KOE
JDI Group

Kaohsiung Opto-Electronics Inc.

FOR MESSRS : _____   DATE : Jun. 18th ,2012

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

TX14D14VM1BPB

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ACCEPTED BY:_____   PROPOSED BY:_____

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
May.13,'08	7B64PS 2705-TX14D14VM1BPB-2 PAGE 5-1/3	5.2.3 MECHANICAL CHARACTERISTICS Changed : ITEM / SPECIFICATION / NOTE Pen Input Pressure / 20gf ~ 100gf / R0.8, Polyacetal Pen Finger / 20gf ~ 100gf / R8.0, Silicon Rubber ↓ ITEM / SPECIFICATION / NOTE Pen Input Pressure / 1.2N max. / R0.8, Polyacetal Pen Finger / 1.2N max. / R8.0, Silicon Rubber
	7B64PS 2708-TX14D14VM1BPB-2 PAGE 8-5/6	8.5 INTERNAL PIN CONNECTION Changed : CN1 JAE : FA5B040HF1R3000(Sn plating) → FA5B040HP1R3000(Au plating)
	7B64PS 2709-TX14D14VM1BPB-2 PAGE 9-1/1	9. DIMENSIONAL OUTLINE The lot label size and position is changed.
	7B64PS 2712-TX14D14VM1BPB-2 PAGE 12-1/1	12.1 LOT MARK Changed : 5 digits for production number ↓ 6 digits for production number 12.4 LOCATION OF LOT MARK Changed Added : 12.5 REVISION(Rev.) CONTROL
May 01,'12	All pages	Company name changed: KAOHSIUNG HITACHI ELECTRONICS CO.,LTD. ↓ KAOHSIUNG OPTO-ELECTRONICS INC.

The mechanical characteristics tables (for the first row) rendered distinctly:

5.2.3 MECHANICAL CHARACTERISTICS — Changed:

ITEM	SPECIFICATION	NOTE
Pen Input Pressure	20gf ~ 100gf	R0.8, Polyacetal Pen
Finger	20gf ~ 100gf	R8.0, Silicon Rubber

↓

ITEM	SPECIFICATION	NOTE
Pen Input Pressure	1.2N max.	R0.8, Polyacetal Pen
Finger	1.2N max.	R8.0, Silicon Rubber

Added : 12.5 REVISION(Rev.) CONTROL

Rev No.	ITEM
A	CN1 JAE : FA5B040HF1R3000
B	CN1 JAE : FA5B040HP1R3000

RECORD OF REVISION

DATE	SHEET No.	SUMMARY

May 01,'12	7B64PS 2705-TX14D14VM1BPB-3 PAGE 5-1/3~2/3	5.1 ELECTRICAL CHARACTERISTICS OF LCD
		   Added : Note4
		
		5.2 ELECTRICAL CHARACTERISTICS OF TOUCH PANEL
		   Added : Note4

Jun. 18,'12	7B64PS 2705-TX14D14VM1BPB-4 PAGE 5-1/3~2/3	5.2.2 ELECTRICAL CHARACTERISTICS
		   Revised : XT-XB : 230~650Ω → 320~980Ω
		
		5.2.4 OPTICAL CHARASTERISTICS
		   Revised : SPECIFICATION 80% min. → 77% min.

3.GENERAL DATA

The specifications are applied to the following TFT-LCD (Thin Film Transistor with Amorphous Silicon Technology) module with LED Back-light unit.

(1)	Part Name	TX14D14VM1BPB
(2)	Module Dimensions	131.0(W)mm x 102.2(H)mm x 13.1(D)mm typ.
(3)	LCD Active Area	115.2(W)mm x 86.4(H)mm
(4)	Dot Pitch	0.06(W)mm x 3(R,G,B)(W) x 0.18(H)mm
(5)	Resolution	640x3(R,G,B))(W)x480(H) dots
(6)	Color Pixel Arrangement	R,G,B Vertical stripe
(7)	LCD Type	Transmissive Color TFT LCD (Normally White)
(8)	Display Type	Active Matrix
(9)	Number of Colors	262k Colors (R,G,B 6bit digital each)
(10)	Backlight	Light Emitting Diode (LED) x 21 pcs.
(11)	Weight	(200)g (typ.)
(12)	Interface	40pin (C-MOS)
(13)	Power Supply Voltage	3.3V only (Include Timing Controller and Power Unit)
(14)	Viewing Direction	6 O'clock (The direction it's hard to be discolored)
(15)	Touch Panel	Resistance type
		The Surface is antiglare type.

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS   VSS=0V

| ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARKS
Power Supply for Logic	VDD	-0.3	4.0	V	
Input Voltage	VI	-0.3	VDD+0.3		Note1
Static Electricity	VESD0	-	±100	V	Note2,3
	VESD1	-	±2.5	kV	Note2,4
LED Forward Current	IF	-	35	mA	Note5
LED Pulse Forward Current	IFP	-	80	mA	Note6
LED Reuerse Voltage	VR	-	5	V	

Note 1 : DTMG,DCLK,RD0~RD5,GD0~GD5,BD0~BD5,MODE,U/D,L/R.

Note 2 : 200pF-250Ω 25℃ - 70%RH
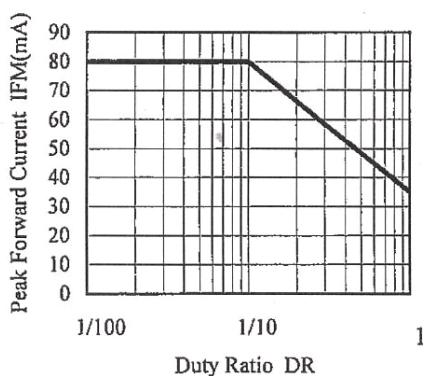
Note 3 : Interface Pin Connector.

Note 4 : The surface of metal bezel and LCD panel .

Note 5 :
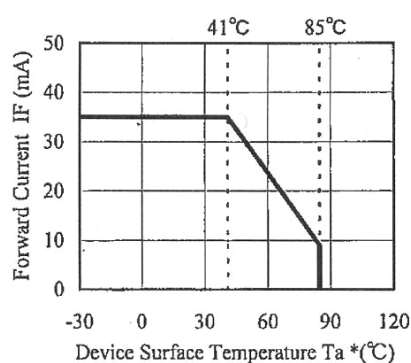
[Forward Current Derating Curve]

Note 6 : Duty ratio =1/10 , pulse width=0.1ms

[Peak Forward Current vs Duty Ratio (Ta*=25℃)]

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

I T E M	OPERATING		STORAGE		REMARKS
	MIN.	MAX.	MIN.	MAX.	
Temperature	-20	70	-30	80	Note2,3,6,7,8,10
Humidity	(Note 1)		(Note 1)		Without condensation
Vibration	-	$4.9 m/s^2$ (0.5G)	-	$19.6 m/s^2$ (2G) (Note 5)	Note4
Shock	-	$29.4 m/s^2$ (3G)	-	$490 m/s^2$ (50G) (Note 5)	XYZ directions Note9
Corrosive Gas	Not Acceptable		Not Acceptable		
Operating Life (Note 12)	40,000 h (Note 11)		-		At 25℃ , I_{LED}=84mA max.

Note 1 : Ta≦40℃ :85%RH max.

Ta＞40℃ :Absolute humidity must be lower than the humidity of 85%RH at 40℃.

Note 2 : For storage condition Ta at -30℃ ＜ 48h , at 80℃ ＜ 100h.

For operating condition Ta at -20℃ ＜ 48h , at 70℃ ＜ 100h.

Note 3 : Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 4 : 5Hz~100Hz(Except resonance frequency)

Note 5 : This LCM will resume normal operation after finishing the test.

Note 6 : The response time will be slower at low temperature.

Note 7 : Only operation is guarantied at operating temperature. Contrast, response time, another display quality are evaluated at +25℃.

Note 8 : If LED is drived by high current. The life time of LED will be note11 reduced. Also high temperature and humidity.

Note 9 : Pulse Width : 10ms

Note 10 : This is panel surface temperature , not ambient temperature.

Note 11 : When brightness reached 50% of initial brightness.

Note 12 :Life time is estimated data.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD   Ta=25℃,VSS=0V

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage	VDD	-	3.0	3.3	3.6	V
Power Supply Current (Note 3)	IDD	VDD-VSS=3.3V	-	130	-	mA
Input Voltage for Logic (Note 1)	VIH	"H" level	0.7VDD	-	VDD	V
	VIL	"L" level	VSS	-	0.3VDD	
Output Voltage for Logic (Note 1)	VOH	"H" level	VDD-0.4	-	-	V
	VOL	"L" level	VSS		VSS+0.4	
Vsync Frequency (Note 2)	fV	-	-	60.0	73.3	Hz
Hsync Frequency (Note 2)	fH	-	-	31.5	36.5	kHz
DCLK Frequency (Note 2)	fCLK	-	-	25.2	29.0	MHz

Note 1 : DTMG,DCLK,Hsync,Vsync,R0~R5,G0~G5,B0~B5,MODE,U/D,L/R.
Note 2 : Need to make sure of flickering and rippling of display when setting the frame frequency in your set.
Note 3 : fV=60Hz , fH=31.5kHz , Ta=25℃ Patten used as display Pattern : All Black
Note 4: 0.4A fuse is applied in the module for IDD. For display activation and protection purpose, power supply is recommended larger than 1.0A to start the display and break fuse once any short circuit occurred.

5.2 ELECTRICAL CHARACTERISTICS OF TOUCH PANEL

5.2.1 OPERATING CONDITION

ITEM	SPECIFICATION	REMARKS
Operating Voltage	5VDC	7VDC max.
Operating Current	20mA max.	

5.2.2 ELECTRICAL CHARACTERISTICS

ITEM		SPECIFICATION	REMARKS
Resistance	XT-XB	320Ω~980Ω	
Between Terminal	YR-YL	210Ω~880Ω	
Insulation Resistance	X-Y	20MΩmin.	At 25V DC
Linearity	X	±1.5% max.	(Note 1)
	Y	±1.5% max.	
Chattering		10ms max.	Voltage 3V,Frequency 5Hz

5.2.3 MECHANICAL CHARACTERISTICS

ITEM	SPECIFICATION	REMARKS
Pen Input Pressure	1.2N max.	R0.8, Polyacetal Pen
Finger	1.2N max.	R8.0, Silicon Rubber
Surface Hardness	3H min.	JIS K 5400

5.2.4 OPTICAL CHARASTERISTICS

ITEM	SPECIFICATION	REMARKS
Transmittance	77% min.	

Note 1 : Operating Voltage 5V DC.
Note 2 : Test Condition.
     R0.8 Polyacetal Pen , 150gf
     (a) X axis linearity testing method , VYR-VYL=5V , VOUT=VXT.
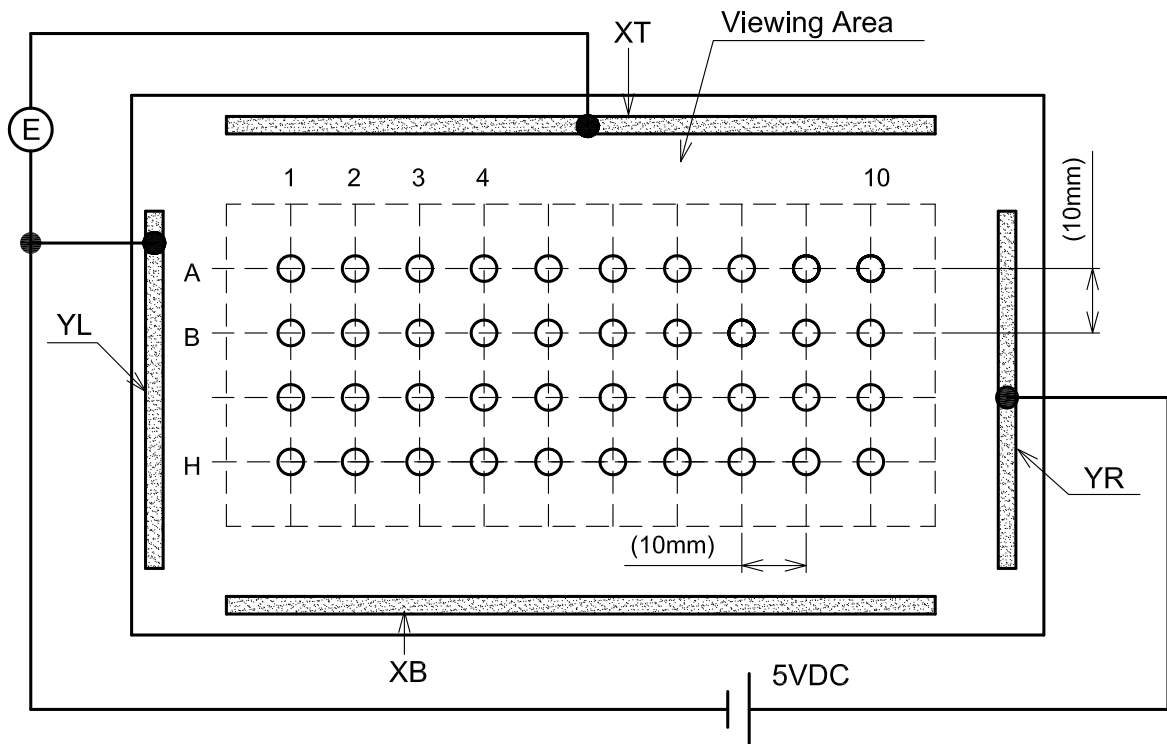
     (b) Y axis linearity testing method , VXT-VXB=5V , VOUT=VYR.

Note 3 : Calculation
     (a) Y axis linearity

$$\text{Linearity} = \frac{\triangle E\ max.}{EA\ -\ EH}\ x100(\%)$$
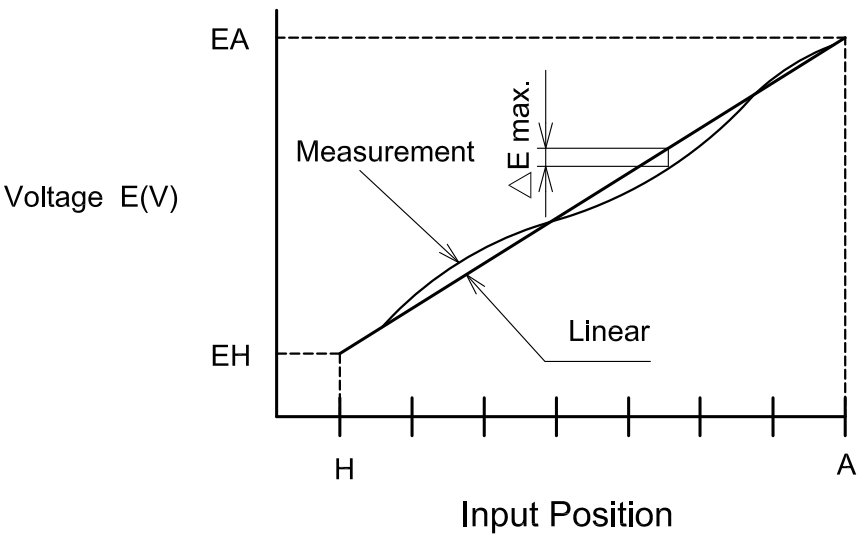
Note 4 : UV protection is recommended to avoid the possibility of performance degrading when touch panel
      is likely applied under UV environment for a long period of time.

5.3 ELECTRICAL CHARACTERISTICS OF LED BACKLIGHT

Ta=25℃ (Backlight on)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARKS
LED Input Voltage (Note 1)	VLED	-	11.5	12	12.5	V	BL Unit
LED Forward Current (Note 1)	ILED	-	-	84	91	mA	BL Unit
LED Reverse Current	I$_R$	VR = 4V	-	-	50	μA	LED / Part

Note 1 : LED circuit
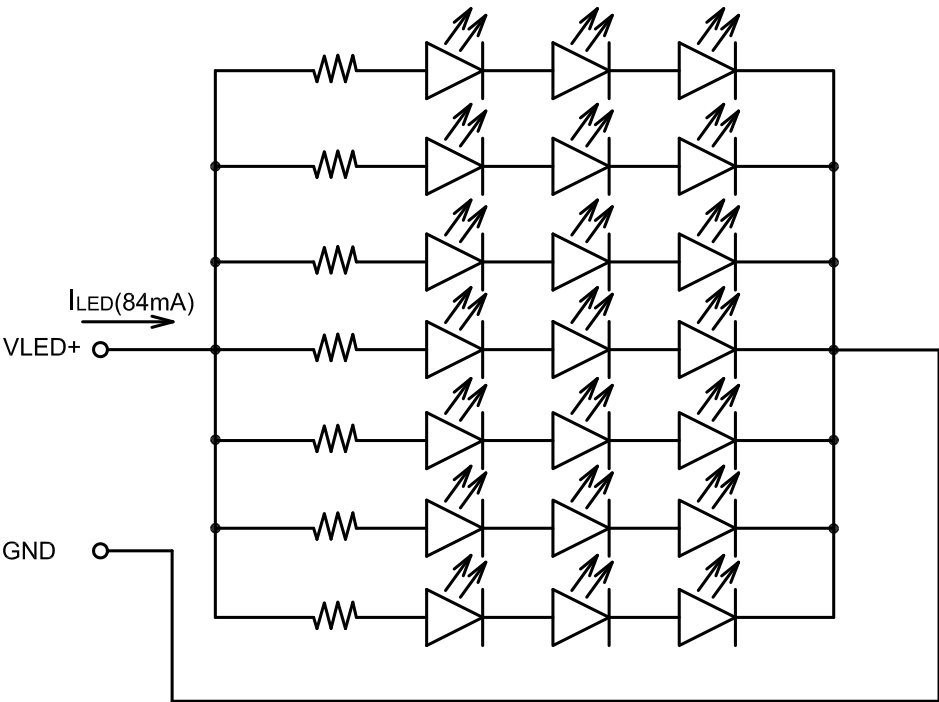
6. OPTICAL CHARACTERISTICS

6.1 OPTICAL CHARACTERISTICS OF LCD   Ta=25℃ (Backlight on)

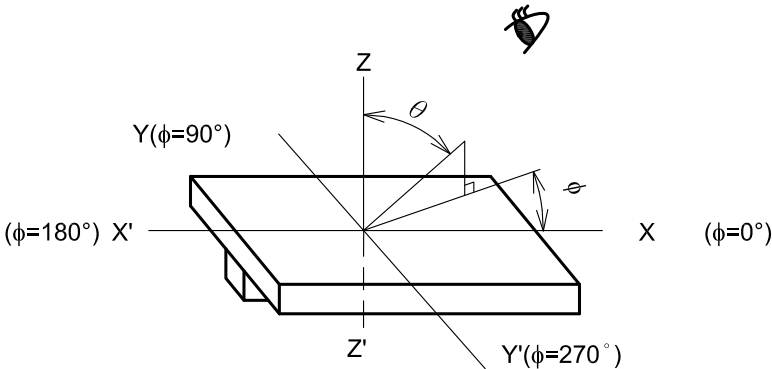| ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARKS
Viewing Area		θx	$\phi=0°,K\geqq5.0$	-	70	-	deg	Note1~5
		$\theta x'$	$\phi=180°,K\geqq5.0$	-	70	-	deg	Note1~5
		θy	$\phi=90°,K\geqq5.0$	-	70	-	deg	Note1~5
		$\theta y'$	$\phi=270°,K\geqq5.0$	-	70	-	deg	Note1~5
Contrast Ratio		K	$\phi=0°,\theta=0°$	120	350	-	-	Note5
Response Time (rise+fall)		tr+tf	$\phi=0°,\theta=0°$	-	45	-	ms	Note6
Color Tone (Primary Color)	Red	x	$\phi=0°, \theta=0°$	0.57	0.62	0.67	-	
		y		0.30	0.35	0.40	-	
	Green	x		0.29	0.34	0.39	-	
		y		0.55	0.60	0.65	-	
	Blue	x		0.10	0.15	0.20	-	
		y		0.08	0.13	0.18	-	
	White	x		0.28	0.33	0.38	-	
		y		0.30	0.35	0.40	-	

Note 1 : Driving Condition
    Display Pattern : White Raster
    I_{LED} Current : 84mA

(Measurement condition : KOE standard)
(Note 3~6) : See next page.

Note 2 : Measurement Condition
    (Transmitance)

BM-5A or
Similar equipment

LCD panel
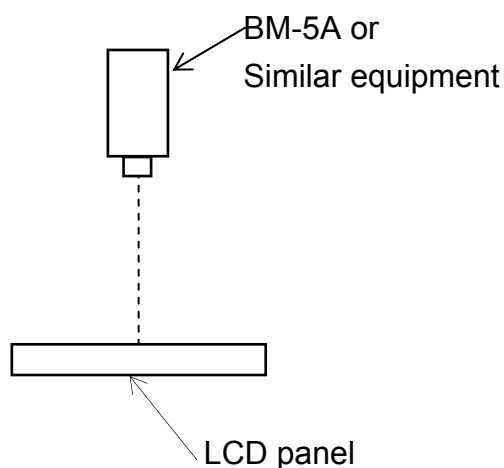
Note 3 : Definition of θ and ϕ
         (Normal)
         Viewing direction

Z

Y(ϕ=90°)

θ

ϕ

(ϕ=180°) X'

X   (ϕ=0°)

Z'

Y'(ϕ=270°)

Note 4 : Definition of Viewing angle $\theta 1$ and $\theta 2$

K

$\theta 1 < 0° < \theta 2$

5.0

$\theta 1$ $\theta 2$
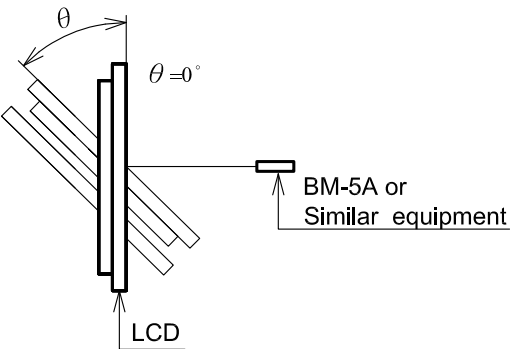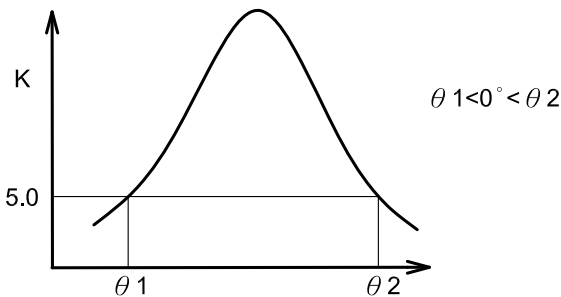
Contrast ratio "K" vs Viewing angle "θ"

θ

$\theta = 0°$

BM-5A or
Similar equipment

LCD

Note 5 : Definition of contrast "K"

$$K = \frac{\text{White Brightness}}{\text{Black Brightness}}$$

Note 6 : Definition optical response time

Black	White	Black

%
100
90

Brightness

10
0

tr

tf

Rise time   Fall time

6.2 OPTICAL CHARACTERISTICS OF BACK-LIGHT

ITEM	MIN.	TYP.	MAX.	UNIT	REMARKS
Brightness	150	280	-	cd/m²	IL=84mA (Note 1,2)
Rise Time	-	3	-	Minute	IL=84mA Brightness 80%
Brightness Uniformity	-	-	±25	%	Under mentioned (Note 1,2,3,4)

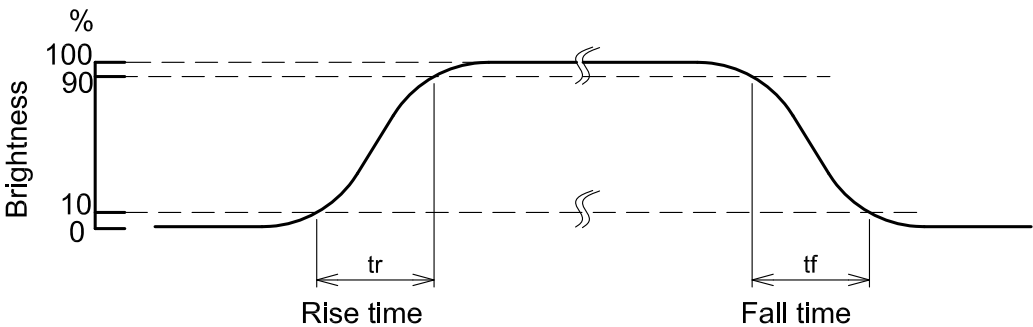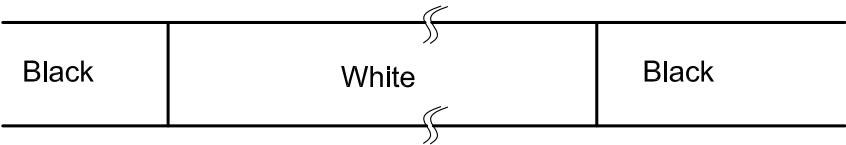(Measurement condition : HITACHI standard)

LED：0h operation, Ta=25℃
 Display data should be set to all "ON".

Note 1 : Measurement after 3 minutes from LED operating.
 Active area center.
Note 2 : Brightness control : 100%.
Note 3 : Measurement of the following 9 places on the display.

```
                    Y=480    Y=960   Y=1440

              P1        P4        P7
    X=120 ────⊕────────⊕─────────⊕────
              P2      P5        P8
    X=240 ────⊕────────⊕─────────⊕────
              P3        P6        P9
    X=360 ────⊕────────⊕─────────⊕────
```
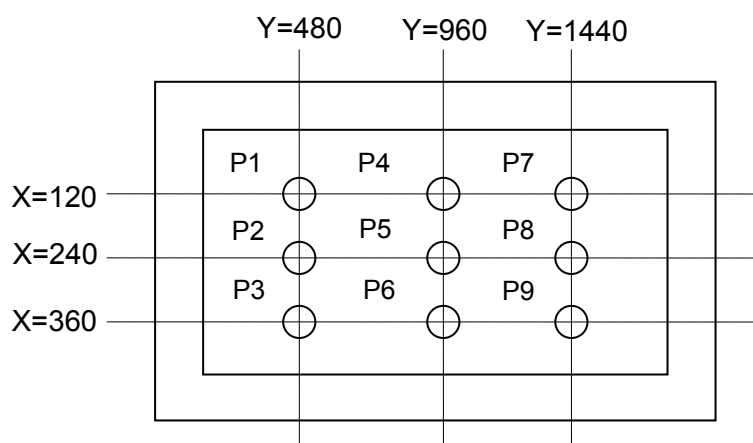
Note 4 : Definition of the brightness tolerance.

$$\left(\frac{\text{Max. brightness or Min. brightness - Average brightness}}{\text{Average brightness}} \right) \times 100\%$$

7. BLOCK DIAGRAM
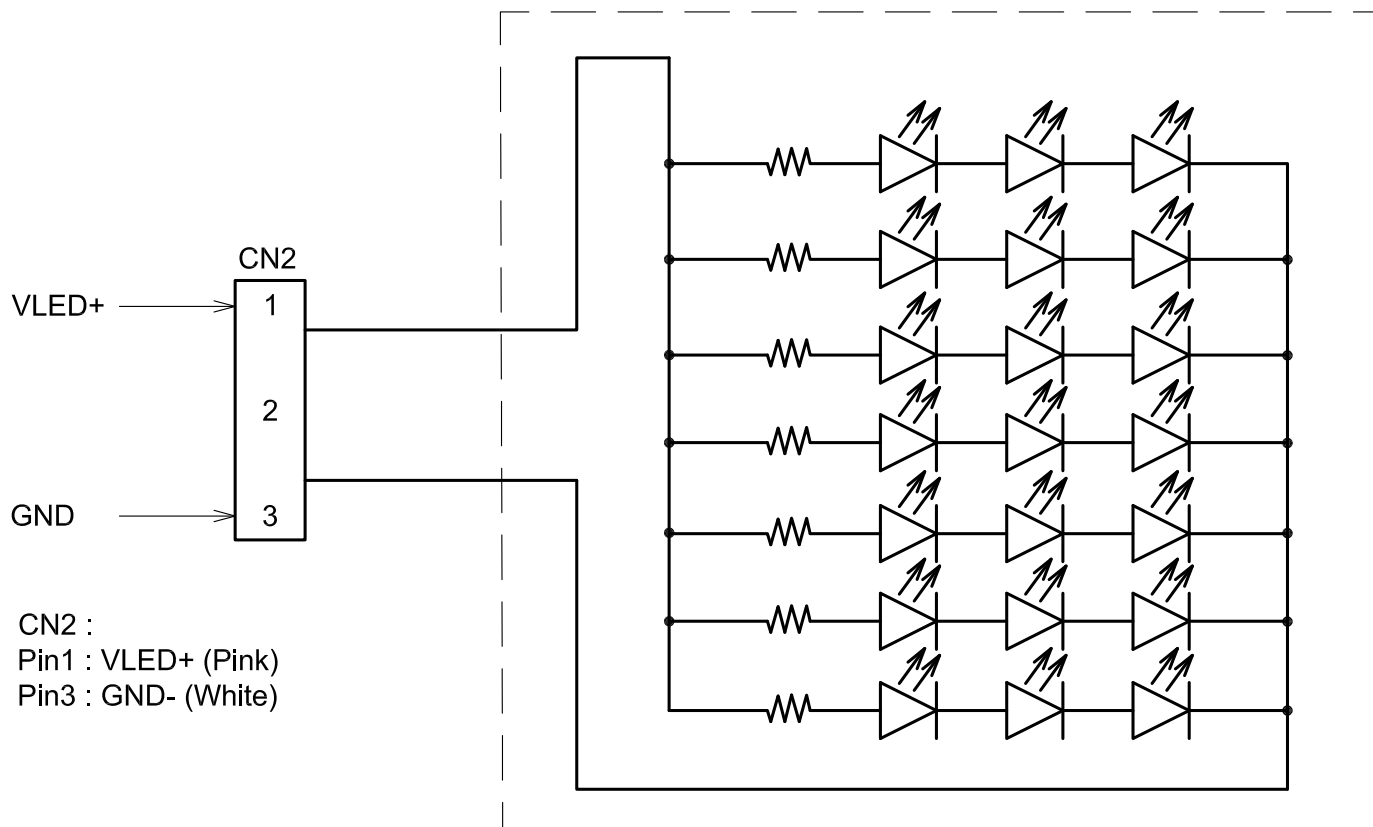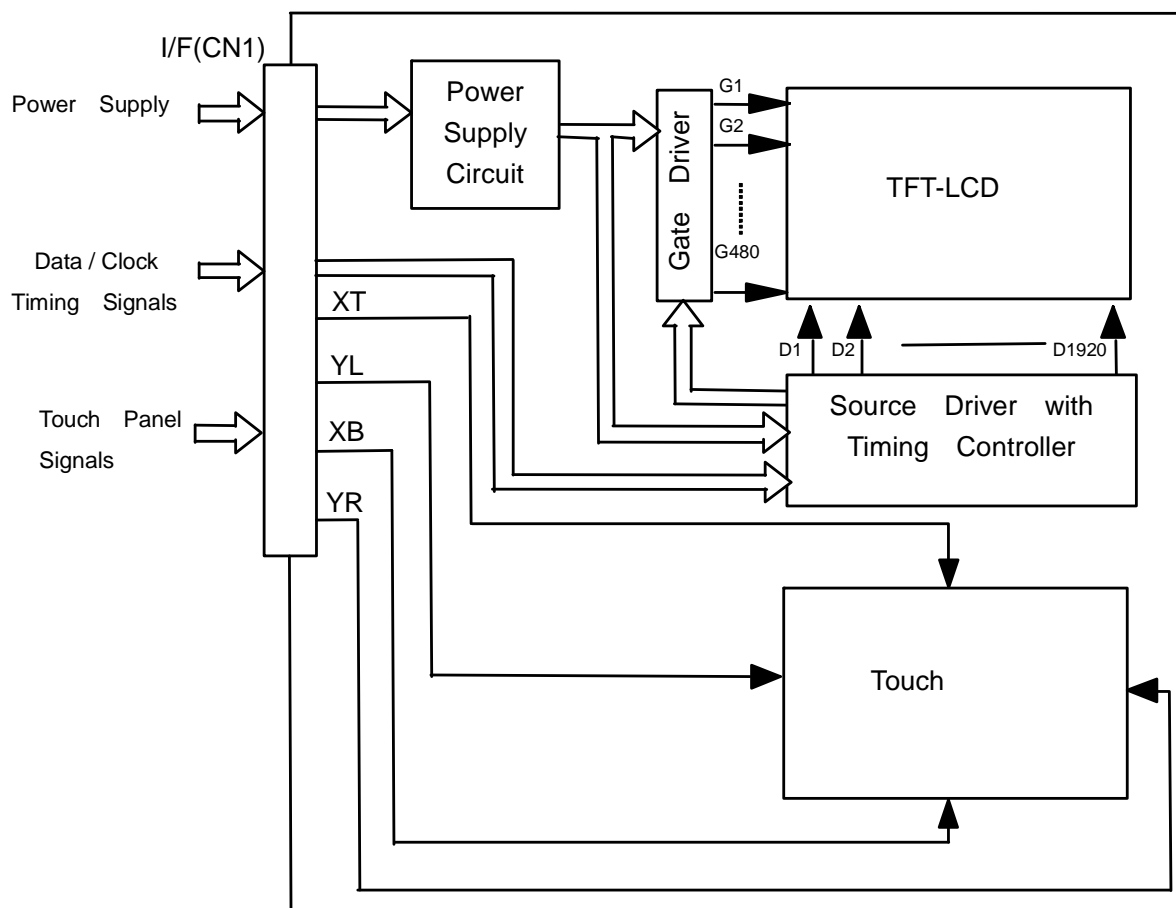
8. INTERFACE TIMING CHART
8.1 TIMING CHART
(Data is latched negative edge trigger of DCLK)

Vsync,Hsync,DTMG,control pin
R0~R5,G0~G5,B0~B5

V_IH min.
V_IL max.

DCLK

tCLK
tWCL
tWCH
50%

DATA
Invalid Data
tSD
tHD
Invalid Data

DTMG
tSI
50%

DCLK

Hsync
tSH
tHH

Vsync
tSV
tHV

Hsync
tHP
tWH

DTMG
tHBP
tHFP

Vsync
tVP
tWV
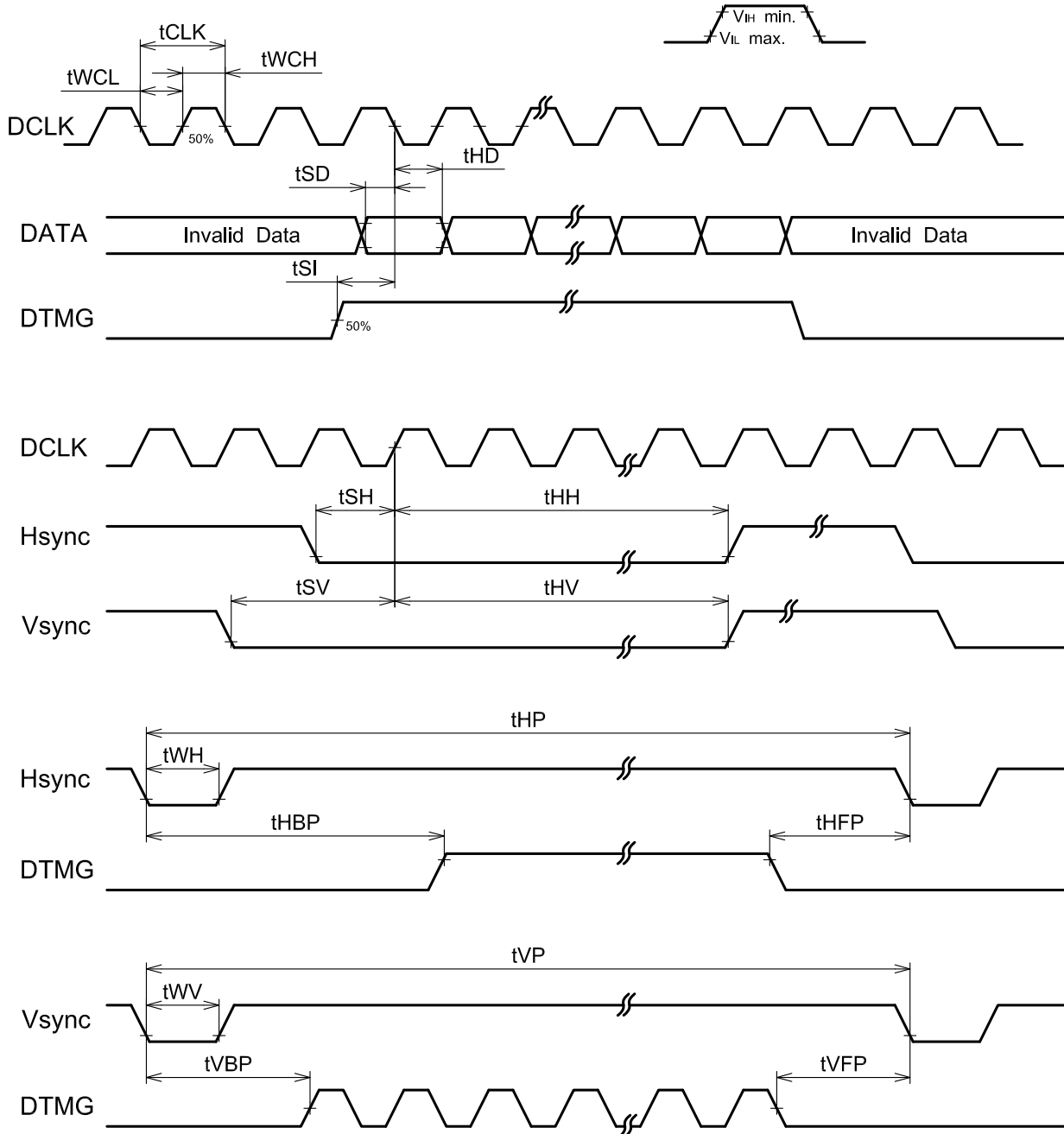
DTMG
tVBP
tVFP

Note 1 : DTMG is definition of the above timing for Hsync and Vsync.
Note 2 : DTMG should be set to low level when it is not input valid data.

8.2 INTERFACE TIMING

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
DCLK	Cycle time	t_{CLK}	34.48	39.71	-	ns	
	Low level Width	t_{WCL}	17.24	-	-		
	High level Width	t_{WCH}	17.24	-	-		
	Duty	D	0.45	0.5	0.55	-	$D= t_{CLKL}/ t_{CLK}$
Data	Set up time	t_{SD}	12	-	-	ns	for DCLK
	Hold time	t_{HD}	12	-	-		

Note : Vsync Cycle should be set to odd.

Hsync-Vsync Mode

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Hsync	Set up time	t_{SH}	12	-	-	ns	for DCLK
	Hold time	t_{HH}	12	-	-		
	Cycle time	t_{HP}	792	800	1039	t_{CLK}	
	Valid width	t_{WH}	6	96	138		
	Horizontal back porch	t_{HBP}	144	144	144		
Vsync	Set up time	t_{SV}	12	-	-	ns	for DCLK
	Hold time	t_{HV}	12	-	-		
	Cycle time	t_{VP}	496	525	747	t_{HP}	
	Valid width	t_{WV}	2	2	10		
	Vertical back porch	t_{VBP}	12	12	12		

DTMG Mode

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
DTMG	Set up time	t_{SI}	12	-	-	ns	for DCLK
	Hold time	t_{HD}	12	-	-		
	Horizontal back porch	t_{HBP}	115	160	255	t_{CLK}	
	Horizontal front porch	t_{HFP}	0	0	0		
	Cycle time	t_{HP}	755	800	895		
	Vertical back porch	t_{VBP}	6	45	255	t_{HP}	
	Vertical front porch	t_{VFP}	0	0	0		
	Cycle time	t_{VP}	486	525	735		
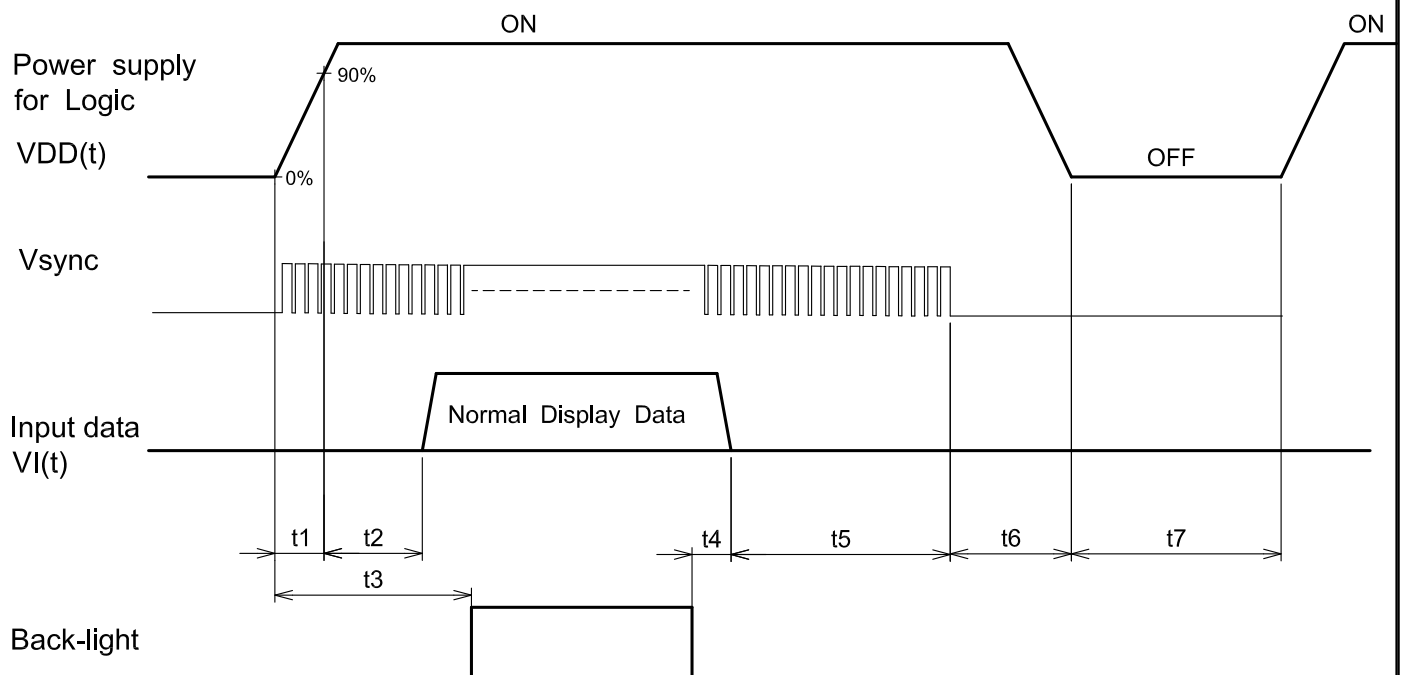
POWER ON

$t_1 \leqq 1ms$
Vsync x 4 $<$ $t_2 \leqq$ Vsync x 8
Vsync x 8 $\leqq t_3$

POWER OFF

5ms $\leqq t_4$
Vsync x 4 $\leqq t_5$
10ms $\leqq t_6 \leqq 50$ ms
400ms $\leqq t_7$

Note 1 : 0V$\leqq$VI(t)$\leqq$VDD(t)DTMG is definition of the above timing for Hsync and Vsync.
Input data must be set to low for power on / off even t1+t2 and t5+t6.
Note 2 : Input data should not be set high impedance when power on.

8.4 RELATIONSHIP BETWEEN DISPLAYED COLOR AND INPUT DATA

	COLOR & GRAY SCALE	DATA SIGNAL																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(1)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	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
	Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(1)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	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
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

8.5 INTERNAL PIN CONNECTION
CN1 JAE: FA5B040HP1R3000 (Suitable FPC : t0.3±0.03mm, 0.5±0.03mm pitch)

| PIN No.	SIGNAL	FUNCTION
1	VDD	Power Supply for Logic
2	VDD	
3	U/D	Vertical Display mode Control (Note 1)
4	L/R	Horizontal Display mode Control (Note 1)
5	Vsync	Vertical Sync Pulse
6	DTMG	Timing Signal for Data
7	VSS	GND
8	DCLK	Dot Clock
9	VSS	GND
10	Hsync	Horizontal Sync Pulse
11	VSS	GND
12	B5	Blue Data
13	B4	
14	B3	
15	VSS	GND
16	B2	Blue Data
17	B1	
18	B0	
19	VSS	GND
20	G5	Green Data
21	G4	
22	G3	
23	VSS	GND
24	G2	Green Data
25	G1	
26	G0	
27	VSS	GND
28	R5	Red Data
29	R4	
30	R3	
31	VSS	GND
32	R2	Red Data
33	R1	
34	R0	
35	MODE	Sync Mode Control (Note 2)
36	VSS	GND
37	XT	Analog Signal Form Digitizer Top.
38	YL	Analog Signal Form Digitizer Left.
39	XB	Analog Signal Form Digitizer Bottom.
40	YR	Analog Signal Form Digitizer Right.

CN2 JST Housing : BHR-03VS-1(Suitable connect : JST SM02(8.0)B-BHS-1-TB)

PIN No.	SIGNAL	FUNCTION
1	VL	Power Supply for LED
2	NC	No Connection
3	GND	GND for LED(0V)

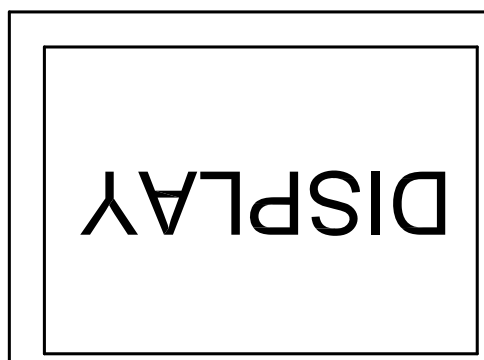Note 1 : Vertical Display Inode and Horizontal Display mode control.

DISPLAY

L/R : L , U/D : L
(default)

YALPSID

L/R : H , U/D : L

DISPLAY

L/R : L , U/D : H

YALPSID
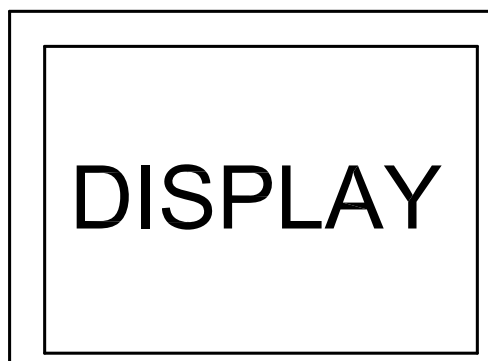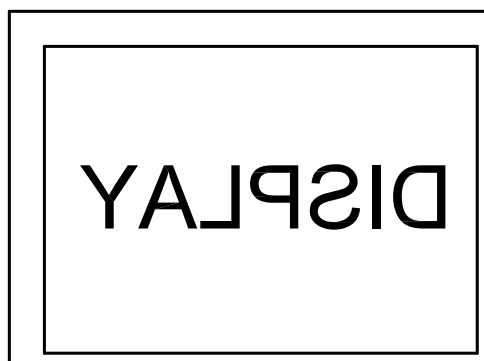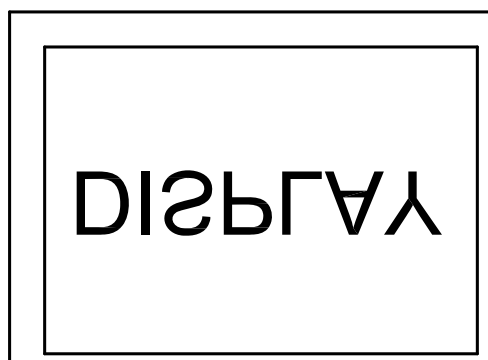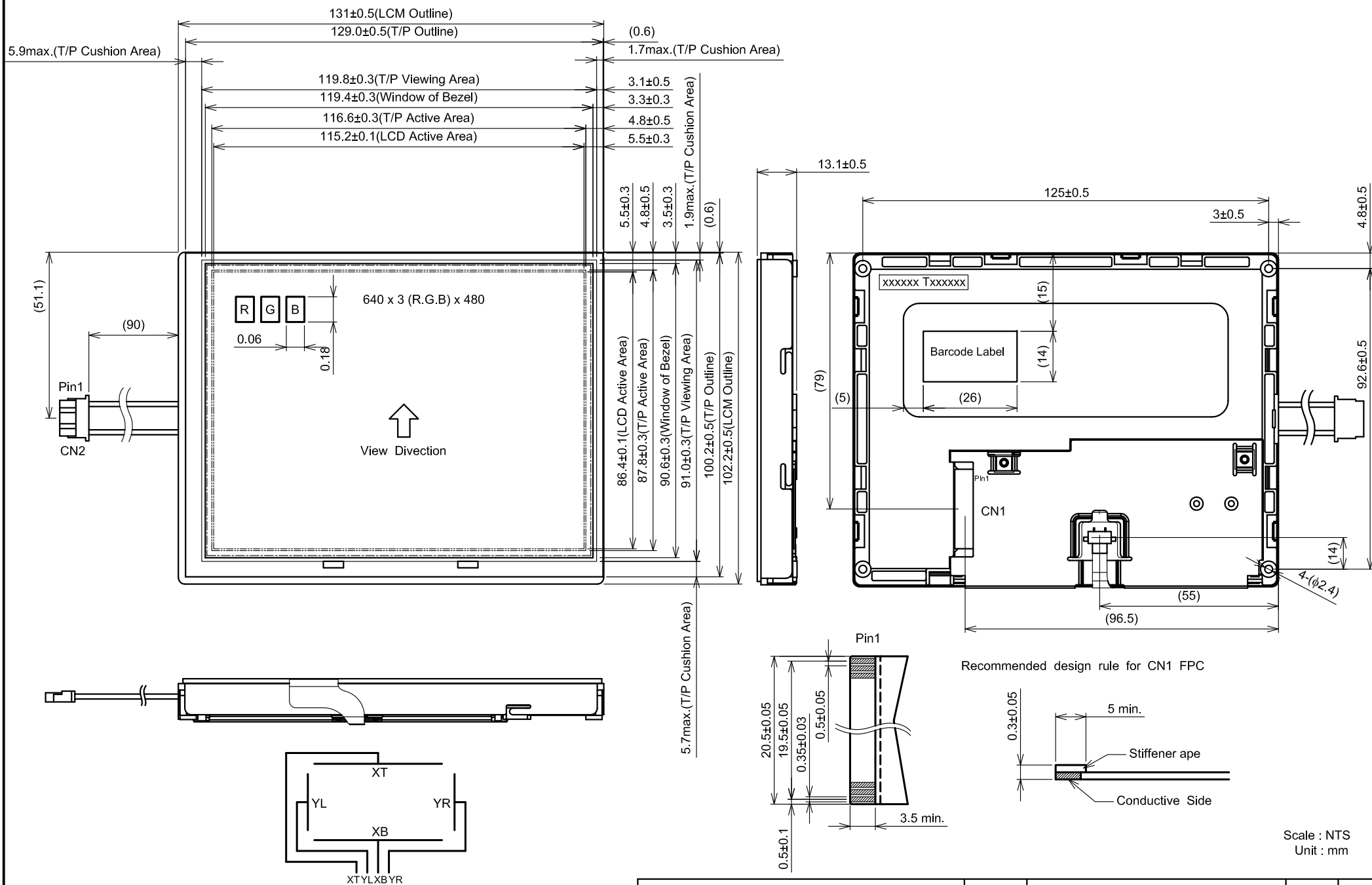
L/R : H , U/D : H

Note 2 : Sync mode control
    H : DTMG only , no need Hsync and Vsync.
    L : Hsync and Vsync only , no need DTMG.
  The DTMG and Hsync-Vsync mode timing is determined as described in 8.2.

9. DIMENSIONAL OUTLINE

131±0.5(LCM Outline)
129.0±0.5(T/P Outline)
(0.6)

5.9max.(T/P Cushion Area)
1.7max.(T/P Cushion Area)

119.8±0.3(T/P Viewing Area)
119.4±0.3(Window of Bezel)
116.6±0.3(T/P Active Area)
115.2±0.1(LCD Active Area)

3.1±0.5
3.3±0.3
4.8±0.5
5.5±0.3

5.5±0.3
4.8±0.5
3.5±0.3
1.9max.(T/P Cushion Area)
(0.6)

13.1±0.5

125±0.5
3±0.5
4.8±0.5

(51.1)
(90)

Pin1
CN2

R G B
0.06
0.18

640 x 3 (R.G.B) x 480

View Divection

86.4±0.1(LCD Active Area)
87.8±0.3(T/P Active Area)
90.6±0.3(Window of Bezel)
91.0±0.3(T/P Viewing Area)
100.2±0.5(T/P Outline)
102.2±0.5(LCM Outline)

5.7max.(T/P Cushion Area)

(79)
(5)
(15)
(14)

xxxxxx Txxxxxx

Barcode Label
(26)

Pin1
CN1

92.6±0.5
(14)
4-(φ2.4)
(55)
(96.5)

XT
YL   YR
XB
XTYLXBYR

Pin1
20.5±0.05
19.5±0.05
0.5±0.05
0.35±0.03
3.5 min.
0.5±0.1

Recommended design rule for CN1 FPC
0.3±0.05
5 min.
Stiffener ape
Conductive Side

Scale : NTS
Unit : mm

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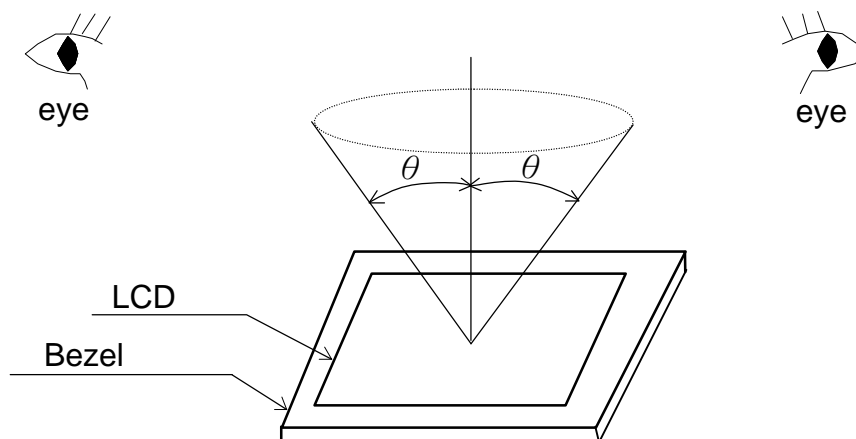
10. APPEARANCE STANDARD

10.1 APPEARANCE INSPECTION CONDITION
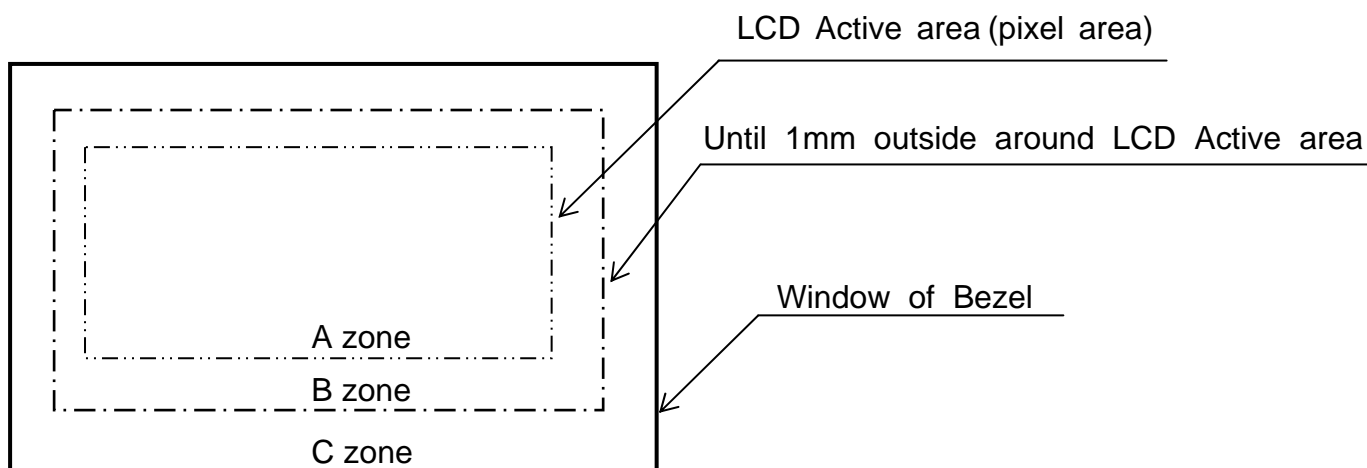Visual inspection should be done under the following condition.

(1) The inspection should be done in a dark room.
   (about 1000(lx),500(lx)min. and non-directive)
(2) The distance between eyes of an inspector and the LCD module is 30cm.
(3) The viewing zone is shown the figure.
   The θ is defined as $\theta \leqq 45\,^\circ$ for LCM power off
   $\theta \leqq 5\,^\circ$ for LCM power on

eye   eye

θ θ

LCD

Bezel

10.2 DEFINITION OF ZONE

LCD Active area (pixel area)

Until 1mm outside around LCD Active area

Window of Bezel

A zone
B zone
C zone

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10.3 APPEARANCE SPECIFICATION

(1)LCD Appearance

*) If the problem related to this section occurs about this item , the responsible persons of both party (Customer and KOE) will discuss the matter in detail.

No.	ITEM	CRITERIA				APPLIED ZONE
L C D	Scratches	Length L(mm)	Width W(mm)	Maximum number acceptable	Minimum space	A,B
		Ignored	W≦0.02	Ignored	-	
		L≦40	0.02＜W≦0.04	10	-	
		L≦20	W≦0.04	10	-	
	Dent	Serious one is not allowed				A
	Wrinkles in Polarizer	Serious one is not allowed				A
	Bubbles	Average diameter D(mm)		Maximum number acceptable		A
		D≦0.2		Ignored		
		0.2＜D≦0.3		12		
		0.3＜D≦0.5		3		
		0.5＜D		none		
	Stains Foreign Materials Dark Spot	Filamentous (Line shape)				A,B
		Length L(mm)	Width W(mm)	Maximum number acceptable		
		L≦2.0	W≦0.03	Ignored		
		L≦3.0	0.03＜W≦0.05	6		
		L≦2.5	0.05＜W≦0.1	1		
		Round(Dot shape)				A,B
		Average diameter D(mm)	Maximum number acceptable	Minimum number acceptable		
		D＜0.2	Ignored	-		
		0.2≦D＜0.3	10	10		
		0.3≦D＜0.4	5	30		
		0.4≦D	none	-		
		The total number	Filamentous + Round=10			
		Those wiped out easily are acceptable				
	Dot Defect			Maximum number acceptable		A
		Sparkle mode	1 dot	4		
			2 dots (Note.(3)-(f))	1		
			Total	5		
		Black mode	1 dot	5		
			2 dots (Note.(3)-(f))	2		
			Total	5		
			Total	10		

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(2) LED BACKLIGHT APPEARANCE

No.	ITEM	CRITERIA			APPLIED ZONE
L E D B A C K L I G H T	Dark Spots White Spots Foreign Materials (Spot)	Average diameter D(mm)		Maximum number acceptable	A
		D≦0.4		ignored	
		0.4＜D		none	
	Foreign Materials (Line)	Width W(mm)	Length L(mm)	Maximum number acceptable	A
		W≦0.2	L≦2.5	1	
			2.5＜L	None	
		0.2<W	-	none	
	Scratches	Width W(mm)	Length L(mm)	Maximum number acceptable	A
		W≦0.1	-	ignored	
		0.1＜W≦0.2	L≦11.0	1	
			11.0＜L	None	
		0.2＜W	-	none	

(3)Touch panel appearance
 Visual inspection should be done under the following condition.
 *) The inspection should be done in a dark room.
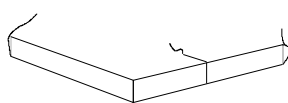   (about 1000(lx),500(lx)min. and non-directive)
 *) The distance between eyes of an inspector and the LCD module is 30 cm.
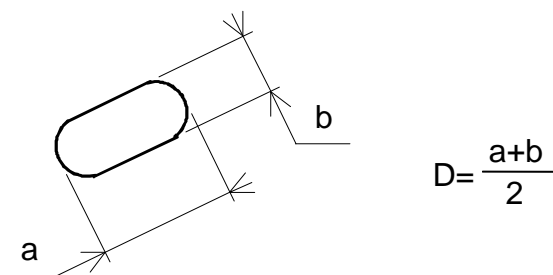 *) The viewing angle≦60°.
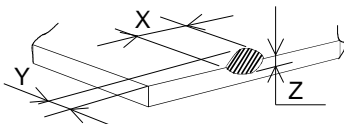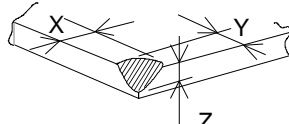
No.	ITEM	CRITERIA			APPLIED ZONE
T O U C H P A N E L	Scratches	Length L(mm)	Width W(mm)	Maximum number acceptable	A,B
		L≧10	W>0.1	None	
		L<10	0.10≧W>0.05	4 pcs max.	
		L<10	0.05≧W	Ignored	
	Foreign Materials	Filamentous (Line shape)			A,B
		Length L(mm)	Width W(mm)	Maximum number acceptable	
		-	W>0.10	Dust (circular)	
		3<L	0.10≧W>0.05	None	
		L≦3	0.05≧W	Ignored	
		Round(Dot shape)			A,B
		Average diameter D(mm)		Maximum number acceptable	
		D>0.35		None	
		0.35≧D>0.25		6 pcs max.	
		D≦0.25		Ignored	

(4) Glass indentation

ITEM	SPECIFICATIONS			
Common Indentation		X ≦5.0mm	Y ≦3.0mm	Z ≦T
Corner Broken		X ≦3.0mm	Y ≦3.0mm	Z ≦T
Proceeding Crack	None			

Note 1 : Definition of average diameter (D)

$$D = \frac{a+b}{2}$$

Note 2 : Definition of length (L) and width (W)
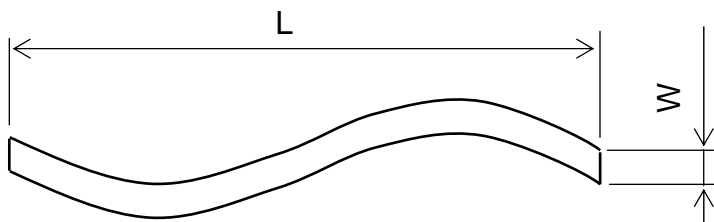
Note 3 : Definition of dot defect

    (a) Dot Defect : Defect Area > 1/2 dot

    (b) Sparkle mode : Brightness of dot is more than 30% at Black raster.

    (c) Black mode : Brightness of dot is less than 70% at R.G.B raster.

    (d) 1 dot : Defect dot is isolated , not attached to other defect dot.

    (e) N dot : N defect dots are consecutive (fig.1).

            (N means the number of defect dots.)

(fig .1)

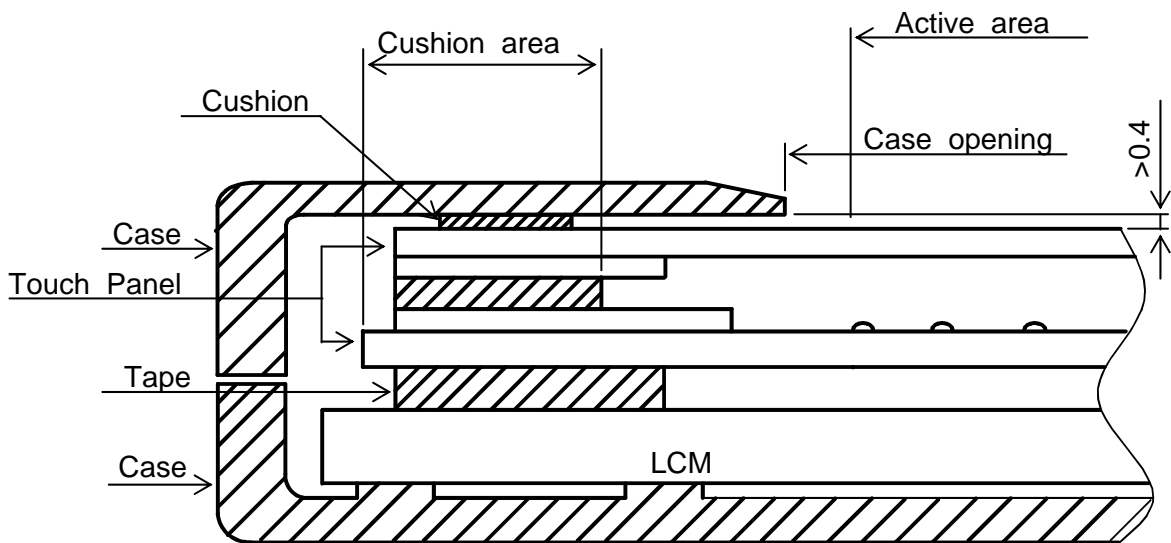2 dots defect included defect dot "X" is defined as follows.

Adjacent dots to defect dot "X" :

    (f) Counting definition of adjacent dots (1 set) : same as 1 dot defect.

    (g) Those wiped out easily are acceptable.

11. PRECAUTION IN DESIGN

11.1 MOUNTING PRECAUTION

(1) When assembling the Touch Panel on you case, please refer to the figure below.

(2) The clearance between the Touch Panel and case shall be designed so that the case edge never presses the input screen when it is deformed by heat or other causes.

(3) The case shall be designed not to touch the tail portion (FPC for Touch Panel).

(4) The boundary space between the effective area and the insulated area is unstable. Touching this area may effect the operation of the Touch Panel.
The case must be designed so that it does not touch the boundary space.

11.2 PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGE

As this module contains C-MOS LSIs, it is not strong against electrostatic discharge. Make certain that the operator's body is connected to the ground through a list band , etc. And don't touch I/F pins directly.

11.3 HANDLING PRECAUTIONS

(1) Since the Touch Panel on the top, and the frame on the bottom tend to be easily damaged, they should be with full care so as not to get them touched, pushed or rubbed by a piece on glass, tweezers and anything else which are harder a pencil lead 3H.

(2) As the adhesives used for adhering upper/lower polarizer's and frame are made of organic substances which will be deteriorated by a chemical reaction with such chemicals as acetone, toluene, ethanol and isopropyl alcohol. The following are recommended for use :
normal hexane
Please contact with us when it is necessary for you to use chemicals other than the above.

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(3) Lightly wipe to clean the dirty surface with absorbent cotton or other soft material like chamois, soaked in the recommended chemicals without scrubbing it hardly. Always wipe the surface horizontally or vertically. Never give a wipe in a circle. To prevent the display surface from damage and keep the appearance in good state, it is sufficient, in general, to wipe it with absorbent cotton.

(4) Immediately wipe off saliva or water drop attached on the display area because it may cause deformation or faded color.

(5) Fogy dew deposited on the surface may cause a damage, stain or dirt to the polarizer.
When you need to take out the LCD module from some place at low temperature for test, etc.
It is required to be warmed them up to temperature higher than room temperature before taking them out.

(6) Touching the display area or I/F pins with bare hands or contaminating them are prohibited, because the stain on the display area and poor insulation between terminals are often caused by being touched with bare hands.
(Some cosmetics are detrimental to polarizer's.)

(7) In general, the glass is fragile so that, especially on its periphery, tends to be cracked or chipped in handling. Please not give the LCD module sharp shocks by falling, etc.

(8) Maximum pressure to the surface must be less than 1.96×10^4 Pa.
And if the pressure area is less than $1cm^2$, maximum pressure must be less than 1.96N.

(9) Since the metal width is narrow on these locations (see page 9-1/1), please careful with handling.

(10) Top sheets shall be cleaned gently using a soft cloth such as those used for glasses. Hard wiping accumulated dust will leave scars on the surface even using a cloth.

11.4 OPERATION PRECAUTION
(1) Using a LCM module beyond its maximum ratings may result in its permanent destruction.
LCM module's should usually be used under recommended operating conditions shown in chapter 5. Exceeding any of these conditions may adversely affect its reliability.

(2) Response time will be extremely delayed at lower temperature than the specified operating temperature range and on the other hand LCD's shows dark blue at higher temperature.
However those phenomena do not main defects of the LCD module. Those phenomena will disappear in the specified operating temperature range.

(3) If the display area is pushed hard during operation, some display patterns will be abnormally display.

(4) A slight dew depositing on terminals may cause electrochemical reaction which leads to terminal open circuit. Please operate the LCD module under the relative condition of 40℃ 85%RH.

(5) Resistance range : Your controller shall be set up to allow the resistance range of Touch Panel specified in our CAS.

(6) Pointed position of Touch Panel may shift owing to a change in resistance of Touch Panel depending on the operation condition . To compensate this shift, the set shall be given a calibration function.

(7) Input shall be made with a stylus pen (poly acetal , R0.8). Chances are very high that use of a metal piece including a ball point pen or sharp edge will impair accuracy.

(8) The Touch Panel is an auxiliary input device. The system shall be designed to have other input device.

11.5 STORAGE
In case of storing LCD module for a long period of time (for instance, for years) for the purpose of replacement use, the following precautions necessary.

(1) Store the LCD modules in a dark place; do not expose them to sunlight or ultraviolet rays.

(2) Keep the temperature between 10℃ and 35℃ at normal humidity.

(3) Store the LCD modules in the container which is used for shipping from us.

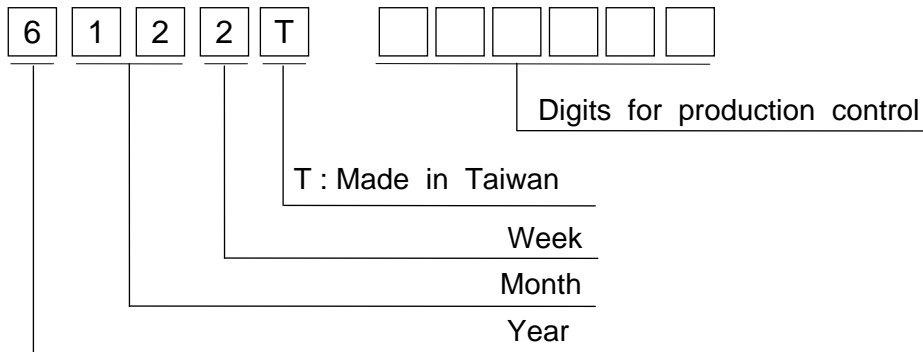(4) No articles shall be left on the surface over an extended period of time.

11.6 SAFETY
Wear finger cots or gloves whenever handling or assembling a Touch Panel its glass edges are sharp.

12. DESIGNATION OF LOT MARK

12.1 LOT MARK

Lot mark is consisted of 5 digits for production lot and 6 digits for production control.

| 6 | 1 | 2 | 2 | T | | | | | | |

Digits for production control

T : Made in Taiwan

Week

Month

Year

Year	Figure in lot mark
2012	2
2013	3
2014	4
2015	5
2016	6

Month	Figure in lot mark	Month	Figure in lot mark
Jan.	01	Jul.	07
Feb.	02	Aug.	08
Mar.	03	Sep.	09
Apr.	04	Oct.	10
May	05	Nov.	11
Jun.	06	Dec.	12

Week (day in calendar)	Figure in lot mark
1~7	1
8~14	2
15~21	3
22~28	4
29~31	5

12.2 SERIAL No.

Serial No. is consisted of 6 digits number (000001~999999).
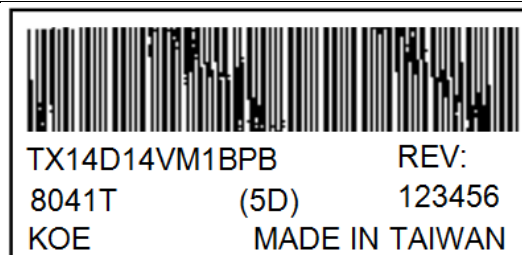
12.3 REVISION (REV.) CONTROL

Rev. is the column for manufacturing convenience A-Z except I and O maybe written on this column.

12.4 LOCATION OF LOT MARK

Label is bring attached on the back side of module.

12.5 REVISION(Rev.) CONTROL

Rev No.	ITEM
A	CN1 JAE : FA5B040HF1R3000
B	CN1 JAE : FA5B040HP1R3000

TX14D14VM1BPB   REV:
8041T   (5D)   123456
KOE   MADE IN TAIWAN

13. PRECAUTION FOR USE

(1) A limit sample should be provided by the both parities on an occasion when the both parties agree to its necessity.
Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

(2) On the following occasions, the handling of the problem should be decided through discussion and agreement between responsible persons of the both parties.

   (1) When a question is arisen in the specifications.

   (2) When a new problem is arisen which is not specified in this specifications.

   (3) When an inspection specifications change or operating condition change by customer is reported to KOE, and some problem is arisen in the specification due to the change.

   (4) When a new problem is arisen at the customer's operating set for sample evaluation.

(3) Regarding the treatment for maintenance and repairing, both parties will discuss it in six months later after latest delivery of this product.

The precaution that should be observed when handling LCM have been explained above.
If any points are unclear or if you have any requests , please contact with KOE.

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