Toshiba Matsushita Display Technology

Liquid Crystal Display
PRODUCT INFORMATION

Diameter 17.7cm(7.0inch) full color

TFT-LCD Monitor Module
LTA070B1N2F

This data is the tentative data for examining a product.

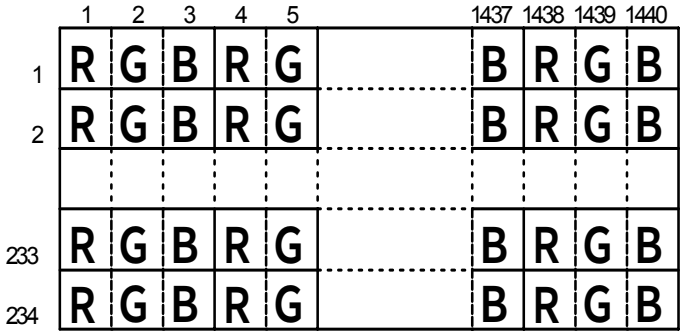
TENTATIVE

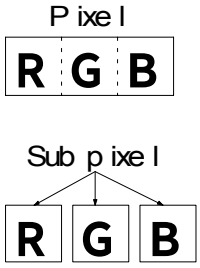
Product specifications

General specifications

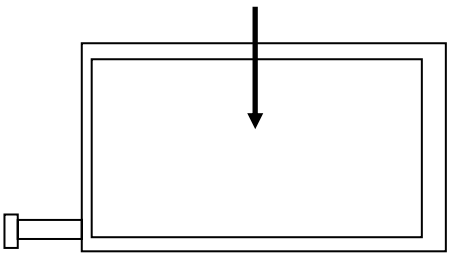
Items		Specifications	Note
Screen size		17.7cm (7.0-inch) diagonal screen	
Display mode		TN full color, Transmissive type	Normally white
Contents		a-Si TFT active matrix panel(COG) Backlight-unit,Case	
Input signal	Supply	4 Supply voltage(V_{DD1},V_{DD2},V_{GH},V_{GL})	
	Signal	6-bit digital RGB signals	Refer to Timing chart
	Sync.	Horizontal/Vertical start puls,clock,enable	
	Common	H-line alternate signal	
	Other	Reversal control	
Number of pixels		800(*W*) x 480(*H*)	Note 1
Number of sub-pixels		2400(*W*) x 480(*H*)	Note 1
Pixel pitch		0.1965(*W*) x 0.1715(*H*)	[unit:mm]
Pixel arrangement		RGB stripe	Note 1
Dimensional outline		167.35(*W*) x 93(*H*) x 6.8(*D*) typ.	[unit:mm]
Backlight		CCFL side light(L type 1 lamp)	
Viewing direction		12 o'clock	Note 2
Weight		180g	(typ.)
Surface treatment		Anti-glare coating on LCD panel surface(Haze=44%) wide view film	
Environment		Pb free LCD	

Note 1 : Pixel arrangement





Note 2 : Viewing direction Viewing direction : 12 o'clock (Max. contrast ratio)



Maximum absolute ratings

Items		Symbol	Conditions	Absolute maximum ratings		Unit	Remarks
				Min.	Max.		
Supply Voltage		*V*DD1	*T*a=25 ± 5°C *V*SS=0V	- 0.3	+4.0	V	
		*V*DD2		- 0.3	+6.0	V	
		*V*GH		+15.0	+42.0	V	
		*V*GL		-18.0	+0.3	V	
		*V*GH-*V*GL		20	40	V	
Input signal voltage	Logic	Note 4		-0.2	*V*DD1	V	
	Data	DA,DB,DC		-0.2	*V*DD1	V	
	Gray scale	V0-V10		-0.2	VDD2	V	
	Common	Vcom		-	+13.0	V	
Input FL current		*I* FL		-	+10	mA	
Storage temperature		*T*stg	–	-40	+85	°C	Note 2
Operating temperature		*T*op	–	-30	+85	°C	Note 2,3

Note 1 : 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. Oterwise the module may be damaged.

Note 2 : The temperature on TFT-LCD panel surface.

Note 3 : The temperature of the module rises under the influence of the backlight. Please design that all parts of this module do not to exceed 85°C

Note 4 : Logic signal : STV1, STV2, CPV, OE, STH1, STH2, CPH, LOAD, U/D, L/R

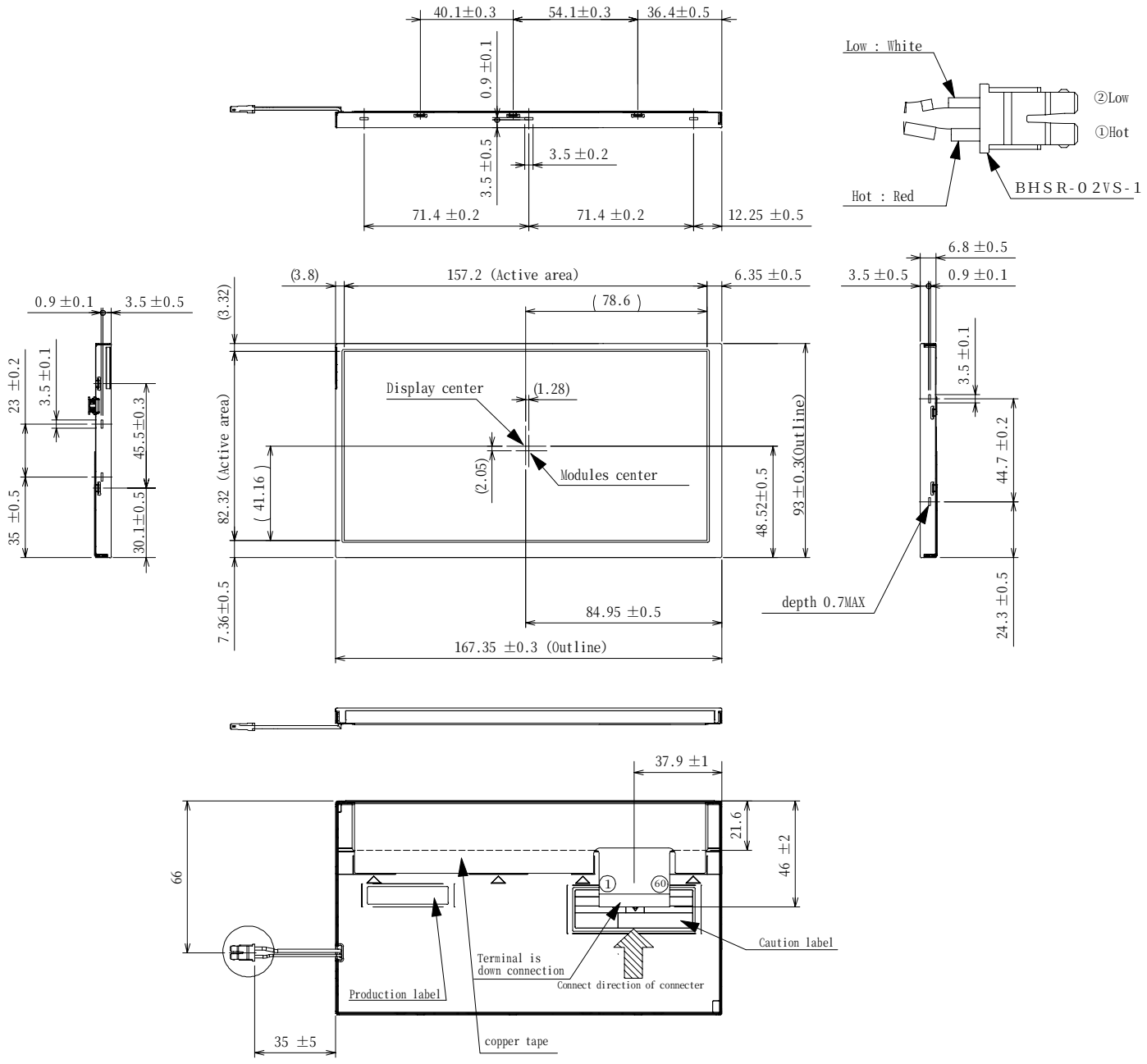
Mechanical Specificaions

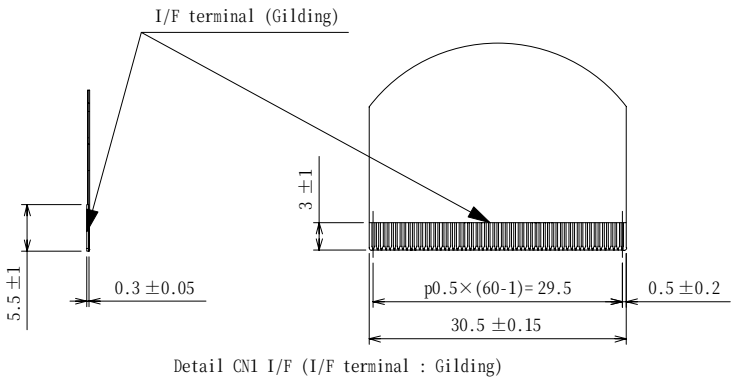
Dimension outline

Item	Specifications	Unit	Note
Dimensional Outline	167.35(W) x 93(H) x 6.8(D)	mm	Typ.
Active area	157.2(W) x 82.32(H)	mm	

Standard tolerance : 0.5mm

Unit : mm





Detail CN1 I/F (I/F terminal : Gilding)

Backlight	1pin	2pin
BHSR-02VS-1	RED	WHITE
	Hot	Low
Finish for Contact pin	Tin-plated	

Interface

[CN1] For LCD panel (60pin, staraight distribution)

No.	Symbol	Functions	No.	Symbol	Functions
1	GND	Ground (0V)	31	DC5	Red data signal 5
2	STH1	Horizontal start pulse 1	32	LOAD	Horizontal enable signal
3	V0	Gray scale voltage	33	L/R	Scanning direction switch
4	V1	Gray scale voltage	34	(NC)	No Connect
5	V2	Gray scale voltage	35	VDD2	Supply voltage(+5.0V)
6	V3	Gray scale voltage	36	VDD2	Supply voltage(+5.0V)
7	V4	Gray scale voltage	37	VDD2	Supply voltage(+5.0V)
8	V5	Gray scale voltage	38	(NC)	No Connect
9	V6	Gray scale voltage	39	GND	Ground (0V)
10	V7	Gray scale voltage	40	GND	Ground (0V)
11	V8	Gray scale voltage	41	CPH	Horizontal clock signal
12	V9	Gray scale voltage	42	GND	Ground (0V)
13	V10	Gray scale voltage	43	(NC)	No Connect
14	DA0	Blue data signal 0	44	VDD1	Supply voltage(+3.3V)
15	DA1	Blue data signal 1	45	VDD1	Supply voltage(+3.3V)
16	DA2	Blue data signal 2	46	STH2	Horizontal start pulse 2
17	DA3	Blue data signal 3	47	(NC)	No Connect
18	DA4	Blue data signal 4	48	VGH	Supply voltage(+18.5V)
19	DA5	Blue data signal 5	49	(NC)	No Connect
20	DB0	Green data signal 0	50	GND	Ground (0V)
21	DB1	Green data signal 1	51	STV2	Vertical start pulse
22	DB2	Green data signal 2	52	OE	Vertical enable signal
23	DB3	Green data signal 3	53	CPV	Vertical clock signal
24	DB4	Green data signal 4	54	U/D	Scanning direction switch
25	DB5	Green data signal 5	55	STV1	Vertical start pulse 1
26	DC0	Red data signal 0	56	(NC)	No Connect
27	DC1	Red data signal 1	57	VGL	Supply voltage(-12.0V)
28	DC2	Red data signal 2	58	(NC)	No Connect
29	DC3	Red data signal 3	59	VCOM	Common voltage
30	DC4	Red data signal 4	60	VCOM	Common voltage

[CN2] For Backlight Connector(BHSR-02VS-1/JAPAN SOLDERLESS TERMINAL MFG Co.,LTD)

No.	Symbol	Functions	I/O
1	VFLH	Power Supply for Backlight（HOT）	INPUT
2	VFLL	Power Supply for Backlight (GND)	INPUT

Note 1 : Power supply sequence

Power ON	V_{DD1}(+3.3V)→V_{DD2}(+5.0V)→V_{GH}(+18.5V) →V_{GL}(-12.0V)
Power OFF	V_{GL}(-12.0V)→V_{GH}(+18.5V)→V_{DD2}(+5.0V) →V_{DD1}(+3.3V)

Select each power supply in above turn, then input ON/OFF to all of them in 60 msec.
(Voltage level ≥90% : ON / Voltage level ≤10% : OFF)
Do not set any power supply ON/OFF individually.

Note 2 : Push-pull inverter will be recommended as high voltage required.

Note 3 : Select horizontal scanning direction as follows;

	No.33 L/R	No.2 STH1	No.46 STH2
Order(L to R)	Hi (3.3V)	Input	Output
Reverce(R to L)	Lo (0V)	Output	Input

* The orderly direction (L to R) : Refer to “Mechanical specifications”

Note 4 : Select vertical scanning direction as follows;

	No.54 U/D	No.55 STV1	No.51 STV2
Order(U to D)	Lo (0V)	Input	Output
Reverce(D to U)	Hi (3.3V)	Output	Input

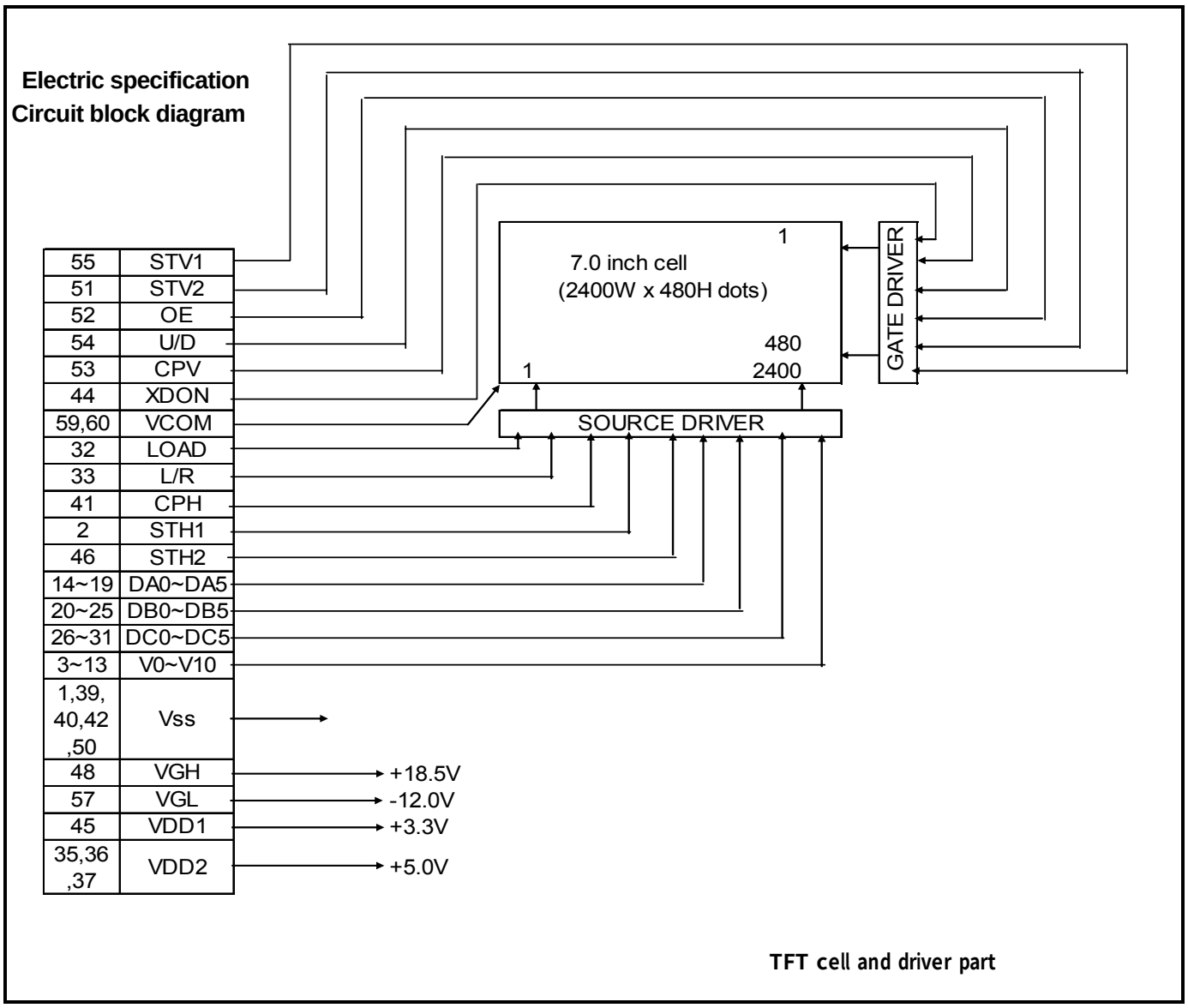
* The orderly direction (U to D) : Refer to “Mechanical specifications”

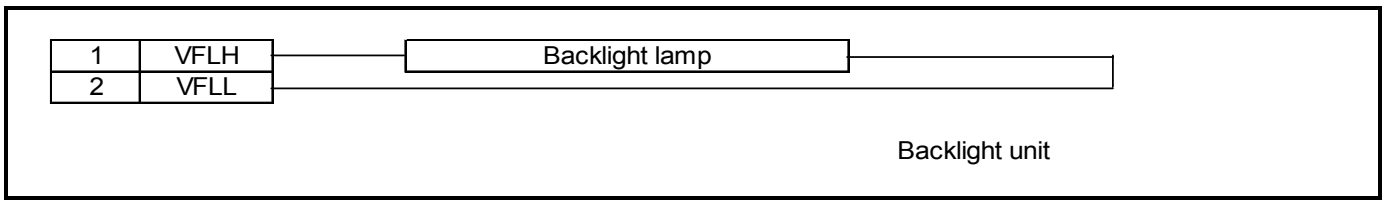
Note 5 : The relation between the display data and the gray scale level :

	Gray scale	D5 (MSB)	D4	D3	D2	D1	D0 (LSB)
dark	Lo	Lo	Lo	Lo	Lo	Lo	Lo
:	L1	Lo	Lo	Lo	Lo	Lo	Hi
:	L2	Lo	Lo	Lo	Lo	Hi	Lo
:	:	:	:	:	:	:	:
:	L61	Hi	Hi	Hi	Hi	Lo	Hi
:	L62	Hi	Hi	Hi	Hi	Hi	Lo
bright	L63	Hi	Hi	Hi	Hi	Hi	Hi

Electrical specifications

Circuit block diagram

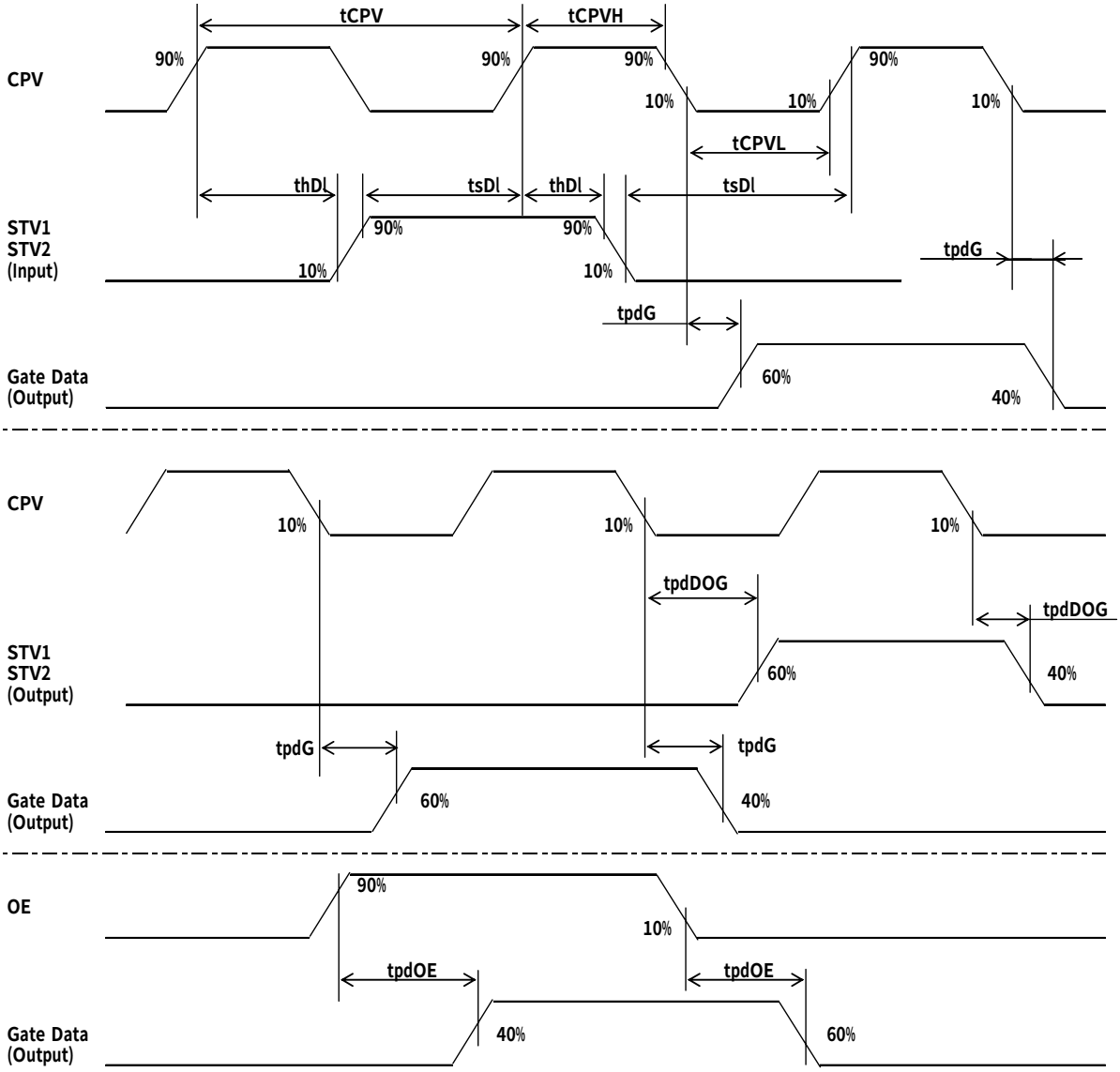




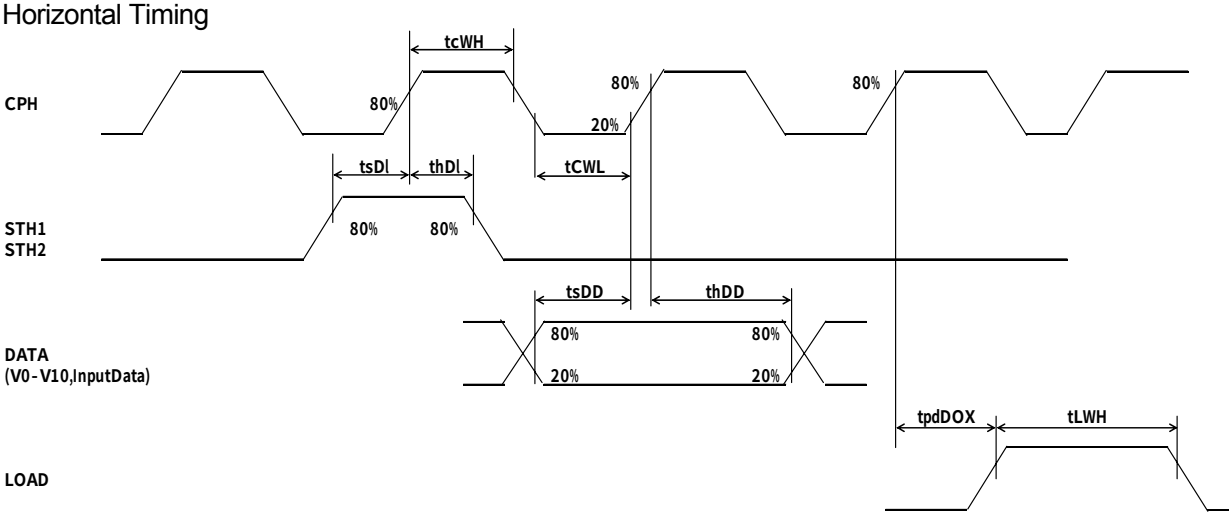
Timing specifications

Indicating timing diagram

Vertical Timing



Horizontal Timing



Input timing specifications

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
Gate	Frequency	1/tCPV	-	-	500	kHz
	Cycle	tCPV	2	-	-	μs
	High time	tCPVH	300	-	-	ns
	Low time	tCPVL	250	-	-	ns
	Setup time	tsDI	200	-	-	ns
	Hold time	thDI	500	-	-	ns
Source	Frequency	1/tCPH	-	-	50	MHz
	High time	tCWH	8	-	-	ns
	Low time	tCWL	6	-	-	ns
	Enable setup	tsDI	4	-	-	ns
	Enable hold	thDI	0	-	-	ns
	Data setup	tsDD	4	-	-	ns
	Data hold	thDD	0	-	-	ns
Delay time	CPV~STV	tpdDOG	-	-	300	ns
	CPV~DATA	tpdG	-	-	1	μs
	OE~DATA	tpdOE	-	-	1	μs
	CPH~LOAD	tpdDOX	7	-	-	ns

Recommended Operating Conditions (Ta=25°C,VSS=0V)

ITEMS	SYMBOL	CONDITONS	SPECIFICATIONS (Note 1)			UNIT	Remarks
			MIN.	TYP.	MAX.		
SUPPLY POWER VOLTAGE	V_{DD1}	-	+3.0	+3.3	+3.6	V	
	V_{DD2}		+4.5	+5.0	+5.5		
	V_{GH}		+18.0	+18.5	+19.0		
	V_{GL}		-13.0	-12.0	-11.0		
INPUT SIGNAL (C-MOS)	V_{IH}	H LEVEL	$0.8V_{DD1}$	-	V_{DD1}	V	
	V_{IL}	L LEVEL	-0.3	-	$0.2V_{DD1}$		
Input signal timing			Refer to Timing Specifications				
COMMON SIGNAL AMPLITUDE	*V*com-AC		2.8	5.8	8.8	V(p-p)	
	*V*com-DC	-	-	(2.45)	-	V	Note2
BACKLIGHT VOLTAGE	V_{FL}	IL=6.0mA	-	620	-	V(rms)	Note2,5
BACKLIGHT CURRENT	I_{FL}	-	5.5	6.0	6.5	mA(rms)	
FL DRIVING FREQUENCY	f_{FL}	-	-	55	-	kHz	Note3
DISCHARGE STARTING VOLTAGE	V_{SFL}	Ta=-30°C	(2000)	-	-	V(rms)	Note2,4,5

Note 1 : The recommended operating conditions show the ranges in which the device can operate normally. Operation beyond the limit of the recommended operating conditions is not assured, even though operating conditions are within the limit of the absolute maximum ratings.

Note 2 : Reference value.

Note 3 : Recommended value.

Note 4 : Initial value.Discharge starting voltage would rise by the change with the passage of time. The value is the voltage measured in front of ballast condenser of inverter by the effective voltmeter or the oscilloscope when the electric current flows.

Note 5 : Lighting ignition voltage/back light voltage is defined as following measuring circuit. Standerd iniverter (Harison HIU-742A 16.5pF)

Electrical & Optical characteristics

Common test conditions : T_a=25 ± 5°C, RH=65 ± 5%, V_{DD1}=3.3V,V_{DD2}=5.0V, V_{GH}=18.5V, V_{GL}= -12.0V, V_{SS}=0V, I_{FL}=6.0mA(rms), f_{FL}=55kHz(TMD's standard inverter), Measured after 30 minutes operation.

ITEMS		SYMBOL	CONDITIONS	SPECIFICATIONS MIN.	SPECIFICATIONS TYP.	SPECIFICATIONS MAX.	UNIT	REMARKS
SUPPLY CURRENT		I_{DD1}	-	-	5.0	-	mA	Note1
		I_{DD2}	-	-	17	-	mA	
		I_{GH}	-	-	200	-	μA	
		I_{GL}	-	-	200	-	μA	
RESPONSE TIME		t_{ON}	Data=L63→L0	-	-	40	ms	
		t_{OFF}	Data=L0→L63	-	-	80		
CONTRAST RATIO		CR	Data=L63/L0	150	300	-	-	Note 2
VIEWING ANGLE	L/R	θ10	Data=L63/L0 CR≥10	50/50	60/60	-	°	Note 7
	U/D	ϕ10		50/30	60/40	-		
LUMINANCE		L	Data=L63	420	500	-	cd/m2	Note 2,5
WHITE CHROMATICITY (Reference)		x	Data=L63	-	(0.327)	-	-	Note 5
		y		-	(0.338)	-		
UNIFORMITY		DLUM	Data=L63	70	-	-	%	Note 5
Low-temperature Start luminance		L_{LOW}	2min,-20° 9mA	-	(350)	-	cd/m2	Note 4 Note 5
BACKLIGHT LIFE (Reference)		-	I_{FL}= 6.0mA(rms) ,continuious	(10000)	-	-	h	Note 3
		-	Ta=-20°,periodic	(2000)	-	-	(Time)	Note 6

Note 1:Timing controller current is not include.

Note 2:100% brightness. These values vary with brightness input.

Note 3:MTTF(Mean Time to Failure), time to become 50% brightness.

Note 4:Reference Value. This spec data used TMD's standard inverter.

Note 5:This spec is spectroradiometer [BM-7] of TMD's Himezji factory.

Note 6:1time = ON(5min) – OFF(5min), I_{FL}=9mArms

Note 7:The viewng direction of this product is 12 o'clock(up side). It is in direction of maximum CR, and shows darker tint.

CAUTION AND HANDLING PRECAUTIONS

For Safety

(1) Special Purposes

Please inform and consult Toshiba when LCD module is used for the equipment that relates to the safety of human body or human life.

(2) Electric Shock

Disconnect power supply before handling LCD module. Do not touch the parts inside LCD module in order to prevent electric shock.

(3) 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 dose not warrants the module, if customer disassembled or modified it.

(4) 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.

(5) Glass of LCD Panel

Be careful with chips of glass that may cause injuring fingers or skin, when the glass is broken.

(6) 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.

Power supply	Recommended maximum output current of power supply
V_{DD1}	≤ 0.5A
V_{DD2}	≤ 1.0A
V_{GH}	≤ 0.5A
V_{GL}	≤ 0.5A

(7) Disposal

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

<END>