1. MECHANICAL DATA

(1) Product No.		AGM3224H
(2) Module Size		142.6 (W)mm x 92.6 (H)mm x MAX 7.5 (D)mm (CCFT B.L.)
(3) Dot Size		0.285 (W)mm x 0.285 (H)mm
(4) Dot Pitch		0.30 (W)mm x 0.30 (H)mm
(5) Number of Dots		320 (W) x 240 (H)Dots
(6) Duty		1/240
(7) LCD Display Mode	STN:	☐ Gray Mode ☐ Yellow Mode ☐ Blue Mode ☐ Other Mode
	FSTN:	☐ Black and White(Normal White/Positive Image) ☐ Black and White(Normal Black/Negative Image)
	Rear Polarizer:	☐ Transflective(Normal) ☐ Transmissive ☐ Transflective(Medium Transparency) ☐ Transflective(High Transparency)
(8) Viewing Direction		☐ 6 O'clock ☐ 12 O'clock ☐ ____O'clock
(9) Backlight		CCFT
(10) Recommended CCFT Inverter		TDK CORP. CXA-L10L
(11) Weight		CCFT : 120 g (approx.)

Revised: March 8, 2001

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V STANDARD

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	−0.3	6.5	V	
Power Supply for LCM	VDD−VEE	0	27.0	V	
Input Voltage	VI	−0.3	VDD+0.3	V	
Static Electricity	−	−	−	−	Note 1

Note 1 LCM should be grounded during handling

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	−20	70	−30	80
Humidity(Without Condensation)	Note 2, 4		Note 3, 4	

Note 2 Ta ≦ 70°C : 75%RH max
Ta > 70°C : Absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 3 Ta at −30°C will be < 48hrs, at 80°C will be < 120hrs

Note 4 Background color will change slightly depending on ambient temperature. This phenomenon is reversible.

3. ELECTRICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Power Supply for Logic		VDD−VSS	−		4.5	5.0	5.5	V
					2.7	3.0	3.3	
Recommended LC Driving Voltage		VDD−VEE	Duty=1/240 Bias=1/13	−20°C	24.3	24.7	25.1	V
				0°C	23.0	23.4	23.8	
				25°C	22.2	22.6	23.0	
				50°C	20.9	21.3	21.7	
				70°C	20.3	20.7	21.1	
Input Voltage		VIH	H level		0.8VDD	−	VDD	V
		VIL	L level		0	−	0.2VDD	V
Power Supply Current		IDD	FLM = 70 Hz VDD = 5.0 V VDD−VEE = 22.6 V PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □		−	6.4	9	mA
		IEE			−	6.0	9	mA
CCFL LAMP	Starting Voltage	Vs			−	420	1000	Vrms
	Lamp Voltage	V_L			−	280	−	Vrms
	Lamp Current	I_L			4	5	6	mArms
	Lamp Consumption	P_L			−	1.4	−	W
	Lamp Frequency	F_L			−	35	−	KHz
	Lamp Life Time	L_L			−	20000	−	hrs
LCM	Surface Luminance	L(ALL ON)	Transmissive/Black		−	191	−	cd/m^2
		L(ALL OFF)			−	8.3	−	cd/m
		L(ALL ON)	Transflective/Normally white		−	23	−	cd/m
		L(ALL OFF)			−	97	−	cd/m
		L(ALL ON)	Transflective/BLUE		−	36	−	cd/m
		L(ALL OFF)			−	195	−	cd/m

4.OPTICAL CHARACTERISTICS

AT VOP

ITEM / MODE		Cr(Contrast Ratio)										θ(Viewing Angle)		φ(Viewing Angle)	
		−20℃		0℃		25℃		50℃		70℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	G,H	–	15	–	18	–	20	–	10	–	5	–	X−60	–	54−33
S	J	–	7	–	8	–	8	–	6	–	4	–	36−36	–	33−36
T	E	–	4	–	4	–	4.5	–	3.5	–	2.5	–	X−37	–	37−27
note		NOTE6										NOTE5			

note:

S: TRANSFLECTIVE(NORMAL)
T: TRANSMISSIVE
P: TRANSFLECTIVE(MEDIUM TRANSPARENCY)
A: GRAY

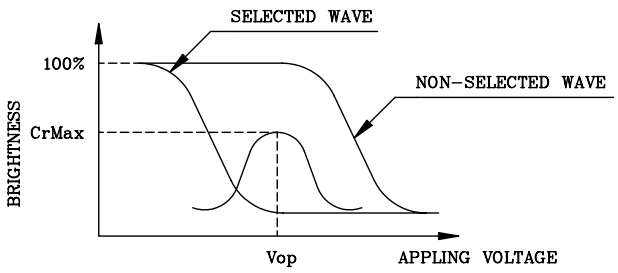
C: YELLOW
E,F: BLUE
G,H: NORMALLY BLACK
J: NORMALLY WHITE
Z: OTHER

AT φ=0° θ=0°

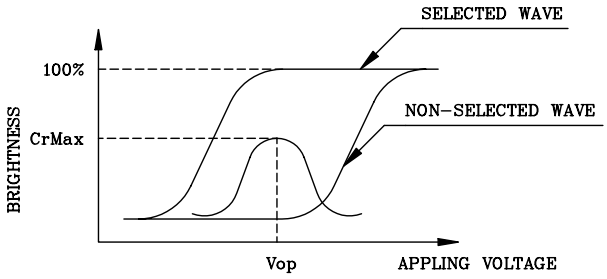
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	−20℃	–	3000	–	ms	NOTE 2
		0℃	–	650	–		
		25℃	–	275	–		
		50℃	–	140	–		
		70℃	–	70	–		
Response Time (fall)	Tf	−20℃	–	2000	–	ms	NOTE 2
		0℃	–	400	–		
		25℃	–	100	–		
		50℃	–	60	–		
		70℃	–	55	–		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



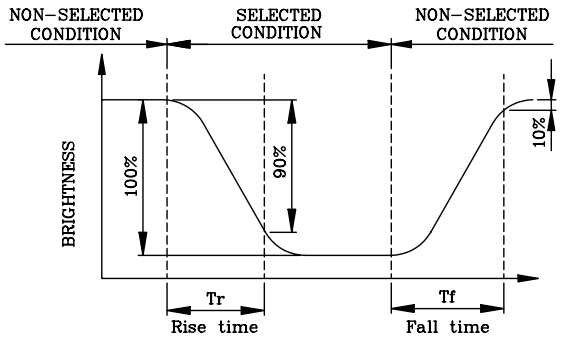
(negative type)

*Conditions

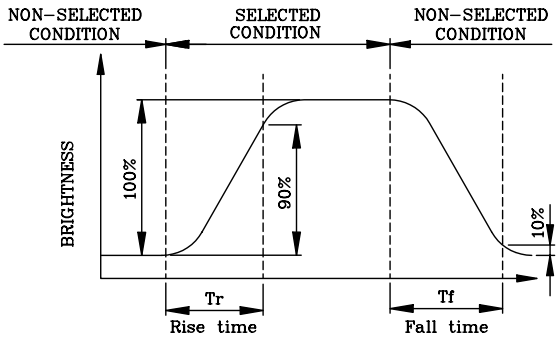
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



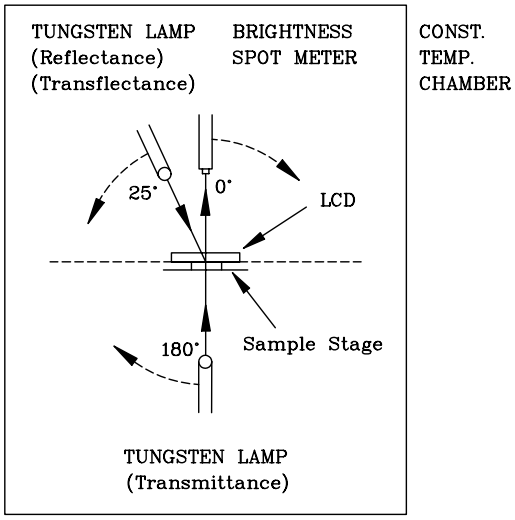
(negative type)

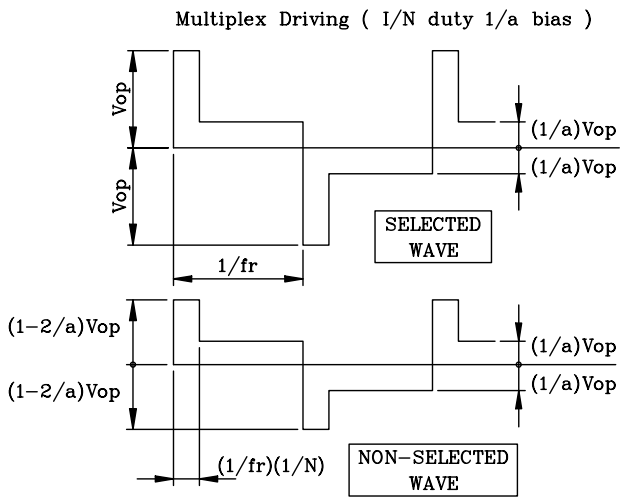
*Conditions

Operating Voltage : Vop
Viewing Angle (θ,ϕ) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 3)

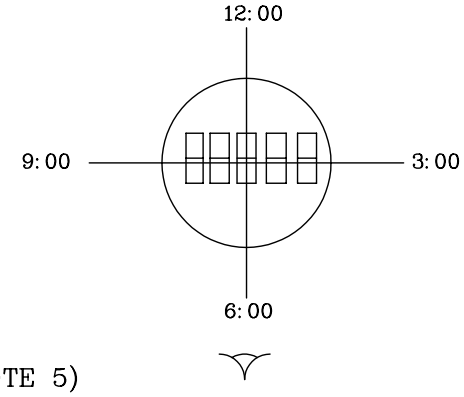
Description of Measuring Equipment and Driving Waveforms





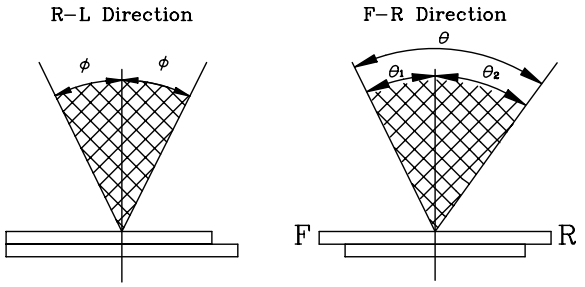
(NOTE 4)

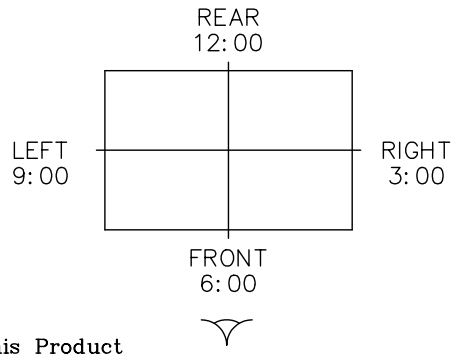
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta_1 > \theta_2$

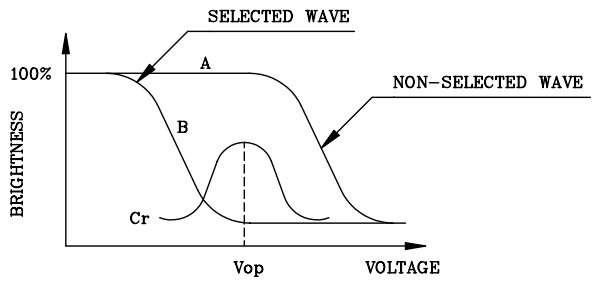
$$\theta = \theta_1 + \theta_2$$

*Conditions

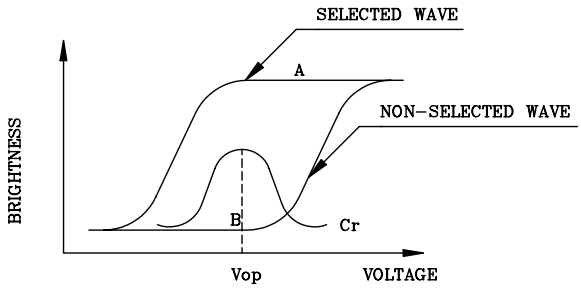
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



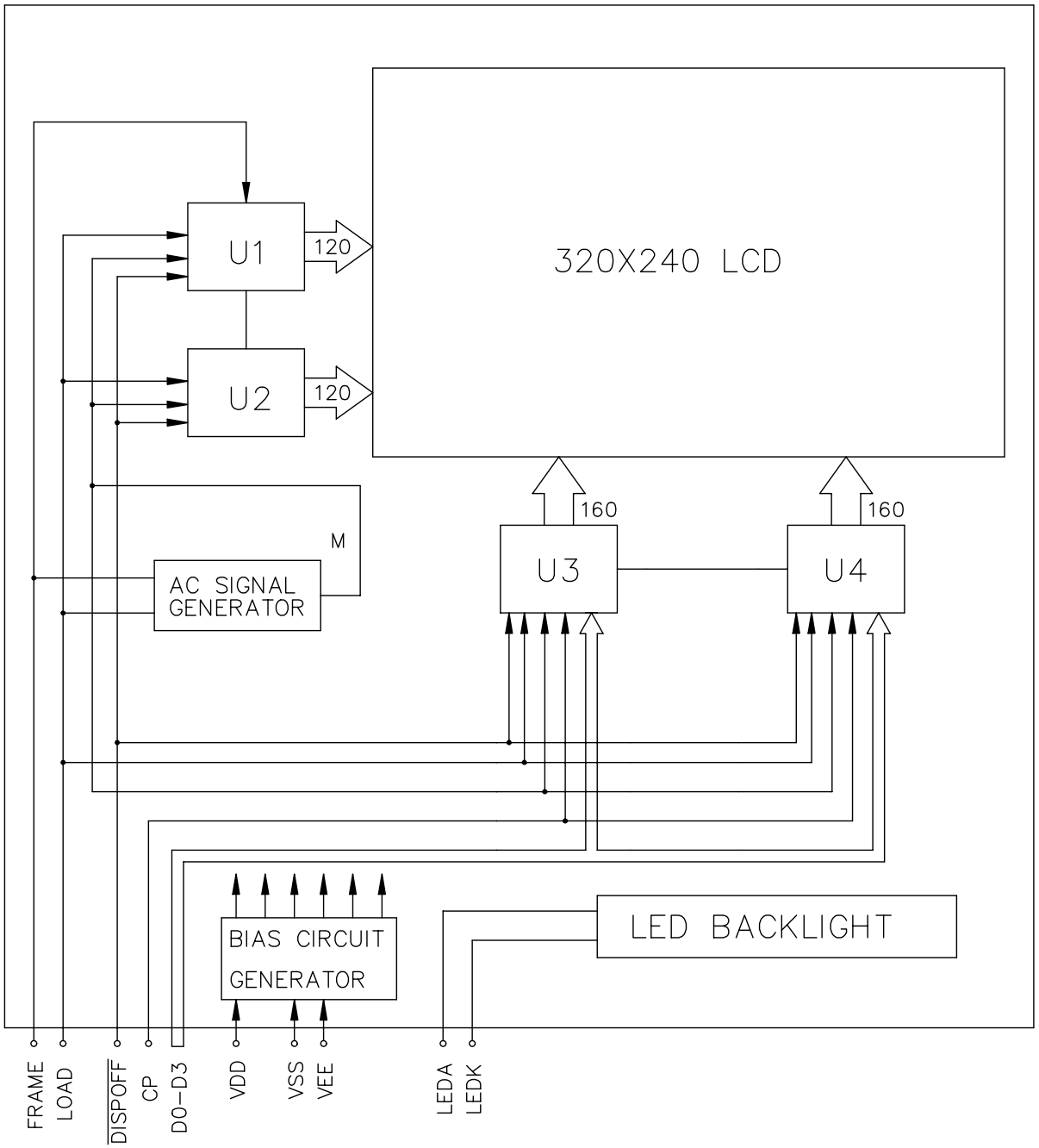
(negative type)

Contrast Ratio : Cr=A/B

*Conditions

Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

5. BLOCK DIAGRAM



* AC SIGNAL SETTING

J1	J2	J3	J4	J5	J6	J7	J8
H	L	L	H	H	L	L	L

6. INTERNAL PIN CONNECTION

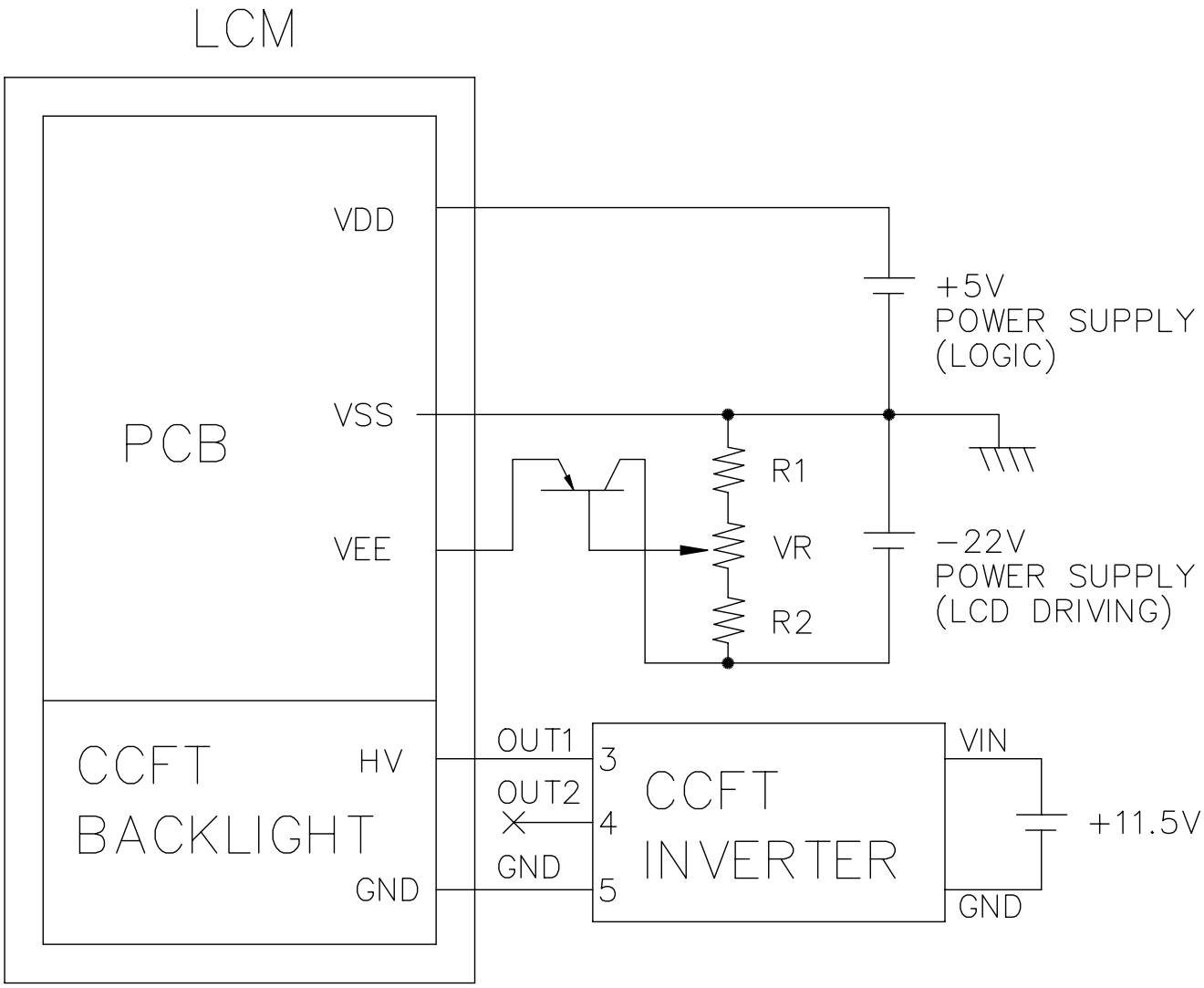
PIN CONNECTOR : ELCO 6224-12P-S-A OR EQUIVALENT

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	FRAME	H	FIRST LINE MARKER
2	LOAD	H→L	DATA LATCH
3	CP	H→L	DATA SHIFT
4	VDD	–	POWER SUPPLY FOR LOGIC
5	VSS	–	GND
6	VEE	–	POWER SUPPLY FOR LC
7	D0	H/L	DISPLAY DATA
8	D1		
9	D2		
10	D3		
11	$\overline{\text{DISPOFF}}$	H/L	H: ON/L: OFF
12	NC	–	–

CCFL CONNECTOR : MITSUMI/M63M83-04 OR EQUIVALENT

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	GND	–	GND FOR CCFT BACKLIGHT
2	NC	–	–
3	NC	–	–
4	HV	–	POWER SUPPLY FOR CCFT BACKLIGHT

7. POWER SUPPLY

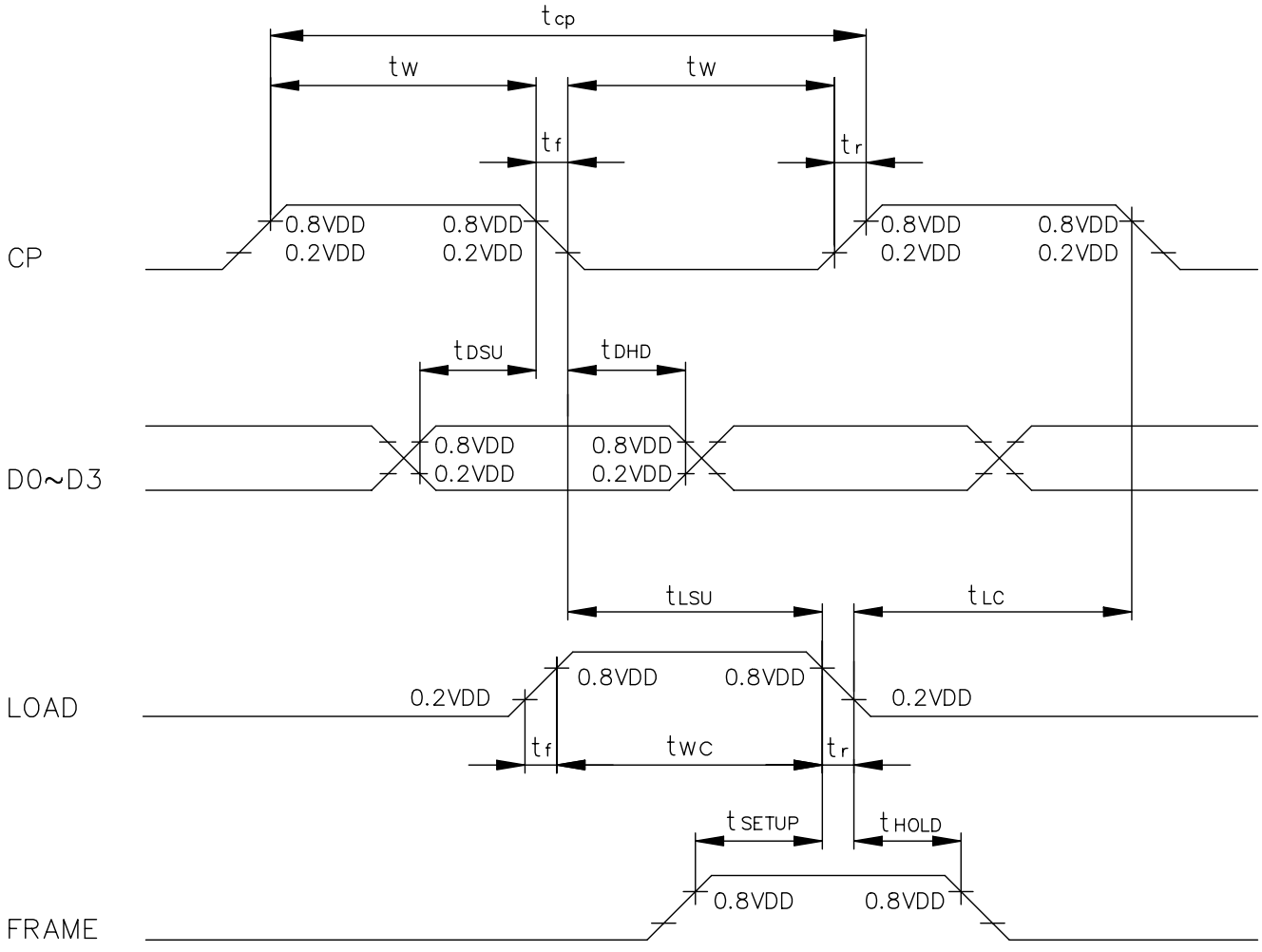


1. R1+VR+R2=10K~20KΩ
2. RECOMMENDED CCFT INVERTER : CXA-L10L(TDK)

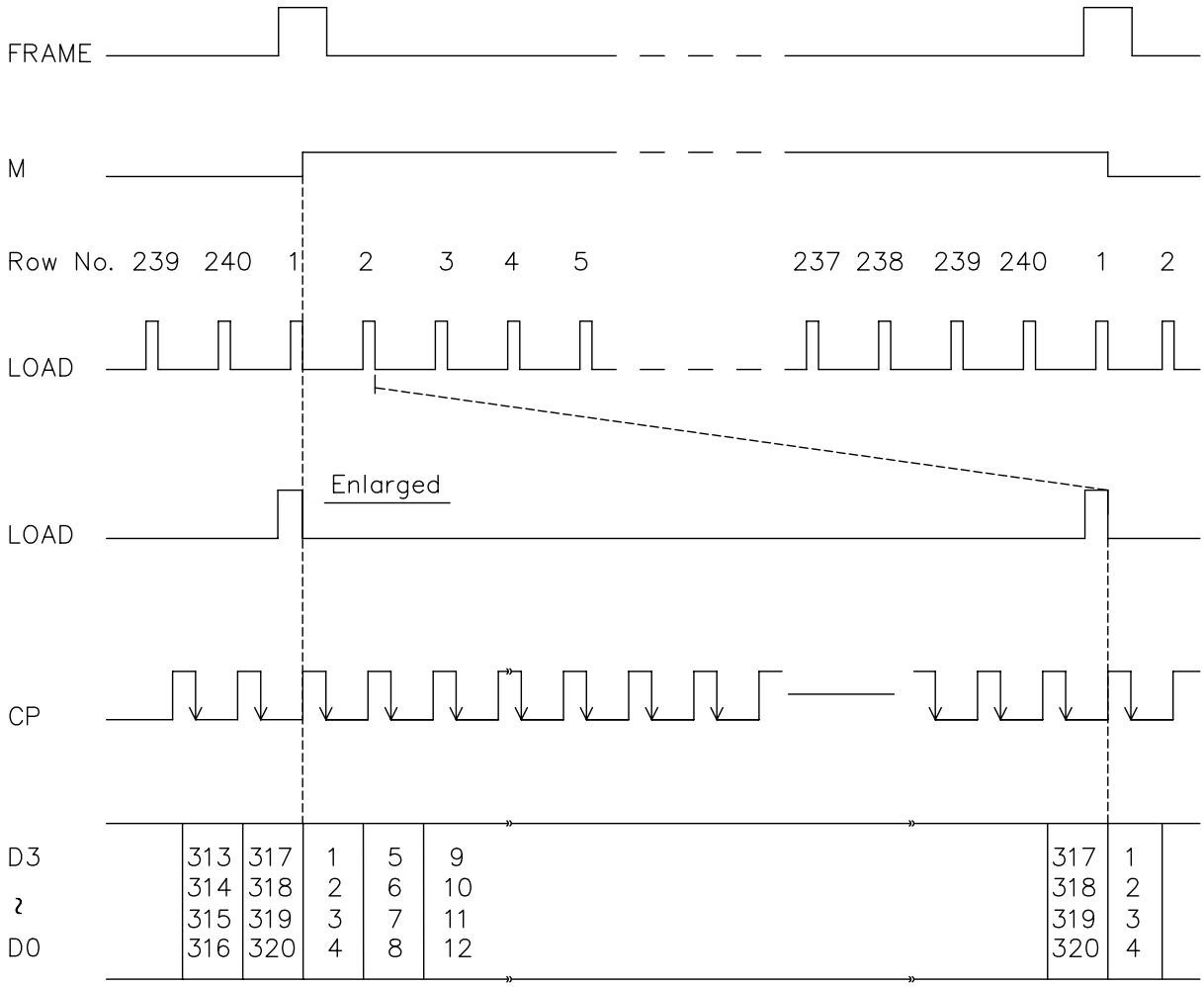
8. TIMING CHARACTERISTICS

@VDD=2.5~5.5V

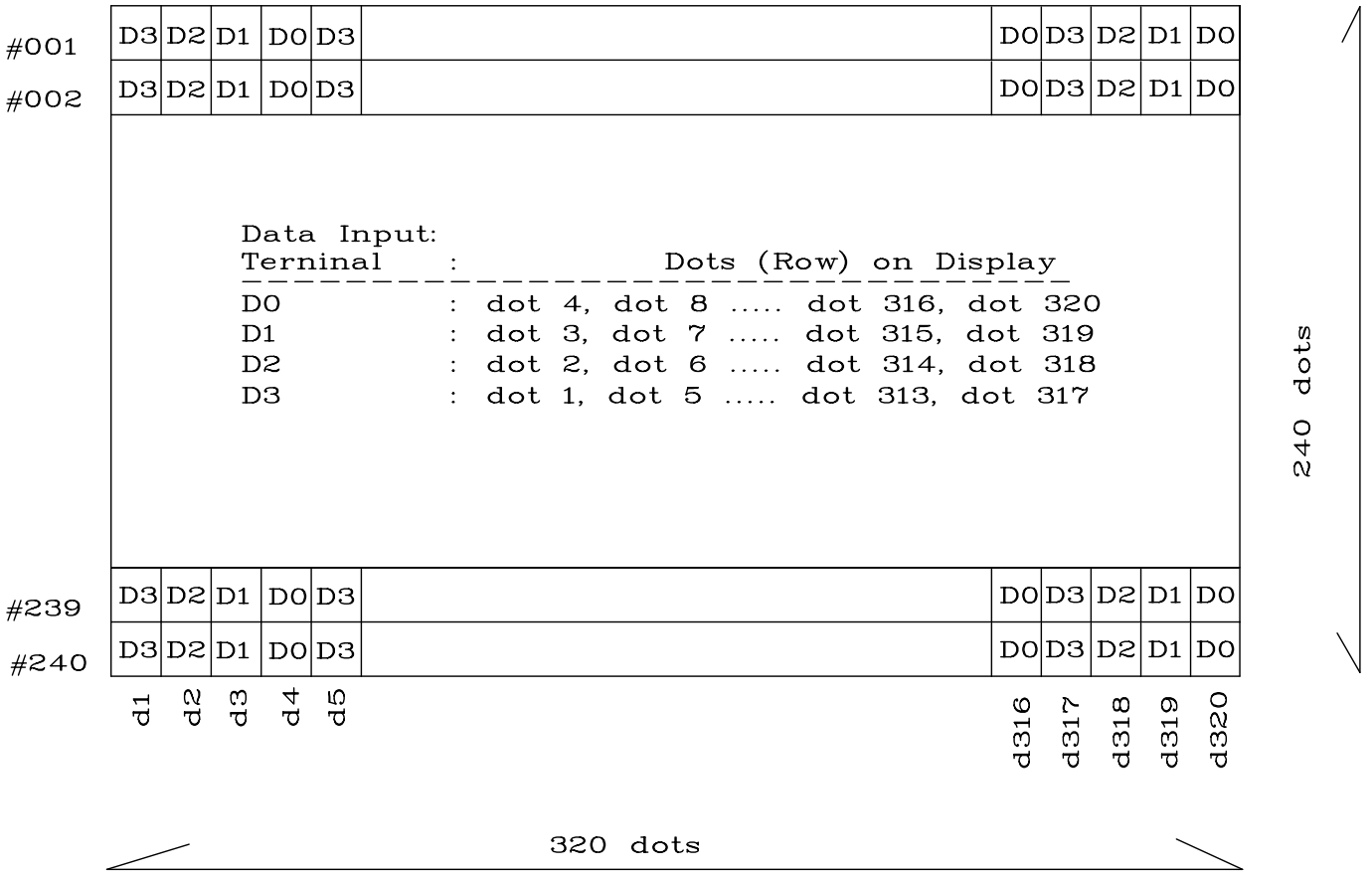
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Shift Clock Period	t_{cp}	220	–	–	ns
"CP" PULSE WIDTH	t_W	90	–	–	ns
CLOCK RISE, FALL TIME	t_r , t_f	–	–	20	ns
DATA SETUP TIME	t_{DSU}	80	–	–	ns
DATA HOLD TIME	t_{DHD}	65	–	–	ns
"CP" →"LOAD" FALL TIME	t_{LSU}	100	–	–	ns
"LOAD"→ "CP" FALL TIME	t_{LC}	100	–	–	ns
"FRAME" SETUP TIME	t_{SETUP}	100	–	–	ns
"FRAME" HOLD TIME	t_{HOLD}	100	–	–	ns
"LOAD" PULSE WIDTH	t_{WC}	110	–	–	ns



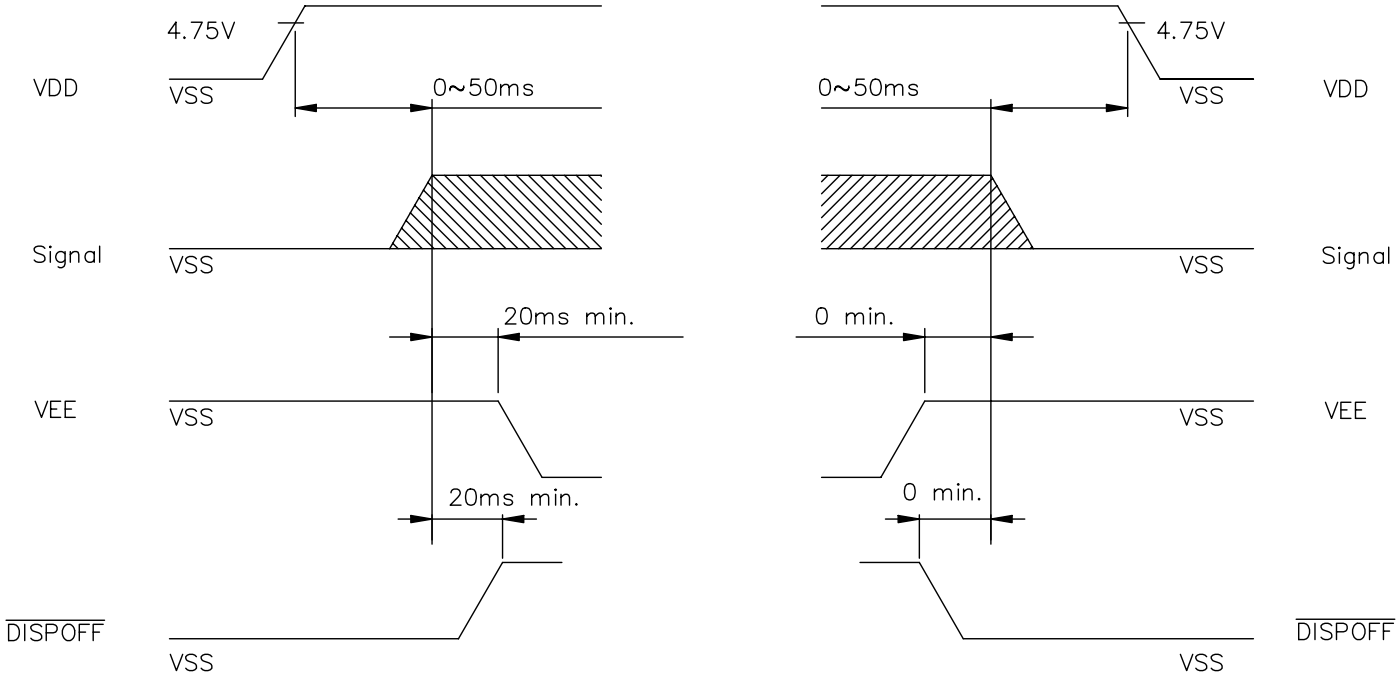
8.2 TIMING CHART OF INPUT SIGNALS



8.3 DISPLAY PATTERN



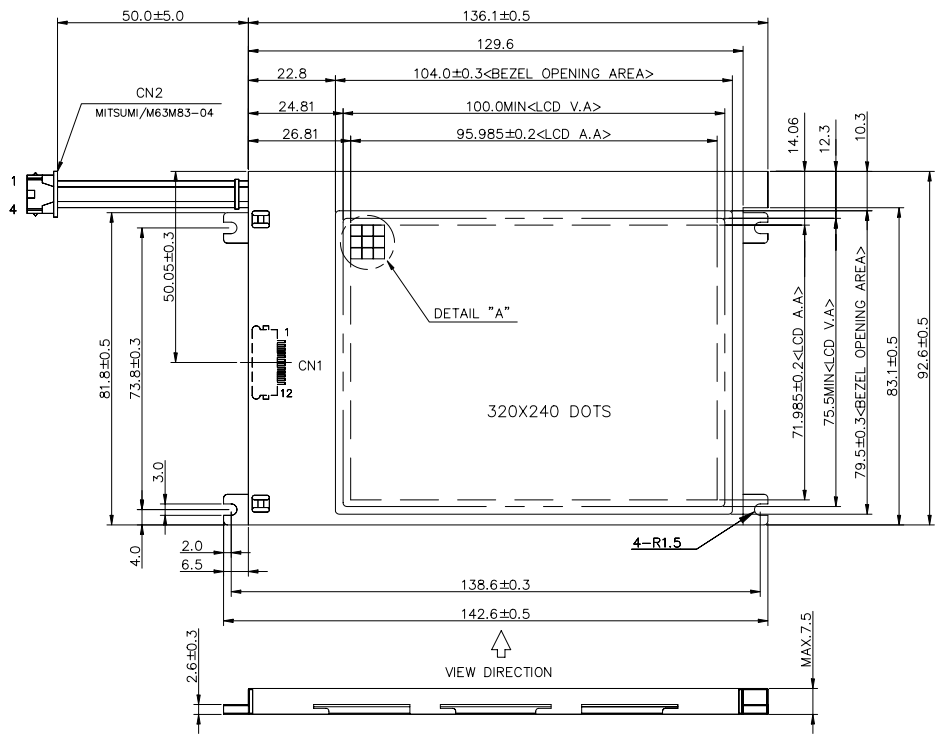
8.4 POWER ON/OFF TIMING

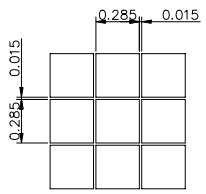


POWER ON

POWER OFF

Missing pixels may occur when the LCM is driven beyond the above power interface timing sequence.





DETAIL "A"
(SCALE 40:1)

CN1:ELCO/6224-12P-S-A OR EQUIVALENT

Pin NO.	SYMBOL	LEVEL	FUNCTION
1	FRAME	H	FIRST LINE MARKER
2	LOAD	H→L	DATA LATCH
3	CP	H→L	DATA SHIFT
4	VDD	–	POWER SUPPLY FOR LOGIC
5	VSS	–	GND
6	VEE	–	POWER SUPPLY FOR LC
7	D0	H/L	DISPLAY DATA
8	D1		
9	D2		
10	D3		
11	$\overline{DISPOFF}$	H/L	H: ON/L: OFF
12	NC	–	–

CN2(CCFT CONNECTOR):MITSUMI/M63M83-04 OR EQUIVALENT

Pin NO.	SYMBOL	FUNCTION
1	GND	GROUND LINE(INVERTER)
2	NC	NO CONNECTION
3	NC	NO CONNECTION
4	HV	HIGH VOLTAGE LINE (INVERTER)

NOTES :

1.RESOLUTION : 320 X 240 DOTS
2.DRIVER IC : "OKI" MSM 6778 (COM)
MSM 6779 (SEG)
3.BACKLIGHT : CCFT (WHITE)
4.FRAME : SUS 430
5.TOLERANCE NO SPECIFIED : ±0.5mm

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE
5					
4					
3					
2					
1					

AZ DISPLAYS, INC.

AGM3224H

APPROVE			THIRD ANGLE P.
CHECK			
DESIGN	J.S HUANG	89.02.19	
DRAWN	J.S HUANG	89.02.19	SCALE / UNIT
	NAME	DATE	1/1 / mm

DWG NO. M372AD0A