



- ☐ Draft Specifications
☒ Preliminary Specifications
☐ Final Specifications

Title	19.0-inches Touch Display Product Specifications
Model Name	F190PET-T21
Version	1

Customer

Approved by

Date

Notice: This Specification is subject to change without notice.

Approved By	Prepared By
ZOE NIEN 2026-01-12	ALLEN FANG 2026-01-12

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REVISION HISTORY

Version	ECN No.	Description of Changes	Date	Prepared
0		Preliminary specification first edition	2023-06-15	Allen Fang
1		Modified Label and Drawing	2026-01-12	Allen Fang



1. GENERAL DESCRIPTION

1.1. INTRODUCTION

F190PET-T21 is a 19.0" color active matrix TFT-LCD module M190ETN01.0 (ES8.0 from 00E) with projective capacitive multi-touch B190PBU-E02 air bonding, with touch driver EXC84H4254STAG.

The display format is intended to support the SXGA (1280 (H) x 1024 (V)) screen and 16.7M colors (RGB 8-bits data). All input signals are 2-channel LVDS interface. This module doesn't contain a driver board for backlight.

1.2. FEATURES

- SXGA (1280 x 1024 pixels) resolution
- LVDS Interface with 2 pixel / clock
- 8-bit color depth, display 16.7M colors
- DE (Data Enable) only
- RoHS / Halogen Free

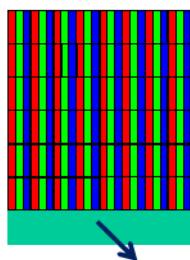
1.3. APPLICATION

- TFT LCD monitor

2. GENERAL SPECIFICATIONS

Parameter	Specification	Unit	Remarks
Active Area Size	19"	inch	
Display Area	376.320 x 301.056 (V)	mm	
Outline Dimension	396.00 (H) x 324.00 (V) x 14.19 (D)	mm	D:PCAP+LCM
Weight	2550	g	Typ.
Driver Element	a-Si TFT active matrix	-	
Display Colors	16.7M (RGB 8-bit)	Colors	
Electrical Interface	LVDS	-	
Number of Pixels	1280(H) x 1024 (V)	pixels	
Pixel Pitch	0.294(H) x 0.294(W)	mm	
Pixel Arrangement	RGB vertical stripe	-	
Display Mode	TN mode, Normal White	-	
NTSC	72	%	
Touch Technology	Projected Capacitive Multi-Touch Panel	-	
Touch Method	Finger or exclusive pen	-	
Numbers of Touch	10	Points	
Touch Driver	EXC84H4254STAG : USB	-	
Touch Sensor Glass Type	Strengthening Glass	-	
Touch Controller IC	EETI, EXC80H84	-	
Touch Driver Interface	USB 2.0	-	
Support OS	Windows (Embedded/CE/XP/2000/Vista/7/8/10) / Linux / Android	-	

LCD Pixel arrangement



Source Board



3.ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Parameter	Symbol	Min.	Max.	Unit
Logic/LCD Drive Voltage	V_{DD}	-0.3	6.0	V
LCD Input Signal Voltage	V_{signal}	-0.3	6.0	V
LED String Current	I_S	0	90	mA
Operating Temperature	T_{op}	0	50	°C
Operating Humidity	H_{op}	20	80	%RH
Storage Temperature	T_{st}	-20	60	°C
Storage Humidity	H_{st}	20	90	%RH
Touch DC Supply Voltage	I2C	-0.3	3.6	V
Touch DC Supply Voltage	USB	-0.3	6.0	V

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

4.ELECTRICAL CHARACTERISTICS

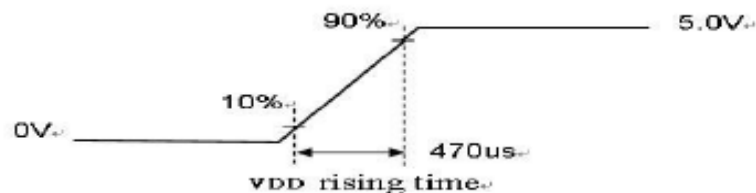
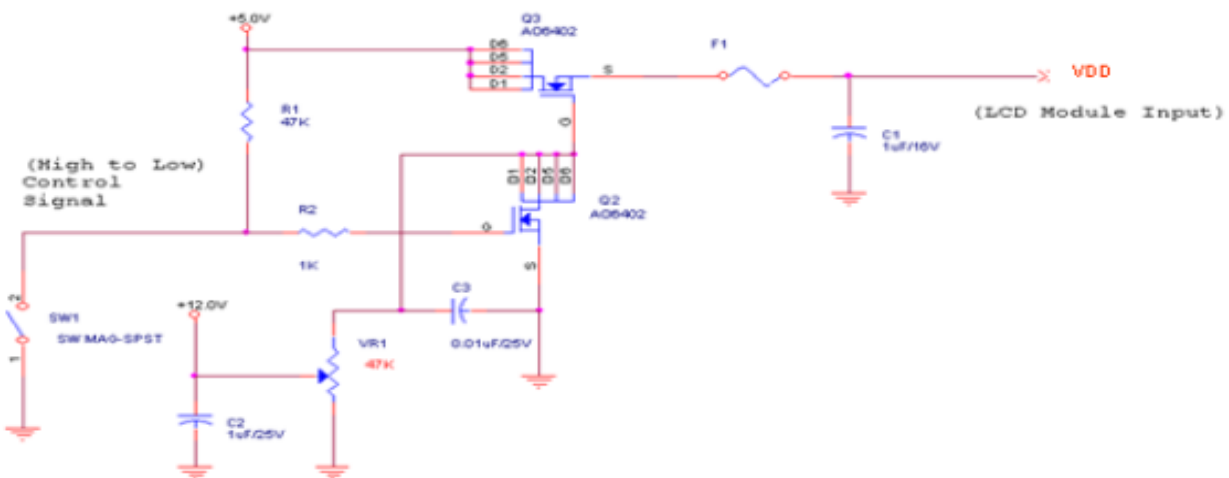
4.1.LCD MODULE

4.1.1.POWER SPECIFICATION

Parameter	Symbol	Min.	Typ.	Max.	Units	Remark
Logic/LCD Drive Voltage	VDD	4.5	5.0	5.5	V	
Input Current	IDD	-	0.53	0.64	A	VDD=5.0V, Black Pattern, F _V =60Hz
		-	0.61	0.73	A	VDD=5.0V, Black Pattern, F _V =75Hz
VDD Power	PDD	-	2.7	3.2	W	VDD=5.0V, Black Pattern, F _V =60Hz
		-	3.05	3.7	W	VDD=5.0V, Black Pattern, F _V =75Hz
Inrush Current	IRush	-	-	3.0	A	Note 1
Allowable VDD Ripple Voltage	VDDrp	-	-	500	mV P-P	VDD=5.0V, Black Pattern, F _V =75Hz

Note1: Inrush Current Measurement:

Test circuit:



The duration of VDD rising time: 470us.

4.1.2. LVDS DC ELECTRICAL CHARACTERISTICS

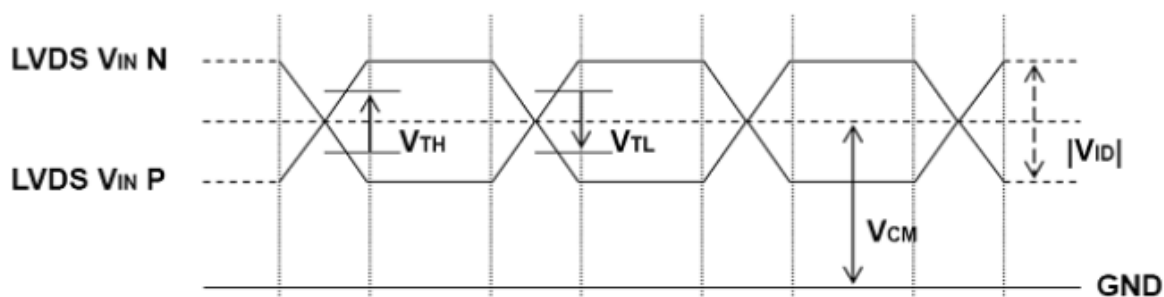
a. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Differential Input High Threshold	V_{TH}	-	-	+100	mV	$V_{CM}=1.2V$
Differential Input Low Threshold	V_{TL}	-100	-	-	mV	$V_{CM}=1.2V$
Input Differential Voltage	$ V_{ID} $	100	-	600	mV	Note
Differential Input Common Mode Voltage	V_{ICM}	+1.0	+1.2	+1.5	V	$V_{TH}-V_{TL}=200mV$

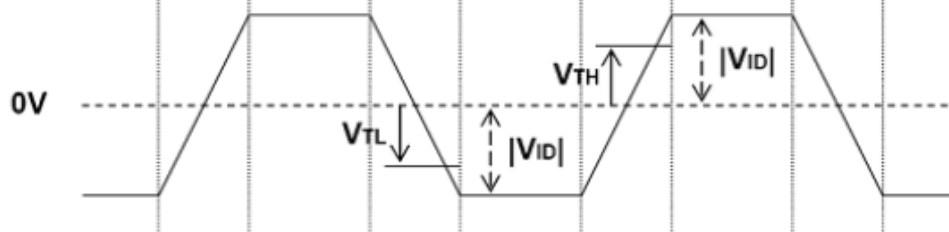
LVDS signal waveform :

Use RxOCLK- & RxOCLK+ as example.

Single-End

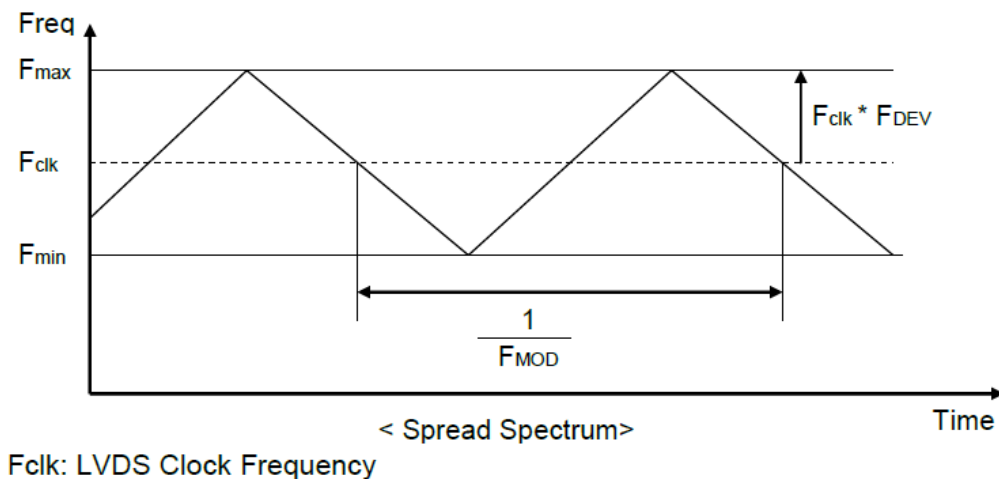


Differential Signal



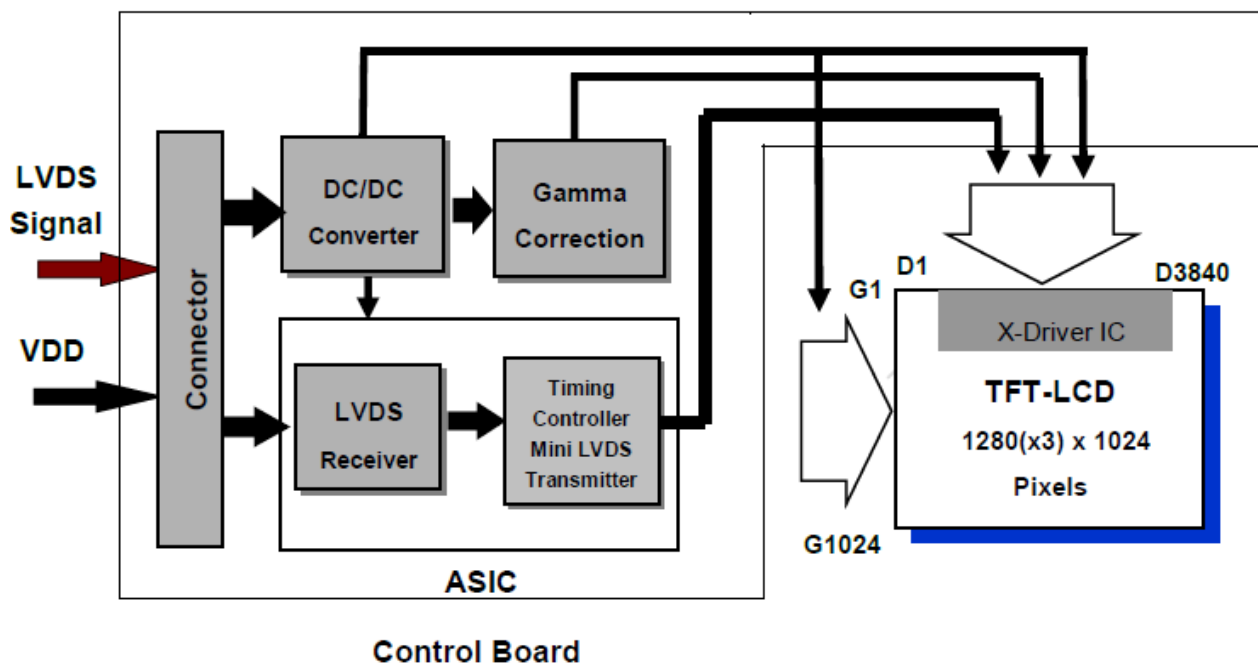
b. AC Characteristics

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	



4.1.3. LCD BLOCK DIAGRAM

The following shows the block diagram of the 19.0 inch Color TFT-LCD Module.

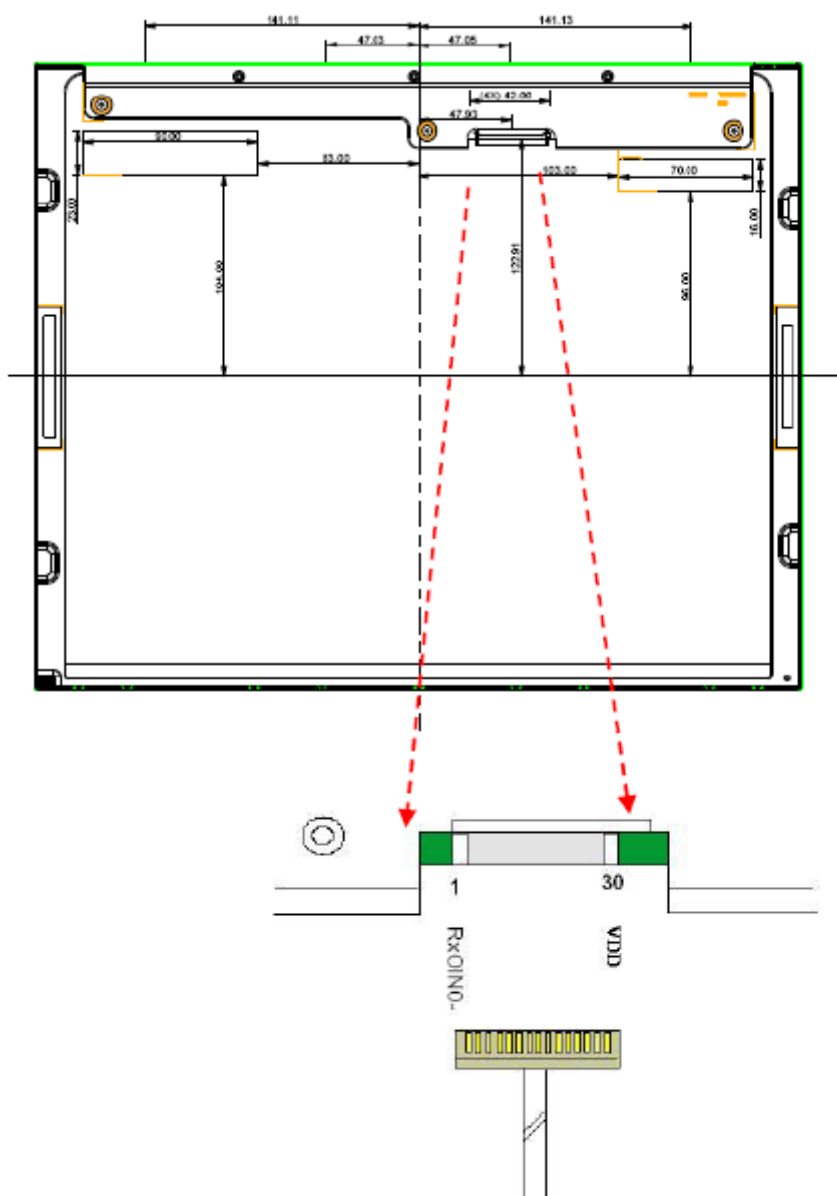


4.1.4. LCD INPUT TERMINAL PIN ASSIGNMENT

Pin	Symbol	Description	Note
1	RX00-	Negative transmission data of Odd pixel 0	
2	RX00+	Positive transmission data of Odd pixel 0	
3	RX01-	Negative transmission data of Odd pixel 1	
4	RX01+	Positive transmission data of Odd pixel 1	
5	RX02-	Negative transmission data of Odd pixel 2	
6	RX02+	Positive transmission data of Odd pixel 2	
7	GND	Ground	
8	RXOCLK-	Negative of clock Odd pixel	
9	RXOCLK+	Positive of clock Odd pixel	
10	RX03-	Negative transmission data of Odd pixel 3	
11	RX03+	Positive transmission data of Odd pixel 3	
12	RXE0-	Negative transmission data of Even pixel 0	
13	RXE0+	Positive transmission data of Even pixel 0	
14	GND	Ground	
15	RXE1-	Negative transmission data of Even pixel 1	
16	RXE1+	Positive transmission data of Even pixel 1	
17	GND	Ground	
18	RXE2-	Negative transmission data of Even pixel 2	
19	RXE2+	Positive transmission data of Even pixel 2	
20	RXECLK-	Negative of clock Even pixel	
21	RXECLK+	Positive of clock Even pixel	
22	RXE3-	Negative transmission data of Even pixel 3	
23	RXE3+	Positive transmission data of Even pixel 3	
24	GND	Ground	
25	GND	NC	
26	NC	No Connection (for AUO test)	
27	NC	No Connection (for AUO test)	
28	POWER	Power +5V	
29	POWER	Power +5V	
30	POWER	Power +5V	

Connector Type :

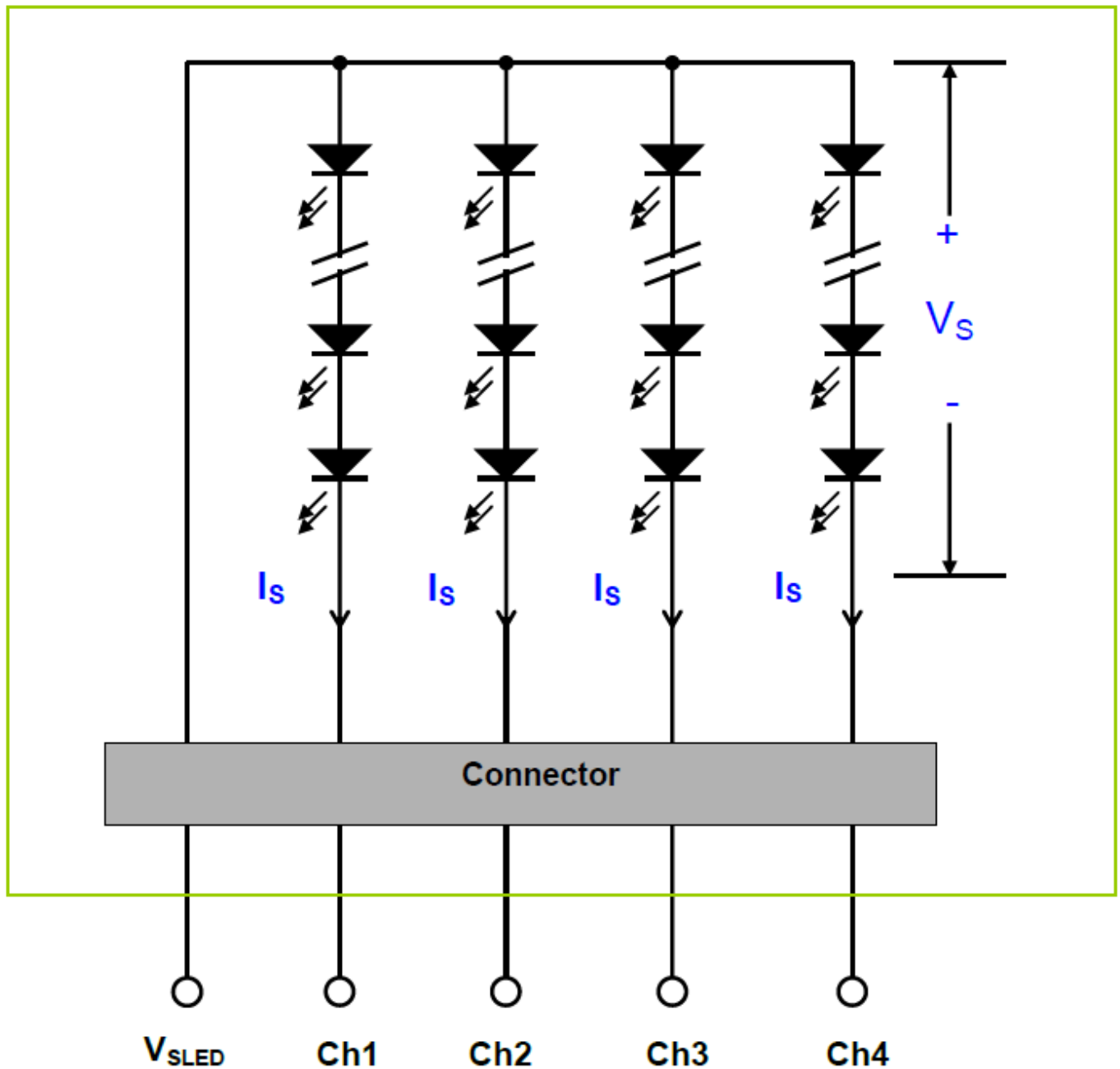
TFT-LCD Connector	Manufacturer	P-TWO	STM
	Part Number	187034-3009	MSBKT2407P30HB
Mating Connector	Manufacturer	JAE or Compatible	
	Part Number	FI-X30HL (Lock Type)	



4.1.5. LCD BACKLIGHT UNIT

4.1.5.1. BLOCK DIAGRAM

The following shows the block diagram of the 19.0 inch Backlight Unit. And it includes 44 pcs LED in the LED light bar. (4 strings and 11 pcs LED of one string)



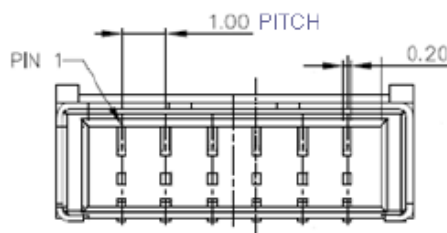
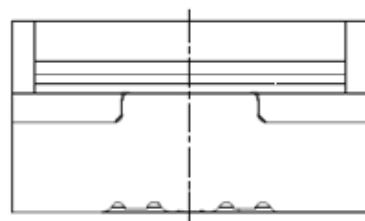
4.1.6. LED BACKLIGHT UNIT

Connector Type:

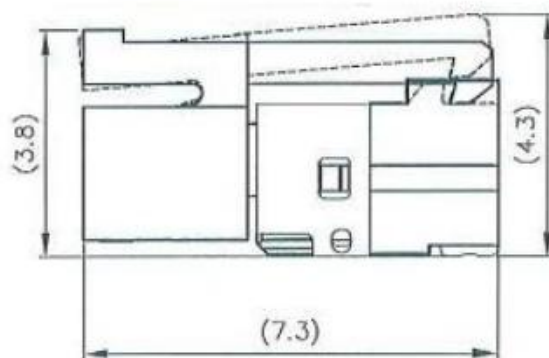
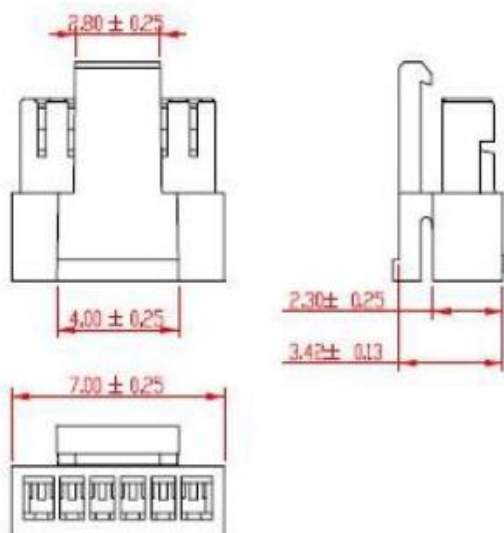
Backlight Connector	Manufacturer	ENTERY
	Part Number	3707K-S06N-21R
Mating Connector	Manufacturer	ENTERY
	Part Number	H112K-P06N-00B (Non-Locking type) H112K-P06N-13B (Locking type)

Backlight Connector dimension:

H x V x D = 13.9 x 3.00 x 4.25, Pitch = 1.0 (unit=mm)

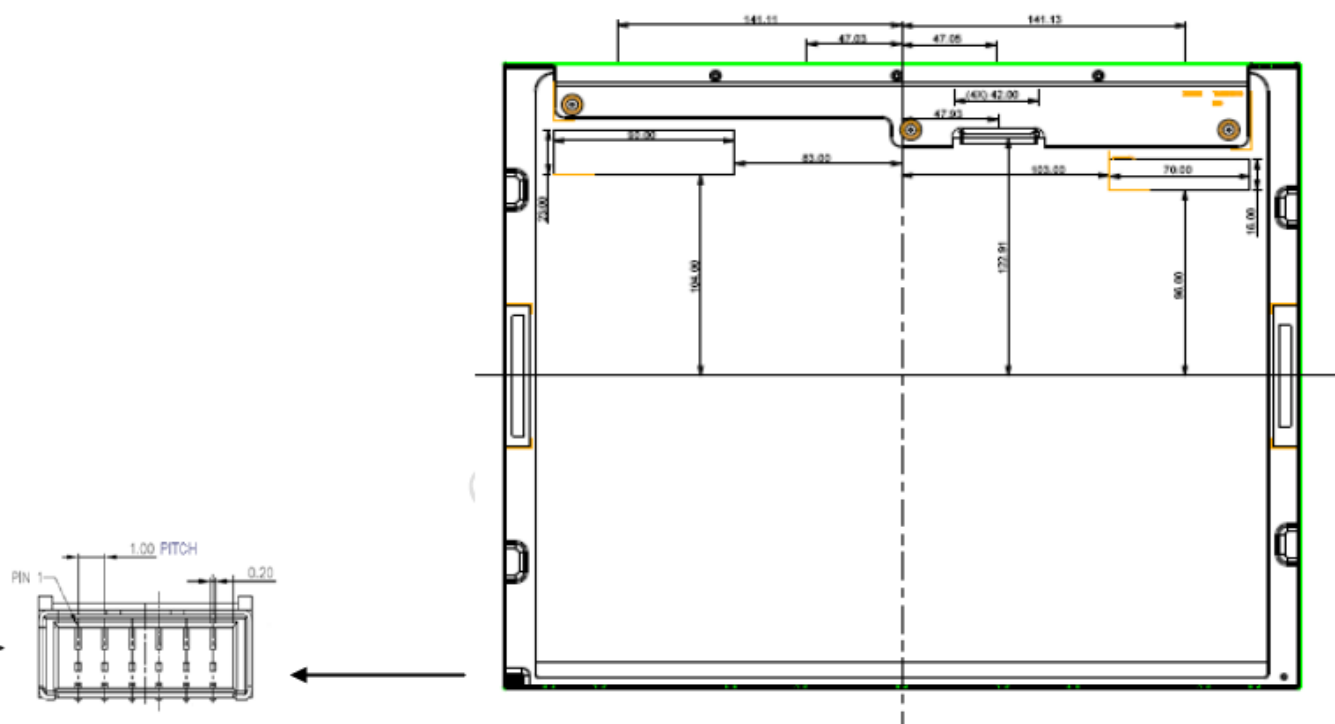


Mating Connector dimension:



Connector Pin Assignment:

Pin No.	Symbol	Description	Remark
1	Ch1	LED Current Feedback Terminal (Channel 1)	
2	Ch2	LED Current Feedback Terminal (Channel 2)	
3	V _{SLED}	LED Power Supply Voltage Input Terminal	
4	V _{SLED}	LED Power Supply Voltage Input Terminal	
5	Ch3	LED Current Feedback Terminal (Channel 3)	
6	Ch4	LED Current Feedback Terminal (Channel 4)	



Recommended Operating Condition

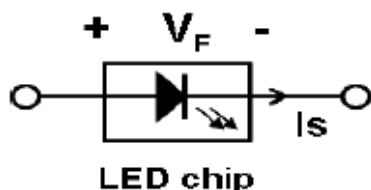
(Ta=25°C)

Symbol	Parameter	Min.	Typ.	Max.	Units	Remark
I_S	LED String Current	-	50	53	mA	100% duty ratio of LED chip (Note 6)
V_S	LED String Voltage	27.2	30.5	33.7	V	$I_S=45\text{mA}@100\%$ duty ratio (Note1, 5, 7)
ΔV_S	Maximum VS Voltage Deviation of light bar	-	-	2.2	V	$I_S=45\text{mA}@100\%$ duty ratio (Note 2)
P_{BLU}	LED Light Bar Power Consumption	-	6.1	6.74	W	(Note 3)
LT_{LED}	LED Life Time	30,000			Hour	(Note 4)
OVP	Over Voltage Protection in system board	110% VS (Max.)			V	(Note 5)

Note 1: V_S (Typ.) = V_F (Typ.) x LED No. (One string);

a. V_F : LED chip forward voltage, V_F (Min.) = 2.47 V, V_F (Typ.) = 2.77 V, V_F (Max.) = 3.06 V

b. The same equation to calculate V_S (Min.) & V_S (Max.) for respective V_F (Min.) & V_F (Max.)



Note 2: ΔV_S (Max.) = ΔV_F X LED No. (One string);

a. ΔV_F : LED chip forward voltage deviation; (0.2V, each Bin of LED V_F)

Note 3: P_{BLU} (Typ.) = V_S (Typ.) X I_S (Typ.) x 4; (4 is total String No. of LED Light bar)

P_{BLU} (Max.) = V_S (Max.) X I_S (Typ.) x 4;

Note 4: Definition of life time:

a. Brightness of LED becomes to 50% of its original value

b. Test Condition: $I_S = 50\text{mA}$ and $T_a=25^\circ\text{C}$ (Room Temperature)

Note 5: Recommendation for LED driver power design:

Due to there are electrical property deviation in LED & monitor set system component after long time operation. AUO strongly recommend the design value of LED driver board OVP (over voltage protection) should be 10% higher than maximum value of LED string voltage (V_S) at least.

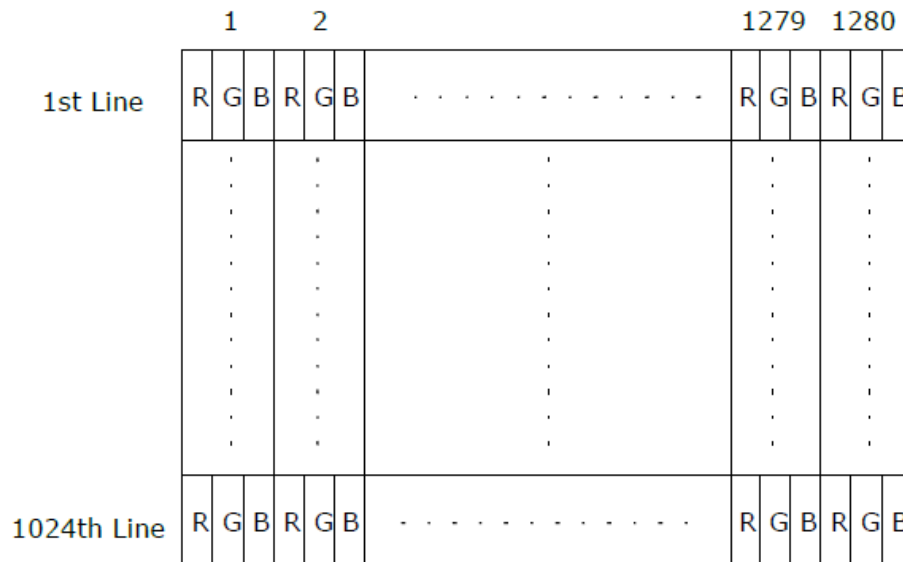
Note 6: AUO strongly recommended "Analog Dimming" method for backlight brightness control for Wavy Noise Free. Otherwise, recommend that Dimming Control Signal (PWM Signal) should be synchronized with Frame Frequency.

Note 7: Ensure that the LED light bar is not subjected either forward or reverse voltage while monitor set is on standby mode or not in use.

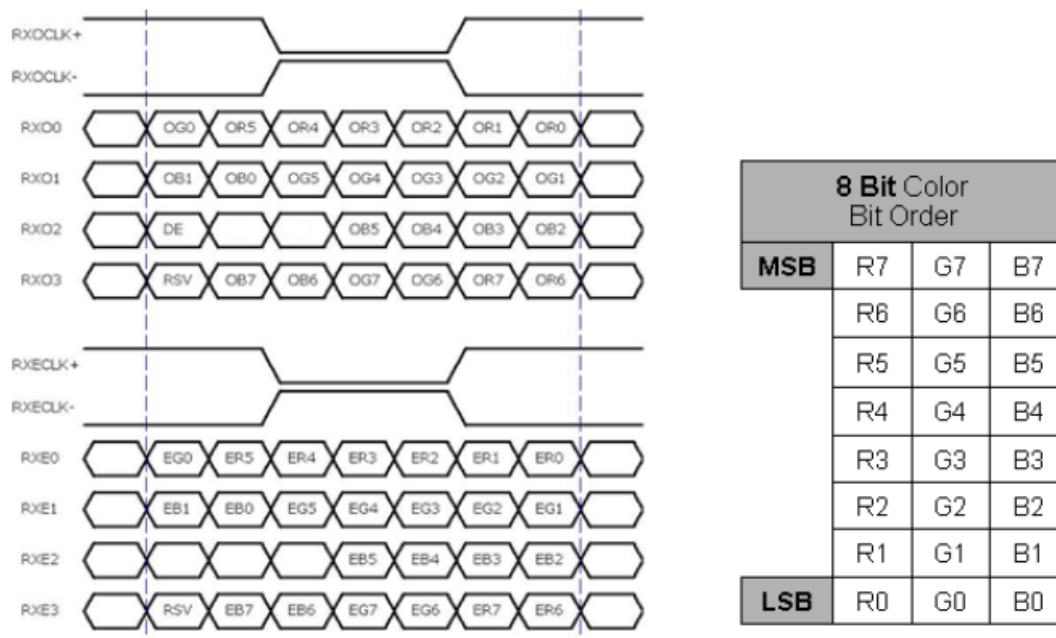
4.1.7. LCD SIGNAL CHARACTERISTIC

4.1.7.1. PIXEL FORMAT IMAGE

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



4.1.7.2. THE LCD INPUT DATA FORMAT



Note1: O="Odd Pixel Data" E="Even Pixel Data"

Note2: Refer to 4.1.7.1 Pixel Format IMAGE, 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)

4.1.7.3. COLOR VERSUS INPUT DATA

The following table is for color versus input data (8bit).

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		
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 127	-	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	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	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		
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	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		
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	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		

4.1.8. LCD INPUT TIMING SPECIFICATION

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

Signal		Symbol	Min.	Typ.	Max.	Unit
Vertical Section	Period	T _V	1036	1066	1873	T _{Line}
	Active	T _{VD}	1024			
	Blanking	T _{VB}	12	42	849	
	Frequency	F _V	50	60	76	Hz
Horizontal Section	Period	T _H	730	844	1320	T _{dclk}
	Active	T _{HD}	640			
	Blanking	T _{HB}	90	204	680	
	Frequency	F _H	51.8	64	93.7	KHz
Clock	Period	T _{CLK}	14.6	18.5	26.4	ns
	Frequency	F _{CLK}	37.8	54	68.4	MHz

Note 1: The optimal Vertical Frequency is 50~76 Hz for best picture quality.

Note 2: The equation is listed as following. Please don't exceed the above recommended value.

$$F_H (\text{Min.}) = F_{CLK} (\text{Min.}) / T_H (\text{Min.});$$

$$F_H (\text{Typ.}) = F_{CLK} (\text{Typ.}) / T_H (\text{Typ.});$$

$$F_H (\text{Max.}) = F_{CLK} (\text{Max.}) / T_H (\text{Min.});$$

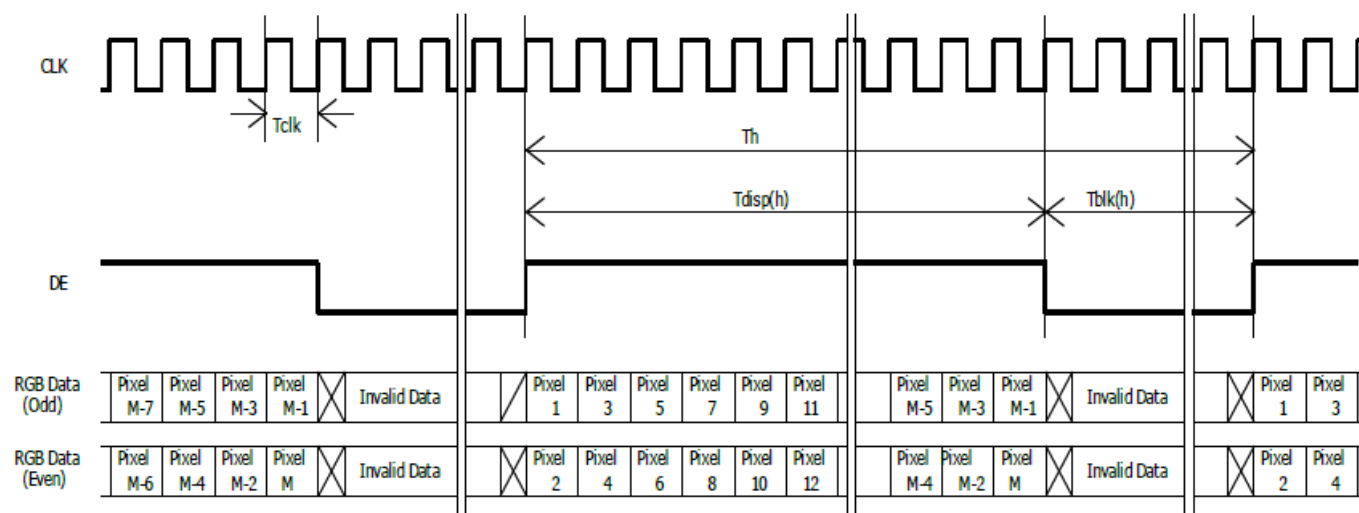
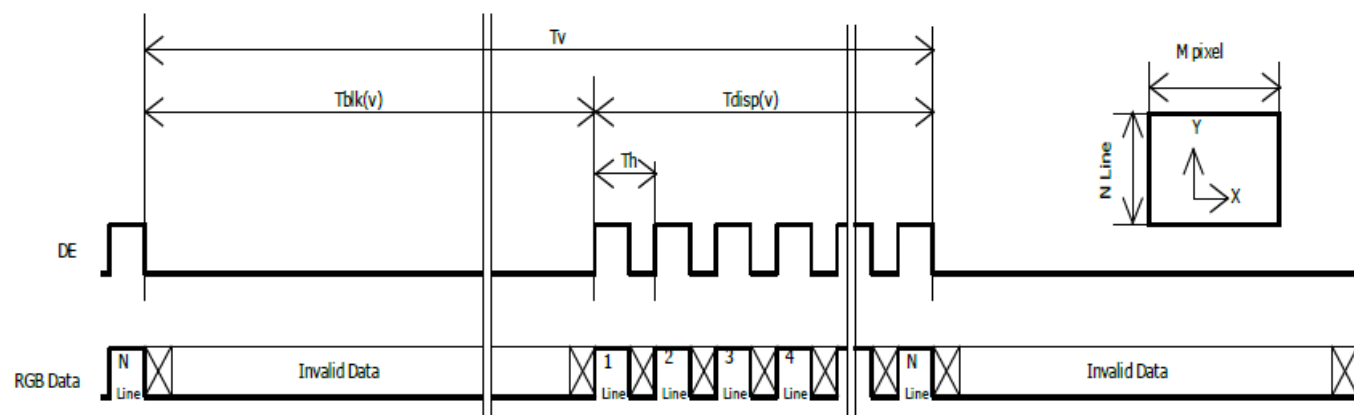
Note 3: The equation is listed as following. Please don't exceed the above recommended value.

$$F_{CLK} (\text{Min.}) = F_V (\text{Min.}) \times T_H (\text{Min.}) \times T_V (\text{Min.});$$

$$F_{CLK} (\text{Typ.}) = F_V (\text{Typ.}) \times T_H (\text{Typ.}) \times T_V (\text{Typ.});$$

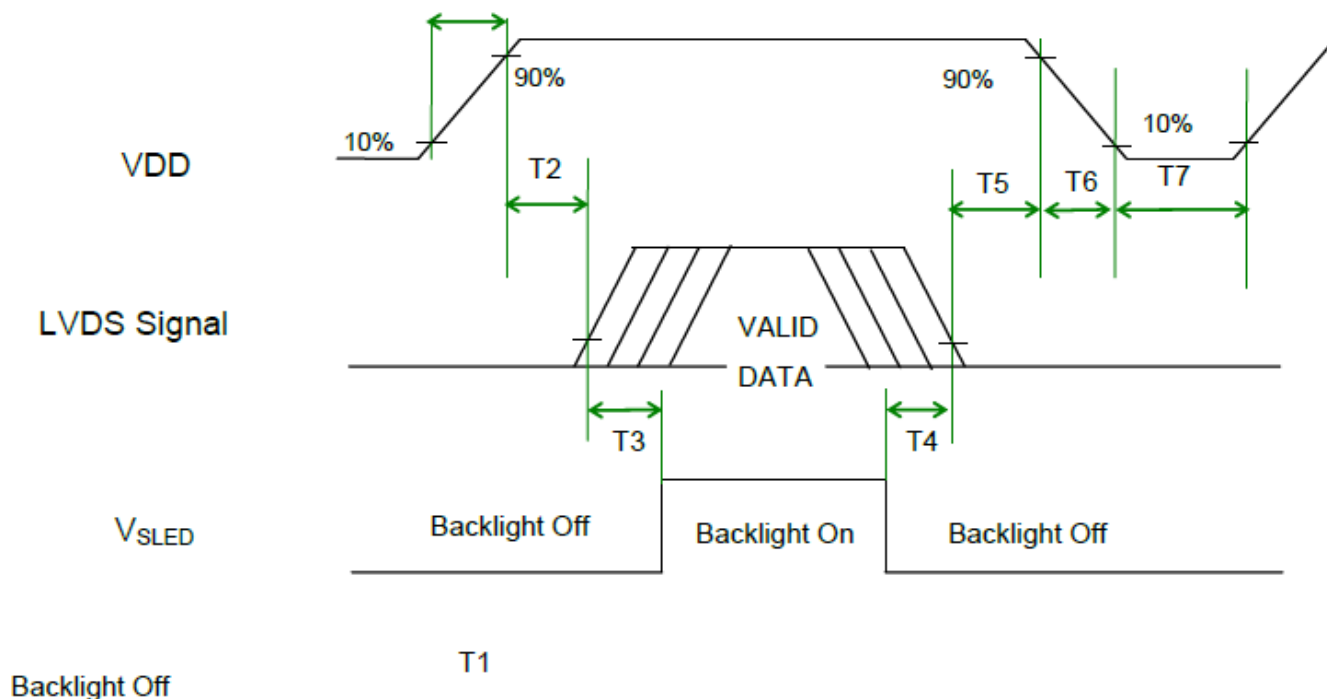
$$F_{CLK} (\text{Max.}) = F_V (\text{Max.}) \times T_H (\text{Typ.}) \times T_V (\text{Typ.});$$

4.1.9. LCD INPUT TIMING DIAGRAM



4.1.10. POWER SEQUENCE FOR LCD

VDD power and lamp on/off sequence are as follows. 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	0	-	50	ms
T3	500	-	-	ms
T4	100	-	-	ms
T5	0	-	50	ms
T6	0	-	200	ms
T7	1000	-	-	ms

Note 1: Recommend setting T5=0ms to avoid electronic noise when VDD is off.

Note 2: During T5 period, please keep the level of input LVDS signals with Hi-Z state.

Note 3: If T4<100ms, there will be no reliability concern, but the display may momentarily show abnormal screen.



4.2.TOUCH PANEL

4.2.1. TOUCH PIN ASSIGNMENT

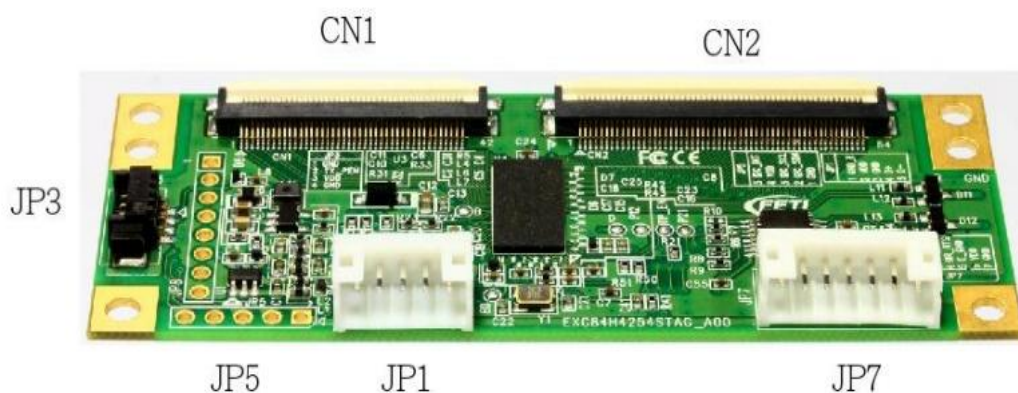
CN1						CN2					
PIN	SYMBOLS	PIN	SYMBOLS	PIN	SYMBOLS	PIN	SYMBOLS	PIN	SYMBOLS	PIN	SYMBOLS
1	TX_S2	21	TX20	41	TX0	1	RX_S1	21	RX32	41	RX12
2	TX39	22	TX19	42	TX_S0	2	RX51	22	RX31	42	RX11
3	TX38	23	TX18			3	RX50	23	RX30	43	RX10
4	TX37	24	TX17			4	RX49	24	RX29	44	RX9
5	TX36	25	TX16			5	RX48	25	RX28	45	RX8
6	TX35	26	TX15			6	RX47	26	RX27	46	RX7
7	TX34	27	TX14			7	RX46	27	RX26	47	RX6
8	TX33	28	TX13			8	RX45	28	RX25	48	RX5
9	TX32	29	TX12			9	RX44	29	RX24	49	RX4
10	TX31	30	TX11			10	RX43	30	RX23	50	RX3
11	TX30	31	TX10			11	RX42	31	RX22	51	RX2
12	TX29	32	TX9			12	RX41	32	RX21	52	RX1
13	TX28	33	TX8			13	RX40	33	RX20	53	RX0
14	TX27	34	TX7			14	RX39	34	RX19	54	RX_50
15	TX26	35	TX6			15	RX38	35	RX18		
16	TX25	36	TX5			16	RX37	36	RX17		
17	TX24	37	TX4			17	RX36	37	RX16		
18	TX23	38	TX3			18	RX35	38	RX15		
19	TX22	39	TX2			19	RX34	39	RX14		
20	TX21	40	TX1			20	RX33	40	RX13		

4.3.TOUCH DRIVER

Control Board : ETP-MB-EXC84H4254STAG

No.	Item	Specification
1	Touch Controller IC	EXC80H84
2	Number Of Support	10 Fingers Touch
3	FPC Type / Interface	USB / RS232

Interface	Symbol	Condition	Min.	Typ.	Max.	Unit
JP1/JP7	VDD	DC	3.5	5	5.5	V



Connector Pin Configuration

JP1 USB connector

JP1	
1	GND_E
2	VDD
3	GND
4	D+
5	D-

JP5 I2C connector

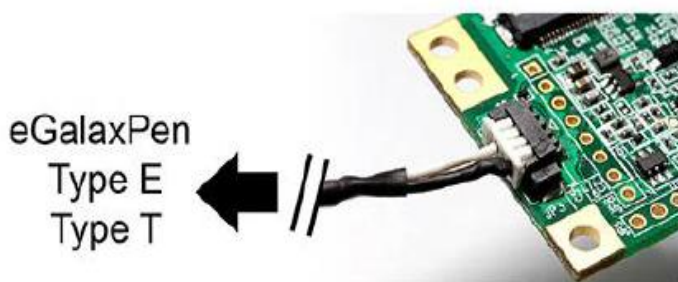
JP5	
1	GND
2	I2C_SDA
3	I2C_SCL
4	VDD
5	I2C_INT

JP7 RS232 connector

JP7	
1	UR_CTS
2	UR_TX
3	UR_RX
4	UR_RTS
5	GND_E
6	VDD
7	GND

JP3 Tethered active stylus connector

JP3	
1	GND_D
2	TX_PEN
3	VDD
4	GND_D



*JP3 connector is reserved for EETI tethered active stylus:

Type E: Entry-type active stylus

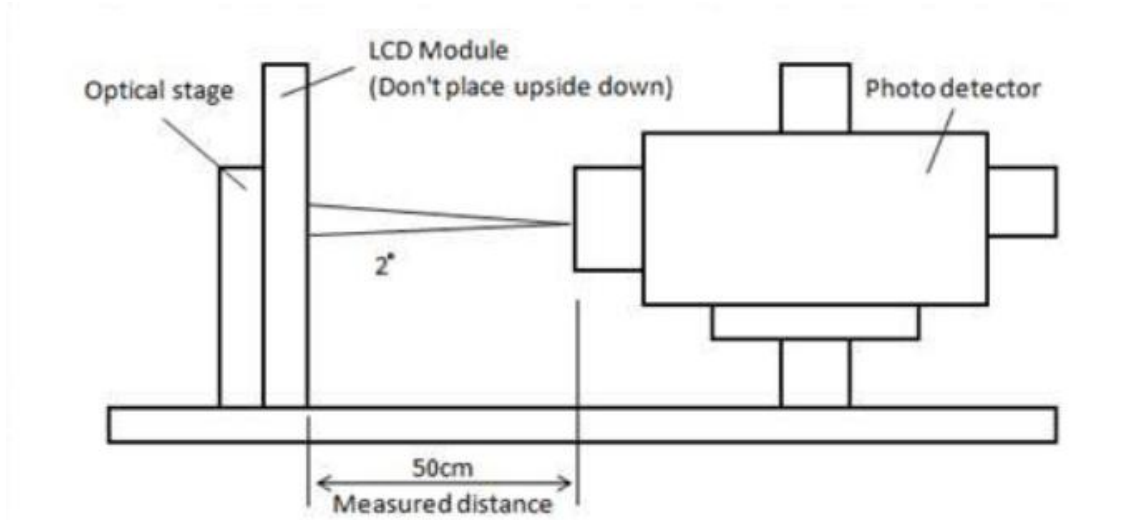
Type T: Tethered USB active stylus

5.OPTICAL CHARACTERISTICS

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

The optical characteristics are measured under stable conditions at 23 ± 0.5 (Room Temperature).								
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
White Luminance		L _W	Center point	200	250	--	Cd/m ²	1
Luminance Uniformity		δ _{W9p}	9 points	75	80	--	%	2, 3
Contrast Ratio		CR	Center point	600	1000	--	-	4
Viewing Angle	Horizontal CR=10	θ _r	CR=10	75	85	--	degree	3
		θ _l		75	85	--		
	Vertical CR=10	θ _u		70	80	--		
		θ _d		70	80	--		
Response Time		T _R	Rising	--	3.6	5.7	ms	5
		T _F	Falling	--	1.4	2.3		
		T _R +T _F	Rising+Falling	--	5	8		
Color Coordinates	Red	R _x	CIE 1931	0.617	0.647	0.677	-	
		R _y		0.311	0.341	0.371		
	Green	G _x		0.296	0.326	0.356		
		G _y		0.596	0.626	0.656		
	Blue	B _x		0.122	0.152	0.182		
		B _y		0.025	0.055	0.085		
	White	W _x		0.283	0.313	0.343		
		W _y		0.299	0.329	0.359		
NTSC				--	72	--	%	

Note 1: Equipment setup:

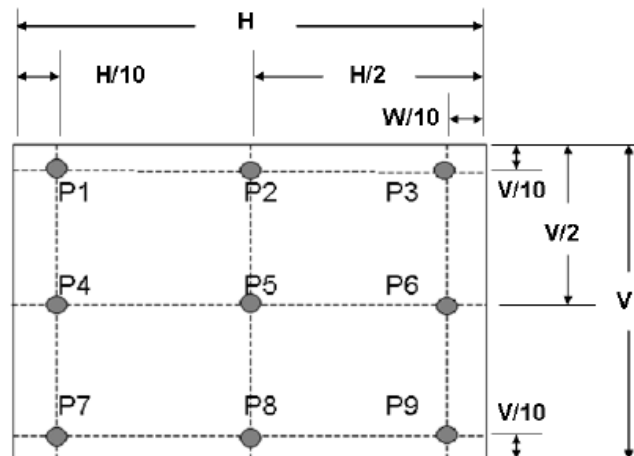


Note 2: Luminance Uniformity Measurement

Definition :

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

Test Pattern: White Pattern



Note 3: Definition of contrast ratio (CR).

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance of White pattern}}{\text{Luminance of Black pattern}}$$

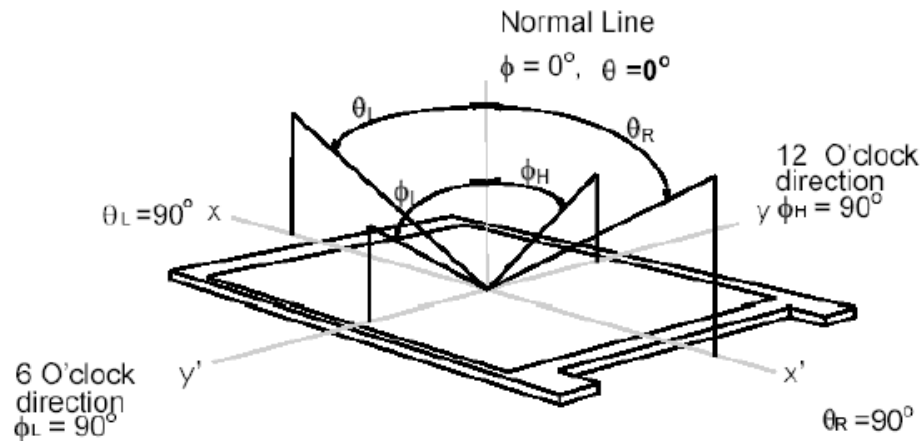
Measured position: Center of screen (P5) & perpendicular to the screen ($\theta=\Phi=0^\circ$)

Note 4: Viewing angle measurement

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

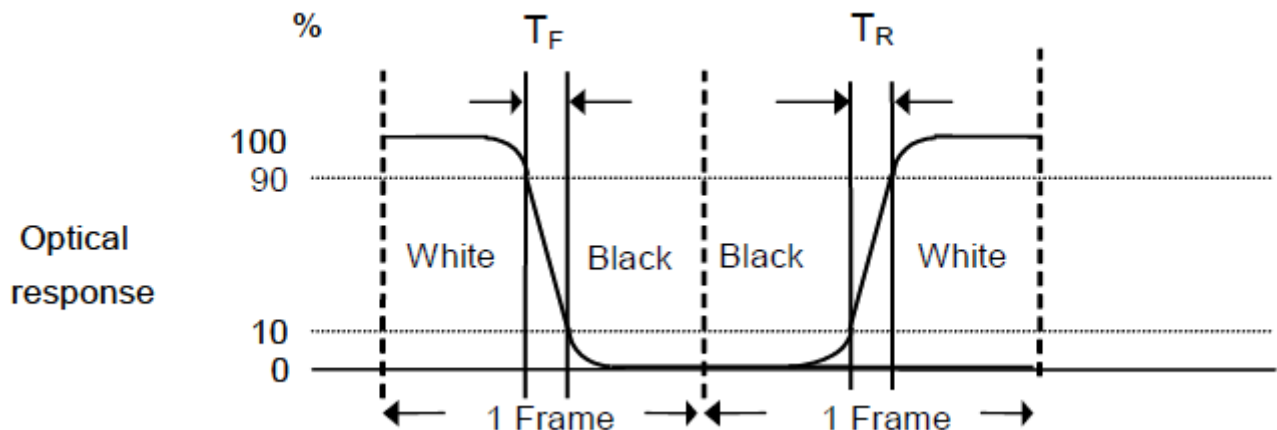
Horizontal view angle: Divide to left and right (θ_L & θ_R)

Vertical view angle: Divide to up and down (ϕ_H & ϕ_L)



Note 5: Response time measurement

The output signals of photo detector are measured when the input signals are changed from display “White” to “Black” (falling time) and from display “Black” to “White” (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.



6.RELIABILITY TEST ITEMS

Test Item		Condition
1	High temperature storage test	60°C, 240hrs
2	Low temperature storage test	-20°C, 240hrs
3	High temperature/Humidity Bias test	50°C, 80%RH, 240hrs
4	High temperature operation test	50°C, 50%RH, 240hrs
5	Low temperature operation test	0°C, 240hrs
6	Thermal Cycle storage test	-20°C(30min)~60°C(30min), 10cycles

7.LABEL

Model No. F190PET-T21

條碼

SN 3A Z 20 2 21 0 XXX1

W=14mm



L=32mm

字型:Arial (6)

Code: 128

字型 : Arial(8)

Code1, 2 Production location

Code 3 Production version

Code 4, 5 Production year

Code 6 Production month

Code 7, 8 Production day

Code 9 Production code

Code 10, 11, 12, 13 Serial number

8.MECHANICAL CHARACTERISTICS

Item		Dimension	Unit	Note
Outline Dimension	Horizontal	395.70	mm	PCAP : B190PBU-E02
	Vertical	323.70	mm	
	Depth	2.75	mm	
	Horizontal	396.00	mm	LCD : M190ETN01.0 (ES8.0 from 00E)
	Vertical	324.00	mm	
	Depth	14.19	mm	
	Horizontal	82.50	mm	Touch Driver : ETP-MP-EXC84H4254STAG
	Vertical	33.00	mm	
	Depth	7.50	mm	
Weight		2550	g	F190PET-T21
Item		Specification		Remarks
PCAP Viewing Area		379.40 mm x 304.10 mm		
PCAP Sensor Area		394.70 mm x 322.70 mm		
PCAP FPC Length		96.65 mm		
PCAP Input method		Finger or exclusive pen		
PCAP Light Transmission		≥ 90% ±3%		
PCAP Operation force		≤10g		Finger Input
PCAP Hardness of surface		≥7H		Pressure 500gf test
PCAP Surface Treatment		Haze <4%		BYK Gardner , ASTM D1003



Front View



Back View



9. ENGINEERING DRAWING

