Tailorpixels

A Professional Manufacturer of Display

Manufacturer Certificated

9001 CERT. No.: 282Q19070712006

14001 CERT. No.: 282E19070712007

Product Specification

Model: TTR170XHT-01

17.0″TFT Display Module(1280*1024)

This module uses RoHS material

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Contents

1 Handling Precautions

1) Since front polarizer is easily damaged, pay attention not to scratch it.
2) Be sure to turn off power supply when inserting or disconnecting from input connector.
3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
7) Do not open or modify the Module Assembly.
8) Do not press the reflector sheet at the back of the module to any directions.
9) In case a TFT-LCD Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of the LED lightbar edge. Otherwise the TFT-LCD Module may be damaged.
10) Insert or pull out the interface connector, be sure not to rotate nor tilt it of the TFT-LCD Module.
11) Do not twist nor bend the TFT -LCD Module even momentary. It should be taken into consideration that no bending/twisting forces are applied to the TFT-LCD Module from outside. Otherwise the TFT-LCD Module may be damaged.
12) Please avoid touching COF position while you are doing mechanical design.
13) When storing modules as spares for a long time, the following precaution is necessary:
Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

2 General Description

This specification applies to the 17 inch wide Color a-Si TFT-LCD Module TTR170XHT-01 The display supports the SXGA+ (1280(H) x 1024(V)) screen format and 16.7M colors (RGB 6-bits + Hi-FRC data). The input interface is Dual channel LVDS and this module doesn't contain an driver board for backlight.

2.1 Display Characteristics

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

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	432 (17.0")
Active Area	[mm]	337.920(H) × 270.336(V)
Pixels H x V	-	1280 × 3(RGB) × 1024
Pixel Pitch	[mm]	0.264(per one triad) × 0.264
Pixel Arrangement	-	R.G.B. Vertical Stripe
Display Mode	-	Normally White
White Luminance (Center)	[cd/m^2]	1000 (Typ.)
Contrast Ratio	-	1000 : 1 (Typ.)
Response Time	[msec]	5 (Typ., on/off)
Power Consumption (LCD Module + Backligh unit)	[Watt]	28 (Typ.) LCD module : PDD (Typ.)=3 @ Black pattern,Fv=60Hz Backlight unit : P_{BLU} (Typ.) = 25 @Is=60mA
Weight	[Grams]	1273 (Typ.)
Outline Dimension	[mm]	358.5(H) x 296.5(V) x 10.3(D) (Typ.)
Electrical Interface	-	Dual Channel LVDS
Support Color	-	16.7M colors (RGB 6-bits +Hi-FRC data)
Surface Treatment	-	Anti-glare type, Hardness 3H
Temperature Range Operating Storage (Shipping)	 [°C] [°C]	 0 to +50 -20 to +60
RoHS Compliance	-	RoHS Compliance
TCO Compliance	-	TCO6.0 Compliance

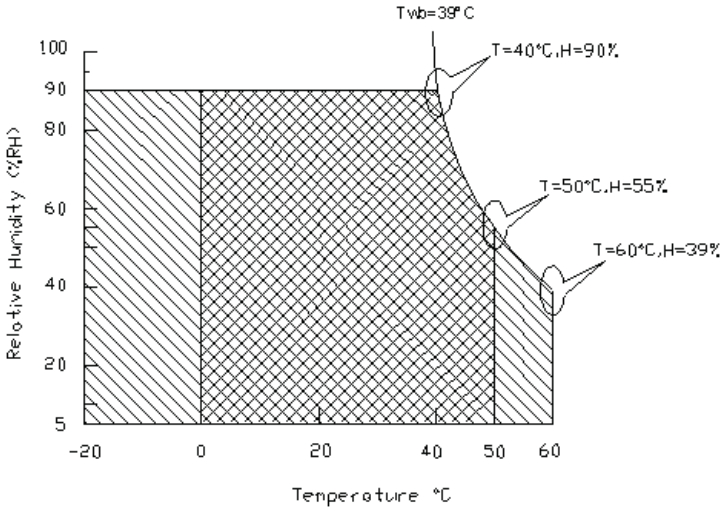
2.2 Absolute Maximum Rating of Environment

Permanent damage may occur if exceeding the following maximum rating.

Symbol	Description	Min.	Max.	Unit	Remark
TOP	Operating Temperature	0	+50	[°C]	***Note 2-1***
TGS	Glass surface temperature (operation)	0	+65	[°C]	***Note 2-1*** *Function judged only*
HOP	Operation Humidity	5	90	[%RH]	***Note 2-1***
TST	Storage Temperature	-20	+60	[°C]	
HST	Storage Humidity	5	90	[%RH]	

Note 2-1: Temperature and relative humidity range are shown as the below figure.

1. 90% RH Max (Ta ≦39℃)
2. Max wet-bulb temperature at 39℃ or less. (Ta ≦39℃)
3. No condensation



Operating Range  Storage Range 

2.3 Optical Characteristics

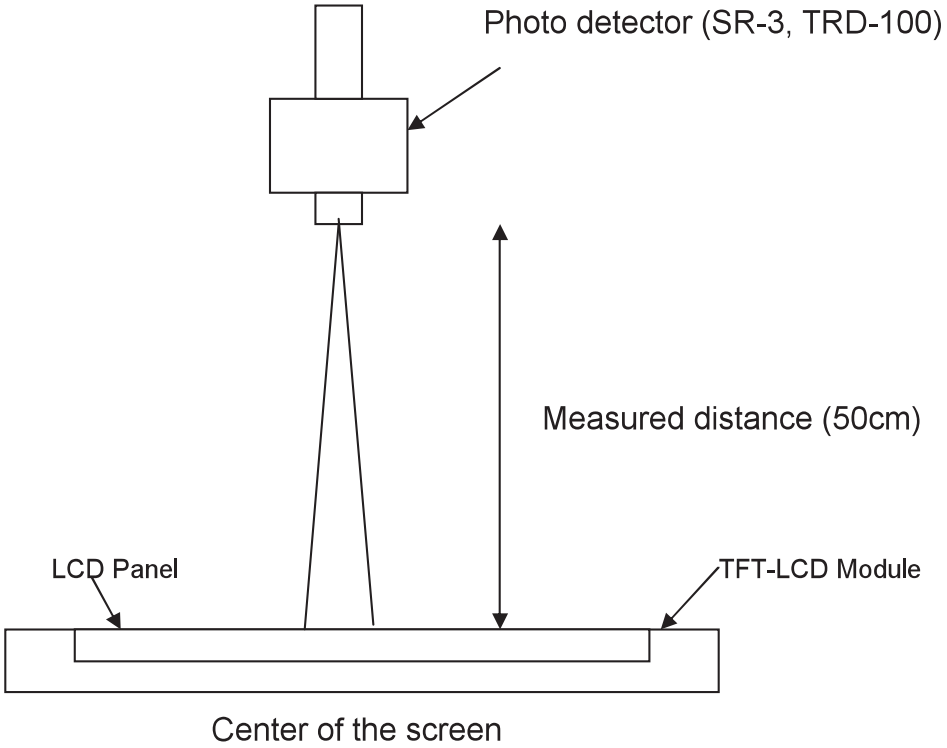
The optical characteristics are measured on the following test condition.

Test Condition:

1. Equipment setup: Please refer to ***Note 2-2***.
2. Panel Lighting time: 30 minutes
3. VDD=5.0V, Fv=60Hz,Is=60mA,Ta=25℃

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
L_w	White Luminance (Center of screen)		900	1000	-	[cd/㎡]	***Note 2-2*** *By SR-3*
L_{uni}	Luminance Uniformity (9 points)		75	80	-	[%]	***Note 2-3*** *By SR-3*
CR	Contrast Ratio (Center of screen)		600	1000	-	-	***Note 2-4*** *By SR-3*
θ_R	Horizontal Viewing Angle (CR=10)	Right	75	85	-	[degree]	***Note 2-5*** *By SR-3*
θ_L		Left	75	85	-		
Φ_H	Vertical Viewing Angle (CR=10)	Up	70	80	-		
Φ_L		Down	70	80	-		
θ_R	Horizontal Viewing Angle (CR=5)	Right	75	88	-		
θ_L		Left	75	88	-		
Φ_H	Vertical Viewing Angle (CR=5)	Up	70	85	-		
Φ_L		Down	70	85	-		
T_R	Response Time	Rising Time	-	3.8	5.5	[msec]	***Note 2-6*** *By TRD-100*
T_F		Falling Time	-	1.2	2.5		
-		Rising + Falling	-	5	8		
R_x	Color Coordinates (CIE 1931)	Red x	0.615	0.645	0.675	-	*By SR-3*
R_y		Red y	0.303	0.333	0.363		
G_x		Green x	0.290	0.320	0.350		
G_y		Green y	0.596	0.626	0.656		
B_x		Blue x	0.123	0.153	0.183		
B_y		Blue y	0.027	0.057	0.087		
W_x		White x	0.283	0.313	0.343		
W_y		White y	0.299	0.329	0.359		
CT	Crosstalk		-	-	1.5	[%]	***Note 2-7*** *By SR-3*
F_{dB}	Flicker (Center of screen)		-	-	-20	[dB]	***Note 2-8*** *By SR-3*

Note 2-2: Equipment setup :

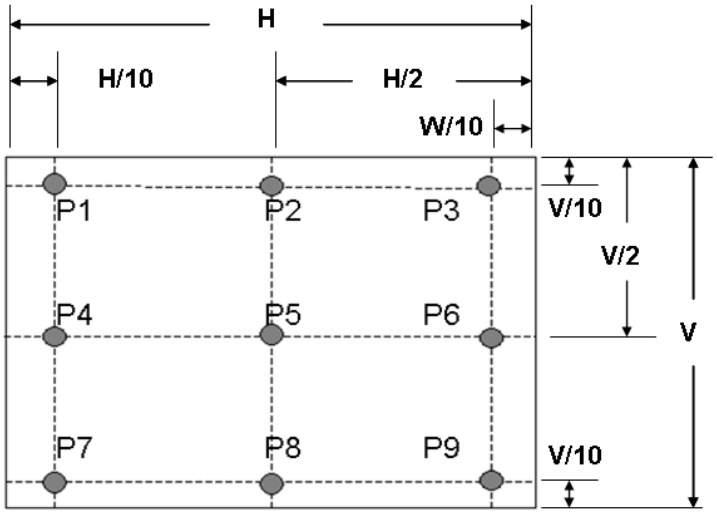


Note 2-3: Luminance Uniformity Measurement

Definition:

$$\text{Luminance Uniformity} = \frac{\text{Minimum Luminance of 9 Points (P1 ~ P9)}}{\text{Maximum Luminance of 9 Points (P1 ~ P9)}}$$

a. Test pattern: White Pattern



Note 2-4: Contrast Ratio Measurement

Definition:

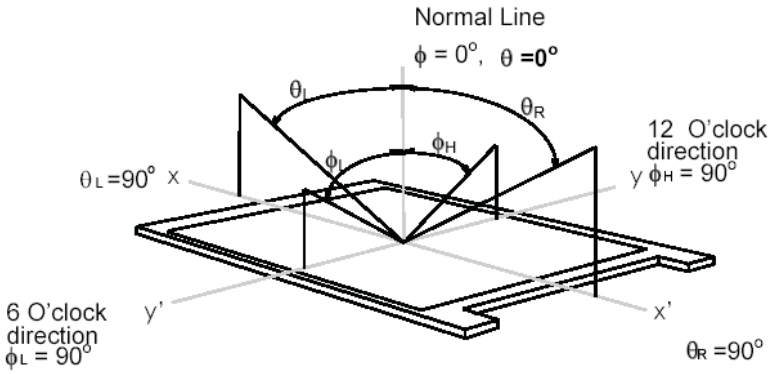
$$\text{Contrast Ratio} = \frac{\text{Luminance of White pattern}}{\text{Luminance of Black pattern}}$$

a. Measured position: Center of screen (P5) & perpendicular to the screen (θ=Φ=0°)

Note 2-5: Viewing angle measurement

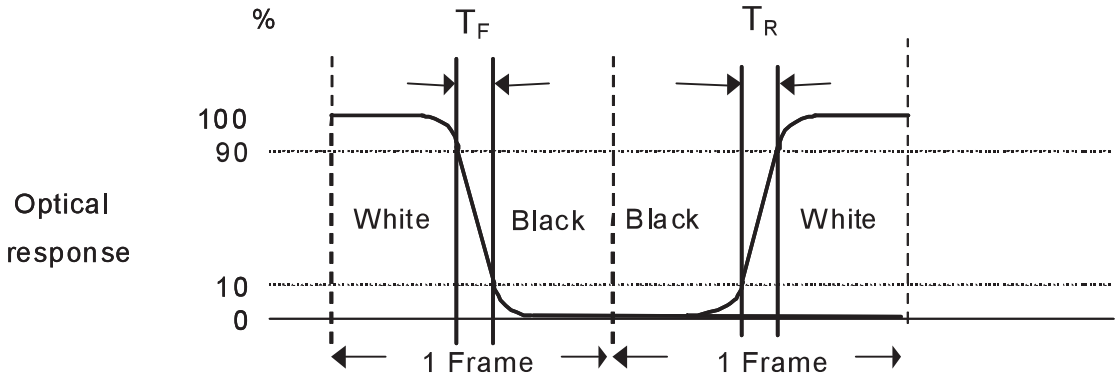
Definition: The angle at which the contrast ratio is greater than 10 & 5 .

a. Horizontal view angle: Divide to left & right (θ_L & θ_R)
Vertical view angle: Divide to up & down (Φ_H &Φ_L)



Note 2-6: Response time measurement

The output signals of photo detector are measured when the input signals are changed from "Black" to "White" (rising time, T_R), and from "White" to "Black" (falling time, T_F), respectively. The response time is interval between the 10% and 90% of optical response. (*Black & White color definition: Please refer section 3.4.3)*



Note 2-7: Crosstalk measurement

Definition:

$CT = Max. (CT_H, CT_V)$;

Where

a. Maximum Horizontal Crosstalk :

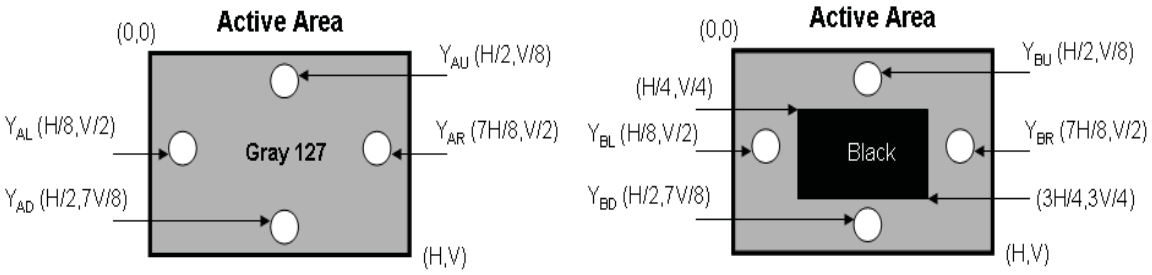
$CT_H = Max. (| Y_{BL} - Y_{AL} | / Y_{AL} \times 100\ \%, | Y_{BR} - Y_{AR} | / Y_{AR} \times 100\ \%)$;

Maximum Vertical Crosstalk:

$CT_V = Max. (| Y_{BU} - Y_{AU} | / Y_{AU} \times 100\ \%, | Y_{BD} - Y_{AD} | / Y_{AD} \times 100\ \%)$;

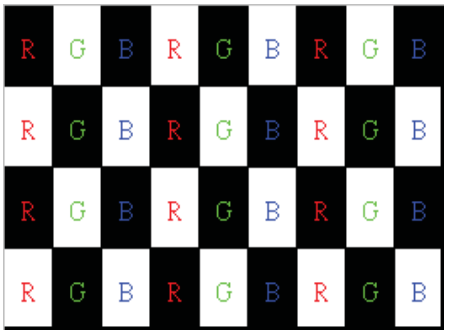
b. Y_{AU}, Y_{AD}, Y_{AL}, Y_{AR} = Luminance of measured location without Black pattern

Y_{BU}, Y_{BD}, Y_{BL}, Y_{BR} = Luminance of measured location with Black pattern



Note 2-8: Flicker measurement

a. Test pattern: It is listed as following.



Gray level = L0

Gray level = L127

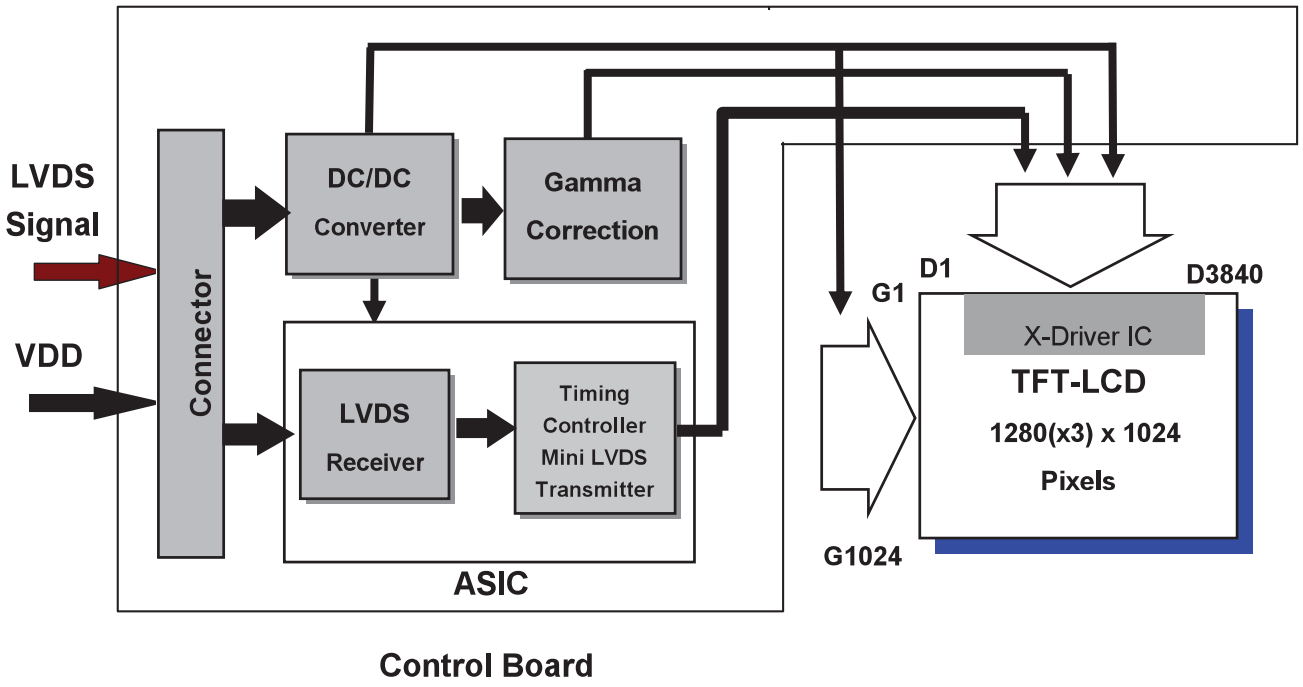
R: Red, G: Green, B:Blue

b. Measured position: Center of screen (P5) & perpendicular to the screen (θ=Φ=0°)

3 TFT-LCD Module

3.1 Block Diagram

The following shows the block diagram of the 17 inch Color TFT-LCD Module.



3.2 Interface Connection

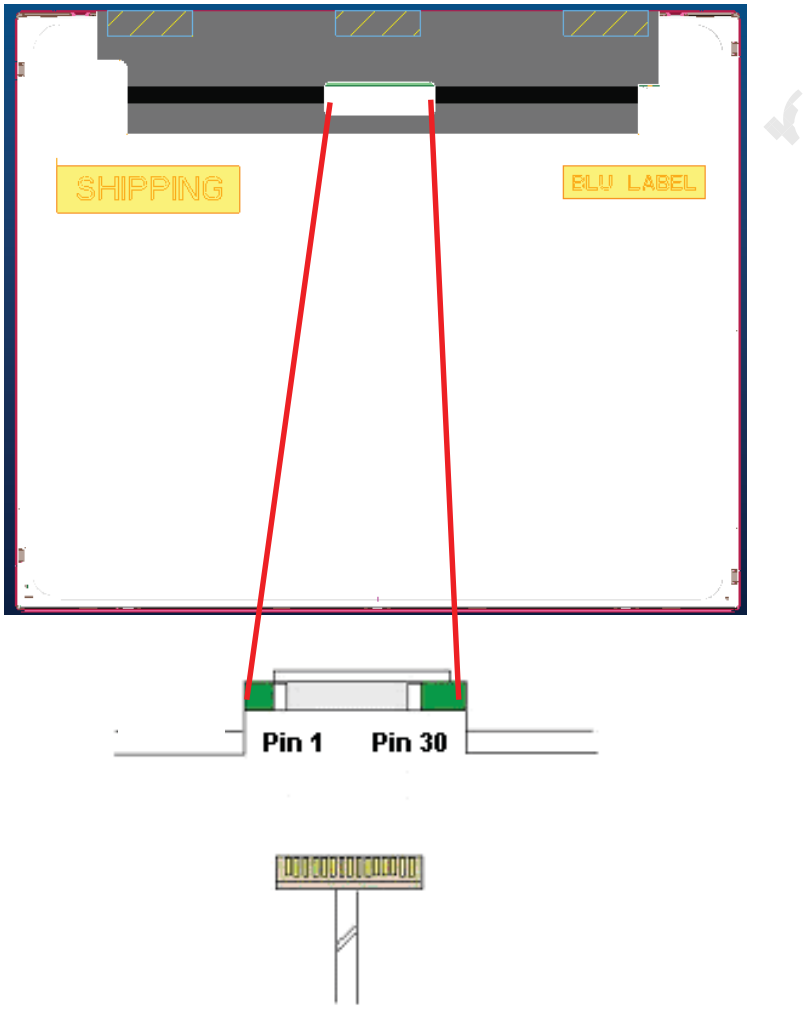
3.2.1 Connector Type

TFT-LCD Connector	Manufacturer	P-TWO	STM
	Part Number	AL230F-A0G1D-P	MSCKT2407P30HB
Mating Connector	Manufacturer	JAE	
	Part Number	FI-X30HL (Locked Type)	

3.2.2 Connector Pin Assignment

PIN #	Symbol	Description	Remark
1	RxO0-	Negative LVDS differential data input (Odd data)	
2	RxO0+	Positive LVDS differential data input (Odd data)	
3	RxO1-	Negative LVDS differential data input (Odd data)	
4	RxO1+	Positive LVDS differential data input (Odd data)	
5	RxO2-	Negative LVDS differential data input (Odd data)	
6	RxO2+	Positive LVDS differential data input (Odd data)	
7	GND	Ground	
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)	
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)	
10	RxO3-	Negative LVDS differential data input (Odd data)	
11	RxO3+	Positive LVDS differential data input (Odd data)	
12	RxE0-	Negative LVDS differential data input (Even data)	
13	RxE0+	Positive LVDS differential data input (Even data)	
14	GND	Ground	
15	RxE1-	Negative LVDS differential data input (Even data)	
16	RxE1+	Positive LVDS differential data input (Even data)	
17	GND	Ground	
18	RxE2-	Negative LVDS differential data input (Even data)	
19	RxE2+	Positive LVDS differential data input (Even data)	
20	RxECLK-	Negative LVDS differential clock input (Even clock)	
21	RxECLK+	Positive LVDS differential clock input (Even clock)	
22	RxE3-	Negative LVDS differential data input (Even data)	
23	RxE3+	Positive LVDS differential data input (Even data)	
24	GND	Ground	
25	NC	No connection (for AUO test only. Do not connect)	
26	NC	No connection (for AUO test only. Do not connect)	

27	NC	No connection (for AUO test only. Do not connect)	
28	VDD	Power Supply Input Voltage	
29	VDD	Power Supply Input Voltage	
30	VDD	Power Supply Input Voltage	



3.3 Electrical Characteristics

3.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

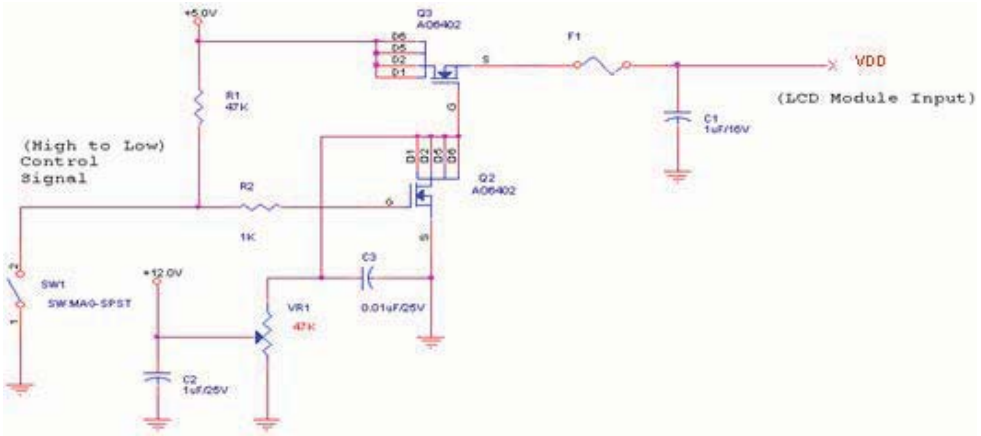
Symbol	Description	Min	Max	Unit	Remark
VDD	Power Supply Input Voltage	GND-0.3	6.0	[Volt]	Ta=25□

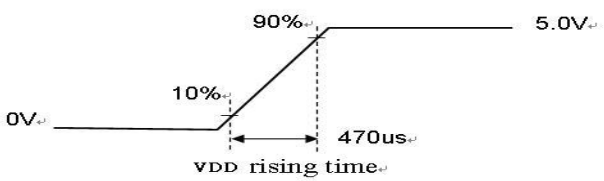
3.3.2 Recommended Operating Condition

Symbol	Description	Min	Typ	Max	Unit	Remark
VDD	Power supply Input voltage	4.5	5.0	5.5	[Volt]	
IDD	Power supply Input Current (RMS)	-	0.6	0.72	[A]	VDD= 5.0V, Black Pattern, Fv=60Hz
			0.72	0.87	[A]	VDD= 5.0V, Black Pattern, Fv=75Hz
PDD	VDD Power Consumption	-	3	3.6	[Watt]	VDD= 5.0V, Black Pattern, Fv=60Hz
			3.6	4.32	[Watt]	VDD= 5.0V, Black Pattern, Fv=75Hz
IRush	Inrush Current	-	-	3.0	[A]	***Note 3-1***
VDDrp	Allowable VDD Ripple Voltage	-	-	500	[mV]	VDD= 5.0V, Black Pattern, Fv=75Hz

Note 3-1: Inrush Current measurement:

Test circuit:

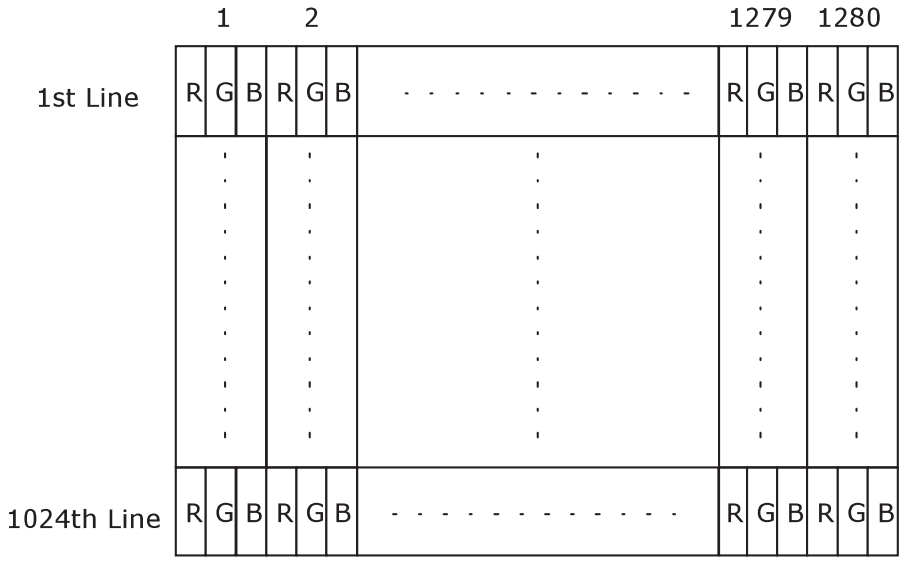




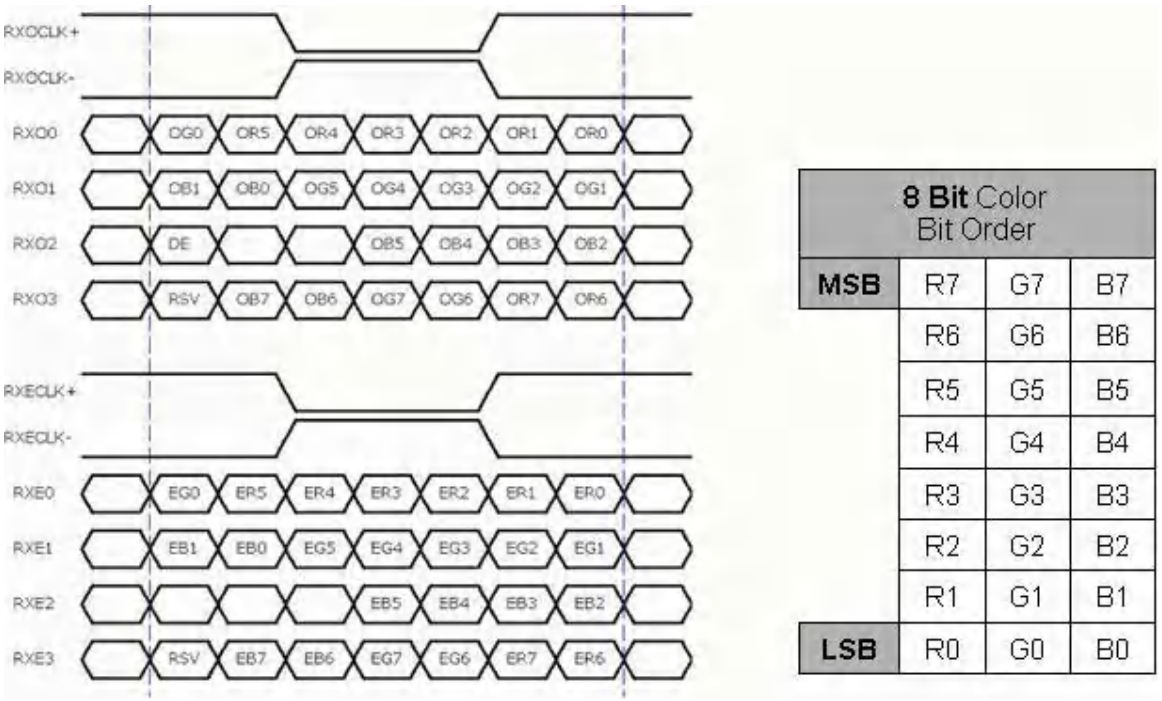
e duration of VDD rising time: 470us.

3.4 Signal Characteristics

3.4.1 LCD Pixel Format



3.4.2 LVDS Data Format



8 Bit Color Bit Order			
MSB	R7	G7	B7
	R6	G6	B6
	R5	G5	B5
	R4	G4	B4
	R3	G3	B3
	R2	G2	B2
	R1	G1	B1
LSB	R0	G0	B0

a. O = “Odd Pixel Data” E = “Even Pixel Data”

b. Refer to 3.4.1 LCD pixel format, the 1st data is 1 (Odd Pixel Data), the 2nd data is 2 (Even Pixel Data) and the last data is 1280 (Even Pixel Data).

3.4.3 Color versus Input Data

The following table is for color versus input data (8bit). The higher the gray level, the brighter the color.

Color	Gray Level	Color Input Data																								Remark
		RED data (MSB:R7, LSB:R0)								GREEN data (MSB:G7, LSB:G0)								BLUE data (MSB:B7, LSB:B0)								
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
White	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gray 127	-	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	
Red	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L255	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Green	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
Blue	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	

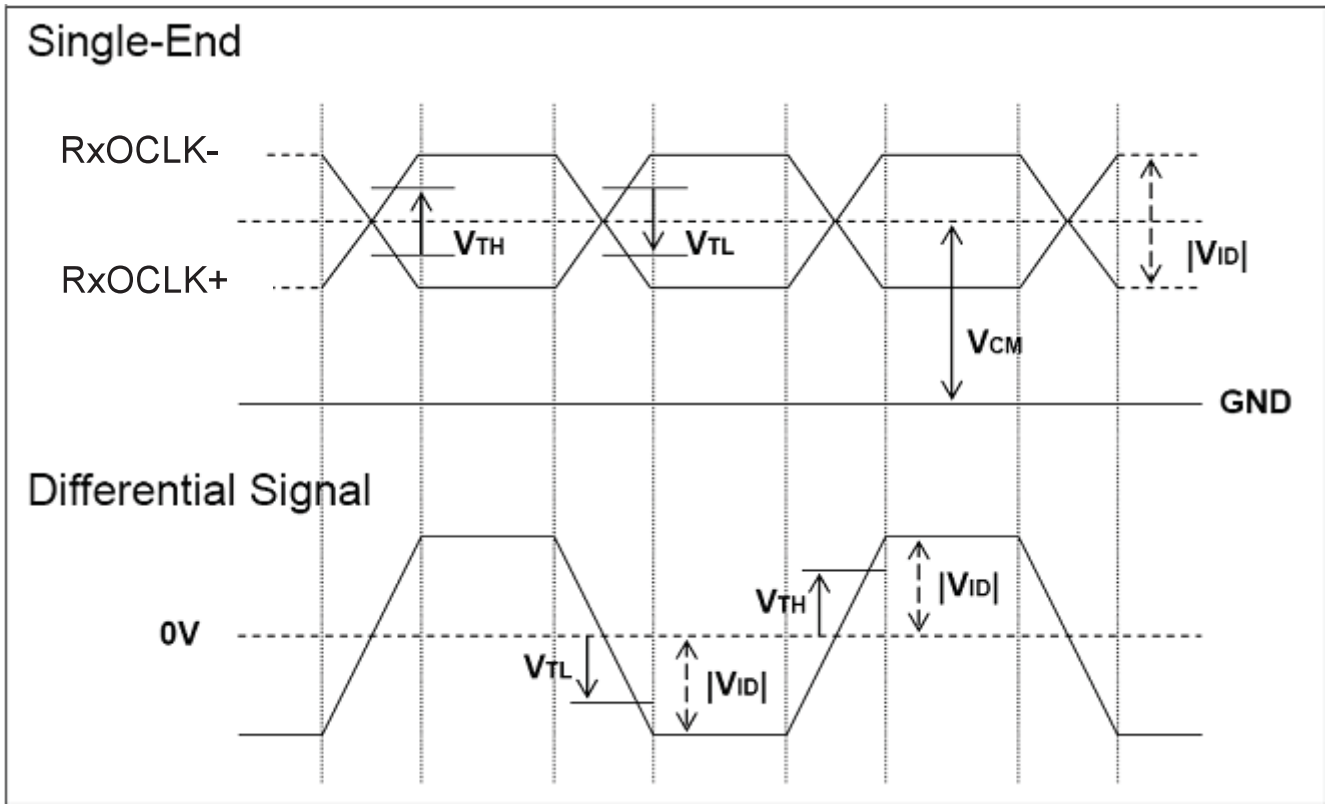
3.4.4 LVDS Specification

a. DC Characteristics:

Symbol	Description	Min	Typ	Max	Units	Condition
V_{TH}	LVDS Differential Input High Threshold	-	-	+100	[mV]	V_{CM} = 1.2V
V_{TL}	LVDS Differential Input Low Threshold	-100	-	-	[mV]	V_{CM} = 1.2V
$\lvert V_{ID} \rvert$	LVDS Differential Input Voltage	100	-	600	[mV]	
V_{CM}	LVDS Common Mode Voltage	+1.0	+1.2	+1.5	[V]	V_{TH}-V_{TL} = 200mV

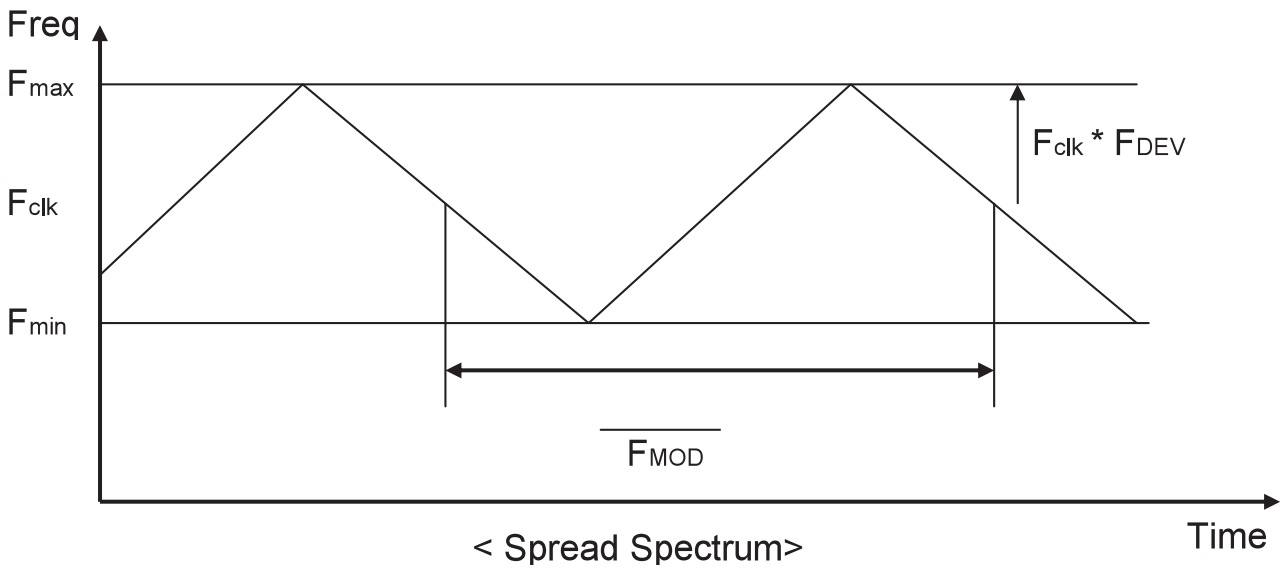
LVDS Signal Waveform:

Use RxOCLK- & RxOCLK+ as example.



b. AC Characteristics:

Symbol	Description	Min	Max	Unit	Remark
F_{DEV}	Maximum deviation of input clock frequency during Spread Spectrum	-	± 3	%	
F_{MOD}	Maximum modulation frequency of input clock during Spread Spectrum	-	200	KHz	



< Spread Spectrum>

Fclk: LVDS Clock Frequency

3.4.5 Input Timing Specification

It only support DE mode, and the input timing are shown as the following table.

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
Tv	Vertical Section	Period	1036	1066	1873	Th	
Tdisp (v)		Active	1024	1024	1024	Th	
Tblk (v)		Blanking	12	42	849	Th	
Fv		Frequency	50	60	76	Hz	
Th	Horizontal Section	Period	730	844	1320	Tclk	
Tdisp (h)		Active	640	640	640	Tclk	
Tblk (h)		Blanking	90	204	680	Tclk	
Fh		Frequency	51.8	64	93.7	KHz	***Note 3-3***
Tclk	LVDS Clock	Period	14.6	18.5	26	ns	1/Fclk
Fclk		Frequency	37.8	54	68.4	MHz	***Note 3-4***

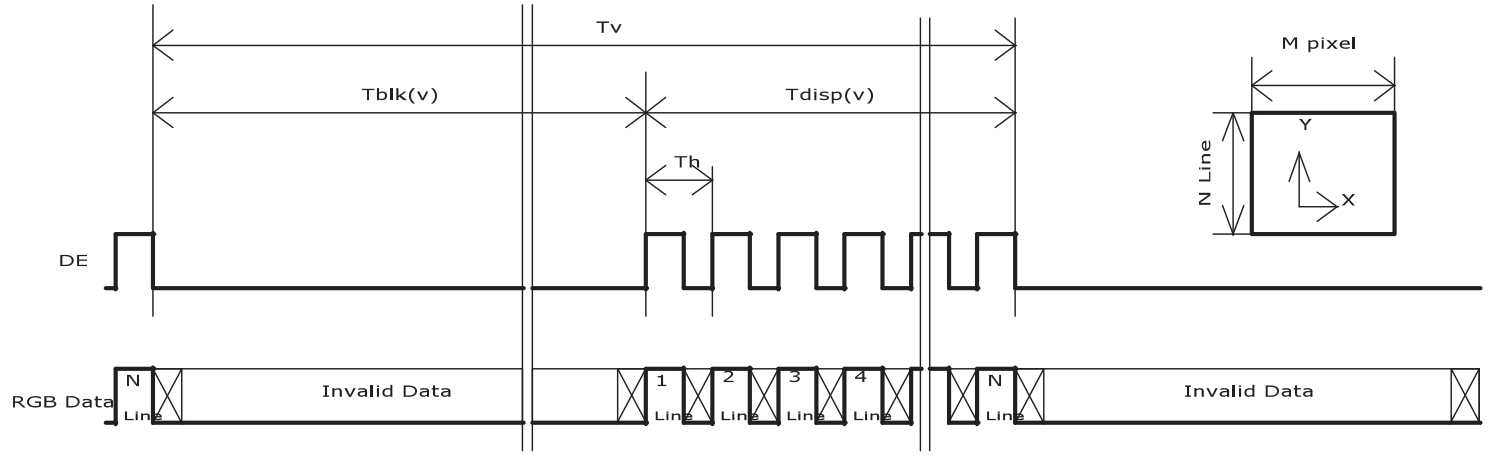
Note 3-3: The equation is listed as following. Please don't exceed the above recommended value.

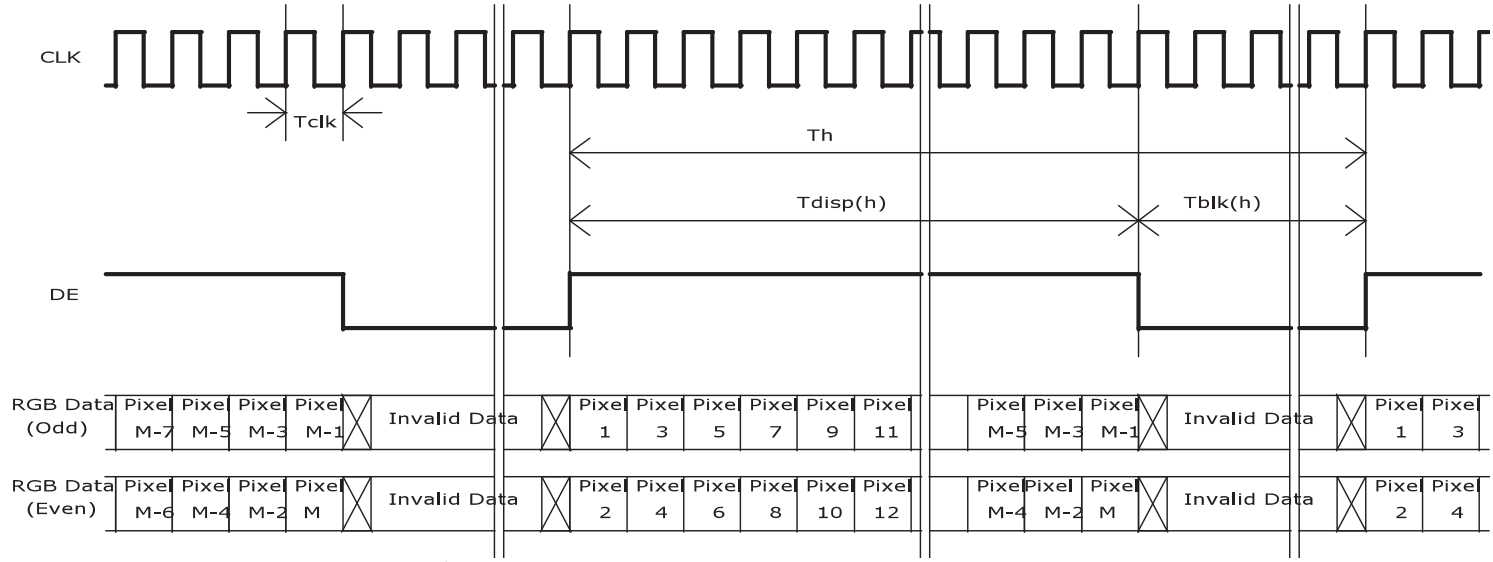
Fh (Min.) = Fclk (Min.) / Th (Min.);
Fh (Typ.) = Fclk (Typ.) / Th (Typ.);
Fh (Max.)= Fclk (Max.) / Th (Min.);

Note 3-4: The equation is listed as following. Please don't exceed the above recommended value.

Fclk (Min.) = Fv (Min.) x Th (Min.) x Tv (Min.);
Fclk (Typ.) = Fv (Typ.) x Th (Typ.) x Tv (Typ.);
Fclk (Max.) = Fv (Max.) x Th (Typ.) x Tv (Typ.);

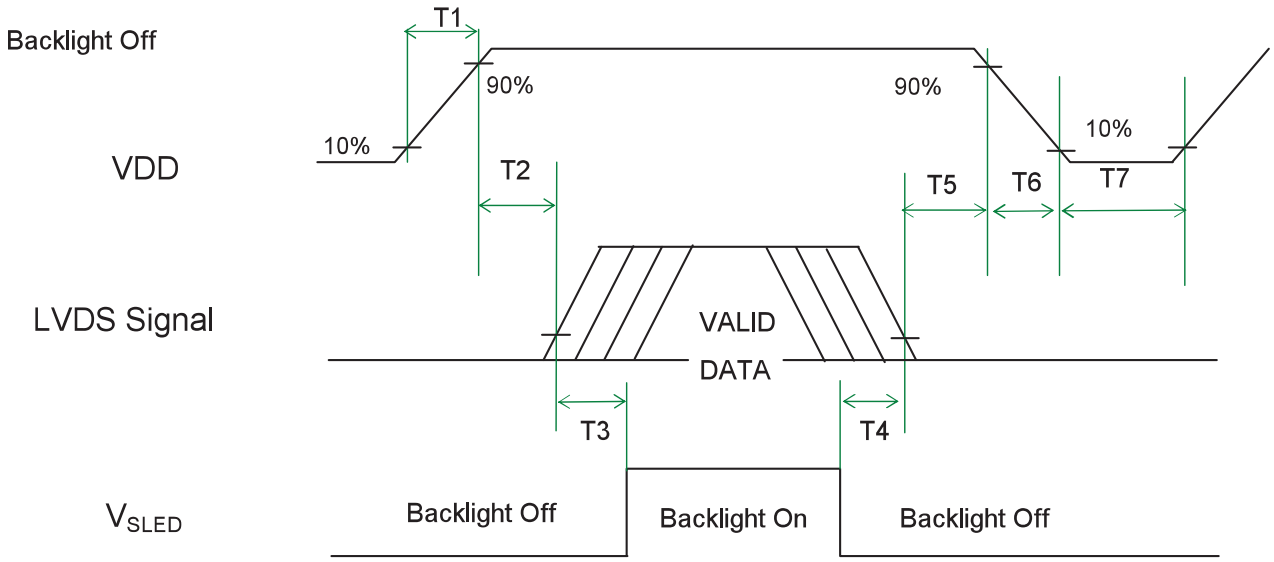
3.4.6 Input Timing Diagram





3.5 Power ON/OFF Sequence

VDD power,LVDS signal and backlight on/off sequence are as following. LVDS signals from any system shall be Hi-Z state when VDD is off.



Power Sequence Timing

Symbol	Value			Unit	Remark
	Min.	Typ.	Max.		
T1	0.5	-	10	[ms]	
T2	0	-	50	[ms]	
T3	500	-	-	[ms]	
T4	100	-	-	[ms]	
T5	0		50	[ms]	***Note 3-5*** ***Note 3-6***
T6	0	-	150	[ms]	***Note 3-6***
T7	1000	-	-	[ms]	

Note 3-5 : Recommend setting T5 = 0ms to avoid electronic noise when VDD is off.

Note 3-6 : During T5 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

4 Backlight Unit

4.1 Block Diagram

P001:Input terminal **PH2.0-6 (2.0mm X 6)**

Pin No.	Symbol	Description	note
1	VCC	Power supply voltage +12V	
2	VCC	Power supply voltage +12V	
3	ON/OFF	Output enable signal	
4	DIM	Dimming signal	
5	GND	Power ground	
6	GND	Power ground	

4.2 Backlight Specification

Parameter			Symbol	Values			Unit	notes
				Min	Typ	Max		
LED Driver :								
Power Supply Input Voltage			VBL	10.2	12.0	13.8	Vdc	1
Power Supply Input Current			IBL	-	2.08	2.17	A	1
Power Supply Input Current (In-Rush)			In-rush	-	-	(TBD)	A	V_{BL} =12.0V $ExtV_{BR-B}$ = 100% 3
Power Consumption			PBL	-	25	30	W	1
Input Voltage for Control System Signals	On/Off	On	V on	2.5	-	5.5	Vdc	
		Off	V off	-0.3	0.0	0.5	Vdc	
	Brightness Adjust		$ExtV_{BR-B}$	30	-	100	%	On Duty 5
				30	-	100	%	
	$ExtV_{BR-B}$ Frequency		f_{PWM}	500	-	1500	Hz	
	Pulse Duty Level (PWM)		High Level	2.5	-	5.5	Vdc	HIGH : on duty LOW : off duty
			Low Level	0.0	-	0.5	Vdc	
LED :								
Life Time				30,000	50,000		Hrs	2

notes :

1. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 60 minutes at 25±2°C. The specified current and power consumption are under the typical supply Input voltage 12Vand VBR (ExtVBR-B : 100%), it is total power consumption.
2. The life time (MTTF) is determined as the time which luminance of the LED is 50% compared to that of initial value at the typical LED current (ExtVBR-B :100%) on condition of continuous operating in LCM state at 25±2°C.
3. The duration of rush current is about 200ms. This duration is applied to LED on time.
4. Even though inrush current is over the specified value, there is no problem if I^2T spec of fuse is satisfied. $ExtV_{BR-B}$ signal have to input available duty range and sequence.
5. After Driver ON signal is applied, $ExtV_{BR-B}$ should be sustained from 30% to 100% more than 500ms. After that, $ExtV_{BR-B}$ 30% and 100% is possible

5 Reliability Test

AUO reliability test items are listed as following table. (*Bare Panel only*)

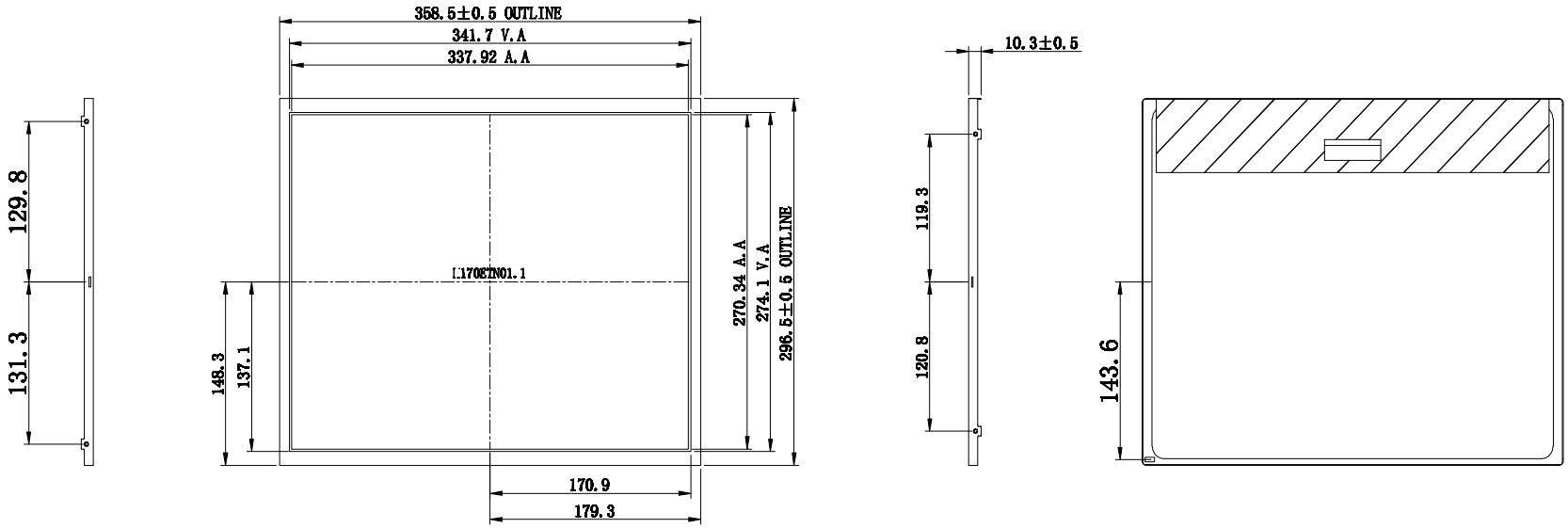
Items	Condition	Remark
Temperature Humidity Bias (THB)	Ta= 50□, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50□, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0□, 300hours	
High Temperature Storage (HTS)	Ta= 60□, 300hours	
Low Temperature Storage (LTS)	Ta= -20□, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Drop Test	Height: 61 cm, package test	
Thermal Shock Test (TST)	-20□/30min, 60□/30min, 100 cycles	***Note 5-1***
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 15KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	***Note 5-2***
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 8 points, 25 times/ point.	
Altitude Test	Operation:18,000 ft Non-Operation:40,000 ft	

Note 5-1: a. A cycle of rapid temperature change consists of varying the temperature from -20□ to 60□, and back again. Power is not applied during the test.

b. After finish temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 5-2: EN61000-4-2, ESD class B: Certain performance degradation allowed
No data lost
Self-recoverable
No hardware failures.

图纸编号：		序号	标记	更改内容	日期	署名
		1	n			



技术要求：

1、产品外观要求：表面无划伤、无披锋、毛刺等不良现象；
2、未标注公差按GB/t1804-m；
3、未标注圆角尺寸，允许圆角为：R=0.2
5、视图采用第三视角法
6、尺寸单位：mm　未标尺寸请CAD中1:1测量
7、修改标记：n
8、带"*"：为重要尺寸，（..）：为参考尺寸

公差等级			
尺寸分段	F	M	C
0-50	±0.05	±0.10	±0.15
50-100	±0.10	±0.15	±0.20
100-150	±0.15	±0.20	±0.50
150-300	±0.20	±0.30	±0.80
300-500	±0.25	±0.50	±1.2
500-800	±0.30	±0.80	±2.0
800-	±0.50	±1.20	±3.00

标记	处数	更改	更改单号	签名	日期	零件名称		17寸LCM			
						零件料号		TTR170XHT-01			
						规格/材质					
分区	签名	日期	分区	签名	日期	版本	比例	单位	数量/套	质量	体积
设计	JHJ	2020.03.03				A1	1:1	mm	1		
工艺						第三角法		第 1 页		共 1 页	
审核											
批准											

7. Packing Specification

TBD

7.2 Pallet and shipment information

Item	Specification			Remark
	Q'ty	Dimension	Weight(kg)	
Panel	1	358.5(H)mm × 296.5(V)mm × 10.3(D)mm	1.45	
Cushion	1	-	0.95	
Box	1	434(L)mm x 278(W)mm x 390(H)mm	0.90	without Panel & cushion
Packing Box	8 pcs/Box	434(L)mm x 278(W)mm x 390(H)mm	13.45	with panel & cushion
Pallet	1	1150(L)mm x 890(W)mm x 132(H)mm	12.00	
Pallet after Packing	18 boxes/pallet	1150(L)mm x 890(W)mm x 131(H)mm	334.8	