

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. : VGG128004-5TSLWH(RoHS)

REVISION : 2

APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER :

STD.

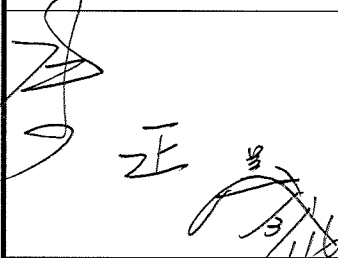
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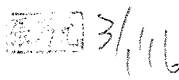
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|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 2 |

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 | 14 |
| 12 | Optical Characteristics | 24 |
| 13 | Reliability Test | 27 |
| 14 | Packaging | 28 |
| 15 | Precautions | 29 |
| 16 | Outline Drawing | 31 |
| 17 | Definition of Labels | 32 |
| 18 | Incoming Inspection Standards | 34 |

| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 4 |

3. Module Numbering System

V G G 1280 04 – 5 T S L W H

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 |
| | VGG128004-5TSLWH | SPEC SAMPLE | 5 |

4. Application

This specification is applied to the 10.1 inch WXGA supported TFT-LCD module, and can display true 16.7M colors (8 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 10.1" TFT-LCD panel, a driver circuit, and backlight unit and used as the input devices for general electric appliances via both finger and Capacitive stylus pen.

5. Features

- WXGA (1280×800 pixels) resolution.
- LVDS Receiver 24 bit Interface
- Dot inversion mode with stripe type.
- LED driver circuit is built in this module to provide PWM Dimmer function.
- Projected Capacitive Touch
 - I²C Interface
 - Multi Touch (Ten points)

6. General Specifications

| Item | Specifications | Unit |
|---------------------|---|------|
| Screen Size | 10.1 (Diagonal) | inch |
| Display Format | 1280RGB(H)×800(V) | dot |
| Active Area | 216.96(H)×135.6(V) | mm |
| Dot Pitch | 0.0565(H)×0.1695(V) | mm |
| Pixel Configuration | RGB Vertical Stripe | - |
| Display Mode | AAS Type Transmissive Mode Normally Black | - |
| Surface Treatment | Hard coating | - |
| Viewing Direction | Full view angle | - |
| Outline Dimension | 229.46(W)×149.1(H)×4.5(D) | mm |
| Weight | 325 | 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 |
| | VGG128004-5TSLWH | SPEC SAMPLE | 6 |

7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

| Item | Symbol | Value | | Unit | Note |
|-------------------------------|-----------------|-------|------|------|--------|
| | | Min. | Max. | | |
| Storage Temperature | T _{ST} | -20 | +60 | °C | (1)(2) |
| Operating Ambient Temperature | T _{OP} | 0 | +50 | °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} | -0.3 | 4.0 | V | - |
| LVDS Driver Output Voltage | - | -0.3 | V _{CC} + 0.3 | V | - |

7.2.2 LED Driver Absolute Maximum Ratings

(Ta=25±2°C)

| Item | Symbol | Value | | Unit | Note |
|---------------------------|------------------|-------|------|------|------|
| | | Min. | Max. | | |
| LED Driver Supply Voltage | V _{LED} | -0.3 | 17 | V | (1) |
| LED Driver PWM | PWM | -0.3 | 6 | 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} | 3.0 | 3.3 | 3.6 | V | - |
| Power Supply Current | I _{CC} | - | 270 | 378 | mA | (1) |
| Differential Input High Threshold Voltage | V _{TH} | - | - | 100 | mV | - |
| Differential Input Low Threshold Voltage | V _{TL} | -100 | - | - | mV | - |
| Power Consumption | P _L | - | 891 | 1247 | mW | (1) |
| VSYNC Frequency | F _V | - | 60 | - | Hz | - |
| DCLK Frequency | DCLK | - | 71.1 | - | 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.

White Pattern / 255 Gray



Active Area

8.2 LED Driver Unit

(Ta=25±2°C)

| Item | Symbol | Value | | | Unit | Note |
|----------------------------|-------------------|-------|-------|------|------|-------------------------------------|
| | | Min. | Typ. | Max. | | |
| Voltage of LED Driver Unit | V _{LED} | 11.5 | 12.0 | 12.5 | V | - |
| Current of LED Driver Unit | I _{LED} | - | 260 | 364 | mA | V _{LED} =12V、 B/L=260mA |
| Voltage of LED Driver Unit | V _{LED} | 4.5 | 5.0 | 5.5 | V | - |
| Current of LED Driver Unit | I _{LED} | - | 630 | 882 | mA | V _{LED} =5V、 B/L=260mA |
| PWM signal Low voltage | V _{PWML} | 0 | - | 0.2 | V | - |
| PWM signal High voltage | V _{PWMH} | 4 | 5.0 | 5.5 | V | - |
| PWM frequency | f _{PWM} | 100 | - | 1000 | Hz | - |
| PWM Pulse width | t _{PWMH} | 10 | - | - | us | - |
| LED Life Time(25°C) | - | 50000 | 60000 | - | hr | (1) |

Note (1) : LED life time is defined as under 25±2°C , when the average brightness decrease to 50% of original brightness

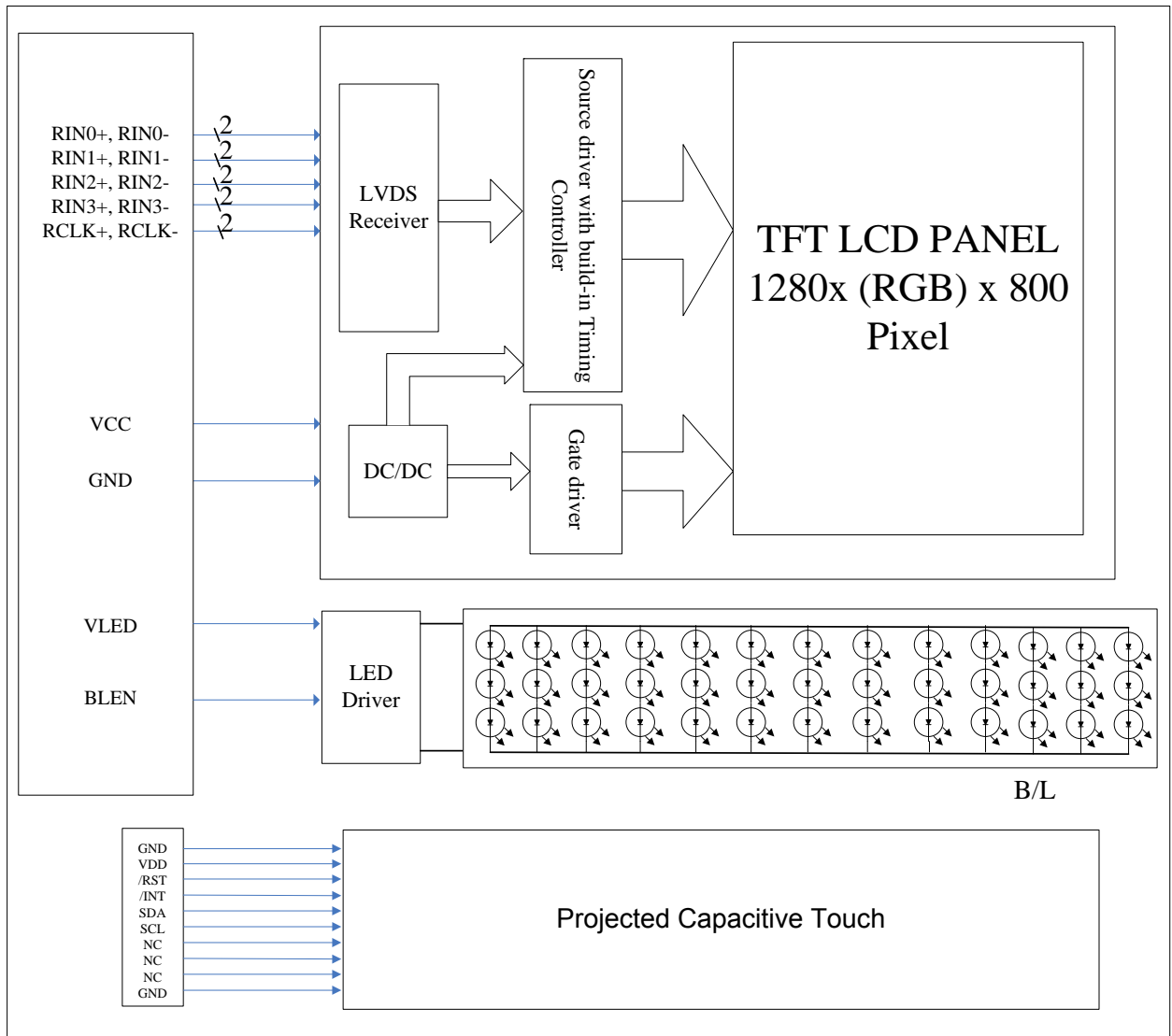
8.3 Projected Capacitive Touch

| Item | Symbol | Value | | | Unit | Note |
|-------------------------------|-----------------|------------------|-------|--------|------|-------|
| | | Min. | Typ. | Max. | | |
| Operating Voltage | VDD | 3.0 | 3.3 | 3.6 | V | - |
| Power Supply Current | IDD | - | 23.6 | 33.1 | mA | (1) |
| Input High Threshold Voltage | V _{IH} | 0.7VDD | - | VDD | V | - |
| Input Low Threshold Voltage | V _{IL} | -0.3 | - | 0.3VDD | V | - |
| Output High Threshold Voltage | V _{OH} | 0.7VDD | - | - | V | - |
| Output Low Threshold Voltage | V _{OL} | - | - | 0.3VDD | V | - |
| Power Consumption | P _L | - | 77.88 | 109.23 | mW | @3.3V |
| Interface | | I ² C | | | | - |
| Function | | Multi Touch | | | | - |

Note (1) This test condition is touched with 10 points.

9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment**10.1 TFT-LCD Module**

Connector: HIROSE DF19G-30P-1H

| Pin No. | Symbol | I/O | Description |
|---------|-----------------|-----|---------------------------|
| 1 | V _{CC} | I | +3.3V power supply |
| 2 | V _{CC} | I | +3.3V power supply |
| 3 | GND | I | Ground |
| 4 | GND | I | Ground |
| 5 | RIN3+ | I | LVDS Signal (+) Channel 3 |
| 6 | RIN3- | I | LVDS Signal (-) Channel 3 |
| 7 | GND | I | Ground |
| 8 | RCLK+ | I | LVDS Clock Signal (+) |
| 9 | RCLK- | I | LVDS Clock Signal (-) |
| 10 | GND | I | Ground |
| 11 | RIN2+ | I | LVDS Signal (+) Channel 2 |
| 12 | RIN2- | I | LVDS Signal (-) Channel 2 |
| 13 | GND | I | Ground |
| 14 | RIN1+ | I | LVDS Signal (+) Channel 1 |
| 15 | RIN1- | I | LVDS Signal (-) Channel 1 |
| 16 | GND | I | Ground |
| 17 | RIN0+ | I | LVDS Signal (+) Channel 0 |
| 18 | RIN0- | I | LVDS Signal (-) Channel 0 |
| 19 | GND | I | Ground |
| 20 | GND | I | Ground |
| 21 | NC | I | Not Connection |
| 22 | NC | I | Not Connection |
| 23 | NC | I | Not Connection |

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|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 11 |

| | | | |
|----|------|---|-------------------------|
| 24 | NC | I | Not Connection |
| 25 | BLEN | I | Note 1 |
| 26 | NC | I | Not Connection |
| 27 | VLED | I | LED driver power supply |
| 28 | VLED | I | LED driver power supply |
| 29 | GND | I | Ground |
| 30 | GND | I | Ground |

Note 1: On/Off Control Input and Dimming Command Input.

A voltage greater than 0.7V will turn on the chip.

When the BLEN pin voltage rises from 0.7V to 1.4V, The LED current will change from 0% to 100% of the maximum LED current.

To use PWM dimming, apply a 100Hz to 1kHz square wave signal with amplitude greater than 1.4V to this pin.

10.2 Improved Projected Capacitive Touch

Connector: CVILUX CF25101D0R0-05

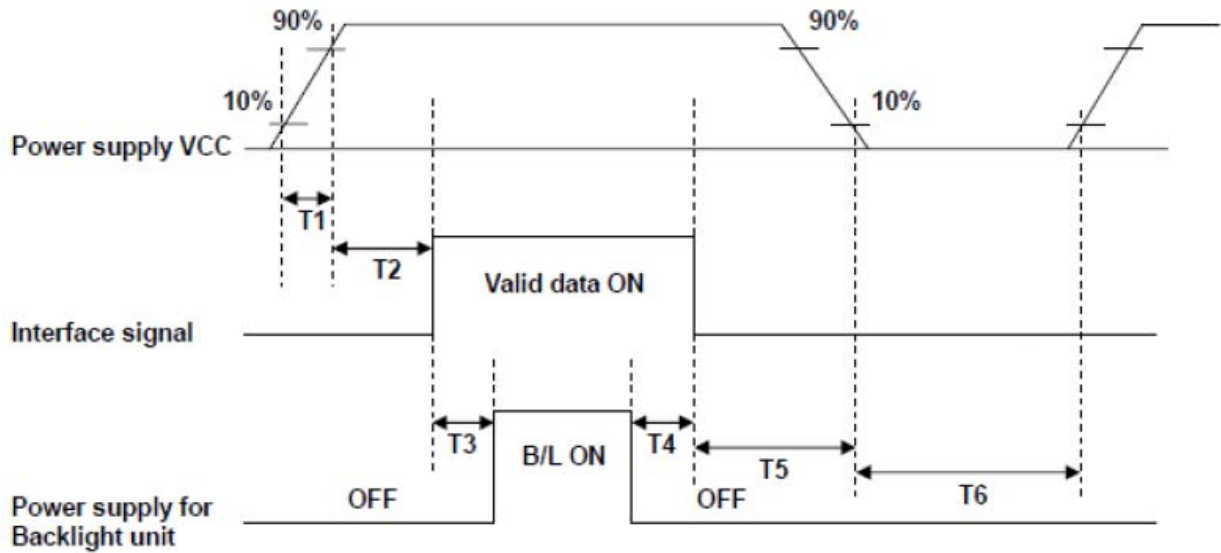
| Pin No. | Symbol | I/O | Description |
|---------|--------|-----|---|
| 1 | GND | I | System ground. |
| 2 | VDD | I | +3.3V power supply. |
| 3 | /RST | I | External reset signal, active low. |
| 4 | /INT | O | Interrupt signal, active low, asserted to request Host start a new transaction. |
| 5 | SDA | I/O | I ² C data signal. |
| 6 | SCL | I | I ² C clock signal. |
| 7 | NC | - | Not Connection |
| 8 | NC | - | Not Connection |
| 9 | NC | - | Not Connection |
| 10 | GND | I | System ground. |

10.3 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 8 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|-----------------|-------------|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
| | | Red | | | | | | | | Green | | | | | | | | Blue | | | | | | | |
| | | 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 | |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 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 | 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 | |
| Gray Scale Of RED | Red(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Red(1) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Red(2) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | |
| | Red(253) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Red(254) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Red(255) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Gray Scale Of Green | Green(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Green(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Green(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | |
| | Green(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Green(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Green(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Gray Scale Of Blue | Blue(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Blue(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | |
| | Blue(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | |
| | Blue(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | | |
| | Blue(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | | |
| | Blue(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |

10.4 Power ON/OFF Sequence



POWER SEQUENCE TABLE

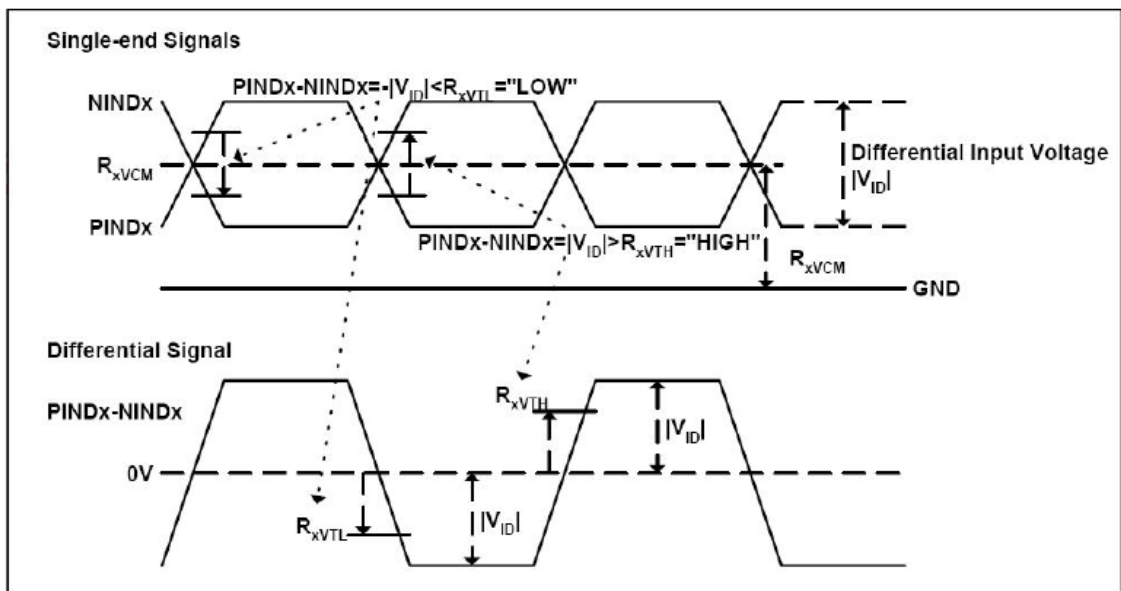
| Parameter | Value | | | Units |
|-----------|-------|-----|------|-------|
| | Min. | Typ | Max. | |
| T1 | 0.5 | - | 10 | ms |
| T2 | 20 | - | 70 | ms |
| T3 | 200 | - | - | ms |
| T4 | 200 | - | - | ms |
| T5 | 20 | - | 70 | ms |
| T6 | 1000 | - | - | ms |

11. Interface Timing

11.1 Input Signal Characteristics

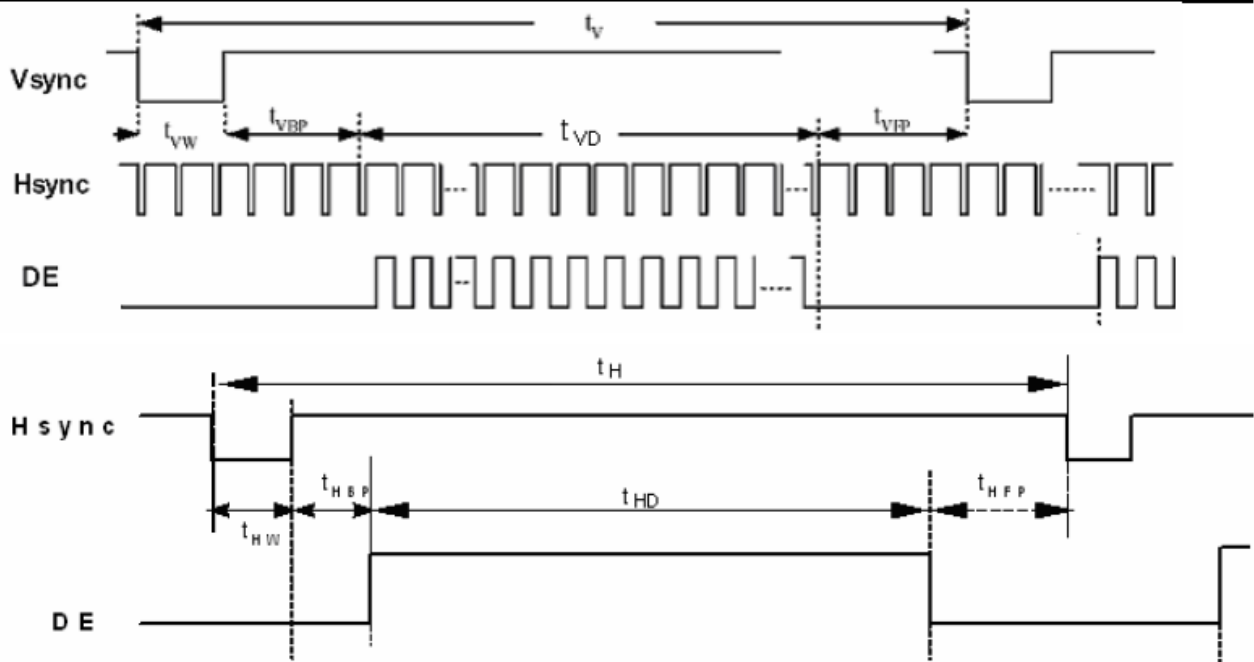
11.1.1.AC Electrical Characteristics

| Parameter | Symbol | Values | | | Unit | Remark |
|--|------------|--------|------|------|------|-----------------|
| | | Min. | Typ. | Max. | | |
| LVDS Differential input high Threshold voltage | R_{xVTH} | - | - | +100 | mV | $R_{xVCM}=1.2V$ |
| LVDS Differential input low Threshold voltage | R_{xVTL} | -100 | - | - | mV | |
| LVDS Differential input common mode voltage | R_{xVCM} | 0.7 | - | 1.6 | V | |
| LVDS Differential voltage | $ V_{ID} $ | 200 | - | 600 | mV | |

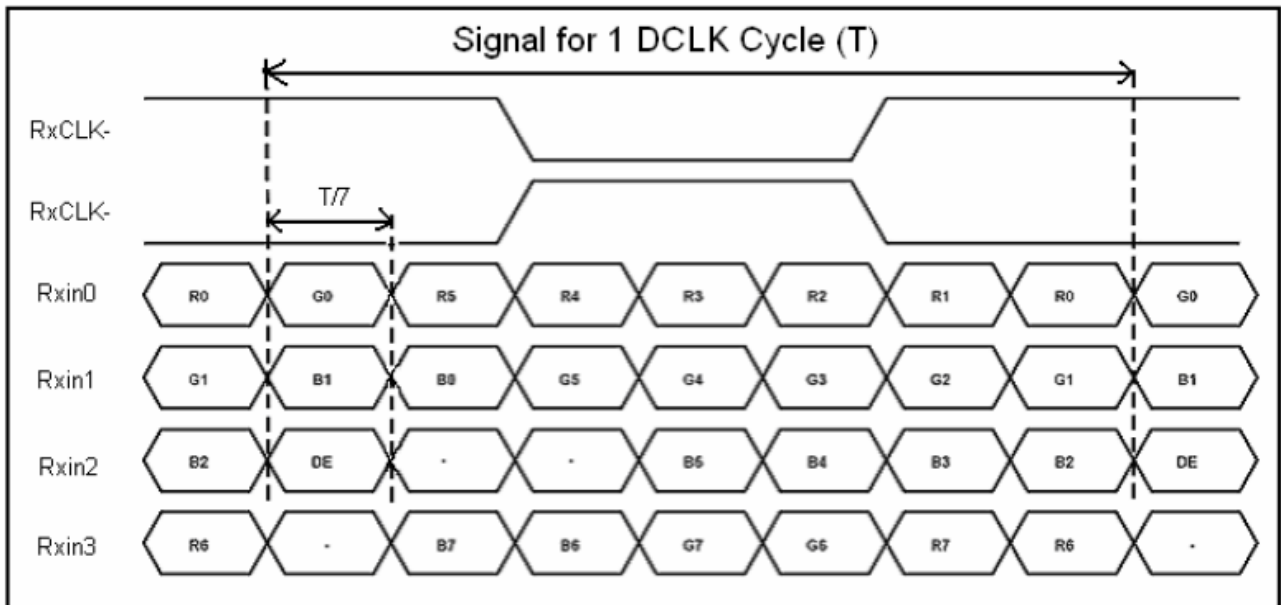


11.1.2. Timing

| Item | Symbol | Values | | | Unit | Remark |
|-----------------------------------|-----------------|--------|------|--------|------|------------------|
| | | Min. | Typ. | Max. | | |
| Clock Frequency | 1/Tc | (68.9) | 71.1 | (73.4) | MHz | Frame rate =60Hz |
| Horizontal display area | tHD | 1280 | | | Tc | |
| HS period time | tH | (1410) | 1440 | (1470) | Tc | |
| HS Width +Back Porch +Front Porch | tHW+ tHBP +tHFP | (60) | 160 | (190) | Tc | |
| Vertical display area | tVD | 800 | | | tH | |
| VS period time | tV | (815) | 823 | (833) | tH | |
| VS Width +Back Porch +Front Porch | tVW+ tVBP +tVFP | (15) | 23 | (33) | tH | |

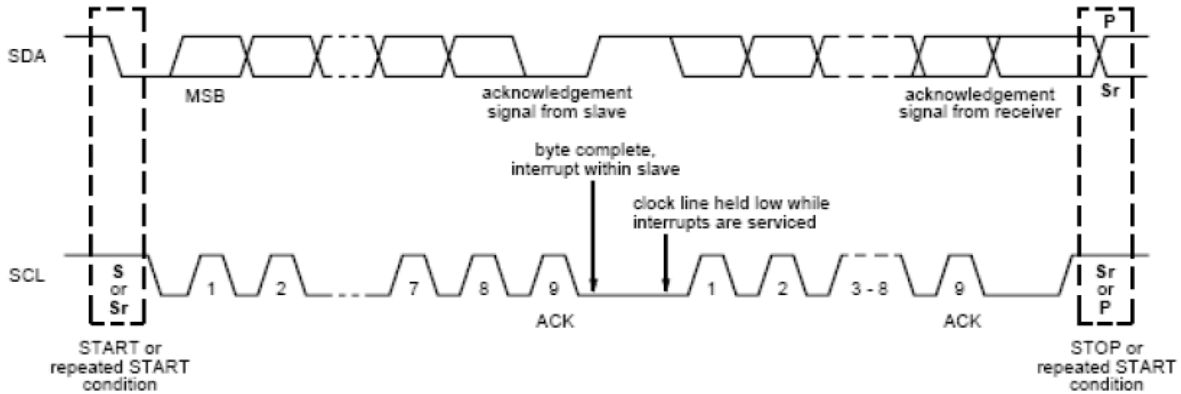


11.1.3. LVDS Data Input Format



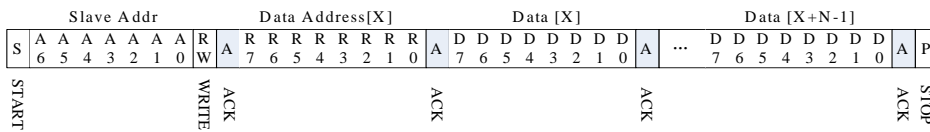
11.2 Timing Requirement of Projected Capacitive Touch

11.2.1 I2C Data Transfer Format

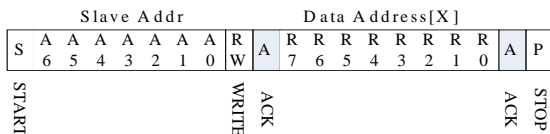


| Mnemonics | Description |
|-----------|---|
| S | I ² C Start or I ² C Restart |
| A[6:0] | Slave Address = 7'b0111000 |
| W | 1'b0: Write |
| R | 1'b1: Read |
| C | ACK |
| P | STOP: the indicate the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet) |

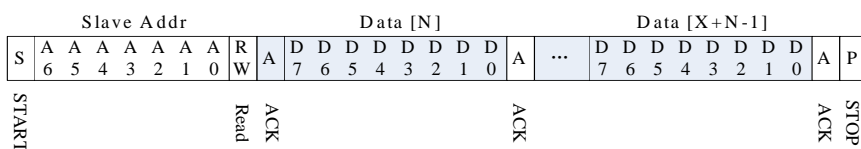
Write N bytes to I2C slave



Set Data Address



Read X bytes from I²C Slave

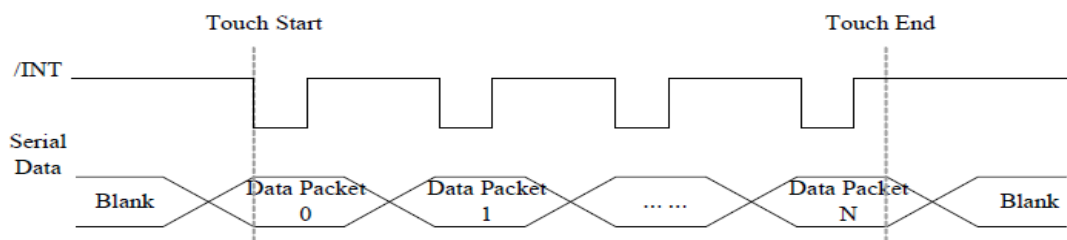


11.2.2 I2C Timing Characteristics

(Ta=25±2°C)

| Parameter | Min | Max | Unit |
|--|-----|-----|------|
| SCL frequency | - | 400 | kHz |
| Bus free time between a STOP and START condition | 4.7 | - | μs |
| Hold time (repeated) START condition | 4.0 | - | μs |
| Data setup time | 250 | - | ns |
| Setup time for a repeated START condition | 4.7 | - | μs |
| Setup time for STOP condition | 4.0 | - | μs |

11.2.3 Interrupt Trigger Mode



11.2.4 I2C Operating Mode Register Map

| Address | Name | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | Host Access |
|---------|-------------|---------------------------------------|------------------|-------|-------|--|--|-------|-------|-------------|
| Op,00h | DEVICE_MODE | | Device Mode[2:0] | | | | | | | RW |
| Op,01h | Reserved | | | | | | | | | R |
| Op,02h | TD_STATUS | | | | | Number of touch points[3:0] | | | | R |
| Op,03h | TOUCH1_YH | 1 st Event Flag | | | | 1 st Touch Y Position[11:8] | | | | R |
| Op,04h | TOUCH1_YL | 1 st Touch Y Position[7:0] | | | | | | | | R |
| Op,05h | TOUCH1_XH | 1 st Touch ID[3:0] | | | | | 1 st Touch X Position[11:8] | | | R |
| Op,06h | TOUCH1_XL | 1 st Touch X Position[7:0] | | | | | | | | R |
| Op,07h | Reserved | | | | | | | | | R |
| Op,08h | Reserved | | | | | | | | | R |
| Op,09h | TOUCH2_YH | 2 nd Event Flag | | | | 2 nd Touch Y Position[11:8] | | | | R |

| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 19 |

| | | | | |
|--------|-----------|---------------------------------------|---|---|
| Op,0Ah | TOUCH2_YL | 2 nd touch Y Position[7:0] | | R |
| Op,0Bh | TOUCH2_XH | 2 nd Touch ID[3:0] | 2 nd Touch X Position[11:8] | R |
| Op,0Ch | TOUCH2_XL | 2 nd Touch X Position[7:0] | | R |
| Op,0Dh | Reserved | | | R |
| Op,0Eh | Reserved | | | R |
| Op,0Fh | TOUCH3_YH | 3 rd Event Flag | 3 rd Touch Y Position[11:8] | R |
| Op,10h | TOUCH3_YL | 3 rd Touch Y Position[7:0] | | R |
| Op,11h | TOUCH3_XH | 3 rd Touch ID[3:0] | 3 rd Touch X Position[11:8] | R |
| Op,12h | TOUCH3_XL | 3 rd Touch X Position[7:0] | | R |
| Op,13h | Reserved | | | R |
| Op,14h | Reserved | | | R |
| Op,15h | TOUCH4_YH | 4 th Event Flag | 4 th Touch Y Position[11:8] | R |
| Op,16h | TOUCH4_YL | 4 th Touch Y Position[7:0] | | R |
| Op,17h | TOUCH4_XH | 4 th Touch ID[3:0] | 4 th Touch X Position[11:8] | R |
| Op,18h | TOUCH4_XL | 4 th Touch X Position[7:0] | | R |
| Op,19h | Reserved | | | R |
| Op,1Ah | Reserved | | | R |
| Op,1Bh | TOUCH5_YH | 5 th Event Flag | 5 th Touch Y Position[11:8] | R |
| Op,1Ch | TOUCH5_YL | 5 th Touch Y Position[7:0] | | R |
| Op,1Dh | TOUCH5_XH | 5 th Touch ID[3:0] | 5 th Touch X Position[11:8] | R |
| Op,1Eh | TOUCH5_XL | 5 th Touch X Position[7:0] | | R |
| Op,1Fh | Reserved | | | R |
| Op,20h | Reserved | | | R |
| Op,21h | TOUCH6_YH | 6 th Event Flag | 6 th Touch Y Position[11:8] | R |
| Op,22h | TOUCH6_YL | 6 th Touch Y Position[7:0] | | R |
| Op,23h | TOUCH6_XH | 6 th Touch ID[3:0] | 6 th Touch X Position[11:8] | R |
| Op,24h | TOUCH6_XL | 6 th Touch X Position[7:0] | | R |
| Op,25h | Reserved | | | R |
| Op,26h | Reserved | | | R |

| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 20 |

| | | | | |
|--------|------------|--|--|---|
| Op,27h | TOUCH7_YH | 7 th Event Flag | 7 th Touch Y Position[11:8] | R |
| Op,28h | TOUCH7_YL | 7 th Touch Y Position[7:0] | | R |
| Op,29h | TOUCH7_XH | 7 th Touch ID[3:0] | 7 th Touch X Position[11:8] | R |
| Op,2Ah | TOUCH7_XL | 7 th Touch X Position[7:0] | | R |
| Op,2Bh | Reserved | | | R |
| Op,2Ch | Reserved | | | R |
| Op,2Dh | TOUCH8_YH | 8 th Event Flag | 8 th Touch Y Position[11:8] | R |
| Op,2Eh | TOUCH8_YL | 8 th Touch Y Position[7:0] | | R |
| Op,2Fh | TOUCH8_XH | 8 th Touch ID[3:0] | 8 th Touch X Position[11:8] | R |
| Op,30h | TOUCH8_XL | 8 th Touch X Position[7:0] | | R |
| Op,31h | Reserved | | | R |
| Op,32h | Reserved | | | R |
| Op,33h | TOUCH9_YH | 9 th Event Flag | 9 th Touch Y Position[11:8] | R |
| Op,34h | TOUCH9_YL | 9 th Touch Y Position[7:0] | | R |
| Op,35h | TOUCH9_XH | 9 th Touch ID[3:0] | 9 th Touch X Position[11:8] | R |
| Op,36h | TOUCH9_XL | 9 th Touch X Position[7:0] | | R |
| Op,37h | Reserved | | | R |
| Op,38h | Reserved | | | R |
| Op,39h | TOUCH10_YH | 10 th Event Flag | 10 th Touch Y Position[11:8] | R |
| Op,3Ah | TOUCH10_YL | 10 th Touch Y Position[7:0] | | R |
| Op,3Bh | TOUCH10_XH | 10 th Touch ID[3:0] | 10 th Touch X Position[11:8] | R |
| Op,3Ch | TOUCH10_XL | 10 th Touch X Position[7 : 0] | | R |
| Op,3Dh | Reserved | | | R |
| Op,3Eh | Reserved | | | R |

11.2.5 DEVICE_MODE

This register is the device mode register, configure it to determine the current mode of the chip.

| Address | Bit Address | Register Name | Description |
|---------|-------------|----------------------|--|
| Op,00h | 6:4 | Device Mode [2:0] | 000b Normal operating Mode 001b System Information Mode (Reserved) 100b Test Mode – read raw data (Reserved) |

11.2.6 TD_STATUS

This register is the Touch Data status register.

| Address | Bit Address | Register Name | Description |
|---------|-------------|--------------------------------|---|
| Op,02h | 3:0 | Number of touch points[3:0] | How many points detected. 1-10 is valid. |

11.2.7 TOUCHn_YH (n:1-10)

This register describes MSB of the Y coordinate of the nth touch point and the corresponding event flag.

| Address | Bit Address | Register Name | Description |
|-----------------------|-------------|-------------------------------|---|
| Op,03h ~ Op,39h | 7:6 | Event Flag | 00b: Put Down 01b: Put Up 10b: Contact 11b: No event |
| | 5:4 | | Reserved |
| | 3:0 | Touch Y Position [11:8] | MSB of Touch Y Position in pixels |

11.2.8 TOUCHn_YL (n:1-10)

This register describes LSB of the Y coordinate of the nth touch point.

| Address | Bit Address | Register Name | Description |
|-----------------------|-------------|------------------------------|---------------------------------------|
| Op,04h ~ Op,3Ah | 7:0 | Touch Y Position [7:0] | LSB of the Touch Y Position in pixels |

11.2.9 TOUCHn_XH (n:1-10)

This register describes MSB of the X coordinate of the nth touch point and corresponding touch ID.

| Address | Bit Address | Register Name | Description |
|-----------------------|-------------|---|--|
| Op,05h ~ Op,3Bh | 7:4 3:0 | Touch ID[3:0] Touch X Position [11:8] | Touch ID of Touch Point MSB of Touch X Position in pixels |

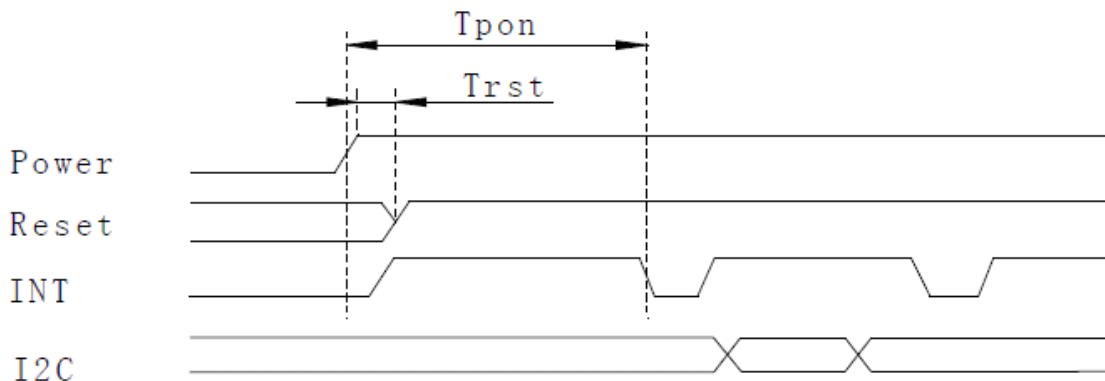
11.2.10 TOUCHn_XL (n:1-10)

This register describes LSB of the X coordinate of the nth touch point.

| Address | Bit Address | Register Name | Description |
|-----------------------|-------------|------------------------------|---------------------------------------|
| Op,06h ~ Op,3Ch | 7:0 | Touch X Position [7:0] | LSB of The Touch X Position in pixels |

11.3 POWER ON/Reset Sequence

Reset and GPIO such as /INT and I2C are advised to be low before powering on. The signal of waking up should be set to be high after powering on. /INT signal will be sent to the host after initializing all parameters and then start to report points to the host.



Power on Sequence

Reset time must be enough to guarantee reliable reset, the time of starting to report point after resetting approach to the time of starting to report point after powering on.

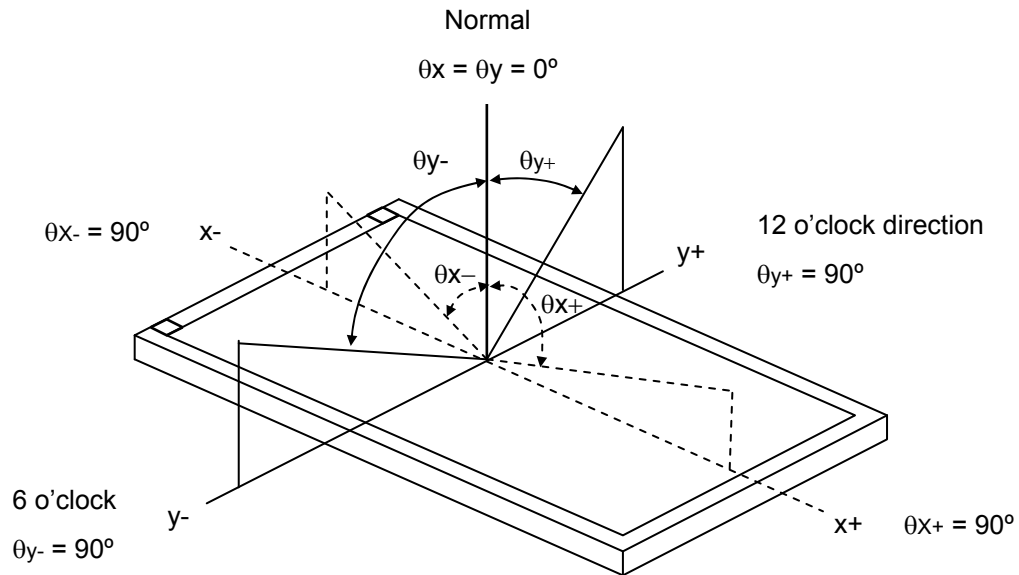
| Parameter | Description | Min | Max | Units |
|-----------|--|-----|-----|-------|
| Tris | Rise time from 0.1VDD to 0.9VDD | -- | 10 | ms |
| Tpon | Time of starting to report point after powering on | 300 | -- | ms |
| Trsi | Time of starting to report point after resetting | 300 | -- | ms |
| Trst | Reset time | 5 | -- | ms |
| Twai | Time of starting to report point after waking | 300 | -- | ms |

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 | 600 | (800) | - | - | (2) |
| Response Time | | T_R | | - | 10 | 20 | ms | (3) |
| | | T_F | | - | 15 | 30 | ms | |
| Luminance(Center) | | Y | | 440 | (490) | - | cd/m ² | (4) |
| Brightness uniformity | | BUNI | | 75 | (80) | - | % | (5) |
| Color Chromaticity | White | W_x | | 0.260 | 0.310 | 0.360 | - | (1),(4) |
| | | W_y | | 0.280 | 0.330 | 0.380 | - | |
| | Red | R_x | | 0.550 | 0.600 | 0.650 | - | |
| | | R_y | | 0.290 | 0.340 | 0.390 | - | |
| | Green | G_x | | 0.290 | 0.340 | 0.390 | - | |
| | | G_y | 0.540 | 0.590 | 0.640 | - | | |
| | Blue | B_x | 0.105 | 0.155 | 0.205 | - | | |
| | | B_y | 0.090 | 0.140 | 0.190 | - | | |
| Viewing Angle | Horizontal | θ_{x+} | $CR \geq 10$ | 75 | (85) | - | deg. | |
| | | θ_{x-} | | 75 | (85) | - | | |
| | Vertical | θ_{y+} | | 75 | (85) | - | | |
| | | θ_{y-} | | 75 | (85) | - | | |

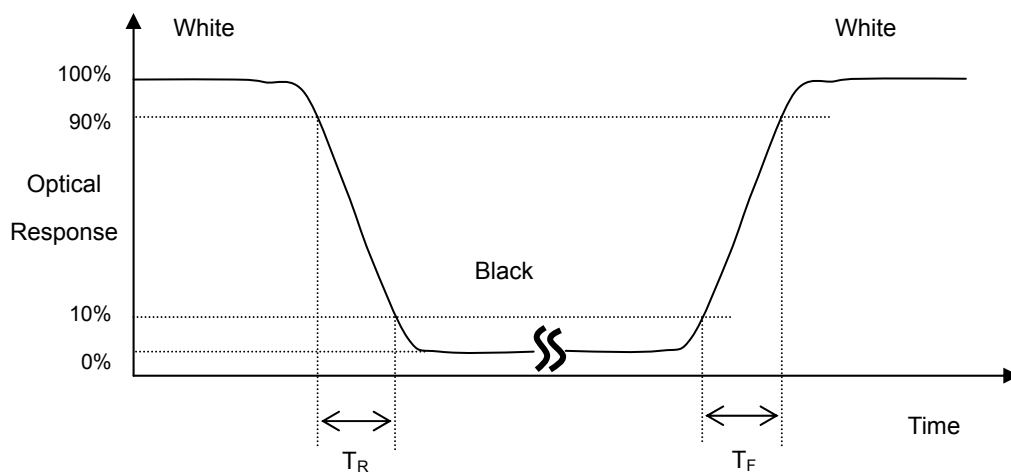
Note (1) Definition of Viewing Angle (θ_x , θ_y):



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

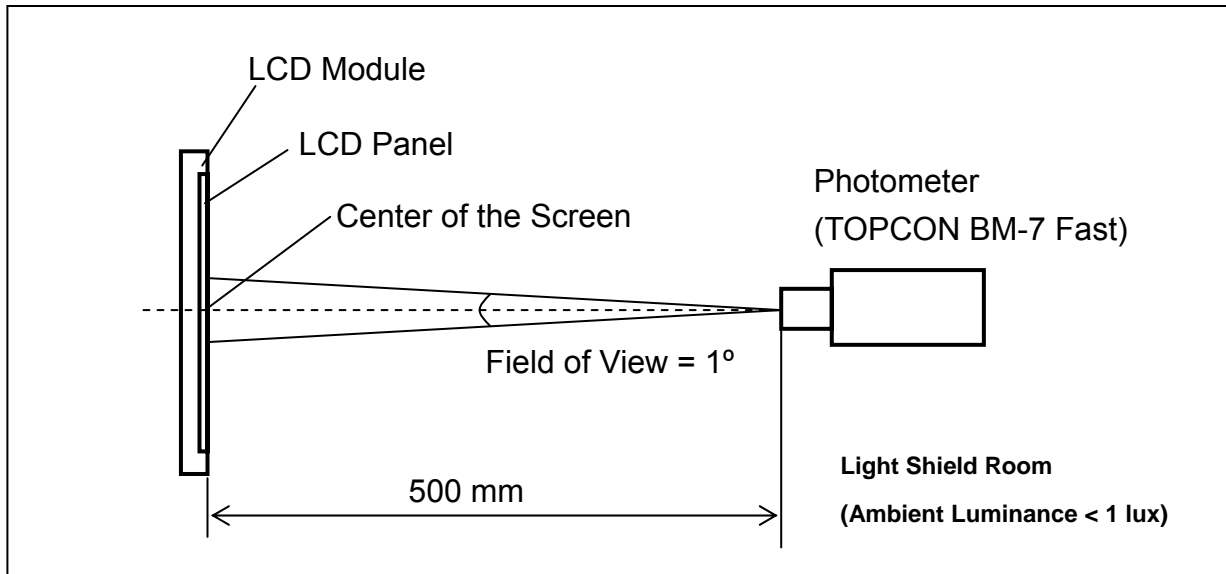
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



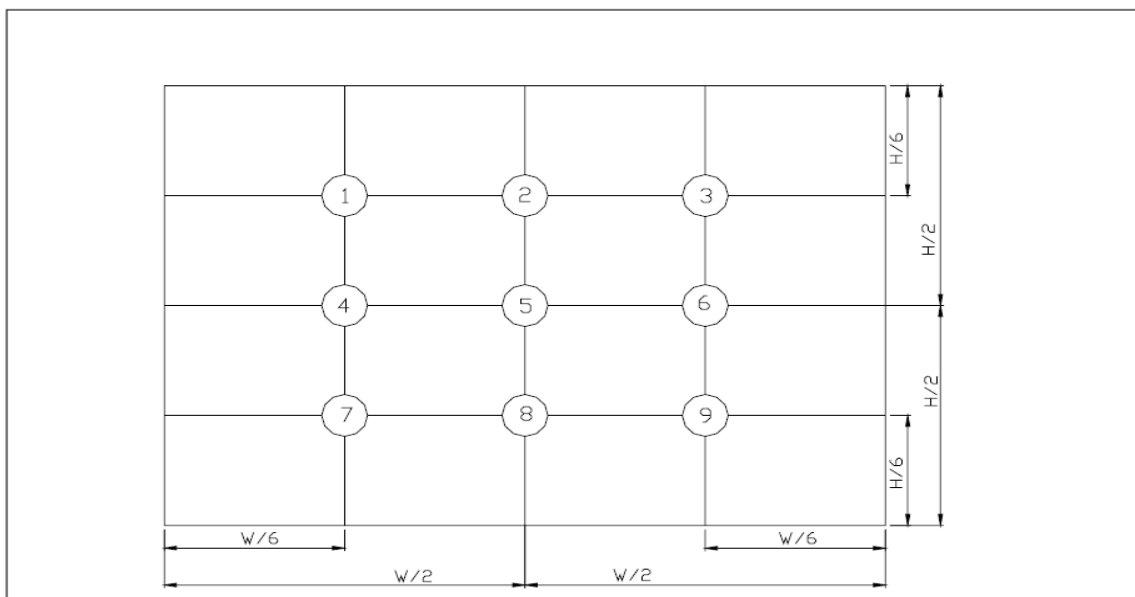
Note (4) Measurement Set-Up:

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)

| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 27 |

13. Reliability Test

| No. | Test Items | Test Condition | Remark |
|-----|---|--|-------------|
| 1 | High Temperature Storage Test | T _a = 60°C 120 hours | (1),(3),(4) |
| 2 | Low Temperature Storage Test | T _a = -20°C 120 hours | (1),(3),(4) |
| 3 | High Temperature Operation Test | T _s = 50°C 120 hours | (2),(3),(4) |
| 4 | Low Temperature Operation Test | T _a = 0°C 120 hours | (1),(3),(4) |
| 5 | High Temperature and High Humidity Operation Test | T _a =40°C 90%RH 120 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) | 0°C (30min) ~ 50°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.

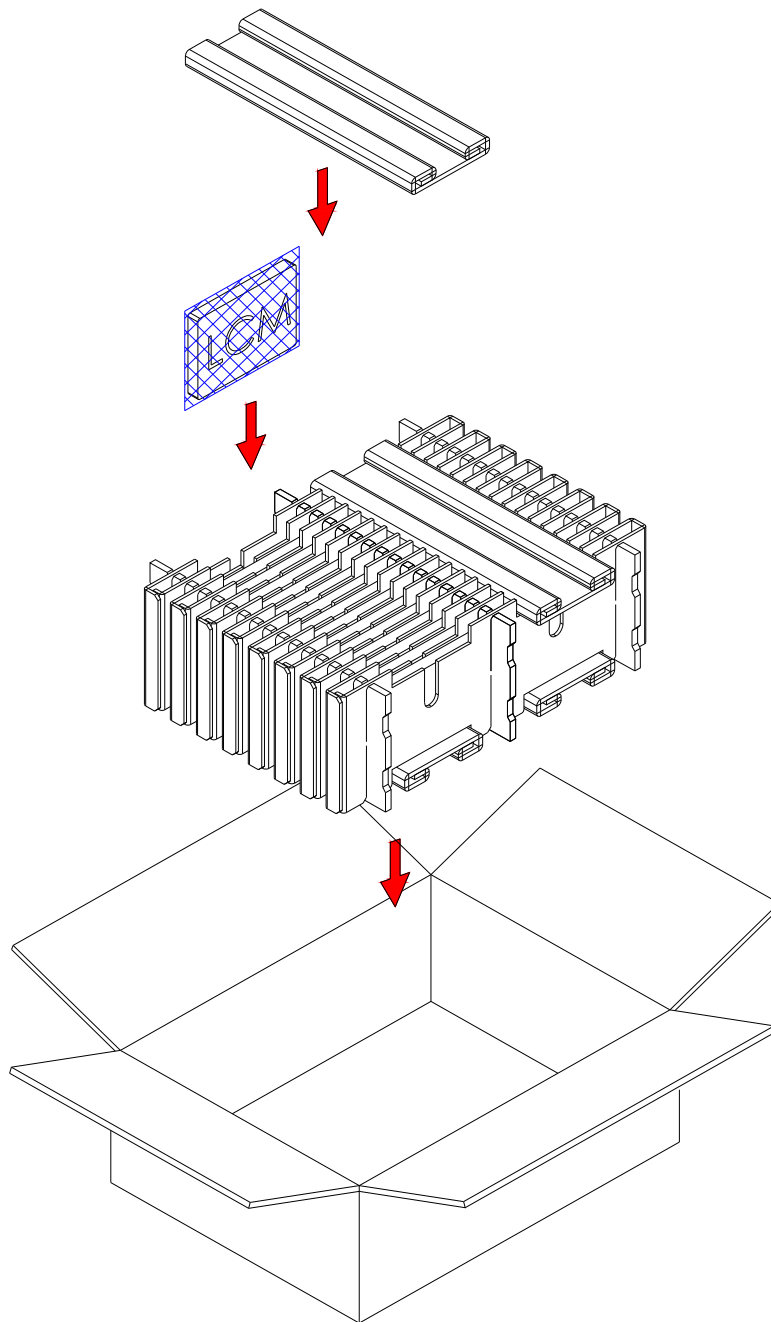
Note 2 : T_s is the temperature of panel's surface.

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.

14. Packaging



PARTS LIST

| | ITEM | SIZE(LxWxH) unit : mm | MATERIAL | Q.T.Y | NOTE |
|---|----------------------|-----------------------|----------|-------|------|
| 1 | STATIC SHIEDING BAGS | 245.0x300.0x0.09 | | 30 | |
| 2 | CARD BOARD | 355.0x235.0x3.5 | CARTON | 3 | |
| 3 | CARD BOARD | 515.0x23.0x235.0 | CARTON | 8 | |
| 4 | EXTERNAL BOX | 520.0x355.0x241.0 | CARTON | 1 | |
| 5 | PRODUCT | 229.46x149.1x4.5 | | 30 | |

| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 29 |

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

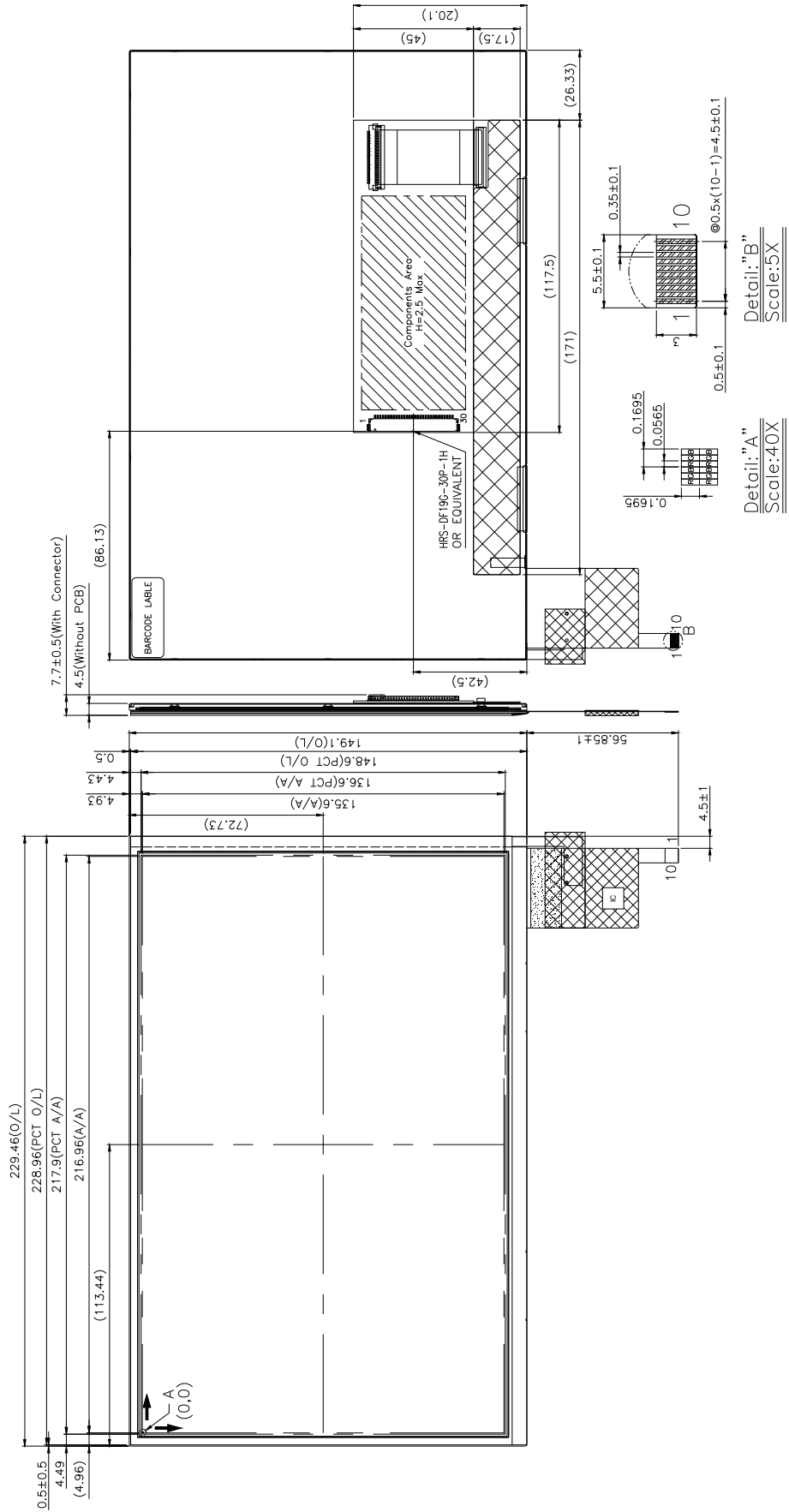
- (1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period
The period is within twelve months since the date of shipping out under normal using and storage conditions.

| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 30 |

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.

16.Outline Drawing



| | | | |
|-------------------|------------------|-------------|-------------|
| EVERVISION | MODEL NO. | | PAGE |
| | VGG128004-5TSLWH | SPEC SAMPLE | 32 |

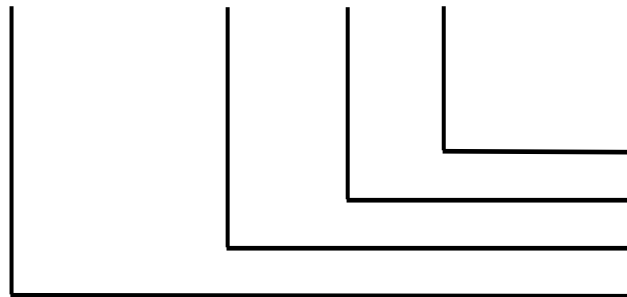
17. Definition of Labels

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



- (a) Module Name : VGG128004-5TSLWH
- (b) Serial ID :

A B C D E F G H IJKL



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 |
| | VGG128004-5TSLWH | SPEC SAMPLE | 33 |

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):

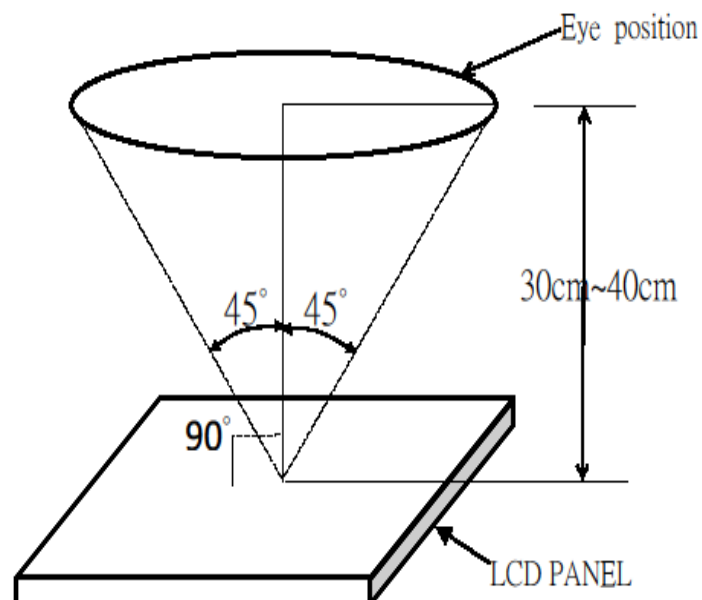
Manufacturing sequence of product, for example : 0001~9999.

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:


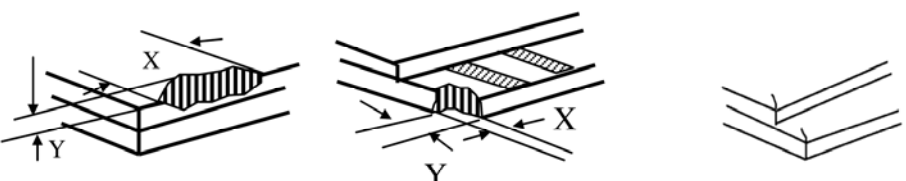
- (1) Test method: According to ANSI/ASQC Z 1.4 .General Inspection Level II take a single time
- (2) The defects classify of AQL as following:

| 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. |

18.3 Inspection Parameters

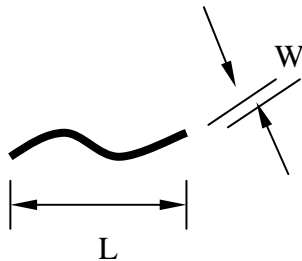
| Item | | Specification/Description | | | Note |
|---|---|--|--------------------------------------|-------------------|----------------|
| Display | Function | No Display | | | - |
| | | Malfunction | | | - |
| Operating | Contrast ratio | Out of Spec | | | - |
| | Line defect | No obvious Vertical and Horizontal line defect in bright , dark and colored. | | | - |
| | Point Defect (red ,green , blue, dark , white) | Item | | Acceptable number | Note: 1、4、5 |
| | | BRIGHT DOT | Random | $N \leq 3$ | |
| | | | 2 dots adjacent | $N \leq 0$ | |
| | | | 3 dots adjacent | $N \leq 0$ | |
| | | Distance | Minimum Distance Between Bright Dots | 5mm | |
| | | DARK DOT | Random | $N \leq 4$ | |
| | | | 2 dots adjacent | $N \leq 0$ | |
| | | | 3 dots adjacent | $N \leq 0$ | |
| TOTAL DOT | | $N \leq 6$ | | | |
| Distance | Minimum Distance Between Dark AND Bright Dots Minimum Distance Between Dark Dots | 5mm | | | |
| External Inspection (non-operating or operating) | Scratch (in display area) | L(mm) | W(mm) | Acceptable number | Note:2 |
| | | - | $W \leq 0.07$ | Disregard | |
| | | $L \leq 5.0$ | $0.07 < W \leq 0.1$ | 4 | |
| | Polarizer dent or bubble (in display area) | Dimension(mm) | | Acceptable number | Note:3 |
| | | $D \leq 0.3$ | | Disregard | |
| | | $0.3 < D \leq 0.5$ | | 4 | |
| | Line Shape (Particles and Lint in display area) | L(mm) | W(mm) | Acceptable number | Note:2 |
| | | - | $W \leq 0.07$ | Disregard | |
| | | $L \leq 5$ | $0.07 < W \leq 0.1$ | 4 | |
| | Dot Shape (Particle in Display area) | Dimension(mm) | | Acceptable number | Note:3 |
| | | $D \leq 0.3$ | | Disregard | |
| | | $0.3 < D \leq 0.5$ | | 4 | |

Incoming Inspection Touch Panel

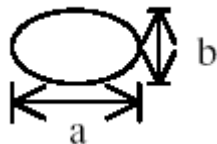
| <p>Circular Defects</p> <p>Linear Defects</p> <p>Scratch</p> <p>Air Bubble</p> <p>Crack</p> <p>Y: Long breakage</p> <p>Z: Wide breakage</p> <p>D: thickness breakage</p> <p>T: single piece of glass thickness (Touch sensor single thickness)</p> <p>VA: Touch control panel viewing area.</p> <p>Sensor wide: the size of the long side of the touch panel.</p> | <p>(1) Circular Defects $\phi = (L+W)/2$</p> <table border="1"> <thead> <tr> <th>Diameter(mm)</th> <th>Spec</th> </tr> </thead> <tbody> <tr> <td>$\phi \leq 0.25$</td> <td>No quantity limit</td> </tr> <tr> <td>$0.25 < \phi \leq 0.5$</td> <td>Max 5 defect</td> </tr> <tr> <td>$0.5 < \phi$</td> <td>Reject</td> </tr> </tbody> </table> | Diameter(mm) | Spec | $\phi \leq 0.25$ | No quantity limit | $0.25 < \phi \leq 0.5$ | Max 5 defect | $0.5 < \phi$ | Reject | | | | |
|--|---|-------------------|-----------------|-------------------|-----------------------|------------------------|---------------|---------------|---------------|--------------|------------|------------|--------|
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| | <p>(2) Linear Defects</p>  <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>$12.0 \geq L$</td> <td>$0.06 \geq W$</td> <td>Accept</td> </tr> <tr> <td>$12.0 \geq L$</td> <td>$0.08 \geq W$</td> <td>Max 5 defect</td> </tr> <tr> <td>$L > 12.0$</td> <td>$W > 0.08$</td> <td>Reject</td> </tr> </tbody> </table> <p>The Min distance of defects must be above 15.0mm.</p> | Length | Width | Acceptable | $12.0 \geq L$ | $0.06 \geq W$ | Accept | $12.0 \geq L$ | $0.08 \geq W$ | Max 5 defect | $L > 12.0$ | $W > 0.08$ | Reject |
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| <p>(3) Scratch</p> <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>$12.0 \geq L$</td> <td>$0.06 \geq W$</td> <td>Accept</td> </tr> <tr> <td>$12.0 \geq L$</td> <td>$0.08 \geq W$</td> <td>Max 5 defect</td> </tr> <tr> <td>$L > 12.0$</td> <td>$W > 0.08$</td> <td>Reject</td> </tr> </tbody> </table> <p>The Min distance of defects must be above 15.0mm.</p> | Length | Width | Acceptable | $12.0 \geq L$ | $0.06 \geq W$ | Accept | $12.0 \geq L$ | $0.08 \geq W$ | Max 5 defect | $L > 12.0$ | $W > 0.08$ | Reject | |
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| <p>(4) Air Bubble</p> <table border="1"> <thead> <tr> <th>Diameter(mm)</th> <th>Spec</th> </tr> </thead> <tbody> <tr> <td>$\phi \leq 0.2$</td> <td>No quantity limit</td> </tr> <tr> <td>$0.2 < \phi \leq 0.6$</td> <td>Max 5 defect</td> </tr> </tbody> </table> <p>The Min distance of defects must be above 10.0mm.</p> | Diameter(mm) | Spec | $\phi \leq 0.2$ | No quantity limit | $0.2 < \phi \leq 0.6$ | Max 5 defect | | | | | | | |
| Diameter(mm) | Spec | | | | | | | | | | | | |
| $\phi \leq 0.2$ | No quantity limit | | | | | | | | | | | | |
| $0.2 < \phi \leq 0.6$ | Max 5 defect | | | | | | | | | | | | |
| <p>(5) Crack</p>  <p>$Z \leq T, X \leq 1/8$ Sensor wide $X \leq 3\text{mm}$ and $Y \leq 1/3D$</p> <p>Y: Did not enter the VA</p> <p>(Accept) (Accept) (Reject)</p> | | | | | | | | | | | | | |

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.

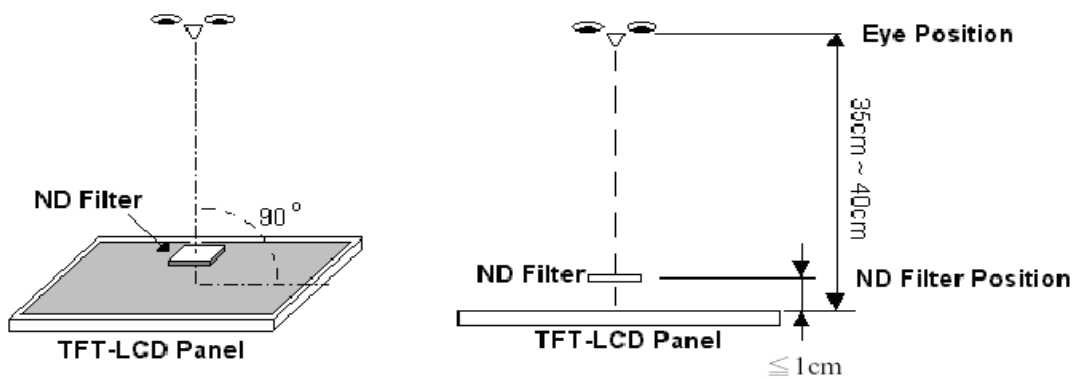
Note2.



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



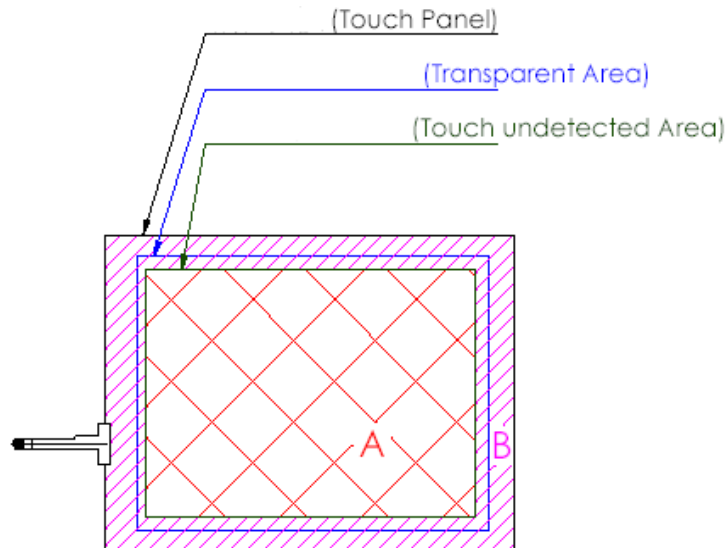
Note4. Bright dot is defined through 2% transmission ND Filter as following.



Note5. ADJACENT DOT



Note6.



A area : Without any defect point effect on normal operation.

B area : None-specify

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.