

# AZ DISPLAYS, INC.

## 1. MECHANICAL DATA

(1) Product No.	<b>AGM6448S</b>
(2) Module Size	264.0 (W)mm x 183.0 (H)mm x MAX10.0 (D)mm
(3) Dot Size	0.305 (W)mm x 0.305 (H)mm
(4) Dot Pitch	0.33 (W)mm x 0.33 (H)mm
(5) Number of Dots	640 (W) x 480 (H)Dots
(6) Duty	1/240
(7) LCD Display Mode	FSTN: Black and White(Normal White/Positive Image) Rear Polarizer: Transflective
(8) Viewing Direction	6 O'clock
(9) Backlight	CCFL
(10) Controller	Excluded
(11) DC/DC Converter	Excluded
(12) Weight	450.0 g(approx.)
(13) Recommended FL Inverter	TAD250(TDK)

Revised: October 23, 2001

## 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	
Power Supply for LCM	VEE-VSS	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	NORMAL TEMP.			
	OPERATION		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 2,4		Note 3,4	
Vibration(Note ※)	-		49m/s <sup>2</sup> (5G)	

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

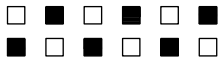
Note 3 Ta at -20°C will be < 48 hrs, at 70°C will be < 120 hrs

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

Note※

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

## 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		VEE-VSS	Duty=1/240 Bias=1/13	0°C	-	-	V	
				25°C	-	23.4		-
				50°C	-	-		-
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 VEE-VSS = 23.4 V	-	2.0	4.0	mA	
		IEE	PATTERN : 	-	10.0	20	mA	
CCFL LAMP	Starting Voltage	Vs		-	750	-	Vrms	
	Lamp Voltage	VL		-	640	-	Vrms	
	Lamp Current	IL		3	5	6	mArms	
	Lamp Consumption	PL		-	3.05	-	W	
	Lamp Frequency	FL		-	45	-	KHz	
	Lamp Life Time	LL	NOTE 1	10000	-	-	hrs	
LCM	Surface Luminance	L	ALL ON	-	TBD	-	cd/m <sup>2</sup>	
			ALL OFF	-	TBD	-		
	Luminance Uniformity	Lu		-	TBD	-	%	

NOTE 1: The life is defined as the time it takes the brightness to reduce to 50% of its original value.

## 4.OPTICAL CHARACTERISTICS

AT Vop

ITEM		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	P	—	TBD	—	TBD	—	TBD
NOTE		NOTE6		NOTE5			

S : Transflective

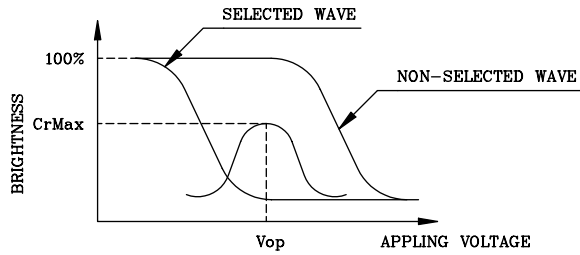
P : Normally White , 6 o'clock

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

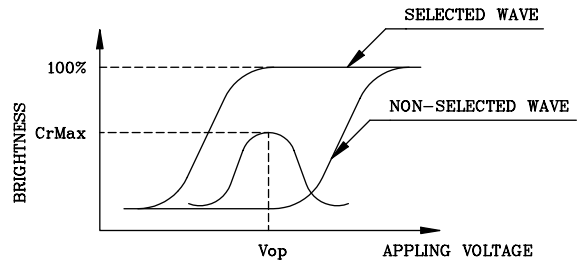
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	TBD	—	ms	NOTE 2
		25℃	—	TBD	—		
		50℃	—	TBD	—		
Response Time (fall)	Tr	0℃	—	TBD	—	ms	NOTE 2
		25℃	—	TBD	—		
		50℃	—	TBD	—		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



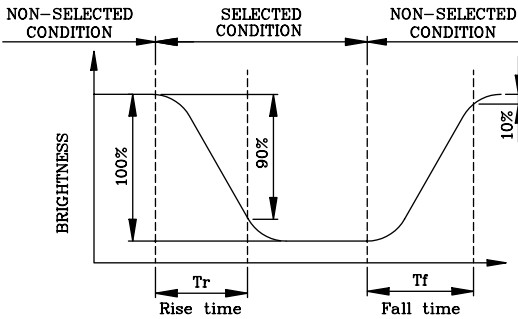
(negative type)

\*Conditions

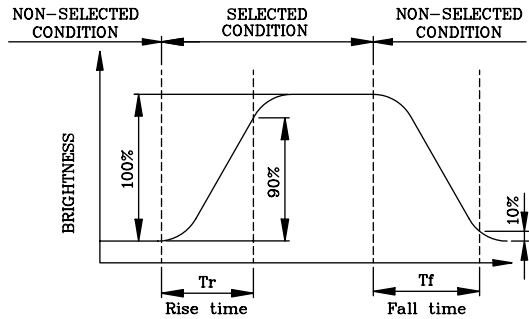
Viewing Angle : 0  
 Frame Frequency : 70Hz  
 Applying Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



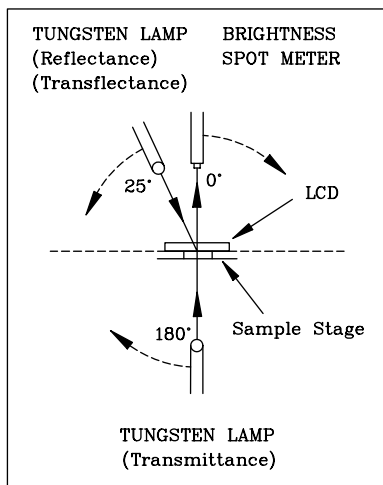
(negative type)

\*Conditions

Operating Voltage : Vop  
 Viewing Angle ( $\theta, \phi$ ) : (0,0)  
 Frame Frequency : 70Hz  
 Applying Waveform : I/N duty 1/a bias

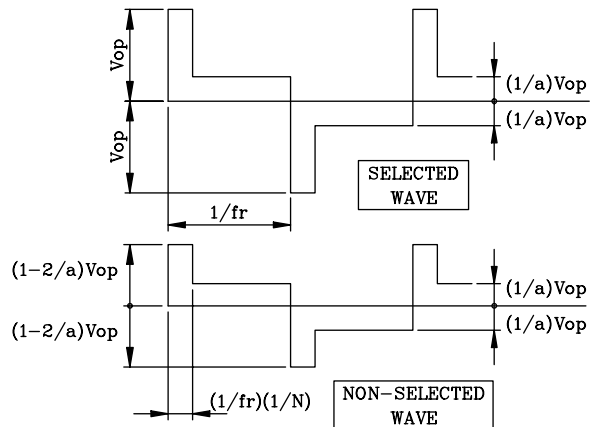
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



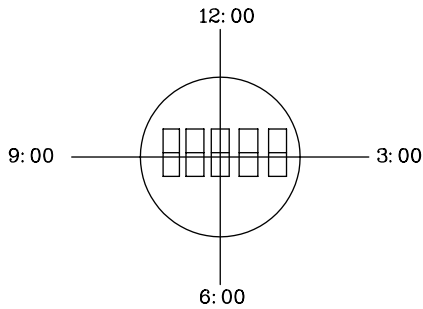
CONST.  
TEMP.  
CHAMBER

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



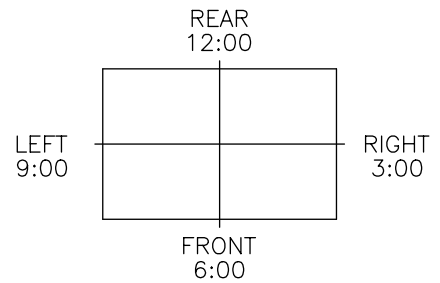
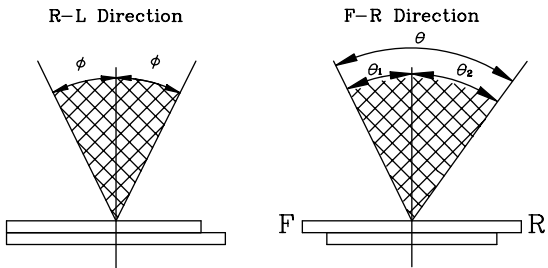
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

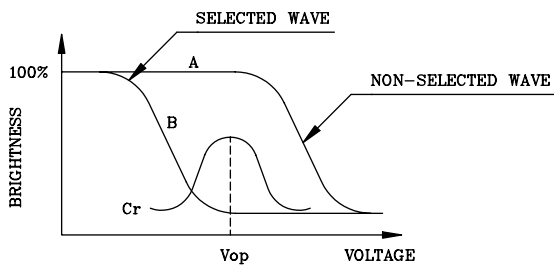
$$\theta = \theta_1 + \theta_2$$

\*Conditions

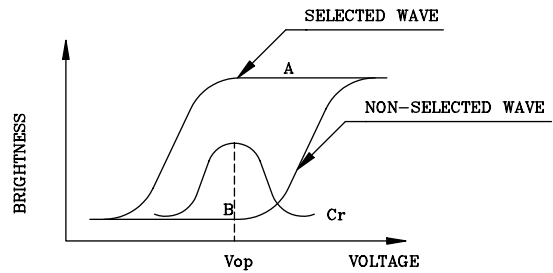
- Operating Voltage :  $V_{op}$
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



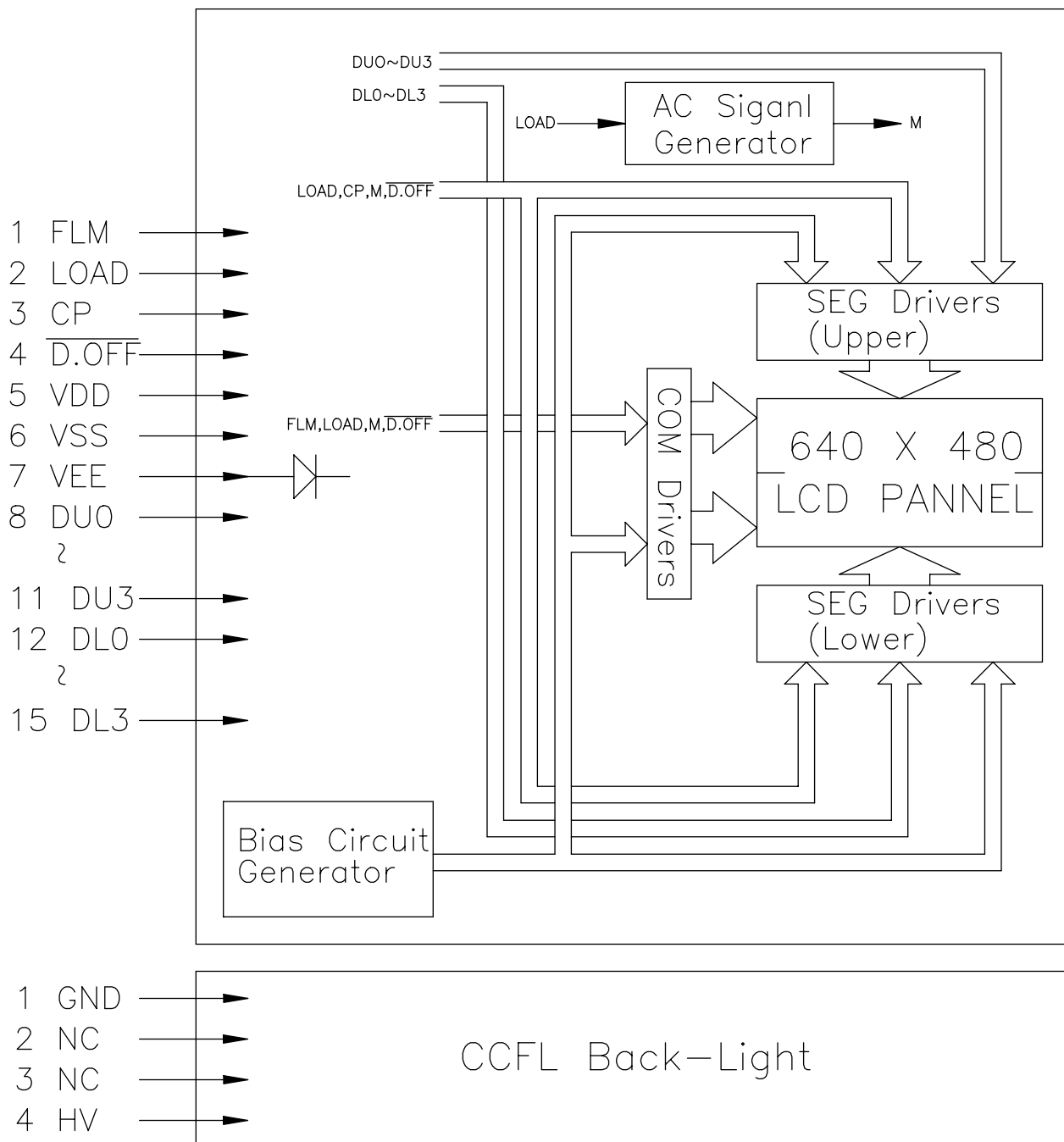
(negative type)

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

\*Conditions

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

## 5. BLOCK DIAGRAM



\* AC Signal Setting

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

## 6. INTERNAL PIN CONNECTION

### LCD

Pin No.	Symbol	Level	Function
1	FLM	H/L	SCAN START-UP SIGNAL
2	LOAD	H→L	DATA LATCH PULSE
3	CP	H→L	DATA SHIFT PULSE
4	$\overline{D.OFF}$	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	DU0	H/L	DISPLAY DATA (UPPER HALF)
9	DU1		
10	DU2		
11	DU3		
12	DL0	H/L	DISPLAY DATA (LOWER HALF)
13	DL1		
14	DL2		
15	DL3		

### CCFT

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

### LCD

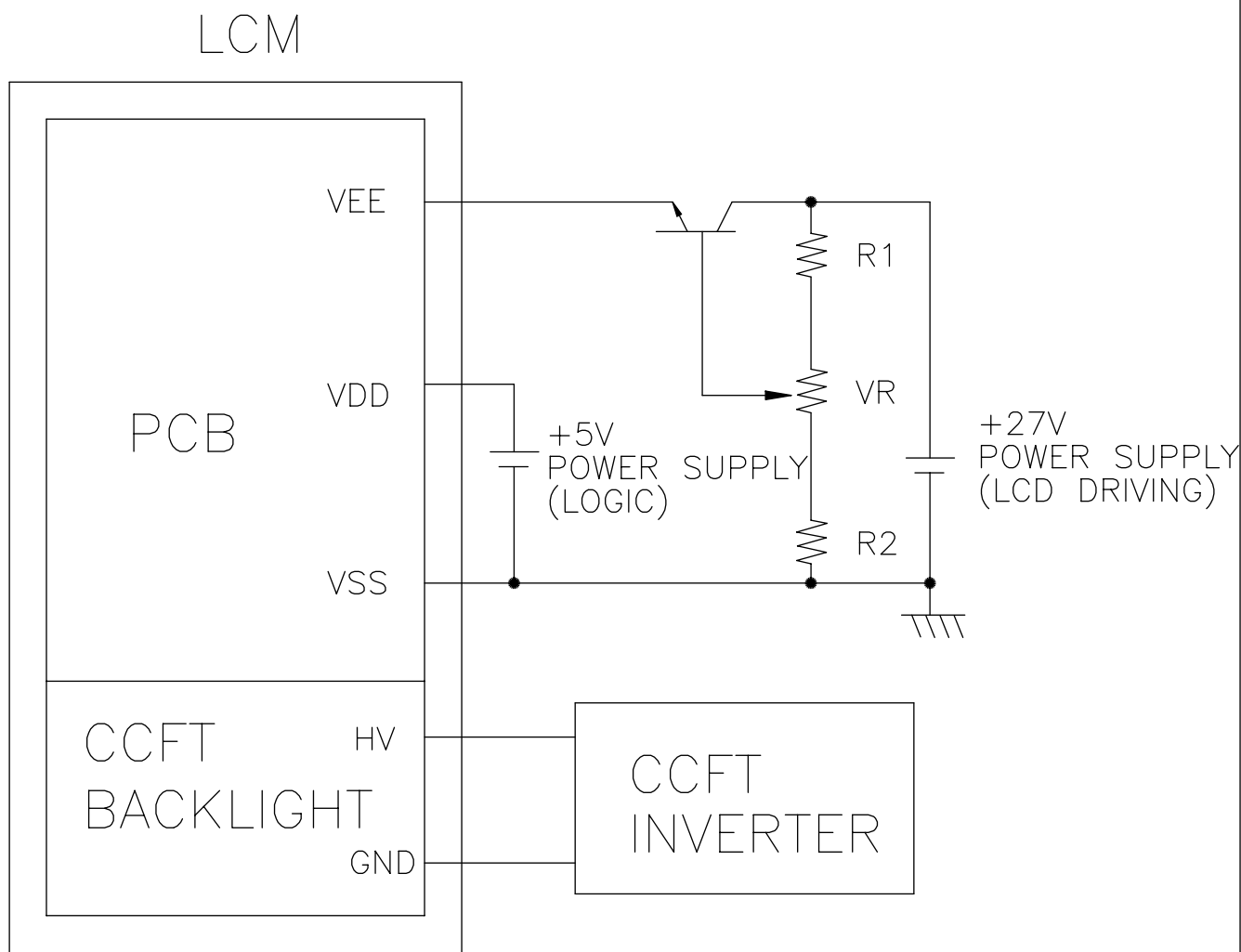
Used connector : 53261-1590 (MOLEX)

### CCFT

USE CONNRCT : M63M83-04(MITSUMI)



## 7. POWER SUPPLY



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

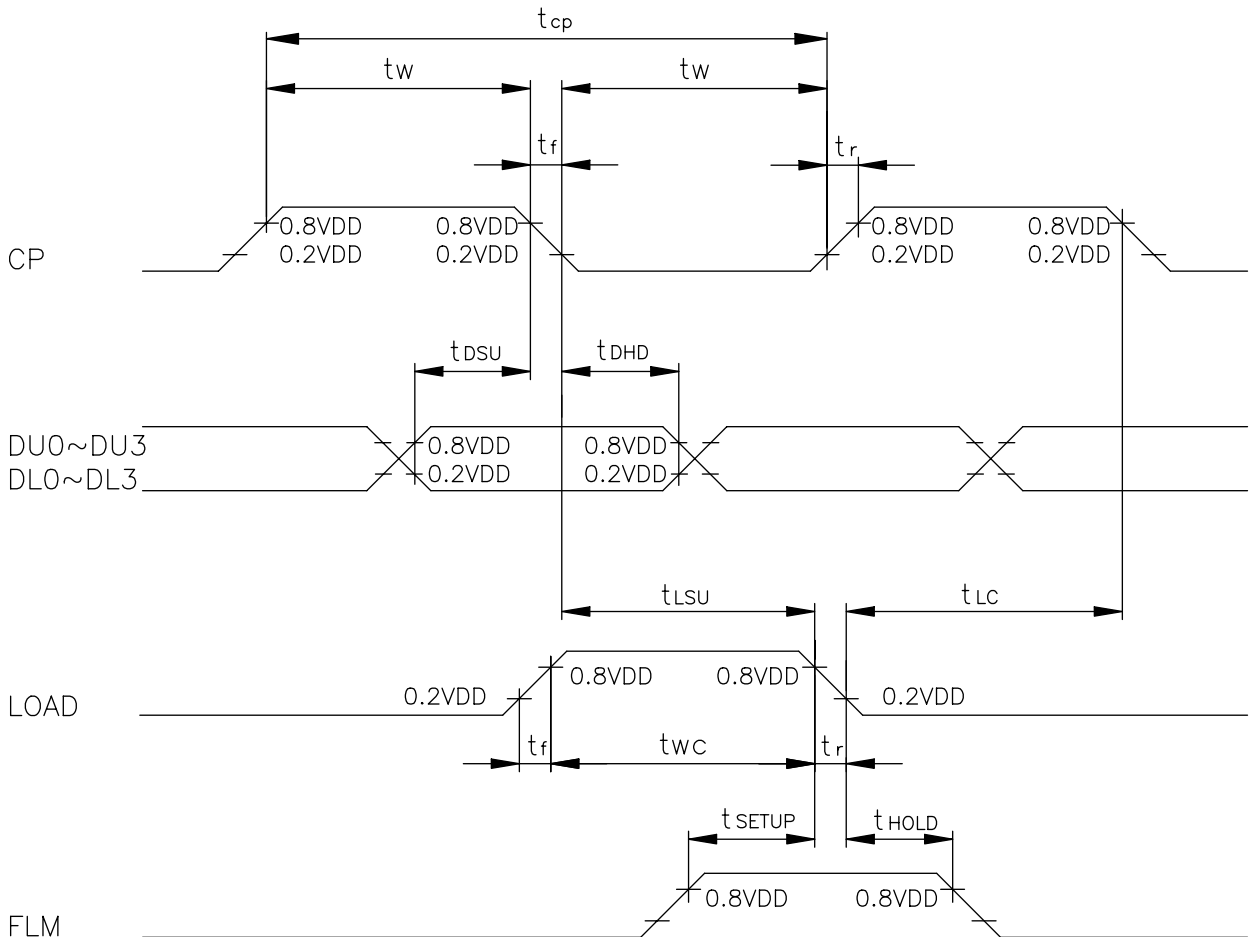
2. RECOMMENDED CCFT INVERTER : TAD250(TDK)

## 8. TIMING CHARACTERISTICS

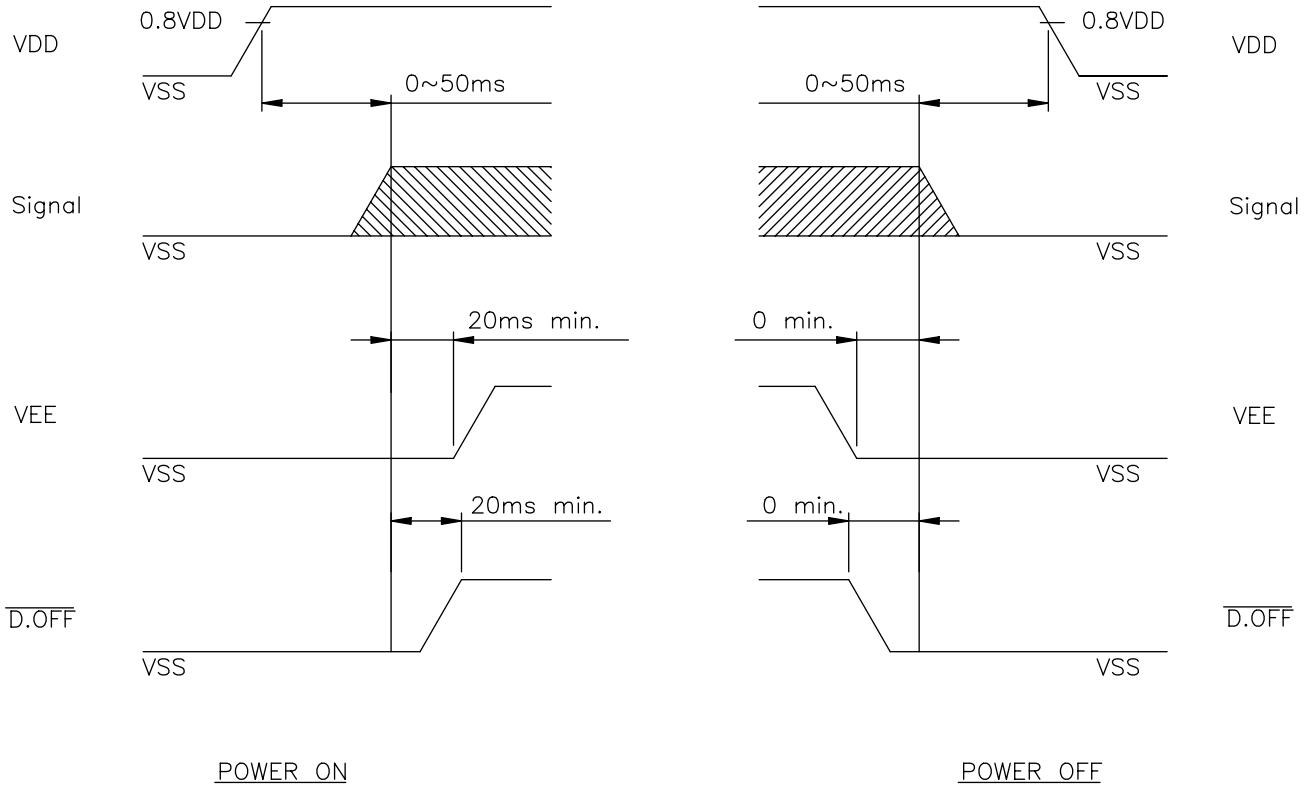
### 8-1. INTERFACE TIMING

@VDD=2.5~5.5V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Shift Clock Period	$t_{cp}$	125	-	-	ns
"CP" PULSE WIDTH	$t_w$	51	-	-	ns
CLOCK RISE, FALL TIME	$t_r, t_f$	-	-	20	ns
DATA SETUP TIME	$t_{DSU}$	40	-	-	ns
DATA HOLD TIME	$t_{DHD}$	30	-	-	ns
"CP" → "LOAD" FALL TIME	$t_{LSU}$	51	-	-	ns
"LOAD" → "CP" FALL TIME	$t_{LC}$	51	-	-	ns
"FLM" SETUP TIME	$t_{SETUP}$	30	-	-	ns
"FLM" HOLD TIME	$t_{HOLD}$	50	-	-	ns
"LOAD" PULSE WIDTH	$t_{wc}$	51	-	-	ns

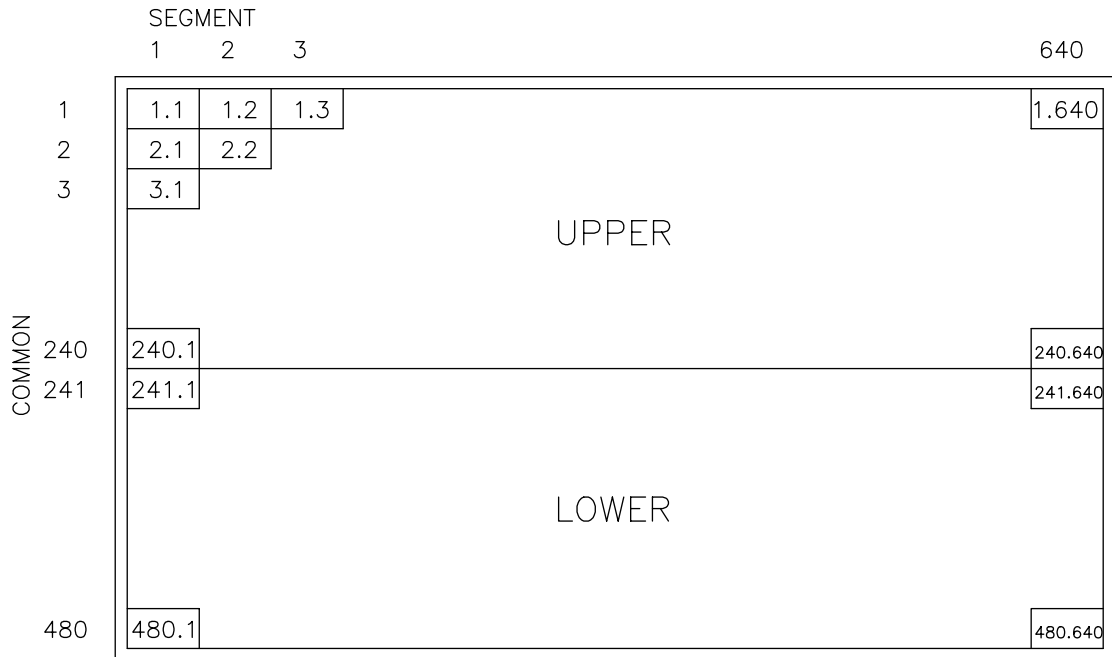


## 8-2. POWER ON/OFF TIMING

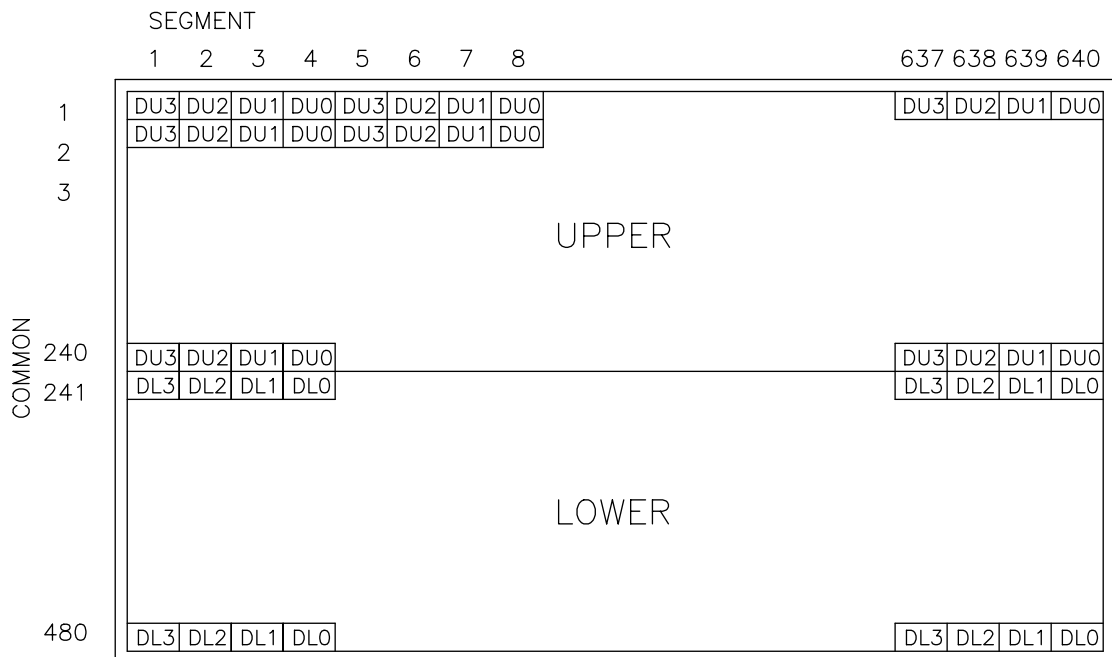


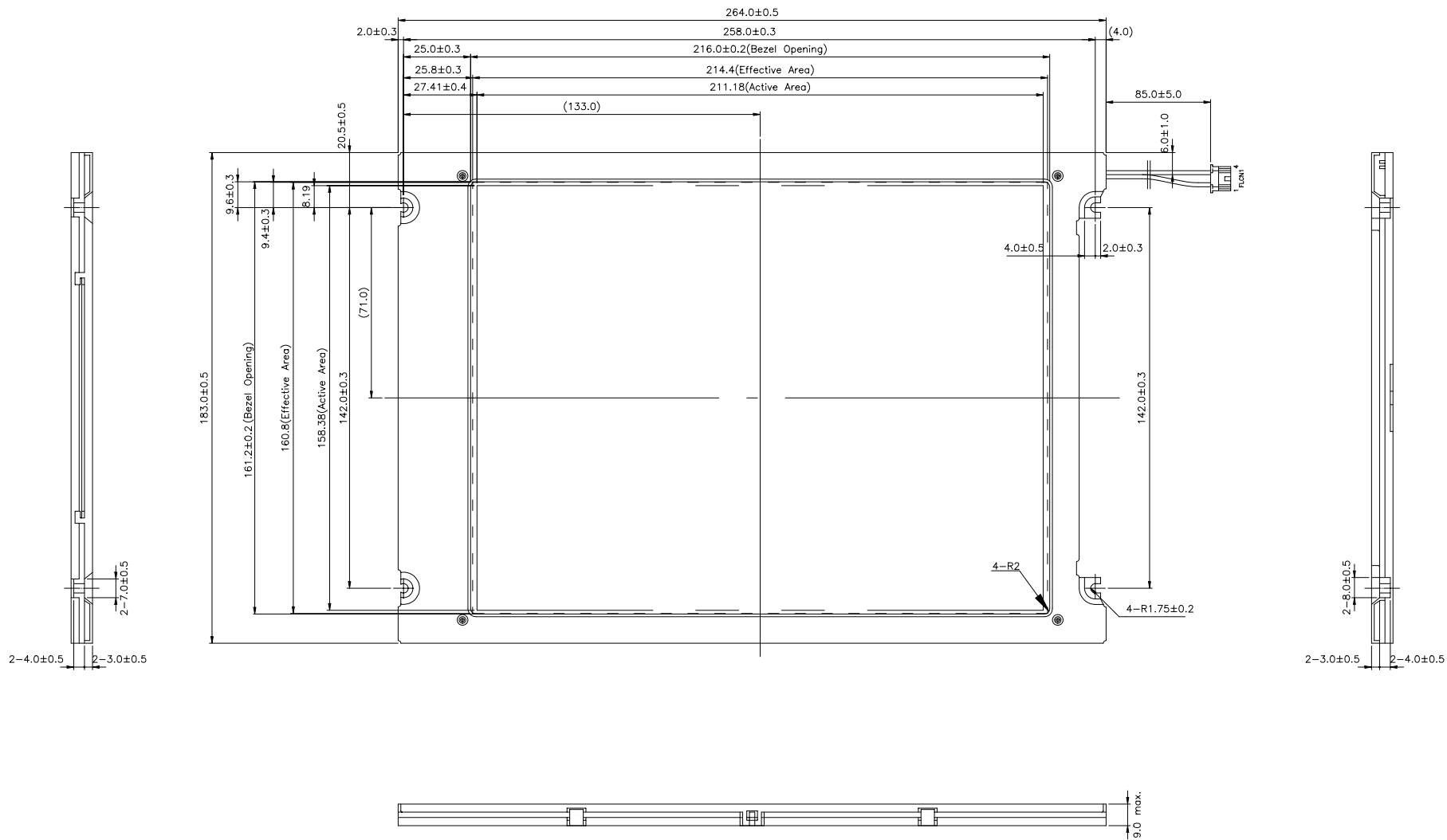
Missing pixels may occur when the LCM is driven beyond the above power interface timing sequence.

## 9. DISPLAY PATTERN



NOTE : 1.1 MEANS 1ST COMMON 1ST SEGMENT DOT





CN1 :MOLEX 53261-1590

FLCN1 : M63M83-04(MITSUMI)

PIN#	1	2	3	4	5	6	7	8
SYMBOL	FLM	LOAD	CP	D.OFF	VDD	VSS	VEE	DU0
PIN#	9	10	11	12	13	14	15	-
SYMBOL	DU1	DU2	DU3	DLO	DLT	DL2	DL3	-

	PIN NO.	SYMBOL	FUNCTION
FLCN1	1	GND	CFL GND
	2	NC	-
	3	NC	-
	4	HV	Power supply voltage for CFL

DIMENSION	TOLERANCE
$L \leq 6$	$\pm 0.25$ (mm)
$6 < L \leq 18$	$\pm 0.3$ (mm)
$18 < L \leq 50$	$\pm 0.4$ (mm)
$50 < L \leq 125$	$\pm 0.5$ (mm)
$125 < L$	$\pm 0.6$ (mm)
ANGLE	$\pm 1^\circ$ (DEG)

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE

AZ DISPLAYS, INC.

AGM6448S

NAME	DATE	THIRD ANGLE P.
APPROVE		
CHECK		
DESIGN		
DRAWN		
SCALE	NONE	UNIT
		mm

DWG NO.

M:434-D:0A