

# 深圳市晶彩世界科技有限公司

## LCD MODULE SPECIFICATION

Customer: \_\_\_\_\_  
Model Name: JCB070TN-27A  
SPEC NO.: \_\_\_\_\_  
Date: 2020.07.02  
Version: 01

- Preliminary Specification  
 Final Specification

For Customer's Acceptance

Approved by	Comment

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## Record of Revision

Version	Revise Date	Page	Content
Pre-Spec.01	2020.07.02	All	Initial Release

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## 1. OVERVIEW

JCB070TN-27A is 7.0" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs ,control circuit and LED backlight. By applying 1024×600 images are displayed on the 7.0" diagonal screen. Display 16.7M colors by R.G.B signal input.

General specifications are summarized in the following table :

ITEM	SPECIFICATION			
Display Area (mm)	154.2144(H)×85.92(V)			
Number of Pixels	1024(H)×3(RGB)×600(V)			
Pixel Pitch (mm)	0.0502(H)×0.143.2(V)			
Color Pixel Arrangement	RGB vertical stripe			
Display Mode	Normally white			
Number of Colors	16.7M			
Brightness (cd/m <sup>2</sup> )	600nit(typ)			
Response Time (ms)	25ms(typ.)			
Contrast Ratio	600:1			
Viewing Angle ( CR ≥ 10)	160degree (Horizontal.)			
	130degree (Vertical)			
Color Saturation	50%(typ.)			
Optimum Viewing Direction	6 O'clock			
Power Consumption (W)	2.592			
Interface connection	RGB, 50pin			
Module Size (mm)		Min.	Typ.	Max
	Horizontal (H)	164.6	164.9	165.2
	Vertical (V)	99.7	100	100.3
	Depth (D)	5.4	5.5	5.7
Module Weight (g)	TBD(Typ)			
Backlight Unit	LED			
Surface Treatment	Anti-Glare 3H			

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## 2. ABSOLUTE MAXIMUM RATINGS

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

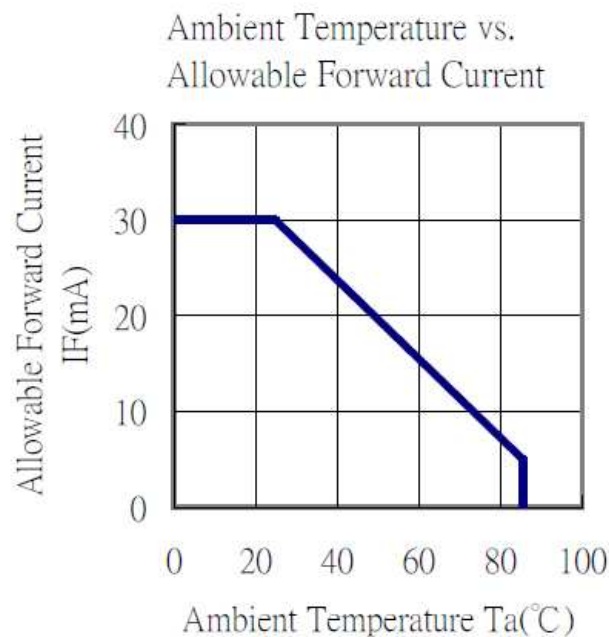
Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	+3.96	V	
Analog Supply Voltage	AVDD	-0.5	+14.85	V	
Gate On Voltage	VGH	-0.3	+40	V	
Gate Off Voltage	VGL	-20	+0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	
Signal Input Voltage	NIND0 ~ NIND3 PIND0 ~ PIND3 NINC,PINC	-0.5	5	V	
Forward Current (per LED)	If	-	30	mA	
Reverse Voltage (per LED)	VR	-	5	V	
Pulse forward current(per LED)	Ifp	-	60	mA	Note *2)
Operation Temperature (LCD panel surface overall)	T <sub>op1</sub>	-20	70	°C	Note *1)
Operation Temperature	T <sub>op</sub>	-20	70	°C	Note *1)
Storage Temperature	T <sub>stg</sub>	-30	80	°C	Note *1)

Note :

\*1) If the product were used out of the operation and storage range, it will have quality issue.

\*2) Ifp Conditions : Pulse Width  $\leq$  10msec · Duty  $\leq$  1/10.

\*3) Each one of LED operation must be follow diagram of Ambient Temperature and Allowable Forward Current.



\*4) If users use the product out of the environmental operation range (temperature and humidity), it will

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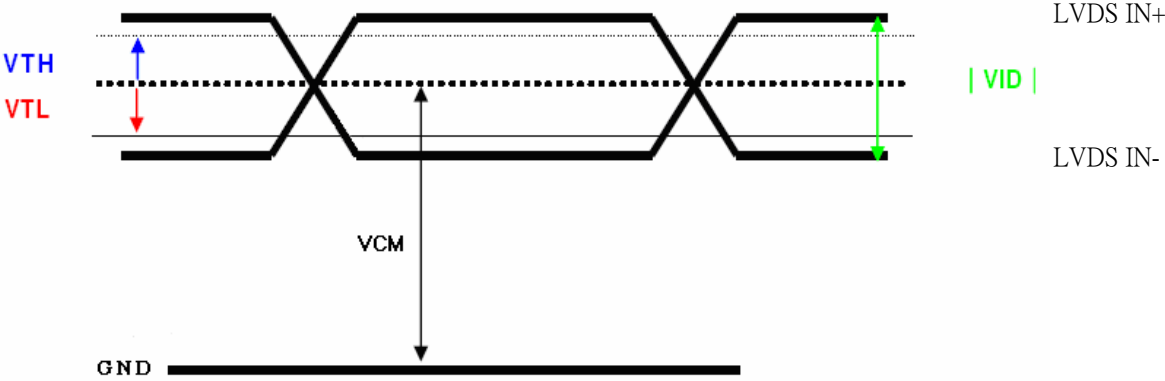
## 3. ELECTRICAL CHARACTERISTICS

### 3.1 Typical Operation Conditions

Ta=25°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	DVDD	3	3.3	3.6	V	
Logic Input Voltage (LVDS:IN+,IN-)	VCM	$\frac{ VID }{2}$	-	$2.4 - \frac{ VID }{2}$	V	Note1
	VID	200	-	600	mV	Note1
	VTH	-	-	100	mV	VCM=1.2V Note1
	VTL	-100	-	-	mV	
Analog Power Supply Voltage	AVDD	9.2	9.5	9.8	V	
Gate On Power Supply Voltage	VGH	17.7	18	18.3	V	
Gate Off Power Supply Voltage	VGL	-9.7	-10	-10.3	V	
Common Power Supply Voltage	VCOM	1.98	2.38	2.78	V	Note2
Logic Input Voltage	VIH	0.7*DVDD	-	DVDD	V	
	VIL	GND	-	0.3*DVDD	V	

Note1 :LVDS signal



Note2 :Please adjust VCOM to make the flicker level be minimum.

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## 3.2 Current Consumption

ITEM	SYMBOL	CONDITION	MIN	TYPE	MAX	UNIT	NOTE
Gate On Power Current	IVGH	VGH = 18V	--	0.5	1	mA	Note1
Gate Off Power Current	IVGL	VGL = -10V	--	0.5	1	mA	Note1
Digital Power Current	IDVDD	DVDD = 3.3V	--	30	45	mA	Note1
Analog Power Current	IAVDD	AVDD = 9.5V	--	35	45	mA	Note1
Total Power Consumption	PC		--	447	604	mW	Note1

Note1: Typical: Under 256 gray pattern  
Maximum: Under black pattern



256 gray pattern

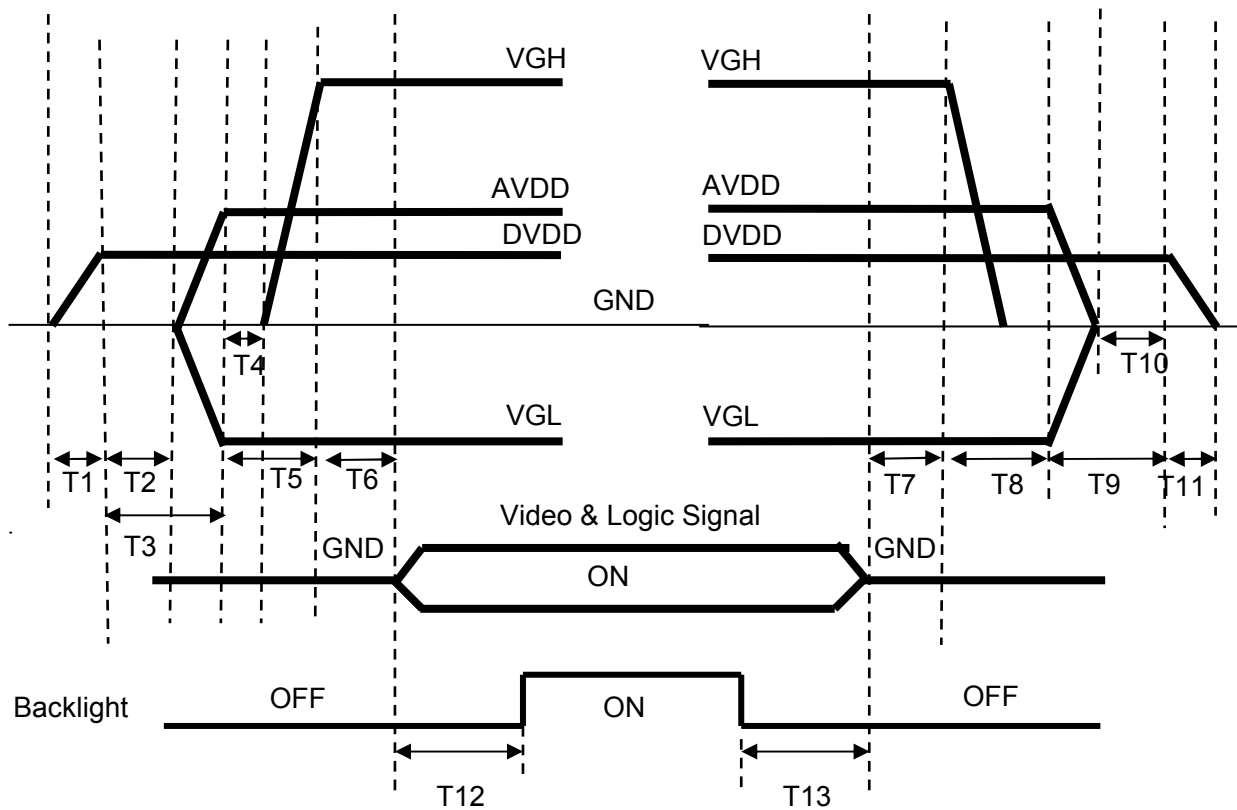


Black Pattern

## 3.3 Power · Signal Sequence

Power On : DVDD → AVDD/VGL → VGH → Video & Logic Signal → Backlight

Power Off : Backlight → Video & Logic Signal → VGH → AVDD/VGL → DVDD



$0 < T1 \leq 10\text{ms}$   
 $T2 > 0\text{ms}$   
 $T3 > 20\text{ms}$   
 $T4 > 0\text{ms}$   
 $T5 > 10\text{ms}$   
 $0 < T6 \leq 10\text{ms}$   
 $T12 \geq 200\text{ms}$

$0\text{ms} < T7 < 50\text{ms}$   
 $0\text{ms} < T8 < 50\text{ms}$   
 $T9 > 0\text{ms}$   
 $T10 > 0\text{ms}$   
 $0 < T11 \leq 10\text{ms}$   
 $T13 \geq 200\text{ms}$

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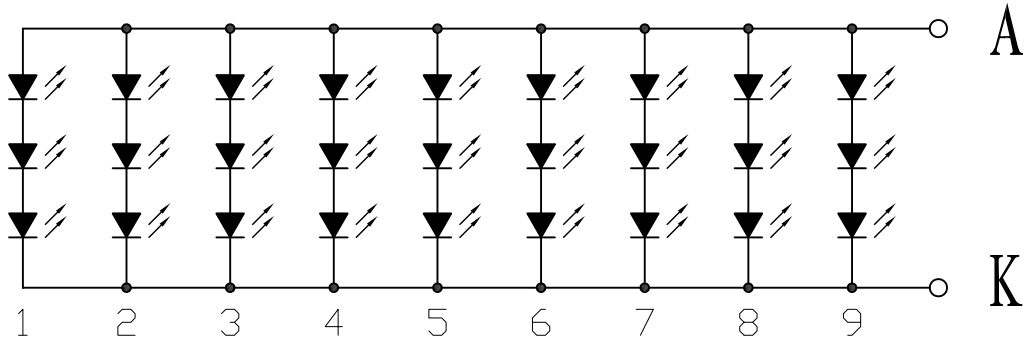
## 3.4 Backlight

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25°C Each serial=20mA	160	180	-	mA	
LED voltage	VL	Ta=25°C Each serial=20mA	9.0	9.9	10.5	V	
Power consumption	WL	Ta=25°C Each serial=20mA	1.62	1.98	-	W	
LED Lifetime	-	Ta=25°C Each serial=20mA	25000			Hr	

Note :

\*1)LED Circuit Diagram :



\*2) A : Anode(+) , K : Cathode(-)

\*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

\*4) Definition of Led lifetime Luminance < Initial luminance 50%.

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## 4. INTERFACE CONNECTION

### 4.1 CN1 (Input Signal)

FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH

No.	Symbol	Function	Remark
1	A	Power for LED backlight (Anode)	
2	A	Power for LED backlight (Anode)	
3	K	Power for LED backlight (Cathode)	
4	K	Power for LED backlight (Cathode)	
5	GND	Power ground	
6	VCOM	Common voltage	
7	VDD	Digital Power	
8	MODE	DE/SYNC mode select. Normally pull high	Note1
9	DE	Data Input Enable	
10	VS	Vertical sync input. Negative polarity	
11	HS	Horizontal sync input. Negative polarity	
12	B7	Blue data(MSB)	
13	B6	Blue data	
14	B5	Blue data	
15	B4	Blue data	
16	B3	Blue data	
17	B2	Blue data	
18	B1	Blue data	
19	B0	Blue data(LSB)	
20	G7	Green data(MSB)	
21	G6	Green data	
22	G5	Green data	
23	G4	Green data	
24	G3	Green data	
25	G2	Green data	
26	G1	Green data	
27	G0	Green data(LSB)	
28	R7	Red data(MSB)	
29	R6	Red data	
30	R5	Red data	
31	R4	Red data	
32	R3	Red data	
33	R2	Red data	
34	R1	Red data	
35	R0	Red data(LSB)	
36	GND	Power Ground	
37	DCLK	Clock input	
38	GND	Power Ground	

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39	L/R	Left or Right Display Control	Note2
40	UPDN	Up / Down Display Control	Note3
41	VGH	Positive Power for TFT	
42	VGL	Negative Power for TFT	
43	AVDD	Analog Power	
44	RESET	Global reset pin.	Note4
45	NC	No connection	
46	VCOM	Common Voltage	
47	DITH	Dithering setting	Note5
48	GND	Power Ground	
49	NC	No connection	
50	NC	No connection	

Note1: DE/SYNC mode select .normally pull high

H:DE mode

L:HS/VS mode

Note2: Source right or left sequence control.

L/R="L",shift left:last data=S1<-S2...S1200=first data

L/R="H",shift right:first data=S1->SS2...S1200=last data

Note3: gate up or down scan control.

U/D="L" , down shift : G1->G2...->G480 ;

U/D="H", up shift: G1<-G2...<-G480

Note4: Global reset pin. Active low to enter reset state.

Suggest to connecting with an RC reset circuit for stability.Normally pull high.

Note5: Dithering setting: DITH="L" 8bit resolution (default setting)

DITH="H" 6bit resolution (last 2 bits of input data truncated)

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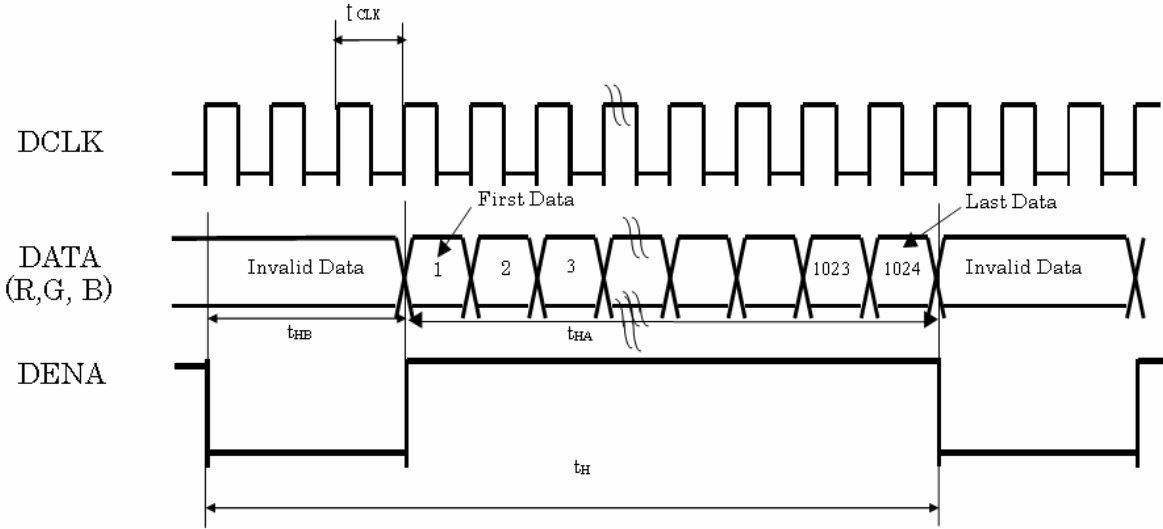
## 5. INPUT SIGNAL(DE ONLY MODE)

### 5.1 Timing Specification

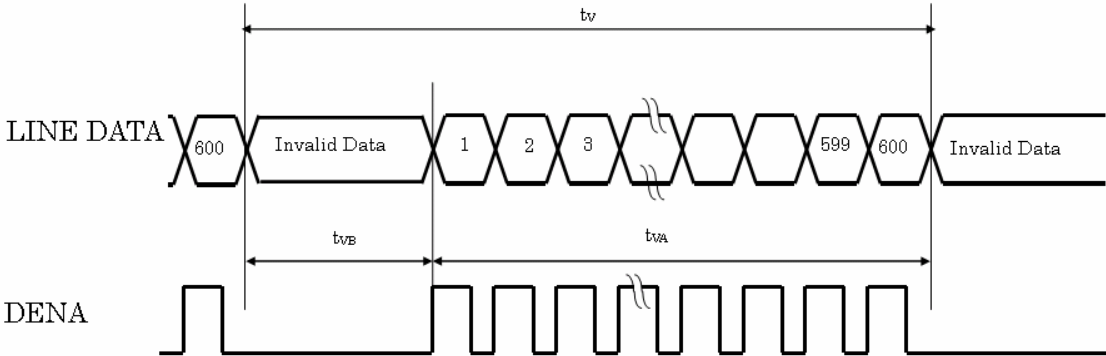
Item		Symbol	Min.	Typ.	Max.	Unit	
LVDS input signal sequence	CLK Frequency	tclk	45	51.2	57	MHz	
LCD input signal sequence (Input LVDS Transmitter)	Horizontal	Horizontal total Time	t <sub>H</sub>	1324	1344	1364	tCLK
		Horizontal effective Time	t <sub>HA</sub>	1024			tCLK
		Horizontal Blank Time	t <sub>HB</sub>	300	320	340	tCLK
	Vertical	Vertical total Time	t <sub>V</sub>	625	635	645	t <sub>H</sub>
		Vertical effective Time	t <sub>VA</sub>	600			t <sub>H</sub>
		Vertical Blank Time	t <sub>VB</sub>	25	35	45	t <sub>H</sub>

### 5.2 Timing sequence(Timing chart)

#### 5.2.1 Horizontal Timing Sequence



#### 5.2.2 Vertical Timing Sequence



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## 5.2.3 Color Data Reference

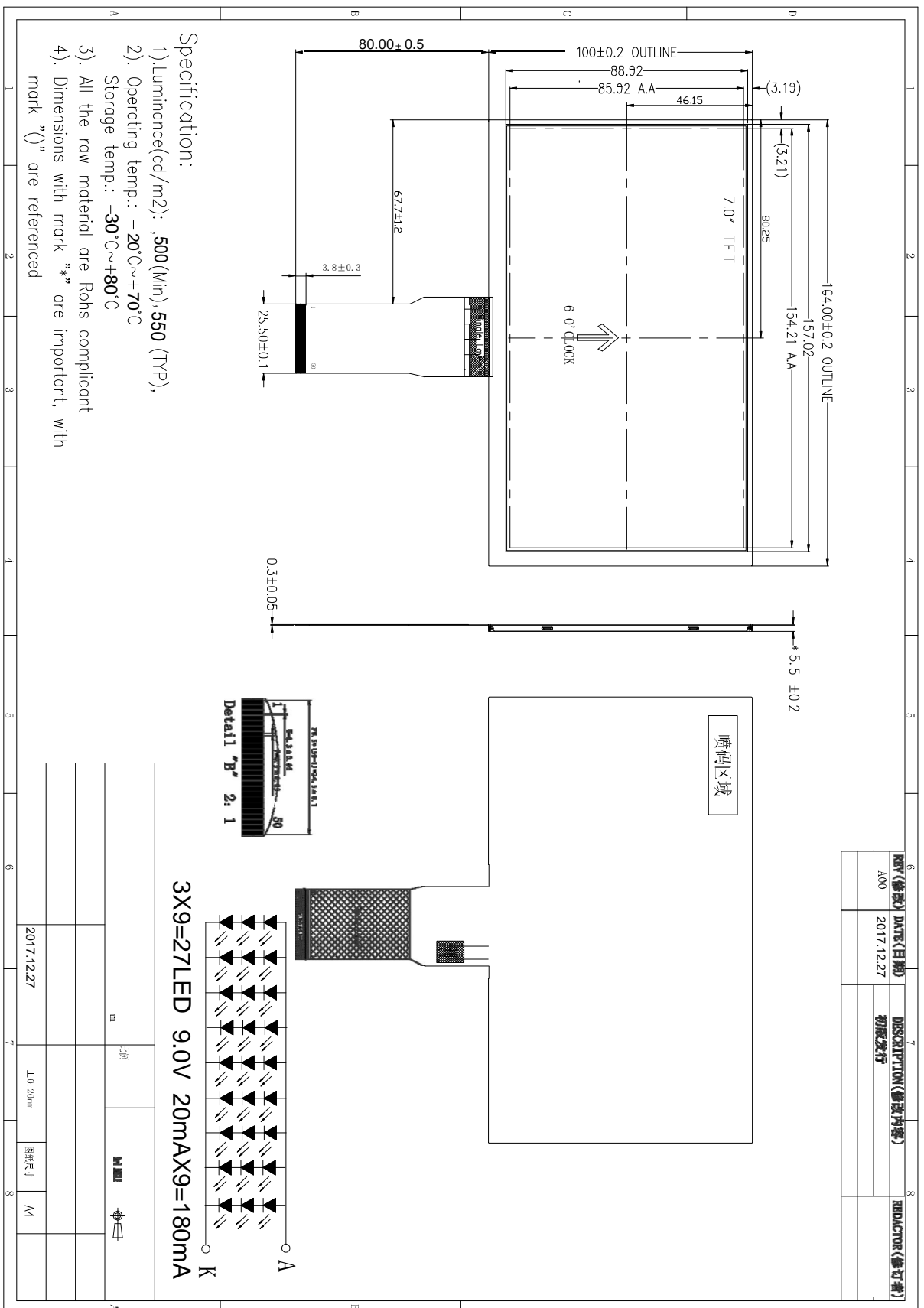
COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	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
	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
RED	RED(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
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	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(255)	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	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(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	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	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	0	0	0	0	0	0	1	0
	BLUE(254)	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(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note :

- 1) Gray level:  
Color(n) : n is level order; higher n means brighter level.
- 2) DATA:  
1: high , 0: low

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## 6. MECHANICAL DIMENSIONC



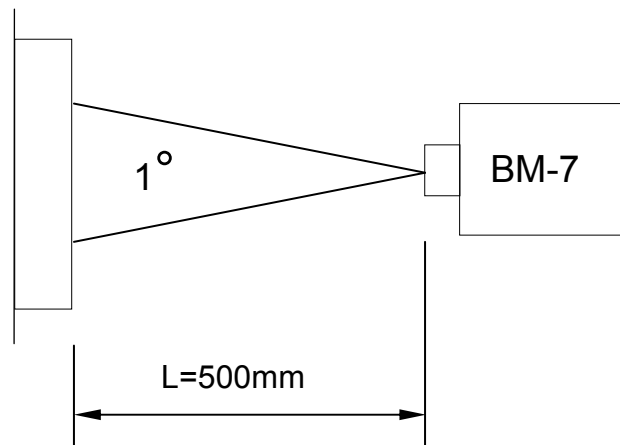
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## 7. OPTICAL CHARACTERISTICS

Ta = 25°C, VCC=3.3V

ITEM		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
Constrast Ratio		CR	Point-5	640	800		--	1, 2, 3
Luminance(CEN)		Lw	Point-5	350	400		cd/m <sup>2</sup>	1, 3
Luminance Uniformity		ΔL		70	80		%	1, 3
Response Time (White - Black)		Tr +Tf	Point-5	-	25	40	ms	1, 3, 5
NTSC		-	Point-5	45	50	-	%	1, 4
Viewing Angle	Vertical	Upper(θ)	CR ≥ 10 Point-5	50	60	--	°	1, 4
		Down(θ)		60	70		°	1, 4
	Horizontal	Left(φ)		70	80		°	1, 4
		Right(φ)		70	80		°	1, 4
Color Coordinate	White	Wx Wy	Point-5	0.250 0.260	0.300 0.310	0.350 0.360	--	1, 3
	Red	Rx Ry		0.549 0.301	0.589 0.341	0.629 0.381		
	Green	Gx Gy		0.294 0.571	0.334 0.611	0.374 0.651		
	Blue	Bx By		0.115 0.066	0.155 0.106	0.195 0.146		

Note1: Measure condition : 25°C ±2°C , 60±10%RH , under10 Lux in the dark room.BM-7(TOPCON) viewing angle2° , IL=180mA ( Backlight current ) , measurement after lighting on 10 mins.



Note2: Definition of contrast ratio :

Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

Definition of luminance : Measure white luminance on the point 5 as figure.7-1

ΔL = [L(MIN)/L(MAX)]×100

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Note3: Definition of luminance : Measure white luminance on the point 5 as figure.7-1

Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.7-1

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

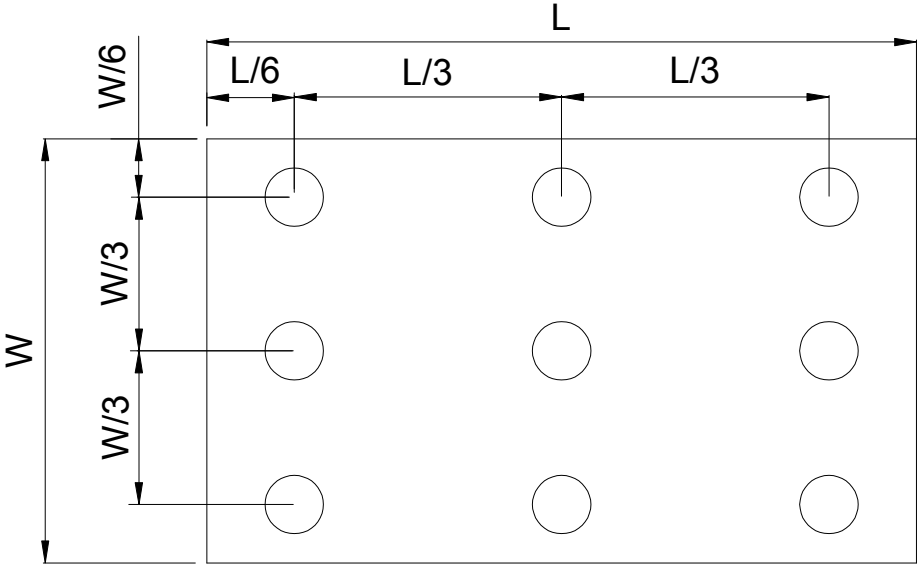


Fig.7-1 Measuring point

Note 4: Definition of Viewing Angle( $\theta, \psi$ ),refer to Fig.7-2 as below :

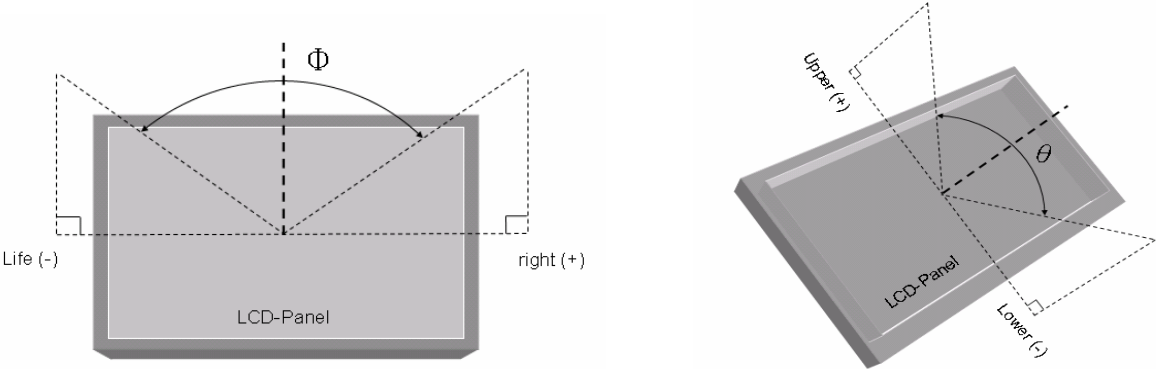


Fig.7-2 Definition of Viewing Angle

Note5: Definition of Response Time.(White-Black)

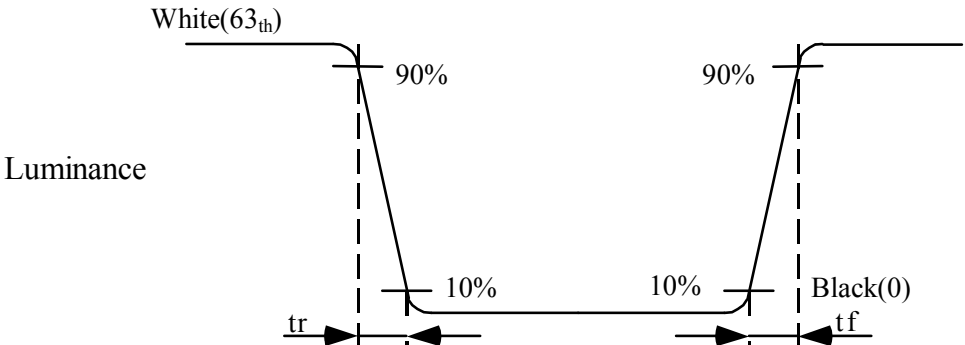


Fig.7-3 Definition of Response Time(White-Black)

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## 8. RELIABILITY TEST

### 8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70°C ; 240hrs	
High Temperature Operation	80°C <sub>Tp</sub> ; 240hrs	Note1
High Temperature Storage	80°C ; 240hrs	
High Temperature High Humidity Operation	60°C ; 90%RH ; 240hrs	
Low Temperature Operation	-20°C ; 240hrs	
Low Temperature Storage	-30°C ; 240hrs	
Thermal Shock	-20°C(0.5hr) ~ 70°C(0.5hr) ; 100 Cycles	Non-Operating
Image Sticking	25°C ; 4hrs	Note 2
MTBF	20000 Hrs	

Note 1 : . Tp: panel surface temperature overall.

Note 2. :

Condition of Image Sticking test : 25 °C ± 2 °C

Operation with test pattern sustained for 4 hrs, then change to mid-gray pattern immediately.

After 5 mins, the mura must be disappeared completely .

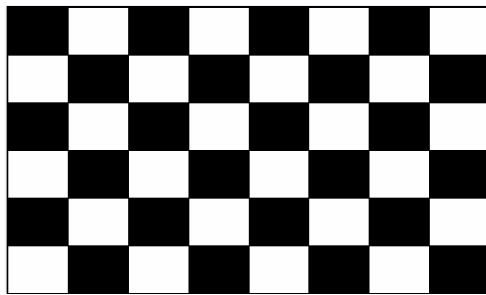


Image Sticking -pattern



Mid-Gray pattern

### 8.2 Shock and Vibration

ITEMS	CONDITIONS
Shock (Non-Operation)	<ul style="list-style-type: none"> <li>● Shock level : 980m/s<sup>2</sup>(equal to 100G).</li> <li>● Waveform : 1/2 Sine wave,6msec</li> <li>● ±X , ±Y , ±Z , each axis 1 times</li> </ul>
Vibration (Non-Operation)	<ul style="list-style-type: none"> <li>● Frequency range : 8~33.3Hz</li> <li>● Stoke : 1.3 mm</li> <li>● Vibration : sinusoidal wave, perpendicular axis (both x, z axis:2Hrs, y axis 4Hrs).</li> <li>● Sweep : 2.9G, 33.3 Hz -400 Hz</li> <li>● Cycle : 15 min</li> </ul>

### 8.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	NOTE
ESD	150pF , 330Ω , ±8kV&±15kV Air& Contact test	1
	200pF , 0Ω , ±200V Contact test	2

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins