SPECIFICATIONS FOR LCD MODULE

MODEL NO.
BL128128C series
VER.01

OR MESSRS:

_____

ON DATE OF:

_____

APPROVED BY:

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BOLYMIN, INC.
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History of Version

Version	Contents	Date	Note
01	NEW VERSION	2006/09/27	SPEC.

C O N T E N T S

1. Numbering System

	B	L	128128	C	-	-	-	-	-	xxx
	0	1	2	3	4	5	6	7	8	9

0	Brand	Bolymin	
1	Module Type	C= character type G= graphic type P= TAB/TCP type	O= COG type F= COF type L=PLED/OLED
2	Format	2002=20 characters, 2 lines 12232= 122 x 32 dots	
3	Version No.	A type	
4	LCD Color	G=STN/gray Y=STN/yellow-green PLED/yellow-green C=color STN,OLED/RGB	B=STN/blue,OLED/blue F=FSTN T=TN D=OLED/blue+yellow A=OLED/blue+yellow+green
5	LCD Type	R=positive/reflective P=positive/transflective	M=positive/transmissive N=negative/transmissive
6	Backlight type/color	L=LED array/ yellow-green H=LED edge/white R=LED array/red G=LED edge/yellow-green F=RGB array I=RGB edge Q=LED edge/red N=No backlight	D=LED edge/blue E=EL/white B=EL/blue C=CCFL/white Y=LED Bottom/yellow O=LED array/orange K=LED edge/green A=LED edge/amber
7	CGRAM Font (applied only on character type)	J=English/Japanese Font E=English/European Font G=Chinese(simple) F=Chinese(traditional)	C=English/Cyrillic Font H=English/Hebrew Font A=English/Arabic Font
8	View Angle/ Operating Temperature	B=Bottom/Normal Temperature H=Bottom/Wide Temperature U=Bottom/Ultra wide Temperature	T=Top/Normal Temperature W=Top/Wide Temperature C=9H/Normal Temperature E=Top/ultra wide temperature
9	Special Code	3=3 volt logic power supply n=negative voltage for LCD c=cable/connector xxx=to be assigned on datasheet	t=temperature compensation for LCD p=touch panel $=RoHS

2. General Specification

(1) Mechanical Dimension

Item	Standard Value	Unit
Number of dots	128x128xRGB	dots
Module dimension (L*W*H)	33.5*33.5*5.55(MAX)	mm
View area	32.5*32.5	mm
Active area	26.291*26.284	mm
Dot size	0.0555(W)x0.1855(H)	mm
Dot pitch	0.0685(W)x0.2055 (H)	mm

(2) Controller IC: SSD1339U4 Controller

(3) Temperature Range

Operating	-20 ~ +70℃
Storage	-40 ~ +85℃

3. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-40	—	+85	℃
Input Voltage	VI	—	—	VDD	V
Operating lift time			13000(*)		Hrs
Storage lift time			20000(**)		Hrs

*:60cd/m^2 light on

**:Ta=25℃,50%RH

4. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}	—	2.4	3.3	3.5	V
Supply Voltage For Analog	Vcc-V_{SS}	—	15.5	16	18	V
Input High Vol	V_{IH}	—	0.7V_{DD}	—	V_{DD}	V
Input Low Vol	V_{IL}	—	0	—	0.3V_{DD}	V
Output High Vol	V_{OH}	—	2.4	—	—	V
Output Low Vol.	V_{OL}	—	—	—	0.4	V
Supply Current	I_{DD}	—	—	120.0	—	mA

5. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR≧20	85		85	deg
	(H) φ	CR≧20	85		85	deg
Contrast Ratio	CR	—		100		—
Response Time 25℃	T rise	—		40		ms
	T fall	—		40		ms

6. Interface Pin Function

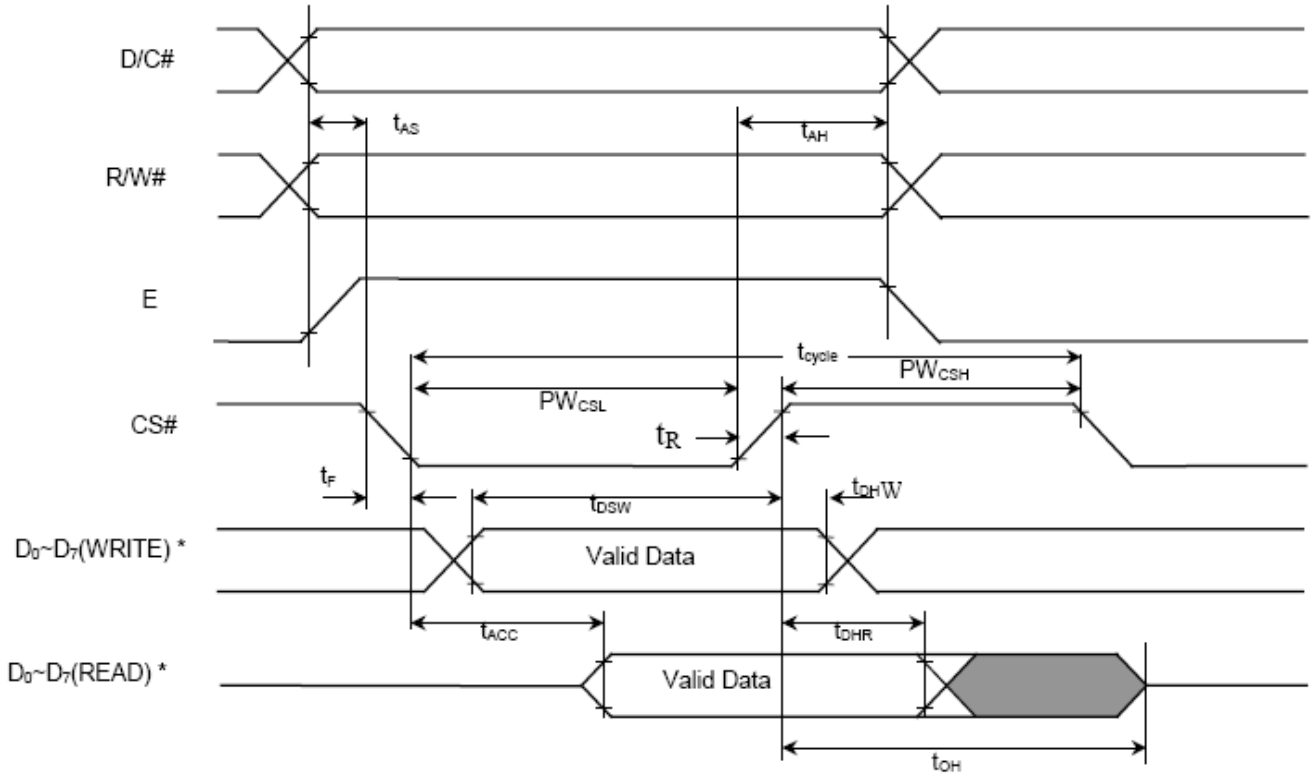
Pin No.	Symbol	Level	Description
1	Vss	0V	Ground
2	Vdd	3.3V	Supply voltage for logic
3	/RES	H/L	Hardware Reset pin
4	D/C	H/L	H: Data; L: Command.
5	CS	H/L	Chip select pin
6	RW	H/L	8080: data write enable pin 6800: Read/Write select pin
7	E	H/L	8080: data read enable pin 6800: Read/Write enable pin
8	DB0	H/L	Data bus line
9	DB1	H/L	Data bus line
10	DB2	H/L	Data bus line
11	DB3	H/L	Data bus line
12	DB4	H/L	Data bus line
13	DB5	H/L	Data bus line
14	DB6	H/L	Data bus line
15	DB7	H/L	Data bus line
16	NC/ VCC	— H/L	NC:No connection VCC: Analog power control(DC +17V)

Default:8080 series interface

7. Timing Characteristics

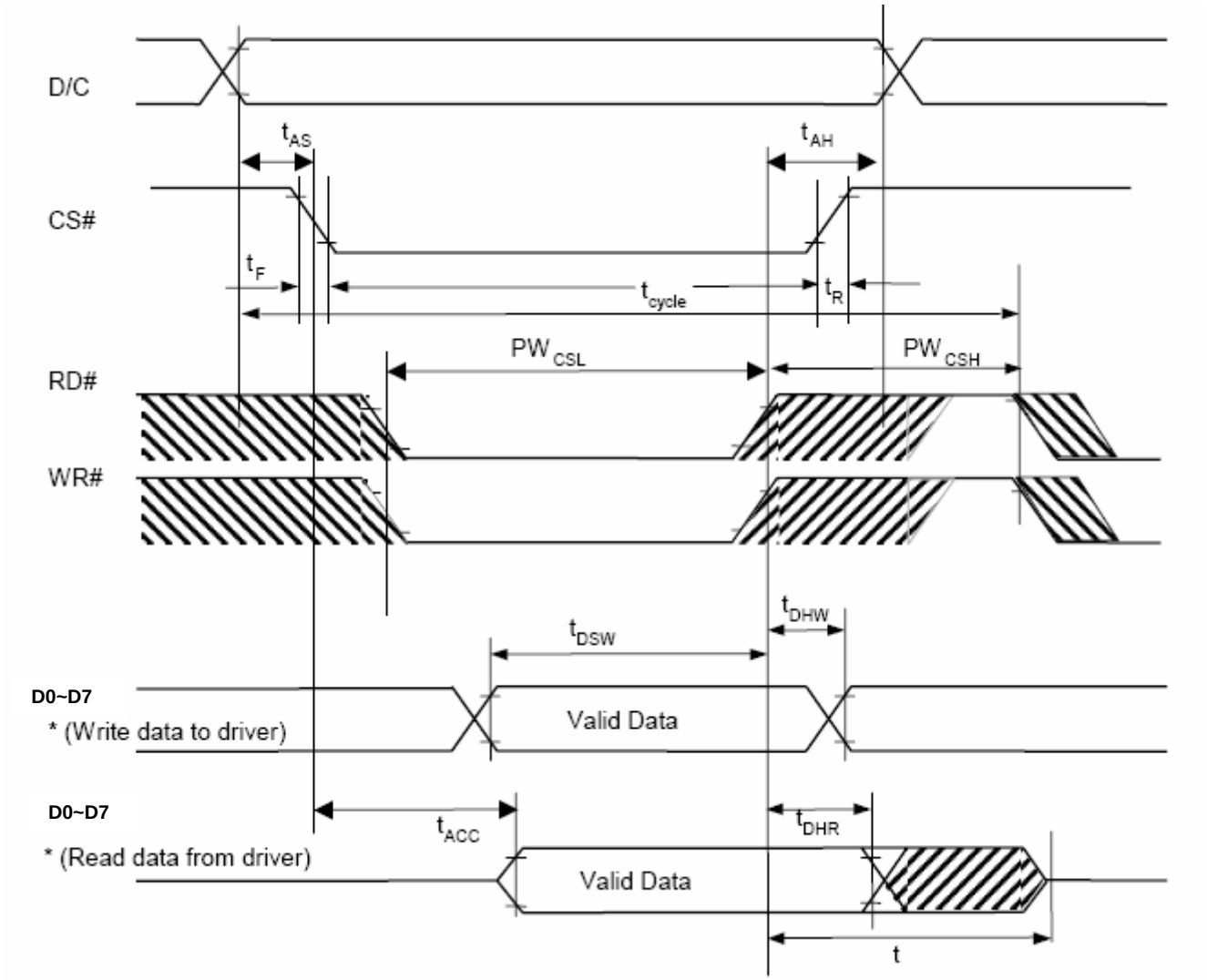
7-1.6800 MPU Interfac

Symbol	Parameter	Min	Typ	Max	Unit
tcycle	Clock Cycle Time	300	-	-	ns
tAS	Address Setup Time	0	-	-	ns
tAH	Address Hold Time	0	-	-	ns
tDSW	Write Data Setup Time	40	-	-	ns
tDHW	Write Data Hold Time	15	-	-	ns
tDHR	Read Data Hold Time	20	-	-	ns
tOH	Output Disable Time	-	-	70	ns
tACC	Access Time	-	-	140	ns
PWCSL	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	120 60	-	-	ns
PWCSH	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	-	-	ns
tR	Rise Time	-	-	15	ns
tF	Fall Time	-	-	15	ns



7-2.8080 MPU Interface

Symbol	Parameter	Min	Typ	Max	Unit
tcycle	Clock Cycle Time	300	–	–	ns
tAS	Address Setup Time	0	–	–	ns
tAH	Address Hold Time	0	–	–	ns
tDSW	Write Data Setup Time	40	–	–	ns
tDHW	Write Data Hold Time	15	–	–	ns
tDHR	Read Data Hold Time	20	–	–	ns
tOH	Output Disable Time	–	–	70	ns
tACC	Access Time	–	–	140	ns
PWCSL	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	120 60	–	–	ns
PWCSH	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	–	–	ns
tR	Rise Time	–	–	15	ns
tF	Fall Time	–	–	15	ns



8. Display Control Instruction

(**D/C** = 0, **R/W** (**WR**) = 0, E(**RD**) = 1) unless specific setting is stated
Single byte command (D/C = 0), Multiple byte command (D/C = 0 for first byte, D/C = 1 for other bytes)

D/C	Hex	D7	D6	D5	D4	D3	D2	D2	D0	Command	Description
0	15	0	0	0	1	0	1	0	1	Set Column Address	A[7:0]: Start Address, reset=0d B[7:0]: End Address, reset=131d Range from 0d to 131d
1	A[7:0]	A7	A6	A5	A4	A3	A2	A1	A0		
1	B[7:0]	B7	B6	B5	B4	B3	B2	B1	B0		
0	75	0	1	1	1	0	1	0	1	Set Row Address	A[7:0]: Start Address, reset=0d B[7:0]: End Address, reset=131d Range from 0d to 131d
1	A[7:0]	A7B7	A6	A5	A4	A3	A2	A1	A0		
1	B[7:0]		B6	B5	B4	B3	B2	B1	B0		
0	5C	0	1	0	1	1	1	0	0	Write RAM Command	Enable MCU to write Data into RAM
0	5D	0	1	0	1	1	1	0	1	Read RAM Command	Enable MCU to read Data from RAM

0	A0	1	0	1	0	0	0	0	0	Set Re-map / Color Depth(Display RAM to Panel)	A[0]=0, Horizontal address increment (POR)
											A[0]=1, Vertical address increment
											
											A[1]=0, Column address 0 is mapped to SEG0 (POR)
											A[1]=1, Column address 131 is mapped to SEG0
											A[2]=0, Color sequence: A # B # C (POR)
											A[2]=1, Color sequence is swapped: C # B # A
											A[3]=0, Disable 9/18-bit bus interface (POR)
											A[3]=1, Enable 9/18-bit bus interface
											
											A[4]=0, Scan from COM 0 to COM [N –1] (POR)
											A[4]=1, Scan from COM [N-1] to COM0. Where N is the Multiplex ratio.
											
											A[5]=0, Disable COM Split Odd Even (POR)
											A[5]=1, Enable COM Split Odd Even
											
											A[7:6] Set Color Depth,
											00 256 color
											01 65K color, (POR)
											10 262k color, 8/9/18-bit,16 bit (1st option) MCU interface
											11 262k color, 16 – bit MCU interface (2nd option)

1	A[7:0]	A7	A6	A5	A4	A3	A2	A1	A0		
0	A1	1 A7	0	1	0	0	0	0	1	Set Display Start Line	Set vertical scroll by RAM from 0~131 [reset=00d]
1	A[7:0]		A6	A5	A4	A3	A2	A1	A0		

D/C	Hex	D7	D6	D5	D4	D3	D2	D2	D0	Command	Description
0 1	A2 A[7:0]	1 A7	0 A6	1 A5	0 A4	0 A3	0 A2	1 A1	0 A0	Set Display Offset	Set vertical scroll by Row from 0-131. [reset=00h]
0	A4~A7	1	0	1	0	0	1	X1	X0	Set Display Mode	A4: All Off A5: All On (All pixels have GS15) A6 : Reset to normal display (POR) A7: Inverse Display (GS0 -> GS63, GS1 -> GS62, ...)
0 1	AD A[7:0]	1 1	0 0	1 0	0 0	1 1	1 A2	0 A1	1 A0	Master Configuration	A[7:0] should be set as 100011A[1]A[0]b A[0]= 0 Select external VCC supply at master ON A[0] = 1 Select internal booster at master ON [reset] A[1]= 0 Select external VCOMH voltage supply at master ON A[1] = 1 Select internal VCOMH regulator at master ON [reset] A[2] = 0 Select external pre-charge voltage source A[2] = 1 Select internal pre-charge voltage source [reset] AE = Sleep mode On (Display off) AF = Sleep mode Off (Display on)
0	AE~AF	1	0	1	0	1	1	1	X0	Set Sleep mode On/Off	
0 0	B0 0	1 0	0 0	1 0	1 A4	0 A3	0 A2	0 A1	0 A0	Power Saving Mode	A[4:0]: 00000b = Normal 10010b = Power Saving 00101b = Reserved
0 1	B1 A[7:0]	1 A7	0 A6	1 A5	1 A4	0 A3	0 A2	0 A1	1 A0	Set Reset (Phase 1) /Pre-charge (Phase 2) period	A[3:0] Phase 1 period of 1~16 dclk clocks [reset=4h] A[7:4] Phase 2 period of 1~16 dclk clocks [reset=7h]
0 1	B3 A[7:0]	1 A7	0 A6	1 A5	1 A4	0 A3	0 A2	1 A1	1 A0	Front Clock Divider (DivSet)/ Oscillator Frequency	A[3:0] [reset=0], divide by DIVSET+1 (i.e. 1 to 16) A[7:4] Osc frequency, frequency increase as level increase [reset=1001b]
0 1 1 1 1 1 1 1	B8 A[7:0] B[7:0] . . . .AE[7:0] AF[7:0]	1 A7 B7 . . . AE7 AF7	0 A6 B6 . . . AE6 AF6	1 A5 B5 . . . AE5 AF5	1 A4 B4 . . . AE4 AF4	1 A3 B3 . . . AE3 AF3	0 A2 B2 . . . AE2 AF2	0 A1 B1 . . . AE1 AF1	0 A0 B0 . . . AE0 AF0	Look Up Table for Gray Scale Pulse width	The next 32 bytes of command set the current drive pulse width of gray scale level GS1, GS3, GS5 …GS63 as below in unit of DCLK. A[7:0] : PW1, POR =1 DCLK B[7:0] : PW3, POR = 5 DCLK C[7:0] : PW5, POR = 9 DCLK . . AE[7:0] : PW61, POR = 121 DCLK AF[7:0] : PW63, POR = 123 DCLK where

											PW1 must > 0 PW3 must > PW1+1 PW5 must > PW3+1 Note: GS0 has no pre-charge and current drive stages. For GS2 GS4…GS62, they are derived by driver itself with: PWn = (PWn-1+PWn+1)/2 Max pulse width is 125
0	B9	1	0	1	1	1	0	0	1	Use Built-in Linear LUT (reset= linear)	Reset to default Look Up Table: PW1 = 1 PW2 = 3 PW3 = 5 PW4 = 7 ... PW62 = 123 PW63 = 125
0 1 1 1	BB A[7:0] B[7:0] C[7:0]	1 A7	0 A6	1 A5	1 A4	1 A3	0 A2	1 A1	1 A0	Set Pre-charge voltage of Color A B C	A[7:0] Pre-charge Color A [reset = 00011100] B[7:0] Pre-charge Color B [reset = 00011100] C[7:0] Pre-charge Color C [reset = 00011100] 00000000 0.51*Vref ..... 00011111 0.84*Vref 1xxxxxxx connects to VCOMH
0 1	BE A[6:0]	1 *	0 A6	1 A5	1 A4	1 A3	1 A2	1 A1	0 A0	Set VCOMH	A[6:0] 000000 0.51*Vref 0 ..... 001111 1 0.84*Vref [VCOMHSET, reset]
0 1 1 1	C1 A[7:0] B[7:0] C[7:0]	1 A7B 7C7	1 A6 B6 C6	0 A5 B5 C5	0 A4 B4 C4	0 A3 B3 C3	0 A2 B2 C2	0 A1 B1 C1	1 A0 B0 C0	Contrast Current for Color A,B,C	A[7:0] Contrast Value Color [reset=1000000b] AB[7:0] [reset=1000000b] Contrast Value Color B C[7:0] Contrast [reset=1000000b] Value Color C
0 1	C7 A[3:0]	1 *	1 *	0 *	0 *	0 A3	1 A2	1 A1	1 A0	Master Contrast Current Control	A[3:0] : 0000 reduce output currents for all colors to 1/16 0001 reduce output currents for all colors to 2/16 .... 1110 reduce output currents for all colors to 15/16 1111 no change [reset = 1111b]
0 1	CA A[7:0]	1 A7	1 A6	0 A5	0 A4	1 A3	0 A2	1 A1	0 A0	Set Mux Ratio	A[7:0] mux ratio 16MUX ~ 132MUX, [reset=131d], (Range from 15d to 131d)
0	E3	1	1	1	0	0	0	1	1	NOP	Command for No Operation

9. Appendix (Drawing)