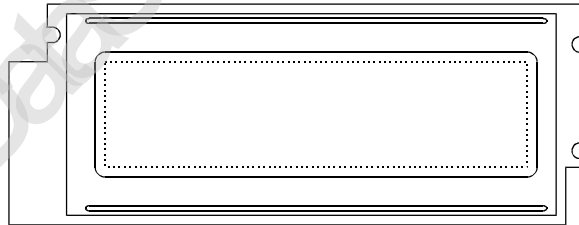


HANTRONIX

PRODUCT SPECIFICATION

HDM150GS32

150x32 GRAPHICS
LCD DISPLAY MODULE



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MECHANICAL DATA

(1) Part Name	
(2) Module Size	116.5 (W)mm x 42.0 (H)mm x MAX 15.5 (D)mm
(3) Dot Size	0.50 (W)mm x 0.55 (H)mm
(4) Dot Pitch	0.55 (W)mm x 0.60 (H)mm
(5) Number of Dots	150 (W) x 32 (H)Dots
(6) Duty	1/32
(7) LCD	Yellow Mode, Transflective Type
(8) Viewing Direction	6 O'clock
(9) Backlight	LED
(10) Weight	70 g

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ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

V_{ss}=0 V: Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	VSS	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	0	50	-20	70	Note 2 , 3
Humidity	Note 1		Note 1		Without condensation

Note 1 Ta ≤ 50°C : 85%RH max

Ta > 50°C : Absolute humidity must be lower

than the humidity of 85%RH at 50°C

Note 2 Ta at -20°C will be < 48hrs, at 70°C will be < 120 hrs

Note 3 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

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ELECTRICAL CHARACTERISTICS

(VDD= 5V±10%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	VIH	H level	0.8VDD	—	VDD	V
	VIO	L level	0	—	0.2VDD	V
Power Supply Current	IDD	VDD = 5.0V	—	—	2.8	mA
LED Consumption Current	I _{LED}		—	—	180	mA
Recommended LC Driving Voltage	VDD—VO		6.2	—	8.2	V

OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Viewing Angle	θ	$Cr \geq 2.0$	50	—	—	deg	NOTE 5
	ϕ		—	—	±40		
Contrast Ratio	Cr	$\phi=0^\circ, \theta=0^\circ$	4	—	—		NOTE 6
Response Time (rise)	Tr	$\phi=0^\circ, \theta=0^\circ$	—	250	500	ms	NOTE 2
Response Time (fall)	Tf	$\phi=0^\circ, \theta=0^\circ$	—	150	300	ms	NOTE 2

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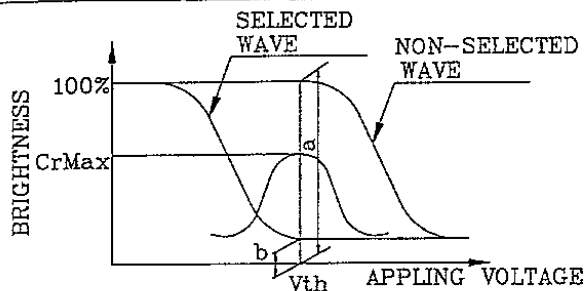
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(NOTE 1)

Definition of Operation Voltage(V_{op})



*Conditions

Viewing Angle(a_1): 90

Frame Frequency: 70Hz

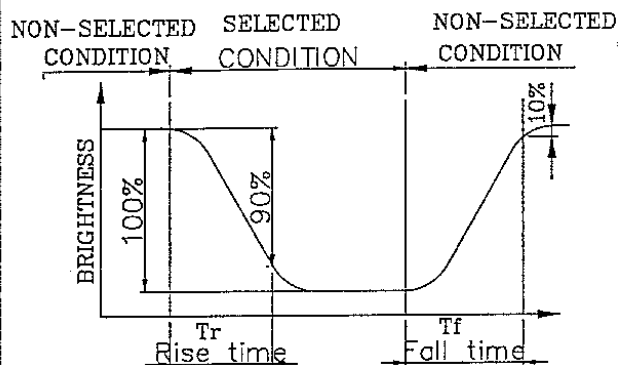
Applying Waveform: 1/N duty 1/a bias

SELECTED WAVEFORM

$V_{op} = V_{DD} - V_o$

(NOTE 2)

Definition of Response Time(T_r, T_f)



*Conditions

Operating Voltage: V_{th}

Viewing Angle(a_1): 90

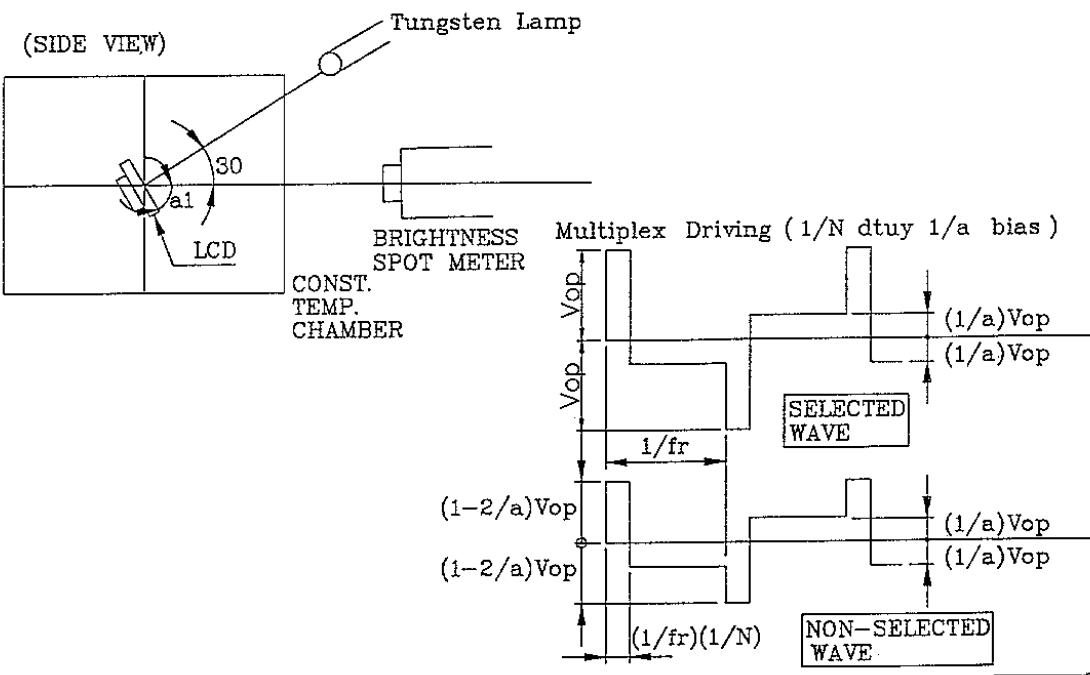
Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

SELECTED WAVEFORM

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



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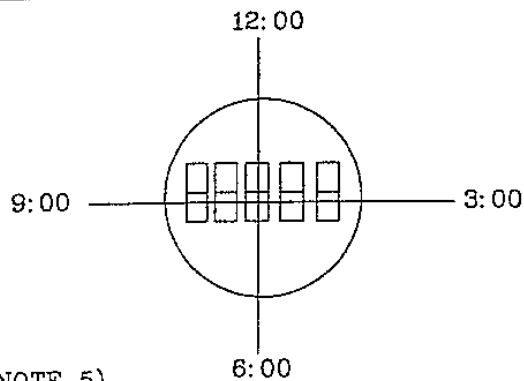
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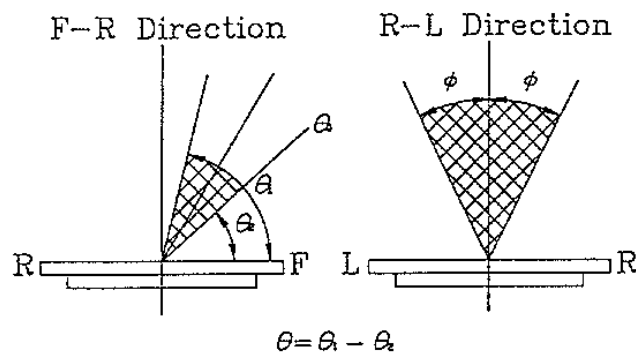
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle(a1,b1)



*Conditions

Operating Voltage: V_{th}

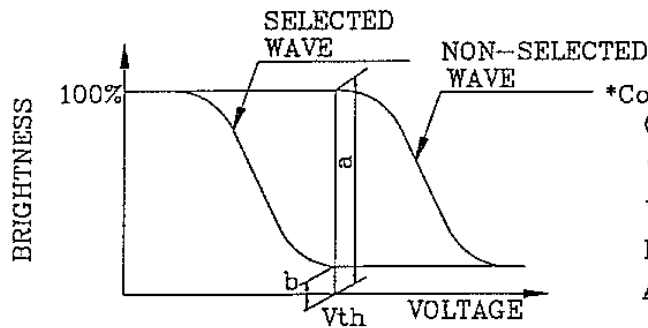
Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

SELECTED WAVEFORM

(NOTE 6)

Definition of Contrast Ratio (Cr)



Contrast Ratio: $Cr = a/b$

*Conditions

Operating Voltage: V_{th}

Temperature : 25

Viewing Angle(a1) : 90

Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

SELECTED WAVEFORM

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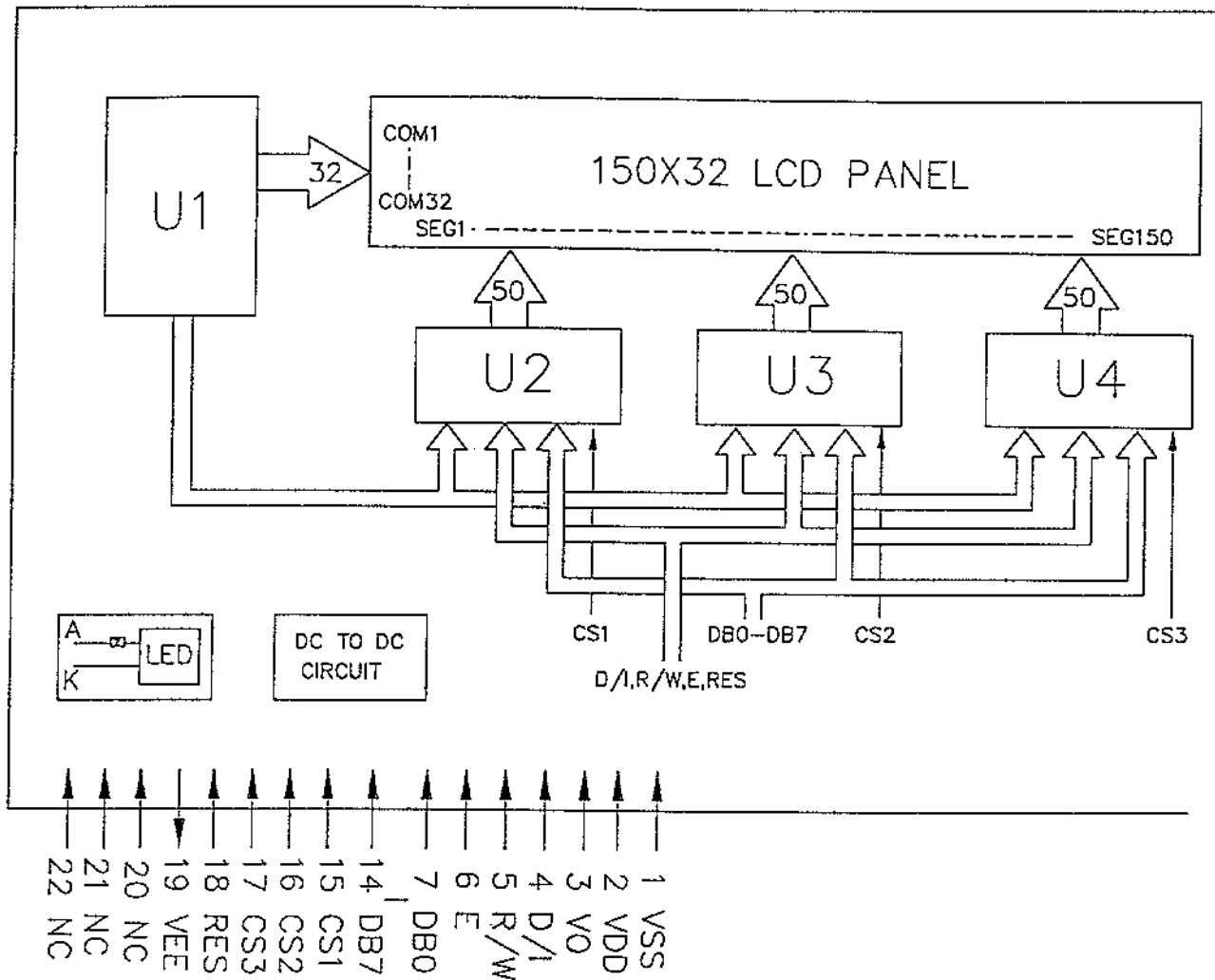
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BLOCK DIAGRAM



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INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function	
1	V _{SS}	—	0V	Power supply
2	V _{DD}	—	+5V	
3	V _O	—	OPERATING VOLTAGE FOR LCD DRIVING	
4	D/I	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT	
5	R/W	H/L	H: DATA READ (FROM LCM TO MPU) L: DATA WRITE (FROM MPU TO LCM)	
6	E	H, H→L	ENABLE SIGNAL	
7	DB0	H/L	DATA BUS LINE	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		
15	CS1	H	CHIP SELECT FOR IC1	
16	CS2	H	CHIP SELECT FOR IC2	
17	CS3	H	CHIP SELECT FOR IC3	
18	RES	L	RESET	
19	VEE	—	POWER SUPPLY FOR LCD DRIVING	
20	NC	—	NO CONNECTION	
21	NC	—	NONE CONNECTION	
22	NC	—	NONE CONNECTION	

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TIMING CHARACTERISTICS

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cyc}	Fig.a , Fig.b	500	—	—	ns
E high level width	P_{WEH}	Fig.a , Fig.b	220	—	—	ns
E low level width	P_{WEL}	Fig.a , Fig.b	220	—	—	ns
E rise/fall time	t_r, t_f	Fig.a , Fig.b	—	—	20	ns
Address set up time	t_{AS}	Fig.a , Fig.b	40	—	—	ns
Address hold time	t_{AH}	Fig.a , Fig.b	10	—	—	ns
Data delay time	t_{DDR}	Fig.b	—	—	140	ns
Data set up time	t_{DSW}	Fig.a	60	—	—	ns
Data hold time (WR)	t_{DHW}	Fig.a	10	—	—	ns
Data hold time (RD)	t_{DHR}	Fig.b	20	—	—	ns

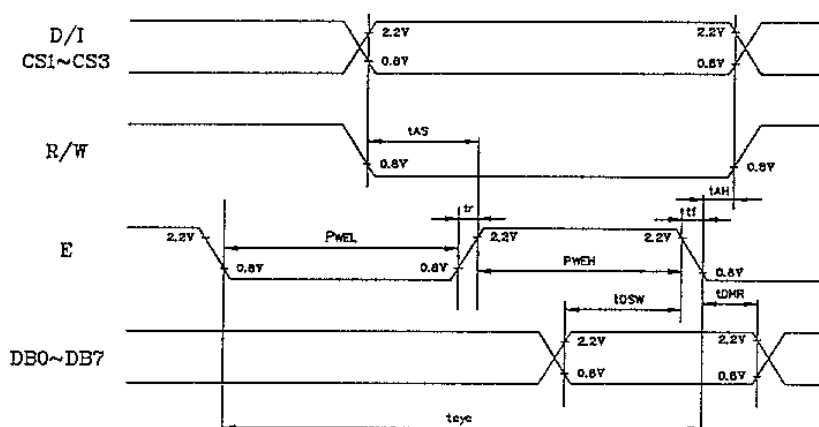


Fig . a Interface timing (data write)

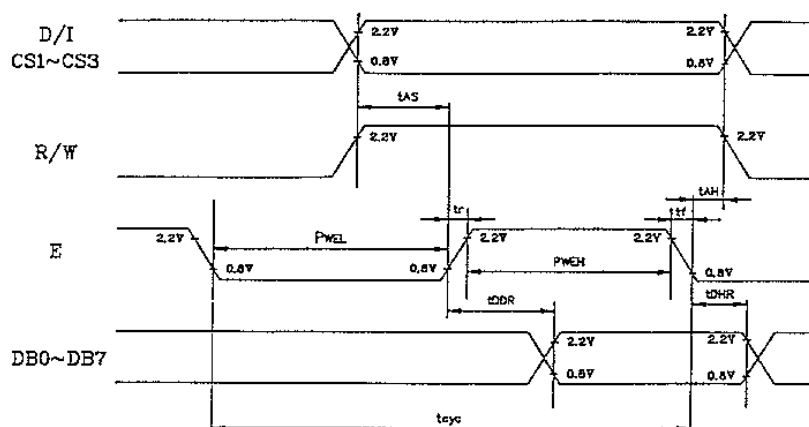
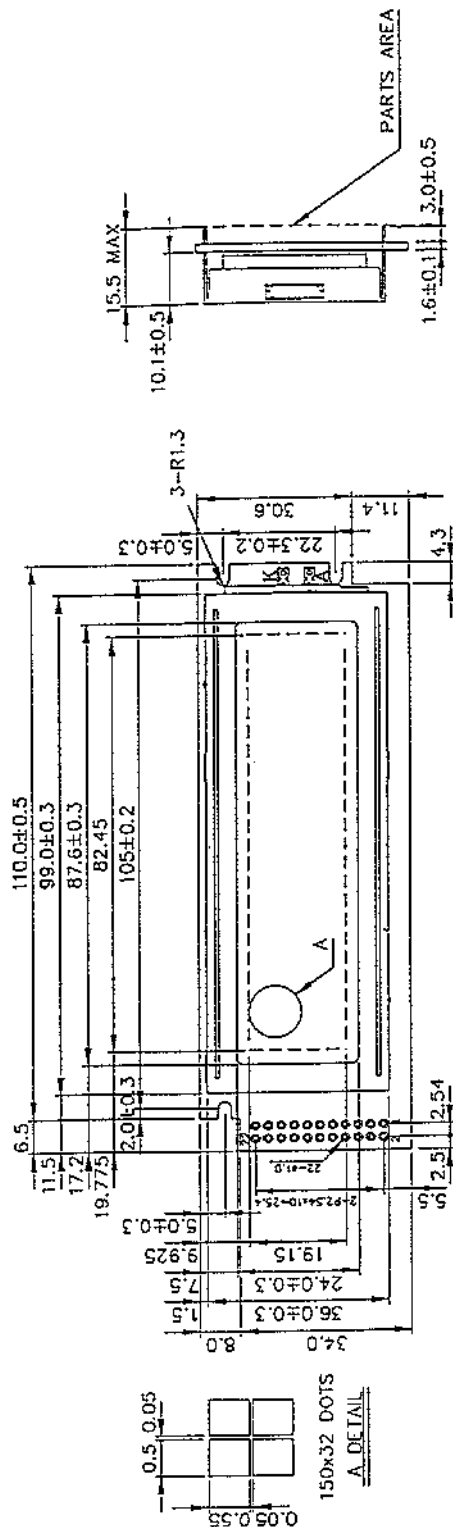


Fig . b Interface timing (data read)



INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	V _{SS}	—	0V
2	V _{DD}	—	+5V supply
3	V _O	—	CHARGING VOLTAGE FOR ICD
4	D/L	H/L	DATA/LOAD SELECT
5	R/W	H/L	READ/WRITE SELECT
6	E	H/H—X	ENABLE
7	DB0	H/L	DATA BUS LINE
8	DB1	H/L	DATA BUS LINE
9	DB2	H/L	DATA BUS LINE
10	DB3	H/L	DATA BUS LINE
11	DB4	H/L	DATA BUS LINE
12	DB5	H/L	DATA BUS LINE
13	DB6	H/L	DATA BUS LINE
14	DB7	H/L	DATA BUS LINE
15	CS1	H	CHIP SELECT FOR IC1
16	CS2	H	CHIP SELECT FOR IC2
17	CS3	H	CHIP SELECT FOR IC3
18	RES	L	RESET
19	VEE	—	NONA BATTERY FOR ICD BATTERY
20	NC	—	NO CONNECTION
21	NC	—	NO CONNECTION
22	NC	—	NO CONNECTION



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