Microtips

T E C H N O L O G Y

Model No: WT ÙPË Í JÎ T ÖËH VÁÇÙÒXÖD

Approved By

Tel: 1 (888) 499-8477

Fax: (407) 273-0771

E-mail: mtusainfo@microtipsusa.com

Web: www.microtipsusa.com

Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-8596MD-T (UFSH-K106EY-FT) Version No. 0	7.0" TFT.(backlight luminance 300cd/㎡)	Y.D. Shie Zi Xin Ou 25-May-2011
1	UMSH-8596MD-1T (UFSH-K106EY-FT) Version No. 0	Modify the backlight luminance from 300cd/㎡ to 500cd/㎡.	Y.D. Shie Danny Jhuang 11-Aug-2014
2	UMSH-8596MD-34T Version No. 0	1.Add the touch panel IC to ST1633i. 2.Modify the module number from UMSH-8596MD-1T to UMSH-8596MD-34T.	H.F. Kuo Zi Xin Ou 30-Apr-2015
3	UMSH-8596MD-34T(REVD) Version No. 0	1. Change the TFT panel and backlight. 2. Modify the module number from UMSH-8596MD-34T to UMSH-8596MD-34T(REVD).	H.F. Kuo Zi Xin Ou 11-Dec-2015

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

Items	Nominal Dimension	Unit
Active screen size	7.0" Diagonal	-
Dot Matrix	800 x RGB x 480	Pixel
Module Size (W x H x T)	165.0 x 106.4 x 8.2	mm.
Active Area (W x H)	152.4 x 91.44	mm.
Pixel Size (W×H)	0.1905 x 0.1905	mm.
Color depth	262K	color
Interface	Parallel 18-bit RGB	-
Driving IC Package	COG	-
Module weight	195±10%	g

1.2 Display specification

Display	Descriptions	Note
LCD Type	a-Si TFT	-
LCD Mode	TN / Normal white	-
Polarizer Mode	Transmissive	-
Polarizer Surface	Normal	-
Pixel arrangement	RGB-stripe	-
Backlight Type	LED	-
Viewing Direction(Gray inversion)	6 O'clock Direction	1

Color tone is slightly changed by temperature and driving voltage.

Note 1 : The viewing direction defined in this specification is according to the rubbing direction of
its TFT surface treatment by the TFT glass manufacturer. The grayscale inversion is at this
direction as well. However, the optimal viewing direction for human view is normally where
the color does NOT change to grayscale inversion, and this would be the opposite site of
the specified viewing direction in this specification. In any case we advise customers to
judge by themselves, and be aware of this phenomenon.

1.3 Outline dimension

DETAIL A

DOTS DETAIL
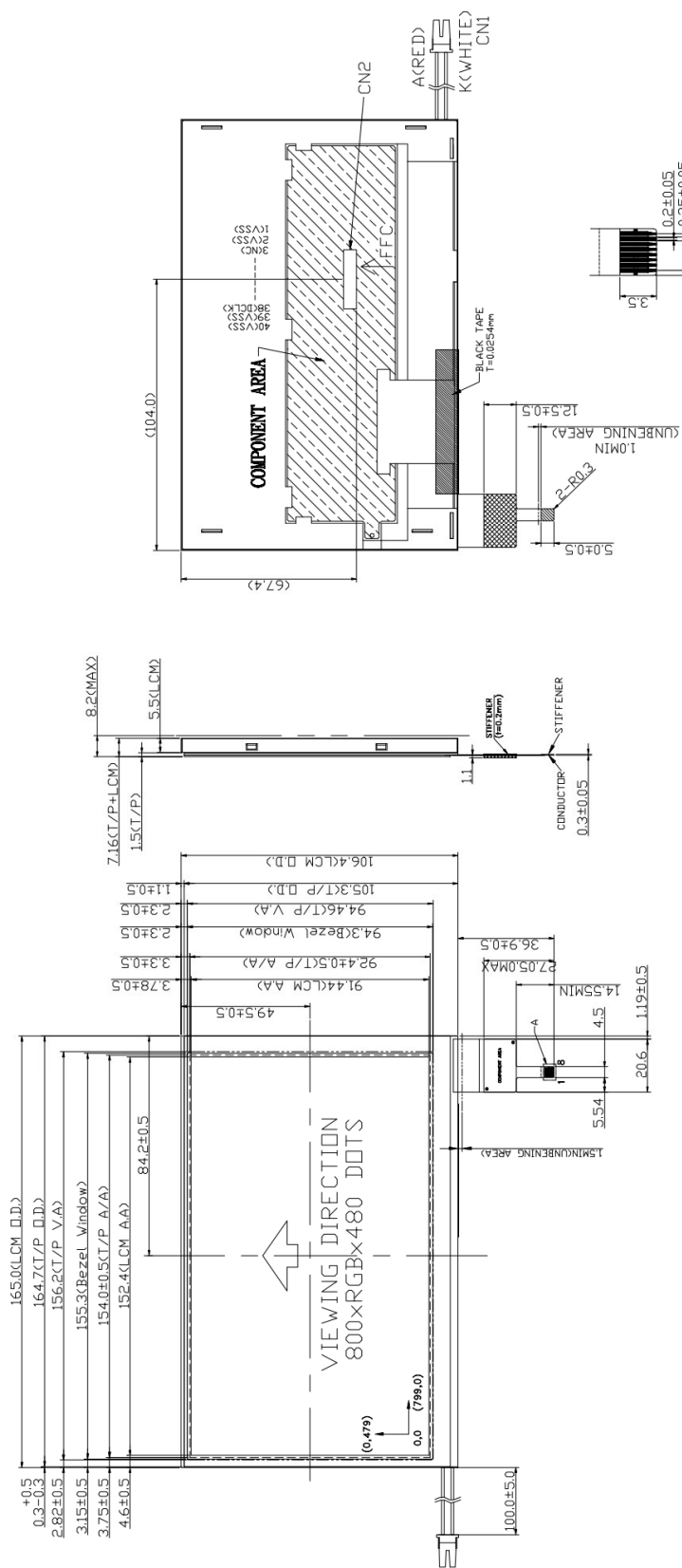
Touch panel

PIN No.	PIN Name
1	VDD
2	GND
3	GND
4	RST
5	INT
6	SCL
7	GND
8	SDA

VIEWING DIRECTION
800×RGB×480 DOTS

NOTE :
1. LCD : TFT TRANSMISSIVE TYPE , NORMAL WHITE
2. VIEWING DIRECTION : 6 O'CLOCK(GARYSCALE INVERSION)
3. Top : -20~70°C ,Tst : -30~80°C
4. LED COLOR : WHITE , 27 PCS DICE
   CONSTANT CURRENT : 210mA ; Vled=9.9V(TYP)
5. GENERAL TOLERANCE:±0.3
6. CN1:BHSR-02VS-1(JST) OR EQUIVALENT
7. CN2:IMSA-9681S-40Y901(IRISO) OR EQUIVALENT
8. PROJECTIVE CAPACITIVE TYPE TOUCH PANNEL
9. THE MINIMUM BENDABLE RADIUS(INNER) OF THE FPC IS 1.0 mm
10. T/P INTERFACE: I2C; IC : ST1633; FIVE POINT TOUCH
    THE METAL FRAME OF LCM DO NOT NEED COMMON-GROUNDED
11. COMPONENT AREA CAN NOT BENDING.

1.4 Block diagram:
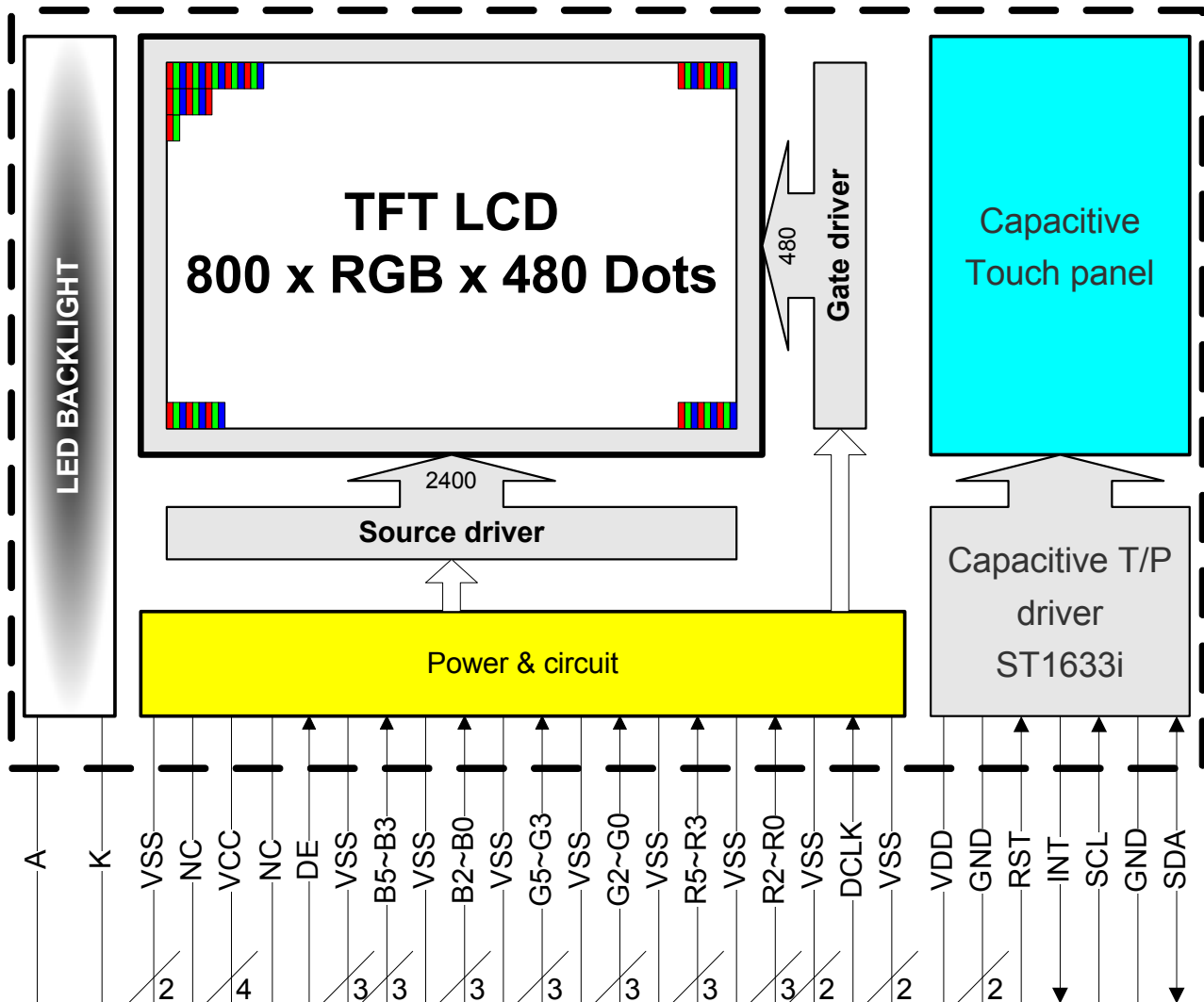
1.5 Interface Pin Connection:

Pin No.	Pin Symbol	I/O	Description
1~2	VSS	P	GND
3	NC	-	No connection
4~7	VCC	P	Power supply for Module (+3.3V)
8	NC	-	No connection
9	DE	I	Data enable
10~12	VSS	P	GND
13~15	B5~B3	I	Blue data input
16	VSS	P	GND
17~19	B2~B0	I	Blue data input
20	VSS	P	GND
21~23	G5~G3	I	Green data input
24	VSS	P	GND
25~27	G2~G0	I	Green data input
28	VSS	P	GND
29~31	R5~R3	I	Red data input
32	VSS	P	GND
33~35	R2~R0	I	Red data input
36~37	VSS	P	GND
38	DCLK	I	Dot clock
39~40	VSS	P	GND

B/L interface pin :

Pin No.	Pin Symbol	I/O	Description
1	A	P	Power supply for LED+
2	K	P	Power supply for LED-

Capacitive touch panel (I2C) Interface:

Pin No.	Pin Symbol	I/O	Description
1	VDD	P	Power supply. (+3.3V)
2~3	GND	P	Ground.
4	RST	I	System reset signal input, active low. Note (1)
5	INT	O	Active low when data output from touch panel.
6	SCL	I	Serial Clock.
7	GND	P	Ground.
8	SDA	I/O	Serial data access.

Note(1): Power On/Off Sequence.
Reset pin should be held low before power on and power off. During power on, after VDD reach normal voltage, Reset pin needs to be held low for 5ms to ensure internal block stable.

Figure - Power On/Off Sequence

Note(2): SDA / SCL pins must connect to 4.7Kohm(Pull-up resistor) at host

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Power supply voltage	VCC	-0.3	7.0	V
	VDD	-0.3	6.0	V
Input voltage	Vin	-0.3	VCC+0.3	V
Operate temperature range	Top	-20	70	℃
Storage temperature range	TST	-30	80	℃

2.2 DC Characteristics

$T_a = 25°C$

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage	VCC	-	3.3	-	V	-
	VDD	-	3.3	-	V	-
Input Voltage (LCM)	V_{IL}	0	-	0.3VCC	V	L level
	V_{IH}	0.7VCC	-	VCC	V	H level
Input Voltage (CTP)	V_{IL}	-	-	0.15VDD	V	L level
	V_{IH}	0.85VDD	-	-	V	H level
Current consumption	I_{VCC}	-	160	250	mA	Note 1
	I_{VDD}	-	14	28	mA	-

*Note1 :

Measuring Condition:

Standard Value MAX.

$Ta = 25°C$

VCC -GND = 3.3V

Display Pattern

0 gray black pattern

2.3 Back-light only Specification :

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	210	-	mA	Ta=25℃	-
Supply Voltage	Vf	-	9.9	-	V	Ta=25℃	-
Half-Life Time	Lf	-	50000	-	hrs	Ta=25℃	1

Note 1：The " Half-Life Time" is defined as the LED chip brightness decreases to 50% than original brightness, Based on Ta 25±2℃,60±10% RH condition.

Note 2：LED backlight is 27 LEDs.

27PCS LED
CONSTANT CURRENT 210mA
VLED = 9.9V (TYP)

A

K
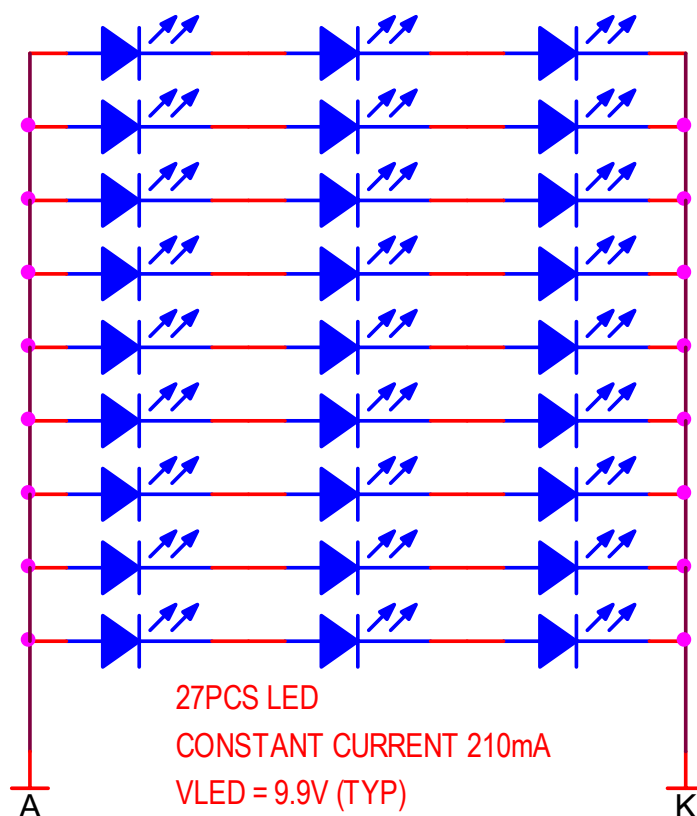
2.4 AC Characteristics

Switching characteristics

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DE setup time	T_{esu}	6	-	-	ns
Source output settling time	T_{ST}	-	-	15	µs
Source output loading R	R_{SL}	-	2	-	K ohm
Source output loading C	C_{SL}	-	60	-	pF

Parallel RGB Input Timing Requirement

DE mode

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	-	33.26	-	MHz
CLK period	T_{CPH}	-	30.06	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
OEV pulse width	T_{OEV}	-	150	-	T_{CPH}
CKV pulse width	T_{CKV}	-	133	-	T_{CPH}
DE(internal)-STV time	T_1	-	4	-	T_{CPH}
DE(internal)-CKV time	T_2	-	40	-	T_{CPH}
DE(internal)-OEV time	T_3	-	23	-	T_{CPH}
DE(internal)-POL time	T_4	-	157	-	T_{CPH}
STV pulse width	-	-	1	-	T_H

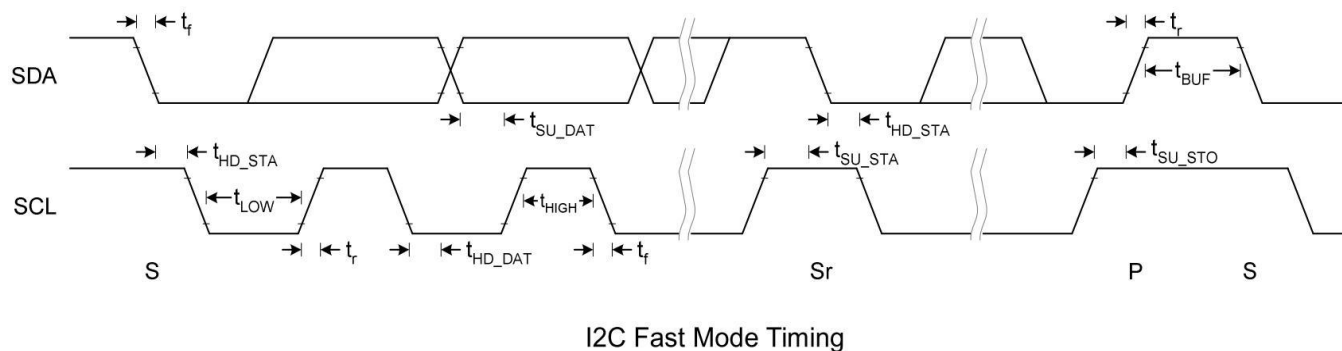(i). $T_{HS}+T_{HA}<T_H$

Timing Controller Timing Chart
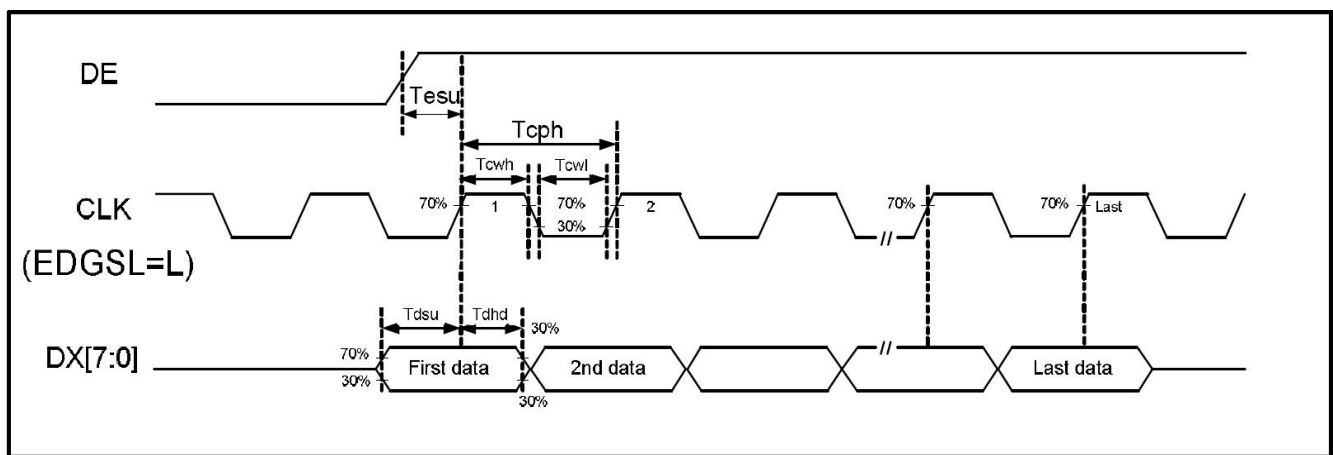
Clock and Data input waveforms
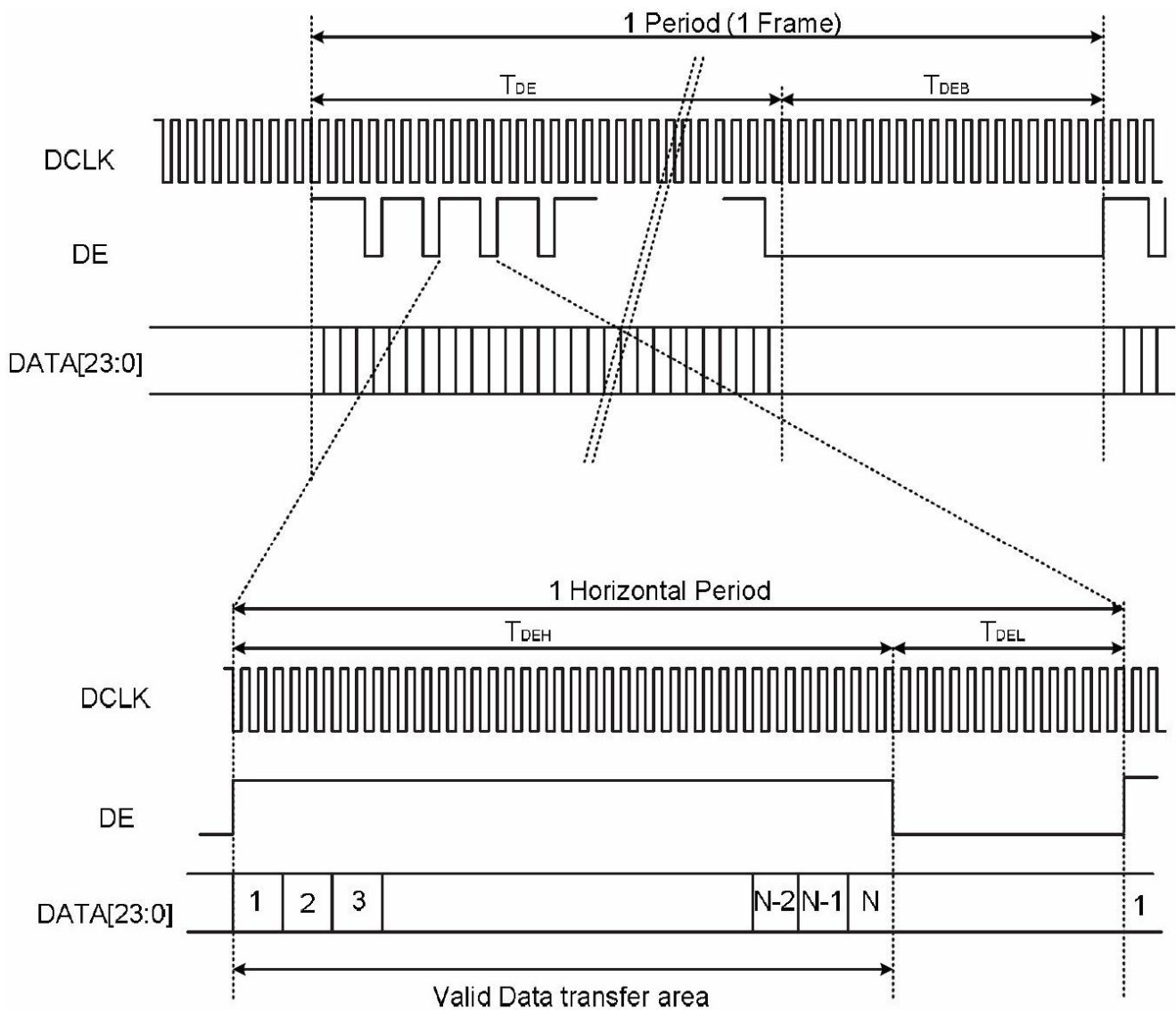
DE Mode Data Format

2-5 Capacitive touch panel controller AC Characteristics

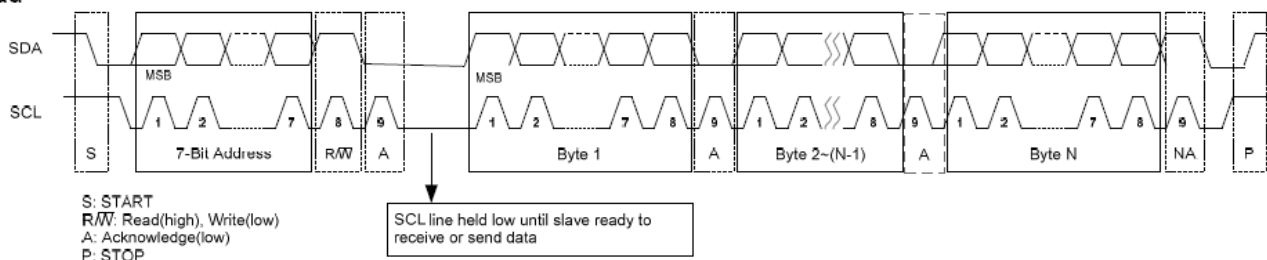## AC Electrical Characteristics

I2C Fast Mode Timing

I2C Fast Mode Timing Characteristic

Conditions: VDD = IOVDD = 3.3V, GND = 0V, T_A = 25°C

Symbol	Parameter	Rating			Unit
		Min.	Typ.	Max.	
f_{SCL}	SCL clock frequency	0	-	400	kHz
t_{LOW}	Low period of the SCL clock	1.3	-	-	us
t_{HIGH}	High period of the SCL clock	0.6	-	-	us
t_f	Signal falling time	-	-	300	ns
t_r	Signal rising time	-	-	300	ns
t_{SU_STA}	Set up time for a repeated START condition	0.6	-	-	us
t_{HD_STA}	Hold time (repeated) START condition. After this period, the first clock pulse is generated	0.6	-	-	us
t_{SU_DAT}	Data set up time	100	-	-	ns
t_{HD_DAT}	Data hold time	0	-	0.9	us
t_{SU_STO}	Set up time for STOP condition	0.6	-	-	us
t_{BUF}	Bus free time between a STOP and START condition	1.3	-	-	us
C_b	Capacitive load for each bus line	-	-	400	pF

2-6 I2C Host Interface Protocol

2.6.1 I2C Slave Interface
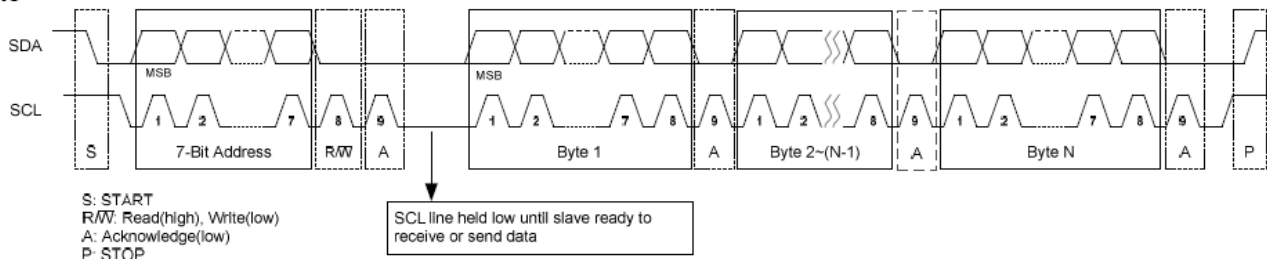
Note : I2C address is default to 0x55 (7-bits address)

2.6.2 Register Read

For reading register value from I2C device, host has to tell I2C device the *Start Register Address* before reading corresponding register value.

I2C Start	I2C Header (W)	Start Reg. Addr. (a)	I2C Stop	I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	...	Value of Reg(a+n)	I2C Stop

Figure 1 - Register Read Format.

Sitronix Touch IC I2C host interface protocol supports *Repeated Register Read*. That is, once the *Start Register Address* has been set by host, consequent I2C Read(R) transactions will directly read register values starting from the *Start Register Address* without setting address first, as shown in Figure 2.

I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	...	Value of Reg(a+n)	I2C Stop	I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	...	Value of Reg(a+n)	I2C Stop

Figure 2 - Repeated Register Read.

Header Value(R) : 0xab

2.6.3 Register Write

For writing register to I2C device, host has to tell I2C device the Start Register Address in each I2C Register Write transaction. Register values to the I2C device will be written to the address starting from the Start Register Address described in Register Write I2C transaction as shown in Figure 3.
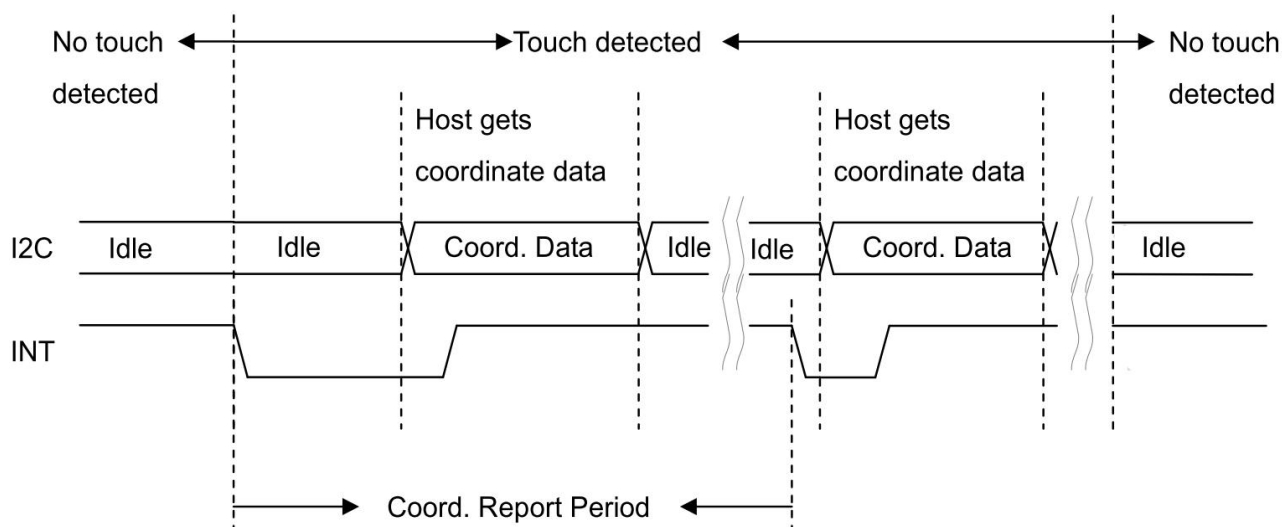
I2C Start	I2C Header (W)	Start Reg. Addr. (a)	Value to Reg(a)	Value to Reg(a+1)	…	Value to Reg(a+n)	I2C Stop
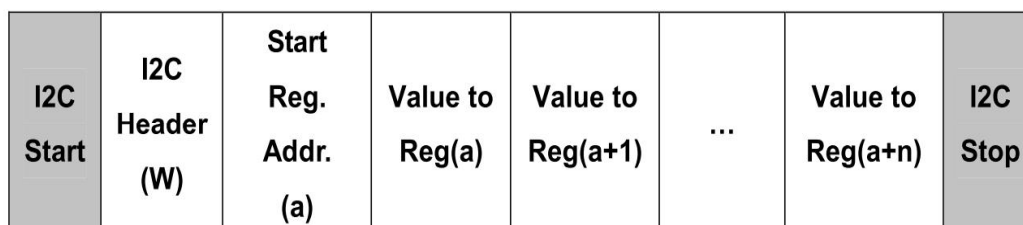
Figure 3 - Register Write Format.

Header Value(W) : 0xaa

2.6.4 I2C Electrical Waveform

2.6.5 Registers

Sitronix Touch IC provides a register set for host to configure device attributes and retrieve information about Device Control , XY Coordinates through device host interface. Host interface registers are listed below.

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
					Host Interface Registers (Report Page)				
0x00	----	Reserved							
0x01	----	Reserved							
0x02	Device Control Reg	Reserved				Reserved	Reserved	Power Down (R/W)	Reset (R/W)
0x03	Timeout to Idle Register	Timeout to Idle (Sec) (R/W)							
0x04 ~ 0x11	------	Reserved							
0x12	XY0 Coord (High Byte)	Valid 0 (RO)	X0_H(RO)			Reserved	Y0_H (RO)		
0x13	X0 Coord (Low Byte)	X0_L(RO)							
0x14	Y0 Coord (Low Byte)	Y0_L(RO)							
0x15		Reserved							
0x16	XY1 Coord (High Byte)	Valid 1 (RO)	X1_H(RO)			Reserved	Y1_H (RO)		
0x17	X1 Coord (Low Byte)	X1_L(RO)							
0x18	Y1 Coord (Low Byte)	Y1_L(RO)							
0x19		Reserved							
0x1A	XY2 Coord (High Byte)	Valid 2 (RO)	X2_H(RO)			Reserved	Y2_H (RO)		
0x1B	X2 Coord (Low Byte)	X2_L(RO)							
0x1C	Y2 Coord (Low Byte)	Y2_L(RO)							
0x1D		Reserved							
0x1E	XY3 Coord (High Byte)	Valid 3 (RO)	X3_H(RO)			Reserved	Y3_H (RO)		
0x1F	X3 Coord (Low Byte)	X3_L(RO)							
0x20	Y3 Coord (Low Byte)	Y3_L(RO)							
0x21		Reserved							
0x22	XY4 Coord (High Byte)	Valid 4 (RO)	X4_H(RO)			Reserved	Y4_H (RO)		
0x23	X4 Coord (Low Byte)	X4_L(RO)							
0x24	Y4 Coord (Low Byte)	Y4_L(RO)							

2.6.6 Device Control Register

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x02	Device Control Reg	Reserved				Reserved	Reserved	Power Down (R/W)	Reset (R/W)

Device Control Register provides device control bits for host to reset the device , power down the device.

2.6.7 Timeout to Idle Register

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x03	Timeout to Idle Register	Timeout to Idle (Sec) (R/W)							

Timeout to Idle Register provides timeout control to entering Idle Mode for host.

The touch controller will enter Idle Mode after the number of seconds specified in Timeout to Idle Register if there is no touch detected in this period.

Set the field to 0xFF will disable Idle Mode. Set the field to 0 will entering Idle Mode immediately.

The default value of Timeout to Idle Register is set to 0x08 for 8 seconds to Idle Mode.

2.6.8 XY Coordinate Registers

0x12	XY0 Coord (High Byte)	Valid 0 (RO)	X0_H(RO)		Reserved	Y0_H (RO)	
0x13	X0 Coord (Low Byte)	X0_L(RO)					
0x14	Y0 Coord (Low Byte)	Y0_L(RO)					
0x15		Reserved					
0x16 ~ 0x21	...	...					
0x22	XY4 Coord (High Byte)	Valid 4 (RO)	X4_H(RO)		Reserved	Y4_H (RO)	
0x23	X4 Coord (Low Byte)	X4_L(RO)					
0x24	Y4 Coord (Low Byte)	Y4_L(RO)					

XY Coordinate Registers represent the XY coordinates for each touch point ID.

Valid bit field tells that this point ID is valid and the XY information represents a real touch point on touch sensor.

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr	25 ℃	-	5	10	ms	2
				Tf	25 ℃	-	15	20		
2	Viewing Angle	Hor.	Center CR≧10	Θ_{2+}	Φ= 0°	60	85	-	degree	3
				Θ_{2-}	Φ= 180°	60	85	-		
		Ver.		Θ_{1+}	Φ= 270°	60	85	-		
				Θ_{1-}	Φ= 90°	60	85	-		
3	Contrast Ratio			Cr	25 ℃	700	1000	-	-	4
4	Red x-code			Rx	25 ℃	0.59	0.64	0.69	-	5
	Red y-code			Ry		0.29	0.34	0.39		
	Green x-code			Gx		0.28	0.33	0.38		
	Green y-code			Gy		0.58	0.63	0.68		
	Blue x-code			Bx		0.10	0.15	0.20		
	Blue y-code			By		0.00	0.05	0.10		
	White x-code			Wx		0.25	0.30	0.35		
	White y-code			Wy		0.27	0.32	0.37		
	Brightness			Y		320	450	-	cd/m^2	
5	Brightness Uniformity				25 ℃	80	-	-	%	6

3.2 Definition of optical characteristics

Measurement condition :

Transmissive and Transflective type

PHOTAL LCD-5000
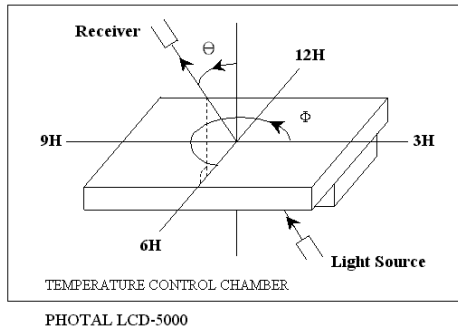
[Note 1] Definition of LCD Driving Vop and Waveform :
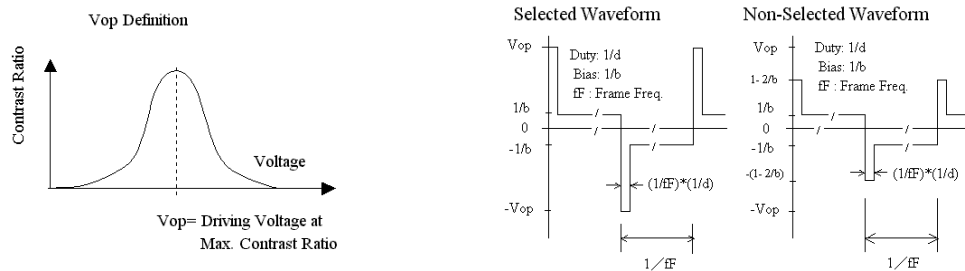
[Note 2] Definition of Response Time
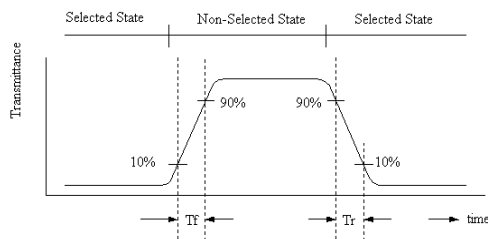
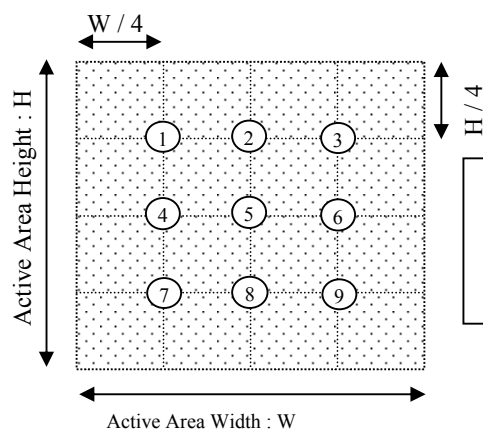## [Note 3] Definition of Viewing Angle :   [Note 4] Definition of Contrast Ratio :
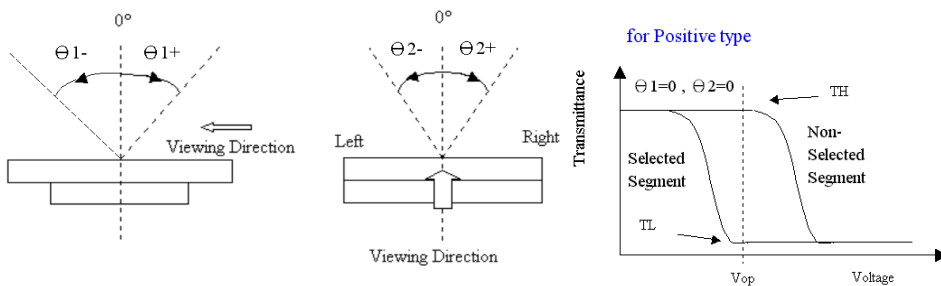
$$Contrast\ Ratio = \frac{TH}{TL}$$

**[Note 5] Definition of measurement of Color Chromaticity and Brightness**

BM-7

500mm

LCD Module
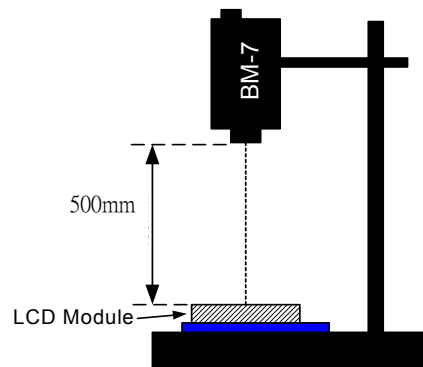
[Note 6] Definition of Brightness Uniformity

W / 4

H / 4

Active Area Height : H

① ② ③

④ ⑤ ⑥

⑦ ⑧ ⑨

Active Area Width : W

$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

[Note 7] Definition of Measurement of Reflectance

BM-7

White Light Source
(Ring)

500mm

15 deg.

LCD Module
or referance
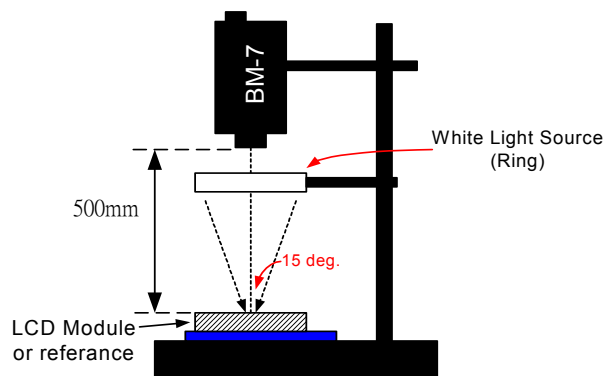
4. RELIABILITY :

Item No	Items	Condition	Note
1	High temperature operating	70 ℃ , 200 hours	1
2	Low temperature operating	-20 ℃ , 200 hours	1
3	High temperature storage	80 ℃ , 200 hours	1
4	Low temperature storage	-30 ℃ , 200 hours	1
5	High temperature & humidity	60℃, 90%RH, 100 hours	2
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. 10 Cycles	1
7	Vibration test	10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction (X,Y,Z)	
8	Drop test	Packed, 100CM free fall, 6 sides, 1 corner, 3edges	
9	Life time	50,000 hours 25℃ , 60%RH , specification condition driving	

Note 1：The product move into the room temperature for at least 2 hours with no condensation.

Note 2：The product move into the room temperature for at least 24 hours with no condensation.

Note 3 : Please change the display picture (autorun) during operating mode. Avoid displaying static images to avoid image sticking , and the image sticking is accelerated by temperature.

　＊ One single product test for only one item.

　＊ Judgment after test : keep in room temperature for more than 2 hours.
- Current consumption < 2 times of initial value
- Contrast > 1/2 initial value
- Function : work normally

5. PRODUCT HANDLING AND APPLICATION

☐ PRECAUTION FOR HANDLING LCM

● The LCD module contains a C-MOS LSI. People who operate the LCM should wear ESD protection eguipement to prevent ESD hurt on products.

● Do not input any signal before power is turned on.

● Do not take LCM from its packaging bag until it is assembled.

● Peel off the LCM protective film slowly since static electricity may be generated.

● Pay attention to the humidity of the work shop, 50~60%RH is satisfactory.

● Use a non-leak iron for soldering LCM.

● Do not touch the display surface or connection terminals area with bare hands. Smudges on the display surface reduce the insulation between terminals.

● Cautions for soldering to LCM:

   Condition for soldering I/O terminals:

   Temperature at iron tip :350℃±15℃.

   Soldering time : 3~4sec./ terminals.

   Type of solder : Eutectic solder(rosin flux filled).

☐ **PRECAUTION IN USE OF LCM**

● Do not contact or scratch the front surface and the contact pads of a LCM with hard materials such as metal or glass or with one's nail.

● To clean the surface , wipe it gently with soft cloth dampened by alcohol.

● Do not attempt to wiped off the contact pads.

● Keep LCM panels away from direct sunlight , also avoid them in high-temperature & high humidity environment for a long period.

● Do not drive LCM by DC voltage.

● Do not expose LCM to organic solvent.

● Liquid in LCM is hazardous substance. In case a contact with liquid crystal material is occured, be sure to immediately wash such material away by soap and water.

● The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

☐ PRECAUTION FOR STORING AND USE OF LCM

● To avoid degradation of the device , do not store the module under the conditions of direct sunlight , high temperature or high humidity . Keep the module in bags designed to prevent static electricity charging under low temperature / normal humidity conditions(avoid high temperature / high humidity and low temperature below 0℃)

● Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause permently damage on display !!

☐ USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

● For the application in medical care, safety and hazardous prodcuts or systems, an authorization from MT is required. MT will not responsible for any damage or loss which caused by the products without any authorization given by URT.

● This product is not allowed to be designed and used for military application and/or purpose.

● The delivery of this product to the countries and/or regions where the embargoes are imposed by U.N. is prohibited.

● The application and delivery of this product must comply with Startegic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

□ USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

●   For the application in medical care, safety and hazardous prodcuts or systems, an

    authorization from MT is required. MT will not responsible for any damage or loss

    which caused by the products without any authorization given by MT.

●   This product is not allowed to be designed and used for military application and/or purpose.

●   The delivery of this product to the countries and/or regions where the embargoes

    are imposed by U.N. is prohibited.

●   The application and delivery of this product must comply with Startegic High-Tech Commodities (SHTC)
    export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

□ **RoHS COMPLIANCE**

●   This product is RoHS compliance .

    Follow RoHS Directive 2011/65/EU.

Pb	< 1000 ppm	Pb	: Lead
Cd	< 100 ppm	Cd	: Cadmium
Hg	< 1000 ppm	Hg	: Mercury
Cr^{6+}	< 1000 ppm	Cr^{6+}	: Chromium VI
PBB	< 1000 ppm	PBB	: Polybrominated biphenyls
PBDE	< 1000 ppm	PBDE	: Polybrominated biphenyl ethers

6. DATE CODE OF PRODUCTS

● Date code will be shown on each product :

● **YY MM DD - XXXX**

Year Month Day - Production lots no.

● Example: 141108 - 0 0 0 3 ==> Year 2014, November,8th , Production lots no.0003

Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

7. PACKING

Instruction of lot number:

LOT NO. : 0 0 0 8 3 5 2 5 (EX)

Date — 01—1 st / 02—2 nd / | | / 31—31 th

Week — 1 ——— 7

Week of Month — 1 ——— 5

Month — 01—January / 02—February / | | / 12—December

Year — 00—2000 / 01—2001
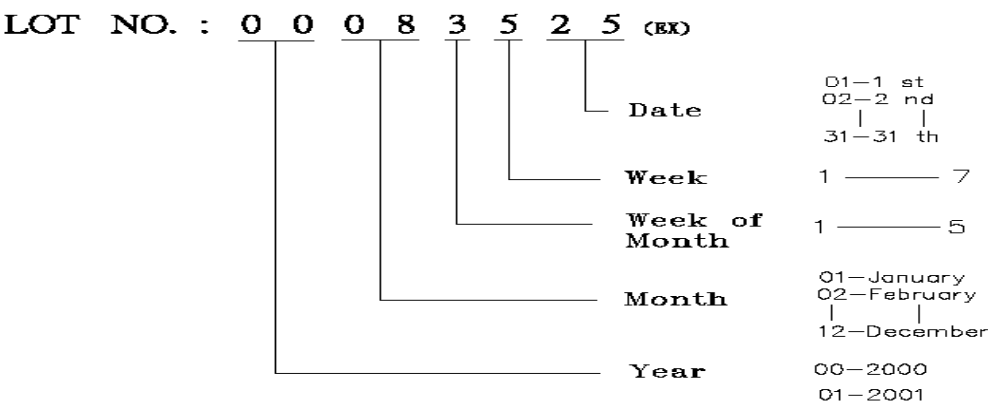
Lable of carton:

Packing tray must be stacked with alternated direction to each others.
To tacks packing trays in same direction will cause product damaged.
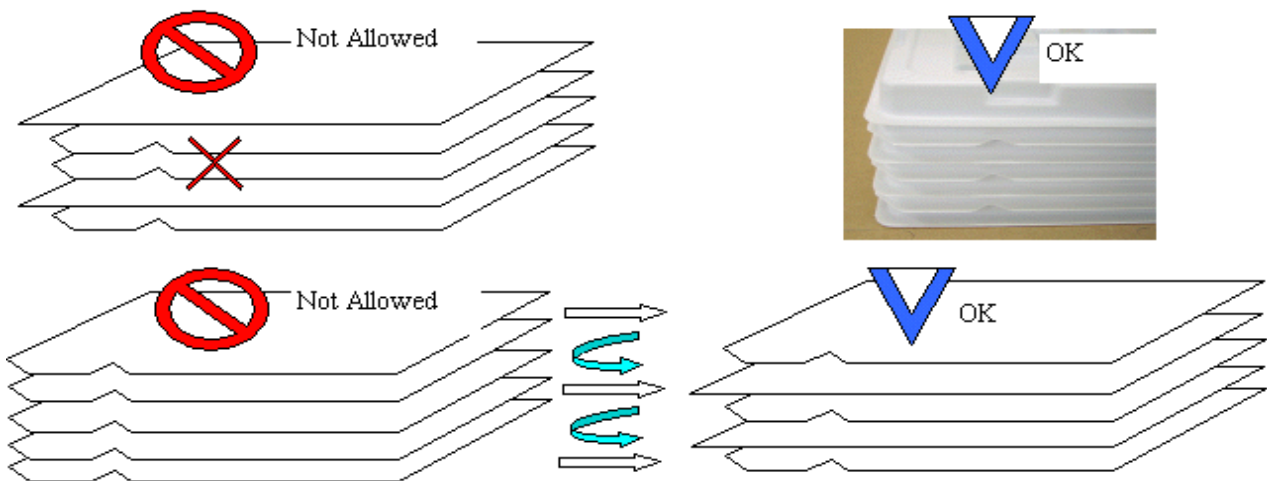
NOTE:

50 PCS/CARTON Kg/carton (gross weight)
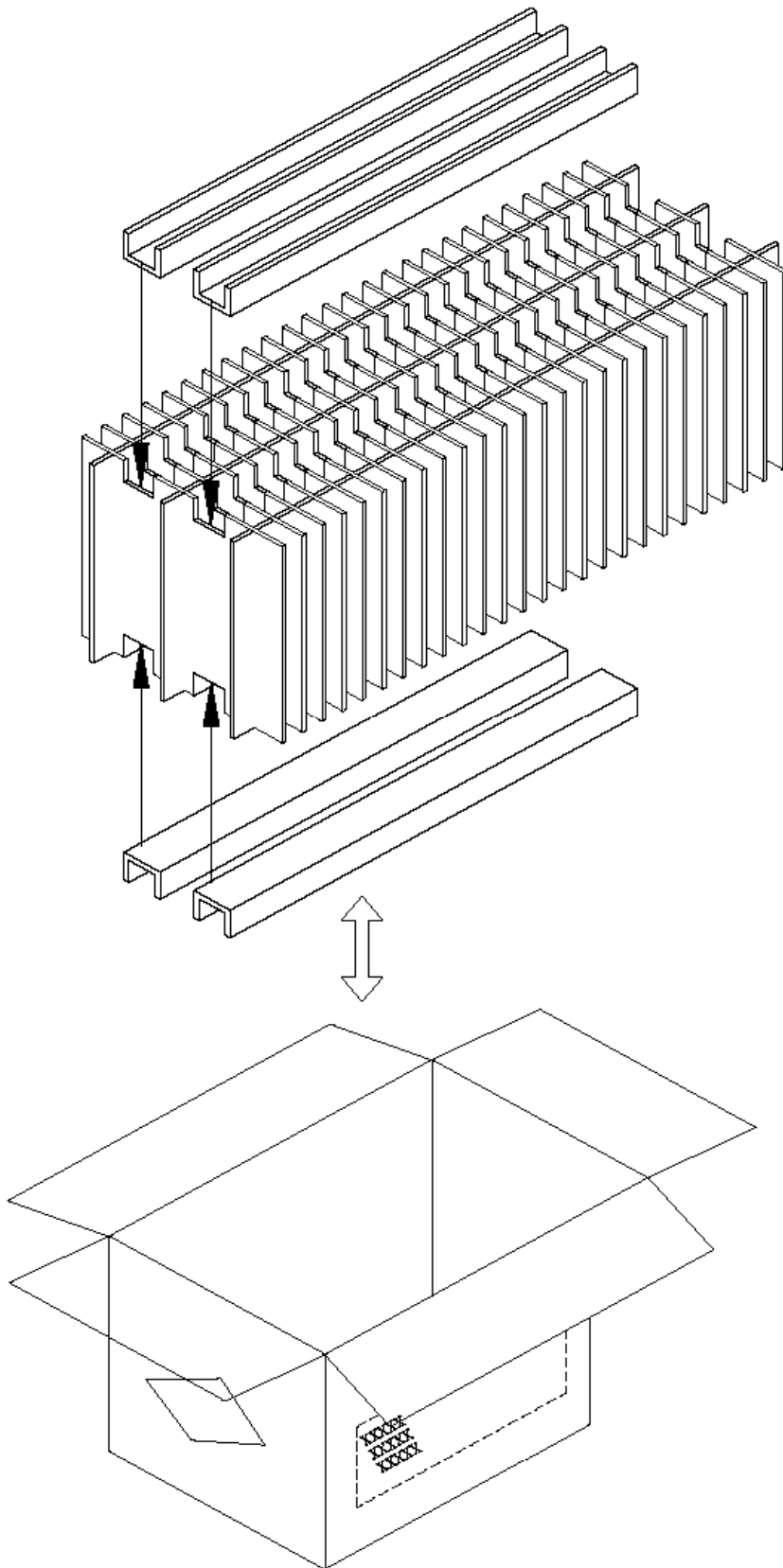
8. INSPECTION STANDARD

8.1. QUALITY :

THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

8.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM MT TO PURCHASER. PURCHASER SHALL CONTROL THE LCM

AT -10 ℃ TO 40 ℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE

AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

8.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %
TOTAL	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

8.1.3. WARRANTY POLICY

MT WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION

OPERATING CONDITIONS. MT WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCT WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF MT.

8.2. CHECKING CONDITION

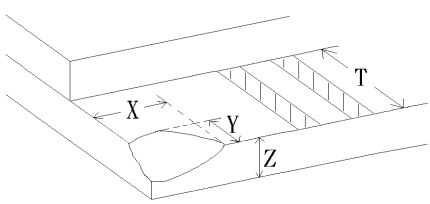**8.2.1.** CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA FROM VIEWING DIRECTION.
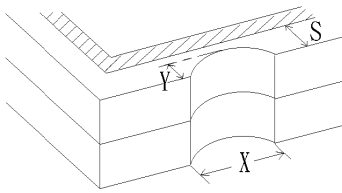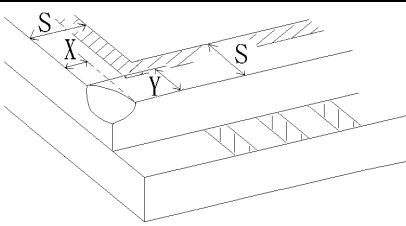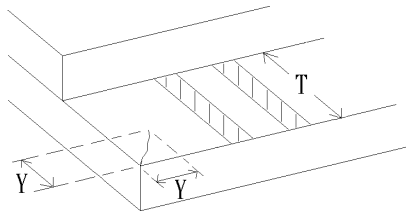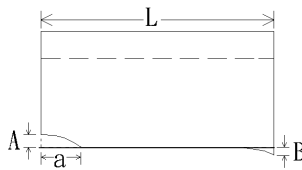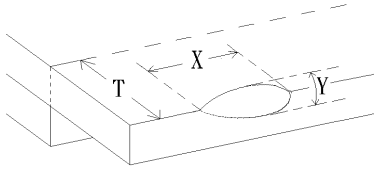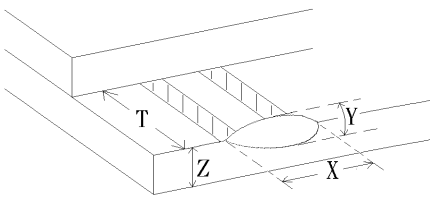
8.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.
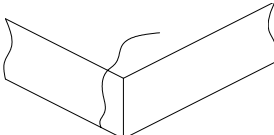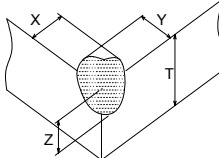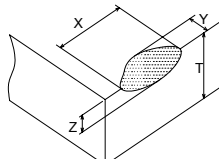
8.3. INSPECTION PLAN :

CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED...............REJECTED QUANTITY SHORT OR OVER......REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ……..REJECTED	Minor
	6. BLEMISH、BLACK SPOT、 WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD......REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、 CHROMATICITY … ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、 WRONG PATTERN DISPLAY	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION...... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

8.4. STANDARD OF VISUAL INSPECTION

NO.	CLASS	ITEM	JUDGEMENT
8.4.1	MINOR	BLACK AND WHITE SPOT FOREIGN MATERIEL DUST IN THE CELL BLEMISH SCRATCH	(A) ROUND TYPE: unit : mm. DIAMETER (mm.) — ACCEPTABLE Q'TY Φ ≦ 0.1 — DISREGARD 0.1 < Φ ≦ 0.25 — 3(Distance>5mm) 0.25 < Φ — 0 NOTE: Φ=(LENGTH+WIDTH)/2 (B) LINEAR TYPE: unit : mm. LENGTH — WIDTH — ACCEPTABLE Q'TY ------ — W ≦0.03 — DISREGARD L ≦ 5.0 — 0.03 < W ≦0.07 — 3(Distance>5mm) ------ — 0.07< W — FOLLOW ROUND TYPE
8.4.2	MINOR	BUBBLE IN POLARIZER DENT ON POLARIZER	unit : mm. DIAMETER — ACCEPTABLE Q'TY Φ ≦0.2 — DISREGARD 0.2 < Φ ≦ 0.5 — 2(Distance>5mm) 0.5 < Φ — 0
8.4.3	MINOR	Dot Defect	Items — ACC. Q'TY Bright dot — N≦ 4(Distance>5mm) Dark dot — N≦ 4(Distance>5mm) Pixel Define : Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern. Note 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.

Detailed tables (8.4.1)

(A) ROUND TYPE: unit : mm.

DIAMETER (mm.)	ACCEPTABLE Q'TY
Φ ≦ 0.1	DISREGARD
0.1 < Φ ≦ 0.25	3(Distance>5mm)
0.25 < Φ	0

NOTE: Φ=(LENGTH+WIDTH)/2

(B) LINEAR TYPE: unit : mm.

LENGTH	WIDTH	ACCEPTABLE Q'TY
------	W ≦0.03	DISREGARD
L ≦ 5.0	0.03 < W ≦0.07	3(Distance>5mm)
------	0.07< W	FOLLOW ROUND TYPE

Detailed table (8.4.2)

unit : mm.

DIAMETER	ACCEPTABLE Q'TY
Φ ≦0.2	DISREGARD
0.2 < Φ ≦ 0.5	2(Distance>5mm)
0.5 < Φ	0

Detailed table (8.4.3)

Items	ACC. Q'TY
Bright dot	N≦ 4(Distance>5mm)
Dark dot	N≦ 4(Distance>5mm)

Pixel Define :

Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Note 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.

NO.	CLASS	ITEM	JUDGEMENT	
8.4.4	MINOR	LCD GLASS CHIPPING	$Y > S$	Reject
8.4.5	MINOR	LCD GLASS CHIPPING	X or $Y > S$	Reject
8.4.6	MAJOR	LCD GLASS GLASS CRACK	$Y > (1/2) T$	Reject
8.4.7	MAJOR	LCD GLASS SCRIBE DEFECT	1. $a > L/3$, $A > 1.5$mm. Reject 2. B : ACCORDING TO DIMENSION	
8.4.8	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL AREA)	$\Phi = (x+y)/2 > 2.5$ mm	Reject
8.4.9	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL SURFACE)	$Y > (1/3) T$	Reject
8.4.10	MINOR	LCD GLASS CHIPPING	$Y > T$	Reject

8.5 INSPECTION STANDARD OF TOUCH PANEL

NO.	CLASS	ITEMS		JUDGEMENT			
8.5.1	MAJOR	Touch Panel Crack				Reject	
8.5.2	MINOR	Touch Panel Chipping	Corner		Not CNC Products	X≦2mm, Y≦2mm, Z<1/2T	Accept
					CNC Products	For CNC Outline Dimension	Accept
			Edge		Not CNC Products	X≦3mm, Y≦3mm, Z<1/2T	Accept
					CNC Products	For CNC Outline Dimension	Accept
8.5.3	MINOR	Scratch Dust and Foreign material (Linear Type)		W≦0.05, L≦10mm		Accept	
				0.05mm<W≦0.07mm；L≦5.0mm Distance between seratch＞5.0mm		Accept 3 ea Max.	
				W>0.07mm		Reject	
8.5.4	MINOR	Scratch Dust and Foreign material (Round Type：Φ=(Length+Width)/2)		Φ≦0.15mm		Accept	
				0.15mm＜Φ≦0.25mm Distance between seratch＞5.0mm		Accept 5 ea Max.	
				Φ＞0.25mm		Reject	
8.5.5	MINOR	Touch Panel Dent / Fish Eyes (Φ=(Length+Width)/2)		Φ≦0.35mm		Accept	
				0.35mm＜Φ≦1.0mm Distance＞5.0mm		Accept 3 ea Max.	
				Φ＞1.0mm		Reject	
8.5.6	MINOR	Touch Panel Air Bubble (Φ=(Length+Width)/2)		Φ≦0.15mm		Accept	
				0.15mm＜Φ≦0.25mm Distance between bubbles＞5.0mm		Accept 3 ea Max.	
				Φ＞0.25mm		Reject	
8.5.7	MINOR	Touch Panel Printing area Scratch		W≦0.03, L≦10mm		Accept	
				0.03mm＜W≦0.05mm, L≦5mm		Accept 3 ea Max.	
				W＞0.05mm or L＞5mm (W>0.05 Follow 8.5.4 Round type)		Reject	
8.5.8	MINOR	Touch Panel White Haze Mark / Dust		Can not be removed		Reject	

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