APPROVAL SIGNATURE

SPECIFICATION

FOR

TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY

TFT-LCD MODULE

LTD121EW6S

SPECIFICATION No. : **G070160-M938**
LTD121EW6S-13

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Revision History

Date	Rev No	Sheet (New)	Item	Old	New	Reason
2007-08-28	0	21	3. Recommended Operating Conditions	LED supply voltage min:(10)V max:(19)V	LED supply voltage min:7.0V max:13.0V	Revise
				LED brightness control freq. : (200) typ	min.:180 Hz typ.:200 Hz max.:220Hz	Revise
		22	4. Electrical Characteristics	Current Consumption Typ.: (300)mA Max.: TBD	Current Consumption Typ.: 300mA Max.: 400mA	Revise
		23	5.2 Optical Specifications	Chromaticity : TBD	See page 23	Revise
2007-08-30	0	23	5.2 Optical Specifications	Viewing Angle Typ.	Viewing Angle Upper:20 typ Lower:30 typ Right : 40 typ Left : 40 typ	ADD Customer Request
				Response Time Typ.	Response Time Typ.:30	ADD Customer Request
				Contrast Ratio:	Contrast Ratio Min.:300 Typ.:600	Revise

Caution and Handling Precaution

For your end users' safety, it is strongly advised that the items with " * " should be included in the instruction manual of the system which may be issued by your organization.

Toshiba Matsushita Display Technology always endeavor to maintain sufficient quality of the LCD panel in process of designing and manufacturing, however, to avoid causing extended damages such as accidents resulting in injury or death, fire accidents, or social damages if the LCD panel fails, please adopt safe design as a whole set, by adopting redundant design, taking measure in set design to prevent fire-spreading, over-current, or incorrect operation, etc.

For Safety

⚠ Warning

1) SPECIAL PURPOSES

a) Toshiba Matsushita Display Technology's Standard LCD modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

b) Since they have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed Toshiba Matsushita Display Technology's specification limits.

c) In addition, since Toshiba Matsushita Display Technology's Standard LCD modules have not been designed for use in applications where performance failures could be life-threatening of catastrophic. They must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

2) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD modules. In order to prevent electric shock, DO NOT TOUCH the electrode part, cables, connectors, and the LED circuit part of a module in which LED are built in as a light source of a backlight or a front light. High voltage is supplied to these parts while power supply is turned on.

⚠ Caution

1-1 CAUTION

1) *DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the modules.

Sensitive parts inside LCD module may be damaged, and dusts or scratches may mar the displays. Toshiba Matsushita Display Technology does not warrant the modules, if customer disassembled or modified them.

2) *BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT PERMIT this material to contact the skin, if glass of LCD panel is broken.

If liquid crystal material contacts the skin, mouth or clothing, take the following actions immediately.

In case contact to the eye or mouth, rinse with large amount of running water for more than 15 minutes. In case contact to the skin or clothing, wipe it off immediately and wash with soap and large amount of running water for more than 15 minutes. The skin or closing may be damaged if liquid crystal material is left adhered.

In case ingestion, rinse out the mouth well with water. After spewing up by drinking large amount of water, get medical treatment.

3) (GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GRASS that may cause injuring fingers or skin, when the glass is broken.

4) ABSOLUTE MAXIMUM RATINGS

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

5) RECOMMENDED OPERATION CONDITIONS

Don't exceed “the recommended operation conditions” in this specification. (The LCD panel should be used within “the recommended operation conditions”.)

The performance and quality of the LCD panel are warranted only when the LCD panel is used within “the recommended operation conditions”. Toshiba Matsushita Display Technology never warrants the performance and quality of the LCD panel when you use the LCD panel over “the recommended operation conditions”, although within “the absolute maximum rating”.

To use the LCD panel over “the recommended operation conditions” may have bad influence on the characteristics and reliability of the LCD panel and may shorten the life of the LCD panel.

Therefore, when designing the whole set, not to be over “the recommended operation conditions”, you should fully take care of supply voltage change, characteristic of connection parts, serge of input-and-output line, and surrounding temperature.

6) POWER PROTECTION CIRCUIT

Employ protection circuit for power supply, whenever the specification specifies it.

A suitable protection circuit should be applied, based on each system design.

DO NOT MODIFY the fuse used in the module. It may cause overheat and/or burning if dusts or metal particles are on the PCBs in the LCD module.

7) DISPOSAL

Always comply all applicable environmental regulations, when disposing of LCD module.

8) EDGES OF PARTS

Be careful with handling the metal flame (bezel) of a module. Even though burr disposal treatment is performed, It may cause injuring. Be careful with edges of glass parts and touch panel identically. For designing the system, give special consideration that the wiring and parts do not touch those edges.

9) LCD module’s upper and lower end portions (LED portions) get hot.

The LEDs are built in the upper and lower end portions of LCD module as backlight sources. While LEDs are lit and immediately after turned off, the face of LCD module (display surface), top and bottom faces, metal portions of right and left side faces, and metal portion of LED unit cover(s) on the back are hot and require caution.

In case of touching (working on) such portion by necessity, surely disconnect the power to the LCD module beforehand (refer to page 2, item (2)), protect hands (skin) with low thermal conductive gloves etc. or wait until the temperature of metal portion gets as low as room temperature, and then touch (work on) the portion while being careful to prevent electrostatic breakdown (refer to page 5, item (2)).

For Designing the System

2-1 DESIGNING ENCLOSURE

1) MECHANICAL DIMENSIONS

Refer to the individual specification for LCD module's mechanical dimensions.

2) MOUNTING HOLES

This is a semi-finished product without front bezel. And this LCD module has no mounting holes.

Please contact to your representative or Toshiba Matsushita Display Technologies Co., Ltd. before starting mechanical design.

3) Handling

When designing module structure or chassis, please conduct a full examination and evaluation internally to prevent troubles and glass breakage.

As for the glass breakage by cell pressing in the market, and the display unevenness (pooling, abnormal display (white spot), etc.) caused by front bezel or objects on front face and back face, Toshiba Matsushita Display Technologies Co., Ltd. cannot deal such problems as our sole responsibility. If such case happens, let us consult with you separately.

4) ＊BENDING / TWISTING

Make sure to design the enclosure that bending/twisting forces are not applied to LCD module during and after the installation into the system.

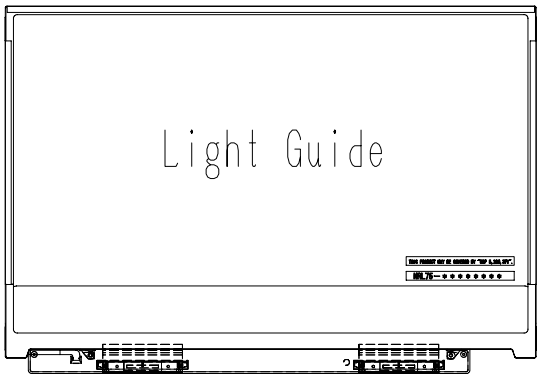
Design it so that the rear side of the LCD module may never be pushed by the set and so on. When the rear side of the LCD module is pushed, a panel is transformed, and that may cause ununiformity on the display.

5) DESIGN OF LCD MODULE REAR SURFACE

Design to not touch backside area.

This LCD module uses light guide. If light guide is pushed, there is danger of appearance of white spot or black spot.

And if circuit board is pushed, there is danger of damage.



6) GASES FROM SETTING MATERIAL

Some plastic materials and shock absorbing materials (rubber) used in the system may generate gases that may cause the deterioration of the polarizer laminated on LCD's panel or internal parts of the module. Prior confirmation is required.

7) GASES FROM PACKAGING MATERIAL

Some materials used for packaging (for which sulfuric acid is used in the recycling process) generate gases that may cause the deterioration of the polarizer laminated on LCD's panel or internal parts of the module. Prior confirmation is required.

2-2 DESIGNING POWER SUPPLIES AND INPUT SIGNALS TO LCD MODULE

1) CAPACITY OF POWER SUPPLY

Be sure that power supply output from the system should be limited to higher values than listed shown below. (For example Quick Arcing Fuse with listed ratings can be used.)

It is because this LCD module explained in this specification has a current limiter, with such function at power input line(s). But it may be some possibility of overheat and/or burning of LCD module and its peripheral devices before current limiter of the module when open-short test of the module is performed by using power supply smaller than following recommended value.

Power Supply	Recommended maximum output current of power supply	Recommended Fuse Rating (in case of using fuse for current limiter)	Built-in Fuse Rating (for reference)
V_{DD}	4.0 A	0.5-3.0 A	1.5 A

Refer to individual specification for details for capacity of power supply, and apply some protection circuit including fuses for power supply lines.

2) SEQUENCE OF POWER SUPPLIES AND INPUT SIGNALS

Power-supply lines should be designed as follows.

Power supplies should always be turned on before the input signals are supplied to LCD module, and the input signals should be disconnected before power supplies are turned off.

If this sequence is not followed, it may cause miss-operation of the panel.

Refer to "2.4.2 Sequence of Power Supplies and Signals" for the detailed specification.

In addition, refer to individual specifications for unused terminals.

3) PREVENTION OF IMAGE STICKING

Design the system not to display same pattern for a long time in order to prevent image sticking on the panel. Note that incorrect sequence of power supplies and input signals may cause the sticking on the panel, too.

4) GROUNDING OF METAL FRAME

Grounding of metal frame of LCD module is generally effective to prevent radiation interference from the system design.

However, the necessity of grounding, or effective grounding method should be dependent on each system design.

2-3 DESIGNING FOR BETTER VISIBILITY

1) PANEL ANGLE

Visibility of LCD module deeply depends on the viewing directions. The position and the angle of LCD module in the system should be designed so that the best visibility can be obtained at the actual usage.

2) WINDOW OPENING

Dimensions of window opening of the system's enclosure should be designed as smaller than "Viewing Area" and larger than "Active Area" specified in individual specification in order to obtain better appearance.

3) PROTECTIVE COVER

In case of severe environmental condition like outdoor usage, a proper transparent protective cover(lens) over LCD module is recommended to prevent scratches, invasion of dust, water, etc., between the system housing and LCD module.

It is recommended to apply an Ultra-violet filter (less than 390nm cut) onto the LCD module, for outdoor operation.

Strong ultra-violet radiation may damage the panel. However, in that case, transmittance-luminance will decrease. Careful selection of material is required.

Don't expose any parts, except the viewing area, into the direct sunlight , otherwise deterioration may occur.

For Installation in Assembly

3-1 CARRYING

Hold metal frame (bezel) when you carry LCD module. Don't hold FL cable.

3-2 ESD (ELECTRO-STATIC DISCHARGE) PREVENTION

The C-MOS LSIs used in LCD module is very sensitive to ESD. The following caution should be taken when installing LCD module to an enclosure of the system in order to prevent damage of C-MOS LSIs used in LCD module.

1) HUMIDITY

Ambient humidity of working area is recommended to be higher than 50%RH in order to avoid ESD.

2) GROUNDING

2-1) Grounded electro-conductive mats are recommended to be covered on the floor of working area and surface of working benches.

2-2) The grounding should be done through a resister of 0.5-1M ohms in order to prevent spark of ESD.

2-3) Person handling LCD modules should be grounded with such as wrist band.

2-4) Tools like screw drivers and working benches should be grounded.

3) IONIZER

Using ionizer (an antistatic blower) is recommended at working area in order to reduce electro-static voltage.

4) REMOVING PROTECTION FILM

When removing protection film from LCD panel, peel off the film slowly (more than three seconds) from the edge of the panel with round-ended tweezers or adhesive tape while blowing with ionizer toward the peeling face to minimize ESD which may damage electrical circuit.

5) Be careful with touching metal portion of testing instruments in order to prevent unnecessary ESD.

6) Do not touch the electrode area of PCB and electrical parts like LSI, capacitor, connector pin, etc.

3-3 DUST AND STAIN PREVENTION

1) WORKING AREA

Reduce dust level in working area. Especially the level of metal particle should be decreased, otherwise electrical circuit in LCD module may be damaged due to short circuit by metal particles.

2) PROTECTION FILM

LCD module may be shipped with "protection film" on LCD panel in order to prevent from scratches and dust.

It is recommended to remove the film at later process of assembling.

3) FINGER PRINT

Use finger stalls or soft and dust-free gloves in order to keep clean appearance of LCD module when handled for incoming inspection and assembly.

4) ＊WIPING OFF DUST ON THE PANEL

When LCD panel becomes dirty, wipe the panel surface off softly with absorbent cotton or another soft cloth.

If necessary, breathe upon the panel surface and then wipe off immediately and softly again.

If the dirt can not be wiped off, follow the instructions described in individual specification.

Be careful not to spill organic solvents into the inside of LCD module. The polarizer laminated to LCD panel and adhesives may be invaded by the organic solvents, so do not use any organic solvents for wiping off LCD panel. Driver IC and PCB area used inside LCD module may be damaged by the solvents.

5) ADHESIVE ON LCD PANEL

Be careful not to attach adhesive, grease, etc., on LCD panel, because it is difficult to remove them without any damages on LCD panel.

6)(WATER SPOTS ON THE PANEL

Avoid the dewing or water condensation.

Wipe off a spot or spots of water or mist on LCD panel softly with absorbent cotton or another cloth as soon as possible if happened, otherwise discoloration or stain may be caused. If water invades into LCD module, it may cause LCD module damages.

7) Gas

Do not expose LCD module to the gas (which is not normally contained in the atmosphere), it may cause mis-operation or defects.

3-4 BENDING / TWISTING OF LCD MODULE DURING ASSEMBLY

1) INSTALLING LCD MODULE TO THE ENCLOSURE

Do not bend or twist LCD module even momentary when LCD module is installed into an enclosure of the system.

Bending or twisting LCD module may cause its damages.

2) FASTENING SCREWS

Fasten screws for mounting holes uniformly, otherwise bending / twisting force may be applied to LCD module.

3) INTERFACE

Do not fasten screws, with catching interface cable or FPC between LCD module and the enclosure.

This may cause bending of LCD module, or become the cause of a failure by damaging cable or FPC.

3-5 MECHANICAL FORCES

1)* STRONG MECHANICAL SHOCK

Refrain from strong mechanical shock like dropping from the working bench or knocking against hard object.

These may cause panel crack, damage of FL or other miss-operation.

2)* EXCESSIVE FORCE

Refrain from excessive force like pushing the surface of LCD panel and LCD module. This may cause scratches or breakage of the panel, or a failure of the module.

3)* PRESSURE ON THE PANEL

Do not put heavy object such as tools, books, etc., and do not pile up LCD modules.

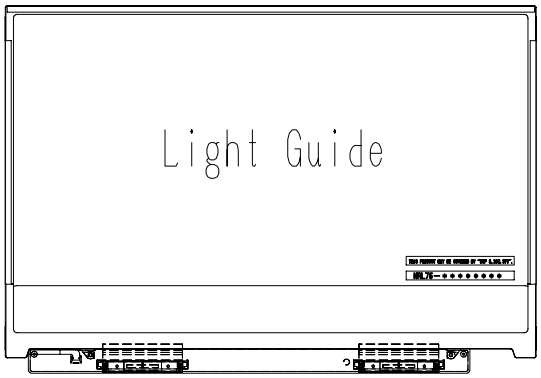
Be careful not to touch surface of the polarizer laminated to the panel with any hard and sharp object. The polarizer is so soft that it can be easily scratched, even the protect film covers it.

4)* PRESSURE ON REAR SIDE

Design to not touch backside area.

This LCD module uses light guide. If light guide is pushed, there is danger of appearance of white spot or black spot.

And if circuit board is pushed, there is danger of damage.



5) CONNECTORS

When inserting or disconnecting the connectors to LCD module, be sure not to apply force against PCB nor connecting cables, otherwise internal connection of PCB and TAB drivers may be damaged.

Do not fasten screws while putting cables like those for interface between LCD module and the enclosure.

3-6 OPERATION

Be sure that the following caution should be taken under assembly and inspection of the system.

1) POWER SUPPLY

Power supplies should always be turned off in connecting process.

Do not connect or disconnect the power cables and connectors with power applied to LCD module.

This may cause damage of module circuit.

2) INPUT SIGNAL

The signal should be applied after power supplies are turned on.

The signal should be removed before power supplies are turned off.

The detailed sequence of power supplies and signals are described in individual specifications.

3) LCD LONG PERIOD OPERATION

In case of LCD long period operation, discoloration of light guide or optical sheet will be happened due to ultra violet and heat from CCFL. As the result, there is possibility to have out of specification for the optical characteristic as “5.2”.

But this is not irregular phenomena. Moreover, CCFL also has the characteristic of color shift by long period operation.

4) LED life

Please note that LED life will be shorter than the average life described in the Specification if the ambient temperature is higher than 25°C.

When replacing LCD module, turn off supply voltage and input signal to the LCD module, surely disconnect the power supply to the circuit for lighting the backlight (not only by turning off the control signal to ON/OFF terminal etc.), and then replace the LCD module.

5) To replace LCD modules, make sure that all power supplies, voltages, input signals and driver for LED backlight should be completely turned off (not only to turn off at ON/OFF terminal, but ensure to turn off the power supply completely then replace LCD modules).

For Transportation and Storage

1) TEMPERATURE

Do not store LCD modules in high temperature, especially in high humidity for a long time (approximately more than one month).

It is strongly recommended to store LCD modules where the temperature is in the range of 0 to 35 degrees Celsius and the humidity is lower than 70%.

2) LOW TEMPERATURE

Liquid crystal material may be coagulated and LCD panel may be damaged at the lower temperature than storage temperature range described in individual specification.

3) ULTRA VIOLET RAY

Store LCD module without exposure to direct sunlight or fluorescent lamps in order to prevent the module from strong ultra violet ray.

4) CLEANLINESS

Keep the module in clean place, because any dust, hard particle may damage the polarizer, or dust invades the inside of the module.

5) ＊CONDENSATION OF WATER

Avoid condensation of water on LCD module, otherwise it may cause mis-operation or defects. Keep away LCD module from such ambient.

6) Gas

Among some of cardboards and rubber parts etc. generates corrosive gas, so it is advisable to confirm its reliability on the whole set or its packed condition.

7) PACKAGING

In case of transportation or storage after opening the original packaging, LCD modules are recommended to be repacked into the original packaging with the same method, especially with same kind of desiccant.

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1. Scope

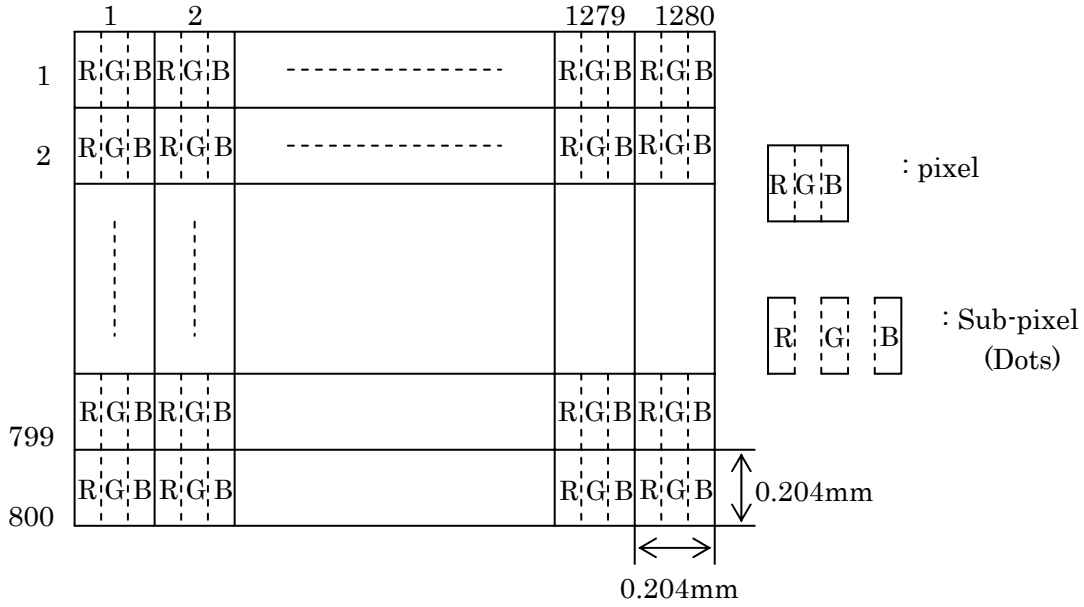
This specification is applicable to Toshiba Matsushita Display Technology's cm diagonal size TFT-LCD module "LTD121EW6S" designed for Personal Computer.

2. Product Specifications

2.1 General Specifications

Item	Specifications
Display Mode	TN color(64 gray scales, 262,144 colors) Transmissive type, Normally white
Viewing Direction	6 o'clock (in direction of maximum contrast)
Driving Method	TFT active matrix
Input Signals	LVDS interface CLK+,CLK- IN0+,IN0- IN1+,IN1- IN2+,IN2-
Active Area	261.12 (*W*) × 163.2 (*H*) (mm)
Viewing Area	262.12 (*W*) × 164.2 (*H*) (mm)
Number of Pixels	1280 (*W*) × 800 (*H*) 1)
Pixel Pitch	0.204 (*W*) × 0.204 (*H*) (mm) 1)
Pixel Arrangement	RGB vertical stripes 1)
Surface Treatment	Glare and hard coat 2H on LCD surface
Backlight	LED backlight (10serial x 4parallel : total 40pcs)
Dimensional Outline	270.5 (*W*) × 187.4 (*H*) × 3.5max. (*D*) (mm)

Note 1)



2.2 Absolute Maximum Ratings [1)]

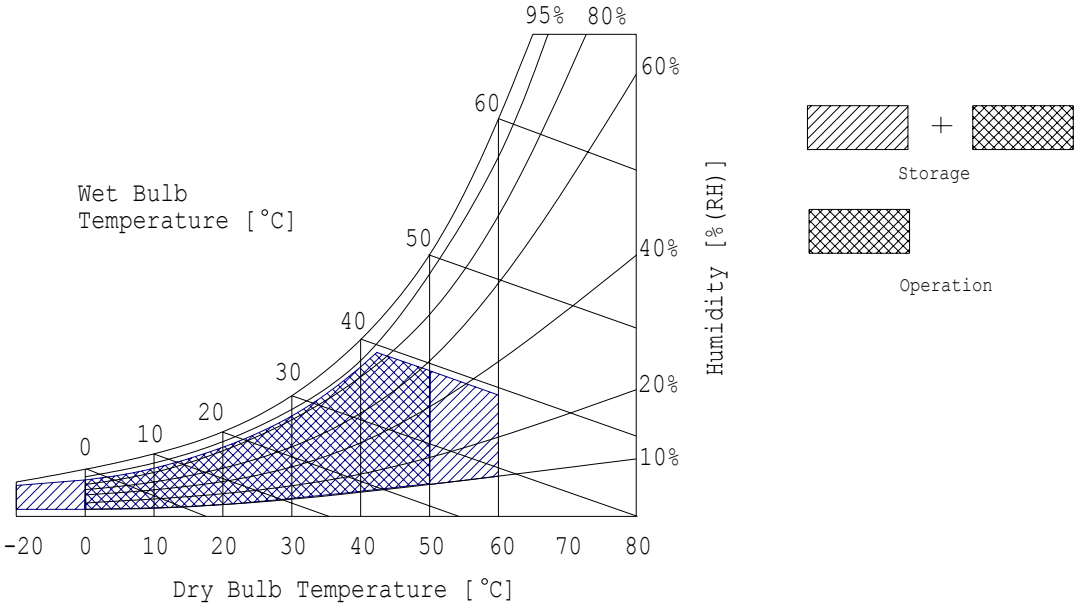
Item	Symbol	Min.	Max.	Unit	Checked Terminal [4)]
Supply Voltage	V_{DD}	-0.3	+4.0	V	V_{DD} - GND
Input Voltage of Signals	V_{IN}	-0.3	V_{DD}+0.3	V	LVDS interface
LED Supply Voltage	V_{LED}	-	5.0	V	
LED Input Current	I_{LED}	0	30	mA	
Operating Ambient Temperature [2)]	T_{OP}	0	+50	°C	
Operating Ambient Humidity [2)]	H_{OP}	10	90	%(RH)	
Storage Temperature [2)]	T_{STG}	-20	+60	°C	
Storage Humidity [2)]	H_{STG}	10	90	%(RH)	
Operating Temperature for Panel [3)]	-	0	+60	°C	

Note1) Do not exceed the maximum rating values under the worst probable conditions taking into account the supply voltage variation, input voltage variation, variation in part constants, and ambient temperature and so on. Otherwise the module may be damaged.

2) Wet bulb temperature should be 39°C Max, and no condensation of water. See figure below.

3) The surface temperature caused by self heat radiation of cell itself is specified on this item.

4) Refer to 2.4.5



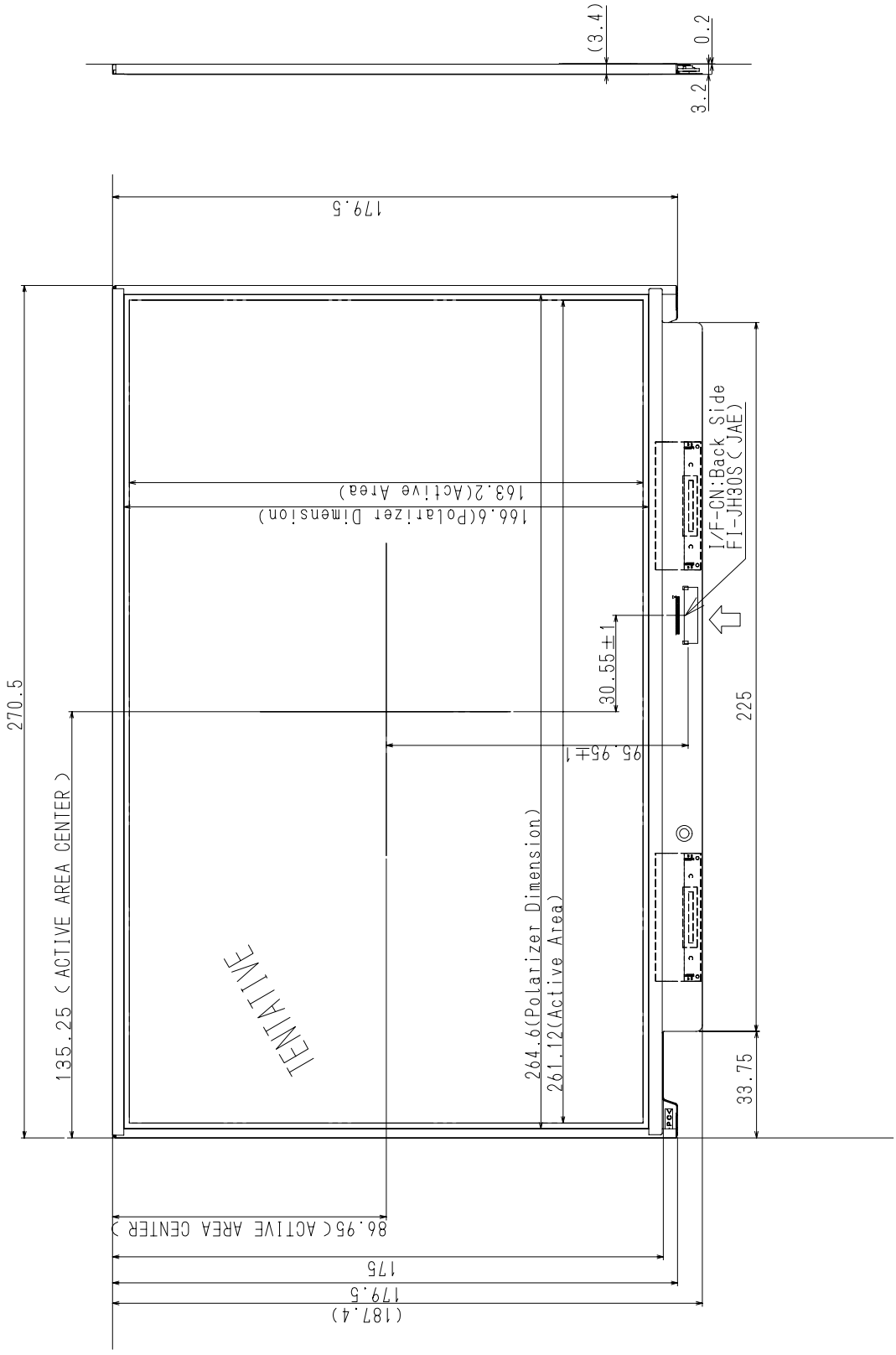
2.3 Mechanical Specifications

2.3.1 Weight

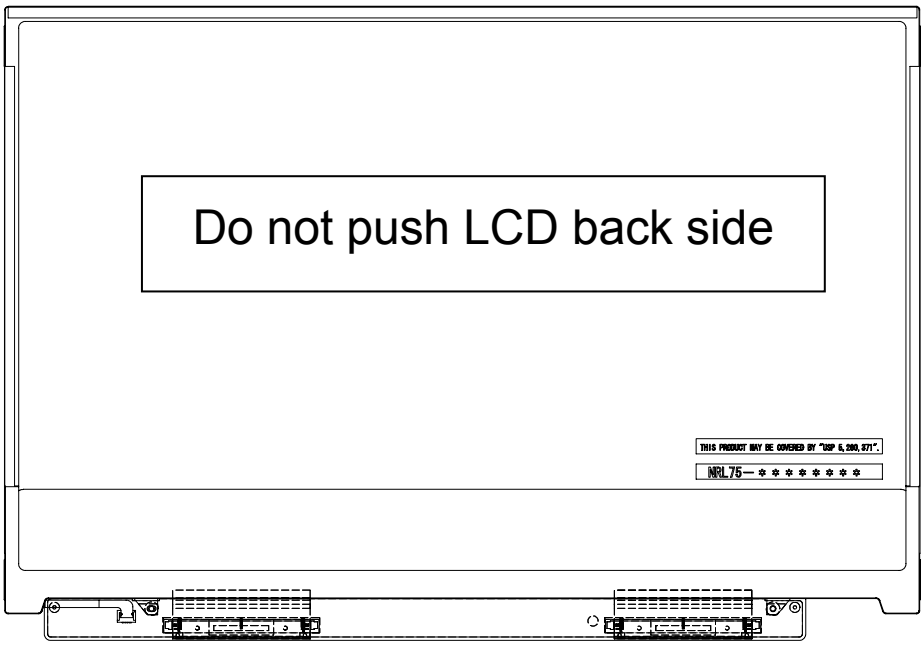
225 ± 15 (g)

2.3.2 Dimensional Outline (front figure)

Unit : mm
Standard Tolerance: ±0.5



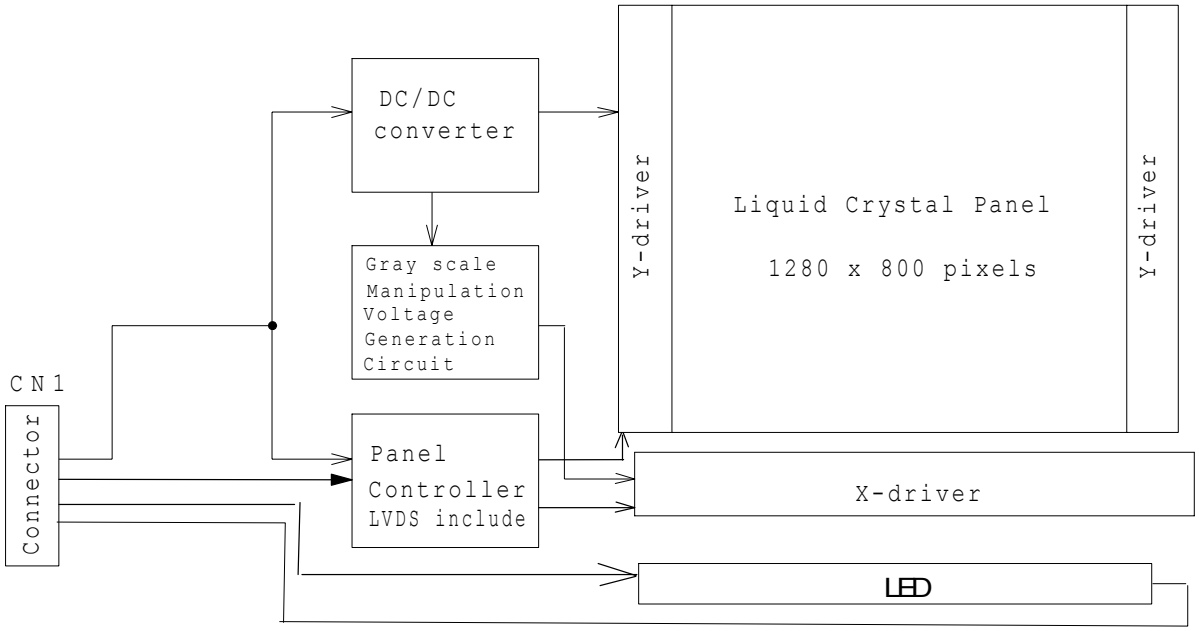
Warning



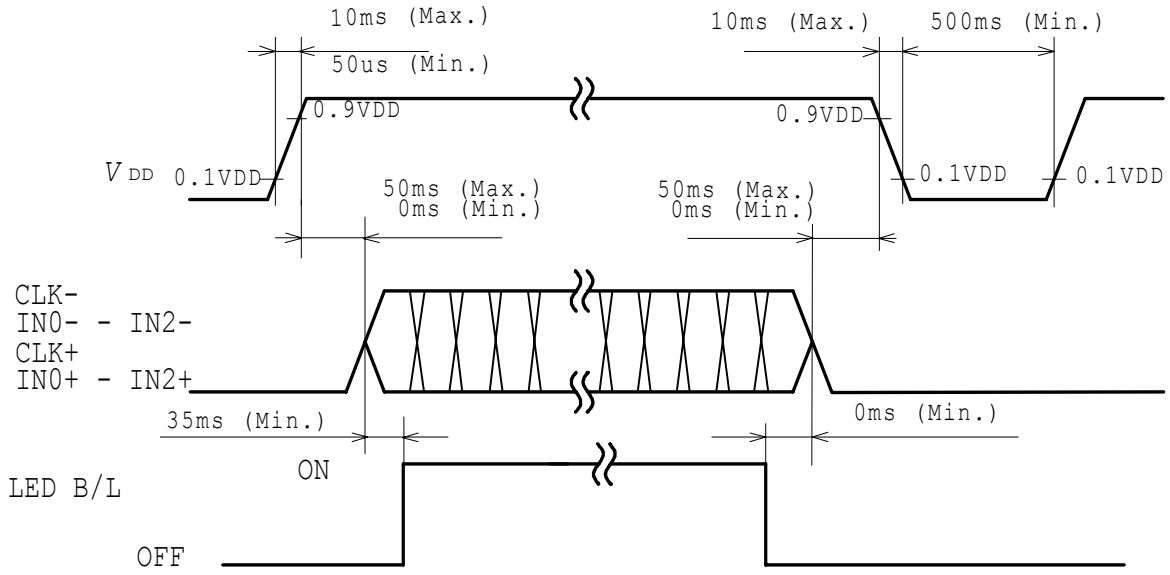
Note) Never push LCD back side. If LCD back side was pressed, It may cause damage of the back light system.

2.4 Electrical Specifications

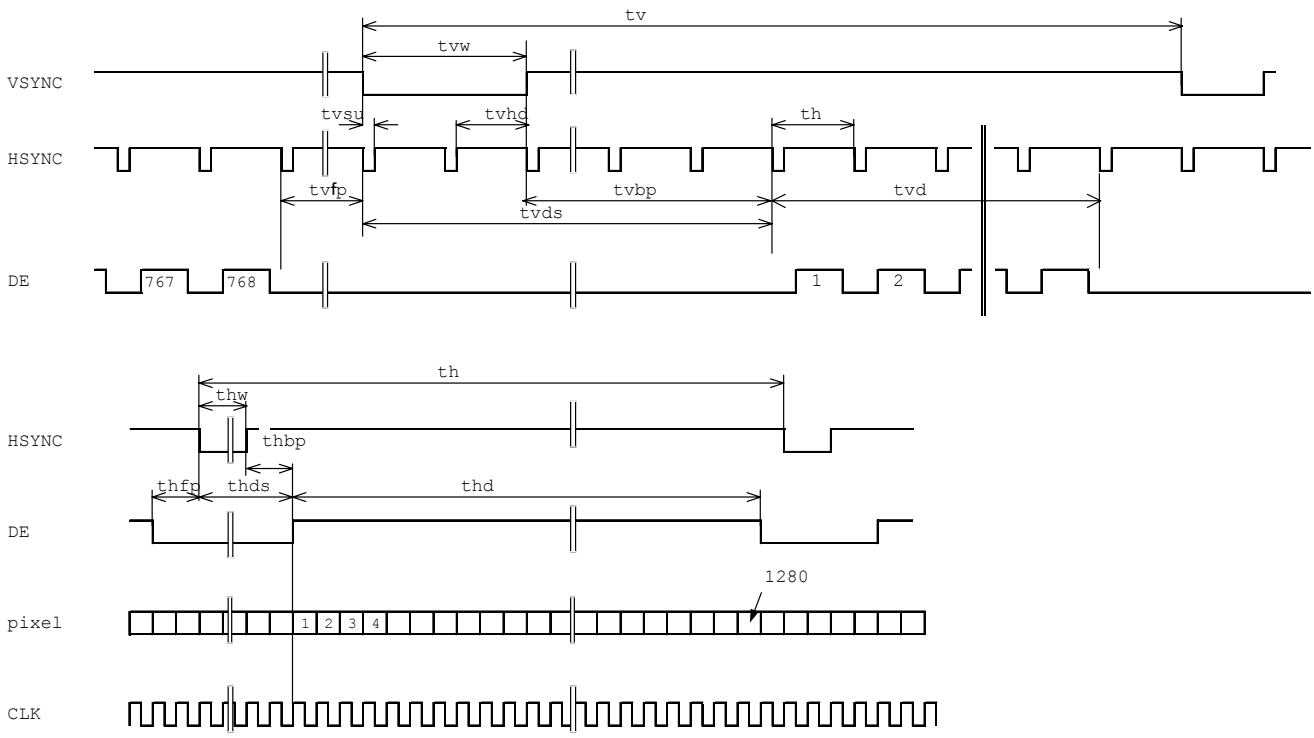
2.4.1 Circuit Diagram



2.4.2 Sequence of Power Supplies and Signals



2.4.3 Timing Chart



2.4.4 Timing Specifications [1) 2) 3) 4) 5) 6)]

Item	Symbol	min.	typ.	max.	unit
Horizontal Scanning Term	*t*hp	1660 x *t*c	1680 x *t*c	1710	clock
H-sync Pulse Width	*t*hspw	4 x *t*c	128 x *t*c	-	clock
Horizontal Front Porch	*t*hfp	4 x *t*c	72 x *t*c	-	clock
Horizontal Back Porch	*t*hbp	4 x *t*c	200 x *t*c	-	clock
Horizontal Display Term	*t*ha	1280 x *t*c	1280 x *t*c	1280 x *t*c	clock
Frame Period	*t*v	808 x *t*h	831 x *t*h	850 x *t*h	line
V-sync Pulse Width	*t*vspw	1 x *t*h	6 x *t*h	-	line
Vertical Front Porch	*t*vfp	1 x *t*h	3 x *t*h	-	line
Vertical Back Porch	*t*vbp	2 x *t*h	22 x *t*h	-	line
Vertical Display Term	*t*vd	800 x *t*h	800 x *t*h	800 x *t*h	line
Clock Period	*t*c	11.76	11.98	12.35	ns

Note 1) Refer to “Timing Chart” and LVDS specifications in TIA/EIA-644

Note 2) If CLK is fixed to "H" or "L" level for certain period while DE is supplied, the panel may be damaged.

Note 3) Do not make *t*v, *t*h, *t*hbp and tvds fluctuate.

If *t*v, *t*h, *t*hbp and *t*vds are fluctuate, the panel displays black.

tvb = tvw + tvfp + tvbp

thb = thw + thfp + thbp

Note 4) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note 5) NCLK count of each Horizontal Scanning Time should be always the same.

V-Blanking period should be “*n*” X “Horizontal Scanning Time”. (*n*: integer)

Frame period should be always the same.

2.4.5 Interface Connector

CN1 INPUT SIGNAL (FI-JH30S-R****/JAE)

[Mating Connector : FI-JH30C-R****/JAE]

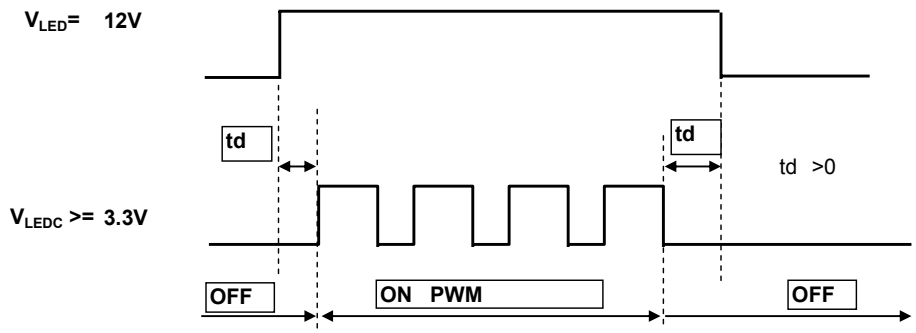
Terminal No.	Symbol	Function
1	V_{LED}	LED Circuit Power Supply : +12V
2	V_{LED}	LED Circuit Power Supply : +12V
3	V_{LED}	LED Circuit Power Supply : +12V
4	V_{LED}	LED Circuit Power Supply : +12V
5	V_{SS}	LED Circuit GND
6	V_{SS}	LED Circuit GND
7	V_{SS}	LED Circuit GND
8	V_{SS}	LED Circuit GND
9	V_{LEDC}	LED Brightness Control : 3.3V PWM control (20-100%) Please refer below
10	V_{SS}	GND
11	V_{DD}	Power Supply : +3.3V
12	V_{DD}	Power Supply : +3.3V
13	V_{DD}	Power Supply : +3.3V
14	V_{DD}	Power Supply : +3.3V
15	$DATA_{EDID}$	DDC Data
16	CLK_{EDID}	DDC Clock
17	V_{EDID}	DDC 3.3V
18	V_{SS}	GND
19	RxIN0-	Negative LVDS differential data input (R0-R5,G0)
20	RxIN0+	Positive LVDS differential data input (R0-R5,G0)
21	V_{SS}	GND
22	RxIN1-	Negative LVDS differential data input (G1-G5, B0-B1)
23	RxIN1+	Positive LVDS differential data input (G1-G5, B0-B1)
24	V_{SS}	GND
25	RxIN2-	Negative LVDS differential data input (B2-B5, HSYNC, VSYNC, DE)
26	RxIN2+	Positive LVDS differential data input (B2-B5, HSYNC, VSYNC, DE)
27	V_{SS}	GND
28	RxCLKIN-	Clock Signal(-)
29	RxCLKIN+	Clock Signal(+)
30	V_{SS}	GND

Note 1) Please connect GND pin to ground. Don't use it as no-connect nor connectiton with high impedance.

Note 2) Please connect NC to nothing. Don't connect it to ground nor to other signal input.

Note 3) 262,144 colors are displayed by the combinations of 18 bits data. (See next page)

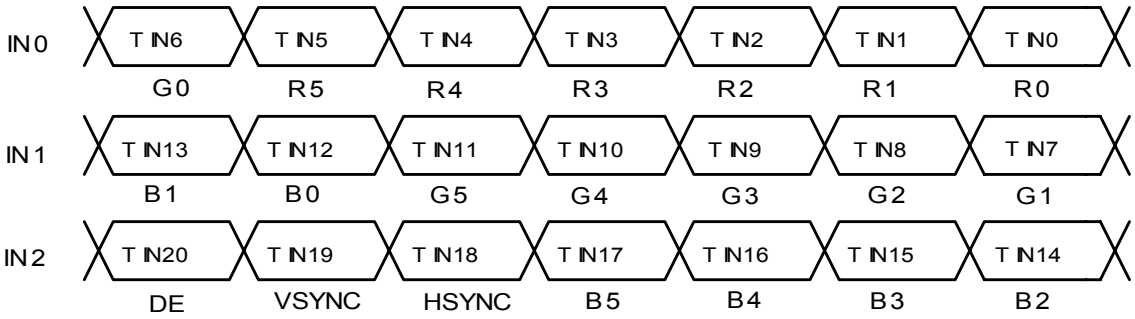
LED Brightness Control (PWM control)



RECOMMENDED TRANSMITTER (THC63LVDF83A,THC63LVDM83A,THC63LVDM83A-85)
TO LTD121EW6S INTERFACE ASSIGNMENT

Case1: 6Bit TRANSMITTER

Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	To LTD121EW6S Interface(CN1)	
Symbol	Terminal	Symbol	Function		Terminal	Symbol
TA0	44	R0	Red Pixels Display Data (LSB)	TA- TA+	No.10 No.11	RxIN0- RxIN0+
TA1	45	R1	Red Pixels Display Data			
TA2	47	R2	Red Pixels Display Data			
TA3	48	R3	Red Pixels Display Data			
TA4	1	R4	Red Pixels Display Data			
TA5	3	R5	Red Pixels Display Data (MSB)			
TA6	4	G0	Green Pixels Display Data (LSB)			
TB0	6	G1	Green Pixels Display Data	TB- TB+	No.13 No.14	RxIN1- RxIN1+
TB1	7	G2	Green Pixels Display Data			
TB2	9	G3	Green Pixels Display Data			
TB3	10	G4	Green Pixels Display Data			
TB4	12	G5	Green Pixels Display Data (MSB)			
TB5	13	B0	Blue Pixels Display Data (LSB)			
TB6	15	B1	Blue Pixels Display Data			
TC0	16	B2	Blue Pixels Display Data	TC- TC+	No.16 No.17	RxIN2- RxIN2+
TC1	18	B3	Blue Pixels Display Data			
TC2	19	B4	Blue Pixels Display Data			
TC3	20	B5	Blue Pixels Display Data (MSB)			
TC4	22	HSYNC	H-Sync			
TC5	23	VSYNC	V-Sync			
TC6	25	DE	Compound Synchronization Signal			
CLK IN	26	NCLK	Data Sampling Clock	TCLK - TCLK +	No.19 No.20	CLK IN- CLK IN+



2.4.6 Colors Combination Table

	Display	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0	Gray ScaleLevel
Basic Color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	L	L	L	L	L	L	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray Scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L 1
		L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L 2
		⋮						⋮						⋮						L3… L60
		H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L61
		H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L62
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	Red L63
Gray Scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L 1
		L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L 2
		⋮						⋮						⋮						L3… L60
		L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L	L61
		L	L	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L	L62
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	Green L63
Gray Scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L 1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L 2
		⋮						⋮						⋮						L3… L60
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H	L61
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L62
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	Blue L63
Gray Scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L 1
		L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L	L 2
		⋮						⋮						⋮						L3… L60
		H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	H	L61
		H	H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	L62
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L63

Note1 L: Low level voltage, H: High level voltage

3. Recommended Operating Conditions [1) 2) 3) 4) 5)]

←

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply Voltage [4)]	V_{DD}	3.0	3.3	3.6	V	
Comon Mode Input Voltage	V_{CM}	1.0	-	1.5	V	
Differential Input amplitude	V_{ID}	100	-	600	mV	
Differential Input Voltage		0.25		0.45	V	
LED driver current	I_{LEDD}	-	380	800	mA	
LED driver supply voltage	V_{LEDD}	7.0	12.0	13.0	V	pin No.1-4
LED brightness control freq.	V_{LEDF}	180	200	220	Hz	
LED brightness control Voltage	$V_{LEDcont}$	3.0	3.3	3.6	V	

Note 1) The module should be always operated within these ranges. The "Typ." shows the recommendable value.

2) Recommended LVDS transmitter: THC63LVDF63A, THC63LVDM63A, THC63LVDM63A-85, THC63LVDF83A, THC63LVDM83A,THC63LVDM83A-85 (made by THine Electronics,Inc.)
Panel Controller contains LVDS, which is based on THC63LVDF84A-85 (made by THine Electronics,Inc.) specification.

3) LVDS is based on TIA/EIA 644
However, Common mode input voltage should be 1.0-1.5V.

4) Checked Pin Terminal: V_{DD}, GND (0V)

5) Checked Pin Terminal: IN0-～CLK+, GND (0V)
Measure: $|V_{IN0+}-V_{IN0-}|$, $|V_{IN1+}-V_{IN1-}|$, $|V_{IN2+}-V_{IN2-}|$
$|V_{CLKN+}-V_{CLK-}|$
Measure: $(V_{IN0+}-V_{IN0-})/2$, $(V_{IN1+}-V_{IN1-})/2$,
$(V_{IN2+}-V_{IN2-})/2$, $(V_{CLK+}-V_{CLK-})/2$,

4. Electrical Characteristics

4.1 Test Conditions

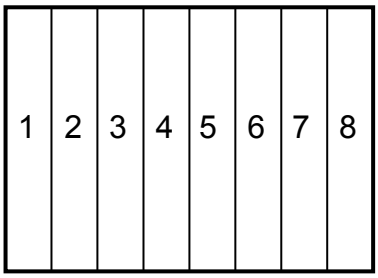
Ambient Temperature	: T_a	25±5°C
Ambient Humidity	: H_a	65±20%(RH)
Supply Voltage	: V_{DD}	3.3V
Input Signal	: Refer typical value in "2.4.4 Timing Specifications".	
LED Input Current	: I_{LED}	20mA(rms) @ PWM 100%

4.2 Specifications ←

Item	Symbol	Min.	Typ.[1)]	Max.	Unit	Remark
Current Consumption	I_{DD}	-	300	400	mA	V_{DD} Terminal Current

Note 1) The Typical value of I_{DD} is measured in the following pattern.

1. White
2. Yellow
3. Purple
4. Red
5. Light Blue
6. Green
7. Blue
6. Black



5. Optical Characteristics

5.1 Test Conditions

It is same as 4.1

The measuring method is shown in 11.

5.2 Optical Specifications [1)] ←

Item		Symbol	Conditions		Specifications			Unit	Remark
					MIn.	Typ	Max.		
Viewing Angle		θ	*CR*>=10	ϕ= 180°	10	20	-	°	
				ϕ= 0°	20	30	-	°	
				ϕ= 90°	30	40	-	°.	
				ϕ= -90°	30	40	-	°	
Contrast Ratio		*CR*	θ=0°, ϕ=0°		300	600	-	-	
Response Time		$t_{ON}+t_{OFF}$	θ=0°, ϕ=0°		-	30	80	ms	
Luminance		*L*	θ=0°, ϕ=0° Gray Scale Level=L63 (White)		140	200	-	cd/m^2	I_{LED}=20mA(rms) PWM=100%
Luminance Uniformity[2)]		LUNF	θ=0°, ϕ=0° Gray Scale Level=L63 (White)		50	-	-	%	*L*min/*L*max
Chromaticity	Red	x_R	Gray Scale Level:L63		0.543	0.598	0.656	-	
		y_R	θ=0°, ϕ=0°		0.304	0.357	0.407	-	
	Green	x_G	Ditto		0.292	0.346	0.405	-	
		y_G			0.536	0.585	0.639	-	
	Blue	x_B	Ditto		0.100	0.156	0.213	-	
		y_B			0.078	0.128	0.181	-	
	White	x_W	Ditto		0.267	0.321	0.379	-	
		y_W			0.292	0.345	0.395	-	

Note 1) Refer to "11. Measuring Method".

Note 2) The above test limit must be applied for initial use. Characteristics will be shifted by long period operation, but it is not irregular phenomena. Theoretically brightness characteristics will be decreased due to CCFL degradation and color shift due to optical components change.

6.Quality

6.1 Inspection AQL

Total of Major Defects : AQL 0.65 %

Total of Minor Defects : AQL 1.5 %

Sampling Method : ISO 2859-1:1999

6.2 Test Conditions

1) Ambient Temperature : 25±5°C

2) Ambient Humidity : 65±20%(RH)

3) Illumination : Approximately 500 lx under the fluorescent lamp

4) Viewing Distance : Approximately 30cm by the eyes of the inspector from the module

5) Inspection Angle : θ=0°, ϕ=0°

6.3 Dimensional Outline

The products shall conform to the dimensions specified in 2.3.2.

Definition of Major and Minor defects are as follows.

Item	Description	Class
Important Dimensions	Dimensional outline, Dimensional between the mounting holes(hinge)	Major
Others	Dimensions specified in this specifications	Minor

6.4 Appearance Test

6.4.1 Test Conditions

1) Condition : Non-operating, operating (Pattern : L63 white raster)

Same as 6.2

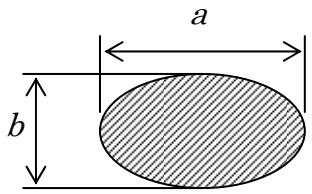
6.4.2 Specifications

<table>
<tr><th>Item</th><th>Description</th><th>Class</th></tr>
<tr><td>PCB Appearance</td><td>Pattern peeling snapping, electrically short</td><td>Major</td></tr>
<tr><td></td><td>Repair portion on PCB is not covered by epoxy resign</td><td></td></tr>
<tr><td>Soldering</td><td>Cold solder joint, lead move when pulled</td><td>Minor</td></tr>
<tr><td>Bezel, Frame, Connectors</td><td>Distinct stain, rust or scratch</td><td>Major</td></tr>
<tr><td>Black and White Spots/Lines[1)2)]</td><td>
<table>
<tr><th>Line width</th><th>Length(mm)</th><th>Acceptable count</th></tr>
<tr><td>$W \leqq 0.05$</td><td rowspan="4">$L \leqq 3$</td><td>neglect</td></tr>
<tr><td>$0.05 < W \leqq 0.07$</td><td>$n \leqq 8$</td></tr>
<tr><td>$0.07 < W \leqq 0.10$</td><td>$n \leqq 2$</td></tr>
<tr><td>$0.10 < W$</td><td>2)</td></tr>
</table>
Dust
<table>
<tr><th>Average diameter(mm)</th><th>Acceptable count/side</th></tr>
<tr><td>$D \leqq 0.2$</td><td>neglect</td></tr>
<tr><td>$0.2 < D \leqq 0.5$</td><td>$n \leqq 4$</td></tr>
</table>
Polarizer scratch
<table>
<tr><td>$D \leqq 0.2$</td><td>neglect</td></tr>
<tr><td>$0.2 < D \leqq 0.5$</td><td>$n \leqq 6$</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

Note 1) Inspection area should be within viewing area.

Note 2) Black/White Spot, Polarizer Dents and Polarizer Bubble shall be judged by "Average Diameter".

Average Diameter $D = (a+b)/2$ (mm)



6.5 Display Quality

6.5.1 Test Conditions

1) Inspection Area : Within active area
2) Driving Condition : Same as test conditions shown in 4.1 and 6.2
3) Test Pattern : White display pattern (gray scale level L63) and black display pattern (gray scale level L0)

6.5.2 Specifications [4]

<table>
<tr><td>Item</td><td>Description / Specifications</td><td>Class</td></tr>
<tr><td>Function</td><td>No display, Malfunction</td><td>Major</td></tr>
<tr><td rowspan="3">Display Quality [1]</td><td>Missing line</td><td>Major</td></tr>
<tr><td>Missing Sub-Pixels
<table>
<tr><td>1) Bright defects[2,3]</td><td>2pcs. max.</td></tr>
<tr><td>2) Dark defects [2]</td><td>4pcs. max.</td></tr>
<tr><td>3) Total sub-pixel defects</td><td>5pcs. max.</td></tr>
<tr><td>4) 2 Conjunction Bright defects</td><td>1 set max.</td></tr>
<tr><td>5) 3 Conjunction Bright defects</td><td>0 set max.</td></tr>
<tr><td>6) 2 Conjunction Dark defects</td><td>1 set max.</td></tr>
<tr><td>7) 3 Conjunction Dark defects</td><td>0 set max.</td></tr>
<tr><td>8) Bright defect to Bright defect distance</td><td>15mm min</td></tr>
<tr><td>9) Dark defect to dark defect distance</td><td>5mm min.</td></tr>
<tr><td>10) Other Item</td><td>Neglect</td></tr>
</table></td><td>Major</td></tr>
<tr><td>Inconspicuous flicker, crosstalk, Newton's ring, Mottling Rubbing defect,
Dim Lines, Horizontal Line and Vertical Line. : neglect</td><td>-</td></tr>
<tr><td>Black and White
Spots/lines</td><td>Inconspicuous defects : neglect</td><td>-</td></tr>
<tr><td>Backlight</td><td>Missing (Non-operating)</td><td>Major</td></tr>
</table>

Note 1) Defects of both color filter and black matrix are counted as bright or dark defects.
Inspection area should be within the active area.

Note 2) Bright defect means a bright spot(sub-pixel) on the display pattern of gray scale L0.
Dark defect means a dark spot(sub-pixel) on the display pattern of gray scale L63.

Note 3) Bright spot which can not be found by using 5%ND-Filter shall not be counted as a defect.

Note 4) When display power turned off, the display image quality is not restricted to above specifications.

6.6 Reliability Test

6.6.1 Test Conditions

1) The module should be driven and inspected under normal test conditions.

2) The module should not have condensation of water (moisture) on the module.

3) The module should be inspected after two or more hours storage in normal conditions (15 - 35°C, 45 - 65%(RH)).

4) A module shall be used only for one test.

6.6.2 Specifications

The module shall have no failure in the following reliability test items.

Test Item	Test Conditions	Result
High Temperature Operation [1)]	50°C 192 h	3p/3p OK
High Temperature Storage [2)]	60°C 192 h	3p/3p OK
High Temperature and High Humidity operation [1)]	50°C 80% 192 h	3p/3p OK
Low Temperature Operation [1)]	0°C 192 h	3p/3p OK
Low Temperature Storage [2)]	-20°C 192 h	3p/3p OK
Temperature Shock [2)]	-20°C ⇔ 60°C 0.5h 0.5h 50 cycles	3p/3p OK

Note 1) Operating

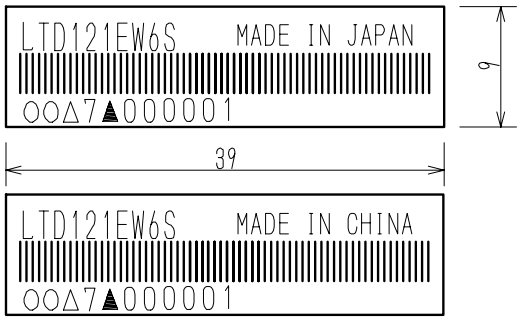
Note 2) Non-Operating

Definitions of failure for judgment shall be as follows:

1) Function of the module should be maintained.
2) Current consumption should be smaller than the specified value.
3) Appearance and display quality should not have distinguished degradation.
4) Luminance should be larger than 50% of the minimum value specified in 5.2.

6.7 Labels

(1) Product Label



Serial number : △△ ▲ 7A 000001
① ② ③ ④

① : Module type code

② : Manufacturing code

③ : Lot code 7 A
(1) (2)

(1):Year code-end of the A.D.

(2):Month code-alphabet → Jan. : A - Dec. : L

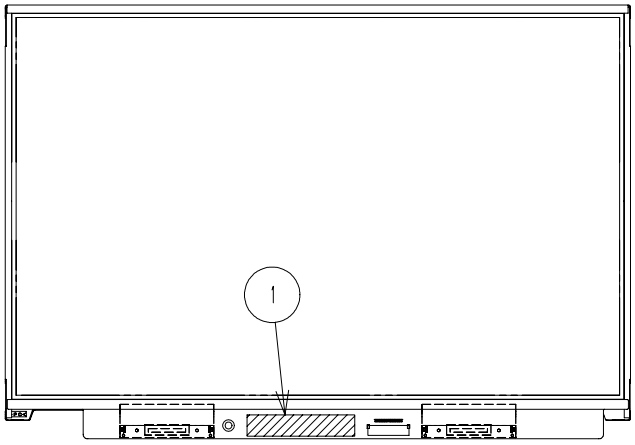
Bar code : CODE-39 High-density

(Example : 7A → 2007 JAN.)

④: Serial code

decimal, 6 figures

2) Label Locations



①:Product Label

7. Lifetime

7.1 Module (except LED backlight)

MTTF (Mean Time To Failure) : 50,000 h

(This value is not assurance time but inference value by following conditions.)

Conditions : Ambient temperature : 25±5°C (No wind)

Ambient humidity : 65%(RH)

7.2 LED backlight

7.2.1 Test Conditions

Ambient temperature : 25±5°C (No wind)

LED current : 15mA(rms)

Lighting condition : continuous lighting

7.2.2 Specifications

MTBF : 10,000 h @15mA

Definitions of failure for judgment shall be as follows.

1) LCD luminance becomes half of the minimum value specified in 5.2.

2) Lamp doesn't light normally.

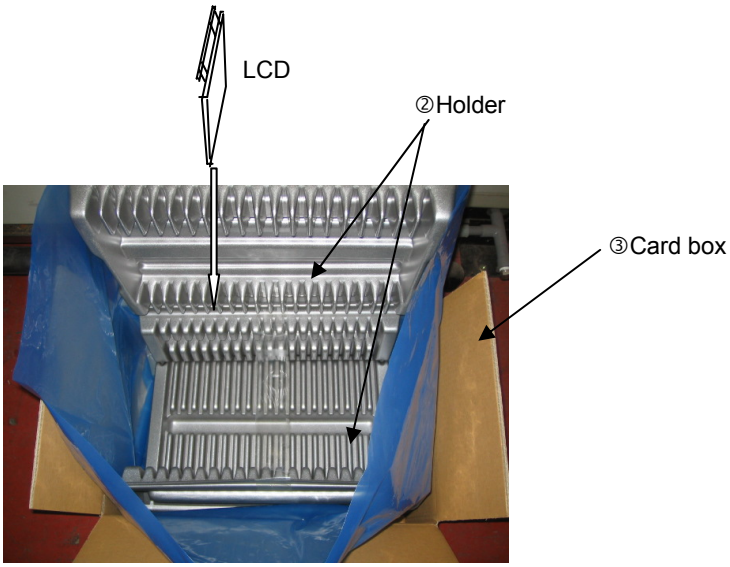
8. Packaging

8.1 Carton (internal package)

(1) Packaging Form

Corrugated cardboard box and polyethylene foam as shock absorber

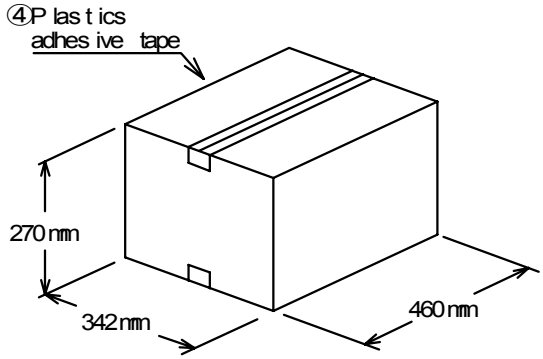
(2) Packaging Method [1)2)]



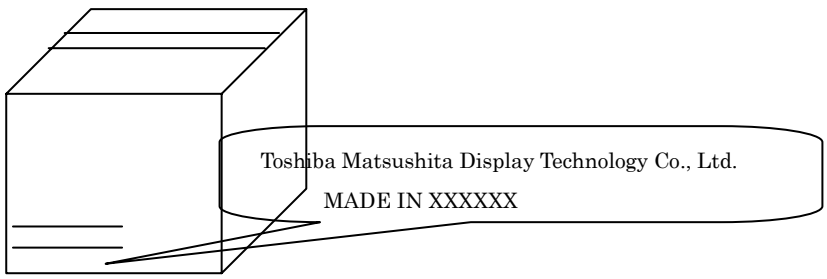
Note 1): Total weight : (Approx.) 10 kg
Note 2): Acceptable number of palette piling: 2 sets

(3) Packaging Material

Number	Quantity	Description
①	20p	Static electricity
②	1set	Holder
③	1p	Corrugated card box
④	1p	Plastics adhesive tape



(4) Carton Marking



9. Warranty

Warranty clause will be decided separately.

10. Regulation

The set (which our LCD module is assembled into) to conform the regulations below, take measures in set side. Toshiba Matsushita Display Technology is not liable for the regulations to the complete set, nor can guarantee our LCD module conform the regulation by itself.

a) Examples of EMI Regulations

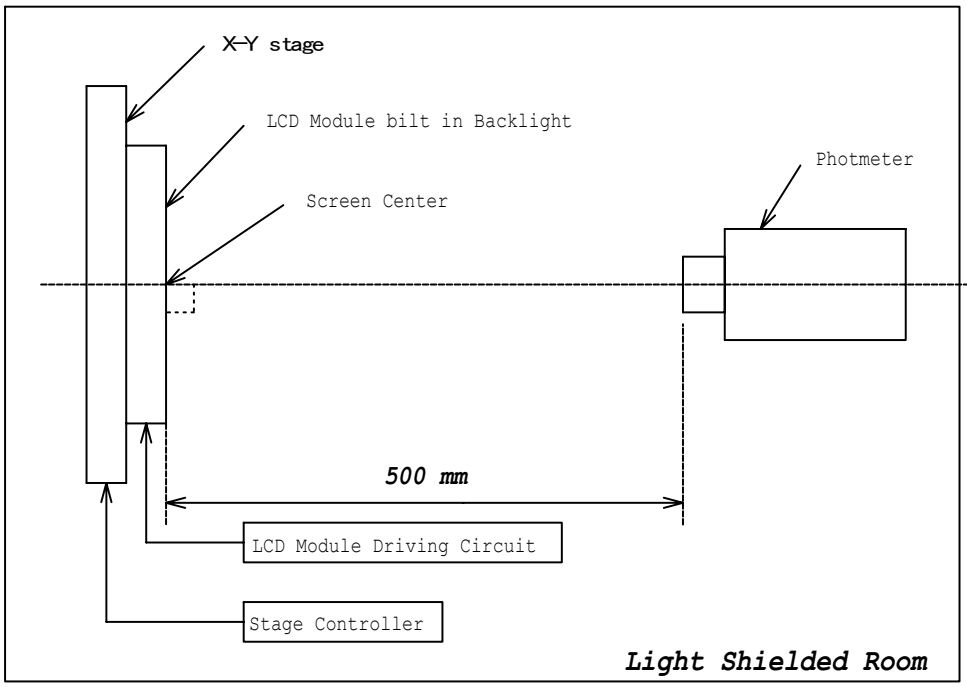
FCC	: PART15 CLASS B
VCCI	: CLASS B
CISPR	: CLASS B

b) Examples of Safety Regulations

IEC	60950
UL	60950

11. Measuring Method

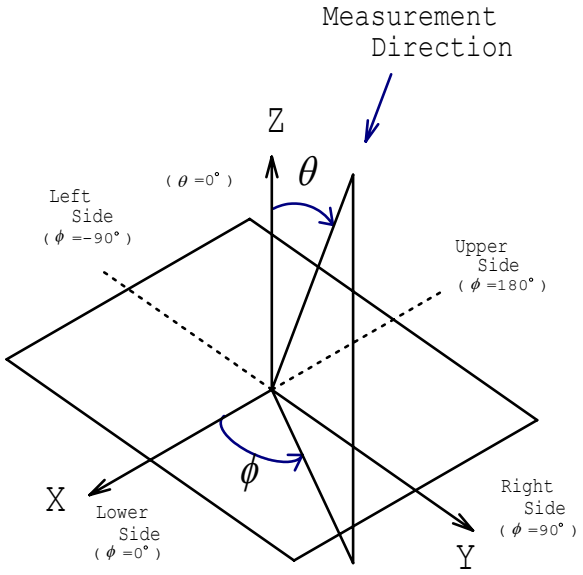
11.1 Measuring System



(1) The measurement point is the center of the active area except for the measurement of Luminance Uniformity.

(2) Photometer : BM-5A / BM-7 TOPCON (Aperture 2°)

(3) Definition of ϕ and θ :



11.2 Measuring Methods

(1) Luminance:

The luminance of the center on a white raster (gray scale level L63) shall be measured.

Measurement shall be executed 30 minutes after the lamp is lit up.

(2) Contrast Ratio:

The contrast ratio can be calculated by the following expression.

Contrast Ratio (*CR*) = L63 / L0

L63 : Luminance on the white raster (gray scale level L63)

L 0 : Luminance on the black raster (gray scale level L0)

(3) Viewing Angle

Viewing angle is defined as the angles(θ, ϕ), in which specified contrast ratio can be obtained.

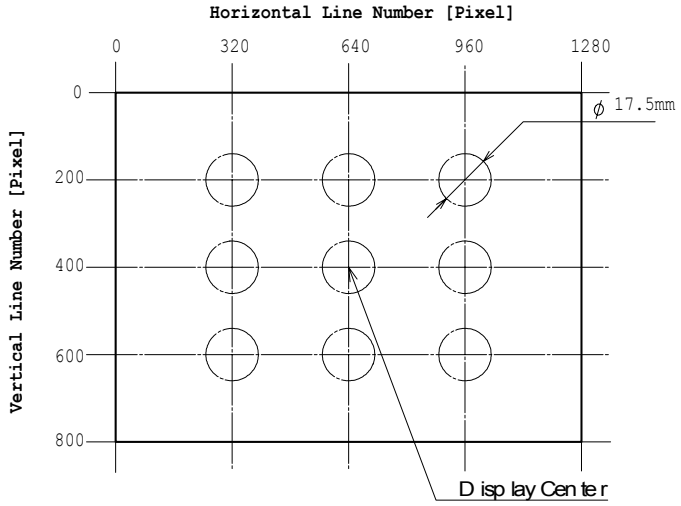
(Refer to 11.1(3) for the axes.)

(4) Luminance Uniformity:

The Luminance should be measured at 9 positions on white raster(gray scale level L63).

Uniformity can be calculated by the following expression.

$$\text{Luminance Uniformity} = \frac{\text{Minimum Luminance}}{\text{Maximum Luminance}} \times 100\%$$

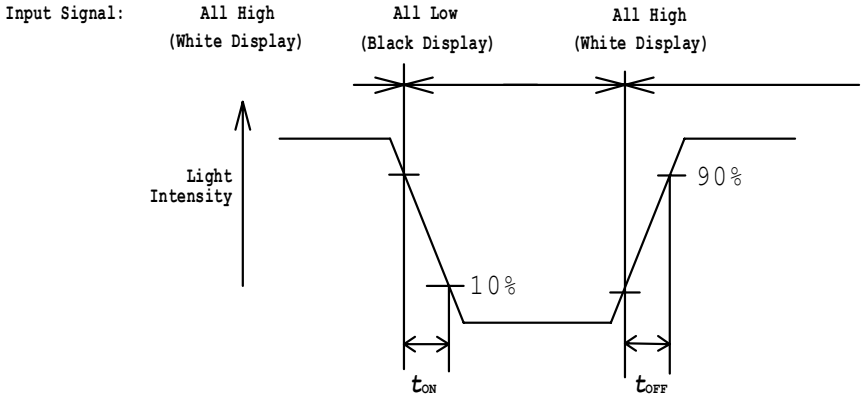


(5) Chromaticity :

The values(x,y) of chromaticity coordinates should be measured for the White, Red, Green and Blue Raster(gray scale level L63) each with a photometer.

(6) Response Time :

The response time (t_{ON}, t_{OFF}) is measured with a photo detector (photodiode) which measures the light intensity of the pixels.



t_{ON} : Turn on time is the time for a photo detector output waveform to go from 90% value to 10% of its maximum.

t_{OFF} : Turn off time is the time for a photo detector output waveform to go from 10% to 90% of its maximum.

Photodiode	: S1223-01 HAMAMATSU PHOTONICS K.K.
White Display	: White Raster (gray scale level L63)
Black Display	: Black Raster (gray scale level L0)

12. EDID

This is the EDID data format to support displays as defined in the VESA Plug & Display.

Header

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	00	Header	00	00000000
1	01	Header	FF	11111111
2	02	Header	FF	11111111
3	03	Header	FF	11111111
4	04	Header	FF	11111111
5	05	Header	FF	11111111
6	06	Header	FF	11111111
7	07	Header	00	00000000

Vendor / Product ID / EDID Version

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
8	08	EISA manufacture code = 3 Character ID	30	00110000
9	09	EISA manufacture code (Compressed ASCII)	64	00011010
10	0A	Panel Supplier Reserved – Product Code	60	01100000
11	0B	Panel Supplier Reserved – Product Code	58	01011000
12	0C	LCD module Serial No - Preferred but Optional (“0” if not used)	01	00000001
13	0D	LCD module Serial No - Preferred but Optional (“0” if not used)	01	00000001
14	0E	LCD module Serial No - Preferred but Optional (“0” if not used)	01	00000001
15	0F	LCD module Serial No - Preferred but Optional (“0” if not used)	01	00000001
16	10	Week of manufacture		Value
17	11	Year of manufacture		Value
18	12	EDID structure version # =	01	00000001
19	13	EDID revision # =	03	00000011

Display Parameters

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
20	14	Video I/P definition = Digital I/P (80h)	80	10000000
21	15	Max H image size = (Rounded to cm)	1A	00011010
22	16	Max V image size = (Rounded to cm)	10	00010000
23	17	Display gamma = (gamma ×100)-100 = Example: (2.2×100) – 100 = 120	78	01111000
24	18	Feature support (no DPMS, Active off, RGB, timing BLK 1)	0A	00001010

Panel Color Coordinates

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
25	19	Red/Green Low bit (RxRy/GxGy)	87	10000111
26	1A	Blue/White Low bit (BxBy/WxWy)	AE	10101110
27	1B	Red X	99	10011001
28	1C	Red Y	57	01010111
29	1D	Green X	4F	01001111
30	1E	Green Y	8C	10001100
31	1F	Blue X	26	00100110
32	20	Blue Y	22	00100010
33	21	White X	50	01010000
34	22	White Y	54	01010100

Established Timings

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
35	23	Established timings 1 (00h if not used)	00	00000000
36	24	Established timings 2 (00h if not used)	00	00000000
37	25	Manufacturer's timings (00h if not used)	00	00000000

Standard Timing ID

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
38	26	Standard timing ID1 (01h if not used)	01	00000001
39	27	Standard timing ID1 (01h if not used)	01	00000001
40	28	Standard timing ID2 (01h if not used)	01	00000001
41	29	Standard timing ID2 (01h if not used)	01	00000001
42	2A	Standard timing ID3 (01h if not used)	01	00000001
43	2B	Standard timing ID3 (01h if not used)	01	00000001
44	2C	Standard timing ID4 (01h if not used)	01	00000001
45	2D	Standard timing ID4 (01h if not used)	01	00000001
46	2E	Standard timing ID5 (01h if not used)	01	00000001
47	2F	Standard timing ID5 (01h if not used)	01	00000001
48	30	Standard timing ID6 (01h if not used)	01	00000001
49	31	Standard timing ID6 (01h if not used)	01	00000001
50	32	Standard timing ID7 (01h if not used)	01	00000001
51	33	Standard timing ID7 (01h if not used)	01	00000001
52	34	Standard timing ID8 (01h if not used)	01	00000001
53	35	Standard timing ID8 (01h if not used)	01	00000001

Timing Descriptor #1

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
54	36	Pixel Clock/10,000 (LSB)	9E	00001110
55	37	Pixel Clock/10,000 (MSB)	20	00100000
56	38	Horizontal Active = xxxx pixels (lower 8 bits) Note	00	00000000
57	39	Horizontal Blanking (Thbp) = xxxx pixels (lower 8 bits)	90	10010000
58	3A	Horizontal Active/Horizontal blanking (Thbp) (upper4:4 bits)	51	01010001
59	3B	Vertical Active = xxxx lines	20	00100000
60	3C	Vertical Blanking (Tvbp) = xxxx lines (DE Blanking min for DE only panels)	1F	00011111
61	3D	Vertical Active : Vertical Blanking (Tvbp) (upper4:4 bits)	30	00110000
62	3E	Horizontal Sync, Offset (Thfp) = xxxx pixels	48	01001000
63	3F	Horizontal Sync, Pulse Width = xxxx pixels	80	10000000
64	40	Vertical Sync, Offset (Tvfp) = xx lines Sync Width = xx lines	36	00110110
65	41	Horizontal Vertical Sync Offset/Width upper 2 bits	00	00000000
66	42	Horizontal Image Size =xxx mm	05	00000101
67	43	Vertical image Size = xxx mm	A3	10100011
68	44	Horizontal Image Size / Vertical image size	10	00010000
69	45	Horizontal Border = 0 (Zero for Notebook LCD)	00	00000000
70	46	Vertical Border = 0 (Zero for Notebook LCD)	00	00000000
71	47	EDID Standard	18	00011110

Timing Descriptor #2 Manufacturer's Specified Range Timing Descriptor

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
72	48	Header : 00 00 00 0F 00	00	00000000
73	49		00	00000000
74	4A		00	00000000
75	4B		0F	00001111
76	4C		00	00000000
77	4D	Value = $HSPW_{min}$ /2 (pixel clks)	02	00000010
78	4E	Value = $HSPW_{max}$ /2 (pixel clks	D3	11010011
79	4F	Value = $Thbp_{min}$ /2 (pixel clks)	04	00000100
80	50	Value = $Thbp_{max}$ /2 (pixel clks)	D5	11010101
81	51	Value = $VSPW_{min}$ /2 (line pulses)	00	00000000
82	52	Value = $VSPW_{max}$ /2 (line pulses)	17	00010111
83	53	Value = $Tvbp_{min}$ /2 (line pulses	01	00000001
84	54	Value = $Tvbp_{max}$ /2 (line pulses	18	00011000
85	55	Thp_{min} = value*2 + $HA_{pixel\ clks}$ (pixel clks) Note	B9	10111001
86	56	Thp_{max} = value*2 + $HA_{pixel\ clks}$ (pixel clks) Note	D7	11010111
87	57	Tvp_{min} = value*2 + VA_{lines} (line pulses)	04	00000100
88	58	Tvp_{max} = value*2 + VA_{lines} (line pulses)	19	00011001
89	59	Module "A" Revision = Example: 00, 01, 02, 03, etc.	00	00000000

Timing Descriptor #3

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
90	5A	Model No.	00	00000000
91	5B	Header : 00 00 00 FE 00	00	00000000
92	5C		00	00000000
93	5D	Terminator : 0A Blank : 20	FE	11111110
94	5E		00	00000000
95	5F	T	54	01010100
96	60	M	4D	01001101
97	61	D	44	01000100
98	62	I	49	01001001
99	63	S	53	01010011
100	64	P	50	01010000
101	65	L	4C	01001100
102	66	A	41	01000001
103	67	Y	59	01011001
104	68	Terminator : 0A	0A	00001010
105	69	Blank : 20	20	00100000
106	6A		20	00100000
107	6B		20	00100000

Timing Descriptor #4

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
108	6C	Module Serial	00	00000000
109	6D		00	00000000
110	6E	Header : 00 00 00 FE 00	00	00000000
111	6F	Terminator : 0A	FE	11111111
112	70	Blank : 20	00	00000000
113	71	L Product Name:	4C	01001100
114	72	T	54	01010100
115	73	D	44	01000100
116	74	1	31	00110001
117	75	2	32	00110010
118	76	1	31	00110001
119	77	E	45	01000101
120	78	W	57	01010111
121	79	6	36	00110110
122	7A	S	53	01010011
123	7B	Terminator : 0A	0A	00001010
124	7C	Blank : 20	20	00100000
125	7D		20	00100000

Byte (dec)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
126	7E	Extension flag (# of optional 128 EDID extension blocks to follow, Typ = 0)	00	00000000
127	7F	Checksum (The 1-byte sum of all 128 bytes in this EDID block shall = 0)	-	-

EDID Notes:

<EEPROM address>

Devise Address Read : A1h
Write : A0h