



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-640480GSTMQW-00H
APPROVED BY	
DATE	

☐ Approved For Specifications

☒ Approved For Specifications & Sample

AMPIRE CO., LTD.

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2009/4/9	--	New Release	JOHN
2009/5/13	3	Add Surface treatment of LCD	Edward
	16	Revise outline dimension	Edward
	4	Add LED Life Time	Edward
2009/6/4	17-18	Add connectors information	Edward
2009/9/1	3 & 10	Correct Contrast ratio and Viewing Angle	JOHN

1. INTRODUCTION

This is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a 5.7inch TFT-LCD panel, a driving circuit and LED backlight system . This TFT-LCD has a high resolution (640(R.G.B) X 480) and can display up to 262,144 colors .

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	640RGB (W) x 480(H)	dots
Display area	115.2 (W) x 86.4 (H)	mm
Pixel pitch	0.1815 (W) x 0.1815 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	144.0(W)x104.6(H)x12.3(D)---(Typ)	mm
Brightness	400	cd/m ²
Contrast ratio	600 : 1	
Backlight unit	LED	
Display color	262,144	colors
Surface treatment	Anti-Glare	

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	Vcc	-0.5	5	V	
Signal Input Voltage	DCLK , DE R0~R5 G0~G5 B0~B5	-0.5	Vcc + 0.5	V	
Operation Temperature	Top	-20	70	℃	(1)
Storage Temperature	Tstg	-30	80	℃	(1)

4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V_{CC}	3.0	3.3	3.6	V	
Power Voltage For VLED	V_{LED}	--	12.0	--	V	(1)
Logic Input Voltage	V_{IH}	$V_{CC} \times 0.7$	--	V_{CC}	V	
	V_{IL}	0	--	$V_{CC} \times 0.3$	V	
PWM Input Voltage	V_{IH}	3.0	--	5.0	V	
	V_{IL}	GND	--	0.3	V	

4-2 TFT LCD current consumption

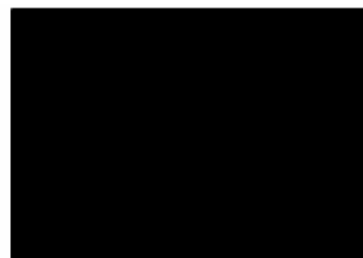
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LCD Power Current	I_{CC}	-	82	-	mA	(1)
LED Power Current	$I_{LED}(V_{LED}=12v)$	-	100	-	mA	
LED Life Time			20K		Hours	$T_a=25^{\circ}C$ $I_{LED}=100mA$

NOTE : (1) Typ : under 64 gray pattern

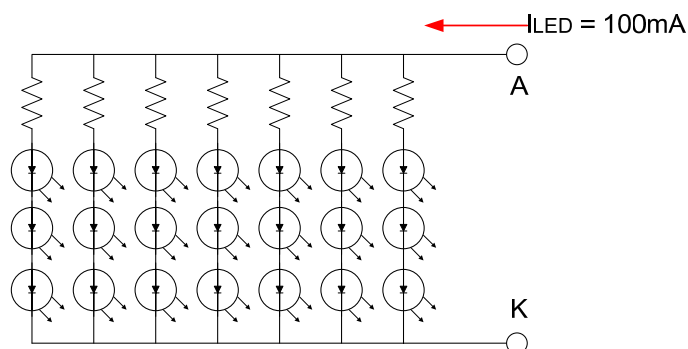
Max : under black pattern



(a) 64 Gray Pattern



(b) Black Pattern



6. INTERFACE

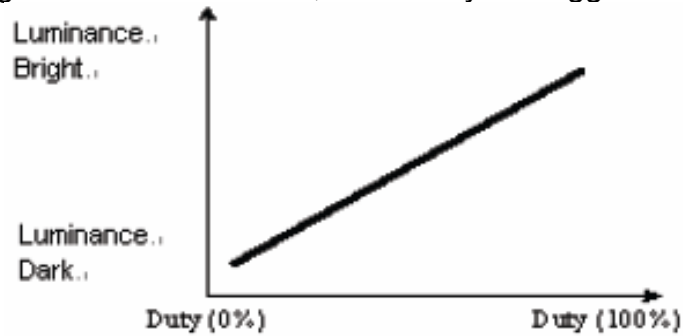
Pin no	Symbol	I/O	Description	Remark
1	GND	I	Gound	
2	CK	I	Clock signal. Latching data at the rising edge	
3	Hsync	I	Horizontal sync input in digital RGB mode	
4	Vsync	I	Vertical sync input in digital RGB mode	
5	GND	I	Gound	
6	R0	I	Red data	
7	R1	I		
8	R2	I		
9	R3	I		
10	R4	I		
11	R5	I		
12	GND	I	Gound	
13	G0	I	Green data	
14	G1	I		
15	G2	I		
16	G3	I		
17	G4	I		
18	G5	I		
19	GND	I	Gound	
20	B0	I	Blue data	
21	B1	I		
22	B2	I		
23	B3	I		
24	B4	I		
25	B5	I		
26	GND	I	Gound	
27	ENAB	I	Input data enable control	
28	VCC	I	+3.3V Power Supply	
29	VCC	I		
30	R/L	I	Right / Left Reverses Mode	
31	U/D	I	Up / Down Reverses Mode	
32	NC	I	No Connection	
33	GND	I	Gound	

CN2:

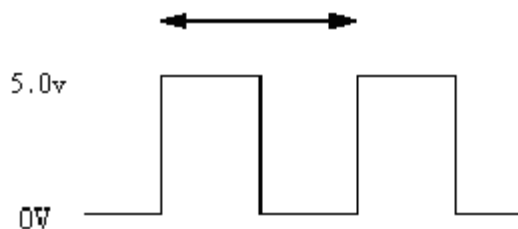
1	12V	LED drive circuit power supply (12V)
2	12V	LED drive circuit power supply (12V)
3	GND	Gound
4	GND	Gound
5	PWM	PWM Dimmer
6	LEDO	LED OPEN[normal:High(5V), open error:Low]

NOTE :

1. PWM adjust brightness to control Pin , Pulse duty the bigger the brighter.

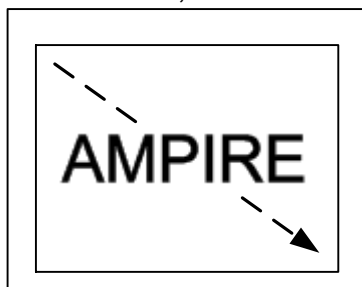


2. PWM signal = 0 ~ 5.0V , operation frequency : 200Hz~1KHz

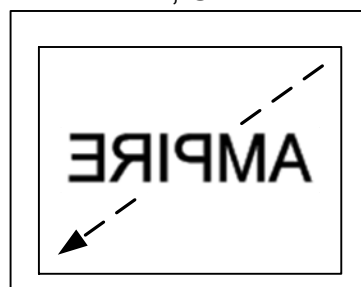


3. U/D and L/R are controlled function

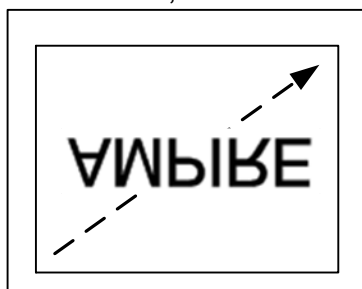
L/R : L, U/D : H



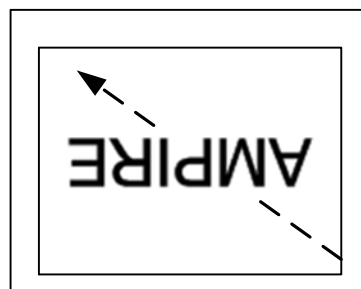
L/R : H, U/D : H



L/R : L, U/D : L



L/R : H, U/D : L



7. INPUT SIGNAL :

7-1 Timing Specification.

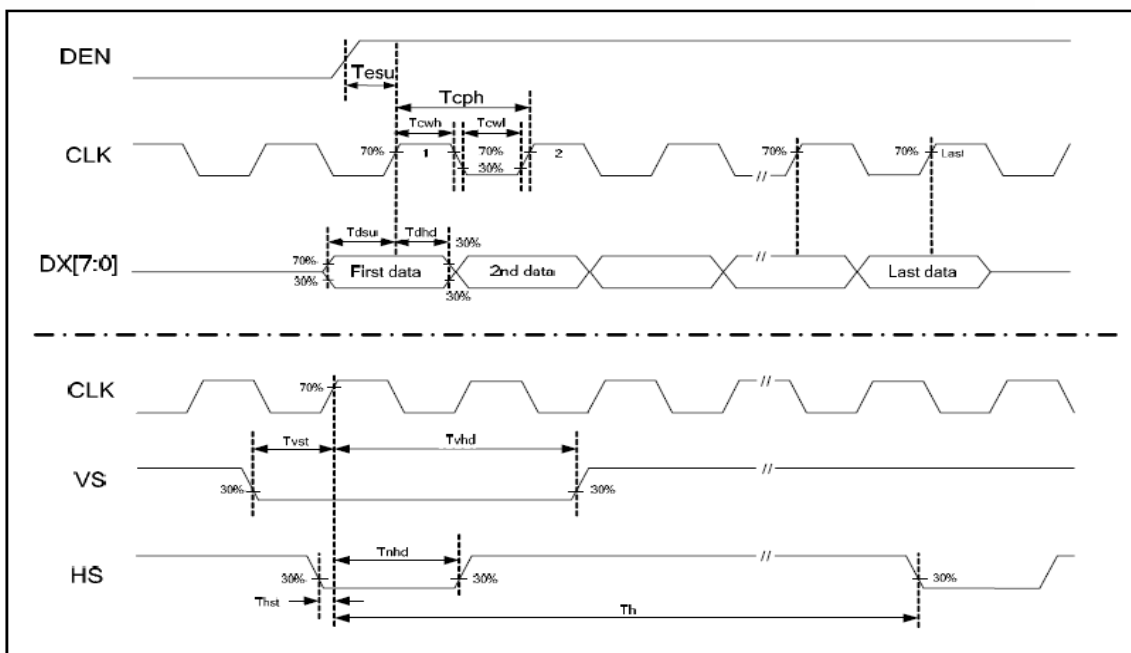
PARAMETER	Symbol	Min.	Typ.	Max	Unit
CLK frequency	F_{CPH}		25.175		MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

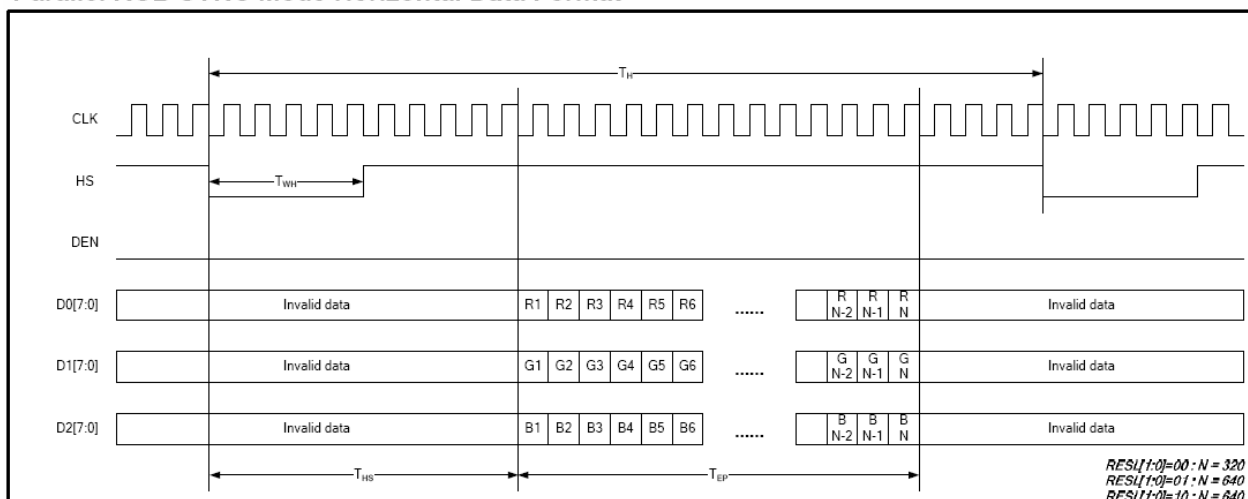
PARAMETER	Symbol	Min.	Typ.	Max	Unit
OEV pulse width	T_{OEV}		100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

7-2 Timing chart

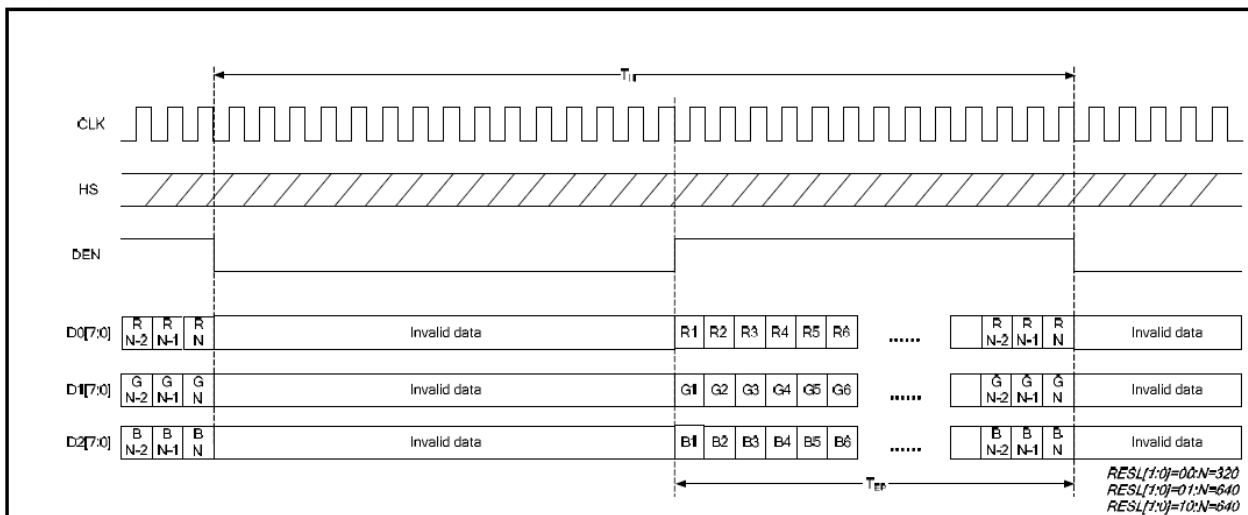
Clock and Data input waveforms



Parallel RGB SYNC Mode Horizontal Data Format



Parallel RGB DE Mode Horizontal Data Format



7-3 Color Data Assignment

COLOR	Input Data	R DATA						G DATA						B DATA					
		R5 MSB	R4	R3	R2	R1	R0 LSB	G5 MSB	G4	G3	G2	G1	G0 LSB	B5 MSB	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	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
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN (2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

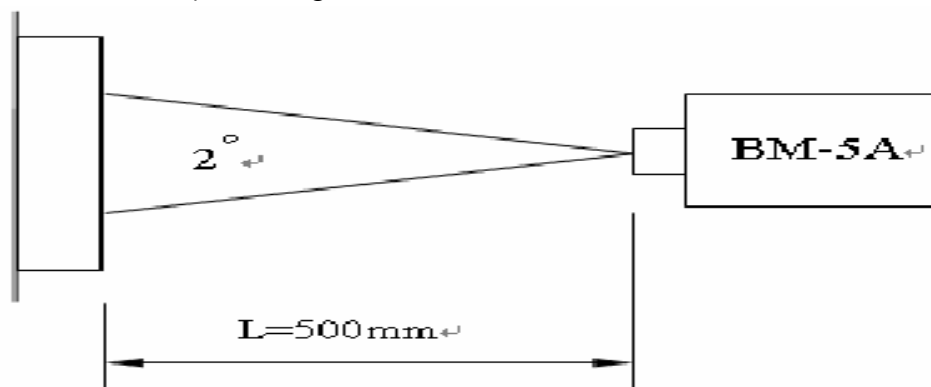
NOTE : (1) Definition of Gray Scale , Color(n) : n is series of Gray Scale
The more n value is the bright Gray Scale
(2) Data : 1-High , 0-Low

8. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast ratio		CR	Point - 5 $\Theta=\Phi=0^{\circ}$	400	600	--	--	(1)(2)(3)	
Luminance		Lw		--	400	-	cd/m ²	(1)(3)	
Luminance Uniformity		Δ L		70	75	-	%	(1)(3)	
Response Time (White – Black)		T _r +T _f		--	50	--	ms	(1)(3)(5)	
Viewing Angle	Vertical	Θ	CR $\geq$ 10 Point – 5	100	130	-	Deg.	(1)(2)(4)	
	Horizontal	Φ		120	150	-			
Color chromaticity		Red	Rx	Point - 5 $\Theta=\Phi=0^{\circ}$	0.566	0.616	0.666	--	(1)(3)
			Ry		0.302	0.352	0.402		
		Green	Gx		0.308	0.358	0.408		
			Gy		0.518	0.568	0.618		
		Blue	Bx		0.096	0.146	0.196		
			By		0.086	0.136	0.186		
		White	Wx		0.296	0.346	0.396		
			Wy		0.328	0.378	0.428		

NOTE :

- (1) Measure conditions : $25^\circ\text{C} \pm 2^\circ\text{C}$, $60 \pm 10\% \text{RH}$ under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VCC=3.3V , VDD=3.3V



- (2) Definition of Contrast Ratio :

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

- (3) Definition of Luminance :

Measure white luminance on the point 5 as figure9-1

Definition of Luminance Uniformity

Measure white luminance on the point 1 ~ 9 as figure9-1

$$\Delta L = [L(\text{MIN}) / L(\text{MAX})] \times 100\%$$

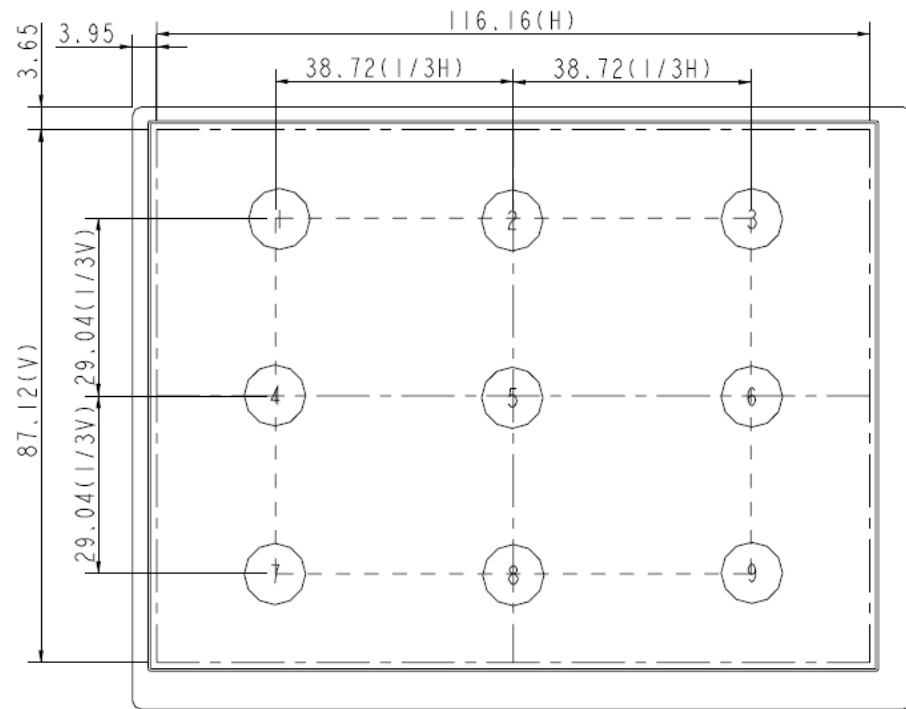


Fig9-1 Measuring point

(4) Definition of Viewing Angle(Θ, Φ), refer to Fig9-2 as below :

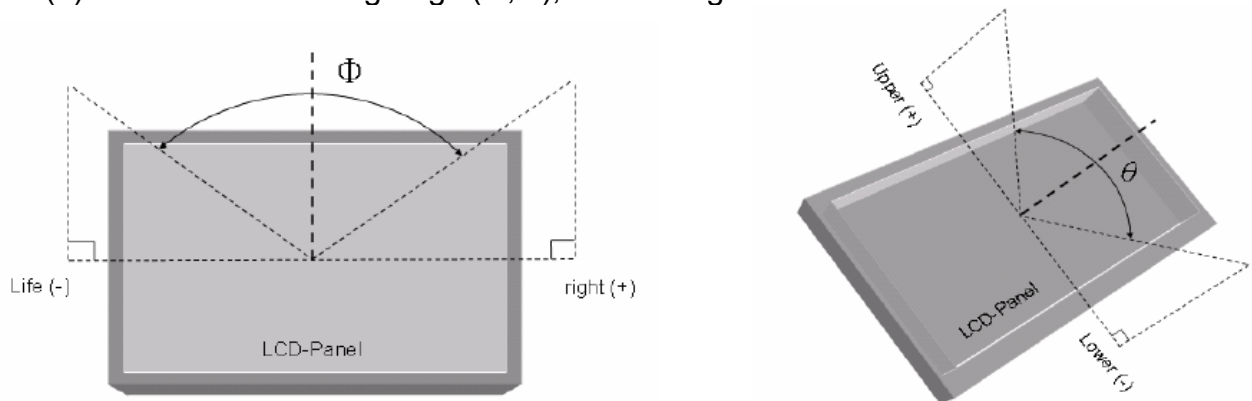


Fig9-2 Definition of Viewing Angle

(5) Definition of Response Time.(White – Black)

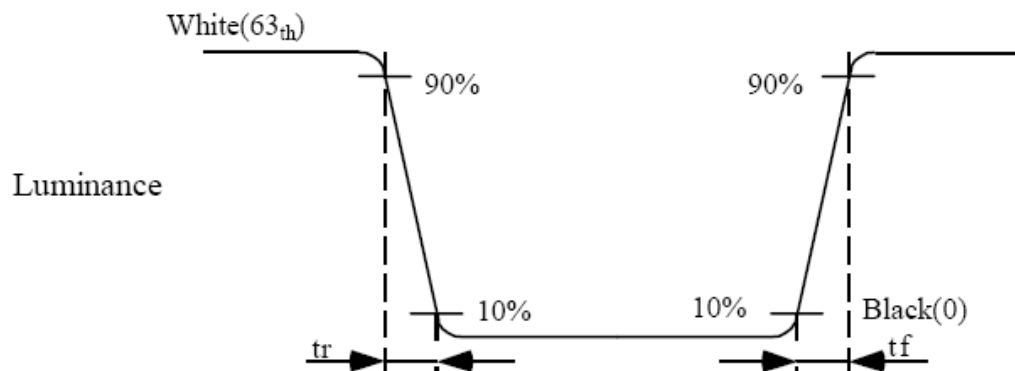


Fig9-3 Definition of Response Time(White-Black)

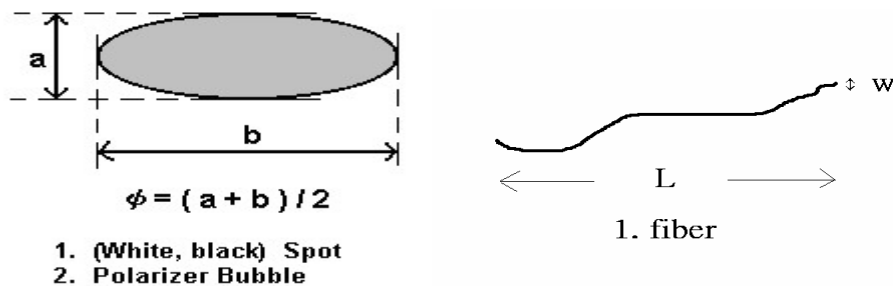
9 INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

DEFECT TYPE			LIMIT				Note	
VISUAL DEFECT	INTERNAL	SPOT	$\varphi < 0.15\text{mm}$		Ignore		Note1	
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$		$N \leq 4$			
			$0.5\text{mm} < \varphi$		$N=0$			
		FIBER	$0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$		$N \leq 3$		Note1	
			$1.0\text{mm} < W, 1.5\text{mm} < L$		$N=0$			
		POLARIZER BUBBLE	$\varphi < 0.15\text{mm}$		Ignore		Note1	
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$		$N \leq 2$			
			$0.5\text{mm} < \varphi$		$N=0$			
		Mura	It' OK if mura is slight visible through 6%ND filter					
ELECTRICAL DEFECT	BRIGHT DOT	A Grade			B Grade			
		C Area	O Area	Total	C Area	O Area	Total	Note3
		$N \leq 0$	$N \leq 2$	$N \leq 2$	$N \leq 2$	$N \leq 3$	$N \leq 5$	Note2
	DARK DOT	$N \leq 2$	$N \leq 3$	$N \leq 3$	$N \leq 3$	$N \leq 5$	$N \leq 8$	
	TOTAL DOT	$N \leq 4$			$N \leq 5$	$N \leq 6$	$N \leq 8$	Note2
	TWO ADJACENT DOT	$N \leq 0$	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	Note4
	THREE OR MORE ADJACENT DOT	NOT ALLOWED						
	LINE DEFECT	NOT ALLOWED						

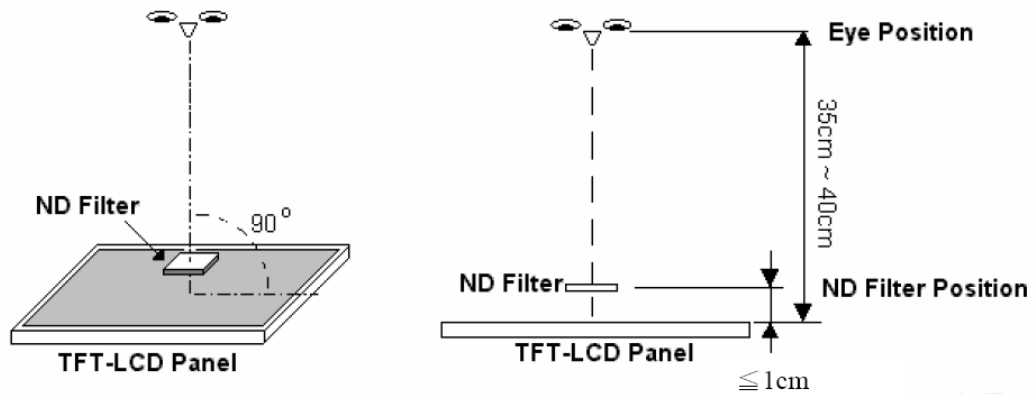
(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

(2) LITTLE BRIGHT DOT ACCEPTITABLE UNDER 6 % ND-Filter

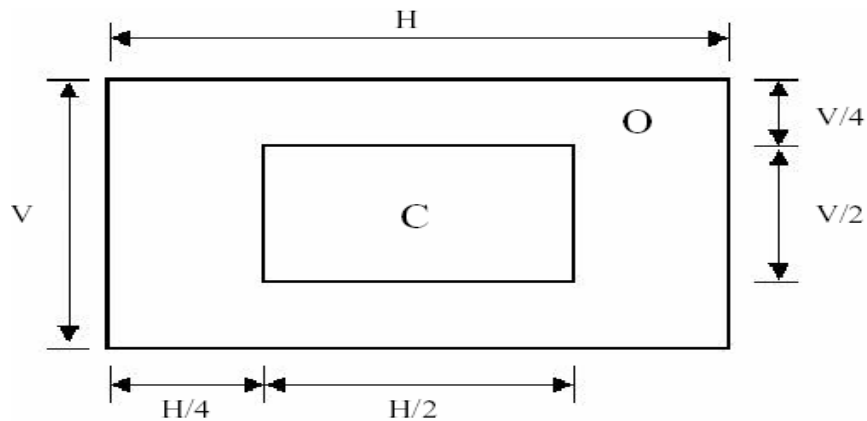
[Note1] W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter



[Note2] Bright dot is defined through 6% transmission ND Filter as following.



[Note3]

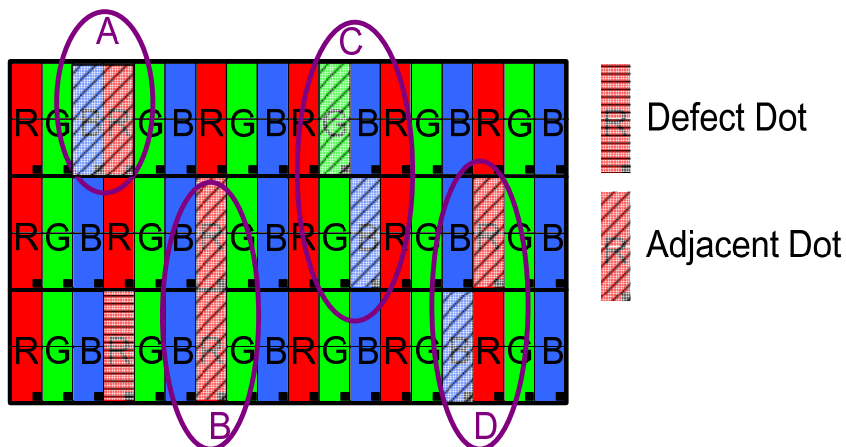


C Area: Center of display area

O Area: Outer of display area

[Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.



- (1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.
- (2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

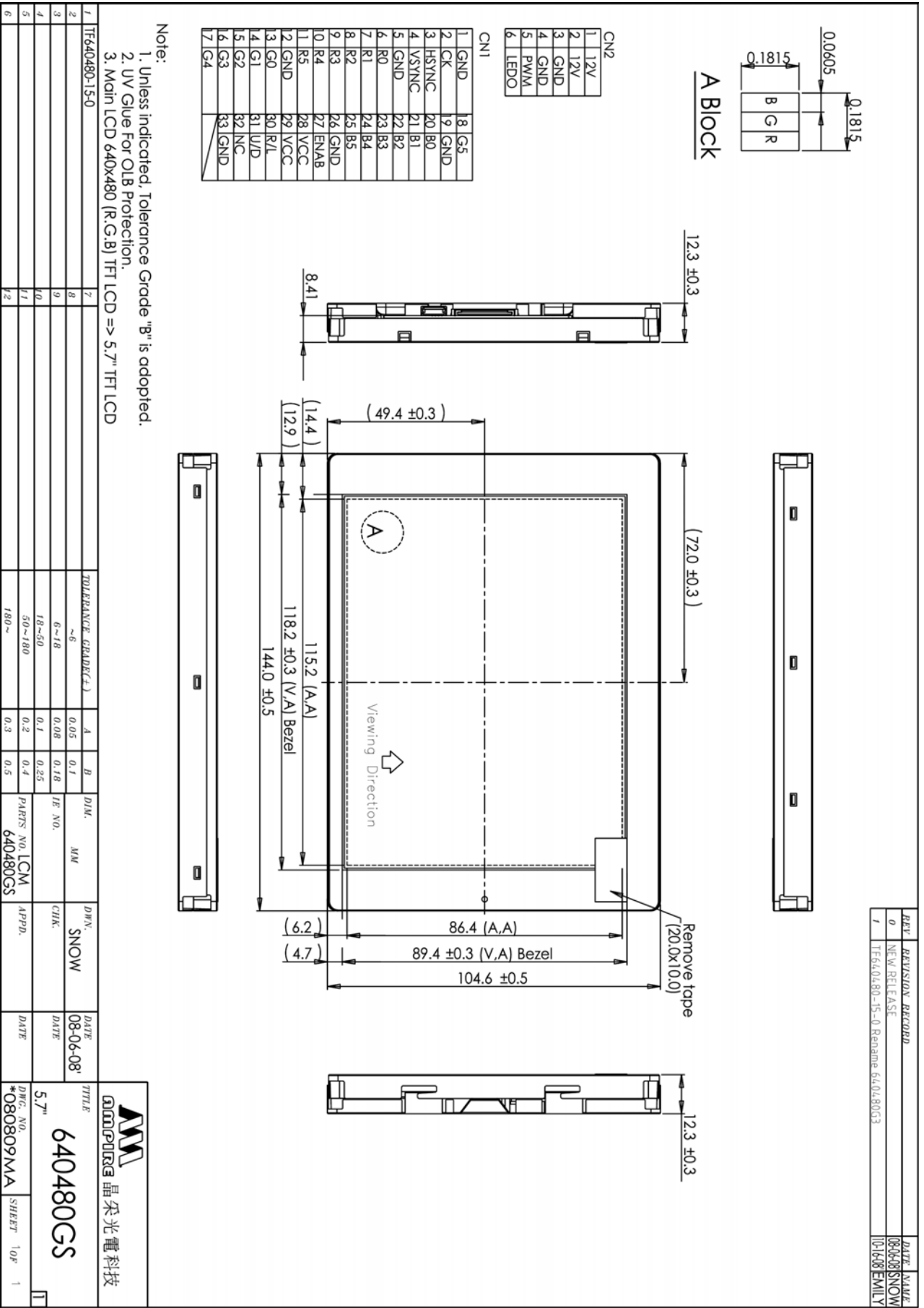
10. RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS
HIGH TEMPERATURE OPERATION	70℃ , 240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60℃ , 90%RH , 240Hrs
HIGH TEMPERATURE STORAGE	80℃ , 240Hrs
LOW TEMPERATURE OPERATION	-20℃ , 240Hrs
LOW TEMPERATURE STORAGE	-30℃ , 240Hrs
THERMAL SHOCK	-30℃ (0.5Hr) ~80℃ (0.5Hr) 200 Cycle

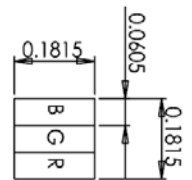
10.1 OTHERS

AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

11. OUTLINE DIMENSION



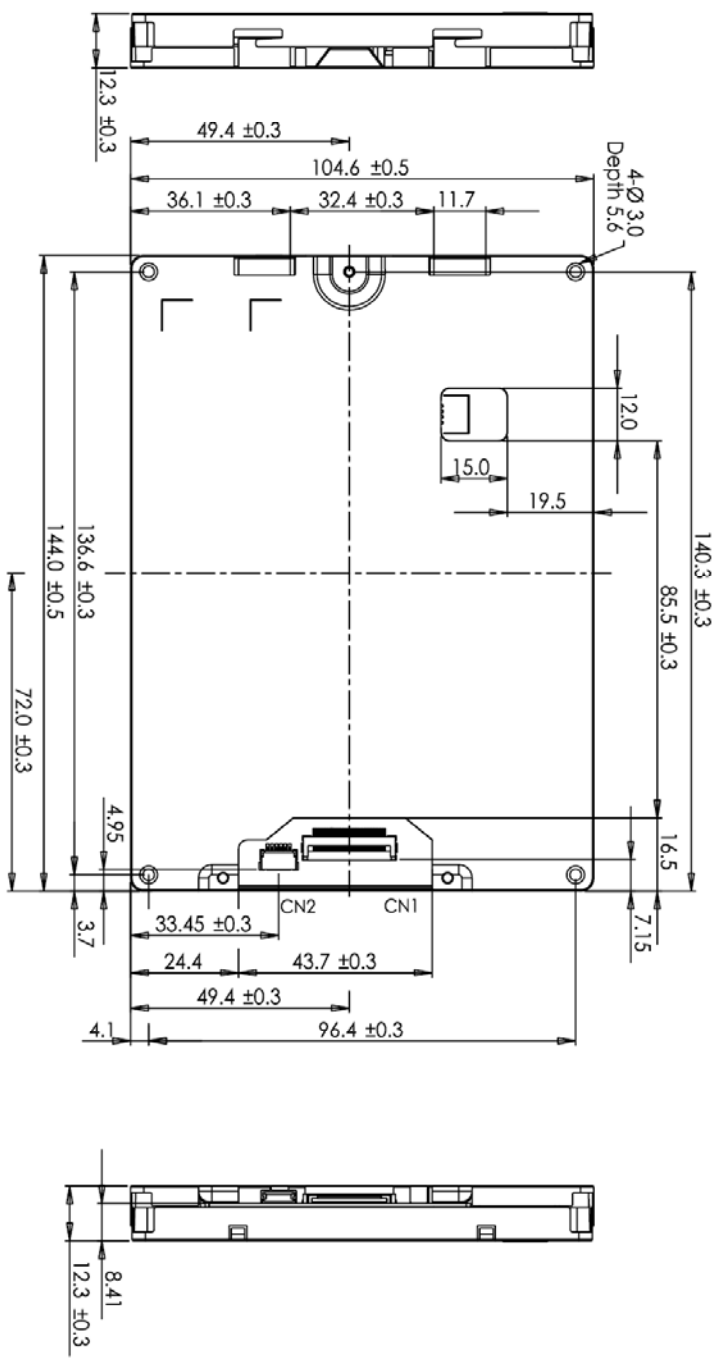
0	NEW RELEASE	08-06-08	SNOW
1	TF640480-15-0 Rename to 640480GS	10-16-08	EMILY
2	Modify CN1 & CN2	05-15-09	EMILY



A Block

CN2	
1	12V
2	12V
3	GND
4	GND
5	PWM
6	LEDO

CN1	
1	GND
2	CK
3	HSYNC
4	VSYNC
5	GND
6	R0
7	R1
8	R2
9	R3
10	R4
11	R5
12	GND
13	G0
14	G1
15	G2
16	G3
17	G4



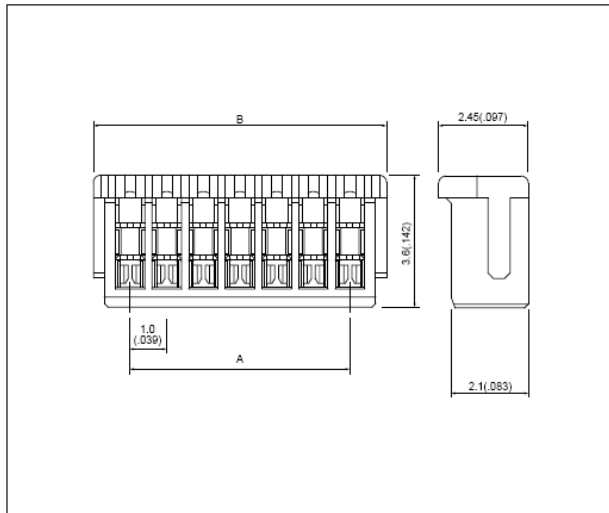
Back View

- Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
 2. UV Glue For OLB Protection.
 3. Main LCD 640x480 (R.G.B) TFT LCD => 5.7" TFT LCD

1	TF640480-15-0	7		TOLERANCE GRAD(%)		A	B	DIM.	MM	DRN.	SNOW	DATE	DATE	TITLE	DRG. NO.	SHEET	10P
2		8		~6		0.05	0.1					08-06-08		5.7"	640480GS	1	1
3		9		6~18		0.08	0.18	JE NO.		CHK.		DATE					
4		10		18~50		0.1	0.25										
5		11		50~180		0.2	0.4	PARTS NO.	LCM-1	APPD.		DATE					
6		12		180~		0.3	0.5		640480GS								

CN1

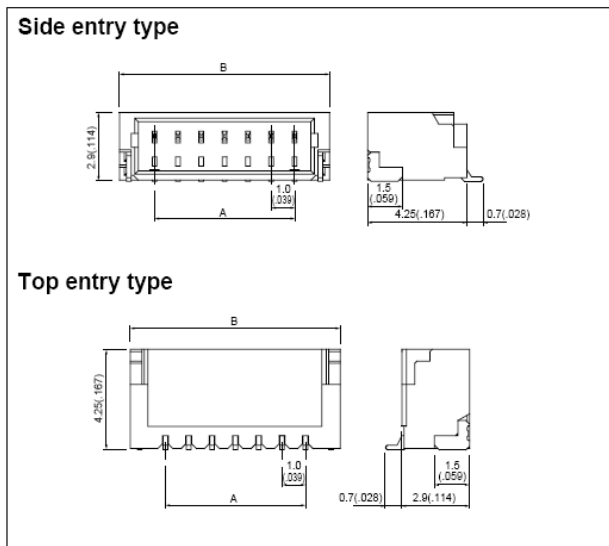


Receptacle

Cir- cuits	Model No.	Dimensions mm(in.)		Q'ty / box
		A	B	
2	02SR-3S	1.0(.039)	3.0(.118)	3,000
3	03SR-3S	2.0(.079)	4.0(.157)	3,000
4	04SR-3S	3.0(.118)	5.0(.197)	3,000
5	05SR-3S	4.0(.157)	6.0(.236)	2,000
6	06SR-3S	5.0(.197)	7.0(.276)	2,000
7	07SR-3S	6.0(.236)	8.0(.315)	2,000
8	08SR-3S	7.0(.276)	9.0(.354)	2,000
9	09SR-3S	8.0(.315)	10.0(.394)	2,000
10	10SR-3S	9.0(.354)	11.0(.433)	2,000
11	11SR-3S	10.0(.394)	12.0(.472)	2,000
12	12SR-3S	11.0(.433)	13.0(.512)	2,000
13	13SR-3S	12.0(.472)	14.0(.551)	2,000
14	14SR-3S	13.0(.512)	15.0(.591)	2,000

Material and Finish

Contact: Phosphor bronze, tin-plated
Housing: Polyamide 66, UL94V-0, natural (ivory)

Shrouded header

Cir- cuits	Top entry type	Side entry type	Dimensions mm(in.)		Q'ty / reel	
			A	B	Top entry type	Side entry type
2	BM02B-SRSS-TB	SM02B-SRSS-TB	1.0(.039)	4.0(.157)	1,500	3,000
3	BM03B-SRSS-TB	SM03B-SRSS-TB	2.0(.079)	5.0(.197)	1,500	3,000
4	BM04B-SRSS-TB	SM04B-SRSS-TB	3.0(.118)	6.0(.236)	1,500	3,000
5	BM05B-SRSS-TB	SM05B-SRSS-TB	4.0(.157)	7.0(.276)	1,500	3,000
6	BM06B-SRSS-TB	SM06B-SRSS-TB	5.0(.197)	8.0(.315)	1,500	3,000
7	BM07B-SRSS-TB	SM07B-S RSS-TB	6.0(.236)	9.0(.354)	1,500	3,000
8	BM08B-SRSS-TB	SM08B-SRSS-TB	7.0(.276)	10.0(.394)	1,500	3,000
9	BM09B-SRSS-TB	SM09B-SRSS-TB	8.0(.315)	11.0(.433)	1,500	3,000
10	BM10B-SRSS-TB	SM10B-SRSS-TB	9.0(.354)	12.0(.472)	1,500	3,000
11	BM11B-SRSS-TB	SM11B-SRSS-TB	10.0(.394)	13.0(.512)	1,500	3,000
12	BM12B-SRSS-TB	SM12B-SRSS-TB	11.0(.433)	14.0(.551)	1,500	3,000
13	BM13B-SRSS-TB	SM13B-SRSS-TB	12.0(.472)	15.0(.591)	1,500	3,000
14	BM14B-SRSS-TB	SM14B-SRSS-TB	13.0(.512)	16.0(.630)	1,500	3,000

Material and Finish

Contact: Copper alloy, copper-undercoated, tin/lead plated
Wafer: Polyamide, UL94V-0, natural (ivory)
Solder tab: Brass, copper-undercoated, tin/lead plated

Note: 1. The products listed above are supplied on embossed-tape.
2. Contact JST for the top entry type headers with suction cap.