

欣瑞达液晶显示技术

X.R.D LCD TECHNOLOGY CO., LTD

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
MODEL	XRDZ-B00457AHUFGWSNN
CUSTOMER APPROVED	

APPROVED BY	CHECKED BY	ORGANIZED BY

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Specification Revision History

Version	Content	Date
A0	First Issue	03-Nov-2021
A1	修改 VDD 和数据信号为 3.3V	07-Dec-2021

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■ MODULE CLASSIFICATION INFORMATION

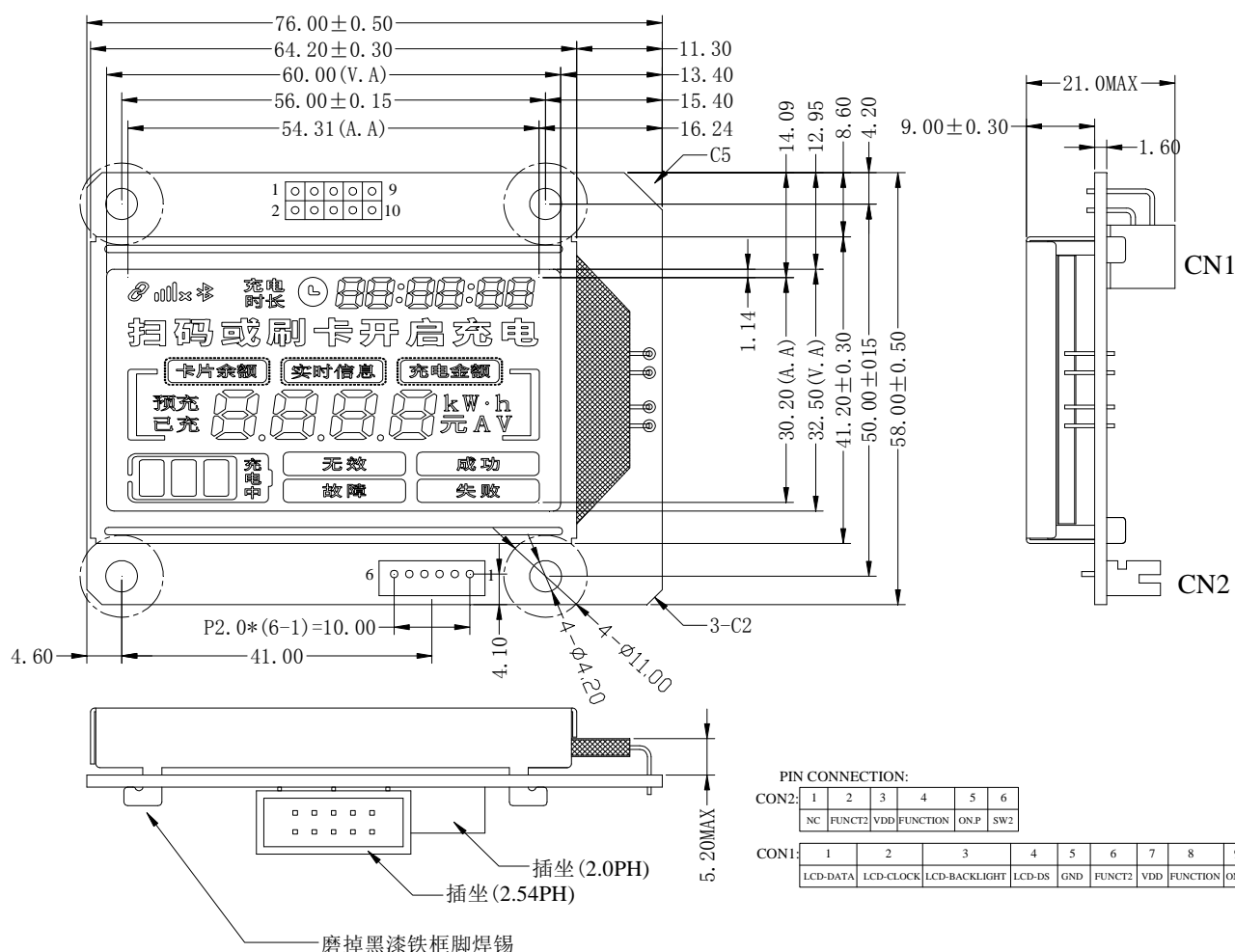
X R D Z - B 0 0 4 5 7 A H U F G W S N N

SPECIAL NEEDS
N:NO SPECIAL NEEDS
CHARACTERS OR FONT MODE
N:WITHOUT
TEMP.GRADE
S: -20° TO +70°
BACKLIGHT MODE & COLOR
W:WHITE
POLARIZER COLOR
G: GREY
POLARIZER MODE
F: Transflective
VIEWING ANGLE
U: 12 0' CLOCK
LCD TYPE
H:HTN
MODEL SERIES
A
DISPLAY FORMAT
00457
IC PACKING
B:COB
LCM TYPE
Z:OTHERS
STANDARD MODULE

■ PHYSICAL DATA

ITEM	STANDARD VALUE	UNIT
NUMBER OF CHARACTERS		mm
MODULE DIMENSION	76.0×58.0×21.0(MAX)	mm
EFFECTIVE DISPLAY AREA	60.0×32.5	mm
CHARACTER SIZE	/	mm
CHARACTER PITCH	/	mm
LCD TYPE	HTN/POSITIVE(GREY)	
DUTY	1/4D, 1/3B	
VIEWING DIRECTION	12:00	o'clock
BACK LIGHT TYPE	SIDE LIT LED	
BACK LIGHT COLOR	White	
APPROX. WEIGHT	TBD	g

■ MECHANICAL DIMENSIONS



NOTES:

ALL UNMARKED TOLERANCES: ±0.2mm;

■ INTERFACE PIN CONNECTIONS

CON1:

NO	SYMBOL	LEVEL	FUNCTION
1	LCD-DATA	H/L	Serial data input/output.
2	LCD-CLOCK	H/L	WRITE clock input with pull-high resistor Data on the DATA line are latched into the CS1621 on the rising edge of the CLOCK signal.
3	LCD-BACKLIGHT	H	Backlight Control
4	LCD-DS	L	Chip selection input with pull-high resistor
5	GND	0V	Ground
6	FUNCTION2		Connect CON2.2
7	VDD	+3.3V	Positive power supply
8	FUNCTION		Connect CON2.4
9	ON. P		Connect CON2.5
10	SW2		Connect CON2.6

CON2:

NO	SYMBOL	LEVEL	FUNCTION
1	NC		
2	FUNCTION2		Connect CON1.6
3	VDD	+3.3V	Positive power supply
4	FUNCTION		Connect CON1.8
5	ON. P		Connect CON1.9
6	SW2		Connect CON1.10

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply voltage for logic	VCC	-0.3	5.5	V
Input voltage	VI	-0.3	VDD+0.3	V
Operating temperature	TOP	-20	+70	°C
Storage temperature	TST	-30	+80	°C

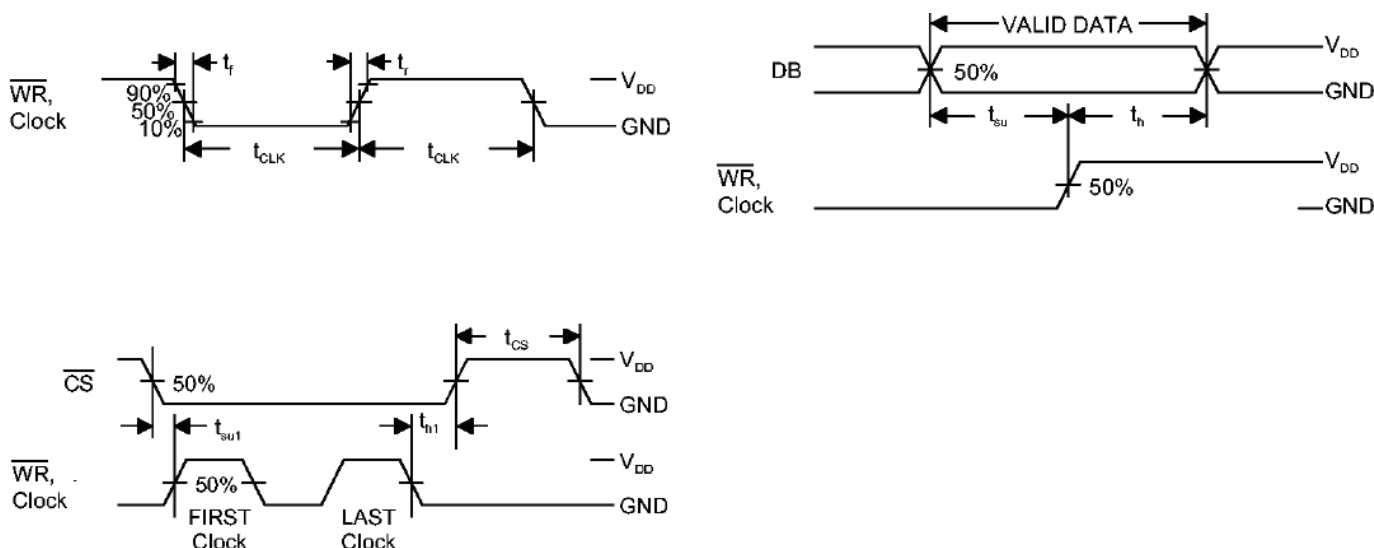
■ ELECTRICAL CHARACTERISTICS

▼ DC Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Supply voltage for logic	VDD	---	3.1	3.3	3.5	V
Supply current for logic	IDD	---	---	150	300	μA
Input voltage 'H' level	VIH	---	2.4	---	3.5	V
Input voltage 'L' level	VIL	---	0	---	0.6	V

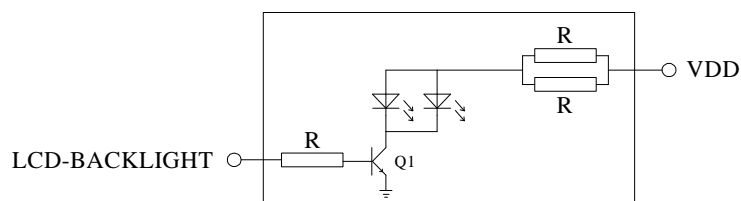
▼ AC Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
System Clock	fsys	On-chip RC oscillator	---	256	---	KHz
LCD Clock	fLCD	On-chip RC oscillator	---	256/768	---	KHz
LCD Common Period	tcom		---	4/ fLCD	---	s
Serial interface reset	tcs	VDD=3.3V, /CS	---	250	---	ns
/WR Input pulse wide	tclk	VDD=3.3V, Write mode	3.34	---	---	us
Rise/Fall time serial DATA clock width	tr,tf	VDD=3.3V	---	120	---	ns
Setup time for DATA to /WR clock width	tsu	VDD=3.3V	---	120	---	ns
Hold time for DATA to /WR clock width	th	VDD=3.3V	---	120	---	ns
Setup time for /CS to /WR clock width	tsu1	VDD=3.3V	---	100	---	ns
Hold time for /CS to /WR clock width	th1	VDD=3.3V	---	100	---	ns



■ BACKLIGHT

- ▼ **Backlight Type:** LED
- ▼ **Backlight color:** White
- ▼ **Power Supply For Backlight**



▼ Absolute Maximum Rating

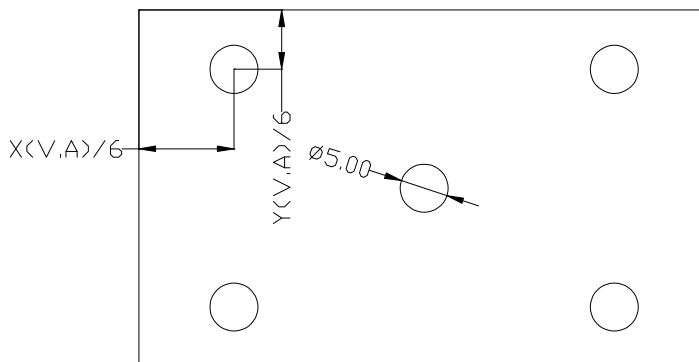
PARAMETER	SYMBOL	CONDITION	MAX	UNIT
Absolute maximum forward current	Ifm		60	mA
Peak forward current	Ifp	1 MSEC plus 10% Duty Cycle	80	mA
Reverse voltage	VR		5.0	V

Note: For operation above 25°C, Then Ifm Ifp must be decreased, the Current decreased is -1.08mA/°C for DC drive and -2.58mA/°C Pulse drive, the power dissipation is -4.5mW/°C. The product working current must not more than the 70% of the Ifm or Ifp according to the working temperature.

▼ Electrical-Optical Characteristics

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Forward voltage	Vf		3.1	3.3	3.5	V
Forward current	If		----	30	40	mA
Reverse current	Ir	VR=5.0V	----	----	10	μA
Chromaticity		If(forward current) = 30mA	x=0.28 y=0.27	x=0.30 y=0.29	x=0.32 y=0.31	
Luminance	Lv	If(forward current) =30mA	----	----	----	cd/m ²

Note: The Master Screen's luminance is the average value of 5 points, and The Lvmin./Lvmax. is not less than 75%. The measurement instrument is BM-7 luminance Colorimeter. The aperture is Φ5 mm.



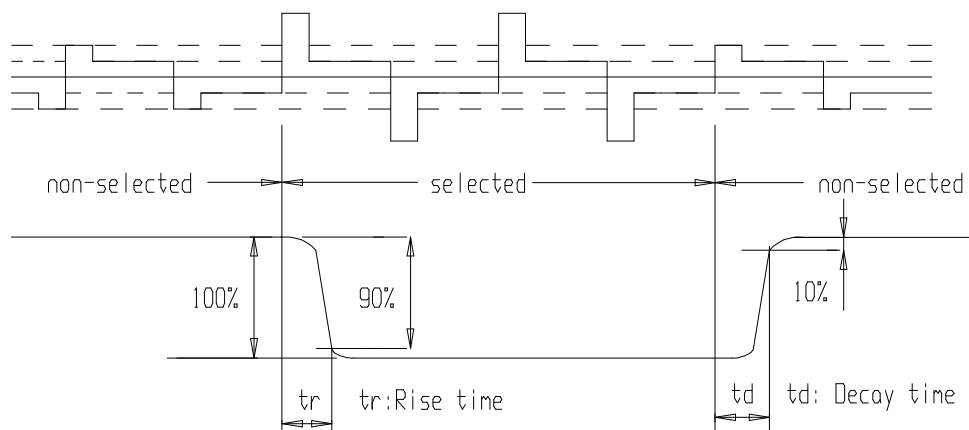
■ OPTICAL CHARACTERISTICS

Test instrument is LCD-5000,made in Japan

Item	Symbol	Condition	Min	Typ	Max	Unit	Remarks	Note
Operating voltage	Vop	25℃	2.9	3.1	3.3	V	---	---
Response time	Tr	----	----	150	230	ms	---	1
	Td	----	----	180	230	ms	---	1
Contrast ratio	Cr	----	3	5	----	---	---	2
Viewing angle range	θ	$Cr \geq 3$	----	20	----	deg	$\theta = 0^\circ$	3
			----	40	----	deg	$\theta = 180^\circ$	3

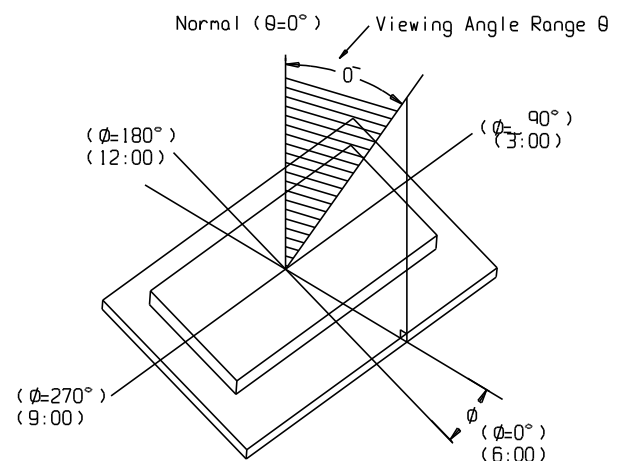
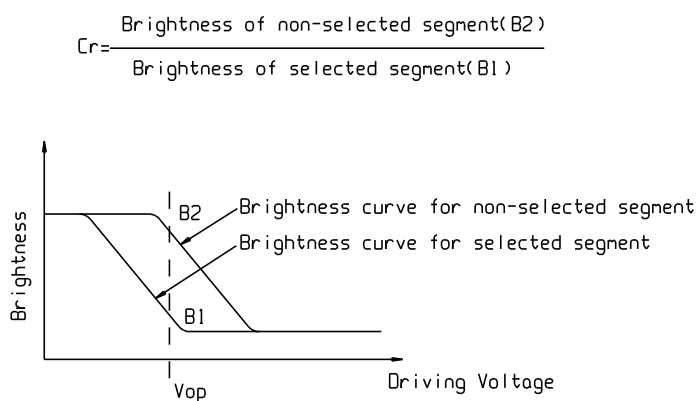
▼ Definition Of Viewing Angle

Note1: Definition of response time

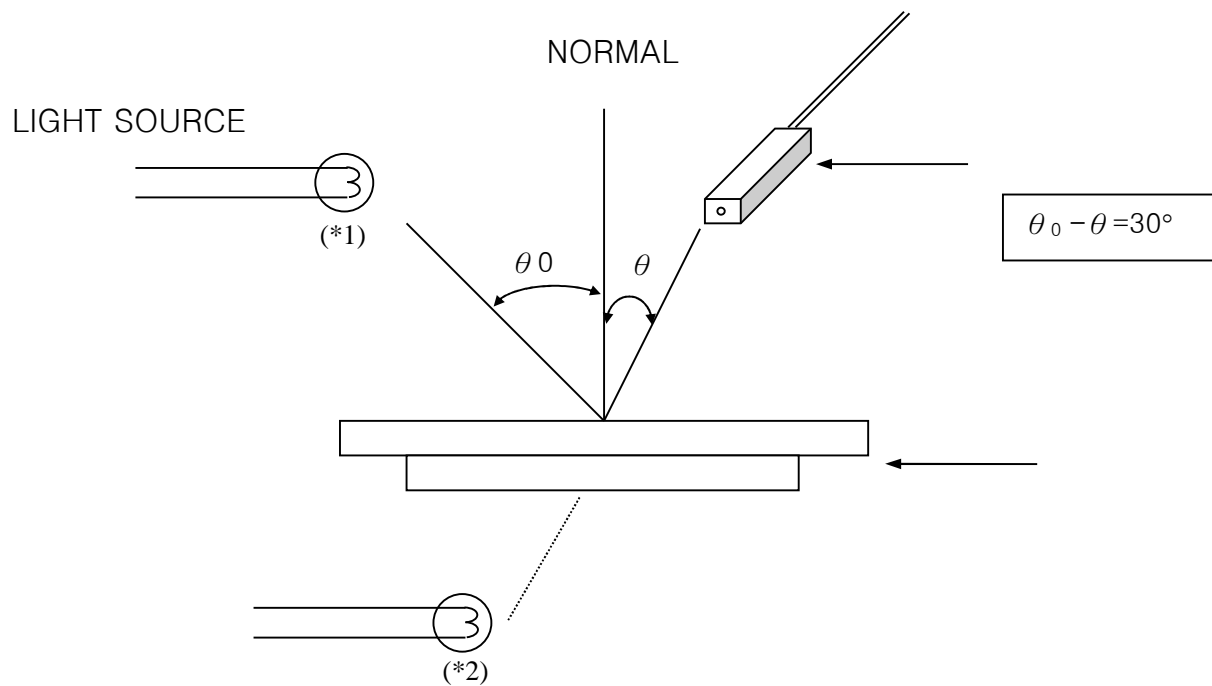


Note2: Definition of contrast ratio 'Cr'

Note3: Definition of viewing angle range ' θ '



Note4:Measuring Instruments For Electro-optical Characteristics



*1.Light source position for measuring the reflective type of LCD panel

*2.Light source position for measuring the transfective / transmissive types of LCD panel

■ OPERATING PRINCIPLES & METHODS

▼ Display memory-RAM

The static display memory (RAM) is organized into 32x4 bits and stores the displayed data. The contents of the RAM are directly mapped to the contents of the LCD driver. Data in the RAM can be accessed by the READ, WRITE, and READ-MODIFY-WRITE commands. The following is a mapping from the RAM to the LCD pattern:

	COM3	COM2	COM1	COM0	
SEG0					0
SEG1					1
SEG2					2
SEG3					3
⋮	⋮	⋮	⋮	⋮	⋮
SEG31					31
	D3	D2	D1	D0	addr Data

Address 6 bits
(A5,A4,.....,A0)

Data 4 bits addr
(D3,D2,D1,D0)

RAM mapping

▼ System oscillator

The LCD OFF command is used to turn the LCD bias generator off. After the LCD bias generator switches off by issuing the LCD OFF command, using the SYS DIS command reduces power consumption, serving as a system power down command. At the initial system power on, the CS1621 is at the SYS DIS state.

▼ Command format

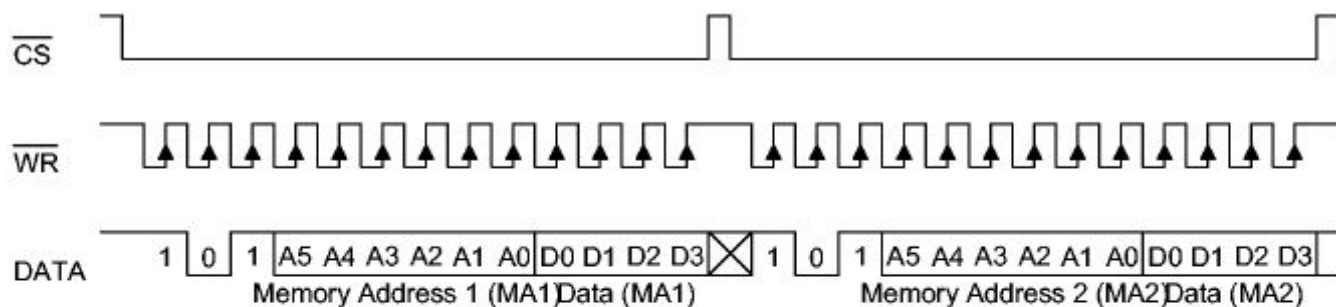
The CS1621 can be configured by the S/W setting. There are two mode commands to configure the CS1621 resources and to transfer the LCD display data. The configuration mode of the CS1621 is called command mode, and its command mode ID is 100. The command mode consists of a system configuration command, a system frequency selection command, a LCD configuration command, and an operating command. The data mode, on the other hand, includes WRITE operations. The following are the data mode IDs and the command mode ID:

Operation	Mode	ID
WRITE	Data	101
COMMAND	Command	100

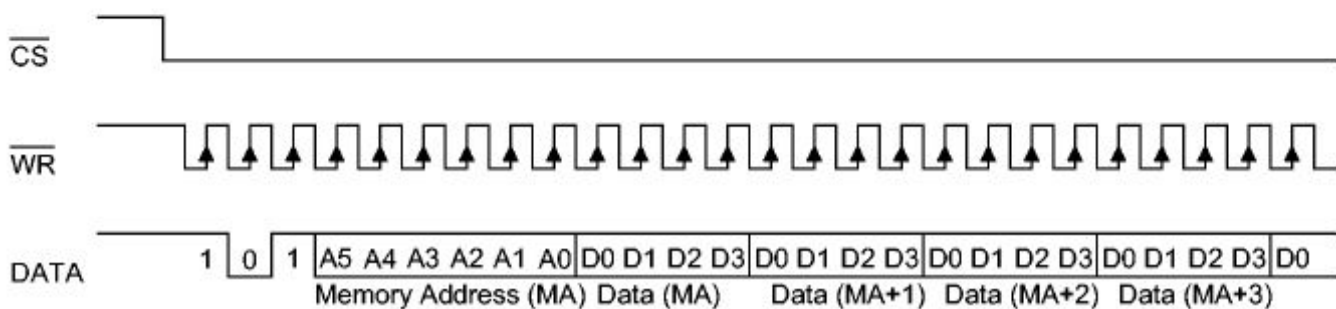
The mode command should be issued before the data or command is transferred. If successive commands have been issued, the command mode ID, namely 100, can be omitted. While the system is operating in the non-successive command or the non-successive address data mode, the CS pin should be set to "1" and the previous operation mode will be reset also. Once the CS pin returns to "0" a new operation mode ID should be issued first.

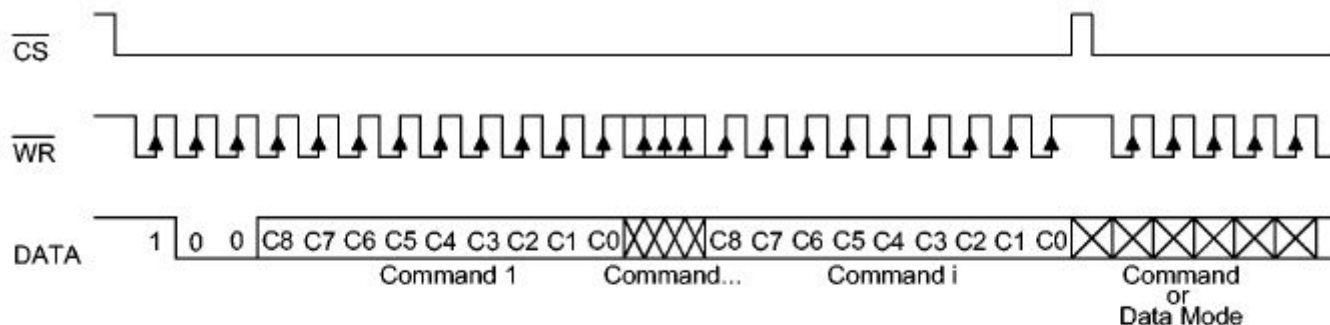
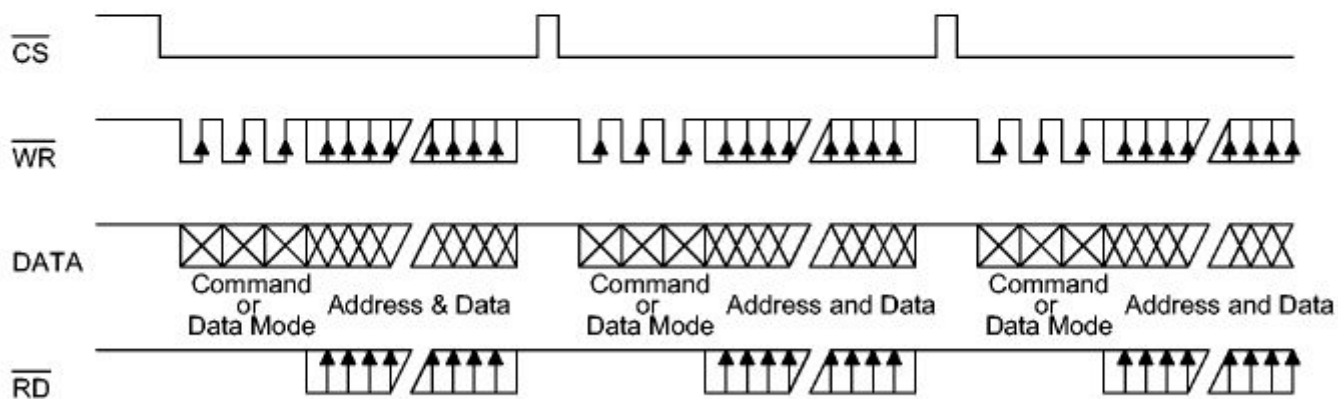
▼ Timing Diagrams

WRITE mode (command code : 1 0 1)



WRITE mode (successive address writing)



Command mode (command code : 1 0 0)**Mode (data and command mode)**

Note: It is recommended that the host controller should read in the data from the $DATA$ line between the rising edge of the \overline{RD} line and the falling edge of the next \overline{RD} line.

▼ **Command Summary**

Name	ID	Command Code	D/C	Function	Def.
WRITE	101	A5A4A3A2A1A0D0D1D2D3	D	Write data to the RAM	
SYS DIS	100	0000-0000-X	C	Turn off both system oscillator and LCD bias generator	Yes
SYS EN	100	0000-0001-X	C	Turn on system oscillator	
LCD OFF	100	0000-0010-X	C	Turn off LCD bias generator	Yes
LCD ON	100	0000-0011-X	C	Turn on LCD bias generator	
TIMER DIS	100	0000-0100-X	C	Disable time base output	
TIMER EN	100	0000-0110-X	C	Enable time base output	
CLR TIMER	100	0000-11XX-X	C	Clear the contents of time base generator	
RC 256K	100	0001-10XX-X	C	System clock source, on-chip RC oscillator	Yes
BIAS 1/2	100	0010-abX0-X	C	LCD 1/2 bias option ab=00:2 commons option ab=01:3 commons option ab=10:4 commons option	
BIAS 1/3	100	0010-abX1-X	C	LCD 1/3 bias option ab=00:2 commons option ab=01:3 commons option ab=10:4 commons option	
NORMAL	100	1110-0011-X	C	Normal mode	Yes

Note : X : Don't care

A5~A0 : RAM addresses

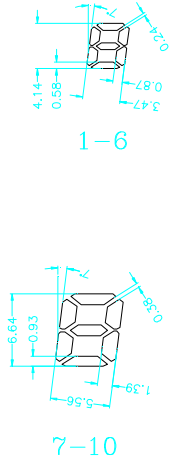
D3~D0 : RAM data

D/C : Data/command mode

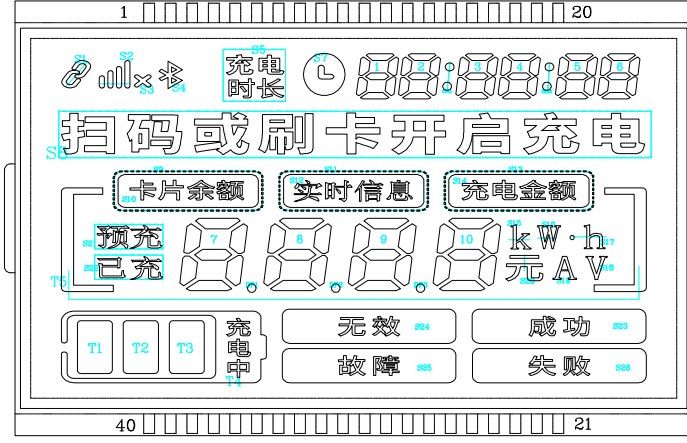
Def. : Power on reset default

All the bold forms, namely 101, and 100, are mode commands. Of these, 100 indicates the Command mode ID. If successive commands have been issued, the command mode ID except for the first command will be omitted.

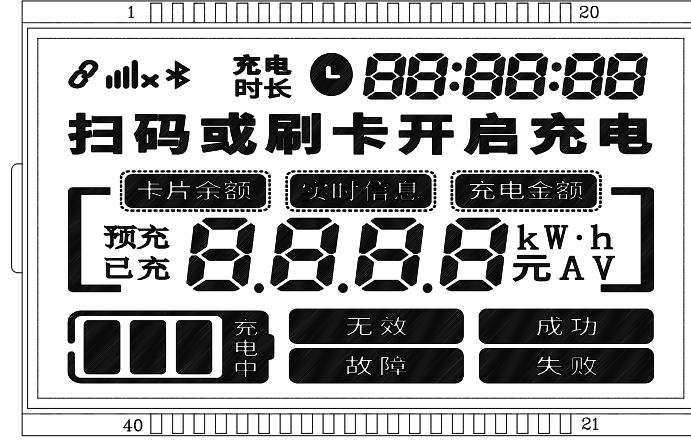
■ DISPLAY DATA RAM ADDRESS MAP



逻辑分段



LCD显示效果图



PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
--	COM3	COM2	COM1	COM0	SEG0	SEG1	SEG2	SEG3	SEG4	SEG5	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12	SEG13	SEG14	SEG15
COM0	--	--	--	COM0	S3	S4	1F	1A	2F	2A	3F	3A	4F	4A	5F	5A	6F	6A	S13	S14
COM1	--	--	COM1	--	S2	S5	1G	1B	2G	2B	3G	3B	4G	4B	5G	5B	6G	6B	S11	S12
COM2	--	COM2	--	--	S1	S7	1E	1C	2E	2C	3E	3C	4E	4C	5E	5C	6E	6C	S9	S10
COM3	COM3	--	--	--	S8	--	--	1D	--	2D	COL1	3D	--	4D	COL2	5D	--	6D	T5	--

PIN	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
--	SEG16	SEG17	SEG18	SEG19	SEG20	SEG21	SEG22	SEG23	SEG24	SEG25	SEG26	SEG27	SEG28	SEG29	SEG30	SEG31	COM0	COM1	COM2	COM3
COM0	S18	S19	S20	10C	10D	DP3	9D	DP2	8D	DP1	7D	S22	S23	S26	--	--	COM0	--	--	--
COM1	S17	S16	S15	10G	10E	9C	9E	8C	8E	7C	7E	S21	S24	S25	--	--	--	COM1	--	--
COM2	--	--	--	10B	10F	9G	9F	8G	8F	7G	7F	--	--	--	T4	T1	--	--	COM2	--
COM3	--	--	--	--	10A	9B	9A	8B	8A	7B	7A	--	--	--	T3	T2	--	--	--	COM3

■ RELIABILITY

▼ Content of Reliability Test

Environmental Test			
No.	Test Item	Content of Test	Test Condition
1	High temperature storage	Endurance test applying the high storage temperature for a long time.	80 °C 96hrs
2	Low temperature storage	Endurance test applying the low storage temperature for a long time.	-30 °C 96hrs
3	High temperature operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70 °C 96hrs
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 96hrs
5	High temperature / Humidity storage	Endurance test applying the high temperature and high humidity storage for a long time.	50 °C , 90 %RH 96 hrs
6	High temperature / Humidity operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	40 °C 90 %RH 96 hrs
7	Temperature cycle	Endurance test applying the low and high temperature cycle. <div style="text-align: center;"> $\begin{array}{ccccc} -20^{\circ}\text{C} & \rightleftharpoons & 25^{\circ}\text{C} & \rightleftharpoons & 70^{\circ}\text{C} \\ 30\text{min.} & & 5\text{min.} & & 30\text{min.} \\ \hline & \xrightarrow{\hspace{10em}} & & & \\ & \text{1 cycle} & & & \end{array}$ </div>	-20°C / 70°C 10 cycles

*** Supply voltage for logic system = 3.3V. Supply voltage for LCD system = Operating voltage at 25°C.

▼ Failure Judgement Criterion

Criterion Item	Test Item No.											Failure Judgment Criterion
	1	2	3	4	5	6	7	8	9	10	11	
Basic specification												Out of the Basic Specification
Electrical characteristic												Out of the DC and AC Characteristic
Mechanical characteristic												Out of the Mechanical Specification Color change : Out of Limit Apperance Specification
Optical characteristic												Out of the Apperance Standard

■ INSPECTION CRITERIA

see :Q/XRD0002-05

■ PRECAUTIONS FOR USING LCD MODULES

▼ Handling Precautions

- (1) The display panel is made of glass. Do not subject it to a mechanical shock by dropping it or impact.
- (2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- (5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents :
 - Isopropyl alcohol
 - Ethyl alcohol
- (6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
 - Water
 - Ketone
 - Aromatic solvents
- (7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

■ USING LCD MODULES

▼ Liquid Crystal Display Modules

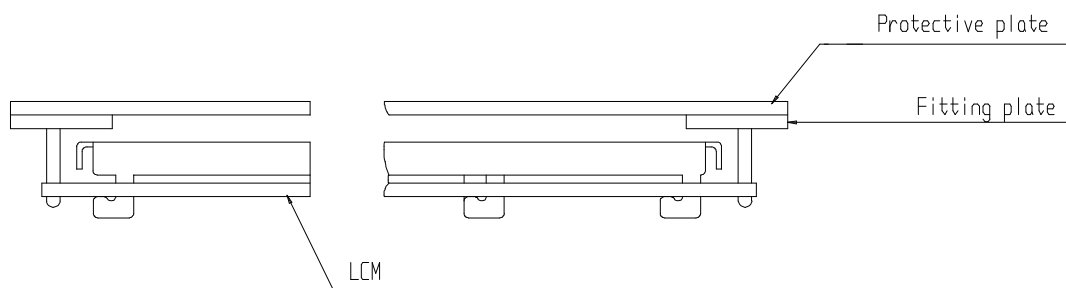
LCD is composed of glass and polarizer. Pay attention to the following items when handling.

- (1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.
- (2) Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).
- (3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.
- (4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.
- (5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.
- (6) Avoid contacting oil and fats.
- (7) Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.
- (8) Do not put or attach anything on the display area to avoid leaving marks on.
- (9) Do not touch the display with bare hands. This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).
- (10) As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

▼ Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

- (1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



- (2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be $\pm 0.1\text{mm}$.

▼ Precaution for Handling LCD Modules

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

- (1) Do not alter, modify or change the shape of the tab on the metal frame.
- (2) Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

- (3) Do not damage or modify the pattern writing on the printed circuit board.
- (4) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- (5) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- (6) Do not drop, bend or twist LCM.

▼ Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

- (1) Make certain that you are grounded when handing LCM.
- (2) Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.
- (3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.
- (4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- (5) As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.
- (6) To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

▼ Precaution for soldering to the LCM

- (1) Observe the following when soldering lead wire, connector cable and etc. to the LCM.
 - Soldering iron temperature : $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$.
 - Soldering time : 3-4 sec.
 - Solder : eutectic solder.

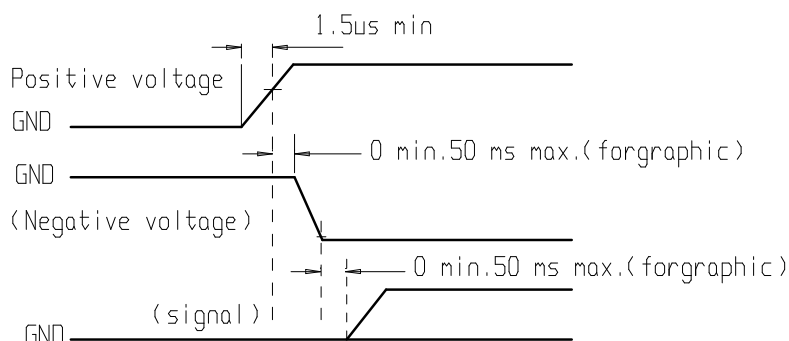
If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage due to flux spatters.

- (2) When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.
- (3) When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

▼ Precautions for Operation

- (1) Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.
- (2) Driving the LCD in the voltage above the limit shortens its life.
- (3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.
- (4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.
- (5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.
- (6) When turning the power on, input each signal after the positive/negative voltage becomes

stable.



▼ Storage

When storing LCD's as spares for some years, the following precaution are necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
- (3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)
- (4) Environmental conditions :
 - Do not leave them for more than 168hrs. at 70°C.
 - Should not be left for more than 48hrs. at -20°C.

▼ Safety

- (1) It is recommended to crush damaged or unnecessary LCD's into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
- (2) If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

▼ Limited Warranty

Unless agreed between X.R.D and customer, X.R.D will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with X.R.D LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects must be returned to X.R.D within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of X.R.D limited to repair and/or replacement on the terms set forth above. X.R.D will not be responsible for any subsequent or consequential events.

▼ Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- PCB eyelet's damaged or modified.
- PCB conductors damaged.
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's, conductors and terminals.