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

Graphic Display Module

Part Number

G128ALGSGSW6WTC3XAM

Overview:

- 128x128 Graphic LCD
- STN, Gray
- 71.3x75.41mm Module
- I2C Interface(s)
- White LED Backlight
- Transflective
- Wide Temp Range
- 3.0V
- LCD IC: ST7528
- RoHS Compliant

Graphic LCD Features

Resolution: 128x128 Dots
Interface(s): I2C
RoHS Compliant.

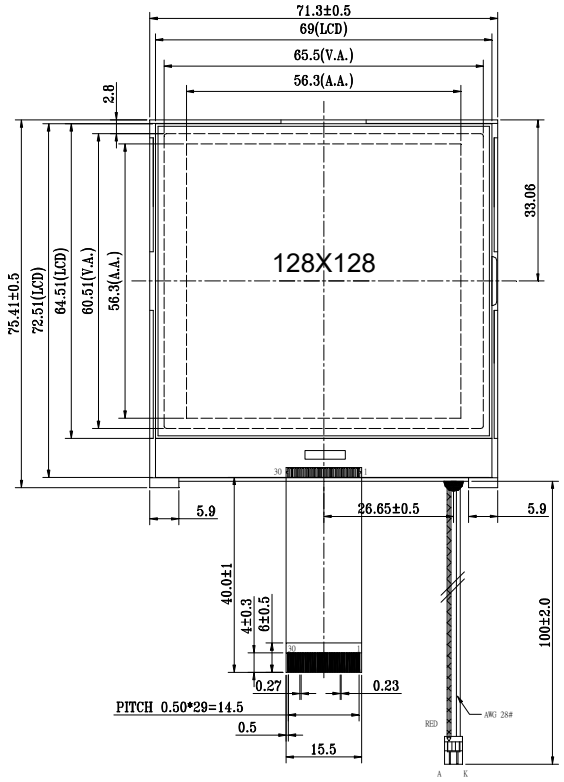
General Information Items	Specification	Unit	Note
	Main Panel		
Viewing Area (VA)	65.50 (H) x 60.51 (V)	mm	--
LCD Type	STN Gray	--	--
Viewing Angle	6:00	O'Clock	--
Polarizer	Transflective	--	--
Backlight Type	LED Edge	--	--
Backlight Color	White	--	--
LCD IC	ST7528	--	--
Drive Mode	1/128 Duty, 1/12 Bias	--	--
Operating Temperature	-20 to +70	°C	--
Storage Temperature	-30 to +80	°C	--

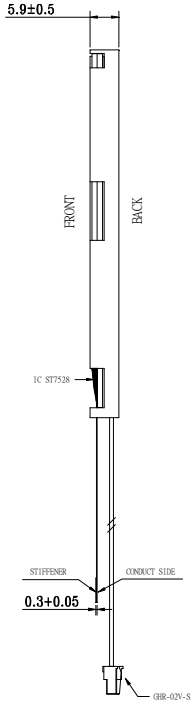
Mechanical Information

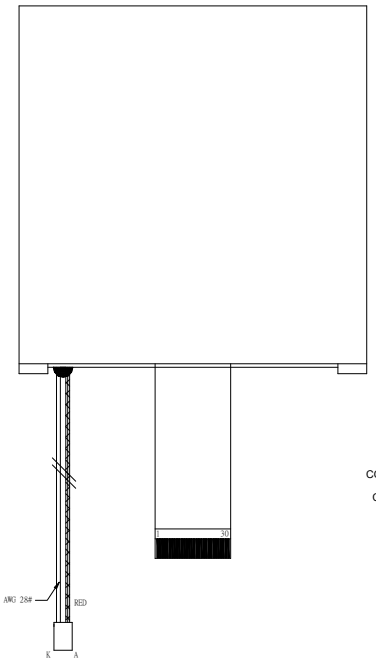
Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	71.30	--	mm	--
	Vertical (V)	--	75.41	--	mm	--
	Depth (D)	--	5.9	--	mm	--
Weight		--	52	--	g	Approximate

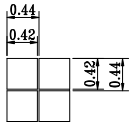
1. Outline Dimensions

Rev.	Description	Date
1.0	First	2019.11.12



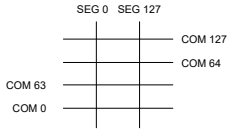






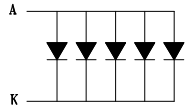
DOTS SCALE 1/10

NO	PIN
1	PS0
2	PS1
3	PS2
4	CSB
5	RST
6	A0
7	RW-WR
8	E-RD
9	DB0
10	DB1
11	DB2
12	DB3
13	DB4
14	DB5
15	DB6
16	DB7
17	VDD
18	VDD
19	VSS
20	VSS
21	VOUT-OUT
22	VOUT-IN
23	V4
24	V3
25	V2
26	V1
27	V0
28	VR
29	INTRS
30	NC



COM & SEG LAYOUT

WHITE LED BACKLIGHT



NOTES:

1. DISPLAY TYPE: 128x128 STN GRAY GRAPHIC LCD
2. POLARIZER: TRANSFLECTIVE
3. VIEWING ANGLE: 6:00
4. OPERATING TEMP: -20°C TO +70°C
   STORAGE TEMPERATURE: -30°C TO +80°C
5. DRIVE METHOD: 1/128 DUTY, 1/12 BIAS,
   VDD 3.0V, VLCD 13.5V
6. LCD IC: ST7528
7. BACKLIGHT: WHITE LED, 45mA, 3.3±0.2V
8. ROHS COMPLIANT.

PS2	PS1	PS0	Interface type
0	0	0	3-Line-SPI MPU interface
0	0	1	8080-series parallel MPU interface
0	1	0	4-Line-SPI MPU interface
0	1	1	6800-series parallel MPU interface
1	0	0	IIC-SPI MPU interface

Model Name: G128ALGSGSW6WTC3XAM		
General Tol: ±0.3		
Approvals	Date	
DWN:		
CHK:		
APP:		

Drawing No.:

Scale:

Size:

Unit: mm

Page: 1/1

2. Input Terminal Pin Assignment

NO.	Symbol	Description	I/O
1~3	PS0~PS2	Microprocessor interface select input pin.	I
4	CSB	Chip select input pin.	I
5	RST	Reset input pin.	I
6	A0	Register select input pin.	I
7	RW-WR	Read / Write execution control pin.	I
8	E-RD	Read / Write execution control pin.	I
9~16	DB0~DB7	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus.	I/O
17	VDD	Power supply for LCM (+3.0V).	P
18	VDD	Power supply for LCM (+3.0V).	P
19	VSS	Ground.	P
20	VSS	Ground.	P
21	VOUT-OUT	If the internal Vout voltage generator is used, the VOUT-IN & VOUT-OUT must be connected together. If an external supply is used, this pin must be left open.	P
22	VOUT-IN	An external Vout supply voltage can be supplied using the VOUT-IN pad. In this case, VOUT-OUT has to be left open, and the internal voltage generator has to be programmed to zero.	P
23~27	V4~V0	LCD driver supply voltages.	I/O
28	VR	V0 voltage adjustment pin.	I
29	INTRS	Internal resistor select pin.	I
30	NC	No connection.	--

I: Input, O: Output, P: Power

3. LCD Optical Characteristics

Item		Symbol	Condition	Min	Typ.	Max	Unit
Contrast Ratio		CR	--	2	5	--	--
Response Time	On	T_{on}	--	--	150	250	ms
	Off	T_{off}		--	200	300	ms
Viewing Angle Ta=25°C	Hor.	Θ_L	Φ=270°, 9H	--	40	--	degree
		Θ_R	Φ=90°, 3H	--	60	--	
	Ver.	Θ_T	Φ=180°, 12H	--	60	--	
		Θ_B	Φ=0°, 6H	--	60	--	

4. Electrical Characteristics

4.1 Absolute Maximum Rating

Characteristics	Symbol	Min	Max	Unit
Power Voltage	VDD-VSS	0.3	3.6	V
Input Voltage	V_{IN}	VSS	VDD	V
Operating Temperature	TOP	-20	+70	°C
Storage Temperature	TST	-30	+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		V0-VSS	Ta =25℃	13.3	13.6	13.9	V
Supply Voltage		VDD	--	2.7	3.0	3.3	V
Input Voltage	H Level	V_{IH}	--	2.2	--	VDD	V
	L Level	V_{IL}	Twice initial value or less	0	--	0.6	V

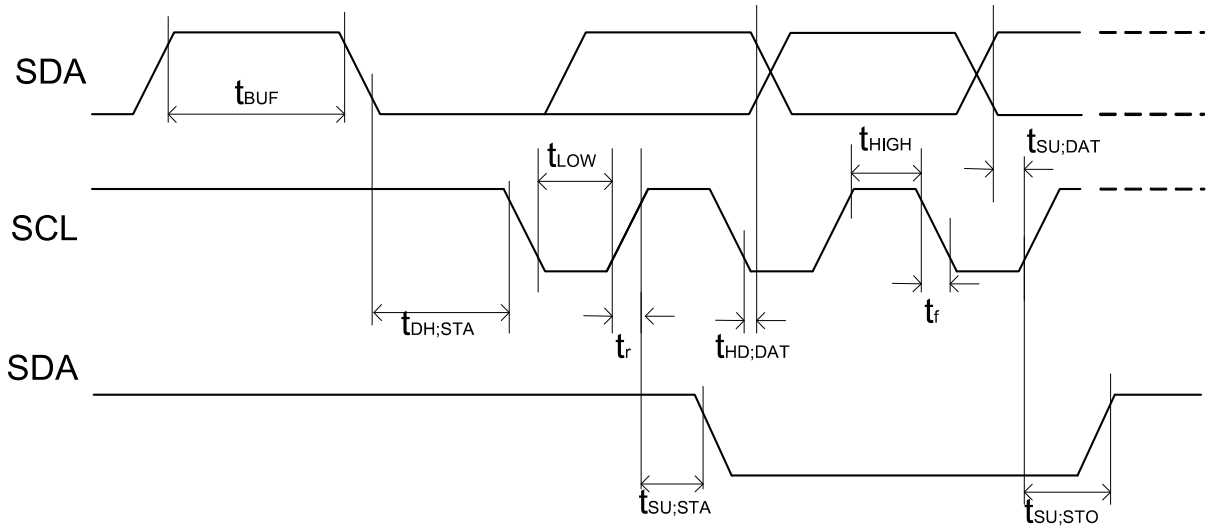
Condition:

1. VDD = 3.0V
2. 1/128 Duty, 1/12 Bias

5. Module Function

5.1 Timing Characteristics

IIC serial interface timing characteristics



(VDD=3.3V, Ta=-30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
SCL clock frequency	SCL	FSCLK		-	400	ns
SCL clock low period		t_{LOW}		1.3	-	ns
SCL clock high period		t_{HIGH}		0.6	-	
Data set-up time	SI	$t_{SU;DAT}$		100	-	
Data hold time		$t_{HD;DAT}$		0	0.9	
SCL,SDA rise time	SCL	t_r		20+0.1Cb	300	
SCL,SDA fall time		t_f		20+0.1Cb	300	
Capacitive load represented by each bus line		Cb		-	400	pF
Setup time for a repeated START condition	SI	$t_{SU;SUA}$		0.6	-	ns
Start condition hold time		$t_{HD;STA}$		0.6	-	
Setup time for STOP condition		$t_{SU;STO}$		0.6	-	
Tolerable spike width on bus		TSW		-	50	
BUS free time between a STOP and START condition	SCL	t_{BUF}		1.3		

5.2 LCM Application

Please see information on pages 82-96 of the data sheet for LCD controller ST7528. The data sheet can be found here: *https://focuslcds.com/wp-content/uploads/Drivers/ST7528.pdf*

5.3 Command Table

Instruction	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
EXT=0 or 1											
Mode Set	0	0	0	0	1	1	1	0	0	0	2-byte instruction to set Mode and FR(Frame frequency control) BE(Booster efficiency control)
	0	0	FR3	FR2	FR1	FR0	0	BE	x'	EXT	
EXT=0											
Read display data	1	1	Read data								Read data into DDRAM
Write display data	1	0	Write data								Write data into DDRAM
Read status	0	1	BUSY	ON	RES	MF2	MF1	MF0	DS1	DS0	Read the internal status
ICON control register ON/OFF	0	0	1	0	1	0	0	0	1	ICON	ICON=0: ICON disable(default) ICON=1: ICON enable & set the page address to 16
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y9	Y8	Y7	Y6	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y5	Y4	Y3	Y2	Set column address LSB
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	release modify-read mode
Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=0: Display OFF D=1: Display ON
Set initial display line register	0	0	0	1	0	0	0	0	x'	x'	2-byte instruction to specify the initial display line to realize vertical scrolling
	0	0	x'	S6	S5	S4	S3	S2	S1	S0	
Set initial COM0 register	0	0	0	1	0	0	0	1	x'	x'	2-byte instruction to specify the initial COM0 to realize window scrolling
	0	0	x'	C6	C5	C4	C3	C2	C1	C0	
Select partial display line	0	0	0	1	0	0	1	0	x'	x'	2-byte instruction to set partial display ratio
	0	0	D7	D6	D5	D4	D3	D2	D1	D0	
Set N-line inversion	0	0	0	1	0	0	1	1	x'	x'	2-byte instruction to set N-line inversion register
	0	0	x'	x'	x'	N4	N3	N2	N1	N0	
Release N-line inversion	0	0	1	1	1	0	0	1	0	0	Release N-line inversion mode
Reverse display ON/OFF	0	0	1	0	1	0	0	1	1	REV	REV=0: normal display REV=1: reverse display
Entire display ON/OFF	0	0	1	0	1	0	0	1	0	EON	EON=0: normal display EON=1: entire display ON

Command Table (Continued)

Instruction	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Ext=0											
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Select DC-DC step-up	0	0	0	1	1	0	0	1	DC1	DC0	Select the step-up of internal voltage converter
Select regulator register	0	0	0	0	1	0	0	R2	R1	R0	Select the internal resistance ratio of the regulator resistor
Select electronic volumn register	0	0	1	0	0	0	0	0	0	1	2-byte instruction to specify the reference voltage
	0	0	x'	x'	EV5	EV4	EV3	EV2	EV1	EV0	
Select LCD bias	0	0	0	1	0	1	0	B2	B1	B0	Select LCD bias
Set Bias Power Save Mode	0	0	1	1	1	1	0	0	1	1	Bias Power save Save the Bias current consumption
	0	0	0	0	0	0	0	0	0	0	
Release Bias Power Save Mode	0	0	1	1	1	1	0	0	1	1	Bias Power save release set the Bias power to normal
	0	0	0	0	0	0	0	1	0	0	
SHL select	0	0	1	1	0	0	SHL	x'	x'	x'	COM bi-directional selection SHL=0: normal direction SHL=1: reverse direction
ADC select	0	0	1	0	1	0	0	0	0	ADC	SEG bi-direction selection ADC=0: normal direction ADC=1: reverse direction
Oscillator on start	0	0	1	0	1	0	1	0	1	1	Start the built-in oscillator
Set power save mode	0	0	1	0	1	0	1	0	0	P	P=0: normal mode P=1: sleep mode
Release power save mode	0	0	1	1	1	0	0	0	0	1	release power save mode
Reset	0	0	1	1	1	0	0	0	1	0	initial the internal function
Set data direction & display data length(DDL)	x'	x'	1	1	1	0	1	0	0	0	2-byte instruction to specify the number of data bytes. (SPI mode)
	x'	x'	D7	D6	D5	D4	D3	D2	D1	D0	
Select FRC and PWM mode	0	0	1	0	0	1	0	FRC	PWM1	PWM0	FRC(1:3FRC, 0:4FRC) PWM1 PWM0 0 0 45PWM 0 1 45 PWM 1 0 60PWM 1 1 ---
NOP	0	0	1	1	1	0	0	0	1	1	*No operation*
Test Instruction	0	0	1	1	1	1	x'	x'	x'	x'	*Don't use this instruction*

Command Table (Continued)

Instruction	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
EXT=1											
Set white mode and 1st frame,	0	0	1	0	0	0	0	0	0	0	Set white mode and 1st frame
set pulse width	0	0	X'	X'	GA05	GA04	GA03	GA02	GA01	GA00	
Set white mode and 2nd frame,	0	0	1	0	0	0	0	0	0	1	Set white mode and 2nd frame
set pulse width	0	0	X'	X'	GA05	GA04	GA03	GA02	GA01	GA00	
Set white mode and 3rd frame,	0	0	1	0	0	0	0	0	1	0	Set white mode and 3rd frame
set pulse width	0	0	X'	X'	GA05	GA04	GA03	GA02	GA01	GA00	
Set white mode and 4th frame,	0	0	1	0	0	0	0	0	1	1	Set white mode and 4th frame
set pulse width	0	0	X'	X'	GA05	GA04	GA03	GA02	GA01	GA00	
Set gray level 1 mode	0	0	84H~87H (4 bytes)								Set gray level1
Set gray level 2 mode	0	0	88H~8BH (4 bytes)								Set gray level2
Set gray level 3 mode	0	0	8CH~8FH (4bytes)								Set gray level3
Set gray level 4 mode	0	0	90H~93H (4bytes)								Set gray level4
Set gray level 5 mode	0	0	94H~97H (4bytes)								Set gray level5
Set gray level 6 mode	0	0	98H~9BH (4 bytes)								Set gray level6
Set gray level 7 mode	0	0	9CH~9FH (4 bytes)								Set gray level7
Set gray level 8 mode	0	0	A0H~A3H (4 bytes)								Set gray level8
Set gray level 9 mode	0	0	A4H~A7H (4 bytes)								Set gray level9
Set gray level 10 mode	0	0	A8H~ABH (4 bytes)								Set gray level10
Set gray level 11mode	0	0	ACH~AFH (4 bytes)								Set gray level11
Set gray level 12 mode	0	0	B0H~B3H (4 bytes)								Set gray level12
Set gray level 13 mode	0	0	B4H~B7H (4 bytes)								Set gray level13
Set gray level 14 mode	0	0	B8H~BBH (4 bytes)								Set gray level14
Set Dark mode and 1st frame,	0	0	1	0	1	1	1	1	0	0	Set Dark mode and 1st frame, set pulse width
set pulse width	0	0	X'	X'	GAF5	GAF4	GAF3	GAF2	GAF1	GAF0	
Set Dark mode and 2nd frame,	0	0	1	0	1	1	1	1	0	1	Set Dark mode and 2nd frame, set pulse width
set pulse width	0	0	X'	X'	GAF5	GAF4	GAF3	GAF2	GAF1	GAF0	
Set Dark mode and 3rd frame,	0	0	1	0	1	1	1	1	1	0	Set Dark mode and 3rd frame, set pulse width
set pulse width	0	0	X'	X'	GAF5	GAF4	GAF3	GAF2	GAF1	GAF0	
Set Dark mode and 4th frame,	0	0	1	0	1	1	1	1	1	1	Set Dark mode and 4th frame, set pulse width
set pulse width	0	0	X'	X'	GAF5	GAF4	GAF3	GAF2	GAF1	GAF0	

5.4 Initialization Code

Please see information on our website for the initialization code for G128ALGSGSW6WTC3XAM.

This information can be found here: *https://focuslcds.com/wp-content/uploads/Code/G128ALGSGSW6WTC3XAM-SPI-CODE.txt*

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.