IPS Alpha Technology, Ltd.

Date: Nov.26,2007

For Messrs. Matsushita Electric Group

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

Part Number:AX080A014B
Matsushita Global Code: L5EDD8Q00038
Matsushita Issue Number: L20070399

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Please return 1 copy with your signature on this page for approval.

Accepted by:_________________________ Proposed by: K. Ashizawa

Date:_________________________

Matsushita Electric Group

Checklist of the items in the panasonic standard delivery specifications

Please check if the delivery specifications include the following items.
(If a listed item is not includes, please make sure to describe the reason why it has not been included.)

Ver.1.1

No.	Item description	Listing check			Reason for not including (Ex Under research, confidential)
1	Part No. reference table (The global part No. and manufacturer part No. must be listed for series part numbers)	☐Yes	☐No	☑N/A	
2	Part number structure (List the type, constant, class stc for a series part No.)	☐Yes	☐No	☑N/A	
3	Place of production, factory name, country of origin	☑Yes	☐No	☐N/A	
4	Electrical characteristics (Measuring circuit, measurement condition, dielectric strength, surge voltage, insulation resistance, rates capacity etc.)	☑Yes	☐No	☐N/A	
5	Mechanical characteristics (Test method, terminal strength, tensile strength, anti-vibration, solder heat resistance, ease of soldering etc.)	☑Yes	☐No	☐N/A	
6	External shape/dimensions (External shape drawing, simensions with tolerance)	☑Yes	☐No	☐N/A	
7	Structure/material (Construction, material)	☐Yes	☑No	☐N/A	
8	Functions (Semiconductor parts must include the functions)	☑Yes	☐No	☐N/A	
9	Microcomputer performance (Microcomputer products must include the CPU bus width (bit))	☐Yes	☐No	☑N/A	
10	Recommended circuit diagrams (Semiconductor parts must include a recommended circuit)	☐Yes	☐No	☑N/A	
11	Pattern diagrams of PCB (Semiconductor parts must include the PCB patterns)	☐Yes	☐No	☑N/A	
12	Environmental reliability warranty items (Anti-humidity, high/low temperature, thermal shock, life etc.)	☑Yes	☐No	☐N/A	
13	Operating temperature range	☑Yes	☐No	☐N/A	
14	Storage temperature range	☑Yes	☐No	☐N/A	
15	Packaging specification (Simple package structure illustration, taping dimensions, stick dimensions, packaged quantity etc.)	☑Yes	☐No	☐N/A	
16	Marking indication method	☐Yes	☑No	☐N/A	
17	Strage period after opening (Semiconductor parts must include the storage environment and storage period after opening)	☐Yes	☑No	☐N/A	
18	Precautions for use	☑Yes	☐No	☐N/A	
19	Temperature profile (Solder flow and reflow temperature profile)	☐Yes	☐No	☑N/A	
20	Failure rate (Exclude if it cannot be determined due to purchased item)	☐Yes	☑No	☐N/A	
21	Safty standards (Conforming standard information, UL/CSA, electricity safety law, PL law etc.)	☐Yes	☑No	☐N/A	
22	Process control chart	☐Yes	☑No	☐N/A	
23	Export control checklist (Survey checklist against the export control law)	☐Yes	☑No	☐N/A	
24	Items subject to advance discussions (Verify the statement that all changes to delivery specifications shall be notified in advance)	☑Yes	☐No	☐N/A	
25	Manufacture's evaluation test data	☐Yes	☑No	☐N/A	
26	Other materials determined necessary by the business unit	☐Yes	☑No	☐N/A	

	Disclosure/Non-disclosure (NDA, blanket contract, etc.)	☑Disclosure	☐Non-disclosure	
	Description of intellectual property right	☑No	☐Yes	

RECORD OF REVISION

Date	The upper section : Previous revision The lower section : New revision Sheet No.	Page	Summary

DESCRIPTION

The following specifications are applied to the following IPS-Pro-TFT LCD module.
Note : Inverter for back light unit is built in this module.

Product Name : AX080A014B

General Specifications

Effective Display Area : (H)697.6845(V)392.256 (mm)

Number of Pixels : (H) 1,366 × (V) 768 (pixels)

Pixel Pitch : (H) 0.510 × (V) 0.510 (mm)

Color Pixel Arrangement : R+G+B Vertical Stripe

Display Mode : Transmissive Mode
Normally Black Mode

Top Polarizer Type : Anti-Glare

Number of Colors : 16,777,216 (colors)

Viewing Angle Range : Super Wide Version
(Horizontal & Vertical : 178°, CR≧10）

Input Signal : 1-channel LVDS (LVDS : Low Voltage Differential Signaling)

Back Light : 18 pcs. of EEFL (EEFL : External Electrode Fluoresent Lamp)

External Dimensions : (H) 760.0 × (V) 450.0 × (t) 70.4 (mm)

Weight : Typ. 7,000 (g)

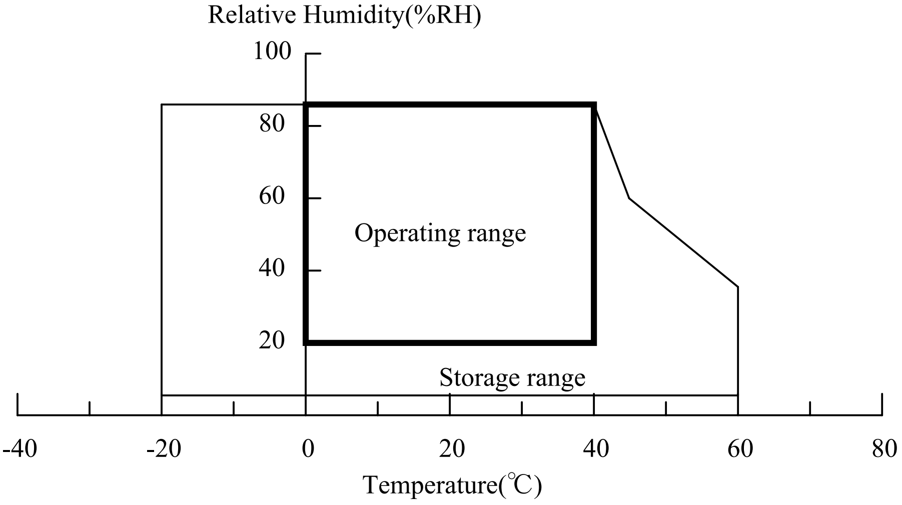
1. ABSOLUTE MAXIMUM RATINGS

1. 1 Environmental Absolute Maximum Ratings

ITEM	Operating		Storage		UNIT	NOTE
	Min.	Max.	Min.	Max.		
Temperature	0	50	-20	60	℃	1),5),6)
Humidity	2)		2)		%RH	1)
Vibration	-	4.9(0.5 G)	-	14.7(1.5 G)	m/s^2	3)
Shock	-	29.4(3 G)	-	294(30 G)	m/s^2	4)
Corrosive Gas	Not Acceptable		Not Acceptable		-	
Illumination at LCD Surface	-	50,000	-	50,000	1x	

Note 1) Temperature and Humidity should be applied to the glass surface of a IPS-Pro TFT LCD module, not to the system installed with a module.
The brightness of a EEFL tends to drop at low temperature. Besides, the life-time becomes shorter at low temperature.

2) Ta≦40 ℃‥‥‥Relative humidity should be less than 85 %RH max. Dew is prohibited.
Ta＞40 ℃‥‥‥Relative humidity should be lower than the moisture of the 85 %RH at 40 ℃.



3) Frequency of the vibration is between 15 Hz and 100 Hz. (Remove the resonance point) 1 hour.

4) Pulse width of the shock is 10 ms.

5) Long operation under low temperature may cause some portion of display area to be reddish for several minutes after turning on the product.
However, it does not affect the characteristics and reliability of the product.

6) The temperature of LCD front surface would be 65 ℃ in operating, it may affect the optical characteristics however it does not damage the function of the module.

1. 2 Electrical Absolute Maximum Ratings

(1)TFT-LCD module Vss = 0 V

ITEM	SYMBOL	Min.	Max.	UNIT	NOTE
Power Supply Voltage	VDD	0	13.2	V	
Input Voltage for logic	V1	-0.3	4.0	V	1)
Electrostatic Durability	VESD0	±100		V	2),3)
	VESD1	±20		kV	2),4)

Note 1) It is applied to pixel data signal and clock signal.
2) Discharge Coefficient : 250 pF - 100 Ω, Environmental : 25 ℃ - 70％RH
3) It is applied to I/F connector pins.
4) It is applied to the surface of a metallic bezel and a LCD panel.

(2) Back light GND = 0 V

ITEM	SYMBOL	Min.	Max.	UNIT	NOTE
Input Current	IL	-	7.0	mArms	1)
Input Voltage	VL	-	(3,000)	Vrms	2)

Note 1) The specification shall be applied to each EEFL. The specification is defined at ground line.
2) The specification shall be applied at connector pins for a EEFL at start-up.

(3) Back-light Inverter GND = 0 V

ITEM	SYMBOL	Min.	Max.	UNIT	NOTE
Input Voltage	Vin	330	410	V	
IC Power Supply	Vic	0	13.2	V	
ON/OFF Control Input Voltage	ON/OFF	0	7.0	V	
Analog Dimming	Vadim	0	7.0	V	
PWM signal voltage	Vpwm	0	7.0	V	

2. INITIAL OPTICAL CHARACTERISTICS

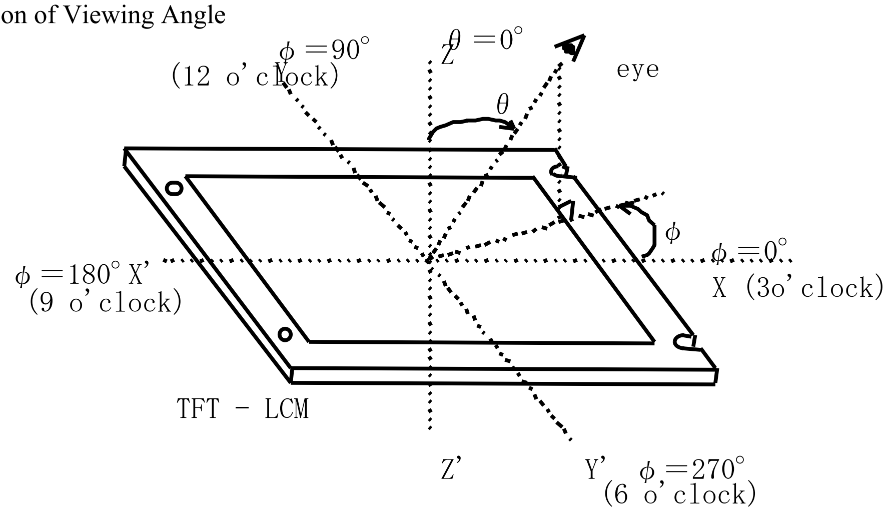
The following optical characteristics are measured under stable conditions. It takes about 30 minutes to reach stable conditions. The measuring point is the center of display area unless otherwise noted.

The optical characteristics should be measured in a dark room or equivalent state.

Measuring equipment : CS-1000A, or equivalent
Ambient Temperature =25 ℃ , VDD=12.0 V , f V=60 Hz ,
Vin=370 V , Adim=1.2 V , PWM on duty =95 %

ITEM		SYMBOL	CONDITION	Min.	Typ.	Max.	UNIT	NOTE
Contrast Ratio		C R	$\theta = 0^\circ$ 1)	600	1100	-	-	2)
Response Time	Rise	ton		-	8	20	ms	3)
	Fall	toff		-	6	20	ms	3)
Brightness of white		Bwh		400	500	-	cd/m^2	
Brightness uniformity		Buni		-	-	30	%	4)
Color Chromaticity (CIE)	Red	χ		0.62	0.65	0.68	-	【Gray scale =255】
		y		0.30	0.33	0.36		
	Green	χ		0.27	0.30	0.33		
		y		0.59	0.62	0.65		
	Blue	χ		0.12	0.15	0.18		
		y		0.04	0.07	0.10		
	White	χ		0.243	0.273	0.303		
		y		0.245	0.275	0.305		
Variation of Color Position (CIE)	Red	Δ χ	$\theta = +50^\circ$ $\phi = 0^\circ$, 90° , 180° , 270° 1)	-	-	0.04	-	5) 【Gray scale =255】
		Δ y		-	-	0.04		
	Green	Δ χ		-	-	0.04		
		Δ y		-	-	0.04		
	Blue	Δ χ		-	-	0.04		
		Δ y		-	-	0.04		
	White	Δ χ		-	-	0.04		
		Δ y		-	-	0.04		
Contrast Ratio at 89 °		CR89		10	-	-	-	Estimated value
Image sticking		-	Mosaic Pattern	invisible			-	6)

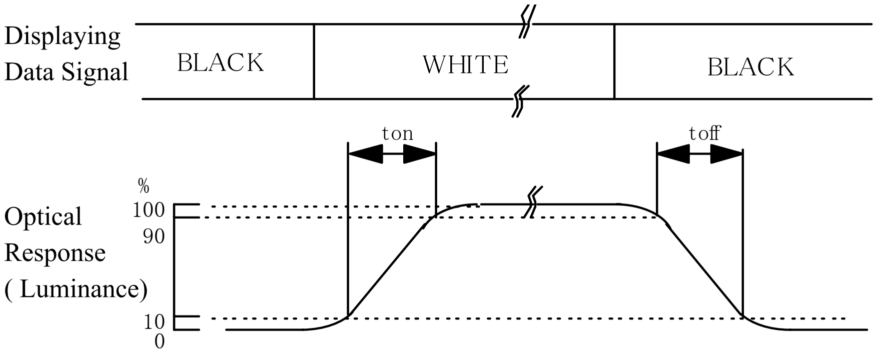
Note 1) Definition of Viewing Angle


ϕ =90°
(12 o' clock)
θ =0°
Z
eye
θ
ϕ
ϕ =0°
X (3o' clock)
ϕ =180° X'
(9 o' clock)
TFT - LCM
Z'
Y' ϕ =270°
(6 o' clock)

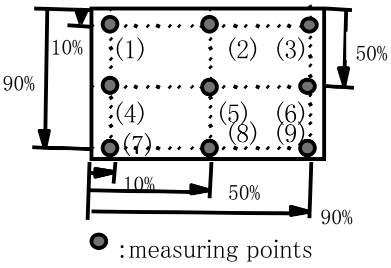
2) Definition of Contrast Ratio (CR)

$$CR=\frac{\text{(Luminance at displaying WHITE)}}{\text{(Luminance at displaying BLACK)}}$$

3) Definition of Response Time


Displaying
Data Signal
BLACK
WHITE
BLACK
ton
toff
%
100
90
10
0
Optical
Response
(Luminance)

4) Definition of Brightness Uniformity


10%
90%
50%
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
10%
50%
90%
● :measuring points

Display pattern is white (255 level) . The brightness uniformity is defined as the following equation. Brightness at each point is measured, and average, maximum and minimum brightness is calculated.

$$Buni=\frac{\left|\text{Bmax or Bmin - Bave}\right|}{\text{Bave}}\times 100$$

where, Bmax = Maximum brightness

Bmin = Minimum brightness

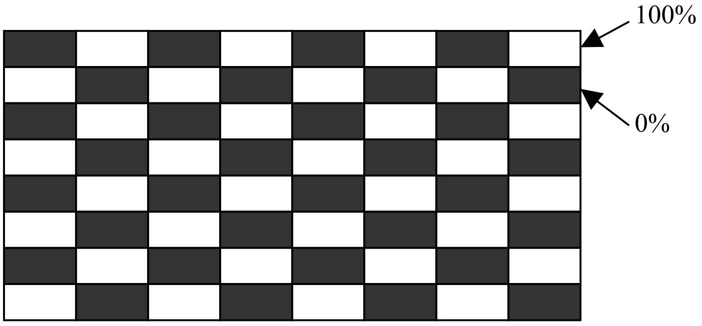
$$Bave = \text{Average brightness} = \frac{\sum_{k=1}^{9}(B(k))}{9}$$

5) Variation of color position on CIE

Variation of color position on CIE is defined as difference between colors at θ=0°and at θ =50°& ϕ =0°90°180°270°.

6) Image Sticking

Mosaic pattern



Condition : Operating mosaic pattern for 2 hours and gray scale (22 %) for 1 hour.

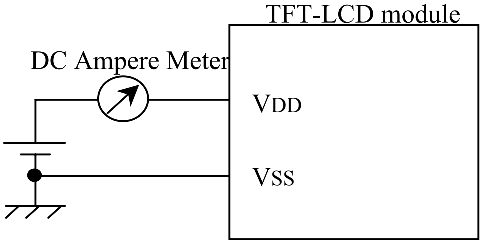
3. ELECTRICAL CHARACTERISTICS

3. 1 TFT-LCD Module

Ta = 25 ℃ , Vss = 0 V

ITEM	SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Power supply Voltage	VDD	11.4	12.0	12.6	V	
Power supply Current	IDD	-	0.4	0.7	A	1),2)
Ripple voltage of power Supply	VDDR	-	-	350	mV	

Note 1) f V = 60.0 Hz , f CLK = 85 MHz , VDD = 12.0 V , and Display pattern is horizontal stripe.



2) Current fuse is built in a module. Current capacity of power supply for VDD should be larger than 4A, so that the fuse can be opened at the trouble of electrical circuit of module.

3. 2 Back Light

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Input Voltage		Vin	330	370	410	V	
IC Power suplly		Vic	10.8	12.0	13.2	V	
ON/OFF Control Voltage	ON	ON/OFF	2.7	3.0	3.3	V	
	OFF		0	-	0.4		
Analog Dimming Input Voltage	Min. Brightness	Vadim	1.0	1.2	1.4	V	
	Max. Brightness		-0.2	0	0.2		
PWM Signal	Low	Vpwm	-	-	0.8	V	
	High		2.0	-	-		
PWM Frequency		-	200	240	252	Hz	Specific assurance
			60	-	200	Hz	Working assurance 4)
On-Duty Range for Burst-Dimming		On-Duty	27	-	95	%	3)
Output Current		IL	(113)	126	(138)	mArms	
Output Voltage	Ta=25℃	VL	(1150)	1250	(1325)	Vrms	
	Ta=0℃		(1245)	1350	(1430)		
Output frequency		f	59.6	60.0	60.4	kHz	
Status Output	Normal	Fail	-	0	0.8	V	Keep low while enable is on and off as long as system is normal.
	Failed stop		Open Collector			V	
EEFL Life Time		-	50,000	60,000	-	hours	2)

Note 1) This characteristics should be applied putting on the lamp about 60 minutes later with ambient temperature. (Ta = 25 ℃ ± 2 ℃)

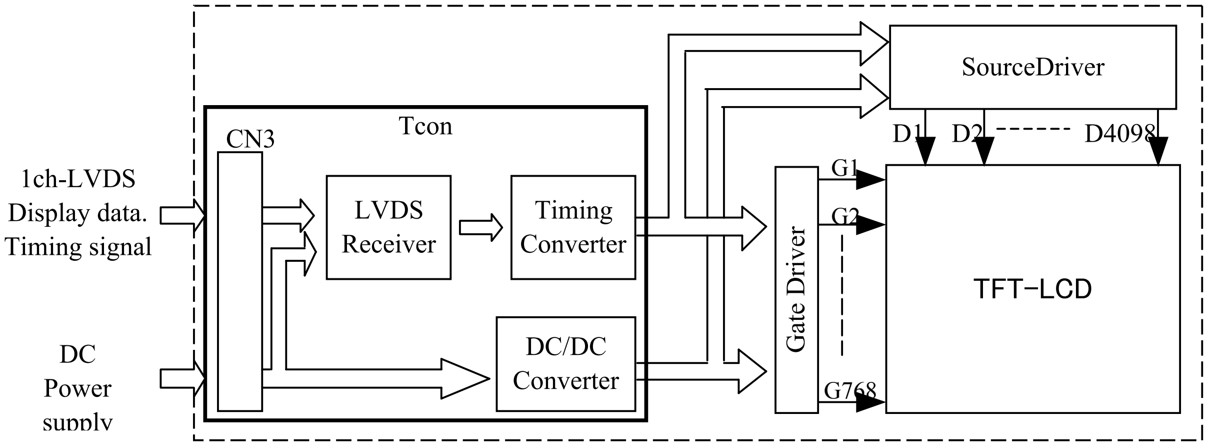
2) Life time of a lamp is defined. The life is determined as the time at which brightness of the lamp is 50 % compared to that of initial value at that typical lamp current on condition of continuous operating at 25 ± 2 ℃.

3) In case ambient temperature less than 0 degree , on duty range for burst dimming should be over 40%.

4) Assure the working of MD without image quality, for example flicker.

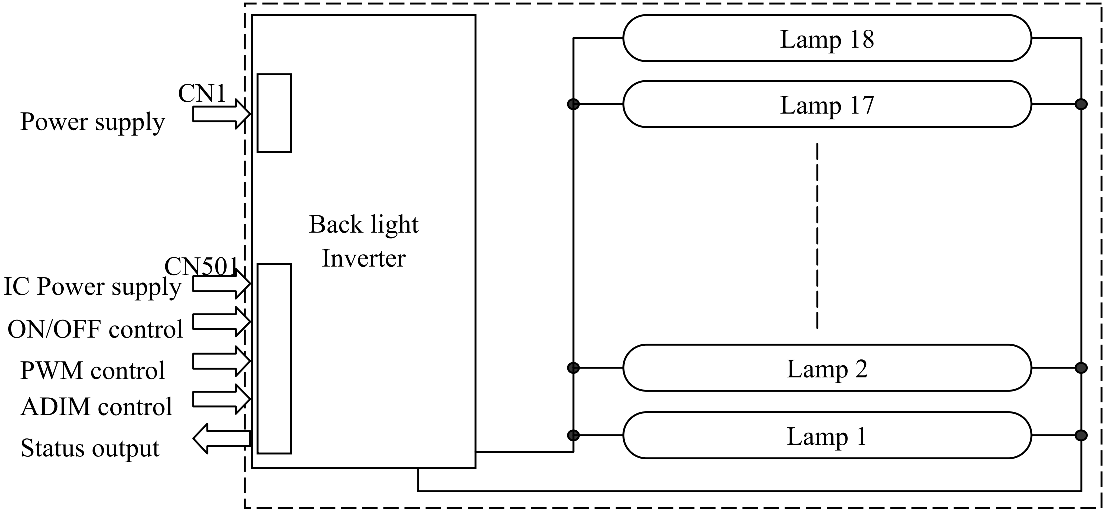
4. BLOCK DIAGRAM

(1) TFT-LCD module



1ch-LVDS
Display data.
Timing signal
DC
Power
supply
CN3
Tcon
LVDS
Receiver
Timing
Converter
DC/DC
Converter
SourceDriver
D1
D2
D4098
G1
G2
G768
Gate Driver
TFT-LCD

(2) Back light unit



Power supply
CN1
IC Power supply
CN501
ON/OFF control
PWM control
ADIM control
Status output
Back light
Inverter
Lamp 18
Lamp 17
Lamp 2
Lamp 1

5. INTERFACE PIN ASSIGNMENT

5. 1 TFT-LCD Module

CN3:JAE FI-X30SSL-HF
(Matching connector : JAE FI-X30C2L)

Pin No.	SYMBOL	Description	Note
1	VDD	Power Supply (typ.+12V)	1)
2	VDD		
3	VDD		
4	VDD		
5	VSS	GND(0V)	2)
6	VSS		
7	VSS		
8	VSS		
9	IC	Internally Connected, Keep Open	
10	IC		
11	VSS	GND(0V)	
12	Rx0-	Pixel Data	3)
13	Rx0+		
14	VSS	GND(0V)	2)
15	Rx1-	Pixel Data	3)
16	Rx1+		
17	VSS	GND(0V)	2)
18	Rx2-	Pixel Data	3)
19	Rx2+		
20	VSS	GND(0V)	2)
21	CLK-	Pixel Clock	3)
22	CLK+		
23	VSS	GND(0V)	2)
24	Rx3-	Pixel Data	3)
25	Rx3+		
26	VSS	GND(0V)	2)
27	IC	Internally Connected, Keep Open	
28	IC		
29	IC		
30	IC		

Notes 1) All VDD pins shall be connected to +12.0V(Typ.).
2) All VSS pins shall be grounded. Metal bezel is internally connected to VSS.
3) Rx n+ and Rx n- (n=0,1,2,3) should be wired by twist-pairs or side-by-side FPC patterns, respectively.

5. 2 Back Light Unit

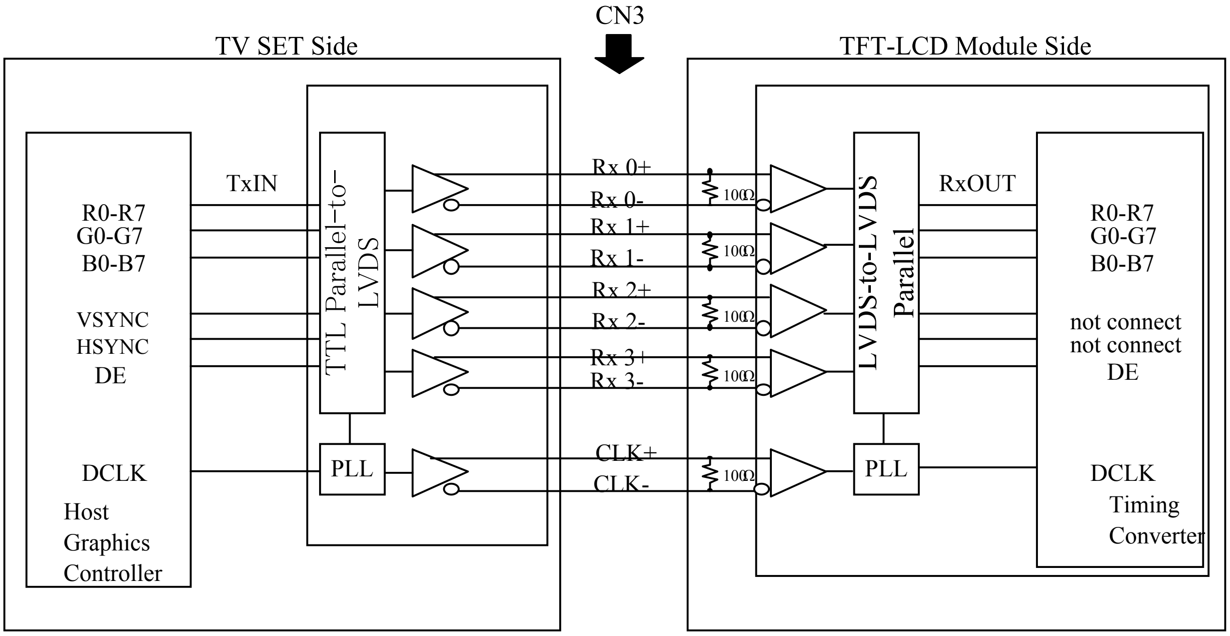
CN1:JST B3P(5-3,4)-VH
(Matching connecor : JST PHR-5)

PIN No.	SYMBOL	DESCRIPTION	NOTE
1	V-	GND (0V)	1)
2	V-	GND (0V)	
3	-	No Pin	
4	-		
5	V+	Power supply (typ.370V)	

CN501:JST B14B-PH-K-S
(Matching connecor : JST PHR-14)

PIN No.	SYMBOL	DESCRIPTION	NOTE
1	VIC	Power supply of inverter IC(+ 12V)	
2	ON/OFF	High : LAMP ON Low : LAMP OFF	
3	ADIM	Analog Dimming	
4	FAIL	Fail signal	
5	PWM	PWM signal	
6	GND	GND	
7	NC	No connection	
8	NC		
9	NC		
10	NC		
11	NC		
12	NC		
13	NC		
14	NC		

5. 3 Block Diagram of Interface


CN3
TV SET Side
TFT-LCD Module Side
TxIN
R0-R7
G0-G7
B0-B7
VSYNC
HSYNC
DE
DCLK
Host
Graphics
Controller
TTL Parallel-to-LVDS
PLL
Rx 0+
Rx 0-
Rx 1+
Rx 1-
Rx 2+
Rx 2-
Rx 3+
Rx 3-
CLK+
CLK-
100Ω
100Ω
100Ω
100Ω
100Ω
LVDS-to-LVDS Parallel
PLL
RxOUT
R0-R7
G0-G7
B0-B7
not connect
not connect
DE
DCLK
Timing
Converter

R0～R7 : Pixel R Data (7; MSB, 0; LSB)
G0～G7 : Pixel G Data (7; MSB, 0; LSB)
B0～B7 : Pixel B Data (7; MSB, 0; LSB)
DE : Data Enable

Note 1) The system must have the transmitter to drive the module.
2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

5. 4 LVDS Interface

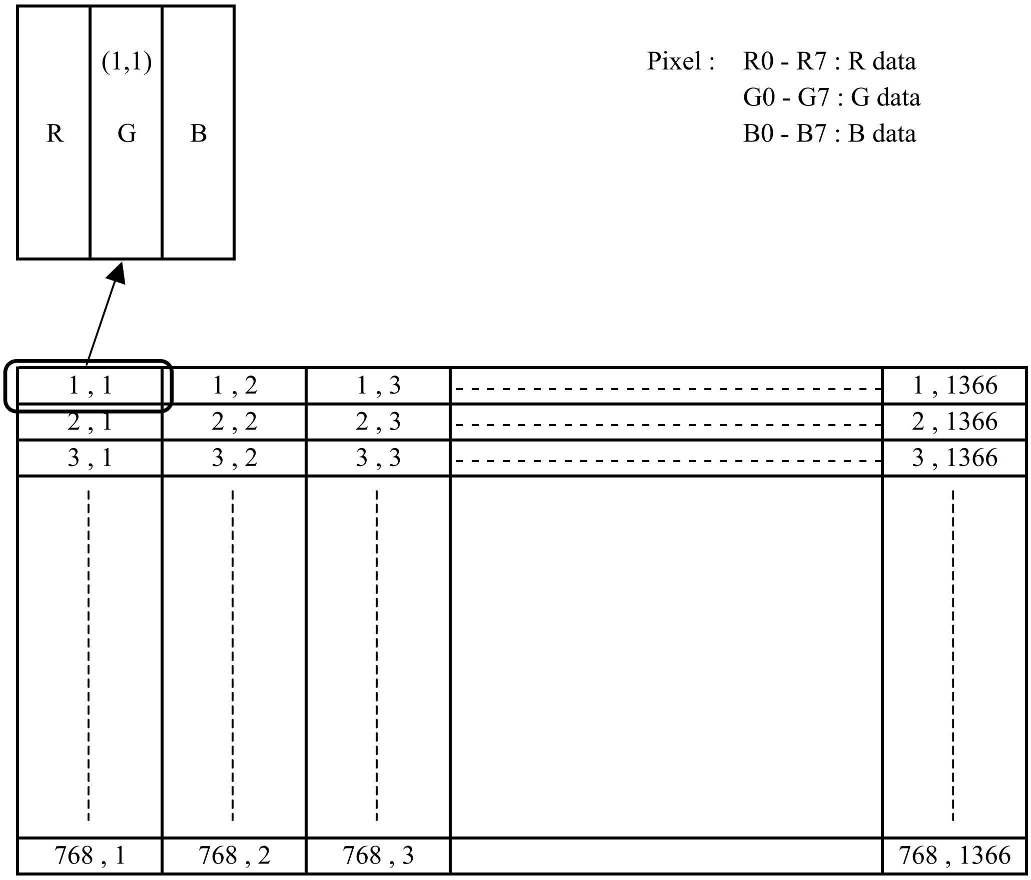
	SIGNAL	TRANSMITTER THC63LVDM83A		INTERFACE CONNECTOR		RECEIVER		TFT CONTROL
		PIN	INPUT	TV Set	TFT-LCD	PIN	OUTPUT	INPUT
24bit	R2	51	Tx IN0			27	Rx OUT0	R2
	R3	52	Tx IN1			29	Rx OUT1	R3
	R4	54	Tx IN2	TA OUT0+	Rx 0+	30	Rx OUT2	R4
	R5	55	Tx IN3			32	Rx OUT3	R5
	R6	56	Tx IN4			33	Rx OUT4	R6
	R7	3	Tx IN6	TA OUT0-	Rx 0-	35	Rx OUT6	R7
	G2	4	Tx IN7			37	Rx OUT7	G2
	G3	6	Tx IN8			38	Rx OUT8	G3
	G4	7	Tx IN9			39	Rx OUT9	G4
	G5	11	Tx IN12	TA OUT1+	Rx 1+	43	Rx OUT12	G5
	G6	12	Tx IN13			45	Rx OUT13	G6
	G7	14	Tx IN14			46	Rx OUT14	G7
	B2	15	Tx IN15	TA OUT1-	Rx 1-	47	Rx OUT15	B2
	B3	19	Tx IN18			51	Rx OUT18	B3
	B4	20	Tx IN19			53	Rx OUT19	B4
	B5	22	Tx IN20			54	Rx OUT20	B5
	B6	23	Tx IN21	TA OUT2+	Rx 2+	55	Rx OUT21	B6
	B7	24	Tx IN22			1	Rx OUT22	B7
	HSYNC	27	Tx IN24			3	Rx OUT24	not connect
	VSYNC	28	Tx IN25	TA OUT2-	Rx 2-	5	Rx OUT25	not connect
	DE	30	Tx IN26			6	Rx OUT26	DE
	R0	50	Tx IN27			7	Rx OUT27	R0
	R1	2	Tx IN5			34	Rx OUT5	R1
	G0	8	Tx IN10	TA OUT3+	Rx 3+	41	Rx OUT10	G0
	G1	10	Tx IN11			42	Rx OUT11	G1
	B0	16	Tx IN16			49	Rx OUT16	B0
	B1	18	Tx IN17	TA OUT3-	Rx 3-	50	Rx OUT17	B1
	RSVD 1)	25	Tx IN23			2	Rx OUT23	not connect
	DCLK	31	TxCLK IN	TxCLK OUT+ TxCLK OUT-	RxCLK IN+ RxCLK IN-	26	RxCLK OUT	DCLK

R0～R7	: Pixel R Data	(7; MSB, 0; LSB)
G0～G7	: Pixel G Data	(7; MSB, 0; LSB)
B0～B7	: Pixel B Data	(7; MSB, 0; LSB)
DE	: Data Enable	

Note 1) RSVD(reserved)pins on the transmitter shall be tied to"H"or"L".

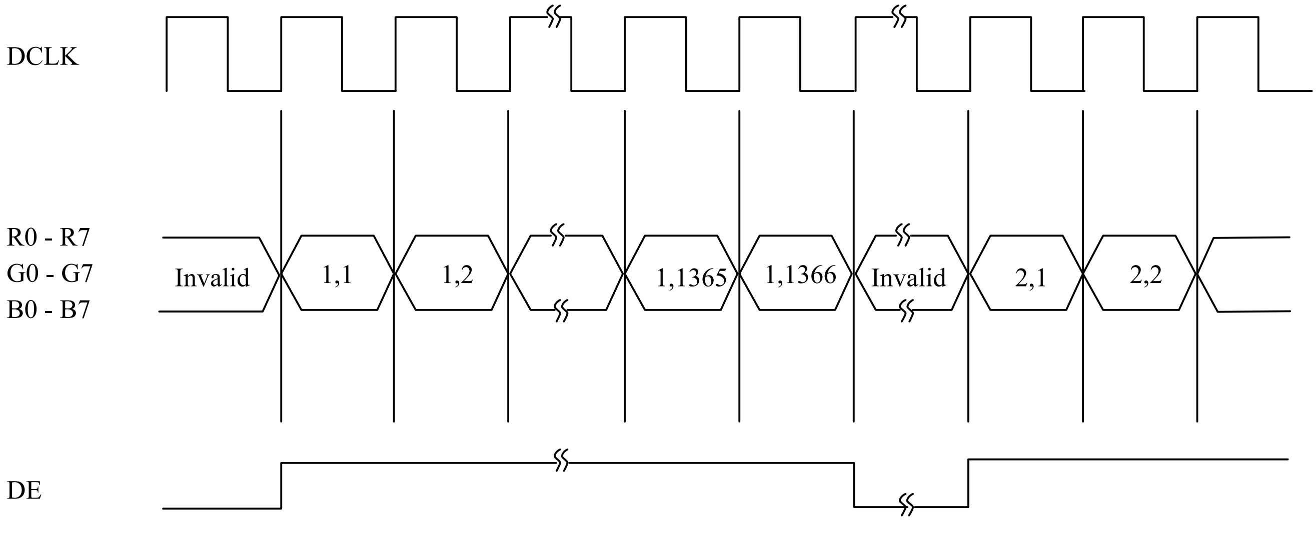
5. 5 Correspondence Between Input Data nd Display Image

Display data of adjacent one pixel is latched during one cycle of DCLK.



Pixel : R0 - R7 : R data
G0 - G7 : G data
B0 - B7 : B data

1 , 1	1 , 2	1 , 3	- - - - - - - -	1 , 1366
2 , 1	2 , 2	2 , 3	- - - - - - - -	2 , 1366
3 , 1	3 , 2	3 , 3	- - - - - - - -	3 , 1366
¦	¦	¦		¦
768 , 1	768 , 2	768 , 3		768 , 1366


DCLK
R0 - R7
G0 - G7
B0 - B7
Invalid
1,1
1,2
1,1365
1,1366
Invalid
2,1
2,2
DE

5. 6 Relationship Between Display Colors And Input Signals

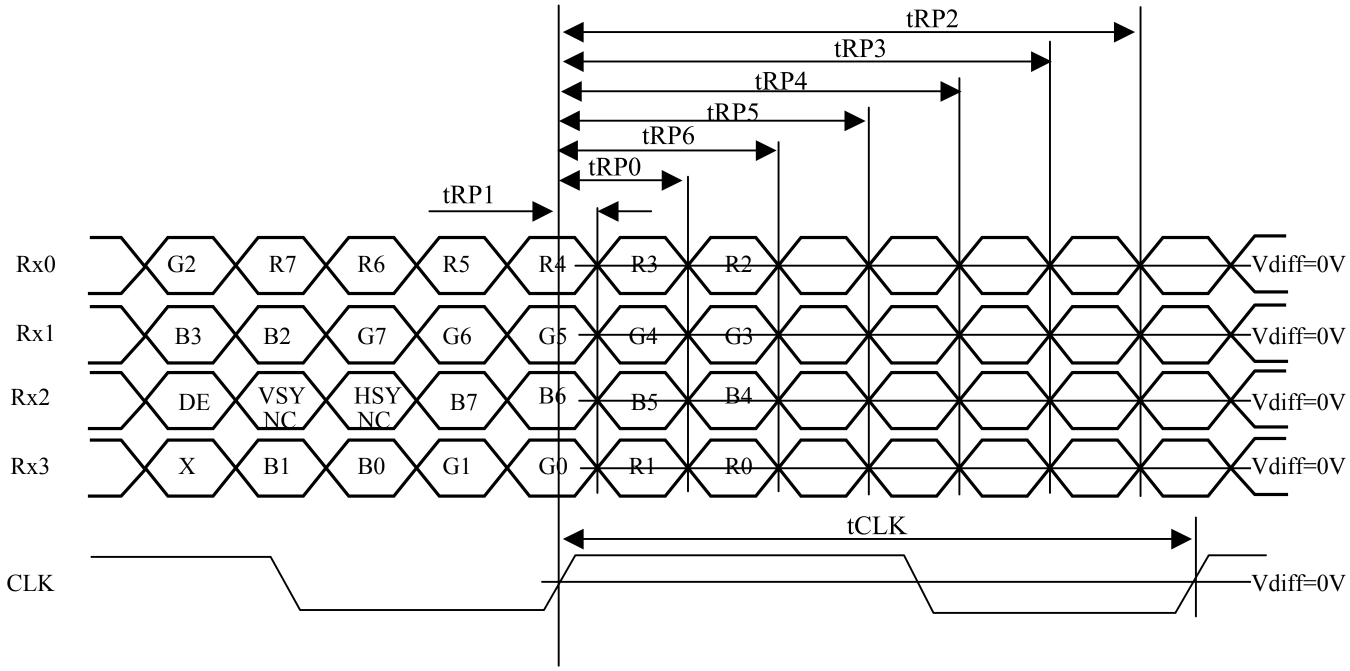
		Red Data								Green Data								Blue Data							
	Input	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Color		MSB							LSB	MSB							LSB	MSB							LSB
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note 1) Definition of gray scale :
Color(n)・・・・Number in parenthesis indicates gray scale level.
Larger n correspondsto brighter level.

2) Data : 1 : High, 0 : Low

6. INTERFACE TIMING

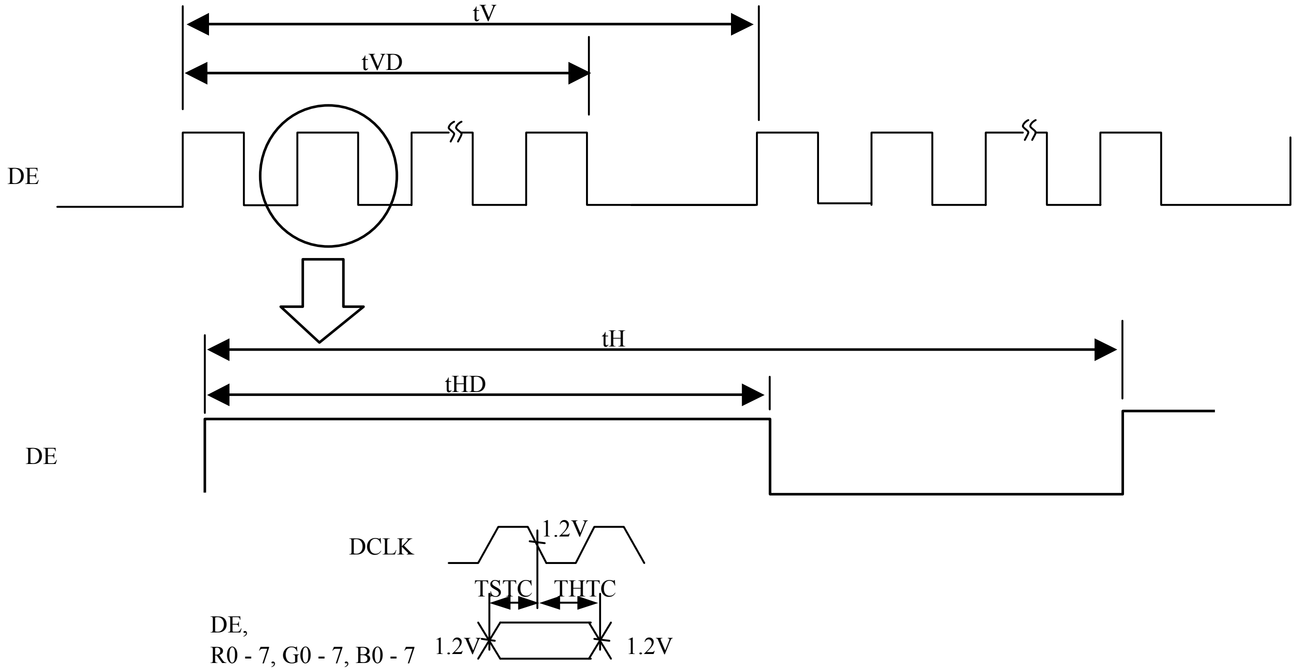
6. 1 LVDS Receiver Timing


tRP2
tRP3
tRP4
tRP5
tRP6
tRP0
tRP1
Rx0
G2
R7
R6
R5
R4
R3
R2
Vdiff=0V
Rx1
B3
B2
G7
G6
G5
G4
G3
Vdiff=0V
Rx2
DE
VSYNC
HSYNC
B7
B6
B5
B4
Vdiff=0V
Rx3
X
B1
B0
G1
G0
R1
R0
Vdiff=0V
tCLK
CLK
Vdiff=0V

Rx0=(Rx0+)-(Rx0-)
Rx1=(Rx1+)-(Rx1-)
Rx2=(Rx2+)-(Rx2-)
Rx3=(Rx3+)-(Rx3-)
CLK=(CLK+)-(CLK-)

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
CLK	Frequency (at 50 Hz)	DCLK	68	78	87	MHz	=1/tclk
	Frequency (at 60 Hz)		78	85	87	MHz	=1/tclk
	CLK Skew	tSC	- 4.0	0	+ 4.0	ns	
Rx*0 Rx*1 Rx*2 Rx*3	0 data position	tRP0	1/7tCLK - 0.4	1/7tCLK	1/7tCLK + 0.4	ns	
	1st data position	tRP1	- 0.4	0	+ 0.4		
	2nd data position	tRP2	6/7tCLK - 0.4	6/7tCLK	6/7tCLK + 0.4		
	3rd data position	tRP3	5/7tCLK - 0.4	5/7tCLK	5/7tCLK + 0.4		
	4th data position	tRP4	4/7tCLK - 0.4	4/7tCLK	4/7tCLK + 0.4		
	5th data position	tRP5	3/7tCLK - 0.4	3/7tCLK	3/7tCLK + 0.4		
	6th data position	tRP6	2/7tCLK - 0.4	2/7tCLK	2/7tCLK + 0.4		

6. 2 Syncronization Signal Timing



Note 1) Reference level for each timing signal is 1.2 V unless it is stated on the chart, high level voltage(VIH) and low level voltage(VIL) are defined as follows:

VIH ≧ 2.0 V VIL ≦ 0.8 V

2) The timing of DCLK to other signals conforms to the specifications of LVDS transmitter.

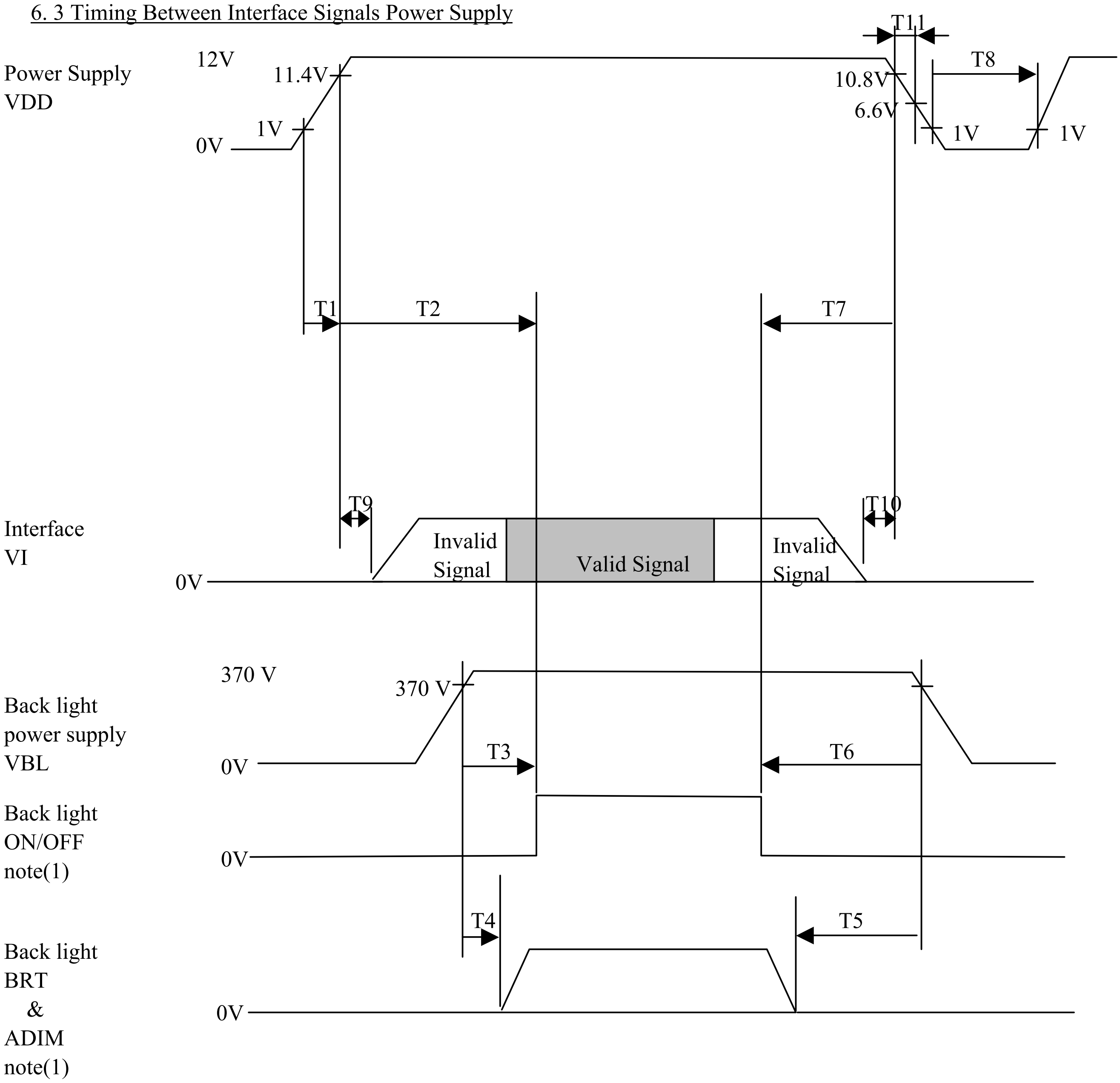
I)50Hz 2pxl/clk

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
DE	Vertical Frequency	fV	48	50	52	Hz	
	Vertical Period	tV	773	860	1000	tH	
	Vertical Valid	tVD		768		tH	
	Horizontal Frequency	fH	-	43	-	kHz	
	Horizontal Period	tH	1400	1814	2000	tCLK	
	Horizontal Valid	tHD		1366		tCLK	

II)60Hz 2pxl/clk

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
DE	Vertical Frequency	fV	58	60	62	Hz	
	Vertical Period	tV	773	773	1000	tH	
	Vertical Valid	tVD		768		tH	
	Horizontal Frequency	fH	-	46.4	-	kHz	
	Horizontal Period	tH	1400	1833	2000	tCLK	
	Horizontal Valid	tHD		1366		tCLK	

6. 3 Timing Between Interface Signals Power Supply


Power Supply
VDD
12V
11.4V
1V
0V
T11
T8
10.8V
6.6V
1V
1V
T1
T2
T7
Interface
VI
0V
T9
Invalid
Signal
Valid Signal
Invalid
Signal
T10
Back light
power supply
VBL
370 V
370 V
0V
T3
T6
Back light
ON/OFF
note(1)
0V
T4
T5
Back light
BRT
&
ADIM
note(1)
0V

0 ≦ T1 ≦ 10
350 ≦ T2
0 ≦ T3
1 ≦ T4

0 < T5
100 < T6
0 ≦ T7
350 ≦ T8

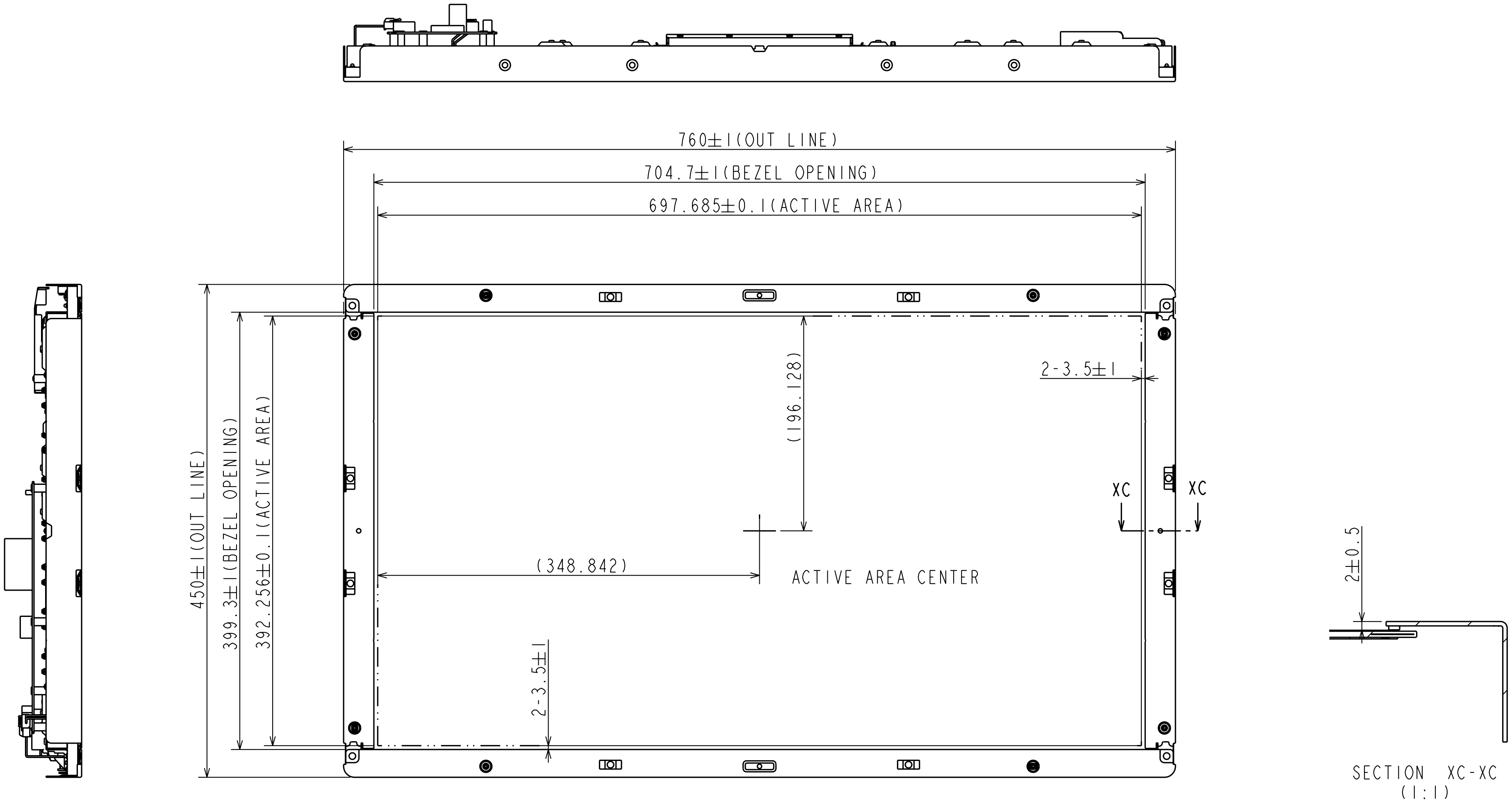
10 ≦ T9
0 ≦ T10

10 < T11

Unit : ms

7. DIMENSIONAL OUT LINE

(1)FRONT VIEW


760±1(OUT LINE)
704.7±1(BEZEL OPENING)
697.685±0.1(ACTIVE AREA)
450±1(OUT LINE)
399.3±1(BEZEL OPENING)
392.256±0.1(ACTIVE AREA)
(196.128)
(348.842)
ACTIVE AREA CENTER
2-3.5±1
2-3.5±1
XC
XC
2±0.5
SECTION XC-XC
(1:1)

Note 1) The dimension in a parenthesis is a reference value.
2) Unspecified tolerance to be ±0.8

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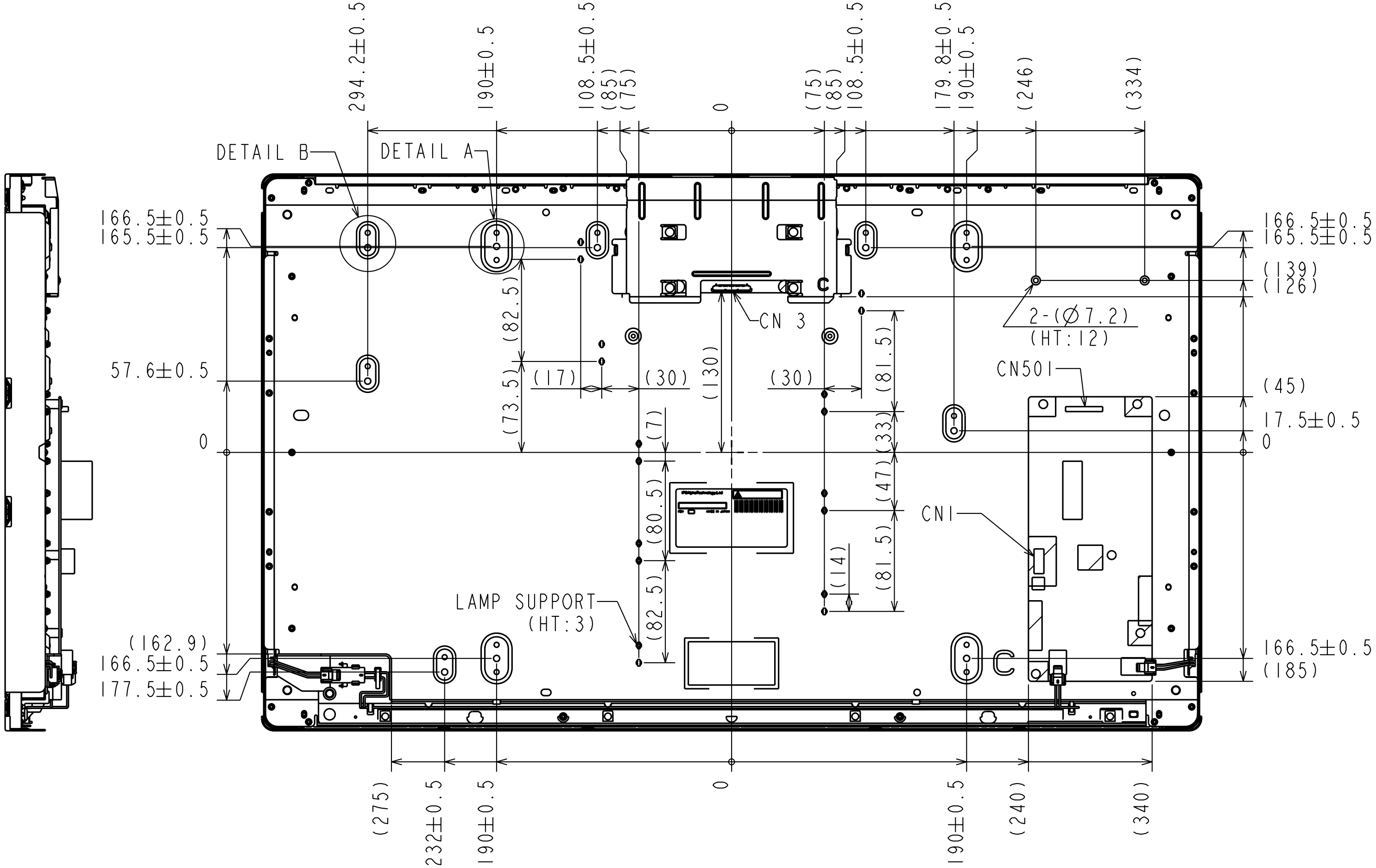
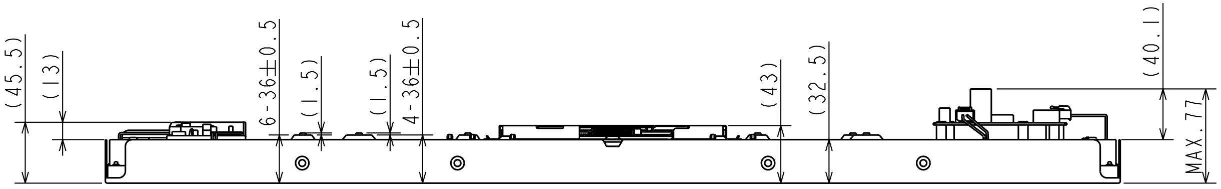
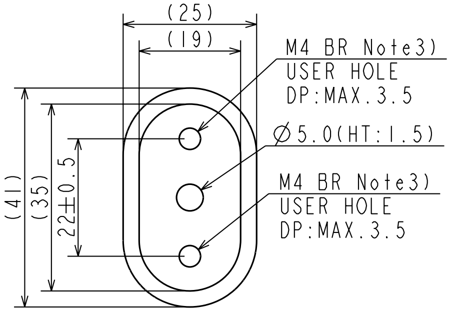
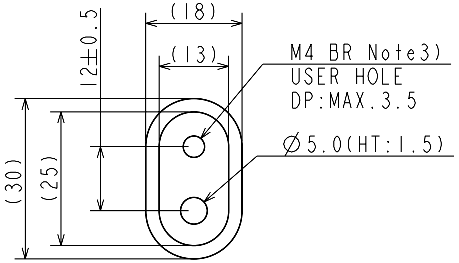
(2)BACK VIEW


294.2±0.5
190±0.5
108.5±0.5
(85)
(75)
0
(75)
(85)
108.5±0.5
179.8±0.5
190±0.5
(246)
(334)
DETAIL B
DETAIL A
166.5±0.5
165.5±0.5
(82.5)
(73.5)
(17)
(30)
(130)
(30)
(81.5)
C
CN 3
(139)
(126)
2-(Ø7.2)
(HT:12)
CN501
57.6±0.5
(45)
17.5±0.5
0
0
(7)
(33)
(80.5)
(47)
CN1
(14)
(81.5)
(82.5)
LAMP SUPPORT
(HT:3)
(162.9)
166.5±0.5
177.5±0.5
166.5±0.5
(185)
C
(275)
232±0.5
190±0.5
0
190±0.5
(240)
(340)


(45.5)
(13)
6-36±0.5
(1.5)
(1.5)
4-36±0.5
(43)
(32.5)
(40.1)
MAX.77


(25)
(19)
M4 BR Note3)
USER HOLE
DP:MAX.3.5
Ø5.0(HT:1.5)
M4 BR Note3)
USER HOLE
DP:MAX.3.5
(41)
(35)
22±0.5

DETAIL A

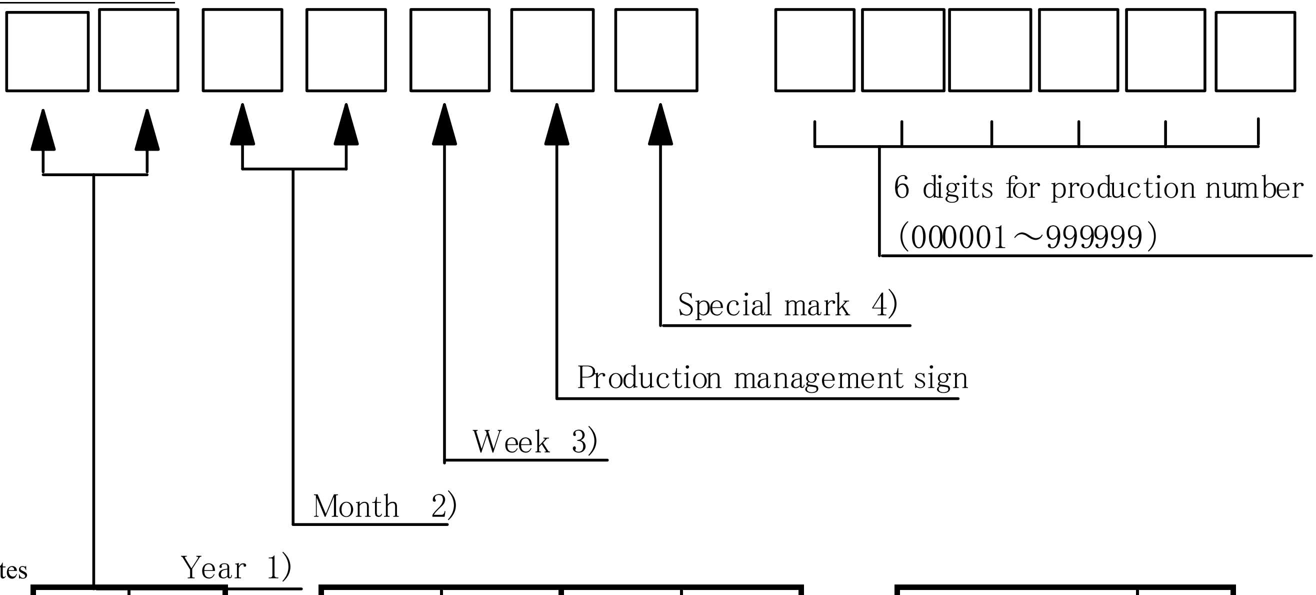

(18)
(13)
12±0.5
M4 BR Note3)
USER HOLE
DP:MAX.3.5
Ø5.0(HT:1.5)
(30)
(25)

DETAIL B

Note 1) The dimension in a parenthesis is a reference value.
2) Unspecified tolerance to be ±0.8
3) Torque MAX. 1.47N·m(15kgf·cm)

8. DESIGNATION OF LOT MARK

8.1 LOT MARK


6 digits for production number
(000001～999999)
Special mark 4)
Production management sign
Week 3)
Month 2)
Year 1)

Notes

1)

Year	Mark
2007	07
2008	08
2009	09

2)

Month	Mark	Month	Mark
1	01	7	07
2	02	8	08
3	03	9	09
4	04	10	10
5	05	11	11
6	06	12	12

3)

Week(Day)	Mark
1～7	1
8～14	2
15～21	3
22～28	4
29～31	5

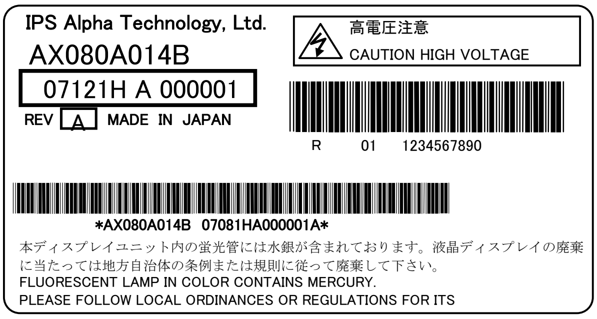
4) "A":Liquid crystal A, "B":Liquid crystal B

8.2 Revision (REV.) control

REV. is the column for manufacturing convenience. A-Z except I and O may be written on this column.

8.3 Location of lot mark

Lot mark is printed on a label. The label is on the metallic bezel as shown in 7. External Dimensional.
The style of character will be changed without notice.



IPS Alpha Technology, Ltd.
AX080A014B
07121H A 000001
REV A MADE IN JAPAN

高電圧注意
CAUTION HIGH VOLTAGE

R 01 1234567890

AX080A014B 07081HA000001A

本ディスプレイユニット内の蛍光管には水銀が含まれております。液晶ディスプレイの廃棄に当たっては地方自治体の条例または規則に従って廃棄して下さい。
FLUORESCENT LAMP IN COLOR CONTAINS MERCURY.
PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS

8.4 Record of the revision descrrived on the label

Revision	Specification
A	Initial

9. COSMETIC SPECIFICATIONS

9.1 Condition for cosmetic inspection

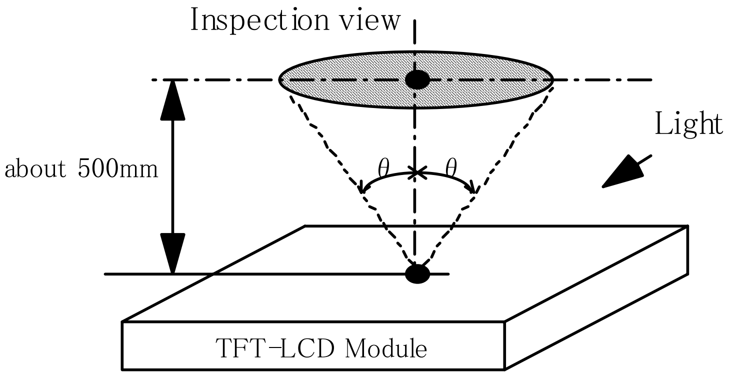
(1) Viewing zone

a) The figure shows the correspondence between eyes (of inspector) and TFT-LCD module.

$\theta \leqq 45^\circ$: when non-operating inspection

$\theta \leqq 5^\circ$: when operating inspection

b) Inspection should be executed only from front side and only A-zone.
Cosmetic of B-zone and C-zone are ignore.
(refer to 9.2 Definition of zone)



(2) Environmental

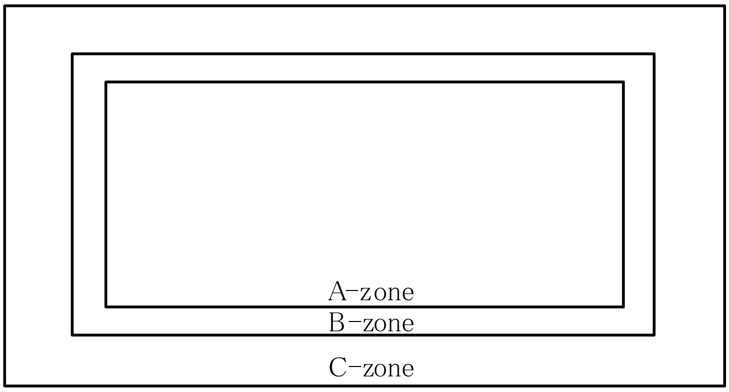
a) Temperature : 25 degrees

b) Ambient light : about 700 lx and non-directive when operating inspection.
: about 1000 lx and non-directive when non-operating inspection.

c) Back-light : when non-operating inspection, back-light should be off .

9.2 Definition of zone

- ･A-zone : Display area (pixel area)
- ･B-zone : Area between A-zone and C-zone
- ･C-zone : Metallic bezel area



9.3 COSMETIC SPECIFICATIONS

When displaying conditions are not stable (ex. at turn on or off), the following specifications are not applied.

	No	ITEM			Max. acceptable number		Unit	Note
					Bright defect	Low bright defect		
Operating inspection	1	Dot defect	Sparkle mode	1-dot	0	4	pcs	1),2),4)
				2-dots	0		Units	1),2),5)
				3-dots	0			
				Density	0		pcs/ φ 20mm	1),2),6)
				Total	4		pcs	1),2)
			Black mode	1-dot	7		pcs	1),3),4)
				2-dots	0		Units	1),3),5)
				3-dots	0			
				Density	3		pcs/ φ 20mm	1),3),6)
				Total	7		pcs	1),3)
				Total	9		pcs	1)
	2	Line defect			Serious one is not allowed		-	-
	3	Uneven brightness						
	4	Stain inclusion (Line shape W : width (mm) L : length (mm))	W≦0.02	L : Ignore	Ignore		pcs	7)
			W≦0.04	L≦4.0	8			
				L>4.0	0			
			W≦0.08	L≦2.0	8			
				L>2.0	0			
			W>0.08	-	(See dot shape)			
	5	Stain inclusion (Dot shape D : ave. dia (mm))	D≦0.22		Ignore		pcs	7)
			D≦0.5		8			
			D>0.5		0			
	6	Scratch on polarizer (Line shape W : width (mm) L : length (mm))	W≦0.02	L : Ignore	Ignore		pcs	8)
			W≦0.08	L≦20	10			
				L>20	0			
			W>0.08	-	0			
	7	Scratch on polarizer (Dot shape D : ave. dia (mm))	D≦0.2		Ignore		pcs	8)
			D≦0.6		10			
			D>0.6		0			

	No	ITEM		Max. acceptable number	Unit	Note
				A-zone		
	8	Bubbles, peeling in polarizer 〔D : ave. dia (mm)〕	D≦0.2	Ignore	pcs	8)
			D≦0.5	10		
			D>0.5	0		
	9	Wrinkles on polarizer		Serious one is not allowed.	-	-

Note 1) Dot defect : defect area > 1/2 dot

2) Sparkle mode :

bright defect	G>24.3%
	R>24.3%
	B>24.3%
low bright defect	24.3%≧G>4.1%
	24.3%≧R>7.8%
	24.3%≧B>18.0%

3) Black mode : brightness of dot is less than 70% at white. (visible to eye)

4) 1 dot : defect dot is isolated, not attached to other defect dot.

5) N dots : N defect dots are consecutive. (N means the number of defects dots)

6) Density : number of defect dots inside ϕ 20mm

7) Those stains which can be wiped out easily are acceptable.

8) Polarizer area inside of B-zone is not applied.

9) No major (serious) defects when viewed in gray scale mode.

10. PRECAUTION

Please pay attention to the followings when a TFT module with a back-light unit is used, handled and mounted.

10.1 Precaution to handling and mounting

(1) Applying strong force to a part of the module may cause partial deformation of frame or mold, and cause damage to the display.

(2) The module should gently and firmly be held by both hands. Never hold by just one hand in order to avoid any internal damage. Never drop or hit the module.

(3) The module should be installed with mounting holes of a module.

(4) Uneven force such as twisted stress should not be applied to a module when a module is mounted on the cover case. The cover case must have sufficient strength so that external force can not be transmitted directly to a module.

(5) It is recommended to leave a space between a module and a holding board of a module so that partial force is not applied to a module.

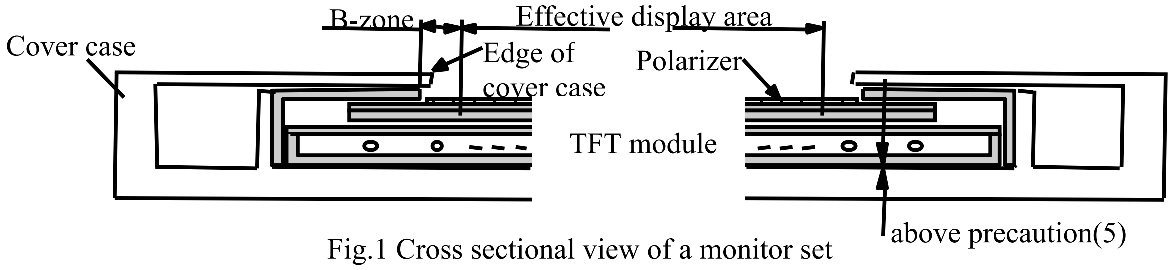


Fig.1 Cross sectional view of a monitor set

(6) The edge of a cover case should be located inside more than 1mm from the edge of a module front frame.

(7) A transparent protective plate should be added on the display area of a module in order to protect a polarizer and TFT cell. The transparent protective plate should have sufficient strength so that the plate can not touch a module by external force.

(8) Materials included acetic acid and choline should not be used for a cover case as well as other parts and boards near a module. Acetic acid attacks a polarizer. Choline attacks electric circuits due to electro-chemical reaction.

(9) The polarizer on a TFT cell should carefully be handled due to its softness, and should not be touched, pushed or rubbed with glass, tweezers or anything harder than HB pencil lead. The surface of a polarizer should not be touched and rubbed with bare hand, greasy clothes or dusty clothes.

(10) The surface of a polarizer should be gently wiped with absorbent cotton, chamois or other soft materials slightly contained petroleum benzene when the surface becomes dirty. Normal-hexane as cleaning chemicals is recommended in order to clean adhesives which fix front/rear polarizers on a TFT cell. Other cleaning chemicals such as acetone, toluen and alcohol should not be used to clean adhesives because they cause chemical damage to a polarizer.

(11) Saliva or water drops should be immediately wiped off. Otherwise, the portion of a polarizer may be deformed and its color may be faded.

(12) The module should not be opened or modified. It may cause not to operate properly.

(13) Metallic bezel of a module should not be handled with bare hand or dirty gloves. Otherwise, color of a metallic frame may become dirty during its storage. It is recommended to use clean soft gloves and clean finger stalls when a module is handled at incoming inspection process and production (assembly) process.

(14) Lamp(EEFL) cables should not be pulled and held.

10.2 Precaution to operation

(1) The ambient temperature near the operated module should be satisfied with the absolute maximum ratings. Unless it meets the specifications, sufficient cooling system should be adopted to system.

(2) The spike noise causes the mis-operation of a module. The level of spike noise should be as follows:
-200mV<=over- and under- shoot of VDD<= +200mV
VDD including over- and under- shoot should be satisfied with the absolute maximum ratings.

(3) Optical response time, luminance and chromaticity depend on the temperature of a TFT module. Response time and saturation time of EEFL luminance become longer at lower temperature operation.

(4) Sudden temperature change may cause dew on and/or in the a module. Dew males damage to a polarizer and/or electrical contacting portion. Dew causes fading of displayed quality.

(5) Fixed patterns displayed on a module for a long time may cause after-image. It will be recovered soon.

(6) A module has high frequency circuits. Sufficient suppression to electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be effective to minimize the interference.

(7) Noise may be heard when a back-light is operated. If necessary, sufficient suppression should be done by system manufacturers.

(8) The module should not be connected or removed while a main system works.

(9) Inserting or pulling I/F connectors causes any trouble when power supply and signal dates are on-state.I/F connectors should be inserted and pulled after power supply and signal dates are turned off.

10.3 Electrostatic discharge control

(1) Since a module consists of a TFT cell and electronic circuits with CMOS-ICs, which are very weak to electrostatic discharge, persons who are handling a module should be grounded through adequate methods such as a list band. I/F connector pins should not be touched directly with bare hands.

(2) Protection film for a polarizer on a module should be slowly peeled off so that the electrostatic charge can be minimized.

10.4 Precaution to strong light exposure

(1) A module should not be exposed under strong light. Otherwise, characteristics of a polarizer and color filter in a module may be degraded.

10.5 Precaution to storage

When modules for replacement are stored for a long time, following precautions should be taken care of:

(1) Modules should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during storage. Modules should be stored at 0 to 35－C at normal humidity (60%RH or less).

(2) The surface of polarizers should not come in contact with any other object. It is recommended that modules should be stored in the Hitachi's shipping box.

10.6 Precaution to handling protection film

(1) The protection film for polarizers should be pealed off slowly and carefully by persons who are electrically grounded with adequate methods such as a list band. Besides, ionized air should be blown over during peeling action. Dusts on a polarizer should be blown off by an ionized nitrogen gun and so on.

(2) The protection film should be peeling off without rubbing it to the polarizer. Because, if the film is rubbed together with the polarizer, since the film is attached to the polarizer with a small amount of adhesive, the adhesive may remain on a polarizer.

(3) The module with protection film should be stored on the conditions explained in 10.5 (1). However, in case that the storage time is too long, adhesive may remain on a polarizer even after a protection film is peeled off. Besides, in case that a module is stored at higher temperature and/or higher humidity, adhesive may remain on a polarizer. The remained adhesive may cause non-uniformity of display image.

(4) The adhesive can be removed easily with Normal-Hexane. The remained adhesive or its vestige on the polarizer should be wiped off with absorbent cotton or other soft materials such as chamois slightly contained Normal-Hexane.

10.7 Safety

(1) Since a TFT cell and lamps are made of glass, handling to the broken module should be taken care sufficiently in order not to be injured. Hands touched liquid crystal from a broken cell should be washed sufficiently.

(2) The module should not be taken apart during operation so that back-light drives by high voltage.

10.8 Environmental protection

(1) The TFT module contains cold cathode fluorescent lamps. Please follow local ordinance or regulations for its disposal.

(2) Flexible printed circuits and printed circuits board used in a module contain small amount of lead. Please follow local ordinance or regulations for its disposal.

10.9 Use restrictions and limitations

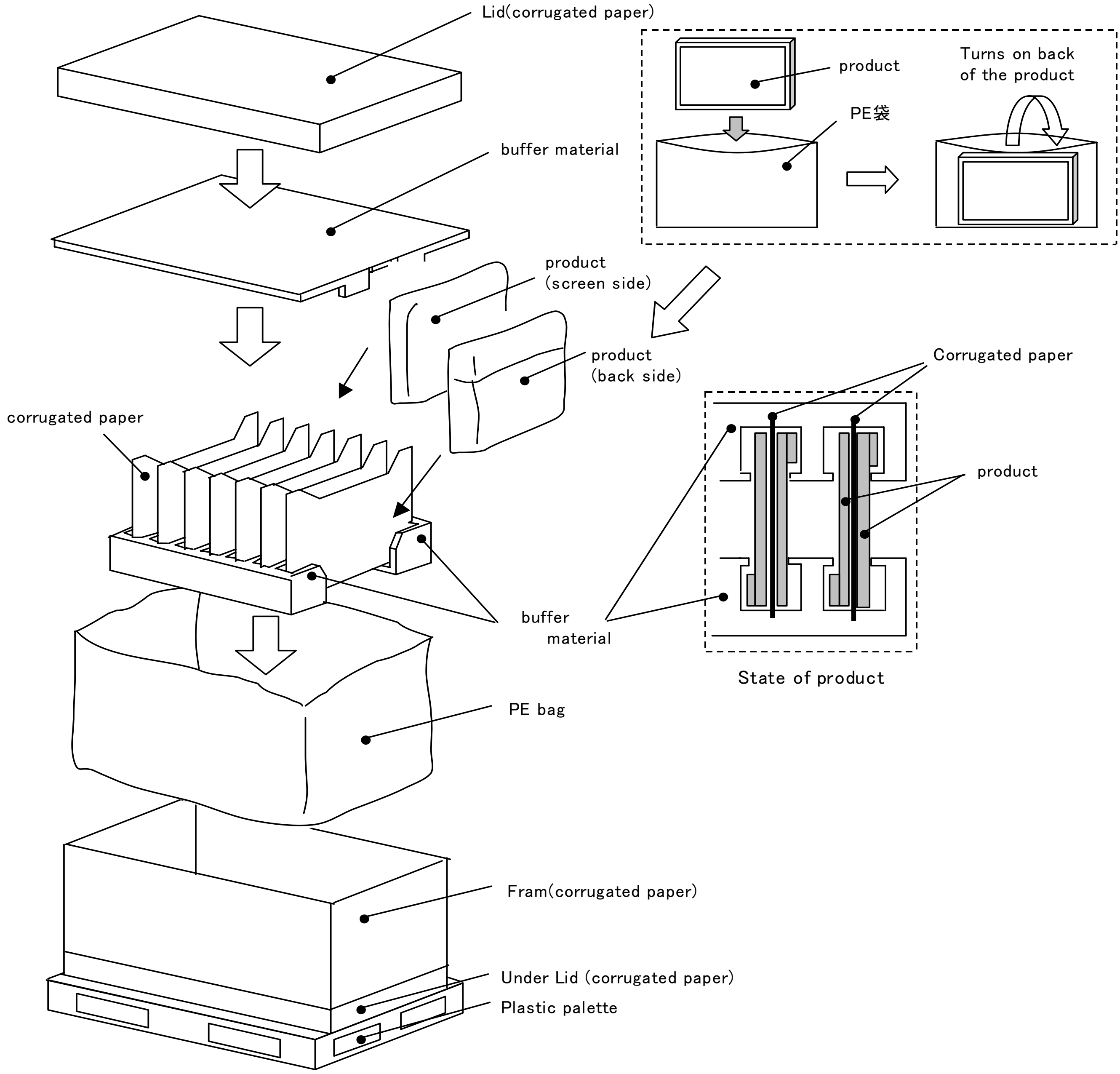
(1) This product is not authorized for use in life support devices or systems, military applications or other applications which pose a significant risk of personal injury.

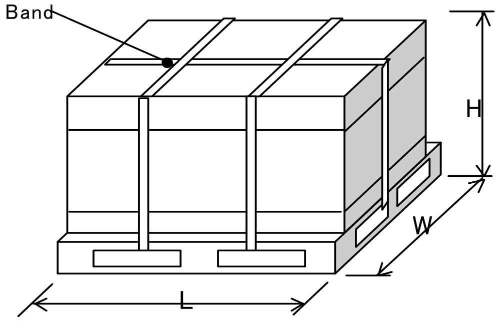
(2) In no event shall IPS Alpha Technology, Ltd.,be liable for any incidental, indirect or consequential damages in connection with the installation or use of this product, even if informed of the possibility thereof in advance. These limitations apply to all causes of action in the aggregate, including without limitation breach of contact, breach of warranty, negligence, strict liability, misrepresentation and other torts.

10.10 Others

(1) Electrical components which may not affect electrical performance are subjective to change without notice because of their availability.

11.Packing

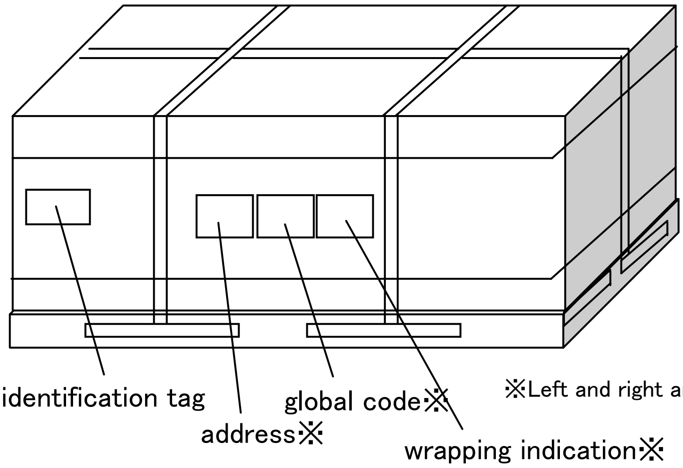

Lid(corrugated paper)
buffer material
product
PE袋
Turns on back of the product
product (screen side)
product (back side)
Corrugated paper
corrugated paper
product
buffer material
State of product
PE bag
Fram(corrugated paper)
Under Lid (corrugated paper)
Plastic palette



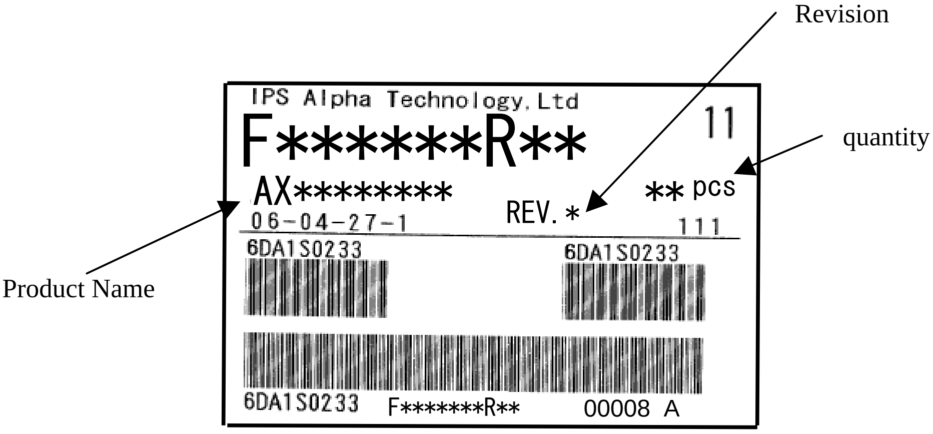
(14products/palette)

Size : 1210(L)×1000(W)×675(H) mm

Weight : 127kg


identification tag
address※
global code※
wrapping indication※

※Left and right are reversed occasionally.


Revision
quantity
Product Name

IPS Alpha Technology, Ltd

F*******R**

11

AX********

REV. *

** pcs

06-04-27-1

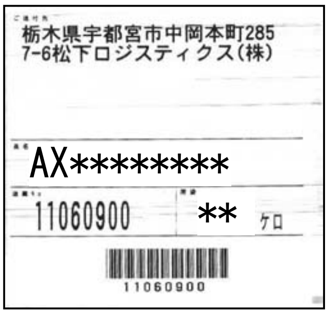
111

6DA1S0233

6DA1S0233

6DA1S0233 F*******R** 00008 A

production slip (ex.) label size (102 × 70)



栃木県宇都宮市中岡本町285
7-6松下ロジスティクス(株)

AX********

11060900

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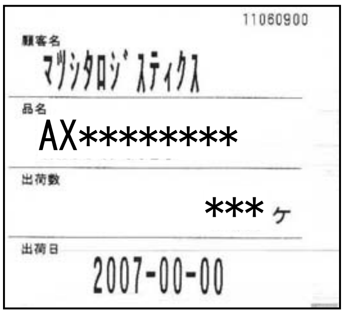
11060900

address (ex.)



11060900

顧客名

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品名

AX********

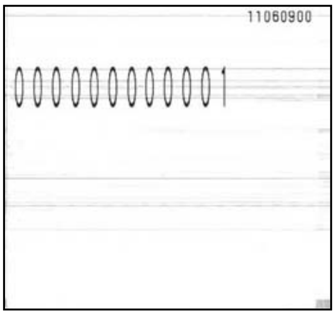
出荷数

*** ケ

出荷日

2007-00-00

wrapping indication (ex.)



11060900

000000000001

global code (ex.)

12. Reliability test

No.	Item	condition	Quantity	Period	
				determination	end
1	Low Temperature / Operating	Ta=0℃	3	500h	1000h
2	High Temperature / Operating	Ta=45℃	3	500h	1000h
3	High Temperature High Humidity / Operating	45℃ 95%RH	3	500h	1000h
4	Low Temperature / Strage	Ta=-30℃	3	500h	1000h
5	High Temperature / Strage	Ta=70℃	3	500h	1000h
6	High Temperature High Humidity / Strage	45℃ 95%RH	3	500h	1000h
7	Heat shock	-25/70℃ 30min./30min.	3	100cy.	200cy.
8	Heat shock test for solder	-35/85℃ 30min./30min.	3	200cy.	500cy.

Result Evaluation

display function should be kept.

13.Condition of Withstand Voltage and Insulation Resistance Test

・AC3000V (+100V,-0V),60Hz 3s(+1s,-0s) Maximum Detection Current 3mA Between CN1 and FG.
・150MΩ min , at DC500V Between CN1 and FG.