

億力光電股份有限公司

EVERVISION ELECTRONICS CO., LTD.

Product Specification For LCD Module
(KVPF-7B-002-16)

Model NO. : VGG121201-6FWNNA(RoHS)


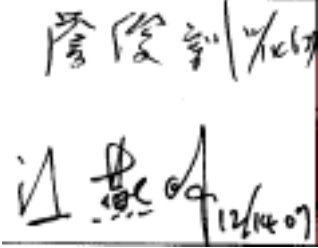
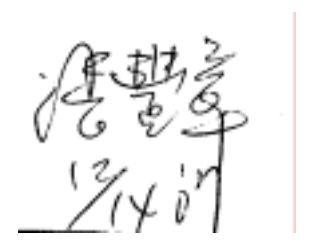

REVISION : 3

APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER : STD	APPROVED BY :
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EVERVISION LCM R&D CENTER

APPROVED BY	CHECKED BY	PREPARED BY	
			
DIRECTOR	MANAGER	Mechanism Engineer	Electronic Engineer

億力光電股份有限公司總公司
EVERVISION ELECTRONICS LTD.
 台北縣中和市建一路 186 號 12 樓
 12F,NO.186, JIAN 1st RD., CHUNG HO CITY,
 TAIPEI HSIEN, TAIWAN, R.O.C
 TEL : +886 2 8227-2788
 FAX : +886 2 8227-2789

億力光電股份有限公司台中分公司
EVERVISION ELECTRONICS(T.C) LTD.
 台中縣潭子鄉台中加工出口區建國路 19 號
 NO.19,CHIEN KUO ROAD.T.E.P.Z TANTZE
 427 TAICHUNG HSIEN TAIWAN R.O.C
 TEL : +886 4 2532-8889
 FAX : +886 4 2532-6689

東莞莞城德寶電子廠
EVERVISION ELECTRONICS(B.V.I) LTD.
 廣東省東莞市城區東縱大道天寶路 9 號
 NO.9,Tian Bao Rd.,Dong Zong St.,Dong Guan City
 Guang Dong, China.
 TEL : +86 769 2220 5258
 FAX : +86 769 2220 7258

勁佳光電(昆山)有限公司
EVERVISION ELECTRONICS(KUNSHAN) LTD.
 江蘇省昆山市玉山鎮高科技工業園城北路 8 號
 NO.8,Chengbei Rd., Hi-Tech Industry Park ,
 Yushan Town , Kunshan City , Jiangsu,China.
 TEL : +86 512 5778 7288
 FAX : +86 512 5777 0688

<http://www.evervisionlcd.com>

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MODULE NUMBERING SYSTEM

V B C 1216 01 - 1 R T N N A

Serial No: A~Z

Backlight Color:
N: Without Backlight;
A: Amber; **B:** Blue; **G:** Green;
L: Yellow; **O:** Orange; **R:** Red;
W: White; **Y:** YellowGreen;
X: Others

Backlight Type:
N: Without Backlight; **E:** EL; **F:** CCFL;
L: General LED; **H:** High NTSC LED ;
R: RGB LED; **X:** Others

LCD Model:
T: TN; **H:** HTN; **G:** STN Gray; **Y:** STN Yellow;
B: STN Blue; **W:** FSTN Black/White;
C: CSTN; **F:** TFT; **O:** OLED; **P:** PLED;
L: LTPS; **N:** Others

LCD Type:
R: Reflective/Positive;
S: Reflective/Negative ;
F: Transflective/Positive ;
G: Transflective/Negative ;
U: Transmissive/Positive ;
T: Transmissive/Negative ; **N:** Others

Temperature Range & View Direction:
 General Purpose : **1:**6H **2:**12H **3:**3H **4:**9H **5:**Others
 High Performance: **6:**6H **7:**12H **8:**3H **9:**9H **0:**Others

STD Product Serial No.: 01~99
 Customer Made Serial No.: A1,A2... A9,B1,B2... B9,C1..

Display Function:
 Segment Number / Characters Lines / Column and Row Dots
 / Length * Width of Other

Display Type:
C: Character Type; **G:** Graphic Type; **S:** Segment Type; **O:** Other

Package Type:
B: COB; **F:** COF; **G:** COG; **H:** Heat Seal; **S:** SMT; **T:** TAB; **O:** Others

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GENERAL SPECIFICATION

ITEM	CONTENTS
Module Size	36.3 (H)mm * 73.2(W)mm *2.1 max(D) mm
Display Format	128*128 DOTS
View Area	30.5 (H)mm * 32.0 (W) mm
Dot Size	0.199 mm* 0.219 mm
Dot Pitch	0.219 mm * 0.239 mm
LCD Type	FSTN / Transflective/Positive
View Angle	6 O'clock
Controller IC	ST7541
Duty Ratio	1/128 duty
Bias	1/12 Bias
Weight	11 g

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ABSOLUTE MAXIMUM RATING(Ta=25 VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Humidity
Supply Voltage for Logic	V _{DD} -V _{SS}	-0.5	-	+5.0	Volt	-
Power Supply for LCD	LCD Vop	+0.3	-	+15.0	Volt	-
Input Voltage	V _{IN}	-0.5	-	V _{DD} +0.5	Volt	-
Operating Temperature	Top	-10	-	+60		Note1
Storage Temperature	Tst	-20	-	+70		Note2

Note1: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Ta 60 : 75%RH max

Ta>60 : absolute humidity must be lower than the humidity of 75%RH at 70

Note2: Ta at -20 will be <48hrs, at 70 will be <120hrs

ELECTRO-OPTICAL CHARACTERISTICS (Ta = 25)

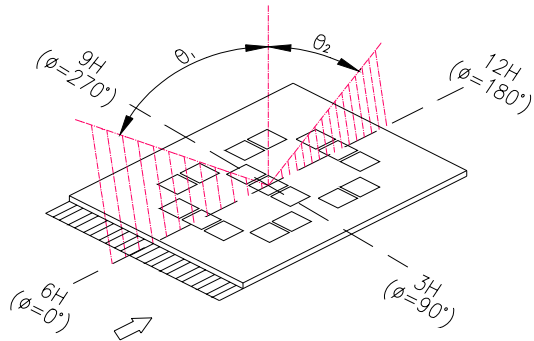
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	V _{DD} -V _{SS}	-	-	3.3	-	Volt
Input Voltage	V _{IL}	L level	V _{SS}	-	0.3V _{DD}	Volt
	V _{IH}	H level	0.7 V _{DD}	-	V _{DD}	Volt
LCD Module Driving Voltage	Vop	Ta = 25	-	11.6	-	Volt
Power Supply Current for LCM	I _{DD}	V _{DD} =3.3V	-	1.0	1.4	mA

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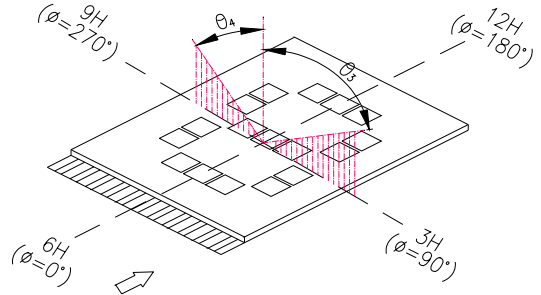
OPTICAL CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Condition	Note
Viewing Angle Cr 2	=0°	1	--	40	--	deg. T=25°C	1.2
	=180°	2	--	10	--		
	=90°	3	--	30	--		
	=270°	4	--	30	--		
Contrast Ratio	Cr	--	7	--	--	T=25°C	3
Response Time (rise)	Tr	--	200	300	ms	T=25°C	4
Response Time (fall)	Tf	--	200	300	ms	T=25°C	4

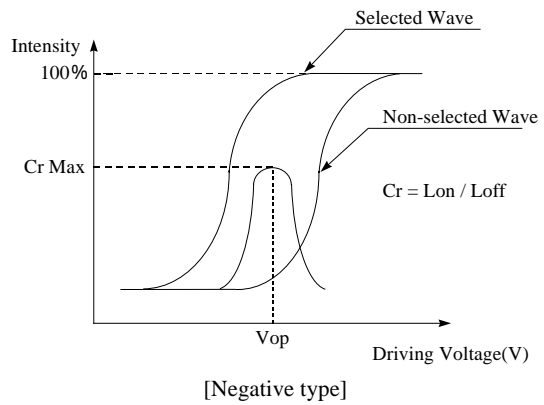
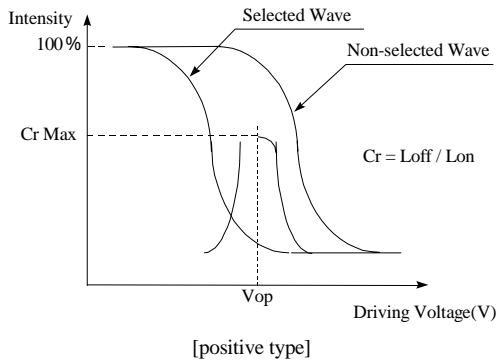
Note 1. Definition of angle 1& 2



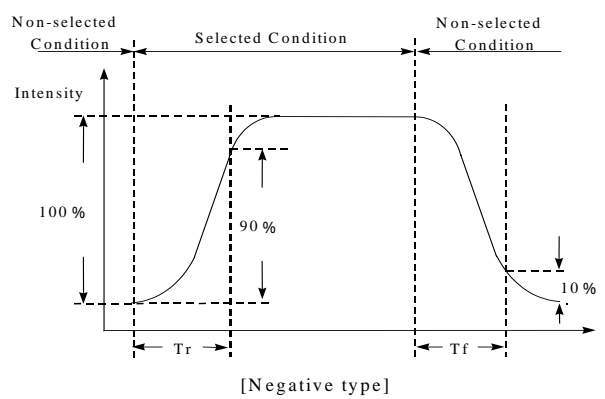
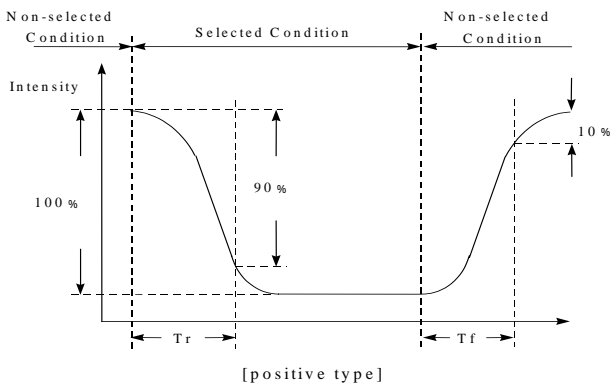
Note 2. Definition of angle 3& 4



Note 3. Definition of contrast ratio (Cr)



Note 4. Definition of response time



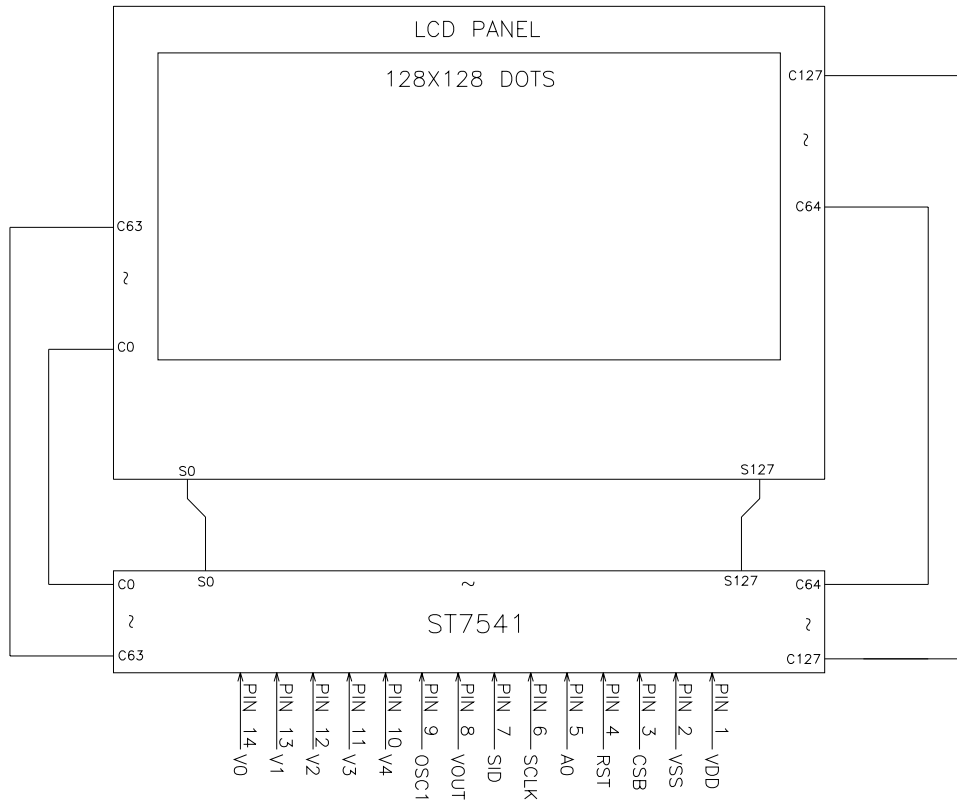
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INTERFACE PIN ASSIGNMENT

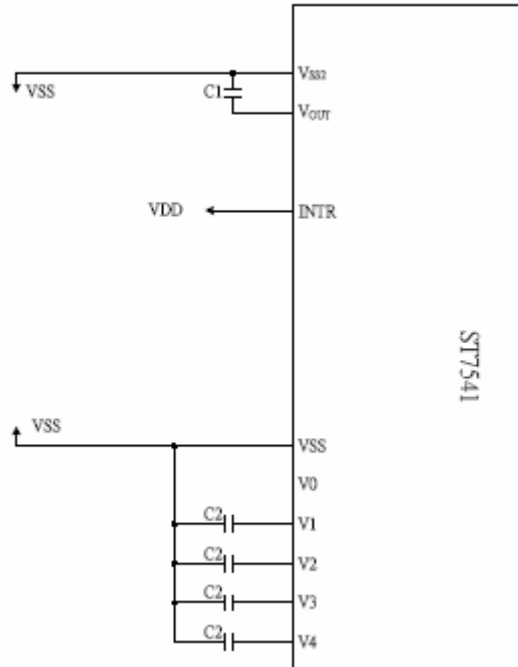
PIN NO.	PIN OUT	FUNCTION DESCRIPTION										
1	VDD	Power supply										
2	VSS	Ground										
3	CSB	Chip select input pins Data/instruction I/O is enabled only when CSB is "L". When chip select is non-active, DB0 to DB7 may be high impedance.										
4	RST	Reset input pin When RESETB is "L", initialization is executed.										
5	A0	Register select input pin . A0 = "H": DB0 to DB7 are display data . A0 = "L": DB0 to DB7 are control data										
6	SCLK	serial input data (SID)										
7	SID	serial input clock (SCLK)										
8	VOUT	Main LCD power supply										
9	OSC1	External OSC input pin, when using internal clock oscillator, connect OSC1 to VDD.										
10~14	V4~V0	<p>LCD driver supply voltages</p> <p>The voltage determined by LCD pixel is impedance-converted by an operational amplifier for application. V1,V2,V3,V4 need the capacitor between with VSS</p> <p>Voltages should have the following relationship; $V0 > V1 > V2 > V3 > V4 > VSS$</p> <p>When the internal power circuit is active, these voltages are generated as following table according to the state of LCD bias.</p> <table border="1" data-bbox="566 1572 1388 1653"> <thead> <tr> <th>LCD bias</th> <th>V1</th> <th>V2</th> <th>V3</th> <th>V4</th> </tr> </thead> <tbody> <tr> <td>1/N bias</td> <td>$(N-1) / N \times V0$</td> <td>$(N-2) / N \times V0$</td> <td>$(2/N) \times V0$</td> <td>$(1/N) \times V0$</td> </tr> </tbody> </table> <p>NOTE: N = 5 to 12</p>	LCD bias	V1	V2	V3	V4	1/N bias	$(N-1) / N \times V0$	$(N-2) / N \times V0$	$(2/N) \times V0$	$(1/N) \times V0$
LCD bias	V1	V2	V3	V4								
1/N bias	$(N-1) / N \times V0$	$(N-2) / N \times V0$	$(2/N) \times V0$	$(1/N) \times V0$								

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BLOCK DIAGRAM



POWER SUPPLY



C1=1uF~4.7uF/16V (X5R)

C2=0.1uF~1uF

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RELIABILITY

Environmental Test

NO.	Test Item	Test Condition	Test Time	Note
1	Low temperature storage	-30±2	240H	-
2	High temperature storage	70±2	240H	-
3	Low temperature operation	-20±2	240H	-
4	High temperature operation	60±2	240H	-
5	High temperature/ Humidity storage	60±2 90%±5%RH	240H	Without dewing
6	Thermal shock storage	-30 (30min) 25 (5min) +70 (30min)	10 cycles	-

Mechanical Test

NO.	Test Item	Test Condition	Note
1	Vibration test	Sweep for 1 min at 10Hz , 55Hz , 10Hz , amplitude 1.5mm 15 minutes each in the X , Y and Z directions(Total 45 minutes)	Non operation state
2	Drop test	One angle,three edges and six sides. 75cm above the ground(no weight difference)	Non operation state

LIFE TIME

Item	Description
1.	Functions, Performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±10°C) , normal humidity(45±20%RH),and in area not exposed to direct sun light. (Expect Backlight)

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Specification of quality assurance

1.1 Purpose

This standard for quality assurance should affirm the quality of LCD module products to supply to (Purchaser) by EVERVISION ELECTRONIC LTD.(Supplier)

1.2 Standard for Quality Test

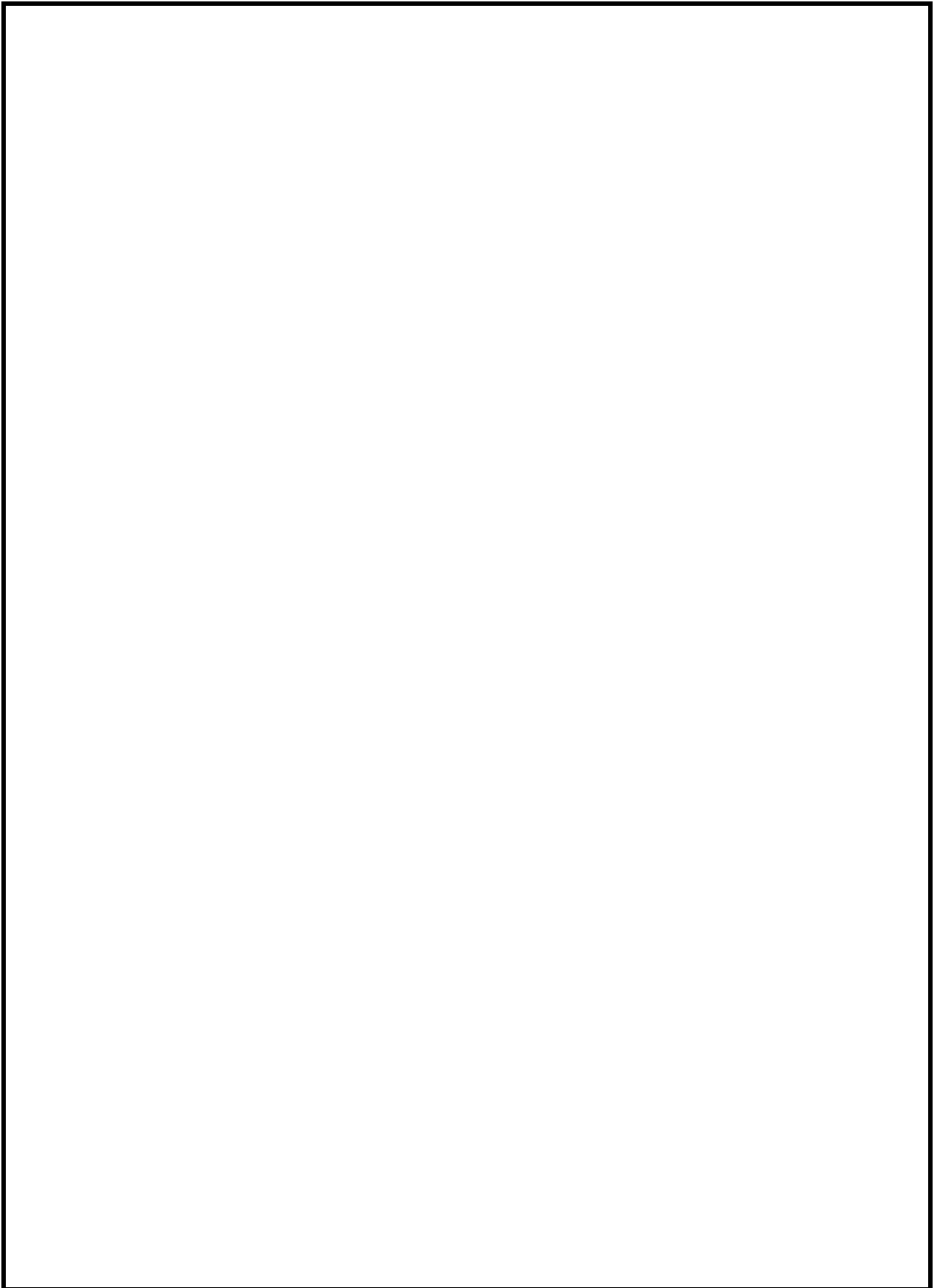
1.2.1 Test method: According to MIL-STD-105E, General Inspection Level II take a single time.

1.2.2 Electronic Assemblies Standard is according to IPC-AA610 REV. C . CLASS 2

1.2.3 The defects classify of AQL as following list.

Classify	Inspect item	Nonconforming status	AQL	Remark
Critical defect	1.Display damage	(1) Non-Display	AQL=0.65	Product no function
		(2) Occur high current		
		(3) Segment missing		
		(4) LCD with wrong viewing direction		
		(5) Back light unlighted		
	2.Dimension not correct	(1) PCB and bezel out of specification	AQL=0.65	Can not assembly
Major defect	1.Display	(1) Display scanned Disorder	AQL=1.0	
		(2) display defect		
	2.Back-light	(1) Flash , duct		
		(2) Wong color		
Minor defect	1.LCD	(1)Dust(Black spot , white spot)	AQL=2.50	Appearance defect
		(2) Polarizer scratch		
		(3) Reflective polarizer with bubble		
		(4) Display segment transfigure		
		(5) Color out of the range of sample color		
	2.COB	(1) The PAD of wire bond exposed		
		(2) Resin not enough (line of wire boding exposure)		
		(3) Bubble,dust on the COB		
	3.PCB	(1) Dust,solder ball on the PCB		
		(2) PAD scratch		
Total			AQL=2.50	

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1.3 NONCONFORMING ANALYSIS & DEAL WITH MANNERS

1.3.1 Nonconforming analysis:

- Purchaser should supply the detail data of non-conforming sample and the improper state.
- After accepting the detail data from purchaser , the analysis of Nonconforming should be finished in two weeks.
- If supplier cannot finish analysis on time , must announce purchaser.

1.3.2 Disposition of nonconforming:

- If the customer will find any defected product during assembly time , supplier will replace the good product for every defect after.
- Both supplier and customer should analysis the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

1.4 Agreement items

Both sides should discuss together when the following problems happen.

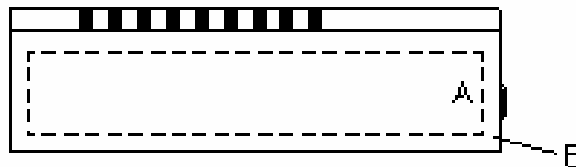
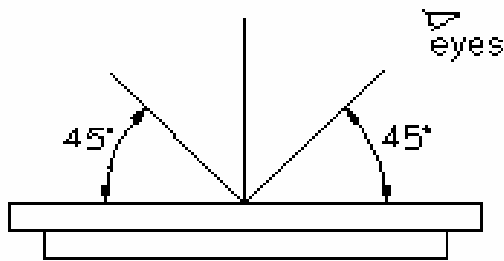
- 1.4.1 There is any problem of standard of quality assurance , and both sides Think that must be modified.
- 1.4.2 There is any argument item which does not recorded in the standard of quality assurance.
- 1.4.3 Any other special problem.

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1.5 Standard of the product appearance test

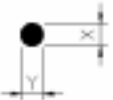

1.5.1 Manner of appearance test

- The test must be under 20W×2 or 40W fluorescent light , and the distance of view must be at 30cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on about 45° of vertical line.

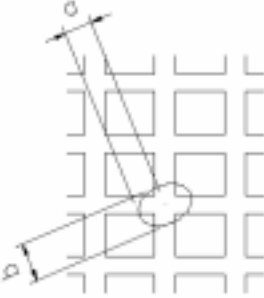


- Definition of area :
A area: viewing area
B area: out of viewing area(outside viewing area)

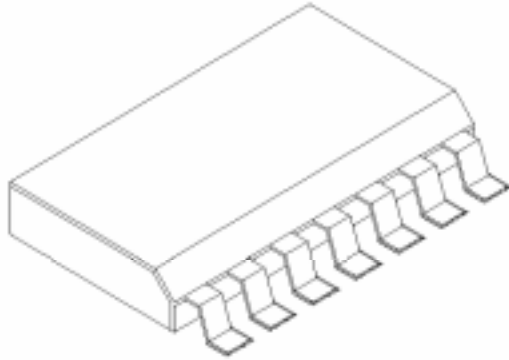
1.5.2 Standard of appearance inspection : (Unit: mm)

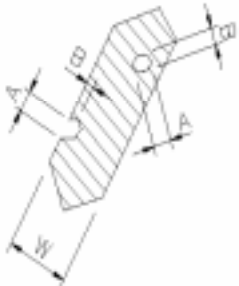
Name:LCM	Inspection Specification																																		
Scope	LCM																																		
Item	Criterion																																		
1.Electronic	<p>(1)Display scanned must be complete.</p> <p>(2)Can not non-display</p> <p>(3)The consumer current can not over the specification</p> <p>(4)Test result as the following must be reject:</p> <p>1.Display incomplete</p> <p>2.Occur high current</p> <p>3.Display defect</p>																																		
2.Black spot , white spot , dust in LCD	<p>(1)Round type : As following drawing</p> $\Psi = (X+Y) / 2$ <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Size</th> <th colspan="2">Acceptable Q'TY</th> </tr> <tr> <th>Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$\Psi < 0.1$</td> <td>Accept no dense</td> <td rowspan="4">Accept No Dense</td> </tr> <tr> <td>$0.1 < \Psi < 0.2$</td> <td>2</td> </tr> <tr> <td>$0.2 < \Psi < 0.25$</td> <td>1</td> </tr> <tr> <td>$0.25 < \Psi$</td> <td>0</td> </tr> </tbody> </table> </div> <p>(2)Line type : (As following drawing)</p> <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Length</th> <th>Width</th> <th colspan="2">Acceptable</th> </tr> <tr> <th colspan="2">Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>Accept</td> <td>$0.02 \geq L$</td> <td rowspan="3">Accept no dense</td> <td rowspan="4">Accept No Dense</td> </tr> <tr> <td>$3.0 \geq L$</td> <td>$0.03 \geq L$</td> </tr> <tr> <td>$2.5 \geq L$</td> <td>$0.05 \geq L$</td> </tr> <tr> <td>---</td> <td>$0.05 \geq L$</td> <td>As round type</td> </tr> </tbody> </table> </div> <p style="text-align: center;">Total acceptable Q'TY (1) + (2) ≤ 3</p>	Size	Acceptable Q'TY		Area	A	B	$\Psi < 0.1$	Accept no dense	Accept No Dense	$0.1 < \Psi < 0.2$	2	$0.2 < \Psi < 0.25$	1	$0.25 < \Psi$	0	Length	Width	Acceptable		Area		A	B	Accept	$0.02 \geq L$	Accept no dense	Accept No Dense	$3.0 \geq L$	$0.03 \geq L$	$2.5 \geq L$	$0.05 \geq L$	---	$0.05 \geq L$	As round type
Size	Acceptable Q'TY																																		
Area	A	B																																	
$\Psi < 0.1$	Accept no dense	Accept No Dense																																	
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Name:LCM	Inspection Specification												
Scope	LCM												
Item	Criterion												
3.Segmenter transfigure(Digit, word , sign)	<p>c.Alignment layer defect :</p> $\Psi = (a+b) / 2$  <table border="1" data-bbox="571 965 1310 1290"> <thead> <tr> <th>Size Ψ</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td>$\Psi \leq 0.4$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.4 < \Psi \leq 1.0$</td> <td>5</td> </tr> <tr> <td>$1.0 < \Psi \leq 1.5$</td> <td>3</td> </tr> <tr> <td>$1.5 < \Psi \leq 2.0$</td> <td>2</td> </tr> <tr> <td>Total acceptable QTY</td> <td>7</td> </tr> </tbody> </table>	Size Ψ	Acceptable QTY	$\Psi \leq 0.4$	Accept no dense	$0.4 < \Psi \leq 1.0$	5	$1.0 < \Psi \leq 1.5$	3	$1.5 < \Psi \leq 2.0$	2	Total acceptable QTY	7
Size Ψ	Acceptable QTY												
$\Psi \leq 0.4$	Accept no dense												
$0.4 < \Psi \leq 1.0$	5												
$1.0 < \Psi \leq 1.5$	3												
$1.5 < \Psi \leq 2.0$	2												
Total acceptable QTY	7												
4.Color	Sample of the lowest acceptable quality level.												
5.Back-light	<p>(1)The color of backlight should correspond its specification.</p> <p>(2)Not allow flash and unlighten on backlight.</p> <p>(3)Not allow larger than 0.25mm dust on backlight.</p>												
6.COB	<p>(1)Not allow the PAD of wire bond exposed.</p> <p>(2)Not allow the line type of wire bond on resin.</p> <p>(3)Not allow bubble and dust on resin.</p>												

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Name:LCM	Inspection Specification
Scope	LCM
Item	Criterion
7.PCB	<p>(1)Not allow dirty and reminded solder on PCB.</p>  <p>(2)Not allow scratch on pin PAD.</p>

Name:LCM	Inspection Specification																		
Scope	LCM																		
Item	Criterion																		
1.Polarizer scratch	Following the dust specification of time type.																		
2.Polarizer ripple	Not allow get in side Viewing Area .																		
3.Polarizer bubble	<p>(1)Bubble could be seen by eyes exigitly to be judged According to black spot specification.</p> <p>(2)Not allow polarize jutting glass outside.</p> <table border="1" data-bbox="529 790 1316 1151"> <thead> <tr> <th>Size</th> <th colspan="2">Acceptable Q'TY</th> </tr> <tr> <th>Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$\Psi < 0.2$</td> <td>Accept no dense</td> <td rowspan="4">Accept No Dense</td> </tr> <tr> <td>$0.2 < \Psi < 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < \Psi < 1.0$</td> <td>2</td> </tr> <tr> <td>$1.0 < \Psi$</td> <td>0</td> </tr> <tr> <td>Total acceptable Q'TY</td> <td>3</td> <td></td> </tr> </tbody> </table>	Size	Acceptable Q'TY		Area	A	B	$\Psi < 0.2$	Accept no dense	Accept No Dense	$0.2 < \Psi < 0.5$	3	$0.5 < \Psi < 1.0$	2	$1.0 < \Psi$	0	Total acceptable Q'TY	3	
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4.Segmenter transfigure(Digit, word , sign)	<p>(1)PIN hole , transfigure : (See below)</p> <p>a. Segment display:</p>  <table border="1" data-bbox="810 1406 1393 1619"> <thead> <tr> <th>Width</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.4$</td> <td>$\Psi \leq 0.2$ and $\Psi \leq 1/2w$</td> </tr> <tr> <td>$W \geq 0.4$</td> <td>$\Psi \leq 0.25$ and $\Psi \leq 1/3v$</td> </tr> </tbody> </table> <p>Note: W : Segment width Ψ : (AB)/2 Only allow one defect in one segment. Ψ under 0.10mm is acceptable.</p>	Width	Acceptable	$W \leq 0.4$	$\Psi \leq 0.2$ and $\Psi \leq 1/2w$	$W \geq 0.4$	$\Psi \leq 0.25$ and $\Psi \leq 1/3v$												
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HANDLING PRECAUTION

1. Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers which easily get damaged since the Module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling the LCD Modules.

2. Caution of LCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifluoroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent :

- Water
- Aromatics

3. Caution against static charge

The LCD Module uses C-MOSLSI drivers, so we recommend that you connect any unused input terminal to VDD or VSS, do not input any signals before power is turned on.

And ground your body, Work/assembly table. And assembly equipment to protect against static electricity.

4. Packaging

-Modules use LCD elements, and must be treated as such. Avoid in tense shock and falls from a height.

-To prevent modules from degradation. Do not operate or store them exposed directly to sunshine or high temperature/humidity.

5. Caution for operation

-It is indispensable to drive LCD's within the specified voltage limit since the higher voltage than the limit shortens LCD life.

An electrochemical reaction due to direct current causes LCD deterioration, Avoid the use of -Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them.

However those phenomena do not mean malfunction or out of order with LCD's. Which will come back in the specified operating temperature range.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the relative condition of 40%RH, 50%RH or less is required.

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6. Storage

In the case of storing for a long period of time (for instance. For years) for the purpose or replacement use, The following ways are recommended.

- Storage in a polyethylene bag with sealed so as not to enter fresh air outside in it, And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping temperature in the specified storage temperature range.
- Storing with no touch on polarizer surface by the anything else. (It is recommended to store them as they have been contained in the inner container at the time of delivery)

7. Safety

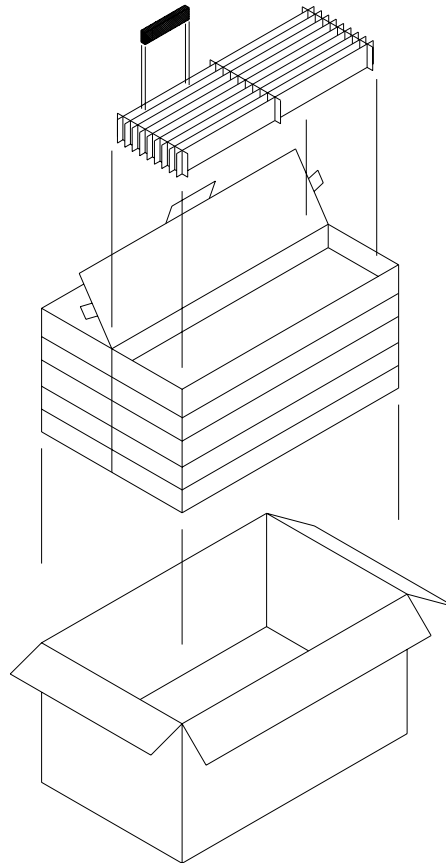
It is recommendable to crash damaged or unnecessary LCD into pieces and wash off liquid crystal by using solvents such as acetone and ethanol. Which should be burned up later.

When any liquid crystal leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

PACKING METHOD

Packing Method

MODEL : VGG121201-6FWNNA



PARTS LIST

	ITEM	SIZE(WxHxD) unit:mm	MATERIAL	Q.T.Y	NOTE
1	CARD BOARD(C03)	530.0x44.0 13J	CARTON	90	
2	CARD BOARD(C04)	174.0x44.0 9J	CARTON	70	
3	INTERNAL BOX(S07)	552.0x188.0x54.0	CARTON	10	
4	EXTERNAL BOX(L21)	573.0x394.0x288.0	CARTON	1	
5	PRODUCT	36.3x73.2x2.1max		480	