SiGma Micro
IC Solution Designing

SPECIFICATION

SG8F160P

8-BIT MCU With Embedded Touch Sensor

Version 1.1

Sigma reserves the right to change this documentation without prior notice

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

TABLE OF CONTENTS

1. GENERAL DESCRIPTION 3

2. FEATURES 3

3. PIN ASSIGNMENT 5

4. BLOCK DIAGRAM 6

5. ABSOULUTE MAXIMUM RATING 6

6. ELECTRICAL CHARACTERISTICS 7

6.1 DC CHARACTERISTICS 7

6.2 AC CHARACTERISTICS 7

7. PACKAGE 8

8.APPLICATION CIRCUIT 9

9. PACKAGE DISCRIPTION 11

10.REVISION HISTORY 12

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

1. GENERAL DESCRIPTION

The SG8F160P is 8 bit MCU with 16 channels of touch sensor and 20 I/O ports. It develops from the mcu-SG8000B, which includes 8-bit CPU core, program OTP ROM, SRAM, TIMER, GPIO and touch sensor. It can also provide the interrupt function and the wakeup function from stand-by mode.

2. FEATURES

Microcontroller Features:

• Operating voltage range: 2.4V~5.5V.

• Operating frequency up to 20MHz

• 8-bit MCU core

• 4K×14 bits OTP ROM for program.

- 6 level stacks for subroutine nesting

• 144×8 bits SRAM, and 128 bytes split to 4 banks.

• 3 bi-directional I/O ports (20 I/O pins)

- P07-P00 has wake-up function, Pullup function and external interrupt function.
- P17-P10 has wake-up function and Pullup function.
- P23-P20 has wake-up function, Pullup function and external interrupt function.

• Clock Sources

- HRC(32K~8M)
- Crystal oscillator (32768Hz~20MHz)
- LRC(200K)

• 6 interrupt sources:

- TCC Timer overflow interrupt.
- 2 external interrupt
- RTC Timer overflow interrupt.
- 2 touch pad interrupt

• 8-bit RTC Timer with overflow interrupt.

• 8-bit TCC Timer with overflow interrupt.

• 8-bit prescaler for WDT or TCC

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

• Touch sensor

- 16 channels.
- own RC oscillator.
- 16-bit Timer with overflow interrupt.
- touch pad interrupt and also have wake-up function.

• Built-in power on reset (POR)

• Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)

• Watchdog Timer (WDT) with its own on-chip RC oscillator to prevent system stand still

• Built-in low power voltage reset (LVR)

• CMOS technology for low power consumption

System mode :

- SG8F160P supports four work modes
  - Normal: MCU turn on, XTAL(or HRC) and LRC turn on.
  - Slow: MCU turn on, XTAL(or HRC) turn off and LRC oscillator turn on.
  - Idle: MCU turn off, XTAL(or HRC) turn off and LRC oscillator turn on.
  - Sleep: MCU, XTAL(or HRC) and LRC oscillator turn off.

深圳市芯胜威电子 0755-84039893 E-mail：xsw2001@126.com http://xsw.dzsc.com

3. PIN ASSIGNMENT

Pin Name	Direction	Function description
GND	POWER	Negative power supply pin.
VDD	POWER	Positive power supply pin.
RST_EXTb/VPP	I	External reset signal.
P23 ~ P20	I/O	I/O port. These ports have Wake-up function, external interrupt function and pullup function.
OSCO	O	High frequency crystal oscillator output.
OSCI	I	High frequency crystal oscillator input. High frequency RC oscillator input.
P07 ~ P00	I/O	I/O port. These ports have Wake-up function, external interrupt function and pullup function.
VREF	I	Reference voltage input.
TS15 ~ TS0	I	Touch sensor signal input.
VC2	I	Comparator input.
VC1	I	Comparator input.
P17 ~ P10	I/O	I/O port. These ports have Wake-up function and pullup function.

Note1: The list is counterclockwise .

Note2: In OTP ROM programming mode, the shared pins are as follow,

RST_EXTb/VPP, high voltage program port.

P21 – DOUT, program data serial output port.

P20 – VPP_ACT, program active port.

TS4 – OEB, OTP ROM output enable port.

TS3 – PGMB, program enable port.

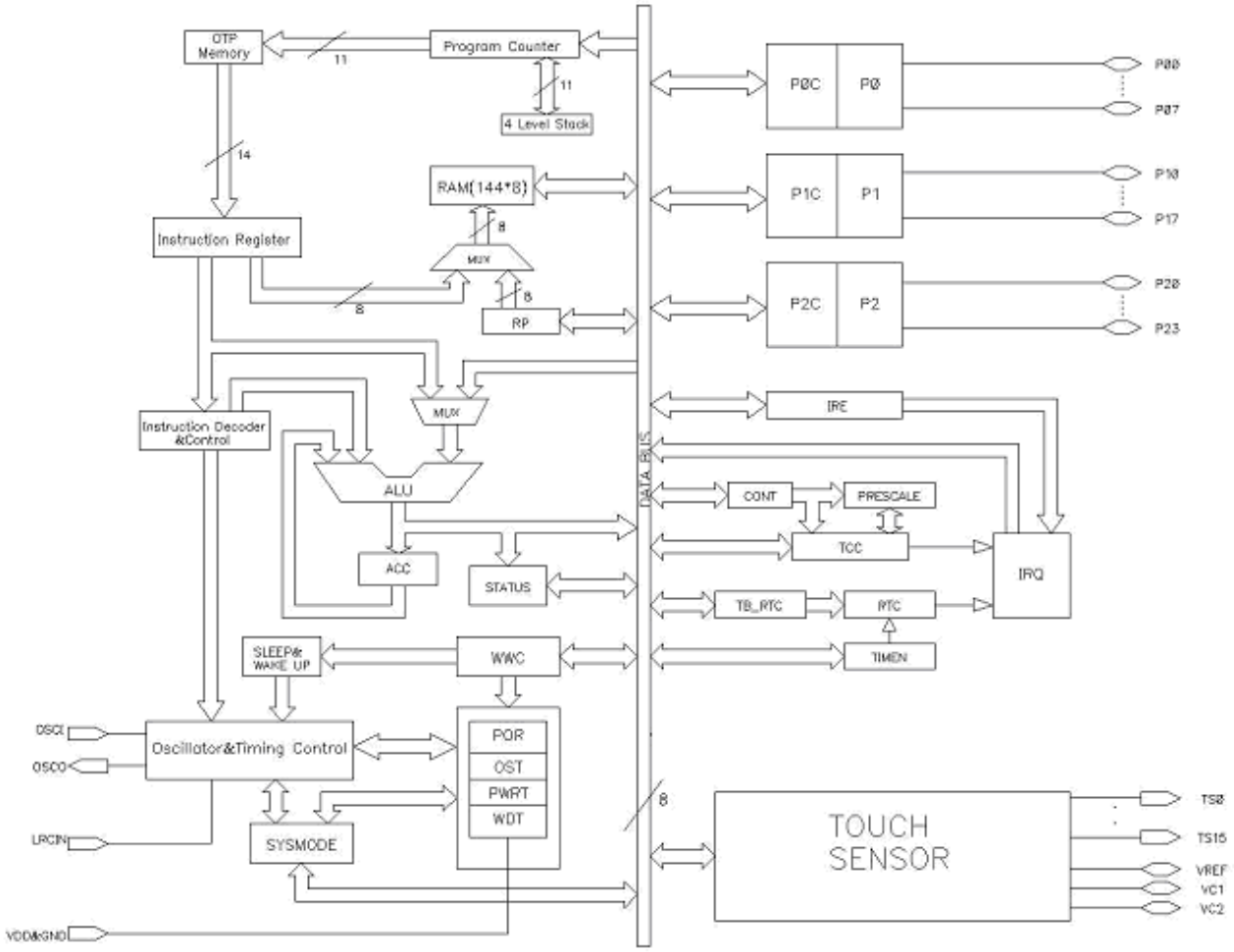
TS2 – DIN, program data input port.

TS1 – DCLK, program clock input port.

TS0 – CEB, chip enable port.

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

4. BLOCK DIAGRAM



5. ABSOULUTE MAXIMUM RATING

Symbol	Rating	Unit
Supply Voltage to Ground potential (VDD~GND)	-0.5~+6.0	V
Input Voltage (Vin)	GND-0.3<Vin<VDD+0.3	V
Output Voltage (Vout)	GND<Vout<VDD	V
Operating Temperature (Top)	-40~+85	℃
Storage Temperature (Tst)	-50~+100	℃
Operating Frequency (Fop)	32K~20M	Hz
ESD-HBM(Human Body Mode)	4000(min)	V

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

6. ELECTRICAL CHARACTERISTICS

6.1 DC CHARACTERISTICS

(VDD= 3.0V, No load, Main clock = 4MHz, subclock = 32768HZ with crystal mode. Ta = 25℃,)

Symbol	Parameter		Min.	Type	Max.	Unit	Test condition
VDD	Operating voltage		2.4		5.5	V	-
Isb	Operating current	Sleep	-	1	3	uA	MCU, XTAL(or HRC) and LRC oscillator turn off
Iop1		IDLE	-	4	6	uA	MCU turn off, XTAL(or HRC) turn off and LRC oscillator turn on
Iop2		Slow	-	25	30	uA	MCU turn on, XTAL(or HRC) turn off and LRC oscillator turn on
Iop3		Normal	-	0.55	0.7	mA	MCU turn on, XTAL(or HRC) and LRC turn on
Vih1	Input high voltage		-	2	-	V	Vdd=5V
Vil1	Input low voltage		-	1	-	V	Vdd=5V
Voh1	Output high voltage		4.5	-	-	V	Vdd=5V, Ioh=4mA
Vol1	Output low voltage		-	-	0.5	V	Vdd=5V,Iol=10mA
Ioh1	I/O output high current		3	4		mA	Vdd=5V, Voh=4.5V
Iol1	I/O output low current		9	10		mA	Vdd=5V,Vol=0.5V
Rup	Pull-up resistor			75		KΩ	Vdd=5V

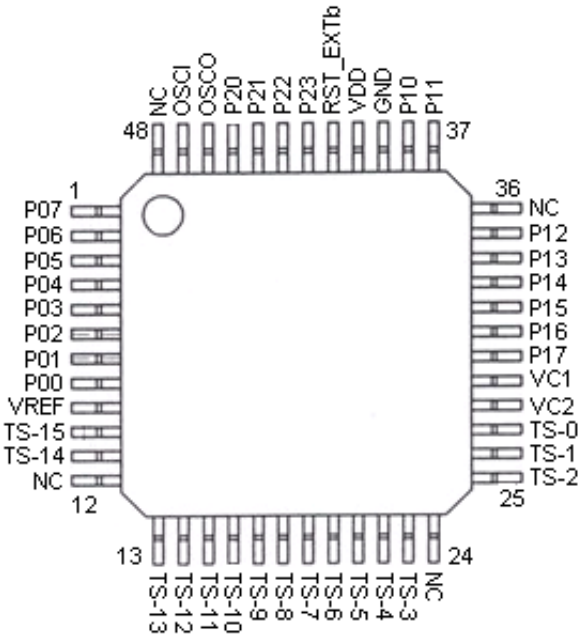
6.2 AC CHARACTERISTICS

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test condition
F_{LRC}	Internal RC Oscillator Frequency	-	200K	-	Hz	VDD=3V
F_{HRC}	External RC Oscillator Frequency	32K	-	8M	Hz	-

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test condition
F_{XTAL}	Crystal Oscillator Frequency	32768	-	20M	Hz	-
T_{CYC}	Instruction Cycle Time	-	2/Fosc	-	S	-
T_{POR}	POR Timer Period	-	33	-	ms	VDD=3V FOSC = 2MHz
T_{RST}	Reset Active Width	1	500		us	VDD=3V FOSC = 2MHz
T_{WDT}	Watch Dog Timer Period	-	20	-	ms	VDD = 3V
DF/F	RC OSC Frequency Stability	-	-	10	%	Fosc(3V)-Fosc(2.4V) Fosc(2.4V)

7. PACKAGE

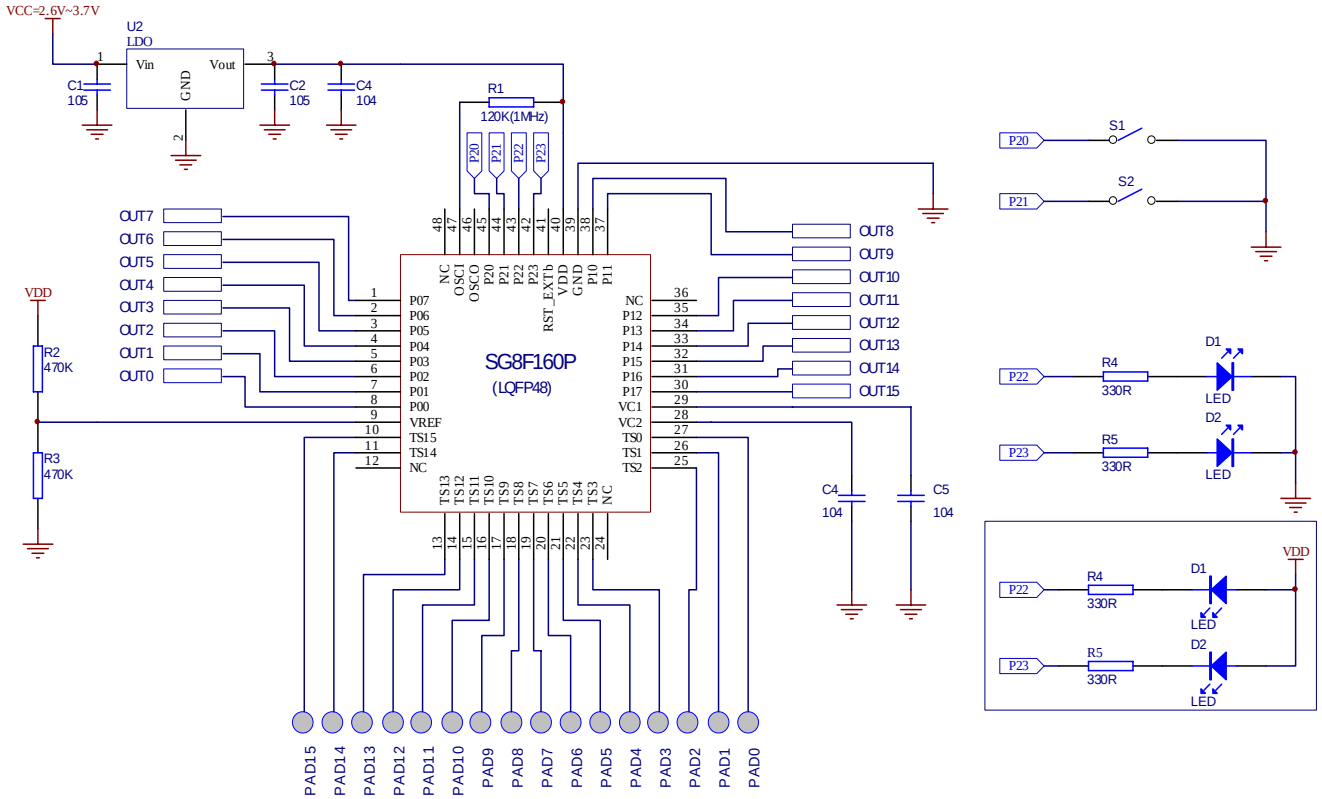


LQFP48

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

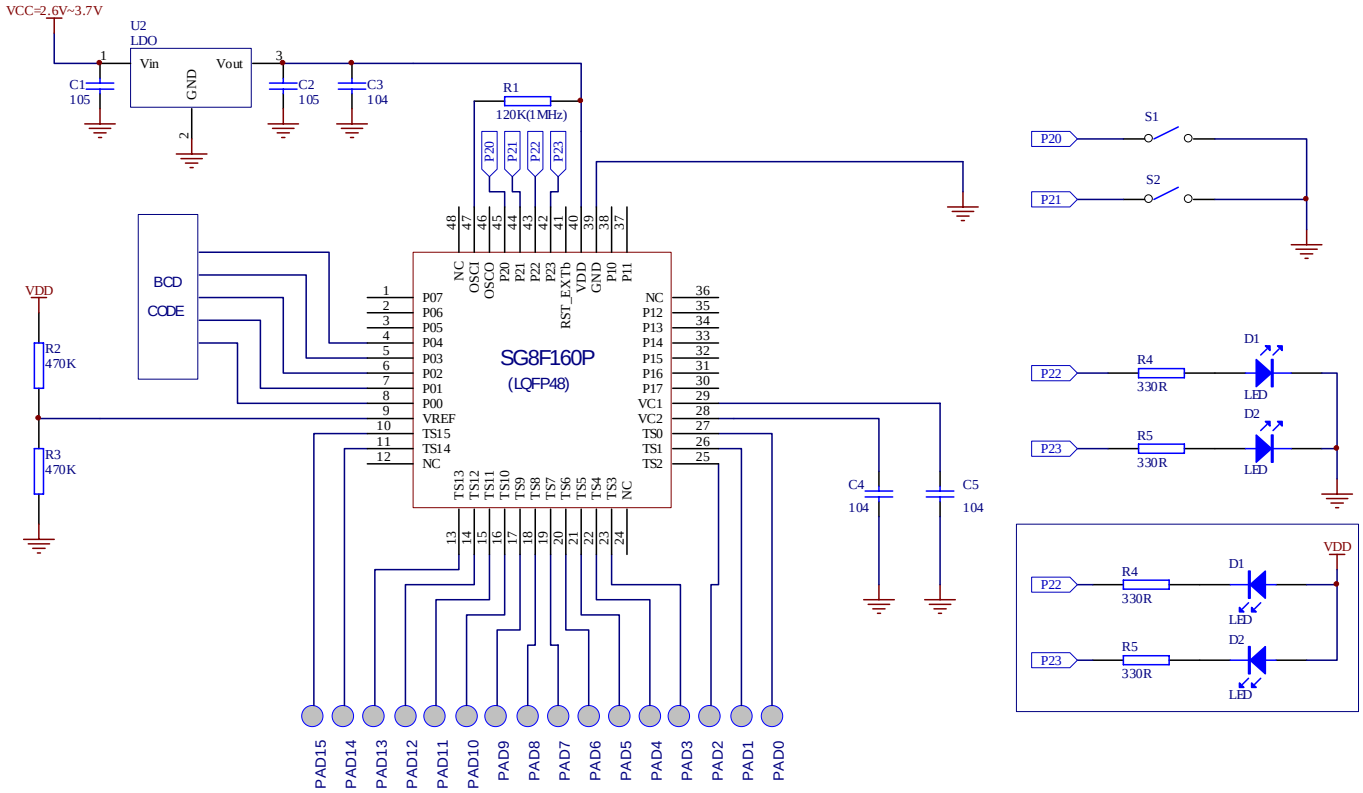
8.APPLICATION CIRCUIT

TYPE 1 —— OCOO（One Channel One Out）



深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

Type 2 —— BCD Code Output



The relation of RC oscillator frequency and resistor (HZ)

1. VDD=5.0V

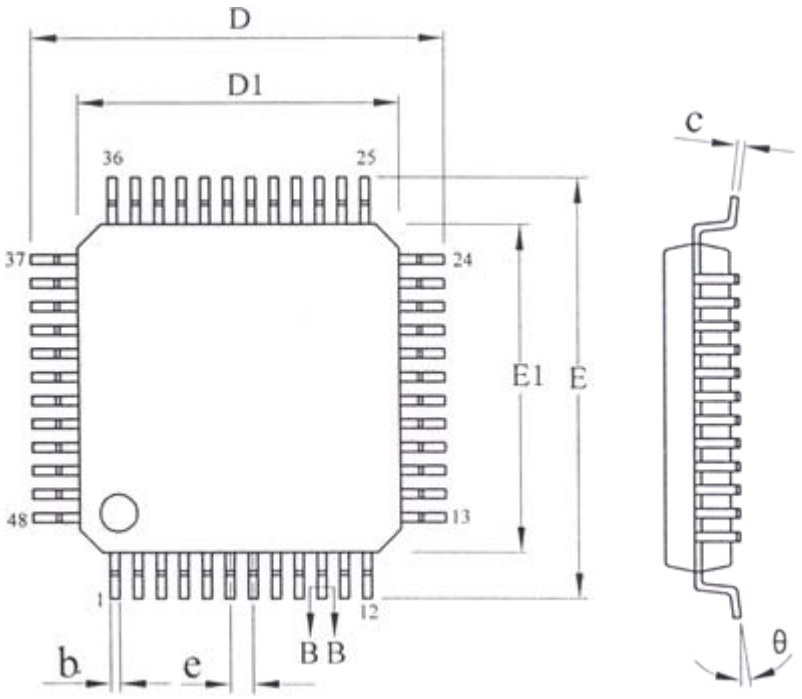
R_{OSC}（OHM）	1K	3.9K	9.1K	20K	56K	120K	300K	4.7M
F_{REQ}（HZ）	10M	8M	6M	4M	2M	1M	455K	32K

2. VDD=3.3V

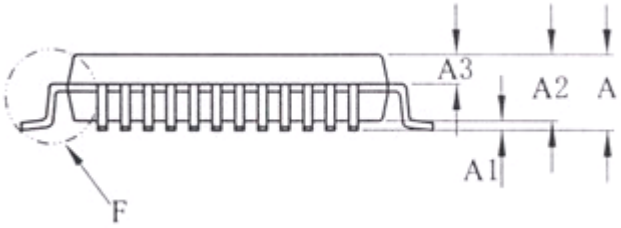
R_{OSC}（OHM）	3.6K	15K	47K	120K	300K	4.7M
F_{REQ}（HZ）	6M	4M	2M	1M	455K	32K

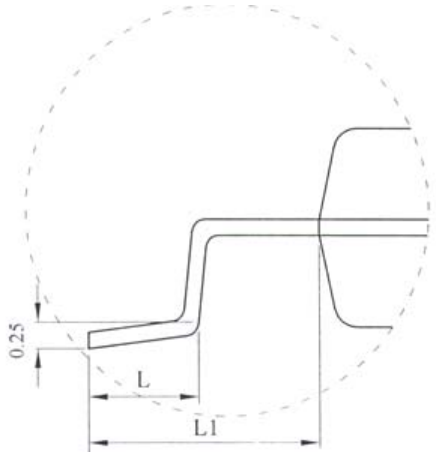
深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

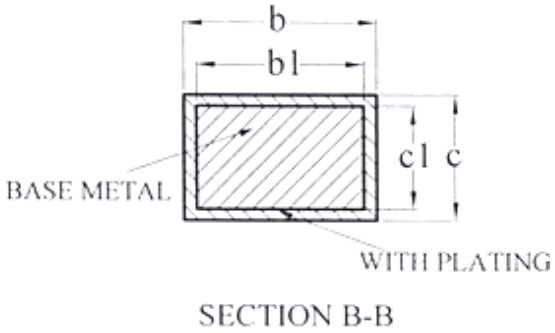
9. PACKAGE DISCRIPTION



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	0.15	0.25
A2	1.30	1.40	1.50
A3	0.54	0.64	0.74
b	0.19	—	0.27
b1	0.18	0.20	0.23
c	0.13	—	0.18
c1	0.12	0.13	0.14
D	8.80	9.00	9.20
D1	6.80	7.00	7.20
E	8.80	9.00	9.20
E1	6.80	7.00	7.20
e	0.50BSC		
L	0.35	0.50	0.65
L1	1.00BSC		
θ	0	—	8°







SECTION B-B

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com

10.REVISION HISTORY

Version	Update date	Revised Content	Revised By	Confirmed By
V1.0	2007-8-6	Original version	Joan	Alan
V1.2	2007-9-26	1.Modify the Block Diagram 2.Modify the Absolute Maximum Rating 3.Add the Electrical Characteristics	Kate	Alan

深圳市芯胜威电子 0755-84039893 E-mail: xsw2001@126.com http://xsw.dzsc.com