Product Specifications

Customer:

Product name : Ultra-wide angle compact camera w/ DEP Lens

Model name : **NM33-M**

Company Name / Person to Authorize	Signature

OPT Corporation

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Check of drawing	Check of drawing	PREPARED

Table of Contents

1. Application

This Specification applies to NM33-M, Ultra-wide angle compact camera module.

2. Features

- Using newly-developed compact fish-eye lens, it allows shooting hemispheric scope by the simple structure camera.
- Adopt the glass lens to provide high-reliability and high-definition images.
- Because the camera is small, it is possible to hide the existence of the camera by burying it under the wall or ceiling.
- Featured NTSC/PAL composite video output, it allows to connect to all existence multipurpose video systems, directly.
- JPEG compressed digital images via USB port provide high-definition images to PCs.
- With newly-developed high-speed processor, it enables to dewarp the hemispheric images into various panoramic images within the module, including enlarge the portions, or scrolling display.
- Fifteen kinds of display methods (image development) are selectable.
- The camera starts up photographing by supplying a power. A simple key sequence by specified circuit allows you to simple operation without preparing complicated set up of application software.
- Because of the special-purpose lens and embedded image developing system, there is no mechanical moving part for pan/tilt/zoom.

3. Precautions for Use

- The use or lease, in whole or in part, of this Specification without the authorization of the right holder may violate applicable copyright law.
- Please use the unit at indoors, or under the corresponding environment.
  ☞ It must not be setup in places exposed to condensation or freeze.
- Dust, dirt, fingerprints, etc.
  ☞ Remove the greasy dirt with a cotton swab dipped in ethanol.
- Do not give a mechanical vibration or shock.
  ☞ As a module itself, this module doesn't prepare any protection measures against mechanical vibration or shock. If the mechanical vibration or shock is likely to occur, please add some countermeasures for shock-absorption.
- As a module itself, it doesn't prepare any protection measures against: EMC/ EMI, static damages, dust and water entry.
- Connection and disconnection of the cables to the camera must be done when the power to the camera is off. Otherwise, it will cause the malfunction of the camera.
- The use of the power voltage other than that specified exclusively for use with this product may cause fire or electric shocks.
- When touching the camera, please do after turning off the power to the camera. The camera might be hot, and take care about the burn, please.
- Due to continual improvements, design and specifications are subject to change without notice.

4. Precautions for Installation

- It is recommended to use the retainer specified for the camera to retain the camera.
- In order to avoid fine dust from coming into the camera, never place the camera with the lens holding screw up.
- To use the unit in the troublesome condition of the ambient by convention, apply some measures to assist the heat liberation or cooling down.

5. Product specification

Item	Value			Measure	Remarks
	Minimum	Nominal	Maximum		
Power Supply Voltage Consumption current (max.)	4.5	5.0 500	5.5	V mA	Maximum current consumption is a reference value at the maximum operational voltage.
Absolute Maximum Rating Voltage	-0.3 ~ 6.0			V	
Lens Object distance Angle of view	10 ～ infinity 180°＋214°			mm	Measuring from the lens surface w/ minus angle of 17°
Image sensor Effective Pixels Pixels to use	H:2048×V:1536, approx. 3.15M approx. 1.70M			pixel pixel	1/2" Single-panel CMOS color method
Minimum object illuminance	5			lux	with AE is off.
AV Output (analog) (VBS mode) Video Signal system Output drive capability Video Output method	 1Vp-p Composite Video, Negative sync. 75 NTSC/PAL			 Ω 	 (pre-set at ex-factory)
AV Output (digital) (FS USB mode) Signal System Image Compression Technology Image Size Number of Colors	 USB 1.1 JPEG 640 × 480, 320 x 240 32 bit Color			 Pixel 	Movie Max. Frame Rate: 15 fps VGA, QVGA size
USB	USB1.1 (Full speed)				OS: Windows XP (Note 1)
Dimension size weight	 W:39.0 × H:44.7 × D:38.0 80±5			 mm g	 Design standard value Design standard value
Operation Environment	Temperature: 0 ～ 40 Humidity: 20 ～ 80			℃ %(RH)	Non-condensation Cool the product to prevent the product surface temperature from being out of specified range.
Storage Environment	Temperature: －20 ～ 60 Humidity: 20 ～ 90			℃ %(RH)	

Note 1: The camera function might be unstable with unspecified OS.
When using the camera with a PC, don't use the PC with the power saving mode (standby or pause). Otherwise, the camera does not perform. If intending to use the PC with the power saving mode, close the camera application in advance.

6. Items enclosed

- Camera
- 21-pin connect cable (L=300 mm): 1 pc

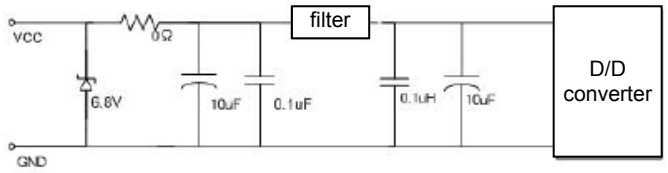
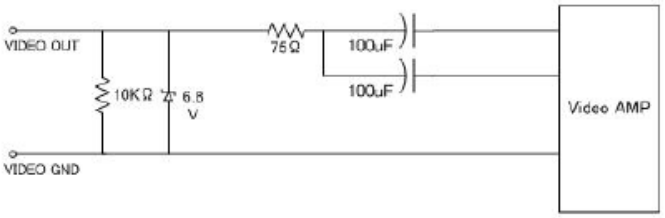
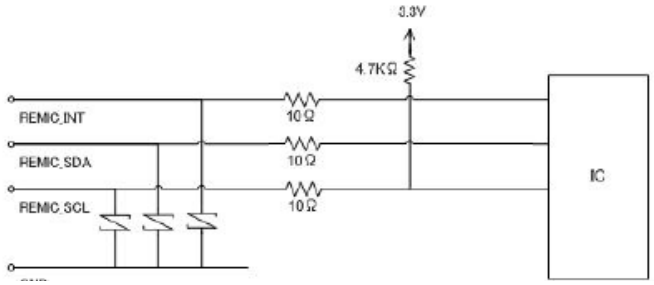
7. Functions

items	description	remarks
Exposure control	Automatic electronic system	
White balance control	Automatic electronic system	
Video signal system	NTSC/PAL switching is possible	Pre-set at ex-factory
Display the processing of Image-development	Image output has selectable fifteen patterns.	Able to switch by Control Commands
Positioning for Image-development	Processing of Image-development area(s) is adjustable.	Able to switch by Control Commands
Flip Vertical images	Flip Vertical is activated by a control signal.	Able to switch by Control Commands
Pan, Tilt, & Zoom function	Pan, Tilt, & Zoom function are activated by a control signal.	Able to switch by Control Commands

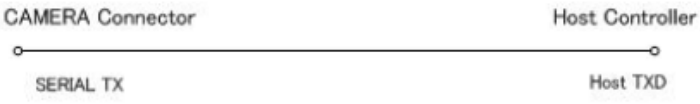
8. Input-output terminal specification

Terminal name	No	Description	Remarks
Vcc	1	Power source	
Vcc	2	Power source	
GND	3	Camera power GND	
USB D-	4	USB signal data line -	
USB D+	5	USB signal data line +	
GND	6	GND	
VIDEO OUT	7	NTSC/PAL image signal output	
VIDEO GND	8	Image signal base GND	
REMC INT	9	Interrupt signal input for external control	3.3 V line
REMC SCL	10	Clock signal output for external control	3.3 V line
REMC SDA	11	Data signal input for external control	3.3 V line
GND	12	GND	
SERIAL TX	13	Serial signal output	3.3 V line
SERIAL RX	14	Serial signal input	3.3 V line
SERIAL GND	15	Serial signal GND	
Reserve	16	Reserve	Leave it OPEN
Reserve	17	Reserve	Leave it OPEN
Reserve	18	Reserve	Leave it OPEN
Reserve	19	Reserve	Leave it OPEN
Reserve	20	Reserve	Leave it OPEN
Reserve	21	Reserve	Leave it OPEN

9. Terminal Internal Connection

Terminal name	No	Internal Circuit	Remarks
Vcc	1/2		Camera Power
GND	3/6/ 12		Camera Power GND
VIDEO OUT	7		Image signal output
VIDEO GND	8		Image signal base GND
			【External Control Signal 】
REMC INT	9		INTERRUPT signal
REMC SDA	11		DATA input/output signal
REMC SCL	10		CLOCK signal
Reserve	16		
Reserve	17		
Reserve	18		
Reserve	19		
Reserve	20		
Reserve	21		

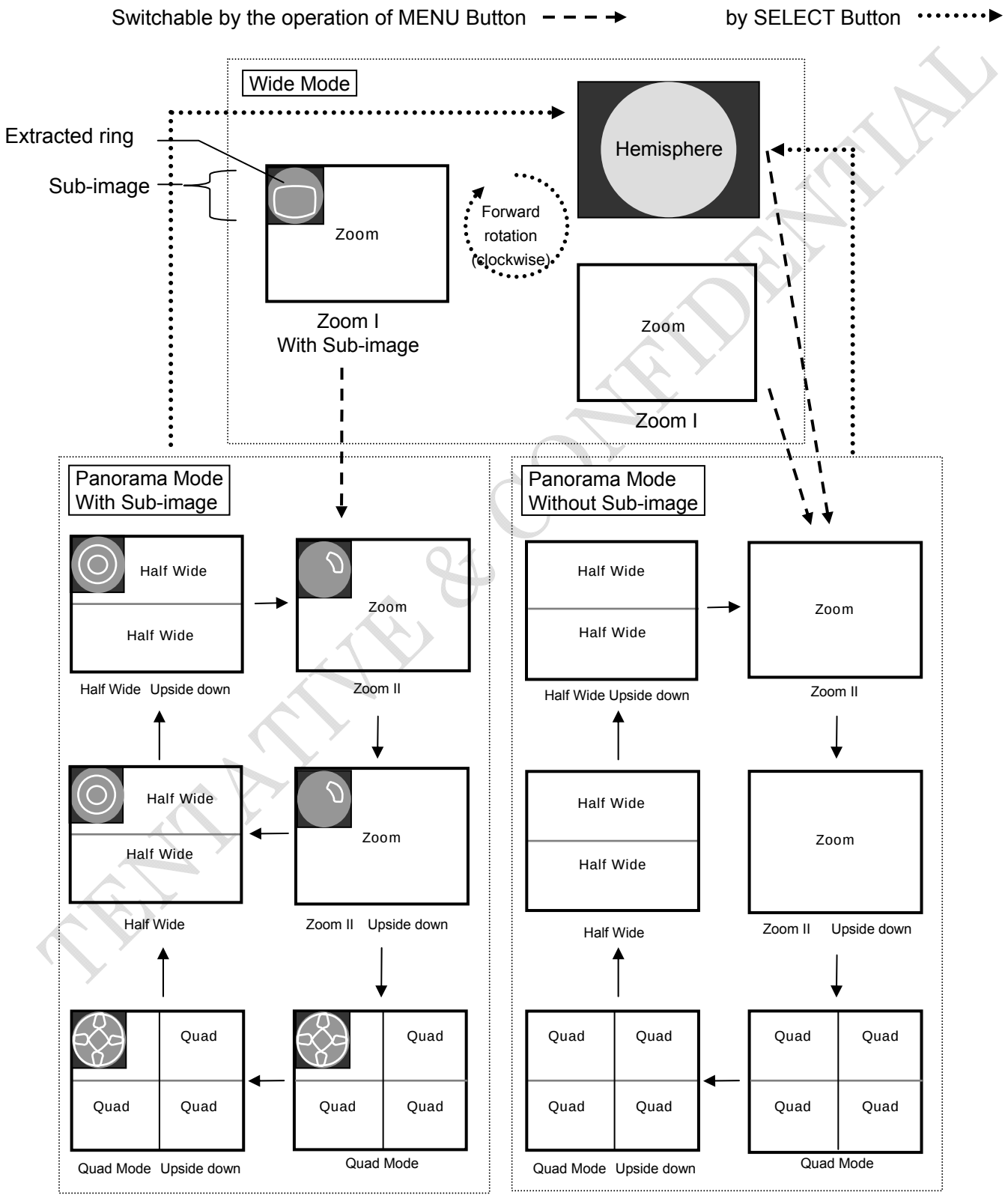
10. Terminal External Connection

Terminal name	No	Internal Circuit	Remarks
SERIAL TX	13		Serial signal output
SERIAL RX	14		Serial signal input
SERIAL GND	15		Serial signal GND
Vcc	1/2		Camera power
USB D-	4		USB signal Data line -
USB D+	5		USB signal data line +
GND	3/6/12		GND

11. Patterns of Image-development

- Shift to the following Image-development, using control signal or making commands via USB.
- Panorama mode contains Flip Vertical mode

☞ **Note** : In case of images on an overscan monitor, part of the periphery of images may be cut out.



Development mode	Description
Hemisphere	Displays the hemisphere images projected on the image sensor (CMOS Image Sensor)
Half Wide	Enlarges the specific areas every 180-degree to create a rectangle. Displays the image, dividing the screen in half.
Zoom Ⅰ	Enlarges the specific areas to create a rectangle. Displays the whole image.
Zoom Ⅱ	Enlarges the specific areas to create a rectangle. Displays the whole image. *Scrolling direction is not the same between Zoom Ⅰ and Zoom Ⅱ

12. External Control Signal

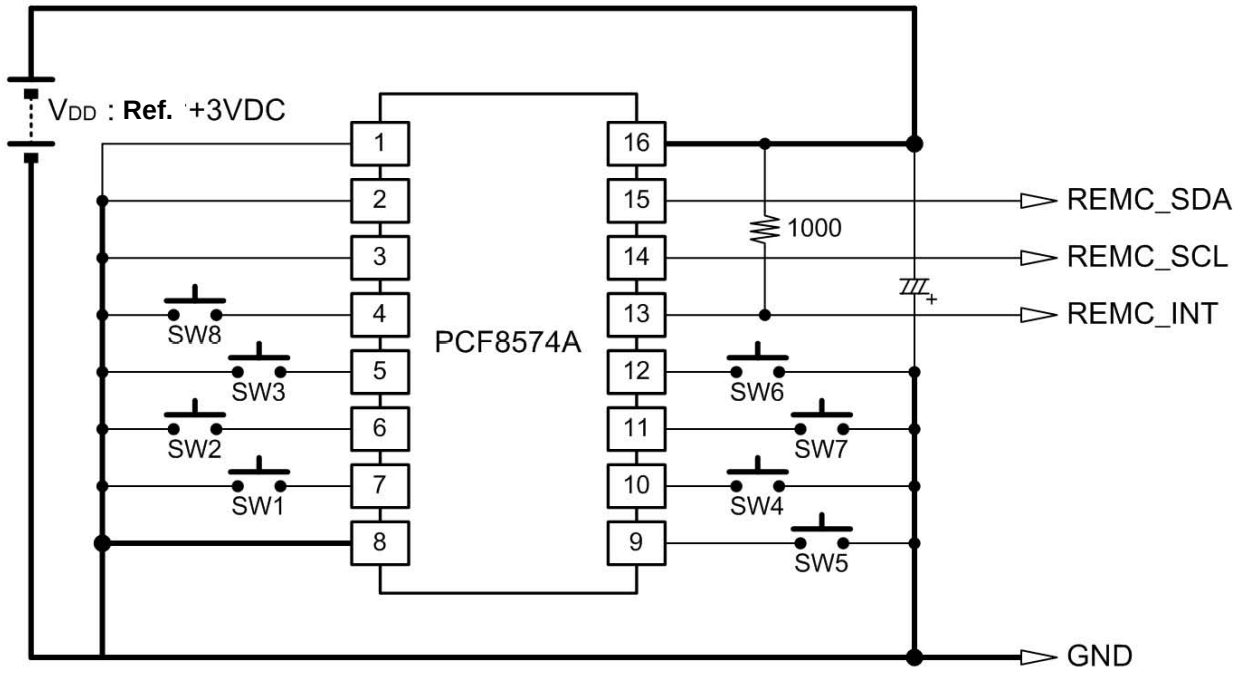
- The signals (REMC_INT, REMC_SCL, REMC_SDA) make it available to switchover and controlling of various functions.
  ☞ Please refer to the circuit indicated in "13. External Control Reference Circuit".

Function		SW Name	Description	Applicable screen/ mode
Switching Image patterns		MENU	Switching the image-development pattern in the Panorama Mode	all Modes
		SELECT	Switching the image-development pattern in the Wide Mode	
Adjusting the image position (Wide Mode)	Rightward shift	E	Shift the extracted ring Rightward. (The indicated image moves from right to left.)	Other than Hemisphere
	Leftward shift	W	Shift the extracted ring Leftward. (The indicated image moves from left to right.)	
	Upward shift	N	Shift the extracted ring Upward.	
	Downward shift	S	Shift the extracted ring Downward.	
Adjusting the image position (Panorama Mode)	Rotate Counterclockwise	E	Rotate the indicated image counterclockwise. (Note 1)	Other than Hemisphere
	Rotate Clockwise	W	Rotate the indicated image clockwise. (Note 1)	
	Move Inward	E	Move the indicated image inward. (Note 1)	
	Move Outward	S	Move the indicated image outward. (Note 1)	
Zoom IN/Out Adjusting the extracted ring size	Enlarge	UP	Zoom In : the area in the extracted ring becomes small.	Other than Hemisphere
	Minify	DOWN	Zoom Out : the area in the extracted ring becomes large.	
Save the preset values		SELECT + UP (Note 2)	Save the current Image-development mode, displayed position on screen, and information of adjusting extracted ring.	All modes

Note 1: The direction to rotate or move becomes opposite in the Flip Vertical mode.
Note 2: Press UP while pressing SELECT.

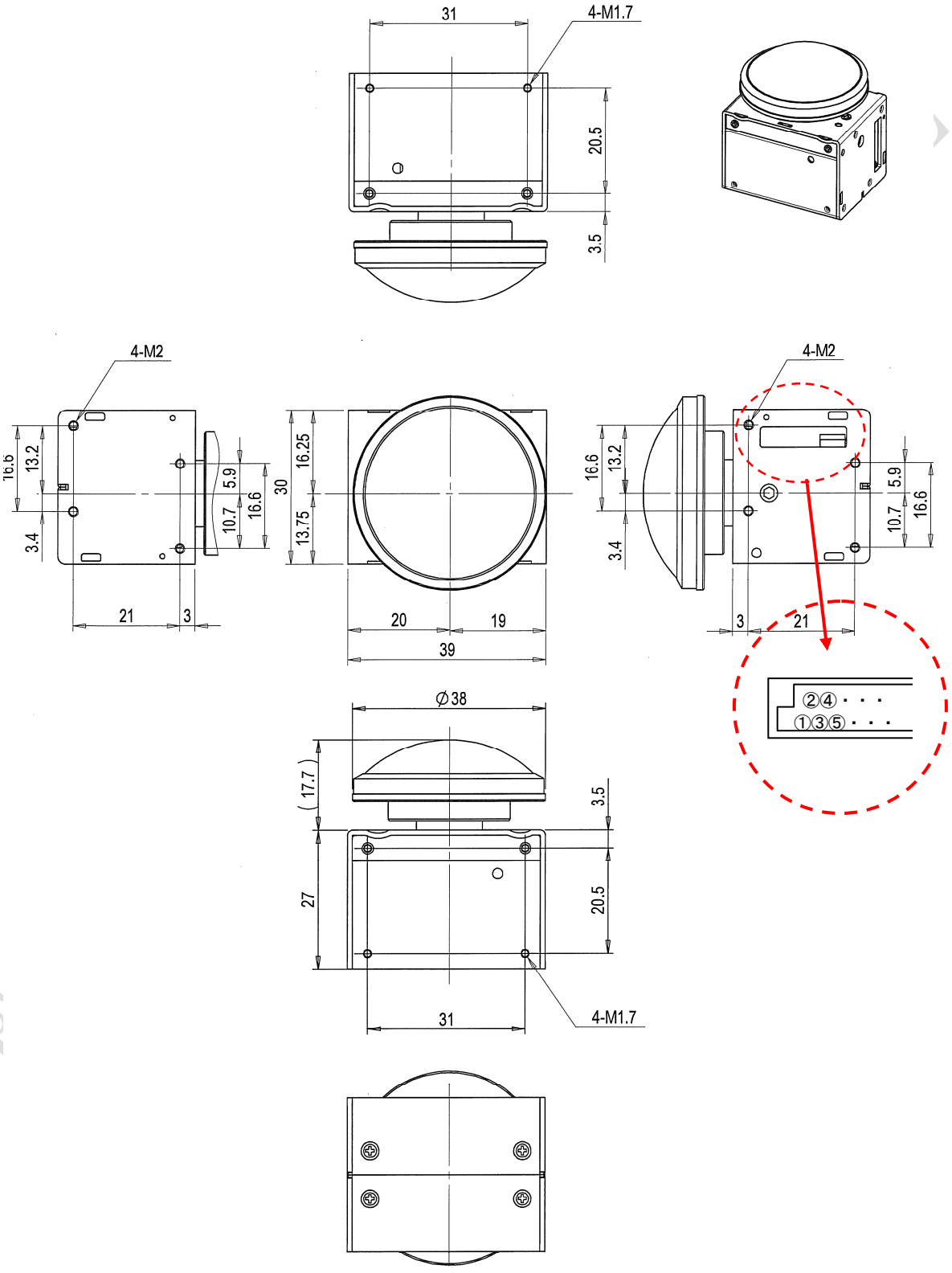
13. External Control Reference Circuit

This is the referenced circuit diagram for using the External Control Signals.

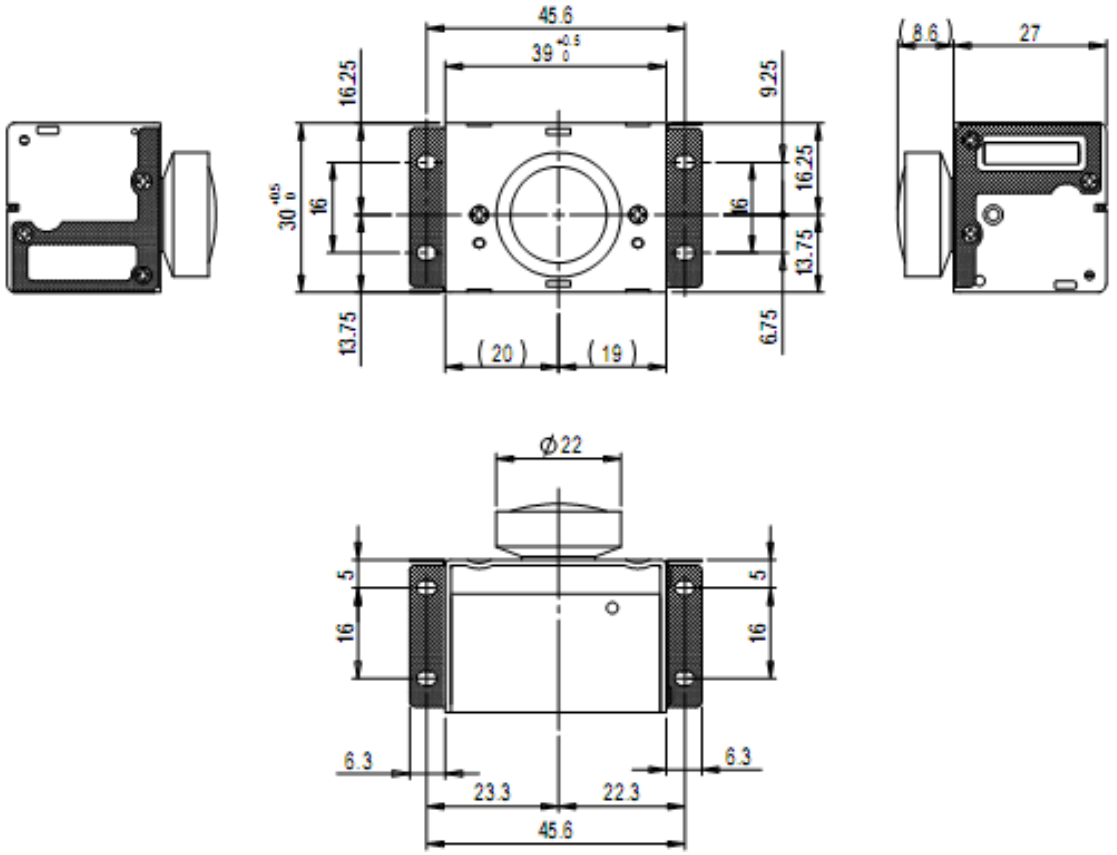


Note: This is just an example of circuit diagram to control the signals for NM33 externally and not the subject of our guarantee for the function. Our company doesn't assume the responsibility of damage or third party's industrial property that originates in this circuit and the problem of the violation of the intellectual property right at all.

14. Dimensional outline drawing



15. Dimensional Information of Retainer



Note: This is the drawing for the model NM33-N. The shape and size of the lens part varies according to the lens specification.