

User's Guide

NHD-320240WG-ATMI-NZ

LCM

(Liquid Crystal Display Graphic Module)

RoHS Compliant

NHD-	Newhaven Display
320240-	320 x 240 pixels
WG-	W= Factory Line G= Display Type: Graphic
A-	Model / Serial number: A
T-	White LED B/L
M-	STN-(negative)Blue
I-	Transmissive, 6:00 View, Wide Temperature (-20 ~ +70c)
NZ-	Without Negative Voltage; RoHS

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2. Precautions in Use of LCD Module

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD Module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.

3. General Specification for **NHD-320240WG-ATMI-NZ**

ITEM	STANDARD VALUE	UNIT
Number of dots	320 x 240	dots
Outline dimension	166.8(W) x 109.0(H) x 11.0max(T)	mm
View area	122.0(W) x 92.0(H)	mm
Active area	115.18(W) x 86.38(H)	mm
Dot size	0.34(W) x 0.34(H)	mm
Dot pitch	0.36(W) x 0.36(H)	mm
LCD type	STN- BLUE, Negative, Transmissive	
View direction	6 o'clock	
Backlight	LED, White	

4. Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Temperature	T_{OP}	-20	—	+70	°C
Storage Temperature	T_{ST}	-30	—	+80	°C
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

5. Electrical Characteristics

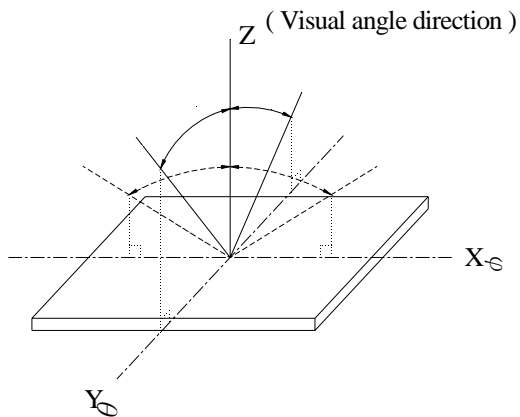
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Voltage	$V_{DD}-V_{SS}$	—	—	5.0	5.5	V
Supply Voltage For LCD	$V_{DD}-V_{EE}$	$T_a=-20^{\circ}\text{C}$	—	—	25.0	V
		$T_a=25^{\circ}\text{C}$	—	24.0	—	V
		$T_a=+70^{\circ}\text{C}$	23.0	—	—	V
Input High Volt.	V_{IH}	—	$0.8V_{DD}$	—	V_{DD}	V
Input Low Volt.	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	I_{DD}	—	70.0	75.0	80.0	mA

6. Optical Characteristics

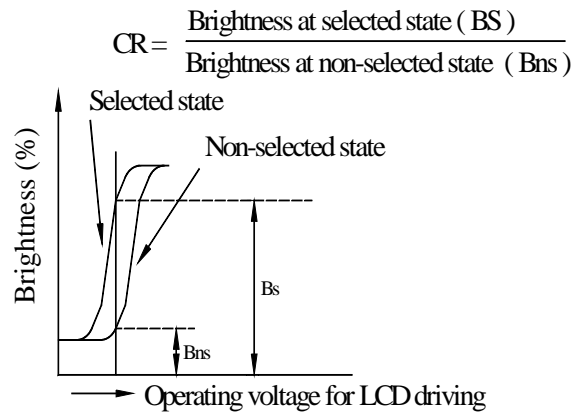
ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
View Angle	(V) θ	$CR \geq 2$	10	—	105	deg.
	(H) φ	$CR \geq 2$	-30	—	30	deg.
Contrast Ratio	CR	—	—	3	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	150	200	ms

6.1 Definitions

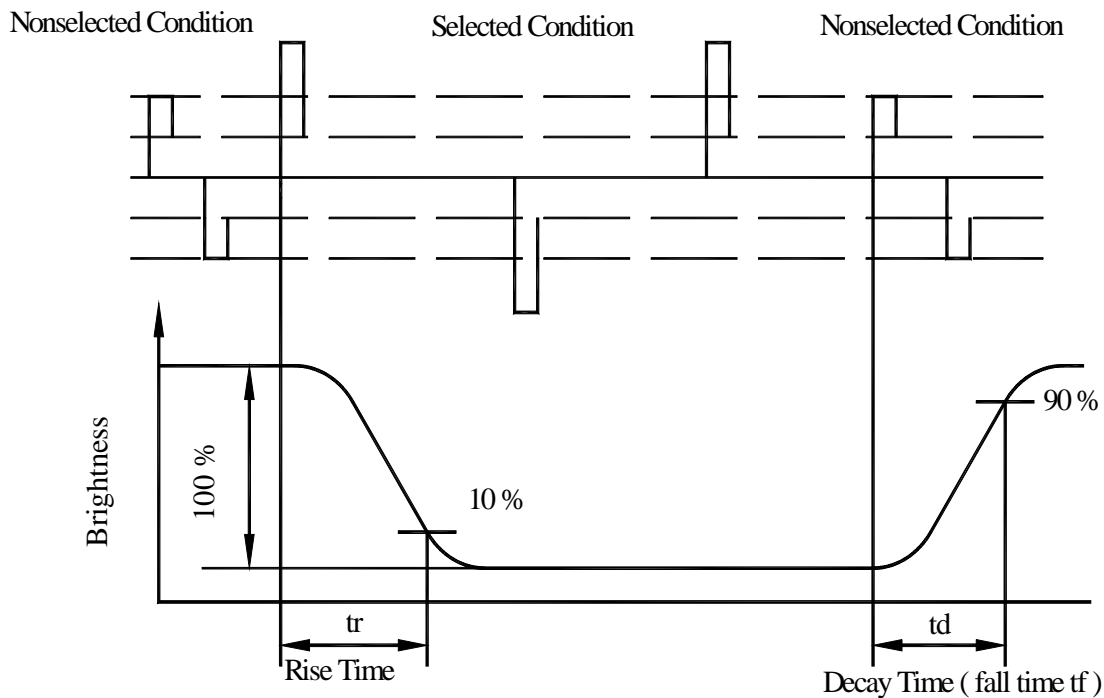
■ View Angles



■ Contrast Ratio



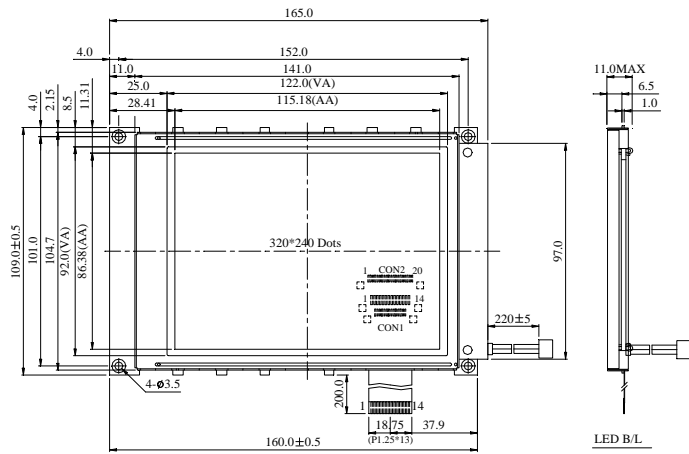
■ Response time



7. Interface Description

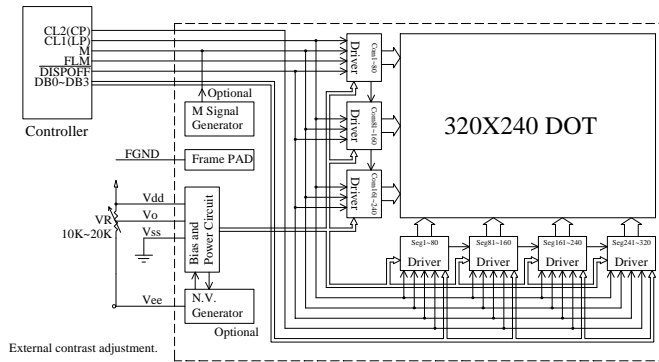
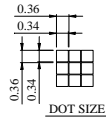
Pin No.	Symbol	Level	Description
1	D0	H/L	Display data, bit0
2	D1	H/L	Display data, bit1
3	D2	H/L	Display data, bit2
4	D3	H/L	Display data, bit3
5	$\overline{\text{DISPOFF}}$	H/L	H: Display ON, L: Display OFF
6	FLM	H/L	Scan start-up signal
7	M (N.C.)	H/L	Frame reverse signal (alternate signal)
8	CL1 (LP)	H to L	Data latch pulse
9	CL2 (CP)	H to L	Data shift pulse
10	V_{DD}	5.0V	Power supply for Logic
11	V_{SS}	0V	Ground
12	V_{EE}	-25v	Negative voltage output (Built-in)
13	V_O	(Variable)	Driving voltage for LCD
14	FGND		Frame Ground

8. Contour Drawing & Block diagram

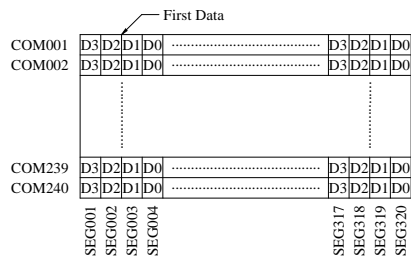
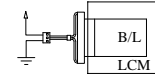


PINNO.	SYMBOL
1	DB0
2	DB1
3	DB2
4	DB3
5	DISPOFF
6	FLM
7	M
8	LP
9	CP
10	Vdd
11	Vss
12	Vee
13	Vo
14	FGND

The non-specified tolerance of dimension is ±0.3mm.



LED B/L drive directly from connector.



9. Timing Characteristics

9.1. Common & Segment interface timing:

ITEM	symbol	Test Condition	Min.	Typ.	Max.	Units
Clock Cycle	tC	Fig.1	100	—	—	ns
CP Pulse Width	tWC	Fig.1	50	—	—	ns
LP Pulse Width	tWL	Fig.1	50	—	—	ns
Data Set Up Time	tDSU	Fig.1	30	—	—	ns
Data Hold Time	tDHD	Fig.1	30	—	—	ns
CP Rise/Fall Time	tr,tf	Fig.1	—	—	50	ns
CP to LOAD	tCL	Fig.1	80	—	—	ns
LOAD to CP	tLC	Fig.1	110	—	—	ns
LP Pulse Width	tLW	Fig.1	50	—	—	ns
CL1 Pulse Width	tCW	Fig.2	63	—	—	ns
Data Set Up Time	tDSU2	Fig.2	100	—	—	ns
Data Hold Time	tDHD2	Fig.2	100	—	—	ns
CL1 Rise/Fall Time	tr2,tf2	Fig.2	—	—	50	ns

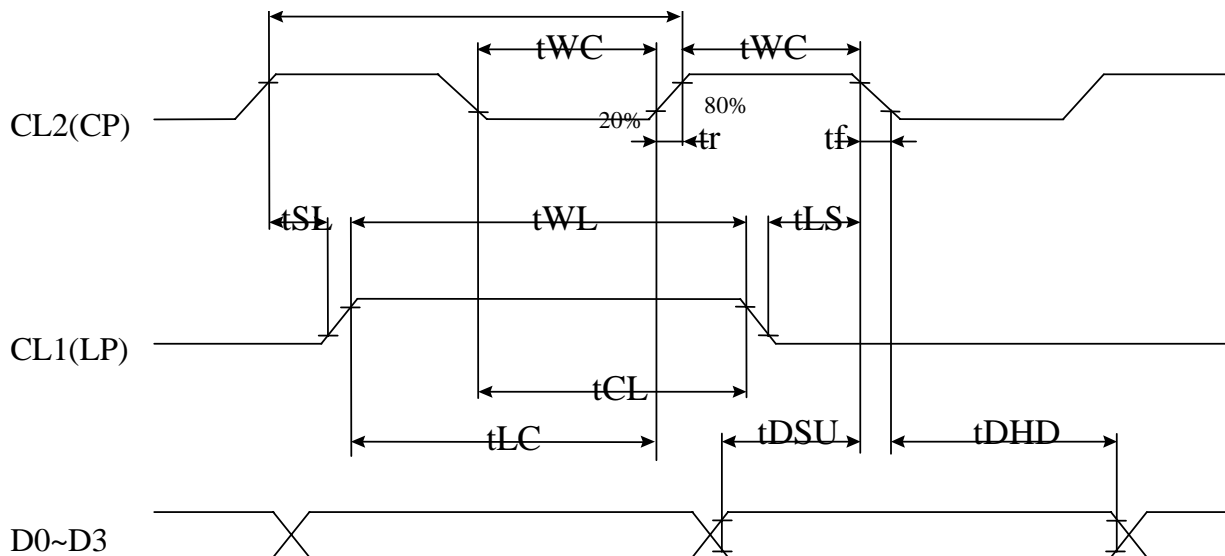


Fig 1. SEGMENT TIMING

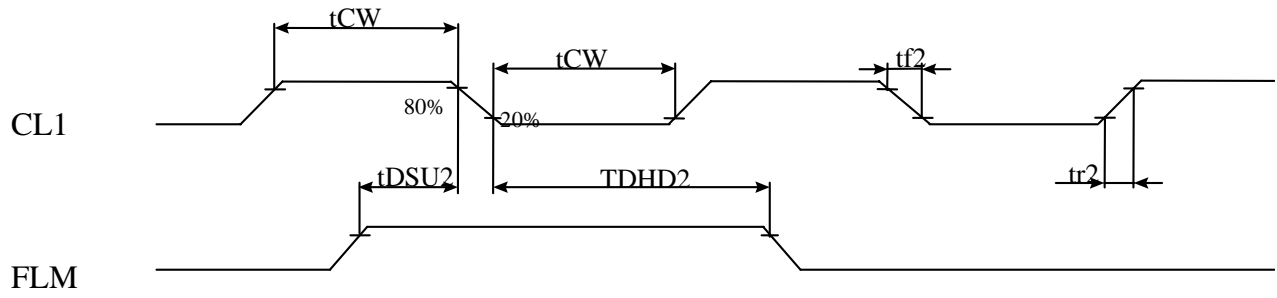
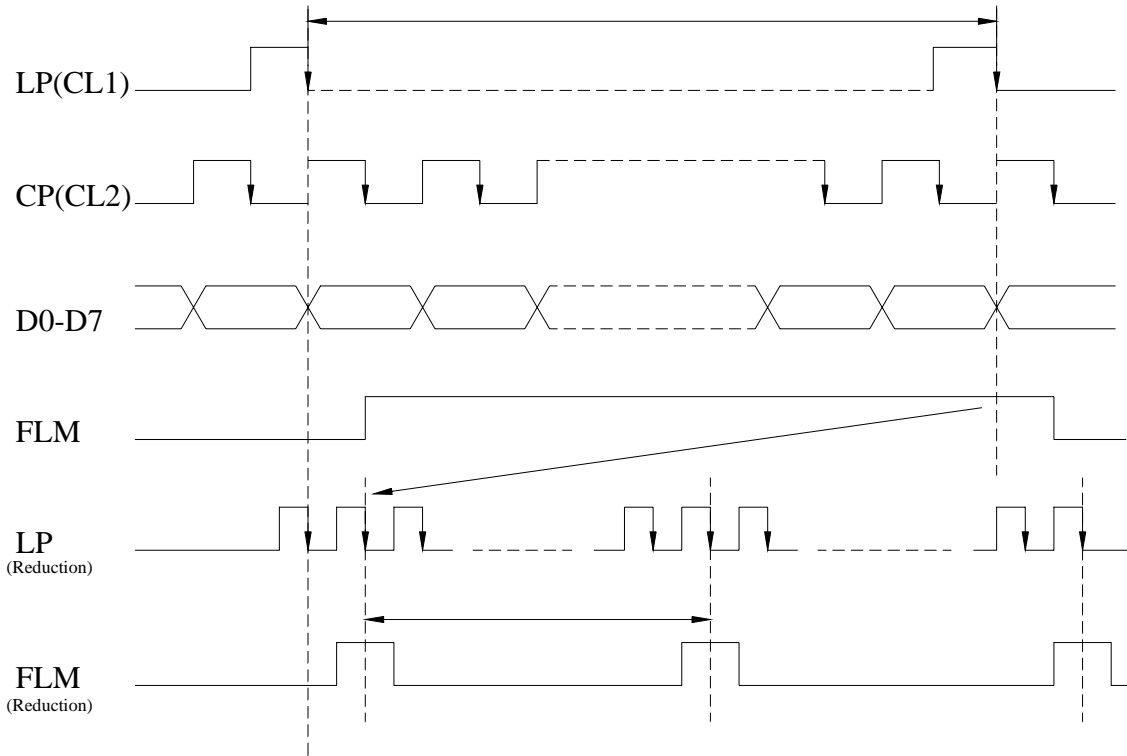
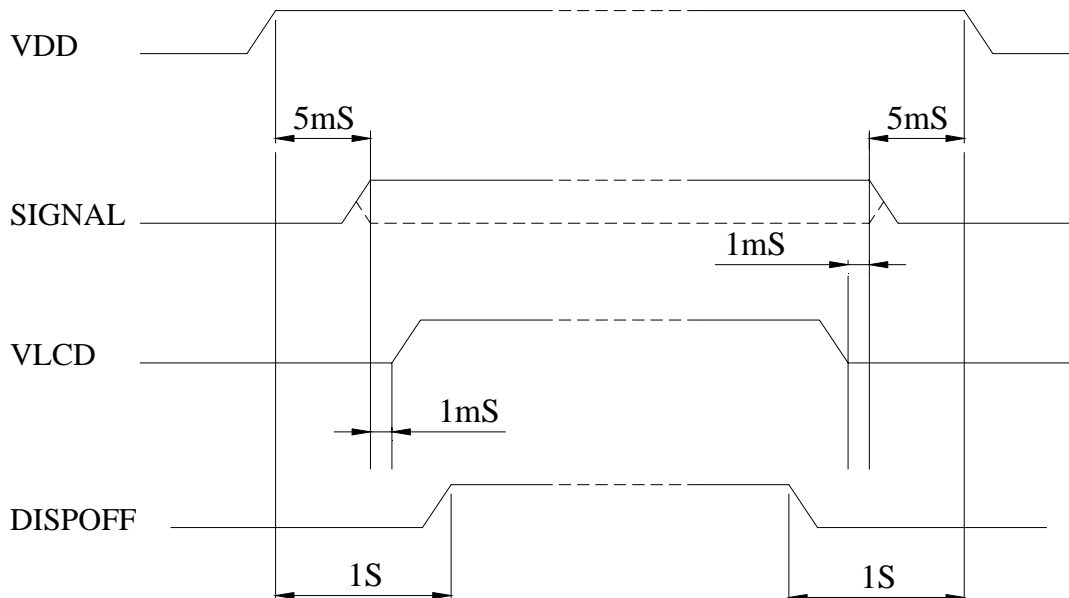


Fig 2 COMMON TIMING

TIMING CHART OF INPUT SIGNAL



POWER ON/OFF TIMING



10. Quality Assurance

◆ Screen Cosmetic Criteria

No.	Defect	Judgement Criteria	Partition																				
1	Spots	<p>A) Clear</p> <table border="1"> <thead> <tr> <th>Size: d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.1$</td> <td>Disregard</td> </tr> <tr> <td>$0.1 < d \leq 0.2$</td> <td>6</td> </tr> <tr> <td>$0.2 < d \leq 0.3$</td> <td>2</td> </tr> <tr> <td>$0.3 < d$</td> <td>0</td> </tr> </tbody> </table> <p>Note: Including pin holes and defective dots which must be within one pixel size.</p> <p>B) Unclear</p> <table border="1"> <thead> <tr> <th>Size: d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>Disregard</td> </tr> <tr> <td>$0.2 < d \leq 0.5$</td> <td>6</td> </tr> <tr> <td>$0.5 < d \leq 0.7$</td> <td>2</td> </tr> <tr> <td>$0.7 < d$</td> <td>0</td> </tr> </tbody> </table>	Size: d mm	Acceptable Qty in active area	$d \leq 0.1$	Disregard	$0.1 < d \leq 0.2$	6	$0.2 < d \leq 0.3$	2	$0.3 < d$	0	Size: d mm	Acceptable Qty in active area	$d \leq 0.2$	Disregard	$0.2 < d \leq 0.5$	6	$0.5 < d \leq 0.7$	2	$0.7 < d$	0	Minor
Size: d mm	Acceptable Qty in active area																						
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$0.5 < d \leq 0.7$	2																						
$0.7 < d$	0																						
2	Bubbles in Polarize	<table border="1"> <thead> <tr> <th>Size: d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.3$</td> <td>Disregard</td> </tr> <tr> <td>$0.3 < d \leq 1.0$</td> <td>3</td> </tr> <tr> <td>$1.0 < d \leq 1.5$</td> <td>1</td> </tr> <tr> <td>$1.5 < d$</td> <td>0</td> </tr> </tbody> </table>	Size: d mm	Acceptable Qty in active area	$d \leq 0.3$	Disregard	$0.3 < d \leq 1.0$	3	$1.0 < d \leq 1.5$	1	$1.5 < d$	0	Minor										
Size: d mm	Acceptable Qty in active area																						
$d \leq 0.3$	Disregard																						
$0.3 < d \leq 1.0$	3																						
$1.0 < d \leq 1.5$	1																						
$1.5 < d$	0																						
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																				

11. 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.	80°C 200hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	—
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	—
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	80°C,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.	70°C,90%RH 96hrs	—
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. $ \begin{array}{c} -30^{\circ}\text{C} \quad 25^{\circ}\text{C} \quad 80^{\circ}\text{C} \\ \longleftarrow \hspace{1.5cm} \longrightarrow \\ 30\text{min} \quad 5\text{min} \quad 30\text{min} \\ \hline 1 \text{ cycle} \end{array} $	-30°C/80°C 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 msdc 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°C

12. Backlight Information

(Ta=25°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I _{LED}	-	150	180	mA	V=3.7V
Supply Voltage	V	-	3.5	3.6	V	-
Reverse Voltage	V _R	-	-	10	V	-
Luminous Intensity	I _V	-	30	-	CD/M ²	I _{LED} =160mA
Wave Length	λ _p	-	-	-	nm	I _{LED} =160mA
Life Time	-	-	50K	-	Hr.	V ≤ 3.6mA
Color	White					