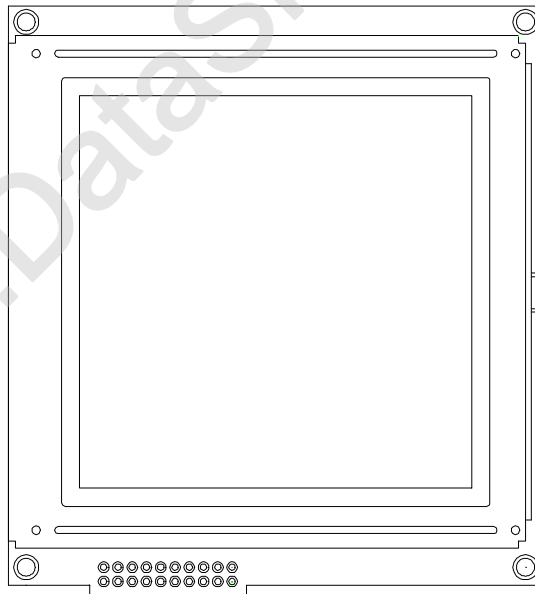


HANTRONIX

PRODUCT SPECIFICATION

HDM128GS12-4

128 x 128 GRAPHICS
LCD DISPLAY MODULE



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

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JK	REV.: 1.0	HDM128GS12-4	SHEET 2 OF 14
				DATE: 9/18/03

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	
CI2 Low Level Width	Twlc	35	--	--	
CI2 High Level Width	Twhc	35	--	--	ns
CIk1 Low Level Width	Twl1	700	--	--	
CIk2 Low Level Width	Twl2	700	--	--	
CIk1 High Level Width	Twh1	2100	--	--	

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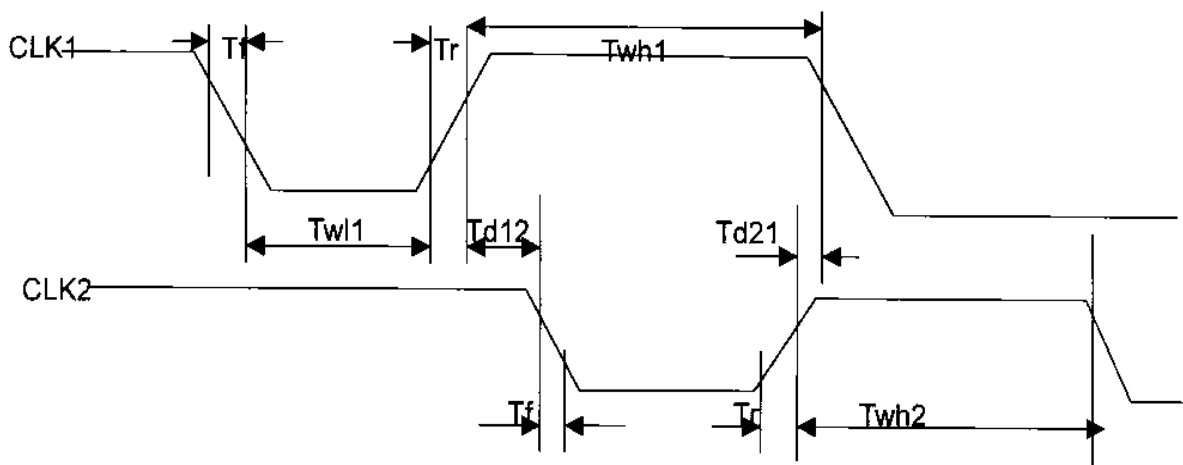
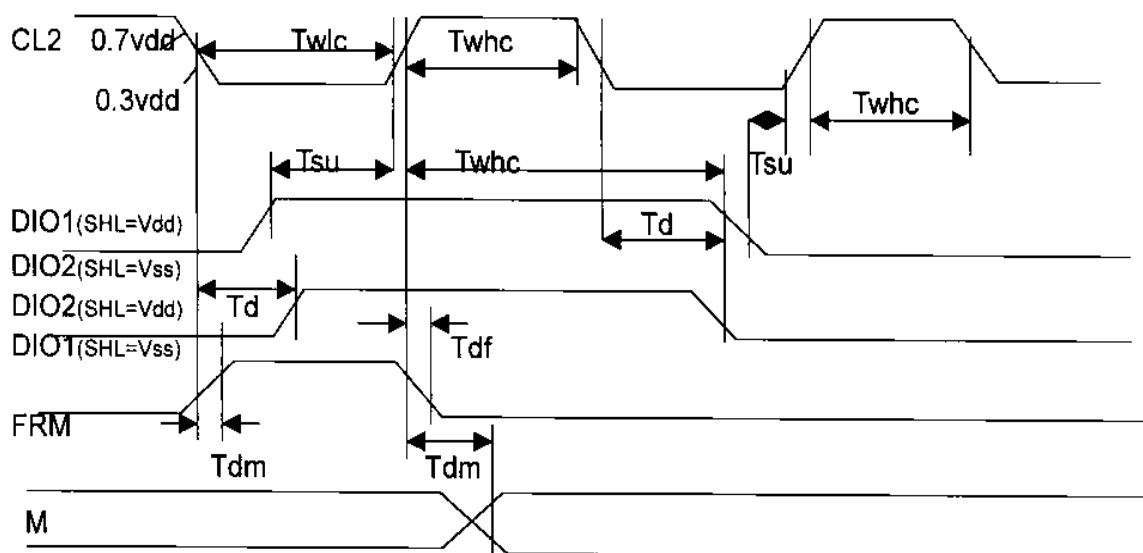
REV.:
1.0

HDM128GS12-4

SHEET 3 OF 14

DATE:
9/18/03

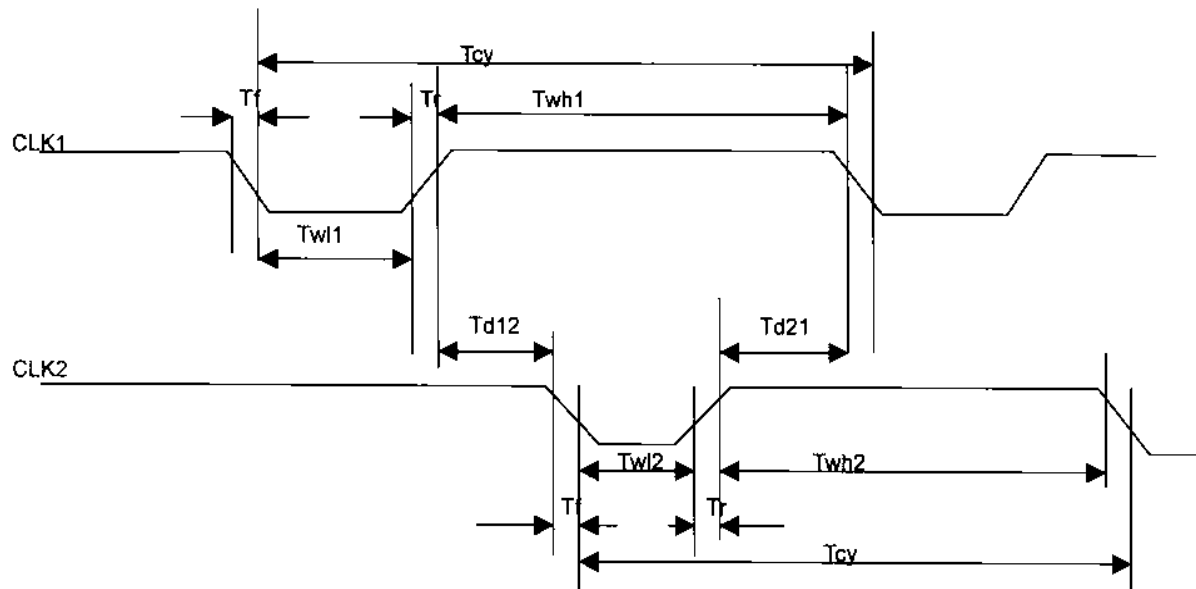
Clk2 High Level Width	Twh2	2100	--	--	ns
Clk1-Clk2 Phase Difference	Td12	700	--	--	
Clk2-Clk1 Phase Difference	Td21	700	--	--	
Clk1,Clk2 Rise/Fall Time	Tr/Tf	--	--	150	



(2) Segment Driver:

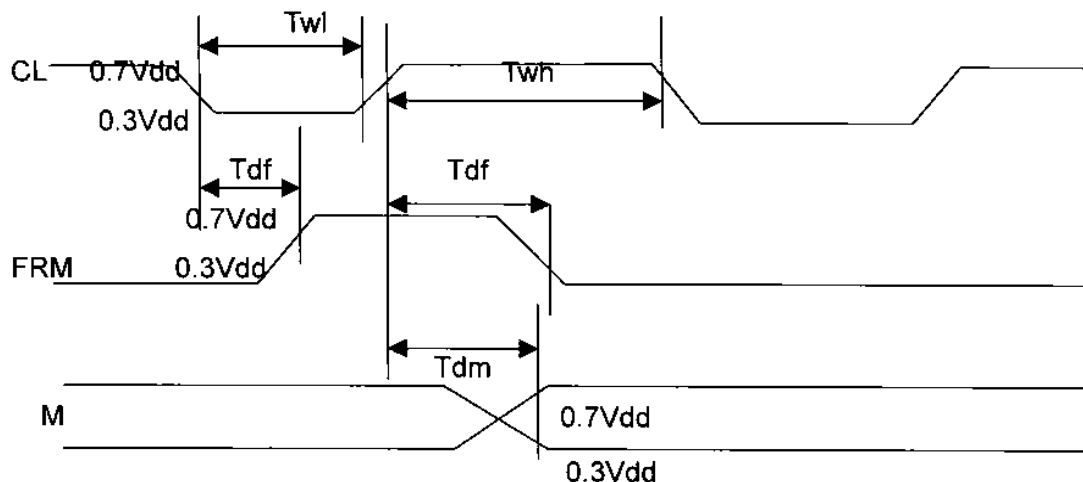
A. Clock Timing:

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

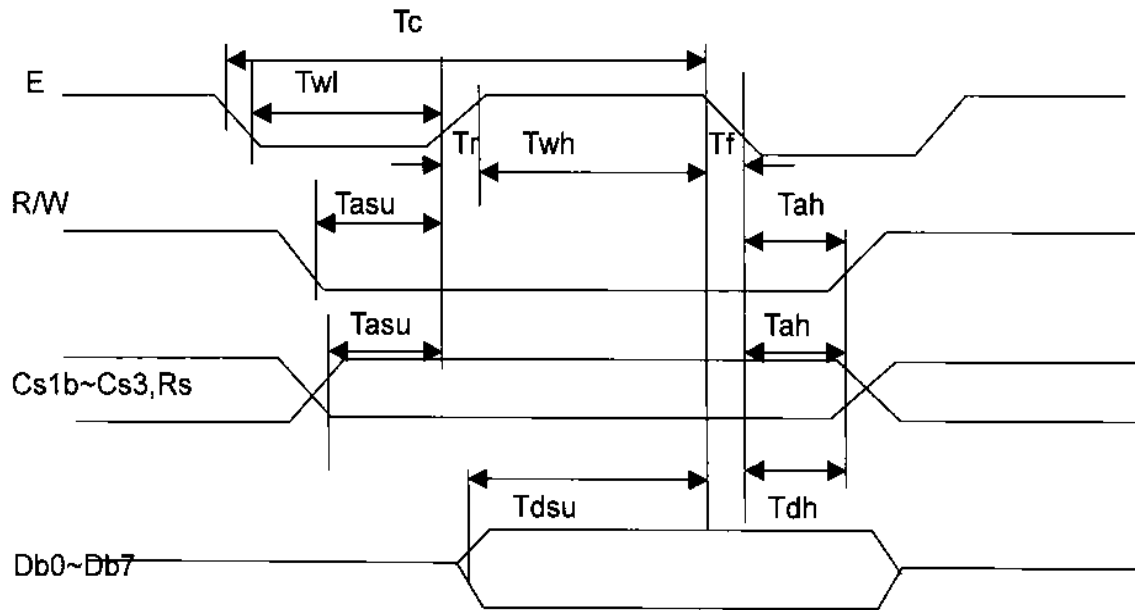
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Frm Delay Time	Tdf	-2	--	+2	μ s
M Delay Time	Tdm	-2	--	+2	μ s
CL"Low" Level Width	Twl	35	--	--	μ s
CL"High" Level Width	Twh	35	--	--	μ s



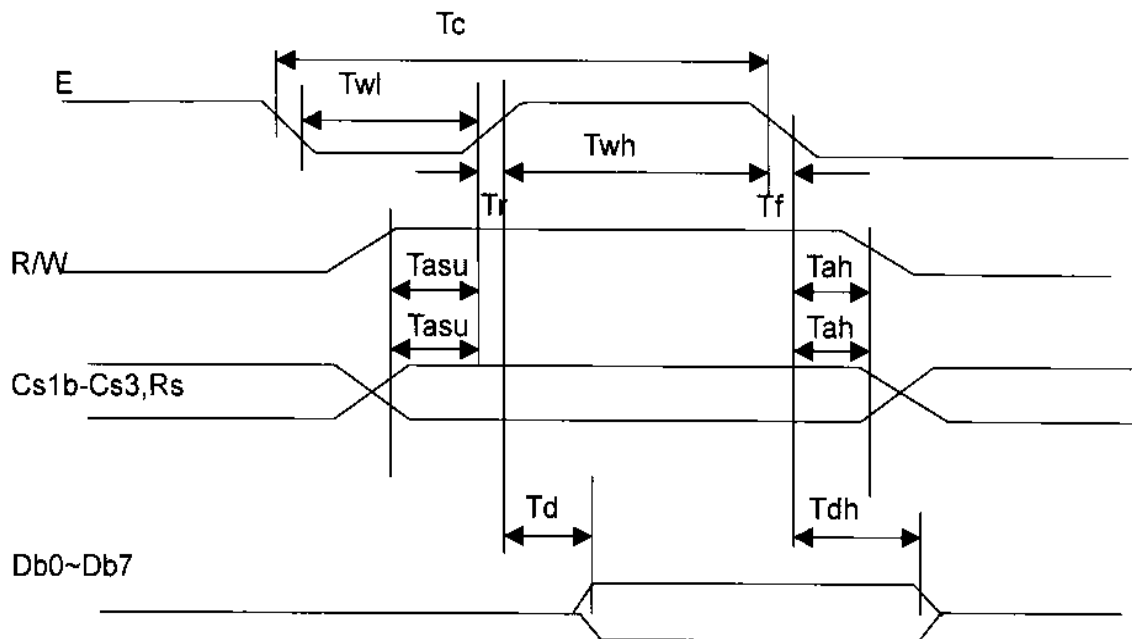
C. Mpu Interface:

Characteristic	Symbol	Min.	Typ.	Max.	Unit
E Cycle	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:



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

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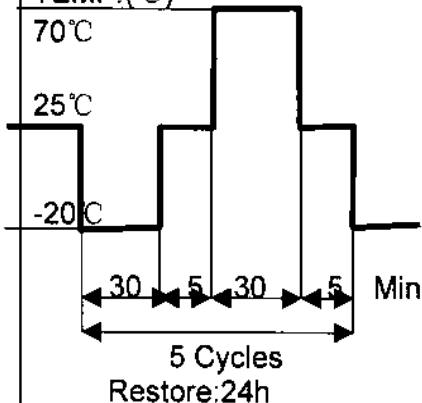
REV.:
1.0

HDM128GS12-4

SHEET 8 OF 14

DATE:
9/18/03

2. 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	TEMP: ($^\circ\text{C}$)  The diagram shows a thermal shock profile with three cycles. The temperature levels are 25°C, 70°C, and -20°C. The dwell times are 30 minutes at 25°C, 5 minutes at 70°C, 30 minutes at -20°C, and 5 minutes at 70°C. The total time for 5 cycles is indicated as 5 Cycles. The restore time is 24h.	Tenny	Passed

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REV.:
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HDM128GS12-4

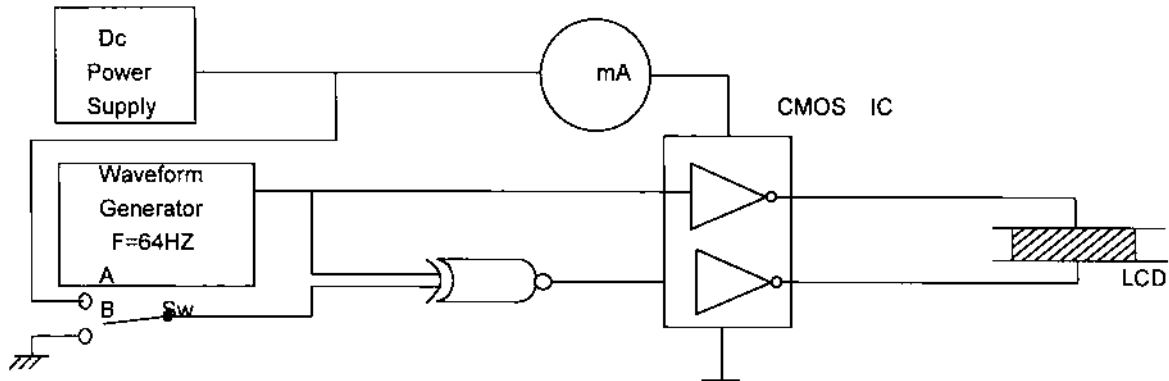
SHEET 9 OF 14

DATE:
9/18/03

III. The LCD Measuring Method and Equipment

1. Current Consumption Measuring

(1) Equipment



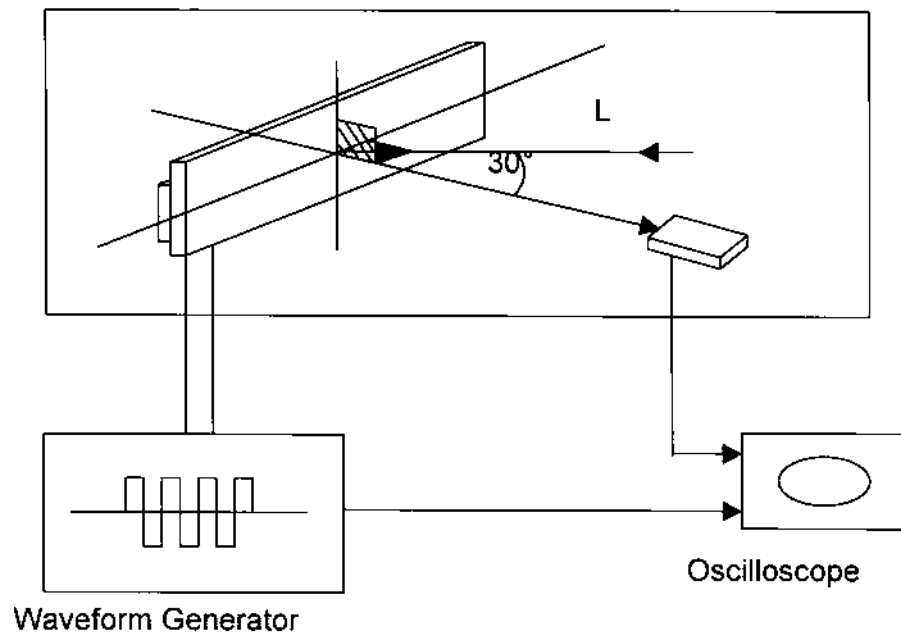
(2) Condition

Operating Frequency: 128HZ

Operating Voltage (RMS): Selected Voltage

2. Threshold Voltage and Response Time Measuring

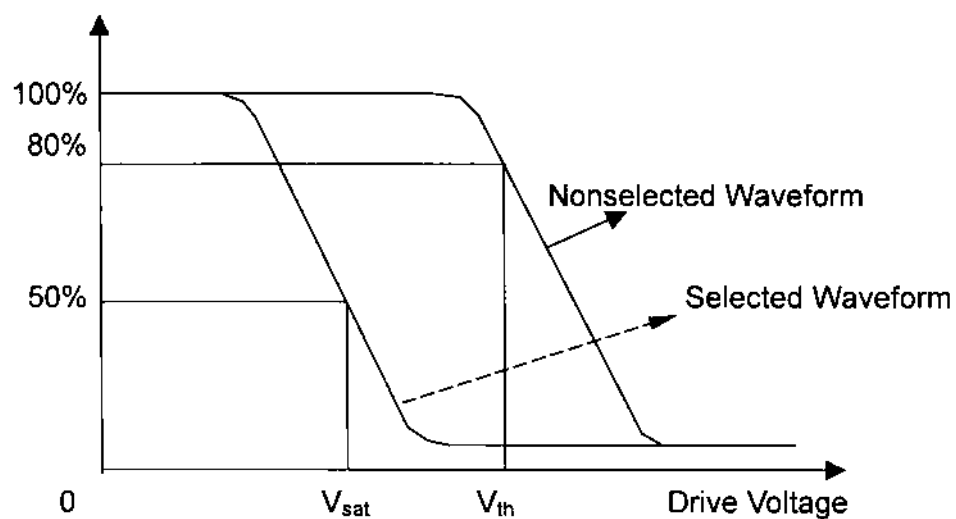
(1) Equipment



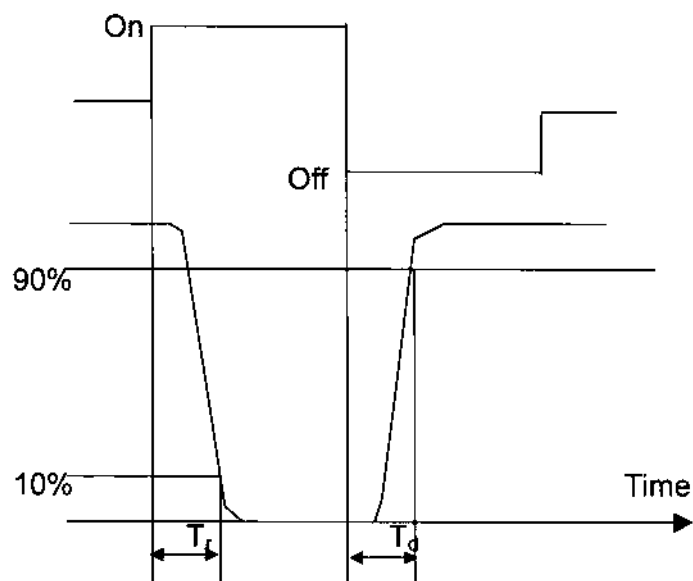
(2) Definition

A. Threshold Voltage (V_{th})

Brightness



B. Response Time



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REV.:
1.0

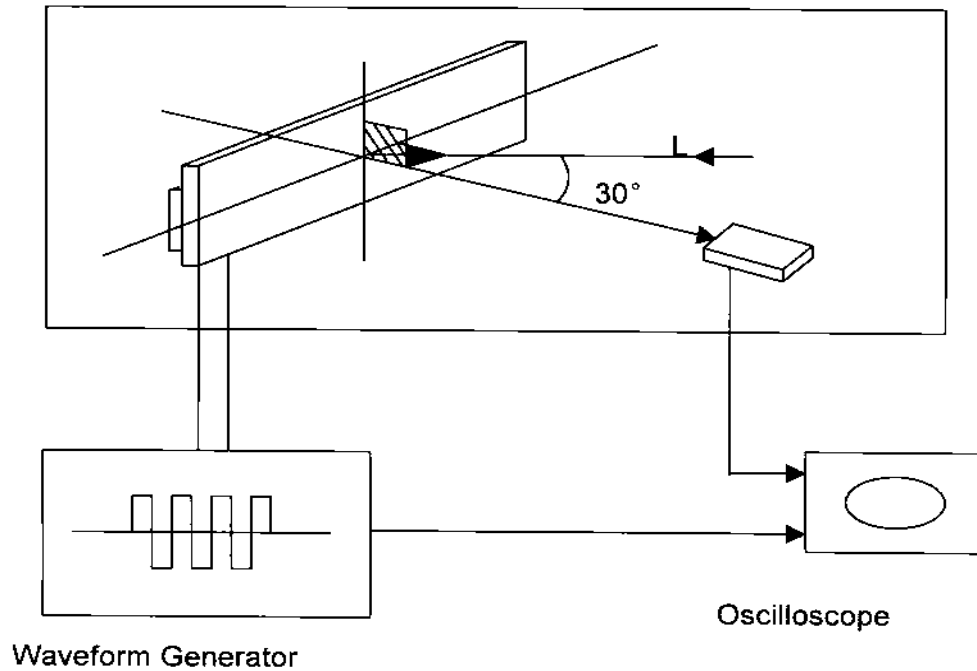
HDM128GS12-4

SHEET 11 OF 14

DATE:
9/18/03

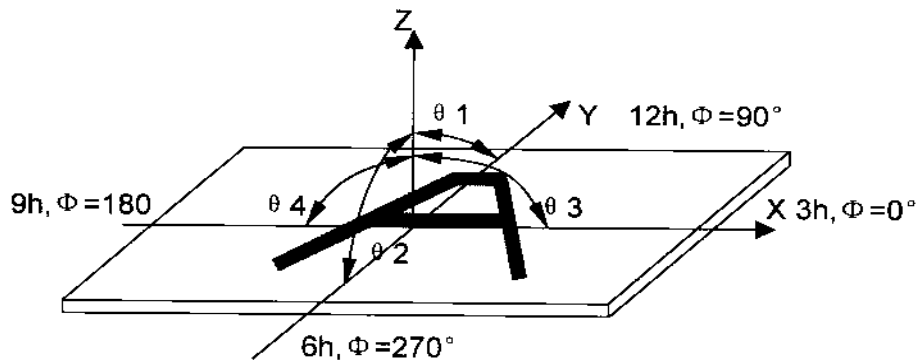
3. Contrast Measuring

(1) Equipment



(2) Definition:

A. Viewing Angle:



B. Contrast Ratio (Positive)

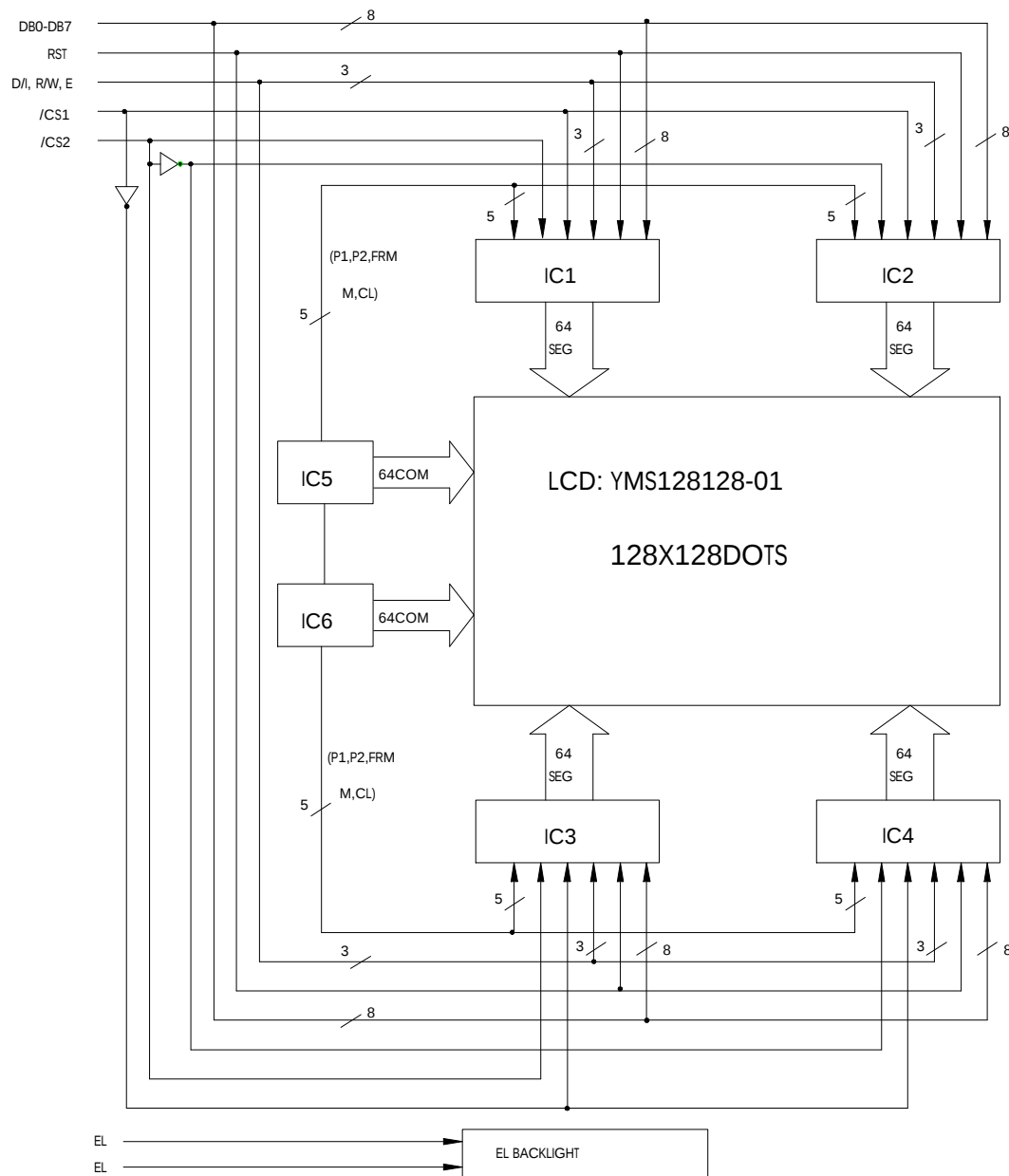
$$CR = \frac{\text{Brightness of non-selected wave-form}}{\text{Brightness of selected wave-form}}$$

4. Reliability Test:

Equipment : TENNY

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JK	REV.: 1.0	HDM128GS12-4	SHEET 12 OF 14 DATE: 9/18/03
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IV. Block Diagram



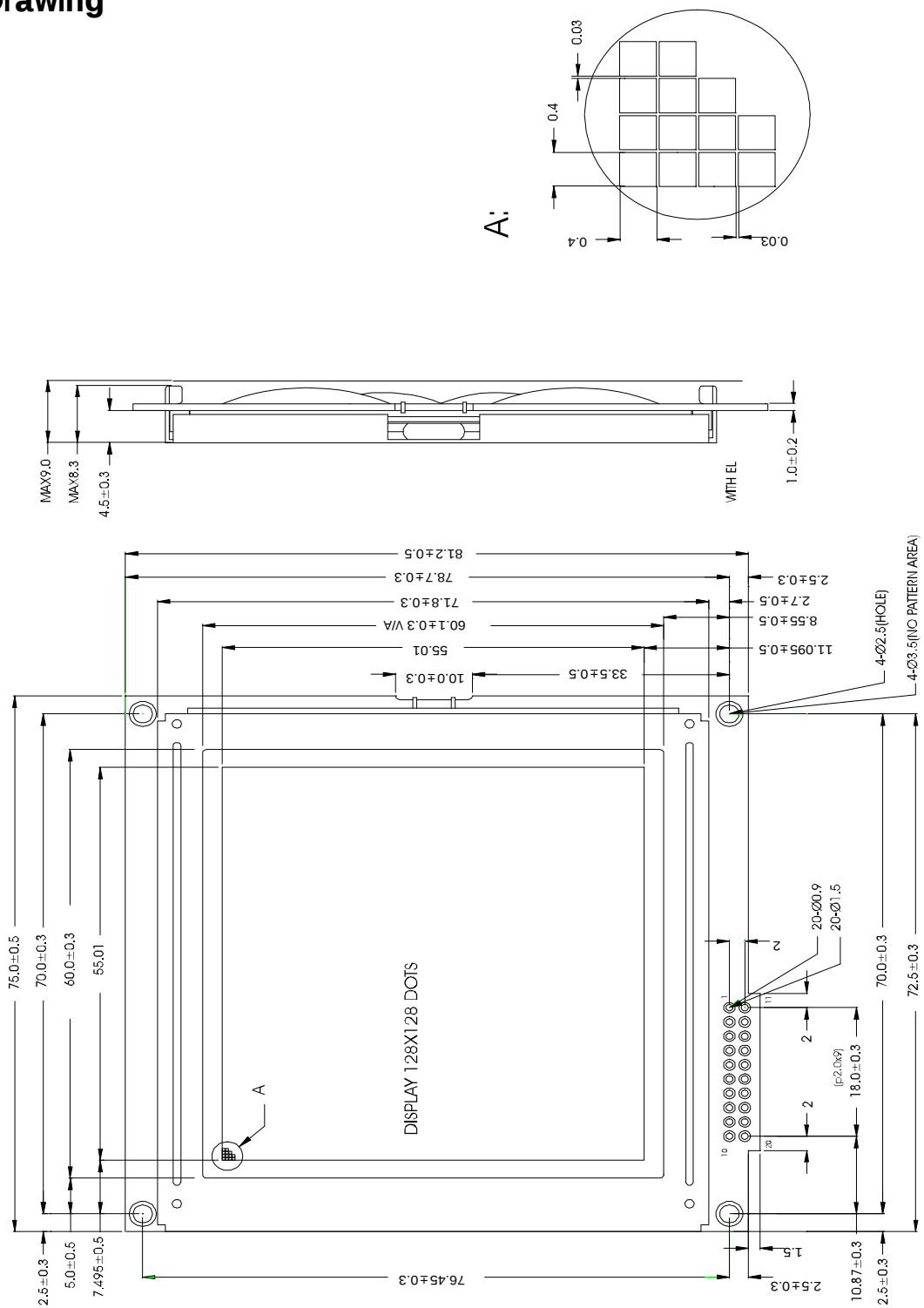
COMMON DRIVER: KS0107B or EQUIV

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	CS1	CS2	RST	R/W	D/I	E	VSS	E/L	E/L

V. Drawing



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REV.:
1.0

HDM128GS12-4

SHEET 14 OF 14

DATE: 9/18/03