

DISPLAYTRONIC

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

AGM1232F SERIES GRAPHIC MODULE VER1.1

CUSTOMER APPROVAL			
1.POLARIZER OPTIONS: <input type="checkbox"/> R=REFLECTIVE <input type="checkbox"/> F=TRANSFLECTIVE <input type="checkbox"/> N=TRANSMISSIVE NEGATIVE <input type="checkbox"/> M=TRANSMISSIVE POSITIVE			
2.BACKLIGHT OPTIONS: <input type="checkbox"/> N=NONE <input type="checkbox"/> E=EL <input type="checkbox"/> L=LED (Y-G) <input type="checkbox"/> C=CCFL			
3. BACKLIGHT COLOR: <input type="checkbox"/> A= AMBER <input type="checkbox"/> B= BLUE <input type="checkbox"/> G= GREEN <input type="checkbox"/> W=WHITE <input type="checkbox"/> R= RED <input type="checkbox"/> RGB= RED+GREEN+BLUE			
4.FLUID OPTIONS: <input type="checkbox"/> T=TN <input type="checkbox"/> F=FSTN <input type="checkbox"/> Y=STN-YELLOW GREEN <input type="checkbox"/> G=STN-GRAY <input type="checkbox"/> B=STN-BLUE			
5. VIEWING DIRECTION: <input type="checkbox"/> B=BOTTOM VIEW(6 O'CLOCK) <input type="checkbox"/> T=TOP VIEW(12 O'CLOCK)			
6.TEMPERATURE RANGE: <input type="checkbox"/> S=STANDARD TEMPERATURE RANGE <input type="checkbox"/> H=DUAL POWER,WIDE TEMPERATURE RANGE <input type="checkbox"/> W=SINGLE POWER,WIDE TEMPERATURE RANGE			
7.OTHERS REQUIREMENT:			
※ PART NO. : _____			
APPROVAL		COMPANY CHOP	
CUSTOMER COMMENTS			

DISPLAYTRONIC ENGINEERING APPROVAL		
DESIGN BY	CHECKED BY	APPROVED BY

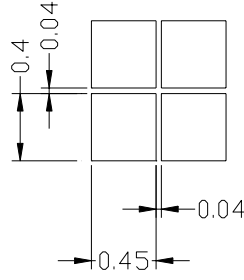
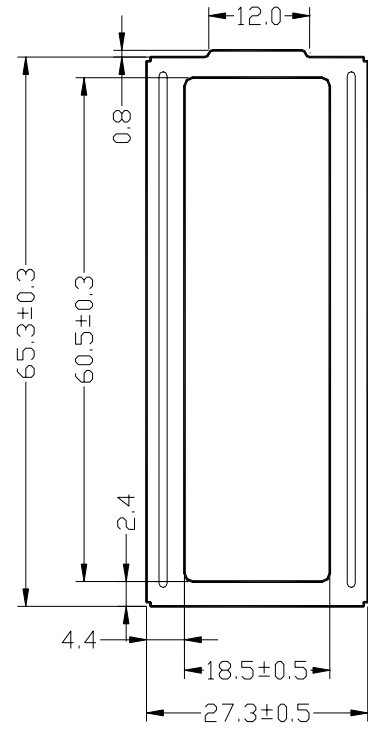
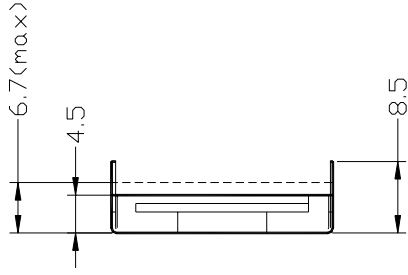
REVISION RECORD

REVISION	REVISION DATE	PAGE	CONTENTS
VER1.1	15/6-2006		MODIFY THE COVER,ADD CONTENT AND REVISION RECORD.

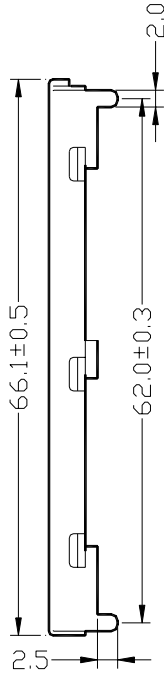
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1.0 MECHANICAL DIAGRAM



Display Pattern

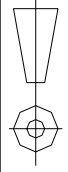


PIN	SYMBOL	FUNCTION
1	V _{dd}	POWER SUPPLY (+5V)
2	V _{ss}	POWER SUPPLY (GND)
3	V _o	POWER SUPPLY FOR LCD DRIVING
4	RES	RESET
5	E1	ENABLE FOR IC1
6	E2	ENABLE FOR IC2
7	R/W	READ/WRITE SIGNAL
8	A _φ	INSTRUCTION/DATA
9	DB0	DATA BUS LINE
10	DB1	
11	DB2	
12	DB3	
13	DB4	
14	DB5	
15	DB6	
16	DB7	
17	NC	
18	NC	

DISPLAYTRONIC

TITLE:
ACM1232F SERIES
LCD MODULE

REVISION RECORD	NAME	DATE	DRAWING NO.:	DATE:
1			ACM1232F-LCM-01	
2			REVISION:	
3			VER.1	
4				



UNIT: MM
SCALE:

2.0 MECHANICAL SPECS

Item	Description
1. Overall Module Size	66.1mm(W) x 27.3mm(H) x max 8.5mm(D)
2. Dot Size	0.40mm(W) x 0.45mm(H)
3. Dot Pitch	0.44mm(W) x 0.49mm(H)
4. Duty	1/32
5. LC Fluid Options	STN, FSTN
6. Polarizer Options	Reflective
7. 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	2.4	-	7.0	V
Supply voltage for LCD drive	Vdd- Vo	3.5	-	13.0	V

4.0 ELECTRICAL CHARACTERISTICS

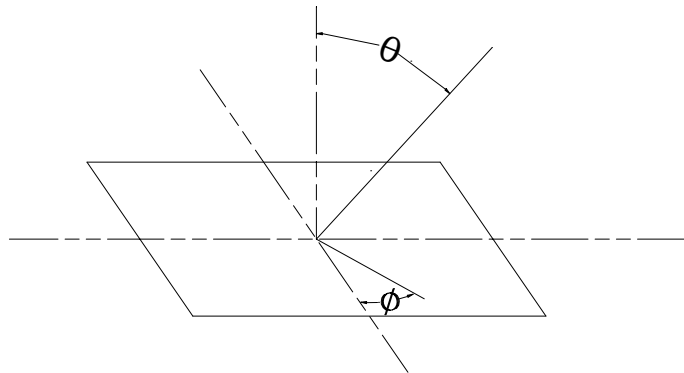
Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	Vih	H level	0.8Vdd	-	Vdd	V
Input voltage (low)	Vil	L level	0	-	0.2Vdd	V
Recommended LC Driving Voltage	Vdd - Vo	-20°C	-		7.5	V
		25°C	-	6.5	-	
		70°C	4.5		-	
Power Supply Current	Idd	Vdd=5.0V	-	-	13.0	mA
EL Power Supply Voltage	Vfel		30	100	160	~V
EL Power Supply Current	Ifel		-	3.0	10	~mA

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:

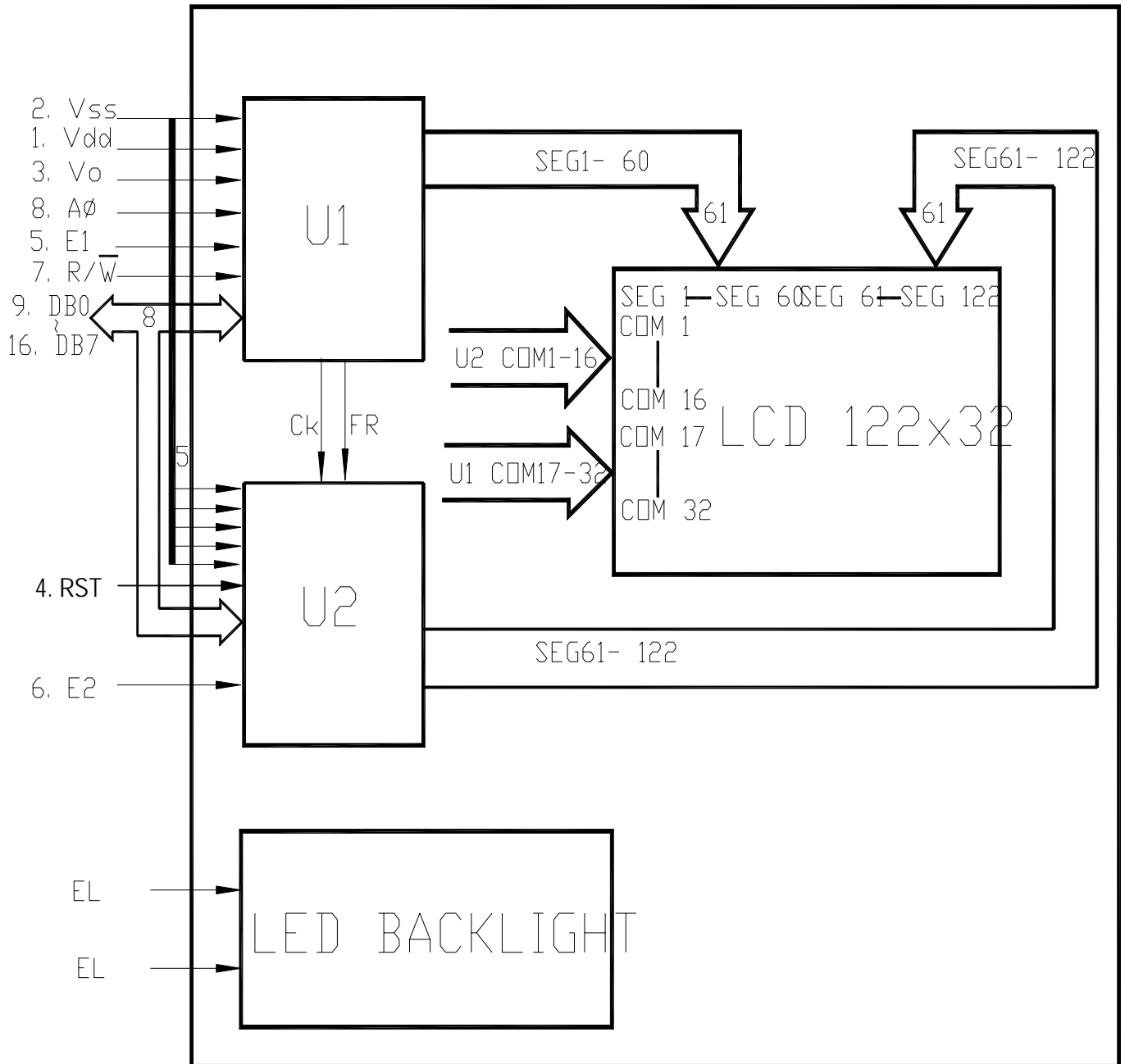
- R: Reflective
- S: Transflective
- A: STN Gray
- B: STN Yellow
- C: FSTN



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

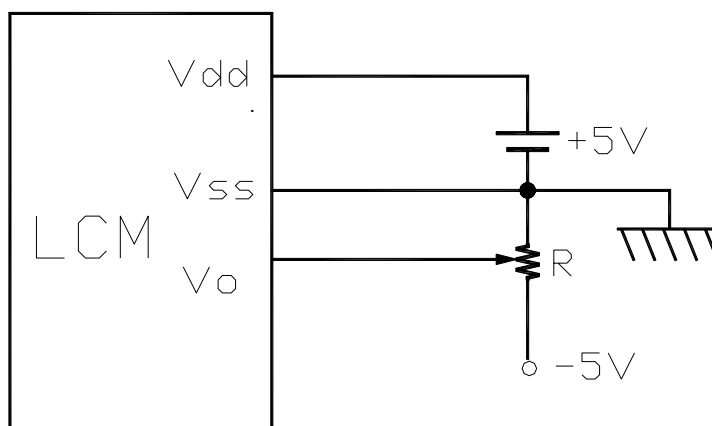
6.0 BLOCK DIAGRAM



7.0 PIN ASSIGNMENT

Pin No.	Symbol	Function	Level
1	Vdd	Power Supply For Logic Circuit	
2	Vss	Ground	
3	Vo	Power Supply For LCD Driving	-
4	RST	Reset	
5	E1	Enable for IC1	H/L
6	E2	Enable for IC2	H/L
7	R/W	H: Data read L: Data write	H/L
8	A0	Instruction/Data	H/L
9	DB0	Data bit 0	H/L
10	DB1	Data bit 1	H/L
11	DB2	Data bit 2	H/L
12	DB3	Data bit 3	H/L
13	DB4	Data bit 4	H/L
14	DB5	Data bit 5	H/L
15	DB6	Data bit 6	H/L
16	DB7	Data bit 7	H/L
17	NC		
18	NC		

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	T_{EW}	100			
	Write		80			
Rise and fall time	T_r, T_f	Fig. a, Fig. b	-	-	15	ns

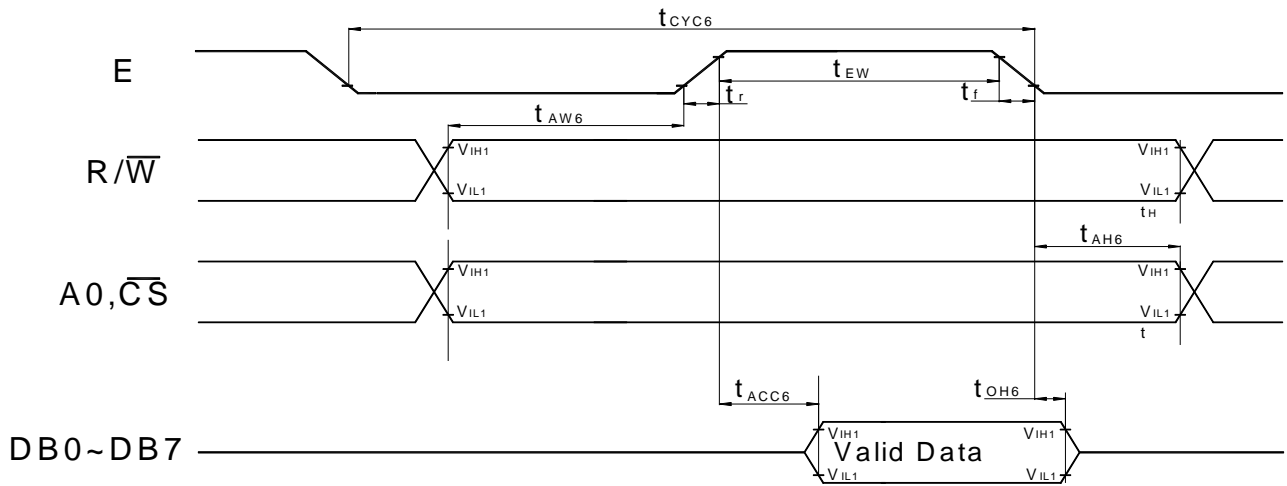


Fig. a Interface timing (data Read)

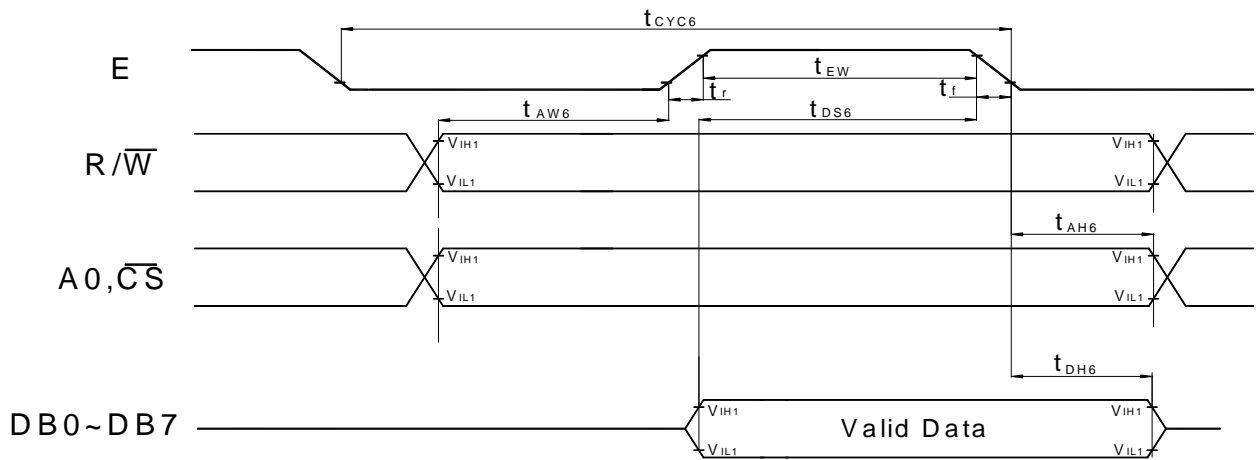


Fig. b Interface timing (data Write)

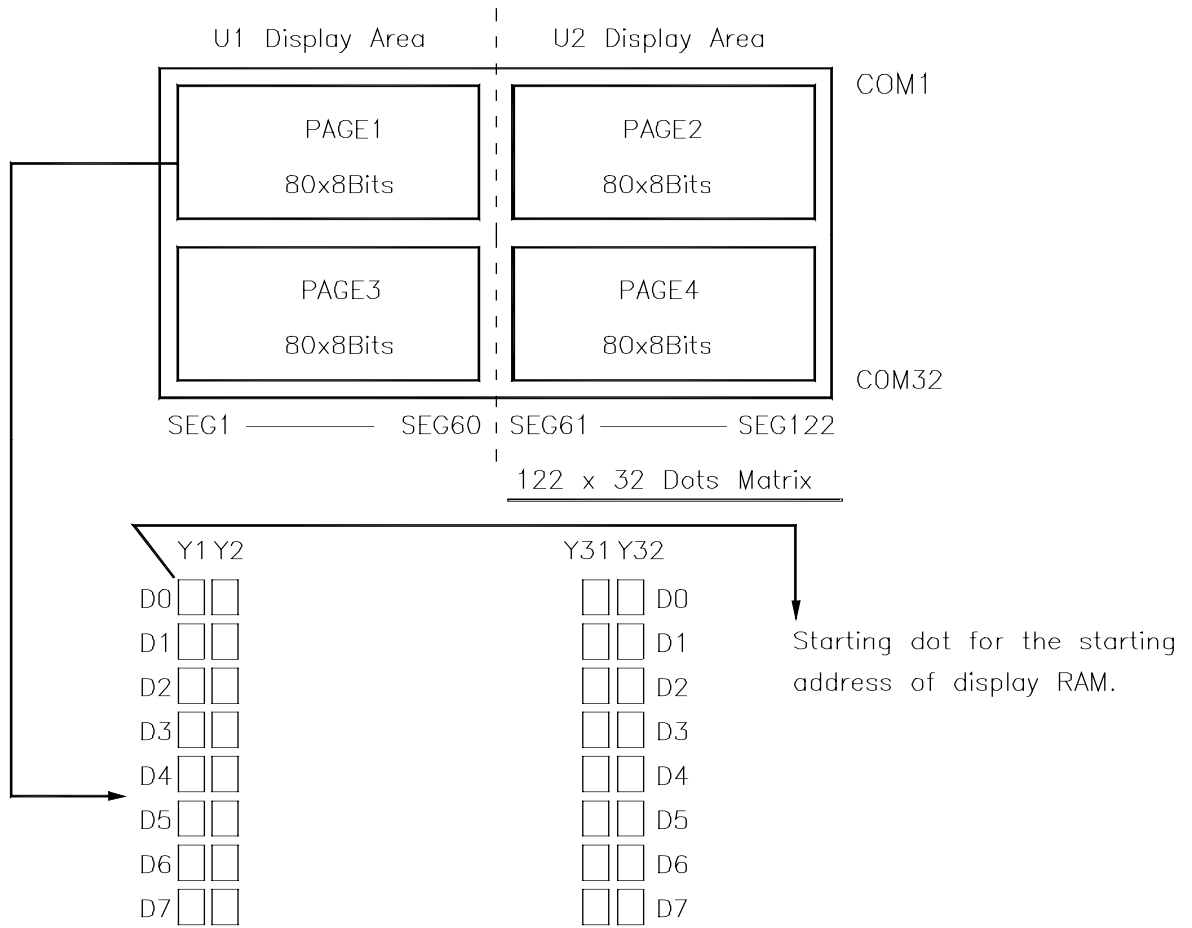
10.0 RELIABILITY TEST

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

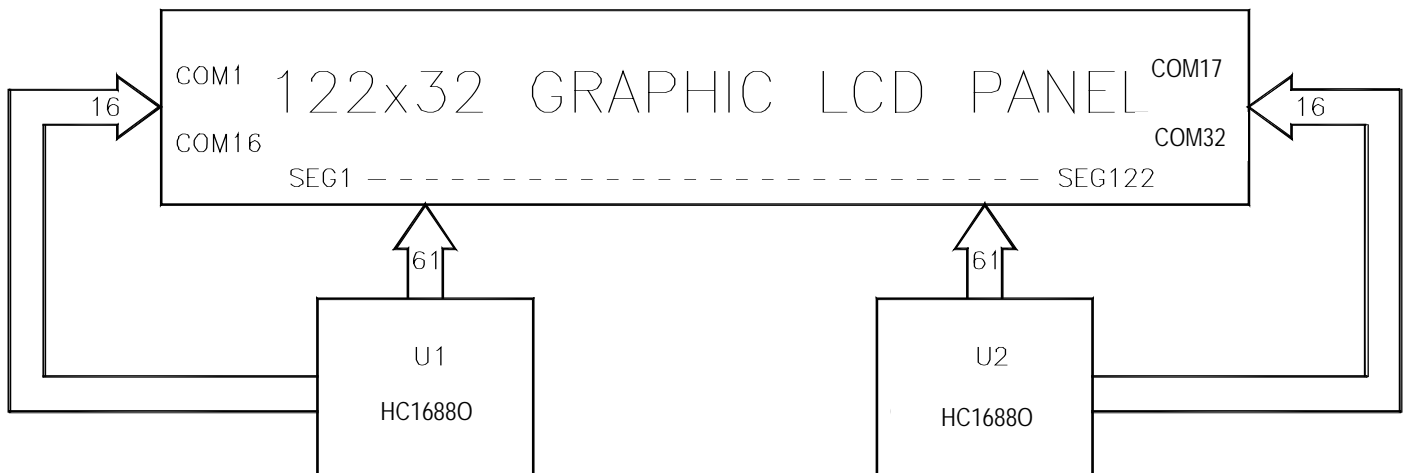
*Evaluations and assessment to be made two hours after returning to room temperature (25°C±5°C).

*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 SED1520DOA/FOA. 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 1: CW output 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