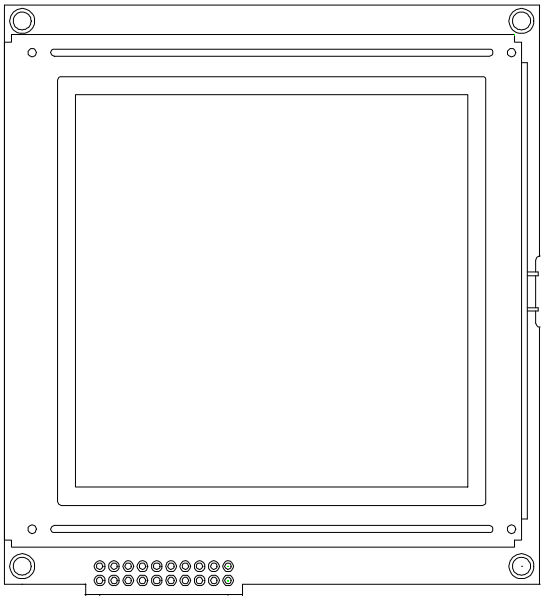
HANTRONIX

PRODUCT SPECIFICATION

HDM128GS12-4

128 x 128 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JK	**REV.:** 1.0	HDM128GS12-4	SHEET 1 OF 14 **DATE:** 9/18/03

Ⅰ. General Specifications

1. General

The HDM128GS12-4 dot matrix graphic LCD module consist of liquid crystal display CMOS common driver and CMOS segment driver, a STN LCD, a White EL Backlight.

2. Features

A. 64 Bits Shift Register to Internal LCD Circuit.
B. Display Data Is Stored In Display Data Ram From MPU
C. High Voltage CMOS Process.
D. Drive Method:1/128 Duty, 1/12 Bias
E. The Module Operating Voltage: 5V;
F. The LCD Operating Voltage : 17.8V;
G. Viewing Direction: 6:00H or 12:00H
H. Operating Temperature: 0℃~50℃
I. Storage Temperature: -20℃~70℃
J. The Connector Method Between LCD And PCB: Zebra; Heat-Seal

3.Mechanical Data:

(1) Module Size ---------- 75.0 l * 82.7 w mm
(2) Viewing Area ---------- 60.0 l * 60.1 w mm
(3) Dot Size ---------- 0.40 w * 0.40 h mm
(4) Dot Quality---------- 128 * 128

4.Pin Connections:

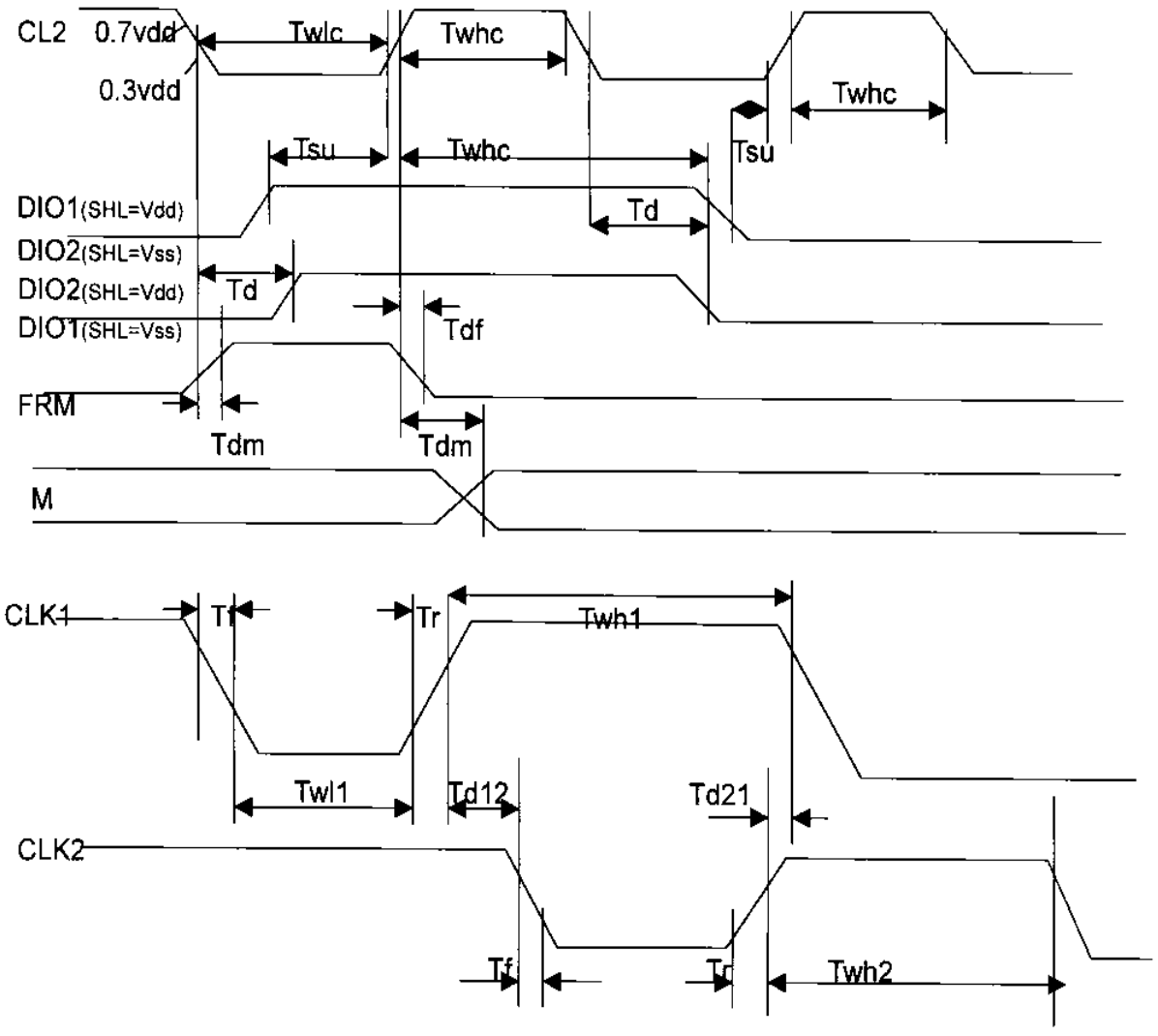
Pin No.	Symbol	Function
1	VDD	Logic Supply Voltage(+5.0V)
2	VSS	Ground(0v)
3	VEE	LCD Driver Voltage Input(+17.8V)
4-11	DB0~DB7	Data Bus Line
12	Cs1	Chip Selection(Segment Driver 1)
13	Cs2	Chip Selection(Segment Driver 2)
14	RST	Reset Signal
15	R/W	Read/Write Select
16	D/I	Data Or Instruction
17	E	Enable Signal
18	VSS	Ground
19-20	EL	EL Backlight

5.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	--	--	ns
Clk2-Clk1 Phase Difference	Td21	700	--	--	
Clk1,Clk2 Rise/Fall Time	Tr/Tf	--	--	150	



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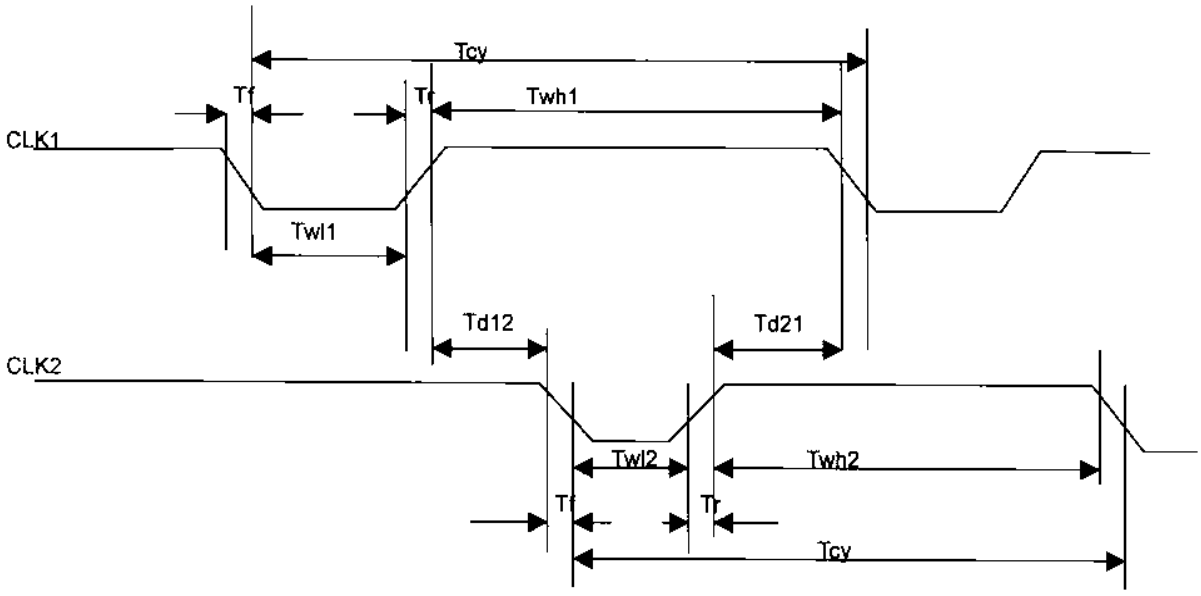
(2) Segment Driver:

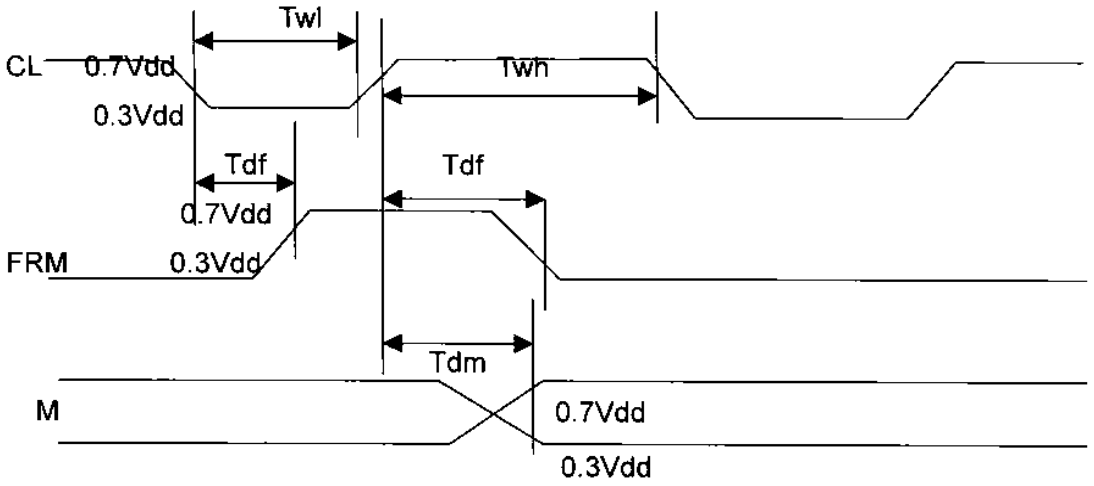
A. Clock Timing:

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	



B.Display Control Timing

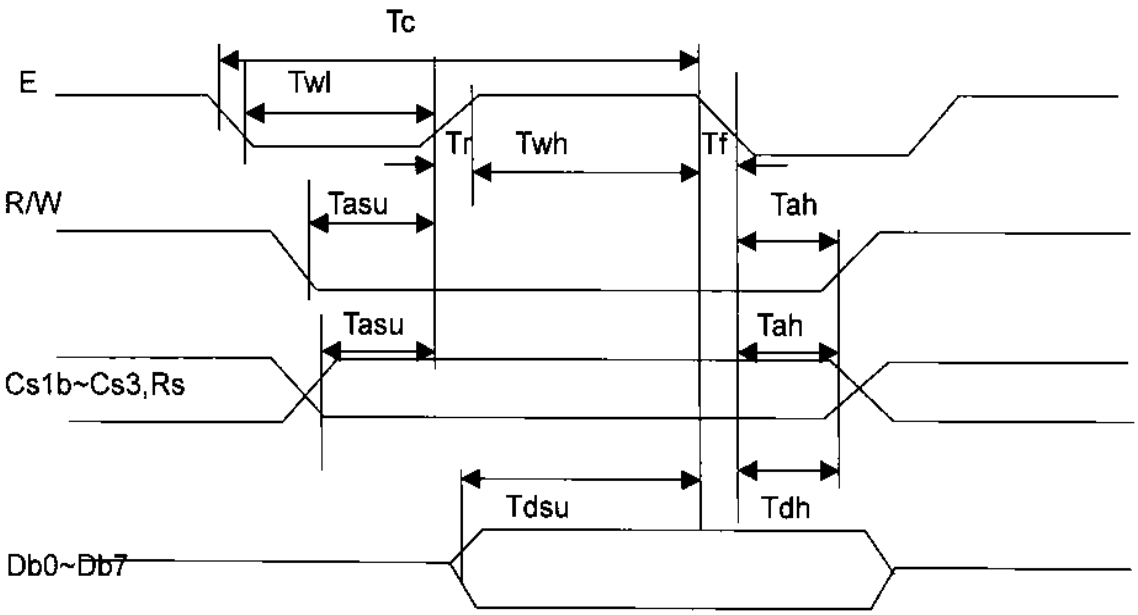
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Frm Delay Time	Tdf	-2	--	+2	μs
M Delay Time	Tdm	-2	--	+2	μs
Cl"Low" Level Width	Twl	35	--	--	μs
Cl"High"Level Width	Twh	35	--	--	μs



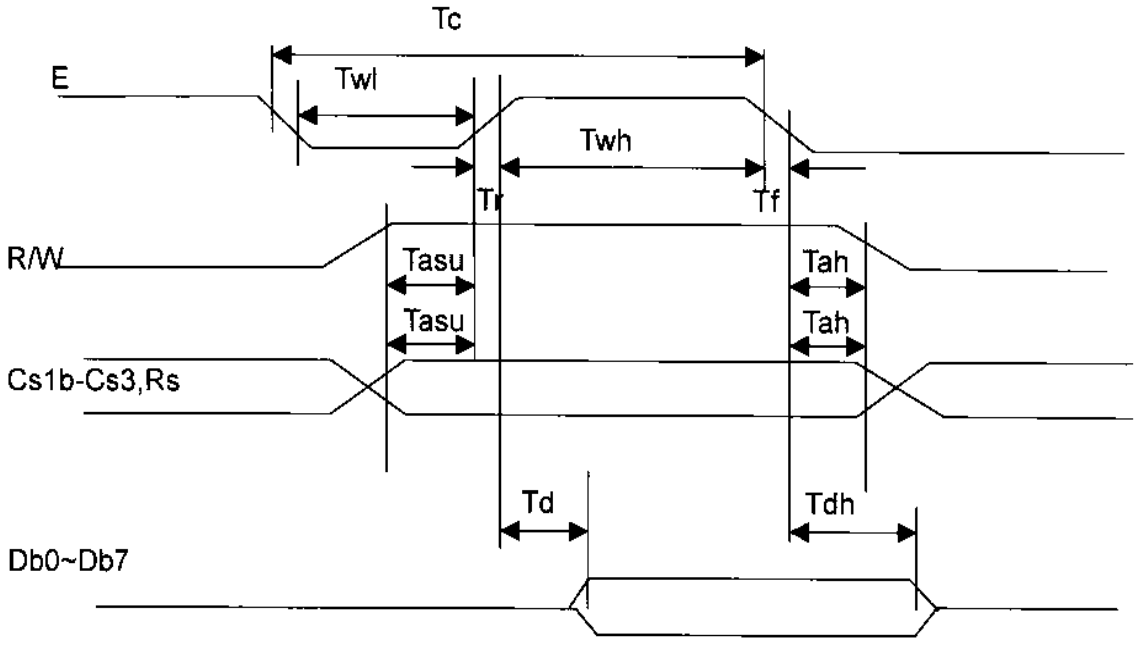
C.Mpu Interface:

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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Ⅱ.The Characteristics and The Reliability Test

1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)℃ Hum=(70±5)%RH

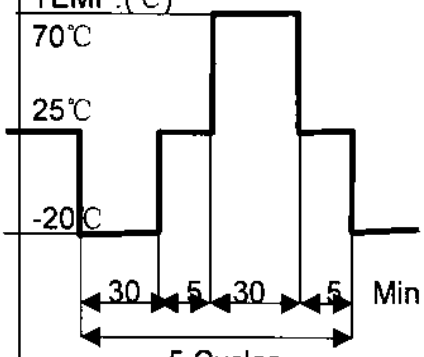
V_{dd}: 5.0V F_{osc}: 450KHZ

NO	Item		Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)		Vdd-Vss		5.0		V	
2	Supply Current (Logic)		Idd		2.27		mA	Vdd=5V
3	LCD Operating Voltage		Vdd-V_0		17.8		V	25℃
4	Response Time		Ton		95		ms	
			Toff		107		ms	
5	Contrast		CR	3				
6	Viewing Angel	12H	θ 1		24		Deg.	(CR≥3.0)
		6H	θ 2		37			
		3H	θ 3		45			
		9H	θ 4		45			
7	LCD Threshold Voltage		Vth		1.82		V	25℃

3. Electrical-optical Characteristics(EL unit):

Ltem	Min	Typ	Max	Unit	Condition
Input voltage		100	150	AC Vrms	
Current consumption		0.12	0.17	mA/cm^2	400HZ 100Vrms
Luminous	45	55		cd/m^2	400HZ 100Vrms
Input frequency		400	1000	Hz	Sine wave

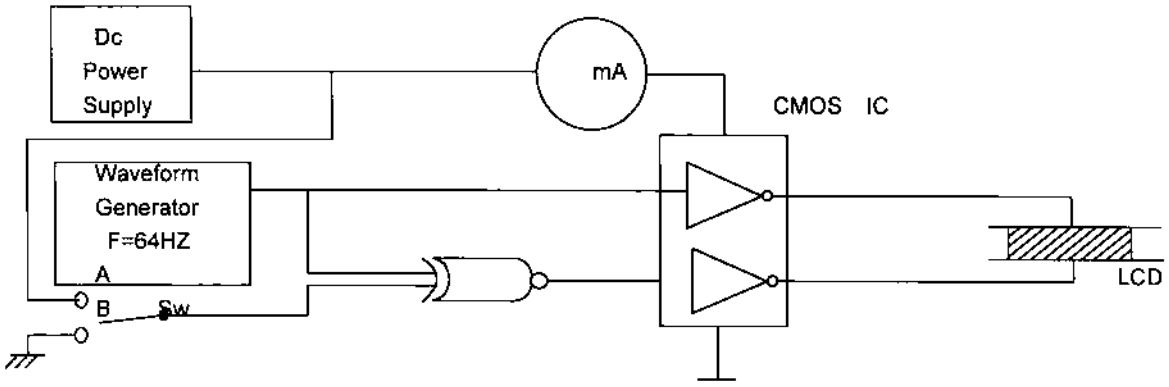
2.Reliability Test

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

Ⅲ.The LCD Measuring Method and Equipment

1. Current Consumption Measuring

   (1) Equipment



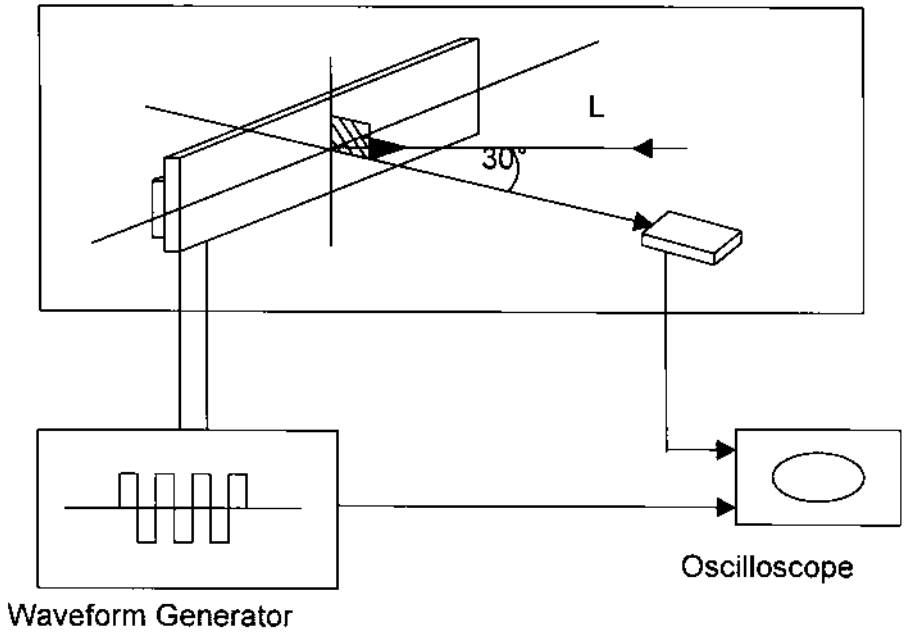
   (2) Condition

   Operating Frequency: 128HZ

   Operating Voltage (RMS): Selected Voltage

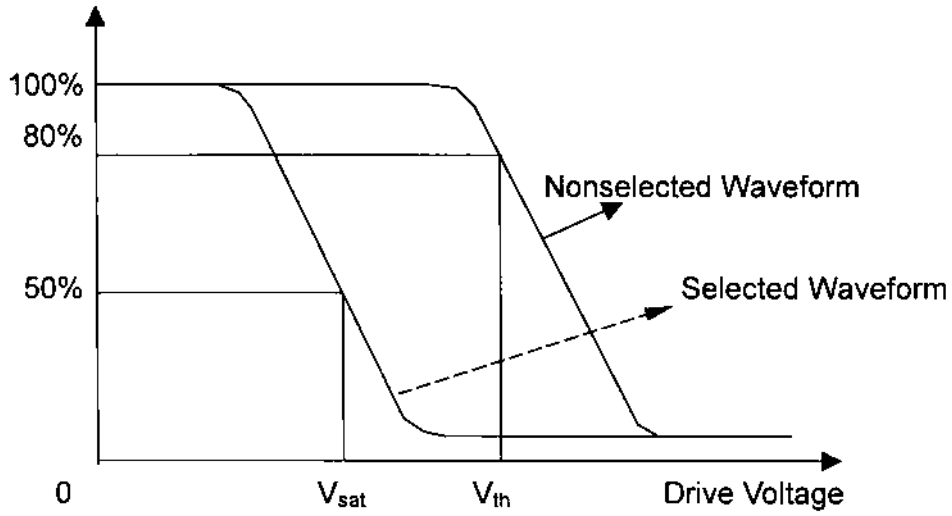
2. Threshold Voltage and Response Time Measuring

   (1) Equipment

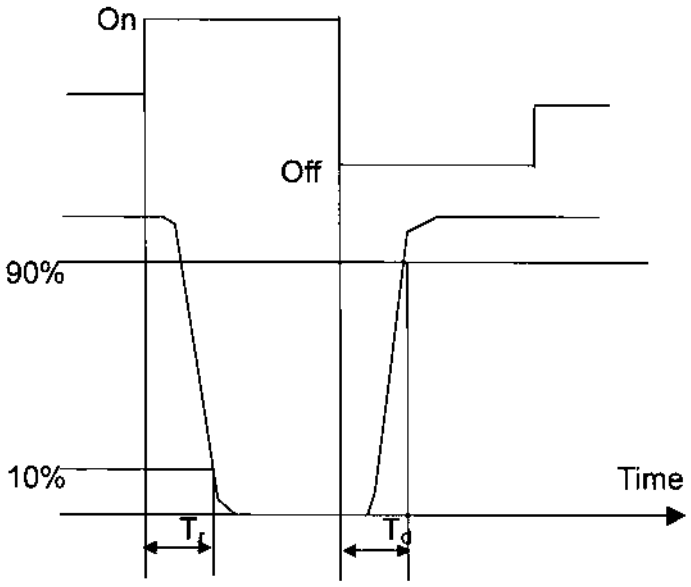


(2) Definition

A. Threshold Voltage (V_{th})

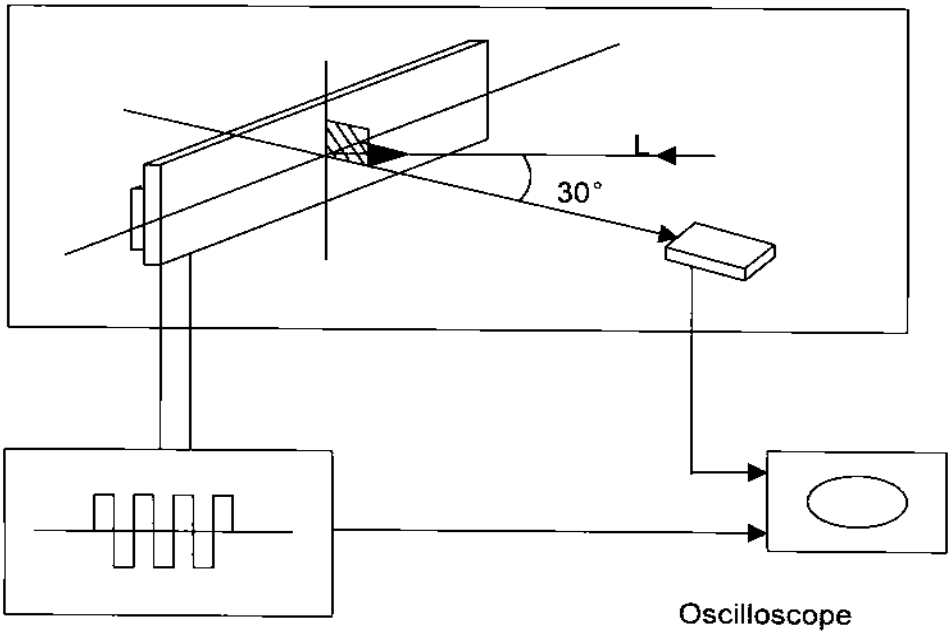


B. Response Time



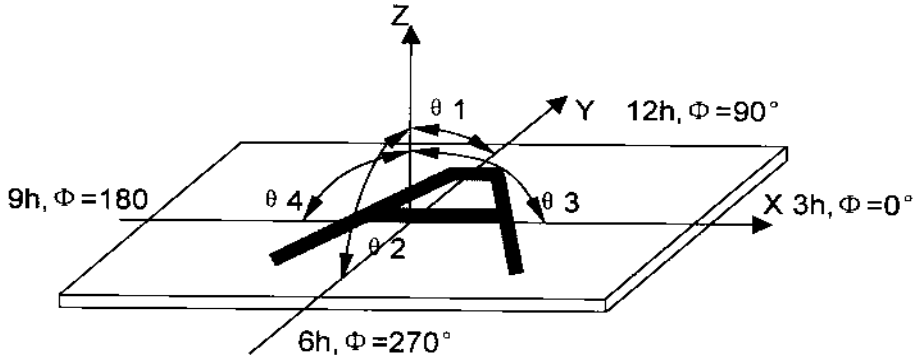
3. Contrast Measuring

(1) Equipment



(2)Definition:

A.Viewing Angle:



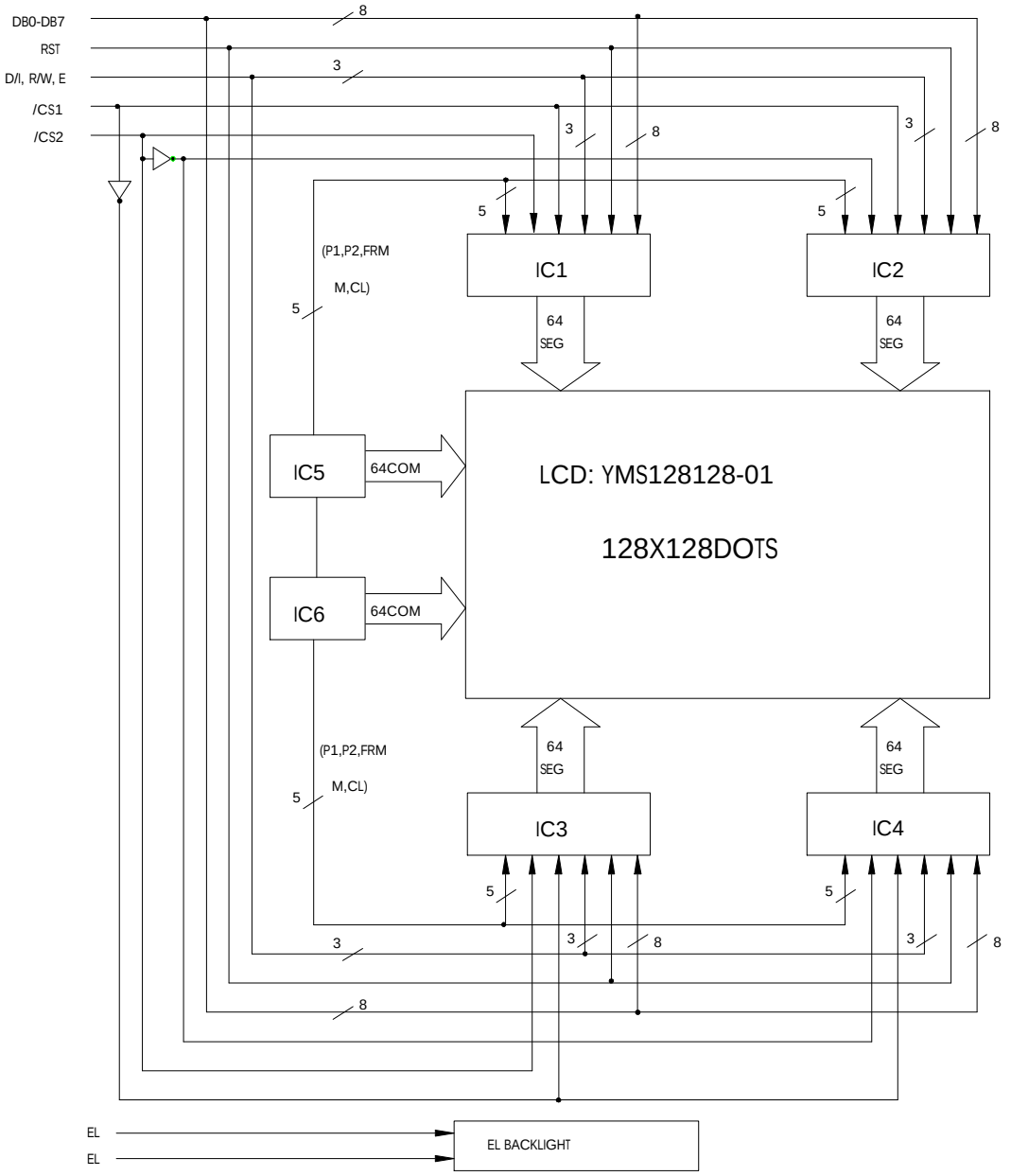
B. Contrast Ratio (Positive)

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

4. Reliability Test:

Equipment : TENNY

IV. Block Diagram



COMMON DRIVER: KS0107B or EQUIV

SEGMENT DTIVER: KS0108B or EQUIV

*PIN DESCRIPTION

NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PIN	VDD	VSS	VEE	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	$\overline{CS1}$	$\overline{CS2}$	$\overline{RST}$	R/$\overline{W}$	D/$\overline{I}$	E	VSS	E/L	E/L

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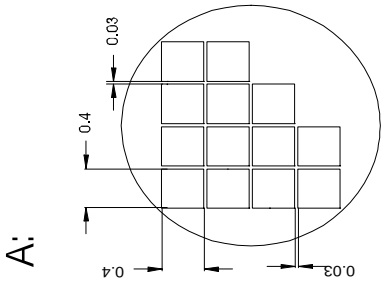
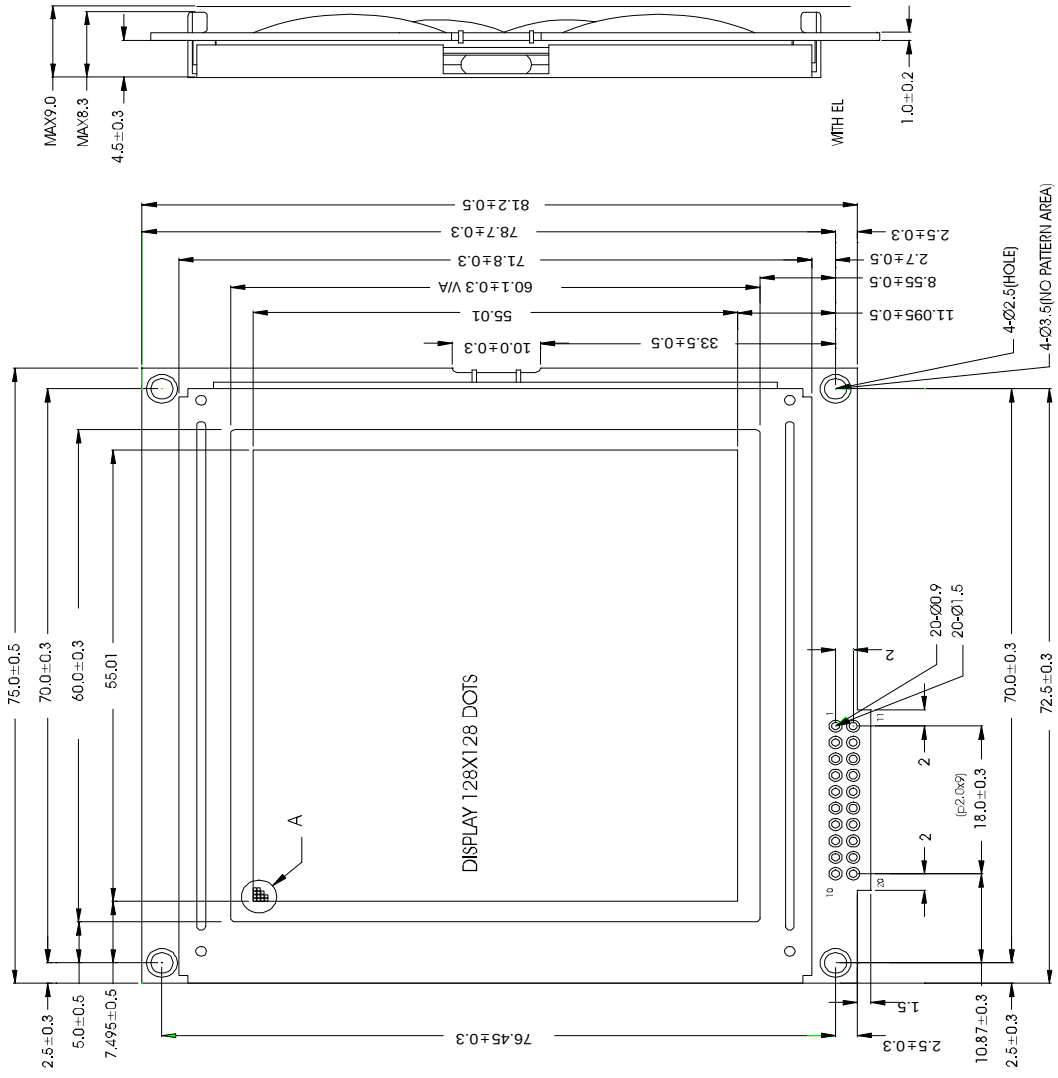
V. Drawing





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