

AZ DISPLAYS, INC.

COMPLETE LCD SOLUTIONS

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

PART NUMBER:

AGM6448E

REVISED:

FEBRUARY 4, 2003

AZ DISPLAYS, INC.

1. MECHANICAL DATA

(1) Product No.	AGM6448E
(2) Module Size	205.5 (W)mm x 141.0 (H)mm x 7.0 MAX (D)mm
(3) Dot Size	0.21 (W)mm x 0.21 (H)mm
(4) Dot Pitch	0.23 (W)mm x 0.23 (H)mm
(5) Number of Dots	640 (W) x 480 (H)Dots
(7) Duty	1/240
(8) LCD Display Mode	FSTN: Black and White(Normally Black/Negative Image) Rear Polarizer: Transmissive
(9) Viewing Direction	<input type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock
(10) Backlight	CCFL
(11) Controller	Excluded
(12) DC/DC Converter	Excluded
(13) Weight	310 g(approx.)

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0 V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	VEE-VSS	0	27	V	
Static Electricity	-	-	-	-	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 2,4		Note 3,4	
Vibration(Note 5)	-		49m/s ² (5G)	

Note 1 LCM should be grounded during handling

Note 2 Ta ≤ 50°C : 85%RH max

Ta > 50°C : Absolute humidity must be lower
than the humidity of 85%RH at 50°C

Note 3 Ta at -20°C will be < 48 hrs, at 70°C will be < 120 hrs

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

Note 5

Frequency (HZ)	10~55~10/1 min
Vibration Width	1.5 m/m
Vibration Direction	X/Y/Z
Vibration Time	15 min/cycle X 3 directions

4. OPTICAL CHARACTERISTICS

AT Vop

ITEM		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
MODE		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	G	—	8.0	—	80	—	±50
NOTE		NOTE 6		NOTE 5			

NOTE :

T: TRANSMISSIVE

G: NORMALLY BLACK, 6 O'clock

AT $\phi=0^\circ$ $\theta=0^\circ$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	340	680	ms	NOTE 2
		25℃	—	120	240		
		50℃	—	90	180		
Response Time (fall)	Tr	0℃	—	370	710	ms	NOTE 2
		25℃	—	170	290		
		50℃	—	80	170		

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3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Lamp : Rating

T_a=25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Open Voltage	V _{OPEN}	600	—	—	Vrms	—
Lamp Voltage	V _L	—	350	—	Vrms	—
Lamp current	I _L	4	5	6	mArms	(*1)
Lamp power consumption	P _L	—	1.75	—	W	(*2)
Lamp frequency	F _L	—	35	—	KHz	—
Lamp life time	L _L	—	20000	—	hrs	(*3)

(*1) It is recommended that I_L be not more than 6 mArms so that heat radiation of CCFT backlight may least affect the display quality .

(*2) Power consumption excludes inverter loss .

(*3) CCFT lifetime is defined as the time taken for the brightness to reduce to 50% of its original value.

4.OPTICAL CHARACTERISTICS

AT Vop

ITEM		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
MODE		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	G	—	8.0	—	80	—	±50
NOTE		NOTE 6		NOTE 5			

NOTE :

T: TRANSMISSIVE

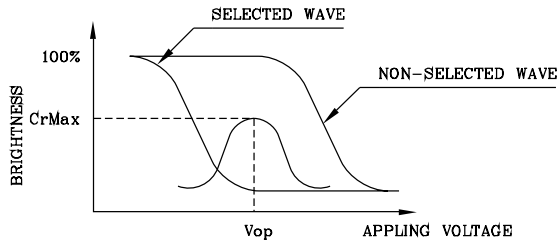
G: NORMALLY BLACK, 6 O'clock

AT $\phi=0^\circ$ $\theta=0^\circ$

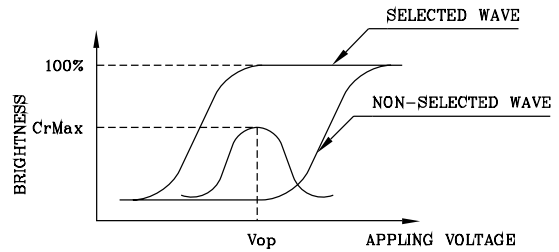
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	340	680	ms	NOTE 2
		25℃	—	120	240		
		50℃	—	90	180		
Response Time (fall)	Tr	0℃	—	370	710	ms	NOTE 2
		25℃	—	170	290		
		50℃	—	80	170		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



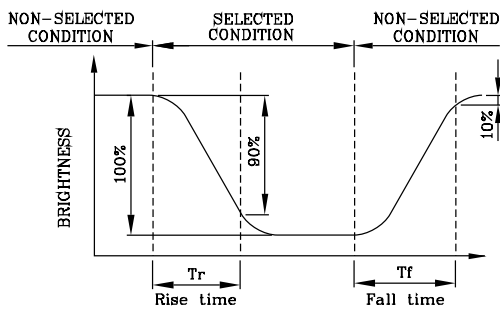
(negative type)

*Conditions

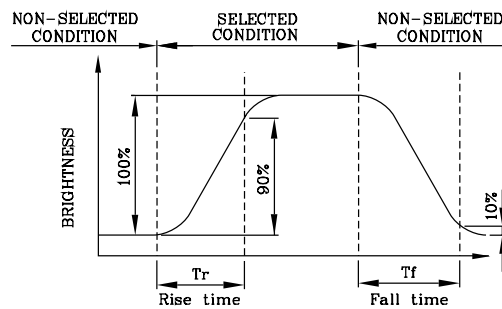
Viewing Angle : 0
 Frame Frequency : 70Hz
 Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



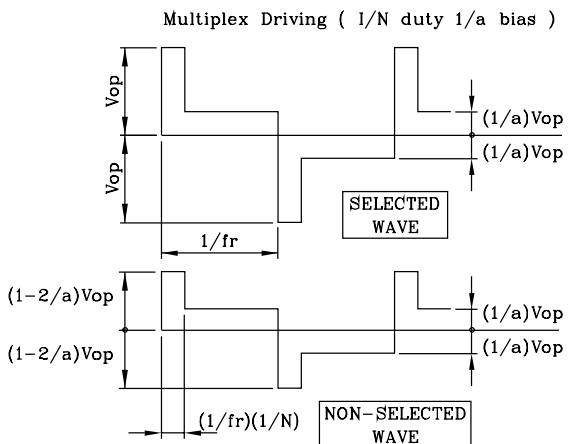
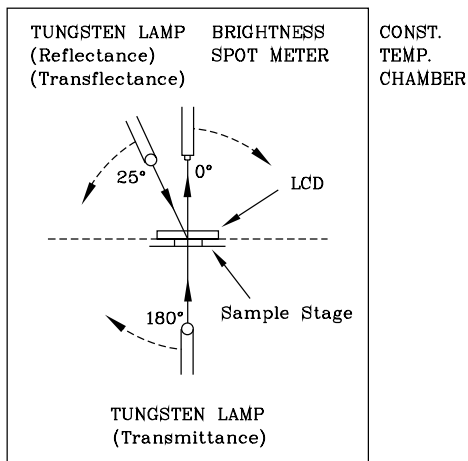
(negative type)

*Conditions

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

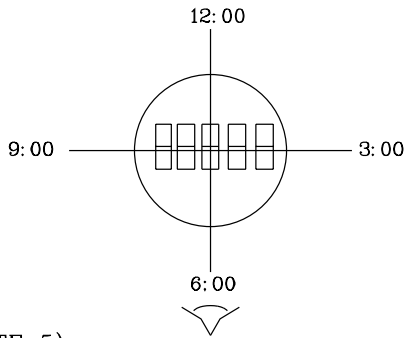
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



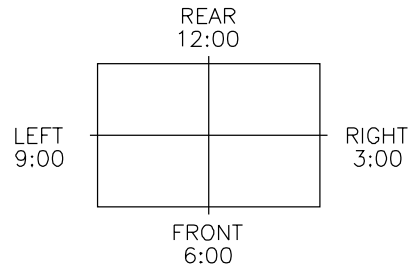
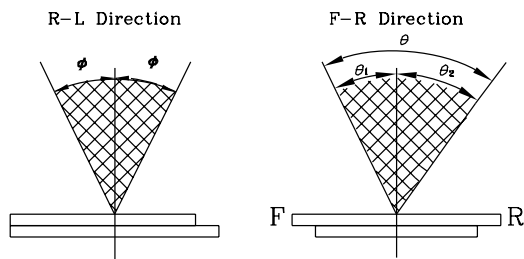
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product

The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

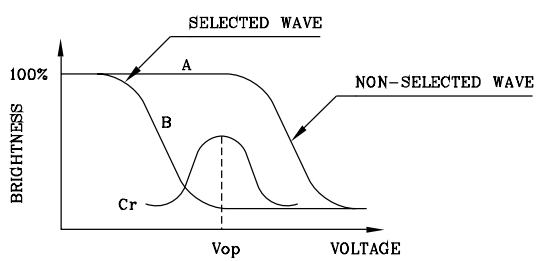
$$\theta = \theta_1 + \theta_2$$

*Conditions

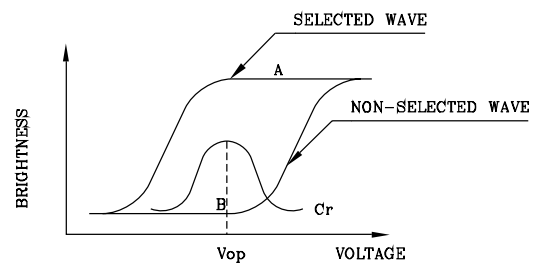
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



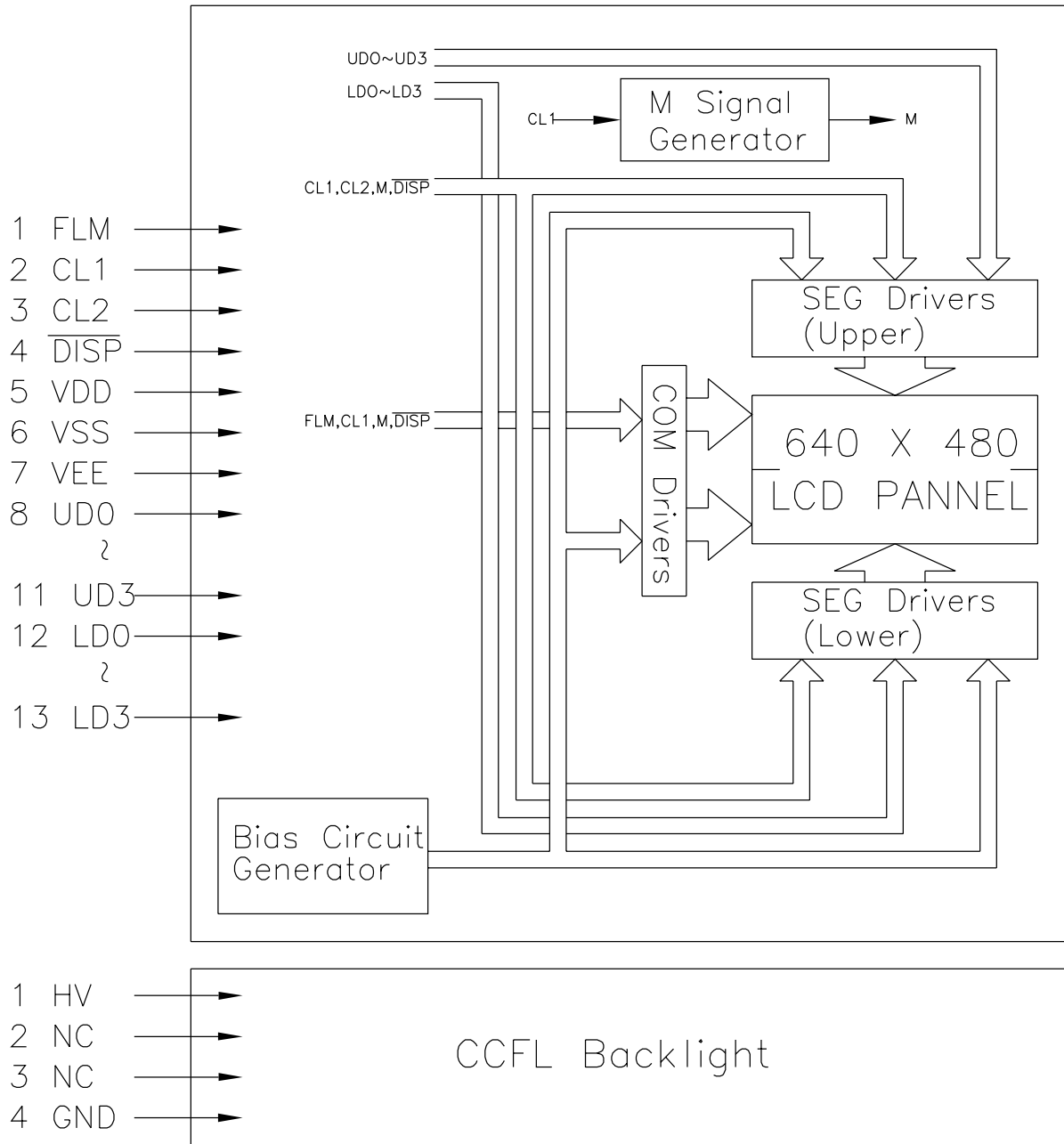
(negative type)

$$\text{Contrast Ratio} : Cr = A/B$$

*Conditions

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

5. BLOCK DIAGRAM



* M Signal Value Setting

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

6. INTERNAL PIN CONNECTION

LCD

Pin No.	Symbol	Level	Function
1	FLM	H/L	SCAN START-UP SIGNAL
2	CL1	H→L	DATA LATCH PULSE
3	CL2	H→L	DATA SHIFT PULSE
4	\overline{DISP}	H/L	DISPLAY OFF ("H"=ON,"L"=OFF)
5	VDD	-	POWER SUPPLY FOR LOGIC (+3.3V/+5V)
6	VSS	-	SIGNAL GROUND (GND)
7	VEE	-	POWER SUPPLY FOR LCD (+V)
8	UD0	H/L	DISPLAY DATA (UPPER HALF)
9	UD1		
10	UD2		
11	UD3		
12	LD0	H/L	DISPLAY DATA (LOWER HALF)
13	LD1		
14	LD2		
15	LD3		

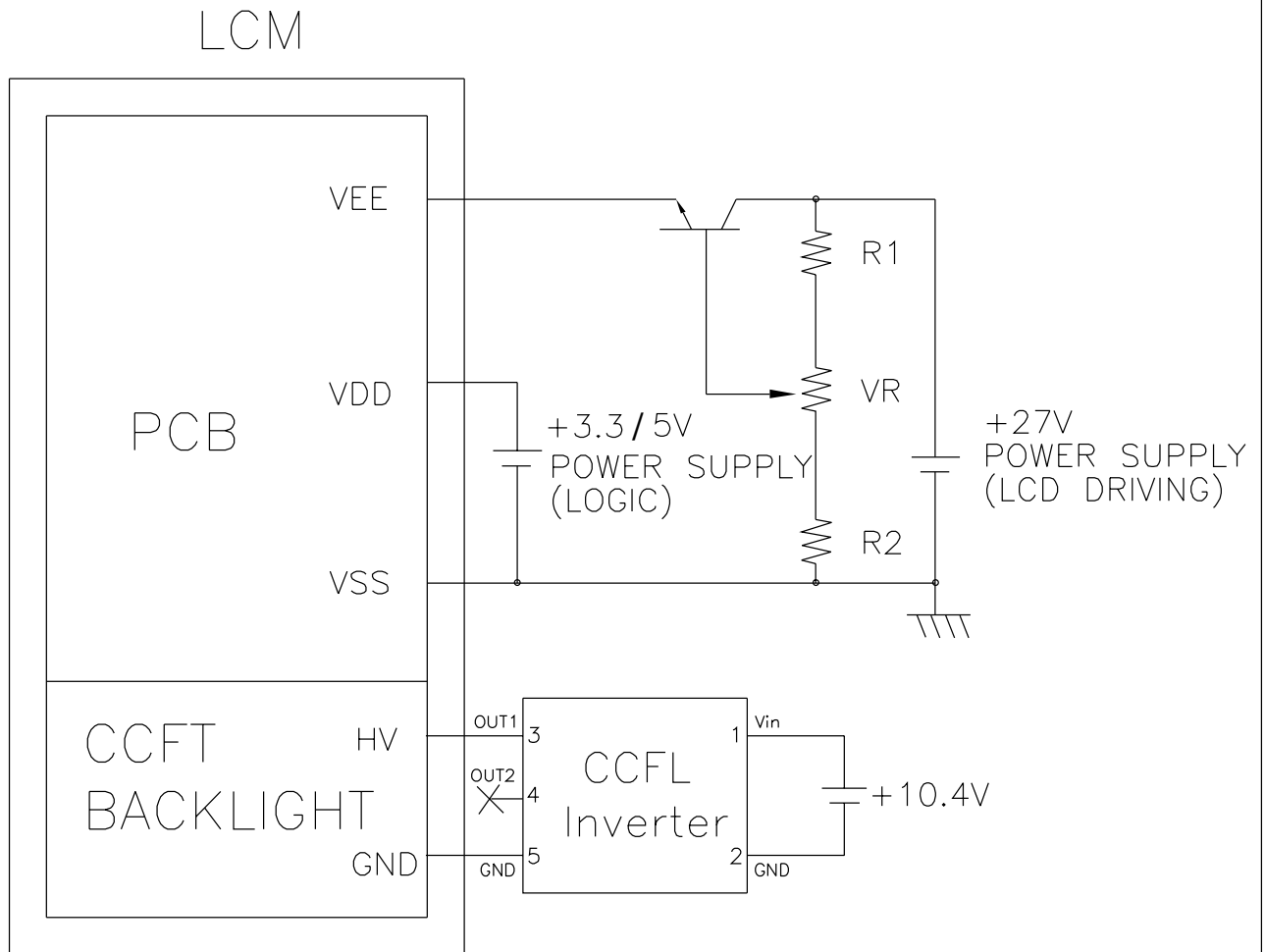
CCFL

Pin No.	Symbol	Level	Function
1	HV	-	HIGH VOLTAGE LINE (INVERTER)
2~3	NC	-	NON CONNECTION
4	GND	-	GROUND LINE (INVERTER)

LCD connector : MOLEX 53261-1590
 Mating connector : MOLEX 51021-1500(HOUSING) X 1 +
 MOLEX 50058-8000(TERMINAL) X 15 or Compatible

CCFL connector : M63M83-04 (MITSUMI)
 Mating connector : M60-04-30-114P (MITSUMI)
 M60-04-30-134P (MITSUMI)
 M61M73-04 (MITSUMI)

7. POWER SUPPLY



1. $R1 + VR + R2 = 10K \sim 20K\Omega$

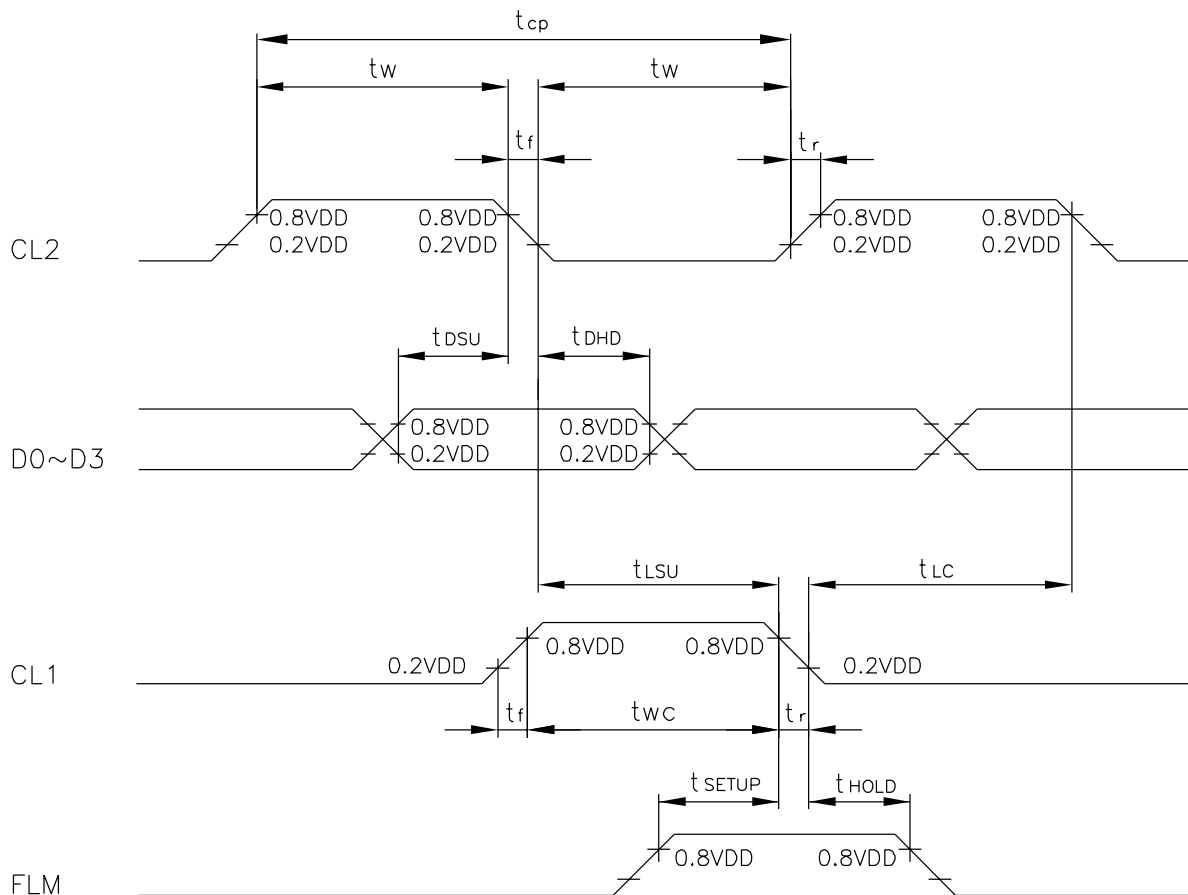
2. RECOMMENDED CCFT INVERTER : CXA-L10L(TDK)

8. TIMING CHARACTERISTICS

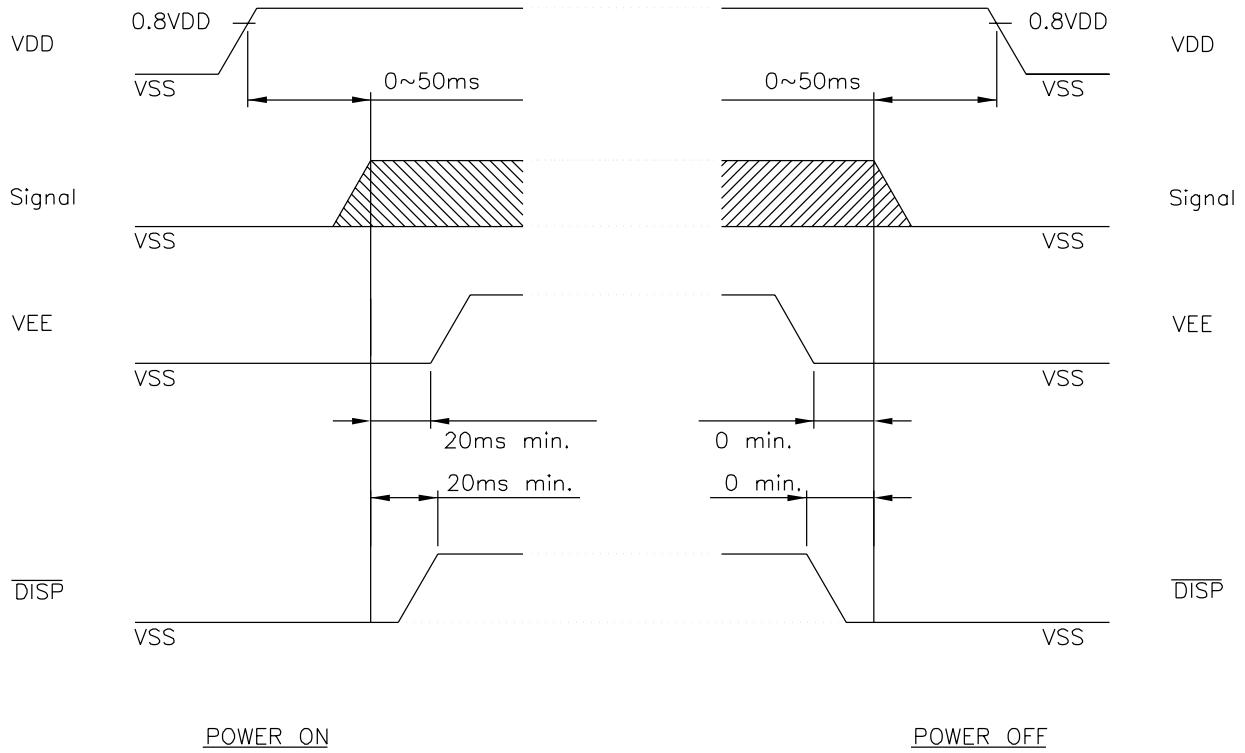
8-1. INTERFACE TIMING

@VDD=2.5~5.5V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Shift Clock Period	t_{cp}	152	-	-	ns
"CL2" PULSE WIDTH	t_w	65	-	-	ns
CLOCK RISE, FALL TIME	t_r, t_f	-	-	50	ns
DATA SETUP TIME	t_{DSU}	50	-	-	ns
DATA HOLD TIME	t_{DHD}	40	-	-	ns
"CL2" → "CL1" FALL TIME	t_{LSU}	65	-	-	ns
"CL1" → "CL2" FALL TIME	t_{LC}	65	-	-	ns
"FLM" SETUP TIME	t_{SETUP}	100	-	-	ns
"FLM" HOLD TIME	t_{HOLD}	100	-	-	ns
"CL1" PULSE WIDTH	t_{wc}	65	-	-	ns

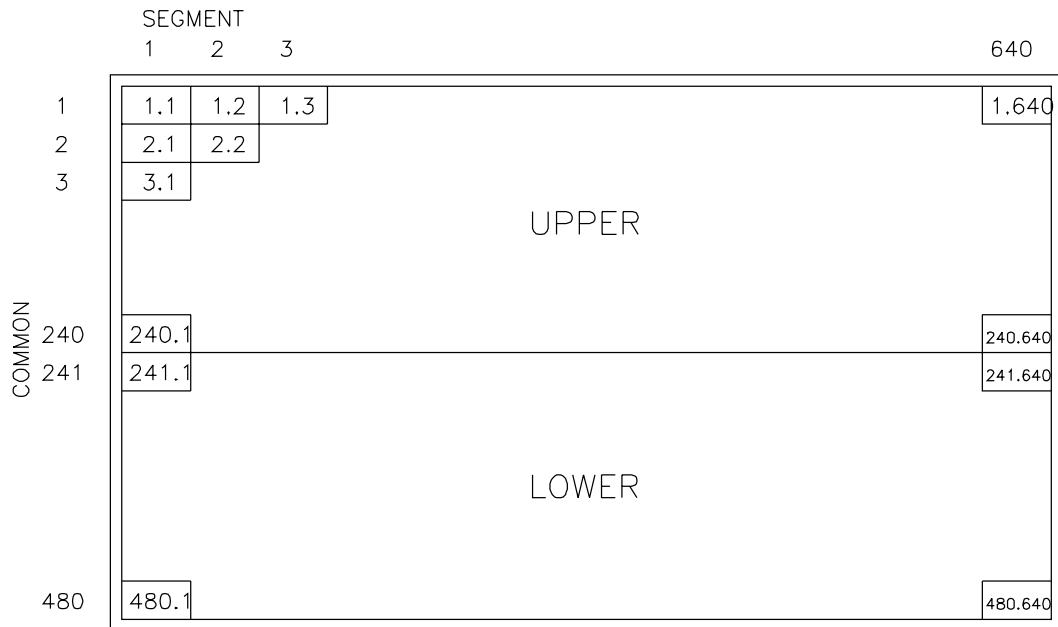


8-2. POWER ON/OFF TIMING

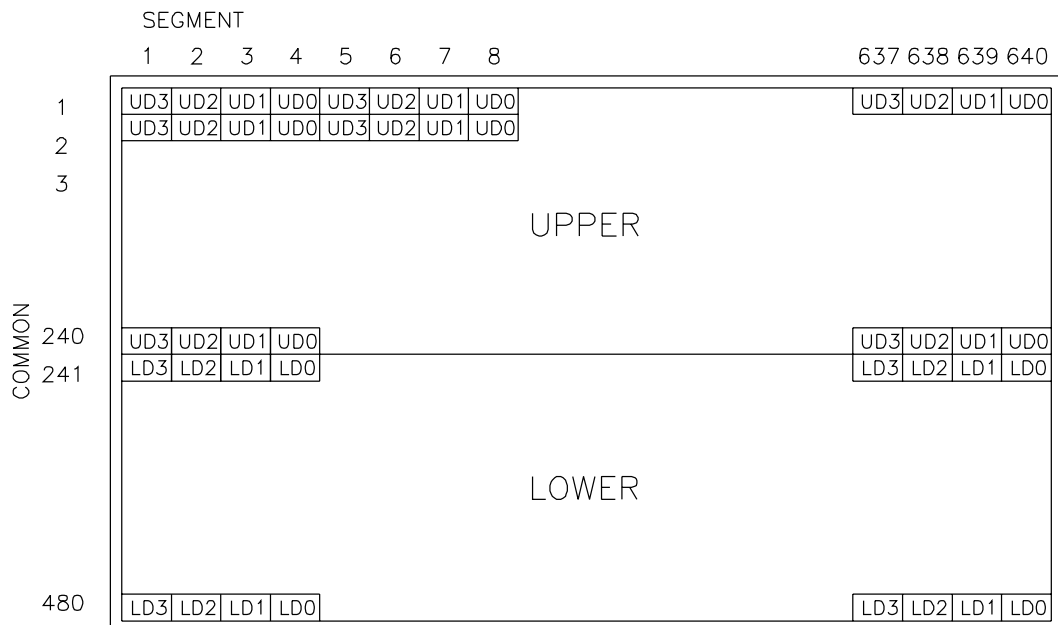


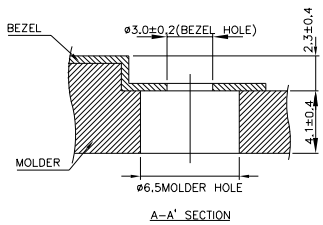
Missing pixels may occur when the LCM is driven beyond the above power interface timing sequence.

8-3.DISPLAY PATTERN



NOTE : 1.1 MEANS 1ST COMMON 1ST SEGMENT DOT





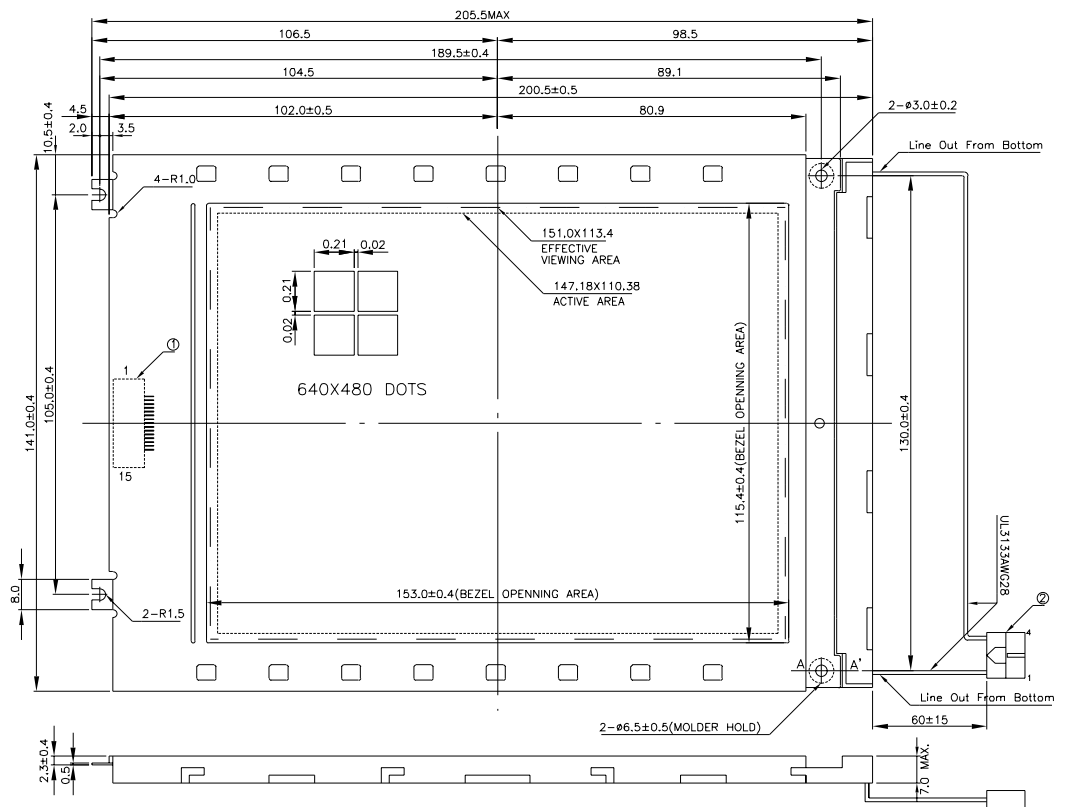
- Note :
- ① LCD connector : MOLEX, 53261-1590
 - ② CCFT connector : M63M83-04 (MITSUMI)
correspondable CCFT connector : M60-04-30-114P (MITSUMI)
M60-04-30-134P (MITSUMI)
M61M73-04 (MITSUMI)
 - ③ TOLERANCE NO SPECIFIED:±0.5 mm

I/O connection

Pin No.	Symbol	Signal Level	Function
1	FLM	H	Scan Start-up Signal
2	CL1	H=L	Data Latch Pulse
3	CL2	H=L	Data Shift Pulse
4	DISP	H/L	Display Off ("H"=ON,"L"=OFF)
5	VDD	-	Power Supply for Logic (+5V)
6	VSS	-	Signal Ground (GND)
7	VEE	-	Power Supply for LCD (+V)
8	UD0	H/L	Display Data (Upper Half)
9	UD1	H/L	
10	UD2	H/L	
11	UD3	H/L	Display Data (Lower Half)
12	LD0	H/L	
13	LD1	H/L	
14	LD2	H/L	
15	LD3	H/L	

CCFT

Pin No.	Symbol	Signal Level	Function
1	HV	-	High Voltage Line (Inverter)
2~3	NC	-	Non Connection
4	GND	-	Ground Line (Inverter)



AZ DISPLAYS, INC.

AGM6448E

APPROVE	NAME	DATE	THIRD ANGLE P.
CHECK			
DESIGN	Louis Lee	88.10.13	SCALE UNIT
DRAWN	MAY PINC	88.10.13	2/3 mm
DWG NO.	M1168-D16A		

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE