CUSTOMER :

M O D E L : MOG-160BB01T-S Series

DESCRIPTION : LCD MODULE

◆ CUSTOMER APPROVAL

	CHECKED	CHECKED	APPROVAL
APPROVAL			
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

MYTECH CORPORATION

180 Old Tappan Rd., Bldg. 6, Old Tappan, NJ 07675
Tel: (201) 784-8867 Fax: (201) 784-8932
Email: *mysales@mytechcorp.com*

NOTE: 1. This specification may, wholly or partially, be subjected to change without notice.
2. Information contained herein is proprietary information of MYTECH CORPORATION. The dissemination use or duplication for any purpose other than for which the information is provided is prohibited by MYTECH CORPORATION except by express permission.

2. General Specification

(1) Mechanical Dimension

Item	Standard Value	Unit
Number of dots	160x160	dots
Outline dimension	69.0(W)x 69.5(H)x 5.5max(T)	mm
View area	60.1(W)x 60.0(H)	mm
Active area	55.985(W)x 55.985(H)	mm
Dot size	0.335(W)x 0.335(H)	mm
Dot pitch	0.35(W)x 0.35(H)	mm

(2) Controller IC: SED1335

(3) Temperature Range

	Normal	Wide
Operating	0 ~+50℃	-20 ~+70℃
Storage	-10 ~+ 60℃	-30 ~+80℃

(4) Polarizer

FSTN / black / Negative, STN / blue / Negative : Anti-glare Polarizer

3.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	—	+70	℃
Storage Temperature	T_{ST}	-30	—	+80	℃
Input Voltage	V_I	0	—	V_{DD}	V
Supply Voltage For Logic	V_{DD}	0	—	6.5	V
Supply Voltage For LCD	V_{DD}-V_{EE}	0	—	32	V

4.Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Voltage	V_{DD}-V_{SS}	—	3.0	5.0	5.5	V
Supply Voltage For LCD	V_{ADJ}-V_{SS}	Ta=-20℃ Ta=25℃ Ta=+70℃	— — —	21.5 19.0 17.5	— — —	V V V
Input High Volt.	V_{IH}	—	0.8V_{DD}	—	V_{DD}	V
Input Low Volt.	V_{IL}	—	0	—	0.2V_{DD}	V
Output High Volt.	V_{OH}	—	V_{DD} -0.4	—	—	V
Output Low Volt.	V_{OL}	—	—	—	0.4	V
Supply Current(EL ON)	I_{DD}	—	—	—	100	mA
	IEE	—	—	—	1.0	mA

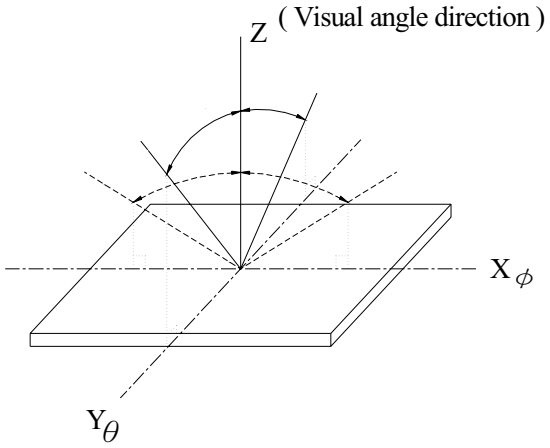
5.Optical Characteristics

a. FSTN

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR≧3	10		60	deg
	(H) φ	CR≧3	-45		45	deg
Contrast Ratio	CR	—		5		—
Response Time 25℃	T rise	—		100	150	ms
	T fall	—		150	200	ms

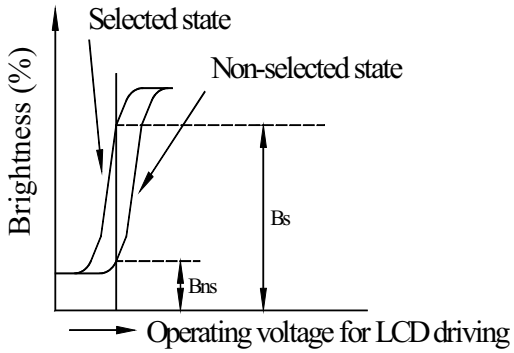
5.1 Definitions

■View Angles

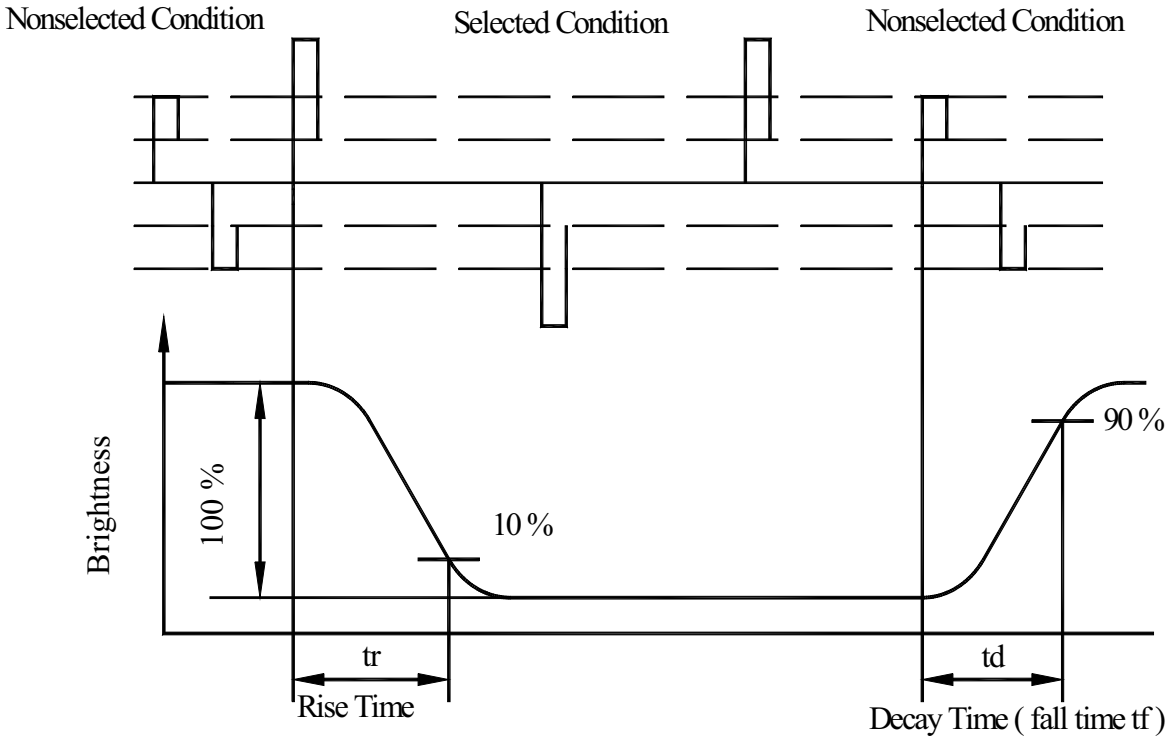


■Contrast Ratio

$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$



■Response time



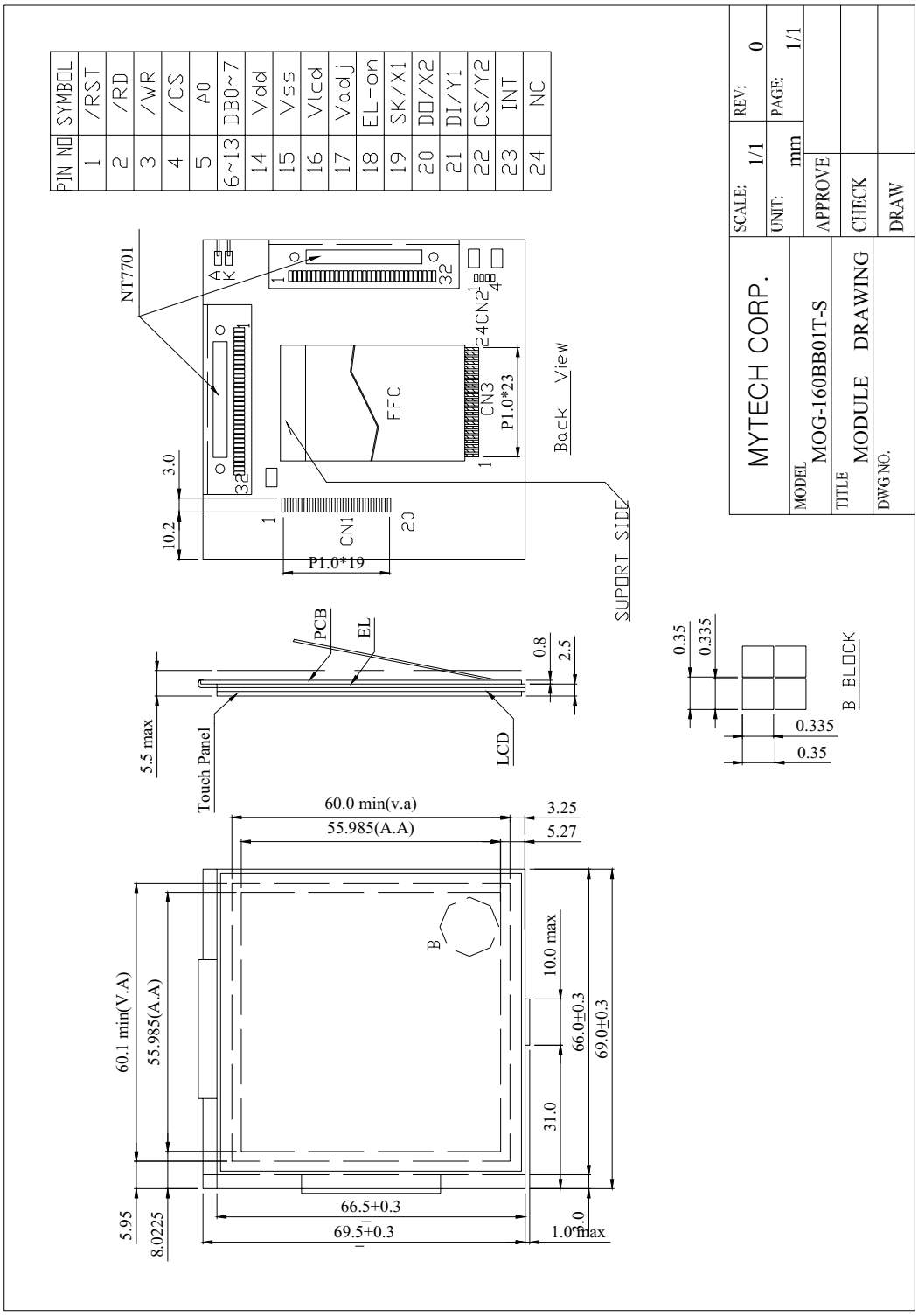
6. Interface Description

Pin No.	Symbol	Level	Description
1	$\overline{RES}$	H/L	Controller reset signal, Active L
2	$\overline{RD}$	H/L	8080 family: Read signal, 6800 family: Enable clock
3	$\overline{WR}$	H/L	8080 family: Write signal, 6800 family: R/W signal
4	$\overline{CS}$	H/L	Chip select , Active L
5	A0	H/L	RD=L WR=H ,A0=L :Data Read AO=H :Status read RD=H WR=L ,A0=L :Data Write AO=H :Command write
6~13	DB0~DB7	H/L	Data bus
14	V_{DD}	5.0V	Power supply for Logic (option +3V)
15	VSS	0V	Logic Ground
16	Vlcd	25V	Positive voltage output
17	VADJ	(Variable)	Driving voltage for LCD(typical 19.0V at 25C)
18	EL-ON	H/L	H:EL backlight on
19	SK/X1		Serial clock/Right signal in X axis (For touch panel)
20	DO/X2		Data output / Left signal in X axis (For touch panel)
21	DI/Y1		Data input / Upper signal in Y axis (For touch panel)
22	CS/Y2		Chip select / Lower signal in Y axis (For touch panel)
23	INT		Interrupt for touch panel controiler
24	NV		

* SK,DO,DI,CS,INT are for touch panel controller IC built in.

* X1,X2,Y1,Y2 are for touch panel only.

7. Outline Drawing



8. Timing Characteristics

8.1 8080 Family Interface Timing

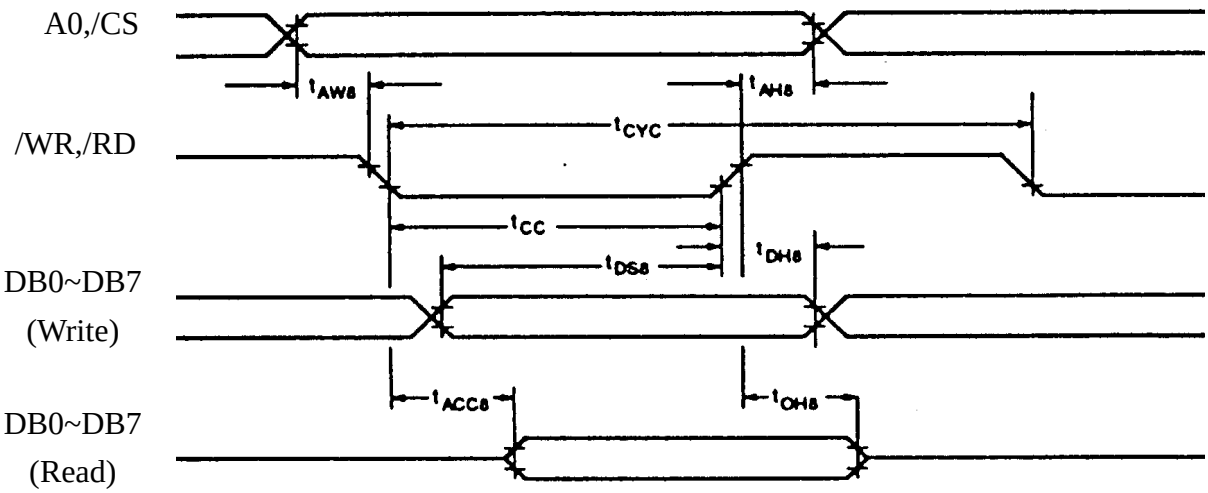
Parameter	Condition	Symbol	Min	Max	Unit	Remark
Address Hold Time	CL=100 pF VDD=2.7~4.5	tAH8	10		ns	A0,/CS
Address Setup Time		tAW8	0		ns	
System Cycle Time		tCYC	Note		ns	/WR,/RD
Strobe Pulse Width		tOC	150		ns	
Data Setup Time		tDS8	120		ns	DB0~DB7
Data Hold Time		tDH8	5		ns	
/RD Access Time		tACC8	-	80	ns	
Output Disable Time		tOH8	10	55	ns	

Note: For memory control and system control commands:

tCYC8=2tC+tOC+tCEA+75 > tACV +245

For all other commands:

tCYC8=4tC+tOC+30



8. Timing Characteristics

8.1 8080 Family Interface Timing

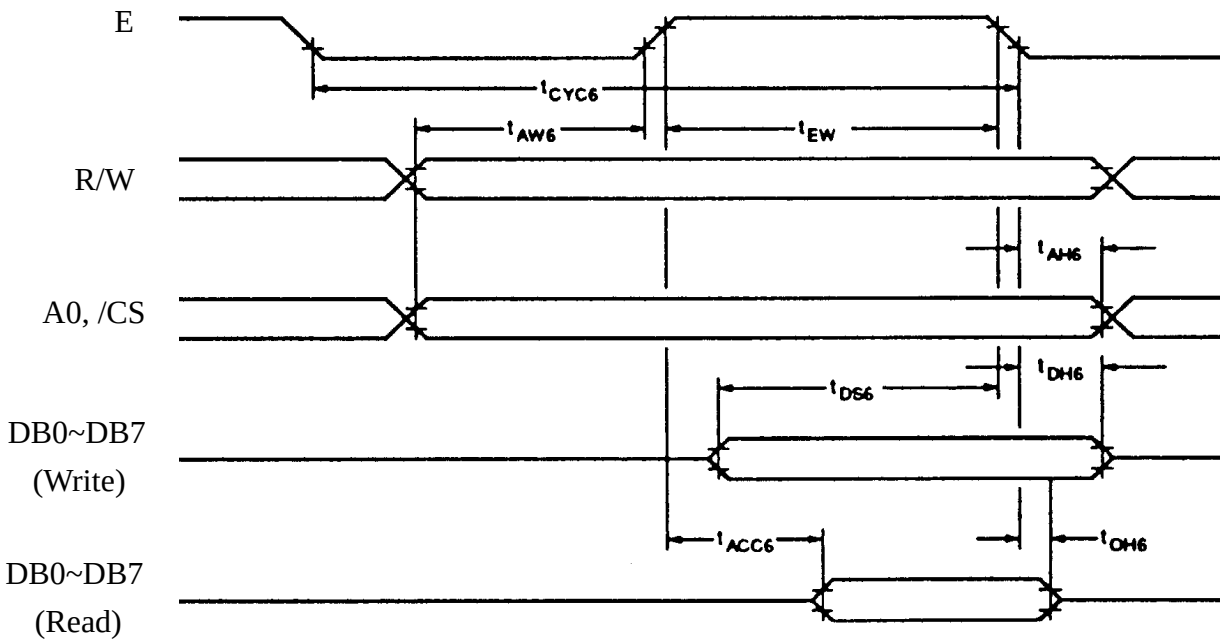
Parameter	Condition	Symbol	Min	Max	Unit	Remark
Address Hold Time	CL=100 pF VDD=2.7~4.5	tAH8	10		ns	A0,/CS
Address Setup Time		tAW8	0		ns	
System Cycle Time		tCYC	Note		ns	/WR,/RD
Strobe Pulse Width		tOC	150		ns	
Data Setup Time		tDS8	120		ns	DB0~DB7
Data Hold Time		tDH8	5		ns	
/RD Access Time		tACC8	-	80	ns	
Output Disable Time		tOH8	10	55	ns	

Note: For memory control and system control commands:

tCYC8=2tC+tOC+tCEA+75 > tACV +245

For all other commands:

tCYC8=4tC+tOC+30



AC Electrical Characteristics

9 Instruction Set

Class	Command	Code											Hex	Command Description	Command read parameters	
		/RD	/WR	A0	D7	D6	D5	D4	D3	D2	D1	D0			Number of byters	Section
System Control	SYSTEM	1	0	1	0	1	0	0	0	0	0	0	40	Initialized Device and display	8	8.2.1
	SLEEP IN	1	0	1	0	1	0	1	0	0	1	1	53	Enter Standby mode	0	8.2.2
Display Control	DISP	1	0	1	0	1	0	1	1	0	0	D	58,	Enable and disable display and	1	8.3.1
	SCROLL	1	0	1	0	1	0	0	0	1	0	0	44	set Display start address and	10	8.3.2
	CSRFORM	1	0	1	0	1	0	1	1	1	0	1	5D	Set cursor byte	2	8.3.3
	CGRAM	1	0	1	0	1	0	1	1	1	0	0	5C	Set start address of character	2	8.3.6
	CSRDIR	1	0	1	0	1	0	0	1	1	CD 1	CD 0	4C to 4F	Set direction of cursor movement	0	8.3.4
	HDOT SCR	1	0	1	0	1	0	1	1		1	0	5A	set horizontal scroll position	1	8.3.7
	OVLAY	1	0	1	0	1	0	1	1	0	1	1	5B	set display overlay format	1	8.3.5
Drawing Control	CSRW	1	0	1	0	1	0	0	0	1	1	0	46	set cursor address	2	8.4.1
	CSRR	1	0	1	0	1	0	0	0	1	1	1	47	read cursor address	2	8.4.2
Memory Control	MWRITE	1	0	1	0	1	0	0	0	0	1	0	42	write to display memory	-	8.5.1
	MREAD	1	0	1	0	1	0	0	0	0	1	1	43	read from display memory	-	8.5.2

Note:

1. In general, the internal registers of the SED1335F are modified as each command parameter is input. However, the microprocessor does not have to set all the parameters of a command and may send a new command before all parameters have been input. The internal registers for the parameters that have been input will have been changed but the remaining parameter registers are unchanged.

   2 bytes parameters(where two bytes are treated as 1 data item) are handled as following:

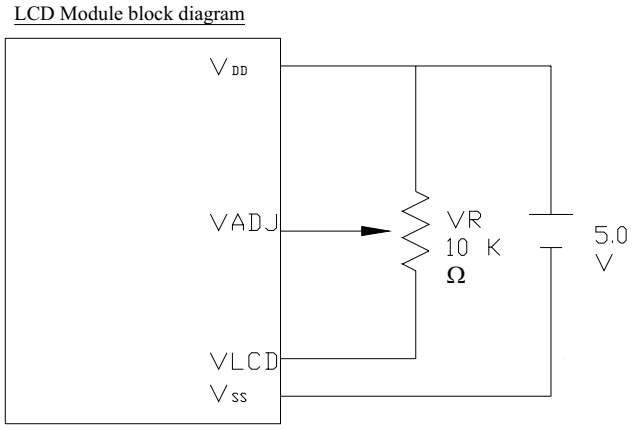
   a. CSRW, CSRR: Each byte is processed individually. The microprocessor may read or write just the low byte of the cursor address.

   b. SYSTEM SET, SCROLL, CGRAM ADR. : Both parameter bytes are processed together. If the command is changed after half of the parameter has been input, the single byte is ignored.

2. APL and APH are 2-byte parameters, but are treated as two 1-byte parameters.
3. Please refer to SED1335F LCD Controller Data Book for detail.

10. Power Supply for LCD Module and LCD Operating Voltage a Adjustment

LCM operating on " DC 3V or 5V " input with external negative voltage.



11. Backlight Information

EL / white

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Voltage	Vrms	--	110 (AC)		--	
Frequency	HZ	--	400		--	
Brightness*	cd/m^2	48	60		--	110Vrms 1000Hz
CIE Chromaticity Diagram	X	--	0.330		--	
	Y	--	0.335		--	
Current Dissipation	mA/cm^2	--	1.33		--	
Power Dissipation	mW/cm^2	--	26.29		--	
Color	white					

- **With EL backlight drive circuit built in,**
- **Input 5Vdc on Interface pin18(EL-ON), the EL backlight will be light on.**

12.Touch panel Information

As shown on MOG-160BB01T-S TP touch panel spec.
Touch panel controller IC information shown on MK715 spec.

13. Quality Assurance

Screen Cosmetic Criteria

No.	Defect	Judgement Criterion	Partition
1	Spots	A)Clear Size: d mm — Acceptable Qty in active area d ≦0.1 — Disregard 0.1<d≦0.2 — 6 0.2<d≦0.3 — 2 0.3<d — 0 Note: Including pin holes and defective dots which must be within one pixel size. B)Unclear Size: d mm — Acceptable Qty in active area d ≦0.2 — Disregard 0.2<d≦0.5 — 6 0.5<d≦0.7 — 2 0.7<d — 0	Minor
2	Bubbles in Polarize	Size: d mm — Acceptable Qty in active area d≦0.3 — Disregard 0.3<d≦1.0 — 3 1.0<d≦1.5 — 1 1.5<d — 0	Minor
3	Scratch	In accordance with spots cosmetic criteria. When the light reflects on the panel surface, the scratches are not to be remarkable.	Minor
4	Allowable Density	Above defects should be separated more than 30mm each other.	Minor
5	Coloration	Not to be noticeable coloration in the viewing area of the LCD panels. Back-light type should be judged with back-light on state only.	Minor

14.Reliability

Content of Reliability Test

Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	60℃ 200hrs	——
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-10℃ 200hrs	——
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50℃ 200hrs	——
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0℃ 200hrs	——
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	60℃,90%RH 96hrs	——
6	High Temperature/ Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	50℃,90%RH 96hrs	——
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. -10℃ 25℃ 60℃ 30min 5min 30min 1 cycle	-10℃/60℃ 10 cycles	——
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	——
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msedc 3 times of each direction	——
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115mbar 40hrs	——
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	——

***Supply voltage for logic system=5V. Supply voltage for LCD system =Operating voltage at 25℃