

AZ DISPLAYS, INC.

COMPLETE LCD SOLUTIONS

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

PART NUMBER:

AGM6448E

REVISED:

October 4, 2006

AZ DISPLAYS, INC.

1.MECHANICAL DATA

NO	ITEM	CONTENTS	UNIT
1	Product No.	AGM6448E	—
2	Module Size	205.5 (W) x 141.0 (H) x 7.0 max (D)	mm
3	Dot Size	0.21 (W) x 0.21 (H)	mm
4	Dot Pitch	0.23 (W) x 0.23 (H)	mm
5	Number of Dots	640 (W) x 480 (H)	Dot
6	Duty	1/240	—
7	LCD Display Mode	FSTN, Normally White / Positive Image	—
8	Rear Polarizer	Transflective Type(High Transparency)	—
9	Viewing Direction	6	O'clock
10	Backlight	CCFL	—
11	Controller	Excluded	—
12	DC/DC Converter	Excluded	—
13	Touch Panel	Excluded	—
14	Weight	310 (Approx.)	g

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

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP.			
	OPERATION		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity (Without Condensation)	Note 2,4		Note 3,4	
Vibration(Note 5)	-		49m/s ² (5G)	

Note 2 Ta ≦ 70°C : 75%RH max

Note 3 Please refer to item of reliability test

Note 4 Background color will change slightly depending on ambient temperature.
That 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

Note 6 Operation temp not include CCFL Lamp

3.ELECTRICAL CHARACTERISTICS

3-1.ELECTRICAL CHARACTERISTICS OF LCD

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Power Supply for Logic		VDD-VSS	-		3.0	3.3	3.6	V
					4.75	5.0	5.25	
Input Voltage		VIL	L level		VSS	0.2VDD	-	V
		VIH	H level		0.8VDD	VDD	-	V
LCM Recommend LCD Module Driving Voltage		VEE-VSS	Duty=1/240	-20°C	24.2	24.6	25.0	V
				0°C	22.7	23.1	23.5	
				25°C	21.9	22.3	22.7	
				50°C	21.1	21.5	21.9	
				70°C	20.6	21.0	21.4	
Power Supply Current for LCM		IDD	VDD=5.0V VEE-VSS=22.3V FLM=70Hz PATTERN : ■ □ ■ □ □ ■ □ ■		-	3	6	mA
		IEE			-	15	30	
LCM	Surface Luminance	Ls	IL =5mA	PATTERN: (Dots All On)	-	30	50	cd/m²
				PATTERN: (Dots All Off)	70	100	-	
LCM	Surface Uniformity	U	IL =5mA	PATTERN: (Dots All On)	80	85	-	%

3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used Lamp Rating

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Lamp Voltage	V_L	—	350	—	Vrms	—
Lamp current	I_L	4	5	6	mArms	—
Lamp power consumption	P_L	—	1.75	—	W	(*1)
Lamp frequency	F_L	—	35	—	KHz	—
Lamp life time	L_L	—	20000	—	hrs	at $I_L = 5 \text{ mArms}$ $T_a=25^\circ\text{C}$ (*2)

(*1) Power consumption excluded inverter loss .

(*2) Lamp life time is defined as follows : The final brightness is at 50% of original brightness .

4.OPTICAL CHARACTERISTICS

WIDE TEMPERATURE MODE

AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)										θ (Viewing Angle)		ϕ (Viewing Angle)	
		-20°C		0°C		25°C		50°C		70°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
H	J	2.8	4	3.5	5	4.2	6	2.8	4	2.1	3	—	F:40 R:30	—	L:35 R:35
NOTE		NOTE 6										NOTE 5			

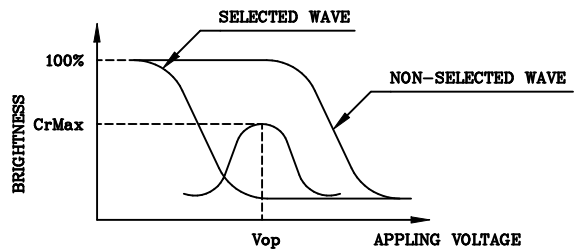
NOTE :
H : Transflective(High Transparency)
J : Normally White, 6 O'clock

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

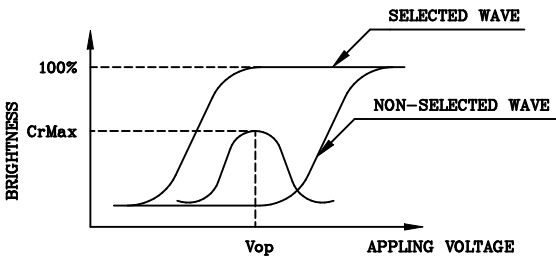
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	2000	4000	6000	ms	NOTE 2
		0℃	400	750	1100		
		25℃	125	250	375		
		50℃	60	120	180		
		70℃	35	70	105		
Response Time (fall)	Tf	-20℃	1000	2000	3000	ms	NOTE 2
		0℃	210	420	630		
		25℃	60	120	180		
		50℃	30	60	90		
		70℃	20	40	60		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



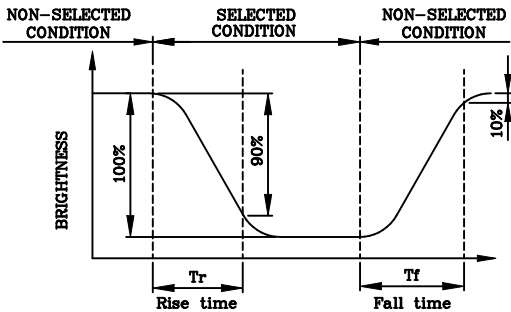
(negative type)

*Conditions

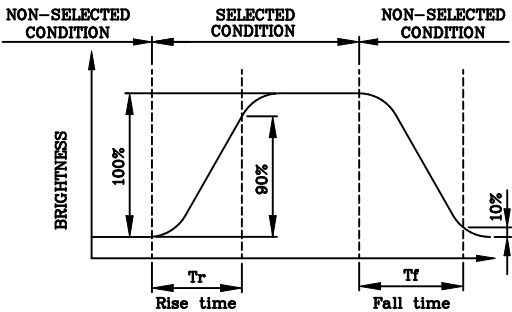
Viewing Angle : 0
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



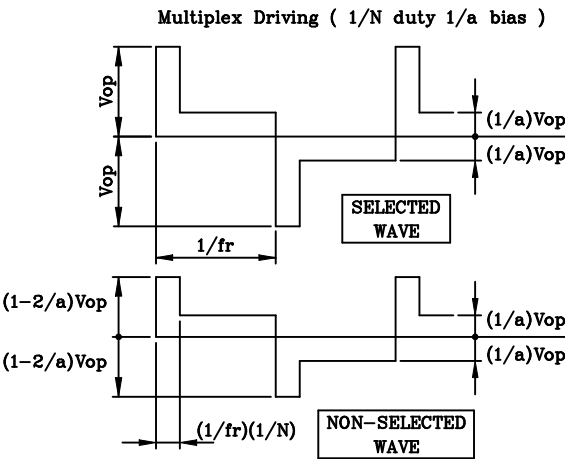
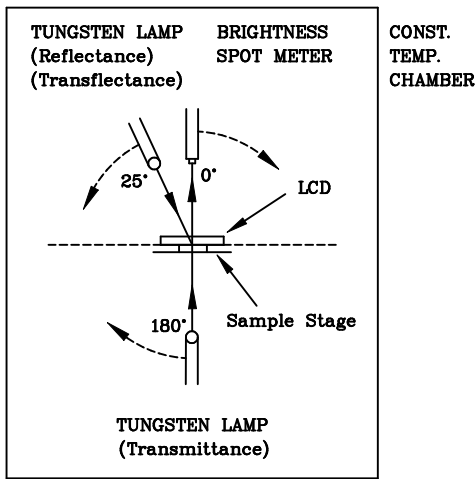
(negative type)

*Conditions

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

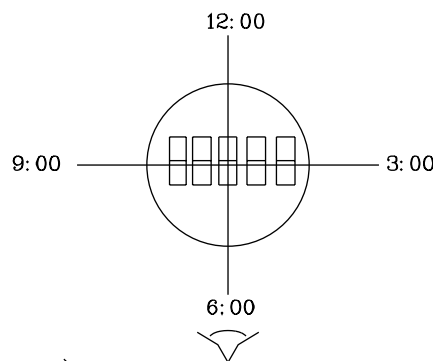
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



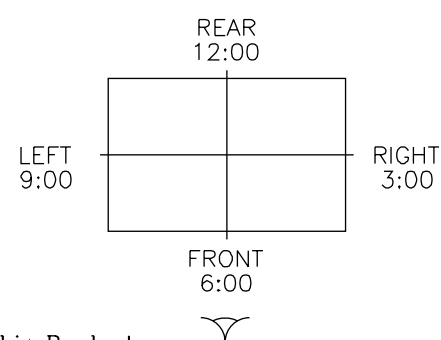
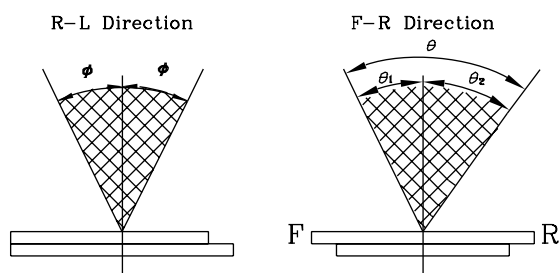
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

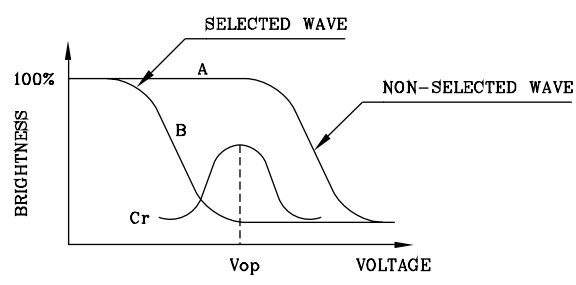
$$\theta = \theta_1 + \theta_2$$

*Conditions

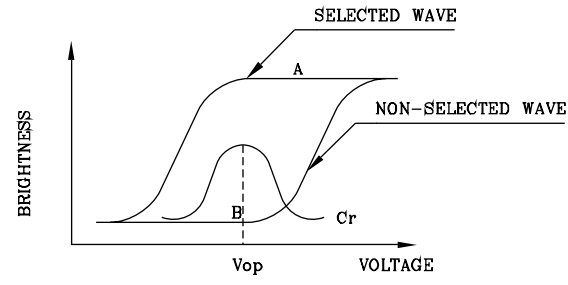
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



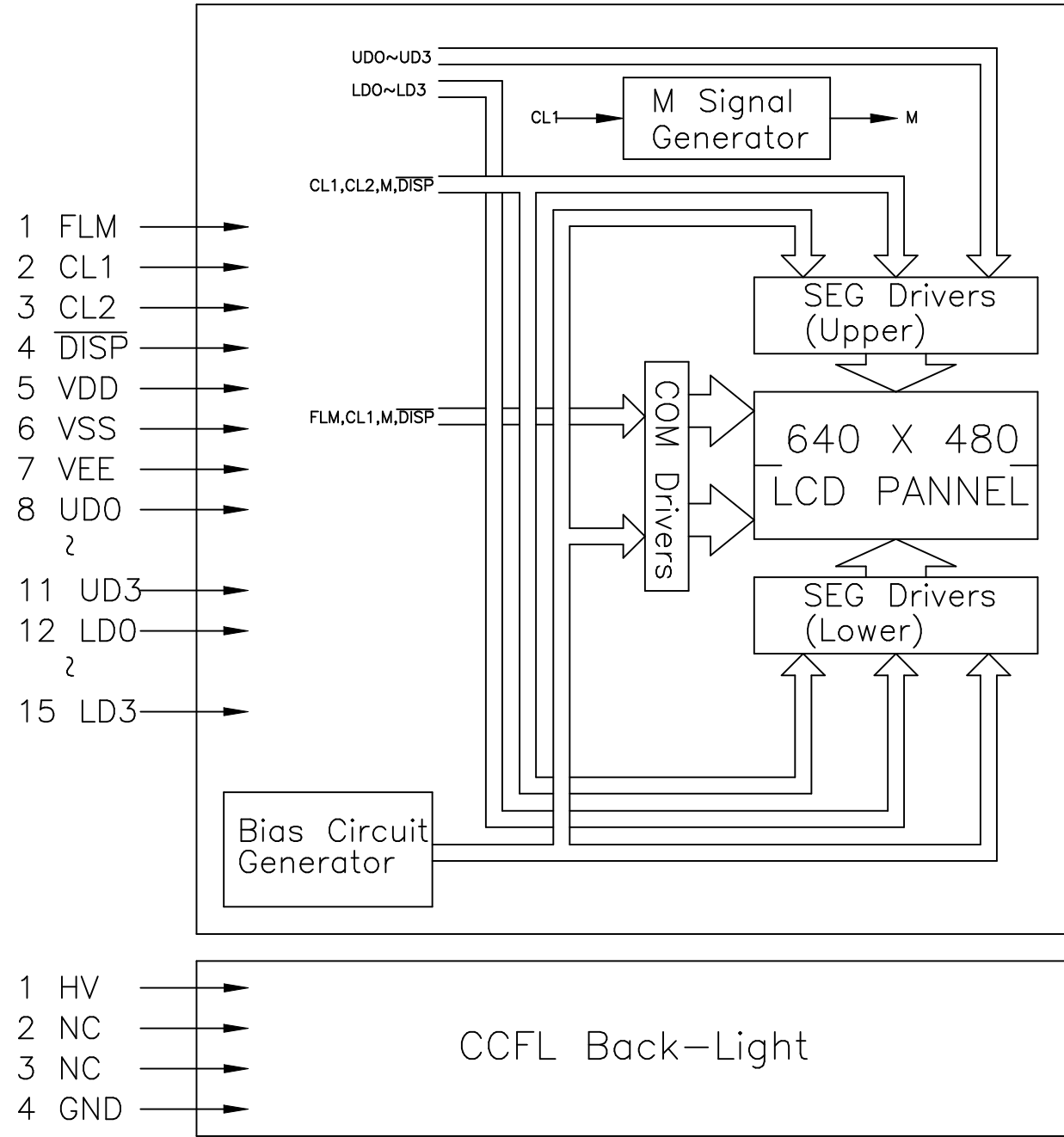
(negative type)

Contrast Ratio : $Cr = A/B$

*Conditions

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

5.BLOCK DIAGRAM



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)

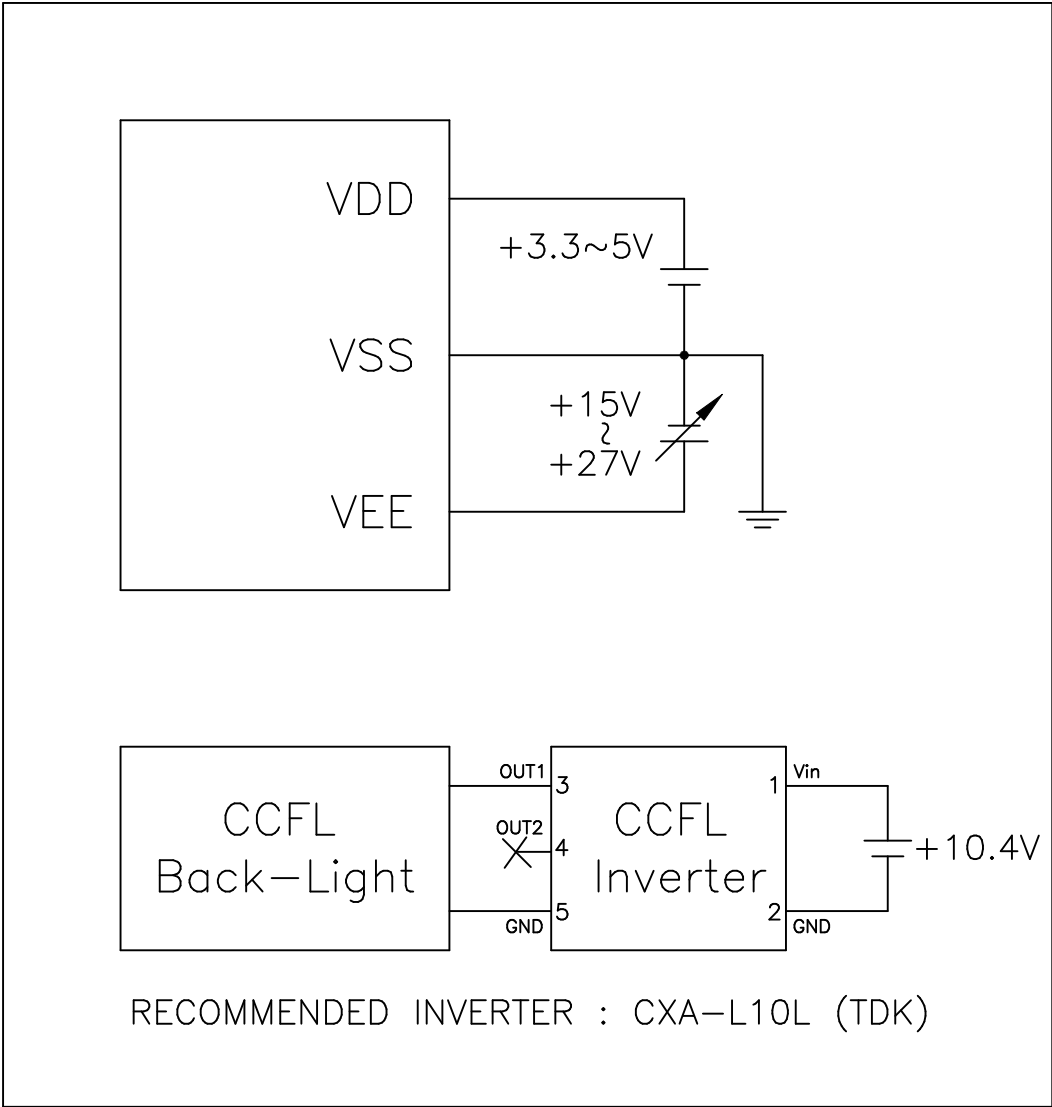
LCD

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

CCFL

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

7. POWER SUPPLY

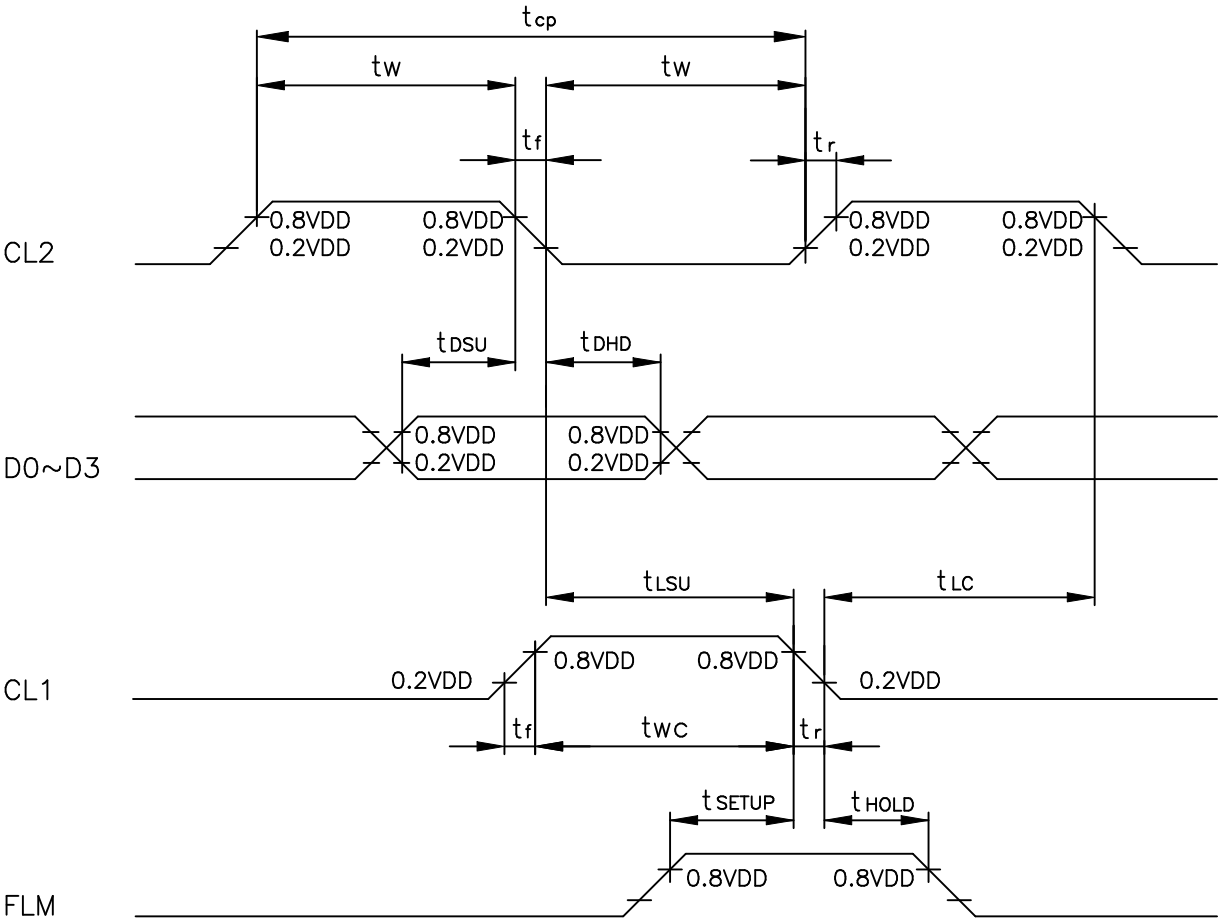


8.TIMING CHARACTERISTICS

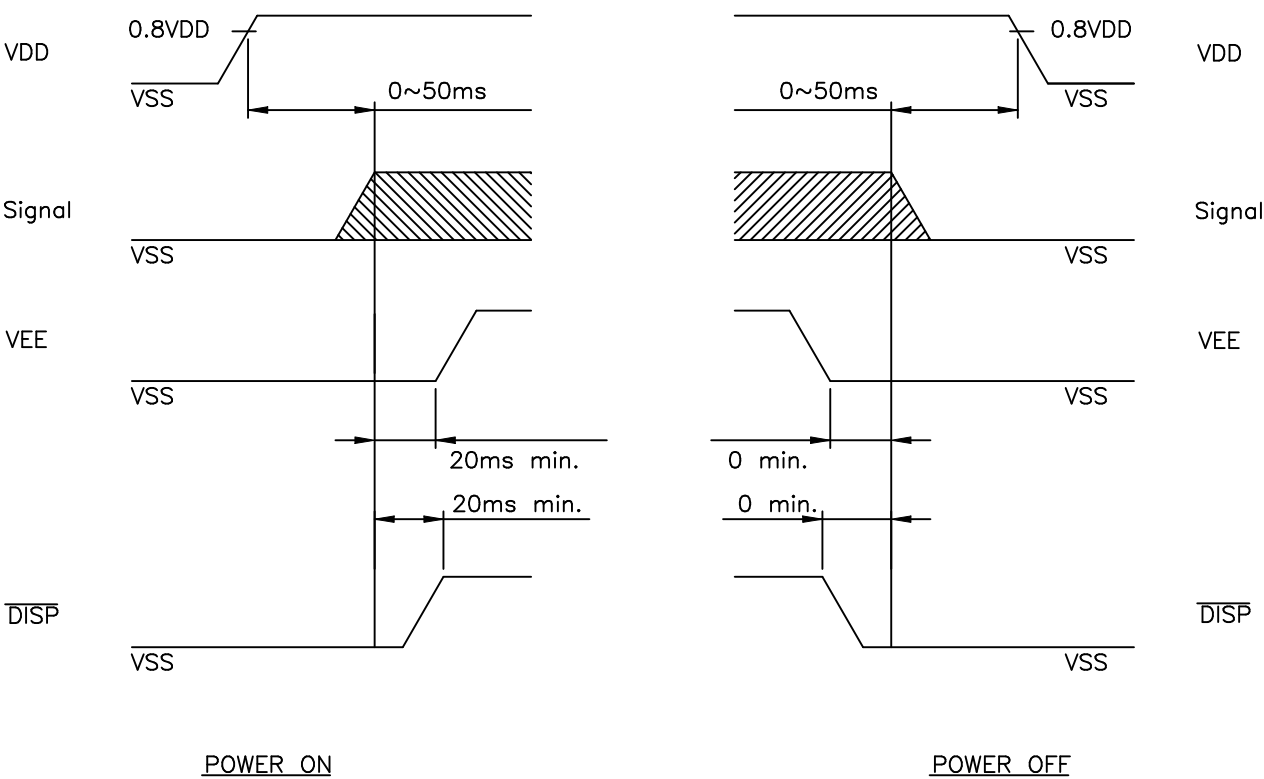
8-1.INTERFACE TIMING

@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

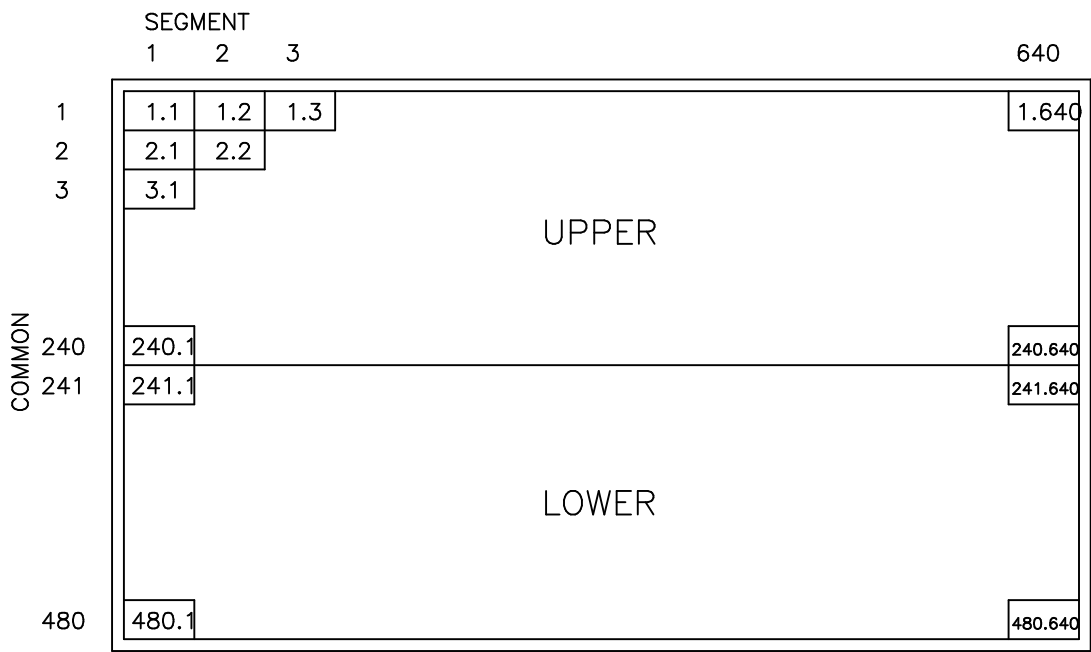


8-2. POWER ON/OFF TIMING

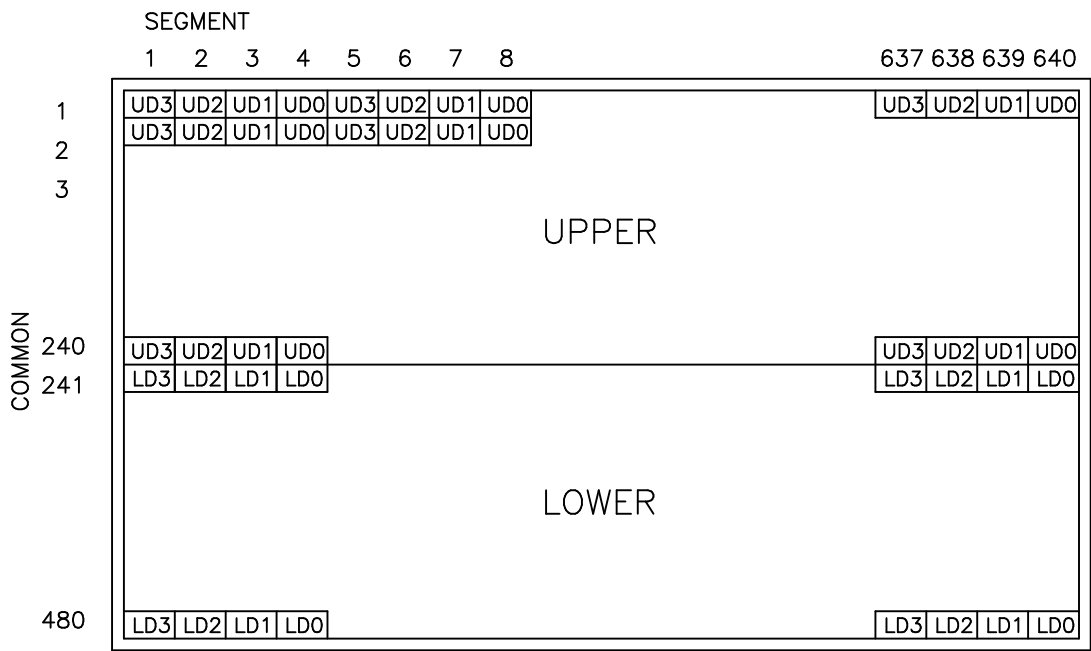


The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

8-3.DISPLAY PATTERN



NOTE : 1.1 MEANS 1ST COMMON 1ST SEGMENT DOT





- 1.Resolution: 640X480 DOTS
- 2.Backlight: CCFT
- 3.Frame Material: SECC (0.5mmt)
- 4.LCD Connector: 53261-1590 (MOLEX)
- 5.CCFT Connector: M63M83-04 (MITSUMI)
correspondable CCFT connector : M60-04-30-114P (MITSUMI)
M60-04-30-134P (MITSUMI)
M61M73-04 (MITSUMI)
- 6.Tolerance No Specified: $\pm 0.5\text{mm}$

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	
12	LD0	H/L	Display Data (Lower Half)
13	LD1	H/L	
14	LD2	H/L	
15	LD3	H/L	

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



						APPROVE				
						CHECK				
						DESIGN	C. B. LAN	93.08.17	SCALE	UNIT
						DRAWN	C. B. LAN	93.08.17	1/1	mm
										
REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG NO.	M701AD6A 			