MIDAS Displays
design • manufacture • supply

Electra House, 32 Southtown Road
Great Yarmouth, Norfolk
NR31 0DU, England

Telephone +44 (0)1493 602602
Fax +44 (0)1493 665111
Email:sales@midasdisplays.com
www.midasdisplays.com

MDT0144ASS-MULTI	128 x 128	MULTI Interface	TFT Module
MCT0144C6W128128PML	**Specification**		
Version: 1	**Date: 18/11/2015**		
Revision			
1	17/11/2015	First issue	

Display Features		
Display Size	1.44"	
Resolution	128 x 128	
Orientation	Portrait	
Appearance	RGB	
Logic Voltage	3.3V	
Interface	MULTI	
Brightness	70 cd/m^2	
Touchscreen	---	
Module Size	32.86 x 38.00 x 2.60mm	
Operating Temperature	-20°C ~ +70°C	
Pinout	30 way FFC	Box Quantity / Weight / Display
Pitch	0.5mm	--- / ---

RoHS compliant

* - For full design functionality, please use this specification in conjunction with the ST7735S specification.(Provided Separately)

Display Accessories	
Part Number	**Description**
MPBV7	Interconnect board that converts a 30-way FFC to 30 crimp-wire connector.
MCIB-12	Uno32 Break-out Board with SD Card and LED Backlight Driver. The MCIB-12 Board can be used for any display with a 4 bit, 8 bit, I2C or SPI interface.

Optional Variants	
Appearances	**Voltage**

General Description

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous sili con TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 1.44'TFT-LCD contains 128x128 pixels, and can display up to 65K colors.

* Features

-Low Input Voltage: 3.3V(TYP)

-Display Colors of TFT LCD: 65K colors

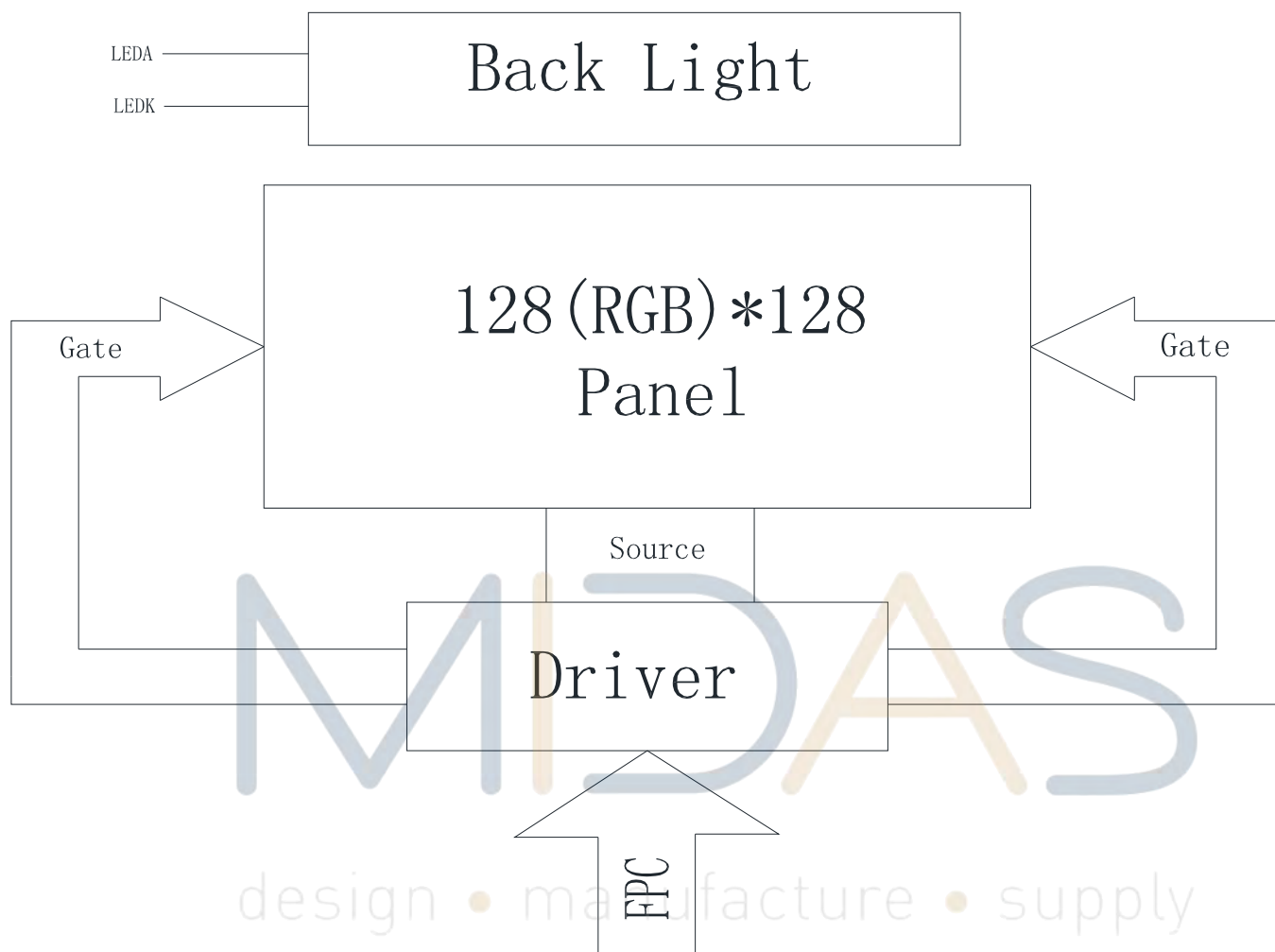-RGB Interface: - 8/16-BIT 8080 MCU interface

　　　　　　　 - 3/4-line SPI

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	25.50(H)*26.50(V)　(1.44inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K	colors	-
Number of pixels	128(RGB)*128	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.1992(H)*0.207(V)	mm	-
Viewing angle	6:00	o'clock	-
TFT Driver IC	ST7735S	-	-
Display mode	Transmissive/ Normally white	-	-
Operating temperature	-20～+70	℃	-
Storage temperature	-30～+80	℃	-

* Mechanical Information

	Item	Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		32.36		mm	-
	Vertical(V)		38.00		mm	-
	Depth(D)		2.60		mm	-
Weight			TBD		g	-

Block Diagram

LEDA

LEDK

Back Light

Gate

128(RGB)*128
Panel

Gate

Source

Driver

FPC

Outline dimension

Pin Assignment Table

NO.	PIN NAME
1	GND
2	VCC
3	IOVCC
4	IM0
5	IM2
6	SPI4W
7	DB15
8	DB14
9	DB13
10	DB12
11	DB11
12	DB10
13	DB09
14	DB08
15	DB07
16	DB06
17	DB05
18	DB04
19	DB03
20	DB02
21	DB01
22	DB0(SPI-SDA)
23	RD
24	RS(SPI-SCL)
25	RESET
26	CS
27	WR(SPI-RS)
28	LEDK
29	LEDA
30	GND

Interface Type Table

SPI4W	IM2	IM0	Interface type	DB Pin in use
0	1	0	DBI Typ_ 8-bit interface	DB7-DB0
0	1	1	DBI Typ_ 16-bit interface	DB15-DB0
0	0	0	3-Wire 9 BIT data serial interface	SDA SCL CS
1	0	0	4-Wire 8 BIT data serial interface	SDA SCL CS RS

NOTE:
1. If not use PIN, fix to the GND , IOVCC or NC.

MIDAS
design • manufacture • supply

DRAWING NAME		
PARTS NO.		
TOLERANCE(公差)		Unit mm
TOLERANCE UNLESS OTHERWISE SPECIFIED	X.X±0.3 X.XX±0.2	Drawn / Checked / Approve
Scale 1:1		Page 1/1

ReV	Revision content description	Date
V0	FIRST	2015/07/14

NOTES:
1. DISPLAY TYPE: 1.44" TFT-LCD
2. DISPLAY MODE: T/N NORMALLY WHITE
3. VIEWING DIRECTION: 6:00
4. DRIVER IC: ST7735S (COG)
5. VCI: 2.8-3.3V(TYP),IOVCC=1.8V-3.3V VCL: 2.8-3.3V(TYP)
6. OPERATING TEMP: -20°C TO 70°C STORAGE TEMP: -30°C TO 80°C
7. BACK LIGHT: LED WHITE, 1 LED, 15-20mA, 3.2±0.3V
8. RoHS COMPLIANT.

Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground.	P
2	VCC	Supply voltage (3.3V).	P
3	IOVCC	Supply voltage for I/O.(1.8V-3V)	P
4	IM0	IM0='0', MCU 8-bit parallel. IM0='1', MCU 16-bit parallel.	I
5	IM2	MCU parallel interface and serial interface select. IM2='1', Parallel Interface. IM2='0', Serial Interface.	I
6	SPI4W	- SPI4W='0', 3-line SPI Enable. - SPI4W='1', 4-line SPI Enable. -If not used, Fix this pin to DGND.	I
7	DB15		I/O
8	DB14		I/O
9	DB13		I/O
10	DB12		I/O
11	DB11		I/O
12	DB10		I/O
13	DB09	- DB[15:0] are used as MCU parallel interface data bus..	I/O
14	DB08	- DB0 is the serial input/output signal in serial	I/O
15	DB07	interface mode.	I/O
16	DB06	- In serial interface, DB[15:1] are not used and	I/O
17	DB05	should be fixed at GND.	I/O
18	DB04		I/O
19	DB03		I/O
20	DB02		I/O
21	DB01		I/O
22	DB0(SPI-SDA)		I/O

23	RD	Read Enable in 8080 MCU Parallel Interface.	I
24	RS(SPI-SCL)	-Display data/command selection pin in MCU Interface. -RS='1': Display data or parameter. -RS='0': Command data. -In serial interface, this is used as SCL. -If not used, please fix this pin at IOVCC or GND level.	I
25	RESET	This signal will reset the device and must be applied to properly initialize the chip.	I
26	CS	Chip Selection Pin -Low Enable.	I
27	WR(SPI-RS)	-Write enable in MCU parallel interface. -In 4-line SPI, this pin is used as RS (data/command selection). -If not used, please fix this pin at IOVCC or GND.	I
28	LEDK	Cathode pin of backlight.	P
29	LEDA	Anode pin of backlight.	P
30	GND	Ground.	P

LCD Optical Characteristics

Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Transmittance (with Polarizer)		T(%)	--	--	5	--		
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	500	700			
Response time	Rising	T_R		--	5	10	msec	
	Falling	T_F		--	15	25		
Color gamut		S(%)		--	40	--	%	
Color Filter Chromacicity	White	W_X		0.285	0.305	0.325		
		W_Y		0.314	0.334	0.354		
	Red	R_X		0.588	0.608	0.628		
		R_Y		0.296	0.316	0.336		
	Green	G_X		0.285	0.305	0.325		
		G_Y		0.536	0.556	0.576		
	Blue	B_X		0.115	0.135	0.155		
		B_Y		0.117	0.137	0.157		
Viewing angle	Hor.	Θ_L	CR>10	--	60	--		
		Θ_R		--	60	--		
	Ver.	Θ_U		--	30	--		
		Θ_D		--	60	--		
Option View Direction			6 O'clock					

Measuring Condition

■ Measuring surrounding：dark room

■ Ambient temperature：25±2℃

■ 15min. warm-up time.

Measuring Equipment

Note (1) Definition of Viewing Angle :

12' o'clock
$\Phi=90°$

$\Phi=180°$

$\Phi=0°$

6' o'clock
$\Phi=270°$
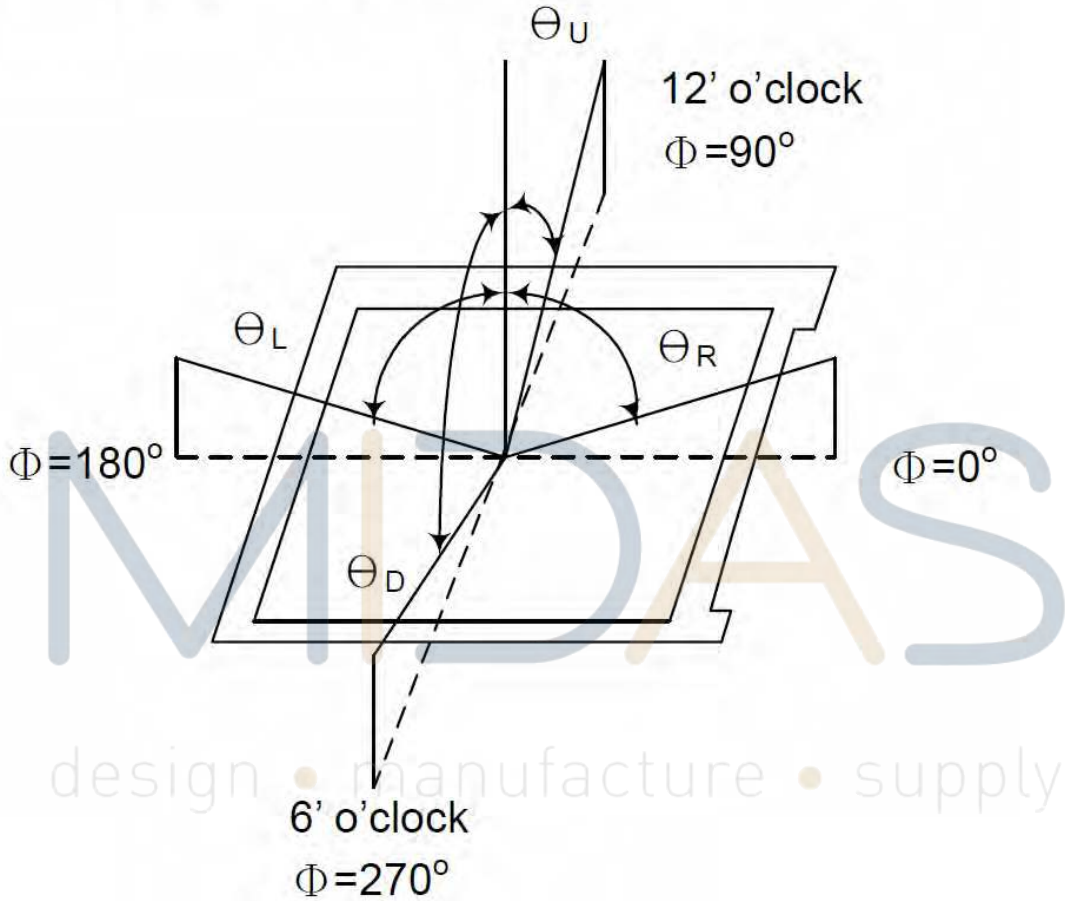
Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time : Sum of T_R and T_F

Optical response
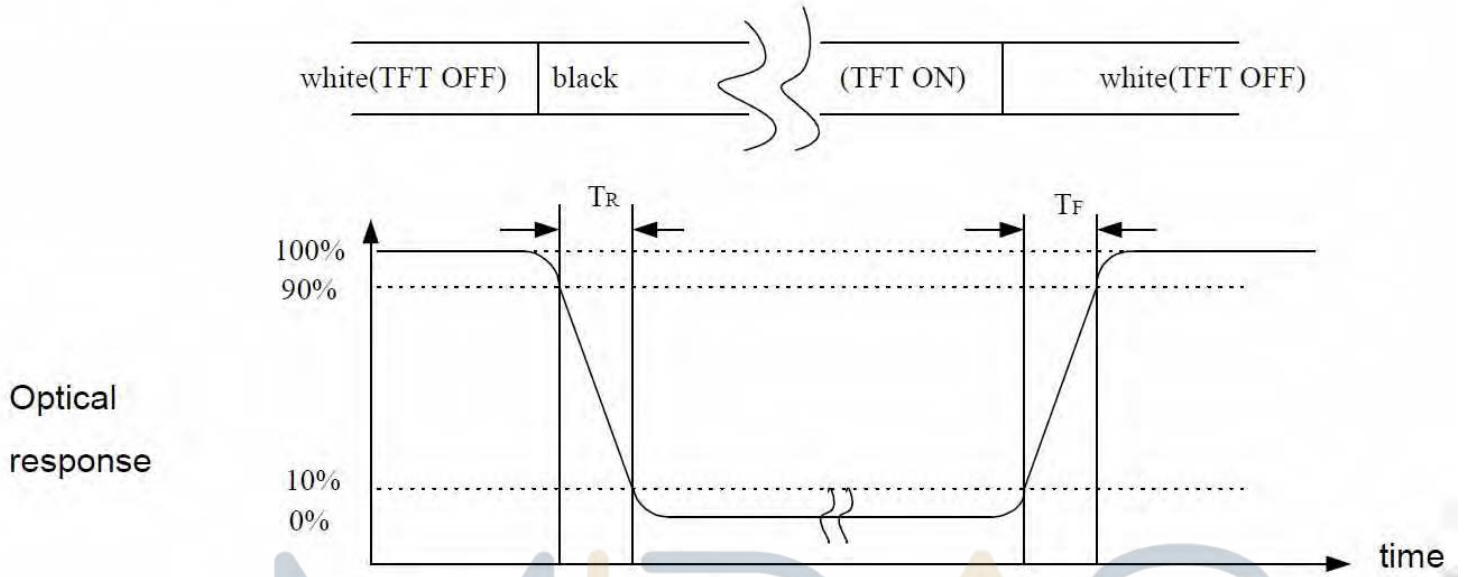
Note (4) Definition of optical measurement setup
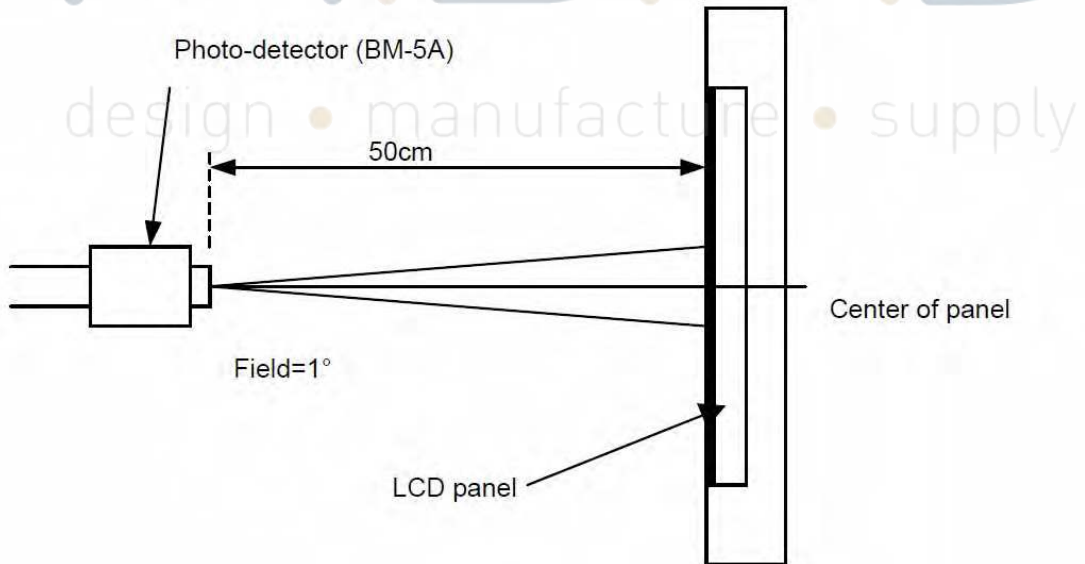
Note(5) Rubbing Direction

Viewing angle 12 o'clock

TFT

45° 45°

CF
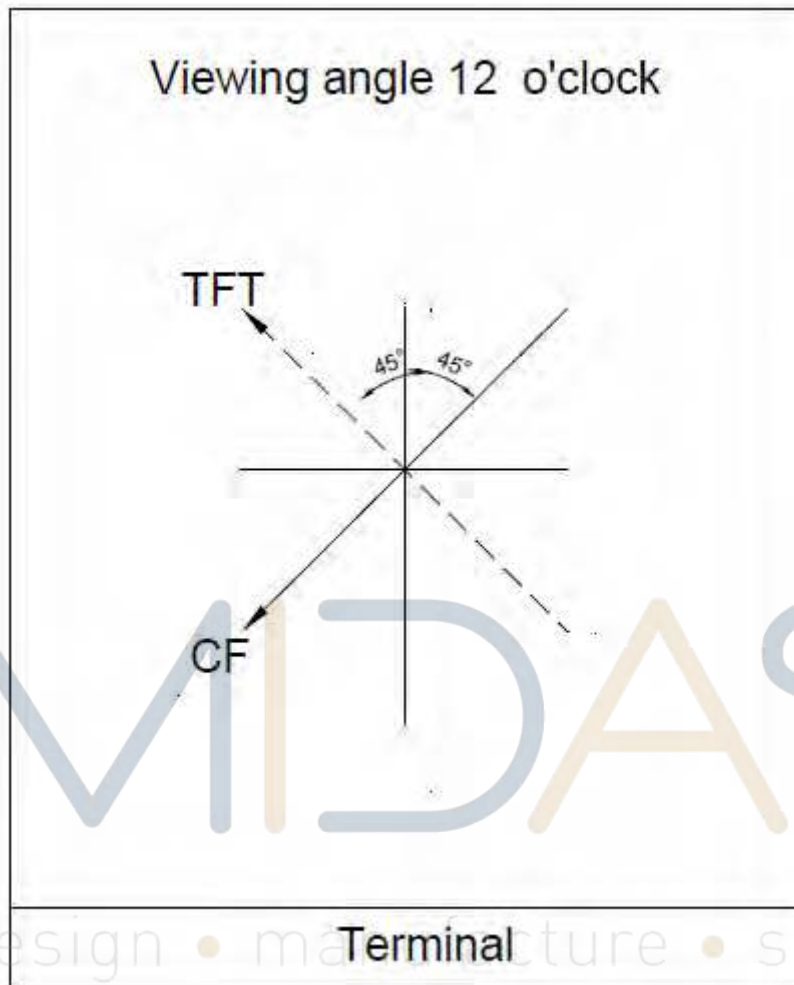
Terminal

Viewing From CF Glass Side

Electrical Characteristics

Absolute Maximum Rating (Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.8	**V**
Digital interface supple Voltage	VDDIO	-0.3	4.6	**V**
Operating temperature	T_{OP}	-20	+70	℃
Storage temperature	T_{ST}	-30	+80	℃

DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	2.4	3.3	4.8	V	
Digital interface supple Voltage	VDDIO	1.65	3.3	4.8	V	
Normal mode Current consumption	IDD	--	1.2	--	mA	
Level input voltage	V_{IH}	0.7VDDIO		VDDIO	V	
	V_{IL}	GND		0.3VDDIO	V	
Level output voltage	V_{OH}	0.8VDDIO		VDDIO	V	
	V_{OL}	GND		0.2VDDIO	V	

LED Backlight Characteristics

The back-light system is edge-lighting type with 2 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	15	20	--	mA	
Forward Voltage	V_F	--	3.2	--	V	
LCM Luminance	L_V	70	--	--	cd/m2	If=20mA

LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	

Note (1)　LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

Ta=25±3　℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2)　The "LED life time" is defined as the module brightness decrease to 50% original brightness at

Ta=25℃　and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The

constant current driving method is suggested.
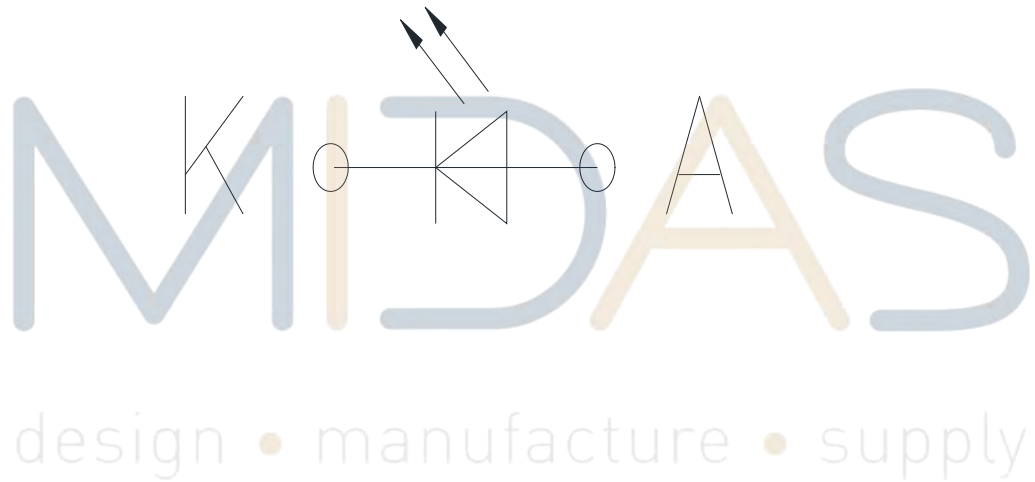
AC Characteristic

8080 Series MCU Parallel Interface Timing Characteristics: 16/8-bit Bus
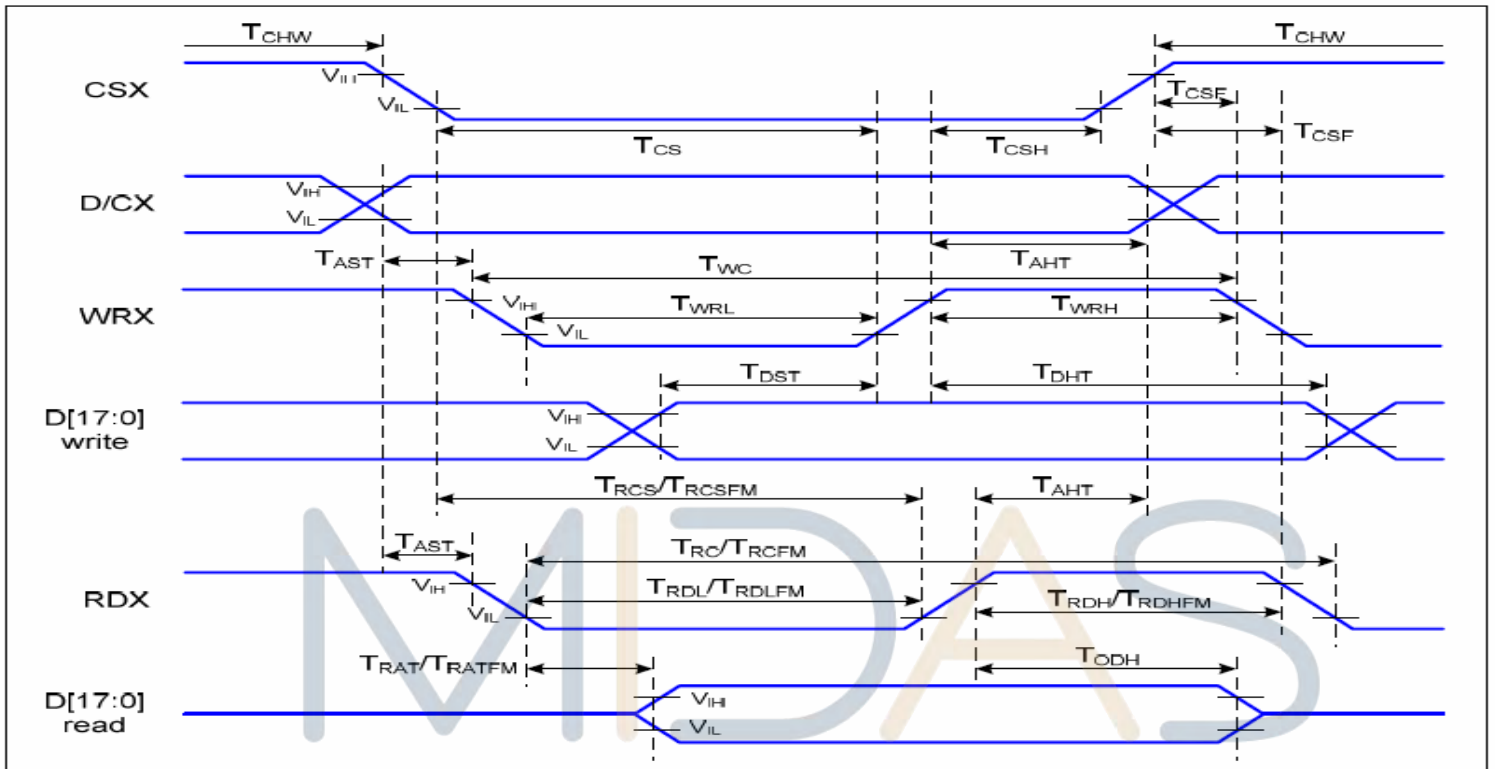
Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	TAST	Address Setup Ttime	0		ns	-
	TAHT	Address Hold Time (Write/Read)	10		ns	
CSX	TCHW	Chip Select "H" Pulse Width	0		ns	-
	TCS	Chip Select Setup Time (Write)	15		ns	
	TRCS	Chip Select Setup Time (Read ID)	45		ns	
	TRCSFM	Chip Select Setup time (Read FM)	355		ns	
	TCSF	Chip Select Wait Time (Write/Read)	10		ns	
	TCSH	Chip Select Hold Time	10		ns	
WRX	TWC	Write Cycle	66		ns	
	TWRH	Control Pulse "H" Duration	15		ns	
	TWRL	Control Pulse "L" Duration	15		ns	
RDX (ID)	TRC	Read Cycle (ID)	160		ns	When Read ID Data
	TRDH	Control Pulse "H" Duration (ID)	90		ns	
	TRDL	Control Pulse "L" Duration (ID)	45		ns	

Serial Interface Characteristics (3-line Serial)
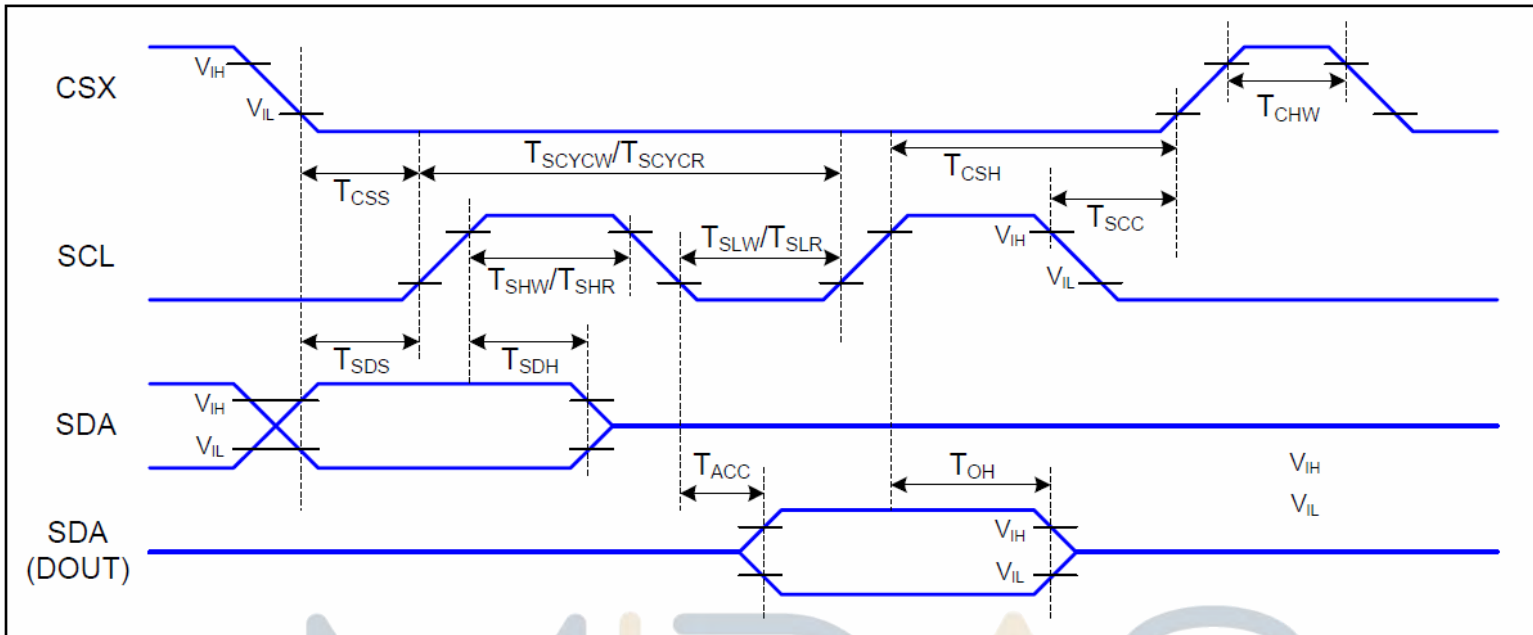
Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	15		ns	
	TCSH	Chip Select Hold Time (Write)	15		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" pulse width	40		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	66		ns	
	TSHW	SCL "H" Pulse Width (Write)	15		ns	
	TSLW	SCL "L" Pulse Width (Write)	15		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

Serial Interface Characteristics (4-line Serial)
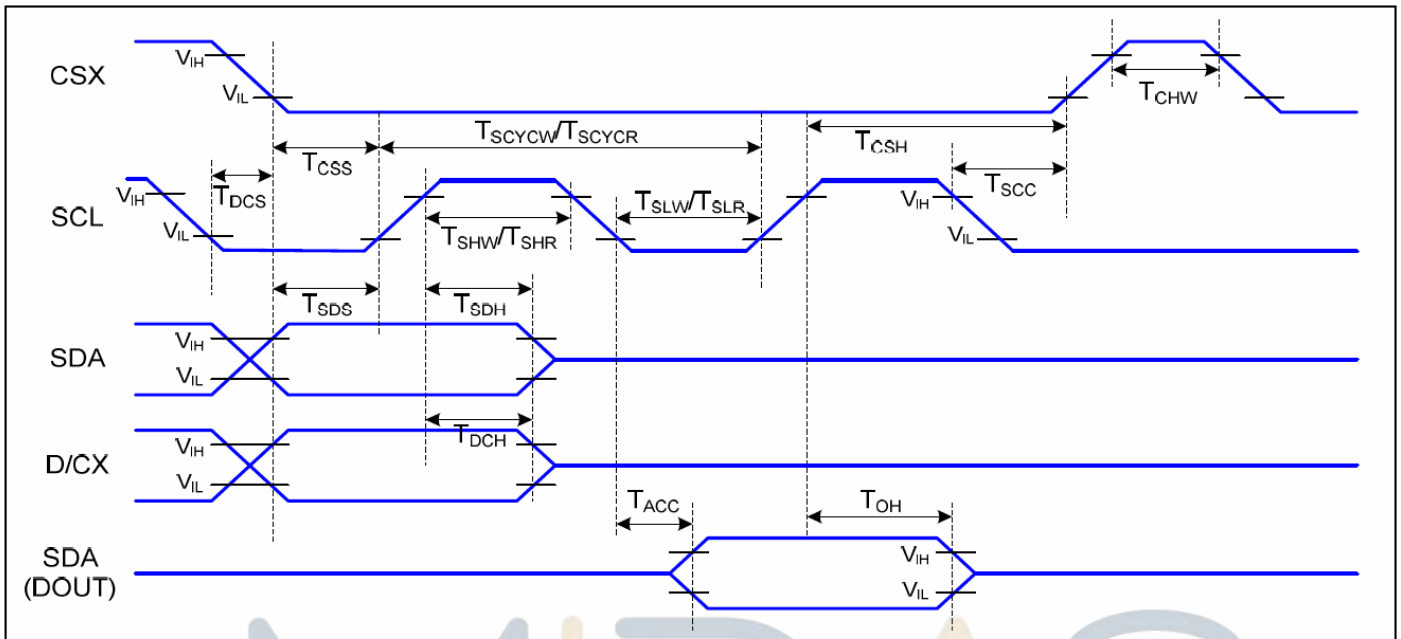
Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	45		ns	
	TCSH	Chip Select Hold Time (Write)	45		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" Pulse Width	40		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	66		ns	-Write Command & Data Ram
	TSHW	SCL "H" Pulse Width (Write)	15		ns	
	TSLW	SCL "L" Pulse Width (Write)	15		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	-Read Command & Data Ram
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
D/CX	TDCS	D/CX Setup Time	10		ns	
	TDCH	D/CX Hold Time	10		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

Reset Timing Characteristics
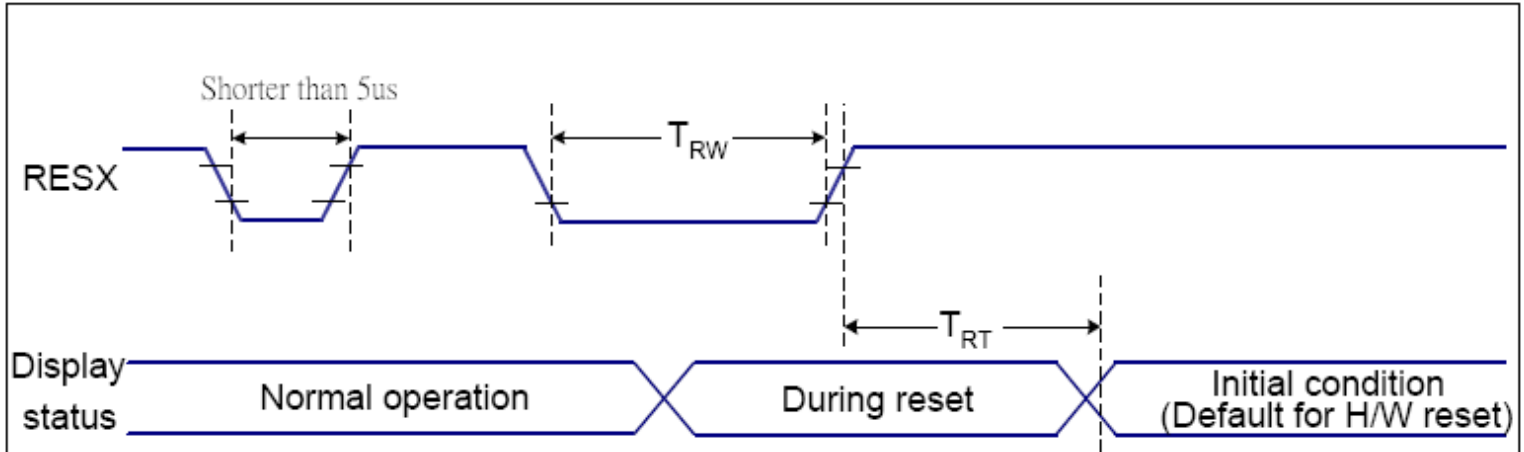
VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:

10µs

Reset is accepted

10µs

20ns — Less than 20ns width positive spike will be rejected.
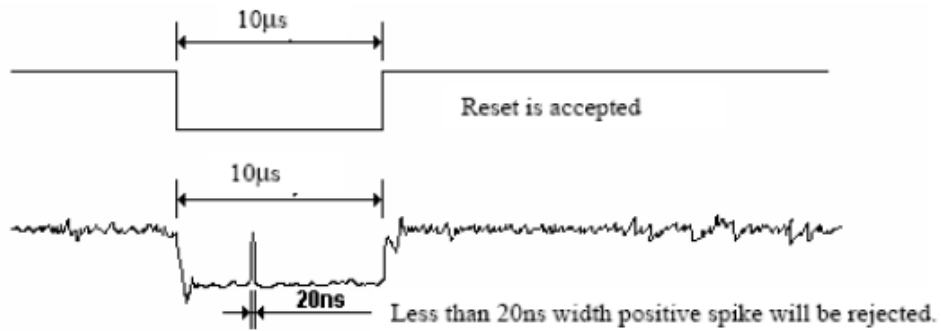
5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

LCD Module Out-Going Quality Level

VISUAL & FUNCTION INSPECTION STANDARD

Inspection conditions

Inspection performed under the following conditions is recommended.

        Temperature : 25±5℃

        Humidity :   65%±10%RH

        Viewing Angle : Normal viewing Angle.

        Illumination: Single fluorescent lamp (300 to 700Lux)

        Viewing distance:30-50cm
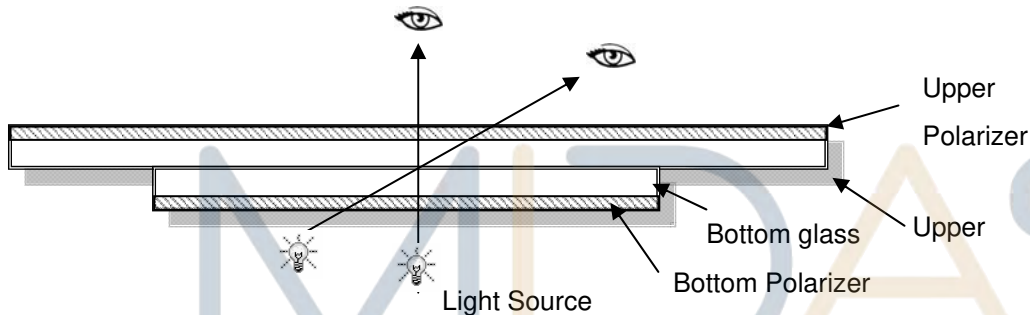
Definition
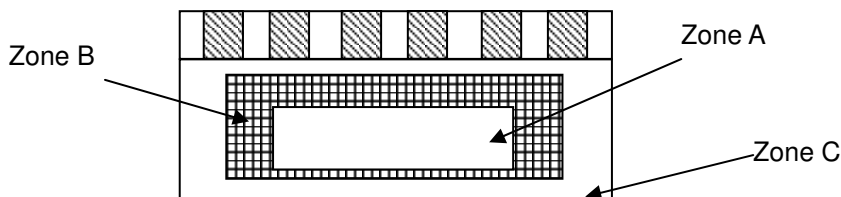
Zone A : Effective Viewing   Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

 As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function

 or appearance after assembly by customer.

Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

Major defect	Minor defect
0.65	1.5
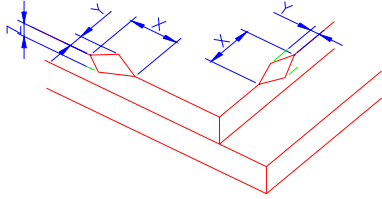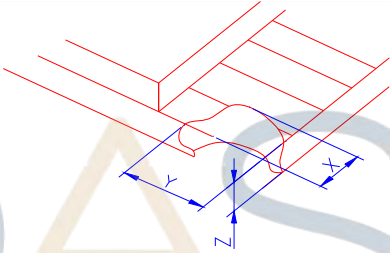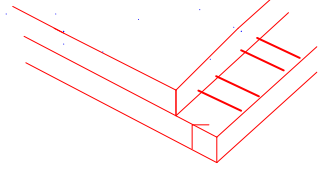
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	
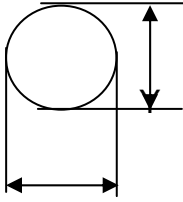
Criteria (Visual)
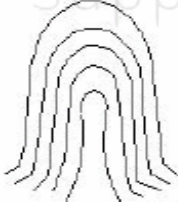
Number	Items	Criteria(mm)		
1.0 LCD Crack/Broken	(1) The edge of LCD broken			
		X	Y	Z
NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD		≤3.0mm	<Inner border line of the seal	≤T
	(2)LCD corner broken			
		X	Y	Z
		≤3.0mm	≤L	≤T
	(3) LCD crack	Crack Not allowed		

Number	Items	Criteria (mm)
2.0	Spot defect	① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）

Spot defect diagram:

X

$\Phi=(X+Y)/2$

① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）

Zone / Size (mm)	Accep able Qty		
	A	B	C
Φ≤0.10	Ignore		Ignor
0.10<Φ≤0.20	3(distance≧10mm)		
0.20<Φ≤0.25	2		
Φ > 0.25	0		

②Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		Ignore
0.10<Φ≤0.20	3(distance≧10mm)		
0.20<Φ≤0.30	2		
Φ > 0.30	0		

③ Polarizer accidented spot

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.3<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

Line defect (LCD/TP /Polarizer black/white line, scratch, stain)

Width(mm)	Length(mm	Acceptable Qty		
		A	B	C
Φ≤0.03	Igno e	Ignore		Ignore
0.03<W≤0.05	L≤3.0	N≤2		
0.05<W≤0.08	L≤2.0	N≤2		
0.08<W	Define as spot defect			

3.0	Polarizer Bubble			

<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.2<Φ≤0.4</td><td colspan="2">3(distance≧10 m)</td></tr>
<tr><td>0.4<Φ≤0.6</td><td colspan="2">2</td></tr>
<tr><td>0.6<Φ</td><td colspan="2">0</td></tr>
</table>

4.0	SMT	According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.

5.0	TP Related		

TP bubble/ accidented spot

<table>
<tr><th rowspan="2">Size Φ(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.25</td><td colspan="2">3 （distance≧</td></tr>
<tr><td>0.25<Φ≤0.3</td><td colspan="2">2</td></tr>
<tr><td>0.3<Φ</td><td colspan="2">0</td></tr>
</table>

Assembly deflection

beyond the edge of backlight ≤0.15mm

Newton Ring

Newton Ring area>1/3 TP area NG

Newton Ring area≤1/3 TP area OK

2.非規律生

1.規律性

				 似牛顿环
		TP corner broken X：length Y：width Z：height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z<LCD thicknes</td></tr></table> * Circuitry broken is not allowed.	
		TP edge broken X：length Y：width Z：height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z<LCD thicknes</td></tr></table> * Circuitry broken is not allowed.	
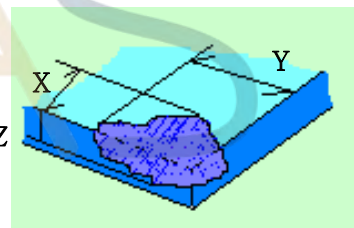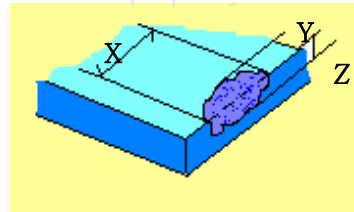
Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

Low Temperature Operating Life test	-20℃, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	70℃90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-20℃ ↔ 70℃, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	80℃, 96HR	3ea	pass	-
Low Temperature Storage test	－ 30℃, 96HR	3ea	pass	-
ESD test	150pF, 330Ω , ±6KV(Contact)/± 8KV(Air), 5 points/panel, 10 times/point	3ea	pass	
Thermal Shock Resistance	The sample should be allowed to stand the following 5 cycles of operation: TSTL for 30 minutes -> normal temperature for 5 minutes -> TSTH for 30 minutes -> normal temperature for 5 minutes, as one cycle, then taking it out and drying it at normal temperature, and allowing it stand for 24 hours	3ea	pass	
Box Drop Test	1 Corner 3 Edges 6 faces, 66㎝(MEDIUM BOX)	1box	pass	-

Note (1) ON Time over 10 seconds, OFF Time under 10 seconds

Cautions and Handling Precautions

Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the "Power ON" condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence &6.2 Power Off Sequence

Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.