



Winstar Display Co., LTD

華凌光電股份有限公司



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SPECIFICATION

CUSTOMER : _____

MODULE NO.: **WG320240D-TFH-VZ**

APPROVED BY: (FOR CUSTOMER USE ONLY)	
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
ISSUED DATE:			



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MODLE NO :

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DOC. FIRST ISSUE

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SUMMARY

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First issue

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1. Module Classification Information

W G 3 2 0 2 4 0 D — T F H — VZ
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Brand : WINSTAR DISPLAY CORPORATION

② Display Type : H→Character Type, G→Graphic Type

③ Display Font : 320 * 240 Dots

④ Model serials number

⑤ Backlight Type : N→Without backlight

B→EL, Blue green

A→LED, Amber

D→EL, Green

R→LED, Red

W→EL, White

O→LED, Orange

F→CCFL, White

G→LED, Green

Y→LED, Yellow Green

⑥ LCD Mode : B→TN Positive, Gray

T→FSTN Negative

N→TN Negative,

G→STN Positive, Gray

Y→STN Positive, Yellow Green

M→STN Negative, Blue

F→FSTN Positive

⑦ LCD Polarize Type/ A→Reflective, N.T, 6:00

H→Transflective, W.T,6:00

Temperature range/ D→Reflective, N.T, 12:00

K→Transflective,

View direction

G→Reflective, W. T, 6:00

W.T,12:00

J→Reflective, W. T, 12:00

C→Transmissive, N.T,6:00

B→Transflective, N.T,6:00

F→Transmissive, N.T,12:00

E→Transflective, N.T.12:00

I→Transmissive, W. T, 6:00

L→Transmissive,

W.T,12:00

⑧ Special Code V: Build in Negative Voltage

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

ITEM	STANDARD VALUE	UNIT
Number of dots	320x240	dots
Outline dimension	156.7(W)x 98.0(H)x 11.4max(T)	mm
View area	106.0(W)x 80.6(H)	mm
Active area	95.98(W)x 71.98(H)	mm
Dot size	0.27(W)x 0.27(H)	mm
Dot pitch	0.3(W)x 0.3(H)	mm
LCD type	FSTN ,Positive , Transflective	
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

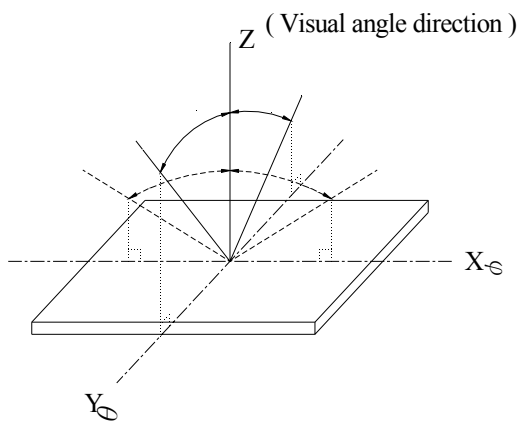
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Voltage	$V_{DD}-V_{SS}$	—	—	5.0	5.5	V
Supply Voltage For LCD	$V_{DD}-V_O$	$T_a=0^{\circ}\text{C}$	—	—	22.6	V
		$T_a=25^{\circ}\text{C}$	—	21.6	—	V
		$T_a=+50^{\circ}\text{C}$	20.6	—	—	V
Input High Volt.	V_{IH}	—	$0.8V_{DD}$	—	V_{DD}	V
Input Low Volt.	V_{IL}	—	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}	—	—	45	50	mA

6. Optical Characteristics

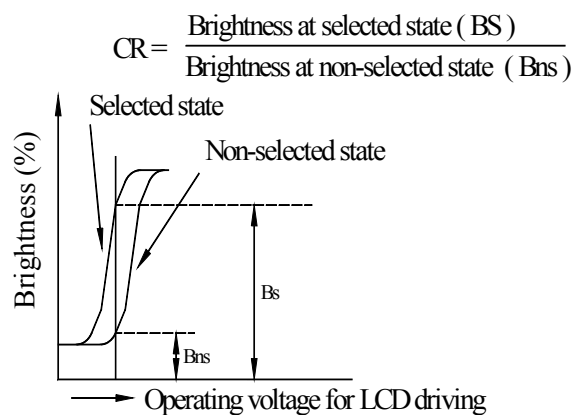
ITEM	SYMBAL	CONDITION	MIN	TYP	MAX	UNIT
View Angle	(V) θ	$CR \geq 3$	30	—	60	deg.
	(H) φ	$CR \geq 3$	-45	—	45	deg.
Contrast Ratio	CR	—	—	5	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	150	200	ms

6.1 Definitions

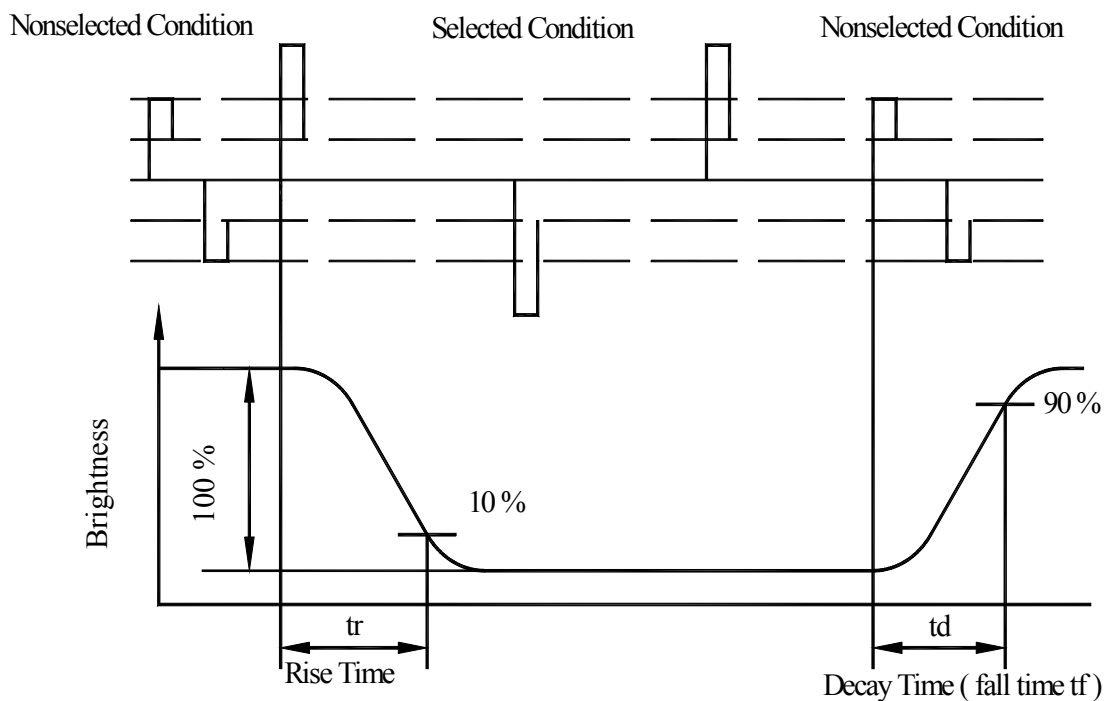
■ View Angles



■ Contrast Ratio



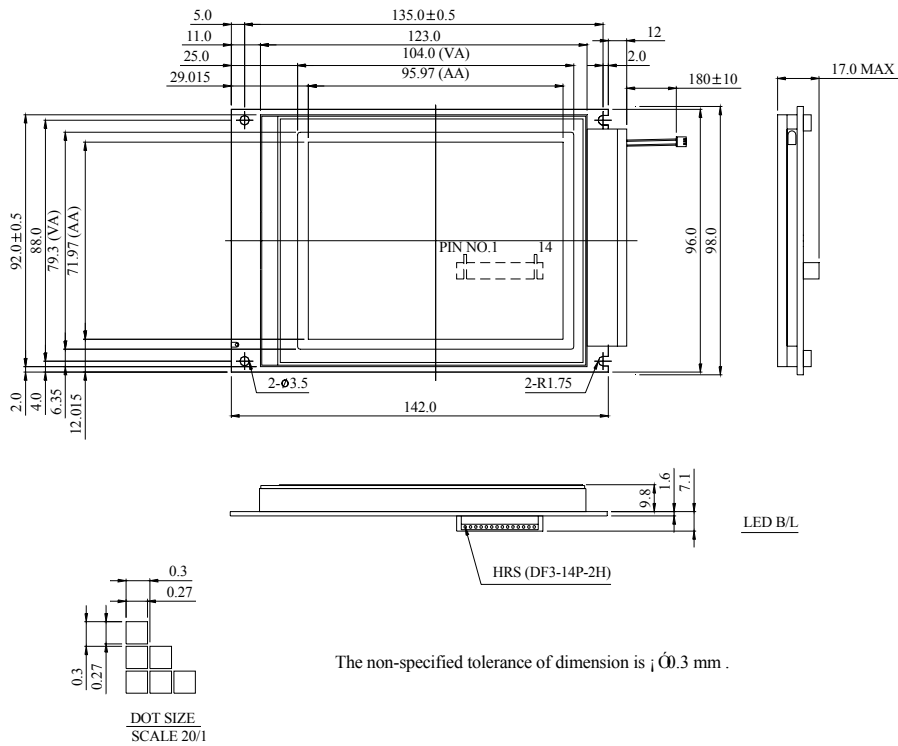
■ Response time



7. Interface Description

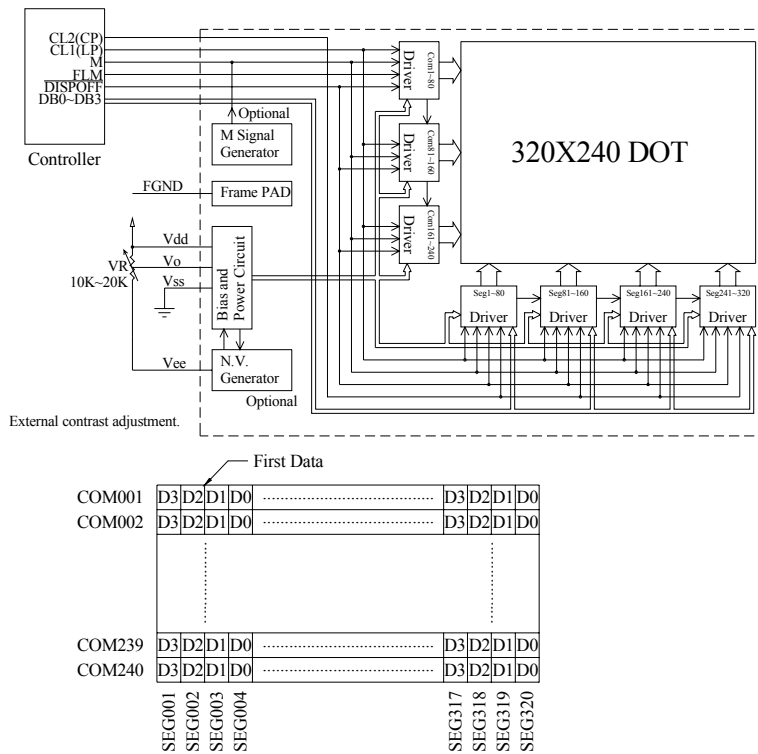
Pin No.	Symbol	Level	Description
1	FRAME	H/L	Scan start-up signal
2	DF(M)	H/L	Frame reverse signal(alternate signal)
3	LOAD(CL1)	H to L	Data latch pulse
4	CP(CL2)	H to L	Data shift pulse
5	$\overline{\text{DISPOFF}}$	H/L	H: Display ON, L: Display OFF
6	D0	H/L	Display data, bit0
7	D1	H/L	Display data,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

8. Contour Drawing & Block diagram

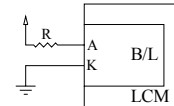


PIN LAYOUT

PIN NO.	SYMBOL
1	FRAME
2	DF
3	LOAD
4	CP
5	D•OFF
6	D0
7	D1
8	D2
9	D3
10	VDD
11	VSS
12	VEE
13	V0
14	FG



LED B/L drive directly from A,K.



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

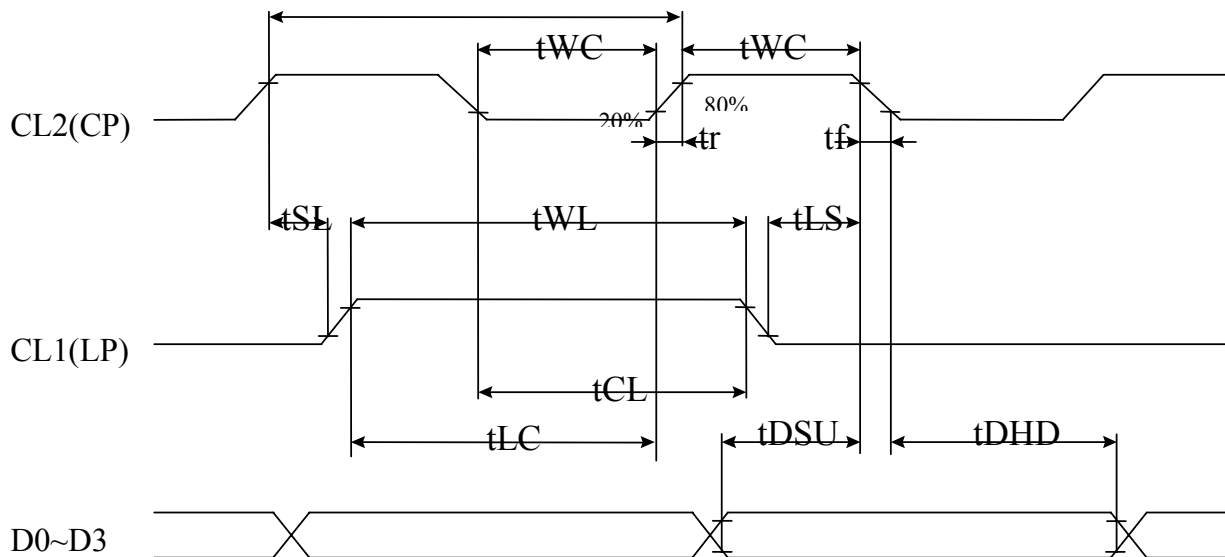


Fig 1. SEGMENT TIMING

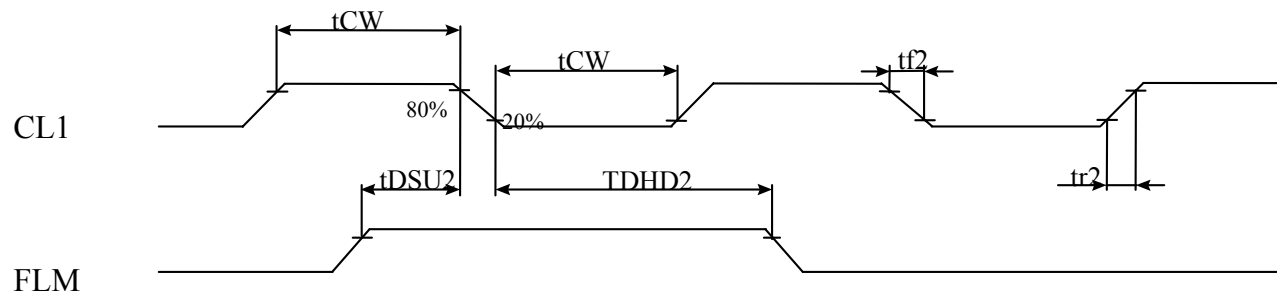
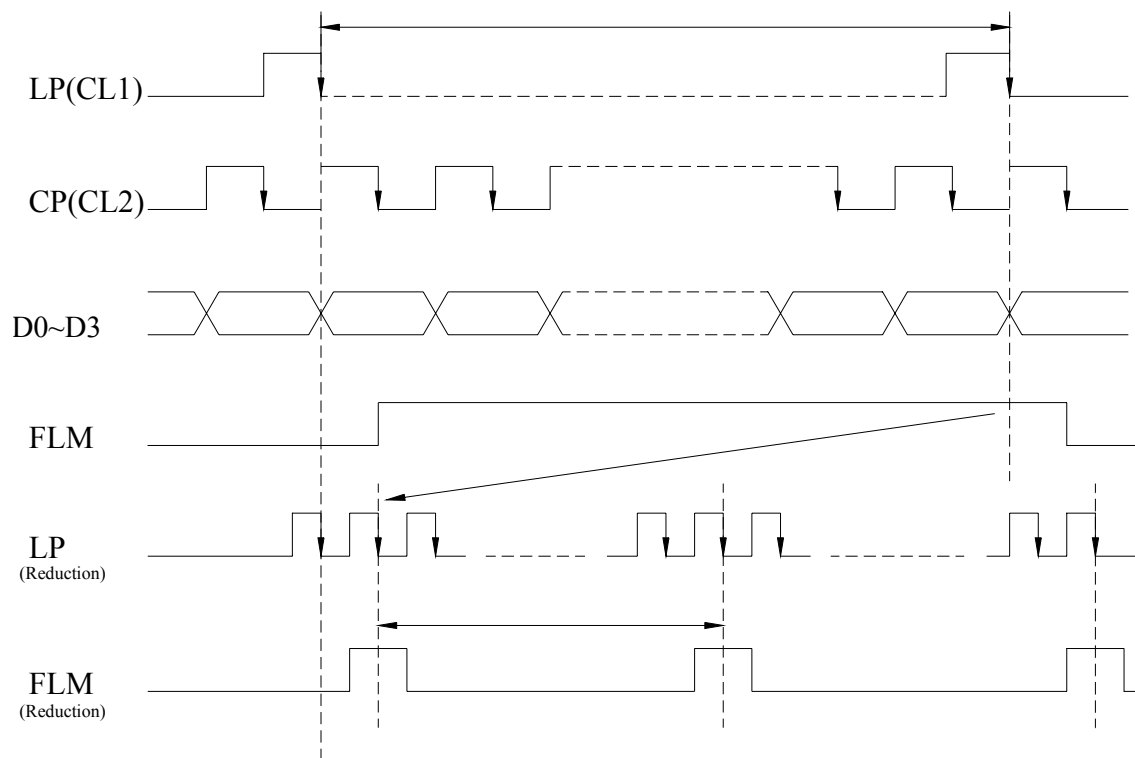
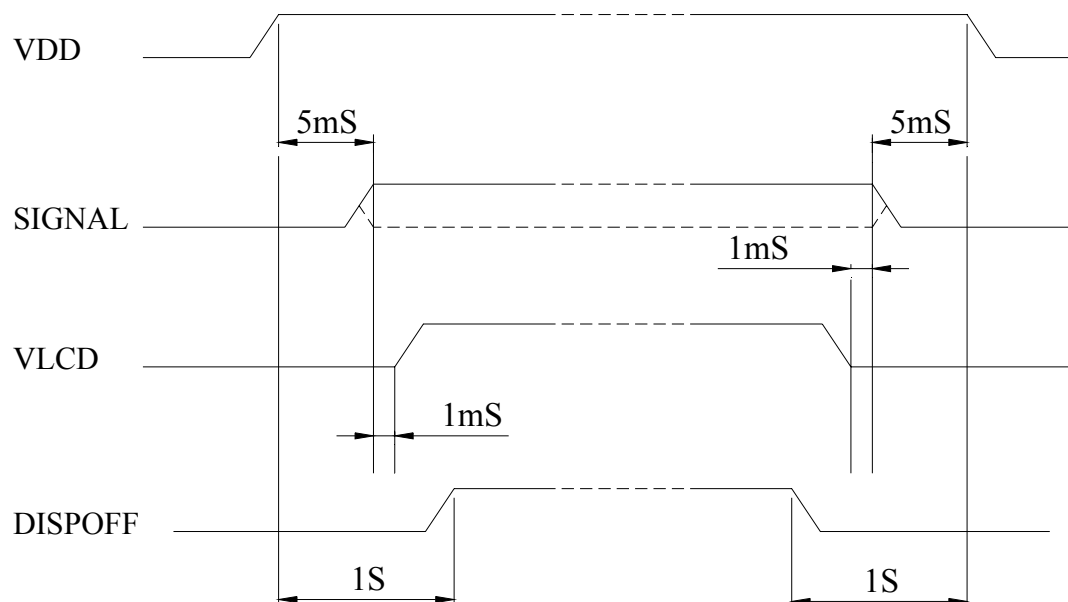


Fig 2 COMMON TIMING

TIMING CHART OF INPUT SIGNAL



POWER ON/OFF TIMING



10. Quality Assurance

◆ Screen Cosmetic Criteria

No.	Defect	Judgement Criterion	Partition																				
1	Spots	A)Clear <table><tr><th>Size: d mm</th><th>Acceptable Qty in active area</th></tr><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></table> Note: Including pin holes and defective dots which must be within one pixel size. B)Unclear <table><tr><th>Size: d mm</th><th>Acceptable Qty in active area</th></tr><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></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																						
$d \leq 0.1$	Disregard																						
$0.1 < d \leq 0.2$	6																						
$0.2 < d \leq 0.3$	2																						
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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																						
2	Bubbles in Polarize	<table><tr><th>Size: d mm</th><th>Acceptable Qty in active area</th></tr><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></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℃ 200hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30℃ 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℃ 200hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	—
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	80℃,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℃,90%RH 96hrs	—
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. -30°C 25°C 80°C $\xleftarrow{\hspace{1.5cm}}$ $\xrightarrow{\hspace{1.5cm}}$ 30min 5min 30min 1 cycle	-30℃/80℃ 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℃

12. Backlight Information

LED(Edge) backlight Specification

(Ta=25°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I _{LED}	—	200	—	mA	V=3.5V
Supply Voltage	V	—	3.5	3.7	V	—
Reverse Voltage	V _R	—	—	5	V	—
Luminous Intensity	I _V	20	30	—	CD/M ²	I _{LED} =200mA
Wave Length	λ _p	—			nm	I _{LED} =200mA
Life Time	—	—	50K	—	Hr.	V ≤ 3.5V
Color	White					