Toshiba Matsushita Display Technology

LIQUID CRYSTAL DISPLAY
PRODUCT INFORMATION

Diameter 18cm(7inch) full-color

LTA070B0SxA

TENTATIVE

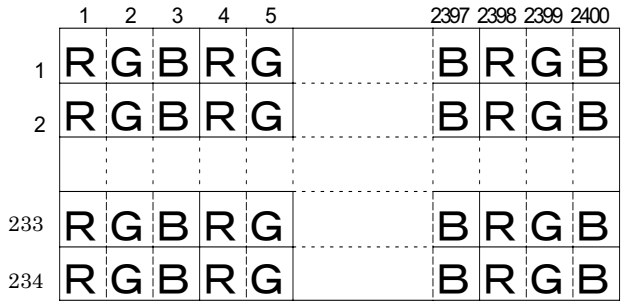
FEATURE

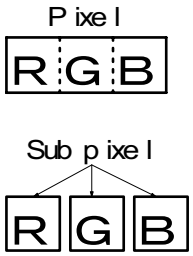
(1) 18cm(7inch)diagonal and wide display.(The ratio 17(W):9(H))
(2) High resolution display.(480(W)x234(H) pixel)
(3) Wide viewing angle spec.
(4) Wide range temperature.

GENERAL SPECIFICATIONS

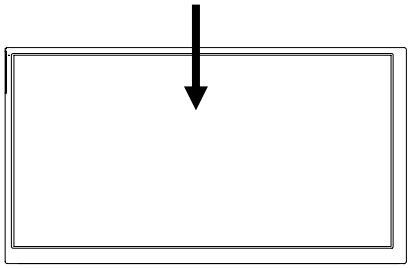
ITEM		PECIFICATION	UNIT
DISPLAY SIZE		18cm diagonal (7inch) screen	-
CONTENTS		TFT-cell(COG), Backlight, Case	-
DISPLAY MODE		TN Full-color, a-Si TFT active matrix, Normally-white	-
INPUT SIGNALS	SUPPLY	4 Supply voltage (+3.3V,+5.0V,+18.5V,-12.0V)	
	Sync.	Horizontal/Vertical start pulse and clock,enable	-
	Video	Specified Analog RGB Signals(H-line inverted)	-
	Common	H-line inverted Signal	-
NUMBER OF PIXELS		480(W) x 234(H)	-
NUMBER OF SUB PIXELS		1440(W) x 234(H)	-
PIXEL ARRANGEMENT		RGB stripe(Note.1)	-
PIXEL PITCH		0.3255(W) x 0.352(H)	mm
DIMENSIONAL OUTLINE(typ)		167.0(W) x 93.0(H) x 6.8(D)	mm
WEIGHT		175(typ.)	g
BACKLIGHT		CCFL edge light (L type 1 lamp)	-
VIEWING DIRECTION		Maximum contrast ratio at 12 o'clock (Note.2)	-
SURFACE TREATMENT		AG coating on LCD panel surface	-
Environment		Pb free LCD	-

Note 1 : Pixel arrangement





Note 2: Viewing direction



12 o'clock (Source driver and FPC are down side)

- The technical information carried in this data explains typical operation and application of a product, and does not perform guarantee to the right of the industrial property others of our company and a third person, or consent of concession in case of the use.
- The items mentioned may refuse and may be changed that there is nothing. Please ask TMD in use.

ABSOLUTE MAXIMUM RATING.

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	+6.5		
		V_{GH}		+15.0	+29.0	V	
		V_{GL}		-17.0	V_{SS}	V	
		V_{GH}-V_{GL}		15.0	42.0	V	
Input signal voltage	Video	VR,VG,VB		V_{SS}+0.2	V_{DD2}-0.3	V	
	Sync.	STH1,STV 1,CPH,CPV		V_{SS}-0.3	V_{DD1}+0.3	V	
	Common	Vcom		-10.0	13.0	V	
Input FL current		I_{FL}	–	–	10	mA	
Operating temperature		Top	–	-30	85	°C	Note 2,3
Storage temperature		Tstg	–	-40	85	°C	Note 2

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.

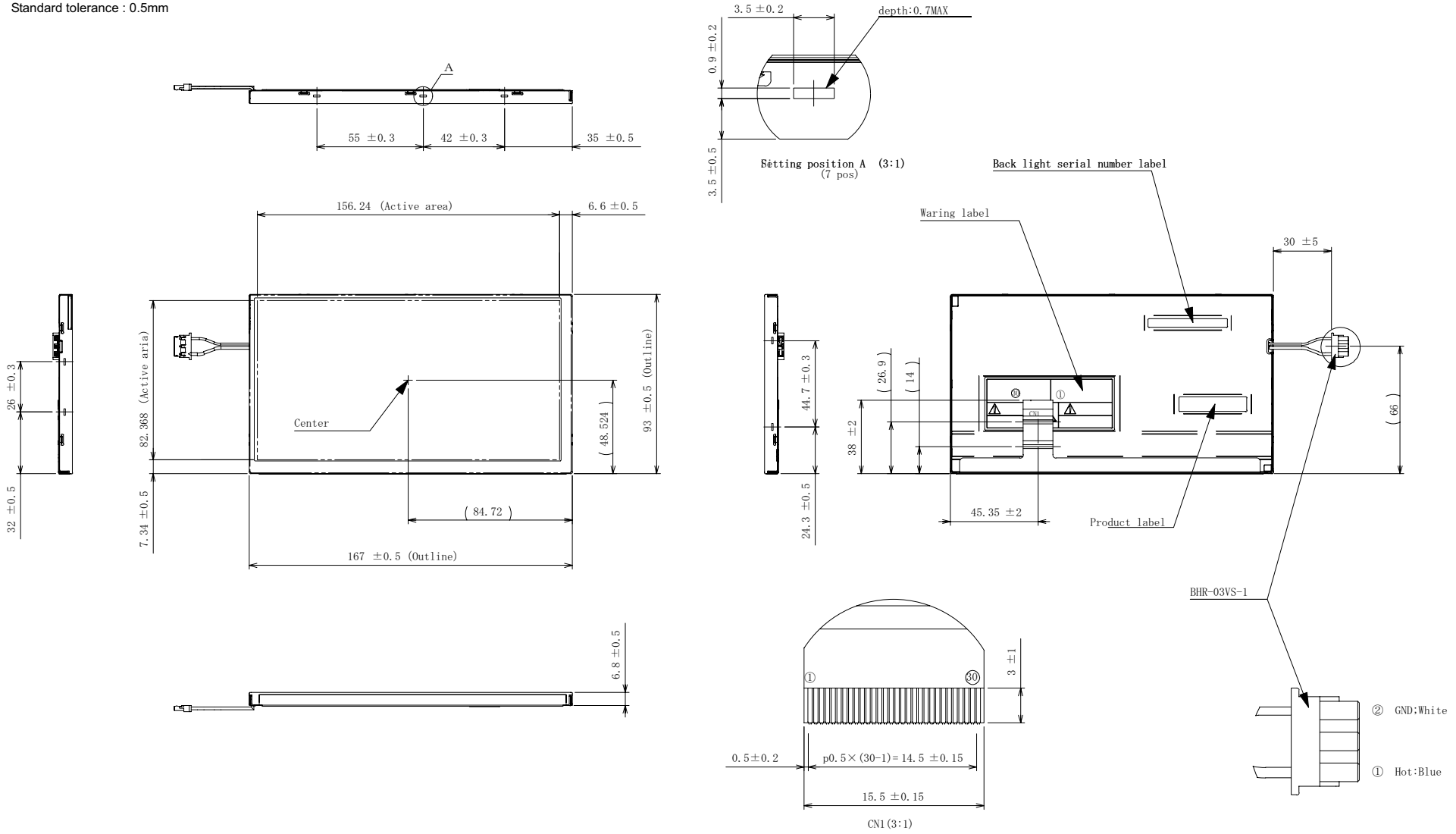
Note 2 : The temperature on TFT-LCD panel surface.

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°

Mechanical specifications

Unit : mm

Standard tolerance : 0.5mm



INTERFACE

[CN1] For LCD panel (FPC:0.5mm Pitch)

No.	Symbol	Functions	I/O	Remarks
1	VSS	Ground (0V)	-	
2	NC	No Connect	-	
3	V_{GL}	Power Supply –12.0V	INPUT	Note1
4	STV1	Vertical start pulse 1	INPUT	Note2
5	U/D	Scanning Direction Switch normally Lo input	INPUT	Note2
6	CPV	Vertical clock pulse	INPUT	
7	OE1	Vertical(gate) enable 1	INPUT	
8	OE2	Vertical(gate) enable 2	INPUT	
9	OE3	Vertical(gate) enable 3	INPUT	
10	STV2	Vertical start pulse 2	INPUT	Note2
11	V_{DD1}	Power Supply +3.3V	INPUT	Note1
12	NC	No Connect	-	
13	V_{GH}	Power Supply +18.5V	INPUT	Note1
14	NC	No Connect	-	
15	Vcom	Common Voltage	INPUT	
16	STH2	Horizontal start pulse 2	INPUT	Note3
17	V_{DD2}	Power Supply +5.0V	INPUT	Note1
18	VR	Video Input R	INPUT	
19	VG	Video Input G	INPUT	
20	VB	Video Input B	INPUT	
21	VSS	Ground (0V)	-	
22	CPH1	Horizontal clock pulse1	INPUT	Note4
23	CPH2	Horizontal clock pulse2	INPUT	Note4
24	CPH3	Horizontal clock pulse3	INPUT	Note4
25	VSS	Ground (0V)	-	
26	MODE	Date Sampling Switch	INPUT	Noet4
27	L/R	Scanning Direction Switch normally Hi input	INPUT	Noet3
28	CX	Column driver latch channel control	INPUT	Note3
29	STH1	Horizontal start pulse 1	INPUT	
30	VSS	Ground (0V)	-	

Mating connector : 54132-3092/Molex

[CN2] For Backlight (Connector : BHR-03VS-1/Japan soderless terminal mfg co.,ltd)

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

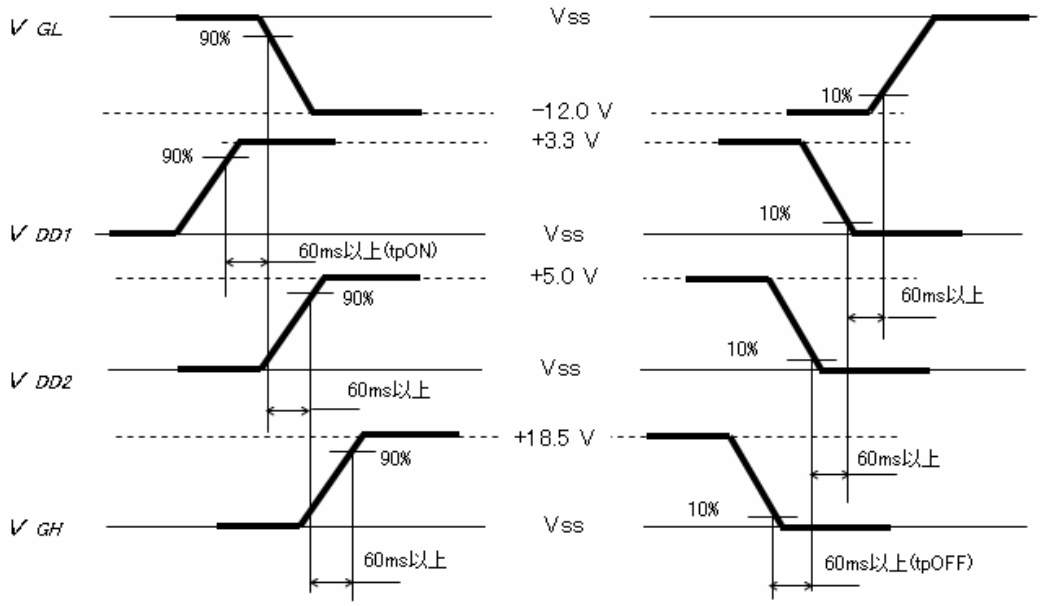
Mating connector: BHSR-03VS-1/J.S.T.Mfg Co.,Ltd

Note1:Power supply sequence

Power ON VDD1 → VGL → VDD2 → VGH

Power OFF VGH → VDD2 → VDD1, VGL

＜ON sequence＞ ＜OFF sequence＞



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

Note2: gate scanning control signal as follows.

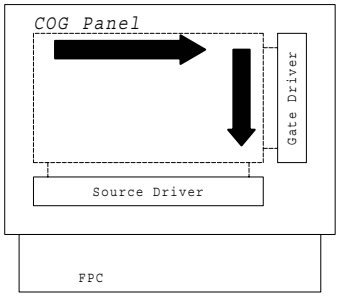
Positive

Up to down	U/D(No.5)	STV1(No.4)	STV2(No.10)
	Lo	Input	Output
Left to right	L/R(No.27)	STH1(No.29)	STH2(No.16)
	Hi	Input	Output

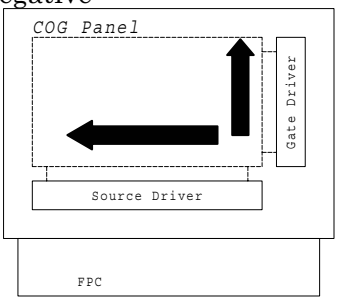
Negative

down to Up	UD(No.5)	STV1(No.4)	STV2(No.10)
	Hi	Output	Input
Right to Lef	L/R(No.27)	STH1(No.29)	STH2(No.16)
	Lo	Output	Input

Positive



Negative



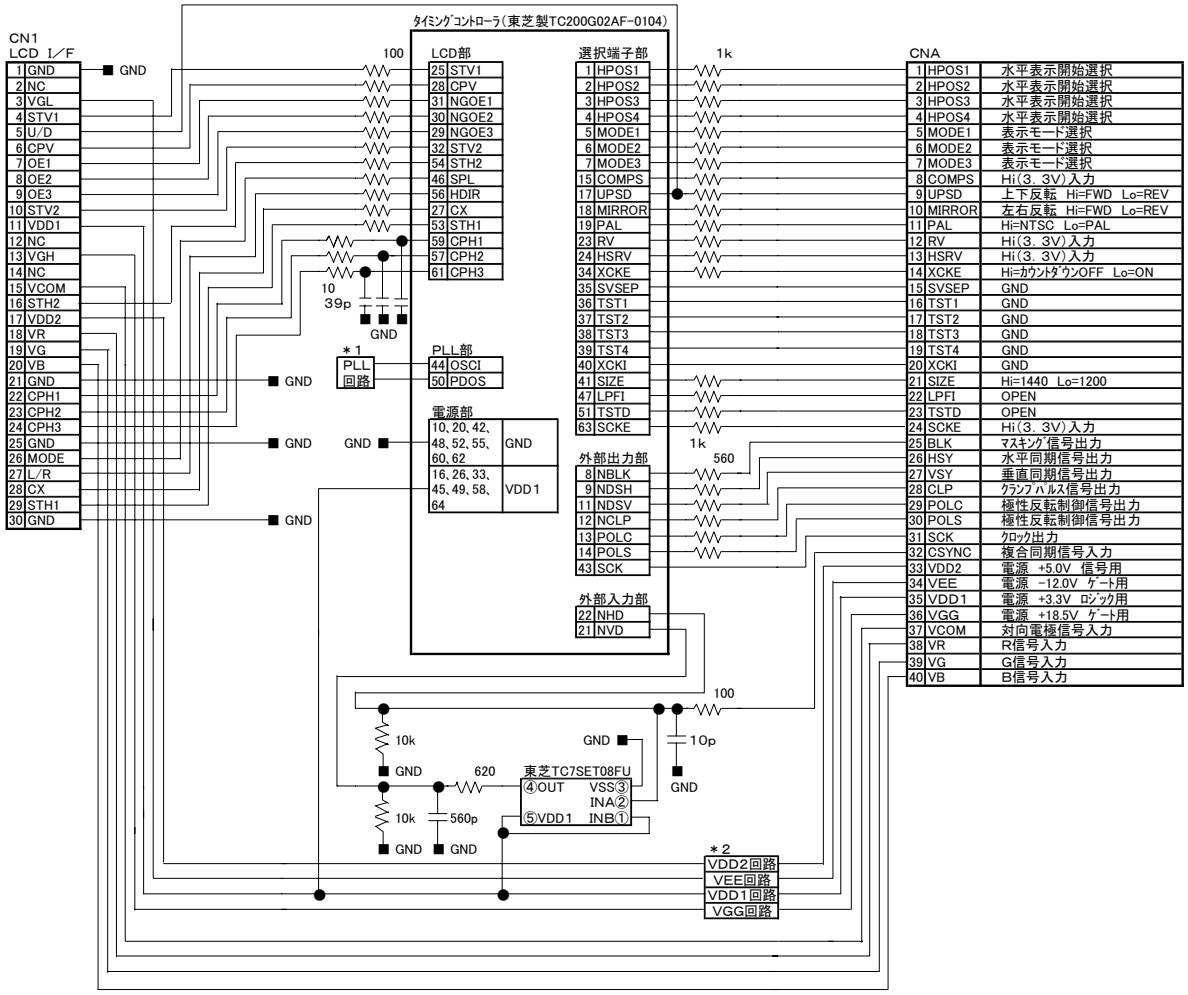
Note4 : source sampling method as follows.

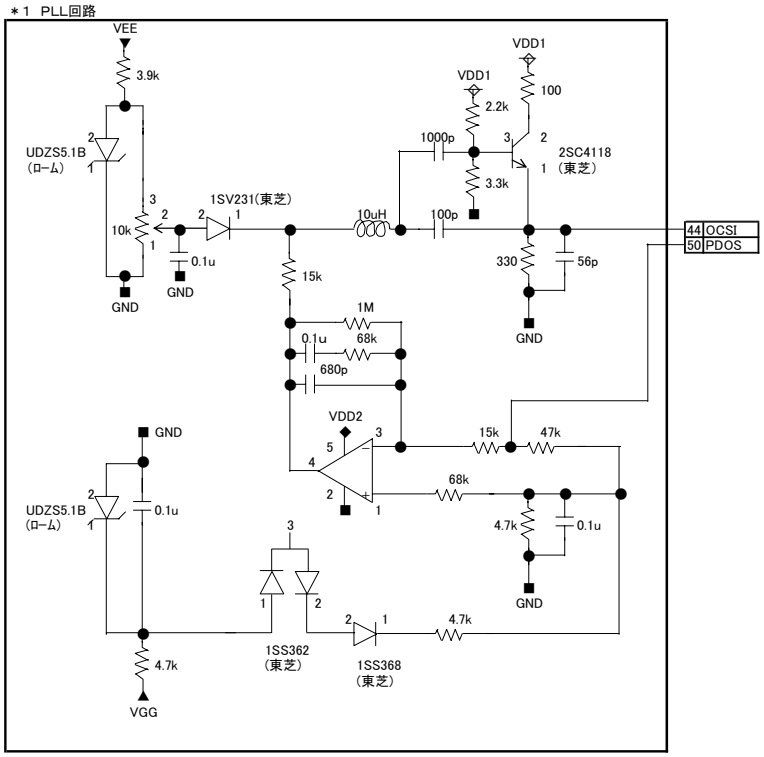
	No. 26 MODE	No. 22 CPH1	No. 23 CPH2	No. 24 CPH3
Sequential sampling	Lo	Input	Input	Input
Synchronous samplig	Hi	Input	Lo	Lo

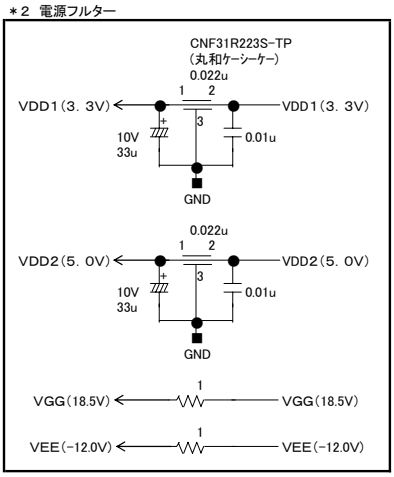
Note5 : Refer to an electric characteristic standard and a timing.

Note6 : Refer to “Recommended operating circuit

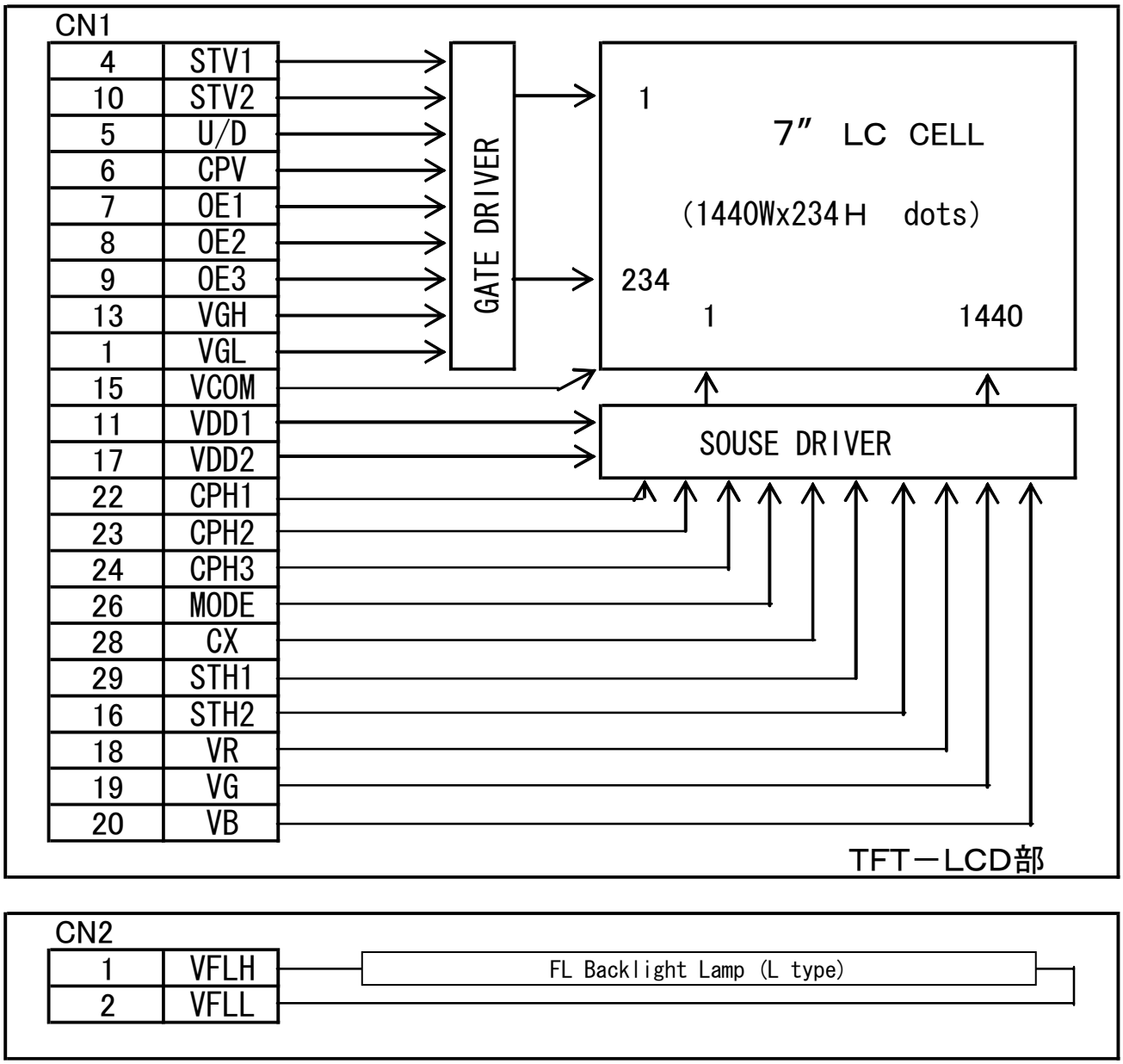
Recommended operating circuit





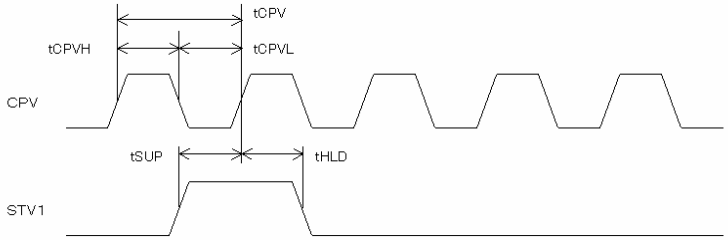


CIRCUIT BLOCK DIAGRAM



TIMING CHART

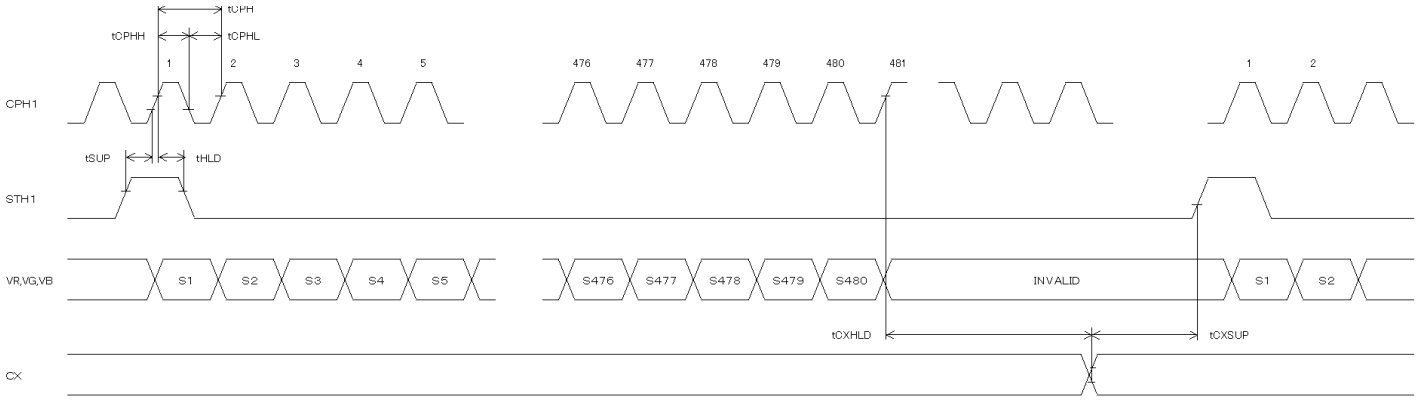
Vertical Timing



Horizontal Timing

RGB simultaneous sampling

Sampling(MODE=Hi)



Timing example for use timing controller[TC200G02AF-0104(TOSHIBA)]

<Vertical> (NTSC)

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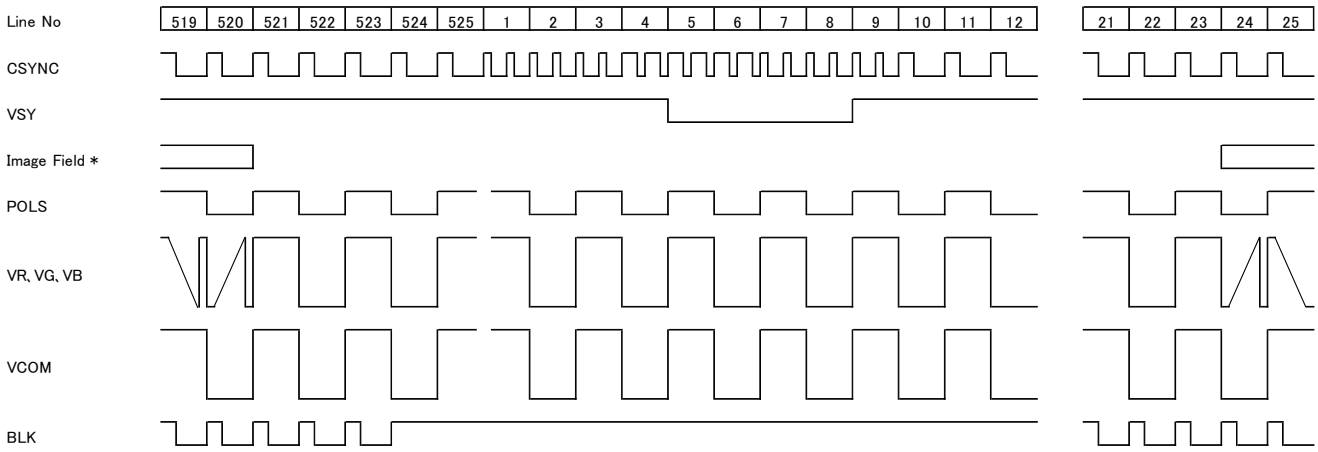
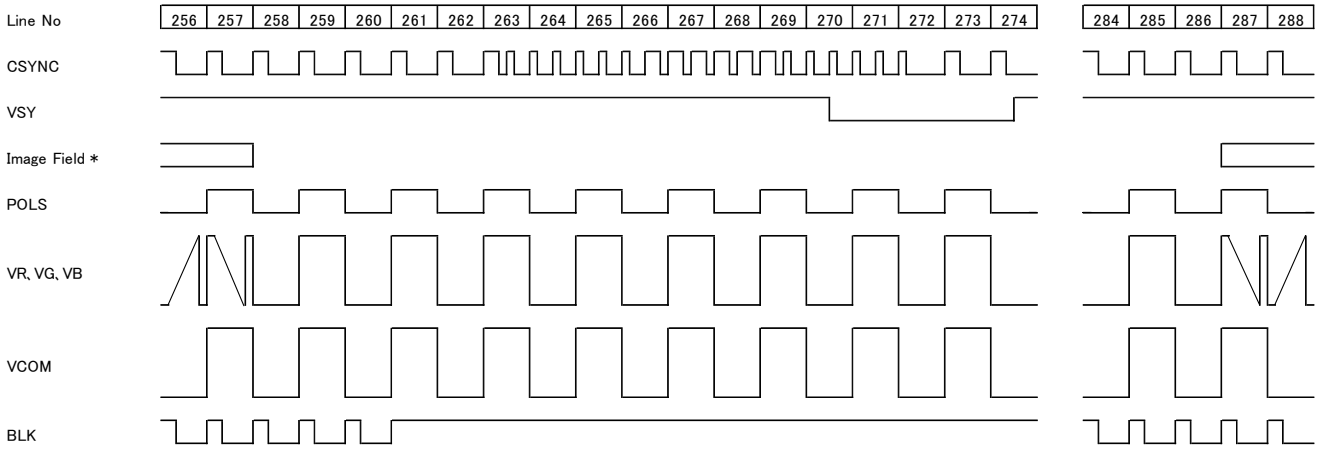
NTSC

<ODD FIELD>



<EVEN FIELD>



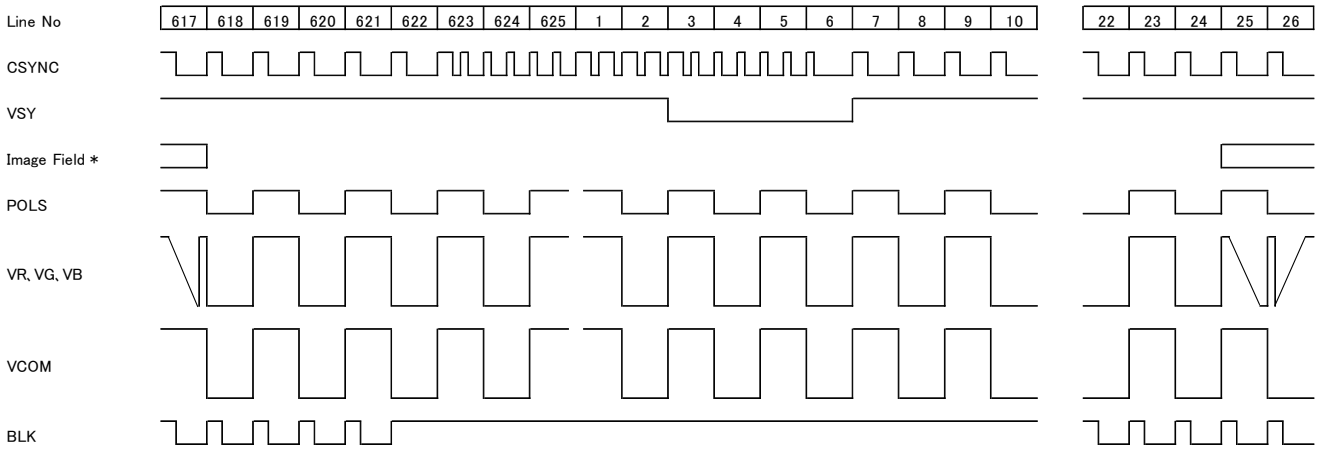
* Display differs by a selection oc display mode.(Refer to Right table)
An aforementioned timimng chart shows position around FULL-MODE..

Display Mode	Image Field(Line No.)	
	ODD	EVEN
FULL	24~257	287~520
NORMAL-CENTER		
NORMAL-LEFT		
NORMAL-RIGHT		
WIDE		
ZOOM1	53~228	316~491
ZOOM2	39~242	302~505

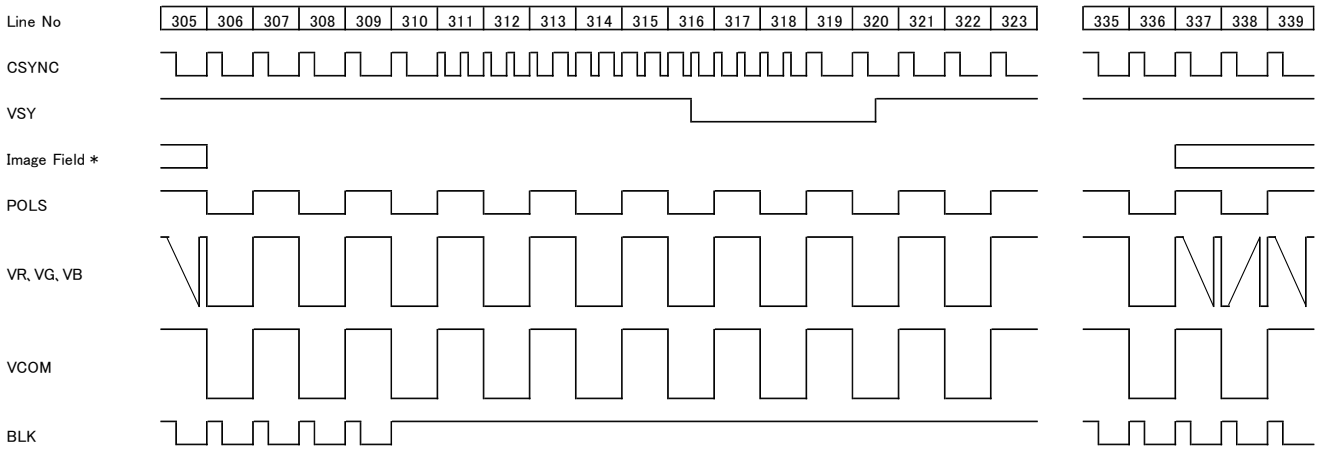
<Vertical> (PAL)

PAL

<ODD FIELD>



<EVEN FIELD>

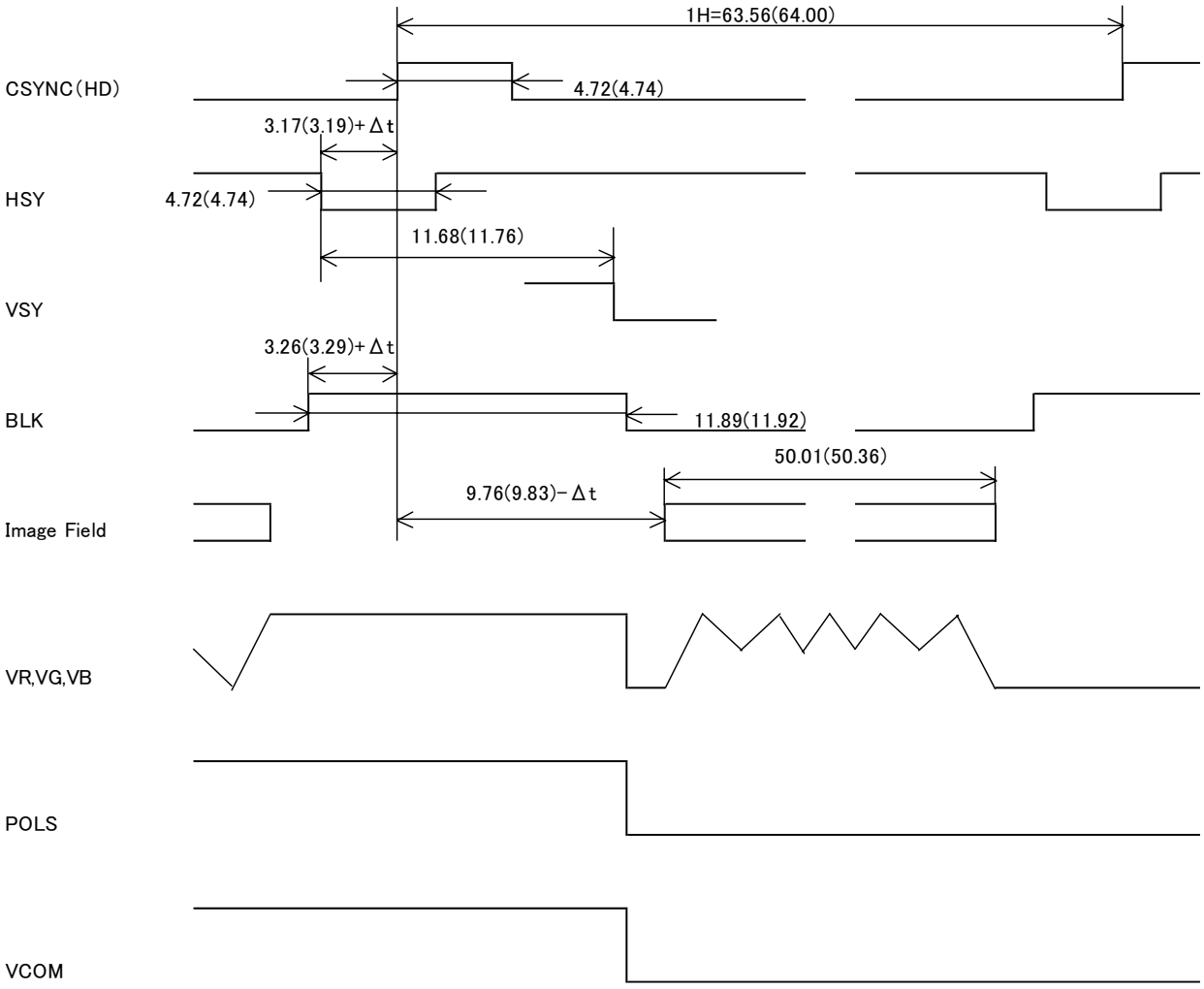


* Display differs by a selection of display mode.(Refer to Right table)
An aforementioned timing chart shows display position around FULL MODE..

Display Mode	Image Field(Line No.)	
	ODD	EVEN
FULL	25～305	337～617
NORMAL-CENTER		
NORMAL-LEFT		
NORMAL-RIGHT		
WIDE	48～281	361～594
ZOOM1	60～269	373～582
ZOOM2	48～281	361～594

.

<Horizontal> (NTSC / PAL)



Unit: μs

Note 1:Refer to “Recommended operating condition”.

Note 2:Value in brackets correspond to PAL mode.

Note 3: f_{HDN}=15.734kHz, f_{HDP}=15.625kHz

Note 4: Δt＝０．２０８(０．２１０)μs×n

HPOS4	HPOS3	HPOS2	HPOS1	n
Hi	Lo	Lo	Lo	+8
Hi	Lo	Lo	Hi	+7
Hi	Lo	Hi	Lo	+6
Hi	Lo	Hi	Hi	+5
Hi	Hi	Lo	Lo	+4
Hi	Hi	Lo	Hi	+3
Hi	Hi	Hi	Lo	+2
Hi	Hi	Hi	Hi	+1
Lo	Lo	Lo	Lo	0
Lo	Lo	Lo	Hi	−1
Lo	Lo	Hi	Lo	−2
Lo	Lo	Hi	Hi	−3
Lo	Hi	Lo	Lo	−4
Lo	Hi	Lo	Hi	−5
Lo	Hi	Hi	Lo	−6
Lo	Hi	Hi	Hi	−7

9. RECOMMENDED OPERATING CONDITIONS

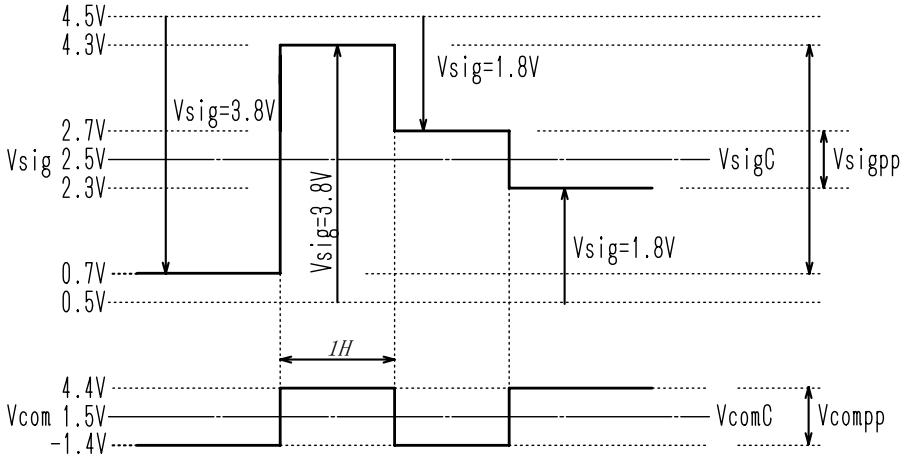
(Ta=25°C,VSS=0V)

ITEMS	SYMBOL	CONDITONS	SPECIFICATIONS (Note 1)			UNIT	Remarks
			MIN.	TYP.	MAX.		
SUPPLY POWER VOLTAGE	V_{DD1}	-	+3.00	+3.30	+3.60	V	
	V_{DD2}		+4.75	+5.00	+5.25		
	V_{GH}		+17.5	+18.5	+19.5		
	V_{GL}		-13.0	-12.0	-11.0		
INPUT VIDEO VOLTAGE	*V*sigC	-	+2.4	+2.5	+2.6	V	Note 2
	*V*sigpp	VsigC=2.5V	3.7	4.0	4.3	V(p-p)	
COMMON SIGNAL AMPLITUDE	*V*comC		-	(+1.5)	-	V	
	*V*compp	-	5.5	5.8	7.0	V(p-p)	
INPUT SIGNAL (C-MOS)	V_{IH}	Hi LEVEL	$0.8V_{DD1}$	-	V_{DD1}+0.3	V	
	V_{IL}	Lo LEVEL	Vss-0.3	-	$0.2V_{DD1}$		
Frame frequency	f_{CLK}	CPH	9.20	9.59	9.95	MHz	
		CPV	15.00	15.734	16.50	KHz	
	f_{ST}	STH	15.00	15.734	16.50	KHz	
		STV	57.143	59.939	62.852	Hz	
BACKLIGHT VOLTAGE	V_{FL}	IL=7mA(rms)	-	500	-	V(rms)	Refernce
BACKLIGHT CURRENT	I_{FL}	-	5.0	7.0	8.0	mA(rms)	
FL DRIVING FREQUENCY	f_{FL}	-	-	(51.1)	-	kHz	
DISCHARGE STARTING VOLTAGE	V_{SFL}	Ta=25°C	1500	-	-	V(rms)	
		Ta=-30°C	1700	-	-		

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:Input signal timing.(Vsig,Vcom)

[Example Timing]



Optimization of input Voltage on viewing angle is necessary.

Note 3: Adjust for minimum flicker.

Note 4 : Terminals for sync. signal : STV1,STV2,CPV,OE1,OE2,OE3,CPH,STH1,STH2
Terminals for control signal : U/D,L/R,CX

Note 5:Refer to "Recommended operating circuit"

ELECTRICAL CHARACTERISTICS

Common Test Conditions:Ta=25±5°C, V RH=65 %, V_{DD1}=+3.3V,V_{DD2}=+5.0V,V_{GH}=+18.5V, V_{GL}=-12.0V, VSS=0V,
VsigC=+2.5V,Vcompp=5.8V(p-p), I_{FL}=6.0mArms, Measured after 30 minutes operation.

ITEMS	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	REMARKS
			MIN.	TYP.	MAX.		
INPUT CAPACITY	C_{IN}	-	-	-	50	Pf	CPH,CPV STH,STV, OE,CX
	C_{VI}	-	-	-	200	pF	VR,VG.VB
	C_{com}	f=fHD/2	-	-	300	nF	*V*com
SUPPLY CURRENT	I_{DD1}	-	--	2.2	10	mA	
	I_{DD2}	-	--	20	40	mA	
	I_{GH}	Vsigpp=4.0V(p-p)	--	70	1000	μA	
	I_{GL}	-	--	70	1000	μA	
INPUT TIMING	t_{CPV}		-	-	100	KHz	
	t_{CPVH}		500	-	-	ns	
	t_{CPVL}		500	-	-	ns	
	t_{CPH}		-	-	20	KHz	
	t_{CPHH}		15	-	-	ns	
	t_{CPHL}		15	-	-	ns	
	t_{SUP}		7	-	-	ns	
	t_{HLD}		7	-	-	ns	
	t_{CXSUP}		1.0	-	-	μs	
	t_{CXHLD}		50	-	-	ns	

11. OPTICAL CHARACTERISTICS

Common test conditions : T_a=25 ± 5°C, RH=65 %, V_{DD1}=+3.3V, V_{DD2}=5.0V, V_{GH}=18.5V, V_{GL}= -12.0V, V_{SS}=0V, Vsigc=2.5V, Vcompp=5.8V, Vcomc=Adjust for minimum flicker. ,Back Light inverter=standard or I_{FL}=7.0mA(rms) Measured after 30 minutes operation.

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	REMARKS
				MIN.	TYP.	MAX.		
RESPONSE TIME		t_{ON}	Vsig=4→0V	-	-	50	ms	
		T_{OFF}	Vsig=0→4V	-	-	75		
CONTRAST RATIO		CR	Vsig=0/4	150	250	-	-	
VIEWING ANGLE	L/R	θ10	Vsig=0/4V CR≥10	45/45	55/55	-	°	Note 3
	U/D	ϕ10		45/15	60/30	-		
LUMINANCE		L	Vsig=0V	350	400	-	cd/m2	Note 4
V-L THRESHOLD		Vth	90% LT	-	1.0	1.5	V	
WHITE CHROMATICITY (Reference)		x	Vsig=0V	-	(0.299)	-	-	Note 3
		y		-	(0.312)	-		
UNIFORMITY		DLUM	Vsig=0V	70	-	-	%	
BACKLIGHT LIFE (Reference)		-	I_{FL}=7mA(rms)	(10,000)	-	-	h	Note 1

Note 1:MTTF(Mean Time to Failure), time to become 50% brightness.

Note 2:The viewing direction of this product is 6o'cloch(Down side). It is in direction of maximum CR, and shows darker tint.

Note 3:This spec is spectroradiometer [BM-7] of TMD.

Note 4:This spec is uesing standard inverter of TMD

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

1) SPECIAL PURPOSES

A) Toshiba'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'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's published specification limits.

C) In addition, since Toshiba 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 doses 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.

<END>