

	PRODUCTION SPECIFICATION OF TFT LCD MODULE	Model No: M215PDTBA B11
		OC PN: LC215DTBA-11

**PRODUCTION SPECIFICATION
OF TFT LCD MODULE**

Model No. : M215PDTBA B11

OC PN: LC215DTBA-11

CUSTOMER	
CONFIRMED BY	
APPROVED BY	

PREPARED BY	
CONFIRMED BY	



	PRODUCTION SPECIFICATION OF TFT LCD MODULE	Model No: M215PDTBA B11
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Date	Rev.	Page	Old Description	New Description	Remark
2023.05.10	1.0	All	The specification was first issued		



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1.GENERAL DESCRIPTION

1.1 OVERVIEW

This specification applies to the 21.5 inch-wide Color a-Si TFT-LCD Module LC215DTBA. The display supports the FHD - 1920(H) x1080(V) screen format and 16.7M colors (RGB 6-bit with FRC data) by using LVDS(Low Voltage Differential Signaling) to interface, +5V of DC supply voltage.

1.3 General Specifications

Item	Specifications	Unit	Note
Screen Diagonal	21.5 inch	[mm]	Note 1
Active Area	476.64 (H) ×268.11 (V)	[mm]	
Pixels H x V	1920(×RGB) ×1080		
Pixel Pitch	0.24825 ×0.24825	[mm]	
Pixel Arrangement	R.G.B. Vertical Stripe		
Display Mode	Normally White		
Optical Response Time	5 ms (Typ., on/off)	[msec]	
Nominal Input Voltage VDD	5.0V	[Volt]	
Power Consumption	12.24 watts Backlight+5.5 watts Opencell (white pattern)	[Watt]	
Electrical Interface	LVDS		
Support Color	16.7M colors (6bit with FRC)		
Surface Treatment	Anti-Glare, 3H		

1.4 Mechanical Specification

Item		Min	Typ	Max	Unit	Note
Weight		-200	2100	+200	g	-
Module Size	Horizontal(H)	(TYP)-0.5	495.60	(TYP)+0.5	mm	1
	Vertical (V)		292.20		mm	
	Depth(D)		11.50		mm	

Note 1: Please refer to the "outline dimension" for more information of back and front outline dimensions.



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2. Absolute Maximum Ratings

2.1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	[oC]	(1)
Operation Humidity	HOP	5	90	[%RH]	(2)
Storage Temperature	TST	-20	+60	[oC]	(3)
Storage Humidity	HST	5	90	[%RH]	(4)

Note 1: With in Ta (25C)

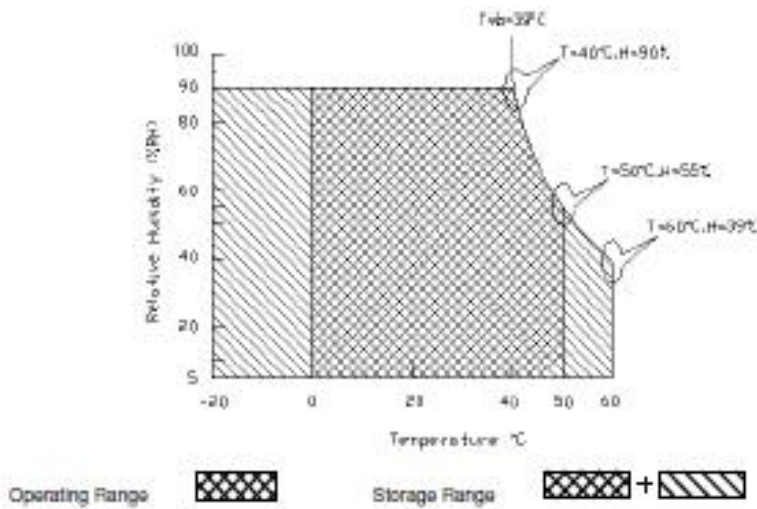
Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: Temperature and relative humidity range are shown as the below figure.

1. 90% RH Max (≤ 39 C)

2. Max wet-bulb temperature at 39

Note 4: Function Judged only



2.2 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Conditions
Power Supply Voltage	VCC	-0.3	6.0	V	(1)
Input Signal Voltage	Vin	-0.3	3.6	V	

Note: (1) Within $T_a=25\pm 2^{\circ}\text{C}$

2.3 Backlight Unit

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
LED operation Voltage	V_{led}	50.4	-	57.6	V_{led}	
LED operation Current	I_{led}	-	240	-	mA	(1)
BackLight Power	P_{BL}	12.10	-	13.82	W	(1)

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.



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3. ELECTRICAL CHARACTERISTICS

3.1 Absolute Maximum Rating

Parameter	Symbol	Condition	Ratings	Unit	Remark
+5V supply voltage	VCC	Ta=25°C	0 ~ +6	V	
Storage temperature	Tstg	-	-20 ~ +60	°C	
Operation temperature	Topa	-	0 ~ +50	°C	

3.2 Control circuit driving

Parameter		Symbol	Min	Typ	Max	Unit	Remark
+5V supply voltage	Supply voltage	VCC	4.5	5.0	5.5	V	[Note 1]
	Current dissipation	ICC	—	820	900	mA	VCC=5.0V,60Hz Black Pattern
		Irush	—	—	3	A	[Note 2]
Permissible input ripple voltage		VRP	—	—	300	mVp-p	VCC=5.0V
Differential Input Threshold Voltage	High	VTH	—	—	100	mV	VCM=1.2V
	Low	VTL	-100	—	—	mV	[Note 3]
Input Differential Voltage		VID	100	—	600	mV	
Differential Input Common Mode Voltage		VCM	1.0	1.2	1.5	V	
Power consumption		P	—	4.1	4.5	W	

[VCM]: Common mode voltage of LVDS driver

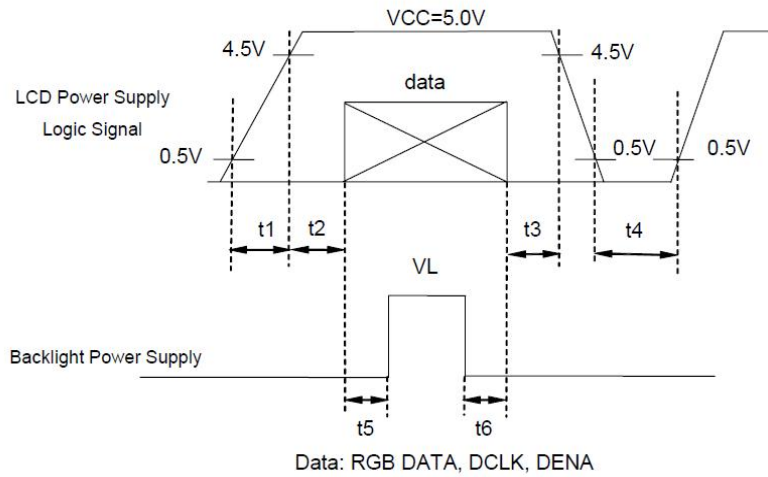
[Note1] Power, data sequence

$$0.50\text{ms} \cong t1 \cong 10\text{ms} \quad t4 \cong 1 \text{ sec}$$

$$0.01\text{ms} < t2 \cong 50\text{ms} \quad t5 \cong 500\text{ms}$$



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※ Data: CLKIN±, RIN0±, RIN1±, RIN2±, RIN3±

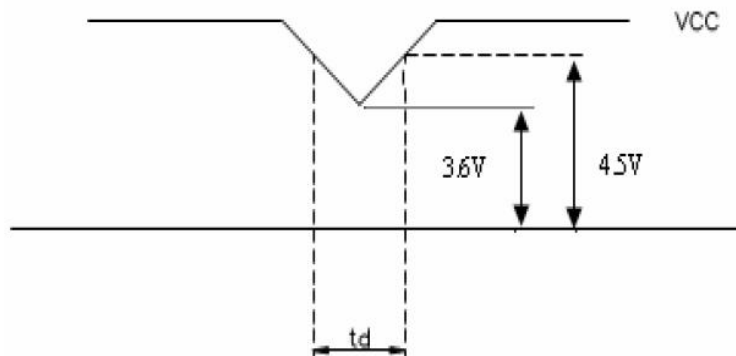
※ About the relation between data input and back light lighting, please base on the above-mentioned input sequence.

※ When back light is switched on before panel operation or after a panel operation stop, it may not display normally. But this phenomenon is not based on change of an incoming signal, and does not give damage to a liquid crystal display.

※ VCC-dip conditions:

(1) When $3.6V \cong VCC(\min) < 4.5V$, $t_d \cong 10\text{ ms}$

(2) When $VCC < 3.6V$, VCC-dip conditions should also follow the VCC-turn-on conditions.



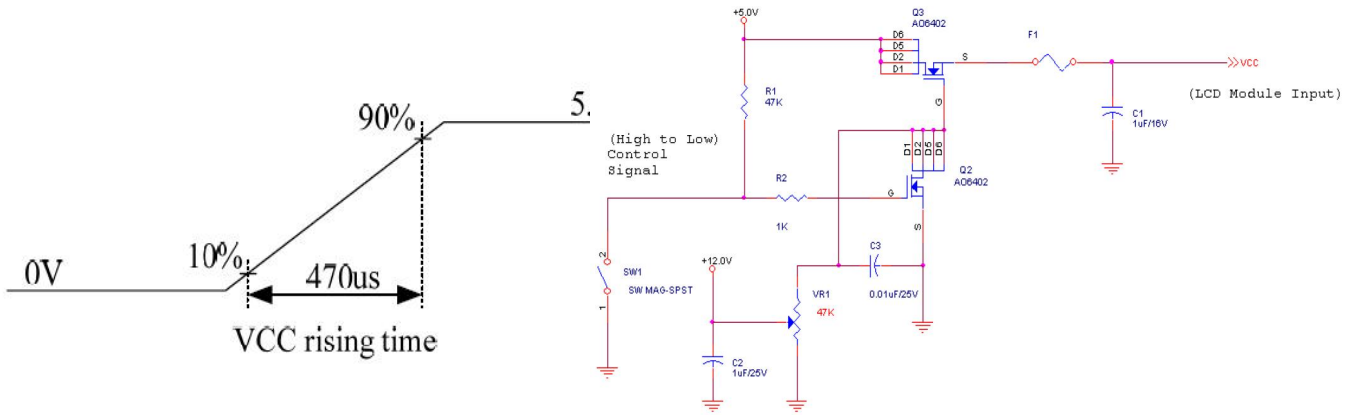
[Note2]

Irush Measurement Condition:

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



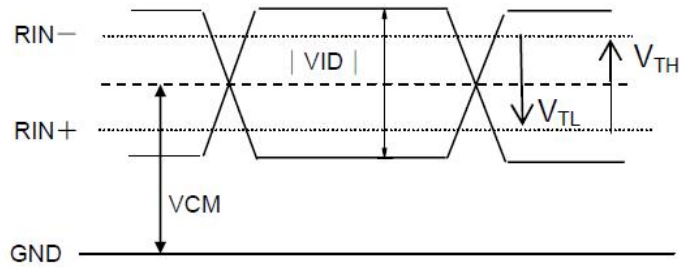
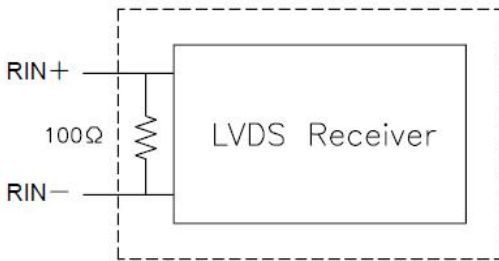
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[Note3]

RIN+: Positive differential DATA & CLK Input

RIN -: Negative differential DATA & CLK Input



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4.0 INTERFACE CONNECTION.

4.1 Interface Pin Assignment

CN1: 3-10122314-0 (XDYT) or equivalent 1mm pitch 30 pin (1)

PIN #	Symbol	DESCRIPTION	REMARK
1	RxOIN0-	Negative LVDS Clock input(ODD)	LVDS
2	RxOIN0+	Positive LVDS Clock input(ODD)	LVDS
3	RxOIN1-	Negative LVDS Clock input(ODD)	LVDS
4	RxOIN1+	Positive LVDS Clock input(ODD)	LVDS
5	RxOIN2-	Negative LVDS DATA input(ODD)	LVDS
6	RxOIN2+	Positive LVDS DATA input(ODD)	LVDS
7	GND	Power Ground	
8	RxOCLK-	Negative LVDS Clock input(ODD)	LVDS
9	RxOCLK+	Positive LVDS Clock input(ODD)	LVDS
10	RxOIN3-	Negative LVDS DATA input(ODD)	LVDS
11	RxOIN3+	Positive LVDS DATA input(ODD)	LVDS
12	RxIN0-	Negative LVDS DATA input(EVEN)	LVDS
13	RxIN0+	Positive LVDS DATA input(EVEN)	LVDS
14	GND	Power Ground	
15	RxIN1-	Negative LVDS DATA input(EVEN)	LVDS
16	RxIN1+	Positive LVDS DATA input(EVEN)	LVDS
17	GND	Power Ground	
18	RxIN2-	Negative LVDS DATA input(EVEN)	LVDS
19	RxIN2+	Positive LVDS DATA input(EVEN)	LVDS
20	RxCLKIN-	Negative LVDS Clock input(EVEN)	LVDS
21	RxCLKIN+	Positive LVDS Clock input(EVEN)	LVDS
22	RxIN3-	Negative LVDS DATA input(EVEN)	LVDS
23	RxIN3+	Positive LVDS DATA input(EVEN)	LVDS
24	GND	Power Ground	
25	NC	No connection	
26	NC	No connection	
27	NC	No connection	[Note 1]
28	VDD	Power Supply input Voltage +5V	
29	VDD	Power Supply input Voltage +5V	
30	VDD	Power Supply input Voltage +5V	

[Note 1] Built-in Self Test (BIST)

*1) PIN27=NC: Disable BIST function.

Available LVDS Signal input: Display LVDS input Pattern.

No LVDS Signal or unavailable LVDS Signal input: Display Black Pattern.

*2) PIN27=High(2.7V~3.3V): Enable BIST function.

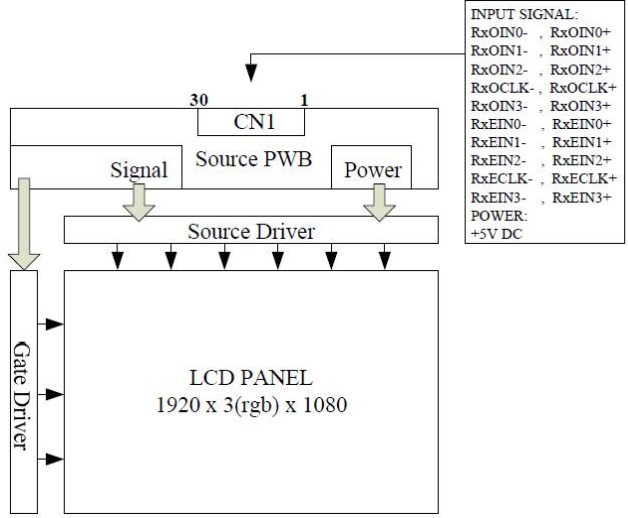
Available LVDS Signal input: Display LVDS input Pattern.

No LVDS Signal or unavailable LVDS Signal input: Display BIST Pattern.

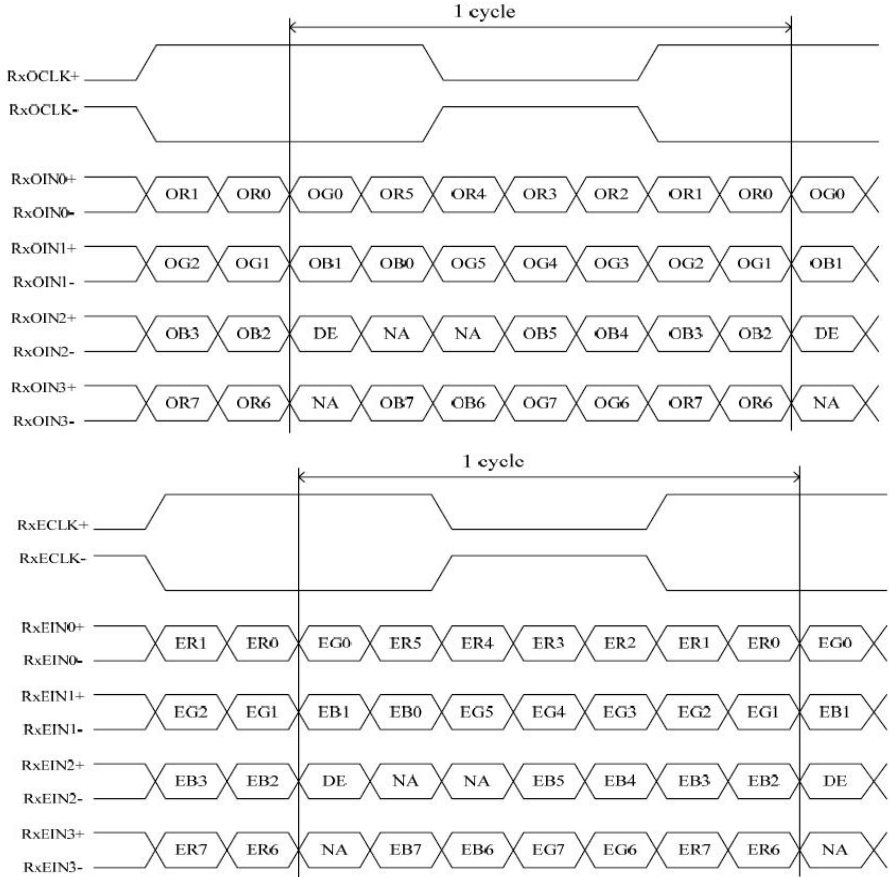


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4.2 Block Diagram (Open-cell)



4.3 LVDS INTERFACE



DE: Display Enable

NA: Not Available (Fixed Low)

R/G/B Data 7:MSB , R/G/B Data 0:LSB , O : "First Pixel Data" E : "Second Pixel Data"



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4.4 Backlight Electrical / Optical Characteristics

4.4.1 backlight connector

CN2 : PH 2.0 2P

Pin#	Signal Name
1	VDD+ (Red)
2	VDD-(Black)

4.4.2 LED Bar

Parameter	Symbols	Min	Typ	Max	Unit
Forward Voltage (one circuit)	VF	2.8	-	3.2	MHz
Reverse Current (one circuit)	IR	-	-	10	μA
Forward Current	IF	-	90	120	Ma
Chromaticity Coordinates	X	0.268	0.279	0.285	
	Y	0.252	0.267	0.273	
Lumen	ϕ	20	22	24	LM
Viewing Angle	2θ1/2	-	120	-	Deg.
Number Of LED	Pcs	-	72	-	Pcs
Operation Voltage(LB)	VLB	50.4	-	57.6	V
Operation Current(LB)	ILB	-	240	-	mA
Power Consumption	PLB	12.096	-	13.824	W



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4.5 COLOR DATA INPUT ASSIGNMENT

	Colors & Gray scale	Data signal																								
		Gray Scale	R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
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 total 24 bit data signals, the 16,7M colors display can be achieved on the screen.



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5. INTERFACE TIMING

5.1 INPUT SIGNAL TIMING SPECIFICATIONS

(a) The input signal timing specifications are shown as the following table and timing diagram.

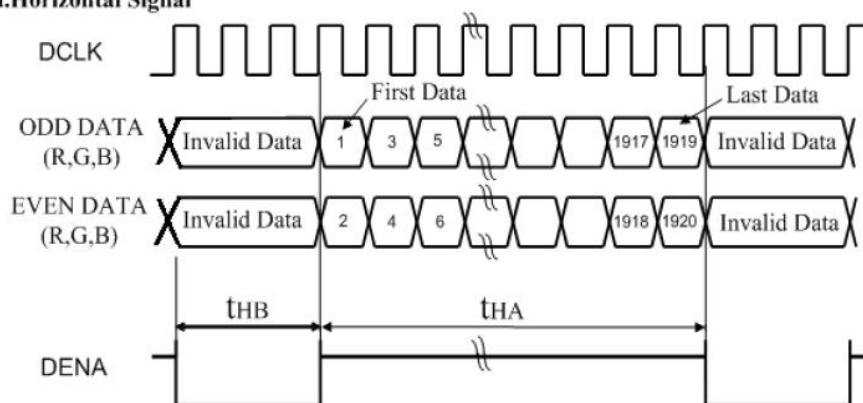
Item		Symbol	Min	Typ.	Max.	Unit		
LCD Timing	DCLK	Freq.	fCLK	55	72	90	MHz	
		Cycle	tCLK	18.18	13.89	11.11	ns	
	DE	Horizontal	Horizontal effective time	tHA	960	960	960	tCLK
			Horizontal blank time	tHB	32	100	115	tCLK
			Horizontal total time	tH	992	1060	1075	tCLK
		Vertical	Vertical frame Rate	Fr	50	60	75	Hz
			Vertical total time	tV	1084	1130	1170	tH
			Vertical effective time	tVA	1080	1080	1080	tH
	Vertical blank time		tVB	4	50	90	tH	

[Note]

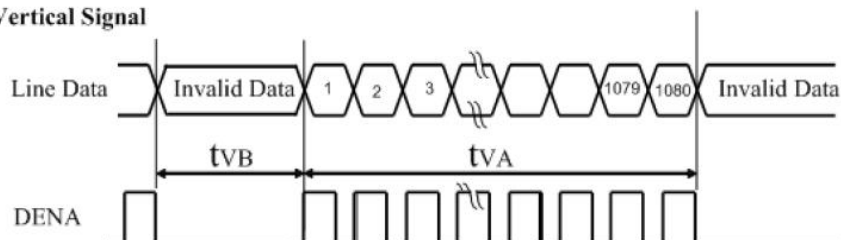
- *1) DE (data enable) usually is positive.
- *2) DCLK still inputs during blanking.
- *3) DE mode only.
- *4) It may cause flicker at 50Hz.

(b) Timing Chart

a. Horizontal Signal



b. Vertical Signal



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6. Optical Specification

6.1 Test Condition

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25 ± 2	°C
Ambient Humidity	Ha	50 ± 10	%RH
Supply Voltage	Vcc	5.0	V
Input Signal	According to typical value in "3.Electrical characteristics		
LED Input Voltage	V _{LED}	51.8	V
LED Input Current	I _{LED}	240.0	mA
Power Consumption	Pw	12.4	W

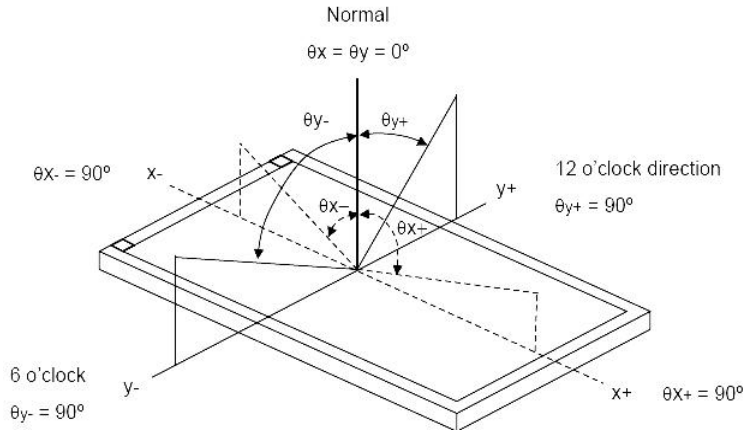
6.2 Optical Characteristics

The relative measurement methods of optical characteristics are shown as below.
The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio	CR	θ _x =0,θ _y =0, viewing normal angle	700	1000	—	—	—	
Response Time	Tr+Tf		—	5	8	ms	Note 3	
Brightness uniformity	BU		70	75	—	—	Note 2	
Center Luminance of White	Lc		220	250	—	cd/m ²	—	
The color chromaticity	Red		R _x	Typ. -0.03	0.638	Typ. +0.03	—	—
			R _y		0.331		—	—
	Green		G _x		0.314		—	—
			G _y		0.617		—	—
	Blue		B _x		0.156		—	—
			B _y		0.143		—	—
White	W _x	0.295	—	—				
	W _y	0.335	—	—				
Color Gamut	CG		68%	72%	—	—	Note 2	
Viewing Angle	Horizontal	θ _{x+}	CR ≥ 10	80	85	—	Deg	Note 1
		θ _{x-}		80	85	—		
	Vertical	θ _{y+}		75	85	—		
		θ _{y-}		75	85	—		

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Note 1: The definition of viewing angle

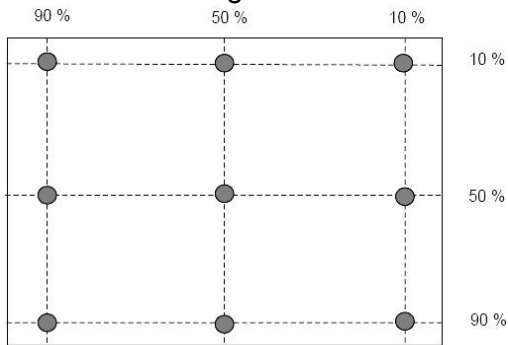


Note 2: Definition of luminance, CR measured positions and brightness uniformity
 (a) Measure White luminance on the below 9 points and take the average value .
 (b) CR : measures the same 9 points and take the average value .The Definition of Contrast Ratio is as follows :

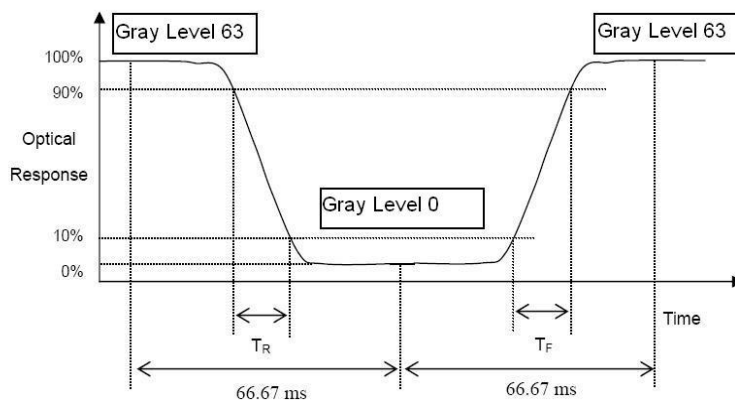
$$CR = \frac{ON(\text{white L254})\text{Luminance}}{OFF(\text{Black L0})\text{Luminance}}$$

(c) The definition of White Vibration

$$\frac{\text{The minimum brightness of 9 dot}}{\text{The maximum brightness of 9 dot}} \times 100\%$$

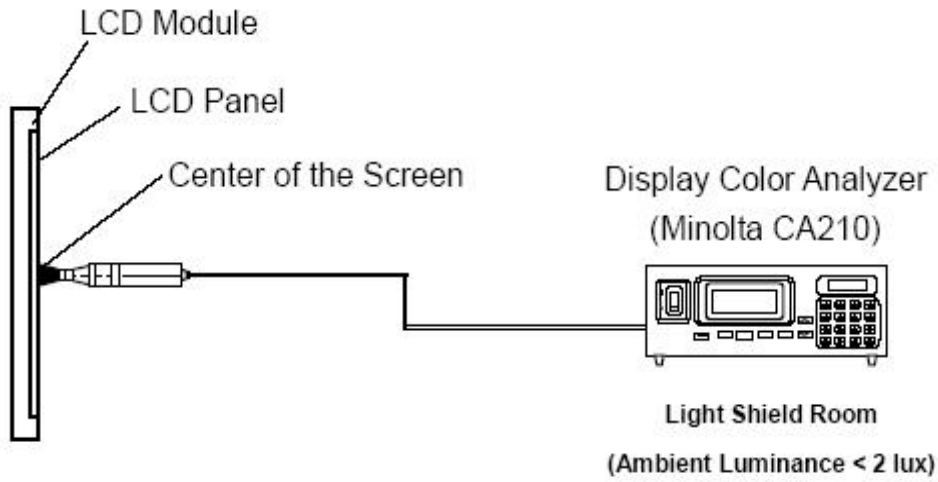


Note 3: Definition of Response Time (TR, TF):



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Note 4: The measure method



- (a): The measurement point is the center of the active area except for the measurement of Luminance Uniformity
- (b): Photometer :CA-210




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7. Labels

7.1 Panel Label:

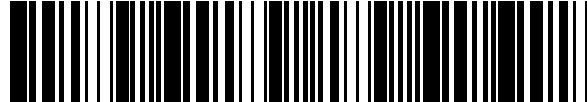
Model No: M215PDTBA B11
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ABCDEFGHIJKLMNHIJK

51-57V,240mA L=250cd/m2 **RoHS**

7.1 Carton Label:



ABCDEFGHIJKLMNHIJK

Model No,(型号) : M215PDTBA B11

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QTY'(数量) : 10 pcs

N.W(净重) : KG

G.W(毛重) : KG **RoHS**

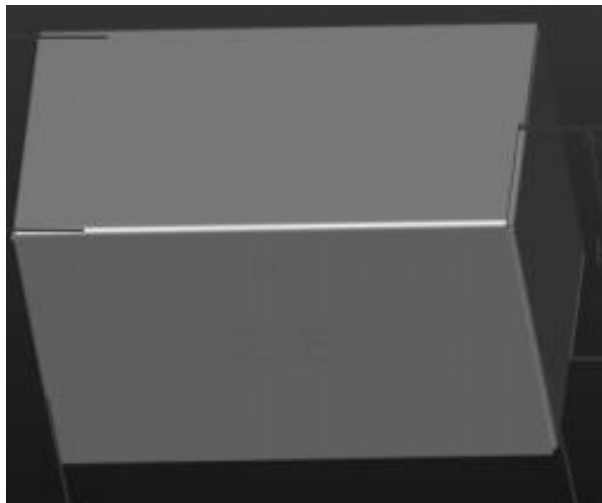
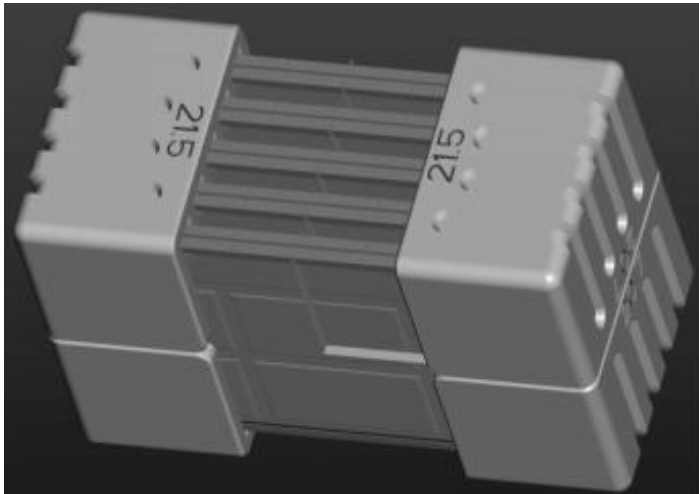


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8. Packaging

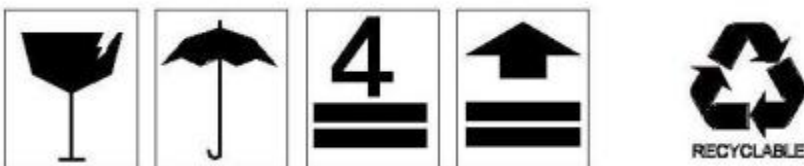
8.1 Carton(internal package)

- (1)Packaging Form
- (2) Packaging Method
- (2) carton box size: 550*350*273mm



Note 1) Acceptable number of piling : 10 sets

8.2 Packing Mark



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9. PRECAUTION

9.1 ASSEMBLY AND HANDLING PRECAUTIONS

- 1 Do not apply rough force such as bending or twisting to the module during assembly.
- 2 To assemble or install module into user's system can be in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- 3 It's not permitted to have pressure or impulse on the module because the LED panel and Backlight will be damaged.
- 4 Always follow the correct power sequence when LED module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- 5 Do not pull the I/F connector in or out while the module is operating .
- 6 Do not disassemble the module.
Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very
- 7 soft and easily scratched.
- 8 It is dangerous that moisture come into or contacted the LED module, because moisture may damage LED module when it is operating.
- 9 High temperature or humidity may reduce the performance of module. Please store LED module within the specified stored conditions.
- 10 When ambient temperature is lower than 10 °C may reduce the display quality. For example, the response time will become slowly.

7.2 SAFETY PRECAUTIONS

- 1 It is dangerous that moisture come into or contacted the LED module, because the moisture may damage LED module when it is operating.
- 2 If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth, in case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- 3 After the module's end of life, it is not harmful in case of normal operation and storage.

	PRODUCTION SPECIFICATION OF TFT LCD MODULE	Model No: M215PDTBA B11
		OC PN: LC215DTBA-11

Outline dimension

