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1 OF 35

**TITLE :**

**DV430FHB-R00 Product Specification**

Fuzhou BOE Optoelectronics Technology Co.,Ltd



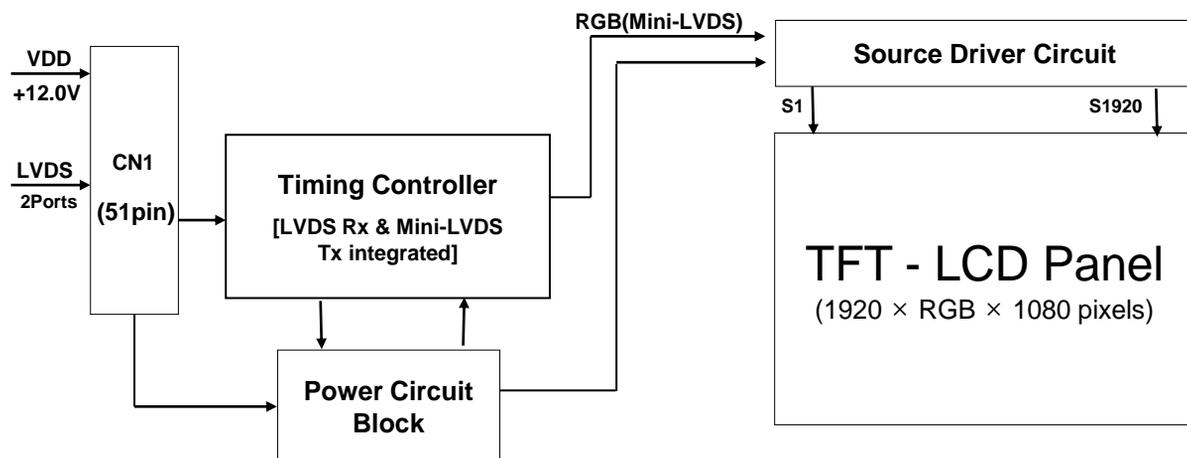
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

DV430FHB-R00 is a color active matrix TFT LCD open cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This open cell has a 42.5 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD panel is adapted for a low reflection and higher color type.



### 1.2 Features

- LVDS interface with 2 pixel / clock
- High-speed response
- Low color shift image quality
- 8-bit color depth, display 16.7M colors
- Wide viewing angle, gate driver use GOA mode
- DE (Data Enable) only mode
- ADS technology is applied for high display quality
- RoHS compliant
- High TNI 105°C
- Landscape and Portrait Display
- 7\*24hr in auto aging status

### 1.3 Application

- Commercial Digital Display
- Display Terminals for Control System

### 1.4 General Specification

< Table 1. General Specifications >

| Parameter               |           | Specification  | Unit   | Remark                       |
|-------------------------|-----------|--|--------|------------------------------|
| Active area             |           | 940.896(H) × 529.254(V)                                      | mm     |                              |
| Number of pixels        |           | 1920(H) × 1080(V)  | pixels |                              |
| Pixel pitch             |           | 163.35(H) × 490.05(V)  | um     |                              |
| Pixel arrangement       |           | Pixels RGB Vertical stripe                                   |        |                              |
| Display colors          |           | 16.7M (8bits True)   | colors |                              |
| Display mode            |           | Transmission mode, Normally Black                            |        |                              |
| Open Cell Transmittance |           | 6.0  | %      | At center point with BOE BLU |
| Weight                  |           | 1510 (Typ.)  | gram   |                              |
| Power Consumption       |           | 6.0  | Watt   |                              |
| Temperature             | Operating | -20~70   | °C     | High TNI 105°C               |
|                         | Storage   | -30~80   |        |                              |
| Surface Treatment       |           | Haze 1% , 3H, Anti-Glare Layer (for Front) , Clear(for Rear) |        |                              |

## 2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

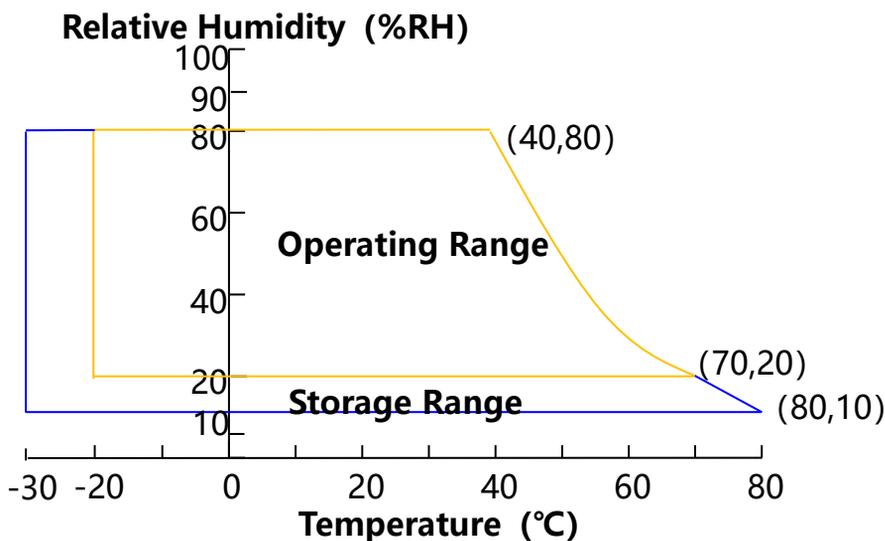
< Table 2. Open Cell Electrical Specifications >

[VSS=GND=0V]

| Parameter                  | Symbol           | Min.    | Max. | Unit | Remark     |
|----------------------------|------------------|---------|------|------|------------|
| Power Supply Voltage       | VDD              | VSS-0.3 | 13.5 | V    | Ta = 25 °C |
| Operating Temperature      | T <sub>OP</sub>  | -20     | +70  | °C   | Note 1     |
|                            | T <sub>SUR</sub> | -20     | +70  | °C   |            |
| Storage Temperature        | T <sub>ST</sub>  | -30     | +80  | °C   |            |
| Operating Ambient Humidity | Hop              | 10      | 80   | %RH  |            |
| Storage Humidity           | Hst              | 10      | 80   | %RH  |            |

Note 1 : Temperature and relative humidity range are shown in the figure below.  
Wet bulb temperature should be 39 °C max. and no condensation of water.

Note 2 : Thermal management should be considered in terminal product design to prevent the surface temperature of display area from being over 73°C. The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 73°C with LCD module alone in a temperature controlled chamber.



### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 TFT LCD Open Cell

< Table 3. Open Cell Electrical Specifications >

[Ta =25 ± 2 °C]

| Parameter                   |   | Symbol | Values |     |      | Unit | Remark |
|-----------------------------|---|--------|--------|-----|------|------|--------|
|                             |   |        | Min    | Typ | Max  |      |        |
| Power Supply Input Voltage  |   | VDD    | 10.8   | 12  | 13.2 | Vdc  |        |
| Power Supply Ripple Voltage |   | VRP    |        |     | 300  | mV   |        |
| Power Supply Current        |   | IDD    | -      | 500 | 950  | mA   | Note 1 |
| Power Consumption           |   | PDD    | -      | 6   | 12.5 | Watt |        |
| Rush current                |   | IRUSH  | -      | -   | 3.0  | A    | Note 2 |
| LVDS Interface              | Differential Input High Threshold Voltage | VLVTH  | +100   |     | +300 | mV   |        |
|                             | Differential Input Low Threshold Voltage  | VLVTL  | -300   |     | -100 | mV   |        |
|                             | Common Input Voltage                      | VLVC   | 1.0    | 1.2 | 1.4  | V    |        |
| CMOS Interface              | Input High Threshold Voltage              | VIH    | 2.7    | -   | 3.3  | V    |        |
|                             | Input Low Threshold Voltage               | VIL    | 0      | -   | 0.6  | V    |        |

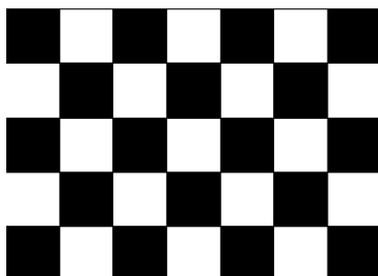
Note 1 : The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for VDD=12.0V,

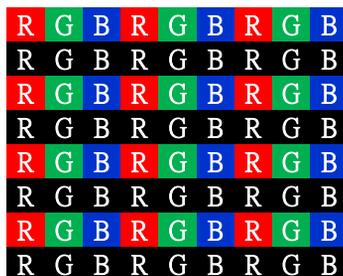
Frame rate  $f_v=60\text{Hz}$  and Clock frequency = 74.25MHz.

Test Pattern of power supply current

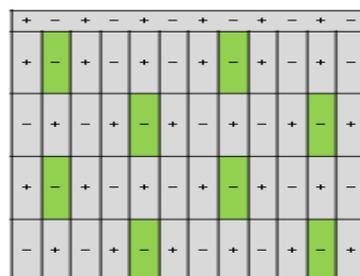
a) Typ : Mosaic 7X5 (L0/L255)



b) Max : Horizontal 1 Line (L0/L255)



c) Flicker Pattern



Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

## 4.0 INTERFACE CONNECTION

### 4.1 Open Cell Input Signal & Power

- Connector : F05035-51P-H (巨铖) or PM.FPC.LVS0505101(昶通) .

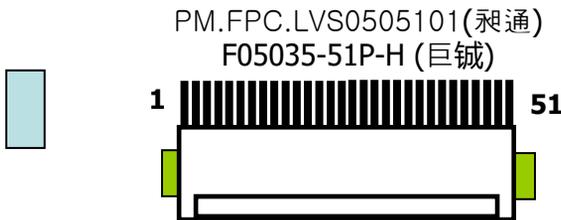
< Table 4. Open Cell Input Connector Pin Configuration >

| Pin No | Symbol  | Description  | Pin No | Symbol  | Description   |
|--------|---------|--|--------|---------|---|
| 1      | NC      | No Connection  | 21     | GND     | Ground  |
| 2      | SDA     | I <sup>2</sup> C Data                                    | 22     | CH1[3]- | First pixel negative LVDS differential data input. Pair3  |
| 3      | SCL     | I <sup>2</sup> C Clock                                   | 23     | CH1[3]+ | First pixel positive LVDS differential data input. Pair3  |
| 4      | NC      | Not Connected  | 24     | NC      | Not Connected   |
| 5      | NC      | Not Connected  | 25     | NC      | Not Connected   |
| 6      | NC      | Not Connected  | 26     | NC      | Not Connected   |
| 7      | SELLVDS | High: JEIDA<br>Low or Open: VESA                         | 27     | NC      | Not Connected   |
| 8      | NC      | Not Connected  | 28     | CH2[0]- | Second pixel negative LVDS differential data input. Pair0 |
| 9      | NC      | Not Connected  | 29     | CH2[0]+ | Second pixel positive LVDS differential data input. Pair0 |
| 10     | NC      | Not Connected  | 30     | CH2[1]- | Second pixel negative LVDS differential data input. Pair1 |
| 11     | GND     | Ground   | 31     | CH2[1]+ | Second pixel positive LVDS differential data input. Pair1 |
| 12     | CH1[0]- | First pixel negative LVDS differential data input. Pair0 | 32     | CH2[2]- | Second pixel negative LVDS differential data input. Pair2 |
| 13     | CH1[0]+ | First pixel positive LVDS differential data input. Pair0 | 33     | CH2[2]+ | Second pixel positive LVDS differential data input. Pair2 |
| 14     | CH1[1]- | First pixel negative LVDS differential data input. Pair1 | 34     | GND     | Ground  |
| 15     | CH1[1]+ | First pixel positive LVDS differential data input. Pair1 | 35     | CH2CLK- | Second pixel negative LVDS clock                          |
| 16     | CH1[2]- | First pixel negative LVDS differential data input. Pair2 | 36     | CH2CLK+ | Second pixel positive LVDS clock                          |
| 17     | CH1[2]+ | First pixel positive LVDS differential data input. Pair2 | 37     | GND     | Ground  |
| 18     | GND     | Ground   | 38     | CH2[3]- | Second pixel negative LVDS differential data input. Pair3 |
| 19     | CH1CLK- | First pixel negative LVDS clock                          | 39     | CH2[3]+ | Second pixel positive LVDS differential data input. Pair3 |
| 20     | CH1CLK+ | First pixel positive LVDS clock                          |        |         |   |

| Pin No | Symbol | Description   | Pin No | Symbol | Description        |
|--------|--------|---------------|--------|--------|--------------------|
| 40     | NC     | Not Connected | 46     | GND    | Ground             |
| 41     | NC     | Not Connected | 47     | NC     | Not Connected      |
| 42     | NC     | Not Connected | 48     | VCC    | Input Voltage +12V |
| 43     | NC     | Not Connected | 49     | VCC    | Input Voltage +12V |
| 44     | GND    | Ground        | 50     | VCC    | Input Voltage +12V |
| 45     | GND    | Ground        | 51     | VCC    | Input Voltage +12V |

- Notes :
1. NC(Not Connected) : This pins are only used for BOE internal operations.
  2. Input Level of LVDS signal is based on the EIA-644 Standard.
  3. LVDS\_SEL : This pin is used for selecting LVDS signal data format.  
 If this Pin : High (3.3V) → JEIDA LVDS format  
 Otherwise : Low (GND) or Open (NC) → Normal NS LVDS format

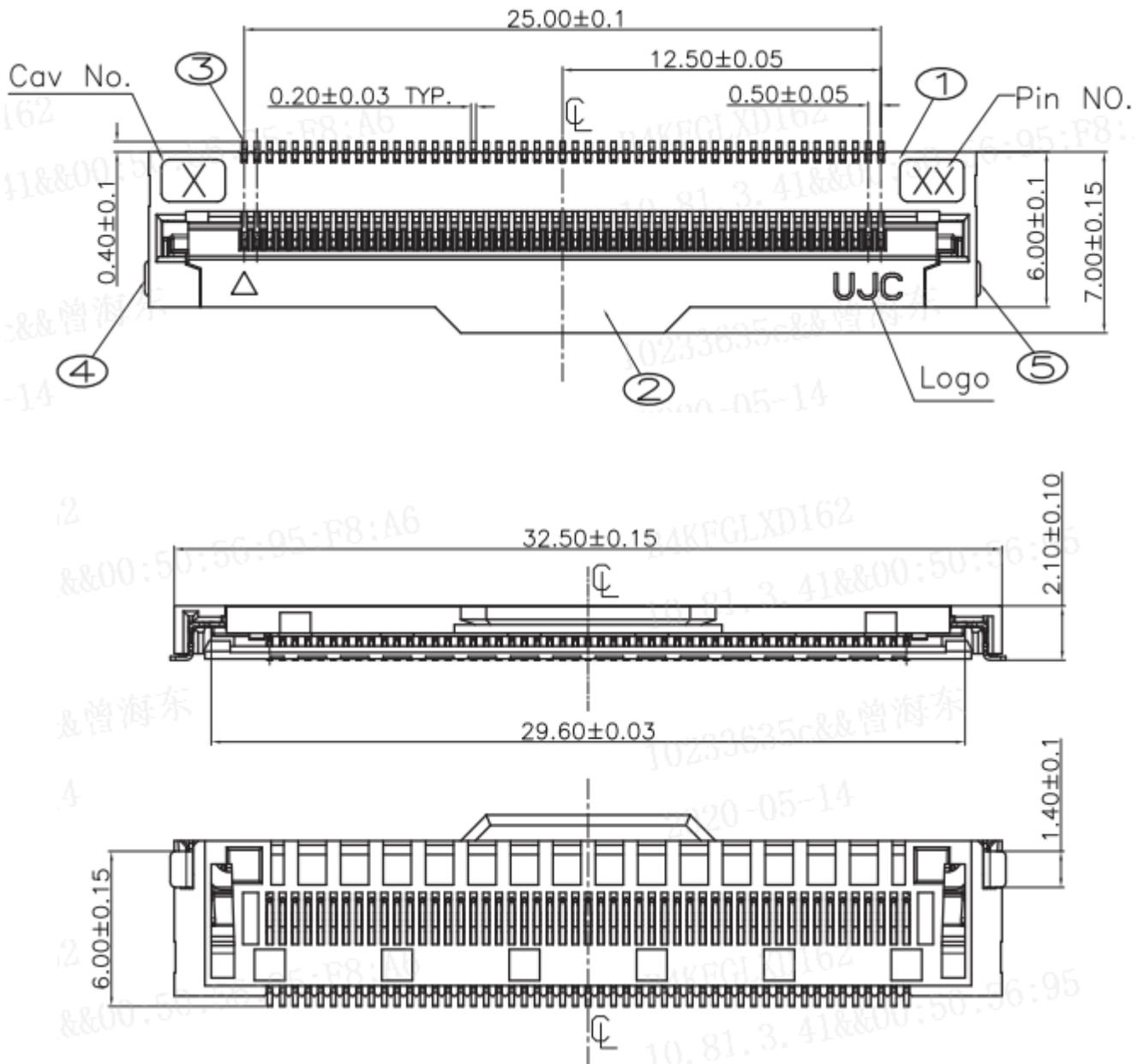
### Rear view of LCM



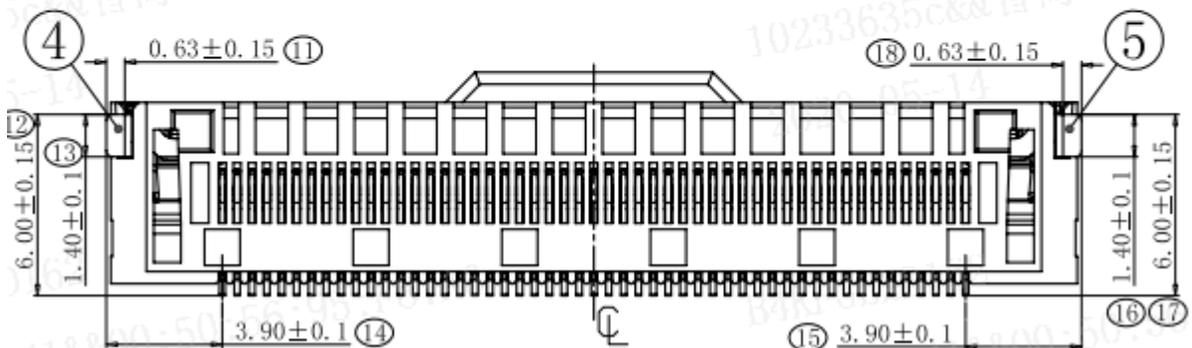
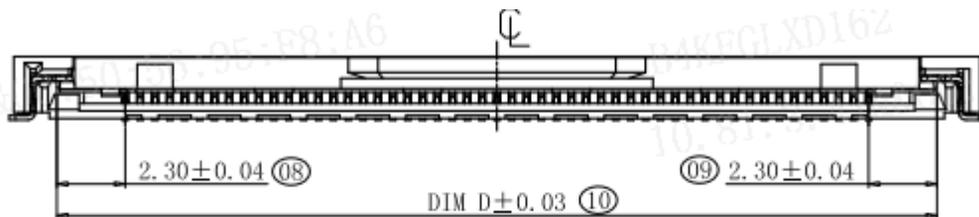
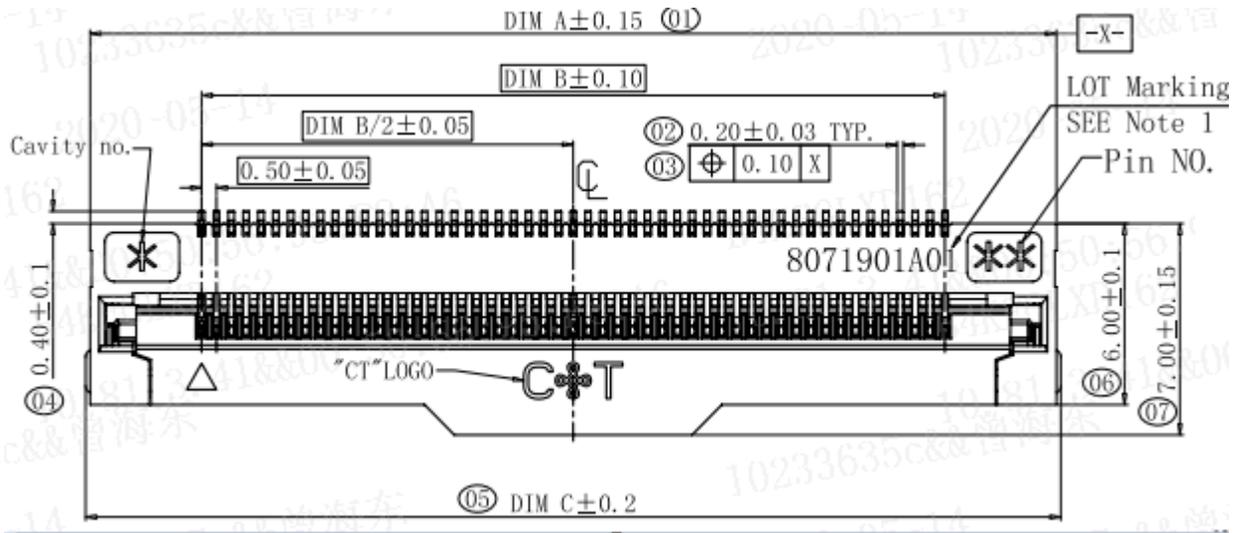
### BIST Pattern

| PT1:Black<br>(2sec) | PT2:White<br>(2sec) | PT3:Red<br>(2sec) | PT4:Green<br>(2sec) | PT5:Blue<br>(2sec) |
|---------------------|---------------------|-------------------|---------------------|--------------------|
|                     |                     |                   |                     |                    |

-51 pin LVDS Connector — F05035-51P-H (巨铖)

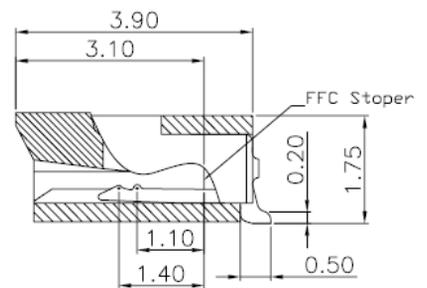
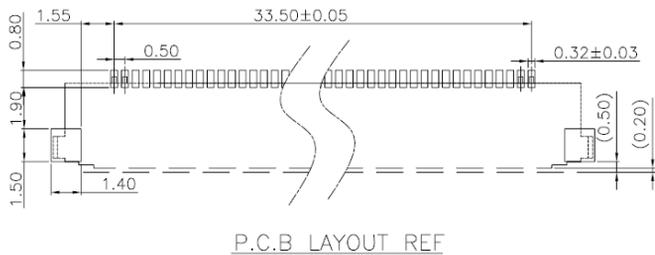
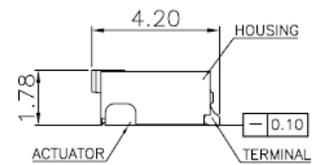
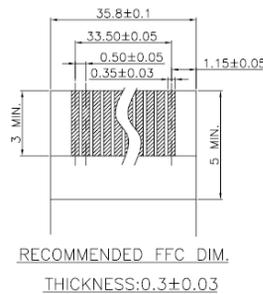
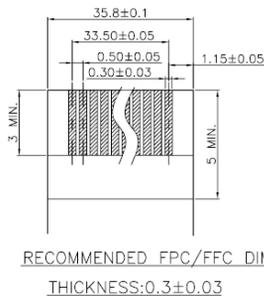
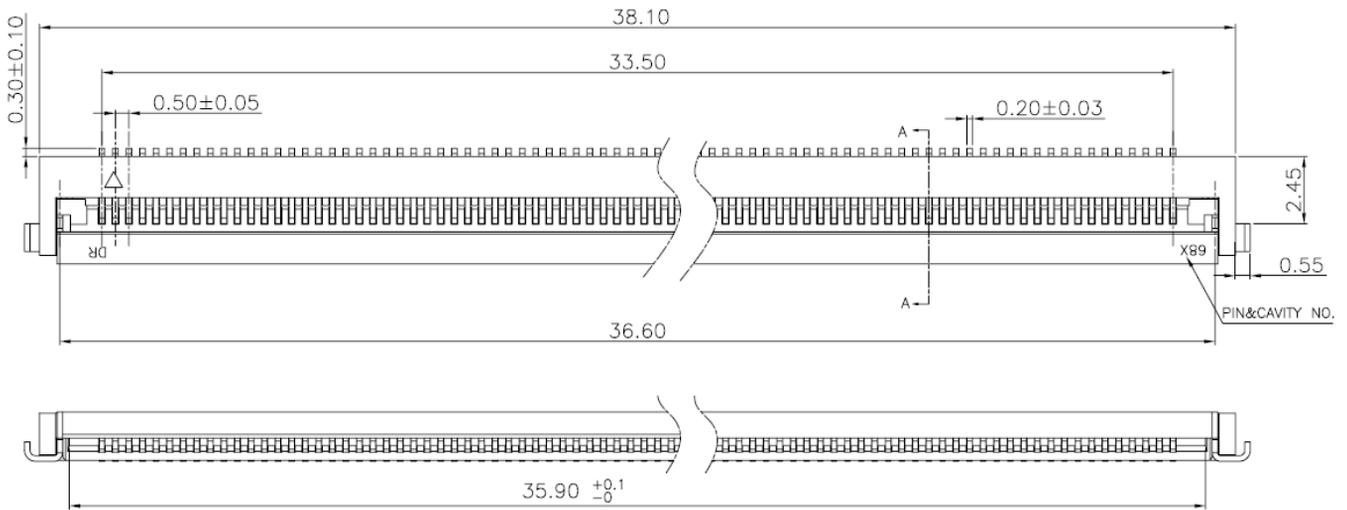


## -51 pin LVDS Connector — PM.FPC.LVS0505101(昶通)



| PIN NO. | DIM A | DIM B | DIM C | DIM D |
|---------|-------|-------|-------|-------|
| 30      | 22.00 | 14.50 | 22.30 | 19.10 |
| 41      | 27.50 | 20.00 | 27.80 | 24.60 |
| 51      | 32.50 | 25.00 | 32.80 | 29.60 |

- 68 pin FFC Connector — FC0568-L3920W420H180-N02 :



## 4.2 LVDS Interface

- LVDS Receiver : Timing Controller (LVDS Rx merged) / LVDS Data : Pixel Data

< Table 5. Open Cell Input Connector Pin Configuration >

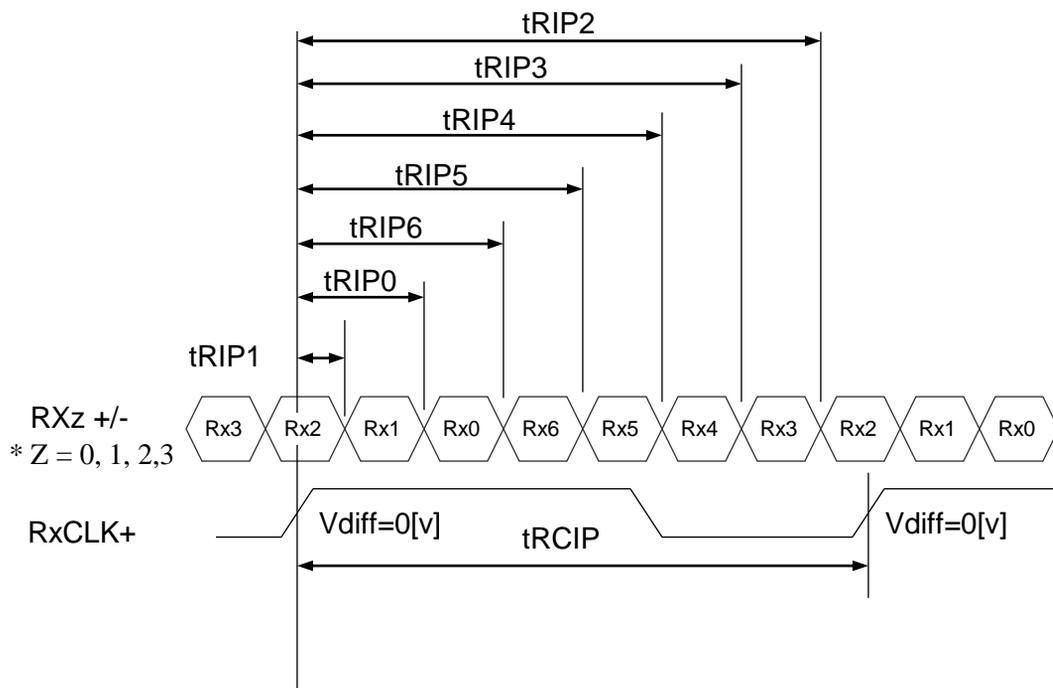
| Channel No. | Data No. | 8-bit LVDS Type |       |
|-------------|----------|-----------------|-------|
|             |          | NS              | JEIDA |
| 0           | Bit-0    | R0              | R2    |
|             | Bit-1    | R1              | R3    |
|             | Bit-2    | R2              | R4    |
|             | Bit-3    | R3              | R5    |
|             | Bit-4    | R4              | R6    |
|             | Bit-5    | R5              | R7    |
|             | Bit-6    | G0              | G2    |
| 1           | Bit-0    | G1              | G3    |
|             | Bit-1    | G2              | G4    |
|             | Bit-2    | G3              | G5    |
|             | Bit-3    | G4              | G6    |
|             | Bit-4    | G5              | G7    |
|             | Bit-5    | B0              | B2    |
|             | Bit-6    | B1              | B3    |
| 2           | Bit-0    | B2              | B4    |
|             | Bit-1    | B3              | B5    |
|             | Bit-2    | B4              | B6    |
|             | Bit-3    | B5              | B7    |
|             | Bit-4    | HS              | HS    |
|             | Bit-5    | VS              | VS    |
|             | Bit-6    | DE              | DE    |
| 3           | Bit-0    | R6              | R0    |
|             | Bit-1    | R7              | R1    |
|             | Bit-2    | G6              | G0    |
|             | Bit-3    | G7              | G1    |
|             | Bit-4    | B6              | B0    |
|             | Bit-5    | B7              | B1    |
|             | Bit-6    | -               |       |

## 4.3 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 6.

<Table 6. LVDS Rx Interface Timing Specification>

| Item         | Symbol | Min              | Typ          | Max              | Unit | Remark |
|--------------|--------|------------------|--------------|------------------|------|--------|
| CLKIN Period | tRCIP  | 10.31            | 13.47(10.78) | 15.87            | nsec |        |
| Input Data 0 | tRIP1  | -0.42            | 0.0          | +0.42            | nsec |        |
| Input Data 1 | tRIP0  | tRCIP/7-0.42     | tRCIP/7      | tRCIP/7+0.42     | nsec |        |
| Input Data 2 | tRIP6  | 2 × tRCIP/7-0.42 | 2 × tRCIP/7  | 2 × tRCIP/7+0.42 | nsec |        |
| Input Data 3 | tRIP5  | 3 × tRCIP/7-0.42 | 3 × tRCIP/7  | 3 × tRCIP/7+0.42 | nsec |        |
| Input Data 4 | tRIP4  | 4 × tRCIP/7-0.42 | 4 × tRCIP/7  | 4 × tRCIP/7+0.42 | nsec |        |
| Input Data 5 | tRIP3  | 5 × tRCIP/7-0.42 | 5 × tRCIP/7  | 5 × tRCIP/7+0.42 | nsec |        |
| Input Data 6 | tRIP2  | 6 × tRCIP/7-0.42 | 6 × tRCIP/7  | 6 × tRCIP/7+0.42 | nsec |        |

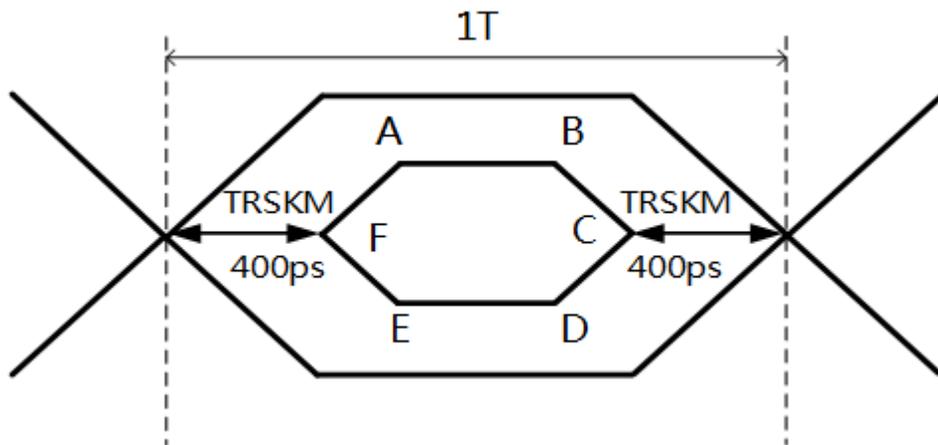


\*  $V_{diff} = (RXz+) - (RXz-), \dots, (RXCLK+) - (RXCLK-)$

### 4.4 LVDS Rx Interface Eye Diagram

< Table 7. LVDS Rx Interface Eye Diagram >

| Symbol | Min | Typ  | Max | Unit | Note |
|--------|-----|------|-----|------|------|
| A      | —   | 100  | —   | mV   |      |
| B      | —   | 100  | —   | mV   |      |
| C      | —   | 0    | —   | mV   |      |
| D      | —   | -100 | —   | mV   |      |
| E      | —   | -100 | —   | mV   |      |
| F      | —   | 0    | —   | mV   |      |



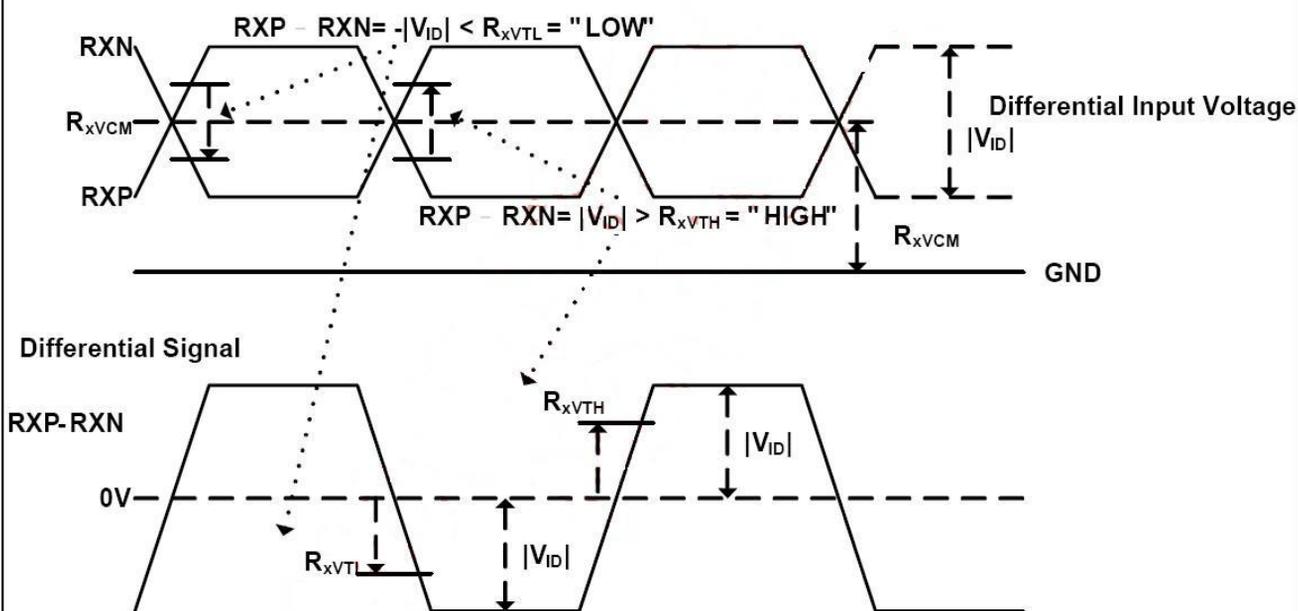
- Notes: 1. Time F to A,B to C,C to D,E to F is 150p second.
- 2. LVDS clock=85Mhz.
- 3. The time A to B= $1T - 2 * TRSKM - 2 * 150ps$ .

### 4.5 LVDS Receiver Differential Input

< Table 7-1. LVDS Receiver Differential Input >

| Symbol     | Parameter                                 | Min          | Typ | Max                | Unit | Condition      |
|------------|---|--------------|-----|--------------------|------|----------------|
| $R_{xVTH}$ | Differential input high threshold voltage |              |     | +0.1v              | V    | $RxVCM = 1.2V$ |
| $R_{xVTL}$ | Differential input low threshold voltage  | -0.1V        |     |                    | V    |                |
| $R_{xVIN}$ | Input voltage range (singled-end)         | 0            |     | 2.4                | V    |                |
| $R_{xVCM}$ | Differential input common mode voltage    | $ V_{ID} /2$ |     | $2.4 -  V_{ID} /2$ | V    |                |
| $ V_{ID} $ | Differential input voltage                | 0.1          |     | 0.6                | V    |                |

#### Single-end Signals



### 5.0 SIGNAL TIMING SPECIFICATION

#### 5.1 Timing Parameters (DE only mode)

< Table 8. Timing Table >

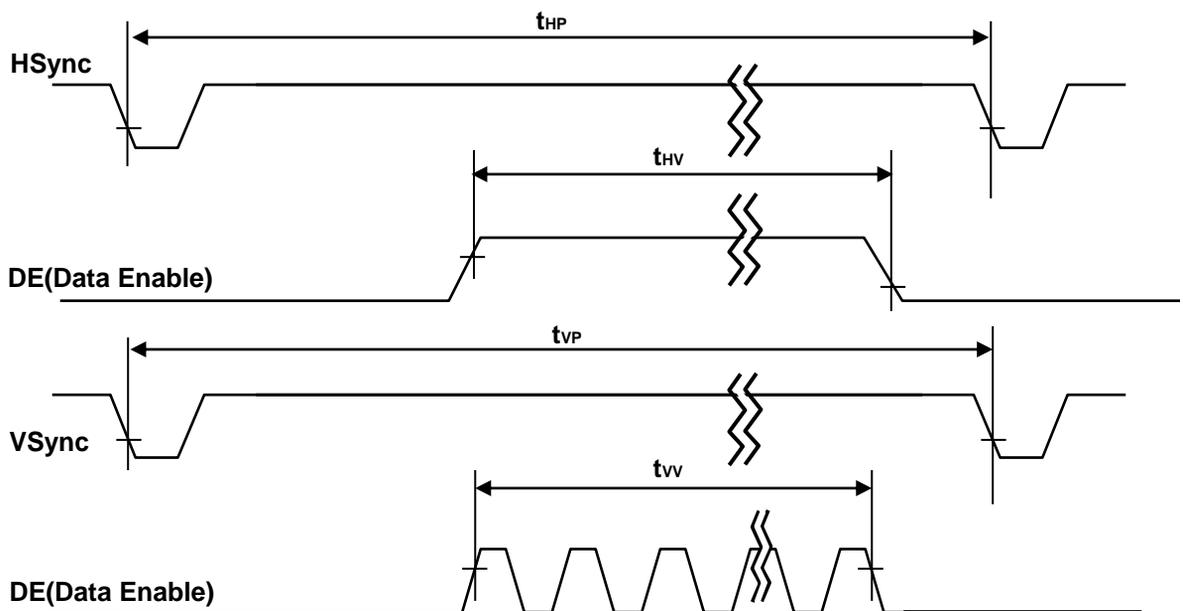
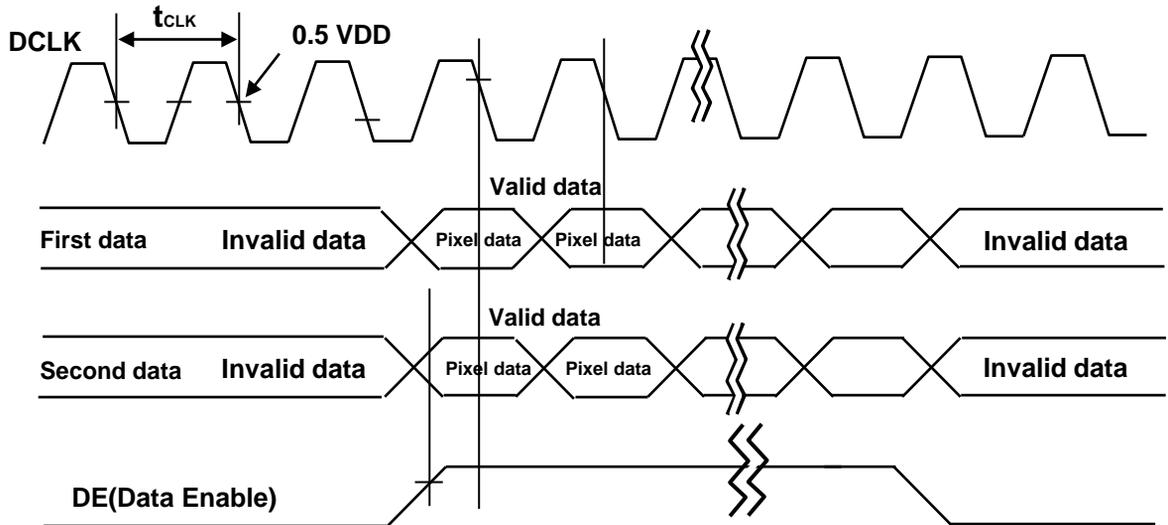
| Item                           |           | Symbols |                 | Min  | Typ   | Max  | Unit             |
|--------------------------------|-----------|---------|-----------------|------|-------|------|------------------|
| Clock                          | Frequency | 1/Tc    |                 | 60   | 74.25 | 78   | MHz              |
|                                | High Time | Tch     |                 | -    | 4/7Tc | -    |                  |
|                                | Low Time  | Tcl     |                 | -    | 4/7Tc | -    |                  |
| Frame Period                   |           | Tv      |                 | 1100 | 1125  | 1149 | lines            |
|                                |           |         |                 | 48.5 | 60    | 63   | Hz               |
| Horizontal Active Display Term |           | Valid   | t <sub>HV</sub> | -    | 960   | -    | t <sub>CLK</sub> |
|                                |           | Total   | t <sub>HP</sub> | 1060 | 1100  | 1200 | t <sub>CLK</sub> |
| Vertical Active Display Term   |           | Valid   | t <sub>VV</sub> | -    | 1080  | -    | t <sub>HP</sub>  |
|                                |           | Total   | t <sub>VP</sub> | 1100 | 1125  | 1149 | t <sub>HP</sub>  |

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

< Table 9. LVDS Input SSCG >

| Symbol             | Parameter   | Condition  | Min  | Typ   | Max  | Unit |
|--------------------|---|--|------|-------|------|------|
| F                  | LVDS Input frequency                                  | -  | 45   | 74.25 | 85   | MHz  |
| T <sub>LVSK</sub>  | LVDS channel to channel skew                          | F=100MHz<br>V <sub>IC</sub> =1.2V<br>V <sub>ID</sub> =±400mV | -380 | -     | +380 | ps   |
| F <sub>LVMOD</sub> | Modulating frequency of input clock during SSC        |  | -    | -     | 85   | KHz  |
| F <sub>LVDEV</sub> | Maximum deviation of input clock frequency during SSC |  | -3   | -     | +3   | %    |
| T <sub>CY-CY</sub> | Cycle to Cycle jitter                                 |  | -    | -     | 100  | ps   |

### 5.2 Signal Timing Waveform



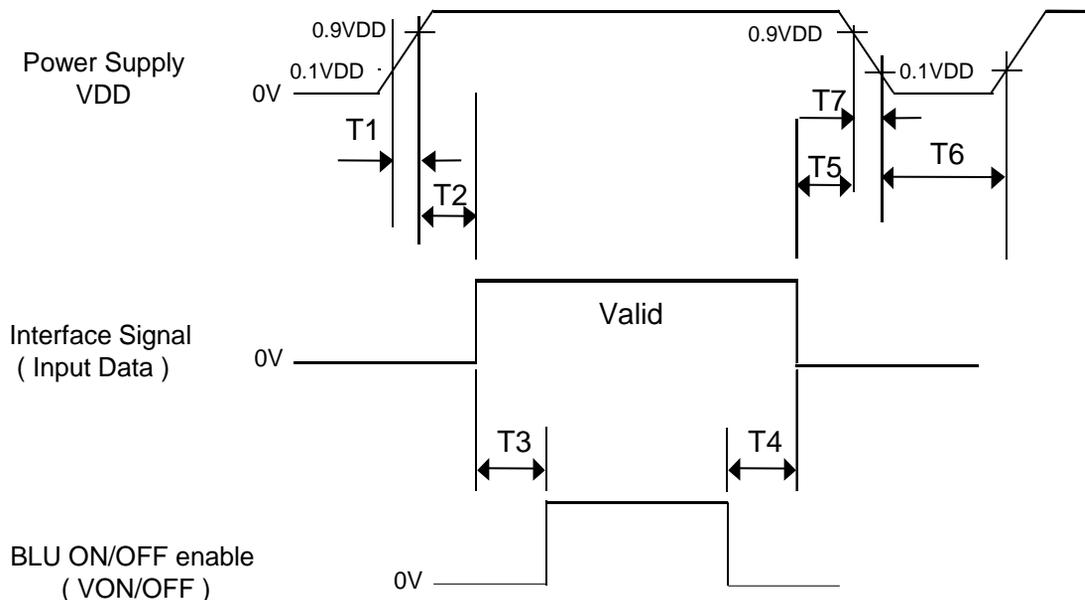
## 5.3 Input Signals, Basic Display Colors and Gray Scale of Colors

< Table 10. Input Signal and Display Color Table >

| Color & Gray Scale  |          | Input Data Signal |    |    |    |    |    |    |    |            |    |    |    |    |    |           |    |    |    |    |    |    |    |    |    |
|---------------------|----------|-------------------|----|----|----|----|----|----|----|------------|----|----|----|----|----|-----------|----|----|----|----|----|----|----|----|----|
|                     |          | Red Data          |    |    |    |    |    |    |    | Green Data |    |    |    |    |    | Blue Data |    |    |    |    |    |    |    |    |    |
|                     |          | R7                | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7         | G6 | G5 | G4 | G3 | G2 | G1        | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors        | Black    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Blue     | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Green    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Cyan     | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Red      | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Magenta  | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Yellow   | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | White    | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Gray Scale of Red   | Black    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | △        | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | △        | ↑                 |    |    |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |
|                     | ▽        | ↓                 |    |    |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |
|                     | Brighter | 1                 | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | ▽        | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red      | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Gray Scale of Green | Black    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | △        | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | △        | ↑                 |    |    |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |
|                     | ▽        | ↓                 |    |    |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |
|                     | Brighter | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 0         | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | ▽        | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Gray Scale of Blue  | Black    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | △        | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  |
|                     | △        | ↑                 |    |    |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |
|                     | ▽        | ↓                 |    |    |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |
|                     | Brighter | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 1  |
|                     | ▽        | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  |
|                     | Blue     | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Gray Scale of White | Black    | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | △        | 0                 | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  |
|                     | △        | ↑                 |    |    |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |
|                     | ▽        | ↓                 |    |    |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |
|                     | Brighter | 1                 | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 0         | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 1  |
|                     | ▽        | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  |
|                     | White    | 1                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

## 5.4 Power Sequence

To prevent a latch-up or DC operation of the Open Cell, the power on/off sequence shall be as shown in below



< Table 11. Sequence Table >

| Parameter | Values |     |     | Units |
|-----------|--------|-----|-----|-------|
|           | Min    | Typ | Max |       |
| T1        | 0.5    | -   | 20  | ms    |
| T2        | 10     | -   | 100 | ms    |
| T3        | 200    | -   | -   | ms    |
| T4        | 200    | -   | -   | ms    |
| T5        | 0      | -   | -   | ms    |
| T6        | 1      | -   | -   | s     |

- Notes:
1. Back Light must be turn on after power for logic and interface signal are valid.
  2. Even though T1 is out of SPEC, it is still ok if the inrush current of VDD is below the limit.
  3. When  $VDD < 0.9VDD(Typ.)$ , Power off.
  4. T7 decreases smoothly, if there were rebounding voltage, it must smaller than 5 volts.

### 6.0 OPTICAL SPECIFICATIONS

The test of optical specifications shall be measured in a dark room (ambient luminance  $\leq 1$  lux and temperature  $= 25 \pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (Goniometer system and PR730) and test unit shall be located at an approximate distance 180cm from the LCD surface at a viewing angle of  $\theta$  and  $\Phi$  equal to  $0^\circ$ . We refer to  $\theta_{\Phi=0}$  ( $=\theta_3$ ) as the 3 o'clock direction (the "right"),  $\theta_{\Phi=90}$  ( $=\theta_{12}$ ) as the 12 o'clock direction ("upward"),  $\theta_{\Phi=180}$  ( $=\theta_9$ ) as the 9 o'clock direction ("left") and  $\theta_{\Phi=270}$  ( $=\theta_6$ ) as the 6 o'clock direction ("bottom"). While scanning  $\theta$  and/or  $\Phi$ , the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 12.0V at  $25^\circ\text{C}$ . Optimum viewing angle direction is 6 'clock.

< Table 12. Optical Table >

[VDD = 12.0V, Frame rate = 60Hz, Ta =  $25 \pm 2^\circ\text{C}$ ]

| Parameter             |            | Symbol        | Condition  | Min            | Typ   | Max            | Unit | Remark     |
|-----------------------|------------|---------------|--|----------------|-------|----------------|------|------------|
| Viewing Angle         | Horizontal | $\Theta_3$    | CR > 10  |                | 89    |                | Deg. | Note 1     |
|                       |            | $\Theta_9$    |  |                | 89    |                | Deg. |            |
|                       | Vertical   | $\Theta_{12}$ |  |                | 89    |                | Deg. |            |
|                       |            | $\Theta_6$    |  |                | 89    |                | Deg. |            |
| Contrast ratio        |            | CR            |  | 800            | 1200  | -              |      | Note 2     |
| Reproduction of color | White      | $W_x$         | $\Theta = 0^\circ$<br>(Center)<br>Normal Viewing Angle | TYP.<br>- 0.03 | 0.272 | TYP.<br>+ 0.03 |      | Note 3     |
|                       |            | $W_y$         |  |                | 0.289 |                |      |            |
|                       | Red        | $R_x$         |  |                | 0.639 |                |      |            |
|                       |            | $R_y$         |  |                | 0.334 |                |      |            |
|                       | Green      | $G_x$         |  |                | 0.296 |                |      |            |
|                       |            | $G_y$         |  |                | 0.602 |                |      |            |
|                       | Blue       | $B_x$         |  |                | 0.150 |                |      |            |
|                       |            | $B_y$         |  |                | 0.067 |                |      |            |
| Response Time         | G to G     | $T_g$         |  | -              | 13    | 20             | ms   | Without OD |
| Gamma Scale           |            |               |  | 2.0            | 2.2   | 2.4            |      |            |
| Cell Transmittance    |            |               |  | -              | 6.0   |                | %    | Note 5     |

#### Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
2. Contrast measurements shall be made at viewing angle of  $\theta = 0^\circ$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See Figure 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The color chromaticity coordinates specified in Table 9 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel. The BLU is used by BOE.
4. Response time  $T_g$  is the average time required for display transition by switching the input signal as below table and is based on Frame rate  $f_V = 60\text{Hz}$  to optimize. Each time in below table is defined as Figure 2 and shall be measured by switching the

| Measured Response Time | Target |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|------------------------|--------|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|                        | 0      | 15 | 31 | 47 | 63 | 79 | 95 | 111 | 127 | 143 | 159 | 175 | 191 | 207 | 223 | 239 | 255 |  |
| Start                  | 0      |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 15     |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 31     |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 47     |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 63     |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 79     |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 95     |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 111    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 127    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 143    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 159    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 175    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 191    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 207    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 223    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
|                        | 239    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |
| 255                    |        |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |  |

#### 5. Definition of Transmittance (T%) :

Module is with white(L255) signal input

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of BLU}} \times 100 \%$$

## 7.0 MECHANICAL CHARACTERISTICS

### 7.1 Dimensional Requirements

Figure 3(located in Appendix) shows mechanical outlines for the model DV430FHB-R00. Other parameters are shown in Table 13.

< Table 13. Dimensional Parameters >

| Parameter        | Specification                                | Unit   |
|------------------|--|--------|
| Active area      | 940.896 (H) × 529.254(V)                     | mm     |
| Pixel pitch      | 163.35 (H) × 490.05(V)                       | um     |
| Number of pixels | 1920(H) × 1080(V) (1 pixel = R + G + B dots) | pixels |
| Weight           | 1510(Typ.)                                   | g      |

### 7.2 Surface Treatment and Polarizer Hardness

The surface of the LCD has an Low haze coating to Reduce scratching. Front Polarizer hardness is at least 3H.

## 8.0 RELIABILITY TEST

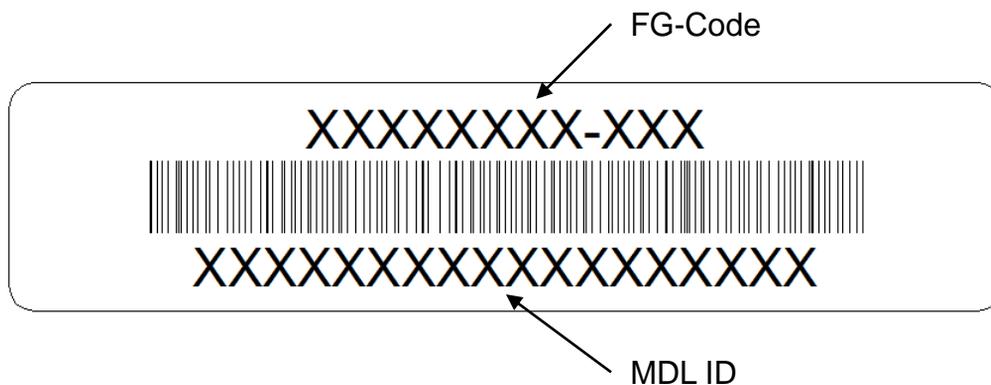
The Reliability test items and its conditions are shown in below.

< Table 14. Reliability Test Parameters >

| No | Test Items                                      | Conditions                              |
|----|---|---|
| 1  | High temperature storage test                   | Ta = 80 °C, 240 hrs                     |
| 2  | Low temperature storage test                    | Ta = -30 °C, 240 hrs                    |
| 3  | High temperature & high humidity operation test | Ta = 50 °C, 80%RH, 240hrs               |
| 4  | High temperature operation test                 | Ta = 70 °C, 240hrs                      |
| 5  | Low temperature operation test                  | Ta = -20 °C, 240hrs                     |
| 6  | Thermal shock                                   | Ta = -20 °C ↔ 60 °C (0.5 hr), 100 cycle |

This test condition is based on BOE module.

### 9.0 PRODCUT SERIAL NUMBER



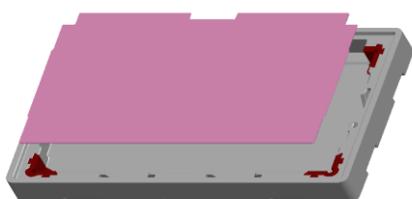
#### MDL ID Naming Rule:

|               |                   |    |       |      |      |    |               |                      |   |    |    |
|---------------|-------------------|----|-------|------|------|----|---------------|----------------------|---|----|----|
| Digit<br>Code | 1                 | 2  | 3     | 4    | 5    | 6  | 7             | 8                    | 9 | 10 | 11 |
| Description   | Model Code<br>GBN |    | Grade | Line | Year |    | Month         | Model Extension Code |   |    |    |
| Digit<br>Code | 12                | 13 | 14    | 15   | 16   | 17 | 18            |                      |   |    |    |
| Description   | Serial No         |    |       |      |      |    | 扫码不显示, BOE厂内用 |                      |   |    |    |

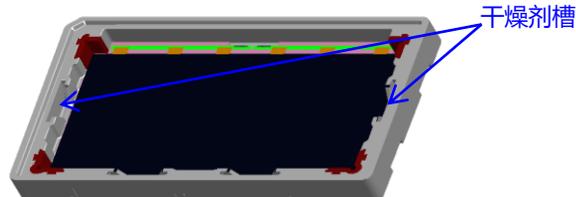
## 10.0 PACKING INFORMATION

BOE provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method and Barcode information are shown in below.

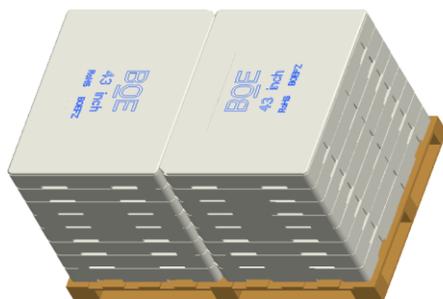
### 10.1 Packing Order



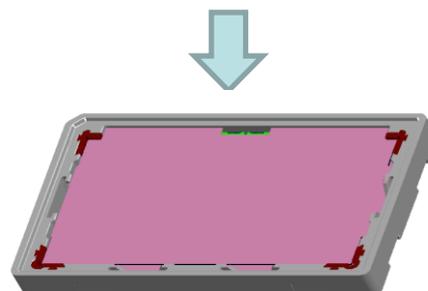
1. Put 1 pcs 3t EPE pad in the box.



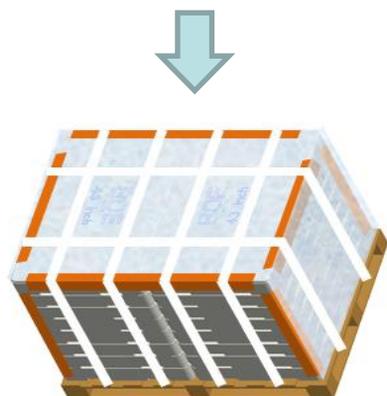
2. Put one open cell on EPE pad.



4. Put totally 16 boxes on the pallet and 2 cover. Then put 1pcs PE film on the top of cover(16ea boxes per pallet)



3. Put 1 pcs 2t EPE pad, ... , totally 17 pcs open cells and 16 pcs 2t EPE pads in the EPO bottom, then, put another 3t EPE pad on the top. Finally, put 2ea Drier, Total :2ea CaCl<sub>2</sub> Drier, 17pcs OC, 16pcs 2t EPE Pad, 2pcs 3t EPE Pad



5. Put 8ea Paper Corner, and pack with wrap film. Finally. pack with 6 packing belts.

厢车装载方式: 双层码放

Pallet摆放方式: 两竖

12m厢车装载量: 8704Pcs (32托)

### 10.2 Packing Note

- Box Dimension : 1100mmL×705mmW×127mmH
- Package Quantity in one Box : 17pcs

### 10.3 Box Label

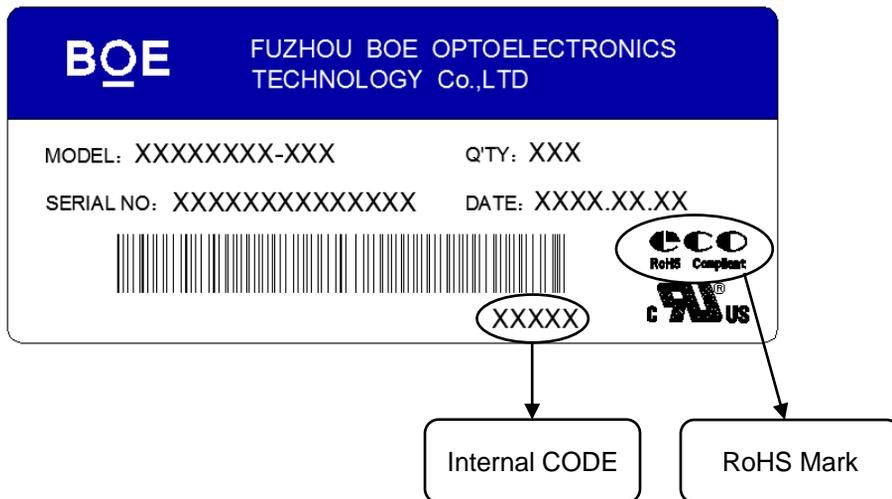
- Label Size : 70 mm (L) × 30 mm (W)
- Contents

Model : DV430FHB-R00 (FG Code of Product)

Q`ty : 17 Open Cell in one box.

Serial No. : Box ID.

Date : Packing Date



- Box ID Naming Rule:

| Digit Code  | 1            | 2 | 3     | 4    | 5    | 6     | 7             | 8         | 9 | 10 | 11 | 12 | 13 |
|-------------|--------------|---|-------|------|------|-------|---------------|-----------|---|----|----|----|----|
| Description | Products GBN |   | Grade | Line | Year | Month | Revision Code | Serial No |   |    |    |    |    |

## 11.0 PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD Module.

### 11.1 Mounting Precautions

- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- You must mount a module using specified mounting holes (Details refer to the drawings)
- You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- Do not apply mechanical stress or static pressure on module; Abnormal display cause by pressing some parts of module during assembly process, do not belong to product failure, the press should be agreed by two sides.
- Determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Do not apply mechanical stress or static pressure on module, and avoid impact, vibration and falling.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Protection film for polarizer on the module should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperature specification.
- Long side LED Bar design is recommended when using E-LED type Back Light
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane & alcohol is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene, because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading..

- This module has its circuitry PCB's on the rear side and Driver IC, should be handled carefully in order not to be stressed.
- Avoid impose stress on PCB and Driver IC during assembly process ,Do not drawing, bending, COF package & wire
- Do not disassemble the module.

## 11.2 Operating Precautions

- Do not connector or disconnect the cable to/from the Module at the “Power On” Condition.
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the module would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- Do not allow to adjust the adjustable resistance or switch
- The electrochemical reaction caused by DC voltage will lead to LCD module degradation, so DC drive should be avoided.
- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipment to protect against static electricity.
- Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- Design the length of cable to connect between the connector for back-light and the converter as shorter as possible and the shorter cable shall be connected directly , The long cable between back-light and Converter may cause the Luminance of LED to lower and need a higher startup voltage
- The cables should be as short as possible between System Board and PCB interface.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

### 11.3 Electrostatic Discharge Precautions

- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc.
- Do not close to static electricity to avoid product damage.
- Do not touch interface pin directly.

### 11.4 Precautions for Strong Light Exposure

- Do not leave the module operation or storage in Strong light . Strong light exposure causes degradation of polarizer and color filter.

### 11.5 Precautions for Storage

#### A. Atmosphere Requirement

| ITEM                | UNIT   | MIN | MAX |
|---------------------|--|-----|-----|
| Storage Temperature | (°C)   | 5   | 40  |
| Storage Humidity    | (%rH)  | 40  | 75  |
| Storage Life        | 6 months   |     |     |
| Storage Condition   | <ul style="list-style-type: none"> <li>• The storage room should be equipped with a dark and good ventilation facility.</li> <li>• Prevent products from being exposed to the direct sunlight, moisture and water.</li> <li>• The product need to keep away from organic solvent and corrosive gas.</li> <li>• Be careful for condensation at sudden temperature change.</li> <li>• Storage condition is guaranteed under packing conditions.</li> </ul> |     |     |

#### B. Package Requirement

- The product should be placed in a sealed polythene bag.
- Product Should be placed on the pallet, Which is away from the floor, Be cautions not to pile the product up.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
- As the original protective film, do not use the adhesive protective film to avoid change of Pol color and characteristic.

## 11.6 Precautions for protection film

- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- People who peeled off the protection film should wear anti-static strap and grounded well.

## 11.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD modules are designed for consumer applications . Accordingly, long-term display like in Commercial Display application, can cause uneven display including image sticking. To optimize module's lifetime and function, several operating usages are required.

### 1. Normal operating condition

- Temperature:  $20 \pm 15^{\circ}\text{C}$
- Operating Ambient Humidity :  $55 \pm 20\%$
- Display pattern: dynamic pattern (Real display)
- Well-ventilated place is recommended to set up Commercial Display system

### 2. Special operating condition

#### a. Ambient condition

- Well-ventilated place is recommended to set up Commercial Display system.

#### b. Power and screen save

- Periodical power-off or screen save is needed after long-term display.

c. As the low temperature, the response time is greatly delayed. As the high temperatures (higher than the operating temperature) the LCD module may turn black screen. The above phenomenon cannot explain the failure of the display. When the temperature returns to the normal operating temperature, the LCD module will return to normal display.

d. When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD module may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD module 's surface which may affect the operation of the polarizer and LCD module

e. Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.

f. Products should be protected from high and low temperature, water vapor and ultraviolet radiation,in order to avoid direct exposure to the extreme environment for a long time.

g. Long time and large angle forward use or unconventional use , It is strongly recommended to contact BOE for filed application engineering advice

3. Operating usages to protect against image sticking due to long-term static display.
  - a. Suitable operating time: under 20 hours a day.
  - b. Static information display recommended to use with moving image.
    - Cycling display between 5 minutes' information(static) display and 10 seconds' moving image.
  - c. Background and character (image) color change
    - Use different colors for background and character, respectively.
    - Change colors themselves periodically.
  - d. Avoid combination of background and character with large different luminance.
    - 1) Abnormal condition just means conditions except normal condition.
    - 2) Black image or moving image is strongly recommended as a screen save
4. Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.
5. Module should be turned clockwise based on front view when used in portrait mode.

## 11.8 Other Precautions

### A. LC Leak

- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
- If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.
- If LC touch eyes, eyes need to be washed with running water at least 15 minutes.

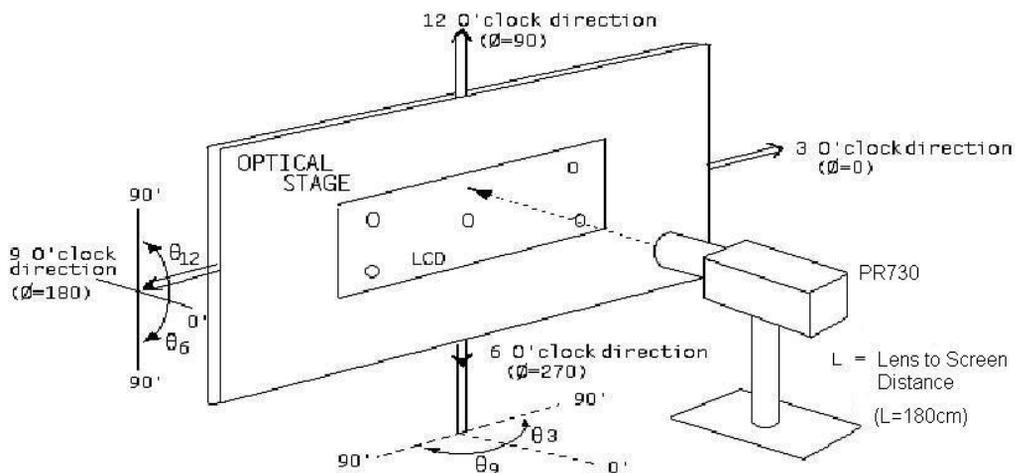
### B. Rework

- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

- ### C. In order to prevent potential problems, flicker should be adjusted by optimizing the Vcom value in customer LCM Line through the I2C Interface.

## 12.0 APPENDIX

< Figure 1. Measurement Set Up >



< Figure 2. Response Time Testing >

Any level of gray (Bright)

Any level of gray (Dark)

Any level of gray (Bright)

