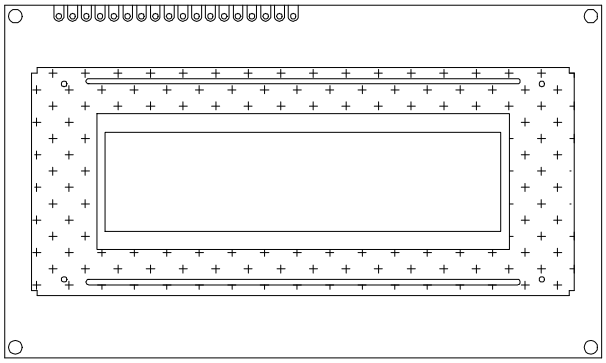
PRODUCT SPECIFICATION

HDM32GS12-8

128x32 GRAPHICS
LCD DISPLAY MODULE



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1. General Specifications

1. Features

A. Drive Method:1/32 Duty, 1/9 Bias

B. The Module Operating Voltage:5V;

C. Viewing Direction: 6:00h

D. Operating Temperature: 0℃~50℃

E. Storage Temperature: -20℃~70℃

F. The Connector Method Between LCD And PCB: Zebra.

G. The LCD Operating Voltage :9V;

H. Display type: STN-YELLOW , Positive

2.Mechanical Data:

(1) Module Size ---------- 110.0 w * 65.0 h mm

(2) Viewing Area ---------- 76.0 w * 25.0 h mm

(3) Dot Size ---------- 0.52 w * 0.52 h mm

(4) Dot Quality---------- 128 * 32

3.Pin Connections:

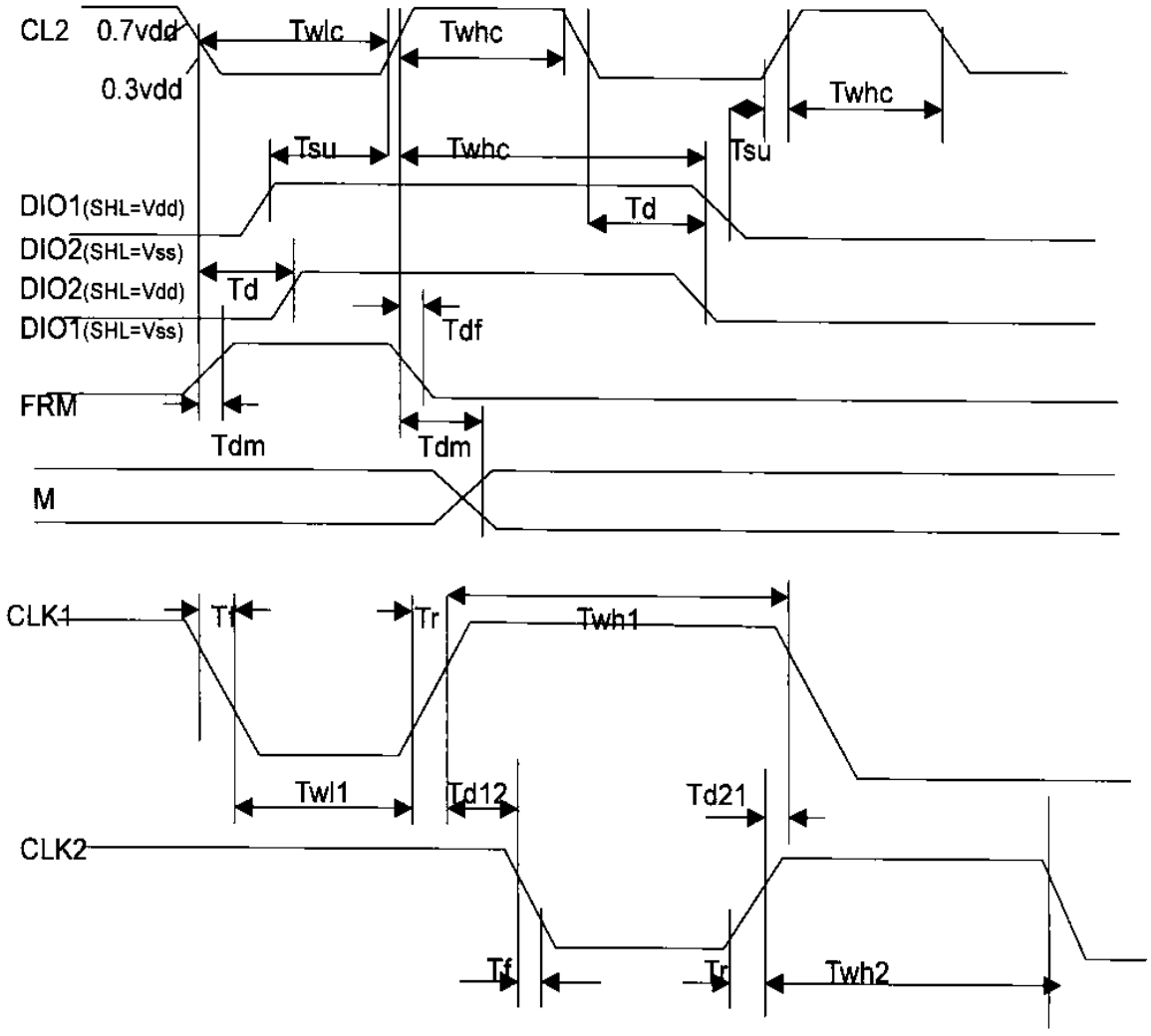
Pin No.	Symbol	Function
1	VSS	Ground(0v)
2	VDD	Logic Supply Voltage(+5.0V)
3	VEE	LCD Driver Voltage Input(+9V)
4	E	Enable Signal
5	RS	Data Or Instruction
6	R/W	Read/Write Select
7	RST	Reset Signal
8	CSB	Chip Selection
9~16	DB0~DB7	Data Bus Line
17-18	LED +,-	LED Backlight

4.Timing Characteristics:(VDD=5V±10%)

(1).Common Driver :

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Data Setup Time	Tsu	20	--	--	us
Data Hold Time	Tdh	40	--	--	
Data Delay Time	Td	5	--	--	
FRM Delay Time	Tdf	-2	--	2	
M Delay Time	Tdm	-2	--	2	
Cl2 Low Level Width	Twlc	35	--	--	
Cl2 High Level Width	Twhc	35	--	--	
Clk1 Low Level Width	Twl1	700	--	--	ns
Clk2 Low Level Width	Twl2	700	--	--	
Clk1 High Level Width	Twh1	2100	--	--	
Clk2 High Level Width	Twh2	2100	--	--	
Clk1-Clk2 Phase Difference	Td12	700	--	--	
Clk2-Clk1 Phase Difference	Td21	700	--	--	

Clk1,Clk2 Rise/Fall Time	Tr/Tf	--	--	150	ns



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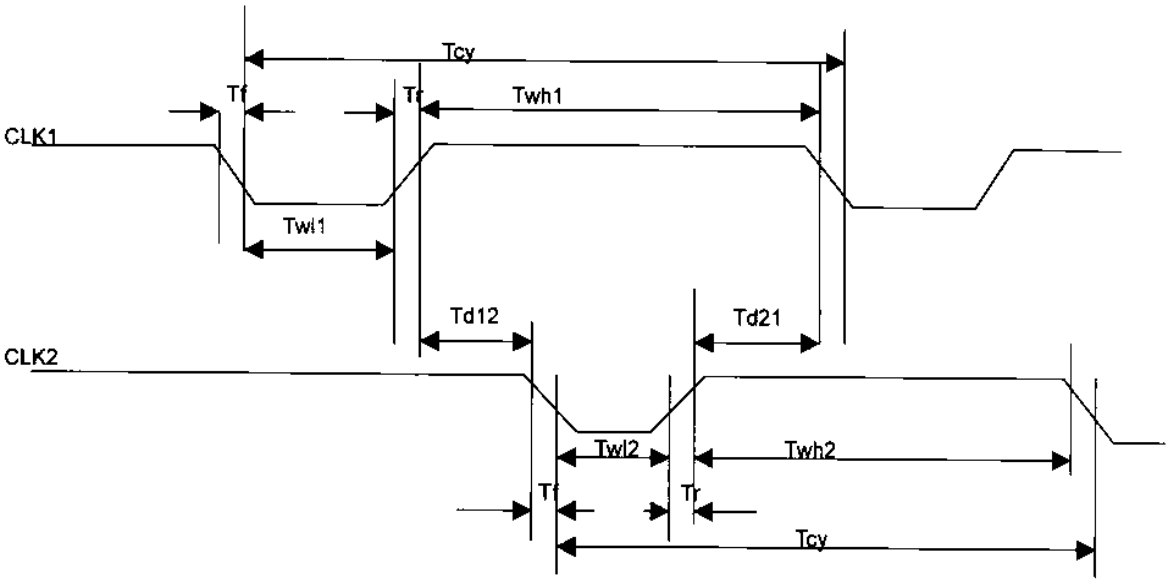
(2) Segment Driver:

A. Clock Timing:

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Clk1,Clk2 Cycle Time	Tcy	2.5	--	20	μ s
Clk1"Low" Level Width	Twl1	625	--	--	ns
Clk2"Low" Level Width	Twl2	625	--	--	
Clk1"High"Level Width	Twh1	1875	--	--	
Clk2"High"Level Width	Twh2	1875	--	--	
Clk1-Clk2 Phase Difference	Td12	625	--	--	
Clk2-Clk1 Phase Difference	Td21	625	--	--	
Clk1,Clk2 Rise Time	Tr	--	--	150	
Clk1,Clk2 Fall Time	Tf	--	--	150	



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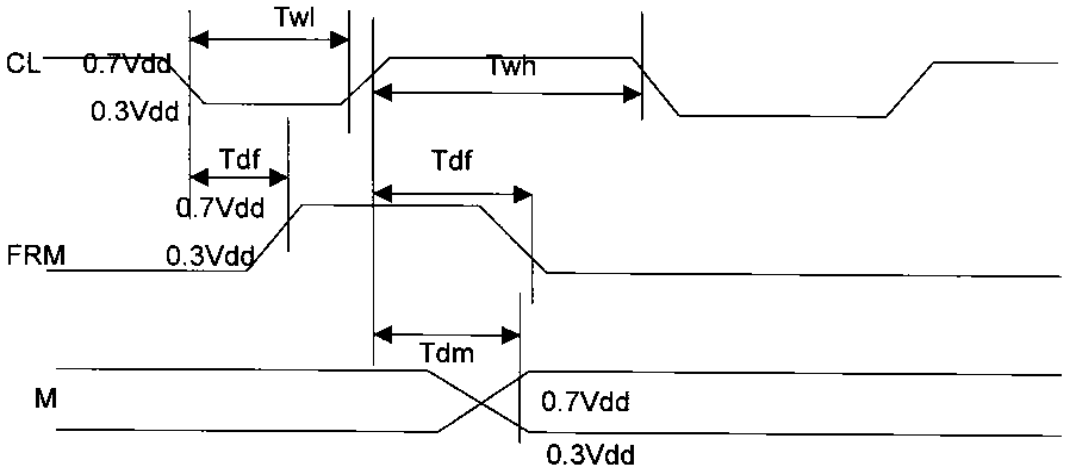
B.Display Control Timing

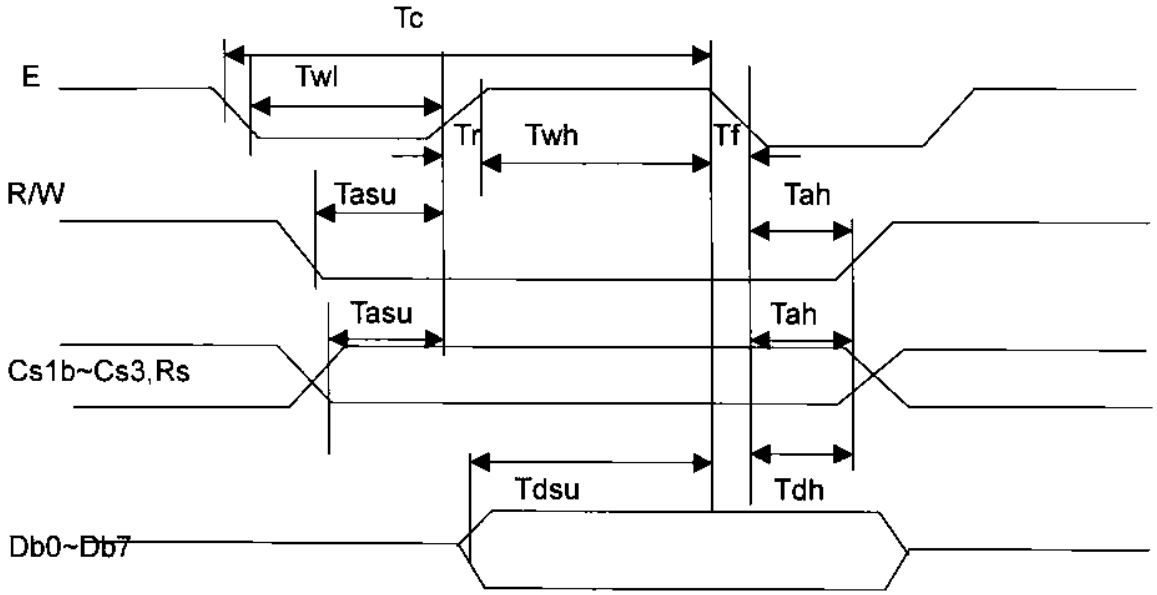
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Frm Delay Time	Tdf	-2	--	+2	μs
M Delay Time	Tdm	-2	--	+2	μs
Cl"Low" Level Width	Twl	35	--	--	μs
Cl"High"Level Width	Twh	35	--	--	μs



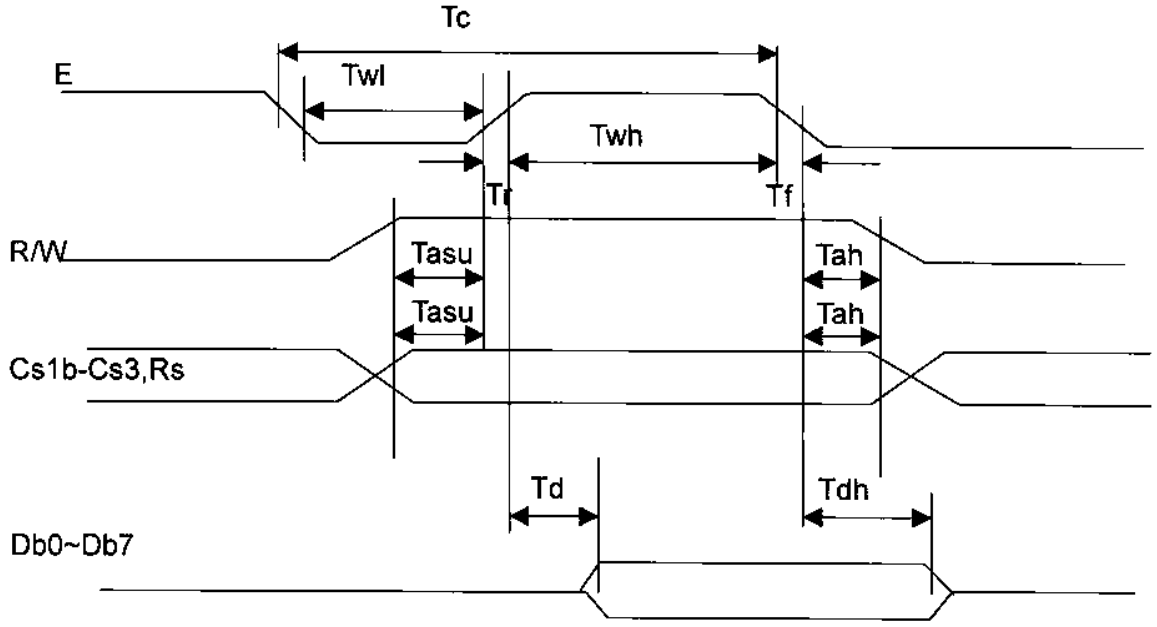
C.Mpu Interface:

Characteristic	Symbol	Min.	Typ.	Max.	Unit
E Cycle	Tc	1000	--	--	ns
E High Level Width	Twh	450	--	--	
E Low Level Width	Twl	450	--	--	
E Rise Time	Tr	--	--	25	
E Fall Time	Tf	--	--	25	
Address Set-Up Time	Tasu	140	--	--	
Address Hold Time	Tah	10	--	--	
Data Set-Up Time	Tdsu	200	--	--	
Data Delay Time	Td	--	--	320	
Data Hold Time(Write)	Tdhw	10	--	--	
Data Hold Time(Read)	Tdhr	20	--	--	

Mpu Write Timing:



Mpu Read Timing:



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2.The Characteristics and The Reliability Test

1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)℃ Hum=(70±5)%RH

V_{dd}: 5.0V

NO	Item		Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)		Vdd-Vss	4.5	5.0	5.5	V	
2	Supply Current (Logic)		Idd		2.1		mA	Vdd=5V
3	LCD Operating Voltage		Vdd-V_0		9.0		V	25℃
4	Response Time		Ton		145		ms	
			Toff		86		ms	
5	Contrast		CR	3				
6	Viewing Angel	12H	θ 1		25		Deg.	(CR≥3.0)
		6H	θ 2		43			
		3H	θ 3		45			
		9H	θ 4		45			
7	LCD Threshold Voltage		Vth		7.32		V	25℃

:

2. Characteristics of backlight (LED unit)

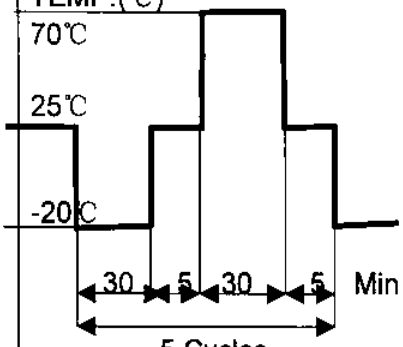
(1).Absolute Maximum Ratings:

Item	Symbol	Typ.	Max.	Unit	Condition
Forward Current	IFM	240	480	mA	Ta=25℃
Reverse Voltage	VR	10		V	Ta=25℃
Power Dissipation	PD	1008		mW	Ta=25℃

(2).Electrical-optical Characteristics:

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward Voltage	VF		4.2	4.6	V	
Reverse current	IR		0.2		mA	
Luminous	LV		200		cd/m^2	IF=240mA
Color	Yellow/Green					

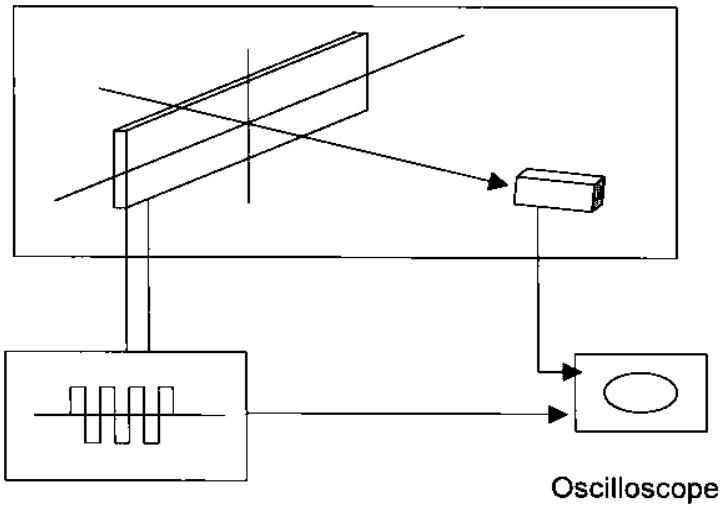
3.Reliability Test

No	Items	Test Condition	Equipment	Test Result
1	High TEMP Storage	TEMP: 70±2℃ Time: 96h Restore:24h	Tenny	Passed
2	Low TEMP Storage	TEMP: -20±3℃ Time: 96h Restore:24h	Tenny	Passed
3	High TEMP Operating	TEMP:50±2℃ Vop: 5V Timp: 24h Restore:24h	Tenny	Passed
4	Low TEMP Operating	TEMP:0±2℃ Vop: 5V Timp: 24h Restore:24h	Tenny	Passed
5	High TEMP High Hum Storage	TEMP:40±2℃ Hum: 95%Rh Time: 96h Restore:24h	Tenny	Passed
6	Thermal Shock	TEMP:(℃)  5 Cycles Restore:24h	Tenny	Passed

3.The LCD Measuring Method and Equipment

1. Threshold Voltage and Response Time Measuring

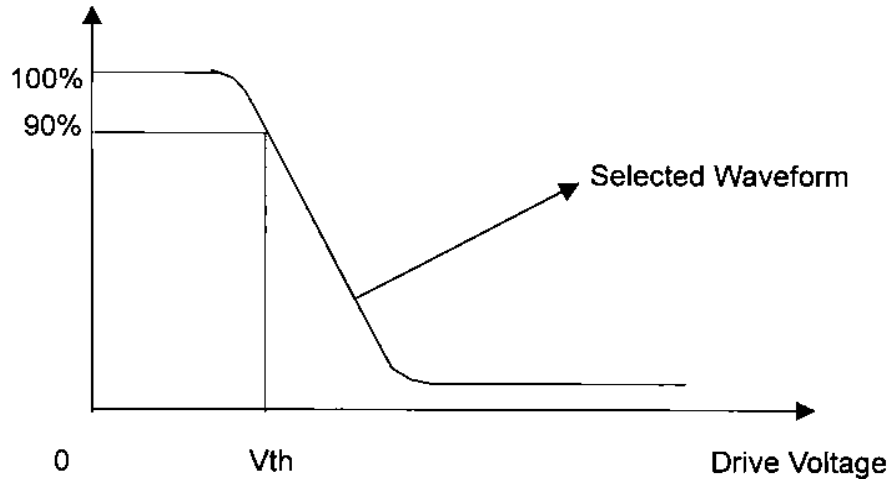
(1) Equipment



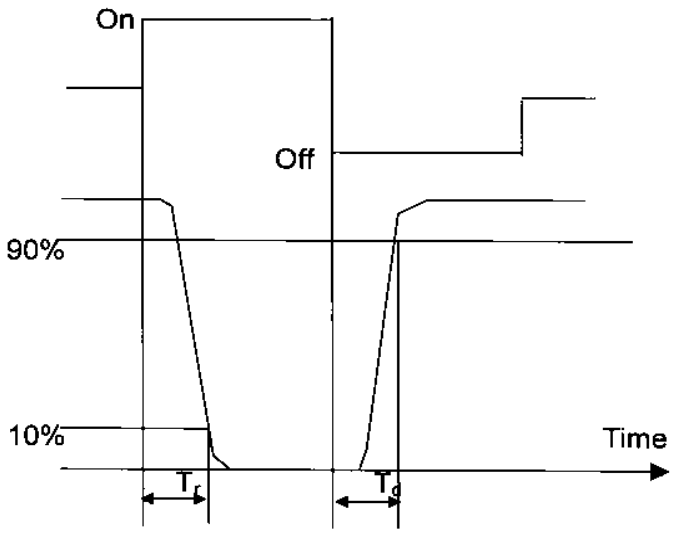
(2) Definition

A. Threshold Voltage Vth

Brightness

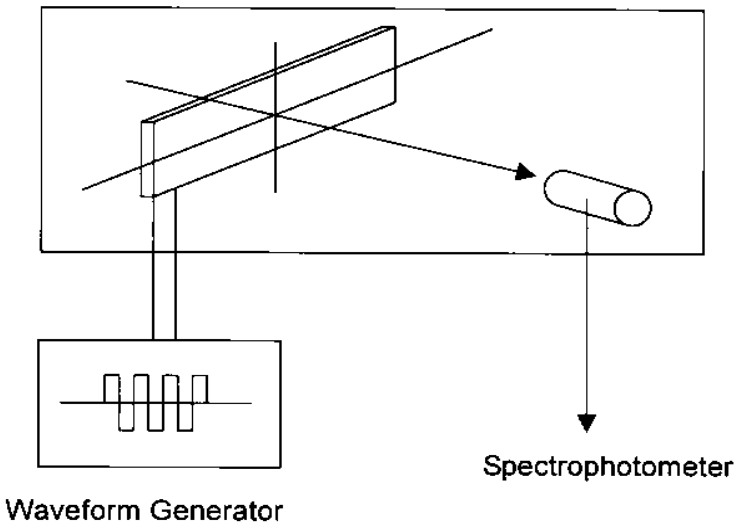


B. Response Time



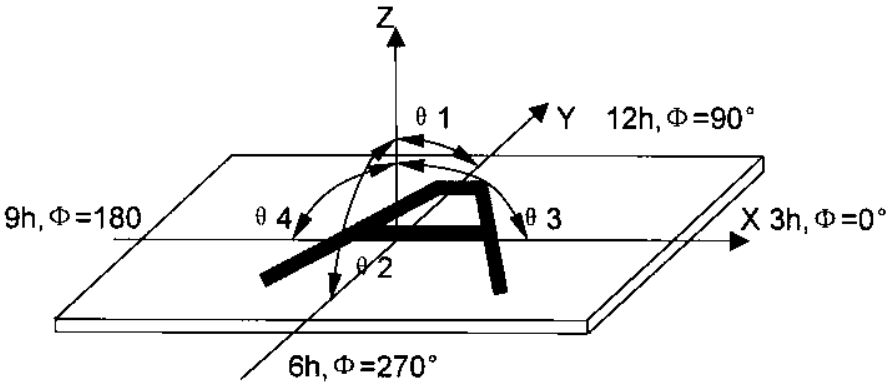
2. Contrast Measuring

(1) Equipment



(2)Definition:

A.Viewing Angle:



B. Contrast Ratio (Positive)

$$CR = \frac{\text{Brightness of non-selected wave-form}}{\text{Brightness of selected wave-form}}$$

3. Reliability Test:

Equipment : TENNY

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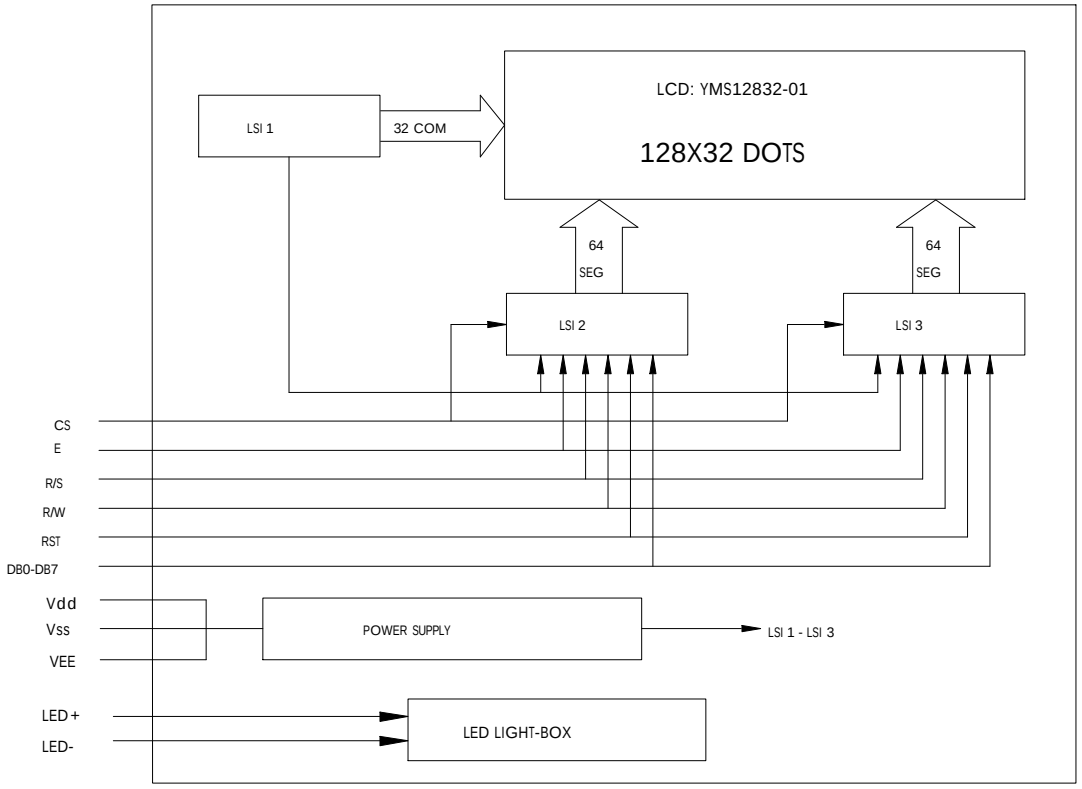
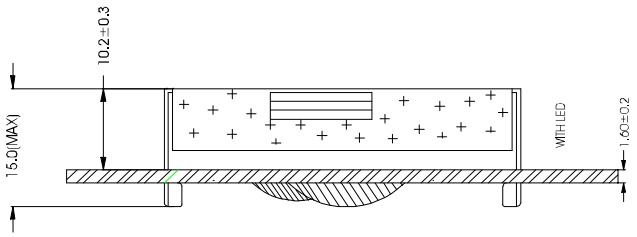
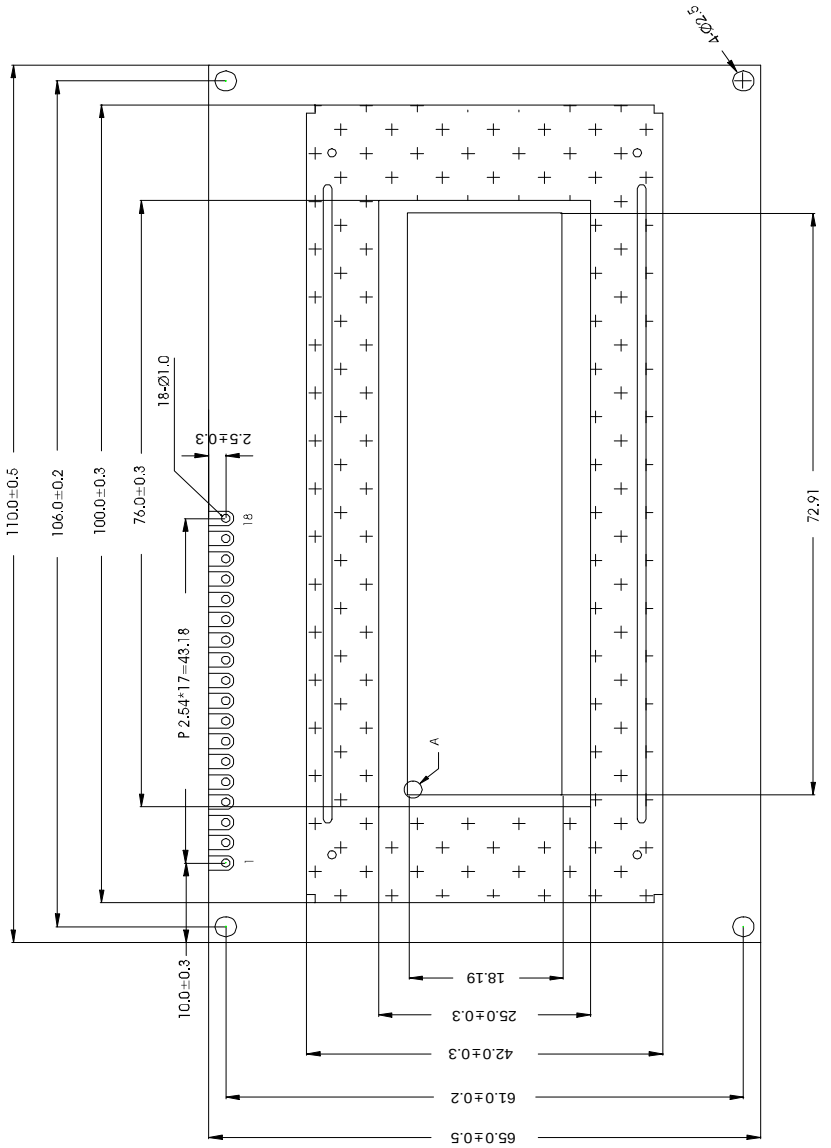
4. Block Diagram

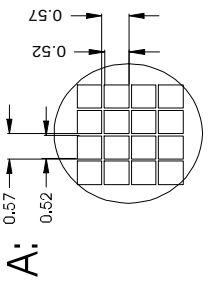


1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
VSS	VDD	VEE	E	R/S	R/W	RST	CSB	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	LED+	LED-

5. Drawing







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