

SPECIFICATION FOR TFT MODULE

MODULE NO:AFS176220TG-2.2-U910001 REVISION NO: 03

Customer's Approval:

	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)	XJZ	2011-12-8
CHECKED BY	YHW	2011-12-8
APPROVED BY	HSH	2011-12-8

Version	DATE	DESCRIPTION	CHANGED BY
00	Oct-14-2011	First Issue	Ylh
01	Oct-17-2011	Rev. C/D	Alfred
02	Nov-08-2011	Rev. Interface Definition	Ylh
03	Mar-05-2012	Rev. B/L Brightness & FPC Structure	Ylh

DOCUMENT REVISION HISTORY

CONTENTS

1. Features & Mechanical specifications	1
2. Dimensional Outline	2
3. Block Diagram	3
4. Pin Description	4
5. Absolute Maximum Ratings	5
6. Electrical Characteristics	5
7. Backlight Specification	5
8. Electro-Optical Characteristics	6
9. Instruction Description	9
10. AC Characteristics	11
11. Quality Specification	13

1. Features & Mechanical Specifications

Item	Contents	Unit
	LCD	
LCD Type	TFT / Transmissive / Normally White	
Viewing direction	12:00	
Backlight	White LED x 3 in Parallel	
Interface	8080-8bit parallel bus interface	
Driver IC	ILI9225G	
Outline Dimension	41.7(W) ×56.16(H) × 2.5(T)	mm
Glass area (W×H×T)	$38.048(W) \times 50.16(H) \times 1.0(T)$	mm
Active area (W×H)	34.848 × 43.56	mm
Number of Dots	176(RGB) × 220	
Dot pitch (W×H)	0.066 × 0.066	mm
Pixel pitch (W×H)	0.198 × 0.198	mm
Operating Temperature	$-10 \sim +50$	°C
Storage temperature	$-20 \sim +60$	°C

2. Dimensional Outline

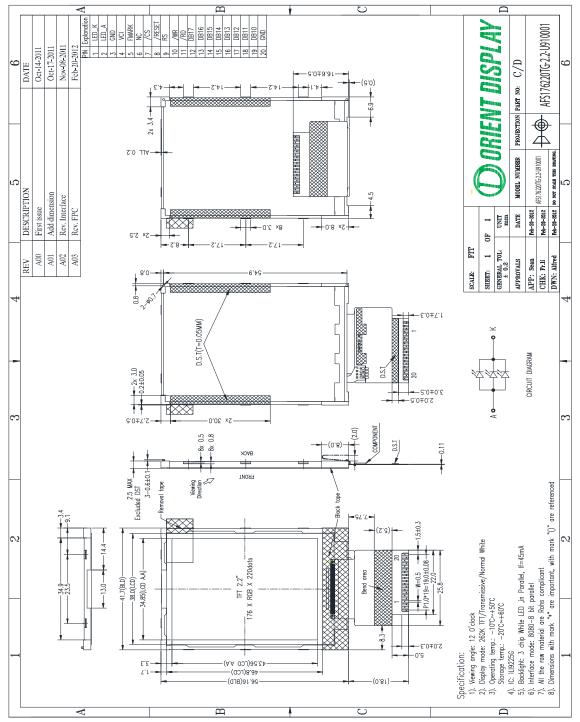


Figure 1. Dimensional outline

3. Block Diagram

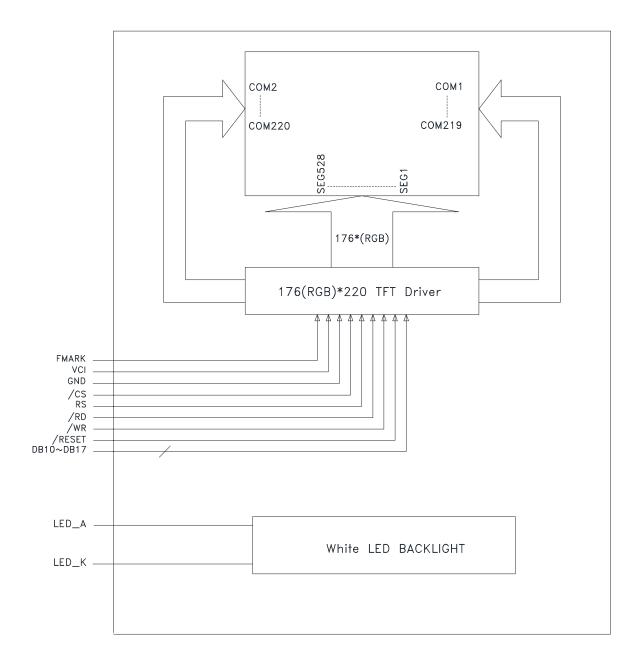


Figure 2. Block diagram

4. Pin Description

PIN No.	SYMBOL	Function
1	LED_K	Backlight LED Cathode
2	LED_A	Backlight LED Anode
3	GND	Ground
4	VCI	A supply voltage to the analog circuit
5	FMARK	Tearing effect output pin to synchronize MCU to frame writing, activated by S/W command. When this pin is not activated, this pin is low. If not used, open this pin.
6	NC	No connection
7	/CS	Chip Select Signal ("Low" enable)
8	/RESET	Reset pin. (Active Low)
9	RS	A register select signal. Low: select an index or status register High: select a control register
10	/WR	Write signal.
11	/RD	Read signal.
12~19	DB17~DB10	Data Bus
20	GND	Ground

5. Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply Voltage range	VCI	-0.3 to +4.6	V
Operating Temperature range	Тор	-10 to +50	°C
Storage Temperature range	Tst	-20 to +60	°C

<u>6. Electrical Characteristics</u>

DC Characteristics	
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Item	Symbol	Min.	Type.	Max.	Unit
Driver Supply Voltage	VCI	2.5	-	3.3	V

7. Backlight Characteristics

White LED \times 3 in parallel					($(Ta = 25^{\circ}C)$
Item	Symbol	Condition	Min	Тур	Max	Unit
Forward Voltage	VF	IF=45mA	-	3.2	-	V
Uniformity	$\triangle Bp$	-	80	-	-	%
Luminance for LCD	Lv	IF=45mA	-	4700	-	cd/m ²

Electro O								
Item		Symbol	Condition	Min.	Тур.	Max.	Unit	Note
Transmittand (without Pola		T(%)	_	-	16.0	_	_	
Contrast Rat	io	CR	⊖=0	400	500	_	_	(1)(2)
	Rising	T _R	Normal	Ι	2	4		
Response time	Falling	T _F	viewing angle _ _	_	6	12	msec	(1)(3)
Color gamut		S(%)			60		%	
	White	Wx		0.283	0.303	0.323		
	vvriite	Wy		0.305	0.325	0.345		
	Red	Rx		0.606	0.626	0.646		
Color	Reu	Ry		0.314	0.334	0.354		(1)(4)
chromaticity	Green	Gx		0.257	0.277	0.297		CF glass
(CIE1931)	Gleen	Gy		0.529	0.549	0.569		
	Blue	Bx		0.122	0.142	0.162		
	Blue	Ву		0.102	0.122	0.142		
		θL		35	45	_		
Viewing	Hor.	θ _R	00.10	35	45	_		
angle	Ver	θu	CR>10	35	45	_		
	Ver.	θρ		10	20	-		
Optima View Direction				12 0'	clock			(5)

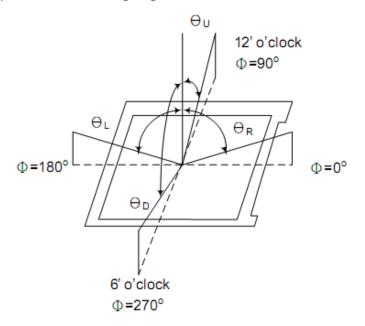
<u>8. Electro-Optical Characteristics</u>

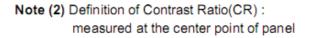
Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 15min. warm-up time.

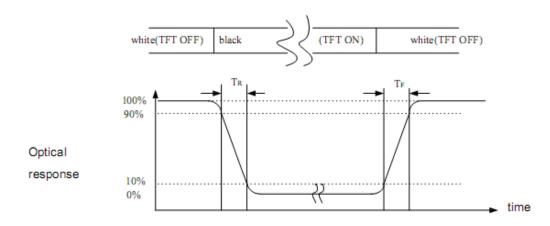
Measuring Equipment

 FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics. Note (1) Definition of Viewing Angle :

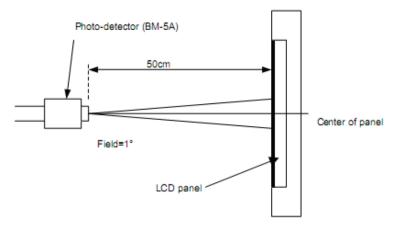




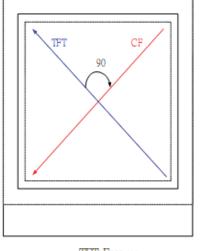
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.



TFT Face up

9. Instruction Description

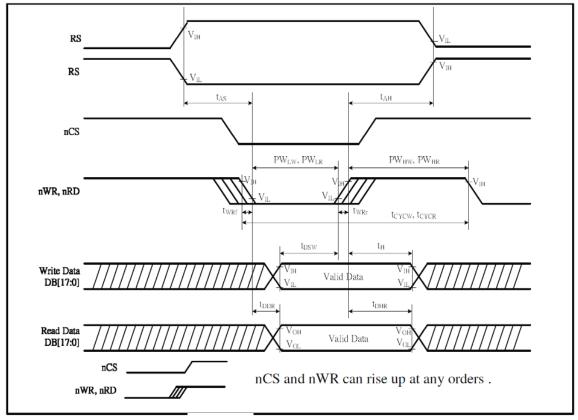
i i <th< th=""><th></th><th></th><th></th><th></th><th></th><th>_</th><th></th><th></th><th></th><th></th><th></th><th></th><th>-</th><th></th><th>_</th><th></th><th></th><th></th><th></th><th>_</th></th<>						_							-		_					_
Matrix Matrix Matrix <th>1000</th> <th>Registers Name</th> <th>RW</th> <th>RS</th> <th>D15</th> <th>D14</th> <th>D13</th> <th>D12</th> <th>D11</th> <th>D10</th> <th>D9</th> <th>DS</th> <th>D7</th> <th>D6</th> <th>D5</th> <th>D4</th> <th>D3</th> <th>D2</th> <th>D1</th> <th>Do</th>	1000	Registers Name	RW	RS	D15	D14	D13	D12	D11	D10	D9	DS	D7	D6	D5	D4	D3	D2	D1	Do
no. no. </td <td>120</td> <td></td> <td>1.00</td> <td></td> <td>1.25</td> <td>20.0 **</td> <td>1.1.2.2.1</td> <td>20 1</td> <td></td> <td>1.2</td> <td></td> <td>282</td> <td>10000</td> <td>141576</td> <td></td> <td>1.428</td> <td>1.02</td> <td>1.1.1.2.2.1</td> <td>ID1</td> <td>IDO</td>	120		1.00		1.25	20.0 **	1.1.2.2.1	20 1		1.2		282	10000	141576		1.428	1.02	1.1.1.2.2.1	ID1	IDO
im im< i	00h	Driver Code Head	н	1	10000		14.165		0		5 - 5 Store 1		0			and Series	1005-010	1 million		1 NLO
Matrix	01h	Driver Output Control	w	9	5.22		12112	10.000	0				0	0	0		10400	1955 1990	(0)	(0)
and by and <td>02h</td> <td>LCD AC Driving Control</td> <td>w</td> <td>5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> <td></td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>FLD</td>	02h	LCD AC Driving Control	w	5	0	0	0	0	0	0			0	0	0	0	0	0	0	FLD
is indicis one is indicis one is i								BGR							ID1	IDO	AM			(0)
Mo Model condition With No <	03h	Entry Mode	w	1	0	0	0	100000	0	0			0	0		12.22	10000	0	0	0
Math Math <t< td=""><td>07h</td><td>Display Control 1</td><td>w</td><td>4</td><td>0</td><td>0</td><td>0</td><td>120000</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>- 10 C C</td><td>693</td><td>16006</td><td>D1</td><td>D0</td></t<>	07h	Display Control 1	w	4	0	0	0	120000	0	0	0	0	0	0	0	- 10 C C	693	16006	D1	D0
matrix matrix </td <td>1993</td> <td></td> <td>-</td> <td></td> <td>1</td> <td></td> <td></td> <td>(0)</td> <td></td> <td></td> <td></td> <td>1.00</td> <td></td> <td></td> <td></td> <td>(0)</td> <td>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</td> <td>1.</td> <td>(0) BP1</td> <td>(0) BP0</td>	1993		-		1			(0)				1.00				(0)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.	(0) BP1	(0) BP0
eta fixed condition fixed cond	08h	Blank Period Control 1	w	્ય	0	0	0	0					0	0	0	0	10.00	10.00	(0)	(0)
No. No. <td>0Bh</td> <td>Frame Cycle Control</td> <td>w</td> <td>a</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> <td></td> <td>RTN1</td> <td>RTN0</td>	0Bh	Frame Cycle Control	w	a									0	0	0	0			RTN1	RTN0
is indication is i			-	-	10212		3.525	1962			1.11		1				1.000	10	(0) RIM1	(0) RIMO
Pho Outbook	oCh	Interface Control	W	<u>_</u> 1	0	0	0	0	0	0	0		0	0	0		0	0	(0)	(0)
No No<	0Fh	Oscillation Control	w	1	0	0	0	0					0	0	0	0	0	0	0	OSC
Name Name <th< td=""><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>(0)</td><td>(1)</td><td>(1)</td><td>(1)</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td></td><td></td><td>_ON(1) STB</td></th<>			-						(0)	(1)	(1)	(1)	-	-	-	-	-			_ON(1) STB
Name Processed 2 No 1 0	10h	Power Control 1	W	्रा	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	(0)
No No<	11h	Power Control 2	w		0	0	0	APON	0	0	0	0	0	1	0	0	0	0	0	1
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base Control 4 W I O O O O O O OUO	12h	Power Control 3	w	1	0		10000	100.00	0	0	0	0	0	0	0	1	0	0	1	0
Image Promoting S VI I VCMS	13h	Power Control 4	w	4	0				0	0	0	0	0	GVD6	GVD5	GVD4	GVD3	GVD2	GVD1	GVD0
Name Description No					10000	104462005	1.120121	972900	2022	8.023235	10000	0.5192.00			1 932000	201012-02	12330	0.00011-	(1)	(0) VML0
ph/ AdAdess 5xt w 1 0 0 <t< td=""><td>14h</td><td>Power Control 5</td><td>w</td><td>1</td><td>1.100</td><td></td><td>1.12135.111</td><td>112232</td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td>10.80</td><td>1999</td><td>1000</td><td>(0)</td><td>(1)</td></t<>	14h	Power Control 5	w	1	1.100		1.12135.111	112232					0			10.80	1999	1000	(0)	(1)
Image: Serie Control Image: Se	20h	RAM Address Set 1	w		0								AD7	AD6	AD5		AD3		AD1	ADO
Int MarkAddeess Sal 2 W I	5.05		- <u></u>									120	1.000	2014Qoc	1.000000	10024-see	10000	100000000	(0)	(0)
2nd Wink Dates GRAM W 1 UNICATE ReserverVerVerVerVerVerVerVerVerVerVerVerVerVe	21h	RAM Address Set 2	w	1	0	0	0	0	0	0	0	0	1.12.22			11.000	1.000	1222	(0)	AD8 (0)
Ne. Registers Name RW RS D15 D14 D13 D12 D11 D16 D6 D6 D5 D4 D3 D20 D11 D10	22h	Write Data to GRAM	w	1						1	WD[17:0]: P	in assignment	varies accord							
Image: state	22h		7000 000	1	Dif		012		0.1			0000		20120	1	Di	52	Pa	51	50
base San Generic by bit bit< bit bit	100.1	Read Data to GRAM	R	1						3	RD[17:0]: P	in assignment	varies accordi	ng to the intert	face method.					
netrici section netrici netrici <t< td=""><td>22h</td><td></td><td>7000 000</td><td>RS</td><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td></td><td></td><td>0000</td><td></td><td>- 24730</td><td>1</td><td>1.08/802</td><td>Contract California</td><td>Weiking</td><td>D1</td><td>Do</td></t<>	22h		7000 000	RS	D15	D14	D13	D12	D11			0000		- 24730	1	1.08/802	Contract California	Weiking	D1	Do
Image: control of the contro	22h No.	Registers Name	RW							D10	D9	Da	D7	D6	D5	SCN4	SCN3	SCN2	SCN1	SCN0
varial Scale Control 2 W 1 0	22h No. 30h	Registers Name Gate Scan Control	RW	1	0	0	0	0	0	D10 0	D9	D 8 0	D7	D6 0	D5	SCN4 (0)	SCN3 (0)	SCN2 (0)	88233 x t	2003042
33h Varial Scriet Control 3 W 1 0 0 0 0 <td>22h No. 30h</td> <td>Registers Name Gate Scan Control</td> <td>RW</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>D10 0</td> <td>D9</td> <td>D8 0</td> <td>0 SEA7 (1)</td> <td>0 SEA6 (1)</td> <td>0 SEA5 (0)</td> <td>SCN4 (0) SEA4 (1)</td> <td>SCN3 (0) SEA3 (1)</td> <td>SCN2 (0) SEA2 (0)</td> <td>SCN1 (0) SEA1 (1)</td> <td>SCN0 (0) SEA0 (1)</td>	22h No. 30h	Registers Name Gate Scan Control	RW	1	0	0	0	0	0	D10 0	D9	D 8 0	0 SEA7 (1)	0 SEA6 (1)	0 SEA5 (0)	SCN4 (0) SEA4 (1)	SCN3 (0) SEA3 (1)	SCN2 (0) SEA2 (0)	SCN1 (0) SEA1 (1)	SCN0 (0) SEA0 (1)
Image: Second	22h No. 30h 31h	Registers Name Gate Scan Control Vertical Scrott Control 1	R.W W W	1	0	0	0	0	0	D10 0	D9 0	0 0	0 SEA7 (1) SSA7	0 SEA6 (1) SSA6	0 SEA5 (0) SSA5	SCN4 (0) SEA4 (1) SSA4	SCN3 (0) SEA3 (1) SSA3	SCN2 (0) SEA2 (0) SSA2	SCN1 (0) SEA1 (1) SSA1	SCN0 (0) SEA0 (1) SSA0
341 Partial Driving Position -1 W 1 0 0 0 0 0 0 (1) <th< td=""><td>22h No. 30h 31h 32h</td><td>Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2</td><td>RW W W</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0 0 0</td><td>0</td><td>D10 0 0</td><td>0 0 0</td><td>0 0 0</td><td>0 SEA7 (1) SSA7 (0)</td><td>0 SEA6 (1) SSA6 (0)</td><td>0 SEA5 (0) SSA5 (0)</td><td>SCN4 (0) SEA4 (1) SSA4 (0)</td><td>SCN3 (0) SEA3 (1) SSA3 (0)</td><td>SCN2 (0) SEA2 (0) SSA2 (0)</td><td>SCN1 (0) SEA1 (1)</td><td>SCN0 (0) SEA0 (1)</td></th<>	22h No. 30h 31h 32h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2	RW W W	1	0	0	0	0 0 0	0	D10 0 0	0 0 0	0 0 0	0 SEA7 (1) SSA7 (0)	0 SEA6 (1) SSA6 (0)	0 SEA5 (0) SSA5 (0)	SCN4 (0) SEA4 (1) SSA4 (0)	SCN3 (0) SEA3 (1) SSA3 (0)	SCN2 (0) SEA2 (0) SSA2 (0)	SCN1 (0) SEA1 (1)	SCN0 (0) SEA0 (1)
3h Partial Diriving Position -2 W 1 0 0 0 0<	22h No. 30h 31h 32h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2	RW W W	1	0	0	0	0 0 0	0	D10 0 0	0 0 0	0 0 0	D7 0 SEA7 (1) SSA7 (0) SST7 (0)	D6 0 SEA6 (1) SSA6 (0) SST6 (0)	D5 0 SEA5 (0) SSA5 (0) SST5 (0)	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0)	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0)	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0)
Indicational Window Address -1 W 1 0 <th< td=""><td>22h No. 30h 31h 32h 33h</td><td>Registers Name Gate Scan Centrol Vertical Scroll Centrol 1 Vertical Scroll Centrol 2 Vertical Scroll Centrol 3</td><td>RW W W</td><td>1 1 1 1</td><td>0 0 0</td><td>0 0 0</td><td>0 0 0</td><td>0 0 0</td><td>0 0 0</td><td>D10 0 0 0</td><td>0 0 0</td><td>0 0 0 0</td><td>0 SEA7 (1) SSA7 (0) SST7 (0) SE17</td><td>D6 0 SEA6 (1) SSA6 (0) SST6 (0) SE16</td><td>0 SEA5 (0) SSA5 (0) SST5 (0) SE15</td><td>SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SE14</td><td>SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13</td><td>SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12</td><td>SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11</td><td>SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SE10</td></th<>	22h No. 30h 31h 32h 33h	Registers Name Gate Scan Centrol Vertical Scroll Centrol 1 Vertical Scroll Centrol 2 Vertical Scroll Centrol 3	RW W W	1 1 1 1	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	D10 0 0 0	0 0 0	0 0 0 0	0 SEA7 (1) SSA7 (0) SST7 (0) SE17	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SE16	0 SEA5 (0) SSA5 (0) SST5 (0) SE15	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SE14	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SE10
36h Horizontal Window Address -1 W 1 0 0 0 0	22h No. 30h 31h 32h 33h 34h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1	RW W W W W	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0	0 0 0 0	D10 0 0 0	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D6 0 0 0 0 0	D7 0 SEA7 (1) SSA7 (0) SST7 (0) SE17 (1)	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SE16 (1)	D5 0 SEA5 (0) SSA5 (0) SST5 (0) SE15 (0)	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SE14 (1)	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13 (1)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0)	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0)
37h Horizontal Window Address -2 W 1 0 <td>22h No. 30h 31h 32h 33h 34h</td> <td>Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1</td> <td>RW W W W W</td> <td>1 1 1 1</td> <td>0 0 0 0</td> <td>0 0 0 0</td> <td>0 0 0 0 0 0 0 0</td> <td>0 0 0 0</td> <td>0 0 0 0</td> <td>D10 0 0 0</td> <td>D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>D6 0 0 0 0 0</td> <td>D7 0 SEA7 (1) SSA7 (0) SST7 (0) SE17 (1) SS17 (0)</td> <td>D6 0 SEA6 (1) SSA6 (0) SST6 (0) SS16 (1) SS16 (0)</td> <td>D5 0 SEA5 (0) SSA5 (0) SST5 (0) SS15 (0) SS15 (0)</td> <td>SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SE14 (1) SS14 (0)</td> <td>SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13 (1) SS13 (0)</td> <td>SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0) SS12 (0)</td> <td>SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11 (1) SS11 (0)</td> <td>SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SE10 (1) SS10 (0)</td>	22h No. 30h 31h 32h 33h 34h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1	RW W W W W	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0	0 0 0 0	D10 0 0 0	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D6 0 0 0 0 0	D7 0 SEA7 (1) SSA7 (0) SST7 (0) SE17 (1) SS17 (0)	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SS16 (1) SS16 (0)	D5 0 SEA5 (0) SSA5 (0) SST5 (0) SS15 (0) SS15 (0)	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SE14 (1) SS14 (0)	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13 (1) SS13 (0)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0) SS12 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11 (1) SS11 (0)	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SE10 (1) SS10 (0)
Normal Sector Normal	22h No. 30h 31h 32h 33h 34h 35h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2	RW W W W W W	1 1 1 1	0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0	0 0 0 0 0	D10 0 0 0 0	0 0 0 0 0	Ds 0 0 0 0 0 0 0 0 0 0	0 SEA7 (1) SSA7 (0) SST7 (0) SE17 (1) SS17 (0) HEA7	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SE16 (1) SS16 (0) HEA6	D5 0 SEA5 (0) SSA5 (0) SS15 (0) SS15 (0) HEA5	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SE14 (1) SS14 (0) HEA4	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13 (1) SS13 (0) HEA3	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0) SS12 (0) SS12 (0) HEA2 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11 (1) SS11 (0) HEA1	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SE10 (1) SS10
38h Vertical Window Address -1 W 1 0	No	Registers Name Gate Scan Centrol Vertical Scroll Centrol 1 Vertical Scroll Centrol 2 Vertical Scroll Centrol 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1	RW W W W W W	1 1 1 1 1 1	0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0	D10 0 0 0 0 0 0 0	D9 0 0 0 0 0 0 0	DB 0 0 0 0 0 0 0 0 0 0 0 0 0	D7 0 SEA7 (1) SST7 (0) SE17 (1) SS17 (0) HEA7 (1)	D6 0 SEA6 (1) SST6 (0) SST6 (0) SE16 (1) SS16 (1) SE16 (0) HEA6 (0)	D5 0 SEA5 (0) SST5 (0) SE15 (0) SS15 (0) HEA5 (1) HSA5	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SST4 (1) SS14 (0) HEA4 (0) HSA4	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13 (1) SS13 (0) HEA3 (1)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0) SS12 (0) SS12 (1)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (1) SS11 (0) HEA1 (1) HSA1	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SE10 (1) SS10 (0) HEA0 (1) HSA0
96h Vertical Window Address -2 W 1 0	No	Registers Name Gate Scan Centrol Vertical Scroll Centrol 1 Vertical Scroll Centrol 2 Vertical Scroll Centrol 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1	RW W W W W W	1 1 1 1 1 1	0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0	D10 0 0 0 0 0 0 0	D9 0 0 0 0 0 0 0	DB 0 0 0 0 0 0 0 0 0 0 0 0 0	D7 0 SEA7 (1) SSA7 (0) SET7 (0) SET7 (1) SS17 (0) HEA7 (0)	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SS16 (0) HEA6 (0) HSA6 (0)	D5 0 SEA5 (0) SS35 (0) SS15 (0) SS15 (0) HEA5 (1) HSA5 (0)	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SST4 (1) SS14 (0) HEA4 (0) HSA4 (0)	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SST3 (0) SS13 (0) HEA3 (1) HSA3 (0)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0) SS12 (0) HEA2 (1) HSA2 (0)	SCN1 (0) SEA1 (1) SST1 (0) SST1 (1) SS11 (0) HEA1 (1) HSA1 (0)	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SST0 (1) SS10 (0) HEA0 (1) HSA0 (0)
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Solu Gamma Control 1 W 1 0	222h No. 30h 31h 32h 33h 34h 35h 36h 37h 38h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -1	RW W W W W W W W	1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0		D10 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DS 0 0 0 0 0 0 0 0 0 0 0 0 0	07 0 SEA7 (1) SSA7 (0) SS17 (1) SS17 (1) HEA7 (1) HEA7 (1) VEA7 (1)	D6 0 SEA6 (1) SSA6 (0) SE16 (1) SS16 (0) HEA6 (0) VEA6 (1)	DS 0 SEA5 (0) SS345 (0) SS15 (0) SS15 (0) HEA5 (1) HSA5 (0) VEA5 (0)	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SST4 (0) HEA4 (0) HEA4 (0) VEA4 (1)	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SST3 (0) SS13 (0) HEA3 (1) HEA3 (1) VEA3 (1)	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) HEA2 (1) HEA2 (0) VEA2 (0)	SCN1 (0) SEA1 (1) SST1 (0) SST1 (1) SS11 (0) HEA1 (1) HSA1 (0)	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SST0 (1) SS10 (0) HEA0 (1) HSA0 (0)
5h Camma Control 2 W 1 0	222h No. 30h 31h 32h 33h 34h 35h 36h 37h 38h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -1	RW W W W W W W W	1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0		D10 0 0 0 0 0 0 0 0 0 0 0 0	D9 0	Ds 0	07 0 SEA7 (1) SSA7 (0) SS17 (0) SS17 (0) HEA7 (1) HSA7 (0) VEA7	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SS16 (0) HEA6 (0) VEA6 (1)	DS 0 SEA5 (0) SST5 (0) SE15 (0) SS15 (0) SS15 (0) SS15 (0) VEA5 (0) VSA5	SCN4 (0) SEA4 (1) SST4 (0) SST4 (0) SST4 (0) HEA4 (0) HEA4 (0) VEA4 (1) VSA4	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SE13 (1) SS13 (0) HEA3 (1) HSA3 (0) VEA3 (0) VSA3 (0)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SST2 (0) SS12 (0) HEA2 (0) VEA2 (1) HSA2 (0) VEA2 (0) VSA2 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11 (1) SS11 (0) HEA1 (1) HSA1 (0) VEA1 (0) VSA1 (0)	SCN0 (0) SEA0 (1) SST0 (0) SST0 (1) SST0 (1) SST0 (1) HEA0 (1) HEA0 (1) HSA0 (0) VEA0 (0)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	No. 30h 31h 32h 32h 34h 35h 36h 36h 38h	Registers Name Gate Scan Centrol Vertical Scroll Centrol 1 Vertical Scroll Centrol 2 Vertical Scroll Centrol 3 Partial Driving Position -1 Partial Driving Position -2 Horizental Window Address -1 Horizental Window Address -1 Vertical Window Address -2 Vertical Window Address -2	RW W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ра 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	07 0 SEA7 (1) SSA7 (0) SE17 (0) SE17 (0) HEA7 (1) HSA7 (0) VEA7 (1) VSA7 (0)	D6 0 SEA6 (1) SSA6 (0) SE16 (0) SS16 (0) HEA6 (0) VEA6 (1)	DS 0 SEA5 (0) SST5 (0) SE15 (0) SS15 (0) SS15 (0) SS15 (0) VEA5 (0) VSA5 (0)	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SS14 (1) SS14 (0) HEA4 (0) HEA4 (0) VEA4 (1) VSA4 (0)	SCN3 (0) SEA3 (1) SSA3 (0) SS13 (0) SS13 (0) HEA3 (0) HEA3 (0) VEA3 (1) VEA3 (0) VEA3 (0)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SE12 (0) SE12 (0) SE12 (0) HEA2 (1) HEA2 (0) VEA2 (0) VEA2 (0) KP02	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SE11 (1) SS11 (0) HEA1 (1) HSA1 (0) VEA1 (1) VSA1	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (0) SST0 (0) SS10 (0) HEA0 (1) HSA0 (0) VEA0 (1) VSA0
S2h Gamma Control S W 1 0 0 0 0 (0) (0) (0) (0) (0) (0) (0) (0) (1) (0) (1) (0) (1) (0) (No. 30h 31h 32h 32h 33h 34h 36h 37h 38h 39h 50h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -2 Vertical Window Address -2 Gamma Control 1	RW W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D9 0	ра 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 SEA7 (1) SSA7 (0) SST7 (0) SST7 (1) SS17 (1) SS17 (1) SS17 (1) VEA7 (1) VEA7 (1) VEA7 (1) VEA7 (0) O O	D6 0 SEA6 (1) SST6 (0) SST6 (0) SS16 (0) HEA6 (0) VEA6 (1) VSA6 (0)	D5 0 SEA5 (0) SST5 (0) SS15 (0) SS15 (0) SS15 (0) VEA5 (0) VEA5 (0) 0	SCN4 (0) SEA4 (1) SSA4 (0) SS14 (0) SE14 (1) SE14 (1) HEA4 (0) HEA4 (0) VEA4 (1) VEA4 (1) VEA4 (0) O	SCN3 (0) SEA3 (1) SSA3 (0) SS13 (0) SE13 (1) SS13 (1) HEA3 (1) HEA3 (1) VEA3 (1) VEA3 (1) VEA3 (0) KP03 (0)	SCN2 (0) SEA2 (0) SSA2 (0) SST2 (0) SST2 (0) HEA2 (0) HSA2 (0) VEA2 (0) VSA2 (0) VSA2 (0) KP22 KP22	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (1) (0) SST1 (1) (0) HEA1 (1) (0) VEA1 (1) (1) VEA1 (1) (0) VEA1 (1) (0) KP01	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (1) SS10 (1) HEA0 (1) HEA0 (1) HEA0 (1) VEA0 (1) VEA0 (0) KP20
Sh Camma Control 4 W 1 D D D PP3 PP1 PP10 PP10 D D PP30 P300	No. 30h 31h 32h 32h 33h 34h 36h 37h 38h 39h 50h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -2 Vertical Window Address -2 Gamma Control 1	RW W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KP12 (0)	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KP11 (0)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 SEA7 (1) SSA7 (0) SST7 (0) SST7 (1) SS17 (1) SS17 (1) SS17 (1) VEA7 (1) VEA7 (1) VEA7 (1) VEA7 (0) O O	D6 0 SEA6 (1) SST6 (0) SST6 (0) SS16 (0) HEA6 (0) VEA6 (1) VSA6 (0)	D5 0 SEA5 (0) SST5 (0) SS15 (0) SS15 (0) SS15 (0) VEA5 (0) VEA5 (0) 0	SCN4 (0) SEA4 (1) SSA4 (0) SS14 (0) SE14 (1) SE14 (1) HEA4 (0) HEA4 (0) VEA4 (1) VEA4 (1) VEA4 (0) O	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SST3 (0) HEA3 (0) HEA3 (0) VEA3 (0) VEA3 (0) KP03 (0) KP03 (0) KP23 (1)	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SS12 (0) HEA2 (1) HSA2 (0) VSA2 (0) VSA2 (0) KP02 (0) KP22 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (0) SST1 (0) HEA1 (1) HEA1 (1) VSA1 (0) KP01 (0) KP21 (0)	SCN0 (0) SEA0 (1) SSA0 (0) SST0 (1) SST0 (0) HEA0 (1) HEA0 (0) VEA0 (0) VEA0 (0) VEA0 (0) KP00 (0) KP00 (0)
S4h Damma Control 5 W 1 0 0 0 0 00	No. 30h 31h 32h 33h 33h 33h 36h 36h 39h 50h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -1 Vertical Window Address -2 Gamma Control 1 Gamma Control 2	RW W W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	рто 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D9 0	D8 0	0 SEA7 (1) SSA7 (0) SS17 (1) SS17 (1) SS17 (1) HEA7 (1) VEA7 (0) VEA7 (0) 0 0 0 0 0 0 0 0 0 0 0 0 0	D6 0 SEA6 (1) SST6 (0) SST6 (0) SS16 (1) SS16 (0) HEA6 (0) VEA6 (0) VSA6 (0) 0	D5 0 SEA5 (0) SST5 (0) SST5 (0) SS15 (0) HEA5 (1) HSA5 (0) VEA5 (0) Q 0 0	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SS14 (0) HEA4 (0) HEA4 (0) VEA4 (1) VSA4 (0) 0 0	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SST3 (0) SST3 (0) HEA3 (1) HSA3 (0) VEA3 (1) VEA3 (0) KP03 (0) KP43	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SS12 (0) HEA2 (1) HSA2 (0) VEA2 (0) VEA2 (0) KP02 (0) KP42	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (0) SS11 (0) HEA1 (1) HSA1 (0) VEA1 (1) VSA1 (0) (0) KP01 (0) KP11 (0) KP41	SCN0 (0) (0) (1) SSA0 (0) SST0 (1) SST0 (1) HSA0 (1) HSA0 (1) VSA0 (1) VSA0 (1) KP20 (0) KP20 (0) KP40
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55h Gamma Control 6 W 1 0 0 0 KN33 KN32 KN31 KN30 0 0 0 KN32 KN33 KN30 0 0 0 KN32 KN30 0	No	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -1 Vertical Window Address -1 Vertical Window Address -2 Gamma Control 1 Gamma Control 2 Gamma Control 3	RW W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 KP12 (0) KP52 (0) RP12 (0)	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KPs11 (0) KP51 (0) RP11	D8 0	D7 0 SEA7 (0) SST7 (0) SE17 (1) SS17 (0) HEA7 (1) HSA7 (0) VEA7 (1) VSA7 (0) 0 0 0	D6 0 SEA6 (1) SSA6 (0) SE16 (1) SS16 (0) SE16 (1) SSA6 (0) VEA6 (0) VSA6 (0) 0 0 0	D5 0 SEA5 (0) SSA5 (0) SS15 (0) SS15 (0) HEA5 (0) VEA5 (0) VSA5 (0) 0 0	SCN4 (0) SEA4 (1) SSA4 (0) SST4 (0) SST4 (0) SS14 (0) HEA4 (0) VEA4 (1) VEA4 (1) VSA4 (0) O O	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SST3 (0) SST3 (0) HEA3 (1) HEA3 (1) HEA3 (1) VEA3 (1) VEA3 (0) KP03 (0) KP23 (1) KP43 (1) RP03 (1)	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SS12 (0) HEA2 (1) HSA2 (0) VEA2 (0) KP02 (0) KP42 (0) RP02 (0) RP02 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (0) SST1 (0) HEA1 (1) HSA1 (0) VEA1 (1) VSA1 (0) KP01 (0) KP01 (0) KP41 (1) RP01 (1)	SCN0 (0) SEA0 (1) SSN0 (0) SST0 (0) SST0 (0) SST0 (0) SST0 (0) HEA0 (0) HEA0 (0) KP00 (0) KP20 (0) KP40 (0) RP00 (0)
Seh Gamma Control 7 W 1 0 0 0 (1) (0) </td <td>No</td> <td>Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -1 Vertical Window Address -2 Gamma Control 1 Gamma Control 3 Gamma Control 4</td> <td>R.W W W W W W W W W W W W W W</td> <td>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</td> <td></td> <td></td> <td></td> <td></td> <td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>D10 0</td> <td>D9 0 RP11 (0) RP11 0 KN11</td> <td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>D7 0 SEA7 (1) SST7 (0) SS17 (1) SS17 (1) SS17 (1) SS17 (1) SS17 (1) VEA7 (1) VEA7 (0) 0 0 0 0 0 0 0</td> <td>D6 0 SEA6 (1) SST6 (0) SST6 (0) SS16 (0) HEA6 (0) VEA6 (1) VSA6 (0) 0 0 0 0 0 0</td> <td>D5 0 SEA5 (0) SST5 (0) SE15 (0) SS15 (0) VEA5 (0) VEA5 (0) 0 0 0 0 0 0 0</td> <td>SCN4 (0) SEA4 (1) SST4 (0) SE14 (1) SS14 (0) HEA4 (0) HEA4 (0) VEA4 (1) VEA4 (1) VEA4 (0) O O O</td> <td>SCN3 (0) SEA3 (1) SST3 (0) SST3 (0) SST3 (1) SST3 (1) HEA3 (1) HEA3 (1) VEA3 (0) VEA3 (0) VEA3 (0) KP23 (1) KP23 (1) RP34 (1) KP43 (1) KP4</td> <td>SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) VEA2 (0) VEA2 (0) VEA2 (0) VEA2 (0) KP22 (0) KP22 (0) RP22 (0) SCN2 (0) KP22 (0) KP22 (0) KP42 (0) KP42 (0) KP42 (0) KP42 (0) SCN2 (0) SCN2 (0) SST2 SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 SST2 (0) SST2 SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (</td> <td>SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (1) SST1 (1) SST1 (1) HEA1 (1) HEA1 (1) VEA1 (0) VEA1 (0) KP01 (0) KP21 (0) KP21 (1) RP01 (1) SP01 (1) KN01</td> <td>SCN0 (0) SEA0 (1) SSN0 (0) SS10 (1) SS10 (1) SS10 (1) HSA0 (1) HSA0 (0) KP00 (0) KP20 (0) KP20 (0) KP20 (0) KP20 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) SSN0 SSN0 (0) SSN0 (0</td>	No	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -1 Vertical Window Address -2 Gamma Control 1 Gamma Control 3 Gamma Control 4	R.W W W W W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 0	D9 0 RP11 (0) RP11 0 KN11	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D7 0 SEA7 (1) SST7 (0) SS17 (1) SS17 (1) SS17 (1) SS17 (1) SS17 (1) VEA7 (1) VEA7 (0) 0 0 0 0 0 0 0	D6 0 SEA6 (1) SST6 (0) SST6 (0) SS16 (0) HEA6 (0) VEA6 (1) VSA6 (0) 0 0 0 0 0 0	D5 0 SEA5 (0) SST5 (0) SE15 (0) SS15 (0) VEA5 (0) VEA5 (0) 0 0 0 0 0 0 0	SCN4 (0) SEA4 (1) SST4 (0) SE14 (1) SS14 (0) HEA4 (0) HEA4 (0) VEA4 (1) VEA4 (1) VEA4 (0) O O O	SCN3 (0) SEA3 (1) SST3 (0) SST3 (0) SST3 (1) SST3 (1) HEA3 (1) HEA3 (1) VEA3 (0) VEA3 (0) VEA3 (0) KP23 (1) KP23 (1) RP34 (1) KP43 (1) KP4	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) VEA2 (0) VEA2 (0) VEA2 (0) VEA2 (0) KP22 (0) KP22 (0) RP22 (0) SCN2 (0) KP22 (0) KP22 (0) KP42 (0) KP42 (0) KP42 (0) KP42 (0) SCN2 (0) SCN2 (0) SST2 SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 SST2 (0) SST2 SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (1) SST1 (1) SST1 (1) HEA1 (1) HEA1 (1) VEA1 (0) VEA1 (0) KP01 (0) KP21 (0) KP21 (1) RP01 (1) SP01 (1) KN01	SCN0 (0) SEA0 (1) SSN0 (0) SS10 (1) SS10 (1) SS10 (1) HSA0 (1) HSA0 (0) KP00 (0) KP20 (0) KP20 (0) KP20 (0) KP20 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) SSN0 SSN0 (0) SSN0 (0
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BN13 BN12 BN11 BN10 BN03 BN02 BN0	No. 30h 31h 32h 32h 33h 55h 50h 51h 52h 53h 54h	Registers Name Gate Scan Centrol Vertical Scroll Centrol 1 Vertical Scroll Centrol 2 Vertical Scroll Centrol 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -2 Vertical Window Address -2 Gamma Centrol 1 Gamma Centrol 3 Gamma Centrol 4	RW W W W W W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 RP12 (0) RN12 (0)	D9 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 SEA7 (1) SSA7 (0) SS17 (0) SS17 (1) SS17 (0) HEA7 (1) HSA7 (0) VEA7 (0) VSA7 (0) 0 0 0 0 0 0 0 0 0 0 0 0 0	D6 0 SEA6 (1) SSA6 (0) SST6 (0) SS16 (0) HEA6 (0) VEA6 (1) VSA6 (0) 0 0 0 0 0 0 0 0 0 0	DS 0 SEA5 (0) SSA5 (0) SST5 (0) SS15 (0) HEA5 (1) HSA5 (0) VSA5 (0) 0 0 0 0 0 0 0 0 0 0	SCN4 (0) SEA4 (1) SST4 (0) SST4 (0) SST4 (0) SST4 (0) SST4 (0) SST4 (0) SST4 (0) VSA4 (0) VEA4 (0) VSA4 (0) O O O O O	SCN3 (0) SEA3 (1) SST3 (0) SST3 (0) SST3 (1) SST3 (1) HEA3 (1) HEA3 (1) VEA3 (0) VEA3 (0) VEA3 (0) KP23 (1) KP23 (1) KP23 (1) KP23 (1) KP4	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) SST2 (0) VEA2 (0) VEA2 (0) VEA2 (0) VEA2 (0) KP2 KP22 (0)	SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (1) SS11 (0) WEA1 (1) HEA1 (1) WEA1 (0) VEA1 (0) KP21 (0) KP21 (1) RP01 (1) KP2	SCN0 (0) SEA0 (1) SSA0 (0) SS10 (0) SS10 (1) SS10 (1) SS10 (1) SS10 (1) VEA0 (1) VEA0 (0) KP20 (0) KP20 (0) KP20 (0) KP40) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (0) KP40 (
	No. 30h 31h 32h 32h 33h 34h 36h 36h 36h 36h 57h 52h 53h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -2 Gamma Control 1 Gamma Control 3 Gamma Control 4 Gamma Control 5 Gamma Control 6	RW W W W W W W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D10 0	D9 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D7 0 SEA7 (0) SST7 (0) SE17 (1) SS17 (0) HEA7 (1) HSA7 (0) VEA7 (0) 0 0 0 0 0 0 0 0 0 0 0 0 0	D6 0 SEA6 (0) SSA6 (0) SSA6 (0) SE16 (1) SSA6 (0) SE16 (0) HEA6 (0) VEA6 (1) VSA6 (0) 0 0 0 0 0 0 0 0 0 0 0	D5 0 SEA5 (0) SSA5 (0) SS15 (0) SE15 (0) SE15 (0) SS15 (0) HEA5 (0) VEA5 (0) 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCN4 (0) SEA4 (1) SST4 (0) SE14 (0) SST4 (0) HEA4 (0) HSA4 (0) HSA4 (0) VEA4 (1) VEA4 (1) VEA4 (0) O O O O O O	SCN3 (0) SEA3 (1) SSA3 (0) SST3 (0) SS13 (1) SS13 (1) HEA3 (1) HEA3 (1) VEA3 (1) VEA3 (0) VEA3 (1) KP03 (1) RP03 (1) RP03 (1) RP03 (1) KN03 (1) KN03 (1) KN03 (1) KN23 (1) KN23	SCN2 (0) SEA2 (0) SST2 (0) SSS	SCN1 (0) SEA1 (1) SSA1 (0) SET1 (0) SST1 (1) (1) SST1 (1) HEA1 (1) HEA1 (1) VEA1 (1) VSA1 (0) KP21 (0) KP21 (0) KP21 (0) KP21 (0) KP41 (1) SP01 (1) SP01 (1) SP01 (1) SP01 (1) SP01 (1) SP01 (1) SP01 (1) SP01 (1) SP01 SP01 SP01 SP01 SP01 SP01 SP01 SP01	SCN0 (0) SEA0 (1) (1) SSA0 (0) (0) (1) (1) SS10 (1) (1) SS10 (1) SS10 (1) VEA0 (1) VEA0 (1) VEA0 (1) VEA0 (1) VEA0 (1) KP20 (0) KP20 () KP20 () KP20 () KP20 () KP20 () KP20 () KP20 () KP20 () KP20 () (
57h Gamma Control 8 W 1 0 0 0 0 (1) (0) (1) (0) 0 0 0 0 (0) (0) (0) (0)	No. 30h 31h 32h 32h 33h 34h 36h 36h 36h 36h 57h 52h 53h	Registers Name Gate Scan Control Vertical Scroll Control 1 Vertical Scroll Control 2 Vertical Scroll Control 3 Partial Driving Position -1 Partial Driving Position -2 Horizontal Window Address -1 Horizontal Window Address -2 Vertical Window Address -2 Gamma Control 1 Gamma Control 3 Gamma Control 4 Gamma Control 5 Gamma Control 6	RW W W W W W W W W W W W W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	рто 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	D9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 KP11 (0) KP51 (0) KN11 (0) KN51 (0)	D8 0 KN30 0 0	D7 0 SEA7 (0) SST7 (0) SE17 (1) SS17 (0) HEA7 (1) HSA7 (0) VEA7 (0) 0 0 0 0 0 0 0 0 0 0 0 0 0	D6 0 SEA6 (0) SSA6 (0) SSA6 (0) SE16 (1) SSA6 (0) SE16 (0) HEA6 (0) VEA6 (1) VSA6 (0) 0 0 0 0 0 0 0 0 0 0 0	D5 0 SEA5 (0) SSA5 (0) SS15 (0) SE15 (0) SE15 (0) SS15 (0) HEA5 (0) VEA5 (0) 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCN4 (0) SEA4 (1) SST4 (0) SE14 (0) SST4 (0) HEA4 (0) HSA4 (0) HSA4 (0) VEA4 (1) VEA4 (1) VEA4 (0) O O O O O O	SCN3 (0) SEA3 (1) SST3 (0) SST3 (0) SST3 (0) HEA3 (1) HEA3 (1) HEA3 (1) VEA3 (1) KP03 (0) KP03 (0) KP03 (1) KP4	SCN2 (0) SEA2 (0) SST2 (0) SST2 (0) SST2 (0) HEA2 (0) HEA2 (0) VSA2 (0) KP02 (0) KP02 (0) KP02 (0) KP02 (0) KP4 (0) KP42 () KP42 () KP42 (SCN1 (0) SEA1 (1) SSA1 (0) SST1 (0) SST1 (0) SST1 (0) HEA1 (1) HSA1 (0) HEA1 (1) VSA1 (0) KP01 (0) KP21 (0) KP41 (1) SP01 (0) KP41 (1) SP01 (0) KP41 (1) SP01 (0) KP41 (1) SP01 (0) KP41 (1) SP01 (0) KP41 (1) SP01 (1) SP01 (1) SP01 (1) SP01 SP01 (1) SP01 SP01 SP01 SP01 SP01 SP01 SP01 SP01	SCN0 (0) SEA4 (1) SSA4 (0) SST (SST (SST (SST (SST (SST (SST (SST

No.	Registers Name	RW	RS	D15	D14	D13	D12	D11	D10	D9	DB	D7	D6	D5	D4	D3	D2	D1	DO
58h	Gamma Control 9	w	1	0	0	0	VRP14 (0)	VRP13 (0)	VRP12 (1)	VRP11 (1)	VRP10 (1)	0	0	0	VRP04 (1)	VRP03 (0)	VRP02 (0)	VRP01 (0)	VRP00 (0)
59h	Gamma Control 10	w	1	0	0	0	VRN14 (0)	VRP13 (0)	VRP12 (1)	VRP11 (1)	VRP10 (1)	0	0	0	VRN04 (1)	VRN03 (0)	VRN02 (0)	VRN01 (0)	VRN00 (0)
60h	NV Memory Data Programming	w	1	0	0	0	o	0	0	0	0	NVM_ D7	NVM_ D6	NVM_ D5	NVM_ D4	NVM_ D3	NVM_ D2	NVM_ D1	NVM_
61h	NV Memory Control	w	1	0	0	0	0	0	0	0	VCM_	0	o	o	0	o	o	ID_PGM_ EN	VCM_ PGM_EN
62h	NV Memory Status	w	1	0	0	PGM_ CNT2	PGM_ CNT1	0	0	0	0	0	VCM_ D6	VCM_ D5	VCM_ D4	VCM_ D3	VCM_ D2	VCM_ D1	VCM_ D0
63h	NV Memory Protection Key	R		KEY 15	KEY 14	KEY 13	KEY 12	KEY 11	KEY 10	KEY 9	KEY 8	KEY 7	KEY 6	KEY 5	KEY 4	KEY 3	KEY 2	KEY 1	KEY
65h	ID Code	R		0	0	0	0	0	0	0	0	0	0	0	0	ID3	ID2	ID1	IDO
66h	SPI Read/Write Control	R		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	RWX (0)

10. AC Characteristics

Normal Write Mode (IOVCC = 1.65~3.3V, VCI=2.5~3.3V)

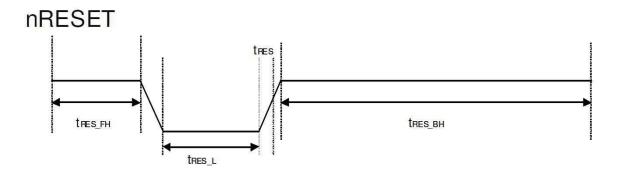
	Symbol	Unit	Min.	Max.	Test Condition	
Bus cycle time	Write		ns	66	-	-
Bus cycle time	Read	t _{CYCR}	ns	300	-	-
Write low-level pu	lse width	PWLW	ns	35	500	-
Write high-level p	ulse width	PW _{HW}	ns	35	-	-
Read low-level pu	lse width	PWLR	ns	150	-	-
Read high-level p	Read high-level pulse width		ns	150	-	
Write / Read rise /	fall time	t _{WRr} /t _{WRf}	ns	-	15	
Setup time	Write (RS to nCS, E/nWR)	tur	ns	10	-	
Setup time	Read (RS to nCS, RW/nRD)	t _{AS}		5	-	
Address hold time	9	t _{AH}	ns	5	-	
Write data set up time		t _{DSW}	ns	10	-	
Write data hold time		t _H	ns	15	-	
Read data delay time		t _{DDR}	ns	-	100	
Read data hold tin	ne	t _{DHR}	ns	5	-	



i80-System Bus Timing

Reset Timing	Charateristics	(IOVCC = 1.65)	~ 3.3V)
neset mining	onunuteristios	(10100 - 1.00	0.01)

Item	Symbol	Unit	Min.	Тур.	Max
Reset front high-levelwith	t _{RES_FH}	ms	1		
Reset low-level width	t _{RES_L}	us	10		
Reset back high-level width	t _{RES_BH}	ms	50		
Reset rise time	t _{rRES}	us			10



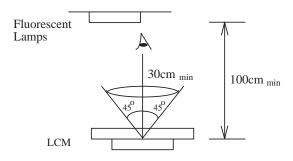
<u>11.Quality Specifications</u>

All The raw material are Rohs complicant.

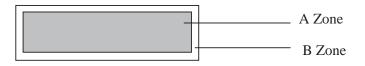
11.1 Standard of the product appearance test

Manner of appearance test: The inspection should be performed in using 20W x 2 fluorescent lamps. Distance between LCM and fluorescent lamps should be 100 cm or more. Distance between LCM and inspector eyes should be 30 cm or more.

Viewing direction for inspection is 45° from vertical against LCM.



Definition of zone:



A Zone: viewing area B Zone: outside viewing area

11.2 Specification of quality assurance

AQL inspection standard

Sampling method: MIL-STD-105E, Level II, single sampling

Defect classification (Note: * is not including)

Classify		Item	Note	AQL
Major	Display state	Short or open circuit		0.65
		LC leakage		
		Flickering	1	
		No display		
		Wrong viewing direction		
		Contrast defect (dim, ghost)	2	
		Back-light	1,8	
	Non-display	Flat cable or pin reverse	10	
		Wrong or missing component	11	
Minor	Display state	Background color deviation	2	1.0
		Black spot and dust	3	
		Line defect, Scratch	4	
		Rainbow	5	
		Chip	6	
		Pin hole	7	
	Polarizer	Protruded	12	
		Bubble and foreign material	3	
	Soldering	Poor connection	9	
	Wire	Poor connection	10	
	TAB	Position, Bonding strength	13	

Note on defect classification

No.	Item	Criterion			
1	Short or open circuit	Not allow			
	LC leakage				
	Flickering				
	No display				
	Wrong viewing direction				
	Wrong Back-light				
2	Contrast defect		Refe	r to approval sam	ple
	Background color deviation				
3	Point defect, Black spot, dust		7	Point Size	Acceptable Qty.
	(including Polarizer)	X	_	φ <u><</u> 0.10	Disregard
				0.10<∳≤0.20	3
	$\phi = (X+Y)/2$		_	0.20<∳≤0.25	2
	$\Psi = (2X + 1)/2$		_	0.25<∳≤0.30	1
				φ>0.30	0
		Unit: mm			
4	Line defect,				
		│ (· <u></u> · <u></u> w		Line	Acceptable Qty.
	Scratch	$ \leftrightarrow > $	L	W	
		L		0.02≥W	Disregard
			$4.0 \ge L$	$0.03 \ge W > 0.02$	2
			2.0≥L 1.0≥L	0.05≥W>0.03 0.1≥W>0.05	1
				0.1 <w< td=""><td>Applied as point defect</td></w<>	Applied as point defect
		Unit: mm			
5	Rainbow	Not more than two color changes across the viewing area.			

No	Item	Criterion
6	Chip Remark: X: Length direction	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
	Y: Short direction Z: Thickness direction t: Glass thickness W: Terminal Width	$\begin{array}{c c} X & Y \\ \hline \\ X & Y \\ \hline \\ Z \\ \end{array} \\ \begin{array}{c} X & Y \\ \hline \\ \hline \\ Z \\ \end{array} \\ \begin{array}{c} X & Y \\ \hline \\ \hline \\ \hline \\ Z \\ \end{array} \\ \begin{array}{c} X & Y \\ \hline \\ \hline \\ \hline \\ \hline \\ Z \\ \end{array} \\ \begin{array}{c} X & Y \\ \hline \\ \hline \\ \hline \\ \hline \\ Z \\ \end{array} \\ \begin{array}{c} X & Y \\ \hline \\$
		$\begin{array}{c c} X & Y & Z \\ \hline X & X &$
		$W_{\underline{y}} \xrightarrow{Y} \psi$ $X \xrightarrow{Y} Z$ $X \xrightarrow{Y} Z$ $Acceptable criterion$ $X \xrightarrow{Y} Z$ $Disregard \leq 0.2 \leq t$
		$\begin{array}{c c} & Y \\ & X \\ \hline \end{array} \begin{array}{c} Acceptable criterion \\ \hline \hline X \\ \leqslant 5 \\ \leqslant 2 \\ \hline \\ & \leqslant t/3 \\ \hline \end{array}$

No.	Item	Criterion		
7	Segment pattern W = Segment width $\phi = (X+Y)/2$	(1) Pin hole $\phi < 0.10$ mm is acceptable. X Point Size Acceptable Qty		
		$\begin{array}{c c} Y & \swarrow &$		
8	Back-light	 The color of backlight should correspond its specification. Not allow flickering 		
9	Soldering	 (1) Not allow heavy dirty and solder ball on PCB. (The size of dirty refer to point and dust defect) (2) Over 50% of lead should be soldered on Land. 		
10	Wire	 (1) Copper wire should not be rusted (2) Not allow crack on copper wire connection. (3) Not allow reversing the position of the flat cable. (4) Not allow exposed copper wire inside the flat cable. 		
11*	РСВ	(1) Not allow screw rust or damage.(2) Not allow missing or wrong putting of component.		

No	Item	Criterion
12	Protruded W: Terminal Width	$W_{\underline{y}}$ Acceptable criteria: $Y \le 0.4$
13	ТАВ	1. Position $H \xrightarrow{W} H \xrightarrow{W_1} H \xrightarrow{W_1} H \xrightarrow{W_1 \le 1/3W} H \le 1/3H$ 2 FPC bonding strength test $F \xrightarrow{F} FPC$
		P (=F/FPC bonding width) ≥650gf/cm ,(speed rate: 1mm/min) 5pcs per SOA (shipment)
14	Total no. of acceptable Defect	 A. Zone Maximum 2 minor non-conformities per one unit. Defect distance: each point to be separated over 10mm B. Zone It is acceptable when it is no trouble for quality and assembly in customer's end product.

11.3 Reliability of LCM

Reliability test condition:

Item	Condition	Time (hrs)	Assessment
High temp. Storage	60°C	48	
High temp. Operating	50°C	48	
Low temp. Storage	-10°C	48	No abnormalities
Low temp. Operating	0°C	48	in functions
Humidity	40°C/90%RH	48	and appearance
Temp. Cycle	$-10^{\circ}C \leftarrow 25^{\circ}C \rightarrow 60^{\circ}C$	10cycles	
	$(60 \min \leftarrow 5 \min \rightarrow 60 \min)$		

Recovery time should be 24 hours minimum. Moreover, functions, performance and appearance shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ($20\pm8^{\circ}C$), normal humidity (below 65% RH), and in the area not exposed to direct sun light.

11.4 Precaution for using LCD/LCM

LCD/LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

General Precautions:

- 1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.
- 2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isoproply alcohol, ethyl alcohol or trichlorotriflorothane, do not use water, ketone or aromatics and never scrub hard.
- 3. Do not tamper in any way with the tabs on the metal frame.
- 4. Do not made any modification on the PCB without consulting OD.
- 5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or

twisting. Elastomer contacts are very delicate and missing pixels could result from slight

dislocation of any of the elements.

- 6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.
- 7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

Static Electricity Precautions:

- 1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever he/she comes into contact with the module.
- 2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
- 3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.
- 4. The modules should be kept in anti-static bags or other containers resistant to static for storage.
- 5. Only properly grounded soldering irons should be used.
- 6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.
- 7. The normal static prevention measures should be observed for work clothes and working benches.
- 8. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

Soldering Precautions:

- 1. Soldering should be performed only on the I/O terminals.
- 2. Use soldering irons with proper grounding and no leakage.
- 3. Soldering temperature: $280^{\circ}C \pm 10^{\circ}C$
- 4. Soldering time: 3 to 4 second.
- 5. Use eutectic solder with resin flux filling.
- 6. If flux is used, the LCD surface should be protected to avoid spattering flux.
- 7. Flux residue should be removed.

Operation Precautions:

- 1. The viewing angle can be adjusted by varying the LCD driving voltage Vo.
- 2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.
- 3. Driving voltage should be kept within specified range; excess voltage will shorten display life.
- 4. Response time increases with decrease in temperature.
- 5. Display color may be affected at temperatures above its operational range.
- 6. Keep the temperature within the specified range usage and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.
- 7. For long-term storage over 40°C is required, the relative humidity should be kept below 60%, and avoid direct sunlight.

Limited Warranty

OD LCDs and modules are not consumer products, but may be incorporated by OD's customers into consumer products or components thereof, OD does not warrant that its LCDs and components are fit for any such particular purpose.

- The liability of OD is limited to repair or replacement on the terms set forth below. OD will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between OD and the customer, OD will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with OD general LCD inspection standard. (Copies available on request)
- 2. No warranty can be granted if any of the precautions state in handling liquid crystal display above has been disregarded. Broken glass, scratches on polarizer mechanical damages as well as defects that are caused accelerated environment tests are excluded from warranty.
- 3. In returning the LCD/LCM, they must be properly packaged; there should be detailed description of the failures or defect.