# Shenzhen Leadtek Electronics Co.,Ltd

## PRODUCT SPECIFICATION

## TFT-LCD   MODULE

## Module No：LTK101FHNLM19-V0

☑ Preliminary Specification

☐ Approval Specification

| Designed by | Checked by | Approved by |
|---|---|---|
| *jona* | *tom* | *lan* |

## Final Approval by Customer

| Approved by | Comment |
|---|---|
|  |  |

※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

# Revision History

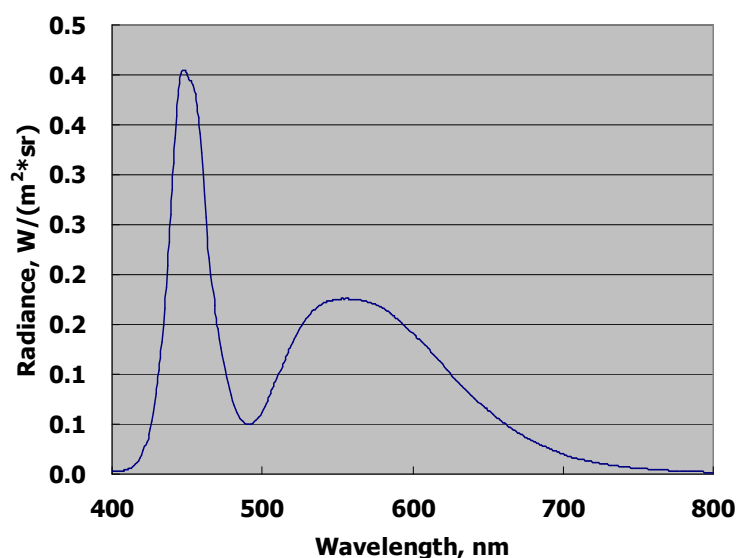| Version | Contents | Date | Note |
|---------|----------|------|------|
| V0 | Original | 2023.04.10 | |
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# 1.General  Specifications

| NO | Item | Specification | Unit | Remark |
|---|---|---|---|---|
| 1 | LCD Size | 10.1 | | - |
| 2 | Panel Type | IPS | | |
| 4 | Resolution | 1200 x RGB x 1920 | pixel | - |
| 5 | Display Mode | Normally Black | - | - |
| 6 | Number of Colors | 16.7M | | - |
| 7 | Viewing Direction | ALL FULL | - | - |
| 8 | NTSC | 66% | | TYP |
| 9 | Contrast Ratio | 1000 | | TYB |
| 10 | Luminance | 350 | cd/㎡ | TYB |
| 11 | LCM Module Size | 143.0(W) x228.6(L) x2.65(H) | mm | Note |
| 12 | Panel Active Area | 135.36 (W) x 216.57 (L) | mm | Note |
| 13 | Pixel Pitch | 37.6 x 112.8 | mm | UM |
| 14 | Weight | TBD | | - |
| 15 | Driver IC | OTA7290B+OTA7290B | | |
| 16 | Driver IC RAM Size | RAMLESS | bit | - |
| 17 | Light Source | 32 white LED in 4S8P | - | - |
| 18 | Interface | MIPI 4Line | - | |
| 19 | Surface Hardness | 6H | - | |
| 20 | Operating Temperature | -20~+60 | ℃ | - |
| 21 | Storage Temperature | -30~+70 | ℃ | - |

Note : Please refer to the mechanical drawing;

## 2. Optical Characteristics

| Item | | Symbol | Conditions | Specifications | | | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | | |
| Transmittance (w/o APCF) | | T% | Viewing normal angle $\theta_X = \theta_Y = 0°$ | 3.53% | 4.04% | | % | All left side data are based on INX's following condition – |
| Contrast Ratio | | CR | | 800 | 1000 | | -- | 1.LC : AAS . 2.CF : CG 70% CF. |
| Response Time | | $T_{on} + T_{off}$ | | | 25 | | ms | 3.Light Source : INX LED BLU. 4.Polarizer : |
| Viewing Angle | Hor. | $\theta_{X+}$ | | 80 | 85 | | deg. | CF:SRW062APN1LT4 TFT:SRW062AWL2/APFV3 5.Machine : DMS 803, (ConoScope for View Angle). 6. VLC dark $\leqq$ 0.3 V, VLC white $\geqq$ 4.1 V 7.Back light structure: Diffuser+BEF+BEF+ Diffuse |
| | | $\theta_{X-}$ | | 80 | 85 | | | |
| | Ver. | $\theta_{Y+}$ | | 80 | 85 | | | |
| | | $\theta_{Y-}$ | | 80 | 85 | | | |
| CF only Color Chromaticity (CIE 1931) | Red | Rx | Viewing normal angle $\theta_X = \theta_Y = 0°$ | 0.631 | 0.651 | 0.671 | - | Under C light Simulation |
| | | Ry | | 0.311 | 0.331 | 0.351 | - | |
| | Green | Gx | | 0.255 | 0.275 | 0.295 | - | |
| | | Gy | | 0.54 | 0.56 | 0.58 | - | |
| | Blue | Bx | | 0.12 | 0.14 | 0.16 | - | |
| | | By | | 0.075 | 0.095 | 0.115 | - | |
| | White | Wx | | 0.28 | 0.3 | 0.32 | - | |
| | | Wy | | 0.305 | 0.325 | 0.345 | - | |
| Color Gamut | | | | | 65 | | % | |

*Note(1)    INX LED BLU Spectrum:

*Note (2)    Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.
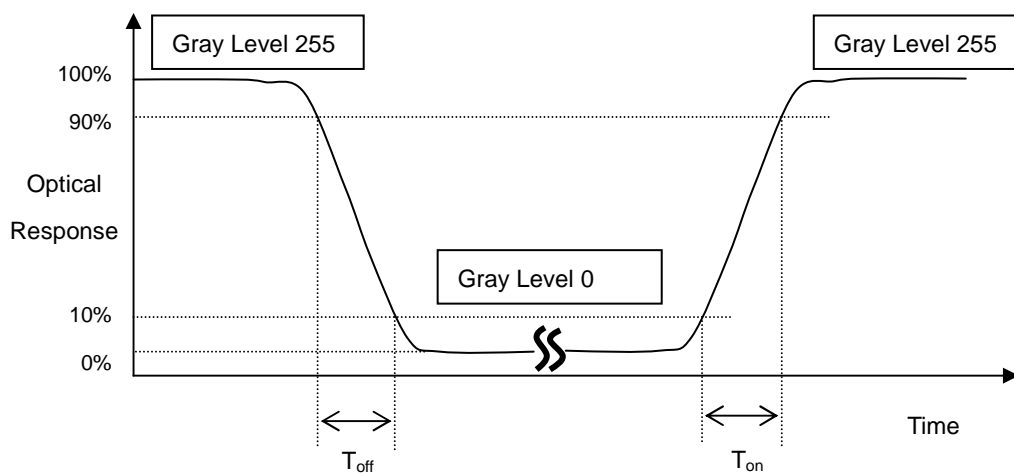
Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (5)
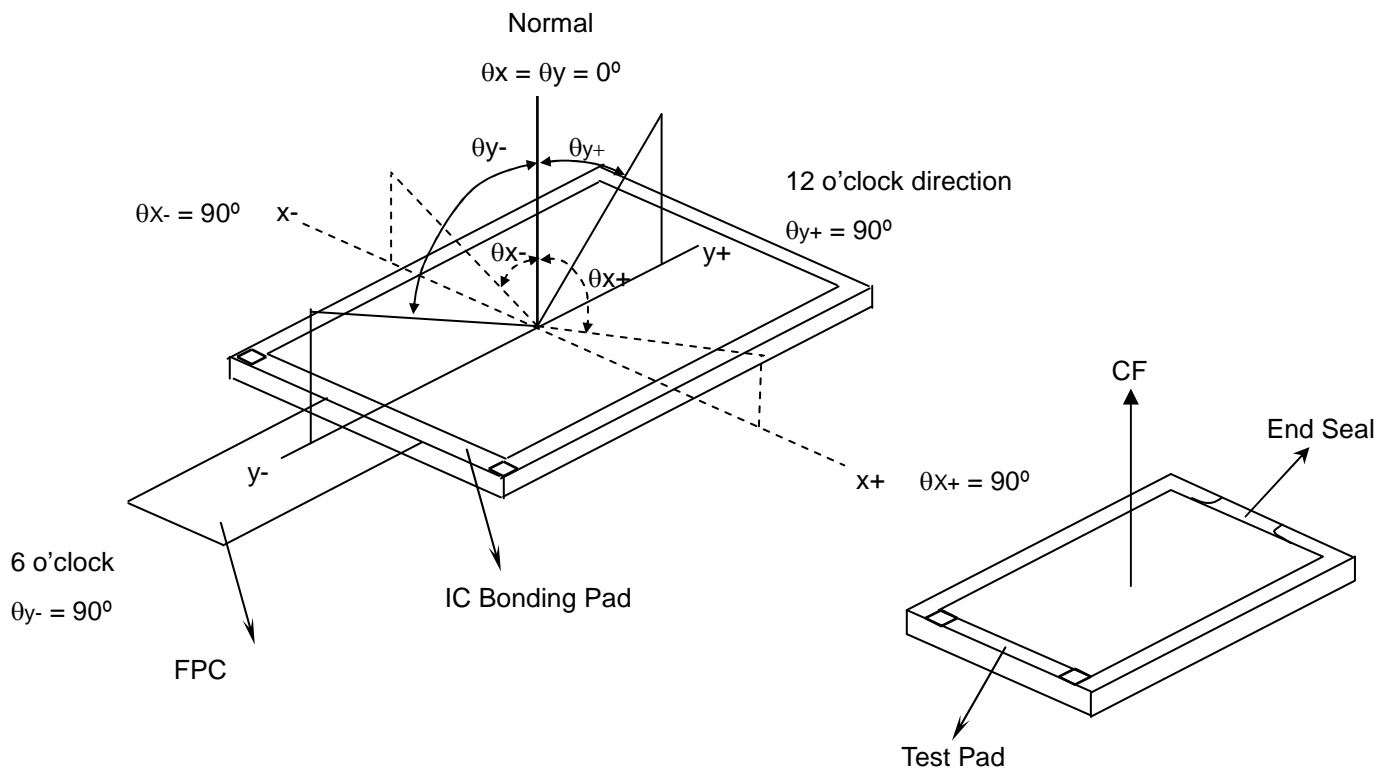
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

*Note (3)    Definition of Response Time ($T_{on}$, $T_{off}$):
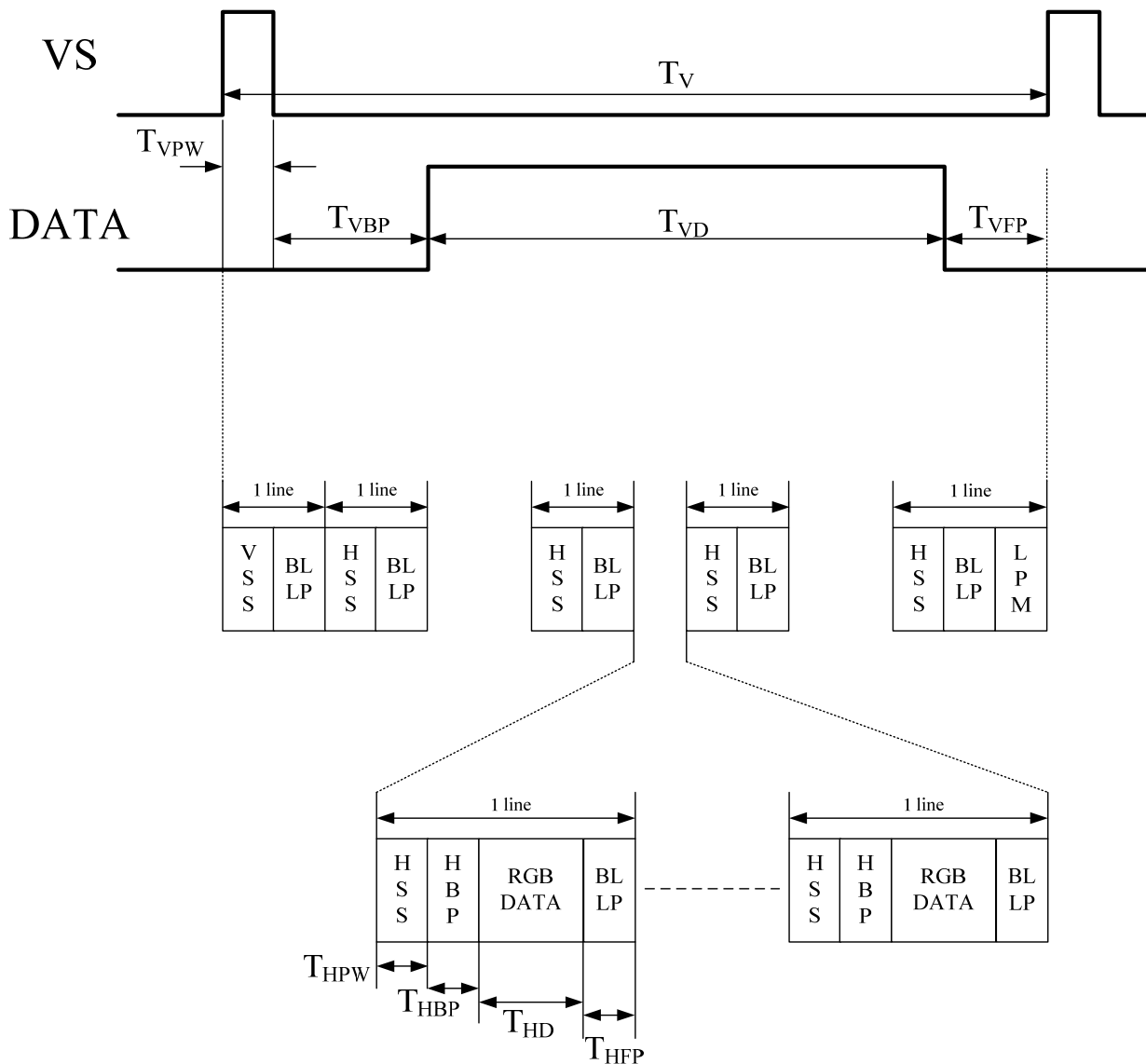
*Note(4)    Definition of Viewing Angle



*Note (5)    Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

# 3. DATA INPUT FORMAT

## 3.1. Data Input Format for MIPI

VS

$T_{VPW}$

$T_V$

DATA

$T_{VBP}$  $T_{VD}$  $T_{VFP}$

| 1 line | | 1 line | | 1 line | | 1 line | | 1 line | | |
| VSS | BLLP | HSS | BLLP | HSS | BLLP | HSS | BLLP | HSS | BLLP | LPM |

| 1 line | | | | 1 line | | | |
| HSS | HBP | RGB DATA | BLLP | HSS | HBP | RGB DATA | BLLP |

$T_{HPW}$  $T_{HBP}$  $T_{HD}$  $T_{HFP}$

## 3.2. Input Timing Table

1200RGBx1920 (4 Data Lanes)

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| MIPI data frequency | FDATA | 955 | 999 | 1000 | Mbps |
| Horizontal display area | THD | | 1200 | | pixel |
| HS period time | TH | 1275 | 1341 | 1342 | pixel |
| HS pulse width | THPW | 1 | 1 | 1 | pixel |
| HS back porch | THBP | 32 | 60 | 60 | pixel |
| HS front porch | THFP | 42 | 80 | 81 | pixel |
| Vertical display area | TVD | | 1920 | | H |
| VS period time | TV | 1981 | 1981 | 1982 | H |
| VS pulse width | TVPW | 1 | 1 | 1 | H |
| VS back porch | TVBP | | 25 | | H |
| VS front porch | TVFP | 35 | 35 | 36 | H |

# 4. FUNCTIONAL DESCRIPTIONS

## 4.1. Power On/Off Sequence

In order to prevent IC from power on reset fail, the rising time ($T_{POR}$) of the digital power supply VDD should be maintained within the given specifications.   Refer to "AC Characteristics" for more detail on timing.

**Power-On/Off Timing Sequence:**
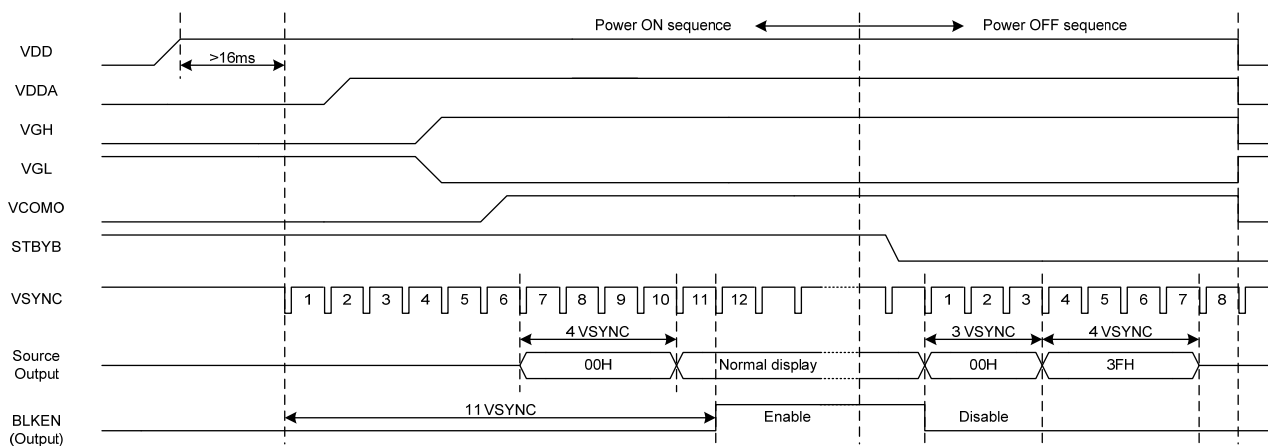


**Enter and Exit Standby Mode Sequence:**
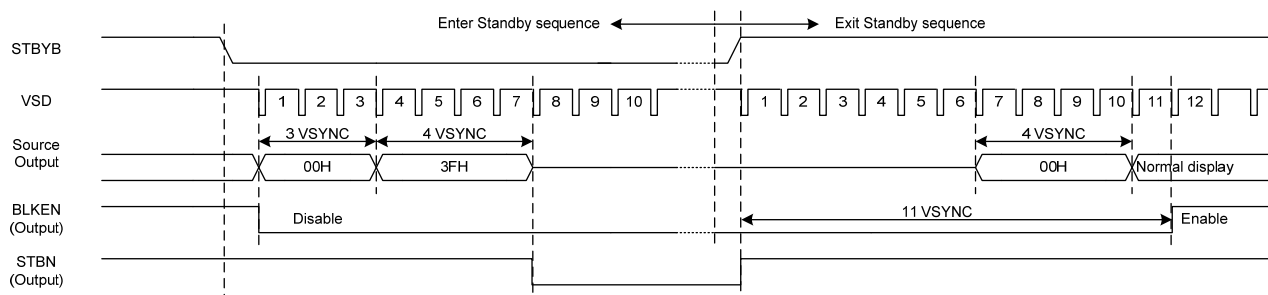
## 5. Interface Pin Connection

| PIN NO | SYMBOL | DESCRIPTION |
|--------|--------|-------------|
| 1 | NC | No connect |
| 2 | VDDIN(3.3V) | Power Voltage for digital circuit    3.3V. |
| 3 | VDDIN (3.3V) | Power Voltage for digital circuit    3.3V. |
| 4 | GND | Ground. |
| 5 | Reset | Global reset pin. |
| **6** | NC | No connect. |
| 7 | GND | Ground. |
| 8 | MIPI_D0N | MIPI-D0Nare differential small amplitude signals. |
| 9 | MIPI_D0P | MIPI-D0Pare differential small amplitude signals. |
| 10 | GND | Ground. |
| 11 | MIPI_D1N | MIPI-D1Nare differential small amplitude signals. |
| 12 | MIPI_D1P | MIPI-D1Pare differential small amplitude signals. |
| 13 | GND | Ground. |
| 14 | MIPI_CLKN | MIPI-CLKNare differential small amplitude signals. |
| 15 | MIPI_CLKP | MIPI-CLKPare differential small amplitude signals. |
| 16 | GND | Ground. |
| 17 | MIPI_D2N | MIPI-D2Nare differential small amplitude signals. |
| 18 | MIPI_D2P | MIPI-D2Pare differential small amplitude signals. |
| 19 | GND | Ground. |
| 20 | MIPI_D3N | MIPI-D3Nare differential small amplitude signals. |
| 21 | MIPI_D3P | MIPI-D3Pare differential small amplitude signals. |
| 22 | GND | Ground. |
| 23 | NC | No connect. |
| 24 | NC | No connect |
| 25 | GND | Ground. |
| 26 | NC | No connect. |
| 27 | NC | No connect. |
| 28 | NC | No connect. |
| 29 | NC | No connect. |
| 30 | GND | Ground. |
| 31 | VLED- | Power for LED backlight (Cathode) |
| 32 | VLED- | Power for LED backlight (Cathode) |
| 33 | NC | No connect. |
| 34 | ID | ID PIN Pull High, If not use, please not connect. |
| 35 | NC | No connect. |
| 36 | NC | No connect. |
| 37 | NC | No connect. |
| 38 | NC | No connect. |
| 39 | VLED+ | Power for LED backlight (Anode) |
| 40 | VLED+ | Power for LED backlight (Anode) |

## 6. 0 Absolute Maximum Ratings

| Item | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Analog Supply Voltage | VDD | 3.3 | 3.6 | V |
| Operating Temperature | TOP | -20 | +60 | °C |
| Storage Temperature | TST | -30 | +70 | °C |

# 6.1 Back-light Unit

| PARAMETER | Sym. | Min. | Typ. | Max. | Unit | Test Condition | Note |
|---|---|---|---|---|---|---|---|
| LED Current | IF | – | 160 | – | mA | – | – |
| LED Voltage | VF | – | 12 | – | V | – | – |
| Luminous instensity | | – | 350 | - | Cd/m2 | – | – |
| Life Time | | – | 25000 | – | Hr. | I≦160mA | – |
| Color | White | | | | | | |

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2)Ta=25±2℃

(3)Test condition: LED Current 160mA
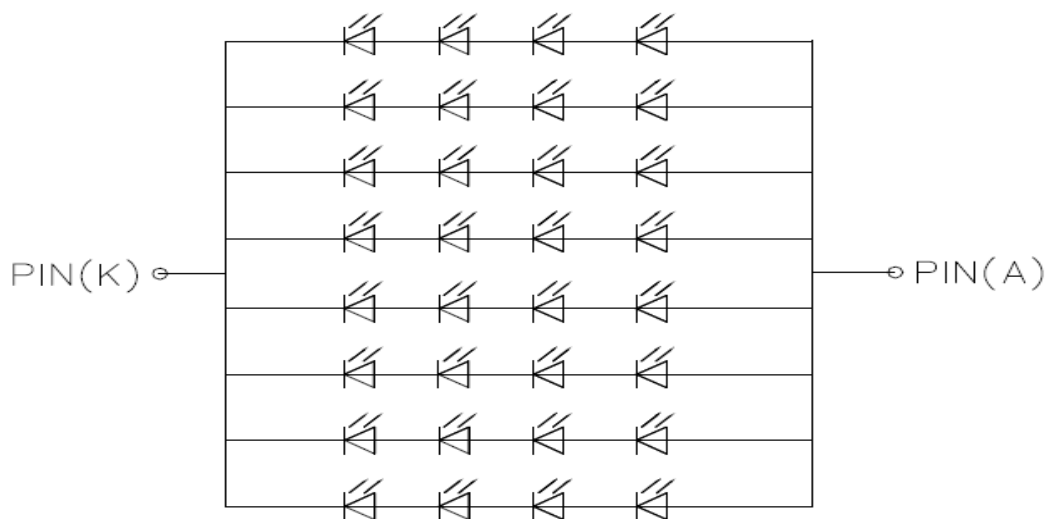


If= 160 mA(20mA/LED)
Vf= 12 V(typ)

## 7. Reliability test items

| NO | Item | Conditions | Remark |
|----|------|-----------|--------|
| 1 | High Temperature Storage | Ta=+70℃,24hrs | |
| 2 | Low Temperature Storage | Ta=-30℃,24hrs | |
| 3 | High Temperature Operation | Ta=+60℃,24hrs | |
| 4 | Low Temperature Operation | Ta=-20℃,24hrs | |
| 7 | Vibration | 1.Random:1.04G,10-500HZ,X,Y,Zdirection 30min/each direction<br>2.Sweep sine:1.5G, 5~500Hz, X/Y/Z,30min/each direction | |
| 8 | Shock | 100G,6ms, ±X, ±Y, ±Z<br>3 time for each direction | JIS C7021, A-10 (Condition A) |
| 9 | Vibration (with carton) | Random:1.04Grms, 10~500Hz, X/Y/Z 45min/each direction<br>Fixed:5Hz, 1.5Grms, X/Y/Z 45min/each direction | |
| 10 | Drop (with carton) | Height: 60cm 1 corner, 3 edges, 6 surfaces | JIS Z0202 |
| 11 | Electrostatic Discharge | ±200V,200PF,0Ω1 time/each terminal | |

Note: All tests above are practiced at module type.

There is no display function NG issue occurred, All the cosmetic specification is judged before the reliability stress.

## 8．Mechanical Drawing

## Front View

228.60±0.2(LCM OD)
219.09±0.20(Up Pol)
216.57(LCD AA)
43.07±0.5
3.53
(27.00)
(42.00)
135.45±0.3

10.1″,IPS
1200*RGB*1920

143.00±0.15(LCM OD)
138.40±0.20(Up Pol)
135.36(LCD AA)
−2.38
−3.38
−2.30
−3.82

High temperature insulating adhesive tape

Connector:BL134-40PW00
Plug direction

High temperature insulating adhesive tape

## Side View

2.65±0.15(LCM)

0.2B(Connector+FPC+Steel sheet+tape)
0.63(Device+FPC+Steel sheet+tape)
Steel sheet:0.2mm
Steel sheet:0.2mm

## Back View

LTK101FHNLM19-V0
YYYY-MM-DD

Code printing

Steel sheet:0.1mm
Steel sheet:0.1mm
Steel sheet

## Back View

1.0MAX
30.95
27.60
(25.00)
(40.00)

Connector:T=2.0 mm
T:1.5max
T:1.5max
Insulating tape:0.05mm

LTK101FHNLM19-V0
YYYY-MM-DD

Code printing

## Notes:

1. Display：10.1″, TFT
2. Resolution：1200×RGB×1920
3. View Direction：ALL
4. LCD Driver IC：OTA7290B+OTA7290B
5. LCM Brightness:350 cd/㎡ (TYP)
6. GENERAL TOLERANCE：±0.2
7. OPERATING TEMP：-20℃~+60℃
8. STORAGE TEMP：-30℃~+70℃
9. Requirements on Environmental Protection：ROHS

If= 160 mA(20mA/LED)
Vf= 12 V(typ)

PIN(K)
PIN(A)

| REV | | DESCRIPTION | DATE | NAME |
|---|---|---|---|---|
| △ | 3 | | | |
| △ | 2 | | | |
| △ | 1 | | | |
| | | NEW | 2023.06.08 | Jerry |

SCALE:1/1 UNIT:mm PAGE:1/1
Part No: LTK101FHNLM19 VER:V0
Customer No:

LEADTEK DISPLAY

LEADTEK COMPANY LIMITED

| | Approve | Check | Drawn |
|---|---|---|---|
| | Ian | Jack | Jerry |

| PIN | SYMBOL |
|---|---|
| 1 | NC |
| 2 | VDDIN |
| 3 | VDDIN |
| 4 | GND |
| 5 | RESET |
| 6 | NC |
| 7 | GND |
| 8 | MIPI_D0N |
| 9 | MIPI_D0P |
| 10 | GND |
| 11 | MIPI_D1N |
| 12 | MIPI_D1P |
| 13 | GND |
| 14 | MIPI_CKN |
| 15 | MIPI_CKP |
| 16 | GND |
| 17 | MIPI_D2N |
| 18 | MIPI_D2P |
| 19 | GND |
| 20 | MIPI_D3N |
| 21 | MIPI_D3P |
| 22 | GND |
| 23 | NC |
| 24 | NC |
| 25 | GND |
| 26 | NC |
| 27 | NC |
| 28 | NC |
| 29 | GND |
| 30 | NC |
| 31 | GND |
| 32 | LEDK |
| 33 | NC |
| 34 | ID |
| 35 | NC |
| 36 | NC |
| 37 | NC |
| 38 | NC |
| 39 | LEDA |
| 40 | LEDA |

# 9.0 General Precaution

## 9.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

## 9.2 Asembly Precaytton

10.2.1 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

10.2.2 Please design display housing in accordance with the following guide lines.

10.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

10.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

10.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. ( Polarizer film, surface of LCD panel is easy to be flawed.)

10.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

10.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

10.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.

10.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

## 9.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

## 9.4 Breakage of LCD Panel

10.4.1 If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

10.4.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.

10.4.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

10.4.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

## 9.5 Absolute Maximum Ratings and Power Protection Circuit

9.5.1 Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

9.5.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

9.5.3 It's recommended employing protection circuit for power supply.

9.6 Operation

9.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

9.6.2 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

9.6.3 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

9.6.4 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

## 9.7 Static Electricity

9.7.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

9.7.2 Because LCD module uses CMOS-IC on TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.

9.7.3 Persons who handle the module should be grounded through adequate methods.

## 9.8 Disposal

When disposing LCD module, obey the local environmental regulations.

## 9.9 OTHERS

9.9.1 A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight land strong UV rays.

9.9.2 Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.

9.9.3 For the packaging box, please pay attention to the followings:

9.9.3.1 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.

9.9.3.2 Please do not pile them up more than 6 boxes. (They are not designed so.) And please do not turn over.

9.9.3.3 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

9.9.3.4 Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

# 10.0 Packing form

7.1 Packing form 1

TBD