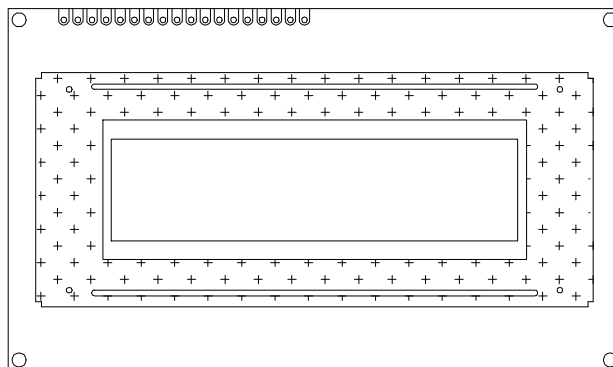




PRODUCT SPECIFICATION

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°C~50°C
- E. Storage Temperature: -20°C~70°C
- 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

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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

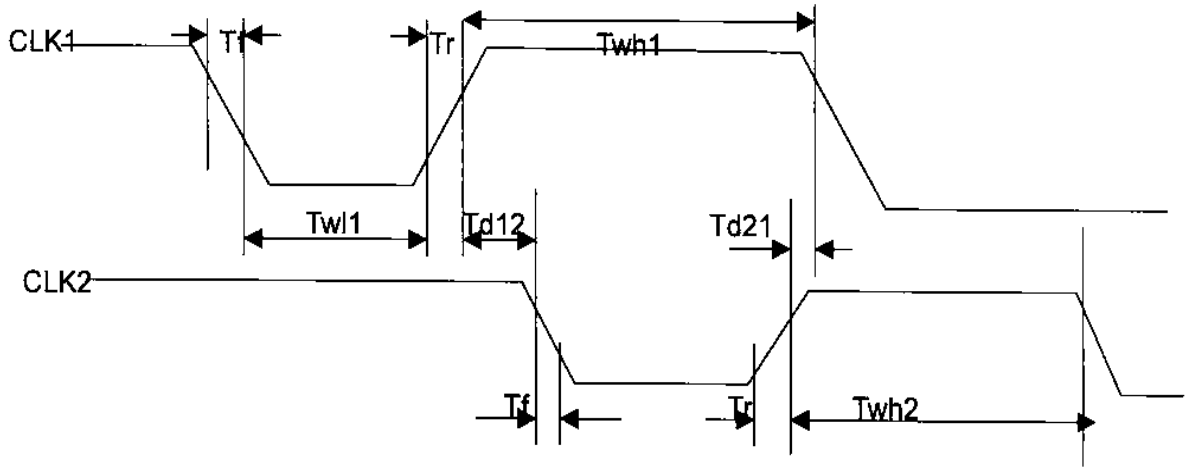
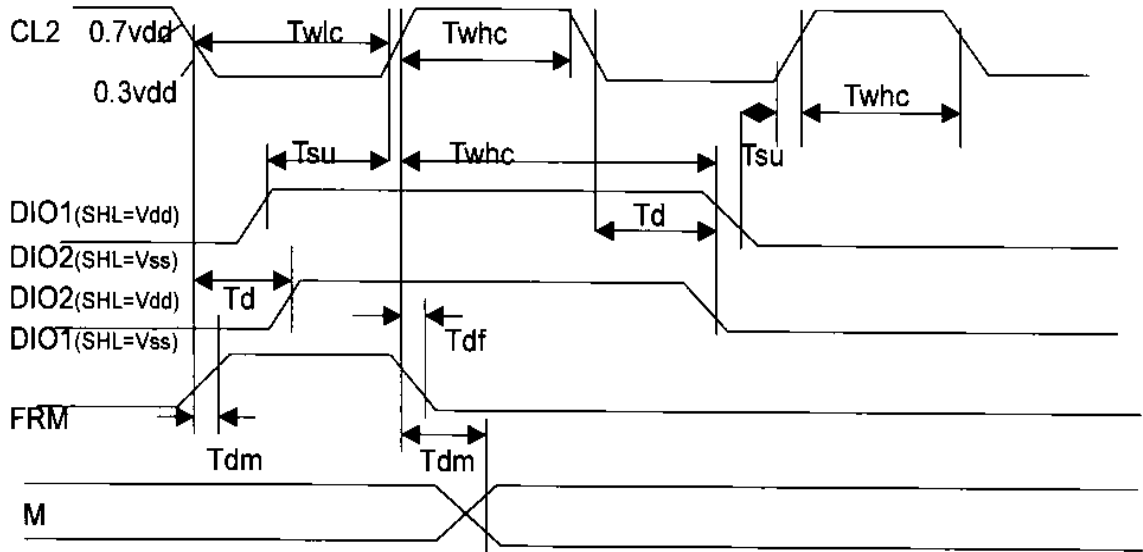
4.Timing Characteristics:(VDD=5V±10%)

(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	--	--	ns
Clk1 Low Level Width	Twl1	700	--	--	
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	--	--	

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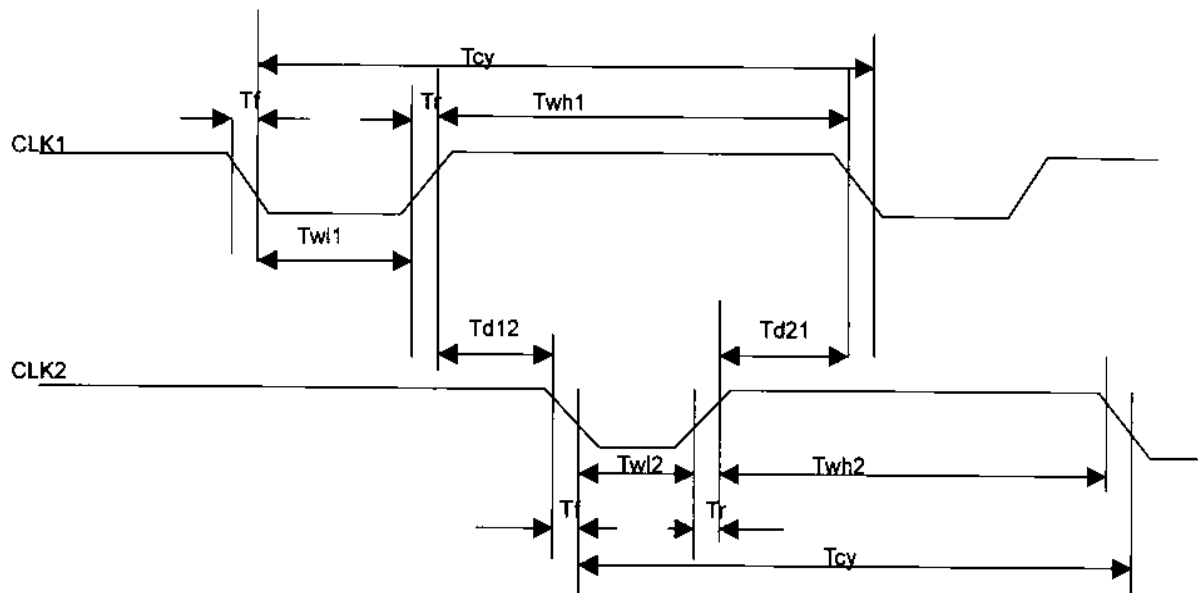


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(2) Segment Driver:

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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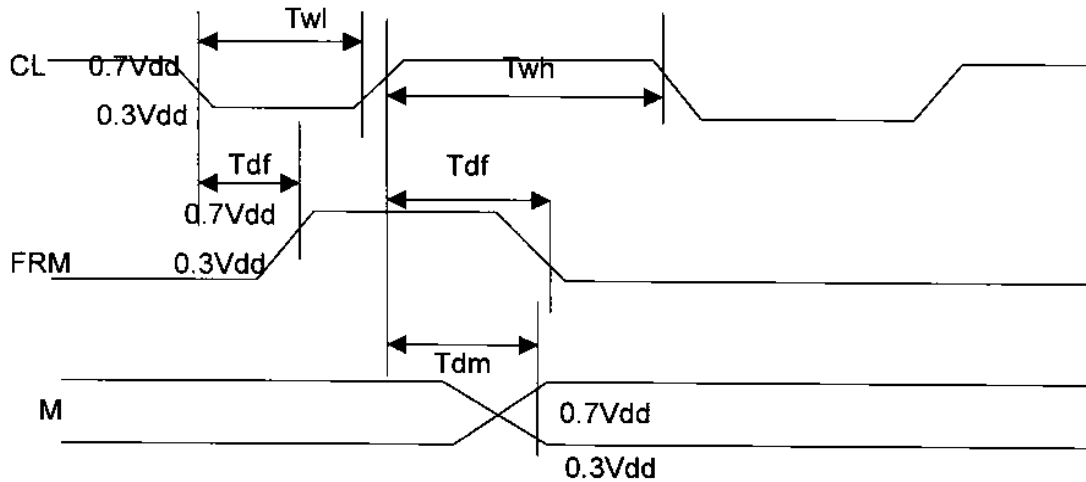
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B. Display Control Timing

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



C. Mpu Interface:

Characteristic	Symbol	Min.	Typ.	Max.	Unit
E Cycle	T _c	1000	--	--	ns
E High Level Width	T _{wh}	450	--	--	
E Low Level Width	T _{wl}	450	--	--	
E Rise Time	T _r	--	--	25	
E Fall Time	T _f	--	--	25	
Address Set-Up Time	T _{asu}	140	--	--	
Address Hold Time	T _{ah}	10	--	--	
Data Set-Up Time	T _{dsu}	200	--	--	
Data Delay Time	T _d	--	--	320	
Data Hold Time(Write)	T _{dhw}	10	--	--	
Data Hold Time(Read)	T _{dhr}	20	--	--	

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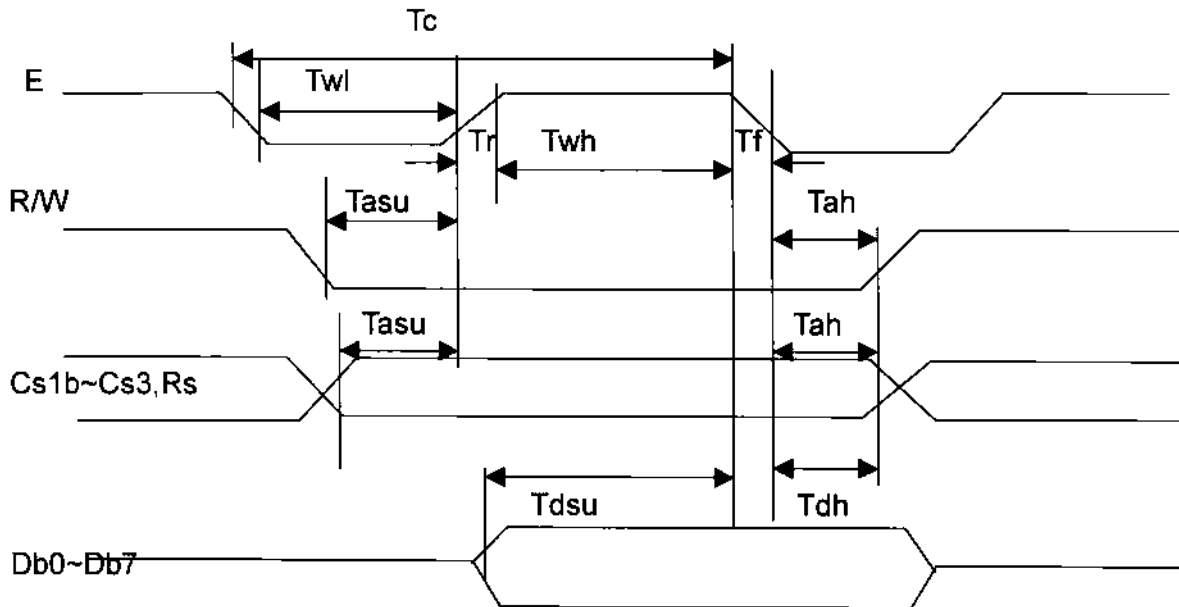
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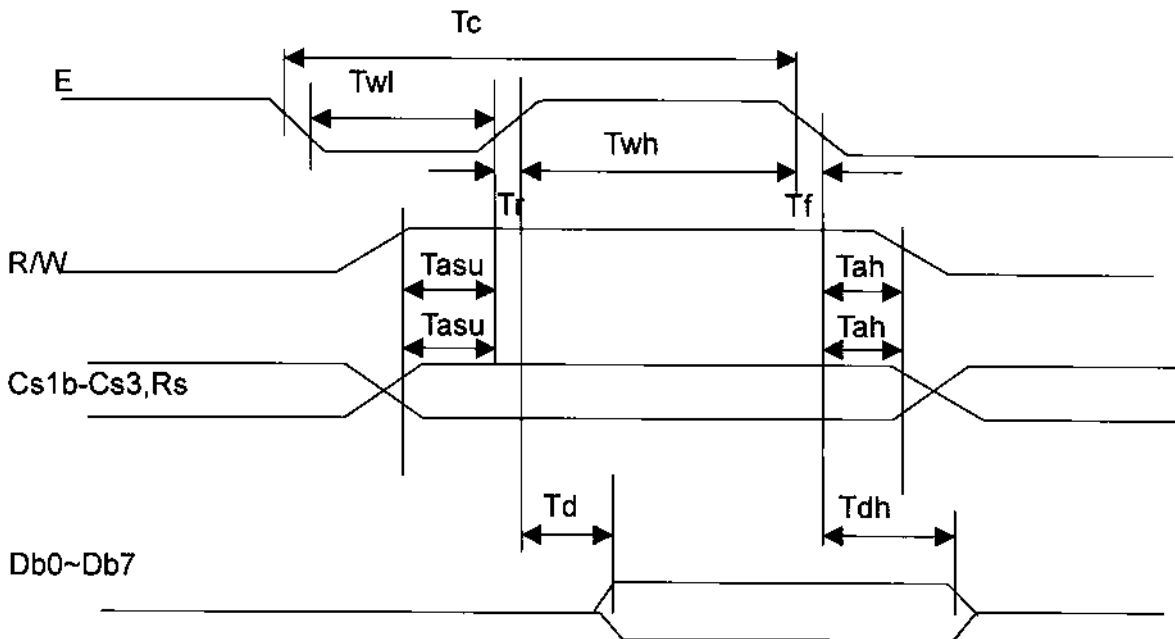
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Mpu Write Timing:



Mpu Read Timing:



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2.The Characteristics and The Reliability Test

1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)°C Hum=(70±5)%RH

V_{dd}: 5.0V

NO	Item	Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)	V _{dd} -V _{ss}	4.5	5.0	5.5	V	
2	Supply Current (Logic)	I _{dd}		2.1		mA	V _{dd} =5V
3	LCD Operating Voltage	V _{dd} -V ₀		9.0		V	25°C
4	Response Time	T _{on}		145		ms	
		T _{off}		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	V _{th}		7.32		V	25°C

2. Characteristics of backlight (LED unit)

(1).Absolute Maximum Ratings:

Item	Symbol	Typ.	Max.	Unit	Condition
Forward Current	I _{FM}	240	480	mA	T _a =25°C
Reverse Voltage	V _R	10		V	T _a =25°C
Power Dissipation	P _D	1008		mW	T _a =25°C

(2).Electrical-optical Characteristics:

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward Voltage	V _F		4.2	4.6	V	
Reverse current	I _R		0.2		mA	
Luminous	L _V		200		cd/m ²	I _F =240mA
Color	Yellow/Green					

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3. Reliability Test

No	Items	Test Condition	Equipment	Test Result
1	High TEMP Storage	TEMP: $70 \pm 2^\circ\text{C}$ Time: 96h Restore: 24h	Tenny	Passed
2	Low TEMP Storage	TEMP: $-20 \pm 3^\circ\text{C}$ Time: 96h Restore: 24h	Tenny	Passed
3	High TEMP Operating	TEMP: $50 \pm 2^\circ\text{C}$ Vop: 5V Timp: 24h Restore: 24h	Tenny	Passed
4	Low TEMP Operating	TEMP: $0 \pm 2^\circ\text{C}$ Vop: 5V Timp: 24h Restore: 24h	Tenny	Passed
5	High TEMP High Hum Storage	TEMP: $40 \pm 2^\circ\text{C}$ Hum: 95%Rh Time: 96h Restore: 24h	Tenny	Passed
6	Thermal Shock	<p>TEMP: ($^\circ\text{C}$)</p> <p>Restore: 24h</p>	Tenny	Passed

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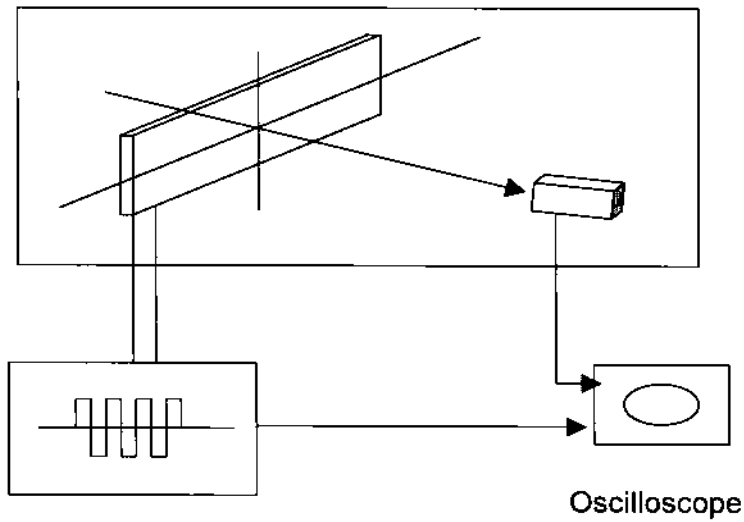
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3.The LCD Measuring Method and Equipment

1. Threshold Voltage and Response Time Measuring

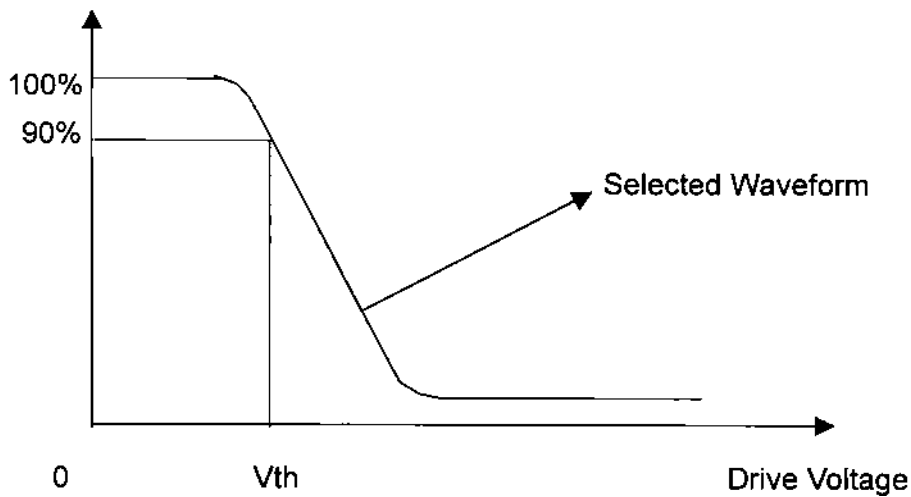
(1) Equipment



Waveform Generator

(2) Definition

A. Threshold Voltage V_{th}
Brightness



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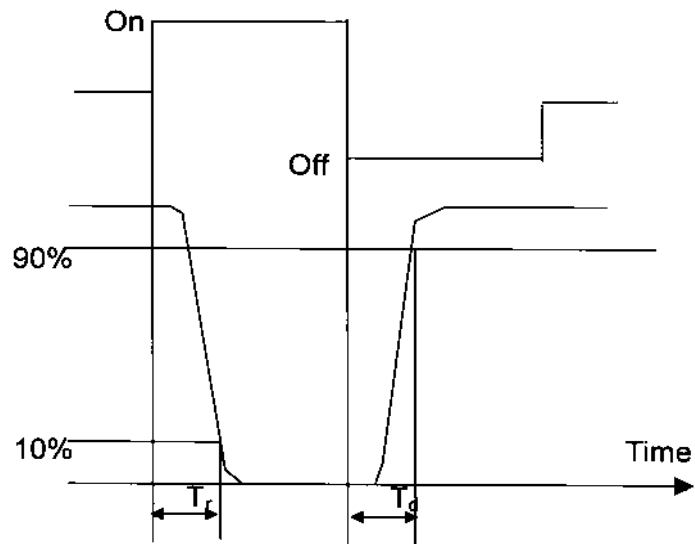
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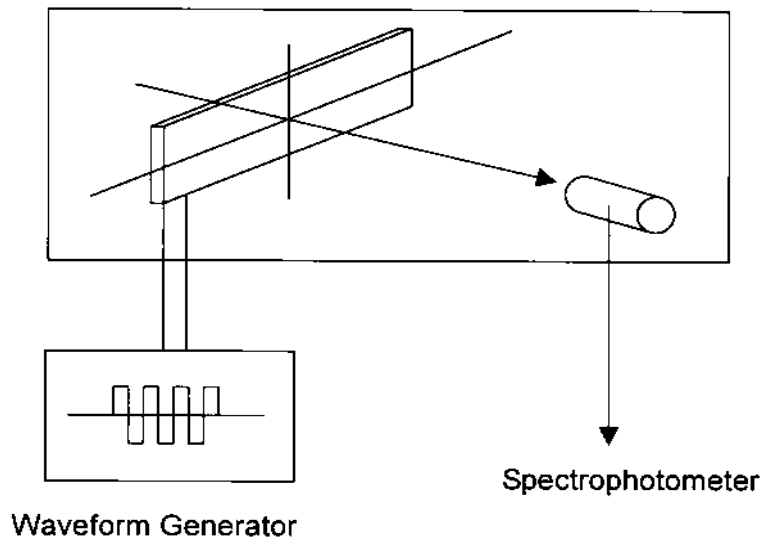
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B. Response Time



2. Contrast Measuring

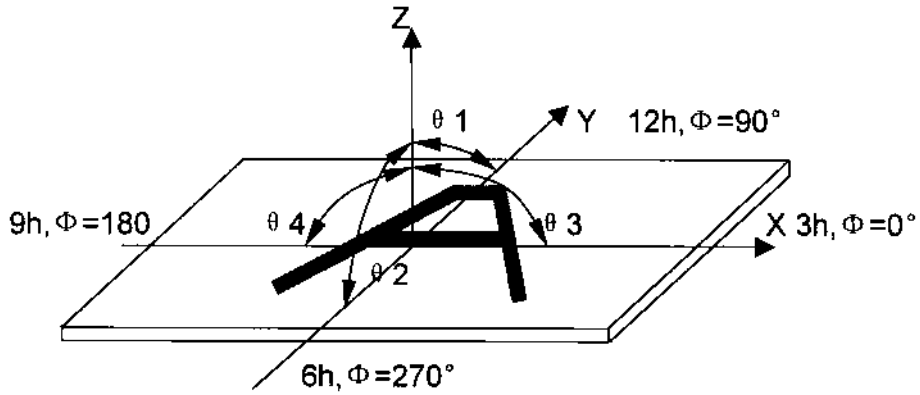
(1) Equipment



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(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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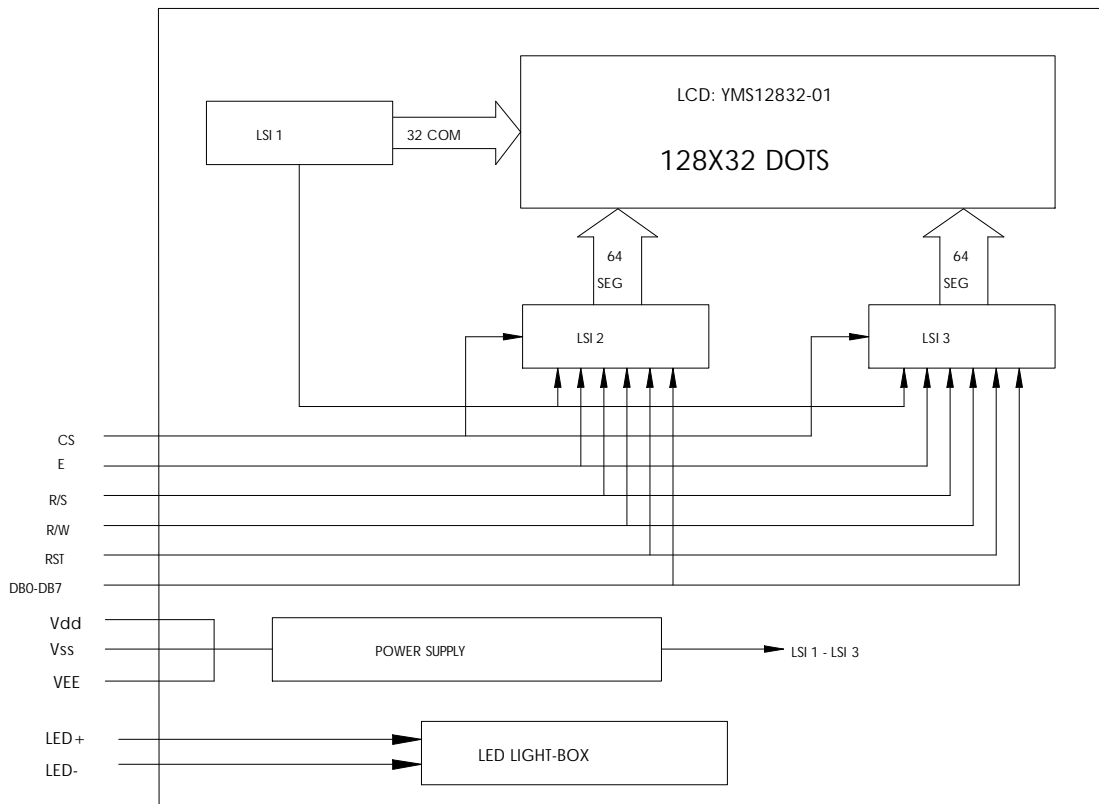
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4. Block Diagram



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-

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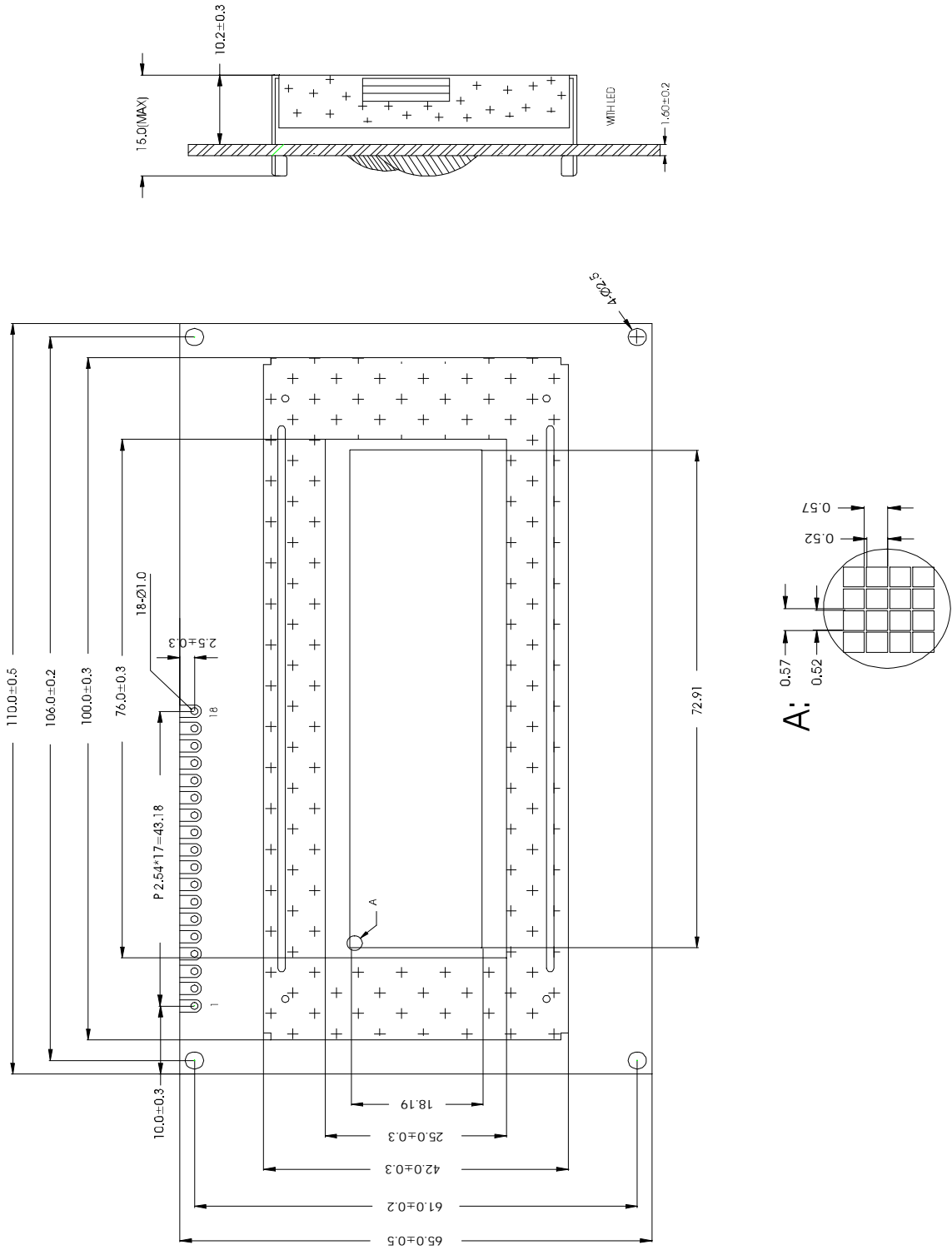
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5. Drawing



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