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GI FAR TECHNOLOGY CO.,LTD
No. 81, Dongfeng St, Shulin District, 23874, New Taipei City, Taiwan, R.O.C.

SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : GFE128032A-YPOE

VERSION : B

DATE : 2017.03.27

CERTIFICATION : ROHS

CUSTOMER SIGN : _____

QA Approved By	Approved By	Prepared By	Prepared By
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Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2012.01.17	A	Specification released		
2017.03.27	B	修改公司抬頭、格式統一		

CONTENTS

1. SCOPE

This specification covers the engineering requirements for the GFE128032A-YPOE liquid crystal module.

2. PRODUCT SPECIFICATIONS

2.1 General

- 128 × 32 dot matrix LCD
- **STN (Yellow-Green)**, **Positive** mode LCD panel
- **Transflective** Wide temperature type
- 6 o'clock
- Multiplexing driving : 1/32duty, 1/5bias
- Controller IC : **SBN0064, SBN6400** or Compatible
- Backlight: **Yellow-Green**

2.2 Mechanical Characteristics

Item	Value	Unit
Number of dots	128X32	Dot
Dot size	0.39X0.39	mm
Dot pitch	0.42X0.42	mm
Module dimension	85(W)X29.5(H)X12.5(T)	mm
Viewing Area	65(W)X16(H)	mm
Active Area	53.73 X 13.41	mm
Module	No Connector	

2.3 Absolute Maximum Ratings (Without LED back-light)

Characteristic	Symbol	Unit	Value
Operating Voltage (logic)	V_{DD}	V	-0.3 to +7.0
Input Voltage	V_{IN}	V	-0.3 to V_{DD}+0.3

Note 1: Referenced to V_{SS}=0V

2.4 Electrical Characteristics (Without LED back-light)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Voltage(logic)	V_{DD}-V_{SS}	--	4.7	5.0	5.3	V
Input Voltage	V_{IH}	--	0.8V_{DD}	--	V_{DD}	V
	V_{IL}	--	V_{SS}	--	0.2V_{DD}	
Output Voltage	V_{OH}	I_{OH}=-0.1mA	0.8V_{DD}	--	V_{DD}	V
	V_{HL}	I_{OL}=0.1mA	V_{SS}	--	0.2V_{DD}	

2.5 Optical Characteristics Absolute maximum ratings

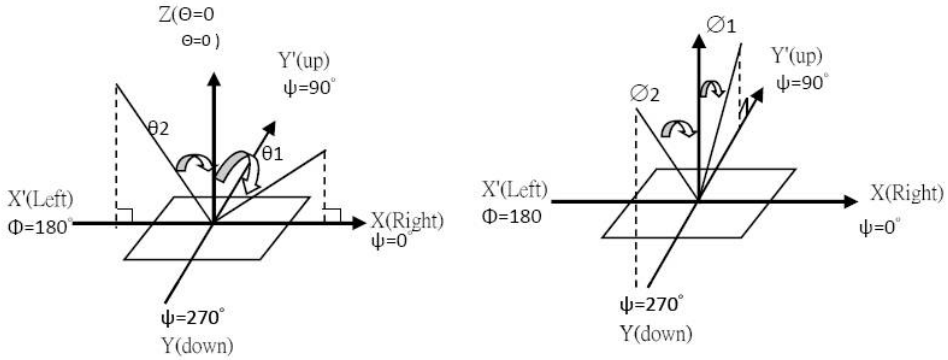
Item	Symbol	Rating	Unit
Operating temperature range	Top	-20~70	°C
Storage temperature range	Tst	-30~80	°C

2.6. Optical Characteristics

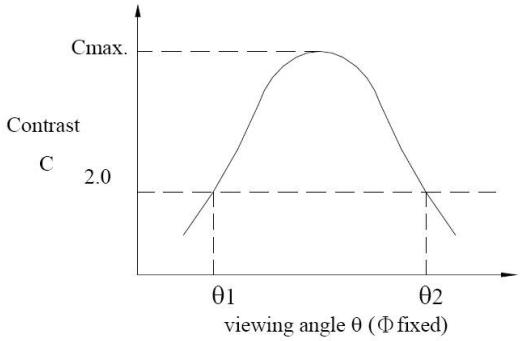
1/32 duty, 1/5 bias, Vop=4.0 V, Ta=25℃

Item	Symbol	Conditions	Min.	Typ.	Max	Reference
Driving voltage	Vop		--	4.0	--	
Viewing angle	θ1、θ2	C≧2.0,∅=0° C	30°	-	-	Notes 1 & 2
Contrast	C	θ=5°, ∅=0°	2.0	-	-	Note 3
Response time(rise)	ton	θ=5°, ∅=0°	-	170	260ms	Note 4
Response time(fall)	toff	θ=5°, ∅=0°	-	250	380ms	Note 4

Note 1: Definition of angles θ and ∅

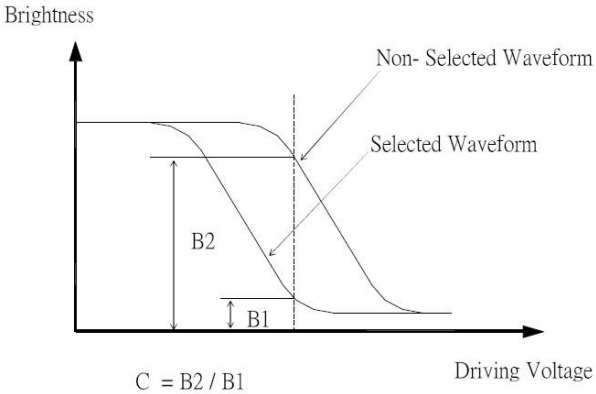


Note 2: Definition of viewing angles θ1 and θ2



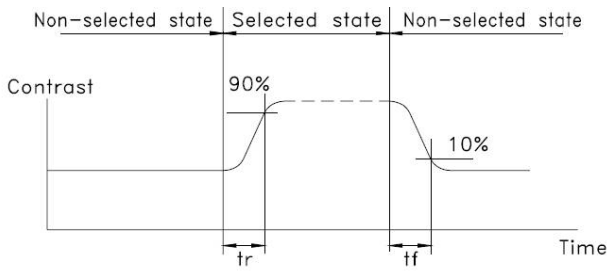
Note : Optimum viewing angle with the naked eye and viewing angle θ at Cmax. Above are not always the same

Note 3: Definition of contrast C



C = B2 / B1

Note 4: Definition of response time



Note: Measured with a transmissive LCD panel which is displayed 1 cm^2

V_{OPR} : Operating voltage f_{FRM} : Frame frequency
t_{ON} : Response time (rise) t_{OFF} : Response time (fall)

2.7 LED Back-light Characteristics

2.7.1 Electrical / optical specifications

Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward voltage	V_f	If=100mA, Yellow Green	3.8	4.0	4.2	V
*Luminous Intensity	I_V	If=100mA, Yellow Green	100	120	--	cd/m^2
Peak Emission Wavelength	λP	If=100mA, Yellow Green	568	572	576	nm
Spectrum Radiation Bandwidth	Δλ	If=100mA, Yellow Green	--	30	--	nm
Reverse Current	$\mathbf{I_R}$	VR=10V, Yellow Green	--	--	0.1	mA
Luminous Uniformity	ΔLv	If=100mA, Yellow Green	70			%

Note: * Please refer to CIE 1931 Chromaticity diagram.

2.7.2 LED Maximum Operating Range

Item	Symbol	Yellow Green	Unit
Power Dissipation	P_{AD}	630	mW
Forward Current	I_F	150	mA
Reverse Voltage	V_R	10	V

3. RELIABILITY

NO.	ITEM	CONDITION		STANDARD	NOTE
1	High Temp. Storage	80℃	120 hrs	Appearance Without defect	
2	Low Temp. Storage	-30℃	120 hrs	Appearance Without defect	
3	High Temp. & High Humi. Storage	40℃ 90% RH	120 hrs	Appearance Without defect	
4	High Temp. Operating Display	70℃	120 hrs	Appearance Without defect	
5	Low Temp. Operating Display	-20℃	120 hrs	Appearance Without defect	
6	Thermal Shock	-20℃, 30min. → 70℃,30min. (1cycle)		Appearance Without defect	10 cycles

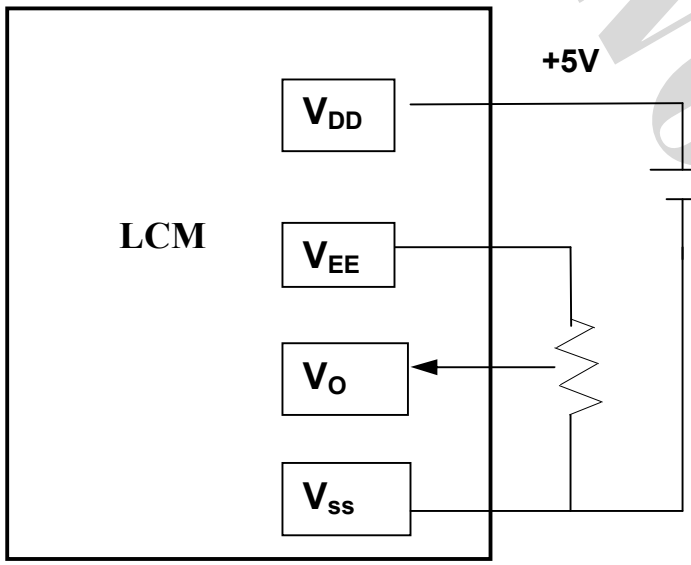
** Dissipation current, contrast and display functions
** Polarizing filter deterioration, other appearance defects
** The function test shall be conducted after 4hours storage at the normal temperature and humidity after remove from the test chamber.

4. OPERATING INSTRUCTIONS

4.1 Input signal Function

Pin No	Symbol	I/O	Function
1	VDD	I	Power supply for logic (+5V)
2	VSS	I	Signal ground (GND)
3	Vo	I	Operating voltage for LCD (variable)
4	RS	I	Reset signal
5	R/W	I	Data read & write
6	E	I	Enable signal
7~14	DB0~DB7	I/O	Bi-direction, tri-state 8-bit parallel data bus for interface with a host microcontroller.
15	CS1	I	Chip1 enable (segment 1 to segment 64),Active high
16	CS2	I	Chip2 enable (segment 65 to segment 128),Active high
17	LEDA	-	LED backlight drive voltage(+)
18	LEDK	-	LED backlight drive voltage ground

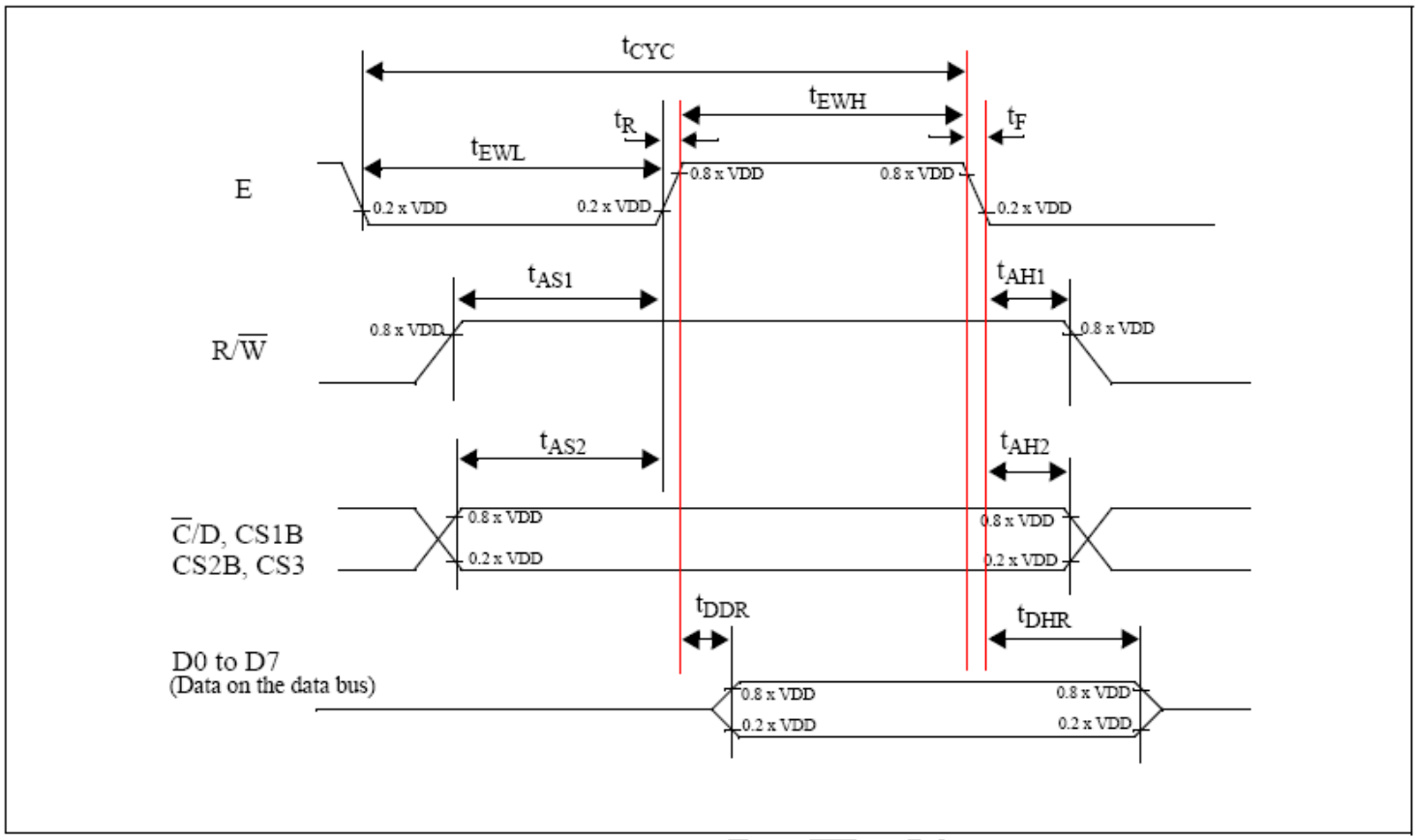
4.2 Voltage Generator Circuit



$V_{DD} - V_{LCD}$: LCD Driving Voltage
VR : 10K~20K

4.3 Timing Diagram

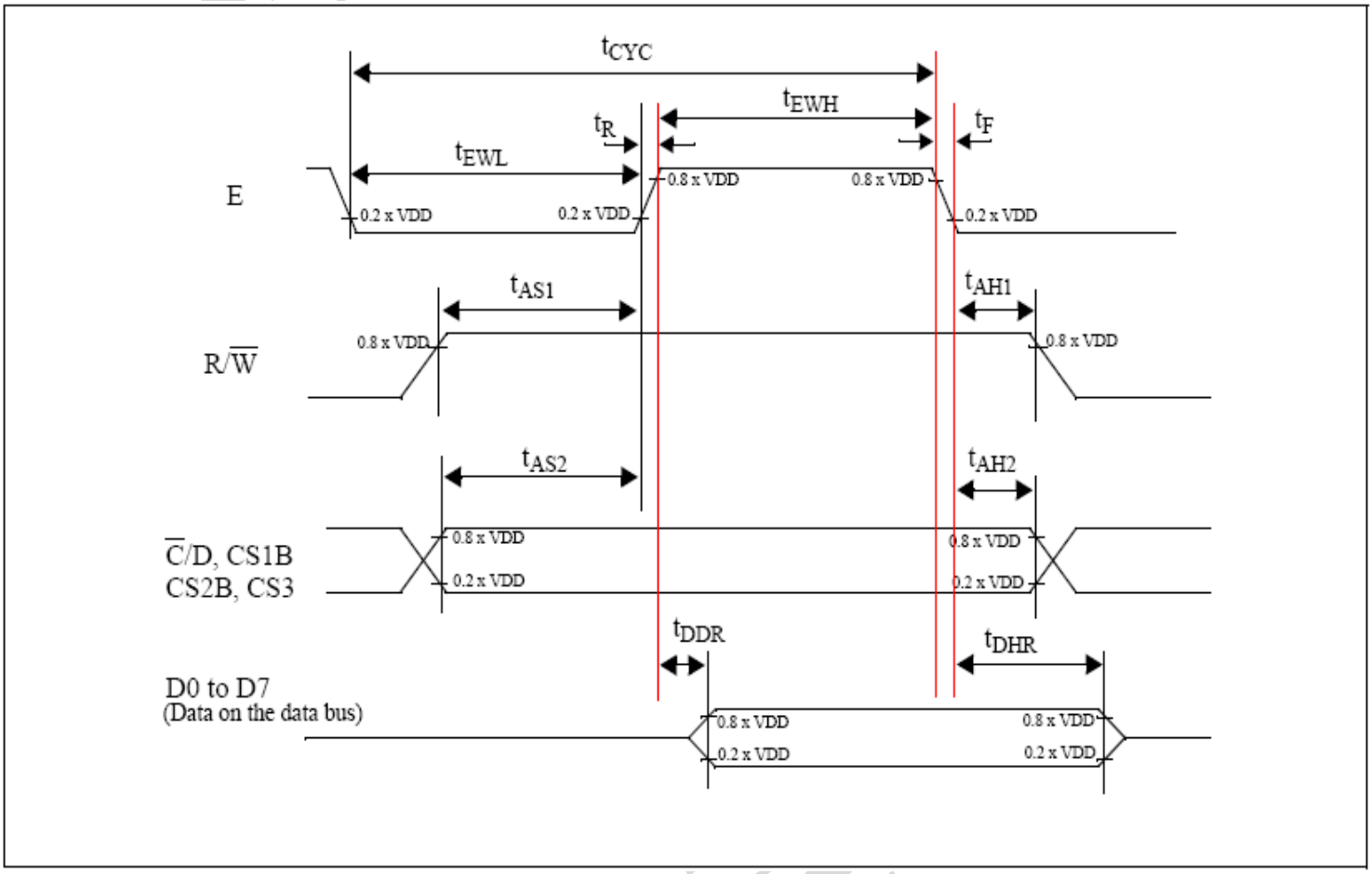
MPU write timing



V_{DD} = 5 V ±10%; V_{SS} = 0 V; T_{amb} = -20 °C to +75°C.

symbol	parameter	min.	max.	test conditions	unit
t_{CYC}	Enable (E) cycle time	1000			ns
t_{EWL}	Enable (E) LOW width	450			
t_{EWH}	Enable (E) HIGH width	450			
t_R	Enable (R) rise time		20		
t_F	Enable (F) fall time		20		
t_{AS1}	Write set-up time	140			
t_{AH1}	Write hold time	10			
t_{AS2}	C/D, CS1B, CS2B, CS3 set-up time	140			
t_{AH2}	C/D, CS1B, CS2B, CS3 hold time	10			
t_{DSW}	Data setup time (on the data bus)	200		The loading on the data bus is shown in Fig. 18.	
t_{DHW}	Data hold time (on the data bus)	10			

MPU read timing



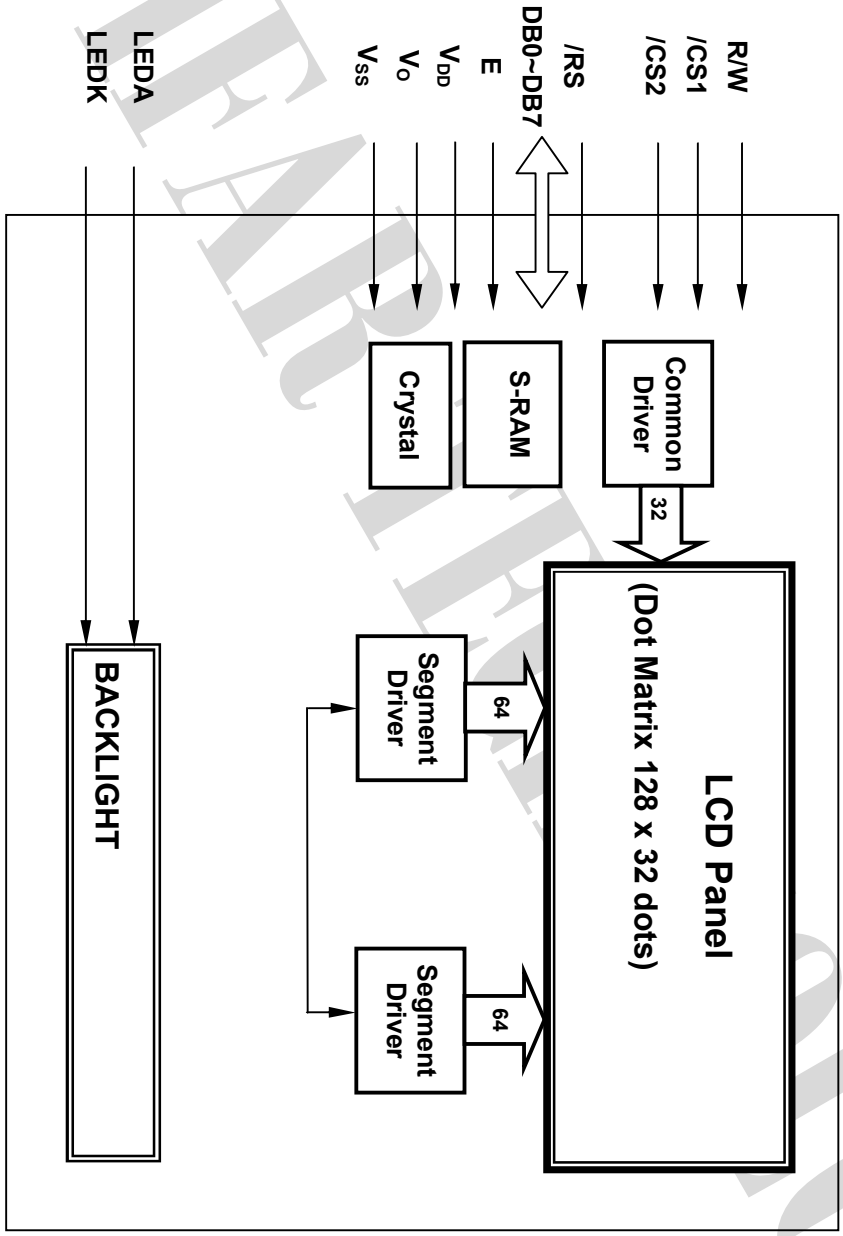
V_{DD} = 5 V ±10%; V_{SS} = 0 V; T_{amb} = -20 °C to +75°C.

symbol	parameter	min.	max.	test conditions	unit
t_{CYC}	Enable (E) cycle time	1000			ns
t_{EWL}	Enable (E) LOW width	450			
t_{EWH}	Enable (E) HIGH width	450			
t_R	Enable (R) rise time		20		
t_F	Enable (F) fall time		20		
t_{AS1}	READ set-up time	140			
t_{AH1}	READ hold time	20			
t_{AS2}	C/D, CS1B, CS2B, CS3 set-up time	140			
t_{AH2}	C/D, CS1B, CS2B, CS3 hold time	10			
t_{DDR}	Data delay time (on the data bus)	320		The loading on the data bus is shown in Fig. 18.	
t_{DHR}	Data hold time (on the data bus)	20			

4.4.Display Command

Instructions	Code										Functions	
	R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Display on/off	0	0	0	0	1	1	1	1	1	1/0	Controls display on/off. RAM data and internal status are not affected.	
Display start line	0	0	1	1	Display start line (0-63)						Specifies the RAM line displayed at the top of the screen.	
Set Page (x address)	0	0	1	0	1	1	1	Page (0-7)			Sets the page (X address) of RAM at the page (X address) register.	
Set Y address	0	0	0	1	Y address (0-63)						Sets the Y address in the Y address in the counter.	
Status read	1	0	Busy	0	ON/OFF	Reset	0	0	0		Reads the status. Reads 1: Reset 0: Normal ON/OFF 1: Display off 0: Display on Busy 1: Internal operation 0: Ready	
Write display data	0	1	Write data								Writes data DB0 (LSB) to DB7 (MSB) on the data bus into display RAM.	Has access to the address of the display RAM specified in advance. After the access, Y address is increased by 1.
Read display data	1	1	Read data								Reads data DB0 (LSB) to DB7 (MSB) from the display RAM to the data bus.	

4.5 Circuit Block Diagram



5. NOTES

▪ Safety

- If the LCD panel breaks, be careful not to get the liquid crystal in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and plenty of water.

Handling

- Avoid static electricity as this can damage the CMOS LSI.
- The LCD panel is plate glass; do not hit or crush it.
- Do not remove the panel or frame from the module.
- The polarizing plate of the display is very fragile; handle it very carefully

Mounting and Design

- Mount the module by using the specified mounting part and holes.
- To protect the module from external pressure, leave a small gap by placing transparent plates (e.g. acrylic or glass) on the display surface, frame, and polarizing plate
- Design the system so that no input signal is given unless the power-supply voltage is applied.
- Keep the module dry. Avoid condensation, otherwise the transparent electrodes may break.

Storage

- Store the module in a dark place where the temperature is 25 °C±10 °C and the humidity below 65% RH.
- Do not store the module near organic solvents or corrosive gases.
- Do not crush, shake, or jolt the module (including accessories).

Cleaning

- Do not wipe the polarizing plate with a dry cloth, as it may scratch the surface.
- Wipe the module gently with soft cloth soaked with a petroleum benzine.
- Do not use ketonic solvents (ketone and acetoe) or aromatic solvents (toluene and xylene), as they may damage the polarizing plate.

6. OPERATION PRECAUTIONS

Any changes that need to be made in this specification or any problems arising from it will be dealt with quickly by discussion between both companies.

7. LCM Dimension