

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℃	
		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		

3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Lamp : Rating

Ta=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℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	G	-	8.0	-	80	-	±50
NOTE		NOTE 6		NOTE 5			

NOTE :

T: TRANSMISSIVE

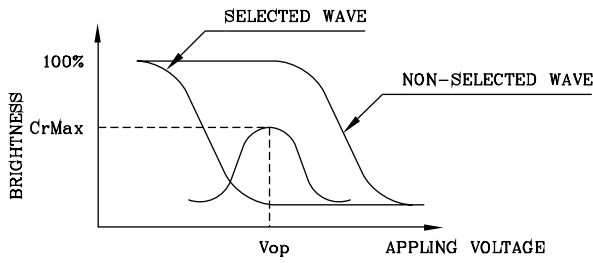
G: NORMALLY BLACK, 6 O'clock

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

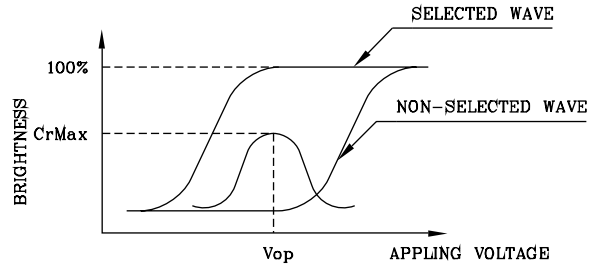
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	-	340	680	ms	NOTE 2
		25℃	-	120	240		
		50℃	-	90	180		
Response Time (fall)	Tr	0℃	-	370	710	ms	NOTE 2
		25℃	-	170	290		
		50℃	-	80	170		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



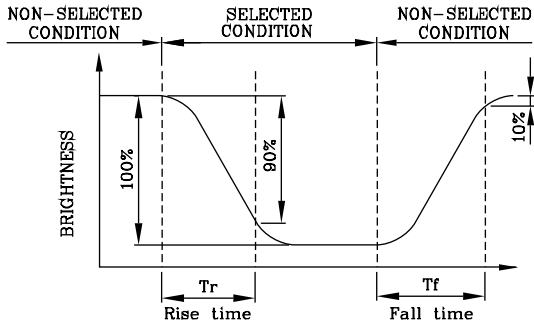
(negative type)

*Conditions

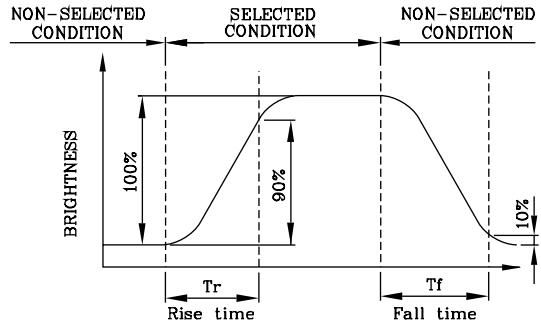
Viewing Angle : 0
 Frame Frequency : 70Hz
 Applying Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



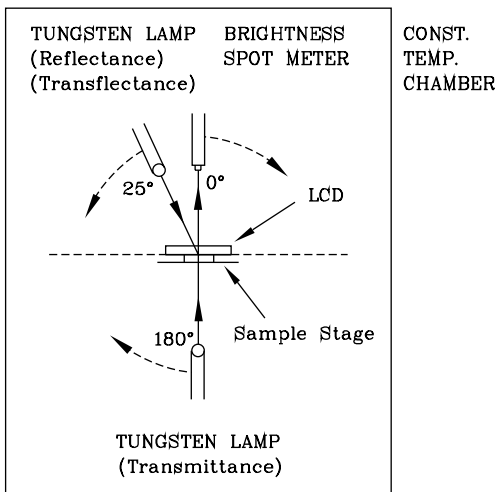
(negative type)

*Conditions

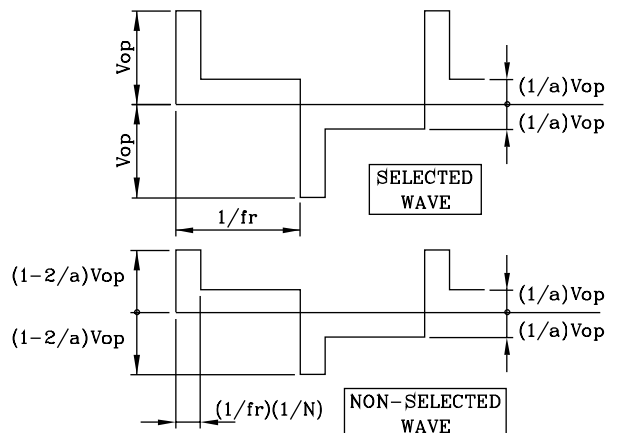
Operating Voltage : Vop
 Viewing Angle (θ,φ) : (0,0)
 Frame Frequency : 70Hz
 Applying Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

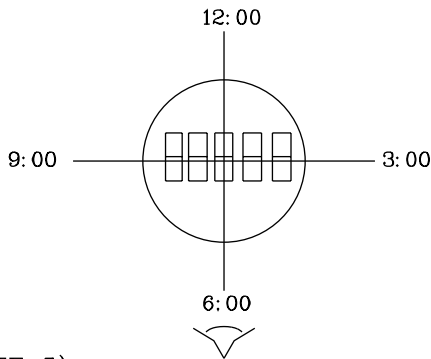


Multiplex Driving (I/N duty 1/a bias)



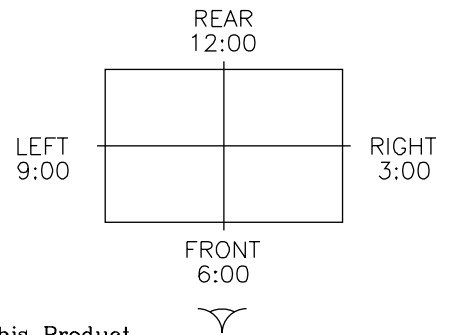
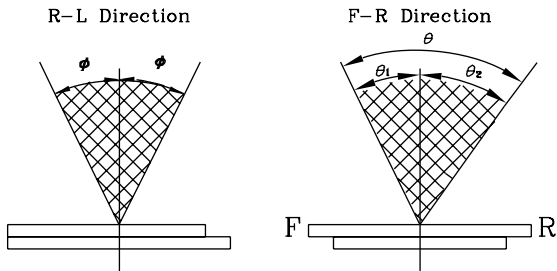
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product
The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

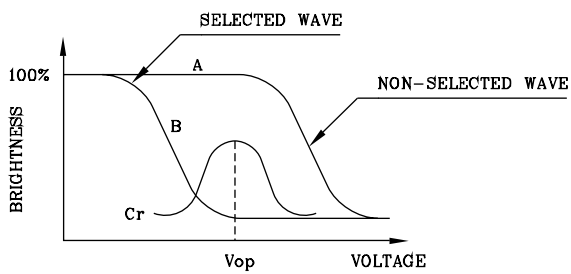
$$\theta = \theta_1 + \theta_2$$

*Conditions

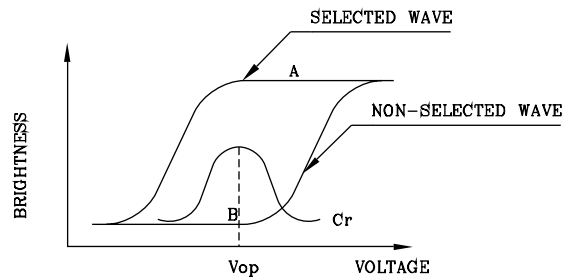
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



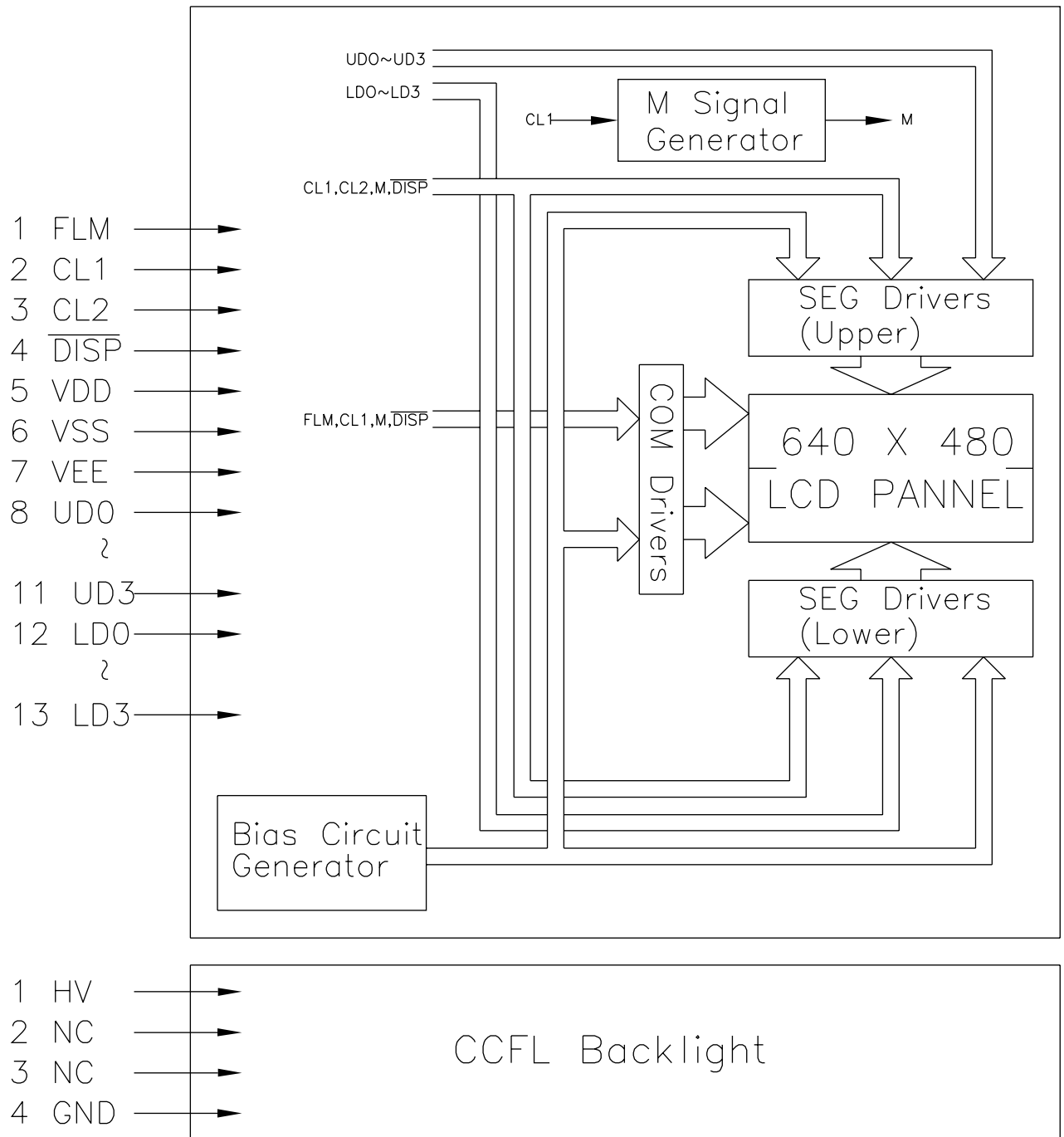
(negative type)

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

*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	$\overline{\text{DISP}}$	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)

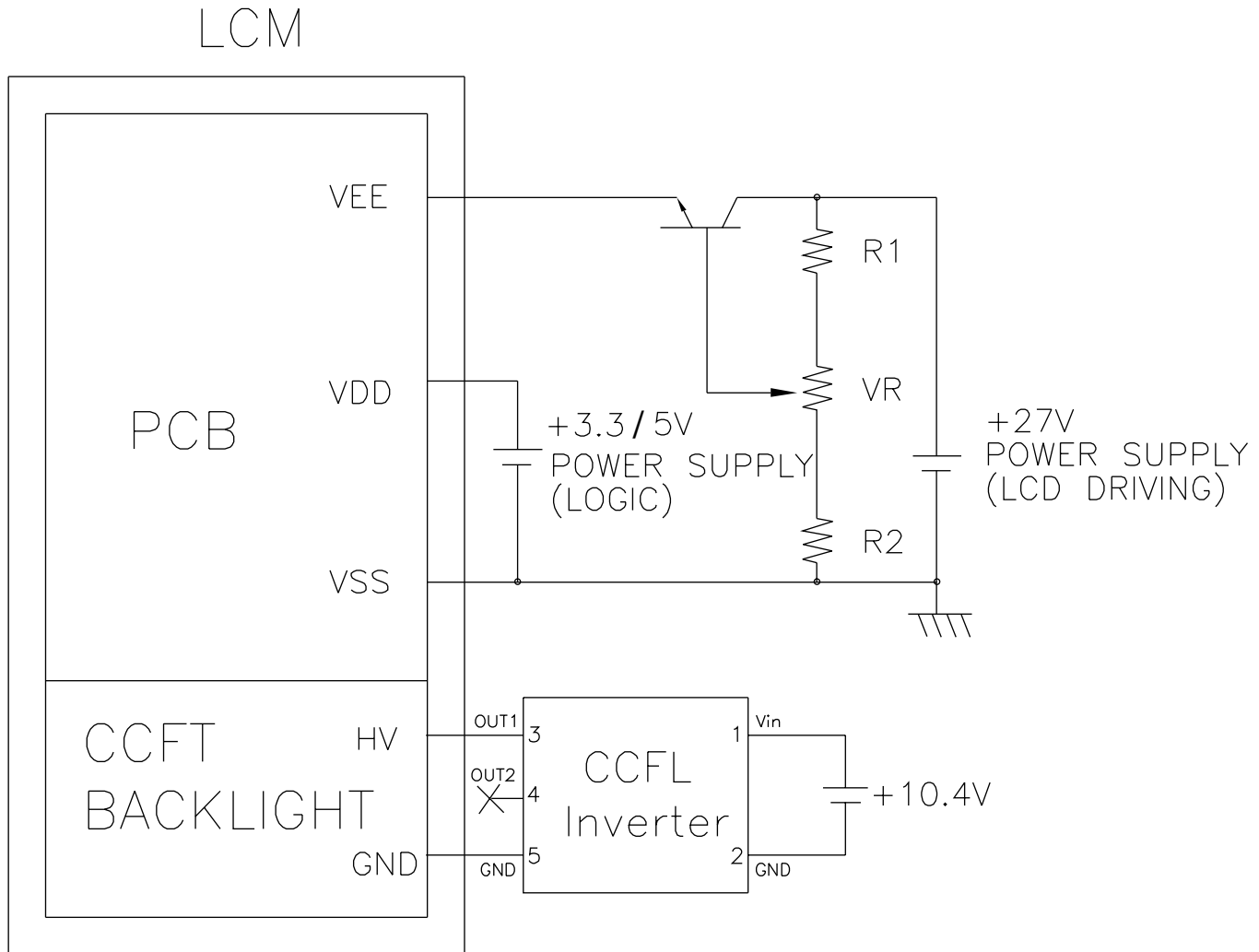
LCD connector : MOLEX 53261-1590

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

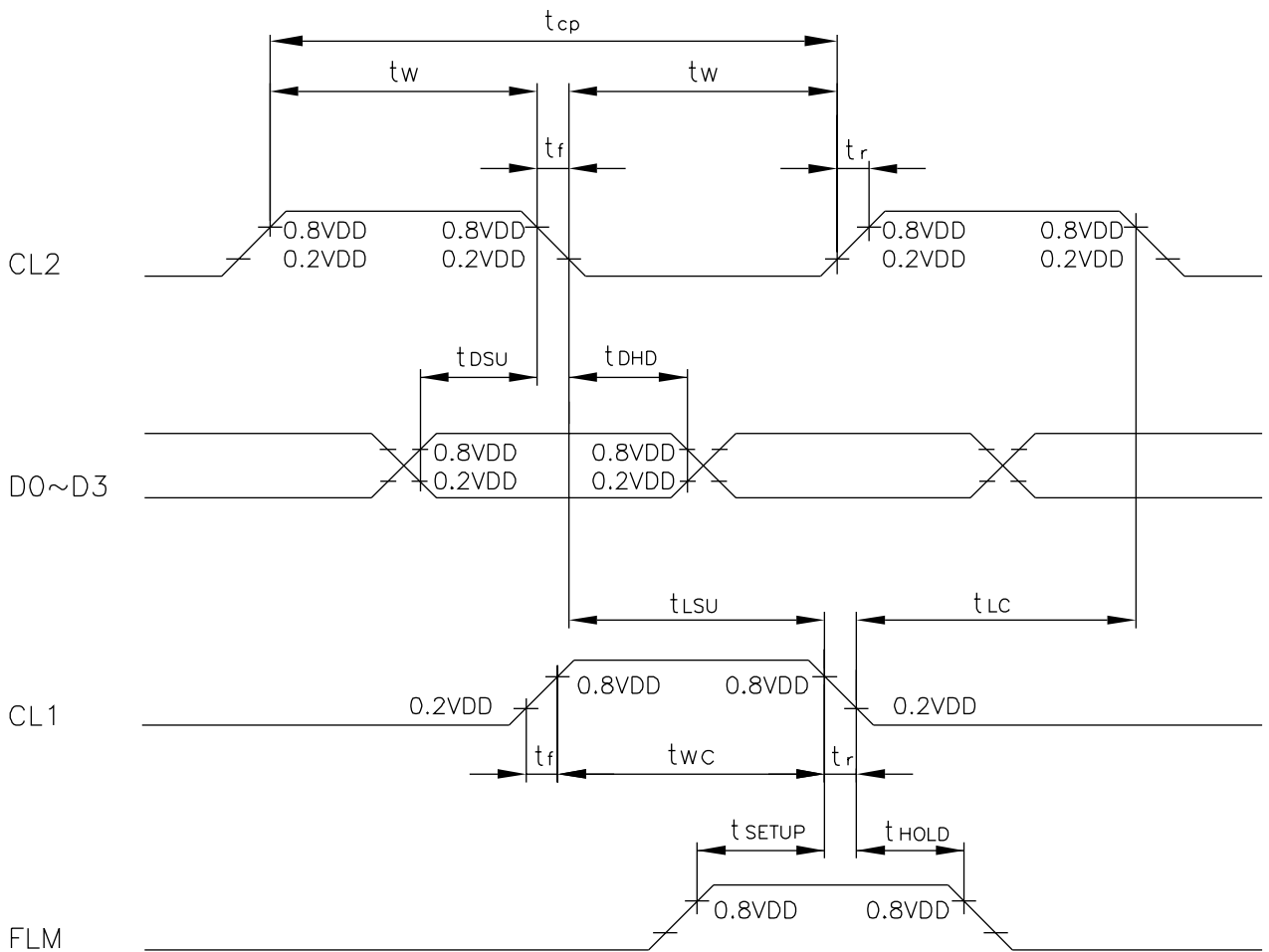
2. RECOMMENDED CCFT INVERTER : CXA-L10L(TDK)

8. TIMING CHARACTERISTICS

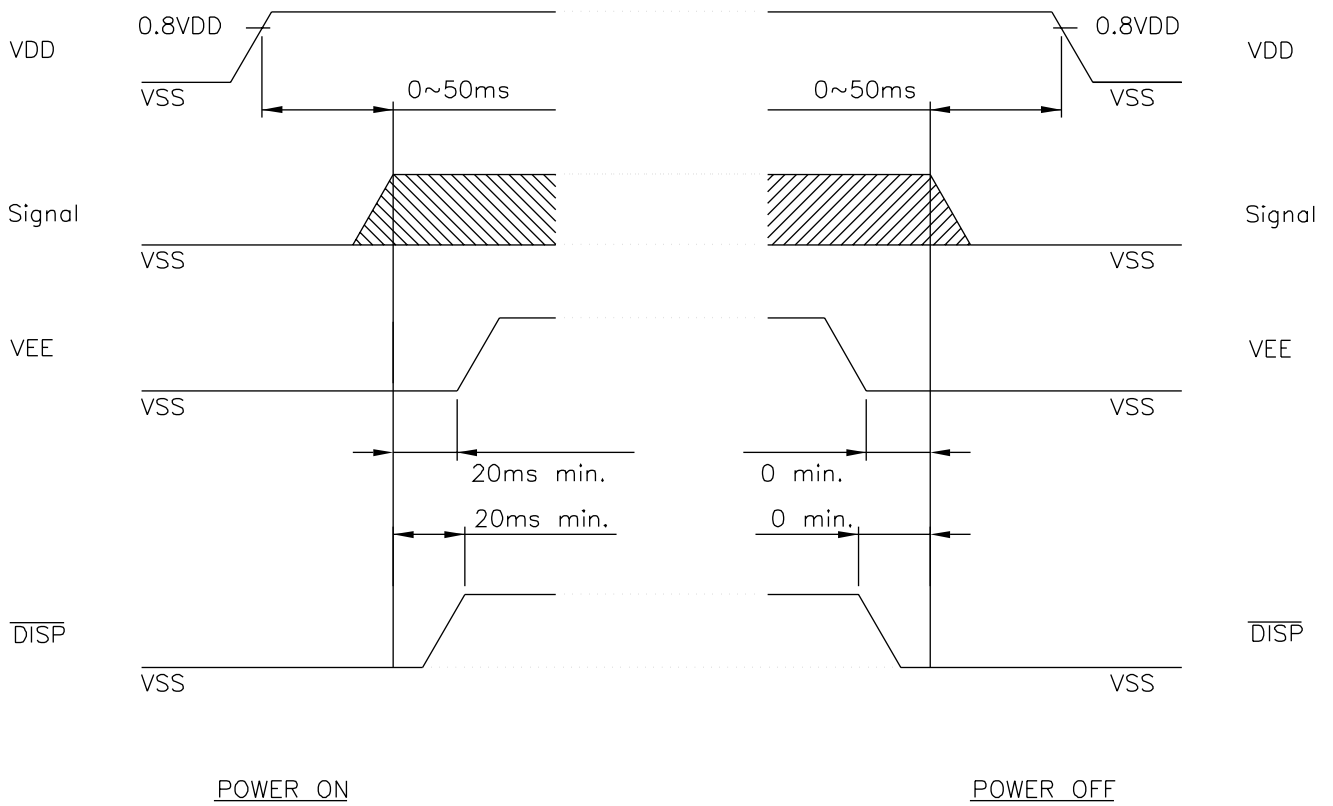
8-1. INTERFACE TIMING

@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

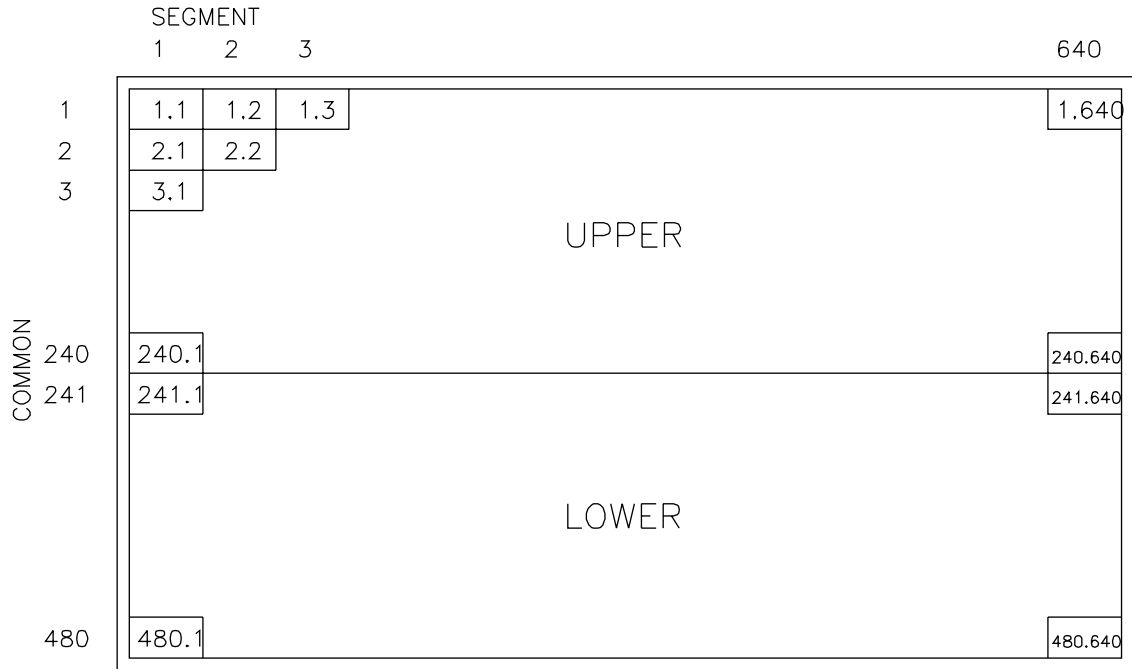


8-2. POWER ON/OFF TIMING

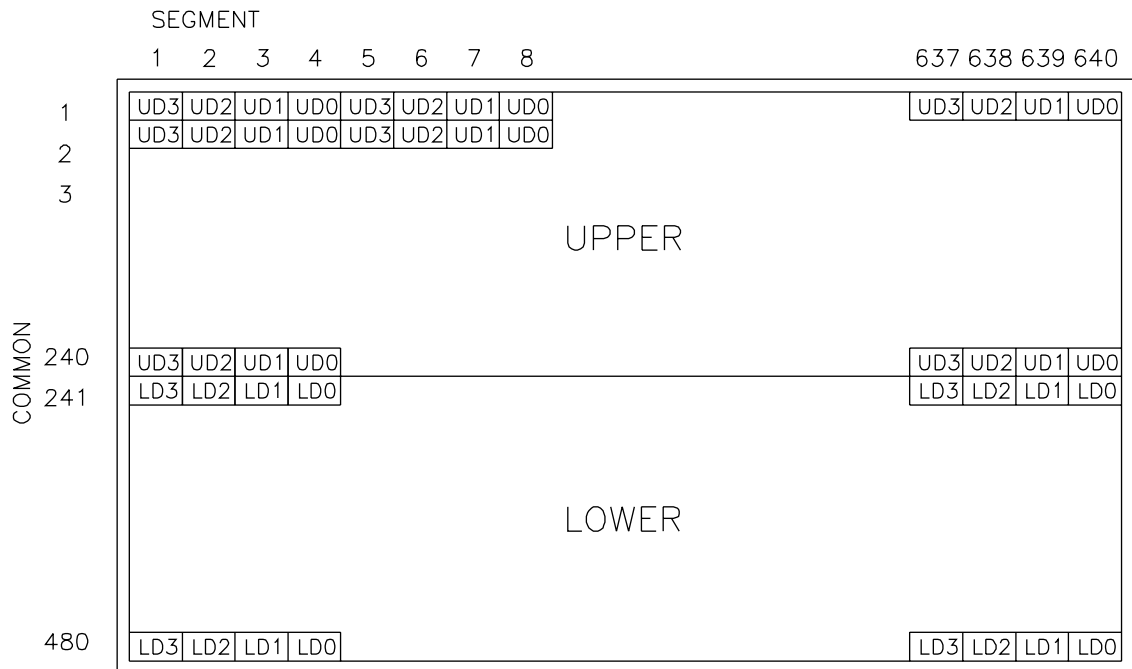


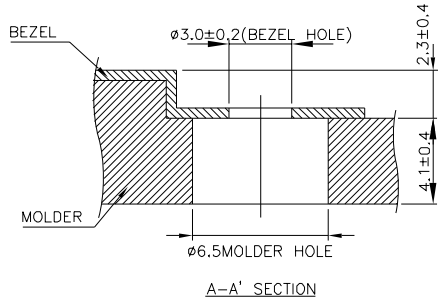
Missing pixels may occur when the LCM is driven beyond the above power interface timing sequence.

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)

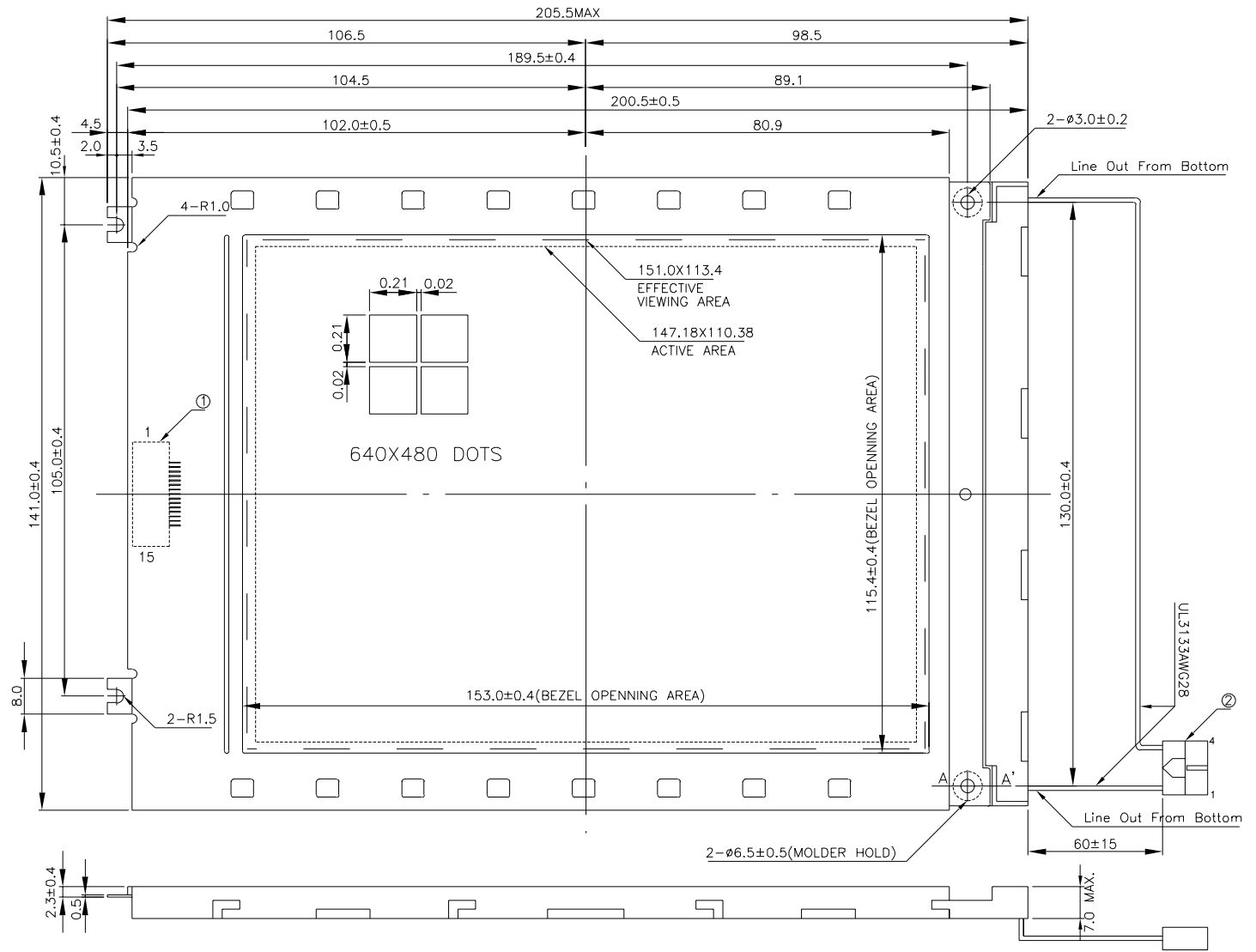
③ TOLERANCE NO SPECIFIED:±0.5 mm

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

	NAME	DATE	THIRD ANGLE P.			
APPROVE						
CHECK						
DESIGN	Louis Lee	88.10.13	SCALE			
DRAWN	MAY PING	88.10.13	UNIT			
REV. NO.	DESCRIPTION		DATE	DESIGN	CHECK	APPROVE

DWG NO. **M1618-D16A**