1. MECHANICAL DATA

(1) Product No.	AGM6448S
(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/s² (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	V_L			−	640	−	Vrms
	Lamp Current	I_L			3	5	6	mArms
	Lamp Consumption	P_L			−	3.05	−	W
	Lamp Frequency	F_L			−	45	−	KHz
	Lamp Life Time	L_L	NOTE 1		10000	−	−	hrs
LCM	Surface Luminance	L	ALL ON		−	TBD	−	cd/m²
			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 / MODE		Cr(Contrast Ratio)		θ(Viewing Angle)		ϕ(Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	P	–	TBD	–	TBD	–	TBD
NOTE		NOTE6		NOTE5			

S : Transflective

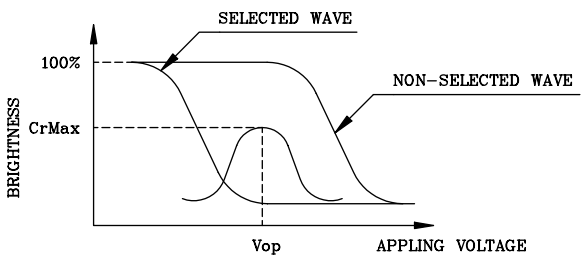
P : Normally White , 6 o'clock

AT ϕ=0° θ=0°

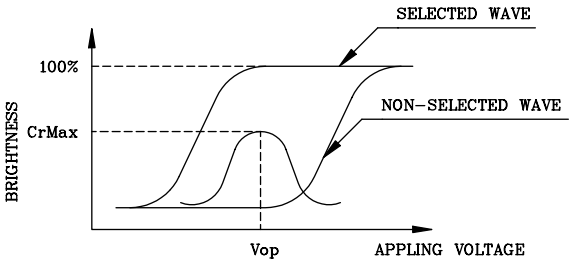
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	TBD	–	ms	NOTE 2
		25℃	–	TBD	–		
		50℃	–	TBD	–		
Response Time (fall)	Tr	0℃	–	TBD	–	ms	NOTE 2
		25℃	–	TBD	–		
		50℃	–	TBD	–		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



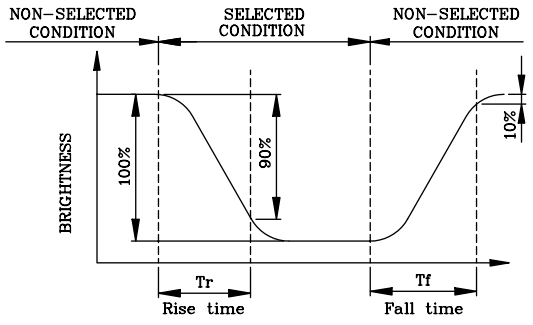
(negative type)

*Conditions

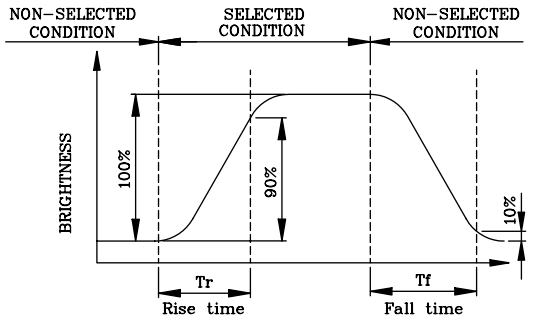
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



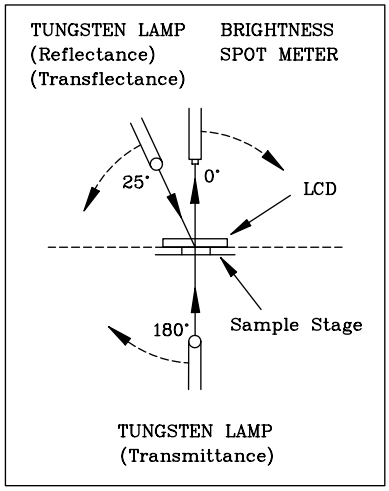
(negative type)

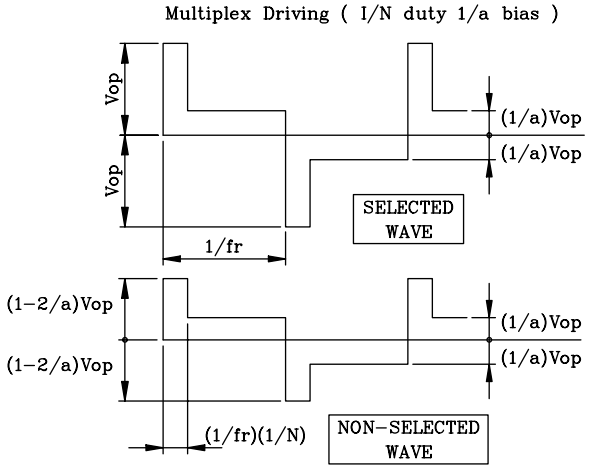
*Conditions

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

(NOTE 3)

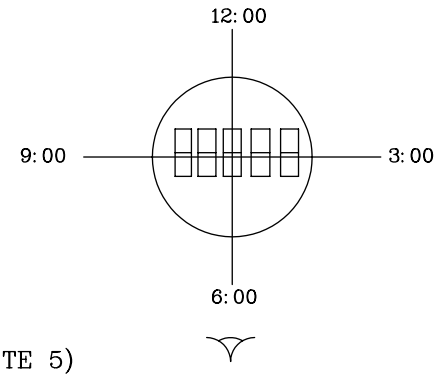
Description of Measuring Equipment and Driving Waveforms





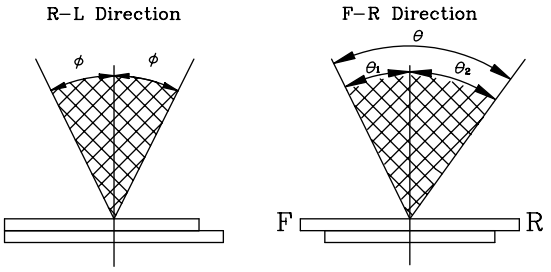
(NOTE 4)

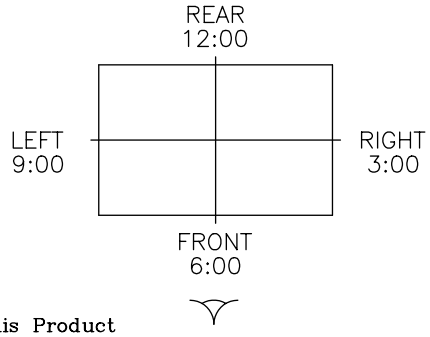
Definition of Viewing Direction



(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

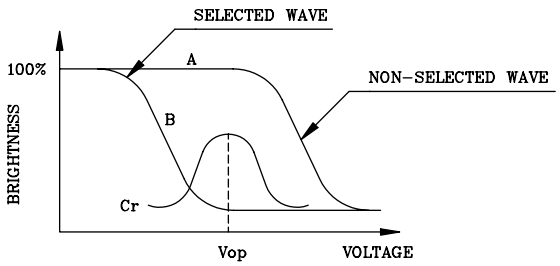
Frame Frequency : 70Hz

Appling Waveform : 1/N duty 1/a bias

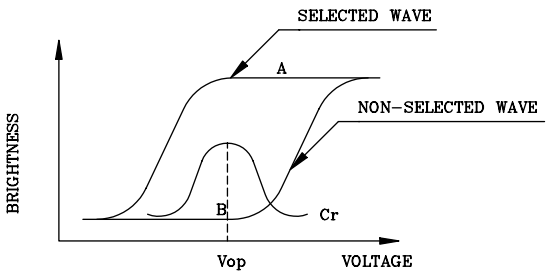
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

Contrast Ratio : Cr=A/B

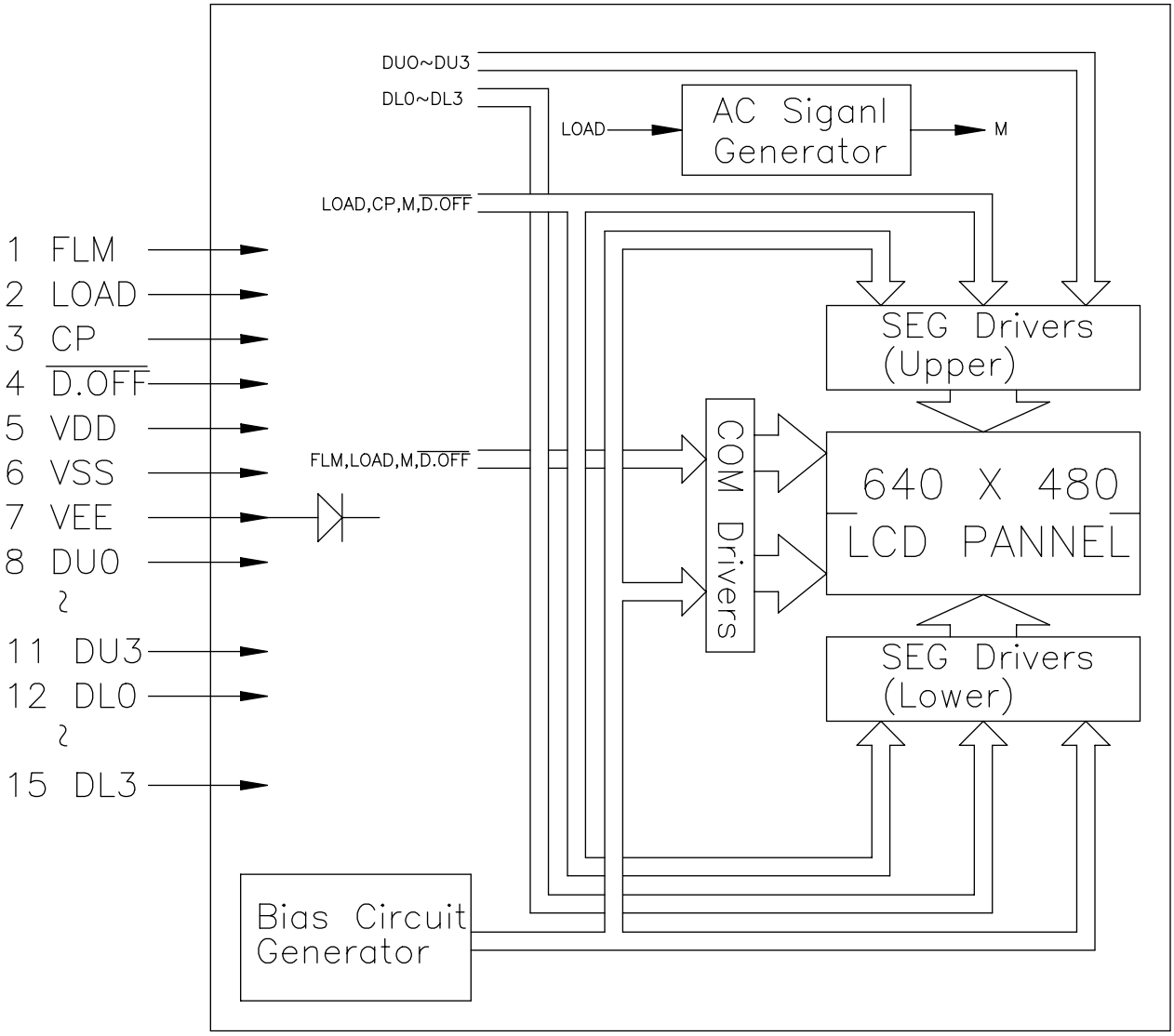
*Conditions

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

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	$\overline{\text{D.OFF}}$	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		

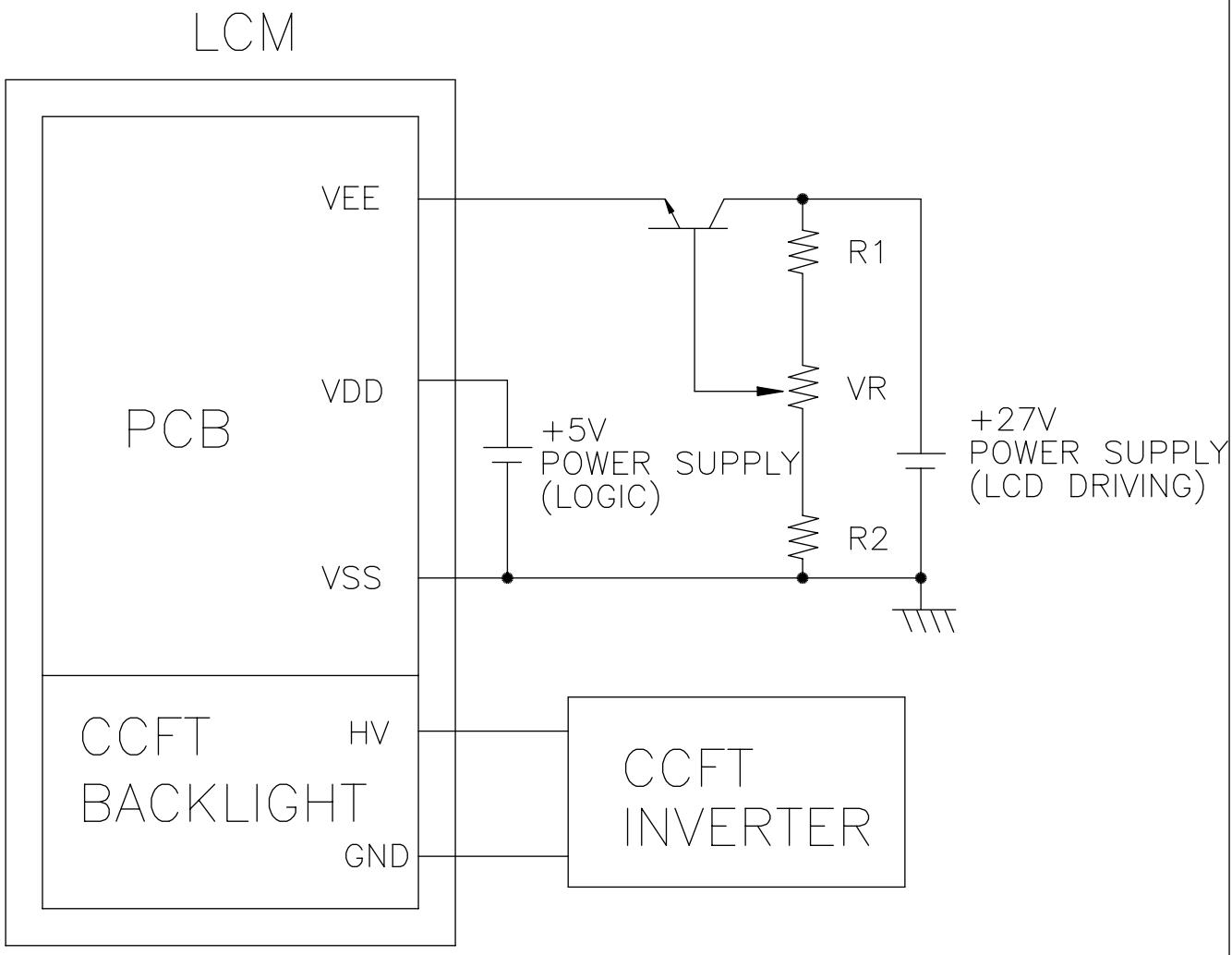
CCFT

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



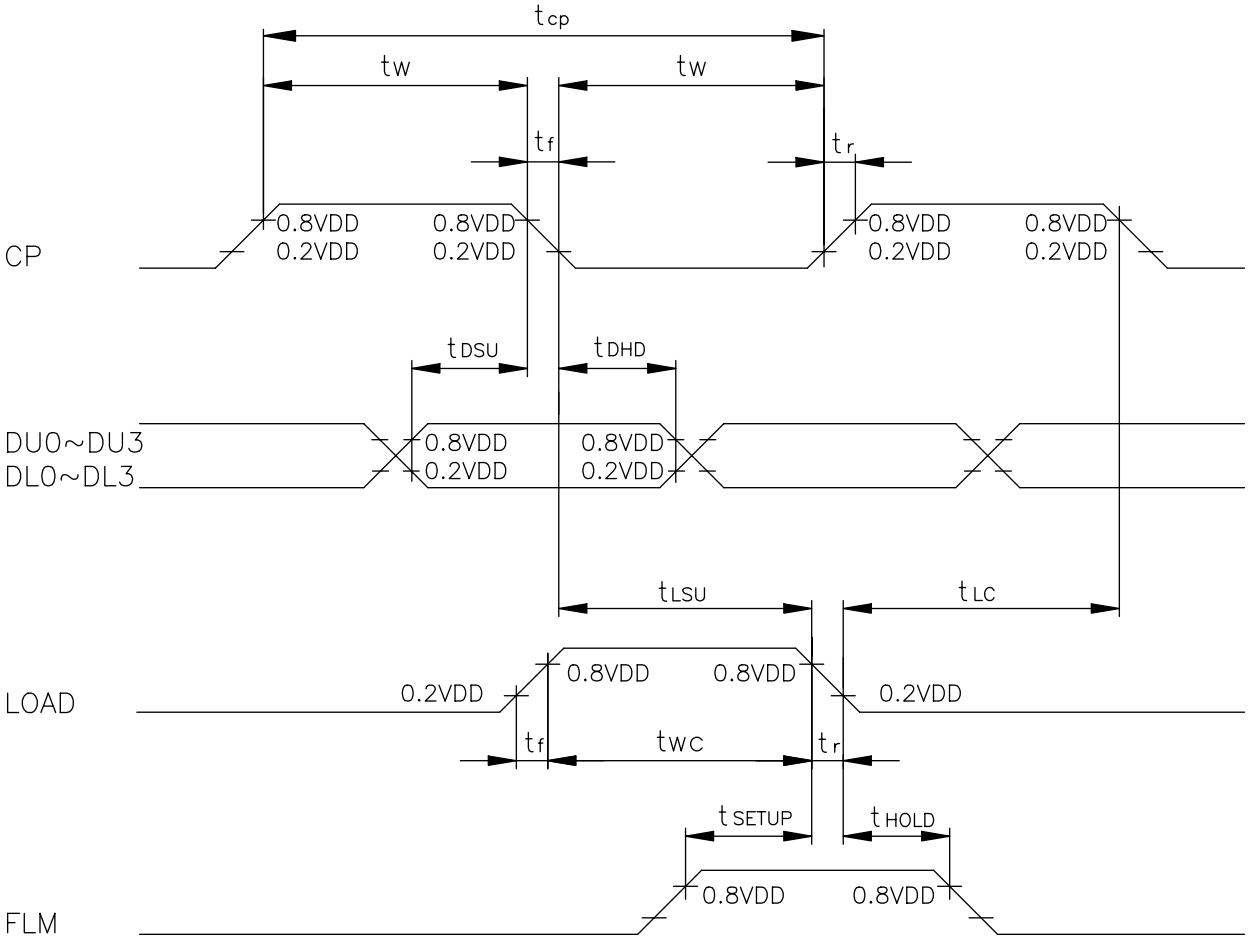
1. R1+VR+R2=10K~20KΩ
2. RECOMMENDED CCFT INVERTER : TAD250(TDK)

8. TIMING CHARACTERISTICS

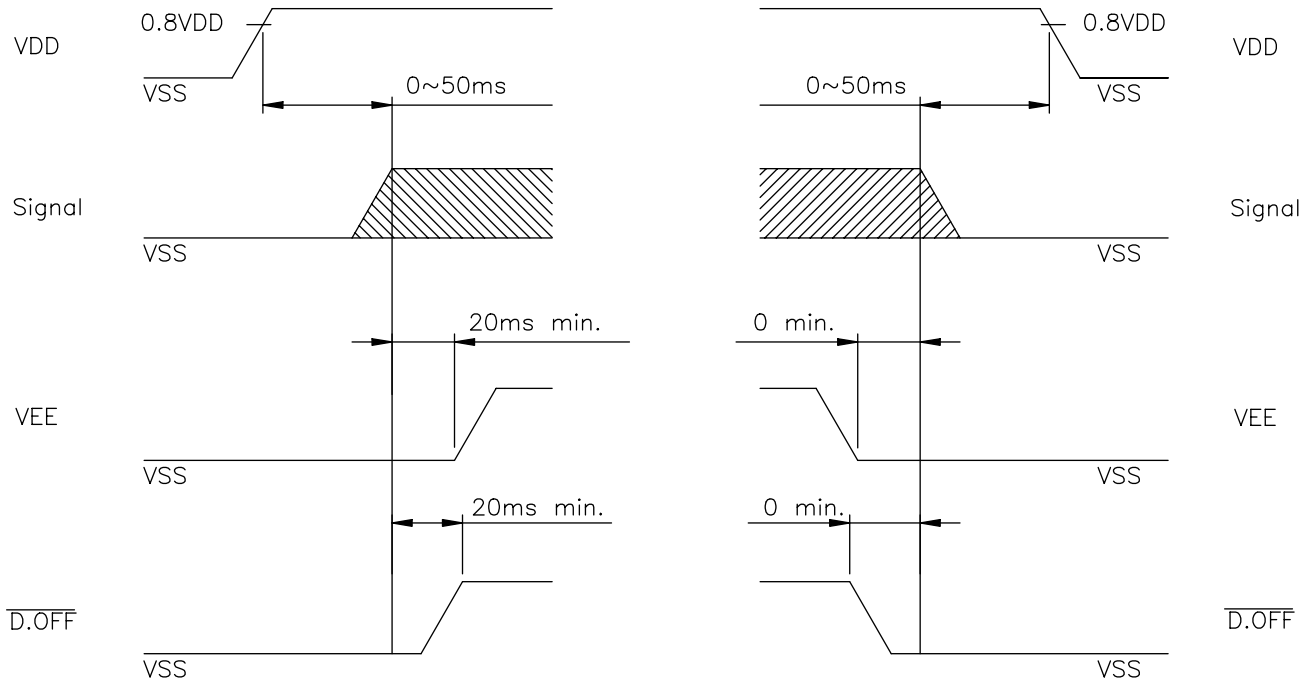
8-1. INTERFACE TIMING

@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

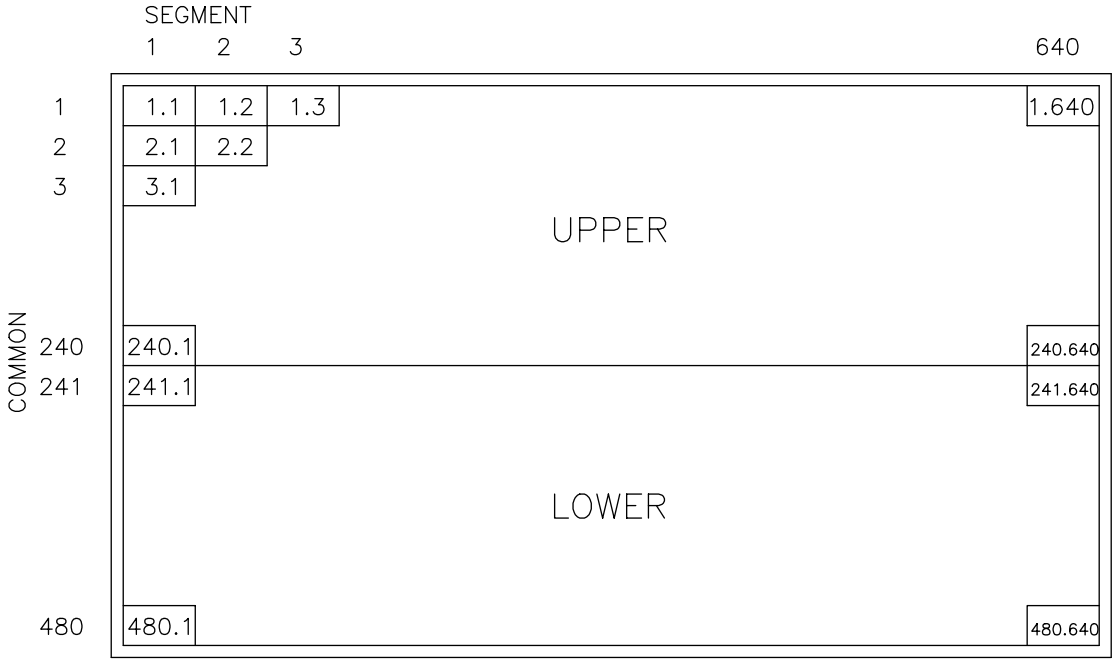


POWER ON

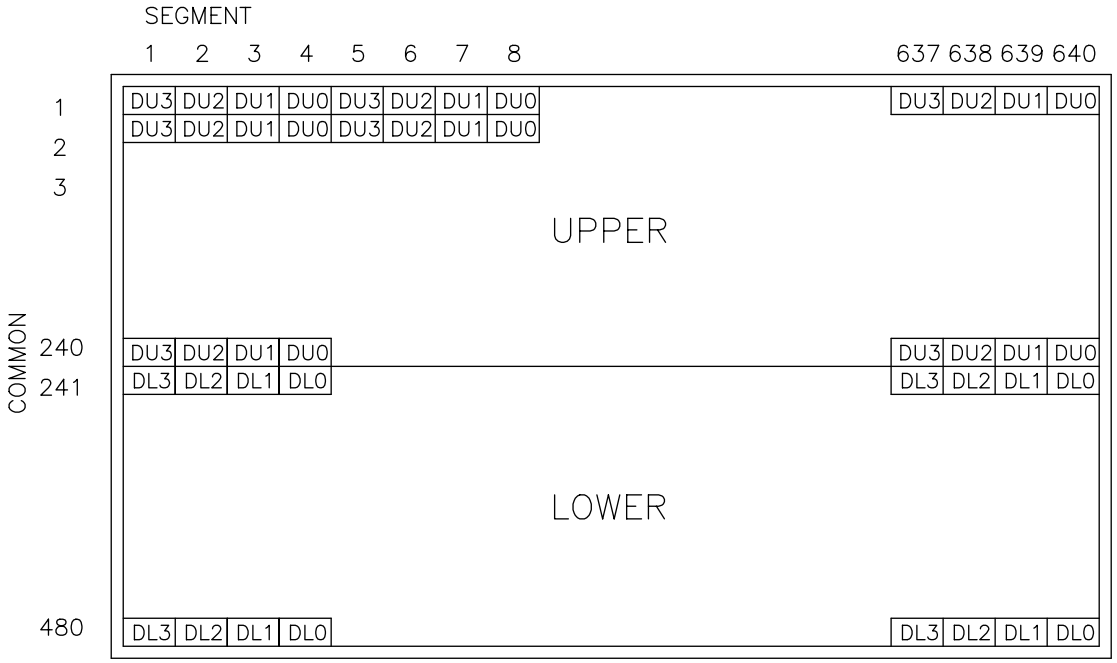
POWER OFF

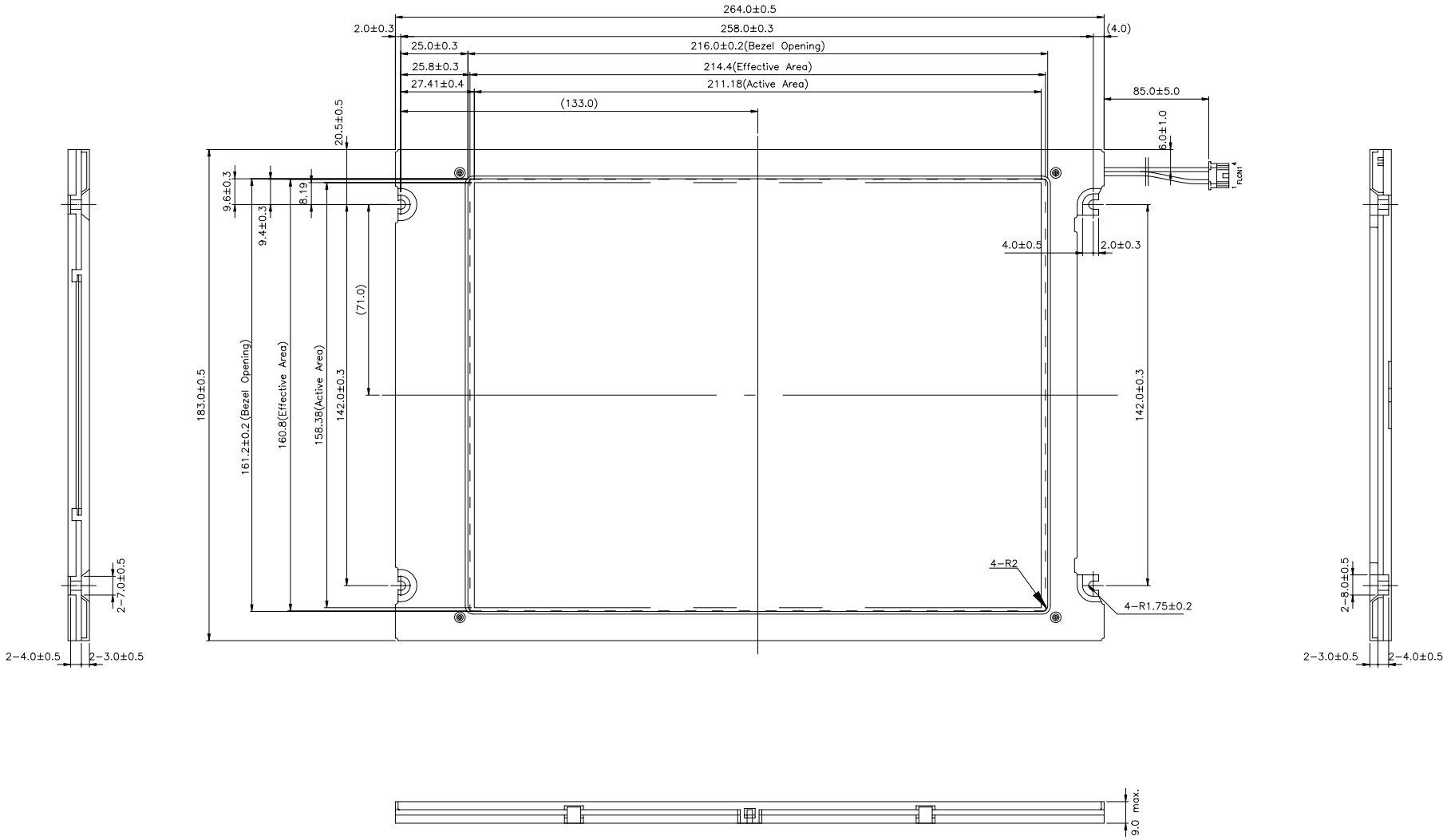
Missing pixels may occur when the LCM is driven beyond the above power interface timing sequence.

9. DISPLAY PATTERN



NOTE : 1.1 MEANS 1ST COMMON 1ST SEGMENT DOT





CN1 :MOLEX 53261-1590

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	DL0	DL1	DL2	DL3	–

FLCN1 : M63M83-04(MITSUMI)

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

DIMENSION	TOLERANCE
L ≤ 6	±0.25 (mm)
6 < L ≤ 18	±0.3 (mm)
18 < L ≤ 50	±0.4 (mm)
50 < L ≤ 125	±0.5 (mm)
125 < L	±0.6 (mm)
ANGLE	±1° (DEG)

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

AZ DISPLAYS, INC.

AGM6448S

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

DWG NO. M434-D0A