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1. GENERAL SPECIFICATIONS:

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3 MODULE NAME:

T240128C-YDYPSWSD

2. FEATURES:

2-1 MAIN LCD (LARGE)

Item Standard Value

Display Type 240*128 dots

LCD Type

☐ FSTN, BLUE, Transmissive, Negative, Extended TEMP

☒ FSTN, Transflective, Positive, Extended TEMP

☐ STN, BLUE, Transmissive, Negative, Extended TEMP

☐ STN, GREY, Transflective, Positive, Extended TEMP

☐ STN, Yellow-GREEN, Positive, Extended TEMP

Driver Condition LCD Module: 1/128 Duty, 1/12 Bias

Viewing Direction 6 O'clock

Backlight Type

☐ YELLOW-GREEN LED BL

☒ WHITE EDGE LED BL

☐ CCFL WHITE BL

Weight TBD

Interface 8-bit 6800/8080 MPU interface

Driver IC Driver IC: RA8806

3. MECHANICAL SPECIFICATIONS

ITEM SPECIFICATIONS UNIT

OUTLINE DIMENSIONS 144(L) X104(W) X 13max(H) mm

VIEWING AREA 114(L)X64(W) mm

ACTIVE AREA 107.95(l)X57.55(w) mm

DISP.CONSTRUCTION 240*128 dots --

DOT SIZE 0.40(L)X0.40(W) mm

DOT PITCH 0.45(L)X0.45(W) mm

ASSY.TYPE COB --

WEIGHT TBD g

Note : For detailed information please refer to LCM drawing

4. ABSOLUTE MAXIMUM RATING

ITEM SYMBOL CONDITION STANDARD VALUE

MIN TYP MAX

UNIT

POWER SUPPLY FOR LOGIC VDD Ta=25°C -0.3 -- 6.5 V

INPUT VOLTAGE VIN Ta=25°C -0.3 -- VDD+0.3 V

OPERATION TEMPERATURE TOPR --- -20 -- +70 °C

STORAGE TEMPERATURE TSTG --- -30 -- +80 °C

Storage Humidity Hb Ta < 40 °C - -- 90 %RH

NOTES:

(1) LCM should be grounded during handling LCM.

5. ELECTRICAL CHARACTERISTICS

ITEM SYMBOL CONDITION STANDARD VALUE

MIN TYP MAX UNIT

POWER SUPPLY VOLTAGE VDD—VSS Ta= +25°C 4.8 5.0 5.2 V

POWER SUPPLY FOR LCD

DRIVING

Vlcd Ta= +25°C -- TBD -- V

INPUT VOLTAGE “H” LEVEL VIH -- 0.8VDD -- VDD V

INPUT VOLTAGE “L” LEVEL VIL -- VSS -- 0.2VDD V

OUTPUT VOLTAGE “H” LEVEL

VOH IOH=-0.5mA 0.8VDD -- VDD V

OUTPUT VOLTAGE “L” LEVEL VOL IOL=-0.5mA VSS -- 0.2VDD V

Supply Current IDD VDD = 5.0 V -- 3 5 mA

VDD-V0 (-20°C) - - - V

VDD-V0 (25°C) - 18.5 - V

LCM Driver Voltage

Vop

VDD-V0 (70°C) - - - V

6. TIMING CHARACTERISTICS

The RA8806/8822 support 8080 or 6800 compatible MPU interface. When the pin SYS_MI is pull low then the MPU interface is set to 8080 compatible. If SYS_MI pull high then the MPU interface is defined as 6800 compatible.

And the pin SYS_DB is used to select the 8080 MPU data bus is 4-Bit or 8-Bit. When SYS_DB pull low, then the data bus for data transition is 4-Bit. If pin SYS_DB pull high, the data transition is 8-Bit. The option of 4-Bit or 8-Bit data bus is for 8080 MPU only. Of course, if used 4-Bit interface then the 8080 MPU has to take double time to communicate with RA8803/8822.

7-1 MPU Interface of 8080 Series

Please refer to Figure 2-1 when 8080 MPU series is used. If SYS_MI pull low, the RA8803/8822 only accept the control signal and handshake with 8080 families MPU.

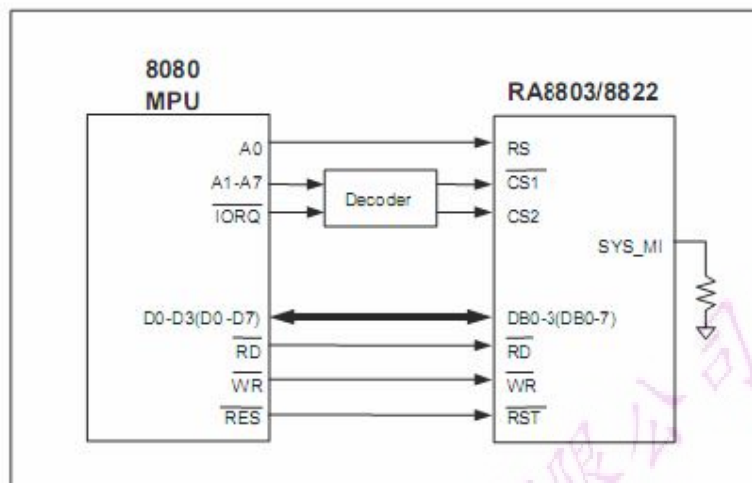


Figure2-1:RA8806/8822 with 8080(4/8-Bit) MPU I/F

Figure 2-2 is the timing diagram of 8080 MPU with RA8803/8822. When RS = "L", means MPU want execute Register Access. When RS = "H" means MPU will execute Data Access for RA8803/8822 Display RAM. Normally the RS pin is connecting to MPU address pin — A0. The major difference of 8080 with 6800 is the Read and Write control signals are separate. RD = Low for read cycle and WR = Low for write cycle. The target of read/write cycle depends on the RS.

In Figure 2-2, If 8080 MPU want to execute Register Read, the MPU has to send Register Address first and then get the register data from data bus. If MPU want to execute Register Write, the MPU has to send the register first and then send the write data through data bus. For RA8803/8822 memory access, The MPU could read from or write data to the Display RAM directly.

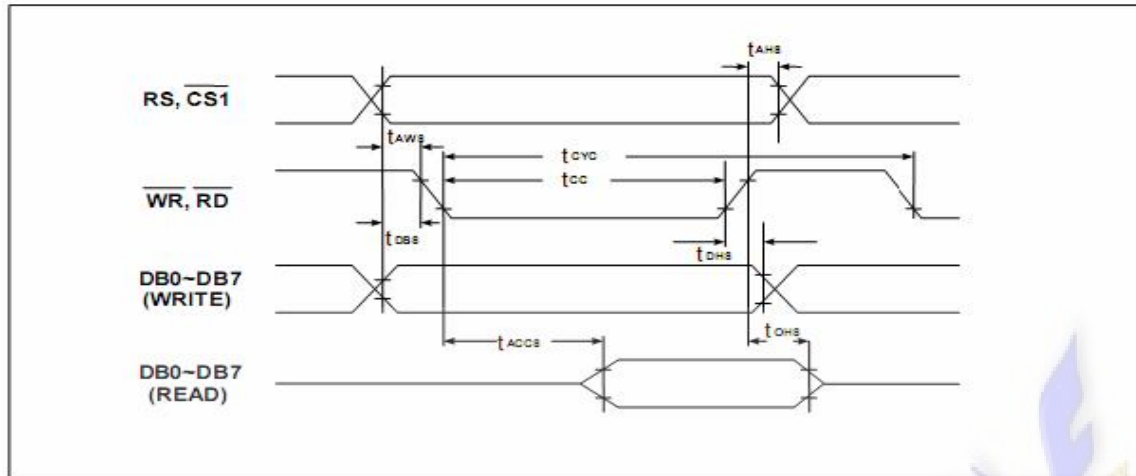


Figure 2-2 : 8-Bit 8080 MPU Access RA8803/8822 Register/Memory
Table 2-1

Signal	Symbol	Parameter	Rating		Unit	Condition
			Min	Max		
RS, CS1#	t_{AH}	Address hold time	10	--	ns	System Clock: 8MHz Voltage: 3.3V
	t_{AW}	Address setup time	63	--	ns	
WR#, RD#	t_{CYC}	System cycle time	800	--	ns	
	t_{CC}	Strobe pulse width	400	--	ns	
DB0 to DB7	t_{DS}	Data setup time	63	--	ns	
	t_{DH}	Data hold time	10	--	ns	
	t_{ACC}	RD access time	--	330	ns	
	t_{OH}	Output disable time	10	--	ns	

Interface Signals

Pin Assignment

NO.	SYMBOL	DESCRIPTION
1	VSS	GROUND
2	VDD	POWER SUPPLY FOR LOGIC AND LCD
3	VR	OPERATING VOLTAGE FOR LCD
4	RS	COMMAND/DATA SELECTION
5	/WR	DATA WRITE
6	/RD	DATA READ
7	/CS1	CHIP ENABLE FOR RA8806
8	CS2	CHIP ENABLE FOR RA8806
9	BUSY	RA8806 BUSY SIGNAL
10	INT	PROGRAMABLE INTERRUPT FOR RA8806
11	/RST	RESET SIGNAL (LOW EFFECTIVE)
12--19	DB0--DB7	DATA BUS
20	VOUT	NEGATIVE VOLTAGE INPUT/OUTPUT
21	A	LED BACKLIGHT POWER SUPPLY(+)
22	K	LED BACKLIGHT POWER SUPPLY(-)

7-2 MPU Interface of 6800 Series

Please refer to Figure 2-3 when 6800 MPU series is used. If SYS_MI pull high, the RA8803/8822 only accept the control signal and hand-shake with 8080 families MPU. For 6800 MPU interface, the Read and Write control is use the same pin $\overline{R/W\#}$. When $R/W\# = \text{High}$, the read cycle is executed. When $R/W\#$ is Low, the write cycle is executed. But the Read or Write cycle is available only when $\text{EN} = \text{High}$. The target of read/write cycle also depends on the RS.

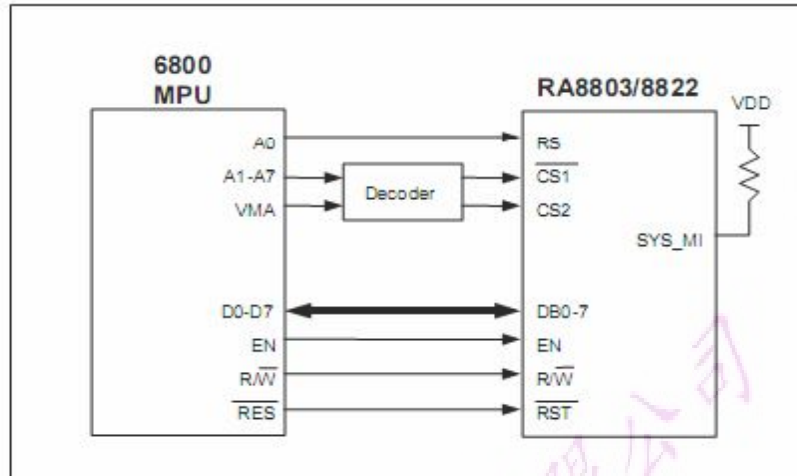


Figure 2-3 : RA8803/8822 With 6800 (8-bit Only) MPU I/F

RA8803/8822 couldn't accept signal from 6800 and 8080 at the same time. Therefore, some pins will have different definition, such as $\text{RD}\#(\text{EN})$. When users use 8080 MPU, then it is defined as $\text{RD}\#$. But when users use 6800 MPU, then it is defined as EN. As for Pin $\text{WR}\#(\text{R/W}\#)$, when users use 8080, then it is defined as $\text{WR}\#$. However, when users choose 6800 MPU, then it is defined as $\text{R/W}\#$. You can refer to RA8803/8822 Datasheet (Chapter 4-1) for more details.

In Figure 2-4, If 6800 MPU want to execute Register Read, the MPU has to send Register Address first and then get the register data from data bus. If MPU want to execute Register Write, the MPU has to send the register first and then send the write data through data bus. For RA8803/8822 memory access, The MPU could read from or write data to the Display RAM directly.

Note: RA8803/8822 support 8Bit data bus only for 6800 series MPU. But for 8080 MPU, RA8803/8822 support both 4Bit and 8Bit interface.

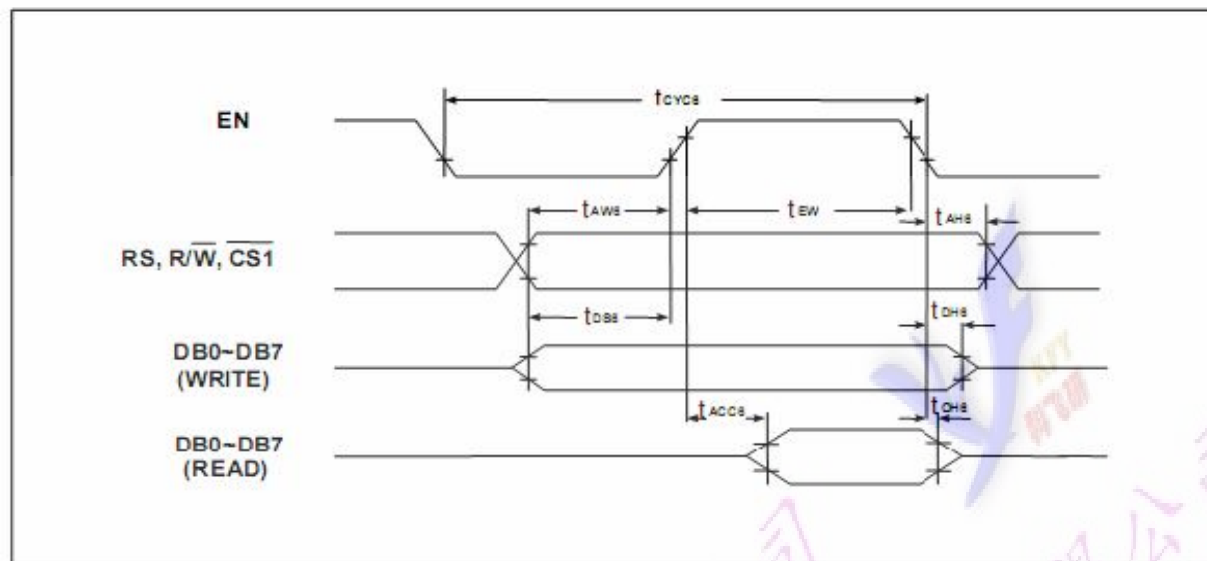


Figure 2-4 : 8-bit 6800 MPU Access A8803/8822 Register/Memory

Table 2-2

Signal	Symbol	Parameter	Rating		Unit	Condition
			Min	Max		
A0, R/W#, CS1#	t_{AHS}	Address hold time	10	--	ns	System Clock: 8MHz Voltage: 3.3V
	t_{AWS}	Address setup time	63	--	ns	
	t_{Cycs}	System cycle time	800	--	ns	
DB0 to DB7	t_{DSS}	Data setup time	63	--	ns	
	t_{DHS}	Data hold time	10	--	ns	
	t_{Accs}	Access time	--	330	ns	
	t_{OHS}	Output disable time	10	--	ns	
EN	t_{EW}	Enable pulse width	400	--	ns	

7. PIN ASSIGNMENT

Pin NO. Symbol Input/Output

Description

1 AVSS I Analog Ground of ADC Touch Panel Controller

2 AVDD I Analog Power of ADC Touch Panel Controller

3 VSS I Ground

4 VDD I Power Supply Voltage

5 V0 I LCD Drive Voltage Input Terminal

6 RS I

Register/Memory Select

The MPU will access Register when RS is Low and access Data Memory when RS is High.

Usually connect to MPU address bus A0.

7 R/W I

Write/Read-Write

When MPU I/F is 8080 series, this pin (WR#) is used as data write, active low.

When MPU I/F is 6800 series, this pin(R/W#) is used as data read/write control. Active high for read and active low for write.

8 E I

Enable/Read Enable

When MPU I/F is 8080 series, this pin (RD#) is used as data read, active low.

When MPU I/F is 6800 series, this pin (EN) is used as Enable, active high.

9 CS1 CS2 I

Chip Select

The RA8803/8822 is active when CS1# is low and CS2 is high

10 BUSY I

Busy Signal

This is a busy output to indicate the RA8803/8822 is in busy state. It could be setup active high or low. If setup active high, the RA8803/8822 can't be access when BUSY pin is high.

It's should be connected to MPU I/O input. The MPU have to poll this pin before accessing RA8803/8822.

11 INT I

Interrupt Signal

This is an interrupt output to indicate the status of RA8803/8822. It could be setup active high or low.

12 RST I

Reset Signal

This is a reset signal used to reset RA8803/8822. Active low.

13 DB0~ DB7 I/O

Data Bus

These are data bus for data transfer between MPU and RA8803/8822.

The high nibble DB[7..4] should be floating when 4-bit data bus mode is used.

14 VOUT O Booster Output

15 LEDK I Backlight- Terminal

16 LEDA I Backlight+ Terminal

- ## 9.OUTLINE DIMENSIONS

8,DRIVER METHOD: 1/128 DUTY, 1/12 BIAS
 9, DRIVER IC: RA8806
 10,BACKLIGHT: LED (WHITE)

10.ENVIRONMENT ABSOLUTE MAXMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃ ~ +70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃ ~ +80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	—	See Note	WITHOUT CONDENSATION

11.RELIABILITY

12-1 RELIABILITY TEST

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +70℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -20℃ 240HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +80℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE - 30℃ 240HRS	
HUMIDITY	40℃ 90%RH 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	<ul style="list-style-type: none"> Operating Time: thirty minutes exposure for each direction (X,Y,Z) Sweep Frequency: 10~55Hz (1 min) Amplitude: 1.5mm 	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20℃ (30mins) \leftrightarrow +70℃ (30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

*NOTE: TEST CONDITION

(1)TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2℃, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN " OPERATING" CONDITION

12. Precaution for Use

The following precautions should be followed, since this module contains precise parts.

- (1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.
- (2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.
- (3) Use protective finger covers when handling the module to avoid scratching or staining the module.
- (4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.
- (5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.
- (6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.
- (7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.
Do not use a module, which has experienced strong mechanical shock.
- (8) Care should be taken when the power supply turns on as following.
 - (a) Do not apply any input signals before the supplying voltage is applied.
 - (b) Do not turn off the power supply while any input signals are applied.

Caution

- (1) Dangerous. Do not shock glass because glass can break.
- (2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)
- (3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)
- (4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
- (5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
- (6) In case of injury, give immediate treatment and consult with a doctor.
- (7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials