DisplayModule

DM-COG12865-709

12865 COG GRAPHIC LCD WITH 6800 MPU INTERFACE

Contents

1 Revision History

Date	Changes
2015-03-13	First release

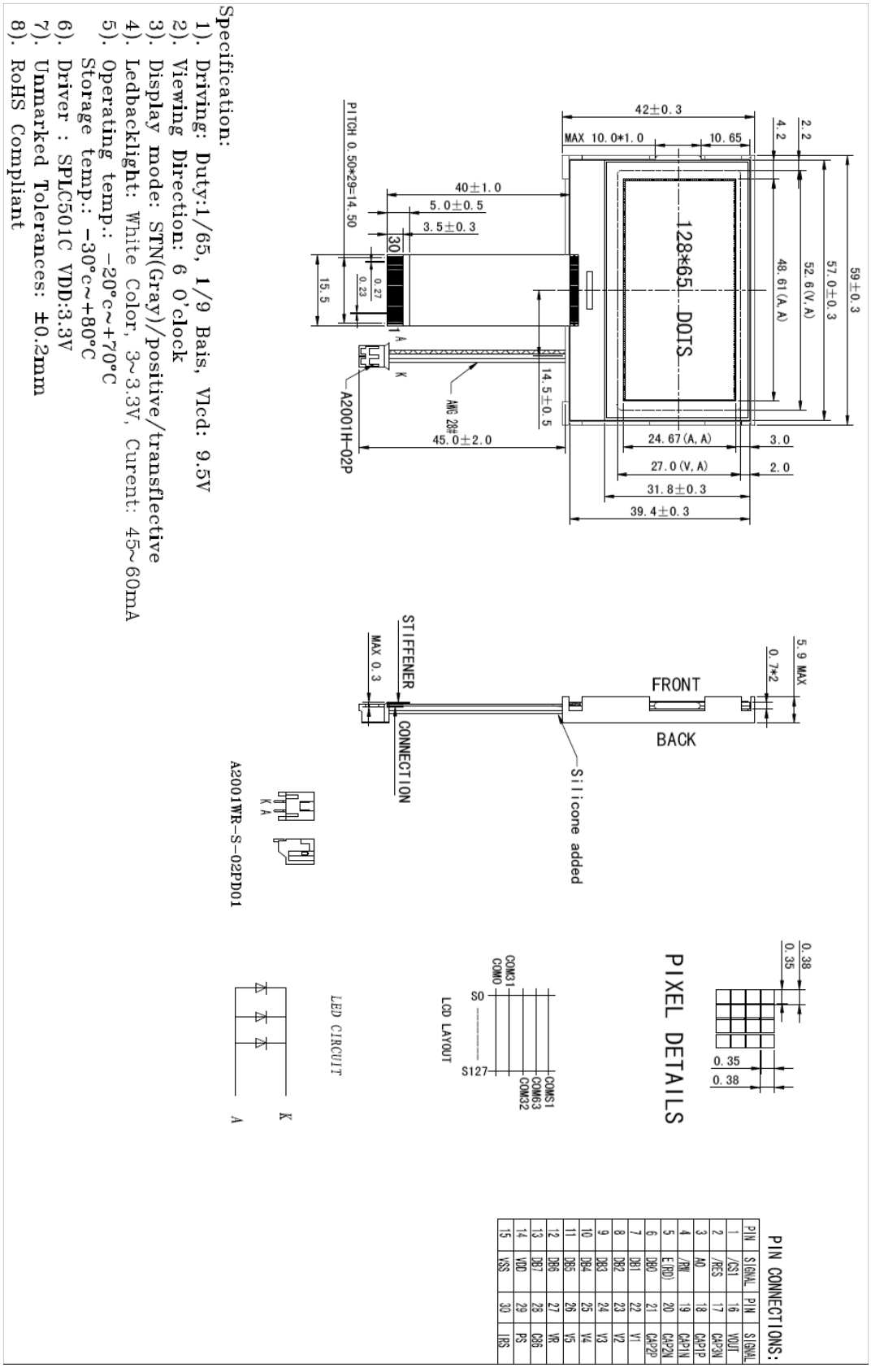
2 Main Features

Item	Specification	Unit
Resolution	128 x 65	pixel
Display Mode	STN Gray, Transflective	-
Controller IC	SPLC501C	-
Interface	68 MPU Interface	
Power Supply	3.0V	V
View Direction	6:00	-
Duty	1/65 duty, 1/9 bias	
Backlight	Edge White LED	-
Weight	16.7	g

3 Pin Description

Pin No.	Symbol	Function Description
1	/CS1	Chip select in serial interface low active
2	/RES	External reset PIN. Must be fixed to VDD low active
3	A0	Select registers. 0: instruction; 1: data register
4	/WR	Read select signal
5	/RD	write select signal
6~13	DB0~DB7	This is an 8-bit-directional data bus
14	VDD	VDD Shared with MPU power supply terminal VCC
15	VSS	0V terminal connected to the system GND
16	VOUT	DC/DC voltage converter. A capacitor is connected between this terminal and VSS
17	CAP3-	DC/DC voltage converter
18	CAP1+	DC/DC voltage converter
19	CAP1-	DC/DC voltage converter
20	CAP2-	DC/DC voltage converter
21	CAP2+	DC/DC voltage converter
22~26	V1~V5	A multi-level power supply for the liquid crystal drive
27	VR	Output voltage regulator terminal
28	C86	This is the MPU interface switch terminal
29	PS	This is the parallel data input/serial data input switch terminal
30	/IRS	The parallel data input/serial data input switch terminal

4 Mechanical Drawing



PIN	SIGNAL	PIN	SIGNAL
1	/CS1	16	VOUT
2	/RES	17	C4P3N
3	A0	18	C4P1P
4	/RW	19	C4P1N
5	E(RD)	20	C4P2N
6	DB0	21	C4P2P
7	DB1	22	V1
8	DB2	23	V2
9	DB3	24	V3
10	DB4	25	V4
11	DB5	26	V5
12	DB6	27	VR
13	DB7	28	C86
14	VDD	29	PS
15	VSS	30	IRS

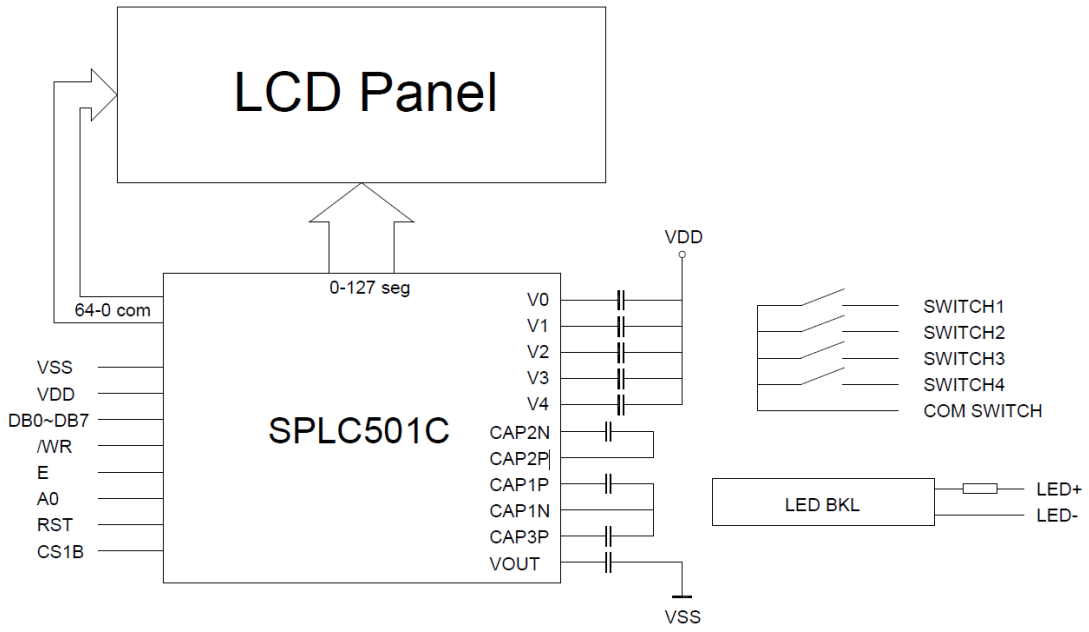
5 Electrical Characteristics

Item	Symbol	Condition	Min	Typ.	Max	Unit
Supply Voltage For Logic	VDD		3.0	3.3	3.5	V
Supply Current	IDD	-	-	0.25	0.45	mA
Low Level Input Voltage	V_{IL}		0	-	0.6	V
High Level Input Voltage	V_{IH}		2.2	-	VDD	V
Low Level Output Voltage	V_{OL}		-		0.4	V
High Level Output Voltage	V_{OH}		2.4		-	V
Backlight Forward Voltage	V_{LED}			3.0		V
Backlight Forward Current	I_{LED}			60	75	mA
Operating Temperature	TOP	Absolute Max	-20		70	°C
Storage Temperature	TST	Absolute Max	-30		80	°C

6 Optical Characteristics

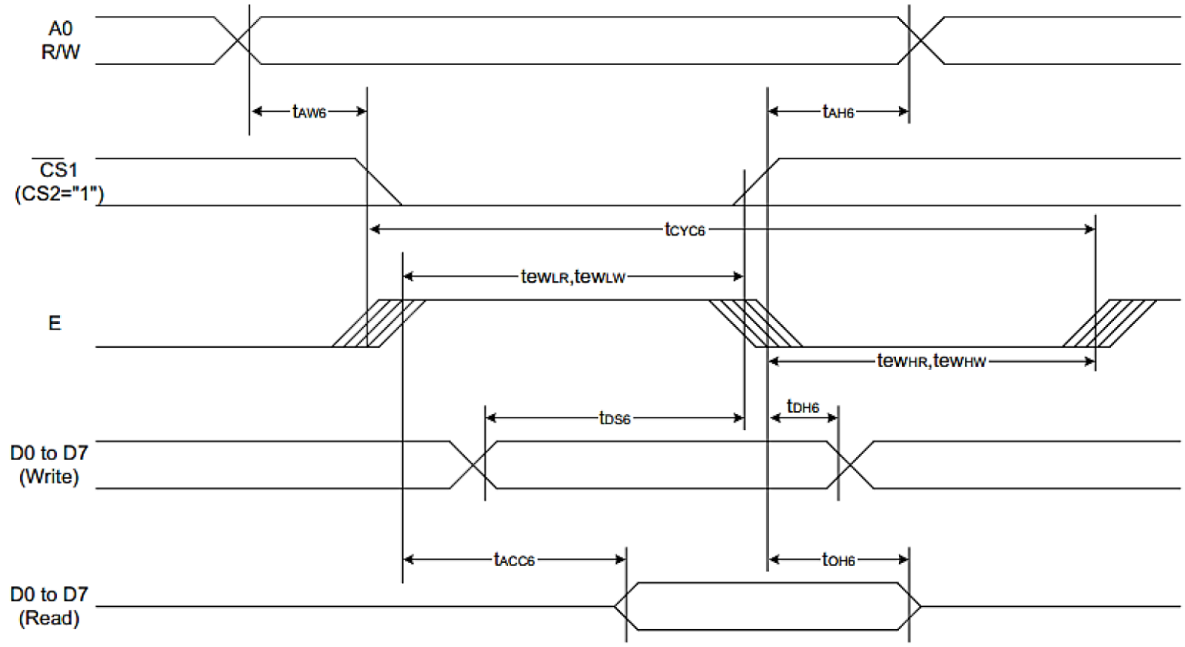
Item	Symbol	Min	Typ	Max	Unit
View Angle-Top -- Bottom	AV		70		°
View Angle-Left -- Right	AH		60		°
Response Time (25°C)	Tr + Tf		350	550	us
Contrast Ratio	CR	3	5		
Luminance	L_V				cd/m²

7 Block diagram



8 Timing Characteristics

8.1 System Bus Read/Write Characteristics (For the 6800 Series MPU)



Symbol	Item	Min	Typ	Max	Unit
t_{AH6}	Address hold time	0	-	-	ns
t_{AW6}	Address setup time	0			ns
t_{CYC6}	System cycle time	240	-	-	ns
t_{CCLW}	Enable Low pulse width (WRITE)	80	-	-	ns
t_{CCHW}	Enable High pulse width (WRITE)	80	-	-	ns
t_{CCLR}	Enable Low pulse width (READ)	80	-	-	ns
t_{CCHR}	Enable High pulse width (READ)	140	-	-	ns
t_{DS6}	Write Data setup time	40		-	ns
t_{DH6}	Write Address hold time	0		-	ns
t_{ACC6}	Read access time	-		70	ns
t_{OH6}	Read Output disable time	5		50	ns

9 Table of Commands

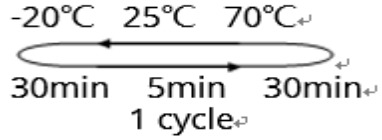
Command	Command Code											Function
	AOP /WR		/RD	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	LCD display ON/OFF 0: OFF, 1: ON
2) Display start line set	0	1	0	0	1	Display start address						Set the display RAM display start line address
3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address
Column address set Lower bit	0	1	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address
5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
6) Display data write	1	1	0	Write data								Writes the status RAM
7) Display data read	1	0	1	Read data								Reads from the display RAM
8) ADC select	0	1	0	1	0	1	0	0	0	0	1	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	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	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	1	Sets the LCD driver voltage bias ratio SPLC501C.....0: 1/9, 1: 1/7
12) Read/modify/write	0	1	0	1	1	1	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	Clear read/modify/write
14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
15) Common output mode select	0	1	0	1	1	0	0	0 1	*	*	*	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			Select internal power supply operating mode
17) V5 voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio (Rb/Ra) mode
18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1	Set the V5 output voltage electronic volume register
Electronic volume register set	0	1	0	*	*	Electronic volume value						
19) Static indicator ON/OFF				1	0	1	0	1	1	0	0 1	0: OFF, 1: ON
Static indicator Register set				*	*	*	*	*	*	Mode		Set the flashing mode
20) Page Blink Page selection	0 0	1 1	0 0	1 P7	1 P6	0 P5	1 P4	0 P3	1 P2	0 P1	1 P0	P7-0: 1 – blinking page 0 – no blinking, normal display
21) Driving Mode set Mode selection	0 0	1 1	0 0	1 D1	1 D0	0 0	1 0	0 0	0 0	1 0	0 0	Set the driving mode register Driving capability (D1, D0): (1,1)>(0,0)>(0,1)>(1,0)
22) Power saver												Display OFF and display all points ON compound command

10 Driver/Controller Information

Built-in SPLC501C Controller

https://drive.google.com/file/d/0B0U8oRNrY9XubjU3aEpYVEtja0k/view?usp=sharing

11 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.

12 Warranty and Conditions

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