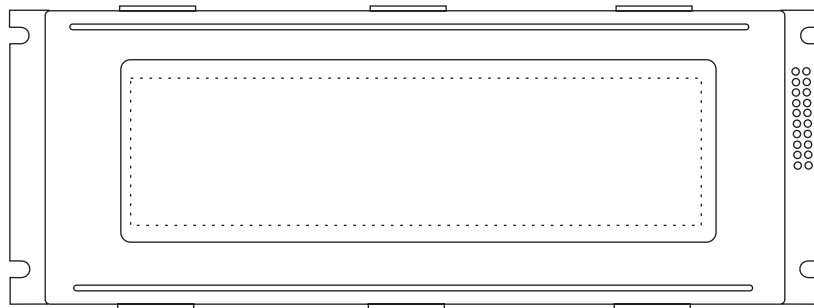




PRODUCT SPECIFICATION

HDM64GS24_-2

240x64 GRAPHICS
LCD DISPLAY MODULE



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I. General Specifications

1. The Features of HDM64GS24_-2

- (1) Low power consumption 5.0V power supply
- (2) 1/64 duty, 1/9 bias
- (3) Viewing direction: 6:00 / 12:00 O'clock
- (4) Operating temperature : Normal (0~50 °C) / Extended (-20~70 °C)
- (5) Storage temperature : Normal (-20~70 °C) / Extended (-30~85 °C)
- (6) Display type: FSTN / STN , Positive / Negative
- (7) DC-to-DC Converter : Built-in
- (8) Controller : Toshiba T6963C

2. Mechanical Data and Conditions:

- (1) Number of Characters ----- 240 Dots * 64 Dots Graphic LCD Module
- (2) Module Size ----- 180.0 w * 65.0 h mm
- (3) Viewing Area ----- 134.0 w * 40.4 h mm
- (4) Dot Size ----- 0.49 w * 0.49 h mm
- (5) Dot Pitch ----- 0.53 w * 0.53 h mm

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

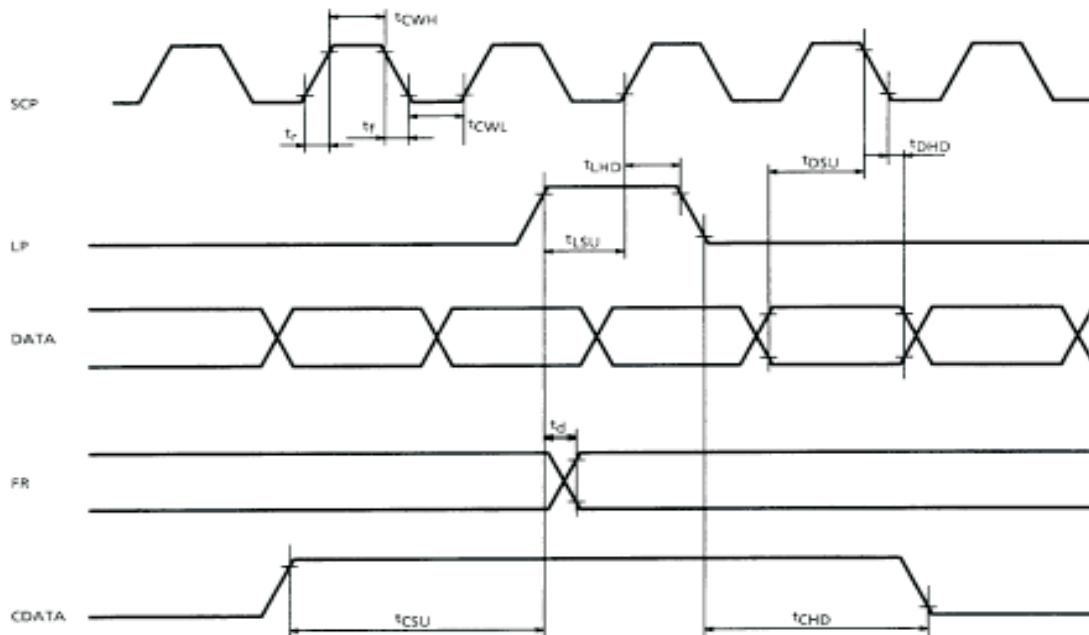
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4. Pin Connections:

Pin No.	Symbol	Function
1	FG	Frame Ground
2	Vss	Ground
3	Vdd	Supply Voltage for Logic and LCD
4	V0	Contrast adjust 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	VEE	Power supply for LCD driving
10	/RES	Reset Signal
11-18	DB0-DB7	Data Bus Line
19	FS	Font Select Signal
20	NC	No Connection
21-22	A,K	LED Power

5. AC Characteristics

Switching Characteristics (1)

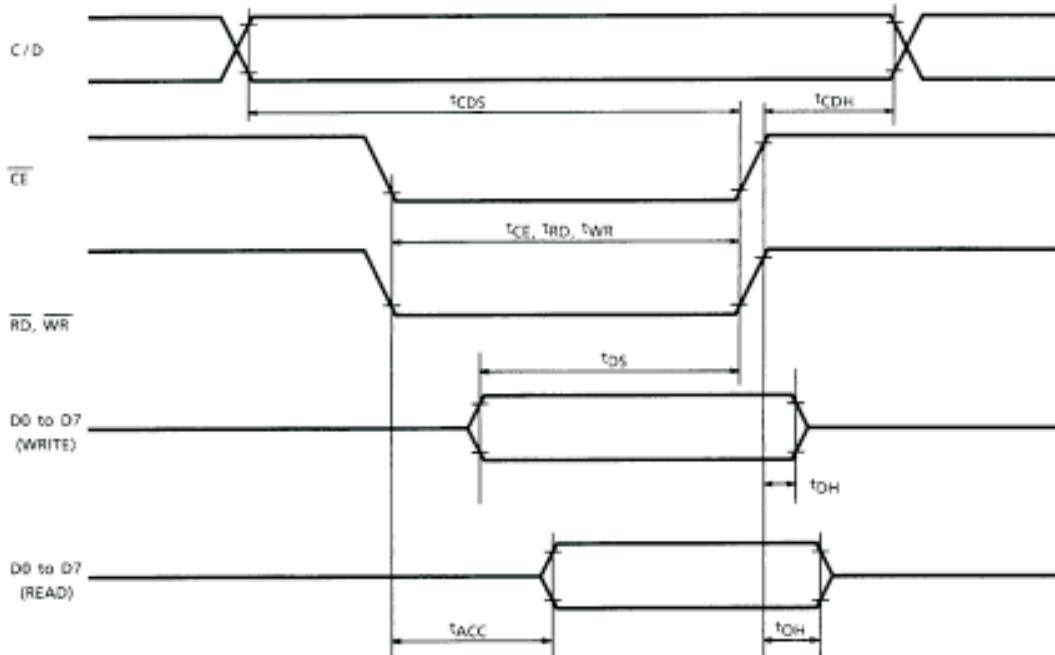


Test conditions (VDD=5.0V±10%, VSS=0V)

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

Switching Characteristics (2)

Bus Timing



Test conditions (VDD=5.0V±10%, VSS=0V)

Item	Symbol	Min.	Typ.	Max.	Unit
C/D Set up Time	t_{CDS}	100	--	--	nS
C/D Hold Time	t_{CDH}	10	--	--	nS
\overline{CE} , \overline{RD} , \overline{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

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The Characteristics and Reliability Test

1. Electro-Optic Characteristics:

Condition: TEMP = (23 ± 3) ° C

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		9.84		mA	Vdd=5V
3	LCD Operating Voltage	Vdd-V ₀		12.2		V	-20 ° C
				11.8		V	25 ° C
				11.4		V	70 ° C
4	Response Time	Ton		182		ms	
		Toff		51		ms	
5	Contrast	CR	3				
6	Viewing Angel	12H	∅ 1		41	Deg.	(CR≥3.0)
		6H	∅ 2		53		
		3H	∅ 3		50		
		9H	∅ 4		50		
70	LCD Threshold Voltage	Vth		2.05		V	25 ° C

2. Characteristics of backlight (LED unit)

(1). Absolute Maximum Ratings (White LED unit) :

Item	Symbol	Rating	Unit	Condition
Forward Current	IFM	20*4	mA	Ta=25 ° C
Reverse Voltage	VR	5	V	Ta=25 ° C
Power Dissipation	PD	75*4	mW	Ta=25 ° C

(2). Electrical-optical Characteristics (White LED unit) :

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward	VF	2.9	3.2	3.5	V	IF=15*4mA
Reverse current	IR			15*4	uA	VR=5V
Luminous	LV	100	130		cd/m ²	IF=15*4mA
Color	WHITE					

Characteristics of backlight (Yellow/green LED unit)

(3). Absolute Maximum Ratings:

Item	Symbol	Rating.	Unit	Condition
Forward Current	IFM	675	mA	Ta=25 ° C
Reverse Voltage	VR	8	V	Ta=25 ° C
Power Dissipation	PD	4500	mW	Ta=25 ° C

(4). Electrical-optical Characteristics:

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward Voltage	VF		4.1		V	IF=675mA
Color	Yellow/green					

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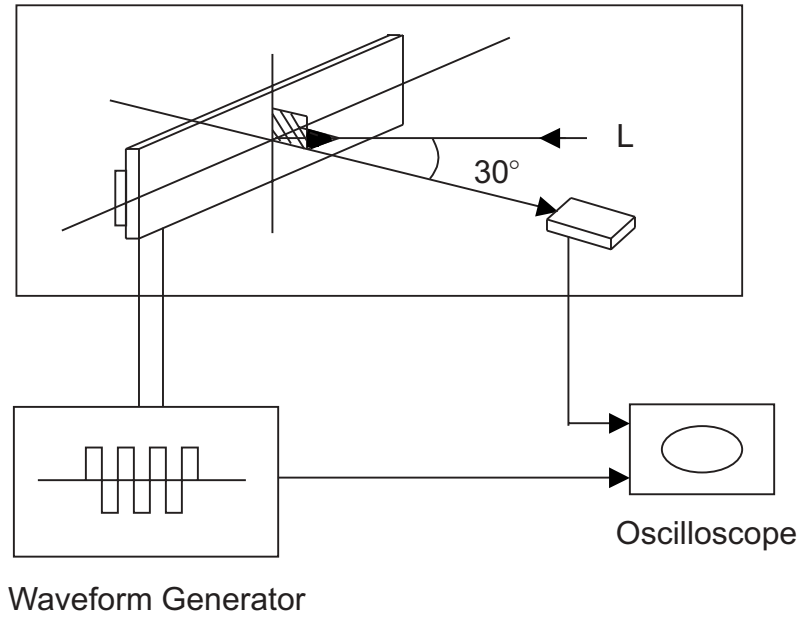
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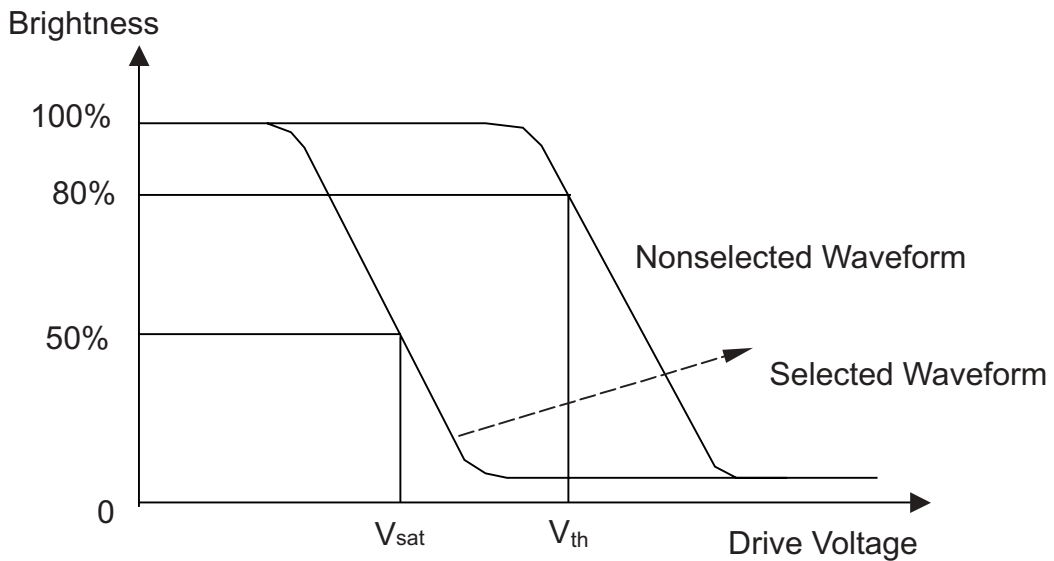
III. The Equipment and LCD Measuring Method

1. Equipment

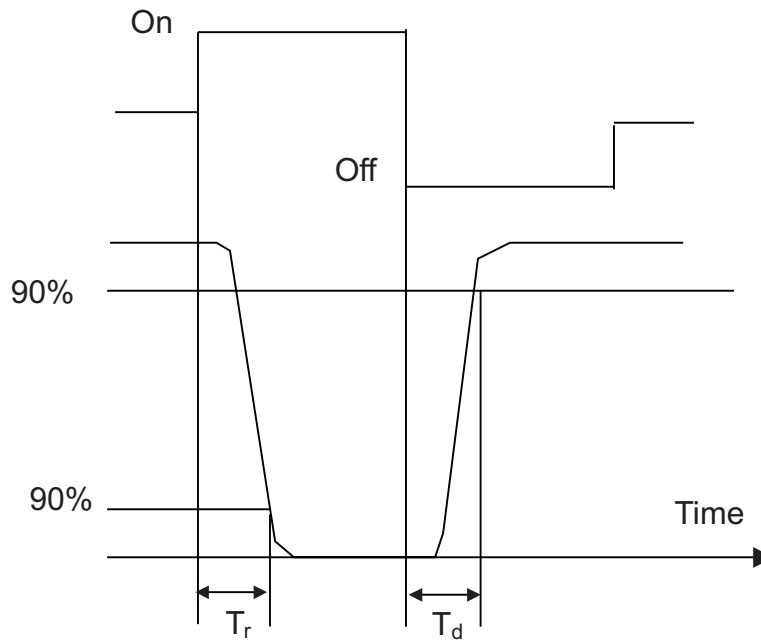


2. Definition

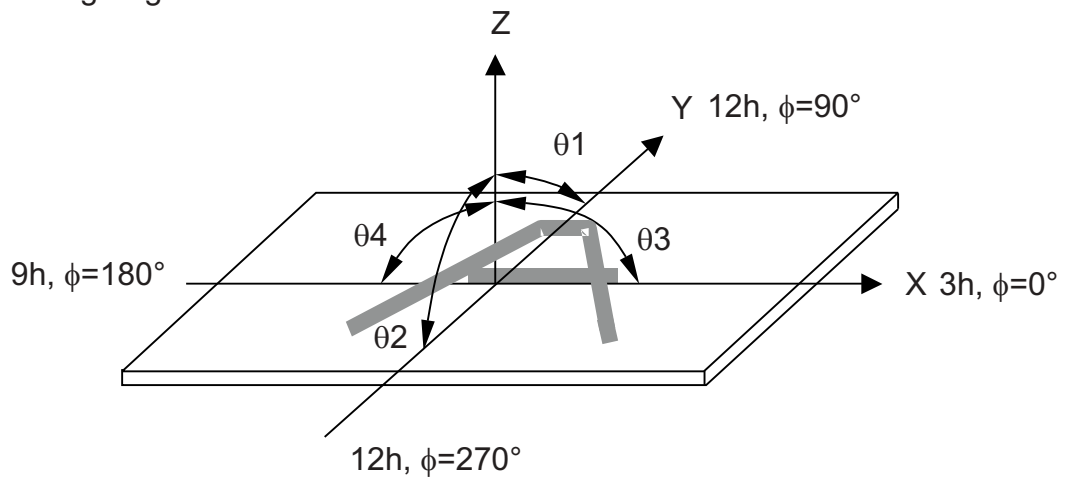
(1) Threshold Voltage (V_{th})



(2) Response Time



(3).Viewing Angle:

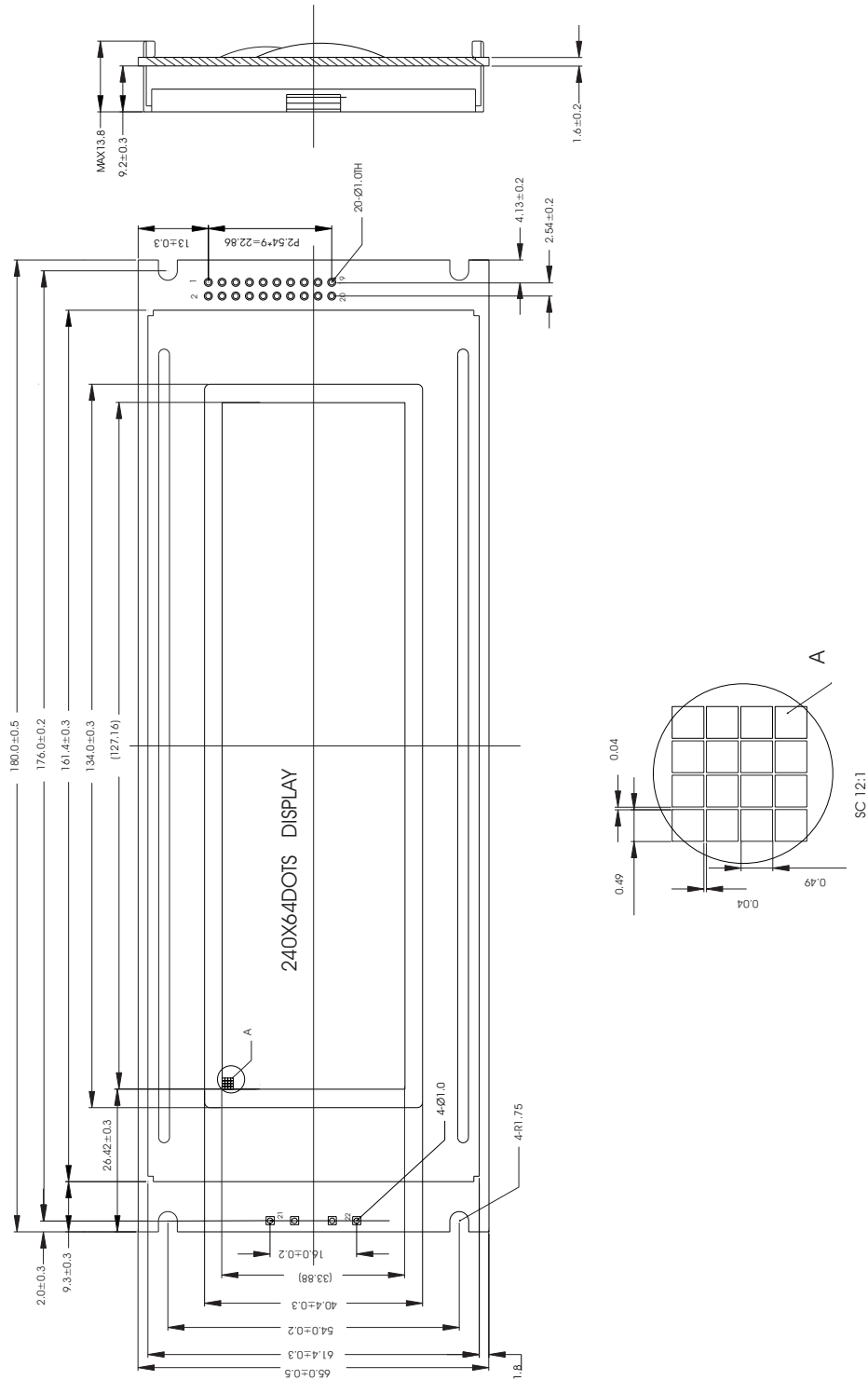


(4).Contrast Ratio (Positive)

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

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V. Drawing



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