



- ☐ Draft Specifications
- ☒ Preliminary Specifications
- ☐ Final Specifications

Title	21.5-inches Touch Display Product Specifications
Model Name	F215PET-Z13
Version	1

Customer

Approved by

Date

Notice: This Specification is subject to change without notice.

Approved By	Prepared By
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2025-12-16	2025-12-16



REVISION HISTORY

Version	ECN No.	Description of Changes	Date	Prepared
0		Preliminary specification first edition	2025-05-12	Allen Fang
1		Modified Label & Drawing	2025-12-16	Allen Fang



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1. GENERAL DESCRIPTION

1.1. INTRODUCTION

F215PET-Z13 is a 21.5" wide color AHVA (IPS-Like) TFT LCD module G215HAN01.5 01 with projected capacitive multi-touch B215PBU-E05 air bonding, with touch driver ETP-MB-EXC84H5680STAG.

The display format is intended to support the FHD mode (1920(H) x 1080(V)) screen and 2 channel 30 pins LVDS interface, 16.7M colors, with white LEDs backlight.

1.2. FEATURES

- FHD (1920x1080) resolution
- LVDS interface with 2 pixel / clock
- 8-bit color depth, display 16.7M colors
- DE (Data Enable) only
- RoHS product

1.3. APPLICATION

- Desktop Type of PC & Workstation Use
- Slim-Size Display for Stand-alone Monitor
- Display Terminals for Control System
- Monitors for Process Controller



2. GENERAL SPECIFICATIONS

Parameter	Specification	Unit	Remarks
Active Area Size	21.5	inch	
Display Area	476.064(H) x 267.786(V)	mm	
Outline Dimension	517.00 (H) x 315.00 (V) x 15.76 (D)	mm	D:PCAP+LCM
Weight	3200	g	Typ.
Driver Element	a-Si TFT active matrix	-	
Display Colors	16,7M (RGB 8-bits)	Colors	
Electrical Interface	2-ch LVDS	-	
Number of Pixels	1920 (H) x 1080 (V)	pixels	
Pixel Pitch	0.24795 (H) x 0.24795 (W)	mm	
Pixel Arrangement	RGB vertical stripe	-	
Display Mode	AHVA / Normal Black	-	
Color Gamut	72	%	
Touch Technology	Projected Capacitive Multi-Touch Panel	-	
Touch Method	Finger or exclusive pen	-	
Numbers of Touch	10	Points	
Touch Driver	ETP-MB-EXC84H5680STAG : 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 / MAC / QNX	-	



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	+5.5	V
LED Supply Voltage	V_F	-0.3	+51.2	V
Operating Temperature	T_{op}	-10	+60	°C
Operating Humidity	H_{op}	5	90	%RH
Storage Temperature	T_{st}	-20	+60	°C
Storage Humidity	H_{st}	5	90	%RH
Touch DC Supply Voltage	USB	-0.3	6.0	V

Note:

1. Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.
2. Maximum Wet-Bulb temperature should be 39°C and no condensation.

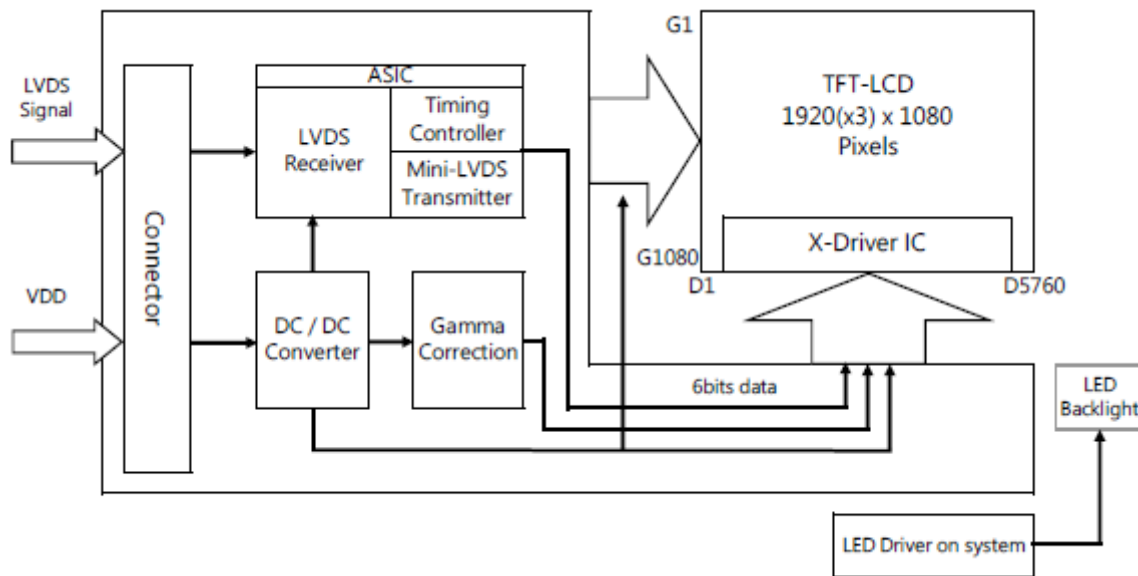
The relative humidity must not exceed 90% non-condensing at temperatures of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C.

4. ELECTRICAL CHARACTERISTICS

4.1.LCD MODULE

4.1.1. LCD BLOCK DIAGRAM

The following diagram shows the function block of the 21.5 inches wide Color TFT/LCD module.



I/F PCB Interface:

Connector: MSBKT2407P30HB

Mating Type:

FI-X30H or FI-X30C2-NPB (Unlocked Type)

4.1.2. POWER SPECIFICATION

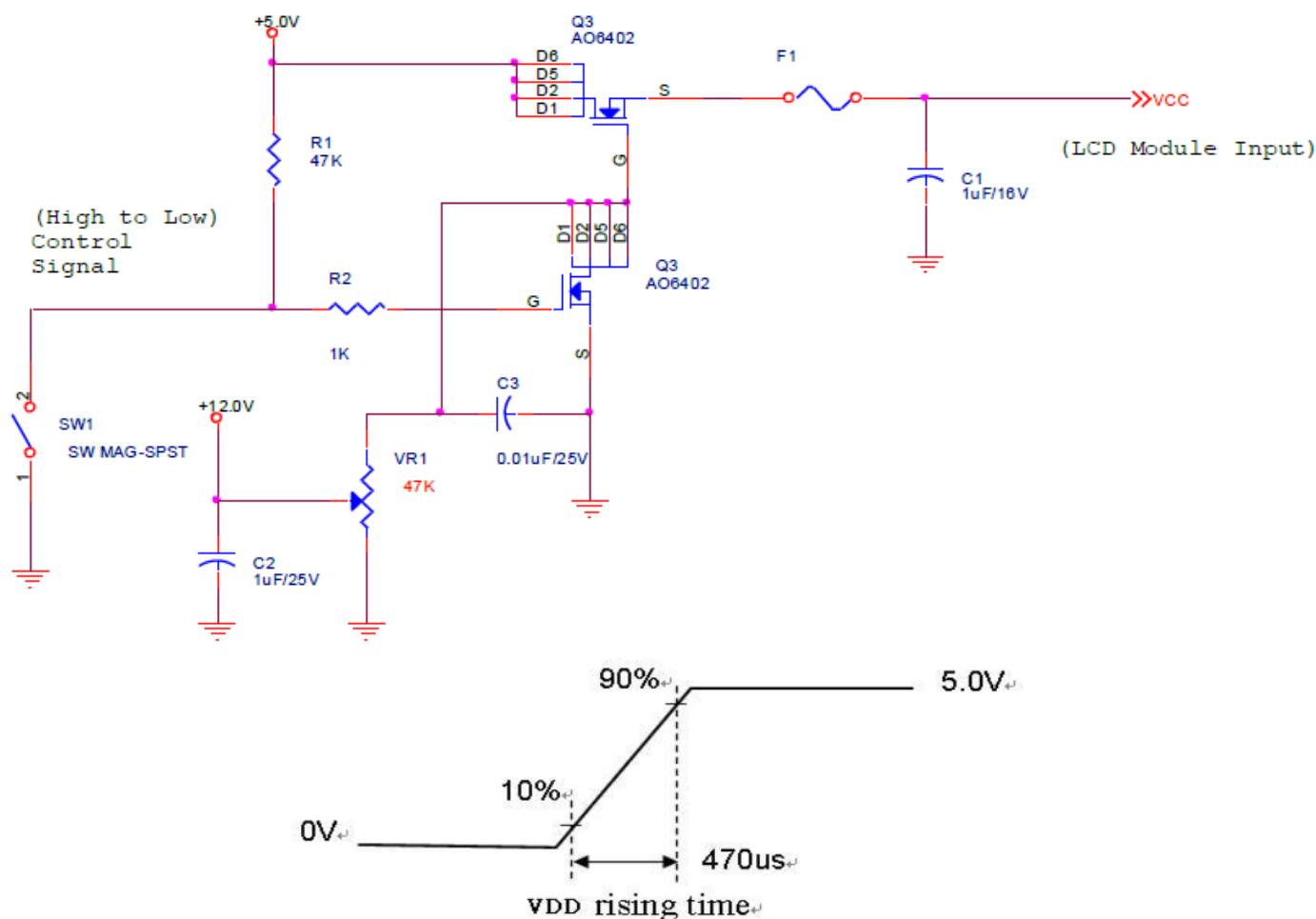
LCD Input power specifications are as below;

The power specifications are measured under 25°C and frame frequency under 60Hz.

Symbol	Parameter	Min.	Typ.	Max.	Units	Remark
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	V	
IDD	IDD Current	-	0.46	0.55	A	All White pattern (VDD=5.0V, at 60Hz)
PDD	VDD Power	-	2.3	2.75	W	All White pattern (VDD=5.0V, at 60Hz)
IRush	Inrush Current	-	-	3.0	A	Note 1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	500	mV p-p	All White pattern (VDD=5.0V, at 60Hz)

Note 1: Measure Condition

The duration of rising time of power input is 470us.



4.1.3. LVDS DC ELECTRICAL CHARACTERISTICS

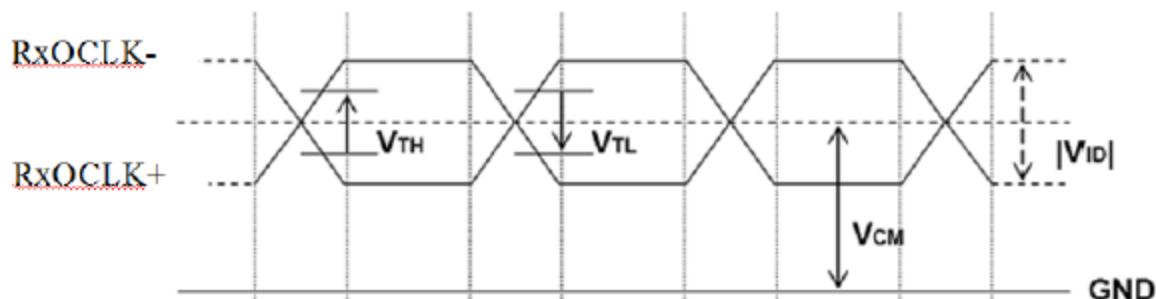
Input signals shall be low or High-Z state when VDD is off. Please refer to the specification of SN75LVDS82DGG (Texas Instruments) in detail.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
V _{TH}	Differential Input High Threshold			+100	mV	V _{CM} =1.2V Note 1
V _{TL}	Differential Input Low Threshold	-100			mV	V _{CM} =1.2V Note 1
V _{ID}	Input Differential Voltage	100	400	600	mV	Note 1
V _{ICM}	Differential Input Common Mode Voltage	1.0	1.2	1.5	V	V _{TH} -V _{TL} =200mV(max) Note 1

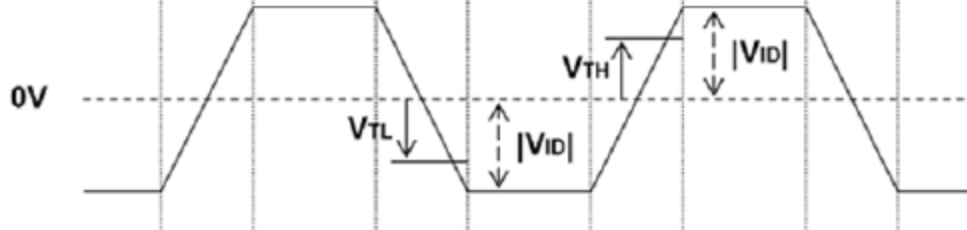
Note 1: LVDS Signal Waveform

Use RxOCLK- & RxOCLK+ as example.

Single-End



Differential Signal



4.1.4. LCD BACKLIGHT UNIT

Parameter	Symbol	Min.	Typ.	Max.	Units	Remark
LED supply Current	I_F		90		mA	$T_a=25^{\circ}\text{C}$
LED Supply Voltage	V_F		3.07	3.20	V	$I_F=(90)\text{mA}$, $T_a=25^{\circ}\text{C}$
LED Power Consumption	P_{LED}	-	0.277		W	$I_F=(90)\text{mA}$, $T_a=25^{\circ}\text{C}$
LED Life-Time	LL	50,000	-	-	Hour	$I_F=(90)\text{mA}$, $T_a=25^{\circ}\text{C}$

Note 1: T_a means ambient temperature of TFT-LCD module.

Note 2: I_F , V_F , P_{LED} are defined for single LED.

Note 3: If G215HAN01.5 01 module is driven by high current or at high ambient temperature & humidity condition. The operation life will be reduced.

Note 4: Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

Note 5: Each LED light bar consists of 64 pcs LED package (4 strings x 16 pcs / string)

4.1.5. LCD INPUT TERMINAL PIN ASSIGNMENT

The module using a pair of LVDS receiver is SN75LVDS82 / SN75LVDS83 (Texas Instruments) or compatible. LVDS is a different signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83 (negative edge sampling) or compatible. The first LVDS port (RxOxxx) transmits odd pixels while the second LVDS port (RxExxx) transmits even pixels.

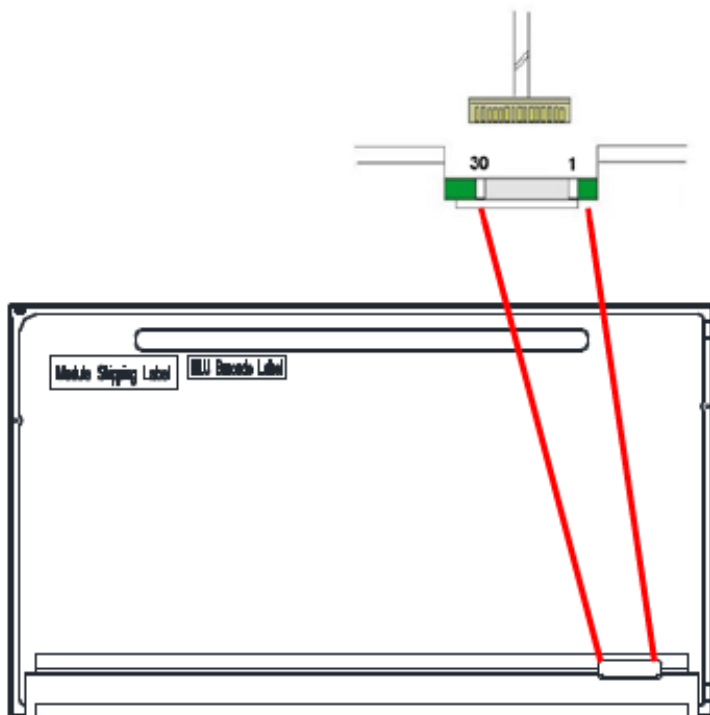
LVDS Connector

TFT-LCD Connector	Manufacturer	STM
	Part Number	MSBKT2407P30HB
Mating Connector	Manufacturer	STM
	Part Number	FI-X30H or FI-X30C2-NPB (Unlocked Type)

Note 1: Start from right side

Pin	Symbol	Description	Note
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 data)	
9	RXOCLK+	Positive LVDS differential clock input (Odd data)	
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 data)	
21	RXECLK+	Positive LVDS differential clock input (Even data)	
22	RXE3-	Negative LVDS differential data input (Even data)	
23	RXE3+	Positive LVDS differential data input (Even data)	
24	GND	Must connect to 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	

Note 1: Input signals shall be low or High-impedance state when VDD is off.



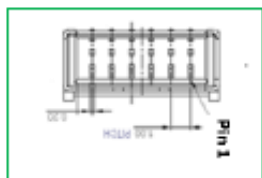
Note 2: Input signals of clock shall be the same timing.

Note 3: Please follow TV VESA Pin Assignment.

4.1.6. LED BACKLIGHT UNIT

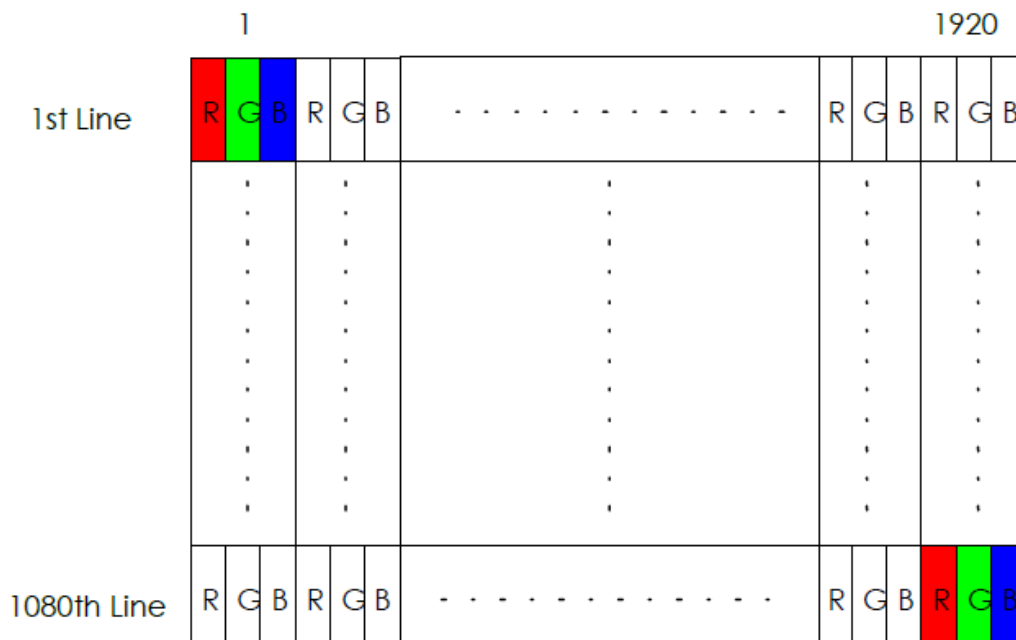
Connector Name / Description	Lamp Connector
Manufacturer	CviLux or Compatible
Connector Model Number	CI1406M1HRN-NH1 or compatible
Mating Model Number	H112K-P06N-00B (Non-Locking type) or Compatible H112K-P06N-13B (Locking type) or Compatible

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

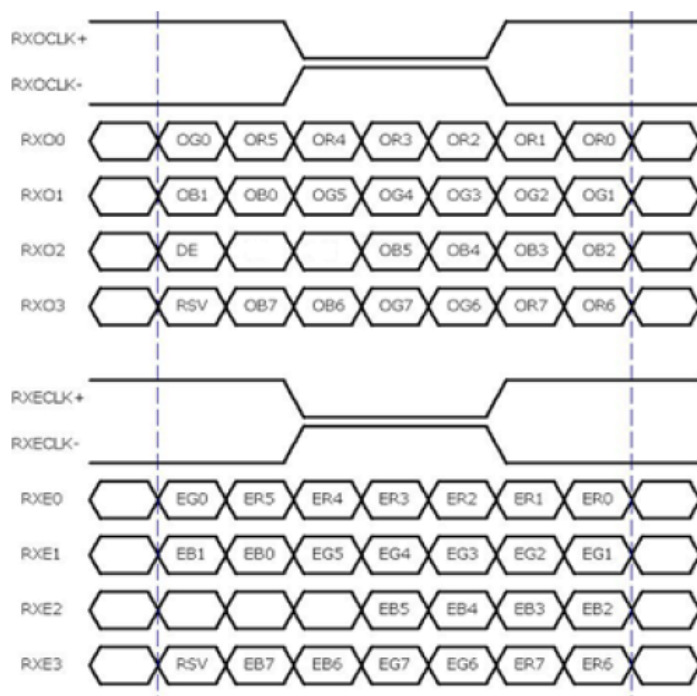


4.1.7. PIXEL FORMAT IMAGE

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



4.1.8. THE LCD INPUT 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

Note1: Normally DE mode only. VS and HS on EVEN channel are not used.

Note2: Please follow VESA.

Note3: 8-bits signal input.

4.1.9. LCD TIMING CHARACTERISTICS

Parameter		Symbol	Min.	Typ.	Max.	Unit
V-section	Period	T _V	1094	1130	1836	T _{LINE}
	Active	T _{disp(v)}	1080			
	Blanking	T _{bp(v)} +T _{fp(v)} +PW _{vs}	14	50	756	
H-section	Period	T _h	1000	1050	1678	T _{CLK}
	Active	T _{disp(h)}	960			
	Blanking	T _{bp(h)} +T _{fp(h)} +PW _{hs}	40	90	718	
Clock	Period	T _{CLK}	11.2	14	18.6	ns
	Frequency	Freq.	53.7	71.2	90	MHz
Frame Rate	Frequency	1/T _V	49	60	76	Hz

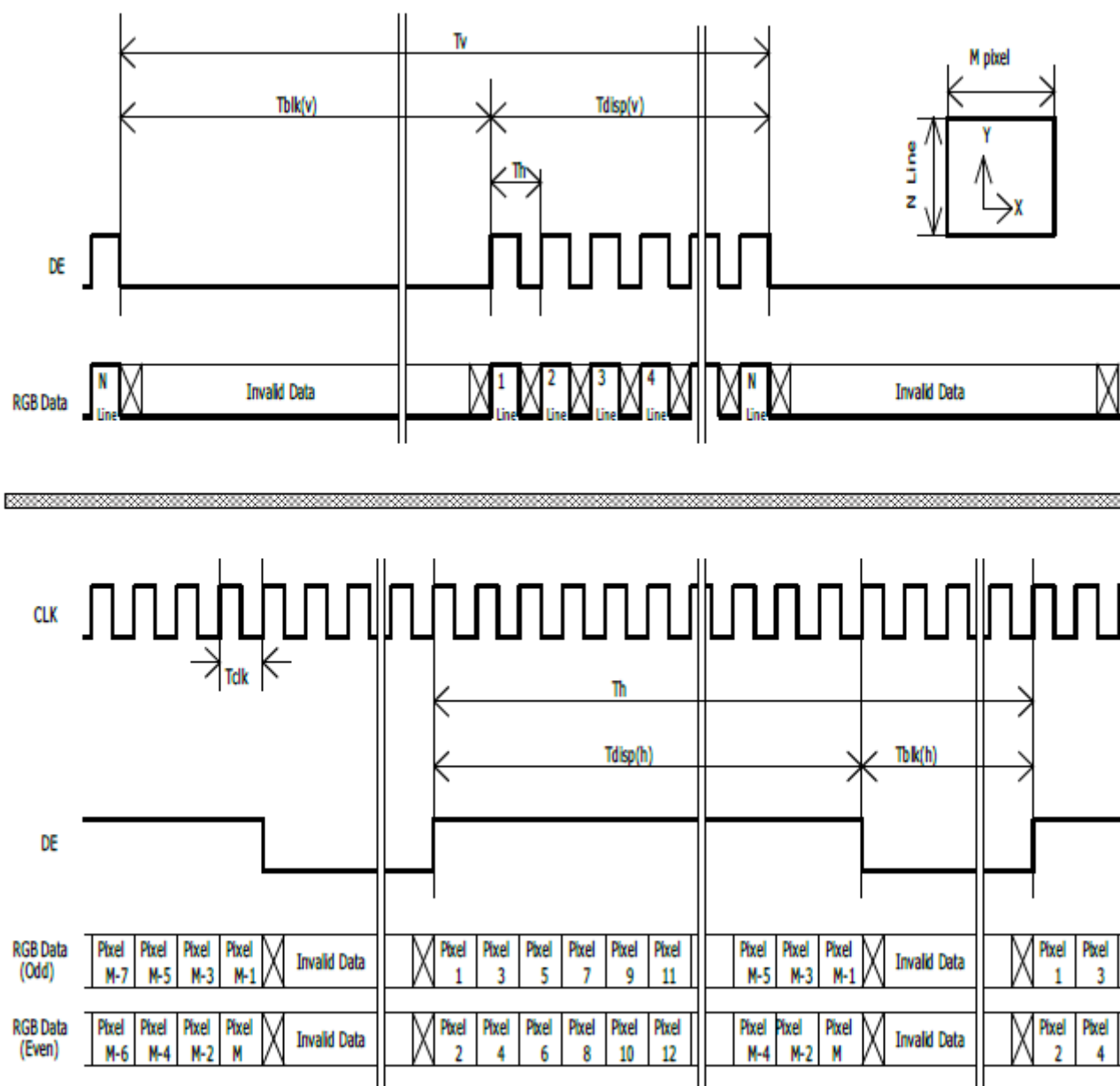
Note 1: Only DE mode operation

The input of Hsync & Vsync signal does not have an effect upon the LCD normal operation.

Note 2: The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rates.

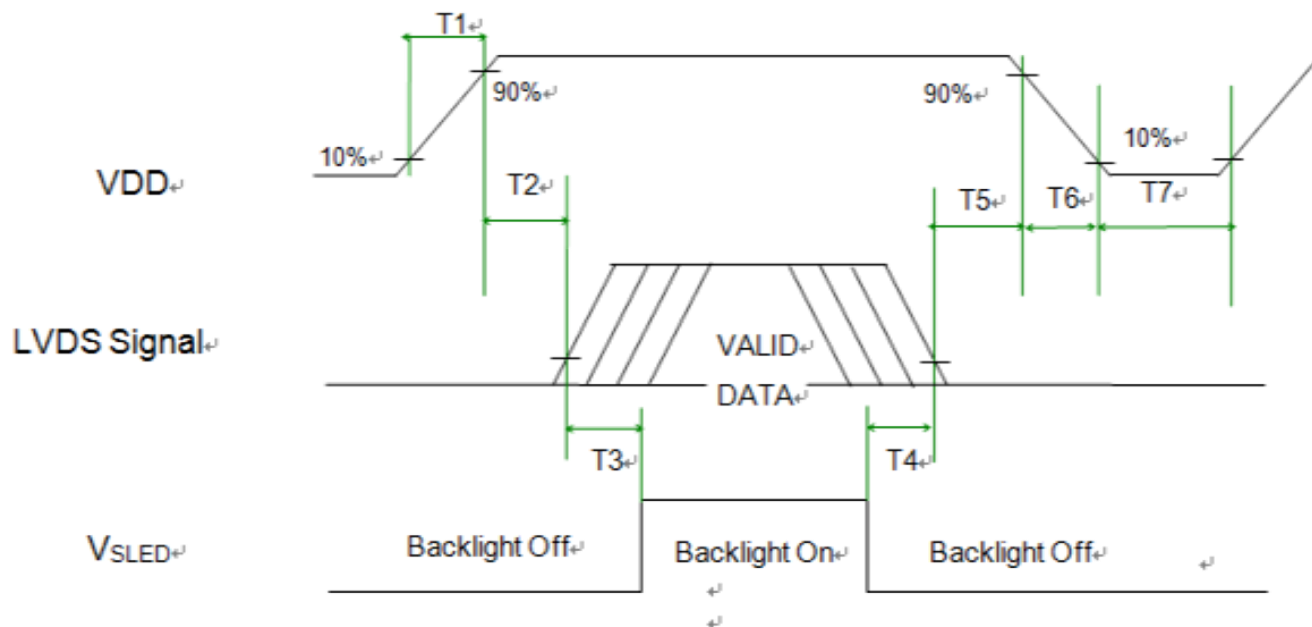
Note 3: Horizontal period should be even.

4.1.10. LCD INPUT TIMING DIAGRAM



4.1.11. POWER SEQUENCE FOR LCD

VDD power and lamp on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be High-impedance state or low level when VDD is off.



Power ON/OFF sequence timing

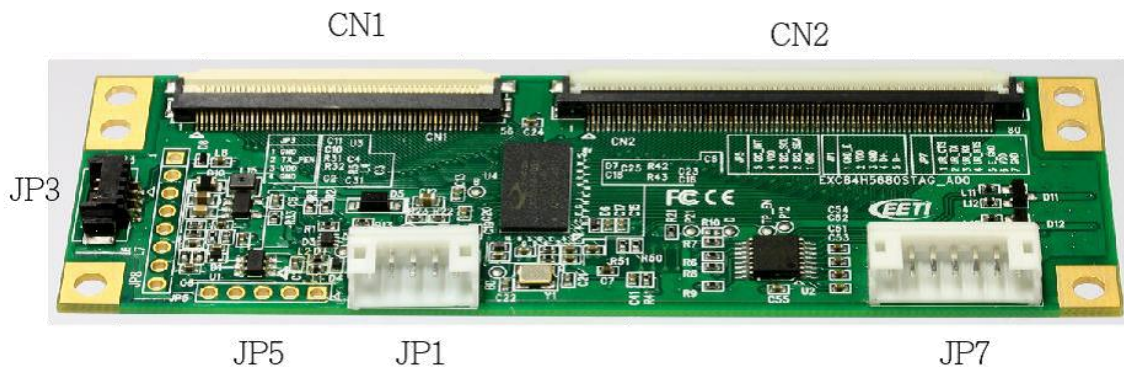
Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	500	-	-	ms
T4	100	-	-	ms
T5	0	-	50	ms
T6	0	-	200	ms
T7	1000	-	-	ms

4.2.TOUCH CONTROL BOARD

ETP-MB-EXC84H5680STAG

Parameter	Values			Unit	Notes
	Min.	Typ.	Max.		
Input Voltage	3.5	5	5.5	V	
Interface	USB:2.0			-	
Max Resolution	16384 x 16384 resolution			-	
Channels of panel	Max. TX: 48 Rx:80 channels			mm	Including shielding pin
Linearity	Line drawing accuracy: 1pt +/- 1 mm offset /10 mm Touch (point) accuracy: 1pt +/- 1mm			mm	
Power consumption (mA)	Active Mode: <90 mA Idle Mode: depends on firmware			mA	
Report rate (points/sec)	≥100			Hz	
Response time	Average <25			ms	

4.2.1. TOUCH CONTROL BOARD PIN ASSIGNMENT



FPC Pin Description

CN1					
PN		PN		PN	
1	NC	21	TX34	41	TX14
2	NC	22	TX33	42	TX13
3	NC	23	TX32	43	TX12
4	NC	24	TX31	44	TX11
5	NC	25	TX30	45	TX10
6	NC	26	TX29	46	TX9
7	NC	27	TX28	47	TX8
8	NC	28	TX27	48	TX7
9	TX_S1	29	TX26	49	TX6
10	TX45	30	TX25	50	TX5
11	TX44	31	TX24	51	TX4
12	TX43	32	TX23	52	TX3
13	TX42	33	TX22	53	TX2
14	TX41	34	TX21	54	TX1
15	TX40	35	TX20	55	TX0
16	TX39	36	TX19	56	TX_S0
17	TX38	37	TX18		
18	TX37	38	TX17		
19	TX36	39	TX16		
20	TX35	40	TX15		

CN2					
PN		PN		PN	
1	RX_S1	21	RX58	41	RX38
2	RX77	22	RX57	42	RX37
3	RX76	23	RX56	43	RX36
4	RX75	24	RX55	44	RX35
5	RX74	25	RX54	45	RX34
6	RX73	26	RX53	46	RX33
7	RX72	27	RX52	47	RX32
8	RX71	28	RX51	48	RX31
9	RX70	29	RX50	49	RX30
10	RX69	30	RX49	50	RX29
11	RX68	31	RX48	51	RX28
12	RX67	32	RX47	52	RX27
13	RX66	33	RX46	53	RX26
14	RX65	34	RX45	54	RX25
15	RX64	35	RX44	55	RX24
16	RX63	36	RX43	56	RX23
17	RX62	37	RX42	57	RX22
18	RX61	38	RX41	58	RX21
19	RX60	39	RX40	59	RX20
20	RX59	40	RX39	60	RX19
				80	RX_S0

Connector Pin Configuration

JP1 USB connector

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

JP5 I2C connector

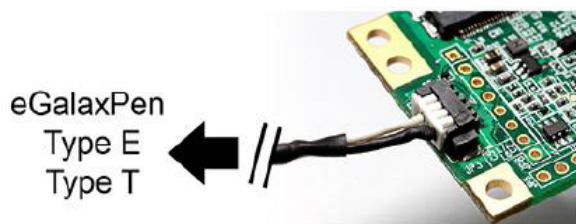
JP5	
1	GND
2	I2C_SDA
3	I2C_SCL
4	VDD
5	I2C_INT

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

JP1 : USB
 Brand: JST
 Part number: SM05B-SRSS-TB or equivalence

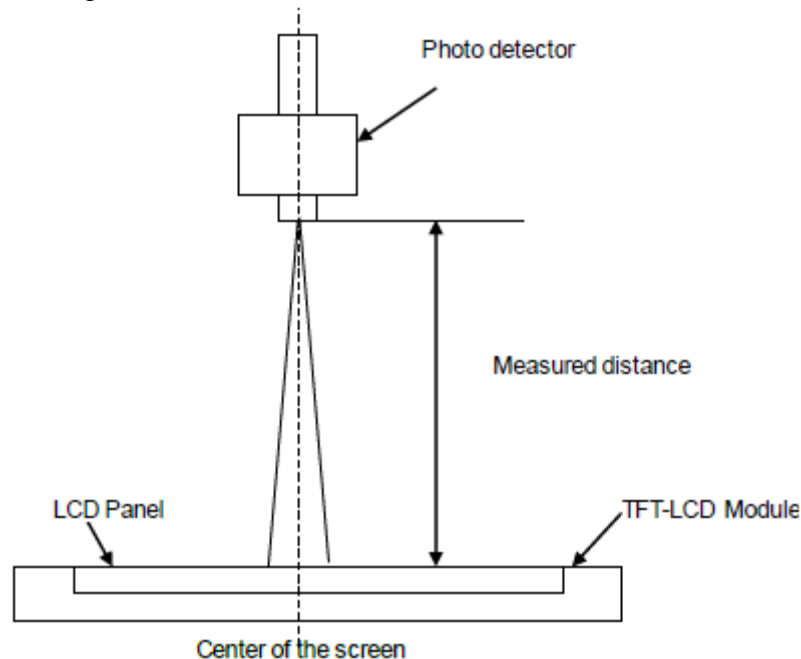
5. OPTICAL CHARACTERISTICS

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

Item	Unit	Conditions		Min.	Typ.	Max.	Note
View Angle	degree	Horizontal CR>10	Right		89	-	2
			Left		89	-	
		Vertical CR>10	Upper		89	-	
			Lower		89	-	
Contrast Ratio	-	Normal Direction		800	1000	-	3
Response Time	ms	Rising Time (T _{IR})			12	22	4
		Falling Time (T _{IF})			10	20	
		Rising + Falling		-	22	42	
Color / Chromaticity Coordinates (CIE)		Red	Rx	(0.596)	(0.646)	(0.666)	5
			Ry	(0.254)	(0.334)	(0.384)	
		Green	Gx	(0.263)	(0.313)	(0.363)	
			Gy	(0.572)	(0.622)	(0.672)	
		Blue	Bx	(0.104)	(0.154)	(0.204)	
			By	(0.001)	(0.051)	(0.101)	
		White	Wx	0.263	0.313	0.363	
			Wy	0.279	0.329	0.379	
White Luminance	cd/m ²			400	500	-	6
Luminance Uniformity	%			(75)	(80)	-	7
Color Gamut	%			-	72	-	

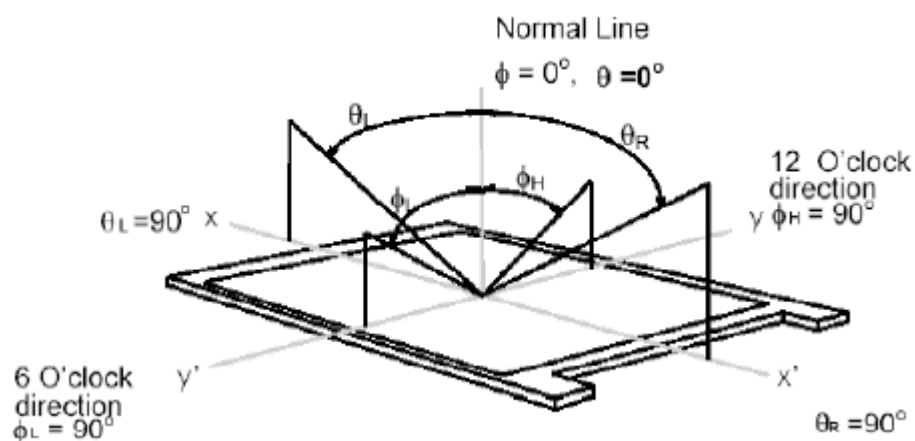
Note 1: Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring (at surface 35°C). In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.



Note 2: Definition of viewing angle measured by ELDIM (EZContrast 88)

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 follows; 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 rotate about its center to develop the desired measurement viewing angle.

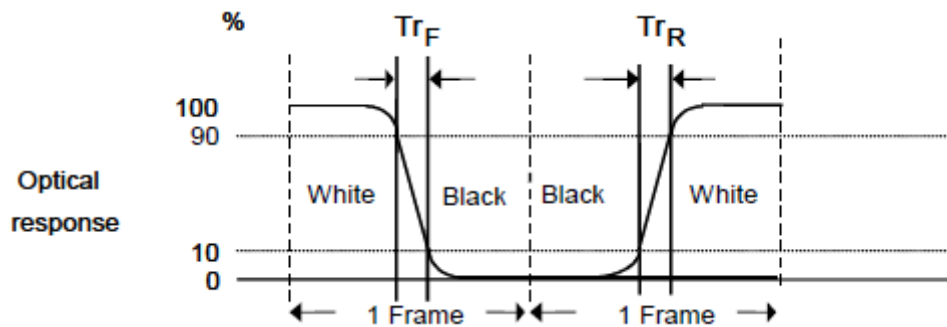


Note 3: Contrast ratio is measured by TOPCON SR-3

Note 4: Definition of response time measured by Westar TRD-100A

The output signals of photo detector are measured when the input signals are change from “Full Black” to “Full White” (rising time, T_{rR}) and from “Full White” to “Full Black” (falling time, T_{rF}), respectively. The response time interval is between 10% and 90% (1 frame at 60Hz) of amplitudes.

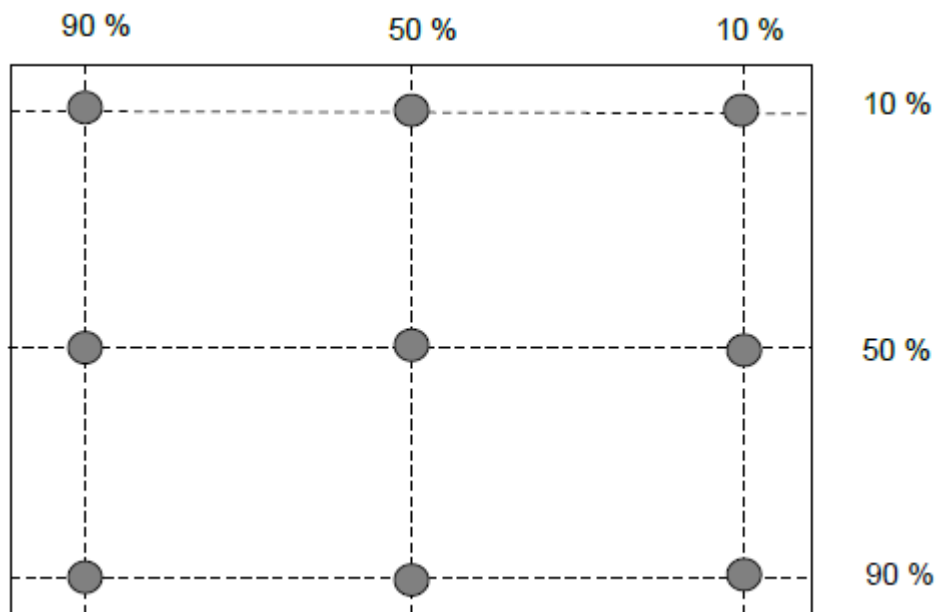
$T_{rR} + T_{rF} = 5 \text{ ms (typ.)}$



Note 5: Color chromaticity and coordinates (CIE) is measured by TOPCON SR-3

Note 6: Central luminance is measured by TOPCON SR-3

Note 7: Luminance uniformity of these 9 points is defined as below and measured by TOPCON SR-3



$$\text{Uniformity} = \frac{\text{Minimum Luminance of 9 points (1~9)}}{\text{Maximum Luminance of 9 points (1~9)}}$$

6. RELIABILITY TEST ITEMS

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

7. LABEL

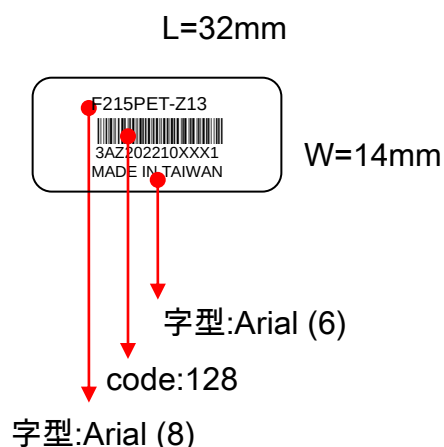
Model NO. **F215PET-Z13**

條碼

SN **3A Z 20 2 21 0 XXX1**

code 1,2 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.





9. MECHANICAL CHARACTERISTICS

Item		Dimension	Unit	Note
Outline Dimension	Horizontal	517.00	mm	PCAP : B215PBU-E05
	Vertical	315.00	mm	
	Depth	4.00	mm	
	Horizontal	497.60	mm	LCD : G215HAN01.5 01
	Vertical	292.20	mm	
	Depth	10.66	mm	
	Horizontal	100.00	mm	Touch Driver : ETP-MB-EXC84H5680STAG
	Vertical	33.00	mm	
	Depth	7.20	mm	
Weight		3200	g	F215PET-Z13
Item		Specification		Remarks
PCAP Viewing Area		477.70mm x 269.40 mm		
PCAP Sensor Area		493.79 mm x 293.07 mm		
PCAP FPC Length		91.75 mm		
PCAP Input method		Finger or exclusive pen		
PCAP Light Transmission		≥85%		
PCAP Operation force		≤10g		Finger Input
PCAP Hardness of surface		≥6H		Pressure 500gf test
PCAP Surface Treatment		Clear Type		



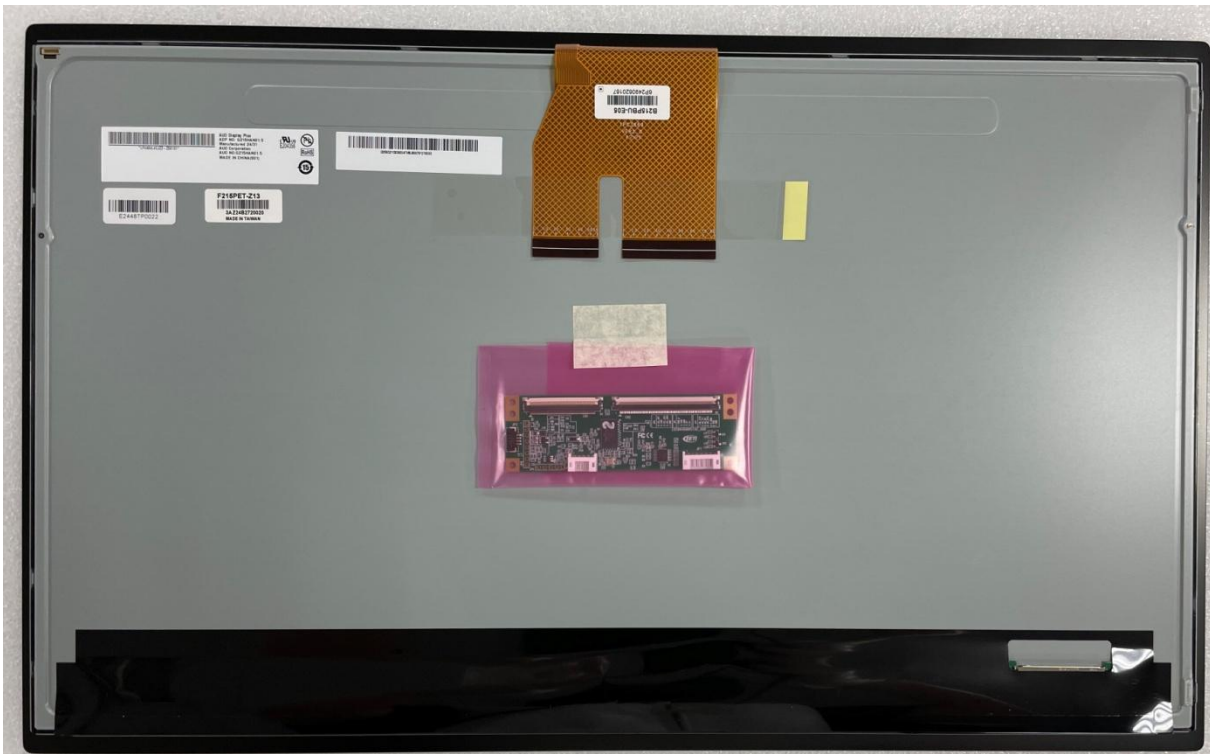
Product Specification

F215PET-Z13

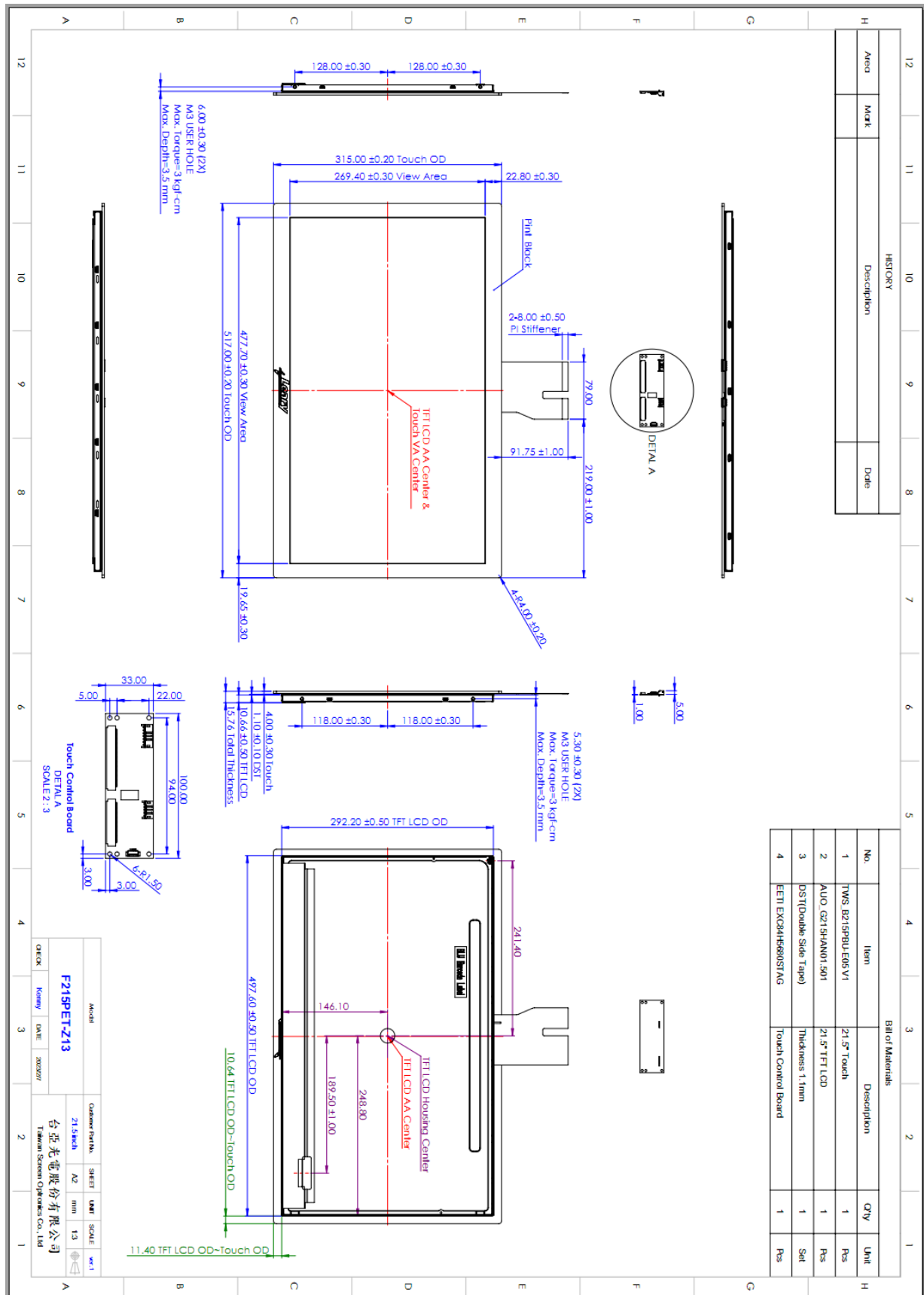
Front View



Back View



10. ENGINEERING DRAWING





Product Specification

F215PET-Z13

Touch Driving Board :

EXC84H5680STAG

