SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : GFE128128A-BNFE

VERSION : B

DATE : 2017.03.30

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
2015.06.30	A	Specification released		
2017.03.30	B	修改公司抬頭、格式統一		

CONTENTS

1. SCOPE

This specification covers the engineering requirements for the GFE128128A-BNFE liquid crystal module.

2. PRODUCT SPECIFICATIONS

2.1 General

- 128 × 128 dot matrix LCD
- STN(BLUE), Negative mode LCD panel
- Transmissive , Wide temperature type
- 6 o'clock
- Multiplexing driving : 1/128duty, 1/12bias
- Controller IC : RA6963
- Backlight: White
- Built-in: DC-DC generator

2.2 Mechanical Characteristics

Item	Value	Unit
Number of dots	128X128	Dot
Dot size	0.50 X 0.50	mm
Dot pitch	0.55 X 0.55	mm
Module dimension	92 (W) X 106 (H) X 14.3(T)	mm
Viewing Area	73(W) X 73(H)	mm
Active Area	70.35 X 70.35	mm
Module	With Connector 2x10 PIN	
Remark		

2.3 Absolute Maximum Ratings (Without LED back-light)

Characteristic	Symbol	Unit	Value
Operating Voltage (logic)	V_{DD}	V	-0.3 to +5.0
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

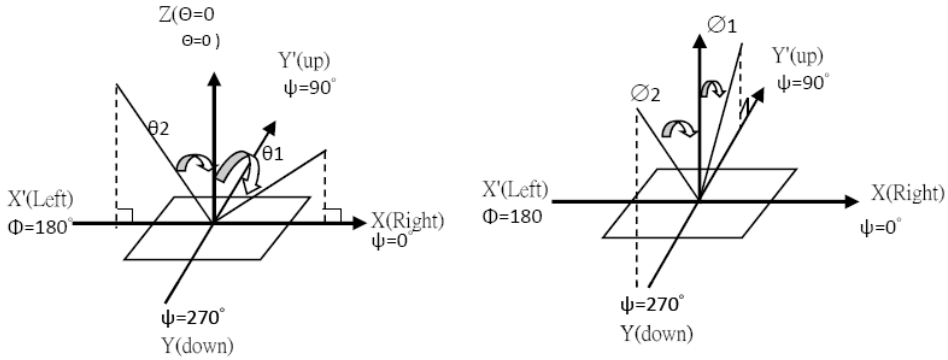
Item	Symbol	Rating	Unit
Operating temperature range	Top	-20~70	°C
Storage temperature range	Tst	-30~80	°C

2.6. Optical Characteristics

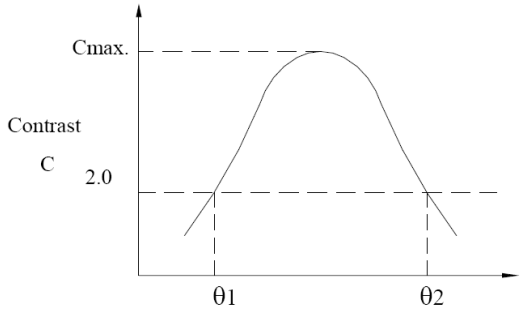
1/128 duty, 1/12 bias, Vop=13V, Ta=25℃

Item	Symbol	Conditions	Min.	Typ.	Max	Reference
Driving voltage	Vop=VDD-VO		--	13	--	
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°	-		TBD	Note 4
Response time(fall)	toff	θ=5°, ∅=0°	-	-	TBD	Note 4

Note 1: Definition of angles θ and ∅

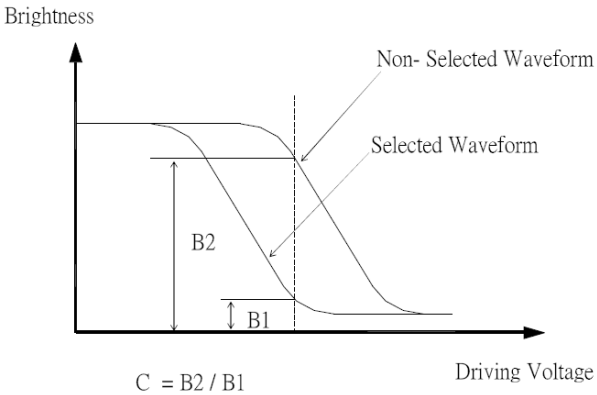


Note 2: Definition of viewing angles θ1 and θ2



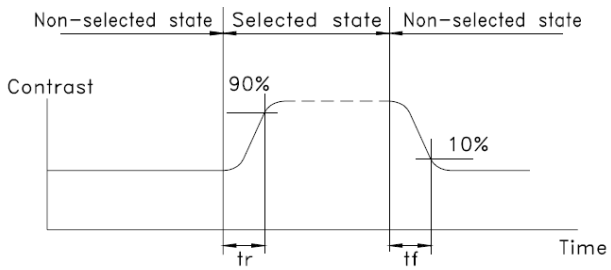
Note : Optimum viewing angle with the naked eye and viewing angle θ at Cmax. Above are not always the same

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=180mA, White	2.8	3.2	3.4	V
*Luminous Intensity	I_V	If=180mA, White	1200	1400	--	cd/m^2
Luminous Tolerance	--	If=180mA, White	--	--	20	%
Reverse Current	I_R	VR=5V, White	--	--	--	mA
Chromaticity	X	If=180mA, White	0.27	0.31	0.34	--
	Y		0.27	0.31	0.34	
Luminous Uniformity	ΔLv	If=180mA, White	70			

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

2.7.2 LED Maximum Operating Range

Item	Symbol	White	Unit
Power Dissipation	P_{AD}	TBD	mW
Forward Current	I_F	180	mA
Reverse Voltage	V_R	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

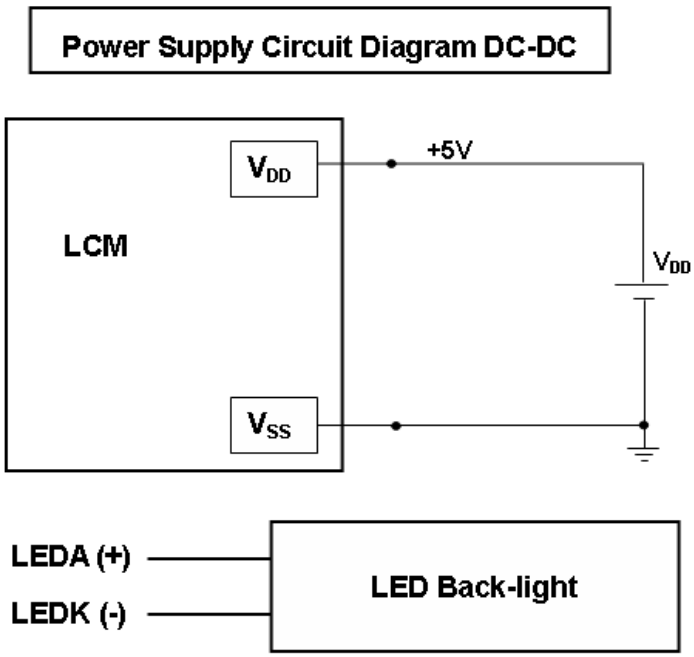
** Dissipation current, contrast and display functions
** Polarizing filter deterioration, other appearance defects
** The function test shall be conducted after 4hours storage at the normal temperature and humidity after remove from the test chamber.

4. OPERATING INSTRUCTIONS

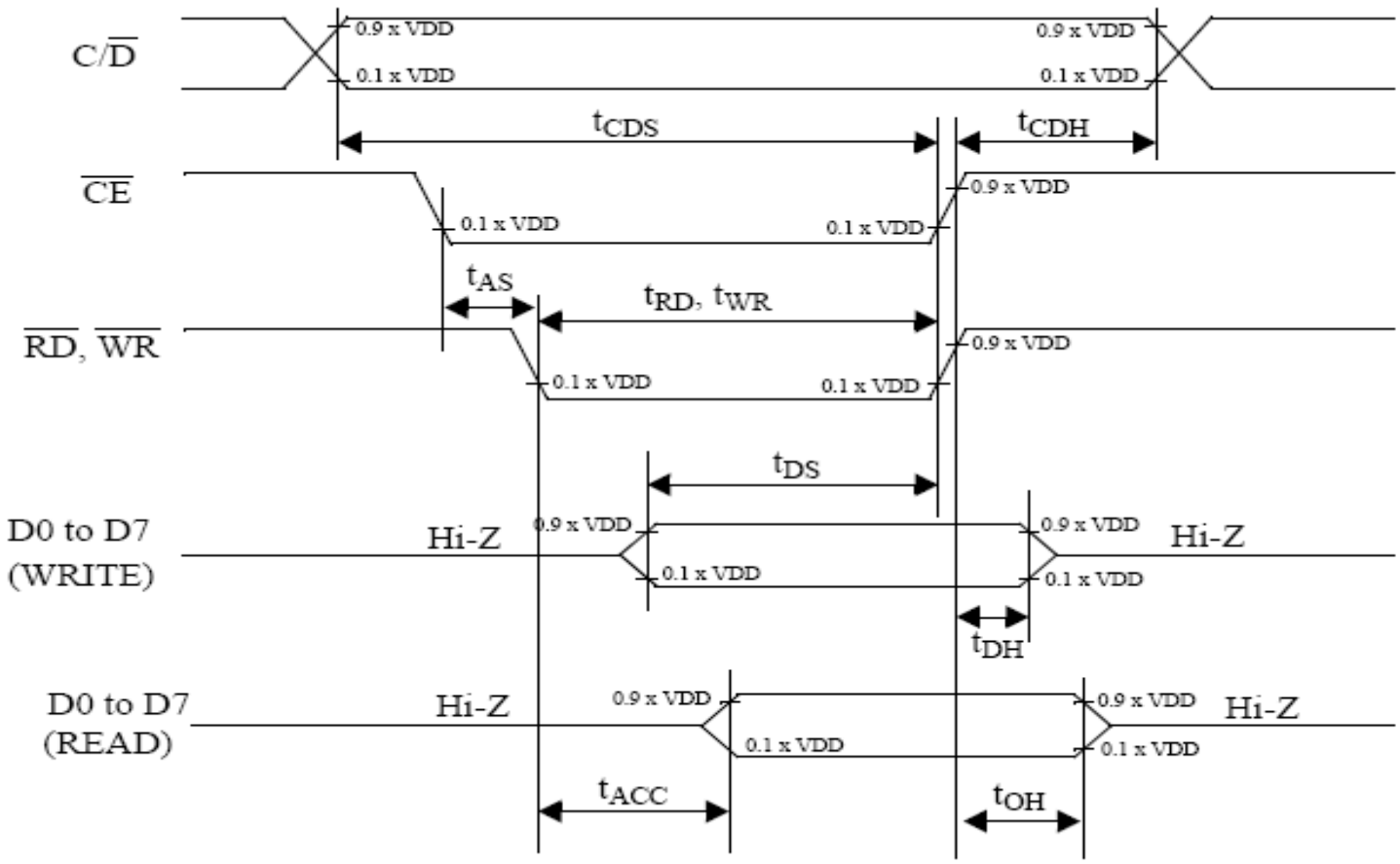
4.1 Input signal Function

NO.	Symbol	Function
1	V_O	LCD Drive Voltage (-)
2	VSS	Ground (0V)
3	VDD	Power supply for Logic circuit (+)
4	VEE	Frame ground
5	/WR	Write Data
6	/RD	Read Data
7	/CE	Chip Enable
8	C/D	Code/Data
9	/RST	Reset Active “L”
10-17	DB0-DB7	Data Bus Line
18	FS	Font select
19	LED A	Power supply for LED (+)
20	LED K	Power supply for LED (-)

4.2 Voltage Generator Circuit



4.3 Timing Characteristics



V_{DD} = 5 V ±10%; V_{SS} = 0 V; T_{amb} = -20 °C to +70°C.

symbol	parameter	MIN.	MAX.	test conditons	Unit
t_{CDS}	C/$\overline{D}$ set-up time	100			ns
t_{CDH}	C/$\overline{D}$ hold time	10			ns
t_{RD}, t_{WR}	$\overline{RD}$, $\overline{WR}$ pulse width	80			ns
t_{AS}	Address set-up time	0			ns
t_{AH}	Address hold time	0			ns
t_{DS}	Data set-up time	80			ns
t_{DH}	Data hold time	40		Note	ns
t_{ACC}	Access time		150	Note	ns
t_{OH}	Output hold time	10	50	Note	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 00H High address 00H	Set Text Home Address
	01000001	Columns		Set Text Area
	01000010	Low address		Set Graphic Home Address
	01000011	Columns		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	--	--	Data Read and Increment ADP
	11000010	DATA	--	Data Write and Decrement ADP
	11000011	--	--	Data Read and Increment ADP
	11000100	DATA	--	Data Write and Nonvariable ADP
	11000101	--	--	Data Read and Nonvariable ADP

SCREEN PEEK	11100000	--	--	Screen Peek
SCREEN COPY	11101000	--	--	Screen Copy
BIT SET/RESET	11110XXX	--	--	Bit Reset
	11111XXX	--	--	Bit Set
	1111X000	--	--	Bit 0 (LSB)
	1111X001	--	--	Bit 1
	1111X010	--	--	Bit 2
	1111X011	--	--	Bit 3
	1111X100	--	--	Bit 4
	1111X101	--	--	Bit 5
	1111X110	--	--	Bit 6
	1111X111	--	--	Bit 7 (MSB)

5. Character Code Map

CHARACTER CODE MAP
ROM code 0101

LSB / MSB	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
1																
2																
3																
4																
5																
6																
7																

6. 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 ºC±10 ºC 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.

7. 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.

8. LCM Dimension