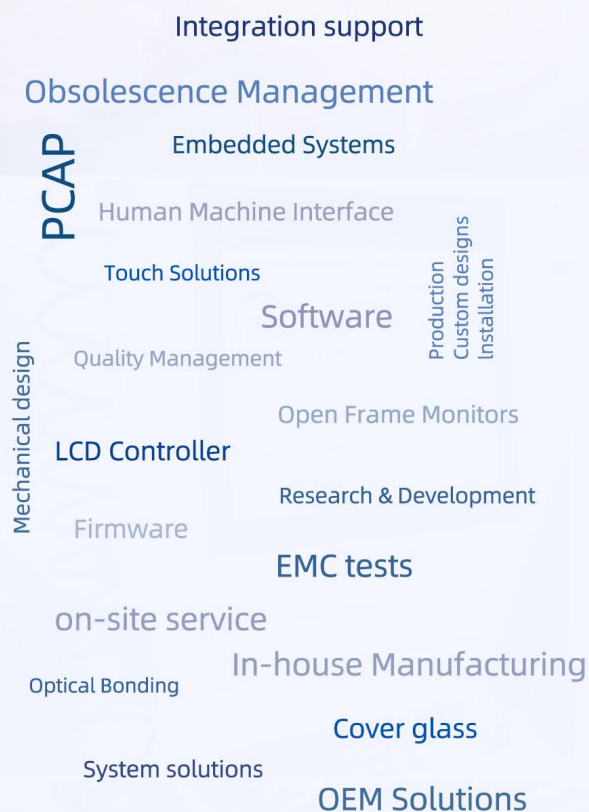


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SPEC. NUMBER S8-*	PRODUCT GROUP TFT- LCD	REV. P2	ISSUE DATE 2020-03-13	PAGE 1 OF 32

B3 EV184QUM-N80 Product Specification Rev.P2

BUYER	
SUPPLIER	HEFEI BOE Optoelectronics Technology CO., LTD
FG-Code	EV184QUM-N80

ITEM	BUYER SIGNATURE	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	_____	_____
Reviewed	_____	_____
Approved	_____	_____

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 2 OF 32

REVISION HISTORY (√)preliminary specification ()Final specification				
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REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2019-08-05	
P1		Update Electrical Specifications、 Optical Specifications、 Reliability Test、 Packing Information	2019-09-29	
P2		Update LED Light Bar Input Current Per Input string Update LED Power Consumption	2020-03-13	

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PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 3 OF 32

Contents

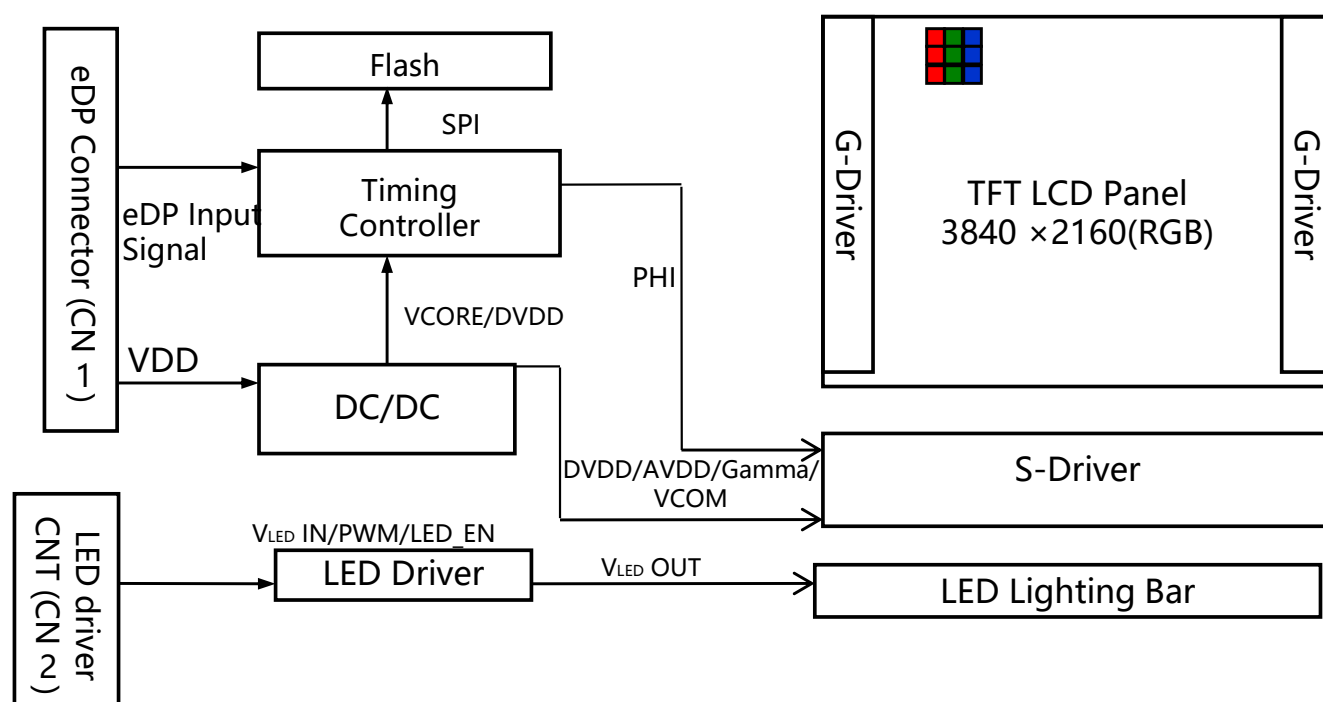
No.	Items	Page
1.0	General Description	4
2.0	Absolute Maximum Ratings	6
3.0	Electrical Specifications	7
4.0	Optical Specifications	17
5.0	Reliability Test	21
6.0	Packing Information	22
7.0	Product Label	24
8.0	Handling & Cautions	25
9.0	Appendix	31

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			4 OF 32

1.0 GENERAL DESCRIPTION

1.1 Introduction

EV184QUM-N80 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 18.4 inch diagonally measured active area with UHD resolutions (3840 horizontal by 2160 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 1.07G colors.



1.2 Features

- 4 lane eDP interface with 5.4Gbps link rates
- 0.5T Glass (Single)
- Reverse Type
- Thin and light weight
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS compliant

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 5 OF 32

1.3 Application

- HMI (Human Machine Interface)

1.4 General Specification

The followings are general specifications at the EV184QUM-N80

<Table 1. LCD Module Specifications>

Parameter	Specification	Unit	Remarks
Active Area	408.96 (H) × 230.04(V)	mm	
Number Of Pixels	3840 x 2160	pixels	
Pixel Pitch	0.03555 x0.1065	mm	
Pixel Arrangement	RGB		
Display Mode	Normal black		
Display Colors	1.07G(8Bit+FRC)	colors	
Surface Treatment	High fineness AG25		
Contrast Ratio	1000:1 (Typ.)		
Viewing Angle(CR>10)	85°/85°/85°/85° (Typ.)	deg.	
Response Time	15ms(Typ.) 18ms (Max.)	ms	
Color Gamut	80% BT2020		
Brightness	1000 (Typ.)	cd/m2	
Brightness Uniformity	85% (Typ.)		L255
Power Consumption	57.2W (Max.)	watt	
Outline Dimension	431(H) × 255.94(V) × 10(D) (Typ.)	mm	
Weight	1290±10 (Typ.)	gram	
Display Orientation	Landscape Only		

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 6 OF 32

2.0 ABSOLUTE MAXIMUM RATINGS

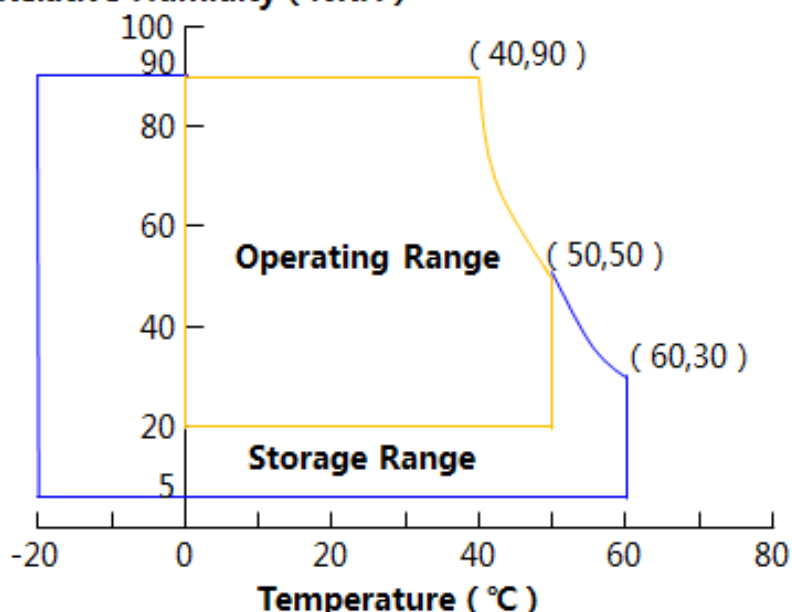
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings >

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	-0.3	14	V	Ta = 25 °C
	BLU	V _{LED}	-0.3	28	V	
		I _{LED}	-	2200	mA	
Control Voltage for BIST		I _{BIST}	-0.3	2.4	V	
Control Voltage for PEN		V _{PEN}	-0.3	2.4	V	
Control Voltage for BL_EN		V _{BL_EN}	-0.3	6	V	
Control Voltage for BL_PWM		V _{BL_PWM}	-0.3	6	V	
Operating Temperature		T _{OP}	0	+50	°C	Note 1
Storage Temperature		T _{ST}	-20	+60	°C	

Note : 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 °C max. and no condensation of water.

Relative Humidity (%RH)



PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 7 OF 32

3.0 ELECTRICAL SPECIFICATIONS

3.1 TFT LCD Module

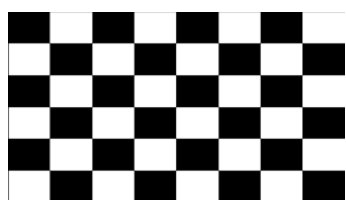
< Table 3. LCD Module Electrical specifications >

[Ta =25±2 °C]

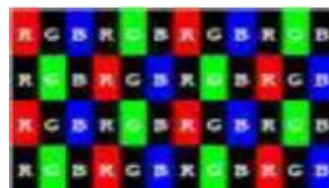
Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max.		
Power Supply Voltage		VDD	10.8	12	13.6	V	Note 1
Power Supply Current		IDD	-	300	750	mA	
PEN	Normal inversion	PEN	-	0	0.3	V	
	2 frame inversion		1.62	1.8	1.98	V	
BIST		ON	1.62	1.8	1.98	V	
		OFF	-	0	0.3	V	
BLU Supply Voltage		V _{LED}	-	24	26.4	V	
BLU Supply Current		I _{LED}	-	1700	1800	mA	
BLU on/off Level		BLU on	3.0	3.3	3.6	V	
		BLU off	0	0	0.5	V	
PWM	Level	High Level	3.0	3.3	3.6	V	
		Low Level	0	0	0.5	V	
	Frequency	F _{PWM}	180	200	3000	Hz	
	Duty Ratio	D _{PWM}	1	-	100	%	Note 2
Power Consumption		P _{Display}	-	3.6	10	W	Note 3
		P _{LED}	-	-	47.2	W	
		P _{total}	-	-	57.2	W	

Notes : : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for Frame rate $f_v=60\text{Hz}$
and Clock frequency = 533MHz. Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)



b) Max : Skip Sub pixel



2. The adjustment range can be 0%~100% during normal operation . However , if the duty cycle is less than 1% and starts after locking , there will be the risk of abnormal output current ; The duty cycle range is required to be 1%~100% when starting. It can be adjusted to 0 after normal operation.

3. The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 8 OF 32

3.2 Back-Light Unit

Table 4. LED Bar Electrical Specifications >

[Ta =25±2 °C]

Parameter	Symbol	Values			Unit	Notes
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	V_{PIN}	-	41.0	43.7	V	
LED Light Bar Input Current Per Input string	I_{string}	-	70	-	mA	Note 1
LED Power Consumption	P_{LB}	-	34.5	36.7	W	
LED Life Time	TLED	30000	-	-	Hrs	Note 2/3

- Notes: 1. Single LED Bar: 6 Strings, 7 LED per string; $I_{LB}=6 \text{ Input strings} \times I_{string}=420\text{mA}$;
There are two light bars, $P_{LB} = 2 \times V_{PIN} \times I_{LB}$ (Without LED converter transfer efficiency)
2. The life time of LED, 30,000Hrs, is determined as the time at which luminance of the LED is 50% compared to that of initial value at the typical LED current on condition of continuous operating at $25 \pm 2^{\circ}\text{C}$.
3. Only under the above operating conditions could the life time of LED be guaranteed.

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 9 OF 32

3.3 INPUT TERMINAL PIN ASSIGNMENT

This LCD employs two interface connections, a 40 pin connector is used for the LCD module electronics interface and a 10 pin connector is used for the backlight system.

3.3.1 Pin assignment for LCD module

Connector 1: I-PEX 20455-040E or equivalent

< Table 5. Pin Assignment for LCD Module Connector >

Pin No.	Symbol	Pin No.	Symbol
1	NC(G_SYNC)	21	LCD_VCC
2	H_GND	22	BIST(LCD Self test)High : 1.8V
3	Lane3_N	23	GND
4	Lane3_P	24	GND
5	H_GND	25	GND
6	Lane2_N	26	GND
7	Lane2_P	27	HPD
8	H_GND	28	GND
9	Lane1_N	29	GND
10	Lane1_P	30	PEN
11	H_GND	31	GND
12	Lane0_N	32	GND
13	Lane0_P	33	GND
14	H_GND	34	GND
15	AUX_CH_P	35	GND
16	AUX_CH_N	36	GND
17	H_GND	37	GND
18	LCD_VCC	38	GND
19	LCD_VCC	39	GND
20	LCD_VCC	40	GND

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 10 OF 32

3.3.2 Pin assignment for LED driver
Connector 2 :JST SM10B-PASS or equivalent

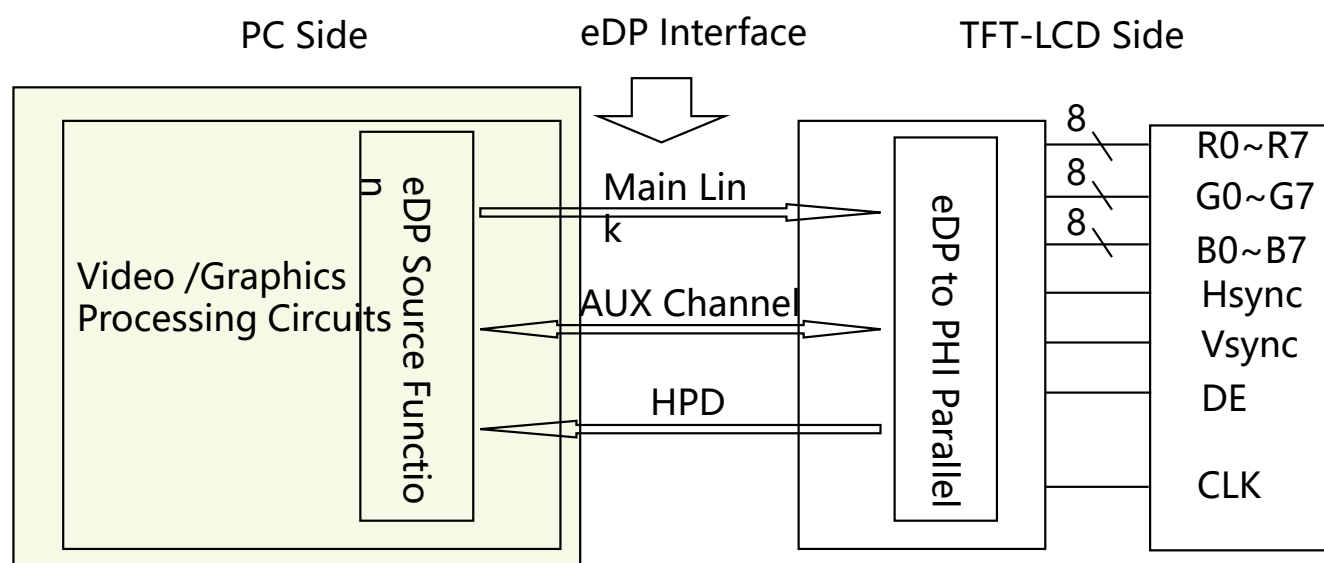
< Table 6. Pin assignment for LED driver >

Pin No.	Symbol	Function	Remark
1	V _{LED}	24V+	Connect VCC
2	V _{LED}	24V+	
3	V _{LED}	24V+	
4	-	NC	
5	LED_PWM	PWM	
6	LED_EN	EN	
7	-	NC	
8	GND	GND	Ground
9	GND	GND	
10	GND	GND	

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 11 OF 32

3.4 eDP Interface

< Table 7. DC Specification >



Note:
Transmitter : Parade DP501 or equivalent.
Transmitter is not contained in module.

Lane 0	Lane 1	Lane 2	Lane 3
R0-9:2	R1-9:2	R2-9:2	R3-9:2
R0-1:0 G0-9:4	R1-1:0 G1-9:4	R2-1:0 G2-9:4	R3-1:0 G3-9:4
G0-3:0 B0-9:6	G1-3:0 B1-9:6	G2-3:0 B2-9:6	G3-3:0 B3-9:6
B0-5:0 R4-9:8	B1-5:0 R5-9:8	B2-5:0 R6-9:8	B3-5:0 R7-9:8
R4-7:0	R5-7:0	R6-7:0	R7-7:0
G4-9:2	G5-9:2	G6-9:2	G7-9:2
G4-1:0 B4-9:4	G5-1:0 B5-9:4	G6-1:0 B6-9:4	G7-1:0 B7-9:4
B4-3:0 R8-9:6	B5-3:0 R9-9:6	B6-3:0 R10-9:6	B7-3:0 R11-9:6
R8-5:0 G8-9:8	R9-5:0 G9-9:8	R10-5:0 G10-9:8	R11-5:0 G11-9:8
G8-7:0	G9-7:0	G10-7:0	G11-7:0
B8-9:2	B9-9:2	B10-9:2	B11-9:2
B8-1:0 R12-9:4	B9-1:0 R13-9:4	B10-1:0 R14-9:4	B11-1:0 R15-9:4
R12-3:0 G12-9:6	R13-3:0 G13-9:6	R14-3:0 G14-9:6	R15-3:0 G15-9:6
G12-5:0 B12-9:8	G13-5:0 B13-9:8	G14-5:0 B14-9:8	G15-5:0 B15-9:8
B12-7:0	B13-7:0	B14-7:0	B15-7:0

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 12 OF 32

3.5 Data Input Format

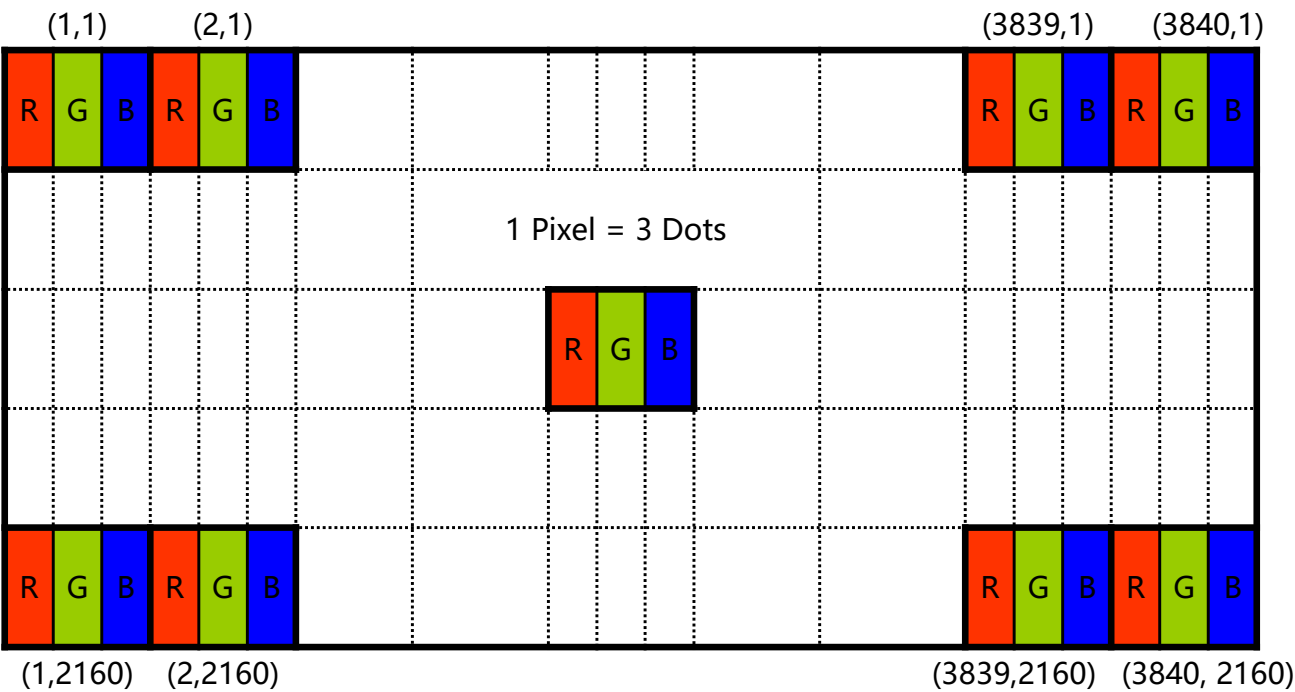


Figure1: Display Position of Input Data (V-H)

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 13 OF 32

3.6 Interface timing Parameter

< Table 8-1. Timing Parameter >

Timing parameter for 【60Hz】

Item		Symbol	Min	Typ	Max	unit
Horizontal Valid		tHV	3840	3840	3840	clocks
Horizontal Blank		-	160	180	210	
Vertical Valid		tVV	2160	2160	2160	Lines
Vertical Blank		-	48	64	84	
Frame Frequency		Fv	58	60	62	Hz
clock	Frequency	1/Tc	512.26	535.43	563.47	MHz
	High Time	Tch		4/7Tc		Tc
	Low Time	Tcl		3/7Tc		Tc

< Table 8-2. Timing Parameter >

Timing parameter for 【50Hz】

Item		Symbol	Min	Typ	Max	unit
Horizontal Valid		tHV	3840	3840	3840	clocks
Horizontal Blank		-	160	180	210	
Vertical Valid		tVV	2160	2160	2160	Lines
Vertical Blank		-	48	64	84	
Frame Frequency		Fv	48	50	52	Hz
clock	Frequency	1/Tc	423.94	447.02	472.59	MHz
	High Time	Tch		4/7Tc		Tc
	Low Time	Tcl		3/7Tc		Tc

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 14 OF 32

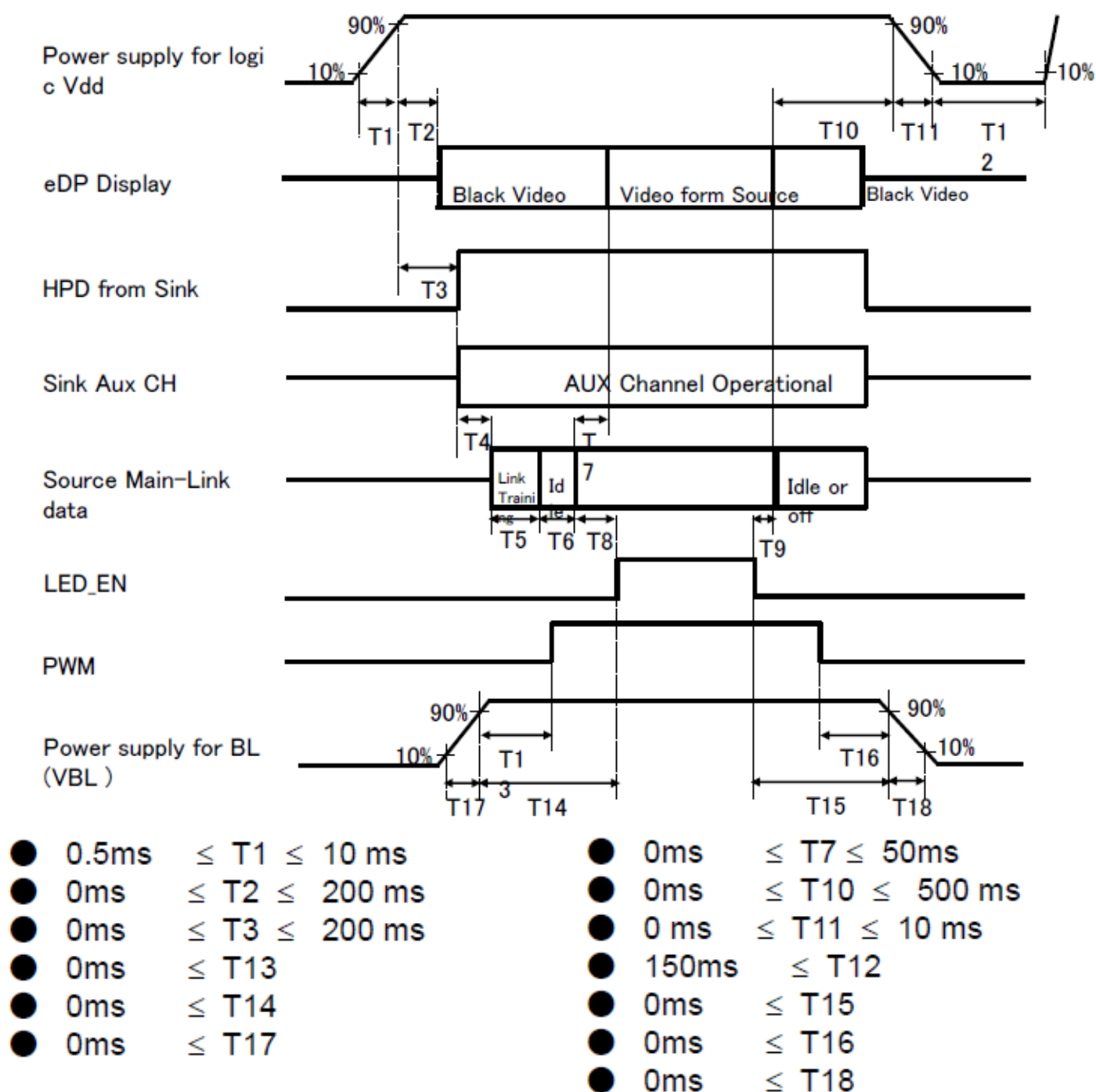
< Table 8-3. Timing Parameter >

Timing parameter for 【48Hz】

Item		Symbol	Min	Typ	Max	unit
Horizontal Valid		tHV	3840	3840	3840	clocks
Horizontal Blank		-	160	180	210	
Vertical Valid		tVV	2160	2160	2160	Lines
Vertical Blank		-	48	64	84	
Frame Frequency		Fv	46	48	50	Hz
clock	Frequency	1/Tc	406.27	429.14	454.41	MHz
	High Time	Tch		4/7Tc		Tc
	Low Time	Tcl		3/7Tc		Tc

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			15 OF 32

3.7 Power Sequence



Notes:

1. When the power Supply VDD is 0v, keep the level of input signals on the low or keep high impedance
2. Do not keep the interface signal high impedance when power is on, Back Light must be turn on after power for logic and interface signal are valid

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 16 OF 32

3.8 Input Color Data Mapping

< Table 9. Input Signal and Display Color Table >

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R9	R8	R7	...	...	R2	R1	R0	G9	G8	G7	...	...	G2	G1	G0	B9	B8	B7	...	...	B2	B1	B0
Basic Colors	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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
Gray Scale of Green	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	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
Gray Scale of Blue	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	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
Gray Scale of White	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
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	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

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 17 OF 32

4.0 OPTICAL SPECIFICATIONS

4.1 Overview

The test of optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25\pm 2^{\circ}\text{C}$) with the equipment of Luminance meter system (Gonio meter system and **TOPCON BM-5**) 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.

4.2 Optical Specifications

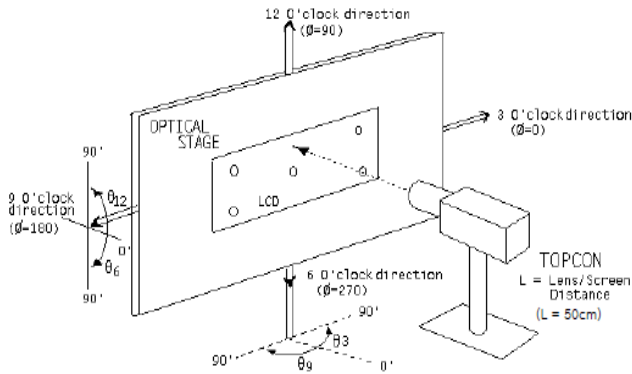
< Table 10. Optical Table >

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
luminance	Bp	$\theta=0^{\circ}$	800	1000	--	cd/m2	Note 1
Brightness Uniformity	ΔBp		80	85	--	%	Note 2
Viewing Angle	θ_L	$Cr \geq 10$	75	85	--	deg	Note 3
	θ_R		75	85	--		
	ψ_T		75	85	--		
	ψ_B		75	85	--		
Contrast Ratio	CR	$\theta=0^{\circ}$	800	1000		-	Note 4
Response Time	Tr+Tf	FF= 0°	-	15	18	ms	Note 5
Color Coordinate of CIE1931	Rx	$\theta=0^{\circ}$	0.655	0.685	0.715	-	Note 6
	Ry		0.282	0.312	0.342		
	Gx		0.190	0.220	0.250		
	Gy		0.688	0.718	0.748		
	Bx		0.117	0.147	0.177		
	By		0.019	0.049	0.079		
	Wx		0.283	0.313	0.343		
	Wy		0.299	0.329	0.359		
Color Gamut	BT2020	CIE1931	75	80	--	%	Note 7
Polarization Direction of Front Polarizer	PdF			0°		Deg.	Note 8
Polarization Direction of Rear Polarizer	PdR			90°		Deg.	

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			18 OF 32

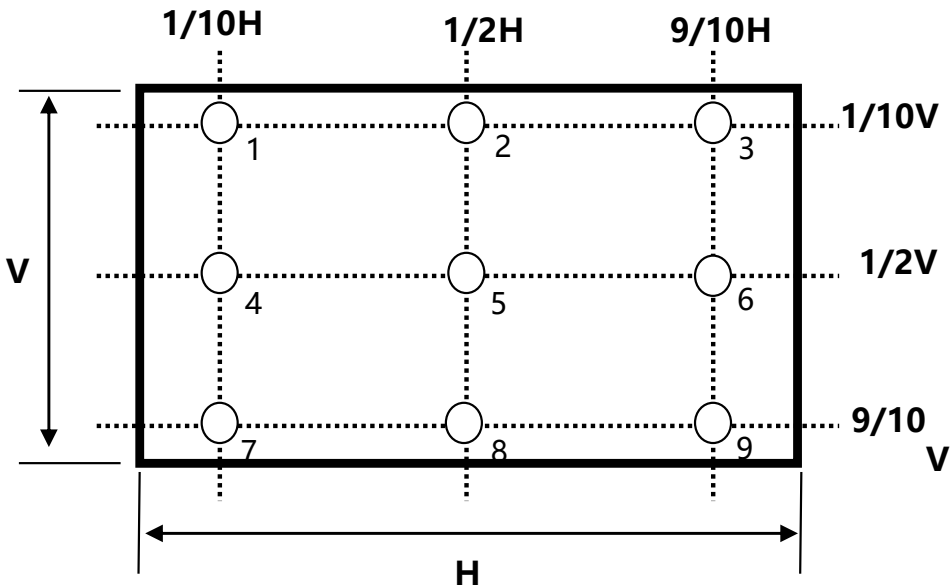
Note1:Luminance measurement

- The test condition is at VLED=24V and Duty=100% measured on the surface of LCD module at 25°C.
- The data are measured after LEDs are lighted on for more than 5 minutes and LCM displays are fully white. The brightness is the center of the LCD. Measurement equipment CS2000 or similar equipments (Field of view:1deg,Distance:50cm)
 - Measuring surroundings: Dark room.
 - Measuring temperature: Ta=25°C.
 - Adjust operating voltage to get optimum contrast at the center of the display.
 - Measured value at the center point of LCD panel must be after more than 5 minutes while backlight turning on.



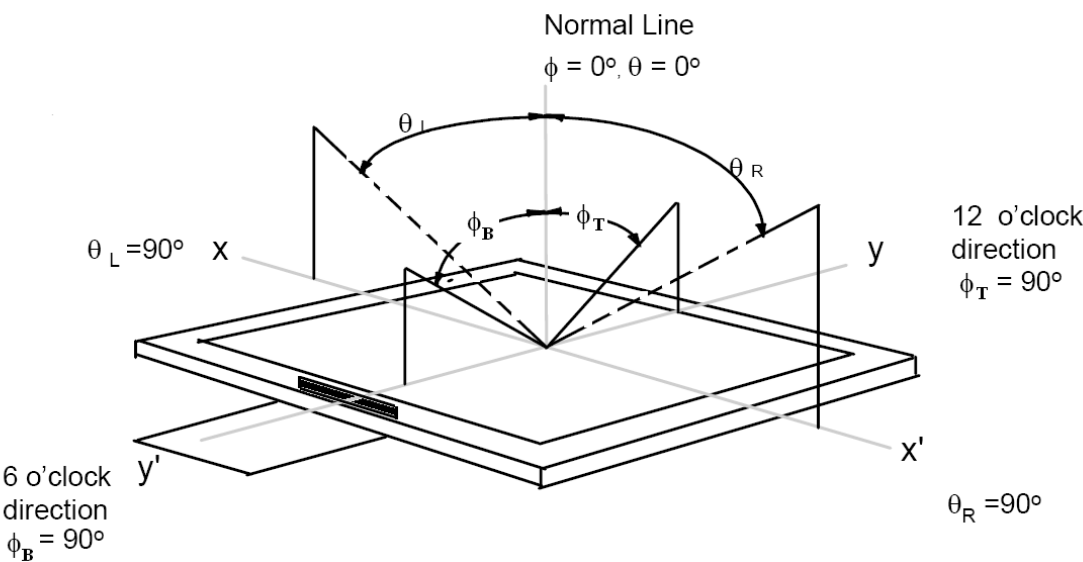
Note2:Uniformity

- The test condition is at VLED=24V and Duty=100% and measured on the surface of LCD module at 25°C.
- Measurement equipment:CS2000 or similar equipments
 - The luminance uniformity is calculated by using following formula:
 - $\Delta Bp = Bp \text{ (Min.)} / Bp \text{ (Max.)} \times 100 \text{ (\%)}$
 - Bp (Max.) = Maximum brightness in 9 measured spots
 - Bp (Min.) = Minimum brightness in 9 measured spots.



PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			19 OF 32

Note 3:The definition of Viewing Angle
Refer to the graph below marked by θ and ϕ .

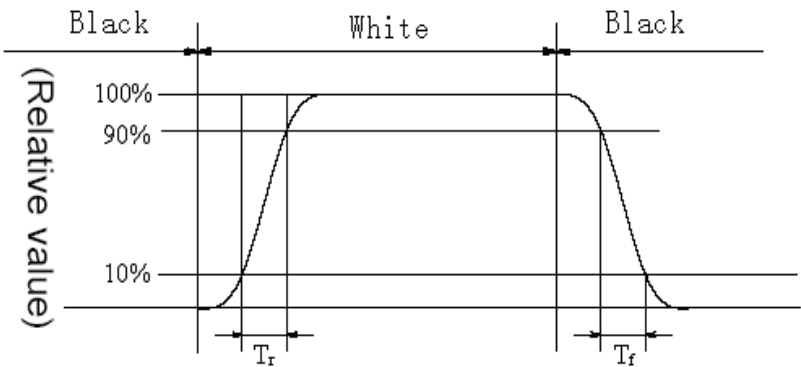


Note4:The definition of Contrast Ratio (Test LCM using CS2000 or similar equipments):

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

Note5:Definition of Response time.(Test LCD using DMS501 or similar equipments):
The output sign also photo detector are measured when the input sign also are changed from "black" to "white" (Voltage falling time)and from "white" to "black" (Voltage rising time), respectively . The response time is defined as the time interval between the 10% and 90% of amplitudes . Refer to figures below.



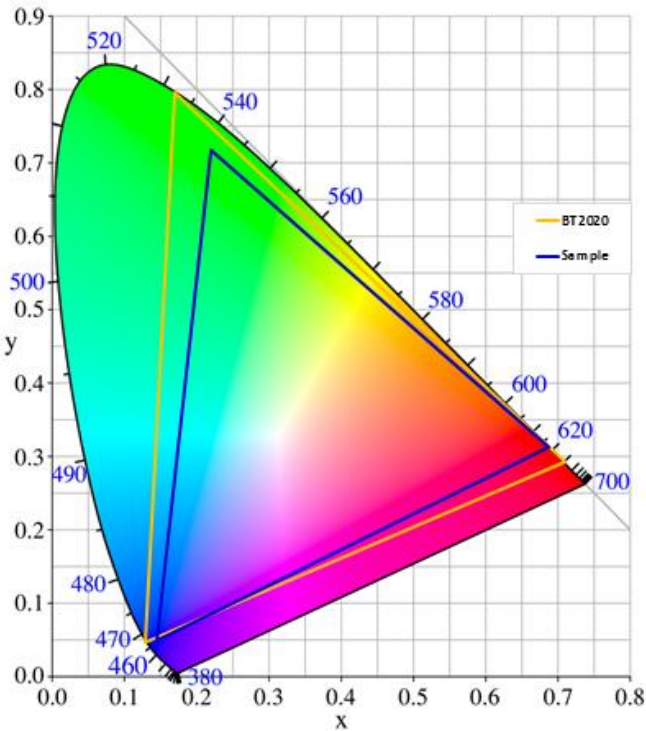
	L0	L1	L2	L3	L4	L5	L6	L7
L0	Black	White	Black	White	Black	White	Black	White
L1	White	Black	White	Black	White	Black	White	Black
L2	Black	White	Black	White	Black	White	Black	White
L3	White	Black	White	Black	White	Black	White	Black
L4	Black	White	Black	White	Black	White	Black	White
L5	White	Black	White	Black	White	Black	White	Black
L6	Black	White	Black	White	Black	White	Black	White
L7	White	Black	White	Black	White	Black	White	Black

Response time of gray to gray:
Measurement equipment: DMS501 or similar equipments.
Test method: we define 8 grays L0-L7,the grays of L0-L7 were defined as:0,36,73, 109, 146, 182, 219, 255. Theoutputsignalsofphotodetectoraremeasuredwhentheinputsignalsarechanged from "Lx" to "Ly" , x, y= [0, 7]. The response time is defined as the time interval between the 10% and 90% of amplitudes. The result of the test can be noted as below:

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			20 OF 32

Note 6: Color Coordinates of CIE 1931
 The test condition is at VLED=24V and Duty=100% and measured on the surface of LCD module at 25 °C.
 Measurement equipment: CS2000 or similar equipments
 The Color Coordinate (CIE 1931) is the measurement of the center of the display shown in below figure.

Note 7: Definition of Color of CIE Coordinate and BT2020 Ratio.

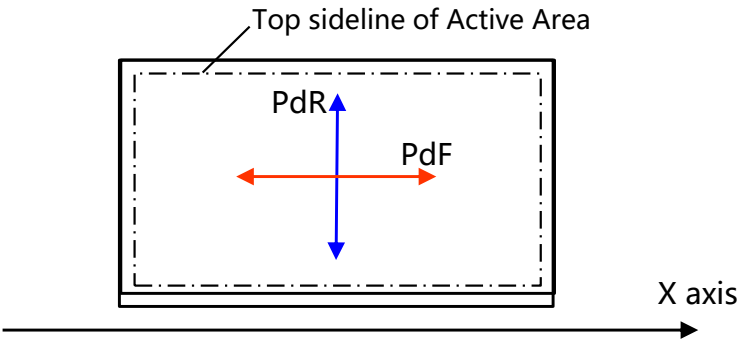


$$G_{BT2020} = \frac{S_{MatchingArea}}{S_{BT2020}} \times 100\%$$

Where sample is the area formed by measured CIE coordinates of RGB, and SBT2020 is the area of standard BT2020 gamut.

Note 8: Polarization Direction Definition

- Viewing direction is normal user viewing direction which is vertical to the display surface
- The polarizer which is closer to viewer is defined as Front Polarizer
- The polarizer which is on the rear side of viewer is defined as Rear Polarizer
- The X axis is defined as parallel line to top & bottom sidelines of the Active Area
- PdF which is marked in blue arrow is polarization degree of Front polarizer
- PdR which is marked in red arrow is polarization degree of Rear polarizer
- The polarization degree parameter must be indicated in range of 0deg to 180deg according to above definition
- The polarization direction means the direction of transmittance axis.



PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 21 OF 32

5.0 RELIABILITY TEST

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

<Table 11. Reliability Test Parameters >

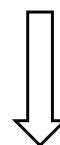
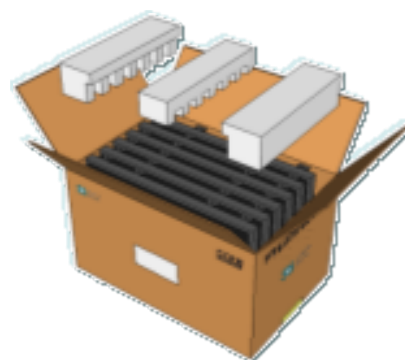
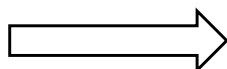
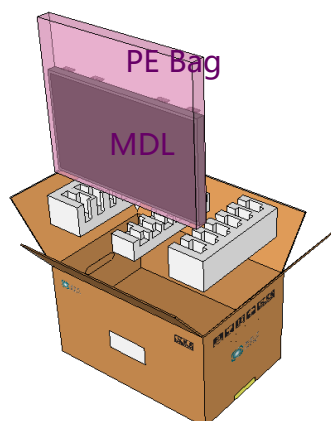
No	Test Items	Conditions
1	High temperature storage test	Ta = 60 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 °C, 80%RH, 240 hrs
4	High temperature operation test	Ta = 50 °C, 240 hrs
5	Low temperature operation test	Ta = 0 °C, 240 hrs
6	Thermal shock	Ta = -20 °C ↔ 60 °C (0.5 hr), 100 cycle
7	Vibration test (non-operating)	1.5G, 10~500Hz, Half Sine X,Y,Z / Sweep rate : 1 hour
8	Shock test (non-operating)	220G, Half Sine Wave 2msec ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 22 OF 32

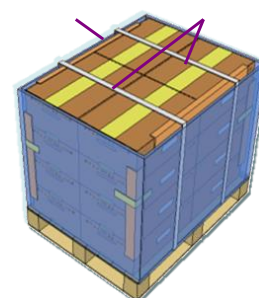
6.0 PACKING INFORMATION(LCM)

Packing procedure:

- EPE Bottom (Big EPE) placed at the bottom of Inner Box
- Protective film attached to Bezel
- MDL is inserted into the shielding bag (PCB facing downward), and after vacuum evacuation, it is inserted vertically into EPE.
- Cover the EPE lid (small EPE))
- After 9pcs MDL is inserted into the card slot,
- Top buckle 2EA EPE COVER
- 9pcs MDL/Box



- Each Pallet has three layers of Box
4 boxes Per Layer, total 12EA boxes
- Wrapping outside Pallet
- 108 Pcs LCM/Pallet



6.1 Packing Note(LCM)

- Box Dimension: 492mm(W) x 463mm(D) x 348mm(H)
- Package Quantity in one Box: 9pcs

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 23 OF 32

6.2 Box label (LCM)

- Label Size :110mm*55mm
- Contents
 - Model : LCM
 - Q`ty : 9pcs/Box
 - Serial No. : Box Serial No. as shown below.
 - Date : Packing Date
 - FG Code : FG Code of Product

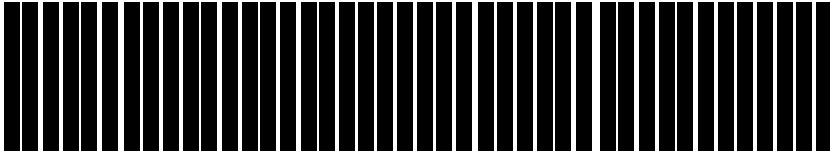
BOE BOE Technology Group Co., Ltd.

MODEL:EV184QUM-N80①

QTY: 9 ②

SERIAL NO: XXXXXXXXXXXXX③

DATE: 20XX / XX/ XX ④



3940 ⑤



No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	X	X	X	X	X	X	X	X	X	X	X	X	X
	GBN		Grade	B3	Year	Month	Rev	Serial number					

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 24 OF 32





Made in China EV184QUM-N80

2CAF197D940G0000D



1

2

3

Label Size: 48mm × 12mm / Thickness: 0.075mm

1. FG-CODE: EV184QUM-N80
2. MDL ID
3. MDL ID Bar Code

BOE MDL ID rule

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	X	X	X	F	X	X	X	3	9	4	0	X	X	X	X	X	X
	GBN		Grade	B8	Year		M	FG Code last four digits				Serial number					

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 25 OF 32

8.0 Handling & Cautions

Please pay attention to the followings when you use this TFT LCD Module.

8.1 Mounting Precautions

- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- You must mount a module using specified mounting holes (Details refer to the drawings).
- You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- Do not apply mechanical stress or static pressure on module; Abnormal display cause by pressing some parts of module during assembly process, do not belong to product failure, the press should be agreed by two sides.
- Determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Do not apply mechanical stress or static pressure on module, and avoid impact, vibration and falling.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Protection film for polarizer on the module should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperature specification.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.

Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 26 OF 32

- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane & alcohol is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene , because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- This module has its circuitry PCB' s on the rear side and Driver IC, should be handled carefully in order not to be stressed.
- Avoid impose stress on PCB and Driver IC during assembly process ,Do not drawing, bending, COF package & wire.
- Do not disassemble the module.

8.2 Operating Precautions

- Do not connector or disconnect the cable to/from the Module at the "Power On" Condition.
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the module would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- Do not allow to adjust the adjustable resistance or switch.
- The electrochemical reaction caused by DC voltage will lead to LCD module degradation, so DC drive should be avoided.
- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipment to protect against static electricity.
- Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 27 OF 32

- The cables should be as short as possible between System Board and PCB interface.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel.
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

8.3 Electrostatic Discharge Precautions

- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc.
- Do not close to static electricity to avoid product damage.
- Do not touch interface pin directly.

8.4 Precautions for Strong Light Exposure

- Do not leave the module operation or storage in Strong light . Strong light exposure causes degradation of polarizer and color filter.

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 28 OF 32

8.5 Precautions for Storage

A. Atmosphere Requirement

ITEM	UNIT	MIN	MAX
Storage Temperature	(°C)	5	40
Storage Humidity	(%RH)	40	75
Storage Life	18 months		
Storage Condition	- The storage room should be equipped with a dark and good ventilation facility. - Prevent products from being exposed to the direct sunlight, moisture and water. - The product need to keep away from organic solvent and corrosive gas. - Be careful for condensation at sudden temperature change. - Storage condition is guaranteed under packing conditions.		

B. Package Requirement

- The product should be placed in a sealed polythene bag.
- Product Should be placed on the pallet, Which is away from the floor, Be cautions not to pile the product up.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
- As the original protective film, do not use the adhesive protective film to avoid change of Pol color and characteristic.

8.6 Precautions for protection film

- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- People who peeled off the protection film should wear anti-static strap and grounded well.

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 29 OF 32

8.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD modules are designed for consumer applications . Accordingly, long-term display like in Commercial Display application, can cause uneven display including image sticking. To optimize module's lifetime and function, several operating usages are required.

1. Normal operating condition

- Temperature: $20\pm 15^{\circ}\text{C}$
- Operating Ambient Humidity : $55\pm 20\%$
- Display pattern: dynamic pattern (Real display)
- Well-ventilated place is recommended to set up Commercial Display system

2. Special operating condition

a. Ambient condition

- Well-ventilated place is recommended to set up Commercial Display system.

b. Power and screen save

- Periodical power-off or screen save is needed after long-term display.

c. As the low temperature, the response time is greatly delayed. As the high temperatures (higher than the operating temperature) the LCD module may turn black screen. The above phenomenon cannot explain the failure of the display. When the temperature returns to the normal operating temperature, the LCD module will return to normal display.

d. When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD module may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD module 's surface which may affect the operation of the polarizer and LCD module .

e. Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.

f. Product reliability and functions are only guaranteed when the product is used under right operation usages. If product will be used in extreme conditions such as high temperature, high humidity, high altitude, special display images, running time, long time operation, outdoor operation, etc. It is strongly recommended to contact BOE for filed application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock market and controlling systems.

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER S8-*	SPEC. TITLE B3 EV184QUM-N80 Product Specification			PAGE 30 OF 32

3. Operating usages to protect against image sticking due to long-term static display.
 - a. Suitable operating time: under 20 hours a day.
 - b. Static information display recommended to use with moving image.
 - Cycling display between 5 minutes' information(static) display and 10 seconds' moving image.
 - c. Background and character (image) color change
 - Use different colors for background and character, respectively.
 - Change colors themselves periodically.
 - d. Avoid combination of background and character with large different luminance.
 - 1) Abnormal condition just means conditions except normal condition.
 - 2) Black image or moving image is strongly recommended as a screen save
4. Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.

8.8 Other Precautions

A. LC Leak

- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
- 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.
- If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.
- If LC touch eyes, eyes need to be washed with running water at least 15 minutes.

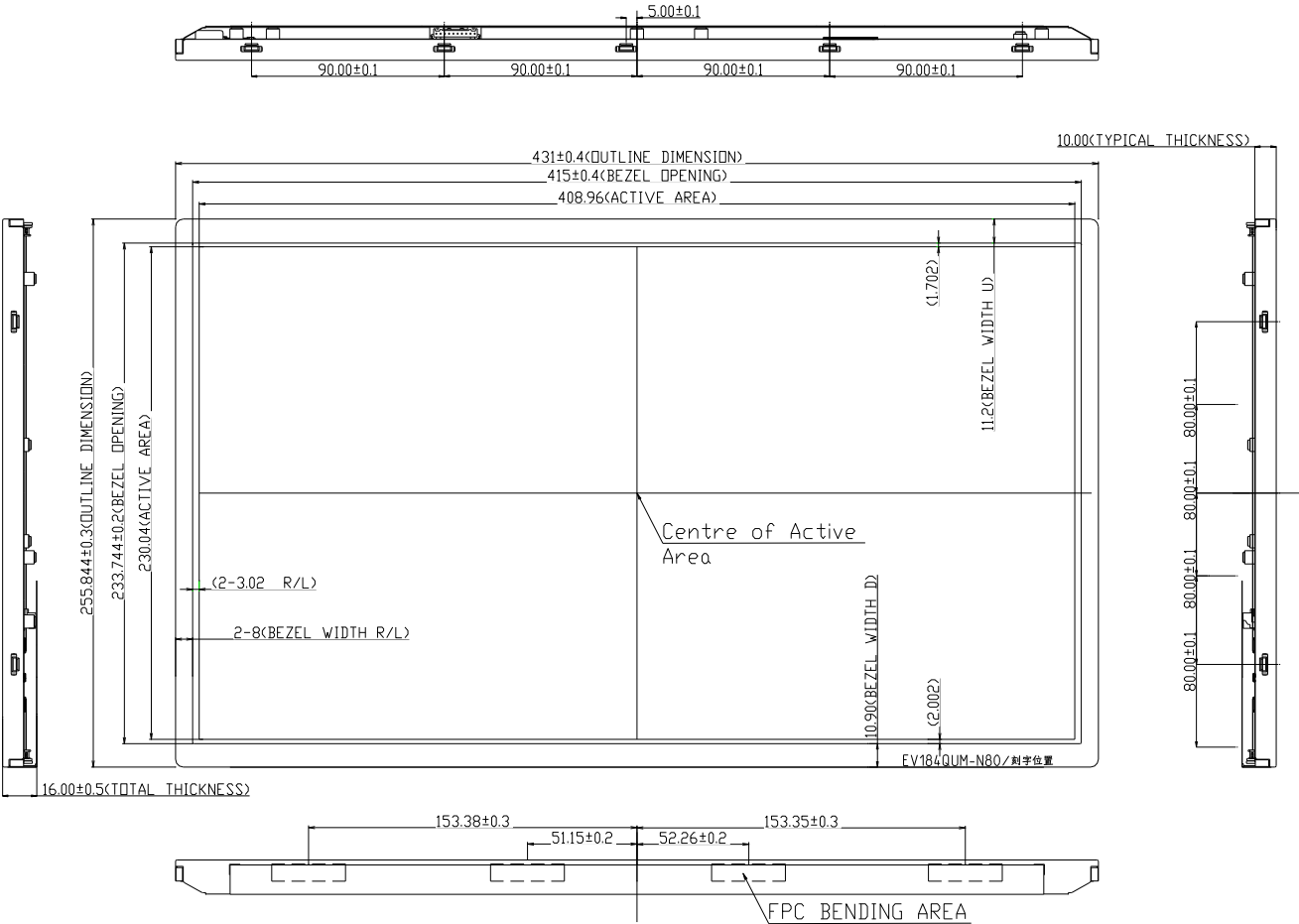
B. Rework

- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			31 OF 32

Mechanical Drawing

Drawing Attachment: Landscape Front View

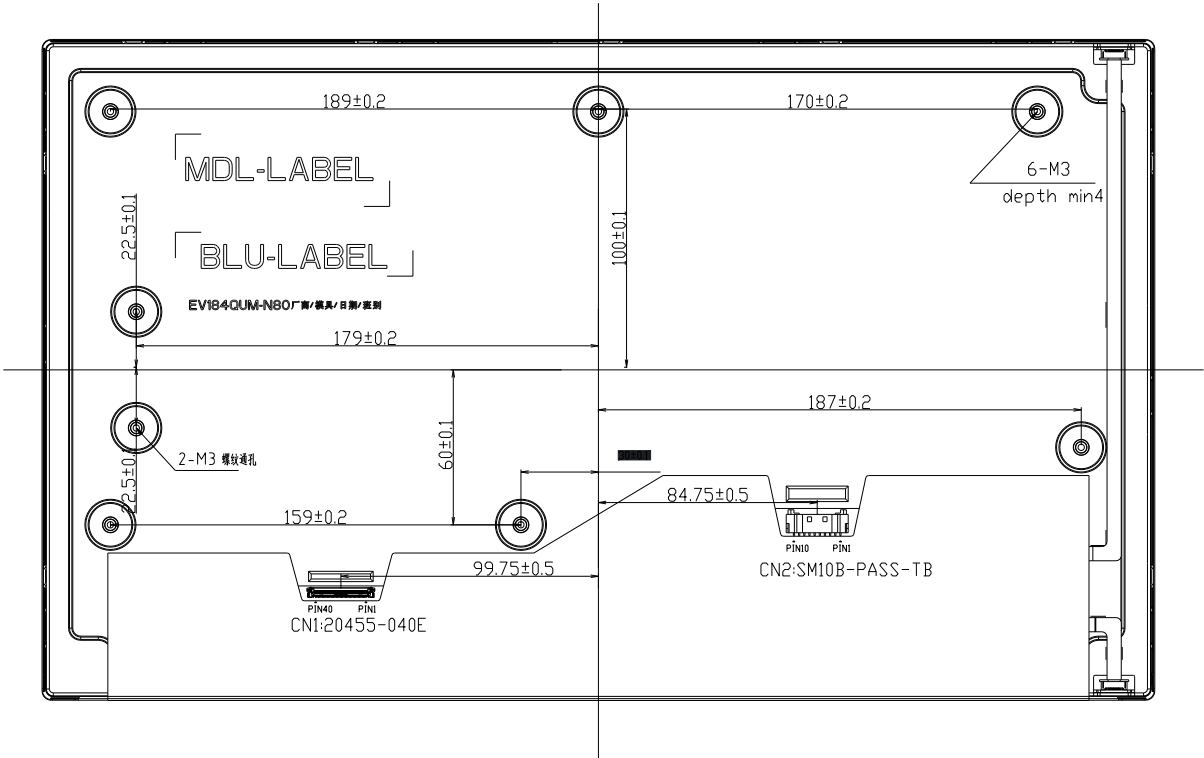


- NOTES:
1. DISPLAY MODE: ADS NB TRANSMISSIVE.
 2. OPERATING TEMPERATURE: 0°C TO 50°C.
 3. STORAGE TEMPERATURE: -20°C TO 60°C.
 4. LCM BRIGHTNESS: 1000nit Typ.
 5. THE DIMENSION IN A PARENTHESIS IS A REFERENCE VALUE.
 6. LED PCB CNT:CF20101V0R0-NH?LED PCBA CNT:FH34SRJ-10S-0.5SH

PRODUCT GROUP		REV	ISSUE DATE	BOE
TFT- LCD PRODUCT		P2	2020-03-13	
SPEC. NUMBER	SPEC. TITLE			PAGE
S8-*	B3 EV184QUM-N80 Product Specification			32 OF 32

Mechanical Drawing

Drawing Attachment: Landscape Back View



7. TYPICAL INSTALLTION STANDARD FOR EACH SCREW: TORQUE 8Kgf.cm;THURST 10Kgf.cm;Tension 15Kgf.cm.