

# AZ DISPLAYS, INC.

## 1. MECHANICAL DATA

(1) Product No.	<b>ACM0801A</b>
(2) Module Size	84.0 (W)mm x 44.0 (H)mm x MAX9.5 (D)mm
(3) Dot Size	1.25 (W)mm x 0.93 (H)mm
(4) Dot Pitch	1.30 (W)mm x 0.98 (H)mm
(5) Number of Characters	8 (W) x 1 (H)Characters
(6) Character Format	5 (W) x 11 (H)Dots
(7) Duty	1/11
(8) LCD Display Mode	STN: <input type="checkbox"/> Gray Mode <input type="checkbox"/> Yellow Mode FSTN: <input type="checkbox"/> Black and White(Normal White/Positive Image)
(9) Viewing Direction	Rear Polarizer: <input type="checkbox"/> Reflective <input type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock <input type="checkbox"/> ____O'clock
(10) Backlight	<b>None</b>
(11) Weight	36g

Revised: January 22, 2002

## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

V<sub>SS</sub>=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	V <sub>I</sub>	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.				WIDE TEMP.			
	OPERATING		STORAGE		OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70	-20	70	-30	80
Humidity (Without Condensation)	Note 1,3		Note 2,3		Note 3,4		Note 3,5	

Note 1 Ta ≤ 50°C : 85%RH max  
 Ta > 50°C : Absolute humidity must be lower  
 than the humidity of 85%RH at 50°C

Note 2 Ta at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 3 Background color changes slightly depending on ambient temperature.  
 This phenomenon is reversible.

Note 4 Ta ≤ 70°C : 75%RH max  
 Ta > 70°C : Absolute humidity must be lower  
 than the humidity of 75%RH at 70°C

Note 5 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs

## 3. ELECTRICAL CHARACTERISTICS

( VDD=5V±10% )

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	VIH	H level	0.8VDD	–	VDD	V
	VIO	L level	0	–	0.2VDD	V
Recommended LC Driving Voltage (NORMAL TEMP. LCM)	VDD–VO (Vop)	0℃	–	3.9	4.3	V
		25℃	3.5	3.8	4.2	
		50℃	3.2	3.5	–	
Recommended LC Driving Voltage (WIDE TEMP. LCM)	VDD–VO (Vop)	–20℃	4.9	5.6	6.4	V
		0℃	4.7	5.5	6.3	
		25℃	4.6	5.4	6.2	
		70℃	4.0	4.7	5.4	
Power Supply Current	IDD	VDD = 5.0V	–	–	2.8	mA

## 4.1 OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT  $V_{OP}$

ITEM MODE		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	3.0	4.0	30	50	20	25
	C	3.5	7.0	40	60	25	35
	J						

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	460	900	ms	NOTE 2
		25℃	–	110	220		
		50℃	–	65	130		
Response Time (fall)	Tf	0℃	–	420	800	ms	NOTE 2
		25℃	–	140	250		
		50℃	–	90	155		

NOTE :

- R: REFLECTIVE
- A: GRAY
- C: YELLOW
- J: NORMALLY WHITE

## 4.2 OPTICAL CHARACTERISTICS

(FOR WIDE TEMPERATURE MODE LCM)

AT Vop

ITEM MODE		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A						
	C	5.5	9	50	80	25	40
	J						

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	-	1000	2000	ms	NOTE 2
		0℃	-	180	360		
		25℃	-	80	160		
		70℃	-	50	100		
Response Time (fall)	Tf	-20℃	-	1500	2400	ms	NOTE 2
		0℃	-	300	560		
		25℃	-	90	190		
		70℃	-	50	100		

NOTE :

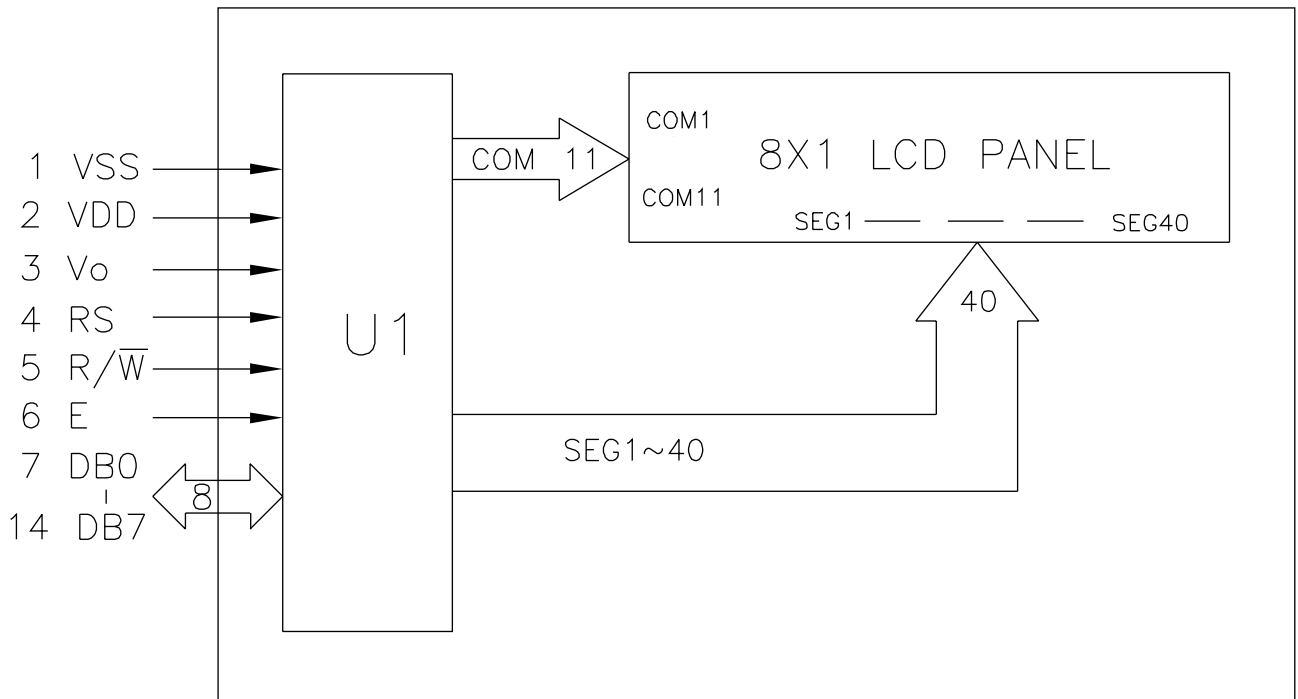
R: REFLECTIVE

A: GRAY

C: YELLOW

J: NORMALLY WHITE

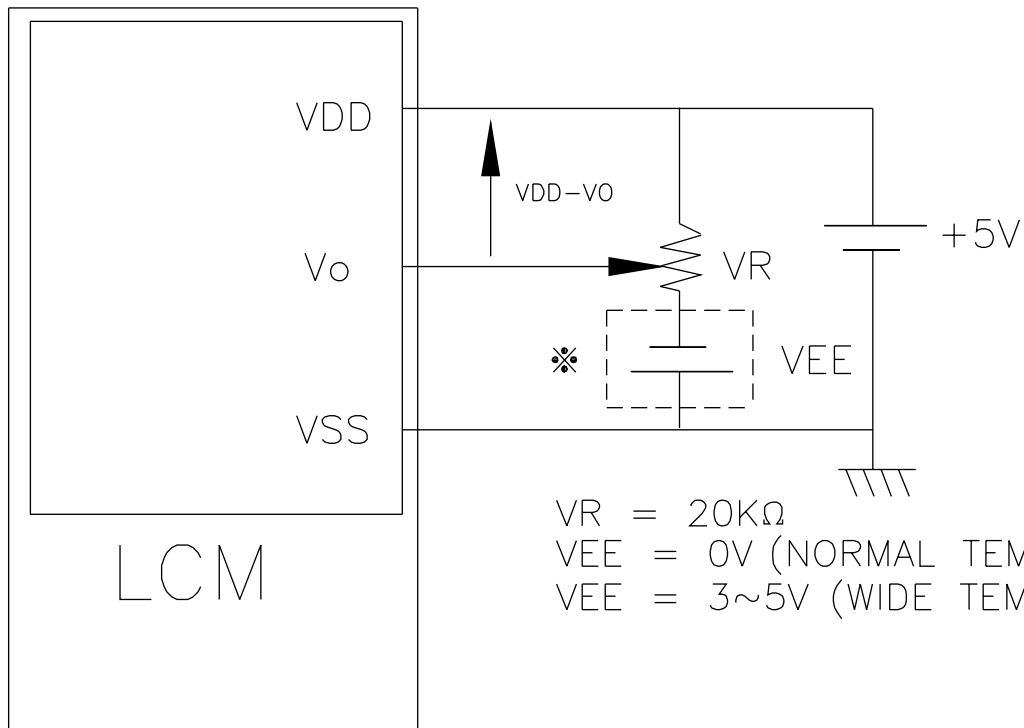
## 5. BLOCK DIAGRAM



## 6. INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function	
1	V <sub>SS</sub>	—	0V	Power Supply
2	V <sub>DD</sub>	—	+5V	
3	V <sub>0</sub>	LCD Contrast Voltage		
4	RS	H/L	L:INSTRUCTION CODE INPUT H:DATA INPUT	
5	R/W	H/L	H:DATA READ (FROM LCM TO MPU) L:DATA WRITE (FROM MPU TO LCM)	
6	E	H,H→L	ENABLE SIGNAL	
7	DB0	H/L	DATA BUS LINE	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		
15	NC	—	NO CONNECTION	
16	NC	—		

## 7. POWER SUPPLY



$VR = 20K\Omega$   
 $VEE = 0V$  (NORMAL TEMP. MODE LCM)  
 $VEE = 3\sim 5V$  (WIDE TEMP. MODE LCM)



## 8. TIMING CHARACTERISTICS

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	$t_{cyc}$	Fig.a, Fig.b	1000	-	-	ns
Enable pulse width	$PW_{EH}$	Fig.a, Fig.b	450	-	-	ns
Enable rise/fall time	$t_{Er}, t_{Ef}$	Fig.a, Fig.b	-	-	25	ns
RS,R/ $\bar{W}$ set up time	$t_{AS}$	Fig.a, Fig.b	60	-	-	ns
Data delay time	$t_{DDR}$	Fig.b	-	-	360	ns
Data set up time	$t_{DSW}$	Fig.a	195	-	-	ns
Hold time	$t_H$	Fig.a, Fig.b	5	-	-	ns

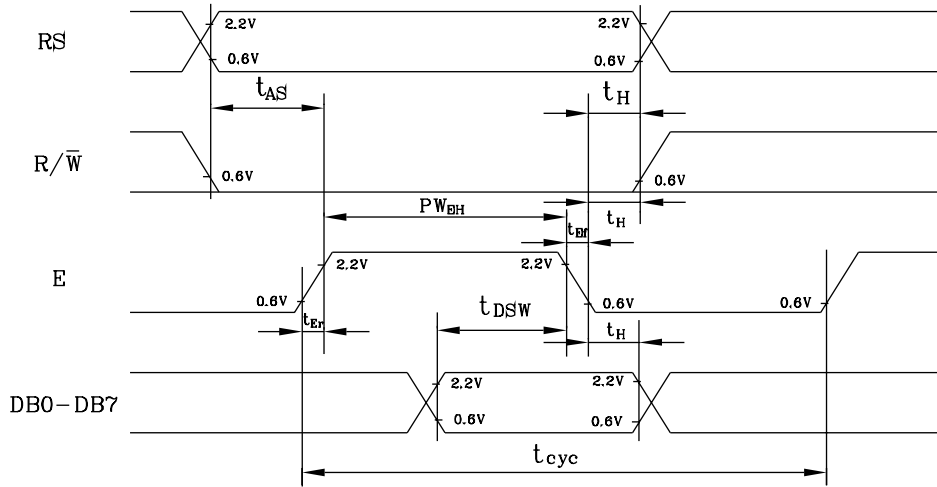


Fig. a Interface timing (data write)

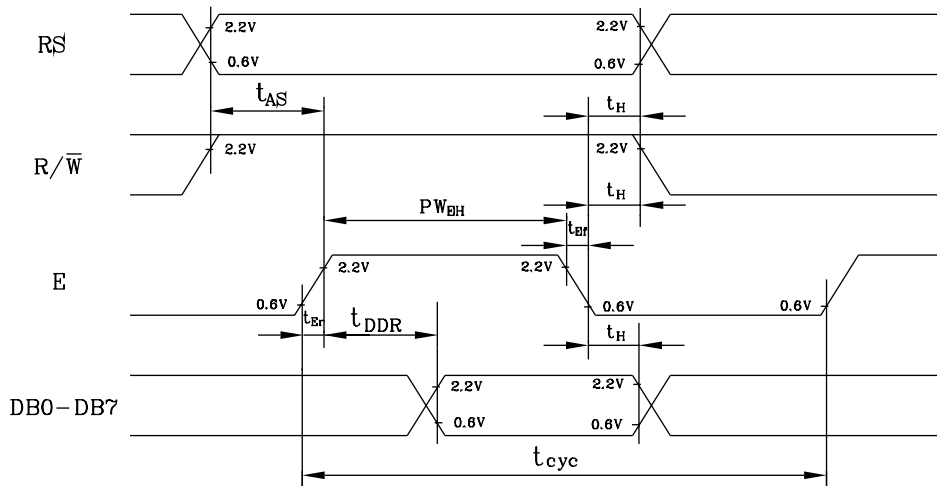
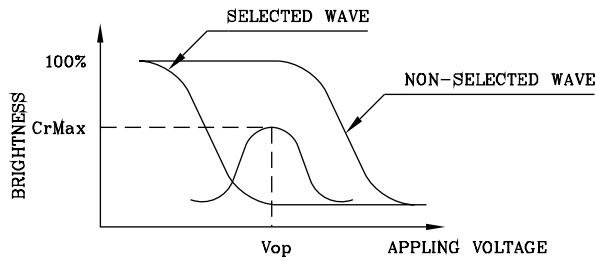


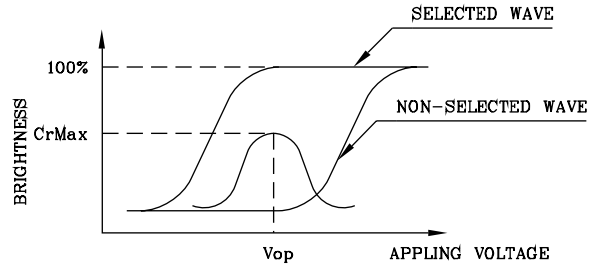
Fig. b Interface timing (data read)

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



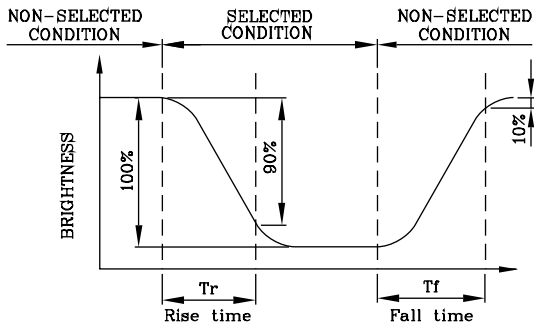
(negative type)

\*Conditions

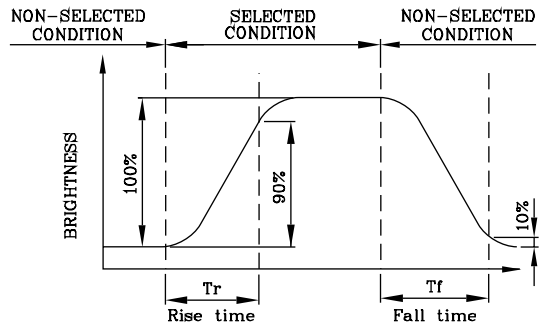
Viewing Angle : 0  
 Frame Frequency : 70Hz  
 Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



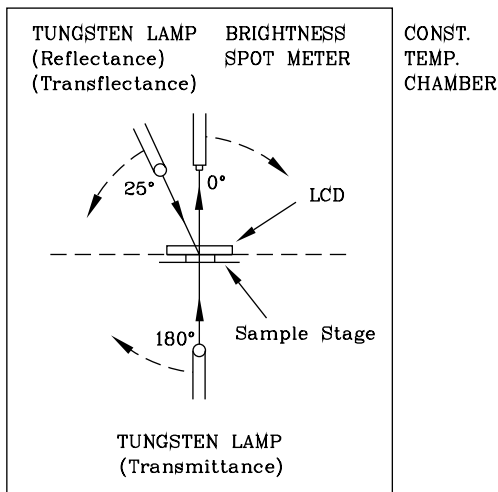
(negative type)

\*Conditions

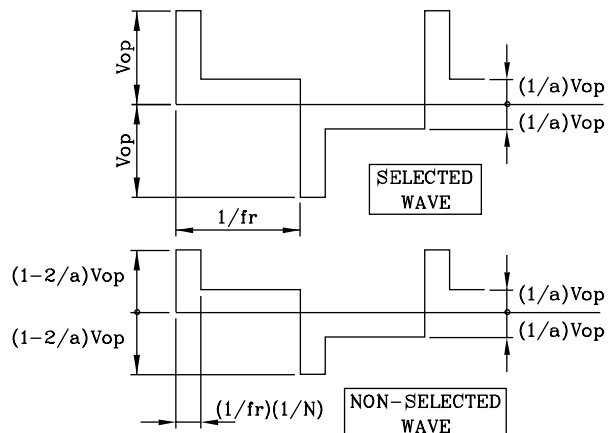
Operating Voltage : Vop  
 Viewing Angle (θ,φ) : (0,0)  
 Frame Frequency : 70Hz  
 Appling Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

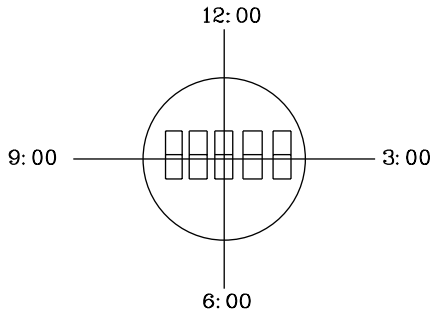


Multiplex Driving ( I/N duty 1/a bias )



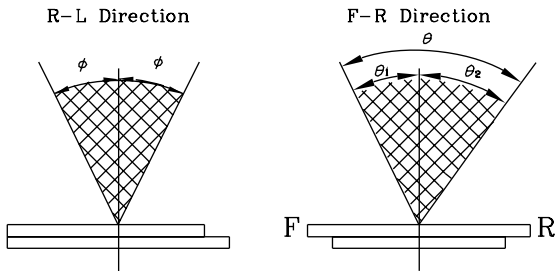
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



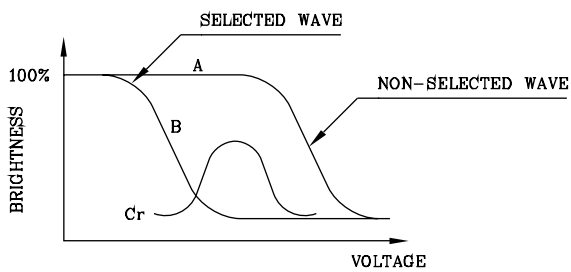
$$\theta = \theta_1 + \theta_2$$

\*Conditions

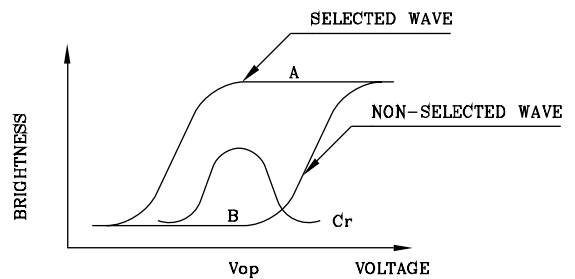
- Operating Voltage :  $V_{op}$
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)

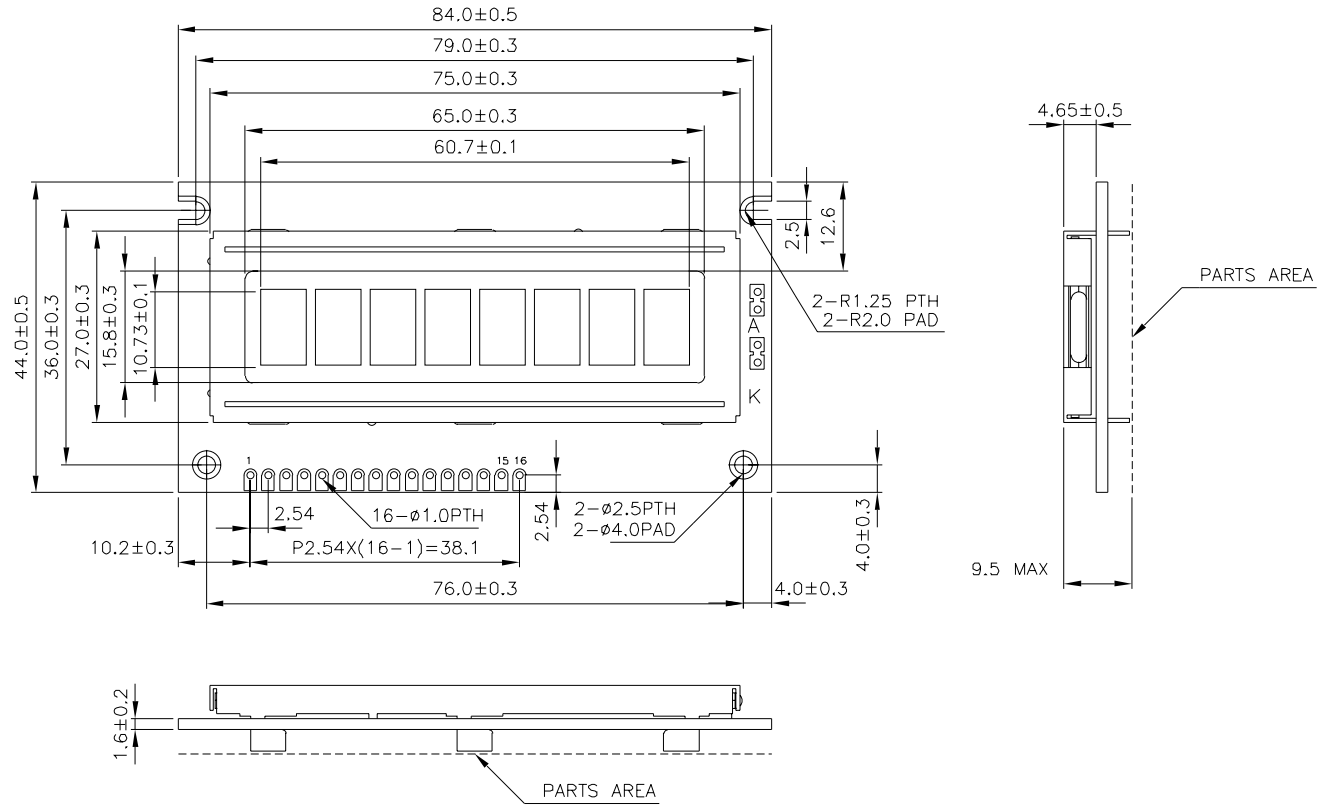


(negative type)

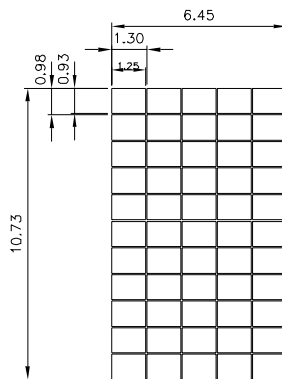
$$\text{Contrast Ratio : } Cr = A/B$$

\*Conditions

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



No	Symbol	Function	
1	VSS	0V	Power Supply
2	VDD	+5V	
3	Vo	LCD Contrast	
4	RS	Function Select	
5	R/W	Read/Write	
6	E	Enable Signal	
7	DB0	Data Bus Line	
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6		
14	DB7	No Connection	
15	NC		
16	NC		



\* Controller Driver : KS0066U-00 OR Compatible

NOTES :

1. Resolution: 8x1 Characters
2. Character Format: 5x11 Dots
3. General Tolerance: ±0.5mm

			AZ DISPLAYS, INC.		
APPROVE	NAME	DATE	TITLE	ACM0801A	
CHECK			DWG-NO	MK-X101XD	Rev.B
DESIGN			UNIT : mm SCALE :		
DRAW	MAY PING	86.11.20			