


TFT Module Specification

MODEL: 13-101ZIEB00C1-S

< ◇ > PRELIMINARY SPECIFICATION

< ◆ > APPROVAL SPECIFICATION

| |
|--------------------|
| CUSTOMER |
| |
| APPROVED BY |
| |
| DATE: |

| DESIGNED | CHECKED | APPROVED |
|----------|---------|--|
| | |  <p>PM 2015.05.29 呂家祥</p> |

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RECORD OF REVISION

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1. GENERAL DESCRIPTION

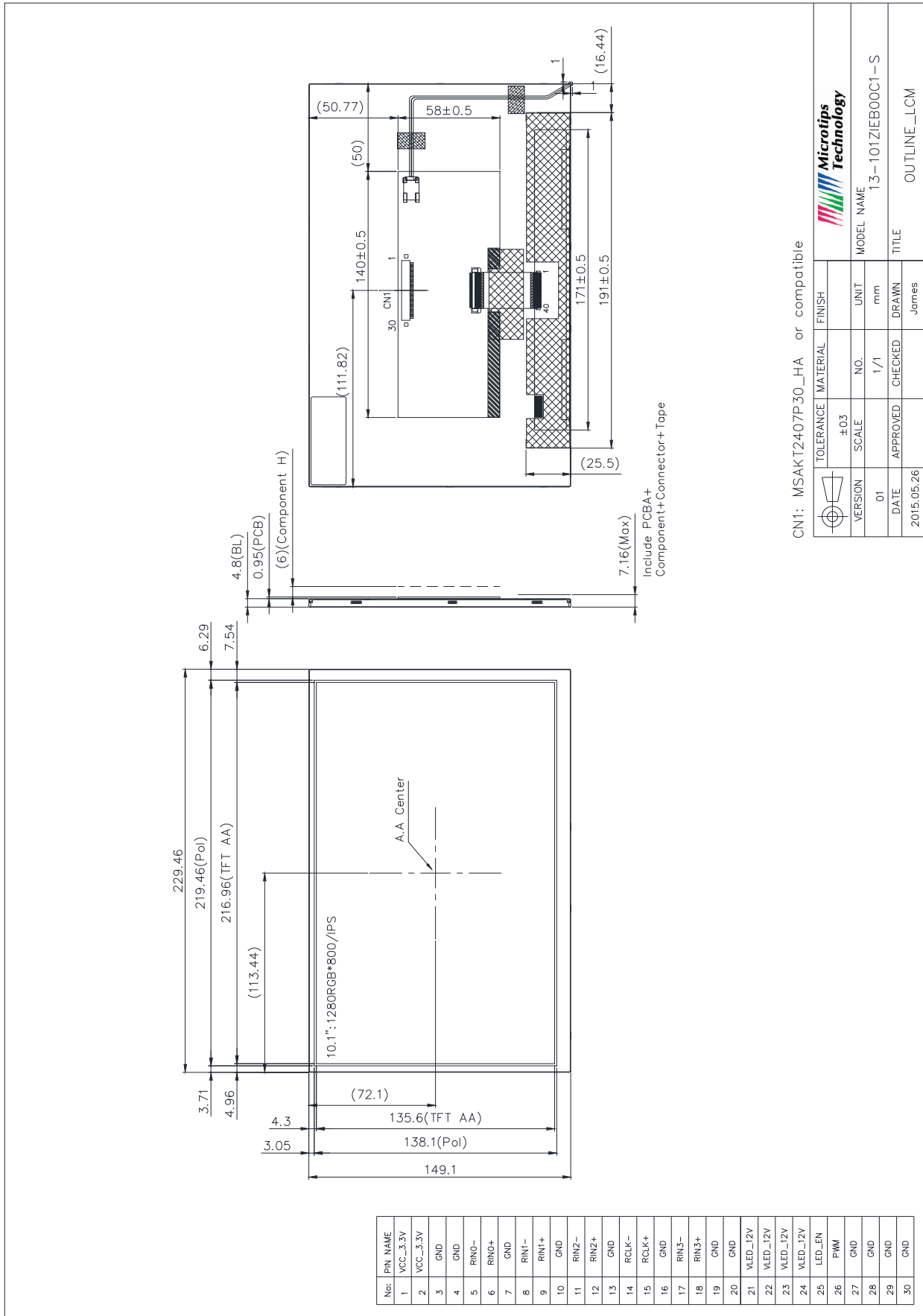
1.1 Description

The specifications is model 13-101ZIEB00C1-S is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit, a back light system. This TFT LCD has a 10.1 (16:10) inch diagonally measured active display area with WXGA (1280 horizontal by 800 vertical pixels) resolution.

1.2 Features:

| No. | Item | Specification | Unit |
|-----|--------------------------------|-------------------------------------|-------------------|
| 1 | Panel Size | 10.1" | Inch |
| 2 | Number of Pixels | 1280 (W) x RGB x 800 (H) | Pixels |
| 3 | Active Area | 216.96 (W) × 135.6 (H) | mm |
| 4 | Pixel Pitch | 0.1695 (W) x 0.1695 (H) | mm |
| 5 | Outline Dimension | 229.46 (W) × 149.1 (H) × 4.8 (T) | mm |
| 6 | Number of Colors | 16.7M | -- |
| 7 | Display Mode | IPS / Normally Black / Transmissive | -- |
| 8 | View Direction | Free direction | -- |
| 9 | Display Format | RGB vertical stripe | -- |
| 10 | Surface Treatment | HC | -- |
| 11 | Contrast Ratio | 800 (Typ.) | -- |
| 12 | Luminance (cd/m ²) | 1000 (Typ.) | cd/m ² |
| 13 | Interface | LVDS 8 bit Interface | -- |
| 14 | Backlight | White LED | -- |
| 15 | Driver IC | -- | -- |
| 16 | Operation Temperature | -20 ~ 70 | °C |
| 17 | Storage Temperature | -30 ~ 80 | °C |
| 18 | Weight | (TBD) | g |

2. MECHANICAL SPECIFICATION



CNI1: MSAKT2407P30_HA or compatible

| TOLERANCE | MATERIAL | FINISH | | |
|------------|----------|---------|-------|-------------|
| ±0.3 | | | | |
| VERSION | SCALE | NO. | UNIT | |
| 01 | 1/1 | | mm | |
| DATE | APPROVED | CHECKED | DRAWN | TITLE |
| 2015.05.26 | | | James | OUTLINE_LCM |



MODEL NAME
13-101ZIEB00C1-S

TITLE
OUTLINE_LCM

3. PIN DESCRIPTION

3.1 TFT LCD Module(CN1)

| Pin No. | Symbol | I/O | Function | Note |
|---------|----------|-----|--|------|
| 1 | VCC | P | Power Supply Logic voltage +3.3V | |
| 2 | VCC | P | Power Supply Logic voltage +3.3V | |
| 3 | GND | P | Ground | |
| 4 | GND | P | Ground | |
| 5 | RIN0- | I | Negative LVDS differential data input | |
| 6 | RIN0+ | I | Positive LVDS differential data input | |
| 7 | GND | P | Ground | |
| 8 | RIN1- | I | Negative LVDS differential data input | |
| 9 | RIN1+ | I | Positive LVDS differential data input | |
| 10 | GND | P | Ground | |
| 11 | RIN2- | I | Negative LVDS differential data input | |
| 12 | RIN2+ | I | Positive LVDS differential data input | |
| 13 | GND | P | Ground | |
| 14 | RCLK- | I | Negative LVDS differential clock input | |
| 15 | RCLK+ | I | Positive LVDS differential clock input | |
| 16 | GND | P | Ground | |
| 17 | RIN3- | I | Negative LVDS differential data input | |
| 18 | RIN3+ | I | Positive LVDS differential data input | |
| 19 | GND | P | Ground | |
| 20 | GND | P | Ground | |
| 21 | VLED_12V | P | Power Supply LED voltage +12V | |
| 22 | VLED_12V | P | Power Supply LED voltage +12V | |
| 23 | VLED_12V | P | Power Supply LED voltage +12V | |
| 24 | VLED_12V | P | Power Supply LED voltage +12V | |
| 25 | LED_EN | I | Back-light On/Off control | |
| 26 | PWM | I | Back-light Dimming control | |
| 27 | GND | P | Ground | |
| 28 | GND | P | Ground | |
| 29 | GND | P | Ground | |
| 30 | GND | P | Ground | |

4. ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Rating

4.1.1 TFT LCD Module

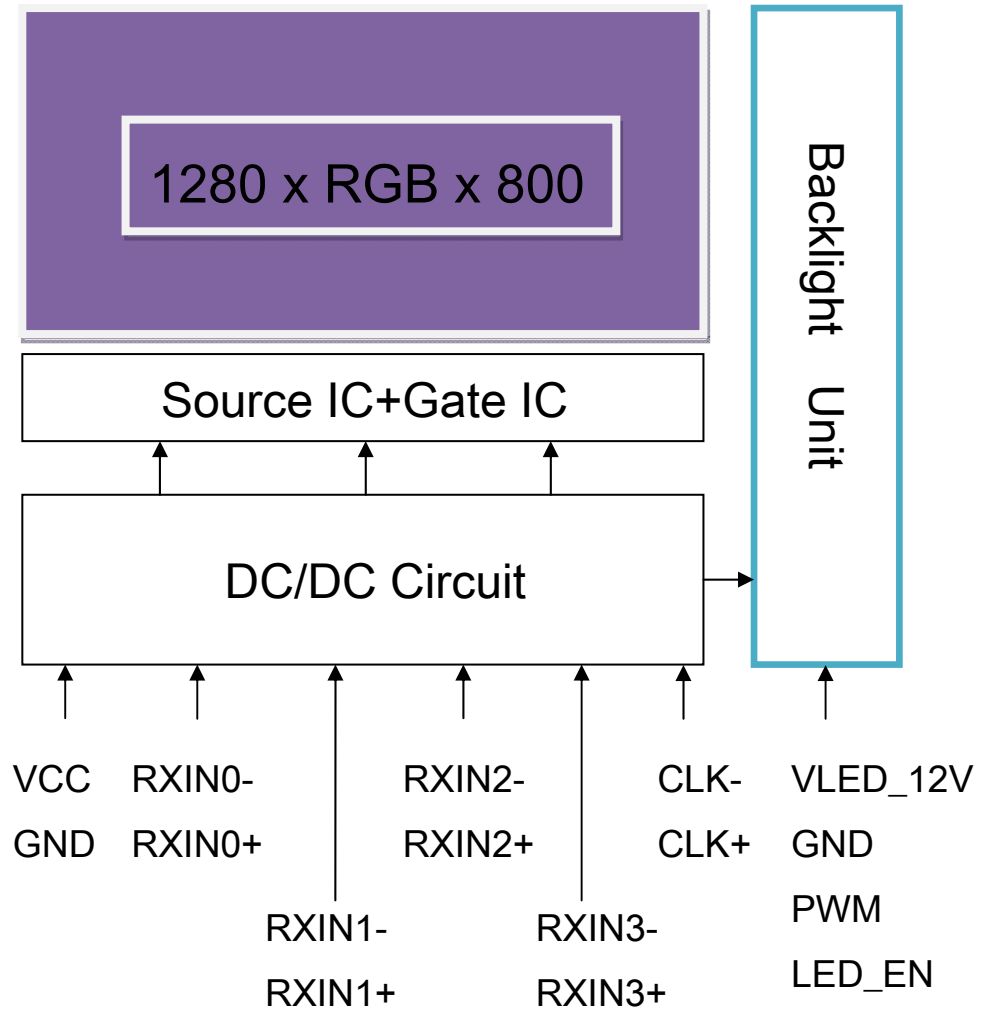
| Item | Symbol | Values | | Unit | Note |
|----------------------|----------|--------|------|------|------|
| | | Min | Max. | | |
| Power supply voltage | VCC | -0.3 | 3.9 | V | |
| | VLED_12V | 4.5 | 36 | V | |

4.1.2 Environment Absolute Rating

| Item | Symbol | Values | | | Unit | Note |
|-----------------------|--------|--------|-----|------|------|------------------------|
| | | Min | Typ | Max. | | |
| Operating Temperature | Topa | -20 | | 70 | °C | Ambient temperature |
| Storage Temperature | Tstg | -30 | | 80 | °C | |

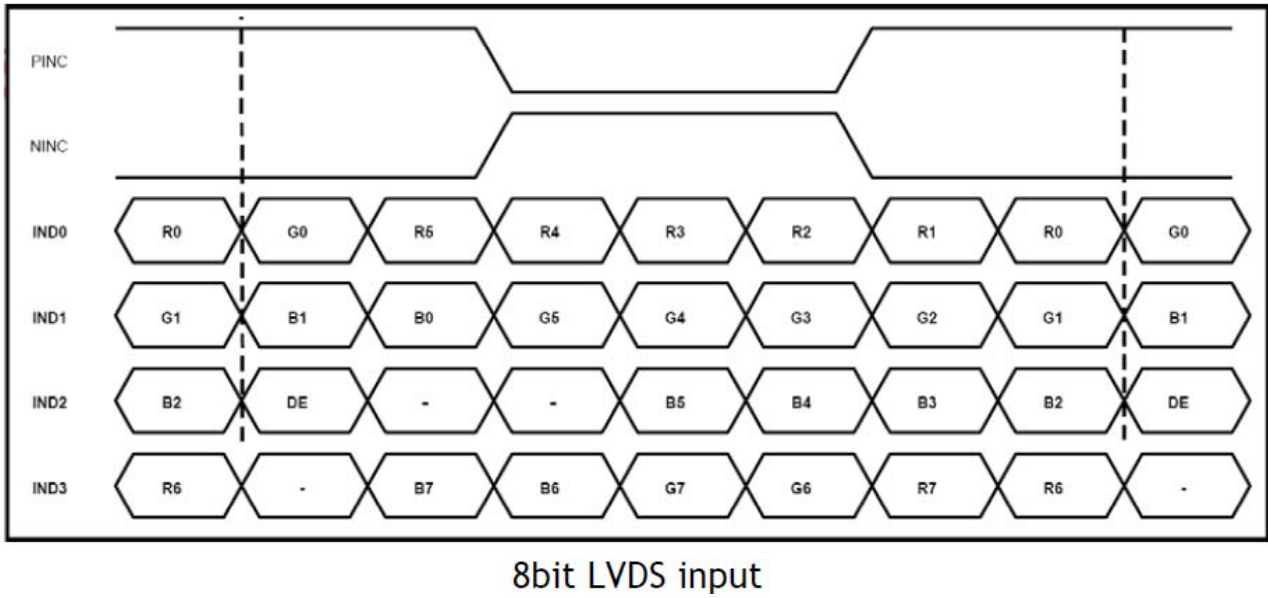
5. BLOCK DIAGRAM

5.1 TFT LCD Module



6. Relationship Between Displayed Color and Input

6.1 8 bit

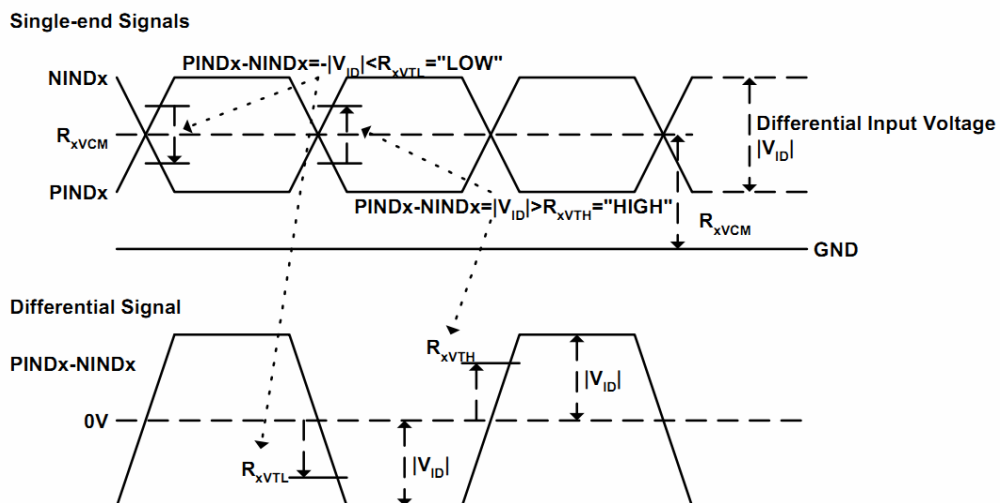


7. ELECTRICAL CHARACTERISTICS

7.1 TFT LCD Module

| Item | Symbol | Values | | | Unit | Note |
|--------------------------------------|----------|--------|------|------|------|-------------|
| | | Min | Typ. | Max. | | |
| Supply Voltage | VCC | 3.0 | 3.3 | 3.6 | V | |
| | VLED_12V | - | 12 | - | V | |
| Differential Input High Threshold | RxVTH | - | - | +100 | mV | RxVCM=+1.2V |
| Differential Input Low Threshold | RxVTL | -100 | - | - | mV | RxVCM=+1.2V |
| Magnitude differential Input Voltage | VID | 200 | - | 600 | mV | (1) |
| Common Mode Voltage | RxVCM | 0.7 | - | 1.6 | V | |
| PWM frequency | | 100 | - | 10K | Hz | |
| Supply Current | ICC | - | TBD | - | mA | |
| | ILED | - | TBD | - | mA | |
| LED life time | | 50000 | - | - | Hr | (2) |

Note 1:

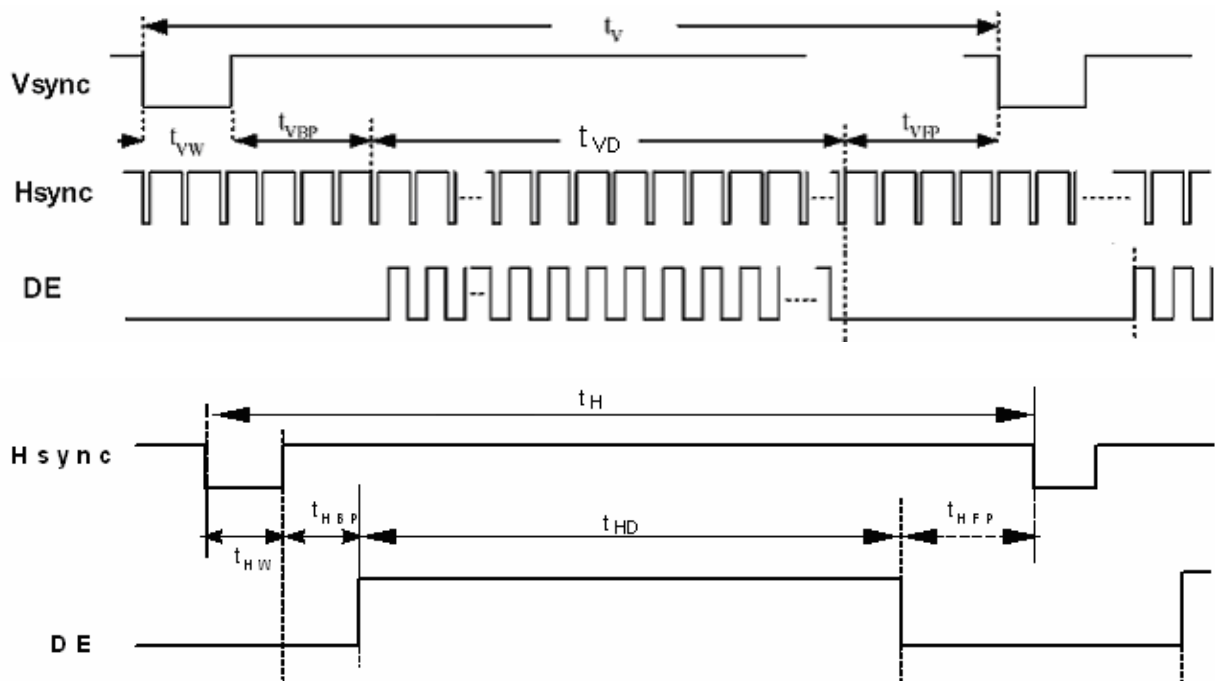


Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C 60% RH.

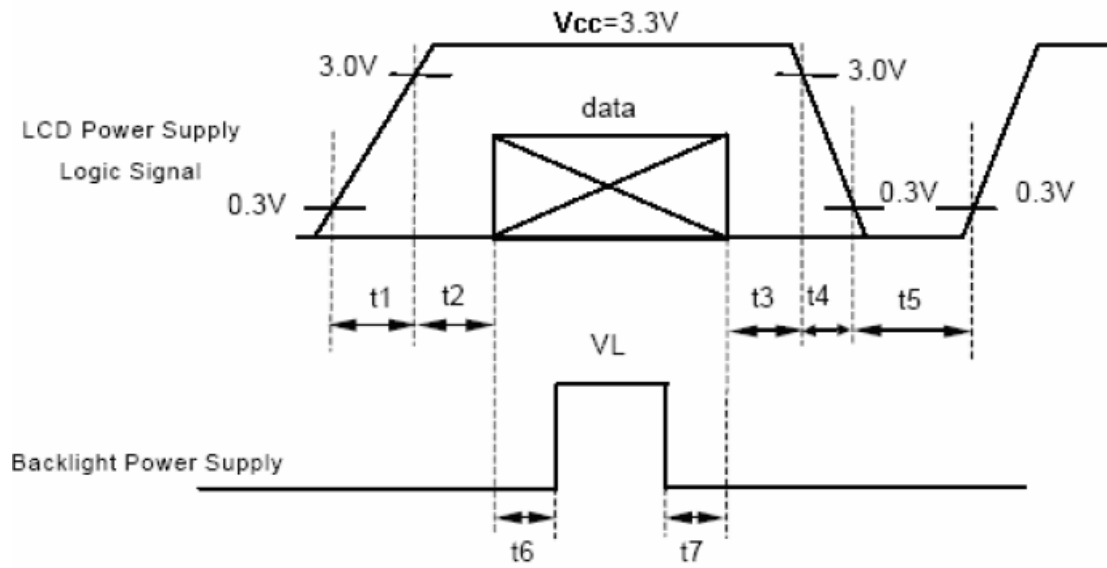
7.2 INTERFACE SPECIFICATIONS

7.2.1 Timing

| Signal | Parameter | Symbol | Min. | Typ. | Max. | Unit. | Remark |
|--------|-----------------|-------------------|------|------|------|-------|--------|
| DCLK | CLK frequency | $1/T_c$ | 68.9 | 71.1 | 73.4 | MHz | |
| HSYNC | Horizontal Line | T_H | 1410 | 1440 | 1470 | Tc | |
| | HS Display Area | T_{HD} | - | 1280 | - | Tc | |
| | HS Blanking | $T_{HBP}+t_{HFP}$ | 130 | 160 | 190 | Tc | |
| VSYNC | VS Period Time | T_V | 815 | 823 | 833 | T_H | |
| | VS Display Area | T_{VD} | - | 800 | - | T_H | |
| | VS Blanking | $T_{VBP}+T_{VFP}$ | 15 | 23 | 33 | T_H | |



7.3 Power On / Off Sequence



Data: RGB DATA, DCLK, DE

$t1 \leq 10\text{ms} : 1 \text{ sec} \leq t5$

$50\text{ms} \leq t2 : 200\text{ms} \leq t6$

$0 < t3 \leq 50\text{ms} : 200\text{ms} \leq t7$

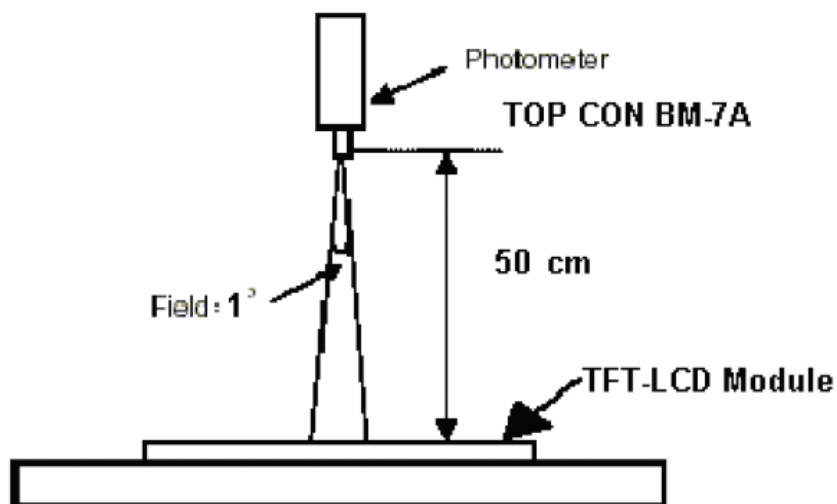
$0 < t4 \leq 10\text{ms}$

8. OPTICAL CHARACTERISTICS

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------|------------|--|-------|-------|-------|-------------------|
| Brightness | -- | Note1, Note 3, ($\theta = 0^\circ$; Normal Viewing Angle) | 800 | 1000 | -- | cd/m ² |
| Uniformity | B-uni | | 75 | 80 | - | % |
| Contrast Ratio | CR | | 600 | 800 | -- | -- |
| Response Time | Tr | | -- | 10 | 20 | ms |
| | Tf | -- | 15 | 30 | ms | |
| Color Chromaticity | White | Wx | 0.260 | 0.310 | 0.360 | -- |
| | | Wy | 0.280 | 0.330 | 0.380 | -- |
| View angle | Horizontal | $\theta x+$ | 75 | 85 | -- | |
| | | $\theta x-$ | 75 | 85 | -- | |
| | Vertical | $\theta Y+$ | 75 | 85 | -- | |
| | | $\theta Y-$ | 75 | 85 | -- | |

Note : The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤ 1 lux, and at room temperature). The operation temperature is $25^\circ\text{C} \pm 2^\circ\text{C}$. The measurement method is shown in Note1.

Note1: The method of optical measurement:

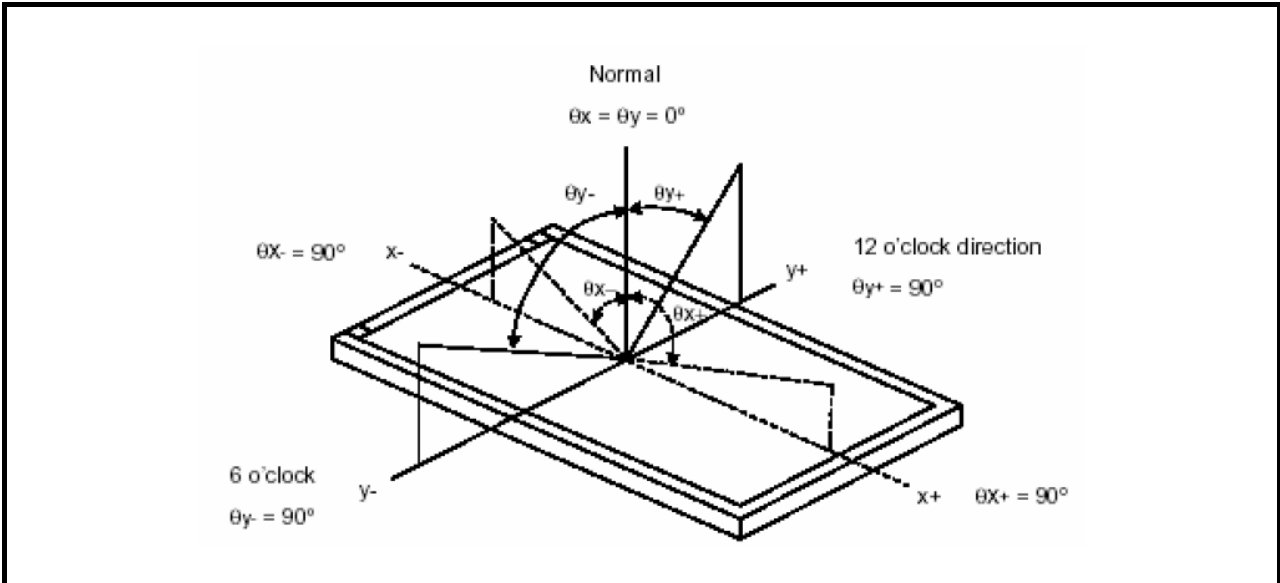


Note2: Measured at the center area of the panel and at the viewing angle of the $\theta x = \theta y = 0^\circ$

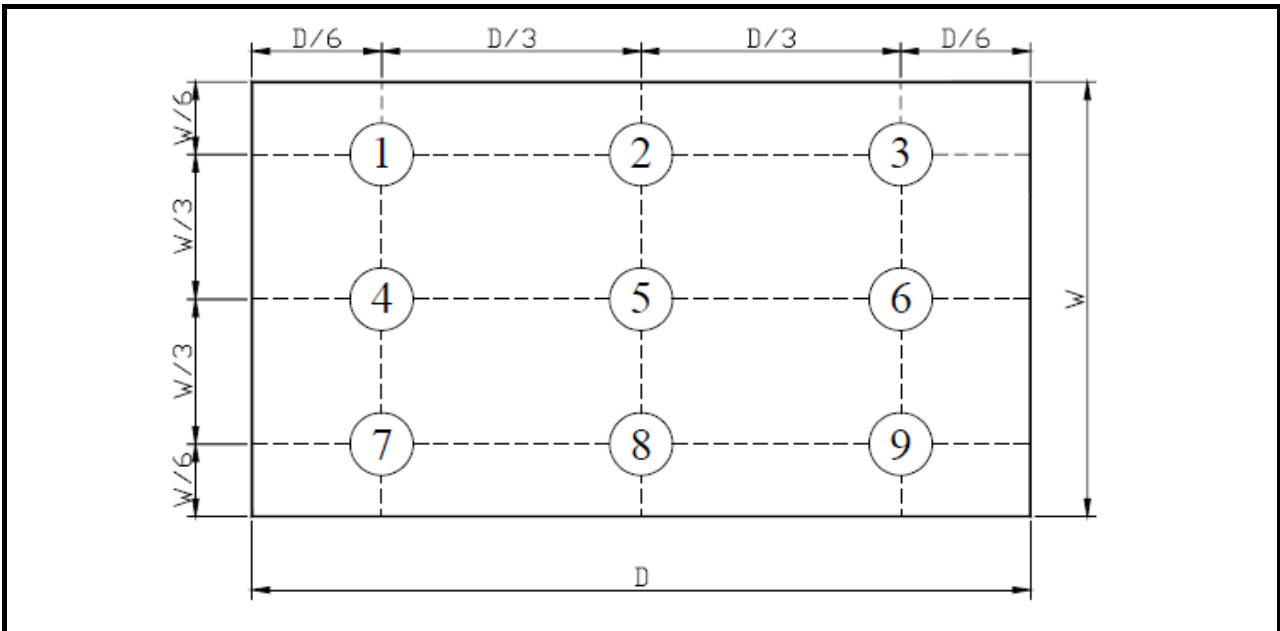
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state \div Luminance with all pixels in Black state

Note 4: Definition of Viewing Angle:



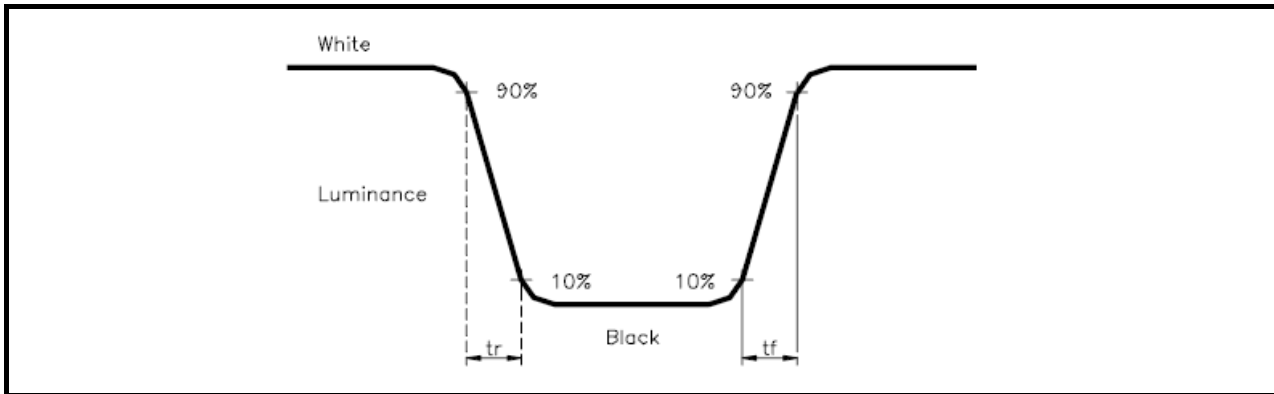
Note 5: Definition of Brightness Uniformity (B-uni):



B-uni = (Minimum luminance of 9 points ÷ Maximum luminance of 9 points) X 100%

Note 6: Definition of Response Time:

The Response Time is set initially by defining the "Rising Time (T_r)" and the "Falling Time (T_f)" respectively. T_r and T_f are defined as following figure



Note 7: Definition of Chromaticity:

The color coordinates (W_x, W_y), (R_x, R_y), (G_x, G_y), and (B_x, B_y) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

9. RELIABILITY

9.1 Test Condition

9.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 5\%$

9.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

9.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

9.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

9.2 TESTS

| No. | ITEM | CONDITION CRITERION |
|-----|---|--|
| 1 | High Temperature Storage | 80°C, 240 hrs |
| 2 | Low Temperature Storage | -30°C, 240 hrs |
| 3 | High Temperature Operating | 70°C, 240 hrs |
| 4 | Low Temperature Operating | -20°C, 240 hrs |
| 5 | High Temperature/Humidity Non-Operating | 40°C, 90%RH, 240 hrs |
| 6 | Temperature Shock Non-Operating | -30°C \longleftrightarrow 80°C (0.5hr each), 100 cycles |
| 7 | Vibration Test Non-Operating | Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z |
| 8 | Electro-static Discharge | \pm 2KV, Human Body Mode, 100pF/1500 Ω |

Note1: The test sample have recovery time for 24 hours at room temperature before the function check. In the standard conditions, there is no any touch panel function NG issue occurred.

9.3 JUDGMENT STANDARD

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

9.4 INCOMING INSPECTION STANDARDS

| No. | Parameter | Criteria | | | | | | | | | | | | |
|---|--|---|------------------------|-------------------|-------------------|-------------|--------------------------------------|---|----------------------------|------|--------------|-----|-------|-----|
| 1 | Operating | Display function: No Display malfunction (Major) | | | | | | | | | | | | |
| | | Contrast ratio (Black, White): Does not meet specified range in the spec. (Major) (Note:3) | | | | | | | | | | | | |
| | | Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major) (Note:1) | | | | | | | | | | | | |
| | | Point Defect : Active area ≤ 5 dots (Minor) (Note:1) | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th rowspan="2">Item</th> <th>Acceptable number</th> <th rowspan="2">Total</th> </tr> <tr> <th>Active Area</th> </tr> </thead> <tbody> <tr> <td>Bright</td> <td>2</td> <td rowspan="2">5</td> </tr> <tr> <td>Dark</td> <td>4</td> </tr> </tbody> </table> | Item | Acceptable number | Total | Active Area | Bright | 2 | 5 | Dark | 4 | | | |
| Item | Acceptable number | Total | | | | | | | | | | | | |
| | Active Area | | | | | | | | | | | | | |
| Bright | 2 | 5 | | | | | | | | | | | | |
| Dark | 4 | | | | | | | | | | | | | |
| 2 | External Inspection (non-operating) | Non-uniformity: Visible through 5%ND filter. (Minor) | | | | | | | | | | | | |
| | | Foreign material in Black or White spots shape ($W > 1/4L$) | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Zone Dimension</th> <th>Acceptable number</th> <th rowspan="3">Class Of Defects</th> <th rowspan="3">AQL Level</th> </tr> </thead> <tbody> <tr> <td>$D > 0.5$</td> <td>0</td> </tr> <tr> <td>$0.3 < D \leq 0.5$</td> <td>5</td> </tr> <tr> <td>$D \leq 0.3$</td> <td>*</td> <td>Minor</td> <td>1.5</td> </tr> </tbody> </table> <p>$D = (\text{Long} + \text{Short}) / 2$ * : Disregard</p> | Zone Dimension | Acceptable number | Class Of Defects | AQL Level | $D > 0.5$ | 0 | $0.3 < D \leq 0.5$ | 5 | $D \leq 0.3$ | * | Minor | 1.5 |
| | | Zone Dimension | Acceptable number | Class Of Defects | | | AQL Level | | | | | | | |
| | | $D > 0.5$ | 0 | | | | | | | | | | | |
| $0.3 < D \leq 0.5$ | 5 | | | | | | | | | | | | | |
| $D \leq 0.3$ | * | Minor | 1.5 | | | | | | | | | | | |
| Foreign Material in Line or spiral shape ($W \leq 1/4L$) (Note: 4) | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Zone L (mm) \ W(mm)</th> <th>Acceptable number</th> <th rowspan="3">Class Of Defects</th> <th rowspan="3">AQL Level</th> </tr> </thead> <tbody> <tr> <td>$L > 5$ $W > 0.1$</td> <td>0</td> </tr> <tr> <td>$0.5 < L \leq 5$ $0.03 < W \leq 0.1$</td> <td>5</td> </tr> <tr> <td>$L \leq 0.5$ $W \leq 0.03$</td> <td>*</td> <td>Minor</td> <td>1.5</td> </tr> </tbody> </table> <p>L : Length W : Width * : Disregard</p> | Zone L (mm) \ W(mm) | Acceptable number | Class Of Defects | AQL Level | $L > 5$ $W > 0.1$ | 0 | $0.5 < L \leq 5$ $0.03 < W \leq 0.1$ | 5 | $L \leq 0.5$ $W \leq 0.03$ | * | Minor | 1.5 | | |
| Zone L (mm) \ W(mm) | Acceptable number | Class Of Defects | | | AQL Level | | | | | | | | | |
| $L > 5$ $W > 0.1$ | 0 | | | | | | | | | | | | | |
| $0.5 < L \leq 5$ $0.03 < W \leq 0.1$ | 5 | | | | | | | | | | | | | |
| $L \leq 0.5$ $W \leq 0.03$ | * | Minor | 1.5 | | | | | | | | | | | |
| 2 | External Inspection (non-operating) | Dimension: Outline (Major) | | | | | | | | | | | | |
| | | Bezel appearance: uneven (Minor) | | | | | | | | | | | | |
| | | Scratch on the polarize: (Note:2) | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Zone L (mm) \ W(mm)</th> <th>Acceptable number</th> <th rowspan="3">Class Of Defects</th> <th rowspan="3">AQL Level</th> </tr> </thead> <tbody> <tr> <td>-- $W > 0.1$</td> <td>0</td> </tr> <tr> <td>$L \leq 3$ $W \leq 0.1$</td> <td>3</td> </tr> </tbody> </table> <p>L : Length W : Width * : Disregard</p> | Zone L (mm) \ W(mm) | Acceptable number | Class Of Defects | AQL Level | -- $W > 0.1$ | 0 | $L \leq 3$ $W \leq 0.1$ | 3 | | | | |
| | | Zone L (mm) \ W(mm) | Acceptable number | Class Of Defects | | | AQL Level | | | | | | | |
| -- $W > 0.1$ | 0 | | | | | | | | | | | | | |
| $L \leq 3$ $W \leq 0.1$ | 3 | | | | | | | | | | | | | |
| Dent or bubble on the polarize (Note:2) | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Zone Dimension</th> <th>Acceptable number</th> <th rowspan="3">Class Of Defects</th> <th rowspan="3">AQL Level</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.3$</td> <td>*</td> </tr> <tr> <td>$D \leq 0.5$</td> <td>3</td> </tr> </tbody> </table> <p>$D = (\text{Long} + \text{Short}) / 2$ * : Disregard</p> | Zone Dimension | Acceptable number | Class Of Defects | AQL Level | $D \leq 0.3$ | * | $D \leq 0.5$ | 3 | | | | | | |
| Zone Dimension | Acceptable number | Class Of Defects | | | AQL Level | | | | | | | | | |
| $D \leq 0.3$ | * | | | | | | | | | | | | | |
| $D \leq 0.5$ | 3 | | | | | | | | | | | | | |

| Class of defects | | | Definition |
|------------------|--------------|---|--|
| | Major | AQL 0.65% | It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function. |
| Minor | AQL 1.5% | It is a defect that will not result in functioning problem with deviation classified. | |

Note1:

(a) Bright point defect is defined as point defect of R,G,B with area $>1/2$ pixel respectively

(b) Dark point defect is defined as visible in full white pattern.

(c) Definition of distribution of point defect is as follows:

- minimum separation between dark point defects should be larger than 5mm.
- minimum separation between bright point defects should be larger than 5mm.

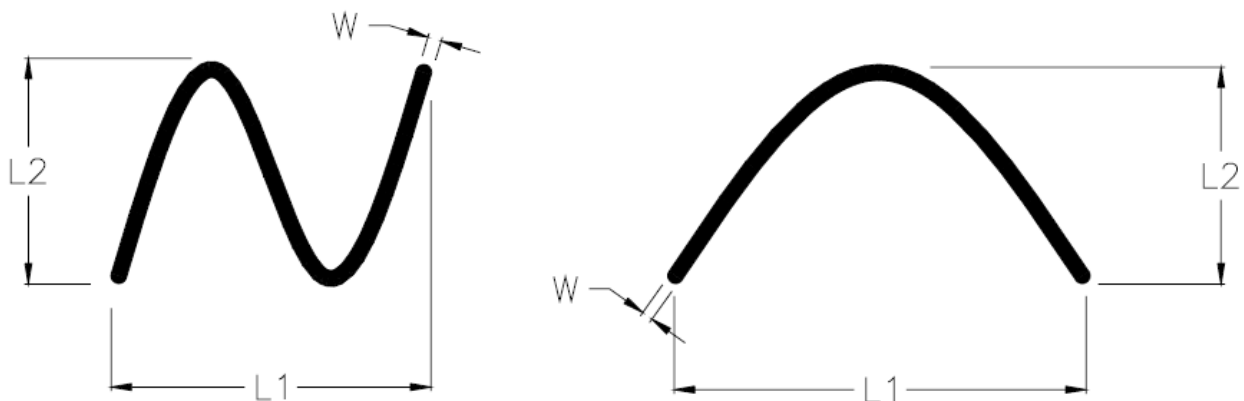
(d) Definition of joined bright point defect and joined dark point defect are as follows:

- Two or more joined bright point defects must be nil.
- Three joined dark point defects must be nil.
- Coupling of one dark and one bright point in junction is counted as one dark and bright spot with 1 pair maximum.
- Two Joined dark point is counted as two dark points with 2 pair maximum.

Note2: The external inspection should be conducted at the distance 30 ± 5 cm between the eyes of inspector and the panel.

Note3: Luminance measurement for contrast ratio is at the distance 50 ± 5 cm between the detective head and the panel with ambient luminance less than 1 lux. Contrast ratio is obtained at optimum view angle.

Note4: W-Width in mm , L-length of Max.(L1,L2) in mm.



9.5 Sampling Condition

Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.

Lot size: Quantity of shipment lot per model.

Sampling type: normal inspection, single sampling

Sampling table: MIL-STD-105E

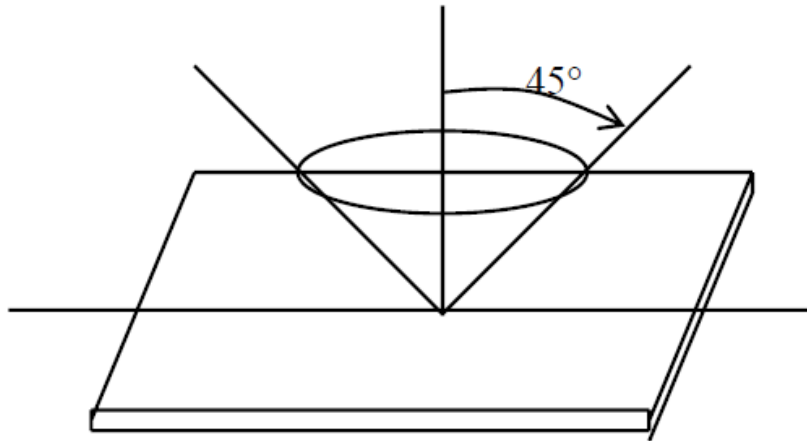
Inspection level: Level II

9.6 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.

$\theta \leq 45^\circ$ inspection under non-operating condition.

$\theta \leq 5^\circ$ inspection under operating condition



10. PRECAUTION RELATING PRODUCT HANDLING

10.1 SAFETY

10.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

10.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

10.2 HANDLING

10.2.1 Avoid any strong mechanical shock which can break the glass.

10.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.

10.2.3 Do not remove the panel or frame from the module.

10.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

10.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

10.2.6 Do not touch the display area with bare hands , this will stain the display area.

10.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

10.2.8 To control temperature and time of soldering is $280 \pm 10^{\circ}\text{C}$ and 3-5 sec.

10.2.9 To avoid liquid (include organic solvent) stained on LCM.

10.3 STORAGE

10.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.

10.3.2 Do not place the module near organics solvents or corrosive gases.

10.3.3 Do not crush, shake, or jolt the module.