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SPEC. NUMBER

PRODUCT GROUP
TFT-LCD

Rev.P0

ISSUE DATE
2020. 08.05PAGE
1 OF 16**B3 10.4 MDL RGB Product Specification Rev.P0**

Supplier	BEIJING BOE Optoelectronics Technology CO., LTD
Model	BA104S01-400

TITLE/SIGNATURE DATE

_____	_____
_____	_____
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ITEM SIGNATURE DATE

Approved	_____
Reviewed	_____
Prepared	_____

BEIJING BOE OPTOELECTRONICS TECHNOLOGY

[illegible]



BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification		PAGE 3 OF 16

Contents

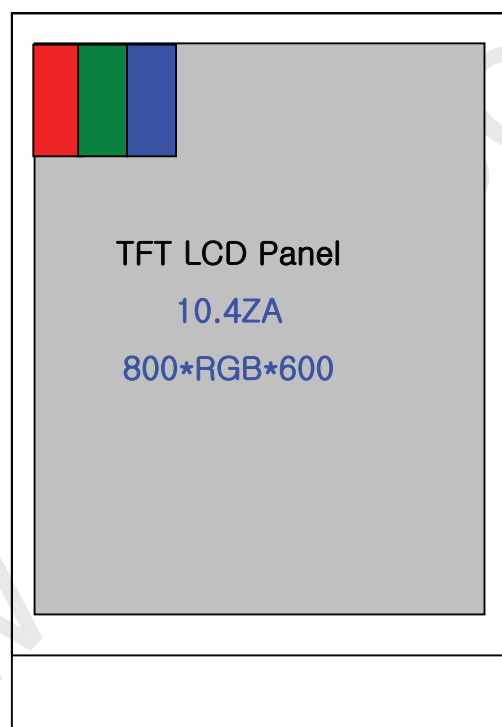
No.	Items	Page
1.0	General Description	4
2.0	Absolute Maximum Ratings	6
3.0	Electrical Specifications.	7
4.0	Optical Specifications.	11
5.0	Mechanical Characteristics	14
6.0	Reliability Test	15
7.0	Pin Assignment	16

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification		PAGE 4 OF 16

1.0 GENERAL DESCRIPTION

1.1 Introduction

BA104S01-400 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 10.4 display area contains 800(RGB) x 600 pixels and can display up to 16.2M colors. This product accords with ROHS environmental criterion.



1.2 Features

- Color Gamut : 55%
- High Reliability

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 5 OF 16	

1.3 Application

- White Goods

1.4 General Specification

The followings are general specifications at the 10.4MDL

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	211.20(H)×158.40(V)	mm	
Number of pixels	800 (H) × 600 (V)	pixels	
Pixel pitch	0.088(H) × 0.264(V)	mm	
Pixel arrangement	RGB Vertical Stripe		
Display colors	16.7M	colors	
Color Gamut	55% (Typ.)		
Display mode	Normally White		
Dimensional Outline	228.40(W)×175.40(V)×6.20(D)	mm	MDL
Backlight	36-LEDs (white)	Pcs	
Brightnedd(LCM)	350	cd/m ²	TYP
Data Transfer	RGB		

Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder.

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 6 OF 16	

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply	VCC	Ta=25℃	-0.3	-	4.0	V	
I/O and interface power supply	-	-	-	-	-	-	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. VCI >VSS must be maintained.
3. Please be sure users are grounded when handing LCD Module

2.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30℃	70℃	-20℃	60℃	1,2

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification		PAGE 7 OF 16

3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications (V_{ss}=0V ,Ta=25℃)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply	VCC	Ta=25℃	3.0	3.3	3.6	V	
	AVDD	Ta=25℃	8.4	9	10	V	
	VGH	Ta=25℃	17	18	19	V	
	VGL	Ta=25℃	-9	-8	-7	V	
	VCOM	Ta=25℃	3.5	3.92	4.2	V	

Note:

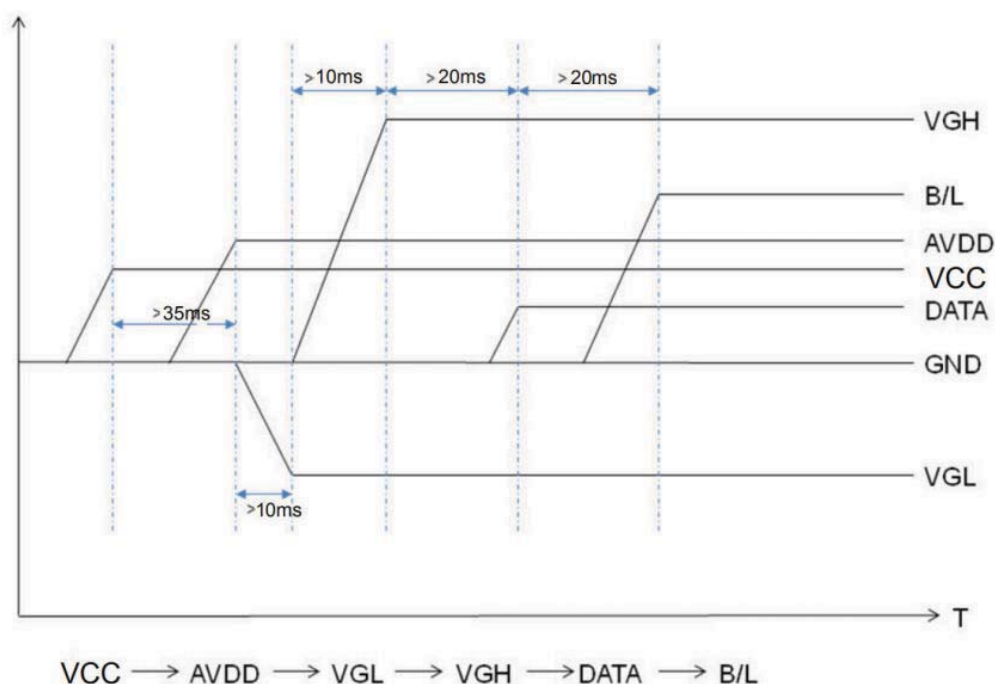
1:When an optimum contrast is obtained in transmissive mode.

2: Tested in 1×1 chessboard pattern.

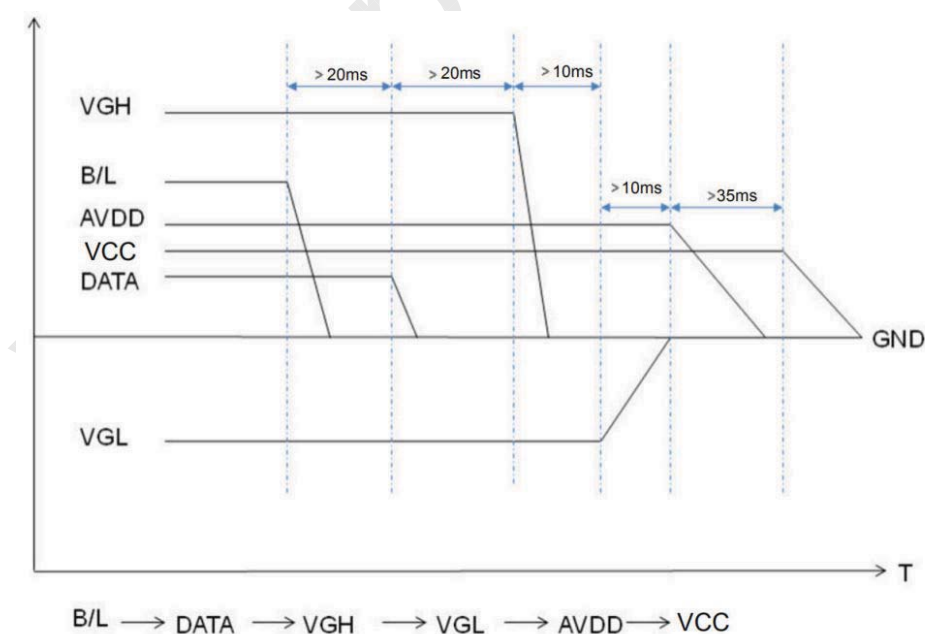
BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 8 OF 16	

3.2 Power On/Off Sequence

a. Power On



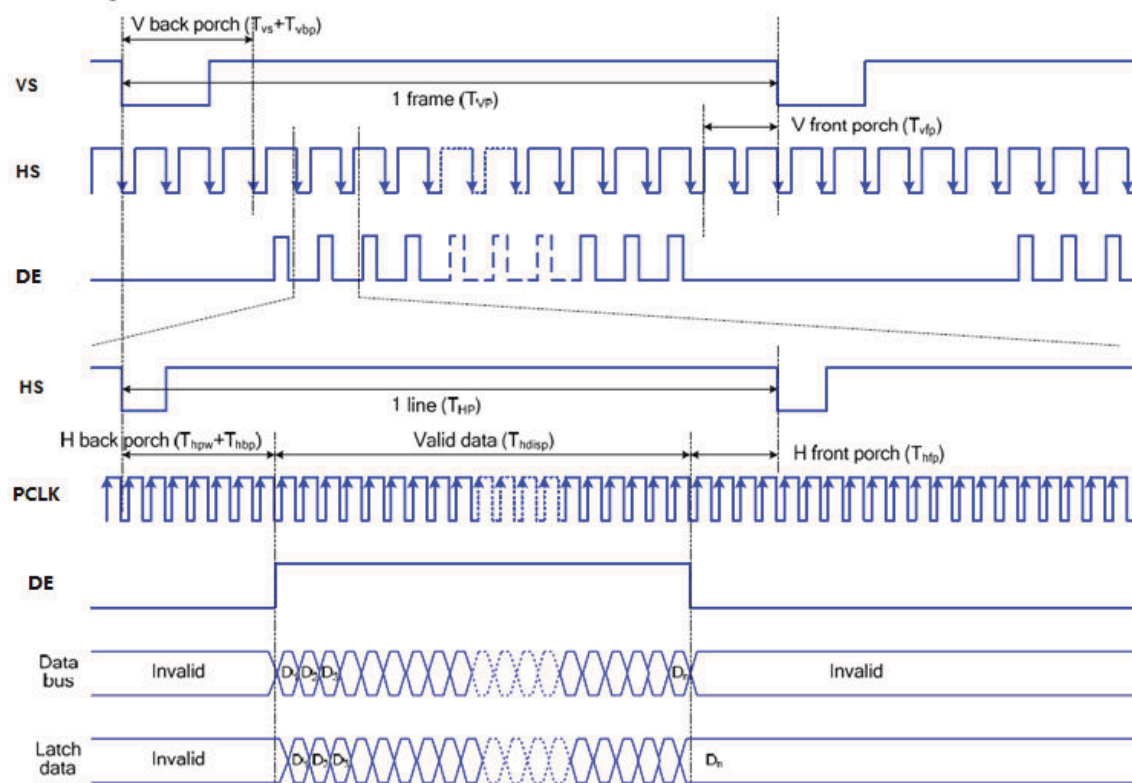
b. Power Off



BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 9 OF 16	

3.3 Input Timing Table

The timing chart of RGB interface DE mode is shown as follows.



Timing Chart of Signals in RGB Interface DE Mode

Parameters	Symbols	Min.	Typ	Max.	Unit
Horizontal Synchronization	hpw	-	5	-	PCLK
Horizontal Back Porch	hbp	-	185	-	PCLK
Horizontal Front Porch	hfp	-	185	-	PCLK
Hsync+ HBP+ HFP	-	-	375*Note1	-	PCLK
Horizontal Address (Display area)	hdisp	-	800	-	PCLK
Horizontal cycle	-	-	12.703	-	us
Vertical Synchronization	VS	-	15	-	Line
Vertical Back Porch	vbp	-	50	-	Line
Vertical Front Porch	vfp	-	30	-	Line
Vsync+ VBP+ VFP	-	-	95	-	Line
Vertical Address (Display area)	vdisp	-	600	-	Line
Vertical cycle	-	-	16.66	-	ms
Frame-Rate	-	-	60	-	Hz

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 10 OF 16	

3.4 LED backlight specification(VSS=0V ,Ta=25℃)

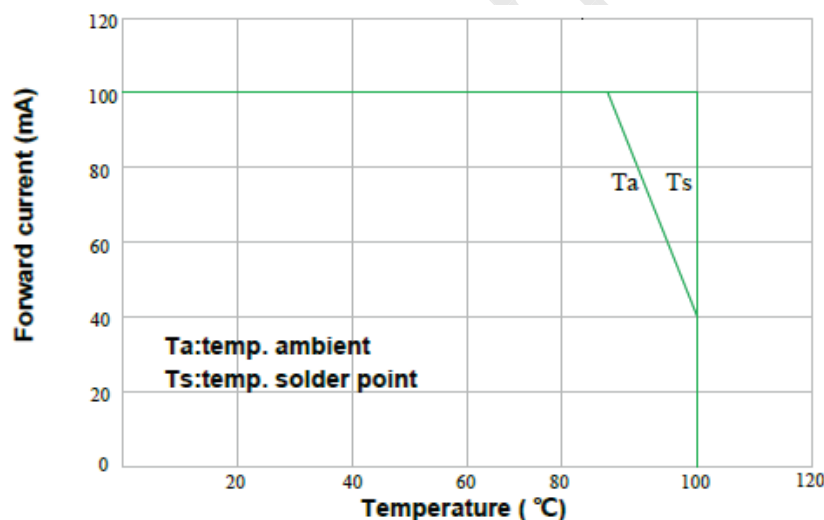
Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V_f	-	-	9	-	V	1
Supply current	I_f	-	-	240	-	mA	2
Number of LED	-	3Sx12P	-	36	-	Piece	
LED life time	-		20000	-	-	Hr	

Note:

1: $V_{LED} = V_{LED(+)} - V_{LED(-)}$.

2: The current of LED is 20mA.

A LED drive in constant current mode is recommended.



BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 11 OF 16	

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of view angle range shall be measured in a dark room (ambient luminance $\leq 1\text{lu}$ x and temperature = $25\pm 2^{\circ}\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCON CS2000/CA310) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta\Phi=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta\Phi=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta\Phi=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta\Phi=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , the center of the measuring spot on the Display surface shall stay fixed. The luminance, color and uniformity (etc) should be tested by CS2000/CA310. The backlight should be operating for 10 minutes prior to measurement. VCC shall be $3.3 \pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 'clock

4.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	80	-	Deg.	Note 1
		Θ_9		-	80	-	Deg.	
	Vertical	Θ_{12}		-	65	-	Deg.	
		Θ_6		-	75	-	Deg.	
Contrast ratio		CR	$\Theta = 0^\circ$	600	800	-		Note 2
White Chromaticity		x_w		Typ -0.03	0.284	Typ +0.03		@C light Note 4
		y_w			0.320			
Response Time (Rising + Falling)		$T_r + T_f$	Ta= 25° C $\Theta = 0^\circ$		30	-	ms	Note 5

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 12 OF 16	

Note :

Notes : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

3. Transmittance is the Value without APF and without CG.

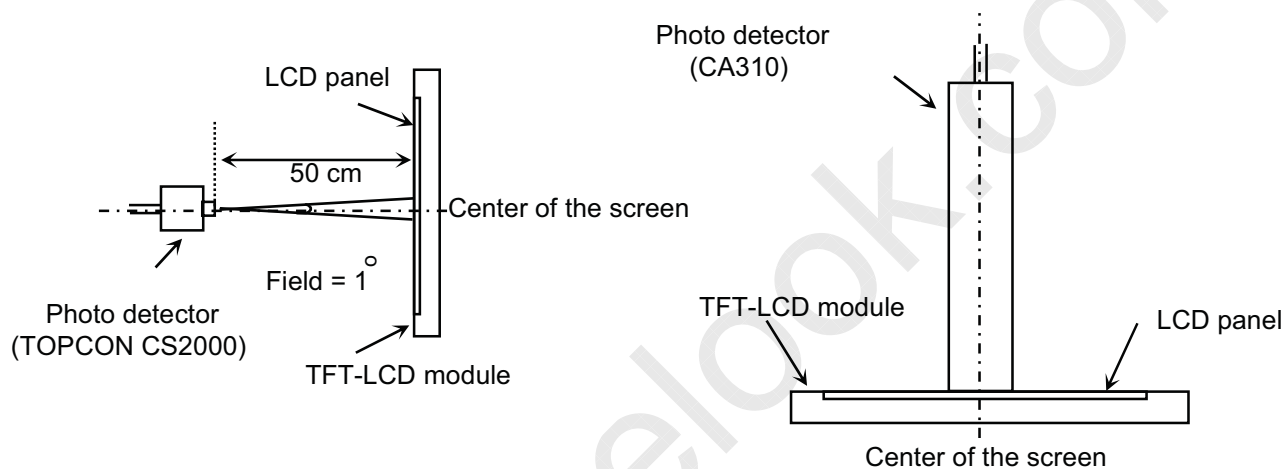
4. The color chromaticity coordinates specified in Table 5. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel and based on C Light.

5. The electro-optical response time measurements shall be made as FIGURE 2. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_f .

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification	PAGE 13 OF 16	

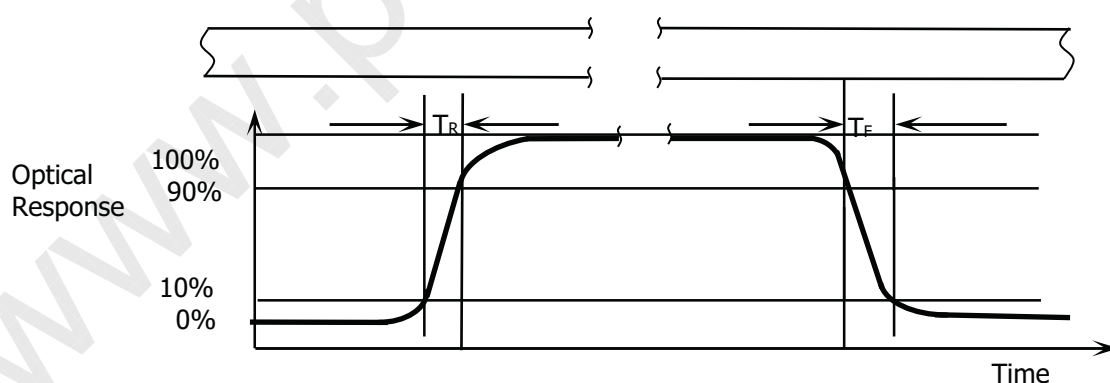
4.2 Optical measurements

Figure 1. Measurement Set Up



View angel range, uniformity, etc. measurement setup

Flicker, measurement setup



The electro-optical response time measurements shall be made as shown in FIGURE 2. The times needed for the luminance to change from 10% to 90% is T_r and 90% to 10% is T_f .

5.0 Mechanical Characteristics

装配基准: LOD左上角				5		6	
1				2		3	
A				4		5	
B				6		7	
C				8		9	
D				10		11	
E				12		13	
1				2		3	
A				4		5	
B				6		7	
C				8		9	
D				10		11	
E				12		13	
1				2		3	
A				4		5	
B				6		7	
C				8		9	
D				10		11	
E				12		13	
1				2		3	
A				4		5	
B				6		7	
C				8		9	
D				10		11	
E				12		13	
1				2		3	
A				4		5	
B				6		7	
C				8		9	
D				10		11	
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D				10		11	
E				12		13	
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C				8		9	
D				10		11	
E				12		13	
1				2		3	
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E				12		13	
1				2		3	
A				4		5	
B				6		7	
C				8		9	
D				10		11	
E				12		13	

A4(210 X 297)

BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification		PAGE 15 OF 16

6.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 4. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature storage test	Ta = 70℃ , 240hrs
2	Low temperature storage test	Ta = -20 ℃ , 240hrs
3	High temperature operation test	Ta = 60℃ , 240hrs
4	Low temperature operation test	Ta = -10 ℃ , 240hrs
5	High temperature & high humidity operation test	Ta = 50 ℃ , 90%RH, 240hrs
6	TST	Ta = -20℃~60℃(1hr),10 cycle



BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.08.05
SPEC. NUMBER	SPEC.TITLE B3 10.4 MDL RGB Product Specification		PAGE 16 OF 16

7.0 Pin Assignment

Pin No.	Symbol	Function
1	GND	Ground
2	AVDD	Power for Analog Circuit(9V)
3	VCC	Power supply(3.3V)
4-11	R0-R7	Red data input
12-19	G0-G7	Green data input
20-27	B0-B7	Blue data input
28	DCLK	Clock input
29	DE	Data enable
30	HSYNC	Horizontal sync input Negative polarity
31	VSYNC	Vertical sync input Negative polarity
32	MODE	DE/SYNC mode select .normally pull high H:DE mode .L:HV sync mode
33-35	NC	No connection
36	VCC	Power supply(3.3V)
37	NC	No connection
38-39	GND	Ground
40	AVDD	Power for Analog Circuit(9V)
41	VCOM	Common Voltage
42	DITH	Dithering setting, DITH="H" 6bit resolution, DITH="L" 8bit resolution
43-55	NC	No connection
56	VGH	Gate ON Voltage(18V)
57	VCC	Power supply(3.3V)
58	VGL	Gate Off Voltage(-8V)
59	GND	Ground
60	NC	No connection