

ALC-121025-02-1

~ 12.1" Wide High Brightness TFT LCD

2017/6/19

Engineering Specifications v.1.0

() Preliminary Specifications

(√) Final Specifications

[This specification is subject to change without notice.]

Company Confidential



| Customer Name | | Customer Approval | |
|---------------------|------------|-------------------|--|
| | | | |
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RECORD OF REVISION

| Version | Date | Page | Original Description | New Description | ECN# |
|---------|-----------|------|----------------------|-----------------|------|
| 1.0 | 2017/6/19 | All | First draft | All | N/A |
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TABLE OF CONTENTS

| | |
|---|-----------|
| PROPRIETARY NOTICE..... | 1 |
| RECORD OF REVISION..... | 2 |
| TABLE OF CONTENTS..... | 3 |
| 1 General Description..... | 4 |
| 1.1 General Specification..... | 4 |
| 2 Optical Characteristics..... | 5 |
| 3 Functional Block Diagram..... | 9 |
| 4 Absolute Maximum Ratings..... | 10 |
| 4.1 Absolute Ratings of TFT LCD..... | 10 |
| 4.2 Absolute Ratings of Backlight Unit..... | 10 |
| 4.3 Absolute Ratings of Environment..... | 10 |
| 5 Electrical Characteristics..... | 11 |
| 5.1 TFT LCD..... | 11 |
| 5.2 Backlight Unit..... | 13 |
| 6 Connector & Pin Assignment..... | 14 |
| 6.1 TFT LCD..... | 14 |
| 6.2 Backlight Unit..... | 16 |
| 7 Signal Characteristic..... | 17 |
| 7.1 Pixel Format Image..... | 17 |
| 7.2 The Input Data Format..... | 18 |
| 7.3 Interface Timing..... | 19 |
| 7.4 Power ON/OFF Sequence..... | 21 |
| 8 Packaging..... | 22 |
| 9 Mechanical Characteristics..... | 23 |
| 9.1 Front View..... | 23 |
| 9.2 Rear View..... | 24 |
| CONTACTING CIVUE..... | 25 |

1 General Description

This TFT LCD module is designed to provide high brightness with long lasting backlight life time.

The rigid structure, and wide operating temperature range of the module make it suitable for industrial uses.

Separate compatible LED driver is available upon request.

1.1 General Specification

The following items are characteristics summary on the table under 25 °C condition:

| Item | Specification | Unit |
|---------------------------|---|-------------------|
| Screen Diagonal | 12.1 (307.34 mm) | inch |
| Active Area | 261.12 (H) x 163.2 (V) | mm |
| Pixels H x V | 1280 x 3 (RGB) x 800 | |
| Pixel Pitch | 0.204 x 0.204 | mm |
| Pixel Arrangement | R.G.B. Vertical Stripe | |
| Display Mode | TN, Normally Black | |
| White Luminance | 1200 (Typ.) | cd/m ² |
| Contrast Ratio | 1000 : 1 (Typ.) | |
| Nominal Input Voltage VDD | 3.3 (Typ.) | Volt |
| Power Consumption | 16.25(Typ.) | Watt |
| Weight | 480 (Max.) | Grams |
| Physical Size | 278.0 (W) x 184.0 (H) x 11.6 (D) (Typ.) | mm |
| Electrical Interface | 1 channel LVDS | |
| Surface Treatment | Hard-coating (3H), Anti-glare | |
| Support Color | 16.7M / 262K colors | |
| Temperature Range | | |
| Operating Temperature | -30 to +85 | °C |
| Storage Temperature | -30 to +85 | °C |
| RoHS Compliance | RoHS Compliance | |

2 Optical Characteristics

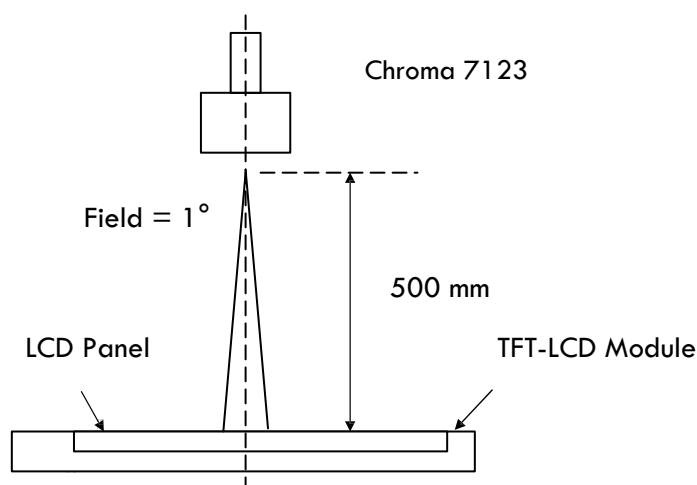
The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

| Item | Conditions | Min. | Typ. | Max. | Unit | Note |
|---|--------------------|-------|-------|-------|-------------------|---------|
| White Luminance | Center point | 1000 | 1200 | - | cd/m ² | (1) |
| Luminance Uniformity | 5 Points | 75 | - | - | % | (1) (3) |
| Contrast Ratio | | 800 | 1000 | - | | (1) (4) |
| Response Time | Rising | - | - | - | msec | (1) (5) |
| | Falling | - | - | - | | |
| | Rising + Falling | - | 25 | - | | |
| Viewing Angle | Horizontal (Right) | 80 | 89 | - | degree | (1) (2) |
| | CR ≥ 10 (Left) | 80 | 89 | - | | |
| | Vertical (Up) | 80 | 89 | - | | |
| | CR ≥ 10 (Down) | 80 | 89 | - | | |
| Color / Chromaticity Coordinates (CIE 1931) | Red x | 0.581 | 0.631 | 0.681 | | (1) |
| | Red y | 0.279 | 0.329 | 0.379 | | |
| | Green x | 0.249 | 0.299 | 0.349 | | |
| | Green y | 0.569 | 0.619 | 0.669 | | |
| | Blue x | 0.105 | 0.155 | 0.205 | | |
| | Blue y | 0.004 | 0.054 | 0.104 | | |
| | White x | 0.263 | 0.313 | 0.363 | | |
| | White y | 0.279 | 0.329 | 0.379 | | |
| NTSC | | - | 72 | - | % | (2) |

Note 1: Measurement method

The LCD Module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring.

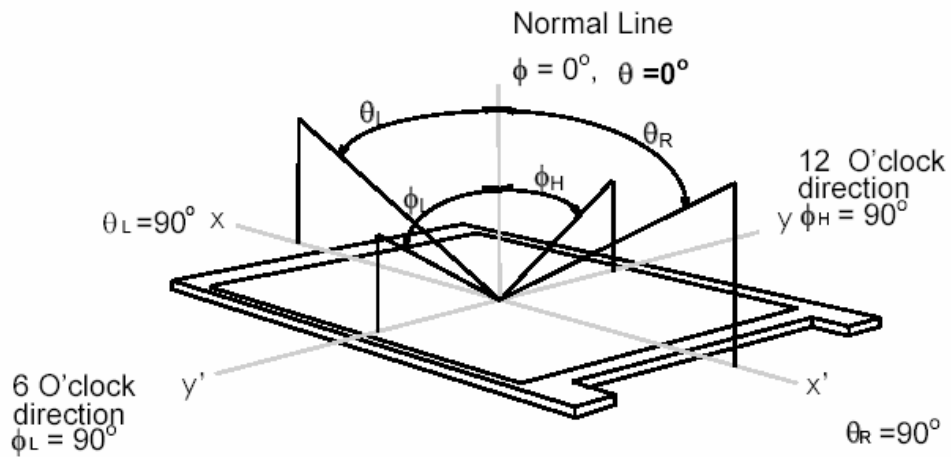
Equipment: Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (Chroma 7123 or equivalent) Aperture 1 with 500mm viewing distance Environment < 1 lux



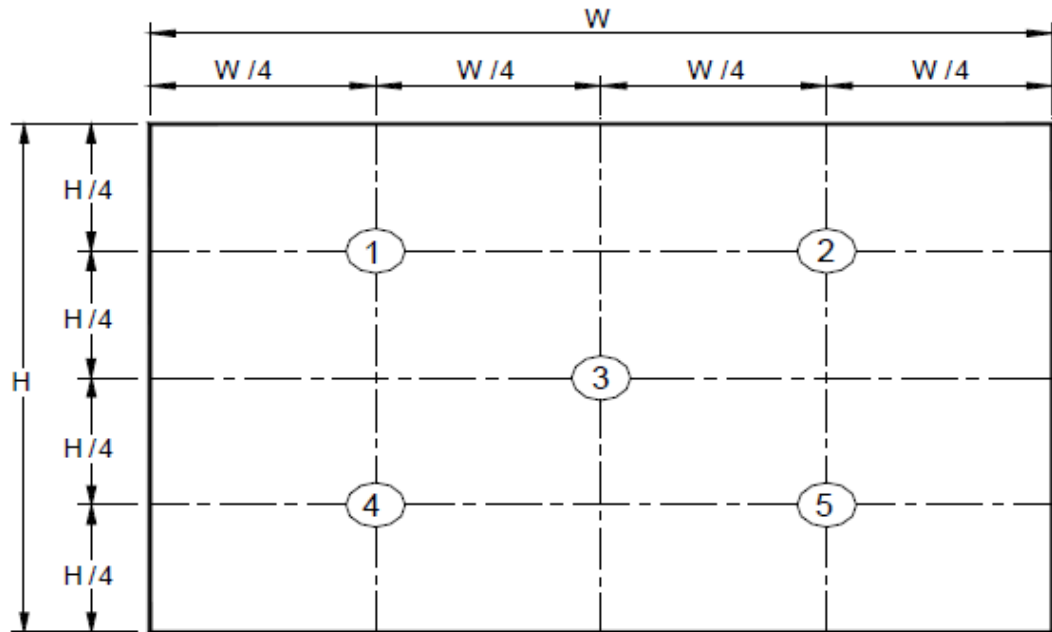
Note 2: Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥ 10 , at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ) horizontal left and right, and 90° (Φ) vertical high (up) and low (down).

The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.



Note 3: Luminance uniformity of these 9 points is definition as below and measured by Chroma 7123.



$$\text{Uniformity} = \frac{\text{Minimum Luminance in 5 points}}{\text{Maximum Luminance in 5 points}}$$

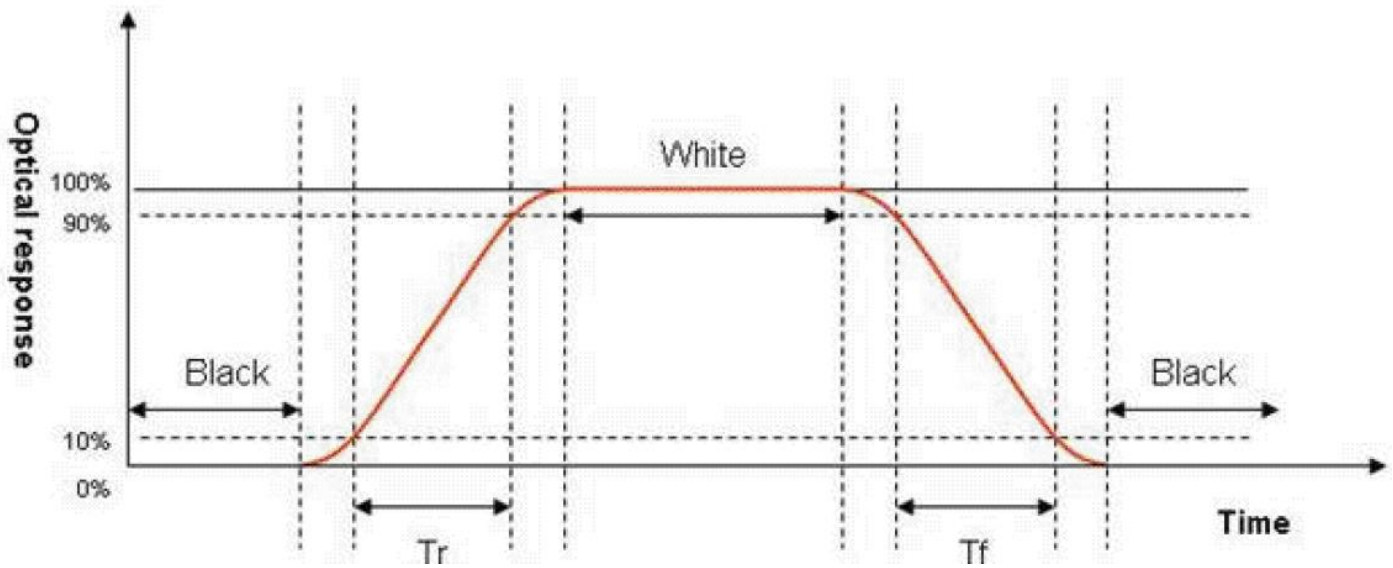
Note 4 : Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

Note 5: Definition of response time:

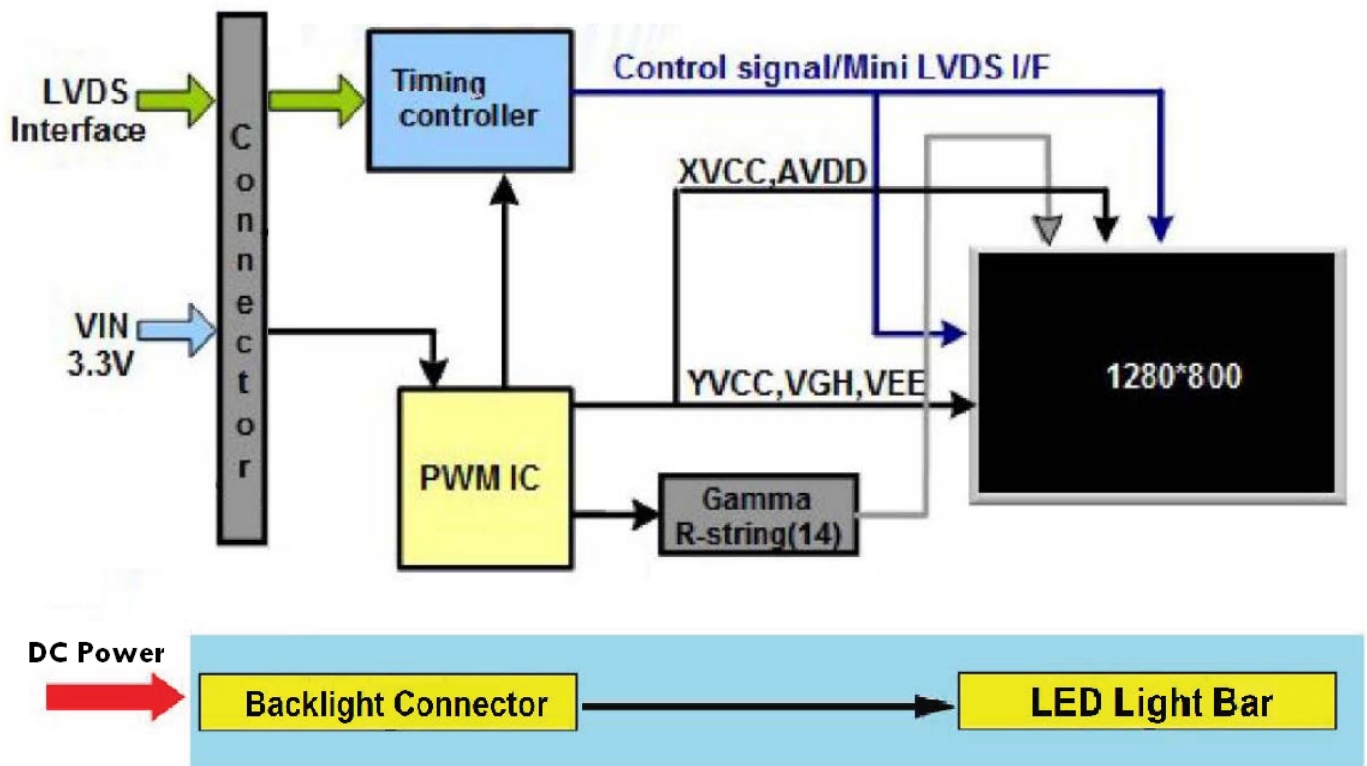
The output signals of photo detector are measured when the input signals are changed from “White” to “Black” (falling time), and from “Black” to “White” (rising time), respectively.

The response time is interval between 10% and 90% of amplitudes. Please refer to the figure as below.



3 Functional Block Diagram

The following diagram shows the functional block of the ALC-121025-02-1 color TFT LCD module:



4 Absolute Maximum Ratings

4.1 Absolute Ratings of TFT LCD

| Item | Symbol | Min | Max | Unit | Conditions |
|--------------------------|--------|------|------|------|------------|
| Logic/LCD Driver Voltage | VDD | -0.3 | +3.8 | Volt | (1) (2) |

4.2 Absolute Ratings of Backlight Unit

| Item | Symbol | Min | Max | Unit | Conditions |
|---------------------------|--------|-----|-----|------|------------|
| Backlight Forward Current | IBL | - | 690 | mA | (1) (2) |

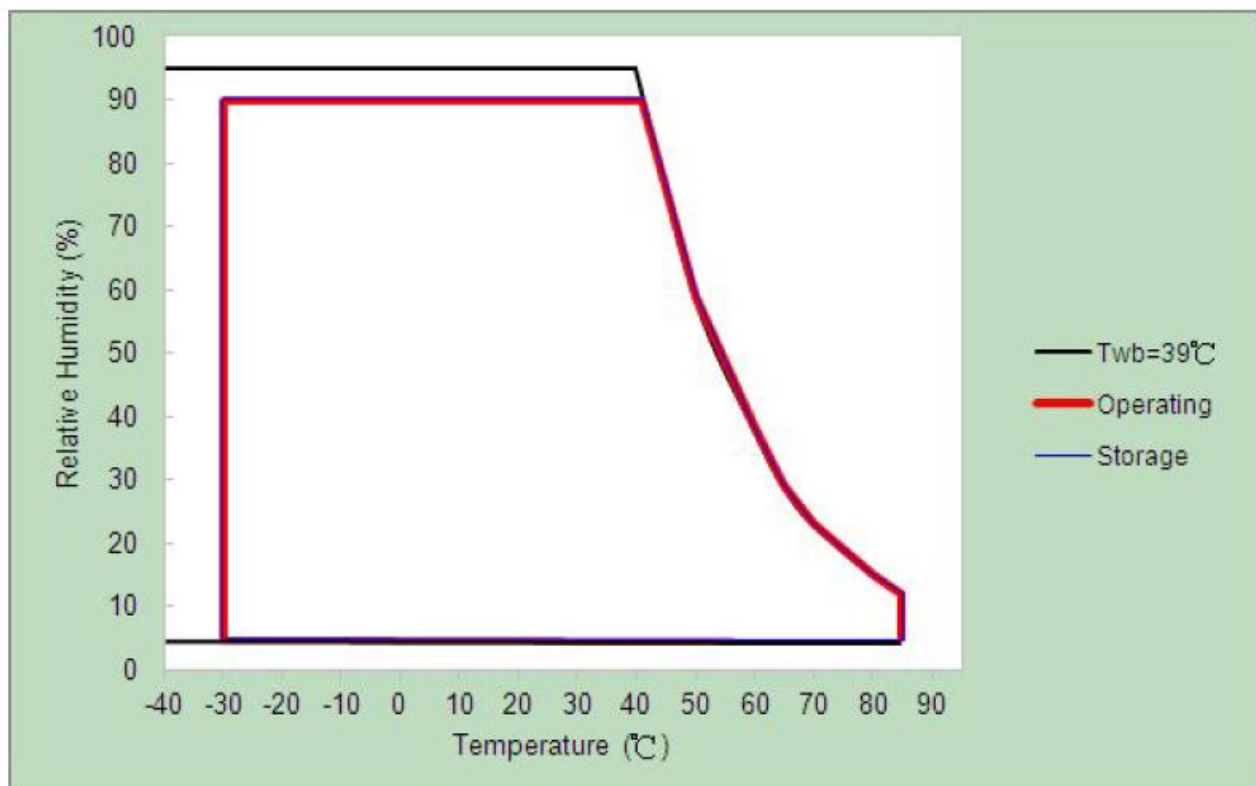
4.3 Absolute Ratings of Environment

| Item | Symbol | Min | Max | Unit | Conditions |
|-----------------------|--------|-----|-----|------|------------|
| Operating Temperature | TOP | -30 | +85 | °C | (3) |
| Operation Humidity | HOP | 5 | 90 | %RH | (3) |
| Storage Temperature | TST | -30 | +85 | °C | (3) |
| Storage Humidity | HST | 5 | 90 | %RH | (3) |

Note 1: At Ta (25°C)

Note 2: Permanent damage to the device may occur if exceed maximum values.

Note 3: Maximum Wet-Bulb should be 39°C and no condensation.



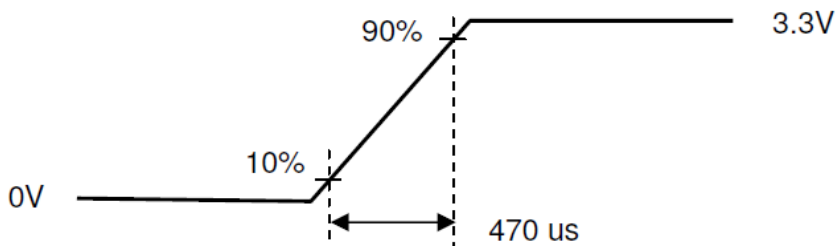
5 Electrical Characteristics

5.1 TFT LCD

5.1.1 POWER SPECIFICATION

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Remark |
|--------|---|------|------|------|------|---------------------------------------|
| VDD | Logic/LCD Drive Voltage | 3.0 | 3.3 | 3.6 | Volt | |
| IDD | Input Current | - | - | 458 | mA | VDD=3.3V, All Black Pattern At 60 Hz) |
| PDD | VDD Power | - | - | 4.65 | Watt | VDD=3.3V, All Black Pattern At 60 Hz |
| Irush | Inrush Current | - | - | 1500 | mA | (1) |
| VDDrp | Allowable Logic/LCD Driver Ripple Voltage | - | - | 100 | mV | VDD=3.3V, All Black Pattern At 60 Hz |

Note 1: Measurement condition:

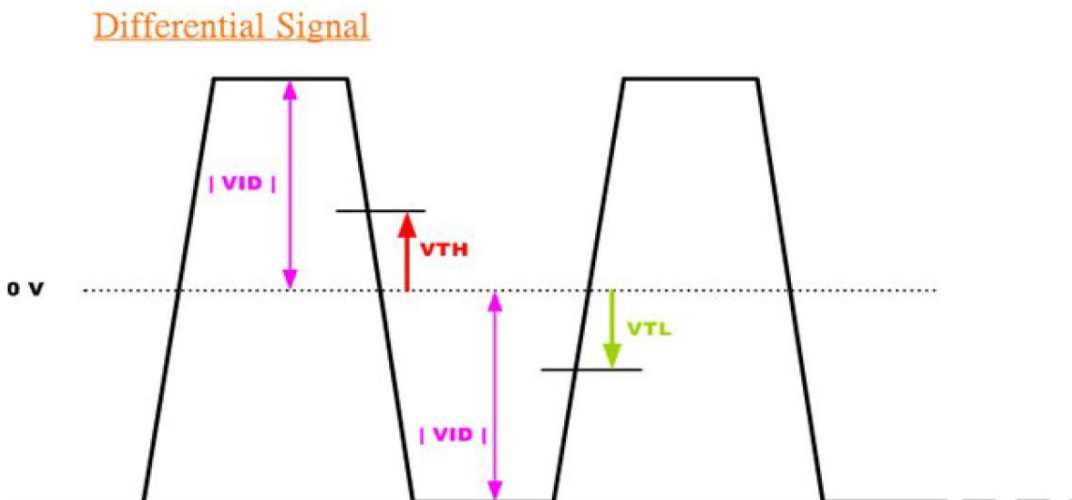
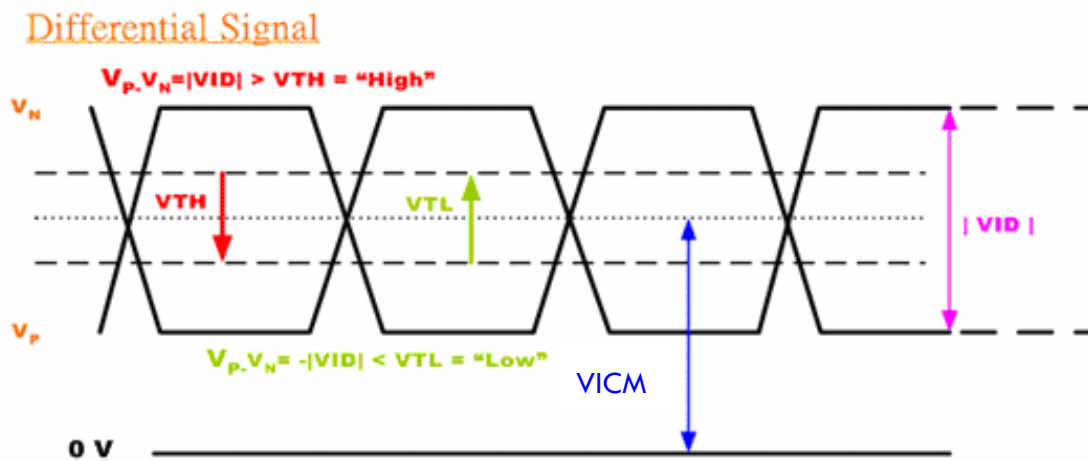


5.1.2 SIGNAL ELECTRICAL CHARACTERISTICS

Input signals shall be low or Hi-Z state when VDD is off.

| Symbol | Item | Min | Typ | Max | Unit | Remark |
|--------|--|------|-----|------|------|----------------|
| VTH | Differential Input High Threshold | - | - | 100 | mV | VICM=1.2V |
| VTL | Differential Input Low Threshold | -100 | - | - | mV | VICM=1.2V |
| VID | Input Differential Voltage | 100 | 400 | 600 | mV | |
| VICM | Differential Input Common Mode Voltage | 1.1 | - | 1.45 | V | VTH/VTL=±100mV |

Note: LVDS Signal Waveform.



5.2 Backlight Unit

5.2.1 PARAMETER GUIDELINE FOR LED

Following characteristics are measured under a stable condition using an inverter at 25°C (Room Temperature):

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Condition |
|--------|-----------------------------|------|--------|------|------|-----------|
| IBL | Backlight Forward Current | - | 670 | 690 | mA | |
| VBL | Backlight Forward Voltage | - | 17.4 | - | Volt | |
| PBL | Backlight Power Consumption | - | 11.6 | - | Watt | |
| LBL | Backlight Life Time | - | 70,000 | - | Hrs | (1) (2) |

Note 1: If the TFT LCD module is driven by higher current, or operate at high ambient temperature or humidity conditions, the backlight life time will be reduced.

Note 2: The backlight life time means the duration to reach 50% of the initial brightness.

6 Connector & Pin Assignment

The module's interface connectors and pin assignments are described as following.

The model name and location of the connectors are also provided in the mechanical drawing.

6.1 TFT LCD

6.1.1 LVDS CONNECTOR (CN1)

| | |
|------------------------|-------------------------------|
| Manufacturer | Starconn or compatible |
| Connector Model Number | 093G30-B0001A-1 or compatible |

6.1.2 LVDS CONNECTOR PIN ASSIGNMENT

| Pin # | Symbol | Description |
|-------|-----------|--------------------------------|
| 1 | NC | No Connector |
| 2 | NC | No Connector |
| 3 | NC | No Connector |
| 4 | NC | No Connector |
| 5 | NC | No Connector |
| 6 | NC | No Connector |
| 7 | GND | Ground |
| 8 | GND | Ground |
| 9 | VDD | Power supply:+3.3V |
| 10 | VDD | Power supply:+3.3V |
| 11 | GND | Ground |
| 12 | GND | Ground |
| 13 | RXin0N | -LVDS differential data (0N) |
| 14 | RXin0P | +LVDS differential data (0P) |
| 15 | GND | Ground |
| 16 | RXin1N | -LVDS differential data (1N) |
| 17 | RXin1P | +LVDS differential data (1P) |
| 18 | GND | Ground |
| 19 | RXin2N | -LVDS differential data (2N) |
| 20 | RXin2P | +LVDS differential data (2P) |
| 21 | GND | Ground |
| 22 | LVDS_RX_N | -LVDS differential clock input |
| 23 | LVDS_RX_P | +LVDS differential clock input |
| 24 | GND | Ground |
| 25 | RXin3N | -LVDS differential data (3N) |

| | | |
|----|---------|---|
| 26 | RXin3P | +LVDS differential data (3P) |
| 27 | GND | Ground |
| 28 | SEL 6/8 | Low or NC-->6 bit input mode High-->8 bit input mode |
| 29 | GND | Ground |
| 30 | GND | Ground |

6.2 Backlight Unit

6.2.1 BACKLIGHT CONNECTOR (CN2)

| | |
|------------------------|-----------------------------|
| Manufacturer | JST |
| Connector Model Number | PHR-2 or compatible |
| Mating Model Number | S2B-PH-SM4-TB or compatible |

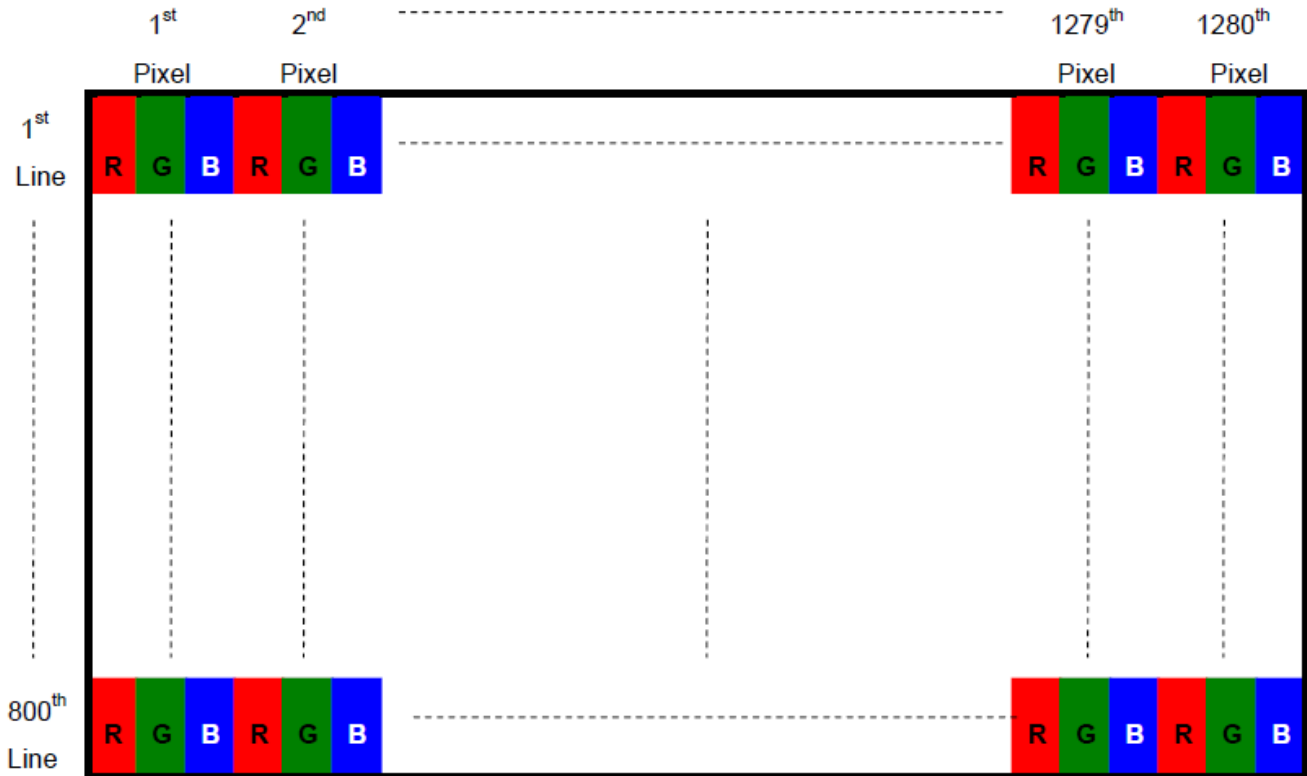
6.2.2 BACKLIGHT CONNECTOR PIN ASSIGNMENT

| Pin # | Symbol | Description | Cable Color |
|-------|--------|-------------|-------------|
| 1 | Power | Input Power | Red |
| 2 | GND | GND | White |

7 Signal Characteristic

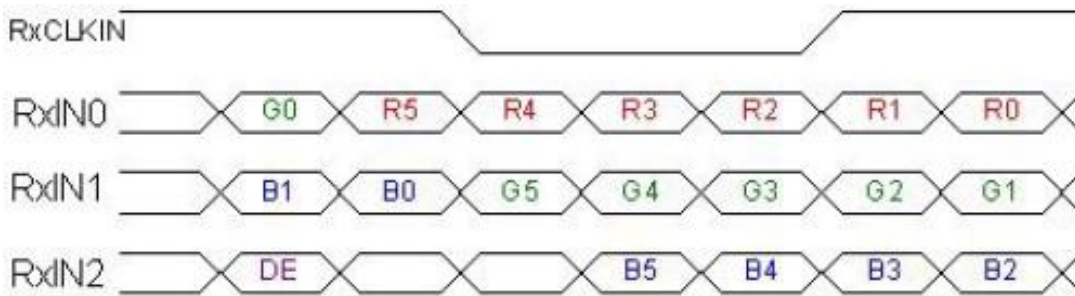
7.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.

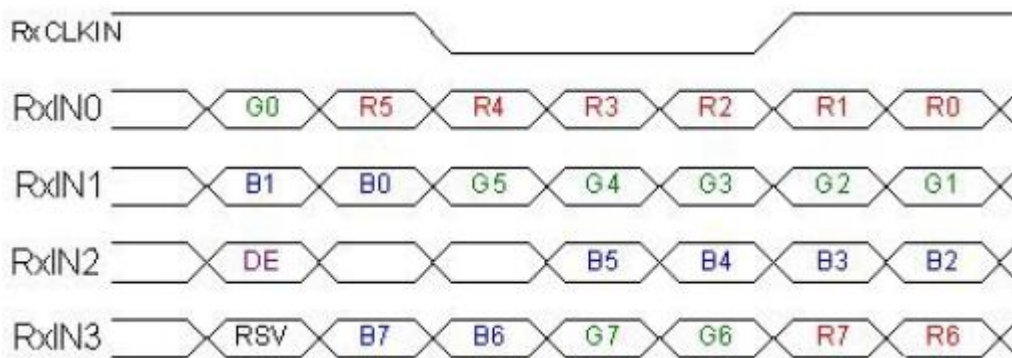


7.2 The Input Data Format

SEL68="Low" or "NC" for 6 bits LVDS Input



SEL68="High" for 8 bits LVDS Input



Note 1: Please follow PSWG.

Note 2: R/G/B data 7:MSB, R/G/B data 0:LSB

Note 3: RSV stands for "Reserved".

7.3 Interface Timing

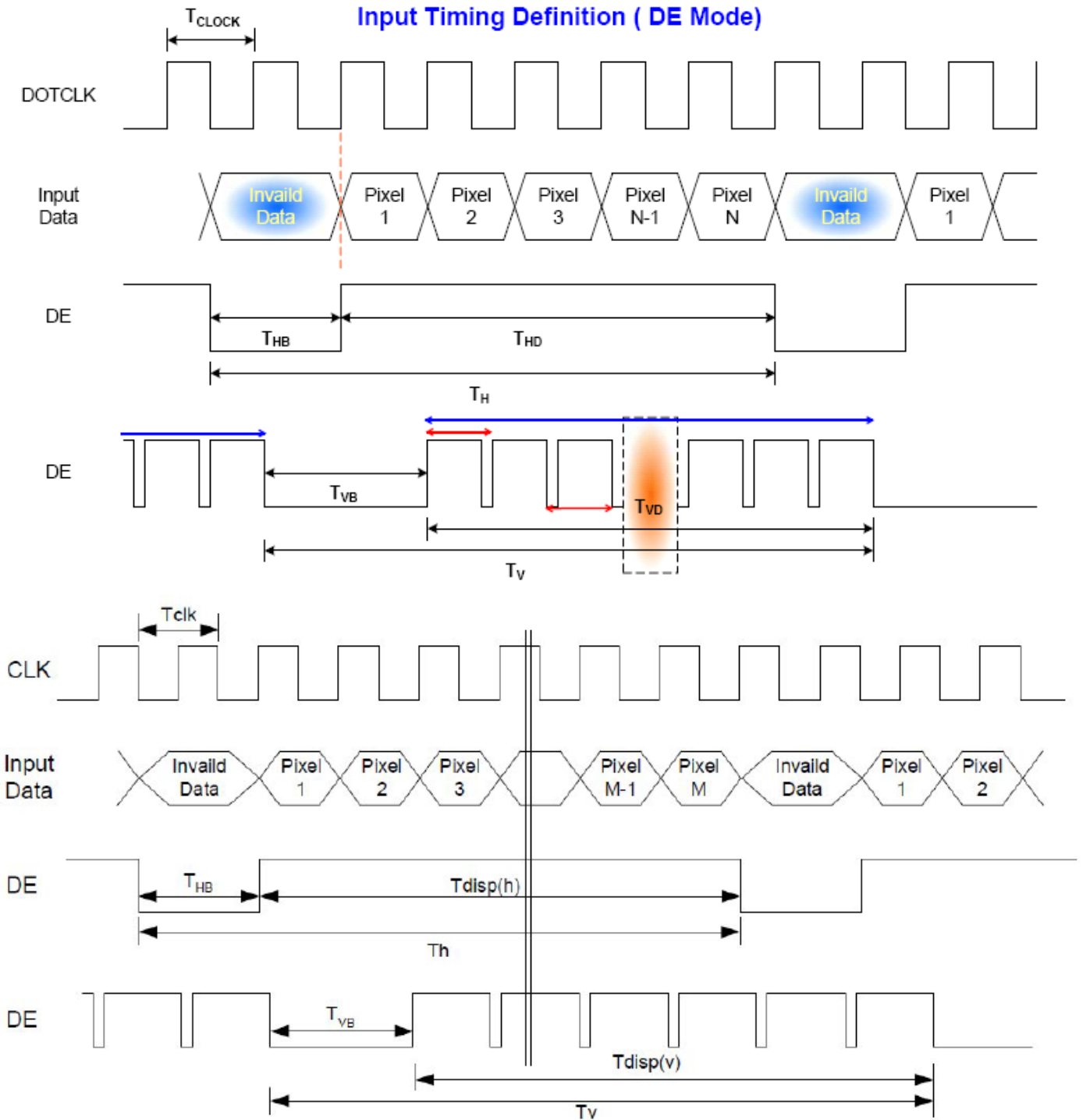
7.3.1 TIMING CHARACTERISTICS

DE mode only

| Parameter | | Symbol | Min. | Typ. | Max. | Unit |
|--------------------|----------|-----------|------|------|------|--------|
| Frame Rate | | - | 50 | 60 | 75 | Hz |
| Clock frequency | | 1/ TClock | 60 | 74.4 | 90 | MHz |
| Vertical Section | Period | TV | 808 | 838 | 900 | TH |
| | Active | TVD | 800 | | | |
| | Blanking | TVB | 8 | 38 | 100 | |
| Horizontal Section | Period | TH | 1350 | 1480 | 1680 | TClock |
| | Active | THD | 1280 | | | |
| | Blanking | THB | 50 | 60 | 75 | |

7.3.2 INPUT TIMING DIAGRAM

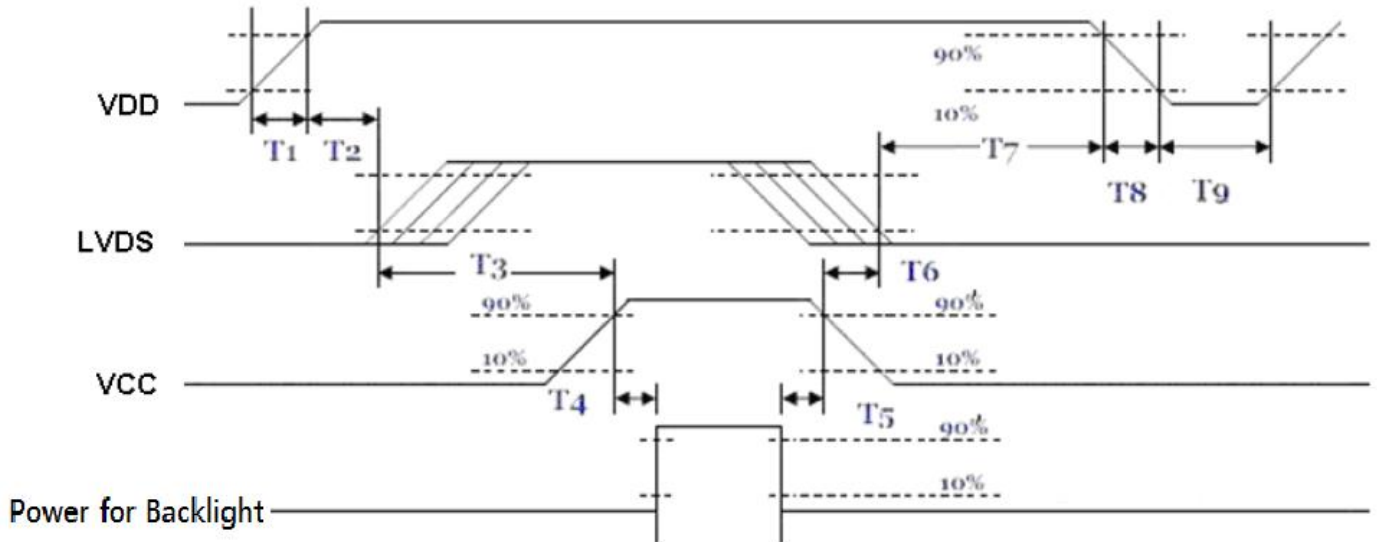
Input Timing Definition (DE Mode)



7.4 Power ON/OFF Sequence

VDD power and backlight on/off sequence is as below. Interface signals are also shown in the chart.

Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

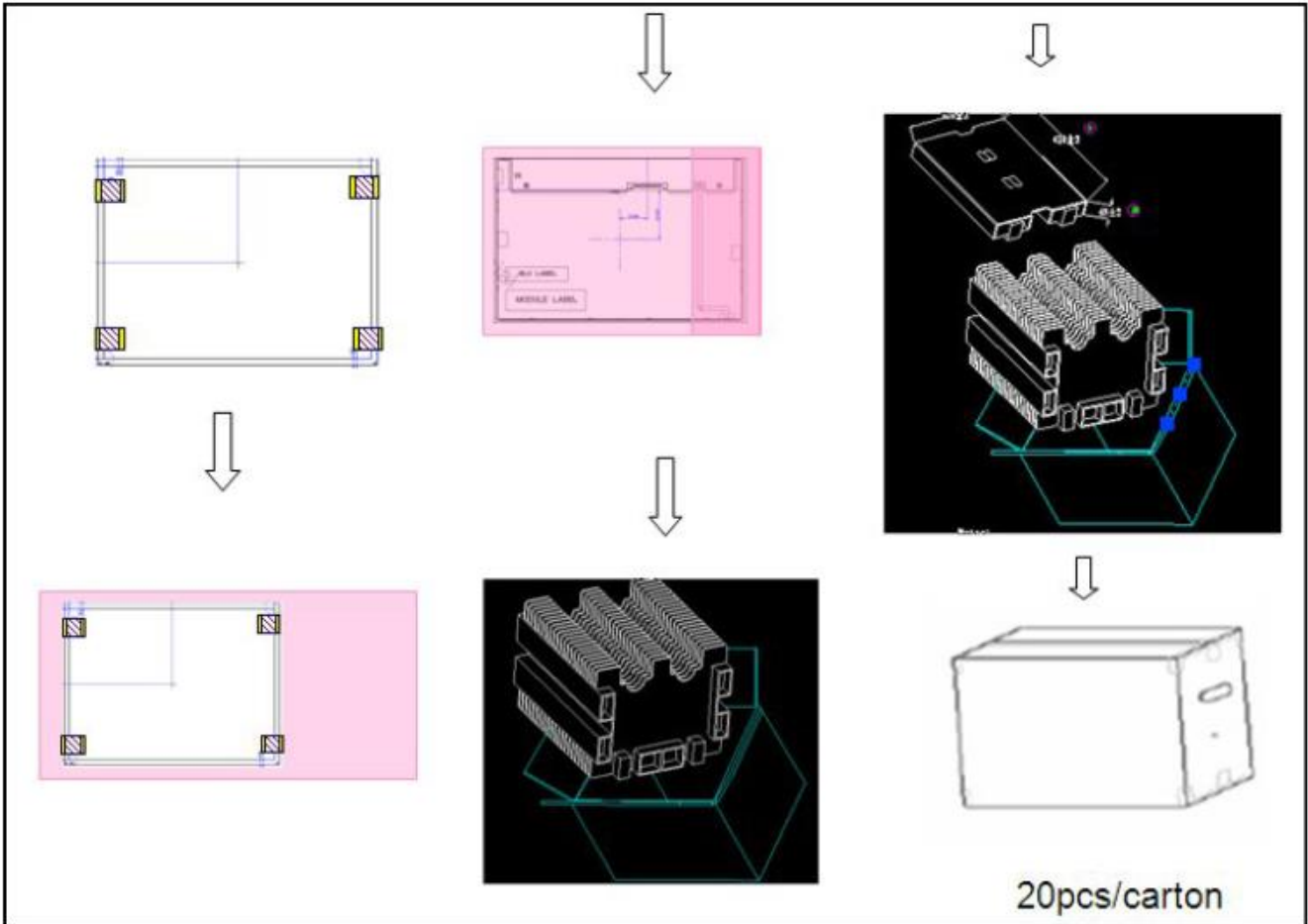
| Parameter | Value | | | Units |
|-----------|-------|------|------|-------|
| | Min. | Typ. | Max. | |
| T1 | 0.5 | - | 10 | ms |
| T2 | 30 | 40 | 50 | |
| T3 | 175 | - | - | |
| T4 | 10 | - | - | |
| T5 | 10 | - | - | |
| T6 | 100 | - | - | |
| T7 | 0 | 16 | 50 | |
| T8 | - | - | 10 | |
| T9 | 1000 | - | - | |

The above on/off sequence should be applied to avoid abnormal function in the display.

Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

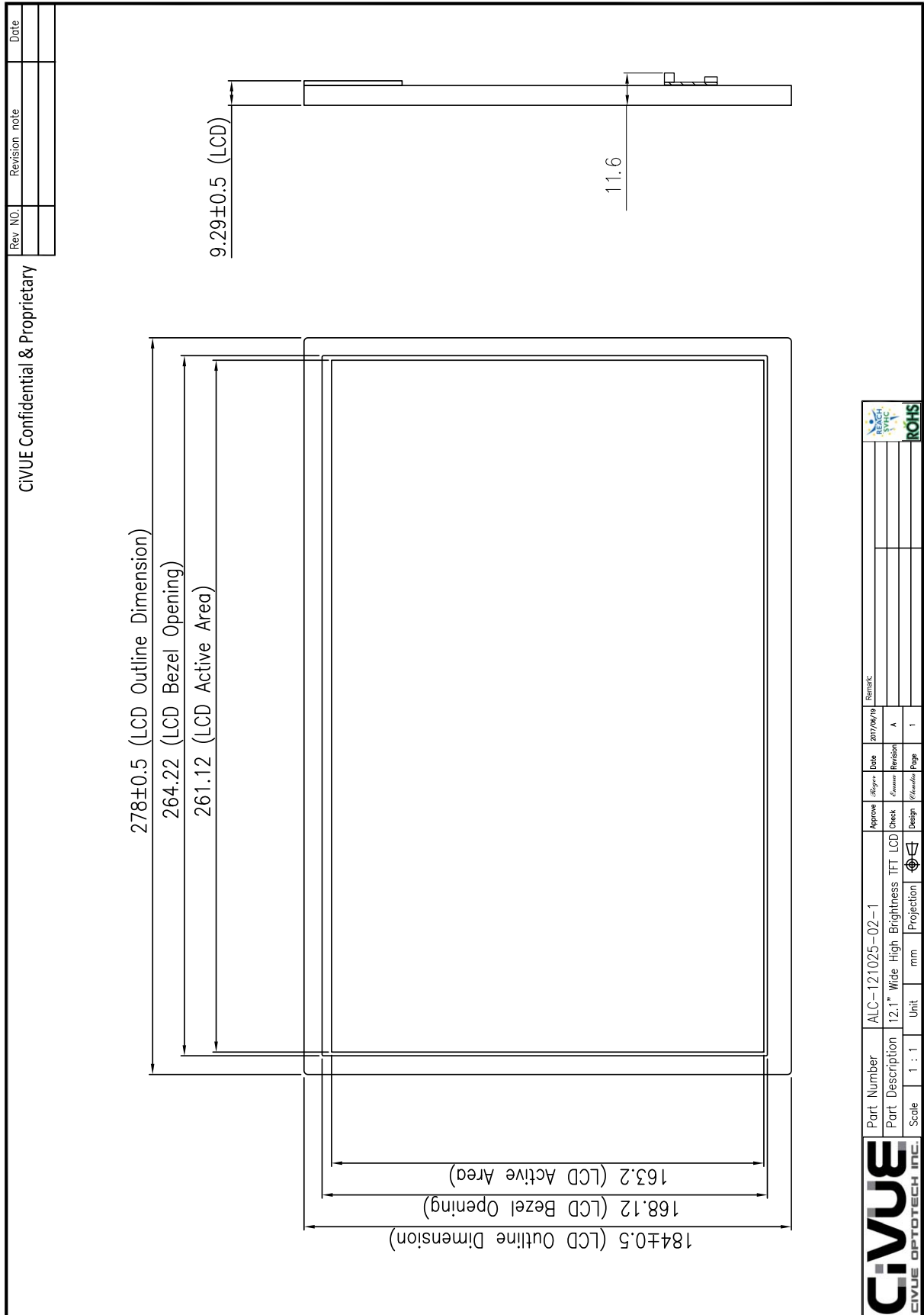
8 Packaging

1. Capacity: 20pcs LCD Modules / per carton
2. Weight: 15.5 kg / per carton
3. The outside dimension of carton is 450 mm x 375 mm x 320 mm



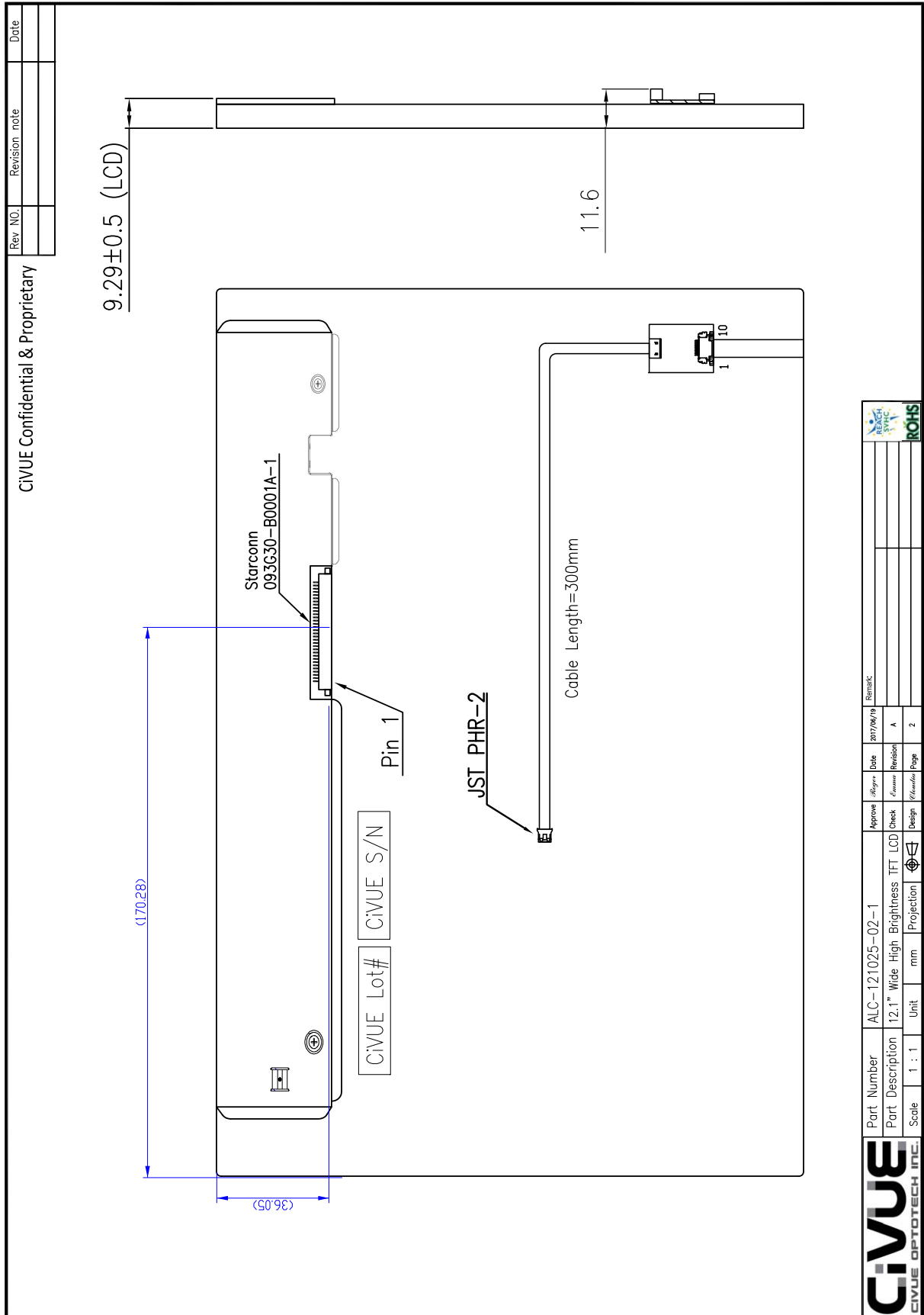
9 Mechanical Characteristics

9.1 Front View



FQ-PD-006-D

9.2 Rear View



FQ-PD-006-D

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