

1. MECHANICAL DATA

(1) Product No.	AGM3224Y
(2) Module Size	76.8 (W)mm x 103.7 (H)mm x 6.5(D)mm
(3) Dot Size	0.234 (W)mm x 0.068 (H)mm
(4) Dot Pitch	0.249 (W)mm x 0.083 (H)mm
(5) Number of Dots	240 (W) x (320 x RGB (H)) Dots
(6) Duty	1/240
(7) LCD Display Mode	FSTN: Color STN Module REAR POLARIZER: Color Transmissive Type
(8) Viewing Direction	6 O'clock
(9) Backlight	CCFL
(10) Controller	Excluded
(11) DC/DC Converter	Excluded
(12) Weight	65.0 g(approx.)

Revised: August 27, 2001

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply for LCD Drive	VEE-VSS	0	42.0	V	
Input Voltage	VI	-0.3	VDD+0.3	V	
Static Electricity	-	-	-	-	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	60
Humidity (Without Condensation)	Note 2,4		Note 3,4	

Note 1 LCM should be grounded during handling.

Note 2 $T_a \leq 50^\circ\text{C}$: 85%RH max


$T_a > 50^\circ\text{C}$: Absolute humidity must be lower than the humidity of 85%RH at 50°C

Note 3 T_a at -20°C will be < 48 hrs, at 60°C will be < 120 hrs

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

This phenomenon is reversible.

3. ELECTRICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT		
Logic Circuit Power Supply		VDD-VSS	Ta= 25°C	3.0	3.3	3.6	V		
				4.5	5.0	5.5			
Input Voltage		VIH	H level	0.8VDD	-	VDD	V		
		VIL	L level	0	-	0.2VDD	V		
Recommended LCD Driving Voltage (Normal Temp. LCM)		VEE-VSS	Duty=1/240 Bias=1/14 VDD=5.0V	0°C	24.9	25.2	25.5	V	
				25°C	23.7	24.0	24.3		
				50°C	22.7	23.0	23.3		
Supply Current for Logic		IDD	VDD-VSS = 5.0V VEE-VSS = 24.0V Ta= 25°C	-	2.0	3.5	mA		
Supply Current for LCD		IEE	PATTERN: 	-	12.0	18.0	mA		
LCM	Surface Luminance	L	VDD-VSS=5.0V VEE-VSS=24.0V Ta= 25°C IL=2.5mArms	PATTERN: (Dots All On of White Color)		-	89.0	-	cd/m ²
				PATTERN: (Dots All Off)		-	7.3	-	cd/m ²

CCFL

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Lamp Voltage	VL	-	300	-	Vrms	IL = 2.5mArms
Lamp current	IL	1.5	2.5	3	mArms	(*1)
Lamp power consumption	PL	0.5	0.8	1	W	(*2)
Lamp frequency	FL	30	40	50	KHz	
Lamp life time	LL	-	20000	-	hrs	

(*1) It is recommended that I_L be not more than 2.5 mArms so that heat radiation of CCFT backlight may least affect the display quality .

(*2) Power consumption excludes inverter .

4. OPTICAL CHARACTERISTICS

4-1 Optical Char. of Normal Temp. Mode

AT Vop

ITEM MODE		Cr(Contrast Ratio)						θ (Viewing Angle)		ϕ (Viewing Angle)	
		0°C		25°C		50°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	G	-	29	-	20	-	5.5	-	100	-	±45
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°C	-	600	-	ms	NOTE 2
		25°C	-	250	-		
		50°C	-	90	-		
Response Time (fall)	Tf	0°C	-	300	-	ms	NOTE 2
		25°C	-	90	-		
		50°C	-	60	-		

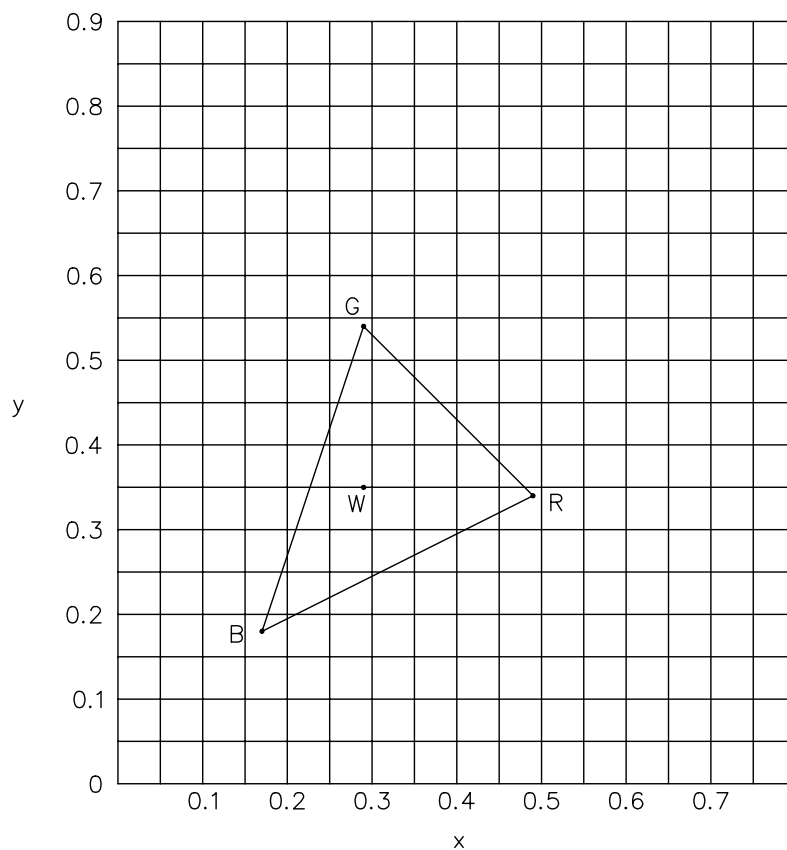
4-2 Color of CIE Coordinate

Ta = 25°C

ITEM		SYMBOL	CONDITION	VALUE	BRIGHTNESS (cd/m ²)
Color of CIE Coordinate	Red	X	$\phi=0^\circ, \theta=0^\circ$	0.49	22.9
		y		0.34	
	Green	X		0.29	61.4
		y		0.53	
	Blue	X		0.17	21.4
		y		0.18	
	White	X		0.29	89.0
		y		0.35	

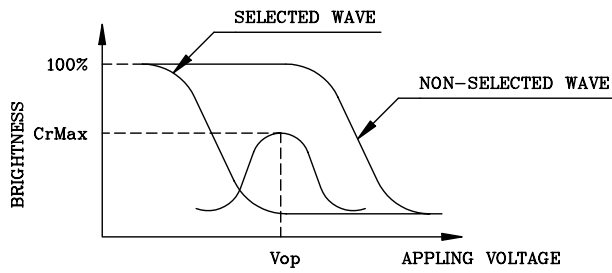
Tolerance : ± 0.05

Fig.1

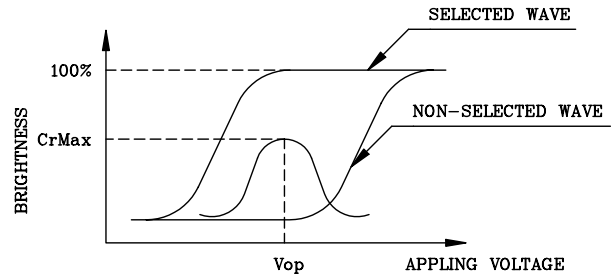


(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



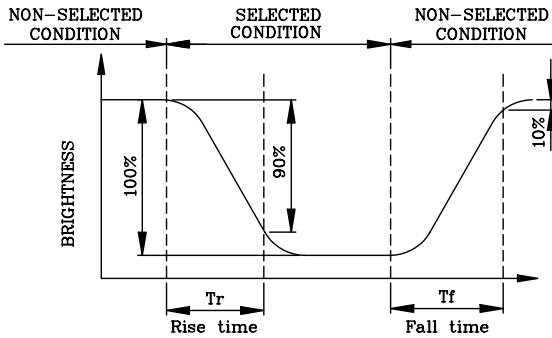
(negative type)

*Conditions

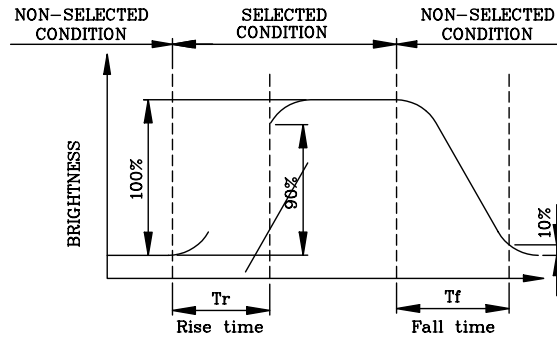
- Viewing Angle : 0
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



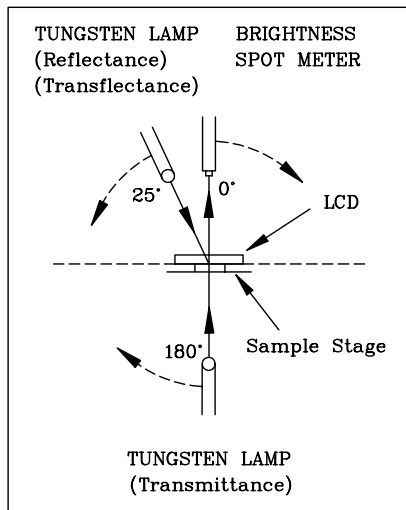
(negative type)

*Conditions

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

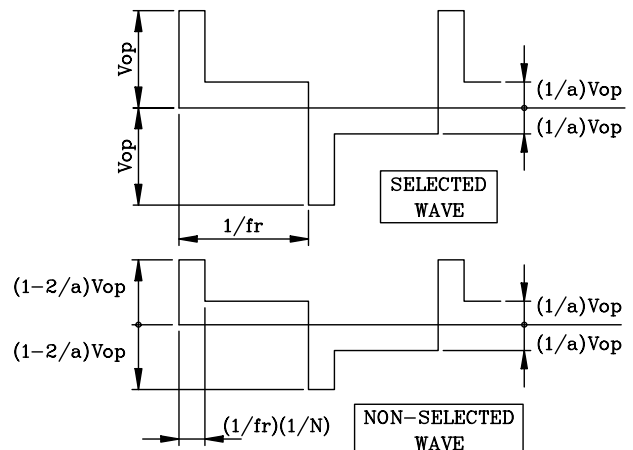
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



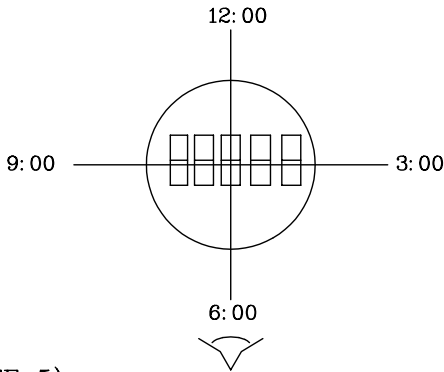
CONST.
TEMP.
CHAMBER

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



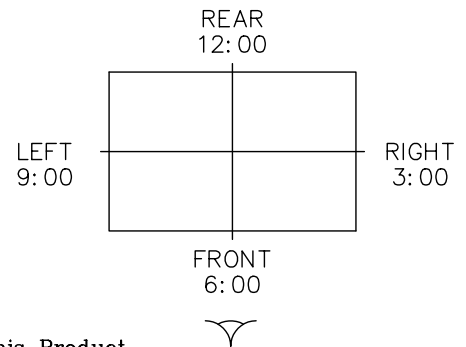
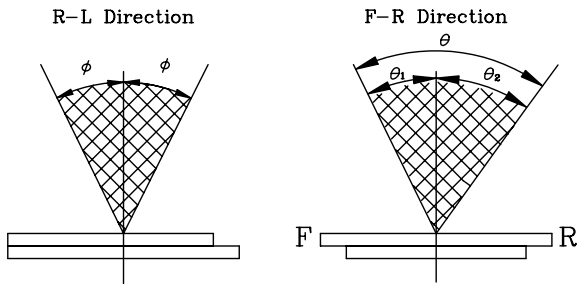
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

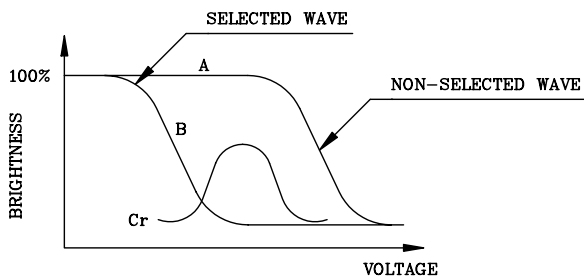
$$\theta = \theta_1 + \theta_2$$

*Conditions

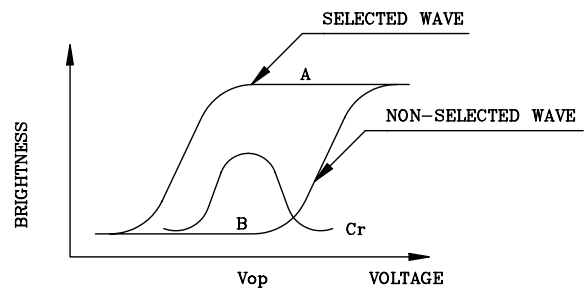
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



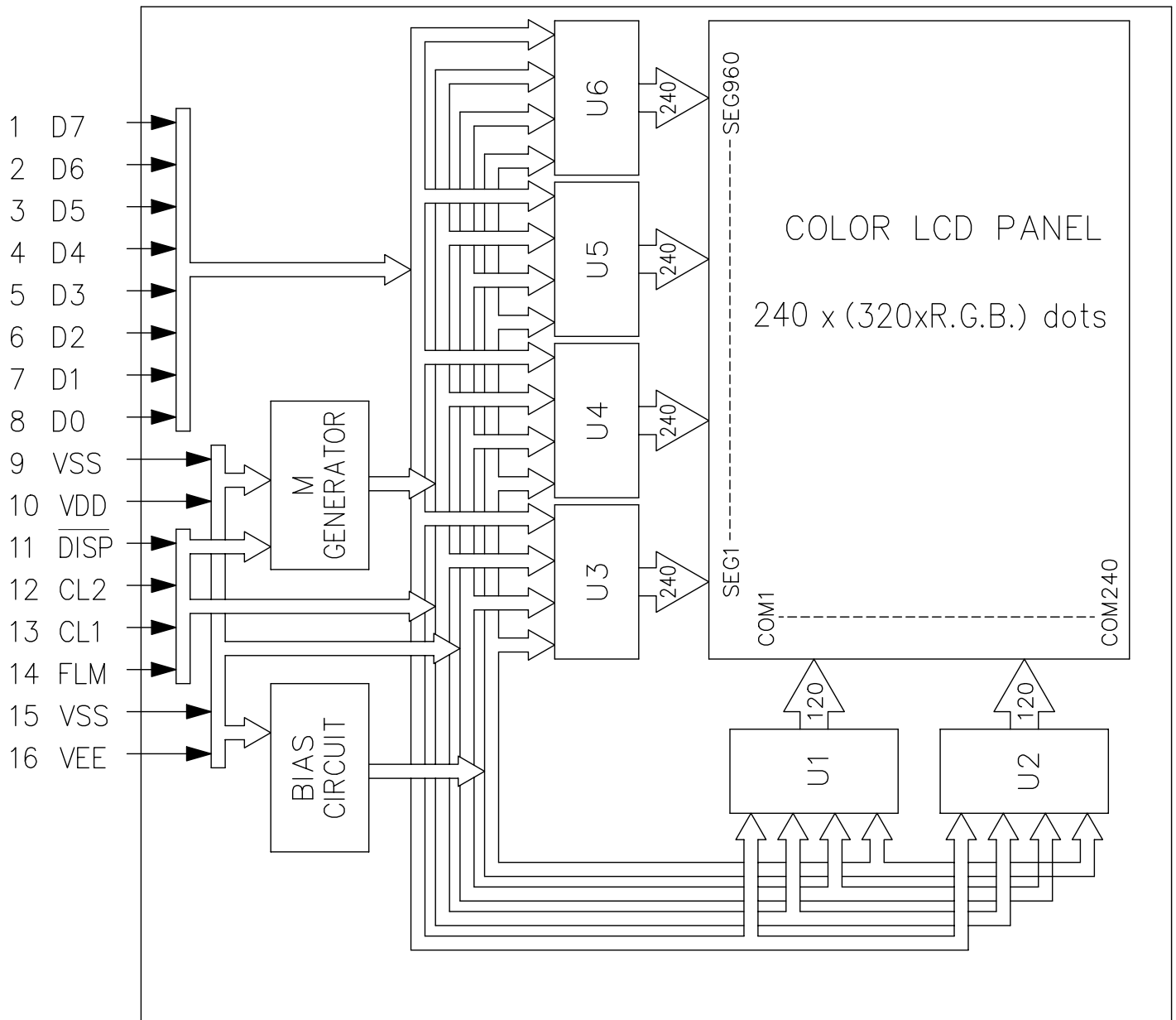
(negative type)

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

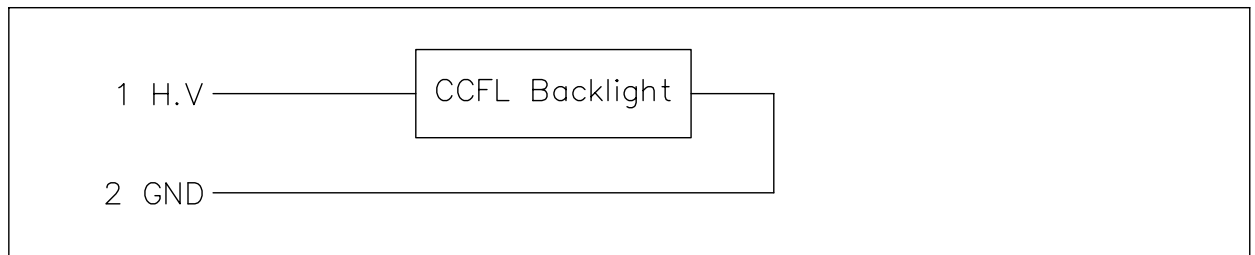
*Conditions

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

5. BLOCK DIAGRAM



CCFL



6. INTERNAL PIN CONNECTION

LCD

Pin No.	Symbol	Level	Function
1	D7	H/L	Display Data
2	D6	H/L	Display Data
3	D5	H/L	Display Data
4	D4	H/L	Display Data
5	D3	H/L	Display Data
6	D2	H/L	Display Data
7	D1	H/L	Display Data
8	D0	H/L	Display Data
9	VSS	—	GND
10	VDD	—	Power Supply for Logic
11	$\overline{\text{DISP}}$	H/L	Display Control Signal, H :Display on L :Display off
12	CL2	H/L	Data input clock
13	CL1	H/L	Input data latch signal
14	FLM	H/L	Scan start-up signal
15	VSS	H/L	Power Supply (0V,GND)
16	VEE	—	Power Supply for LCD

CCFL

Pin No.	Symbol	Level	Function
1	H.V	—	Power Supply for CFL
2	GND	—	CFL GND

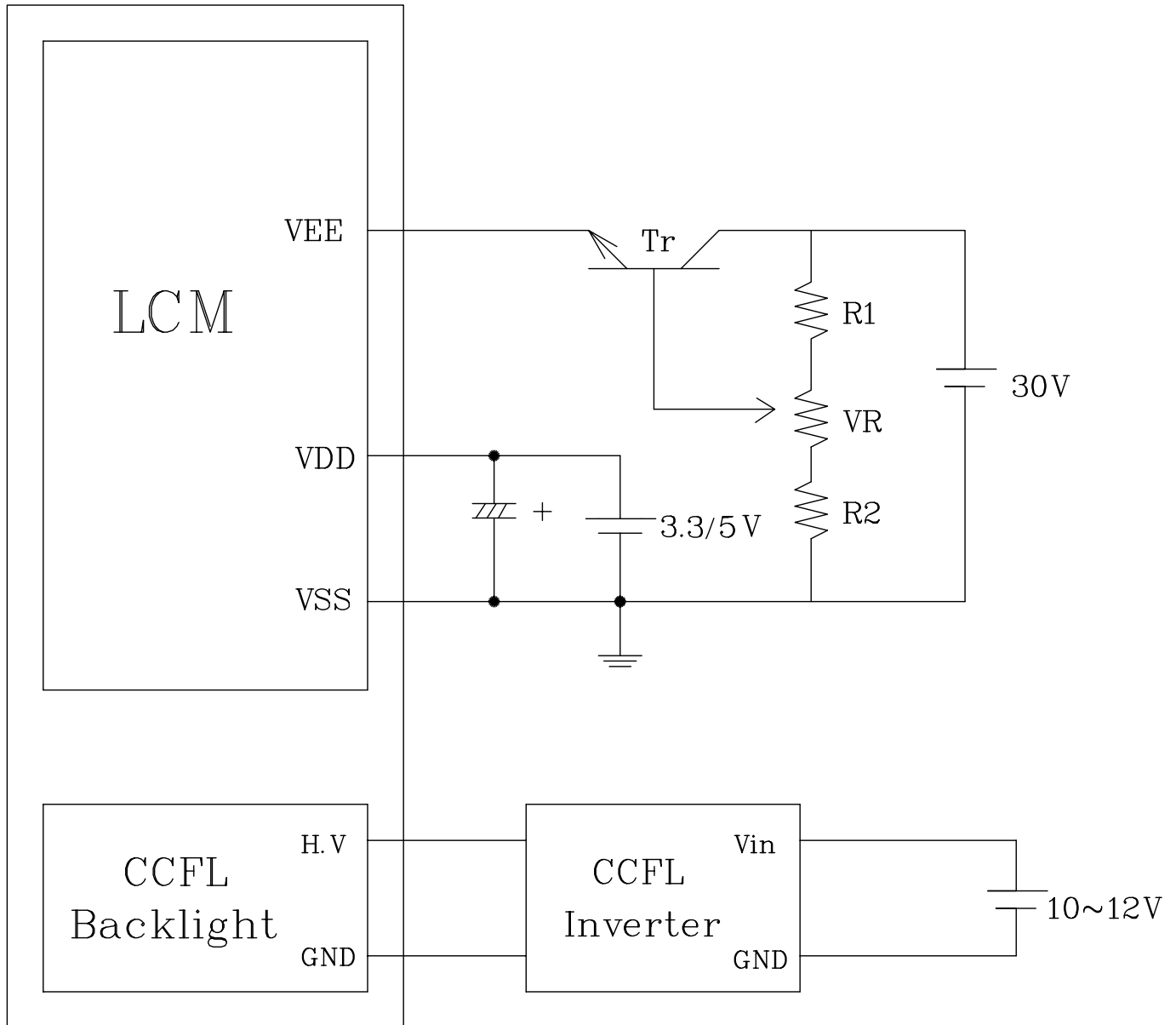
LCD INTERFACE CONNECTOR

FH12-16S-0.5SV (HIROSE)/Suitable FFC :pitch 0.5mm ,width 8.5mm

CCFL CONNECTOR :

BHSR -02VS-1 (JST)/Suitable Connector :SM02B-BHSS-1-TB (JST)

7. POWER SUPPLY



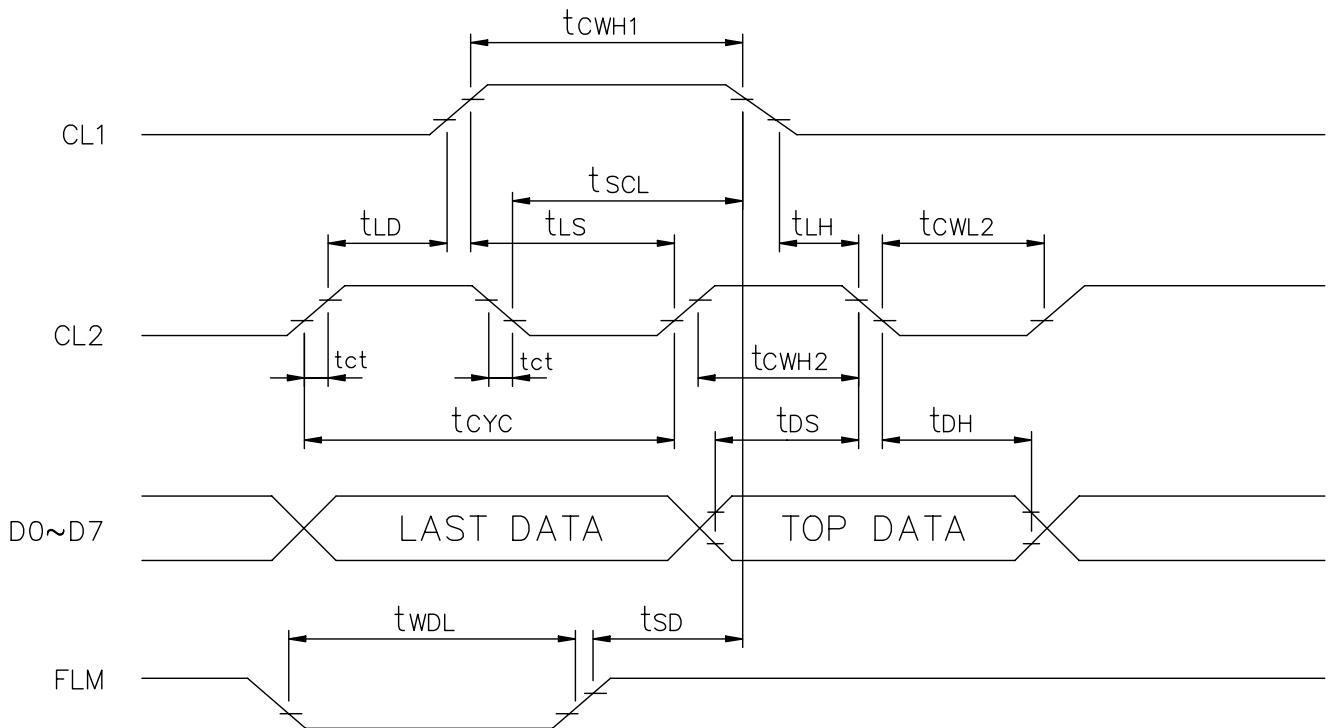
1. $R1 + R2 + VR = 10 \sim 20K \Omega$
2. RECOMMENDED CCFL INVERTER :
COTEK INV-B1

8. TIMING CHARACTERISTICS

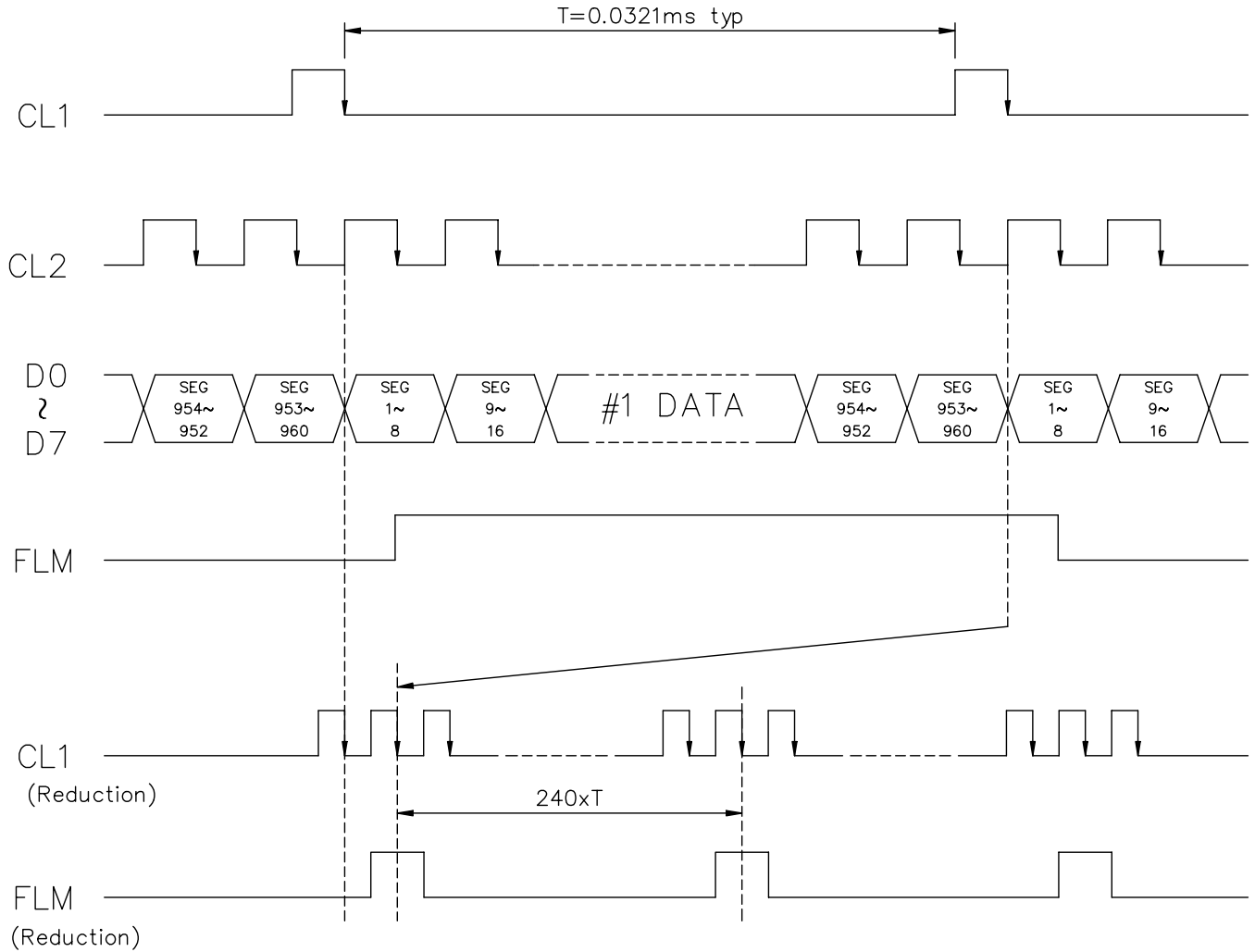
8-1 INTERFACE TIMING

VDD=5.0V ± 10%

Parameter	SYMBOL	MIN.	MAX.	UNIT
CLOCK CYCLE TIME	t_{CYC}	50	—	ns
CL2 HIGH LEVEL WIDTH	t_{CWH2}	15	—	ns
CL2 LOW LEVEL WIDTH	t_{CWL2}	15	—	ns
CL1 HIGH LEVEL WIDTH	t_{CWH1}	25	—	ns
CL2 SETUP TIME	t_{SCL}	100	—	ns
CL2 HOLD TIME	t_{HCL}	100	—	ns
CL2 - CL1 RISE TIME	t_{LD}	5	—	ns
CLOCK RISE / FALL TIME	t_{CT}	—	—	ns
DATA SETUP TIME	t_{DS}	10	50	ns
DATA HOLD TIME	t_{DH}	15	—	ns
FLM SETUP TIME	t_{FS}	30	—	ns
DATA HOLD TIME	t_{FH}	50	—	μ s
FRAME FREQUENCY	t_{FLM}	60	—	ns

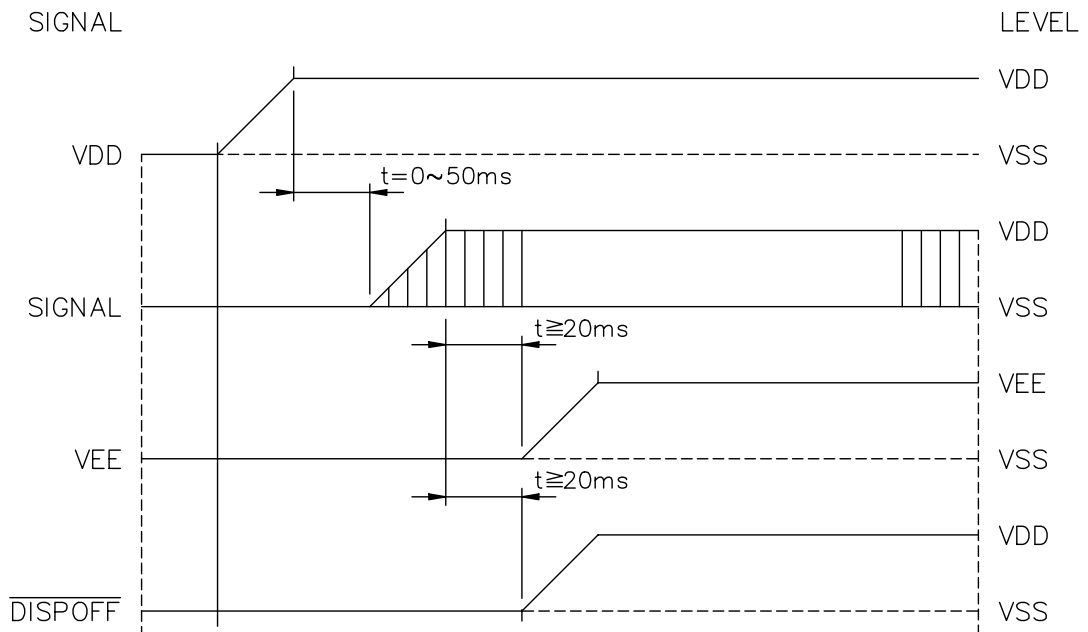


8-2 TIMING CHART OF INPUT SIGNAL

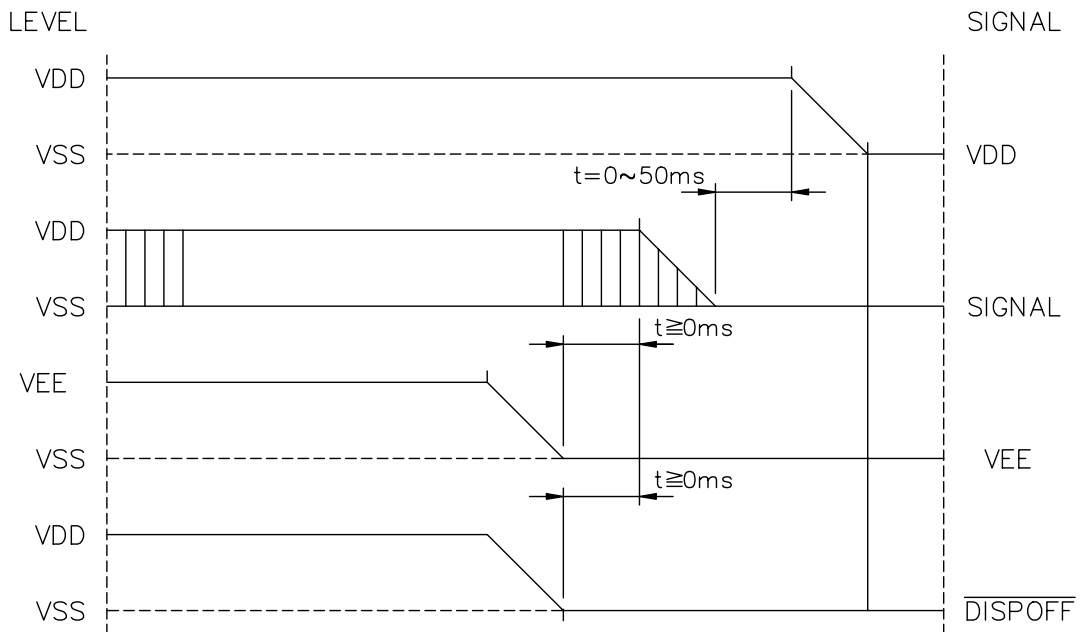


8-3 POWER ON/OFF TIMING

ON SEQUENCE

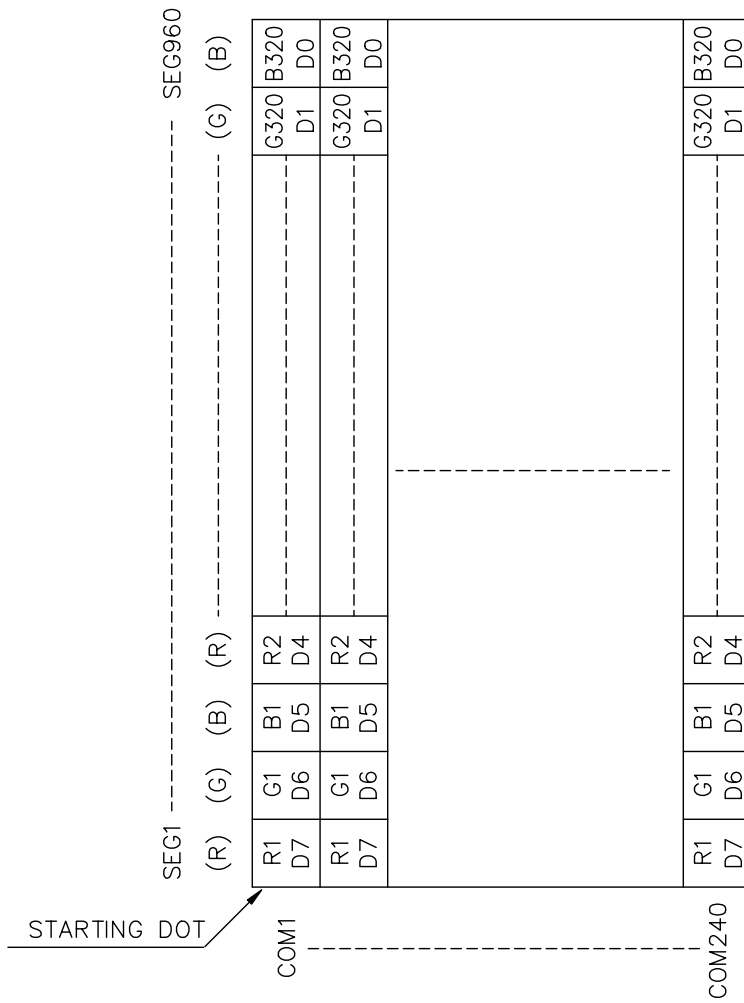


OFF SEQUENCE

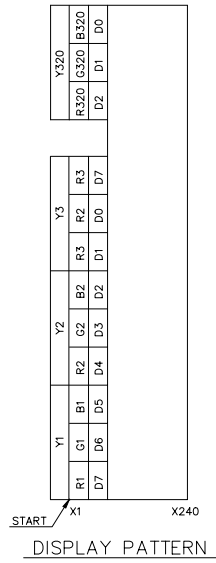
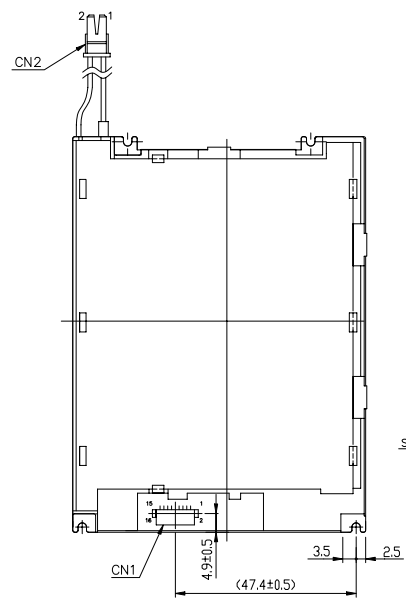
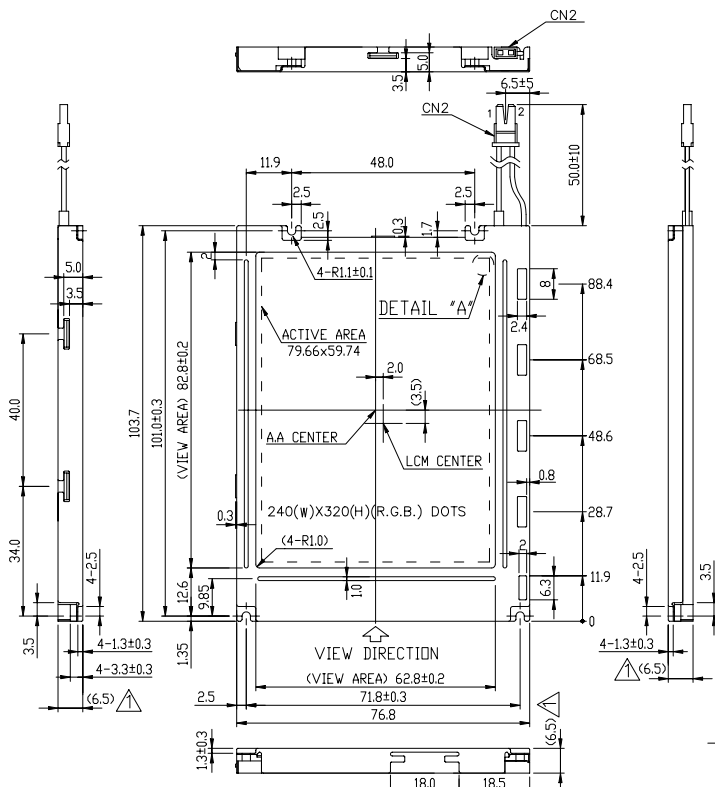


Please maintain the above sequence when turning on and off the power supply of the module. If $\overline{\text{DISPOFF}}$ is supplied to the module while internal alternate signal for LCD driving(M) is unstable, DC component will be supplied to the LCD panel. This may cause damage to the LCD module.

8-4 DISPLAY PATTERN



D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.



NOTE:
 1.RESOLUTION: 240 (H) X 320 (V)(R.G.B.) DOTS
 2.BACKLIGHT: CCFL
 3.FRAME MATERIAL: SUS304 (0.3mmt)

CN1 : FH12-16S-0.5SV(HRS)/SUITABLE FPC : PITCH 0.5mm WIDTH 8.5mm

PIN NO	SYMBOL	FUNCTION	PIN NO	SYMBOL	FUNCTION
1	D7	DISPLAY DATA	11	DISPOFF	DISPLAY CONTROL L: OFF H: ON
2	D6	DISPLAY DATA	12	CL2	DATA INPUT CLOCK
3	D5	DISPLAY DATA	13	CL1	INPUT DATA LATCH SIGNAL
4	D4	DISPLAY DATA	14	FLM	SCAN START-UP SIGNAL
5	D3	DISPLAY DATA	15	V _{SS}	GROUND
6	D2	DISPLAY DATA	16	V _{EE}	POWER SUPPLY FOR LCD
7	D1	DISPLAY DATA	SUITABLE CONNECTOR : SMO2B-BHSS-1-TB (JST)		
8	D0	DISPLAY DATA	CN2 : BHSR-02VS-1(JST) (PIN1-H.V;PIN2-GND)		
9	V _{SS}	GROUND	1	H.V	POWER SUPPLY VOLTAGE FOR CCFL
10	V _{DD}	LOGIC SUPPLY VOLTAGE	2	GND	CCFL GND

0.234	0.015
B	B
G	G
R	R

DETAIL "A"
 (SCALE 40:1)

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)

AZ DISPLAYS, INC.
 AGM3224Y

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG NO.	NAME	DATE	THIRD ANGLE P.
1	Dimension Modified	88.11.24	M.Y. Lin	Louis Lee	L.C. WU	M2111-HDIA	TONY CHOU	88.9.13	☐
							Louis Lee	88.9.13	SCALE UNIT
							C. J. CHEN	88.9.13	NTS mm
							C. J. CHEN	88.9.13	