

MDCOG128064C6W-BNMLW	128 x 64	LCD Module
Specification		
Version: 1	Date: 03/08/2020	
Revision		
1	30/07/2020	First Issue

Display Features			
Resolution	128 x 64		
Appearance	White on Blue		
Logic Voltage	3.0V		
Interface	Parallel / SPI		
Font Set	N/A		
Display Mode	Transmissive		
LC Type	Blue STN		
Module Size	89.70 x 49.80 x 6.00mm		
Operating Temperature	-20°C ~ +70°C		
Construction	COG	Box Quantity	Weight / Display
LED Backlight	White	---	---

* - For full design functionality, please use this specification in conjunction with the ST7565V specification. (Provided Separately)

Display Accessories	
Part Number	Description
MCIB-12	UNO 32 Breakout Board with SD Card and LED BKL driver.
MPBV-7	30-Way FFC to Cable and Wires 0.5mm Pitch.

Optional Variants	
Appearances	Voltage



General Specification

The Features of the Module is description as follow:

- Module dimension: 89.7 x 49.8 x 6.0 mm
- View area: 66.8 x 35.5 mm
- Active area: 63.98 x 31.98 mm
- Number of Dots: 128 x 64
- Dot size: 0.48 x 0.48 mm
- Dot pitch: 0.50x 0.50 mm
- LCD type: STN Negative, Blue Transmissive
- Duty: 1/65duty , 1/9 Bias
- View direction: 6 o'clock
- Backlight Type: LED White
- IC: ST7565V



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Interface Pin Function

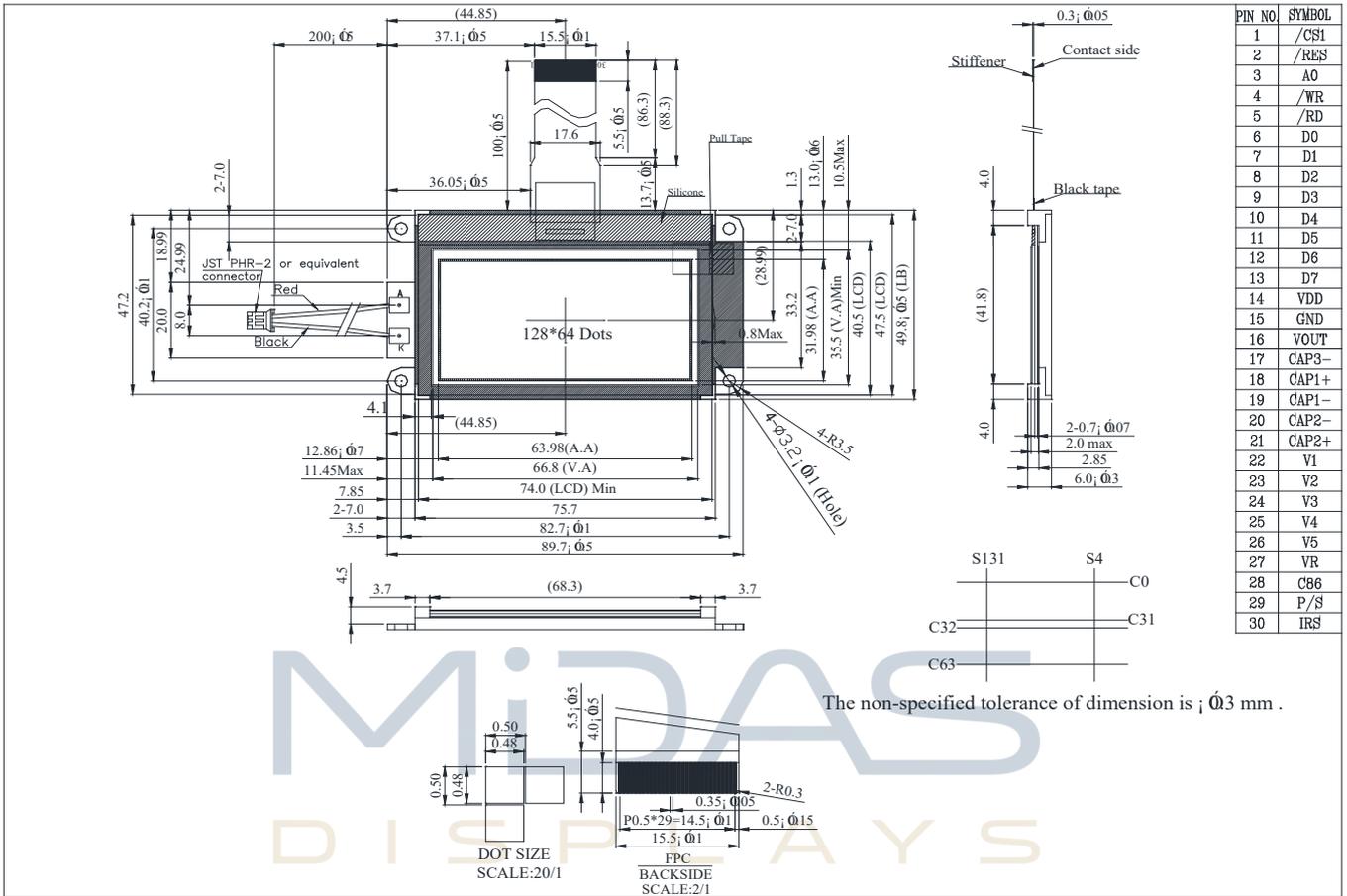
Pin No.	Symbol	Description
1	/CS1	This is the chip select signal. When /CS1 = "L", then the chip select becomes active, and data/command I/O is enabled.
2	/RES	When /RES is set to "L," the settings are initialized. The reset operation is performed by the /RES signal level.
3	A0	This is connect to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or a command. A0 = "H": Indicates that D0 to D7 are display data. A0 = "L": Indicates that D0 to D7 are control data
4	/WR	<ul style="list-style-type: none"> When connected to an 8080 MPU, this is active LOW. (R/W) This terminal connects to the 8080 MPU /WR signal. The signals on the data bus are latched at the rising edge of the /WR signal. When connected to a 6800 Series MPU: This is the read/write control signal input terminal. When R/W = "H": Read. When R/W = "L": Write.
5	/RD	<ul style="list-style-type: none"> When connected to an 8080 MPU, this is active LOW. (E) This pin is connected to the /RD signal of the 8080 MPU, and the ST7565V series data bus is in an output status when this signal is "L". When connected to a 6800 Series MPU, this is active HIGH. This is the 6800 Series MPU enable clock input terminal.
6	D0	<p>DESIGN • MANUFACTURE • SUPPLY</p> <p>This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus.</p> <p>When the serial interface is selected (P/S = "L") :</p> <p>D7 : serial data input (SI) ; D6 : the serial clock input (SCL).</p> <p>D0 to D5 are set to high impedance.</p> <p>When the chip select is not active, D0 to D7 are set to high impedance.</p>
7	D1	
8	D2	
9	D3	
10	D4	
11	D5	
12	D6	
13	D7	
14	VDD	Shared with the MPU power supply terminal Vcc.
15	GND	This is a 0V terminal connected to the system GND.
16	VOUT	DC/DC voltage converter. Connect a capacitor between this terminal and VSS.
17	CAP3-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1+ terminal.
18	CAP1+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1- terminal.



19	CAP1-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1+ terminal.
20	CAP2-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2- terminal.
21	CAP2+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2+ terminal.
22	V1	This is a multi-level power supply for the liquid crystal drive. The voltage Supply applied is determined by the liquid crystal cell, and is changed through the use of resistive voltage divider or through changing the impedance using an op. amp. Voltage levels are determined based on VDD,
23	V2	
24	V3	
25	V4	
26	V5	
27	VR	Output voltage regulator terminal. Provides the voltage between VDD and V5 through a resistive voltage divider. IRS = "L" : the V5 voltage regulator internal resistors are not used . IRS = "H" : the V5 voltage regulator internal resistors are used .
28	C86	This is the MPU interface switch terminal. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 MPU interface.
29	P/S	This is the parallel data input/serial data input switch terminal. P/S = "H": Parallel data input. P/S = "L": Serial data input. When P/S = "L", D0 to D5 fixed "H". /RD (E) and /WR (R/W) are fixed to either "H" or "L". With serial data input, It is impossible read data from RAM.
30	IRS	This terminal selects the resistors for the V5 voltage level adjustment. IRS = "H": Use the internal resistors IRS = "L": Do not use the internal resistors. The V5 voltage level is regulated by an external resistive voltage divider attached to the VR terminal



Contour Drawing

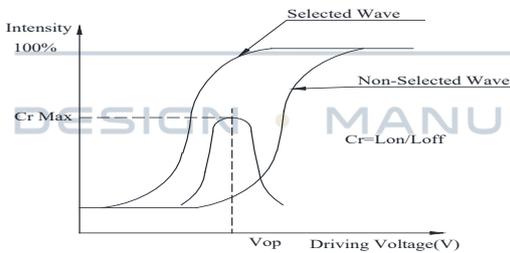
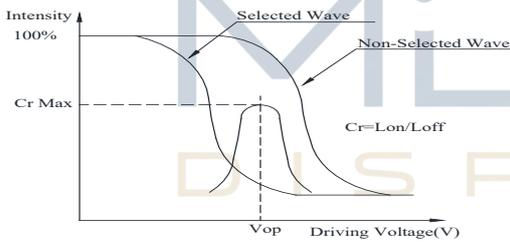


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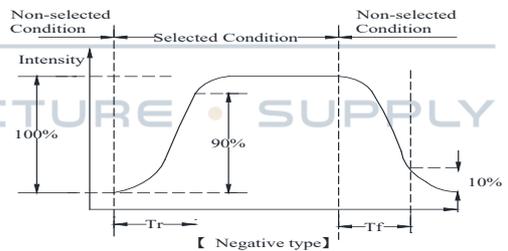
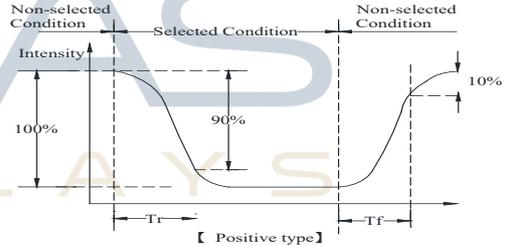
Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	θ	$CR \geq 2$	0	—	20	$\psi = 180^\circ$
	θ	$CR \geq 2$	0	—	40	$\psi = 0^\circ$
	θ	$CR \geq 2$	0	—	30	$\psi = 90^\circ$
	θ	$CR \geq 2$	0	—	30	$\psi = 270^\circ$
Contrast Ratio	CR	—	—	3	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	250	350	ms

Definition of Operation Voltage (Vop)



Definition of Response Time (Tr, Tf)



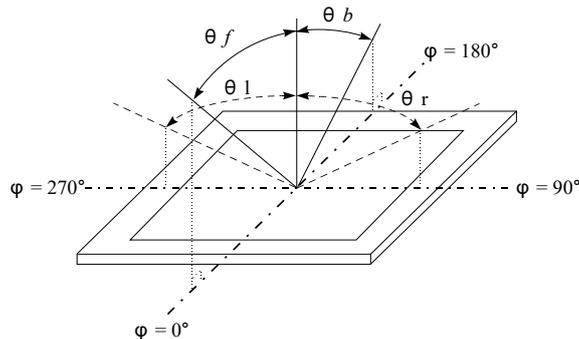
Conditions :

Operating Voltage : Vop

Viewing Angle(θ, φ) : $0^\circ, 0^\circ$

Frame Frequency : 64 HZ Driving Waveform : 1/N duty , 1/a bias

Definition of viewing angle($CR \geq 2$)



Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T _{OP}	-20	—	+70	°C
Storage Temperature	T _{ST}	-30	—	+80	°C
Power Supply Voltage	V _{SS}	-3.6	—	+0.3	V
Power supply voltage (VDD standard)	V5, VOUT	-13.5	—	+0.3	V
Power supply voltage (VDD standard)	V1, V2, V3, V4	V5	—	+0.3	V

Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V _{DD} -V _{SS}	—	2.8	3.0	3.2	V
Supply Voltage For LCD *Note	V _{OP}	T _a =-20°C	—	—	—	V
		T _a =25°C	9.3	9.5	9.7	V
		T _a =70°C	—	—	—	V
Input High Volt.	V _{IH}	—	0.8 V _{DD}	—	V _{DD}	V
Input Low Volt.	V _{IL}	—	V _{SS}	—	0.2 V _{DD}	V
Output High Volt.	V _{OH}	—	0.8 V _{DD}	—	V _{DD}	V
Output Low Volt.	V _{OL}	—	V _{SS}	—	0.2 V _{DD}	V
Supply Current	I _{DD}	V _{DD} =3.0V	—	—	2.0	mA

Please kindly consider to design the Vop to be adjustable while programing the software to match LCD contrast tolerance



Backlight Information

Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I _{LED}	15	40	60	mA	V=5.0V(Note 1)
Supply Voltage	V	—	5.0	—	V	—
Reverse Voltage	V _R	—	—	5	V	—
Colour	X	0.26	—	0.32	—	—
Coordinate	Y	0.26	—	0.32	—	—
Luminance (Without LCD)	I _V	800	1000	—	cd/m ²	I _{LED} =40mA
LED Life Time (For Reference only)	—	—	50K	—	Hr.	I _{LED} =40mA 25°C, 50-60%RH, (Note 2)
Color	White					

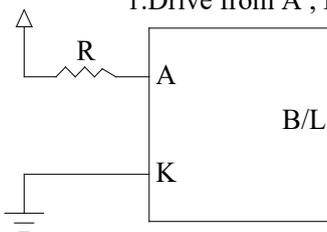
Note: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage can make driving current under safety area (current between minimum and maximum).

Note 1: Supply current minimum value is only for reference since LED brightness efficiency keeps enhancing. Current consumption becomes less and less to achieve the same luminance.

Note 2: 50K hours is only an estimate for reference.

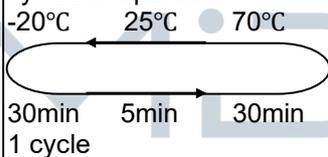
LED B\L Drive Method

1. Drive from A , K



Reliability

Content of Reliability Test (Wide temperature, -20°C~70°C)

Environmental Test			
Test Item	Content of Test	Test Condition	Note
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 low storage temperature for a long time.	-30°C 200hrs	1,2
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	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity storage	The module should be allowed to stand at 60°C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 	-20°C/70°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact), ±800v(air), RS=330Ω CS=150pF 10 times	—

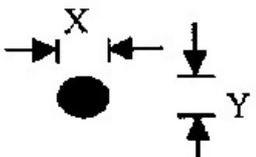
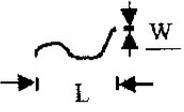
Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

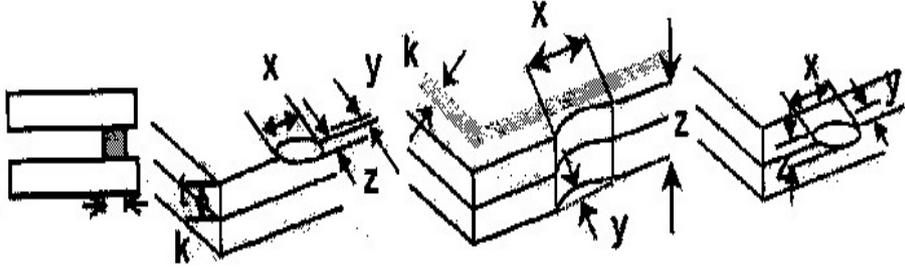
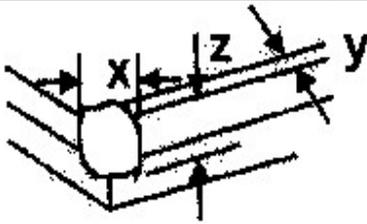
Note3: The packing have to including into the vibration testing.



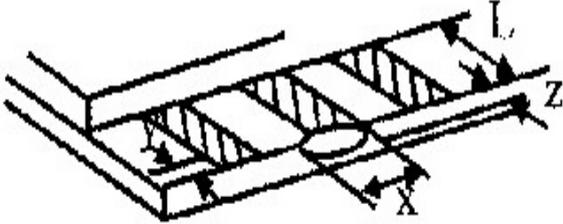
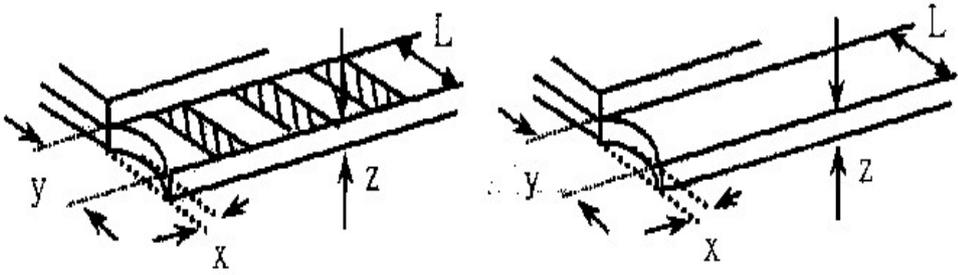
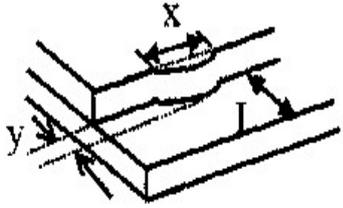
Inspection specification

NO	Item	Criterion	AQL												
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character , dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Contrast defect.	0.65												
02	Black or white spots on LCD (display only)	2.1 White and black spots on display $\leq 0.25\text{mm}$, no more than three white or black spots present. 2.2 Densely spaced: No more than two spots or lines within 3mm	2.5												
03	LCD black spots, white spots, contamination (non-display)	3.1 Round type : As following drawing $\Phi = (x + y) / 2$  <table border="1" data-bbox="805 891 1332 1146"> <thead> <tr> <th>SIZE</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.25$</td> <td>1</td> </tr> <tr> <td>$0.25 < \Phi$</td> <td>0</td> </tr> </tbody> </table>	SIZE	Acceptable Q TY	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	1	$0.25 < \Phi$	0	2.5		
		SIZE	Acceptable Q TY												
$\Phi \leq 0.10$	Accept no dense														
$0.10 < \Phi \leq 0.20$	2														
$0.20 < \Phi \leq 0.25$	1														
$0.25 < \Phi$	0														
3.2 Line type : (As following drawing)  <table border="1" data-bbox="699 1279 1332 1534"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.03$</td> <td rowspan="2">2</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.05$</td> </tr> <tr> <td>---</td> <td>$0.05 < W$</td> <td>As round type</td> </tr> </tbody> </table>	Length	Width	Acceptable Q TY	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.03$	2	$L \leq 2.5$	$0.03 < W \leq 0.05$	---	$0.05 < W$	As round type	2.5
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$L \leq 2.5$	$0.03 < W \leq 0.05$														
---	$0.05 < W$	As round type													
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction. <table border="1" data-bbox="826 1653 1332 1951"> <thead> <tr> <th>Size Φ</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> </tr> <tr> <td>$0.50 < \Phi \leq 1.00$</td> <td>2</td> </tr> <tr> <td>$1.00 < \Phi$</td> <td>0</td> </tr> <tr> <td>Total Q TY</td> <td>3</td> </tr> </tbody> </table>	Size Φ	Acceptable Q TY	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	3	$0.50 < \Phi \leq 1.00$	2	$1.00 < \Phi$	0	Total Q TY	3	2.5
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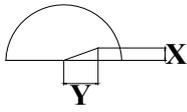


NO	Item	Criterion	AQL																		
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination																			
06	Chipped glass	<p>Symbols Define: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length:</p> <p>6.1 General glass chip : 6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="443 884 1353 1093"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </tbody> </table> <p>⊙ If there are 2 or more chips, x is total length of each chip.</p> <p>6.1.2 Corner crack:</p>  <table border="1" data-bbox="443 1523 1353 1731"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </tbody> </table> <p>⊙ If there are 2 or more chips, x is the total length of each chip.</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
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NO	Item	Criterion	AQL																
06	Glass crack	<p>Symbols :</p> <p>x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>6.2 Protrusion over terminal :</p> <p>6.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="363 763 1286 864"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>6.2.2 Non-conductive portion:</p>  <table border="1" data-bbox="435 1245 1262 1361"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>⊙ If the product will be heat sealed by the customer, the alignment mark not be damaged.</p> <p>6.2.3 Substrate protuberance and internal crack.</p>  <table border="1" data-bbox="772 1664 1334 1765"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td>$y \leq 1/3L$</td> <td>$x \leq a$</td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$x \leq a$	2.5
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y: width	x: length																		
$y \leq 1/3L$	$x \leq a$																		



NO	Item	Criterion	AQL
07	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
08	Backlight elements	8.1 Illumination source flickers when lit. 8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards. 8.3 Backlight doesn't light or color wrong.	0.65 2.5 0.65
09	Bezel	9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination. 9.2 Bezel must comply with job specifications.	2.5 0.65
10	PCB - COB	10.1 COB seal may not have pinholes larger than 0.2mm or contamination. 10.2 COB seal surface may not have pinholes through to the IC. 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. 10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places. 10.5 No oxidation or contamination PCB terminals. 10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts. 10.7 The jumper on the PCB should conform to the product characteristic chart. 10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down. 10.9 The Scraping testing standard for Copper Coating of PCB  $X * Y \leq 2\text{mm}^2$	2.5 2.5 0.65 2.5 2.5 0.65 2.5 2.5
11	Soldering	11.1 No un-melted solder paste may be present on the PCB. 11.2 No cold solder joints, missing solder connections, oxidation or icicle. 11.3 No residue or solder balls on PCB. 11.4 No short circuits in components on PCB.	2.5 2.5 2.5 0.65



NO	Item	Criterion	AQL
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP.	2.5
		12.2 No cracks on interface pin (OLB) of TCP.	0.65
		12.3 No contamination, solder residue or solder balls on product.	2.5
		12.4 The IC on the TCP may not be damaged, circuits.	2.5
		12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever.	2.5
		12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color.	2.5
		12.7 Sealant on top of the ITO circuit has not hardened.	0.65
		12.8 Pin type must match type in specification sheet.	0.65
		12.9 LCD pin loose or missing pins.	0.65
		12.10 Product packaging must the same as specified on packaging specification sheet.	0.65
		12.11 Product dimension and structure must conform to product specification sheet.	0.65
		12.12 Visual defect outside of VA is not considered to be rejection.	

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Precautions in use of LCD Modules

- (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.
- (8) Midas have the right to change the passive components, including R3,R6 & backlight adjust resistors. (Resistors, capacitors and other passive components will have different appearance and color caused by the different supplier.)
- (9) Midas have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance...etc, under the premise of not affecting the electrical characteristics and external dimensions, Midas have the right to modify the version.)
- (10) To ensure the stability of the display screen, please apply screen saver after showing 30 mins of fixed display content.
- (11) Please heat up a little the tape sticking on the components when removing it; otherwise the components might be damaged.

DESIGN • MANUFACTURE • SUPPLY



Material List of Components for RoHs

1. Midas Displays hereby declares that all of or part of products (with the mark “#”in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

Exhibit A : The Harmful Material List

Material	Cd	Pb	Hg	Cr6+	PBB	PBDE	DEHP	BBP	DBP	DIBP
Limited Value	100 ppm	1000 ppm								

Above limited value is set up according to RoHS.

2.Process for RoHS requirement : (only for RoHS inspection)

- (1) Use the Sn/Ag/Cu soldering surface ; the surface of Pb-free solder is rougher than we used before.
- (2) Heat-resistance temp. :
 Reflow : 250°C,30 seconds Max. ;
 Connector soldering wave or hand soldering : 320°C, 10 seconds max.
- (3) Temp. curve of reflow, max. Temp. : 235±5°C ;
 Recommended customer’s soldering temp. of connector : 280°C, 3 seconds.

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Recommendable Storage

- 1. Place the panel or module in the temperature 25°C±5°C and the humidity below 65% RH
- 2. Do not place the module near organics solvents or corrosive gases.
- 3. Do not crush, shake, or jolt the module.

