晶 發 科 技 股 份 有 限 公 司
GI FAR TECHNOLOGY CO.,LTD
No. 81, Dongfeng St, Shulin District, 23874, New Taipei City, Taiwan, R.O.C.

SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : GFE240128I-BNFED01

VERSION : B

DATE : 2017.04.19

CERTIFICATION : ROHS

CUSTOMER SIGN : _____

QA Approved By	Approved By	Prepared By	Prepared By
	GIFAR 2017.04.19 Donlin	GIFAR 2017.04.19 Hazel	

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Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2014.02.05	A	Specification released		
2017.04.19	B	1. 圖面修改 AK Cable 線頭焊接方向，原朝外焊接改朝內焊接。 2. 更新公司抬頭、規格書格式統一		15

TENTS

1. SCOPE

This specification covers the engineering requirements for the GFE240128I-BNFED01 liquid crystal module.

2. PRODUCT SPECIFICATIONS

2.1 General

- 240 × 128 dot matrix LCD
- STN (BLUE), Negative mode LCD panel
- Transmissive Wide temperature type
- 6 o'clock
- Multiplexing driving : 1/128duty, 1/13bias
- Controller IC : RA6963 or Compatible
- Backlight: WHITE Edge LED BL

2.2 Mechanical Characteristics

Item	Value	Unit
Number of dots	240X128	Dot
Dot size	0.47X0.47	mm
Dot pitch	0.03X0.03	mm
Module dimension	170(W) X 93.04(H) X 12.4MAX(T)	mm
Viewing Area	128(W)X74(H)	mm
Active Area	119.97 X 63.97	mm
Module	No Connector	
Remark	1. 符合客人對比效果，使用以下組值： R1、R2、R4、R5：RES、3K Ohm、0805、1%。 R3：RES、24K Ohm、0805、1%。 2. 客戶 AK 輸入 IF 值為 180mA。	

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)

ITEM		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	PIN NAME
Operating Voltage		V_{DD}	--	4.75	5.0	5.25	V	V_{DD}
Input	H Level	V_{IH}	--	VDD-2.2	--	VDD	V	Input pins
	L Level	V_{IL}	--	0	--	0.8	V	Input pins
Output Voltage	H Level	V_{OH}	--	VDD-0.3	--	VDD	V	Output pins
	L Level	V_{OL}	--	0	--	0.3	V	Output pins
Output Resistance	H Level	R_{OH}	V_{OUT}=V_{DD}-0.5V	--	--	400	Ω	Output pins
	L Level	R_{OL}	V_{OUT}=0.5V	--	--	400	Ω	Output pins
Input Pull-up Resistance		RPU	--	50	100	200	kΩ	(Note 1)
Operating Frequency		f_{OSC}	--	0.4	--	5.5	MHz	
Current Consumption (Operating)		I_{DD}(1)	V_{DD}=5.0V(Note 2)	15	23	35	mA	V_{DD}
Current Consumption (Halt)		I_{DD}(2)	V_{DD}=5.0V	--	--	3	μA	V_{DD}

(Note 1) Applied $\overline{T1}, \overline{T2}, \overline{RESET}$

(Note 2) MDS=L,MD0=L,MD1=L,MD2=H,MD3=H,FS0=L,FS1=L, $\overline{SDSEL}$ = L, $\overline{DUAL}$ = H
D7 to D0=LHLHLHLH

2.5 Optical Characteristics Absolute maximum ratings

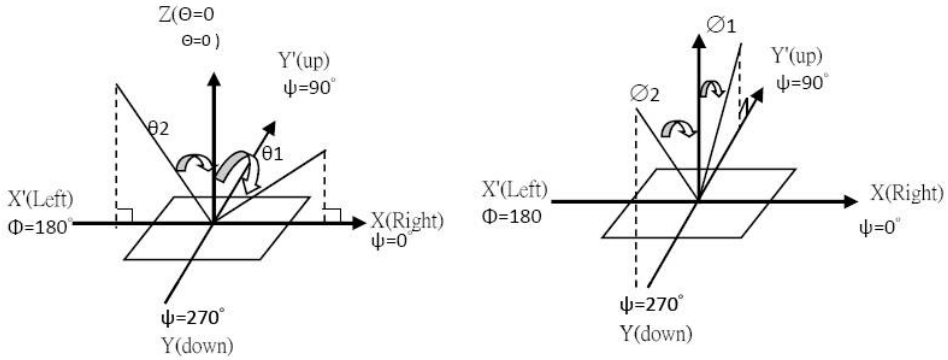
Item	Symbol	Rating	Unit
Operating temperature range	Top	-20~70	°C
Storage temperature range	Tst	-30~80	°C

2.6. Optical Characteristics

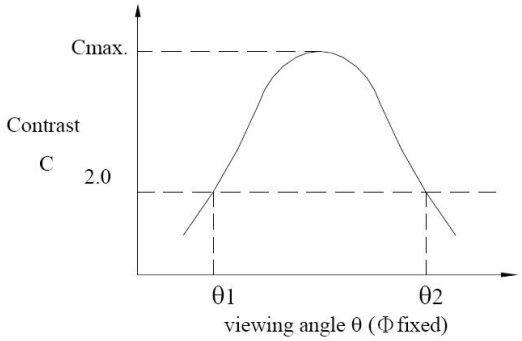
1/128 duty, 1/13 bias, Vop=18.7V, Ta=25℃

Item	Symbol	Conditions	Min.	Typ.	Max	Reference
Driving voltage	Vop		--	18.7	--	
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°	-	-	260ms	Note 4
Response time(fall)	toff	θ=5°, ∅=0°	-	-	380ms	Note 4

Note 1: Definition of angles θ and ∅

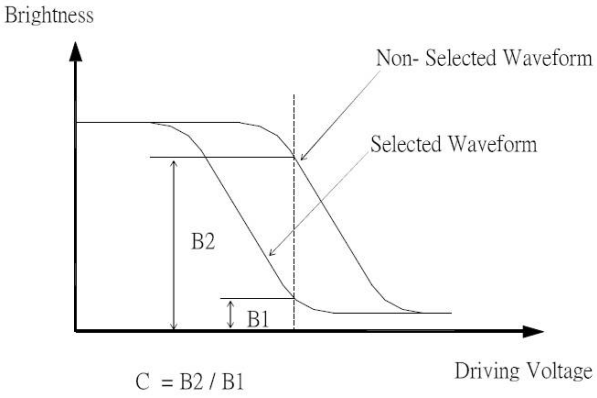


Note 2: Definition of viewing angles θ1 and θ2



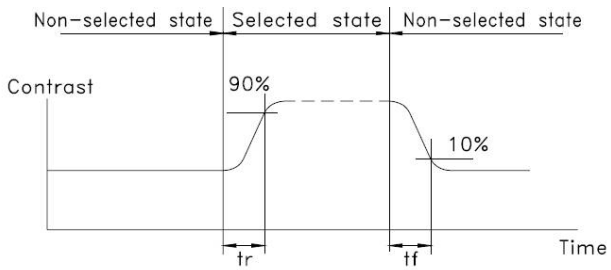
Note : Optimum viewing angle with the naked eye and viewing angle θ at Cmax. Above are not always the same

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

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward voltage	V_f	IF=160mA	3.0	3.5	4.0	V
Reverse Current	Ir	Vr=5.0V	--	--	80	uA
Luminance	L_V	IF=160mA	650	700	--	cd/m^2
Peak wave length	x	IF=160mA	0.26	0.29	0.32	
	y		0.27	0.30	0.33	
Spectral Line half width	△ λ		--	--	--	nm
luminance power deviation	△ EH	Min/max 100%	75	--	--	%

Note: * Measured at the bare LED back-light unit.

2.7.2 LED Maximum Operating Range

Item	Symbol	White	Unit
Power Dissipation	P_{AD}	760	mW
Forward Current	I_F	200	mA
Reverse Voltage	Vr	5	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

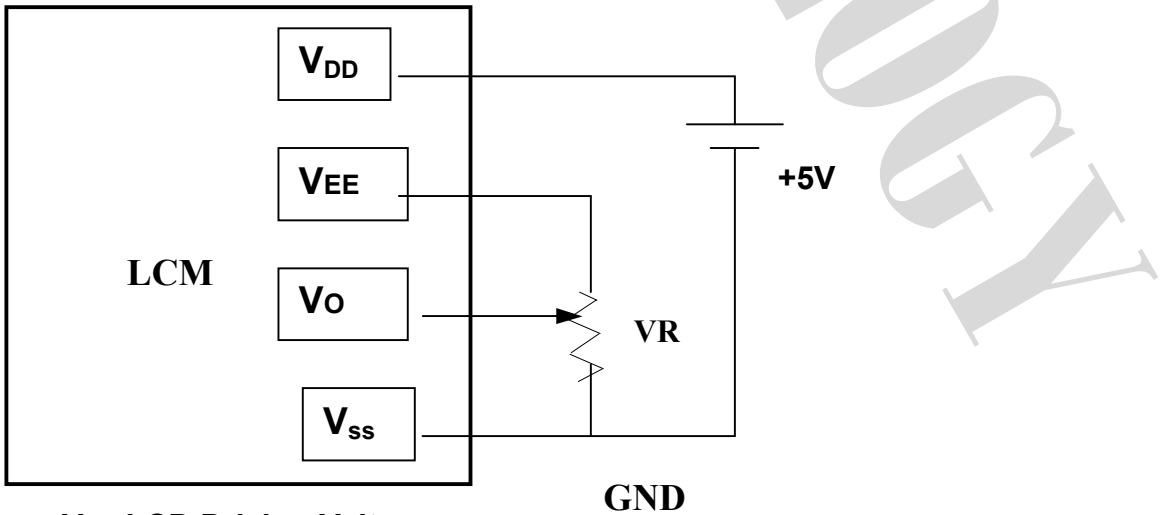
** Dissipation current, contrast and display functions
** Polarizing filter deterioration, other appearance defects
** The function test shall be conducted after 4hours storage at the normal temperature and humidity after remove from the test chamber.

4. OPERATING INSTRUCTIONS

4.1 Input signal Function

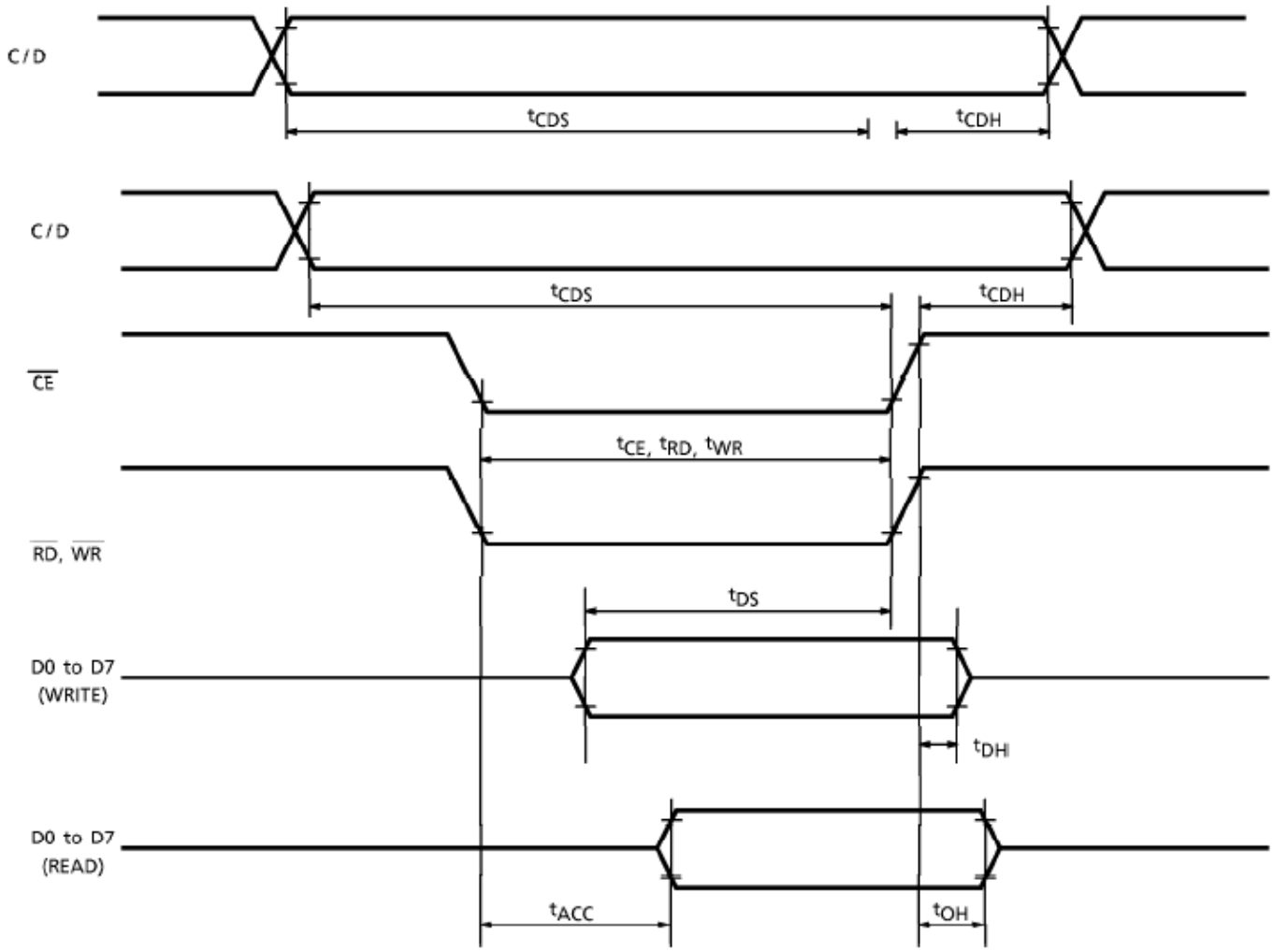
Pin No.	Symbol	Level	Description
1	FGND	—	Frame ground (Connected to bezel)
2	Vss	—	GND
3	Vdd	—	Power supply (+5 V)
4	Vo	—	Power supply for LCD driver
5	WR	L	Data write. Write data intoRA6963 when WR = L
6	RD	L	Data read. Read data from RA6963when RD = L
7	CE	L	L : Chip enable
8	C/D	H / L	WR=L , C/D=H : Command Write C/D=L: Data write RD=L , C/D=H : Status Read C/D=L: Data read
9	Vee	—	Negative voltage output
10	RESET	H / L	H : Normal ; L : Initialize RA6963
11	DB0	H / L	Data bus line
12	DB1	H / L	Data bus line
13	DB2	H / L	Data bus line
14	DB3	H / L	Data bus line
15	DB4	H / L	Data bus line
16	DB5	H / L	Data bus line
17	DB6	H / L	Data bus line
18	DB7	H / L	Data bus line
19	FS	MD2	Pins for selection of font; H : 6 * 8 , L : 8 * 8
20	RV	H / L	H:Reverse L:Normal

4.2 Voltage Generator Circuit



V_{DD} – V_O : LCD Driving Voltage
VR : 10K~20K

4.3 Timing Diagram



TEST CONDITIONS (Unless otherwise noted, $V_{DD} = 5.0V \pm 10\%$, $V_{SS} = 0V$, Ta = −20 to 75°C)

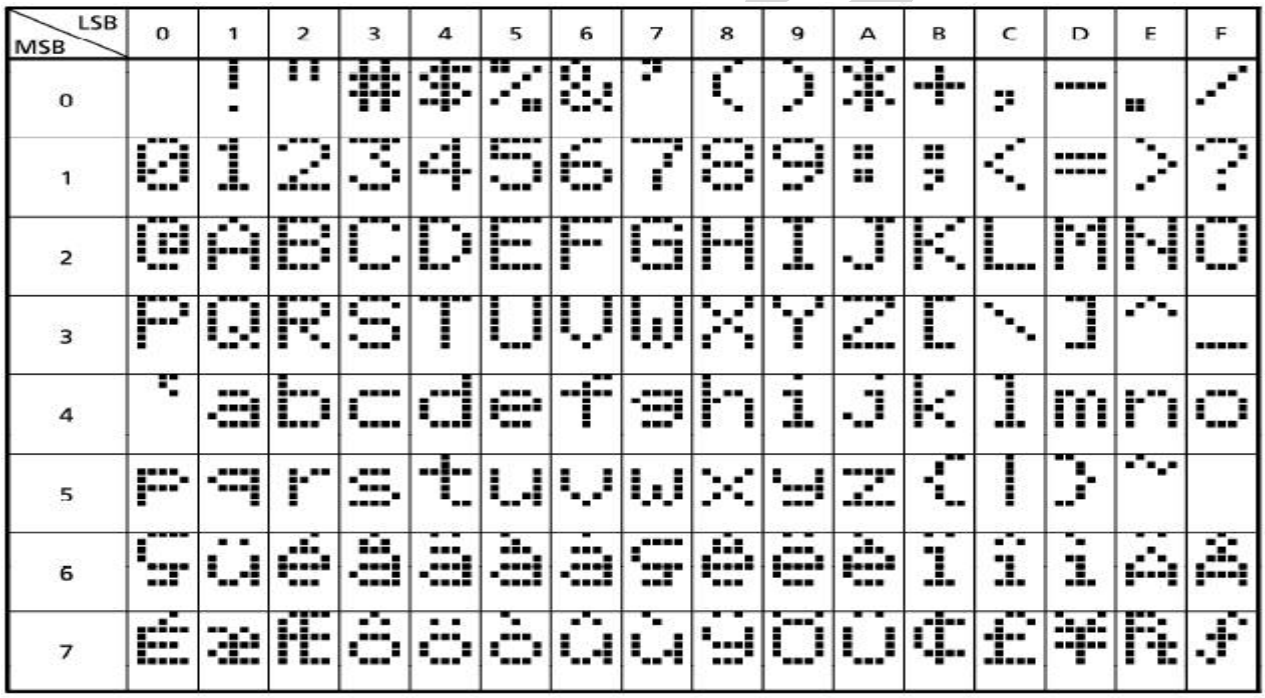
ITEM	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
C/D Set-up Time	t_{CDS}	—	100	—	ns
C/D Hold Time	t_{CDH}	—	10	—	ns
CE, RD, WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	—	80	—	ns
Data Set-up Time	t_{DS}	—	80	—	ns
Data Hold Time	t_{DH}	—	40	—	ns
Access Time	t_{ACC}	—	—	150	ns
Output Hold Time	t_{OH}	—	10	50	ns

4.4.Display Command

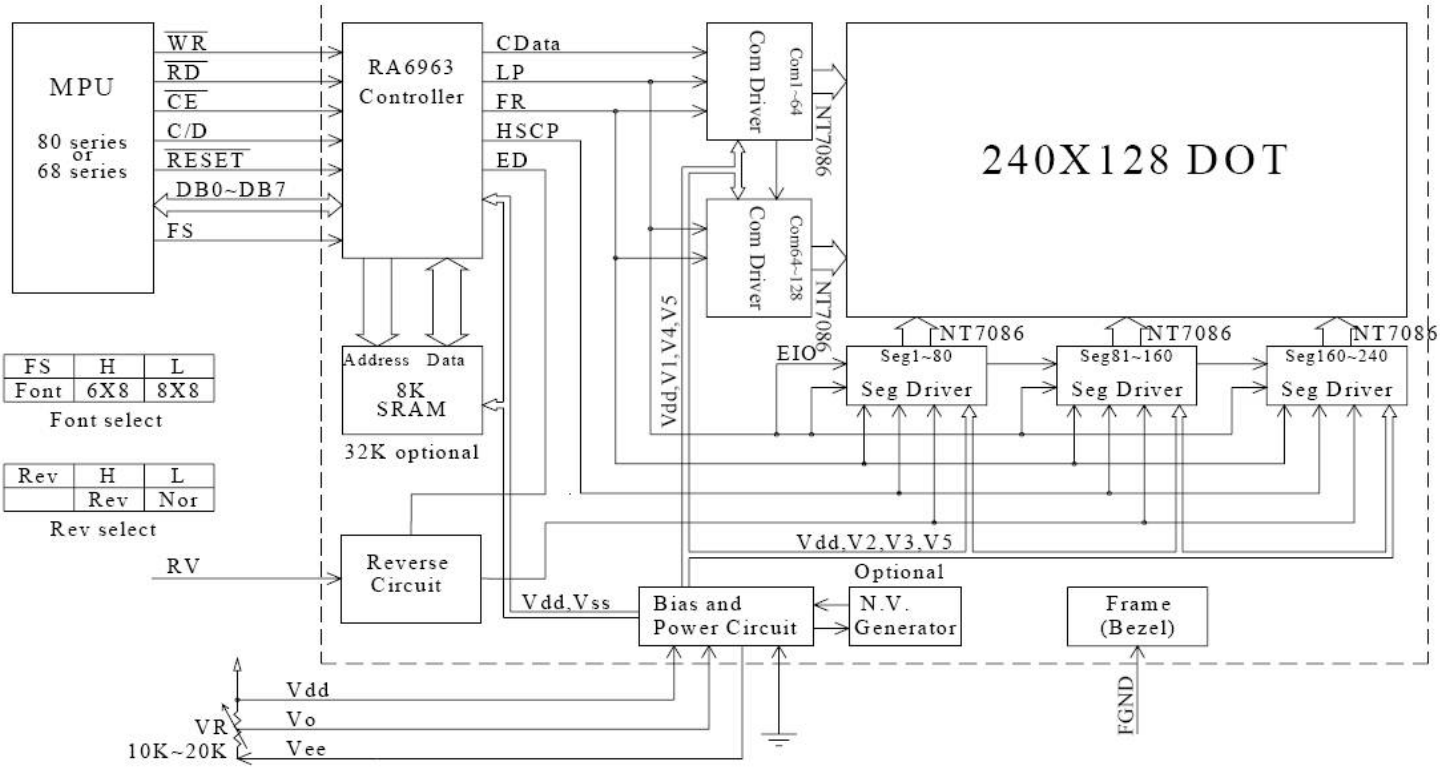
COMMAND	CODE	D1	D2	FUNCTION
REGISTERS SETTING	00100001	X address	Y address	Set Cursor Pointer
	00100010	Data Low	00H High	Set Offset Register
	00100100	address	address	Set Address Pointer
SET CONTROL WORD	01000000	Low address	High address	Set Text Home Address
	01000001	Columns		Set Text Area
	01000010	Low address	00H High address	Set Graphic Home Address
	01000011	Columns	00H	Set Graphic Area
MODE SET	1000X000	--	--	OR mode
	1000X001	--	--	EXOR mode
	1000X011	--	--	AND mode
	1000X100	--	--	Text Attribute mode
	10000XXX	--	--	Internal CG ROM mode
	10001XXX	--	--	External CG RAM mode
DISPLAY MODE	10010000	--	--	Display off
	1001XX10	--	--	Cursor on, blink off
	1001XX11	--	--	Cursor on, blink on
	100101XX	--	--	Text on, graphic off
	100110XX	--	--	Text off, graphic on
	100111XX	--	--	Text on, graphic on
CURSOR PATTERN SELECT	10100000	--	--	1-line cursor
	10100001	--	--	2-line cursor
	10100010	--	--	3-line cursor
	10100011	--	--	4-line cursor
	10100100	--	--	5-line cursor
	10100101	--	--	6-line cursor
	10100110	--	--	7-line cursor
	10100111	--	--	8-line cursor
DATA AUTO READ/WRITE	10110000	--	--	Set Data Auto Write
	10110001	--	--	Set Data Auto Read
	10110010	--	--	Auto Reset
DATA READ/WRITE	11000000	DATA	--	Data Write and Increment ADP
	11000001	--	--	
	11000010	DATA	--	Data Read and Increment ADP
	11000011	--	--	

	11000100 11000101	DATA --	-- --	Data Write and Decrement ADP Data Read and Increment ADP Data Write and Nonvariable ADP Data Read and Nonvariable ADP
SCREEN PEEK	11100000	--	--	Screen Peek
SCREEN COPY	11101000	--	--	Screen Copy
BIT SET/RESET	11110XXX 11111XXX 1111X000 1111X001 1111X010 1111X011 1111X100 1111X101 1111X110 1111X111	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	Bit Reset Bit Set Bit 0 (LSB) Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 (MSB)

4.5 Character Code Map



4.6 Circuit Block Diagram



External contrast adjustment.

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).

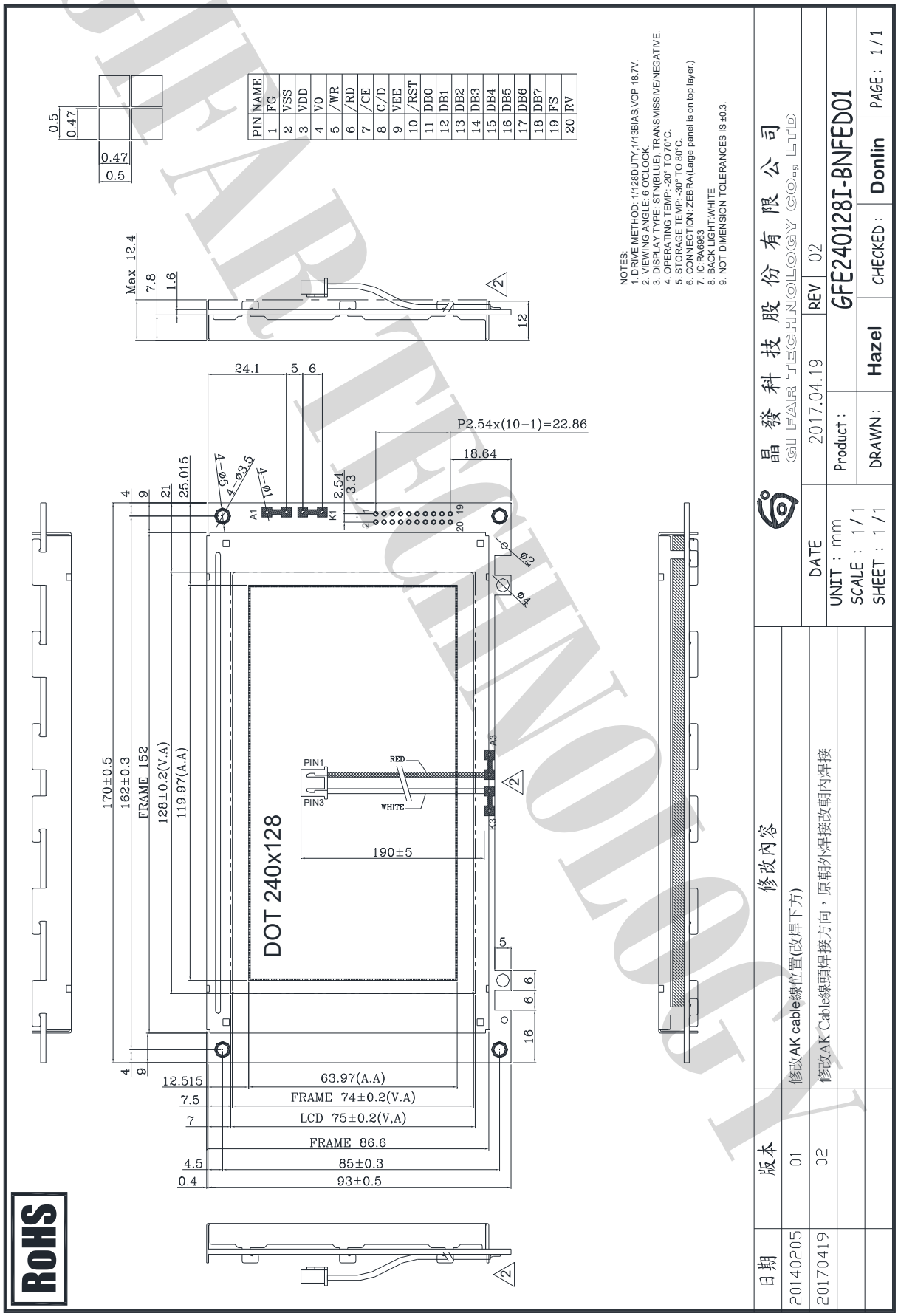
Cleaning

- 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



日期	版本	修改內容
20140205	01	修改AK cable線位置(改焊下方)
20170419	02	修改AK Cable線頭焊接方向，原朝外焊接改朝內焊接