Digital Camera D5600

USB Still Image Capture Device Media Transfer Protocol (MTP) Specifications

Rev. 1.00

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1 Introduction

1.1 Application

These specifications describe the operations of the camera as the USB Still Image Capture Device.

The specifications of the USB Still Image Capture Device are defined by “MTP Specification v1.0 - Media Transfer Protocol (MTP)” and the camera is based on it.

The camera conforms to the USB-related specifications below. For the details of each specification, refer to the related specifications manual.

Item	Contents
USB specifications	Revision2.0
Class	Image Interface
Subclass	Still Image Capture Device
Protocol	Bulk-Only Transport Protocol

2 Outline

2.1 PC Mode

When the camera is connected to the PC, the camera is switched to the PC connection mode.

2.2 PC Connection Mode and Camera Operations

The operations of the camera in the PC connection mode differ from those of the camera alone in the following points.

No.	Description
1	When the host mode is set (the camera is controlled by the PC), the operations by the dials and buttons of the camera body are prohibited with some exceptions. (Refer to subsection 2.4.)
2	The captured images are recorded either in the card or in the SDRAM. (Refer to subsection 2.5.)
3	The image playback cannot be performed. The image deletion by operating the camera body also cannot be performed. (Except in the application mode)
4	The Auto meter-off delay is set to “No limit”.

2.3 Camera Mode and Host Mode

The PC connection mode has the camera mode and the host mode, and the camera is set to the camera mode when it is connected to the PC. Switching between the camera mode and the host mode is performed by the command processing routine in the camera automatically for each command sent from the host or by the ChangeCameraMode command defined as a vendor command.

If the mode is changed to the host mode automatically by the command processing routine, the mode is returned to the camera mode when the command processing is terminated. However, the specification by the ChangeCameraMode command has priority for changing the host mode to the camera mode. If a command for which changing the camera mode to the host mode is necessary is issued while the host mode is specified by the ChangeCameraMode command, the host mode is retained even when the command processing is terminated.

During switching to the host mode by the ChangeCameraMode command, the operation of each dial or button is ignored and the value set by the host is valid. When switching to the camera mode, the values set by the host in the host mode are canceled and those set by each dial or button are used. For the setting value of each dial or button when switching to the host mode, the value set by each dial or button becomes the initial value.

2.4 Application Mode

The camera is switched to the application mode by the ApplicationMode property. At this time, the StoreRemoved event is passed.

In the application mode by the camera mode, the image playback and deletion can be performed on the camera. However, the live view on the camera cannot be executed.

The host, which acquires the events by using the GetEvent command (subsection 6.2.2.6), can acquire all the events generated in the application mode.

The host, which acquires the events by using the Interrupt IN transfer, can acquire only the DevicePropChanged event of the standard property.

2.5 Recording Destination

The camera supports the following three methods for the recording destinations of the image data when the images are acquired by using the shutter-release button of the camera or the release request command from the host during the USB connection.

No.	Description
1	Records in the card (default).
2	Transfers to the host (records in the SDRAM temporarily).
3	Records in the card and transfers to the PC simultaneously.

The camera has the RecordingMedia property (subsection 0) to save the recording destination setting. The RecordingMedia property can be changed only by issuing the command from the host.

The recording destination set in the RecordingMedia property is effective only when the image is captured by using the shutter-release button of the camera, and it is not effective for the shooting request command from the host. For the shooting request command from the host, the recording destination differs depending on the request command.

- When the image is captured by using the shutter-release button of the camera

RecordingMedia property	Operations
Card	The captured data are recorded in the card.
SDRAM	The captured data are recorded in the SDRAM temporarily and transferred to the host.
Card and SDRAM	Operation with the recording destination set to the card and that with the recording destination set to the SDRAM are both performed.

- When the image is captured by using the release request command from the host

RecordingMedia property	Operations
InitiateCapture	The captured data are recorded in the card.
InitiateCaptureRecInSdram	The captured data are recorded in the SDRAM temporarily and transferred to the host.
AfAndCaptureRecInSdram	Operation with the recording destination set to the card and that with the recording destination set to the SDRAM are both performed.
InitiateCaptureRecInMedia	The following three operations can be performed by specifying the parameter.
	1: The captured data are recorded in the card.
	2: The captured data are recorded in the SDRAM temporarily and transferred to the host.
	3: The captured data are recorded in the card and the SDRAM, and those recorded in the SDRAM are transferred to the host.

If the host is incapable of image acquisition operation by the SDRAM recording shown in subsection 2.7, the value of the RecordingMedia property must not be changed.

The host must return the changed value of the RecordingMedia property to [Card] when terminating the use of the camera by communication.

2.5.1 Access to the Card

During the USB connection, the insertion/ejection, existence/nonexistence, capacity, and the type of the card are detected by the camera. For the access to the card, the file system of the camera is always used and that of the host is not used. Therefore the host can access the card only after the USB connection is performed and the initialization of the information in the card is completed. During the USB connection, even if the card does not exist and then it is inserted, the host cannot access the data in the card until the initialization of the card information is completed.

The file system conforms to the DCF. The DPOF specification is also supported. Therefore the host cannot access the card with the directory structure or the file structure that does not conform to the DCF or the DPOF specification.

The host can read the data in the card, but cannot write the data to the card.

The camera can make the deletion of data in the card and perform card formatting by the command from the host.
When the captured images are being recorded on the card, the data deletion and the card formatting cannot be performed until all the images are recorded on the card. The release operation by the shutter-release button of the camera and the shooting request command cannot be executed during the data deletion and the card formatting.

2.5.2 Access to the SDRAM

When accessing the image data recorded in the SDRAM, accessing can be performed only to the one image data that is ready to be taken in and to the oldest image data in order of storage in the SDRAM. The image data in the SDRAM cannot be accessed randomly. (Refer to subsection 8.2).
The image data sent to the host completely is erased from the SDRAM.

2.6 Sending the Event

When the status in the camera is changed, the camera sends an event by the Interrupt transfer to notify the host of the contents of the change. However, the host may not be able to get the event sent by the camera depending on the OS type of the PC (host). Therefore the camera provides two methods of getting the event.

All the generated events can be acquired in order of generation by either of the two methods. The methods are shown below.

No.	Description
1	Sending the event by the Interrupt transfer (based on the PTP specifications)
2	Sending the event by the GetEvent command (vendor-defined)

The camera stores the event generated in the camera in order in the queue buffer and retains the queue buffer status until the event is acquired by the host. The camera is provided with two queue buffers for the two methods of getting the event.

It is necessary for the host to use only one of the two methods of acquiring the event to perform the event processing. The camera does not manage the coordination of the two queue buffers.

When the queue buffer that is not used for the event acquisition becomes full, the camera deletes the old event from the queue buffer and stores the new event in the queue buffer.

For sending the event in the application mode, refer to “Application Mode” (subsection 2.4).

2.7 Shooting Operation and Image Data Acquisition in the PC Connection Mode

While the session is open in the PC connection mode, the camera performs the shooting operation by the command from the host or the shutter-release button of the camera. The captured images are stored in the card or the SDRAM by the command from the host or the setting value of the recording destination property (refer to subsection 2.5).

The host can acquire the saved image data by the GetObject or the GetPartialObject command.

2.7.1 Command Sequence (Recording in the Card)

The command sequence leading from the recording of the captured image data in the card to the data acquisition by the host is shown below.

No.	Description
1	When acquiring the event by the command, the host issues the GetEvent command regularly to acquire the event.
2	The host issues the InitiateCapture command or the InitiateCaptureRecInMedia command to capture the image data. The camera performs the single shot operation or the continuous shot operation according to the shooting mode setting.
3	When the captured image data is saved in the card, the camera issues the ObjectAdded event. The object handle indicating the saved image data is added to the ObjectAdded event.
4	If the continuous shot operation is set, the camera repeats the procedure in (3) as many times as the number of shooting.
5	The camera issues the CaptureComplete event when all the image data captured by the InitiateCapture command or the InitiateCaptureRecInMedia command are saved completely.
6	The host acquires the image data information by issuing the GetObjectInfo command.
7	The host acquires the thumbnail data by issuing the GetThumb and the GetLargeThumb commands, if necessary.
8	The host acquires the image data by issuing the GetObject or GetPartialObject command.
9	When two or more image data are saved by the continuous shot operation, the host repeats the procedures in (6) to (8) to acquire all the image data.

2.7.2 Command Sequence (Recording in the SDRAM)

The command sequence leading from the recording of the captured image data in the SDRAM to the data acquisition by the host is shown below.

No.	Description
1	When acquiring the event by the command, the host issues the GetEvent command regularly to acquire the event.
2	The host issues the InitiateCaptureRecInSdram, the AfAndCaptureRecInSdram, or the InitiateCaptureRecInMedia command to capture the image data. The camera performs the single shot operation or the continuous shot operation according to the shooting mode setting.
3	The host issues the DeviceReady command repeatedly while executing the operations in (4) and after.
4	The host waits for the camera to issue the ObjectAddedInSdram event.
5	The camera saves the captured image data in the SDRAM in order, and issues the ObjectAddedInSdram event in sequence when the sending of image data to the host becomes enabled.
6	The host acquires the image data information by issuing the GetObjectInfo command.
7	The host acquires the thumbnail data by issuing the GetThumb and the GetLargeThumb commands, if necessary.
8	The host acquires the image data by issuing the GetObject or GetPartialObject command.
9	The host repeats the procedures in (6) to (8) as many times as the number of received ObjectAddedInSdram events.
10	When all the image data captured by the InitiateCaptureRecInSdram, the AfAndCaptureRecInSdram, or the InitiateCaptureRecInMedia command are sent completely, the camera sends the CaptureCompleteRecInSdram event.

2.7.3 Command Sequence (Recording by the Shutter-Release Button of the Camera)

The command sequence leading from the capture of the image data by the shutter-release button of the camera to the acquisition of the recorded image data is shown below.

No.	Description
1	When acquiring the event by the command, the host issues the GetEvent command regularly to acquire the event.
2	The shooting operation is performed by the shutter-release button of the camera. The camera performs the shooting operation (single shot operation, the continuous shot operation, or the interval-timer shooting) according to the shooting mode setting.
3	The camera saves the images in the card, the SDRAM, or the card and the SDRAM according to the setting of the recording destination property.
4	When the images are saved in the card, the procedures in (5) to (10) should be performed. When the images are saved in the SDRAM, the procedures in (11) to (15) should be performed.
5	When the captured image data is saved in the card, the camera issues the ObjectAdded event. The object handle indicating the saved image data is added to the ObjectAdded event.
6	If the continuous shot operation is set, the camera repeats the procedure in (3) as many times as the number of shooting.
7	The host acquires the image data information by issuing the GetObjectInfo command.
8	The host acquires the thumbnail data by issuing the GetThumb and the GetLargeThumb commands, if necessary.
9	The host acquires the image data by issuing the GetObject or GetPartialObject command.
10	When two or more image data are saved by the continuous shot operation, the host repeats the procedures in (11) to (14) to acquire all the image data.
11	The camera saves the captured image data in the SDRAM in order, and issues the ObjectAddedInSdram event in sequence when the sending of image data to the host becomes enabled.
12	The host acquires the image data information by issuing the GetObjectInfo command.
13	The host acquires the thumbnail data by issuing the GetThumb and the GetLargeThumb commands, if necessary.
14	The host acquires the image data by issuing the GetObject or GetPartialObject command.
15	The host repeats the procedures in (12) to (15) as many times as the number of received ObjectAddedInSdram events.

16	The camera issues the CaptureCompleteRecInSdram event when all of the saved SDRAM images are transferred.

2.8 Live View Image and Data Acquisition in the PC Connection Mode

When the session is open in the PC connection mode, the camera starts the live view by the request from the host.

During the live view, the live view images can be acquired by the GetLiveViewImage command.

2.8.1 Command Sequence

The command sequence leading from the start of live view by the request from the host to the acquisition of the live view image is shown below.

No.	Description
1	The host issues the StartLiveView command to request the camera to start the live view.
2	After confirming the normal termination of the StartLiveView command, the host issues the DeviceReady command repeatedly until the DeviceReady command response other than Device_Busy appears.
3	The camera returns the normal termination response to the DeviceReady command when the live view image acquisition becomes enabled. If the live view image acquisition is disabled for some reason, the camera returns an error response to the DeviceReady command to terminate the live view.
4	After confirming the normal termination of the DeviceReady command response, the host issues the GetLiveViewImage command to acquire the live view image.
5	The host issues the GetLiveViewImage command repeatedly while the live view continues. At this time, the focal-plane contrast AF driving (AfDrive command), the MF driving (MfDrive command), the AF area change (ChangeAfArea command), etc. can be performed optionally.
6	When the live view is finished, the host issues the EndLiveView command.

2.8.2 Command Sequence (Movie Recording)

The sequence leading from the recording of the movie in the card by the MovieRec command to the acquisition of the movie file is shown below.

No.	Description
1	The host issues MovieRecProhibitionCondition during the movie live view execution to confirm that movie recording can be performed.
2	The host issues the StartMovieRecInCard command to start the movie recording.
3	The camera stops the live view or the host issues the EndMovieRec command to stop the movie recording.
4	The camera writes the captured movie file in the card and issues the ObjectAdded event.
5	The host acquires the ObjectAdded event by the GetEvent command to acquire the ObjectHandle of the movie file.
6	The host acquires the file size of the movie file by the GetObjectInfo command.
7	The host divides and acquires the movie file by the GetPartialObject command. When the movie file is acquired by the GetObject command, the control from the host cannot be performed until the file transfer is finished because the file size of the movie file is large. Therefore, use the GetPartialObject command.

2.8.3 Command Sequence (Bulb Shooting)

The command sequence to acquire the image data recorded by Bulb shooting is shown below.

No.	Description
1	The host changes the camera to the PC host mode by using the ChangeCameraMode command.
2	The host sets “M” by using the ExposureProgramMode property.
3	The host sets Bulb shooting (0xFFFFFFFF) by using the ExposureTime property and the ShutterSpeed property.
4	The host issues the InitiateCaptureRecInMedia command to start shooting.
5	The host issues the DeviceReady command and confirms that the response code is Bulb_Release_Busy.
6	The host issues the TerminateCapture command to terminate Bulb shooting.
7	The camera records the created images in the card, the SDRAM, or the card and the SDRAM after completion of the shooting and issues the ObjectAdded event or the ObjectAddedInSdram event to the host.
8	The host acquires the ObjectAdded event or the ObjectAddedInSdram event by the GetEvent command to acquire the ObjectHandle of the created images.
9	The host acquires the image information by the GetObjectInfo command.
10	The host acquires the thumbnail image by the GetThumb and the GetLargeThumb commands, if necessary.
11	The host acquires the image data by issuing the GetObject or GetPartialObject command.
12	The camera issues the CaptureComplete event or the CaptureCompleteRecInSdram event.
13	The host acquires the CaptureComplete event or the CaptureCompleteRecInSdram event by the GetEvent command.
14	The host changes the camera to the PC camera mode by using the ChangeCameraMode command.

2.9 Reacquisition of the Image Data

When one of the following occurs during the reading sequence of the image data recorded in the SDRAM in subsections 2.7.2 and 2.7.3, the host can redo the image data acquisition by issuing the GetObjectInfo command.

No.	Description
1	The USB connection is cut. (Such as the case that the USB cable is extracted.)
2	The camera returns an error to the GetObject or the GetPartialObject command.
3	It is desirable for the host to redo the acquisition of the SDRAM image.

When the image data that is not sent yet exists in the SDRAM, the camera must retain it even if the USB connection is cut.

If the shooting has been performed with “RAW+JPEG” and either of the image data has been sent normally, only the other image data should be sent again.

2.10 Operation with the Empty Battery

When the battery level is in the operation-disabled condition (during the battery operation), the host is informed of the condition with the card not inserted even if it is inserted.

3 Device Requests

3.1 Standard Device Requests

Request		wIndex	
		Data stage	Status stage
Get Status	Device	The current device power status and the setting of REMOTE_WAKEUP function	Receive NULL data
	Endpoint: Endpoint number that is supported	The current ENDPOINT_STALL status	Receive NULL data
	Endpoint: Endpoint number that is not supported	STALL response	-
Clear Feature	Device: DEVICE_REMOTE_WAKEUP	-	Return NULL data
	Endpoint: END_POINT_HALT Endpoint number that is supported	-	Return NULL data
	Endpoint: END_POINT_HALT Endpoint number that is not supported	-	STALL response
Set Feature	Device: DEVICE_REMOTE_WAKEUP	-	Return NULL data
	Endpoint: END_POINT_HALT Endpoint number that is supported	-	Return NULL data
	Endpoint: END_POINT_HALT Endpoint number that is not supported	-	STALL response
Set Address		-	Return NULL data
Get Descriptor		The specified descriptor	Receive NULL data
Set Descriptor		STALL response	-
Get Configuration		The current configuration value	Return NULL data
Set Configuration	Configuration number that is supported	-	Return NULL data
	Configuration number that is not supported	-	STALL response
Set Interface	Interface number and alternate number that are supported	-	Return NULL data
	Interface number and alternate number that are not supported	-	STALL response
Get Interface	Interface number that is supported	The current alternate value	Return NULL data
	Interface number that is not supported	STALL response	-
Synch Frame		STALL response	-

3.2 Class-Specific Requests

The camera supports the class-specific requests below.

3.2.1 Cancel Request

This request is used for the host to cancel the data transfer.

bmRequestType	bRequest	wValue	wIndex	wLength
00100001b	01100100b	0000h	0000h	06h

The camera receives the Cancel request data according to the following format.

Offset	Field	Size	Value	Description
0	Cancellation Code	2	Code	0x4001
2	TransactionID	4	Number	TransactionID

The camera cancels the command processing that corresponds to the TransactionID.

3.2.2 DeviceReset Request

This request is sent from the host to the camera in order to make the device become in the idle status when the Bulk Pipe is stalled.

bmRequestType	bRequest	wValue	wIndex	wLength
00100001b	01100110	0000h	0000h	0

3.2.3 GetDeviceStatus Request

This request is used for the host to acquire the device information for the recovery of the endpoint that is in the halt status.

bmRequestType	bRequest	wValue	wIndex	wLength
10100001b	01100110	0000h	0000h	0

The camera sends the GetDeviceStatus request data according to the following format.

Offset	Field	Size	Value	Description
0	WLength	2	Number	4
2	Code	2	Code	0x2001: Status OK 0x2019: DeviceBusy

4 Descriptors

4.1 Standard Descriptors

The camera has the following standard descriptors.

4.1.1 Device Descriptor

For HIGH-SPEED				
Offset	Field	Size	Value	Description
0	bLength	1	12h	Size of the descriptor
1	bDescriptorType	1	01h	Type of the descriptor (Device descriptor)
2	bcdUSB	2	0200h	USB specification number (0200h=Revision 2.00)
4	bDeviceClass	1	00h	Class (specified by the interface descriptor)
5	bDeviceSubClass	1	00h	Subclass (specified by the interface descriptor)
6	bDeviceProtocol	1	00h	Protocol (specified by the interface descriptor)
7	bMaxPacketSize0	1	40h	Maximum packet size of endpoint 0
8	idVendor	2	04B0h	Vendor ID (“NIKON”)
10	idProduct	2	043Fh	Product ID
12	bcdDevice	2	0100h	Device release number (0100h=1.00)
14	iManufacture	1	01h	Index of the string descriptor describing the manufacturer name
15	iProduct	1	02h	Index of the string descriptor describing the product name
16	iSerialNumber	1	03h	Index of the string descriptor describing the serial number
17	bNumConfigurations	1	01h	The number of configurations

For FULL-SPEED				
Offset	Field	Size	Value	Description
0	bLength	1	12h	Size of the descriptor
1	bDescriptorType	1	01h	Type of the descriptor (Device descriptor)
2	bcdUSB	2	0200h	USB specification number (0200h=Revision 2.00)
4	bDeviceClass	1	00h	Class (specified by the interface descriptor)
5	bDeviceSubClass	1	00h	Subclass (specified by the interface descriptor)
6	bDeviceProtocol	1	00h	Protocol (specified by the interface descriptor)
7	bMaxPacketSize0	1	40h	Maximum packet size of endpoint 0
8	idVendor	2	04B0h	Vendor ID (“NIKON”)
10	idProduct	2	043Fh	Product ID
12	bcdDevice	2	0100h	Device release number (0100h=1.00)
14	iManufacture	1	01h	Index of the string descriptor describing the manufacturer name
15	iProduct	1	02h	Index of the string descriptor describing the product name
16	iSerialNumber	1	03h	Index of the string descriptor describing the serial number
17	bNumConfigurations	1	01h	The number of configurations

4.1.2 Device_Qualifier Descriptor

Offset	Field	Size	Value	Description
0	bLength	1	0Ah	Size of the descriptor
1	bDescriptorType	1	06h	Type of the descriptor (Device_Qualifier descriptor)
2	bcdUSB	2	0200h	USB specification number (0200h=Revision 2.00)
4	bDeviceClass	1	00h	Class (specified by the interface descriptor)
5	bDeviceSubClass	1	00h	Subclass (specified by the interface descriptor)
6	bDeviceProtocol	1	00h	Protocol (specified by the interface descriptor)
7	bMaxPacketSize0	1	40h	Maximum packet size of endpoint 0
8	bNumComfigurations	1	01h	The number of configurations other than USB2.0
10	bReserved	1	00h	Reserved

4.1.3 Configuration Descriptor

Offset	Field	Size	Value	Description	
0	bLength	1	09h	Size of the descriptor	
1	bDescriptorType	1	02h	Type of the descriptor (Configuration descriptor)	
2	wTotalLength	2	0027h	The total length of the data returned for this configuration All the descriptors are included (configuration, interface, endpoint, and class-specific).	
4	bNumInterfaces	1	01h	The number of interfaces	
5	bConfiguration Value	1	01h	The value used as an argument to Set Configuration Request for selecting this configuration	
6	iConfiguration	1	00h	Index of the string descriptor	
7	bmAttributes	1	C0h	Configuration characteristics	
				Bit7	Reserved (1)
				Bit6	Self-powered
				Bit5	Remote Wakeup
				Bit4…0	Reserved (0)
8	MaxPower	1	01h	Maximum power consumption supplied from the bus to the USB device (2 mA)	

4.1.4 Other_Speed_Configuration Descriptor

Offset	Field	Size	Value	Description	
0	bLength	1	09h	Size of the descriptor	
1	bDescriptorType	1	07h	Type of the descriptor (OtherSpeedConfiguration descriptor)	
2	wTotalLength	2	0027h	The total length of the data returned for this configuration All the descriptors are included (configuration, interface, endpoint, and class-specific).	
4	bNumInterfaces	1	01h	The number of interfaces	
5	bConfiguration Value	1	01h	The value used as an argument to Set Configuration Request for selecting this configuration	
6	iConfiguration	1	00h	Index of the string descriptor	
7	bmAttributes	1	C0h	Configuration characteristics	
				Bit7	Reserved (1)
				Bit6	Self-powered
				Bit5	Remote Wakeup
				Bit4…0	Reserved (0)
8	MaxPower	1	01h	Maximum power consumption supplied from the bus to the USB device (2 mA)	

4.1.5 Interface Descriptor

Offset	Field	Size	Value	Description
0	bLength	1	09h	Size of the descriptor
1	bDescriptorType	1	04h	Type of the descriptor (Interface descriptor)
2	bInterfaceNumber	1	00h	Interface number (0 is the standard.)
3	bAlternatingSetting	1	00h	The value used for selecting the interface
4	bNumEndpoints	1	03h	The number of endpoints
5	bInterfaceClass	1	06h	Class code (06=ImageInterface)
6	bInterfaceSubClass	1	01h	Subclass code (01=Still Image Capture Device)
7	bInterfaceProtocol	1	01h	Protocol (01h=Bulk-Only Transport)
8	iInterface	1	00h	Index of the string descriptor describing this interface

4.1.6 Endpoint Descriptor

4.1.6.1 Bulk-Out Endpoint

For HIGH-SPEED				
Offset	Field	Size	Value	Description
0	bLength	1	07h	Size of the descriptor
1	bDescriptorType	1	05h	Type of the descriptor (Endpoint descriptor)
2	bEndpointAddress	1	02h	Address of the endpoint
				Bit7 Transfer direction (0=OUT, 1=IN)
				Bit6…4 Reserved (0)
				Bit3…0 Endpoint number
3	bmAttributes	1	02h	Attributes of the endpoint
				Bit1…0 Transfer type
				(00 = Control, 01 = Isochronous, 10 = Bulk, 11 = Interrupt)
4	wMaxPacketSize	2	0200h	Maximum packet size of this endpoint (0200h=512Byte)
6	bInterval	1	00h	Polling interval (invalid for the Bulk and the Control endpoints)

For FULL-SPEED				
Offset	Field	Size	Value	Description
0	bLength	1	07h	Size of the descriptor
1	bDescriptorType	1	05h	Type of the descriptor (Endpoint descriptor)
2	bEndpointAddress	1	02h	Address of the endpoint
				Bit7 Transfer direction (0=OUT, 1=IN)
				Bit6…4 Reserved (0)
				Bit3…0 Endpoint number
3	bmAttributes	1	02h	Attributes of the endpoint
				Bit1…0 Transfer type
				(00 = Control, 01 = Isochronous, 10 = Bulk, 11 = Interrupt)
4	wMaxPacketSize	2	0040h	Maximum packet size of this endpoint (0040h=64Byte)
6	bInterval	1	00h	Polling interval (invalid for the Bulk and the Control endpoints)

4.1.6.2 Interrupt Endpoint

For HIGH-SPEED					
Offset	Field	Size	Value	Description	
0	bLength	1	07h	Size of the descriptor	
1	bDescriptorType	1	05h	Type of the descriptor (Endpoint descriptor)	
2	bEndpointAddress	1	83h	Address of the endpoint	
				Bit7	Transfer direction (0=OUT, 1=IN)
				Bit6…4	Reserved (0)
				Bit3…0	Endpoint number
3	bmAttributes	1	03h	Attributes of the endpoint	
				Bit1…0	Transfer type
				(00 = Control, 01 = Isochronous, 10 = Bulk, 11 = Interrupt)	
4	wMaxPacketSize	2	0008h	Maximum packet size of this endpoint (0008h=8Byte)	
6	bInterval	1	09h	Polling interval	

For FULL-SPEED					
Offset	Field	Size	Value	Description	
0	bLength	1	07h	Size of the descriptor	
1	bDescriptorType	1	05h	Type of the descriptor (Endpoint descriptor)	
2	bEndpointAddress	1	83h	Address of the endpoint	
				Bit7	Transfer direction (0=OUT, 1=IN)
				Bit6…4	Reserved (0)
				Bit3…0	Endpoint number
3	bmAttributes	1	03h	Attributes of the endpoint	
				Bit1…0	Transfer type
				(00 = Control, 01 = Isochronous, 10 = Bulk, 11 = Interrupt)	
4	wMaxPacketSize	2	0008h	Maximum packet size of this endpoint (0008h=8Byte)	
6	bInterval	1	0Ah	Polling interval (0Ah=10ms)	

4.1.7 String Descriptor

4.1.7.1 Index1 (iManufacture)

Offset	Field	Size	Value	Description
0	bLength	1	0Ch	Size of the descriptor
1	bDescriptorType	1	03h	Type of the descriptor (String descriptor)
2	bString	10	4E00h 4900h 4B00h 4F00h 4E00h	Unicode character string “NIKON”

4.1.7.2 Index2 (iProduct)

Offset	Field	Size	Value	Description
0	bLength	1	20h	Size of the descriptor
1	bDescriptorType	1	03h	Type of the descriptor (String descriptor)
2	bString	30	4E00h 4900h 4B00h 4F00h 4E00h 2000h 4400h 5300h 4300h 2000h 4400h 3500h 3600h 3000h 3000h	Unicode character string “NIKON DSC D5600”

4.1.7.3 Index3 (iSerialNumber)

Offset	Field	Size	Value	Description
0	bLength	1	1Ah	Size of the descriptor
1	bDescriptorType	1	03h	Type of the descriptor (String descriptor)
2	bString	24	XX00h XX00h XX00h XX00h XX00h XX00h XX00h XX00h XX00h XX00h XX00h XX00h	Unicode character string “XXXXXXXXXXXX”

4.2 Class-Specific Descriptor

The camera has no class-specific descriptor.

5 Protocol

The camera supports the Bulk-Only Transport protocol. In the Bulk-Only protocol, all transmission/reception of the command, data, and response are performed by the bulk transfer. When an asynchronous event is generated in the camera, the information is sent by the Interrupt transfer.

The protocol processing is composed of three phases (command phase, data phase, and response phase). All the commands, data, and responses are stored in the Generic Container Structure and transferred between the host and the camera. The processing starts by sending the command (Bulk-Out transfer) from the host to the camera first (command phase). Then the data is transmitted or received by the bulk transfer if the command needs the data transfer (data phase). The processing is completed when the device transmits the command response to the host (Bulk-In transfer) last (response phase). The command and the response phases are always present.

When sending the event to the host, the contents of the event to be sent are stored according to the asynchronous event interrupt data format and sent as the asynchronous event (Interrupt transfer).

5.1 Generic Container Structure

Each field data of the Generic Container Structure is transferred in order of the LSB first (little endian). The Container Type and the contents of the Payload differ according to the phase difference.

Offset	Size	Field	Description
0	4	Container Length	The number of bytes in the unsigned integer of this container is coded. The still image capture device decides the container size by using this field.
4	2	Container Type	This field shows the container type. 0: Not defined 1: Command block 2: Data block 3: Response block 4: Event block
6	2	Code	This field conforms to MTP Specification v1.0. (OperationCode, ResponseCode, or EventCode) For the data block, the OperationCode of the command block is used.
8	4	TransactionID	This is the number of the 32-bit unsigned integer created by the host related to all the phases. It starts with 0x00000001 and is incremented along with the command block issue. When the OperationCode is OpenSession, 0x00000000 is set and 0x00000001 is given by the next command block. When the number reaches the maximum value (0xFFFFFFFE), the next TransactionID becomes 0x00000001.
12	??	Payload	Differs depending on the phase.

5.2 Asynchronous Event Interrupt Data Format

When an event is generated in the camera, the information is transferred to the host according to the following format. Each field data is transferred in order of the LSB first (little endian).

Offset	Size	Field	Description
0	4	Container Length	The number of bytes in the unsigned integer of the length of this container is coded. The value is 0x00000010.
4	2	Container Type	Container Type = 0x0004 (Event)
6	2	Code	EventCode
8	4	TransactionID	TransactionID = 0xFFFFFFFF
12	??	Payload	Differs depending on the event.

5.3 Phases

The communication between the camera and the host is composed of the three phases; command phase, data phase, and response phase. The details of each phase are shown below.

5.3.1 Command Phase

In the command phase, the host sends the Generic Container Structure of the command block to the camera. The processing is started by sending the command block from the host in the command phase. The camera performs the processing according to the OperationCode sent in the command block. For the OperationCode and its processing, refer to subsection 6.2. The Generic Container Structure field data set in the command phase is shown below.

Offset	Size	Field	Description
0	4	Container Length	Indicates the length of this container. Each code has its own container length.
4	2	Container Type	1: Command block
6	2	Code	Operation Code
8	4	TransactionID	This is the number given by the 32-bit unsigned integer created by the host related to all the phases. It starts with 0x00000001 and is incremented by 1 along with the command block issue. When the OperationCode is OpenSession, 0x00000000 is set and 0x00000001 is given by the next command block. When the number reaches the maximum value of the field (0xFFFFFFFE), the next TransactionID becomes 0x00000001.
12	4	Parameter 1	This field includes the operation parameter. The format and the meaning of the parameter differ depending on the OperationCode.
16	4	Parameter 2	
20	4	Parameter 3	

5.3.2 Data Phase

The data phase is an optional phase used to transfer the data that is larger than what can fit in the data sets of the command or the response block. According to the OperationCode specified by the command block, the data is transferred from the host to the camera, from the camera to the host, or not transferred at all. For the OperationCode and the corresponding data contents, refer to subsection 6.2. The Generic Container Structure field data set in the data phase is shown below.

Offset	Size	Field	Description
0	4	Container Length	Indicates the length of this container. The container length differs depending on the size of the Payload.
4	2	Container Type	2: Data block
6	2	Code	The corresponding OperationCode sent in the command phase is set.
8	4	TransactionID	This is the number given by the 32-bit unsigned integer created by the host related to all the phases. It starts with 0x00000001 and is incremented by 1 along with the command block issue. When the OperationCode is OpenSession, 0x00000000 is set and 0x00000001 is given by the next command block. When the number reaches the maximum value of the field (0xFFFFFFFE), the next TransactionID becomes 0x00000001.
12	??	Payload	The contents of this field differ depending on the OperationCode.

5.3.3 Response Phase

In the response phase, the Generic Container Structure of the response block is sent from the camera to the host in order to indicate whether the command sent in the command phase succeeds or fails.

The contents of the response can be identified by the ResponseCode stored in the Code field. For the ResponseCode, refer to subsection 6.3.

The Generic Container Structure field data set in the response phase is shown below.

Offset	Size	Field	Description
0	4	Container Length	Indicates the length of this container. Each code has its own container length.
4	2	Container Type	3: Response block
6	2	Code	The ResponseCode is set in order to indicate whether the processing corresponding to the OperationCode sent in the command phase succeeds or fails.
8	4	TransactionID	This is the number given by the 32-bit unsigned integer created by the host related to all the phases. It starts with 0x00000001 and is incremented by 1 along with the command block issue. When the OperationCode is OpenSession, 0x00000000 is set and 0x00000001 is given by the next command block. When the number reaches the maximum value of the field (0xFFFFFFFE), the next TransactionID becomes 0x00000001.
12	4	Response Parameter	This field includes the response parameter. The format and the meaning of the parameter differ depending on the OperationCode and the ResponseCode.

5.4 Error Handling

If the following state is detected, the camera returns to the command phase status.

No.	Description
1	Bus reset
2	Reset recovery

5.4.1 Command Block Reception Failure

When the command block reception fails and the reset recovery and the bus reset are not detected, the camera stalls the Bulk-In and the Bulk-Out endpoints and returns to the command phase status.

5.4.2 Command Block Invalidity

When the following error is detected after the command block reception succeeds and the reset recovery and the bus reset are not detected, the camera stalls the Bulk-In and the Bulk-Out endpoints.

No.	Description
1	Container Type of Generic Container Structure is other than the command block.

5.4.3 Command Execution Error

When the command execution error is detected after a valid command block is received, the phase is changed to the response phase and the response code corresponding to the error is set in the Code field of the Generic Container Structure and sent. Stalling is not performed.

6 Code

The codes supported by the camera are described.

6.1 ObjectFormatCode

The ObjectFormatCode indicates the format of the objects in the card inserted in the camera (image file, script file, and DPOF file) and the related objects (corresponding to the directories and the virtual association representing the relation between the images that conform to the DCF standards and the DCF objects in the camera). The following table represents the ObjectFormatCodes supported by the camera.

ObjectFormatCode	Format	Description
0x3000	Undefined	NDF (dust reference image) NEF (when MTP is not supported) (In the definition of MTP Specification v1.0, it is defined as “Format not defined”.)
0x3001	Association	Association (Indicates the directories or the virtual association representing the relation between the images that conform to the DCF standards and the DCF objects.)
0x3002	Script	Script (only the virtual script file is the target)
0x3006	DPOF	Digital Print Order Format File
0x3008 (Not supported)	WAV	AudioClip
0x300D	MOV	Apple QuickTime Video Format (H.264/AVC)
0x3800	Unknown Image Object	NEF (when MTP is supported)
0x3801	EXIF/JPEG	JEIDA Standard
0x3808	JFIF	JPEG File Interchange Format (represents the thumbnail format.)
0x380D	TIFF(RGB)	Tag Image File Format

The ObjectFormatCode may be used as one of the parameters in the command phase.
It is also used in the ObjectInfo data set.

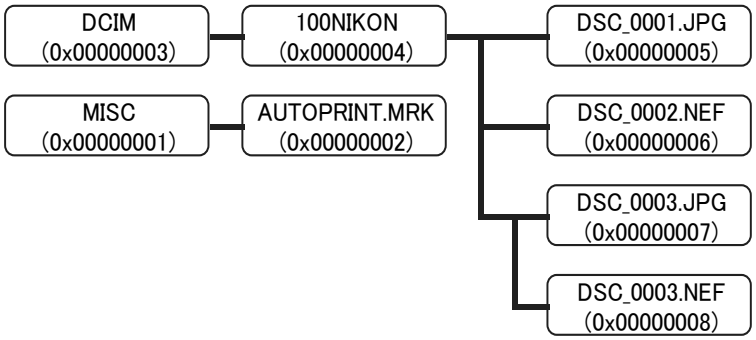
6.1.1 Association Type

There are various Types in the Association defined by ObjectFormatCode. Association is for representing the folders and the file system. All the objects that belong to the Association correspond to the branches of the tree structure under the Association. The associations to which the objects belong are specified in the ParentObject field of the ObjectInfo data set for each object. Type is specified in the AssociationType field of the ObjectInfo data set for the associations object. The Association Type used in the camera is shown below.

Association Code	Association Type	Description
0x0001	GenericFolder	Indicates the general directory. For the camera, it indicates the DCF image directory, DCF directory, and the MISC folder defined in the DPOF specifications.

An example of how the Association is used in the DCF file system for the camera is shown below. Note, however, that the directory name, the file name, and the ObjectHandle value may differ from the ObjectHandle that is actually used in the camera to simplify the explanation.

ObjectHandle	Description	ObjectFormatCode	ParentObject
0x00000001	¥MISC folder	0x3001	0x00000000
0x00000002	¥MISC¥AUTOPRINT.MRK	0x3006	0x00000001
0x00000003	¥DCIM folder	0x3001	0x00000000
0x00000004	¥DCIM¥100NIKON	0x3001	0x00000003
0x00000005	¥DCIM¥100NIKON¥DSC_0001.JPG	0x3801	0x00000004
0x00000006	¥DCIM¥100NIKON¥DSC_0002.NEF	0x3000	0x00000004
0x00000007	¥DCIM¥100NIKON¥DSC_0003.JPG	0x3801	0x00000004
0x00000008	¥DCIM¥100NIKON¥DSC_0003.NEF	0x3000	0x00000004



6.2 Operation Code

The OperationCode is the command that is used by the host to request the operation of the camera in the command phase. The OperationCode is sent as a part of the command block data set.

The OperationCode of the vender command cannot be acquired by the GetDeviceInfo command.

The OperationCode has two bytes.

Operation Codes that can be executed during live view/movie recording are shown below.

For the items marked with “Yes” followed by * in the table below, an execution error occurs under specific conditions depending on each item. For the details of the conditions, refer to each Operation Code.

The OperationCodes supported by the camera are shown below.

Operation Code	Description	Reference item	Live view	During movie recording
0x1001	GetDeviceInfo	6.2.1.1	Yes	Yes
0x1002	OpenSession	6.2.1.2	-	-
0x1003	CloseSession	6.2.1.3	Yes	Yes
0x1004	GetStorageIDs	6.2.1.4	Yes	Yes
0x1005	GetStorageInfo	6.2.1.5	Yes*	Yes*
0x1006	GetNumObjects	6.2.1.6	Yes*	Yes*
0x1007	GetObjectHandles	6.2.1.7	Yes*	Yes*
0x1008	GetObjectInfo	6.2.1.8	Yes*	Yes*
0x1009	GetObject	6.2.1.9	Yes*	Yes*
0x100A	GetThumb	6.2.1.10	Yes*	Yes*
0x100B	DeleteObject	6.2.1.11	Yes*	-
0x100C	SendObjectInfo	6.2.1.12	-	-
0x100D	SendObject	6.2.1.13	-	-
0x100E	InitiateCapture	6.2.1.14	-	-
0x100F	FormatStore	6.2.1.15	Yes*	-
0x1014	GetDevicePropDesc	6.2.1.16	Yes	Yes
0x1015	GetDevicePropValue	6.2.1.17	Yes	Yes
0x1016	SetDevicePropValue	6.2.1.18	Yes*	Yes*
0x101B	GetPartialObject	6.2.1.19	Yes*	Yes*
0x90C0	InitiateCaptureRecInSdram	6.2.2.1	Yes*	-
0x90C1	AfDrive	6.2.2.2	Yes	Yes
0x90C2	ChangeCameraMode	6.2.2.3	-	-
0x90C3	DeleteImagesInSdram	6.2.2.4	Yes*	-
0x90C4	GetLargeThumb	6.2.2.5	Yes*	Yes*
0x90C7	GetEvent	6.2.2.6	Yes	Yes
0x90C8	DeviceReady	6.2.2.7	Yes	Yes
0x90C9	SetPreWbData	6.2.2.8	Yes	-
0x90CA	GetVendorPropCodes	6.2.2.9	Yes	Yes
0x90CB	AfAndCaptureRecInSdram	6.2.2.10	-	-
0x90CC	GetPicCtrlData	6.2.2.11	Yes	Yes
0x90CD	SetPicCtrlData	6.2.2.12	Yes	-
0x90CE	DeleteCustomPicCtrl	6.2.2.14	Yes	-
0x90CF	GetPicCtrlCapability	6.2.2.15	Yes	Yes
0x9201	StartLiveView	6.2.2.16	-	-
0x9202	EndLiveView	6.2.2.17	Yes	Yes
0x9203	GetLiveViewImage	6.2.2.18	Yes	Yes
0x9204	MfDrive	6.2.2.19	Yes*	Yes*
0x9205	ChangeAfArea	6.2.2.20	Yes	Yes
0x9206	AfDriveCancel	6.2.2.21	Yes	Yes
0x9207	InitiateCaptureRecInMedia	6.2.2.22	Yes*	-
0x9209	GetVendorStorageIDs	6.2.2.25	Yes	Yes
0x920A	StartMovieRecInCard	6.2.2.23	Yes	-
0x920B	EndMovieRec	6.2.2.24	Yes	Yes
0x920C	TerminateCapture	6.2.2.26	Yes*	-
0x9400	GetPartialObjectHighSpeed	6.2.2.28	Yes*	Yes*
0x940C	CancelImagesInSdram	6.2.2.29	Yes	-

0x940E	SetPicCtrlDataEx	6.2.2.13	Yes	-
0x941C	GetEventEx	6.2.2.27	Yes	Yes
0x9801	GetObjectPropsSupported	6.2.2.30	Yes	Yes
0x9802	GetObjectPropDesc	6.2.2.31	Yes	Yes
0x9803	GetObjectPropValue	6.2.2.32	Yes	Yes
0x9805	GetObjectPropList	6.2.2.33	Yes*	Yes*

6.2.1 Standard

6.2.1.1 GetDeviceInfo

○ Command Specifications

Operation Code	0x1001
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DeviceInfo data set
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns the information of the camera (DeviceInfo data set).
The DeviceInfo data set includes information such as the camera version information and the codes supported by the camera.

○ Command Details

This operation is the only operation that may be issued inside or outside of a session.
The contents of the DeviceInfo data set sent by the camera are shown in subsection 9.1.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Incomplete_Transfer	The data block transmission fails.

6.2.1.2 OpenSession

○ Command Specifications

Operation Code	0x1002
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode starts the logical connection (session) between the camera and the host.

The SessionID is specified optionally by the host and retained during the session.

○ Operation Parameter

Operation Parameter	Details
Parameter1	SessionID
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Invalid_Parameter	Parameter1 is 0x00000000.
Session_Already_Open	The session between the camera and the host has been already started.

6.2.1.3 CloseSession

○ Command Specifications

Operation Code	0x1003
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode closes the logical connection (session) between the camera and the host.

When this opetation is performed, the operation being run is terminated. Besides, the camera state changed after OpenSession returns to the default.

State	Contents of change
During shooting operation	Only the shooting operation currently being performed is executed. For the continuous shooting, it is not continued.
During AF operation	The AF operation stops.
During execution of live view	The live view is terminated.
In the PC host mode	The camera enters the PC camera mode.
The recording destination is “SDRAM” or “Card and SDRAM”.	The recording destination is set to “Card”.
In the PC application mode	Set to OFF.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.

6.2.1.4 GetStorageIDs

○ Command Specifications

Operation Code	0x1004
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	StorageIDArray
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns a list of the currently valid StorageIDs.
During the application mode, 0x00010000 is set in the slot. Use the GetVendorStorageIDs command (subsection 6.2.2.25) to acquire the StorageID during the application mode.

○ Command Details

The camera returns the StorageID of the main slot.
The StorageID of the main slot takes the following values.

StorageID	Details
0x00010001	When the card is inserted in the main slot
0x00010000	When the card is not inserted in the main slot
	When the card in the main slot is being formatted
	When the battery level of the camera is “Operation disabled status”

The format of the StorageIDArray that is sent by the camera is shown below.
Each field data is stored in the little endian format.

Field	Size (Byte)	Data
NumElement	4	0x00000002 (One element for the array)
ArrayEntry1	4	StorageID (main slot)

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.

6.2.1.5 GetStorageInfo

○ Command Specifications

Operation Code	0x1005
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	StorageInfo
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode obtains the information of the card inserted in the camera.

○ Command Details

The camera returns the StorageInfo data set of the card specified by the StorageID.
The StorageIDs supported by the camera are shown in subsection 6.2.1.4.
The StorageInfo data set sent by the camera is described in subsection 9.2.

○ Operation Parameter

Operation Parameter	Details
Parameter1	StorageID
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_StorageID	The StorageID sent by the camera differs from the StorageID specified by the host.
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.

6.2.1.6 GetNumObjects

○ Command Specifications

Operation Code	0x1006
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	NumObjects

○ Command Outline

The operation by this OperationCode obtains the number of objects that are present in the card. The number of objects recorded in the SDRAM is not included.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is terminated. If the new object is being recorded in the card when this command is received, the processing starts after the acquisition of all the data is completed.

The camera returns the number of objects in the card specified by the StorageID. In addition, Parameter2 and Parameter3, which are optional, can be combined.

Operation Parameter	Value	Details
Parameter1	0xFFFFFFFF	All the cards should be the targets.
	StorageID	The specified card should be the target. Refer to subsection 6.2.1.4.
Parameter2 (Option)	0x00000000	All the object formats should be the targets.
	No value	
	0xFFFFFFFF	All the image formats in the card corresponding to the specified StorageID should be the targets.
	ObjectFormatCode	The specified object format should be the target. Refer to subsection 6.1.
Parameter3 (Option)	0x00000000	All the directories should be the targets.
	No value	
	0xFFFFFFFF	The objects directly under the root should be the targets.
	ObjectHandle	The objects directly under the specified directory should be the targets.

○ Operation Parameter

Operation Parameter	Details
Parameter1	StorageID
Parameter2	[ObjectFormatCode]
Parameter3	[ObjectHandle of the directory]

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	None of Parameter1, Parameter2, and Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_StorageID	The StorageID sent by the camera differs from the StorageID specified by the host.
Invalid_Object_Handle	For an invalid object handle
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.
Specification_By_Format_Unsupported	The specified ObjectFormatCode is not supported.

Invalid_Parent_Object	An ObjectHandle other than that indicating the directory in the card was specified for ObjectHandle (Parameter3) of the specified directory.
	The specified directory does not exist.

6.2.1.7 GetObjectHandles

○ Command Specifications

Operation Code	0x1007
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectHandleArray
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode obtains the handle of the object in the card. The ObjectHandle of the object recorded in the SDRAM is not included.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is terminated. If the new object is being recorded in the card when this command is received, the processing starts after the acquisition of all the data is completed.

The camera returns the ObjectHandle in the card specified by the StorageID. In addition, Parameter2 and Parameter3, which are optional, can be combined.

Operation Parameter	Value	Details
Parameter1	0xFFFFFFFF	All the cards should be the targets.
	StorageID	The specified card should be the target. Refer to subsection 6.2.1.4.
Parameter2 (Option)	0x00000000	All the object formats should be the targets.
	No value	
	0xFFFFFFFF	All the image formats in the card corresponding to the specified StorageID should be the targets.
	ObjectFormatCode	The specified object format should be the target. Refer to subsection 6.1.
Parameter3 (Option)	0x00000000	All the directories should be the targets.
	No value	
	0xFFFFFFFF	The objects directly under the root should be the targets.
	ObjectHandle	The objects directly under the specified directory should be the targets.

The format of the ObjectHandleArray that is sent by the camera is shown below.
Each field data is stored in the little endian format.

Field	Size (Byte)	Data
NumElement	4	The element of the array is N (N indicates the number of objects).
ArrayEntry [0]	4	ObjectHandle [0]
ArrayEntry [1]	4	ObjectHandle [1]
ArrayEntry [2]	4	ObjectHandle [2]

ArrayEntry [N - 1]	4	ObjectHandle [N - 1]

○ Operation Parameter

Operation Parameter	Details
Parameter1	StorageID
Parameter2	[ObjectFormatCode]
Parameter3	[ObjectHandle of the directory]

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	None of Parameter1, Parameter2, and Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_StorageID	The StorageID sent by the camera differs from the StorageID specified by the host.
Invalid_Object_Handle	For an invalid object handle
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.
Specification_By_Format_Unsupported	The specified ObjectFormatCode is not supported.
Invalid_Parent_Object	An ObjectHandle other than that indicating the directory in the card was specified for ObjectHandle (Parameter3) of the specified directory.
	The specified directory does not exist.

6.2.1.8 GetObjectInfo

○ Command Specifications

Operation Code	0x1008
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectInfo
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode obtains the information of the specified object (ObjectInfo). When a new object is added to the card and the host is informed of the addition of the object by the event, the host acquires the information of the object by this command.

○ Command Details

The camera sends the information of the object corresponding to the ObjectHandle specified in Parameter1.

If the specified ObjectHandle is the data in the card, the camera returns the information of the object corresponding to the ObjectHandle.

The ObjectHandle passed by ObjectAddedInSdram should be specified in order to acquire the information of the object in the SDRAM. For the ObjectHandle passed by ObjectAddedInSdram, the image data information is sent to the host.

The ObjectInfo data set sent in the data phase differs depending on the directory and the file types.

The ObjectInfo data set of each object is shown in subsection 9.3.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
	An object in the SDRAM other than the ObjectHandle passed by ObjectAddedInSdram is specified.
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.

6.2.1.9 GetObject

○ Command Specifications

Operation Code	0x1009
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DataObject
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode obtains the specified object (DataObject).

○ Command Details

The camera sends all the file data (DataObject) corresponding to the specified ObjectHandle to the host.

If the specified ObjectHandle is the data in the card, the camera returns the object corresponding to the ObjectHandle.

The ObjectHandle passed by ObjectAddedInSdram should be specified in order to acquire information of the object in the SDRAM. For the ObjectHandle passed by ObjectAddedInSdram, the image data is sent to the host.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
	An object in the SDRAM other than the ObjectHandle passed by ObjectAddedInSdram is specified.
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.

6.2.1.10 GetThumb

○ Command Specifications

Operation Code	0x100A
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ThumbnailObject
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode obtains the thumbnail data of the specified image/movie object (ThumbnailObject).

○ Command Details

The camera sends the thumbnail data (ThumbnailObject) corresponding to the specified ObjectHandle to the host.

If the specified ObjectHandle is the data in the card, the camera returns the thumbnail data corresponding to the ObjectHandle.

The ObjectHandle passed by ObjectAddedInSdram should be specified in order to acquire the information of the object in the SDRAM. For the ObjectHandle passed by ObjectAddedInSdram, the thumbnail data of the image or the movie data is sent to the host.

ThumbnailObject is the thumbnail data of the object (file) specified in ObjectHandle. The size of the ThumbnailObject is 160 x 120 of the small thumbnail size. When the main image is in the JPEG format, the small thumbnail in the JPEG format is sent as it is. When the main image is in the RAW format, the small thumbnail image recorded in the TIFF-RGB format is encoded to the JPEG format by the camera and then sent to the host. However, when the thumbnail data is acquired from RAW in the SDRAM, the small thumbnail image recorded in the TIFF-RGB format is sent to the host as it is. For the format of the RAW small thumbnail image, refer to the accompanying document “RAW Data Format for Digital Camera”.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
	An object in the SDRAM other than the ObjectHandle passed by ObjectAddedInSdram is specified.
No_Thumbnail_Present	The object corresponding to the specified ObjectHandle does not have a thumbnail.
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.

6.2.1.11 DeleteObject

○ Command Specifications

Operation Code	0x100B
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode deletes a specific object saved in the card or all the objects saved in the card. The protected objects are not deleted.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is terminated.

The protected objects are not deleted. An object with an image format that is not supported by the camera is not deleted.

The release is locked until the image deletion is completed.

Operation Parameter	Value	Details
Parameter1	0xFFFFFFFF	All the objects in the card should be the targets.
	ObjectHandle	The specified object should be the target.
Parameter2 (Option)	0x00000000	All the object formats should be the targets.
	No value	
	ObjectFormatCode	The specified object format should be the target. When 0xFFFFFFFF is specified in Parameter1, all the objects that correspond to the specified object format are deleted.

Deleting the objects in the card is locked in the following cases.

No.	Description
1	The RecordingMedia property (subsection 6.5.6.5) is [Card and SDRAM].
2	The movie is being recorded.
3	The card including the specified image is protected.
4	All the inserted cards are protected.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	[ObjectFormatCode]
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
Object_Write_Protect	The object corresponding to the specified ObjectHandle is protected.
Partial_Deletion	When the deletion of two or more objects is specified, all the objects are not deleted.
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.
Store_Read_Only	The card including the specified image is protected.
	All the inserted cards are protected.
Specification_By_Format_Unsupported	The specified ObjectFormatCode is not supported.
Device_Busy	The acquisition operation is being performed when the command processing is started.
Invalid_Parameter	The ObjectFormatCode is specified with the ObjectHandle set to a value other than 0xFFFFFFFF.
Access_Denied	The RecordingMedia property is [Card and SDRAM].
	The movie is being recorded.

6.2.1.12 SendObjectInfo

○ Command Specifications

Operation Code	0x100C
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectInfo
Data direction	From host to camera
Response Code	Refer to Response Code in this subsection.
Response Parameter	Refer to Response Parameter in this subsection.

○ Command Outline

The operation by this OperationCode sends the object information (ObjectInfo) from the host to the camera.

○ Command Details

The operation by this OperationCode is effective when the StorageID is 0x00000000 (the storage destination is not specified) and the Parent ObjectHandle is 0x00000000 or 0xFFFFFFFF.

The camera retains the ObjectInfo received by this command until it receives the SendObject command to be sent from the host successively.

○ Operation Parameter

Operation Parameter	Details
Parameter1	[StorageID]
Parameter2	[(Parent) ObjectHandle]
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block reception fails.
Invalid_StorageID	The StorageID is a value other than 0x00000000.
Invalid_ObjectFormatCode	The ObjectFormat field of the received ObjectInfo is set to a value other than 0x3002 (Script).
Store_Full	The object cannot be received with the size of the buffer prepared by the camera (32768Byte).
Access_Denied	A StorageID of the card is specified.
Specification_of_ Destination_Unsupported	The (Parent) ObjectHandle is a value other than 0x00000000 or 0xFFFFFFFF.

○ Response Parameter

Response Parameter	Description
Parameter1	StorageID [0x00000000]
Parameter2	Parent ObjectHandle [0x00000000]
Parameter3	Any ObjectHandle

6.2.1.13 SendObject

○ Command Specifications

Operation Code	0x100D
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DataObject
Data direction	From host to camera
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode sends the object from the host to the camera.

○ Command Details

The camera records the ObjectData based on the information of the ObjectInfo received in advance. The recording destination is not a card but a virtual recording medium (SDRAM). The camera deletes the ObjectInfo data received in advance when receiving this command and completing the ObjectData reception.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block reception fails.
No_Valid_ObjectInfo	This command is received before the SendObjectInfo command is accepted.

6.2.1.14 InitiateCapture

○ Command Specifications

Operation Code	0x100E
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None
Event Code	Refer to Event Code in this subsection.

○ Command Outline

The operation by this OperationCode starts the camera acquiring one or more new objects (release operation of the camera) according to the current setting. The acquired objects (image data) are always recorded in the card independently of the recording destination property.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the release operation is completed.

The camera starts the release operation when receiving this command. The acquisition of the new object by the release operation of the camera is performed asynchronously.

The transition to the response phase is performed when the start of the release operation is completed or the start of the release operation after the AF operation is completed. (The completion of the start of the release operation is different from the completion of the release operation. This command is an activation command.) If this command is received with the Bit0 value of the WarningStatus property (subsection 6.5.6.15) set to 1 [Sequence error], the sequence error is released, General_Error is passed in the response phase, and the command is terminated.

The camera starts acquiring one or more new objects (release operation of the camera) according to the current setting. Whether the AF is operated when the release is started depends on the setting of the focus-mode selector.

When 0x00000000 is specified in Parameter1, the acquired object is recorded in the card of the recording destination that is set in the camera.

When ObjectFormatCode (subsection 6.1) of Parameter2 is set to 0x00000000, the release operation is performed according to the image quality mode set in the camera. The release operation is performed after changing the image quality mode according to the format if specified.

However, if the ObjectFormatCode is 0x3801 [EXIF], the image quality mode is fixed to JPEG (NORMAL).

When the release operation is started, one or more new objects are created. When the new objects are recorded in the card, the camera generates the ObjectAdded event of the asynchronous interrupt event to inform the host of the addition of the new objects. The ObjectAdded event includes the ObjectHandle indicating the new object that is created. If two or more new objects are created, the ObjectAdded event is issued two or more times. When all the new objects that can be acquired are recorded in the card, the camera issues the CaptureComplete event to the host to inform that the acquisition of all the new objects is completed.

The number of images that can be captured continuously by the continuous low-speed shot and the continuous high-speed shot is the setting value of the BurstNumber property (subsection 6.5.1.16) or that of the ExposureRemaining property (subsection 6.5.6.60), whichever is smaller.

When the value of the StillCaptureMode property (subsection 6.5.1.15) is set to “Self-timer”, the camera changes the value of the StillCaptureMode property (subsection 6.5.1.15) to “Single frame” temporarily for shooting.

StillCaptureMode	BurstNumber	Description
0x0001 (Single frame)	Invalid	Only one image can be captured.
0x0002 (Continuous high-speed shot) 0x8010 (Continuous low-speed shot)	Valid	Among the BurstNumber setting value, the number of images that can be recorded in the SDRAM that is calculated in the camera, and the number of remaining images for recording while the bracketing is being performed, until the least number is reached, the acquisition of the new objects can be performed. Only one image can be captured with the internal flash enabled. Only one image can be captured when the HDR mode is set.
0x8011 (Self-timer)	Invalid	Only one image can be captured (operation equivalent to the single frame).
0x8016 (Quiet shooting)	Invalid	Only one image can be captured (mirror-down after release is performed by the camera automatically).

The camera operates AutoFocus before starting the release operation according to the settings of the FocusMode property (subsection 6.5.1.7) and the DynamicAFonAFC property (subsection 6.5.3.2). If the camera operates AutoFocus, after the AutoFocus operation is completed, the release operation is started when the focused status is set.

Focus mode	Priority in AF-C mode	AF operation
Manual focus	-	Not performed
Single AF servo	Release	Performed
	Focus	Performed
Continuous AF servo	Release	Performed
	Focus	First image: Performed Second image and after: Operation equivalent to the release (shooting priority)
AF servo mode automatic switching	Release	Performed
	Focus	Performed

○ Operation Parameter

Operation Parameter	Details
Parameter1	[StorageID]
Parameter2	[ObjectFormatCode]
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
General_Error	An error is generated in the camera body when the command processing is started.
	The AF operation is not focused with the AF operation mode of AF-S (focus priority) or AF-C (focus priority).
	The aperture value is “F--”and the shooting mode is a mode other than the M mode.
Invalid_StorageID	The StorageID sent by the camera differs from the StorageID specified by the host.
Invalid_ObjectFormatCode	The format of the ObjectFormatCode specified in Parameter2 is not supported by the camera.
Store_Full	The free area for recording is not provided in the card.
Store_Not_Available	A value other than 0 is specified in Parameter1.
	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.
	The specified card does not correspond to the recording destination set by the camera.
Store_Read_Only	All the inserted cards are protected.
Device_Busy	The acquisition operation is being performed when the command processing is started.
	The shutter-release button is being fully pressed.
	The live view is being performed.
	A time-out occurs for the ready waiting status of the internal flash.
Invalid_Parameter	An object that corresponds to the specified ObjectHandle does not exist.
Access_Denied	When a retractable lens is mounted, the lens is retracting.
	The STM lens is being initialized.
	Shooting cannot be performed depending on the camera status by a cause other than the above.

○ Event Code

Event Code	Details
ObjectAdded	A new object is recorded in the card.
CaptureComplete	The acquisition operation of the new object is completed.

6.2.1.15 FormatStore

○ Command Specifications

Operation Code	0x100F
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode formats the card inserted in the camera.

○ Command Details

The camera formats the card specified by the StorageID.
The StorageIDs supported by the camera are shown in subsection 6.2.1.4.
The FilesystemFormat parameter shown in Parameter2 is optional. However, setting of only 0x0003 indicating the DCF is permitted.

Deleting the objects in the card is locked in the following cases.

No.	Description
1	The RecordingMedia property (subsection 6.5.6.5) is [Card and SDRAM].
2	The movie is being recorded.
3	The specified card is protected.

○ Operation Parameter

Operation Parameter	Details
Parameter1	StorageID
Parameter2	[FilesystemFormat]
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_StorageID	The StorageID sent by the camera differs from the StorageID specified by the host.
Store_Not_Available	The card is being initialized.
	The card does not exist.
	The battery level is “Operation disabled status”.
Store_Read_Only	The specified card is protected.
Device_Busy	The acquisition operation is being performed when the command processing is started.
Invalid_Parameter	Parameter2 is neither 0x00000000 nor 0x00000003.
Access_Denied	The RecordingMedia property is [Card and SDRAM].
	Shooting is performed with [Card and SDRAM] specified in the InitiateCaptureRecInMedia command and all the images recorded in the SDRAM are not acquired.
	The movie is being recorded.

6.2.1.16 GetDevicePropDesc

○ Command Specifications

Operation Code	0x1014
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DevicePropDesc data set
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns the DevicePropDesc data set corresponding to the specified DevicePropCode.

○ Command Details

For the supported DevicePropCode, refer to subsection 6.5.
For the DevicePropDesc, refer to subsection 9.4.

○ Operation Parameter

Operation Parameter	Details
Parameter1	DevicePropCode
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
DeviceProp_Not_Supported	The specified DevicePropCode is not supported.

6.2.1.17 GetDevicePropValue

○ Command Specifications

Operation Code	0x1015
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DevicePropValue
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns the current value corresponding to the specified DevicePropCode.

○ Command Details

For the supported DevicePropCode and the details of the DevicePropValue, refer to subsection 6.5.

○ Operation Parameter

Operation Parameter	Details
Parameter1	DevicePropCode
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
DeviceProp_Not_Supported	The specified DevicePropCode is not supported.

6.2.1.18 SetDevicePropValue

○ Command Specifications

Operation Code	0x1016
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DevicePropValue
Data direction	From host to camera
Response Code	Refer to Response Code in this subsection.
Response Parameter	None
Event Code	Refer to Event Code in this subsection.

○ Command Outline

The operation by this OperationCode sets the DevicePropValue corresponding to the specified DevicePropCode to the camera.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is completed.

An error response is made when this command is received during shooting or the AF operation.

For the supported DevicePropCode and the details of the DevicePropValue, refer to subsection 6.5.

○ Operation Parameter

Operation Parameter	Details
Parameter1	DevicePropCode
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
	The specified DevicePropValue is other than the character string indicating the date/time.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block reception fails.
DeviceProp_Not_Supported	The specified DevicePropCode is not supported.
Access_Denied	An operation is denied depending on the status of the camera. The specified DevicePropCode is not permitted for setting.
Device_Busy	The acquisition operation is being performed when the command processing is started, or the AF is being operated.
Invalid_DeviceProp_Format	The size or the format of the DevicePropDesc data set is not appropriate.
Invalid_DeviceProp_Value	The specified DevicePropValue is out of the permitted range.
Shutter_Speed_Bulb	Bulb is specified for the ExposureTime property.

○ Event Code

Event Code	Details
StorageInfoChanged	The settings of the ImageSize and the CompressionSetting properties are changed.

6.2.1.19 GetPartialObject

○ Command Specifications

Operation Code	0x101B
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DataObject
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	The number of bytes actually sent

○ Command Outline

The operation by this OperationCode is the same as that of GetObject.
However, the offset and the number of bytes to be acquired can be specified and the object (DataObject) can be acquired partially.

○ Command Details

The camera sends the file data (DataObject) of the specified size corresponding to the specified ObjectHandle to the host. When the specified ObjectHandle is the data in the card, the camera returns the object corresponding to the ObjectHandle.
The ObjectHandle passed by ObjectAddedInSdram should be specified in order to acquire the information of the object in the SDRAM.
For the DataObject, which is the data to be sent, the file data corresponding to the specified ObjectHandle for MaxSize starting from the position set by the offset is sent to the host. In the case of “(File size - Offset) < MaxSize”, the data of “(File size - Offset)”, not MaxSize, is sent to the host. The sent number of bytes is stored in ResponseParameter and sent to the host.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	Offset (Byte)
Parameter3	MaxSize (Byte)

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	0 is specified.
Session_Not_Open	The session is not started.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
	An object in the SDRAM other than the ObjectHandle passed by ObjectAddedInSdram is specified.

6.2.2 Vendor

6.2.2.1 InitiateCaptureRecInSdram

○ Command Specifications

Operation Code	0x90C0
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode makes the camera start the acquisition of one or more new objects (release operation of the camera) according to the current setting. The acquired object (image data) is saved in the SDRAM.

○ Command Details

This command performs the same operation as that of the InitiateCaptureRecInMedia command (subsection 6.2.2.22) with CaptureSort set to a value other than [Image acquisition release after AF driving] and SaveMedia set to [SDRAM].

The parameters to perform the same operation as that of InitiateCaptureRecInSdram by InitiateCaptureRecInMedia are shown below.

Parameter1 (CaptureSort): from 0x00000000 (PreWB), 0x00000010 (DustOff), 0xFFFFFFFF

Parameter2 (SaveMedia): 0x00000001

For the details, refer to the InitiateCaptureRecInMedia command (subsection 6.2.2.22).

The type of this command (image acquisition release, preset measurement release, or dust reference image release) is distinguished by the CaptureSort value of Parameter1.

CaptureSort	Operation	Description
0xFFFFFFFF	Image acquisition release	Normal release operation
0x00000000	Preset measurement release	Stores the acquired preset gain in the acquired data area.
0x00000010	Dust reference image release	Dust reference image release operation

○ Operation Parameter

Operation Parameter	Details
Parameter1	CaptureSort
Parameter2	None
Parameter3	None

○ Response Code

For the details, refer to the InitiateCaptureRecInMedia command (subsection 6.2.2.22).

6.2.2.2 AfDrive

○ Command Specifications

Operation Code	0x90C1
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode starts the AF driving and has the same function as that of pressing the shutter-release button of the camera body halfway.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is completed.

When receiving this command, the camera starts the AF driving and moves to the response phase. When the value of the FocusMode property (subsection 6.5.1.7) is 0x0001 [MF] or the Bit5 value of the WarningStatus property (subsection 6.5.6.15) is 1 [Minimum aperture warning status], or when the RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On], it is not regarded as an error but the response phase is terminated normally soon.

When the status is shifting to live view by the StartLiveView command, the camera performs the focal-plane contrast AF. At this time, the timing when switching to the response phase and the actions until the AF operation is completed are not changed.

This command is an activation command. When the AF driving is started, the transition to the response phase is performed.

After confirming that the response phase is terminated normally, the host issues the DeviceReady command two or more times to confirm the completion of the operation. The camera returns the Device_Busy response to the DeviceReady command until the AF operation is completed. The camera returns the response of the normal termination to the DeviceReady command when the AF operation is completed. If the AF operation fails, the camera returns the error response to the DeviceReady command.

If the value of the AfModeAtLiveView property (subsection 6.5.6.18) is [Constant AF servo] in the live view status, the camera retains the focusing result for one sec. when the camera returns the response of the normal termination to the DeviceReady command after the AF operation is completed. If shooting is performed while the focusing result is being retained, the focusing result is retained until the shooting operation is completed (even after one sec.) and the focusing result is cleared when shooting is completed. The focusing result does not change while the focusing result is being retained even if the camera is moved (by changing orientation and shifting focus, for example).

If the AF operation fails, the camera returns the error response to the DeviceReady command.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1, Parameter2, and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.

Device_Busy	When the command processing is started, the acquisition operation or the AF operation is being performed.
	The STM lens is being initialized.

6.2.2.3 ChangeCameraMode

○ Command Specifications

Operation Code	0x90C2
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode switches between the camera mode and the host mode.

○ Command Details

The camera is set to the mode specified by the ModeValue. The mode cannot be changed during the release operation or the live view of the camera.

○ Operation Parameter

Operation Parameter	Details	
Parameter1	ModeValue	
	0	Sets to the camera mode.
	1	Sets to the host mode.
Parameter2	None	
Parameter3	None	

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified value of ModeValue is out of the range.
Change_CameraMode_Failed	The mode cannot be changed depending on the operation status of the camera (during the release operation or the live view).

6.2.2.4 DeleteImagesInSdram

○ Command Specifications

Operation Code	0x90C3
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode deletes a specific object saved in the SDRAM or all the objects saved in the SDRAM.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is completed.

The object that corresponds to the specified ObjectHandle is deleted. All the objects in the SDRAM are deleted if the value of Parameter1 is 0. During the process of deleting all the objects, the camera does not issue a new ObjectAddedInSdram event.

For the ObjectHandle, the ObjectHandle passed by the ObjectAddedInSdram event should be specified. When the object corresponding to the specified ObjectHandle has been already sent to the host or deleted, an error response is made.

This command must not be issued during execution of shooting operation. The DeviceReady command should be issued to confirm that the response is changed from Device_Busy to anything other than that. The camera does not accept this command while shooting operation is being performed or until the ObjectAddedInSdram event which passes the object handle of the captured image can be acquired by the GetEvent command.

The release operation is locked during the image deletion in the SDRAM.

Deleting the objects in the card is locked in the following cases.

No.	Description
1	The RecordingMedia property (subsection 6.5.6.5) is [Card and SDRAM].

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Device_Busy	The transition to the host mode is prohibited, or shooting is being performed.
	The shooting operation is being performed.
	The ObjectAddedInSdram event is not ready for passing.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
Access_Denied	The RecordingMedia property is [Card and SDRAM].

6.2.2.5 GetLargeThumb

○ Command Specifications

Operation Code	0x90C4
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	LargeThumbnail data
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode acquires the large thumbnail data of the specified object.

○ Command Details

The camera sends all the large thumbnail data corresponding to the specified ObjectHandle to the host.

When the specified ObjectHandle is the data in the card, the camera returns the large thumbnail data corresponding to the ObjectHandle.

The ObjectHandle passed by ObjectAddedInSdram should be specified in order to acquire the information of the object in the SDRAM.

The LargeThumbnail data is the large thumbnail data of the object (file) specified by the ObjectHandle. The size of the LargeThumbnail data shall be the reference JPEG image size acquired in order of priority shown in the table below.

Order of priority	Reference	Image size
1	MPF class 1	640x424
2	VIEW	570x375
3	MPF class 2	1620x1080

When the object (file) specified by the ObjectHandle is MOV, the size of the JPEG image is the same as that of MOV.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.
	An object in the MISC folder is specified.
	An object in the WAV format is specified (Not supported)
	An object in the SDRAM other than the ObjectHandle passed by ObjectAddedInSdram is specified.
No_Thumbnail_Present	The object corresponding to the specified ObjectHandle does not include a thumbnail.
Store_Not_Available	The card is being initialized, the card does not exist, or the battery level is “Operation disabled status”.

6.2.2.6 GetEvent

○ Command Specifications

Operation Code	0x90C7
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	Event array
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode sends the event retained in the camera to the host.

○ Command Details

The camera sends all the events saved in the event queue buffer prepared for the GetEvent command.

This command cannot handle the events that have two or more parameters. The GetEventEx (subsection 6.2.2.27) should be used for those events.

The format of the event array to be sent by the camera is shown below.

Offset	Value	Name	Description
0	N	EventCount	The number of events
2	EventCode	EventCode [0]	The oldest event
4		EventParameter [0]	Parameter attaching to the oldest event
8	EventCode	EventCode [1]	The second oldest event
10		EventParameter [1]	Parameter attaching to the second oldest event
...			
6 x (N – 1) + 2	EventCode	EventCode [N - 1]	The newest event
6 x (N – 1) + 4		EventParameter [N - 1]	Parameter attaching to the newest event

If there is no event to be sent, the EventCount value is set to 0 and sent to the host.
The camera sends the event by this command and then updates the contents of the event queue buffer prepared for the GetEvent command. The event that has been sent is deleted.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.

6.2.2.7 DeviceReady

○ Command Specifications

Operation Code	0x90C8
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode checks the action by the activation-type command.

○ Command Details

This command is issued repeatedly after issuing an activation-type command; the InitiateCaptureRecInSdram command (subsection 6.2.2.1), the AfAndCaptureRecInSdram command (subsection 6.2.2.10), the InitiateCaptureRecInMedia command (subsection 6.2.2.22), the AfDrive command (subsection 6.2.2.2), the MfDrive command (subsection 6.2.2.19), or the StartLiveView command (subsection 6.2.2.16), in order to check the operation.

The camera makes the error response of Device_Busy during the operation by the activation-type command and the release operation by the shutter-release button or the InitiateCapture command (subsection 6.2.1.14). If an error response is made, the camera cancels the operation.

When the release operation is started by a command with the continuous shot, the Device_Busy response is made until the continuous shot operation is finished (termination of the continuous shot release operation). However, if the out-of-focus status occurs with the following settings when the release is started, the Out_of_Focus response is made and the continuous shot operation is canceled.

No.	Description
1	The FocusMode property (subsection 6.5.1.7) is [Continuous AF servo] and the DynamicAFonAFC property (subsection 6.5.3.2) is [Focus].

When the AF operation is started by the AfDrive command, the Device_Busy response is made until the AF operation is completed. If the AF operation is completed in the non-focused status, however, the Out_of_Focus response is made.

When the release operation is started by the shutter-release button and the InitiateCapture command with the continuous shot, the Device_Busy response is made until the continuous shot operation is finished (termination of the continuous shot release operation).

When the bulb shooting is started by the InitiateCaptureRecInMedia command, the Bulb_Release_Busy response is made until the bulb shooting is completed.

When the live view status is started by the StartLiveView command, the Device_Busy response is made until the acquisition of the live view image becomes enabled. If the acquisition of the live view image cannot be enabled because of some problem caused by the camera (battery empty, warning information, etc.), however, the Invalid_Status response is made.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Device_Busy	The operation of the activation-type command is not finished, or the release operation is being performed.
Out_of_Focus	The AF operation is in the non-focused status with the AF operation mode of AF-S or AF-C.
Wb_Preset_Error	The preset measurement release fails.
Dust_Reference_Error	The dust reference image release fails.
Invalid_Status	An error caused by the camera (battery empty, warning information)
MfDrive_Step_End	The MF driving reaches the end of steps.
MfDrive_Step_ Insufficiency	The driving amount is insufficient.
Bulb_Release_Busy	The bulb shooting is being performed.

6.2.2.8 SetPreWbData

○ Command Specifications

Operation Code	0x90C9
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	PreWbThumImage
Data direction	From host to camera
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode sets the data in the preset manual white balance data area of the camera.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is completed.

This command sets the data in the preset manual white balance data area of the camera.

The camera stores the preset white balance gain value specified by PreWbGainValue in the data area specified by PreWbDataIndex and the thumbnail image of the size set in PreWbThumImageSize. When PreWbThumImageSize is 0, the thumbnail image is not recorded.

○ Operation Parameter

Operation Parameter	Details	
Parameter1	PreWbDataIndex	
	byte2, 3	Reserved (0)
	byte1 (*1)	RotateThumb (0: Horizontal, 1: Grip side upward, 2: Grip side downward)
	byte0	PreWbDataIndex (1=Fixed to the captured data)
Parameter2	PreWbGainValue (*2)	
Parameter3	PreWbThumImageSize	

*1: The byte1 is referred to by the camera when Parameter3: PreWbThumImageSize is a value other than 0.

*2: The contents of PreWbGainValue are shown below.

PreWbGainValue																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
	-	-	-	-	-	Rgain										
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	-	-	-	-	Bgain										

Rgain = (R/G) x 256 [Upper 3 bits: integer section, lower 8 bits: decimal section]
Bgain = (B/G) x 256 [Upper 3 bits: integer section, lower 8 bits: decimal section]
However, the range that can be set is: 0 <= Rgain, Bgain < 8

PreWbThumImageSize indicates the size of PreWbThumImage. When PreWbThumImageSize is 0, PreWbThumImage is not sent in the data phase and the camera stores PreWbGainValue only.

The format of PreWbThumImage shall be the same as that of the thumbnail image (JPEG format) recorded in the JPEG file defined in the accompanying document “RAW Data Format for Digital Camera”.

In addition, PreWbThumImage should be the compression quality Fine (1/4 compression) and PreWbThumImageSize should be 13440 bytes or less.

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1, Parameter2, and Parameter3 are not specified, or a value that is out of the range is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block reception fails.

6.2.2.9 GetVendorPropCodes

○ Command Specifications

Operation Code	0x90CA
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DevicePropCodeArray
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode acquires an array of codes of the vendor property supported by the camera.

○ Command Details

The format of DevicePropCodeArray sent by the camera is shown below.
Each field data is stored in the little endian format.

Field	Size（Byte）	Data
NumElement	4	The element of the array is N (N indicates the number of objects).
ArrayEntry [0]	2	DevicePropCode [0]
ArrayEntry [1]	2	DevicePropCode [1]
ArrayEntry [2]	2	DevicePropCode [2]
・・・		
ArrayEntry [N - 1]	2	DevicePropCode [N - 1]

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.

6.2.2.10 AfAndCaptureRecInSdram

○ Command Specifications

Operation Code	0x90CB
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DevicePropCodeArray
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode starts the AF driving and makes the camera start the acquisition of one or more new objects (release operation of the camera). The acquired object (image data) is saved in the SDRAM.

○ Command Details

This command performs the same operation as that of the InitiateCaptureRecInMedia command (subsection 6.2.2.22) with CaptureSort set to [Image acquisition release after AF driving] and SaveMedia set to [SDRAM].

The parameters to perform the same operation as that of AfAndCaptureRecInSdram by InitiateCaptureRecInMedia are shown below.

Parameter1 (CaptureSort): 0xFFFFFFFE
Parameter2 (SaveMedia): 0x00000001

For the details, refer to the InitiateCaptureRecInMedia command (subsection 6.2.2.22).

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

For the details, refer to the InitiateCaptureRecInMedia command (subsection 6.2.2.22).

6.2.2.11 GetPicCtrlData

○ Command Specifications

Operation Code	0x90CC
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	PicCtrlData
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode acquires the specified second-generation picture control data.

○ Command Details

This command acquires the picture control data of the specified picture control item.

The contents of PicCtrlItem are the same as those of ActivePicCtrlItem property (subsection 6.5.12.1).

The camera sends the current picture control data of the picture control item specified by PicCtrlItem to the host.

The current setting value is sent when DefaultFlag is 0, and the default value is sent when DefaultFlag is 1.

GetPicCtrlData can also be executed with an unregistered custom picture control, and it is sent to the PC with Customflag set to 2.

All the setting values are set independent of the value of QuickAdjustFlag and sent to the PC.

For the format of the picture control data to be received, refer to subsection 7.4.

○ Operation Parameter

Operation Parameter	Details
Parameter1	PicCtrlItem
Parameter2	DefaultFlag
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and/or Parameter2 are not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified PicCtrlItem value is out of the range.
Incomplete_Transfer	The data block transmission fails.

6.2.2.12 SetPicCtrlData

○ Command Specifications

Operation Code	0x90CD
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	PicCtrlData
Data direction	From host to camera
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode sets the picture control data in the specified second-generation picture control item of the camera.

○ Command Details

This command sets the picture control data in the specified picture control item.

The contents of PicCtrlItem are the same as those of ActivePicCtrlItem property (subsection 6.5.12.1).

The camera sets the picture control data that is sent to the picture control item specified by PicCtrlItem.

The value of ModifiedFlag should be “0” or “1”. When ModifiedFlag is “0”, the contents of PicCtrlData are applied as a new picture control. When ModifiedFlag is “1”, the contents of PicCtrlData are applied to the current setting value of the existing picture control.

When QuickAdjustFlag is “1”, the camera identifies only the value of QuickAdjust to decide the adjustment value. (The camera ignores the other adjustment values in the data.)

When QuickAdjustFlag is “0”, the camera ignores the value of QuickAdjust and identifies the other adjustment values in the data to set the adjustment value.

For the format of the picture control data to be sent, refer to subsection 7.4.

If CustomCurveData is valid, the picture control data can be set only when the custom picture control item is specified.

○ Operation Parameter

Operation Parameter	Details
Parameter1	PicCtrlItem
Parameter2	ModifiedFlag
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and/or Parameter2 are not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified PicCtrlItem value is out of the range.
Incomplete_Transfer	The data block transmission fails.
Device_Busy	During shooting by the camera
Access_Denied	“Color” is specified in MonochromeFlag when “Monochrome” is specified in PicCtrlItem.
	“Monochrome” is specified in MonochromeFlag when an item other than “Monochrome” is specified in PicCtrlItem.
	When the custom picture control area is specified with PicCtrlItem, the value of CustomFlag in the picture control data format is not set to 1.
	When the neutral picture control or the custom picture control is set, the value of QuickAdjustFlag in the picture control data format is not set to 0.

6.2.2.13 SetPicCtrlDataEx

○ Command Specifications

Operation Code	0x940E
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	PicCtrlData
Data direction	From host to camera
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode sets the picture control data in the specified picture control item of the camera.

○ Command Details

This command sets the picture control data in the specified picture control item.

The contents of PicCtrlItem are the same as those of ActivePicCtrlItem property (subsection 6.5.12.1).

The camera sets the picture control data that is sent to the picture control item specified by PicCtrlItem.

The value of ModifiedFlag should be “0” or “1”. When ModifiedFlag is “0”, the contents of PicCtrlData are applied as a new picture control. When ModifiedFlag is “1”, the contents of PicCtrlData are applied to the current setting value of the existing picture control.

When QuickAdjustFlag is “1”, the camera identifies only the value of QuickAdjust to decide the adjustment value. (The camera ignores the other adjustment values in the data.)

When QuickAdjustFlag is “0”, the camera ignores the value of QuickAdjust and identifies the other adjustment values in the data to set the adjustment value.

For the format of the picture control data to be sent, refer to subsection 7.4.

If CustomCurveData is valid, the picture control data can be set only when the custom picture control item is specified.

There are two formats in the picture control data; One with the clarity, another without the clarity. When the picture control data without the clarity is specified, FormatType is set to 0. When the data with the clarity as in this camera is specified, FormatType is set to 1.

○ Operation Parameter

Operation Parameter	Details	
Parameter1	PicCtrlItem	
Parameter2	ModifiedFlag	
Parameter3	FormatType	
Parameter4	[ShootingMode]	
	0	Photo shooting menu
	1	Movie shooting menu

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is not specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified PicCtrlItem value is out of the range.
	The ShootingMode is set to 1 (Movie shooting menu) on the camera without the movie shooting menu.
Incomplete_Transfer	The data block transmission fails.
Device_Busy	During shooting by the camera
Access_Denied	“Color” is specified in MonochromeFlag when “Monochrome” is specified in PicCtrlItem.
	“Monochrome” is specified in MonochromeFlag when an item other than “Monochrome” is specified in PicCtrlItem.
	When the custom picture control area is specified with PicCtrlItem, the value of CustomFlag in the picture control data format is not set to 1.
	When the neutral picture control or the custom picture control is specified, the value of QuickAdjustFlag in the picture control data format is not set to 0.

6.2.2.14 DeleteCustomPicCtrl

○ Command Specifications

Operation Code	0x90CE
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode deletes the specified custom picture control item in the camera.

○ Command Details

This command deletes the specified custom picture control item of the camera.

The contents of CustomPicCtrlItem are the same as those of ActivePicCtrlItem property (subsection 6.5.12.1).

○ Operation Parameter

Operation Parameter	Details
Parameter1	CustomPicCtrlItem
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified CustomPicCtrlItem value is out of the range.

6.2.2.15 GetPicCtrlCapability

○ Command Specifications

Operation Code	0x90CF
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	PictureControlCapabilityData
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode acquires the function information of the picture control that is the basis of the specified picture control item.

○ Command Details

This command acquires the function information of the picture control of the color that is the basis of the specified picture control item. When the picture control whose basic picture control is monochrome is specified, the camera sends the data with all fields of PictureControlCapabilityData set to “0”.

The contents of PictureControlCapabilityData are shown below.

Offset	Size	Field	Data	Description	
0x00	1	ValidFlag	0: Invalid 1: Valid	Indicates whether the data is valid or invalid. It should be 0 when a base does not exist or it is monochrome.	
0x01	1	QuickCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the quick adjustment can be selected or not and AUTO can be set or not	
0x02	1	SharpnessCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the edge enhancement can be selected or not and AUTO can be set or not	
0x03	1	ClarityCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the clarity can be selected or not and AUTO can be set or not	
0x04	1	ContrastCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the contrast can be selected or not and AUTO can be set or not	
0x05	1	BrightnessCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the brightness can be selected or not and AUTO can be set or not	
0x06	1	SaturationCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the saturation can be selected or not and AUTO can be set or not	
0x07	1	HueCapa	0x80: Can be selected 0x01: AUTO enabled 0x81: Can be selected and AUTO enabled	Whether the hue can be selected or not and AUTO can be set or not	
0x08	1	DefaultQuickLevel	From -2 to +2	The default position of the quick adjustment	
0x09	1	DefaultLevel[0]	From 0 to 9	Quick adjustment	Edge enhancement
0x0A	1		From -5 to +5		Clarity

0x0B	1		From -3 to +3	value	Contrast
0x0C	1		From -1.5 to +1.5		Brightness
0x0D	1		From -3 to +3		Saturation
0x0E	1		From -3 to +3	-2	Hue
0x0F	1	DefaultLevel[1]	From 0 to 9	Quick adjustment value	Edge enhancement
0x10	1		From -5 to +5		Clarity
0x11	1		From -3 to +3		Contrast
0x12	1		From -1.5 to +1.5		Brightness
0x13	1		From -3 to +3		Saturation
0x14	1		From -3 to +3	-1	Hue
0x15	1	DefaultLevel[2]	From 0 to 9	Quick adjustment value	Edge enhancement
0x16	1		From -5 to +5		Clarity
0x17	1		From -3 to +3		Contrast
0x18	1		From -1.5 to +1.5		Brightness
0x19	1		From -3 to +3		Saturation
0x1A	1		From -3 to +3	0	Hue
0x1B	1	DefaultLevel[3]	From 0 to 9	Quick adjustment value	Edge enhancement
0x1C	1		From -5 to +5		Clarity
0x1D	1		From -3 to +3		Contrast
0x1E	1		From -1.5 to +1.5		Brightness
0x1F	1		From -3 to +3		Saturation
0x20	1		From -3 to +3	1	Hue
0x21	1	DefaultLevel[4]	From 0 to 9	Quick adjustment value	Edge enhancement
0x22	1		From -5 to +5		Clarity
0x23	1		From -3 to +3		Contrast
0x24	1		From -1.5 to +1.5		Brightness
0x25	1		From -3 to +3		Saturation
0x26	1		From -3 to +3	2	Hue

For the picture control for which the quick adjustment cannot be selected (that is, QuickCapa = 0), the default value is stored in DefaultLevel [0].

○ Operation Parameter

Operation Parameter	Details
Parameter1	PicCtrlItem
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and/or Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified PicCtrlItem value is out of the range.
Incomplete_Transfer	The data block transmission fails.

6.2.2.16 StartLiveView

○ Command Specifications

Operation Code	0x9201
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode makes the camera enter the live view status.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the live view status is released.

This command is an activation-type command. The transition to the response phase is performed when the entry into the live view status is started. If this command is received with the Bit0 value of the WarningStatus property (subsection 6.5.6.15) set to 1 [Sequence error], the sequence error is released, Hardware_Error is passed, and the command processing is terminated.

The host confirms that the response phase of this command is terminated normally, and then issues the DeviceReady command repeatedly to confirm whether the acquisition of the live view image becomes enabled. The camera makes the Device_Busy response to the DeviceReady command until the acquisition of the live view image becomes enabled, and makes the normal termination response to the DeviceReady command when the acquisition of the live view image becomes enabled. If the acquisition of the live view image cannot be enabled for some reason, the camera returns an error response to the DeviceReady command.

The host confirms that the response to the DeviceReady command is a normal termination, and then it can acquire the live view image by issuing the GetLiveViewImage command.

The live view status is released by the EndLiveView command. If the live view status is released because of the camera (including the case that the time limit for the live view has been reached), Not_LiveView is passed in the response phase such as the GetLiveViewImage command.

Because the release request by a command other than the InitiateCaptureRecInSdram command (subsection 6.2.2.1) and the InitiateCaptureRecInMedia command (subsection 6.2.2.22, the image acquisition release is specified in Parameter1) cannot be accepted after the camera enters upon the live view status by this command, the InitiateCapture command (subsection 6.2.1.14) and the AfAndCaptureRecInSdram command (subsection 6.2.2.10) cannot be executed until the live view status is released. In addition, because the host mode cannot be released during the live view, the ChangeCameraMode command (subsection 6.2.2.3) cannot be executed.

The live view prohibition condition is shown in the LiveViewProhibitionCondition property (subsection 6.5.11.3). The StartLiveView command must be issued when there is no prohibition factor in the LiveViewProhibitionCondition property (subsection 6.5.11.3). If there is any prohibition factor in the LiveViewProhibitionCondition property (subsection 6.5.11.3), even if the StartLiveView command is issued and the live view is started, the operation is not guaranteed.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Device_Busy	When the command processing is started, the acquisition operation or the live view is being performed.
Hardware_Error	When the command processing is started, some error is generated in the camera body.
Invalid_Status	An error caused by the camera (battery empty, warning information) occurs, or the shutter-release button is being fully pressed.

6.2.2.17 EndLiveView

○ Command Specifications

Operation Code	0x9202
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode releases the live view status.

○ Command Details

This command releases the live view status.
The movie recording is also released at the same time as the live view.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Device_Busy	The live view cannot end because of the camera factor.

6.2.2.18 GetLiveViewImage

○ Command Specifications

Operation Code	0x9203
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	LiveViewObject
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode acquires the newest live view image.
The format of the live view image is JPEG.

○ Command Details

The camera sends the newest live view image (LiveViewObject) to the host.
This command is valid when the camera is in the live view status after getting the StartLiveView command. When the camera is not in the live view status, the Not_LiveView response is made.

LiveViewObject is composed of the display information and the live view image (JPEG).
The format of LiveViewObject is shown below.

	Display information area size		4Byte	
	Live view image area size		4Byte	
Display information	Attached JPEG image size	Horizontal size	2Byte	The size set in the LiveViewImageSize property becomes the JPEG image size. While the movie is being recorded, the image size changes depending on the settings of the MovieRecordScreenSize property and the LiveViewImageSize property.
		Vertical size	2Byte	
	Whole size	Horizontal size	2Byte	Standard of the coordinates
		Vertical size	2Byte	
	Display area size	Horizontal size	2Byte	The whole size is equal to the display area size when the image is not enlarged.
		Vertical size	2Byte	
	Display center coordinates	Horizontal size	2Byte	
		Vertical size	2Byte	
	AF frame size (*1)	Horizontal size	2Byte	
		Vertical size	2Byte	
	AF frame center coordinates (*1)	Horizontal size	2Byte	
		Vertical size	2Byte	
	Reserve		4Byte	
	Reserve		1Byte	
	Rotation direction		1Byte	0: No rotation 1: Rotate counterclockwise 2: Rotate clockwise
	Focus driving status		1Byte	0: Not driving, 1: Driving
	Reserve		1Byte	
	Reserve		4Byte	
	Reserve		2Byte	
	Countdown time		2Byte	Countdown every one second starting from 3600 (one hour) ; countdown starting from thirty seconds with a rise in temperature

	Focusing judgement result			1Byte	0: No information, 1: Not focused, 2: Focused
	AF driving enabled status			1Byte	0: AF driving disabled, 1: AF driving enabled
	Reserve			2Byte	
	Reserve			12Byte	Fixed to 0
	Remaining time of movie recording			4Byte	From 0 to 1200000 [msec] * It is valid during the movie recording state.
	Movie recording information			1Byte	0: During LV execution 1: During movie recording
	AF mode status of the face detection system			1Byte	0: The face detection system is not set to AF. 1: The face detection system is set to AF.
	The number of persons whose faces are detected by the system			1Byte	From 0 to 35 (thirty-five is the maximum number of persons)
	AF area index			1Byte	From 0 to 34 (fixed to 0)
	0 to 34	AF frame size	Horizontal size	2Byte	Area of the AF frame size and the AF frame center coordinates for thirty-five persons (4 Byte + 4 Byte) x 35 persons; 280 Byte in total
			Vertical size	2Byte	
		AF frame center coordinates	Horizontal position	2Byte	
			Vertical position	2Byte	
	Sound indicator (peak value)		L	1Byte	From 0 to 14
			R	1Byte	From 0 to 14
	Sound indicator (current value)		L	1Byte	From 0 to 14
			R	1Byte	From 0 to 14
	Reserve			1Byte	
	Reserve			1Byte	
	Reserve			1Byte	
	Reserve			1Byte	
	Reserve			24Byte	
Live view image	Image data				

The data specifications for LiveViewObject are shown below.

No.	Description
1	The size of the display information is 376Byte.
2	The maximum size of the live view image is 49,920byte.
3	The quality of the live view image is “BASIC”.

The details of the case in which the AF mode status of the face detection system is set to “1: The face detection system is set to AF” are shown below.

No.	Description
1	Even if the number of persons whose faces are detected is zero, the AF mode status of the face detection system is set to “1: The face detection system is set to AF”.
2	The focusing judgement result is set to a value other than “0: No information” for one second when the camera is in focus.
3	Because the AF frame size and the AF frame center coordinates for the face detection system are used, the values in the areas with (*1) in the table are not guaranteed. However, this condition is not applied to the case in which the number of persons whose faces are detected is zero because the setting is fixed to the center wide AF.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Not_LiveView	The camera is not in the live view status.

6.2.2.19 MfDrive

○ Command Specifications

Operation Code	0x9204
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode starts the MF driving in the live view status.

○ Command Details

This command is valid when the camera is in the live view status after getting the StartLiveView command.

The transition to the response phase is performed when the MF operation is terminated.

This command is an activation command. The transition to the response phase is performed when the MF driving is started. The host confirms that the response phase is terminated normally, and then issues the DeviceReady command two or more times to confirm whether the operation is terminated. The camera makes the Device_Busy response to the DeviceReady command until the MF operation is terminated. The camera makes the normal termination response to the DeviceReady command when the MF operation is terminated. If the MF operation fails, the camera makes an error response to the DeviceReady command.

The camera performs the MF driving based on the contents of DriveType specified by Parameter1. The MF driving amount is based on the contents of StepValue specified by Parameter2. The MF driving operates according to the current position.

○ Operation Parameter

Operation Parameter	Details	
Parameter1	DriveType	
	0x00000001	No limit -> Closest
	0x00000002	Closest -> No limit
Parameter2	StepValue (driving amount (the number of pulses))	
	From 1 to 32767	
Parameter3	None	

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and/or Parameter2 are not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified value of DriveType or StepValue is out of the range.
Invalid_Status	The MF driving cannot be performed due to a problem caused by the camera (an error caused by the camera, the CPU internal lens is not mounted, the lens cannot be used, etc.).
	The focus mode is MF.
Not_LiveView	The camera is not in the live view status.
Device_Busy	The AF operation is being performed in the camera.
	The AF-F is being set.
	The STM lens is being initialized.
MfDrive_Step_End	The MF operation reaches the end of steps.

6.2.2.20 ChangeAfArea

○ Command Specifications

Operation Code	0x9205
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode changes the AF area in the live view status.

○ Command Details

This command is valid when the camera is in the live view status after getting the StartLiveView command.

The camera specifies the AF area with the coordinates specified by Parameter1 and Parameter2 set to the center. XValue of Parameter1 and YValue of Parameter2 are used to set the X-axis and the Y-axis, respectively.

The range of XValue and YValue should be the “Whole size” of the header information acquired by the GetLiveViewImage command. However, the range that can be specified should be smaller by the half size of the “AF frame size”. When a value that exceeds the setting permitted range is set, the maximum or the minimum value is reflected.

○ Operation Parameter

Operation Parameter	Details
Parameter1	XValue
Parameter2	YValue
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and/or Parameter2 are not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Not_LiveView	The camera is not in the live view status.
Device_Busy	The AF operation is being performed in the camera.

6.2.2.21 AfDriveCancel

○ Command Specifications

Operation Code	0x9206
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode cancels the AF driving.

○ Command Details

The camera cancels the AF driving in operation.

The transition to the response phase is performed when the cancellation of the AF driving is completed.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.

6.2.2.22 InitiateCaptureRecInMedia

○ Command Specifications

Operation Code	0x9207
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	—
Response Code	Refer to Response Code in this subsection.
Response Parameter	None
Event Code	Refer to Event Code in this subsection.

○ Command Outline

The operation by this OperationCode makes the camera start the acquisition of one or more new objects (release operation of the camera) according to the current setting. The acquired object (image data) is saved in the specified location.

○ Command Details

If the camera is not set to the host mode when receiving this command, the camera changes the setting to the host mode, and returns to the camera mode when the release operation is completed.

This command is an activation-type command. The transition to the response phase is performed when the start of the AF operation is completed if the AF operation is performed, and when the start of the release operation is completed if the AF operation is not performed.

The camera starts the acquisition of one or more new objects (release operation of the camera) according to the current setting. Whether the AF operation is performed or not depends on the value of CaptureSort (described later) in Parameter1 and the focus mode setting. When the live view is executed, it also depends on the live view mode.

If this command is received with the Bit0 value of the WarningStatus property (subsection 6.5.6.15) set to 1 [Sequence error], the sequence error is released, Hardware_Error is passed in the response phase, and the command is terminated.

When the release operation is started, one or more new objects are created. The location where the new objects are created depends on the value of SaveMedia in Parameter2. When the new objects are recorded in the specified location, the camera generates the asynchronous interrupt event to inform the host of the addition of the new objects. The generated event differs according to the recording location. The new object addition event includes the ObjectHandle indicating the created new objects. If two or more new objects are created, the new object addition event should be issued two or more times. When all the new objects that can be acquired are recorded in the specified location completely, the camera issues the shooting completion event to inform the host that the acquisition of all the new objects has been completed. Moreover, the shooting completion event differs according to the recording location. The correspondence between the recording location and each event is shown below.

Recording location	New object addition event	Shooting completion event
Card	ObjectAdded	CaptureComplete
SDRAM	ObjectAddedInSdram	CaptureCompleteInSdram
Card and SDRAM	ObjectAdded and ObjectAddedInSdram	CaptureComplete and CaptureCompleteInSdram

When the recording location is set to [Card and SDRAM], a new object addition event and a shooting completion event are issued separately for the card and the SDRAM. However, the order of issuing the ObjectAdded event and the ObjectAddedInSdram event is not decided and the events are issued in order of completing image recording. The CaptureComplete event and the CaptureCompleteInSdram event are issued in the same way; the event of the recording location in which acquisition of all the new objects is completed first, is issued first.

The number of images that can be captured continuously by the continuous low-speed shot and the continuous high-speed shot is the setting value of the BurstNumber property (Card/SDRAM/Card and SDRAM, subsection 6.5.1.16) or that of the ExposureRemaining property (Card/SDRAM/Card and SDRAM, subsection 6.5.6.6), whichever is smaller.
When the value of the StillCaptureMode property (subsection 6.5.1.15) is set to “Self-timer”, the camera changes the value of the StillCaptureMode property (subsection 6.5.1.15) to “Single frame” temporarily for shooting.

StillCaptureMode	BurstNumber	Description
0x0001 (Single frame)	Invalid	Only one image can be captured.
0x0002 (Continuous high-speed shot) 0x8010 (Continuous low-speed shot)	Valid	Among the BurstNumber setting value, the number of images that can be recorded in the SDRAM that is calculated in the camera, and the number of remaining images for recording while the bracketing is being performed, until the least number is reached, the acquisition of the new objects can be performed. Only one image can be captured when the internal flash enabled or the HDR mode is set.
0x8011 (Self-timer)	Invalid	Only one image can be captured (operation equivalent to the single frame).
0x8016 (Quiet shooting)	Invalid	Only one image can be captured (mirror-down after release is performed by the camera automatically).

When CaptureSort is the image acquisition release, the AF operation is not performed during the live view.

Focus mode	Priority in AF-C mode	AF operation
Manual focus	-	Not performed
Single AF servo	Release	Performed
	Focus	Performed
Continuous AF servo	Release	Performed
	Focus	First image: Performed Second image and after: Operation equivalent to the release (shooting priority)
AF servo mode automatic switching	Release	Performed
	Focus	Performed

The AF operation is always performed when CaptureSort is the image acquisition release after AF driving. Other than in the case of focus priority, the release operation is always started independent of the status after AF driving. In the case of focus priority and the non-focused status, the Out_of_Focus response is made and the processing is terminated without starting the release operation.

When the response phase for this command is terminated normally, the host issues the DeviceReady command two or more times to confirm the completion of the shooting operation. The camera returns the response of the normal termination to the DeviceReady command when the AF operation is completed. If the AF operation fails, the camera returns the error response to the DeviceReady command and the release operation is not performed.

When the dust reference image release is requested, the camera performs the dust reference image release and moves to the response phase. When the dust reference image release fails, the camera returns the error response to the DeviceReady command. When the shooting succeeds, the operation similar to the image acquisition release is performed hereafter.

For the shooting during the live view, only the image acquisition release can be performed. If the image acquisition release after AF driving, the preset measurement release, or the dust reference image release is specified, the Invalid_Status response is made.

If this command is executed during movie recording, the Access_Denied response is made.

○ Operation Parameter

Operation Parameter	Details	
Parameter1	CaptureSort (The details are shown in the table below.)	
Parameter2	SaveMedia	
	0x0000	Card
	0x0001	SDRAM
	0x0002	Card and SDRAM
Parameter3	None	

CaptureSort	Operation	Description
0xFFFFFFFE	Image acquisition release after AF driving	The AF driving is started and then the release operation of the camera is performed.
0xFFFFFFFF	Image acquisition release	Normal release operation
0x00000000	Preset measurement release	Stores the acquired preset gain in the acquired data area.
0x00000010	Dust reference image release	Dust reference image release operation

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and/or Parameter2 are not specified.
	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Invalid_Parameter	The specified CaptureSort is out of the setting range.
Device_Busy	When the command processing is started, the acquisition operation is being performed.
	The STM lens is being initialized.
Hardware_Error	When the command processing is started, some error is generated in the camera body.
Out_of_Focus	The AF operation is not focused with the AF operation mode of AF-S (focus priority) or AF-C (focus priority).
Invalid_Status	The shutter-release button is being fully pressed.
Dust_Referrence_Error	The CPU internal lens is not mounted during the dust reference image release.
	The dust reference image release fails.
Shutter_Speed_Bulb	The shutter speed is set to Bulb. (Only when InitiateCaptureRecInSdram and AfAndCaptureRecInSdram are issued)
Shutter_Speed_Time	The shutter speed is set to Time.
MirrorUp_Sequence	The mirror-up shooting is being performed.
CameraMode_Not_Adjust_Fnumber	An aperture value error occurs and the shooting mode is other than the M mode.
Store_Full	There is no free area for recording in the card.
	There is no free area for recording in the SDRAM.
Store_Not_Available	The card is being initialized
	The card does not exist.
	The battery level is “Operation disabled status”.
Store_Error	SaveMedia is [Card] or [Card and SDRAM] and a CHA error occurs in the camera.
Store_Unformatted	SaveMedia is [Card] or [Card and SDRAM] and the card is not formatted.
Store_Read_Only	The card that is ready for recording is protected.
Access_Denied	When a retractable lens is mounted, the lens is retracting.
	Preset measurement release is performed when the HDRMode property (subsection 6.5.2.16) is set to anything other than [OFF].
	Shooting cannot be performed depending on the camera status by a cause other than the above.

*When SaveMedia is set to [Card and SDRAM], the Store_Full response is made if the card or the SDRAM is out of capacity, and the Store_Not_Available response is made if the card is not inserted. Shooting is not performed in either case.

*When SaveMedia is set to [Card] or [Card and SDRAM], the Store_Error response and the Store_Unformatted response are made if the inserted card causes a CHA error (damaged card) and the card is not formatted, respectively. Shooting is not performed in either case.

○ Event Code

Response Code	Description
ObjectAdded	A new object is recorded in the card.
CaptureComplete	The acquisition operation of all the new objects is completed.
ObjectAddedInSdram	A new object is recorded in the SDRAM.
CaptureCompleteRecInSdram	All the images captured by this command are sent from the SDRAM to the host completely.

6.2.2.23 StartMovieRecInCard

○ Command Specifications

Operation Code	0x920A
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode starts movie recording in the card.

○ Command Details

This command is accepted only during the live view execution. It is recommended to check the movie recording prohibition condition property (MovieRecProhibitionCondition (subsection 6.5.6.20)) before issuing this command. If the movie recording cannot be started, an error response is made.

The DevicePropertyCodes that can be set during movie recording are described in subsection 6.5.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Status	The movie recording cannot be started due to an error caused by the camera.
Not_LiveView	The camera is not in the live view status.

6.2.2.24 EndMovieRec

○ Command Specifications

Operation Code	0x920B
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode finishes movie recording in the card.

○ Command Details

If the InitiateCaptureRecInMedia command or the EndLiveView command is issued instead of this command during movie recording, the movie recording is finished along with the live view completion. In this case, there is no need to issue this command. Because an error occurs if a mode other than the image acquisition release is specified by the InitiateCaptureRecInMedia command, however, the movie recording is not finished.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.

6.2.2.25 GetVendorStorageIDs

○ Command Specifications

Operation Code	0x9209
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	StorageIDArray
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns a list of the currently valid StorageIDs.
For the application mode, the StorageID with the card not inserted can be acquired by GetStorageIDs. Therefore the valid StorageID can be known by using this operation.

○ Command Details

The camera returns the StorageID of the main slot.

The StorageID of the main slot takes the following values.

StorageID	Details
0x00010001	When the card is inserted in the main slot
0x00010000	When the card is not inserted in the main slot
	When the card in the main slot is being formatted
	When the battery level of the camera is “Operation disabled status”

The format of the StorageIDArray that is sent by the camera is shown below.
Each field data is stored in the little endian format.

Field	Size (Byte)	Data
NumElement	4	0x00000001 (One element for the array)
ArrayEntry1	4	StorageID (main slot)

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.

6.2.2.26 TerminateCapture

○ Command Specifications

Operation Code	0x920C
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode stops the shooting operation executed by the host.

○ Command Details

The camera stops the following shooting operation executed by the host.

Shooting operation	Operation after stopping
Bulb shooting	The images captured until the operation is stopped are recorded in the card or the SDRAM.

The transition to the response phase is performed when the start of the shooting stop processing is completed.

○ Operation Parameter

Operation Parameter	Details
Parameter1	Reserved(0)
Parameter2	Reserved(0)
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.

6.2.2.27 GetEventEx

○ Command Specifications

Operation Code	0x941C
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	Event array
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode sends the event retained in the camera to the host.

○ Command Details

This command is the extended version of GetEvent command (subsection 6.2.2.6).

This command has the following extended functions in addition to those of GetEvent command (subsection 6.2.2.6).
The number of the event parameter is variable and the plural parameters can be specified.

The format of the event array is shown below.

Field	DataSize	DataType	Description
NumberOfElements	4	UINT32	The number of events in the list.
Element1 Event Code	2	UINT16	Event Code for element1.
Element1 NumParameters	2	UINT16	Number of parameters for element1.
Element1 Parameter1	4	UINT32	Parameter1 for element1.
Element1 Parameter2	4	UINT32	Parameter2 for element1.
…			
Element1 ParameterN	4	UINT32	Parameter N for element1.
…			
ElementN Event Code	2	UINT16	Event Code for element N.
ElementN NumParameters	2	UINT16	Number of parameters for element N.
ElementN Parameter1	4	UINT32	Parameter1 for element N.
ElementN Parameter2	4	UINT32	Parameter2 for element N.
…			
ElementN ParameterN	4	UINT32	Parameter N for element N.

○ Operation Parameter

Operation Parameter	Details
Parameter1	None
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Any of Parameter1 to Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission failed.

6.2.2.28 GetPartialObjectHighSpeed

○ Command Specifications

Operation Code	0x9400
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	DataObject
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	The number of bytes actually sent

○ Command Outline

The operation by this OperationCode transfers the file data (DataObject) of the specified size corresponding to the specified ObjectHandle from the camera to the host.

This command is suited to transfer large-size data because the time for the camera to read the data from the card is shorter than that of the GetPartialObject command (subsection 6.2.1.19).

○ Command Details

The PC host mode is set during the period of acquisition of file data by using this command. “The period of acquisition” means the period from the first issue of this command by specifying the ObjectHandle to the transfer of all file data of the ObjectHandle or to the cancellation of transfer. In addition, when “information necessary to maintain this command” described later is released, “the period of acquisition” terminates and the PC host mode is released.

The maximum size of the data transferred by this command is the size of the file data specified by the ObjectHandle. The file size can be checked by the GetObjectInfo command (subsection 6.2.1.8).

The following must be satisfied to use this command.

- The ApplicationMode property (subsection 6.5.13.1) setting is valid.

The command should be issued with Terminate set to 1 in order to cancel the transfer while all data of the file specified by the ObjectHandle are not transferred. When Terminate is set to 1, data transfer with 0 byte is performed and “information necessary to maintain this command” managed by the camera is released.

When all data of the specified file are transferred finally, Terminate need not be set to 1. In this case, “information necessary to maintain this command” managed by the camera is released when the transfer of all data is completed.

An example of using the virtual file data is shown below. (ObjectHandle = 0x00000001, FileSize = 0x00100000)

In the case that all data are transferred	In the case that data transfer is canceled
The first time: ObjectHandle = 0x00000001 TransferMaxSize = 0x00020000 Terminate = 0x00000000 The second time: ObjectHandle = 0x00000001 TransferMaxSize = 0x00020000 Terminate = 0x00000000 The eighth time (last data acquisition): ObjectHandle = 0x00000001 TransferMaxSize = 0x00020000	The first time: ObjectHandle = 0x00000001 TransferMaxSize = 0x00020000 Terminate = 0x00000000 The second time: ObjectHandle = 0x00000001 TransferMaxSize = 0x00020000 Terminate = 0x00000000 The third time (data transfer is canceled): ObjectHandle = 0x00000001 TransferMaxSize = 0x00020000

Terminate = 0x00000000	Terminate = 0x00000001

The information necessary to maintain this command is released in any of the following cases. When the information is released, the file data is acquired from the beginning even if this command is issued.

- The file data specified by the ObjectHandle has been transferred completely.
- Terminate of this command is set to 1.
- The interval between the response of this command and the next issue of this command exceeds approx. 60 seconds.
  If the file data offset of the response parameter is 0 after the second transfer of divided data and before transfer of all data, it is regarded as a time-out.
- A card has been inserted/ejected regardless of whether the card contains the file data specified by the ObjectHandle or not.
- The following commands are issued during the period of acquisition of file data.
  OpenSession command (subsection 6.2.1.2)
  CloseSession command (subsection 6.2.1.3)
  GetObjectHandles command (subsection 6.2.1.7)
  An object in the card is specified by the GetObjectInfo command (subsection 6.2.1.8).
  An object in the card is specified by the GetObject command (subsection 6.2.1.9).
  An object in the card is specified by the GetThumb command (subsection 6.2.1.10).
  DeleteObject command (subsection 6.2.1.11)
  SendObjectInfo command (subsection 6.2.1.12)
  SendObject command (subsection 6.2.1.13)
  InitiateCapture command (subsection 6.2.1.14)
  FormatStore command (subsection 6.2.1.15)
  SetDevicePropValue command (subsection 6.2.1.18)
  Images in the card are specified by the GetPartialObject command (subsection 6.2.1.19).
  ChangeCameraMode command (subsection 6.2.2.3)
  An object in the card is specified by the GetLargeThumb command (subsection 6.2.2.5).
  Card/Card & SDRAM recording is specified by the InitiateCaptureRecInMedia command (subsection 6.2.2.22).
  StartMovieRecInCard command (subsection 6.2.2.23)
  EndMovieRec command (subsection 6.2.2.24)
  GetObjectPropValue command (subsection 6.2.2.32)
  GetObjectPropList command (subsection 6.2.2.33)

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	TransferMaxSize (Byte)
Parameter3	Terminate

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1, Parameter2, and Parameter3 are not specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Parameter_Not_Supported	Parameter1, Parameter2, and Parameter3 are not specified.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.

Store_Not_Available	The card is being initialized. The card does not exist. The battery level is “Operation disabled status”.
Invalid_Parameter	“Terminate” is neither 0 nor 1.
Invalid_Status	The ApplicationMode property (subsection 6.5.13.1) setting is not valid.

6.2.2.29 CancelImagesInSdram

○ Command Specifications

Operation Code	0x940C
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	None
Data direction	-
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode cancels the transfer of a specific object saved in the SDRAM.

○ Command Details

If the camera receives this command in the camera mode, the camera changes the setting to the host mode, and returns to the camera mode when the command processing is completed.

This command cancels the transfer of the object corresponding to the specified ObjectHandle. For the ObjectHandle, the ObjectHandle passed by the ObjectAddedInSdram event should be specified. When the object corresponding to the specified ObjectHandle has been already sent to the host or deleted, an error response is made.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Device_Busy	The shooting operation is being performed.
	The ObjectAddedInSdram event is not ready for passing.
Invalid_Object_Handle	An object that corresponds to the specified ObjectHandle does not exist.

6.2.2.30 GetObjectPropsSupported

○ Command Specifications

Operation Code	0x9801
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectPropCodeArray
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode acquires an array of codes of the object property supported by the camera.

○ Command Details

The camera sends the Array of the property corresponding to ObjectFormatCode specified by Parameter1.

The format of ObjectPropCodeArray sent by the camera is shown below.

Each field data is stored in the little endian format.

For the supported ObjectPropCode, refer to subsection 6.6.

Field	Size (Byte)	Data
NumElement	4	The element of the array is N (N indicates the number of objects).
ArrayEntry [0]	2	DevicePropCode [0]
ArrayEntry [1]	2	DevicePropCode [1]
ArrayEntry [2]	2	DevicePropCode [2]

ArrayEntry [N - 1]	2	DevicePropCode [N - 1]

The camera supports the following ObjectFormatCodes only. When an ObjectFormatCode that is not supported is specified, an Invalid_ObjectFormatCode response is made and the command is terminated.

PropertyValue	ObjectFormat
0x3000	Undefined
0x3001	Association
0x3006	DPOF
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x380D	TIFF (RGB)

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectFormatCode
Parameter2	None
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 is not specified.
	Parameter2 and/or Parameter3 are specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
ObjectProp_Not_Supported	The specified ObjectFormatCode is not supported.

6.2.2.31 GetObjectPropDesc

○ Command Specifications

Operation Code	0x9802
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectPropDesc data set
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns the ObjectPropDesc data set corresponding to the specified ObjectPropCode and ObjectFormatCode.

○ Command Details

For the supported ObjectPropCodes, refer to subsection 6.6.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectPropCode
Parameter2	ObjectFormatCode
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and Parameter2 are not specified, or Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
ObjectProp_Not_Supported	The specified ObjectPropCode is not supported.
	The specified ObjectFormatCode is not supported.

6.2.2.32 GetObjectPropValue

○ Command Specifications

Operation Code	0x9803
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectPropValue
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns the current value corresponding to the specified ObjectPropCode.

○ Command Details

The camera sends the object property information specified by Parameter2 to the object corresponding to the ObjectHandle specified by Parameter1.

For the supported ObjectPropCode and the details of ObjectPropValue, refer to subsection 6.6.

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	ObjectPropCode
Parameter3	None

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1 and Parameter2 are not specified, or Parameter3 is specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object corresponding to the specified ObjectHandle does not exist, or it indicates an object in the SDRAM.
ObjectProp_Not_Supported	The specified ObjectPropCode is not supported.

6.2.2.33 GetObjectPropList

○ Command Specifications

Operation Code	0x9805
Operation Parameter	Refer to Operation Parameter in this subsection.
Data	ObjectPropList data set
Data direction	From camera to host
Response Code	Refer to Response Code in this subsection.
Response Parameter	None

○ Command Outline

The operation by this OperationCode returns the ObjectPropList data set.

○ Command Details

The camera returns the ObjectPropList data set for the object corresponding to the ObjectHandle specified by Parameter1 and the ObjectPropCode (object property) specified by Parameter3. The target can be identified by specifying the optional Parameter2, Parameter4, and Parameter5.

For the supported ObjectPropCode and the details of ObjectPropValue, refer to subsection 6.6.

Operation Parameter	Value	Details
Parameter1	0x00000000	The objects directly under the root should be the targets.
	ObjectHandle	The object matching with the specified object handle should be the target.
	0xFFFFFFFF	All the objects should be the targets.
Parameter2 (Optional)	ObjectFormatCode	The object with the specified format should be the target.
Parameter3	0x00000000	All the objects with the group code specified by the Parameter4 should be the targets
	ObjectPropCode	The object with the specified property should be the target.
	0xFFFFFFFF	All the objects without the group code of 0xFFFFFFFF should be the targets.
Parameter4 (Optional)	ObjectPropGroupCode	The object with the specified group code should be the target.
Parameter5 (Optional)	0x00000000	Only the object specified by Parameter1 should be the target. If Parameter1 is not specified (0x00000000), the camera returns an empty ObjectPropList data set.
	Depth	All the objects from the objects specified by Parameter1 to the depth specified by Parameter5 should be the targets.
	0xFFFFFFFF	All the objects included in the folder hierarchy of the object specified by Parameter1 should be the targets. If an object of the file is specified in Parameter1, however, only the object specified by Parameter1 should be the target

The format of ObjectPropList sent by the camera is shown below.

Field name	Field order	Size (Byte)	Datatype	Description
NumberOfElements	1	4	UINT32	Four times the number of properties (Nx4)
Element1ObjectHandle	2	4	ObjectHandle	ObjectHandle of the object to which Property 1 is applied
Element1PropertyCode	3	2	Datacode	Datacode that specifies the ObjectPropDesc describing Property 1
Element1Datatype	4	2	Datacode	Specifies DatatypeCode of Property 1.
Element1Value	5	DTS	DTS	Value of Property 1
Element2ObjectHandle	6	4	ObjectHandle	ObjectHandle of the object to which Property 2 is applied
Element2PropertyCode	7	2	Datacode	Datacode that specifies the ObjectPropDesc describing Property 2
Element2Datatype	8	2	Datacode	Specifies DatatypeCode of Property 2.
Element2Value	9	DTS	DTS	Value of Property 2

ElementNValue	N x 4 + 1	DTS	ObjectHandle	Value of Property N

○ Operation Parameter

Operation Parameter	Details
Parameter1	ObjectHandle
Parameter2	[ObjectFormatCode]
Parameter3	ObjectPropCode
Parameter4	[ObjectPropGroupCode]
Parameter5	[Depth]

○ Response Code

Response Code	Description
OK	Normal termination
Parameter_Not_Supported	Parameter1, Parameter2 and Parameter3 are not specified.
Session_Not_Open	The session is not started.
Invalid_TransactionID	The TransactionID retained by the camera differs from the TransactionID specified by the host.
Incomplete_Transfer	The data block transmission fails.
Invalid_Object_Handle	An object corresponding to the specified ObjectHandle does not exist, or it indicates an object in the SDRAM.
Store_Not_Available	The card is being initialized, the card does not exist, or the battery level is “Operation disabled status”.
Invalid_ObjectPropCode	The specified ObjectPropCode is not supported.
Specification_By_Format_Unsupported	The specified ObjectFormatCode is not supported.

6.3 Response Code

The camera returns the response for the processing in the response phase to the command sent from the host to the camera in the command phase. The ResponseCode shows the contents of the response. The relationship between the ResponseCode and the OperationCode sent in the command phase is as shown in subsection 6.2.

The ResponseCodes supported by the camera are shown below.

Response Code	Description	Reference item
0x2001	OK	6.3.1.1
0x2002	General_Error	6.3.1.2
0x2003	Session_Not_Open	6.3.1.3
0x2004	Invalid_TransactionID	6.3.1.4
0x2005	Operation_Not_Supported	6.3.1.5
0x2006	Parameter_Not_Supported	6.3.1.6
0x2007	Incomplete_Transfer	6.3.1.7
0x2008	Invalid_StorageID	6.3.1.8
0x2009	Invalid_Object_Handle	6.3.1.9
0x200A	DeviceProp_Not_Supported	6.3.1.10
0x200B	Invalid_ObjectFormatCode	6.3.1.11
0x200C	Store_Full	6.3.1.12
0x200D	Object_Write_Protect	6.3.1.13
0x200E	Store_Read_Only	6.3.1.14
0x200F	Access_Denied	6.3.1.15
0x2010	No_Thumbnail_Present	6.3.1.16
0x2012	Partial_Deletion	6.3.1.17
0x2013	Store_Not_Available	6.3.1.18
0x2014	Specification_By_Format_Unsupported	6.3.1.19
0x2015	No_Valid_ObjectInfo	6.3.1.20
0x2019	Device_Busy	6.3.1.21
0x201A	Invalid_Parent_Object	6.3.1.22
0x201B	Invalid_DeviceProp_Format	6.3.1.23
0x201C	Invalid_DeviceProp_Value	6.3.1.24
0x201D	Invalid_Parameter	6.3.1.25
0x201E	Session_Already_Open	6.3.1.26
0x2020	Specification_of_Destination_Unsupported	6.3.1.27
0xA001	Hardware_Error	6.3.2.1
0xA002	Out_of_Focus	6.3.2.2
0xA003	Change_CameraMode_Failed	6.3.2.3
0xA004	Invalid_Status	6.3.2.4
0xA006	Wb_Preset_Error	6.3.2.5
0xA007	Dust_Reference_Error	6.3.2.6
0xA008	Shutter_Speed_Bulb	6.3.2.7
0xA009	MirrorUp_Sequence	6.3.2.8
0xA00A	CameraMode_Not_Adjust_Fnumber	6.3.2.9
0xA00B	Not_LiveView	6.3.2.10
0xA00C	MfDrive_Step_End	6.3.2.11
0xA00E	MfDrive_Step_ Insufficiency	6.3.2.12
0xA021	Store_Error	6.3.2.13
0xA022	Store_Unformatted	6.3.2.14
0xA200	Bulb_Release_Busy	6.3.2.15
0xA204	Shutter_Speed_Time	6.3.2.16
0xA801	Invalid_ObjectPropCode	6.3.2.17
0xA802	Invalid_ObjectProp_Format	6.3.2.18
0xA80A	ObjectProp_Not_Supported	6.3.2.19

6.3.1 Standard

6.3.1.1 OK

- **Response specifications**

Response Code	0x2001

- **Response outline**

Indicates that the processing has been terminated normally.

6.3.1.2 General_Error

- **Response specifications**

Response Code	0x2002

- **Response outline**

Indicates that the processing cannot be terminated normally for some reason.

6.3.1.3 Session_Not_Open

- **Response specifications**

Response Code	0x2003

- **Response outline**

Indicates that the session is not started.

6.3.1.4 Invalid_TransactionID

- **Response specifications**

Response Code	0x2004

- **Response outline**

Indicates that the TransactionID retained by the camera differs from the TransactionID specified by the host.

6.3.1.5 Operation_Not_Supported

- **Response specifications**

Response Code	0x2005

- **Response outline**

Indicates that an OperationCode that is not passed by the DeviceInfo data set is specified.

6.3.1.6 Parameter_Not_Supported

- **Response specifications**

Response Code	0x2006

- **Response outline**

Indicates that the specification of a parameter is inappropriate for the requested operation.

6.3.1.7 Incomplete_Transfer

- **Response specifications**

Response Code	0x2007

- **Response outline**

Indicates that the transmission/reception of the data block fails.
When the file access fails in the camera body, the camera may return this response.

6.3.1.8 Invalid_StorageID

- **Response specifications**

Response Code	0x2008

- **Response outline**

Indicates that a StorageID that differs from the StorageID sent by the camera is specified.

6.3.1.9 Invalid_Object_Handle

- **Response specifications**

Response Code	0x2009

- **Response outline**

Indicates that an invalid object handle is specified or the target object does not exist.

6.3.1.10 DeviceProp_Not_Supported

- **Response specifications**

Response Code	0x200A

- **Response outline**

Indicates that a DevicePropCode that is not passed by the DeviceInfo data set is specified.

6.3.1.11 Invalid_ObjectFormatCode

- **Response specifications**

Response Code	0x200B

- **Response outline**

Indicates that the specified ObjectFormatCode is not supported.
It is also used to indicate that the contents specified in the ObjectCompressedSize field of ObjectInfo are not supported with the SendObjectInfo command.

6.3.1.12 Store_Full

- **Response specifications**

Response Code	0x200C

- **Response outline**

Indicates that the object cannot be received with the size of the buffer prepared by the camera with the SendObjectInfo command.

6.3.1.13 Object_Write_Protect

- **Response specifications**

Response Code	0x200D

- **Response outline**

Indicates that the target object is protected.

6.3.1.14 Store_Read_Only

- **Response specifications**

Response Code	0x200E

- **Response outline**

Indicates that a StorageID of the card is specified with the SendObjectInfo command.
The camera does not support the writing to the card from the host.

6.3.1.15 Access_Denied

- **Response specifications**

Response Code	0x200F

- **Response outline**

Indicates that the operation is denied because of the camera status.
This means that the operation will be denied unless the camera status is changed.
It is not an event that means the busy status.

6.3.1.16 No_Thumbnail_Present

- **Response specifications**

Response Code	0x2010

- **Response outline**

Indicates that the target object does not have a thumbnail.

6.3.1.17 Partial_Deletion

- **Response specifications**

Response Code	0x2012

- **Response outline**

Indicates that although the deletion of two or more objects is commanded, only a part of those are deleted.
It may occur when a part of the target objects are protected.

6.3.1.18 Store_Not_Available

- **Response specifications**

Response Code	0x2013

- **Response outline**

Indicates that the card cannot be accessed because the card is being initialized, the card does not exist, or the battery level is “Operation disabled status”.

6.3.1.19 Specification_By_Format_Unsupported

- **Response specifications**

Response Code	0x2014

- **Response outline**

Indicates that the specified ObjectFormatCode is not supported.

6.3.1.20 No_Valid_ObjectInfo

- **Response specifications**

Response Code	0x2015

- **Response outline**

Indicates that the SendObject command is received before the SendObjectInfo command is accepted.

6.3.1.21 Device_Busy

- **Response specifications**

Response Code	0x2019

- **Response outline**

Indicates that the camera is in the busy status.

6.3.1.22 Invalid_Parent_Object

- **Response specifications**

Response Code	0x201A

- **Response outline**

Indicates that an ObjectHandle other than that indicating a directory is specified for a parameter with which an ObjectHandle of the directory should be specified.
It indicates that the specified directory does not exist.

6.3.1.23 Invalid_DeviceProp_Format

- **Response specifications**

Response Code	0x201B

- **Response outline**

Indicates that the size or the format of the DevicePropDesc data set is inappropriate.

6.3.1.24 Invalid_DeviceProp_Value

- **Response specifications**

Response Code	0x201C

- **Response outline**

Indicates that the specified DevicePropValue is out of the permitted range.

6.3.1.25 Invalid_Parameter

○ **Response specifications**

Response Code	0x201D

○ **Response outline**

Indicates that the specified parameter is out of the specifications.

6.3.1.26 Session_Already_Open

○ **Response specifications**

Response Code	0x201E

○ **Response outline**

Indicates that the OpenSession operation is specified with a session already started.
The camera supports only one session.

6.3.1.27 Specification_of_Destination_Unsupported

○ **Response specifications**

Response Code	0x2020

○ **Response outline**

Indicates that the recording destination specified by the SendObjectInfo command is not supported.

6.3.2 Vendor

6.3.2.1 Hardware_Error

○ **Response specifications**

Response Code	0xA001

○ **Response outline**

Indicates that any error that prevents the camera from operating has occurred in the camera body.

6.3.2.2 Out_of_Focus

○ **Response specifications**

Response Code	0xA002

○ **Response outline**

Indicates that the AF operation is terminated with the non-focused status.

6.3.2.3 Change_Cameramode_Failed

○ **Response specifications**

Response Code	0xA003

○ **Response outline**

Indicates that the switching between the camera mode and the host mode failed.

6.3.2.4 Invalid_Status

○ **Response specifications**

Response Code	0xA004

○ **Response outline**

Indicates that the operation is invalid depending on the status of the camera.

6.3.2.5 Wb_Preset_Error

○ **Response specifications**

Response Code	0xA006

○ **Response outline**

Indicates that the preset measurement release failed.

6.3.2.6 Dust_Reference_Error

○ **Response specifications**

Response Code	0xA007

○ **Response outline**

Indicates that the dust reference image release failed.

6.3.2.7 Shutter_Speed_Bulb

○ **Response specifications**

Response Code	0xA008

○ **Response outline**

Indicates that the shutter speed is Bulb.

6.3.2.8 MirrorUp_Sequence

○ **Response specifications**

Response Code	0xA009

○ **Response outline**

Indicates that the cleaning mirror-up operation is being performed.

6.3.2.9 CameraMode_Not_Adjust_Fnumber

○ **Response specifications**

Response Code	0xA00A

○ **Response outline**

Indicates that the shooting mode is set to a mode other than the M mode with the aperture value set to “F--".

6.3.2.10 Not_LiveView

○ **Response specifications**

Response Code	0xA00B

○ **Response outline**

Indicates that the camera is not in the live view status.

6.3.2.11 MfDrive_Step_End

○ **Response specifications**

Response Code	0xA00C

○ **Response outline**

Indicates that the MF driving reaches the termination.

6.3.2.12 MfDrive_Step_ Insufficiency

○ **Response specifications**

Response Code	0xA00E

○ **Response outline**

Indicates that the driving amount is insufficient.

6.3.2.13 Store_Error

- **Response specifications**

Response Code	0xA021

- **Response outline**

Indicates that a card in which a CHA error occurred (damaged card) is included in the inserted cards.

6.3.2.14 Store_Unformatted

- **Response specifications**

Response Code	0xA022

- **Response outline**

Indicates that an unformatted card is included in the inserted cards.

6.3.2.15 Bulb_Release_Busy

- **Response specifications**

Response Code	0xA200

- **Response outline**

Indicates that bulb shooting is being performed.

6.3.2.16 Shutter_Speed_Time

- **Response specifications**

Response Code	0xA204

- **Response outline**

Indicates that the shutter speed is Time.

6.3.2.17 Invalid_ObjectPropCode

- **Response specifications**

Response Code	0xA801

- **Response outline**

Indicates that the specified ObjectPropCode is not supported.

6.3.2.18 Invalid_ObjectProp_Format

- **Response specifications**

Response Code	0xA802

- **Response outline**

Indicates that the size or the type of the specified ObjectProp is not supported.

6.3.2.19 ObjectProp_Not_Supported

Response Specifications

Response Code	0xA80A

Response Outline

Indicates that the specified ObjectProp is valid but the camera doesn't support it.

6.4 Event Code

The EventCodes are used when an event is passed asynchronously from the camera to the host.

The EventCodes supported by the camera are shown below.

Event Code	Description	Reference item
0x4001	CancelTransaction	6.4.1.1
0x4002	ObjectAdded	6.4.1.2
0x4003	ObjectRemoved	6.4.1.3
0x4004	StoreAdded	6.4.1.4
0x4005	StoreRemoved	6.4.1.5
0x4006	DevicePropChanged	6.4.1.6
0x4007	ObjectInfoChanged	6.4.1.7
0x4008	DeviceInfoChanged	6.4.1.8
0x4009	RequestObjectTransfer	6.4.1.9
0x400A	StoreFull	6.4.1.10
0x400C	StorageInfoChanged	6.4.1.11
0x400D	CaptureComplete	6.4.1.12
0xC101	ObjectAddedInSdram	6.4.2.1
0xC102	CaptureCompleteRecInSdram	6.4.2.2
0xC105	RecordingInterrupted	6.4.2.3

For the following EventCodes, however, the events are passed only when the EventCode is acquired by the GetEvent command from the host and the asynchronous event passing by the Interrupt transfer is not performed.

Event Code	Description	Reference item
0x4006	DevicePropChanged	6.4.1.6
0xC101	ObjectAddedInSdram	6.4.2.1
0xC102	CaptureCompleteRecInSdram	6.4.2.2

For sending the event in the application mode, refer to “Application Mode” (subsection 2.4).

6.4.1 Standard

6.4.1.1 CancelTransaction

○ **Event specifications**

Event Code	0x4001
Event Parameter	None

○ **Event outline**

It is used to inform the host that the processing is canceled. However, it is not used in the camera.

6.4.1.2 ObjectAdded

○ **Event specifications**

Event Code	0x4002
Event Parameter	ObjectHandle

○ **Event outline**

It is used to inform the host that a new object is added to the card.

6.4.1.3 ObjectRemoved

○ **Event specifications**

Event Code	0x4003
Event Parameter	ObjectHandle

○ **Event outline**

It is used to inform the host that a specific object in the card is deleted.

6.4.1.4 StoreAdded

○ **Event specifications**

Event Code	0x4004
Event Parameter	StorageID

○ **Event outline**

It is used to inform the host that the card is inserted in the slot in which the card has not been inserted yet.

The StorageID corresponding to the slot in which the card is inserted is passed as an EventParameter.

6.4.1.5 StoreRemoved

○ **Event specifications**

Event Code	0x4005
Event Parameter	StorageID

○ **Event outline**

It is used to inform the host that the card is ejected from the slot in which the card has been inserted.

The StorageID corresponding to the slot in which the card has been inserted is passed as an EventParameter.

It is also used when the card is formatted to inform the host that the card information is invalid. When the formatting is completed, StoreAdded is used to inform the host that the card information is valid.

6.4.1.6 DevicePropChanged

○ **Event specifications**

Event Code	0x4006
Event Parameter	PropertyCode

○ **Event outline**

It is used to inform the host that the setting value of the camera is changed.

The setting value to be passed is that of DevicePropCode defined in subsection 6.5.

If the setting value of the camera is changed by the SetDevicePropValue command from the host, this event is not passed.

When the InterruptIN transfer is used, this event is passed only for the standard property.

When the GetEvent command is used, this event is passed for all the properties.

6.4.1.7 ObjectInfoChanged

○ **Event specifications**

Event Code	0x4007
Event Parameter	ObjectHandle

○ **Event outline**

It is used to inform the host that the ObjectInfo data set corresponding to a specific object in the card has been changed.

6.4.1.8 DeviceInfoChanged

○ **Event specifications**

Event Code	0x4008
Event Parameter	None

○ **Event outline**

It is used to inform the host that the device function is changed.

6.4.1.9 RequestObjectTransfer

○ **Event specifications**

Event Code	0x4009
Event Parameter	ObjectHandle

○ **Event outline**

It is used to request the GetObject operation for the ObjectHandle specified by the parameter.

6.4.1.10 StoreFull

○ **Event specifications**

Event Code	0x400A
Event Parameter	StorageID

○ **Event outline**

It is used to inform the host that the card corresponding to the StorageID becomes full.

This event is passed when the card becomes full by operating the shutter-release button of the camera or by recording the movie.

6.4.1.11 StorageInfoChanged

○ **Event specifications**

Event Code	0x400C
Event Parameter	StorageID

○ **Event outline**

It is used to inform the host that the free area in the card corresponding to the StorageID is changed.

This event is passed when the setting value of the image size or that of the image quality mode is changed.

6.4.1.12 CaptureComplete

○ **Event specifications**

Event Code	0x400D
Event Parameter	TransactionID

○ **Event outline**

It is used to inform the host that the release operation started by the InitiateCapture command or the InitiateCaptureRecInMedia command is completed.

6.4.2 Vendor

6.4.2.1 ObjectAddedInSdram

○ **Event specifications**

Event Code	0xC101
Event Parameter	ObjectHandle

○ **Event outline**

It is used to inform the host that a new object is added to the SDRAM (transmission of the image data to the host becomes enabled).

The ObjectHandle of the new object is passed as an EventParameter.

If the USB cutting occurs with the image data of the recording destination SDRAM saved in the SDRAM and then it is reconnected, the event is passed again.

The asynchronous event is not sent for this event and it can be acquired by the GetEvent command only.

6.4.2.2 CaptureCompleteRecInSdram

○ **Event specifications**

Event Code	0xC102
Event Parameter	None

○ **Event outline**

It is used to inform the host that all the image data acquired by the release operation started by the InitiateCaptureRecInSdram, the AfAndCaptureRecInSdram or the InitiateCaptureRecInMedia command, or by the shutter-release button of the camera is sent to the host completely.

The asynchronous event is not sent for this event and it can be acquired by the GetEvent command only.

6.4.2.3 RecordingInterrupted

○ **Event specifications**

Event Code	0xC105
Event Parameter	ErrorCode

○ **Event outline**

It is used to inform the host that the movie recording is interrupted.

The interruption cause type is passed as an EventParameter.

The asynchronous event is not sent for this event and it can be acquired by the GetEvent command only.

ErrorCode	Interruption cause
0x00000001	A certain error
0x00000002	Low-speed card error

6.5 DevicePropCode

The camera has an attribute that can be changed as an option. The change is made by operating the device property. The property shows the device characteristics. Each property has a corresponding DevicePropCode.

When the setting value of each defined property is changed, the camera sends the DevicePropChanged event including the DevicePropCode in order to inform the host of the change. The camera sends the event as shown below.

No.	Description
1	When detecting a DeviceProperty whose value is changed, the camera sends the DevicePropChanged event in order to inform the host of the change. When detecting changes in two or more DeviceProperties, the camera sends the DevicePropChanged event for all the DeviceProperties in succession.
2	When the setting value of the DeviceProperty is changed by the SetDevicePropValue command, the camera does not send the DevicePropChanged event including the changed DevicePropCode. However, if any other DeviceProperty is changed under the influence of the change of the DevicePropCode, the camera sends the DevicePropChanged event for the property immediately. For example, if the aperture value is changed by the SetDevicePropValue command when shooting is performed in the A mode (aperture priority), the camera changes the shutter speed automatically. In this case, the camera sends the DevicePropChanged event for the shutter speed.

The error response is made to GetDevicePropDesc, GetDevicePropValue, and SetDevicePropValue as shown below.

No.	Description
1	When either or both of getting/setting are invalid depending on the setting status of the camera for each property, the response of the ResponseCode corresponding to the invalid status is made.
2	When setting is performed for the property that supports getting only, the Access_Denied error response is made.

Sometimes another event needs to be issued after the DevicePropChanged event depending on the type of the PropertyCode. It is described in the explanation for each PropertyCode.

The properties whose values cannot be set during live view or movie recording are described in the following table of DevicePropCodes instead of Response Code of each property. If a value is set to a DevicePropertyCode that is not shown in the table, the Access_Denied response is made. For the items marked with “Yes” followed by * in the table below, the Access_Denied response is made depending on the combination of each item and specific conditions, and the value cannot be set. For the details of the conditions, refer to each property.

The DevicePropCodes supported by the camera are shown below.

settable: Can be set, -: Cannot be set

Property Code	Description	Reference item	Live view	During movie recording
0x5001	BatteryLevel	6.5.1.1		
0x5003	ImageSize	6.5.1.2	settable	-
0x5004	CompressionSetting	6.5.1.3	settable	-
0x5005	WhiteBalance	6.5.1.4	settable	-
0x5007	Fnumber	6.5.1.5	settable	settable
0x5008	FocalLength	6.5.1.6		
0x500A	FocusMode	6.5.1.7		
0x500B	ExposureMeteringMode	6.5.1.8	settable	-
0x500C	FlashMode	6.5.1.9	settable	-
0x500D	ExposureTime	6.5.1.10	settable	settable
0x500E	ExposureProgramMode	6.5.1.11	settable	-
0x500F	ExposureIndex	6.5.1.12	settable	settable
0x5010	ExposureBiasCompensation	6.5.1.13	settable	settable
0x5011	DateTime	6.5.1.14	settable	-
0x5013	StillCaptureMode	6.5.1.15	settable	-

0x5018	BurstNumber	6.5.1.16	settable	-
0x501C	FocusMeteringMode	6.5.1.17	-	-
0x501E	Artist	6.5.1.18		
0x501F	Copyright	6.5.1.19		
0xD015	ResetShootingMenu	6.5.2.1	settable	-
0xD017	WbTuneAuto	6.5.2.2	settable	-
0xD018	WbTuneIncandescent	0	settable	-
0xD019	WbTuneFluorescent	6.5.2.6	settable	-
0xD01A	WbTuneSunny	6.5.2.7	settable	-
0xD01B	WbTuneFlash	6.5.2.8	settable	-
0xD01C	WbTuneCloudy	6.5.2.9	settable	-
0xD01D	WbTuneShade	6.5.2.10	settable	-
0xD01F	WbPresetDataNo	6.5.2.11	settable	-
0xD025	WbPresetDataValue0	6.5.2.12		
0xD026	WbPresetDataValue1	6.5.2.13		
0xD032	ColorSpace	6.5.2.14	settable	-
0xD037	EffectMode	6.5.6.2	settable	-
0xD045	ResetCustomSetting	6.5.3.1	settable	-
0xD048	DynamicAFonAFC	6.5.3.2	-	-
0xD053	EnableCopyright	6.5.4.6	settable	-
0xD054	ISOAutoControl	6.5.2.22	settable	-
0xD056	ExposureEVStep	6.5.3.5	settable	-
0xD05D	AfAtLiveView	6.5.6.19	settable	-
0xD061	AfModeAtLiveView	6.5.6.18	settable	-
0xD066	AutoOffTime	6.5.3.6	settable	-
0xD06A	ExposureDelay	6.5.3.7	settable	-
0xD06B	NoiseReduction	6.5.2.19	settable	-
0xD06C	NumberingMode	6.5.3.8	settable	-
0xD070	NoiseReductionHiIso	0	settable	-
0xD072	ArtistV	6.5.4.4	settable	-
0xD073	CopyrightV	6.5.4.5	settable	-
0xD078	BracketingType	6.5.3.9	settable	-
0xD08A	EnableShutter	0	settable	-
0xD08D	EnableAFAreaPoint	6.5.3.3	-	-
0xD08F	ImageSensorCleaning	6.5.4.1	-	-
0xD090	CommentString	6.5.4.2	settable	-
0xD091	EnableComment	6.5.4.3	settable	-
0xD092	OrientationSensorMode	6.5.6.4	settable	-
0xD09C	RetractableLensWarning	6.5.10.8		
0xD0A0	MovieRecordScreenSize	6.5.2.26	settable	-
0xD0A2	MovieRecordMicrophoneLevel	6.5.2.28	settable	-
0xD0A4	MovieRecProhibitionCondition	6.5.6.20		
0xD0A6	ManualSettingOfMovie	6.5.2.30	settable	-
0xD0A7	MovieRecordQuality	6.5.2.27	settable	-
0xD0A8	MovieRecordMicrophoneLevelValue	6.5.2.29	settable	-
0xD0AA	MovieWindNoiseReduction	6.5.2.31	settable	-
0xD0B5	ISOControlSensitivity	6.5.6.23		
0xD0C0	EnableBracketing	6.5.7.1	settable	-
0xD0C1	AEBracketingStep	6.5.7.2	settable	-
0xD0C2	AEBracketingPattern	6.5.7.3		
0xD0C3	AEBracketingCount	6.5.7.4		
0xD0C4	WBBracketingStep	6.5.7.5	settable	-
0xD0C5	WBBracketingPattern	6.5.7.6		
0xD0C6	ADLBracketingPattern	6.5.7.7		
0xD0E0	LensID	6.5.10.3		
0xD0E1	LensSort	6.5.10.1		
0xD0E2	LensType	6.5.10.2		
0xD0E3	LensFocalMin	6.5.10.4		
0xD0E4	LensFocalMax	6.5.10.5		
0xD0E5	LensApatureMin	6.5.10.6		
0xD0E6	LensApatureMax	6.5.10.7		
0xD0F7	VignetteControl	6.5.2.17	settable	-
0xD0F8	AutoDistortion	0	settable	-
0xD0F9	SceneMode	6.5.6.1	settable	-

0xD100	ShutterSpeed	6.5.6.9	settable	settable
0xD101	ExternalDC-IN	6.5.5.1		
0xD102	WarningStatus	6.5.6.15		
0xD104	AFLockStatus	6.5.6.8		
0xD105	AELockStatus	6.5.6.7		
0xD108	FocusArea	6.5.6.11	-	-
0xD109	FlexibleProgram	6.5.6.10	settable	settable
0xD10B	RecordingMedia	6.5.6.5	settable	-
0xD10E	Orientation	6.5.6.3		
0xD120	ExternalSpeedLightExist	6.5.9.1		
0xD121	ExternalSpeedLightStatus	6.5.9.3		
0xD122	ExternalSpeedLightSort	6.5.9.2		
0xD124	FlashCompensation	6.5.9.5		
0xD125	NewExternalSpeedLightMode	6.5.9.4		
0xD126	InternalFlashCompensation	6.5.8.3	settable	-
0xD12D	ExternalSpeedLightMultiFlashMode	6.5.9.6		
0xD130	HDRMode	6.5.2.16	settable	-
0xD149	RawCompressionBitMode	6.5.2.2	settable	-
0xD14E	Active-D-Lighting	0	settable	-
0xD14F	WbTuneFluorescentType	6.5.2.5	settable	-
0xD161	AFModeSelect	6.5.6.17	-	-
0xD163	AFSubLight	6.5.3.4	-	-
0xD164	ISOAutoShutterTime	6.5.2.24	settable	-
0xD167	InternalFlashMode	6.5.3.9	settable	-
0xD16A	ISOAutoSetting	6.5.2.21	settable	-
0xD183	ISOAutoHighLimit	6.5.2.23	settable	-
0xD1A2	LiveViewStatus	6.5.11.1		
0xD1A3	LiveViewImageZoomRatio	6.5.11.2	settable	-
0xD1A4	LiveViewProhibitionCondition	6.5.11.3		
0xD1AC	LiveViewImageSize	6.5.11.4	settable	-
0xD1B0	ExposureDisplayStatus	6.5.6.12		
0xD1B1	ExposureIndicateStatus	6.5.6.13		
0xD1B2	InfoDisplayErrorStatus	6.5.6.16		
0xD1B3	ExposureIndicateLightup	6.5.6.14		
0xD1B4	ContinuousShootingCount	6.5.6.21		
0xD1B5	AutoSceneModeStatus	6.5.6.22		
0xD1C0	InternalFlashPopup	6.5.8.1		
0xD1C1	InternalFlashStatus	6.5.8.2		
0xD1F0	ApplicationMode	6.5.13.1	settable	-
0xD1F1	ExposureRemaining	6.5.6.6		
0xD1F4	ISOAutoShutterTimeCorrectionValue	6.5.2.25	settable	-
0xD200	ActivePicCtrlItem	6.5.12.1	settable	-
0xD201	ChangePicCtrlItem	6.5.12.2		
0xD303	UseDeviceStageFlag	6.5.14.3		
0xD406	SessionInitiatorVersionInfo	6.5.14.1	-	-
0xD407	PerceivedDeviceType	6.5.14.2		

6.5.1 Standard

6.5.1.1 BatteryLevel

○ Property Specifications

Property Code	0x5001
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	100 [100 %]
Property Value	From 1 [1 %] to 100 [100 %]

○ Property Outline

Indicates “Remaining battery level” of the camera.

○ Property Details

When the battery level is reduced, the PropertyValues sent by the camera are: 1%, 5%, 20%, 35%, and 100% only.

The relationship between the PropertyValue and the remaining battery level display is shown below.

Property Value	Remaining battery level display
100	Remaining battery charge sufficient level
35	Battery charge remaining level
20	Battery replacement warning level
5	Shooting prohibited level
1	Back TFT display prohibited level

When the remaining battery level is the shooting prohibited level, the following settings are made.

No.	Description
1	The WarningStatus property (subsection 6.5.6.15) is set to “Battery insufficient”.
2	The LiveViewProhibitionCondition property (subsection 6.5.11.3) is set to “During insufficiency of battery”.

6.5.1.2 ImageSize

○ Property Specifications

Property Code	0x5003
DataType	String
Description form	Enumeration
Get / Set	Get / Set
Default Value	6000x4000 [Size L]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Image size” that is set in the camera.

○ Property Value

The valid PropertyValues are shown below.

PropertyValue	Description
6000x4000	Size L
4496x3000	Size M
2992x2000	Size S

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The CompressionSetting property (subsection 6.5.1.3) is set to [RAW].
	During INFO warning

6.5.1.3 CompressionSetting

○ Property Specifications

Property Code	0x5004
DataType	UINT8
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x01 [JPEG (NORMAL)]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Image quality mode” that is set in the camera.

○ Property Details

This property indicates the control value in the camera, not a setting value in the menu. This is a value including RAW when the Plus RAW function is valid.

When StorageInfoDataSet (subsection 9.2) is changed according to the change of this property, the StorageInfoChanged event (subsection 6.4.1.11) is issued.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x00	JPEG (BASIC)
0x01	JPEG (NORMAL)
0x02	JPEG (FINE)
0x04	RAW
0x05	RAW + JPEG (BASIC)
0x06	RAW + JPEG (NORMAL)
0x07	RAW + JPEG (FINE)

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	When the HDRMode property (subsection 6.5.2.16) is set to anything other than [OFF], RAW or RAW+JPEG (BASIC/NORMAL/FINE) is set.
	When the ExposureProgramMode property (subsection 6.5.1.11) is [Effects (Miniature, Selective color, Night vision, Toy camera, Super vivid, Pop or Photo illustration)], RAW or RAW+JPEG (BASIC/NORMAL/FINE) is set.
	During INFO warning

6.5.1.4 WhiteBalance

○ Property Specifications

Property Code	0x5005
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x0002 [Auto]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “White Balance” that is set in the camera.

○ Property Details

Although [K] is displayed on the camera body when Candlelight or Dusk/dawn in Scene mode is set, Auto is returned for the value of this property.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0002	Auto
0x0004	Sunny
0x0005	Fluorescent
0x0006	Incandescent
0x0007	Flash
0x8010	Cloudy
0x8011	Shade
0x8013	Preset manual

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	During INFO warning

6.5.1.5 Fnumber

○ Property Specifications

Property Code	0x5007
DataType	UINT16
Description form	Enumeration
Get / Set	Get, Get / Set
Default Value	(Minimum value in the setting range)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Aperture value” with the CPU internal lens mounted.

○ Property Details

When the LensType property (subsection 6.5.10.2) is set to a value other than [G-type lens], the PropertyValue shall be 1 EV irrespective of the value of the ExposureEVStep property (subsection 6.5.3.5).

When the LensSort property (subsection 6.5.10.1) is [Not mounted], the enumeration cannot be created. Therefore the number of enumeration values shall be 1 and the enumeration value, the DefaultValue, and the PropertyValue shall be the same value. The value shall be 1 EV except the maximum aperture value.

If an aperture value error occurs, the number of enumeration values shall be 1 and the enumeration value, the DefaultValue, and the PropertyValue shall be 0xFFFF.

○ Property Value

The PropertyValue should be a hundred times the aperture value.

The PropertyValue changes depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

The setting range of PropertyValue changes depending on the lens and the magnification setting.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [P], [S], [Scene mode], or [Special effect mode].
	The LensSort property (subsection 6.5.10.1) is [Not mounted].
	The WarningStatus property (subsection 6.5.6.15) is [Sequence error].
	The RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On].

6.5.1.6 FocalLength

○ Property Specifications

Property Code	0x5008
DataType	UINT32
Description form	Range
Get / Set	Get
Default Value	(Minimum value in the setting range)
Property Value	The value of a hundred times the focal length

○ Property Outline

Indicates “Focal length” with the CPU internal lens mounted.

○ Property Details

The setting range of PropertyValue changes depending on the lens and the magnification setting.
When the LensSort property (subsection 6.5.10.1) is [Not mounted], the PropertyValue is not fixed.

6.5.1.7 FocusMode

○ Property Specifications

Property Code	0x500A
DataType	UINT16
Description form	Enumeration
Get / Set	Get
Default Value	0x8012 [AF-A]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Focus mode” that is set in the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description	AF type for using the value
0x0001	Manual focus	Phase contrast AF / Contrast AF
0x8010	Single AF servo	Phase contrast AF / Contrast AF
0x8011	Continuous AF servo	Phase contrast AF
0x8012	AF servo mode automatic switching	Phase contrast AF
0x8013	Constant AF servo	Contrast AF

* Phase contrast AF: Viewfinder shooting, Contrast AF: Live view

6.5.1.8 ExposureMeteringMode

○ Property Specifications

Property Code	0x500B
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x0003 [Multi-pattern metering]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Metering mode” that is set in the camera.

○ Property Details

When the LensSort property (subsection 6.5.10.1) is [Not mounted], the camera operates with [Center-weighted metering].

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0002	Center-weighted metering
0x0003	Multi-pattern metering
0x0004	Spot metering

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	AELockStatus (subsection 6.5.6.7) is [Locked].
	The LensSort property (subsection 6.5.10.1) is [Not mounted].
	The LiveViewImageZoomRatio property (subsection 6.5.11.2) is set to anything other than [Entire display].

6.5.1.9 FlashMode

○ Property Specifications

Property Code	0x500C
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x8010 [Front curtain sync]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Synchronization mode” that is set in the camera.

○ Property Details

If Rear curtain sync is set when the ExposureProgramMode property (subsection 6.5.1.11) is set to P/S/A/M and the NewExternalSpeedLightMode property (subsection 6.5.9.4) is set to Multi-flash, Front curtain sync is set.

The camera display status depends on the value of the ExposureProgramMode property (subsection 6.5.1.11). For the Scene Auto Selector mode, however, it depends on the value of the scene selected by the camera in the AutoSceneModeStatus property (subsection 6.5.6.22). In addition, it also differs according to the internal flash/external flash condition.

When the HDRMode property (subsection 6.5.2.16) is set to anything other than [OFF], this property is set to [Flash off].

The camera display status with the internal flash firing is shown below.
The description in parentheses of AUTO indicates the selected result of Scene Auto Selector. When the LV is not performed (still image), AUTO (Auto) is set.
When the ExposureProgramMode property (subsection 6.5.1.11) is set to [Flash off AUTO] and the camera enters the Scene Auto Selector mode, only Flash off is set.

Shooting mode or selected scene	Front curtain sync	Slow sync	Rear curtain sync	Red-eye reduction	Red-eye reduction slow sync	Flash off
P/A	Front curtain sync (*1)	Slow sync	Rear curtain slow sync	Red-eye reduction (*1)	Red-eye reduction slow sync (*2)	-
S/M	Front curtain sync (*1)	-	Rear curtain sync	Red-eye reduction (*1)	-	-
AUTO (Auto/ Portrait/Close up) Portrait Close up Child Party/indoor Pet portrait Toy camera Super vivid Pop Photo illustration	Auto	-	-	Red-eye reduction auto	-	Flash off
AUTO(Landscape) Landscape Sports Night landscape Beach/snow Sunset Dusk/dawn Candlelight Blossom Autumn colors Silhouette High key Low key Miniature effect	-	-	-	-	-	Flash off
AUTO (Night portrait) Night portrait	-	Auto slow	-	-	Red-eye reduction auto slow	Flash off
Flash off AUTO Selective color Night vision	-	-	-	-	-	Flash off
Food	Front curtain sync	-	-	-	-	-

*1: If the property is got with the LCD monitor display “None”, the response of the front curtain sync (0x8010) is made.
*2: If the property is got with the LCD monitor display “Slow sync”, the response of the slow sync (0x8011) is made.

The camera display status with the external flash firing is shown below.
The description in parentheses of AUTO indicates the selected result of Scene Auto Selector. When the LV is not performed (still image), AUTO (Auto) is set.
When the ExposureProgramMode property (subsection 6.5.1.11) is set to [Flash off AUTO] and the camera enters the Scene Auto Selector mode, only Flash off is set.

Shooting mode or selected scene	Front curtain sync	Slow sync	Rear curtain sync	Red-eye reduction	Red-eye reduction slow sync	Flash off
P/A	Front curtain sync	Slow sync	Rear curtain slow sync	Red-eye reduction	Red-eye reduction slow sync	-
S/M	Front curtain sync	-	Rear curtain sync	Red-eye reduction	-	-
AUTO (Auto/ Portrait/Landscape /Close up) Portrait Close up Child Party/indoor Pet portrait Toy camera Super vivid Pop Photo illustration	Front curtain sync	-	-	Red-eye reduction	-	-
Landscape Sports Night landscape Beach/snow Sunset Dusk/dawn Candlelight Blossom Autumn colors Silhouette High key Low key Miniature effect	Front curtain sync	-	-	Red-eye reduction	-	-
AUTO (Night portrait) Night portrait	-	Slow sync	-	-	Red-eye reduction slow sync	-
Flash off AUTO Selective color Night vision	-	-	-	-	-	Flash off
Food	Front curtain sync	-	-	-	-	-

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0002	Flash off
0x0004	Red-eye reduction
0x8010	Front curtain sync
0x8011	Slow sync
0x8012	Rear curtain sync
0x8013	Red-eye reduction slow sync

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The HDRMode property (subsection 6.5.2.16) is set to anything other than [OFF].
	The ExposureProgramMode property (6.5.1.11) is set to [Flash off AUTO], [Scene (Food)] or [Effects (Night vision, Selective color)].

6.5.1.10 ExposureTime

○ Property Specifications

Property Code	0x500D
DataType	UINT32
Description form	Enumeration
Get / Set	Get, Get / Set
Default Value	(Minimum value in the setting range)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Shutter speed” that is set in the camera.

○ Property Details

When the ExposureProgramMode property (subsection 6.5.1.11) is M, the following values are added to the enumerated value. In the case of S, a value corresponding to the current value of bulb shooting/time shooting is added to the enumerated value.

PropertyValue	Use	Condition in which the value can be set
0xFFFFFFFF	Bulb shooting	ExposureProgramMode is M
0xFFFFFFFD	Time shooting	ExposureProgramMode is M

Because the unit of the PropertyValue is 1/10000, a rounding occurs in some range.
In this case, refer to the table below.
EV in parentheses shows the exposure setting step range (ExposureEVStep property (subsection 6.5.3.5)).

PropertyValue	Shutter speed	
	Get	Set
2	1/5000 (1/3 EV) 1/4000 (1/3 EV, 1/2 EV)	1/4000
3	1/3200 (1/3 EV) 1/3000 (1/2 EV)	1/3200 (1/3 EV) 1/3000 (1/2 EV)
6	1/1600 (1/3 EV) 1/1500 (1/2 EV)	1/1600 (1/3 EV) 1/1500 (1/2 EV)

If there is a change in the enumerated values, the enumerated values and the DefaultValue are updated.
When the precise shutter speed should be acquired, use the ShutterSpeed property (subsection 6.5.6.9).

○ Property Value

The valid PropertyValues are shown below. (Excluding bulb shooting and time shooting)

Shutter speed x 10000 [unit: 1/10000 sec.]

(Example) Shutter speed 1/250 sec.: PropertyValue = 40

When the ManualSettingOfMovie property (subsection 6.5.2.30) is set to [On], the ExposureProgramMode property (subsection 6.5.1.11) is M, and the live view is being performed, the valid range of PropertyValue is changed as shown below.

Frame rate	Shutter speed
24p, 25p, 30p	From 1/4000 to 1/30
50p	From 1/4000 to 1/50
60p	From 1/4000 to 1/60

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [P], [A], [Scene mode], or [Special effect mode].
	The WarningStatus property (subsection 6.5.6.15) is [Sequence error].
	The RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On].
	Bulb shooting or time shooting is set when the ExposureProgramMode property (subsection 6.5.1.11) is [S].
	Bulb shooting or time shooting is set when the HDRMode property (subsection 6.5.2.16) is set to anything other than [OFF].

6.5.1.11 ExposureProgramMode

○ Property Specifications

Property Code	0x500E
DataType	UINT16
Description form	Enumeration
Get / Set	Get, Get / Set
Default Value	0x8010 [AUTO]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Shooting mode” that is set in the camera.

○ Property Details

The property can be set only while the camera is switched to the host mode by the ChangeCameraMode command (subsection 6.2.2.3).

If the value of PropertyValue is changed during the host mode, the changed value is canceled when the mode is switched to the camera mode by the ChangeCameraMode command (subsection 6.2.2.3). (Refer to subsection 2.3.)

When the shooting mode is set to [SCENE], the scene mode that is set in the SceneMode property (subsection 6.5.6.1) is used. The scene mode that can be set in the SceneMode property (subsection 6.5.6.1) is the same “Scene mode” as that in this property. They differ only in the setting method.

When the shooting mode is set to [EFFECTS], the mode that is set in the EffectMode property (subsection 6.5.6.2) is used.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0001	[M] Manual
0x0002	[P] Program auto
0x0003	[A] Aperture priority auto
0x0004	[S] Shutter priority auto
0x8010	[Scene mode] AUTO
0x8016	[Scene mode] Flash off AUTO
0x8018	[Scene mode] SCENE
0x8019	[Special effect mode] EFFECTS

6.5.1.12 ExposureIndex

○ Property Specifications

Property Code	0x500F
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x0064 [100]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “ISO sensitivity” that is set in the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0064	100
0x007D	125
0x00A0	160
0x00C8	200
0x00FA	250
0x0140	320
0x0190	400
0x01F4	500
0x0280	640
0x0320	800
0x03E8	1000
0x04E2	1250
0x0640	1600
0x07D0	2000
0x09C4	2500
0x0C80	3200
0x0FA0	4000
0x1388	5000
0x1900	6400
0x1F40	8000
0x2710	10000
0x3200	12800
0x3E80	16000
0x4E20	20000
0x6400	25600

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is AUTO/Flash off AUTO/EFFECT (Night vision).
	During INFO warning

6.5.1.13 ExposureBiasCompensation

○ Property Specifications

Property Code	0x5010
DataType	INT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0 [0.0 EV]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the compensation value of “Exposure compensation” that is set in the camera.

○ Property Value

The valid PropertyValues are shown below.

The value of PropertyValue changes depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

Property Value	Description	ExposureEVStep property (6.5.3.5)	
		1/3 step	1/2 step
+5000	+5.0 EV	Yes	Yes
+4666	+4.7 EV	Yes	-
+4500	+4.5 EV	-	Yes
+4333	+4.3 EV	Yes	-
+4000	+4.0 EV	Yes	Yes
+3666	+3.7 EV	Yes	-
+3500	+3.5 EV	-	Yes
+3333	+3.3 EV	Yes	-
+3000	+3.0 EV	Yes	Yes
+2666	+2.7 EV	Yes	-
+2500	+2.5 EV	-	Yes
+2333	+2.3 EV	Yes	-
+2000	+2.0 EV	Yes	Yes
+1666	+1.7 EV	Yes	-
+1500	+1.5 EV	-	Yes
+1333	+1.3 EV	Yes	-
+1000	+1.0 EV	Yes	Yes
+ 666	+0.7 EV	Yes	-
+ 500	+0.5 EV	-	Yes
+ 333	+0.3 EV	Yes	-
0	0.0 EV	Yes	Yes
- 333	-0.3 EV	Yes	-
- 500	-0.5 EV	-	Yes
- 666	-0.7 EV	Yes	-
-1000	-1.0 EV	Yes	Yes
-1333	-1.3 EV	Yes	-
-1500	-1.5 EV	-	Yes
-1666	-1.7 EV	Yes	-
-2000	-2.0 EV	Yes	Yes
-2333	-2.3 EV	Yes	-
-2500	-2.5 EV	-	Yes
-2666	-2.7 EV	Yes	-
-3000	-3.0 EV	Yes	Yes
-3333	-3.3 EV	Yes	-
-3500	-3.0 EV	-	Yes
-3666	-3.7 EV	Yes	-
-4000	-4.0 EV	Yes	Yes
-4333	-4.3 EV	Yes	-
-4500	-4.5 EV	-	Yes

-4666	-4.7 EV	Yes	-
-5000	-5.0 EV	Yes	Yes

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [AUTO], [Flush off AUTO] or [Special effect mode] (except Night vision).
	During INFO warning

6.5.1.14 DateTime

○ Property Specifications

Property Code	0x5011
DataType	String
Description form	None
Get / Set	Get / Set
Default Value	20160101T000000 [00:00:00, Jan. 1, 2016]
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Date and time” that is set in the camera.

○ Property Details

The format of PropertyValue is a Unicode string of “YYYYMMDDThhmmss” where YYYY is the year, MM is the month, DD is the day of the month, T is a constant character, hh is the hours, mm is the minutes, and ss is the seconds past the minute, in accordance with the ISO8601 standards.

The PropertyValue is the date and time obtained by “UTC + difference in time with the current place setting + summer time”.

The setting range of PropertyValue is from 20000101T000000 to 20991231T235959.

The format of PropertyValue is shown below.

Field	Size (Byte)	Data	Description
NumChar	1	0x10	The number of characters in the string. It is sixteen (including the null character).
StringChars	32		Unicode string “YYYYMMDDThhmmss”

6.5.1.15 StillCaptureMode

○ Property Specifications

Property Code	0x5013
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x0001 [Single-frame shooting (S)]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Release mode” that is set in the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0001	Single-frame shooting (S)
0x0002	Continuous high-speed shooting (CH)
0x8010	Continuous low-speed shooting (CL)
0x8011	Self-timer
0x8016	Quiet shooting

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	During INFO warning

6.5.1.16 BurstNumber

○ Property Specifications

Property Code	0x5018
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	1 [One frame]
Property Value	From 1 [One frame] to 100 [100 frames]

○ Property Outline

Indicates “The number of continuous shooting frames” captured by the command.

○ Property Details

The setting range of PropertyValue changes depending on the values of the ImageSize property (subsection 6.5.1.2) and the CompressionSetting property (subsection 6.5.1.3). However, the value of PropertyValue does not change.

If the value of PropertyValue exceeds its setting range, the continuous shooting is performed only until the maximum number of frames in the setting range is reached.

When the EnableBracketing property (subsection 6.5.7.1) is set to [On] and the bracketing is performed with continuous shooting, the value of this property must be changed. However, even if a value exceeding the number of bracketing frames is set, the continuous shooting is performed only until the number of bracketing frames is reached.

6.5.1.17 FocusMeteringMode

○ Property Specifications

Property Code	0x501C
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	0x8011 [Auto area AF mode]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “AF area mode” that is set in the camera. This property is used for the phase contrast AF (viewfinder shooting).

○ Property Details

If an AF area mode that cannot be set/used in AF-S is set with the AFModeSelect property (subsection 6.5.6.17) set to [AF-C] and then switched to AF-S, the single point AF mode is specified. Then, if AFMode is switched to AF-C, the AF area mode that is set before switching to AF-S is specified. If the AF area mode is set after switching from AF-C to AF-S, the AF area mode set by AF-S is specified even if AFMode is switched to AF-C.

If the ExposureProgramMode property (subsection 6.5.1.11) is changed from PSAM to Scene mode/Special effect mode or from a Scene mode/Special effect mode to another Scene mode/Special effect mode, the PropertyValue is set to the AF area mode for each Scene mode/Special effect mode automatically. If it is changed from a Scene mode/Special effect mode to PSAM, the PropertyValue is set to the value that is set by PSAM before changing to the Scene mode/Special effect mode. The PropertyValue can be changed in the Scene mode/Special effect mode.

Scene mode	AF area mode
AUTO Flash off AUTO Portrait Landscape Child Night portrait Night landscape Party/indoor Beach/snow Sunset Dusk/dawn Blossom Autumn colors Selective color Toy camera Super vivid Pop Photo illustration	Auto area AF mode
Close up Candlelight Food Silhouette High key Low key	Single point AF mode
Night vision Miniature effect	Single point AF mode (Setting cannot be changed.)
Sports Pet portrait	Dynamic AF mode (39 points)

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description	AFMode that can be set/used		
		AF-S	AF-C	AF-A
0x0002	Dynamic AF mode (9 points)	-	Yes	Yes
0x8010	Single point AF mode	Yes	Yes	Yes
0x8011	Auto area AF mode	Yes	Yes	Yes
0x8012	3D-tracking	-	Yes	Yes
0x8013	Dynamic AF mode (21 points)	-	Yes	Yes
0x8014	Dynamic AF mode (39 points)	-	Yes	Yes

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The AFModeSelect property (subsection 6.5.6.17) is [Manual focus].
	The LensSort property (subsection 6.5.10.1) is [Not mounted].
	The ExposureProgramMode property (6.5.1.11) is set to [Effects (Miniature/Night vision)].
	A setting that is not described in “AFMode that can be set/used” column in the above table is specified.

6.5.1.18 Artist

○ Property Specifications

Property Code	0x501E
DataType	String
Description form	None
Get / Set	Get
Default Value	NULL (0x00) character
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Artist” that is set in the camera.

○ Property Details

For setting “Artist”, the ArtistV property (subsection 6.5.4.4) should be used.

The PropertyValue is an optional string of 36 characters or shorter (not including the null character).

If the artist is not set in the camera, the value is zero length string (not including the null character).

6.5.1.19 Copyright

○ Property Specifications

Property Code	0x501F
DataType	String
Description form	None
Get / Set	Get
Default Value	NULL (0x00) character
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Copyright” that is set in the camera.

○ Property Details

For setting “Copyright”, the CopyrightV property (subsection 6.5.4.5) should be used.

The PropertyValue is an optional string of 54 characters or shorter (not including the null character).

If the copyright is not set in the camera, the value is zero length string (not including the null character).

6.5.2 Vendor (Shooting Menu)

6.5.2.1 ResetShootingMenu

○ Property Specifications

Property Code	0xD015
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Not reset]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Reset shooting menu” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not reset
1	Reset (for setting only)

6.5.2.2 RawCompressionBitMode

○ Property Specifications

Property Code	0xD149
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1 [14-bit recording]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “NEF (RAW) recording - Recording bit mode” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	12-bit recording
1	14-bit recording

6.5.2.3 WbTuneAuto

○ Property Specifications

Property Code	0xD017
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance - Auto” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.4 WbTuneIncandescent

○ Property Specifications

Property Code	0xD018
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance - Incandescent” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.5 WbTuneFluorescentType

○ Property Specifications

Property Code	0xD14F
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	3 [White fluorescent lamp]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the light source of “White balance - Fluorescent” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Sodium lamp mixed light
1	Cool white fluorescent lamp
2	Warm white fluorescent lamp
3	White fluorescent lamp
4	Day white fluorescent lamp
5	Daylight fluorescent lamp
6	High color-temperature mercury lamp

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.6 WbTuneFluorescent

○ Property Specifications

Property Code	0xD019
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance - Fluorescent” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.7 WbTuneSunny

○ Property Specifications

Property Code	0xD01A
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance – Direct sunlight” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.8 WbTuneFlash

○ Property Specifications

Property Code	0xD01B
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance - Flash” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.9 WbTuneCloudy

○ Property Specifications

Property Code	0xD01C
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance - Cloudy” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.10 WbTuneShade

○ Property Specifications

Property Code	0xD01D
DataType	UINT16
Description form	Range
Get / Set	Get / Set
Default Value	612
Property Value	From 0 to 1224

○ Property Outline

Indicates the fine tuning volume of “White balance – Shade” in the shooting menu.
For the details of the fine tuning volume, refer to subsection 11.6.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.11 WbPresetDataNo

○ Property Specifications

Property Code	0xD01F
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Acquired data]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “White balance – Preset manual” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Acquired data
1	Captured data

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	The acquired data is set when the HDRMode property (subsection 6.5.2.16) is set to anything other than [OFF].
	During INFO warning.

6.5.2.12 WbPresetDataValue0

○ Property Specifications

Property Code	0xD025
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	0x01000100 [Rgain: 1.0, Bgain: 1.0]
Property Value	(Depends on the user setting)

○ Property Outline

Indicates the white balance data of “White balance – Preset manual – Acquired data” in the shooting menu.

○ Property Details

The format of the PropertyValue is shown below.

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
	-	-	-	-	-	Rgain										
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	-	-	-	-	Bgain										

Rgain = (R/G) x 256 [Upper 3 bits: integer section, lower 8 bits: decimal section]
Bgain = (B/G) x 256 [Upper 3 bits: integer section, lower 8 bits: decimal section]

6.5.2.13 WbPresetDataValue1

○ Property Specifications

Property Code	0xD026
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	0x01000100 [Rgain: 1.0, Bgain: 1.0]
Property Value	(Depends on the user setting)

○ Property Outline

Indicates the white balance data of “White balance – Preset manual – Captured data” in the shooting menu.

(The method of using this property is the same as that of the WbPresetDataValue0 property (subsection 6.5.2.12).)

6.5.2.14 ColorSpace

○ Property Specifications

Property Code	0xD032
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [sRGB]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Color space” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	sRGB
1	Adobe RGB

6.5.2.15 Active-D-Lighting

○ Property Specifications

Property Code	0xD14E
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Auto]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Active D-Lighting” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Auto
1	Off
2	Low
3	Normal
4	High
5	Extra high

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	During INFO warning

6.5.2.16 HDRMode

○ Property Specifications

Property Code	0xD130
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “HDR (high dynamic range)” in the shooting menu.

○ Property Details

If the PropertyValue is set to anything other than [Off], the same operation as that of single-frame shooting is performed even when the StillCaptureMode property (subsection 6.5.1.15) is [Continuous low-speed shooting] or [Continuous high-speed shooting].

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	Low
2	Normal
3	High
4	Extra high
5	Auto

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The CompressionSetting property (subsection 6.5.1.3) is set to [RAW] or [RAW + JPEG (BASIC/NORMAL/FINE)].
	The EnableBracketing property (subsection 6.5.7.1) is set to [On].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	During INFO warning

6.5.2.17 VignetteControl

○ Property Specifications

Property Code	0xD0F7
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1 [Normal]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Vignette control” in the photo shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	High
1	Normal
2	Low
3	Off

6.5.2.18 AutoDistortion

○ Property Specifications

Property Code	0xD0F8
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Automatic distortion correction” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The LensSort property (subsection 6.5.10.1) is a setting other than [CPU lens mounted].
	[Lens supporting automatic distortion correction] bit of the LensType property (subsection 6.5.10.2) is set to 0 (invalid).

6.5.2.19 NoiseReduction

○ Property Specifications

Property Code	0xD06B
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Long exp. NR” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [EFFECTS (Night vision)].

6.5.2.20 NoiseReductionHilso

○ Property Specifications

Property Code	0xD070
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	2 [Normal]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “High ISO NR” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	Low
2	Normal
3	High

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [EFFECTS (Night vision)].

6.5.2.21 ISOAutoSetting

○ Property Specifications

Property Code	0xD16A
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Valid]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the automatic control state of the ISO sensitivity setting with the shooting mode set to Scene mode/Special effect mode.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Valid
1	Invalid

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is PSAM/Special effect mode (Night vision)/AUTO/Flash off AUTO.
	During INFO warning

6.5.2.22 ISOAutoControl

○ Property Specifications

Property Code	0xD054
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “ISO sensitivity settings – ISO sensitivity auto control” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.23 ISOAutoHighLimit

○ Property Specifications

Property Code	0xD183
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	7 [25600]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “ISO sensitivity settings – ISO sensitivity auto control – Maximum sensitivity” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	200
1	400
2	800
3	1600
4	3200
5	6400
6	12800
7	25600

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ISOAutoControl property (subsection 6.5.2.22) is set to [Off].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.24 ISOAutoShutterTime

○ Property Specifications

Property Code	0xD164
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	24 [Auto]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “ISO sensitivity settings – ISO sensitivity auto control – Minimum shutter speed” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	1/2000 sec.
1	1/1600 sec.
2	1/1250 sec.
3	1/1000 sec.
4	1/800 sec.
5	1/640 sec.
6	1/500 sec.
7	1/400 sec.
8	1/320 sec.
9	1/250 sec.
10	1/200 sec.
11	1/160 sec.
12	1/125 sec.
13	1/100 sec.
14	1/80 sec.
15	1/60 sec.
16	1/50 sec.
17	1/40 sec.
18	1/30 sec.
19	1/15 sec.
20	1/8 sec.
21	1/4 sec.
22	1/2 sec.
23	1 sec.
24	2 sec
25	4 sec
26	8 sec
27	15 sec
28	30 sec
29	Auto

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ISOAutoControl property (subsection 6.5.2.22) is set to [Off].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.25 ISOAutoShutterTimeCorrectionValue

○ Property Specifications

Property Code	0xD1F4
DataType	INT8
Description form	Range
Get / Set	Get / Set
Default Value	0
Property Value	From -2 to +2

○ Property Outline

Indicates the correction value when “ISO sensitivity settings – ISO sensitivity auto control – Minimum shutter speed” in the shooting menu is [Auto].

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ISOAutoControl property (subsection 6.5.2.22) is set to [Off].
	The ISOAutoShutterTime property (subsection 6.5.2.24) is not set to [Auto].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.2.26 MovieRecordScreenSize

○ Property Specifications

Property Code	0xD0A0
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [1920×1080 60/50p]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Movie setting – Image size/frame rate” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	1920 x 1080 60p
1	1920 x 1080 50p
2	1920 x 1080 30p
3	1920 x 1080 25p
4	1920 x 1080 24p
5	1280 x 720 60p
6	1280 x 720 50p

6.5.2.27 MovieRecordQuality

○ Property Specifications

Property Code	0xD0A7
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Normal]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Movie setting – Movie image quality” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Normal
1	High image quality

6.5.2.28 MovieRecordMicrophoneLevel

○ Property Specifications

Property Code	0xD0A2
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Microphone sensitivity Auto]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Movie setting – Recording setting” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Microphone sensitivity Auto
1	Reserved
2	Reserved
3	Reserved
4	Not recorded
5	Manual

6.5.2.29 MovieRecordMicrophoneLevelValue

○ Property Specifications

Property Code	0xD0A8
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	15
Property Value	From 1 to 20

○ Property Outline

Indicates “Movie setting – Recording setting – Microphone sensitivity Manual ” in the shooting menu.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The MovieRecordMicrophoneLevel property (subsection 6.5.2.28) is set to a value other than [Manual].

6.5.2.30 ManualSettingOfMovie

○ Property Specifications

Property Code	0xD0A6
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Movie setting – Manual setting of movie” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

6.5.2.31 MovieWindNoiseReduction

○ Property Specifications

Property Code	0xD0AA
DataType	UINT8
Description form	Range
Get / Set	Get, Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Movie setting – Wind noise reduction” in the shooting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	An external microphone is connected.

6.5.3 Vendor (Custom Menu)

6.5.3.1 ResetCustomSetting

○ Property Specifications

Property Code	0xD045
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Reset custom settings” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On (for setting only)

6.5.3.2 DynamicAFonAFC

○ Property Specifications

Property Code	0xD048
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1 [Focus]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Autofocus – AF-C priority selection” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Release
1	Focus

6.5.3.3 EnableAFAreaPoint

○ Property Specifications

Property Code	0xD08D
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [39 points]
Property Value	Refer to Property Value in this subsection.

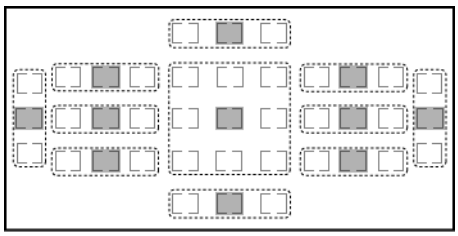
○ Property Outline

Indicates “Autofocus – AF point selection” in the custom setting menu.

○ Property Details

If the selected focus point is not included in the 11 points when the focus points are switched from 39 points to 11 points, the selected focus point is changed automatically.

A change pattern of focus points is shown below.
The focus points in the dotted lines (39 points) are changed to the focus points in gray (11 points).



○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	39 points
1	11 points

6.5.3.4 AFSubLight

○ Property Specifications

Property Code	0xD163
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [On]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Autofocus – Built-in AF-assist illuminator” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	On
1	Off

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] (Landscape, Sports, Night landscape, Beach/snow, Sunset, Dusk/dawn, Pet portrait) or [Special Effect] (Miniature, Night vision).

6.5.3.5 ExposureEVStep

○ Property Specifications

Property Code	0xD056
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [1/3 EV]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Metering/exposure – EV steps for exposure cntrl.” in the custom setting menu.

○ Property Details

If the value of PropertyValue is changed, the AEBracketingStep property (subsection 6.5.7.2) is set to 1 EV.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	1/3 EV
1	1/2 EV

6.5.3.6 AutoOffTime

○ Property Specifications

Property Code	0xD066
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1 [Normal]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Timers/AE lock – Power-off delay” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Short
1	Normal
2	Long
3	Customize

6.5.3.7 ExposureDelay

○ Property Specifications

Property Code	0xD06A
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Shooting/display – Exposure delay mode” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

6.5.3.8 NumberingMode

○ Property Specifications

Property Code	0xD06C
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Shooting/display – File number sequence” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On
2	Reset (for setting only)

6.5.3.9 InternalFlashMode

○ Property Specifications

Property Code	0xD167
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [TTL mode]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Bracketing/flash – Flash cntrl for built-in/external flash” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

For the internal flash

Property Value	Description
0	TTL mode
1	Manual flash mode

For the external flash

Property Value	Description
0	TTL mode
1	Manual flash mode
2	Commander mode

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	The ExternalSpeedLightSort property (subsection 6.5.9.2) is [Without the operating and setting section] and [Commander mode] is set when the external flash without supporting the commander mode.

6.5.3.10 BracketingType

○ Property Specifications

Property Code	0xD078
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1 [AE bracketing]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Bracketing/flash – Auto bracketing set” in the custom setting menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Reserved
1	AE bracketing
2	Reserved
3	WB bracketing
4	ADL bracketing

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	The HDRMode property (subsection 6.5.2.16) is set to anything other than [Off].
	During INFO warning

6.5.4 Vendor (Setup Menu)

6.5.4.1 ImageSensorCleaning

○ Property Specifications

Property Code	0xD08F
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	3 [Execute with power On/Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the setting of “Clean image sensor – Interlocking with power switch” in the setup menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not executed
1	Execute with power On
2	Execute with power Off
3	Execute with power On/Off

6.5.4.2 CommentString

○ Property Specifications

Property Code	0xD090
DataType	String
Description form	None
Get / Set	Get / Set
Default Value	0 character of NULL (0x00)
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Image comment” in the setup menu.

○ Property Details

The PropertyValue is an optional string of 36 characters (not including the null character).

When the image comment is not set on the camera, the value is the string with zero character (not including the null character).

The camera does not send the DevicePropChanged event (subsection 6.4.1.6) even if the PropertyValue is changed.

For the characters that can be input (ASCII code), refer to subsection 10.2.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Invalid_DeviceProp_Format	A string exceeding 36 characters is set.

6.5.4.3 EnableComment

○ Property Specifications

Property Code	0xD091
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Not attached]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Image comment – Attach comment” in the setup menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not attached
1	Attached

6.5.4.4 ArtistV

○ Property Specifications

Property Code	0xD072
DataType	String
Description form	None
Get / Set	Get / Set
Default Value	NULL (0x00) character
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Artist” in the setup menu.

○ Property Details

The PropertyValue is an optional string of 36 characters or shorter (not including the null character).

If the artist is not set in the camera, the value is zero length string (not including the null character).

For the characters that can be input (ASCII code), refer to subsection 10.2.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Invalid_DeviceProp_Format	A string exceeding 36 characters is set.

6.5.4.5 CopyrightV

○ Property Specifications

Property Code	0xD073
DataType	String
Description form	None
Get / Set	Get / Set
Default Value	NULL (0x00) character
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Copyright” in the setup menu.

○ Property Details

The PropertyValue is an optional string of 54 characters or shorter (not including the null character).

If the copyright is not set in the camera, the value is zero length string (not including the null character).

For the characters that can be input (ASCII code), refer to subsection 10.2.

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Invalid_DeviceProp_Format	A string exceeding 54 characters is set.

6.5.4.6 EnableCopyright

○ Property Specifications

Property Code	0xD053
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Not attached]
Property Value	(Depends on the user setting)

○ Property Outline

Indicates “Copyright information– Attach copyright information” in the setup menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not attached
1	Attached

6.5.4.7 EnableShutter

○ Property Specifications

Property Code	0xD08A
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Enable release]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Slot empty release lock” in the setup menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Enable release
1	Release locked

6.5.5 Vendor (Power Supply)

6.5.5.1 ExternalDC-IN

○ Property Specifications

Property Code	0xD101
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Not connected]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the AC adapter connection status.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not connected
1	Connected

6.5.6 Vendor (Camera Information)

6.5.6.1 SceneMode

○ Property Specifications

Property Code	0xD0F9
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	13 [Portrait]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Scene mode” that is set in the camera.

○ Property Details

This is the Scene mode that is used when the ExposureProgramMode property (subsection 6.5.1.11) is set to [SCENE].

When the property is not set to [SCENE], the acquired value is not guaranteed.

The scene mode of the ExposureProgramMode property (subsection 6.5.1.11) and that of this property are the same “Scene mode”. They differ only in the setting method; the shooting mode dial and the command dial.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Night landscape
1	Party/indoor
2	Beach/snow
3	Sunset
4	Dusk/dawn
5	Pet portrait
6	Candlelight
7	Blossom
8	Autumn colors
9	Food
10	Reserved
11	Reserved
12	Reserved
13	Portrait
14	Landscape
15	Child
16	Sports
17	Close up
18	Night portrait

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is not [SCENE].

6.5.6.2 EffectMode

○ Property Specifications

Property Code	0xD037
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	11 [Photo illustration]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Special effect mode” that is set in the camera.

○ Property Details

This is a mode that is used when the ExposureProgramMode property (subsection 6.5.1.11) is set to [EFFECTS].

When the property is not set to [EFFECTS], the acquired value is not guaranteed.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Night vision
1	Reserved
2	Miniature effect
3	Selective color
4	Silhouette
5	High key
6	Low key
7	Toy camera
8	Reserved
9	Super vivid
10	Pop
11	Photo illustration

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is not set to [EFFECTS].

6.5.6.3 Orientation

○ Property Specifications

Property Code	0xD10E
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Landscape or not fixed]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the orientation information.

○ Property Value

The valid PropertyValues are shown below.

When the OrientationSensorMode property (subsection 6.5.6.4) is set to [Off], the PropertyValue is [Landscape or not fixed].

Property Value	Description
0	Landscape or not fixed
1	Portrait (grip side upward)
2	Portrait (grip side downward)
3	Landscape (upside down)

6.5.6.4 OrientationSensorMode

○ Property Specifications

Property Code	0xD092
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [On]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Auto image rotation” in the playback menu.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	On
1	Off

6.5.6.5 RecordingMedia

○ Property Specifications

Property Code	0xD10B
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Card]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the recording destination of the images captured by using the shutter-release button of the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Card
1	SDRAM
2	Card and SDRAM

6.5.6.6 ExposureRemaining

○ Property Specifications

Property Code	0xD1F1
DataType	UINT16
Description form	Range
Get / Set	Get
Default Value	0 [0 frames]
Property Value	0 [0 frames] to 65535 [65535 frames]

○ Property Outline

Indicates the number of frames that can be recorded on the card.

○ Property Details

The value changes depending on the setting of the camera. When a card is not inserted in the camera, it should be 0 frames.

Even if the total exceeds 65535 frames, the value of PropertyValue is set to 65535.

6.5.6.7 AELockStatus

○ Property Specifications

Property Code	0xD105
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Lock released]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the AE lock status.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Lock released
1	Locked

6.5.6.8 AFLockStatus

○ Property Specifications

Property Code	0xD104
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Lock released]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the AF lock status.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Lock released
1	Locked

6.5.6.9 ShutterSpeed

○ Property Specifications

Property Code	0xD100
DataType	UINT32
Description form	Enumeration
Get / Set	Get, Get / Set
Default Value	(Minimum value in the setting range)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “Shutter speed” that is set in the camera.

○ Property Details

When the ExposureProgramMode property (subsection 6.5.1.11) is M, the following values are added to the enumerated value. In the case of S, a value corresponding to the current value of bulb shooting/time shooting is added to the enumerated value.

PropertyValue	Use	Condition in which the value can be set
0xFFFFFFFF	Bulb shooting	ExposureProgramMode is M
0xFFFFFFFD	Time shooting	ExposureProgramMode is M

The enumerated values change depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

If there is a change in the enumerated values, the enumerated values and the DefaultValue are updated.

○ Property Value

The valid PropertyValues are shown below. (Excluding bulb shooting and time shooting)

Property Value	Description
Upper 2 bytes	Numerator of the shutter speed
Lower 2 bytes	Denominator of the shutter speed

(Example) Shutter speed 1/250 sec. : PropertyValue = 0x000100FA
(Example) Shutter speed 25 sec. : PropertyValue = 0x00190001

When the ManualSettingOfMovie property (subsection 6.5.2.30) is set to [On], the ExposureProgramMode property (subsection 6.5.1.11) is M, and the live view is being performed, the valid range of PropertyValue is changed as shown below.

Frame rate	Shutter speed
24p, 25p, 30p	From 1/4000 to 1/30
50p	From 1/4000 to 1/50
60p	From 1/4000 to 1/60

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [P], [A], [Scene mode], or [Special effect mode].
	The WarningStatus property (subsection 6.5.6.15) is [Sequence error].
	The RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On].
	Bulb shooting or time shooting is set when the ExposureProgramMode property (subsection 6.5.1.11) is [S].
	Bulb shooting or time shooting is set when the HDRMode property (subsection 6.5.2.16) is set to anything other than [Off].

6.5.6.10 FlexibleProgram

○ Property Specifications

Property Code	0xD109
DataType	INT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [0.0 EV]
Property Value	From -30 [-5 EV] to +30 [+5 EV]

○ Property Outline

Indicates the program shift value in units of 1/6 EV.

○ Property Details

When the value of the ExposureProgramMode property (subsection 6.5.1.11) is a value other than [P], the value of PropertyValue is not valid but set to 0.

The StepSize of the property changes depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

ExposureEVStep	StepSize
0 (1/3 EV)	2
1 (1/2 EV)	3

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is set to anything other than [P].
	The RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On].

6.5.6.11 FocusArea

○ Property Specifications

Property Code	0xD108
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1
Property Value	From 0 to 39

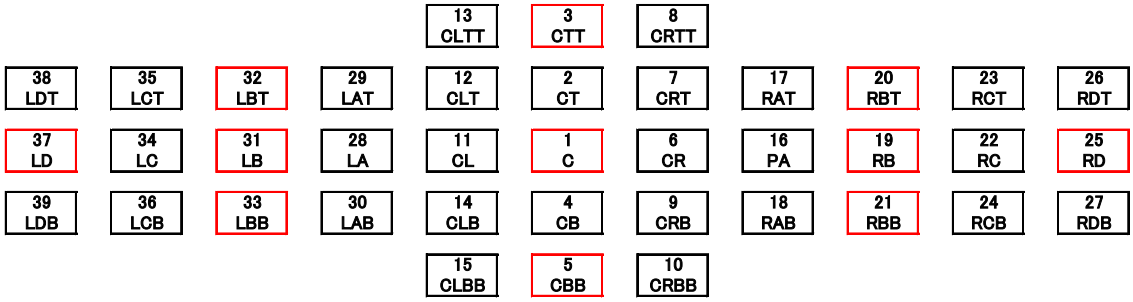
○ Property Outline

Indicates the focus point.

○ Property Details

The following figure shows the values of PropertyValue and the AF area positions.

When the EnableAFAreaPoint property (subsection 6.5.3.3) is [11 points], the red frames become valid.



○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The FocusMeteringMode property (subsection 6.5.1.17) is [Auto area AF mode].
Invalid_DeviceProp_Value	PropertyValue is 0.

6.5.6.12 ExposureDisplayStatus

○ Property Specifications

Property Code	0xD1B0
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Normal]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the display status of the shutter speed and the aperture value in the camera.

○ Property Details

It is 1 (only shutter speed is blinking) during bulb/time warning.

○ Property Value

The valid PropertyValues are shown below.

		Shutter speed	
		Normal	Blinking
Aperture value	Normal	0	1
	Blinking	2	3

6.5.6.13 ExposureIndicateStatus

○ Property Specifications

Property Code	0xD1B1
DataType	INT8
Description form	Range
Get / Set	Get
Default Value	0 [0.0 EV]
Property Value	From -60 [-10 EV] to +60 [+10 EV]

○ Property Outline

Indicates the display value of the indicator in units of 1/6 EV.

When the ExposureIndicateLightup property (subsection 6.5.6.14) is [Off], the value of PropertyValue is not fixed.

6.5.6.14 ExposureIndicateLightup

○ Property Specifications

Property Code	0xD1B3
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [On]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the indicator display On/Off.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	On
1	Off

6.5.6.15 WarningStatus

○ Property Specifications

Property Code	0xD102
DataType	UINT8
Description form	None
Get / Set	Get
Default Value	0 [No warning]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the camera warning information.

○ Property Value

The valid PropertyValues are shown below.
When the PropertyValue is a value other than 0, the release is locked.

Bit	Description	Type
Bit7	Check sum error	0: Invalid, 1: Valid
Bit6	Bulb warning	0: Invalid, 1: Valid
Bit5	Minimum aperture warning	0: Invalid, 1: Valid
Bit4	i-TTL error	0: Invalid, 1: Valid
Bit3	(Reserved)	0: Invalid, 1: Valid
Bit2	(Reserved)	0: Invalid, 1: Valid
Bit1	Battery insufficient	0: Invalid, 1: Valid
Bit0	Sequence error	0: Invalid, 1: Valid

6.5.6.16 InfoDisplayErrorStatus

○ Property Specifications

Property Code	0xD1B2
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the error display status of the INFO display on the LCD monitor.

○ Property Details

The error display conditions indicated by this property are as shown in the table below.

Name	Timing for starting message of errors and warning	Finish timing
Release sequence error	After the release sequence is completed	Generation cause released
Check sum error	When the power switch is turned On	Generation cause released
Card hard error	When the card is inserted or the card is accessed	Generation cause released
Main MCU system startup abnormality error	When an excessive load is applied to the power supply	Generation cause released
Battery ID unauthentication error	When a battery other than the exclusive ID battery is mounted	Generation cause released
Minimum aperture warning	When the Fmin detection switch is turned Off	Generation cause released
TTL warning	When the flash is set to TTL without a CPU lens being mounted	Generation cause released
Card write-protected & not-formatted warning	When a card is inserted with the recording destination set to “Card (Card and SDRAM)” or when the recording destination is set to “Card (Card and SDRAM)” while a card is inserted	Generation cause released
Card not-formatted warning	Same as the above	Generation cause released
Card write-protected warning	Same as the above	Generation cause released
Battery release prohibition level warning	After the shutter-release button is pressed fully	Generation cause released

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

6.5.6.17 AFModeSelect

○ Property Specifications

Property Code	0xD161
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	2 [AF-A]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “AF mode” that is set in the camera.
This property is used for the phase contrast AF (viewfinder shooting).

○ Property Details

The PropertyValue that can be set in this property changes according to the three items; the FocusMode property (subsection 6.5.1.7), the LensSort property (subsection 6.5.10.1), and the ExposureProgramMode property (subsection 6.5.1.11) at the time of viewfinder shooting.

For the focus mode that can be set in each condition, refer to the table below.

Condition	Item				
Lens other than AF-S lens (including the case that a lens is not mounted)	MF (fixed)				
AF-S lens + MF setting (lens setting)	MF (fixed)				
AF-S lens + AF setting (lens setting) + PSAM		MF (selection)	AF-S	AF-C	AF-A
AF-S lens + AF setting (lens setting) + Scene mode/EffectMode		MF (selection)			AF-A

If AF-S is set when the FocusMeteringMode property (subsection 6.5.1.17) is set to the dynamic AF mode (9, 21, or 39 points) or 3D-tracking, the dynamic AF mode (9, 21, or 39 points) or the 3D-tracking of the FocusMeteringMode property (subsection 6.5.1.17) is released and the single point AF mode is set.
After that, if AF-C is set, the FocusMeteringMode property (subsection 6.5.1.17) is set to the AF area mode prior to change.
When a retractable lens is mounted and the lens is retracting, the mode becomes MF (fixed).

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	AF-S
1	AF-C
2	AF-A
3	MF (fixed)
4	MF (selection)

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	MF (fixed) is set.
	The camera is not in the AF operation valid condition (the LensSort property (subsection 6.5.10.1) is [CPU lens mounted] and the LensType property (subsection 6.5.10.2) is [AF-S lens]).
	MF is selected as the lens setting.
	The RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On].
	The ExposureProgramMode property (subsection 6.5.1.11) is [EFFECTS (Night vision)].

6.5.6.18 AfModeAtLiveView

○ Property Specifications

Property Code	0xD061
DataType	UINT8
Description form	Enumeration
Get / Set	Get / Set
Default Value	0 [AF-S]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “AF mode” that is set in the camera.
This property is used for LiveView.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	AF-S
1	Reserved (cannot be used)
2	AF-F
3	MF (fixed)
4	MF (selection)

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The MF (fixed) is set.
	The camera is not in the AF operation valid condition (the LensSort property (subsection 6.5.10.1) is [CPU lens mounted] and the LensType property (subsection 6.5.10.2) is [AF-S lens]).
	MF is selected as the lens setting.
	The RetractableLensWarning property (subsection 6.5.10.8) is [(Retractable lens warning) On].
	The AF-F is set when the ExposureProgramMode property (subsection 6.5.1.11) is [EFFECTS (Photo illustration/Toy camera/Miniature)].

*The condition for setting the PropertyValue to MF (fixed) is the same as that of the AFModeSelect property (subsection 6.5.6.17).
When a retractable lens is mounted and the lens is retracting, the mode becomes MF (fixed).

6.5.6.19 AfAtLiveView

○ Property Specifications

Property Code	0xD05D
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	1 [Wide area AF]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates “AF area mode” that is set in the camera.
This property is used for LiveView.

○ Property Details

If the live view is executed with the target tracking AF set, this property is changed to the wide area AF for operation.

If the ExposureProgramMode property (subsection 6.5.1.11) is changed from PSAM to Scene mode/Special effect mode or from a Scene mode/Special effect mode to another Scene mode/Special effect mode, the PropertyValue is set to the AF area mode for each Scene mode/Special effect mode automatically. If it is changed from a Scene mode/Special effect mode to PSAM, the PropertyValue is set to the value that is set by PSAM before changing to the Scene mode/Special effect mode. The PropertyValue can be changed in the Scene mode/Special effect mode.

Shooting mode	AF during live view execution
Sports Night landscape Pet portrait Silhouette High key Low key Selective color Night vision Miniature effect Toy camera Super vivid Pop Photo illustration	Wide area AF
Portrait Landscape Party/indoor Beach/snow Sunset Dusk/dawn Candlelight Blossom Autumn colors Night portrait Child AUTO (Auto/Portrait/ Landscape/Portrait)*1 Flash off AUTO (Auto/Portrait/Landscape/ Portrait)*1	Face detection system AF
Close up Food AUTO (Close up)*1 Flash off AUTO (Close up)*1	Normal area AF

*1: The descriptions in parentheses of AUTO/Flash off AUTO indicate the selected results of Scene Auto Selector.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Face detection system AF
1	Wide area AF
2	Normal area AF
3	Target tracking AF

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The target tracking AF is set during live view execution.
	The ExposureProgramMode property (subsection 6.5.1.11) is [AUTO], [Flash off AUTO] or [EFFECTS (Miniature effect)].

6.5.6.20 MovieRecProhibitionCondition

○ Property Specifications

Property Code	0xD0A4
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	0x00000000
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the movie recording prohibition condition.

○ Property Details

When the PropertyValue is a value other than 0, the movie recording cannot be started.
When the live view is not started, the value of PropertyValue is not fixed. Even if a value has been entered, it is not guaranteed.

○ Property Value

The valid PropertyValues are shown below.
The PropertyValue takes the following values in the bit assignment. (1: Valid, 0: Invalid)

Bit	Description
Bit31	Not used
Bit30	Not used
Bit29	Not used
Bit28	Not used
Bit27	Not used
Bit26	Not used
Bit25	Not used
Bit24	Not used
Bit23	Not used
Bit22	Not used
Bit21	Not used
Bit20	Not used
Bit19	Not used
Bit18	Not used
Bit17	Not used
Bit16	Not used
Bit15	Not used
Bit14	The camera is not in the application mode.
Bit13	Not used
Bit12	During enlarged display of live view
Bit11	Card protected
Bit10	During movie file recording
Bit9	There are images or movies not recorded in the buffer.
Bit8	Not used
Bit7	Not used
Bit6	Not used
Bit5	Not used
Bit4	Not used
Bit3	No free area in the card
Bit2	Card not formatted
Bit1	Card error
Bit0	No card inserted

6.5.6.21 ContinuousShootingCount

○ Property Specifications

Property Code	0xD1B4
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	100 [100 frames]
Property Value	From 0 [0 frames] to 100 [100 frames]

○ Property Outline

Indicates the number of frames that can be recorded in continuous shooting by the command.
The number of frames that can be recorded in continuous shooting can be acquired with any setting value of the RecordingMedia property (subsection 6.5.6.5).

○ Property Details

The number of continuous shooting frames changes depending on the following setting values on the camera.

Set contents	Property
Image size	ImageSize property (subsection 6.5.1.2)
Image quality mode	CompressionSetting property (subsection 6.5.1.3)
HDR	HDRMode property (subsection 6.5.2.16)
Automatic distortion correction	AutoDistortion property (subsection 0)
Long-exposure noise reduction	NoiseReduction property (subsection 6.5.2.19)
Control scene mode	SceneMode property (subsection 6.5.6.1)

6.5.6.22 AutoSceneModeStatus

○ Property Specifications

Property Code	0xD1B5
DataType	UINT16
Description form	Enumeration
Get / Set	Get
Default Value	0x8010 [AUTO]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the scene mode that is selected by the camera in the Scene Auto Selector mode.

○ Property Details

This property is valid when the conditions for Scene Auto Selector are met, that is, when the live view is being performed and the ExposureProgramMode property (subsection 6.5.1.11) is Auto/Flash off Auto.

If the conditions for Scene Auto Selector are not met, the value of PropertyValue is 0x0000.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0000	The conditions for Scene Auto Selector are not met.
0x8010	AUTO
0x8011	Portrait
0x8012	Landscape
0x8013	Close up
0x8020	Night portrait

6.5.6.23 ISOControlSensitivity

○ Property Specifications

Property Code	0xD0B5
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	100 [ISO100]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the ISO sensitivity that is controlled by the camera.

○ Property Value

The PropertyValue ranges from ISO100 to Hi2 (ISO102400).

The valid PropertyValues are shown below.

Property Value	Description	Property Value	Description
100	ISO100	3200	ISO3200
110	ISO110	3600	ISO3600
125	ISO125	4000	ISO4000
140	ISO140	4500	ISO4500
160	ISO160	5000	ISO5000
180	ISO180	5600	ISO5600
200	ISO200	6400	ISO6400
220	ISO220	7200	ISO7200
250	ISO250	8000	ISO8000
280	ISO280	9000	ISO9000
320	ISO320	10000	ISO10000
360	ISO360	11000	ISO11000
400	ISO400	12800	ISO12800
450	ISO450	14400	ISO14400
500	ISO500	16000	ISO16000
560	ISO560	18000	ISO18000
640	ISO640	20000	ISO20000
720	ISO720	22000	ISO22000
800	ISO800	25600	ISO25600
900	ISO900	28800	Hi0.2
1000	ISO1000	32000	Hi0.3
1100	ISO1100	36000	Hi0.5
1250	ISO1250	40000	Hi0.7
1400	ISO1400	45600	Hi0.8
1600	ISO1600	51200	Hi1.0
1800	ISO1800	57600	Hi1.2
2000	ISO2000	64000	Hi1.3
2200	ISO2200	72000	Hi1.5
2500	ISO2500	81200	Hi1.7
2800	ISO2800	91200	Hi1.8
-	-	102400	Hi2.0

6.5.7 Vendor (Bracketing)

6.5.7.1 EnableBracketing

○ Property Specifications

Property Code	0xD0C0
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the status of bracketing.

○ Property Details

If the value of the ExposureEVStep property (subsection 6.5.3.5) is changed with the BracketingType property (subsection 6.5.3.10) set to [AE bracketing], the PropertyValue is set to [Off].

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The HDRMode property (subsection 6.5.2.16) is set to anything other than [Off].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	The BracketingType property (subsection 6.5.3.10) is set to [WB bracketing] and the CompressionSetting property (subsection 6.5.1.3) is set to [RAW] or [RAW + JPEG (BASIC/NORMAL/FINE)].

6.5.7.2 AEBracketingStep

○ Property Specifications

Property Code	0xD0C1
DataType	UINT8
Description form	Range
Get / Set	Get, Get / Set
Default Value	0 [1/3 EV]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the step range of AE bracketing.

○ Property Details

When the value of the ExposureEVStep property (subsection 6.5.3.5) is changed, the PropertyValue is set to 1 EV.

When the EnableBracketing property (subsection 6.5.7.1) is set to [Off] and the BracketingType property (subsection 6.5.3.10) is set to [WB bracketing] or [ADL bracketing], the value of PropertyValue is not fixed.

The value of PropertyValue changes depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description	ExposureEVStep	
		0（1/3 step）	1（1/2 step）
0	1/3EV	Valid	-
1	1/2EV	-	Valid
2	2/3EV	Valid	-
3	1EV	Valid	Valid
4	1+1/3EV	Valid	-
5	1+1/2EV	-	Valid
6	1+2/3EV	Valid	-
7	2EV	Valid	Valid

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The EnableBracketing property (subsection 6.5.7.1) is set to [Off].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	The BracketingType property (subsection 6.5.3.10) is set to [WB bracketing] or [ADL bracketing].

6.5.7.3 AEBracketingPattern

○ Property Specifications

Property Code	0xD0C2
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	4 [3 images (normal, under and over)]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the compensation direction and the number of images to be captured for AE bracketing.

○ Property Details

When the EnableBracketing property (subsection 6.5.7.1) is set to [Off] and the BracketingType property (subsection 6.5.3.10) is set to [WB bracketing] or [ADL bracketing], the value of PropertyValue is not fixed.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
4	3 images (normal, under and over)

6.5.7.4 AEBracketingCount

○ Property Specifications

Property Code	0xD0C3
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	1
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the number of the image (nth image) to be captured next for AE bracketing and ADL bracketing.

○ Property Details

If one or more images have been captured, the bracketing count is reset and the value of this property is set to 1 in the following cases.

No.	Description
1	The status of the camera is changed from the viewfinder shooting to live view.
2	The status of the camera is changed from live view to the viewfinder shooting.
3	The status of the camera is changed from through-the-lens image display of live view photography to that of movie live view.
4	The status of the camera is changed from through-the-lens image display of movie live view to that of live view photography.

When the EnableBracketing property (subsection 6.5.7.1) is set to [Off] and the BracketingType property (subsection 6.5.3.10) is set to [WB bracketing], the value of PropertyValue is not fixed.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
From 1 to 3	AE bracketing
From 1 to 2	ADL bracketing

6.5.7.5 WBBracketingStep

○ Property Specifications

Property Code	0xD0C4
DataType	UINT8
Description form	Range
Get / Set	Get, Get / Set
Default Value	0 [1 EV]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the step range for WB bracketing.

○ Property Details

When the EnableBracketing property (subsection 6.5.7.1) is set to [Off] and the BracketingType property (subsection 6.5.3.10) is set to anything other than [WB bracketing], the value of PropertyValue is not fixed.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	1 EV
1	2 EV
2	3 EV

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The EnableBracketing property (subsection 6.5.7.1) is set to [Off].
	The BracketingType property (subsection 6.5.3.10) is set to anything other than [WB bracketing].
	The CompressionSetting property (subsection 6.5.1.3) is set to [RAW] or [RAW + JPEG (BASIC/NORMAL/FINE)].
	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].

6.5.7.6 WBBracketingPattern

○ Property Specifications

Property Code	0xD0C5
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	4 [3 images (normal, under and over)]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the compensation direction and the number of images to be captured for WB bracketing.

○ Property Details

When the EnableBracketing property (subsection 6.5.7.1) is set to [Off] and the BracketingType property (subsection 6.5.3.10) is set to anything other than [WB bracketing], the value of PropertyValue is not fixed.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
4	3 images (normal, under and over)

6.5.7.7 ADLBracketingPattern

○ Property Specifications

Property Code	0xD0C6
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [2 images (Off -> User setting)]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the number of images to be captured for ADL bracketing.

○ Property Details

When the EnableBracketing property (subsection 6.5.7.1) is set to [Off] and the BracketingType property (subsection 6.5.3.10) is set to anything other than [ADL bracketing], the value of PropertyValue is not fixed.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	2 images (Off -> User setting)

*For the user setting, the setting value of the Active-D-Lighting property (subsection 0) should be used.
When the Active-D-Lighting property is set to [Off], Auto is used.

6.5.8 Vendor (Internal Flash)

6.5.8.1 InternalFlashPopup

○ Property Specifications

Property Code	0xD1C0
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Pop-down]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the pop-up status of the internal flash.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Pop-down
1	Pop-up

6.5.8.2 InternalFlashStatus

○ Property Specifications

Property Code	0xD1C1
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Charging]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the charging status of the internal flash.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Charging
1	Ready status

6.5.8.3 InternalFlashCompensation

○ Property Specifications

Property Code	0xD126
DataType	INT8
Description form	Range
Get / Set	Get / Set
Default Value	0
Property Value	From -18 to +6

○ Property Outline

Indicates the flash compensation value of the internal flash in units of 1/6 EV.

○ Property Details

The value of PropertyValue changes depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

When the ExposureEVStep property (subsection 6.5.3.5) is changed from 1/3 EV to 1/2 EV

1/3 EV	1/2 EV
+1.0	+1.0
+0.7	+0.5
+0.3	+0.5
0.0	0.0
-0.3	-0.5
-0.7	-0.5
-1.0	-1.0
-1.3	-1.5
-1.7	-1.5
-2.0	-2.0
-2.3	-2.5
-2.7	-2.5
-3.0	-3.0

When the ExposureEVStep property (subsection 6.5.3.5) is changed from 1/2 EV to 1/3 EV

1/2 EV	1/3 EV
+1.0	+1.0
+0.5	+0.3
0.0	0.0
-0.5	-0.3
-1.0	-1.0
-1.5	-1.3
-2.0	-2.0
-2.5	-2.3
-3.0	-3.0

The StepSize of this property changes depending on the value of the ExposureEVStep property (subsection 6.5.3.5).

ExposureCompEVStep	StepSize
0（1/3 EV）	2
1（1/2 EV）	3

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [AUTO], [Flash off AUTO] or [Special effect mode].
	The HDRMode property (subsection 6.5.2.16) is set to anything other than [Off].
	The InternalFlashMode property (subsection 6.5.3.9) is [Manual flash mode], the ExternalSpeedLightExist property (subsection 6.5.9.1) is [Not mounted], and the InternalFlashPopup property (subsection 6.5.8.1) is [Pop-up].
	The InternalFlashMode property (subsection 6.5.3.9) is [Manual flash mode], the ExternalSpeedLightExist property (subsection 6.5.9.1) is [Mounted], and the ExternalSpeedLightSort property (subsection 6.5.9.2) is [New-type communication (without the operating and setting section)].

6.5.9 Vendor (External Flash)

6.5.9.1 ExternalSpeedLightExist

○ Property Specifications

Property Code	0xD120
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Not mounted]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the mounting status of the external flash.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not mounted
1	Mounted

6.5.9.2 ExternalSpeedLightSort

○ Property Specifications

Property Code	0xD122
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Noncommunication]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the communication status of the external flash.

○ Property Details

When the ExternalSpeedLightExist property (subsection 6.5.9.1) is set to [Not mounted], the value of PropertyValue is not fixed.

If the external flash for old-type communication is mounted, the PropertyValue becomes [Noncommunication].

For the communication status types of the external flash, refer to “External Flash Types” (subsection 11.7).

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Noncommunication
1	Reserve (unusable)
2	New-type communication (with the operating and setting section)
3	New-type communication (without the operating and setting section)

6.5.9.3 ExternalSpeedLightStatus

○ Property Specifications

Property Code	0xD121
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Not charged]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the charge status of the external flash.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not charged
1	Ready

*When the ExternalSpeedLightExist property (subsection 6.5.9.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.9.4 NewExternalSpeedLightMode

○ Property Specifications

Property Code	0xD125
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the flash mode of the external flash (new-type communication).

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	i-TTL-BL
2	i-TTL
3	Aperture interlocking automatic flash
4	External automatic flash
5	Manual (distance priority)
6	Manual
7	Multi-flash

*When the ExternalSpeedLightExist property (subsection 6.5.9.1) is set to [Not mounted], the value of PropertyValue is not fixed.

*When the ExternalSpeedLightSort property (subsection 6.5.9.2) is set to anything other than [New-type communication], the value of PropertyValue is not fixed.

6.5.9.5 FlashCompensation

○ Property Specifications

Property Code	0xD124
DataType	INT8
Description form	Range
Get / Set	Get
Default Value	0 [0.0 EV]
Property Value	From -18 [-3.0 EV] to +18 [+3.0 EV]

○ Property Outline

Indicates the flash compensation value in units of 1/6 EV.

○ Property Details

When the ExternalSpeedLightExist property (subsection 6.5.9.1) is set to [Not mounted], the value of PropertyValue is not fixed.

When the ExternalSpeedLightSort property (subsection 6.5.9.2) is set to anything other than [New-type communication], the value of PropertyValue is not fixed.

The value of PropertyValue is valid when the values of the ExternalSpeedLightSort property (subsection 6.5.9.2) and the NewExternalSpeedLightMode property (subsection 6.5.9.4) are as shown in the table below. In the cases other than those in the table below, the value of PropertyValue is 0.

ExternalSpeedLightSort	NewExternalSpeedLightMode
Noncommunication	(Invalid)
New-type communication	i-TTL-BL i-TTL Aperture interlocking automatic flash Manual (distance priority)

6.5.9.6 ExternalSpeedLightMultiFlashMode

○ **Property Specifications**

Property Code	0xD12D
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Stand-alone flash]
Property Value	Refer to Property Value in this subsection.

O Property Outline

Indicates the commander mode of the external flash.

O Property Details

When the ExternalSpeedLightExist property (subsection 6.5.9.1) is set to [Not mounted], the value of PropertyValue is not fixed.

When the ExternalSpeedLightSort property (subsection 6.5.9.2) is set to anything other than [New-type communication], the value of PropertyValue is not fixed.

O Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Stand-alone flash (Commander mode is invalid or not supported)
1	Other flash units (Commander mode is valid)

6.5.10 Vendor (Lens)

6.5.10.1 LensSort

○ Property Specifications

Property Code	0xD0E1
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	1 [CPU lens mounted]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the mounting status of the CPU lens.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Not mounted (lens not mounted or non-CPU lens mounted)
1	CPU lens mounted

6.5.10.2 LensType

○ Property Specifications

Property Code	0xD0E2
DataType	UINT64
Description form	None
Get / Set	Get
Default Value	1 [D-type lens]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates information on the CPU lens.

○ Property Value

The valid PropertyValues are shown below.

Bit	Description	Type
Bit9 to Bit63	(Reserved)	
Bit8	STM lens	0: Invalid, 1: Valid
Bit7	E-type lens (electromagnetic aperture)	0: Invalid, 1: Valid
Bit6	Retractable lens	0: Invalid, 1: Valid
Bit5	Lens supporting automatic distortion correction	0: Invalid, 1: Valid
Bit4	AF-S lens	0: Invalid, 1: Valid
Bit3	DX lens (for the exclusive use of Nikon digital cameras)	0: Invalid, 1: Valid
Bit2	VR lens (with anti-vibration mechanism)	0: Invalid, 1: Valid
Bit1	G-type lens (without aperture dial)	0: Invalid, 1: Valid
Bit0	D-type lens (with distance encoder)	0: Invalid, 1: Valid

*When the value of the LensSort property (subsection 6.5.10.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.10.3 LensID

○ Property Specifications

Property Code	0xD0E0
DataType	UINT16
Description form	None
Get / Set	Get
Default Value	0
Property Value	(Depends on the lens type)

○ Property Outline

Indicates the ID of the CPU lens.

○ Property Details

The value of PropertyValue indicates an ID (2Byte).

When the value of the LensSort property (subsection 6.5.10.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.10.4 LensFocalMin

○ Property Specifications

Property Code	0xD0E3
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	5000 [50 mm]
Property Value	(Depends on the lens type)

○ Property Outline

Indicates the focal length at the Wide-end with the CPU lens mounted.

○ Property Details

The value of PropertyValue should be a hundred times the focal length (mm).

When the value of the LensSort property (subsection 6.5.10.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.10.5 LensFocalMax

○ Property Specifications

Property Code	0xD0E4
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	5000 [50 mm]
Property Value	(Depends on the lens type)

○ Property Outline

Indicates the focal length at the Tele-end with the CPU lens mounted.

○ Property Details

The value of PropertyValue should be a hundred times the focal length (mm).

When the value of the LensSort property (subsection 6.5.10.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.10.6 LensApatureMin

Property Specifications

Property Code	0xD0E5
DataType	UINT16
Description form	None
Get / Set	Get
Default Value	140 [F 1.4]
Property Value	(Depends on the lens type)

Property Outline

Indicates the maximum aperture value at the Wide-end with the CPU lens mounted.

Property Details

The value of PropertyValue should be a hundred times the maximum aperture value.
When the value of the LensSort property (subsection 6.5.10.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.10.7 LensApatureMax

Property Specifications

Property Code	0xD0E6
DataType	UINT16
Description form	None
Get / Set	Get
Default Value	1600 [F16]
Property Value	(Depends on the lens type)

Property Outline

Indicates the maximum aperture value at the Tele-end with the CPU internal lens mounted.

Property Details

The value of PropertyValue should be a hundred times the maximum aperture value.
When the value of the LensSort property (subsection 6.5.10.1) is set to [Not mounted], the value of PropertyValue is not fixed.

6.5.10.8 RetractableLensWarning

Property Specifications

Property Code	0xD09C
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

Property Outline

Indicates the retractable lens warning condition.

Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	(Retractable lens warning) Off
1	(Retractable lens warning) On

6.5.11 Vendor (Live View)

6.5.11.1 LiveViewStatus

○ Property Specifications

Property Code	0xD1A2
DataType	UINT8
Description form	Range
Get / Set	Get
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the status of the live view.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

6.5.11.2 LiveViewImageZoomRatio

○ Property Specifications

Property Code	0xD1A3
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Entire display]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the magnification of the live view image.

○ Property Details

When the camera receives the StartLiveView command, the PropertyValue should be set to [Entire display].

When the value of PropertyValue is changed, it takes a fixed amount of time before the contents of the change are reflected in the live view image that can be acquired by the GetLiveViewImage command (subsection 6.2.2.18).

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Entire display
1	25 %
2	33 %
3	50 %
4	66 %
5	100 %

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Not_LiveView	The property is set in a state other than during the live view.

6.5.11.3 LiveViewProhibitionCondition

○ Property Specifications

Property Code	0xD1A4
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	0x00000000
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the live view prohibition condition. If there is any prohibition factor in this property, the StartLiveView command must not be issued. If the StartLiveView command is issued and the live view is started when there is any prohibition factor in this property, the operation is not guaranteed.

○ Property Value

The valid PropertyValues are shown below.

Bit	Description	Type
Bit31	The ExposureProgramMode property (subsection 6.5.1.11) is set to anything other than P/S/A/M.	0: Invalid, 1: Valid
Bit30	(Reserved)	0: Invalid, 1: Valid
Bit29	(Reserved)	0: Invalid, 1: Valid
Bit28	(Reserved)	0: Invalid, 1: Valid
Bit27	(Reserved)	0: Invalid, 1: Valid
Bit26	(Reserved)	0: Invalid, 1: Valid
Bit25	(Reserved)	0: Invalid, 1: Valid
Bit24	When a retractable lens is mounted, the lens is retracting.	0: Invalid, 1: Valid
Bit23	(Reserved)	0: Invalid, 1: Valid
Bit22	(Reserved)	0: Invalid, 1: Valid
Bit21	During bulb warning or the shutter speed is the time shooting	0: Invalid, 1: Valid
Bit20	Card unformatted	0: Invalid, 1: Valid
Bit19	Card error	0: Invalid, 1: Valid
Bit18	The recording destination is the card or the card & SDRAM, and the card is protected	0: Invalid, 1: Valid
Bit17	The live view cannot be started when the temperature rises.	0: Invalid, 1: Valid
Bit16	(Reserved)	0: Invalid, 1: Valid
Bit15	During processing by the shooting command *Until the shooting operation ends.	0: Invalid, 1: Valid
Bit14	The recording destination is the card or the card & SDRAM, and the card is not inserted with the release disabled without a card.	0: Invalid, 1: Valid
Bit13	(Reserved)	0: Invalid, 1: Valid
Bit12	(Reserved)	0: Invalid, 1: Valid
Bit11	The CPU lens is not mounted and the exposure mode is not M.	0: Invalid, 1: Valid
Bit10	(Reserved)	0: Invalid, 1: Valid
Bit9	TTL error	0: Invalid, 1: Valid
Bit8	During insufficiency of battery	0: Invalid, 1: Valid
Bit7	(Reserved)	0: Invalid, 1: Valid
Bit6	(Reserved)	0: Invalid, 1: Valid
Bit5	The aperture value is being set by the lens aperture ring.	0: Invalid, 1: Valid
Bit4	(Reserved)	0: Invalid, 1: Valid
Bit3	(Reserved)	0: Invalid, 1: Valid
Bit2	Sequence error	0: Invalid, 1: Valid
Bit1	(Reserved)	0: Invalid, 1: Valid
Bit0	(Reserved)	0: Invalid, 1: Valid

*When the PropertyValue is a value other than 0, the live view cannot be started.

6.5.11.4 LiveViewImageSize

Property Specifications

Property Code	0xD1AC
DataType	UINT8
Description form	Enumeration
Get / Set	Get / Set
Default Value	2 [Equivalent to VGA]
Property Value	Refer to Property Value in this subsection.

Property Outline

Indicates the size of the live view image acquired by the GetLiveViveImage command.

Property Value

The valid PropertyValues are shown below.

Property Value	Description
1	Equivalent to QVGA (up to 320x240)
2	Equivalent to VGA (up to 640x480)

6.5.12 Vendor (Picture Control)

6.5.12.1 ActivePicCtrlItem

○ Property Specifications

Property Code	0xD200
DataType	UINT16
Description form	Enumeration
Get / Set	Get / Set
Default Value	1 [Standard]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the picture control item whose setting is currently valid.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
1	Standard
2	Neutral
3	Vivid
4	Monochrome
5	Portrait
6	Landscape
7	Flat
From 201 to 209	Custom picture control (from 1 to 9)

○ Response Code

When the value is set under the following conditions, an error response is made as shown below and the value cannot be set.

Response Code	Description
Invalid_Status	Setting to an unregistered area is performed for the custom picture control.
Access_Denied	The ExposureProgramMode property (subsection 6.5.1.11) is [Scene mode] or [Special effect mode].
	During INFO warning

6.5.12.2 ChangePicCtrlItem

○ Property Specifications

Property Code	0xD201
DataType	UINT16
Description form	Enumeration
Get / Set	Get
Default Value	0 [None]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the number of picture controls and items whose settings are changed.

○ Property Details

When the setting of each item for the picture control is changed or each item for the custom picture control is edited, registered, changed in the registration name, or deleted, the items whose settings are changed are enumerated.

When the PropertyValue is acquired by the GetDevicePropDesc command (subsection 6.2.1.16), the PropertyValue is cleared and becomes 0.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	None
1	Standard
2	Neutral
3	Vivid
4	Monochrome
5	Portrait
6	Landscape
7	Flat
From 201 to 209	Custom picture control (from 1 to 9)

6.5.13 Vendor (Application Mode)

6.5.13.1 ApplicationMode

○ Property Specifications

Property Code	0xD1F0
DataType	UINT8
Description form	Range
Get / Set	Get / Set
Default Value	0 [Off]
Property Value	Refer to Property Value in this subsection.

○ Property Outline

Indicates the status of the application mode.

○ Property Details

When the PropertyValue is set to [On], the camera shifts to the application mode.
Refer to “Application Mode” (subsection 2.4).

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0	Off
1	On

6.5.14 Vendor (MTP)

6.5.14.1 SessionInitiatorVersionInfo

○ **Property Specifications**

Property Code	0xD406
DataType	String
Description form	None
Get / Set	Get / Set
Default Value	“Windows/6.0.5330.0 MTPClassDriver/6.0.5330.0” [Session initiator version information character string]
Property Value	(Depends on the camera setting)

○ **Property Outline**

Indicates the version information of the host in open session.

○ **Property Details**

The PropertyValue should be a PTP string of 255 characters or shorter.
(HTTP 1.1 spec (RFC 2068) User Agent string format)

6.5.14.2 PerceivedDeviceType

○ **Property Specifications**

Property Code	0xD407
DataType	UINT32
Description form	None
Get / Set	Get
Default Value	0x00000001 [Digital still camera]
Property Value	0x00000001 [Digital still camera]

○ **Property Outline**

Indicates the type of the device.

6.5.14.3 UseDeviceStage Flag

○ **Property Specifications**

Property Code	0xD303
DataType	UINT8
Description form	None
Get / Set	Get
Default Value	0x01 [On]
Property Value	0x01 [On]

○ **Property Outline**

Indicates that the device can use Device Stage when the PropertyValue is a value other than 0. Windows searches the metadata of Device Stage in the metadata service until the device installation is completed. If the metadata of Device Stage in the server of Microsoft cannot be acquired, Windows displays Baseline Experience instead of Device Stage.

6.6 ObjectPropCode

Each of the objects in the camera has various sorts of specific information. As a method of transmission/reception of object information, an operation already exists in the PTP for operating the ObjectInfo data set. However, this is a static data set that cannot be expanded and includes basic information on the object. Various metadata concerning objects can be handled by operating the object property. Each object property has a corresponding ObjectPropCode.

The ObjectPropCodes supported by the camera are shown below.

Object Code	Description	Reference item
0xDC01	StorageID	6.6.1.1
0xDC02	ObjectFormat	6.6.1.2
0xDC03	ProtectionStatus	6.6.1.3
0xDC04	ObjectSize	6.6.1.4
0xDC07	ObjectFilename	6.6.1.5
0xDC08	DateCreated	6.6.1.6
0xDC09	DateModified	6.6.1.7
0xDC0B	ParentObject	6.6.1.8
0xDC0D	Hidden	6.6.1.9
0xDC41	PersistentUniqueObjectIdentifier	6.6.1.10
0xDC44	Name	6.6.1.11
0xDC81	RepresentativeSampleFormat	6.6.2.1
0xDC82	RepresentativeSampleSize	6.6.2.2
0xDC83	RepresentativeSampleHeight	6.6.2.3
0xDC84	RepresentativeSampleWidth	6.6.2.4
0xDC86	RepresentativeSampleData	6.6.2.5
0xDC87	Width	6.6.3.1
0xDC88	Height	6.6.3.2
0xDC8A	Rating	6.6.3.3
0xDCD3	ImageBitDepth	6.6.3.4
0xDC89	Duration	6.6.4.1
0xDE93	SampleRate	6.6.4.2
0xDE94	NumberOfChannels	6.6.4.3
0xDE97	ScanType	6.6.4.4
0xDE9A	AudioBitRate	6.6.4.5
0xDE9B	VideoFourCCCode	6.6.4.6
0xDE9C	VideoBitRate	6.6.4.7

6.6.1 Object Information

6.6.1.1 StorageID

○ Property Specifications

Property Code	0xDC01
DataType	UINT32
Get / Set	Get
Default Value	0x00010001
Group Code	0x00000001
Form Flag	0x00 (None)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the StorageID of the object. (It is the same value as that of the first field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x00010001	Main slot
0x00020001	Subslot

6.6.1.2 ObjectFormat

○ Property Specifications

Property Code	0xDC02
DataType	UINT16
Get / Set	Get
Default Value	0x3000
Group Code	0x00000001
Form Flag	0x00 (None)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the ObjectFormatCode of the object. (It is the same value as that of the second field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x3000	Undefined
0x3001	Association
0x3006	DPOF
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x3808	JFIF
0x380D	TIFF (RGB)

6.6.1.3 ProtectionStatus

○ Property Specifications

Property Code	0xDC03
DataType	UINT16
Get / Set	Get
Default Value	0x0000
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the protection status of the object. (It is the same value as that of the third field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0000	Protection is not set.
0x0001	Protection is set.

6.6.1.4 ObjectSize

○ Property Specifications

Property Code	0xDC04
DataType	UINT64
Get / Set	Get
Default Value	0x0000000000000000
Group Code	0x00000001
Form Flag	0x00 (None)
Property Value	(Object size)

○ Property Outline

This indicates the size of the object in units of bytes. (It is the same value as that of the fourth field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

6.6.1.5 ObjectFilename

○ Property Specifications

Property Code	0xDC07
DataType	String
Get / Set	Get
Default Value	0x00 (Null)
Group Code	0x00000001
Form Flag	0x05 (RegEx)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates an optional string that shows a file name of an object. (It is the same value as that of the sixteenth field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

However, the ObjectPropDesc returned in the Image format differs from that returned in the Association format.

○ Property Value

The valid PropertyValues are shown below.

ObjectFormat	RegEx
Association	[0-9]{3}[_a-zA-Z0-9]{5}
Other than Association	[_a-zA-Z]{4}[0-9]{4}¥.[a-zA-Z]{3}

6.6.1.6 DateCreated

○ Property Specifications

Property Code	0xDC08
DataType	String
Get / Set	Get
Default Value	0x00 (Null)
Group Code	0x00000001
Form Flag	0x03 (DateTime)
Property Value	(Date and time of object creation)

○ Property Outline

This indicates a string that shows the date and time of object creation. (It is the same value as that of the seventeenth field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

6.6.1.7 DateModified

○ Property Specifications

Property Code	0xDC09
DataType	String
Get / Set	Get
Default Value	0x00 (Null)
Group Code	0x00000001
Form Flag	0x03 (DateTime)
Property Value	(Date and time of object update)

○ Property Outline

This indicates a string that shows the date and time of object update. (It is the same value as that of the eighteenth field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

6.6.1.8 ParentObject

○ Property Specifications

Property Code	0xDC0B
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x00 (None)
Property Value	(Date and time of object update)

○ Property Outline

This indicates the ObjectHandle of the parent object of the object. (It is the same value as that of the twelfth field of the ObjectInfo data set.)

It is applied to the objects of all the formats supported by the camera.

6.6.1.9 Hidden

○ Property Specifications

Property Code	0xDC0D
DataType	UINT16
Get / Set	Get
Default Value	0x0000
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	(Hidden attribute of the object)

○ Property Outline

This indicates a hidden attribute of the object.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3000	Undefined
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0000	Displayed object
0x0001	Hidden object

6.6.1.10 PersistentUniqueObjectIdentifier

○ Property Specifications

Property Code	0xDC41
DataType	UINT128
Get / Set	Get
Default Value	0x00^16
Group Code	0x00000001
Form Flag	0x00 (None)
Property Value	(Object-specific identifier)

○ Property Outline

This indicates an object-specific identifier (PUOID).
It is applied to the objects of all the formats supported by the camera.

The generation rule of the PUOID is shown below.

0 through 3	4 through 15
ObjectHandle (4Byte)	0 (not used)

6.6.1.11 Name

○ Property Specifications

Property Code	0xDC44
DataType	String
Get / Set	Get
Default Value	0x00 (Null)
Group Code	0x00000001
Form Flag	0x00 (None)
Property Value	(File name of an object)

○ Property Outline

This indicates an optional string that shows a file name of an object. (It should be the same value as that of ObjectFilename.)

It is applied to the objects of all the formats supported by the camera.

6.6.2 Thumbnail

6.6.2.1 RepresentativeSampleFormat

○ Property Specifications

Property Code	0xDC81
DataType	UINT16
Get / Set	Get
Default Value	0x3000
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the ObjectFormatCode of the thumbnail image.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

○ Property Value

The valid PropertyValues are shown below.

PropertyValue	Setting
0x3000	Undefined
0x3808	JFIF
0x380D	TIFF

6.6.2.2 RepresentativeSampleSize

○ Property Specifications

Property Code	0xDC82
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 0x00010000

○ Property Outline

This indicates the size of the thumbnail in bytes.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

6.6.2.3 RepresentativeSampleHeight

○ Property Specifications

Property Code	0xDC83
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 120

○ Property Outline

This indicates the height of the thumbnail in pixels.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

6.6.2.4 RepresentativeSampleWidth

○ Property Specifications

Property Code	0xDC84
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 160

○ Property Outline

This indicates the width of the thumbnail in pixels.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

6.6.2.5 RepresentativeSampleData

○ Property Specifications

Property Code	0xDC86
DataType	AUINT8
Get / Set	Get
Default Value	0x00000000
Group Code	0xFFFFFFFF
Form Flag	0x06 (ByteArray)
Property Value	From 0 to 0x00010000

○ Property Outline

This indicates the thumbnail data.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

6.6.3 Image Information

6.6.3.1 Width

○ Property Specifications

Property Code	0xDC87
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 10000

○ Property Outline

This indicates the width of the object in pixels.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

6.6.3.2 Height

○ Property Specifications

Property Code	0xDC88
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 10000

○ Property Outline

This indicates the height of the object in pixels.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

6.6.3.3 Rating

○ Property Specifications

Property Code	0xDC8A
DataType	UINT16
Get / Set	Get
Default Value	0x0000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 100

○ Property Outline

This indicates the rating of the object.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)
0x380D	TIFF

○ Property Value

The valid PropertyValues are shown below.

Property Value	Rating settings
0x0000	None
0x0001	★
0x0019	★★
0x0032	★★★
0x004B	★★★★
0x0063	★★★★★

6.6.3.4 ImageBitDepth

○ Property Specifications

Property Code	0xDCD3
DataType	UINT32
Get / Set	Get
Default Value	0x0000000C
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the bit depth of the object.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x3800	Unknown Image Object
0x3801	EXIF/JPEG
0x380D	TIFF

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0000000C	12bit
0x0000000E	14bit
0x00000018	24bit

6.6.4 Movie Information

6.6.4.1 Duration

○ Property Specifications

Property Code	0xDC89
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0 to 0x001B773F (1799999msec)

○ Property Outline

This indicates the length of the object in msec.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)

6.6.4.2 SampleRate

○ Property Specifications

Property Code	0xDE93
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the sample rate of the object.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x00000000	0 Hz (no sound)/Unknown
0x0000BB80	48.000 Hz

6.6.4.3 NumberOfChannels

○ Property Specifications

Property Code	0xDE94
DataType	UINT16
Get / Set	Get
Default Value	0x0000
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the number of channels of the object.
It is applied to the objects of the following formats.

ObjectFormatCode	Description
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0000	Unused (no sound)/Unknown
0x0002	Stereo (2ch)

6.6.4.4 ScanType

○ Property Specifications

Property Code	0xDE97
DataType	UINT16
Get / Set	Get
Default Value	0x0000
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the scan type of the object.

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x0000	Unused

6.6.4.5 AudioBitRate

○ Property Specifications

Property Code	0xDE9A
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0x00000000 (No sound/Unknown) to 0x00177000

○ Property Outline

This indicates the audio bit rate of the object.
It is applied to the objects of the following format.

ObjectFormatCode	Description
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)

6.6.4.6 VideoFourCCCode

○ Property Specifications

Property Code	0xDE9B
DataType	UINT32
Get / Set	Get
Default Value	0x61766331
Group Code	0x00000001
Form Flag	0x02 (Enumeration)
Property Value	Refer to Property Value in this subsection.

○ Property Outline

This indicates the FourCC code for the video codec.
It is applied to the objects of the following format.

ObjectFormatCode	Description
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)

○ Property Value

The valid PropertyValues are shown below.

Property Value	Description
0x61766331	“avc1”

6.6.4.7 VideoBitRate

○ Property Specifications

Property Code	0xDE9C
DataType	UINT32
Get / Set	Get
Default Value	0x00000000
Group Code	0x00000001
Form Flag	0x01 (Range)
Property Value	From 0x00000000 (Unknown) to 0x30000000

○ Property Outline

This indicates the number of bits of the object processed per sec.

The PropertyValue should be a value obtained by multiplying the maximum number of bytes per sec. of the object by 8 (bit).

It is applied to the objects of the following format.

ObjectFormatCode	Description
0x300D	MOV Apple QuickTime Video Format (H.264/AVC)

7 Data Type

7.1 DataTypeCode

The standard data types used by the camera are shown below.

DataTypeCode	Type	Description
0x0001	INT8	Signed 8-bit integer
0x0002	UINT8	Unsigned 8-bit integer
0x0003	INT16	Signed 16-bit integer
0x0004	UINT16	Unsigned 16-bit integer
0x0005	INT32	Signed 32-bit integer
0x0006	UINT32	Unsigned 32-bit integer
0x0007	INT64	Signed 64-bit integer
0x0008	UINT64	Unsigned 64-bit integer
0x0009	INT128	Signed 128-bit integer
0x000A	UINT128	Unsigned 128-bit integer
0x4001	AINT8	Signed 8-bit integer array
0x4002	AUINT8	Unsigned 8-bit integer array
0x4003	AINT16	Signed 16-bit integer array
0x4004	AUINT16	Unsigned 16-bit integer array
0x4005	AINT32	Signed 32-bit integer array
0x4006	AUINT32	Unsigned 32-bit integer array
0x4007	AINT64	Signed 64-bit integer array
0x4008	AUINT64	Unsigned 64-bit integer array
0x4009	AINT128	Signed 128-bit integer array
0x400A	AUINT128	Unsigned 128-bit integer array
0xFFFF	STR	Variable length Unicode character string

7.2 Character String Format

The field representing the character string complies with the following format.
Each field data is stored in the little endian format.

Field	Size (Byte)	Data	Description
NumChar	1	N	Represents the number of characters in the string. The terminating null character is included. The maximum number of characters is 255.
StringChars [0]	2		Unicode character
StringChars [1]	2		Unicode character

StringChars [N - 1]	2	0x0000	Unicode character (null)

7.3 Date Format

The character string representing the date complies with the following format.
The date and time is shown in the form of the most significant value through the least significant value according to the format of ISO8601 standard. This is a Unicode string format of "YYYYMMDDThhmmss" where YYYY is the year, MM is the month, DD is the day of the month, T is a constant character, hh is the hours, mm is the minutes, and ss is the seconds past the minute. The data is stored in the following array for the transmission/reception between the camera and the host.

Field	Size (Byte)	Data	Description
NumChar	1	0x10	Represents the number of characters in the string. The terminating null character is included. The number of characters in the string representing the time is sixteen.
StringChars	32		Unicode string "YYYYMMDDThhmmss"

When the format setting is "YYYYMMDDThhmmss.xx", the data following "YYYYMMDDThhmmss" should be ignored for use.

The array type complies with the following format. Each field data is stored in the little endian format.

Field	Size (Byte)	Data
NumElement	4	The number of array elements is N (N is the number of objects).
ArrayEntry [0]	ElementSize	ArrayData [0]
ArrayEntry [1]	ElementSize	ArrayData [1]
ArrayEntry [2]	ElementSize	ArrayData [2]

ArrayEntry [N - 1]	ElementSize	ArrayData [N - 1]

ElementSize: Data size of ArrayData

7.4 Picture Control Format

The field representing the picture control data complies with the following format.
The format of the picture control version 2 should be used for controling the picture control of this camera.

7.4.1 Color (Version 1)

Field	Size (Byte)	Data
PicCtrlItem	1	Kinds of picture control 1: Standard, 2: Neutral, 3: Vivid, 4: Monochrome, 5: Portrait, 6: Landscape (For the custom picture control, the base picture control is set.)
MonochromeFlag	1	Monochrome flag 0: Color, 1: Monochrome
CustomFlag	1	Custom flag 0: Normal, 1: Custom, 2: Unused custom
RegistrationName	20	Registration name of picture control It is fixed to 20byte (terminated with null).
QuickAdjustFlag	1	Quick adjustment flag 0: Invalid, 1: Valid Neutral and Custom: Invalid
QuickAdjust	1	Quick adjustment From -2 to +2
Saturation	1	Saturation From -3 to +3 -128: Auto
Hue	1	Hue From -3 to +3
Sharpening	1	Sharpening From 0 to 9 -128: Auto
Contrast	1	Contrast From -3 to +3 -128: Auto
Brightness	1	Brightness From -1 to +1
CustomCurveFlag	1	Custom curve flag 0: Custom curve is invalid, 1: Custom curve is valid.
CustomCurveData	578	Custom curve data (Refer to subsection 10.1.) LUT data (Not used when the custom curve flag is invalid.)

7.4.2 Monochrome (Version 1)

Field	Size (Byte)	Data
PicCtrlItem	1	Kinds of picture control 1: Standard, 2: Neutral, 3: Vivid, 4: Monochrome, 5: Portrait, 6: Landscape (For the custom picture control, the base picture control is set.)
MonochromeFlag	1	Monochrome flag 0: Color, 1: Monochrome
CustomFlag	1	Custom flag 0: Normal, 1: Custom, 2: Unused custom
RegistrationName	20	Registration name of picture control It is fixed to 20byte (terminated with null).
FilterEffects	1	Filter effects 0: None, 1: Yellow, 2: Orange, 3:Red, 4: Green
Toning	1	Toning 0: B&W, 1: Sepia, 2: Cyanotype, 3: Red, 4: Yellow, 5: Green, 6: Blue Green, 7: Blue, 8: Purple Blue, 9: Red Purple
ToningDensity	1	Toning (density) From 1 to 7 It is not referred to when Toning is B&W.
（Reserve）	1	(Reserve）
Sharpening	1	Sharpening From 0 to 9 -128: Auto
Contrast	1	Contrast From -3 to +3 -128: Auto
Brightness	1	Brightness From -1 to +1
CustomCurveFlag	1	Custom curve flag 0: Custom curve is invalid, 1: Custom curve is valid.
CustomCurveData	578	Custom curve data (Refer to subsection 10.1.) LUT data (Not used when the custom curve flag is invalid.)

7.4.3 Color (Version 2)

Field	Size (Byte)	Data
PicCtrlItem	1	Kinds of picture control 1: Standard, 2: Neutral, 3: Vivid, 4: Monochrome, 5: Portrait, 6: Landscape From 101 to 199: Optional picture control (For the custom picture control, the base picture control is set.)
MonochromeFlag	1	Monochrome flag 0: Color, 1: Monochrome
CustomFlag	1	Custom flag 0: Normal, 1: Custom, 2: Unused custom
RegistrationName	20	Registration name of picture control It is fixed to 20byte (terminated with null).
QuickAdjustFlag	1	Quick adjustment flag 0: Invalid, 1: Valid Neutral and Custom: Invalid
QuickAdjust	1	Quick adjustment (1 step) From -2 to +2
Saturation	1	Saturation (0.25 step) From -3 to +3 -128: Auto
Hue	1	Hue (0.25 step) From -3 to +3
Sharpening	1	Sharpening (0.25 step) From 0 to 9 -128: Auto
Contrast	1	Contrast (0.25 step) From -3 to +3 -128: Auto
Brightness	1	Brightness (0.25 step) From -1.5 to +1.5
Clarity	1	Clarity (0.25 step) From -5 to +5 -128: Auto
CustomCurveFlag	1	Custom curve flag 0: Custom curve is invalid, 1: Custom curve is valid.
CustomCurveData	578	Custom curve data (Refer to subsection 10.1.) LUT data (Not used when the custom curve flag is invalid.)

7.4.4 Monochrome (Version 2)

Field	Size (Byte)	Data
PicCtrlItem	1	Kinds of picture control 1: Standard, 2: Neutral, 3: Vivid, 4: Monochrome, 5: Portrait, 6: Landscape From 101 to 199: Optional picture control (For the custom picture control, the base picture control is set.)
MonochromeFlag	1	Monochrome flag 0: Color, 1: Monochrome
CustomFlag	1	Custom flag 0: Normal, 1: Custom, 2: Unused custom
RegistrationName	20	Registration name of picture control It is fixed to 20byte (terminated with null).
FilterEffects	1	Filter effects 0: None, 1: Yellow, 2: Orange, 3:Red, 4: Green
Toning	1	Toning 0: B&W, 1: Sepia, 2: Cyanotype, 3: Red, 4: Yellow, 5: Green, 6: Blue Green, 7: Blue, 8: Purple Blue, 9: Red Purple
ToningDensity	1	Toning (density) (0.25 step) From 1 to 7 It is not referred to when Toning is B&W.
(Reserve)	1	(Reserve)
Sharpening	1	Sharpening (0.25 step) From 0 to 9 -128: Auto
Contrast	1	Contrast (0.25 step) From -3 to +3 -128: Auto
Brightness	1	Brightness (0.25 step) From -1.5 to +1.5
Clarity	1	Clarity (0.25 step) From -5 to +5 -128: Auto
CustomCurveFlag	1	Custom curve flag 0: Custom curve is invalid, 1: Custom curve is valid.
CustomCurveData	578	Custom curve data (Refer to subsection 10.1.) LUT data (Not used when the custom curve flag is invalid.)

7.4.5 Setting Value for Each Step

The setting values for the picture control format and the camera internal values are shown below.

7.4.5.1 For 0.25 step

Picture control format	Camera internal value
-20	-5
-19	-4.75
-18	-4.5
-17	-4.25
-16	-4
-15	-3.75
-14	-3.5
-13	-3.25
-12	-3
-11	-2.75
-10	-2.5
-9	-2.25
-8	-2
-7	-1.75
-6	-1.5
-5	-1.25
-4	-1
-3	-0.75
-2	-0.5
-1	-0.25
0	0
1	0.25
2	0.5
3	0.75
4	1
5	1.25
6	1.5
7	1.75
8	2
9	2.25
10	2.5
11	2.75
12	3
13	3.25
14	3.5
15	3.75
16	4
17	4.25
18	4.5
19	4.75
20	5
21	5.25
22	5.5
23	5.75
24	6
25	6.25
26	6.5
27	6.75
28	7
29	7.25
30	7.5
31	7.75
32	8
33	8.25
34	8.5
35	8.75
36	9

7.4.5.2 For 1 step

Picture control format	Camera internal value
-3	-3
-2	-2
-1	-1
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

8 ObjectHandle

The ObjectHandle is used to represent the individual objects in the camera (image file, non-image file, directories, and the virtual association representing the relations of the images and the DCF objects conforming to the DCF standards).

The ObjectHandle is unsigned 32 bits. A unique value is set for the ObjectHandle indicating each object. The specified ObjectHandle is fixed in one session.

8.1 ObjectHandle of the Object Recorded in the Card

The camera sets a 4-byte unique value freely for the ObjectHandle created for the data in the card by the camera. The host application does not care the contents.

8.2 ObjectHandle of the Object Recorded in the SDRAM

The object recorded in the SDRAM is the image file only.

The host can access the image data in the SDRAM by specifying the ObjectHandle passed by ObjectAddedInSdram.

8.3 Addition of the ObjectHandle

The camera acts as shown below when an object is newly added to the card during one session.

No.	Description
1	In accordance with the ObjectHandle format defined in this section, the camera specifies a unique ObjectHandle that is not coordinated with other ObjectHandles already specified for the newly added object.
2	The camera sends the ObjectAdded event including the specified ObjectHandle as a parameter to the host. At this time, FreeSpaceInBytes and FreeSpaceInImages indicated in the StorageInfo data set are updated immediately.

9 Data Set

The camera transmits the information about the camera to the host by using some data sets. The data sets supported by the camera and their contents are shown below.

9.1 DeviceInfo Data Set

The DeviceInfo data set is sent by the operation of the GetDeviceInfo command.
Each field data is stored in the little endian format.
The information sent by the DeviceInfo data set is shown below.

Field	Description
StandardVersion	The highest version of the standard that can support the device.
VendorExtensionID	The vendor extension ID used by the device.
VendorExtensionVersion	The vendor-specific version number of extensions that are supported.
VendorExtensionDesc	An optional string used to hold a human-readable description of the VendorExtensionID.
FunctionalMode	An optional field used to hold the functional mode.
OperationsSupported	An array of OperationCodes supported by the camera.
EventsSupported	An array of EventCodes supported by the camera.
DevicePropertiesSupported	An array of DevicePropCodes supported by the camera.
CaptureFormats	An array of ObjectFormatCodes that can be created by the camera with InitiateCapture.
ImageFormats	An array of ObjectFormatCodes supported by the camera.
Manufacture	An optional human-readable string used to indicate the device manufacturer.
Model	An optional human-readable string used to indicate the device name.
DeviceVersion	An optional human-readable string used to indicate the device version.
SerialNumber	An optional human-readable string used to indicate the serial number of the camera.

Field	Size (Byte)	Data	DataType	Description
StandardVersion	2	0x0064		Version 1.00
VendorExtensionID	4	0x00000006		-
VendorExtensionVersion	2	0x0064		Version 1.00
VendorExtensionDesc	39	0x13 0x6D00 0x6900 0x6300 0x7200 0x6F00 0x7300 0x6F00 0x6600 0x7400 0x2E00 0x6300 0x6F00 0x6D00 0x3A00 0x2000 0x3100 0x2E00 0x3000 0x0000	String	Unicode character string “microsoft.com: 1.0”
FunctionalMode	2	0x0000		Normal mode
OperationsSupported	112	0x00000036 0x1001 0x1002 0x1003 0x1004 0x1005 0x1006 0x1007 0x1008 0x1009 0x100A 0x100B 0x100C 0x100D 0x100E 0x100F 0x1014 0x1015 0x1016 0x101B 0x90C0 0x90C1 0x90C2 0x90C3 0x90C4 0x90C7 0x90C8 0x90C9 0x90CA 0x90CB 0x90CC 0x90CD 0x90CE 0x90CF 0x9201 0x9202 0x9203 0x9204 0x9205 0x9206 0x9207 0x9209	Array	OperationCode supported by the camera

		0x920A 0x920B 0x920C 0x9400 0x940C 0x940E 0x9520 0x9521 0x9522 0x9801 0x9802 0x9803 0x9805		
EventsSupported	36	0x00000010 0x4001 0x4002 0x4003 0x4004 0x4005 0x4006 0x4007 0x4008 0x4009 0x400A 0x400C 0x400D 0xC101 0xC102 0xC105 0xC700	Array	EventCode supported by the camera
DevicePropertiesSupported	48	0x00000016 0x5001 0x5003 0x5004 0x5005 0x5007 0x5008 0x500A 0x500B 0x500C 0x500D 0x500E 0x500F 0x5010 0x5011 0x5013 0x5018 0x501C 0x501E 0x501F 0xD303 0xD406 0xD407	Array	DevicePropertyCode supported by the camera The vendor codes are not enumerated in this field. The vendor codes can be acquired by the GetVendorPropCodes command (subsection 6.2.2.9).
CaptureFormats	10	0x00000002 0x3801 0x3000 0x3800	Array	ObjectFormatCode that can be created by the camera with InitiateCapture. This changes whether the connection usees MTP or not. MTP : 0x3000 is not supported Not MTP : 0x3800 is not supported
ImageFormats	18	0x00000007 0x3000 0x3001 0x3002 0x3006 0x300D 0x3801 0x380D	Array	ObjectFormatCode supported by the camera. This changes whether the connection usees MTP or not. MTP : 0x3002 is not supported Not MTP : 0x3800 is not supported

		0x3800		
Manufacture	37	0x12 0x4E00 0x6900 0x6B00 0x6F00 0x6E00 0x2000 0x4300 0x6F00 0x7200 0x7000 0x6F00 0x7200 0x6100 0x7400 0x6900 0x6F00 0x6E00 0x0000	String	Unicode character string “Nikon Corporation”
Model	13	0x06 0x4400 0x3500 0x3600 0x3000 0x3000 0x0000	String	Unicode character string “D5600”
DeviceVersion	13	0x06 0x5600 0x3100 0x2E00 0x3000 0x3000 0x0000	String	Unicode character string “V1.00”
SerialNumber	67	0x21 0xXX00	String	Unicode character string “XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX”

		0x0000		

9.2 StorageInfo Data Set

The StorageInfo data set is sent by the operation of the GetStorageInfo command.
This data set indicates information about the storage medium (card).
Each field data is stored in the little endian format.
Information sent by the StorageInfo data set is shown below.

Field	Description
StorageType	Indicates the type of the card. Removable Ram is set.
FilesystemType	Indicates the filesystem of the card. It conforms to the DCF.
AccessCapability	Indicates the access right for the card. When the card is not locked, it is read-only and the image deletion is allowed. When the card is locked, it is read-only and the image deletion is not allowed.
MaxCapacity	Indicates the capacity of the card. It depends on the card used.
FreeSpaceInBytes	Indicates the free space in the card. It depends on the card used and the space that is currently used.
FreeSpaceInImages	Indicates the number of images that can be recorded in the free space of the card. It is the number of images captured in the mode that is currently set in the camera. It depends on the card used and the space that is currently used.
StorageDescription	Indicates a human-readable text description of the card. This field is not used for the camera.
VolumeLabel	Indicates the volume label of the card. It is described in a human-readable character string (Unicode character string).

Field	Size (Byte)	Data	DataType	Description
StorageType	2	0x0004		Removable Ram
FilesystemType	2	0x0003		Based on the DCF
AccessCapability	2	0x0002 0x0001 (Card lock)		Read-Only with Object Deletion Read-Only without Object Deletion (Card lock)
MaxCapacity	8			Depends on the card.
FreeSpaceInBytes	8			Depends on the card and the space used.
FreeSpaceInImages	4			Depends on the card and the space used.
StorageDescription	1	0x00		-
VolumeLabel			String	Unicode character string

9.3 ObjectInfo Data Set

The ObjectInfo data set is sent by the operation of the GetObjectInfo command.
This data set indicates information about the objects in the card.
Each field data in which the data type is not specified is stored in the little endian format.

Field	Description
StorageID	Indicates the StorageID of the card.
ObjectFormat	Indicates the ObjectFormatCode of the object.
ProtectionStatus	Indicates the protection status of the object.
ObjectCompressedSize	Indicates the size of the object in bytes.
ThumbFormat	Indicates the ObjectFormat of the thumbnail.
ThumbCompressedSize	Indicates the size of the thumbnail in bytes.
ThumbPixWidth	Indicates the thumbnail width in pixels.
ThumbPixHeight	Indicates the thumbnail height in pixels.
ImagePixWidth	Indicates the image width in pixels.
ImagePixHeight	Indicates the image height in pixels.
ImageBitDepth	Indicates the bit depth of the image.
ParentObject	Indicates the ObjectHandle of the parent object of this object.
AssociationType	Indicates the association type. It is used for the object of the association type.
AssociationDesc	Indicates the descriptor parameter of the association. It is not used in the camera.
SequenceNumber	Indicates the component of the association. It is not used in the camera.
Filename	Indicates an optional character string showing the file name of the object.
CaptureDate	Indicates the character string showing the date and time of object creation.
ModificationDate	Indicates the character string showing the date and time of object modification. When the object does not have a date and time of modification, the same date and time as that of the object creation is stored.
Keywords	Indicates the character string showing the image-related keyword. It is not used in the camera.

9.3.1 Directory/Virtual Association Data Set

Field	Size (Byte)	Data	DataType	Description
StorageID	4	StorageID		StorageID
ObjectFormat	2	0x3001		Association (Refer to ObjectFormatCode.)
ProtectionStatus	2	0x0000		-
ObjectCompressedSize	4	0x00000000		-
ThumbFormat	2	0x0000		-
ThumbCompressedSize	4	0x00000000		-
ThumbPixWidth	4	0x00000000		-
ThumbPixHeight	4	0x00000000		-
ImagePixWidth	4	0x00000000		-
ImagePixHeight	4	0x00000000		-
ImageBitDepth	4	0x00000000		-
ParentObject	4	ObjectHandle		ObjectHandle of the parent directory DCIM folder: 0x00000000 MISC folder: 0x00000000
AssociationType	2	0x0001		GenericFolder
AssociationDesc	4	0x00000000		-
SequenceNumber	4	0x00000000		-
Filename			String	Unicode character string
CaptureDate			String	Date and time of capture (Unicode character string) (Not used for the virtual association)
ModificationDate			String	Date and time of modification (Unicode character string) (Not used for the virtual association)
Keywords	1	0x00		-

9.3.2 Image File Data Set

Field	Size (Byte)	Data	DataType	Description
StorageID	4	StorageID		StorageID SDRAM image: 0x00000000
ObjectFormat	2			0x3000 (Undefined), 0x3801 (EXIF) 0x3801 (TIFF)
ProtectionStatus	2			0x0001 (with protection setting), 0x0000 (without protection setting)
ObjectCompressedSize	4			File size
ThumbFormat	2	0x3808		JFIF (Refer to ObjectFormatCode.)
ThumbCompressedSize	4			Thumbnail size
ThumbPixWidth	4	0x000000A0		Horizontal size of the thumbnail (160)
ThumbPixHeight	4	0x00000078		Vertical size of the thumbnail (120)
ImagePixWidth	4			Horizontal size of the main image
ImagePixHeight	4			Vertical size of the main image
ImageBitDepth	4	0x00000000		-
ParentObject	4	ObjectHandle		ObjectHandle of the parent directory
AssociationType	2	0x0000		-
AssociationDesc	4	0x00000000		-
SequenceNumber	4	0x00000000		-
Filename			String	File name character string (Unicode character string) “File name.extension” is set for the images recorded in the card with the recording destination set to “Card” or “Card and SDRAM”. “DSC_0000.extension” is set for the images whose recording destination is the SDRAM. For the images recorded in the SDRAM with the recording destination set to “Card and SDRAM”, the name including the folder name and the file name of the image recorded in the card simultaneously is set. “Folder name¥(backslash)file name.extension”. If the image deletion is performed by operating the camera during the card recording while “Card and SDRAM” recording is set in the application mode, the file name of the image with the recording destination SDRAM may be “DSC_0000.extension” in some cases. When the object format is “Undefined”, the extension is NEF (RAW) or NDF (dust reference image).
CaptureDate			String	Date and time of capture (Unicode character string)
ModificationDate			String	Date and time of modification (Unicode character string)
Keywords	1	0x00		-

9.3.3 Script File Data Set

Field	Size (Byte)	Data	DataType	Description
StorageID	4	0x00000000		
ObjectFormat	2	0x3002		Script (Refer to ObjectFormatCode.)
ProtectionStatus	2	0x0000		No protection setting
ObjectCompressedSize	4			File size
ThumbFormat	2	0x0000		-
ThumbCompressedSize	4	0x00000000		-
ThumbPixWidth	4	0x00000000		-
ThumbPixHeight	4	0x00000000		-
ImagePixWidth	4	0x00000000		-
ImagePixHeight	4	0x00000000		-
ImageBitDepth	4	0x00000000		-
ParentObject	4	0x00000000		-
AssociationType	2	0x0000		-
AssociationDesc	4	0x00000000		-
SequenceNumber	4	0x00000000		-
Filename			String	File name (Unicode character string) (“DDISCVRY.DPS” or “DREQUEST.DPS”)
CaptureDate			String	Date and time of creation (Unicode character string)
ModificationDate			String	Date and time of modification (Unicode character string)
Keywords	1	0x00		-

9.3.4 DPOF File Data Set

Field	Size (Byte)	Data	DataType	Description
StorageID	4			StorageID sent to the host by GetStorageID
ObjectFormat	2	0x3006		DPOF (Refer to ObjectFormatCode.)
ProtectionStatus	2			0x0001 (with protection setting) or 0x0000 (without protection setting)
ObjectCompressedSize	4			File size
ThumbFormat	2	0x0000		-
ThumbCompressedSize	4	0x00000000		-
ThumbPixWidth	4	0x00000000		-
ThumbPixHeight	4	0x00000000		-
ImagePixWidth	4	0x00000000		-
ImagePixHeight	4	0x00000000		-
ImageBitDepth	4	0x00000000		-
ParentObject	4	ObjectHandle		ObjectHandle of the MISC folder
AssociationType	2	0x0000		-
AssociationDesc	4	0x00000000		-
SequenceNumber	4	0x00000000		-
Filename			String	File name (Unicode character string)
CaptureDate			String	Date and time of capture (Unicode character string)
ModificationDate			String	Date and time of modification (Unicode character string)
Keywords	1	0x00		-

9.3.5 Movie File Data Set

Field	Size (Byte)	Data	DataType	Description
StorageID	4	StorageID		StorageID Image: 0x00000000
ObjectFormat	2			0x300D (MOV)
ProtectionStatus	2			0x0001 (with protection setting) 0x0000 (without protection setting)
ObjectCompressedSize	4			File size
ThumbFormat	2	0x3808		JFIF (Refer to ObjectFormatCode.)
ThumbCompressedSize	4			Thumbnail size
ThumbPixWidth	4	0x000000A0		Horizontal size of the thumbnail (160)
ThumbPixHeight	4	0x00000078		Vertical size of the thumbnail (120)
ImagePixWidth	4			Horizontal size of the main movie
ImagePixHeight	4			Vertical size of the main movie
ImageBitDepth	4	0x00000000		-
ParentObject	4	ObjectHandle		ObjectHandle of the parent directory
AssociationType	2	0x0000		-
AssociationDesc	4	0x00000000		-
SequenceNumber	4	0x00000000		-
Filename			String	File name character string (Unicode character string) “File name.MOV”
CaptureDate			String	Date and time of capture (Unicode character string)
ModificationDate			String	Date and time of modification (Unicode character string)
Keywords	1	0x00		-

9.4 DevicePropDesc Data Set

The DevicePropDesc data set is sent by the operation of the GetDevicePropDesc command.
This data set indicates information about the settings and the attribute of the device.
Each field data in which the data type is not specified is stored in the little endian format.

Field	Description
DevicePropCode	Indicates DevicePropCode of the property.
DataType	Indicates the data type of the property.
GetSet	Indicates the access attribute of the property.
Factory Default Value	Indicates the default value of the property.
Current Value	Indicates the current value of the property.
FormFlag	Indicates the property description data set.

Field	Size (Byte)	Data	DataType	Description
DevicePropertyCode	2	DevicePropCode		DevicePropCode supported by the camera
DataType	2			Indicates the data type of the property. It differs depending on each property. Refer to DataTypeCode (subsection 7.1).
GetSet	1			Indicates whether the property is for reading only or for both reading and writing. 0x00: Reading only (Get) 0x01: Reading/writing (Get/Set)
FactoryDefaultValue	DTS			Default value. It differs depending on each property.
CurrentValue	DTS			Current value. It differs depending on each property.
FormFlag	1			Indicates the property description data set. 0x00: None 0x01: Range 0x02: Enumeration
FORM	DTS			The contents of the field depend on the FormFlag field. It does not exist when the FormFlag field is set to 0.

9.5 ObjectPropDesc Data Set

The ObjectPropDesc data set is sent by the operation of the GetObjectPropDesc command.
This data set indicates information about the settings and the attribute of the object.
Each field data in which the data type is not specified is stored in the little endian format.

Field	Description
DevicePropCode	Indicates DevicePropCode of the property.
DataType	Indicates the data type of the property.
GetSet	Indicates the access attribute of the property.
Default Value	Indicates the default value of the property.
Group Code	Indicates the search group of the property.
FormFlag	Indicates the property description data set.

Field	Size (Byte)	Data	DataType	Description
ObjectPropertyCode	2	ObjectPropCode	UINT16	ObjectPropCode supported by the camera
DataType	2	DataTypeCode	UINT16	Indicates the data type of the property. It differs depending on each property. Refer to DataTypeCode (subsection 7.1).
GetSet	1		UINT8	Indicates whether the property is for reading only or for both reading and writing. 0x00: Reading only (Get) 0x01: Reading/writing (Get/Set)
DefaultValue	DTS			The default value in the camera. It differs depending on each property.
Group Code	4		UINT32	Search group
FormFlag	1		UINT8	Indicates the property description data set. 0x00: None 0x01: Range 0x02: Enumeration 0x03: Time 0x04: Fixed-length array 0x05: Regular expression 0x06: Byte string 0x07: LongString
FORM	DTS			The contents of the field depend on the FormFlag field. It does not exist when the FormFlag field is set to 0.

9.6 Property Description Data Set

The property description data set is set in the FORM field of the DevicePropDesc data set and the ObjectPropDesc data set.

9.6.1 Range Form

Field	Size (Byte)	Description
MinimumValue	DTS	The minimum value supported by the PropertyValue
MaximumValue	DTS	The maximum value supported by the PropertyValue
StepSize	DTS	The property supports the value indicated as shown below. MinimumValue + N x StepSize * N: From 0 to the maximum value * PropertyValue: Smaller than the Maximum Value

9.6.2 Enumeration Form

Field	Size (Byte)	Description
NumberOfValue	2	Indicates the number of values of the PropertyValue supported by the property.
SupportedValue1	DTS	The property supports this PropertyValue.
SupportedValue2	DTS	The property supports this PropertyValue.
SupportedValue3	DTS	The property supports this PropertyValue.

SupportedValueM	DTS	The property supports this PropertyValue.

9.6.3 Time Form

For the time form, the FORM field does not exist.

The time form is represented by a Unicode character string in the ISO standard format. (Refer to ISO8601.)

YYYYMMDDThhmmss.s	
YYYY	Year
MM	Month (from 01 to 12)
DD	Date (from 01 to 31)
T	Fixed character
hh	Hour starting from 0 a.m. (from 00 to 23)
mm	Minutes (from 00 to 59)
ss.s	Seconds

9.6.4 Fixed-Length Array Form

Field	Size (Byte)	Description
Length	2	It is an unsigned 16-bit integer and indicates the number of array elements.

9.6.5 Regular Expression Form

Field	Size (Byte)	Description
RegEx	DTS	It indicates the regular expression for creating the PropertyValue correctly.

9.6.6 Byte String Form

Field	Description
MaxLength	It indicates the maximum length of the byte string.

9.6.7 LongString Form

Field	Description
MaxLength	It indicates the maximum length of the LongString. The property includes the data type of AUINT16. (Characters coded by 2-byte Unicode characters as defined in ISO10646.)

10 Data Format

10.1 LUT Format

For the LUT data, the 64-byte header to be used for the host is added to the 2048-byte (11 bit x 8 bit) actual data. The header format is specified by the host individually (storage position of the spline point of the LUT to be sent, etc., data to reproduce the LUT when reading is performed), and the camera does not care the contents. However, because the two bytes of the header are used for the camera to decide whether the header data is present or not, the data needs to be set in the header.

The LUT format is shown below.

Byte	Description
0, 1	Length (2116)
2, 3	Reserved
From 4 to 67	Lut Header
68	Data0
69	Data1
- - -	
2115	Data2047

As an example of Lut Header, the contents of the header set by the Nikon application are shown below.

Byte	Description	Range
1	AriaID (Byte1)	0x49
2	AriaID (Byte2)	0x30
3	Input Minimum (Black Point)	0-255
4	Input Maximum	0-255
5	Output Minimum	0-255
6	Output Maximum	0-255
7	Gamma (integer portion)	0-20
8	Gamma (fractional portion)	0-100
9	Number of Spline Points	2-20
10, 11	Spline Point1 (x,y)	0-255,0-255
12, 13	Spline Point2 (x,y)	0-255,0-255
- - -		
48, 49	Spline Point20 (x,y)	0-255,0-255
From 50 to 64	Reserved	0

10.2 ASCII Codes

For the property related to the comment of the camera, only the following 90 characters of ASCII codes can be input.

In the same way, for “Copyright” and “Artist”, only the following 90 characters of ASCII codes can be input.

SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
:	;	<	=	>	?	@	[	]	_	{	}				
0	1	2	3	4	5	6	7	8	9						
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X	Y	Z						
a	b	c	d	E	f	g	h	i	j	k	l	m	n	o	p
q	r	s	t	U	v	w	x	y	z						

7-Bit ASCII Code Table (JIS Roman letter set: C0, GL)								
	0x0?	0x1?	0x2?	0x3?	0x4?	0x5?	0x6?	0x7?
0x?0	NUL	DLE	SP	0	@	P	`	p
0x?1	SOH	DC1	!	1	A	Q	a	q
0x?2	STX	DC2	"	2	B	R	b	r
0x?3	ETX	DC3	#	3	C	S	c	s
0x?4	EOT	DC4	$	4	D	T	d	t
0x?5	ENQ	NAK	%	5	E	U	e	u
0x?6	ACK	SYN	&	6	F	V	f	v
0x?7	BEL	ETB	'	7	G	W	g	w
0x?8	BS	CAN	(	8	H	X	h	x
0x?9	HT	EM	)	9	I	Y	i	y
0x?a	LF	SUB	*	:	J	Z	j	z
0x?b	VT	ESC	+	;	K	[	k	{
0x?c	FF	FS	,	<	L	¥	l	|
0x?d	CR	GS	-	=	M	]	m	}
0x?e	SO	RS	.	>	N	^	n	~
0x?f	SI	US	/	?	O	_	o	DEL

11 Appendices

11.1 Properties Affected by Mounting the CPU Lens

The following properties are affected by mounting the CPU lens.

Property	CPU lens mounted	CPU lens not mounted
LensSort	Mounted	Not mounted
Fnumber	Get / Set	Get
FocalLength	Valid	Not fixed
LensType	Valid	Not fixed
LensID	Valid	Not fixed
LensFocalMin	Valid	Not fixed
LensFocalMax	Valid	Not fixed
LensApatureMin	Valid	Not fixed
LensApatureMax	Valid	Not fixed

11.2 Properties Affected by Mounting the External Flash

Property	External flash mounted		External flash not mounted
	New-type communication	Noncommunication	
ExternalSpeedLightExist	Mounted	Mounted	Not mounted
ExternalSpeedLightSort	New-type communication	Noncommunication	Not fixed
ExternalSpeedLightStatus	Valid	Valid	Not fixed
NewExternalSpeedLightMode	Valid	Not fixed	Not fixed
FlashCompensation	Valid/Not fixed	Not fixed	Not fixed
ExposureTime	Bulb ～ (*1) (*2)	Bulb ～ (*1)	Bulb ～ 1/4000
ShutterSpeed	Bulb ～ (*1) (*2)	Bulb ～ (*1)	Bulb ～ 1/4000

*1: Flash shooting synchronization speed
*2: Speed limit of the external flash

11.3 Properties Affected by the Shooting Mode

Property	Shooting mode					
	Manual	Program auto	Aperture priority auto	Shutter priority auto	Each scene mode	Each effect mode
ExposureProgramMode	Manual	Program auto	Aperture priority auto	Shutter priority auto	Each scene mode	Each effect mode
Fnumber	Get / Set (*1)	Get	Get / Set (*1)	Get	Get	Get
ExposureTime	Get / Set	Get	Get	Get / Set (*2)	Get	Get
ShutterSpeed	Get / Set	Get	Get	Get / Set	Get	Get
FlexibleProgram	Not fixed	Get / Set	Not fixed	Not fixed	Not fixed	Not fixed

*1: Setting is disabled when a lens other than the CPU lens is mounted.
*2: Setting is disabled with Bulb.

11.4 Properties Affected by the Setting of Auto Bracketing

Property	Settings of auto bracketing					
	AE		WB		ADL	
	BKT On	BKT Off	BKT On	BKT Off	BKT On	BKT Off
BracketingType	AE		WB		ADL	
EnableBracketing	On	Off	On	Off	On	Off
AEBracketingStep	Valid	Not fixed	Not fixed	Not fixed	Not fixed	Not fixed
AEBracketingPattern	Valid	Not fixed	Not fixed	Not fixed	Not fixed	Not fixed
AEBracketingCount	Valid	Not fixed	Not fixed	Not fixed	Valid	Not fixed
WBBracketingStep	Not fixed	Not fixed	Valid	Not fixed	Not fixed	Not fixed
WBBracketingPattern	Not fixed	Not fixed	Valid	Not fixed	Not fixed	Not fixed
ADLBracketingPattern	Not fixed	Not fixed	Not fixed	Not fixed	Valid	Not fixed

11.5 Properties Affected by the Location Setting

The UTC time is retained in the camera. When displaying the time on the menu or getting/setting the DateTime property, ‘Location setting’ and ‘Summer time setting’ in the camera are considered.

When getting the DateTime property, the calculated value shown below is passed to the host.

Time in the camera + Difference in time with the location setting + Summer time

When the camera settings are as shown in the table below, the calculation is “13:00:00 + 09:00 + 0:00” and the value passed to the host is “2006/06/01 22:00:00”.

Time in the camera (UTC)	2006/06/01 13:00:00
Location setting	UTC+9 (Tokyo, Seoul)
Summer time setting	None

When the DateTime property is set, the value calculated as shown below is set in the camera.

Time set by the host - Difference in time with the location setting - Summer time

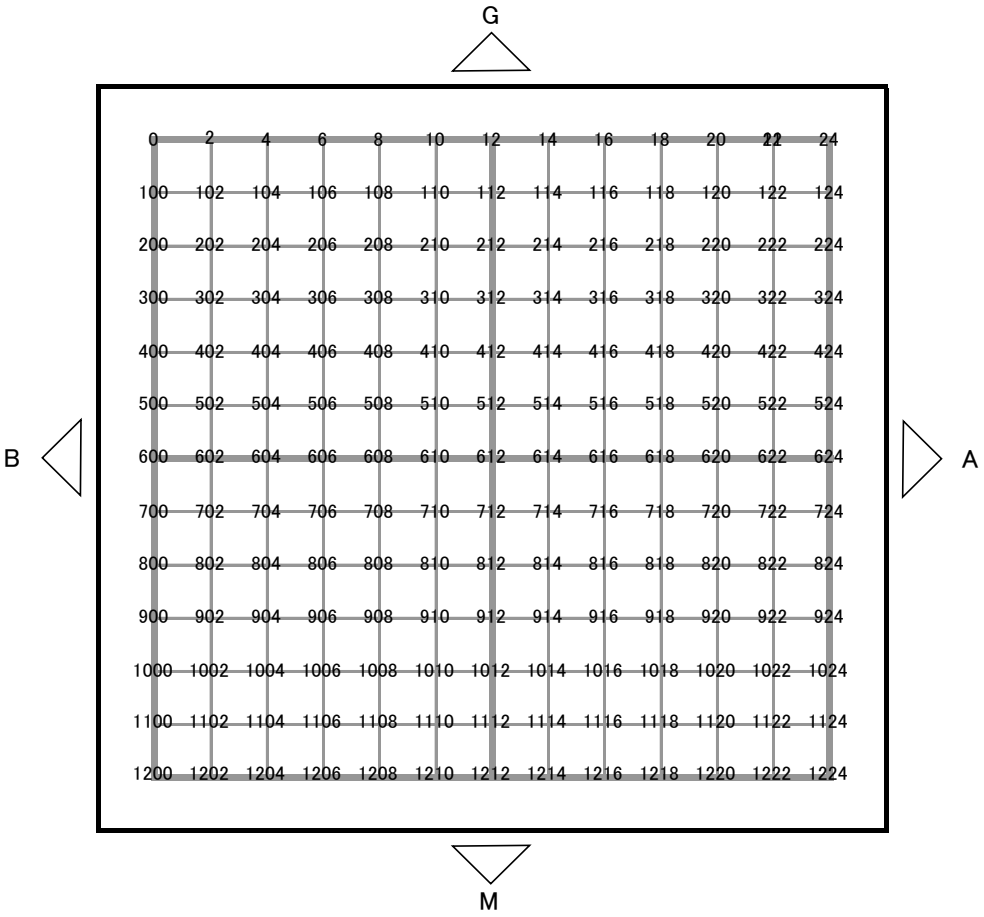
When the camera settings are as shown in the table below and the time set by the host is “2006/06/01 13:00:00”, the calculation is “13:00:00 - 09:00 - 0:00” and the time setting in the camera is “2006/06/01 04:00:00”.

Location setting	UTC+9 (Tokyo, Seoul)
Summer time setting	None

11.6 White Balance Fine Tuning Coordinates

The relationship between the values of PropertyValue of the property affecting the white balance fine tuning and the actual setting coordinates is shown below.

On the A-B axis: in steps of 0.5, on the G-M axis: in steps of 0.25



11.7 External Flash Types

The communication status types of the external flash are shown below.

New-type communication (with the operating and setting section)	New-type communication (without the operating and setting section)	Old-type communication	Noncommunication	Mounting not detected
SB-910 SB-900 SB-800 SB-700 SB-600 SU-800	SB-400 SB-300	SB-80DX SB-50DX SB-28DX SB-28D SB-28 SB-27 SB-26 SB-25 SB-24	SB-30 SB-29 SB-29s SB-23 SB-22 SB-22s SB-21A SB-21B SB-20 SB-19 SB-18 SB-17 SB-16A SB-16B SB-15 SB-14 SB-12 SB-11 SB-10 SB-E	SB-9 SB-8 SB-7 SB-6 SB-5 SB-4 SB-3 SB-2 SB-1

*For old-type communication and noncomminucation, mounting is not detected in the camera.