11.6 ” Full HD
High brightness color LCD module

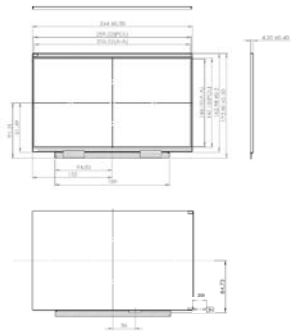
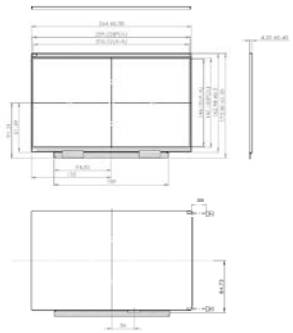
SPECIFICATION

MODEL NAME: LMWG7116ZMN1

Date: 2018 / 05 / 03

Customer Signature		
Customer		
Approved Date	**Approved By**	**Reviewed By**

RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2018/01/23	All	First Edition for customer		
0.2 2018/05/31	5	1200nits by LED backlight	1000nits by LED backlight	
	6	White luminance：1200	White luminance：1000	
		Power consumption：	Power consumption：	
		9.613	9.91	
		LED line：8.613W	LED line：8.91W	
	7	Center luminance	Center luminance	
		min：960 typ：1200	min：800 typ：1000	
	15	LED current：290	LED current：150	
		LED power：8.613	LED power：8.91	
		PL=VL x IL x 1	PL=VL x IL x 2	
	26			

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) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
10) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

2. General Description

2.1, Overview

This specification is a 11.6” TFT Liquid Crystal Display module with LED Backlight unit and 30 pins eDP interface. This module supports 1920 x 1080 FHD mode and can display 16.7M (RGB 8 bits) colors.

LED driving board for backlight unit is not included.

2.2 Features

- High brightness display, 1000 nits by LED backlight.
- RoHS Compliance

2.3 Application

Industrial Application.

2.4 Display Specifications

Items	Unit	Specification
Screen Diagonal	inch	11.6
Active Area	mm	256.32 (H) x 144.18 (V)
Pixels H x V	pixels	1920 x3(RGB) x 1080
Pixels Pitch	um	133.5 (per one triad) x 133.5
Pixel Arrangement		RGB Vertical stripe
Display mode		Normally black
White luminance (center)	Cd/m^2	1000 (Typ.)
Contrast ratio		1000 (Typ.)
Optical Response Time	msec	25 ms (Typ. on/off)
Normal Input Voltage Vcc	Volt	3.3
Power Consumption (Vcc Line + LED backlight)	Watt	9.91 (max) (Vcc line=1.0; LED line=8.91 W)
Weight	Grams	TBD (max.)
Physical size	mm	264(H) x 172.8(V) x 4.2 (D) (with PCB) 264(H) x 162.98(V) x 4.2 (D) (without PCB)
Electrical Interface		eDP (2 Lane)
Support Colors		16.7M colors (RGB 8-bit)
Surface Treatment		Anti-Glare
Temperature range Operating Storage	 ^0C ^0C	 0 ~ 50 -20 ~ 60
RoHS Compliance		RoHS Compliance

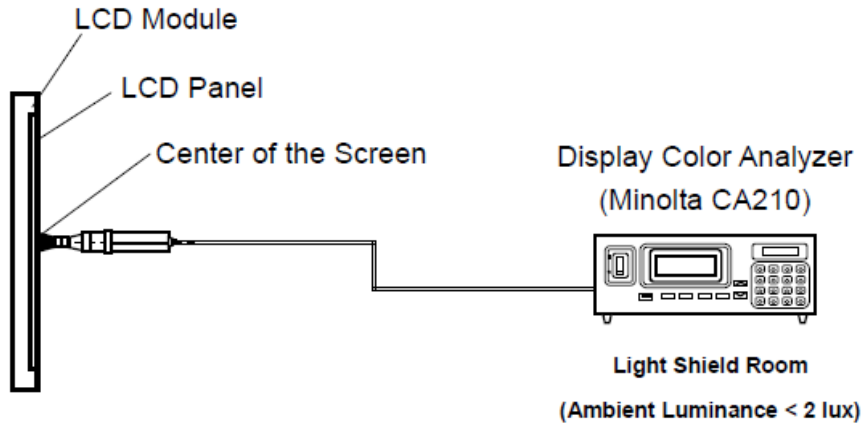
2.5 Optical Characteristics

The following optical characteristics are measured under stable condition at 25 ^{0}C

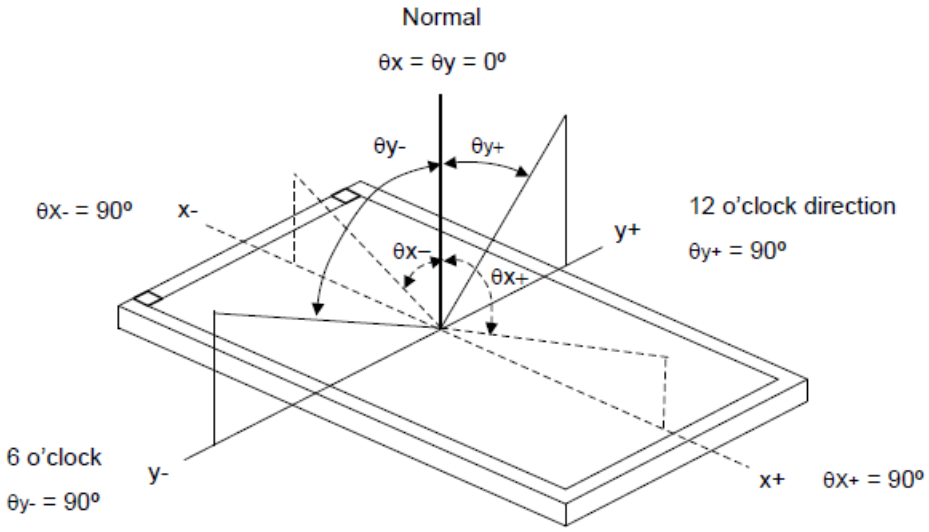
Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right) CR=10 (Left)		178		2
		Vertical (Up) CR=10 (Down)		178		
Contrast Ratio		Normal Direction	700	1000		3
Response Time	msec	Raising + Falling		25		4
Color / Chromaticity Coordinates (CIE)		Red x	-0.05	0.640	+0.05	5
		Red y		0.330		
		Green x		0.300		
		Green y		0.600		
		Blue x		0.150		
		Blue y		0.060		
Color coordinates (CIE) White		White x		0.313		
		White y		0.329		
Center Luminance	Cd/m^2		800	1000		6
Luminance Uniformity	%		70	75		7
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



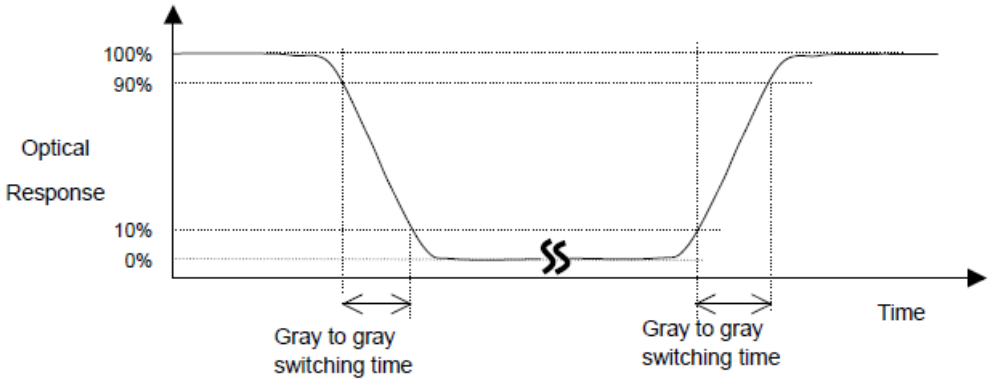
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA210

Note 4: Definition of Response time

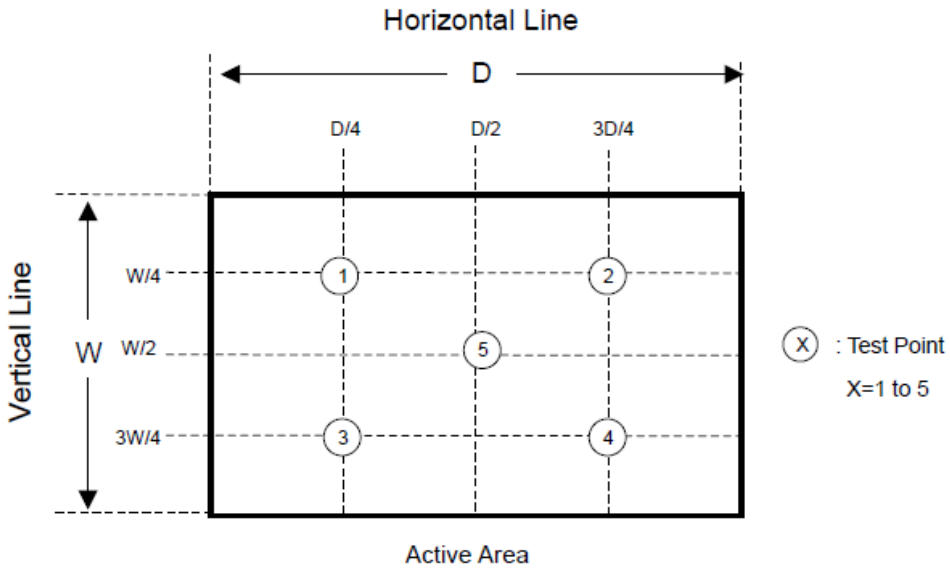
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA210

Note 6: Center luminance is measured by Minolta CA210

Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA210

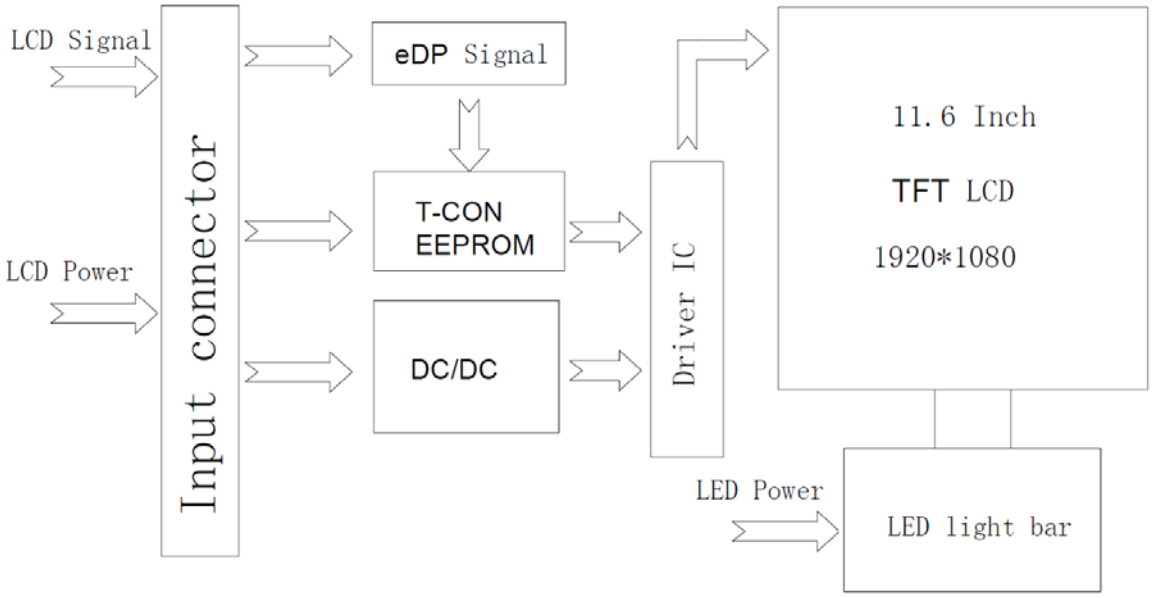


Uniformity = (Min. Luminance of 5 points) / (Max. Luminance of 5 points)

3. **Functional Block Diagram**

3.1 FUNCTION BLOCK DIAGRAM

The following diagram shows the functional block of the 11.6 inches Color TFT-LCD Module:



4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

4.1 TFT LCD Module

Items	Symbol	Min	Max	Unit	Conditions
Power supply voltage	Vcc	-0.3	6.0	Volt	
Logic input voltage	Vi	-0.3	Vcc		

4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED Current	I LED	--	60	mA	Note 1, 2

4.3 Absolute Ratings of Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T_{OP}	0	-	50	^{0}C	Note 3
Operation Humidity	H_{OP}	5		90	%	
Storage temperature	T_{ST}	-20		60	^{0}C	
Storage Humidity	H_{ST}	5		90	%	

Note 1: With in Ta= 25℃

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

Note 3: For quality performance, please refer to IIS (Incoming Inspection Standard).

5. Electrical characteristics

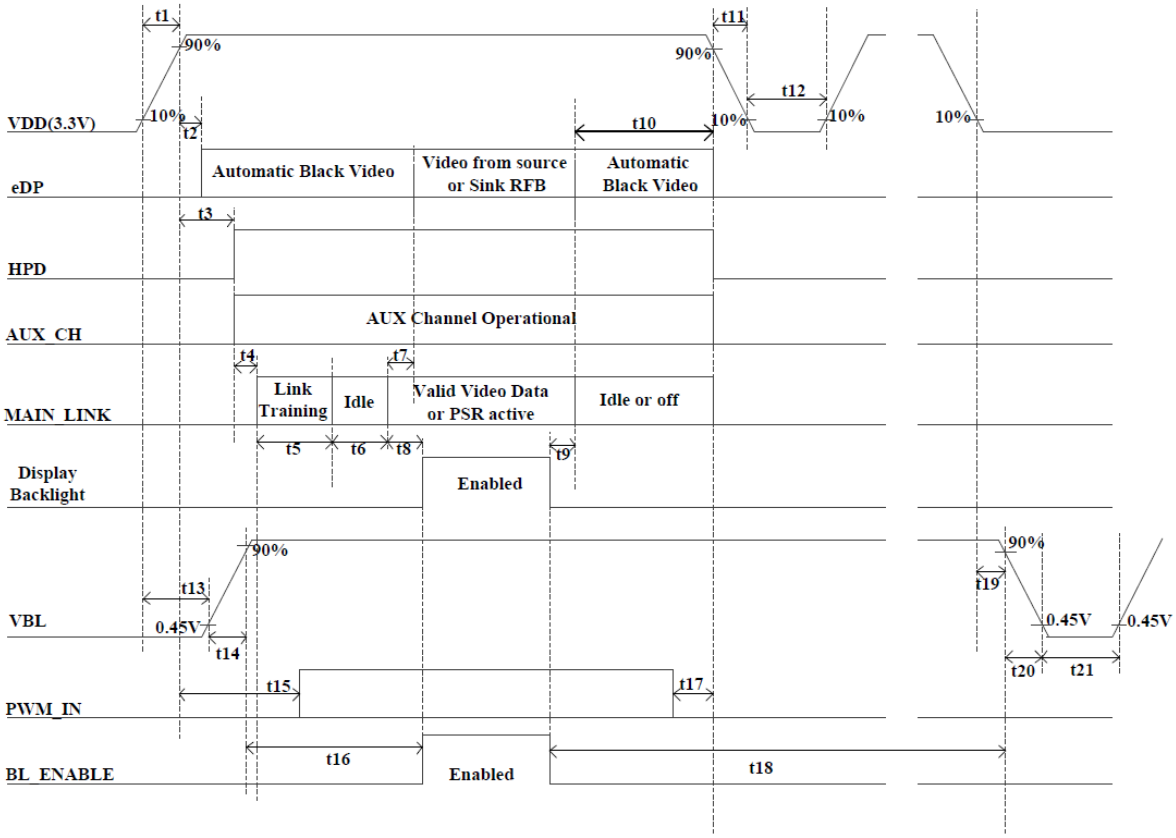
5.1 TFT LCD Module Power Specification

Input power specifications are as follows

Ta＝+25℃

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 6-1-1]
Current dissipation	IDD	-	212	364	mA	[Note 6-1-2]
Inrush Current	Irush	-	-	1.0	A	[Note 6-1-3]
Permissible input ripple voltage	V_{RP}	-	-	100	mVp-p	VDD=+3.3V
eDP HPD Signal Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
HPD High level output voltage	VOH_{HPD}		VDD-0.1	-		
HPD Low level output voltage	VOL_{HPD}	-	0			
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI_{AUX}	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	$V_{AUX-DIFF-pp}$	0.32	-	1.36	V	
AUX DC Common mode Voltage	$V_{AUX-DC-CM}$	0	-	2.0	V	
AUX Short current limit	I_{AUX_SHORT}	-	-	90	mA	
AUX CH termination Cresistor	R_{AUX_TERM}	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C_{AUX}	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16	-	
eDP Main Link Receiver Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Link clock down spreading	Down_Spread_Amplitude	0		0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	120	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	$RL_{RX-DIFF}$	9	-	-	dB	
Differential termination resistance	$R_{RX-TERM}$	-	100	-	Ω	
RX short circuit Current Limit	$I_{RX-SHORT}$	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	$T_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$	-	-	-	ps	

[Note 6-1-1] ON-OFF conditions for supply voltage



[Note] Do not keep the interface signal high-impedance or unusual signal when power is on.

Symbol	Min	Max	Unit	Note
t1	0.5	10	ms	
t2	0	100	ms	
t3	0	100	ms	
(t4)	-	-	ms	
(t5)	-	-	ms	
(t6)	-	-	ms	
(t7)	0	50	ms	
(t8)			ms	
(t9)			ms	
(t10)	0	500	ms	
t11	1	50	ms	[Note1]
t12	500	-	ms	
(t13)	-	-	ms	
t14	0.5	10	ms	
t15	100		ms	
(t16)	-	-	ms	
t17	0	-	ms	
(t18)	-	-	ms	
t19	-	-	ms	
t20	0.1	-	ms	
t21	100		ms	

[Note 1]As for the power off sequence for VDD (t11), be sure to keep above mentioned timing.

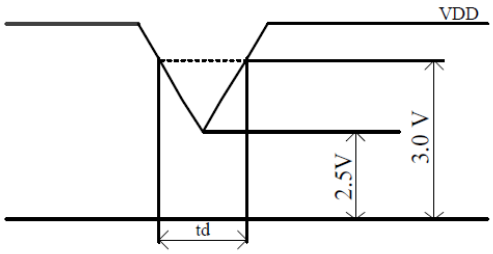
If the VDD power off sequence timing is other than shown above, LCD may cause permanent damage.
*1 : As for the power sequence for backlight, it is recommended to apply above mentioned input timing.
If the backlight is light on and off at a timing other than shown above, displaying image maybe getdisturbed.

VDD-dip-conditions

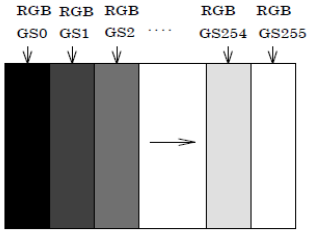
1) 2.5 V≦VDD＜3.0 V
td≦10 ms

Under above condition, the display image should return to an appropriate figure after VDD voltage recovers.

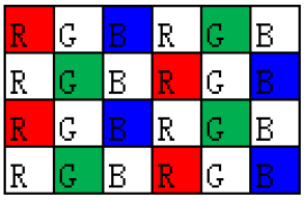
2) VDD＜2.5 V
VDD-dip conditions should also follow the ON-OFF conditions for supply voltage.



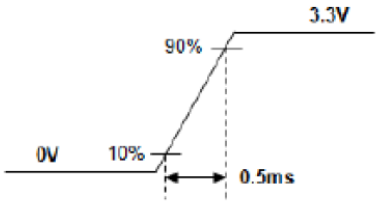
[Note 6-1-2]
Typical current condition: 16-gray-bar pattern.
VDD＝+3.3V



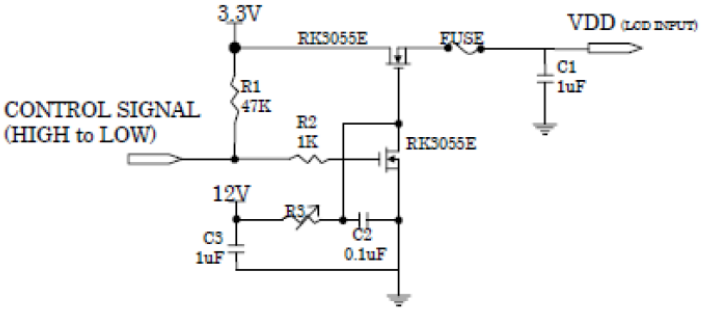
Maximum current condition: Vertical stripe pattern.
VDD＝+3.3V



[Note 6-1-3]
·Rising time VDD :



·measurement condition :



5.2 Backlight Unit

Parameter guideline is under stable conditions at 25℃ (Room Temperature):

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)			29.7	[V]	2
LED current (IL)		150		[mA]	2,
LED Power (PL)			8.91	[W]	
LED Life Time(LTLED)	30,000			[Hour]	1

Note 1: The “LED lift time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and typical LED Current at 150 mA.

Note 2: PL=VL x IL x 2

LED Light bar connector

Connector : JOIN TEK JT1025-1021

(The recommended model is BHSR-02VS-1 manufactured by JST)

Pin no	Symbol	I/O	Description	Remark
1	VLED+	P	Backlight LED anode	
2	VLED-	P	Backlight LED cathode	

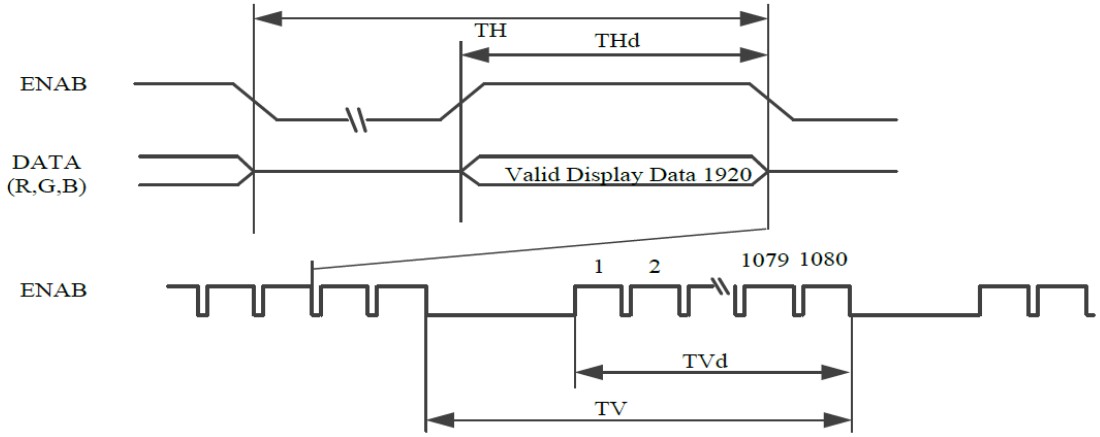
6. Timing characteristics of input signals

6.1.1 Timing Characteristics

VDD=+3.0V~+3.6,Ta=-10°C~+60°C

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	1/Tc	–	138.5	–	MHz	[Note7-1-1]
Data enable signal	Horizontal period	TH	–	2080	–	clock	
				15.02		μs	
	Horizontal period (High)	THd	-	1920	-	clock	
	Vertical period	TV	–	1111	–	line	
			-	16.685	-	ms	
	Vertical period (High)	TVd	–	1080	–	line	

[Note 7-1-1] In case of using the long vertical period, the deterioration of display quality, flicker, etc, may occur.



6.1.2 Input data signals and display position on the screen

Display position of input data(V·H)

6.1.3 EDID data structure

This is the EDID(Extended Display Identification Data) data formats to support displays as defined in the VESA Plug & Display.

Byte (decimal)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	00	Header	00	00000000
1	01	Header	FF	11111111
2	02	Header	FF	11111111
3	03	Header	FF	11111111
4	04	Header	FF	11111111
5	05	Header	FF	11111111
6	06	Header	FF	11111111
7	07	Header	00	00000000
8	08	EISA manufacture code =NCP	38	00111000
9	09	EISA manufacture code (Compressed ASCII)	70	01110000
10	0A	Product code (LM116LF3L03)	00	00000000
11	0B	Product code (hex,LSB first)	00	00000000
12	0C	LCD module Serial No (fixed “0”)	00	00000000
13	0D	LCD module Serial No (fixed “0”)	00	00000000
14	0E	LCD module Serial No (fixed “0”)	00	00000000
15	0F	LCD module Serial No (fixed “0”)	00	00000000
16	10	Week of manufacture	00	00000000
17	11	Year of manufacture - 1990 (ex 2000 – 1990 = 10) 2015-1990 = 25	19	00011001
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 4	04	00000100
20	14	Video i/p definition = Digital 8bit DP support	A5	10100101
21	15	Max H image size(cm) = 26cm	1A	00011101
22	16	Max V image size(cm) = 15cm	0F	00010001
23	17	Display gamma (2.2×100) – 100 = 120	78	01111000
24	18	Feature support(stanby,suspend,RGB color/Prefer Time)	06	00000110
25	19	Red/Green Low bit(RxRy/GxGy)	DE	11011110
26	1A	Blue/White Low bit(BxBy/WxWy)	50	01010000
27	1B	Red X(Rx) (written value 0.64)	A3	10100011
28	1C	Red Y(Ry) (written value 0.33)	54	01010100
29	1D	Green X(Gx) (written value 0.3)	4C	01001100
30	1E	Green Y(Gy) (written value 0.6)	99	10011001
31	1F	Blue X(Bx) (written value 0.15)	26	00100110
32	20	Blue Y(By) (written value 0.06)	0F	00001111
33	21	White X(Wx) (written value 0.313)	50	01010000
34	22	White Y(Wy) (written value 0.329)	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2	00	00000000
37	25	Established timings 3(Manufacture’s reserved timing)	00	00000000
38	26	Standard timing ID1	01	00000001
39	27	Standard timing ID1	01	00000001
40	28	Standard timing ID2	01	00000001

41	29	Standard timing ID2	01	00000001
42	2A	Standard timing ID3	01	00000001
43	2B	Standard timing ID3	01	00000001
44	2C	Standard timing ID4	01	00000001
45	2D	Standard timing ID4	01	00000001
46	2E	Standard timing ID5	01	00000001
47	2F	Standard timing ID5	01	00000001
48	30	Standard timing ID6	01	00000001
49	31	Standard timing ID6	01	00000001
50	32	Standard timing ID7	01	00000001
51	33	Standard timing ID7	01	00000001
52	34	Standard timing ID8	01	00000001
53	35	Standard timing ID8	01	00000001
54	36	Detailed timing descriptor#1 fck/10000 (=138.5MHz/10000=13850=361Ah)	1A	00011010
55	37	#1 fck	36	00110110
56	38	#1 Horizontal active 1920=780h 80h	80	10000000
57	39	#1 Horizontal blanking 160=0A0h A0h	A0	10100000
58	3A	#1 Horizontal active/Horizontal blanking 70h	70	01110000
59	3B	#1 Vertical active 1080=438h 38h	38	00111000
60	3C	#1 Vertical blanking 31=01Fh 1Fh	1F	00011111
61	3D	#1 Vertical active/Vertical blanking 40h	40	01000000
62	3E	#1 Horizontal sync , offset(Thfp) 48=030h 30h	30	00110000
63	3F	#1 Horizontal sync , width 32=020h 20h	20	00100000
64	40	#1 Vertical sync,offset / Vertical sync,width (offset=3h/width=5h)	35	00110101
65	41	#1 Horizontal sync offset/width/Vertical sync offset/width	00	00000000
66	42	#1 Horizontal image size 256.32 mm=100h 00h	00	00000000
67	43	#1 Vertical image size 144mm=090h 90h	90	10010000
68	44	#1 Horizontal image size / Vertical image size 10h	10	00010000
69	45	Horizontal boader	00	00000000
70	46	Vertical boader	00	00000000
71	47	Flags(Non-interlaced=0/non 3D=00/Degital separate=11/Horizontal polarity/Vertical polarity=00)	18	00011000
72	48	Detailed timing descriptor#1 fck/10000 (=110.92224MHz/10000=11092.224=2B54h)	54	01010100
73	49	#2fck	2B	00101011
74	4A	#2 Horizontal active 1920=780h 80h	80	10000000
75	4B	#2 Horizontal blanking 160=0A0h A0h	A0	10100000
76	4C	#2 Horizontal active/Horizontal blanking 70h	70	01110000
77	4D	#2 Vertical active 1080=438h 38h	38	00111000
78	4E	#2 Vertical blanking 31=01Fh 1Fh	1F	00011111
79	4F	#2 Vertical active/Vertical blanking 40h	40	01000000
80	50	#2 Horizontal sync , offset(Thfp) 48=030h 30h	30	00110000
81	51	#2 Horizontal sync , width 32=020h 20h	20	00100000
82	52	#2 Vertical sync, offset / Vertical sync, width (offset=3h/width=5h)	35	00110101
83	53	#2 Horizontal sync offset/width/Vertical sync offset/width	00	00000000
84	54	#2 Horizontal image size 256.32mm=100h 00h	00	00000000
85	55	#2 Vertical image size 144mm=090h 90h	90	10010000

86	56	#2 Horizontal image size / Vertical image size 10h	10	00010000
87	57	Horizontal boader	00	00000000
88	58	Vertical boader	00	00000000
89	59	Flags(Non-interlaced=0/non 3D=00/Degital separate=11/Horizontal polarity/Vertical polarity=00)	18	00011000
90	5A	Detailed timing descriptor #3	00	00000000
91	5B	Flag	00	00000000
92	5C	Reserved	00	00000000
93	5D	Dummy Descriptor	10	00010000
94	5E	Flag	00	00000000
95	5F	1st Dummy	00	00000000
96	60	2nd Dummy	00	00000000
97	61	3rd Dummy	00	00000000
98	62	4th Dummy	00	00000000
99	63	5th Dummy	00	00000000
100	64	6th Dummy	00	00000000
101	65	7th Dummy	00	00000000
102	66	8th Dummy	00	00000000
103	67	9th Dummy	00	00000000
104	68	10th Dummy	00	00000000
105	69	11th Dummy	00	00000000
106	6A	New line character #3 indicates end	00	00000000
107	6B	Padding with “blank” character	00	00000000
108	6C	Detailed timing descriptor #4	00	00000000
109	6D	Flag	00	00000000
110	6E	Reserved	00	00000000
111	6F	Display Product name	FC	11111100
112	70	Flag	00	00000000
113	71	Supplier P/N#1 (L)	4C	01001100
114	72	Supplier P/N#2 (C)	43	01000011
115	73	Supplier P/N#3 (1)	31	00110001
116	74	Supplier P/N#4 (1)	31	00110011
117	75	Supplier P/N#5 (6)	36	00110011
118	76	Supplier P/N#6 (L)	4C	01001100
119	77	Supplier P/N#7 (F)	46	01000110
120	78	Supplier P/N#8 (3)	31	00110100
121	79	Supplier P/N#9 (L)	4C	01001100
122	7A	Supplier P/N#10 (0)	30	00110000
123	7B	Supplier P/N#11 (3)	31	00110001
124	7C	Supplier P/N#12 ("space")	0A	00001010
125	7D	(If<13 char, then terminate with ASCII code 0Ah,set remaining char 20h)	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	9D	00100000

6.2 Pin Assignment

CN1 (eDP signals , +3.3V DC power supply and B/L power supply)

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	Reserved for LCD	[Note4-1-1]
2	H_GND	P	High Speed Ground	
3	Lane1_N	I	Complement Signal Link Lane 1	
4	Lane1_P	I	True Signal Link Lane 1	
5	H_GND	P	High Speed Ground	
6	Lane0_N	I	Complement Signal Link Lane 0	
7	Lane0_P	I	True Signal Link Lane 0	
8	H_GND	P	High Speed Ground	
9	AUX_CH_P	I	True Signal Auxiliary Channel	
10	AUX_CH_N	I	Complement Signal Auxiliary Channel	
11	H_GND	P	High Speed Ground	
12	LCD_VDD	P	LCD logic and driver power(3.3V)	
13	LCD_VDD	P	LCD logic and driver power(3.3V)	
14	NC	I	Reserved for LCD manufacturer's use	[Note4-1-1]
15	LCD_GND	P	LCD logic and driver ground	
16	LCD_GND	P	LCD logic and driver ground	
17	HPD	O	HPD signal pin	[Note4-1-2]
18	BL_GND	P	Backlight ground	
19	BL_GND	P	Backlight ground	
20	BL_GND	P	Backlight ground	
21	BL_GND	P	Backlight ground	
22	BL_ENABLE	I	Backlight ON/OFF	[Note4-1-3]
23	BL_PWM_DIM	I	System PWM	[Note4-1-4]
24	NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]
25	NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]
26	BL_PWR	P	Backlight power	
27	BL_PWR	P	Backlight power	
28	BL_PWR	P	Backlight power	
29	BL_PWR	P	Backlight power	
30	NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]

*1 P: POWER I: Input O: Output

The shielding case is connected with signal GND

・Connector used :20455-030E-76 (I-PEX)

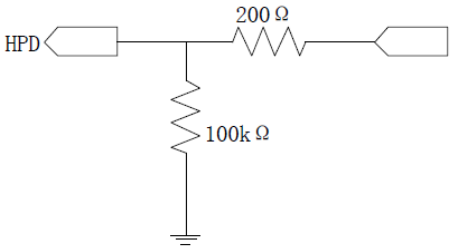
・Corresponding connector : 20453-030T (I-PEX)

(Panda is not responsible to its product quality, if the user applies a connector not corresponding to the above model.)

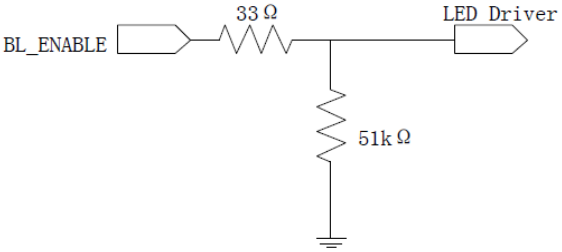
All terminals except NC terminal must be connected to input signal desicribed as above or supply voltage or GND each.

[Note 4-1-1] Do not input any signals or any powers into a NC pin. Keep the NC pin open.

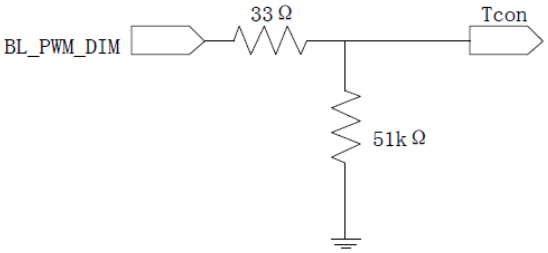
[Note 4-1-2] Output circuit is as below.



[Note 4-1-3]Input circuit is as below.



[Note 4-1-4]Input circuit is as below.



6.3 Relationship between display colors and input signals

	Colors & Gray Scale	Gray Scale	Data signal																							
			R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
			LSB							MSB	LSB							MSB	LSB							MSB
Basic Color	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
	Blue	–	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	–	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	–	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	–	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	–	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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 Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓								↓								↓				
	⇩	↓				↓								↓								↓				
	Brighter	GS253	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS254	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS255	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓								↓								↓				
	⇩	↓				↓								↓								↓				
	Brighter	GS253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	⇩	GS254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green	GS255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	⇧	↓				↓								↓								↓				
	⇩	↓				↓								↓								↓				
	Brighter	GS253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	⇩	GS254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Blue	GS255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

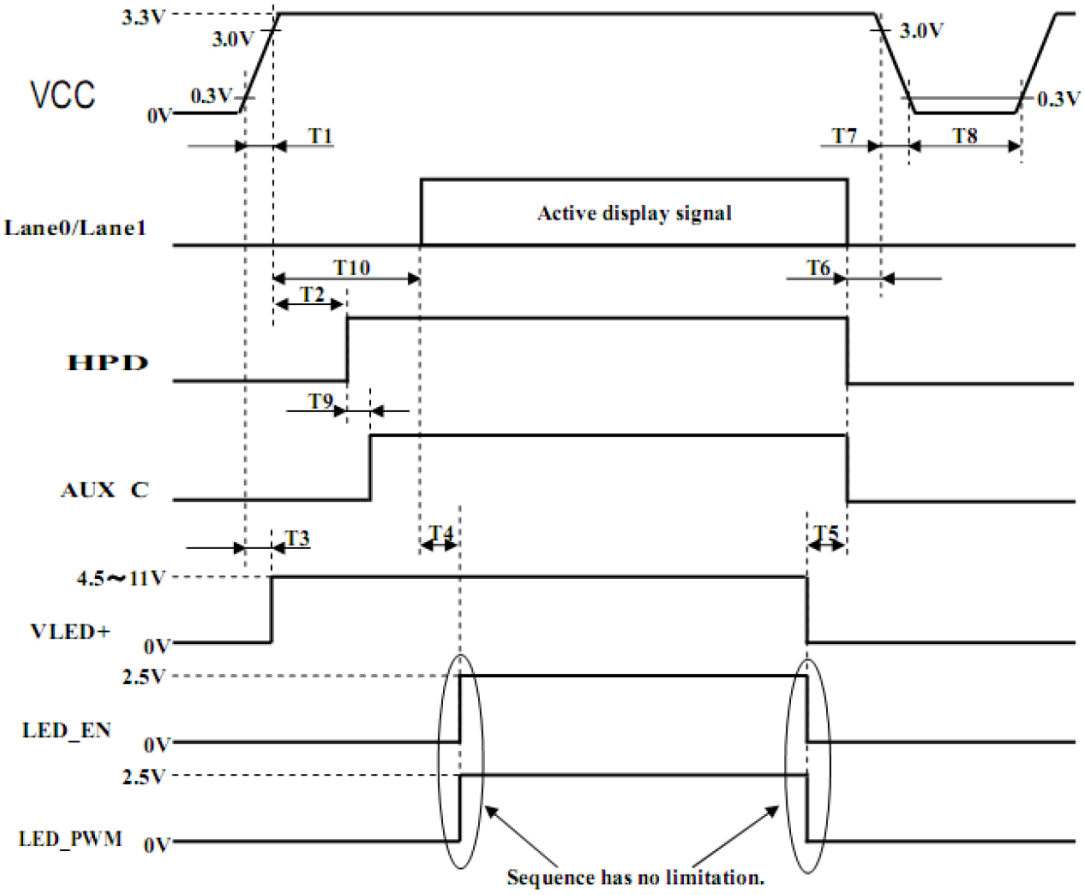
0: Low level voltage, 1: High level voltage.

Each basic color can be displayed in 256 gray scales from 8 bit data signals.
According to the combination of 24 bit data signals, the 16.7M color display can be achieved on the screen.

6.4 Power ON/OFF Sequence

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.

Display Port panel power sequence:



SYMBOL	Min.	Typ.	Max.	UNIT	Note
T1	0.5	-	10	ms	
T2	-	160	180	ms	
T3	0	-	-	ms	
T4	0	-	-	ms	
T5	0	-	-	ms	
T6	0	-	-	ms	
T7	-	-	10	ms	
T8	500	-	-	ms	
T9	0	-	-	ms	
T10	260	-	-	ms	

7. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 60℃, 90%RH, 240hours	
High Temperature Operation (HTO)	Ta= 50℃, 240hours	3
Low Temperature Operation (LTO)	Ta= 0℃, 240hours	
High Temperature Storage (HTS)	Ta= 60℃, 240hours	
Low Temperature Storage (LTS)	Ta= -20℃, 240hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 9 points, 25 times/ point.	
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 9 points, 25 times/ point.	

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. 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. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

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

Note 3: The test items are tested by open frame type chassis.

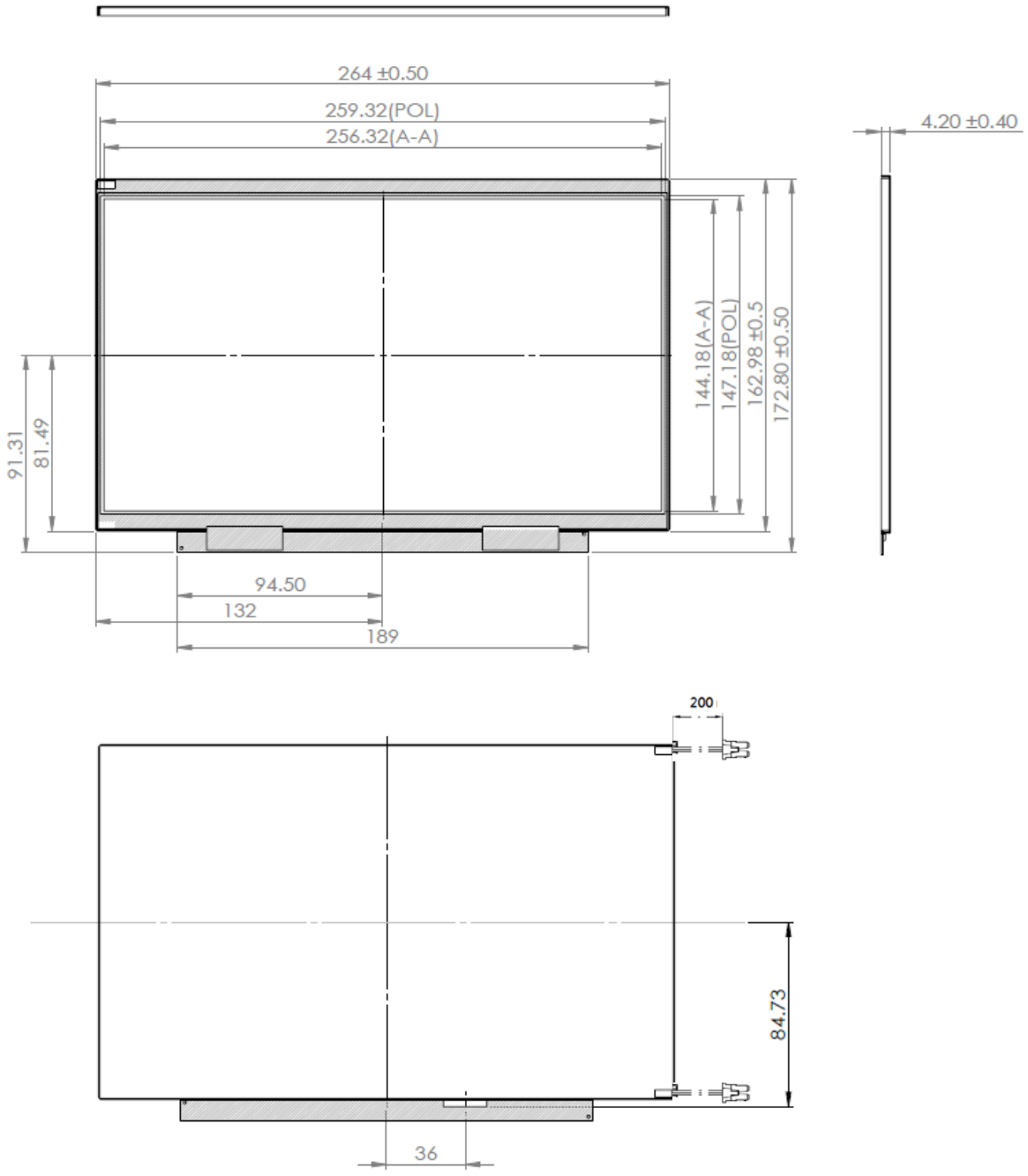
8. Shipping Label & Package (TBD, Reference only)

(1) LCD modules / 1 Box : TBD

(2) Box dimensions: TBD

(3) Weight: TBD

9. Mechanical Characteristic (mm, the LED cable length: 200 mm)



10 .Inspection Specifications

The buyer (customer) shall inspect the modules within twenty calendar days since the delivery date (the "inspection period") at its own cost. The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller.

The buyer may, under commercially reasonable reject procedures, reject an entire lot in the delivery involved if, within the inspection period, such samples of modules within such lot show an unacceptable number of defects in accordance with this incoming inspection standards, provided however that the buyer must notify the seller in writing of any such rejection promptly, and not later than within three business days of the end of the inspection period.

Should the buyer fail to notify the seller within the inspection period, the buyer's right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

11. Warranty

Inteltronic Inc. warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for one year from the date of purchase.

Inteltronic Inc. will be limited to replace or repair any of its module which is found and confirmed defective electrically or visually when inspected in accordance with Inteltronic Inc. general module inspection standard.

This warranty does not apply to any products which have been on customer’s production line, repaired or altered by persons other than repair personnel authorized by Inteltronic Inc., or which have been subject to misuse, abuse, accident or improper installation. Inteltronic Inc. assumes no liability under the terms of this warranty as a consequence of such events.

If an Inteltronic Inc. product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. In returning the modules, they must be properly packaged with original package; there should be detailed description of the failures or defect.

12. RMA

Products purchased through Inteltronic Inc. and under warranty may be returned for replacement. Contact support@inteltronicinc.com for RMA number and procedures

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