

Programmer's Guide for CXN010x

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Sony Semiconductor Solutions Corporation

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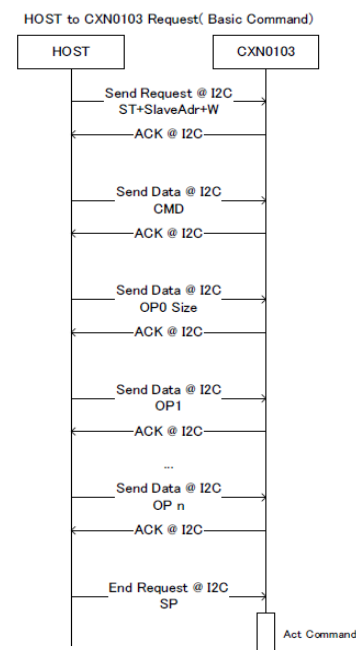
I2C Communication

- Basic -

HOST→CXN0103 Module communication (Request)

The Request communication procedure is described below.

1. The HOST transmits an I2C ST (Start Condition)-Slave Address-W (Write) request to the CXN0103 Module.
2. When the CXN0103 Module receives the above transmission instruction, it sends back ACK.
3. The HOST transmits each data (CMD, OP0, OP1 to OPn) 1 byte at a time.
4. The CXN0103 Module sends back ACK each time it receives the above data.
5. When the HOST finishes transmitting the data, it transmits SP (Stop Condition) to the CXN0103 Module.
6. When the CXN0103 Module receives SP, it performs the processing requested by CMD.



Sequence Conforming to the Request Communication Procedure

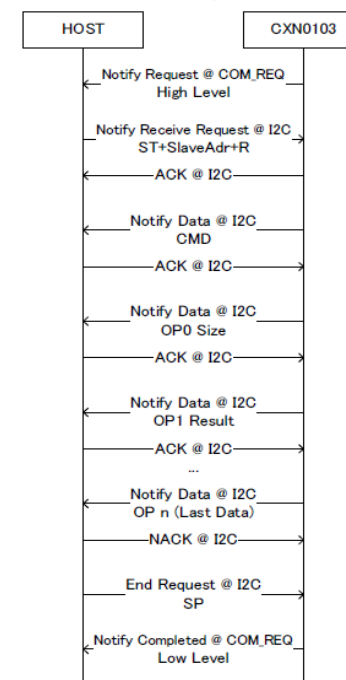
The Notify communication procedure is described below.

1. The CXN0103 Module sets COM_REQ to High level to notify the HOST that it wishes to start communication.
2. The HOST transmits the I2C ST (Start Condition)-Slave Address-R (Read) request to the CXN0103 Module at the timing when it is ready to communicate.
3. When the CXN0103 Module receives the above transmission instruction, it sends back ACK.
4. The CXN0103 Module transmits each data (CMD, OP0, OP1 to OPn) 1 byte at a time.
5. The HOST sends back an ACK each time it receives the above data.
6. When the HOST finishes receiving the data, or when communication becomes impossible, it transmits NACK.
7. When the CXN0103 Module receives NACK, it stops data transmission and waits for SP (Stop Condition).
8. The HOST transmits SP (Stop Condition) to the CXN0103 Module.
9. When the CXN0103 Module receives SP, it sets COM_REQ to Low level to notify that communication has ended.

* When the Notify command is received, the HOST should always transmit SP after 32 bytes (CMD+OP0-30) of data have been received. However, note that reception data in excess of the size specified by OP0 is treated as invalid data (dummy data).

* When the HOST requests to get data of a size larger than that indicated by OP0 in Notify communication (when the HOST continues to output ACK in the procedure above), the CXN0103 Module sends dummy data (0xFF).

CXN0103 to HOST Notify (Basic Command)



Sequence Conforming to the Notify Communication Procedure

◆ **Step1: Power on the module**

- HOST System start to supply the power to the Pico Projector module, then the module will initialize itself automatically.

◆ **Step2: Receive “Boot Completed Notify”**

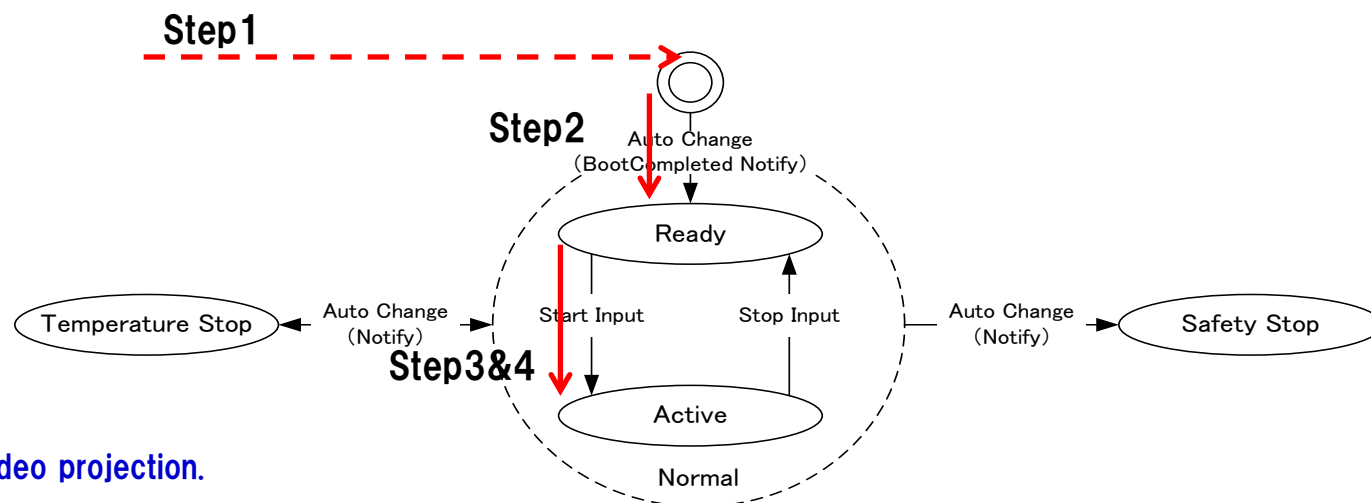
- The module will notify, a few seconds later from Step1.
(Byte string ‘0x00 0x01 0x00’ to be expected)
- HOST should receive and confirm it whether the module is normally booted or not.

◆ **Step3: Originate “Start Input” command**

- HOST should originate “Start Input” command (Byte string ‘0x01 0x00’), then the module will start outputting video.

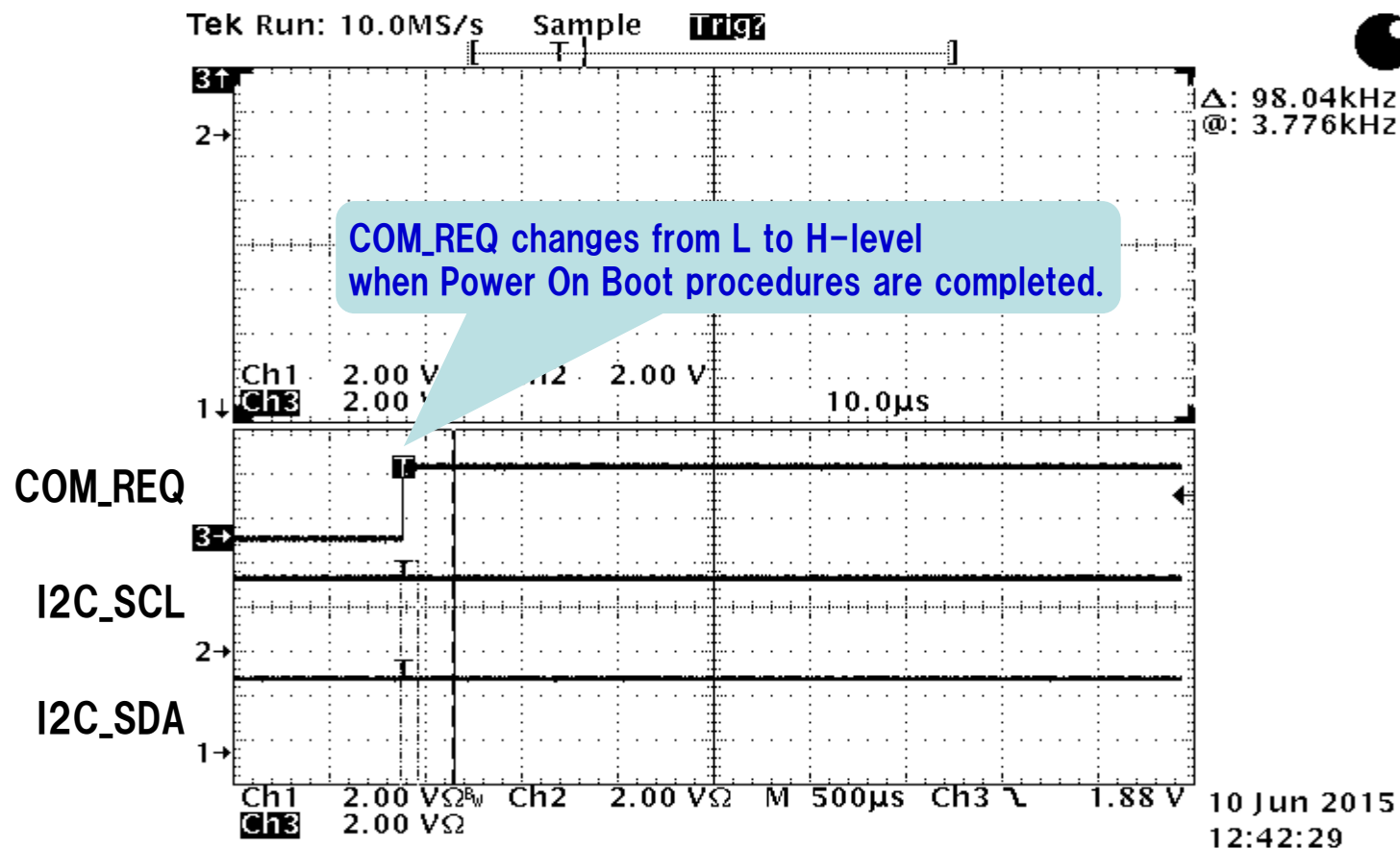
◆ **Step4: Receive Notify for “Start Input”**

- The module will notify, when “Start Input” command is processed normally.
(Byte string ‘0x01 0x01 0x00’ to be expected)

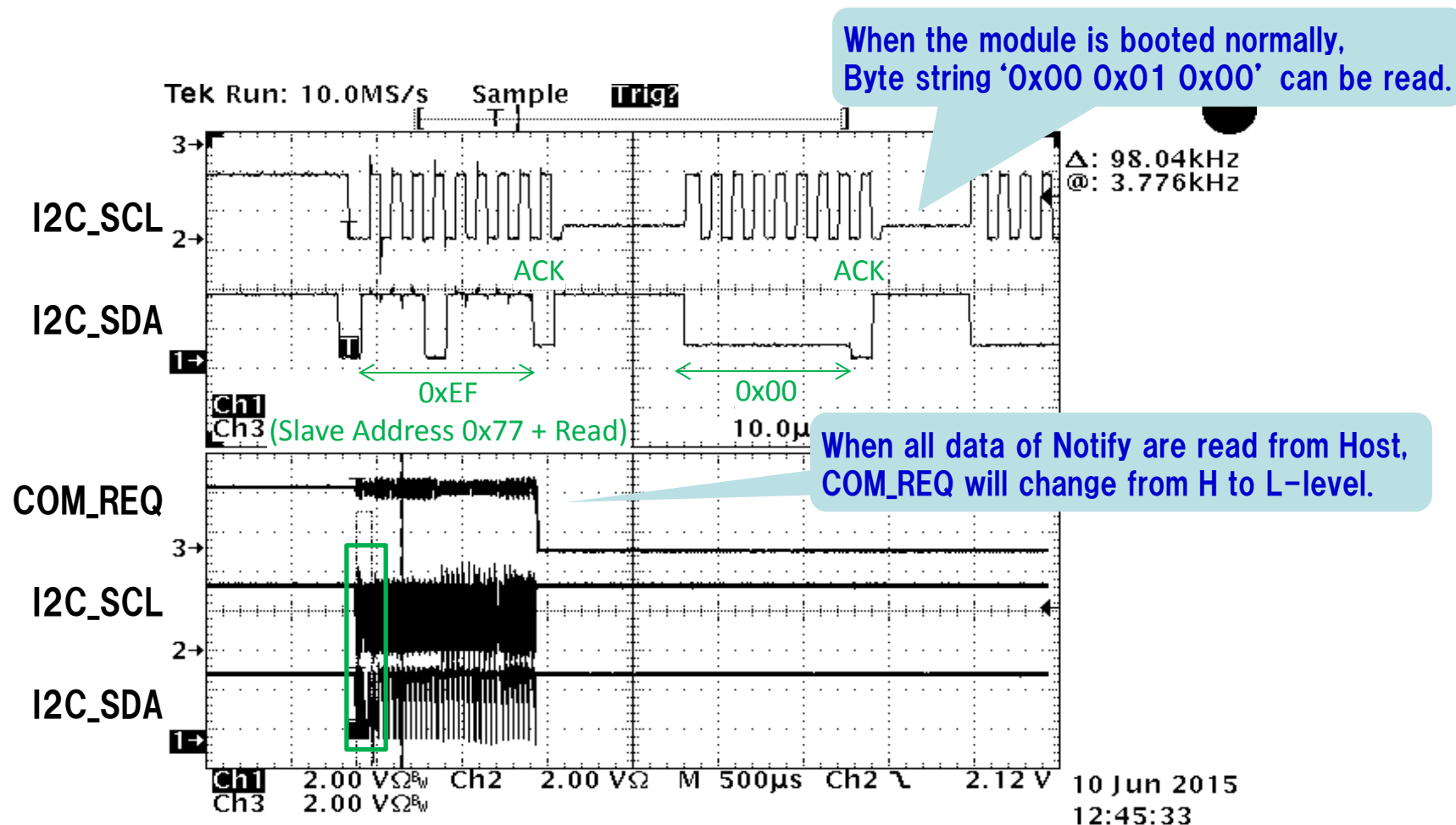


(NOTE) Both Step2 and 4 can be skipped,
if your purpose is only sanity check of the video projection.

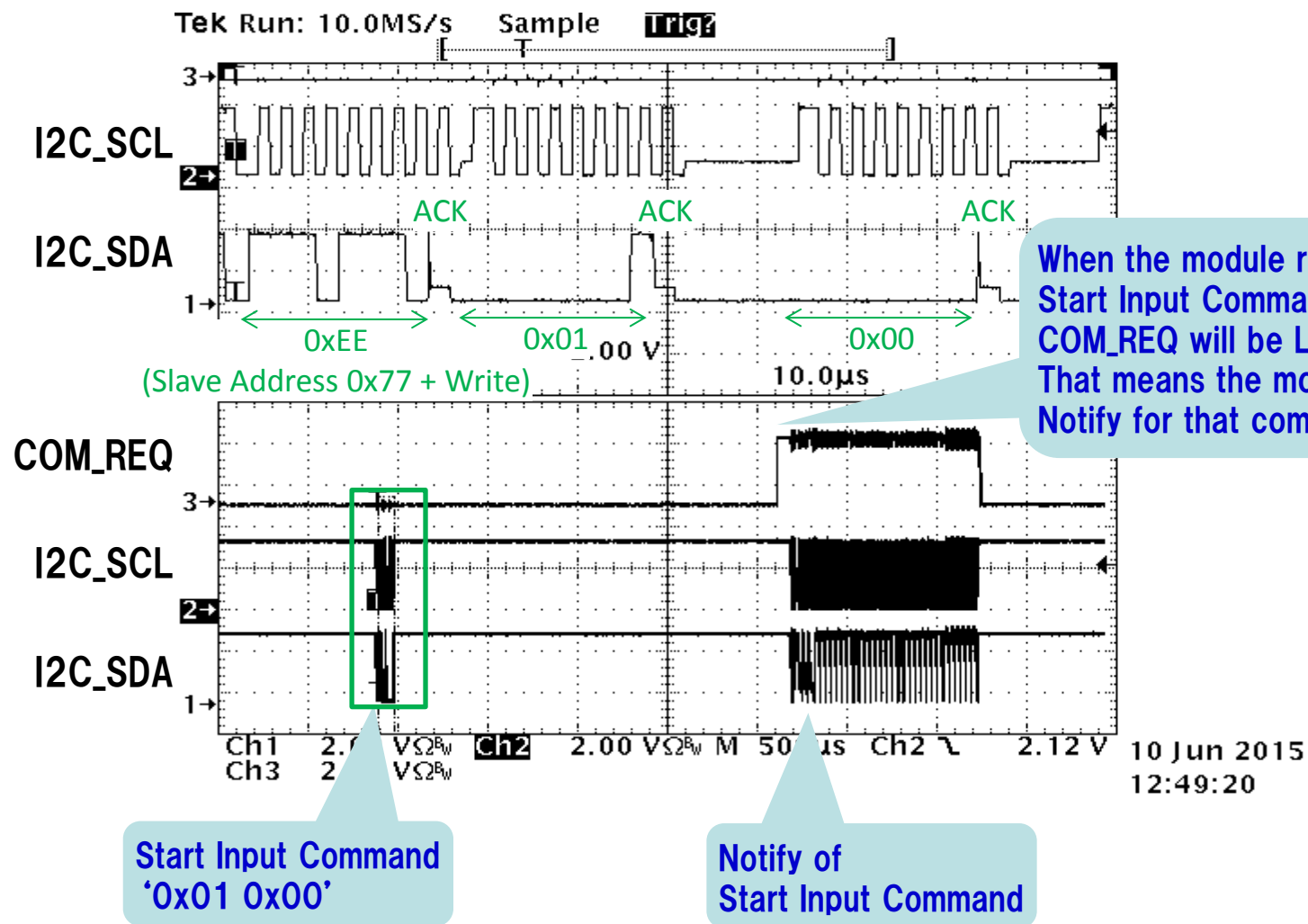
I2C waveform – Step1: Power On



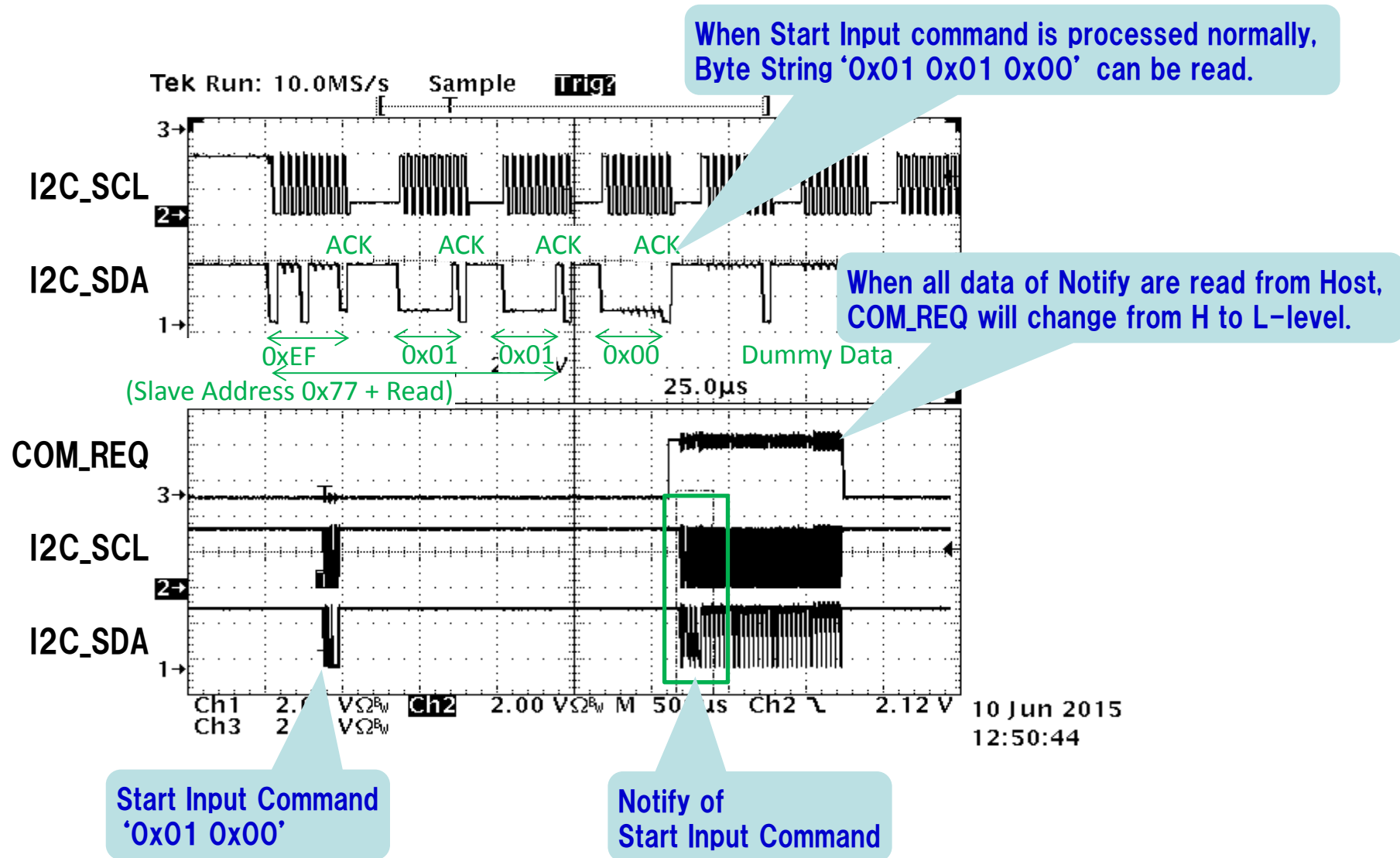
I2C waveform – Step2: Boot Completed Notify



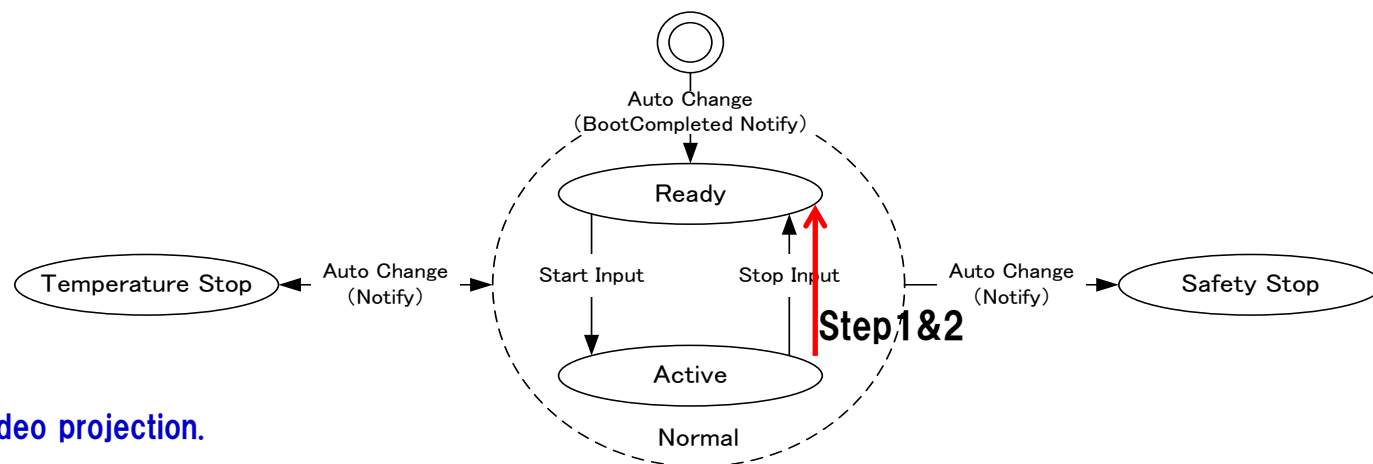
I2C waveform – Step3: Start Input Command



I2C waveform – Step4: Notify of Start Input Command



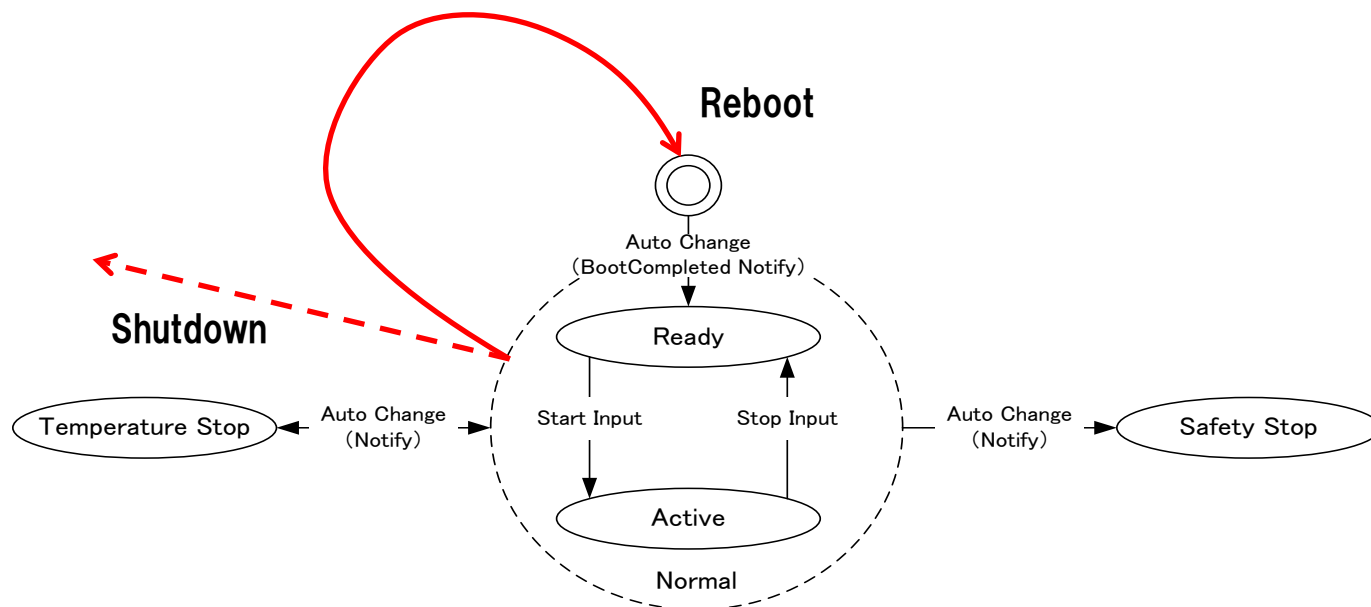
- ◆ **Step0:** The module in Active state
- ◆ **Step1:** Originate “Stop Input” command
 - HOST should originate “Stop Input” command (Byte string ‘0x02 0x00’), then the module will stop outputting video.
- ◆ **Step2:** Receive Notify for “Stop Input”
 - The module will notify, when “Stop Input” command is processed normally.
(Byte string ‘0x02 0x01 0x00’ to be expected)



(NOTE) Step2 can be skipped,
if your purpose is only sanity check of the video projection.

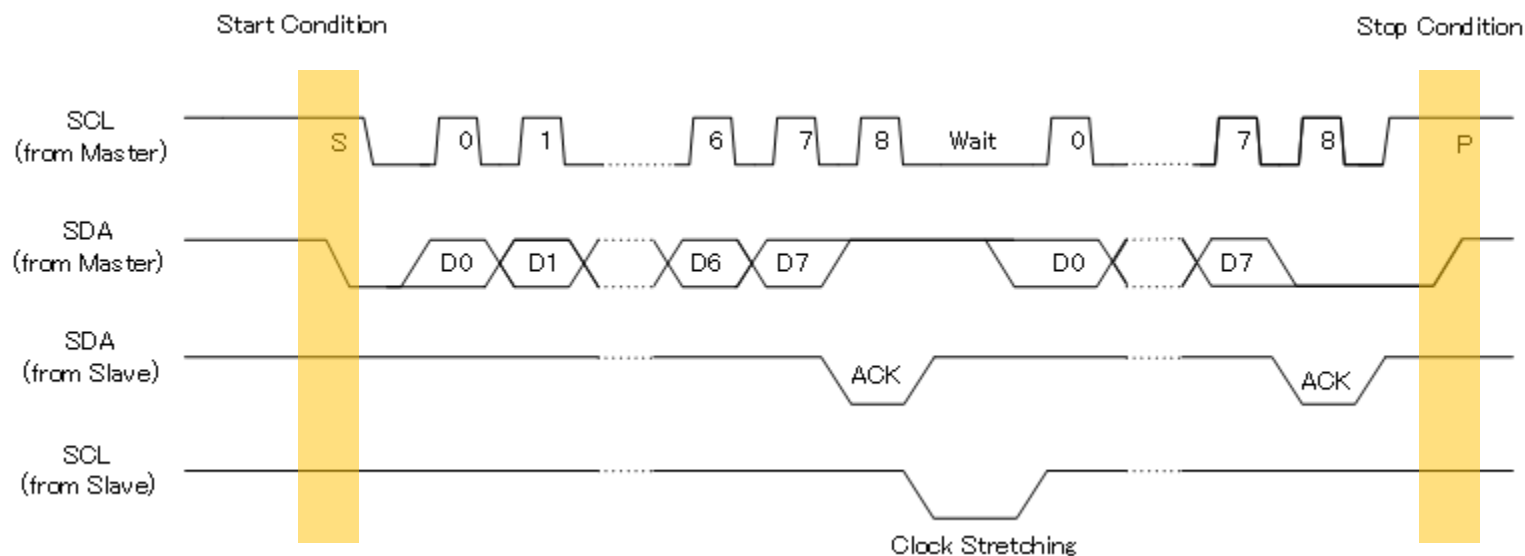
◆ Step1: Originate “Shutdown•Reboot” command

- In case of Shutdown, HOST should originate “Shutdown•Reboot” command with OP1= ‘Stops all functions’ (Byte string ‘0x0B 0x01 0x00’), then the module will stop all function and power off.
- In case of Reboot, HOST should originate “Shutdown•Reboot” command with OP1= ‘Reboot’ (Byte string ‘0x0B 0x01 0x01’), then the module will stop all function and self-reboot.

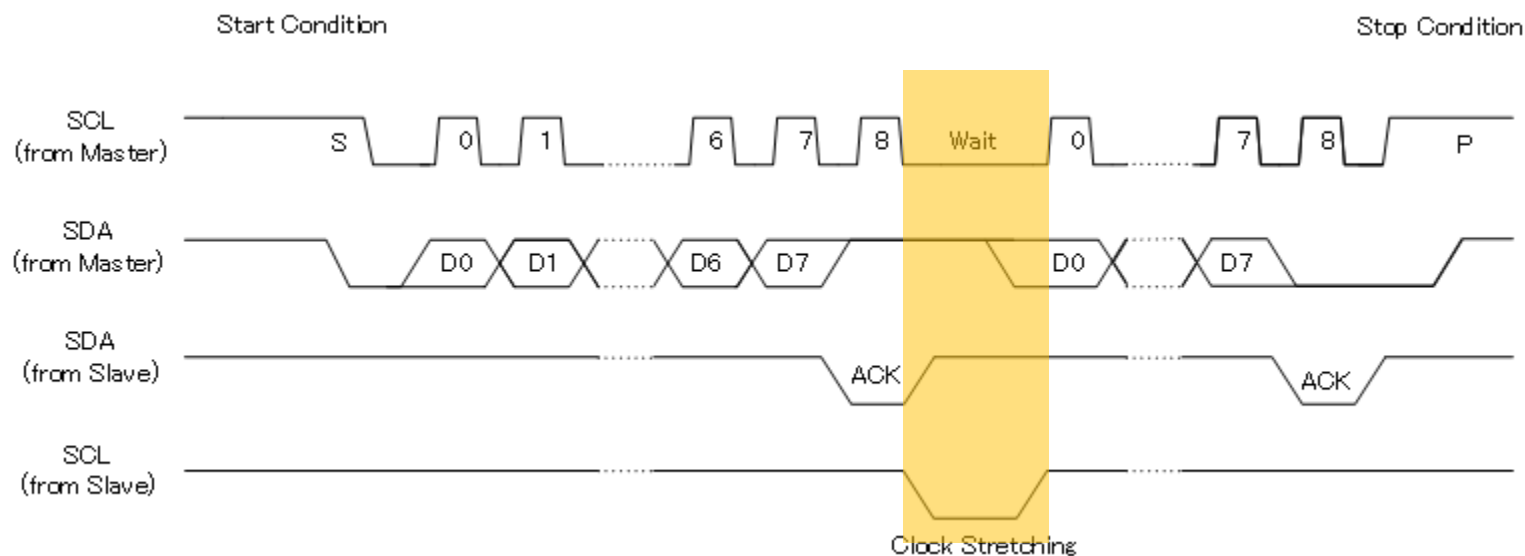


I2C Communication

- Tips -

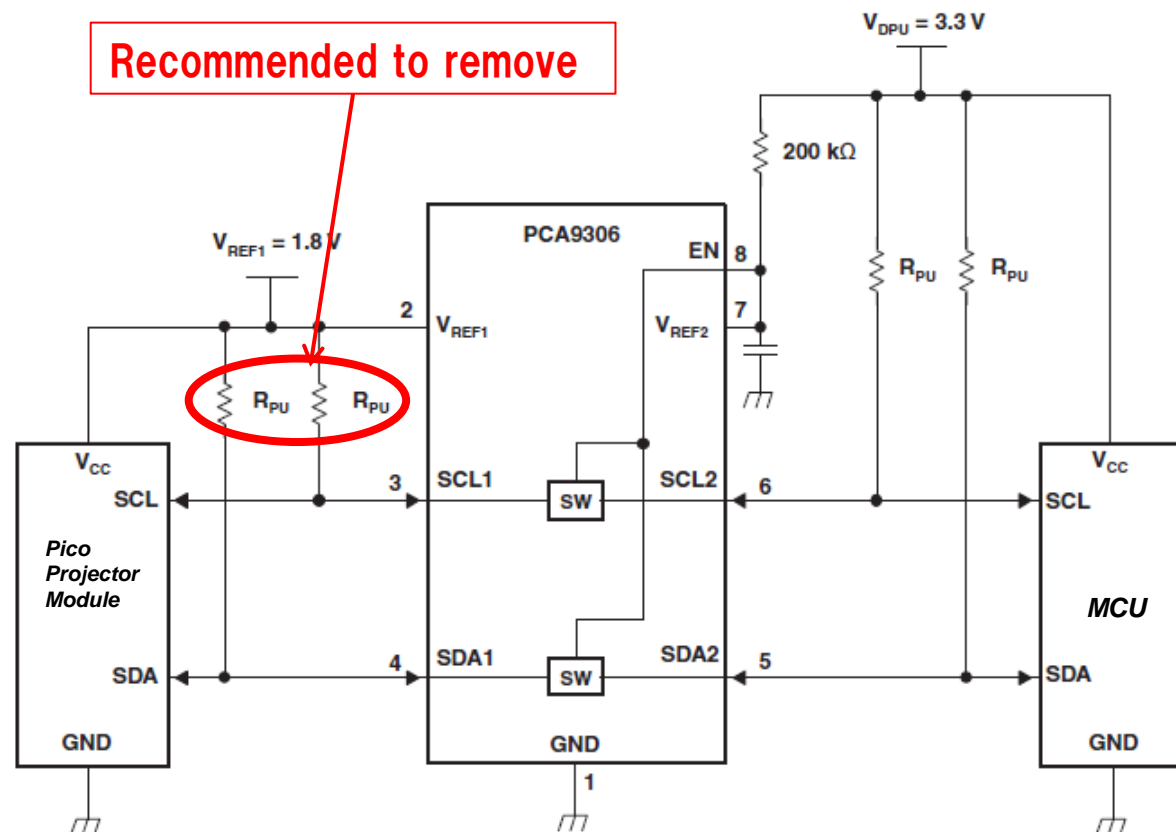


- In normal state both SCL and SDA lines are high. The communication is initiated by the master device and generates the Start Condition (S) followed by the address of the slave device.
- Once all bytes are read or written, the master device generates Stop Condition (P) . This signals to other devices on the I2C bus that the communication has ended and another device may use the bus.
- CXN010X/CXN020X module treats Stop Condition as a terminator, the end of each command/notify byte string.

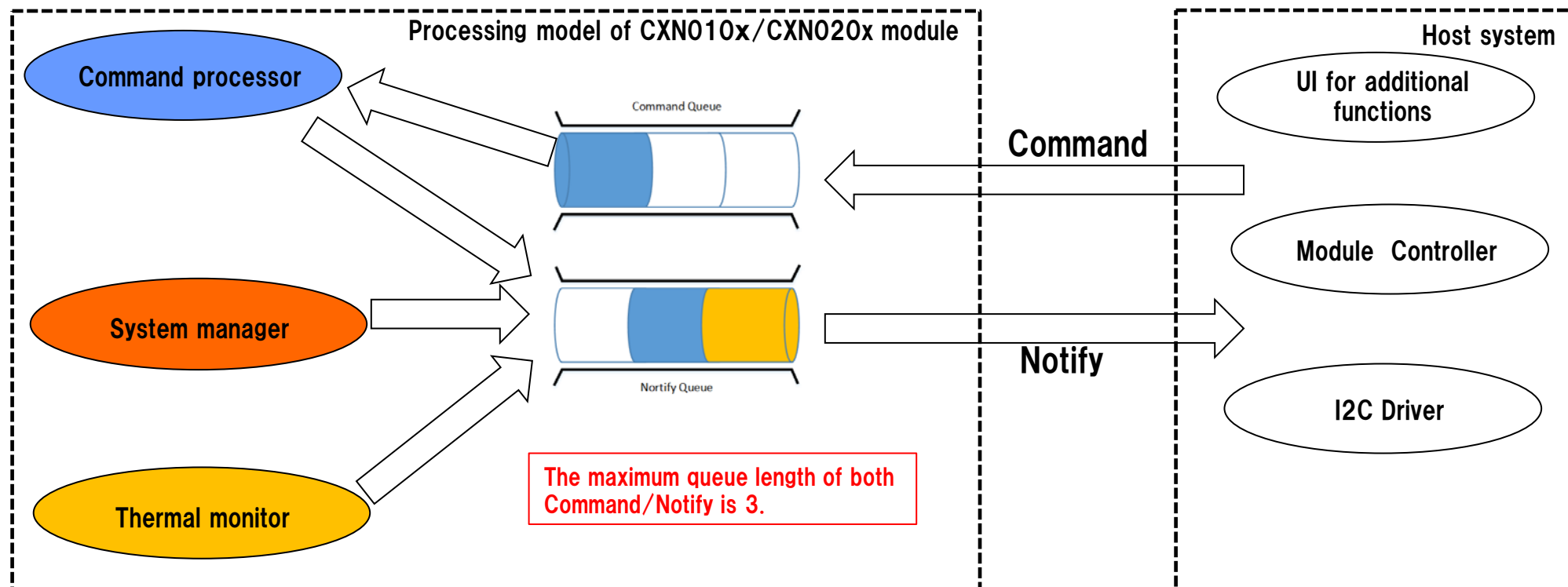


- I2C slave device can slow down communication by stretching SCL. During an SCL low phase, any I2C device on the I2C bus may additionally hold down SCL to prevent it from rising again, enabling it to slow down the SCL clock rate or to stop I2C communication for a while.
- Sony's pico projector module sometimes does Clock Stretching to wait I2C master, if some response data is not ready.

- A circuit with voltage-level translator may be figured on the right, if the circuit design is based on the example in the design document of the translator.
- Both SCL and SDA lines of Sony's module has been already been pulled-up internally. Therefore, it might be excessive when there is an external pull-up resistors.
 - ◆ Clock Stretching may not work well.
- If the external pull-up resistors is connected to the SCL and SDA lines of the module and then I2C communication is not performed properly, it should remove the external pull-up resistors.



Sample Application Circuit using TI's voltage-level translator
(Convert 1.8V to/from 3.3V)



- Emergency notify will be originated asynchronously and independently from command processing. Immediately after the host issues some command, the first notify from the module may not be for the command.
- When there are 3 notifies remaining in the notify queue, coming notify will not be stored into the queue and then it will be completely lost.

Sample case of poor implementation

```
UINT32 Exec_Some_Command (UNIT8 *data_addr_of_some_command)
{
    Bool status_of_COM_REQ;
    UINT32 size;
    UINT32 ret;

    i2c_write (data_addr_of_some_command, sizeof (SOME_COMMAND));

    do {
        status_of_COM_REQ = Check_COM_REQ ();
    }
    while (status_of_COM_REQ != HIGH);

    size = i2c_read (data_addr_of_some_notify, sizeof (SOME_NOTIFY));
    // Not always for Notify of this command.

    ret = Check_Notify_Result (data_addr_of_some_notify);
    return ret;
}
```

- This example show the pair of command and notify to be processed synchronously.
 - ◆ This code can not handle the following cases:
 - a. **Emergency notify or Temperature Emergency notify occurred** during the command processing by the module.
 - b. **Two or more different commands** issued consequentially.
 - c. **Division Transmission Update Function.**
Division Transmission Update FW Image notify or Division Transmission Update Picture Data notify will be occurred, after all Division Transmission Update Data following Division Update FW Image/Division Transmission Update Picture Data are issued.
- Instead of synchronous programming design like above sample code, asynchronous programming design is recommended.

- Q1: I2C read start timing
 - ◆ [Q] Does it need to add some delay time for I2C read after COM_REQ has been changed from Low to High? If yes, how many delay time does it need to add?
 - ◆ [A] No. It is possible to start I2C read immediately after COM_REQ from Low to High.
- Q2: I2C error case: COM_REQ never changed to Low
 - ◆ [Q] What is a situation to observe COM_REQ is not changed from High to Low after finishing I2C read?
 - ◆ [A] It may be observed in the following cases:
 - No Stop Condition has occurred properly from I2C master (=Host) .
 - ✓ The module treats Stop Condition as a terminator of each command and notify.
 - Another "Notify" is still remaining.
 - ✓ For example, when Host does not read any "Notify" from boot-up till "Start input", there are two "Notify" stored. One is "Boot Completed Notify" and the other is Notify for "Start input" command.
 - ✓ As another example, when Host writes incorrectly a meaningless value (For example: 1byte of 0x00), the module will treat it as an invalid command and issue an individual notify with error.
- Q3: I2C error case: I2C ACK not originated properly
 - ◆ [Q] What is a situation to encounter any other I2C read fail issue?
 - ◆ [A] It may be observed in the following cases:
 - During the host process of a read access to I2C, if host does not properly respond with ACK and try to start another read access, then the module will not handle and deadlock occur.
 - ✓ No other case of I2C read fail is considered except mentioned above.

■ Q4: COM_REQ check timing

◆ [Q] When should host system check COM_REQ status?

◆ [A] Following procedures are recommended.

- In case of COM_REQ connected as an interrupt signal of host system (Rising Edge Triggering):
 - ✓ No need special procedures.
- In case of COM_REQ connected as an interrupt signal of host system (Level Triggering):
 - ✓ Due to some internal processing delay from “Stop Condition detection” to “COM_REQ negation”, Host system should be better to put some interval (around 1ms) before enabling COM_REQ interrupt detection after transmitting Stop Condition.
- In case of COM_REQ connected as a generic input signal and host system polling with some interval:
 - ✓ Due to some processing delay from “Stop Condition detection” to “COM_REQ negation”, Host system should be better to put some interval (around 1ms) before polling again COM_REQ status after transmitting Stop Condition.
- NOTE: When I2C master (=Host) reads Notify via I2C and terminates with Stop Condition, then the module checks the completion of read access and changes COM_REQ status from High to Low. These procedures are done by the module's firmware and it takes hundreds of microseconds delay from receiving Stop Condition to changing COM_REQ status. If Host system checks the status of COM_REQ immediately after sending Stop Condition, there are possible to read the COM_REQ status before changing the status by the module.
 - ✓ There are a high risk to encounter above issue, when a performance of the host side processor is much faster than the internal processor of the module and each processes can be done in shorter periods,

- Q5: COM_REQ status control

- ◆ [Q] When will COM_REQ be backed to low without read Notify or Power off?
- ◆ [A] No methods exist, except reading Notify, Power Off, Shutdown and Reboot.

- I2C slave address is correct?
 - ◆ Sony Pico Projector module address is “0x77”.
- Is there any external pull-up resistors?
 - ◆ Should remove the resistors if exist.
- Is there any notch observed at the end of clock stretching?
 - ◆ Some I2C master can not handle clock stretching properly.
- Illegal notify “0x00 0x01 0xD0” is overserved?
 - ◆ There are high possible to issue the byte strings beginning with 0x00. Please check a behavior or an initialize sequence of the I2C driver software.
- Does an actual length of each commands match with the specification?
 - ◆ If there are some dummy/padding bytes following command byte string, some commands can not work as expected.
 - Ex: Division Transmission Update Data command

Procedure example for Temperature Stop state

When monitored internal temperature reaches 60°C, the module gets in to the Mute (black screen) mode. And when the temperature becomes under 60°C, the state is back to previous state (it resumes automatically). However this may cause oscillation between Mute and previous state. Following procedure is an example to avoid unexpected oscillation.

Monitored internal temperature reaches 60°C



in to the Mute (black screen) mode automatically



"Temperature Emergency Notify" returns



Send "Mute" command explicitly



Monitor the temperature using "Get Temperature" command and if temperature becomes low enough for example 50 °C(*), then



Send "UnMute" command to resume

(*): Monitored temperature differs from heat sink, usually it is lower than heat sink by several degrees, depending on thermal design. Please check heat sink temperature correlation. Temperature must be maintained based on heat sink temperature.

Update of FW / Start-up screen picture

There are two ways for FW and start-up screen picture update.

1. Use I2C from HOST CPU
2. Use UART from outside PC control
 - ✓ This might be used in product manufacturing line using PC connected with wire to board and terminal software like TeraTerm.
 - ✓ Strongly recommended to place terminals or something connector on board in order to be wired from outside.

This is helpful and important for manufacturer, when start-up screen is installed in set manufacturing line. Therefore update scheme should be considered properly.

Test procedure example for using I2C update and also instruction for using UART update are described in following pages.

Test procedure example of update using I2C

Use "Update FW Image" or "Division Transmission Update FW Image" command.

* For many application processor system, it limits data transfer size at one time for I2C, in that case , please use "Division Transmission Update FW Image" with chunked data transfer.

1. Check current FW version with "Get Version" command (0xA2 0x00)
"0xA2 0x0d 0x00 0x-- 0x-- 0x-- 0x-- , , , , " should be sent back as Notify.
 2. Update FW with "Division Transmission Update FW Image" using "flash(date)_====_**_DCL.img"
as test FW data.
 3. Reboot once.
 4. Then check FW was updated with "Get Version" command.
"0xA2 0x0d 0x00 0x== 0x== 0x== 0x== , , , , " should be sent back as Notify.
 5. Re-update back to current FW with "Division Transmission Update FW Image" using
"flash(date)_----_**_DCL.img"
 6. Check current FW version resumed with "Get Version" command.
"0xA2 0x0d 0x00 0x-- 0x-- 0x-- 0x-- , , , , " should be sent back as Notify.
- ✓ Sony will provide test FW data "flash(date)_====_**_DCL.img" and current FW data
"flash(date)_----_**_DCL.img" to resume.

Use "Update Picture Data" or "Division Transmission Update Picture Data" command.

* For many application processor system, it limits data transfer size at one time for I2C, in that case , please use "Division Transmission Update Picture Data" with chunked data transfer.

1. Update picture data with "Division Transmission Update Picture Data" using "(test).bin" as test picture data.
2. Reboot once.
3. Check the picture image as start-up screen was changed.
4. Re-update back to real picture with "Division Transmission Update picture Data" using "xx.bin" to resume.
5. Check the picture image as start-up screen was resumed correctly to real picture.

Update instruction using UART

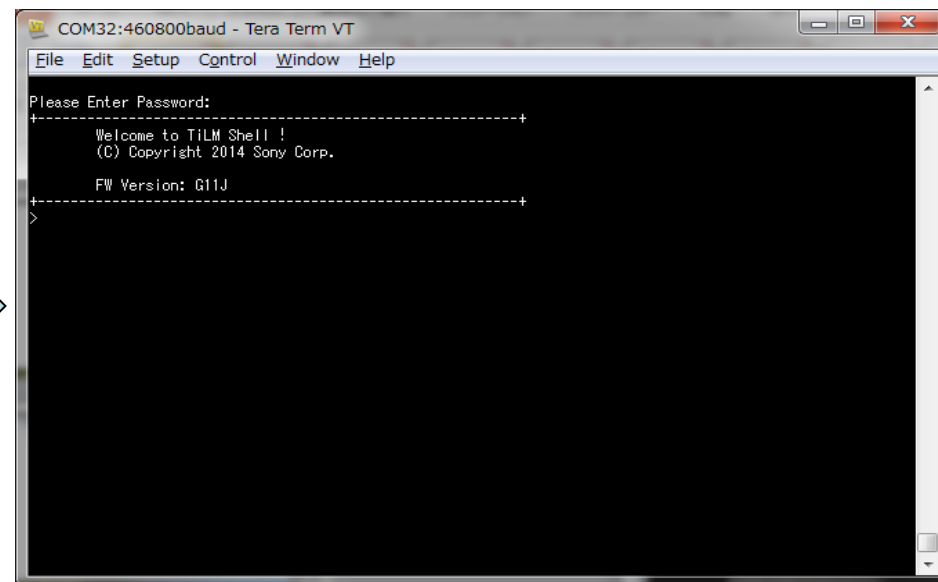
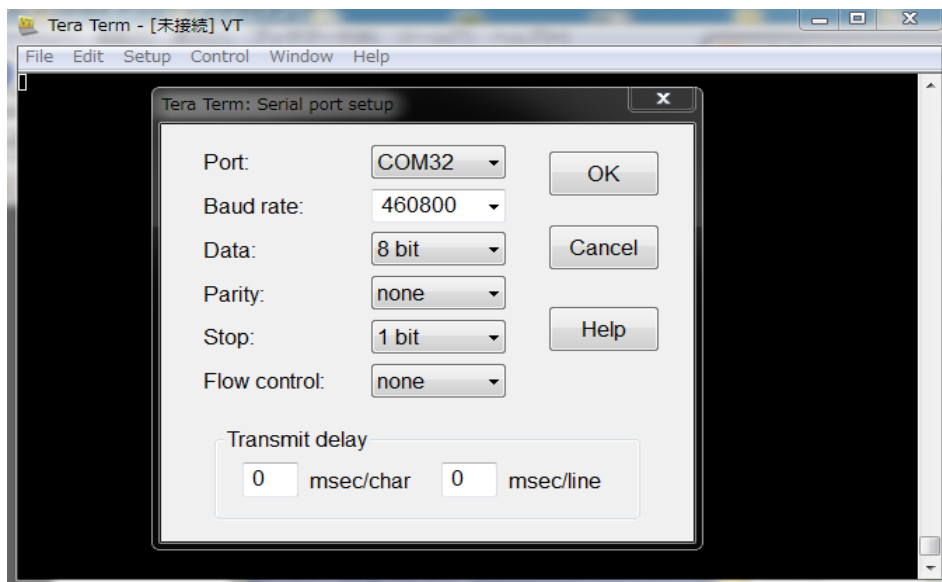
■ Description

- ◆ The module has a UART (Universal Asynchronous Receiver/Transmitter) interface. This interface can be used for logo updates and firmware updates.
This describes the start-up screen picture and firmware updating method using the UART interface.

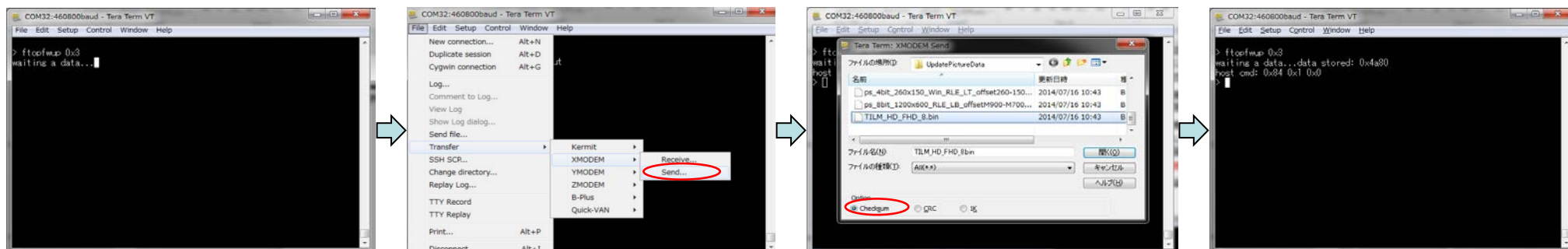
■ Contents

- ◆ Terminal Setup
- ◆ Start-up screen picture Update
- ◆ Firmware Update

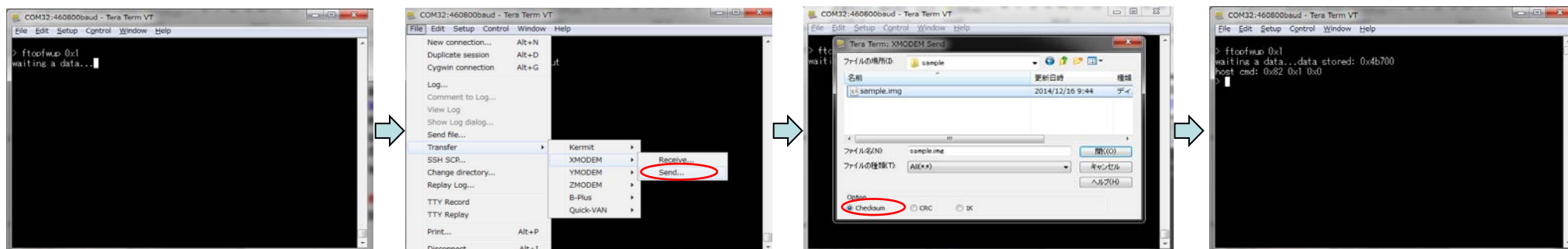
1. Turn on power to the module
2. Start TeraTerm(A free software terminal emulator for MS-Windows)
 - ◆ Select your Com Port
 - ◆ Set the baud rate to 460800
3. Enter the password
 - ◆ Password is 'sonytilm'

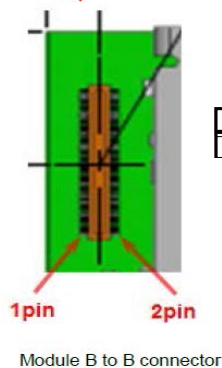
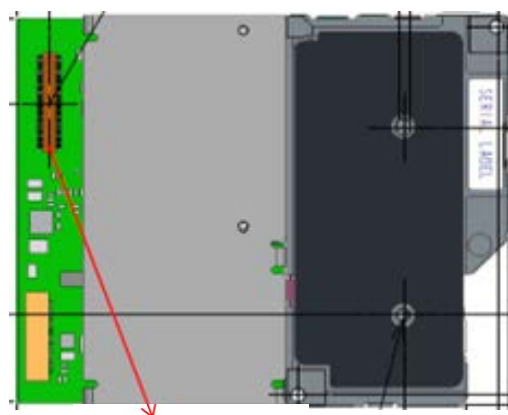


1. Enter the screen picture update command below:
`> ftopfwup 0x3`
 Then you will get a message 'waiting a data...'
2. Send a picture binary file using the XMODEM/SUM protocol:
`File -> Transfer -> XMODEM -> Send...` (Select the checksum option)
*** During sending a picture binary, there is a possibility that SYSERR_X may be asserted. If SYSERR_X has been asserted, please ignore it.**
3. Once the transfer and update have finished you will get a message like:
`data stored: 0x4a80`
`host cmd: 0x84 0x1 0x0`
*** Don't turn the power off before update is completely finished.**
4. Reboot the module

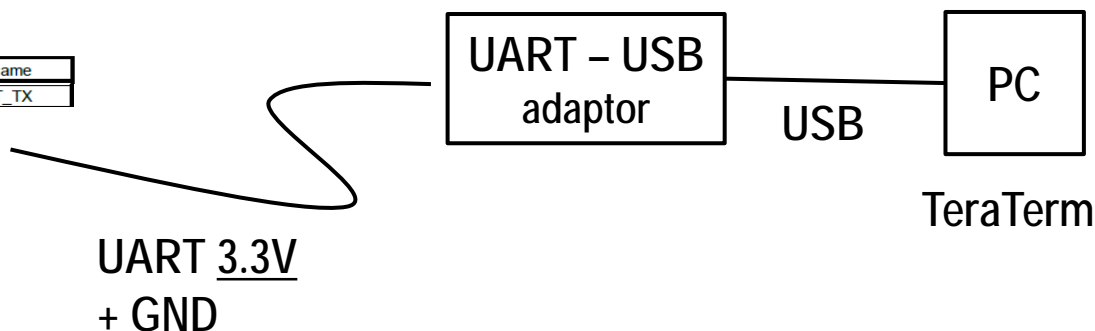


1. Enter the firmware update command below:
`> ftopfwup 0x1`
Then you will get a message 'waiting a data...'
2. Send a firmware binary file using the XMODEM/SUM protocol:
`File -> Transfer -> XMODEM -> Send...` (Select the checksum option)
*** During sending a firmware binary, there is a possibility that SYSERR_X may be asserted. If SYSERR_X has been asserted, please ignore it.**
3. Once the transfer and update have finished you will get a message like:
`data stored: 0x4b700`
`host cmd: 0x82 0x1 0x0`
*** Don't turn the power off before update is completely finished.**
4. Reboot the module





Pin Name	Pin #	Pin #	Pin Name
UART_RX	38	37	UART_TX



※ This UART connection is helpful and important for manufacturer, when star-up screen is installed in set manufacturing line.
Also, It is recommended that the UART_RX and UART_TX have TP for debugging and FW updating

Save Factory Param

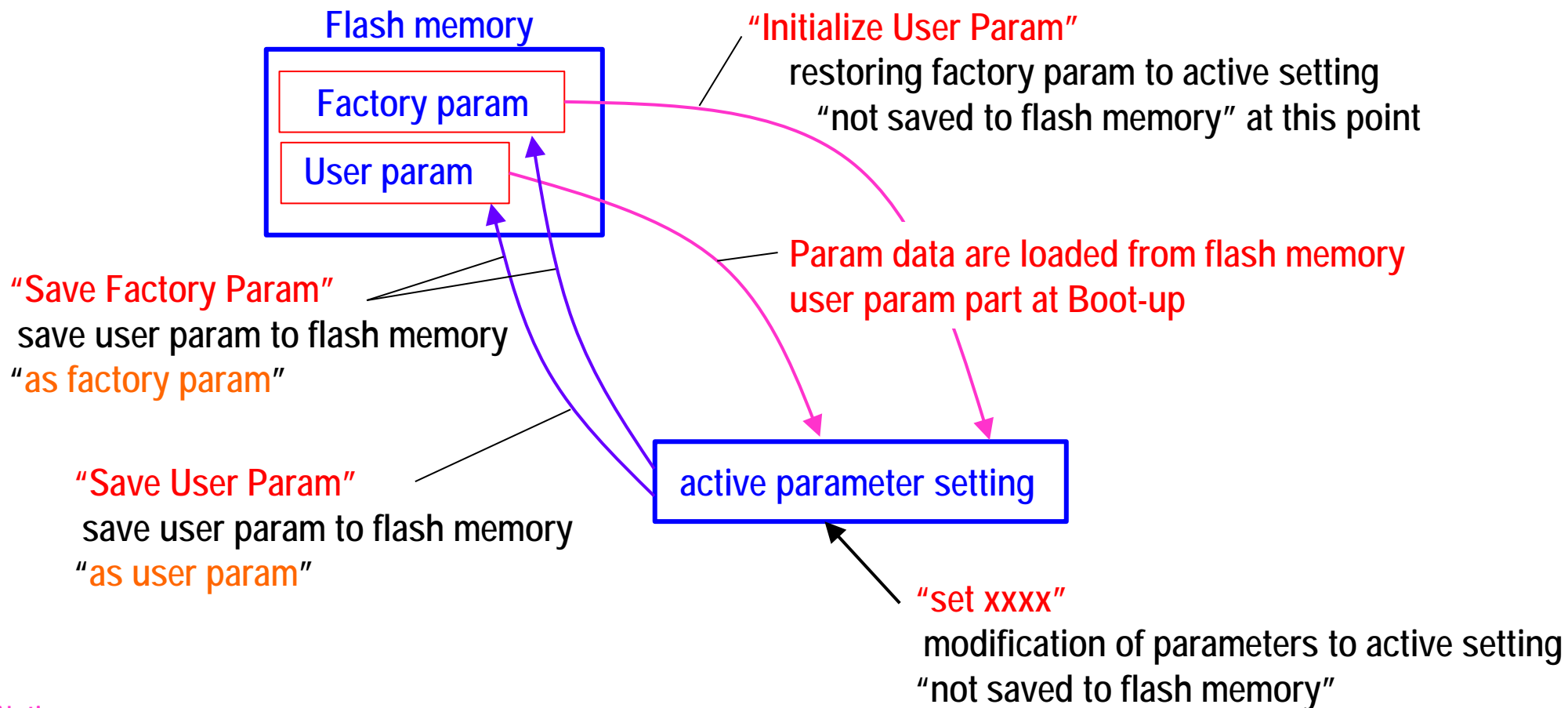
“Initialize User Param” can reset parameters (Param) to factory values, however this factory values are not able to be changed in default command set.

Special command, “Save Factory Param” is available to rewrite factory param values.

“Save Factory Param” makes HOST-system possible to set the reset values which can restore using “Initialize User Param” command.

Please use this command carefully because it overwrite original factory parameter which can not be recovered. It is not recommended to use unless really required.

Relation and behavior of Param-commands are explained at the next page.

**Notice:**

When commands with **writing flash memory** are used,
power supply of module must not be off until completion.

It may destroy flash memory data. In this case, the module can not be booted-up permanently.
Also "EN" pin must be kept high during that, lowing EN causes internal power down.
Completion can be recognized by Notify with normal completion result.

Save Factory Param

[Description]

This command saves the all parameters as factory setting values.

[Attributes]

Attribute	Information
Type	Request • Notify type
CMD	0x09
Request OP0 [Size information]	0x08
Notify OP0 [Size information]	0x01

[Detailed Description of Request]

Issue this command to execute a save all parameters request. This makes it possible to save the parameters as factory setting. These saved parameters are used as default parameters for Initialized User Param command to reset as factory setting.

When the Request communication of this command stalls partway and a Time Out occurs, or when processing cannot be performed due to internal circumstances, Command Emergency Notify is notified by Module→**HOST** communication.

This command can be issued in the Ready and Active state.

The OP information sent by the Request is shown below.

OP	Description
OP1	1 byte of the 4-byte parameter version information. This is the version [0] value. Fixed value
OP2	1 byte of the 4-byte parameter version information. This is the version [1] value.
OP3	1 byte of the 4-byte parameter version information. This is the version [2] value.
OP4	1 byte of the 4-byte parameter version information. This is the version [3] value.
OP5	1 byte of the 4-byte parameter date information. This is the date [0] value.
OP6	1 byte of the 4-byte parameter date information. This is the date [1] value.
OP7	1 byte of the 4-byte parameter date information. This is the date [2] value.
OP8	1 byte of the 4-byte parameter date information. This is the date [3] value.

OP1:

This indicates 1 byte of the 4-byte parameter version information. When the version information is expressed as version[4] = {"G", "0", "1", "2"}, this is the ASCII data for version[0]="G".
This is a fixed value, so it can not be changed.

OP2:

This indicates 1 byte of the 4-byte parameter version information. When the version information is expressed as version[4] = {"G", "0", "1", "2"}, this is the ASCII data for version[1]="0".
This value is an arbitrarily determined value, so there is no value information.

OP3:

This indicates 1 byte of the 4-byte parameter version information. When the version information is expressed as version[4] = {"G", "0", "1", "2"}, this is the ASCII data for version[2]="1".

This value is an arbitrarily determined value, so there is no value information.

OP4:

This indicates 1 byte of the 4-byte parameter version information. When the version information is expressed as version[4] = {"G", "0", "1", "2"}, this is the ASCII data for version[3]="2".

This value is an arbitrarily determined value, so there is no value information.

OP5:

This indicates 1 byte of the 4-byte parameter date information. When the date information is expressed as version[4] = {0x20, 0x14, 0x02, 0x10}, this is the ASCII data for date[0]=0x20.

This value is an arbitrarily determined value, so there is no value information.

OP6:

This indicates 1 byte of the 4-byte parameter date information. When the date information is expressed as version[4] = {0x20, 0x14, 0x02, 0x10}, this is the ASCII data for date[1]=0x14.

This value is an arbitrarily determined value, so there is no value information.

OP7:

This indicates 1 byte of the 4-byte parameter date information. When the date information is expressed as version[4] = {0x20, 0x14, 0x02, 0x10}, this is the ASCII data for date[2]=0x02.

This value is an arbitrarily determined value, so there is no value information.

OP8:

This indicates 1 byte of the 4-byte parameter date information. When the date information is expressed as version[4] = {0x20, 0x14, 0x02, 0x10}, this is the ASCII data for date[3]=0x10.

This value is an arbitrarily determined value, so there is no value information.

[Detailed Description of Notify]

Notify is always sent back as the response of this command.

The OP information sent by Notify is shown below.

OP	Description
OP1	Command result

OP1:

This indicates the command result. The possible value information is shown below.

Value	Description
0x00	Normal
0x8X	Internal failure, X is 1 to 4.

Attention for flash memory write

**When commands with writing flash memory are used,
power supply of module must not be off until completion.**

It may destroy flash memory data. In this case, the module can not be booted-up permanently. Also "EN" pin must be kept high during that, lowering EN causes internal power down. Completion can be recognized by Notify with normal completion result.

Corresponding commands including flash writing operation are:

- "Save User Param"
- "Save Factory Param"
- "Update FW Image"
- "Update Picture Data"
- "Division Transmission Update Data"
- "Set EasyOpticalAdjustmentControl"
- "Set EasyOpticalAdjustmentExit"
- "Set EasyBiphaseAdjustmentControl"
- "Set EasyBiphaseAdjustmentExit"

Adjustment function

Laser Scanning Beam projector needs to implement two adjustment functions as maintenance mode due to drift with time or stress during set product manufacturing.

- 1) Laser beam alignment
- 2) Bi-phase adjustment

*Details are described in following pages.

This function is needed for two cases,

- (1) End customer may execute adjustment of them when realizing image drift.
- (2) Manufacturer needs to inspect image quality in set product manufacturing line and adjust them if necessary.

➤ **Laser beam alignment:**

Laser beam spots may shift in manufacturing and time depending effect. Though beam spots have been corrected in manufacturing process, alignment adjustment function is required to be implemented in HOST firmware due to time depending issue in use and stress in set manufacturing process. To adjust this alignment, [please refer to followings in "FW Specification document"](#).

< Detailed Description of Functions >

Adjustment function (Optical axis offset)

Adjustment function (Easy optical axis offset adjustment)

< Command list>

Get Optical Alignment

Set Optical Alignment

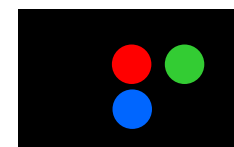
Set EasyOpticalAdjustmentControl

Set EasyOpticalAdjustmentPlus

Set EasyOpticalAdjustmentMinus

Set EasyOpticalAdjustmentExit

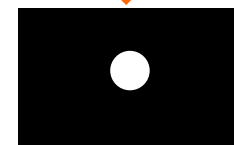
[example image]



Beam spots miss-aligned



Adjusted with correction command



Beam spots aligned

➤ **Bi-phase adjustment:**

Laser beam scanning is swept right to left and left to right, this is called "Bi-phase".

Scanning phase between them is adjusted in manufacturing process, however it may shift with time depending effect. So phase adjustment function is required to be implemented in HOST firmware due to time depending issue in use. To adjust this phase, [please refer to followings in "FW Specification document"](#).

< Detailed Description of Functions >

Adjustment function (Biphase)

Adjustment function (Easy biphase adjustment)

< Command list>

Get Biphase

Set Biphase

Set EasyBiphaseAdjustmentControl

Set EasyBiphaseAdjustmentPlus

Set EasyBiphaseAdjustmentMinus

Set EasyBiphaseAdjustmentExit

[example image]



Scanning phase shifted



Adjusted with correction command



Scanning phase adjusted

Resume from lock-state of failure mode

The module has a function to lock in order to avoid boot again as “Failure Mode” in case of physical malfunction causing abnormal laser emission before regular “Laser Safety Function” is activated.

The way (command) to resume the module from this locked state by set product side is provided. However in use, it must be confirmed the module works properly. The module must not be used in the real failure case.

The module might detect the failure mode and be lock accidentally under following cases. Please handle and design the module carefully.

1. In case the module is put on/off the board which power is supplied, or in case of contact failure of connector.
2. In case the module is booted at VBAT under 3.0V of specification.
(For example, Battery characteristic and/or power supply design is weak or not proper.)

The locked state can be released with following commands.

Please confirm the module works properly after resuming the module.

For example, if the module is locked again even at full charged battery condition, it may be real malfunction and please do not use the module.

If “Boot Completed Notify” result is “0x80” in the boot sequence, the module is in the failure mode and locked state. In this situation, “Get TroubleInfo” and “Clear TroubleInfo” commands can be used for getting failure information and clearing the failure state to resume, respectively.

Get TroubleInfo

[Description]

This command gets the failure information stored internally.

[Attributions]

Attribute	Information
Type	Request・Notify type
CMD	0xCA
Request OP0 [Size information]	0x05
Notify OP0 [Size information]	0x03

[Detailed Description of Request]

Issue this command to execute a get stored failure information request. This makes it possible to get the stored failure information by Notify communication.

When the Request communication of this command stalls partway and a Time Out occurs, or when processing cannot be performed due to internal circumstances, Command Emergency Notify is notified by Module→HOST communication.

This command can be issued in the Ready, Active and failure states.

The OP information sent by Request is shown below.

OP	Description
OP1	0x01 (Fixed value)
OP2	0x24 (Fixed value)
OP3	0x10 (Fixed value)
OP4	0x06 (Fixed value)
OP5	0x00 (Fixed value)

OP1 to OP5:

Each OP is fixed value and other value is not guaranteed.

[Detailed Description of Notify]

Notify is always sent back as the stored failure information response of this command.

The OP information sent by Notify is shown below.

OP	Description
OP1	Command result
OP2	0x01 (Fixed value)
OP3	Stored failure information

OP1:

This indicates the command result. The possible value information is shown below.

Value	Description
0x00	Normal
0x8X	Internal failure, X is 1 to 4.

OP2:

Fixed value

Value	Description
0x01	Fixed value

OP3:

This indicates the stored failure information. The possible value information is shown below.

Value	Description
0x00	No failure information stored, not failure state
0x01	Failure information stored, in failure state

Clear TroubleInfo

[Description]

Issue this command to clear the stored failure information. This makes it possible to resume the module if the failure occurred accidentally.

[Attributions]

Attribute	Information
Type	Request • Notify type
CMD	0xCB
Request OP0 [Size information]	0x06
Notify OP0 [Size information]	0x01

[Detailed Description of Request]

Issue this command to execute a clear stored failure information request. This makes it possible to clear the stored failure information.

When the Request communication of this command stalls partway and a Time Out occurs, or when processing cannot be performed due to internal circumstances, Command Emergency Notify is notified by Module→**HOST** communication.

This command can be issued in the Ready, Active and failure states.

The OP information sent by Request is shown below.

OP	Description
OP1	0x01 (Fixed value)
OP2	0x24 (Fixed value)
OP3	0x10 (Fixed value)
OP4	0x06 (Fixed value)
OP5	0x00 (Fixed value)
OP6	0x00 (Fixed value)

OP1 to OP6:

Each OP is fixed value and other value is not guaranteed.

[Detailed Description of Notify]

Notify is always sent back as the stored failure information response of this command.

The OP information sent by Notify is shown below.

OP	Description
OP1	Command result

OP1:

This indicates the command result. The possible value information is shown below.

Value	Description
0x00	Normal
0x8X	Internal failure, X is 1 to 4.

Error Code - CXN010x -

Error Code (OP1 of Notify)

Event occurring	Notfiy Name	CMD Number	OP1 Value	Estimated status	Action
Once after booting	"Boot Completed Notify"	0x00	0x00	Normal Operation	–
			0x80	Stop abnormally	*1 Try to unlock "lock-mode" and check the behavior
			0x8X	Stop abnormally	*2 Report to Sony.
			0xFE	Stop abnormally	*3 Report to Sony.
Other than booting, due to invalid command	Similar but different from "Boot Completed Notify"	0x00	0xD0/0xFF	Normal Operation (Invalid command)	*7 Please confirm control software design
Asynchronous (Depending on module condition)	"Emergency Nofify"	0x10	0x80	Stop abnormally	*4 Try to reboot and check the behavior
			0x81	Stop abnormally	*4 Try to reboot and check the behavior
			0x82	Stop abnormally	*4 Try to reboot and check the behavior
			0x83	Normal Operation [Automatically muted/unmuted] (Input Video Signal issue)	It might be caused due to a low quality of input video signal. Please check the video I/F design.
	"Temperture Emergency and Recovery Notify"	0x11	0x00/0x01/ 0x80/0x81	Normal Operation (Thermal issue)	*5 Please confirm Thermal Design.
	"Command Emergency Notify"	0x12	0xFB/0XF0	Normal Operation (Access faiulre)	*6 Stop the power supply to recover
Synchronous (Immediately after each command originating)	Notify coressponding each command (Other than Boot Complete or any emergency Notify)	Depend on preceding command	0x00	Normal Operation (Valid command)	–
			Other than 0x00	Normal Operation (Invalid command)	*7 Please confirm control software design

Error Code (OP1 of Notify) (cont.)

<p>*1 Please try to resume the module from locked state, according to the procedure mentioned in Application Note. If the module is locked again after resuming the module from locked state, the module might be really malfunctioned. Then please discontinue use of the module and report to Sony.</p> <p>If the module works properly after resuming from locked state, the module might detect the failure mode and be lock accidentally under following cases.</p> <ul style="list-style-type: none"> - In case the module is put on/off the board which power is supplied, or in case of contact failure of connector. - In case the module is booted at VBAT under 3.0V of specification. (For example, Battery characteristic and/or power supply design is weak or not proper.) <p>To avoid above cases, please handle and design the module carefully.</p>
<p>*2 The module will originate these notifies, when the module detects the malfunction of internal hardware, laser, MEMS and so on. initialization sequence is not completed successfully. If this error code is notified, please discontinue use of the module and report to Sony.</p>
<p>*3 The module will originate these notifies when the module is unable to read the parameter/data from flash memory properly. Due to stopping power supply or disconnecting the connector during flash memory rewriting operation, stored data in flash memory is damaged/destoryed. If this error code is notified, an individual adjustment parameter/data might be lost. Please discontinue use of the module and report to Sony.</p> <p>For example, following commands will rewrite flash memory:</p> <ul style="list-style-type: none"> "Save User Param" "Save Factory Param" "Update FW Image" "Update Picture Data" "Division Transmission Update Data" "Set EasyOpticalAdjustmentControl" "Set EasyOpticalAdjustmentExit" "Set EasyBiphaseAdjustmentControl" "Set EasyBiphaseAdjustmentExit" <p>When commands with writing flash memory are used, power supply of module must not be off until completion.</p>
<p>*4 The module will originate these notifies, when the module detects the malfunction of internal hardware, laser, MEMS, etc. If "Boot Completed Notify" with OP1 value other than 0x00 is notified after rebooting the module, then please discontinue use of the module.</p>
<p>*5 Please refer "Thermal Design" in application note.</p>
<p>*6 The module will originate these notify, when the module is unable to accept any command thereafter. (also "Reboot command" is not acceptable.) Please stop the power supply of the module to recover.</p>
<p>*7 The module will originate these notifies, when the module detect the invalid command code/operands or the command during inappropriate module state.</p>

Others

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