

# AZ DISPLAYS, INC.

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*COMPLETE LCD SOLUTIONS*

## SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

PART NUMBER:

ACM1602Z

REVISED:

OCTOBER 22, 2002



# AZ DISPLAYS, INC.

## 1. MECHANICAL DATA

(1) Product No.	<b>ACM1602Z</b>
(2) Module Size	65.0 (W)mm x 27.7 (H)mm x MAX2.0 (D)mm (W/O B.L.)
(3) Dot Size	0.55 (W)mm x 0.60 (H)mm
(4) Dot Pitch	0.60 (W)mm x 0.65 (H)mm
(5) Number of Characters	16 (W) x 2 (H)
(6) Duty	1/16
(7) LCD Display Mode	STN: <input type="checkbox"/> Gray Mode <input type="checkbox"/> Yellow Mode <input type="checkbox"/> Blue Mode FSTN: <input type="checkbox"/> Black and White(Normal White/Positive Image) <input type="checkbox"/> Black and White(Normal Black/Negative Image)
(8) Viewing Direction	Rear Polarizer: <input type="checkbox"/> Reflective <input type="checkbox"/> Transflective <input type="checkbox"/> Transmissive <input type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock <input type="checkbox"/> ____O'clock
(9) Backlight	W/O
(10) Weight	6.8 g (approx)
(11) Controller (COG)	NT7605

## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	5.5	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity (Without Condensation)	Note 2,4		Note 3,4	

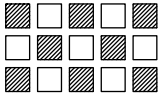
Note 2 : Ta ≤ 50°C : 85%RH max  
 Ta > 50°C : Absolute humidity must be lower  
 than the humidity of 85%RH at 50°C

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

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

## 3. ELECTRICAL CHARACTERISTICS

( VDD=5.0V ± 10% )

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Input Voltage	VIH	H level	0.8VDD	–	VDD	V	
	VIL	L level	0	–	0.2VDD	V	
Recommended LCD Driving Voltage	VDD–V5 (VLCD)	DUTY= 1/16 Bias= 1/5	0°C	4.9	5.1	5.3	V
			25°C	4.7	4.9	5.1	
			50°C	4.6	4.8	5.0	
Power Supply Current	IDD	VDD = 5.0V 	–	1.2	2.0	mA	

## 4. OPTICAL CHARACTERISTICS

AT V<sub>OP</sub>

ITEM		Cr(Contrast Ratio)						$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)		
		0°C		25°C		50°C		25°C		25°C		
MODE		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	
R	A	—	4.5	—	5.0	—	4.0	—	29–24	—	±99	
Note		NOTE 6						NOTE 5				

NOTE :

R : Reflective

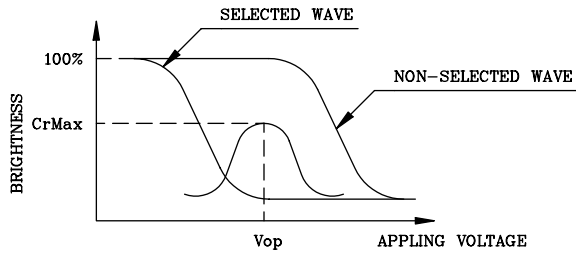
A : Gray , 6 O'clock

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

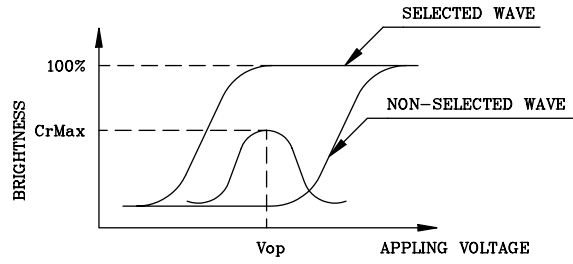
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	520	570	620	ms	NOTE 2
		25°C	130	150	170		
		50°C	60	80	100		
Response Time (fall)	Tf	0°C	250	300	350	ms	NOTE 2
		25°C	50	70	90		
		50°C	10	30	50		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



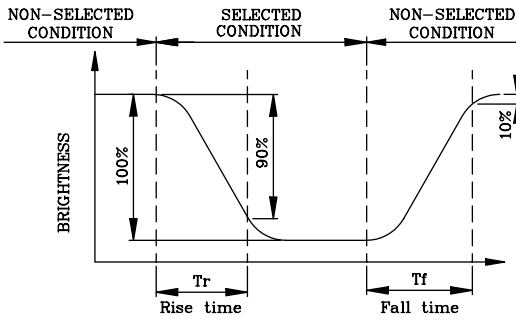
(negative type)

\*Conditions

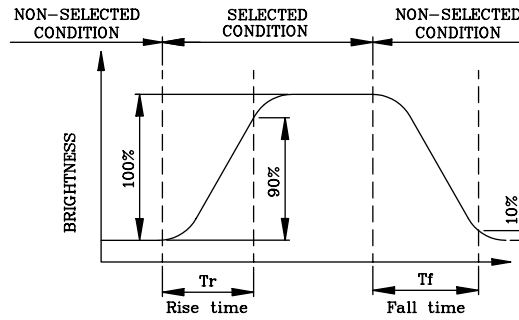
- Viewing Angle : 0
- Frame Frequency : 70Hz
- Applying Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



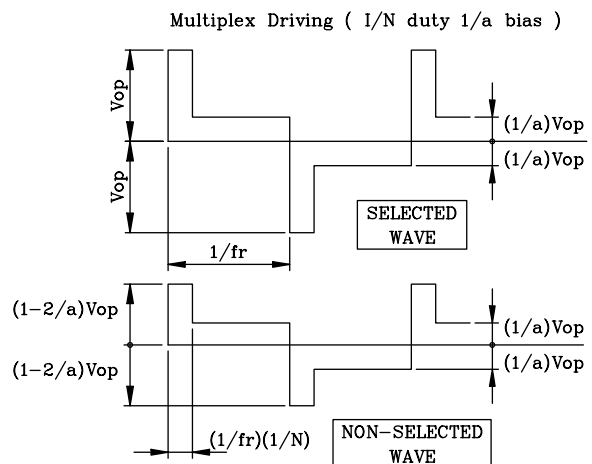
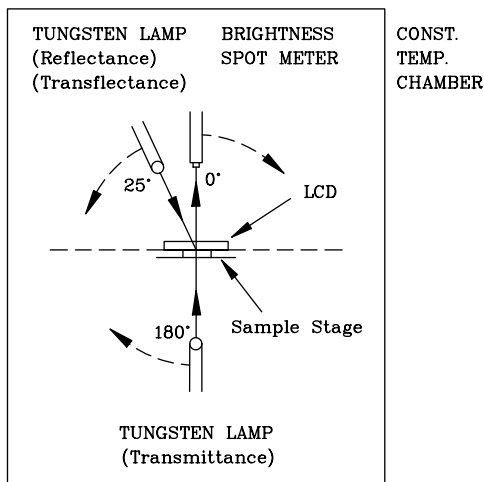
(negative type)

\*Conditions

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

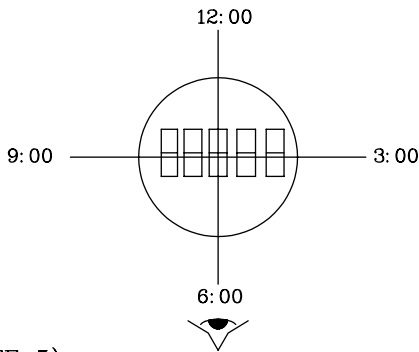
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



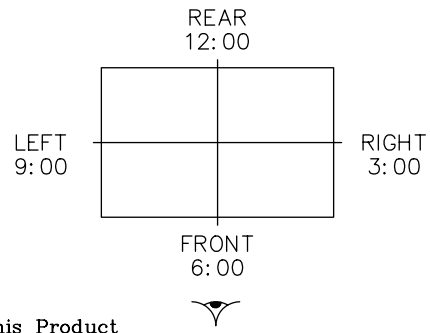
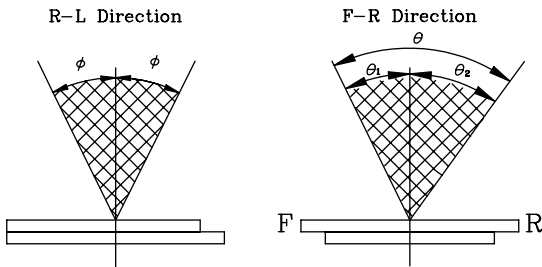
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

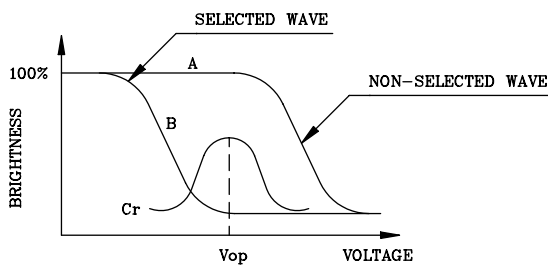
$$\theta = \theta_1 + \theta_2$$

\*Conditions

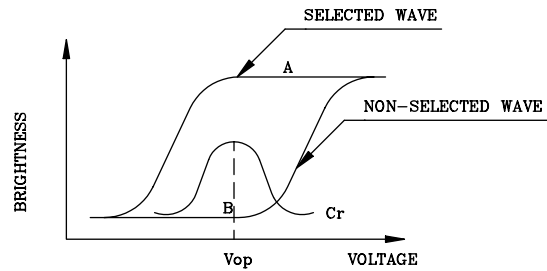
Operating Voltage :  $V_{op}$   
Frame Frequency : 70Hz  
Applying Waveform : 1/N duty 1/a bias  
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

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

\*Conditions

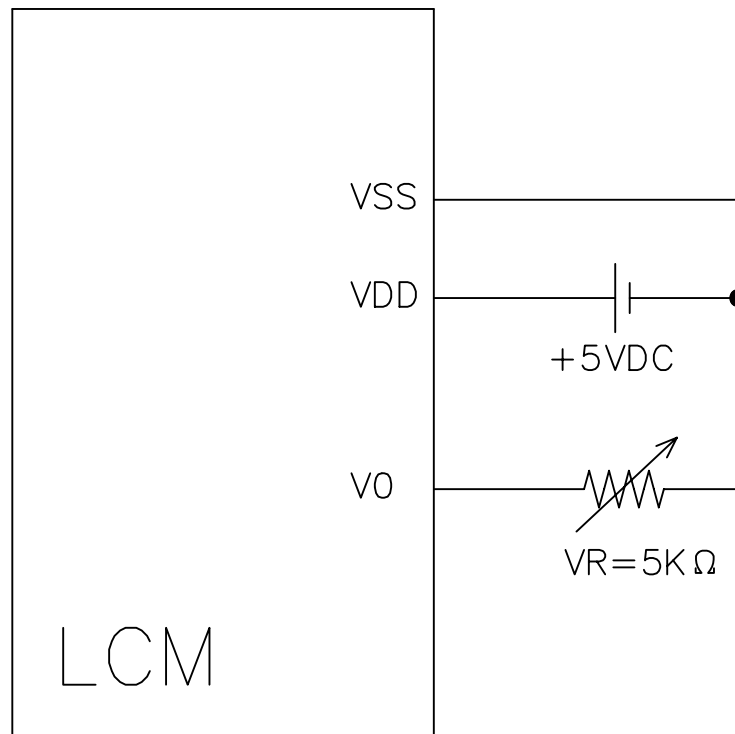
Viewing Angle : 0  
Frame Frequency : 70Hz  
Applying Waveform : 1/N duty 1/a bias



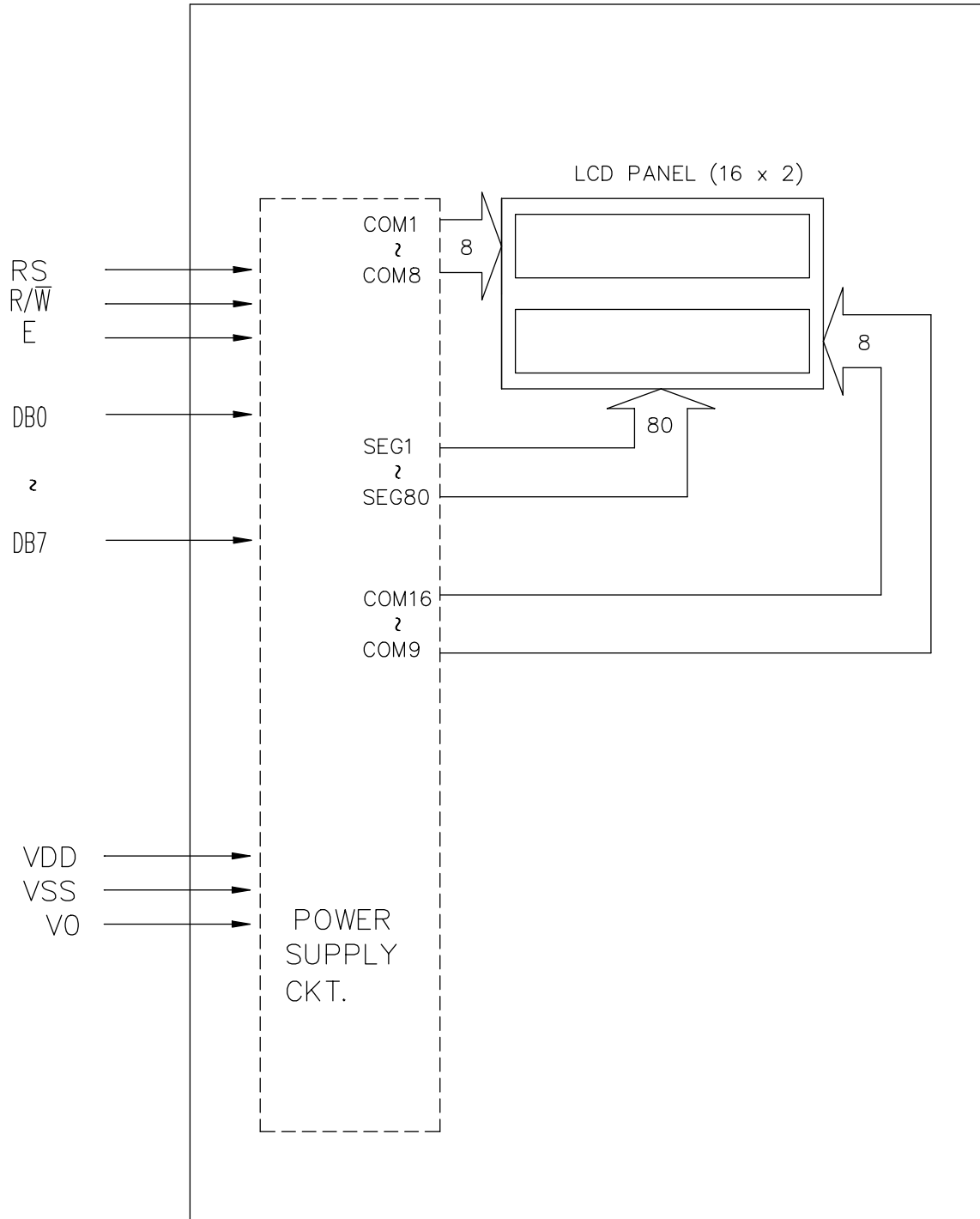
## 5. INTERNAL PIN CONNECTION

Pin NO.	Symbol	Function
1	RS	H:Data Input L:Instruction Input
2	R/ $\bar{W}$	H:Data Read L:Data Write
3	E	Enable
4	DB0	Data Bus
5	DB1	
6	DB2	
7	DB3	
8	DB4	
9	DB5	
10	DB6	
11	DB7	
12	Vss	0V Power Supply
13	Vdd	+5V Power Supply
14	VO	Operating Voltage for LCD Driving

## 6. POWER SUPPLY/BOOSTER CAPACITANCE



## 7. MPU INTERFACE/BLOCK DIAGRAM





## 9. TIMING CHARACTERISTICS

(Read Operation)

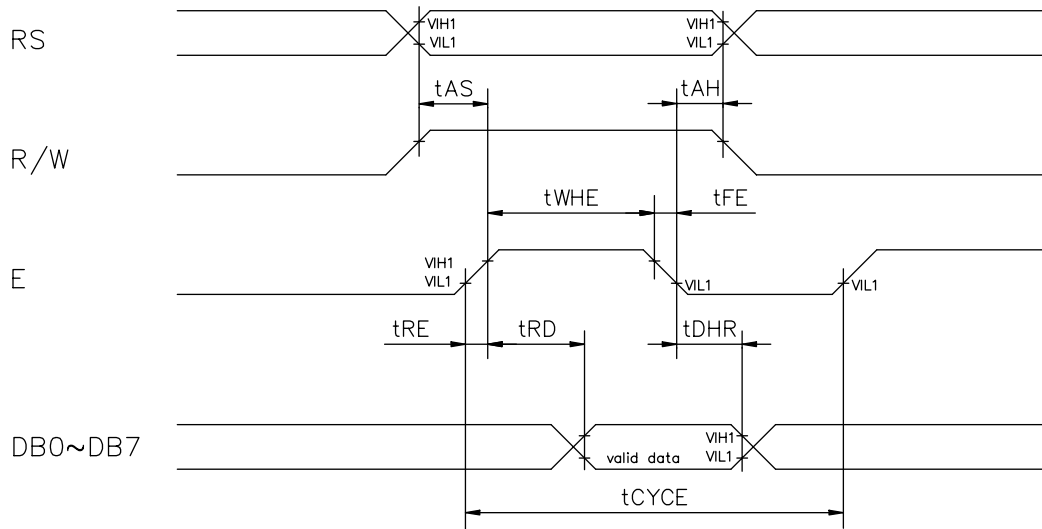


Figure 1. Bus Read Operation Sequence

(Write Operation)

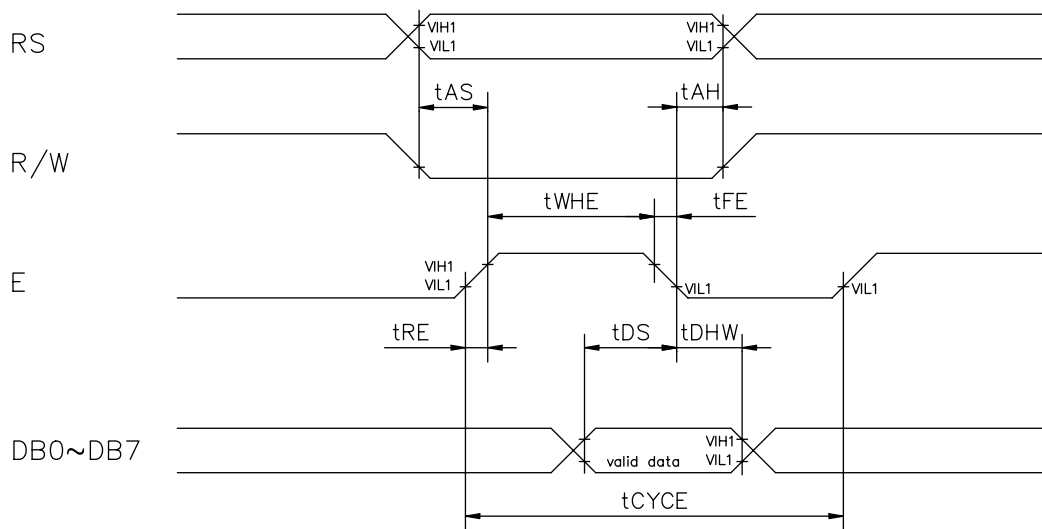
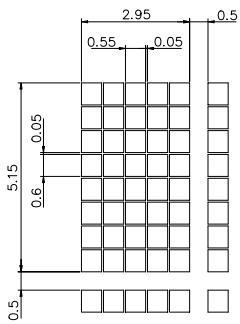
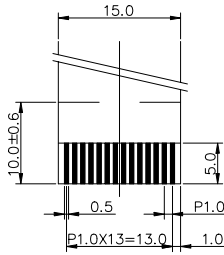
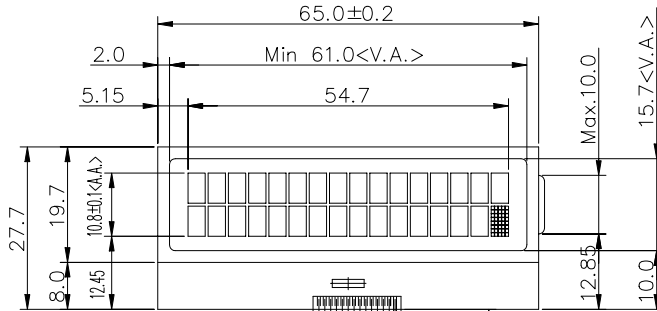


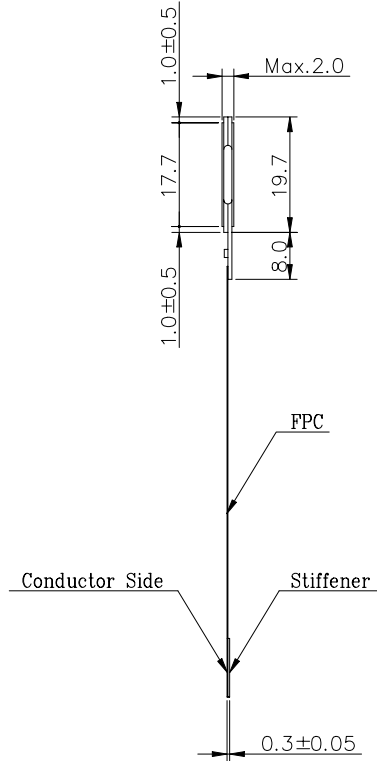
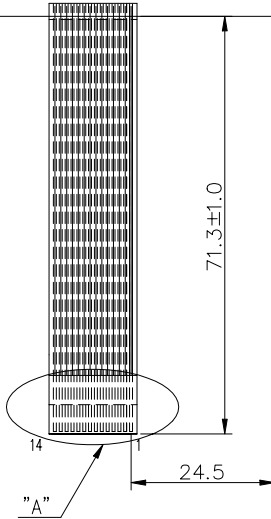
Figure 2. Bus Write Operation Sequence



Detail "A"  
(Scale 15:1)



Detail "A"  
(Scale 2:1)



Pin NO.	Symbol	Function
1	RS	H:Data Input L:Instruction Data Input
2	R/W	H:Data Read L:Data Write
3	E	Enable
4	DB0	Data Bus
5	DB1	
6	DB2	
7	DB3	
8	DB4	
9	DB5	
10	DB6	
11	DB7	
12	Vss	0V Power Supply
13	Vdd	+5V Power Supply
14	VO	Operating Voltage for LCD Driving

Notes:

- Resolution : 16X2 Characters
- COG IC : NT7605
- Glass Thickness : 0.7mm

GENERAL TOLERANCE LIST

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)

AZ DISPLAYS, INC.

ACM1602Z

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG NO.	NAME	DATE	SCALE	UNIT	THIRD ANGLE P.
						M409-D0A	J.S HUANG	89.08.29	1/1	mm	