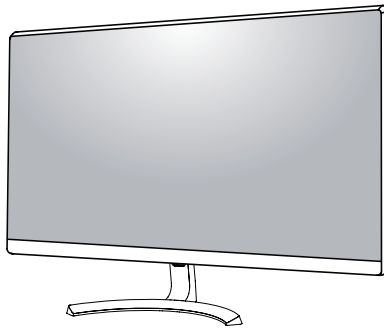# LG
Life's Good

LED MONITOR
SERVICE MANUAL

CHASSIS : LM68A

MODEL : 24MP60

CAUTION
BEFORE SERVICING THE CHASSIS, READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

CONTENTS

LGE Internal Use Only

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

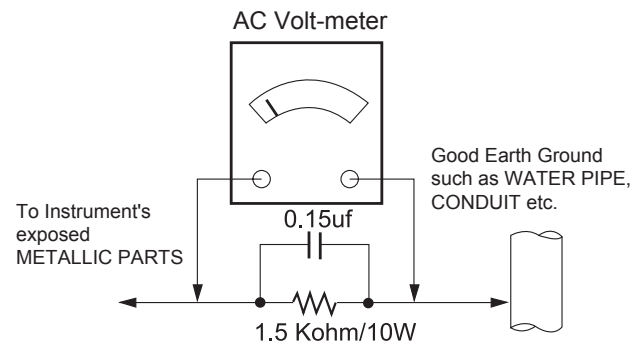**Do not use a line Isolation Transformer during this check.**

Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit

AC Volt-meter

To Instrument's exposed METALLIC PARTS

Good Earth Ground such as WATER PIPE, CONDUIT etc.

0.15uf

1.5 Kohm/10W

When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1
*Base on Adjustment standard

SPECIFICATION

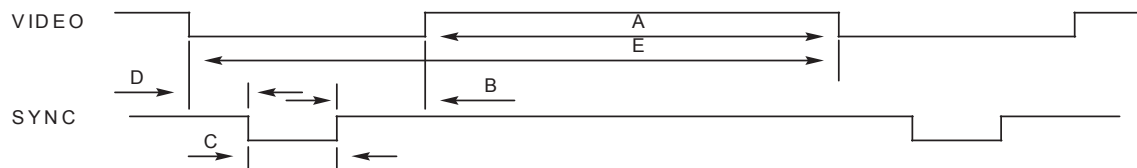NOTE : Specifications and others are subject to change without notice for improvement.

1. General Specification

No	Item		Content	Remark
1	Customer		BRAND	
2	**User Model Name**		**24MP60**	
3	Sale region		Refer to Suffix standard	
4	Feature		21.5"/ 23.8" / 27" WIDE LCD MONITOR	
5	**Chassis Name**		**LM68A**	
6	General Scope	External SW &Adj.	Joystick OSD (Menu, Picture Mode, Input, Power off)	
		Function	OSD,DDC2B,DDC2AB, HDCP, Control Lock, Original Ratio / Wide, Black level, Smart Energy Saving Screen Split, SUPER RESOLUTION+，Color Wizard, Reader mode, LG Color Cloning, Black Stabilizer	
7	Input	D-SUB IN	RGB Analog	
		DVI IN	DVI IN	
		HDMI IN	HDMI IN	
		HP OUT	Audio L/R OUT	
8	Power Cord		Length : 1.5±0.05 M Shape : Wall-out Color : Black	Refer to Suffix standard and power cord table
9	Cable	Signal Cable (D-SUB)	Length : 1.5m Shape : Detachable Type Color : Black Pin : Triple Row, 15 Pin D-Sub	Refer to Suffix standard
		Signal Cable (HDMI)	Length : 1.5m Shape : Detachable Type Color : Black Pin : 19Pin HDMI	Refer to Suffix standard

10	Power	Input: AC100~240V 50~60Hz,1.0A Max ; DC 19V 1.6A; DC 19V 1.3A Output: DC 19V 1.3 A		Refer to Suffix standard
11	Applied Panel List	P/N: EAJ62570001 P/N: EAJ63989601 P/N: EAJ63908401 P/N: EAJ63953201	LM238WF1-SJE1 LM238WF1-SJK1 MV238FHB-N40 HM238EUN-SLML9	
	Applied BLU List	P/N: EBV61158009(BLACK) P/N:EBV61158010(WHITE) Black color :EBV61158021 White color:EBV61158022 P/N: EBV61158025(BLACK)		

2. Signal Timing(Resolution)

2.1 Signal(Video & Sync)

2.1.2 H/V Timing

MODE	CLASSIFICATION	Polarity	DOT CLOCK [MHz]	Frequency [kHz]/ [Hz]	Total Period (E)	Display (A)	Front Porch (D)	Sync. (C)	Back Porch (B)	Resolution
1	H(Pixels)	-	28.321	31.468	900	720	18	108	54	720 X 400
	V(Lines)	+		70.08	449	400	12	2	35	
2	H(Pixels)	-	25.175	31.469	800	640	16	96	48	640 x 480
	V(Lines)	-		59.94	525	480	10	2	33	
3	H(Pixels)	-	31.5	37.5	840	640	16	64	120	640 x 480
	V(Lines)	-		75	500	480	1	3	16	
4	H(Pixels)	+	40.0	37.879	1056	800	40	128	88	800 x 600
	V(Lines)	+		60.317	628	600	1	4	23	
5	H(Pixels)	+	49.5	46.875	1056	800	16	80	160	800 x 600
	V(Lines)	+		75.0	625	600	1	3	21	
6	H(Pixels)	-	65.0	48.363	1344	1024	24	136	160	1024 x 768
	V(Lines)	-		60.0	806	768	3	6	29	
7	H(Pixels)	+	78.75	60.023	1312	1024	16	96	176	1024 x 768
	V(Lines)	+		75.029	800	768	1	3	28	
8	H(Pixels)	+	108.0	67.500	1600	1152	64	128	256	1152 x 864
	V(Lines)	+		75.000	900	864	1	3	32	
9	H(Pixels)	+	108.0	63.981	1688	1280	48	112	248	1280 x 1024
	V(Lines)	+		60.02	1066	1024	1	3	38	
10	H(Pixels)	+	135.0	79.976	1688	1280	16	144	248	1280 x 1024
	V(Lines)	+		75.025	1066	1024	1	3	38	
11	H(Pixels)	-	146.25	65.290	2240	1680	104	176	280	1680 x 1050
	V(Lines)	+		59.954	1089	1050	3	6	30	
12	H(Pixels)	+	148.50	67.50	2200	1920	88	44	148	1920 x 1080
	V(Lines)	+		60	1125	1080	4	5	36	

● D-SUB/DVI DTV Mode is not supported (interlace mode)

2.1.3 HDMI Timing

	Factory support mode (Preset Mode)	Horizontal frequency (KHz)	Vertical frequency (Hz)	HDMI
1	480P	31.5	60	O
2	576P	31.25	50	O
3	720P	37.5	50	O
4	720P	45	60	O
5	1080P	56.25	50	O
6	1080P	67.5	60	O (Recommend Mode)

ADJUSTMENT INSTRUCTION

1. Coverage

Apply to 21.5"/23"/ 24"/27"Wide monitor made in Monitor Factory(Kumi Korea) or made in accordance with the

standard of

Kumi Factory process.

2. Appointment

2.1 Adjustment must be done as fixed sequence, and adjustment sequence can be modified after agreement with

the responsible R&D engineer considering mass-production condition.

2.2 Power : AC 100-240V to Adapter, 19Vdc out

2.3Inputsignal:As Product Standard(Signal ROM**:**

2.4 Warm-up Time : Depends on assemble line(Recommend : Over 5 minutes)

2.5 Adjustment equipment :

- White balance equipment : CA-110/210(or equivalent)
- Signal Generator : VG-819(or VG828 or equivalent)
- PC : More than 486 computer with White balance adjust program.,
- HDCP Adjusting Jig equipment.
- Etc. : Display Monitor, Oscilloscope

3. Adjustment

3.1 Overview

Use factory automation equipment and adjust automatic movement.

But, do via passivity adjust in error occurrence.

3.2 Adjustment order(refer to the Adjustment standard and adjustment command table)

3.2.1 Board Assembly Line

- Connect input signal to 15pin D-sub.
- Ready for adjustment: check whether adjustment command works normally or not and the operating state of each mode.
- Check the display state of gray color when 256 gray scale pattern is embodied.
- Read by EEPROM Read Command to check whether initial value is correct or not.

3.2.2 Total Assembly Line

- Input analog signal. (**1920x1080**@60Hz)
- **This model don't need to input HDCP key, because internal HDCP key is embedded in scaler IC.**
- Ready : Warm-up in 5 minutes in the state with signal(depends on line condition)
- Connect input signal to D-sub.
- Default value before adjustment : **Contrast "70" , Brightness "100(Max)"**

3.2.3 Adjustment of Horizontal/Verticality screen position, Clock and Phase at each Mode.

- There is no special factory mode adjustment.

Writing initial value of EEPROM in Board Assembly line is adjusting Preset Mode and Reset

mode. (EEPROM is initialized when AC Power is ON first.)

■ If the change of FOS data is needed after M.P, it is possible by writing Mode Data with EEPROM write command or modifying the Mode Data in MICOM itself.

 # Caution)   Must keep power-on more than 3 seconds after AC Power-on first time.

3.2.4 Color coordinates adjustment and Luminance adjustment.

3.2.4.1 Color coordinates adjustment

■ Monitor Contrast / Brightness

- **Contrast   :   70**

- **Brightness :   100(Max)**

 - **Energy saving : low**

■ CA-110: channel: 8 / **CA-210: channel** 14

■ Signal Generator :   At cut-off and drive → 16 step pattern for ADC

- Output Voltage   :   700   mVp-p

- Output Mode   : Mode 12(1920x1080+ 60Hz)mode Setting.

3.2.4.2.Adjustment : Board Assembly Line

MP58   model use internal ADC, no need connect D-SUB cable

Internal ADC steps as below

On AC power on with Aging mode, checking the ADC values and then decide to do or not,

• **Read ADC OFFSET and GAIN flags from   0xA8 0x0D, 0x0E on NVRAM**

• **If those values are not 0xAA on Aging mode, must do internal ADC calibration.**

• **If the result of internal ADC calibration is OK, save the ADC result and make the OFFSET and GAIN flags to 0xAA and make the Internal_ADC flag to INTERNAL.**

• **Display the result of ADC on Aging Mode OSD and Service OSD**

If don't use internal ADC, please follow below step

■ Input 16 step pattern for ADC (Mode12, pattern 11). (Video level : 700 mVp-p)

■ Adjust by commanding AUTO_COLOR_ADJUST

■ Confirm "Success" message in Screen or Check the data of   **0x0D, 0x0E** address of EEPROM(**0xA8**) is 0xAA after waiting 5 seconds

■ If there is "FAULT" message or the data of   **0x0D, 0x0E** address of EEPROM **0xA8** is not **0xAA**, do adjust again

■ If all Adjustment is completed, the values of 6500K, User Color and 9300K are saved automatically.

3.2.4.3. Confirm at Total Assembly Line: adjustment

- Check the data of **0x0D, 0x0E** address of EEPROM(**0xA8**) is 0xAA.
- If the data of **0x0D, 0x0E** address of EEPROM(**0xA8**) is not 0xAA, do adjust again by 3.2.4.2.

3.2.4.4. Confirm PRESET 6500K Color coordinates and Adjust PRESET 9300K Color coordinates .

- Set as **Aging mode ON**, by commanding AGING_ON/OFF command code.
- Select Module that is being used in present production by commanding MODULE SELECT.
- Send SYSTEM RESET command to set Module data.
- Input Full White Pattern (Video level : 700 mVp-p)
- 9300K color adjustment

   This Model Non TCO-6.0 Appliance.

   If this TCO 03 spec should be satisfied later, refer to below method.

   Adjust to meet x = 0.287±0.005, y=0.303±0.005 in 5 minutes.

   x= 0.285±0.005, y= 0.301±0.005 in 5~30 minutes.

   x=0.283±0.005, y=0.298±0.005 over than 30minutes, and confirm.

   Adjust to meet Y = over 150cd and confirm

- Input Full White Pattern (Video level : 700 mVp-p)
- Set as 6500K by commanding COLOR_MODE_CHANGE Command code.
- 6500K color adjustment

   If this TCO 03 spec should be satisfied later, refer to below method.

   Adjust to meet x = 0.317 ± 0.005, y=0.332±0.005 in 5 minutes.

   x= 0.315 ± 0.005 , y= 0.331±0.005 in 5~30 minutes.

   x=0.313 ± 0.005, y=0.329±0.005 over than 30minutes, and confirm.

   (Option) It's another method for 6500K color adjustment at Gumi & NT

   At first, check △UV. If that is under 0.0065, the set is not adjusted.

   If not. It is adjust to meet u'= 0.198±0.0065, v'=0.469±0.0065

   Adjust to meet Y = over 200 cd and confirm.

3.2.4.5. Confirm User color coordinates .

- Confirm Whether User color is saved same as 6500K.
- After confirming Color coordinates, **Must return to 6500K**
- Confirm whether user color is 50. If the value of user color(R/G/B) is 30, do adjust again by

3.2.5 Confirm Operation state.

3.2.5.1 Operation mode : Confirm whether each appointed mode operate correctly or not.

3.2.5.2 Confirmation of Adjustment condition and operation : Confirm whether it meet Auto/Manual equipement Adjustment standard or not.

- Confirm Analog screen state : Confirm screen state at below mode.

   Appointment mode : 640*480 @60Hz (Mode 2), 800*600@75Hz(Mode 5)

<div align="center">1024*768@60Hz(Mode 6), 1280*1024@60Hz(Mode 9)

1680*1050@60Hz(Mode 11)，1920*1080@60HZ(Mode 12)

SMPTE pattern(Check 0%,5%,95%,100%) –Mode can be added.</div>

■ Check HDCP signal screen by using Video generator that generate HDCP signal

3.2.5.3. Confirm Auto adjustment operation.

- **Input Analog 1 Dot on/off & Rectangle Pattern at Mode 12(1920x1080@60Hz)**
- Confirm adjustment operation by changing Clock, Phase,H/V Position.
- Check Clock, Phase by pressing AUTO Key.
- Confirm first set of new lot by periods

3.2.5.4 Other quality

- Confirm that each items satisfy under standard condition that was written product spec.
- Confirm Applying Module & MICOM Setting → Confirm with Service OSD

  → Confirm at Service OSD by "Menu + Power key" on .(from Power off)

  → Confirm first set of new lot by periods, and confirm periodically when there is Process change or Adjustment setting change.

3.2.5.5. OSD & Adjustment device Confirmation : Confirm operation mentioned as product spec.

- Vary Brightness and Contrast and confirm the variation of Luminance and display status.
- Operate the Super+ Resolution function and confirm variation of Luminance.
- Make sure to do FACTORY RESET after confirmation of OSD function.

3.2.5.6. Confirm the display state by inputting 8 color Bar Pattern & 256 Gray Scale pattern.

3.2.5.7. DPM operation confirmation: Check if Power LED breathing and Power Consumption operates as standard.

- Measurement Condition : 230V@ 50Hz (Analog)
- Confirm DPM operation at the state of screen without Video Signal.(refer to Spec at Page 11)

3.2.5.8. DDC EDID Write

- Check default EDID Checksum.
- The address of Checksum is 0xEF (Page: 0xA6)
- Command: 0x88 0 0   --Check D-sub default EDID checksum
-                 0x88 1 1   --Check DVI   default EDID checksum
-                 0x88 0 2   --Check HDMI   128 byte default EDID checksum
-                 0x88 1 2   --Check HDMI   256 byte default EDID checksum

  The default checksum data of each model：   Please refer to MP57 MS.

- **HDMI part EDID data**
- MP55HQ/H does not need input HDMI EDID on the line, F/W include HDMI EDID, aging on MODE If AC ON, HDMI EDID is automatically loaded to EEPROM(24C02).
- After input D-sub EDID, Please send command "**0x77 00 00**"&"**0x77 00 01**" to update the S/N of DVI&HDMI EDID, and then check the data of 0xF8 address of EEPROM(0xA6) is **0x77**

Other model if need input EDID on the line, please refer below steps:

- Confirm whether module selection is correct or not on the self-diagnostics OSD with signal cable disconnected.

- Connect HDMI Signal Cable to DVI-D wafer.

- Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.

- Check whether written EDID data is correct or not.

-

.- Analog part EDID data

- Connect analog Signal Cable to D-sub wafer.

- **Write EDID DATA to EEPROM(24C16) by using DDC2AB protocol.**

* check the line EEPROM flag ：EEPROM address：**A6,FA** data：0x1F

Key_full_check_IT
_SW_121122.ppt

- If NG ,pls press every key ,then check again.

- Check whether written EDID data is correct or not.

   (refer to Product spec).

⇨ After writing EDID, send Elapsed Time Clear command.

   (Elapsed time should not be displayed, after EDID writing)

   : Confirm periodically (in the first set of new lot, process change) whether module name and

      aging time disappeared on the self-diagnostics OSD with signal cable disconnected.

→ If Elapsed Time Clear command isn't executed, module name, aging time and TCO word appear

on the self-diagnostics OSD.(Module name and aging time should not appear after writing EDID)

   → Make sure to do FACTORY RESET at the final process.

3.2.5.9. Shipping condition

- Contrast   :   70
- Power Switch   :   Off
- Brightness   :   "100(Max)"
- Color Select   :   custom
- Language Select   :   Refer to product spec.

- OSD Position: Match Position with Key position

- Power indicator   :   ON
- Sound   :   ON
- **Check HDMI Audio headphone function, after check, please set signal source to RGB Mode by Hand.**

3.2.5.10 V-Com Adjustment

- Definition: adjusting V-Com level thereby show minimum flicker
- Process: By LG cmd , Check Flicker Level and If Can't meet Flicker spec,
  Adjust V-com value through IIC line of panel. If flicker level meet spec, save V-com value at EEPROM.
- Connection Diagram
- The type of Probe must be CA-P12/15 or CA-P15

- V-com adjustment Spec

Model	Flicker level
xxMP58xx	≤20

4. Signal composition for adjustment

4.1 I2C (100K BPS)

4.2 COMMUNICATION START

START	6E	A	STOP	50Ms

#Until ACK BIT goes LOW, Repeat it.

4.3 Command form.

Command form use DDC2AB standard communication protocol.

START	6E	A	50	A	LEN	A	03	A	CMD	A	00	A	VAL	A	CS	A	STOP

a. LEN : DATA BYTE number to send.

b. CMD : Command language that monitor executes.

c. VAL : FOS DATA

d. CS   : Dada's CHECHSUM that transmit

e. DELAY : 50MS

f. A : Acknowledge

4.4 Screen adjust command (LENGTH = 84)

No.	Adjustment contents	CMD(hex)	ADR	VAL(hex)	Explanation
1	FACTORY ON	E0	00	00	Adjustment start
2	**SAVE MODE**	E2	00	00	
3	EEPROM ALL INITIAL	E4	00	00	adjustment Initialization
4	EEPROM READ	E7	Slave add		At EEPROM Read
5	EEPROM WRITE	E8	Slave add	Data	Write data at EEPROM
6	MODE SAVE	EA	00	00	Mode Data(FOS) Save
7	COLOR SAVE	EB	00	00	User color
				01	6500K
				02	9300K
10	Tune H Position	20	00	00-?	Tune H Position
11	Tune V Position	30	00	00-?	Tune V Position
12	Tune CLOCK	90	00	00-?	Tune CLOCK
13	Tune PHASE	92	00	00-?	Tune PHASE
14	R GAIN	16	00	00-80	Tune Gain
15	G GAIN	18	00	00-80	
16	B GAIN	1A	00	00-80	
17	R OFFSET	80	00	00-80	Tune OFFSET
18	G OFFSET	82	00	00-80	
19	B OFFSET	84	00	00-80	
20	BRIGHT(Backlight)	10	00	00-64	Tune Analog Bright
21	BRIGHT1(Scaler)	11	00	00-64	Tune Digital Bright
22	FACTORY RESET	F0	00	00	Factory reset
23	AUTO_COLOR_ADJUST	F1	00	0	AUTO COLOR Tuning 0:Auto color
24	COLOR_MODE_CHANGE	F2	00	00	User save
				01	6500K
				02	9300K
				03	sRGB

26	Elapsed time Clear	E9	00	00	Aging off&Clear elapsed time
27	Aging On/Off (Page A6: 0xF4)	F3	00	FF/00	FF:ON / 00:OFF
28	Input Select	F4	00	**60**	**1:DSUB ANALOG**
				80	**2:DVI DIGITAL**
				90	**3:HDMI**
29	SYSTEM RESET	F5	00	00	Restart System
30	Module Select (Page A6: 0xF3)	F6	00	**PANEL BIZ**	
				0X44	LM215WF3 (22MP58VQ-***X***)
				0X21	LM238WF1 (24MP58VQ-***X***)
				0X03	LM270WF5 (27MP58VQ-***X***)
				0x4E	PBLGD215ES (22MP58VQ-***K*** (EPA7.0)
				0x07	PBLGD270ES (27MP58VQ-***K*** (EPA7.0)
				0x2B	PBLGD238ES (24MP58VQ-***K*** (EPA7.0)
				0x2E	LM238WF1SJK1 (24MP58VQ-***M***) (PLUS16)
				0x29	MV238FHBN40 (24MP58VQ-***D***) (BOE)
				0x4D	LGM215EB41 (24MP58VQ-***D***) (BOE)
				0x2F	HM238EUNSLML9 (24MP58VQ-***H***) (BM)
				0x2B	PBLGD238ES (24MP60VQ-***K***) (Same with 24MP58VQ***K***)
				Normal	
				0X48	HM215EUN (22MP58VQ-***Y***)
				0x30	HM238EUN (22MP58VQ-***Y***)
				0x4F	HM215EUNES (22MP58VQ.***S*** (EPA7.0))
				0x2C	HM238EUNSLML3 (24MP58VQ.***S*** (EPA7.0))

				0x50	LM215WF3SLS1 (22MP58VQ.***K***(EPA7.0))
31	Select Language	68	00	00-10	17 language 00:English 0C: Ukrainian 01:German 0D : Chinese 02:French 0E : TCH(繁体中文) 03:Spanish 0F : Japanese 04:Italian **10:Korean** 05:Swedish 11: Hindi 06:Finnish 07:Fortuguese 08:Bratil 09:Polish 0A:Russian 0B:Greek
	Only LGD panel biz models need				
32 Vcom*	Internal Pattern ON	A7	00	03	OSD Flicker pattern on
	Vcom Adjustment	A9	00	Value	Range (0x00 ~ 0x7F)
	Save Vcom vlaue	A8	00	00	Save Vcom value in EEROM for SVC OSD
	Internal Pattern Off	A7	00	00	OSD Flicker pattern off
33	APD address & value	A6	0xFE		OFF: 0x00 ON: 0x11

*SAVE

 - COLOR SAVE : R/G/B,GAIN & OFFSET

 - SYSTEM SAVE : CONTRAST , BRIGHT

4.5. EEPROM Data Write

 4.5.1 Siganl TABLE

START	6E	A	50	A	84+n	A	03	A	CMD	A	ADH	A	ADL	A

Data 1	A	...	Data n	A	CS	A	STOP	Delay 20m

LEN   :   84h+Bytes

CMD   :   E8h

ADH   : E^{2}PROM   Slave Address(A0,A2,A4,A6,A8,AA,AC,AE), Not 00h(Reserved by Buffer To EEPROM)

ADL   :   E^{2}PROM   Sub Address(00~FF)

Data   :   Write data

Delay : 20ms

4.5.2. Command Set

No.	Adjustment contents	CMD(hex)	LEN	Explanation
1	EEPROM WRITE	E8	94	16-Byte Write
2			(84+n)	n-byte Write

* Use

■ FOS Default write :

<14mode data> write

SyncFlags,HPeriodH, HPeriodL, VtotalH,VtotalL, SrcHTotalH, SrcHTotalL

SrcHStartH, SrcHStartL, SrcVStartH,SrcVStartL, HsyncPhase

■ Temporary Data write: Write to particular address of EEPROM.

4.6 E^{2}PROM Data Read

4.6.1 Signal TABLE

| START | 6E | A | 50 | A | 84 | A | 03 | A | CMD | A | ADH | A | ADL | A | CS | A | STOP |

Delay 150ms

| START | 6F | A | D1 | A | -- | Dn | A | STOP |

128 Bytes

4.6.2 COMMAND SET

No.	Adjustment contents	CMD(hex)	ADH(hex)	ADL(hex)	Explanation
1	EEPROM READ	E7	A0	0	0-Page 0~7F Read
2				80	0-Page 80~FF Read
3			A2	0	1-Page 0~7F Read
4				80	1-Page 80~FF Read
5			A4	0	2-Page 0~7F Read
6				80	2-Page 80~FF Read
7			A6	0	3-Page 0~7F Read
8				80	3-Page 80~FF Read
9			A8	0	4-Page 0~7F Read
10				80	4-Page 80~FF Read
11			AA	0	5-Page 0~7F Read

				80	5-Page 80~FF Read
12				80	5-Page 80~FF Read
13			AC	0	6-Page 0~7F Read
14				80	6-Page 80~FF Read
15			AE	0	7-Page 0~7F Read
16				80	7-Page 80~FF Read

4.6.3 Use

■ Read E^{2}PROM's specific area as unit of 128(80h)-byte. (84h)

4.6.4 EDID Write

EEPROM access by using DDC2B protocol

■ 1-Byte write

START	A0	A	L	A	D	A	STOP

L : 0x00~0x7F

D : data

■ 8-byte write

START	A0	A	L	A	Data	A	....	A	Data8	A	STOP

L : 0x00,0x10,….0x70

4.6.5 EDID Read

DDC2B Command.(A0/A1)

START	A0	A	00	START	A1	A	Data1	. . .	Data128	A	CS	A	STOP

- 128 Byte transfer of EDID Buffer of MICOM

5. Standard of Auto/Manual equipment adjustment

No.	Item			Adjustment & measurement standard	Operation mode	Operation Pattern	Measurement Position
1	Voltage(V)			5V± 0.3V / 3.3V±0.25V, 1.2V± 0.07	MODE 12 MSPG : 126	Pattern4	TP of Each power
2	Color coordinates (9300/6500K)	Black Level		Auto Adjustment	MODE 12 MSPG : 126	Pattern 0	Center of Screen
3	Color coordinates (6500K)	DRIVE1	X	0.313±0.005	MODE 12 MSPG : 126	Pattern1	Center of Screen
			Y	0.329±0.005			
	Color coordinates (9300K)	DRIVE2	X	0.283±0.005			
			Y	0.298±0.005			

	Luminance	6500K	More than **200**cd/m2	MODE 12 MSPG：126 (700 mVp-p)	Pattern1	Center of Screen
4	Screen Position	H V	FULL SIZE	MODE 12 MSPG：126	Pattern4	Full Screen
5	Screen Compensation	CLOCK PHASE	FULL SIZE	MODE 12 MSPG：126	Pattern 4	Full screen
		AUTO	FULL SIZE	MODE 12 MSPG：126	Pattern 4	Full screen
6	DPM Confirmation	On Mode		MODE 12 MSPG：126	**note1**	White
		Sleep Mode	≤0.3W		Pattern 6 Patten 7 Patten 8	White blinking
		Off Mode	≤0.3W			off
7	SOG signal Confirmation		Input SOG signal	MODE 12 MSPG：126	Pattern 9	Full screen
8	Gray scale Confirmation		Linear gray Scale	MODE 12 MSPG：126	Pattern 9	Full screen
9	Withstanding Voltage confirmation		When 1500Vac or 2121Vdc is impressed between the first of power (Live/Neutral) and ground (Earth) for 1 second, check whether something wrong happens or not.			
10	Ground Confirmation		When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω			
11	Cutoff /ADC Adjustment Pattern		16 step pattern for ADC 1920 * 1080 (700mVp-p)	MODE 12 MSPG：126	Patten11 MSPG 29	

*Note 1 (Test condition):

- mode12(1920x1080 @60Hz),

- Burst pattern

- 100V ~ 240Vac

- Analog & Digital & HDMI

- After aging 30min

6. Pattern for Adjustment

Pattern 0 : FULL BLACK (State of without video signal)

Pattern 1 : FULL WHITE (Don't display other Character except for White Pattern)

Pattern 3 : FULL WHITE

Pattern 4 : Cross hatch pattern (Horizontal 10Line, Vertcial 8Line) & Rectangle Pattern

Pattern 5 : 1 Dot on, 1 Dot off & Rectangle Pattern

Pattern 6 : Vertical Sync only input (Use signal cable of which Pin #5 is GND)

Pattern 7 : Horizontal Sync only input (Use signal cable of which Pin #5 is GND)

Pattern 8 : State of without Vertical/Horizontal Sync and Video Signal. (Use signal cable of which Pin #5 is GND)

Pattern 9 : 8 Color Bar Pattern + 16 Gray Level Pattern

Pattern 10 : SMPTE Pattern

Pattern 11 : 16 Gray Step Pattern (700mV)

BLOCK DIAGRAM

EXPLODED VIEW

DISASSEMBLY

Fig.1   Put the MNT on the clean vinyl

Fig.2 Disassemble the Stand

Fig 3 Remove the Hinge cover

Fig 4 Remove to Hinge Top 2ea.

Fig 5 Separate to Back cover by hand at bottom

Fig 6 Disassemble the backcover

Fig 7 Separate to B/C.

Fig 8 Separate to the LED Wafer/ LVDS & Jog cover assy.

FIG 9 Disassemble the PCB fixed screw 2ea.

Fig 10 Disassemble the Metal bottom bar by screw 4ea.

Fig 11 Separate to cabinet by Plastic Jig.

Fig 12 Separate to the Cell & BLU.

TROUBLESHOOTING GUIDE

1. NO POWER

```
┌──────────────────┐  N  ┌──────────────────┐  Y  ┌──────────────────┐
│   Check JP800    │ ──> │   Check Power    │ ──> │  Replace Power   │
│ Voltage Level    │     │   connector      │     │     Board        │
│     (12V)        │     │    OK ?          │     │                  │
└──────────────────┘     └──────────────────┘     └──────────────────┘
         │ Y
         v
┌──────────────────┐  N  ┌──────────────────┐
│   Check IC700    │ ──> │  Replace IC700 & │
│     Output       │     │     Recheck      │
│ Voltage Level    │     │                  │
│     (5VS)        │     │                  │
└──────────────────┘     └──────────────────┘
         │ Y
         v
┌──────────────────┐  N  ┌──────────────────┐
│ Check IC801 Output│ ──>│  Replace IC801 & │
│ Voltage Level (1.1V,│  │     Recheck      │
│      3.3V)       │     │                  │
└──────────────────┘     └──────────────────┘
         │ Y
         v
┌──────────────────┐  N  ┌──────────────────┐
│  Check X100 Clock│ ──> │   Replace X100   │
│    14.318MHz     │     │                  │
└──────────────────┘     └──────────────────┘
         │ Y
         v
┌──────────────────┐
│  Replace IC101   │
│  Flash Memory    │
└──────────────────┘
```

```
┌─────────────────┐   N   ┌─────────────────┐   N   ┌──────────────────────┐
│ Module Back Light│──────▶│ Check LED Driver│──────▶│ Check IC100          │
│       On?        │       │       FB        │       │ Replace Main Scaler IC│
│                  │       │   (P700 1,6)    │       │                      │
└─────────────────┘       └─────────────────┘       └──────────────────────┘
         │ Y
         ▼
┌─────────────────┐   N   ┌─────────────────┐
│ Check Panel Power│──────▶│ Replace IC700 & │
│    5V(JP125)    │       │    Recheck      │
│ Check IC700 Output│      │                 │
│       5V        │       │                 │
└─────────────────┘       └─────────────────┘
         │ Y
         ▼
┌─────────────────┐   N   ┌─────────────────┐
│ Check Panel Clock│──────▶│ Check IC100     │
│ P101(#10,11,22,23)│      │ Repair Main B/D │
│                  │       │                 │
└─────────────────┘       └─────────────────┘
         │ Y
         ▼
┌─────────────────┐   N   ┌─────────────────┐
│ Check FFC Cable │──────▶│ Replace Cable   │
│  for Damage or  │       │                 │
│ Open Conductors │       │                 │
└─────────────────┘       └─────────────────┘
         │ Y
         ▼
┌─────────────────┐
│ Replace T-Con   │
│ Board or Module │
└─────────────────┘
```

```
┌─────────────────────┐
│  Check input signal │
│       format        │
│  Is it supported?   │
└─────────────────────┘
           │ Y
           ▼
┌─────────────────────┐
│  Check Dsub Cable   │
│   for Damage or     │
│   Open Connector    │
└─────────────────────┘
           │ Y
           ▼
┌─────────────────────┐      N   ┌─────────────────────┐
│       Check         │─────────▶│  Replace Connector  │
│ JK200,201,202,P20   │          │                     │
│   0 for proper      │          └─────────────────────┘
│   connection or     │
│      Damage         │
└─────────────────────┘
           │ Y
           ▼
┌─────────────────────┐      N   ┌─────────────────────┐
│     Check I2C       │─────────▶│  Re Download EDID   │
│ Signal(JK200,201,2  │          │        Data         │
│    02,P200          │          └─────────────────────┘
└─────────────────────┘
           │ Y
           ▼
┌─────────────────────┐
│   Replace Main      │
│  Scaler (IC100)     │
└─────────────────────┘
```

LG
Life's Good