Specification of LCD Module

Product No: ZX12864SPIDA-6532A

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1.GENERAL DESCRIPTION

The ZX12864SPIDA-6532A is a 128X64 DOTS MATRIX LCD module which is fabricated by low power COMS technology. It has an FSTN panel composed of 128 segments and 64 commons. The LCM can be easily accessed by microcontroller via 8bit parallel interface.

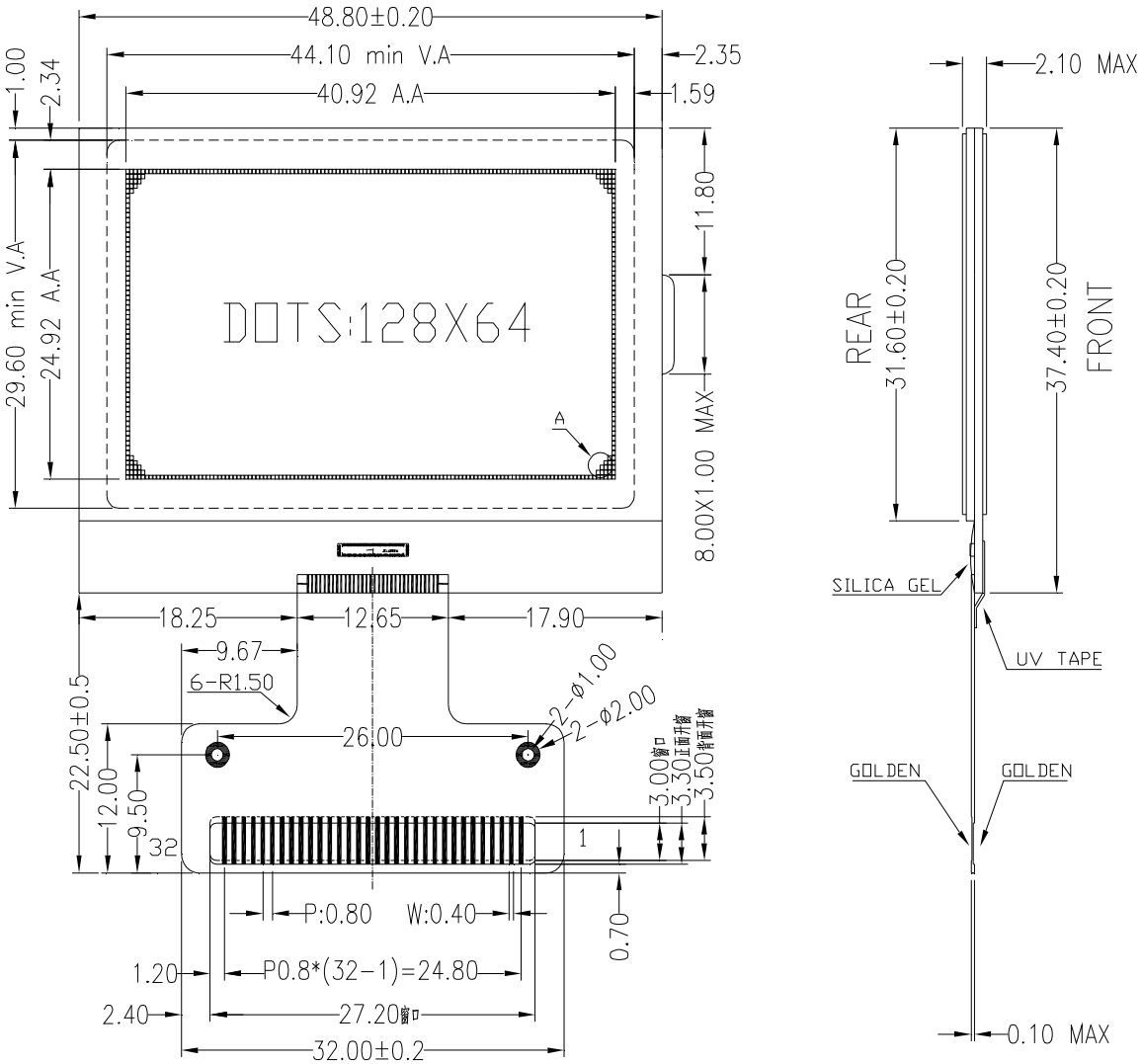
2.FEATURES

Display Model	TRANSFLECTIVE and POSITIVE type
	FSTN Mode LCD
Display Format	128X64 DOTS MATRIX
Input Data	Parallel data input from MPU
Multiplexing Ration	1/65 Duty , 1/9Bias
Viewing Direction	6 O'clock
DRIVER	ST7565R

3.MECHANICAL SPECIFICATION

Item	Specifications	Unit
Module Size(W*H*T)	48.8X（37.4+22.5）X2.1MAX	mm
Viewing Area (W*H)	44.1X29.6	mm
Dot Pitch (W*H)	0.32X0.39	mm
Dot Size (W*H)	0.28X0.35	mm
Active Area (W*H)	40.92X24.92	mm
N b f Dots	128X64	

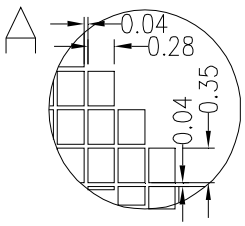
4.MECHANICAL DIMENSION



莫块接口定义:

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DESC	IRS	/HPM	PSB	C86	VR	V0	V1	V2	V3	V4	CAP4+	CAP2-	CAP2+	CAP1+	CAP1-	CAP3+
PIN	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
DESC	VOUT	VSS	VDD	D7	D6	D5	D4	D3	D2	D1	D0	R/D	WR	A0	/RES	/CS

DISPLAY TYPE: FSTN/POSITIVE
POLARIZER: TRANSFLECTIVE
VIEWING DIRECTION: 6:00-CLOCK
DRIVE METHOD: 1/65DUTY,1/9BIAS
LCM OPERATING VOLTAGE: 3.0v
LCD OPERATING VOLTAGE: 8.6 TO 9.0v(MAX)
OPERATING TEMP: -20 TO 70 Deg.C
STORAGE TEMP: -30 TO 80 Deg.C
UNSIGNED TOLERANCE: ±0.20



5. PIN DESCRIPTIONS

PIN	SYMBOL	I/O	FUCTION
1	IRS	-	This terminal selects the resistors for the V0 voltage level adjustment.
2	/HPM	-	This is the power control terminal for the power supply circuit for liquid crystal drive.
3	PSB	-	This pin configures the interface to be parallel mode or serial mode.
4	C86	-	This is the MPU interface selection pin. C86 = "H" : 6800 Series MPU interface. C86 = "L" : 8080 Series MPU interface.
5	VR	-	Output voltage regulator terminal.
6	V0	-	This is a multi-level power supply for the liquid crystal drive.
7	V1		
8	V2		
9	V3		
10	V4		
11	CAP4+	-	DC/DC voltage converter.
12	CAP2-		
13	CAP2+		
14	CAP1+		
15	CAP1-		
16	CAP3+		
17	VOUT		
18	VSS	-	Ground
19	VDD	-	Power supply
20	D7	I/O	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus.
21	D6		
22	D5		
23	D4		
24	D3		
25	D2		
26	D1		
27	D0		

28	R/D	I/O	When connected to 8080 series MPU, this pin is treated as the “/RD” signal of the 8080MPU and is LOW-active. The data bus is in an output status when this signal is “L”. When connected to 6800 series MPU, this pin is treated as the “E” signal of the 6800MPU and is HIGH-active. This is the enable clock input terminal of the 6800 Series MPU. 8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus.
29	WR	I/O	When connected to 8080 series MPU, this pin is treated as the “/WR” signal of the 8080MPU and is LOW-active.The signals on the data bus are latched at the rising edge of the /WR signal.When connected to 6800 series MPU, this pin is treated as the “R/W” signal of the 6800MPU and decides the access type :When R/W = “H” : Read.When R/W = “L” : Write
30	A0	I/O	are display data 7tod 0s that Detacidni” H “=0When A are control data 7tod 0D taht setacidni” L “=0When A
31	/RES	I/O	When /RES is set to “L” the seting are intialized
32	/CS	I/O	The chip select singal

6. MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit
Supply Voltage	VDD	-0.3	3.6	V
	Vout	-0.3	13.5	V
Input Voltage	Vin	VSS-0.3	VDD+0.3	V
Operating temperature	Topr	-10	60	℃
Storage temperature	Tstr	-20	70	℃

7. ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ.	Max.	Unit
Supply Voltage	Logic	V_{DD}-GND	-	3.0	-	V

Input cotage	H level	V_{DD}	-	$0.8V_{DD}$	-	V_{DD}	V
	L level	V_{IH}		V_{SS}	-	$0.2V_{DD}$	
LCD Driving Voltage		V_{LCD}		-	8.4	-	V

Note1. The value is measure at following condition; follow same condition to test sample and mass product.

(a)VDD=3.0V

(b)1/65Duty ,1/9 Bias

8. MODULE FUNCTION DESCRIPTION

Timing Characteristics

System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)

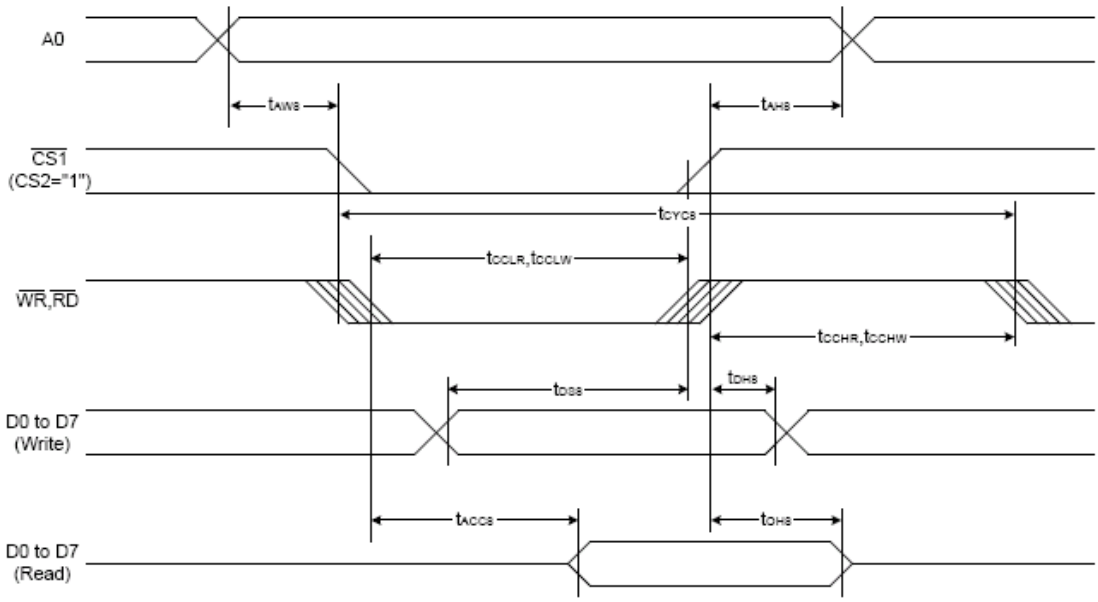


Figure 37

Table 24

(V_{DD} = 3.3V, Ta = –30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH8}		0	—	Ns
Address setup time		t_{AW8}		0	—	
System cycle time		t_{CYC8}		240	—	
Enable L pulse width (WRITE)	WR	t_{CCLW}		80	—	
Enable H pulse width (WRITE)		t_{CCHW}		80	—	
Enable L pulse width (READ)	RD	t_{CCLR}		140	—	
Enable H pulse width (READ)		t_{CCHR}		80		
WRITE Data setup time	D0 to D7	t_{DS8}		40	—	
WRITE Address hold time		t_{DH8}		0	—	
READ access time		t_{ACC8}	C_L = 100 pF	—	70	
READ Output disable time		t_{OH8}	C_L = 100 pF	5	50	

System Bus Read/Write Characteristics 2 (For the 6800 Series MPU)

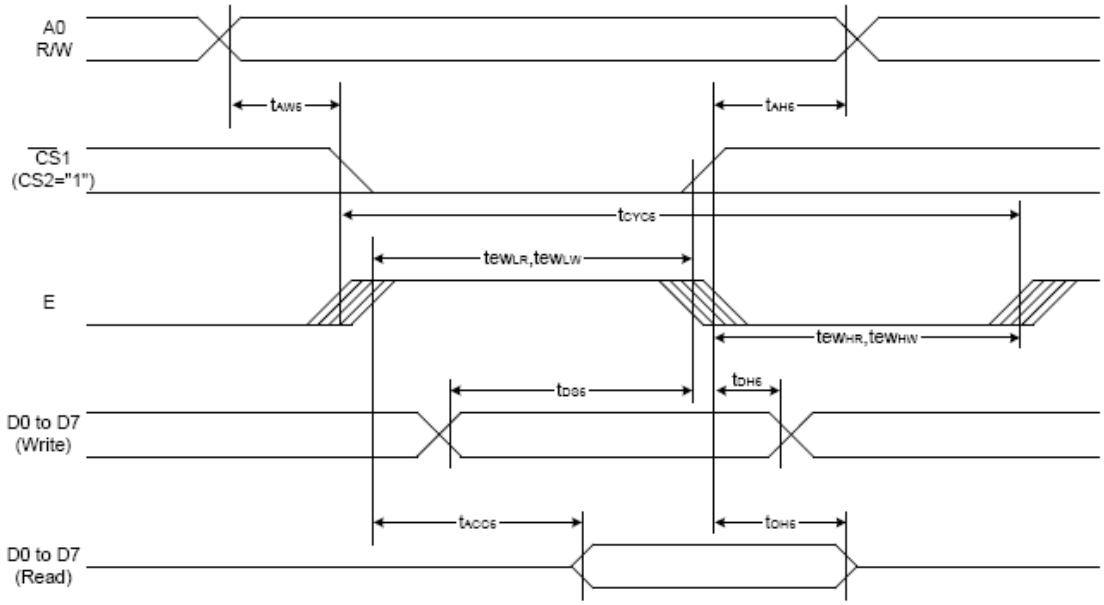


Figure 38

Table 27

(V_{DD} = 3.3V, Ta = –30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH6}		0	—	ns
Address setup time		t_{AW6}		0	—	
System cycle time		t_{CYC6}		240	—	
Enable L pulse width (WRITE)	WR	t_{EWLW}		80	—	
Enable H pulse width (WRITE)		t_{EWHW}		80	—	
Enable L pulse width (READ)	RD	t_{EWLR}		80	—	
Enable H pulse width (READ)		t_{EWHR}		140		
WRITE Data setup time	D0 to D7	t_{DS6}		40	—	
WRITE Address hold time		t_{DH6}		0	—	
READ access time		t_{ACC6}	C_L = 100 pF	—	70	
READ Output disable time		t_{OH6}	C_L = 100 pF	5	50	

The 4-line SPI Interface

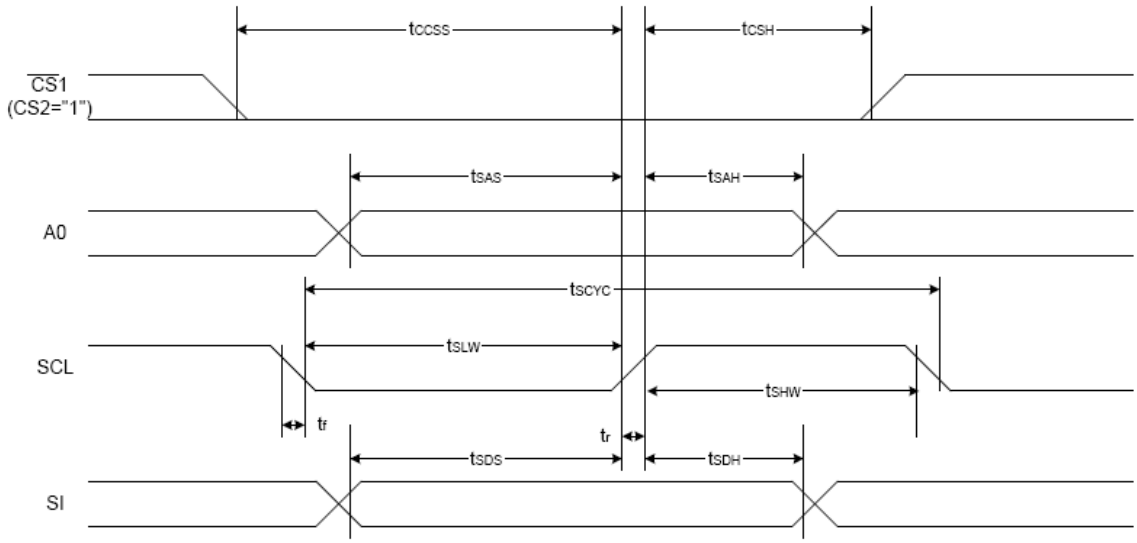


Figure 39

Table 30

(VDD = 3.3V,Ta = –30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
4-line SPI Clock Period	SCL	Tscyc		50	—	ns
SCL “H” pulse width		Tshw		25	—	
SCL “L” pulse width		TSLW		25	—	
Address setup time	A0	TSAS		20	—	
Address hold time		Tsah		10	—	
Data setup time	SI	Tsds		20	—	
Data hold time		TSDH		10	—	
CS-SCL time	CS	Tcss		20	—	
CS-SCL time		Tcsh		40	—	

2. APPLICATION OF LCM

not using internal regulator resistors

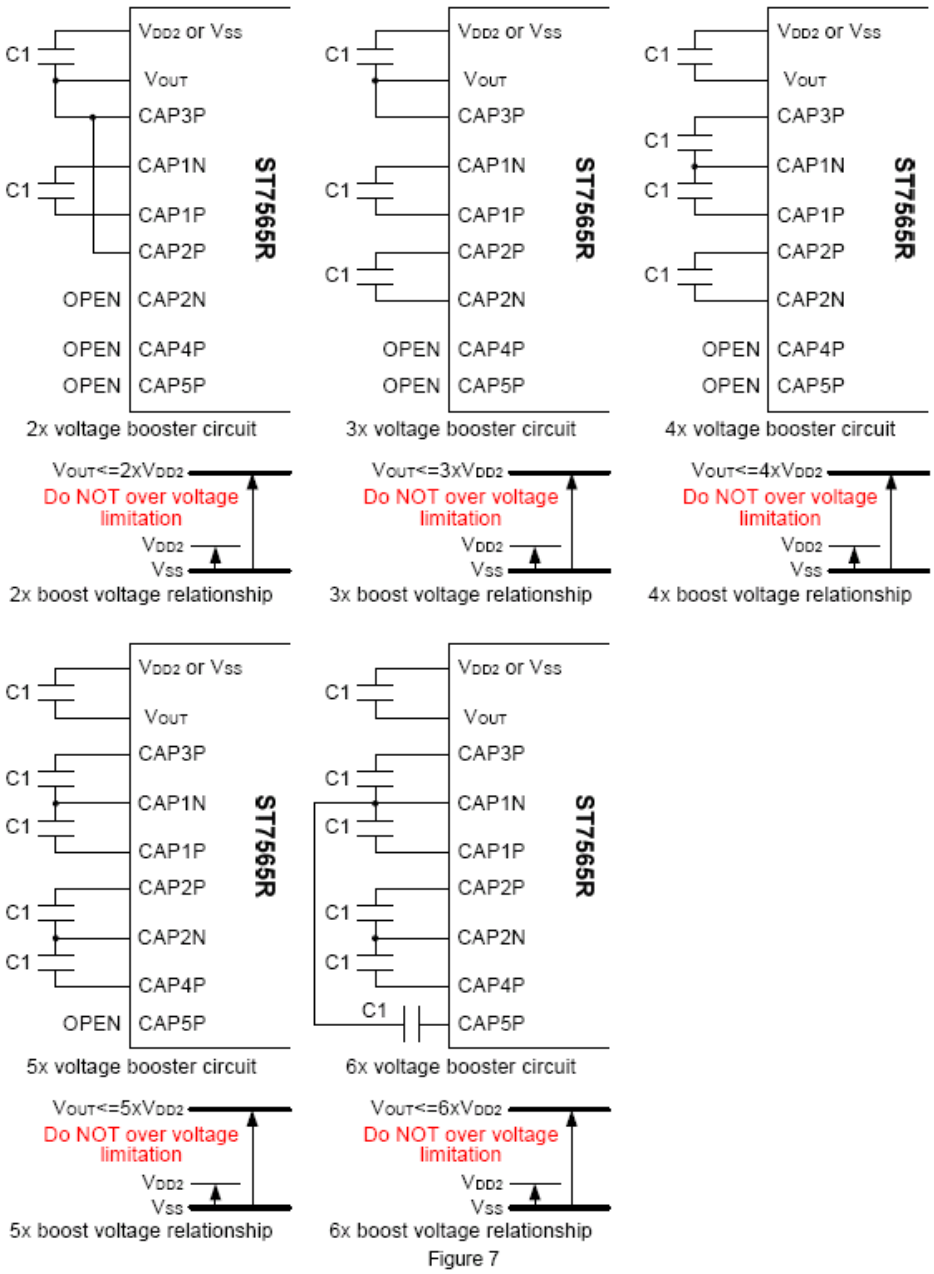


Figure 7

* The V_{DD2} voltage range must be set so that the V_{OUT} terminal voltage does not exceed the absolute maximum rated value.
* The maximum voltage of the booster capacitor terminals are :
  V_{MAX}: CAP5P > CAP4P > CAP3P > CAP2P > CAP1P > CAP2N = CAP1N.

3 . COMMAND TABLE

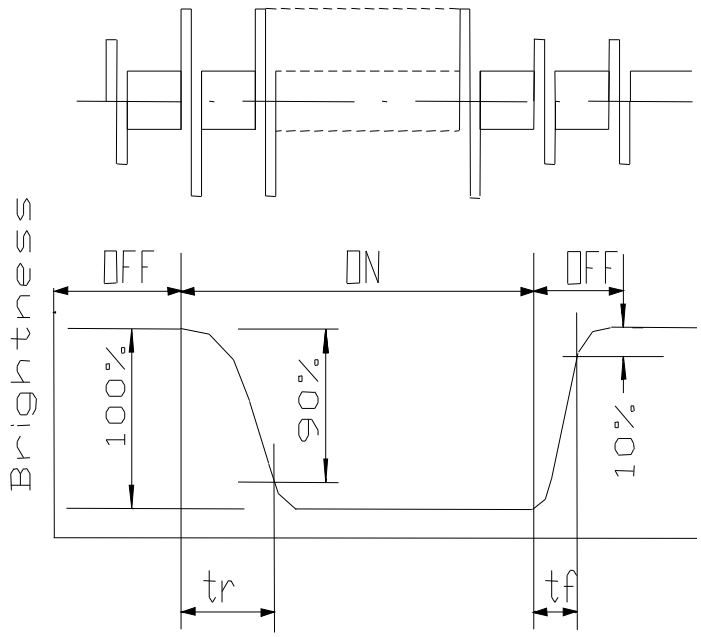
Command	Command Code										Function
	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0 1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address						Sets the display RAM display start line address
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit Column address set lower bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address. Sets the least significant 4 bits of the display RAM column address.
				0	0	0	0	Least significant 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 to the display 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	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	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	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) V_0 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 Electronic volume register set	0	1	0	1	0	0	0	0	0	0	1	Set the V_0 output voltage electronic volume register
				0	0	Electronic volume value						
(19) Static indicator ON/OFF Static indicator register set	0	1	0	1	0	1	0	1	1	0	0 1	0: OFF, 1: ON Set the flashing mode
				0	0	0	0	0	0	0	Mode	
(20) Booster ratio set	0	1	0	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	step-up value		
(21) Power save	0	1	0									Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(23) Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command

9. Electro-Optical Characteristics

(1).FSTN Type

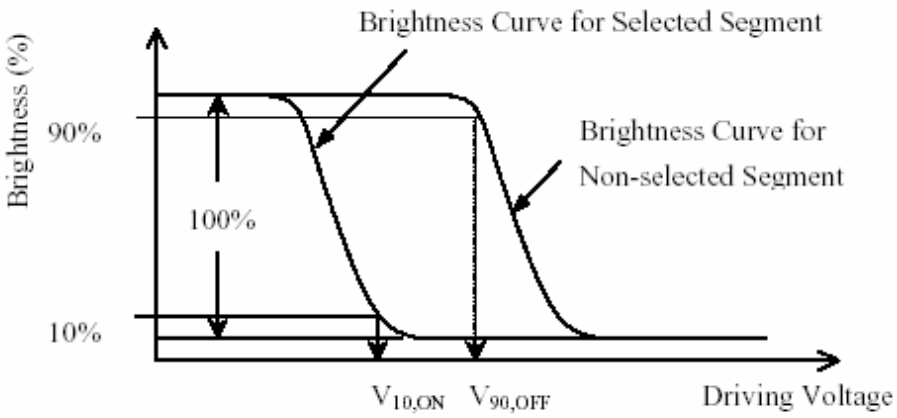
Item	Symbol	Condition	Min	Typ	Max	Units
Contrast	K	u=0° F=0°	5 ： 1	—	—	deg.
Viewing Angle	u	K=5 F=0°	u_2 2 u_1=30	—	—	deg.
		K=5 u=10°	F= 6 30	—	—	deg.
Response time	T_{on}	258C	—	—	250	ms
	T_{off}	258C	—	—	250	ms

(2). Definition of Optical Response Time



(3). Definition of Driving Voltage (Vlcd)

$$Vlcd=(V_{10,ON}+V_{90,OFF})/2$$



(4). Definition of Viewing Angle θ and Φ