



冀雅（廊坊）电子有限公司

JIYA (LANGFANG) ELECTRONICS CO., LTD

模块产品规格书
SPECIFICATION FOR LCD MODULE

客户 COSTOMER	
产品型号 MODEL	JYG-24032010G(R)-KT9L2-VA

设 计 ORGANIZED BY	审 核 CHECKED BY	批 准 APPROVED BY
ChangXing Li	<i>ELON AN</i>	<i>Jungai Cheng</i>

公司地址：中国河北廊坊市经济技术开发区 2 号路 36 号 邮编：065001

COMPANY ADDRESS:

**No.36. ROAD No.2. LANGFANG ECONOMIC & TECHNICAL DEVELOPMENT
ZONE HEBEI CHINA.**

P.C: 065001

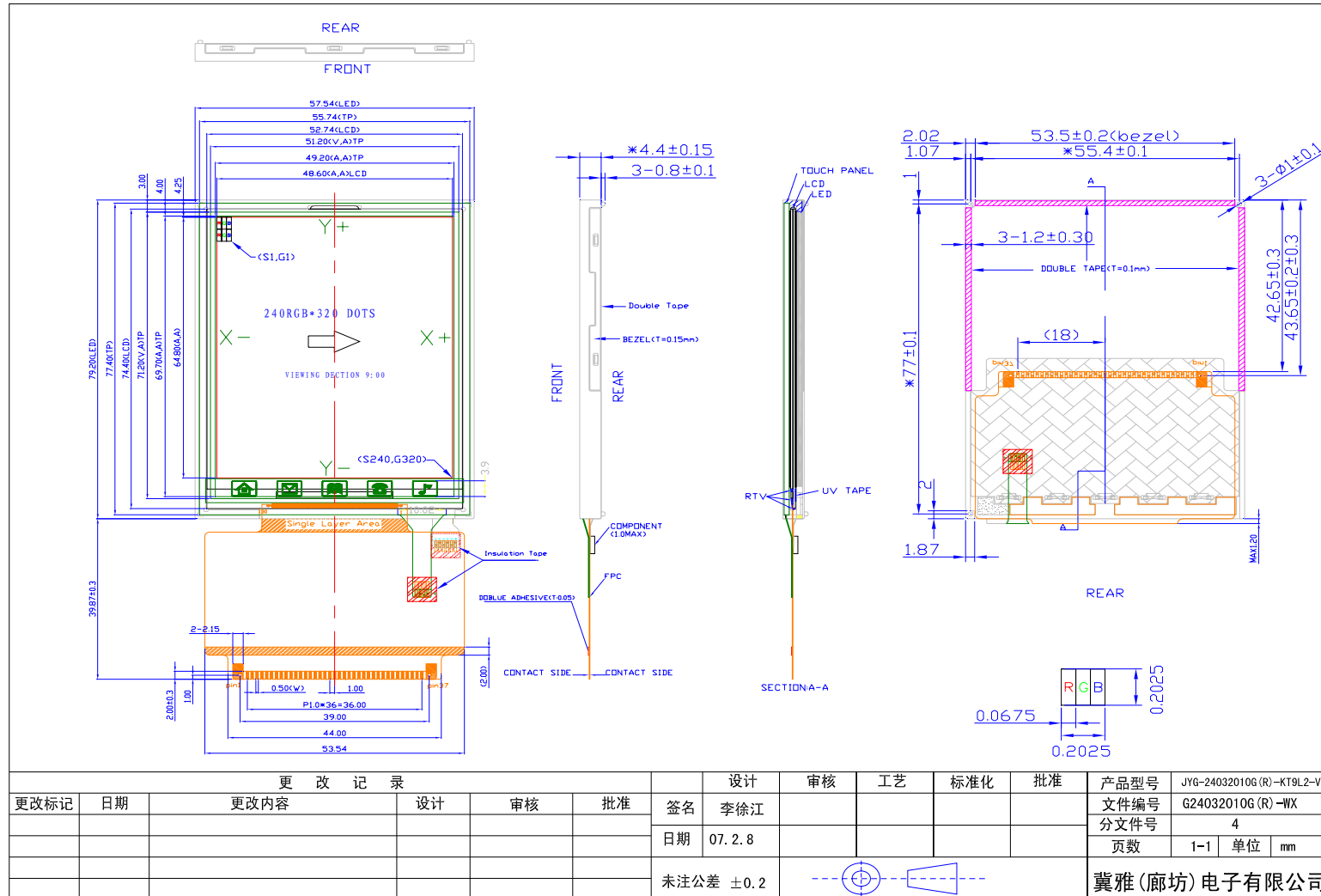
电话: 86-316-6063731

传真: 86-316-6063724

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1.LCM DRWING



2. GENERAL DESCRIPTION

MAIN TECHNIQS: COG
DISPLAY CONTENT: 240RGB*320 DOTS
DISPLAY TYPE: 262K COLORS-TFT-NEGATIVE-TRANSMISSIVE
DRIVER METHOD: 1/320Duty
VIEWING DIRECTION: 9:00
CONTROLLER: SSD1289Z
BACKLIGHT: LED COLOR-WHITE
OPEATING TEMPERATURE: -20℃-+70℃
STORAGE TEMPERATURE: -30℃-+80℃
REFERENCE DOCUMENTS : SSD1289Z datasheet

3. MECHANICAL SPECIFICATIONS

ITEM	CONTENT	UNIT
DOTS NUMBER	240(RGB)*320 DOTS	dots
MODULE DIMENSION	57.54(w)*119.07(h)*4.4(t)	mm
ACTIVE AREA	48.60(w)*64.80(h)	mm
PIXEL DIMENSION	0.2025(w)*0.2025(h)	mm

4. ELECTRO-OPTICAL CHARACTERISTICS

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Threshold voltage		V _{sat}	—	—	2.3	—	V	(5)
		V _{th}	—	—	1.46	—	V	
Transmittance		T(%)	—	—	7.28	—	—	
Contrast Ratio		CR	θ=0 Normal viewing angle	—	250	—	—	(1)(2)
Response time		T _R +T _F		—	25	—	msec	(1)(3)
Color gamut		S(%)			63%			(C-light)
Color chromaticity (CIE1931)	White	W _x		0.622	0.642	0.662		(1)(4) CF glass (C-light)
		W _y		0.309	0.329	0.349		
	Red	R _x		0.267	0.287	0.307		
		R _y		0.557	0.577	0.597		
	Green	G _x		0.115	0.135	0.155		
		G _y		0.083	0.103	0.123		
	Blue	B _x		0.292	0.312	0.332		
		B _y		0.313	0.333	0.353		
Viewing angle	Hor.	θ _L	CR>10	50	60	—		
		θ _R		30	40	—		
	Ver.	θ _U		50	60	—		
		θ _D		50	60	—		
Optima View Direction		9 O'clock						(6)

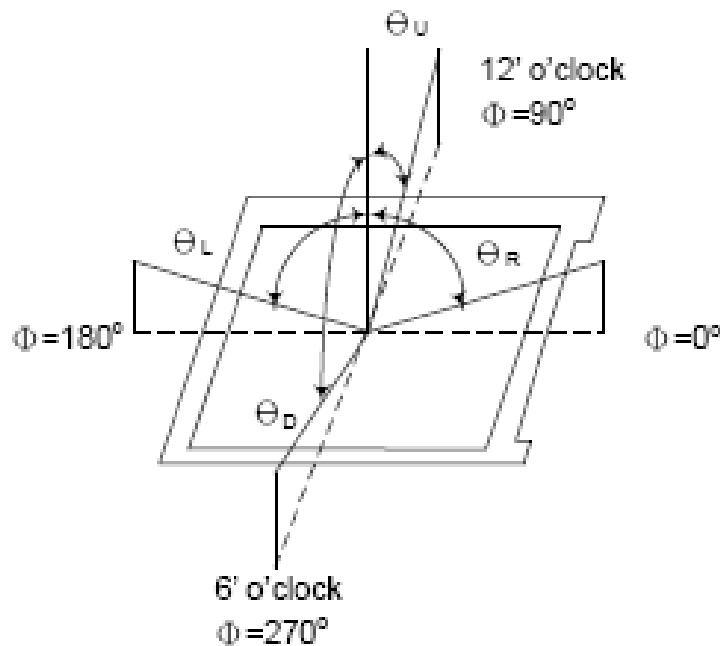
■ Measuring Condition

- Measuring surrounding: dark room
- Ambient temperature: 25±2°C
- 5min. warm-up time.

4.2 Measuring Equipment

- Otsuka Electric Corp., which utilized MCPD-3000 for Chromaticity and BM-5 for other optical characteristics.

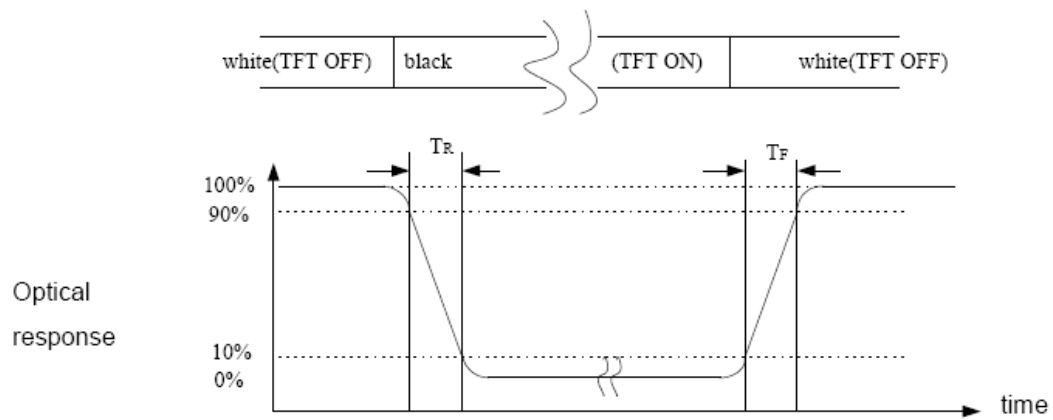
Note (1) Definition of Viewing Angle :



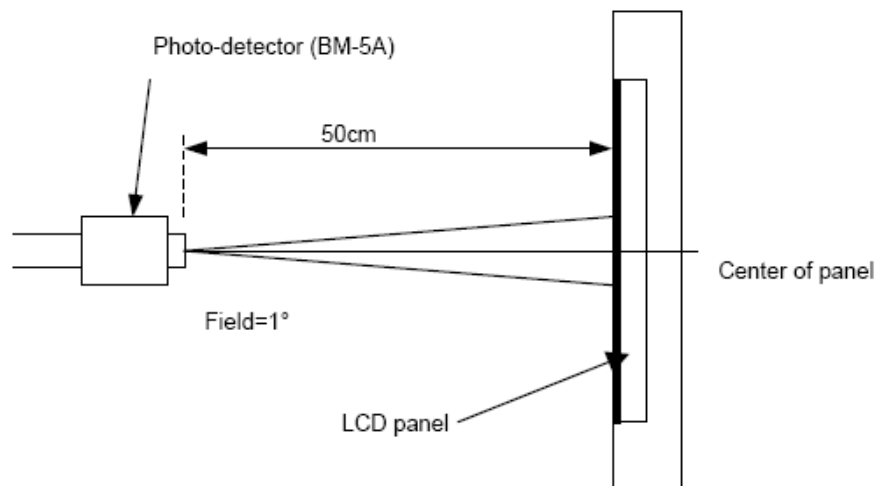
Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

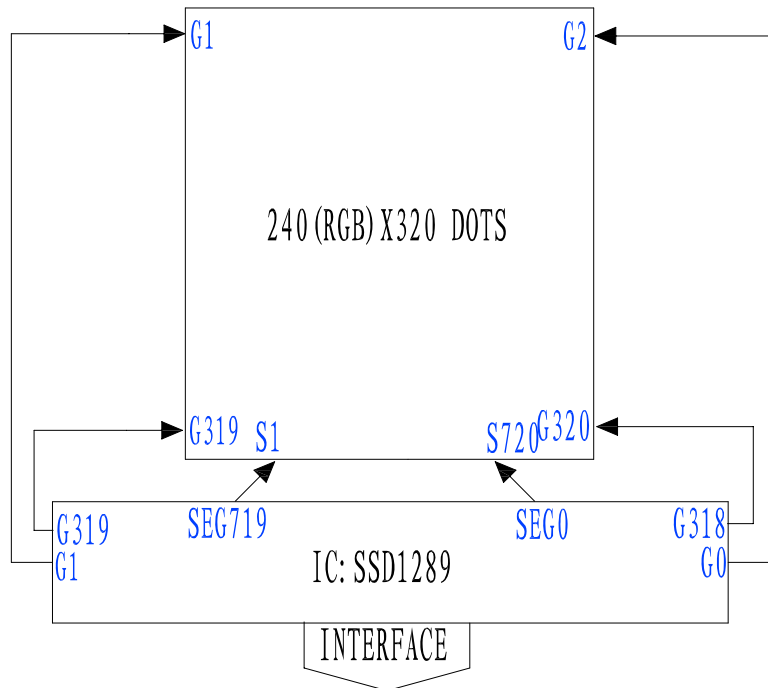
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



5.BLOCK DIAGRAM



6.ELECTRONIC CHARACTERISTICS

6.1 MAXIMUM VALUES

ITEM	SYMBOL	STANDARD VALUE		UNIT
		MIN	MAX	
Logic supply voltage	V _{DDIO}	-0.3	+4.0	V
	V _{DDEXT}	-0.3	+4.0	V
Input voltage	V _{CI}	V _{SS} -0.3	+5.0	V
Operating Temperature	T _{op}	-20	+70	°C
Storage Temperature	T _{st}	-30	+80	°C

6.2. DC CHARACTERISTICS

DC Characteristics (Unless otherwise specified, Voltage Referenced to V_{SS} , $V_{DDIO} = 1.65$ to $3.6V$, $T_A = -20$ to $70^\circ C$)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
VDDIO	Power supply pin of IO pins	Recommend Operating Voltage Possible Operating Voltage	1.4	-	3.6	V
VDDEXT	Auxiliary power supply pin for VDD	Recommend Operating Voltage Possible Operating Voltage	1.4	-	3.6	V
VCI	Booster Reference Supply Voltage Range	Recommend Operating Voltage Possible Operating Voltage	2.5 or VDDIO whichever is higher	-	3.6	V
VGH	Gate driver High Output Voltage Booster efficiency	No panel loading; 4x or 5x booster; ITO for CYP, CYN, VCIX2, VCI and VCHS = 10 Ohm	88	90	-	%
		No panel loading; 6x booster; ITO for CYP, CYN, VCIX2, VCI and VCHS = 10 Ohm	82	84	-	%
VCIX2	VCIX2 primary booster efficiency	No panel loading, ITO for CYP, CYN, VCIX2, VCI and VCHS = 10 Ohm	83	85	-	%
VGH	Gate driver High Output Voltage		9	-	15	V
VGL	Gate driver Low Output Voltage		-15	-	-7	V
VcomH	Vcom High Output Voltage		-	-	5	V
VcomL	Vcom Low Output Voltage		$-V_{CIM}+0.5$	-	-	V
VLCD63	Max. Source Voltage		-	-	5	V
$\Delta VLCD63$	Source voltage variation		-2	-	2	%
V _{OH1}	Logic High Output Voltage	I _{out} = -100 μ A	0.9*VDDIO	-	VDDIO	V
V _{OL1}	Logic Low Output Voltage	I _{out} =100 μ A	0	-	0.1*VDDIO	V
V _{IH1}	Logic High Input voltage		0.8*VDDIO	-	VDDIO	V
V _{IL1}	Logic Low Input voltage		0	-	0.2*VDDIO	V
I _{OH}	Logic High Output Current Source	V _{out} = V _{DDIO} -0.4V	50	-	-	μ A
I _{OL}	Logic Low Output Current Drain	V _{out} = 0.4V	-	-	-50	μ A
I _{OZ}	Logic Output Tri-state Current Drain Source		-1	-	1	μ A
I _{IL} /I _{IH}	Logic Input Current		-1	-	1	μ A
C _{IN}	Logic Pins Input Capacitance		-	5	7.5	pF
f _{DOTCLK}	DOTCLK frequency	Display is ON	1		8.22	MHz
R _{SON}	Source drivers output resistance		-	1	TBD	k Ω
R _{GON}	Gate drivers output resistance		-	500	TBD	Ω
R _{CON}	Vcom output resistance		-	200	TBD	Ω
I _{dp} (262k)	Display current for 262k	V _{ddio} =V _{ddext} = 1.8V, V _{ci} = 2.8V. 5x/-5x booster ratio. Full color current consumption, without panel loading	-	2.4	-	mA
I _{dp} (8 color)	Display current for 8 color mode	Current consumption for 8 color partial display, without panel loading	-	800	-	μ A
I _{slp}	Sleep mode current	Oscillator off, no source/gate output, Ram read write halt.	-	50	-	μ A

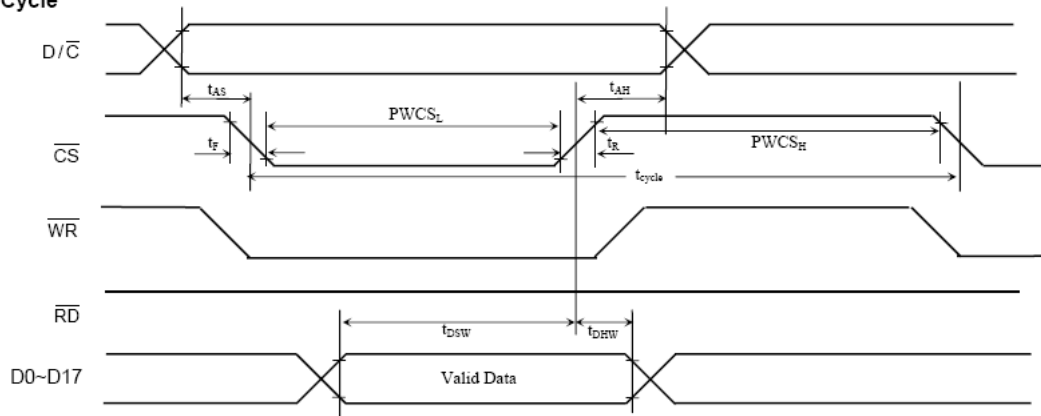
6.3 .TIMING CHARACTERISTICS

Parallel 8080-series Interface Timing Characteristics

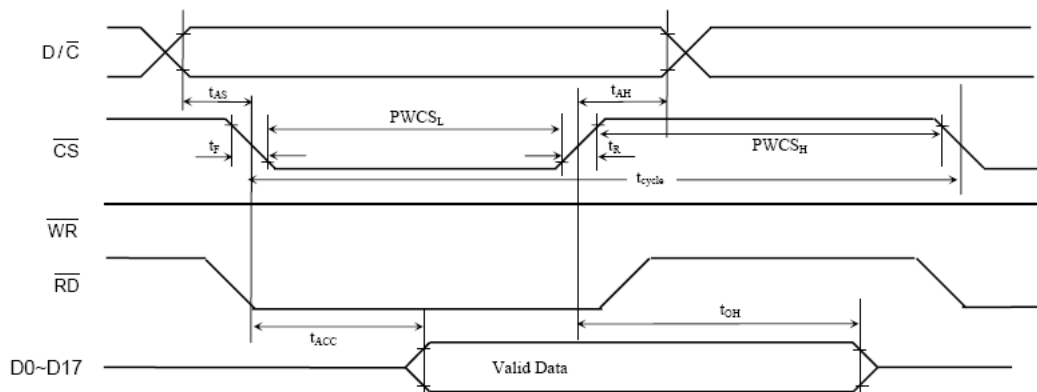
($T_A = -20$ to 70°C , $V_{DDIO} = 1.65\text{V}$ to 3.6V , $V_{DDEXT} = 1.65\text{V}$ to 1.95V , $\text{REGVDD} = 'L'$)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	100	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle)	1000	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Data Setup Time	5	-	-	ns
t_{DHW}	Data Hold Time	5	-	-	ns
t_{ACC}	Data Access Time	250	-	-	ns
t_{OH}	Output Hold time	100	-	-	ns
PWCS_L	Pulse Width /CS low (write cycle)	50	-	-	ns
PWCS_H	Pulse Width /CS high (write cycle)	50	-	-	ns
PWCS_L	Pulse Width /CS low (read cycle)	500	-	-	ns
PWCS_H	Pulse Width /CS high (read cycle)	500	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

Write Cycle



Read Cycle



7. PINS DESCRIPTION

Pin No.	Symbol	Description
1	GND	Ground
2	VDD	Power supply(2.8V)
3	VDD	Power supply(2.8V)
4	CS	L:Chip Selected H:Chip Unselected
5	RS	L:Command;H:display data
6	WR	I80 system:Serves as a write
7	RD	I80 system:Serves as a read signal
8	RESET	L: initialization is executed
9-24	DB0-DB15	Data Bus
25	GND	Ground
26	Y-	Touch screen Y -
27	X-	Touch screen X -
28	Y+	Touch screen Y +
29	X+	Touch screen X +
30	LED-1	Backlight LED cathode(K1)
31	LED-2	Backlight LED cathode(K2)
32	LED-3	Backlight LED cathode(K3)
33	LED-4	Backlight LED cathode(K4)
34	LED-5	Backlight LED cathode(K5)
35	LEDA	Backlight LED anode
36	LEDA	Backlight LED anode
37	GND	Ground

8. INSTRUCTION DESCRIPTION

Reg#	Register	R/W	D/C	IB15	IB14	IB13	IB12	IB11	IB10	IB9	IB8	IB7	IB6	IB5	IB4	IB3	IB2	IB1	IB0
R	Index	0	0	0	0	0	0	0	0	0	0	ID7	ID6	ID5	ID4	ID3	ID2	ID1	ID0
SR	Status Read	1	0	L7	L6	L5	L4	L3	L2	L1	L0	0	0	0	0	0	0	0	0
R00h	Oscillation Start (0000h)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OSCEN
R01h	Driver output control [0XXX][X0X1]3F	0	1	0	RL	REV	CAD	BGR	SM	TB	MUX8	MUX7	MUX6	MUX5	MUX4	MUX3	MUX2	MUX1	MUX0
R02h	LCD drive AC control (0000h)	0	1	0	0	0	FLD	ENWS	B/C	ECR	WSMD	NW7	NW6	NW5	NW4	NW3	NW2	NW1	NW0
R03h	Power control (1) GAMAS[2:0] = 000, 100 262K color (RGB444)	0	1	DCT3	DCT2	DCT1	DCT0	BT2	BT1	BT0	0	DC3	DC2	DC1	DC0	AP2	AP1	AP0	0
	GAMAS[2:0] = 001, 101 262K color (RGB444)			0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	0
	GAMAS[2:0] = 010, 110 262K color (RGB444)			0	1	1	0	0	0	1	0	0	1	1	0	0	1	0	0
	GAMAS[2:0] = 011, 111 262K color (RGB444)			0	1	1	0	0	1	0	0	0	1	1	0	0	1	0	0
	All GAMAS[2:0] setting 8 color (BGR444)			0	1	1	0	1	0	1	0	0	1	1	0	0	1	0	0
R05h	Compare register (1) (0000h)	0	1	CPR5	CPR4	CPR3	CPR2	CPR1	CPR0	0	0	CPR6	CPR4	CPR3	CPR2	CPR1	CPR0	0	0
R06h	Compare register (2) (0000h)	0	1	0	0	0	0	0	0	0	0	CPR5	CPR4	CPR3	CPR2	CPR1	CPR0	0	0
R07h	Display control (0000h)	0	1	0	0	0	PT1	PT0	VLE2	VLE1	SPT	0	0	GCN	DTE	CM	0	D1	D0

R0Bh	Frame cycle control (5308h)	0	1	NO1	NO0	SDT1	SDT0	0	EQ2	EQ1	EQ0	DIV1	DIV0	SDIV	SRTN	RTN3	RTN2	RTN1	RTN0
R0Ch	Power control (2) (0004h)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R0Dh	Power control (3) GAMAS[2:0] = 000, 100 (0006h) GAMAS[2:0] = 001, 101 (000Ah) GAMAS[2:0] = 010, 110 (000Ch) GAMAS[2:0] = 011, 111 (000Eh)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	VRH3	VRH2	VRH1	VRH0
R0Eh	Power control (4) GAMAS[2:0] = 000, 100 (3200h) GAMAS[2:0] = 001, 101 (2C00h) GAMAS[2:0] = 010, 110 (320Ch) GAMAS[2:0] = 011, 111 (320Eh)	0	1	0	0	VCOM3	VDV4	VDV3	VDV2	VDV1	VDV0	0	0	0	0	0	0	0	0
ROFh	Gate scan start position (0000h)	0	1	0	0	0	0	0	0	0	SCN8	SCN7	SCN6	SCN5	SCN4	SCN3	SCN2	SCN1	SCN0
R10h	Sleep mode (0001h)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SLP
R11h	Entry mode (6830h)	0	1	VS mode	DFM1	DFM0	TRANS	CEDef	WMode	DMode1	DMode0	TY1	TY0	ID1	ID0	AM	LG2	LG1	LG0
R16h	Horizontal Porch (EF1Ch)	0	1	XL7	XL6	XL5	XL4	XL3	XL2	XL1	XL0	HBP7	HBP6	HBP5	HBP4	HBP3	HBP2	HBP1	HBP0
R17h	Vertical Porch (D103h)	0	1	VFP7	VFP6	VFP5	VFP4	VFP3	VFP2	VFP1	VFP0	VBP7	VBP6	VBP5	VBP4	VBP3	VBP2	VBP1	VBP0

(continued)

Reg#	Register	R/W	D/C	IB15	IB14	IB13	IB12	IB11	IB10	IB9	IB8	IB7	IB6	IB5	IB4	IB3	IB2	IB1	IB0
R1Eh	Power control (5) GAMAS[2:0] = 000, 100 (0020h) GAMAS[2:0] = 001, 101 (0024h) GAMAS[2:0] = 010, 110 (002Fh) GAMAS[2:0] = 011, 111 (0031h)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R22h	RAM data write RAM data read	0	1	Data[17:0] mapping depends on the interface setting															
R23h	RAM write data mask (1) (0000h)	0	1	WMR5	WMR4	WMR3	WMR2	WMR1	WMR0	0	0	WMG5	WMG4	WMG3	WMG2	WMG1	WMG0	0	0
R24h	RAM write data mask (2) (0000h)	0	1	0	0	0	0	0	0	0	0	WMB5	WMB4	WMB3	WMB2	WMB1	WMB0	0	0
R25h	Frame Frequency (8000h)	0	1	OSC3	OSC2	OSC1	OSC0	0	0	0	0	0	0	0	0	0	0	0	0
R28h	VCOM OTP (000Ah)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
R29h	VCOM OTP (80C0h)	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
R30h	γ control (1)	0	1	0	0	0	0	0	PKP12	PKP11	PKP10	0	0	0	0	0	PKP02	PKP01	PKP00
R31h	γ control (2)	0	1	0	0	0	0	0	PKP32	PKP31	PKP30	0	0	0	0	0	PKP22	PKP21	PKP20
R32h	γ control (3)	0	1	0	0	0	0	0	PKP52	PKP51	PKP50	0	0	0	0	0	PKP42	PKP41	PKP40
R33h	γ control (4)	0	1	0	0	0	0	0	PRP12	PRP11	PRP10	0	0	0	0	0	PRP02	PRP01	PRP00
R34h	γ control (5)	0	1	0	0	0	0	0	PKN12	PKN11	PKN10	0	0	0	0	0	PKN02	PKN01	PKN00
R35h	γ control (6)	0	1	0	0	0	0	0	PKN32	PKN31	PKN30	0	0	0	0	0	PKN22	PKN21	PKN20
R36h	γ control (7)	0	1	0	0	0	0	0	PKN52	PKN51	PKN50	0	0	0	0	0	PKN42	PKN41	PKN40
R37h	γ control (8)	0	1	0	0	0	0	0	PRN12	PRN11	PRN10	0	0	0	0	0	PRN02	PRN01	PRN00
R3Ah	γ control (9)	0	1	0	0	0	VRP14	VRP13	VRP12	VRP11	VRP10	0	0	0	0	VRP03	VRP02	VRP01	VRP00
R3Bh	γ control (10)	0	1	0	0	0	VRN14	VRN13	VRN12	VRN11	VRN10	0	0	0	0	VRN03	VRN02	VRN01	VRN00

R41h	Vertical scroll control (1) (0000h)	0	1	0	0	0	0	0	0	0	VL16	VL17	VL16	VL15	VL14	VL13	VL12	VL11	VL10
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R42h	Vertical scroll control (2) (0000h)	0	1	0	0	0	0	0	0	0	VL26	VL27	VL26	VL25	VL24	VL23	VL22	VL21	VL20
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R44h	Horizontal RAM address position (EF00h)	0	1	HEA7	HEA6	HEA5	HEA4	HEA3	HEA2	HEA1	HEA0	HSA7	HSA6	HSA5	HSA4	HSA3	HSA2	HSA1	HSA0
				1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0
R45h	Vertical RAM address start position (0000h)	0	1	0	0	0	0	0	0	0	VSA8	VSA7	VSA6	VSA5	VSA4	VSA3	VSA2	VSA1	VSA0
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R46h	Vertical RAM address end position (013Fh)	0	1	0	0	0	0	0	0	0	VEA8	VEA7	VEA6	VEA5	VEA4	VEA3	VEA2	VEA1	VEA0
				0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1
R48h	First window start (0000h)	0	1	0	0	0	0	0	0	0	SE16	SE17	SE16	SE15	SE14	SE13	SE12	SE11	SE10
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R49h	First window end (013Fh)	0	1	0	0	0	0	0	0	0	SE16	SE17	SE16	SE15	SE14	SE13	SE12	SE11	SE10
				0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1
R4Ah	Second window start (0000h)	0	1	0	0	0	0	0	0	0	SE26	SE27	SE26	SE25	SE24	SE23	SE22	SE21	SE20
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R4Bh	Second window end (013Fh)	0	1	0	0	0	0	0	0	0	SE26	SE27	SE26	SE25	SE24	SE23	SE22	SE21	SE20
				0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1
R4Eh	Set GDDRAM X address counter (0000h)	0	1	0	0	0	0	0	0	0	XAD7	XAD6	XAD5	XAD4	XAD3	XAD2	XAD1	XAD0	
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R4Fh	Set GDDRAM Y address counter (0000h)	0	1	0	0	0	0	0	0	0	YAD6	YAD7	YAD6	YAD5	YAD4	YAD3	YAD2	YAD1	YAD0
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: In R01h, bits REV, CAD, BGR, TB, RL, CM will override the corresponding hardware pins settings.

9. BACKLIGHT PARAMETERS

(除非特别说明,环境温度 T=25° Unless specified,The Ambient temperature T=25°C)

项目 Item	符号 Symbol	最小值 min.	典型值 typ.	最大值 max.	单位 Unit	条件 Condition
正向电压 Forward Voltage	Vf	3.0	3.3	3.6	V	If= 90 mA T=25°C
反向电流 Reverse Current	Ir			2500	μA	
色度坐标值 Chromaticity Coordinates Ranks:	X Y	0.26 0.26		0.31 0.31		
亮度 Luminance	Lv Main Lv Sub.	3600	4000		cd/m ²	Vr= 0.8 V
均匀性 Unifromity	△	80%				MIN/MAX*100%
工作温度 Operating Temperature Range		Topr		-30~+70°C °C		
贮存温度 Storage Temperature Range		Tstg		-40~+80°C °C		

10. PRODUCT QUALITY & RELIABILITY

10.1 Standard for Quality Test

10.1.1 Inspection :

Before delivering, the supplier should take the following tests, and affirm the quality of product.

10.1.2 Electro-Optical Characteristics:

According to the individual specification to test the product.

10.1.3 Test of Appearance Characteristics:

According to the individual specification to test the product.

10.1.4 Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

10.1.5 Delivery Test:

Before delivering, the supplier should take the delivery test.

A. Test method: According to MIL-STD-105E, General Inspection Level II take a single time.

B. The defects classify of AQL as following:

Major defect: AQL=0.65

Minor defect: AQL=2.5

Total defects: AQL=2.5

10.2 Standard for inspection

10.2.1 Manner of appearance test:

a. The test must be under a 40W fluorescent light, and the distance of view must be at 30 cm.

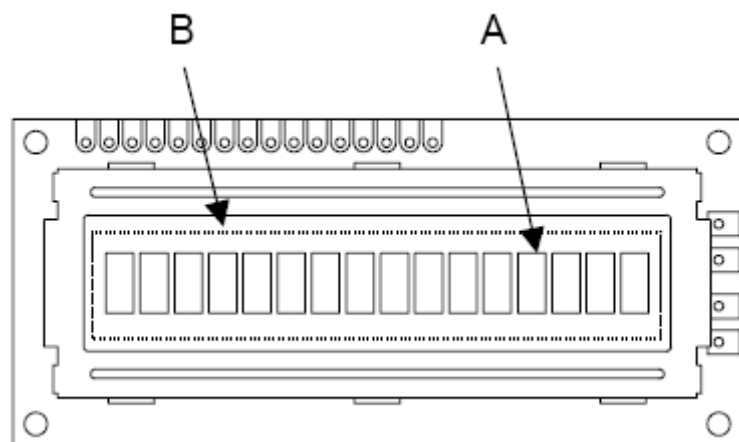
b. When test the model of transmissive product must add the reflective plate.

c. The test direction is base on about around 45° of vertical line.

10.2.2 Definition of area: B A

A Area : Viewing area.

B Area : Out of viewing area.(Outside viewing area)



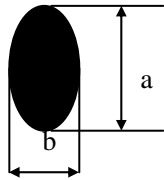
10.2.3 Basic principle:

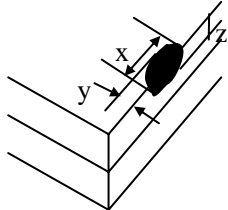
A. In principle the defect out of Area A should be acceptable if the defect does not affect assemblage and the quality of productions.

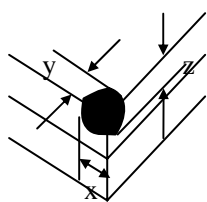
- B. If defects that can not describe clearly, acceptable samples will be the standard.
 C. The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
 D. Must add new item on time when it is necessary.

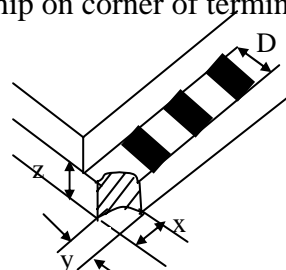
10.2.4 Standard of inspection

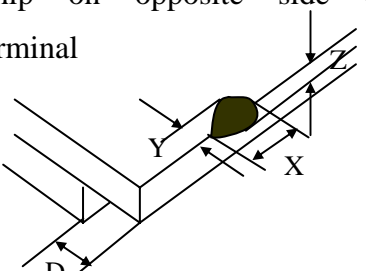
Defect	Inspect item	Criteria
1 Minor	Scratch and fold on polarizer. Scratch on glass. Glass fiber etc. (by bare eyes, defect outside viewing area is acceptable)	length ignore width $\leq 0.03\text{mm}$ acceptable

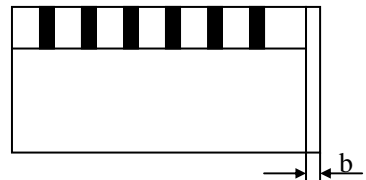
Defect	Inspect item	Criteria
2 Minor	Chip on glass(round type) Chip on polarizer(round type) Air bubble between polarizer and glass  $\Phi = (a + b) / 2$	$\Phi \leq 0.5\text{mm}$ acceptable $0.5 < \Phi \leq 0.7\text{mm}$ two are acceptable $\Phi > 0.7\text{mm}$ reject 1.The distance between any two dots should be more than 5mm. 2.Defect outside viewing area is acceptable. 3.If the air bubble is black, it can be judged as black spot.

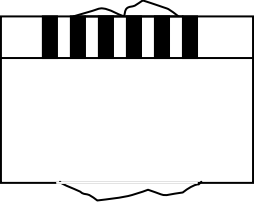
Defect	Inspect item	Criteria
3 Minor	Chip out  a: LCD length x: length y: width z: thickness	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x \geq 5\text{mm}$ reject $z < 2/3t, y \geq s$ reject $z \geq 2/3t, y \geq 1/3s$ reject t: glass thickness. S: distance between glass edge and inside of edge sealing

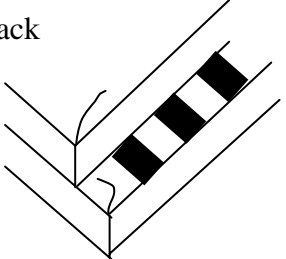
Defect	Inspect item	Criteria
4 Minor	Chip on corner of neat edge  X: length Y: width S: width of edge sealing	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x \geq 5\text{mm}$ reject $x > S * 2/3, x > S * 2/3$ reject z: ignore any chip exposes the silver dot reject

Defect	Inspect item	Criteria
5 Minor	Chip on corner of terminal edge  D: terminal length	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x \geq 5\text{mm}$ reject y, z: ignore

Defect	Inspect item	Criteria
6 Minor	Chip on opposite side of terminal  D: terminal length	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x > 5\text{mm}$ reject $y > 1/2D$ reject $z > 1/2t, y > 1/4D$ reject D: terminal length

Defect	Inspect item	Criteria
7 Minor	Cutting/breaking defect (flare)  b	Dimension not meet the drawing specification reject $b \geq 0.3\text{mm}$ reject

Defect	Inspect item	Criteria
8 Major	Cutting/breaking defect (flare) 	According to the dimension of drawing

Defect	Inspect item	Criteria
9 Major	Crack 	Any crack trend to extend reject

Defect	Inspect item	Criteria
10 Minor	Black spot, air bubble, stain, white spot (defect outside viewing area is acceptable) $\phi = (\text{length} + \text{width}) / 2$	$\phi \leq 0.1\text{mm}$ acceptable $0.1\text{mm} < \phi \leq 0.20\text{mm}$ two are acceptable $0.2\text{mm} < \phi \leq 0.25\text{mm}$ one are acceptable $\phi > 0.25\text{mm}$ reject the distance between two spots $> 5\text{mm}$

Defect	Inspect item	Criteria
11 Major	Liquid leakage, open sealant	reject

Defect	Inspect item	Criteria
12 Minor	Rainbow	According to samples

Defect	Inspect item	Criteria
13 Major	Display type not meet the requirement	According to samples

Defect	Inspect item	Criteria
14 Major	FPC、TCP、FLEX are broken or not connected firmly	reject

Defect	Inspect item	Criteria
15 Major	The component on PCB is missing ,soldered unfirmly or bridged	reject

Defect	Inspect item	Criteria
16 Minor	The soldering tin of pinouts is not enough	A. The height of soldering tin in though-holes is 1/2 less than the height of PCB looked down from the component side reject B. The width of soldering tin on pads around the though-hole is 2/3 less than the width of pad reject

Defect	Inspect item	Criteria
17 Minor	The soldering tin of pinouts overflows	The distance between pieces of soldering tin is less than 0.2 mm reject

Defect	Inspect item	Criteria
18 Minor	The soldering tin of SMT is not enough	The height that soldering tin covers the bump of SMT component is 1/2 less than the height of bump reject

Defect	Inspect item	Criteria
19 Minor	The soldering tin of SMT overflows	The soldering tin covers whole bump reject

Defect	Inspect item	Criteria
20 Minor	The component is broken	reject

Defect	Inspect item	Criteria
21 Minor	The shape of pinouts is not the same as that in the criterion	It makes the LCM work badly reject

Defect	Inspect item	Criteria
22 Mjor	The pinout is broken	reject

Defect	Inspect item	Criteria
23 Minor	The paint falls off the frame or the frame is damaged	$\Phi > 1.0\text{mm}$ reject $\Phi = (\text{length} + \text{width}) / 2$

Defect	Inspect item	Criteria
24 Minor	The frame is scratched visibly	Length ignore Width $\leq 0.5\text{mm}$ reject

Defect	Inspect item	Criteria
25 Minor	The frame is rusted (accumulation)	When the shape is as dot, reference to defect 23 When the shape is as line, reference to defect 24

Defect	Inspect item	Criteria
26 Major	The foot of frame is broken or can not be fixed	reject

Defect	Inspect item	Criteria
27 Minor	The copper on PCB is damaged	A. the track or pad is borken reject

Defect	Inspect item	Criteria
28 Minor	Paste layer falls off	When the shape is as dot,reference to defect 23 When the shape is as line,reference to defect 24

Defect	Inspect item	Criteria
29 Major	The bolt is missed	reject

Defect	Inspect item	Criteria
30 Minor	The bolt is not hard up	reject

Defect	Inspect item	Criteria
31 Major	No function	reject

Defect	Inspect item	Criteria
32 Major	Some row or column is absent	reject

Defect	Inspect item	Criteria
33 Major	The frame is absent	reject

Defect	Inspect item	Criteria
34 Major	The LCM can not follow the program	reject

Defect	Inspect item	Criteria
35 Minor	Some row or column displays more heavily or lightly than others in the same frame	Reference to the sample

Defect	Inspect item	Criteria
36 Minor	The display is not equality	Reference to the sample

Defect	Inspect item	Criteria
37 Major	Pattern not meet the drawing specification	reject

Defect	Inspect item	Criteria
38 Major	Deformation	reject

Defect	Inspect item	Criteria
39 Minor	Black dots or white dots in viewing area	reference to defect 23 or the sample

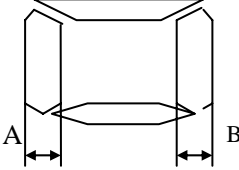
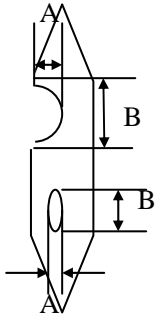
Defect	Inspect item	Criteria
40 Minor	Black lines or white lines in viewing area	reference to defect 1

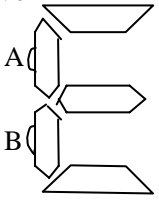
Defect	Inspect item	Criteria
41 Major	Wrong viewing direction	reject

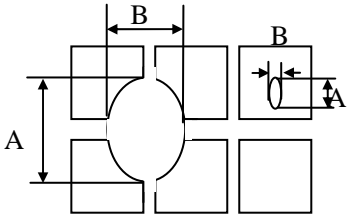
Defect	Inspect item	Criteria
42 Major	Operating current upper the specification	reject

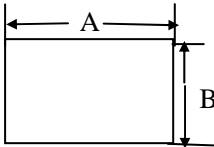
Defect	Inspect item	Criteria
43 Major	The backlight can not light	reject

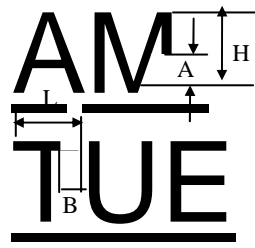
Defect	Inspect item	Criteria
44 Minor	The backlihg is not equality	Reference to the sample

Defect	Inspect item	Criteria
45 Minor	Shape of pattern  W: width of pattern	$ A-B > 1/3W$ reject $ A-W > 1/3W$ reject $ A-B > 0.25mm$ reject
Defect	Inspect item	Criteria
46 Minor	pinhole  W: width of character	$\phi < 0.2mm$ acceptable $0.2mm < \phi \leq 0.25mm$ three are acceptable (distance between two spots should be more than 20mm) $\phi > 0.25mm$ or $\phi > 1/3W$ reject

Defect	Inspect item	Criteria
47 Minor	Concave  $\phi = 1/2 (\text{length} + \text{width})$	$\phi > 0.25mm$ or $1/3W$ reject

Defect	Inspect item	Criteria
48 Minor	Pinhole in pixels  $\Phi = (A+B) / 2$	Reference to defect 10

Defect	Inspect item	Criteria
49 Minor	Pixel deformation 	A: Quantity of deformation>25% reject B: Quantity of deformation>25% reject

Defect	Inspect item	Criteria
50 Minor	Pinhole in character 	Vertical: $A > 1/4H$ reject Horizontal: $B > 1/3L$ reject

10.3RELIABILITY

ITEM	CONDITION
High temperature operation	70 °C , 96 hrs
Low temperature operation	-20 °C , 96 hrs
Moisture storage	60 °C , 90%RH, 96 hrs
High temperature storage	80 °C , 96 hrs
Low temperature storage	-30 °C , 96 hrs
Thermal shock	-30 °C (30 minute) 25 °C (5 minute) 80 °C (30 minute) CYCLES: 10
LIFE TIME	50,000 hours, 25±10℃, 45±20% RH

11.PRECAUTIONS IN USING

11.1 Liquid crystal display (LCD)

The LCD panel is made up of glass, organic fluid and polarizer. When handling, please pay attention to the following items:

- 1) Keep the operation and storage temperature of the LCD within the range specified in the LCD specification. Otherwise, excessive temperature and humidity would cause polarization degradation, bubble generation or polarizer peel-off.
- 2) Prevent it from mechanical shock by dropping it from a high place, etc.
- 3) Don't contact, push or rub the exposed polarizers with anything harder than HB pencil lead.
- 4) Avoid using chemicals such as acetone, toluene, ethanol and isoropylalcohol to clean the front/rear polarizers and reflectors, which will cause damage to them.
- 5) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause deformation or color fading. The LCM is assembled and adjusted with a high degree of precision.
- 6) Do not put or attach anything on the display area. Avoid touching the display area with bare hand.

11.2 Precaution for handling LCD modules

The LCM is assembled and adjusted with a high degree of precision, do not applying excessive shocks to it or making any alterations or modifications to it, the following precautions should be taken when handing.

- 1) Do not drop, bend or twist the module.
- 2) Do not alter or making any modification on the shape of the metal frame.
- 3) Do not change the shape, the pattern wiring or add any extra hole on the PCB.
- 4) Do not modify or touch the zebra rubber strip(conductive rubber) with another object.
- 5) Do not change the positions of components on the PCB.

11.3 Eletro-static discharge control

Careful attention should be paid to control the electrostatic discharge of the modules, since the modules contain no. of CMOS LSI.

- 1) Make sure you are grounded properly when remove the module from its antistatic bag. Be sure that the module and have the same electric potential.
- 2) Only properly grounded soldering iron should be used.
- 3) Modules should be stored in antistatic bag or other containers resistant to static after remove from its original package.
- 4) When using the electric screw-driver is used, make sure the screw driver had been ground potentiality to minimize the transmission of EM wave produced by commutator sparks.
- 5) In order to reduce the generation of static electricity, a relative humidity of 50-60% is recommended.

11.4 Precaution for soldering

- 1) Soldering should apply to I/O terminals only.
- 2) Soldering temperature is $280^{\circ}\text{C}+(-)10^{\circ}\text{C}$.
- 3) Soldering time 3-4 seconds.
- 4) Eutectic solder (rosin flux filled) should be used.
- 5) If soldering flux is used, be sure to remove any remaining flux after finishing the soldering operation and LCD surface should be covered during soldering to prevent any damage to flux spatters.
- 6) When remove the lead wires from the I/O terminals, use proper de-soldering methods, e.g. suction type de-soldering irons. Do not repeat wiring by soldering more than three times at the pads and plated though holes may be damaged.

11.5 Precaution for operation

- 1) Adjust liquid crystal driving voltage (V_o) to varies viewing angle and obtain the contrast.
- 2) V_o should be kept in proper range stated in the specification. Excess voltage will shorten the LCD life.
- 3) Response time is greatly delayed at low temperature. It will recover when go back to normal temperature.
- 4) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore it should be used under the relative condition of 50% RH.

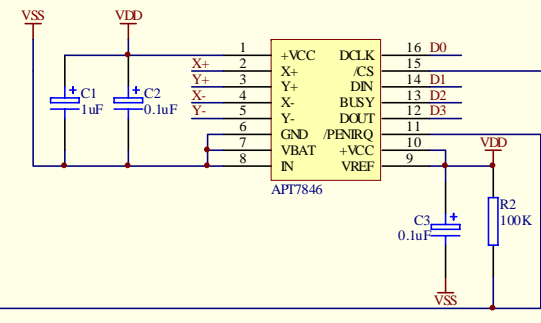
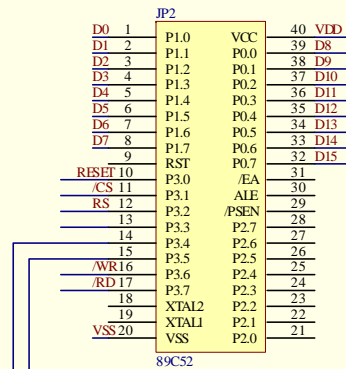
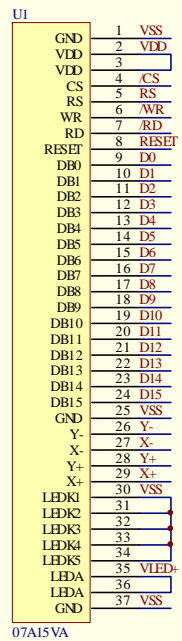
11.6 Storage

When long term storage is required, following precautions are necessary:

- 1) Storage them in a sealed polyethylene bag (antistatic), seal the opening, and store it where it is not subjected to direct sunshine, or to the light of fluorescent lamp. If properly sealed, there is no need for desiccant.
- 2) Store them in the temperature range of $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$ and at low humidity is recommended.

12. APPLICATION

12.1 REFERENCE CIRCUIT



Title		
Size	Number	Revision
A4		
Date:	15-Mar-2007	Sheet of
File:	C:\Documents and Settings\lex\桌面\07A15VA\07A15VA.ddb	07A15VA.ddb

12.2 APPENDIX

INITIALIZATION FOR REFERENCE (MPU: AT89C52):

INITIAL: MOV REG,#07H

LCALL BWRCTRL

MOV DATH,#00H

MOV DATL,#21H

LCALL BWRCMD

MOV REG,#00H ;register Select (R00H)

LCALL BWRCTRL

MOV DATH,#00H ;Oscillation Start

MOV DATL,#01H

LCALL BWRCMD

mov time1,#80

lcall Delay

MOV REG,#07H

LCALL BWRCTRL

MOV DATH,#00H

MOV DATL,#23H

LCALL BWRCMD

MOV REG,#10H

LCALL BWRCTRL

MOV DATH,#00H

MOV DATL,#00H

LCALL BWRCMD

mov time1,#60

lcall Delay

MOV REG,#07H

LCALL BWRCTRL

MOV DATH,#00H

MOV DATL,#33H

LCALL BWRCMD

MOV REG,#11H

LCALL BWRCTRL

MOV DATH,#40H

MOV DATL,#70H

LCALL BWRCMD

mov time1,#60

lcall Delay

MOV REG,#02H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
mov time1,#60
lcall Delay

MOV REG,#01H
LCALL BWRCTRL
MOV DATH,#63H
MOV DATL,#3FH
LCALL BWRCMD

MOV REG,#03H
LCALL BWRCTRL
MOV DATH,#0A8H
MOV DATL,#0AAH
LCALL BWRCMD

MOV REG,#0CH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#03H
LCALL BWRCMD

MOV REG,#0DH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#0CH
LCALL BWRCMD

MOV REG,#05H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#06H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD

MOV REG,#16H

LCALL BWRCTRL
MOV DATH,#0EFH
MOV DATL,#1CH
LCALL BWRCMD
MOV REG,#17H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD

MOV REG,#0BH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#30H
LCALL BWRCMD
MOV REG,#0FH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#1EH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#0B0H
LCALL BWRCMD

MOV REG,#41H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#42H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD

MOV REG,#44H
LCALL BWRCTRL
MOV DATH,#0EFH
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#45H

LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#46H
LCALL BWRCTRL
MOV DATH,#01H
MOV DATL,#3FH
LCALL BWRCMD

MOV REG,#48H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#49H
LCALL BWRCTRL
MOV DATH,#01H
MOV DATL,#3FH
LCALL BWRCMD
MOV REG,#4AH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#4BH
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD

MOV REG,#23H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#24H
LCALL BWRCTRL
MOV DATH,#00H
MOV DATL,#00H
LCALL BWRCMD
MOV REG,#21H
LCALL BWRCTRL
MOV DATH,#00H

MOV DATL,#00H
LCALL BWRCMD

.....**TO YOUR CODE**

REVISIONS					
No.	DATE	DESCRIPTION	ORGANIZED BY	CHECKED BY	APPROVED BY
1					
2					
3					
4					
5					
6					
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