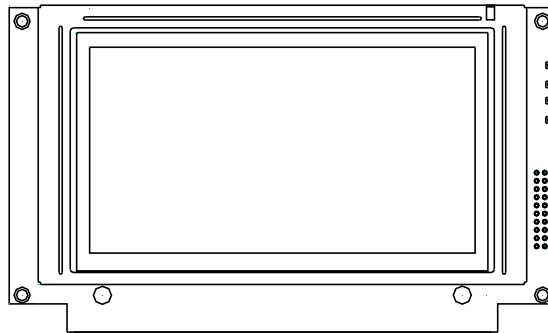




PRODUCT SPECIFICATION

HDM128GS24L-1

240 x 128 MONOCHROME GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC.
10080 BUBB RD.
CUPERTINO, CA 95014

Q.A.:

ZW

REV:

1.0

HDM128GS24L-1

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DATE:

12/10/07

.General Specifications

1.The Features

- (1). Low power consumption 5.0V power supply
- (2). 1/128 duty,1/13 bias
- (3). Viewing direction: 6:00
- (4). Operating tempration: -20~70 ° C
- (5). Storage tempration: -30~85 ° C
- (6). Display type: STN , Negative

2.Mechanical Data and Conditions:

- (1) Number of Characters----- 240 Dots * 128 Dots Graphic LCD Module
- (2) Module Size-----170.0 w * 101.5 h mm
- (3) Viewing Area ----- 128.0 w * 74.0 h mm
- (4) Dot Size -----0.47 w * 0.47 h mm
- (5) Dot Pitch -----0.50 w * 0.50 h mm
- (6) Outline Dimensions-----See Attached Drawing

3. Absolute Maximum Ratings

Characteristics	Symbol	Ratings
Supply Voltage	VDD	-0.3V to +7.0V
Input Voltage	V _{IN}	-0.3V to V _{dd} +0.3V

4. Electrical Characteristics

Dc Characteristics

Test Conditions(Unless otherwise noted, Vss=0V, VDD=5.0V± 10% ,

Item	Symbol	Test Conditions	IMN	TYP	MAX	Unit	Pin Name
Operating Voltage	VDD		4.5	5.0	5.5	V	VDD
Input	H Level	VIH	Vdd-2.2		VDD	V	Input Pins
	L Level	VIL	0		0.8	V	Input Pins
Output	H Level	VOH	VDD-0.3		VDD	V	Output Pins
	L Level	VOL	0		0.3	V	Output Pins
Output	H Level	ROH	VOUT=VDD-0.5V		400	Ohm	Output Pins
	L Level	ROL	VOUT=0.5V		400	Ohm	Output Pins
Input Pull-Up Resistance	RPU		50	100	200	K Ohm	(Note 1)
Operating Frequency	Fosc			0.4	5.5	MHZ	

(Note 1) Applied /T1. /T2 /RESET

(Note 2) MDS=L, MD0=L, MD1=L, MD2=H, MD3=H, FS0=L, FS1 =L, /SDSEL=L, /DUAL=H, D7 to D0=LHLHLHLH

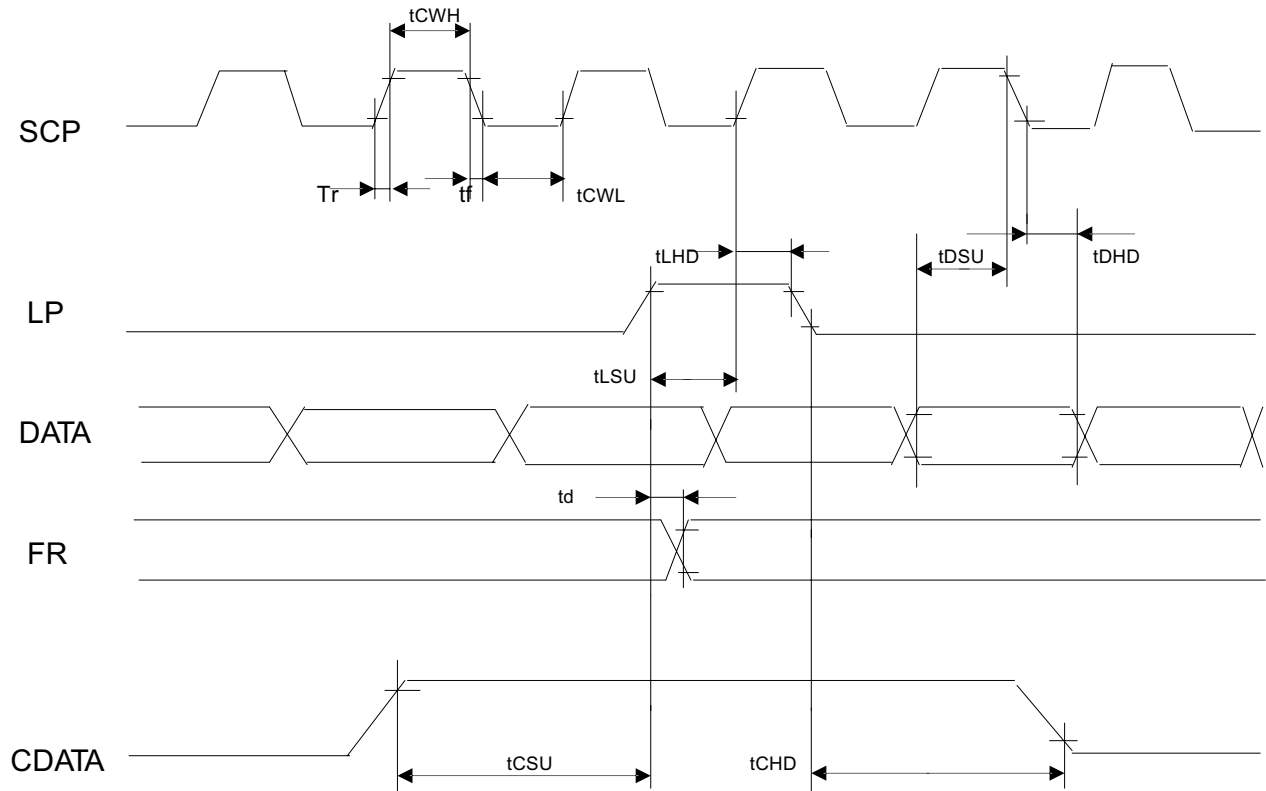
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5.Pin Connections:

PIN NO.	SYMBOL	FUNCTION
1	FG	FRAME GROUND(0V)
2	VSS	GROUND
3	VDD	POWER SUPPLY FOR LOGIC
4	VL	POWER SUPPLY FOR LCD DRIVING
5	WR	WRITE SIGNAL
6	RD	READ SIGNAL
7	CE	CHIP ENABLE SIGNAL
8	C/D	H: INSTRUCTION CODE, L: DATA
9	N/C	NO CONNECTION
10	RESET	RESET SIGNAL
11-18	DB0-DB7	DATA INPUT/OUTPUT
19	FS1	PINS FOR SELECTION OF FONT
20	RV	DISPLAY DATA REVERSE RV=H: REVERSE DISPLAY RV=L: NORMAL DISPLAY

6.AC Characteristics

Switching Characteristics (1)



Test conditions (unless otherwise noted, $V_{DD}=5.0V \pm 10\%$, $V_{SS}=0$)

Item	Symbol	Min.	Typ.	Max.	Unit
Operating frequency	f_{scp}	--	--	2.75	MHZ
SCP pulse width	t_{CWH}, t_{CWL}	150	--	--	ns
SCP rise/fall time	t_r, t_f	--	--	30	ns
LP set-up time	t_{LSU}	150	--	290	ns
LP hold time	t_{LHD}	5	--	40	ns
Data set-up time	t_{DSU}	170	--	--	ns
Data hold time	t_{DHD}	80	--	--	ns
FR delay time	t_d	0		90	ns
CDATA set-up time	t_{CSU}	450		850	ns
CDATA hold time	T_{CHD}	450		950	ns

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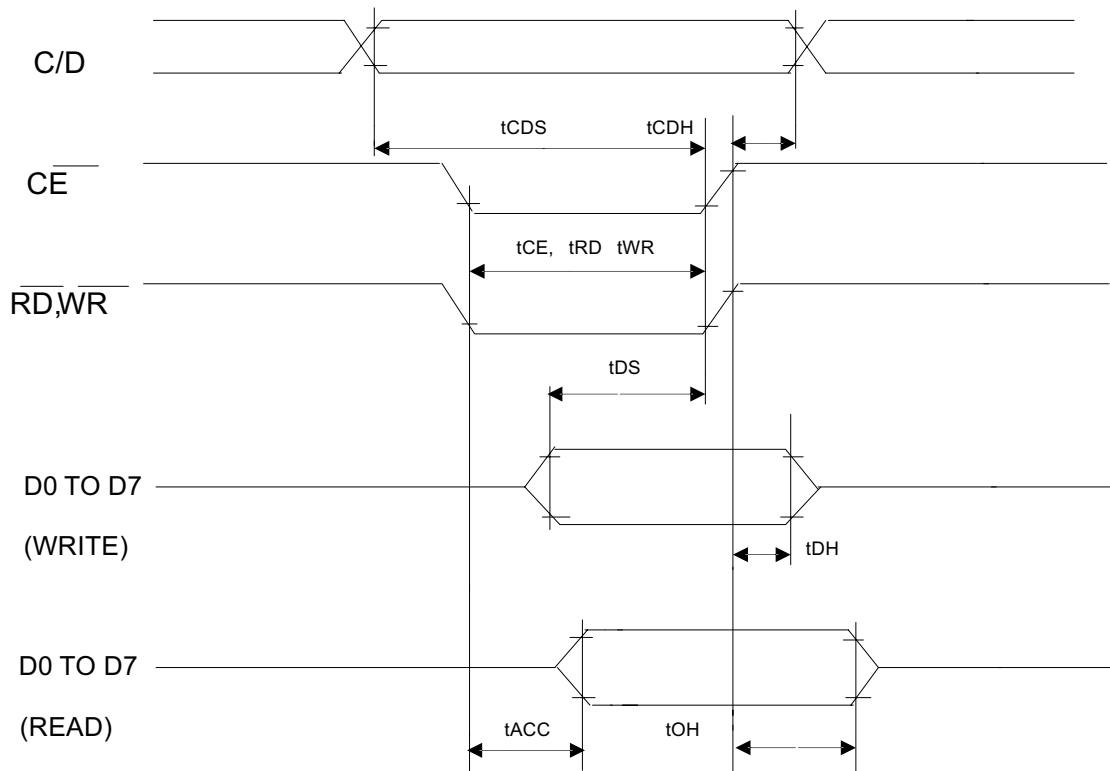
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Switching characteristics(2)

Bustiming

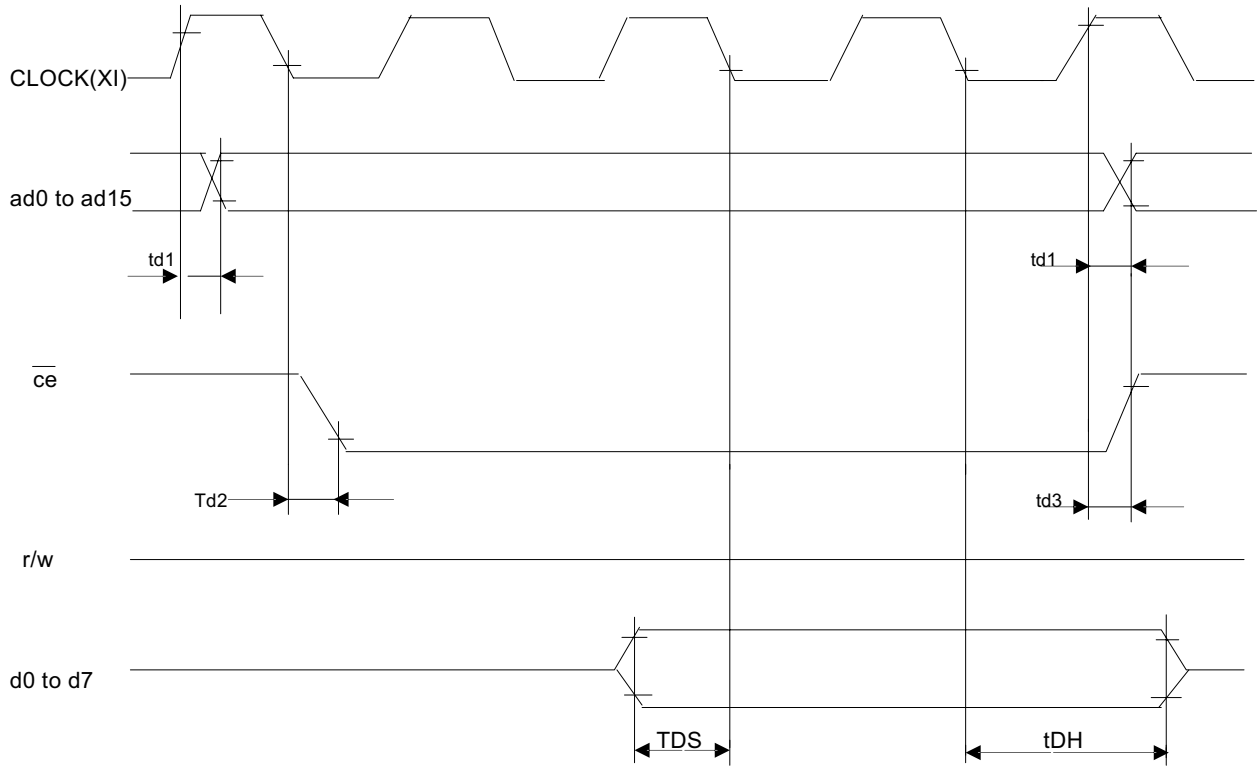


Test Conditions (Unless otherwise noted $V_{DD}=5.0V \pm 10\%$, $V_{SS}=0V$)

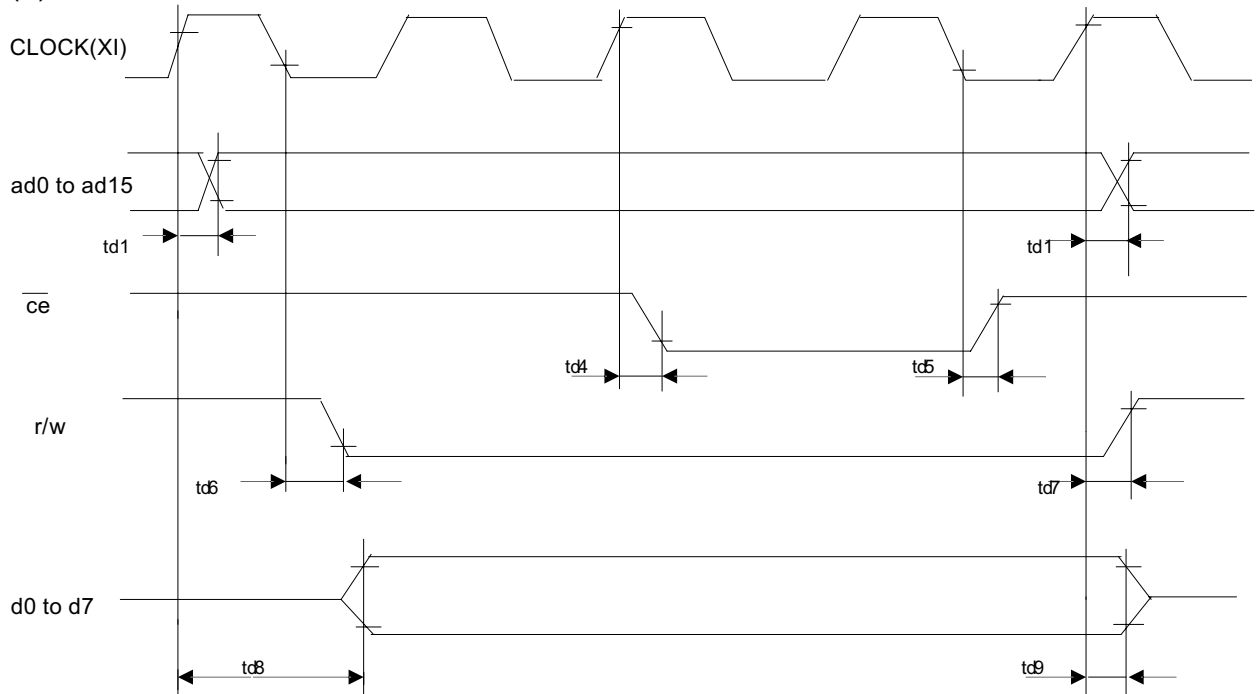
Item	Symbol	Min.	Typ.	Max.	Unit
C/D Set-up Time	t_{CDS}	100	--	--	nS
C/D Hold Time	t_{CDH}	10	--	--	nS
/CE,/RD,/WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	80	--	--	nS
Data Set-up Time	t_{DS}	80	--	--	nS
Data Hold Time	t_{DH}	40	--	--	nS
Access Time	t_{ACC}	--	--	150	nS
Output Hold Time	t_{OH}	10	--	50	nS

Switching characteristics (3)

(1) External RAM read mode



(2) External RAM write mode

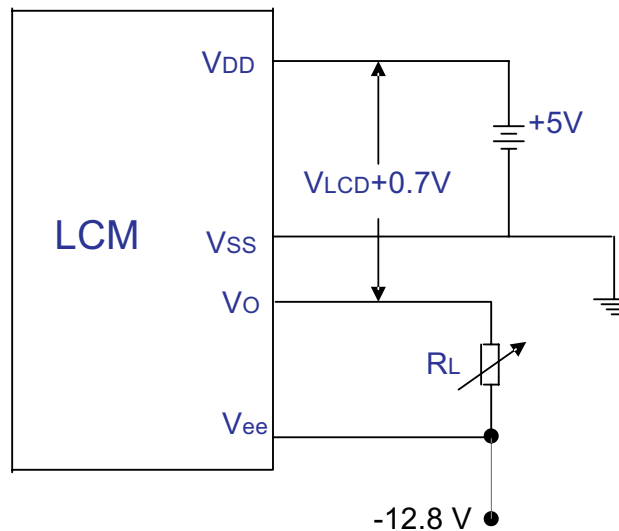


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Test Conditions (Unless otherwise noted ,VDD=5.0V± 10%, VSS=0)

Item	Symbol	Min.	Typ.	Max.	Unit
Address delay time	t_{d1}	--	--	250	nS
ce fall delay time(read)	t_{d2}	--	--	180	nS
ce rise delay time(read)	t_{d3}	--	--	180	nS
Data set-up time	t_{DS}	0	--	--	nS
Data hold time	t_{DH}	30	--	--	nS
ce fall delay time(write)	t_{d4}	--	--	200	nS
ce rise delay time(write)	t_{d5}	--	--	200	nS
r/w fall delay time	t_{d6}			180	nS
r/w rise delay time	t_{d7}			180	nS
Data stable time	t_{d8}			450	nS
Data hold time	t_{d9}			200	nS

7. Power Supply:



.The Characteristics and Reliability Test

1.Electro-Optic Characteristics:

Condition:TEMP=(23± 3) ° C 3)

NO	Item	Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)	Vdd-Vss	4.5	5.0	5.5	V	
2	LCD Operating Voltage	Vdd-V ₀		18.2		V	-20 °C
				17.8		V	25 °C
				17.4		V	70 °C
3	Response Time	Ton		188		ms	
		Toff		132		ms	
4	Contrast	CR	2				
5	Viewing Angel	12H	∅1		56		Deg. (CR≥2.0)
		6H	∅2		66		
		3H	∅3		60		
		9H	∅4		60		
6	LCD Threshold Voltage	Vth		16.8		V	25 °C

2. Characteristics of backlight

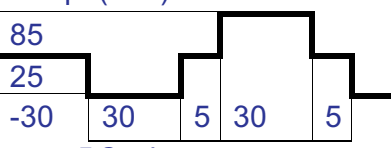
Item	Symbol	Min.	Typ	Max.	Unit	Condition
Forward Voltage	VF	2.9	3.2	3.5	V	IF=240mA
Forward Current	IF		240		mA	
Reverse Voltage	VR			5.0	V	EACH CHIP
Reverse Current	IR			10	uA	
Power Dissipation	PD		768		mW	IF=240mA
Color	WHITE					

WARNING:

A BACKLIGHT IS A KIND OF CURRENT DEVICE,IT MUST CONNECT A RESISTANCE FOR LIMITING CURRENT ,OR IT WILL BE DAMAGED.

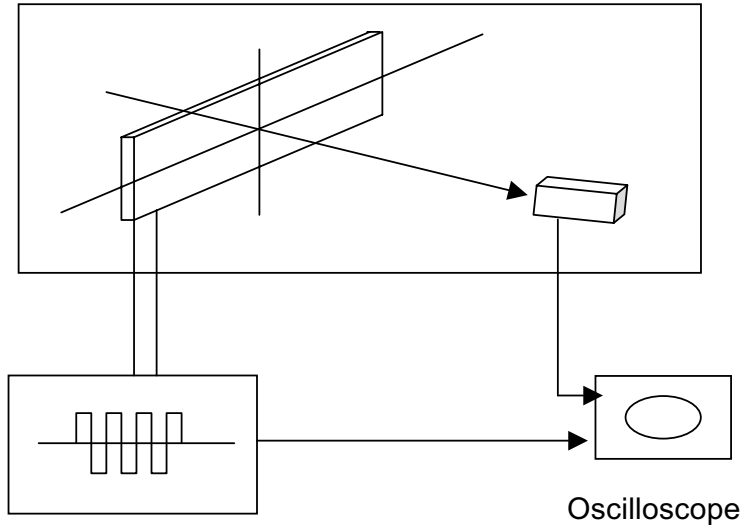
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2. Reliability Test

No	Items	Test Condition	Equipment	Test Result
1	High Temp Storage	Temp: 85 ± 2 ° C Time: 96h Restore: 24h	Tenny	Passed
2	Low Temp Storage	Temp: -30 ± 3 ° C Time: 96h Restore: 24h	Tenny	Passed
3	High Temp Static drive	Temp: 70 ± 2 ° C Vop: 5V Time: 24h Restore: 24h	Tenny	Passed
4	Low Temp Static drive	Temp: -20 ± 3 ° C Vop: 5V Time: 24h Restore: 24h	Tenny	Passed
5	High Temp High Hum Storage	Temp: 40 ± 2 ° C Hum: 95%Rh Time: 96h Restore: 24h	Tenny	Passed
6	Thermal Shock	Temp: (° C)  5 Cycles Restore: 24h	Tenny	Passed

The Equipment and LCD Measuring Method

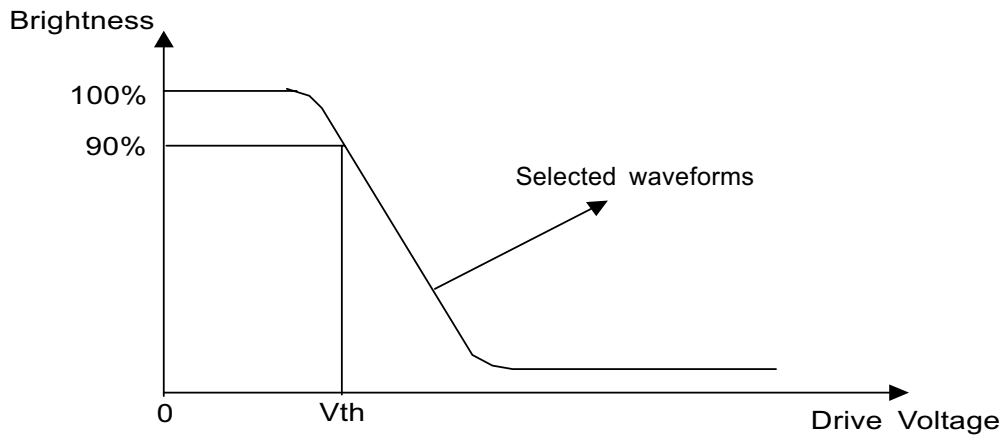
1. Equipment



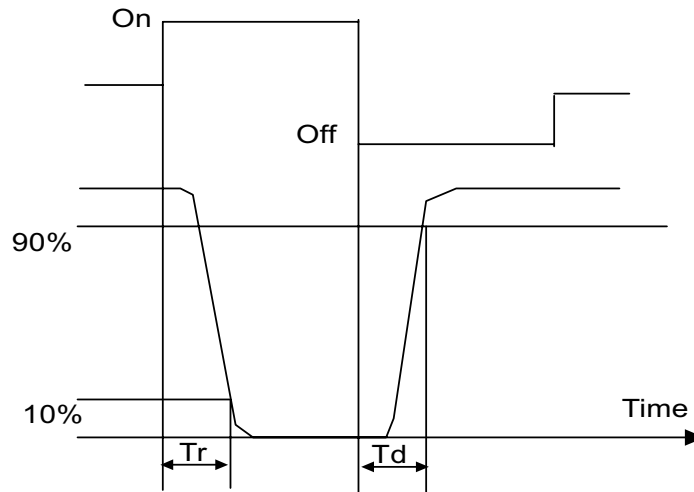
Waveform Generator

(2) Definition

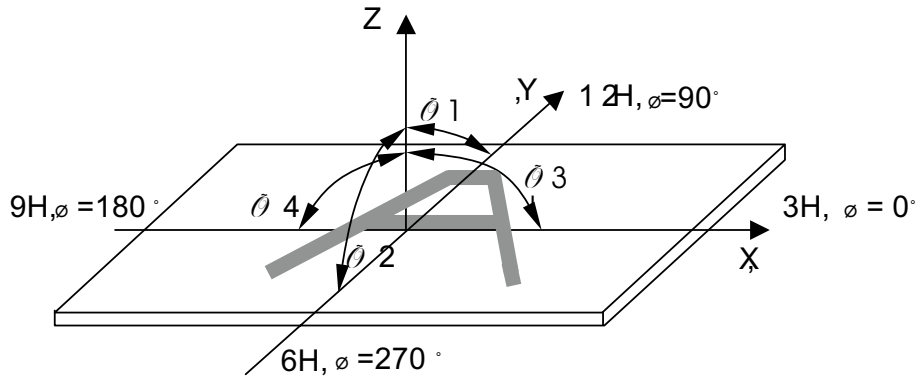
a. Threshold Voltage (V_{th})



b. Response Time



a. Viewing Angle:



b. Contrast Ratio (positive)

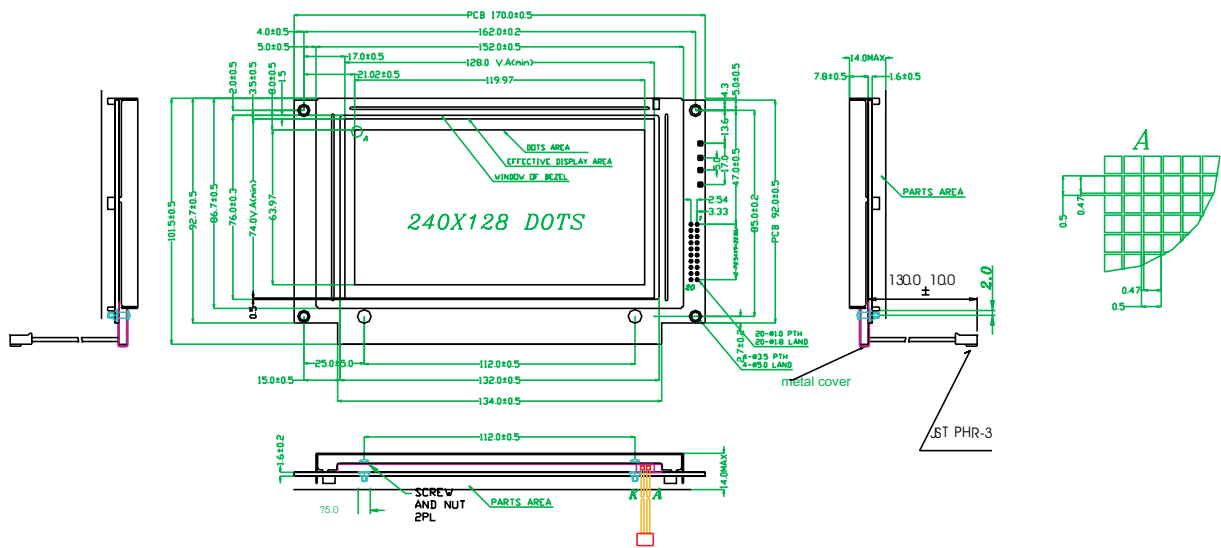
$$CR = \frac{\text{Brightness of non-selected wave-form}}{\text{Brightness of selected wave-form}}$$

4. Reliability Test:

Equipment : Tenny

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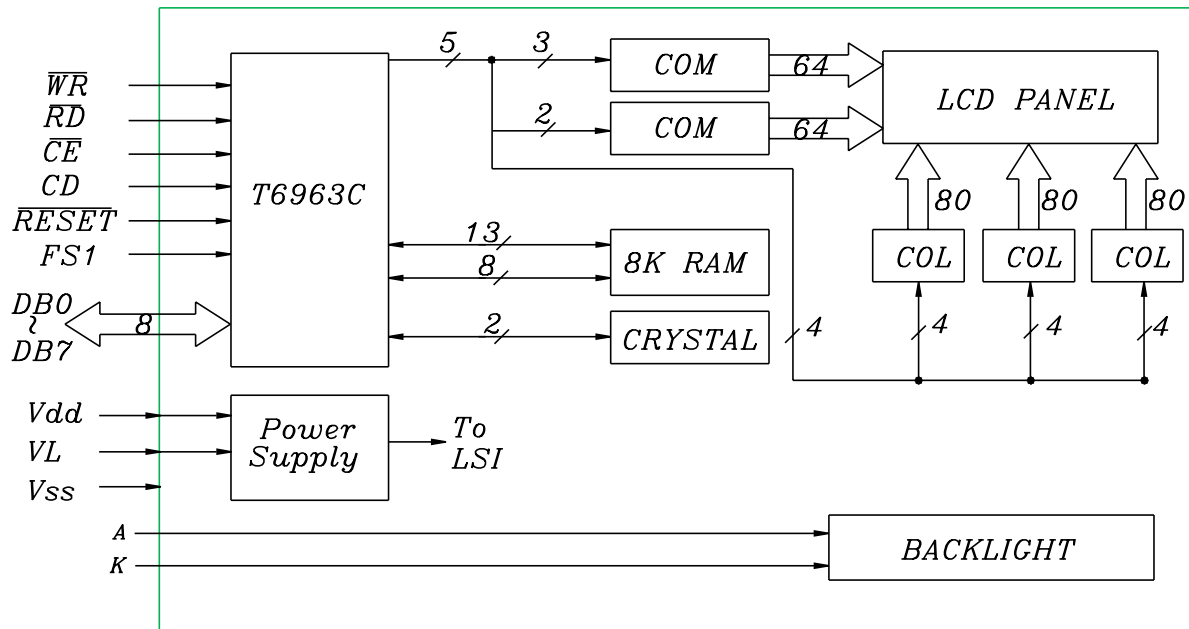
. Attach Drawing



Note:

1. Operating Voltage: 5V
2. Drive method: 1/128 Duty, 1/13 Bias
3. Viewing Direction: 6:00
4. Operating Temp: -20°C~70°C
5. Storage Temp: -30°C~85°C
6. Display type: STN,Negative

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PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SYMBOL	FG	V _{ss}	V _{dd}	VL	WR	RD	CE	CD	N/C	RESET	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	FS1	RV