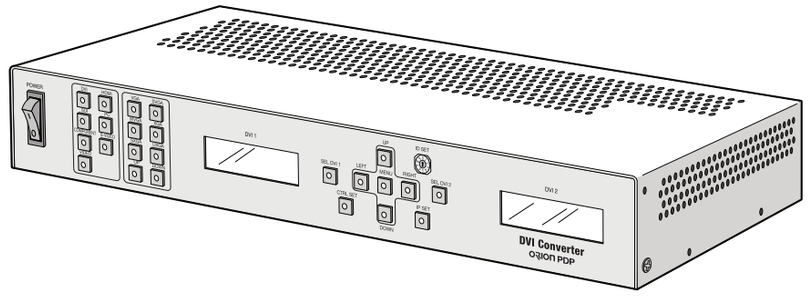
DVI Converter



User's Manual

Thank you for purchasing our DVI Converter.
Please read through this user's manual for safety before installing this product.
This product is manufactured for Multi Plasma display model only.

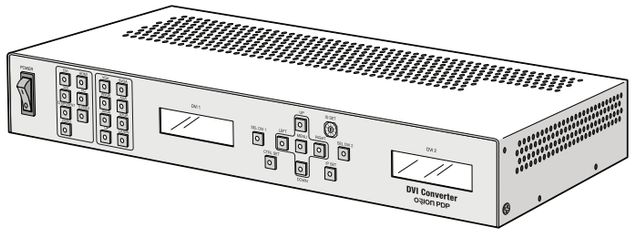
ORION PDP CO.,LTD.
www.oriondisplay.net

Address: 257-6, Gongdan-dong, Gumi-si, Gyeongsangbuk-do, Korea
Tel : +82-2-6678-8533, Fax: +82-2-6678-8599

• 2009.12.21

Product & Accessary

Please check remote controller and all the accessories are included in the box



DVI Converter : 1EA

User's Manual : 1EA

DVI-D Cable

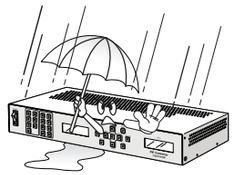
Power Cable

Contents

01. Safety Precautions

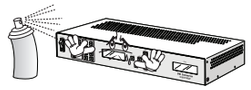
■ Cautions for DVI Converter

- Please do not use at the places of hot and humid environment.
  - It may damage the product.

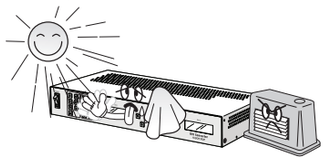


- Please be careful not to soak unknown material or liquid into the product.
  - It may damage the product.

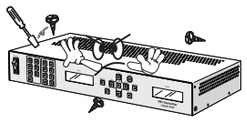
- Do not store or use flammables like a combustible spray around the product.
  - It has a possible danger of explosion or fire.



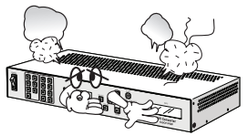
- Do not put the product under the direct sunlight or near to hot places.
  - It may cause fire.



- Do not disassemble, repair or alter the product with users' own intention.
  - It may cause an electric shock or fire. If you need to test, adjust or repair the product, contact with an authorized service center.

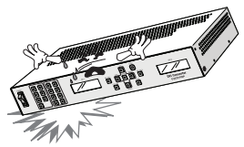


- If you detect smoke, smell or strange sound from the product, stop using the product immediately, disconnect the power cable and contact with an authorized service center.
  - It may cause an electric shock or fire.

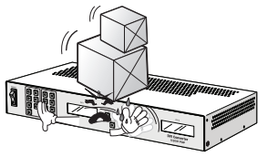


- Do not spray water directly on the product.
  - It may cause an electric shock or fire.

- Carefully move the product not to give any shock.
  - It may cause product malfunction.



- Please do not stack heavy objects on top of the product.
  - It may damage the product.

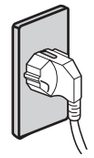


- Please keep away from children's reach.
  - If they drop Remote Controller, it may hurt the children or cause product malfunction.

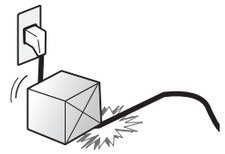
■ Cautions for Electricity

- Do not touch the power cable with wet hands.
  - It may cause an electric shock.

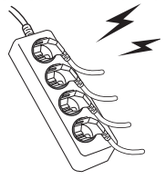
- Make sure the power plug is properly connected.
  - Loose connection may cause an electric shock.



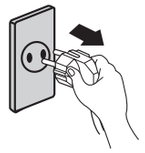
- Do not put a heavy object on the cable or fold the cable.
  - It may cause an electric shock or fire.



- Do not connect to a multi-power-socket together with many other electric products.
  - It may cause an electric shock or fire.



- Disconnect the power plug on the occasion of lightning.
  - It may damage the product.



Notice to users

Warning

Class A digital device

It is a device designed for business purpose with a safety certificate for electromagnetic interference, which user should be mindful of.

02. Introduction

■ Product Introduction

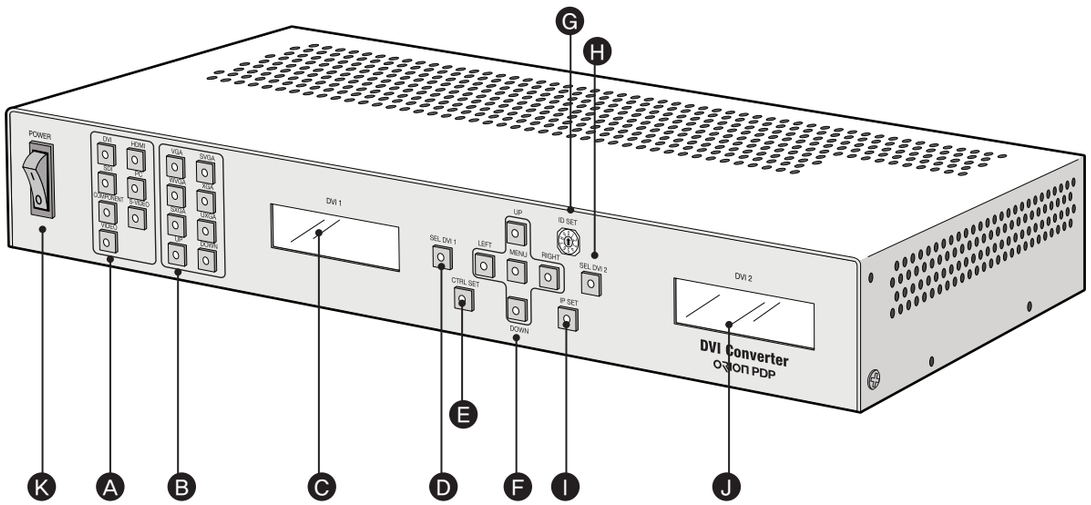
1. DVI Converter is a device for converting digital and analog image signals into DVI image signal output. It can display variety of image signals by connecting its two independent DVI outputs and the two DVI inputs of MPDP (OPM-4250.) Its two independent DVI outputs allow displaying the same images and different images simultaneously. It also supports various resolutions from VGA (640x480) to UXGA (1600x1200.)
2. DVI converter supports analog inputs such as PC (RGB), COMPONENT(Y.Pb,Pr), S-Video, and Video (CVBS) as well as digital inputs such as DVI, HDMI, and HD-SDI. PC resolution is available from VGA (640x480) to UXGA (1600x1200) and DTV resolution is available from 480i 60Hz to 1080P 60Hz.
3. The information for the present input mode and output resolution is displayed on the LCD screen.
4. DVI converter supports PIP (Picture In Picture) function for variety of image output. The PIP position can be changeable for better and effective image output.
5. DVI Converter provides various communication interfaces; Serial (RS-232C), Ethernet, and Front Key. DVI Converter employs Serial (RS-232C) interface as a basic communication method, but it also supports Ethernet and Front Key Control for convenient use for users' circumstance or preference. Users can choose their communication interface among Serial (RS-232C), Ethernet, and Front Key. Especially, DVI Converter can be controlled by Ethernet through LAN network or internet. DVI Converter can be directly controlled with Front Key.
6. DVI Converter
   DVI Converter Control can be done by MSCS (Multi-Screen Control Software) or New MFC(New Multi-Function Controller.)

■ Features and advantages

1. DVI Converter converts various image signal inputs to DVI output.
   * Analog input: PC (RGB), COMPONENT(Y.Pb,Pr), S-Video, Video (CVBS)
   * Digital input: DVI, HDMI, HD-SDI
   * DVI output: 2 Independent scaled image output-DVI Output1, DVI Output2 (VGA ~ UXGA-60Hz)
2. Controllable by Serial(RS-232C), Ethernet(Remote control) and Front Keypad
3. Controllable with New MFC (New Multi Function Controller)
   DVI output: 2 Independent scaled image output - DVI Output1, DVI Output2 (VGA ~ UXGA-60Hz)
4. Control Software (MSCS: Multi Screen Control Software)
5. Output adjustment (Brightness, Contrast, Sharpness, Color, Tint)
6. OSD
7. PIP (Main-/Sub-Source Select, Position, Swap)

03. Names and functions

■ Front side



A. Input Source
DVI, HDMI, SDI, PC, COMPONENT, S-VIDEO, VIDEO

B. Output Resolution
VGA, SVGA, WVGA, XGA, SXGA, UXGA, UP, DOWN

C. DVI1 Status Display
Display the version information of DVI converter channel 1, when DIV converter is booted.

D. DVI1 Select
Select DVI 1 channel.

E. Serial/Ethernet Select
Select communication mode between Serial (RS-232C) or Ethernet (LAN)

F. Navigation Key
Keys to control OSD "MENU, LEFT, RIGHT, UP, DOWN"

G. Rotary Switch
Set the ID.

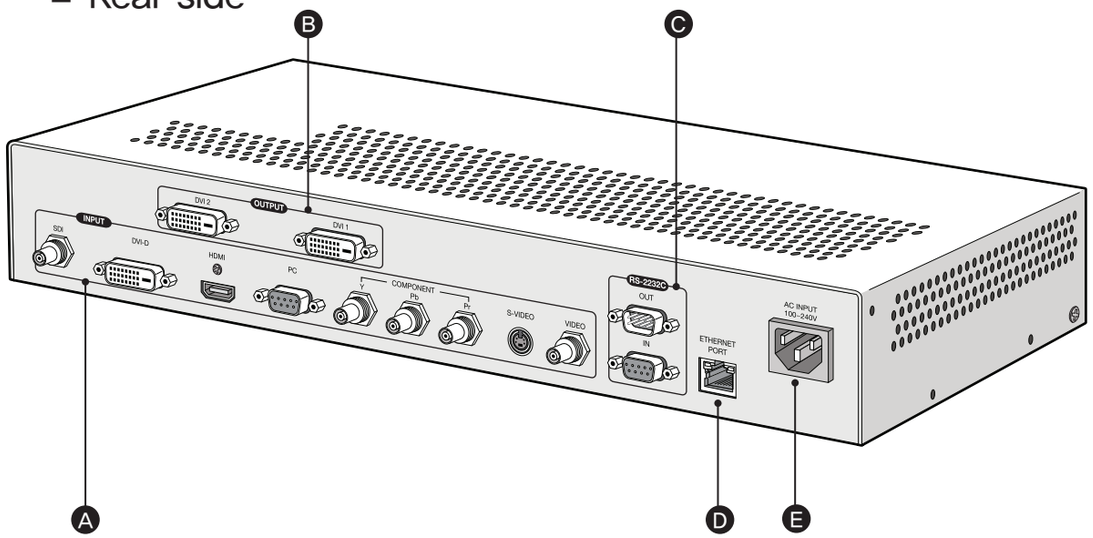
H. DVI2 Select
Select DVI 1 channel.

I. Ethernet IP Setting
Ping test for Ethernet communication mode.

J. DVI2 Status Display
Display the version information of DVI converter channel 1, when DIV converter is booted.

K. Power ON/OFF Switch
Power On/Off switch. (AC 100~240V, 50/60Hz).

■ Rear side



A. INPUT
SDI: Y/Cb/Cr signal, BNC Connector

DVI-D: TMDS signal, DVI Connector

HDMI: TMDS signal, HDMI Connector

PC: Computer RGB analog signal, D-Sub 15Pin

COMPONENT: DVD signal, DTV-YPbPr signal, BNC Connector

S-VIDEO: S-Video signal (Y/C), NTSC, PAL, SECAM, 4Pin Mini Din

VIDEO: Composite signal, NTSC, PAL, SECAM, BNC Connector

B. OUTPUT
DVI1: TMDS signal, DVI Connector

DVI2: TMDS signal, DVI Connector

C. RS-232C
IN: DVI Converter control, Daisy-chain input, Firmware Update, 9Pin D-Sub

OUT: Daisy-chain output

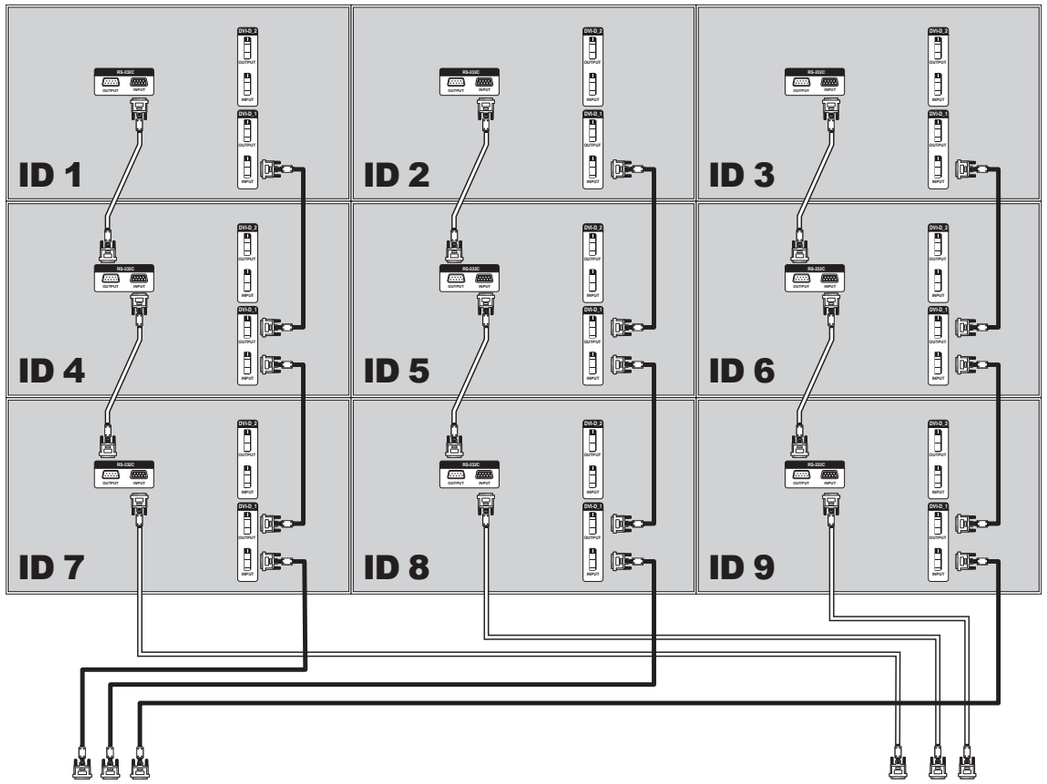
D. ETHERNET PORT
IEEE Standard UTP Cable, RJ45 Connector

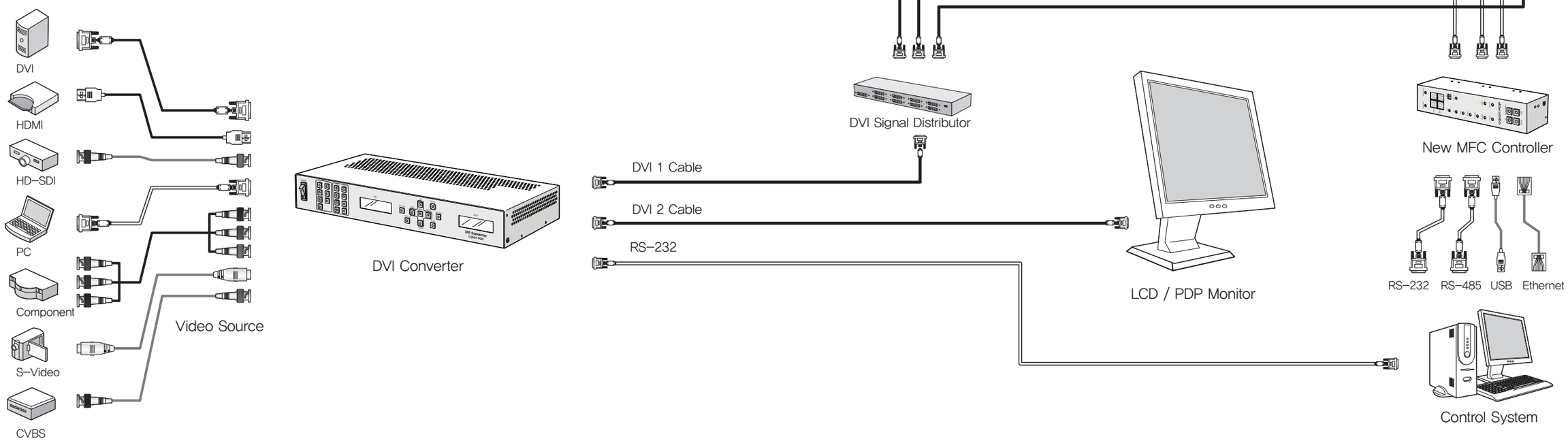
E. AC INPUT
AC 100~240V 50/60Hz

04. DVI-Converter Installation and configuration method

04-1. Installation

1. Connect power cable and DVI cable between DVI Converter and MPDP or other Display devices and install it at the convenient place to use.
2. Connect DVI Converter and controlling device such as a computer with RS-232C cable.
   1) If you use New MFC, select one of ETHERNET, RS-232C, USB, and IR REMOCON to control. (See New MFC user manual)
   2) If you do not use New MFC, connect controlling device and MPDP or other Display devices with RS-232C cable to control.
3. Connect screen image source (DVI, HDMI, HD-SDI, PC, COMPONENT, S-VIDEO, and CVBS) to the input port of DVI Converter.
4. Connect the DVI output of DVI Converter to MPDP or other Display devices.
5. Power on and select input source and control necessary functions with controlling device and the keys of DVI Converter.





05. How to configure DVI Converter control mode

05-1. RS-232C Interface mode

1. RS-232C Mode configuration

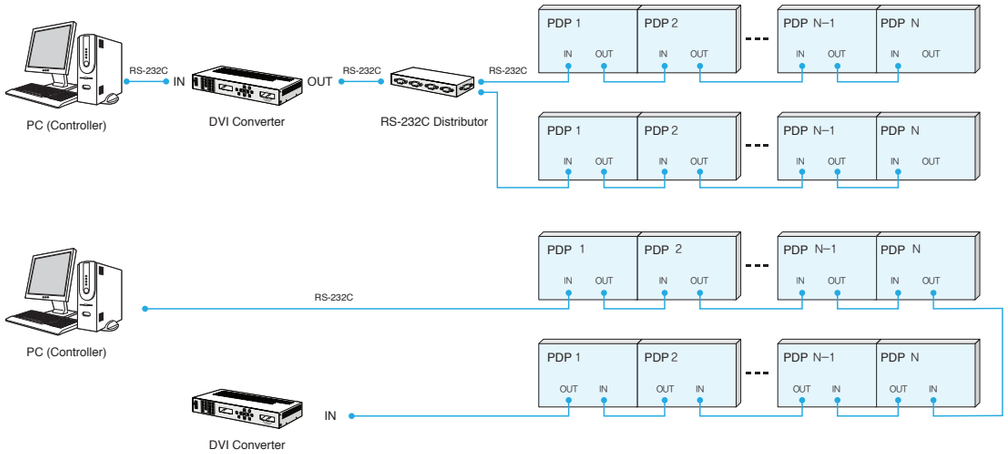
- Serial communication applies RS-232C standard.
- If the LED on "CTRL_SET" Button in the front is turned on, RS-232C command is not working. Press "CTRL_SET" Button and the LED is turned off, RS-232C command is executed.
- Ethernet mode is not available during RS-232C mode.
- It can be controlled through a serial port of MSCS (Multi Screen Control Software.)

2. Communication configuration

Transmission Type	Asynchronous Serial Communication	Parity bit	None
Baud Rate	115200bps	Stop bits	1

* When the LED on "CTRL_SET" Button in the front is turned off, RS-232C communication mode is working.
The other communication modes are not available besides Key.

3. Connection Diagram



05-2. Ethernet Interface mode

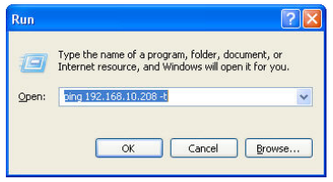
1. Ethernet Mode configuration

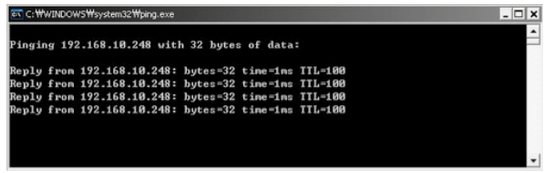
- Ethernet communication is based on TCP/IP Protocol. According to DHCP configuration, it can be used as dynamic or static IP. Remote control is also available via World Wide Web.
- If the LED on "CTRL_SET" Button in the front is turned off, Ethernet command is not working. Press "CTRL_SET" Button and the LED is turned on, Ethernet mode is activated and its command is executed.
- RS-232C mode is not available during Ethernet mode.
- It can be controlled through a LAN port of MSCS (Multi Screen Control Software.)
- To use Ethernet mode, Ethernet is configured at Configuration mode in advance.
- Perform Ping test to check the connection status after configuration.
  If "Request timed out" response lasts more than 5 minutes, check the Ethernet configuration.
  If the problem continues, contact to your server manager. (H/W Port Number: 9761)

■ Ping Test

The window as shown in the left side of the following pictures is popped up by pressing "Window" key and "R" key at the same time. Type the IP address in the window.
e.g. "Ping 192.168.10.248 –t"

Then the DOS window is open and ping test start. (Ping test can be done at DOS window)





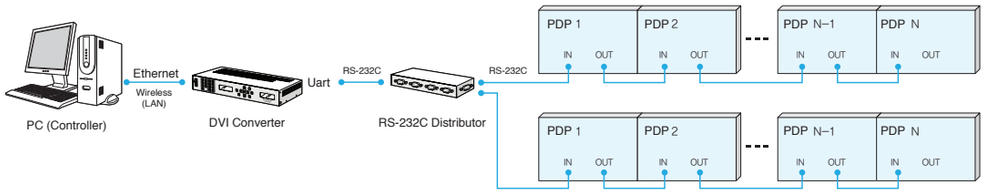
2. Communication configuration

Hardware Port		9761
DHCP	On	IP Address / SubNet Mask / Gate Way / DNS Server configuration not necessary
	Off	IP Address / SubNet Mask / Gate Way / DNS Server configuration necessary

* When the LED on "CTRL_SET" Button in the front is turned on, Ethernet communication mode is working.
  The other communication modes are not available besides Key.

3. Connection Diagram

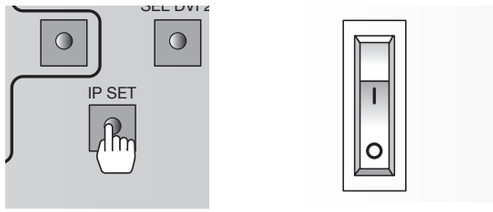
- Following diagram is an example of TCP/IP communication interface.
- Serial Daisy-Chain may vary depend on the installation circumstance.
- DVI converter must be connected before MPDP in the Ethernet mode.



05-3. IP address Setting

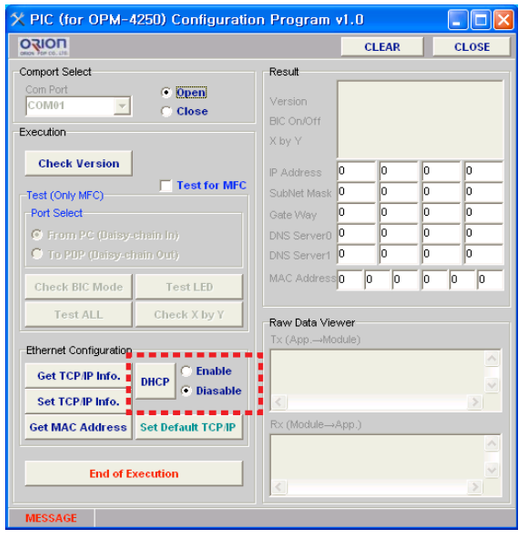
1) Connect DVI Converter and Computer with RS-232c cable.

2) Turn on the power while pressing "IP Set" button.

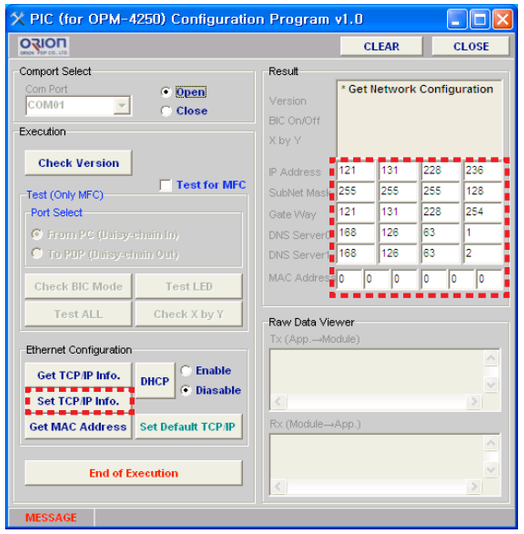


3) Load the provided program by executing "PIC Configuration.exe" in your computer.
   A status window is popped up as shown in the following picture.

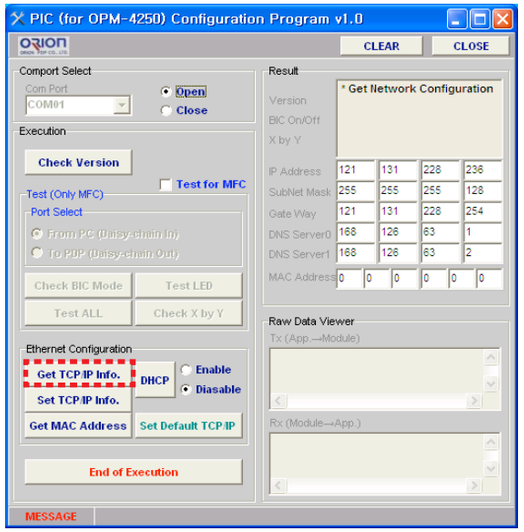
4) Configure DHCP as Enable for dynamic IP address and Disable for static IP address.



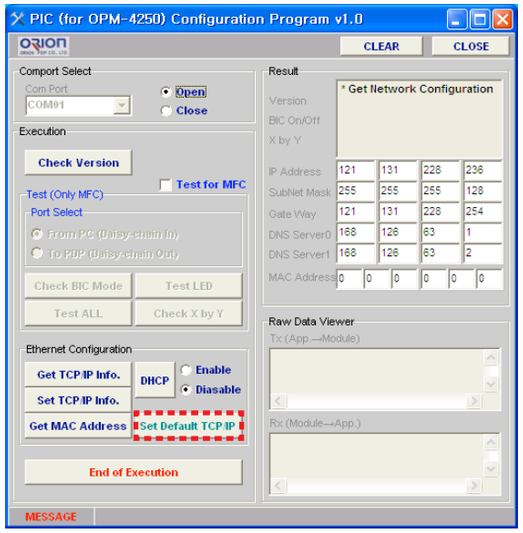
5) Type in the static IP address and press "Set TCP/IP Info"



6) Press "Get TCP/IP Info" and check the IP address.



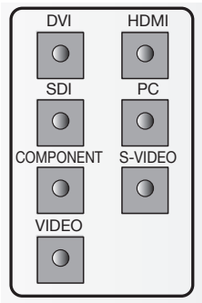
** If you click "Set Default TCP/IP", the IP address will be changed as the predetermined IP address in MFC.



06. How to use

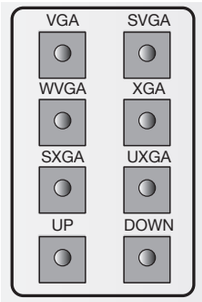
06-1. Using the main key of DVI converter

1. Input Source



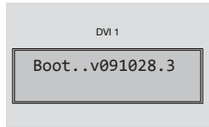
- **DVI:** Select DVI for DVI Converter Input.
- **HDMI:** Select HDMI for DVI Converter Input.
- **SDI:** Select SDI for DVI Converter Input .
- **PC:** Select PC for DVI Converter Input .
- **COMPONENT:** Select COMPONENT for DVI Converter Input.
- **S-VIDEO:** Select S-VIDEO for DVI Converter Input.
- **VIDEO:** Select VIDEO for DVI Converter Input.

2. Output Resolution

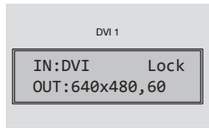


- **VGA:** Select VGA (640x480, 60Hz) for DVI Converter Output.
- **SVGA**: Select SVGA (800x600, 60Hz) for DVI Converter Output.
- **WVGA:** Select WVGA (853x480, 60Hz) for DVI Converter Output.
- **XGA:** Select XGA (1024x768, 60Hz) for DVI Converter Output.
- **SXGA:** Select SXGA (1280x1024, 60Hz) for DVI Converter Output.
- **UXGA:** Select UXGA (1600x1200, 60Hz) for DVI Converter Output.
- **UP:** Select various resolutions for DVI Converter Output.
- **DOWN:** Select various resolutions for DVI Converter Output.

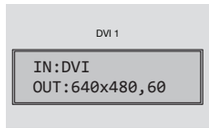
3. DVI1 Status Display



- Display the version information of DVI Converter Channel1 at the time of power on booting.
  - e.g. "Boot..v091028.3": Revision 3, October 28, 2009.
- Display the current Input source, Output resolution and Lock Mode Status after power on booting sequence.

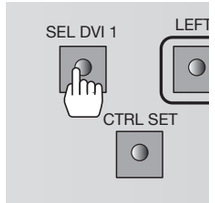


  - e.g. First line: "IN:DVI Lock"/ Second line "OUT:640x480,60": Input source is DVI, Output Resolution is 640x480, 60Hz and Key Lock On Mode.



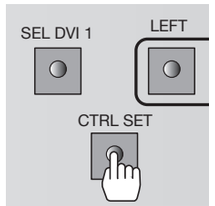
  - e.g. First line: "IN:DVI" / Second line "OUT:640x480,60": Input source is DVI, Output Resolution is 640x480, 60Hz and Key Lock Off Mode.

4. DVI1 Selector



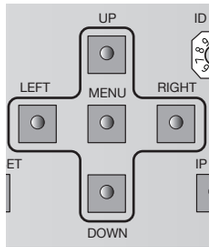
- It is used to control DVI1 Channel.
- If the LED on "SEL_DVI 1" button is turned off, it is impossible to control DVI1 Channel and if the LED on "SEL_DVI 1" button is turned on, DVI1 Channel can be controlled.
- When you press "SEL_DVI 1" button, the LED on "SEL_DVI 2" button is turned off and unable to control DVI2 Channel

5. Serial/Ethernet Selector



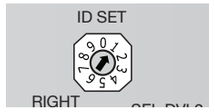
- It is used to select the communication mode of DVI Converter; Serial(RS-232C) or Ethernet(LAN.)
- If the LED on ""CTRL_SET" button is turned off, it can be controlled as Serial (RS-232C) mode.
- If the LED on ""CTRL_SET" button is turned on, it can be controlled as Ethernet(LAN) mode.

6. Navigation Key



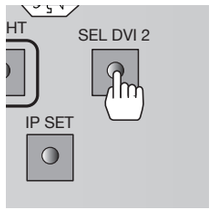
- It is used to control DVI Converter with OSD.
- To use various functions of DVI Converter with "MENU, LEFT, RIGHT, UP, DOWN" Keys.

7. Rotary Switch



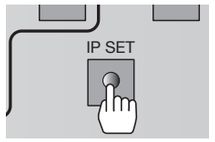
- It is used to set ID.
- The ID range is from "0" to "9".

8. DVI2 Selector



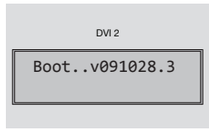
- It is used to control DVI2 Channel.
- If the LED on "SEL_DVI 2" button is turned off, it is impossible to control DVI1 Channel and if the LED on "SEL_DVI 2" button is turned on, DVI1 Channel can be controlled.
- When you press "SEL_DVI 2" button, the LED on "SEL_DVI 1" button is turned off and unable to control DVI1 Channel

9. Ethernet IP Setting

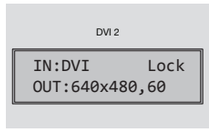


- "IP SET" button is used to do IP Setting in Ethernet mode.

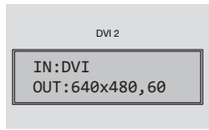
10. DVI2 Status Display



- Display the version information of DVI Converter Channel2 at the time of power on booting.
  - e.g. "Boot..v091028.3": Revision 3, October 28, 2009.
- Display the current Input Source, Output Resolution, and Lock Mode Status after power on booting sequence.

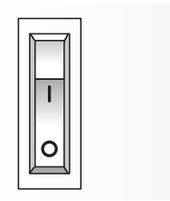


  - e.g. First line: "IN:DVI Lock", Second line "OUT:640x480,60": Input source is DVI, Output Resolution is 640x480, 60Hz and Key Lock On Mode.



  - e.g. First line: "IN:DVI ", Second line "OUT:640x480,60": Input source is DVI, Output Resolution is 640x480, 60Hz and Key Lock Off Mode.

11. Power ON/OFF Switch

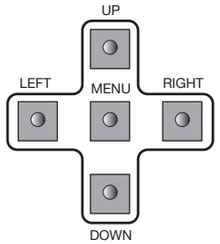


- It is used to turn on/off AC 100~240V 50/60Hz.

06-2. How to use OSD

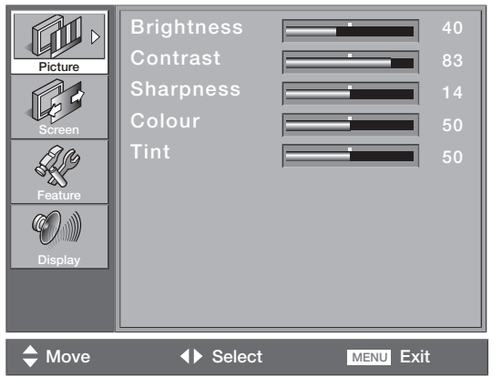
1. Picture Mode

- Brightness, Contrast, sharpness, Color and Tint menus can be adjusted by Picture mode.
- "Color" and "Tint" menus are not available for DVI, HDMI, HDSDI, and PC inputs.
- "Tint" menu is not available for S-VIDEO and VIDEO inputs, if the video standard is PAL.

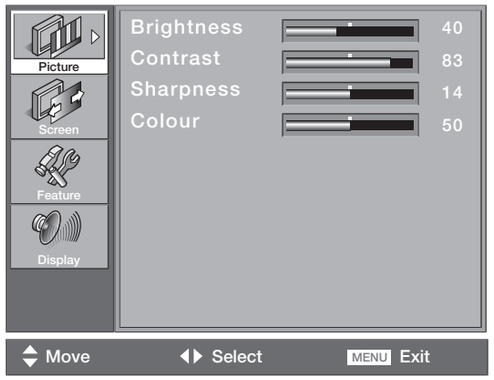


1) Press "Menu" button of Front Key to load Menu screen.
2) Select "Picture" using UP/DOWN buttons.
3) Sub-menu is activated by pressing "RIGHT" button.
4) Select the item you want to adjust using UP/DOWN buttons.
5) The values can be controlled by LEFT/RIGHT buttons.
6) Press "Menu" button to finish OSD after adjustment.

- **Brightness** : Adjustment range is from 0 to 100.
- **Contrast** : Adjustment range is from 0 to 100.
- **Sharpness** : Adjustment range is from 0 to 28.
- **Color** : Adjustment range is from 0 to 100.
- **Tint** : Adjustment range is from 0 to 90.



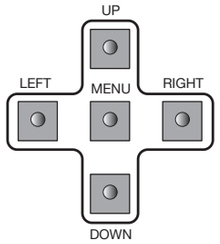
NTSC OSD (Video, S-Video)



PAL OSD (Video, S-Video)

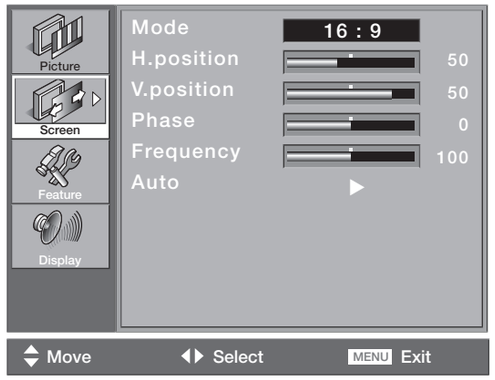
2. Screen Mode

- H. Position, V. Position, Phase, Frequency, Auto and Image Blend menus can be adjusted by Screen mode.
- H. Position, V. Position, Phase, Frequency, and Auto menus are available only for PC input.
- Image Blend Menu is available only for PIP and the transparency of the sub picture may be changed during Image Blend control.
- Screen mode control is not usable for PIP.

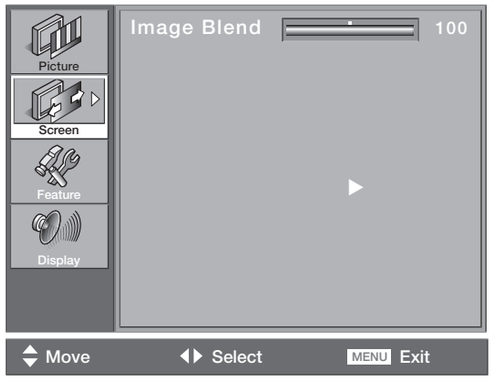


1) Press "Menu" button of Front Key to load Menu screen.
2) Select "Picture" using UP/DOWN buttons.
3) Sub-menu is activated by pressing "RIGHT" button.
4) Select the item you want to adjust using UP/DOWN buttons.
5) The values can be controlled by LEFT/RIGHT buttons.
6) Press "Menu" button to finish OSD after adjustment.

- **Mode** : 16:9, LB (16:9), LBS (16:9), 14:9, LB (14:9), LBS (14:9), and Toggle can be selected.
- **H.Position** : Adjustment range is from 0 to 100. (PC only)
- **V.Position** : Adjustment range is from 0 to 100. (PC only)
- **Phase** : Adjustment range is from 0 to 63. (PC Only)
- **Frequency** : Adjustment range is from 0 to 50. (PC Only)
- **Auto** : Auto tracking is executed by clicking "RIGHT" button. (PC Only)
- **Image Blend** : Adjustment range is from 0 to 100. (PIP Mode Only)



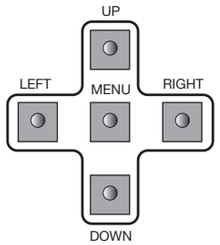
PC OSD



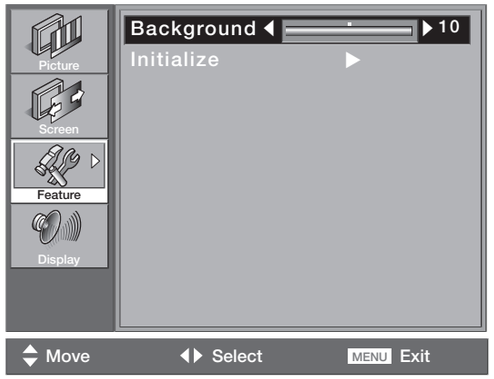
PIP OSD

3. Feature Mode

- Background and Initialize menus can be adjusted by Feature mode.
- During Background control, the transparency of the OSD menu may be changed.



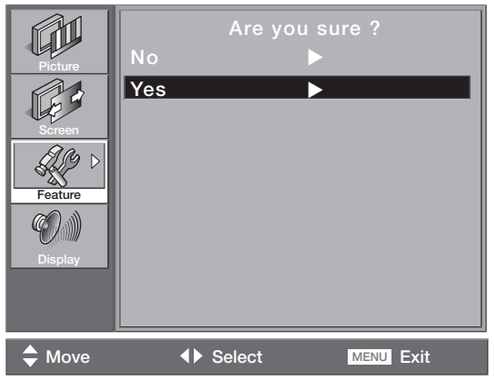
1) Press "Menu" button of Front Key to load Menu screen.
2) Select "Picture" using UP/DOWN buttons.
3) Sub-menu is activated by pressing "RIGHT" button.
4) Select the item you want to adjust using UP/DOWN buttons.
5) The values can be controlled by LEFT/RIGHT buttons.
6) Press "Menu" button to finish OSD after adjustment.



• **Background** : Adjustment range is from 0 to 10.

- Following menu is appeared by selecting Initialize.

1) Press "RIGHT" button at the following screen.

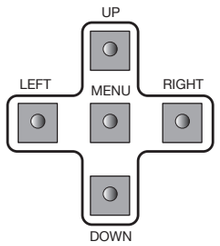


2) You can see the following menu.

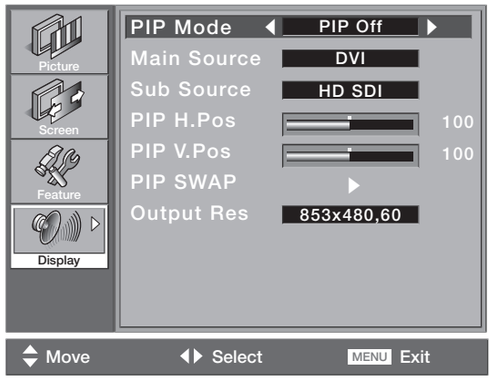
3) If you select "No" or Menu to return to Initialize menu.
4) If you select "Yes" for User data initialization.

4. Display Mode

- PIP mode, Main Source, Sub Source, PIP H. Position, PIP V. Position, PIP SWAP and Output Resolution can be adjusted by Display mode.
- If PIP is off, Sub Source, PIP H. Position, PIP V. Position, PIP SWAP Menus are inactivated.
- DVI, HDMI, HD-SDI, PC, DTV, S-VIDEO, or VIDEO is selected sequentially for Main Source. The Menu is off, when Source is changed.
- Sub Source, PIP H. Position, PIP V. Position, PIP SWAP Menus are activated for PIP mode.
- During PIP mode, Main source is restricted by Sub source. Main Source and Sub source are restricted by each other. If Main Source has digital input such as DVI, HDMI, or HD-SDI, Sub Source has analog Input such as PC, DTV, S-VIDEO, or VIDEO. If Main Source has analog Input PC, DTV, S-VIDEO, or VIDEO, Sub Source has digital input such as DVI, HDMI, or HD-SDI.
- Main Source and Sub Source can be interchanged by PIP SWAP.



1) Press "Menu" button of Front Key to load Menu screen.
2) Select "Picture" using UP/DOWN buttons.
3) Sub-menu is activated by pressing "RIGHT" button.
4) Select the item you want to adjust using UP/DOWN buttons.
5) The values can be controlled by LEFT/RIGHT buttons.
6) Press "Menu" button to finish OSD after adjustment.



- **PIP Mode** : PIP OFF and PIP (Toggle) can be selected.
- **Main Source** : DVI, HDMI, HD-SDI, PC, DTV, S-VIDEO, or VIDEO (Toggle) can be selected.
- **Sub Source** : DVI, HDMI, HD-SDI, PC, DTV, S-VIDEO, or VIDEO (Toggle) can be selected.
- **PIP H. Position** : Adjustment range is from 0 to 100.
- **PIP V. Position** : Adjustment range is from 0 to 100.
- **PIP SWAP** : Press "RIGHT" button to execute PIP SWAP.
- **Output Resolution** :

Resolution	Frequency
640x480	60Hz
640x480	85Hz
800x600	50Hz
800x600	60Hz
800x600	85Hz
853x480	50Hz
853x480	60Hz
1024x768	60Hz
1024x768	85Hz
1280x1024	50Hz
1280x1024	60Hz
1600x900	50Hz
1600x900	60Hz
1600x1200	50Hz
1600x1200	60Hz
1706x960	60Hz

Main / Sub	DVI	HDMI	HDSDI	PC	DTV	S-VIDEO	VIDEO
DVI	X	X	X	O	O	O	O
HDMI	X	X	X	O	O	O	O
HDSDI	X	X	X	O	O	O	O
PC	O	O	O	X	X	X	X
DTV	O	O	O	X	X	X	X
S-VIDEO	O	O	O	X	X	X	X
VIDEO	O	O	O	X	X	X	X

06-3. How to use MSCS (Multi Screen Control Software)

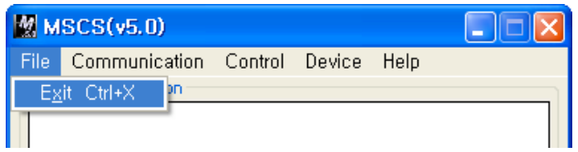
■ Introduction

- MSCS Ver. 5.0 is software to control DVI Converter.
- DVI converter can be controlled by a computer with MSCS.

Main Image of MSCS (Multi Screen Control system)

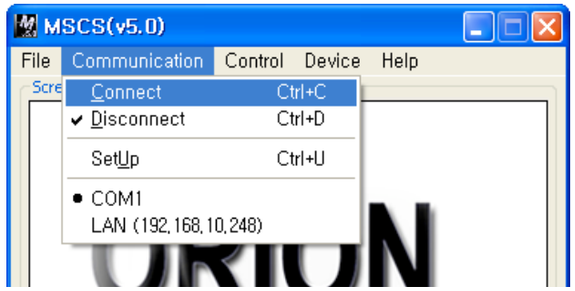
1. Program End

- Click Exit from File (Ctrl+X) to end the program.



2. Setting 'Com Port'

- Com Port connects or disconnects the communication between DVI Converter and MPDP.
- Connet MPDP to DVI Converter Com Port via RS-232C cable.
- Go to MSCS Menu -> Communication and set Com Port.
  Click 'Connect' or Press 'Ctrl+C' to initiate the communication between the computer and the DVI Converter.
- In order to disconnect communication, click 'Disconnect' using mouse or press 'Ctrl+D' using keyboard.

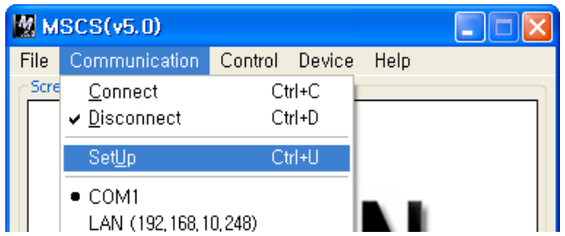


- **Connect:** Connect the communication between the computer and the DVI Converter.
- **Disconnect:** Disconnect the communication between the computer and the DVI Converter.
- **SetUp:** Configure the Serial port of a computer to communicate with DVI Converter.
  e.g. COM1, COM17 ···

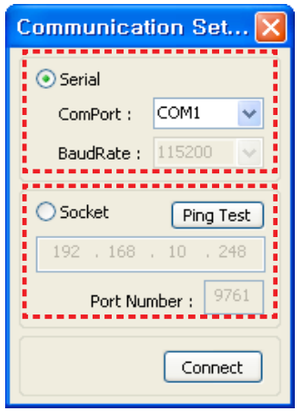
Communication configuration	Sub-Communication
Baud Rate	115200 bps
Data Bit	8 Bits
Stop Bit	1 Bit
Parity Bit	None Parity Bit

3. Port Setting

• Please select "Menu → Communication → Setup" or "Ctrl+U" to start SetUp.



• **Serial :** Set the serial communication as a default communication.
• **Com Port :** Set the port of a PC to communicate with MPDP.
• **Baud Rate :** Fixed at 115200bps.
※ Caution: Users cannot change the Baud rate.
• **Socket :** Set the Ethernet LAN communication.
• **Edit Box :** Set the IP address.
• **Port Number :** Fixed as 9761.
※ Caution: Users cannot change the port number.
• **Ping Test:** Test the IP address.
• **Connect :** Connect the communication.
• **LAN :** Set the Ethernet communication.



4. "New design/Last design" setting

• When Com Port is successfully connected, pop-up window for "New design/Last design" appears.

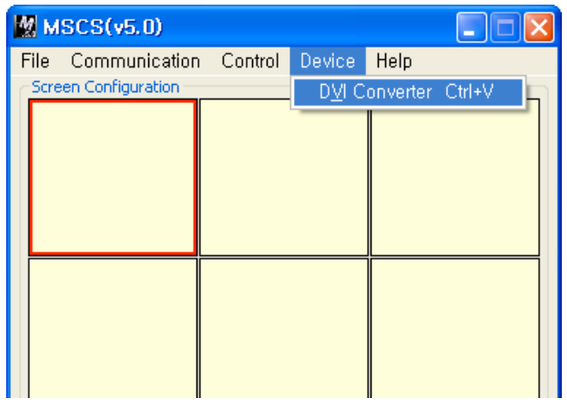
New/Last Design Set

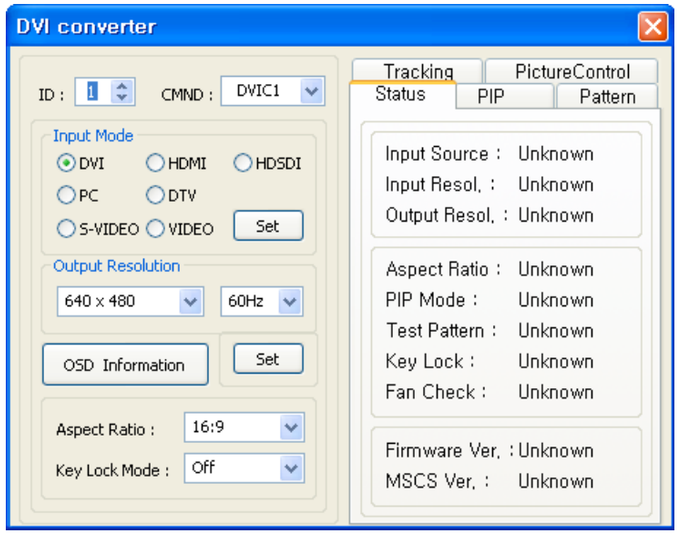
• Click "Open New Design" to prepare new configuration.
• Click "Open Last Design" to go to last design before closing.

• When the connection is successfully completed after setting Com Port, following Message dialog is displayed. The dialog window will be disappeared in 1 second.

5. DVI Converter

- To use DVI Converter, go to MSCS Menu → Device → DVI Converter or press "Ctrl+V" using Keyboard.

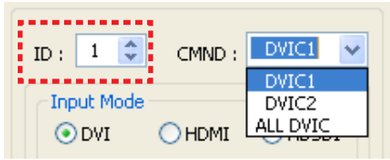




DVI Converter Main Dialog

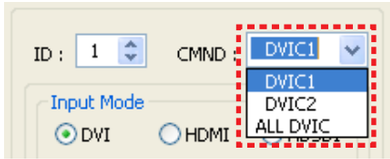
■ ID

- Set the ID of DVI Converter. The ID can be selected from 1 to 9.



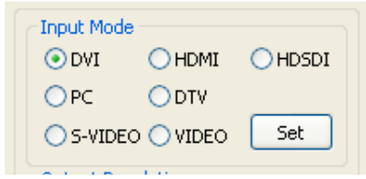
■ CMND

- Select the channel of DVI converter to control.
- One of DVI Channel 1(DVIC1), DVI Channel 2(DVIC2), and ALL DVI Channel can be selected.



■ Input Mode

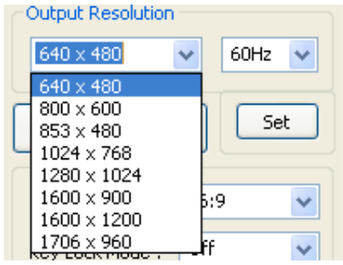
- Select the input mode of DVI Converter.
- One of DVI, HDMI, HDSDI, PC, DTV, S-VIDEO, and VIDEO can be selected.
- **Set :** Select one mode from 7 Input Modes and execute.



■ Output Resolution

- Set the output resolution of DVI Converter.

Resolution	frequency
640 x 480	60Hz / 85Hz
800 x 600	50Hz / 60Hz / 85Hz
853 x 480	50Hz / 60Hz
1024 x 768	60Hz / 85Hz
1280 x 1024	50Hz / 60Hz
1600 x 900	50Hz / 60Hz
1600 x 1200	50Hz / 60Hz
1706 x 960	60Hz



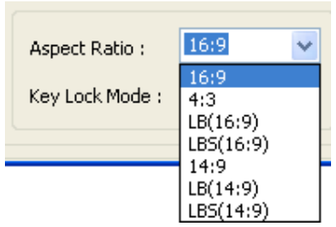
- **Set :** Set the output resolution.

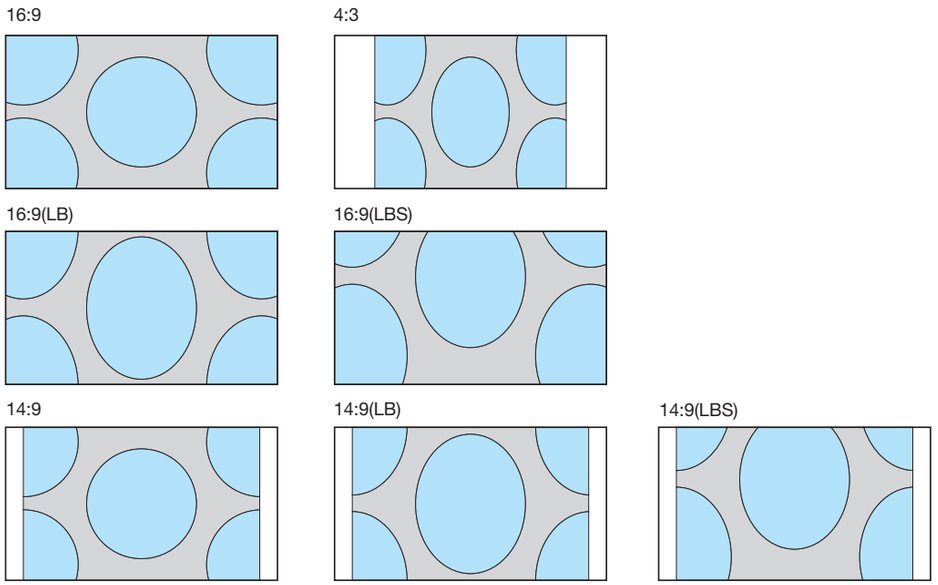
■ OSD Information

- The DVI converter input and input resolution are displayed on the screen.

■ Aspect Ratio

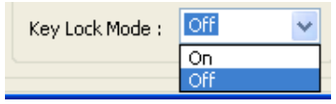
- Set or change the screen ratio (Horizontal: Vertical).
- **16 : 9 :** Set the screen ratio as 16:9 wide screen.
- **4 : 3 :** Set the screen ratio as 4:3.
- **LB(Letter Box) :** Expand the screen image to remove the black patterns at the top and bottom portions of the screen..
- **LBS(Letter Box Subtitle) :** Expand the screen with the subtitle to the top portion. (The bottom portion remains with black pattern).





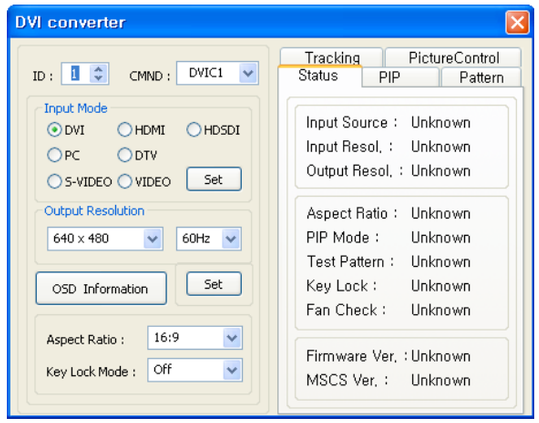
■ Key Lock Mode

・Lock the front key of DVI Converter not to turn On or Off.



■ Status

・Display the DVI Converter status (Input Source, Input Resolution, Output Resolution, Aspect Ratio, PIP Mode, Test Pattern, Key Lock, Fan Check, Firmware Version, MSCS Version information)



Status Dialog

■ Picture Control

・Control the Brightness, Contrast, Sharpness, Color, and Tint of the DVI Converter.

・**Brightness :** The range of "Brightness" you can adjust is 0 to 100.

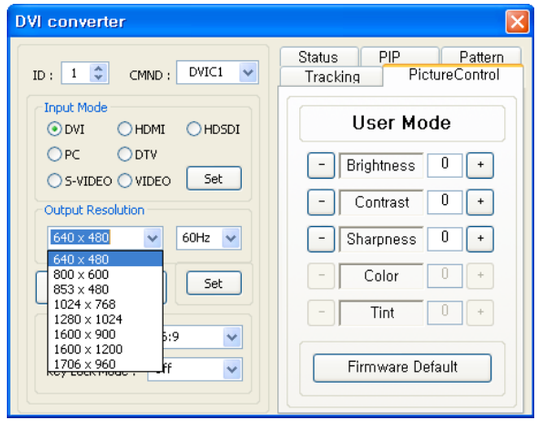
・**Contrast :** The range of "Contrast" you can adjust is 0 to 100.

・**Sharpness :** The range of "Sharpness" you can adjust is 0 to 28.

・**Color :** The range of "Color" you can adjust is 0 to 100

・**Tint :** The range of "Tint" you can adjust is 0 to 90.

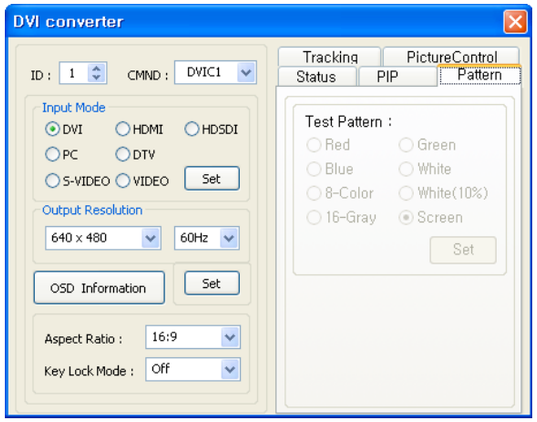
・**Firmware Default :** Initialize the adjusted values to the default values.



Picture Control Dialog

■ Pattern

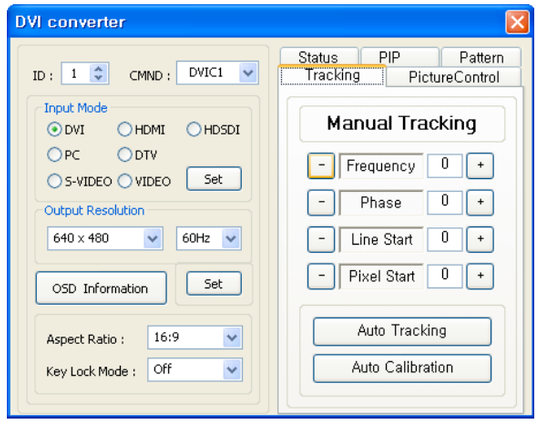
- Select the Test Pattern (Red, Blue, 8-Color, 16-Gray, Green, White, White (10%), Screen)
- **Set :** Set or change the Pattern.



Pattern Dialog

■ Tracking

- Control the Screen size, sharpness, and position of DVI Converter with PC input mode.
- In case alignment doesn't work through "Tracking Auto" command, users can tune finely through "Manual Tracking".
- "Manual Tracking" window enables users to set Frequency, Phase, LineStart and PixelStart.
- Detail adjustment steps are as follows.
  1) Tune "Phase" until the vertical lines are clearly adjusted..
  2) Tune "LineStart" to adjust vertical alignment. "PixelStart" for horizontal alignment.
  3) Adjust "Frequency" if alignment is still wrong.
     If you adjust "Frequency", repeat step 1) and 2) to fit alignment.
     Adjustable range is as follows
- **Frequency :** The range of "Frequency" you can adjust is -50 to 50.
- **Phase :** The range of "Phase" you can adjust is 0 to 63.
- **Linestart :** The range of "Linestart" you can adjust is -23 to 10.
- **Pixelstart :** The range of "Pixelstart" you can adjust is -50 to 40.
- **Auto Tracking :** Automatic alignment for DVI Converter screens.
- **Auto Calibration :** Automatic color control for DVI Converter screen.



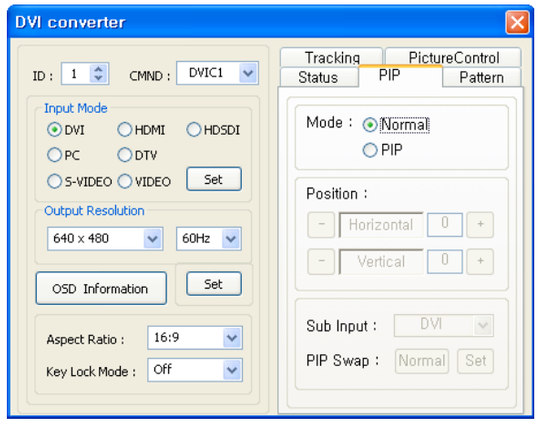
Tracking Dialog

■ PIP(Picture In Picture)

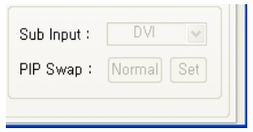
- A variety of images can be displayed with the PIP function of DVI converter. To activate PIP, click "PIP" in the Mode. The position of sub-picture can be controlled by clicking – / + buttons o increase or decrease the number or directly type in the numbers at Edit box.
- Various input sources can be used. To set the sub-input, click the sub-input combo box and select sub-input.
- Main screen and sub-screen can be swapped with the PIP Swap function. Press "Set" button at the right side of "PIP Swap." If you want to return to previous screen, press "Normal" button at the right side of "PIP Swap".
- **Mode :** Normal mode – Normal screen without PIP (PIP Off)
  PIP mode–Sub-screen is displayed at the lower right corner of the screen. (PIP On)
- **Position :** Horizontal – Adjust the horizontal location of PIP. Adjustable range 0~100
  Vertical – Adjust the vertical location of PIP. Adjustable range 0~100
- **Sub Input :** Set the input for PIP. One of DVI, HDMI, HDSDI, PC, DTV, S-VIDEO, and VIDEO can be selected for sub-input.

※ **According to the main input, the sub-input can be restricted. If the main input is a digital input such as DVI, HDMI or HD-SDI, the sub-input should be an analog input such as PC, DTV, S-VIDEO or Video. If the main input is an analog input the sub-input should be a digital input.**

- **PIP Swap :** Normal – Return to previous locations of swapped Main Source Input screen and Sub Source Input screen.
  Set – Exchange the locations of Main Source Input screen and Sub Source Input screen.



PIP(Picture In Picture) Dialog

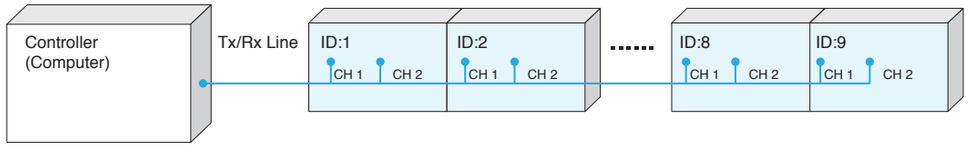


Main / Sub	DVI	HDMI	HDSDI	PC	DTV	S-VIDEO	VIDEO
DVI	X	X	X	O	O	O	O
HDMI	X	X	X	O	O	O	O
HDSDI	X	X	X	O	O	O	O
PC	O	O	O	X	X	X	X
DTV	O	O	O	X	X	X	X
S-VIDEO	O	O	O	X	X	X	X
VIDEO	O	O	O	X	X	X	X

07. DVI Converter Protocol

1. Introduction

This chapter introduces PROTOCOL between DVI Converter and the controlling devices like a computer for better understanding and effective use. So, it focuses on brief introduction of functions and PROTOCOL without further technical explanation.



※ Connection format may vary depends on environmental condition or users' preference.
〈Communication Diagram〉

1.1. Communication Setting

- Transmission type: Asynchronous Serial Communication
- Connection type: Daisy Chain
- Baud Rate: 115200bps
- Parity bit: None
- Stop bits: 1

2. Protocol Format

2.1. Send To PDP

STX	Command	Length	Data	ETX
1 byte	1 byte	1 byte	Variable	1 byte

ID	Ch1/Ch2	Other Data
1 byte	1 byte	N byte

- It is a format to send commands to DVIC. The set of the designated ID is working as commanded. However, a virtual ID value is generated by adding 100 to the original DVIC ID to distinguish the ID from the ID of MPDP.
- STX (0x02): The initiation Code. The beginning of Protocol. (Fixed value)
- Command: The code of actual execution (Dynamic value)
- Length: The length of "Data" area. (Dynamic value: "0"~"255")
- Data: "ID," "Ch1/Ch2" and other Data area (Dynamic value)
- ID: The code to distinguish DVIC. It is allocated in the rage of "101"~"109."
- Ch1/Ch2: The classification code for "Channel1" is "0x01", "Channel2" for "0x00. " (Dynamic value)
- ETX (0x03): The end of Protocol. (Fixed value)

2.2. Receive From DVIC

STX	CMD	Length	Data	Check Sum	ETX
1 byte	1 byte	1 byte	Variable	1 byte	1 byte

ID	Ch1/Ch2	Other Data
1 byte	1 byte	N byte

- It is a format to respond to certain commands. The difference from "Send to PDP" is the existence of "Check Sum".
- STX (0x02): The initiation Code. The beginning of Protocol. (Fixed value)
- Command: The code of actual execution (Dynamic value)
- Length: The length of "Data" area. (Dynamic value: "0"~"255")
- Data: "ID," "Ch1/Ch2" and other Data area (Dynamic value)
- ID: The code to distinguish DVIC. It is allocated in the rage of "101"~"109."
- Ch1/Ch2: The classification code for "Channel1" is "0x01", "Channel2" for "0x00." (Dynamic value)
- Check Sum: Add all the values of "STX~Data" and execute "Not" operation.
- ETX (0x03): The end of Protocol. (Fixed value)

3. Command

3.1. Infomation

- Display information on the DVIC screen. (Input source and resolution by OSD)
- It is available only during Power on status.
- Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x42	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Ch1 (0x01), Ch2 (0x00)

- Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x42	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

- "Information" Communication Sequence
  * Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
  * It is recommended not to give the other command or change the resolution during transmission.
  * ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Information Command transmission (to Ch2) ⇄ Information Response transmission (from Ch2)

Information Command transmission (to Ch1) ⇄ Information Response transmission (from Ch1)

3.2. Input-Mode Change

- Change input mode without screen scaling.
- It is available only during Power on status.
- CMD: 0xA4 (DVI), 0xA5 (HDMI), 0xA6 (HDSDI), 0xA7 (PC), 0xA8 (DTV), 0xAA (S-VIDEO), 0xAB (VIDEO)
- Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	Variable	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

- Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	Variable	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

- "Input-Mode Change" Communication Sequence
  * Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
  * It is recommended not to give the other command or change the resolution during transmission.
  * ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Input-Mode Change Command transmission (to Ch2) ⇄ Input-Mode Change Response transmission (from Ch2)

Input-Mode Change Command transmission (to Ch1) ⇄ Input-Mode Change Response transmission (from Ch1)

3.3. Test Pattern

- Checking the image quality of DVIC with the built-in pattern
- It is available only during Power on status.
- Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0x96	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value: All input mode.
- Screen (0x01), White (0x02), Red (0x03), Green (0x04), Blue (0x05),
- 8-Color (0x06), 10%-White (0x07), 16-Gray (0x08)
- Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x96	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

- "Test Pattern" Communication Sequence
  * Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
  * It is recommended not to give the other command or change the resolution during transmission.
  * ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Test Pattern Command transmission (to Ch2) ⇄ Test Pattern Response transmission (from Ch2)

Test Pattern Command transmission (to Ch1) ⇄ Test Pattern Response transmission (from Ch1)

3.4. Key Lock Mode

- The command for restricting Front Key function of DVIC
- It is available only during Power on status.
- Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0x5C	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

* Value: Key Lock Mode On (0x01), Key Lock Mode Off (0x02)

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x5C	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "Key Lock Mode" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Key Lock Mode Command transmission (to Ch2) ⇄ Key Lock Mode Response transmission (from Ch2)

Key Lock Mode Command transmission (to Ch1) ⇄ Key Lock Mode Response transmission (from Ch1)

3.5. PIP Mode

– The command for PIP function of DVIC
– It is available only during Power on status.

– Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0x98	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value: Normal (0x01), PIP Mode (0x02)

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x98	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "PIP Mode" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

PIP Mode Command transmission (to Ch2) ⇄ PIP Mode Response transmission (from Ch2)

PIP Mode Command transmission (to Ch1) ⇄ PIP Mode Response transmission (from Ch1)

3.6. PIP Position

– The command for controlling the PIP screen position
– It is available only during Power on status.
– CMD: 0x5D (PIP H. Position), 0x5E (PIP V. Position)

– Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	Variable	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value:
– PIP H. Position: 0 (0x00) ~ 100 (0x64)
– PIP V. Position: 0 (0x00) ~ 100 (0x64)

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	Variable	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "PIP Position" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

PIP Position Command transmission (to Ch2) ⇄ PIP Position Response transmission (from Ch2)

PIP Position Command transmission (to Ch1) ⇄ PIP Position Response transmission (from Ch1)

3.7. PIP Swap Mode

- The command for interchanging the positions of main picture and sub picture.
- It is available only for PIP mode during Power on status.
- Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0x99	0x03	Variable	Variable	Variable	0x03

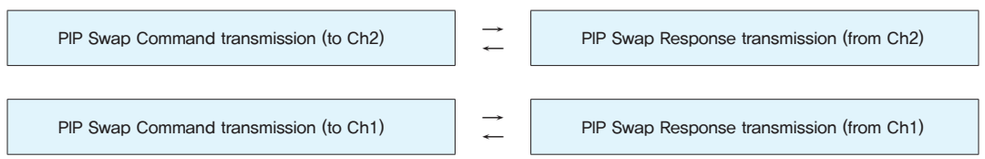
* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value:
- Normal Mode (0x01) – Main picture and Sub picture are displayed without position change.
- Swap Mode (0x02) – The positions of Main picture and Sub picture are interchanged.

- Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x99	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

- "PIP Swap" Communication Sequence
  * Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
  * It is recommended not to give the other command or change the resolution during transmission.
  * ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)



3.8. PIP Input–Mode Change

- The command for changing PIP Input mode without screen scaling.
- It is available only for PIP mode during Power on status.

- Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0xA0	0x03	Variable	Variable	Variable	0x03

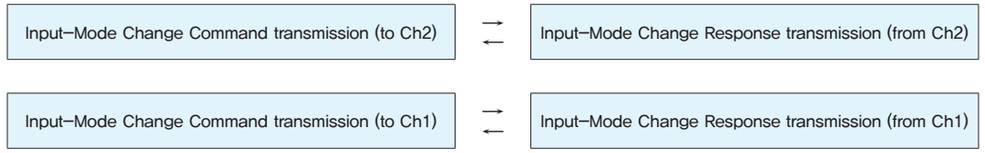
* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2 : Channel1 (0x01), Channel2 (0x00)
* Value
- DVI (0x01), HDMI (0x02), HDSDI (0x03), PC (0x04), DTV (0x05), S–VIDEO (0x06), VIDEO (0x07)
- If the Main Input–Mode is DVI, HDMI, or HDSDI, PIP Input–Mode cannot be DVI, HDMI, or HDSDI.
- If the Main Input–Mode is PC, DTV, S–VIDEO, or VIDEO, PIP Input–Mode cannot be PC, DTV, S–VIDEO, or VIDEO.
- Main Input–Mode and PIP Input–Mode cannot have the same input source.

- Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0xA0	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

- "Input–Mode Change" Communication Sequence
  * Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
  * It is recommended not to give the other command or change the resolution during transmission.
  * ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1).



3.9. Get PIP Status

- The command for checking PIP status information.
- It is available only during Power on status.
- CMD: 0x5F
- Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x5F	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

– Receive from MPDP

	STX	CMD	Length	Data			Check Sum	ETX
				ID	Ch1/Ch2	Status		
Value	0x02	0x5F	0x07	Variable	Variable	…	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.
* Status

No.	Data	Length	Explanation
1	PIP Mode	1 byte	1:Normal, 2: PIP
2	PIP H. Position	1 byte	0 (0x00) ~ 100 (0x64)
3	PIP V. Position	1 byte	0 (0x00) ~ 100 (0x64)
4	PIP Input Source	1 byte	1: DVI, 2: HDMI, 3: HDSDI, 4: PC, 5: DTV, 6: S-Video, 7: Video
5	PIP Swap Mode	1 byte	1: Normal, 2: Swap

– "PIP Status Get" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

PIP Status Get Command transmission (to Ch2) ⇄ PIP Status Get Response transmission (from Ch2)

PIP Status Get Command transmission (to Ch1) ⇄ PIP Status Get Response transmission (from Ch1)

3.10. Output Resolution Change

– The command for changing the output resolution of DVIC
– It is available only for PIP mode during Power on status. In case of PIP mode, it becomes PIP Normal mode.

– Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0xA2	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value
  640x480(60Hz) (0x01), 640x480(85Hz) (0x02), 800x600(50Hz) (0x03), 800x600(60Hz) (0x04), 800x600(85Hz) (0x05), 853x480(50Hz) (0x06), 853x480(60Hz) (0x07), 1024x768(60Hz) (0x08), 1024x768(85Hz) (0x09), 1280x1024(50Hz)(0x0A), 1280x1024(60Hz) (0x0B), 1600x900(50Hz) (0x0C), 1600x900(60Hz) (0x0D), 1600x1200(50Hz) (0x0E), 1600x1200(60Hz) (0x0F), 1706x960(60Hz) (0x10)

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0xA2	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "Output Resolution Change" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Output Resolution Change Command transmission (to Ch2) ⇄ Output Resolution Change Responsetransmission (from Ch2)

Output Resolution Change Command transmission (to Ch1) ⇄ Output Resolution Change Response transmission (from Ch1)

3.11. Get Test Pattern Status

– The command for checking Test Pattern information.
– It is available only during Power on status.

– Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x60	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

– Receive from MPDP

	STX	CMD	Length	Data			Check Sum	ETX
				ID	Ch1/Ch2	Status		
Value	0x02	0x60	0x3	Variable	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.
* Status
  Screen (0x01), White (0x02), Red (0x03), Green (0x04), Blue (0x05), 8–Color (0x06), 10%–White (0x07), 16–Gray (0x08)

– "Test Pattern Status Get" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Test Pattern Status Get Command transmission (to Ch2) ⇄ Test Pattern Status Get Response transmission (from Ch2)

Test Pattern Status Get Command transmission (to Ch1) ⇄ Test Pattern Status Get Response transmission (from Ch1)

3.12. Auto–Calibration

– The command for adjusting Gain and Offset of ADC with 100% 8–Color input. It is available only for PC/DTV input.
– It is available only during Power on status.

– Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x80	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x80	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "Auto–Calibration" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Auto–Calibration Command transmission (to Ch2) ⇄ Auto–Calibration Response transmission (from Ch2)

Auto–Calibration Command transmission (to Ch1) ⇄ Auto–Calibration Response transmission (from Ch1)

3.13. Screen Mode

– The command for controlling the aspect ratio of DVIC.
– It is available only during Power on status and not available for PIP mode.

– Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	0x95	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value:

– 16:9 (0x01): Set the aspect ratio as 16:9
– 4:3 (0x02): Set the aspect ratio as 4:3
– 16:9(LB) (0x03): Set the aspect ratio as 16:9 Letter–Box. It is used for the screen with black areas at the top and bottom.
– 16:9(LBS)(0x04): Set the aspect ratio as 16:9 Letter–Box Subtitle. It is used for the images with sub–title and black area at the top and bottom of the screen.
– 14:9 (0x05): Set the aspect ratio as 14:9
– 14:9(LB) (0x06): Set the aspect ratio as 14:9 Letter–Box. It is used for the screen with black areas at the top and bottom.
– 14:9(LBS)(0x07): Set the aspect ratio as 14:9 Letter–Box Subtitle. It is used for the screen with black areas at the top and bottom.

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x95	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "Screen Mode" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Screen Mode Command transmission (to Ch2) ⇄ Screen Mode Response transmission (from Ch2)

Screen Mode Command transmission (to Ch1) ⇄ Screen Mode Response transmission (from Ch1)

3.14. Tracking Mode

- The command for adjusting screen alignment automatically or manually or loading predetermined value in PC RGB mode
- CMD:
  0x4A (Auto Tracking), 0x4B (Get Tracking Values), 0x4C (Frequency-tracking), 0x4D (Phase-tracking), 0x4E (Line-Start tracking), 0x4F (Pixel-Start tracking)
- It is available only during Power on status.
- Send to MPDP

A. Auto-tracking/Get Tracking Values: Adjusting PC (RGB) screen alignment automatically.

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	Variable	0x02	Variable	Variable	0x03

B. Frequency/Phase/Line-Start/Pixel-Start-tracking: Adjusting PC (RGB) screen alignment manually.

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Tracking Value	
Value	0x02	Variable	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value: Apply for all input mode .
- Frequency range: 77(0x4D) ~ 177(0xB1) /Actual Value (-50 ~ +50) /Actual Value + 127 (0x7F)
- Phase range: 127(0x7F) ~ 158(0x9E) /Actual Value (0 ~ +31) /Actual Value + 127 (0x7F)
- Line Start range: 104(0x68) ~ 137(0x89) /Actual Value (-23 ~ +10) /Actual Value + 127 (0x7F)
- Pixel Start range: 77(0x4D) ~ 167(0xA7) /Actual Value (-50 ~ +40) /Actual Value + 127 (0x7F)

- Receive from MPDP

A. Auto-tracking, Frequency/Phase/Line-Start/Pixel-Start-tracking

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	Variable	0x03	Variable	Variable	Variable	0x03

B. Get Tracking Values

	STX	CMD	Length	Data			Check Sum	ETX
				ID	Ch1/Ch2	Tracking Value		
Value	0x02	Variable	0x05	Variable	Variable	...	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Tracking Value
- Frequency range: 77(0x4D) ~ 177(0xB1) / Actual Value (-50 ~ +50) / Actual Value + 127 (0x7F)
- Phase range: 127(0x7F) ~ 158(0x9E) / Actual Value (0 ~ +31) / Actual Value + 127 (0x7F)
- Line Start range: 104(0x68) ~ 137(0x89) / Actual Value (-23 ~ +10) / Actual Value + 127 (0x7F)
- Pixel Start range: 77(0x4D) ~ 167(0xA7) / Actual Value (-50 ~ +40) / Actual Value + 127 (0x7F)

- "Tracking Mode" Communication Sequence
  * Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
  * It is recommended not to give the other command or change the resolution during transmission.
  * ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Tracking Mode Command transmission (to Ch2) ⇄ Tracking Mode Response transmission (from Ch2)

Tracking Mode Command transmission (to Ch1) ⇄ Tracking Mode Response transmission (from Ch1)

*" Get Tracking Values" command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Get Tracking Mode Command transmission (to Ch2) ⇄ Get Tracking Mode Response transmission (from Ch2)

Get Tracking Mode Command transmission (to Ch1) ⇄ Get Tracking Mode Response transmission (from Ch1)

3.15. Default Data Load (Picture Control Data)

- The command for initializing the adjusted values and apply the built-in values.
- It is available only during Power on status.
- This commands should be executed with care, because all the adjusted values will be erased.
- Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x97	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

- Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	0x97	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "Default Data Load" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Default Data Load Command transmission (to Ch2) ⇄ Default Data Load Response transmission (from Ch2)

Default Data Load Command transmission (to Ch1) ⇄ Default Data Load Response transmission (from Ch1)

3.16. Graphic User Mode Control

– The command for adjusting the values of Brightness, Contrast, Sharpness, Color, and Tint.
– CMD: 0x8F (Brightness), 0x90 (Contrast), 0x91 (Sharpness), 0x92 (Color), 0x93 (Tint)
– It is available only during Power on status.
– The adjusted value will not be applied during stand–by phase or no input signal.
So, there must be input signals of corresponding mode to apply adjusted values.

– Send to MPDP

	STX	CMD	Length	Data			ETX
				ID	Ch1/Ch2	Value	
Value	0x02	Variable	0x03	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Value: Apply to all input mode .
Brightness ("0" ~ "100"), Contrast ("0" ~ "100"), Sharpness ("0" ~ "28"), Color ("0" ~ "100"), Tint ("0" ~ "100")

– Receive from MPDP

	STX	CMD	Length	Data		Check Sum	ETX
				ID	Ch1/Ch2		
Value	0x02	Variable	0x02	Variable	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.

– "Graphic User Mode Control" Communication Sequence

* Wait for the response for 40msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Graphic User Mode Control Command transmission (to Ch2) ⇄ Graphic User Mode Control Response transmission (from Ch2)

Graphic User Mode Control Command transmission (to Ch1) ⇄ Graphic User Mode Control Response transmission (from Ch1)

3.17. Get Current Status

– The command for checking current DVIC status information.
– CMD: 0x87
– It is available only during Power on status.

– Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x87	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

– Receive from MPDP

	STX	CMD	Length	Data			Check Sum	ETX
				ID	Ch1/Ch2	Status		
Value	0x02	0x87	0x17	Variable	Variable	…	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Check Sum: Add all the values of "STX ~ Data" and execute "Not" operation.
* Status (21byte)

No.	Data	Length	Explanation
1	Input Source	1 byte	1: DVI, 2: HDMI, 3: HDSDI, 4: PC, 5: DTV, 6: S-Video, 7: Video
2	Input Resolution	1 byte	The value for the detected input resolution
3	Output Resolution	1 byte	The value for the configures output resolution
4	Not Used	1 byte	
5	Aspect Ratio	1 byte	1: 16:9, 2: 4:3, 3: 16:9(LB), 4: 16:9(LBS), 5: 14:9, 6: 14:9(LB), 7: 14:9(LBS)
6	PIP	1 byte	1: Normal, 2: PIP
7~10	Not Used	4 byte	
11	Test Pattern	1 byte	1: Screen, 2: White, 3: Red, 4: Green, 5: Blue, 6: 8-Color,7: 10%-White, 8: 16-Gray
12	Not Used	1 byte	
13	FAN Check	1 byte	0: Off, 1: On
14	Key Lock	1 byte	1: On, 2: Off
15~21	F/W Version	7 byte	Year: 2 byte, Month: 2byte, Day: 2byte, Rev: 1byte Ex) December 29th, 2012 Rev. 2→ 0x01 0x02 0x01 0x02 0x02 0x09 0x02

〈 The value for the detected input resolution (It is different from the supporting resolution) 〉

Resolution	Value	Resolution	Value	Resolution	Value
640x480x60	0(0x00)	720Px50	21(0x15)	1360x768x60	45(0x2D)
640x480x85	*1(0x01)*	576Px50	22(0x16)	640x350x85	46(0x2E)
800x600x56	2(0x02)	480Px60	23(0x17)	640x480x75	*47(0x2F)*
800x600x60	3(0x03)	1920x1080ix60	24(0x18)	640x480x72	48(0x30)
800x600x75	4(0x04)	1920x1080ix50	25(0x19)	1152x864x75	49(0x31)
800x600x85	5(0x05)	1280x720Px60	26(0x1A)	1280x720x60	50(0x32)
853x480x60	6(0x06)	1280x720Px50	27(0x1B)	1280x768x75	*51(0x33)*
1024x768x60	7(0x07)	PAL	28(0x1C)	1280x1024x75	52(0x34)
1024x768x70	8(0x08)	SECAM	29(0x1D)	1366x768x50	53(0x35)
1024x768x75	*9(0x09)*	PALP	30(0x1E)	1400x1050x50	54(0x36)
1024x768x85	*10(0x0A)*	NTSC	31(0x1F)	1440x900x60	55(0x37)
1280x768x60	11(0x0B)	NTSCP	32(0x20)	576ix50	56(0x38)
1280x960x60	12(0x0C)	Unknown	34(0x22)	480ix60	57(0x39)
1280x1024x60	13(0x0D)	No-Signal	35(0x23)	1080px60	58(0x3A)
1366x768x60	14(0x0E)	853x480x50	38(0x26)	1080px50	59(0x3B)
1600x1200x60	15(0x0F)	1280x1024x50	39(0x27)	1920x1080px60	60(0x3C)
1400x1050x60	16(0x10)	1360x768x50	40(0x28)	1920x1080px50	61(0x3D)
1706x960x60	17(0x11)	1600x900x50	41(0x29)	1024x576x50	62(0x3E)
1080ix60	18(0x12)	1600x900x60	42(0x2A)	1024x576x60	63(0x3F)
1080ix50	19(0x13)	1600x1200x50	43(0x2B)		
720Px60	20(0x14)	800x600x50	44(0x2C)		

※ The resolutions written in red or italic letters can be detected, but they are not supporting resolutions.

– "Get Current Status" Communication Sequence

* Wait for the response for 800msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Get Current Status Command transmission (to Ch2) ⇄ Get Current Status Response transmission (from Ch2)

Get Current Status Command transmission (to Ch1) ⇄ Get Current Status Response transmission (from Ch1)

3.18. Get Picture Control Data

– The command for check the current picture control data (Brightness, Contrast, Sharpness, Color, Tint) of DVIC.
– It is available only during Power on status.

– Send to MPDP

	STX	CMD	Length	Data		ETX
				ID	Ch1/Ch2	
Value	0x02	0x88	0x02	Variable	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)

– Receive from MPDP

	STX	CMD	Length	Data			Check Sum	ETX
				ID	Ch1/Ch2	Values		
Value	0x02	0x88	0x34	Variable	Variable	…	Variable	0x03

* ID range (Program): 0x65(101) ~ 0x6D(109)
* Ch1/Ch2: Channel1 (0x01), Channel2 (0x00)
* Values (39 byte)

No.	Data	Length	Explanation
1	User Mode – Brightness	1 byte	Range: 0(0x00) ~ 100(0x64)
2	User Mode – Contrast	1 byte	Range: 0(0x00) ~ 100(0x64)
3	User Mode – Sharpness	1 byte	Range: 0(0x00) ~ 28(0x1C)
4	User Mode – Color	1 byte	Range: 0(0x00) ~ 100(0x64)
5	User Mode – Tint	1 byte	Range: 0(0x00) ~ 90(0x5A)
6~39	Not Used	34 byte	

– "Get Picture Control Data" Communication Sequence

* Wait for the response for 800msec after sending commands. In case of response failure, it is recommended to send the command again.
* It is recommended not to give the other command or change the resolution during transmission.
* ALL DVIC command is executed Channel2 and Channel1 sequentially. (Channel2 → Channel1)

Get Picture Control Data Command transmission (to Ch2) ⇄ Get Picture Control Data Response transmission (from Ch2)

Get Picture Control Data Command transmission (to Ch1) ⇄ Get Picture Control Data Response transmission (from Ch1)

08. Check followings before asking for service

Before calling for any repair, check the following and then refer to the store or dealership where you purchased this product.

1. In case you cannot control DVI converter with MSCS.
   - Check the RS-232C cable connection. Check the IN and OUT of RS-232C Port at the rear side of DVI Converter.
   - Check the channel connection of MSCS. You can check the LEDs on "SEL_DVI1" and "SEL_DVI2" buttons at the front side of DVI Converter.
   - Check the LED of "CTRL_SET" button at the front side of DVI Converter. If the LED is turned on, it is Ethernet mode and Serial control is not working. It should be turned off.
2. In case you cannot control DVI converter with the Front Keys at the front side of DVI Converter.
   - Check DVI1 Status Display or DVI2 Status Display.
     If there is "Lock" is shown at the right side of the first line on the LCD, Key Lock Mode is on.
     In that case, Front Key is not functioning. To use Front Key, turn off Key Lock Mode at MSCS.
   - Check the channel connection of MSCS. You can check the LEDs on "SEL_DVI1" and "SEL_DVI2" buttons at the front side of DVI Converter.
3. In case you have no screen image of the display devices.
   - Check the connection of the output channel of DVI Converter and the input of display devices.

09. Specification

Product Name	Specification	
DVI Converter	Power supply	100 ~ 250V AC, 50/60Hz
	Power consumption	40W (MAX)
	Size	405mm(W) X 250mm(D) X 60mm(H)
	Environmental Condition	0℃ ~ 40℃, 20 ~80% RH
	Weight	3Kg

Input/Output Specification

	Terminal Name	Terminal Specification	
Video Input Singal	Composite Video	BNC 1Pin	NTSC, PAL, SECAM
	S-Video	DIN 4Pin	NTSC, PAL, SECAM
	Component Video	BNC 3Pin	480i, 576i, 480p, 576p, 720p, 1080i, 1080p
	Analog RGB	D-Sub 15Pin (Female)	VGA, SVGA, WVGA, XGA, SXGA, WXGA, UXGA Horizontall Freq. : 15.5Khz ~ 75Khz Vertical Freq. : 50/60Hz
	DVI / HDMI	DVI-D 24Pin (Female) / HDMI 29Pin	480p, 576p, 720p, 1080i, 1080p VGA, SVGA, WVGA, XGA, SXGA, WXGA, UXGA Horizontall Freq. : 15.5Khz ~ 75Khz Vertical Freq. : 50/60Hz
	SDI	BNC 1Pin	SMPTE 259M-C, SMPTE 292M, SMPTE 424M, SMPTE 425 (Level A & B)
Video Output Signal	DVI	DVI-D 24Pin (Female)	640X480-60/85, 800X600-50/60/85, 853X480-50/60, 1027X768-60/85, 1280X1024-50/60, 1600X900-50/60, 1600X1200-50/60, 1706X960-60
Control Method	RS-232C	D-Sub 9Pin (Female)	Baud Rate : 115200 Max ±15V
	Ethernet	RJ-45	TCP/IP
	Key Pad		Input Souce Select Hot Key, Output Resolution Select Hot Key, Navigation Key(OSD), Control Channel Select, Communication Method Select.
Display	STN LCD	2X16	Input Souce, Output Resolution Display

※ Specification can be changed without prior notice to improve product quality.

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