

億力光電股份有限公司

EVERVISION ELECTRONICS CO., LTD.

Product Specification For LCD Module

(KVPF-7B-002-16)

Model NO. : VGG322427-6UFLWD(RoHS)

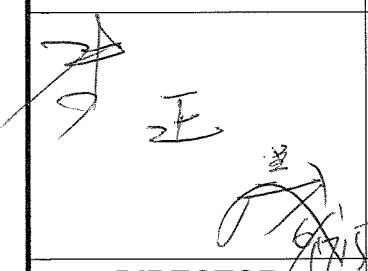
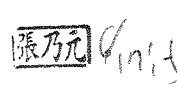
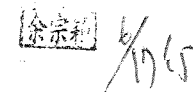

REVISION : 1

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|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 2 |

1. Table of Contents

| No. | Contents | Page |
|------------|---|-------------|
| 1 | Table of Contents | 2 |
| 2 | Record of Revisions | 3 |
| 3 | Module Numbering System | 4 |
| 4 | Application | 5 |
| 5 | Features | 5 |
| 6 | General Specifications | 5 |
| 7 | Absolute Maximum Ratings | 6 |
| 8 | Electrical Characteristics | 7 |
| 9 | Block Diagram | 9 |
| 10 | Input / Output Terminals Pin Assignment | 10 |
| 11 | Interface Timing | 13 |
| 12 | Optical Characteristics | 18 |
| 13 | Reliability Test | 21 |
| 14 | Packaging | 22 |
| 15 | Precautions | 23 |
| 16 | Outline Drawing | 26 |
| 17 | Definition of Labels | 27 |
| 18 | Incoming Inspection Standards | 29 |

| | | | |
|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 4 |

3. Module Numbering System

V G G 3224 27 – 6 U F L W D

Serial No: A~Z

Backlight Color:

N:Without Backlight;
A:Amber; **B:**Blue; **G:**Green;
L:Yellow; **O:**Orange; **R:**Red;
W:White; **Y:**YellowGreen;
X:Others

Backlight Type:

N:Without Backlight; **E:**EL; **F:**CCFL;
L:General LED; **H:**High NTSC LED ;
R:RGB LED; **X:**Others

LCD Model:

A:ASTN; **B:**STN Blue; **C:**CSTN; **D:**DSTN;
F:TFT; **G:**STN Gray; **H:**HTN; **I:**IBN;
K:Black Mask TN **L:**LTPS; **M:**MVA;
N:others; **O:**OLED; **P:**PLED; **S:**IPS;
T:TN; **U:**FSC TN; **W:**FSTN Black/white;
X:FFSTN; **Y:**STN Yellow;

LCD Type:

R: Reflective/Positive;
S : Reflective/Negative ;
F : Transflective/Positive ;
G: Transflective/Negative ;
U: Transmissive/Positive ;
T: Transmissive/Negative ; **N:**Others

Temperature Range & View Direction:

General Purpose : **1:**6H **2:**12H **3:**3H **4:**9H **5:**Others
High Performance: **6:**6H **7:**12H **8:**3H **9:**9H **0:**Others

STD Product Serial No.: 01~99

Customer Made Serial No.: A1,A2...A9,B1,B2...B9,C1..

Display Function:

Segment Number / Characters Lines / Column and Row Dots
/ Length * Width of Other

Display Type:

C:Character Type; **G:**Graphic Type; **S:**Segment Type; **O:**Other

Package Type:

B:COB; **F:**COF; **G:**COG; **H:**Heat Seal; **S:**SMT; **T:**TAB; **O:**Others

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| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 5 |

4. Application

This specification is applied to the 3.5 inch QVGA supported TFT-LCD module, and can display 16M colors. The module is designed for PMP, GPS, DMB, other electronic products which require flat panel display of digital signal interface, and used as the input devices for general electric appliances via both finger and pen-entry.

5. Features

- QVGA (320×240 pixels) resolution.
- Display in 16M colors
- Serial Peripheral Interface (SPI).
- Line inversion mode with stripe type.
- SYNC mode is supported for digital RGB input data format.
- This display has extended temperature range.
- Transparent Touch panel
 - 4-Wire
 - Analog Resistive

6. General Specifications

| Item | Specifications | Unit |
|---------------------|---|------|
| Screen Size | 3.5 (Diagonal) | inch |
| Display Format | 320RGB(H)×240(V) | dot |
| Active Area | 70.08(H)×52.56(V) | mm |
| Dot Pitch | 0.073(H)×0.219(V) | mm |
| Pixel Configuration | RGB Vertical Stripe | - |
| Display Mode | TN Type Transmissive Mode(Micro Reflective) Normally White | - |
| Surface Treatment | Anti-Glare and Hard Coating(3H) | - |
| Viewing Direction | 6 O'clock (The Gray Inversion will appear at this direction) | - |
| Outline Dimension | 76.9(W)×63.9(H)×4.4(D) | mm |
| DC to DC circuit | Build-in | - |
| Weight | 41.5 | g |
| RoHS Compliance | Evervision certifies this product to be in compliance with European Union Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment. | - |

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| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 6 |

7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

| Item | Symbol | Value | | Unit | Note |
|-----------------------|-----------------|-------|------|------|--------|
| | | Min. | Max. | | |
| Storage Temperature | T _{ST} | -40 | +80 | °C | (1)(2) |
| Operating Temperature | T _{OP} | -30 | +80 | °C | (1)(2) |

Note1: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

7.2 Electrical Absolute Ratings

7.2.1 TFT-LCD Module

(Ta=25±2°C, GND=V_{SS}=0V)

| Item | Symbol | Value | | Unit | Note |
|------------------------------|-----------------|----------------------|------|------|------|
| | | Min. | Max. | | |
| Digital Power Supply Voltage | V _{CC} | V _{SS} -0.3 | 5.0 | V | - |

7.2.2 Backlight Unit

(Ta=25±2°C)

| Item | Symbol | Value | | Unit | Note |
|-----------------|----------------|-------|------|------|------|
| | | Min. | Max. | | |
| Forward current | I _f | - | (50) | mA | (1) |
| Reverse voltage | V _R | - | (25) | V | (1) |

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

8. Electrical Characteristics

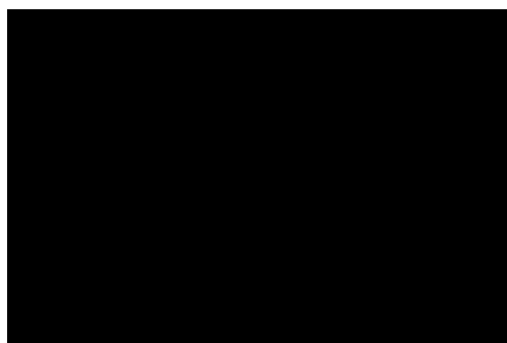
8.1 TFT-LCD Module

(Ta=25±2°C)

| Item | Symbol | Value | | | Unit | Note |
|------------------------------|-----------------|--------------------|-------|--------------------|------|------|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | V _{CC} | 2.5 | 3.3 | 3.6 | V | - |
| Power Supply Current | I _{CC} | - | 15.6 | 22.0 | mA | (1) |
| Input High Threshold Voltage | V _{IH} | 0.8V _{CC} | - | V _{CC} | V | - |
| Input Low Threshold Voltage | V _{IL} | 0 | - | 0.2V _{CC} | V | - |
| Power Consumption | P _L | - | 51.48 | 72.6 | mW | (1) |
| VSYNC Frequency | F _V | - | 60 | 90 | Hz | - |
| HSYNC Frequency | F _H | - | 15.72 | 22.35 | KHz | - |
| DCLK Frequency | DCLK | - | 6.5 | 10 | MHz | - |

Note (1) The specified power consumption is under the conditions at V_{CC}=3.3V, F_V=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

| | | | |
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| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 8 |

8.2 Backlight Unit

(Ta=25±2°C)

| Item | Symbol | Value | | | Unit | Note |
|---------------------|-----------------|-------|--------|------|------|------|
| | | Min. | Typ. | Max. | | |
| LED Voltage | VL | - | (16.5) | - | V | (1) |
| LED Current | IL | - | (40) | - | mA | (1) |
| Power Consumption | P _{BL} | - | (660) | - | mW | (1) |
| LED Life Time(25°C) | - | 50000 | 60000 | - | hr | (2) |

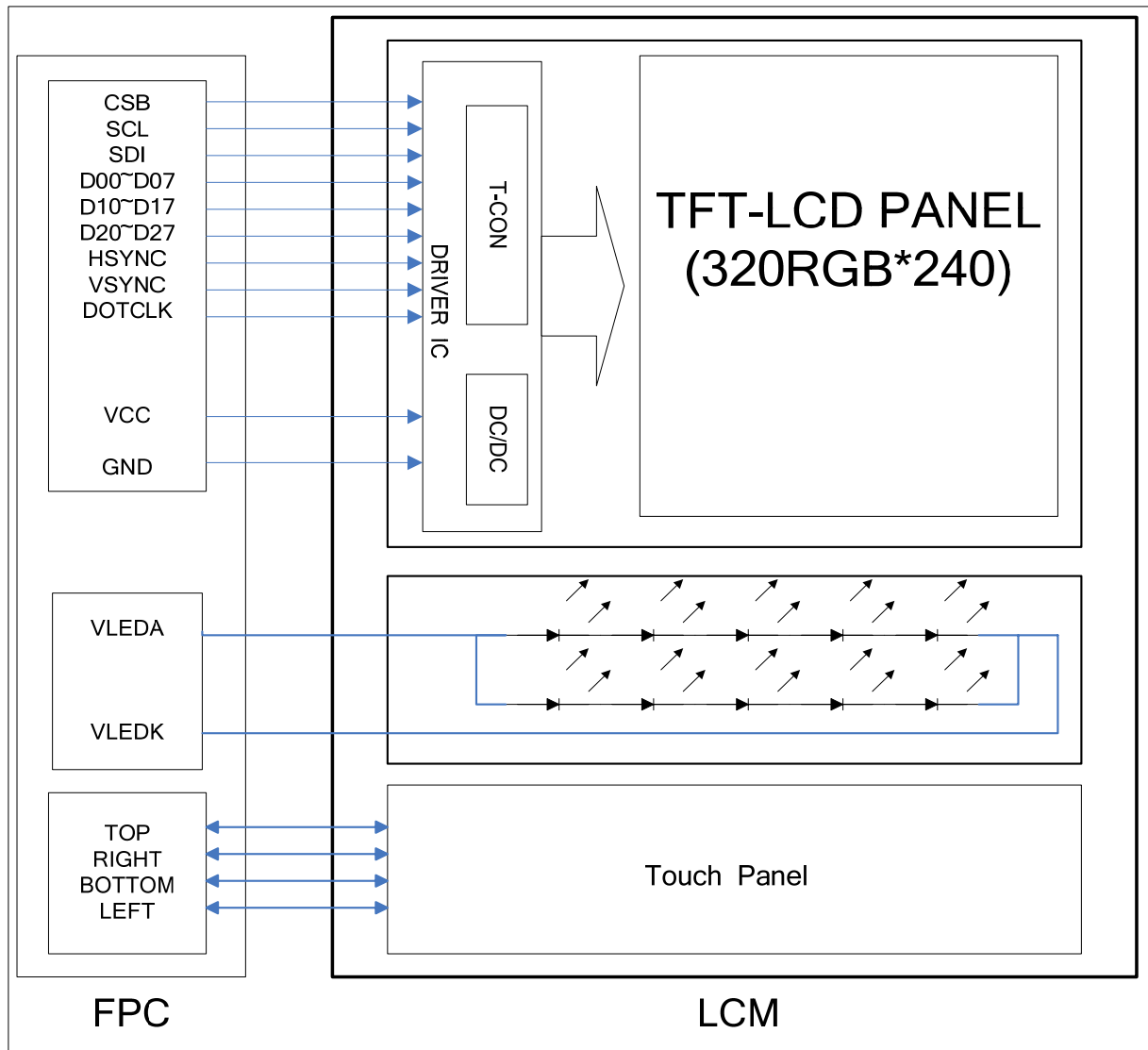
Note (1) The driving design of backlight unit is dependent on serial consideration of 5S2P LEDs.

Note (2) LED life time is defined as under 25±2°C, when the average brightness decrease to 50% of original brightness

8.3 Transparent Touch panel

| Item | | Value | | | Unit | Note |
|-----------------------|-------------|---------|------|------|------|--------------|
| | | Min. | Typ. | Max. | | |
| Operating Voltage | | - | 5 | 7 | V | - |
| Terminal Resistance | X-direction | 200 | - | 900 | Ω | At connector |
| | Y-direction | 50 | - | 600 | Ω | At connector |
| Insulation Resistance | | ≥ 20MΩ | | | | at DC25V |
| Chatting | | ≤ 10 ms | | | | - |
| Linearity | | ≤ 1.5% | | | | |

9. Block Diagram
TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module (CVILUX CF25601D0R0-05)

| Pin No. | Symbol | I/O | Description |
|---------|--------|-----|-----------------|
| 1 | LED_K | I | LED_cathode |
| 2 | LED_K | I | LED_cathode |
| 3 | LED_A | I | LED_anode |
| 4 | LED_A | I | LED_anode |
| 5 | GND | I | Ground |
| 6 | X1 | I | X_Right |
| 7 | Y1 | I | Y_Bottom |
| 8 | X2 | I | X_Left |
| 9 | Y2 | I | Y_Up |
| 10 | GND | I | Ground |
| 11 | NC | I | No connection |
| 12 | NC | I | No connection |
| 13 | NC | I | No connection |
| 14 | RESET | I | Reset |
| 15 | CSB | I | CHIP SELECT |
| 16 | SCL | I | Serial Clock |
| 17 | SDI | I | Serial Data |
| 18 | D20 | I | Blue data(LSB) |
| 19 | D21 | I | Blue data |
| 20 | D22 | I | Blue data |
| 21 | D23 | I | Blue data |
| 22 | D24 | I | Blue data |
| 23 | D25 | I | Blue data |
| 24 | D26 | I | Blue data |
| 25 | D27 | I | Blue data(MSB) |
| 26 | D10 | I | Green data(LSB) |
| 27 | D11 | I | Green data |
| 28 | D12 | I | Green data |
| 29 | D13 | I | Green data |
| 30 | D14 | I | Green data |
| 31 | D15 | I | Green data |
| 32 | D16 | I | Green data |

| Pin No. | Symbol | I/O | Description |
|---------|-----------------|-----|-------------------------------|
| 33 | D17 | I | Green data(MSB) |
| 34 | D00 | I | Red data(LSB) |
| 35 | D01 | I | Red data |
| 36 | D02 | I | Red data |
| 37 | D03 | I | Red data |
| 38 | D04 | I | Red data |
| 39 | D05 | I | Red data |
| 40 | D06 | I | Red data |
| 41 | D07 | I | Red data(MSB) |
| 42 | HSYNC | I | Horizontal synchronous signal |
| 43 | VSYNC | I | Vertical synchronous signal |
| 44 | DOTCLK | I | Data Colck |
| 45 | NC | I | No connection |
| 46 | NC | I | No connection |
| 47 | V _{CC} | I | Vdigital |
| 48 | V _{CC} | I | Vdigital |
| 49 | NC | I | No connection |
| 50 | NC | I | No connection |
| 51 | NC | I | No connection |
| 52 | NC | I | No connection |
| 53 | NC | I | No connection |
| 54 | NC | I | No connection |
| 55 | NC | I | No connection |
| 56 | NC | I | No connection |
| 57 | NC | I | No connection |
| 58 | NC | I | No connection |
| 59 | GND | I | Ground |
| 60 | GND | I | Ground |

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| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 13 |

11. Interface Timing

11.1 Input Signal Characteristics

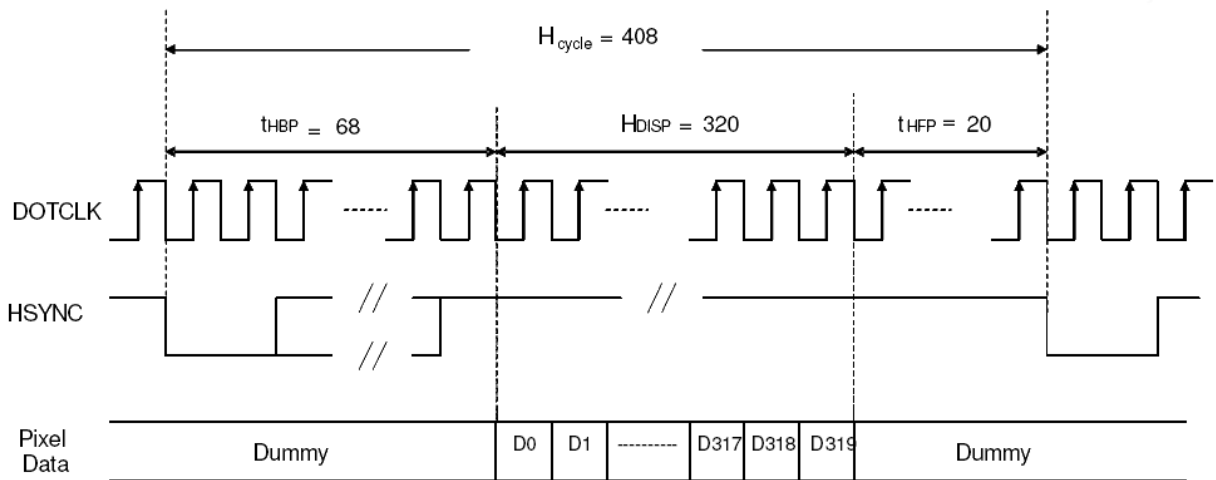
11.1.1 Digital Parallel RGB Interface (960×240 resolution)

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | |
|------------------------------|-------------|--------|-------------|--------|---------|-------|
| | | 24 bit | 24 bit | 24 bit | | |
| DOTCLK Frequency | fDOTCLK | - | 6.5 | 10 | MHz | |
| DOTCLK Period | tDOTCLK | 100 | 154 | - | ns | |
| Horizontal Frequency (Line) | fH | - | 14.9 | 22.35 | KHz | |
| Vertical Frequency (Refresh) | fV | - | 60 | 90 | Hz | |
| Horizontal Back Porch | tHBP | - | 68 | - | tDOTCLK | |
| Horizontal Front Porch | tHFP | - | 20 | - | tDOTCLK | |
| Horizontal Data Start Point | tHBP | - | 68 | - | tDOTCLK | |
| Horizontal Blanking Period | tHBP + tHFP | - | 88 | - | tDOTCLK | |
| Horizontal Display Area | HDISP | - | 320 | - | tDOTCLK | |
| Horizontal Cycle | Hcycle | - | 408 | 450 | tDOTCLK | |
| Vertical Back Porch | tVBP | - | 18 | - | Lines | |
| Vertical Front Porch | tVFP | - | 4 | - | Lines | |
| Vertical Data Start Point | tVBP | - | 18 | - | Lines | |
| Vertical Blanking Period | tVBP + tVFP | - | 22 | - | Lines | |
| Vertical Display Area | NTSC | VDISP | - | 240 | - | Lines |
| | PAL | | 280(PALM=0) | | | |
| | | | 288(PALM=1) | | | |
| Vertical Cycle | NTSC | Vcycle | - | 262 | 350 | Lines |
| | PAL | | 313 | | | |

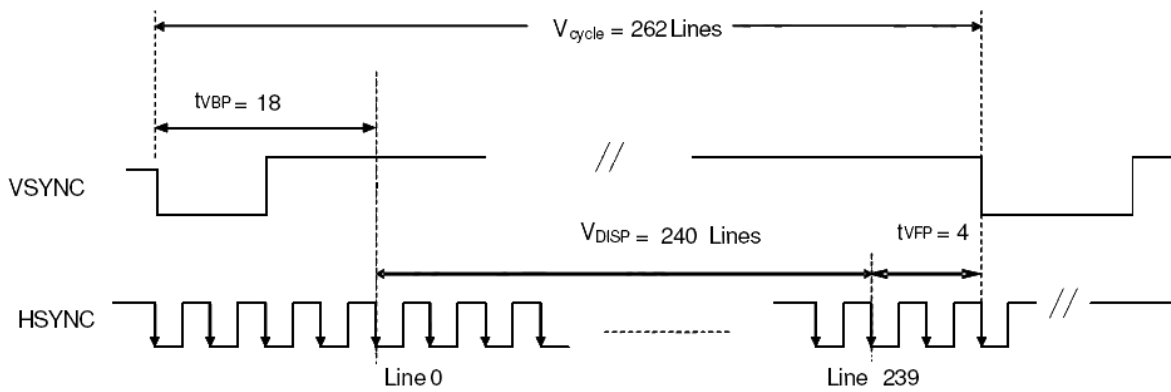
11.1.2 SPI Interface

| Characteristics | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------------|--------|------|------|------|------|
| Serial Clock Frequency | fclk | - | - | 20 | MHz |
| Serial Clock Cycle Time | tclk | 50 | - | - | ns |
| Clock Low Width | tsl | 25 | - | - | ns |
| Clock High Width | tsh | 25 | - | - | ns |
| Clock Rising Time | trs | - | - | 30 | ns |
| Clock Falling Time | tfl | - | - | 30 | ns |
| Chip Select Setup Time | tcss | 0 | - | - | ns |
| Chip Select Hold Time | tcsh | 10 | - | - | ns |
| Chip Select High Delay Time | tcsd | 20 | - | - | ns |
| Data Setup Time | tds | 5 | - | - | ns |
| Data Hold Time | tdh | 10 | - | - | ns |

11.2 Waveform



Horizontal Data Transaction Timing

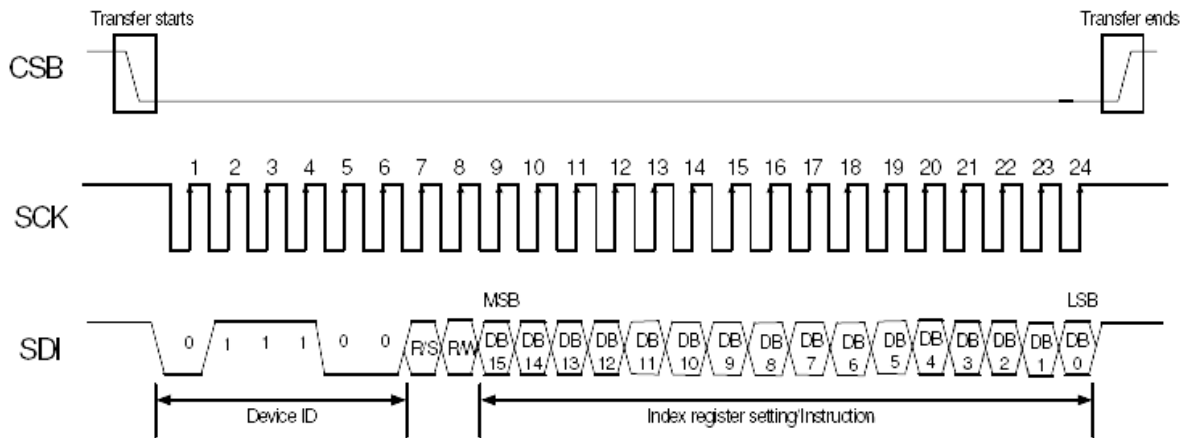


Vertical Data Transaction Timing

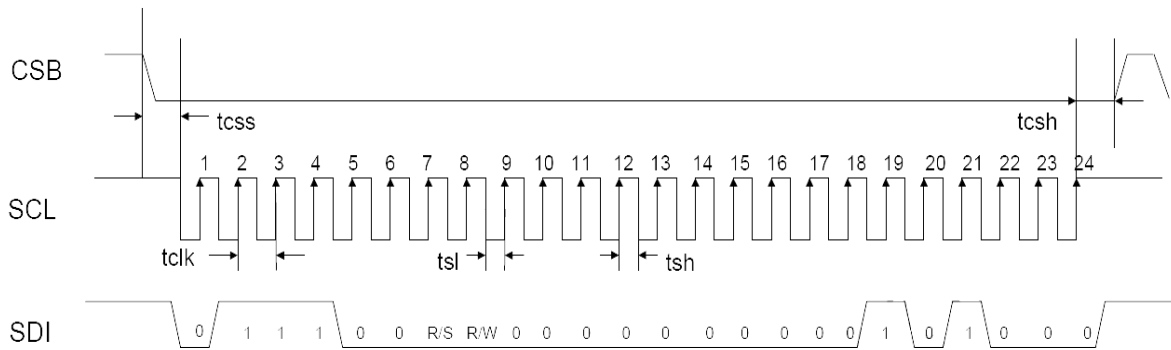
Data Transaction Timing in Parallel RGB (24 bit) Interface (SYNC Mode)

11.2.2 SPI

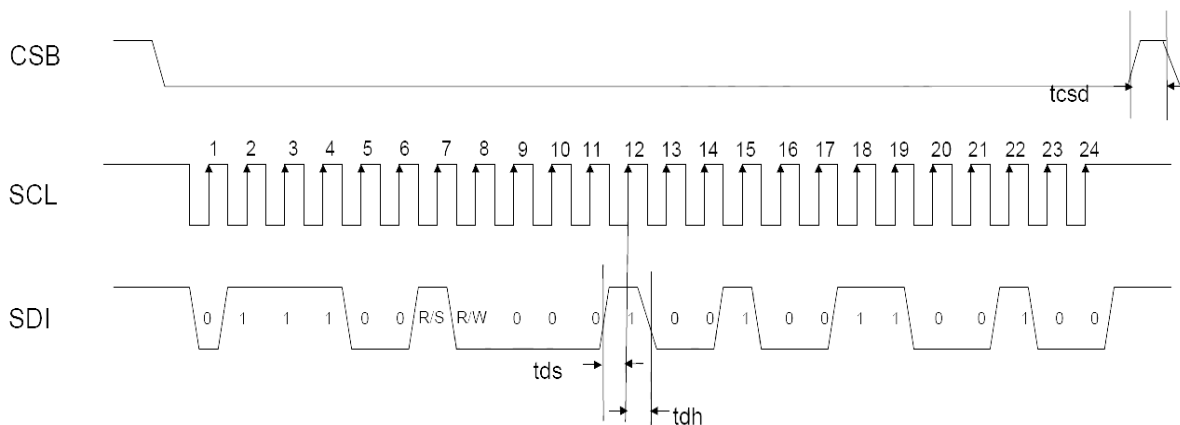
| R/S | R/W | status |
|-----|-----|-------------------|
| 0 | 0 | Write SPI address |
| 1 | 0 | Write SPI data |



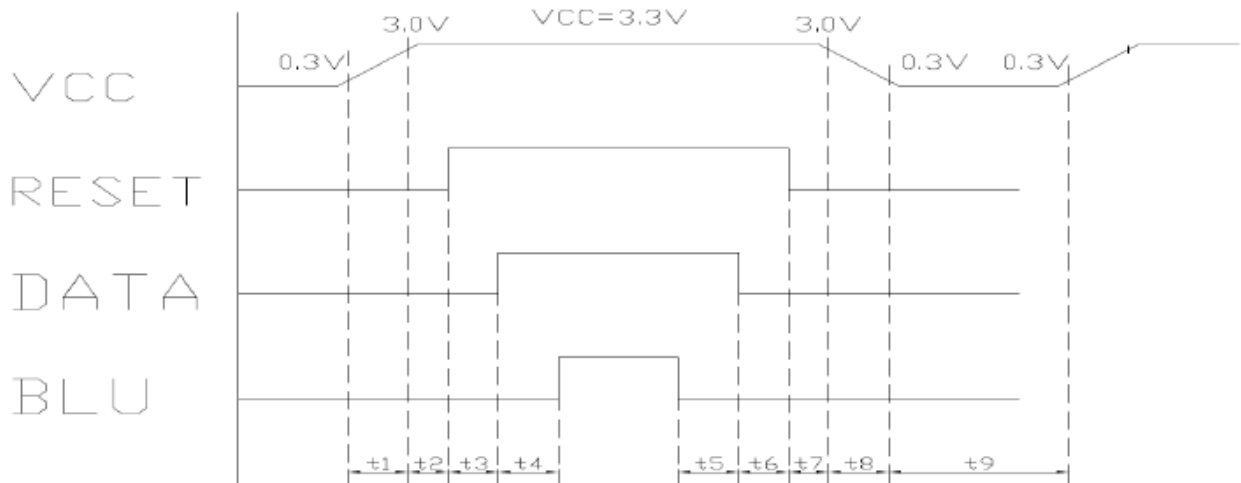
First Transmission (Register)



Second Transmission (Data)



11.3 Power On / Off Sequence



- | | | |
|-------------------|-------------------|-------------------------|
| $T1 \leq 10ms$ | $200ms \leq T5$ | $1 \text{ sec} \leq T9$ |
| $10\mu s \leq T2$ | $50ms \leq T6$ | |
| $50ms \leq T3$ | $10\mu s \leq T7$ | |
| $200ms \leq T4$ | $T8 \leq 10ms$ | |

**11.4. Instruction Description
SPI Command Table**

| Reg# | Register | R/W | R/S | IB15 | IB14 | IB13 | IB12 | IB11 | IB10 | IB9 | IB8 | IB7 | IB6 | IB5 | IB4 | IB3 | IB2 | IB1 | IB0 | |
|------|-------------------------------|----------|-----|-------|-------|-------|--------|--------|--------|--------|--------|-------|------|------|------|------|--------|--------|--------|--------|
| SR | Status Read | 1 | 0 | L7 | L6 | L5 | L4 | L3 | L2 | L1 | L0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R01h | Driver output control | 0 | 1 | 0 | RL | REV | PINV | BGR | SM | TB | CPE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R02h | LCD driver AC control | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | B/C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R03h | Power control (1) | 0 | 1 | DCT3 | DCT2 | DCT1 | DCT0 | BTF | BT2 | BT1 | BT0 | DC3 | DC2 | DC1 | DC0 | AP2 | AP1 | AP0 | 0 | |
| R04h | Data and color filter control | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PALM | BLT1 | BLT0 | OEA1 | OEA0 | SEL2 | SEL1 | SEL0 | SWD2 | SWD1 | SWD0 | |
| R05h | Function control | 0 | 1 | GHN | XDK | GDIS | LPF | DEP | CKP | VSP | HSP | DEO | DIT | 0 | PWM | 0 | FB2 | FB1 | FB0 | |
| R06h | Reserved | Reserved | | | | | | | | | | | | | | | | | | |
| R07h | Reserved | Reserved | | | | | | | | | | | | | | | | | | |
| R0Ah | Contrast/Brightness control | 0 | 1 | 0 | BR6 | BR5 | BR4 | BR3 | BR2 | BR1 | BR0 | 0 | 0 | 0 | CON4 | CON3 | CON2 | CON1 | CON0 | |
| R0Bh | Frame cycle control | 0 | 1 | NO1 | NO0 | SDT1 | SDT0 | 0 | EQ2 | EQ1 | EQ0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R0Dh | Power control (2) | 0 | 1 | 0 | VRC2 | VRC1 | VRC0 | 0 | 0 | VDS1 | VDS0 | 0 | 0 | VRH5 | VRH4 | VRH3 | VRH2 | VRH1 | VRH0 | |
| R0Eh | Power control (3) | 0 | 1 | 0 | 0 | 1 | VDV6 | VDV5 | VDV4 | VDV3 | VDV2 | VDV1 | VDV0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R0Fh | Gate scan starting Position | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | SCN7 | SCN6 | SCN5 | SCN4 | SCN3 | SCN2 | SCN1 | SCN0 | |
| R16h | Horizontal Porch | 0 | 1 | XLIM8 | XLIM7 | XLIM6 | XLIM5 | XLIM4 | XLIM3 | XLIM2 | XLIM1 | XLIM0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R17h | Vertical Porch | 0 | 1 | STH1 | STH0 | HBP6 | HBP5 | HBP4 | HBP3 | HBP2 | HBP1 | HBP0 | VBP6 | VBP5 | VBP4 | VBP3 | VBP2 | VBP1 | VBP0 | |
| R1Eh | Power control (4) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | nOTP | VCM6 | VCM5 | VCM4 | VCM3 | VCM2 | VCM1 | VCM0 | |
| R27h | Reserved | Reserved | | | | | | | | | | | | | | | | | | |
| R28h | Reserved | Reserved | | | | | | | | | | | | | | | | | | |
| R29h | Reserved | Reserved | | | | | | | | | | | | | | | | | | |
| R2Bh | Reserved | Reserved | | | | | | | | | | | | | | | | | | |
| R30h | γ control (1) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PKP 12 | PKP 11 | PKP 10 | 0 | 0 | 0 | 0 | 0 | PKP 02 | PKP 01 | PKP 00 | |
| R31h | γ control (2) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PKP 32 | PKP 31 | PKP 30 | 0 | 0 | 0 | 0 | 0 | PKP 22 | PKP 21 | PKP 20 | |
| R32h | γ control (3) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PKP 52 | PKP 51 | PKP 50 | 0 | 0 | 0 | 0 | 0 | PKP 42 | PKP 41 | PKP 40 | |
| R33h | γ control (4) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PRP 12 | PRP 11 | PRP 10 | 0 | 0 | 0 | 0 | 0 | PRP 02 | PRP 01 | PRP 00 | |
| R34h | γ control (5) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PKN 12 | PKN 11 | PKN 10 | 0 | 0 | 0 | 0 | 0 | PKN 02 | PKN 01 | PKN 00 | |
| R35h | γ control (6) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PKN 32 | PKN 31 | PKN 30 | 0 | 0 | 0 | 0 | 0 | PKN 22 | PKN 21 | PKN 20 | |
| R36h | γ control (7) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PKN 52 | PKN 51 | PKN 50 | 0 | 0 | 0 | 0 | 0 | PKN 42 | PKN 41 | PKN 40 | |
| R37h | γ control (8) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PRN 12 | PRN 11 | PRN 10 | 0 | 0 | 0 | 0 | 0 | PRN 02 | PRN 01 | PRN 00 | |
| R3Ah | γ control (9) | 0 | 1 | 0 | 0 | 0 | VRP 14 | VRP 13 | VRP 12 | VRP 11 | VRP 10 | 0 | 0 | 0 | 0 | 0 | VRP 03 | VRP 02 | VRP 01 | VRP 00 |
| R3Bh | γ control (10) | 0 | 1 | 0 | 0 | 0 | VRN 14 | VRN 13 | VRN 12 | VRN 11 | VRN 10 | 0 | 0 | 0 | 0 | 0 | VRN 03 | VRN 02 | VRN 01 | VRN 00 |

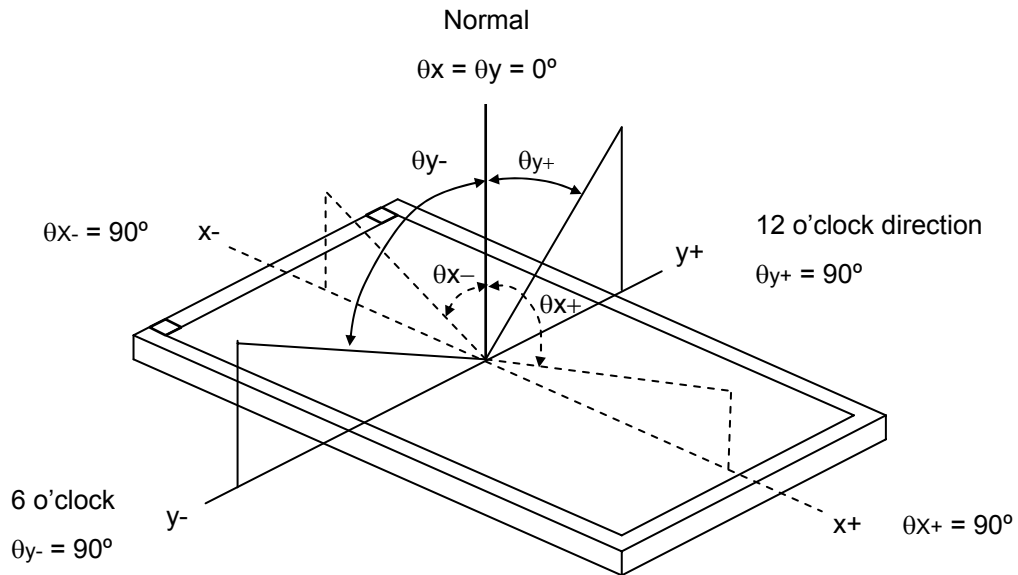
Note: * means don't care

12. Optical Characteristics

The optical characteristics should be measured in a dark environment (≤ 1 lux) or equivalent state with the methods shown in Note (4).

| Item | | Symbol | Conditions | Min. | Typ. | Max. | Unit | Note |
|-----------------------|------------|---------------|--|-------|---------|-------|-------------------|---------|
| Contrast Ratio | | CR | $\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle | 400 | (500) | - | - | (2) |
| Response Time | | T_{R+T_F} | | - | 50 | - | ms | (3) |
| Luminance(Center) | | Y | | 770 | (925) | - | cd/m ² | (4) |
| Brightness uniformity | | BUNI | | 75 | (80) | - | % | (5) |
| Color Chromaticity | Red | Rx | | 0.595 | 0.645 | 0.695 | - | (1),(4) |
| | | Ry | | 0.295 | 0.345 | 0.395 | - | |
| | Green | Gx | | 0.315 | 0.365 | 0.415 | - | |
| | | Gy | | 0.520 | 0.570 | 0.620 | - | |
| | Blue | Bx | | 0.095 | 0.145 | 0.195 | - | |
| | | By | | 0.045 | 0.095 | 0.145 | - | |
| | White | Wx | 0.250 | 0.300 | 0.350 | - | | |
| | | Wy | 0.260 | 0.310 | 0.360 | - | | |
| Viewing Angle | Horizontal | θ_{x+} | CR \geq 10 | 55 | (70) | - | deg. | |
| | | θ_{x-} | | 55 | (70) | - | | |
| | Vertical | θ_{y+} | | 40 | (55) | - | | |
| | | θ_{y-} | | 50 | (70) | - | | |

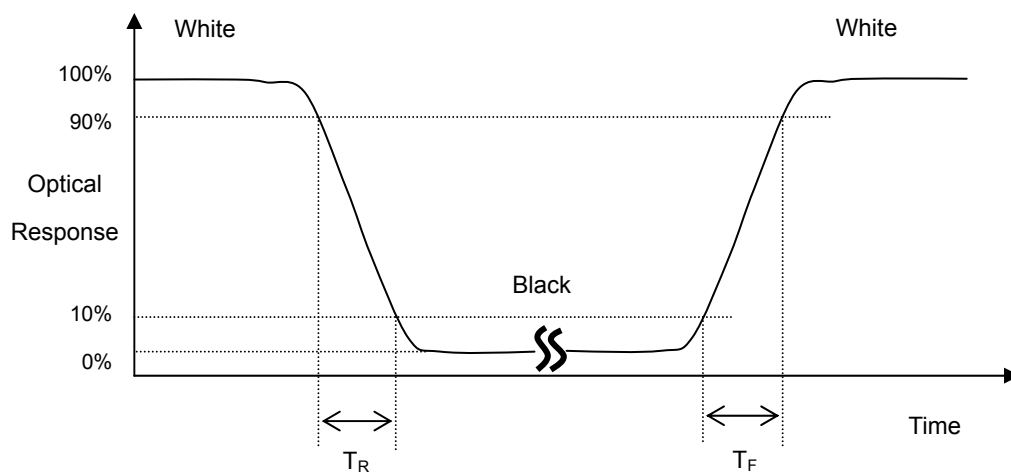
Note (1) Definition of Viewing Angle (θ_x, θ_y):



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

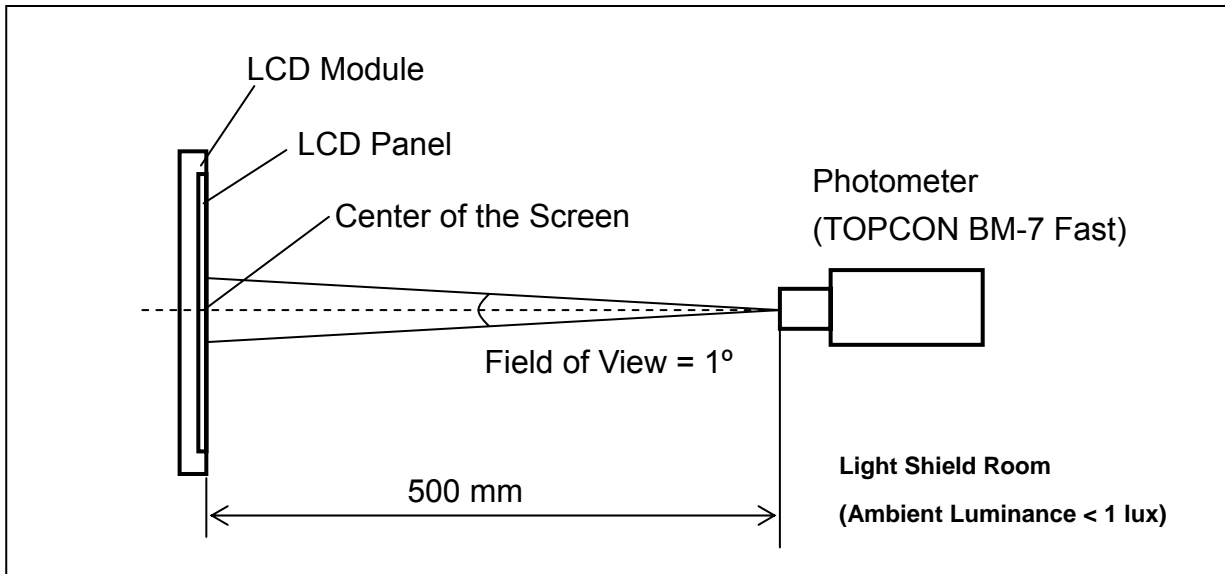
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note (3) Definition of Response Time (T_R, T_F):



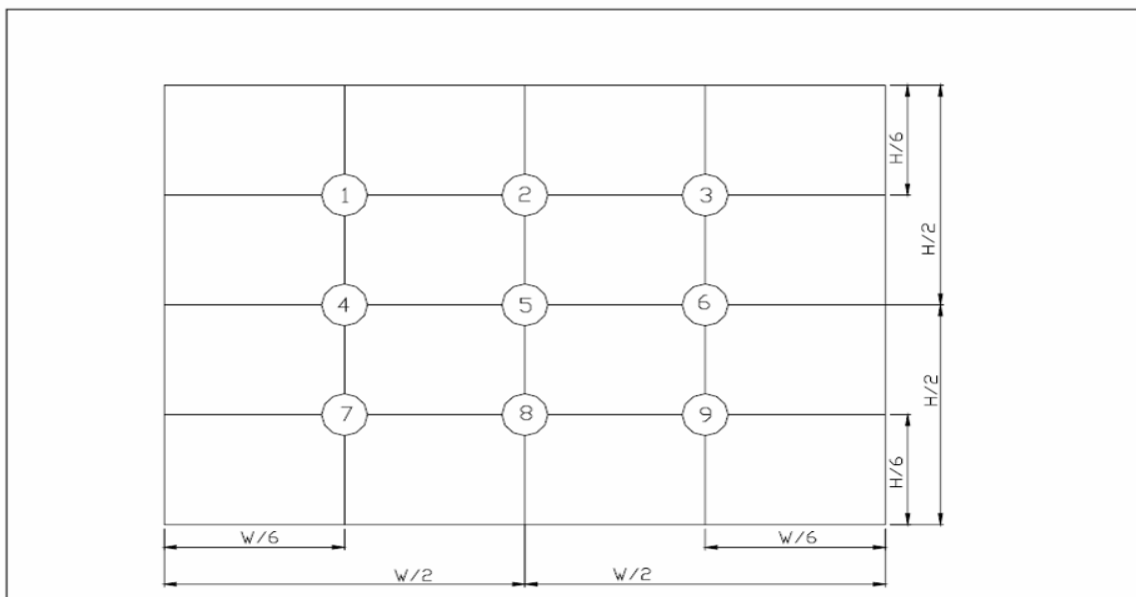
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a dark room or equivalent condition.



Note (5) Definition of brightness uniformity

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



(單位 : mm)

13. Reliability Test

| No. | Test Items | Test Condition | Remark |
|-----|--|--|-------------|
| 1 | High Temperature Storage Test | T _a = 80°C 240 hours | (1),(3),(4) |
| 2 | Low Temperature Storage Test | T _a = -40°C 240 hours | (1),(3),(4) |
| 3 | High Temperature Operation Test | T _s = 80°C 240 hours | (2),(3),(4) |
| 4 | Low Temperature Operation Test | T _a = -30°C 240 hours | (1),(3),(4) |
| 5 | High Temperature and High Humidity Operation Test | T _a =60°C 90%RH 240 hours | (3), (4) |
| 6 | Electro Static Discharge Test (non-operating) | -Panel Surface/Top Case : 150pF, 330Ω Air : ±15kV, Contact: ±8kV | (3) |
| 7 | Mechanical Shock Test (non-operating) | Half sine wave, 100G, 6ms 3 times shock of each six surfaces | (3) |
| 8 | Vibration Test (non-operating) | Sine wave:10 ~ 55 ~ 10Hz amplitude:1.5mm 3 axis, 2 hours/axis | (3) |
| 9 | Thermal Shock Test (non-operating) | -20°C (30min) ~ 70°C (30min) ,10 cycles | (3) , (4) |
| 10 | Drop Test(with Carton) | Height : 80cm 1 corner, 3 edges, 6 surfaces | (3) |

Note 1: T_a is the ambient temperature of samples.

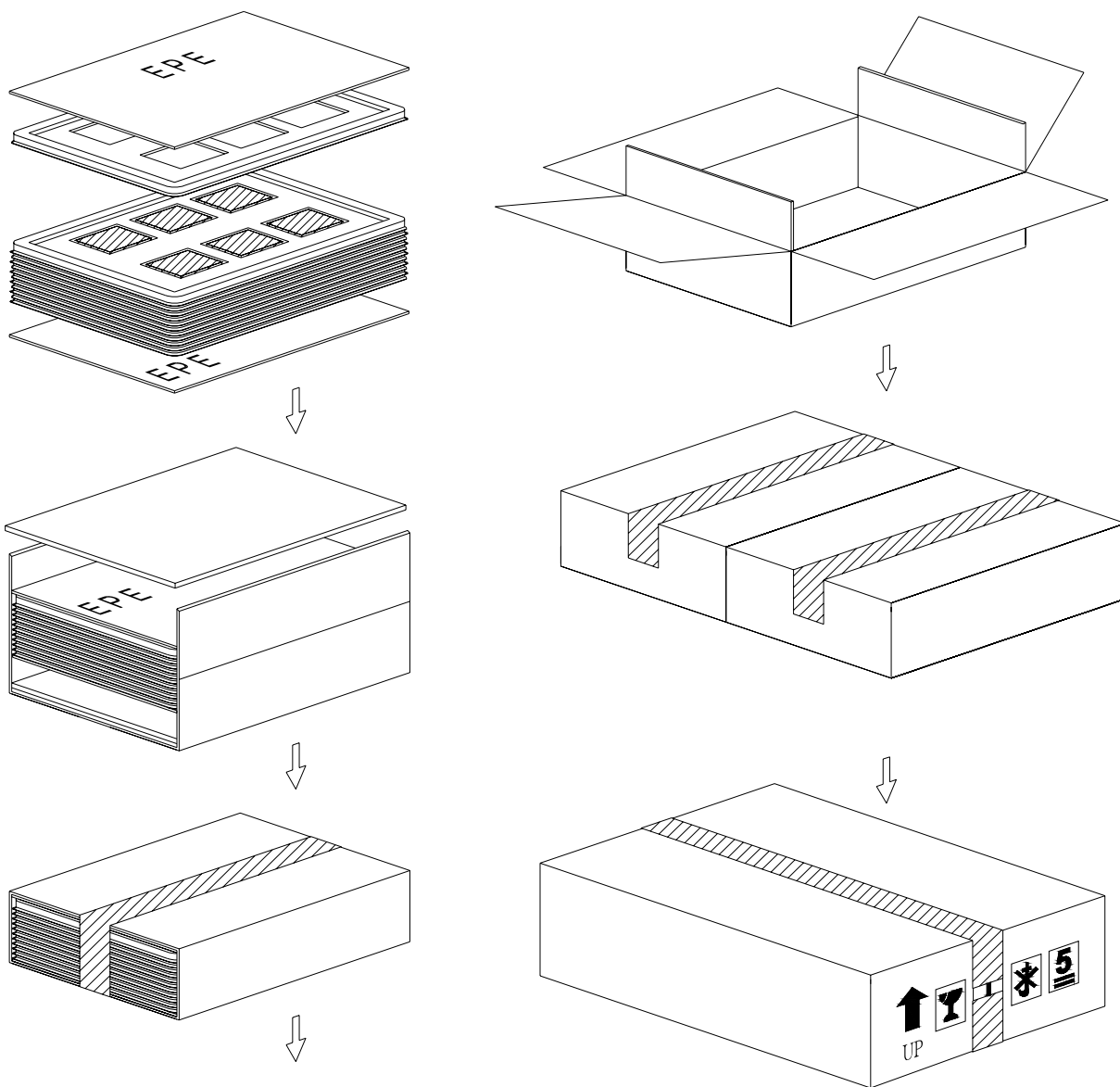
Note 2: T_s is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function.
After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

NOTE5: When OP reaches -30 degree, the reaction of the display will be slower. However, this phenomenon is reversible after the ambient temperature returns to higher values.

14. Packaging



| PARTS LIST | | | | | |
|------------|-------------------|---------------------|----------|-------|------|
| | ITEM | SIZE(LxWxH) unit:mm | MATERIAL | Q.T.Y | NOTE |
| 1 | TRAY | 372.0x262.0x16.6 | PET | 28 | |
| 2 | EPE(J46) | 372.0x262.0x5.0 | EPE | 4 | |
| 3 | CARD BOARD(P01) | 816.0x375.0x3.5 | CARTON | 2 | |
| 4 | CARD BOARD(P02) | 945.0x275.0x3.5 | CARTON | 2 | |
| 5 | CARD BOARD(P03) | 375.0x265.0x3.5 | CARTON | 4 | |
| 6 | INTERNAL BOX(S01) | 400.0x290.0x150.0 | CARTON | 2 | |
| 7 | EXTERNAL BOX(L28) | 600.0x420.0x180.0 | CARTON | 1 | |
| 8 | PRODUCT | 76.9x63.9x4.4 | | 144 | |

| | | | |
|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 23 |

15. Precautions

15.1 Assembly and Handling Precautions

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It's recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Don't apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD module in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow.

15.2 Safety Precautions

- (1) 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.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

15.3 Terms of Warrant

- (1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period
The period is within twelve months since the date of shipping out under normal using and storage conditions.

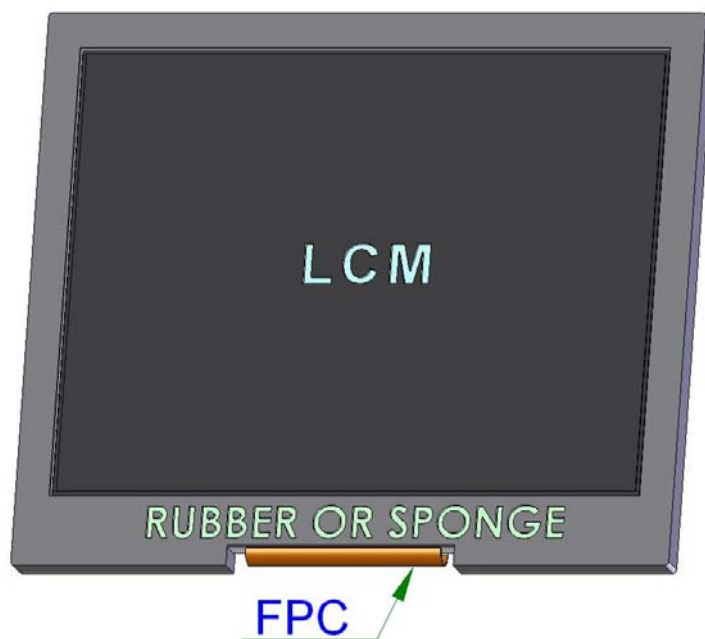
| | | | |
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| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 24 |

15.4 Caution

This Evervision LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation, industrial control, home appliances, etc. The modules should not be used in applications where module failure could result in physical harm or loss of life, and Evervision expressly disclaims any and all liability relating in any way to the use of the module in such applications.

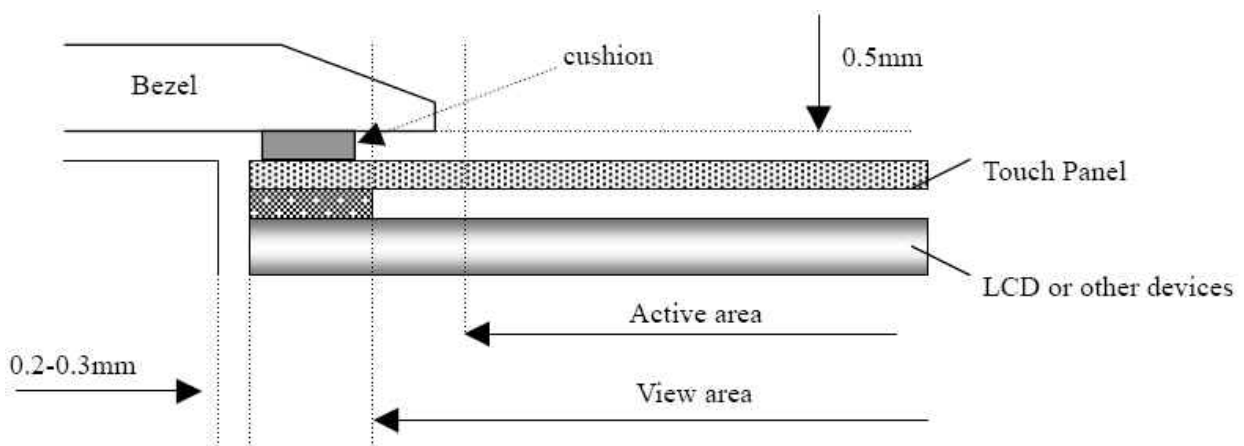
15.5 Cautions for LCM's installing and assembling

Please keep away the FPC while assembling or fixing the LCM to avoid FPC being damaged or extruded or other related problems. Please see below picture.



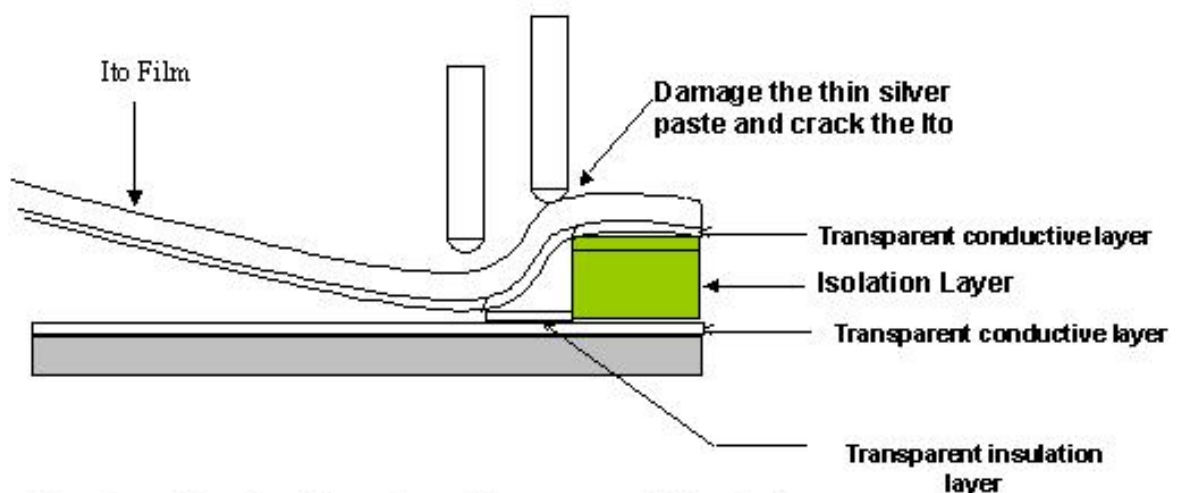
15.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area.
 The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode.
 It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.



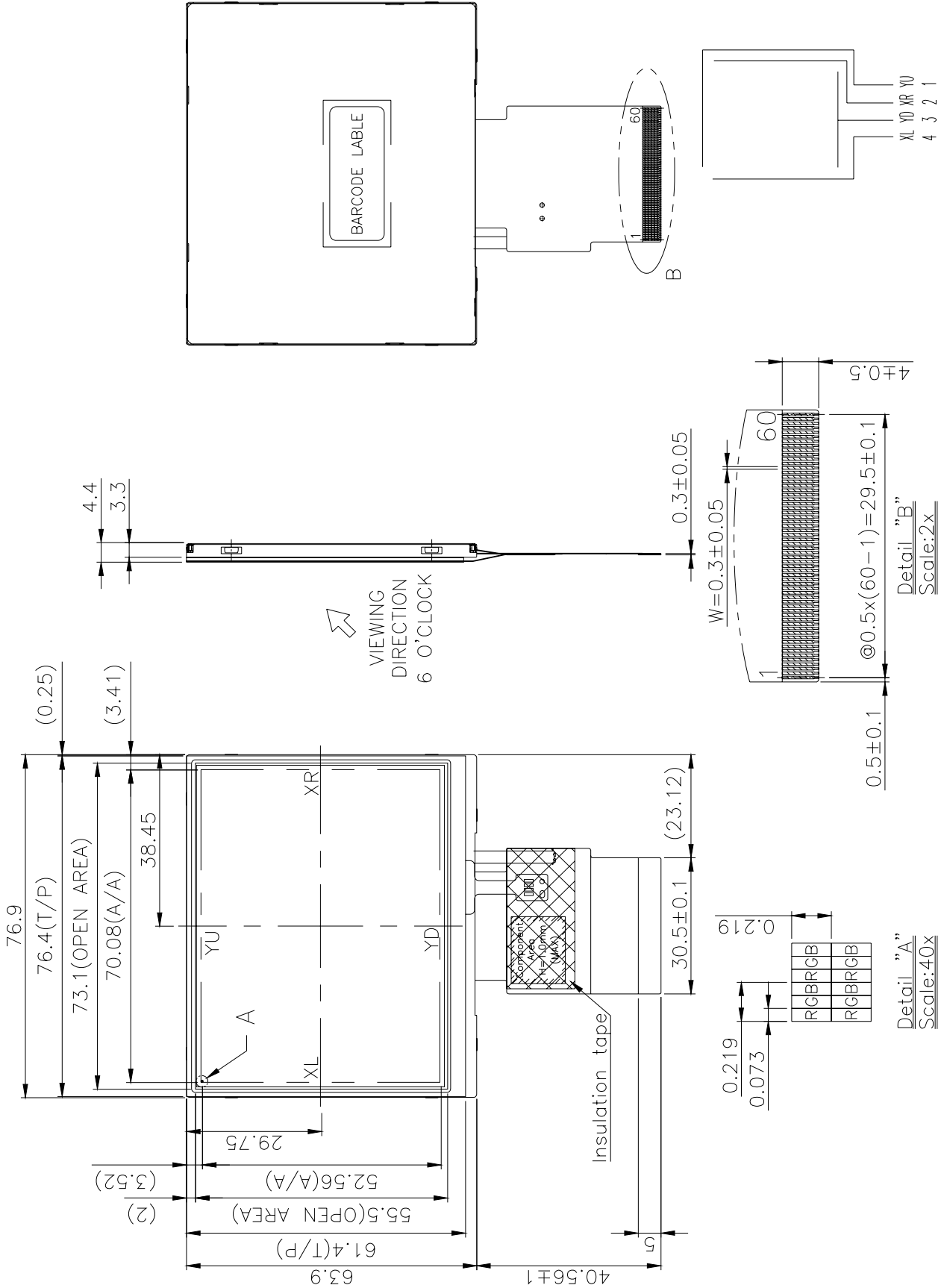
15.7 Operation Prohibit

Not Suggested Pen Input Position On Touch Panel



Pen input load on the edge of transparent insulation area might damage the ITO of ITO Pet- Film and reduce the durability of touch panel

16.Outline Drawing



| | | | |
|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 27 |

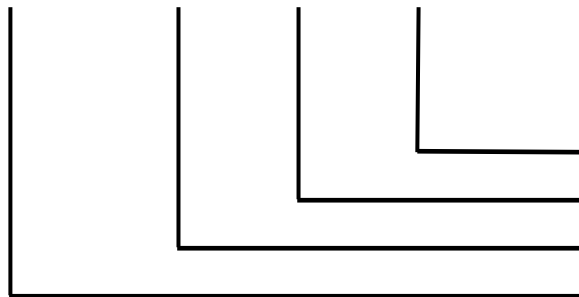
17. Definition of Labels

The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Module Name : VGG322427-6UFLWD
- (b) Serial ID :

A B C D E F G H I J K L



Serial No.
Factory Code
Manufactured Date
Screen Size

Serial ID includes the information as below :

- (a) Screen size (Diagonal) : Inch Code (ABCD)
3.5" → 0350
10.4" → 1040
- (b) Manufactured Date : Year 、 Month 、 Day (EFG)

Year (E)

| | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Mark | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| Mark | A | B | C | D | E | F | G | H | I | J |

| | | | |
|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 28 |

Month (F)

| | | | | | | | | | | | | |
|-------|------|------|------|------|-----|------|------|------|------|------|------|------|
| 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 |

Day (G)

| | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G |
| Day | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |
| Mark | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | |

(c) Factory Code (H):
For EVERVISION internal use.

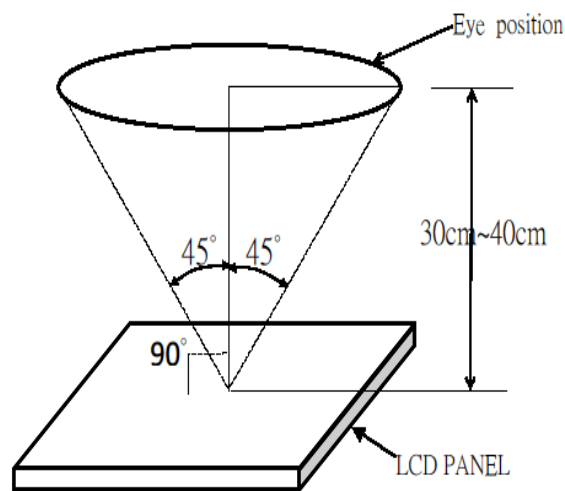
(d) Serial No. (IJKL):
Manufacturing sequence of product, for example : 0001~9999.

18. Incoming Inspection Standards

18.1 The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

- (1) Ambient temperature $25 \pm 5^{\circ}\text{C}$
- (2) Humidity: 45 ~ 65 % RH
- (3) Viewing distance is approximately 30 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig _1 ($\pm 45^{\circ}$)
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection



Fig_1

18.2 The defects classify of AQL as following:

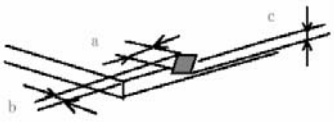
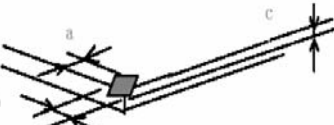
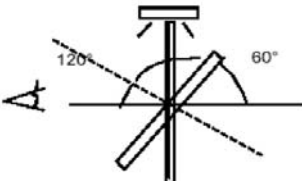

- (1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level II take a single time
- (2) The defects classify of AQL as following:

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

| | | | |
|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 30 |

18.3 Inspection Parameters

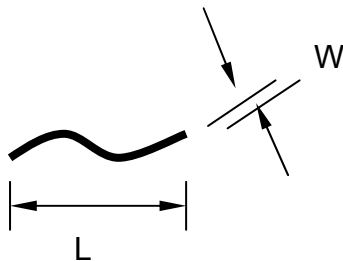
| Item | | Specification/Description | | | Note | |
|---|--|--|-------------------|-------------------|------------|----------------------|
| Display | Function | No Display | | | - | |
| | | Malfunction | | | - | |
| Operating | Contrast ratio | Out of Spec | | | - | |
| | Line defect | No obvious Vertical and Horizontal line defect in bright , dark and colored. | | | - | |
| | Point Defect (red ,green ,blue ,dark ,white) | Item | Acceptable number | | | Note: 1、4、 5、6 |
| | | | A | B | Total | |
| | | BRIGHT DOT | $N \leq 0$ | $N \leq 2$ | $N \leq 6$ | |
| | | DARK DOT | $N \leq 2$ | $N \leq 4$ | | |
| | | TOTAL DOT | $N \leq 2$ | $N \leq 4$ | | |
| TWO ADJACENT DOT | NOT ALLOWED | | | | | |
| THREE OR MORE ADJACENT DOT | NOT ALLOWED | | | | | |
| External Inspection (non-operating or operating) | Scratch (in display area) | L(mm) | W(mm) | Acceptable number | Note:2 | |
| | | $L \leq 2.5$ | $W \leq 0.1$ | 3 | | |
| | | $L > 2.5$ | $W > 0.1$ | 0 | | |
| | Polarizer dent or bubble (in display area) | Dimension(mm) | | Acceptable number | Note:3 | |
| | | $D \leq 0.25$ | | Disregard | | |
| | | $D \leq 0.5$ | | 4 | | |
| | Line Shape (Particles and Lint in display area) | L(mm) | W(mm) | Acceptable number | Note:2 | |
| | | - | $W \leq 0.07$ | Disregard | | |
| | | $L \leq 5$ | $W \leq 0.1$ | 4 | | |
| | | $L \geq 5$ | $W \geq 0.1$ | 0 | | |
| Dot Shape (Particle in Display area) | Dimension(mm) | | Acceptable number | Note:3 | | |
| | $D \leq 0.25$ | | Disregard | | | |
| | $D \leq 0.5$ | | 4 | | | |

| Item | | Specification/Description | | | Note |
|----------------|--|---------------------------|---------------------|--|--------|
| Touch Panel | Scratch | L(mm) | W(mm) | Acceptable number | Note:2 |
| | | $L \leq 10$ | $W < 0.05$ | Disregard | |
| | | | $0.05 \leq W < 0.1$ | $N \leq 4$ | |
| | | | $W \geq 0.1$ | 0 | |
| | Foreign Materials (Linear shape) | $L \leq 10$ | $W < 0.05$ | Disregard | Note:2 |
| | | | $0.05 \leq W < 0.1$ | $N \leq 3$ | |
| | | | $W \geq 0.1$ | 0 | |
| | Foreign Materials (Circular shape) | Dimension(mm) | | Acceptable number | Note:3 |
| | | $D \leq 0.25$ | | Disregard | |
| | | $0.25 < D \leq 0.5$ | | $N \leq 6$ | |
| $D > 0.5$ | | 0 | | | |
| Glass chipping |  | | | $a \leq 5.0\text{mm}$ $b \leq 3.0\text{mm}$ $c \leq t$ (t : Glass think) | Note:7 |
| |  | | | $a \leq 3.0\text{mm}$ $b \leq 3.0\text{mm}$ $c \leq t$ (t : Glass think) | Note:7 |
| Newton-ring | (In case of doubtful situations) Observe on 60° from the product surface under a white Fluorescent lamp (3-wavelength lamp). | | | Average diameter $\leq 1/3$ Touch Panel area Disregard. | Note:7 |
| |  | | | | |
| Membrane Drum |  | | | $H \leq 0.3\text{mm}$ | - |

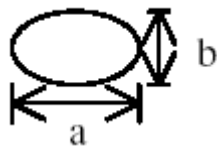
Note1. The definition of dot defect :

The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

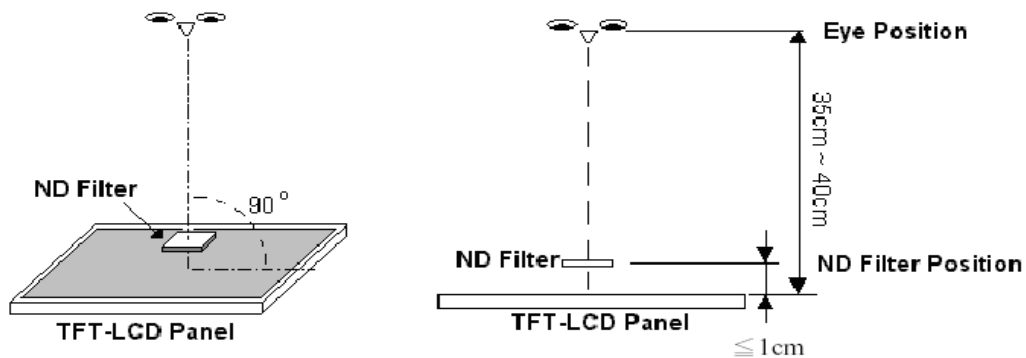
Note2.



Note3. D : Diameter $D=(a+b)/2$



Note4. Bright dot is defined through 2% transmission ND Filter as following.

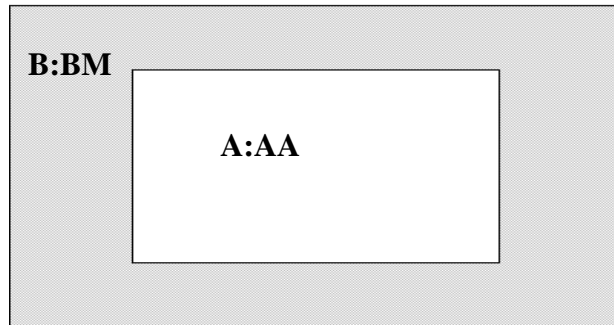


Note5. ADJACENT DOT



| | | | |
|-------------------|------------------|-----------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG322427-6UFLWD | SPEC ONLY | 33 |

Note6.



18.4 Handling of LCM

- (1) Don't give external shock.
- (2) Don't apply excessive force on the surface.
- (3) Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't disassemble the LCM.