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Electronic Products for the OEM

LCD PRODUCT SPECIFICATION

| PART NUMBER:	USMPG-TQ240128B-TZWFH-TP
DESCRIPTION:	240x128 Graphic LCD; FSTN Display Mode; Transflective, Positive with White LED Sidelight, 6 O'Clock Viewing Direction and Resistive Touch Panel.

ISSUE DATE	APPROVED BY (Customer Use Only)	CHECKED BY	PREPARED BY
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SPECIFICATIONS OF
LCD MODULE

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1. Features

a) 240x128 dots graphic LCD module

b) Built-in controller T6963C or equivalence

c) Easy interface with 4-bit and 8-bit MPU

d) +5V power supply, 1/128 duty cycle

e) FSTN LCD, transflective mode, positive display

f) 6 O'clock viewing direction.

g) Build-in DC/DC negative voltage

h) Side type LED backlight, white color

i) Wide working temperature range -20~70℃
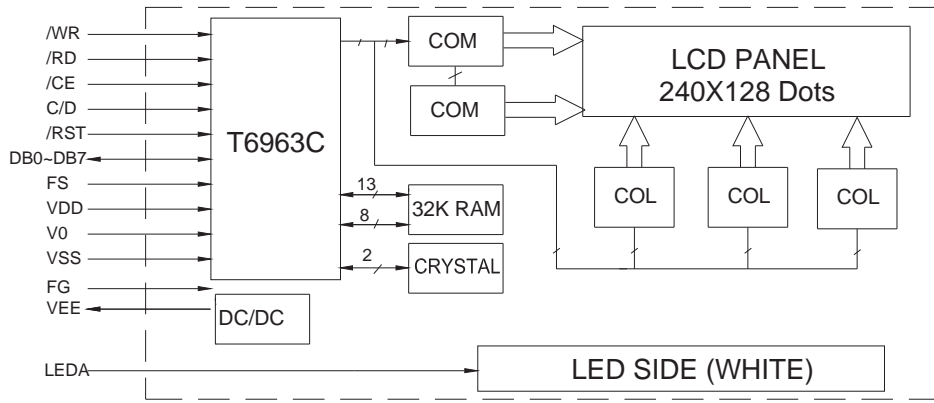
2. Outline dimension
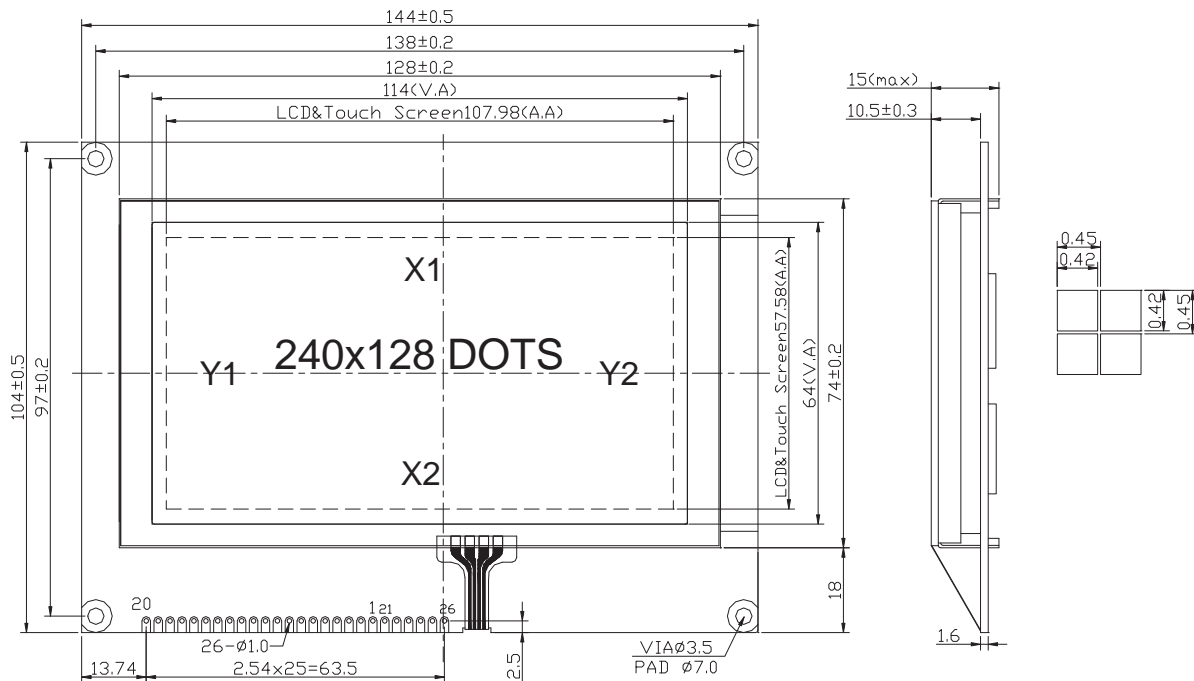
3. Absolute maximum ratings

Item	Symbol	Standard			Unit
Power voltage	$V_{DD}-V_{SS}$	0	-	7.0	V
Input voltage	V_{IN}	V_{SS}	-	V_{DD}	V
Operating temperature range	T_{OP}	-20	-	+70	℃
Storage temperature range	T_{ST}	-30	-	+80	℃

4. Block diagram

5. Interface pin description

Pin No.	Symbol	External connection	Function
1	V_{SS}		Signal ground for LCM (GND)
2	V_{DD}	Power supply	Power supply for logic (+5V) for LCM
3	V_0		Operating voltage for LCD
4	C/D	MPU	H: Instruction L: Data
5	/RD	MPU	Read enable signal
6	/WR	MPU	Write enable signal
7~14	DB0~DB7	MPU	Data bus line
15	/CE	MPU	Chip enable signal
16	/RST	MPU	Reset signal
17	VEE		Negative voltage output
18	MD2	MPU	Selection of number of columns:H-32,L-40
19	FS	MPU	Font selection: H=6x8 dot matrix, L=8x8 dot matrix
20	NC		No connection
21	X1		
22	Y1		Pins of touch panel
23	X2		
24	Y2		
25	A	BKL power supply	Anode of LED backlight (+5V)
26	K	BKL power supply	Cathode of LED backlight (0V)

Contrast adjust
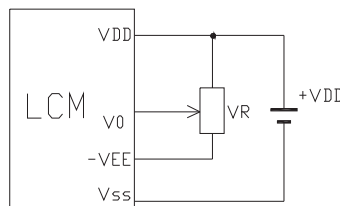
$V_{DD} \sim V_0$: LCD Driving voltage
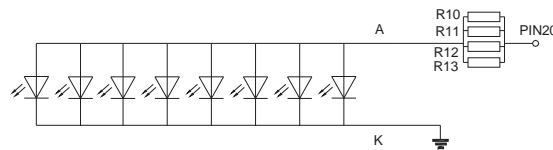
VR: 10k~20k

6. Optical characteristics
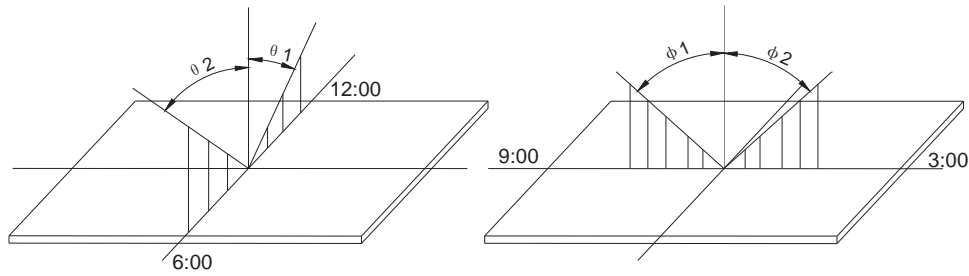
FSTN type display module (Ta=25℃, V_{DD}=5.0V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing angle	θ	Cr≥5	-60	-	45	deg
	Φ		-40	-	40	
Contrast ratio	Cr		-	6	-	-
Response time (rise)	Tr	-	-	180	270	ms
Response time (fall)	Tr	-	-	190	280	

7. Electrical characteristics

➢ **Backlight circuit diagram(1 x 8 LEDs)**

LED Color: White color

➢ **Led ratings**

Item	Symbol	Min	Typ.	Max	Unit
Forward Voltage	V_F	3.0	3.1	3.2	V
Forward current	I_f	-	-	100	mA
Power	P			320	mW
Peak wave length	λp				nm
Luminance	Lv		350		Cd/m^2

➢ **DC characteristics**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage for LCD	V_{DD}-V_0	Ta =25℃	-	18.5	-	V
Input voltage	V_{DD}		4.7	5.0	5.5	
Supply current	I_{DD}	Ta=25℃, V_{DD}=5.0V	-	15	18	mA
Input leakage current	I_{LKG}		-	-	1.0	uA
"H" level input voltage	V_{IH}		2.2	-	V_{DD}	
"L" level input voltage	V_{IL}	Twice initial value or less	0	-	0.6	
"H" level output voltage	V_{OH}	L_{OH}=-0.25mA	2.4	-	-	V
"L" level output voltage	V_{OL}	L_{OH}=1.6mA	-	-	0.4	
Backlight supply voltage	V_F	R(R_{10}/R_{11}/R_{12}/R_{13})=25Ω	-	5.0	5.5	
Backlight supply current	I_F	V_F=5.0V, R=25Ω	-	80	100	mA

> ➢ **Switching characteristics** (Ta=25℃, V$_{DD}$=5.0V)

Item	Symbol	Test conditions	Min.	Typ.	Max.	Unit
C/D set-up time	T$_{cds}$		100	—	—	
C/D hold time	T$_w$		10	—	—	
/CE, /RD, /WR pulse width	T$_{ce}$, T$_{rd}$, T$_{wr}$		80	—	—	
Data set-up time	T$_{ds}$	—	80	—	—	ns
Data hold time	T$_{dh}$		40	—	—	
Access time	T$_{acc}$		—	—	150	
Output hold time	T$_{oh}$		10	—	50	

Bus timing diagram
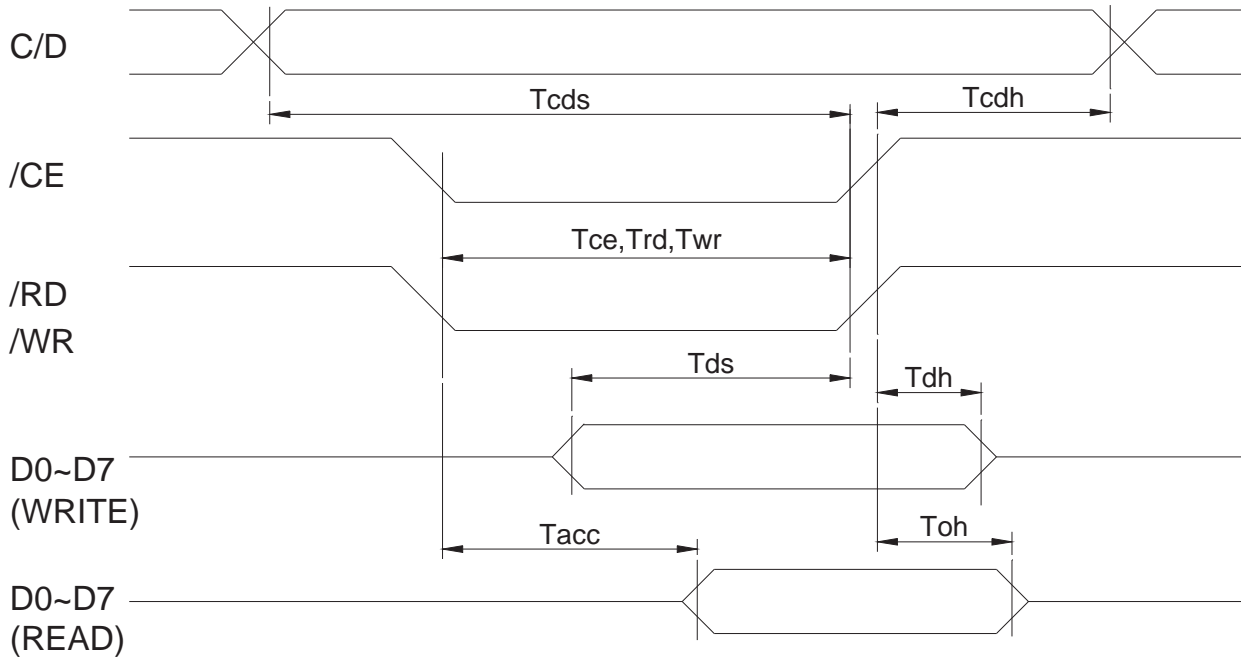
8. Flowchart of communications with MPU

Status read

A status check must be performed before data is read or written. The status word format is as follows:

/RD	/WR	/CE	C/D	STA7	STA5	STA5	STA4	STA3	STA2	STA1	STA0
0	1	0	1	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0

|		
STA0	Check command execution capability	0: disable 1:enable
STA1	Check data read / write capability	0: disable 1:enable
STA2	Check auto mode data read capability	0: disable 1:enable
STA3	Check auto mode data write capability	0: disable 1:enable
STA4	Not used	
STA5	Check controller operation capability	0: disable 1:enable
STA6	Error flag. Used for screen peek and screen copy commands.	0: no error 1:error
STA7	Check the blink condition	0: display off 1:normal display

Notes:

1. It is necessary to check STA0 and STA1 at the same time. There is a possibility of erroneous operation due to a hardware interrupt.

2. For most modes STA0 / STA1 are used as a status check.

3. STA2 and STA3 are valid in auto mode; STA0 and STA1 are invalid.

4. When using the STA7=0 command, a status read must be performed. If a status check is not carried out, the RA6963 cannot operate normally, even after a delay time. The hardware interrupt occurs during the address calculation period (at the end of each line). If a STA7=0 command is sent to the RA6963 during this period, the RA6963 enters wait status. If a status check is not carried out in this state before the next command is sent, there is the possibility that the command or data will not be received.

Setting data

When using the RA6963, first set the data, and then set the command. Procedure for sending a command:

a) The case of 1 data   b) the case of 2 data

(a)   (b)
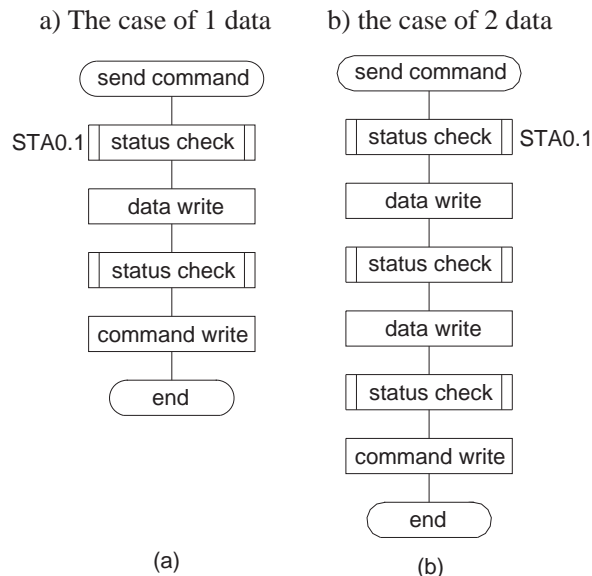
Note: When sending more than two data, the last datum (or last two data) is valid.

9. Command definitions

Command	Code	D1	D2	Function
Registers setting	00100001 00100010 00100100	X address Data Low address	Y address 00H High address	Set cursor pointer Set offset register Set address pointer
Set control word	01000000 01000001 01000010 01000011	Low address columns Low address columns	High address 00H High address 00H	Set text home address Set text area Set graphic home address Set graphic area
Mode set	1000X000 1000X001 1000X011 1000X100 10000XXX 10001XXX			OR mode EXOR mode AND mode Text attribute mode Internal CG ROM mode External CG RAM mode
Display mode	10010000 1001XX10 1001XX11 100101XX 100110XX 100111XX			Display off Cursor on, blink off Cursor on, blink on Text on, graphic off Text off, graphic on Text on, graphic on
Cursor pattern select	10100000 10100001 10100010 10100011 10100100 10100101 10100110 10100111			1- Line cursor 2- Line cursor 3- Line cursor 4- Line cursor 5- Line cursor 6- Line cursor 7- Line cursor 8- Line cursor
Data auto read / write	10110000 10110001 10110010			Set data auto write Set data auto read Auto reset
Data read / write	11000000 11000001 11000010 11000011 11000100 11000101	Data Data Data		Data write and increment ADP Data read and increment ADP Data write and decrement ADP Data read and decrement ADP Data write and no variable ADP Data read and no variable ADP
Screen peek	11100000			Screen peek
Screen copy	11101000			Screen copy
Bit set / reset	11110XXX 11111XXX 1111X000 1111X001 1111X010 1111X011 1111X100 1111X101 1111X110 1111X111			Bit reset Bit set Bit 0 (LSB) Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7(MSB)

Note: When an MPU program with checking the busy flag (DB7) is made, it must be necessary 1/2fosc is necessary for executing the next instruction by the falling edge of the "E" signal after the busy flag (DB7) goes to "Low".

X: invalid

Contents

1). Setting registers

D1	D2	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
X	X	0	0	1	0	0	N2	N1	N0

CODE	HEX.	FUNCTION	D1	D2
00100001	21H	Set cursor pointer	X ADRS	Y ADRS
00100010	22H	Set offset register	DATA	00H
00100100	24H	Set address pointer	Low ADRS	High ADRS

➢ **Set cursor pointer**

X ADRS and Y ADRS specify the position or the cursor. The cursor position can only be moved by this command. Data read / write from the MPU never changes the cursor pointer. X ADRS and Y ADRS are specified as follows.

X ADRS   00H to 4FH (lower 7 bits are valid)

Y ADRS   00H to 1FH (lower 5 bits are valid)

a) Single-scan

X ADRS   00H to 4FH

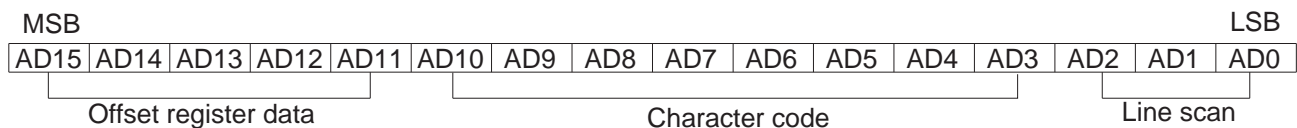Y ADRS   00H to 0FH

b) Dual-scan

X ADRS   00H to 4FH

Y ADRS   00H to 0FH (upper screen)

Y ADRS   10H to 1FH (lower screen)

➢ **Set offset register**

The offset register is used to determine the external character generator RAM area.

The RA6963 has a 16-bit address bus as follows:

MSB															LSB
AD15	AD14	AD13	AD12	AD11	AD10	AD9	AD8	AD7	AD6	AD5	AD4	AD3	AD2	AD1	AD0

Offset register data — Character code — Line scan

RA6963 assign external character generator, when character code set 80H to FFH in using internal character generator. Character code 00H to 80H assign External character generator, when External generator mode.

The senior five bits define the start address in external memory of the CGRAM area. The next eight bits represent the character code of the character. In internal CGRAM mode, character codes 00H to 7FH represent the predefined "internal" CGRAM characters, and codes 80H to FFH represent the user's own "external" characters. In external CGRAM mode, all 256 codes from indicate one of the eight rows of eight dots that define the character's shape.
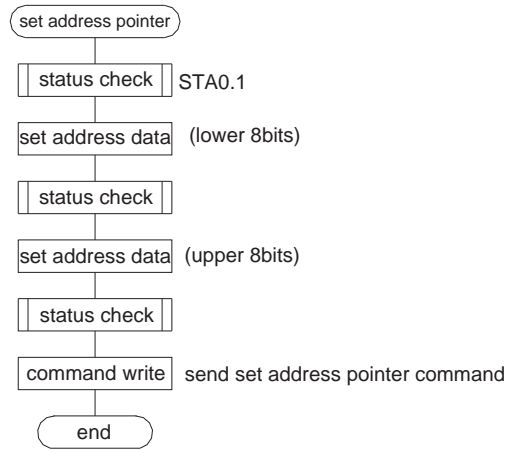
➢ **Set address pointer**

The set address pointer command is used to indicate the start address for writing to (or reading from) external RAM.

The flow chart for setting address pointer command:

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```
              ( set address pointer )
                        |
              | status check |  STA0.1
                        |
              | set address data |  (lower 8bits)
                        |
              | status check |
                        |
              | set address data |  (upper 8bits)
                        |
              | status check |
                        |
              | command write |  send set address pointer command
                        |
                     ( end )
```

2). Set control word

D1	D2	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
X	X	0	1	0	0	0	0	N1	N0

CODE	HEX.	FUNCTION	D1	D2
01000000	40H	Set text home address	Low address	High address
01000001	41H	Set text area	Columns	00H
01000010	42H	Set graphic home address	Low address	High address
01000000	43H	Set graphic area	Columns	00H

The home address and column size are defined by this command.

➢ **Set text home address**

The starting address in the external display RAM for text display is defined by this command.

The text home address indicates the leftmost and uppermost position.

The relationship between external display RAM address and display position

TH		TH +CL
TH+TA		TH+TA+CL
(TH+TA)+TA		TH+2TA+CL
(TH+2TA)+TA		TH+3TA+CL
/		/
TH+(N-1) TA		TH+(N-1) TA+CL

TH: text home address

TA: text area number (columns)

CL: columns ate fixed by hardware (pin-programmable)

➢ **Set graphic home address**

The starting address of the external display RAM used for graphic display is defined by this command. The graphic home address indicates the leftmost and uppermost position.

The relationship between external display RAM address and display position

GH		GH +CL
GH+GA		GH + GA +CL
(GH+ GA)+ GA		GH +2 GA +CL
(GH +2 GA)+ GA		GH +3 GA +CL
/		/
GH +(N-1) GA		GH +(N-1) GA +CL

GH: Graphic home address

GA: Graphic area number (columns)

CL: columns ate fixed by hardware (pin-programmable)

➢ **Set text area**

The display columns are defined by the hardware setting. This command can be used to adjust the columns of the display.

➢ **Set graphic area**

The display columns are defined by the hardware setting. This command can be used to adjust the columns of the graphic display.

If the graphic area setting is set to match the desired number of columns on the LCD, the addressing scheme will be automatically modified so that the start address of each line equals the end address of the previous line +1.

3). Mode set

CODE	FUNCTION	OPERAND
1000X000	OR Mode	—
1000X001	EXOR Mode	—
1000X011	AND Mode	—
1000X100	TEXT Attribute Mode	—
10000XXX	Internal character Mode	—
10001XXX	External character Mode	—

The display mode is defined by this command. The display mode does not change until the next command is sent. The logical OR, EXOR, AND of text or graphic display can be displayed.

In internal character generator mode, character codes 00H to 7FH are assigned to the built-in character generator ROM. The character codes 80H to FFH are automatically assigned to the external character generator RAM.

NOTE: attribute functions can only be applied to text display, since the attribute data is placed in the graphic RAM area.

Attribute function

The attribute operations are reverse display, character blink and inhibit. The attribute data is written into the graphic area, which was defined by the set control word command. Only text display is possible in attribute function mode; graphic display is automatically disabled. However, the display mode command must be used to turn both text and graphic on in order for the attribute function to be available.

The attribute data for each character in the text area is written to the same address in the graphic area. The attribute function is defined as follows.

Attribute RAM 1byte

X	X	X	X	DB3	DB2	DB1	DB0

DB3	DB2	DB1	DB0	FUNCTION
0	0	0	0	Normal display
0	1	0	1	Reverse display
0	0	1	1	Inhibit display
1	0	0	0	Blink of normal display
1	1	0	1	Blink of reverse display
1	0	1	1	Blink of inhibit display

4). Display mode

CODE	FUNCTION	OPERAND
10010000	Display off	——
1001xx10	Cursor on, blink off	——
1001xx11	Cursor on, blink on	——
100101xx	Text on, graphic off	——
100110xx	Text off, graphic on	——
100111xx	Text on, graphic on	——

1	0	0	1	DB3	DB2	DB1	DB0

DB0: cursor blink   on: 1   off: 0

DB1: cursor display   on: 1   off: 0

DB2: text display   on: 1   off: 0

DB3: graphic display   on: 1   off: 0

NOTE: It is necessary to turn on "text display" and "graphic display" in the following cases.

     a)   Combination of text / graphic display

     b)   Attribute function

5). Cursor pattern select

CODE	FUNCTION	OPERAND
10100000	1-line cursor	
10100001	2-line cursor	
10100010	3-line cursor	
10100011	4-line cursor	
10100100	5-line cursor	
10100101	6-line cursor	
10100110	7-line cursor	
10100111	8-line cursor	

When cursor display is on, this command selects the cursor pattern in the range 1 line to 8 lines. The cursor pointer set command defines the cursor address.
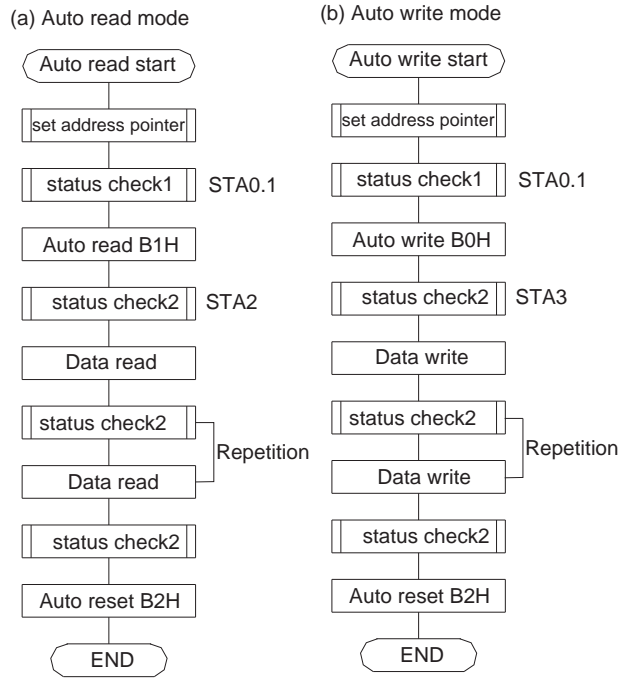
6). Data auto read / write

CODE	HEX.	FUNCTION	OPERAND
10110000	B0H	Set data auto write	—
10110001	B1H	Set data auto read	—
10110010	B2H	Auto rest	—

The command is convenient for sending a full screen of data from the external display RAM. After setting auto mode, a data write (or read) command is not need to be sent between each datum. A data auto write (or read) command must be send after a set address pointer command. After this command, the address pointer is automatically incremented by 1 after each datum. In auto mode, the RA6963 cannot accept any other commands. The auto reset command must be sent to the RA6963 after all data has been sent, to clear auto mode.

NOTE: A status check for auto mode (STA2, STA3 should be checked between sending of each datum. Auto

reset should be performed after checking STA3=1(STA2=1)). Refer to the following flowchart.

(a) Auto read mode
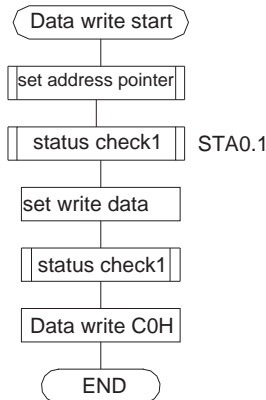
```
  Auto read start
        │
  set address pointer
        │
  status check1        STA0.1
        │
  Auto read B1H
        │
  status check2        STA2
        │
  Data read
        │
  status check2  ┐
        │        │ Repetition
  Data read      ┘
        │
  status check2
        │
  Auto reset B2H
        │
       END
```

(b) Auto write mode

```
  Auto write start
        │
  set address pointer
        │
  status check1        STA0.1
        │
  Auto write B0H
        │
  status check2        STA3
        │
  Data write
        │
  status check2  ┐
        │        │ Repetition
  Data write     ┘
        │
  status check2
        │
  Auto reset B2H
        │
       END
```

7). Data read / write

CODE	HEX.	FUNCTION	OPERAND
11000000	C0H	Data write and increment ADP	Data
11000001	C1H	Data read and increment ADP	—
11000010	C2H	Data write and decrement ADP	Data
11000011	C3H	Data read and decrement ADP	—
11000100	C4H	Data write and no variable ADP	Data
11000101	C5H	Data read and no variable ADP	—

This command is used for writing data from the MPU to external display RAM, and reading data from external display RAM to the MPU. Data write /data read should be executed after setting address using ser address pointer command. The address pointer can be automatically incremented or decremented using this command.

Note: This command is necessary for each 1-byte datum. Refer to the following flowchart.

```
   Data write start
         │
   set address pointer
         │
   status check1      STA0.1
         │
   set write data
         │
   status check1
         │
   Data write C0H
         │
        END
```

8). Screen peek

| CODE	HEX.	FUNCTION	OPERAND
11100000	E0H	Screen peek	—

This command is used to transfer 1 byte of displayed data to the data stack; this byte can then be read from the

MPU by data access. The logical combination of text and graphic display data on the LCD screen can be read by read by this command.

The status (STA6) should be checked just after the screen peek command. If the address determined by the set address pointer command is not in the graphic area, this command is ignored and a status flag (STA6) is set.

Refer to the following flowchart.
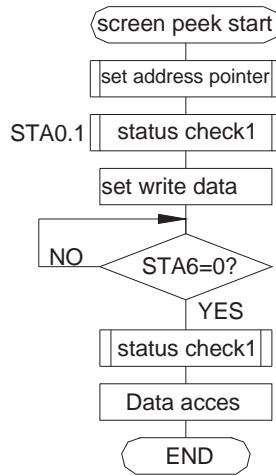
Note: This command is available when hardware column number and software column number are the same. Hardware column number is related to MD2 and MD3 setting. Software column number is related to ser text area and set graphic area command.

9). Screen copy

CODE	HEX.	FUNCTION	OPERAND
11101000	E8H	Screen copy	—

This command copies a raster line of data to the graphic area.

The start point must be set using the set address pointer command.

Note:

If the attribute function is being used, this command is not available. (With attribute data is graphic area data.)

With dual-scan, this command cannot be used (because the RA6963 cannot separate the upper screen data and lower screen data). Refer to the following flowchart.
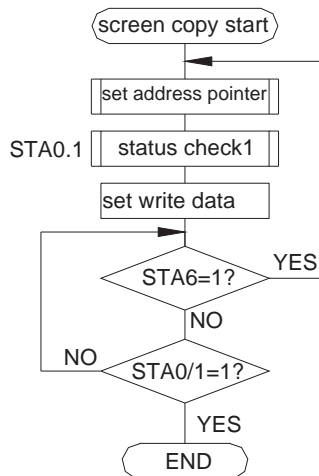
This command is available when hardware column number and software column number are the same. Hardware column number is related to MD2 and MD3 setting. Software column number is related to set text area and set

graphic area command.

10). Bit set /reset

CODE	FUNCTION	OPERAND
11110XXX	Bit reset	——
11111XXX	Bit set	——
1111X000	Bit 0 (LSB0)	——
1111X001	Bit 1	——
1111X010	Bit 2	——
1111X011	Bit 3	——
1111X100	Bit 4	——
1111X101	Bit 5	——
1111X110	Bit 6	——
1111X111	Bit 7 (LSB0)	——

This command use to set or reset a bit of the byte specified by the address pointer. Only one bit can be set or reset at a time. Refer to the following flowchart.

```
      ( Bit set/reset )
             |
   | set address pointer |
             |
     | status check1 |  STA0.1
             |
      | set write data |
             |
     | status check1 |
             |
      | Bit set (read) |
             |
          ( END )
```
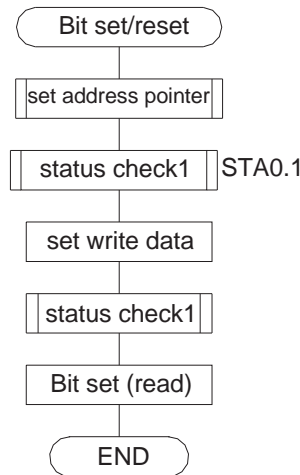
10 Specification of Quality Assurance

1 PURPOSE

This specification provides the product technical conditions, quality inspection, reliability test and the method of packing, transport and storage for USMPG-TQ240128B-TZWFH-TP LCD module.

2 SCOPE OF APPLICATION

This specification applies to USMPG-TQ240128B-TZWFH-TP graphic LCD module.

3 REQUIREMENTS

3.1 All specs of USMPG-TQ240128B-TZWFH-TP graphic module should be compliant to this specification.

3.2 The module structure, outline dimension, viewing area, display mode, viewing angle and pin-out interface for USMPG-TQ240128B-TZWFH-TP should conform to the design drawing approved by client.

3.3 The cosmetic quality criteria of USMPG-TQ240128B-TZWFH-TP are specified in table 1.
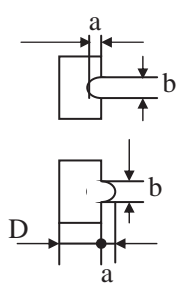
Table 1 LCM Cosmetic Quality Criteria

ITEM	INSPECTION CRITERIA
Outline Dimension	Conforms to design drawing spec or sample approved by client
Interface	Conforms to design drawing spec or sample approved by client
Display Mode	Conforms to design drawing spec or sample approved by client
Component Soldering	(1)Rejected when component is not attached on soldering surface and sticking up (2)Rejected when solder covers less than 2/3 of soldering area or component is not connected to soldering area
Metal Frame	(1)Surface of metal frame should be clean and smooth. The scratch of coating or roasted lacquer layer is according to following standard: Width and Length of scratch Numbers allowed W≤0.10; L≤5.0 3 W≤0.20; L≤3.0 2 W≤0.30; L≤3.0 1 Rejected when scratch exceeds the above spec. (2) Shape of frame should conform to design drawing spec, out of shape is not allowed.
Adhesive Sealing	(1) Too small adhesive area to cause exposure of IC pin (Free of soldering-proof area) on PCB is rejected. (2) Exposure of chip bonding wire on COB board is rejected. (3) Bubble size on surface of adhesive sealing exceeding 0.5mm is rejected.
PCB Board	(1)Size of drill hole on PCB board should conform to design drawing spec or sample approved by client. (2)Printing the non-concerned text or symbol on PCB is rejected.

3.4 Function test criteria of USMPG-TQ240128B-TZWFH-TP are specified in table 2.

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Table 2 LCM Function Test Criteria

ITEM		INSPECTION CRITERIA
Display Pattern		Rejected when display the following patterns: a. Missing horizontal or vertical line; b. Uneven contrast of display pattern; c. Glimmering or jumping pattern; d. Disorder of display function; e. No display or light display.
Pattern Defect	Rainbow	Viewing at specified viewing angle range, more than two color rainbow on display panel inspected by naked eye is not allowed.
	Extra or Missing pattern	Not allowed
	Pattern Intrusion or Protrusion	(1) a x b>0.2x0.2mm^2 Not allowed (2) a or b>1/5D Not allowed (3) When size of a or b is less than or equal to the above range, the total number of pattern intrusion or protrusion should not exceed 4.
LED Backlight Defect	Transmissive type LCD	Spot of LED backlight: 　　Diameter of spot　　　　　Number allowed 　　　Dia.≤0.10mm　　　　　　Ignored 0.10mm<Dia.≤0.20mm　　　　　　6 0.20mm<Dia.≤0.25mm　　　　　　5 0.25mm<Dia.≤0.40mm　　　　　　3 0.40mm<Dia.　　　　　　　　　0
Function Defect		The followings are not allowed: a. No function switch; b. Slow response time.

3.5 Defects like bad alignment layer and fluid leakage are not allowed on the display panel. 3.6

Electrical and optical parameters for USMPG-TQ240128B-TZWFH-TP LCM refer to Table 3.

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Table 3 Electrical and Optical Parameters of LCM

ITEM	SYMBOL	STN Dot Matrix Character Type			UNIT
		MIN.	TYP.	MAX.	
LCD Operating Voltage	V_{lcd}	-	5.0	-	V
Contrast	C_r	10:1			-
Response Time (25℃)	t_r		150	250	ms
	t_d		150	250	
Viewing Angle (Cr=3)	θ	45	-	60	deg
	Φ	-40	-	40	
Operating Temp.	T_{OP}	-20~+70			℃
Storage Temp.	T_{ST}	-30~+80			
Minimum Life Time	τ	≥50000			h

3.7 Reliability Test

Items of reliability test are as the followings with no abnormalities and function failures found after the test:

(Number of specimen: 16)

3.7.1 Low Temperature and Storage Test

  Wide temperature type -30 ℃ 500 Hours   Restore 12 Hours

  Standard temperature type -20℃ 500 Hours   Restore 12 Hours

3.7.2 High Temperature and Storage Test

  Wide Temperature type 80 ℃ 500 Hours   Restore 12 Hours

  Standard temperature type 70℃ 500 Hours   Restore 12 Hours

3.7.3 Humidity Test

  40±2℃, RH=93±2%   500 Hours   Restore 12 Hours

3.7.4 Temperature Shock Test

  -20℃ 30Min→ 25℃ 30min→ 70℃ 30Min→ 25℃ 30Min→ -20℃ 30Min 10 Cycles, Restore 12 Hours

3.7.5 Vibration Test

  Sweep for 3 min at 10Hz, and amplitude 2mm at 10Hz for 2 hours each in X, Y and Z direction

3.7.6 Drop Test

  Drop shock from height of 1m 10pcs in packing

3.8 The LCM Must Have Following Distinct Marks:

  a) Brand of manufacturer.

  b) Part Number: USMPG-TQ240128B-TZWFH-TP

  a)   Product qualified label.

  b)   Lot number or date of manufacture

4 GENERAL EXPERIMENT OR TEST CONDITION (TC)

  Operating Voltage: V_{DD}=Driving Voltage of IC;

  Environmental Temperature: To=25±3℃;

  Environmental Humidity: RH≤70%

5   INSPECTION PROCEDURE

To guarantee the display in accordance with the technical spec, product inspection must be carried out in manufacturing and outgoing process.

5.1 Cosmetic and Display Function Inspection

This inspection includes all batch inspection of USMPG-TQ240128B-TZWFH-TP module. Unless otherwise specified, all cosmetic items inspected are carried out with bare-eye inspection at the condition of normal illumination & eyesight and 25cm distance between inspector eye and module.

The items for cosmetic and display function inspection are shown in Table 4.

5.2 Outgoing Inspection

Before products are shipped out of factory, outgoing inspection is implemented according to the relevant regulation in this specification. All acceptance items must be passed prior to the delivery.

The outgoing AQL level is shown in Table 4.

Table 4 Items for cosmetic and display function inspection

ITEM	REQUIREMENT	CONDITION	METHOD	COSMETIC AND FUNCTION INSPECTION	OUTGOING INSPECTION AQL
Structure and Size	Chapter 3.2	Power Off	Measuring Tool	Random Sampling 20~25 Pcs	2.0
Cosmetic	Chapter 3.3	Power Off	Measuring Tool or Visual Check		2.0
Display Function	Chapter 3.4, 3.5	Power Off or Whole Screen Display	Visual Check or Electrical Test	100% Inspection	0.65
Marks	Chapter 3.8	Power Off	Visual Check		2.0

6   PACKING, TRANSORTATION, STORAGE

6.1   Packing Content

6.1.1   Package for USMPG-TQ240128B-TZWFH-TP LCM is anti-static bag (or shield bag) and carton box inside, and hard carton outside.

6.1.2   After LCM are packed into anti-static bag and put in box, separate alignment in good order with tight press and fixed position is required.

6.1.3   Unless otherwise specified, packing carton should be marked with description of P/N, quantity, date of manufacture, etc. and symbols of 'TAKE CARE' 'UP SIDE' 'NO WET'.

6.2   Transportation

Unless otherwise specified, carton with LCM can be carried by any means of transport. During transportation, being wet by rain, mechanical strike, close to corrosive materials such as acid and alkali etc. should be avoided.

6.3   Storage

6.3.1 Unless otherwise specified, LCM should be stored in circumstance of –20~+60℃ temperature range with relative humidity RH≤80%, good ventilation and free of corrosiveness.

6.3.2 After the LCM qualified is packed into warehouse, the storage time is generally less than half year. If the storage is longer than the time, the LCM should be re-inspected and qualified prior to shipping and use.

Displays

US Micro Products is an industrial distributor specializing in engineered display solutions. We dedicate ourselves to providing the best in displays for the medical, industrial, gaming, automotive, aerospace, military and consumer markets.

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TFT Display

Open Frame Monitors

Passive LCDs

Multitouch

Touch Screen

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Our full line of peripheral devices includes keyboards, trackballs and printers. These rugged industrial products are designed to meet the rigorous demands of your equipment and are available in a variety of standard and custom options.

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Aerospace Trackballs

Printers