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TFT | OLED | CHARACTER | GRAPHIC | UWVD | SEGMENT | CUSTOM

Graphic Display Module

Part Number

G12864J-FT3-DS63

Overview:

- 128x64 Graphic LCD
- FSTN Positive
- 80.00x57.00mm Module
- 4-Line Serial Interface
- White LED Backlight
- Transflective
- Special Temp Range
- 3.0V
- LCD IC: ST7565R
- RoHS Compliant

Graphic LCD Features

Resolution: 128x64 Dots

Interface(s): 4-Line Serial

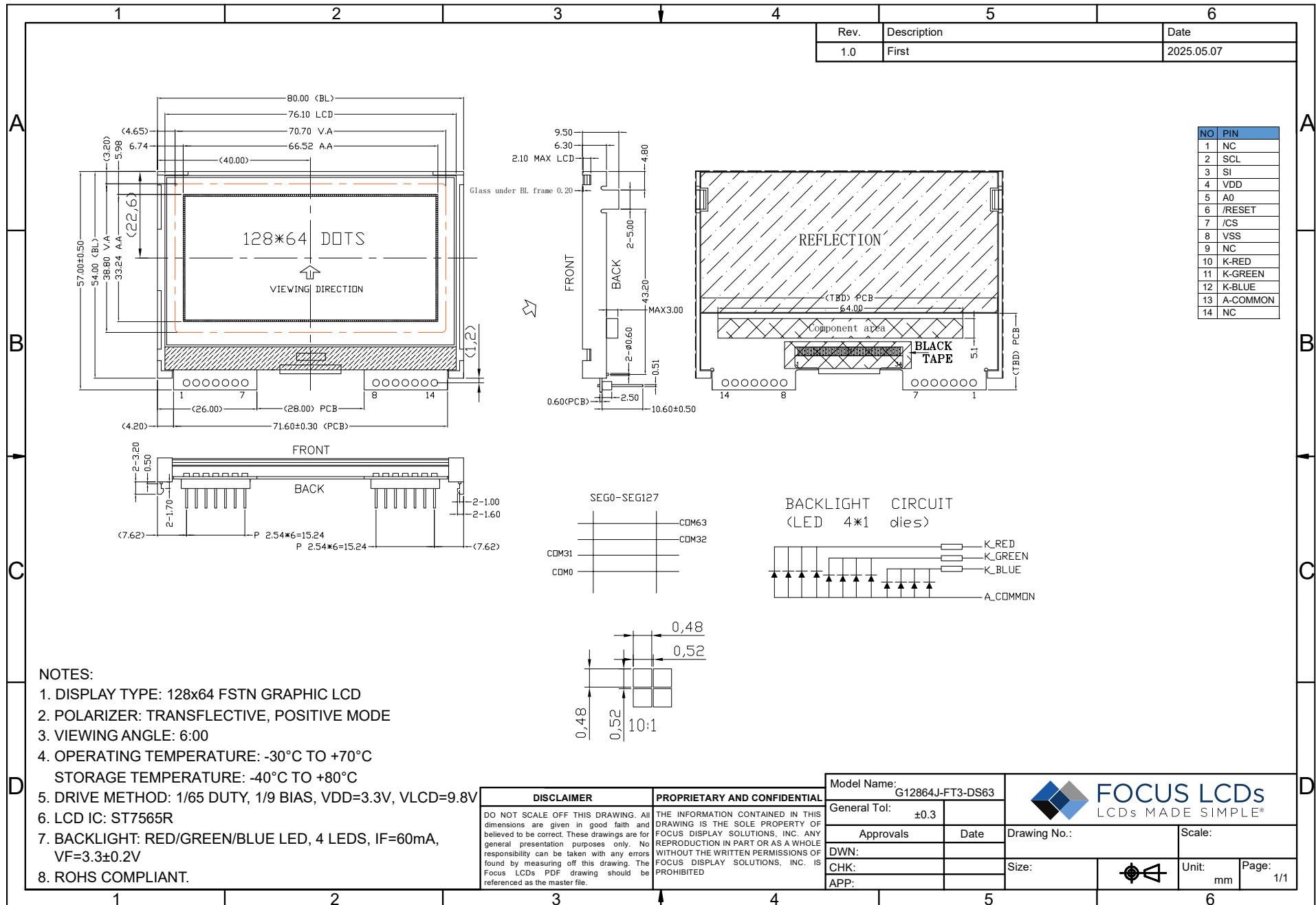
RoHS Compliant.

General Information Items	Specification	Unit	Note
	Main Panel		
Viewing Area (VA)	70.7 (H) x 38.8 (V)	mm	--
LCD Type	FSTN Positive	--	--
Viewing Angle	6:00	O'Clock	--
Polarizer	Transflective	--	--
Backlight Type	LED	--	--
Backlight Color	White	--	--
LCD IC	ST7565R	--	--
Drive Mode	1/65 Duty, 1/9 Bias	--	--
Operating Temperature	-30 to +70	°C	--
Storage Temperature	-40 to +80	°C	--

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	80.00	--	mm	--
	Vertical (V)	--	57.00	--	mm	--
	Depth (D)	--	9.50	--	mm	--
Weight		--	31.10	--	g	Approximate

1. Outline Dimensions



2. Input Terminal Pin Assignment

NO.	Symbol	Description	I/O
1	NC	Not connected.	--
2	SCL	Serial clock.	I/O
3	SI	Serial data.	I/O
4	VDD	Power supply.	P
5	A0	This is connected to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or a command. A0="H": Indicates that D0 to D7 are display data. A0="L": Indicates that D0 to D7 are control data.	I
6	/RES	When /RES is set to "L", the setting are initialized. The reset operation is performed by the /RES signal level.	I
7	/CS1	This is the chip select signal. When CS1="L", the the chip select becomes active, and data/command I/O is enabled	I
8	VSS	Power ground.	P
9	NC	Not connected.	--
10	K-RED	Backlight power - for red light.	P
11	K-GREEN	Backlight power - for green light.	P
12	K-BLUE	Backlight power - for blue light.	P
13	A	Backlight power supply.	P
14	NC	Not connected.	--

I: Input, O: Output, P: Power

3. LCD Optical Characteristics

Item	Symbol	Condition	Min	Typ.	Max	Unit	
Contrast Ratio	CR	--	--	5	--	--	
Response Time	On	T_{on}	--	150	250	ms	
	Off	T_{off}	--	180	300	ms	
Viewing Angle $C_r \geq 2, 25^\circ\text{C}$	Hor.	Θ_L	$\Phi=270^\circ, 9H$	--	55	--	degree
		Θ_R	$\Phi=90^\circ, 3H$	--	55	--	
	Ver.	Θ_T	$\Phi=180^\circ, 12H$	--	40	--	
		Θ_B	$\Phi=0^\circ, 6H$	--	70	--	

4. Electrical Characteristics

4.1 Absolute Maximum Rating

Characteristics	Symbol	Min	Max	Unit
Supply Voltage	VDD	0.3	4.2	V
	Vout	0.3	12.6	V
Input Voltage	Vin	VSS-0.3	VDD+0.3	V
Operating Temperature	T_{OP}	-30	+70	$^\circ\text{C}$
Storage Temperature	T_{ST}	-40	+80	$^\circ\text{C}$

NOTE: If the absolute maximum rating of the above parameters is exceeded, even momentarily, the quality of the product may be degraded. Absolute maximum ratings specify the values which the product may be physically damaged if exceeded. Be sure to use the product within the range of the absolute maximum ratings.

4.2 DC Electrical Characteristics

Characteristics		Symbol	Condition	Mi	Typ.	Max	Unit	
Operating Voltage (1)		VDD1	--	1.7	--	3.3	V	
Operating Voltage (2)		VDD2	--	2.4	--	3.3	V	
Operating Voltage (3)		VDD3	--	2.4	--	3.3	V	
Input Voltage	H Level	V _{IH}	--	0.7*VDD1	--	VDD1	V	
	L Level	V _{IL}	--	VSS1	--	0.3*VDD1	V	
Output Voltage	H Level	V _{OH}	I _{OUT} =1mA, VDD1=1.8V	0.8*VDD1	--	VDD1	V	
	L Level	V _{OL}	I _{OUT} =1mA, VDD1=1.8V	VSS1	--	0.2*VDD1	V	
Input Leakage Current		I _{LI}	--	-1.0	--	1.0	μA	
Output Leakage Current		I _{LO}	--	-3.0	--	3.0	μA	
Liquid Crystal Driver ON Resistance		R _{ON}	T _a =25°C	V _{op} =8.5V, ΔV=0.85V	--	0.6	0.8	KΩ
				V _G =1.9V, ΔV=0.9V	--	1.3	1.5	KΩ
Frame Frequency		FR	Duty=1/65, V _{op} =8.5V, T _a =25°C	70	75	80	Hz	

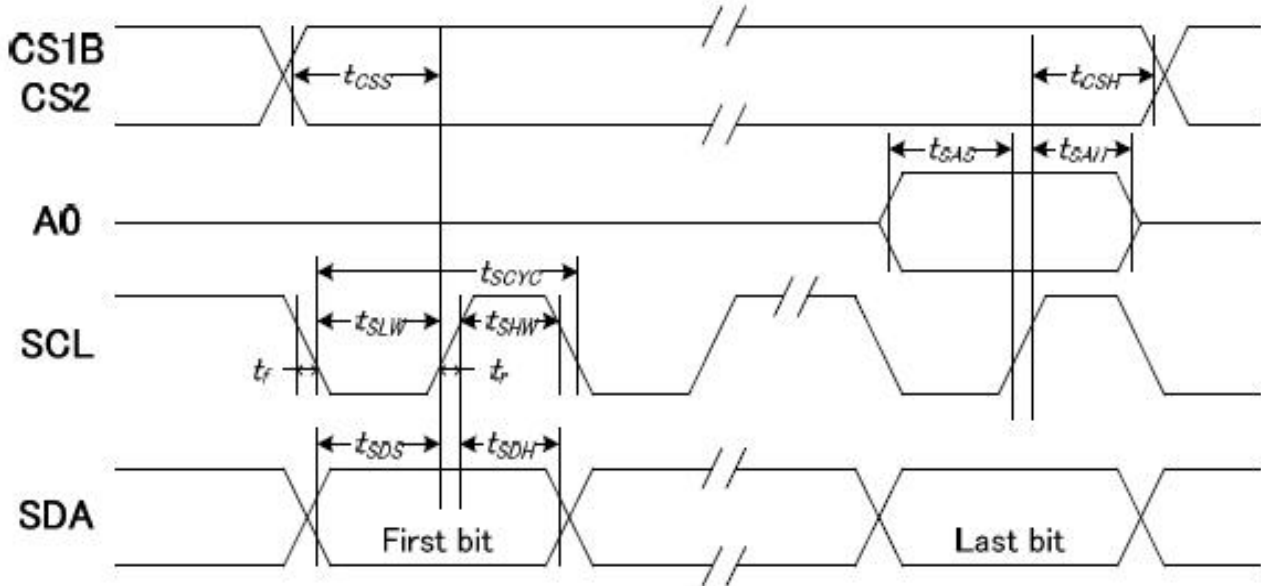
Condition:

1. VDD = 3.3V
2. 1/65 Duty, 1/9 Bias

5. Module Function

5.1 Timing Characteristics

System Bus Timing for 4-Line SPI MCU Interface



(VDD=3.3V, Ta=25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial clock period	SCLK	t_{SCYC}		50	—	ns
SCLK "H" pulse width		t_{SHW}		25	—	
SCLK "L" pulse width		t_{SLW}		25	—	
Address setup time	A0	t_{SAS}		20	—	
Address hold time		t_{SAH}		10	—	
Data setup time	SDA	t_{SDS}		20	—	
Data hold time		t_{SDH}		10	—	
CS-SCLK time	CS1B CS2	t_{CSS}		20	—	
CS-SCLK time		t_{CSH}		40	—	

5.2 LCM Application

Please see information on pages 43-45 of the data sheet for LCD controller ST7565R. The data sheet can be found here: <https://focuslcds.com/wp-content/uploads/Drivers/ST7565R.pdf>

5.3 Command Table

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	BUSY	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[1:0]=(0,0), x2, x3, x4 BL[1:0]=(0,1), x5 BL[1:0]=(1,1), x6
	0	0	0	0	0	0	0	0	0	BL1	
(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	-	-	-	-	Do NOT use. Reserved for testing.
(23) Power Save Mode Set	0	0	1	0	1	0	1	1	0	MD	MD=0, sleep mode MD=1, normal
	0	0	0	0	0	0	0	0	0	0	

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

5.4 Initialization Code

```

*****
;
;Module:          G12864J-FT3-DS63
;Controller:     ST7565R
;Interface::     Serial
;Data:
;Description:    1/65 duty, 1/9 bias, test program

```

```

*****
;

```

```

    CS    EQU    P3.0
    RES   EQU    P3.1
    A0    EQU    P3.2
    WWR   EQU    P3.3
    RRD   EQU    P3.4

```

```

    DB4   EQU    P1.4
    DB5   EQU    P1.5
    SCL   EQU    P1.6
    DI    EQU    P1.7

```

```

.....
;
    COM   EQU    50H
    DAT   EQU    51H

```

```

    ORG   0000H
    LJMP  START
    ORG   0030H

```

```

START:    LCALL DELAY0

```

```

    CLR  WWR
    CLR  RRD
    CLR  DB4
    CLR  DB5

```

```

;    CLR CS
    CLR RES
    LCALL DELAY0
    LCALL DELAY0
    LCALL DELAY0
    SETB RES
    LCALL DELAY0

```

INITIALIZE:

```

MOV COM,#0A2H
LCALL WRCOM           ;   Set bias: 1/9

MOV COM,#0A0H
LCALL WRCOM           ;   ADC select ,segment display, normal.

MOV COM,#0C8H
LCALL WRCOM           ;   Common mode select, Reverse display

MOV COM,#0A6H
LCALL WRCOM           ;   Display normal

MOV COM,#0F8H
LCALL WRCOM
MOV COM,#00H
LCALL WRCOM           ;   select booster ratio

MOV COM,#25H           ;   20H~27H
LCALL WRCOM           ;   Internal resistor ratio set
LCALL DELAY0

MOV COM,#81H
LCALL WRCOM
MOV COM,#38D           ;   38D=1CH
LCALL WRCOM           ;
LCALL DELAY0

MOV COM,#2CH
LCALL WRCOM

MOV COM,#2EH
LCALL WRCOM

MOV COM,#2FH
LCALL WRCOM

LCALL DELAY0

MOV COM,#0AFH
LCALL WRCOM           ;   Display on

LCALL DELAY
LCALL DELAY
  
```

```

MOV COM,#40H
LCALL WRCOM                                ; Display start line 0

,*****
MAIN:   MOV   COM,#40H
        LCALL WRCOM                                ; Display start line 0

        MOV   R1,#03H
        MOV DPTR,#DISP1

LOOP1:  MOV   R0,#0B0H

        CLR A
        MOVC A,@A+DPTR
        MOV R6,A

        INC DPTR
        CLR A
        MOVC A,@A+DPTR
        MOV R7,A
        INC DPTR

LOOP2:  MOV R3,#40H
        MOV COM,R0 LCALL
        WRCOM

        MOV COM,#10H LCALL
        WRCOM          MOV
        COM,#00H      LCALL
        WRCOM

LOOP4:  MOV DAT,R6
        LCALL WRDAT
        MOV DAT,R7
        LCALL WRDAT
        DJNZ R3,LOOP4

        INC R0
        CJNE
        R0,#0B8H,LOOP2
        LCALL DELAY
        LCALL DELAY
        LCALL DELAY
        LCALL DELAY
        DJNZR1,LOOP1
,*****

```

PICTURE:

```
MOV R1,#03H
MOV DPTR,#DISP2
```

PICT1: MOV R0,#0B0H

PICT2: MOV R3,#80H
 MOV COM,R0
 LCALL WRCOM

```
MOV COM,#10H
LCALL WRCOM
MOV COM,#00H
LCALL WRCOM
```

PICT3: CLR A
 MOVC A,@A+DPTR
 INC DPTR
 MOV DAT,A
 LCALL WRDAT
 DJNZ R3,PICT3

```
INC R0
CJNE
R0,#0B8H,PICT2
LCALL DELAY
LCALL DELAY
LCALL DELAY
LCALL DELAY
```

```
LJMP MAIN
```

#####

WRCOM: PUSH ACC

```
CLR CS
CLR A0
SETB SCL
MOV A,COM
MOV R4,#08H
```

WRCOM1: RLC A
 MOV DI,C

```

CLR SCL
NOP
SETB SCL
NOP
DJNZ R4,WRCOM1

```

```

SETB CS

```

```

POP ACC

```

```

RET

```

```

,*****
,

```

```

WRDAT:    PUSH ACC

```

```

CLR CS

```

```

SETB A0

```

```

;    SETB SCL

```

```

MOV A,DAT

```

```

MOV R4,#08H

```

```

WRDAT1:  RLC A

```

```

MOV DI,C

```

```

CLR SCL

```

```

NOP

```

```

SETB SCL

```

```

NOP

```

```

DJNZ R4,WRDAT1

```

```

SETB CS

```

```

POP ACC

```

```

RET

```

```

,*****
,

```

```

DELAY:    MOV 62H,#08H

```

```

DELAY1:   MOV 63H,#099H

```

```

DELAY2:   MOV 64H,#0AAH

```

```

DELAY3:   DJNZ 64H,DELAY3

```

```

DJNZ 63H,DELAY2

```

```

DJNZ 62H,DELAY1

```

```

RET

```

```

,*****
,

```

```

DELAY0:    MOV 60H,#066H
DELAY02:   MOV 61H,#066H
DELAY01:   DJNZ 61H,DELAY01
           DJNZ 60H,DELAY02
  
```

```
RET
```

```

,*****
DISP1: DB 0AAH,0AAH,0FFH,00H,0AAH,055H
DISP2: ,*****The following data is created by GetData*****
  
```

```
,*****Copyright: · (chen feng wu)*****
```

```

db 0ffh,001h,001h,001h,001h,001h,001h,001h,001h,081h
db 081h,081h,081h,081h,0f1h,081h,081h,081h,081h,081h
db 001h,001h,001h,001h,001h,001h,0e1h,021h,021h,021h
db 021h,021h,0a1h,021h,021h,021h,021h,021h,021h,001h
db 001h,001h,081h,011h,061h,001h,001h,0e1h,021h,021h
db 021h,0e1h,001h,081h,001h,001h,0f1h,001h,001h,001h
db 001h,001h,001h,001h,0f1h,051h,051h,051h,051h,051h
db 051h,051h,0f1h,001h,001h,001h,001h,001h,001h,001h
db 001h,001h,001h,001h,001h,001h,001h,001h,001h,001h
db 001h,001h,001h,001h,001h,001h,001h,001h,001h,001h
db 001h,001h,001h,001h,001h,001h,001h,001h,001h,001h
db 001h,001h,001h,001h,001h,001h,001h,0ffh
  
```

```

db 0ffh,000h,000h,000h,000h,000h,000h,000h,0ffh
db 044h,044h,044h,044h,0ffh,044h,044h,044h,044h,0ffh
db 000h,000h,000h,000h,000h,080h,07fh,000h,004h,004h
db 004h,004h,0ffh,004h,014h,0e4h,046h,004h,000h,000h
db 000h,000h,040h,0c3h,038h,006h,000h,07fh,000h,0ffh
db 000h,07fh,000h,07fh,000h,000h,0ffh,000h,000h,000h
db 000h,004h,004h,004h,07dh,055h,055h,055h,0fdh,055h
db 055h,055h,07dh,004h,004h,004h,000h,000h,000h,000h
db 000h,000h,000h,000h,000h,000h,000h,000h,000h,000h
db 000h,000h,000h,001h,001h,0ffh,001h,001h,000h,000h
db 000h,080h,078h,047h,05ch,0e0h,000h,000h,088h,088h
db 088h,088h,088h,088h,088h,088h,088h,000h,000h,000h
db 000h,000h,000h,000h,000h,000h,000h,0ffh
  
```

```

db 0ffh,0e0h,0e0h,0e0h,0e0h,0e0h,0e0h,0e0h,0e0h,0e0h
db 0e0h,0e0h,0e0h,0e0h,0e3h,0e4h,0e4h,0e4h,0e4h,0e4h
db 0e4h,0e7h,0e0h,0e0h,0e2h,0e1h,0e2h,0e2h,0e2h,0e2h
db 0e2h,0e2h,0e3h,0e2h,0e2h,0e2h,0e2h,0e2h,0e2h,0e0h
db 0e0h,0e0h,0e0h,0efh,0e0h,0e0h,0e8h,0e4h,0e3h,0e0h
db 0e1h,0e6h,0e0h,0e0h,0e0h,0e4h,0e8h,0e7h,0e0h,0e0h,0e0h
db 0e0h,0e4h,0e4h,0e4h,0e5h,0e5h,0e5h,0e5h,0e7h,0e5h
db 0e5h,0e5h,0e5h,0e5h,0e4h,0e4h,0e0h,0e0h,0e0h,0e0h
db 0e0h,0e0h,0e0h,000h,000h,000h,000h,000h,000h,000h
db 000h,000h,000h,004h,004h,007h,004h,004h,000h,000h
db 004h,007h,004h,000h,000h,004h,007h,004h,000h,000h
db 000h,000h,000h,000h,000h,000h,000h,000h,000h,000h
db 000h,000h,000h,000h,000h,000h,000h,0ffh
  
```

```

db 0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,007h
db 0b7h,0b7h,0b7h,0b7h,000h,0b7h,0b7h,0b7h,0b7h,007h
db 0ffh,0ffh,0ffh,0efh,09fh,0feh,079h,09fh,0fbh
db 0bbh,09bh,0aah,0b1h,0bbh,09bh,03bh,0fbh,0fbh,0ffh
db 0ffh,0ffh,0f7h,0ceh,079h,09fh,0ffh,001h,0fdh,00dh
db 0fdh,001h,0ffh,007h,0ffh,0ffh,000h,0ffh,0ffh,0ffh
db 0ffh,0bfh,0bfh,0bfh,020h,0aah,0aah,0aah,02ah,0aah
db 0aah,0aah,020h,0bfh,0bfh,0bfh,0ffh,0ffh,0ffh,0ffh
db 0ffh,0ffh,000h,000h,000h,000h,000h,000h,000h,000h
db 000h,000h,000h,010h,010h,0f0h,010h,010h,000h,000h
db 010h,0f0h,010h,010h,010h,0e0h,000h,000h,080h,080h
db 080h,080h,080h,080h,080h,080h,080h,000h,000h,000h
db 000h,000h,000h,000h,000h,000h,000h,0ffh
  
```

db 0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0ffh,0f0h
 db 0fbh,0fbh,0fbh,0fbh,0c0h,0bbh,0bbh,0bbh,0bbh,0b0h
 db 0bfh,08fh,0ffh,0ffh,0fbh,0fbh,003h,0fch,0bfh,0cfh
 db 0f0h,0ffh,0ffh,080h,0ffh,0c0h,0bfh,0bfh,08fh,0ffh
 db 0ffh,0ffh,0fbh,003h,0fch,0ffh,07fh,0b8h,0cfh,0f0h
 db 0efh,098h,0ffh,0f8h,0bfh,07fh,080h,0ffh,0ffh,0ffh
 db 0ffh,0bfh,0bfh,0bfh,0a8h,0aah,0aah,0aah,080h,0aah
 db 0aah,0aah,0a8h,0afh,0bfh,0bfh,0ffh,0ffh,0ffh,0ffh
 db 0ffh,0ffh,0ffh,000h,000h,000h,000h,000h,000h,000h
 db 000h,000h,000h,040h,040h,07fh,040h,040h,000h,000h
 db 040h,07fh,041h,041h,041h,022h,01ch,000h,008h,008h
 db 008h,008h,008h,008h,008h,008h,008h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,0ffh

db 0ffh,007h,007h,007h,007h,007h,007h,047h,047h
 db 047h,0c7h,047h,047h,047h,007h,007h,0f7h,007h,007h
 db 007h,007h,007h,007h,007h,0c7h,047h,047h,047h,047h
 db 057h,0e7h,047h,047h,047h,047h,047h,047h,047h,007h
 db 007h,007h,087h,017h,067h,007h,007h,0e7h,027h,027h
 db 027h,0e7h,007h,087h,007h,007h,0f7h,007h,007h,007h
 db 007h,007h,007h,0f7h,057h,057h,057h,057h,057h
 db 057h,057h,0f7h,007h,007h,007h,007h,007h,007h,007h
 db 007h,007h,007h,000h,000h,000h,000h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,0ffh

db 0ffh,000h,000h,000h,000h,000h,040h,0c0h,040h
 db 040h,03fh,020h,021h,011h,0c1h,039h,007h,001h,001h
 db 0ffh,000h,000h,000h,080h,0a0h,091h,08ah,080h,0a6h
 db 0b3h,0eah,0a6h,0b2h,0c1h,08ah,091h,0a0h,080h,000h
 db 000h,000h,040h,0c3h,038h,006h,000h,07fh,000h,0ffh
 db 000h,07fh,000h,07fh,000h,000h,0ffh,000h,000h,000h
 db 000h,004h,004h,004h,07dh,055h,055h,055h,0fdh,055h
 db 055h,055h,07dh,004h,004h,004h,000h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,000h,000h,000h
 db 000h,000h,000h,001h,001h,0ffh,001h,001h,000h,000h
 db 0f8h,006h,001h,001h,001h,001h,007h,000h,088h,088h
 db 088h,088h,088h,088h,088h,088h,088h,000h,000h,000h
 db 000h,000h,000h,000h,000h,000h,000h,0ffh

db 0ffh,080h,080h,080h,080h,080h,080h,080h,080h,080h
 db 080h,080h,084h,082h,081h,080h,082h,082h,086h,082h
 db 081h,080h,080h,080h,080h,080h,080h,080h,080h,080h
 db 080h,08fh,080h,080h,080h,080h,080h,080h,080h,080h
 db 080h,080h,080h,08fh,080h,080h,088h,084h,083h,080h
 db 081h,086h,080h,080h,084h,088h,087h,080h,080h,080h
 db 080h,084h,084h,084h,085h,085h,085h,085h,087h,085h
 db 085h,085h,085h,085h,084h,084h,080h,080h,080h,080h
 db 080h,080h,080h,080h,080h,080h,080h,080h,080h,080h
 db 080h,080h,080h,084h,084h,087h,084h,084h,080h,080h
 db 080h,083h,084h,084h,084h,082h,081h,080h,080h,080h
 db 080h,080h,080h,080h,080h,080h,080h,080h,080h,080h
 db 080h,080h,080h,080h,080h,080h,080h,0ffh

6. Cautions and Handling Precautions

6.1 Handling and Operating the Module

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.
2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.
5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
8. Protect the module from static; it may cause damage to the CMOS ICs.
9. Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
10. Do not disassemble the module.
11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
12. Pins of I/F connector shall not be touched directly with bare hands.
13. Do not connect, disconnect the module in the "Power ON" condition.
14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence.

6.2 Storage and Transportation

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%.
2. Do not store the TFT-LCD module in direct sunlight.
3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.