

# APPROVAL SHEET 承认书

客户名称 Customer		
产品型号 Part NO.	<b>ABR116B30-040-121-0302</b>	
产品内容 Product type	Mode: TFT LCD Module	
备注栏 Remarks	<input type="checkbox"/> APPROVAL FOR SEPCIFICATIONS ONLY <input checked="" type="checkbox"/> APPROVAL FOR SEPCIFICATIONS AND SAMPLE	
客户确认签章 Signature by Customer:		
备注/ Notes:		
PREPARED BY	CHECKED BY	APPROVED BY

## RECORDS OF REVISION

[illegible]


## 1. Application 2. Overview

This specification applies to a color TFT-LCD Module,

This Open-cell is a color active matrix LCD open-cell incorporating Oxide TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, a control circuit and power supply circuit. Graphics and texts can be displayed on a 1920×3×1080 dots panel with 16,777,216 colors by using eDP (Embedded Display Port) Ver1.2 interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving.

In this TFT-LCD panel, color filters for excellent color performance is incorporated to realize brighter and clearer pictures, making this open-cell optimum for use in multi-media applications.

Optimum viewings are in all directions.

Without Backlight-driving LED controller.

eDP transfer rate specification: 2.7Gbps/2 lane.

## 3. Mechanical specifications.

Parameter	Specification	Unit	Note
Display size	11.6" (Diagonal)	inch	
Active area	256.32(H) × 144.18(V)	mm	
Pixel Format	1920(H) × 1080(V) (1pixel = R + G + B dot)	pixel	
Pixel pitch	0.1335(H) × 0.1335 (V)	mm	
Pixel configuration	R, G, B vertical stripe		
Display mode	Normally black		
Surface treatment of front polarizer	Anti-glare coating: (3H)		

### Outline dimensions

Parameter		Min	Typ	Max	Unit	Remark
Unit outline dimensions	Width	263.2	263.4	263.6	mm	
	Height	157.02	157.22	157.42	mm	
	Depth	2.4	2.6	2.8	mm	w/o PWB.[Note3-2]
Mass		-	-	-	g	

[Note 3-1] Outline dimensions is shown in page 19

[Note 3-2] Without war page and deflection.

## 4. Input Terminals

### 4-1 Driving interface of PWB

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

Pin No.	Symbol	I/O	Function	Remark
1	CABC_EN / NC	-	Reserved for CD	[Note4-1-1]
2	H_GND	P	High Speed round	[Note4-1-2]
3	Lane1_N	I	Complement Signal Link Lane 1	
4	Lane1_P	I	True Signal Link Lane 1	
5	H_GND	P	High Speed round	[Note4-1-2]
6	Lane0_N	I	Complement Signal Link Lane 0	
7	Lane0_P	I	True Signal Link Lane 0	
8	H_GND	P	High Speed round	[Note4-1-2]
9	AUX_CH_P	I	True Signal Auxiliary Channel	
10	AUX_CH_N	I	Complement Signal Auxiliary Channel	
11	H_GND	P	High Speed round	[Note4-1-2]
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	[Note4-1-3]
18	LED-1	P	NC	
19	LED-2	P	NC	
20	LED-3	P	NC	
21	LED-4	P	NC	
22	NC	I	BL_ENABLE	[Note4-1-4]
23	NC	I	BL_PWM_DIM	[Note4-1-5]
24	SCL/NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]
25	SDA/NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]

26	BL_PWR	P	NC	
27	BL_PWR	P	NC	
28	BL_PWR	P	NC	
29	BL_PWR	P	NC	
30	NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]

\*1 P: POWER I: Input O: Output

[Note 4-1-1] Don't input any signals or any powers into a NC pin. Keep the NC pin open.

[Note 4-1-2] 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.)

The equivalent circuit figure of the terminal.

[Note 4-1-3]

[Note 4-1-4]

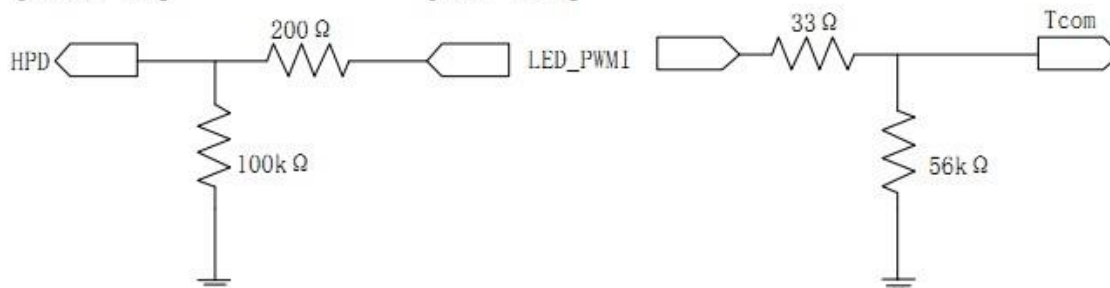


Fig.4-1-1 Equivalent circuit (Pin No.17)

Fig.4-1-2 Equivalent circuit (Pin No.23)

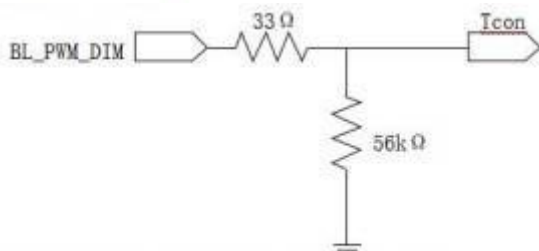


Fig.4-1-3 Equivalent circuit (Pin No.23)

## 4-2 eDP interface

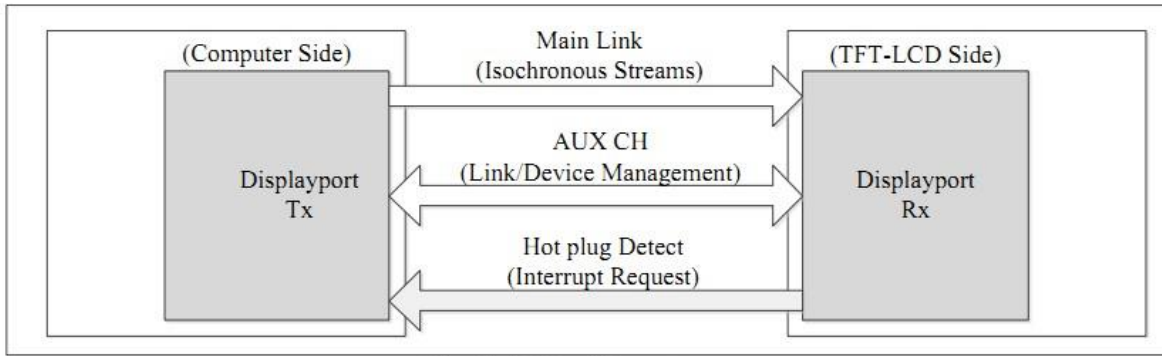


Fig.4-2-1 DP architecture

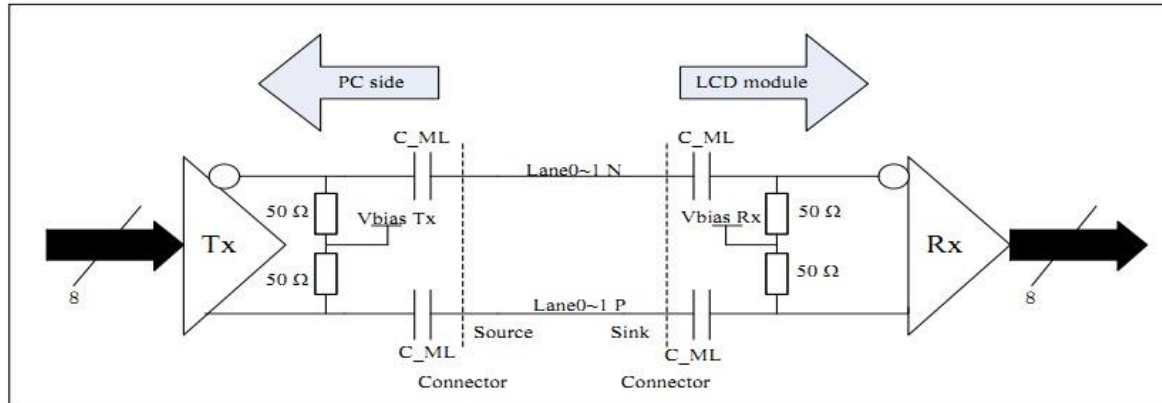


Fig.4-2-2 Main Link differential pair

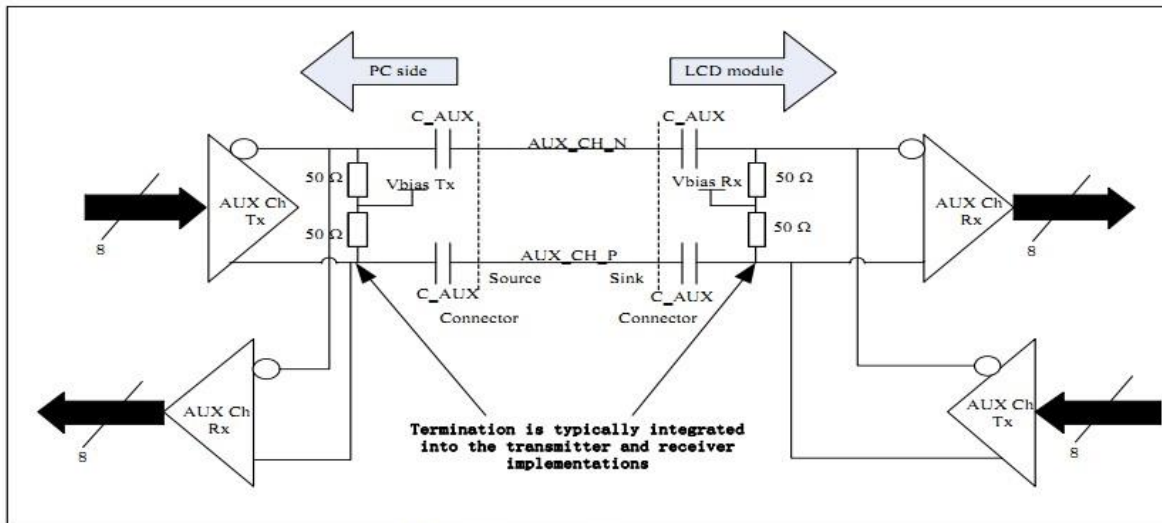


Fig.4-2-3 AUX Link differential pair

Lane0	Lane1
R0-7:0	R1-7:0
G0-7:0	G1-7:0
B0-7:0	B1-7:0
R2-7:0	R3-7:0
G2-7:0	G3-7:0
B2-7:0	B3-7:0
R4-7:0	R5-7:0
G4-7:0	G5-7:0
B4-7:0	B5-7:0

Fig.4-2-4 eDP 2lane 8bit input data mapping

## 5. Electrical Characteristics

### 5-1 Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		Unit	Remark
			MIN	MAX		
+3.3V supply voltage	VDD	Ta=25°C	-0.3	+3.6	V	
Backlight supply voltage	VBL	Ta=25°C	-0.3	+21	V	
Input voltage(eDP)	VI	Ta=25°C	-0.3	+1.5	V	[Note 5-1]
Input voltage(BL)	VBL_I	Ta=25°C	-0.3	VDD+0.3	V	[Note 5-2]
Storage temperature	Tstg		-10	+60	°C	[Note 5-3]
Operation temperature	Topa		0	+50	°C	

(\*) "Absolute Maximum Ratings" is regulations that do not exceed it even momentarily.

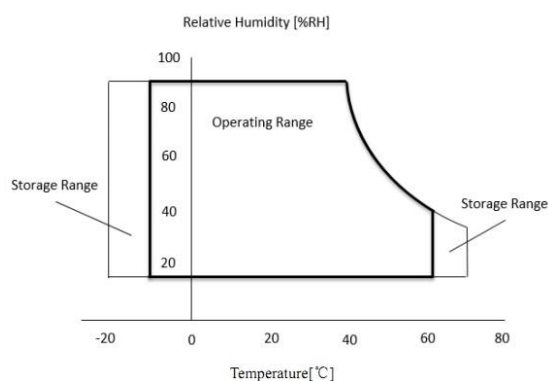
(\*) Stress beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device.

[Note 5-1] eDP signals

[Note 5-2] Backlight control signals (BL\_ENABLE, BL\_PWM\_DIM)

[Note 5-3] Humidity: 90%RH Max.at Ta ≤ +40°C.

Maximum wet-bulb temperature at +39°C or less at Ta > +40°C, No condensation.



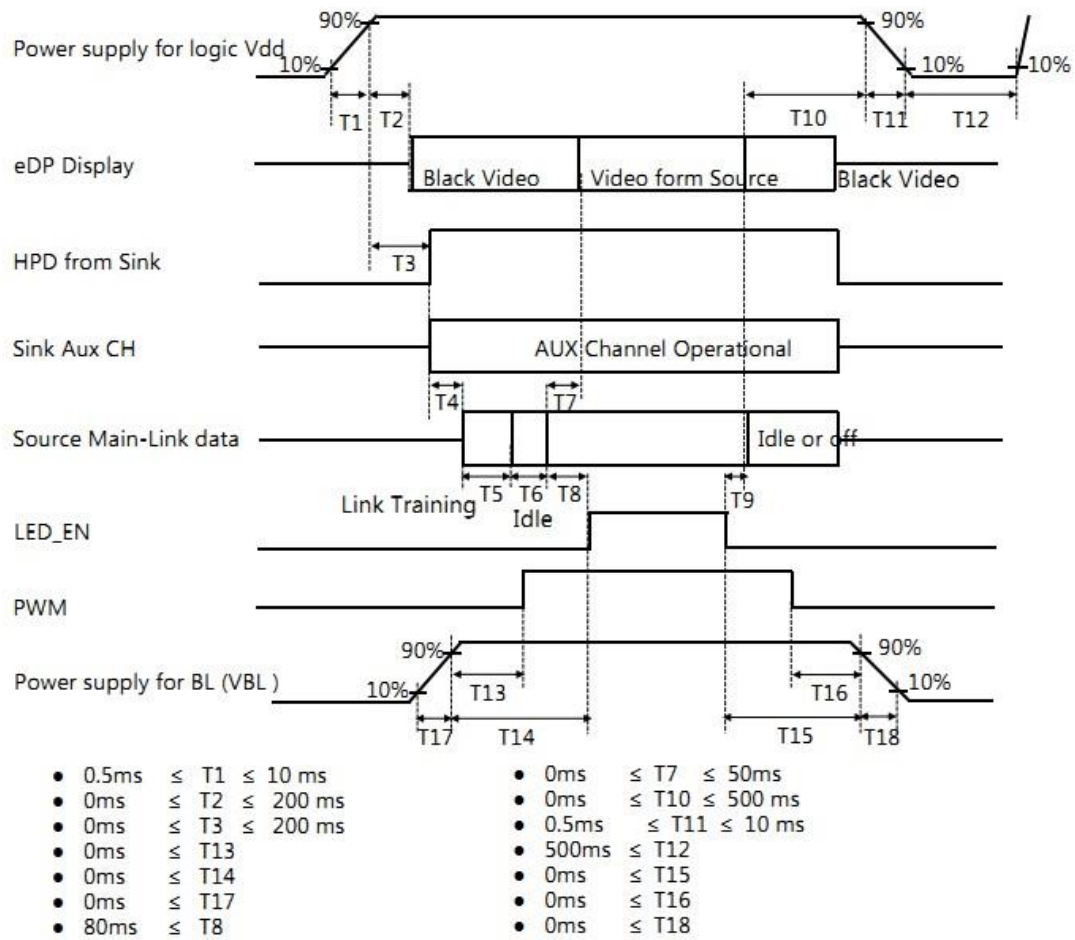
## 5. DC Characteristics

### 5-2-1. TFT-LCD panel driving

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 5-2-1]
Permissible input ripple voltage	VRP	-	-	100	mVp-p	VDD=+3.3V
eDP HPD Signal Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
HPD High level output voltage	VOH <sub>HPD</sub>		VDD-0.1			
HPD Low level output voltage	VOL <sub>HPD</sub>					
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI <sub>AUX</sub>	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	V <sub>AUX-DIFF-pp</sub>	0.32	-	1.36	V	
AUX DC Common mode Voltage	V <sub>AUX-DC-CM</sub>	0	-	2.0	V	
AUX Short current limit	I <sub>AUX_SHORT</sub>	-	-	90	mA	
AUX CH termination DC resistor	R <sub>AUX_TERM</sub>	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C <sub>AUX</sub>	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16	-	
eDP AUX Channel 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 <sub>RX-DIFFp-p</sub>	90		1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	RL <sub>RX-DIFF</sub>	9	-	-	dB	
Differential termination resistance	R <sub>RX-TERM</sub>	-	100	-	Ω	
RX short circuit Current Limit	I <sub>RX-SHORT</sub>		-	50	mA	
Lane Intra-pair Skew at RX package pins	T <sub>RX-SKEW-NTRA-PAIR-High-Bit-Rate</sub>	-	-	TBD	ps	

[Note 5-2-1] ON-OFF conditions for supply voltage

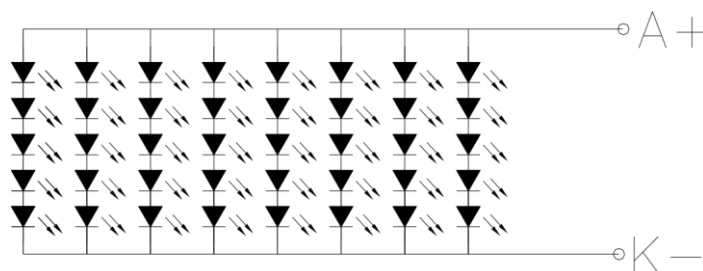




**Notes:**

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.

## 6 . Backlight Characteristics



Backlight LED Circuit

5S8P=40LED

$6\text{V} \times 5 = 30\text{V}$      $15\text{mA} \times 8 = 120\text{mA}$

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf		30		V	25°C
Supply Current	If	-	120	-	mA	25°C

Uniformity for LCM	-	75	-	-	%	25°C
Life Time	-	20000	30000	-	Hr	25°C

## 7. Timing characteristics of input signals

### 7-1.Timing Characteristics

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	136.8	141.4	148	MHz
Frame Period		Tv	1096	1100	1120	lines
			60	60	60	Hz
			16.67	16.67	16.67	ms
Vertical Display Period		Tvd	-	1080	-	lines
One line Scanning Period		Th	2080	2142	2200	clocks
Horizontal Display Period		Thd	-	1920	-	clocks

### 7-2. Input data signals and display position on the screen



Display position of input data(V·H)

### 7-3 Input signal, basic display colors and gray scale of each color

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					
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	0	0			
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1			
	Green	—	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			
	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	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	0	0			
	Magenta	—	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1			
	Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	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	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	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	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	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	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	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	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	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	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	0	0			
	⬆	↓	↓								↓								↓												
	⬇	↓	↓								↓								↓												
	Brighter	GS253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0			
	⬇	GS254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	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	0	0	0	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	0	0			
	⬆	GS1	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			
	Darker	GS2	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			
	⬆	↓	↓								↓								↓												
	⬇	↓	↓								↓								↓												
	Brighter	GS253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1			
	⬇	GS254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1			
	Blue	GS255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	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.

### 8. EDID Specifications



Check FAE QE	Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
-	-	#REF!	00	0		0	EDID Header
-	-	01	FF	255		255	
-	-	02	FF	255		255	
-	-	03	FF	255		255	
-	-	04	FF	255		255	
-	-	05	FF	255		255	
-	-	06	FF	255		255	
-	-	07	00	0		0	
V		08	09	9		BOE	ID = BOE
V		09	E5	229			
	V	0A	70	112		2416	ID = 2416
	V	0B	09	9			
V		0C	00	0		0	32-bit serial No.
V		0D	00	0		0	
V		0E	00	0		0	
V		0F	00	0		0	
V		10	01	1		1	Week of manufacture
V		11	1E	30		2020	Year of Manufacture
V		12	01	1		1	EDID Structure Ver.
V		13	01	1		1	EDID revision #
V	V	14	00	0		-	Video input definition
	V	15	19	25		26	Max H image size
	V	16	0E	14		14	Max V image size
	V	17	78	120		2.2	Display Gamma
V		18	00	0		-	Feature support
	V	19	24	36		-	Red/Green low bits
	V	1A	10	16		-	Blue/White low bits
	V	1B	97	151	604	0.590	Red x high bits
	V	1C	59	89	358	0.350	Red y high bits
	V	1D	54	84	337	0.330	Green x high bits
	V	1E	8E	142	568	0.555	Green y high bits
	V	1F	27	39	156	0.153	Blue x high bits
	V	20	1E	30	121	0.119	Blue y high bits
	V	21	50	80	320	0.313	White x high bits
	V	22	54	84	336	0.329	White y high bits
V		23	00	0		-	Established timing 1
V		24	00	0		-	Established timing 2
V		25	00	0		-	Established timing 3
V		26	01	1			Standard timing #1
V		27	01	1			
V		28	01	1			Standard timing #2
V		29	01	1			
V		2A	01	1			Standard timing #3
V		2B	01	1			
V		2C	01	1			Standard timing #4
V		2D	01	1			
V		2E	01	1			Standard timing #5
V		2F	01	1			
V		30	01	1			Standard timing #6
V		31	01	1			
V		32	01	1			Standard timing #7
V		33	01	1			
V		34	01	1			Standard timing #8
V		35	01	1			
	V	36	B2	178		147.7	147.7MHz Main clock
	V	37	39	57			
	V	38	80	128		1920	Hor Active = 1920
	V	39	D4	212		212	Hor Blanking = 212
	V	3A	70	112		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
	V	3B	38	56		1080	Ver Active = 768
	V	3C	4B	75		75	Ver Blanking = 75
	V	3D	40	64		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
	V	3E	30	48		48	Hor Sync Offset = 48
	V	3F	20	32		32	H Sync Pulse Width = 32
	V	40	36	54		3	V sync Offset = 3 line
	V	41	00	0		6	V Sync Pulse width : 6 line
	V	42	35	53		309	Horizontal Image Size = 309 mm (Low 8 bits)
	V	43	AD	173		173	Vertical Image Size = 173 mm (Low 8 bits)
	V	44	10	16		-	4 bits of Hor Image Size + 4 bits of Ver Image Size
	V	45	00	0		0	Hor Border (pixels)
	V	46	00	0		0	Vertical Border (Lines)
	V	47	00	0		-	Refer to right table

V	48	Detailed timing/monitor descriptor #2	00	0	0.0	0MHz Main clock
V	49		00	0		
V	4A		00	0	0	Hor Active = 0
V	4B		00	0	0	Hor Blanking = 0
V	4C		00	0	0	4 bits of Hor. Active + 4 bits of Hor. Blanking
V	4D		00	0	0	Ver Active = 768
V	4E		00	0	0	Ver Blanking = 0
V	4F		00	0	-	4 bits of Ver. Active + 4 bits of Ver. Blanking
V	50		00	0	0	Hor Sync Offset = 0
V	51		00	0	0	H Sync Pulse Width = 0
V	52		00	0	0	V sync Offset = 0 line
V	53		00	0	0	V Sync Pulse width : 0 line
V	54		00	0	0	Horizontal Image Size = 0 mm (Low 8 bits)
V	55		00	0	0	Vertical Image Size = 0 mm (Low 8 bits)
V	56		00	0	-	4 bits of Hor Image Size + 4 bits of Ver Image Size
V	57		00	0	0	Hor Border (pixels)
V	58		00	0	0	Vertical Border (Lines)
V	59		00	0	-	Refer to right above table
V	5A	Detailed timing/monitor descriptor #3	00	0		Indicates descriptor #3 is a display Descriptor
V	5B		00	0		
V	5C		00	0		Reserved
V	5D		00	0		Tag : ASCII String
V	5E		00	0		Reserved
V	5F		00	0		Manufacture name :
V	60		00	0		
V	61		00	0		
V	62		00	0		
V	63		00	0		
V	64		00	0		
V	65		00	0		
V	66		00	0		
V	67		00	0		
V	68		00	0		
V	69		00	0		
V	6A		00	0		
V	6B		00	0		
V	6C	Detailed timing/monitor descriptor #4	00	0		Indicates descriptor #4 is a display Descriptor
V	6D		00	0		Reserved
V	6E		00	0		Tag : ASCII String
V	6F		FE	254		Reserved
V	70		00	0		Model name : QV116FHB-N81
V	71		51	81	Q	
V	72		56	86	V	
V	73		31	49	1	
V	74		31	49	1	
V	75		36	54	6	
V	76		46	70	F	
V	77		48	72	H	
V	78		42	66	B	
V	79		2D	45	-	
V	7A		4E	78	N	
V	7B		38	56	8	
V	7C		31	49	1	
V	7D		0A	10		
V	7E	Extension flag	00	0	1	0 : 1個EDID; N-1: N個EDID
-	-	Checksum	FB	251	251	-

## 9. Optical characteristics

Paramete	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	85	-	[Note9-1,93,9-4,9-6]
		θR	-	85	-	
	Vertical	θT	-	85	-	
		θB	-	85	-	
Contrast Ratio	Center	700	1000	-	-	[Note9-2,94,10-6]
Response Time	Tr+Td	-	25		ms	[Note9-1,95,9-6]
CF Color Chromaticity	Red x	Typ. - 0.05	TBD	Typ. +0.05	-	[Note 9-2,9-6] Normal operation (PWM Duty=100%)
	Red y		TBD		-	

(CIE1931)	Green x		TBD		-	
	Green y		TBD		-	
	Blue x		TBD		-	
	Blue y		TBD		-	
	White x		(0.293)		-	
	White y		(0.329)		-	
NTSC ratio	%		(72)		-	
Center Luminance of white	$Y_{Li}$	<b>450</b>	<b>500</b>		cd/m	
White uniformity 13pt	$\delta_w$	=0	1.3	1.5		[Note 9-2,9-7]

※The measurement shall be taken 30 minutes after lighting the module at the following rating.

※Condition: PWM Duty = 100%

※The optical characteristics shall be measured in a dark room or equivalent.

[Note 9-1] Measurement of viewing angle range [Note 9-2] Measurement of luminance and Response time.  
Chromaticity and Contrast.

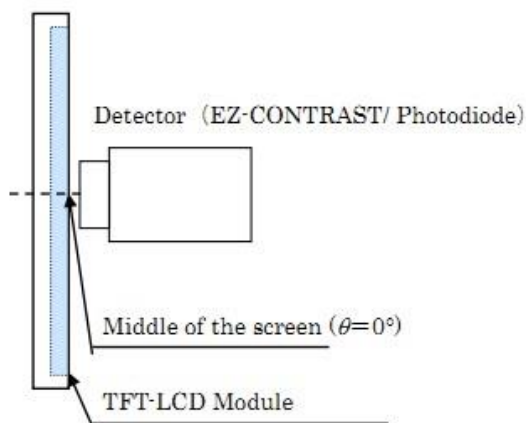


Fig.9-1 Measurement of Viewing angle range and Response time.  
(Viewing angle range: EZ-CONTRAST, Response time: Photodiode)

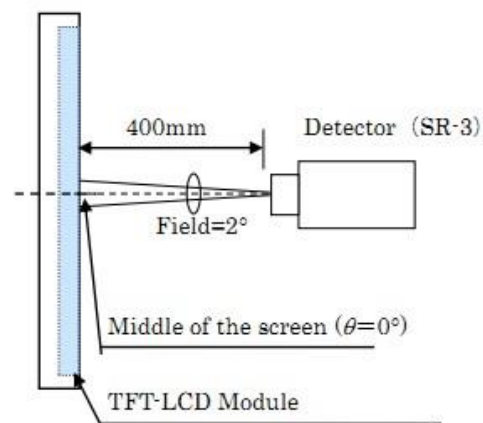


Fig.9-2 Measurement of Contrast, Luminance, Chromaticity, White variation, Crosstalk and Color temperature variation.

[Note 9-3] Definitions of viewing angle range

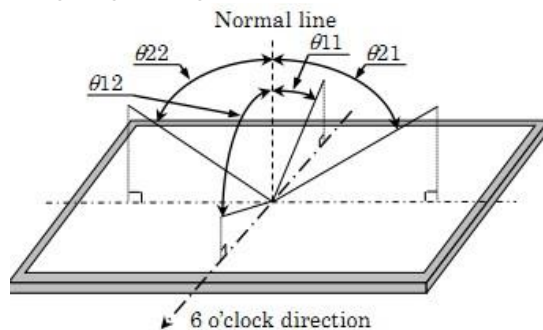


Fig.9-3 Viewing angle

[Note 9-4] Definition of contrast ratio:

The contrast ratio is defined as the following.

Luminance(Brightness) with all pixels white

Contrast Ratio =



## Luminance(Brightness) with all pixels Black

[Note 9-5] Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

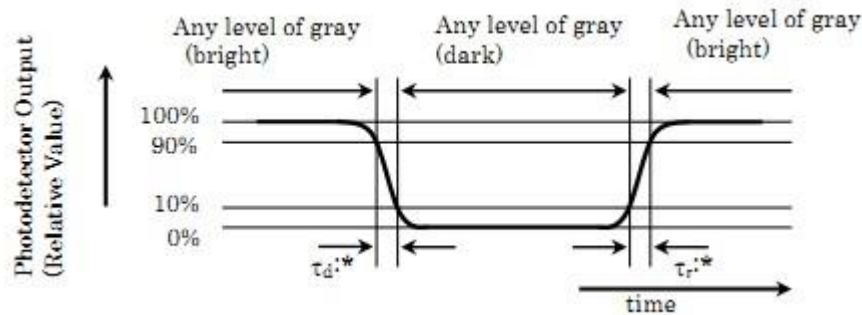


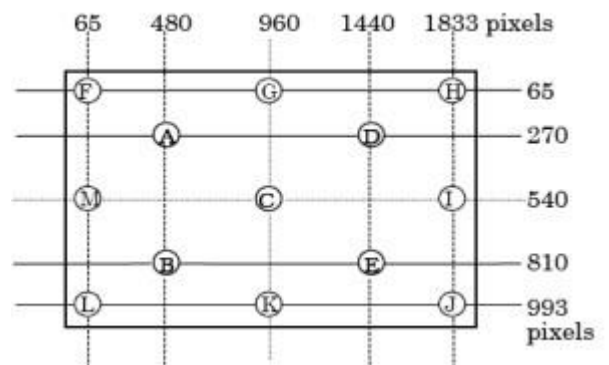
Fig.9-4 Responsetime

[Note9-6] This shall be measured at center of the screen.

[Note9-7] Definition of white uniformity :

White uniformity is defined as the following with 5 measurements (A~M)  
Maximum Luminance of 5 Points (Brightness)

$$\delta_w = \frac{\text{Maximum Luminance of 5 Points (Brightness)}}{\text{Minimum Luminance of 5 Points (Brightness)}}$$



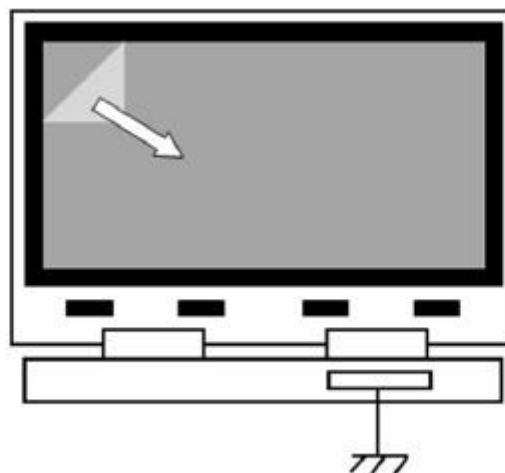
**10. Display Quality** The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standard.

### 11. Handling Precautions

- a) Be sure to turn off the power supply when inserting or disconnecting the cable.  
Please insert for too much stress not to join a connector in the case of insertion of a connector.
- b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- c) Since the front polarizer is easily damaged, pay attention not to scratch it.
- d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.
- g) Since CMOS LSI is used in this module, take care of static electricity and injure the human earth when handling. Observe all other precautionary requirements in handling components.
- h) This module has its circuitry PCBs on the side and should be handled carefully in order not to be stressed.
- i) Laminate film is attached to the module surface to prevent it from being scratched. Peel the laminate film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc. Working under the following environments is desirable.
  - All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without ail.
  - Use Ionized blower for electrostatic removal, and peel of the laminate film with a constant speed. (Peeling of it at over 2 seconds)
- j) The polarizer surface on the panel is treated with Anti-Glare. In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.
- k) Do not expose the LCD module to a direct sunlight, for a long period of time to protect the module from the ultra violet ray.

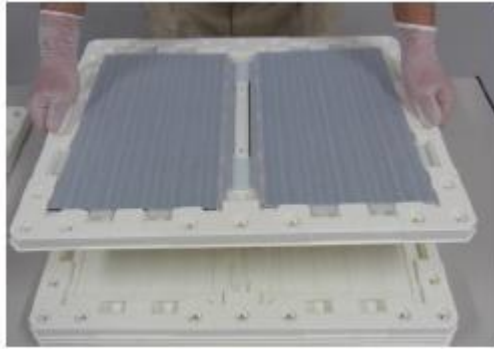
- l) When handling LCD modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD modules.
- m) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.
- n) Disassembling the module can cause permanent damage and should be strictly avoided.  
Please don't remove the fixed tape, insulating tape etc that was pasted on the original module.  
(Except for protection film of the panel.)
- o) Be careful when using it for long time with fixed pattern display as it may cause afterimage.  
(Please use a screen saver etc., in order to avoid an afterimage.)
- p) If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.
- q) Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series), tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film. Be sure to confirm the component of them.
- r) Do not use polychloroprene. If you use it, there is some possibility of generating Cl<sub>2</sub> gas that influences the reliability of the connection between LCD panel and driver IC.
- s) Do not put a laminate film on LCD module, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.
- t) Ground module bezel to stabilize against EMI and external noise.
- u) When you peel off the protection film
  - Be sure to peel off slowly(recommended more than 5sec) and constant speed
  - Peeling direction shows the following Figure
  - Be sure to ground person with adequate methods such as the anti-static wrist band.
  - Be sure to ground all terminals of the PWB connector while peeling of the protection film.
  - Ionized air should be blown over during peeling action.
  - The protection film must not touch driver-ICs, PWB and all components on PWB.
  - If adhesive may remain on the polarizer after the protection film peeling off, please remove with isopropylalcohol.

Front view



- v) Caution for when bending FPC
  - (1) Not to apply force at connection part (both panel side and PCB side)
  - (2) Not to fold tightly
  - (3) Please make sure to push a part where is no components on, when sticking PCB on the back side of BL, Also, please make sure not to break other components by nail
- w) Precautions for Handling Tray
  - (1) Hold center of short side of tray with both hands when handling one or more trays.

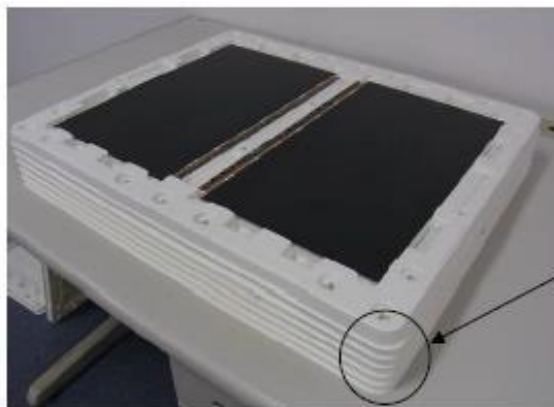




Caution: Do not handle with only one hand.



- (2) Always place tray on flat surface.
  - (3) When stacking trays, please align same shape corner of each tray. One corner is R corner.(Ref.Pic.1)
  - (4) Maximum stacking quantity is the number of trays inside one box.
- Ex:In case of 20pcs LCD module per box(2pcs LCD module per tray),maximum stacking is 10 trays. (Ref.Pic.3)



R Corner

Pic. 1

## 12. Packaging Condition(TBD)

Piling number of cartons	
Package quantity in one carton	
Carton size	
Total mass of one carton filled with full modules	
Packing form	

## 13. Label (TBD)

- 1) Module Bar code label:  
TBD

2) Packing bar code label  
TBD

14. RoHS Directive

This LCD open-cell is compliant with RoHS Directive.

15. Reliability Test Items

No.	Test Item	Conditions
1	High temperature storage test	Ta=60℃ 72h
2	Low temperature storage test	Ta=-10℃ 72h
3	High temperature & high humidity operation test	Ta=40℃90%RH 72h (No condensation)
4	High temperature operation test	Ta=50℃ 72h
5	Low temperature operation test	Ta=0℃ 72h

[Result Evaluation Criteria] Under the display quality test condition with normal operation state.

Do not change these condition as such changes may affect practical display function.

[Normal operation state] temperature: + 15~ + 35℃, Humidity: 45~75%, Atmospheric pressure:  
86~106kPa

1	2	3	4	5	6	7	8
Do 2: 2021.06.18    Page: 1/1    THE THIRD ANGLE				Customer Code:		SPECIFICATION OF BACKLIGHT	
P/N(exclude wrapper):				CUSTOMER'S P/N:		EDITION: 01	
M16B30-040-121-0302				P/N: (include wrapper)		Approval (核准)	
2021.06.18				2021.06.18		Check (检查)	
2021.06.18				2021.06.18		Design (设计)	

Notes:

- Unit:mm.
- Do not scale drawing.
- All radii without dimension R0.2.
- Modification Mark.
- Draft angle: 1°
- Center luminance :450cd/m<sup>2</sup>(Min),500cd/m<sup>2</sup>(Typ)
- Luminance uniformity: 75%(min)(min/max\*100%)
- Unspecified Tolerance is ±0.2
- Operation conditions :If= 120mA, Vf=30V(TYP)
- Color coordinate:X=0.1BD±0.05,Y=0.1BD±0.05
- All materials comply with RoHS
- The measured value of luminance and color coordinate bases BM-7
- Check item:1~9

Top View Dimensions: 263.5±0.2, 256.3±0.2(A), 257.9±0.2(POL), 157.22±0.2, 145.78(POL), 144.18±0.2(A), 81.49, 9.4, 2.84, 131.2, 157.82.

Side View Dimensions: 2.10±0.2, 4.33±0.2, 112.39, 11.9, 16, 110±10.

Backlight LED Circuit

SS8P=40LED

6V\*5=30V 15mA\*8=120mA

REV	DATE	DESCRIPTION (修改内容)	REVISER NO.	APPROVE BY	QUANTITY
1		Front iron frame (上铁板)			0
2		PCB (线路板)			0
3		Double-sided stick (双面胶)			2
4		HOUSING (前壳)			1
5		PCB (线路板)			0
6		Wire (导线)			0
7		LED (发光二极管)			40
8		BEF (背光板)			3
9		Diffuser film (扩散片)			1
10		Light guide plate (导光板)			1
11		Reflector film (反射板)			1
12		Rear iron frame (下铁板)			1