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ISO 9001
QUALITY MANAGEMENT

MEDICAL | INDUSTRIAL | DEFENSE | AGRICULTURE | FOOD SERVICE

G12832B-FTW-DS63

Product Description

- 128x32 Graphic LCD
- FSTN Positive
- 38.20x11.00mm Module
- Serial I^2C Interface
- White LED Backlight

- Transflective
- Wide Temp Range
- 3.0V
- LCD IC: ST7539
- RoHS Compliant

LCD@FocusLCDs.com | 480-503-4295

Revision History

Date	Rev. No	Page	Summary
06/16/2023	1.0	All	First issue

Graphic LCD Features

Resolution: 128x32 Dots
Interface(s): I^2C
RoHS Compliant.

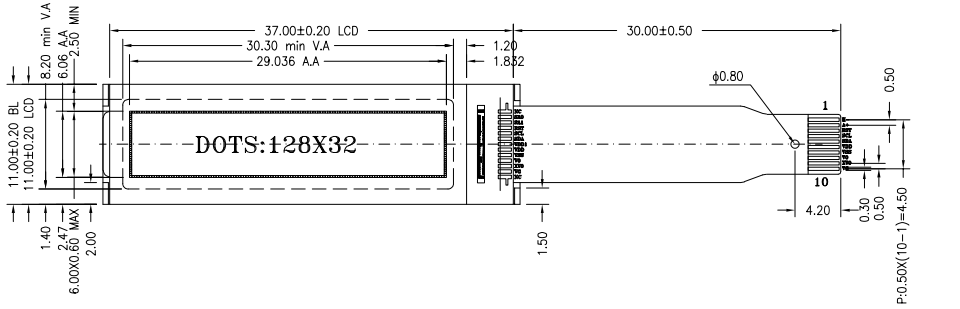
General Information Items	Specification	Unit	Note
	Main Panel		
Viewing Area (VA)	30.30 (H) x 8.20 (V)	mm	--
LCD Type	FSTN Positive	--	--
Viewing Angle	6:00	O'Clock	--
Polarizer	Transflective	--	--
Backlight Type	LED	--	--
Backlight Color	White	--	--
LCD IC	ST7539	--	--
Drive Mode	1/33 Duty, 1/7 Bias	--	--
Operating Temperature	-10 to +70	°C	--
Storage Temperature	-20 to +80	°C	--

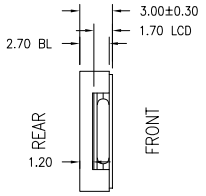
Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	38.20	--	mm	--
	Vertical (V)	--	11.00	--	mm	--
	Depth (D)	--	3.00	--	mm	--
Weight		--	2	--	g	Approximate

1. Outline Dimensions

Rev.	Description	Date
1.0	First	06/16/2023

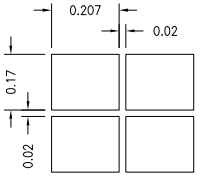


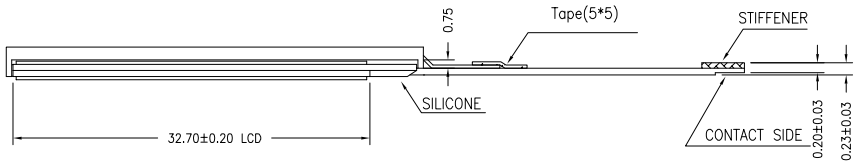


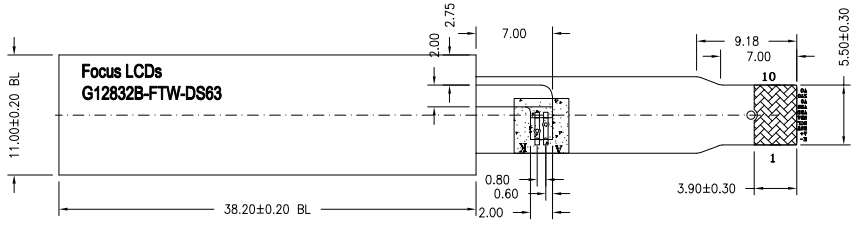
Pin Assignment:

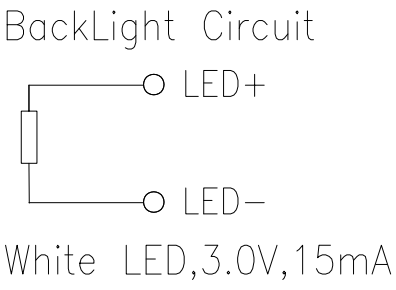
NO	PIN
1	K-
2	A+
3	RST
4	SCL
5	SDA
6	VDD
7	VSS
8	V0
9	XV0
10	VG

C 0.10μF-1.0 μF
C 0.10μF-1.0 μF









NOTES:
1. DISPLAY TYPE: 128x32 FSTN GRAPHIC LCD
2. POLARIZER: TRANSFLECTIVE, POSITIVE
3. VIEWING ANGLE: 6:00
4. OPERATING TEMPERATURE: -10°C TO +70°C
   STORAGE TEMPERATURE: -20°C TO +80°C
5. DRIVE METHOD: 1/33 DUTY, 1/7 BIAS, VDD 3.0V, VLCD 7.5V
6. LCD IC: ST7567
7. BACKLIGHT: WHITE LED, 15mA, 3.0V
8. ROHS COMPLIANT.

Model Name: G12832B-FTW-DS63		
General Tol: ±0.3		
Approvals	Date	
DWN:		
CHK:		
APP:		

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Drawing No.: | Scale:

Size: | Unit: mm | Page: 1/1

2. Input Terminal Pin Assignment

NO.	Symbol	Description	I/O
1	K-	LED ground.	P
2	A+	LED power supply.	P
3	RST	Reset input pin (active low, initializes controller). When RST is “L”, internal initialization is executed.	I
4	SCL	Serial clock input.	I/O
5	SDA	Serial data line.	I/O
6	VDD	Power supply.	P
7	VSS	Ground.	P
8	V0	LCD driving voltage for commons at negative frame.	P
9	XV0	LCD driving voltage for commons at positive frame.	P
10	VG	LCD driving voltage for segments.	P

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°C	Hor.	Θ_L	Φ=270°, 9H	--	55	--	degree
		Θ_R	Φ=90°, 3H	--	55	--	
	Ver.	Θ_T	Φ=180°, 12H	--	40	--	
		Θ_B	Φ=0°, 6H	--	70	--	

4. TFT Electrical Characteristics

4.1 Absolute Maximum Rating

Characteristics	Symbol	Min	Max	Unit
Supply Voltage	VDD	-0.3	4.0	V
	Vout	-0.3	18.0	V
Input Voltage	V_{IN}	-0.3	VDD+0.3	
Operating Temperature	T_{OP}	-10	+70	°C
Storage Temperature	T_{ST}	-20	+80	°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	Min	Typ.	Max	Unit
LCD Driving Voltage		VLCD	--	--	7.5	--	V
Supply Voltage		VDD	VDD-GND	2.8	3.0	3.2	V
Input Voltage	H Level	V_{IH}	--	0.7VDD	--	VDD	V
	L Level	V_{IL}	--	VSS	--	0.3VDD	V

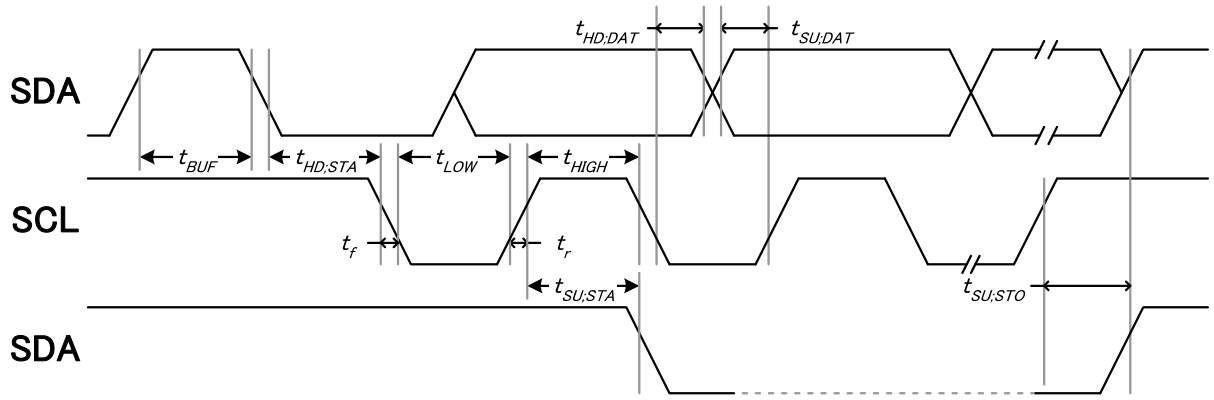
Condition:

1. VDD = 3.0V
2. 1/33 Duty, 1/7 Bias

5. Module Function

5.1 Timing Characteristics

Serial I2C Interface Timing



(VDD=1.8-3.3V, Ta=25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial clock frequency	SCL	f_{SCL}		—	400	kHz
SCL clock LOW period		t_{LOW}		1.3	—	μs
SCL clock HIGH period		t_{HIGH}		0.6	—	
BUS free time between a STOP and START		t_{BUF}		1.3	—	
Data setup time	SDA	$t_{SU;Data}$		0.1	—	
Data hold time tHD;Data 0 0.9		$t_{HD;Data}$		0	0.9	
Setup time for a repeated START condition		$t_{SU;STA}$		0.6	—	
Start condition hold time		$t_{HD;STA}$		0.6	—	
Setup time for STOP condition		$t_{SU;STO}$		0.6	—	
Signal rise time	SDA SCL	t_r		20+0.1Cb	300	ns
Signal fall time		t_f		20+0.1Cb	300	
Capacitive load represented by each bus line		C_b		—	400	pF
Tolerable spike width on bus		t_{SW}		—	50	ns

Note:

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

5.2 LCM Application

Please see information on pages 52-55 of the data sheet for LCD controller ST7539. The data sheet can be found here: https://focuslcds.com/wp-content/uploads/Drivers/ST7539i2-G4.pdf

5.3 Command Table

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data to DDRAM
Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from DDRAM Only for parallel interface and I2C
Read Status Byte (parallel interface)	0	1	ID0	MX	MY	WA	DE	0	0	0	Read status byte Only for parallel interface
			0	POR	0	0	0	ID3	ID2	ID1	
Read Status Byte (4-SPI)	0	0	1	1	1	1	1	1	1	0	Read status byte Only for 4 line SPI
	0	1	ID0	MX	MY	WA	DE	0	0	0	
			0	POR	0	0	0	ID3	ID2	ID1	
Set Column Address LSB	0	0	0	0	0	0	CA3	CA2	CA1	CA0	Set column address of RAM
Set Column Address MSB	0	0	0	0	0	1	CA7	CA6	CA5	CA4	
Set Scroll Line	0	0	0	1	SL5	SL4	SL3	SL2	SL1	SL0	Specify line address for the 1st display line of DDRAM (vertical scrolling)
Set Page Address	0	0	1	0	1	1	PA3	PA2	PA1	PA0	Set page address of RAM
Set Contrast	0	0	1	0	0	0	0	0	0	1	2-byte instruction. Set Vop voltage
			EV7	EV6	EV5	EV4	EV3	EV2	EV1	EV0	
Set Partial Screen Mode	0	0	1	0	0	0	0	1	0	PS	PS=1: Enable partial mode
Set RAM Address Control	0	0	1	0	0	0	1	AC2	AC1	AC0	Set column and page address behavior
Set Frame Rate	0	0	1	0	1	0	0	0	FR1	FR0	Set frame frequency
Set All Pixel ON	0	0	1	0	1	0	0	1	0	AP	Set all display segments on
Set Inverse Display	0	0	1	0	1	0	0	1	1	INV	Set inverse display
Set Display Enable	0	0	1	0	1	0	1	1	1	PD	PD=0: Chip is in power down mode

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Scan Direction	0	0	1	1	0	0	0	MY	MX	0	Set COM and SEG scan direction
Software Reset	0	0	1	1	1	0	0	0	1	0	Set software reset
NOP	0	0	1	1	1	0	0	0	1	1	No operation
Set Bias	0	0	1	1	1	0	1	0	BR1	BR0	Set internal bias circuit
Set COM End	0	0	1	1	1	1	0	0	0	1	2-byte instruction. Set display duty
			--	--	CEN5	CEN4	CEN3	CEN2	CEN1	CEN0	
Partial Start Address	0	0	1	1	1	1	0	0	1	0	Set partial start for partial display screen
			--	--	DST5	DST4	DST3	DST2	DST1	DST0	
Partial End Address	0	0	1	1	1	1	0	0	1	1	Set partial end for partial display screen
			--	--	DEN5	DEN4	DEN3	DEN2	DEN1	DEN0	
Test Control	0	0	1	1	1	1	1	1	1	1	Set test command table
			--	--	--	--	--	--	H1	H0	

5.4 Initialization Code

```
  void init()
{
      RES=1;
      RES=0;
      delay(2);
      RES=1;
      delay(20);

      RES=0;
      delay(2);
      RES=1;
      delay(20);

      write_com(0xa0);
      write_com(0xe9);
      write_com(0x81);
      write_com(130);
      write_com(0xc2);
      write_com(0x85);
      write_com(0xf1);
      write_com(0x20);

      write_com(0xf2);
      write_com(0x00);
      write_com(0xf3);
      write_com(0x1f);

      clealddram();
      write_com(0xaf);

}
```

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 ℃ 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.