Microtips TECHNOLOGY

Model No: AWK-1280800T101N03

| Approved By | |
|---|---|
| | |

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# Revision Record

| Rev No. | Rev Date | Contents | Note |
|---|---|---|---|
| A | 2019/12/27 | New issue | |
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# Table of Contents

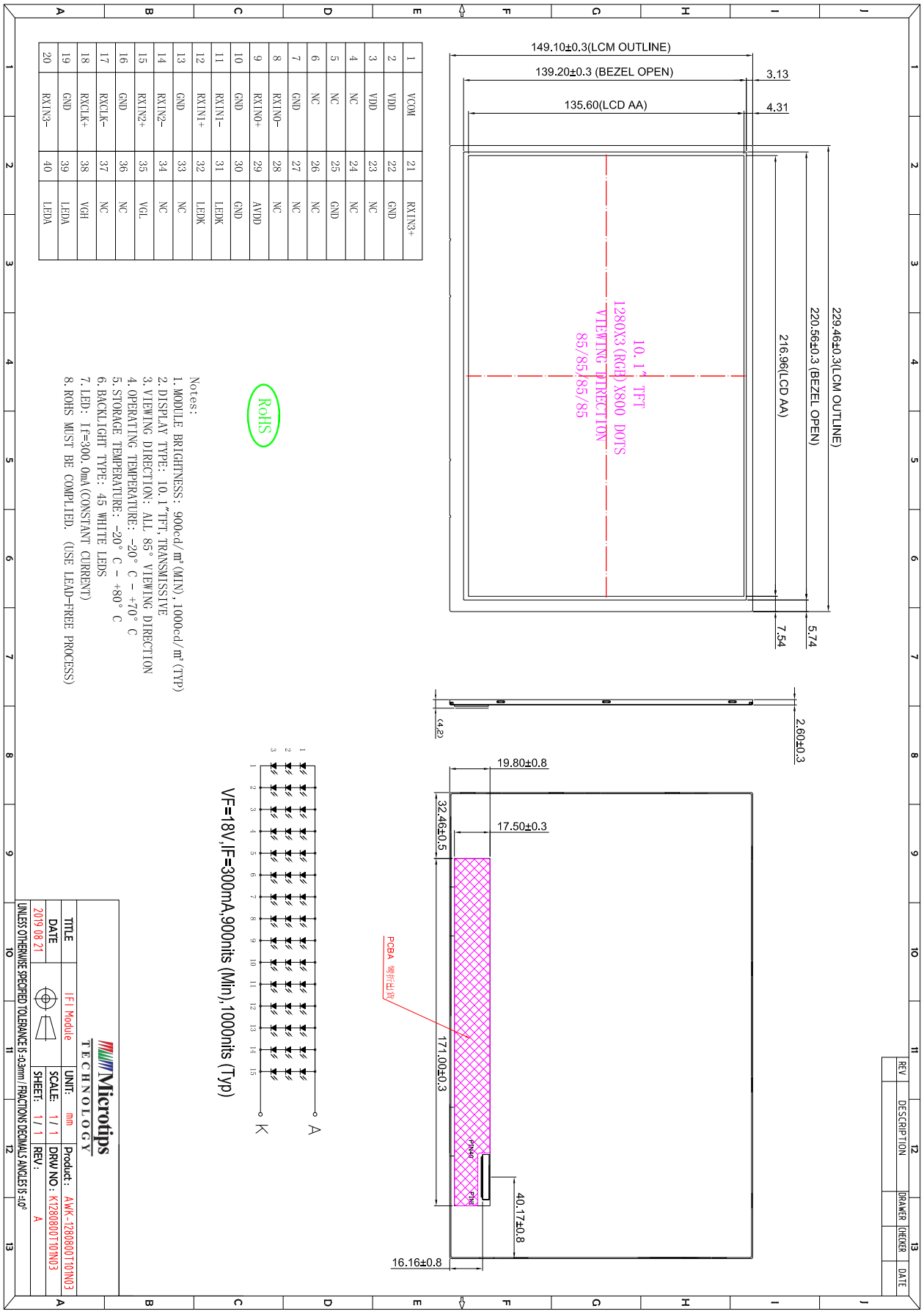
## 1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by Microtips Technology. If the event of unforeseen problem or unspecified items may occur naturally shall negotiate and agree to solution

## 2. General Information

| ITEM | STANDARD VALUES | UNITS |
|---|---|---|
| LCD type | 10.1”TFT | -- |
| Dot arrangement | 1280×3 (RGB)×800 | dots |
| Color filter array | RGB vertical stripe | -- |
| Display mode | Normally Black / IPS | -- |
| Viewing Direction | ALL | -- |
| Top Polarizer Type | Fog | -- |
| Module size | 229.46(W)×149.10(H)×2.6(T) | mm |
| Active area | 216.96(W)×135.60(H) | mm |
| Dot pitch | 0.0565(W)×0.1695(H) | mm |
| Interface | LVDS | -- |
| Back Light | 45 White LEDS | -- |
| Operating temperature | -20 ~ +70 | °C |
| Storage temperature | -20 ~ +80 | °C |

# 3. External Dimensions




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | VCOM | 21 | RXIN3+ | 1 | 1 | 21 | RXIN3+ | 1 | 1 |
| 2 | VDD | 22 | GND | 2 | 2 | 22 | GND | 2 | 2 |
| 3 | VDD | 23 | NC | 3 | 3 | 23 | NC | 3 | 3 |
| 4 | NC | 24 | NC | 4 | 4 | 24 | NC | 4 | 4 |
| 5 | NC | 25 | GND | 5 | 5 | 25 | GND | 5 | 5 |
| 6 | NC | 26 | NC | 6 | 6 | 26 | NC | 6 | 6 |
| 7 | GND | 27 | NC | 7 | 7 | 27 | NC | 7 | 7 |
| 8 | RXIN0- | 28 | NC | 8 | 8 | 28 | NC | 8 | 8 |
| 9 | RXIN0+ | 29 | AVDD | 9 | 9 | 29 | AVDD | 9 | 9 |
| 10 | GND | 30 | GND | 10 | 10 | 30 | GND | 10 | 10 |
| 11 | RXIN1- | 31 | LEDK | 11 | 11 | 31 | LEDK | 11 | 11 |
| 12 | RXIN1+ | 32 | LEDK | 12 | 12 | 32 | LEDK | 12 | 12 |
| 13 | GND | 33 | NC | 13 | 13 | 33 | NC | 13 | 13 |
| 14 | RXIN2- | 34 | NC | 14 | 14 | 34 | NC | 14 | 14 |
| 15 | RXIN2+ | 35 | VGL | 15 | 15 | 35 | VGL | 15 | 15 |
| 16 | GND | 36 | NC | 16 | 16 | 36 | NC | 16 | 16 |
| 17 | RXCLK- | 37 | NC | 17 | 17 | 37 | NC | 17 | 17 |
| 18 | RXCLK+ | 38 | VGH | 18 | 18 | 38 | VGH | 18 | 18 |
| 19 | GND | 39 | LEDA | 19 | 19 | 39 | LEDA | 19 | 19 |
| 20 | RXIN3- | 40 | LEDA | 20 | 20 | 40 | LEDA | 20 | 20 |

Notes:
1. MODULE BRIGHTNESS: 900cd/m² (MIN), 1000cd/m² (TYP)
2. DISPLAY TYPE: 10.1"TFT, TRANSMISSIVE
3. VIEWING DIRECTION: ALL 85° VIEWING DIRECTION
4. OPERATING TEMPERATURE: -20° C ~ +70° C
5. STORAGE TEMPERATURE: -20° C ~ +80° C
6. BACKLIGHT TYPE: 45 WHITE LEDS
7. LED: If=300.0mA(CONSTANT CURRENT)
8. ROHS MUST BE COMPLIED. (USE LEAD-FREE PROCESS)

| REV | DESCRIPTION | DRAWER | CHECKER | DATE |
|---|---|---|---|---|
| | | | | |

Microtips TECHNOLOGY

| TITLE | IF1 Module | UNIT: | mm | Product: | AWK-1280800T101N03 |
|---|---|---|---|---|---|
| DATE | | SCALE: | 1 / 1 | DRW NO: | K1280800T101N03 |
| 2019 08 21 | | SHEET: | 1 / 1 | REV: | A |

UNLESS OTHERWISE SPECIFIED TOLERANCE IS ±0.3mm / FRACTIONS DECIMALS ANGLES IS ±1.0°

## 4. Interface Description

A 40pin connector is used for the module electronics interface. The recommended model is F62240-H1210A manufactured by Vigorconn.

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | VCOM | P | Common Voltage | |
| 2 | VDD | P | Power Supply | |
| 3 | VDD | P | Power Supply | |
| 4 | NC | --- | No connection | |
| 5 | NC | --- | No connection | |
| 6 | NC | --- | No connection | |
| 7 | GND | P | Ground | |
| 8 | Rxin0- | I | -LVDS Differential Data Input | R0-R5, G0 |
| 9 | Rxin0+ | I | +LVDS Differential Data Input | |
| 10 | GND | P | Ground | |
| 11 | Rxin1- | I | -LVDS Differential Data Input | G1~G5, B0,B1 |
| 12 | Rxin1+ | I | +LVDS Differential Data Input | |
| 13 | GND | P | Ground | |
| 14 | Rxin2- | I | -LVDS Differential Data Input | B2-B5,HS,VS, DE |
| 15 | Rxin2+ | I | +LVDS Differential Data Input | |
| 16 | GND | P | Ground | |
| 17 | RxCLK- | I | -LVDS Differential Clock Input | LVDS CLK |
| 18 | RxCLK+ | I | +LVDS Differential Clock Input | |
| 19 | GND | P | Ground | |
| 20 | Rxin3- | I | -LVDS Differential Data Input | R6, R7, G6, G7, B6, B7 |
| 21 | Rxin3+ | I | +LVDS Differential Data Input | |
| 22 | GND | P | Ground | |
| 23 | NC | --- | No connection | |
| 24 | NC | --- | No connection | |
| 25 | GND | P | Ground | |
| 26 | NC | --- | No connection | |

| | | | | |
|---|---|---|---|---|
| 27 | NC | --- | No connection | |
| 28 | NC | --- | No connection | |
| 29 | AVDD | P | Power for Analog Circuit | |
| 30 | GND | P | Ground | |
| 31 | LED- | P | LED Cathode | |
| 32 | LED- | P | LED Cathode | |
| 33 | NC | --- | No connection | |
| 34 | NC | --- | No connection | |
| 35 | VGL | P | Gate OFF Voltage | |
| 36 | NC | --- | No connection | |
| 37 | NC | --- | No connection | |
| 38 | VGH | P | Gate ON Voltage | |
| 39 | LED+ | P | LED Anode | |
| 40 | LED+ | P | LED Anode | |

**I:input ; O:output ; P:Power**

## 5. Absolute Maximum Ratings

| Item | Symbol | Values | | Unit | Remark |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Power voltage | VDD | -0.3 | 3.9 | V | |
| | AVDD | -0.3 | 14.0 | V | |
| | $V_{GH}$ | -0.3 | 42.0 | V | |
| | $V_{GL}$ | -19.0 | 0.3 | V | |
| | $V_{GH}$-$V_{GL}$ | 12.0 | 40.0 | V | |
| Operation Temperature | $T_{OP}$ | -20 | + 70 | ℃ | |
| Storage Temperature | $T_{ST}$ | -20 | + 80 | ℃ | |

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

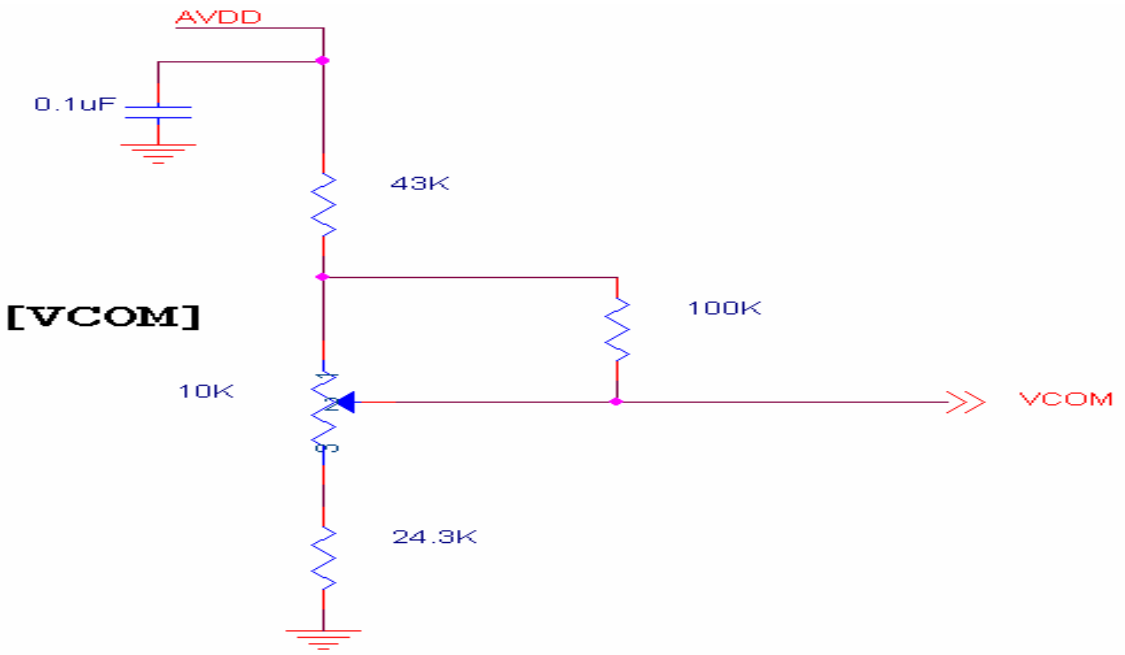
## 6. DC Characteristics

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Power voltage | VDD | 2.3 | 2.5 | 2.7 | V | Note 2 |
| | IVDD | TBD | TBD | TBD | mA | |
| | AVDD | 8.0 | 8.2 | 8.4 | V | |
| | $V_{GH}$ | 21.7 | 22.0 | 22.3 | V | |
| | $V_{GL}$ | -7.3 | -7.0 | -6.7 | V | |
| Input signal voltage | VCOM | 2.7 | 3.0 | 3.3 | V | Note 3 |
| Input logic high voltage | $V_{IH}$ | 0.8 VDD | - | 3.6 | V | |
| Input logic low voltage | $V_{IL}$ | 0 | - | 0.2 DVDD | V | |

**Note 1:** Be sure to apply VDD and $V_{GL}$ to the LCD first, and then apply $V_{GH}$.

**Note 2:** VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

**Note 3:** Typical VCOM is only a reference value, It must be optimized according to each LCM. Be sure to use VR.



# 7. TFT LCM Timing Characteristics

## 7.1 CMOS/TTL DC Specification

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{IH}$ | High Level Input Voltage | RS=VCC or GND | 2.0 | | $V_{CC}$ | V |
| $V_{IL}$ | Low Level Input Voltage | RS=VCC or GND | GND | | 0.8 | V |
| $V_{DDQ}$[1] | Small Swing Voltage | | 1.2 | | 2.8 | V |
| $V_{REF}$ | Input Reference Voltage | Small Swing (RS=$V_{DDQ}$/2) | | $V_{DDQ}$/2 | | |
| $V_{SH}$[2] | Small Swing High Level Input Voltage | $V_{REF}$ = $V_{DDQ}$/2 | $V_{DDQ}$/2 +100mV | | | V |
| $V_{SL}$[2] | Small Swing Low Level Input Voltage | $V_{REF}$ = $V_{DDQ}$/2 | | | $V_{DDQ}$/2 -100mV | V |
| $I_{INC}$ | Input Current | $0V \le V_{IN} \le V_{CC}$ | | | ±10 | uA |

Notes: [1] $V_{DDQ}$ voltage defines max voltage of small swing input. It is not an actual input voltage.
[2] Small swing signal is applied to TA0-6,TB0-6,TC0-6,TD0-6 and CLKIN.

## 7.2 LVDS Transmitter DC Specifications

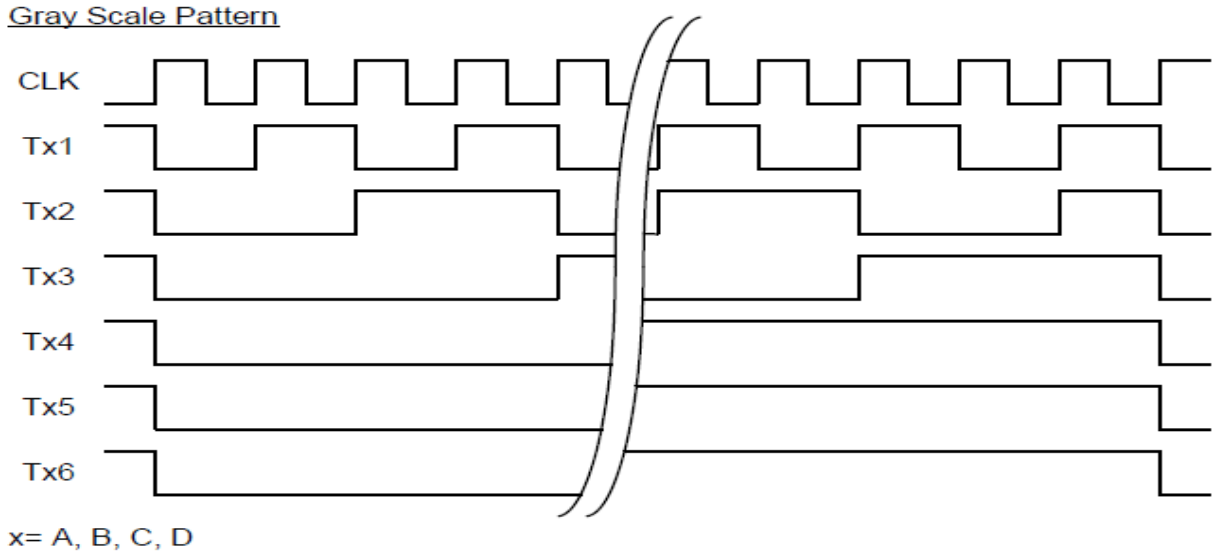
$V_{CC}$ = VCC = PLL VCC = LVDS VCC

| Symbol | Parameter | Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| VOD | Differential Output Voltage | RL=100 Ω | Normal swing RS=$V_{CC}$ | 250 | 350 | 500 | mV |
| | | | Reduced swing RS=GND | 100 | 200 | 300 | mV |
| ΔVOD | Change in VOD between complementary output states | RL=100 Ω | | | | 35 | mV |
| VOC | Common Mode Voltage | | | 1.125 | 1.25 | 1.375 | V |
| ΔVOC | Change in VOC between complementary output states | | | | | 35 | mV |
| $I_{OS}$ | Output Short Circuit Current | VOUT=0V, RL=100 Ω | | | | -24 | mA |
| $I_{OZ}$ | Output TRI-STATE Current | /PDWN=0V, $V_{OUT}$=0V to $V_{CC}$ | | | | ±10 | uA |

## 7.3 Supply Current

$V_{CC}$ = VCC = PLL VCC = LVDS VCC

| Symbol | Parameter | Condition(*) | | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $I_{TCCG}$ | Transmitter Supply Current | RL=100Ω,CL=5pF $V_{CC}$=3.3V, f=85MHz Gray Scale Pattern | RS=$V_{CC}$ | 52 | 58 | mA |
| | | | RS=GND | 40 | 46 | mA |
| $I_{TCCW}$ | Transmitter Supply Current | RL=100Ω,CL=5pF $V_{CC}$=3.3V, f=85MHz Worst Case Pattern | RS=$V_{CC}$ | 61 | 67 | mA |
| | | | RS=GND | 50 | 56 | mA |
| $I_{TCCS}$ | Transmitter Power Down Supply Current | /PDWN = L | | | 10 | uA |



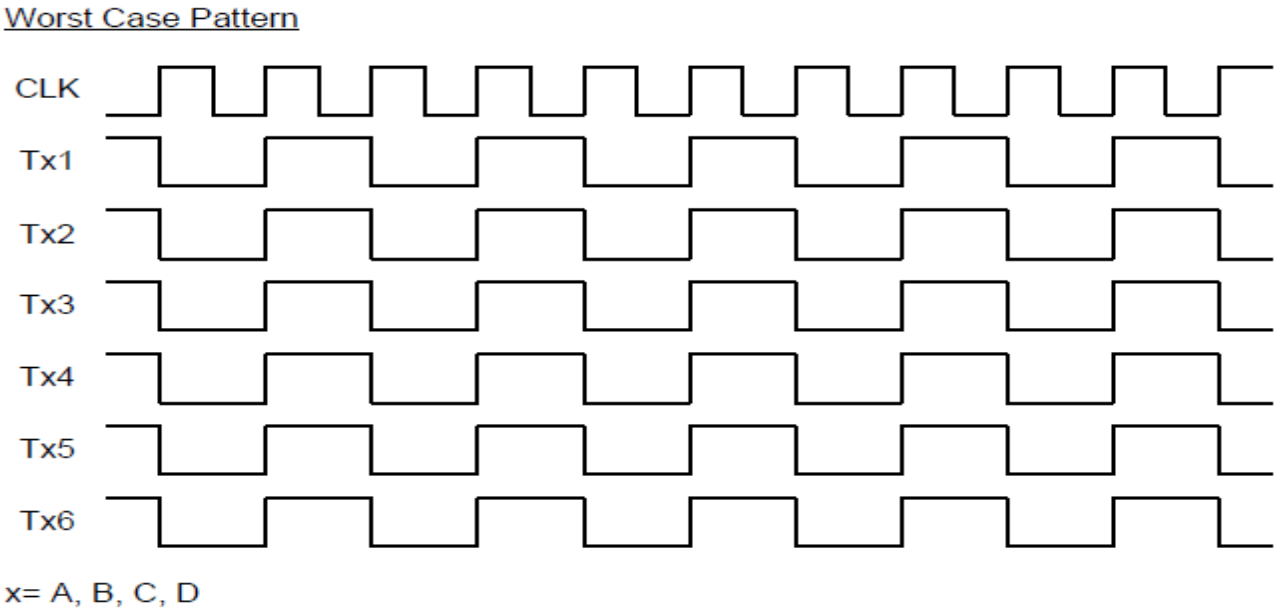




Fig1. Data Pattern

## 7.4 Switching Characteristics

$V_{CC}$ = VCC = PLL VCC = LVDS VCC

| Symbol | Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $t_{TCIT}$ | CLK IN Transition time | | | 5.0 | ns |
| $t_{TCP}$ | CLK IN Period | 11.7 | T | 125 | ns |
| $t_{TCH}$ | CLK IN High Time | 0.35T | 0.5T | 0.65T | ns |
| $t_{TCL}$ | CLK IN Low Time | 0.35T | 0.5T | 0.65T | ns |
| $t_{TCD}$ | CLK IN to TCLK+/- Delay | | 3T | | ns |
| $t_{TS}$ | TTL Data Setup to CLK IN | 2.5 | | | ns |
| $t_{TH}$ | TTL Data Hold from CLK IN | 0 | | | ns |
| $t_{LVT}$ | LVDS Transition Time | | 0.6 | 1.5 | ns |
| $t_{TOP1}$ | Output Data Position0 (T=11.7ns) | -0.2 | 0.0 | +0.2 | ns |
| $t_{TOP0}$ | Output Data Position1 (T=11.7ns) | $\frac{T}{7}-0.2$ | $\frac{T}{7}$ | $\frac{T}{7}+0.2$ | ns |
| $t_{TOP6}$ | Output Data Position2 (T=11.7ns) | $2\frac{T}{7}-0.2$ | $2\frac{T}{7}$ | $2\frac{T}{7}+0.2$ | ns |
| $t_{TOP5}$ | Output Data Position3(T=11.7ns) | $3\frac{T}{7}-0.2$ | $3\frac{T}{7}$ | $3\frac{T}{7}+0.2$ | ns |
| $t_{TOP4}$ | Output Data Position4 (T=11.7ns) | $4\frac{T}{7}-0.2$ | $4\frac{T}{7}$ | $4\frac{T}{7}+0.2$ | ns |
| $t_{TOP3}$ | Output Data Position5 (T=11.7ns) | $5\frac{T}{7}-0.2$ | $5\frac{T}{7}$ | $5\frac{T}{7}+0.2$ | ns |
| $t_{TOP2}$ | Output Data Position6 (T=11.7ns) | $6\frac{T}{7}-0.2$ | $6\frac{T}{7}$ | $6\frac{T}{7}+0.2$ | ns |
| $t_{TPLL}$ | Phase Lock Loop Set | | | 10.0 | ms |

AC Timing Diagrams

TTL Input

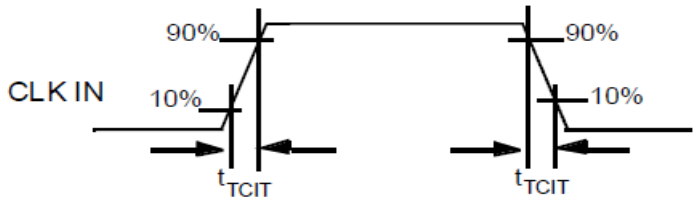



Fig2. CLKIN Transition Time

LVDS Output

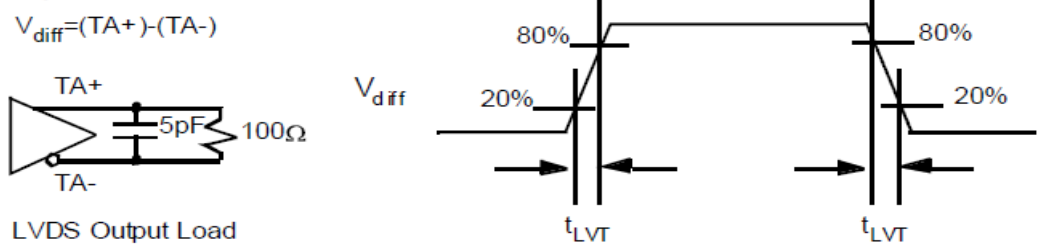



Fig3. LVDS Output Load and Transition Time

## 7.5 AC Timing Diagrams

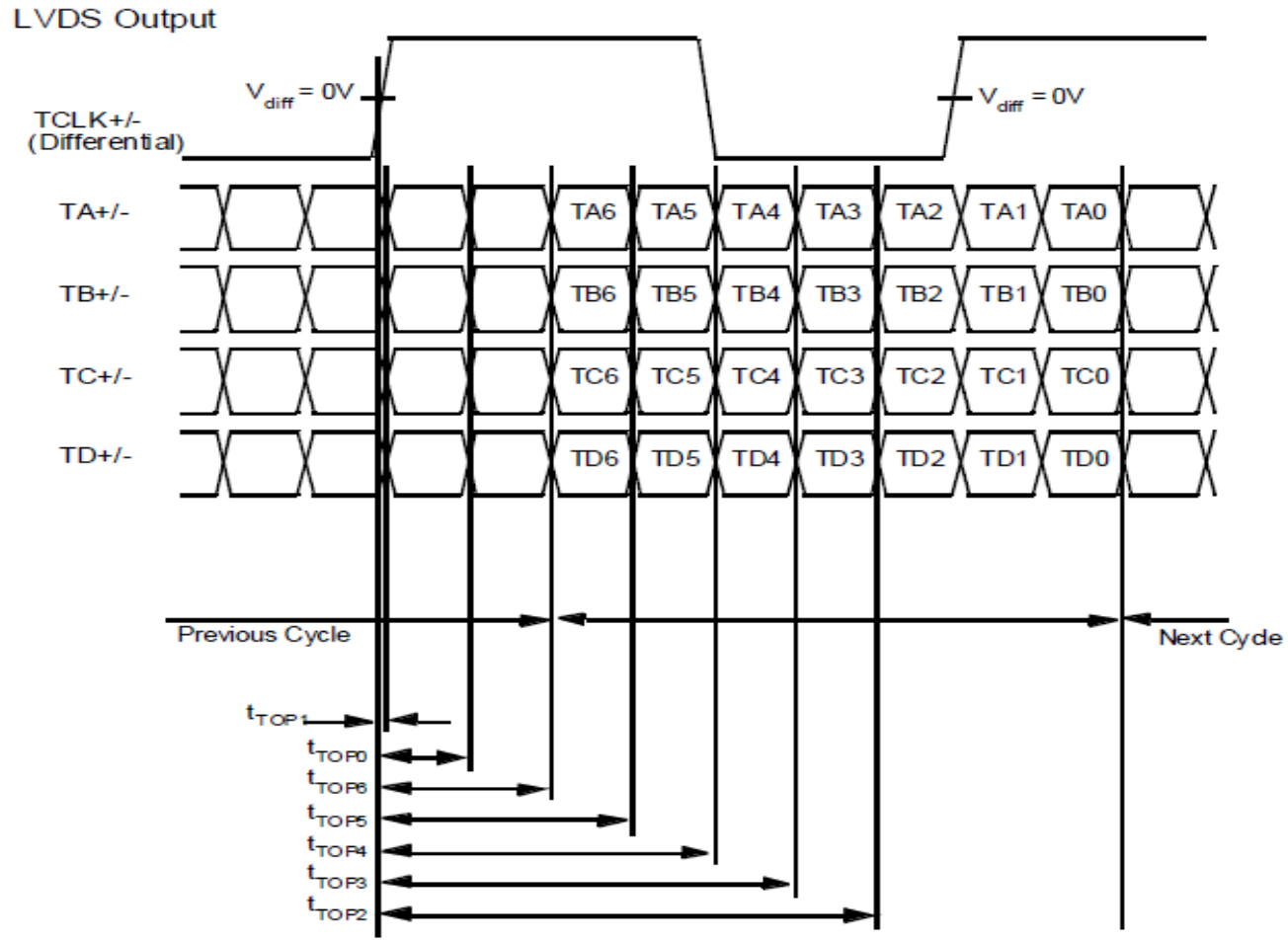



Fig6. LVDS Output Data Position

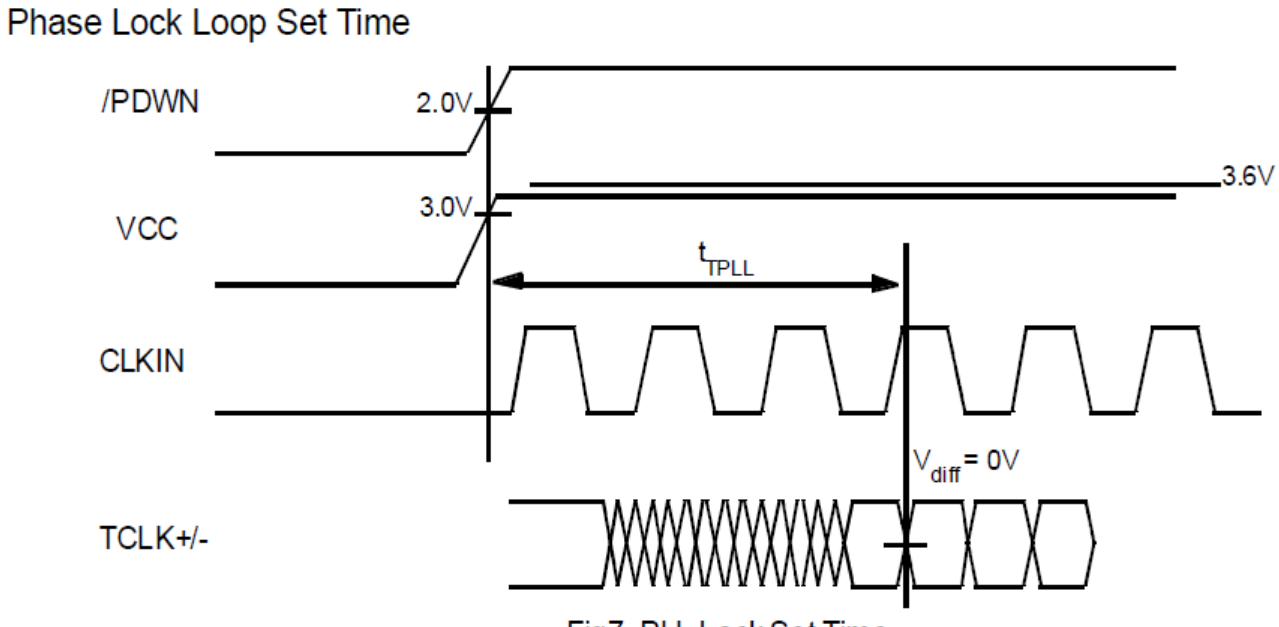
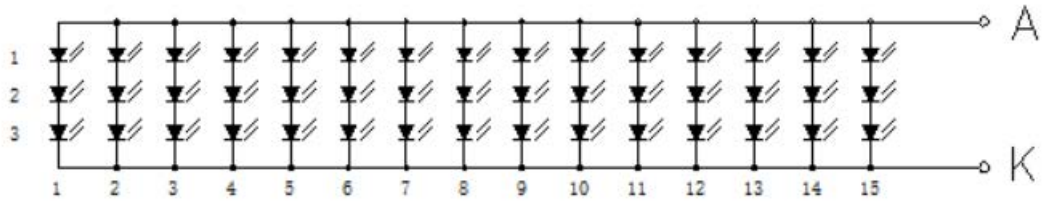



Fig7. PLL Lock Set Time

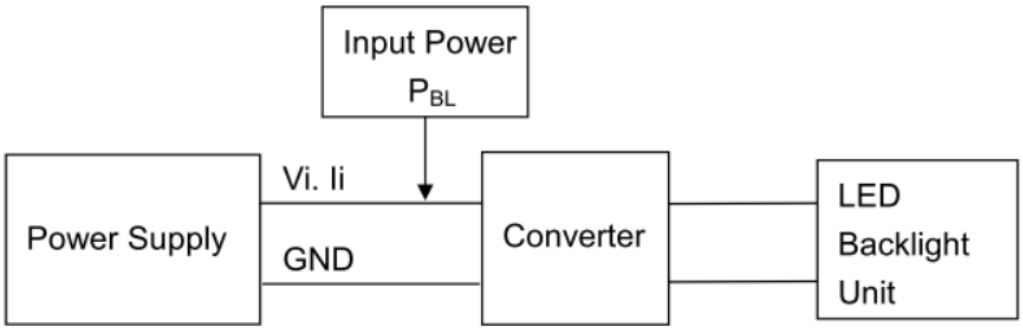
## 8. Backlight Characteristic




| Item | Symbol | MIN | TYP | MAX | UNIT | Test Condition |
|---|---|---|---|---|---|---|
| Supply Voltage | Vf | 16.5 | 18.0 | 19.5 | V | If=300mA |
| Supply Current | If | - | 300 | - | mA | - |
| Life Time | - | - | 20000 | - | Hr | If=300mA |
| Backlight Color | White | | | | | |

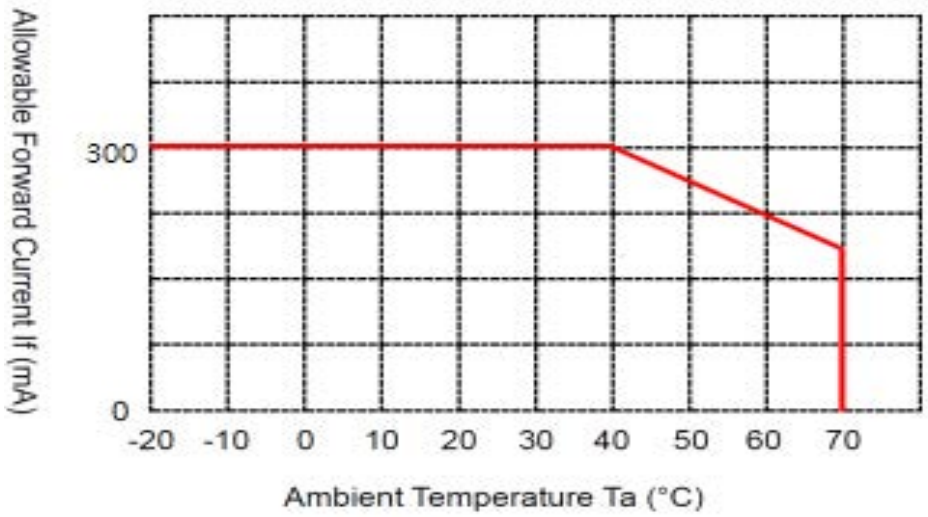
**Note 1:** The LED Supply Voltage is defined by the number of LED at Ta=25℃ and If = 300 mA.

**Note 2:** LED current is measured by utilizing a high frequency current meter as shown below:




**Note 3:** The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If = 300mA.. The LED lifetime could be decreased if operating If is larger than 300 mA.

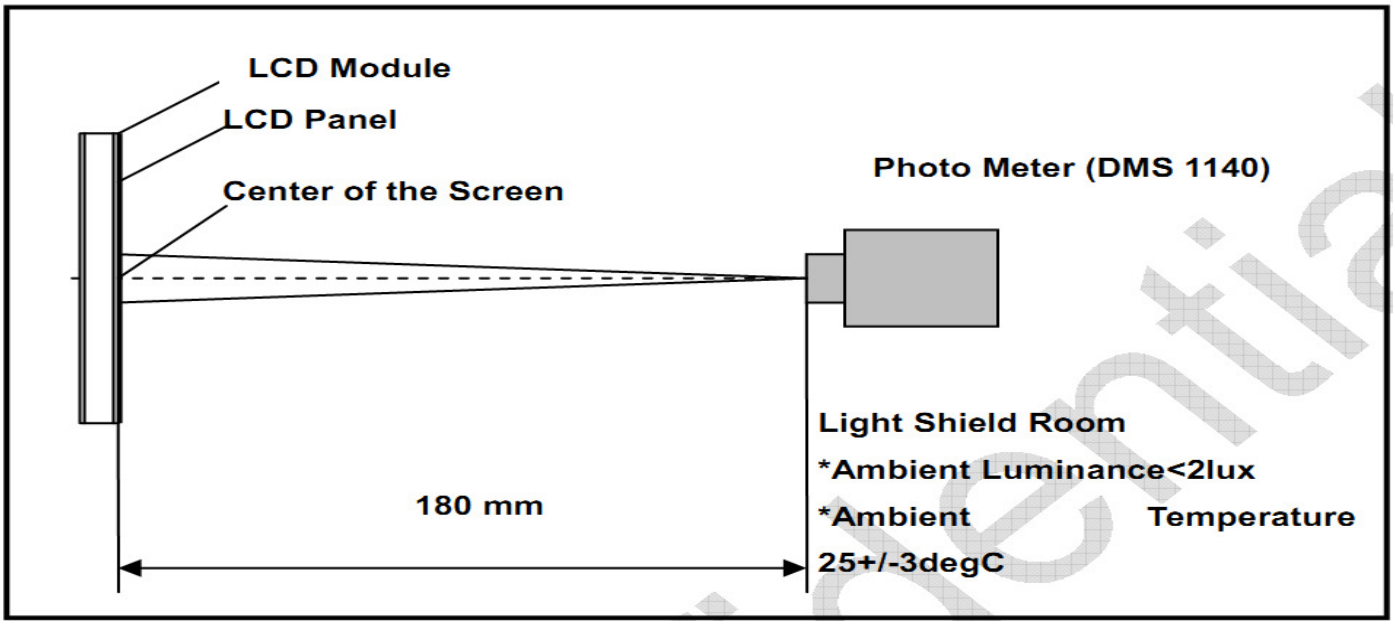
**Note 4:** LED light bar circuit:



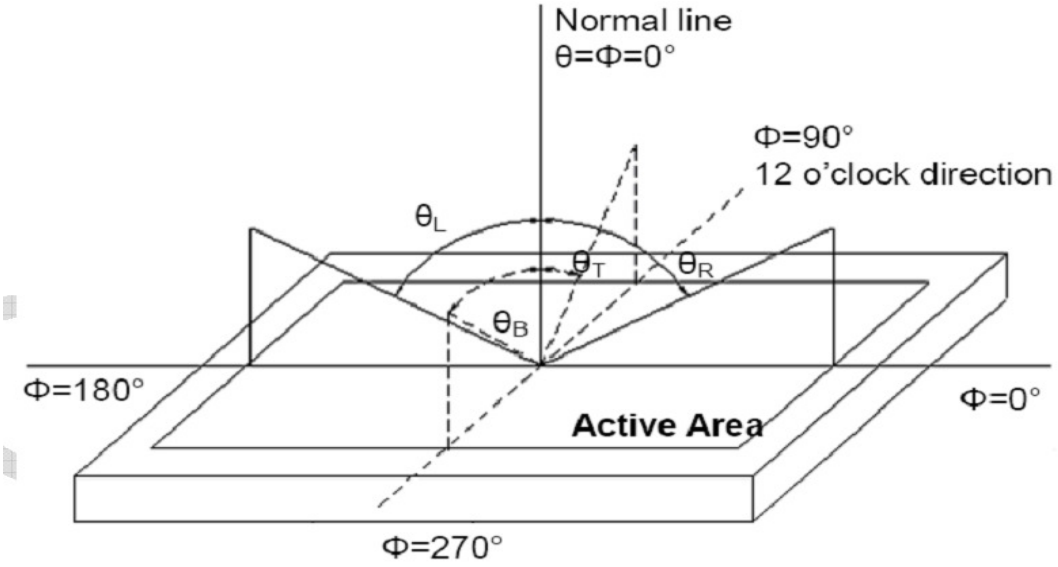
## 9. Optical Characteristics

| Item | Conditions | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Viewing Angle (CR>10) | Horizontal | θL | - | 85 | - | degree | (1),(2),(6) |
| | | θR | - | 85 | - | | |
| | Vertical | θT | - | 85 | - | | |
| | | θB | - | 85 | - | | |
| Contrast Ratio | Center | | 600 | 800 | - | - | (1),(3),(6) |
| Luminous Intensity for LCM | - | | 900 | 1000 | - | $Cd/m^2$ | |
| Uniformity for LCM | - | | 75 | 80 | - | % | |
| Response Time | Rising | | - | 10 | 20 | ms | (1),(4),(6) |
| | Falling | | - | 15 | 30 | | |
| CF Color Chromaticity (CIE1931) | White x | | 0.260 | 0.310 | 0.360 | - | (1), (6) |
| | White y | | 0.280 | 0.330 | 0.380 | - | |
| | Red x | | 0.510 | 0.560 | 0.610 | - | |
| | Red y | | 0.295 | 0.345 | 0.395 | - | |
| | Green x | | 0.270 | 0.320 | 0.370 | - | |
| | Green y | | 0.549 | 0.599 | 0.649 | - | |
| | Blue x | | 0.102 | 0.152 | 0.202 | - | |
| | Blue y | | 0.066 | 0.116 | 0.166 | - | |

**Note (1) Measurement Setup:** The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



**Note (2) Definition of Viewing Angle**



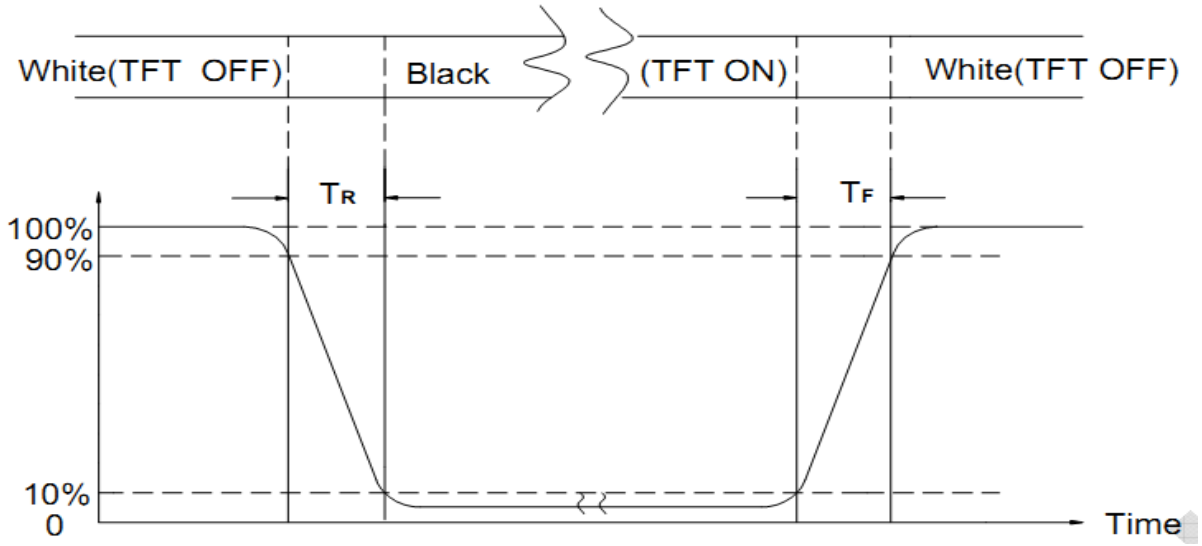

**Note (3) Definition of Contrast Ratio (CR)**

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63, L0: Luminance of gray level 0

**Note (4) Definition of response time**




**Note (5) Definition of Transmittance (Module is without signal input)**

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

**Note (6) Definition of color chromaticity (CIE1931)**

Color coordinates measured at the center point of

## 10. Reliability Test Conditions and Methods

| No. | Test Items | Test Condition | Inspection After Test |
|---|---|---|---|
| ① | High Temperature Storage | 80°C±2°C×96Hours | Inspection after 2~4hours storage at room temperature, the samples should be free from defects:<br>1, Air bubble in the LCD.<br>2, Seal leak.<br>3, Non-display.<br>4, Missing segments.<br>5, Glass crack.<br>6, Current IDD is twice higher than initial value.<br>7, The surface shall be free from damage.<br>8, The electric characteristic requirements shall be satisfied. |
| ② | Low Temperature Storage | -20°C±2°C×96Hours | |
| ③ | High Temperature Operating | 70°C±2°C×96Hours | |
| ④ | Low Temperature Operating | -20°C±2°C×96Hours | |
| ⑤ | Temperature Cycle(Storage) | -20°C (30min) ⇔ 25°C (5min) ⇔ 70°C (30min)<br>1cycle<br>Total 10cycle | |
| ⑥ | Damp Proof Test (Storage) | 50°C±5°C×90%RH×96Hours | |
| ⑦ | Vibration Test | Frequency:10Hz~55Hz~10Hz<br>Amplitude:1.5mm<br>X,Y,Z direction for total 3hours<br>(packing condition test will be tested by a carton) | |
| ⑧ | Drooping Test | Drop to the ground from 1M height one time<br>every side of carton.<br>(packing condition test will be tested by a carton) | |
| ⑨ | ESD Test | Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times | |

REMARK:
1, The Test samples should be applied to only one test item.
2, Sample side for each test item is 5~10pcs.
3,For Damp Proof Test, Pure water(Resistance＞10MΩ)should be used.
4,In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

# 11. Inspection Standard

## 11.1 Scope

Specifications contain

11.1.1 Display Quality Evaluation

11.1.2 Mechanics Specification

## 11.2 Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow

MIL-STD-105E.

11.2.1 Lot size: Quantity per shipment as one lot (different model as different lot ).

11.2.2 Sampling type: Normal inspection, single sampling.

11.2.3 Sampling level: Level II.

11.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.5

## 11.3 Panel Inspection Condition

11.3.1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

11.3.2 Inspection Distance:

35±5 cm

11.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

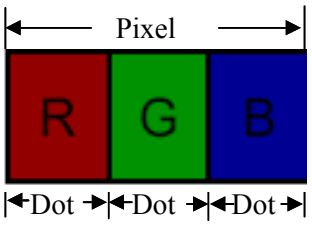
11.3.4 Inspection time：

Perceptibility Test Time: 20 seconds max.

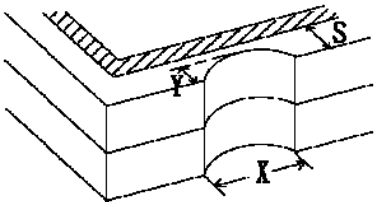
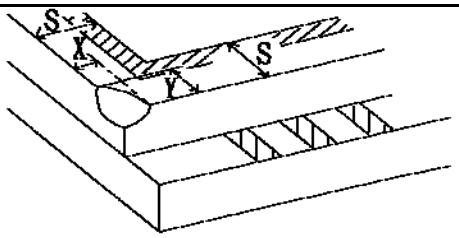
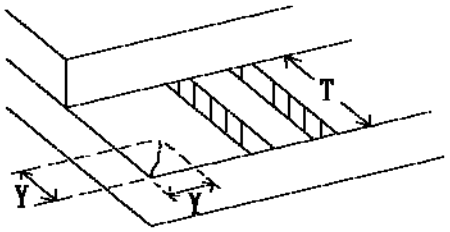
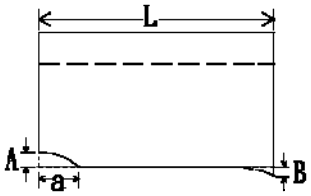
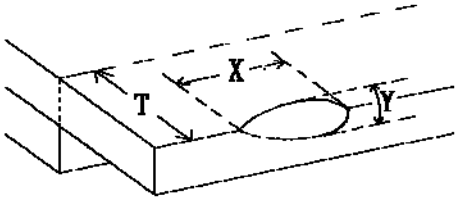
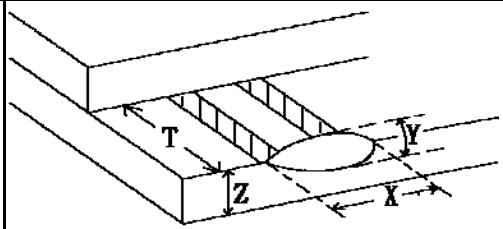
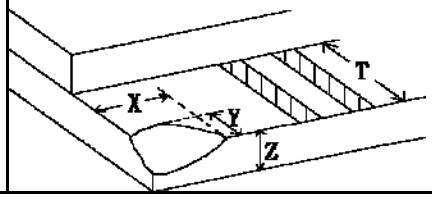
## 11.4 Inspection Plan

| Class | Item | Judgment | 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.<br>Quantity short or over.....Rejected. | Critical |
| | 3. Product indication. | "MODEL NO." should indicate on the product. | Major |
| Assembly | 4. Dimension,<br>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.<br>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.<br>Wrong pattern display. | No display, wrong pattern display, current consumption.<br>Out of specification.....Rejected. | Critical |
| | 13. Dot defect.(for color and TFT) | According to standard of visual Inspection. | Minor |

## 11.5 Standard Of Visual Inspection

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGMENT</th></tr>
<tr><td>11.5.1</td><td>Minor</td><td>Black and white spot.<br>Foreign materiel.<br>Dust.<br>Blemish.<br>Scratch.</td><td>(A) Round type: Unit: mm
<table>
<tr><th>Diameter (mm.)</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.25</td><td>Disregard</td></tr>
<tr><td>0.25 < Φ≦0.5</td><td>3(Distance>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table>
Note: Φ = (length+width)/2<br>(B) Linear type: Unit: mm
<table>
<tr><th>Length</th><th>Width (mm.)</th><th>Acceptable Q'ty</th></tr>
<tr><td>--</td><td>W≦0.03</td><td>Disregard</td></tr>
<tr><td>L≦5.0</td><td>0.03 < W≦0.07</td><td>3(Distance>5mm)</td></tr>
<tr><td>--</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>11.5.2</td><td>Minor</td><td>Dent on polarizer.</td><td>Unit: mm.
<table>
<tr><th>Diameter</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.25</td><td>Disregard</td></tr>
<tr><td>0.25 < Φ≦0.7</td><td>3(Distance>5mm)</td></tr>
<tr><td>0.7< Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.5.3</td><td>Minor</td><td>Bubble in polarizer.</td><td>Unit: mm.
<table>
<tr><th>Diameter</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.25</td><td>Disregard</td></tr>
<tr><td>0.2 5< Φ≦0.7</td><td>5(Distance>5mm)</td></tr>
<tr><td>0.7 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.5.4</td><td>Minor</td><td>Dot defect</td><td>
<table>
<tr><th>Items</th><th>Acceptable Q'ty</th></tr>
<tr><td>Bright dot</td><td>N ≦3</td></tr>
<tr><td>Dark dot</td><td>N ≦4</td></tr>
<tr><td>Total dot</td><td>N ≦6</td></tr>
</table>
Pixel define : 

Note1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.<br>Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.<br>Note 3: The bright dot defect must be visible through 2% ND filter<br>Note 4: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.</td></tr>
</table>

| No. | Class | Item | Judgment |
|---|---|---|---|
| 11.5.5 | Minor | LCD glass chipping. |   Y>S Reject |
| 11.5.6 | Minor | LCD glass chipping. |   X or Y>S Reject |
| 11.5.7 | Major | LCD glass crack. |   Y>(1/2) T Reject |
| 11.5.8 | Major | LCD glass scribe defect. |   1. a>L/3, A>1.5mm Reject<br>2. B : According to dimension |
| 11.5.9 | Minor | LCD glass chipping.<br>(on the terminal area) |   Φ = (x+y)/2>2.5mm Reject |
| 11.5.10 | Minor | LCD glass chipping.<br>(on the terminal surface) |   Y>(1/3)T Reject |
| 11.5.11 | Minor | LCD glass chipping. |   Y>T Reject |

# 12. Handling Precautions

## 12.1 Mounting Method

The LCD panel of Microtips TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

## 12.2 Caution of LCD Handling And Cleaning

When cleaning the display surface, Use soft cloth with solvent [Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

## 12.3 Caution Against Static Charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to power or ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

## 12.4 Packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

## 12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher

voltage then the limit cause the shorter LCD life.

- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

  Usage under the maximum operating temperature, 50%Rh or less is required.

## 12.6 Storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

## 12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

# 13. Precaution for Use

## 13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

## 13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to Microtips TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

# Mouser Electronics

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