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| Document Title | HSD123KPW2-D10 Preliminary Specification for 新勢力 | Page No. | 1/25 |
| Document No. | | Revision | 1.0 |

TO : New Power 新勢力

Date : Mar., 5, 2018

HannStar Product Specification (Preliminary)

Model: HSD123KPW2-D10

Note: 1.Please contact HannStar Display Corp. before designing your product based on this module specification.
2.The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by HannStar for any intellectual property claims or other problems that may result from application based on the module described herein.
3.The mark “ ** ” of Model means sub-model code.

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Record of Revisions

| Rev. | Date | Sub-Model | Description of change |
|------|---------------|-----------|--|
| 1.0 | Mar., 5, 2018 | D10 | Preliminary Specification was first released |



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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD123KPW2-D10 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 and a back light system. This TFT LCD has a 12.28" (8:3) inch diagonally measured active display area with 5760 x 720 dot (1920 horizontal by 720 vertical pixel) resolution.

1.2 Features

- 12.28 (8:3 diagonal) inch configuration
- 16.7M
- ROHS / Halogen Free Compliance

1.3 Applications

- Automotive

1.4 General information

| Item | | Specification | Unit |
|-------------------|------------------------------|--------------------------------|--------|
| Outline Dimension | | 308.1(H) x 130.0(V) x7.6(Typ.) | mm |
| Display area | | 292.032(H) x 109.512(V) | mm |
| Number of Pixel | | 1920 RGB (H) x 720(V) | pixels |
| Pixel pitch | | 0.1521(H) x 0.1521 (V) | mm |
| Pixel arrangement | | RGB Vertical stripe | |
| Display mode | | Normally Black | |
| NTSC | | 70 (typ.) | % |
| Surface treatment | | AG | |
| Weight | | 515 (Typ.) | g |
| Back-light | | Single LED (Side-Light type) | |
| Power Consumption | Logic System (White Pattern) | 1.65 W (Max.) | W |
| | B/L System | 10.472 W (Max.) | W |

1.5 Mechanical Information

| Item | | Min. | Typ. | Max. | Unit |
|-------------|----------------|-------|-------|-------|------|
| Module Size | Horizontal (H) | 307.6 | 308.1 | 308.6 | mm |
| | Vertical (V) | 129.5 | 130.0 | 130.5 | mm |
| | Depth (D) | 7.3 | 7.6 | 7.9 | mm |
| Weight | | — | 515 | — | g |

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

| Parameters | Symbol | Min. | Max. | Unit | Note |
|-------------|--------|------|------|------|------|
| Power Logic | VCC | -0.3 | 3.6 | V | |

2.2 Environment Absolute Rating

| Item | Symbol | Min. | Max. | Unit | Note |
|-----------------------|------------------|------|------|------|------|
| Operating Temperature | T _{opa} | -30 | 85 | °C | |
| Storage Temperature | T _{stg} | -40 | 90 | °C | |

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|------------------------------|---------|------------------|------------------------------------|-------|-------|-------|-------------------|-----------------------------------|
| Contrast | | CR | $\Theta=0$ Normal viewing angle | 900 | 1100 | — | | (1)(2) |
| Response time | Rising | T _R | | — | — | 14 | msec | (1)(3) |
| | Falling | T _F | | — | — | 16 | | |
| White luminance (Center) | | Y _L | | 650 | 850 | — | cd/m ² | (1)(4) (I _L =350mA) |
| Color chromaticity (CIE1931) | White | W _x | | 0.256 | 0.296 | 0.336 | | (1)(4) |
| | | W _y | | 0.284 | 0.324 | 0.364 | | |
| | Red | R _x | | 0.608 | 0.648 | 0.688 | | |
| | | R _y | | 0.293 | 0.333 | 0.373 | | |
| | Green | G _x | | 0.251 | 0.291 | 0.331 | | |
| | | G _y | | 0.569 | 0.609 | 0.649 | | |
| | Blue | B _x | | 0.106 | 0.146 | 0.186 | | |
| | | B _y | | 0.020 | 0.060 | 0.100 | | |
| Viewing angle | Hor. | Θ _L | CR>10 | 80 | 85 | — | | |
| | | Θ _R | | 80 | 85 | — | | |
| | Ver. | Θ _U | | 80 | 85 | — | | |
| | | Θ _D | | 80 | 85 | — | | |
| Brightness uniformity | | B _{UNI} | Θ=0 | 70 | 80 | — | % | (5) |
| Optima View Direction | | Free | | | | | | (6) |

3.2 Measuring Condition

- Measuring surrounding : dark room
- LED current I_L : 280mA
- Ambient temperature : 25±2°C
- 15min. warm-up time.

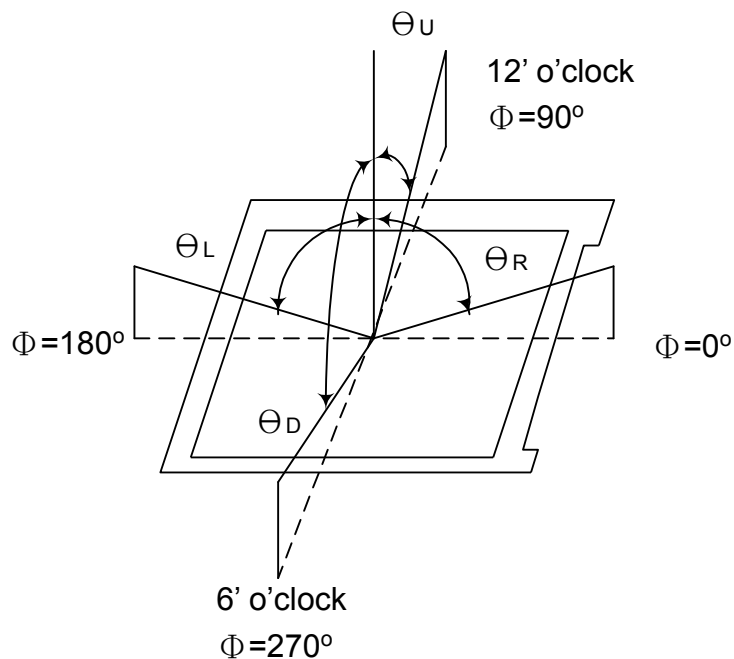
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3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

- Measuring spot size : 20 ~ 21 mm

Note (1) Definition of Viewing Angle:

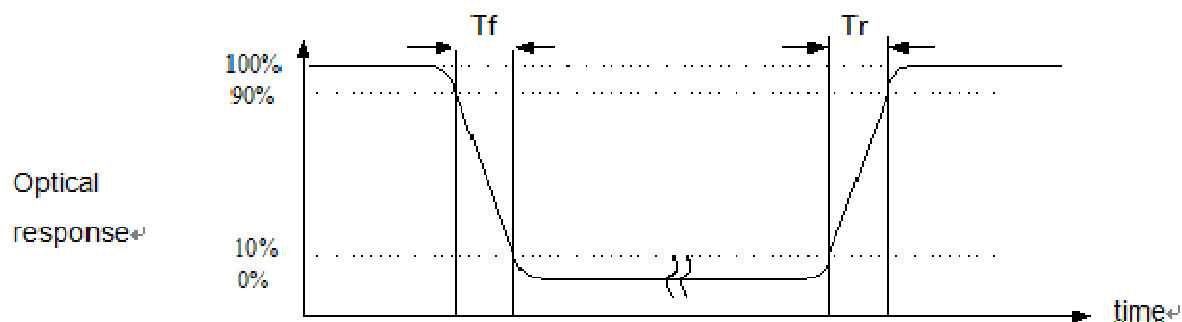


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

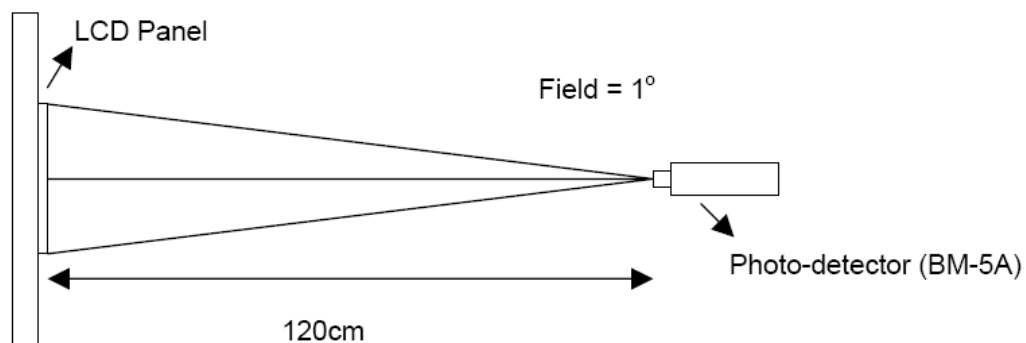
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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Note (3) Definition of Response Time : Sum of T_R and T_F

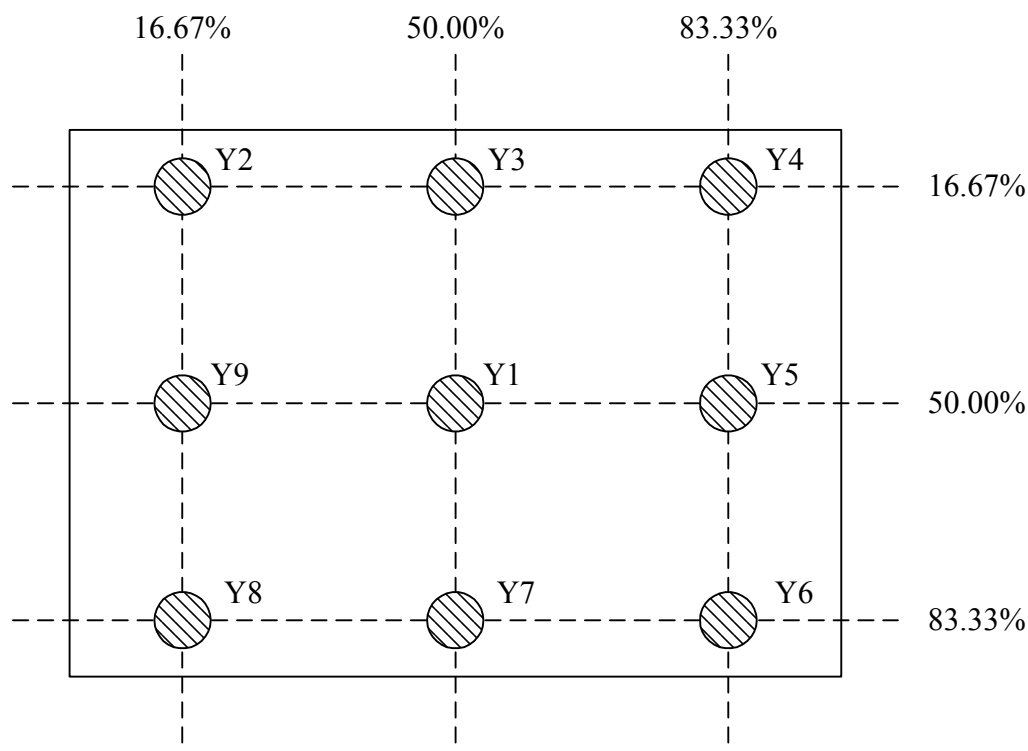


Note (4) Definition of optical measurement setup



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Note (5) Definition of brightness uniformity



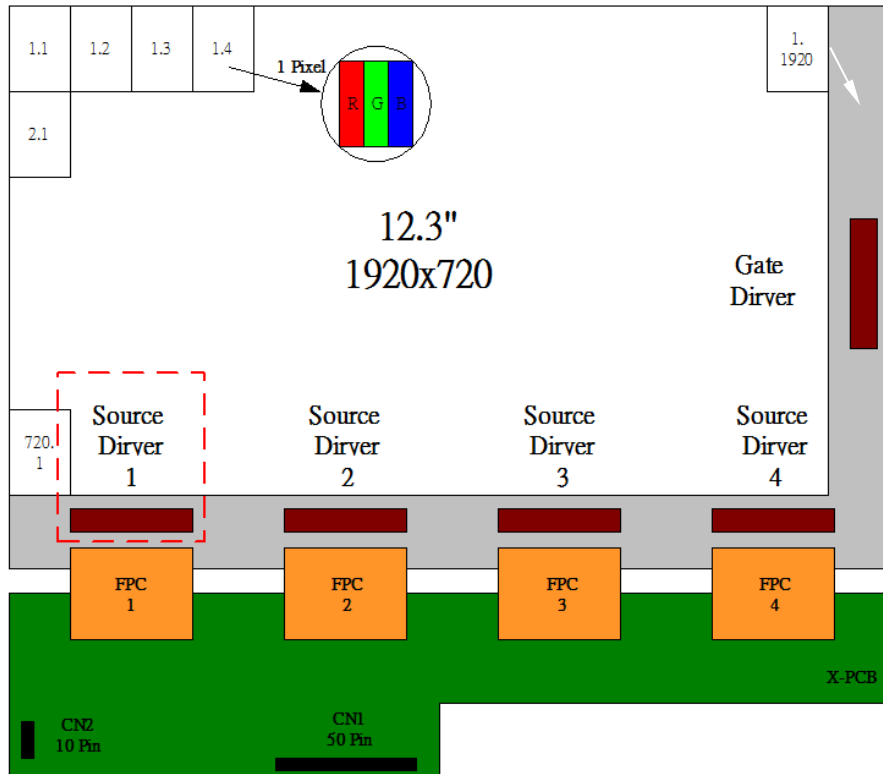
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

Note (6) : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

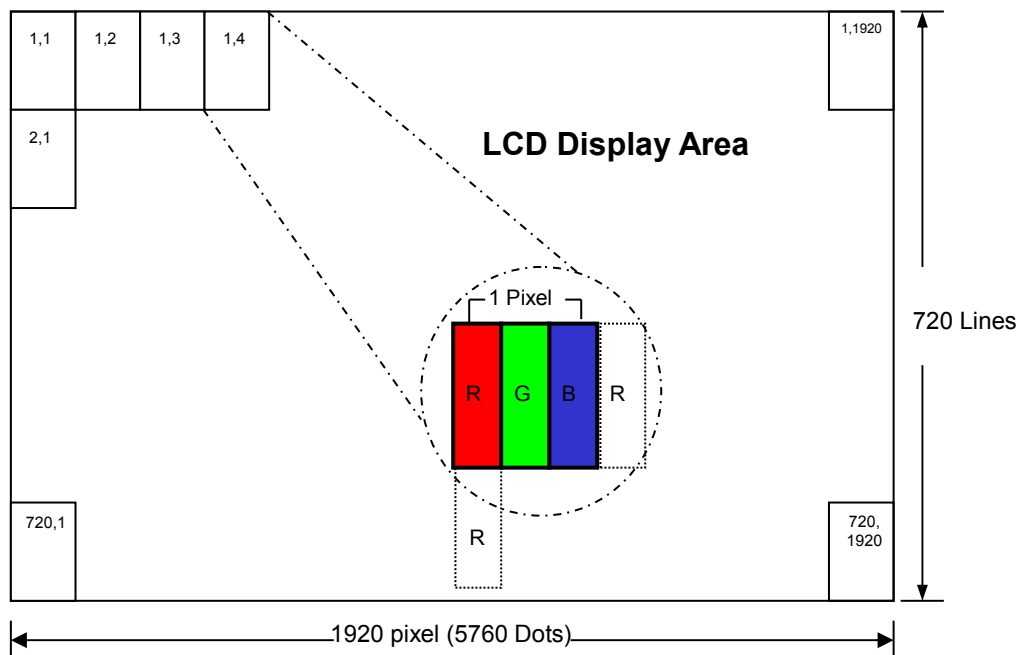
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



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4.3 Relationship Between Displayed Color and Input

| | Display | MSB R7 R6 R5 R4 R3 R2 R1 R0 | LSB G7 G6 G5 G4 G3 G2 G1 G0 | MSB B7 B6 B5 B4 B3 B2 B1 B0 | Gray scale Level |
|-----------------------------|-------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------|
| Basic color | Black | L L L L L L L L | L L L L L L L L | L L L L L L L L | - |
| | Blue | L L L L L L L L | L L L L L L L L | H H H H H H H H | - |
| | Green | L L L L L L L L | H H H H H H H H | L L L L L L L L | - |
| | Light Blue | L L L L L L L L | H H H H H H H H | H H H H H H H H | - |
| | Red | H H H H H H H H | L L L L L L L L | L L L L L L L L | - |
| | Purple | H H H H H H H H | L L L L L L L L | H H H H H H H H | - |
| | Yellow | H H H H H H H H | H H H H H H H H | L L L L L L L L | - |
| | White | H H H H H H H H | H H H H H H H H | H H H H H H H H | - |
| Gray scale of Red | Black | L L L L L L L L | L L L L L L L L | L L L L L L L L | L0 |
| | Dark ↑ ↓ Light | L L L L L L L H | L L L L L L L L | L L L L L L L L | L1 |
| | | L L L L L L H L | L L L L L L L L | L L L L L L L L | L2 |
| | | : | : | : | L3...L251 |
| | | H H H H H H L L | L L L L L L L L | L L L L L L L L | L252 |
| | Light | H H H H H H L H | L L L L L L L L | L L L L L L L L | L253 |
| | | H H H H H H H L | L L L L L L L L | L L L L L L L L | L254 |
| | Red | H H H H H H H H | L L L L L L L L | L L L L L L L L | Red L255 |
| Gray scale of Green | Black | L L L L L L L L | L L L L L L L L | L L L L L L L L | L0 |
| | Dark ↑ ↓ Light | L L L L L L L L | L L L L L L L H | L L L L L L L L | L1 |
| | | L L L L L L L L | L L L L L L H L | L L L L L L L L | L2 |
| | | : | : | : | L3...L251 |
| | | L L L L L L L L | H H H H H H L L | L L L L L L L L | L252 |
| | Light | L L L L L L L L | H H H H H H L H | L L L L L L L L | L253 |
| | | L L L L L L L L | H H H H H H H L | L L L L L L L L | L254 |
| | Green | L L L L L L L L | H H H H H H H H | L L L L L L L L | Green L255 |
| Gray scale of Blue | Black | L L L L L L L L | L L L L L L L L | L L L L L L L L | L0 |
| | Dark ↑ ↓ Light | L L L L L L L L | L L L L L L L L | L L L L L L L H | L1 |
| | | L L L L L L L L | L L L L L L L L | L L L L L L H L | L2 |
| | | : | : | : | L3...L251 |
| | | L L L L L L L L | L L L L L L L L | H H H H H H L L | L252 |
| | Light | L L L L L L L L | L L L L L L L L | H H H H H H L H | L253 |
| | | L L L L L L L L | L L L L L L L L | H H H H H H H L | L254 |
| | Blue | L L L L L L L L | L L L L L L L L | H H H H H H H H | Blue L255 |
| Gray scale of White & Black | Black | L L L L L L L L | L L L L L L L L | L L L L L L L L | L0 |
| | Dark ↑ ↓ Light | L L L L L L L H | L L L L L L L H | L L L L L L L H | L1 |
| | | L L L L L L H L | L L L L L L H L | L L L L L L H L | L2 |
| | | : | : | : | L3...L251 |
| | | H H H H H H L L | H H H H H H L L | H H H H H H L L | L252 |
| | Light | H H H H H H L H | H H H H H H L H | H H H H H H L H | L253 |
| | | H H H H H H H L | H H H H H H H L | H H H H H H H L | L254 |
| | White | H H H H H H H H | H H H H H H H H | H H H H H H H H | White L255 |

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5.0 INTERFACE PIN CONNECTION

CN1 FPC connector is used for electronics interface.

AORORA F31L-1A7H1-21050 , 50PIN

| No. | Symbol | Function |
|-----|--------|--|
| 1 | GND | Ground |
| 2 | NC | No connect |
| 3 | VCC | Panel Power |
| 4 | VCC | Panel Power |
| 5 | GND | Ground |
| 6 | GND | Ground |
| 7 | NC | No connect |
| 8 | NC | No connect |
| 9 | GND | Ground |
| 10 | O IN0- | Odd pixel negative LVDS differential clock input |
| 11 | O IN0+ | Odd pixel positive LVDS differential clock input |
| 12 | O IN1- | Odd pixel negative LVDS differential clock input |
| 13 | O IN1+ | Odd pixel positive LVDS differential clock input |
| 14 | O IN2- | Odd pixel negative LVDS differential clock input |
| 15 | O IN2+ | Odd pixel positive LVDS differential clock input |
| 16 | O CK- | Odd pixel negative LVDS differential clock input |
| 17 | O CK+ | Odd pixel positive LVDS differential clock input |
| 18 | O IN3- | Odd pixel negative LVDS differential clock input |
| 19 | O IN3+ | Odd pixel positive LVDS differential clock input |
| 20 | E IN0- | Even pixel negative LVDS differential clock input |
| 21 | E IN0+ | Even pixel positive LVDS differential clock input |
| 22 | E IN1- | Even pixel negative LVDS differential clock input |
| 23 | E IN1+ | Even pixel positive LVDS differential clock input |
| 24 | E IN2- | Even pixel negative LVDS differential clock input |
| 25 | E IN2+ | Even pixel positive LVDS differential clock input |
| 26 | E CK- | Even pixel negative LVDS differential clock input |
| 27 | E CK+ | Even pixel positive LVDS differential clock input |
| 28 | E IN3- | Even pixel negative LVDS differential clock input |
| 29 | E IN3+ | Even pixel positive LVDS differential clock input |
| 30 | GND | Ground |
| 31 | NC | No connect |
| 32 | RESET | Global reset pin,active low. |
| 33 | STBYB | Standby mode,active low. |
| 34 | CA3 | Output signal to indicate self protection mode, when DE,HS,VS,DCLK, any of these signals is missing, it will become High. If using this pin, CA3 need to pulled low by an resistor,else , let it floating. |

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|----|-------|--|
| 35 | SCL | Serial interface clock input. (User folating) |
| 36 | SDA | Serial interface data input/output.(User folating) |
| 37 | CSB | Serial interface chip enable.(User folating) |
| 38 | GND | Ground |
| 39 | GND | Ground |
| 40 | NC | No connect |
| 41 | LEDA | LED power (Anode) |
| 42 | LEDA | LED power (Anode) |
| 43 | LEDA | LED power (Anode) |
| 44 | NC | No connect |
| 45 | LEDK1 | Cathode 1 |
| 46 | LEDK2 | Cathode 2 |
| 47 | LEDK3 | Cathode 3 |
| 48 | LEDK4 | Cathode 4 |
| 49 | NTC_A | NTC_Anode |
| 50 | NTC_K | NTC_Cathode |

CN2 HIROSE FH52-10S-0.5SH 10PIN

| | | |
|----|-------|-------------------|
| 1 | LEDA | LED power (Anode) |
| 2 | LEDA | LED power (Anode) |
| 3 | LEDA | LED power (Anode) |
| 4 | NC | No connect |
| 5 | LEDK1 | Cathode 1 |
| 6 | LEDK2 | Cathode 2 |
| 7 | LEDK3 | Cathode 3 |
| 8 | LEDK4 | Cathode 4 |
| 9 | NTC_A | NTC_Anode |
| 10 | NTC_K | NTC_Cathode |

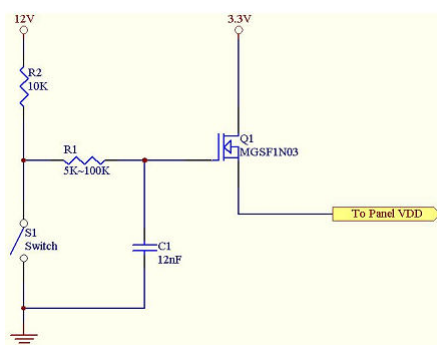
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6.0 ELECTRICAL CHARACTERISTICS

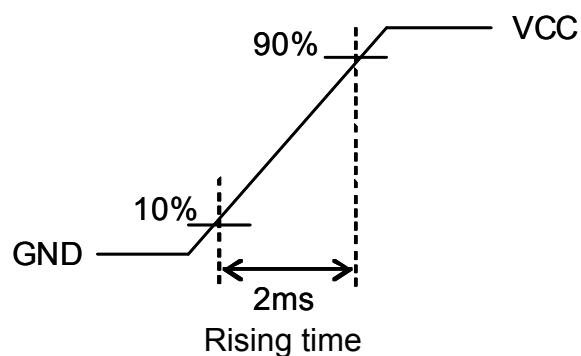
6.1 TFT LCD Module

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|-------------------------|-------------------|---------|------|---------|------|----------------------------|
| Supply Voltage | VCC | 3 | 3.3 | 3.6 | V | |
| Input signal voltage | ViH | VCC*0.7 | - | VCC | V | |
| | ViL | 0 | - | VCC*0.3 | V | |
| Current of power supply | I _{DD} | -- | -- | 500 | mA | VCC =3.3V White pattern |
| Inrush current | I _{RUSH} | — | — | 2.0 | A | Note* |

Note* : Inrush current test circuit and rising time setting (power on)



Test circuit



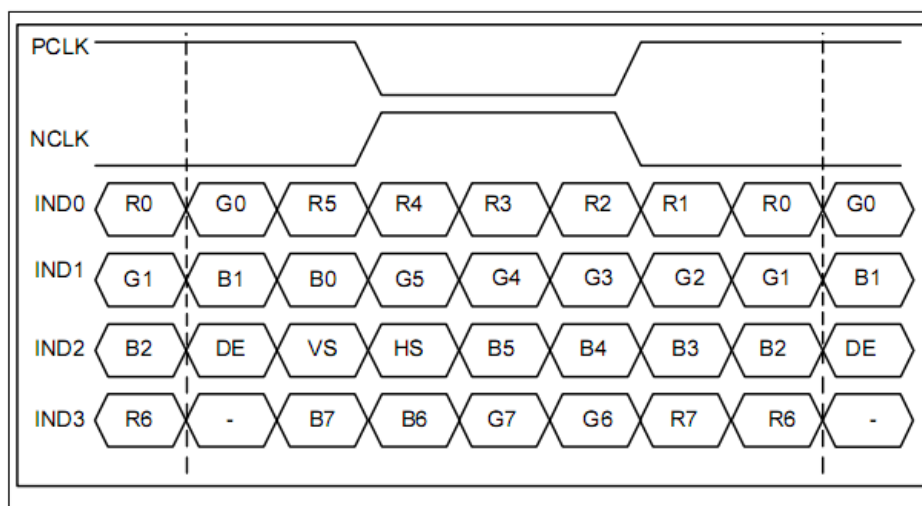
6.2 Switching Characteristics for LVDS Receiver

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------------------------------|-----------------|------|------|----------------------------|------|-----------------------|
| Differential Input High Threshold | V _{th} | 100 | — | 300 | mV | V _{CM} =1.2V |
| Differential Input Low Threshold | V _{tl} | -300 | — | -100 | mV | |
| Input Current | I _{IN} | -10 | — | +10 | uA | |
| Differential input Voltage | V _{ID} | 0.2 | — | 0.6 | V | |
| Common Mode Voltage Offset | V _{CM} | 1 | 1.2 | 1.7-(V _{ID} /2) | V | |

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6.3 Bit LVDS input

6.3.1 8Bit LVDS input



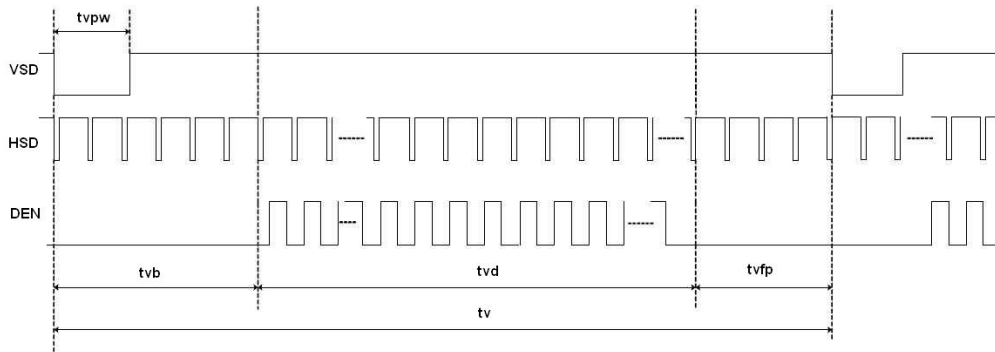
6.4 Interface Timing (DE mode)

| Interface Timing (DE mode) | | | | | |
|-------------------------------------|------------|------|------|------|-------|
| Two Port LVDS Timing.(1920xRGBx720) | | | | | |
| Item | Symbol | Min. | Typ. | Max. | Unit |
| Frame Rate | FR | 55 | 60 | 65 | Hz |
| Frame Period | T_v | 730 | 792 | 864 | line |
| Vertical Display Time | T_{vd} | 720 | 720 | 720 | line |
| Vertical Blanking Time | T_{vb} | 10 | 72 | 144 | line |
| 1 Line Scanning Time | T_h | 984 | 992 | 1104 | clock |
| Horizontal Display Time | T_{hd} | 960 | 960 | 960 | clock |
| Horizontal Blanking Time | T_{hb} | 24 | 32 | 144 | clock |
| Clock Rate | F_{DCLK} | 85 | 90 | 95 | MHz |

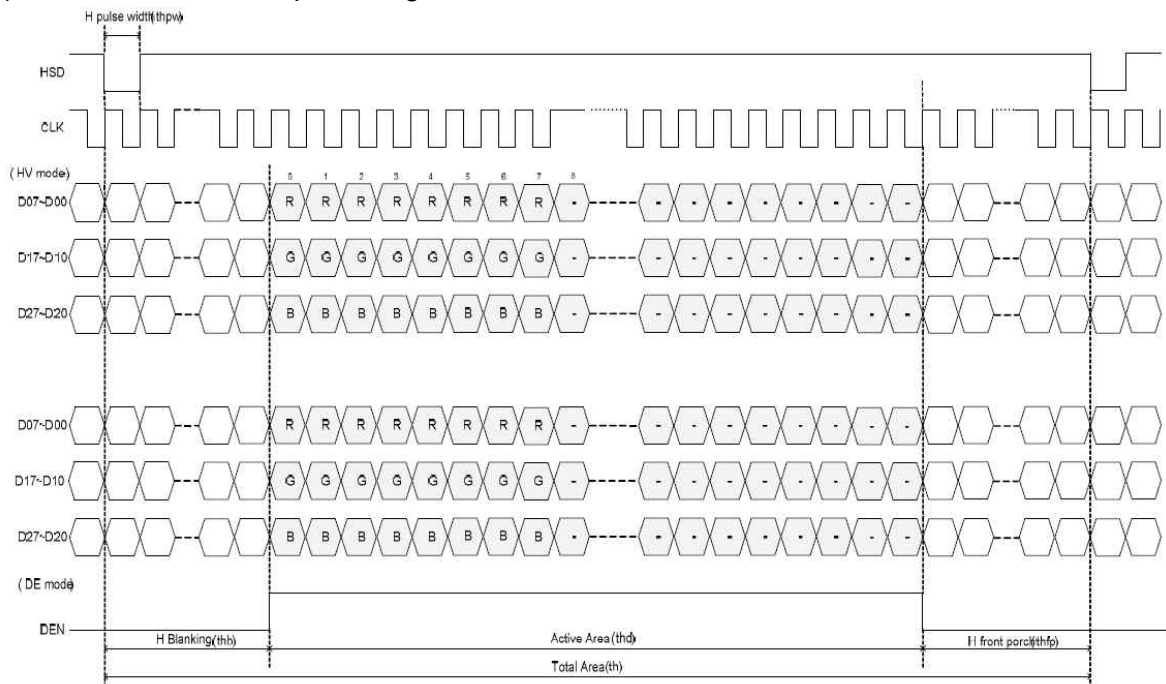
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Timing Diagram of Interface Signal (DE mode)

(1) Vertical input timing



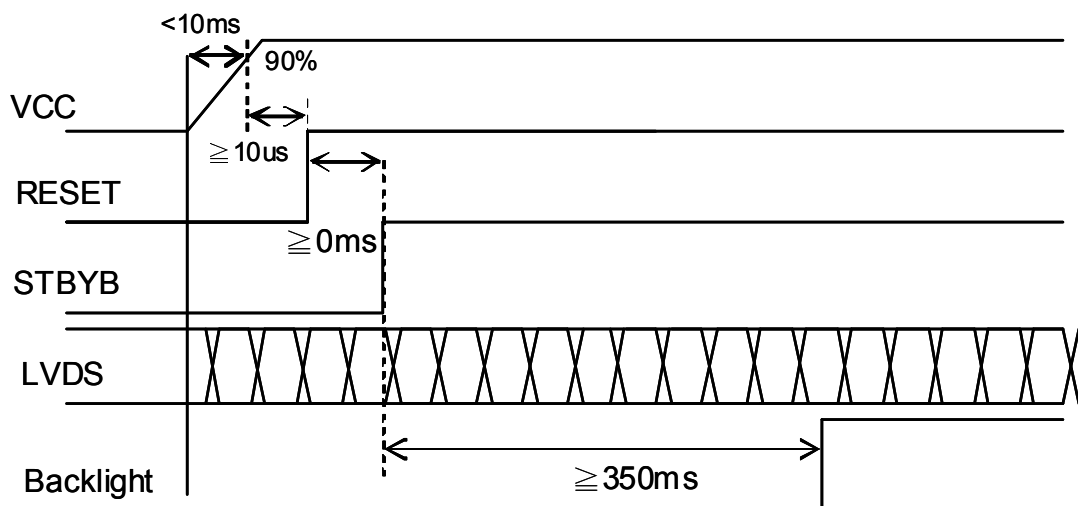
(2) Horizontal Vertical input timing



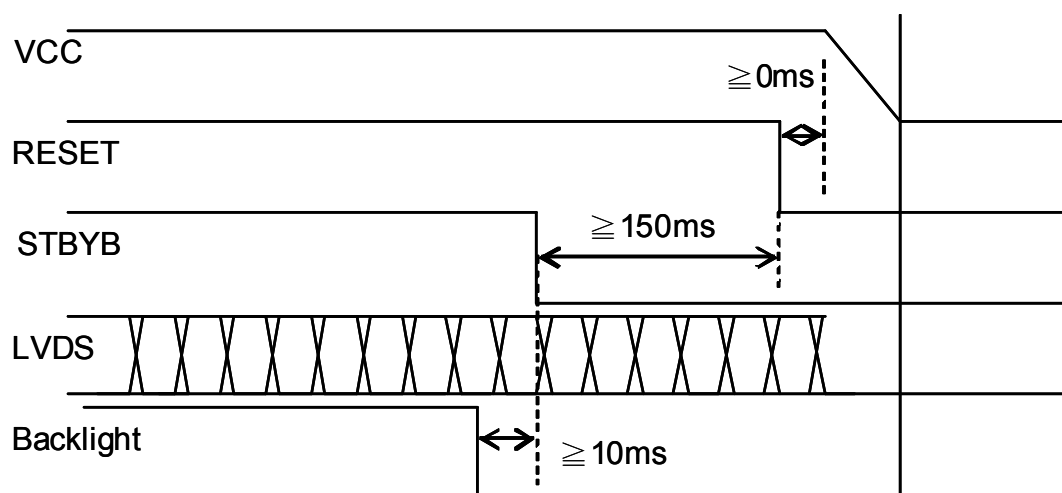
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6.5 Power On / Off Sequence

Power ON



Power OFF



| | | | |
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6.6 Backlight Unit

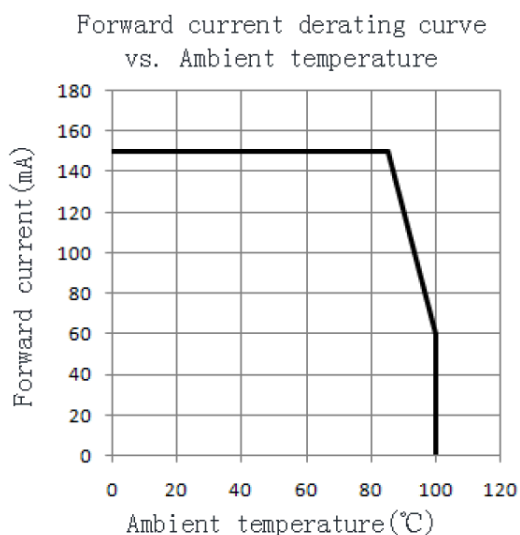
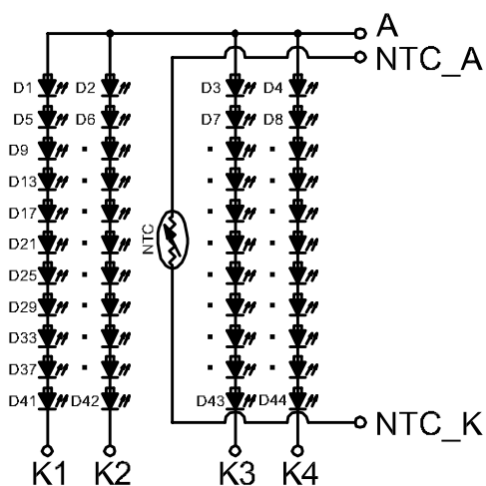
| Parameter | Symbol | Min | Typ | Max | Units | Condition |
|---------------|--------|--------|-----|------|-------|---|
| LED Current | I_F | -- | 280 | -- | mA | $T_a=25^{\circ}\text{C}$ |
| LED Voltage | V_F | -- | -- | 37.4 | Volt | $T_a=25^{\circ}\text{C}$ |
| LED Life-Time | N/A | 30,000 | -- | -- | Hour | $T_a=25^{\circ}\text{C}$ $I_F=70\text{mA}$ Note (2) |

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm 3^{\circ}\text{C}$, typical I_L value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=280\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 300 mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit 11S4P =44pcs LED

Note (4) LED temperature current curve, The temperature at 60 degrees before the output 60mA / CH, 60 degrees to 80 degrees when the linear drop to 30mA.



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7.0 RELIABILITY TEST ITEMS

| No. | Item | Conditions | Remark |
|-----|--|---|---------|
| 1 | High Temperature Storage | Ta=+90°C, 240hrs | 1, 2, 3 |
| 2 | Low Temperature Storage | Ta=-40°C, 240hrs | 1, 2, 3 |
| 3 | High Temperature Operation | Ta=+85°C, 240hrs | 1, 2, 3 |
| 4 | Low Temperature Operation | Ta=-30°C, 240hrs | 1, 2, 3 |
| 5 | High Temperature and High Humidity (operation) | Ta=+65°C, 90%RH, 240hrs | 1, 2, 3 |
| 6 | Thermal Cycling Test (non operation) | -30°C(30min)→+80°C(30min),100 cycles | 1, 2, 3 |
| 7 | Electrostatic Discharge | ±200V,200pF(0Ω) 1 time/connector | |
| 8 | Vibration | 1.Random: 1.04G, 10~500Hz, XYZ, 30min/each direction 2.Sine: Freq.1.5G, 8~33.3Hz, Stoke: 1.3mmhz Sweep: 2.9G, 33.3~400 X/Z: 2hrs, Y:4hrs | |
| 9 | Shock | Half-Sine, 100G, 6ms, ±XYZ, 1time | |
| 10 | Vibration (with carton) | Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ 各方向 2hrs | |
| 11 | Drop (with carton) | Drop height condition, basis on the product weight and Follw QB100-0027 1 corner, 3 edges, 6 surfaces | |

Note1 : There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

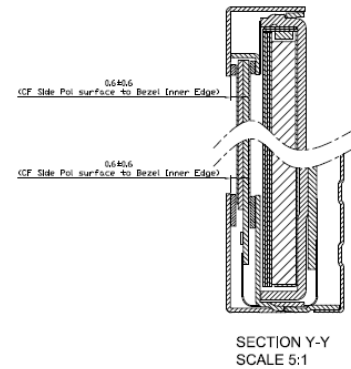
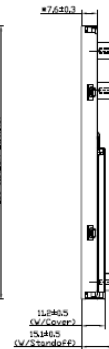
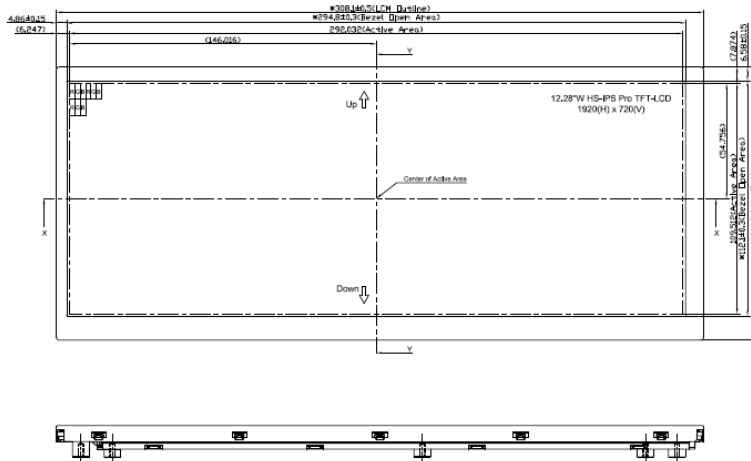
Note2 : All of the function & cosmetic Judgment basis base on IIS Spec. at room temperature.
(The tested module must have enough recovery time at least 2 hours at room temperature.)

Note3 : The test condition definition panel's surface temperature.

| | | | |
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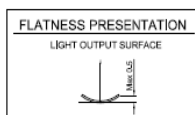
8.0 OUTLINE DIMENSION

Unit : mm

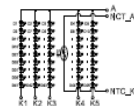


NOTES :

1. "Ⓝ" Marks the Incoming Inspection dimension.
2. "✱" Marks the design critical dimension, must meet CPK >= 1.33
3. "() " Marks the reference dimension.
4. Rotational Torque :
The first fastening torque of screw hole is 3.5 kgf-cm, and refasten 15 times by 2.5 kgf-cm.
5. Mold releasing agent, dirt, oil, grease, contaminant should be cleaned up.
6. Burr and chipping are not allowed around all edges and corners.
7. All film should not be waving and wave warping.
8. LCM flatness SPEC. (Measured by thickness gauge by HSD SPEC 0.5 mm Max.)

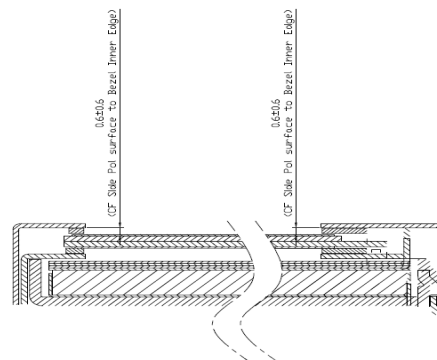


9. LED circuit diagram and Light Bar FPC Pin define:



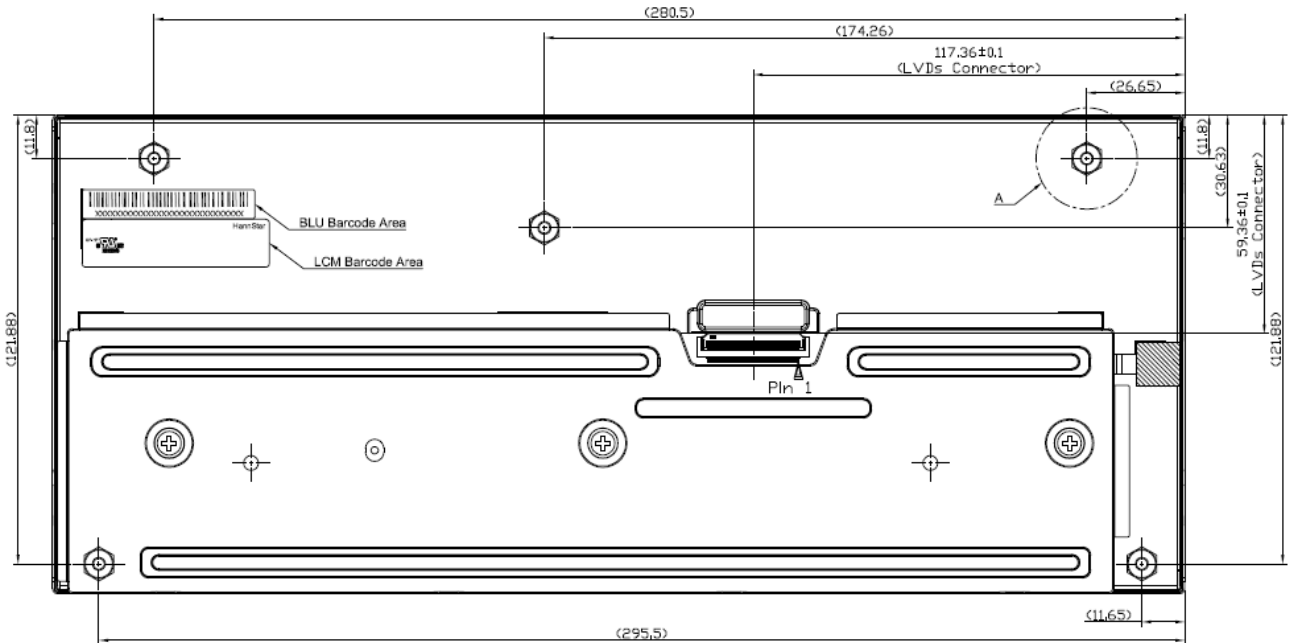
| Pin | Symbol | Description |
|-----|--------|--------------------|
| 1 | V+ | LED Power Positive |
| 2 | V- | LED Power Negative |
| 3 | G | LED Green |
| 4 | R | LED Red |
| 5 | B | LED Blue |
| 6 | Y | LED Yellow |
| 7 | W | LED White |
| 8 | NC | No Connection |
| 9 | NC | No Connection |
| 10 | NC | No Connection |

10. Unspecified dimensions refer to 3D file.



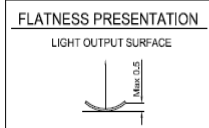
Note: General tolerance: +/- 0.3mm

| | | | |
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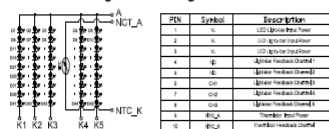


NOTES :

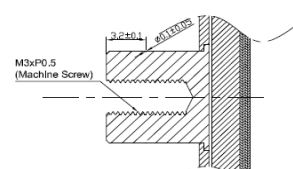
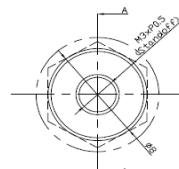
1. " (N) " Marks the Incoming Inspection dimension.
2. " * " Marks the design critical dimension, must meet CPK >= 1,33
3. " () " Marks the reference dimension.
4. Rotational Torque :
The first fastening torque of screw hole is 3,5 kgf-cm, and refasten 15 times by 2,5 kgf-cm.
5. Mold releasing agent, dirt, oil, grease, contaminant should be cleaned up.
6. Burr and chipping are not allowed around all edges and corners.
7. All film should not be waving and wave warping.
8. LCM flatness SPEC, (Measured by thickness gauge by HSD SPEC 0,5 mm Max.)



9. LED circuit diagram and Light Bar FPC Pin define:



10. Unspecified dimensions refer to 3D file.



Note: General tolerance: +/- 0.3mm

| | | | |
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9.0 LOT MARK

9.1 Lot Mark

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

Code 1,2,3,4,5,6: HannStar internal flow control code.

Code 7: production location.

Code 8: production year.

Code 9: production month.

Code 10,11,12,13,14,15: serial number.

Note (1) Production Year: Code 8 is defined by the last number of the year, for example

| | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| Year | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2015 |
| Mark | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |

Note (2) Production Month

| | | | | | | | | | | | | |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Month | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |

9.2 Detail of Lot Mark

- (1) Below label is attached on the backside of the LCD module. See Section 8.0: Outline Dimension.
- (2) The detail of Lot Mark is attached as below.
- (3) This is subject to change without prior notice.



| | | | |
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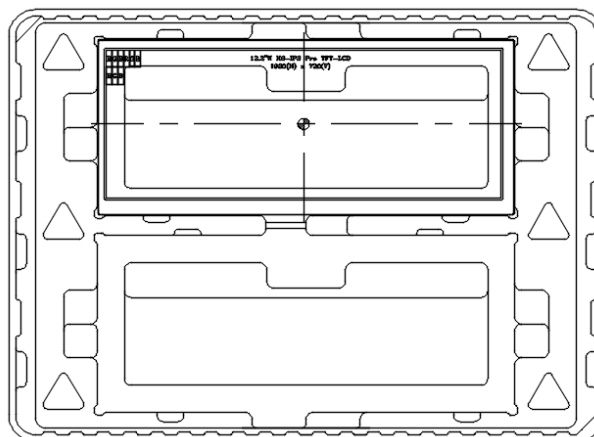
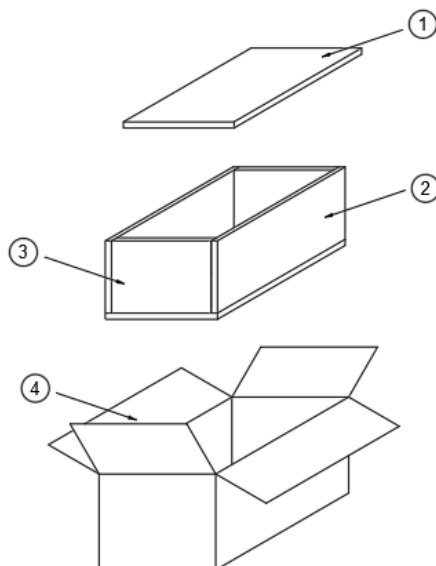
10.0 PACKAGE SPECIFICATION

10.1 Packing form

| Item | Q'ty | Material | Size |
|------|------|----------------------------------|--------------------|
| ① | 2 | EPE Board (T/B) | 480 x 360 x 20mm |
| ② | 2 | EPE Board (L/R) | 325 x 235 x 20mm |
| ③ | 2 | EPE Board (F/RE) | 480 x 235 x 20mm |
| ④ | 1 | Corrugated Paperboard (AB Flute) | 500 x 380 x 312mm |
| ⑤ | 11 | PET Tray | 440 x 320 x 24.1mm |

(1) Package quantity in one carton: 20 pieces.

10.2 Packing assembly drawings



| | | | |
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11.0 GENERAL PRECAUTION

11.1 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.

11.2 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.

11.3 Breakage of LCD Panel

11.3.1. 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.

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

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

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

11.4 Electric Shock

11.4.1. Disconnect power supply before handling LCD module.

11.4.2. Do not pull or fold the LED cable.

11.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

11.5 Absolute Maximum Ratings and Power Protection Circuit

11.5.1. 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.

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

11.5.3. It's recommended to employ protection circuit for power supply.

11.6 Operation

11.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

11.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

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

| | | | |
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11.6.4 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.

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

11.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

11.8 Static Electricity

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

11.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

11.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

11.10 Disposal

When disposing LCD module, obey the local environmental regulations.