LIQUID CRYSTAL DISPLAY MODULE
MODEL: MTF-TQ57SN721-AV
Customer's No.:

Acceptance

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Approved and Checked by

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Revise Records

Rev.	Date	Contents	Written	Approved
A	2007/8/16	Specification released	Fanny Wang	Steele Lee

Special Notes

Note1.	
Note2.	
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1. GENERAL DESCRIPTION AND FEATURES

MTF-TQ57SN721-AV is a TM (Transmissive) type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a driver circuit and a back-light unit. The resolution of a 5.7" contains 320RGB×240 dots and can display up to 262K colors. The following table described the features of MTF-TQ57SN721-AV.

1.1 Features

- Transmissive type with LED back-light.
- TN (Twisted Nematic) mode.
- Digital RGB (6bits/color) Data Transfer
- Backlight-driving DC/AC inverter is not built in this module.

1.2 General Specifications

Item	Specification	Unit
Screen Size	5.7 inches diagonal	-
Display Resolution	320 x RGB x 240	Dot
Pixel Pitch	0.36 (H) ×0.36 (V)	mm
Active Area	115.2 (W) x 86.4 (H)	mm
Outline Dimension	144.0 (W) x 104.6 (H) x 12.8 (T), without FPCB tail.	mm
Weight	155g (MTF-TQ57SN721-AV)	-
	202g (MTF-TQ57SP721-AV)	
Display Mode	Normally white/Transmissive/Wide view	-
Pixel Arrangement	RGB-Vertical Stripe	-
Surface Treatment	Non-glare (3H)	-
Viewing Direction	6 o'clock	-
Input Interface	Digital RGB (6bits/color) Data Transfer	-
TFT Driver	Source: Himax HX8218A, Gate: Himax HX8615A	-
Color Garmut	NTSC 58%	-
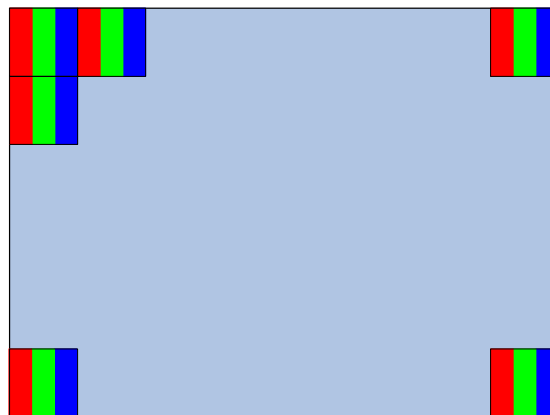
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2. INPUT TERMINAL PIN ASSIGNMENT

2.1 Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	DGND	--	GND	-
2	DCLK	I	Clock signal for sampling each data signal	-
3	Hsync	I	Horizontal synchronous signal (Negative)	-
4	Vsync	I	Vertical synchronous signal (Negative)	-
5	GND	I	GND	-
6	R0	I	RED data signal (LSB)	-
7	R1	I	RED data signal	-
8	R2	I	RED data signal	-
9	R3	I	RED data signal	-
10	R4	I	RED data signal	-
11	R5	I	RED data signal (MSB)	-
12	GND	--	GND	-
13	G0	I	GREEN data signal (LSB)	-
14	G1	I	GREEN data signal	-
15	G2	I	GREEN data signal	-
16	G3	I	GREEN data signal	-
17	G4	I	GREEN data signal	-
18	G5	I	GREEN data signal (MSB)	-
19	GND	--	GND	-
20	B0	I	BLUE data signal(LSB)	-
21	B1	I	BLUE data signal	-
22	B2	I	BLUE data signal	-
23	B3	I	BLUE data signal	-
24	B4	I	BLUE data signal	-
25	B5	I	BLUE data signal(MSB)	-
26	GND	--	GND	-
27	DEN	I	Signal to settle the horizontal display position (Positive)	Note5-1
28	V_{DD}	--	＋3.3V power supply	-
29	V_{DD}	--	＋3.3V power supply	-
30	LRC	I	Horizontal display mode select signal L: Normal H: Left / Right reverse mode	Note5-2

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31	UDC	I	Vertical display mode select signal H: Normal L: Up / Down reverse mode	Note5-3
32	NC	--	No Connection	-
33	GND	I	GND	-

Note5-1 The horizontal display start timing is settled in accordance with a rising timing of ENAB signal. In case ENAB is fixed "Low", the horizontal start timing is determined. Don't keep ENAB "High" during operation.
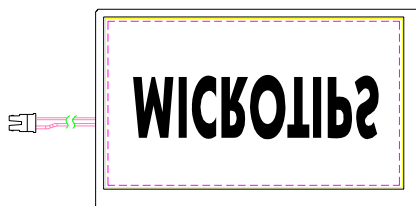
Note5-2,3
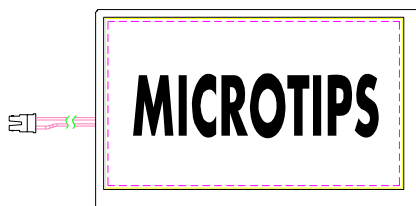
R/L = L, U/D = H

R/L = H, U/D = H

R/L = L, U/D = L
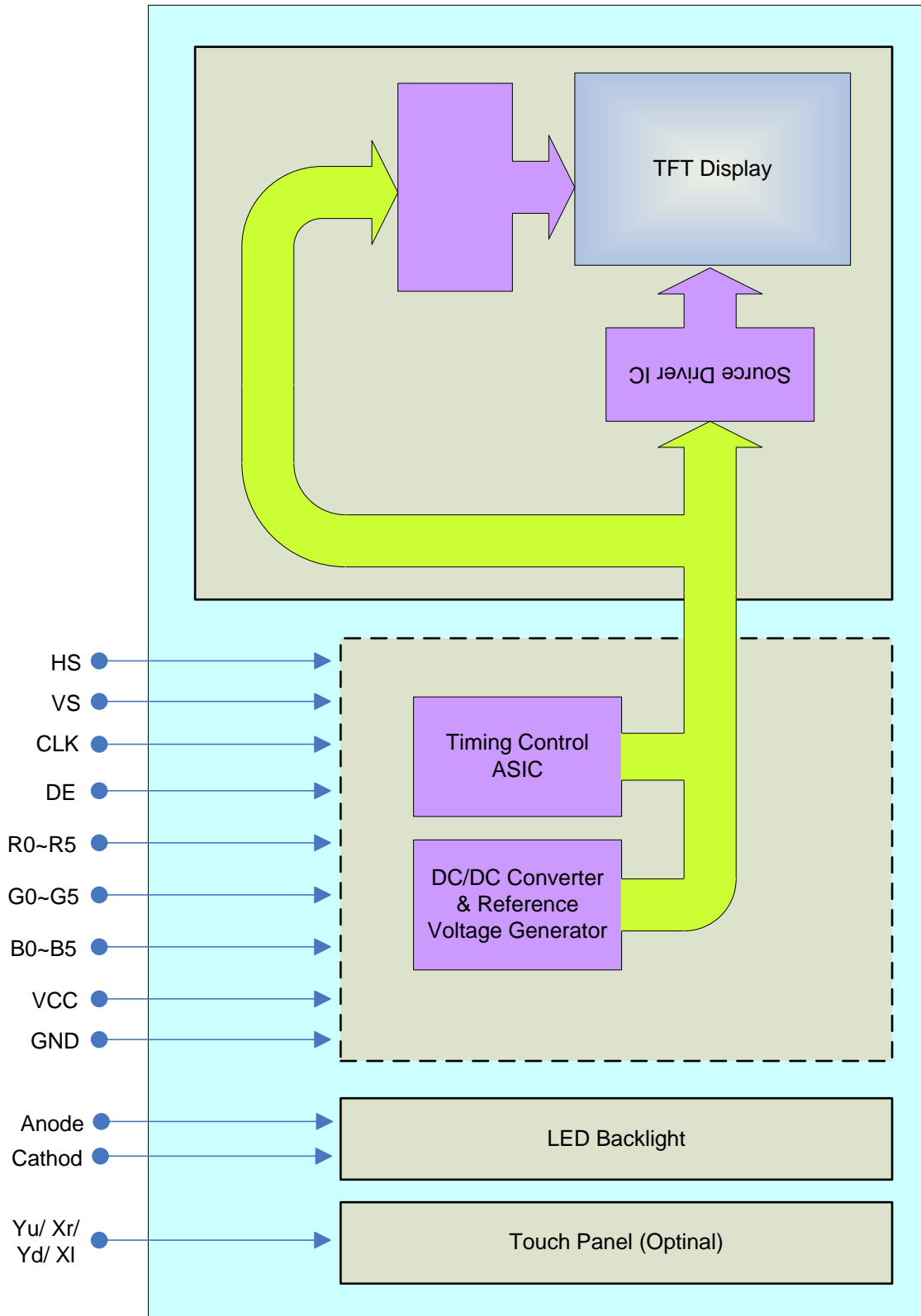
R/L = H, U/D = L

2.2   Back-light Unit (BLU)

Pin No.	Symbol	Function	Remark
1	LEDA	Power Supply for LED backlight	
2	LEDK	GND for LED backlight	

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3. BLOCK DIAGRAM

4. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (1).
Measuring equipment: LCD-5000, BM-5A, BM-7, PR-650, EZ-Contrast

$(Ta=25°C , I_F=300mA)$

Item		Symbol	Condition	Min	Type	Max	Unit	Note
Brightness	MTF-TQ57SN721-AV	Br	300mA/6.6V	-	500	-	cd/m^2	Note 1
	MTF-TQ57SP721-AV			-	400	-	cd/m^2	
Response time		T_r	θ=0°	-	15	20	ms	Note 2
		T_f		-	35	50	ms	
Contrast ratio		CR	At optimized viewing angle	150	250	-	-	Note 3
Color Chromaticity	Red	R_X	θ=0° Normal Viewing Angle	0.610	0.640	0670	-	-
		R_Y		0.314	0.344	0.374		
	Green	G_X		0.268	0.298	0.328	-	
		G_Y		0.553	0.583	0.613		
	Blue	B_X		0.107	0.137	0.167	-	
		B_Y		0.139	0.159	0.179		
	White	Wx		0.282	0.312	0.342	-	
		Wy		0.319	0.349	0.379		
Viewing Angle (6H)	Hor.	$θ_R$	CR≥10	-	65	-	Degree	Note 4
		$θ_L$		-	65	-		
	Ver.	$θ_B$		-	50	-		
		$θ_F$		-	65	-		
LED Life time	25°C	LL	I_F=300mA V_F=6.6V	-	50k	-	Hours	Note 5

Note 1 : Test Equipment Setup

After stabilizing and leaving the panel alone at a given temperature for 30 min., the measurement should be executed. Measurement should be executed in a stable, windless, and dark room, 30 min. after turning the back light on. This should be measured in the center of screen.
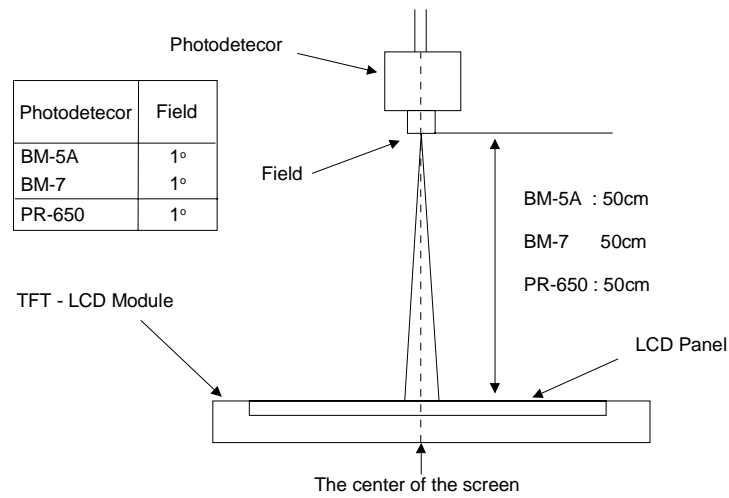
Back-Light current: 300mA
Environment condition: 1. Ta=25±2°C
　　　　　　　　　　　 2. Illuminations≦1 lux

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Photodetecor

Photodetecor	Field
BM-5A	1°
BM-7	1°
PR-650	1°

Field

BM-5A : 50cm

BM-7   50cm

PR-650 : 50cm

TFT - LCD Module

LCD Panel

The center of the screen

Note 2 :   Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

Tr

Tf

%

100

90

Optical
Response

10

0
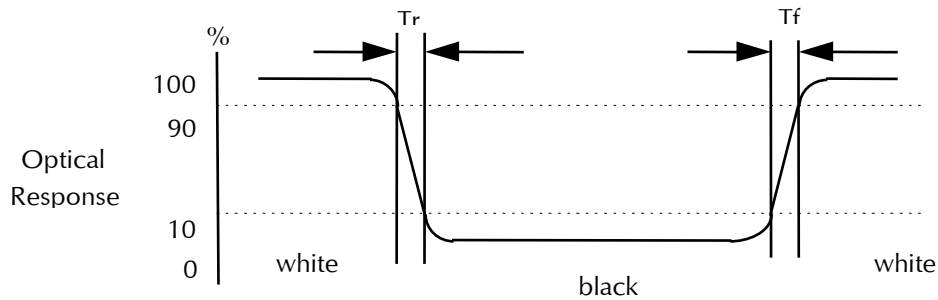
white

black

white

Note 3 : Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$
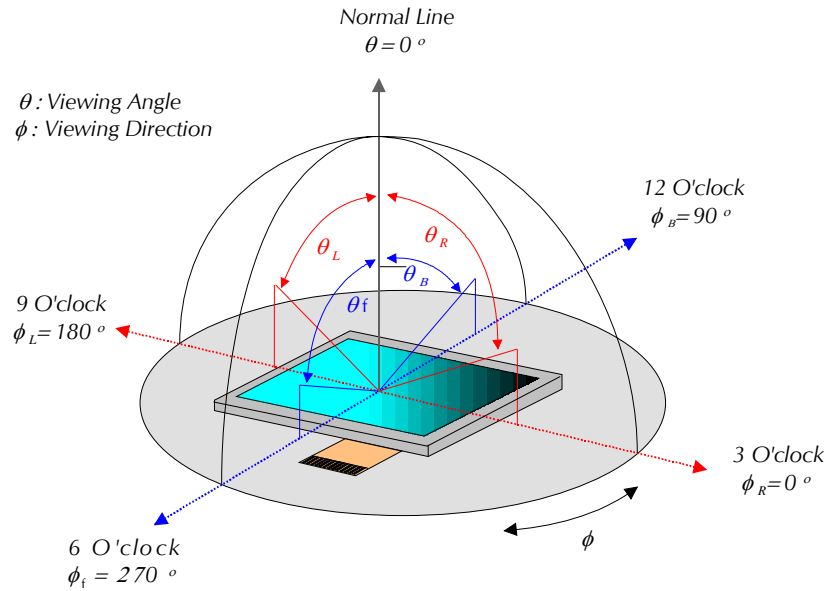
Note 4 : Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

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View Angle

Note 5 : This is the reference value. The white-LED life time is defined as a time when brightness not to become under 50% of the original value (at Ta=25°C)

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5. ABSOLUTE MAXIMUM RATINGS

5.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

$(Ta=25°C, V_{SS}=GND=0)$

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-30	80	°C	(1)
Operating temperature (Ambient temperature)	T_{OPR}	-20	70	°C	(1), (2)

Note (1) 95 % RH Max. (40 °C ≥ Ta)

Maximum wet-bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.
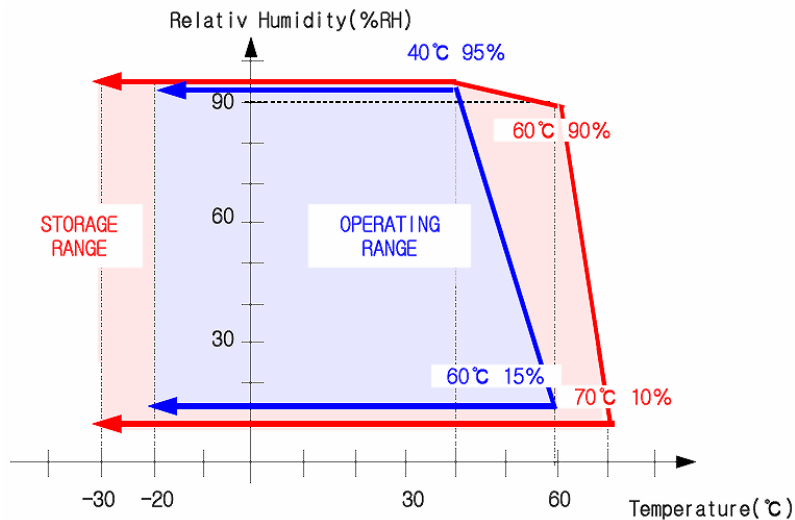
(2) In case of below 0°, the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of LC's character

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5.2   Electrical Absolute Maximum Rating

(Ta=25°C, V_{SS}=GND=0)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply Voltage	V_{DD}	-0.3	-	+7.0	V	Note 1
Permissive input ripple voltage	V_{RF}	--	--	100	mVp-p	V_{DD} = +3.3V
Input voltage (Low)	V_{IL}	0	--	0.3 V_{DD}	V	Note 2
Input voltage (High)	V_{IH}	0.7 V_{DD}	--	+5.5	V	
Input current (Low)	I_{OL1}	--	--	10	μA	V_I=0V, Note 2
Input current (High)	I_{OH1}	--	--	10	μA	V_I=3.3~5.0V, Note 3
	I_{OH2}	--	--	100	μA	V_I=3.3~5.0V, Note 4

Note1:

V_{DD} -turn-on conditions

0 < t1 ≤ 20ms

0 < t2 ≤ 50ms

0 < t3 ≤ 1s
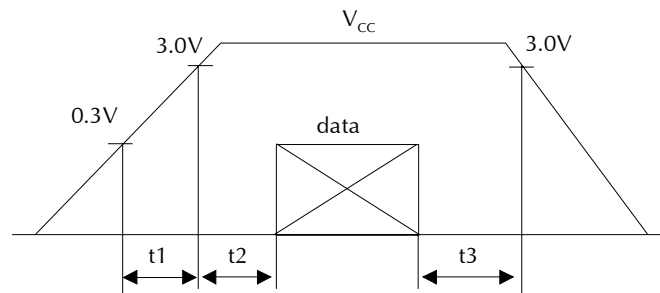
V_{DD} -dip conditions

V_{DD} -dip conditions should also follow the V_{DD} -turn-on conditions

Td ≤ 20ms
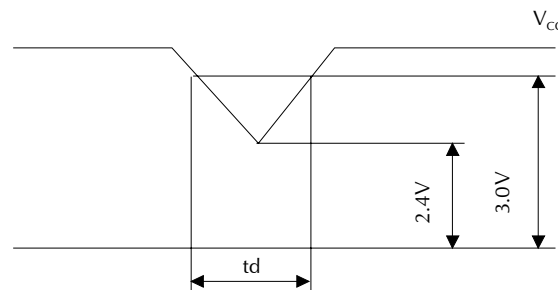
Note2: CLK, R0~R5, G0~G5, B0~B5, Hsync, Vsync, DE, R/L, U/D
Note3: CLK, R0~R5, G0~G5, B0~B5, Hsync, Vsync, R/L, U/D
Note4: DE

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6. ELECTRICAL CHARACTERISTICS

6.1 DC Electrical Characteristics

(Ta=25±2°C, V_{SS}=GND=0)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage		V_{DD}	3.0	3.3	3.6	V	
Supply Current		I_{DD}	40	50	60	mA	Note 2
Input Voltage for logic	L Level	V_{IH}	0.7 V_{DD}	--	V_{DD}	V	Note 1
	H Level	V_{IL}	0	--	0.3 V_{DD}	V	

Note1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5
Note2: fV =60Hz , Ta=25°C , Display pattern : All Black

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6.2   AC Timing Characteristic of The LCD

       6.2.1   Timing Condition

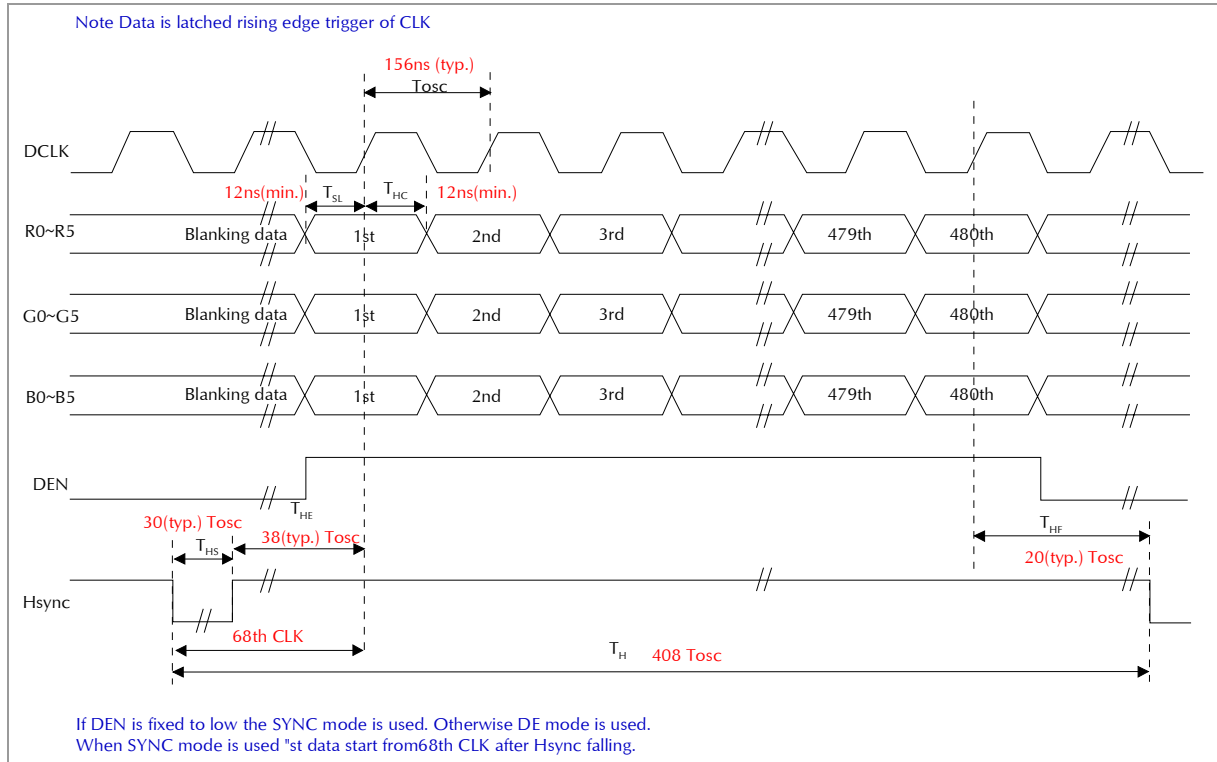| Signal	Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	DCLK period		T_{OSC}	--	156	--	ns	
	Frequency		F_{OSC}	--	6.4	--	MHz	
	DCLK High plus width		T_{CH}	--	78	--	ns	
	DCLK Low plus width		T_{CL}	--	78	--	ns	
RGB DATA	Data setup time		T_{SU}	12	--	--	ns	
	Data hold time		T_{HD}	12	--	--	ns	
Hsync	Hsync period		T_H	--	408	--	T_{OSC}	
	Hsync pulse width		T_{HS}	5	30	--	T_{OSC}	
	Back-Parch		T_{HB}	--	38	--	T_{OSC}	
	Front-Parch		T_{HF}	--	20	--	T_{OSC}	
	Hsync rising time		T_{Cr}	--	--	700	ns	
	Hsync falling time		T_{Cf}	--	--	300	ns	
Vsync	Vsync period	NTSC		--	262.5	--	T_H	
		PAL		--	312.5	--	T_H	
	Vsync pulse width		T_{VS}	1	3	5	T_H	
	Back-Porch	NTSC	T_{VB}	--	15	--	T_H	
		PAL		--	23	--	T_H	
	Display Period		T_{VD}	--	240	--	T_H	
	Front Porch	NTSC	T_{VF}	--	4.5	--	T_H	
		PAL		--	46.5	--	T_H	
	Vsync rising time		T_{Vr}	--	--	700	ns	
	Vsync falling time		T_{Vf}	--	--	1.5	μs	
	Vsync falling to Hsync rising time for odd field		T_{HVO}	1	--	--	T_{OSC}	
	Vsync falling to Hsync falling time for even field		T_{HVE}	1	--	--	T_{OSC}	
DEN	Vsync-DEN time	NTSC	T_{VSE}	--	18	--	T_H	
		PAL	T_{VSE}	--	26	--	T_H	
	Hsync-DEN time		T_{HE}	36	68	88	T_{OSC}	
	DEN plus width		T_{EP}	--	320	--	T_{OSC}	

Note : If DEN is fixed to low, the SYNC mode is used. Otherwise DE mode is used. When SYNC mode is used, 1st data start from 68th CLK after Hsync falling

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6.2.2 Horizontal Display Timing

Note Data is latched rising edge trigger of CLK

If DEN is fixed to low the SYNC mode is used. Otherwise DE mode is used.
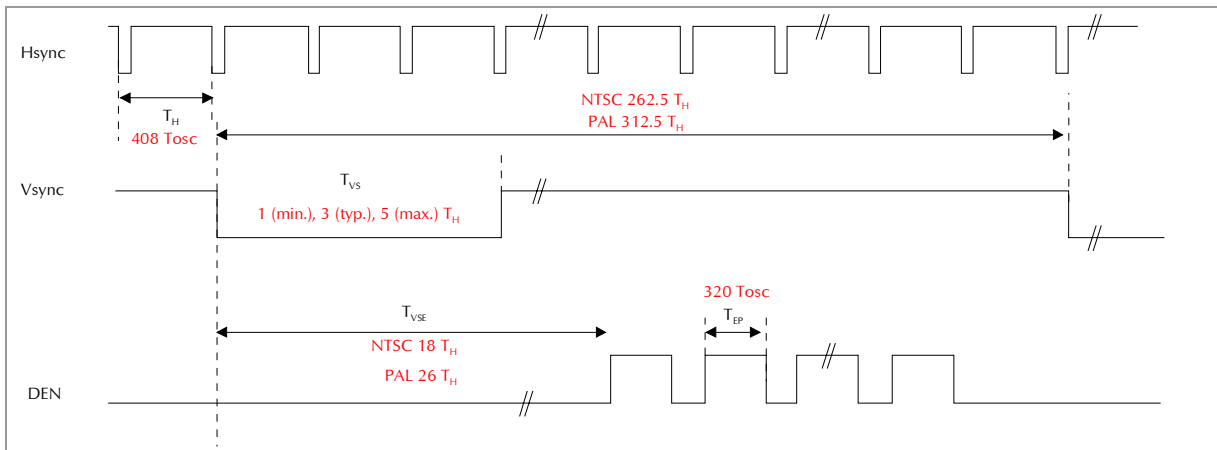When SYNC mode is used "st data start from68th CLK after Hsync falling.

6.2.3 Vertical Display Timing

6.2.4 Hsync and Vsyne Timing
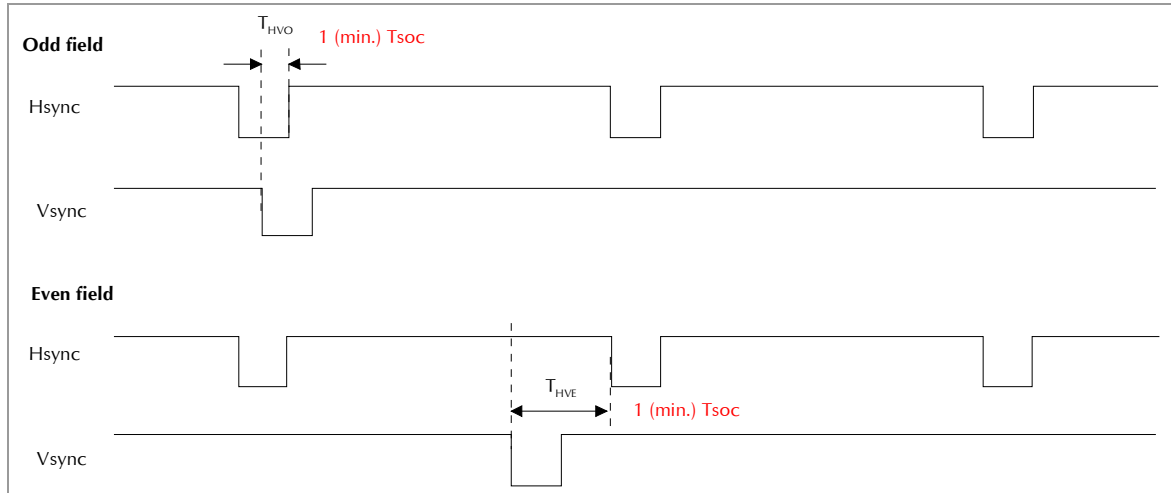
7. BACKLIGHT SPECIFICATIONS

7.1 Absolute Maximum Ratings

Ta=25°C

Item	Symbol	Maximum rating	Unit	Note
Peak Forward Current	I_{FM}	450	mA	(1)
Reverse Voltage	V_R	10	V	-
Power Dissipation	P_D	3300	mW	-
Operating Temperature	T_{OP}	-20~70	℃	-
Storage Temperature	T_{ST}	-30~80	℃	-

Note (1): Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.
Functional operation should be restricted to the conditions described under normal operating conditions.

7.2 Electrical/Operating Characteristics

Ta = 25°C

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Condition
Forward Voltage	V_F	-	6.6	-	V	
LED Current	I_F	-	300	-	mA	
Uniformity*	-	80	-	-	%	Ta=25℃ IF=300mA
Chromaticity Coordinates	X	0.26	0.29	0.32	-	
	Y	0.26	0.29	0.32	-	

*: Uniformity = (Min./Max.) x 100%
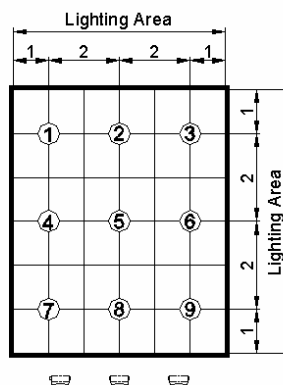
8. DISPLAYED COLOR AND INPUT DATA

		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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Red(0)	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
		Green(0)	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
		Blue(0)	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
		Cyan	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
		Magenta	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
		Yellow	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
		White	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red		Black	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Red(62)	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
		Red(61)	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Red(31)	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Red(1)	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
		Red(0)	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
Green		Black	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Green(62)	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
		Green(61)	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Green(31)	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Green(1)	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1
		Green(0)	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
Blue		Black	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Blue(62)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
		Blue(61)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Blue(31)	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Blue(1)	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1
		Blue(0)	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

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9. QUALITY STANDARD FOR LCD

9.1 Objective

This specification book is the standard for LCD module general inspection. And also this book will be refer to customer approval specification.

9.2 Scope

This specification book is applicable to general LCD module. If supplier has any doubt or requirement, then it can be discussed.

9.2.1 Acceptable Quality Level

INSPECTION	SAMPLING PROCEDURES	A.Q.L
Major	MIL-STD-105E Inspection Level II Normal Inspection Single sample inspection	1
Minor	MIL-STD-105E Inspection Level II Normal Inspection Single sample inspection	1.5

Major defect :
A major defect is a defect that could result in failure or extremely reduction on the usability of the product for its intended purpose.
Minor defect :
A minor defect is one that does not materially reduce the usability of the product for its intended purple or is a departure from established standards giving no significant bearing on the effective use or operation of the unit.

9.2.2 Inspection Conditions

9.2.2.1 The environmental conditions for inspection shall be as follows

- Room Temperature : 25±10°C
- Humidity Temperature : 45±20%RH

9.2.3 The external visual inspection

- The inspection shall be performed by using 40Watts fluorescent lamp for illumination and the distance between LCD and eyes of the inspector shall be 30cm or more.

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9.2.4　　Inspection Item

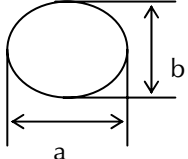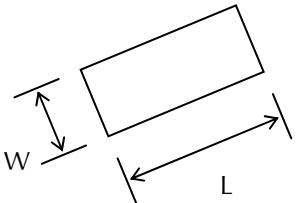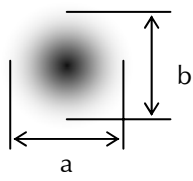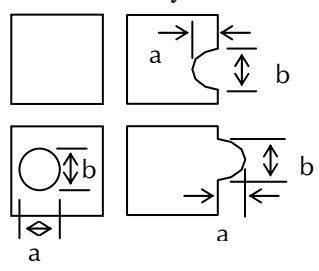| Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble	The color of a small area is different from the remainder. The phenomenon dose not change with voltage.
Contrast variation	The color of a small area is different from the remainder. The phenomenon change with voltage.
Glass defect	Glass crack, Chip
Operating	Function, Contrast, Uniformity, Components

9.2.5　　Definition of the Area
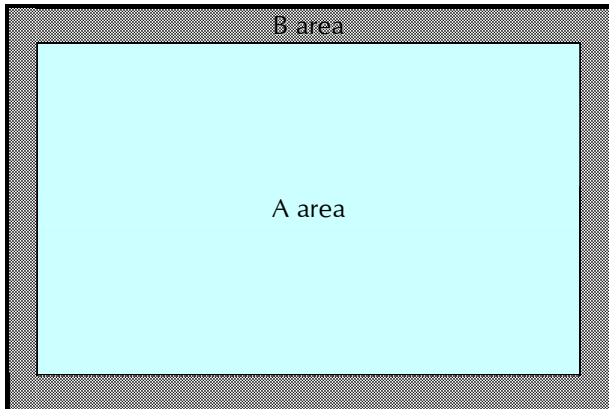
A area: Viewing Area
B area: Out of Viewing Area

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9.3   Inspection specification

9.3.1   Non-operating inspection specification

Class of defects	No.	Inspection Item	Criteria of defects		Acceptable Q'ty		
					Zone A		Zone B
Major	1	Circuits	1. Circuit short		0		0
			2. Circuit open				
Minor	2	Black spot, White spot, Bright spot, Foreign particle $\phi = (a+b)/2$	A	$\phi \leq 0.3$	Ignore		Ignore
			B	$0.3 < \phi \leq 0.4$	4		
			C	$0.4 < \phi \leq 0.5$	2		
			D	$0.5 < \phi$	0		
			Total defect point (B,C)		4		
			* Reject when 5 or more spots are gathered within 5mm circle.				
	3	Black line, White line	A	$W \leq 0.02$	-	*	Ignore
			B	$0.02 < W \leq 0.05$	$L \leq 5$	2	
			C	$0.05 < W \leq 0.1$	$L \leq 3$	2	
			D	$0.1 < W$	-	0	
			Total defect point (B,C)			3	
			* Reject when 5 or more spots are gathered within 5mm circle.				
	4	Contrast variation $\phi = (a+b)/2$	A	$\phi \leq 0.3$	Ignore		Ignore
			B	$0.3 < \phi \leq 0.4$	4		
			C	$0.4 < \phi \leq 0.5$	2		
			D	$0.5 < \phi$	0		
			Total defect point (B,C)		4		
	5	attern deformity $\phi = (a+b)/2$	1. Pin hole				Ignore
			A	$\phi \leq 0.15$	Ignore		
			B	$0.15 < \phi \leq 0.2$	2 (*)		
				$0.2 < \phi$	0		
			* Two pin hole shall not formed in the single dot				
			2. Excess, void				Ignore
			A	$a \leq 0.2$ & $b \leq 0.2$	Ignore		
			B	$0.2 < a$ or $0.2 < b$	0		
Minor	6	Dot defect	A	Bright dot	$N \leq 2$		Ignore
			B	Dark dot	$N \leq 3$		

			C	Total Bright & Dark Dots	N≦4	
			* This inspection item does not apply to B/W LCD			
	7	Bubble between Polarizer and panel	A	$\phi \leqq 0.3$	Ignore	Ignore
			B	$0.3 < \phi \leqq 0.5$	2	
			C	$0.5 < \phi$	0	
	8	Polarizer scratch and particle	Circular : Same as inspection item No.2			Ignore
			Linear : Same as inspection item No.3			
	9	Polarizer Dent	A	$\phi \leqq 0.2$	Ignore	Ignore
			B	$0.2 < \phi \leqq 0.3$	4	
			C	$0.3 < \phi \leqq 0.4$	2	
			D	$0.4 < \phi$	0	
			Total defect point (B,C)		3	
	10	Bubble in the Cell	Any size		0	0
	11	Dirt on polarizer	Dirt which can be wiped easily should be accepted.			
	12	Protection film	The protection film should not be stripped up to viewing area and the peeled off angle should not exceed 20 degrees.			
	13	Polarizer shift	1. Shifting in position should not exceed the glass outline dimension. 2. Incomplete covering of the viewing area due to shifting is not allowed. 3. Shifting in position should be within the tolerance (refer to module dimensional drawing)			
	14	Silicon	1. Silicon must cover all circuits. 2. Silicon thickness should be within specification (refer to module dimensional drawing)			
	15	Tape	1. Location: refer to specification. 2. Insufficient adhesive.			
Major	16	TCP, FPC defect	Film or Pattern should not have crack.			
	17	Components	Missing components not allowed.			

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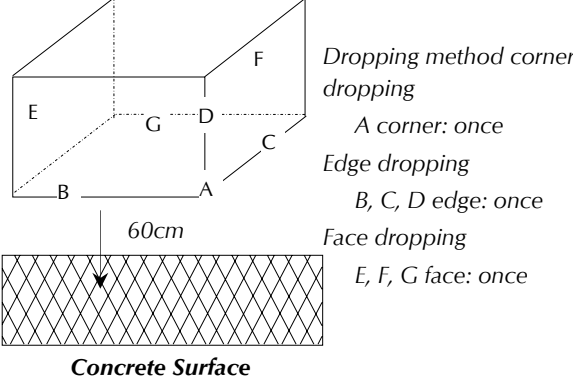
Class of defects	No.	Inspection Item	Criteria of defects
Major	1	No display	-
	2	Abnormal operation	-
	3	Contrast defect	Judge according to module specification. Establish boundary sample if required.
	4	Viewing angle defect	Judge according to module specification. Establish boundary sample if required.
	5	Excess power consumption	Judge according to module specification.
	6	Back-light, LED defect	1. No lit-on 2. Different color 3. Low brightness
	7	Speaker, Vibrator defect	1. No operation 2. Abnormal operation
Minor	8	Cross-talk defect	No noticeable crosstalk. Establish boundary sample if required.
	9	Uneven brightness	No noticeable unevenness allowed. Establish boundary sample if required.
	10	Uneven color	No noticeable unevenness allowed. Establish boundary sample if required.
	11	Spot, Pinhole, Foreign particle, Line	Same as in Chapter 7.1

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10. RELIABILITY CONDITION FOR LCD

10.1   LCM Reliability Test

No.	Parameter	Condition
1	High Temperature Operating	70°C±2°C, 240 hrs (Operation state)
2	Low Temperature Operating	-20°C±2°C, 240 hrs (Operation state)
3	High Temperature Storage	80°C±2°C, 240 hrs
4	Low Temperature Storage	-30°C±2°C, 240 hrs
5	Damp Proof Test	40°C±2°C, 90~95%, 96hrs
6	Vibration Test	Total fixed amplitude: 1.5mm Vibration Frequency: 10~55Hz One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.

7	Shock Test	To be measured after dropping from 60cm high on the concrete surface in packing state.
		
		Dropping method corner dropping
		    A corner: once
		Edge dropping
		    B, C, D edge: once
		Face dropping
		    E, F, G face: once

Notes: 1. No dew condensation to be observed.
   2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.
   3. Vibration test will be conducted to the product itself without putting I in a container.

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11. PRECAUTIONS

11.1 Operation

Burn-in sometimes happens when the same character was displayed at along time. Therefore, to prevent Burn-in, it is recommended to set up a Screen-saver function.

11.2 Safety

The liquid crystal in the LCD is poisonous, DO NOT put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.
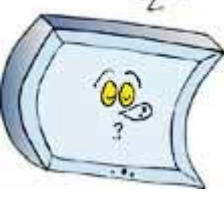
11.3 Handling

	a. The LCD module shall be installed flat, without twisting or bending. b. COF or FPC has narrow pattern width, so easily become open circuit by external force. DO NOT apply pressure to COF or FPC especially in bending area.
	c. To avoid damage in appearance or malfunction, DO NOT subject the module to mechanical shock or to excessive force on its surface.
	d. The polarizer attached to the display is very easy to be damaged, handle it with care to avoid scratching.
	e. To avoid contamination on the display surface, DO NOT touch the display surface with bare hands. f. Provide a space so that the LCD module does not come into contact with other components.

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	g. To protect the LCD panel from external pressure, put covering glass (acrylic board or similar board) to keep appropriate space between them.
	h. Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
	i. Property of semiconductor devices may be affected when they are exposed to light possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, your design and mounting layout done are so that the IC is not exposed to light in actual use.
	j. Strong light exposure causes degradation of color filter. It may not recover
	k. DO NOT contact with water to avoid Metal corrosion. l. When it is not in use, the screen must be turned off or the pattern must be frequently changed by a screen saver. If it displays the same pattern for a long period of time, brightness down/image sticking may develop due to the LCD structure.
	m. Never disassemble LCD product under any circumstances. If unqualified operators or users assemble the product after disassembling it, it may not function or its operation may be seriously affected.

11.4 Static electricity

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge.

	a. The LCD module shall be installed flat, without twisting or bending. Ground soldering iron tips, tools and testers when they operate. b. Ground your body when handling the products. c. DO NOT apply voltage to the input terminal without applying power supply. d. DO NOT apply voltage that exceeds the absolute maximum rating. e. Store the products in an anti-electrostatic container. f. Peel off protect tape, attached to polarizer, slowly to minimize ESD damage.

11.5 Storage

	Store the products in a dark place at +5 ~ +25 degree C, low humidity (50%RH or less). DO NOT store the products in an atmosphere containing organic solvents or corrosive gases.

11.6 Cleaning

	a. DO NOT wipe the polarizer with dry cloth, as it might cause scratch. b. Wipe the polarizer with a soft cloth soaked with petroleum IPA, other chemical might damage.

11.7 Waste

	When dispose of LCD module, manage it at the production waste according to the relevant laws and regulations.

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12. WARRANTY

This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

1   We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.

2   We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.

3   We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.

4   We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product. Microtips-origin longer than one year from Microtips production.
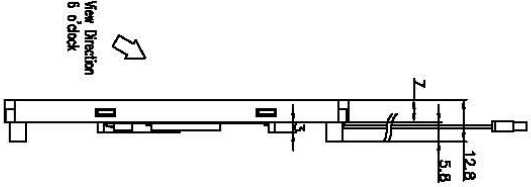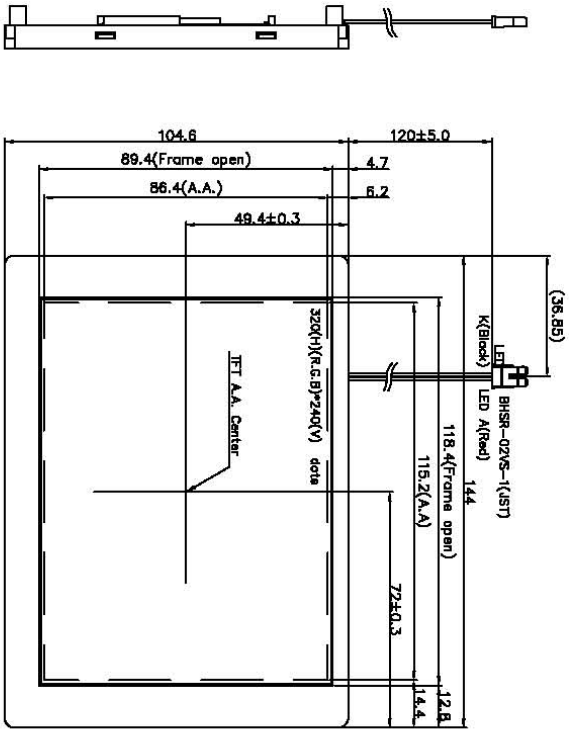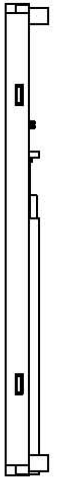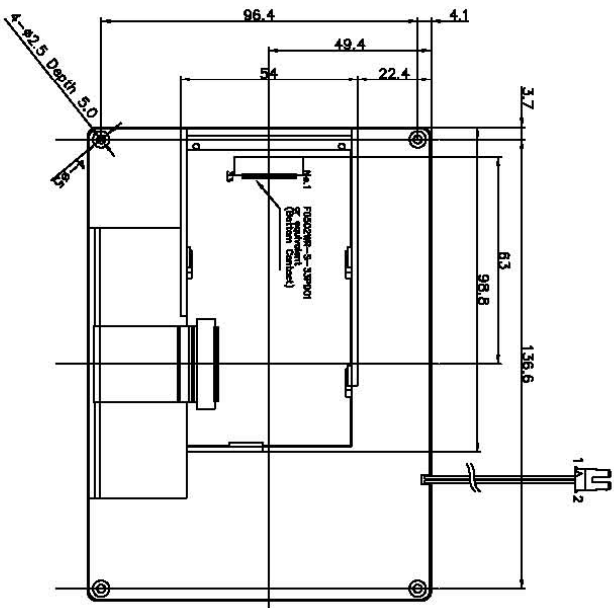
13. DIMENSIONAL OUTLINES

See next page.

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Note:
1. Operating Temperature:-20℃ to 70℃
2. Storage Temperature:-30℃ to 80℃
3. LCD Backlight : 30 chip-white LED
4. No specified TOl.=±0.3
5. Brightness : 500 cd/m²(Min)
6. Uniformity : 75%

7. Electrical Circuit of Backlight:

300mA, 6.6V(TYP)

PIN ASSIGNMENT:

1.DGND	11.R5	21.B1
2.DCLK	12.GND	22.B2
3.HSYNC	13.G0	23.B3
4.VSYNC	14.G1	24.B4
5.GND	15.G2	25.B5
6.R0	16.G3	26.GND
7.R1	17.G4	27.DEN
8.R2	18.G5	28.VDD
9.R3	19.GND	29.VDD
10.R4	20.B0	30.LRC
		31.UDC
		32.NC
		33.GND

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NO.	PART NAME	DRAWN	CHECK	APP'D	Q'TY	
	M-TQ57SN721-AV					

MT-RD
Carol
06/28/07

UNIT: MM
DATE: 06/28/07'
SCALE: 1/1
MATERIAL: FINISH

UNLESS OTHERWISE SPECIFIED
TOLERANCE ON
FRACTIONS DECIMALS ANGLES
0.10   0.5°

DWG FOR MODULE: MT-TQ57SN721-AV
FILE: DWG\Design\LCM\WITH\MT-TQ57SN721-AV\2D
DWG NO.: FTQ57SN7210-AV
SHEET 1 / 1   Rev: X

REV. | DESCRIPTION | DRAWN | CHECK | APP'D | DATE

Mouser Electronics

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