



SPECIFICATIONS

CUSTOMER : 廣積科技股份有限公司

MODEL NO. : GIR2002P-FPFFJPA

VERSION : B

DATE : 2014.10.15

CERTIFICATION : ROHS

Customer Sign	Approved By	Prepared By	Prepared By

晶發科技有限公司
GI FAR TECHNOLOGY CO.,LTD

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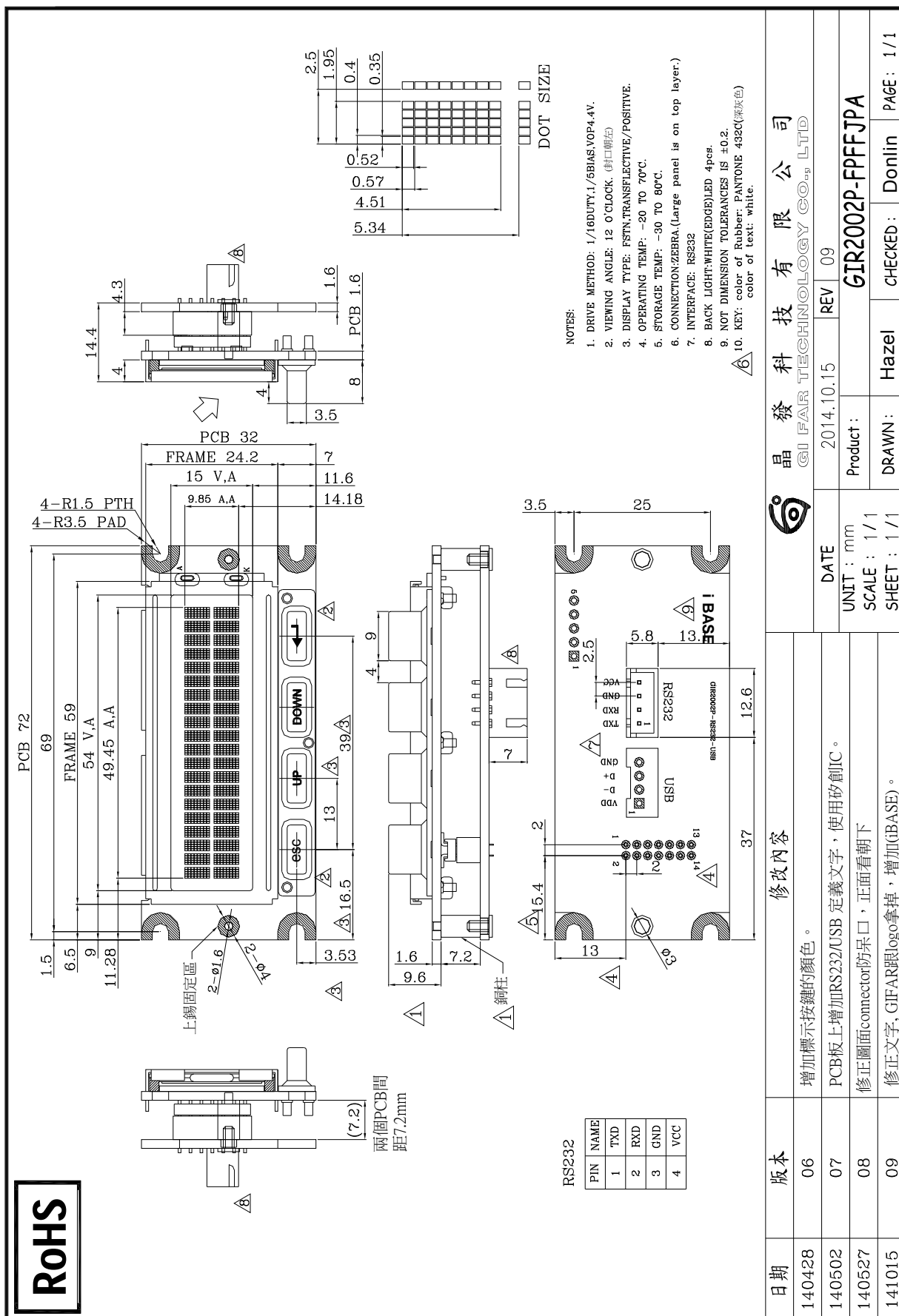


Quality Certified
ISO 9001:2008
Licence No: TA1062-QC-EC

Revision Record

[illegible]

LCM Dimension





1. Mechanical Specifications

Item	Value	Unit
Number of dots	20 X 2	Dot
Dot size	0.35 X 0.52	mm
Dot pitch	0.40 X 0.57	mm
Module dimension	72.0(W) X 32.0(H) X 25.4(T)	mm
Viewing Area	54 (W)X15 (H)	mm
Active Area	49.45 (W) X 9.85 (H)	mm
Duty	1/16	-
Bias	1/5	-
Viewing direction	12 O'clock	-
Lcd type	FSTN TRANSFLECTIVE / POSITIVE	-
LCM Controller	ST7066U-0A, ST7063D	
Backlight	White	-
INTERFACE	RS232	-
REMARK		



2. Backlight Characteristic

2.1 Electrical / optical specifications

Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward voltage	V _f	If=60mA, White	2.9	3.1	3.3	V
LED *Luminous Intensity	I _v	If=60mA, White	700	880	1320	Cd/m ²
Chromaticity Coordinate	x	If=60mA, White	0.26	-	0.32	
	y		0.26	-	0.32	
Uniformity	Avg	If=60mA, White	75			%
Reverse Current	I _R	VR=5V, White	--	10	--	uA

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

2.2 LED Maximum Operating Range

Item	Symbol	WHITE	Unit
Power Dissipation	P _{AD}	198	mW
Forward Current	I _F	60	mA
Reverse Voltage	V _R	5	V



3. Absolute Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Power supply Voltage	VDD	-	--	5.0	V
Operating temperature	TOPR	-	-20	70	°C
Storage temperature	TSTG	-	-30	80	°C
Static electricity	Be sure that you are grounded when handling LCM				

4. Optical Characteristics

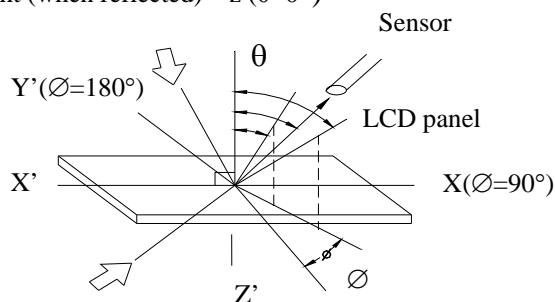
1/16 duty, 1/5 bias, Vopr=4.4V, Ta=25°C

Item	Symbol	Conditions	Min.	Typ.	Max	Reference
Viewing angle	θ	$C \geq 2.0, \varnothing = 0^\circ$	45°	-	-	Notes 1 & 2
Contrast	C	$\theta = 5^\circ, \varnothing = 0^\circ$	3	--	-	Note 3
Response time(rise)	ton	$\theta = 5^\circ, \varnothing = 0^\circ$	-	-	260ms	Note 4
Response time(fall)	toff	$\theta = 5^\circ, \varnothing = 0^\circ$	-	-	380ms	Note 4

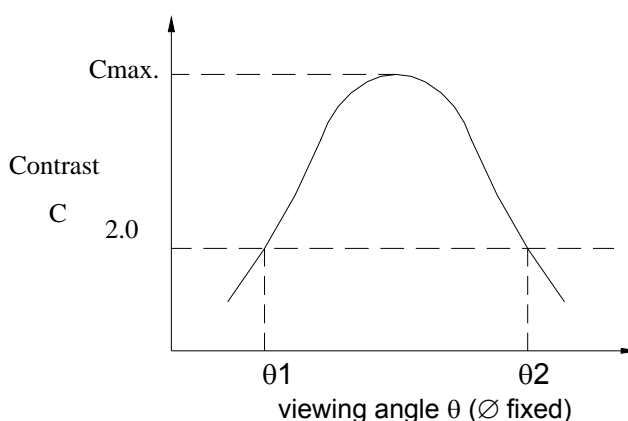
Note 1: Definition of angles θ and \varnothing

Note 2: Definition of viewing angles θ_1 and θ_2

Light (when reflected) $z (\theta=0^\circ)$



Light (when transmitted) $Y (\varnothing=70^\circ)$
 $(\theta=90^\circ)$



Note : Optimum viewing angle with the naked eye and viewing angle θ at C_{max} . Above are not always the same

Note 3: Definition of contrast C

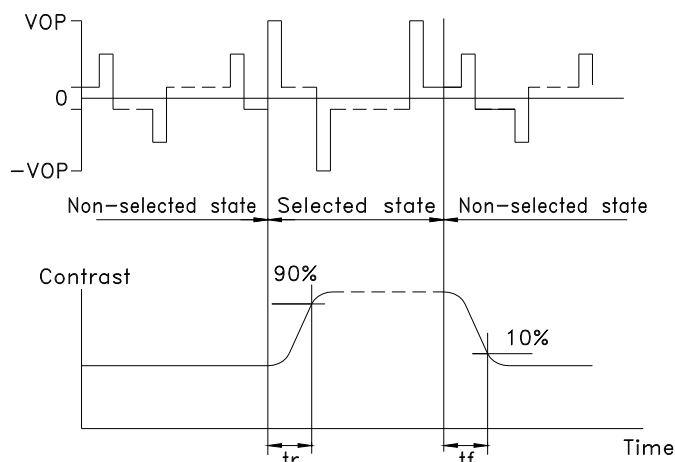
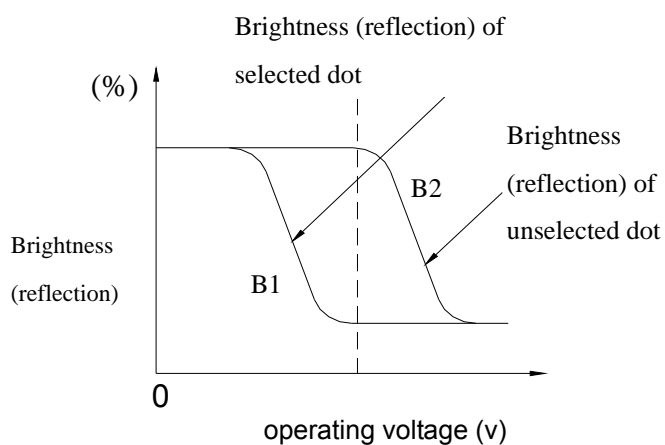
Note 4: Definition of response time

$$C = \frac{\text{Brightness (reflection) of unselected dot (B2)}}{\text{Brightness (reflection) of selected dot (B1)}}$$



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Note: Measured with a transmissive LCD panel which is displayed 1 cm²

V_{OPR} : Operating voltage
 t_{ON} : Response time (rise)

f_{FRM} : Frame frequency
 t_{OFF} : Response time (fall)

5. Interface Pin Description

Connector RS232

No	Signal
1	TXD
2	RXD
3	GND
4	VCC



6. Command Summary

Command	Syntax	Default	Description
Auto line wrap on	FE 43 FD	on	Enables line wrapping. Character will wrap to first position of next line if it reaches the end of a line.
Auto line wrap off	FE 44 FD	N/A	Disables line wrapping. Character will go to the first position of the original line if it reaches the end of a line.
Set text insertion point	FE 47 [col] [row] FD	N/A	Sets the text insertion point to [col] and [row]. [col] : 0x00 to 0x0F [row] : 0x00 to 0x01
Set text insertion point home	FE 48 FD	N/A	Sets the text insertion point to [0] and [0].
Underline cursor on	FE 4A [col] [row] FD	N/A	Turns on the underline cursor and sets it at location [col] and [row]. [col] : 0x00 to 0x0F [row] : 0x00 to 0x01
Underline cursor off	FE 4B FD	N/A	Turns off the underline cursor.
Blinking Block cursor on	FE 59 [col] [row] FD	N/A	Turns on the blinking block cursor and sets it at Location [col] and [row]. [col] : 0x00 to 0x0F [row] : 0x00 to 0x01
Blinking Block cursor off	FE 5A FD	N/A	Turn off the blinking block cursor.
Cursor left	FE 4C FD	N/A	Moves the underline cursor to left. It will move to the end of the same line if it reaches the beginning of a line
Cursor right	FE 4D FD	N/A	Moves the underline cursor to right. It will move to the beginning of the same line if it reaches the end of a line
Initial thick vertical bar graph	FE 76 FD	N/A	Initializes 5 pixels width as the vertical bar.
Initial thin vertical bar graph	FE 73 FD	N/A	Initializes 2 pixels width as the vertical bar.
Draw vertical bar graph	FE 3D [col] [height] FD	N/A	Draws vertical bar at position [col] of the last row with height [height]. [col] : 0x00 to 0x0F [height] : 0x00 to 0x10
Erase vertical bar graph	FE 2D [col] FD	N/A	Erases vertical bar at position [col]. [col] : 0x00 to 0x0F
Initialize horizontal bar graph	FE 68 FD	N/A	Initialize horizontal bar graph.
Draw horizontal bar graph	FE 7C [col] [row] [len] FD	N/A	Draws horizontal bar at position [col] and [row] With length [length]. [length] ranges from [0x00] to 0x7A.



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Read Model Number	FE 30 FD	N/A	Reads 2 bytes back from LCD
Read Firmware Version	FE 31 FD	N/A	Reads 2 bytes back from LCD
Soft Reset	FE 56 FD	N/A	Resets
Clear display	FE 58 FD	N/A	Clears screen of LCD and places the text insertion point to top left.
Backlight on	FE 42 FD	on	Turns on the backlight.
Backlight off	FE 46 FD	N/A	Turns off the backlight.
Backlight brightness	FE 41 [brightness] FD	N/A	Adjust LED brightness. [brightness] : 0x01 to 0x08.
Auto key hold on	FE 32 FD	N/A	Auto key hold on.
Auto key hold off	FE 33 FD	N/A	Auto key hold off.
Set RS232 port speed	FE 39 [speed] FD	0x03 =19200	Sets RS232 port speed. [speed] : 0x00 to 0x06 0x00 = 115200 0x01 = 57600 0x02 = 38400 0x03 = 19200 0x04 = 9600 0x05 = 4800 0x06 = 2400
Save user defined characters	FE 4F [cc] FD	N/A	Save user defined characters. [cc] : 0x01 to 0x08..
Define custom character	FE 4E [cc] [8 bytes] FD	N/A	Defines custom character. [cc] : 0x01 to 0x08.
Load user defined characters	FE 50 [cc] FD	N/A	Load user defined characters. [cc] : 0x01 to 0x08.
Save user settings	FE 53 [ud] [4 bytes] FD	N/A	Save user settings. User is required to save 4 bytes at a time. [ud] : 0x01 to 0x04.
Read user settings	FE 54 [ud] FD	N/A	Read user settings. 4 bytes are returned at each time [ud] : 0x01 to 0x04.
Save custom startup screen	FE 40 [bb] [8bytes] FD	N/A	Save custom startup characters. [bb] for LCM1602 : 0x00 to 0x03 [bb] for LCM2002 : 0x00 to 0x04
Set LCM for 16x02	FE 34 FD	N/A	Set LCM for 16x02
Set LCM for 20x02	FE 35 FD	N/A	Set LCM for 20x02



7. RELIABILITY

Test item	Test condition	Evaluation and assessment
Operation at high temperature and humidity	40 °C±2 °C 90%RH for 500hours	No abnormalities in functions* and appearance**
Operation at high temperature	60 °C±2 °C for 500 hours	No abnormalities in functions* and appearance**
Heat shock	-20± ~ +60 °C Left for 1 hour at each temperature, transition time 5 min, repeated 10times	No abnormalities in functions* and appearance**
Low temperature	-20±2 °C for 500 hours	No abnormalities in functions* and appearance**
Vibration	Sweep for 1 min at 10 Hz, 55Hz, 10Hz, amplitude 1.5mm 2 hrs each in the X,Y and Z directions	No abnormalities in functions* and appearance**
Drop shock	Dropped onto a board from a height of 10cm	No abnormalities in functions* and appearance**

* Dissipation current, contrast and display functions

** Polarizing filter deterioration, other appearance defects

7.1 Liquid crystal panel service life

100,000 hours minimum at 25 °C±10 °C

7.2 definition of panel service life

- Contrast becomes 30% of initial value
- Current consumption becomes three times higher than initial value
- Remarkable alignment deterioration occurs in LCK cell layer
- Unusual operation occurs in display functions



8. Appendix

Upper 4 bit Lower 4 bit	0000	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	CG BLANK ()														
0001	[21]	!	1	A	Q	a	q								
0010	[21]	"	2	B	R	b	r								
0011	[41]	#	3	C	S	c	s								
0100	[01]	\$	4	D	T	d	t								
0101	[01]	%	5	E	U	e	u								
0110	[21]	&	6	F	V	f	v								
0111	[01]	*	7	G	W	g	w								
1000	[11]	(	8	H	X	h	x								
1001	[21]	)	9	I	Y	i	y								
1010	[21]	*	#	J	Z	j	z								
1011	[41]	+	\$	K	[	k	[
1100	[01]	,	<	L	^	l	^								
1101	[01]	-	=	M	_	m	_								
1110	[21]	"	>	N	^	n	^								
1111	[01]	/	?	O	_	o	^								