Toshiba Mobile Display Co., Ltd.

PRODUCT INFORMATION

22cm COLOUR TFT-EL MODULE
(8.5 TYPE)

LT085AC18T00
(p-Si TFT)

All information is subject to change without notice. Please read bottom

TENTATIVE

FEATURES

(1) 8.5"W-VGA(800x480 pixels) display
(2) RGB 6bit(3.3V C-MOS Parallel Interface)
(3) LED Backlight(25,000hours MTBF, @200cd/m2) without driving circuit

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (typ.)	210.0(*W*) x 134.0(*H*) x 10.5 (*D*) mm
Number of Pixels	800(*W*) x 480(*H*) pixels
Active Area	184.8(*W*) x 110.88(*H*) mm
Pixel Pitch	0.231(*W*) x 0.231(*H*)
Weight (approximately)	260g
Backlight	LED, Sidelight type

ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit
Supply Voltage (V_{DD})	-0.3	4.0	V
LED forward current (I_{LED})	---	30	mA
LED reverse voltage (V_R)	---	5	V
LED forward voltage (V_{LED})	---	(25)	V
Input Signal Voltage	-0.3	V_{DD}+0.3	V
Operating Temperature	-10	70	°C
Storage Temperature	-20	80	°C
Operating Humidity	10	90	%RH
Storage Humidity	10	90	%RH

ELECTRICAL SPECIFICATION (*T*a=25°C) (RECOMMENDED OPERATION CONDITION)

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	V_{DD}	3.0	3.3	3.6	V	
	(V_{LED})	16.8	19.2	21	V	*1
"H" level input voltage(V_{IH})		0.7V_{DD}	---	V_{DD}	V	
"L" level input voltage(V_{IL})		0	---	0.3 V_{DD}	V	
Current Consumption	I_{DD}	---	(160)	(250)	mA	*2
	(I_{LED})	---	15.0	25.0	mA	*1, *3
Power Consumption		---	(1.39)	---	W	*1 ,*2, *3

*1 : Between V_{Ad} to V_{Cad1}, V_{Cad2}, V_{Cad3} *2 : 8 color bars pattern *3 : Except the efficiency of LED driver

OPTICAL SPECIFICATION (*T*a=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (*CR*)		200	300	---	---	
Response Time	(t_{ON})	---	---	50	msec	
	(t_{OFF})	---	---	50	msec	
Viewing Angle CR>10	Top/Bottom	---	60/35	---	°	
	Left/Right	---	55/55	---	°	
Luminance (*L*)		---	200	---	cd/m^2	I_{LED}=15mA
Lamp Life Time(MTBF)*4,*5		25,000			hours	I_{LED}=15mA

*4 : Conditions ;*T*a=25°C continuous lighting

*5 : Definitions of failure ; 1) Lcd luminance becomes half of the minimum value. 2) LED doesn't light normally.

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

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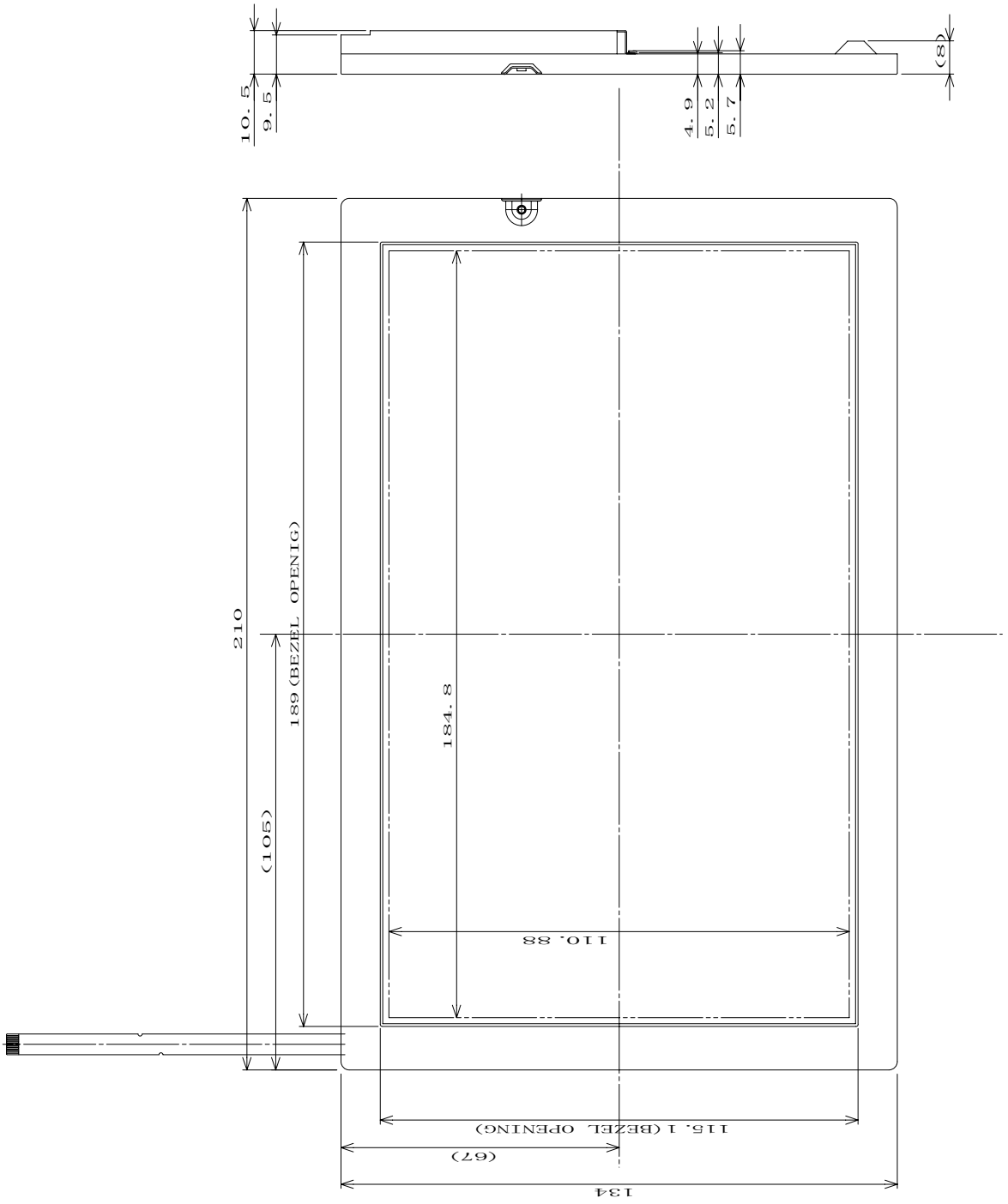
DIMENSIONAL OUTLINE

Unit : mm

Standard tolerance : ±0.5

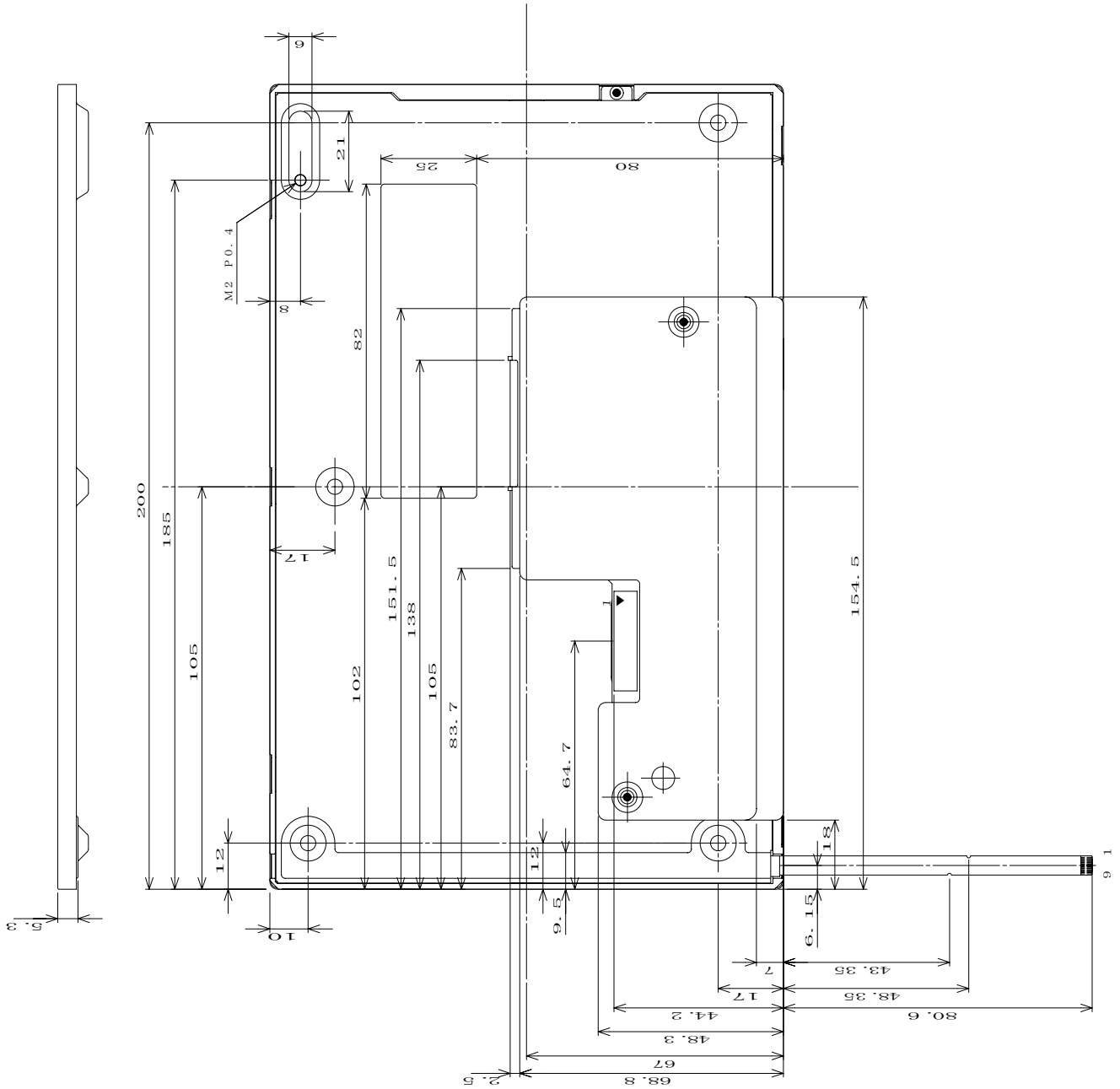
(Front)



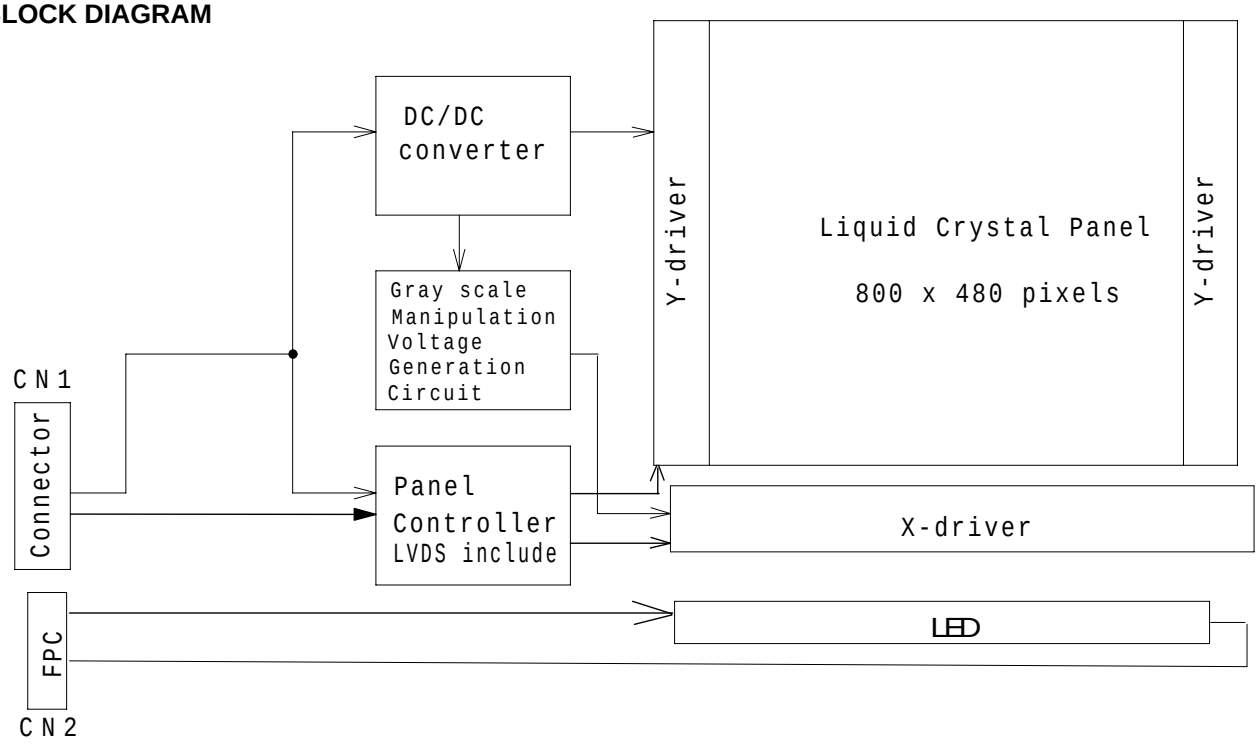
(Rear)

Unit : mm

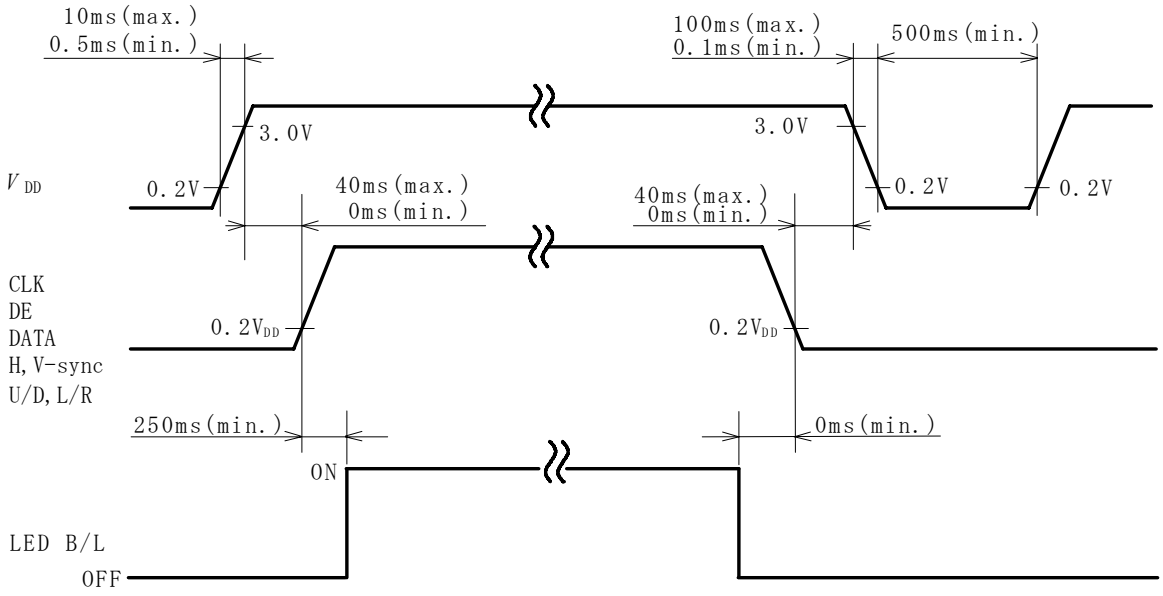
Standard tolerance : ±0.5



BLOCK DIAGRAM

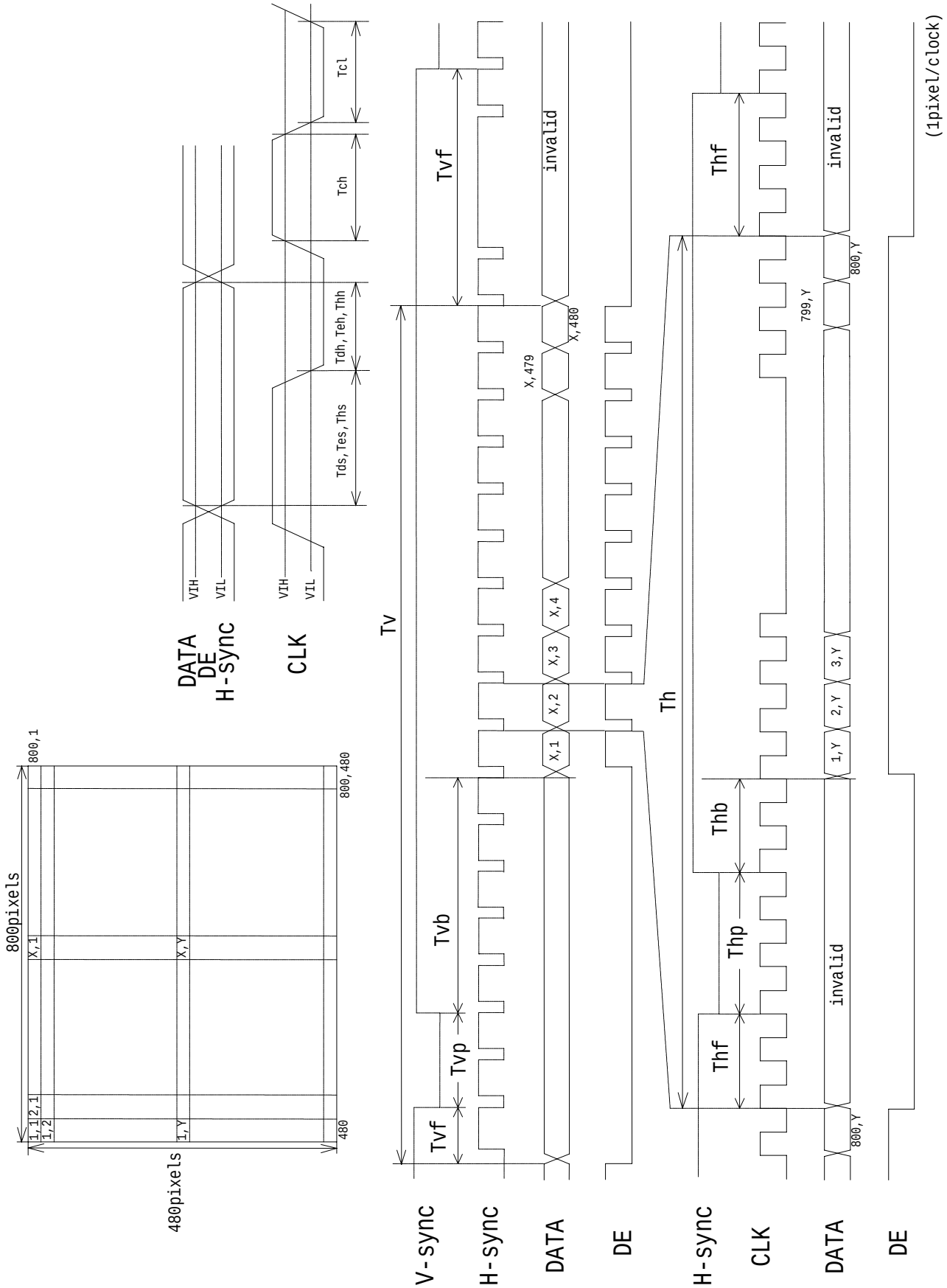


SEQUENCE OF POWER SUPPLIES AND SIGNALS



Note 1) When turn V_{DD} on and turn it off, the form of voltage should be input with no ripple signal.

TIMING CHART



TIMING SPECIFICATION [1) 2) 3) 4) 5)]

Item		Symbol	min.	typ.	max.	unit
CLK	frequency	*Fck*	29.88	33.2	36.52	MHz
	Period	*Clk*	27.4	30.1	33.5	ns
Clock	High Time	*Tch*	12	-	-	ns
	Low time	*Tcl*	12	-	-	ns
DATA	Setup Time	*Tds*	5	-	-	ns
Data	Hold Time	*Tdh*	5	-	-	ns
DE	Setup Time	*Tds*	5	-	-	ns
Data Enable	Hold Time	*Tdh*	10	-	-	ns
HS	Setup Time	*Ths*	5	-	-	ns
	Hold Time	*Thh*	10	-	-	ns
Horizontal	Period	*Th*	944	1056	1088	(Clk)
Sync			-	31.8	-	us
	Pulse Width	*Thp*	4	128	-	(Clk)
	Front Porch	*Thf*	-	40	-	(Clk)
	Back Porch	*Thb*	7	88	-	(Clk)
VS	Period	*Tv*	516	525	534	(Th)
			14.7	16.6	17.4	ms
Vertical	Pulse Width	*Tvp*	1	2	-	(Th)
Sync	Front Porch	*Tvf*	-	11	-	(Th)
	Back Porch	*Tvb*	4	32	-	(Th)

Note 1) If NCLK is fixed to "H" or "L" level for certain period while DE is supplied, the panel may be damaged.

Note 2) 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.

Note3) Do not make *tv*, *th* and thp fluctuate.

Note4) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note5) 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.

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector: FH12-40S-0.5SH (89) / HIROSE ELECTRIC CO.,LTD.

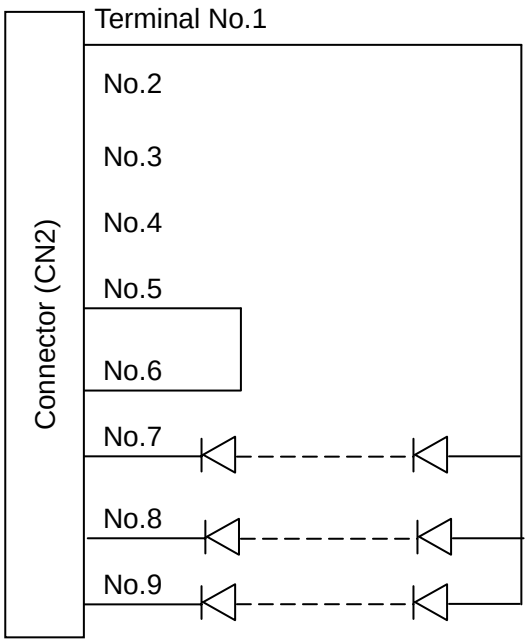
Terminal No.	Symbol	Function
1	GND	
2	GND	
3	CLK	CLOCK
4	GND	
5	GND	
6	NC[1)]	
7	R0	RED DISPLAY DATA (LSB)
8	R1	RED DISPLAY DATA
9	R2	RED DISPLAY DATA
10	GND	
11	R3	RED DISPLAY DATA
12	R4	RED DISPLAY DATA
13	R5	RED DISPLAY DATA (MSB)
14	GND	
15	G0	GREEN DISPLAY DATA (LSB)
16	G1	GREEN DISPLAY DATA
17	G2	GREEN DISPLAY DATA
18	GND	
19	G3	GREEN DISPLAY DATA
20	G4	GREEN DISPLAY DATA
21	G5	GREEN DISPLAY DATA (MSB)
22	GND	
23	B0	BLUE DISPLAY DATA (LSB)
24	B1	BLUE DISPLAY DATA
25	B2	BLUE DISPLAY DATA
26	GND	
27	B3	BLUE DISPLAY DATA
28	B4	BLUE DISPLAY DATA
29	B5	BLUE DISPLAY DATA (MSB)
30	GND	
31	H-sync	HORIZONTAL SYNC.
32	GND	
33	V-sync	VERTICAL SYNC.
34	NC[1)]	
35	DE	DATA ENABLE
36	NC[1)]	
37	VDD	+3.3V POWER SUPPLY
38	VDD	+3.3V POWER SUPPLY
39	VDD	+3.3V POWER SUPPLY
40	VDD	+3.3V POWER SUPPLY

CN2 LED INPUT SIGNAL

Mating Connector: IMSA-9632S-09Y931 / IRISO electronics co., LTD

Terminal No.	Symbol	Function
1	V_{Ad}	LED Power Supply (Anode)
2	NC	
3	NC	
4	NC	
5	NC	(Shorted pattern between Terminal No.5 and No.6)
6	NC	(Shorted pattern between Terminal No.5 and No.6)
7	V_{Cad3}	LED3 Power Supply (Cathode)
8	V_{Cad2}	LED3 Power Supply (Cathode)
9	V_{Cad1}	LED3 Power Supply (Cathode)

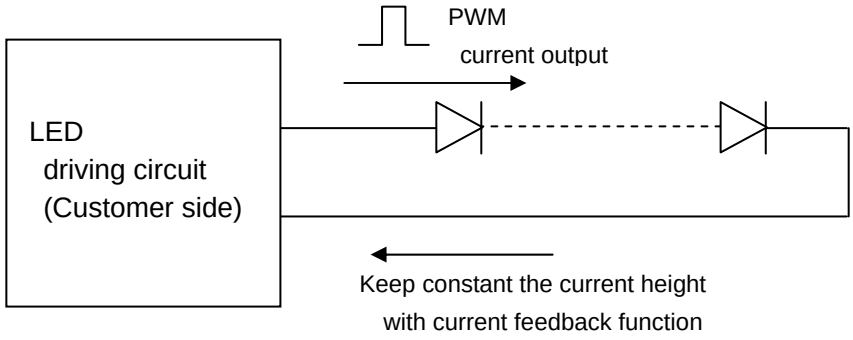
EQUIVALENT CIRCUIT OF LED



Note) Cautions on use the circuit of LED

1) The current feedback function is needed to each LED line.
2) We recommend the PWM (Pulse Width Modulation) driving to control the brightness. The brightness control with current modulation may cause a change of chromaticity. So please keep constant the current height of each LED line, and control the brightness with PWM driving.

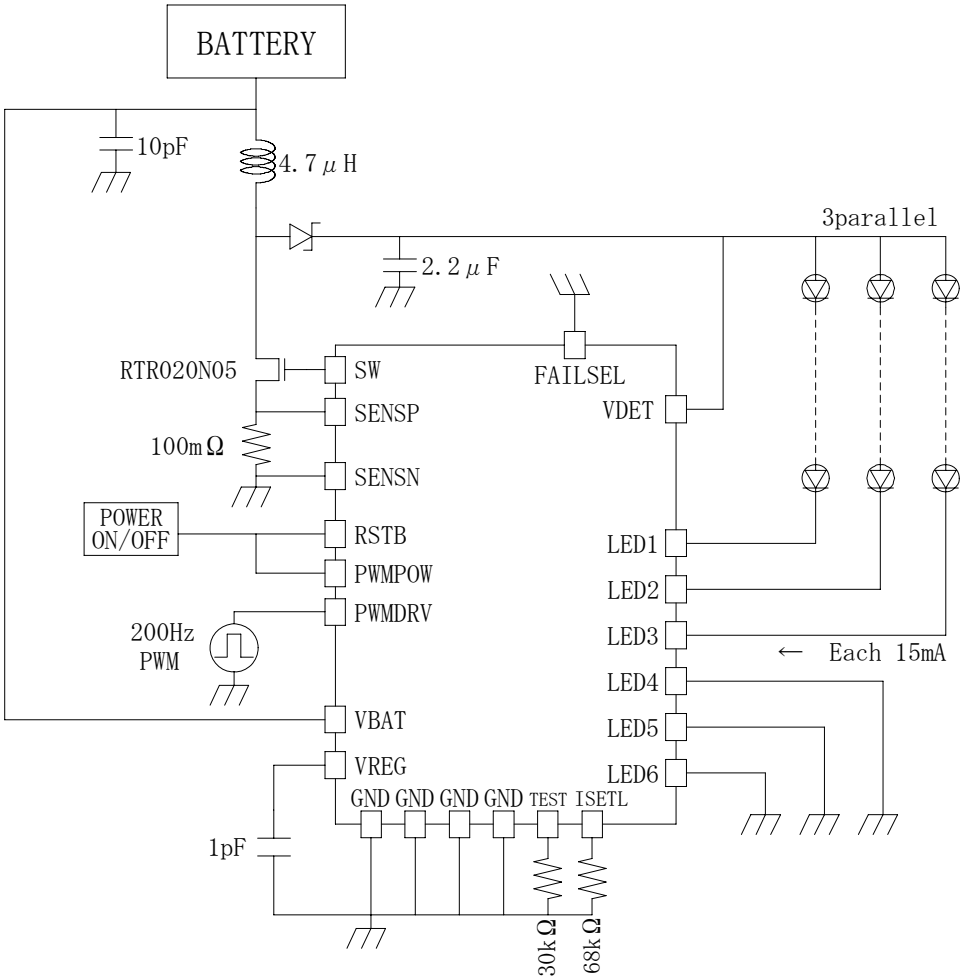
RECOMMENDED LED DRIVING BLOCK DIAGRAM



REFERENCED LED DRIVER CIRCUIT

Referenced LED driver IC: BD6583MUV / ROHM CO., LTD.

Please refer to technical note of BD6583MUV.



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	-
	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

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

1) SPECIAL PURPOSES

A) Toshiba Mobile Display Co.,Ltd'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 Mobile Display Co.,Ltd'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 Mobile Display Co.,Ltd's published specification limits.

C) In addition, since Toshiba Mobile Display Co.,Ltd 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 Mobile Display Co.,Ltd 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.