# Product Specification
## AU OPTRONICS CORPORATION

**B156HW03 V0** Document Version : 1.0

( ) **Preliminary Specifications**

(✓) **Final Specifications**

| Module | 15.6" (15.55) FHD 16:9 Color TFT-LCD with *LED Backlight* design |
|---|---|
| Model Name | B156HW03 V0 (H/W:0A) |
| Note ( ) | LED Backlight with driving circuit design |

| Customer | Date |
|---|---|
| | |

| Approved by | Date |
|---|---|
| Vicki Chai | 03/29/2011 |

| Checked & Approved by | Date |
|---|---|
| | |

| Prepared by | Date |
|---|---|
| Aries Hsu | 03/29/2011 |

Note: This Specification is subject to change without notice.

**NBBU Marketing Division / AU Optronics corporation**

## 2. General Description

B156HW03 V0 is a Color Active Matrix Liquid Crystal Display composed of a TFT LCD panel, a driver circuit, and LED backlight system. The screen format is intended to support the 16:9 FHD (1920(H) x 1080(V)) screen and 262k colors (RGB 6-bits data driver) with LED backlight driving circuit. All input signals are LVDS interface compatible.

B156HW03 V0 is designed for a display unit of notebook style personal computer and industrial machine.

## 2.1 General Specification

The following items are characteristics summary on the table at 25 ℃ condition:

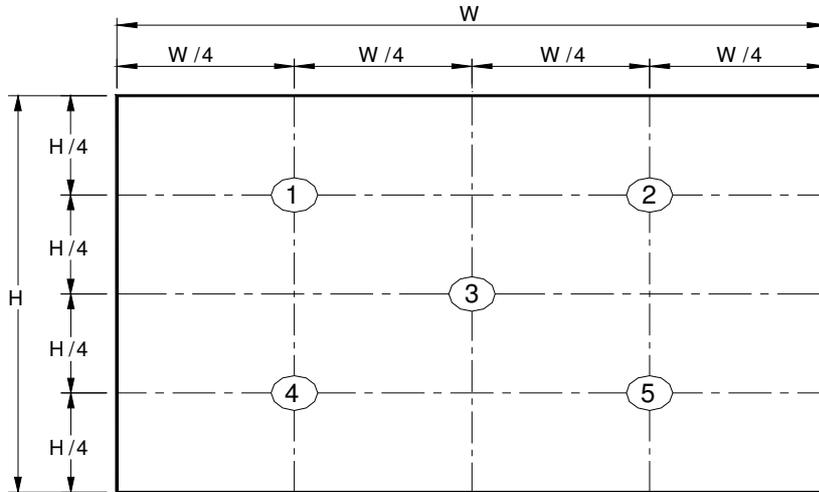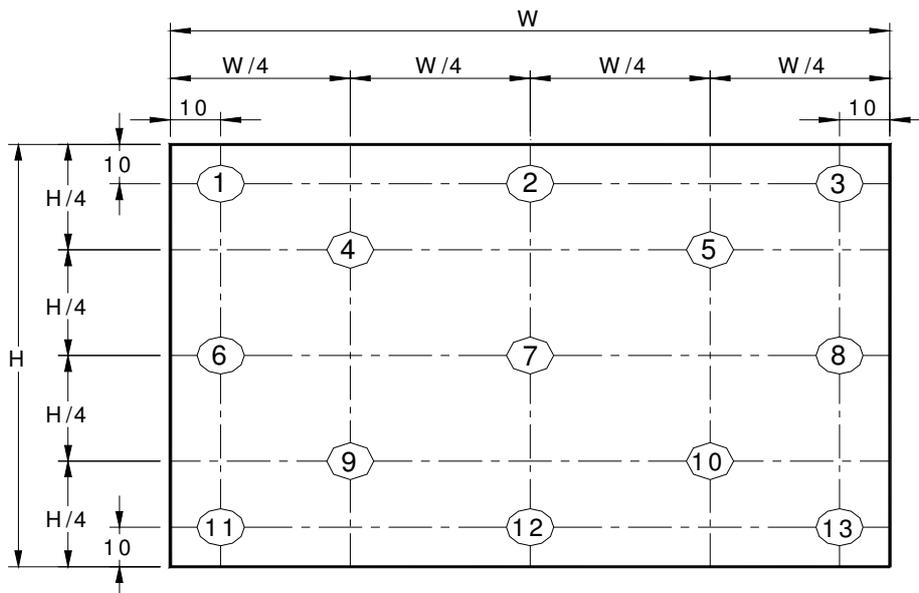| Items | Unit | Specifications | | | |
|---|---|---|---|---|---|
| Screen Diagonal | [mm] | 15.6" (15.55) | | | |
| Active Area | [mm] | 344.16 x 193.59 | | | |
| Pixels H x V | | 1920 x 3(RGB) x 1080 | | | |
| Pixel Pitch | [mm] | 0.17925 x 0.17925 | | | |
| Pixel Format | | R.G.B. Vertical Stripe | | | |
| Display Mode | | Normally White | | | |
| White Luminance (I$_{LED}$=6.5mA) (Note: I$_{LED}$ is LED current) | [cd/m$^2$] | 300 Typ. (5 points average) 255 Min. (5 points average) | | | |
| Luminance Uniformity | | 1.25 Max. (5 points) | | | |
| Contrast Ratio | | 500 :1 Typ | | | |
| Response Time | [ms] | 8 Typ / 16 Max. | | | |
| Nominal Input Voltage VDD | [Volt] | +3.3 Typ. | | | |
| Power Consumption | [Watt] | 8.0 Max. (Include Logic and BLU Power) | | | |
| Weight | [Grams] | 440 Max. | | | |
| Physical Size **Without   inverter, bracket.** | [mm] | | Min. | Typ. | Max. |
| | | Length | 359 | 359.5 | 360 |
| | | Width | 223.3 | 223.8 | 224.3 |
| | | Thickness | | | 4.1 |
| Electrical Interface | | 2 channel LVDS | | | |
| Glass Thickness | [mm] | 0.5 | | | |
| Surface Treatment | | Glare | | | |
| Support Color | | 262K colors ( RGB 6-bit ) | | | |
| Temperature Range     Operating     Storage (Non-Operating) | [ºC] [ºC] | 0 to +50 -20 to +60 | | | |
| RoHS Compliance | | RoHS Compliance | | | |

## 2.2 Optical Characteristics

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

| Item | | Symbol | Conditions | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| White Luminance ILED=20mA | | | 5 points average | 255 | 300 | - | cd/m² | 1, 4, 5 |
| Viewing Angle | | $\theta_R$ $\theta_L$ | Horizontal (Right) CR = 10 (Left) | 60 60 | 70 70 | - - | degree | 4, 9 |
| | | $\psi_H$ $\psi_L$ | Vertical (Upper) CR = 10 (Lower) | 45 50 | 60 60 | - - | | |
| Luminance Uniformity | | $\delta_{5P}$ | 5 Points | - | - | 1.25 | | 1, 3, 4 |
| Luminance Uniformity | | $\delta_{13P}$ | 13 Points | - | - | 1.50 | | 2, 3, 4 |
| Contrast Ratio | | CR | | 400 | 500 | - | | 4, 6 |
| Cross talk | | % | | | | 4 | | 4, 7 |
| Response Time | | $T_{RT}$ | Rising + Falling | - | 8 | 14 | msec | 4, 8 |
| Color / Chromaticity Coodinates | Red | Rx | CIE 1931 | 0.590 | 0.620 | 0.650 | | 4 |
| | | Ry | | 0.319 | 0.349 | 0.379 | | |
| | Green | Gx | | 0.294 | 0.324 | 0.354 | | |
| | | Gy | | 0.576 | 0.606 | 0.636 | | |
| | Blue | Bx | | 0.122 | 0.152 | 0.182 | | |
| | | By | | 0.088 | 0.118 | 0.148 | | |
| | White | Wx | | 0.283 | 0.313 | 0.343 | | |
| | | Wy | | 0.299 | 0.329 | 0.359 | | |
| NTSC | | % | | -- | 60 | | | |

**Note 1**: 5 points position (Ref: Active area)

W

W /4    W /4    W /4    W /4

H /4

H /4    ① ②

H    H /4    ③

H /4    ④ ⑤

H /4

**Note 2**: 13 points position (Ref: Active area)

W

W /4    W /4    W /4    W /4

10    10

10

H /4    ① ② ③

④ ⑤

H /4

H    ⑥ ⑦ ⑧

H /4

⑨ ⑩

H /4    ⑪ ⑫ ⑬

10

**Note 3**: The luminance uniformity of 5 or13 points is defined by dividing the maximum luminance values by the minimum test point luminance.

$$\delta_{W5} = \frac{\text{Maximum Brightness of five points}}{\text{Minimum Brightness of five points}}$$

$$\delta_{W13} = \frac{\text{Maximum Brightness of thirteen points}}{\text{Minimum Brightness of thirteen points}}$$

**Note 4**: Measurement method

The LCD module should be stabilized at 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 stable, windless and dark room, and it should be measured in the center of screen.



Center of the screen
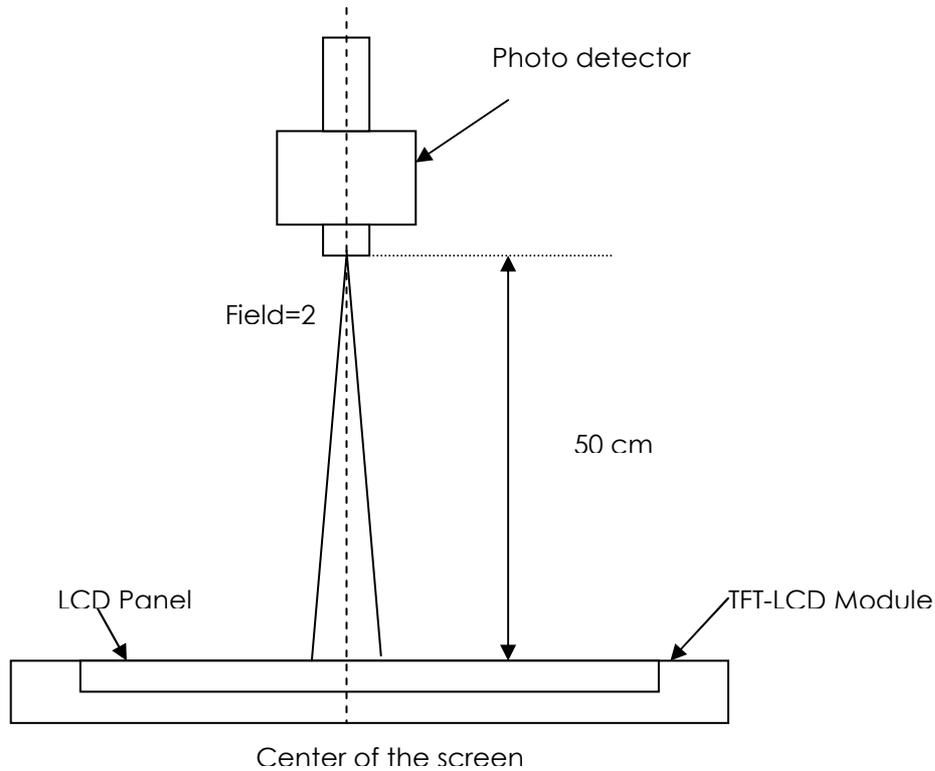
**Note 5**： Definition of Average Luminance of White ($Y_L$):

Measure the luminance of gray level 63 at 5 points，$Y_L$ = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5

L (x) is corresponding to the luminance of the point X at Figure in Note (1).

**Note 6**： Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$
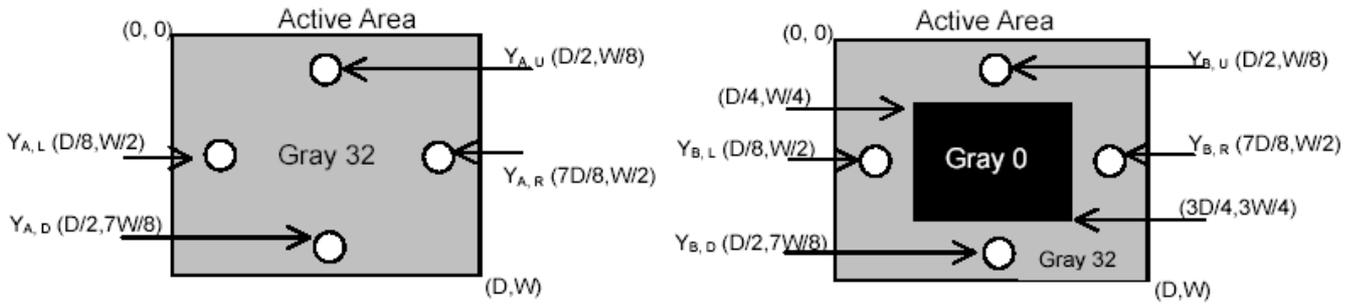
**Note 7**： Definition of Cross Talk (CT)

CT = | $Y_B - Y_A$ | / $Y_A$ × 100 (%)

Where

$Y_A$ = Luminance of measured location without gray level 0 pattern (cd/m2)

$Y_B$ = Luminance of measured location with gray level 0 pattern (cd/m2)

**Note 8**： Definition of response time:

The output signals of BM-7 or equivalent are measured when the input signals are changed from "Black" to "White" (falling time) and from "White" to "Black" (rising time), respectively. The response time interval between the 10% and 90% of amplitudes. Refer to figure as below.
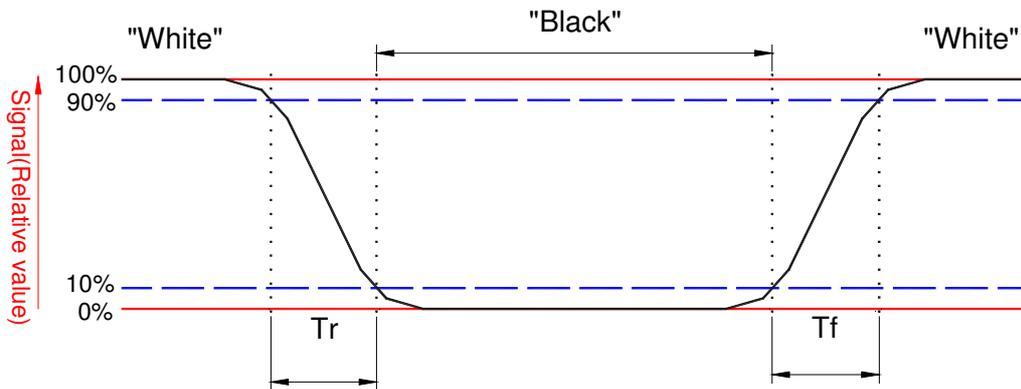
**Note 9**： Definition of view angle

Viewing angle is the measurement of contrast ratio $\geq 10$, 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 follows; 90° ($\theta$) horizontal left and right and 90° ($\Phi$) 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.
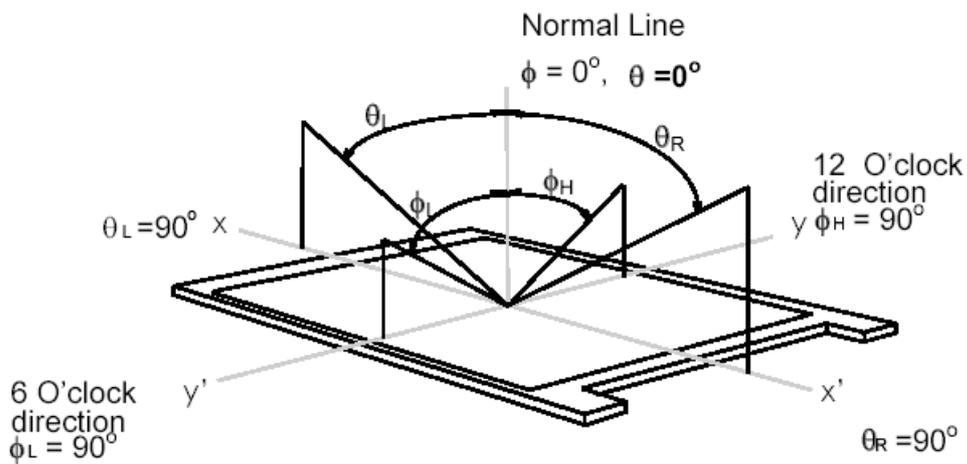
## 3. Functional Block Diagram

The following diagram shows the functional block of the 15.6 inches wide Color TFT/LCD 40 Pin.
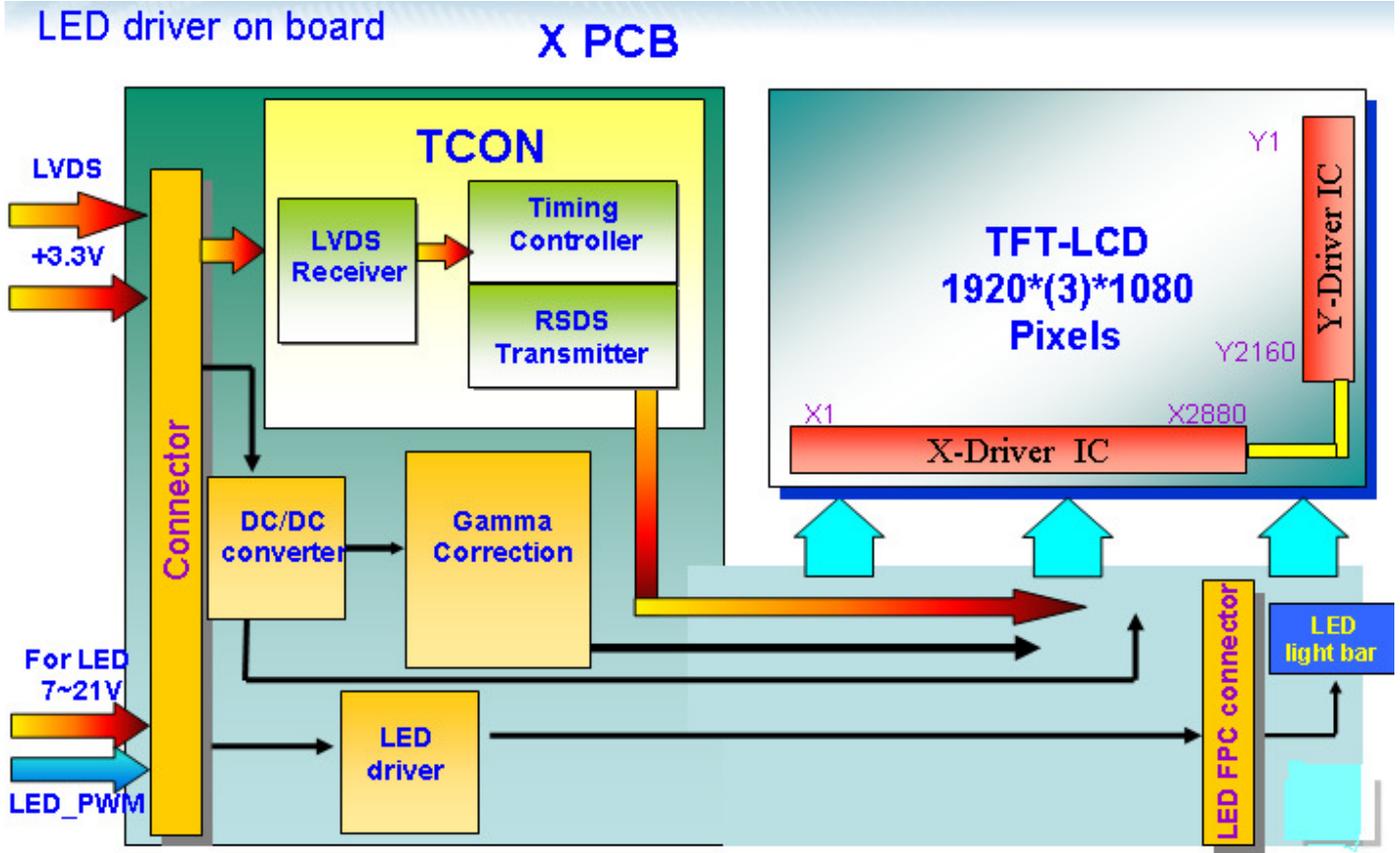
## 4. Absolute Maximum Ratings

An absolute maximum rating of the module is as following:

### 4.1 Absolute Ratings of TFT LCD Module

| Item | Symbol | Min | Max | Unit | Conditions |
|---|---|---|---|---|---|
| Logic/LCD Drive | Vin | -0.3 | +4.0 | [Volt] | Note 1,2 |

### 4.2 Absolute Ratings of Environment

| Item | Symbol | Min | Max | Unit | Conditions |
|---|---|---|---|---|---|
| Operating | TOP | 0 | +50 | [°C] | Note 4 |
| Operation Humidity | HOP | 8 | 95 | [%RH] | Note 4 |
| Storage Temperature | TST | -20 | +60 | [°C] | Note 4 |
| Storage Humidity | HST | 5 | 95 | [%RH] | Note 4 |

Note 1: At Ta (25℃ )

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

Note 3: LED specification refer to section 5.2

Note 4: For quality performance, please refer to AUO IIS (Incoming Inspection Standard).

Operating Range          Storage Range
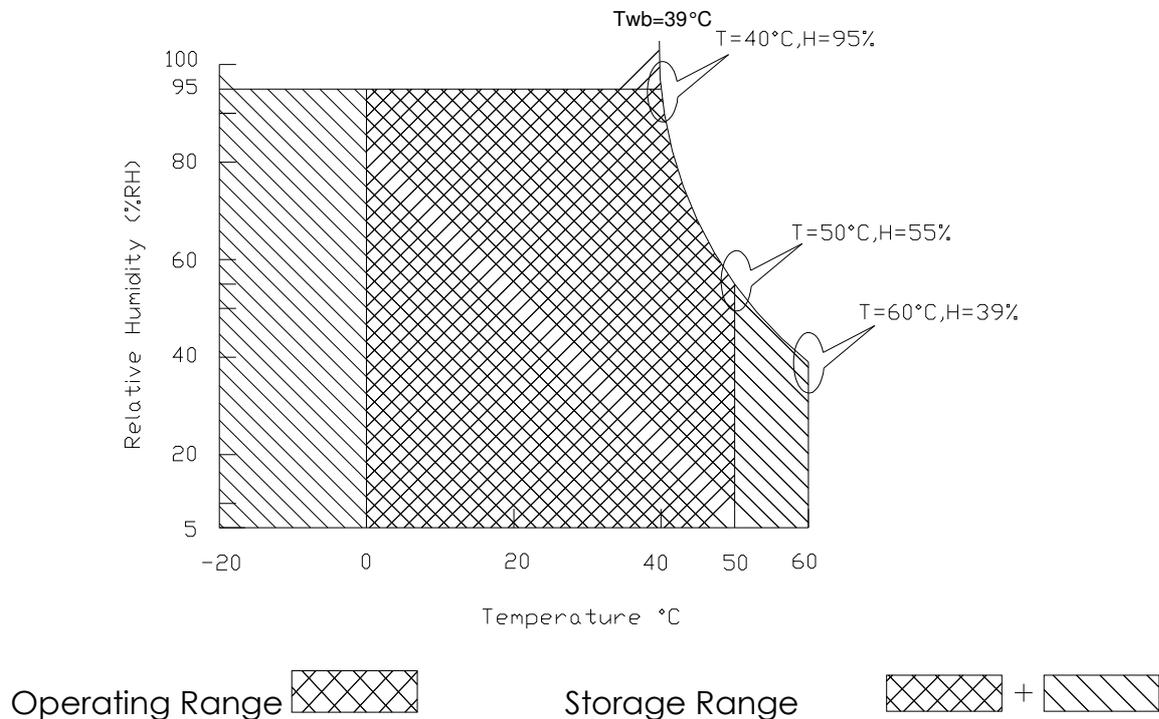
## 5. Electrical characteristics

### 5.1 TFT LCD Module

#### 5.1.1 Power Specification

Input power specifications are as follows;

The power specification are measured under 25℃ and frame frenquency under 60Hz

| Symble | Parameter | Min | Typ | Max | Units | Note |
|--------|-----------|-----|-----|-----|-------|------|
| VDD | Logic/LCD Drive Voltage | 3.0 | 3.3 | 3.6 | [Volt] | |
| PDD | VDD Power | - | - | 2.0 | [Watt] | Note 1/2 |
| IDD | IDD Current | - | - | 606 | [mA] | Note 1/2 |
| IRush | Inrush Current | - | - | 2000 | [mA] | Note 3 |
| VDDrp | Allowable Logic/LCD Drive Ripple Voltage | - | - | 100 | [mV] p-p | |

Note 1 : Maximum Measurement Condition : Black Pattern, XP Desktop Pattern

Note 2 : Typical Measurement Condition: Mosaic Pattern, XP Desktop Pattern

Note 3 : Measure Condition
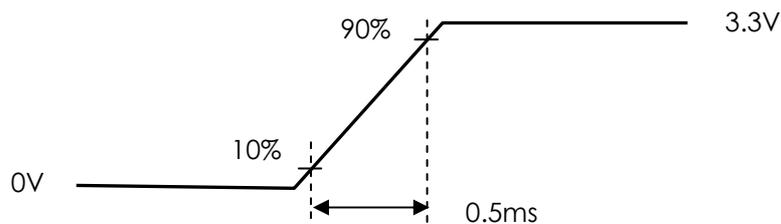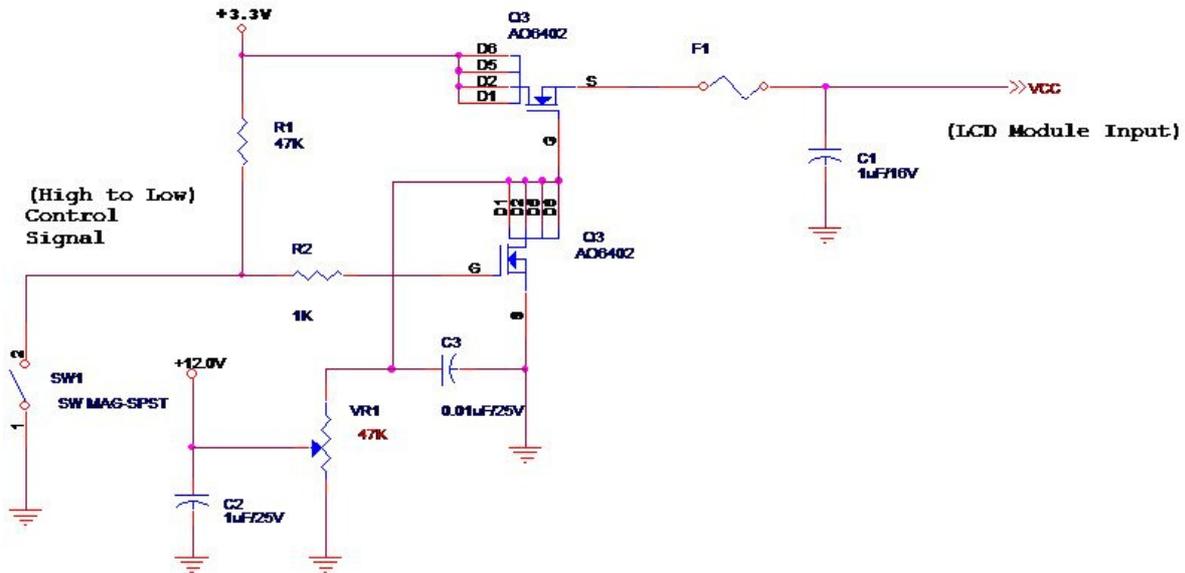




**Vin rising time**

## 5.1.2 Signal Electrical Characteristics

Input signals shall be low or High-impedance state when VDD is off.


Signal electrical characteristics are as follows;

| Parameter | Condition | Min | Max | Unit |
|-----------|-----------|-----|-----|------|
| $V_{TH}$ | Differential Input High Threshold (Vcm=+1.2V) | - | 100 | [mV] |
| $V_{TL}$ | Differential Input Low Threshold (Vcm=+1.2V) | -100 | - | [mV] |
| $|V_{ID}|$ | Differential Input Voltage | 100 | 600 | [mV] |
| $V_{CM}$ | Differential Input Common Mode Voltage | 1.125 | 1.375 | [V] |

Note: LVDS Signal Waveform
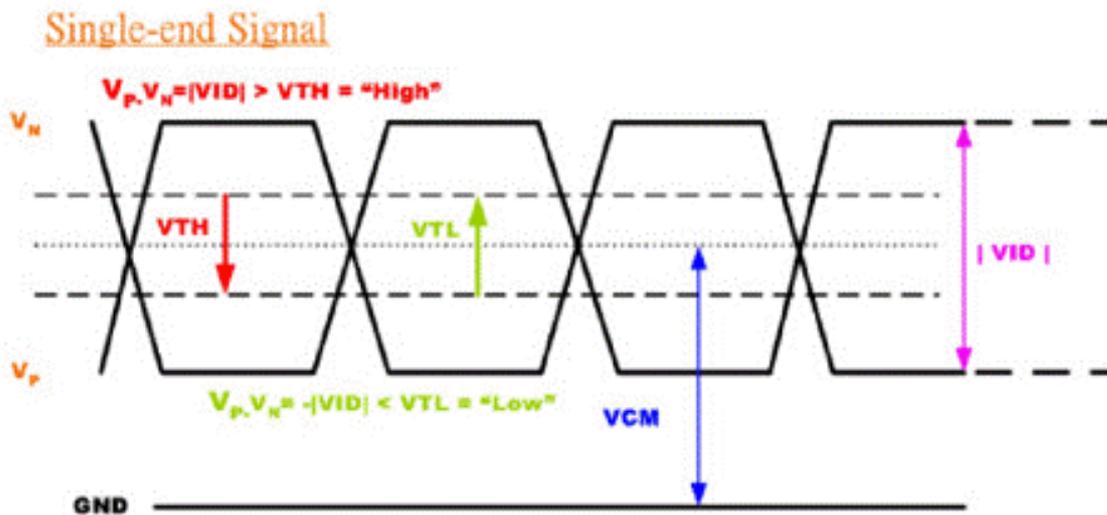
## 5.2 Backlight Unit

### 5.2.1 LED characteristics

| Parameter | Symbol | Min | Typ | Max | Units | Condition |
|---|---|---|---|---|---|---|
| Backlight Power Consumption | PLED | - | | 6.0 | [Watt] | (Ta=25℃), Note 1 Vin =12V |
| LED Life-Time | N/A | 10,000 | - | - | Hour | (Ta=25℃), Note 2 I$_F$=20 mA |

**Note 1:** Calculator value for reference P$_{LED}$ = VF (Normal Distribution) * IF (Normal Distribution) / Efficiency

**Note 2:** The LED life-time define as the estimated time to 50% degradation of initial luminous.

### 5.2.2 Backlight input signal characteristics

| Parameter | Symbol | Min | Typ | Max | Units | Remark |
|---|---|---|---|---|---|---|
| LED Power Supply | VLED | 7.0 | 12.0 | 21.0 | [Volt] | |
| LED Enable Input High Level | VLED_EN | 3.0 | - | 5.5 | [Volt] | |
| LED Enable Input Low Level | | - | - | 0.8 | [Volt] | Define as Connector Interface (Ta=25℃) |
| PWM Logic Input High Level | VPWM_EN | 3.0 | - | 5.5 | [Volt] | |
| PWM Logic Input Low Level | | - | - | 0.8 | [Volt] | |
| PWM Input Frequency | FPWM | 100 | 1K | 20k | Hz | |
| PWM Duty Ratio | Duty | 5 | -- | 100 | % | |

Note 1: Calculator Value for refence IFx VFx 36 efficency (85%) = P(typ);P(max) estimated with Lf and VF tolerance.

Note2: The LED life-time define as the estimated time to 50% degradation of iinitial luminous.

Note3: Output PWM frequency< 5k Hz

# 6. Signal Characteristic

## 6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.

## 6.2 The input data format
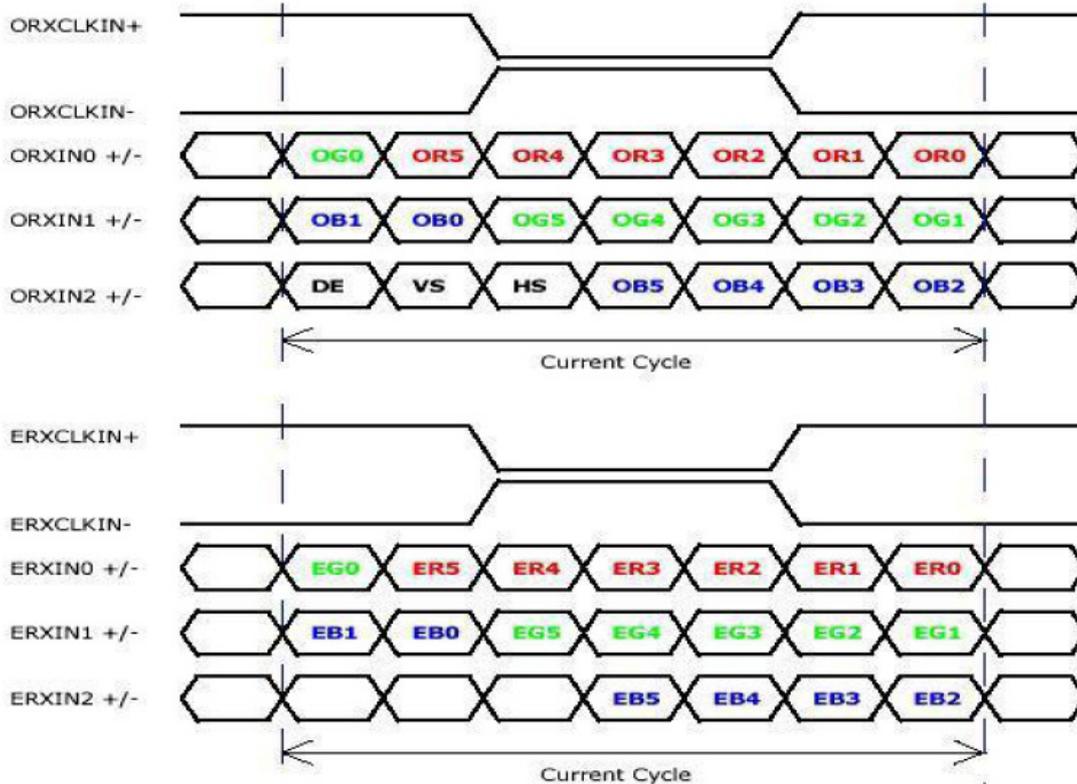


| Signal Name | Description | |
|---|---|---|
| R5<br>R4<br>R3<br>R2<br>R1<br>R0<br><br> | Red Data 5 (MSB)<br>Red Data 4<br>Red Data 3<br>Red Data 2<br>Red Data 1<br>Red Data 0 (LSB)<br><br>Red-pixel Data | Red-pixel Data<br>Each red pixel's brightness data consists of these 6 bits pixel data. |
| G5<br>G4<br>G3<br>G2<br>G1<br>G0<br><br> | Green Data 5 (MSB)<br>Green Data 4<br>Green Data 3<br>Green Data 2<br>Green Data 1<br>Green Data 0 (LSB)<br><br>Green-pixel Data | Green-pixel Data<br>Each green pixel's brightness data consists of these 6 bits pixel data. |
| B5<br>B4<br>B3<br>B2<br>B1<br>B0<br><br> | Blue Data 5 (MSB)<br>Blue Data 4<br>Blue Data 3<br>Blue Data 2<br>Blue Data 1<br>Blue Data 0 (LSB)<br><br>Blue-pixel Data | Blue-pixel Data<br>Each blue pixel's brightness data consists of these 6 bits pixel data. |
| RxCLKIN | Data Clock | The signal is used to strobe the pixel data and DE signals. All pixel data shall be valid at the falling edge when the DE signal is high |
| DE | Display Timing | This signal is strobed at the falling edge of RxCLKIN. When the signal is high, the pixel data shall be valid to be displayed. |
| VS | Vertical Sync | The signal is synchronized to RxCLKIN . |
| HS | Horizontal Sync | The signal is synchronized to RxCLKIN . |

Note: Output signals from any system shall be low or High-impedance state when VDD is off.

## 6.3 Integration Interface and Pin Assignment

### 6.3.1 Connector Description

Physical interface is described as for the connector on module.

These connectors are capable of accommodating the following signals and will be following components.

| Connector Name / Designation | For Signal Connector |
|---|---|
| Manufacturer | IPEX or compatible |
| Type / Part Number | IPEX 20455-040E-12R or compatible |
| Mating Housing/Part Number | IPEX 20353-040T-11 or compatible |

### 6.3.2 Pin Assignment

LVDS is a differential signal technology for LCD interface and high speed data transfer device.

| PIN# | Signal Name | Description |
|---|---|---|
| 1 | NC | No Connection |
| 2 | VDD | Power Supply +3.3V |
| 3 | VDD | Power Supply +3.3V |
| 4 | VEDID | EDID +3.3V Power |
| 5 | NC | No Connect (Reserve for M1 aging) |
| 6 | CLKEDID | EDID Clock Input |
| 7 | DATAEDID | EDID Data Input |
| 8 | RxOIN0- | -LVDS Differential Data INPUT(Odd R0-R5,G0) |
| 9 | RxOIN0+ | +LVDS Differential Data INPUT(Odd R0-R5,G0) |
| 10 | VSS | Ground |
| 11 | RxOIN1- | -LVDS Differential Data INPUT(Odd G1-G5,B0-B1) |
| 12 | RxOIN1+ | +LVDS Differential Data INPUT(Odd G1-G5,B0-B1) |
| 13 | VSS | Ground |
| 14 | RxOIN2- | -LVDS Differential Data INPUT(Odd B2-B5,HS,VS,DE) |
| 15 | RxOIN2+ | +LVDS Differential Data INPUT(Odd B2-B5,HS,VS,DE) |
| 16 | VSS | Ground |
| 17 | RxOCKIN- | -LVDS Odd Differential Clock INPUT |
| 18 | RxOCKIN+ | +LVDS Odd Differential Clock INPUT |
| 19 | CM_EN | CM_EN |
| 20 | RxEIN0- | -LVDS Differential Data INPUT(Even R0-R5,G0) |
| 21 | RxEIN0- | +LVDS Differential Data INPUT(Even R0-R5,G0) |
| 22 | VSS | Ground |
| 23 | RxEIN1- | -LVDS Differential Data INPUT(Even G1-G5,B0-B1) |

| 24 | RxEIN1+ | +LVDS Differential Data INPUT(Even G1-G5,B0-B1) |
|----|---------|-----------------------------------------------|
| 25 | VSS | Ground |
| 26 | RxEIN2- | -LVDS Differential Data INPUT(Even B2-B5,HS,VS,DE) |
| 27 | RxEIN2+ | +LVDS Differential Data INPUT(Even B2-B5,HS,VS,DE) |
| 28 | VSS | Ground |
| 29 | RxECKIN- | -LVDS Even Differential Clock INPUT |
| 30 | RxECKIN+ | +LVDS Even Differential Clock INPUT |
| 31 | VLED_GND | LED Ground |
| 32 | VLED_GND | LED Ground |
| 33 | VLED_GND | LED Ground |
| 34 | NC | No Connection |
| 35 | S_PWMIN | System PWM Logic Input level |
| 36 | LED_EN | LED enable input level |
| 37 | DCR_EN | DCR_EN |
| 38 | VLED | LED Power Supply |
| 39 | VLED | LED Power Supply |
| 40 | VLED | LED Power Supply |

Note1: Start from right side
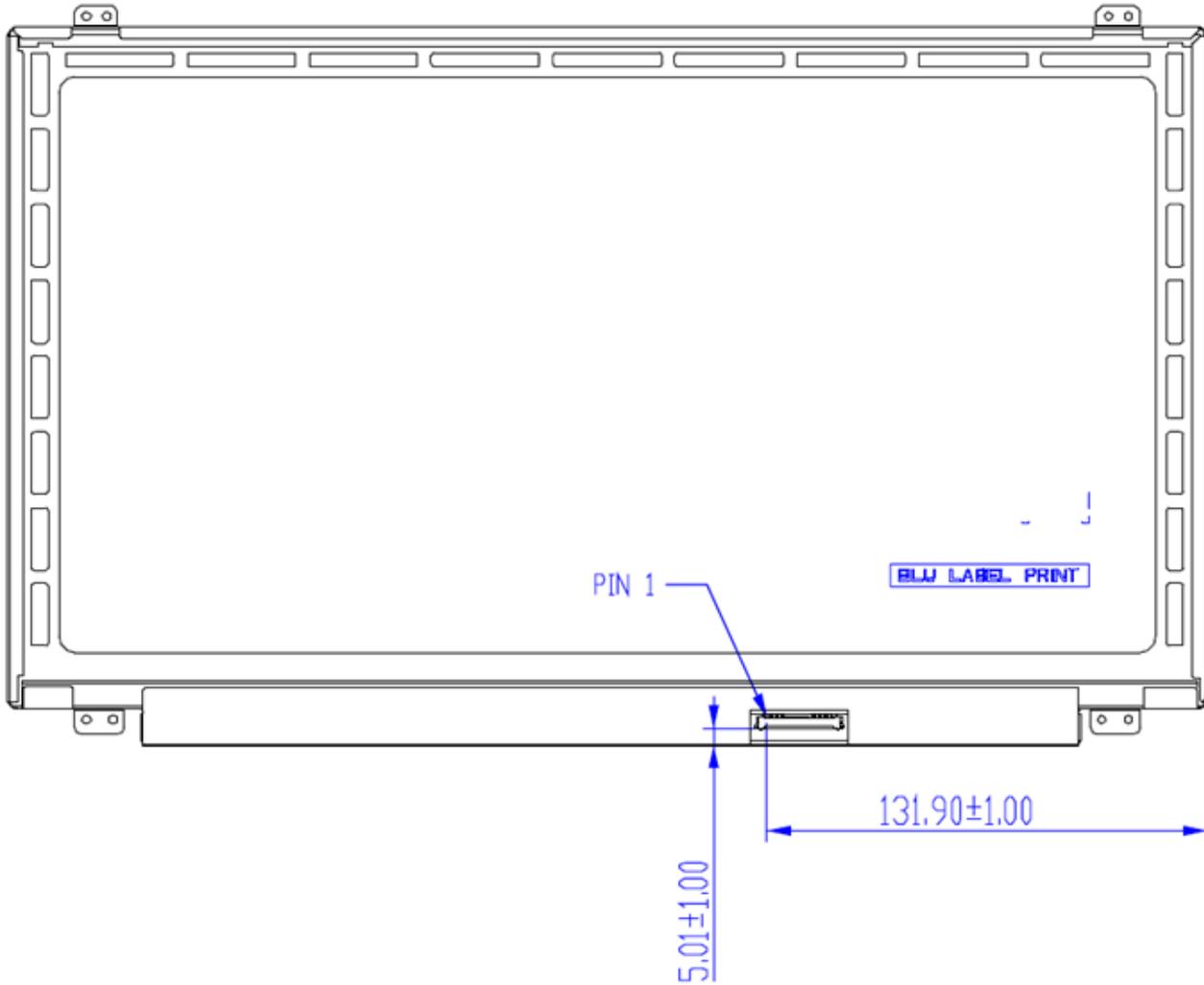
Note2: Input signals shall be low or High-impedance state when VDD is off.

internal circuit of LVDS inputs are as following.

The module uses a 100ohm resistor between positive and negative data lines of each receiver input

## 6.4 Interface Timing

### 6.4.1 Timing Characteristics

Basically, interface timings should match the 1920x1080 /60Hz   manufacturing guide line timing.

| Parameter | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Frame Rate** | | - | 40 | 60 | - | **Hz** |
| **Clock frequency** | | $1/ T_{Clock}$ | - | 70 | 85 | **MHz** |
| **Vertical Section** | **Period** | $T_V$ | 1088 | 1130 | - | $T_{Line}$ |
| | **Active** | $T_{VD}$ | | 1080 | | |
| | **Blanking** | $T_{VB}$ | 8 | 50 | - | |
| **Horizontal Section** | **Period** | $T_H$ | 990 | 1072 | - | $T_{Clock}$ |
| | **Active** | $T_{HD}$ | | 960 | | |
| | **Blanking** | $T_{HB}$ | 30 | 112 | - | |

Note : DE mode only

### 6.4.2 Timing diagram
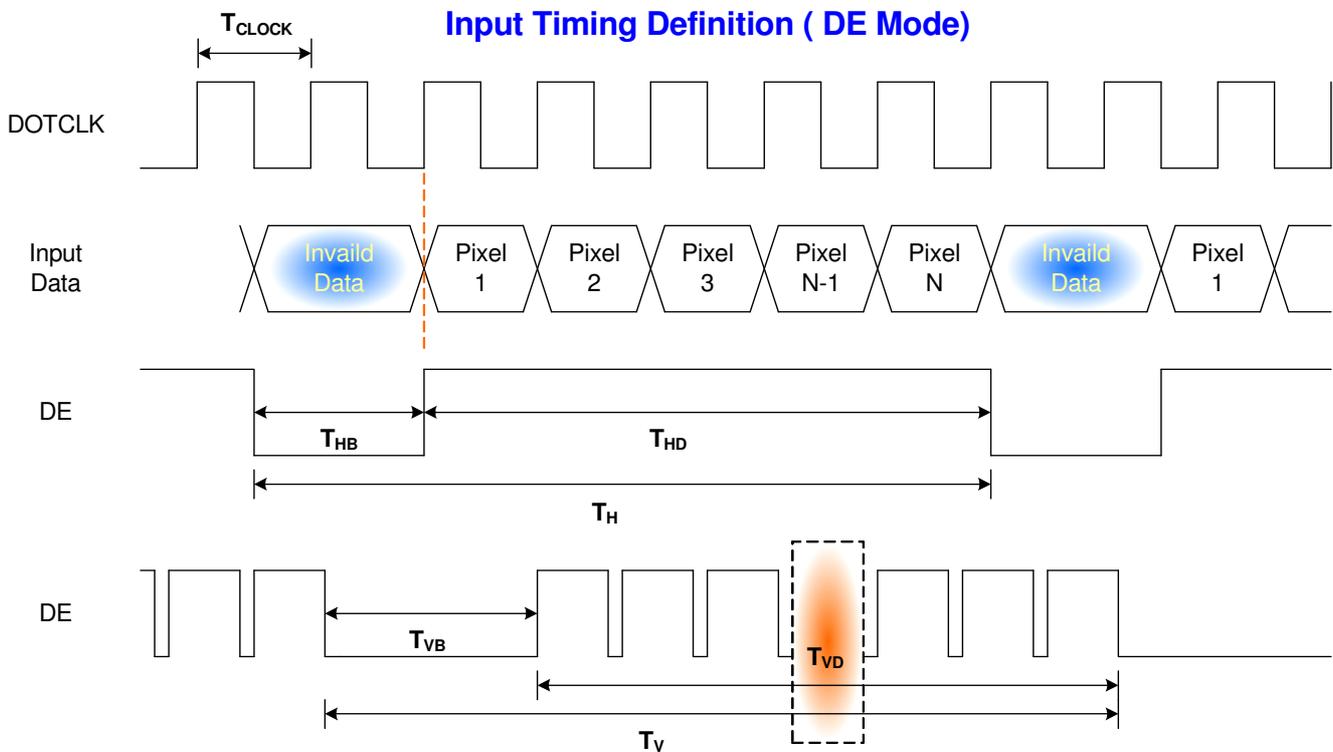
## 6.5 Power ON/OFF Sequence

LED on/off sequence is as follows. Interface signals are also shown in the chart.

**1)Power on/off sequence**



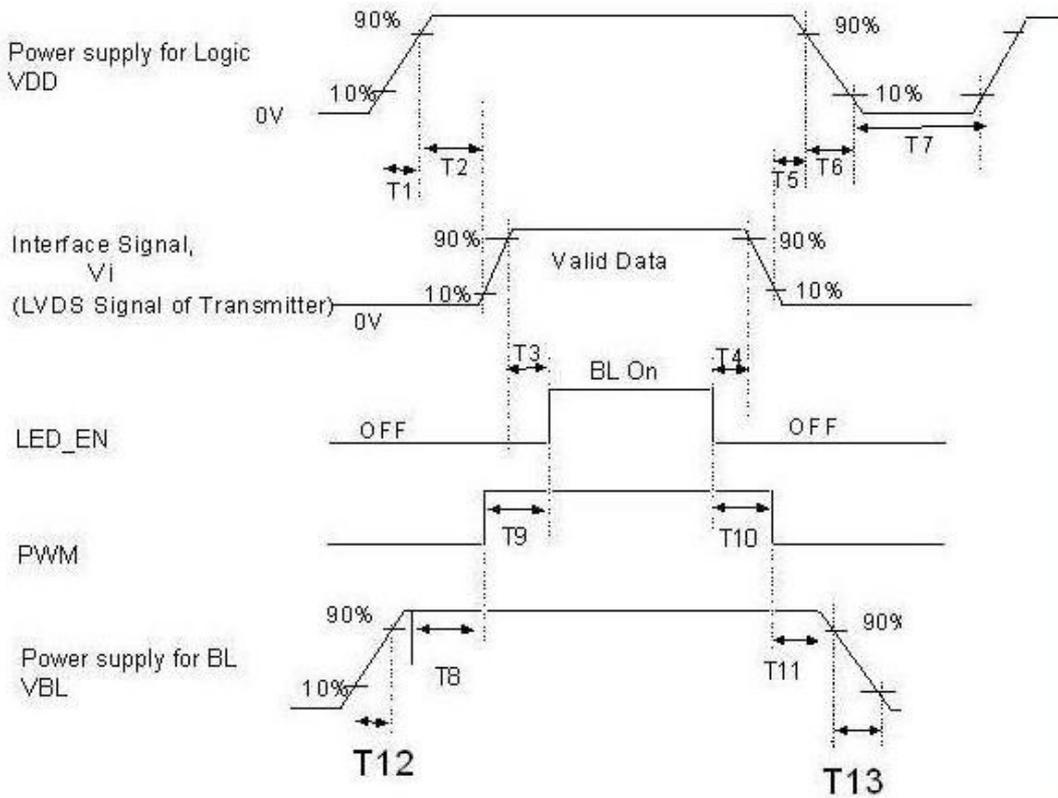|        | Min (ms) | Max (ms) |
|--------|----------|----------|
| T1     | 0.5      | 10       |
| T2     | 0        | 50       |
| T3     | 200      | -        |
| T4     | 200      | -        |
| T5     | 0        | 50       |
| T6     | 0        | 10       |
| T7     | 500      | -        |
| T8     | 10       | -        |
| T9     | 10       | 180      |
| T10    | 10       | 180      |
| T11    | 10       | -        |
| T12    | 0.5      | 10       |

Note 1 : If T4<200ms, The display garbage may occur. We suggest T4>200ms to avoid the display garbage.

Note 2 : If T1 or T12<0.5ms, the inrush current may cause the damage of fuse. If T1 or T12<0.5ms, the inrush current $I^2t$ is under typical melt of fuse Spec. , there is no mentioned problem.

# 7. Vibration and Shock Test

## 7.1 Vibration Test

**Test Spec:**

- Test method: Non-Operation
- Acceleration: 1.5 G
- Frequency: 10 - 500Hz Random
- Sweep: 30 Minutes each Axis (X, Y, Z)

## 7.2 Shock Test Spec:

**Test Spec:**

- Test method: Non-Operation
- Acceleration: 220 G , Half sine wave
- Active time: 2 ms
- Pulse: X,Y,Z .one time for each side

## 7.3. Reliability

| Items | Required Condition | Note |
|---|---|---|
| Temperature Humidity Bias | Ta= 40℃, 90%RH, 300h | |
| High Temperature Operation | Ta= 50℃, Dry, 300h | |
| Low Temperature Operation | Ta= 0℃, 300h | |
| High Temperature Storage | Ta= 60℃, 35%RH, 300h | |
| Low Temperature Storage | Ta= -20℃, 50%RH, 300h | |
| Thermal Shock Test | Ta=-20℃ to 60℃, Duration at 30 min, 100 cycles | |
| ESD | Contact : ±8 KV <br> Air : ±15 KV | Note 1 |

**Note1:** According to EN 61000-4-2 , ESD class B: Some performance degradation allowed. No data lost

. Self-recoverable. No hardware failures.

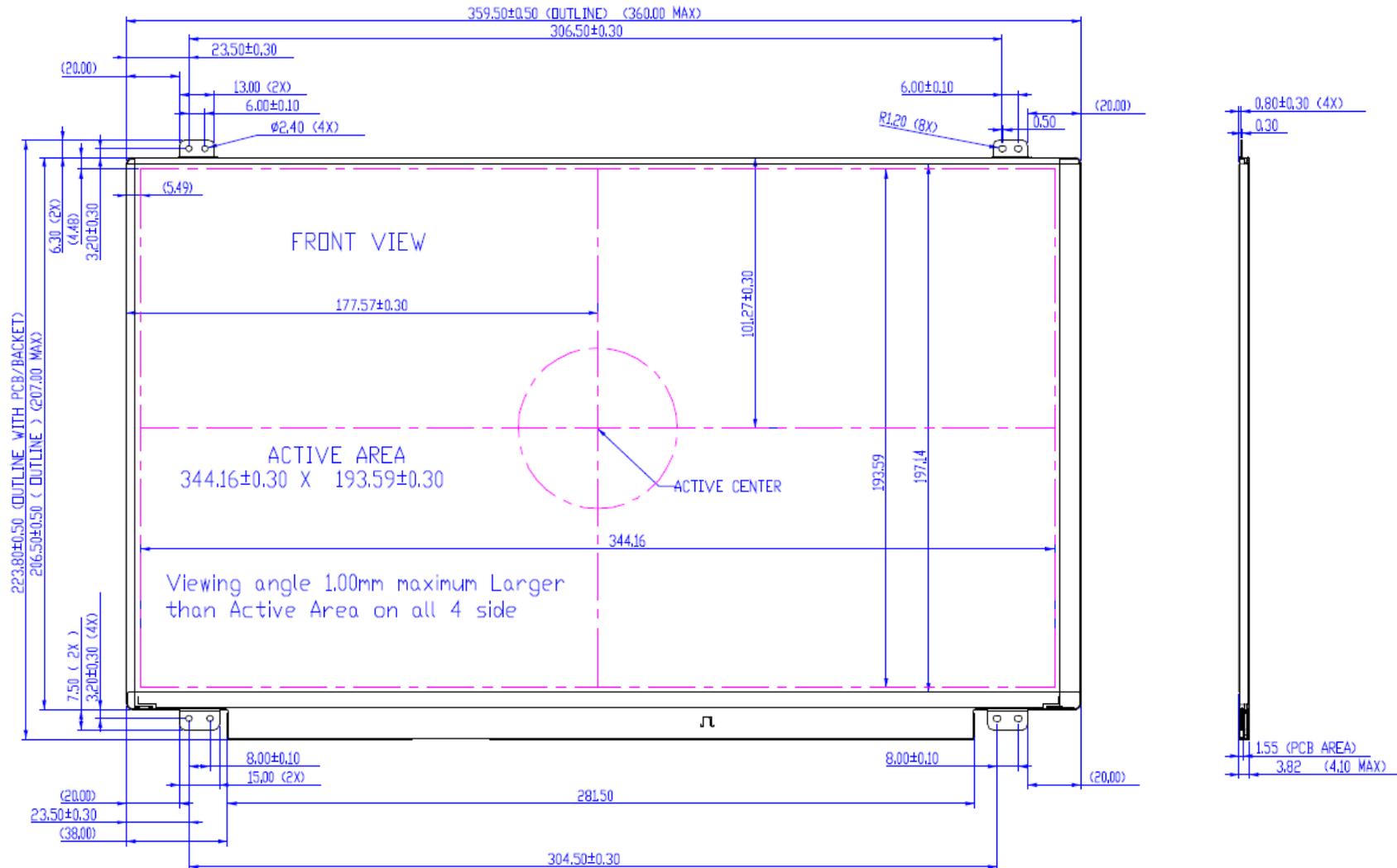**Remark:** MTBF (Excluding the LED): 30,000 hours with a confidence level 90%

## 8. Mechanical Characteristics

## 8.1 LCM Outline Dimension

## 8.1.1 Standard Front View

## 8.1.2 Standard Rear View



PIN 1

BLU LABEL PRINT

131.90±1.00

5.01±1.00
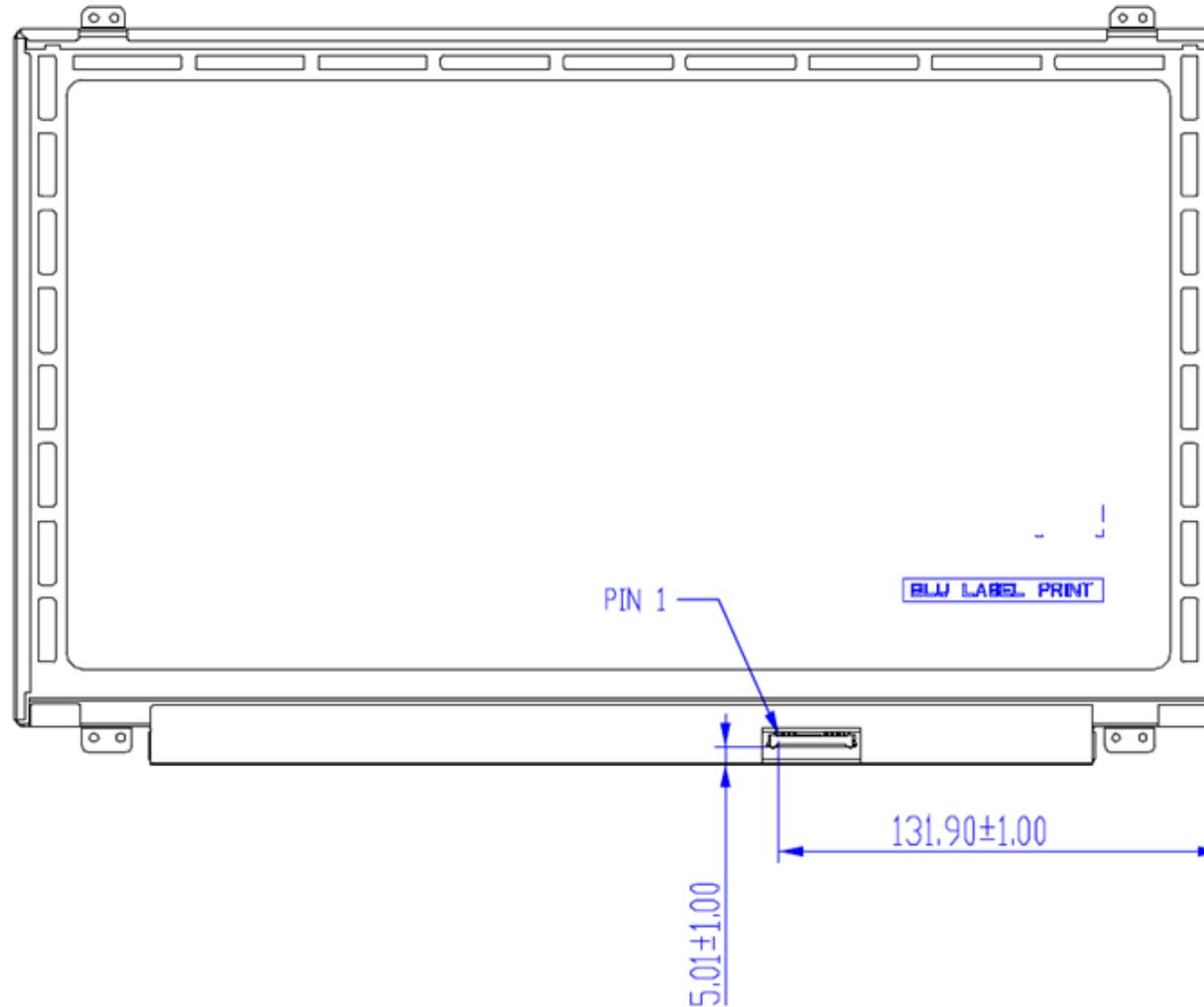
## 9. Shipping and Package

### 9.1 Shipping Label Format

XXXXXXXXXXXX- XXXXX

CN -0NCDF3-72090-
XXX-XXXX-A00
Made In China
DP/N 0NCDF3

Manufactured YY/MM
Model No: B156HW03 V0
AU Optronics
**MADE IN CHINA (S1)**

H/W: 0A  F/W:1

### 9.2 Definition of customer PPID Label and Revision Code

Please refer to the Dell Part identification Label Specification, Number:13190

| Build Name(s): | PPID Revision Code(s): |
|---|---|
| Sub System Test (SST)<br><br>Working Sample (WS)<br><br>ENG 2 | X00, X01, X02, ..., X0n |
| Product Test (PT)<br><br>Engineering Sample (ES)<br><br>ENG 3 | X10, X11, X12, ..., X1n |
| System Test (ST)<br><br>Customer Sample (CS)<br><br>ENG 4 | X20, X21, X22, ... X2n |
| X-Build (XB)<br><br>Mass Production (MP)<br><br>ENG 5 | A00, A01, A02, ... A0n |

## 9.2. Carton package
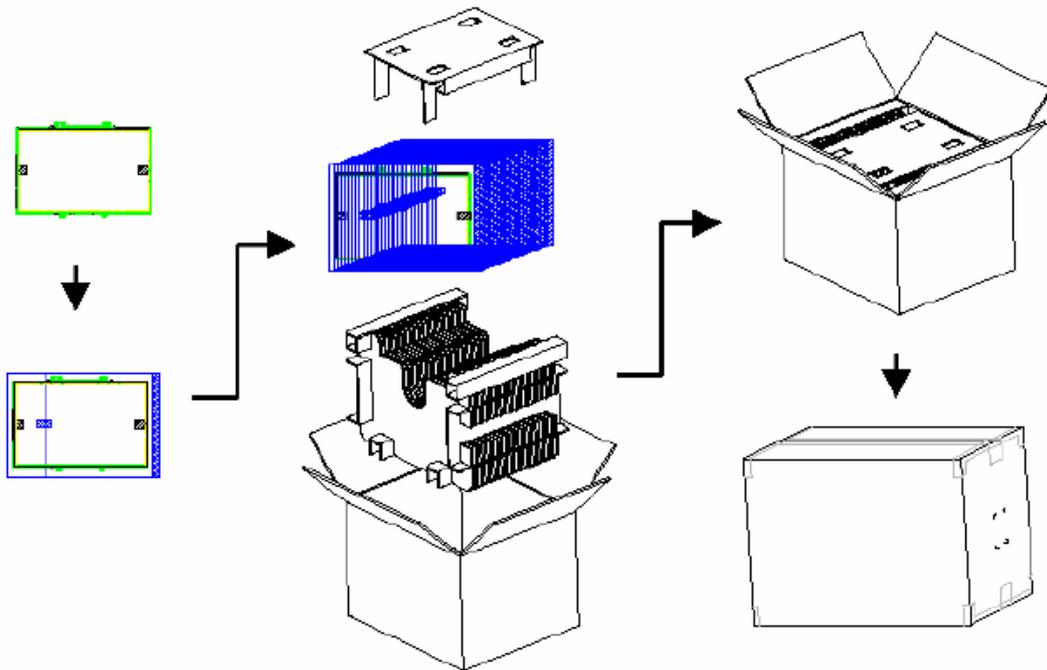


## 9.3 Shipping package of palletizing sequence
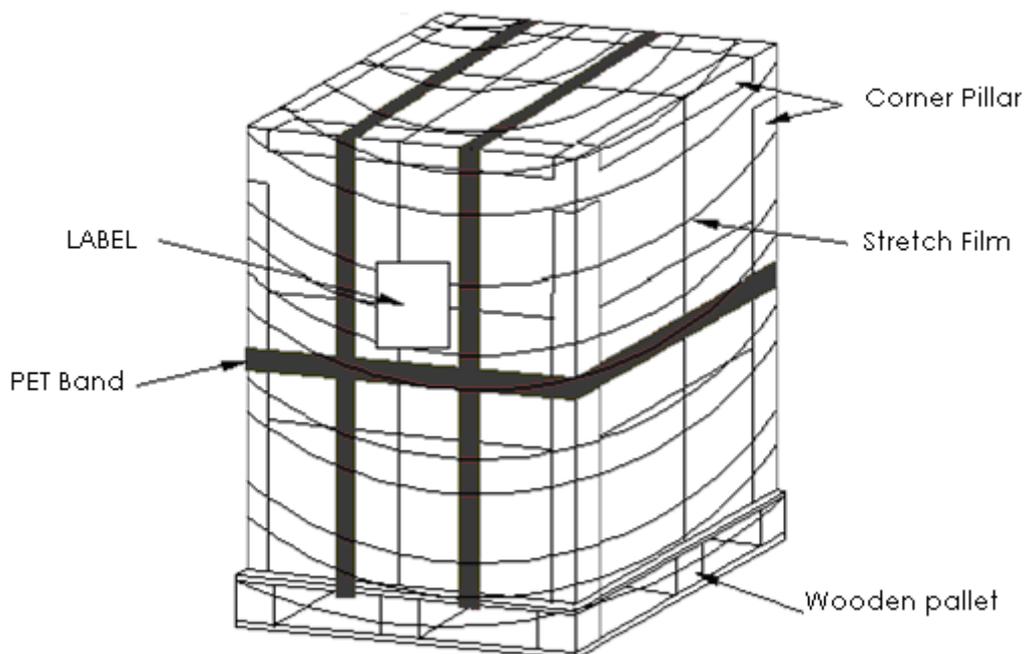
## 10. Appendix: EDID description

| | Byte (hex) | Field Name and Comments | Value (hex) | Value (binary) | Value (DEC) |
|---|---|---|---|---|---|
| Header | 0 | Header | 00 | 00000000 | 0 |
| | 1 | Header | FF | 11111111 | 255 |
| | 2 | Header | FF | 11111111 | 255 |
| | 3 | Header | FF | 11111111 | 255 |
| | 4 | Header | FF | 11111111 | 255 |
| | 5 | Header | FF | 11111111 | 255 |
| | 6 | Header | FF | 11111111 | 255 |
| | 7 | Header | 00 | 00000000 | 0 |
| Vendor / Product EDID Version | 8 | EISA manufacture code = 3 Character ID | 06 | 00000110 | 6 |
| | 9 | EISA manufacture code (Compressed ASCII) | AF | 10101111 | 175 |
| | 0A | Panel Supplier Reserved – Product Code | ED | 11101101 | 237 |
| | 0B | Panel Supplier Reserved – Product Code | 30 | 00110000 | 48 |
| | 0C | LCD module Serial No - Preferred but Optional ("0" if not used) | 00 | 00000000 | 0 |
| | 0D | LCD module Serial No - Preferred but Optional ("0" if not used) | 00 | 00000000 | 0 |
| | 0E | LCD module Serial No - Preferred but Optional ("0" if not used) | 00 | 00000000 | 0 |
| | 0F | LCD module Serial No - Preferred but Optional ("0" if not used) | 00 | 00000000 | 0 |
| | 10 | Week of manufacture | 00 | 00000000 | 0 |
| | 11 | Year of manufacture | 14 | 00010100 | 20 |
| | 12 | EDID structure version # = 1 | 01 | 00000001 | 1 |
| | 13 | EDID revision # = 4 | 04 | 00000100 | 4 |
| Display Parameters | 14 | Video I/P definition | 90 | 10010000 | 144 |
| | 15 | Max H image size = ?? cm(Rounded to cm) | 22 | 00100010 | 34 |
| | 16 | Max V image size = ?? cm(Rounded to cm) | 13 | 00010011 | 19 |
| | 17 | Display gamma = (gamma ×100)-100 = Example: ( 2.2×100 ) – 100 = 120 | 78 | 01111000 | 120 |
| | 18 | Feature support | 02 | 00000010 | 2 |
| Panel Color Coordinates | 19 | Red/Green Low bit (RxRy/GxGy) | D1 | 11010001 | 209 |
| | 1A | Blue/White Low bit (BxBy/WxWy) | 15 | 00010101 | 21 |
| | 1B | Red X          Rx = 0.??? | 9E | 10011110 | 158 |
| | 1C | Red Y          Ry = 0.??? | 59 | 01011001 | 89 |
| | 1D | Green X          Rx = 0.??? | 53 | 01010011 | 83 |
| | 1E | Green Y          Ry = 0.??? | 9B | 10011011 | 155 |
| | 1F | Blue X          Rx = 0.??? | 27 | 00100111 | 39 |
| | 20 | Blue Y          Ry = 0.??? | 1E | 00011110 | 30 |
| | 21 | White X          Rx = 0.??? | 50 | 01010000 | 80 |

| | | | | | |
|---|---|---|---|---|---|
| | 22 | White Y          Ry = 0.??? | 54 | 01010100 | 84 |
| **Established Timings** | 23 | Established timings 1   (00h if not used) | 00 | 00000000 | 0 |
| | 24 | Established timings 2   (00h if not used) | 00 | 00000000 | 0 |
| | 25 | Manufacturer's timings    (00h if not used) | 00 | 00000000 | 0 |
| **Standard Timing ID** | 26 | Standard timing ID1   (01h if not used) | 01 | 00000001 | 1 |
| | 27 | Standard timing ID1   (01h if not used) | 01 | 00000001 | 1 |
| | 28 | Standard timing ID2   (01h if not used) | 01 | 00000001 | 1 |
| | 29 | Standard timing ID2   (01h if not used) | 01 | 00000001 | 1 |
| | 2A | Standard timing ID3   (01h if not used) | 01 | 00000001 | 1 |
| | 2B | Standard timing ID3   (01h if not used) | 01 | 00000001 | 1 |
| | 2C | Standard timing ID4   (01h if not used) | 01 | 00000001 | 1 |
| | 2D | Standard timing ID4   (01h if not used) | 01 | 00000001 | 1 |
| | 2E | Standard timing ID5   (01h if not used) | 01 | 00000001 | 1 |
| | 2F | Standard timing ID5   (01h if not used) | 01 | 00000001 | 1 |
| | 30 | Standard timing ID6   (01h if not used) | 01 | 00000001 | 1 |
| | 31 | Standard timing ID6   (01h if not used) | 01 | 00000001 | 1 |
| | 32 | Standard timing ID7   (01h if not used) | 01 | 00000001 | 1 |
| | 33 | Standard timing ID7   (01h if not used) | 01 | 00000001 | 1 |
| | 34 | Standard timing ID8   (01h if not used) | 01 | 00000001 | 1 |
| | 35 | Standard timing ID8   (01h if not used) | 01 | 00000001 | 1 |
| **Timing Descripter #1** | 36 | Pixel Clock/10,000 (LSB) | B0 | 10110000 | 176 |
| | 37 | Pixel Clock/10,000 (MSB) | 36 | 00110110 | 54 |
| | 38 | Horizontal Active   = ???? pixels (lower 8 bits) | 80 | 10000000 | 128 |
| | 39 | Horizontal Blanking (Thbp)    = 320 pixels (lower 8 bits) | E0 | 11100000 | 224 |
| | 3A | Horizontal Active/Horizontal blanking (Thbp)        (upper4:4 bits) | 70 | 01110000 | 112 |
| | 3B | Vertical Active   = ??? lines | 38 | 00111000 | 56 |
| | 3C | Vertical Blanking (Tvbp) = ?? lines (DE Blanking typ. for DE only panels) | 08 | 00001000 | 8 |
| | 3D | Vertical Active : Vertical Blanking (Tvbp) (upper4:4 bits) | 40 | 01000000 | 64 |
| | 3E | Horizontal Sync, Offset (Thfp) = ?? pixels | 30 | 00110000 | 48 |
| | 3F | Horizontal Sync, Pulse Width = ??? pixels | 64 | 01100100 | 100 |
| | 40 | Vertical Sync, Offset (Tvfp) = ? lines Sync Width = ? lines | 31 | 00110001 | 49 |
| | 41 | Horizontal Vertical Sync Offset/Width upper 2 bits | 00 | 00000000 | 0 |
| | 42 | Horizontal Image Size =??? mm | 58 | 01011000 | 88 |
| | 43 | Vertical image Size = ??? mm | C1 | 11000001 | 193 |
| | 44 | Horizontal Image Size / Vertical image size | 10 | 00010000 | 16 |
| | | | | | |
| | 45 | ? Horizontal Border = 0   (Zero for Notebook | 00 | 00000000 | 0 |

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| | | | | | |
|---|---|---|---|---|---|
| | | LCD) | | | |
| | 46 | Vertical Border = 0 (Zero for Notebook LCD) | 00 | 00000000 | 0 |
| | 47 | Bit[7] 0: Non-interlace, 1: Interlace<br>Bit[6:5] 00: Normal display, no strero, see VESA EDID Spec 1.3<br>Bit[4:3] 00: Analog composite, 01: Bipolar analog composite, 10: Digital composite, 11: Digital separate<br>Bit[2:1] : The interpretation of bits 2 and 1 is dependent on the decode of bits 4 and 3 - see VESA EDID Spec 1.3<br>Bit[0] : See VESA EDID Spec 1.3<br>==> fix=1A | 1A | 00011010 | 26 |
| Timing Descripter #2<br>(=Timing Descripter #1) | 48 | Pixel Clock/10,000 (LSB) | 75 | 01110101 | 117 |
| | 49 | Pixel Clock/10,000 (MSB) | 24 | 00100100 | 36 |
| | 4A | Horizontal Active = xxxx pixels (lower 8 bits) | 80 | 10000000 | 128 |
| | 4B | Horizontal Blanking (Thbp) = xxxx pixels (lower 8 bits) | E0 | 11100000 | 224 |
| | 4C | Horizontal Active/Horizontal blanking (Thbp) (upper4:4 bits) | 70 | 01110000 | 112 |
| | 4D | Vertical Active = xxxx lines | 38 | 00111000 | 56 |
| | 4E | Vertical Blanking (Tvbp) = xxxx lines (DE Blanking typ. for DE only panels) | 08 | 00001000 | 8 |
| | 4F | Vertical Active : Vertical Blanking (Tvbp) (upper4:4 bits) | 40 | 01000000 | 64 |
| | 50 | Horizontal Sync, Offset (Thfp) = xxxx pixels | 30 | 00110000 | 48 |
| | 51 | Horizontal Sync, Pulse Width = xxxx pixels | 64 | 01100100 | 100 |
| | 52 | Vertical Sync, Offset (Tvfp) = xx lines Sync Width = xx lines | 31 | 00110001 | 49 |
| | 53 | Horizontal Vertical Sync Offset/Width upper 2 bits | 00 | 00000000 | 0 |
| | 54 | Horizontal Image Size =xxx mm | 58 | 01011000 | 88 |
| | 55 | Vertical image Size = xxx mm | C1 | 11000001 | 193 |
| | 56 | Horizontal Image Size / Vertical image size | 10 | 00010000 | 16 |
| | 57 | Horizontal Border = 0 (Zero for Notebook LCD) | 00 | 00000000 | 0 |
| | 58 | Vertical Border = 0 (Zero for Notebook LCD) | 00 | 00000000 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| | | Bit[7]       0: Non-interlace, 1: Interlace<br>Bit[6:5] 00: Normal display, no strero,   see VESA EDID Spec 1.3<br>Bit[4:3] 00: Analog composite, 01: Bipolar analog composite, 10: Digital                        composite, 11: Digital separate<br>Bit[2:1]       : The interpretation of bits 2 and 1 is dependent on the decode of                      bits 4 and 3 - see VESA EDID Spec 1.3<br>Bit[0]          : See VESA EDID Spec 1.3 | | | |
| | 59 | ==> fix=1A | 1A | 00011010 | 26 |
| | 5A | Flag | 00 | 00000000 | 0 |
| | 5B | Flag | 00 | 00000000 | 0 |
| | 5C | Flag | 00 | 00000000 | 0 |
| | 5D | Data Type Tag:   Alphanumeric Data String (ASCII) ==> fix=FE | FE | 11111110 | 254 |
| | 5E | Flag | 00 | 00000000 | 0 |
| | 5F | Dell P/N 1st Character | 4E | 01001110 | 78 |
| | 60 | Dell P/N 2nd Character | 43 | 01000011 | 67 |
| | 61 | Dell P/N 3rd Character | 44 | 01000100 | 68 |
| | 62 | Dell P/N 4th Character | 46 | 01000110 | 70 |
| | 63 | Dell P/N 5th Character | 33 | 00110011 | 51 |
| | 64 | **EDID Revision**<br>**Bit[6:0] See charts below**<br>**Bit[7] 0: X-rev, 1: A-rev** | 80 | 10000000 | 128 |
| | 65 | Manufacturer P/N | 42 | 01000010 | 66 |
| | 66 | Manufacturer P/N | 31 | 00110001 | 49 |
| | 67 | Manufacturer P/N | 35 | 00110101 | 53 |
| | 68 | Manufacturer P/N | 36 | 00110110 | 54 |
| | 69 | Manufacturer P/N | 48 | 01001000 | 72 |
| | 6A | Manufacturer P/N | 57 | 01010111 | 87 |
| | 6B | Manufacturer P/N (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h) | 33 | 00110011 | 51 |
| | 6C | Flag | 00 | 00000000 | 0 |
| | 6D | Flag | 00 | 00000000 | 0 |
| | 6E | Flag | 00 | 00000000 | 0 |
| | 6F | Data Type Tag:   Manufacturer Specified Data 00 ==>fix=00 | 00 | 00000000 | 0 |
| | 70 | Flag | 00 | 00000000 | 0 |
| | 71 | Color Management | 00 | 00000000 | 0 |
| | 72 | Panel Structure | 41 | 01000001 | 65 |
| | 73 | Frame Rate | 22 | 00100010 | 34 |
| | 74 | Light Controller Interface and Luminance | 96 | 10010110 | 150 |

Timing Descripter #3
Dell specific information

Timing Descripter #4

| | | | | | |
|---|---|---|---|---|---|
| | 75 | Outdoor Features | 01 | 00000001 | 1 |
| | 76 | Multi-Media Features | 11 | 00010001 | 17 |
| | 77 | Multi-Media Features | 00 | 00000000 | 0 |
| | 78 | Special Features #1 | 00 | 00000000 | 0 |
| | 79 | Special Features #2 | 02 | 00000010 | 2 |
| | 7A | Special Features #3 | 01 | 00000001 | 1 |
| | 7B | (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h) | 0A | 00001010 | 10 |
| | 7C | (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h) | 20 | 00100000 | 32 |
| | 7D | (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h) | 20 | 00100000 | 32 |
| Checksum | 7E | Extension flag   (# of optional 128 EDID extension blocks to follow, Typ = 0) | 00 | 00000000 | 0 |
| | 7F | Checksum   (The 1-byte sum of all 128 bytes in this EDID block shall = 0) | 15 | 00010101 | 21 |