

DISPLAYTRONIC

A DIVISION OF ZE XIAMEN CO., LTD.

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

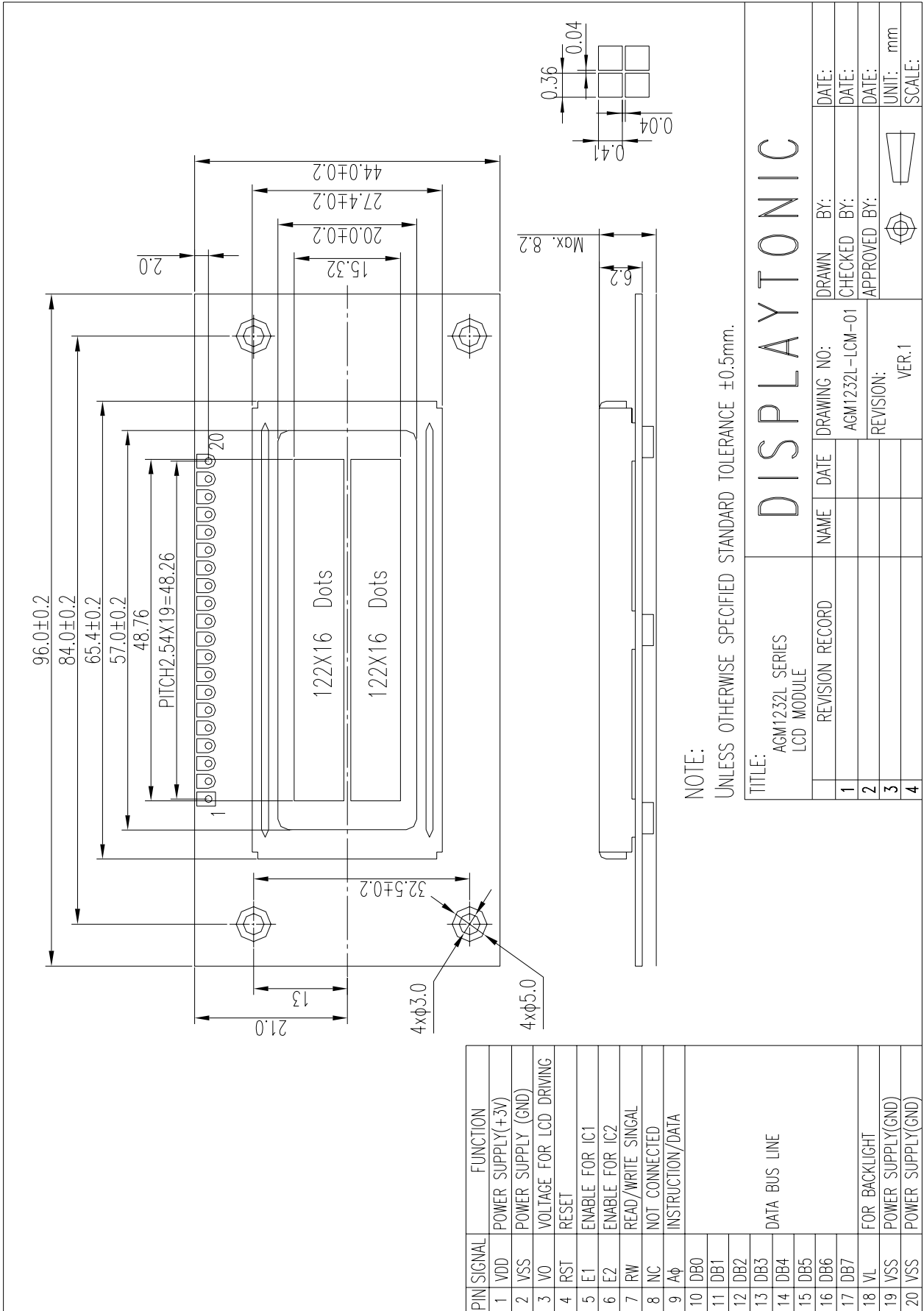
PART NUMBER:

AGM1232L SERIES

DATE:

19/4-2005

1.0 MECHANICAL DIAGRAM



2.0 MECHANICAL SPECS

Item	Description
1. Overall Module Size	96.0mm(W) x 44.0mm(H) x max 8.2mm(D)
2. Dot Size	0.36mm(W) x 0.41mm(H)
3. Dot Pitch	0.40mm(W) x 0.45mm(H)
4. Duty	1/32
5. LC Fluid Options	STN
6. Polarizer Options	Transflective or Transmissive
7. Backlight Options	LED or EL
8. Temperature Range Options	Standard (0°C ~ 50°C), Wide (-20°C ~ 70°C)

3.0 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	3	7.0	V
Supply voltage for LED	VL	2.0	2.2	2.4	V
Supply current for LED backlight	Iin	70	90	110	mA

4.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	Vih	H level	0.8Vdd	-	Vdd	V
Input voltage (low)	Vil	L level	0	-	0.2Vdd	V
Recommended LC Driving Voltage (Standard Temp)	Vdd - Vo	-20°C	-		9.5	V
		25°C	-	6.5	-	
		70°C	4.5		-	
Power Supply Current	Idd	Vdd=5.0V	-	-	13.0	mA
LED Power Supply Voltage	Vfled	R=6.8Ω	-4.0	4.2	4.4	V
LED Power Supply Current	Ifled	R=6.8Ω	-	150	300	mA

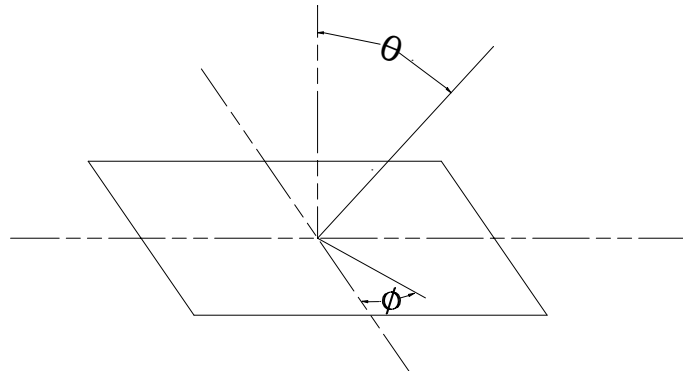
NOTE: Vfled = the voltage between LED 'A' and 'K'

5.0 OPTICAL CHARACTERISTICS

Item Mode		Cr (Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25°C		25°C		25°C	
		MIN.	TYP.	MIN	TYP.	MIN	TYP.
R	A	2.8	3.05	80°	85°	-	35°
	B	7.10	7.70	80°	85°	-	35°
	C	-	-	-	-	-	-
S	A	2.49	2.99	80°	85°	-	35°
	B	7.05	7.55	80°	85°	-	35°
	C	-	-	-	-	-	-

Note:

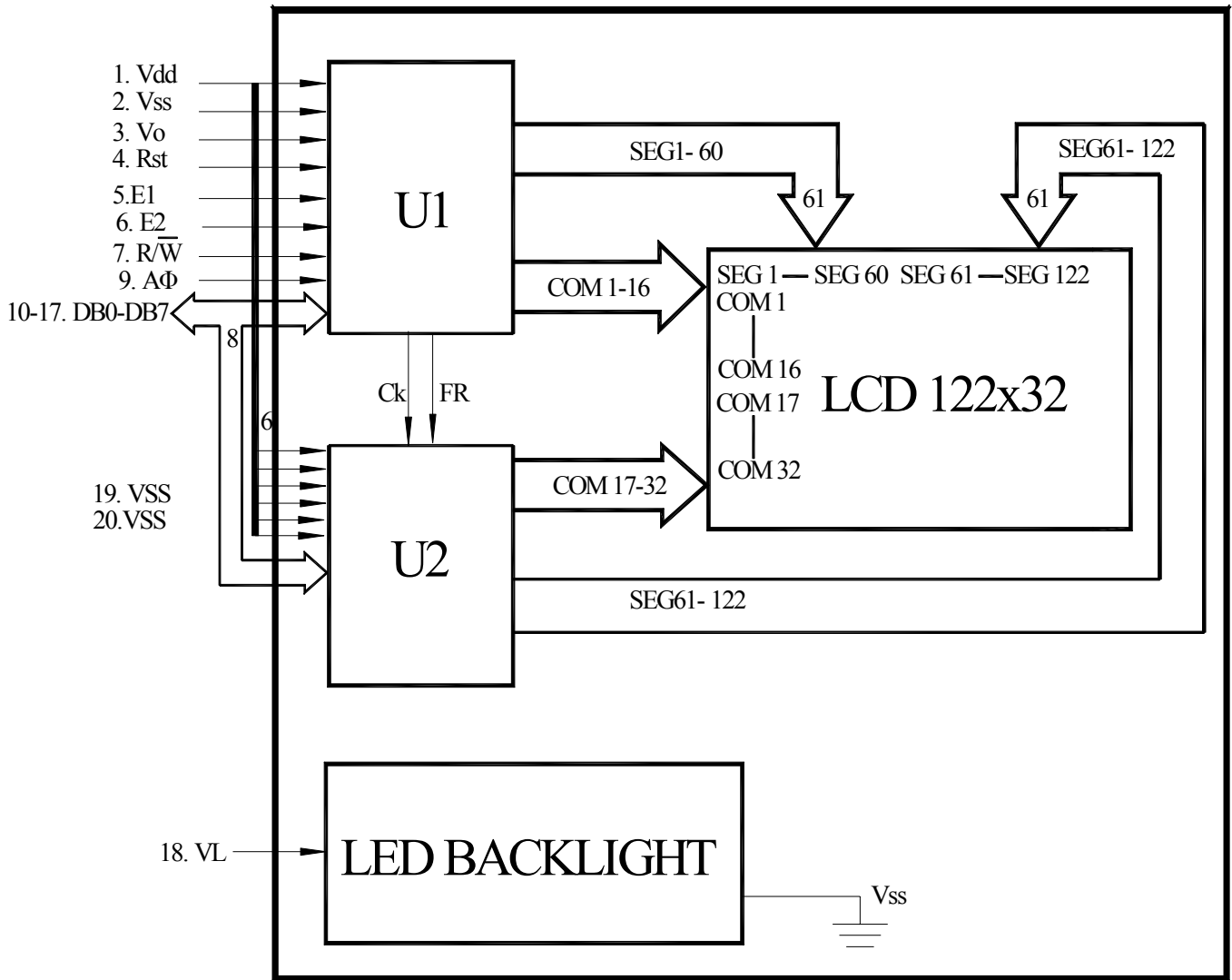
- R: Reflective
- S: Transflective
- A: STN Gray
- B: STN Yellow
- C: FSTN



At: $\phi = 0^\circ, \theta = 0^\circ$

Item	Symbol	Condition	Min	Typ	Max	Unit
Response time (rise)	Tr	25 °C	-	80	160	ms
Response time (fall)	Tf	25°C	-	50	100	ns

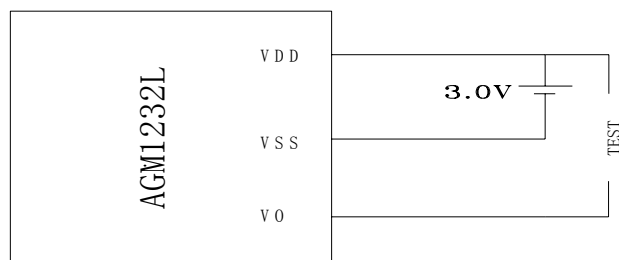
6.0 BLOCK DIAGRAM



7.0 PIN ASSIGNMENT

Pin No.	Symbol	Function	Level
1	Vdd	Power Supply For Logic Circuit	+3.0V
2	Vss	Ground	0V
3	Vo	Power Supply For LCD Driving(Test only)	TEST LCD DRIVING VOLTAGE
4	Res	Reset	L:80 MPU, H:68 MPU
5	E1	Enable for IC1	H/L
6	E2	Enable for IC2	H/L
7	RW	READ / WRITE	H/L
8	NC	NOT CONNECTED	-
9	AΦ	Instruction / Data	0: Instruction 1: Data
10	DB0	Data bit 0	H/L
11	DB1	Data bit 1	H/L
12	DB2	Data bit 2	H/L
13	DB3	Data bit 3	H/L
14	DB4	Data bit 4	H/L
15	DB5	Data bit 5	H/L
16	DB6	Data bit 6	H/L
17	DB7	Data bit 7	H/L
18	VL	Power Supply for BL+	FOR LED:+2.2V/90mA INPUT FOR EL: BACKLIGHT CONTROL
19	Vss	Ground	-
20	Vss	Ground	-

8.0 POWER SUPPLY



9.0 TIMING CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
System cycle time	t_{CYC6}	Fig. a, Fig. b	1000	-	-	ns
Address setup time	t_{AW6}	Fig. a, Fig. b	20	-	-	ns
Address hold time	t_{AH6}	Fig. a, Fig. b	10	-	-	ns
Data hold time	t_{DH6}	Fig. a	10	-	-	ns
Data setup time	t_{DS6}	Fig. a	80	-	-	ns
Output disable time	t_{OH6}	CL=100 pF	10	-	60	ns
Access time	t_{ACC6}		-	-	90	
Enable pulsewidth	Read Write	T_{EW}	100			
			80			
Rise and fall time	T_r, T_f	Fig. a, Fig. b	-	-	15	ns

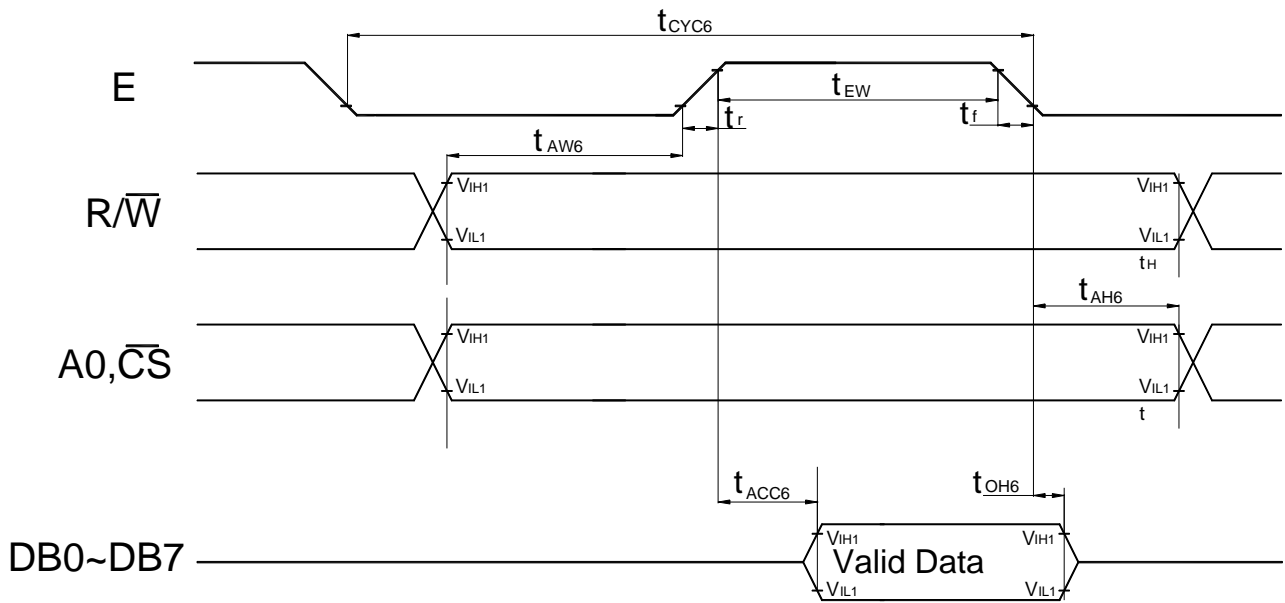


Fig. a Interface timing (data Read)

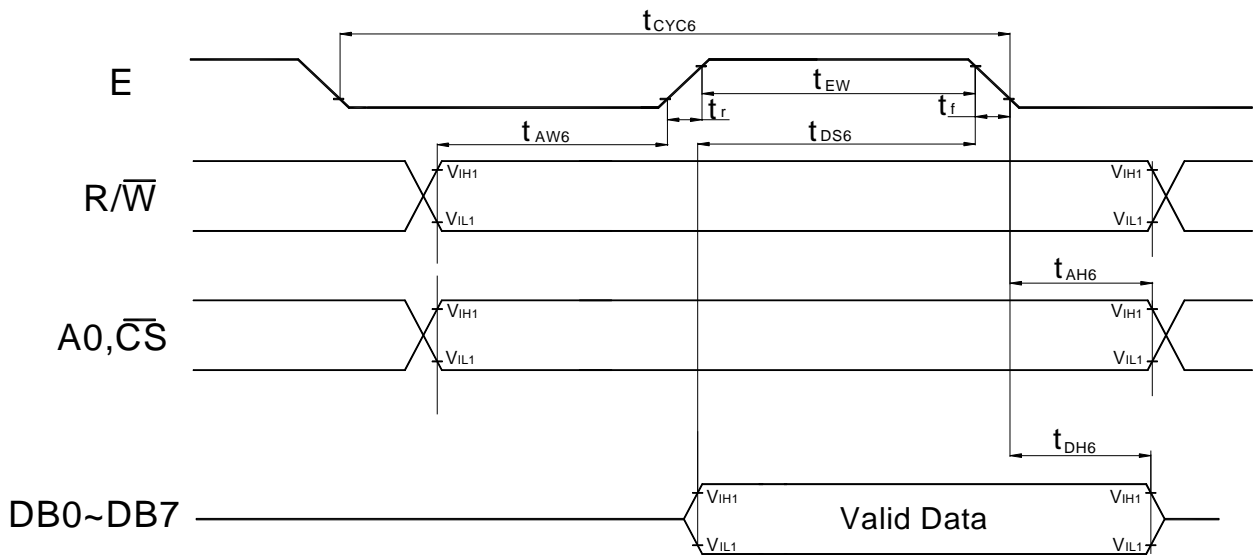


Fig. b Interface timing (data Write)

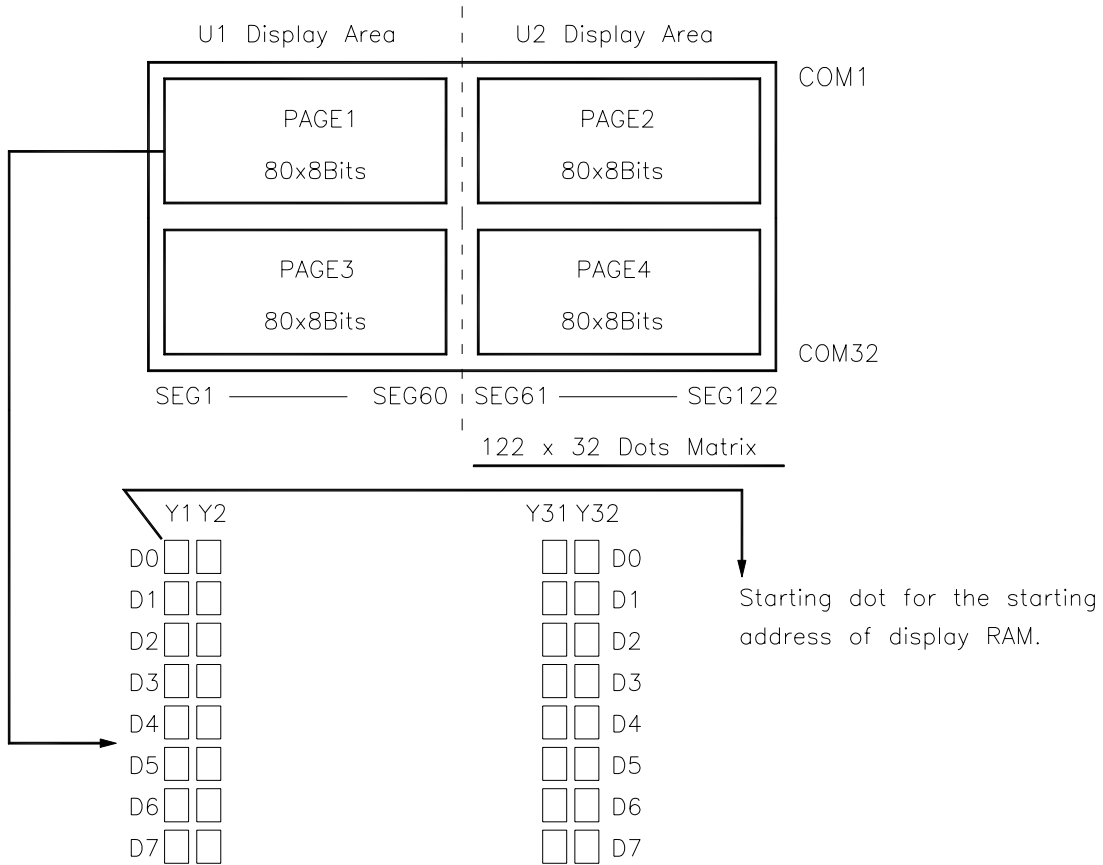
10.0 RELIABILITY TEST

Storage Condition	Content	Evaluations and Assessment*			
		Current Consumption	Oozing	Contrast	Other Appearances
Operation at high temperature and humidity	40°C,90% RH,240hrs	Twice initial value or less	none	More than 80% of initial value	No abnormality
High temperature storage	60°C, 240hrs	Twice initial value or less	none	More than 80% of initial value	No abnormality
Low temperature storage	-20°C, 240hrs	Twice initial value or less		More than 80% of initial value	No abnormality

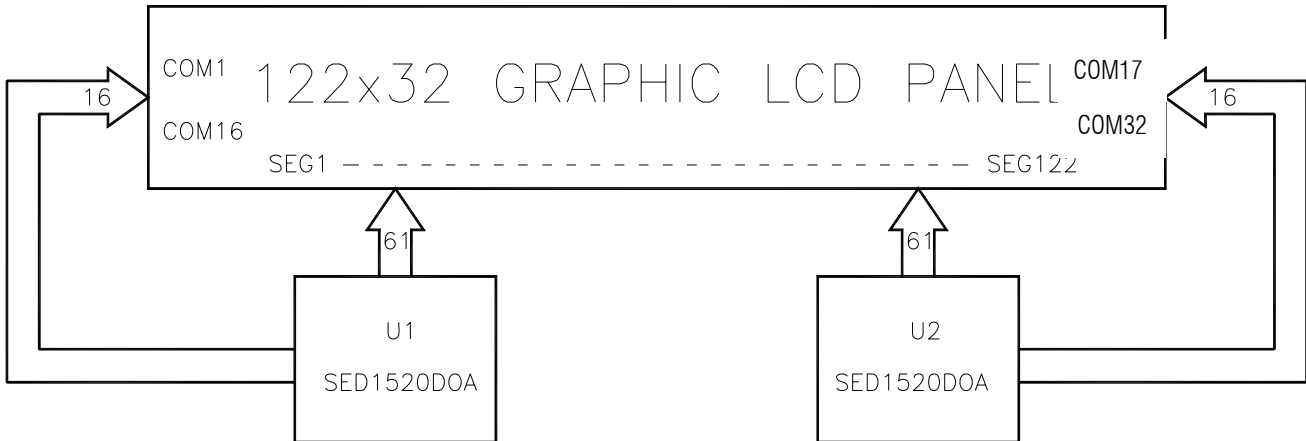
*Evaluations and assessment to be made two hours after returning to room temperature (25°C±5°C).

*The LCDs subjected to the test must not have dew condensation.

11.0 RELATION BETWEEN DISPLAY PATTERN AND DRIVERS



Each segment driver has 4 pages RAM, and each page has 80x8 bits RAM. D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.



12.0 DISPLAY CONTROL INSTRUCTION

The display control instructions control the internal state of the IC. Instructions are received from MPU to IC for the display control.

INSTRUCTION	A0	RD	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	DESCRIPTION
Display ON/OFF	0	1	0	1	0	1	0	1	1	1	1/0	Turns display on or off. 0: OFF. 1:ON
Set Page Address	0	1	0	1	0	1	1	1	0	Page (0~3)		Sets display RAM Page in Page address register
Set Column (Segment address)	0	1	0	0	Column address (0~79)						Sets display RAM column address in column address register	
Display Start Line	0	1	0	1	1	0	Display start line (0~31)					Indicates the display data RAM displayed at the top of the screen.
Status Read	0	0	1	BUSY	ADC	ON/OFF	RESET	0	0	0	0	Reads the following status: BUSY 0: Ready 1: Busy ADC output 1: CW 0: CCW output ON/OFF 0: Display on 1: Display off RESET 0: Normal 1: Being Reset
Write Display Data	1	1	0	Write Data								Writes data DB0~DB7 from bus into display data RAM.
Read Display Data	1	0	1	Read Data								Reads data DB0~DB7 from display data RAM onto the data bus.
Select ADC	0	1	0	1	0	1	0	0	0	0	0/1	0: CW output,1: CCW output
Static drive ON/OFF	0	1	0	1	0	1	0	0	1	0	0/1	1: Static drive, 0: Normal driving
Select duty	0	1	0	1	0	1	0	1	0	0	0/1	Select LCD duty cycle 1:1/32, 0: 1/16
Read-Modify-Wreti	0	1	0	1	1	1	0	0	0	0	0	Read-Modify-write ON
END	0	1	0	1	1	1	0	1	1	1	0	Read-Modify-write OFF
Reset	0	1	0	1	1	1	0	0	0	1	0	Software reset