DATA IMAGE CORPORATION

LCD Module Specification

Preliminary

ITEM NO.: **GM241232GNSWAG06**

Table of Contents

Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	JACK	JOE	GARY	KEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	7/FEB/12’		26

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	7/FEB/12’			Initial PRELIMINARY

3. GENERAL SPECIFICATION

Display Format :	240 (W)	×	128 (H)	dots
Dots Size :	0.47 (W)	×	0.47 (H)	mm
View Area :	123.0 (W)	×	68.0 (H)	mm
General Dimensions :	159.4 (W)	×	101.0 (H) × 11.0 (T)	mm Max.
Weight :	220 g max.			

LCD Type & Background Color : [V] STN Blue [ ] STN Yellow [ ] FSTN Dark Gray

Polarizer mode : [ ] Reflective [ ] Transflective

[ ] Transmissive [V] Negative

View Angle : [V] 6 O'clock [ ] 12 O'clock [ ] Others _____

Backlight : [V] LED [ ] EL [ ] CCFL

Backlight Color : [ ] Yellow green [ ] Amber [ ] Blue Green

[V] White [ ] Others

Controller / Driver : LC7981 /KS0086

Temperature Range : [V] Normal [ ] Wide Temperature

Operating	0 to 50°C	Operating	-20 to 70°C
Storage	-20 to 70°C	Storage	-30 to 80°C

Pixel Color: White

REMARK:
Our components and processes are compliant to RoHS standard.

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

V_{SS}= 0V, Ta = 25°C

Item	Symbol	Min.	Max.	Unit
Supply Voltage (Logic)	V_{DD}-V_{SS}	-0.3	7	V
Supply Voltage (LCD Driver)	V_{DD}-V_O	0	30	V
Input Voltage	V_I	-0.3	V_{DD}+0.3	V
Operating Temperature	T_{OP}	0	50	℃
Storage Temperature	T_{STG}	-20	70	℃

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Item	Operating		Storage		Comment
	(Min.)	Max.)	(Min.)	(Max.)	
Ambient Temp	0	50	-20	70	Note (1)
Humidity	Note (2)		Note(2)		Without Condensation
Vibration	--	4.9M/S^2	--	19.6M/S^2	XYZ Direction
Shock	--	29.4M/S^2	--	490M/S^2	XYZ Direction

Note(1) Ta = 0°C : 50Hr Max.
Note(2) Ta ≤ 40°C : 90% RH Max.
Ta ≥ 40°C : Absolute humidity must be lower than the humidity of 90% RH at 40°C.

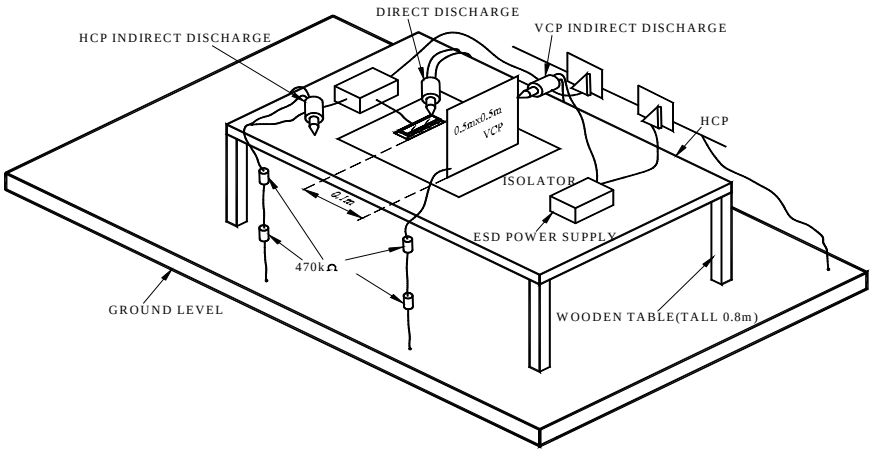
4.3 Electronic Static Discharge maximum rating

ESD test method : IEC 61000-4-2

Item	Description	
Testing environment	Ambient temperature :15°C to 35 °C Humidity: 30% to 60 % LCM (E.U.T) : Power up	
Testing equipment	Manufacture: Noise Ken, Model No. ESD-100L	
Testing condition	See drawing 1	
Direct discharge	0 to ± 6 KV	Discharge point, see drawing 2
Indirect discharge	0 to ± 12KV	Discharge point, see drawing 1
Pass condition	No malfunction of unit. Temporary malfunction of unit which can be recovered by system reset	
Fail condition	Non. Recoverable malfunction of LCM or system	

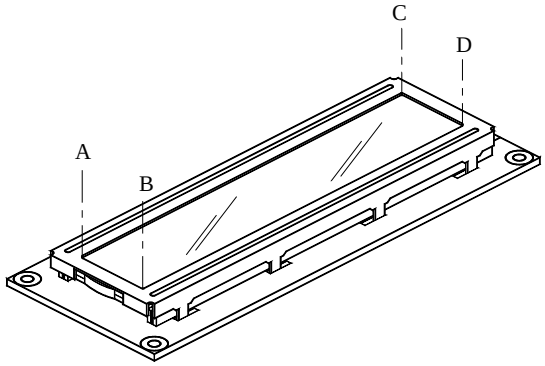
(1)

FIG 1 ESD TESTING EQUIPMENT



DIRECT CONTACT DISCHARGE

CONTACT POINT : A.B.C.D



(2)

5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage (Logic)	VDD-VSS	--	4.5	5.0	5.5	V
Supply Voltage (LCD)	VDD-VO	0°C	16.5	17.0	17.5	V
		25°C	15.9	16.3	16.9	
		50°C	15.3	15.8	16.4	
Input Voltage	VIH	--	2.2	--	VDD	V
	VIL		0	--	0.8	
Logic Supply Current	IDD	VDD-VSS=5V	--	12	--	mA
	IEE		--	2.5	--	mA

6. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	Symbol	Condition	Min.	Typ.	Max.	Unit	Ref.
Rise Time	Tr	0°C	--	--	--	ms	Note (1)
		25°C		170	255		
Fall Time	Tf	0°C	--	--	--	ms	
		25°C		210	315		
Contrast	CR	25°C	2	4.74	--	--	Note (3)
View Angle	θ1~θ2 ∅1, ∅2	25°C & CR≥2	25	--	--	Deg	Note (2)
			25	--	--		
			35	--	--		
			40	--	--		
Frame Frequency	Ff	25°C	--	64	--	Hz	--

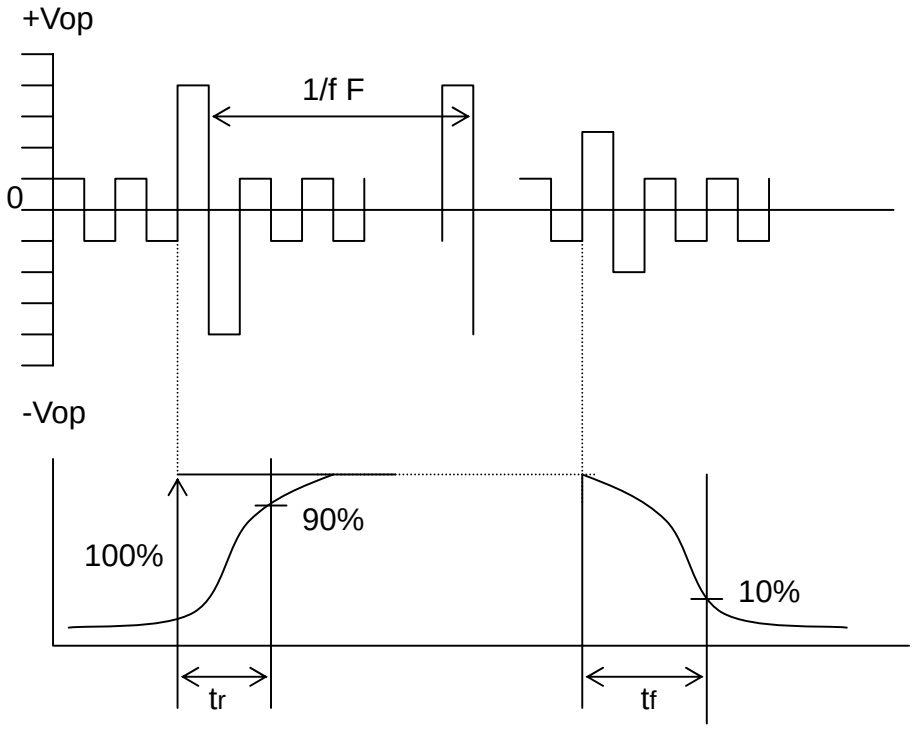
Note (1) & (2) : See next page

Note (3) : Contrast ratio is defined under the following condition:

$$CR = \frac{\text{Brightness of non-selected condition}}{\text{Brightness of selected condition}}$$

(a). Temperature ---------- 25°C
(b). Frame frequency ---- 64Hz
(c). Viewing angle -------- θ= 0°, ∅ = 0°
(d). Operating voltage --- 16.3V

Note (1) Response time is measured as the shortest period of time possible between the change in state of an LCD segment as demonstrated below:

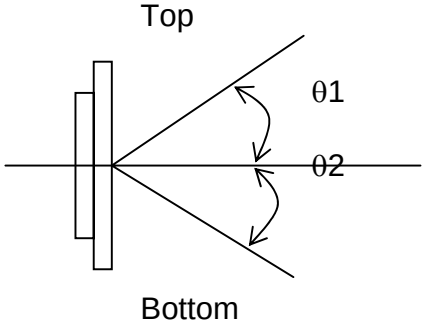


Condition:

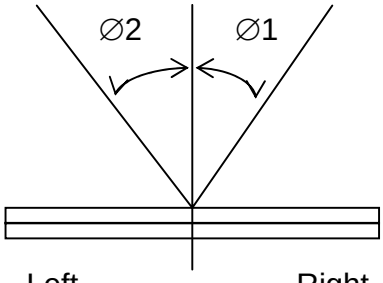
(a) . Temperature ----------25℃
(b) . Frame frequency --------- 64Hz
(c) . View Angle ---------- θ = 0°, ∅=0°
(d) . Operating voltage --------16.3V

Note (2) Definition of View Angle

Top – Bottom direction



Right -- Left direction



6.1 LED ELECTRO-OPTICAL CHARACTERISTIC

Ta = 25°C

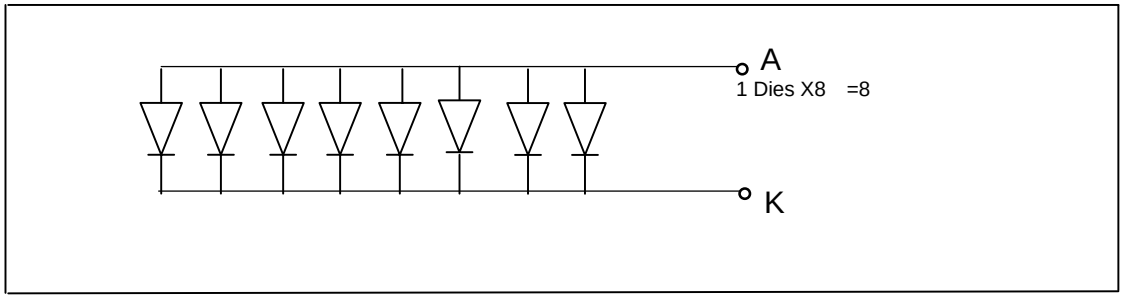
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	IF = 160mA White	--	3.3	3.6	V
Luminous Intensity	I_V	IF = 160mA White	500	600	--	cd/m^2
Chromaticity	X	IF = 160mA White	0.27	0.30	0.33	nm
	Y		0.26	0.29	0.32	
Uniformity	--	IF = 160mA White	70	--	--	%
Reverse Current	IR	VR = 4V White	--	--	0.2	mA

Note : Measured at the bared LED backlight unit.

6.2 LED MAXIMUM OPERATING RANGE

Item	Symbol	White	Unit
Power Dissipation	P_{AD}	0.864	W
Forward Current	I_{AF}	240	mA
Reverse Voltage	VR	4	V

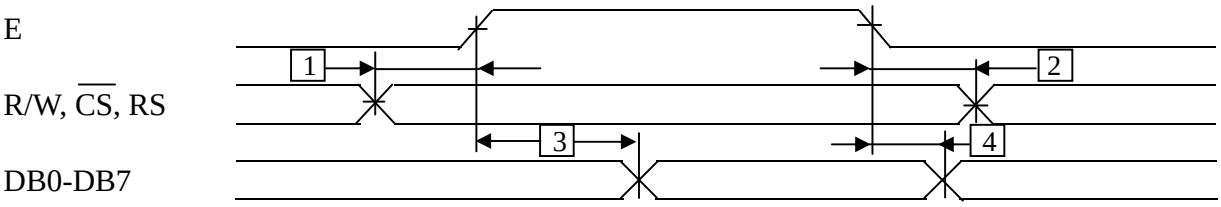
6.2.1 LED ARRAY BLOCK DIAGRAM



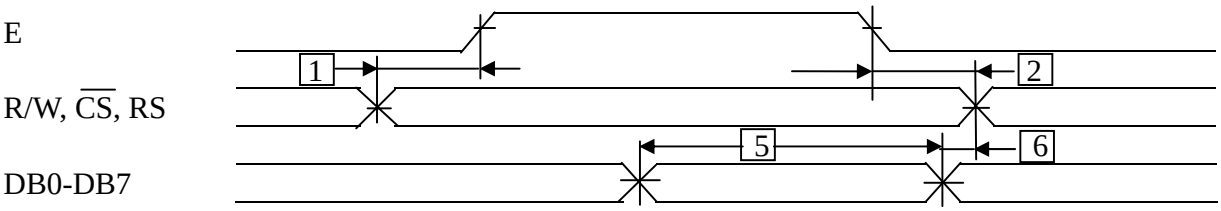
7. TIMING CHARACTERISTICS

- Bus read/write operation

- **READ CYCLE**



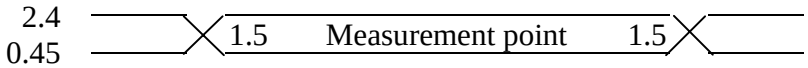
- **WRITE CYCLE**



Ta = -20 to + 70℃, VDD = 5V±5%, GND = 0V

No.	Item	Symbol	min	typ	max	unit	Conditions
1	Address set-up time	tAS	90	--	--	ns	
2	Address hold time	tAH	10	--	--	ns	
3	Data delay time (read)	tDDR	--	--	140	ns	CL = 50pF
4	Data hold time (read)	tDHR	10	--	--	ns	
5	Data set-up time (write)	tDSW	220	--	--	ns	
6	Data hold time (write)	tDHW	20	--	--	ns	

Note : Definition of the test waveform

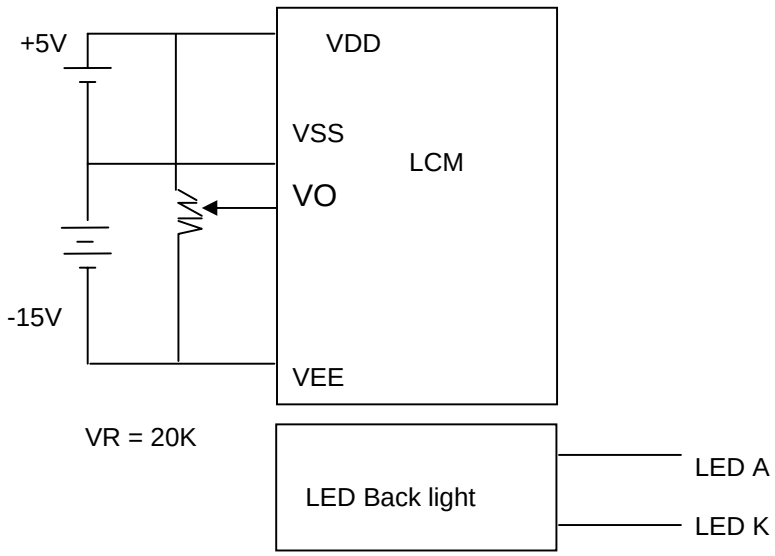


The input terminals are driven at 2.4V and 0.45V. Timing is measured at 1.5V..

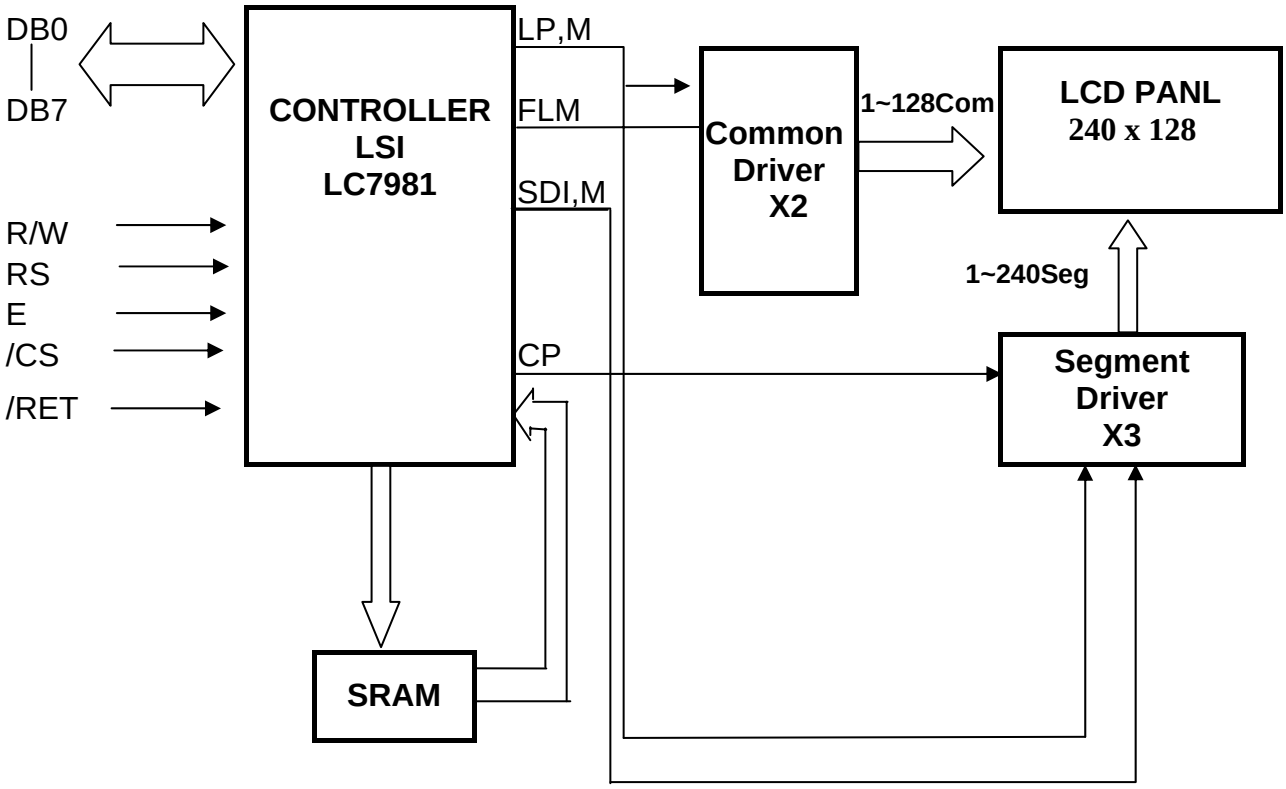
8. PIN CONNECTIONS

Pin	Symbol	Function
1	V_{SS}	Ground(0V)
2	V_{DD}	+5V
3	Vo	Power Supply for LCD Drive
4	RS	H/L H→ Instruction , L→Data
5	R/W	H/L H→ Data Read (LCD→MPU) L→ Data Write(LCD←MPU)
6	E	Enable
7	DB0	Data Bus Line
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	/CS	Chip Enable Active “L”
16	/RET	Reset Active “L”
17	VEE	Negative Voltage Input(-15V)
18	/DISP OFF	Display ON/OFF control input (H=on,L=off)
19	NC	No Connection.
20	NC	No Connection.

9. POWER SUPPLY



10. BLOCK DIAGRAM



Display control instruction

Display is controlled by writing data into the instruction register and 13 data registers. The instruction register and the data register are distinguished by the RS signal. First, write 4-bit data in the instruction register when RS=1, then specify the code of the data register. Next, with RS=0, write 8-bit data in the data register, which executes the specified instruction.

A new instruction cannot be accepted while an old instruction is being executed. As the Busy flag is set under this condition, write an instruction only after reading the Busy flag and making sure that it is 0.

However, the next instruction can be executed without checking the Busy flag when the maximum read cycle time or the write cycle time has been exceeded after execution of the previous data read instruction or the data write instruction. The Busy flag does not change when data is written into the instruction register (RS=1). Therefore, the Busy flag need not be checked immediately after writing data into the instruction register.

1) Mode control

Write code “00H” (in hexadecimal notation) in the instruction register and specify the mode control register.

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	0	0	0	0
Mode control Reg	0	0	0	0	MODE Data					

DB5	DB4	DB3	DB2	DB1	DB0	Cursor/blink	CG	Graphic/character display
1 / 0	1 / 0	0	0	0	0	Cursor OFF	Built-in CG	Character display
		0	1			Cursor ON		
		1	0			Cursor OFF character blink		
		1	1			Cursor blink		
		0	0		1	Cursor OFF	External CG	
		0	1			Cursor ON		
		1	0			Cursor OFF character blink		
		1	1			Cursor blink		
		0	0	1	0			Graphic mode
Display ON/OFF	Master/slave	Blink	Cursor	Mode	External/ Built in CG			

1 : master mode
2 : slave mode

1 : display ON
2 : display OFF

2) Setting the character pitch

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	0	0	0	1
Character pitch Reg	0	0	(Vp-1) Binary				0	(Hp-1) Binary		

Vp is the number of vertical dots per character. Determine Vp with the pitch between two vertically placed characters taken into consideration. This value is meaningful only in the character display mode: It is invalid in the graphic mode.

In character mode, Hp indicates the number of horizontal dots per character, from the leftmost part of one character to the leftmost part of the next. In the graphic mode, Hp indicates how many bits (or dots) from RAM appear in a 1-byte display.

Hp must take one of the following three values.

Hp	DB2	DB1	DB0	
6	1	0	1	Horizontal character pitch 6
7	1	1	0	〃 7
8	1	1	1	〃 8

3) Setting the number of characters

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	0	0	1	0
Character number Reg	0	0	(H_N-1) Binary							

In the character display mode, H_N indicates the number of characters in the horizontal direction. In the graphic mode, it indicates the number of bytes in the horizontal direction. The total number of dots positioned horizontally on the screen n is given by the formula

$n = Hp \times H_N$

Even numbers in the range 2 to 256 (decimal) can be set as H_N.

4) Setting the time division number (display duty)

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	0	0	1	1
Time division Reg	0	0	(N_x-1) Binary							

Consequently, $1/N_x$ is the display duty.

Decimal numbers within the range 1 to 256 can be set as N_x.

5) Setting the cursor position

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	0	1	0	0
Cursor position Reg	0	0	0	0	0	0	(C_P-1) Binary			

In the character display mode, C_P indicates the line at which the cursor is displayed. For example, when C_P=8 (decimal) is specified, the cursor is displayed beneath the character of the 5 x 7 dot-font. The horizontal length of the cursor equals Hp (the horizontal character pitch). Decimal values in the range 1 to 16 can be assigned to Cp.

When the value is less than the vertical character pitch Vp ($Cp \leqq Vp$), display priority is given to the cursor (provided the cursor display is ON). The cursor is not displayed when $CP \rangle Vp$. The horizontal length of the cursor equals Hp.

6) Setting the display start lower address

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	0	0	0
Display start address Reg (lower byte)	0	0	(start address lower byte) Binary							

7) Setting the display start upper address

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	0	0	1
Display start address Reg (upper byte)	0	0	(start address upper byte) Binary							

This instruction writes the display start address value in the display start address register. The display start address is the RAM address at which data to be displayed at the leftmost position of the top lime of the screen is stored. The start address consists of 16 bits (upper and lower).

8) Setting the cursor (lower) address (RAM read/write lower address)

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	0	1	0
Cursor address counter (lower byte)	0	0	(cursor address lower byte) Binary							

9) Setting the cursor (upper) address (RAM read/write upper address)

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	0	1	1
Cursor address counter (upper byte)	0	0	(cursor address upper byte) Binary							

This instruction writes the cursor address value in the cursor address counter. The cursor address indicates the address for exchanging display data and character codes with RAM. In other words, data at the address specified by the cursor address is read from or written into RAM. In character display, the cursor is displayed at the position specified by the cursor address.

The cursor address is divided into a lower address (8 bits) and an upper address (8 bits). It should be set in accordance with the following rules.

1	To rewrite (set) both lower and upper addresses:	First set the lower address, then the upper.
2	To rewrite the lower address:	Always reset the upper address after setting the lower address.
3	To rewrite the upper address only:	Set the upper address. It is necessary to reset the lower address.

The cursor address counter is a 16-bit up-counter with set/reset functions: when the Nth bit goes from 1 to 0, the count of the (N + 1)th bit increments by one. Accordingly, when the lower address is set so that the lower MSB (8 bit) changes from 1 to 0, the LSB (1st bit) of the upper counter must increment by one. When setting the cursor address, set the lower and upper addresses as a 2-byte continuous instruction.

10) Writing display data

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	1	0	0
RAM	0	0	MSB	(pattern data, character code)						LSB

Write code “0DH” in the instruction register. Then, write 8-bit data with RS = 0, and the data is written into RAM as display data or character codes at the address specified by the cursor address counter. After writing, the count of the cursor address Counter increments by 1.

11) Reading display data

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	1	0	1
RAM	0	0	MSB	(pattern data, character code)						LSB

Write “0CH” in the instruction register. Then, establish the read status with RS = 0, and data in the RAM can be read. The Procedure for reading data is as follows:

This instruction outputs the contents of the data output register to DB0 to 7, then transfers the RAM data indicated by the cursor address to the data output register. It then increments the cursor address by 1, which means that correct data cannot be read in the first read operation. The specified value is output in the second read operation. Accordingly, a dummy read operation must be performed once when reading data after setting the cursor address.

12) Bit clear

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	1	1	0
Bit clear	0	0	0	0	0	0	0	(N_B-1) Binary		

13) Bit set

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Reg	0	1	0	0	0	0	1	1	1	1
Bit set	0	0	0	0	0	0	0	(N_B-1) Binary		

As the bit-clear or bit-set instruction, 1 bit of a 1 byte of data in display RAM is set to 0 or 1. The bit specified by NB is set to 0 for the bit-clear instruction and 1 for the bit-set instruction. The RAM address is specified by the cursor address, which is automatically incremented by 1 at the completion of the instruction. NB is a value in the range from 1 to 8. The LSB is indicated by N_B=1, and the MSB by N_B=8.

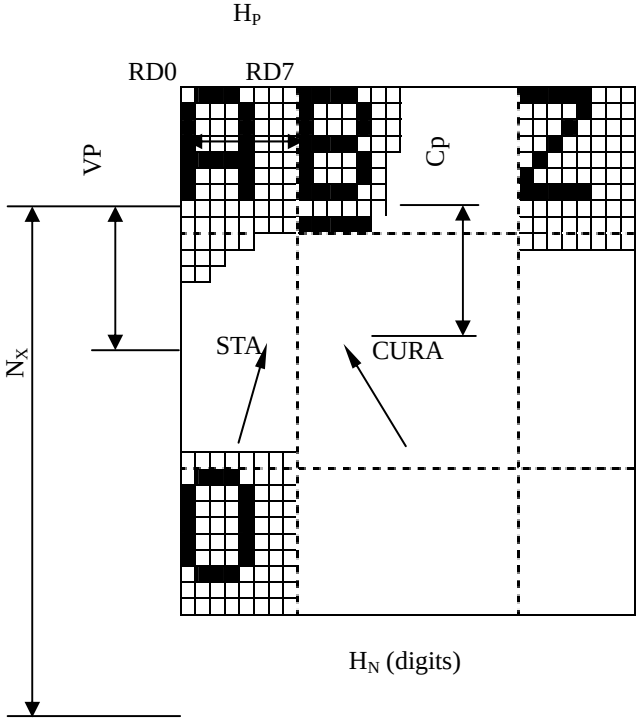
14) Reading the BUSY flag

Register	R/W	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Busy flag	1	1	1 / 0	*						

The Busy flag is output to DB7 when read mode is established with RS=1.The Busy flay is set to 1 while any of the instructions 1) through 13) is being executed. It is set to 0 at the completion of the execution, allowing the next instruction to be accepted. No other instruction can be accepted when the Busy flag is 1. Accordingly, before writing an instruction

and data, it is necessary to ensure that the Busy flag is 0. However, the next instruction can be executed without checking the Busy flag when the maximum read cycle time or the write cycle time has been exceeded after execution of the previous data read instruction or the data write instruction.
The Busy flag does not change when data is written into the instruction register (RS=1). Therefore, the Busy flag need not be Checked immediately after writing data into the instruction register.
Specification of the instruction register is unnecessary to read the Busy flag.

The relation between the LCD panel display and H_P,H_N,V_P,C_P, and N_X.



Symbol	Description	Contents	Value
H_P	Horizontal character pitch	Character pitch in the horizontal direction	6 to 8 dots
H_N	Number of characters in the horizontal direction	Number of characters (digits) per horizontal line or the number of words per line (graphic)	Even digits in the range 2 to 256
V_P	Vertical character pitch	Character pitch in the vertical direction	1 to 16 dots
C_P	Cursor position	The line number at which the cursor is to be displayed	1 to 16 lines
N_X	Number of lines in the vertical direction	Display duty	1 to 256 lines

Note)
When the number of vertical dots on the screen is m and that of horizontal dots is n,

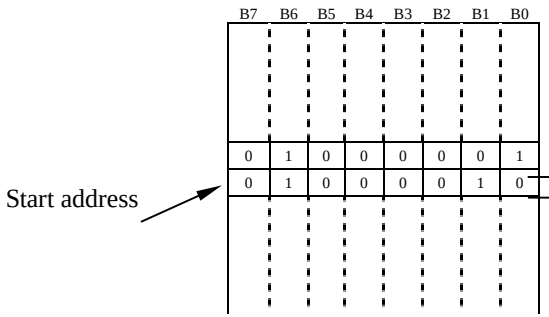
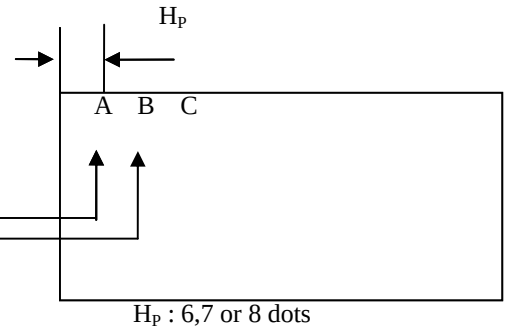
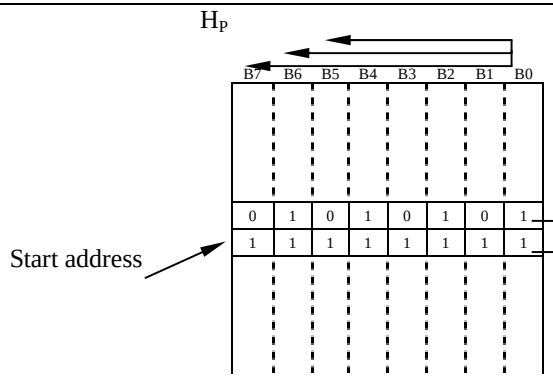
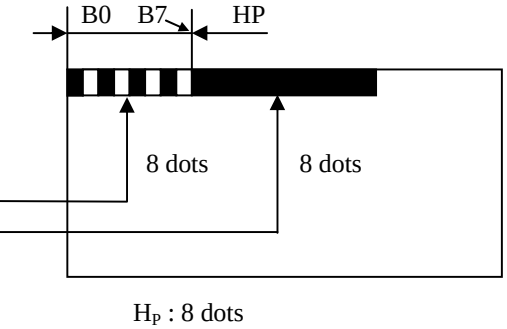
$1/m = 1/N_X$ = Display duty

$n = H_P \times H_N$

m/V_P = number of display lines

$C_P \leqq V_P$

Display mode

Display mode	Display data from the MPU	RAM	LC Panel
Character display	Display pattern (8 bits)		
Graphic	Display code (8 bits)		

11. QUALITY ASSURANCE

11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)
Temperature : 20 ± 5°C
Humidity : 65 ± 5%

11.1.2 Operation
Unless specified otherwise, test will be conducted with LCM in operation.

11.1.3 Container
Unless specified otherwise, vibration test will be conducted on module only.

11.1.4 Test Frequency
Single cycle.

11.1.5 Test Method

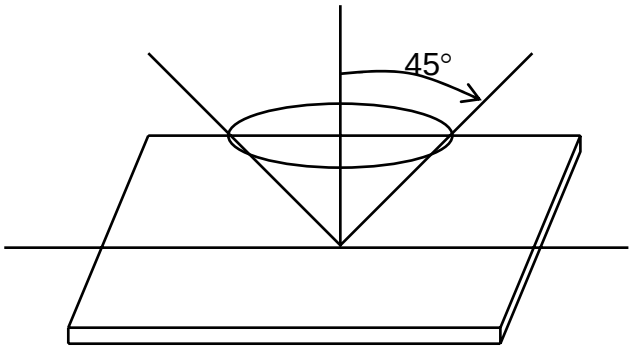
No.	Parameter	Conditions	Regulations
1	High Temperature Operating	50 ± 2 °C;96Hr	Note 3
2	Low Temperature Operating	0 ± 2 °C; 96Hr	Note 3
3	High Temperature Storage	70 ± 2 °C; 96Hr	Note 3
4	Low Temperature Storage	-20 ± 2 °C; 96Hr	Note 3
5	Vibration Test (Non-operation state)	Total fixed amplitude : 1.5mm Vibration Frequency : 10 ~ 55Hz One cycle 60 seconds to 3 directions of X.Y.Z. for each 15 minutes	Note 3
6	Damp Proof Test (Non-operation state)	40°C ± 2°C, 90~95%RH, 96h	Note 1,2
7	Shock Test (Non-operation state)	To be measured after dropping from 60cm high once concrete surface in packing state	Note 3

Note 1: Returned under normal temperature and humidity for 4 hrs.
Note 2: No dew condensation to be observed.
Note 3: No change on display and in operation under the test condition

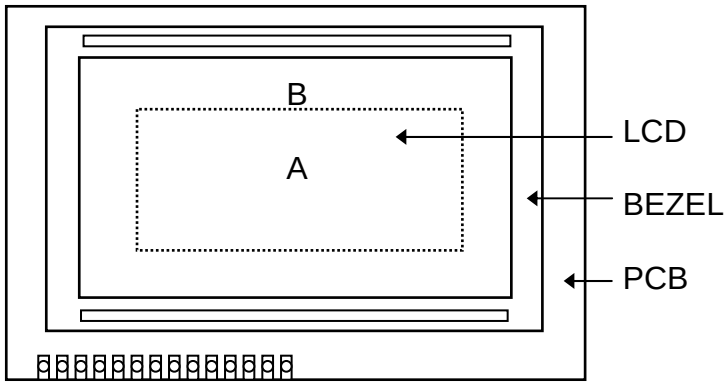
11.2 Inspection condition

11.2.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.

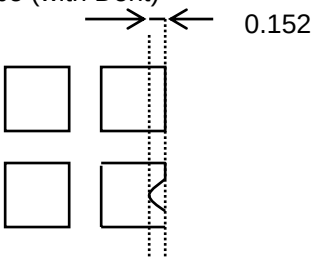


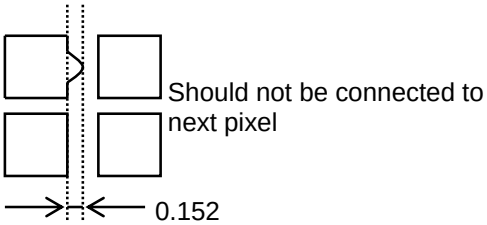
11.2.2 Definition of applicable Zones

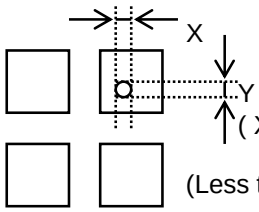


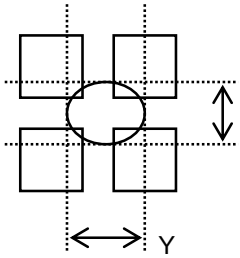
A : Display Area
B : Non-Display Area

11.2.3 Inspection Parameters

<table>
<tr><th>No.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td>1</td><td>Black or White spots</td><td>
<table>
<tr><th rowspan="2">Zone / Dimension</th><th colspan="2">Acceptable number</th><th rowspan="2">Class Of Defects</th><th rowspan="2">AQL Level</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>D < 0.15</td><td>*</td><td>*</td><td rowspan="4">Minor</td><td rowspan="4">2.5</td></tr>
<tr><td>0.15≤ D< 0.2</td><td>4</td><td>4</td></tr>
<tr><td>0.2 ≤ D ≤ 0.25</td><td>2</td><td>2</td></tr>
<tr><td>D ≤ 0.3</td><td>0</td><td>1</td></tr>
</table>
D = (Long + Short) / 2 * : Disregard
</td></tr>
<tr><td>2</td><td>Scratch, Substances</td><td>
<table>
<tr><th rowspan="2">X (mm) \ Zone / Y(mm)</th><th rowspan="2">Y(mm)</th><th colspan="2">Acceptable number</th><th rowspan="2">Class Of Defects</th><th rowspan="2">AQL Level</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>*</td><td>0.04 ≥ W</td><td>*</td><td>*</td><td rowspan="4">Minor</td><td rowspan="4">2.5</td></tr>
<tr><td>3.0 ≥ L</td><td>0.06 ≥ W</td><td>4</td><td>4</td></tr>
<tr><td>2.0 ≥ L</td><td>0.08 ≥ W</td><td>2</td><td>3</td></tr>
<tr><td>—</td><td>0.1 < W</td><td>0</td><td>1</td></tr>
</table>
X : Length Y : Width * : Disregard
Total defects should not exceed 4/module
</td></tr>
<tr><td>3</td><td>Air Bubbles
(between glass & polarizer)</td><td>
<table>
<tr><th rowspan="2">Zone / Dimension</th><th colspan="2">Acceptable number</th><th rowspan="2">Class of Defects</th><th rowspan="2">AQL Level</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>D ≤ 0.15</td><td>*</td><td>*</td><td rowspan="3">Minor</td><td rowspan="3">2.5</td></tr>
<tr><td>0.15 < D ≤ 0.25</td><td>2</td><td>*</td></tr>
<tr><td>0.25 < D</td><td>0</td><td>1</td></tr>
</table>
* : Disregard
Total defects shall not excess 3/module.
</td></tr>
<tr><td>4</td><td>Uniformity of Pixel</td><td>(1) Pixel shape (with Dent)
 
</td></tr>
</table>

<table>
<tr><td>4</td><td colspan="2">Uniformity of Pixel</td><td>(2) Pixel shape (with Projection)
 

(3) Pin hole
 

(X + Y)/2 ≤ 0.2mm
(Less than 0.1 mm is no counted)
(4) Deformation
 

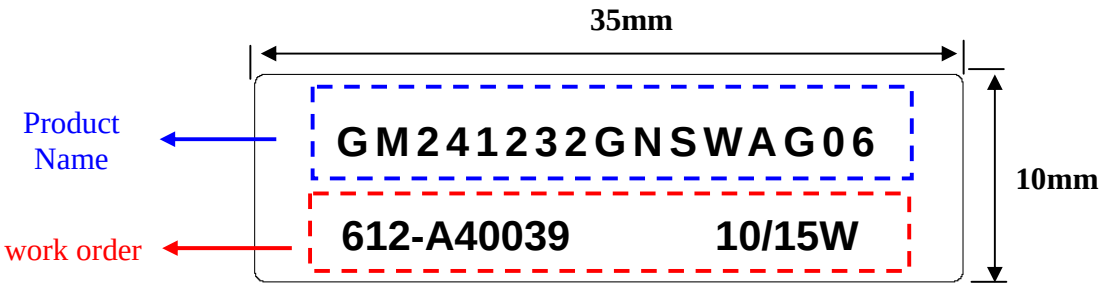
X (X + Y) / 2 ≤ 0.3mm
Total acceptable number : 1/pixel, 5/cell</td></tr>
<tr><td rowspan="4">Class of defects</td><td rowspan="2">Major</td><td>AQL 0.65%</td><td>Definition</td></tr>
<tr><td>AQL 1.00%</td><td>It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
It is a defect that is likely to assembly size and not result in functioning problem.</td></tr>
<tr><td>Minor</td><td>AQL 2.5%</td><td>It is a defect that will not result in functioning problem with deviation classified.</td></tr>
</table>

11.3 Sampling Condition

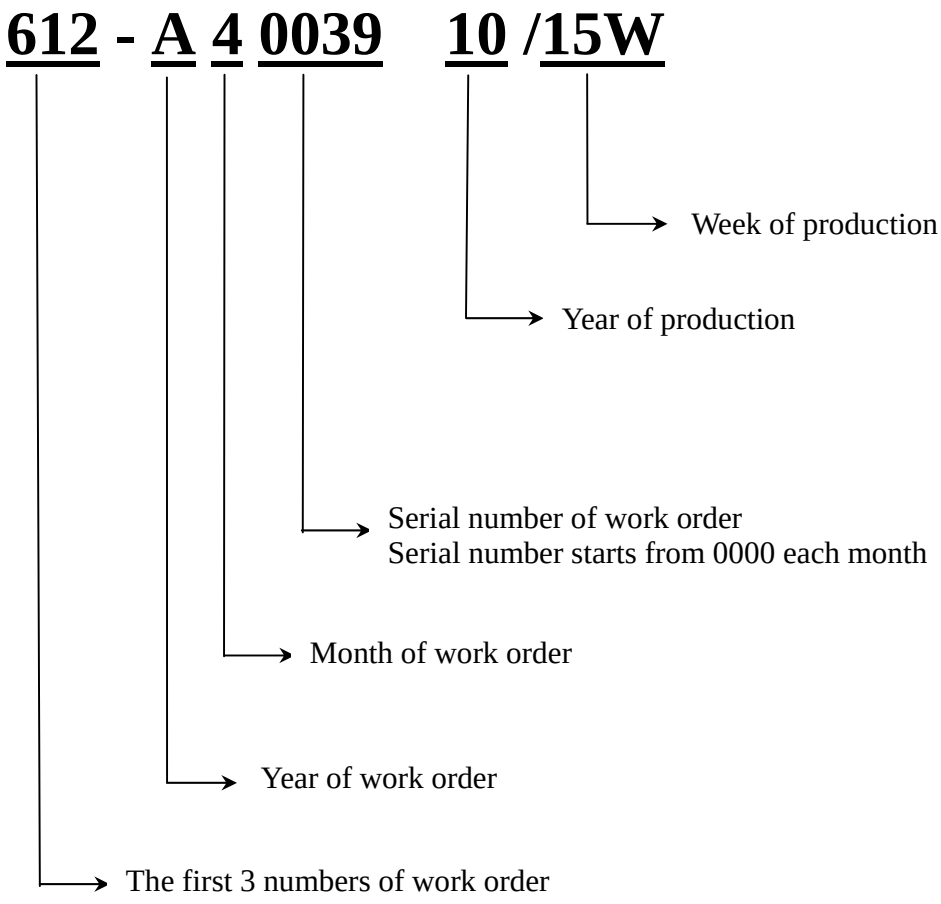
Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.
Lot size: Quantity of shipment lot per model.
Sampling type: normal inspection, single sampling
Sampling table: MIL-STD-105E
Inspection level: Level II

12. LCM PRODUCT LABEL DEFINE

Product Label style:



Work order Define:



Product Name Define:

GM 241232 G N S W A G 06

Version : 06

ROHS

View direction & Temp. Range
A–Bottom view 6H & Normal temp.
B–Bottom view 6H & Wide temp.
C–Top View & Normal temp.
D–Top View & Wide temp.

Backlight Color
B –Blue
W –White

Backlight
S –edge light LED B/L
E –EL
C-CCFL

MODE
M – transmissive R – Reflective
F – transflective **N - Negative**

LCD type
G –STN
F – FSTN
S – STN Yellow

Series code
241**32**– Dot number =240 x 128 dots, **3** LCD Type, **2** PCB Type

Model type
CM – Character Module
GM – Graphic Module
TG –Slim TAB/COG Graphic Module
TGX–Custom Slim TAB/COG Graphic Module

13. PRECAUTIONS IN USE LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degredation, polarizer peel off or bubble.

(2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.

(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

(4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.

(5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

(1). Do not tamper in any way with the tabs on the metal frame.

(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.

(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).

(4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting . Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

(1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.

(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.

(3). Only properly grounded soldering irons should be used.

(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3 Soldering

(1). Solder only to the I/O terminals.

(2). Use only soldering irons with proper grounding and no leakage.

(3). Soldering temperature : 280°C ± 10°C

(4). Soldering time: 3 to 4 sec.

(5). Use eutectic solder with resin flux fill.

(6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

2.4 Operation

(1). The viewing angle can be adjusted by varying the LCD driving voltage V0.

(2). Driving voltage should be kept within specified range; excess voltage shortens display life.

(3). Response time increases with decrease in temperature.

(4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".

(5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

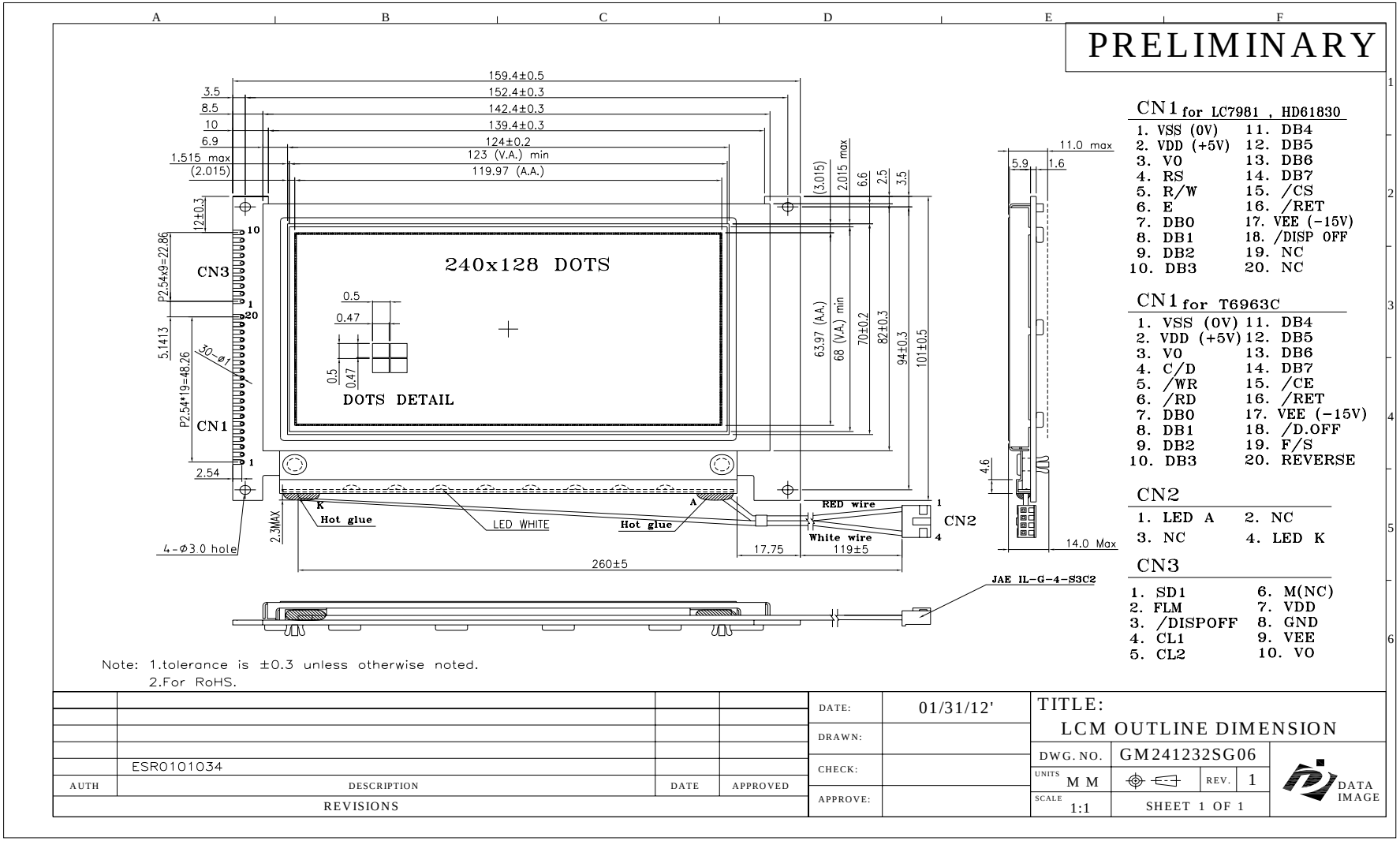
2.5 Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

2.6 Limited Warranty

Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DATA IMAGE is limited to repair and/or replacement on the terms set forth above. DATA IMAGE will not responsible for any subsequent or consequential events.

14.OUTLINE DRAWING



Note: 1.tolerance is ±0.3 unless otherwise noted.
2.For RoHS.

AUTH	DESCRIPTION	DATE	APPROVED
	ESR0101034		

REVISIONS

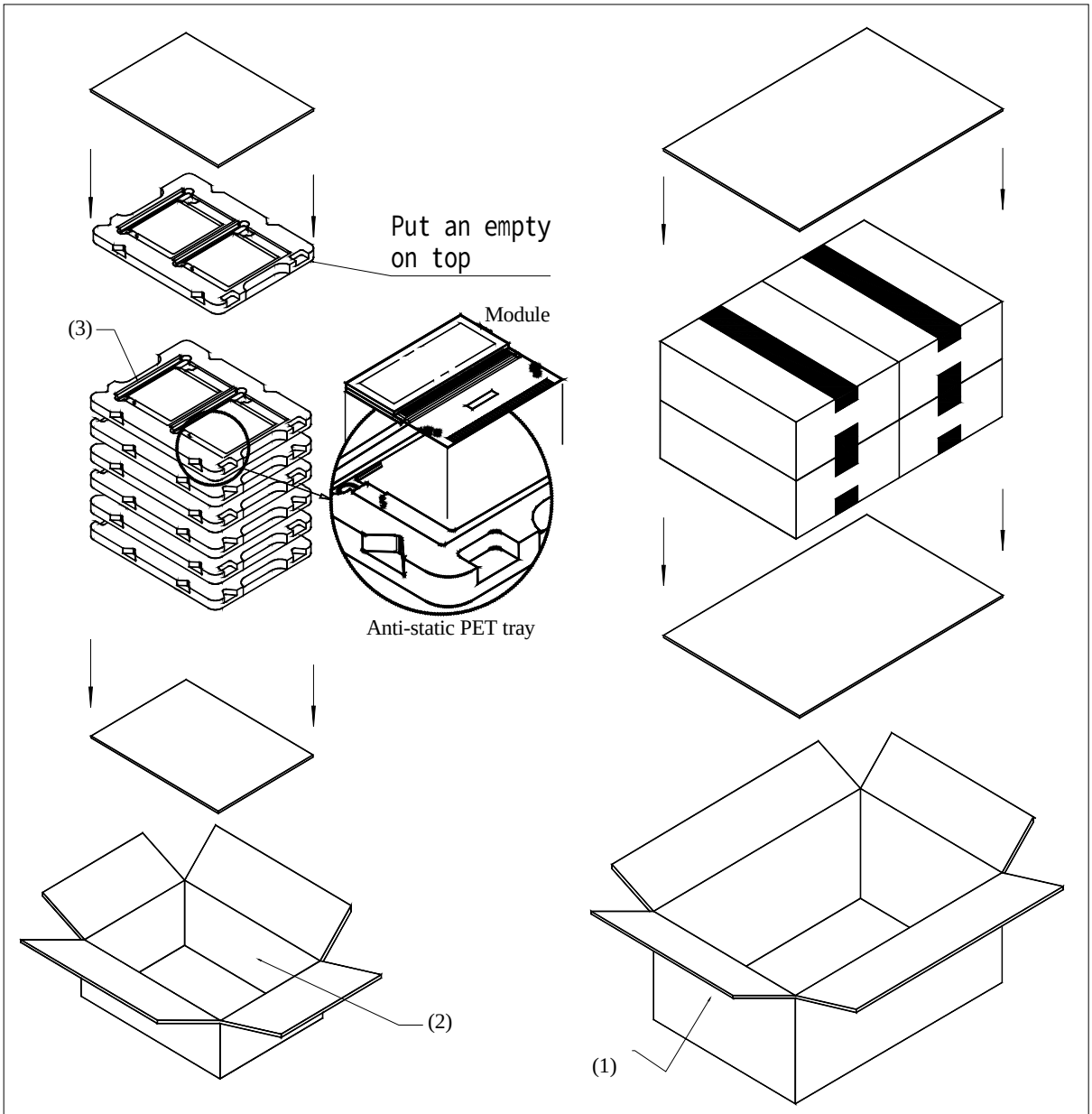
DATE:	01/31/12'
DRAWN:	
CHECK:	
APPROVE:	

TITLE: LCM OUTLINE DIMENSION

DWG. NO.	GM241232SG06
UNITS M M	REV. 1
SCALE 1:1	SHEET 1 OF 1

DATA IMAGE

15. PACKAGE INFORMATION



Item	Size(L*W*H)	Quantity	Note
1.Master Carton	482*282*279	1	
2.Inner Carton	267*224*115	4	

Quantity Per Inner Carton	12	Quantity per Master Carton	48
N . W	10.6 (kg)	G . W	11.6 (kg)