T220 / T220G
T200 / T200G
Training Manual

Development 3 Group

Development 5 (VD) Lab

Contents

- Product Overview
- Circuit Description
- Assembly and Disassembly
- Troubleshooting
- How to Execute Code
- Etc.

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1. Product Overview (Product Features)

*. Feature

-. Panel : 300cd/m2, 2ms, CR1000:1, 170/160 (CR>10)
-. DC 20000:1
-. DPMS : <1W
-. Power off : 0.3W(Typ)
-. Magic Bright3, Magic Tune
-. New function : Off-Timer / Image size / Color effect
-. Windows Vista
-. D-Sub & DVI with HDCP

1. Product Overview (Product Specification)

Key Specification			
Model	**T190(G)**	**T200(G)**	**T220(G)**
Size	19” wide	20” wide	22” wide
Resolution	1440* 900@60Hz	1680* 1050@60Hz	1680* 1050@60Hz
Brightness	300cd/㎡	300cd/㎡	300cd/㎡
Contrast Ratio	1000: 1	1000: 1	1000: 1
Dynamic Contrast	20000: 1	20000: 1	20000: 1
Supported Resolution	VGA ~ UXGA	VGA ~ UXGA	VGA ~ UXGA
Horizontal Frequency	30~81kHz	30~81kHz	30~81kHz
Vertical Frequency	56~75Hz	56~75Hz	56~75Hz
Sync Type	Sep. / Comp. / SOG	Sep. / Comp. / SOG	Sep. / Comp. / SOG
Response Time	2ms	2ms	2ms
Viewing Angle (CR>10)	170º/ 160º	170º/ 160º	170º/ 160º
Signal Input	Analog / DVI Digital	Analog / DVI Digital	Analog / DVI Digital
Power Consumption (ON)	34 Watt	40 Watt	45 Watt
Power Consumption (DPMS)	<1 Watt	<1 Watt	<1 Watt
Stand	Simple		

1. Product Overview (Product Specification)

Key Specification		
Function	**Detail Function**	**Description**
Magic color	Off	Magic Color Off
	Demo	Used for shop demos. The left one is for Magic Color On. The right one is for Magic Color Off.
	Full	Presents more abundant colors by expanding the three color tones of R, G and B.
	Intelligent	Expands all R/G/B colors except for skin tones.
Magic Bright	Custom	Factory defaults
	Text	The brightness setting for text editing
	Internet	The brightness setting for Internet use
	Game	The brightness setting for playing Internet games
	Sports	The brightness and color temperature settings for watching sports programs
	Movie	The brightness and color temperature settings for watching movies
	Dynamic Contrast	Dynamic Contrast is to automatically detect distribution of inputted visual signal and adjust to create optimum contrast.
Color Tone	Cool	The blue tone from the R/G/B colors is emphasized
	Normal	Natural state. There is no artificial adjustment to the R/G/B colors
	Warm	The red tone from the R/G/B colors is emphasized
	Custom	The user-defined state of the R/G/B Color Control is saved

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1. Product Overview (Product Specification)

Key Specification		
□□	□□ □□	□□
Color Effect	Off	Color Effect Off
	Grayscale	Display monitor in Gray tone.
	Green	Display monitor in Green tone.
	Blue	Display monitor in Blue tone.
	Sepia	Display monitor in Brown tone.
Customized Key	MagicBright	Hot key Function : MagicBright.
	MagicColor	Hot key Function : MagicColor .
	Color Effect	Hot key Function : Color Effect .
	Image Size	Hot key Function : Image Size .

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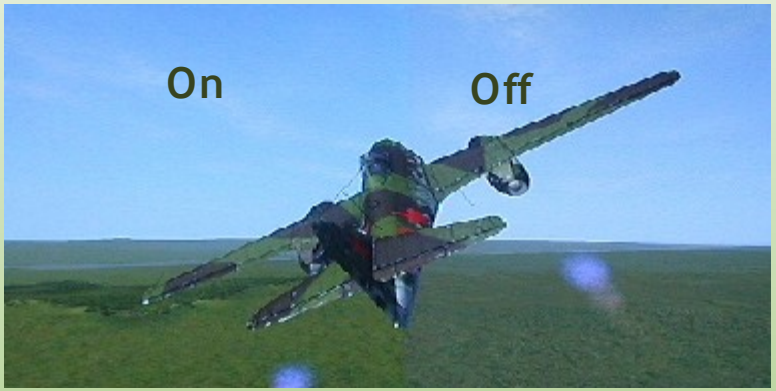
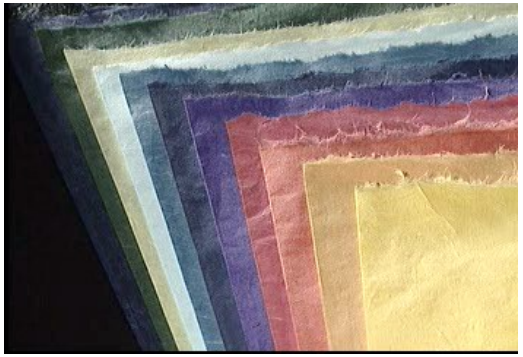
1. Product Overview (Magic Color)

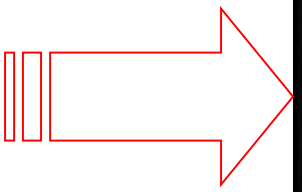
Magic color Demo Mode

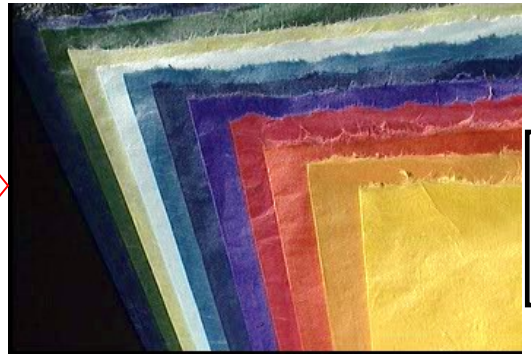


DEMO mode

Magic color Full Mode







All R/G/B Colors Expanded

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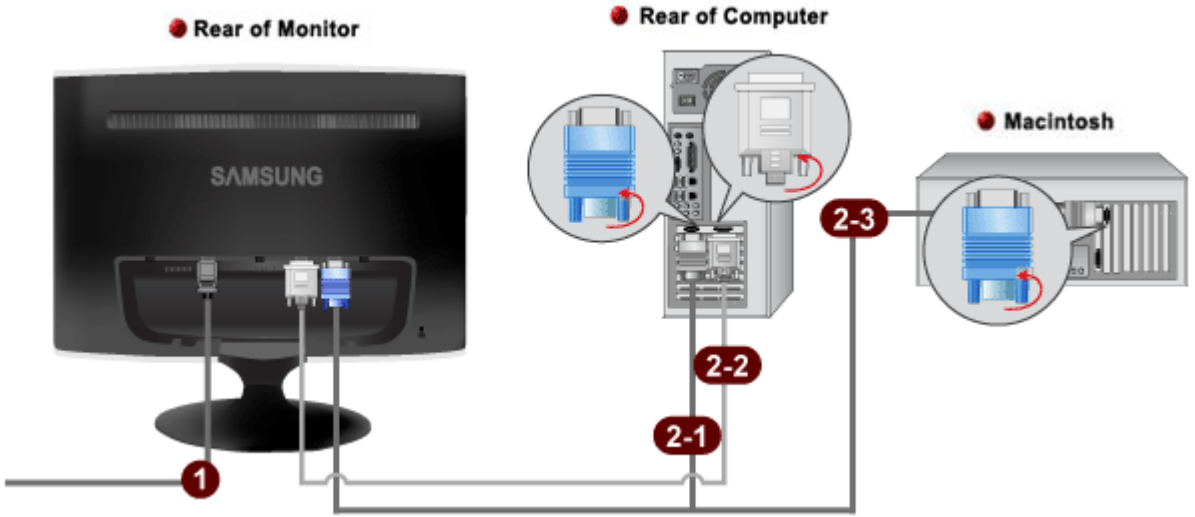
1. Product Overview (Magic Color)

Magic color
Intelligent Mode

Except Skin Tone

1. Product Overview (Connecting External Devices)



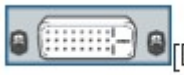
1 Connect the power cord for your monitor to the power port on the back of the monitor.
Plug the power cord for the monitor into a nearby outlet.

2 Use a connection appropriate for your computer.

2-1 Using the D-sub (Analog) connector on the video card.
Connect the signal cable to the 15-pin, D-sub connector on the back of your monitor.


[RGB IN]

2-2 Using the DVI (Digital) connector on the video card.
Connect the DVI Cable to the DVI IN Port on the back of your Monitor.


[DVI IN]

2-3 Connected to a Macintosh.
- Connect the monitor to the Macintosh computer using the D-sub connection cable.

Note

If the monitor and the computer are connected, you can turn them on and use them.

1. Product Overview (Supported Display Modes)

Display Mode	Horizontal Frequency (kHz)	Vertical Frequency (Hz)	Pixel Clock (MHz)	Sync Polarity (H/V)
IBM, 640 x 350	31.469	70.086	25.175	+/-
IBM, 640 x 480	31.469	59.940	25.175	-/-
IBM, 720 x 400	31.469	70.087	28.322	-/+
MAC, 640 x 480	35.000	66.667	30.240	-/-
MAC, 832 x 624	49.726	74.551	57.284	-/-
MAC, 1152 x 870	68.681	75.062	100.000	-/-
VESA, 640 x 480	37.500	75.000	31.500	-/-
VESA, 640 x 480	37.861	72.809	31.500	-/-
VESA, 800 x 600	35.156	56.250	36.000	-/-
VESA, 800 x 600	37.879	60.317	40.000	+/+
VESA, 800 x 600	46.875	75.000	49.500	+/+
VESA, 800 x 600	48.077	72.188	50.000	+/+
VESA, 1024 x 768	48.363	60.004	65.000	-/-
VESA, 1024 x 768	56.476	70.069	75.000	-/-
VESA, 1024 x 768	60.023	75.029	78.750	+/+
VESA, 1152 x 864	67.500	75.000	108.000	+/+
VESA, 1280 x 1024	60.000	60.000	108.000	+/+
VESA, 1280 x 1024	79.976	75.025	135.000	+/+
VESA, 1440 x 900	55.935	59.887	106.500	-/+
VESA, 1440 x 900	70.635	74.984	136.750	-/+

1. Product Overview (OSD Functions)

1. MENU
2. MagicBright™ / Down
3. Brightness / Up Button
4. Enter / Source Button
5. Auto

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1. Product Overview (OSD Functions)

(1) MENU Button : Open the OSD menu. Use this button to exit the OSD or go to the upper OSD menu.

(2) MagicBright Button : Press this button to adjust MagicBright™.
MagicBright™ is a monitor that fits to various user environments such as editing documents, Internet use and watching movies, etc. It has more than double the brightness and screen quality of existing monitors. The dedicated buttons on the front of the monitor allow users to easily implement six (7) different sets of brightness and clearness settings that fit the environment

- **-. Custom** : The Custom mode provides refined brightness and clearness levels. However, it may not be comfortable on the eyes depending on the user's preferences. In this case, adjust the brightness and clearness using the menu.
- **-. Text** : Text mode provides the same brightness level of general monitors appropriate for text editing.
- **-. Internet** : Internet mode provides enhanced brightness while maintaining a level of text readability appropriate to the Internet environment where text and images are combined.
- **-. Game** : Game mode provides a brightness level appropriate for playing games where there are a lot of graphics and fast screen switching.
- **-. Sport** : Sports mode provides a brightness level appropriate for watching sports programs where there is a lot of movement.
- **-. Movie** : Movie mode provides excellent brightness and cleanness levels for the entertainment (movies, DVD, TV, etc.) environment, at the same level as a TV.
- **-. Dynamic Contrast** : Dynamic Contrast is to automatically detect distribution of inputted visual signal and adjust to create optimum contrast

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1. Product Overview (OSD Functions)

1)	**Brightness Button**	: Use this button to adjust the brightness of the screen
2)	**Adjustment Button**	: Use this button to move around the OSD menu or change the value.
3)	**Enter/ Source Button**	: Press this button to select a function and video source..
4)	**Auto Button**	: If Button is pressed. Auto adjustment function operates automatically. (Only in analog mode)
5)	**Power Button**	: Press this button to turn the monitor on or off.

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1. Product Overview (OSD Tree)

(...re)	(Color)	(Image)	(OSD)	(Setup)	(...on)	(...ght)
-. Brightness -. Contrast	-. MagicColor .off .Demo .Full .Intelligent -. ColorTone .Cool .Normal .Warm .Custom -. Color Control .Red .Green .Blue -. Color Effect .Off .Grayscale .Green .Aqua .Sepia -. Gamma .Mode1 .Mode2 .Mode3	-. Coarse -. Fine -. Sharpness -. H-Position -. V-Position	-. Language -. H Position -. V Position -. Transparency -. Display Time	-. Reset -. Custmized Key .MagicBright .MagicColor .Color Effect .Image Size -. Off Timer .Off .On -. Auto Source -. Image Size .Normal .Wide	-. Source -. Frequency -. Resolution	-. Custom -. Text -. Internet -. Game -. Sport -. Movie -. Dynamic Contrast

1. Product Overview (OSD Hidden Key)

No	Function	Operating method
1	User Delete	Select Brightness from the menu, and then hold down the Enter button for five (5) seconds while the menu is displayed.
2	Entering the Service Menu	Set both the brightness and the contrast to '0' on the menu, and then hold down the Enter button for five (5) seconds while the menu is displayed.
3	Color Calibration	Select OSD/Language English from the menu, and then hold down the Enter button for five (5) seconds while the menu is displayed. (The screen is in 16 gray colors.)
4	Menu Lock	Hold down the Menu button for five (5) seconds

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1. Product Overview (Specifications of Options)

□□	□□□	□□ □□	□□
	Quick Setup Guide	BH68-00907A	
	Warrant card	BH68-00633B	
	Monitor Driver, User's Guide	BN59-00716A	
	D-Sub(15-pin)cable	BN39-00244G	
	Power Code	3903-000042	
	DVI Cable	BN39-00246L	Sold separately

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2. Circuit Description (New Part)

***. Scaler(MSTR)**

SE758MH-LF

Use a type of scaler with an embedded MCU core.

-. Detailed Specifications

- On-Chip Microcontroller
- On-Chip OSD Controller
- LVDS/RSDS Transmitters
- 128-QFP Package / 3.3V/1.8V suppliers

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2. Circuit Description (Product Structure)

1. Panel Part

➢See Product Specifications.

2. Main Board Part

➢ Receives external PC analog signals, and then outputs the video signals to the panel using a Scaler and also outputs the same signals as external input.

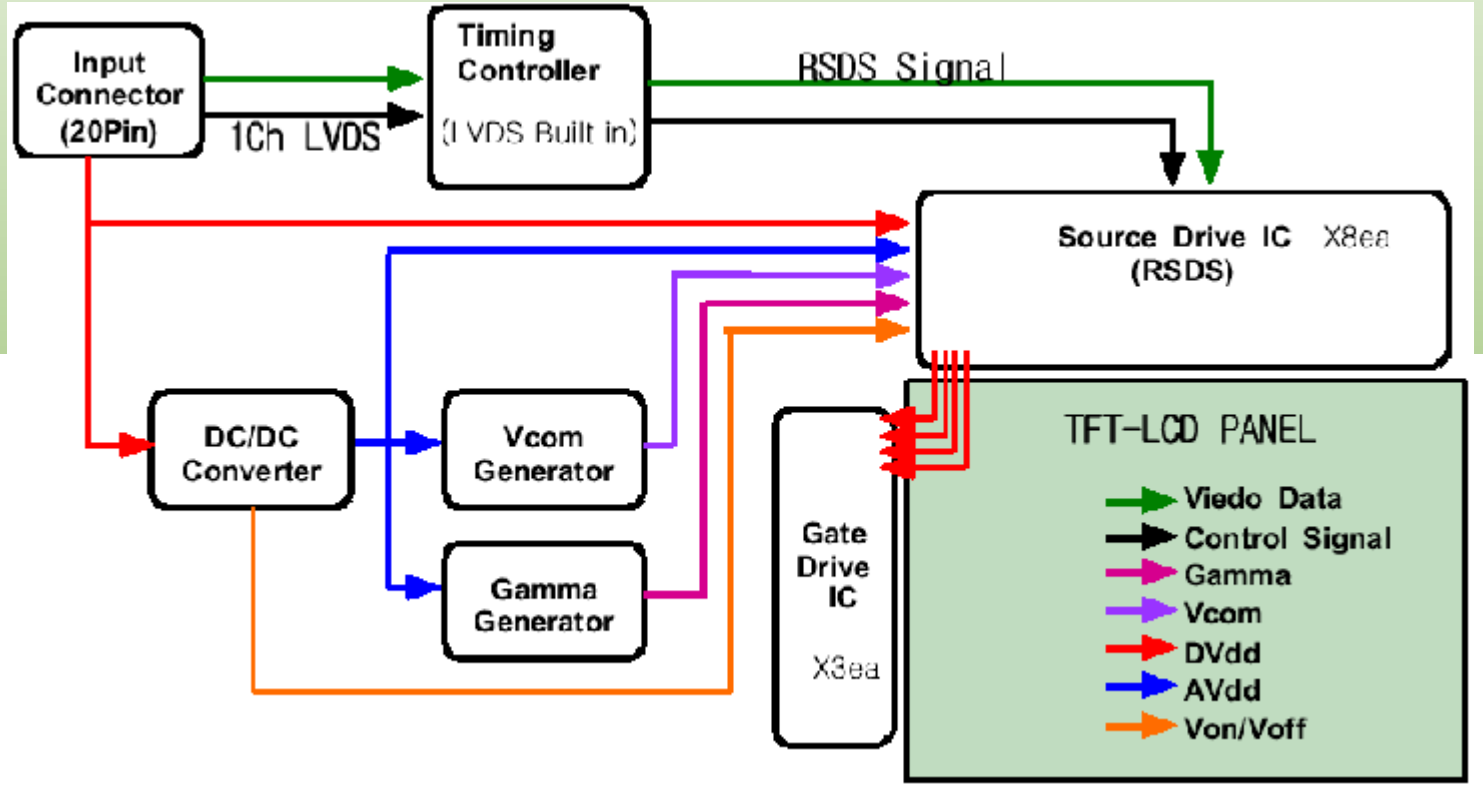
3. I P BOARD

➢Inverter + SMPS BOARD

4. Function Button

Transfers the input signals where the Function button is used to the main board and displays the LED.

2. Circuit Description (Panel Part)



2. Circuit Description (Panel Part)

* PROTECTION*

- LAMP(Inverter) PROTECION

=> The protection is activated if there is no feedback because the lamp connector is disconnected or the lamp is cracked.

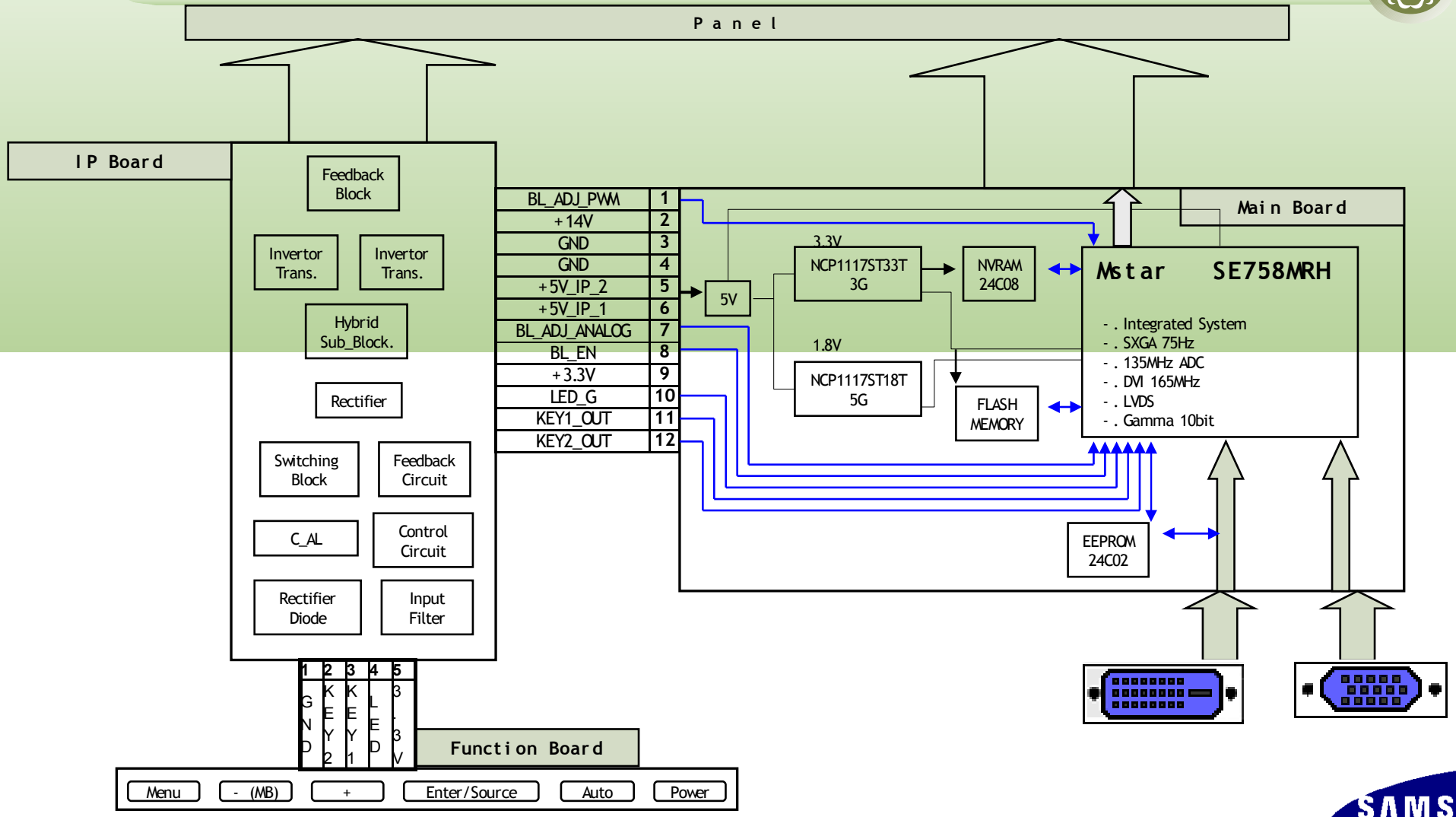
=> The over voltage protection starts as a lamp protection if the output voltage of the inverter transformer is high.

- Power Protection

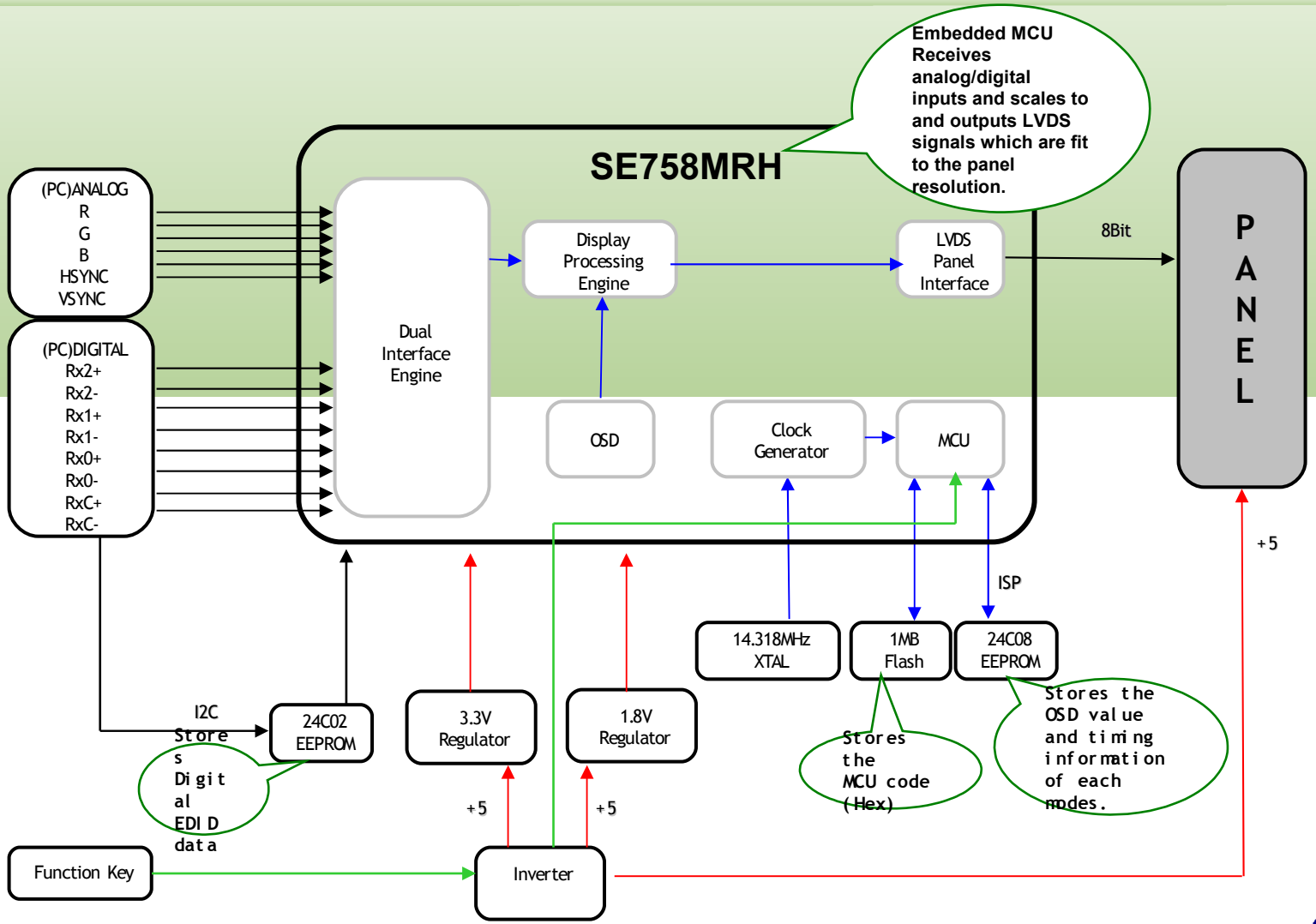
=> All panel protection (OVP/OCP) operates in Auto Recovery mode. When the panel is stopped temporarily due to a protection issue, it powers the panel on again to resume the operation after the problem is cleared.

However, as an exception, in the case of a thermal protection issue, the panel can only operate normally if the power is turned off and is fully discharged and turned on again. This is controlled by a function designed in the power IC.

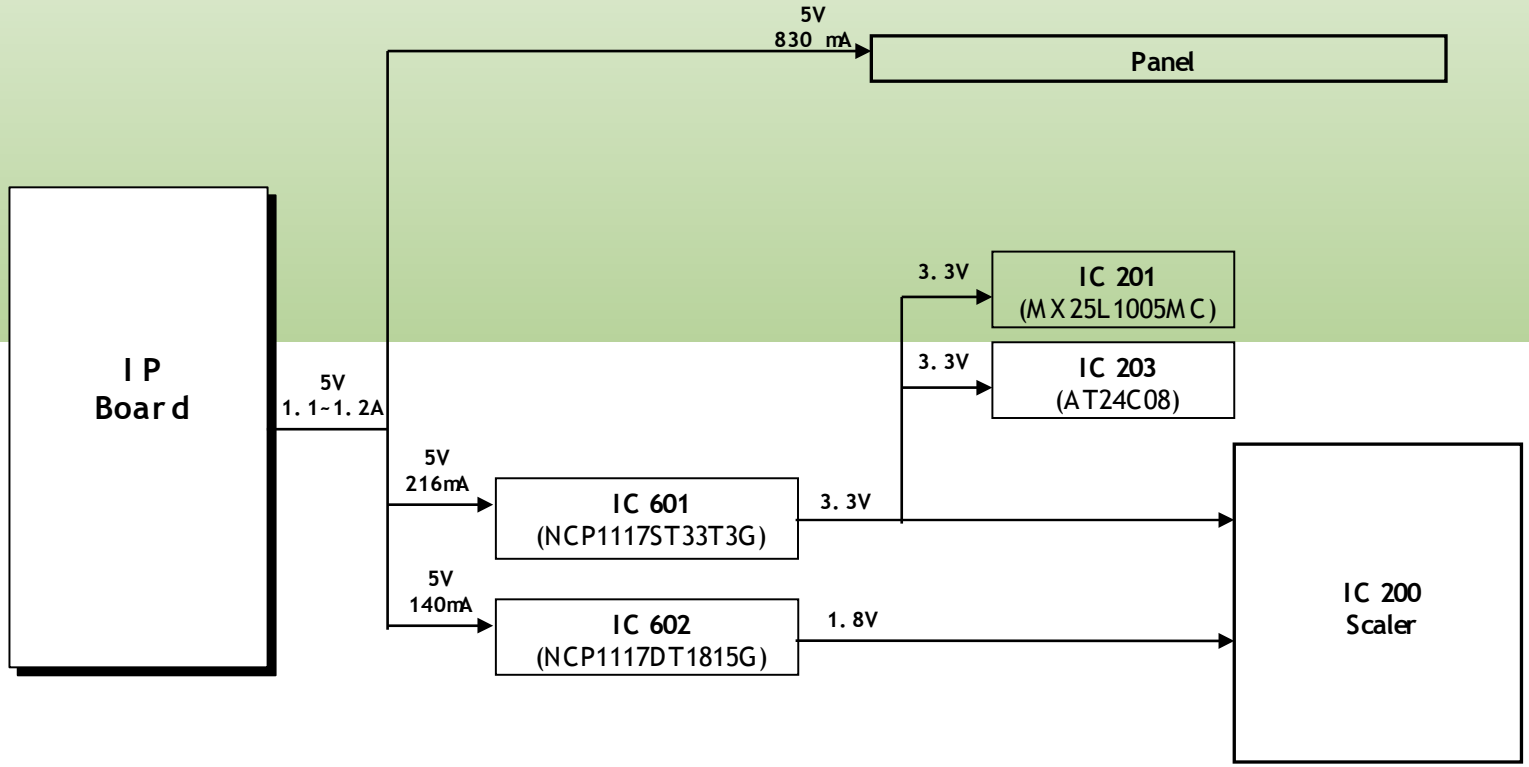
2. Circuit Description (Scaler Part)



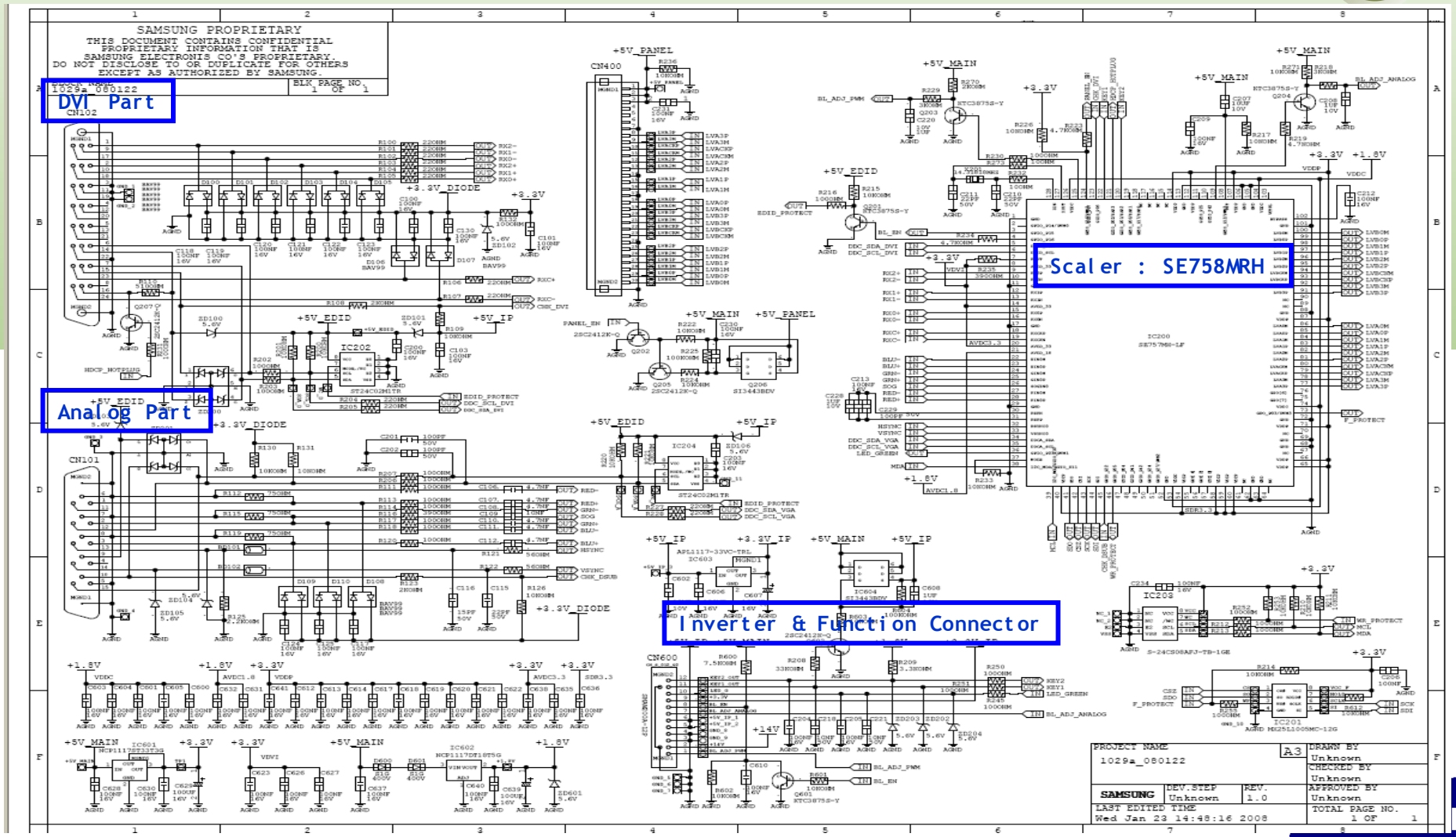
2. Circuit Description (Scaler Part)



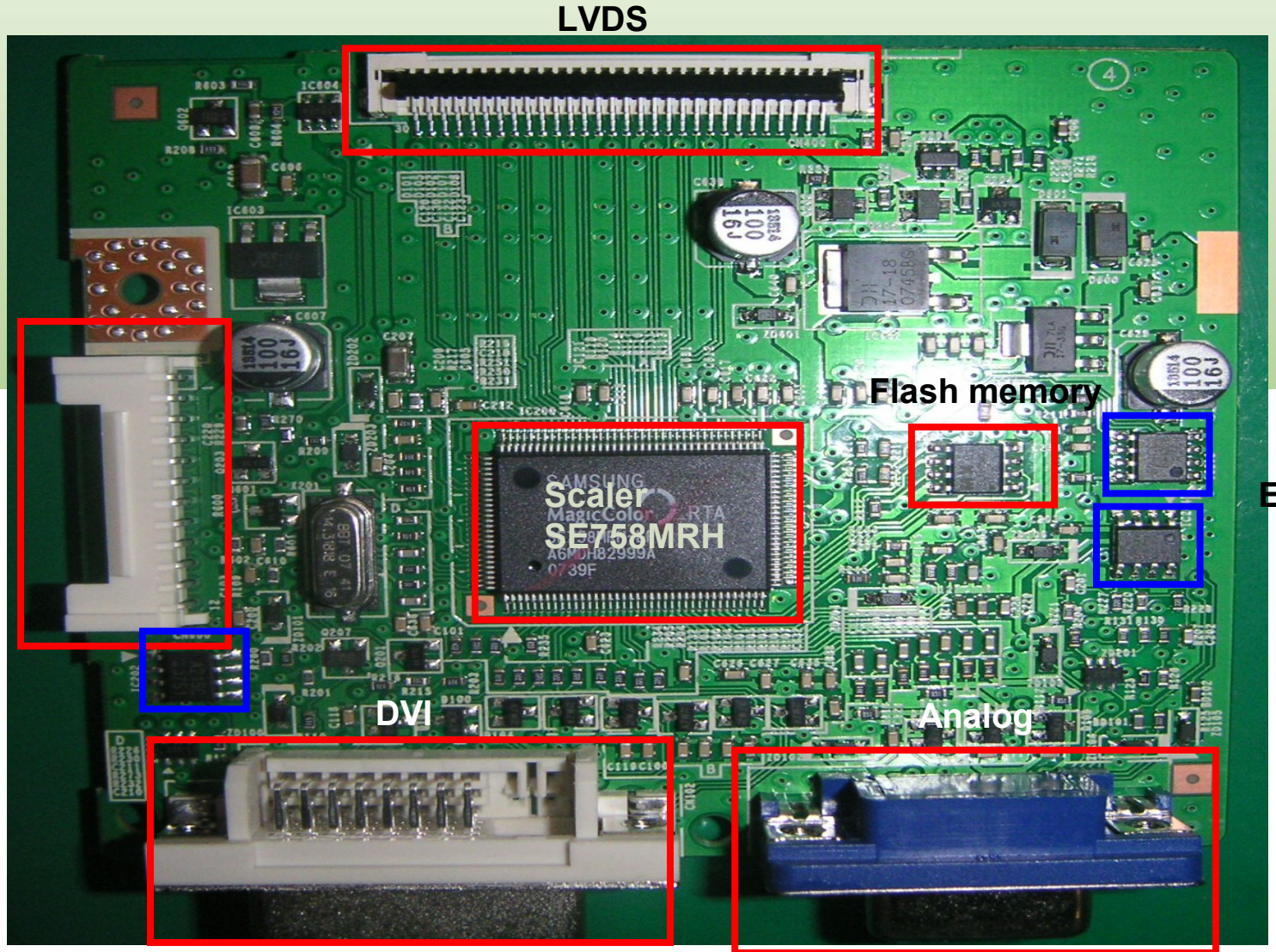
2. Circuit Description (Power Flow Chart)



2. Circuit Description (Circuit Diagram)



2. Circuit Description (Main PBA)



2. Circuit Description (Main PBA)

No	Block	Description	Remark
1	Scaler IC200	Besides the ADC, LVDS, and scaling part, an MCU is embedded as well. All of them are integrated into one chip.	SE758MRH
2	Flash Memory IC201	Stores the MCU program embedded in the scaler. It is of a flash type and rewritable.	MX25L1005MC
3	IC203	Stores the OSD and various timing values.	24C08
4	IC202	The memory to which analog DDC data is input	24C02
5	Regulator	An IC that receives DC voltage inputs. It is used in circuits that stabilize the DC voltage.	NCP1117DT18T5G NCP1117ST33T3G

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2. Circuit Description (IP Board - Dimming)

*. There are three methods. The Current Control method adjusts the size of the current entering the lamp. The PWM method turns the lamp on and off according to a specific frequency. The Complex method mixes those two methods.

1. Current Control (Analog Dimming)
   - Dimming is possible with comparatively no effect on the panel.
   - A minimum current is required with which no partial lightning occurs in the lamp at the minimum brightness.
   - Low dimming ratio (Approx. 2:1)
   -Because the inverter is optimized to the maximum brightness, the efficiency is degraded in the dimming state.

2. PWM Control (Burst Dimming) – The Piccolo model uses PWM fully from OSD 0 to 100.
- Dimming is achieved by turning the lamp on and off at a frequency of approx. 300 Hz to 1 kHz.
- Turning a large capacity of current on and off at a specific cycle causes ground instability and noise to the panel, which results in waterfalls on the screen.
- Because it operates at the maximum brightness when the lamp is on, the efficiency is high. It resolves the problem of partial lightning at minimum brightness, thus, displays a high dimming ratio (approx. 5:1).

3. Complex Control
-Removes the possibility that waterfalls can occur by using the analog method at the early stage of dimming.
- Heightens the dimming ratio by using the PWM method at the later stage of dimming.

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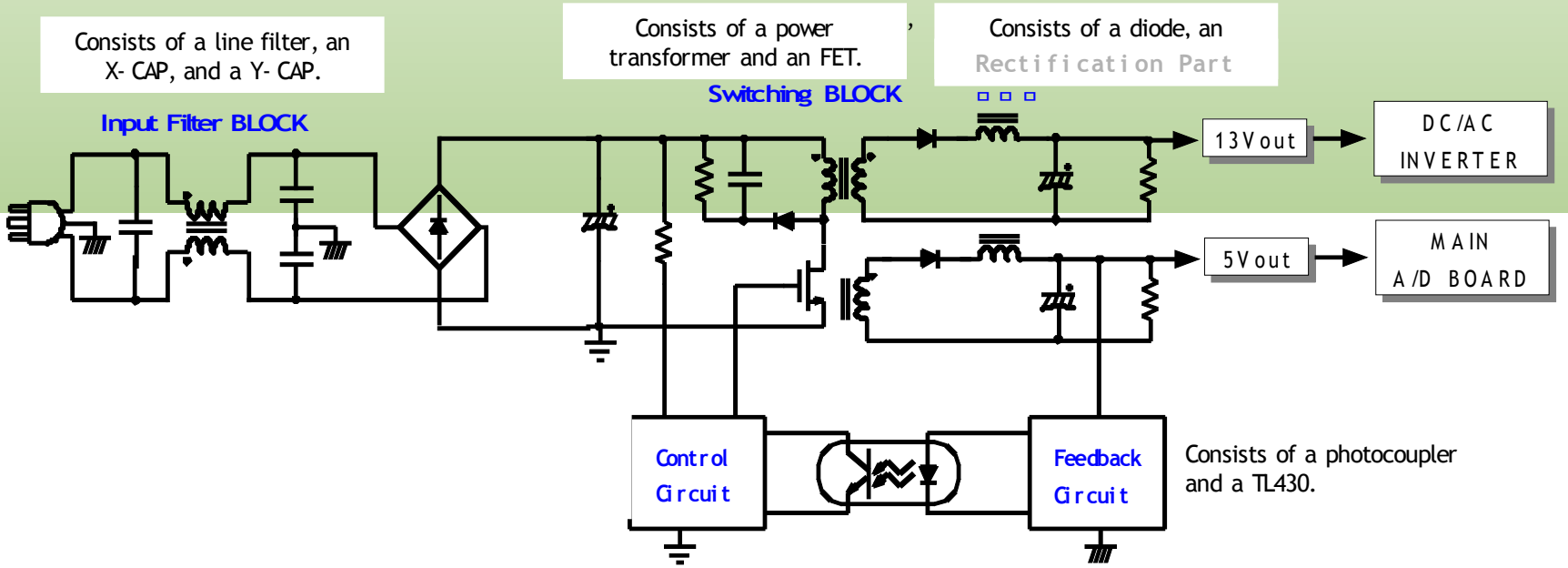
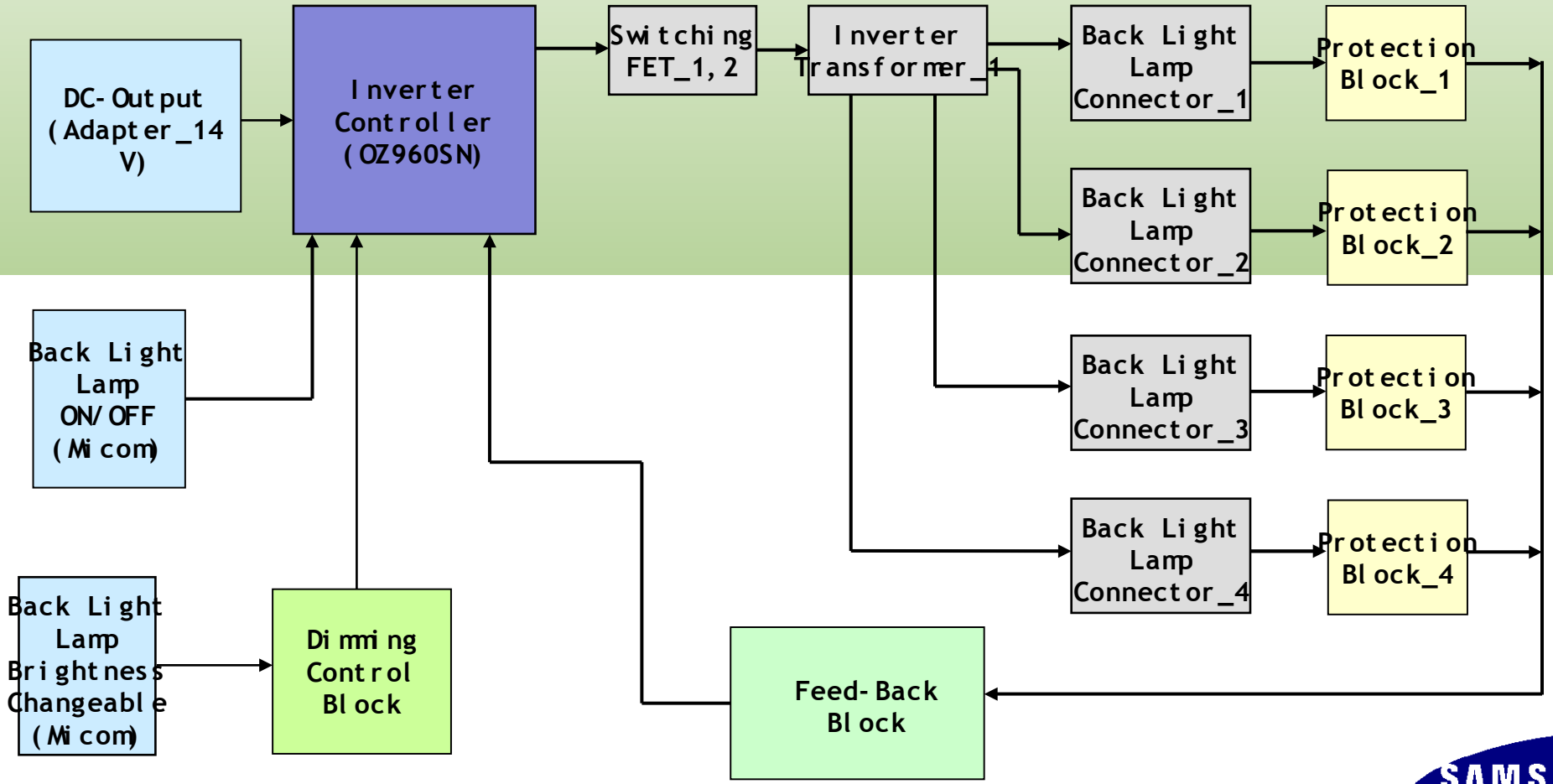
2. Circuit Description (IP Board)

SMPS Part



2. Circuit Description (IP Board Circuit Diagram)

Inverter Part



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3. Assembly and Disassembly

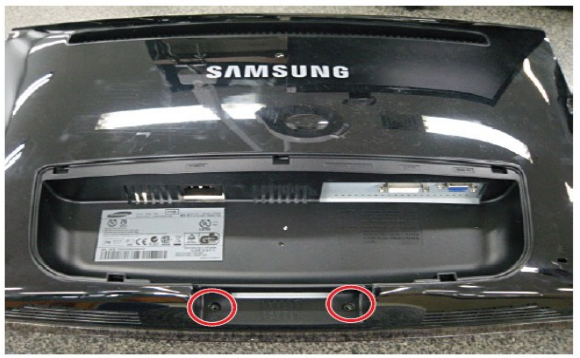
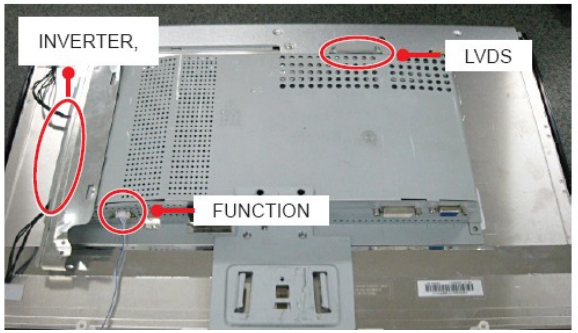
Caution : 1. Turn the monitor off before beginning the disassembly sequences for this monitor.

2. When disassembling the monitor, do not use any metal tools except for the provided jig.

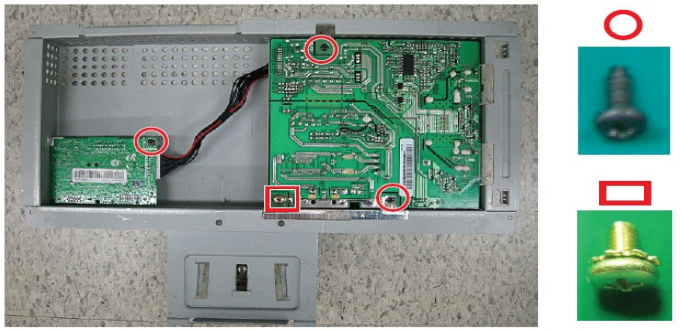
3. Disassemble the monitor carefully as directed in the following procedures.

Description	Picture Description
1. Place a soft cloth on the table and place the monitor onto it with the front part facing downwards. Hold the monitor set with one hand and hold and pull the stand body backwards with the other hand to remove the stand body from the monitor set.	
2. Insert both hands into the groove and then lift up and remove the cover.	

3. Assembly and Disassembly

Description	Picture Description
3. Remove the four (2) screws.	
4. Remove the INVERTER wire, LVDS cable, and FUNCTION cable, and then remove the SHIELD-COVER.	

3. Assembly and Disassembly

Description	Picture Description
5. After disconnecting SHIELD- LAMP of left side, disassemble lamp wire between panel and IP-Board.	
6. Remove the four (4) screws shown in the figure and remove the Bracket support.	

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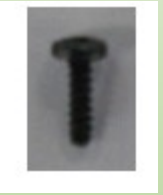
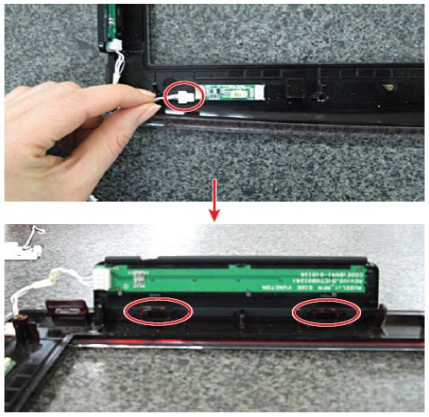
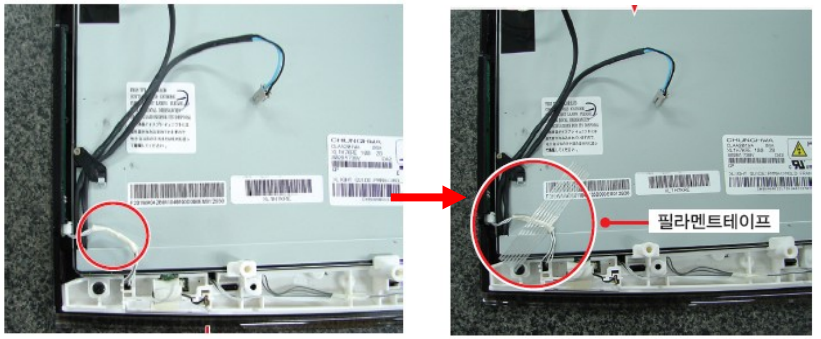
3. Assembly and Disassembly

Description	Picture Description
7. Remove the two (2) screws and then remove the holders from the four (4) snaps designated in the right figure using the provided jig.	 
8. Remove the connectors. (*Caution : Servicing is not supported for the PCB.)	

3. Assembly and Disassembly

Description	Picture Description
▶ Assembly 9. The assembly is in the reverse order of the disassembly. 10. Connect the disassembled snap and the LED module again.	
11. Fix the connecting wire with filament tape. (*Caution : If the wire is damaged when closing the cover, an operating error may occur. Therefore, make sure to close the cover after fixing it with filament tape.)	

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3. Assembly and Disassembly

Description	Picture Description
12. The assembly is in the reverse order of the disassembly. Insert the cover into the groove and then press both sides.	

- The assembly is in the reverse order of disassembly.

4. Troubleshooting

❖ Checking Before repairing

1. Check the power state and the cable connections.

. Check the connections of the power and signal cables.

. Check whether the function button operates normally.

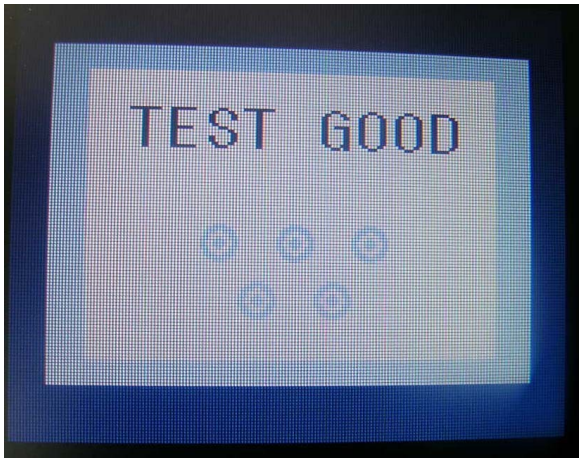
2. Check "TEST GOOD" OSD

. The Purpose and Function of the Self-Test

➔ A Self-Test has been added to easily recognize whether the monitor has a fault or not and consequently to minimize customer claims for non-malfunctions of the product.

. How to Perform a Self-Test

➔ Press the Menu button in the DPMS state, and determine whether the monitor is normal or not.



No screen	Determine according to the output message. -. Check Panel 5V of main board and IP □
Focus fault	Determine according to dimming level of the "TEXT GOOD" message. -. Check Panel and LVDS output
Screen trembling	Determine according to trembling level of the message window. -. Check Panel and LVDS output

4. Troubleshooting

***. Other simple diagnostics**

➔**No power** (No video and Function LED does nor work)

. Check connection Lamp wire, LVDS cable , function cable.

. Disconnect Inverter connector and check 5V and 14V of Ip board connector.

➔ If it does not operate, IP board is inferior goods.

Or BL_EN pin connect to 5V. If panel is not on, Ip board inferior goods.

. Ip board operate normally : Check +5V_Panel signal.

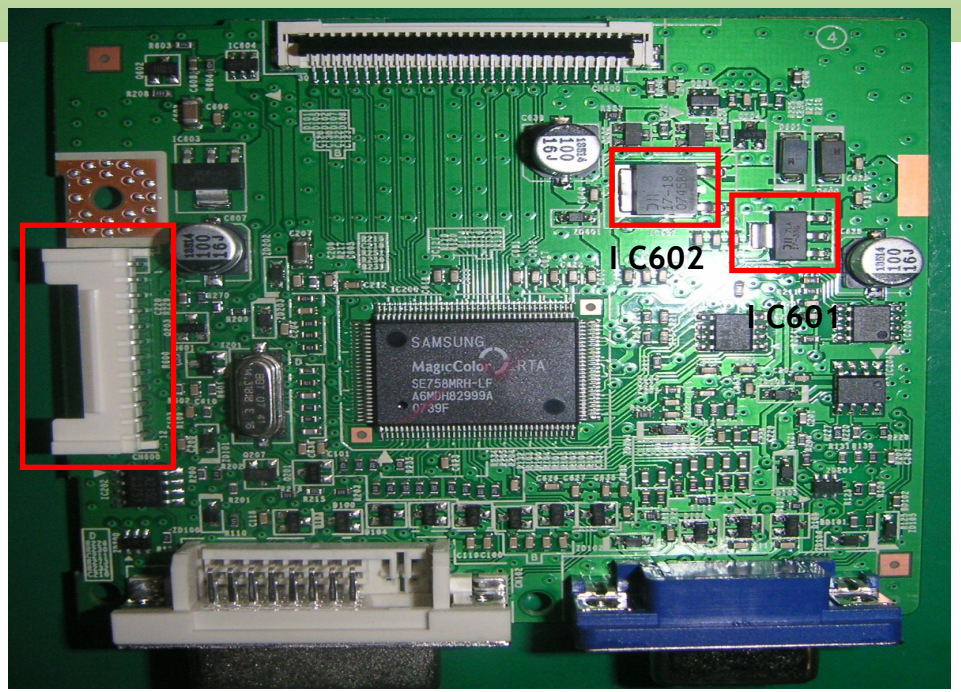
➔ If it operate normally, Panel is inferior goods.

. Panel & Ip board operates normally: Check Main board and Function board.

4. Troubleshooting

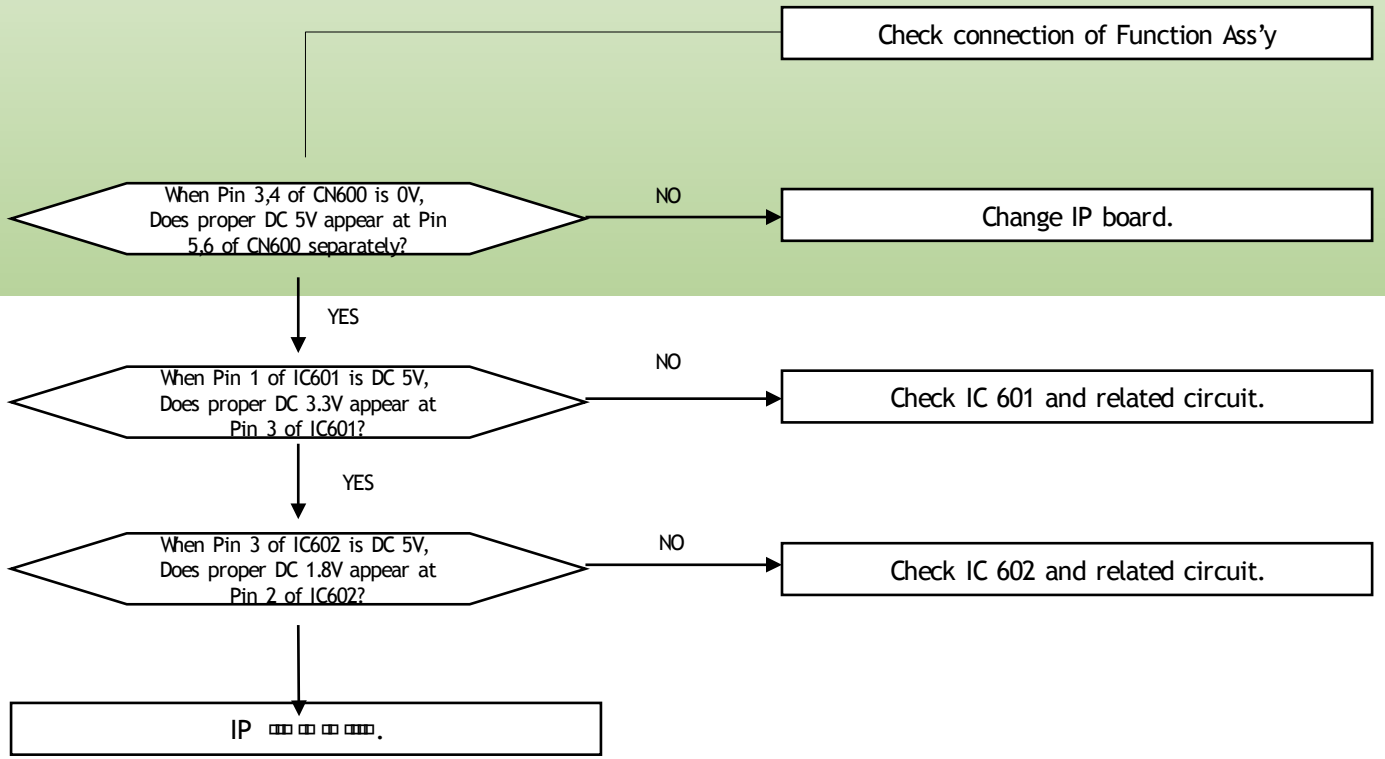
No power

Symptom	: -. When turning on the Power button after connecting the power, the LED at the front of the monitor does not operate.
Major Checkpoints:	-. Check the IP board power fuse and IP board output power. -. Check the connections for the IP board and the Main board. -. Check the main board power part and check also whether there is any abnormal output at other output terminals.



4. Troubleshooting

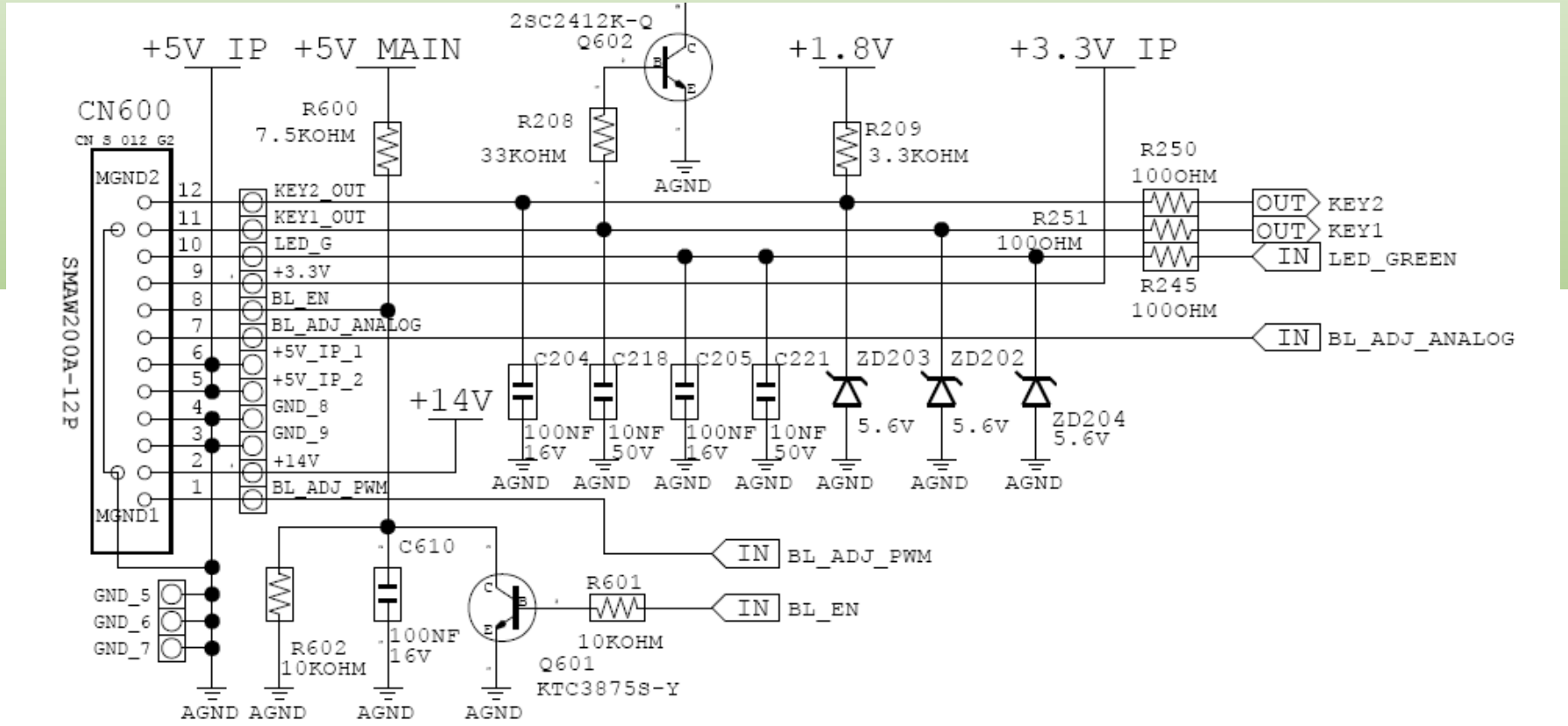
No power



Caution : Make sure to disconnect the power before working on the IP board.

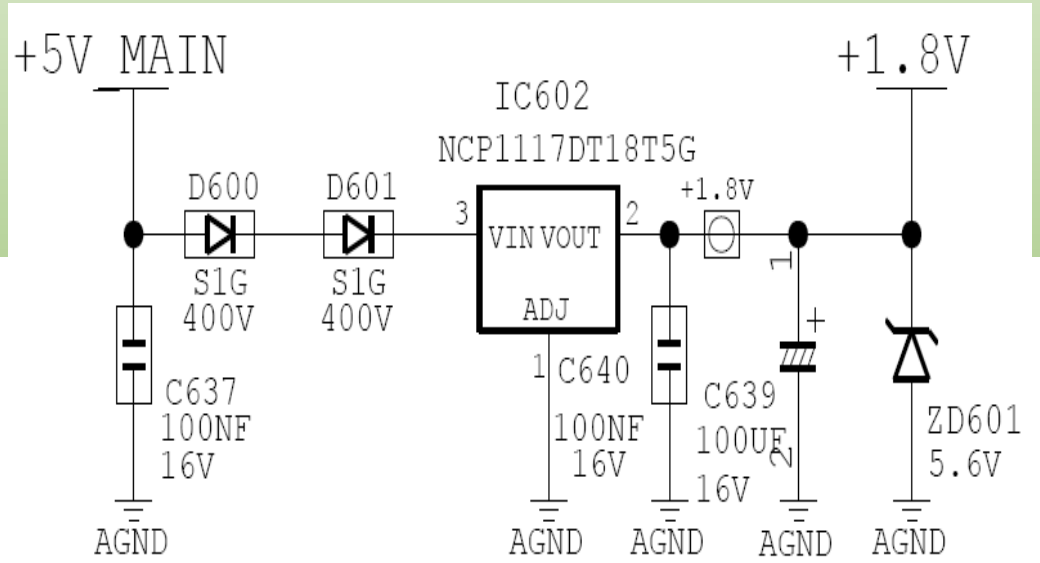
4. Troubleshooting

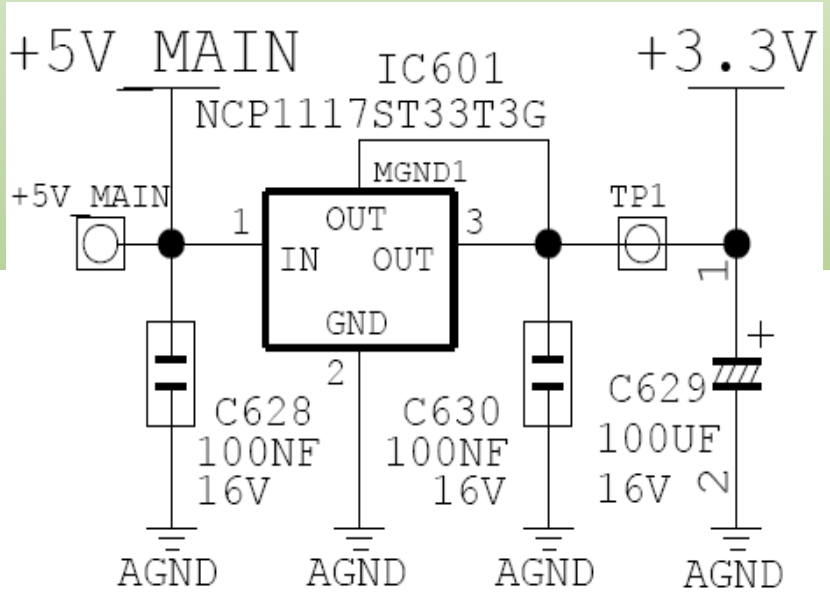
The Circuit diagram when the power not turn on



4. Troubleshooting

The Circuit diagram when the power not turn on

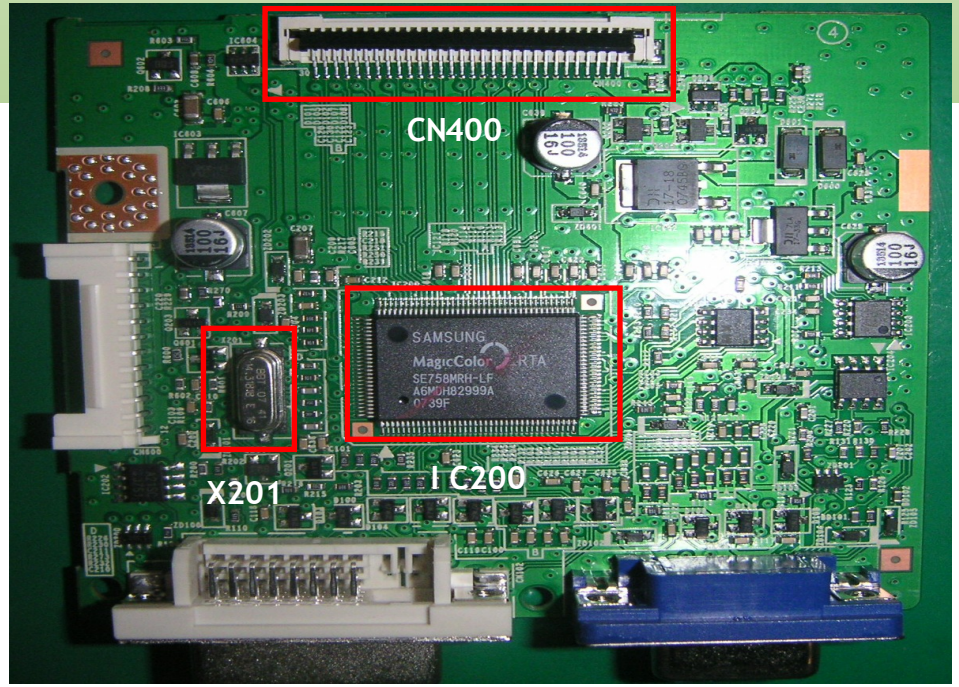




4. Troubleshooting

No video (Analog)

Symptom : -. Though the LED power turns on, the screen is blank when connecting the VGA cable.
Major Checkpoints: -. Check the D-sub connection.
-. Check whether the LVDS cable is connected correctly to the Panel.
-. Check whether the lamp connector of the Panel is connected correctly to the IP board.



4. Troubleshooting

No video (Analog)

Check the signal cables and the connections.

1 Is X201 oscillating correctly?
- NO → Replace or check related circuit.
- YES ↓

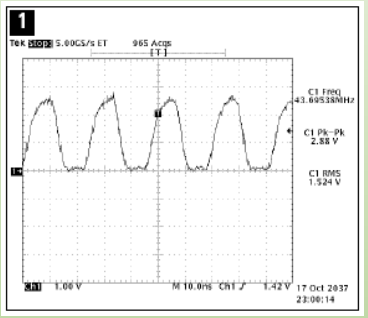
2 Do the RGB input appear at R111, R114, R118 ?
- NO → Check Input part
- YES ↓

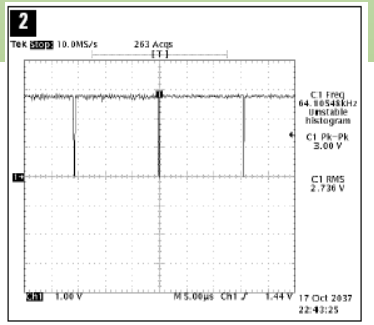
3 Does the Hsync , 4 Vsync input appear at pin 32,33 of IC 200, respectively?
- NO → Check IC201 and related circuit.
- YES ↓

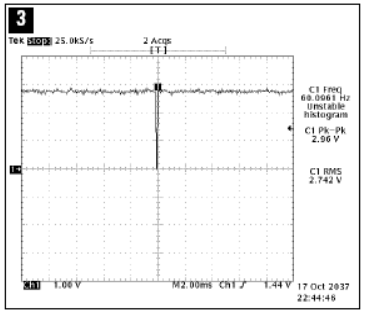
Do output signals appear at pin 8 to 30 of CN400?
- NO → Check ICN400 and related circuit.
- YES ↓

There are DC 5V at pin 1,2, and 3 of CN400?
- NO → Check +5V_Panel and BL_EN signal.
- YES ↓

Replace LCD panel



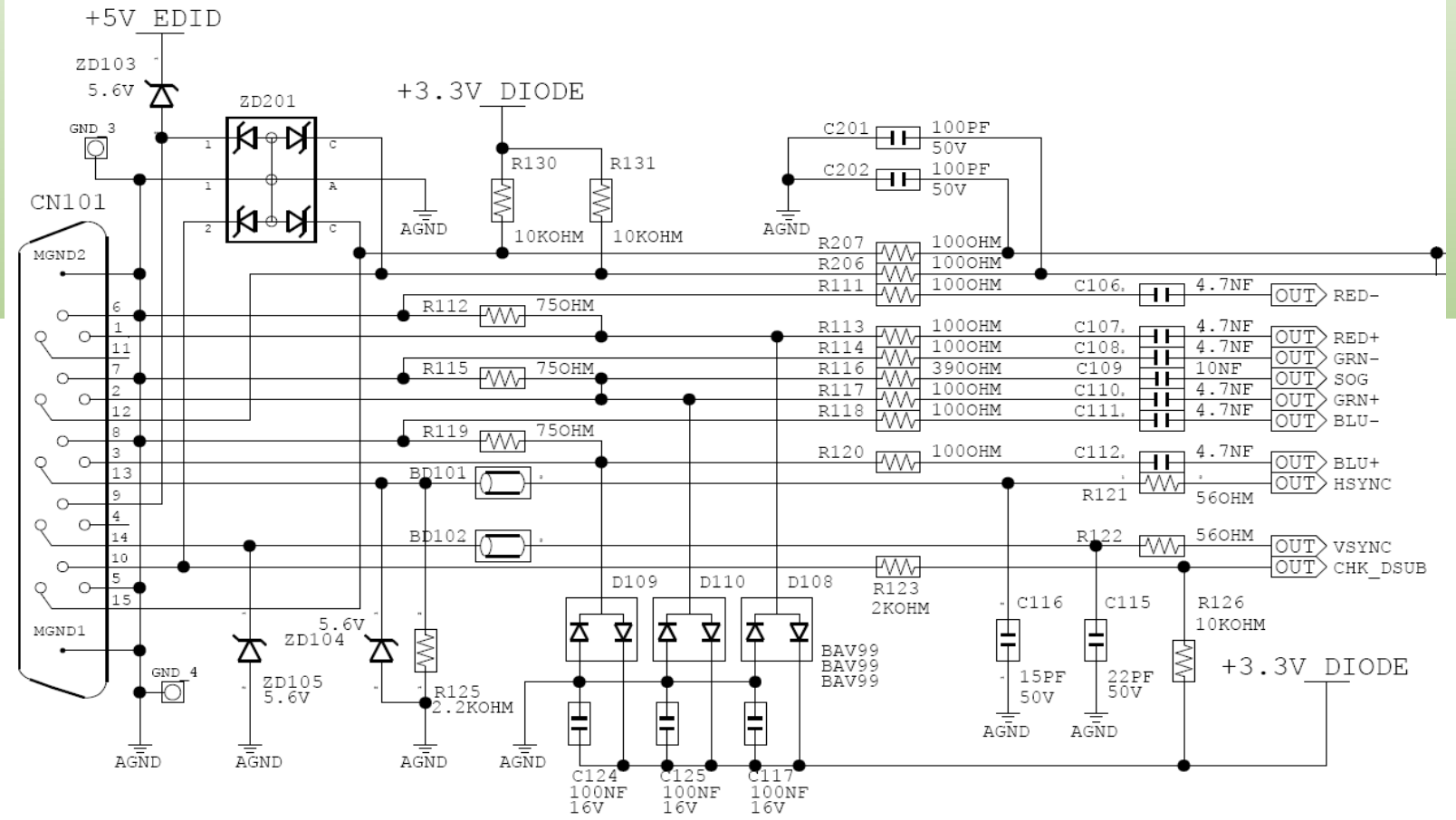




Caution : Make sure to disconnect the power before working on the IP board.

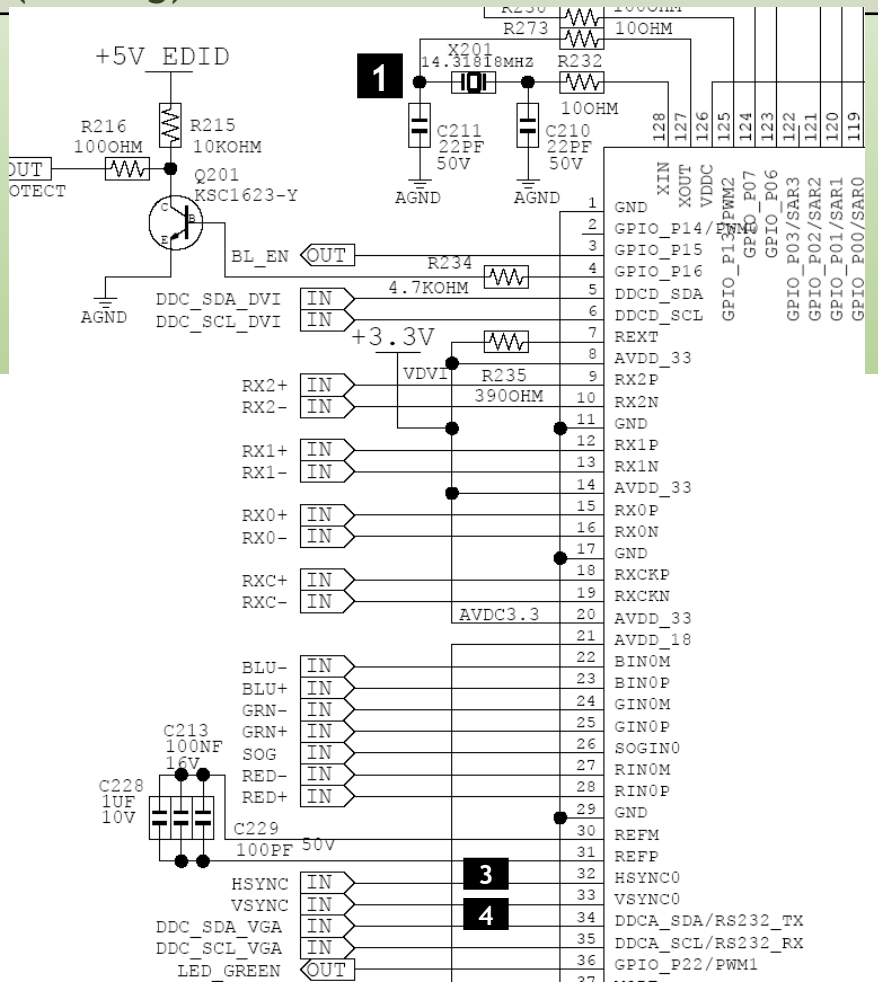
4. Troubleshooting

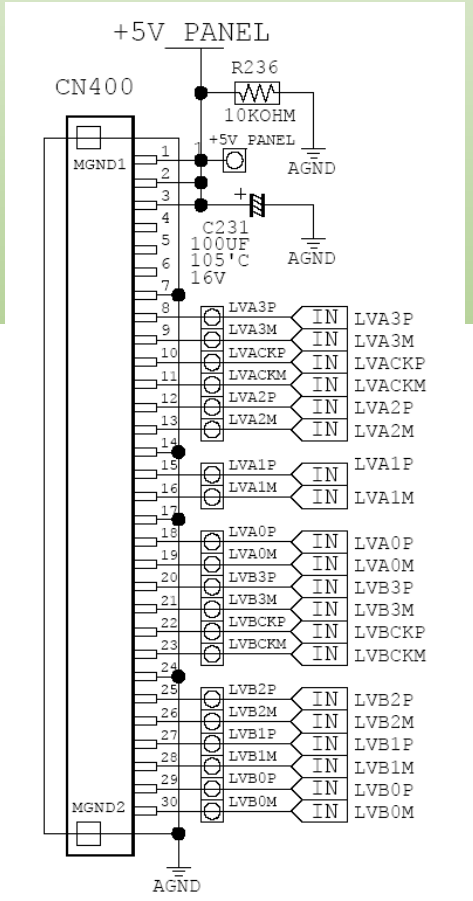
The Circuit diagram when no video (Analog)



4. Troubleshooting

The Circuit diagram when no video (Analog)

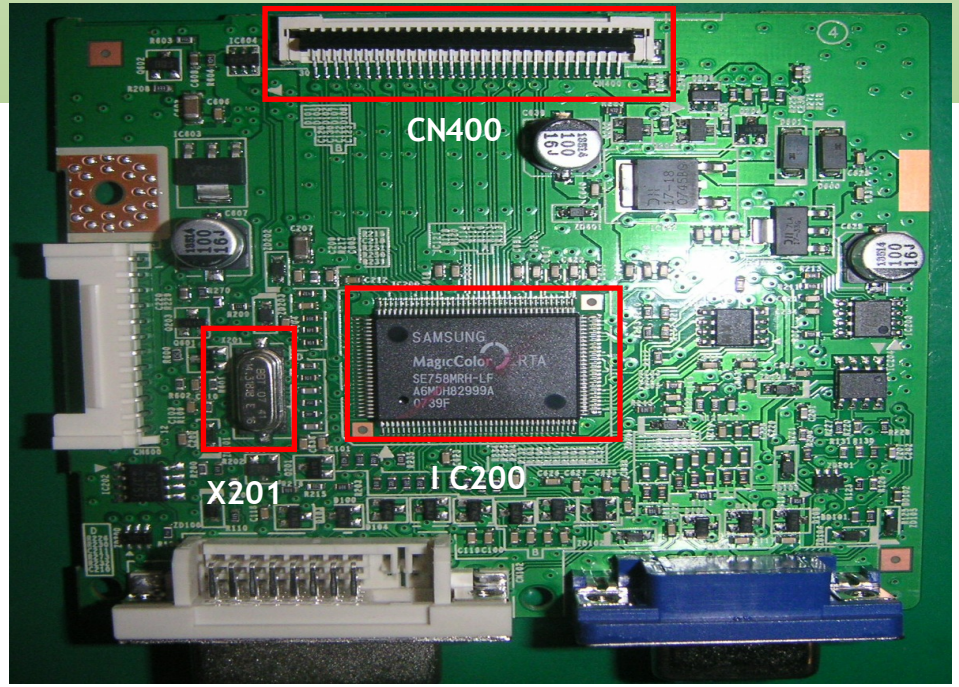




4. Troubleshooting

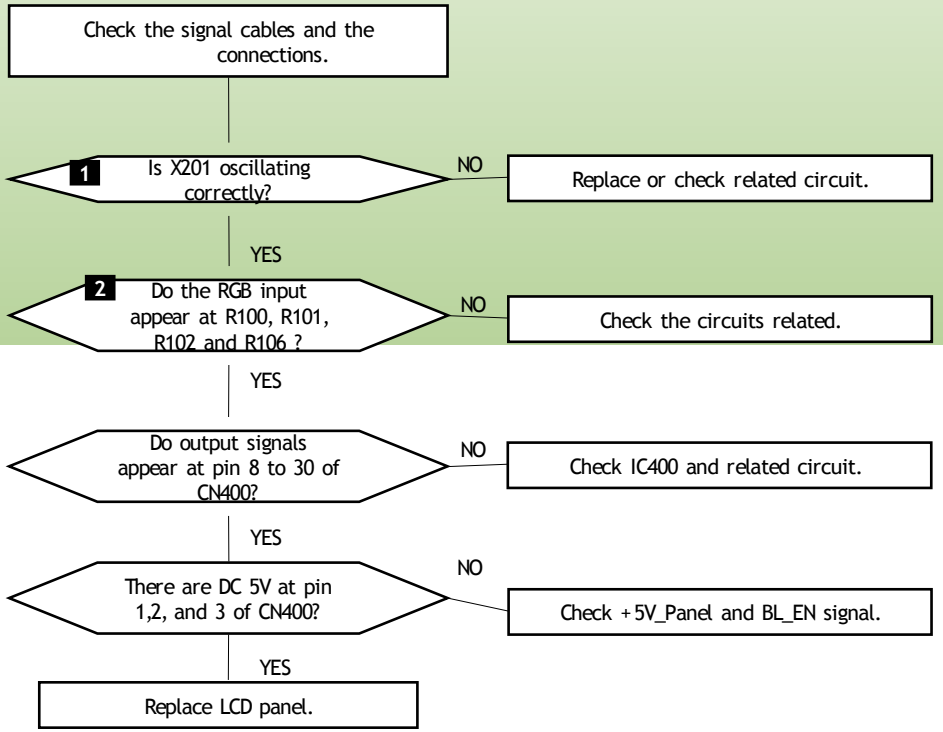
No video (Digital)

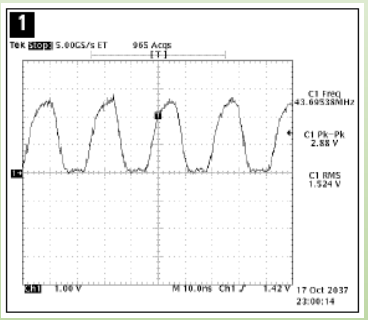
Symptom : -. Though the LED power turns on, the screen is blank when connecting the DVI cable.
Major Checkpoints: -. Check the DVI connection.
-. Check whether the LVDS cable is connected correctly to the Panel.
-. Check whether the lamp connector of the Panel is connected correctly to the IP board.

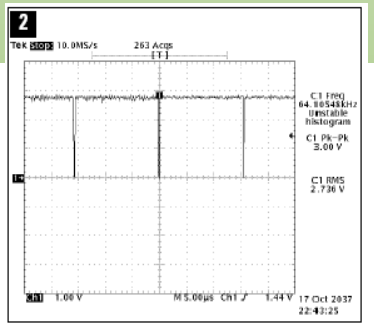


4. Troubleshooting

No video (Digital)



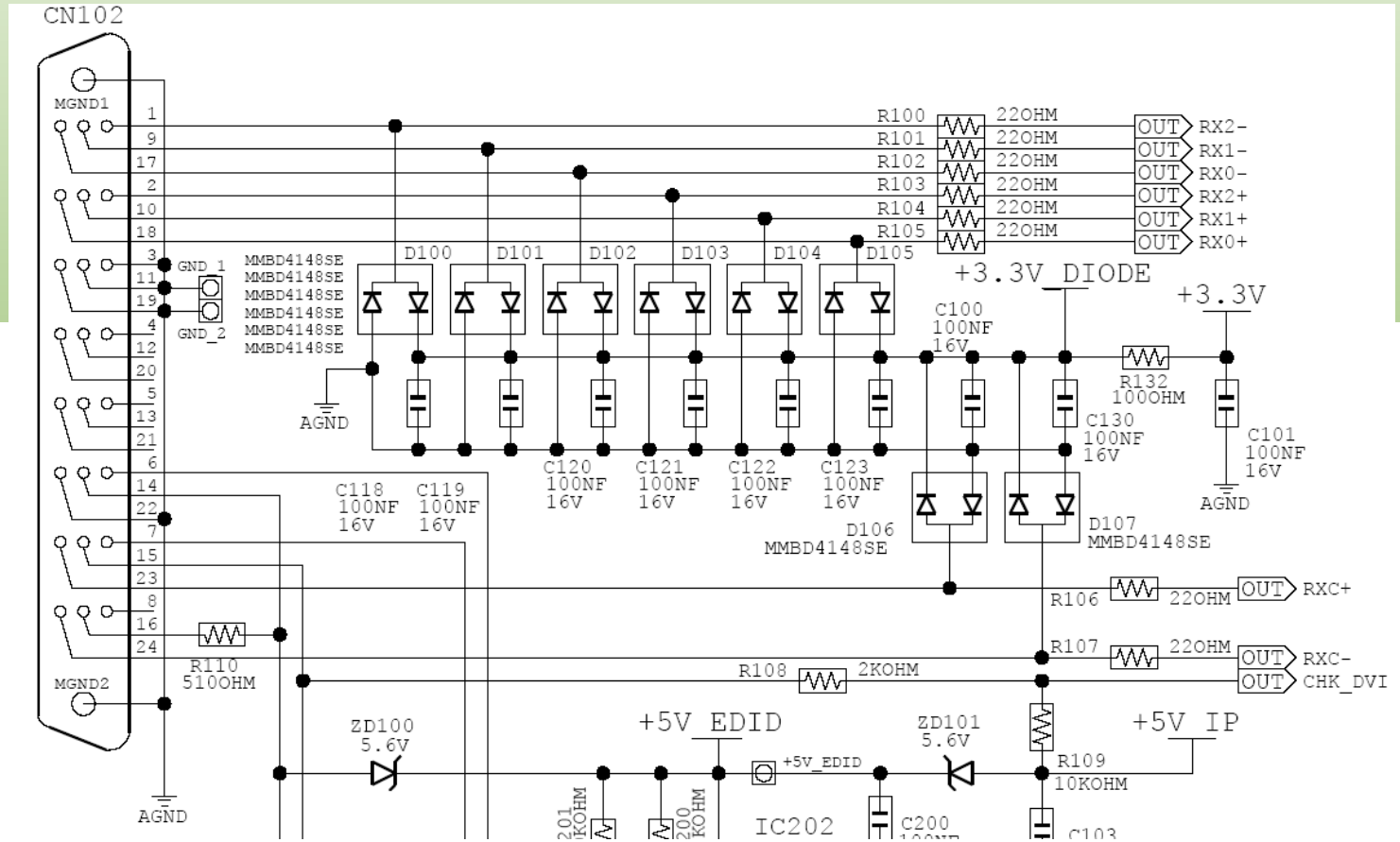




Caution : Make sure to disconnect the power before working on the IP board.

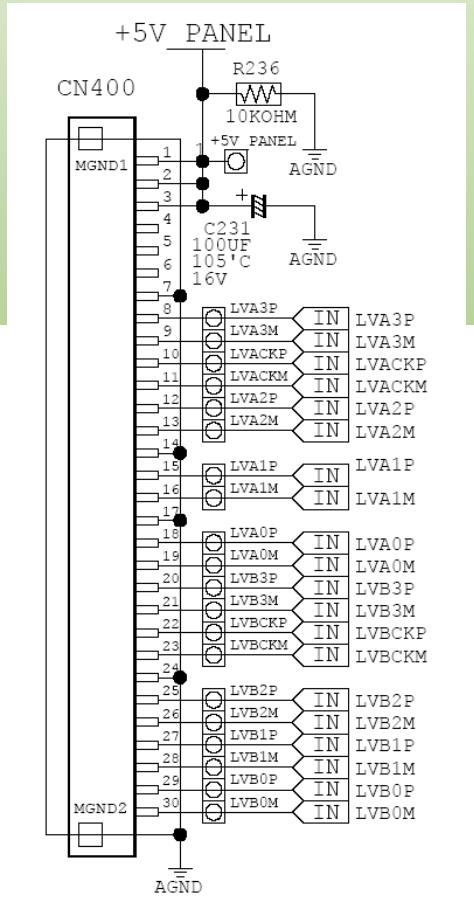
4. Troubleshooting

The Circuit diagram when no video (Digital)



4. Troubleshooting

The Circuit diagram when no video (Digital)



4. Troubleshooting

*. Check Code version.

-. Enter the service mode, and check MCU code version and checksum.

-.How to enter service mode

➔ Set both the brightness and the contrast to 0.

➔ Hold down the Enter button for five (5) seconds.

➔ The SVC Function OSD will appear.

➔ To exit the SVC Function OSD, you have to turn off the power.

-. Safe Mode.

➔ **If the frequency of the input signals is higher than the supported frequency, Safe mode gives a user a period of time (one (1) minute) to change the video card settings to a Recommended mode.**

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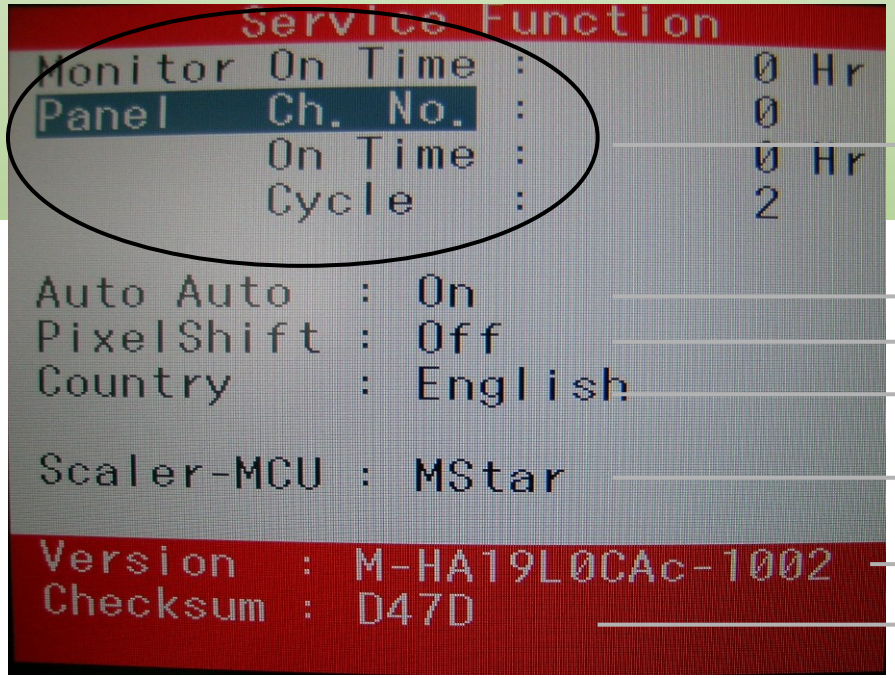
4. Troubleshooting

*. Service Function OSD



Panel Information

Select Auto

Select Pixel Shift

Country

Scaler Vender

Micom version

Micom checksum

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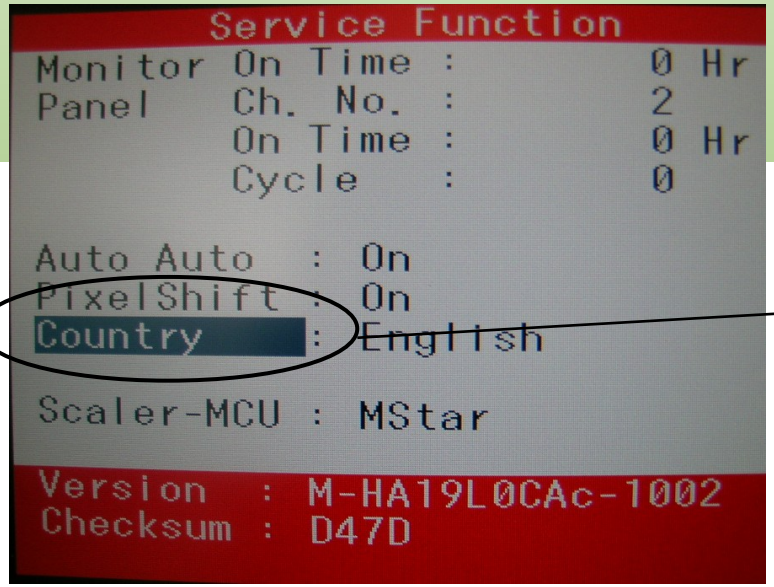
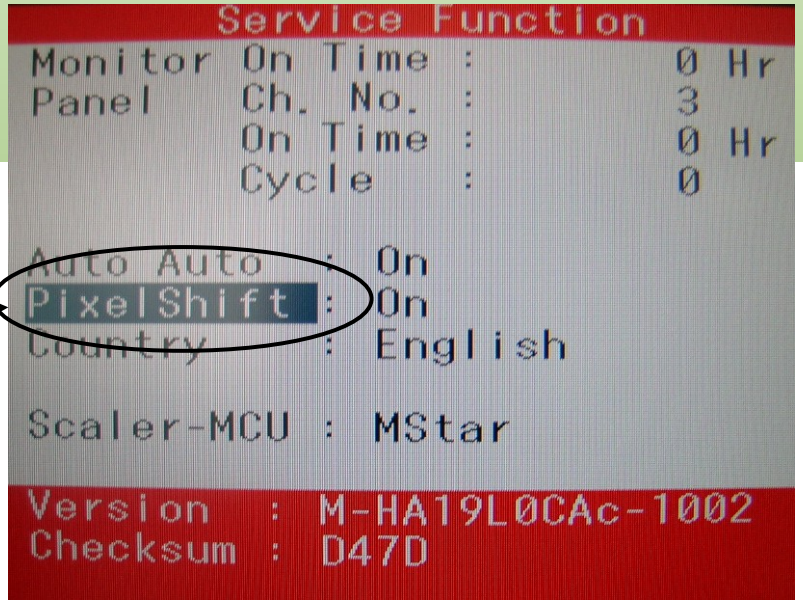
4. Troubleshooting

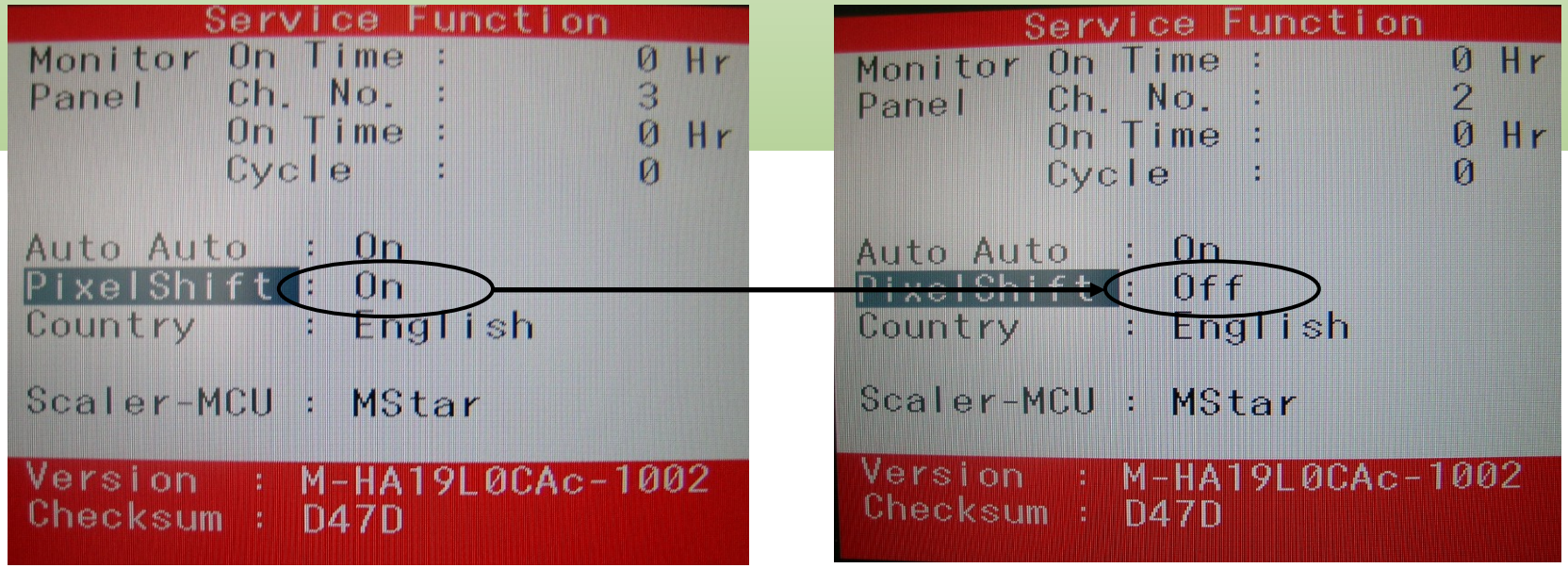
***. To move next step. Press (+) key.**





4. Troubleshooting

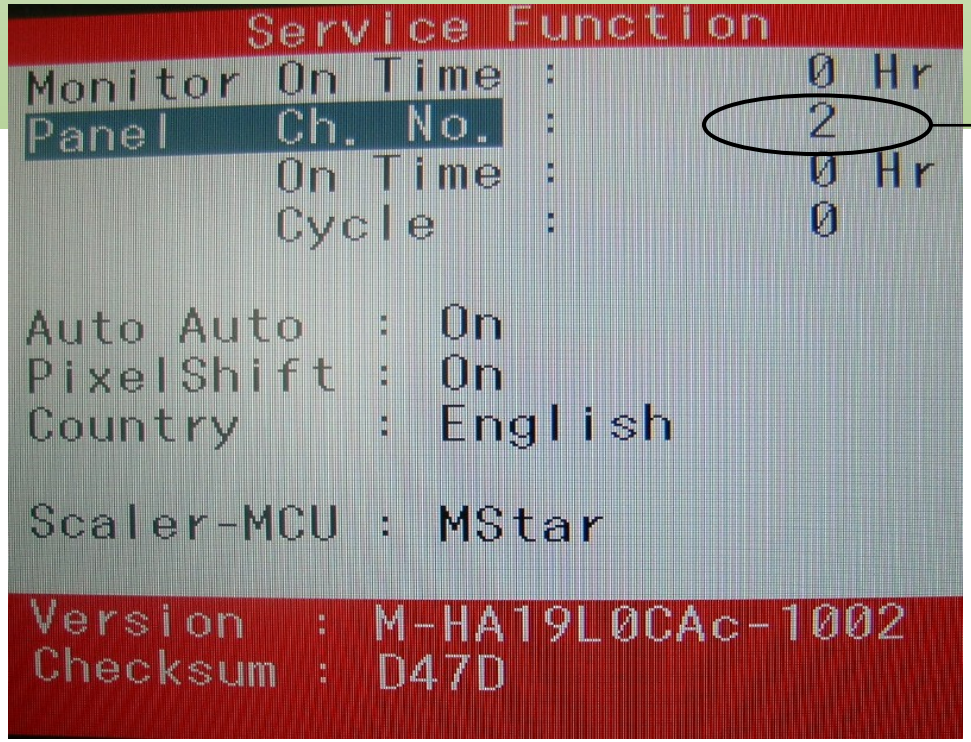
***. To select off/on. Press (-) key.**



4. Troubleshooting

***. Replace Panel**

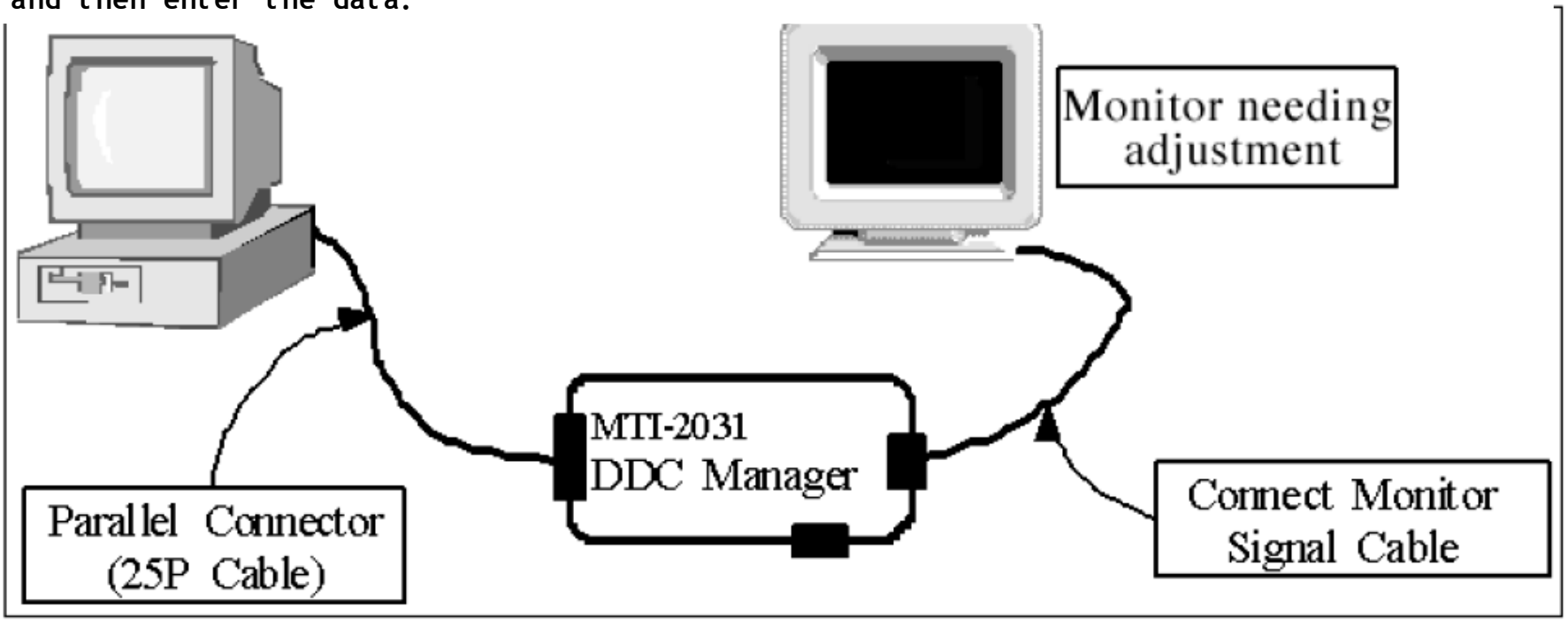
After replacing the panel, select the Panel item and then hold down the Menu button for five (5) seconds.
The Ch. No. of the panel will increase. Then, on time and cycle number will be set to 0.



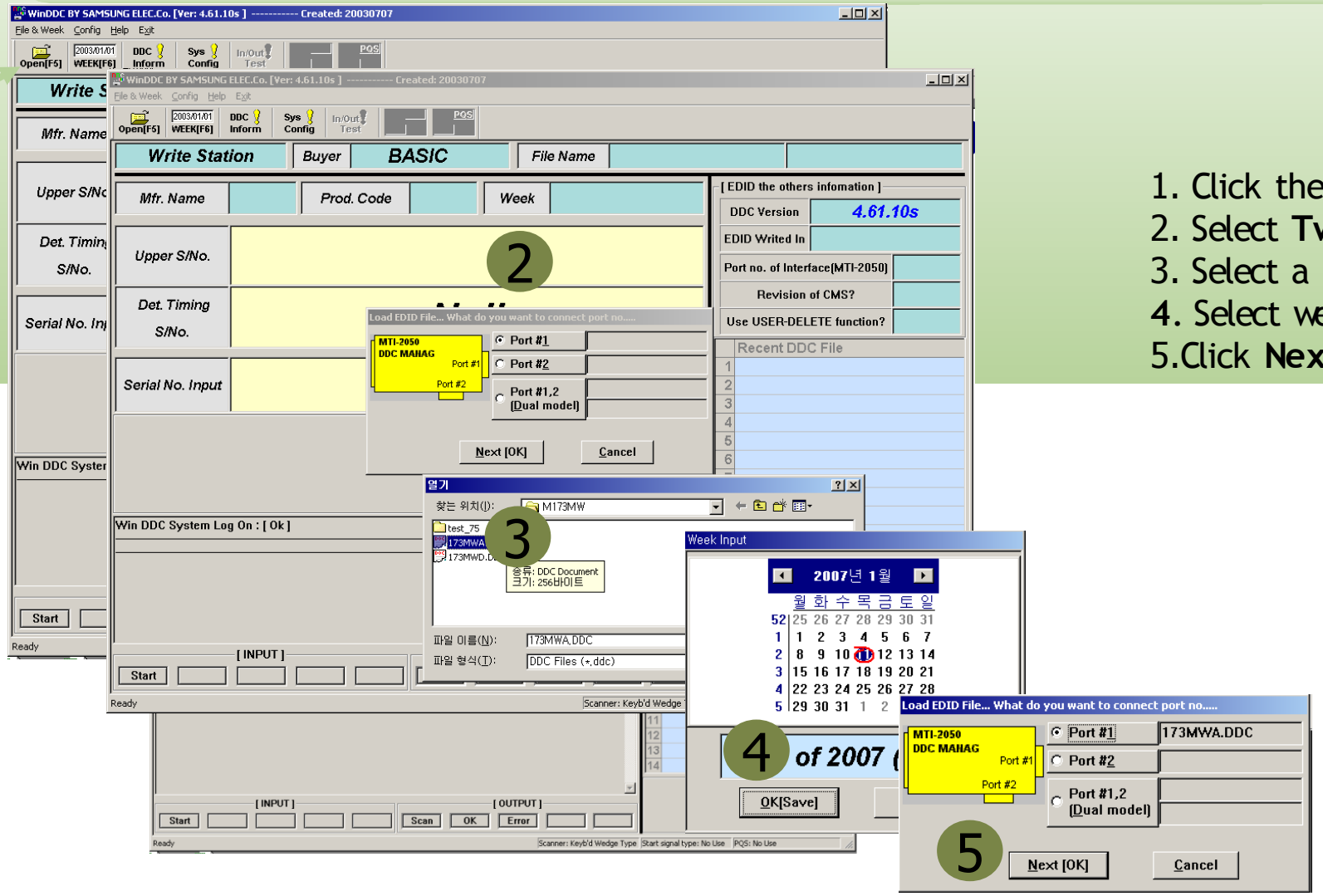
5. How to execute code

1. Enter the DDC EDID data when the AD board is replaced.

2. Download the DDC input program and the DDC file that corresponds to the model from the Quality Department of Samsung and install it using a jig as shown in the figure below, and then enter the data.

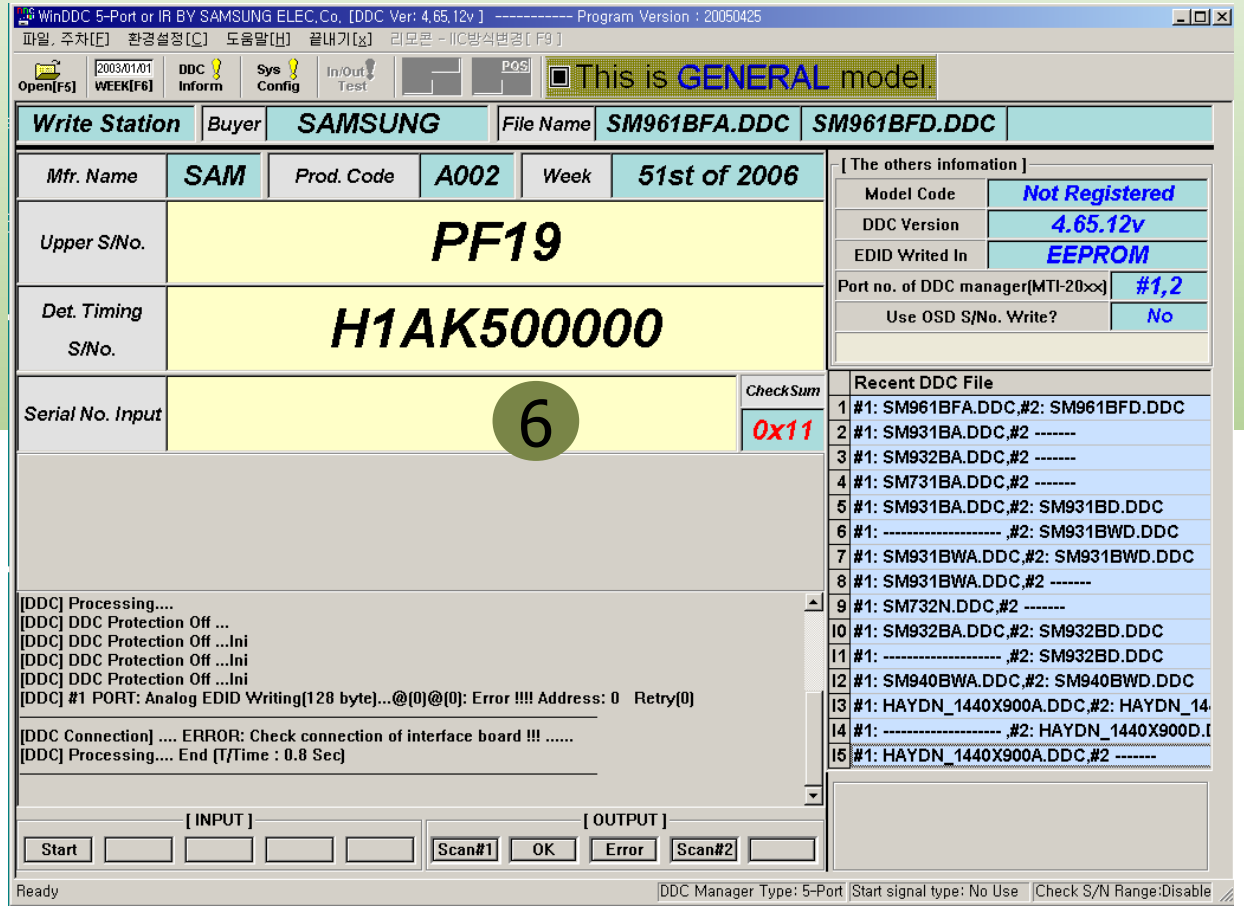


5. How to execute code (DDC)



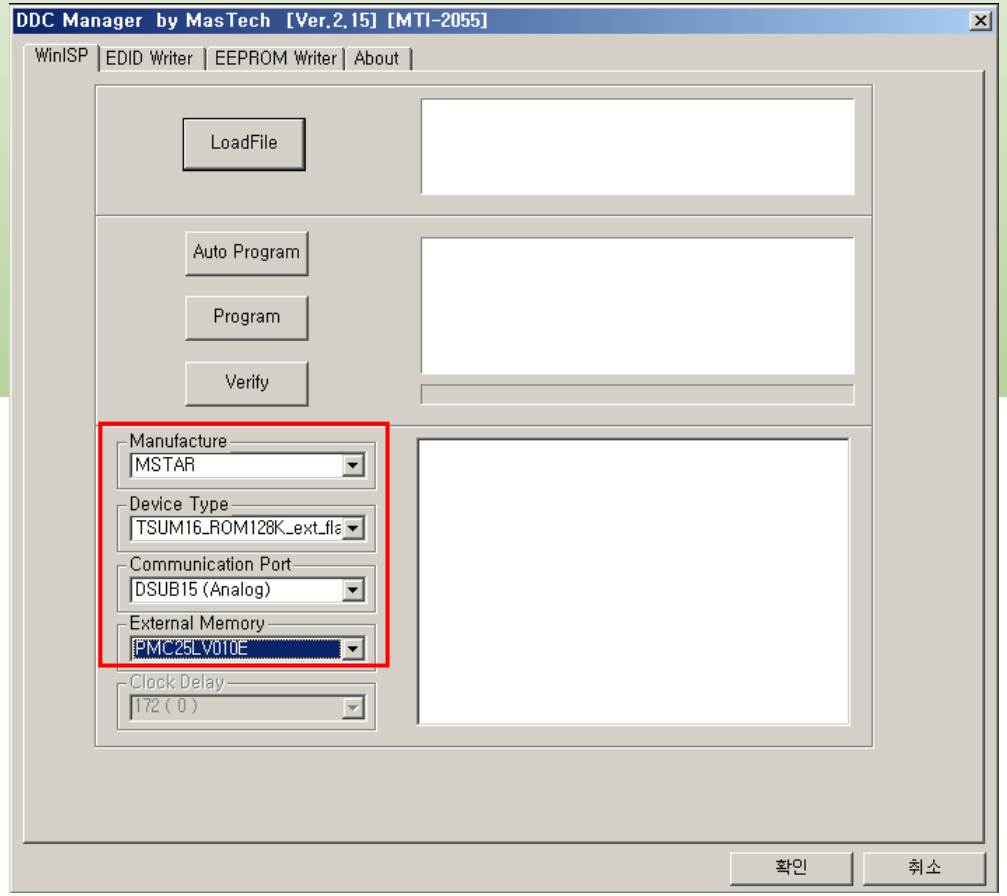
1. Click the **Open** icon
2. Select **Two EDI D**
3. Select a **DDC** file.
4. Select week
5. Click **Next (OK)**.

5. How to execute code (DDC)



6: Enter the serial number and press the Enter key.

5. How to execute code (MCU code)



1. Options Checking.
   -. Manufacture : MSTAR
   -. Device Type :TSUM16_ROM128K_ext_flash
   -. Communication Port : DSUB15 (Analog)
   -. External Memory : PMC25LV010E

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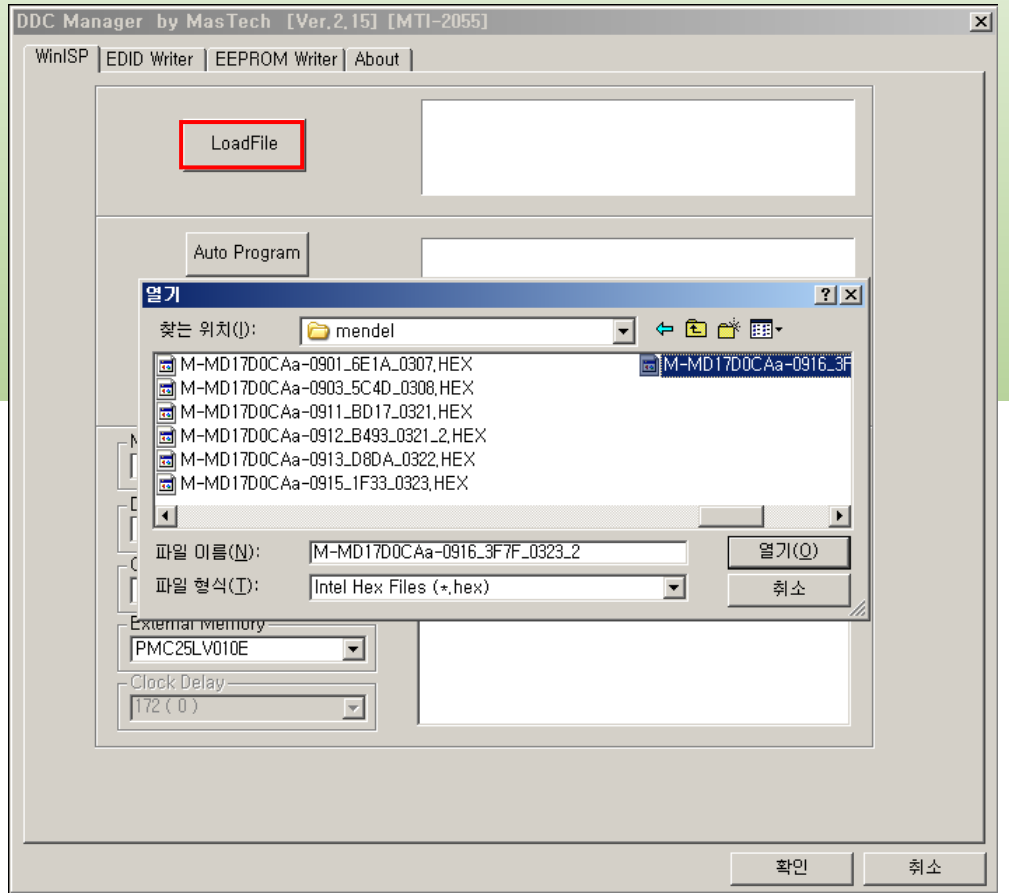
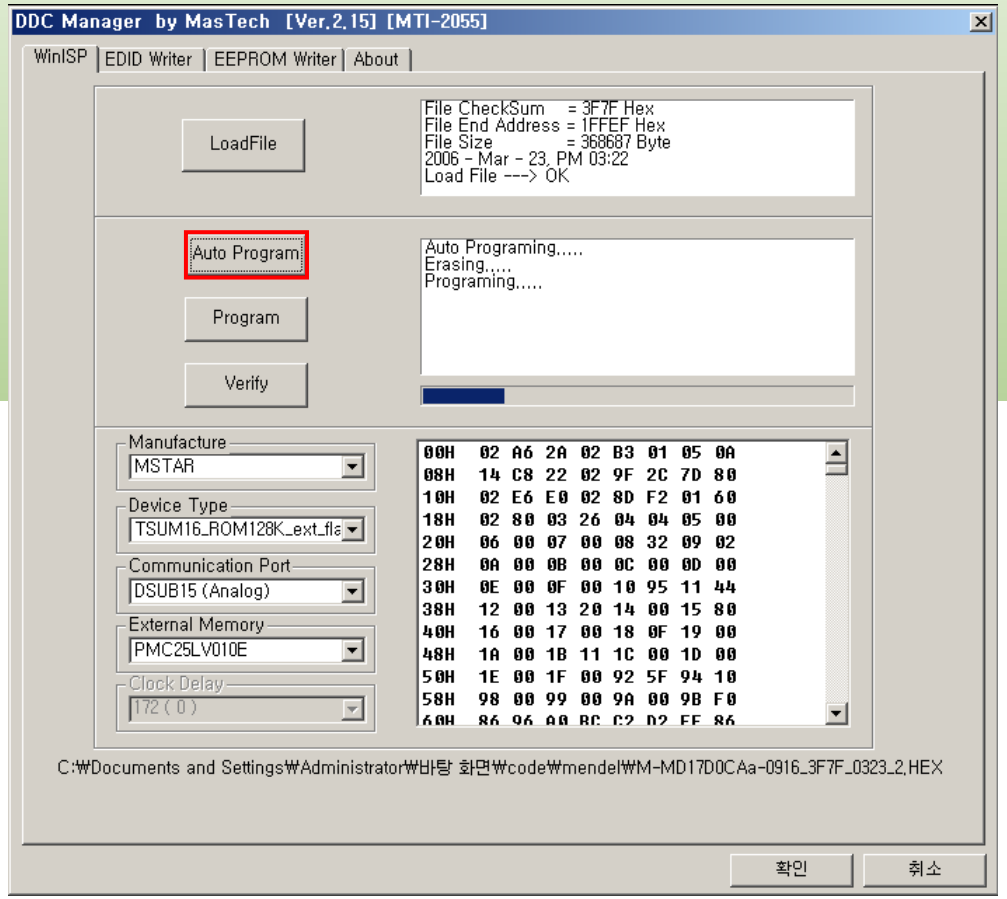
5. How to execute code (MCU code)



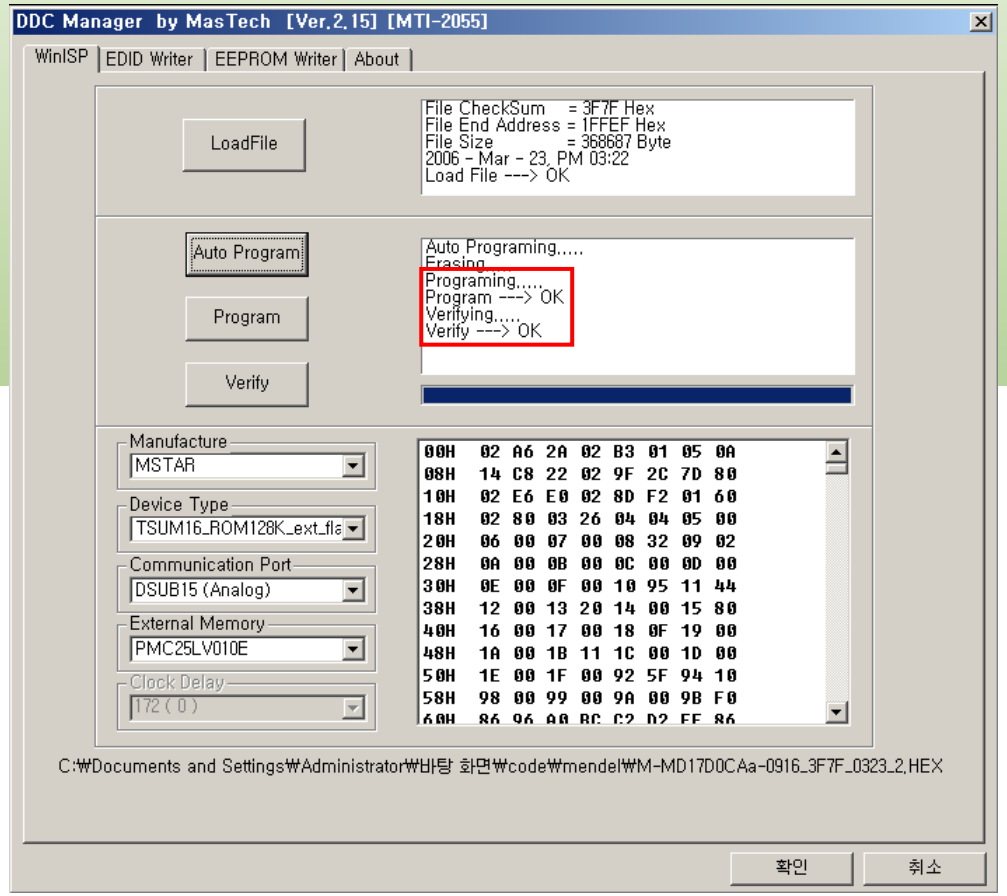
2. After click the 'LoadFile' button , choose MCU code.

5. How to execute code (MCU code)



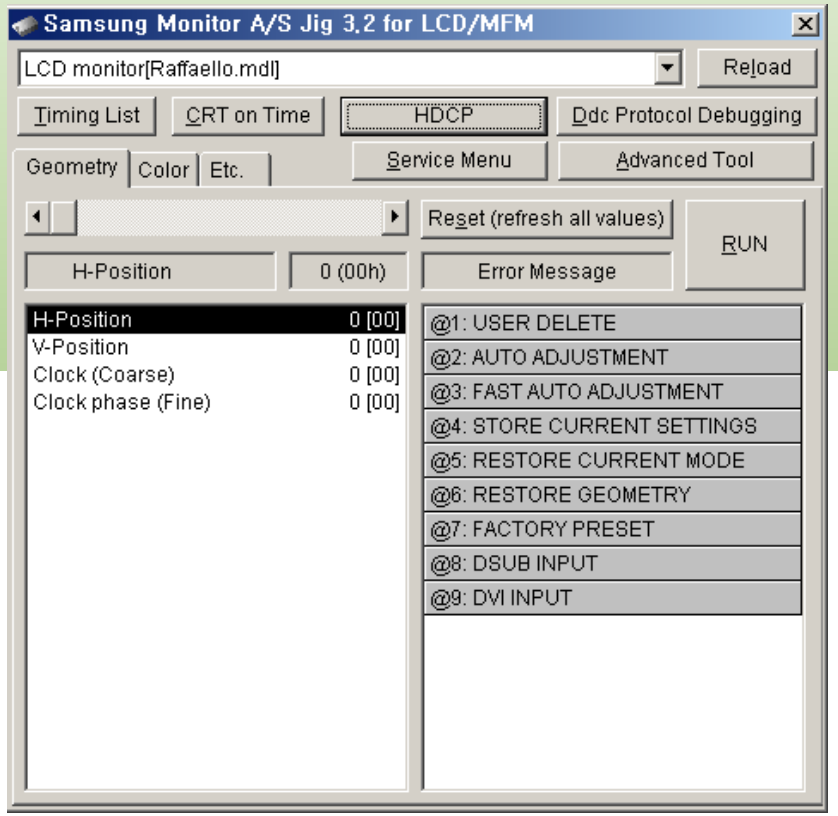
3. 'Auto Program' button choice.

5. How to execute code (MCU code)



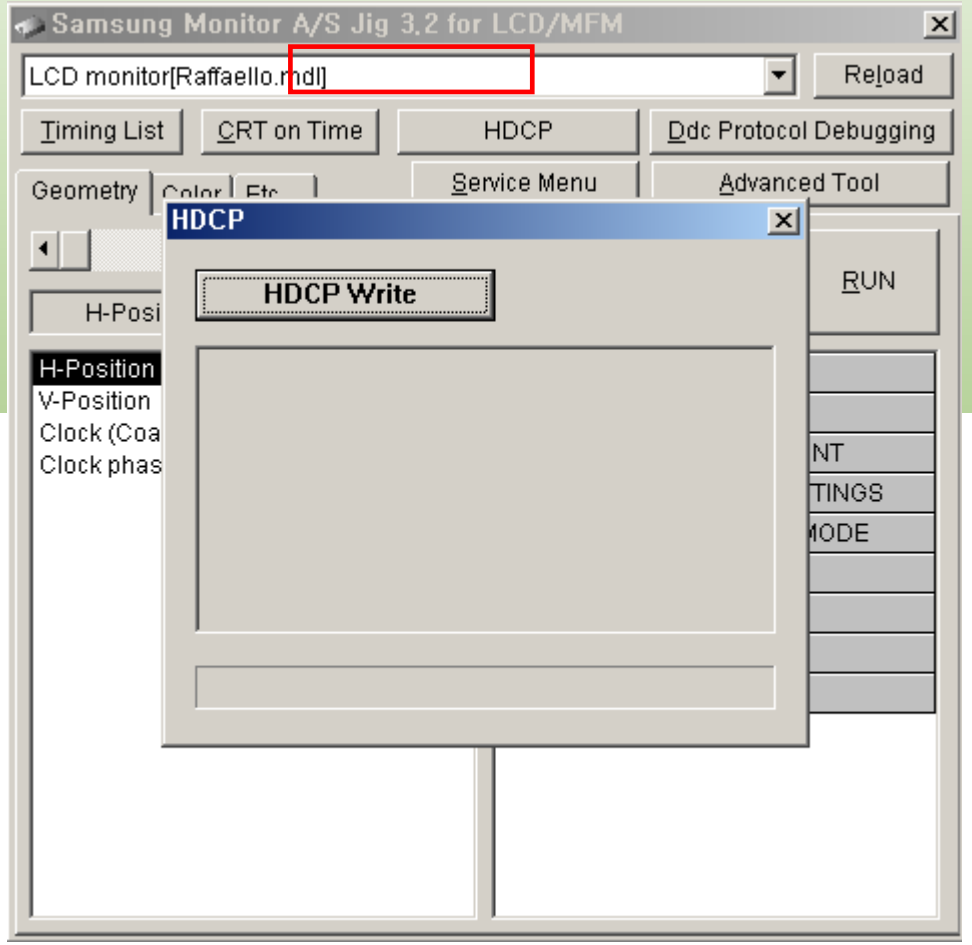
4. After the Program and Verify completed, execute hard power off/on.

5. How to Execute code (HDCP Code)



1. Execute ‘service.exe’.

5. How to execute code (HDCP code)



2. Click ‘HDCP’ button.

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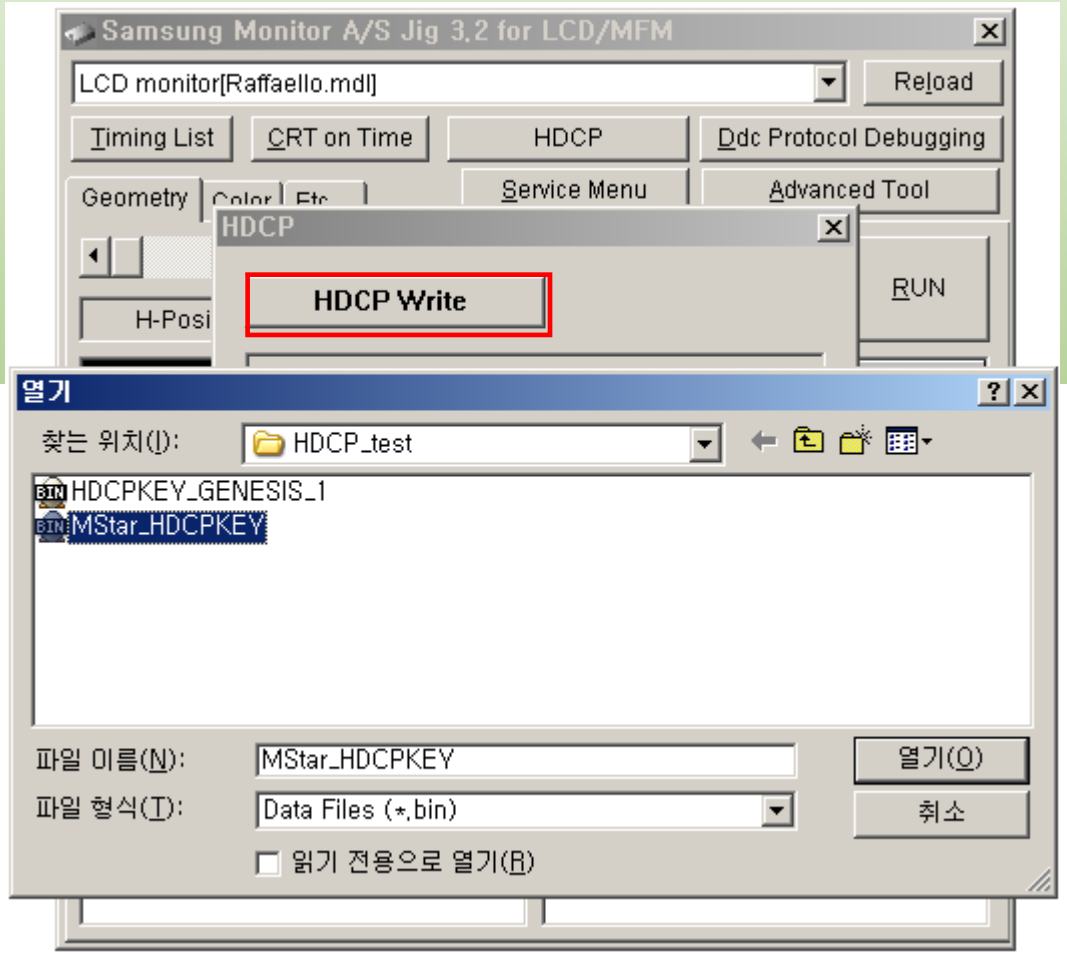
5. How to execute code (HDCP code)



3. Click ‘HDCP Write’ button and select ‘MStar_HDCPKEY’.

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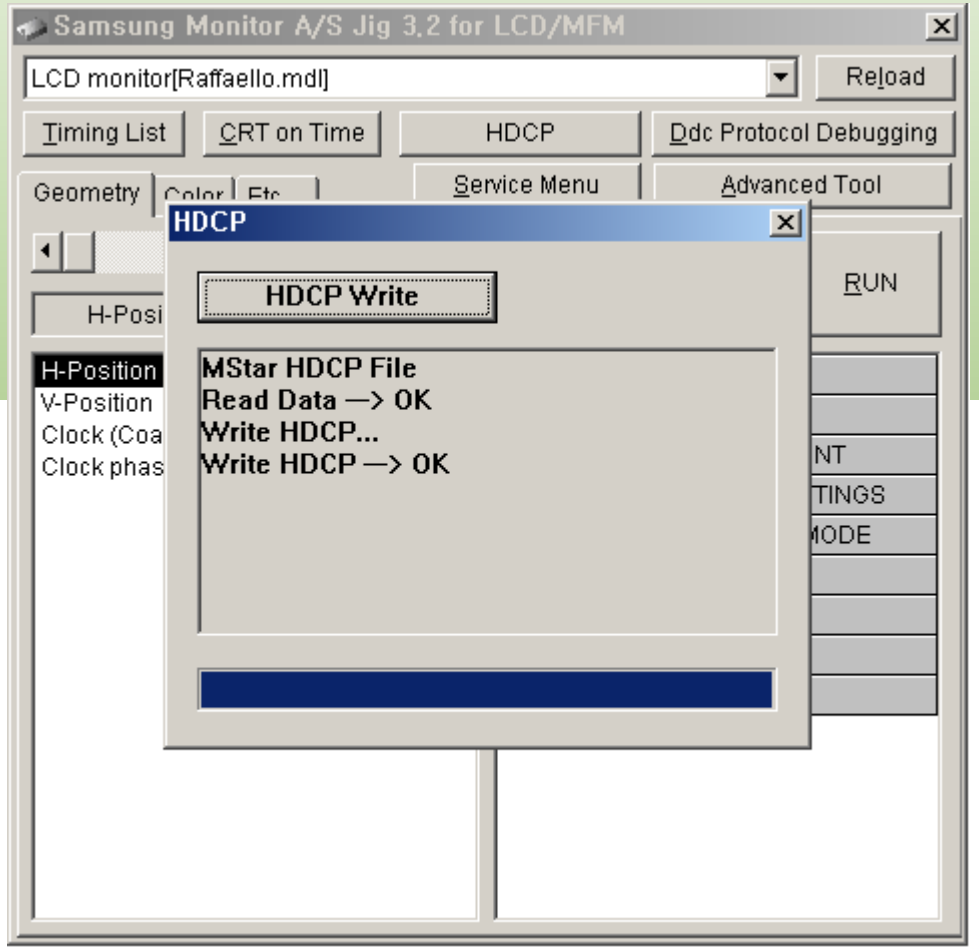
5. How to execute code (HDCP code)

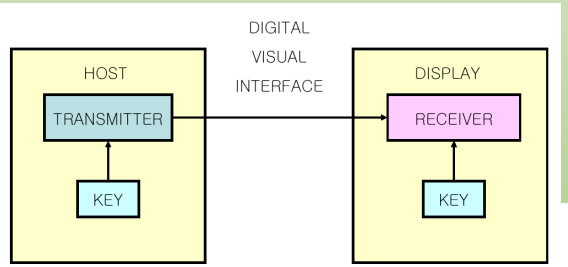


4. HDCP KEY writing is Complete.

6. etc. (HDCP Function)

- HDCP : HDCP is designed to protect the video transmission between a DVI video transmitter and a DVI video receiver
- Diagram : The HDCP Authentication protocol is an exchange between a video transmitter and a video receiver that affirms to the transmitter that the receiver is authorized to receive the protected information.

  this affirmation is in the form of the receiver demonstrating knowledge of a set of secret device keys.



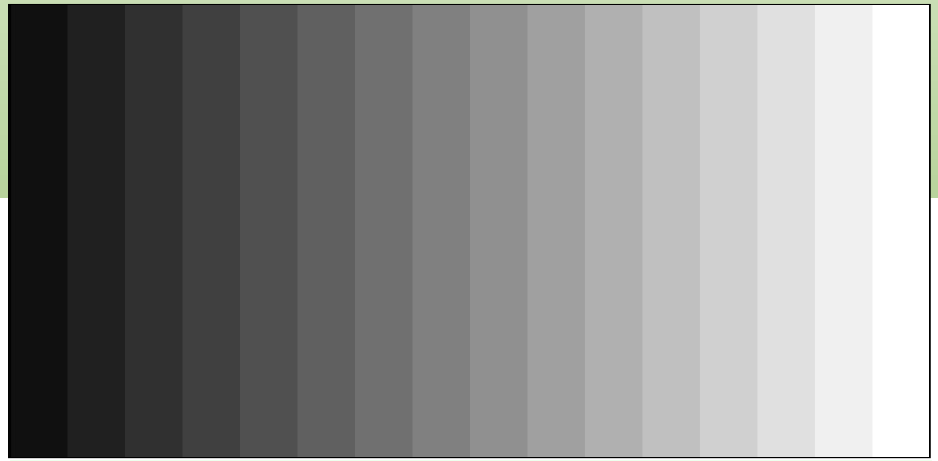
1. It takes about 2s to encrypt.
2. Encryption fail : Noise Display ➔ Check supported resolution.
   S/W power off, on.(for new encrypt)
   Rewrite HDCP.
   Check HDCP device
   &video card& Contents.

Support resolution
640 x 480p @50/60
720 x 480p @50/60
720 x 576p @50/60
1280 x 720p @50/60

6. etc. (After replacing Main board)

Auto Color

- PC analog (1680X1050 at 60 Hz): Tools to use: MSPG-3240L



PC Analog Control Pattern(16 GRAY)

- **Select Language English on the OSD menu and then hold down the Menu button for five (5) seconds.**

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