

FEATURES

- (1) 14.1"XGA(1024x768 pixels) display size for notebook PC
- (2) SPWG-B dimension
- (3) LVDS interface system (H-Sync, V-Sync)
- (4) B-Grade LCD Module

TENTATIVE**MECHANICAL SPECIFICATIONS**

Item	Specifications
Dimensional Outline (typ.)	299.0(W) x 227.8(H) x 5.5max.(D) mm
Number of Pixels	1024(W) x 768(H) pixels
Active Area	285.7(W) x 214.3(H) mm
Pixel Pitch	0.279(W) x 0.279(H)
Weight (approximately)	440g max.
Backlight	Single CCFL, Sidelight type

ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit	
Supply Voltage	(V _{DD})	-0.3	4.0	V
	(V _{FL})	0	2.0	kV(rms)
FL Driving Frequency (f _{FL})	-	100	kHz	
Input Signal Voltage (V _{IN})	-0.3	V _{DD} +0.3	V	
Operating Temperature	0	50	°C	
Storage Temperature	-20	60	°C	
Storage Humidity	10	90	%(RH)	

ELECTRICAL SPECIFICATION

Item	Min.	Typ.	Max.	Unit	Remarks	
Supply Voltage	(V _{DD})	3.0	3.3	3.6	V	
	(V _{FL})	---	680	---	V(rms)	I _{FL} =6.0 mA(rms)
FL Start Voltage (T _a =0°C)		1500	---	---	V(rms)	
Differential Input Voltage	(V _{ID})	100	---	600	mV	
Common Mode Input Voltage	(V _{CM})	1.0	---	2.4-V _{ID} /2	V	
Current Consumption	*2 (I _{DD})	---	235	---	mA	
	*3 (I _{FL})	---	6.0	---	mA(rms)	
*2 *3 Power Consumption		---	4.85	---	W	I _{FL} =6.0 mA(rms)

*1 : Refer to THC63LVDF84A Specification by Thine Electronics, Inc.

*2 : 8 color bars pattern

*3 : Excepting the efficiency FL inverter

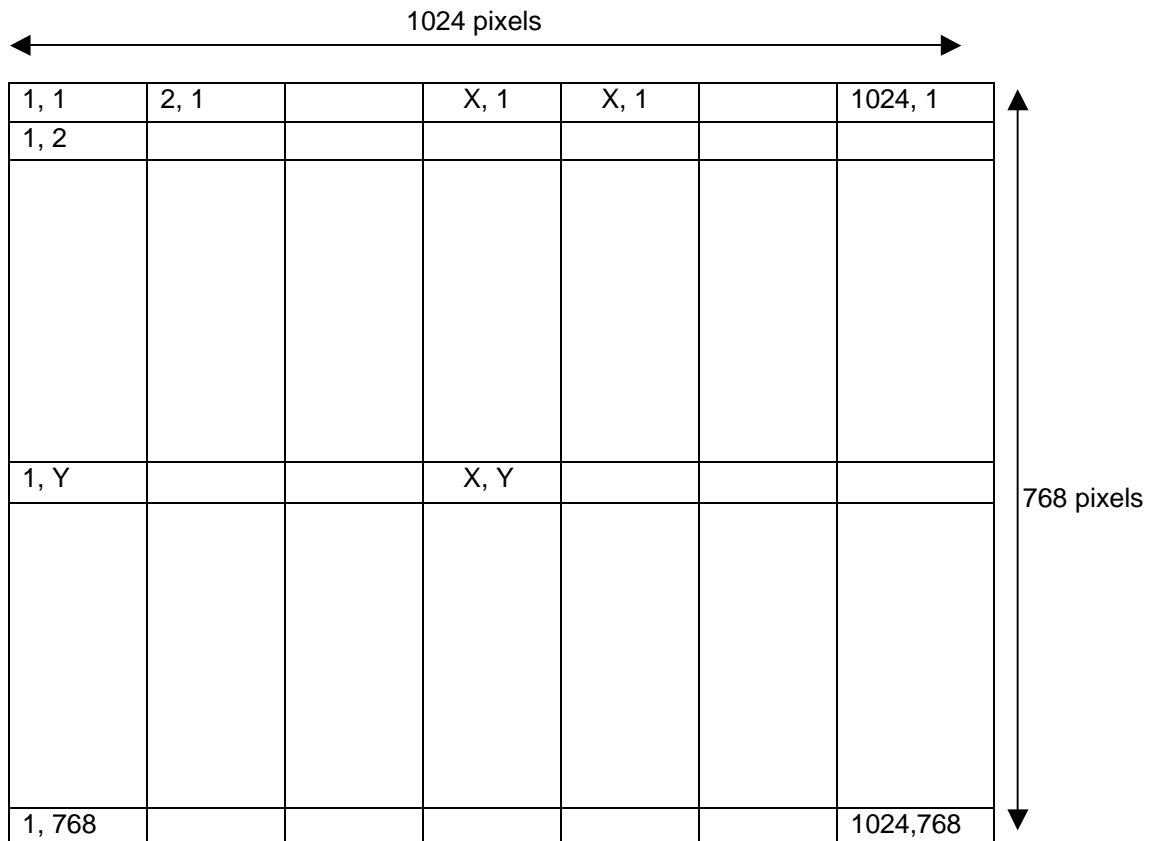
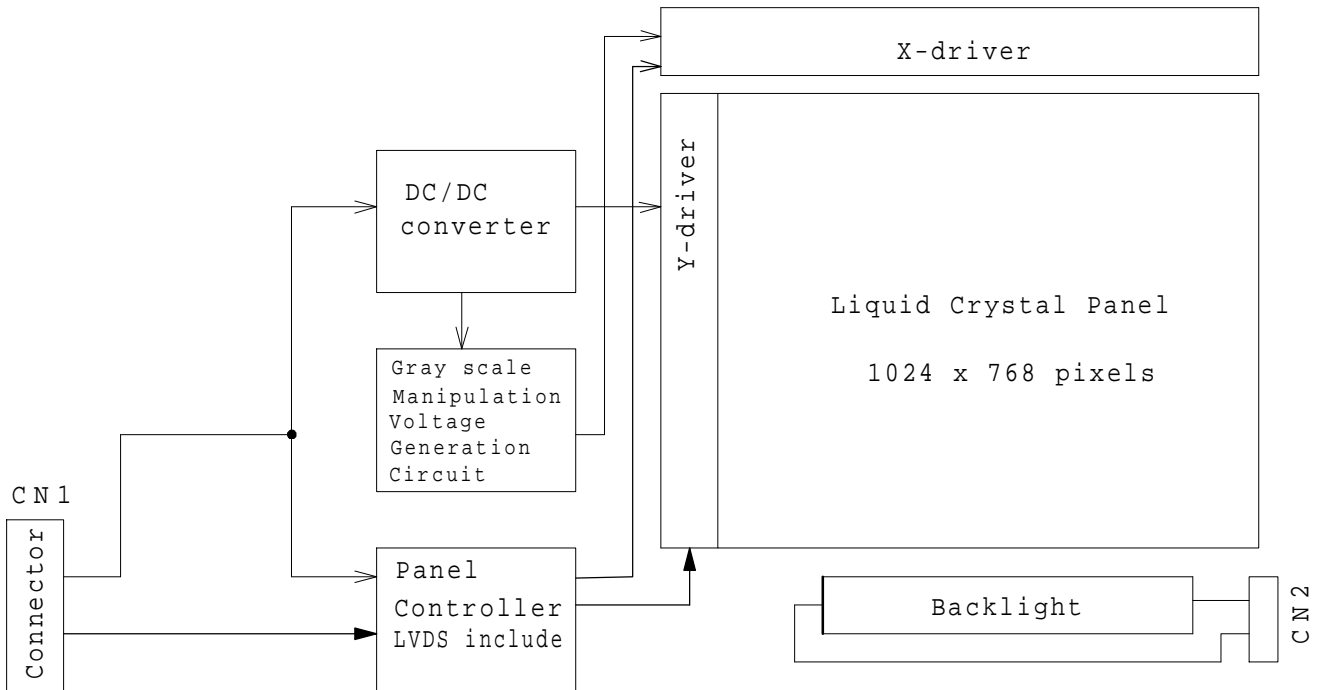
OPTICAL SPECIFICATION (T_a=25°C)

Item	Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (CR)	---	(300)	---	---	
Response Time	(t _{ON})	---	(15)	---	ms
	(t _{OFF})	---	(20)	---	ms
Luminance (L)	---	(170)	---	cd/m ²	I _{FL} =6.0 mA(rms)

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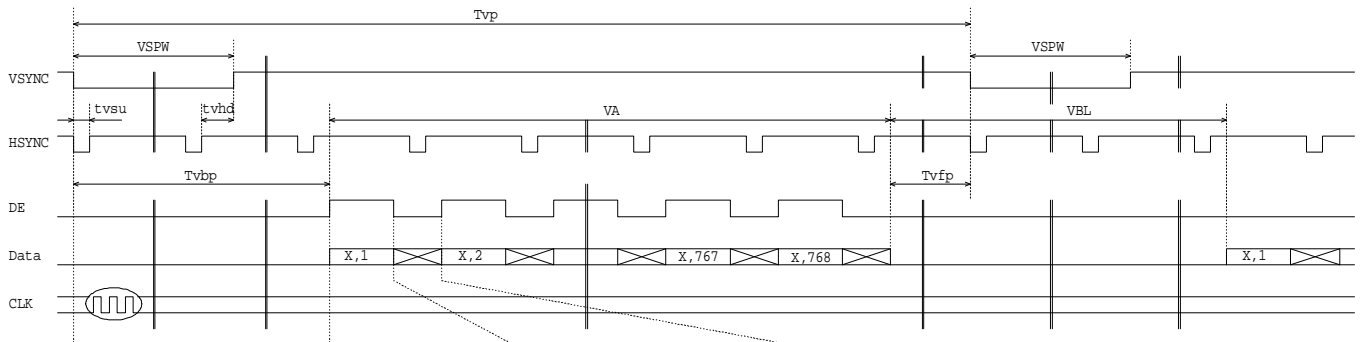
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Matsushita Display Technology before proceeding with the design of equipment incorporating this product.

BLOCK DIAGRAM

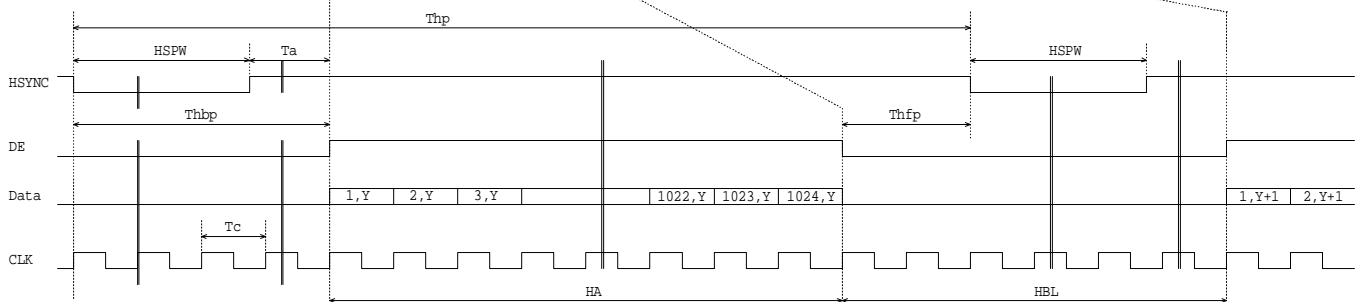


TIMING CHART

(1) Vertical Timing



(2) Horizontal Timing



TIMING SPECIFICATION 1) 2) 3) 4) 5) 6) 7) 8)

Item	Symbol	min.	typ.	max.	unit
Horizontal Scanning Term	Thp	1319	1344	1462	Tc
		-	20.68	-	us
H-sync Pulse Width	HSPW	12	-	140	Tc
Horizontal Front Porch	Thfp	4	-	136	Tc
Horizontal Back Porch	ta	4	-	136	Tc
Horizontal Blanking Term	HBL	295	320	438	Tc
Horizontal Display Term	HA	1024	1024	1024	Tc
Frame Period	Tvp	778	806	860	Thp
		-	16.67	17.24	ms
V-sync Pulse Width	VSPW	2	-	7	Thp
V-sync Set Up Time (to H-sync)	tv _{su}	8	-	14	Tc
V-sync Hold Time	tv _{hd}	8	-	-	-
Vertical Front Porch	Tv _{fp}	2	-	8	-
Vertical Back Porch	Tv _{bp}	8	-	14	-
Vertical Blanking Term	VBL	10	38	92	Thp
Vertical Display Term	VA	768	768	768	Thp
DE Pulse Width	HA	1024	1024	1024	Tc
Clock Period	Tc	15.000	15.384	-	ns

Note 1) Refer to "Timing Chart" and LVDS (THC63LVDF84A) specifications by THine Electronic, Inc..

Note 2) If ENAB is fixed to "H" or "L" level for certain period while NCLK is supplied, the panel displays black with some flicker.

Note 3) If NCLK is fixed to "H" or "L" level for certain period while ENAB is supplied, the panel may be damaged.

Note 4) Please adjust LCD operating signal timing and FL driving frequency, to optimize the display quality.

There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency), even if the condition satisfies above timing specifications and recommended operating conditions shown in 3.

Note5) Do not make *tv*, *tv_{dh}* and *tv_{ds}* fluctuate.

If *tv*, *tv_{dh}*, and *tv_{ds}* are fluctuate, the panel displays black.

Note6) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note7) 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.

Note 8) Please keep below equations.

$$VBL = Tv_{fp} + Tv_{bp}$$

$$HSPW = HBL - Thfp - ta$$

$$Thbp = HSPW + ta$$

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : FI-XB30S*-HF** or FI-X30S-HF** / JAE Locking Type

Mating Connector : Wire Type : FI-X30H(Housing), FI-XC3-1-15000(Contact), FPC Type : FI-X30M or FI-X30MR

Coax Type : FI-X30C or FI-X30C2(Housing), FI-X30CH-7000(Shell)

Terminal No.	Symbol	Function
1	V _{SS}	GND
2	V _{DD}	POWER SUPPLY : +3.3V
3	V _{DD}	POWER SUPPLY : +3.3V
4	NC	Non-Connection
5	NC	Non-Connection
6	NC	Non-Connection
7	NC	Non-Connection
8	RxIN0-	Negative LVDS differential data input, [R0-R5, G0]
9	RxIN0+	Positive LVDS differential data input, [R0-R5, G0]
10	V _{SS}	GND
11	RxIN1-	Negative LVDS differential data input, [G1-G5, B0-B1]
12	RxIN1+	Positive LVDS differential data input, [G1-G5, B0-B1]
13	V _{SS}	GND
14	RxIN2-	Negative LVDS differential data input, [B2-B5, HS, VS, DE]
15	RxIN2+	Positive LVDS differential data input, [B2-B5, HS, VS, DE]
16	V _{SS}	GND
17	RxCLKIN-	Negative LVDS differential clock input
18	RxCLKIN+	Positive LVDS differential clock input
19	V _{SS}	GND
20	RxIN0-	NC
21	RxIN0+	NC
22	V _{SS}	GND
23	RxIN1-	NC
24	RxIN1+	NC
25	V _{SS}	GND
26	RxIN2-	NC
27	RxIN2+	NC
28	V _{SS}	GND
29	RxCLKIN-	NC
30	RxCLKIN+	NC

Note 1) Please connect NC pin to nothing. Don't connect it to grand nor to other signal input.

Please connect GND to ground. Don't use it as no-connect nor connection with high impedance.

Note 2) 262,144 colors are displayed by the combinations of 18 bits data. (See next page)

CN2 CCFL POWER SOURCE

Connector : BHSR-02VS-1 / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

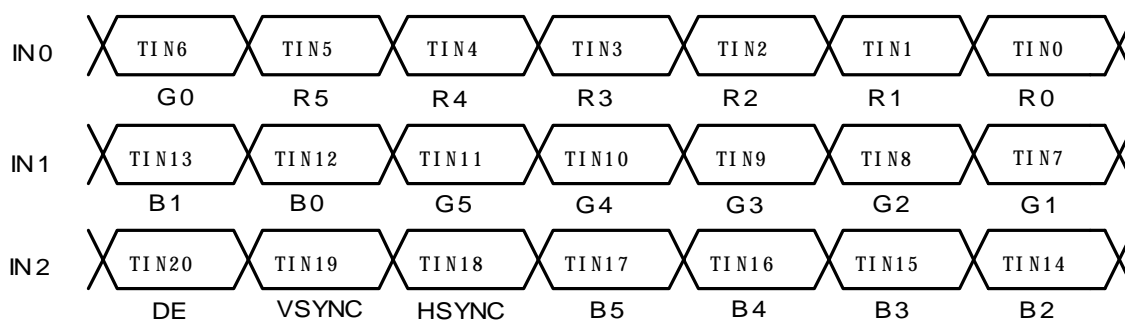
Mating Connector : SM02B-BHS-1 / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Terminal No.	Symbol	Function
1	V _{FLH}	CCFL Power Supply (high voltage)
2	V _{FLL}	CCFL Power Supply (low voltage)

RECOMMENDED TRANSMITTER (DS90CF363) TO LTD141LA2S INTERFACE ASSIGNMENT

Case1: 6bit Transmitter

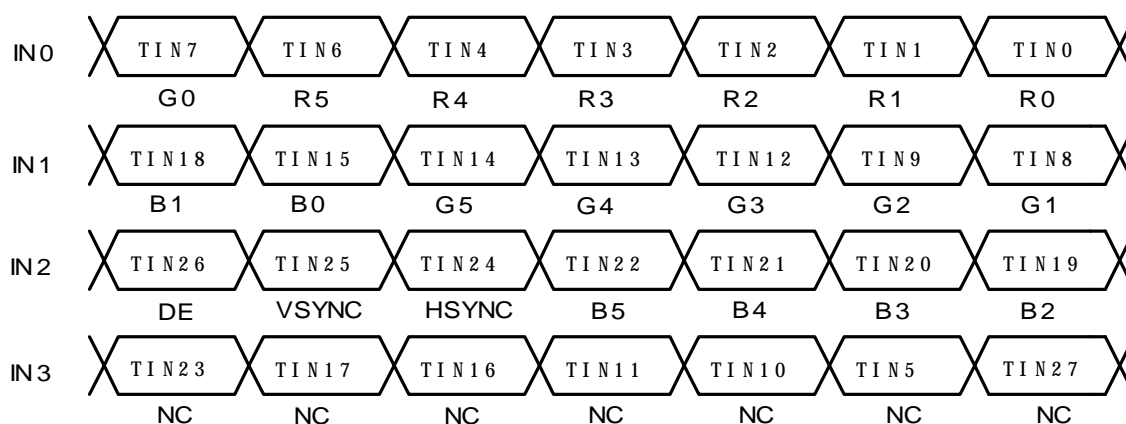
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	To LTD141LA2S Interface(CN1)	
Symbol		Symbol	Function		Terminal	Symbol
T1IN0	44	R0	Red Pixels Display Data (LSB)	TOUT0- TOUT0+	No. 8 No. 9	RxIN0- RxIN0+
T1IN1	45	R1	Red Pixels Display Data			
T1IN2	47	R2	Red Pixels Display Data			
T1IN3	48	R3	Red Pixels Display Data			
T1IN4	1	R4	Red Pixels Display Data			
T1IN5	3	R5	Red Pixels Display Data (MSB)			
T1IN6	4	G0	Green Pixels Display Data (LSB)	TOUT1- TOUT1+	No.11 No.12	RxIN1- RxIN1+
T1IN7	6	G1	Green Pixels Display Data			
T1IN8	7	G2	Green Pixels Display Data			
T1IN9	9	G3	Green Pixels Display Data			
T1IN10	10	G4	Green Pixels Display Data			
T1IN11	12	G5	Green Pixels Display Data (MSB)			
T1IN12	13	B0	Blue Pixels Display Data (LSB)	TOUT2- TOUT2+	No.14 No.15	RxIN2- RxIN2+
T1IN13	15	B1	Blue Pixels Display Data			
T1IN14	16	B2	Blue Pixels Display Data			
T1IN15	18	B3	Blue Pixels Display Data			
T1IN16	19	B4	Blue Pixels Display Data			
T1IN17	20	B5	Blue Pixels Display Data (MSB)			
T1IN18	22	HSYNC	Horizontal Synchronized Signal	TCLK OUT- TCLK OUT+	No.17 No.18	RxCLKIN - RxCLKIN +
T1IN19	23	VSYNC	Vertical Synchronized Signal			
T1IN20	25	DE	Data Enable			
T1CLK IN	26	NCLK	Data Sampling Clock			



RECOMMENDED TRANSMITTER (DS90CF383) TO LTD141LA2S INTERFACE ASSIGNMENT

Case2: 8bit Transmitter

Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	To LTD141LA2S Interface(CN1)	
Symbol		Symbol	Function		Terminal	Symbol
T2IN0	51	RE0	Red Pixels Display Data (LSB)	T1OUT0- T1OUT0+	No.8 No.9	RxIN0- RxIN0+
T2IN1	52	RE1	Red Pixels Display Data			
T2IN2	54	RE2	Red Pixels Display Data			
T2IN3	55	RE3	Red Pixels Display Data			
T2IN4	56	RE4	Red Pixels Display Data			
T2IN5	3	RE5	Red Pixels Display Data (MSB)			
T2IN6	4	GE0	Green Pixels Display Data (LSB)	T1OUT1- T1OUT1+	No.11 No.12	RxIN1- RxIN1+
T2IN7	6	GE1	Green Pixels Display Data			
T2IN8	7	GE2	Green Pixels Display Data			
T2IN9	11	GE3	Green Pixels Display Data			
T2IN10	12	GE4	Green Pixels Display Data			
T2IN11	14	GE5	Green Pixels Display Data (MSB)			
T2IN12	15	BE0	Blue Pixels Display Data (LSB)	T1OUT2- T1OUT2+	No.14 No.15	RxIN2- RxIN2+
T2IN13	19	BE1	Blue Pixels Display Data			
T2IN14	20	BE2	Blue Pixels Display Data			
T2IN15	22	BE3	Blue Pixels Display Data			
T2IN16	23	BE4	Blue Pixels Display Data			
T2IN17	24	BE5	Blue Pixels Display Data (MSB)			
T2IN18	27	HSYNC	Horizontal Synchronized Signal	T1OUT3- T1OUT3+	-	-
T2IN19	28	VSYNC	Vertical Synchronized Signal			
T2IN20	30	DE	Data Enable			
T2IN21	50	NC	Non Connection (open)			
T2IN22	2	NC	Non Connection (open)			
T2IN23	8	NC	Non Connection (open)			
T2IN24	10	NC	Non Connection (open)	T1CLK OUT- T1CLK OUT+	No.17 No.18	RxCLKIN - RxCLKIN +
T2IN25	16	NC	Non Connection (open)			
T2IN26	18	NC	Non Connection (open)			
T2IN27	25	NC	Non Connection (open)			
T2CLK IN	31	NCLK	Data Sampling Clock			



256k (k=1024) COLORS COMBINATION TABLE

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

DISPLAY QUALITY SPECIFICATION

Item	Description / Specifications	Class
Function	No display, Malfunction	Major
Display Quality ¹⁾²⁾³⁾	Missing line	Major
	Missing Sub-Pixels 1) Bright defects : 15pcs. maximum 2) Dark defects : 15pcs. maximum 3) Total sub-pixel defects : 20pcs. maximum	Minor
	Various uniformity (mura) : neglect	-
	Inconspicuous flicker, crosstalk, Newton's ring and other defects : neglect	-
	Black and White Spots/line	Inconspicuous defects : neglect
Backlight	Missing (Non-operating)	Major

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.

**FOR SAFETY**

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.

In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY LCD MODULES".

Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

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 Toshiba Matsushita Display technology's Standard LCD Modules 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 published specification limits.

C) In addition, since Toshiba Matsushita Display technology Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or 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) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.

Toshiba Matsushita Display technology does not warrant the module, if customer disassembled or modified it.

3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.

If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.

If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

4) GLASS OF LCD PANEL

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

5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.

DO NOT TOUCH the parts inside LCD module and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit while power supply is turned on.

6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

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.

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

Suitable protection circuit should be applied for each system design.

7) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.