

# AZ DISPLAYS, INC.

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*COMPLETE LCD SOLUTIONS*

## **SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY**

PART NUMBER:

ACM 2004E SERIES

DATE:

April 24, 2002

# ACM2004E SERIES LCD MODULE

## 1.0 MECHANICAL SPECS

1. Overall Module Size	182.0mm(W) x 90.0mm(H) x max 13.0mm(D) for LED backlight version 182.0mm(W) x 90.0mm(H) x max 9.50mm(D) for reflective version
2. Dot Size	1.10mm(W) x 1.50mm(H)
3. Dot Pitch	1.20mm(W) x 1.60mm(H)
4. Duty	1/16
5. Controller IC	ST7066
6. LC Fluid	TN, STN
7. Polarizer	Reflective, Transflective, Transmissive
8. Viewing Angle	Bottom, Top
9. Backlight	Side LED
10. Temperature Range	Standard(0°C ~ 50°C), Wide(-20°C ~ 70°C)

## 2.0 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Typ	Max	Unit
Operating temperature (Standard)	Top	0	-	50	°C
Storage temperature (Standard)	Tst	-10	-	60	°C
Operating temperature (Wide temperature)	Top	-20	-	70	°C
Storage temperature (Wide temperature)	Tst	-30	-	80	°C
Input voltage	Vin	Vss		Vdd	V
Supply voltage for logic	Vdd- Vss	2.7	-	5.5	V
Supply voltage for LCD drive	Vdd- Vo	3.0	4.6	6.5	V

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## 3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	Vih	H level	2.2	-	Vdd	V
Input voltage (low)	Vil	L level	0	-	0.6	V
Recommended LC Driving Voltage (Standard Temp)	Vdd - Vo	0°C	-	4.8	5.4	V
		25°C	4.2	4.6	-	
		50°C	3.9	4.3	-	
Recommended LC Driving Voltage (Wide Temp)	Vdd -Vo	-20°C	-	6.4	7.2	V
		0°C	-	4.8	-	
		50°C	-	4.3	-	
		70°C	3.7	4.2	-	
Power Supply Current	Idd	Vdd=5.0V, fosc=270kHz	-	0.5	1.0	mA
LED Power Supply Voltage	Vfled	R=6.8Ω	-	4.6	5.0	V
LED Power Supply Current	Ifled	R=6.8Ω	-	240	480	mA

## 4.0 OPTICAL CHARACTERISTICS (Ta=25°C, Vdd= 5.0V±0.25V, TN LC fluid)

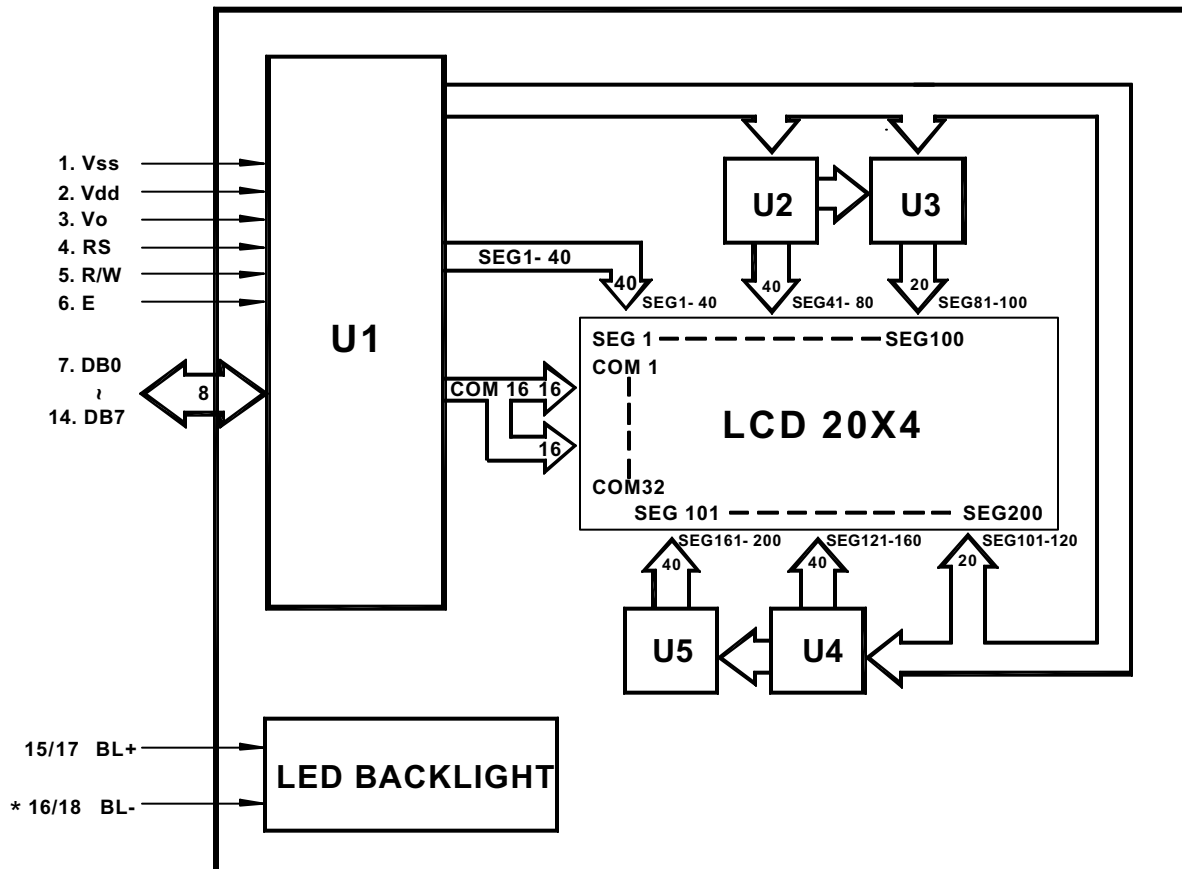
Item	Symbol	Condition	Min	Typ	Max	Unit
Viewing angle (horizontal)	θ	Cr ≥ 4.0	-25	-	-	deg
Viewing angle (vertical)	φ	Cr ≥ 4.0	-30	-	30	deg
Contrast Ratio	Cr	φ=0°, θ=0°	-	2	-	
Response time (rise)	Tr	φ=0°, θ=0°	-	120	150	ms
Response time (fall)	Tf	φ=0°, θ=0°	-	120	150	ms

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## 4.1 OPTICAL CHARACTERISTICS (Ta=25°C, Vdd= 5.0V±0.25V, STN LC fluid)

Item	Symbol	Condition	Min	Typ	Max	Unit
Viewing angle (horizontal)	$\theta$	$Cr \geq 2.0$	-60	-	35	deg
Viewing angle (vertical)	$\phi$	$Cr \geq 2.0$	-40	-	40	deg
Contrast Ratio	Cr	$\phi=0^\circ, \theta=0^\circ$	-	6	-	
Response time (rise)	Tr	$\phi=0^\circ, \theta=0^\circ$	-	150	250	ms
Response time (fall)	Tf	$\phi=0^\circ, \theta=0^\circ$	-	150	250	ms

## 5.0 BLOCK DIAGRAM



\*Note: connected to Vss

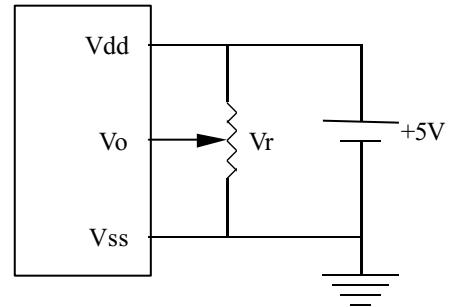
# ACM2004E SERIES LCD MODULE

## 6.0 PIN ASSIGNMENT

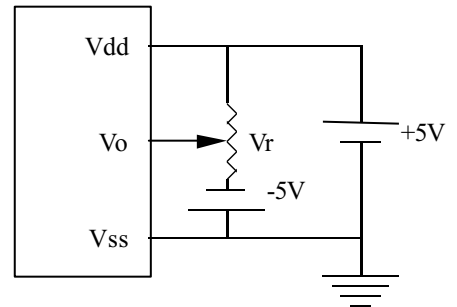
Pin No.	Symbol	Function
1	Vss	Ground
2	Vdd	+5V
3	Vo	LCD contrast adjust
4	RS	Register select
5	R/W	Read / write
6	E	Enable
7	DB0	Data bit 0
8	DB1	Data bit 1
9	DB2	Data bit 2
10	DB3	Data bit 3
11	DB4	Data bit 4
12	DB5	Data bit 5
13	DB6	Data bit 6
14	DB7	Data bit 7
15	BL+	Power Supply for BL+
*16	BL-	Power Supply for BL-
17	BL+	Power Supply for BL+
*18	BL-	Power Supply for BL-

\*Note: connected to Vss

## 7.0 POWER SUPPLY



STANDARD TEMP RANGE



WIDE TEMP RANGE

$V_r = 10K\Omega \sim 20K\Omega$

## 8.0 TIMING CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Enable cycle time	$t_c$	Fig. a, Fig. b	500	-	-	ns
Enable pulse width	$t_w$	Fig. a, Fig. b	220	-	-	ns
Enable rise/fall time	$t_R, t_F$	Fig. a, Fig. b	-	-	25	ns
RS, R/W set up time	$t_{SU}$	Fig. a, Fig. b	40	-	-	ns
RS, R/W hold time	$t_H$	Fig. a, Fig. b	10	-	-	ns
Data delay time	$t_D$	Fig. b	-	-	120	ns
Data set up time	$t_{DSU}$	Fig. a	60	-	-	ns
Data hold time	$t_{DH}$	Fig. a, Fig. b	20	-	-	ns

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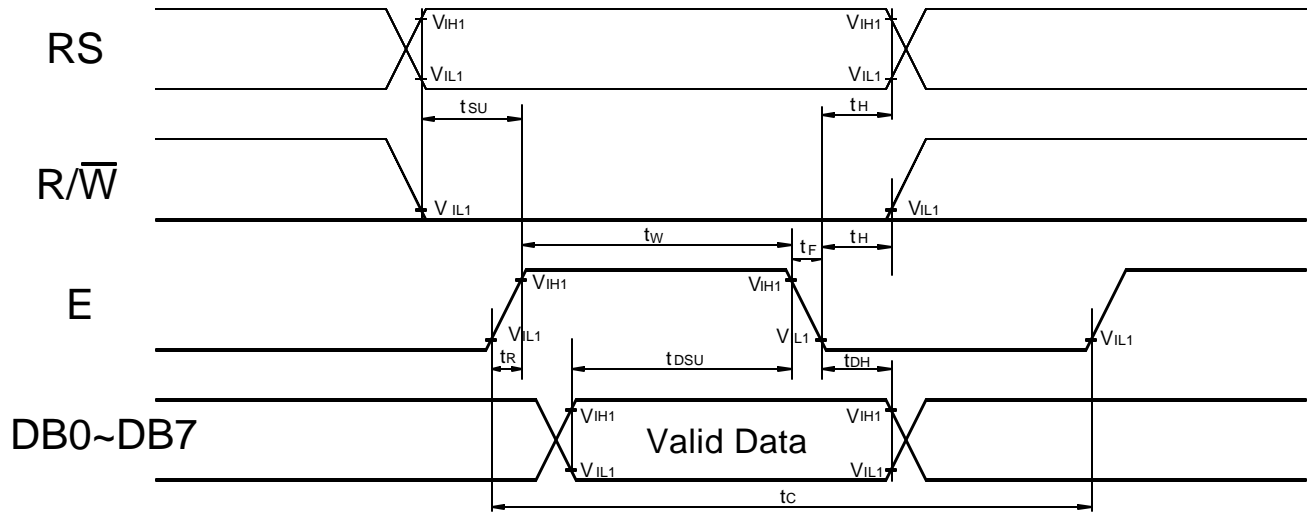


Fig. a Interface timing (data write)

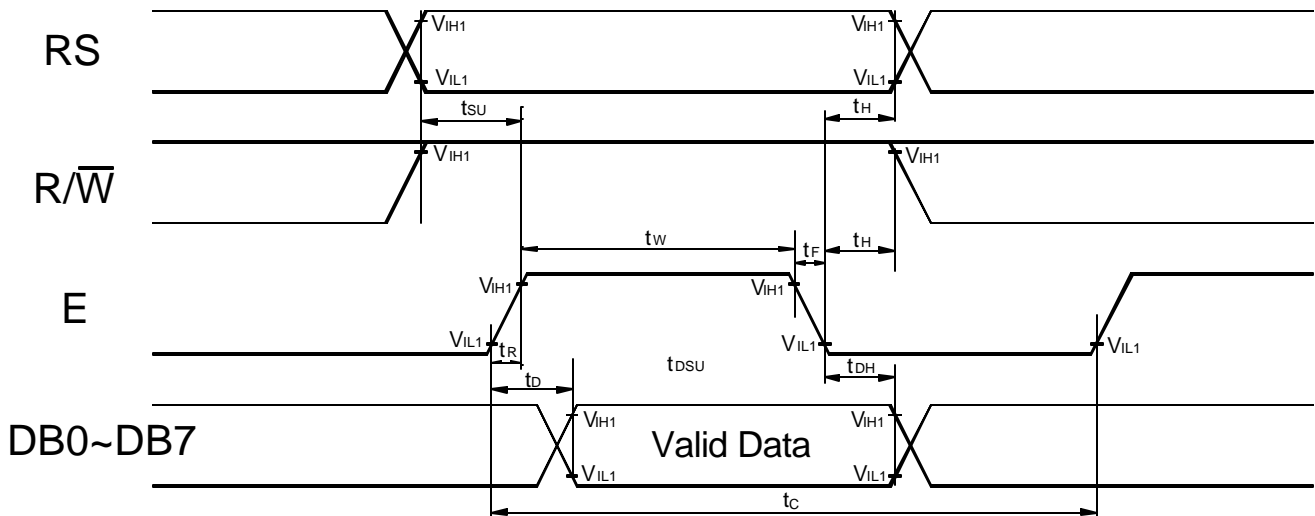
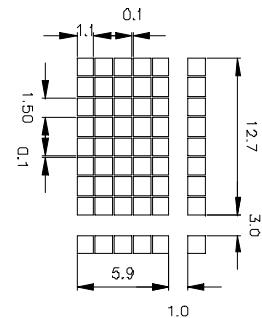
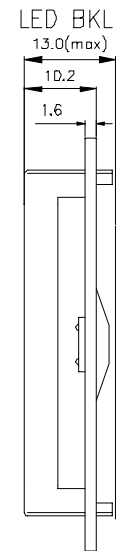
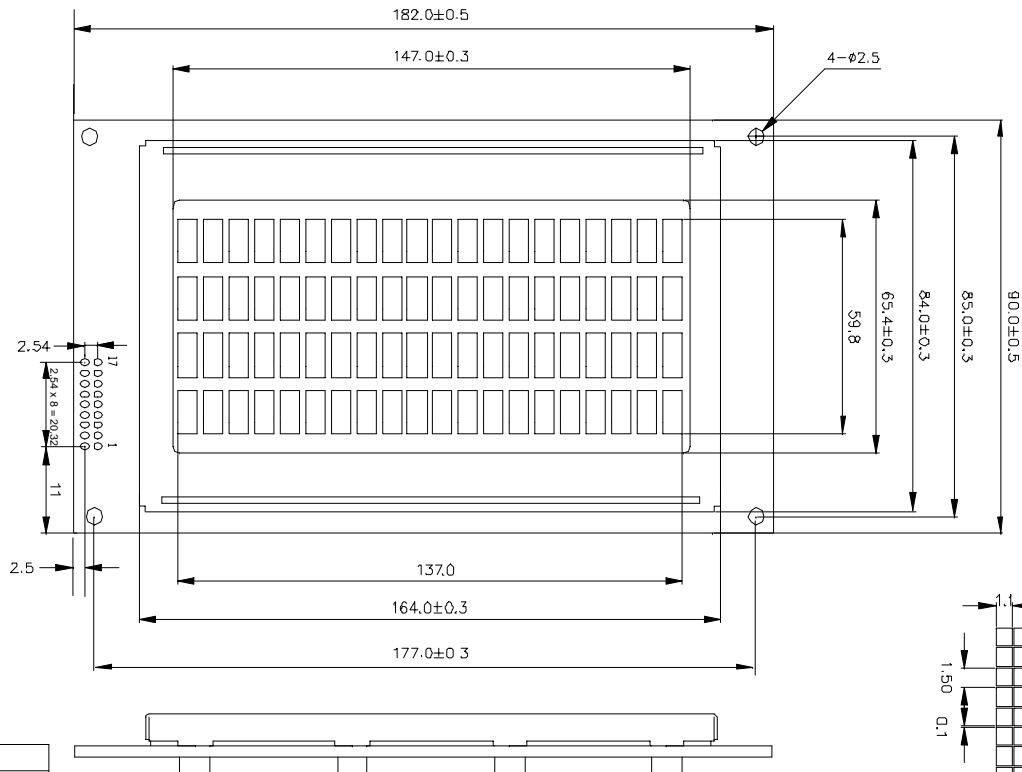
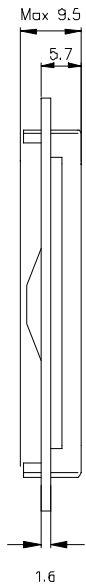


Fig. b Interface timing (data read)

Without BKL



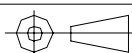
NOTE:

UNLESS OTHERWISE SPECIFIED STANDARD TOLERANCE ±0.5MM.

Display Pattern

PIN	SYMBOL	FUNCTION
1	V <sub>SS</sub>	POWER SUPPLY (GND)
2	V <sub>DD</sub>	POWER SUPPLY (+5V)
3	V <sub>0</sub>	CONTRAST ADJUST
4	RS	REGISTER SELECT
5	R/W	READ/WRITE SIGNAL
6	E	ENABLE SIGNAL
7	DB0	DATA BUS LINE
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15,17	BL+	POWER SUPPLY FOR BL+
*16,18	BL-	POWER SUPPLY FOR BL-

\*Note: connected to V<sub>SS</sub>

TITLE: ACM2004E SERIES LCD MODULE		<b>AZ DISPLAYS, INC.</b>				
REVISION RECORD		NAME	DATE	DRAWING NO.:	DRAWN BY:	DATE:
1				ACM2004E-LCM-D1	CHECKED BY:	DATE:
2				REVISION:	APPROVED BY:	DATE:
3						
4				VER.1		
						UNIT: MM
						SCALE: