



## LCD MODULE SPECIFICATION

PART NO. RYP12232A-GYMSWN-A

Approved	Checked	Prepared	Date Issued

<b>Customer Approval</b>	<input type="checkbox"/> <b>Approved</b> <input type="checkbox"/> <b>Reject</b>  <b>Comment:</b>
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## 2. CONTENTS

NO.	ITEM	PAGE
0	APPROVAL	1
1	REVISION HISTORY	2
2	CONTENT	3
3	FEATURES	4
4	GENERAL SPECIFICATIONS	4
5	OUTLINE DIMENSIONS	5
6	PIN CONNECTIONS	6
7	BLOCK DIAGRAM	7
8	APPLICATION CIRCUIT EXAMPLE	8
9	ABSOLUTE MAXIMUM RATING	9
10	ELECTRICAL CHARACTERISTICS	9
11	ELECTRO-OPTICAL CHARACTERISTICS	10
12	DESCRIPTION OF MEASURING EQUIPMENT	11
13	CONTROLLER ELECTRICAL CHARACTERISTICS	12
14	TIMING CHARACTERISTICS	13
15	DISPLAY COMMANDS	18
16	QUALITY LEVEL	19
17	PRECAUTIONS	21
18	PACKAGE INFORMATION	22
19	CODE RULES	23



### 3. FEATURES

1. Support display capacity: 122x 32 Pixels dots with FSTN mode.
2. On-chip Display Data RAM , Capacity: 122×32 = 3904 bits.
3. Serial interfaces are supported.
4. Abundant command functions Display data Read/Write, display ON/OFF, Normal/Reverse display mode, page address set, display start line set, column address set, status read, display all points ON/OFF, LCD bias set, electronic volume, read/modify/write, segment driver direction selects, power saver, static indicator, common output status select, Vo voltage regulation internal resistor ratio set.
5. Static drive circuit equipped internally for indicators.(1 system, with variable flashing speed.)
6. Low-power liquid crystal display power supply circuit equipped internally. Booster circuit (with Boost ratios of 4X/5X, where the step-up voltage reference power supply can be input externally).
7. High-accuracy voltage adjustment circuit (Thermal gradient  $-0.05\%/^{\circ}\text{C}$  ) V0 voltage regulator resistors equipped internally, V1 to VSS voltage divider resistors equipped internally, electronic volume function equipped internally, voltage follower.
8. CR oscillator circuit equipped internally.
9. Extremely low power consumption Operating power when the built-in power supply is used (an example) 60uA (VDD – VSS =3.0 V, Quad voltage, V0 – XV0 = 11.0 V). Conditions: When displays pattern OFF and the normal mode is selected.
10. Power supply operate on the low 1.8 voltage Logic power supply
  - VDD – VSS = 1.8V to 3.3 V (+10% Range)
  - Boost reference voltage: VDD2 – VSS = 2.4V to 3.3V
  - Booster maximum voltage limited
  - VOUT= 16.0V (+10% Range)
  - Liquid crystal drive power supply: V0 – XV0 = 4.0V to 13.0 V

### 4. GENERAL SPECIFICATIONS

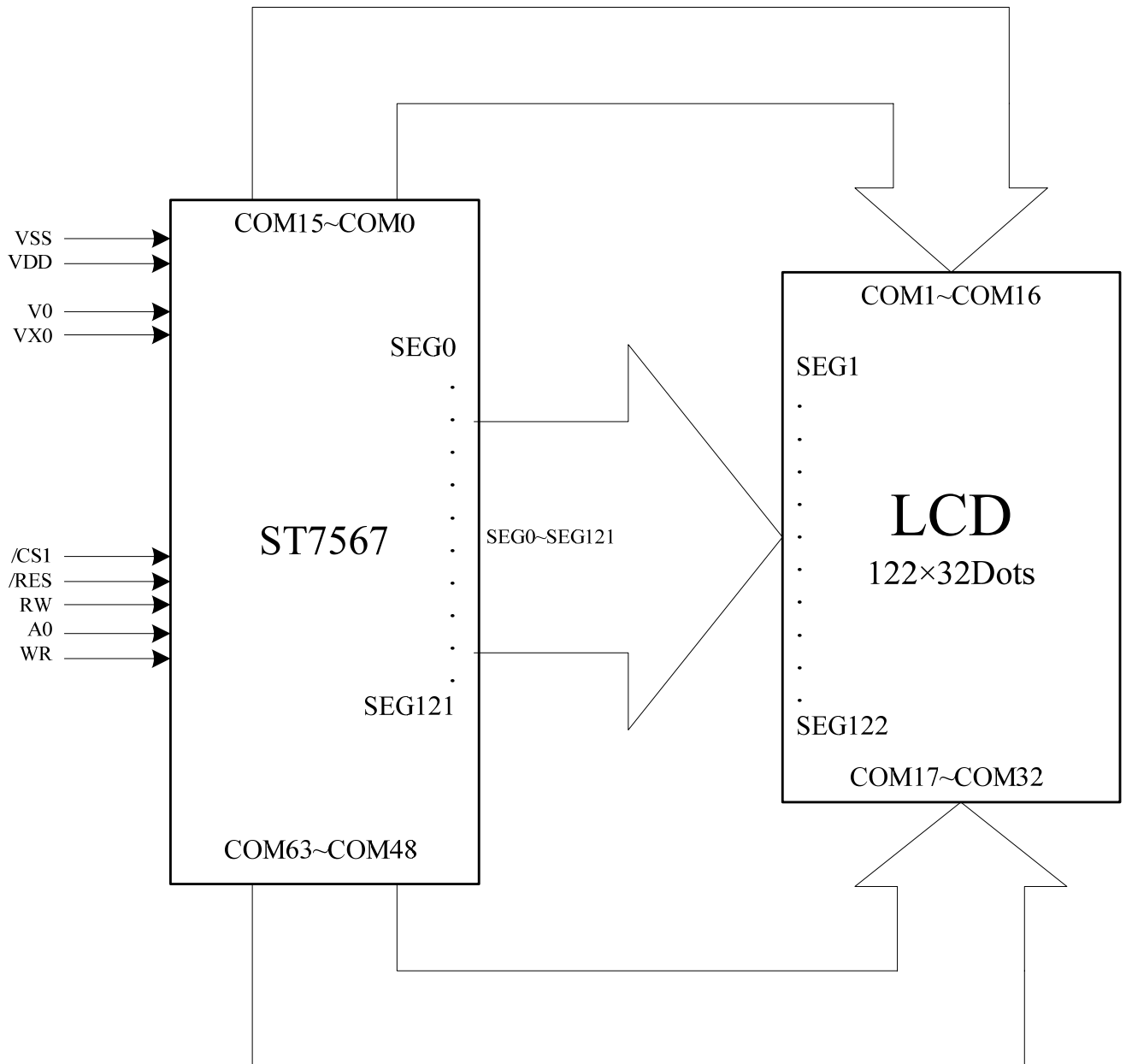
ITEM	DESCRIPTION	UNIT
Outline Size	79.0(L) × 46.0(W) × 11.2(T)	mm
LCD Type	STN/Y-G, Transmissive, Positive,1/33Duty,1/6Bias	---
Display type	122 × 32 dots	---
View Area	54.8 × 19.1	mm
Display Area	48.78 × 14.38	mm
Dots size	0.38 × 0.43	mm
Dots pitch	0.40 × 0.45	mm
Controller & driver	ST7567-COG	---
View Direction	12 O'Clock	---
Interface mode	8 BIT 8080	---
VDD&VLCD(Type)	3.3 V & 8.3 V	V
Backlight(Type)	White+黄膜, 3.1V,60 mA Uniformity $\geq 75\%$	---
Operation Temp.	-30~+70	$^{\circ}\text{C}$
Storage Temp.	-40~+85	$^{\circ}\text{C}$



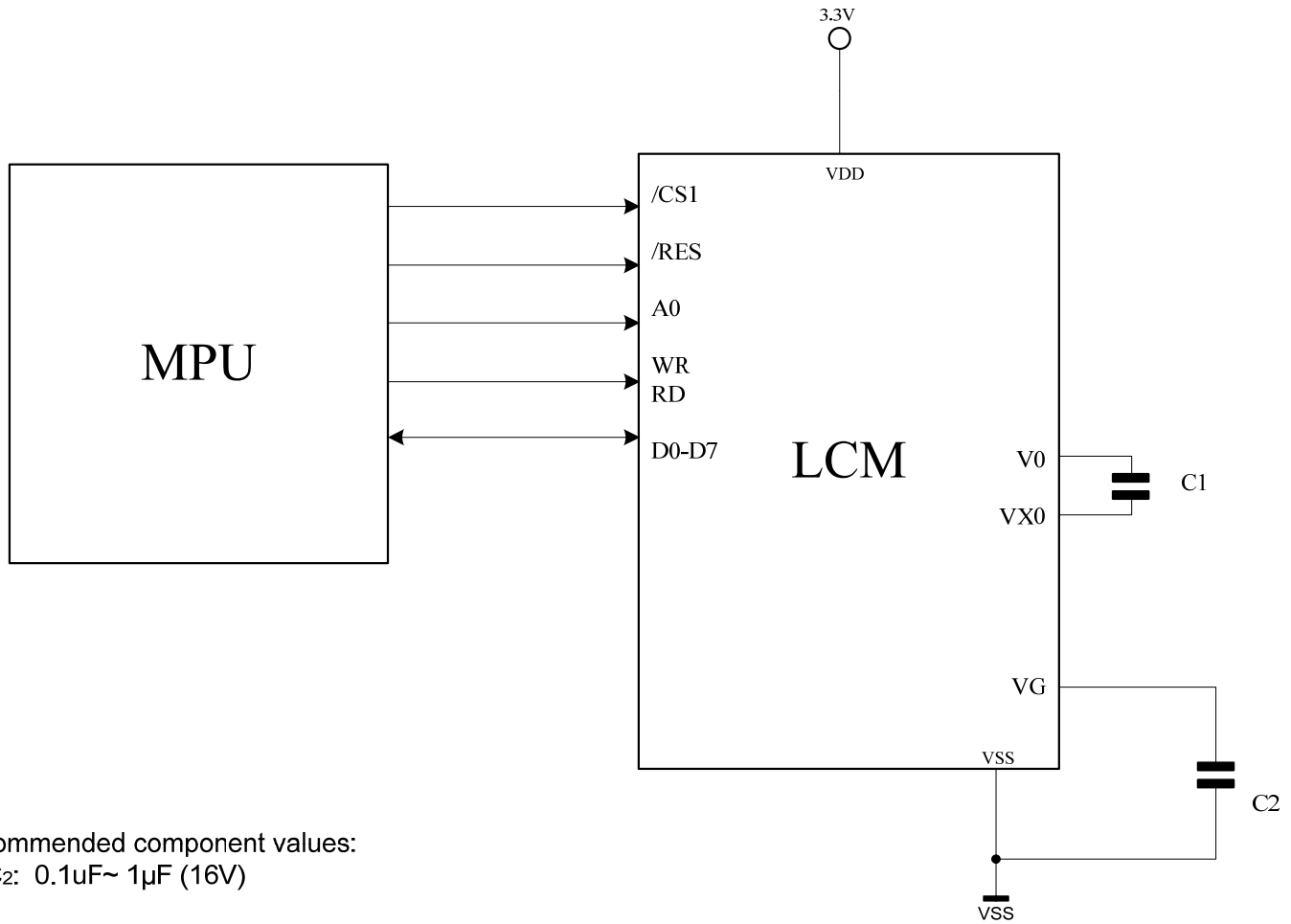


Pin No.	Pin Out	Description
1	VDD	Power supply for logic circuit.
2	VDD	Power supply for logic circuit.
3	D7	8-bit bi-directional data bus.
4	D6	
5	D5	
6	D4	
7	D3	
8	D2	
9	D1	
10	D0	
11	RD	Read enable input pin.
12	WR	Write enable input pin.
13	A0	Register select input pin; A0="H": display; A0="L": control data.
14	RST	Reset input pin; When /RES is set to "L", Settings are initialized.
15	CS1B	Chip select input pin.
16	VDD	Power supply for logic circuit.
17	VSS	Ground.
18	VSS	Ground.
19	LED+	LED Backlight +.
20	LED-	LED Backlight -.
21	VSS	Ground.
22	KEY-MENU	-
23	KEY-LEFT	-
24	KEY-RIGHT	-
25	KEY-OK	-
26	LED-LINK	-
27	CALL-BUTTON	-
28	VSS	Ground.
29	IRDA SENSOR	-
30	VSS	Ground.
31	VSS	Ground.
32	VSS	Ground.

## 7. BLOCK DIAGRAM (SPI-4 LINE)



## 8. APPLICATION CIRCUIT EXAMPLE (8080)



### Note

- Recommended component values:  
C1, C2: 0.1uF~ 1uF (16V)





## 9. ABSOLUTE MAXIMUM RATING

### ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT
POWER SUPPLY FOR LOGIC	VDD-VSS	-0.3	3.6	V
POWER SUPPLY FOR LCD DRIVE	V0-XV0	-0.3	13	V
INPUT VOLTAGE	VIN	-0.3	VDD+0.3	V
POWER SUPPLY FOR LED	VA-VK	-0.3	3.3	V

### ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

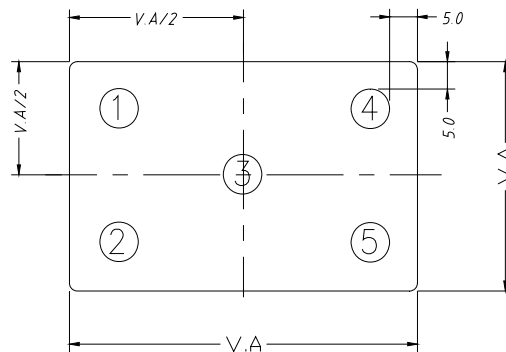
ITEM	OPERATING		STORAGE		UNIT	COMMENT
	MIN	MAX	MIN	MAX		
AMBIENT TEMPERATURE	-30	+70	-40	+85	°C	
HUMIDITY	/		/		--	WITHOUT CONDENSATION
VIBRATION (M/S <sup>2</sup> )	/	/	/	/	--	SEE "ITEMS OF RELIABILITY"
TEMPERATURE CYCLING TEST	/	/	/	/	--	SEE "ITEMS OF RELIABILITY"
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		--	

### 10. ELECTRICAL CHARACTERISTICS (V<sub>SS</sub>=0V)

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Power Supply for Logic	V <sub>DD</sub> -V <sub>SS</sub>	T <sub>a</sub> =25°C	1.8	3.0	3.3	Volt	
Power Supply for Backlight	V <sub>LED+</sub> ~ V <sub>LED-</sub>		2.8	3.0	3.2	Volt	
Input Voltage	V <sub>IL</sub>	V <sub>DD</sub> =3V±5%	V <sub>SS</sub>		0.2 V <sub>DD</sub>	Volt	
	V <sub>IH</sub>		0.8 V <sub>DD</sub>	-	V <sub>DD</sub>	Volt	
Output Voltage	V <sub>OL</sub>	V <sub>DD</sub> =3V±5%	V <sub>SS</sub>	-	0.2 V <sub>DD</sub>	Volt	
	V <sub>OH</sub>		0.8 V <sub>DD</sub>	-	V <sub>DD</sub>	Volt	
LCD drive Voltage (recommended Voltage)	XV0-V0	T <sub>a</sub> =0°C	--	--	--	Volt	
		T <sub>a</sub> =25°C	8.1	8.3	8.5		
		T <sub>a</sub> =50°C	--	--	--		
Power Supply Current for LCM	I <sub>DD</sub>	V <sub>DD</sub> =3.0V	-	150	300	uA	Note1
	I <sub>LED</sub>	V <sub>LED</sub> =2.8 V	--	60	80	mA	

Note1: Backlight Electrical-Optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Conditon
Luminance	L <sub>v</sub>	200	300	-	CD/m <sup>2</sup>	If= 60 mA
	Wavelength Range	X	0.26	-	0.32	
		Y	0.26	-	0.32	
Brightness uniformity	△%	75	-	-	%	min / max * 100%

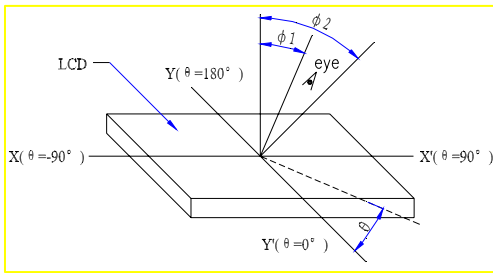


Uniformity Test

### 11. ELECTRO-OPTICAL CHARACTERISTICS

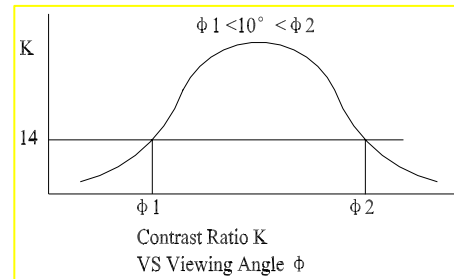
Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Viewing angle range	$\theta_2 - \theta_1$	$T_a = 25^\circ\text{C}$	20	-	-	Deg	K=1.4 A,B
	$\Phi$		-	-	-		
Rise Time	$T_r$	$T_a = 25^\circ\text{C}$	-	180	300	ms	$\Phi = 10$ $\Theta = 0$ C
		$T_a = 0^\circ\text{C}$	-	-	-		
Fall Time	$T_f$	$T_a = 25^\circ\text{C}$	-	220	300	ms	$\Phi = 10$ $\Theta = 0$ C
		$T_a = 0^\circ\text{C}$	-	-	-		
Contrast	Cr	$T_a = 25^\circ\text{C}$	-	6	-	-	$\Phi = 10$ $\Theta = 0$ D

#### 11.1 Definition of angle $\theta$ and $\phi$



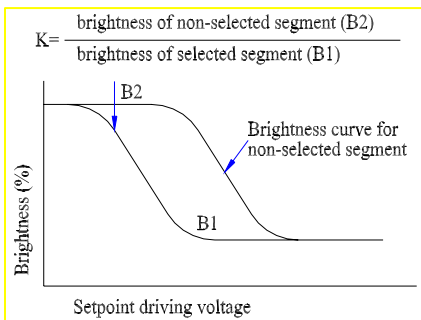
POSITIVE TYPE

#### 11.2 Definition of viewing angle $\phi_1$ and $\phi_2$



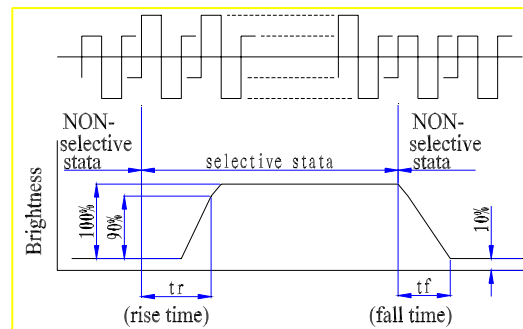
POSITIVE TYPE

#### 11.3 Definition of contrast "K"



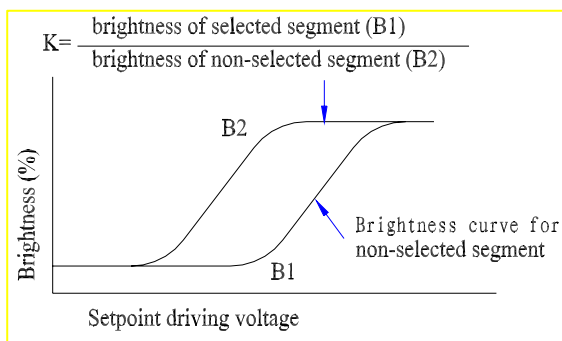
NEGATIVE TYPE

#### 11.4 Definition of optical response

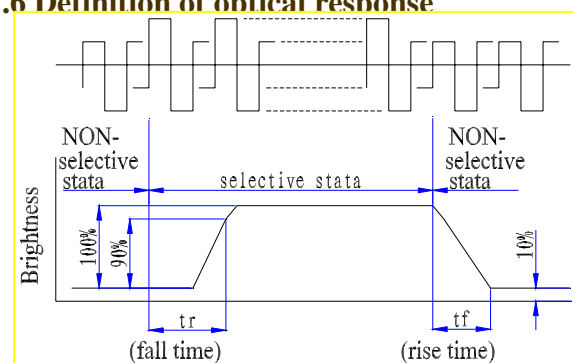


NEGATIVE TYPE

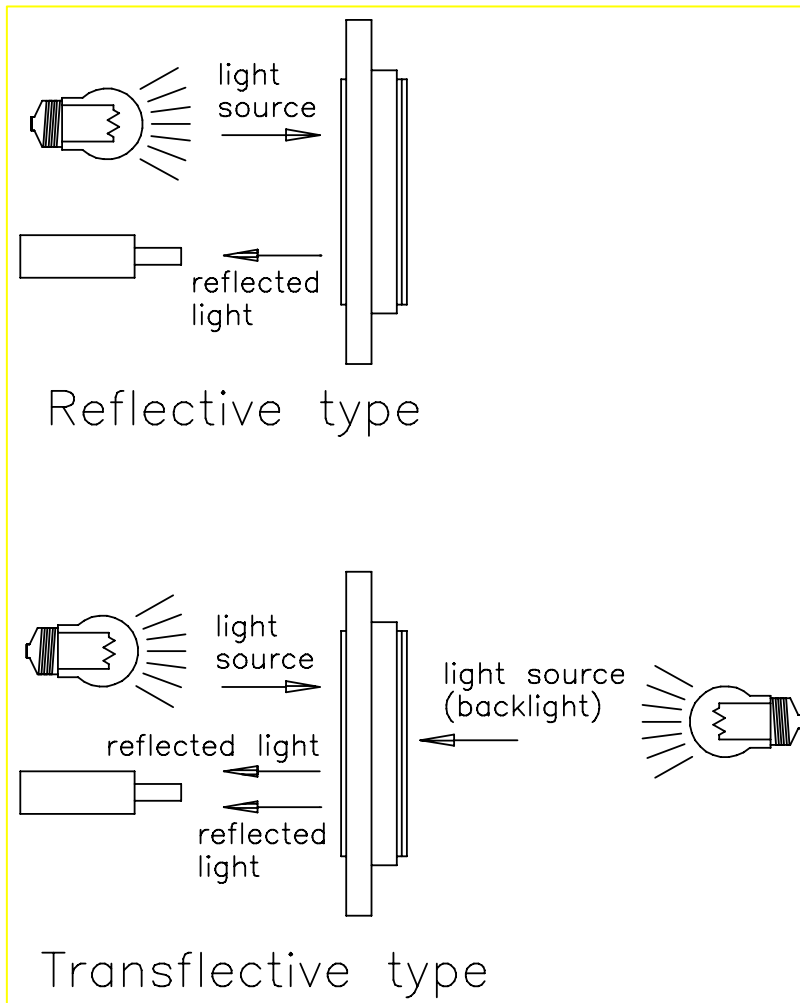
#### 11.5 Definition of contrast "K"



#### 11.6 Definition of optical response



## 12. DESCRIPTION OF MEASURING EQUIPMENT



### 13. CONTROLLER ELECTRICAL CHARACTERISTICS

#### DC Characteristics

VSS=0V; Tamb = -30°C to +85°C; unless otherwise specified.

Item	Symbol	Condition	Rating			Unit	Applicable Pin	
			Min.	Typ.	Max.			
Operating Voltage (1)	VDD1		1.7	—	3.3	V	VDD1	
Operating Voltage (2)	VDD2		2.4	—	3.3	V	VDD2	
Operating Voltage (3)	VDD3		2.4	—	3.3	V	VDD3	
Input High-level Voltage	V <sub>IHC</sub>		0.7 x VDD1	—	VDD1	V	MPU Interface	
Input Low-level Voltage	V <sub>ILC</sub>		VSS1	—	0.3 x VDD1	V	MPU Interface	
Output High-level Voltage	V <sub>OHC</sub>	I <sub>OUT</sub> =1mA, VDD1=1.8V	0.8 x VDD1	—	VDD1	V	D[7:0]	
Output Low-level Voltage	V <sub>OLC</sub>	I <sub>OUT</sub> =-1mA, VDD1=1.8V	VSS1	—	0.2 x VDD1	V	D[7:0]	
Input Leakage Current	I <sub>LI</sub>		-1.0	—	1.0	μA	MPU Interface	
Output Leakage Current	I <sub>LO</sub>		-3.0	—	3.0	μA	MPU Interface	
Liquid Crystal Driver ON Resistance	R <sub>ON</sub>	Ta=25°C	V <sub>OP</sub> =8.5V, ΔV=0.85V	—	0.6	0.8	KΩ	COMx
			V <sub>G</sub> =1.9V, ΔV=0.19V	—	1.3	1.5	KΩ	SEGx
Frame Frequency	FR	Duty=1/65, V <sub>OP</sub> =8.5V Ta = 25°C	70	75	80	Hz		

Current consumption: During Display, with internal power system, current consumed by whole IC (bare die).

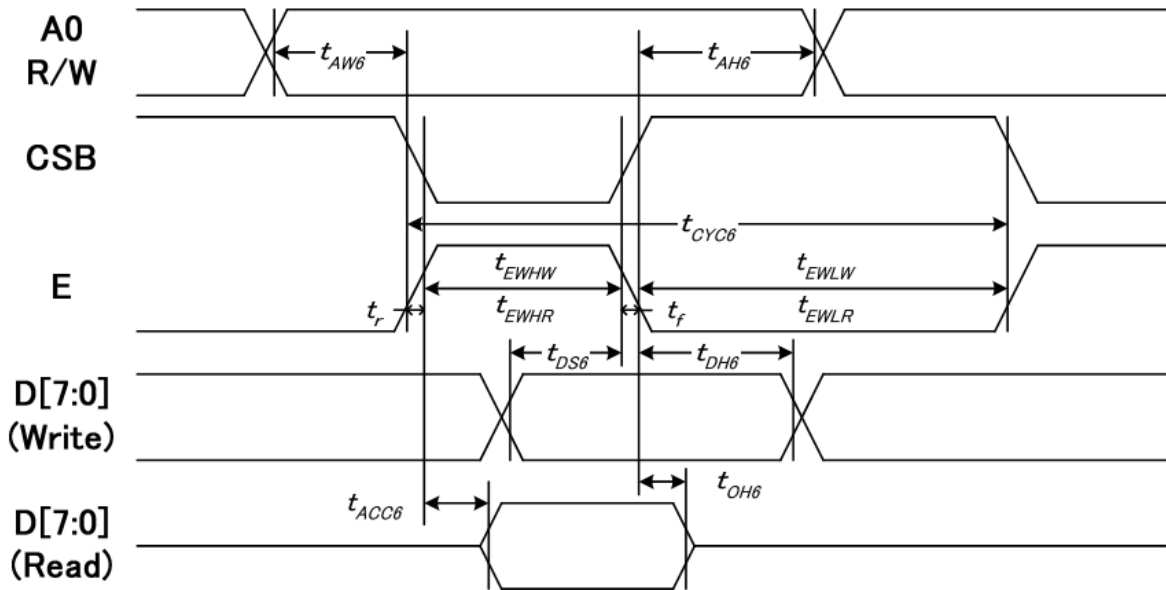
Test Pattern	Symbol	Condition	Rating			Unit	Note
			Min.	Typ.	Max.		
Display Pattern: SNOW (Static)	ISS	VDD1=VDD2=VDD3=3.0V, Booster X5 V <sub>OP</sub> = 8.5 V, Bias=1/9 Ta=25°C	—	150	300	μA	
Display OFF	ISS	VDD1=VDD2=VDD3=3.0V, Booster X5 V <sub>OP</sub> = 8.5 V, Bias=1/9 Ta=25°C	—	95	190	uA	
Power Down	ISS	VDD1=VDD2=VDD3=3.0V, Ta=25°C	—	8	16	μA	

Note:

- The Current Consumption is DC characteristics

### 14. TIMING CHARACTERISTICS

System Bus Timing for 6800 Series MPU



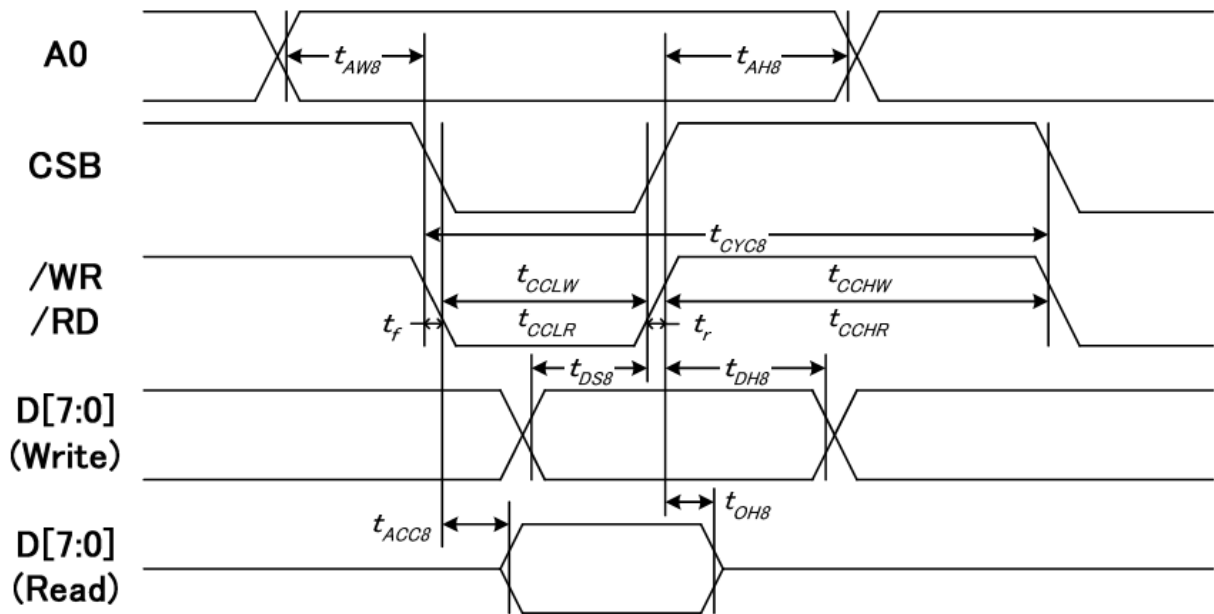
(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	t <sub>AW6</sub>		0	—	ns
Address hold time		t <sub>AH6</sub>		10	—	
System cycle time	E	t <sub>CYC6</sub>		240	—	
Enable L pulse width (WRITE)		t <sub>EHLW</sub>		80	—	
Enable H pulse width (WRITE)		t <sub>EHWLW</sub>		80	—	
Enable L pulse width (READ)		t <sub>EHLR</sub>		80	—	
Enable H pulse width (READ)	t <sub>EWHHR</sub>		140	—		
Write data setup time	D[7:0]	t <sub>DS6</sub>		40	—	
Write data hold time		t <sub>DH6</sub>		10	—	
Read data access time		t <sub>ACC6</sub>	CL = 16 pF	—	70	
Read data output disable time		t <sub>OH6</sub>	CL = 16 pF	5	50	

(VDD1 = 2.8V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	t <sub>AW6</sub>		0	—	ns
Address hold time		t <sub>AH6</sub>		0	—	
System cycle time	E	t <sub>CYC6</sub>		400	—	
Enable L pulse width (WRITE)		t <sub>EHLW</sub>		220	—	
Enable H pulse width (WRITE)		t <sub>EHWLW</sub>		180	—	
Enable L pulse width (READ)		t <sub>EHLR</sub>		220	—	
Enable H pulse width (READ)	t <sub>EWHHR</sub>		180	—		
Write data setup time	D[7:0]	t <sub>DS6</sub>		40	—	
Write data hold time		t <sub>DH6</sub>		20	—	
Read data access time		t <sub>ACC6</sub>	CL = 16 pF	—	140	
Read data output disable time		t <sub>OH6</sub>	CL = 16 pF	10	100	

### System Bus Timing for 8080 Series MPU



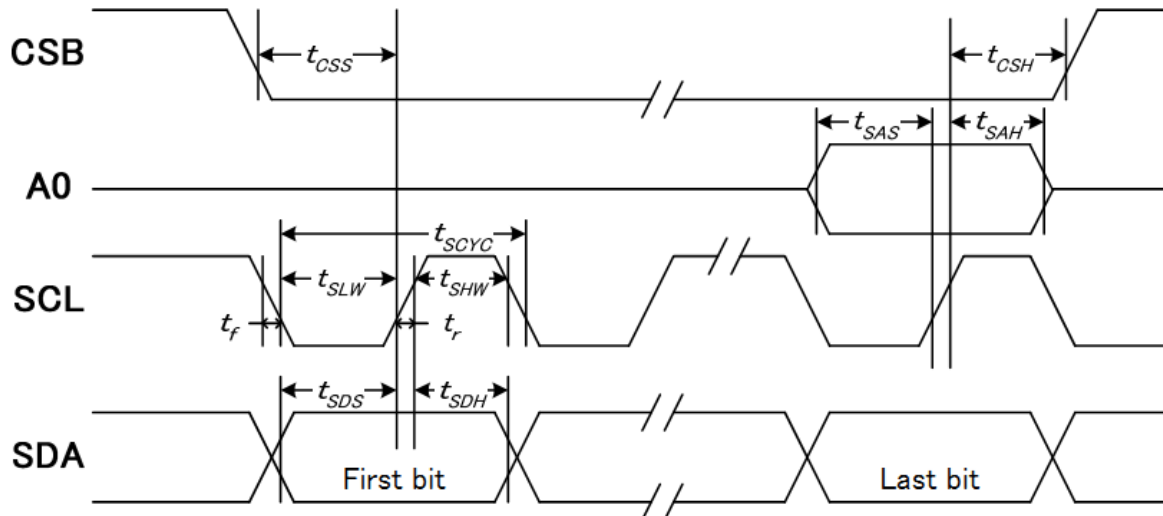
(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		10	—	
System cycle time	/WR	tCYC8		240	—	
/WR L pulse width (WRITE)		tCCLW		80	—	
/WR H pulse width (WRITE)		tCCHW		80	—	
/RD L pulse width (READ)		RD	tCCLR		140	
/RD H pulse width (READ)	tCCHR			80	—	
WRITE Data setup time	D[7:0]	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	70	
READ Output disable time		tOH8	CL = 16 pF	5	50	

(VDD1 = 2.8V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		0	—	
System cycle time	/WR	tCYC8		400	—	
/WR L pulse width (WRITE)		tCCLW		220	—	
/WR H pulse width (WRITE)		tCCHW		180	—	
/RD L pulse width (READ)		RD	tCCLR		220	
/RD H pulse width (READ)	tCCHR			180	—	
WRITE Data setup time	D[7:0]	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	140	
READ Output disable time		tOH8	CL = 16 pF	10	100	

### System Bus Timing for 4-Line Serial Interface



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		50	—	ns
SCLK "H" pulse width		tSHW		25	—	
SCLK "L" pulse width		tSLW		25	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		10	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		10	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		40	—	

(VDD1 = 2.8V, Ta = 25°C)

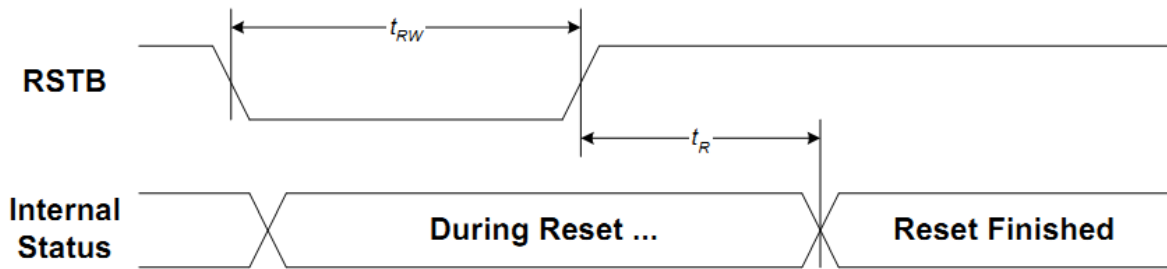
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		100	—	ns
SCLK "H" pulse width		tSHW		50	—	
SCLK "L" pulse width		tSLW		50	—	
Address setup time	A0	tSAS		30	—	
Address hold time		tSAH		20	—	
Data setup time	SDA	tSDS		30	—	
Data hold time		tSDH		20	—	
CSB-SCLK time	CSB	tCSS		30	—	
CSB-SCLK time		tCSH		60	—	

\*1 The input signal rise and fall time (tr, tf) are specified at 15 ns or less.

\*2 All timing is specified using 20% and 80% of VDD1 as the standard.



### Hardware Reset Timing



(VDD1 = 3.3V, Ta = 25°C)

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.0	us
Reset "L" pulse width	tRW		1.0	—	

(VDD1 = 2.8V, Ta = 25°C)

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	2.0	us
Reset "L" pulse width	tRW		2.0	—	

### 15. DISPLAY COMMANDS

The display commands shown below control the internal state of the LCD driver ICs. Commands are sent from CPU to LCD module for the display control.( please to visit the web: <http://www.sitronix.com.tw>)

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4) Set Column Address	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7 (at 1/65 duty)
(12) Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0 , Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Software reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(18) Set EV	0	0	1	0	0	0	0	0	0	1	Double command!! Set electronic volume (EV) level
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	
(19) Set Booster	0	0	1	1	1	1	1	1	0	0	Double command!! Set booster level: BL=0: 4X BL=1: 5X
	0	0	0	0	0	0	0	0	0	BL	
(20) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	-	Do NOT use. Reserved for testing.

Note: Symbol "-" means this bit can be "H" or "L".



## 16. QUALITY LEVEL

### Inspection conditions

#### Environmental conditions

The environmental conditions for inspection shall be as follows: Room temperature:  $22 \pm 3$  °C ; Humidity:  $50 \pm 10\%$  RH

#### The external visual inspection

The inspection shall be performed by using a single 20W fluorescent lamp for illumination and the distance from LCD to eyes of the inspector should be 30cm or more.

### Classification of defects

#### A major defect

A major defect refers to A defect which may substantially degrade usability for product applications.

#### Minor defect

A Minor defect refers to A defect which is not considered to substantially degrade product application or A defect which deviates from existing standards almost unrelated to the effective use of the product or its operation

Sampling procedures for each items acceptance level table

Defect type	Sampling procedures	AQL
Major defect	MIL-STD-105D Inspection level1 normal inspection Single sample inspection	1.0
Minor defect	MIL-STD-105D Inspection level1 normal inspection Single sample inspection	2.5

### Life time

50,000Hrs(25°C in the room without ray of sun)

### Items of reliability

ITEM	CONDITIONS	CRITERION
High temperature operation test	+70°C \ 120 hours	1. It judged at room temperature after 1 hours to be good as appearance and electrical test is normal after the experiment. 2. Current consumption should within the specification of Approval sheet Electro-optical characteristics
Low temperature operation test	-30°C \ 120 hours	5-10pcs
High temperature/humidity storage test	+85°C, 80%±10%RH \ 120 hours	
High temperature storage test	+85°C \ 120 hours	
Low temperature storage test	-40°C \ 120 hours	



Temperature cycling test	<p style="text-align: center;">-30°C (30 min) ↓      ↑ 25°C (5 min) ↓      ↑ 70°C (30 min)</p> <p style="text-align: center;">CYCLES: 10</p>	
Vibration	<p>Random Wave: 10 ~ 50 Hz Each Direction (x, y, z): 30 Min.</p>	

**Cosmetic criteria of LCD screen**

DEFECT	JUDGEMENT CRITERION		
Spots	<b>Size d (mm)</b>	<b>Acceptable quantity in active area</b>	
	d ≤ 0.1	Disregard	
	0.1 < d ≤ 0.2	6	
	0.2 < d ≤ 0.3	2	
	d > 0.3	0	
Note: d = (Length + Width)/2			
Polarizer Bubbles	<b>Size d (mm)</b>	<b>Acceptable quantity in active area</b>	
	d ≤ 0.3	Disregard	
	0.3 < d ≤ 1.0	3	
	1.0 < d ≤ 1.5	1	
	d > 1.5	0	
Note: d = (Length + Width)/2			
Lines	<b>Width W (mm)</b> <b>Length L (mm)</b>	<b>Acceptable quantity in active area</b>	
	W ≤ 0.02	Disregard	
	0.02 < W ≤ 0.05	L ≤ 5.0	6
		L > 5.0	0
	0.05 < W ≤ 0.1	L ≤ 2.0	6
		L > 2.0	0
	W > 0.1	See criteria for spots	
Testing conditions: 20W fluorescent lamp at 30 cm distance at normal viewing angle			

## 17. PRECAUTIONS

### **Static charge**

Since this LCD module contains CMOS LSI that are sensitive to static charge, care must be taken when handling it.

### **Power on sequence**

1. Input signals should not be applied to the LCD module before the logic system voltage has reached the specified voltage. If the above sequence is not kept, the LCD module might be permanently damaged.
2. When connecting the power supply, connect the LCD bias voltage after connecting the logic system voltage.
3. When disconnecting the power supply, disconnect the logic system voltage after the LCD bias voltage.
4. It is recommended to connect a serial resistor or fuse to the LCD bias power supply of the system as a current limiter. The value of the resistor depends on the kind of LCD used, but is typically 50~100  $\Omega$

### **Operation**

1. It is essential to drive the LCD within the specified voltage limits, since a higher driving voltage than allowed causes a shorter LCD lifetime. Under these circumstances, electrochemical reactions will result in undesirable deterioration of the LCD.
2. The response time of the LC fluid is considerably longer at low temperature than in the normal operating temperature range. On the other hand, the LCD will show a dark blue color at high temperatures. Those phenomena do not indicate a malfunction or defect of the LCD. Back at normal temperatures, the LCD will return to its original behavior.
3. If the display area is pressed hard during operation, some abnormal display patterns might appear. However, the display will resume normal operation after turning the module off and on.
4. Moisture on the terminals could cause an electrochemical reaction resulting in an open terminal connection. If the environmental temperature is higher than 50°C, it is required that the relative humidity is 50% or less.

### **Long-time storage**

For long-term storage the following methods are highly recommended:

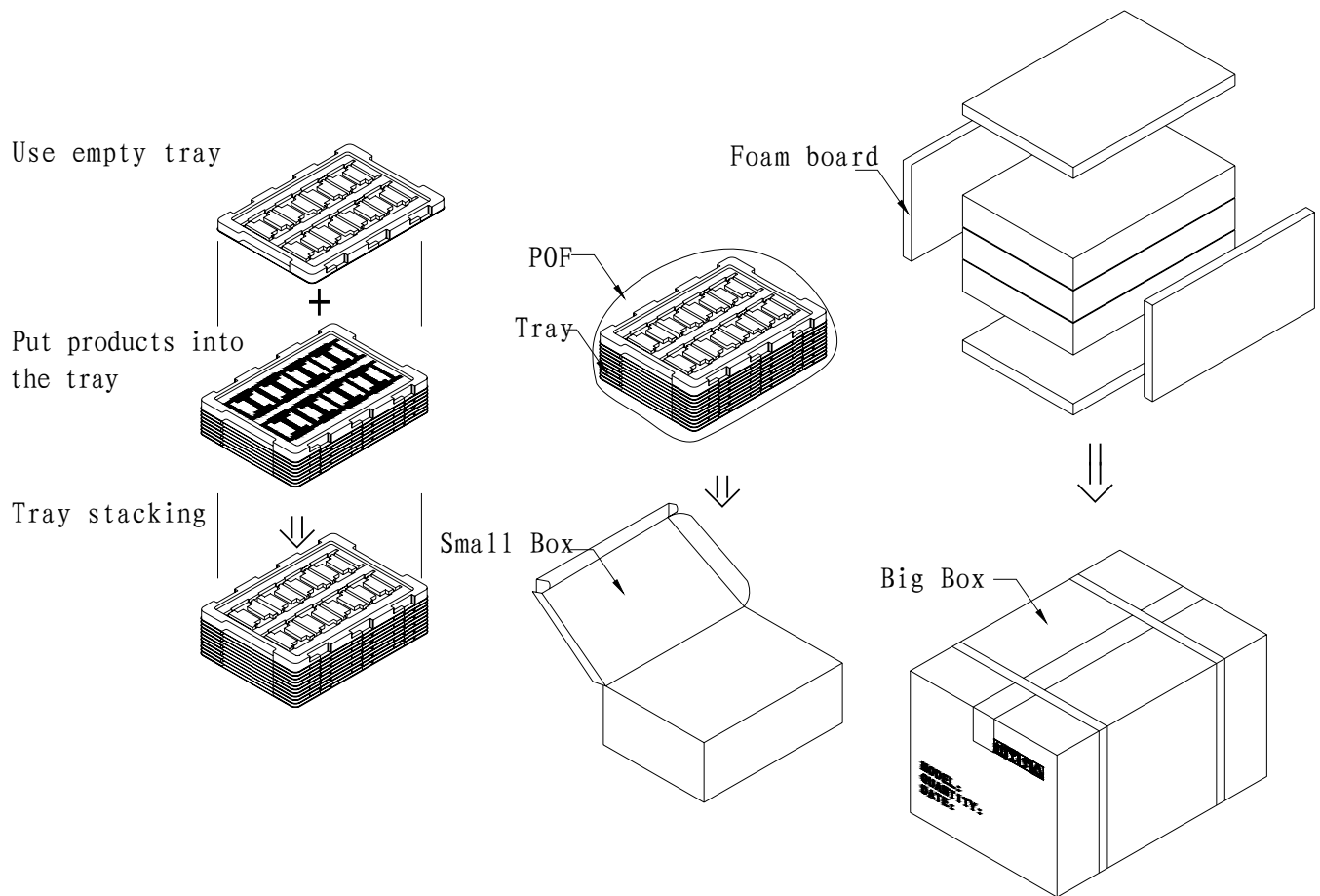
1. Store the product in a polyethylene bag with a sealed opening to prevent fresh air entering from the outside. Placing it with a desiccant is not necessary.
2. Store the product in a dark place, with the temperature in the range from -10°C to 60°C.
3. Keep the sensitive polarizer surface of the LCD panels clear of any contact. We recommend using the container that was used by HTVD to deliver the products.

### **Cleaning of product**

To clean the product make sure to use absorbent cotton cloth or other soft material like chamois. Make sure to rub it gently and do not use chemicals when cleaning.

## 18. PACKAGE INFORMATION

Packaging Material				
No.	Item	Model	Dimensions (mm)	Quantity
1	LCM	-	-	?
2	POF	11-01-0001	--	--
3	TRAY	12-06-0093	425.0×290.0×?	?
4	FOAM BOARD	12-07-0009	400.0×300.0×20.00	4
5	SMALL BOX	12-01-0005	440.0×300.0×80.00	3
6	BIG BOX	12-00-0011	450.0×350.0×320.0	1

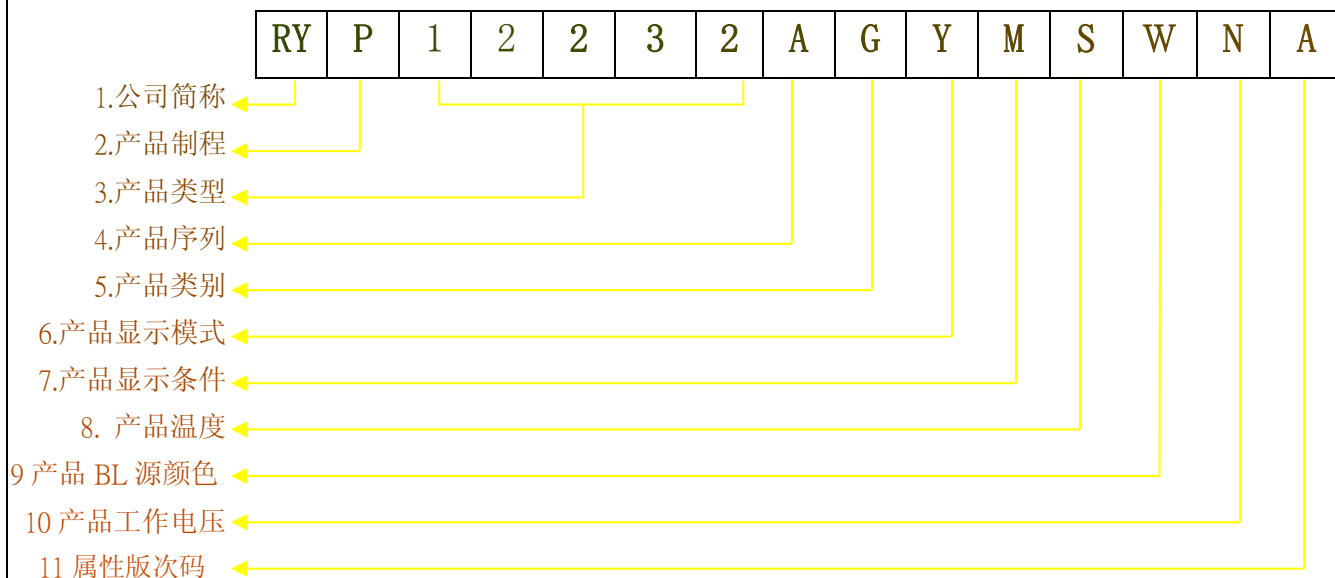


### NOTE:

*This map for reference only, and the actual amount of packaging in order to prevail in kind.*

### 19. CODE RULES

#### 19-1、产品编码方式



#### 19-2、制程码说明

**G**—COG 类型产品    **P**—COB/PCBA 类型产品（COG 加 PCB 也归类于 COB 类型）    **F**—彩屏类型产品

#### 19-3、产品类型码说明

直接用产品点阵数、字符数编码，比如：1602/12864,段码从 7001 开始编流品号。

#### 19-4、产品序列码说明

同一类型（点阵数，字符数相同，特殊要求）用 A~Z 区分。

#### 19-5、产品类别码说明

**C**—字符类型产品    **G**—图形点阵类型产品    **N**—段码类型产品

#### 19-6、显示模式代码说明

T-TN   H-HTN   F-FSTN   V-VA   Y-STN Yellow-Green   G-STM Gray   B-STN Blue   D-DFSTN

#### 19-7、显示条件代码： **R**-反射    **T**-正显半透    **M**-正显全透    **U**-负显半透    **V**-负显全透

#### 19-8、工作温度代码说明： N-常温（0~50℃）    W-宽温（-20~70℃）    S-超宽温（-30~80）

#### 19-9、BL 源颜色代码说明

**W**-白色    **R**-红色    **B**-蓝色    **O**-橙色    **G**-翠绿色    **YG** - 黄绿色    **AM** - 琥珀色

**GR**-绿色/红色    **RB**-蓝色/红色    **BG**-绿色/蓝色    **RO**-红色/琥珀色    **RGB**-三色(红蓝绿)    **N**-无背光

#### 19-10、工作电压代码说明： N-3.3V    W-5.0V

#### 19-11、属性版次码

版次码由英文字母一码组成，从 A~Z 依次递增。一个版次码对应唯一规格产品型号。