FM-V1020M 液晶显示屏使用手册
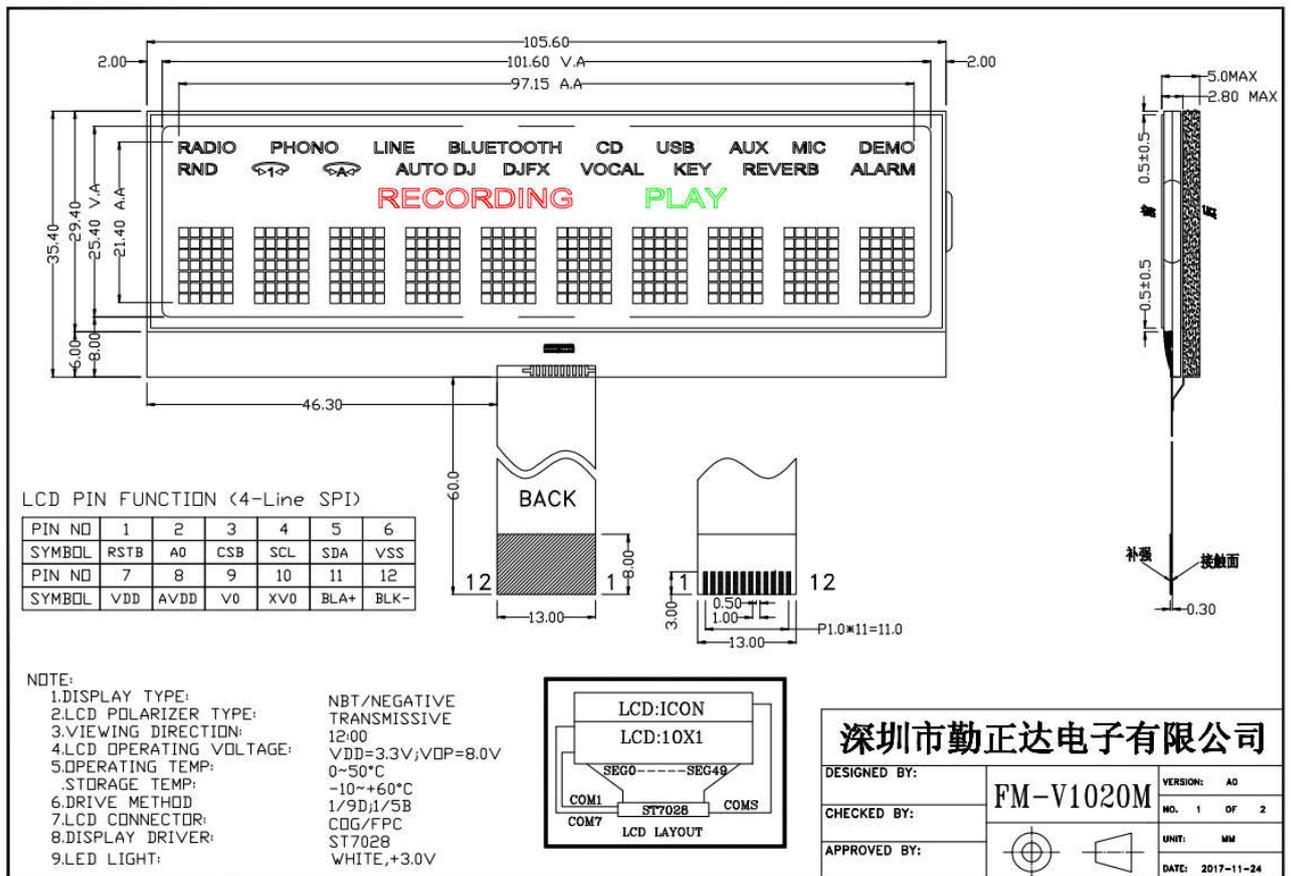

深圳市勤正达电子有限公司

一.概述：

    FM-V1020M 是一款段码与字符型液晶显示屏。它主要采用动态驱动原理由 ST7028 控制器对其进行控制并驱动显示。此显示器采用了 COG 加 FPC 的封装方式,使其寿命长，连接可靠。

二.特性：

    1.工作电压为+3.3V ,内建升压器。

    2.与 CPU 接口采用 4-Line SPI 总线协议。

三.外形尺寸：

    1.外形结构图：

LCD PIN FUNCTION (4-Line SPI)

PIN NO	1	2	3	4	5	6
SYMBOL	RSTB	A0	CSB	SCL	SDA	VSS
PIN NO	7	8	9	10	11	12
SYMBOL	VDD	AVDD	V0	XV0	BLA+	BLK-

NOTE:
1.DISPLAY TYPE: NBT/NEGATIVE
2.LCD POLARIZER TYPE: TRANSMISSIVE
3.VIEWING DIRECTION: 12:00
4.LCD OPERATING VOLTAGE: VDD=3.3V;VOP=8.0V
5.OPERATING TEMP: 0~50°C
 .STORAGE TEMP: -10~+60°C
6.DRIVE METHOD   1/9D;1/5B
7.LCD CONNECTOR: COG/FPC
8.DISPLAY DRIVER: ST7028
9.LED LIGHT: WHITE,+3.0V

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DESIGNED BY:	FM-V1020M	VERSION: A0
CHECKED BY:		NO. 1 OF 2
APPROVED BY:		UNIT: MM
		DATE: 2017-11-24

2.全屏显示与逻辑图:

黑色丝印于底玻璃

全屏显示效果图

LOGIC:

PIN	SEG0	SEG1	SEG7	SEG10	SEG11	SEG12	SEG13	SEG15	SEG16	SEG21
COMS	RADIO	RND		PHONO		LINE	BLUETOOTH	AUTO	DJ	RECOVERING

PIN	SEG28	SEG29	SEG30	SEG31	SEG32	SEG35	SEG38	SEG40	SEG45	SEG46	SEG48
COMS	DJFX	CD	VOCAL	USB	KEY	PLAY	AUX	REVERB	MIC	DEMO	ALARM

四.引脚特性:

引脚号	引脚名称	级　别	引　脚　功　能　描　述
1	RSTB	H/L	复位，L：复位。
2	A0	H/L	寄存器选择。H：数据。L：命令
3	CSB	H/L	片选。L：选择
4	SCL	H/L	串行时钟输入
5	SDA	H/L	串行数据输入
6	VSS	0V	电源地
7	VDD	+3.3V	电源
8	AVDD	--	AVDD 通过一个电容(1Uf)与 VSS 相连
9	V0	--	V0通过一个电容(1uF)与 XV0相连
10	XV0	--	
11	BLA+	+3.0V	背光电源
12	BLK-	0V	背光地

五.电气特性：

1.限定参数:

项 目	名称	值	单位	备 注
Operating Voltage	VDD	+3.0 to +3.3	V	*1
Supply Voltage	VEE	VDD-3.3toVDD-3.0	V	*2

●

项 目	名称	值	单位	备 注
Operating Temperature	T_{OPR}	-10 to +60	℃	
Storage Temperature	T_{STG}	-20 to +70	℃	

*1.Based on VSS=0V
*2.Applies to V_{LCD}

2.直流特性:（VDD=+3.3V，VSS=0V， VLCD=8.0V，Ta=-20～+70℃）

项 目	名称	测试条件	Min	Typ	Max	单位	备注
Input High Voltage	V_{IH}	−	2.7	−	VDD	V	*1
Input Low Voltage	V_{IL}	−	0	−	0.6	V	*1
Output High Voltage	V_{OH}	$I_{OH}=-500uA$	2.4	−	−	V	*2
Output Low Voltage	V_{OL}	$I_{OL}=0.5mA$		−	0.6	V	*2
Input Leakage Current	I_{LKG}	$V_{IN}=VSS\sim VDD$	−1.0	−	1.0	uA	*3
Three-state(OFF) input Current	I_{TSL}	$V_{IN}=VSS\sim VDD$	−3.3	−	3.3	uA	*4
Operating Current	I_{DD1}	During Display	−	−	0.5	mA	*5
	I_{DD2}	During Access			1	mA	*5
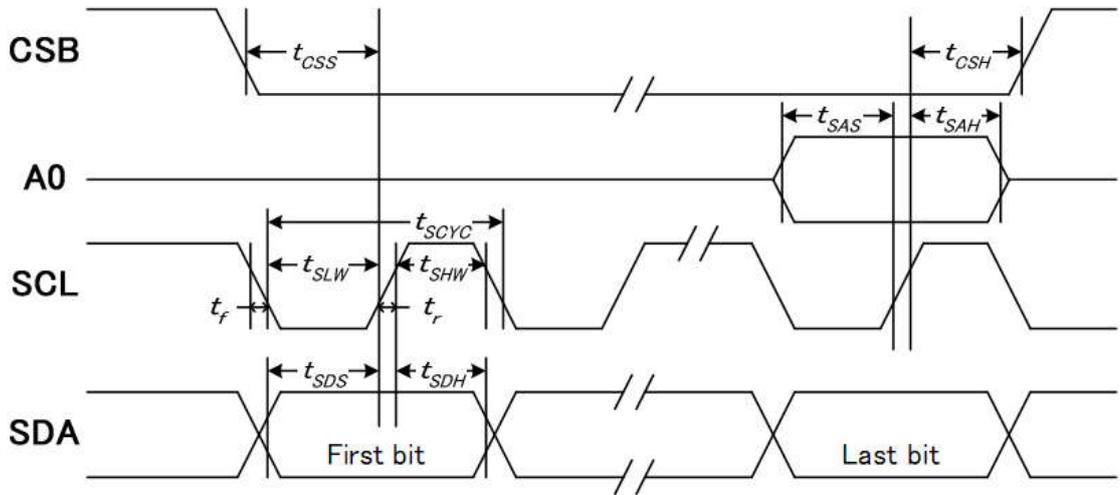
Ta = 25℃

Item	Signal	Symbol	VDD1=2.8V		VDD1=3.3V		Unit
			Min.	Max.	Min.	Max.	
Serial Clock Period	SCL	tSCYC	90	-	60	-	ns
SCL "H" pulse width		tSHW	35	-	25	-	
SCL "L" pulse width		tSLW	30	-	20	-	
Address setup time	A0	tSAS	10	-	10	-	ns
Address hold time		tSAH	10	-	10	-	
Data setup time	SI	tSDS	15	-	10	-	ns
Data hold time		tSDH	15	-	10	-	
sChip select setup time	CSB	tCSS	20	-	20	-	ns
Chip select hold time		tCSH	60	-	50	-	

Note:

1. All timing is specified using 20% and 80% of VDD1 as the reference.

2. The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.

Hardware Reset Timing
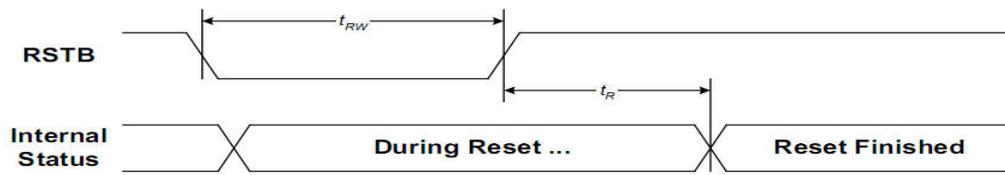
Ta =25℃

Item	Signal	Symbol	VDD1=2.8V		VDD1=3.3V		Unit
			Min.	Max.	Min.	Max.	
Reset time	RSTB	tR	-	2.0	-	1.0	us
Reset "L" pulse width		tRW	2.0	-	1.0	-	

七.指令说明：

Instruction	Instruction Code										Description
	A0	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
Default Instruction Table (IS[1:0]: Don't Care)											
Clear Display	0	0	0	0	0	0	0	0	0	1	Display clear and set AC to "00H".
Return Home	0	0	0	0	0	0	0	0	1	X	Set AC to "00H". It will return cursor to the original position if shifted. The contents in DDRAM are not changed.
Set Entry Mode	0	0	0	0	0	0	0	1	I/D	S	Set cursor move direction and display shift direction. The effects are performed after each data access (write or read).
Display Control	0	0	0	0	0	0	1	D	C	B	D=1: Entire display on; C=1: Cursor on; B=1: Cursor position blinks.
Function Set	0	0	0	0	1	DL	X	X	IS2	IS1	DL: Interface data is 8/4 bits; IS[1:0]: select instruction table.
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address into AC (address counter).
Read Status	0	1	0	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Read the content of AC (address counter)
Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM/ICONRAM)
Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM/ICONRAM)
Instruction Table 0: IS[1:0]=(0,0)											
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	X	X	S/C and R/L: Immediately move cursor or shift display by 1.
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address into AC (address counter)

Instruction	Instruction Code										Description
	A0	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
Instruction Table 1: IS[1:0]=(0,1)											
Follower Control	0	0	0	0	0	1	BS2	BS1	X	X	BS[2:1]: Bias select; BS[2:1]=(0,1): 1/5 Bias BS[2:1]=(1,X): 1/6 Bias
Set ICON RAM Address	0	0	0	1	0	0	AC3	AC2	AC1	AC0	Set ICON address into AC (address counter).
V0 Control 1	0	0	0	1	0	1	PD	VC6	VC5	VC4	PD=1: Enter Power Down mode VC[6:4]: Set V0 (High-nibble)
ICON/Power Control	0	0	0	1	1	0	Ion	Bon	Ron	Fon	Ion: ICON display on/off Bon: Set booster circuit on/off Ron: Set regulator circuit on/off Fon: Set follower circuit on/off.
V0 Control 2	0	0	0	1	1	1	VC3	VC2	VC1	X	Set V0 (Low-nibble).
Instruction Table 2: IS[1:0]=(1,0)											
Set Display Mode	0	0	0	0	0	1	UD	DH	N2	N1	UD: Set double height position (DHu or DHd) DH: Double Height on/off N[2:1]: Display line number.
Select CGRAM & COM/SEG direction	0	0	0	1	0	0	OPR2	OPR1	SHLS	SHLC	OPR[2:1]: Set CGRAM mapping SHLS: Set SEG scan direction SHLC: Set COM scan direction
Set Frame Rate	0	0	0	1	0	1	0	FR2	FR1	FR0	FR[2:0]: Select Frame Rate