

**DM-COG12864-707**  
**12864 COG GRAPHIC LCD WITH**  
**4-WIRE SPI MPU INTERFACE**

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## 1 Revision History

Date	Changes
2015-03-13	First release

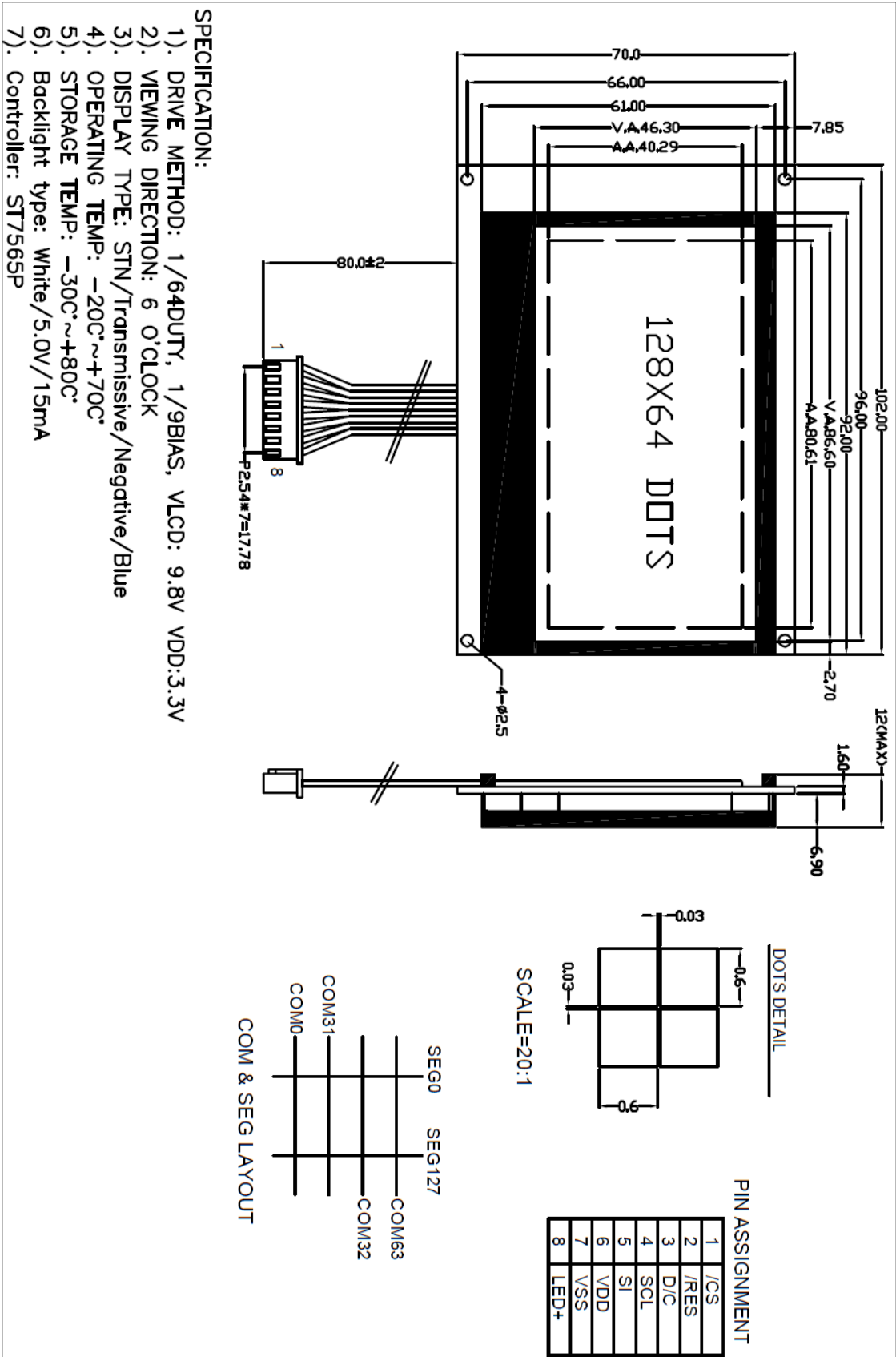
## 2 Main Features

Item	Specification	Unit
Resolution	128 x 64	pixel
Display Mode	STN Blue, Transmissive	-
Controller IC	ST7565P	-
Interface	4-WIRE SPI	
Power Supply	3.3V	V
View Direction	6:00	-
Duty	1/64 duty, 1/9 bias	
Backlight	White LED	-
Weight	84.7	g

### 3 Pin Description

Pin No.	Symbol	Function Description
1	/CS1	Used to enter chip select signal
2	/RESET	Controller reset (module reset)
3	D/C	Register select signal
4	SCL	Serial clock input
5	SI	Serial data input
6	VDD	Power supply for logic (+3.3V)
7	VSS	Power supply for LCM (GND)
8	LED+	Power supply for BKL (+3.3V)

## 4 Mechanical Drawing



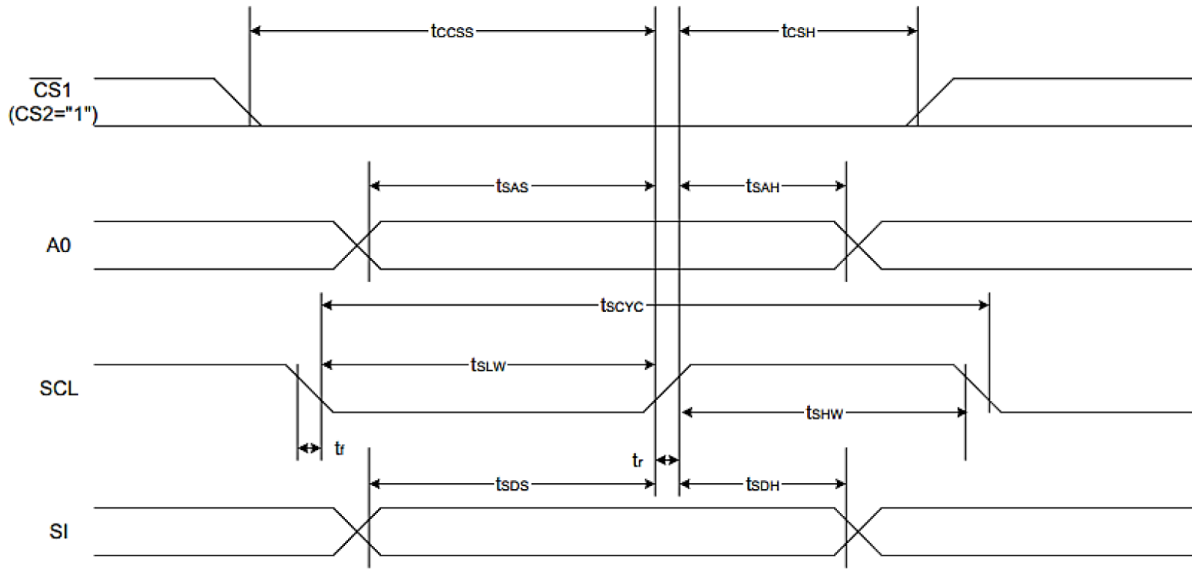
## 5 Electrical Characteristics

Item	Symbol	Condition	Min	Typ.	Max	Unit
Supply Voltage For Logic	VDD		2.4	3.3	3.3	V
Supply Current	IDD	-	-		147	uA
Low Level Input Voltage	V <sub>IL</sub>		0	-	0.6	V
High Level Input Voltage	V <sub>IH</sub>		2.2	-	VDD	V
Low Level Output Voltage	V <sub>OL</sub>		-		0.4	V
High Level Output Voltage	V <sub>OH</sub>		2.4		-	V
Backlight Forward Voltage	V <sub>LED</sub>			3.3		V
Backlight Forward Current	I <sub>LED</sub>			15		mA
Operating Temperature	TOP	Absolute Max	-20		70	°C
Storage Temperature	TST	Absolute Max	-30		80	°C

## 6 Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit
View Angle-Vertical	AV	-60		35	°
View Angles-Horizontal	AH	-40		40	°
Response Time (25°C)	Tr + Tf		300	500	us
Contrast Ratio	CR		6		
Luminance	L <sub>v</sub>				cd/m <sup>2</sup>

## 7 Timing Characteristics

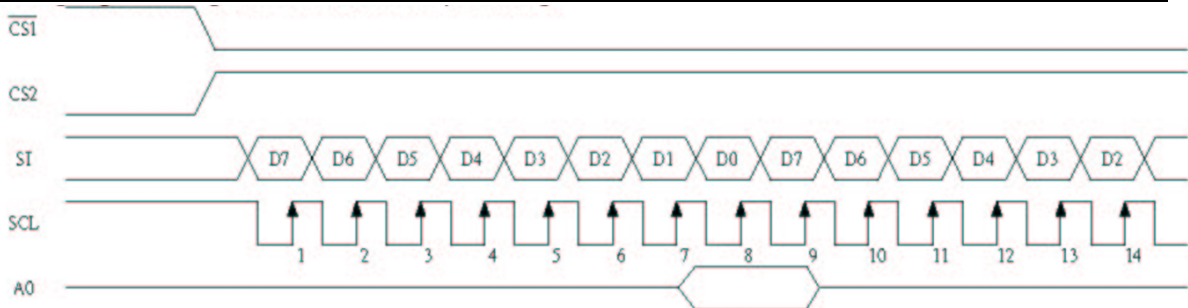


VDD=3.3V, Ta=-30 to 85°C

Symbol	Item	Min	Typ	Max	Unit
$t_{SCYC}$	Serial Clock Period	50	-	-	ns
$t_{SHW}$	SCL "H" pulse width	25	-	-	ns
$t_{SLW}$	SCL "L" pulse width	25	-	-	ns
$t_{SAS}$	Address setup time	20	-	-	ns
$t_{SAH}$	Address hold time	10	-	-	ns
$t_{SDS}$	Data setup time	20	-	-	ns
$t_{SDH}$	Data hold time	10	-	-	ns
$t_{CSS}$	CS-SCL time	20	-	-	ns
$t_{CSH}$	CS-SCL time	40	-	-	ns

VDD=2.7V, Ta=-30 to 85°C

Symbol	Item	Min	Typ	Max	Unit
$t_{SCYC}$	Serial Clock Period	100	-	-	ns
$t_{SHW}$	SCL "H" pulse width	50	-	-	ns
$t_{SLW}$	SCL "L" pulse width	50	-	-	ns
$t_{SAS}$	Address setup time	30	-	-	ns
$t_{SAH}$	Address hold time	20	-	-	ns
$t_{SDS}$	Data setup time	30	-	-	ns
$t_{SDH}$	Data hold time	20	-	-	ns
$t_{CSS}$	CS-SCL time	30	-	-	ns
$t_{CSH}$	CS-SCL time	60	-	-	ns



## 8 Table of Commands

Command	Command Code									Function			
	A0	/RD	/WR	D7	D6	D5	D4	D3	D2		D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address					0	Sets the display RAM display start line address	
(3) Page address set	0	1	0	1	0	1	Page address				0	Sets the display RAM page address	
(4) Column address set upper bit Column address set lower bit	0	1	0	0	0	0	1	Most significant column address			0	Sets the most significant 4 bits of the display RAM column address.	
				0	0	0	0	Least significant column address			0	Sets the least significant 4 bits of the display RAM column address.	
(5) Status read	0	0	1	Status			0	0	0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data							0	Writes to the display RAM	
(7) Display data read	1	0	1	Read data							0	Reads from the display RAM	
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	0	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	1	Sets the LCD display normal/ reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	1	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565R)
(12) Read-modify-write	0	1	0	1	1	1	0	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			0	Select internal power supply operating mode
(17) V <sub>0</sub> voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			0	Select internal resistor ratio(Rb/Ra) mode
(18) Electronic volume mode set Electronic volume register set	0	1	0	1	0	0	0	0	0	0	0	1	Set the V <sub>0</sub> output voltage electronic volume register
				0	0	Electronic volume value					0		
(19) Sleep mode set	0	1	0	1	0	1	0	1	1	0	0	1	0: Sleep mode, 1: Normal mode
				*	*	*	*	*	*	*	0	0	
(20) Booster ratio set	0	1	0	1	1	1	1	1	1	0	0	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
				0	0	0	0	0	0	0	0	0	step-up value
(21) NOP	0	1	0	1	1	1	0	0	0	0	1	1	Command for non-operation
(22) Test	0	1	0	1	1	1	1	*	*	*	*	*	Command for IC test. Do not use this command

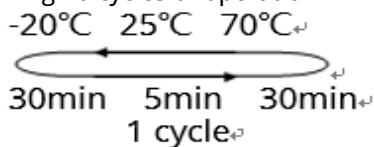
## 9 Driver/Controller Information

Built-in ST7565P Controller

<https://drive.google.com/file/d/0Bxu0OURUiyL5T0tzaGYxNGFtaVE/view?usp=sharing>



## 10 Reliability

Test Item	Content of Test	Test Condition	Note
High Temperature Storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max, for 96hrs under no-load condition excluding the polarizer. Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation 	-20°C/70°C 10 cycles	-
Vibration Test	Endurance test applying the vibration during transportation and using	Total fixed amplitude: 15mm; Vibration: 10~55Hz; One cycle 60 seconds to 3 directions of X, Y, Z, for each 16 minutes.	3
Static Electricity Test	Endurance test apply the electric stress to the terminal.	VS=800V, RS=1.5kΩ, CS=100pF, 1 time.	-

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal. Temperature and humidity after remove from the rest chamber.

Note3: Test performed on product itself, not inside a container.

## 11 Warranty and Conditions

<http://www.displaymodule.com/pages/faq>