

SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE



CUSTOMER : URT-STD

Model No. : UMOH-8061MD-T

Model version : 0

Document Revision : 0

| CUSTOMER APPROVED SIGNATURE | | | |
|-----------------------------|--|--|--|
| | | | |

This specification need to be signed by purchaser or customer as a specification of products production and delivery from URT. Without signature of this specification , any purchase order for this model no. will be treated and considered that this specification is automatically acknowledged and accepted by purchaser or customer.

 **U.R.T.**  **UNITED RADIANT TECHNOLOGY CORPORATION**

Allen Wang
APPROVED

George Tseng
CHECKED

Angus Chiu
CHECKED

Sharon Tsai
PREPARED

Dec-17-2010
Date

COMPANY : No. 2,Fu-hsing Road,Taichung Economic Processing Zone,Tantzu,Taichung,Taiwan,R.O.C.

TEL: 886-4-25314277

FAX: 886-4-25313067



Revision 0 ; UMOH-8061MD-T Ver. 0 ; December-17-2010

Page: 1

This document has been signed by Digital Signature Approval System



UNITED RADIANT TECHNOLOGY CORP .

Headquarter office: NO.2 FU-SHING ROAD, T.E.P.Z. TANTZU, TAICHUNG, TAIWAN, R.O.C.
TEL: +886-4-25314277 FAX: +886-4-25313067
Factory: NO.12 CHIEN KUO ROAD, T.E.P.Z., TANTZU, TAICHUNG, TAIWAN, R.O.C.

To Whom It May Concern:

In continuing to develop and promote the strategic partnership between United Radiant Technology (URT) and Microtips USA (MTUSA), URT is please to announce that we have entered into an agreement with MTUSA to support some key projects only through MTUSA and as such the attached spec with URT Part no. will be manufactured by URT but support and logistic of the sales will be handled by MTUSA.

URT is confident that this arrangement between our two companies will ultimately benefit the end customer.

Thank You.

Raymond Chen

A handwritten signature in cursive script that reads "Raymond Chen". The signature is written in black ink and is positioned above a horizontal line.

Sales Manager: URT

Revision record

| Document Revision | Model No. Version No. | Description | Revision by |
|----------------------|--------------------------------|--|---|
| 0 | UMOH-8061MD-T Version No. 0 | 1. Modify the glass number. 2. Modify the module number from UMNH-8061MD-10T to UMOH-8061MD-T. | Jeffry Chen Eric Chen 17-Dec-2010 |
| | | | |

CONTENTS:

| No. | Item | Page |
|-----|---|-------|
| 1 | BASIC SPECIFICATION | |
| | 1.1 Mechanical Specification | 4 |
| | 1.2 Display Specification | 4 |
| | 1.3 Outline Dimension | 5 |
| | 1.4 Block Diagram | 6 |
| | 1.5 Interface Pin | 7 |
| 2 | ELECTRICAL CHARACTERISTICS | |
| | 2.1 Absolute Maximum Ratings | 8 |
| | 2.2 DC Characteristics | 9 |
| | 2.2.1 Back-light | 9 |
| | 2.3 Command Sequence | 10~14 |
| | 2.4 AC Characteristics | 15~16 |
| 3 | OPTICAL CHARACTERISTICS | |
| | 3.1 Condition | 17 |
| | 3.2 Definition of Optical Characteristics | 19~20 |
| 4 | RELIABILITY | 21 |
| 5 | PRODUCT HANDING AND APPLICATION | 22 |
| 6 | DATECODE | 23 |
| 7 | PACKING & LOTNO | 24~25 |
| 8 | INSPECTION STANDARD | 26~29 |

1. BASIC SPECIFICATION

1.1 Mechanical specifications

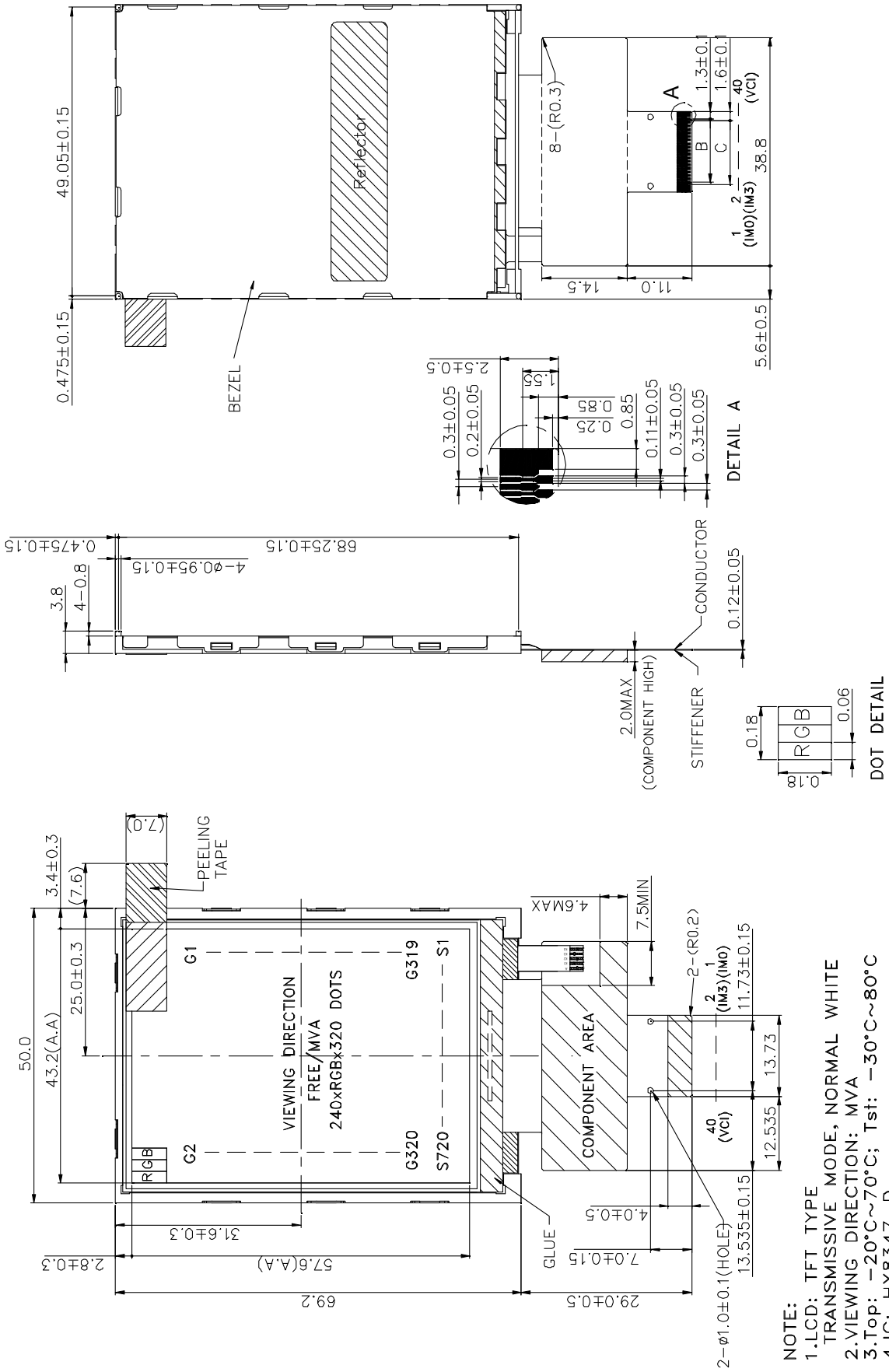
| Items | Nominal Dimension | Unit |
|-------------------------|----------------------------|-------|
| Active screen size | 2.8" diagonal | - |
| Dot Matrix | 240 x RGB x 320 | Pixel |
| Module Size (W x H x T) | 50 x 69.2 x 3.8 | mm. |
| Active Area (W x H) | 43.2 x 57.6 | mm. |
| Pixel Size (W×H) | 0.18 × 0.18 | mm. |
| Color depth | 262K | color |
| Interface | 8/9/16/18-bit MPU parallel | - |
| Driving IC Package | COG | - |
| Module Weight | 19 | 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) | Free | - |

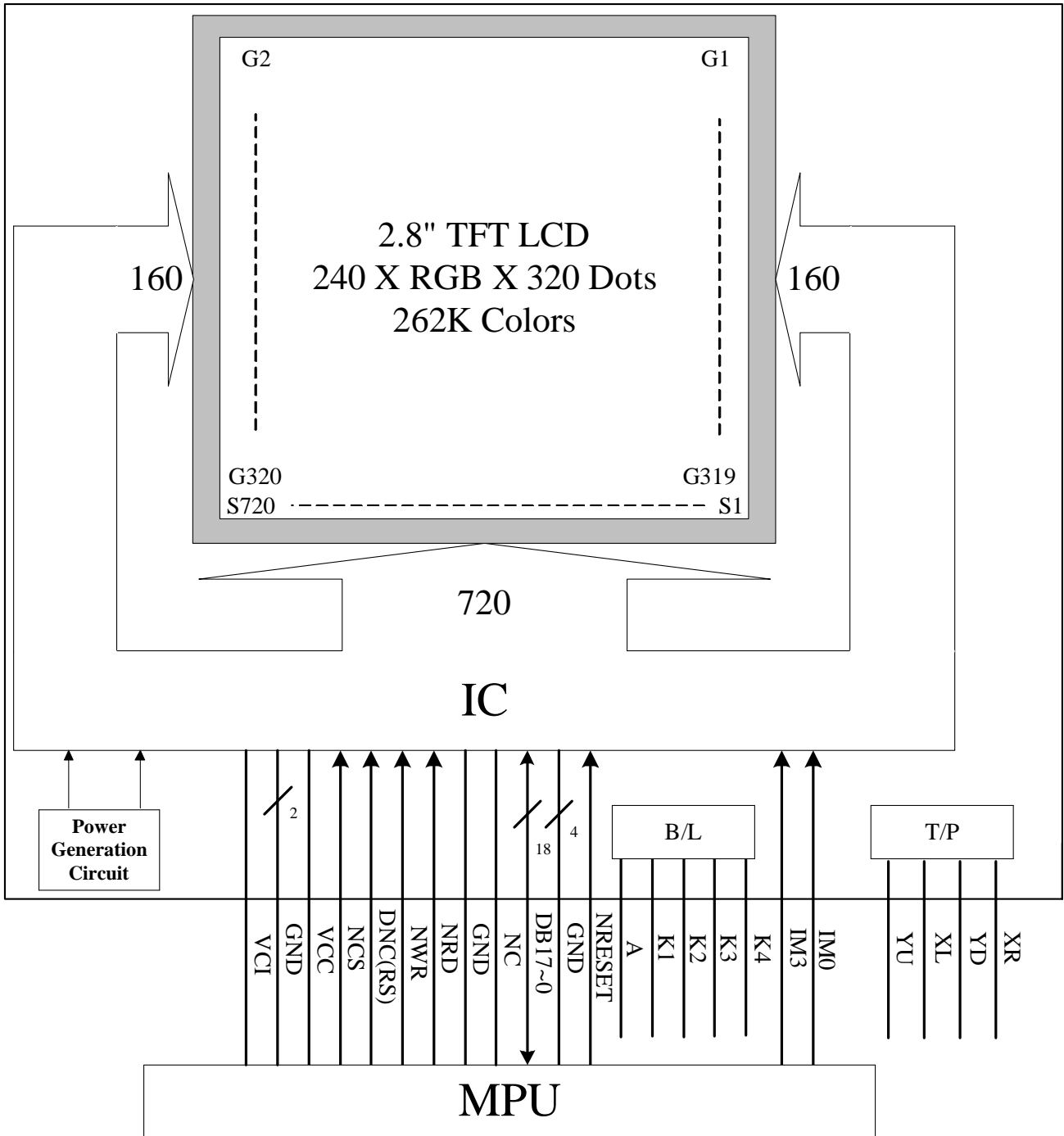
* Color tone is slightly changed by temperature and driving voltage.

1.3 Outline dimension



- NOTE:**
1. LCD: TFT TYPE
 2. TRANSMISSIVE MODE, NORMAL WHITE
 3. VIEWING DIRECTION: MVA
 4. IC: HX8347-D
 5. TOLERANCE FOR NOT ASSIGNED: ±0.2mm
 6. LED: WHITE 4 PCS, $V_{led} = 3.5V(TYP)$, $I_F = 80.0\text{ mA}$ (CONSTANT CURRENT)
 7. THE MINIMUM BENDING RADIUS(INNER) OF THE FPC IS 0.5mm
 8. B: 10.8±0.1(P0.6X18) ; C: 10.8±0.1(P0.6X18)

1.4 Block diagram:



1.5 Interface pin :

| Pin No. | Pin Symbol | I/O | Description | | | |
|---------|------------|-----|---|-----|-----------------------------|--------------------|
| 1 | IM0 | I | Select the MPU system interface mode | | | |
| | | | IM3 | IM0 | MPU-Interface Mode | DB Pin in use |
| | | | 0 | 0 | i80-system 16-bit interface | DB[17:10], DB[8:1] |
| | | | 0 | 1 | i80-system 8-bit interface | DB[17:10] |
| 2 | IM3 | I | 1 | 0 | i80-system 18-bit interface | DB[17:0] |
| | | | 1 | 1 | i80-system 9-bit interface | DB[17:9] |
| 3 | K4 | P | Cathode4 input for LED backlight. | | | |
| 4 | K3 | P | Cathode3 input for LED backlight. | | | |
| 5 | K2 | P | Cathode2 input for LED backlight. | | | |
| 6 | K1 | P | Cathode1 input for LED backlight. | | | |
| 7 | A | P | Anode input for LED backlight. | | | |
| 8 | NRESET | I | Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied | | | |
| 9~12 | GND | P | Power Supply for Ground(0V). | | | |
| 13~30 | DB17~DB0 | I/O | 18-bit bi-directional data bus. The unused pins let to open. | | | |
| 31 | NC | - | No connection. | | | |
| 32 | GND | P | Power Supply for Ground(0V). | | | |
| 33 | NRD | I | Read enable pin I80 parallel bus system interface. | | | |
| 34 | NWR | I | Write enable pin I80 parallel bus system interface. | | | |
| 35 | DNC(RS) | I | Command / parameter or display data selection pin. | | | |
| 36 | NCS | I | Chip select signal. | | | |
| | | | Low: chip can be accessed; High: chip cannot be accessed. | | | |
| 37 | VCC | P | Digital IO Pad power supply. (+2.8V) | | | |
| 38~39 | GND | P | Power Supply for Ground(0V). | | | |
| 40 | VCI | P | Analog power supply. (+2.8V) | | | |

Touch Panel:

| Pin No. | Pin Symbol | I/O | Description |
|---------|------------|-----|-------------------------|
| 1 | XR | - | Touch panel control pin |
| 2 | YD | - | Touch panel control pin |
| 3 | XL | - | Touch panel control pin |
| 4 | YU | - | Touch panel control pin |

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

| Items | Symbol | Min. | Max. | Unit |
|-----------------------------|-----------------|------|---------|------|
| Supply voltage for logics | VCC | -0.3 | +4.6 | V |
| Supply voltage for analog | VCI | -0.3 | +4.6 | V |
| Input voltage | V _i | -0.3 | VCC+0.3 | V |
| Operating temperature range | T _{OP} | -20 | +70 | °C |
| Storage temperature range | T _{ST} | -30 | +80 | °C |

2.2 DC Characteristics

| Items | Symbol | Min. | Typ. | Max. | Unit | Condition |
|--------------------------|----------------------|--------|------|--------|------|-----------|
| Supply voltage (Logic) | VCC | 1.65 | 2.8 | 3.3 | V | NOTE |
| Supply voltage (analog) | VCI | 2.3 | 2.8 | 3.3 | V | NOTE |
| Input high level voltage | V _{IH} | 0.8VCC | - | VCC | V | - |
| Input low level voltage | V _{IL} | -0.3 | - | 0.2VCC | V | - |
| Power supply current | I _{VCC+VCI} | - | - | 8.4 | mA | NOTE |

NOTE :

Measuring Condition :

Standard Value MAX.

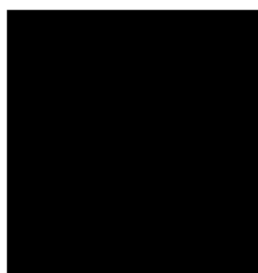
T_a = 25°C

VCC-VSS = +2.8V

VCI-VSS = +2.8V

Fosc = 2.62 MHz

Display Patten



0 gray black pattern

2.2.1 Back-light Characteristics

| PARAMETER | SYMBOL | MIN | TYP | MAX | Unit | Test Condition | NOTE |
|----------------|----------------|-----|-------|-----|------|--|------|
| Supply Current | I _f | - | 80 | - | mA | T _a =25°C I _f =80mA | - |
| Supply Voltage | V _F | - | 3.5 | - | V | T _a =25°C I _f =80mA | - |
| Half-Life Time | L _f | - | 10000 | - | hrs | T _a =25°C I _f =80mA | 1 |

Note 1 : The “ Half-Life Time ”is defined as the module brightness decrease to 50% original brightness.

2.3 Command Sequence (Recommend by U.R.T.)

LCD_Initial_ HX8347-D:

Start Initial Sequence:

| COMMAND | CODE | DESCRIPTION |
|---------|---|-------------|
| -- | LCD_RESET=1 delay 5ms LCD_RESET=0 delay 10ms | |
| -- | 00EAH 0000H | PTBA[15:8] |
| -- | 00EBH 0020H | PTBA[7:0] |
| -- | 00ECH 000CH | STBA[15:8] |
| -- | 00EDH 00C4H | STBA[7:0] |
| -- | 00E8H 0040H | OPON[7:0] |
| -- | 00E9H 0038H | OPON1[7:0] |
| -- | 00F1H 0001H | OTPS1B |
| -- | 00F2H 0010H | GEN |
| -- | 0027H 00A3H | - |

Gamma 2.2 Setting:

| COMMAND | CODE | DESCRIPTION |
|----------------------------------|----------------|--------------------|
| Gamma Control 1 Register | 0040H 0001H | |
| Gamma Control 2 Register | 0041H 0007H | |
| Gamma Control 3 Register | 0042H 0006H | |
| Gamma Control 4 Register | 0043H 000AH | |
| Gamma Control 5 Register | 0044H 000CH | |
| Gamma Control 6 Register | 0045H 003DH | |
| Gamma Control 7 Register | 0046H 0002H | |
| Gamma Control 8 Register | 0047H 0043H | |
| Gamma Control 9 Register | 0048H 0007H | |
| Gamma Control 10 Register | 0049H 0014H | |
| Gamma Control 11 Register | 004AH 0019H | |
| Gamma Control 12 Register | 004BH 001AH | |
| Gamma Control 13 Register | 004CH 001EH | |
| Gamma Control 14 Register | 0050H 0002H | |
| Gamma Control 15 Register | 0051H 0033H | |
| Gamma Control 16 Register | 0052H 0035H | |

| | | |
|----------------------------------|----------------|--|
| Gamma Control 17 Register | 0053H 0039H | |
| Gamma Control 18 Register | 0054H 0038H | |
| Gamma Control 19 Register | 0055H 003EH | |
| Gamma Control 20 Register | 0056H 003CH | |
| Gamma Control 21 Register | 0057H 007DH | |
| Gamma Control 22 Register | 0058H 0001H | |
| Gamma Control 23 Register | 0059H 0005H | |
| Gamma Control 24 Register | 005AH 0006H | |
| Gamma Control 25 Register | 005BH 000BH | |
| Gamma Control 26 Register | 005CH 0018H | |
| Gamma Control 27 Register | 005DH 00FFH | |

Power Voltage Setting:

| COMMAND | CODE | DESCRIPTION |
|---------------------------------|----------------|--|
| Power Control 2 Register | 001BH 001BH | VRH=4.65V |
| Power Control 1 Register | 001AH 0001H | BT (VGH~15V,VGL~-10V,DDVDH~5V) |
| Vcom Control 2 Register | 0024H 0045H | VMH(VCOM High voltage) |
| Vcom Control 3 Register | 0025H 001FH | VML(VCOM Low voltage) |
| Vcom Control 1 Register | 0023H 008AH | for Flicker adjust //can reload from OTP |

Power on Setting:

| COMMAND | CODE | DESCRIPTION |
|--------------------------------------|-----------------------------|---|
| OSC Control 1 Register | 0018H 0036H | I/P_RADJ,N/P_RADJ, Normal mode 60Hz |
| OSC Control 2 Register | 0019H 0001H | OSC_EN='1', start Osc |
| Display Mode Control Register | 0001H 0000H | DP_STB='0', out deep sleep |
| Power Control 6 Register | 001FH 0088H delay 5ms | GAS=1, VOMG=00, PON=0, DK=1, XDK=0, DVDH_TRI=0, STB=0 |
| Power Control 6 Register | 001FH 0080H delay 5ms | GAS=1, VOMG=00, PON=0, DK=0, XDK=0, DVDH_TRI=0, STB=0 |
| Power Control 6 Register | 001FH 0090H delay 5ms | GAS=1, VOMG=00, PON=1, DK=0, XDK=0, DVDH_TRI=0, STB=0 |
| Power Control 6 Register | 001FH 00D0H delay 5ms | GAS=1, VOMG=10, PON=1, DK=0, XDK=0, DDVDH_TRI=0, STB=0 |

262k/65k color selection:

| COMMAND | CODE | DESCRIPTION |
|--------------------------------|----------------|---|
| COLMOD Control Register | 0017H 0006H | default 0x06 262k color // 0x05 65k color |

Display ON Setting:

| COMMAND | CODE | DESCRIPTION |
|--|------------------------------|-------------------------|
| Panel Characteristic Control Register | 0036H 0002H | /SS_P, GS_P,REV_P,BGR_P |
| Display Control 3 Register | 0028H 0038H delay 40ms | GON=1, DTE=1, D=1000 |
| Display Control 3 Register | 0028H 003CH | GON=1, DTE=1, D=1100 |

Set Window Area:

| COMMAND | CODE | DESCRIPTION |
|--|----------------|--------------|
| Column Address Start Register Upper Byte | 0002H 0000H | |
| Column Address Start Register Low Byte | 0003H 0000H | Column Start |
| Column Address End Register Upper Byte | 0004H 0000H | |
| Column Address End Register Low Byte | 0005H 00EFH | Column End |
| Row Address Start Register Upper Byte | 0006H 0000H | |
| Row Address Start Register Low Byte | 0007H 0000H | Row Start |
| Row Address End Register Upper Byte | 0008H 0001H | |
| Row Address End Register Low Byte | 0009H 003FH | Row End |

Power Off Setting:

| COMMAND | CODE | DESCRIPTION |
|----------------------------|------------------------------|---|
| Display Control 1 Register | 0028H 0038H delay 40ms | GON='1' DTE='1' D[1:0]='10' |
| Power Control 6 Register | 001FH 0089H delay 40ms | GAS=1, VOMG=00, PON=0, DK=1, XDK=0, DVDH_TRI=0, STB=1 |
| Display Control 1 Register | 0028H 0004H delay 40ms | GON='1' DTE='0' D[1:0]='01' |
| OSC Control 2 Register | 0019H 0000H delay 5ms | OSC_EN='0' |

2.4 AC Characteristics

2.4.1 Parallel Interface Characteristics (8080-series MPU)

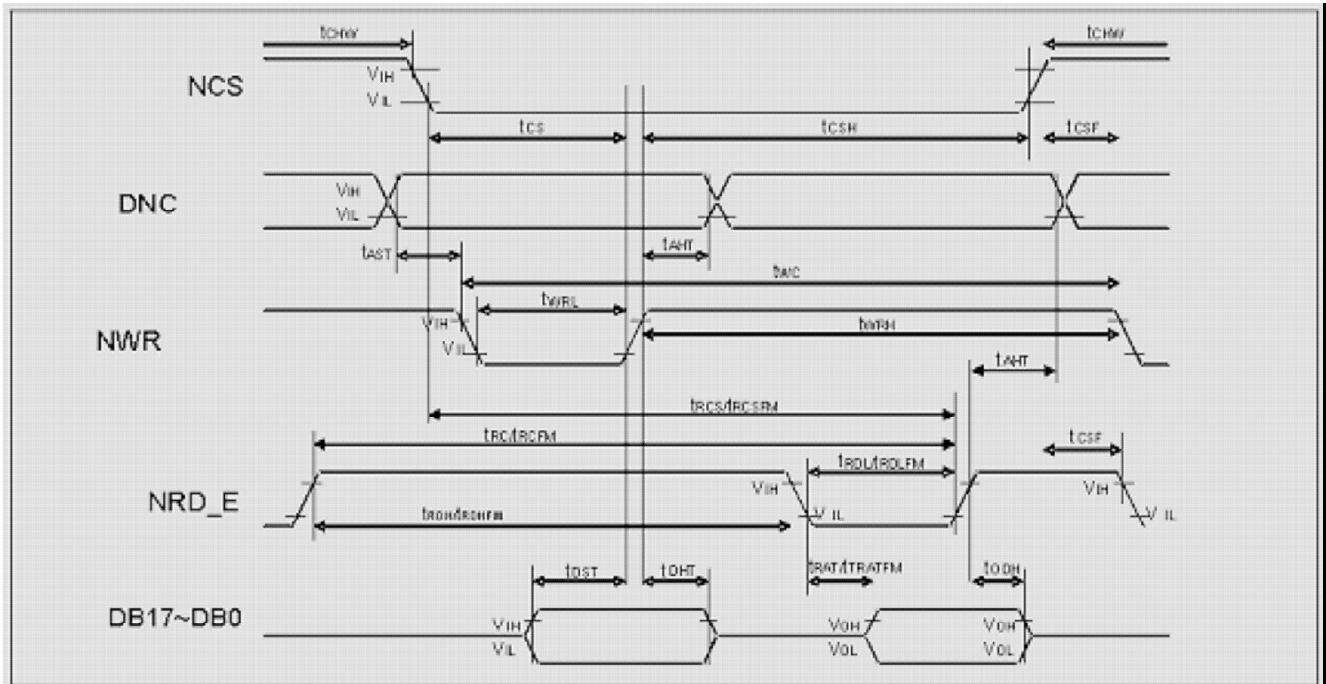
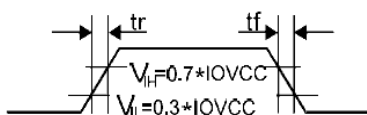


Figure 2.5.1 Parallel Interface Characteristics (8080-Series MPU)
(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, Ta = -30 to 70° C)

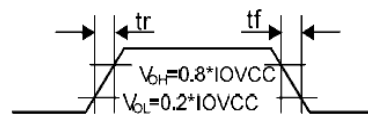
| Signal | Symbol | Parameter | Min. | Max. | Unit | Description |
|-------------|--------|------------------------------------|------|------|------|---|
| DNC_SCL | tAST | Address setup time | 0 | - | | - |
| | tAHT | Address hold time (Write/Read) | 10 | - | ns | - |
| NCS | tCHW | Chip select "H" pulse width | 0 | - | | |
| | tCS | Chip select setup time (Write) | 15 | - | | |
| | tRCS | Chip select setup time (Read ID) | 45 | - | | |
| | tRCSFM | Chip select setup time (Read FM) | 355 | - | ns | - |
| | tCSF | Chip select wait time (Write/Read) | 10 | - | | |
| | tCSH | Chip select hold time | 10 | - | | |
| NWR_SCL | tWC | Write cycle | 66 | - | | |
| | tWRH | Control pulse "H" duration | 15 | - | ns | - |
| | tWRL | Control pulse "L" duration | 15 | - | | |
| NRD(ID) | tRC | Read cycle (ID) | 160 | - | | |
| | tRDH | Control pulse "H" duration (ID) | 90 | - | ns | When read ID data |
| | tRDL | Control pulse "L" duration (ID) | 45 | - | | |
| NRD(FM) | tRCFM | Read cycle (FM) | 450 | - | | |
| | tRDHFM | Control pulse "H" duration (FM) | 90 | - | ns | When read from frame memory |
| | tRDLFM | Control pulse "L" duration (FM) | 355 | - | | |
| DB17 to DB0 | tDST | Data setup time | 10 | - | | |
| | tDHT | Data hold time | 10 | - | | |
| | tRAT | Read access time (ID) | - | 40 | ns | For maximum CL=30pF For minimum CL=8pF |
| | tRATFM | Read access time (FM) | - | 340 | | |
| | tODH | Output disable time | 20 | 80 | | |

Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

Input Signal Slope



Output Signal Slope



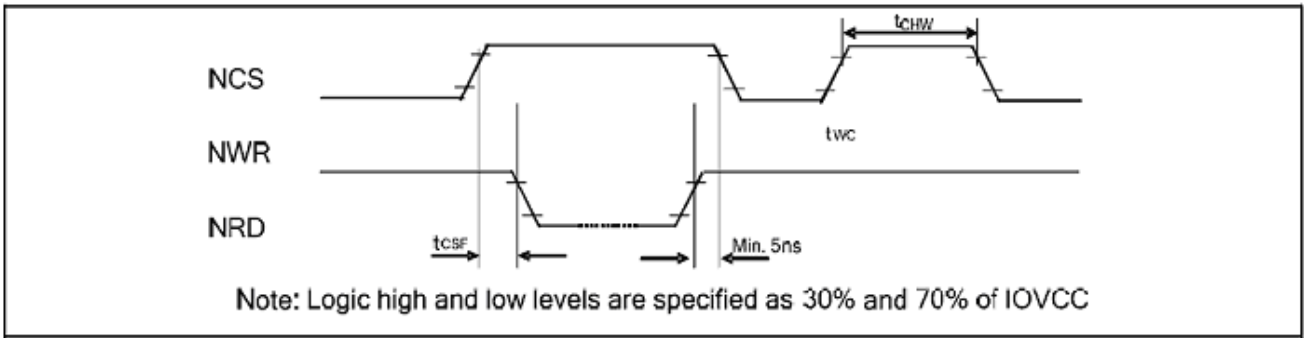


Figure 2.5.2 Chip Select Timing

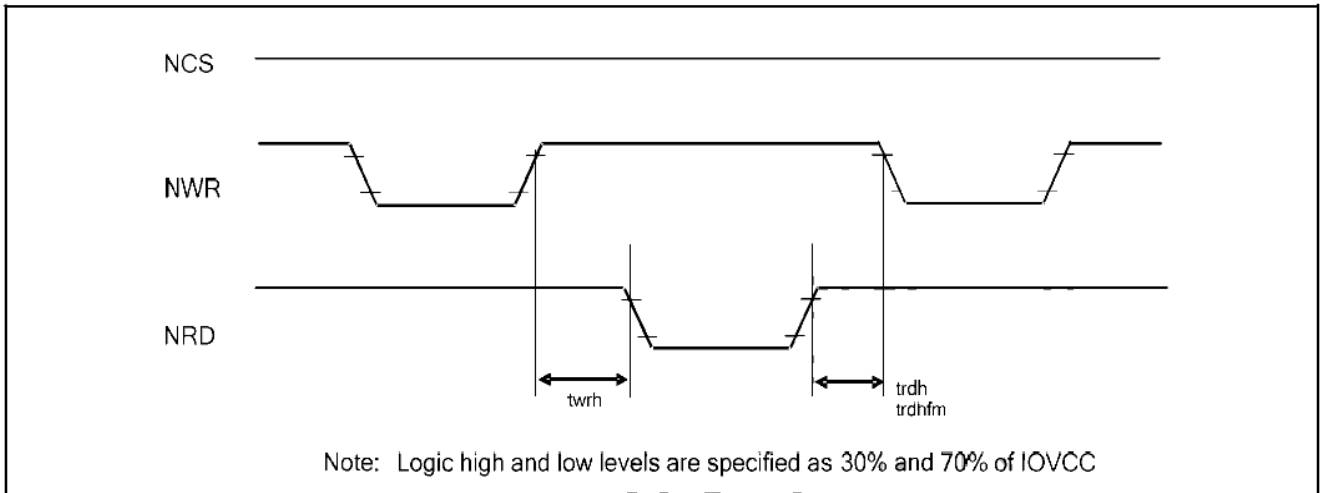


Figure 2.5.3 Write to Read and Read to Write Timing

2.4.2 Reset Timing Characteristics

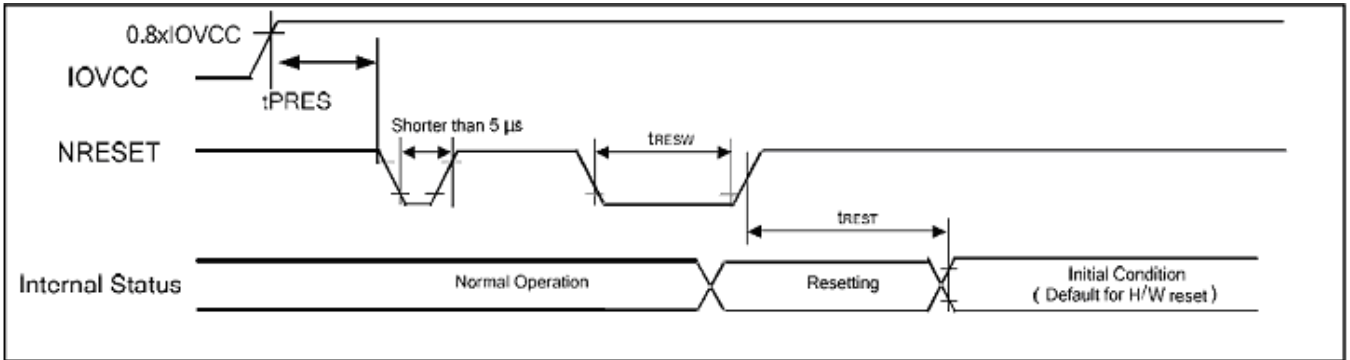


Figure 2.5.4 Reset Input Timing

| Symbol | Parameter | Related Pins | Spec. | | | Note | Unit |
|--------|---|----------------|-------|------|------|--------------------------------------|------|
| | | | Min. | Typ. | Max. | | |
| tRESW | Reset low pulse width ⁽¹⁾ | NRESET | 10 | - | - | - | μs |
| tREST | Reset complete time ⁽²⁾ | - | - | - | 5 | When reset applied during STB mode | ms |
| | | - | - | - | 120 | When reset applied during STB mode | ms |
| tPRES | Reset goes high level after Power on time | NRESET & IOVCC | 1 | - | - | Reset goes high level after Power on | ms |

Note: (1) Spike due to an electrostatic discharge on NRESET line does not cause irregular system reset according to the table below.

| NRESET Pulse | Action |
|------------------------|----------------|
| Shorter than 5 μ | Reset Rejected |
| Longer than 10 μs | Reset |
| Between 5 μs and 10 μs | Reset Start |

- (2) 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 STB Out –mode. The display remains the blank state in STB –mode) and then return to Default condition for H/W reset.
- (3) During Reset Complete Time, VMF value in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of NRESET.

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

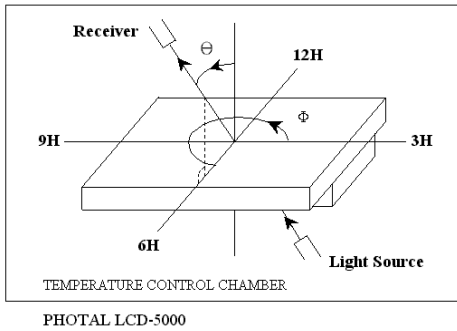
Electrical and Optical Characteristics

| No. | Item | | symbol / temp. | Min. | Typ. | Max. | Unit | Note | |
|-----|-----------------------|------|----------------|---------------|------|------|------|--------|---|
| 1 | Response Time | | Tr+Tf 25 °C | - | 30 | - | ms | 2 | |
| 2 | Viewing Angle | Hor. | Cr>10 | Θ_{2+} | 0° | - | 80 | degree | 3 |
| | | | | Θ_{2-} | 180° | - | 80 | | |
| | | Ver. | | Θ_{1+} | 270° | - | 80 | | |
| | | | | Θ_{1-} | 90° | - | 80 | | |
| 3 | Contrast Ratio | | Cr 25 °C | 600 | 800 | - | - | 4 | |
| 4 | Red x-code | | Rx | 25 °C | 0.59 | 0.64 | 0.69 | - | 5 |
| | Red y-code | | Ry | | 0.28 | 0.33 | 0.38 | | |
| | Green x-code | | Gx | | 0.29 | 0.34 | 0.39 | | |
| | Green y-code | | Gy | | 0.56 | 0.61 | 0.66 | | |
| | Blue x-code | | Bx | | 0.09 | 0.14 | 0.19 | | |
| | Blue y-code | | By | | 0.02 | 0.07 | 0.12 | | |
| | White x-code | | Wx | | 0.25 | 0.30 | 0.35 | | |
| | White y-code | | Wy | | 0.28 | 0.33 | 0.38 | | |
| | Brightness | | Y | | 150 | 200 | - | | |
| 5 | Brightness Uniformity | | | 25 °C | 80 | - | - | % | 6 |

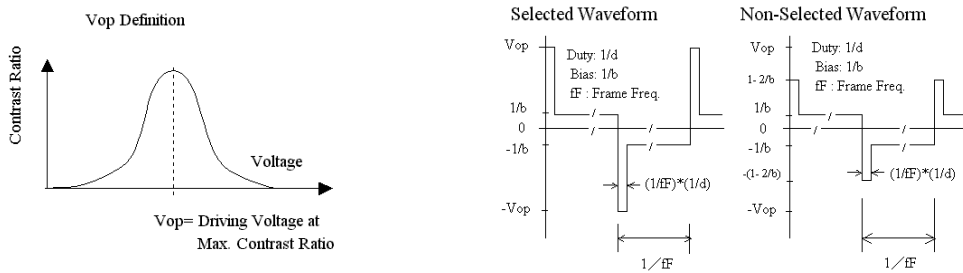
3.2 Definition of optical characteristics

Measurement condition :

Transmissive and Transflective type

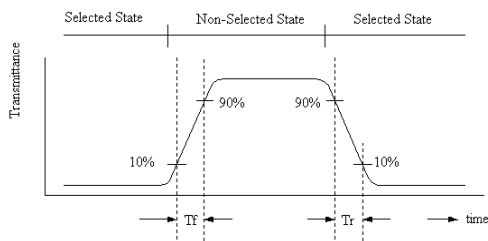


[Note 1] Definition of LCD Driving Vop and Waveform :



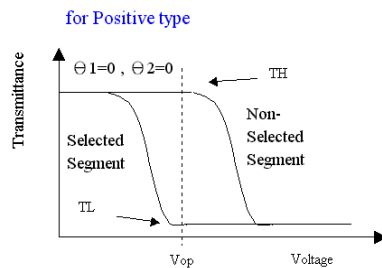
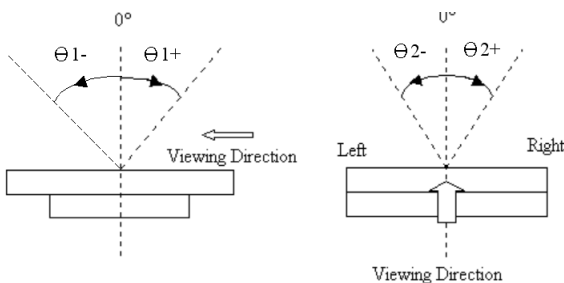
[Note 2] Definition of Response Time

for Positive type :



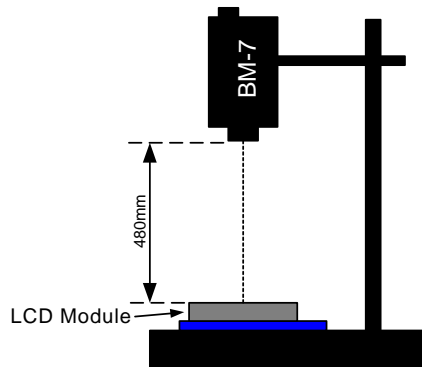
[Note 3] Definition of Viewing Angle :

[Note 4] Definition of Contrast Ratio :

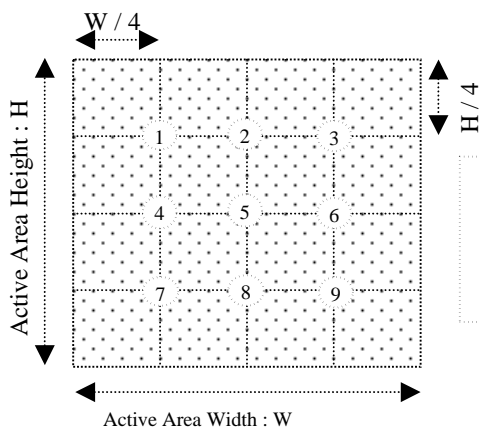


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

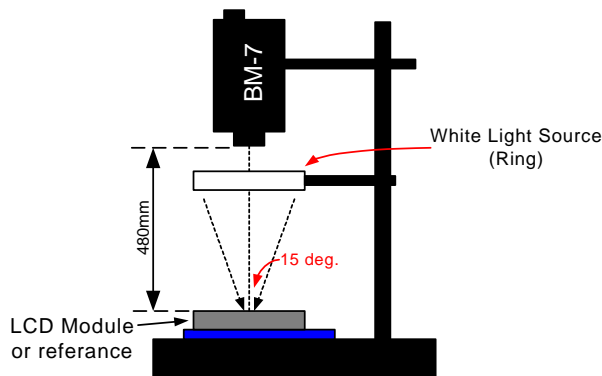


[Note 6] Definition of Brightness Uniformity



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

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

| Item No | Items | Condition |
|---------|-------------------------------------|--|
| 1 | High temperature operating | 70 , 200 hours |
| 2 | Low temperature operating | -20 , 200 hours |
| 3 | High temperature storage | 80 , 200 hours |
| 4 | Low temperature storage | -30 , 200 hours |
| 5 | High temperature & humidity storage | 60 , 90%RH, 100 hours |
| 6 | Thermal Shock storage | -30 , 30min.<=> 80 , 30min. 10 Cycles |
| 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 |

* 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 equipment 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 wipe 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 occurred, 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 permanently damage on display !!

USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

For the application in medical care, safety and hazardous products or systems, an authorization from URT is required. URT 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 Strategic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

6. DATE CODE OF PRODUCTS

Date code will be shown on each product :

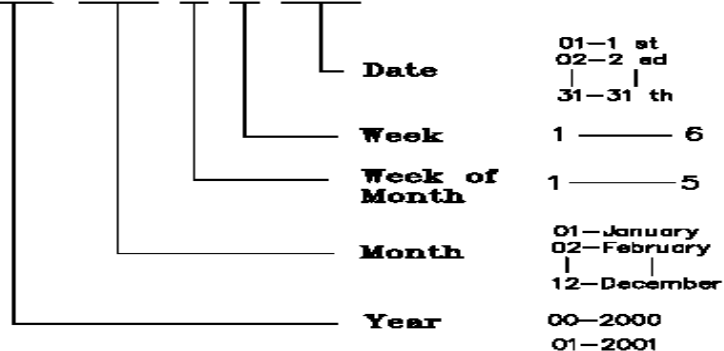
YY MM DD - XXXX
| | | |
Year Month Day - Production lots

Example: 090508 - 0 0 0 3 ==>Year 2009, May.,08rd , Batch no.03

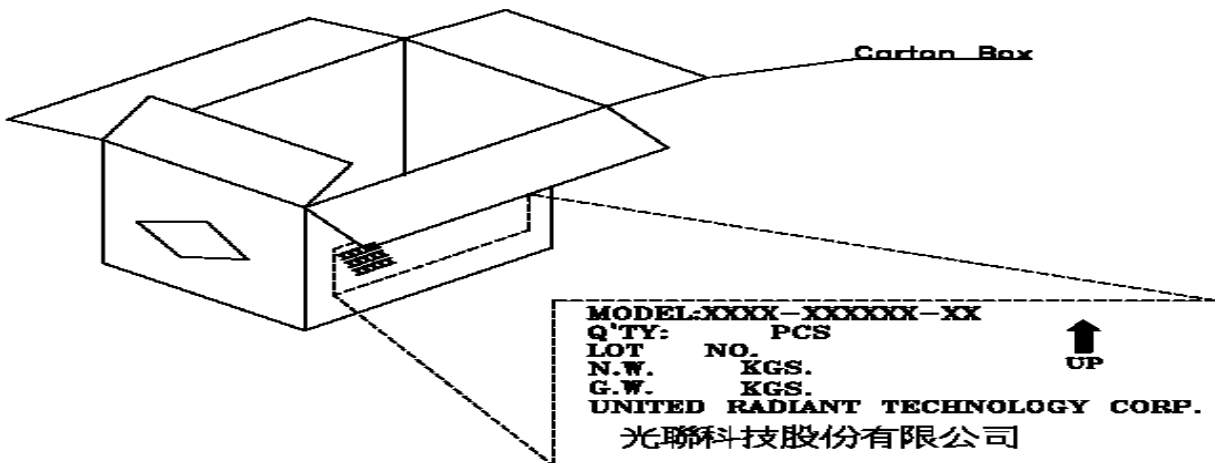
7. PACKING

Instruction of lot number:

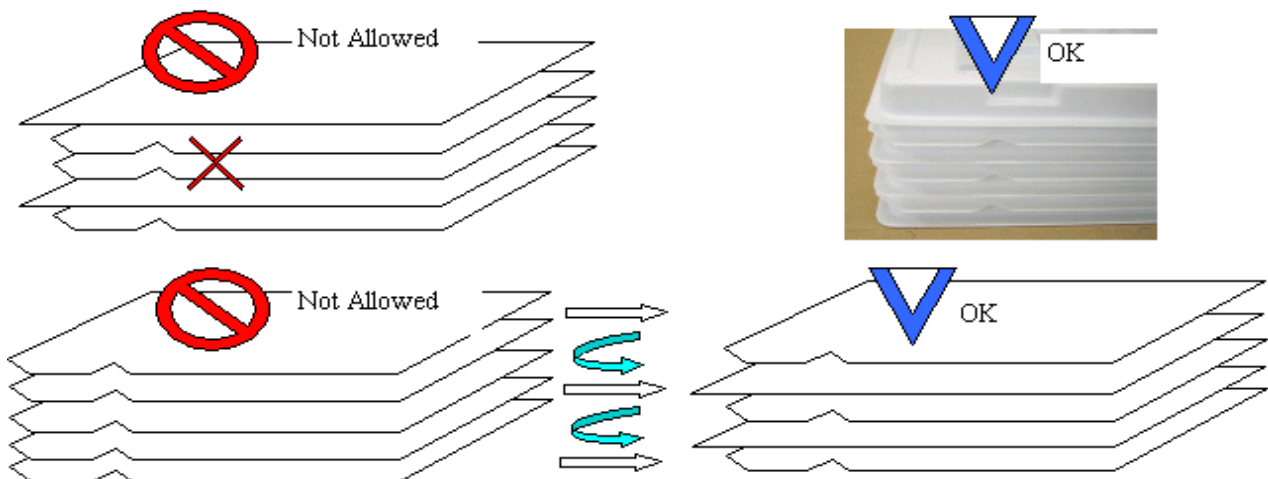
LOT NO. : 0 0 0 8 3 5 2 5 (EX)



Label of carton:



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



MODEL NO: UM*

T.B.D.pcs / Tray

T.B.D.Tray / Box

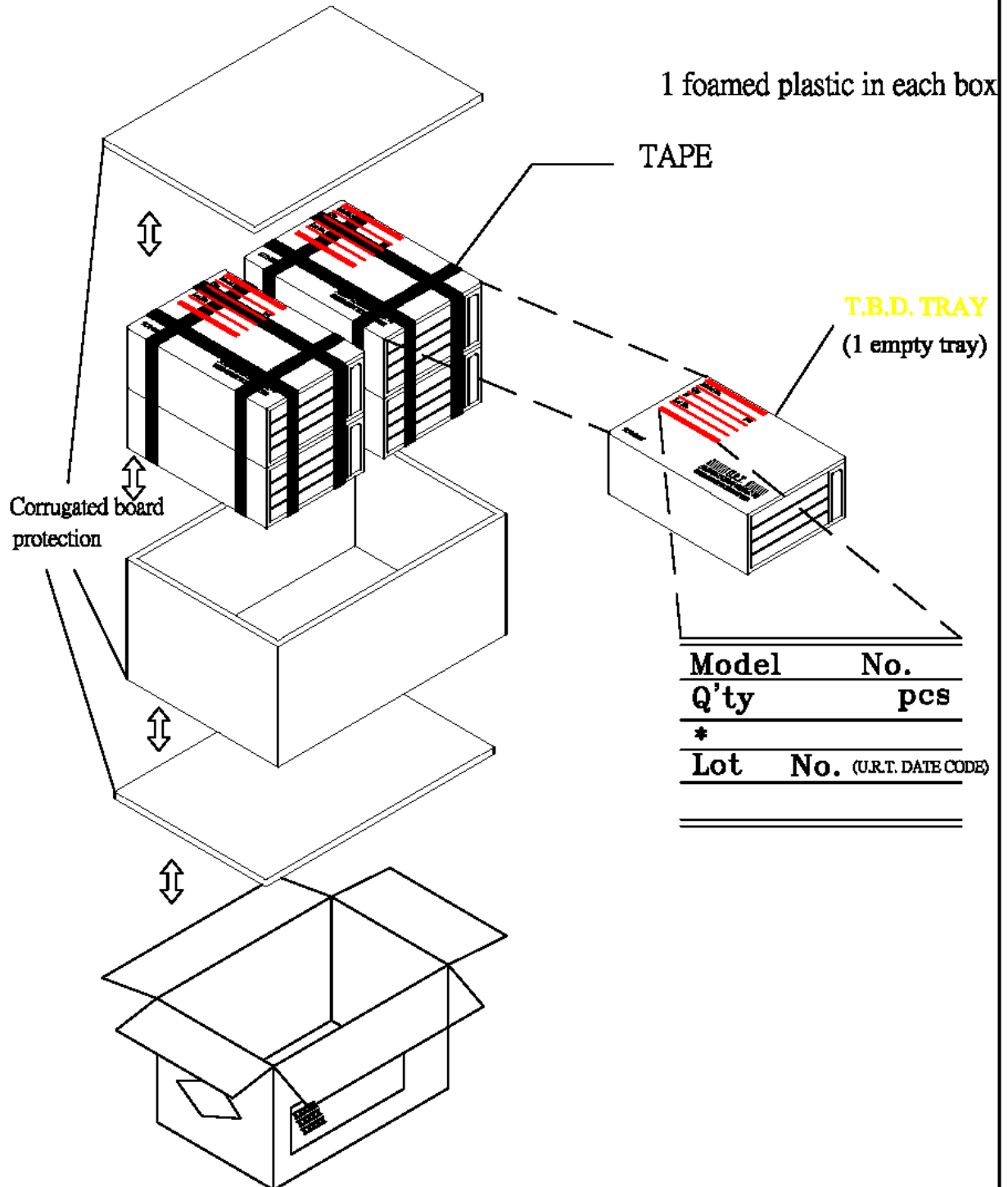
T.B.D. Box / Carton

T.B.D.pcs / Carton

NOTE:

(1) Be warned, the direction of the tray has to turn it by 180 degree before stack it up. Otherwise, it will be packager's responsibility!!

(2) Safe Stack : 5 cartons only



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 U.R.T. TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 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 (or MIL-STD-105E) , LEVEL 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

U.R.T. WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. U.R.T. WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF U.R.T.

8.2. CHECKING CONDITION

8.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

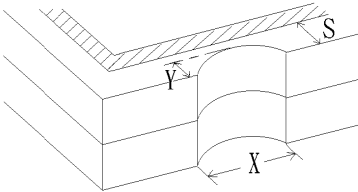
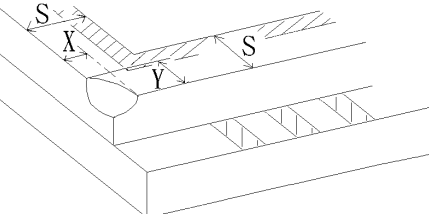
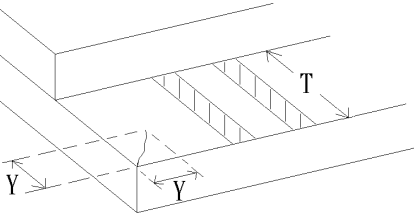
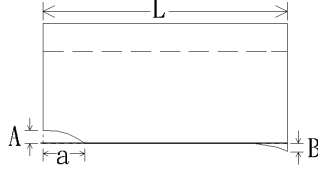
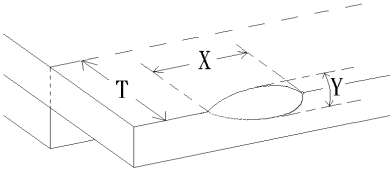
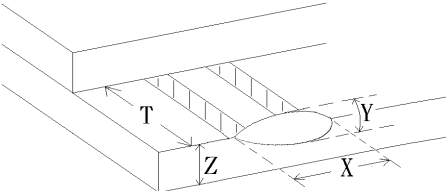
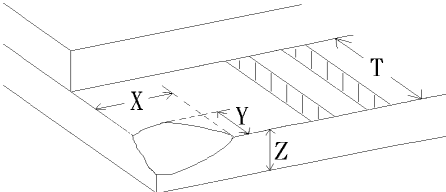
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

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 AREAREJECTED | 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, CHARACTERREJECTED | Critical |
| | 12.SHORT CIRCUIT, WRONG PATTERN DISPLAY | NON DISPLAY, WRONG PATTERN DISPLAY, CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED | Critical |
| | 13. PIN HOLE, PATTERN DEFORMITY | ACCORDING TO STANDARD OF VISUAL INSPECTION | Minor |

8.4. STANDARD OF VISUAL INSPECTION

| NO. | CLASS | ITEM | JUDGEMENT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|-----------------|--|--|----------------|-----------------|------------|-----------|------------|-----|------------|---|--------|---|--------|-------|-----------------|-------|--------|-----------|-------|---------------|---|-------|---------------|---|-------|----------|-------------------|---|---|---|---|---|---|---|---|
| 8.4.1 | MINOR | <p>. BLEMISH, BLACK SPOT, WHITE SPOT IN THE LCD.</p> <p>. BLEMISH, BLACK SPOT, WHITE SPOT AND SCRATCH ON THE POLARIZER</p> | <p>(A) ROUND TYPE: unit : mm.</p> <table border="1"> <thead> <tr> <th>DIAMETER (mm.)</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>DISREGARD</td> </tr> <tr> <td>0.1 < 0.2</td> <td>2</td> </tr> <tr> <td>0.2 < 0.25</td> <td>1</td> </tr> <tr> <td>0.25 <</td> <td>0</td> </tr> </tbody> </table> <p>NOTE: $=(\text{LENGTH}+\text{WIDTH})/2$</p> <p>(B) LINER TYPE: unit : mm.</p> <table border="1"> <thead> <tr> <th>LENGTH</th> <th>WIDTH</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td>W 0.03</td> <td>DISREGARD</td> </tr> <tr> <td>L 5.0</td> <td>0.03 < W 0.05</td> <td>3</td> </tr> <tr> <td>L 5.0</td> <td>0.05 < W 0.07</td> <td>1</td> </tr> <tr> <td>-----</td> <td>0.07 < W</td> <td>FOLLOW ROUND TYPE</td> </tr> </tbody> </table> | DIAMETER (mm.) | ACCEPTABLE Q'TY | 0.1 | DISREGARD | 0.1 < 0.2 | 2 | 0.2 < 0.25 | 1 | 0.25 < | 0 | LENGTH | WIDTH | ACCEPTABLE Q'TY | ----- | W 0.03 | DISREGARD | L 5.0 | 0.03 < W 0.05 | 3 | L 5.0 | 0.05 < W 0.07 | 1 | ----- | 0.07 < W | FOLLOW ROUND TYPE | | | | | | | | |
| DIAMETER (mm.) | ACCEPTABLE Q'TY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.1 | DISREGARD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.1 < 0.2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.2 < 0.25 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 < | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LENGTH | WIDTH | ACCEPTABLE Q'TY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ----- | W 0.03 | DISREGARD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L 5.0 | 0.03 < W 0.05 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L 5.0 | 0.05 < W 0.07 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ----- | 0.07 < W | FOLLOW ROUND TYPE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8.4.2 | MINOR | BUBBLE IN POLARIZER | <p style="text-align: right;">unit : mm.</p> <table border="1"> <thead> <tr> <th>DIAMETER</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>0.15</td> <td>DISREGARD</td> </tr> <tr> <td>0.15 < 0.5</td> <td>2</td> </tr> <tr> <td>0.5 <</td> <td>0</td> </tr> </tbody> </table> | DIAMETER | ACCEPTABLE Q'TY | 0.15 | DISREGARD | 0.15 < 0.5 | 2 | 0.5 < | 0 | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIAMETER | ACCEPTABLE Q'TY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.15 | DISREGARD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.15 < 0.5 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.5 < | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8.4.3 | MINOR | Dot Defect | <table border="1"> <thead> <tr> <th>Items</th> <th>ACC. Q'TY</th> </tr> </thead> <tbody> <tr> <td>Bright dot</td> <td>N 4</td> </tr> <tr> <td>Dark dot</td> <td>N 4</td> </tr> </tbody> </table> <p>Pixel Define</p> <table border="1"> <tbody> <tr> <td>R</td><td>G</td><td>B</td><td>R</td><td>G</td><td>B</td><td>R</td><td>G</td><td>B</td> </tr> <tr> <td>R</td><td>G</td><td>B</td><td>R</td><td>G</td><td>B</td><td>R</td><td>G</td><td>B</td> </tr> <tr> <td>R</td><td>G</td><td>B</td><td>R</td><td>G</td><td>B</td><td>R</td><td>G</td><td>B</td> </tr> </tbody> </table> <p>Not 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. Not 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern. Not 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.</p> | Items | ACC. Q'TY | Bright dot | N 4 | Dark dot | N 4 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| Items | ACC. Q'TY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bright dot | N 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dark dot | N 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | G | B | R | G | B | R | G | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | G | B | R | G | B | R | G | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | G | B | R | G | B | R | G | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| NO. | CLASS | ITEM | JUDGEMENT |
|--------|-------|---------------------------------------|--|
| 8.4.4 | MINOR | CHIPPING |  $Y > S$ REJ. |
| 8.4.5 | MINOR | CHIPPING |  $X \text{ or } Y > S$ REJ. |
| 8.4.6 | MAJOR | GLASS CRACK |  $Y > (1/2) T$ REJ. |
| 8.4.7 | MAJOR | SCRIBE DEFECT |  <ol style="list-style-type: none"> $a > L/3$, $A > 1.5\text{mm}$. REJ. B : ACCORDING TO DIMENSION |
| 8.4.8 | MINOR | CHIPPING (ON THE TERMINAL AREA) |  $= (x+y)/2 > 2.5 \text{ mm}$ REJ. |
| 8.4.9 | MINOR | CHIPPING (ON THE TERMINAL SURFACE) |  $Y > (1/3) T$ REJ. |
| 8.4.10 | MINOR | CHIPPING |  $Y > T$ REJ. |