KOE
JDI Group

Kaohsiung Opto-Electronics Inc.

FOR MESSRS : _____   DATE : May 1st ,2012

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

TX16D11VM2CCA

Contents

ACCEPTED BY: _____   PROPOSED BY: _Ken Chen_

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Apr.13,'05	7B64PS 2706-TX16D11VM2CCA-2 Page 6-1/3	6.1 OPTICAL CHARACTERISTICS OF LCD Revised:

6.1 OPTICAL CHARACTERISTICS OF LCD
Revised:

ITEM			CONDITION	MIN	TYP	MAK	UNIT	NOTE
Viewing Area		θ x	$\phi=0°$，K≧5.0	-	(60)	-	deg	1~5
		θ x'	$\phi=180°$，K≧5.0		(60)		deg	1~5
		θ y	$\phi=90°$，K≧5.0		(45)		deg	1~5
		θ y'	$\phi=270°$，K≧5.0	-	(60)	-	deg	1~5
Color Tone (Primary Color)	Red	x	$\phi=0°$，$\theta=0°$	-	(0.62)	-	-	
		y		-	(0.34)	-	-	
	Green	x		-	(0.30)	-	-	
		y		-	(0.59)	-	-	
	Blue	x		-	(0.14)	-	-	
		y		-	(0.09)	-	-	
	white	x		-	(0.29)	-	-	
		y		-	(0.31)	-	-	

ITEM			CONDITION	MIN	TYP	MAK	UNIT	NOTE
Viewing Area		θ x	$\phi=0°$，K≧5.0	-	70	-	deg	1~5
		θ x'	$\phi=180°$，K≧5.0	-	70	-	deg	1~5
		θ y	$\phi=90°$，K≧5.0	-	60	-	deg	1~5
		θ y'	$\phi=270°$，K≧5.0	-	70	-	deg	1~5
Color Tone (Primary Color)	Red	x	$\phi=0°$，$\theta=0°$	0.57	0.62	0.67	-	
		y		0.29	0.34	0.39	-	
	Green	x		0.25	0.30	0.35	-	
		y		0.54	0.59	0.64	-	
	Blue	x		0.09	0.14	0.19	-	
		y		0.04	0.09	0.14	-	
	White	x		0.24	0.29	0.34	-	
		y		0.26	0.31	0.36	-	

DATE	SHEET No.	SUMMARY
	7B64PS 2706-TX16D11VM2CCA-2 Page 6-3/3	6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

Revised：

ITEM	TYP
BriRghtness	(200)

ITEM	TYP
BriRghtness	(280)

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Aug.06,'05	7B64PS 2709-TX16D11VM2CCA-3 Page 9-1/2~2/2	9. DIMENSIONAL OUTLINE Changed the length of CN2
May.13,'08	7B64PS 2708-TX16D11VM2CCA-4 PAGE 8-6/7	8.5 INTERNAL PIN CONNECTION Changed : CN1 JAE : FA5B040HP1 (Sn plating) → FA5B040HP1R3000 (Au plating)
	7B64PS 2709-TX16D11VM2CCA-4 PAGE 9-2/2	9. DIMENSIONAL OUTLINE The lot label size and position is changed.
	7B64PS 2712-TX16D11VM2CCA-4 PAGE 12-1/1	12.1 LOT MARK Changed : 5 digits for production number ↓ 6 digits for production number 12.3 LOCATION OF LOT MARK Changed Added : 12.4 REVISION(Rev.) CONTROL
Jan.12,'10	7B64PS 2704-TX16D11VM2CCA-5 PAGE 4-1/1	4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS Changed

12.4 REVISION(Rev.) CONTROL

Rev No.	ITEM
A	CN1 JAE : FA5B040HP1R3000

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0℃	50℃	-20℃	60℃

↓

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20℃	70℃	-20℃	70℃

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Jan.12,'10	7B64PS 2712-TX16D11VM2CCA-5 PAGE 12-1/1	12.3 LOCATION OF LOT MARK Changed Added : 12.4 REVISION(Rev.) CONTROL | Rev No.	ITEM	NOTE
A	CN1 JAE : FA5B040HP1R3000	-
B	Touch Panel (Change)	PCN No.0776	

May 01,'12	All pages	Company name changed:
		  KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.
		          ↓
		  KAOHSIUNG OPTO-ELECTRONICS INC.

	7B64PS 2705-TX16D11VM2CCA-6 PAGE 5-1/2	5.1 ELECTRICAL CHARACTERISTICS OF LCD
		    Added : Note4
		
		5.2 ELECTRICAL CHARACTERISTICS OF TOUCH PANEL
		    Added : Note1

3.GENERAL DATA

(1)	Part Name	TX16D11VM2CCA
(2)	Module Dimensions	173.0(W)mm x 70.0(H)mm x (8.6)max.(D)mm
(3)	LCD Active Area	148.8(W)mm x 53.76(H)mm
(4)	Dot Pitch	0.0775(W)mm x 3(R,G,B)(W) x 0.224(H)mm
(5)	Resolution	640 x 3(R,G,B))(W) x 240(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 parallel)
(10)	Backlight	Cold Cathode Fluorescent Tube (CFL) x 1 Average life time 50kh at 25℃ IL=5mA
(11)	Weight	140g
(12)	Interface	40pin (C-MOS)
(13)	Power Supply Voltage	3.3V only (Include Timing Controller and Power Unit)
(14)	Touch Panel	Resistance Type The surface is antiglare type.
(15)	Viewing Direction	12 O'clock

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS OF LCD   VSS=0V

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARKS
Power Supply for Logic	VDD	-0.3	4.0	V	
Input Voltage	VI	-0.2	VDD+0.2		Note1
Input Current	Ii	0	1	A	
Static Electricity	VESD0	-	±100	V	Note2,3
	VESD1	-	±8	kV	Note2,4

Note 1 : DTMG,DCLK,RD0~RD5,GD0~GD5,BD0~BD5.

Note 2 : 200pF-250Ω 25℃ - 70%RH

Note 3 : Interface Pin Connector.

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

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

I T E M	OPERATING		STORAGE		REMARKS
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-20℃	70℃	-20℃	70℃	Note2,3,6
Humidity	(Note 1)		(Note 1)		Without condensation
Vibration	-	4.9m/s^2 (0.5G)	-	19.6m/s^2 (2G) (Note 5)	Note4
Shock	-	29.4m/s^2 (3G)	-	490m/s^2 (50G) (Note 5)	XYZ directions Note7,8
Corrosive Gas	Not Acceptable		Not Acceptable		

Note 1 : Ta≦40℃ :85%RH max.

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

Note 2 : Ta at -20℃ for 48h , at 60℃ for 168h.

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 as low temperature.

Note 7 : Pulse Width : 10ms

Note 8 : The module has no mounting hole.
　　　　It should be fixed by the may of sandwiching-like method. (Fig.1)
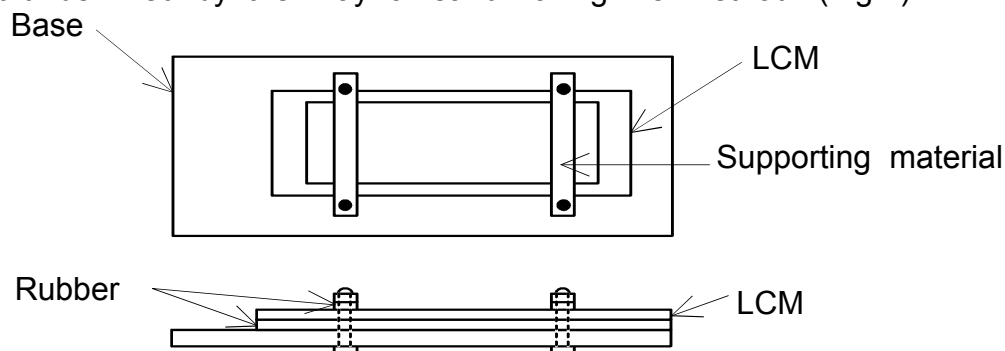
Fig.1

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
Input Voltage for Logic (Note 1)	VI	"H" level	2.0	-	VDD	V
		"L" level	VSS	-	0.8	
Power Supply Current (Note 2)	IDD for HVGA Display Mode	VDD-VSS=3.3V	-	94	-	mA
	IDD for VGA Display Mode		-	110	-	
Vsync Frequency	fV	-	52	60	68	Hz
Hsync Frequency	fH for HVGA Display Mode		12.8	15.1	36.1	kHz
	fH for VGA Display Mode	-	25.3	29.5	36.1	
DCLK Frequency	fCLK for HVGA Display Mode		8.7	10.7	26.7	MHz
	fCLK for VGA Display Mode	-	17.2	20.9	26.7	

Note 1 : DTMG,DCLK, RD0~RD5,GD0~GD5,BD0~BD5.
Note 2 : f V=60Hz,Ta=25℃, Pattern used as display pattern : All Black.
Note 3 : Need to make sure of flickering and rippling of display when setting the frame frequency in your set.
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 ELECTRICAL CHARACTERISTICS

ITEM		SPECIFICATION	REMARKS
Resistance Between Terminal	X-axis	50~300Ω	
	Y-axis		
Insulation Resistance		20MΩ min.	Operating Voltage : 25V DC
Linearity	X	2.5% max.	
	Y	5% max.	
Chattering		10ms max.	

5.2.2 MECHANICAL CHARACTERISTICS

ITEM	SPECIFICATION	REMARKS
Pen Input Pressure	0.5N max.	R1mm polyacetal pen
Surface Hardness	3H min.	JIS K5400

5.2.3 OPTICAL CHARASTERISTICS

ITEM	SPECIFICATION	REMARKS
Transparency	80% min.	

Note 1 : 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 BACKLIGHT

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Lamp Voltage	VL	-	450	-	Vrms	Ta=25℃
Frequency	fL	-	55	-	kHz	
Lamp Current (1Lamp)(Note 7)	IL	2.0	5.0	7.0	mA	Ta=25℃
Starting Discharge Voltage	VS (Note 2)	1300	-	-	Vrms	Ta=0℃

Note 1 : Please design your lamp driving circuit (inverter) based on the above specifications, and inform KOE about it.

Note 2 : Starting discharge voltage is increased when LCM is operating under low temperature.
Please check the characteristics of your inverter before applying to your set.

Note 3 : Average life time of CFL will be decreased when LCM is operating under low temperature.

Note 4 : Under lower driving frequency of an inverter, a certain Backlight system (CFL & CFL reflection sheet) may generate a sound noise. Before designing the inverter, please consider the driving frequency and noise.

Note 5 : When IL is over 7.0mA, it may cause uneven contrast near CFL location, due to heat dispersion form CFL.

Note 6 : We recommend to equip protection circuit (To stop output) which works under abnormal operation to the inverter for CFL.

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	$\phi=90°,K\geqq5.0$	-	60	-	deg	Note1~5
		$\theta y'$	$\phi=270°,K\geqq5.0$	-	70	-	deg	Note1~5
Contrast Ratio		K	$\phi=0°,\theta=0°$	100	200	-	-	Note5
Response Time (rise+fall)		tr+tf	$\phi=0°,\theta=0°$	-	45	-	ms	Note6
Color Tone (Primary Color)	Red	x	$\phi=0°,\quad\theta=0°$	0.57	0.62	0.67	-	
		y		0.29	0.34	0.39	-	
	Green	x		0.25	0.30	0.35	-	
		y		0.54	0.59	0.64	-	
	Blue	x		0.09	0.14	0.19	-	
		y		0.04	0.09	0.14	-	
	White	x		0.24	0.29	0.34	-	
		y		0.26	0.31	0.36	-	

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

Note 1 : Driving Condition
   Display Pattern : White Raster
   ICFL Current : (5)mA

Note 2 : Measurement Condition
   (Transmitance)

BM-5A or
Similar equipment

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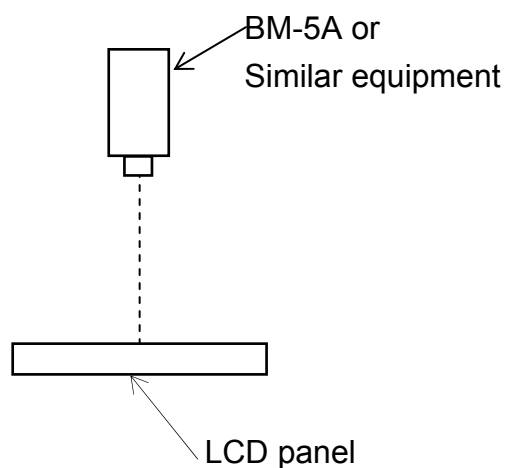
Note 3 : Definition of θ and ϕ
(Normal)
Viewing direction

Z

Y(ϕ=90°)

θ

ϕ

(ϕ=180°) X' — — — — X (ϕ=0°)

Z'

Y'(ϕ=270°)
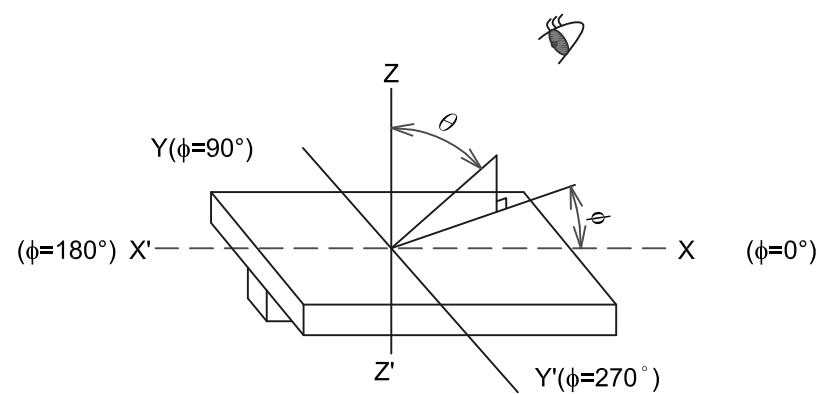
Note 5 : Definition of contrast "K"

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

Note 4 : Definition of Viewing angle $\phi1$ and $\phi2$

K

5.0

$\phi1$ $\phi2$

$\phi1 < 0° < \phi2$
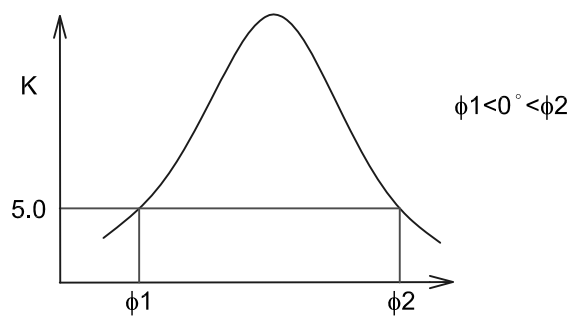
Contrast ratio "K" vs Viewing angle "ϕ"

ϕ

ϕ=0°

BM-5A or
Similar equipment

LCD
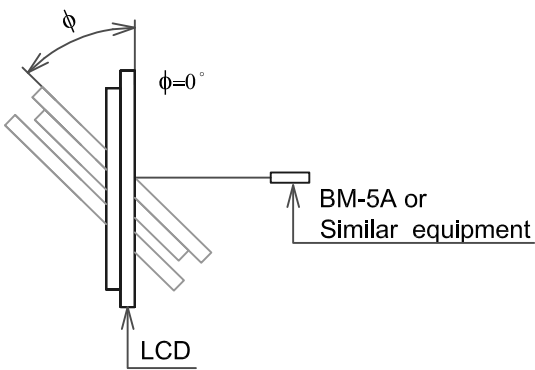
Note 6 : Definition optical response time

| Black | White | Black |

%
100
90

Brightness

10
0

tr
Rise time

tf
Fall time
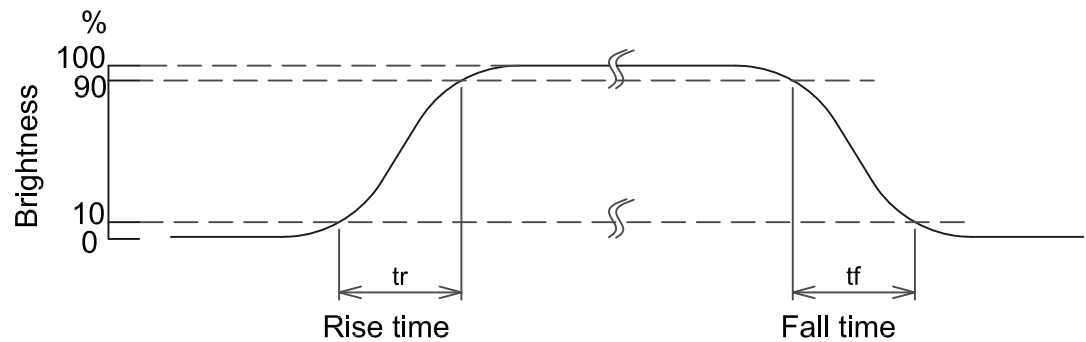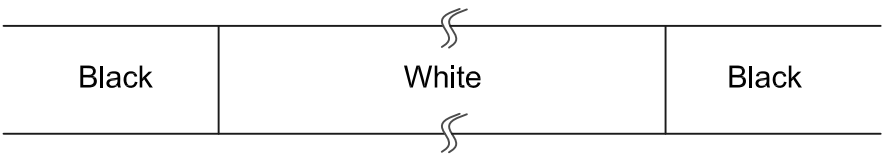
6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

ITEM	MIN.	TYP.	MAX.	UNIT	REMARKS
Brightness	-	280	-	cd/m^2	IL=5mA (Note 1,2)
Rise Time	-	3	-	Minute	IL=5mA Brightness 80%
Brightness Uniformity	-	-	±25	%	Under mentioned (Note 1,3,4)

(Measurement condition : KOE standard)

CFL: 0h operation, Ta=25℃
 Display data should all be "ON"

Note 1 : Measurement after 10 minutes from CFL operating.
   Average value of 9 points (Note 3)
Note 2 : Brightness control : 100%.
   Note 3 : Measurement of the following 9 places on the display.
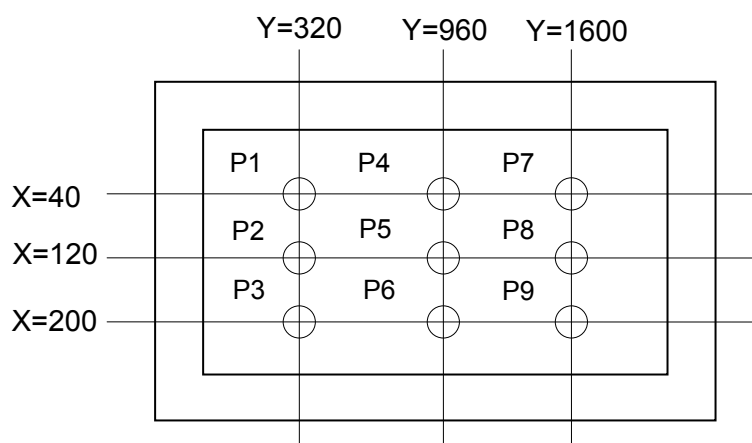
Note 4 : Definition of the brightness tolerance.

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

7.BLOCK DIAGRAM

I/F(CN1)

Input Voltage

Power Supply

Timing Controller

Power Unit

Gate Driver

G1
G2
G240

TFT-LCD

D1 D2   D1920

Drain Driver

CN

GN

VL

CFL

I/F (CN3)

Touch Panel Signal

Touch Panel
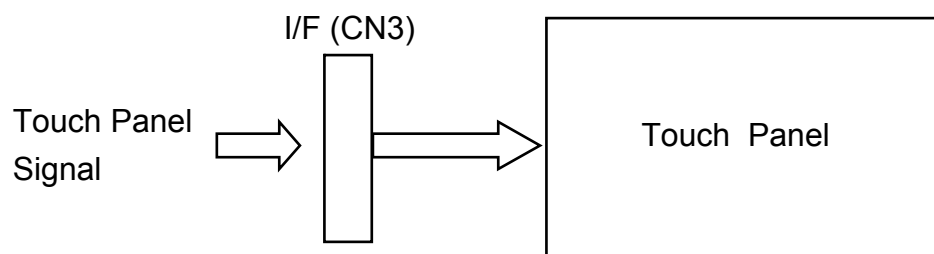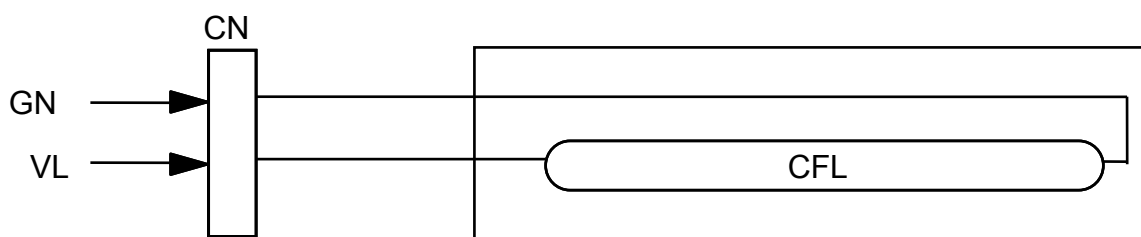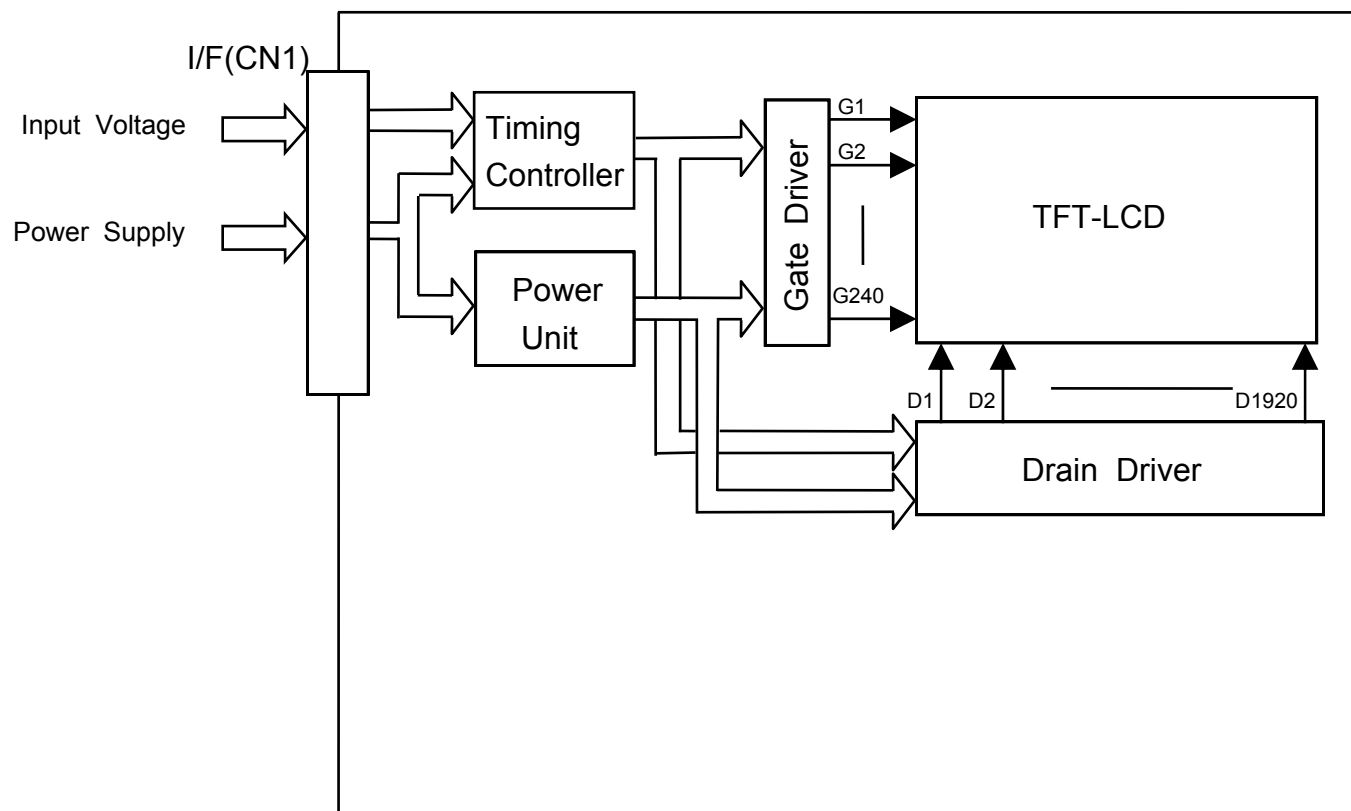
8.INTERFACE TIMING
8.1.1 INTERFACE TIMING FOR HVGA DISPLAY MODE

	ITEM	MIN.	TYP.	MAX.	UNIT	SYMBOL	REMARKS
DCLK	Cycle time	37.5	94	114.9		t_{CLK}	
	Low level Width	15	-	-		t_{WCL}	
	High level Width	15	-	-	ns	t_{WCH}	
	Rise time	-	-	25		tr_{CLK}	
	Fall time	-	-	25		t_{fCLK}	
	Duty	0.45	0.5	0.55	-	D	$D= t_{CLKL/ CLK}$
Hsync	Set up time	5	-	-	ns	t_{SH}	for DCLK
	Hold time	10	-	-		t_{HH}	
	Cycle	679	709	739	t_{CLK}	t_{HP}	
	Valid width	4	5	5		t_{WH}	
	Rise/Fall time	-	-	30	ns	t_{Hr}, t_{Hf}	
Vsync	Set up	0	-	-	t_{CLK}	t_{SV}	for Hsync
	Hold	2	-	-		t_{HV}	
	Cycle	245	251	533	t_{HP}	t_{VP}	
	Valid width	2	2	2		t_{WV}	
	Rise/Fall time	-	-	50	ns	t_{Vr}, t_{Vf}	
DTMG	Set up time	5	-	-	ns	t_{SI}	for DCLK
	Hold time	10	-	-		t_{HI}	
	Rise/Fall time	-	-	30	ns	t_{ir}, t_{if}	
	Horizontal back porch	24	37	50	t_{CLK}	t_{hbp}	
	Horizontal front porch	15	32	49		t_{hfp}	
	Vertical back porch	4	7	196	t_{HP}	t_{vbp}	
	Vertical front porch	1	4	97		t_{vfp}	
Data	Set up time	5	-	-	ns	t_{sd}	for DCLK
	Hold time	10	-	-		t_{hd}	
	Rise/Fall time	-	-	25	ns	t_{dr}, t_{df}	

Note : Vsync Cycle No. should be set to odd.

8.1.2 INTERFACE TIMING FOR VGA DISPLAY MODE

	ITEM	MIN.	TYP.	MAX.	UNIT	SYMBOL	REMARKS
DCLK	Cycle time	37.4	47.8	58.1		t_{CLK}	
	Low level Width	15	-	-		t_{WCL}	
	High level Width	15	-	-	ns	t_{WCH}	
	Rise time	-	-	25		tr_{CLK}	
	Fall time	-	-	25		t_{fCLK}	
	Duty	0.45	0.5	0.55	-	D	D= $t_{CLKL/CLK}$
Hsync	Set up time	5	-	-	ns	t_{SH}	for DCLK
	Hold time	10	-	-		t_{HH}	
	Cycle	679	709	739	t_{CLK}	t_{HP}	
	Valid width	4	5	5		t_{WH}	
	Rise/Fall time	-	-	30	ns	t_{hr},t_{hf}	
Vsync	Set up	0	-	-	t_{CLK}	t_{sv}	for Hsync
	Hold	2	-	-		t_{hv}	
	Cycle	485	491	533	t_{HP}	t_{vp}	
	Valid width	2	2	2		t_{wv}	
	Rise/Fall time	-	-	50	ns	t_{vr},t_{vf}	
DTMG	Set up time	5	-	-	ns	t_{si}	for DCLK
	Hold time	10	-	-		t_{hi}	
	Rise/Fall time	-	-	30	ns	t_{ir},t_{if}	
	Horizontal back porch	24	37	50	t_{CLK}	t_{hbp}	
	Horizontal front porch	15	32	49		t_{hfp}	
	Vertical back porch	4	7	28	t_{HP}	t_{vbp}	
	Vertical front porch	1	4	25		t_{vfp}	
Data	Set up time	5	-	-	ns	t_{sd}	for DCLK
	Hold time	10	-	-		t_{hd}	
	Rise/Fall time	-	-	25	ns	t_{dr},t_{df}	

Note : Vsync Cycle No. should be set to odd.

8.2 TIMING CHART
(Data is latched negative edge trigger of DCLK)

t_{Hr}, t_{Vr} t_{Hf}, t_{Vf}
t_{Ir}, t_{Dr} t_{If}, t_{Df}

VSYNC, HSYNC, DTMG,
R0～5, G0～5, B0～5

V_{IH}min.
V_{IL}max.

t_{WCH} t_{WCL} t_{fCLK} t_{rCLK}

t_{CLK} 1.5V

DCLK

t_{CLKL} t_{HD} t_{SD}

DATA   Invalid Data   Invalid Data

t_{HI} t_{SI}

DTMG

DCLK

t_{HH} t_{SH}

Hsync

t_{SV} t_{HV}

Vsync

t_{HP}

Hsync t_{WH}

t_{HBP} t_{HFP}

DTMG

t_{VP}

Vsync t_{WV}

t_{VBP} t_{VFP}
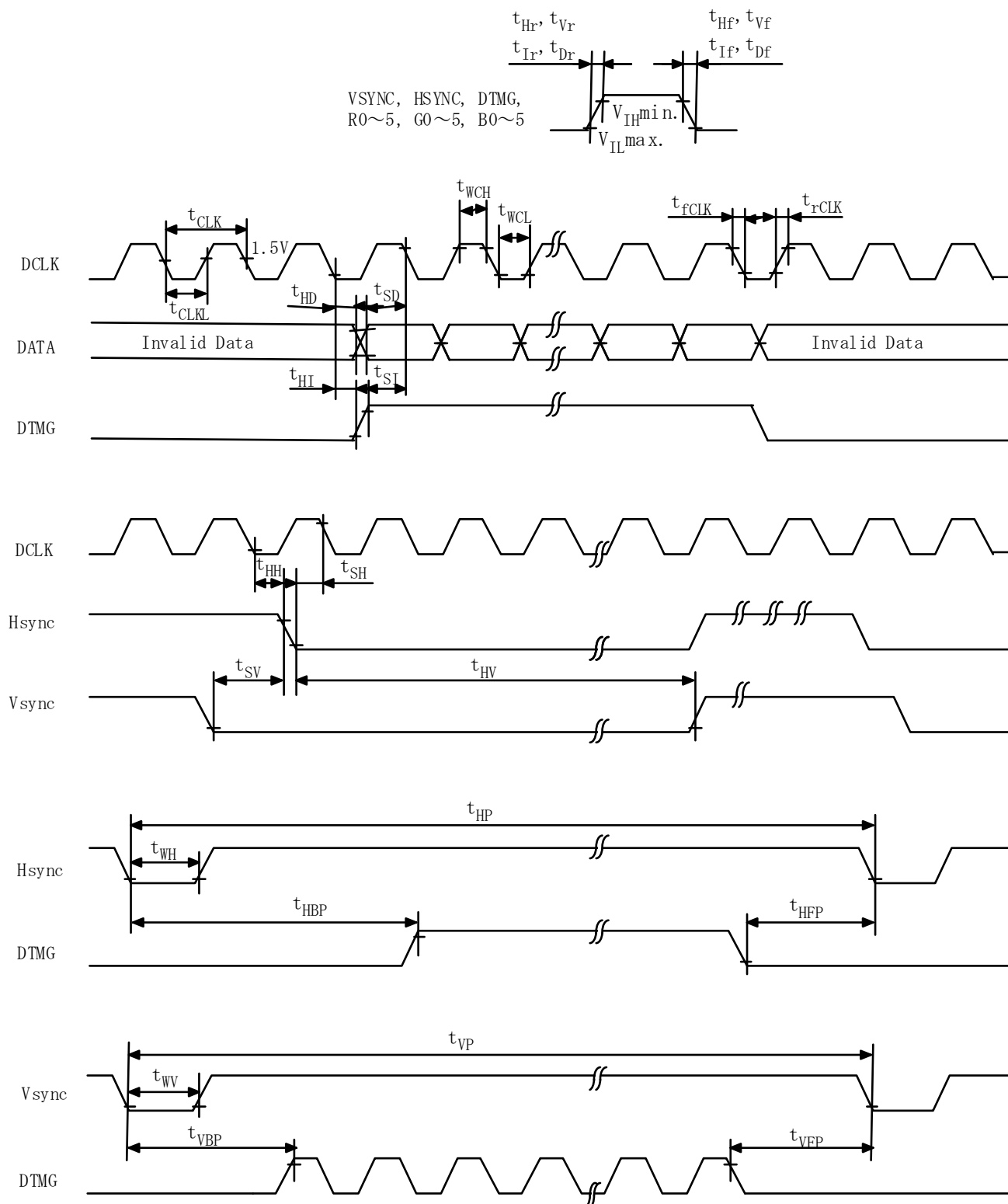
DTMG

Note 1 : DTMG is definition of the above timing for Hsync and Vsync.
Note 2 : No matter when Hsync and Vsync is inputted ,this LCM can be drove
only DTMG Signal. DTMG should be set to low level when it is not input
valid data.

8.3 POWER ON/OFF SEQUENCE
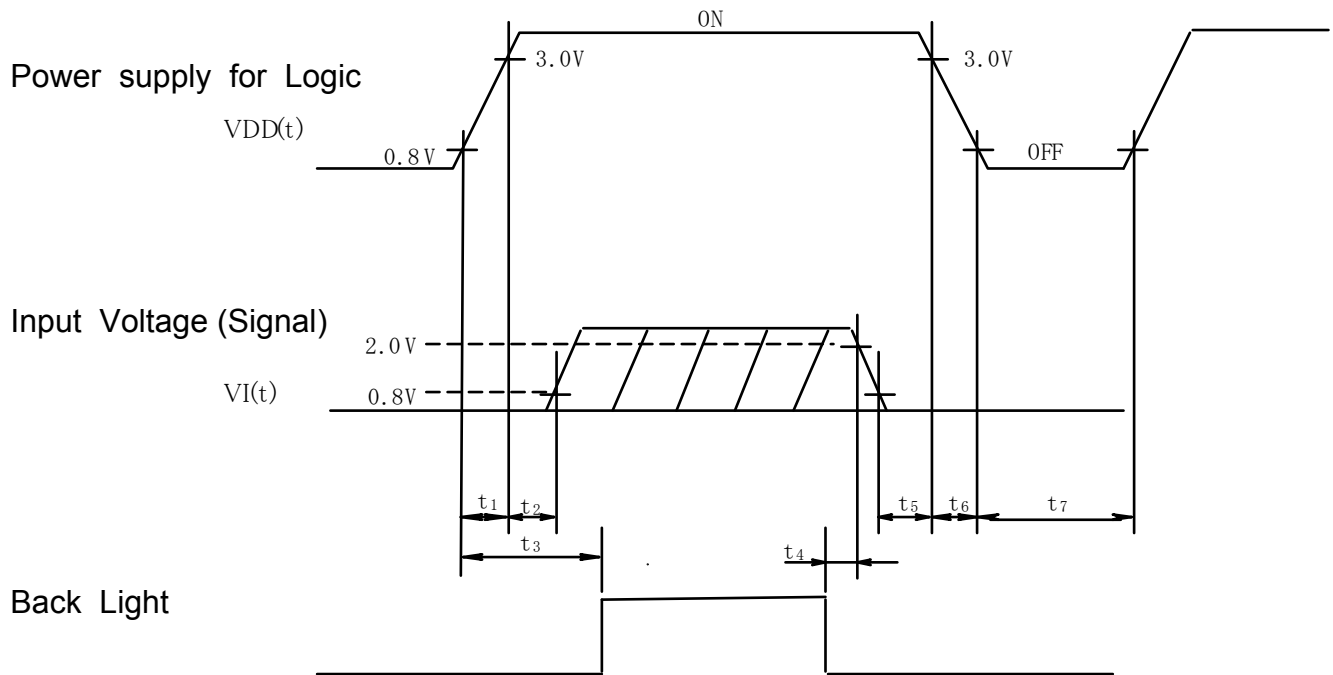
Power supply for Logic
VDD(t)

ON
3.0V
3.0V
0.8V
OFF

Input Voltage (Signal)
VI(t)
2.0V
0.8V

t_1 t_2 t_5 t_6 t_7
t_3 t_4

Back Light

POWER ON	POWER OFF
$t_1 \leqq 15ms$	$5ms \leqq t_4$
$0ms < t_2 \leqq 45ms$	$0ms \leqq t_5 \leqq 45ms$
$0.1s \leqq t_3$	$0ms \leqq t_6 \leqq 20ms$
	$0.4s \leqq t_7$

Note 1 : $0V \leqq VI(t) \leqq VDD(t)$
VI(t) and VDD(t) is a surfeit of condition for power on/off.
Note 2 : Input Voltage(Signal) should not be set high impedance when power on.

8.4 RELATIONSHIP BETWEEN DISPLAYED COLOR AND INPUT DATA

	COLOR & GRAY SCALE	GRAY SCALE LEVELS	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic Color	Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	-	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	-	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	-	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	-	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	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	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	↓	↓		↓				↓						↓					
	↓	↓	↓		↓				↓						↓					
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	↓	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	↑	↓	↓		↓				↓						↓					
	↓	↓	↓		↓				↓						↓					
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	↓	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	↑	↓	↓		↓				↓						↓					
	↓	↓	↓		↓				↓						↓					
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	↓	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	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±0.05mm，0.5±0.05mm pitch)

PIN No.	SIGNAL	FUNCTION
1	VDD	Power Supply for Logic
2	VDD	Power Supply for Logic
3	VDD	Power Supply for Logic
4	VDD	Power Supply for Logic
5	NC	No Connection
6	DTMG	Timing Signal for Data
7	VSS	GND
8	DCLK	Dot Clock
9	VSS	GND
10	NC	No Connection
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	Vcom	Common Voltage (Generated by LCM)
36	VSS	GND
37	NC	No Connection
38	NC	No Connection
39	NC	No Connection
40	NC	No Connection

CN2 JST Housing : BHSR-02VS-1 (Suitable Connector : JST SM02B-BHSS-1)
Contact pin : SBHS-002T-P0.5

PIN No.	SIGNAL	LEVEL	FUNCTION
1	VSS	-	GND for CFL
2	VCFL	-	Power Supply for CFL

CN3 FPC CONNECTION

PIN No.	SIGNAL	FUNCTION
1	Y1	Analog Signal Touch Panel
2	X2	Analog Signal Touch Panel
3	Y2	Analog Signal Touch Panel
4	X1	Analog Signal Touch Panel
5	SENSE	Analog Signal Touch Panel

9. DIMENSIONAL OUTLINE
9.1 FRONT VIEW

173±0.5
172.7±0.3 (T/P External outline)
153.8min. (T/P Transparent Area)
152.8±0.3 (Window of Bezel)
150.8min. (T/P Active Area/LCD Viewing Area)
148.8±0.1 (LCD Active Area)

190±1

14.28±0.5
14.78±0.5
15.78±0.5
16.78±0.5

(91.18)

(8.6)max.

3.5±0.5
3.77±0.5
4.77±0.5
5.77±0.5

(8)(Stiffener)

58.76min. (T/P Transparent Area)
57.76±0.3 (Window of Bezel)
55.76min. (T/P Active Area/LCD Viewing Area)
53.76±0.1 (LCD Active Area)
70.0±0.5

(32.65)
35±0.5
(3)
(16±0.5)

X2
Y1
VIEWING DIRECTION
Y2
X1

T/P
LCM

(50)

2
CN2
1

Recommended design rule for I/F FPC

3.5min.
0.5±0.05
0.5±0.1
19.5±0.05
20.5±0.05
0.3±0.03
0.3±0.05
4.2min.

1
2
3
4
5

X2
Y1
S
Y2
X1
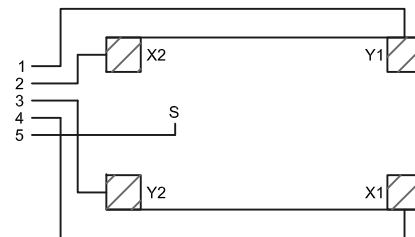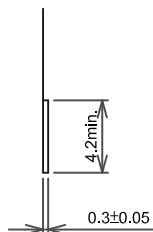
PIN NO.	Assignment
1	Y1-drive
2	X2-drive
3	Y2-drive
4	X1-drive
5	Sense

Scale : NTS
Unit : mm

9.2 REAR VIEW

Insert Direction →

(69.8)

(16)

1

CN1

40

(Bottom Contact Connector)

A

1

CN3

5

(5)

Barcode Label

(14)

CN2

(26)

(5)

Width 0.6±0.1

P 1.0x4=4.0±0.1

6.1±0.2
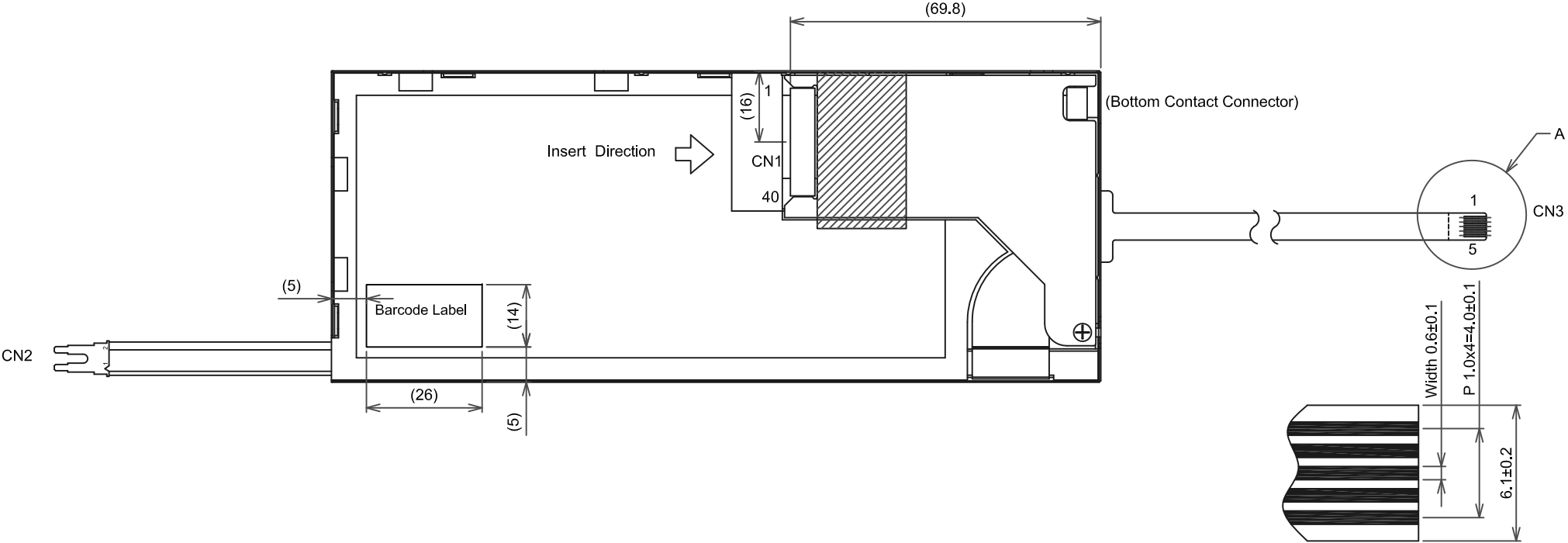
Detail A

Scale : NTS
Unit : mm

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.(More than 1000(lx) 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 $\theta \leqq 45°$ for LCM power off

$\theta \leqq 5°$ for LCM power on

eye

eye

θ θ

LCD

Bezel

10.2 DEFINITION OF ZONE

Display area (pixel area)

Until 1mm outside around display area

Metal bezel area
(include I/F connector)

A zone

B zone
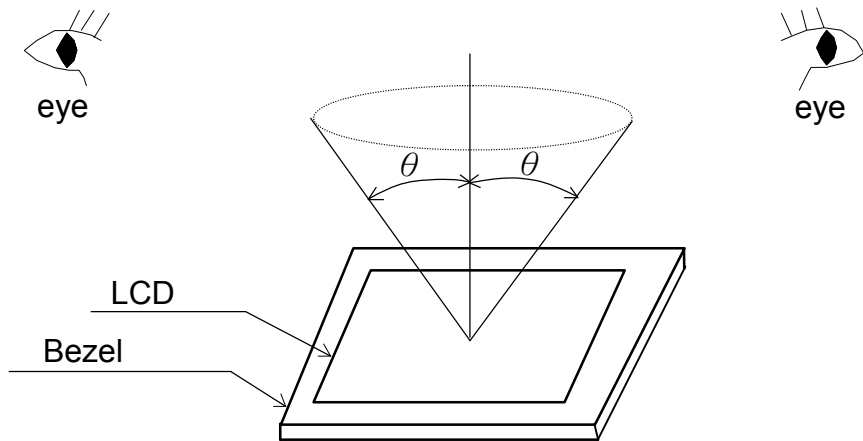
C zone
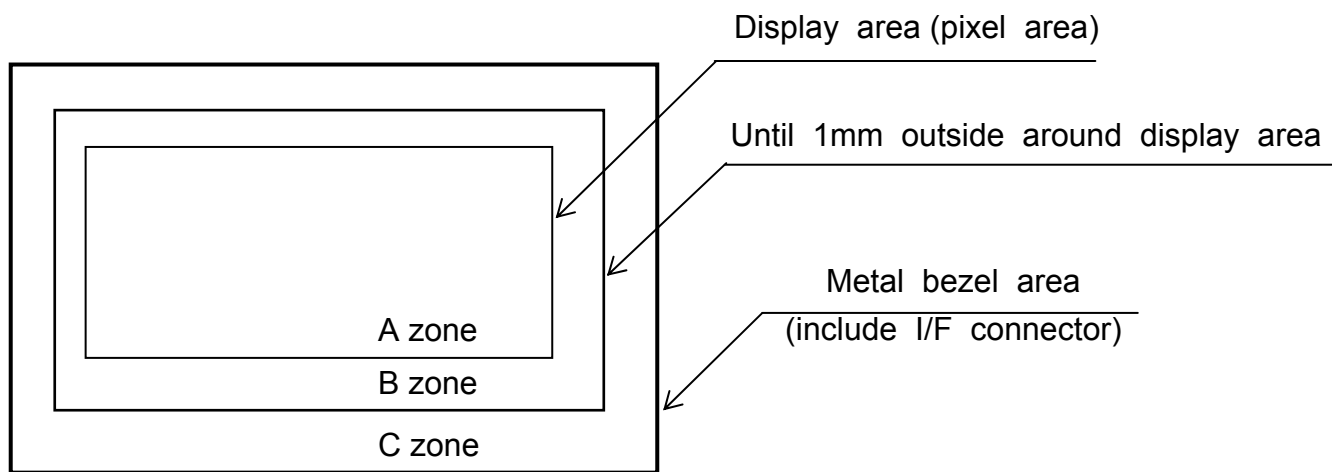
10.3 APPEARANCE SPECIFICATION
(1)LCD Appearance
*) If the problem related to this section occurs about this item , the responsible persons of both party (Customer and KOE) will discuss the matter in detail.

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				
	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 Space		
		D＜0.2	Ignored	-		
		0.2≦D＜0.3	10	10 mm		
		0.3≦D＜0.4	5	30 mm		
		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	1		
			Total (Note.(3)-(f))	5		
		Black mode	1 dot	5		
			2 dots	2		
			Total (Note.(3)-(f))	5		
			Total (Note.(3)-(f))	10		

(2) CFL BACKLIGHT APPEARANCE

<table>
<tr><td rowspan="14">No.</td><td rowspan="14">ITEM</td><td colspan="3">CRITERIA</td><td>APPLIED ZONE</td></tr>
</table>

No.	ITEM	CRITERIA			APPLIED ZONE
C F L 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
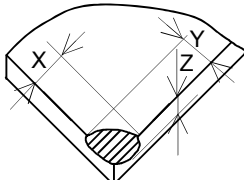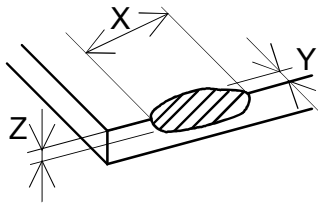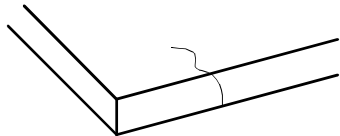
ITEM	CRITERIA		
Scratch	W＞0.05	L＞3	None
	0.05≧W	L≦3	ignored
Dust(Linear)	W＞0.05	L＞10	None
	0.05≧W	L≦10	ignored
Dust(Circular)	D＞0.35		None
	0.35≧D＞0.25		Maximum 6pcs
	0.25≧D		ignored

Applied only in the active area. Scratches or dusts in the outside of the active area are acceptable unless the electrical characteristics are affected.

• Dirt

Acceptable if not noticeable on a black mat.

• Tip, crack (applicable to glass only)

ITEM	CRITERIA			
Tip Corner		X	≦3.0	Not acceptable if the film is damaged
		Y	≦3.0	
		Z	≦1.1	
Tip Side		X	≦3.0	Not acceptable if the film is damaged
		Y	≦3.0	
		Z	≦1.1	
Crack				None

Blistering Puffiness

Gauge

0.4 mm max.

Touch Panel
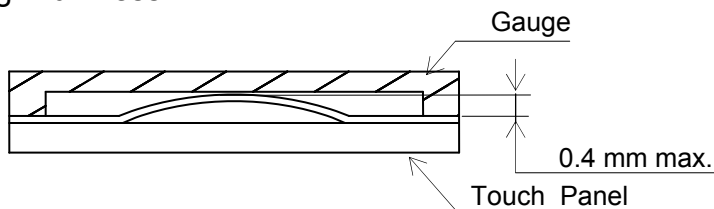
Note 1 : Definition of average diameter (D)

b

a

$$D = \frac{a+b}{2}$$
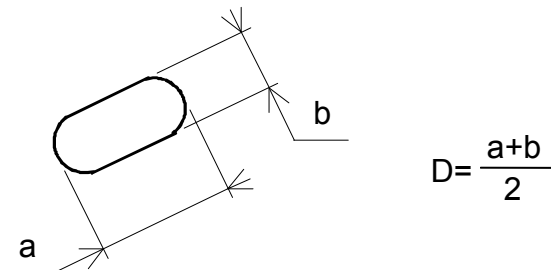
Note 2 : Definition of length (L) and width (W)

L

W
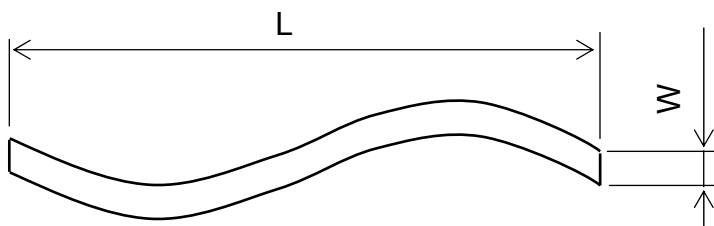
Note 3 : Definition of dot defect

(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)

R	G	B	R	G	B	R	G	B
				x				

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 and 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

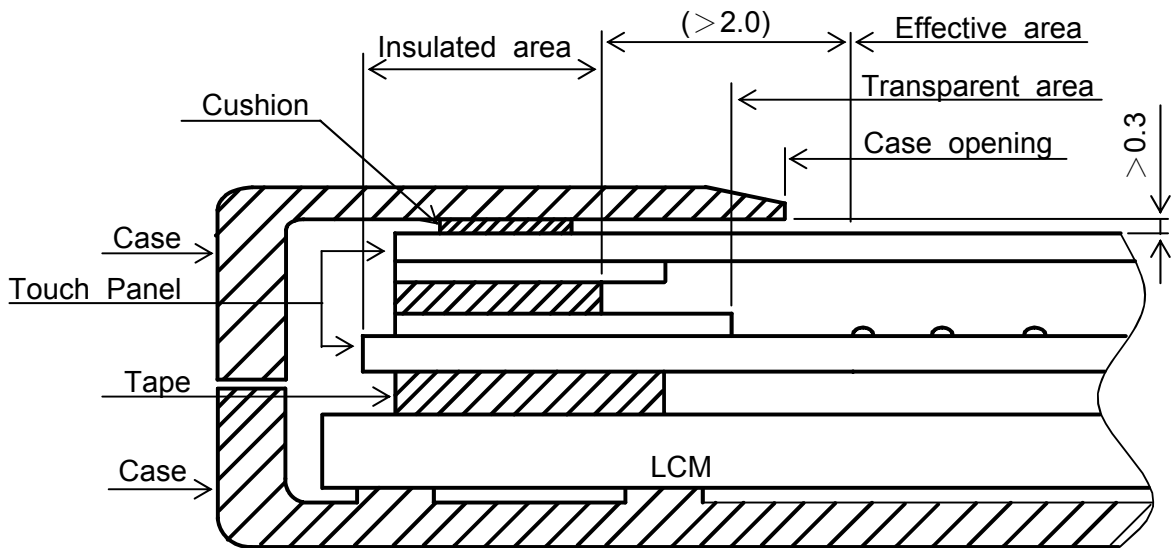As this module contains C-MOS LSIs, it is not strong against electrostatic discharge. Make certain that the operator's body is connected to the ground through a list band , etc. And don't touch I/F pins directly.

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 2H.

(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.

| KAOHSIUNG OPTO-ELECTRONICS INC. | SHEET NO. | 7B64PS 2711-TX16D11VM2CCA-6 | PAGE | 11-1/4 |

(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 9-1/2), 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 4.
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.

11.7 MOUNTING PRECAUTION

(1) When assembling the LCM Module, please refer to the below.

(2) The use of cushion is recommended in order to protect the module from shock.

(3) To pervent the module cover from being pressed, the distance between the case and cushion, should be shorter than 1.0mm.
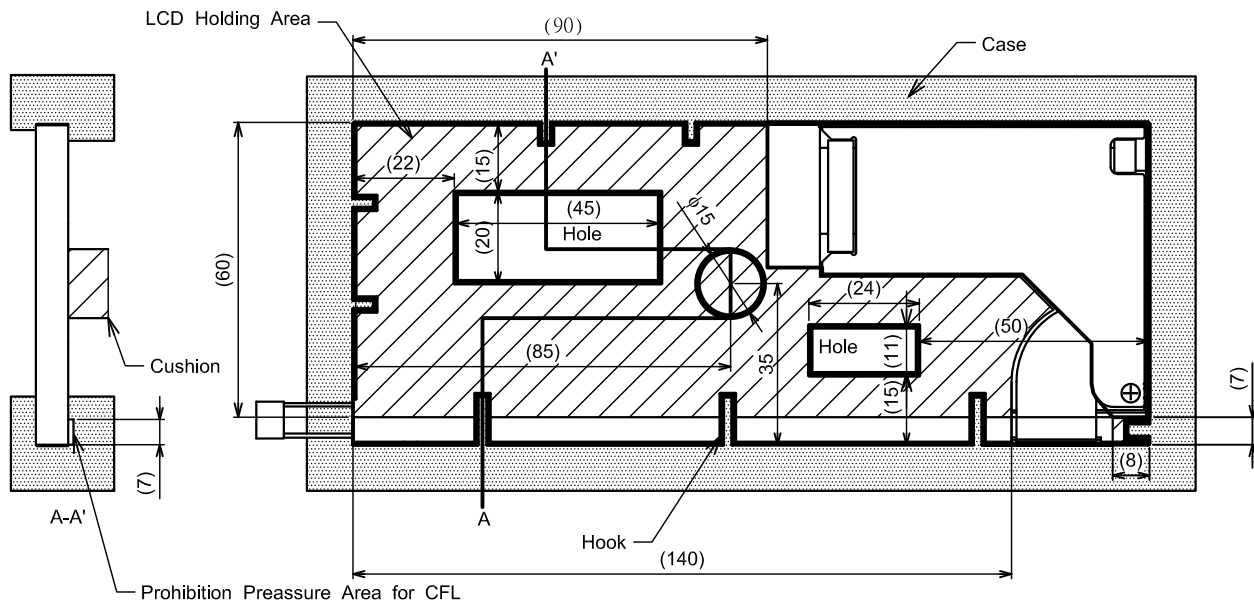
12. DESIGNATION OF LOT MARK
12.1 LOT MARK
Lot mark is consisted of 5 digits for production lot and
6 digits for production control.

| 4 | 0 | 5 | 1 | 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 LOCATION OF LOT MARK
Label is bring attached on the back side of module.

12.4 REVISION(Rev.) CONTROL

Rev No.	ITEM	NOTE
A	CN1 JAE : FA5B040HP1R3000	-
B	Touch Panel (Change)	PCN No.0776

TX16D11VM2CCA   REV: B
8041T   (5F)   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.