Toshiba Matsushita Display Technology Co., Ltd.

33.7cm COLOUR TFT-LCD MODULE
(13.3 TYPE)
LT133DEV4A00
(p-Si TFT)

PRODUCT INFORMATION

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

FEATURES

(1) 13.3"WIDE-XGA(1280x800 pixels) display size for notebook PC
(2) LED Backlight with LED controller IC
(3) Anti-Glare Surface
(4) Bezel less structure

TENTATIVE

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (typ.)	304.0(W) x 202.4 (H) x 3.25(D) (mm)
Number of Pixels	1280 (W) x 800(H) pixels
Active Area	286.08(W) x 178.8(H) (mm)
Pixel Pitch	0.2235(W) x 0.2235(H) (mm)
Weight (approximately)	230 g
Backlight	LED

ABSOLUTE MAXIMUM RATINGS

Item		Min.	Max.	Unit
Supply Voltage	(V_{DD})	-0.3	4.0	V
	(V_{LED})	-0.3	22	V
LED Current (I_{LED})		-	(30)	mA
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	
Supply LED Voltage	(V_{LED})	7.5	12	21	V	
Common Mode Input Voltage	(V_{CM})	0.7	-	1.75	V	
Differential Input Amplitude	(V_{ID})	100	---	600	mV	
Current Consumption	*1 (I_{DD})	---	310	400	mA	
	*2 (I_{LED})	---	15	17.5	mA	
Power Consumption		---	TBD.	---	W	PWM=100%:15 mA

*1 : 8 color bars pattern
*2 : The current value of each row should be the same value.

OPTICAL SPECIFICATION (Ta=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (CR)		150	300	---	---	
Response Time	(t_{ON})+ (t_{OFF})	---	-	50	ms	
Luminance (L)		(210)	(300)	---	cd/m^2	PWM=100%:15mA

DIMENSIONAL OUTLINE

(Front side)

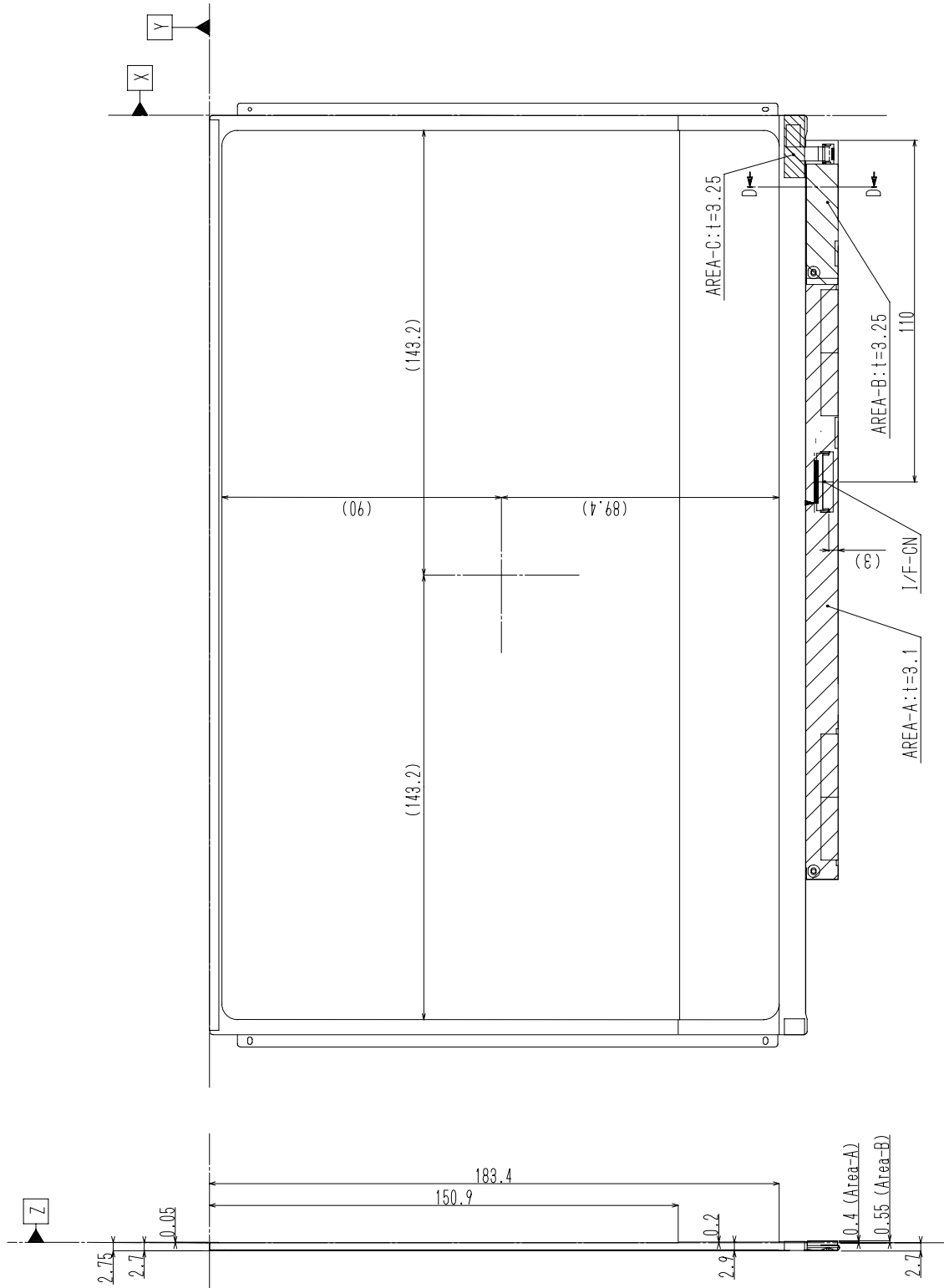## TENTATIVE

Unit : mm

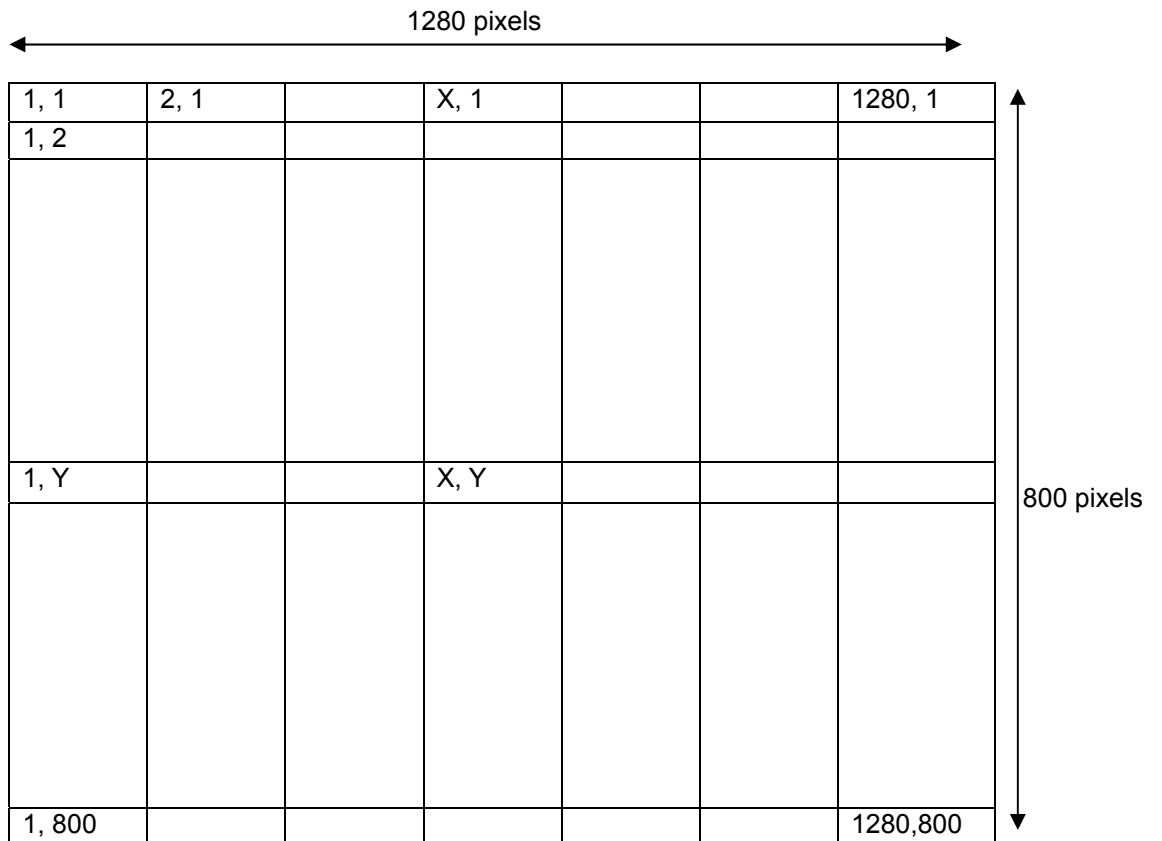Standard tolerance : ±0.5

2008-03-10 (Ver.0.1)
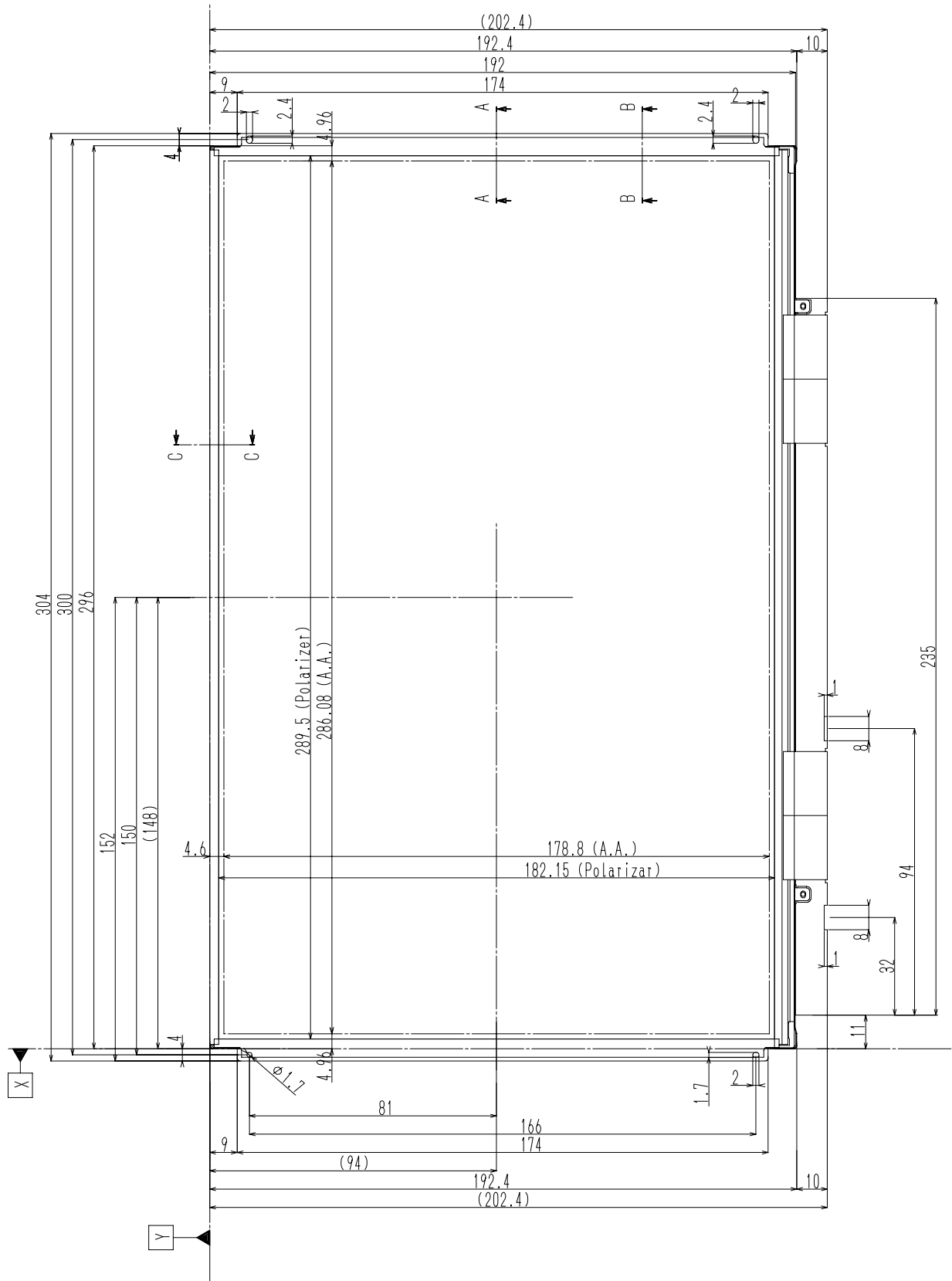
DIMENSIONAL OUTLINE

(Back side)

TENTATIVE

Unit : mm

Standard tolerance : ±0.5

BLOCK DIAGRAM

DC/DC converter	
Gray scale Manipulation Voltage Generation Circuit	
CN1	
Connector	
Panel Controller LVDS include	
Gate driver	Liquid Crystal Panel 1280 x 800 pixels
Gate driver	
Source driver	
LED Driver Board	LED LED LED LED LED LED

1280 pixels

1, 1	2, 1		X, 1			1280, 1
1, 2						
1, Y			X, Y			
1, 800						1280,800

800 pixels

2008-03-10 (Ver.0.1)

TIMING CHART

2008-03-10 (Ver.0.1)
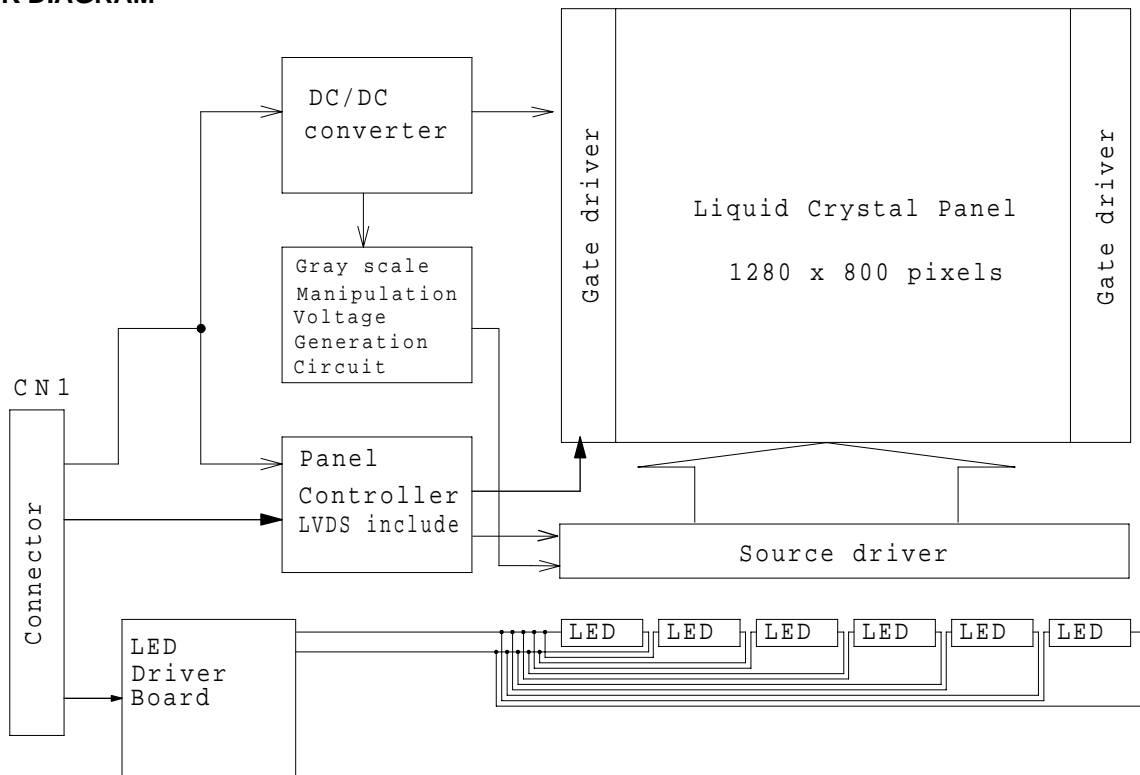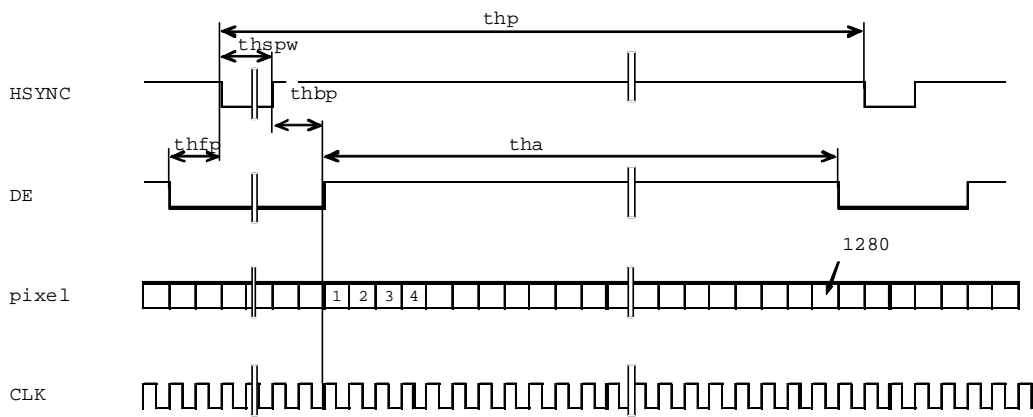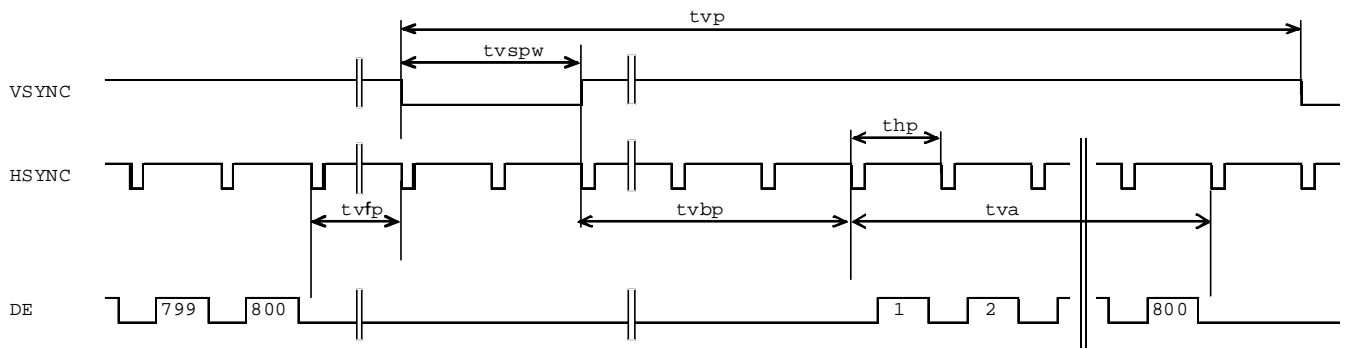
TIMING SPECIFICATION [1) 2) 3) 4) 5) 6)]

Item	Symbol	min.	typ.	max.	unit
Horizontal Scanning Term	th	-	1448 x tc	-	clock
H-sync Pulse Width	$t$hw	4 x tc	32 x tc	-	clock
Horizontal Front Porch	$t$hfp	4 x tc	48 x tc	-	clock
Horizontal Back Porch	$t$hbp	4 x tc	80 x tc	-	clock
Horizontal Blanking Period(*8)	$t$hb	-	168 x tc	-	clock
Horizontal Display Term	$t$hd	1280 x tc	1280 x tc	1280 x tc	line
Frame Period	tv	-	830 x th	-	line
V-sync Pulse Width	$t$vw	1 x th	6 x th	-	line
Vertical Front Porch	$t$vfp	1 x th	3 x th	-	line
Vertical Back Porch	$t$vbp	2 x th	14 x th	-	line
Vertical Blanking Period(*9)	$t$vb	-	30 x th	-	ns
Vertical Display Term	$t$vd	800 x th	800 x th	800 x th	
Clock Period	tc	-	13.87	-	

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

Note 2) If DE 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 DE is supplied, the panel may be damaged.

Note4) tvb = tvw + tvfp + tvbp
thb = thw + thfp + thbp

Note5) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note6) 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.

2008-03-10 (Ver.0.1)

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

CN1 INPUT SIGNAL (20347-040E-02 / I-PEX)

[Mating Connector : 20345-*40T-## / I-PEX]

Terminal No.	Symbol	Function
1	GND	GND
2	NC	Non-Connection
3	VDD	Power Supply : +3.3V
4	VDD	Power Supply : +3.3V
5	VDD	Power Supply : +3.3V
6	VEDID	EDID 3.3V power
7	NC	Non-Connection
8	CLK	EDID clock
9	DATA	EDID data
10	GND	GND
11	GND	GND
12	NC	Non-Connection
13	RxIN0-	Negative LVDS differential data input (R0-R5, G0)
14	RxIN0+	Positive LVDS differential data input (R0-R5, G0)
15	GND	GND
16	RxIN1-	Negative LVDS differential data input (G1-G5, B0-B1)
17	RxIN1+	Positive LVDS differential data input (G1-G5, B0-B1)
18	GND	GND
19	RxIN2-	Negative LVDS differential data input (B2-B5, HS, VS, DE)
20	RxIN2+	Positive LVDS differential data input (B2-B5, HS, VS, DE)
21	GND	GND
22	CLK-	Clock Signal(-)
23	CLK+	Clock Signal(+)
24	GND	GND
25	PWM	PWM brightness control (10kHz +/- 5%)
26	VBL-	LED power return
27	VBL-	LED power return
28	VBL-	LED power return
29	VBL-	LED power return
30	VBL-	LED power return
31	NC	Non-Connection
32	VBL+	7.5V - 21V LED power
33	VBL+	7.5V - 21V LED power
34	VBL+	7.5V - 21V LED power
35	VBL+	7.5V - 21V LED power
36	VBL+	7.5V - 21V LED power
37	NC	Non-Connection
38	SMB_CLK	SMBus Clock
39	SMB_DAT	SMBus Data
40	GND	GND

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

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

2008-03-10 (Ver.0.1)
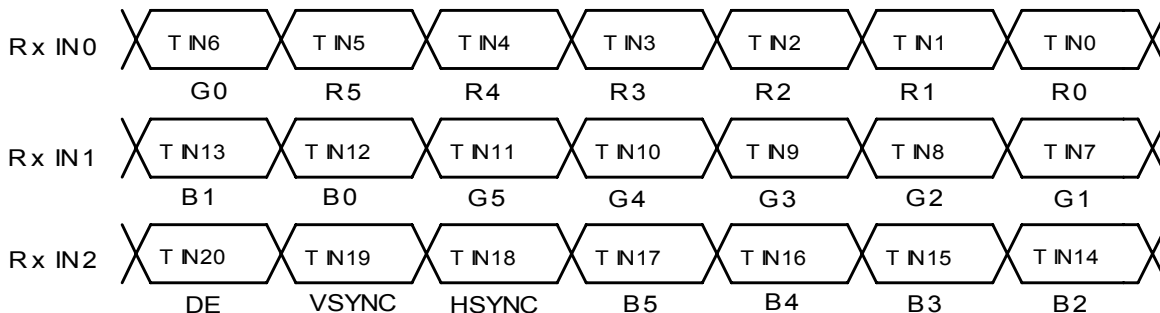
SMBus Basic specification
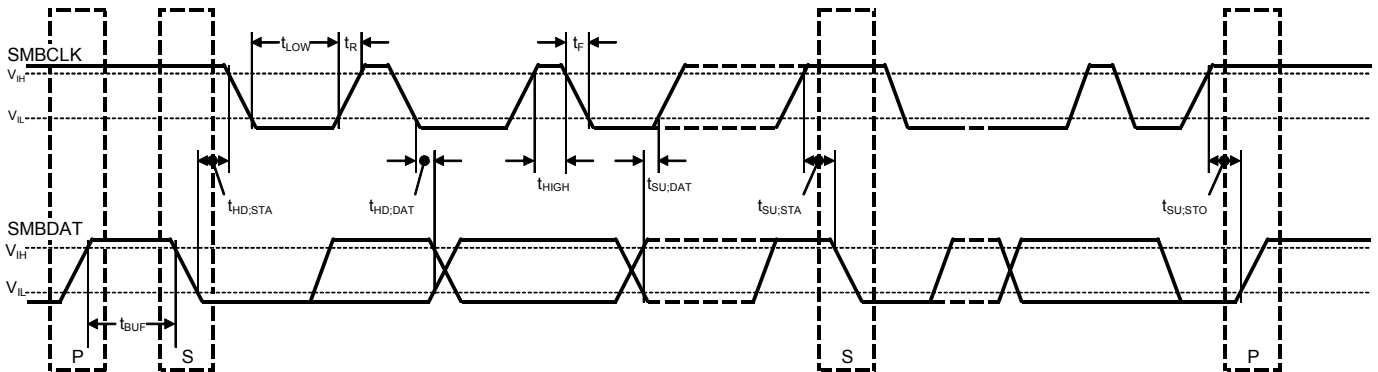
Symbol	Parameter	Limits		Units	Comments
		Min	Max		
F_{SMB}	SMBus Operating Frequency	10	100	KHz	
T_{BUF}	Bus free time between Stop and Start Condition	4.7	-	µs	
$T_{HD;STA}$	Hold time after (Repeated Start Condition. After this Period, the first clock is generated.)	4.0	-	µs	
$T_{SU;STA}$	Repeated Start Condition setup time	4.7	-	µs	
$T_{SU;STO}$	Stop Condition setup time	4.0	-	µs	
$T_{HD;DAT}$	data hold time	300		ns	
$T_{SU;DAT}$	Data setup time	250	-	ns	
$T_{TIMEOUT}$	Detect clock low timeout	25	35	ms	
T_{LOW}	Clock low period	4.7	-	µs	
T_{HIGH}	Clock high period	4.0	50	µs	
$T_{LOW:SET}$	Cumulative clock low extend time(slave device)	-	25	ms	
$T_{LOW:MEXT}$	Cumulative clock low extend time(master device)	-	10	ms	
T_F	Clock/Data Fall Time	-	300	ns	
T_R	Clock/Data Rise Time	-	1000	ns	
T_{POR}	Time in which a device must be operational after power-on reset		500	ms	

2008-03-10 (Ver.0.1)

SMBus specification for LTD133EWDA

WRITE BYTE FORMAT

S	ADDRESS	WR	ACK	COMMAND	ACK	DATA	ACK	P
-	7 bits (0101100)	1b	1b	8 BITS (See below)	1b	8 BITS	1b	-
	SLAVE ADDRESS			COMMAND BYTE:SELECTS WHICH REGISTER YOU ARE WRITING TO		DATA BYTE:DATA GOES INTO THE REGISTER SET BY THE COMMAND BYTE		

READ BYTE FORMAT

S	ADDRESS	WR	ACK	COMMAND	ACK	S	ADDRESS	RD	ACK	DATA	///	P
-	7 BITS (0101100)	1b	1b	8 BITS (See below)	1b	-	7 BITS (0101100)	1b	1b	8 BITS	1b	-
	SLAVE ADDRESS			COMMAND BYTE:SELECTS WHICH REGISTER YOU ARE READING TO			SLAVE ADDRESS:REPEATED DUE TO CHANGE IN DATA-FLOW DIRECTION			DATA BYTE:READS FROM THE REGISTER SET BY THE COMMAND BYTE		

S = START CONDITION	SHADED = SLAVE TRANSMISSION	WR = WRITE = 0
P = STOP CONDITION	ACK = ACKNOWLEDGE = 0	RD = READ = 1
		/// = NOT ACKNOWLEDGE

COMMAND and DATA

BRIGHTNESS CONTROL RESISTER : 0x00

BIT_7(R/W)	BIT_6(R/W)	BIT_5(R/W)	BIT_4(R/W)	BIT_3(R/W)	BIT_2(R/W)	BIT_1(R/W)	BIT_0(R/W)
BRT_7	BRT_6	BRT_5	BRT_4	BRT_3	BRT_2	BRT_1	BRT_0

Bit Field Definitions :

BRT_[7,6,....0]	= 256 steps of brightness level / default = 0xFF

DEVICE CONTROL RESISTER : 0x01

BIT_7	BIT_6	BIT_5	BIT_4	BIT_3	BIT_2(R/W)	BIT_1(R/W)	BIT_0(R/W)
Reserved	Reserved	Reserved	Reserved	Reserved	PWM_MD	PWM_SEL	BL_CTL

Bit Field Definitions :

PWM_MD	= PWM mode select (1=absolute brightness, 0=% change) / default=0
PWM_SEL	= Brightness Multiplex select (1=PWM_IN pin, 0=SMBus valu) default=0
BL_CTL	= Backlight LED ON/OFF (1=On, 0=Off) / default=0

Operating Modes selected by Device Control Register Bits 1 and 2

PWM_MD	PWM_SEL	Mode
x	1	PWM mode
1	0	SMBus Mode
0	0	SMBus mode with DPST

2008-03-10 (Ver.0.1)

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	-
	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	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
	Light	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	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
	Light	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	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
	Light	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	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
	Light	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

2008-03-10 (Ver.0.1)

⚠ 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-D-001A,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY 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 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 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 connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from 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.