Version No.：	01

SPECIFICATIONS

PRODUCT ：LCD MODULE

MODEL NO.：S95163

CUSTOMER			SUCCESS		
APPROVED	CHECKED	CHECKED	APPROVED	CHECKED	PREPARED

☐ **APPROVAL** FOR SPECIFICATIONS ONLY

■ **APPROVAL** FOR SPECIFICATIONS AND SAMPLE

深圳市宇顺电子有限公司

SUCCESS ELECTRONIC CO.,LTD.

RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
MAY.14.2007	01	FIRST RELEASE	Daniel. YU	Daniel. YU	KING.YANG

CONTENTS

1. GENERAL SPECIFICATIONS

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by SUCCESS ELECTRONIC to Customer。

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3 MODULE NAME:

S95163

2. FEATURES

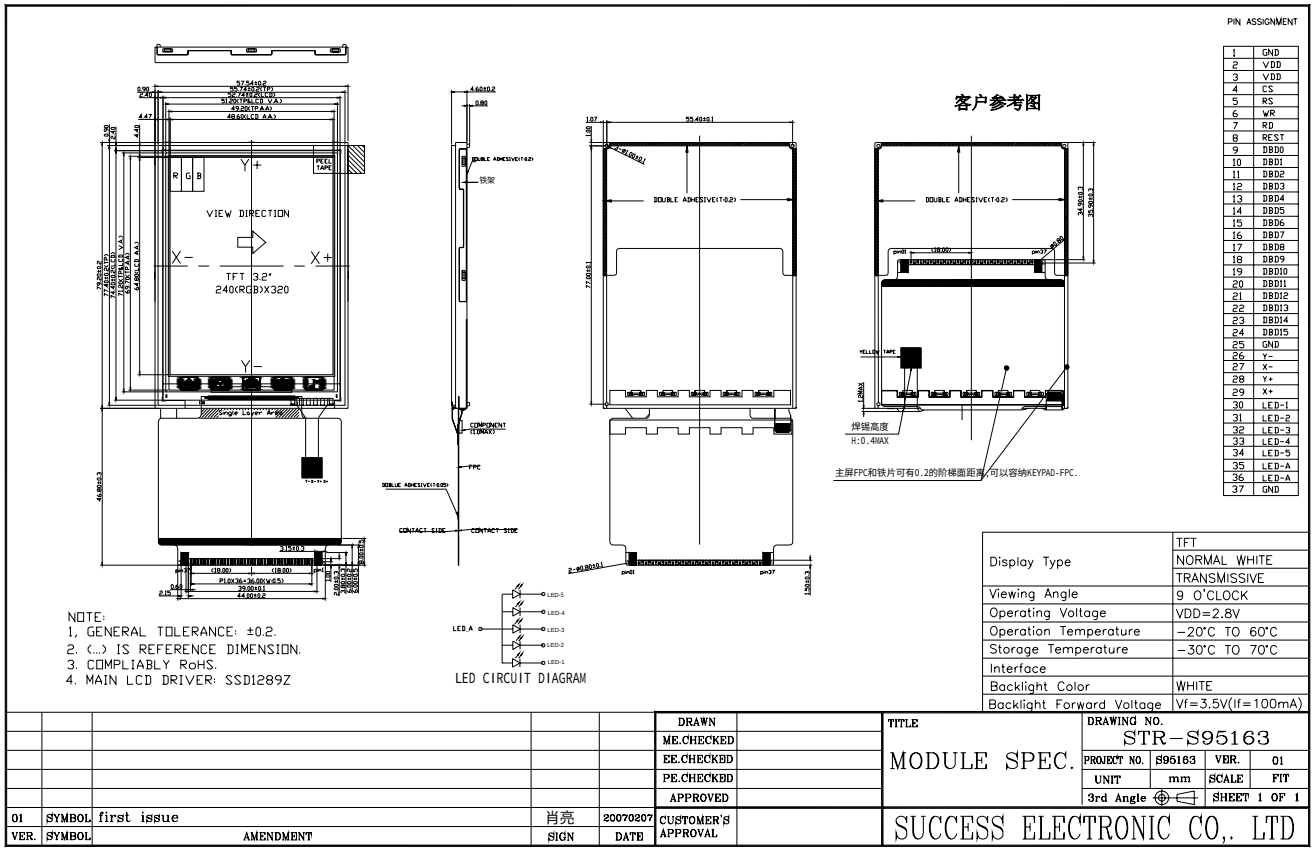
2-1 MAIN LCD (LARGE)

(1) Display Type: TFT, Transmissive, 9 o'clock
(2) Driving Method: TBD
(3) With WHITE LED Backlight
(4) DRIVE IC: SSD1289Z

3. MECHANICAL SPECIFICATIONS

ITEM	SPECIFICATIONS	UNIT
OUTLINE DIMEMSIONS	57.54(W) x79.2(H) x4.6(T)	mm
ACTIVE AREA	48.6 (W) x64.8(H)	mm
DISP.CONSTRUCTION	240(RGB) x320 Dots	PIXELS
NUMBER OF DOTS	240 x3 x320	Dots
PIXEL PITCH	0.2025X0.2025	mm
ASSY.TYPE	COG+FPC	---
BACKLIGHT	WHITE LED	—
WEIGHT	TBD	g

4.OUTLINE DIMENSIONS



PIN	
1	GND
2	VDD
3	VDD
4	CS
5	RS
6	WR
7	RD
8	REST
9	DBD0
10	DBD1
11	DBD2
12	DBD3
13	DBD4
14	DBD5
15	DBD6
16	DBD7
17	DBD8
18	DBD9
19	DBD10
20	DBD11
21	DBD12
22	DBD13
23	DBD14
24	DBD15
25	GND
26	Y-
27	X-
28	Y+
29	X+
30	LED-1
31	LED-2
32	LED-3
33	LED-4
34	LED-5
35	LED-A
36	LED-A
37	GND

NOTE:
1, GENERAL TOLERANCE: ±0.2.
2. (...) IS REFERENCE DIMENSION.
3. COMPLIABLY RoHS.
4. MAIN LCD DRIVER: SSD1289Z

Display Type	TFT NORMAL WHITE TRANSMISSIVE
Viewing Angle	9 O'CLOCK
Operating Voltage	VDD=2.8V
Operation Temperature	−20°C TO 60°C
Storage Temperature	−30°C TO 70°C
Interface	
Backlight Color	WHITE
Backlight Forward Voltage	Vf=3.5V(If=100mA)

VER.	SYMBOL	AMENDMENT	SIGN	DATE
01	SYMBOL	first issue	肖亮	20070207

DRAWN	
ME.CHECKED	
EE.CHECKED	
PE.CHECKED	
APPROVED	
CUSTOMER'S APPROVAL	

TITLE: MODULE SPEC.

DRAWING NO.: STR−S95163

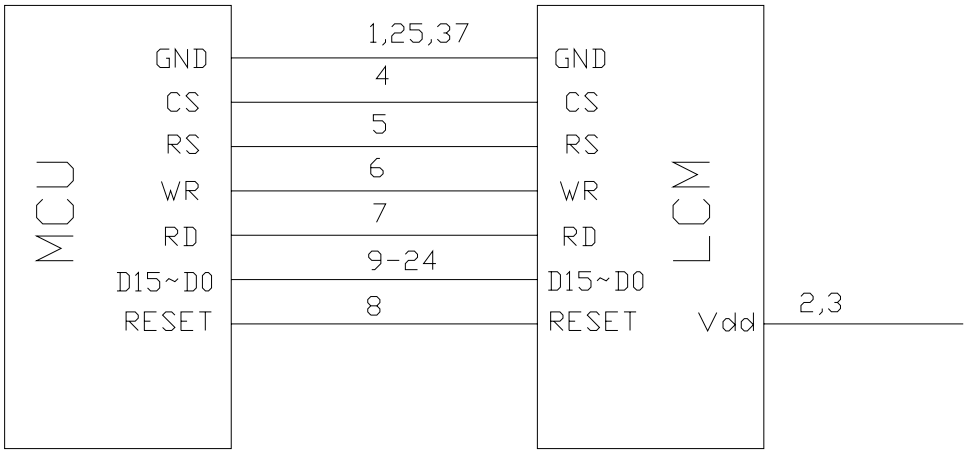
PROJECT NO.	S95163	VER.	01
UNIT	mm	SCALE	FIT
3rd Angle		SHEET	1 OF 1

SUCCESS ELECTRONIC CO,. LTD

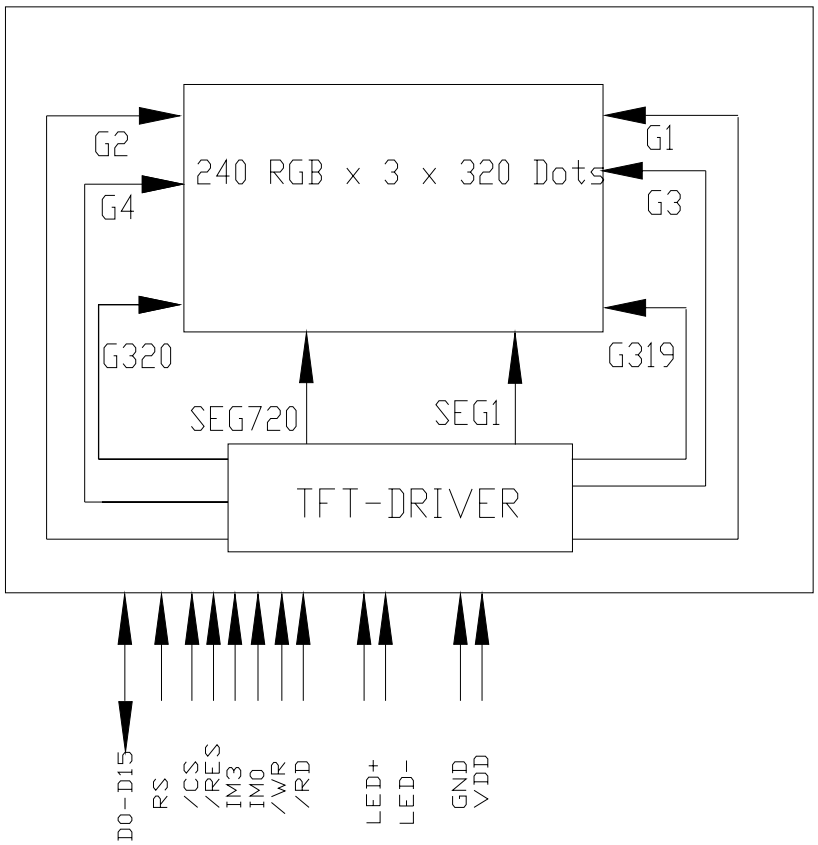
5. INTERFACE ASSIGNMENT

PIN NO.	FUNCTION DESCRIPTIONS	SYMBOL
1	Ground	GND
2	Power supply for analog and logic	VDD
3	Power supply for analog and logic	VDD
4	Chip enable signal , chip can be accessed when it is low	CS
5	The signal for register index (RS=1)or register command(RS=0) select	RS
6	Serves as a write signal and writes data at the rising edge in i80 system interface	WR
7	Serves as a read signal and read data at the low level in i80 system interface	RD
8	Reset pin, can reset the chip at the low level	TEST
9	Data bus 0	DBD0
10	Data bus 1	DBD1
11	Data bus 2	DBD2
12	Data bus 3	DBD3
13	Data bus 4	DBD4
14	Data bus 5	DBD5
15	Data bus 6	DBD6
16	Data bus 7	DBD7
17	Data bus 8	DBD8
18	Data bus 9	DBD9
19	Data bus 10	DBD10
20	Data bus 11	DBD11
21	Data bus 12	DBD12
22	Data bus 13	DBD13
23	Data bus 14	DBD14
24	Data bus 15	DBD15
25	Ground	GND
26	Touch panel input pin	Y-
27	Touch panel input pin	X-
28	Touch panel input pin	Y+
29	Touch panel input pin	X+
30	Power supply for LED-	LED-1
31	Power supply for LED-	LED-2
32	Power supply for LED-	LED-3
33	Power supply for LED-	LED-4
34	Power supply for LED-	LED-5
35	Power supply for LED+	LED-A
36	Power supply for LED+	LED-A
37	Ground	GND

6.APPLICATION CUICIRT

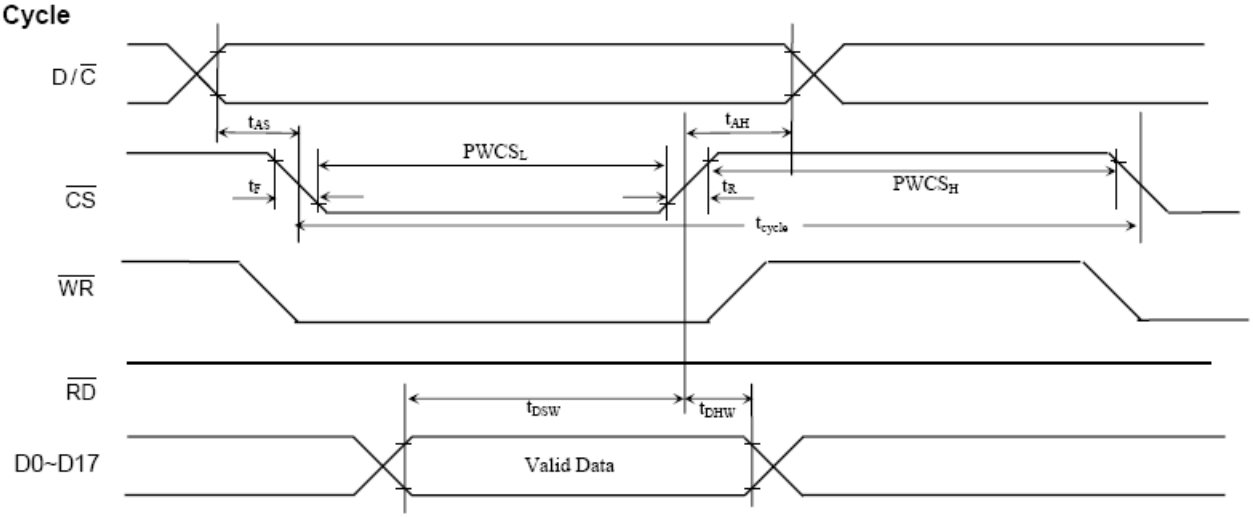


7. BLOCK DIAGRAM



8.TIMING CHARACTERISTICS:

Write Cycle



Read Cycle

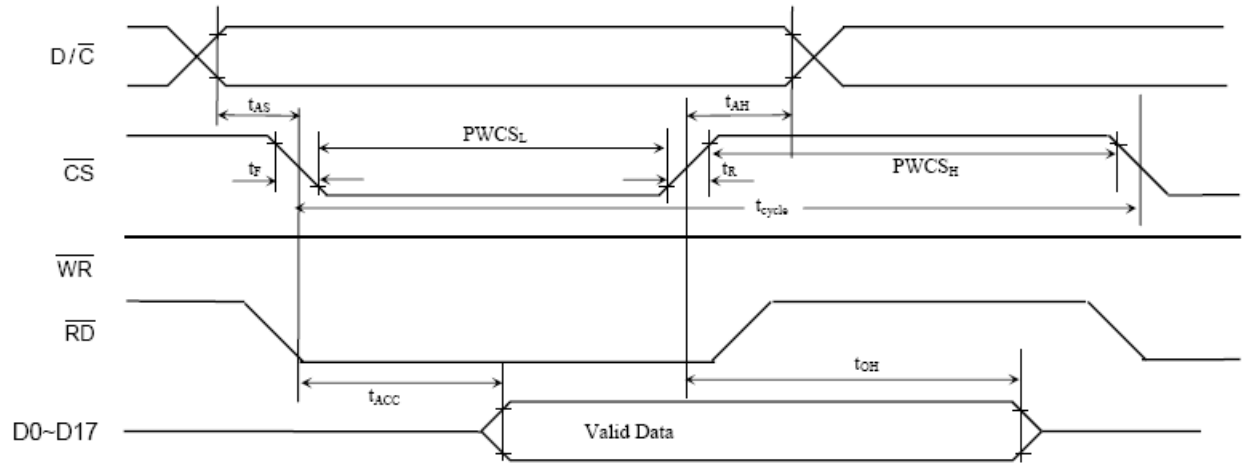
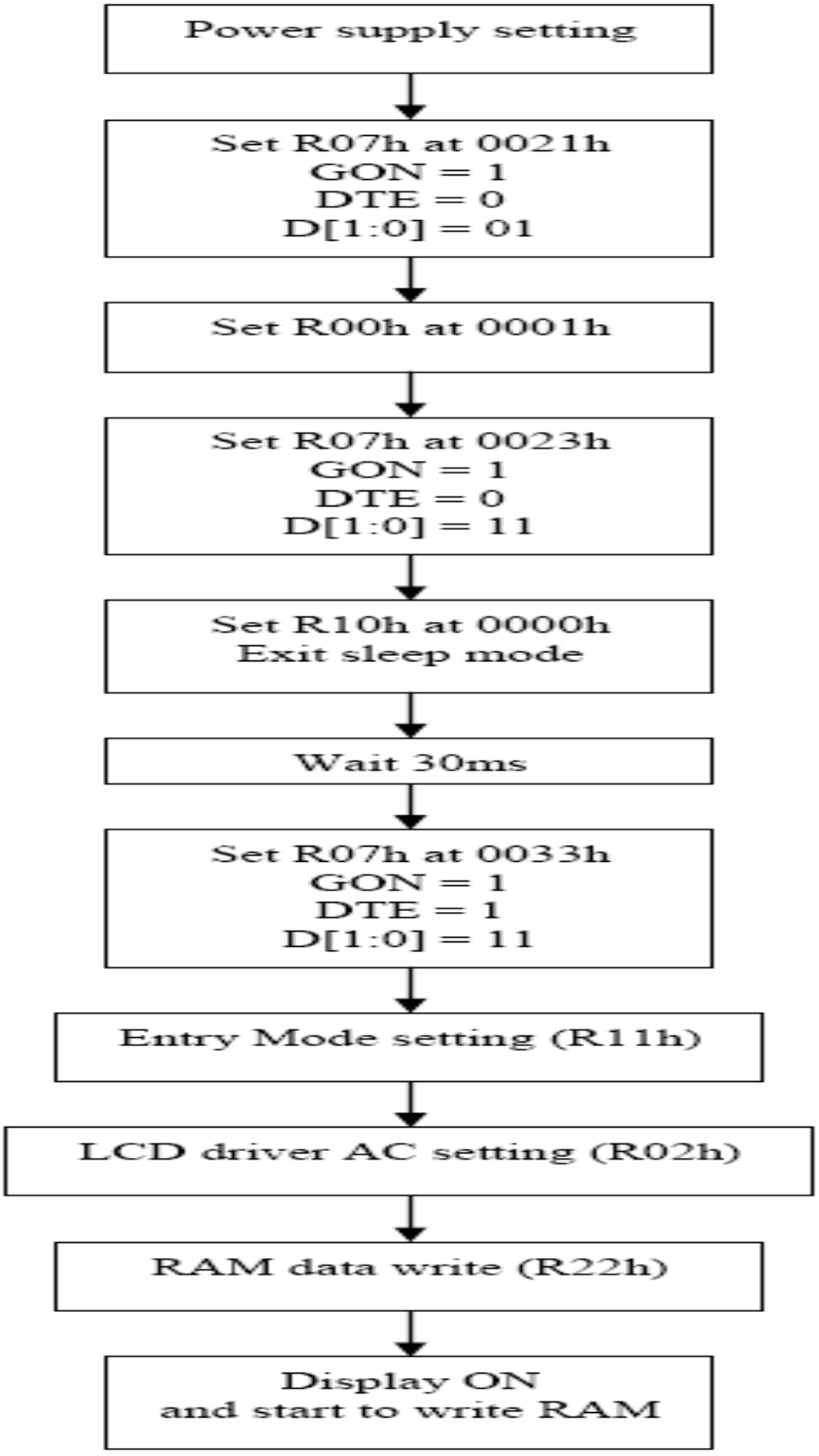
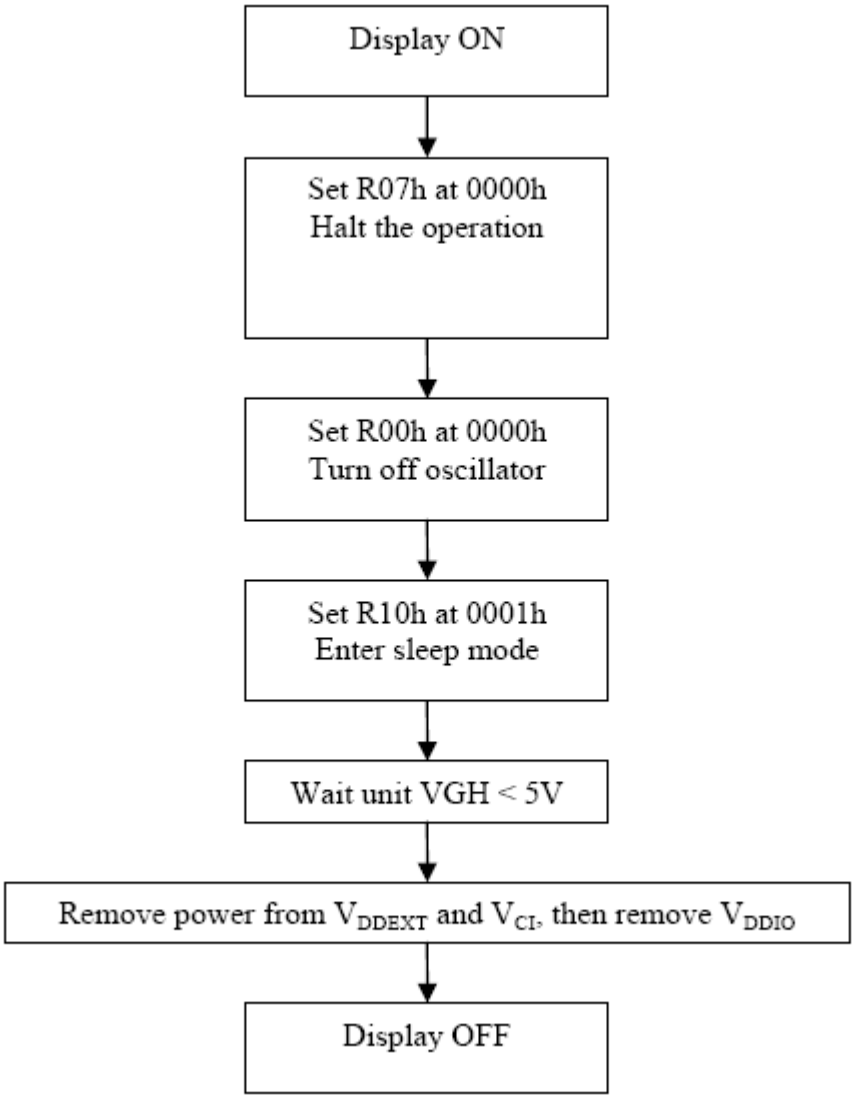


Figure 13-2 –Parallel 8080-series Interface Timing Characteristics

9. POWER ON/OFF SEQUENCE




Display ON
Set R07h at 0000h
Halt the operation
Set R00h at 0000h
Turn off oscillator
Set R10h at 0001h
Enter sleep mode
Wait unit VGH < 5V
Remove power from V_{DDEXT} and V_{CI}, then remove V_{DDIO}
Display OFF

10. INITIALIZED CODE

Please contact us for details.

11. INSTRUCTION TABLE

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	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OSCEN
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R01h	Driver output control	0	1	0	RL	REV	CAD	BGR	SM	TB	MUX8	MUX7	MUX6	MUX5	MUX4	MUX3	MUX2	MUX1	MUX0
	[0XXX][X0X1]3F			0	X	X	X	X	0	X	1	0	0	1	1	1	1	1	1
R02h	LCD drive AC control	0	1	0	0	0	FLD	ENWS	B/C	EOR	WSMD	NW7	NW6	NW5	NW4	NW3	NW2	NW1	NW0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R03h	Power control (1)	0	1	DCT3	DCT2	DCT1	DCT0	BT2	BT1	BT0	0	DC3	DC2	DC1	DC0	AP2	AP1	AP0	0
	All GAMAS[2:0] setting 8 color (6A64h)			0	1	1	0	1	0	1	0	0	1	1	0	0	1	0	0
R05h	Compare register (1)	0	1	CPR5	CPR4	CPR3	CPR2	CPR1	CPR0	0	0	CPG5	CPG4	CPG3	CPG2	CPG1	CPG0	0	0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R06h	Compare register (2)	0	1	0	0	0	0	0	0	0	0	CPB5	CPB4	CPB3	CPB2	CPB1	CPB0	0	0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R07h	Display control	0	1	0	0	0	PT1	PT0	VLE2	VLE1	SPT	0	0	GON	DTE	CM	0	D1	D0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R0Bh	Frame cycle control	0	1	NO1	NO0	SDT1	SDT0	0	EQ2	EQ1	EQ0	DIV1	DIV0	SDIV	SRTN	RTN3	RTN2	RTN1	RTN0
	(5308h)			0	1	0	1	0	0	1	1	0	0	0	0	1	0	0	0
R0Ch	Power control (2)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	VRC2	VRC1	VRC0
	(0004h)			0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
R0Dh	Power control (3)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	VRH3	VRH2	VRH1	VRH0
R0Eh	Power control (4)	0	1	0	0	VCOMG	VDV4	VDV3	VDV2	VDV1	VDV0	0	0	0	0	0	0	0	0
ROFh	Gate scan start position	0	1	0	0	0	0	0	0	0	SCN8	SCN7	SCN6	SCN5	SCN4	SCN3	SCN2	SCN1	SCN0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R10h	Sleep mode	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SLP
	(0001h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
R11h	Entry mode	0	1	VS mode	DFM1	DFM0	TRANS	OEDef	WMode	DMode1	DMode0	TY1	TY0	ID1	ID0	AM	LG2	LG1	LG0
	(6830h)			0	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0
R15h	Generic Interface Contrl	0	1	0	0	0	0	0	0	0	0	1	1	0	1	INVDOT	INVDEN	INNVHS	INVVS
	(00D0h)			0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
R16h	Horizontal Porch	0	1	XL7	XL6	XL5	XL4	XL3	XL2	XL1	XL0	HBP7	HBP6	HBP5	HBP4	HBP3	HBP2	HBP1	HBP0
	(EF1Ch)			1	1	1	0	1	1	1	1	0	0	0	1	1	1	0	0
R17h	Vertical Porch	0	1	VFP7	VFP6	VFP5	VFP4	VFP3	VFP2	VFP1	VFP0	VBP7	VBP6	VBP5	VBP4	VBP3	VBP2	VBP1	VBP0
	(0103h)			0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1

(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)	0	1	0	0	0	0	0	0	0	0	nOTP	0	VCM5	VCM4	VCM3	VCM2	VCM1	VCM0
R22h	RAM data write	0	1	Data[17:0] mapping depends on the interface setting															
	RAM data read	1	1																
R23h	RAM write data mask (1)	0	1	WMR5	WMR4	WMR3	WMR2	WMR1	WMR0	0	0	WMG5	WMG4	WMG3	WMG2	WMG1	WMG0	0	0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R24h	RAM write data mask (2)	0	1	0	0	0	0	0	0	0	0	WMB5	WMB4	WMB3	WMB2	WMB1	WMB0	0	0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R25h	Frame Frequency	0	1	OSC3	OSC2	OSC1	OSC0	0	0	0	0	0	0	0	0	0	0	0	0
	(8000h)			1	0	0	0	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)	0	1	0	0	0	0	0	0	0	VL18	VL17	VL16	VL15	VL14	VL13	VL12	VL11	VL10
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R42h	Vertical scroll control (2)	0	1	0	0	0	0	0	0	0	VL28	VL27	VL26	VL25	VL24	VL23	VL22	VL21	VL20
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R44h	Horizontal RAM address position	0	1	HEA7	HEA6	HEA5	HEA4	HEA3	HEA2	HEA1	HEA0	HSA7	HSA6	HSA5	HSA4	HSA3	HSA2	HSA1	HSA0
	(EF00h)			1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0
R45h	Vertical RAM address start position	0	1	0	0	0	0	0	0	0	VSA8	VSA7	VSA6	VSA5	VSA4	VSA3	VSA2	VSA1	VSA0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R46h	Vertical RAM address end position	0	1	0	0	0	0	0	0	0	VEA8	VEA7	VEA6	VEA5	VEA4	VEA3	VEA2	VEA1	VEA0
	(013Fh)			0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1
R48h	First window start	0	1	0	0	0	0	0	0	0	SS16	SS17	SS16	SS15	SS14	SS13	SS12	SS11	SS10
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R49h	First window end	0	1	0	0	0	0	0	0	0	SE16	SE17	SE16	SE15	SE14	SE13	SE12	SE11	SE10
	(013Fh)			0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1
R4Ah	Second window start	0	1	0	0	0	0	0	0	0	SS26	SS27	SS26	SS25	SS24	SS23	SS22	SS21	SS20
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R4Bh	Second window end	0	1	0	0	0	0	0	0	0	SE26	SE27	SE26	SE25	SE24	SE23	SE22	SE21	SE20
	(013Fh)			0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1
R4Eh	Set GDDRAM X address counter	0	1	0	0	0	0	0	0	0	0	XAD7	XAD6	XAD5	XAD4	XAD3	XAD2	XAD1	XAD0
	(0000h)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R4Fh	Set GDDRAM Y address counter	0	1	0	0	0	0	0	0	0	YAD8	YAD7	YAD6	YAD5	YAD4	YAD3	YAD2	YAD1	YAD0
	(0000h)			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.
Setting R28h as 0x0006 is required before setting R25h and R29h registers.

12. DDRAM ARRANGEMENT

	RL=1	S0	S1	S2	S3	S4	S5	S6	S7	S8	…	S714	S715	S716	S717	S718	S719	
	RL=0	S719	S718	S717	S716	S715	S714	S713	S712	S711	…	S5	S4	S3	S2	S1	S0	
	BGR=0	R	G	B	R	G	B	R	G	B	…	R	G	B	R	G	B	Vertical address
	BGR=1	B	G	R	B	G	R	B	G	R	…	B	G	R	B	G	R	
TB=1	TB=0																	
G0	G319	0000H,0000H			0000H, 0001H			0000H, 0010H			…	0000H, 00EEH			0000H, 00EFH			0
G1	G318	0001H,0000H			0001H, 0001H			0001H, 0010H			…	0001H, 00EEH			0001H, 00EFH			1
G2	G317	0010H,0000H			0010H, 0001H			0010H, 0010H			…	0010H, 00EEH			0010H, 00EFH			2
G3	G316	0011H,0000H			0011H, 0001H			0011H, 0010H			…	0011H, 00EEH			0011H, 00EFH			3
G4	G315	0100H,0000H			0100H, 0001H			0100H, 0010H			…	0100H, 00EEH			0100H, 00EFH			4
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G316	G3	013CH, 0000H			013CH, 0001H			013CH, 0010H			…	013CH, 00EEH			013CH, 00EFH			316
G317	G2	013DH, 0000H			013DH, 0001H			013DH, 0010H			…	013DH, 00EEH			013DH, 00EFH			317
G318	G1	013EH, 0000H			013EH, 0001H			013EH, 0010H			…	013EH, 00EEH			013EH, 00EFH			318
G319	G0	013FH, 0000H			013FH, 0001H			013FH, 0010H			…	013FH, 00EEH			013FH, 00EFH			319

Horizontal address	0	1	2	…	238	239

Remark : The address is in 00xxH,0yyyH format, where yyy is the vertical address and xx is the horizontal address

13. ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD－VSS	Ta=25℃	-0.3	－	4.6	V
INPUT VOLTAGE	VIN	Ta=25℃	-0.3	－	VDD+0.3	V
OPERATION TEMPERATURE	TOPR	---	- 10	－	70	℃
STORAGE TEMPERATURE	TSTG	---	-30	－	+80	℃

NOTES:

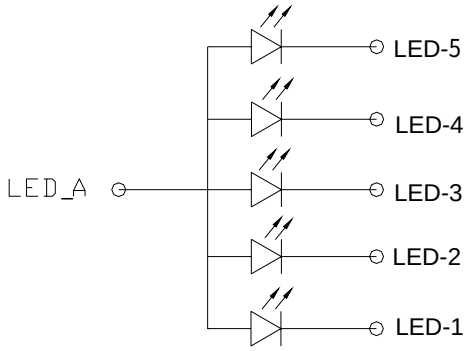
(1) LCM should be grounded during handling LCM.

14. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY VOLTAGE	VDD－VSS	Ta= +25℃	2.6	2.8	3.0	V
POWER SUPPLY FOR LCD DRIVING	Vlcd	Ta= +25℃	4.5	－	5.5	V
INPUT VOLTAGE “H” LEVEL	VIH	－	0.8VDD	－	VDD	V
INPUT VOLTAGE “L” LEVEL	VIL	－	VSS	－	0.2VDD	V
OUTPUT VOLTAGE “H” LEVEL	VOH	IOH=-100uA	0.8VDD	－	VDD	V
OUTPUT VOLTAGE “L” LEVEL	VOL	IOL=100uA	VSS	－	0.2VDD	V

15. LED BACKLIGHT

15-1 POWER SUPPLY FOR LED BACKLIGHT



15-2 ABSOLUTE MAXIMUN RATING

PARAMETER	SYMBOL	SPECIFICATIONS	UNIT
POWER DISSIPATION	PD	350	mW
FORWARD CURRENT	IFm	100	mA
REVERSE VOLTAGE	VF	3.5	V
OPERATION TEMPERATURE	TOPR	-20℃ ～+70℃	℃
STORAGE TEMPERATURE	TSTG	-30℃ ～+80℃	℃

15-3 ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	REMARK	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
FORWARD VOLTAGE	VF	VF =3.5V	90	100	110	mA
LUMINOUS INTENSITY	Iv	VF =3.5V	3000	3200	3500	cd/m2
LUMINOUS TOLERANCE	Iv-m	(min/max)/100	80	—	—	%
CHROMATICITY COORDINATES	X	VF =3.5V	0.25	—	0.29	
	Y		0.25	—	0.29	

16.OPTICAL CHARACTERISTICS

Item		Symbol	Conditions	Specifications Min.	Typ.	Max.	Unit	Note
Transmittance		T%	Viewing normal angle $\theta_X = \theta_Y = 0°$		4.7		%	All left side dat are based o CMO's followin condition – Type 767 NTSC: 60% LC:5066 Light : C light (Machine:BM5A Normal Polarize Without DBEF
Contrast Ratio		CR		150	250	-	-	
Response Time		T_R		NA	10	20	ms	
		T_F		NA	20	30	ms	
Chromaticity	Red	X_R		0.603	0.633	0.663		
		Y_R		0.299	0.329	0.359		
	Green	X_G		0.264	0.294	0.324		
		Y_G		0.546	0.576	0.606		
	Blue	X_B		0.103	0.133	0.163		
		Y_B		0.092	0.122	0.152		
	White	X_W		0.278	0.308	0.338		
		Y_W		0.316	0.346	0.376		
Viewing Angle	Hor.	θ_{X+}	Center CR≥10		45	-	deg.	
		θ_{X-}			45	-		
	Ver.	θ_{Y+}			35	-		
		θ_{Y-}			15	-		

Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

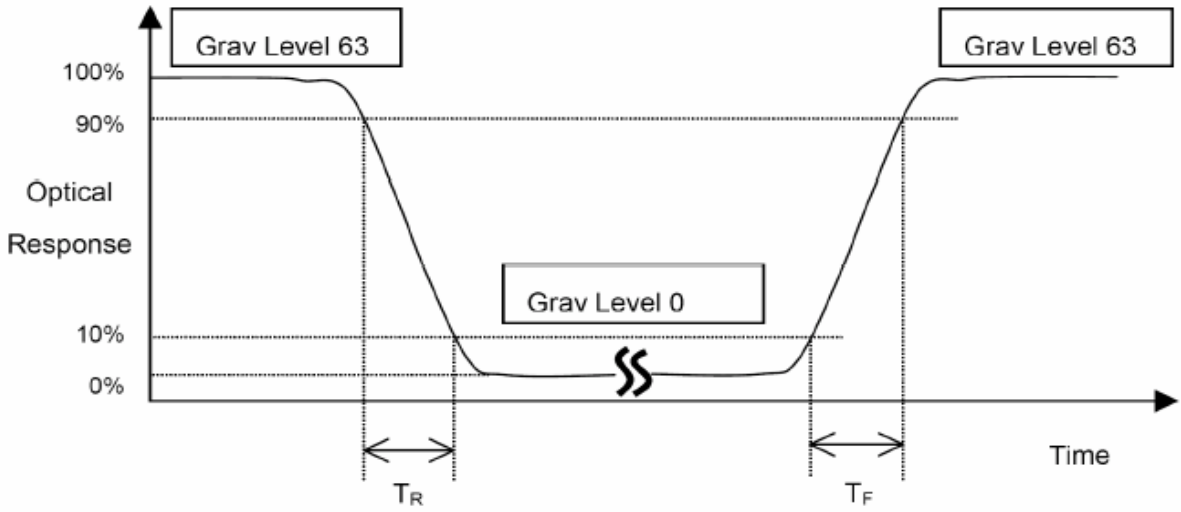
L63: Luminance of gray level 63

L0: Luminance of gray level 0

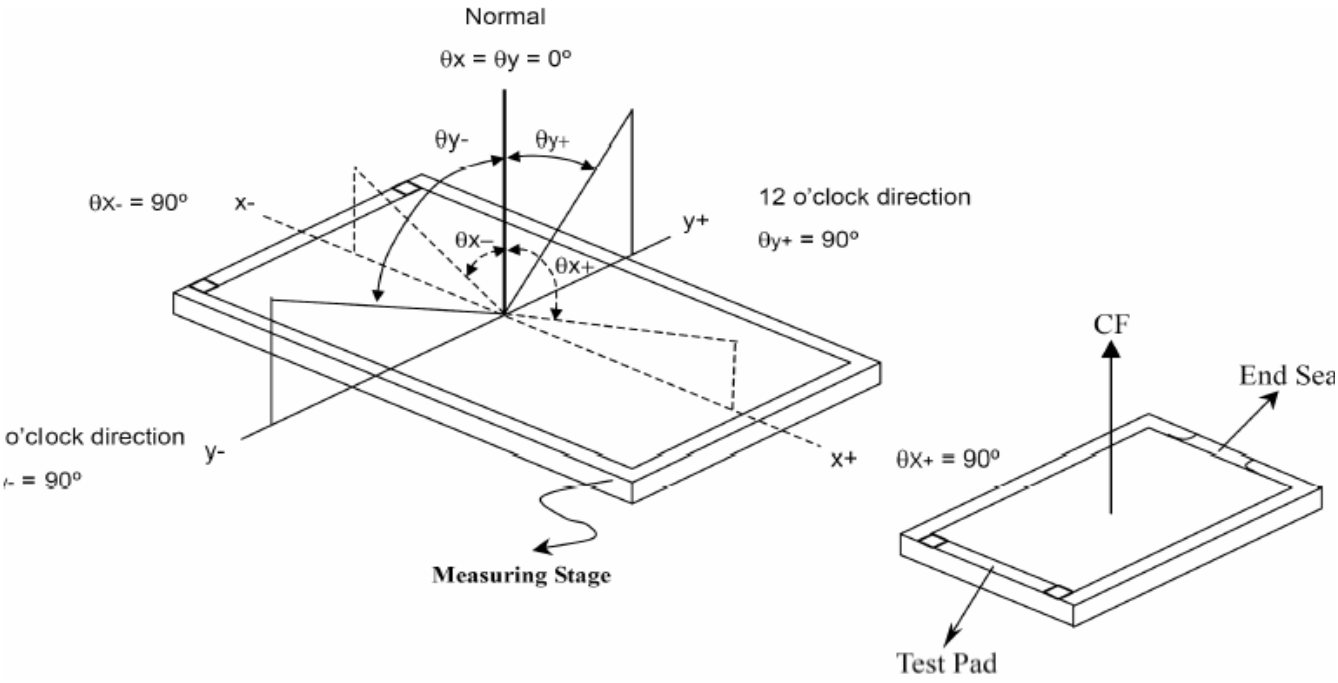
CR = CR (10)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (2) Definition of Response Time (TR, TF):



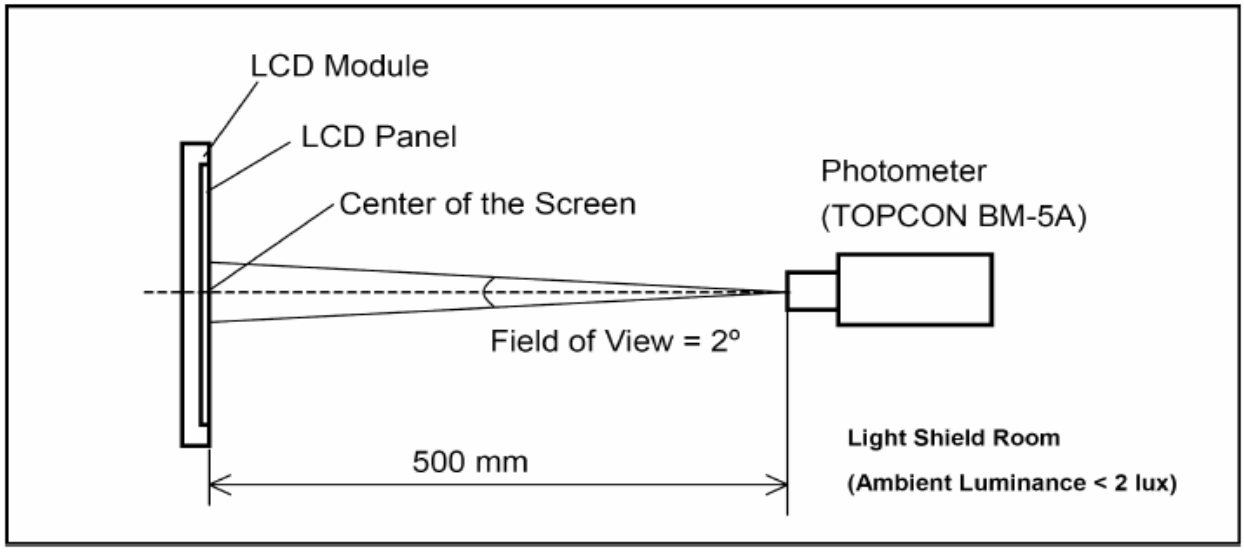
*Note(3) Definition of Viewing Angle



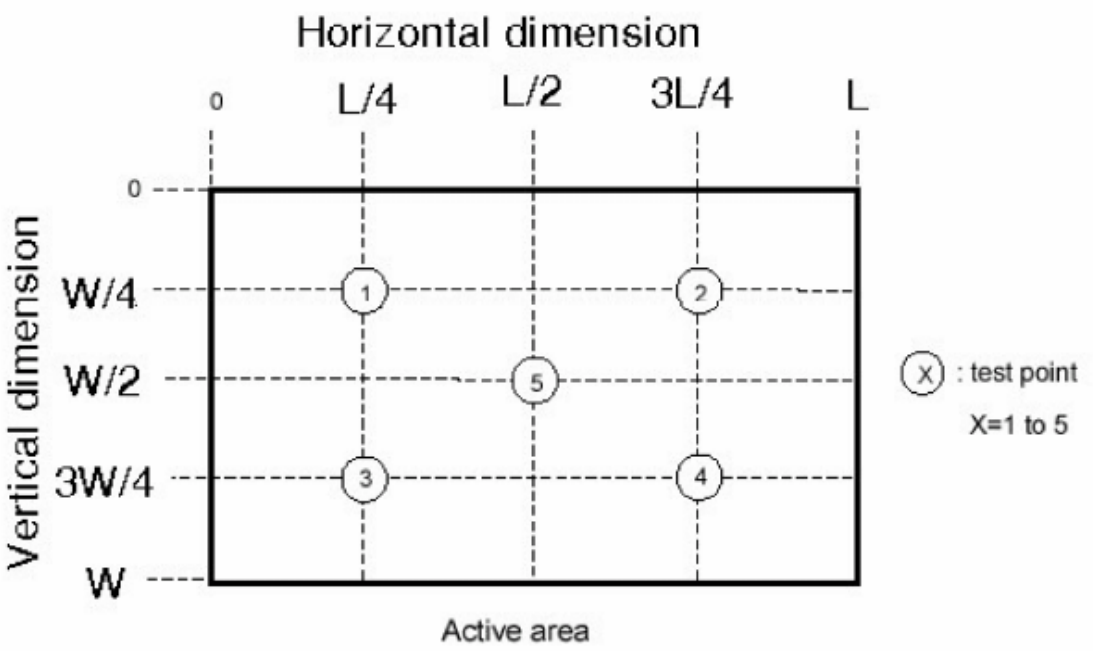
*** The above "Viewing Angle" is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O'clock. Module maker can increase the "Viewing Angle" by applying Wide View Film.

*Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



*Note (5)


Horizontal dimension
0
L/4
L/2
3L/4
L
Vertical dimension
0
W/4
W/2
3W/4
W
1
2
3
4
5
X : test point
X=1 to 5
Active area

17. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-10℃～+70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃～+80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	—	See Note	WITHOUT CONDENSATION

18.RELIABILITY

No.	Test Item	Test Condition	Check Time
1	High temp storage	T= 80℃	240 hrs
2	Low temp storage	T= -30℃	240 hrs
3	High temp operation	T= 70℃	240 hrs
4	Low temp operation	T= -20℃	240 hrs
5	High temp & high humidity	T=60℃ H=90%	240 hrs

Reliability Test Criteria:

Display function should be no change under normal operating condition.

19.PRECAUTIONS FOR USE OF LCD MODULES

19-1 HANDING PRECAUTIONS

(1) The display panel is made of glass. Do not subject it to a mechanical shock by dropping it or impact.

(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents :

- Isopropyl alcohol
- Ethyl alcohol

(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.

- Water
- Ketone
- Aromatic solvents

(7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

(8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

(9) Do not attempt to disassemble or process the LCD module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(12) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded.
- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

19-2 STORAGE PRECAUTIONS

When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags (avoid high temperature / high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

19-3 OTHERS

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.

20. USING LCD MODULES

20-1 LIQUID CRYSTAL DISPLAY MODULES

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or

polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

(9) Do not touch the display with bare hands. This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).

(10) As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

20-2 PRECAUTION FOR HANDING LCD MODULES

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

(1) Do not alter, modify or change the the shape of the tab on the metal frame.

(2) Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

(3) Do not damage or modify the pattern writing on the printed circuit board.

(4) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

(5) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

(6) Do not drop, bend or twist LCM.

(7) In order to avoid the cracking of the FPC,you should to pay attention to the area of FPC(R50mm) where the FPC was bent .the edge of coverlay;the area of surface of Ni-Au plating,the area of soldering land,the area of through hole.

20-3 ELECTRO-STATIC DISCHARGE CONTROL

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

(1) Make certain that you are grounded when handing LCM.

(2) Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.

(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

(5) As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

(6) To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

20-4 PRECAUTIONS FOR OPERATION

(1) Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.

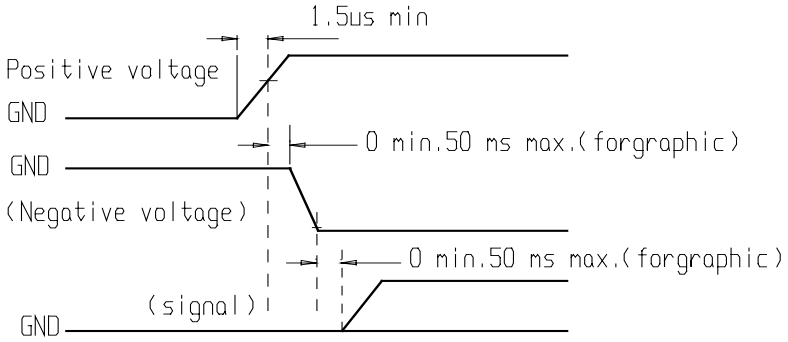
(2) Driving the LCD in the voltage above the limit shortens its life.

(3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.



20-5 STORAGE

When storing LCDs as spares for some years, the following precaution are necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.

(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)

(4) Environmental conditions :

- Do not leave them for more than 160hrs. at 70°C.
- Should not be left for more than 48hrs. at -20°C.

20-6 SAFETY

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leakes out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

20-7 LIMITED WARRANTY

Unless agreed between SUCCESS and customer, SUCCESS will replace or repair any of its LCD modules which are found to

be functionally defective when inspected in accordance with SUCCESS LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects must be returned to SUCCESS within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of SUCCESS limited to repair and/or replacement on the terms set forth above. SUCCESS will not be responsible for any subsequent or consequential events.

20-8 RETURN LCM UNDER WARRANTY

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- Circuit modified in any way, including addition of components.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB's eyelet, conductors and terminals.