



*Classic LCDs & LEDs*

# LCD MODULE SPECIFICATION

## ITEM CODE

# FG12864H01-FSWFBW-51YN

SPECIFICATION ESTABLISHED DATE: 2016.12.06



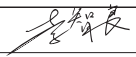
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**AMENDMENT RECORD**

<b>MARK</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>ITEM</b>	<b>PAGE</b>	<b>APPROVED</b>
1	2016.04	INITIAL ISSUED	ALL	ALL	



1. The following icons are absolutely designed by FORDATA independently in 2007-SEP. They are unique in the LCD industry and are used for marking out FORDATA products' characteristics quickly and simply without any special meaning. FORDATA reserves the composing right and copyright. No one else is allowed to adopt these icons without FORDATA's approval.
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4. As the difference in test standard and test conditions, also FORDATA's insufficient familiarity with the actual LCD using environment, all the referred information in this DATASHEET (including the icons) only have two functions:
  - 4.1: providing quick reference when you are judging whether the product meets your requirements or not.
  - 4.2: listing out the tolerance.

**FORDATA declares seriously:** you should first test the corresponding sample(s) before signing the formal FORDATA SAMPLE APPROVAL document rather than consider this DATASHEET as the standard for judging whether the LCD meets your requirements or not. Once you place bulk order(s) to FORDATA without testing samples. FORDATA will disclaim all responsibility if the mass-production is proved not to meet with your requirements.
5. The sequence of the icons is random and doesn't indicate the importance grade.

6. Icons explanation



FORDATA is an integrated manufacturer of flat panel display (FPD). All above listed icons and words compses FORDATA's logo.  
 From 2000, FORDATA has supplied LCD module  
 From 2006, FORDATA has supplied TN, HTN, STN, FSTN monochrome LCD panel  
 From 2012, FORDATA has supplied all kinds of LED backlight.



**FAST RESPONSE TIME**  
 This icon on the cover indicates the product is with high response speed; Otherwise not.



**PROTECTION CIRCUIT**  
 This icon on the cover indicates the product is with protection circuit; Otherwise not.



**HIGH CONTRAST**  
 This icon on the cover indicates the product is with high contrast; Otherwise not.



**LONG LIFE VERSION**  
 This icon on the cover indicates the product is long life version (over 9K hours guaranteed); Otherwise not.



**WIDE VIEWING SCOPE**  
 This icon on the cover indicates the product is with wide viewing scope; Otherwise not.



**Anti UV VERSION**  
 This icon on the cover indicates the product is against UV line. Otherwise not.



**RoHS COMPLIANCE**  
 This icon on the cover indicates the product meets ROHS requirements; Otherwise not.



**EASY OPERATION TEMPERATURE**  
 This icon on the cover indicates the product can have good contrast on one driving voltage in indicated operation temperature range.



**3TIMES 100% QC EXAMINATION**  
 This icon on the cover indicates the product has passed FORDATA's thrice 100% QC. Otherwise not.



**TWICE SELECTION OF LED MATERIALS**  
 This icon on the cover indicates the LED has passed FORDATA's twice strict selection which promises the product's identical color and brightness; Otherwise not.



**VlcM = 3.0V**  
 This icon on the cover indicates the product can work at 3.0V exactly; otherwise not.



**N SERIES TECHNOLOGY (2008 developed)**  
 FORDATA adopts new structure, new craft, new technology and new materials inside both LCD module and LCD panel to improve the "RainBow"



1	2	3	4	5	6	—	7	8	9	10	11	12	—	13	14	15	16
F	C	08	01	A	23	—	F	H	Y	Y	B	W	—	5	2	L	E

No.	REMARKS	DESCRIPTION				
1	COMPANY ABBRAVIATION	F = FORDATA				
2	STANDARD MODULE TYPE	C = Character type standard LCD module (COB version) G = Graphic type standard LCD module (COB version)				
3	Character (FC series)	08, 10, 12, 16, 20, 24, 40, = Character number Per line				
	Graphic (FG series)	80, 100, 120, 122, 128, 160 ... .. = Row Dots Quantity				
4	Character (FC series)	01, 02, 04, = Character Lines				
	Graphic (FG series)	32, 64, 80, 128, 160 ... .. =Column Dots Quantity				
5	Serial Number	A~Z which is decided by the sizes of viewing area				
6	Identifying Code	00~99 which is decided by all the other aspects for the same viewing area				
7	Polarizer type	R = Positive Reflective M = Positive Transmissive B = Super Black technology <i>New!</i> F = Positive Transflective N = Negative Transmissive				
8	Backlight type	N = No Backlight S = Edge Type LED Backlight (Standard version) H = Edge Type LED Backlight (Long life span version) <i>New!</i> E = EL backlight without Invertor C = CCFL backlight without Invertor L = Array Type LED Backlight F = EL backlight with Invertor T = CCFL backlight with Invertor				
9	Backlight color	N = No Backlight R = Red B = Blue Y = Yellow-Green A = Amber G = Green W = White C = Blue-Green Q = RedGreenBlue three color <i>New!</i>				
10	LCD panel type	T = TN G = Gray STN H = HTN B = Blue STN Y = Yellow-Green STN F = FSTN				
11	Viewing angle	B = Bottom 6:00 T = Top 12:00 R = Right 3:00 L = Left 9:00				
12	Operation temperature range	S = 0°C ~ 50°C (Single Supply Voltage) W = -20°C ~ 70°C (Single Supply Voltage) T = -30°C ~ 80°C (Single Supply Voltage) D = 0°C ~ 50°C (Dual Supply Voltage) H = -20°C ~ 70°C (Dual Supply Voltage) E = -30°C ~ 80°C (Dual Supply Voltage)				
13	Driving Voltage Code (This code was updated from 2015-JAN-1ST)		Vlcm = 3.0V	Vlcm = 3.3V	Vlcm = 3.6V	Vlcm = 5.0V
		Vled = Indicated Voltage*	P	R	X	Q
		Vled = 4.2V	M	G	D	K
		Vled = 3.0V	9	A	3	4
		Vled = 3.3V	T	B	K	F
		Vled = 5.0V	8	C	2	5
	NO/EL/CCFL	1	H	7	6	
14	Backlight Connect Method	0 = PIN1 LED-, PIN2 LED+ 1 = PIN15(17/19) LED+, PIN16(18/20) LED- 2 = PIN15(17/19) LED-, PIN16(18/20) LED+ 3 = PIN15(17/19) LED+, PIN16(18/20) NC 4 = PIN15(17/19) NC, PIN16(18/20) LED+ 5 = PINA LED+, PINK LED- 6 = No / EL / CCFL Backlight				
15	IC Manufacturer Code	A~Z or 01~99 which is decided by different IC manufacturers				
*16	Font Set	A~Z or 01~99 which is decided by different font maps				

Please refer INDICATED VOLTAGE of LED in Page4 and Page5.



## FEATURES

AVAILABLE OPTIONS	CHARACTERISTICS	CODE	No.
DISPLAY FORMAT	128 X 64 DOT MATRIX	FG12864H01	1~6
POLARIZER OPTIONS	Positive Transflective	F	7
BACKLIGHT TYPE OPTIONS	Edge Type LED Backlight (Standard version)	S	8
BACKLIGHT COLOR OPTIONS	White color	W	9
LCD PANEL OPTIONS	FSTN	F	10
VIEWING ANGLE OPTIONS	6:00 ( Bottom )	B	11
TEMPERATURE RANGE OPTIONS	-20°C ~ 70°C, Single Supply Voltage	W	12
SUGGESTED DRIVING VOLTAGE	Vlcm = 5.0V Vled = 5.0V	5	13
SUGGESTED LED DRIVING MODE	PIN19: LED+, PIN20:LED-	1	14
CONTROLLER ▲1	RA6963+NT7086*3	Y	15
FONT MAP CODE	NO FONT SET	N	16
DRIVING DUTY	1/64	—	—
DRIVING BIAS	1/9	—	—

▲1 Please ask for datasheet of the mentioned controller from FORDATA or FORDATA's authorized distributors. You can find the related information including AC & DC characteristics, Write & Read Timing diagram, Instruction table and descriptions, DDRAM & CGRAM, Rest Function and so on from the datasheet of controller.

▲1 You can ask for the example of software program (C language) from FORDATA or FORDATA's authorized distributors.


## MECHANICAL SPECIFICATIONS

OVERALL SIZE	75.0W x 52.7H	mm	THICKNESS	max 13.0	mm
VIEWING AREA	60.0W x 32.5H	mm	HOLE-HOLE	70.0W x 49.7H	mm
DOT SIZE	0.39W x 0.39H	mm	DOT PITCH	0.04W x 0.04H	mm

## ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
POWER SUPPLY ( LOGIC)	Vdd	25°C	-0.3	—	7.0	V
POWER SUPPLY (LCD)	V0	25°C	Vdd -19.0	—	Vdd +0.3	V
INPUT VOLTAGE	Vin	25°C	-0.3	—	Vdd +0.3	V
OPERATING TEMPERATURE	Vopr	—	-20	—	70	°C
STORAGE TEMPERATURE	Vstg	—	-30	—	80	°C

## ELECTRONIC CHARACTERISTICS \*

ICONS	ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
	INPUT VOLTAGE	Vlcm = Vdd	—	—	5.0	—	V
	SUPPLY CURRENT	Idd	Vdd=5V	—	12.0	—	mA
	DRIVING VOLTAGE FOR LCD PANEL	Vlcd = (Vdd - V0)	-20°C	8.80	—	9.10	V
			0°C	—	—	—	
			25°C	8.70	8.90	9.10	
			50°C	—	—	—	
			70°C	8.50	—	9.00	

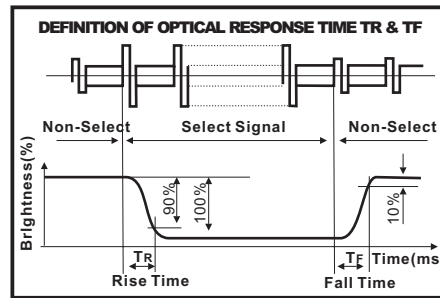
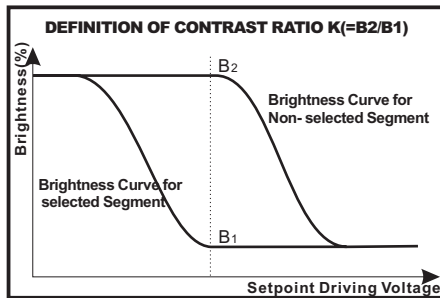
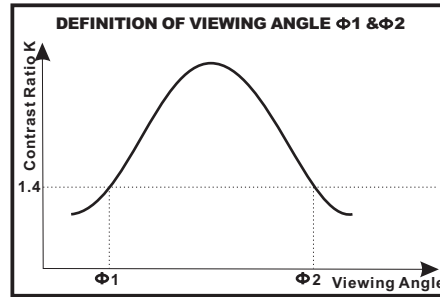
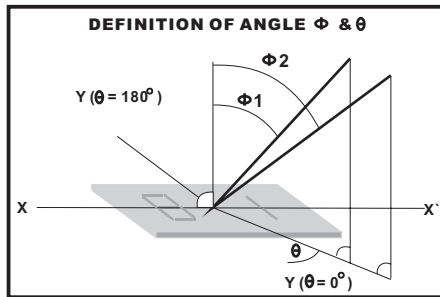
\* All data are recorded from TEST REPORT #FSYP044200132



**LCD CHARACTERISTICS**

**FOR STN/FSTN TYPE LCD Panel (TA=25 °C, Vlcd=5.0V ± 0.5V)**

ICONS	ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
	VIEWING ANGLE	$\Phi 2 - \Phi 1$	K=4	40	—	—	deg
		$\theta$		60			
	CONTRAST RATIO	K	—	6	—	—	—
	RESPONSE TIME(RISE)	TR	—	—	150	250	ms
	RESPONSE TIME(FALL)	TF	—	—	150	250	ms



**LED CHARACTERISTICS**

ICONS	ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
	LED FORWARD VOLTAGE	Vf	25°C If = 25mA	—	5.0	—	V
	LED FORWARD CURRENT ▲2	If	25°C	—	25	—	mA
	LED REVERSE CURRENT	Ir	25°C Vr=5.0V	—	—	20	μA
	LED COLOR RANGE	X coordinate	25°C If = 25mA	0.26	—	0.30	—
		Y coordinate		0.27	—	0.31	—
	LED BRIGHTNESS (WITHOUT LCD)	Lv	25°C If = 25mA	—	450	—	cd/m <sup>2</sup>
	LED BRIGHTNESS UNIFORMITY	Lvmin/Lvmax	25°C If = 25mA	70	—	—	Ratio
LED LIFE TIME ▲3	—	25°C If = 25mA	9K	—	—	Hours	

▲2 请注意, 驱动背光考虑的是恒流而不是恒压. 所以, 这个数值非常重要!

YOUR ATTENTION: It is constant current (not constant voltage) that should be applied when driving LED backlight. Therefore, this data is very important!

\* 当工作温度高于25°C时, Ifm, Ifp和Pd必须降低; 电流降低率是 -0.36\*2mA/°C (直流驱动), 或-0.86\*2 mA/°C (脉冲驱动), 功率降低率是-75\*2mW/°C. 产品工作电流不能大于对应的工作条件温度Ifm或Ifpr的60%.  
For operation above 25°C, The Ifm Ifp & Pd must be derated, the Current derating is -0.36\*2mA/°C for DC drive and -0.86\*2 mA/°C for Pulse drive, the power dissipation is -75\*2 mW/°C The product working current must not be more than 60% of the Ifm or Ifp according to the working temperature.

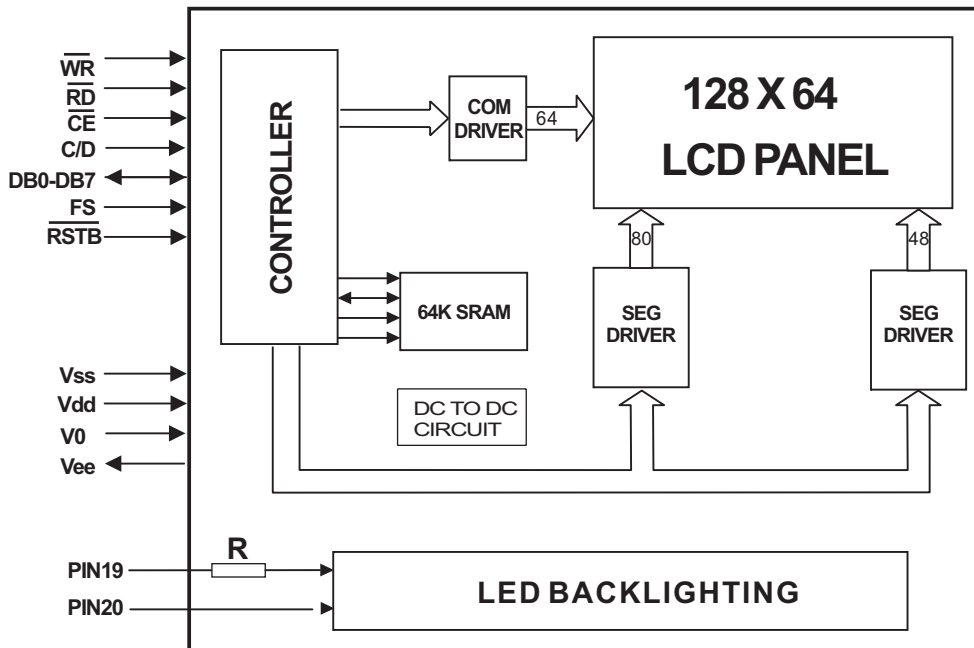
▲3 如果您需要让背光连续不间断工作超过8小时/天, 那么不建议您采用这款背光. 福德电子可以提供您长寿背光的解决方案. If you want to drive the LED BKL uninterruptedly over 8hours/day, you are not suggested this version. FORDATA can offer you long life design LED backlight solution.



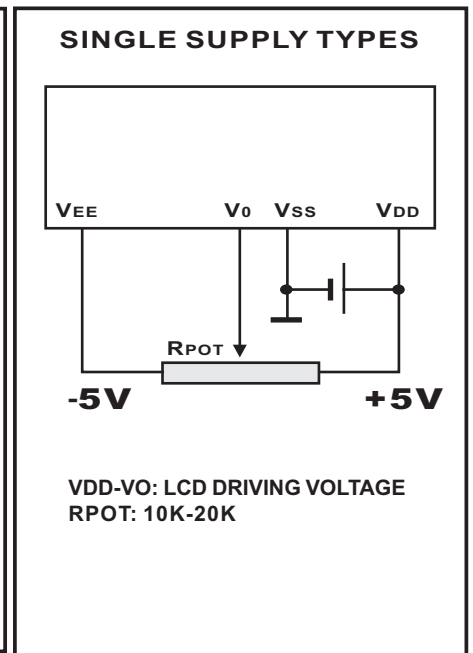
**PIN ASSIGNMENT**

PIN	SYMBOL	DESCRIPTION	REMARKS
1	Vee	Negative voltage output	
2	Vss	GND	
3	VDD	Power supply for LCM	5.0V
4	V0	Contrast Adjust	
5	/WR	Data bus line	
6	/RD	Data bus line	
7	/CE	Data bus line	
8	C/D	Data bus line	
9	/RST	Data bus line	
10	DB0	Data bus line	
11	DB1	Data bus line	
12	DB2	When CS1=H,CS2=L, select U2	
13	DB3	When CS1=L,CS2=H, select U3	
14	DB4	Reset signal	
15	DB5	Read / Write	
16	DB6	H/L H: Data, L: Instruction code	
17	DB7	Enable Signal	
18	FS	Negative voltage output	
19	LED+	Power supply for BKL	5.0V
20	LED-	Power supply for BKL	

**BLOCK DIAGRAM**



**POWER SUPPLY DIAGRAM**



ROM Code 0101

MSB \ LSB	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
1																
2																
3																
4																
5																
6																
7																







FULL-SIZED PACKAGE
45 PCS/BOX
8 BOXES/CARTON
360 PCS/CARTON
13.00 KGS/CTN(G.W.)
0.054 M <sup>3</sup> /CARTON

HALF-SIZED PACKAGE
45 PCS/BOX
4 BOXES/CARTON
180 PCS/CARTON
6.0 KGS/CTN(G.W.)
0.027 M <sup>3</sup> /CARTON

PACKING DECLARATION
1. This packaging information is for reference only. The actual information is subject to the actual packaging. Especially for packaging of LCL, tolerances may exist.
2. FORDATA will not be responsible for quality problems caused by unnormal transportation conditions (including but not limited to climate factors or human factors, such as improper handling).

