



# SPECIFICATION

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**SG8F080P**

**8-BIT MCU With Embedded Touch Sensor**

**Version 1.1**

**Sigma reserves the right to change this documentation without prior notice.**



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## 1. GENERAL DESCRIPTION

The SG8F080P is 8 bit MCU with 8 channels of touch sensor and 10 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
- 4Kx14 bits OTP ROM for program.
  - 6 level stacks for subroutine nesting
- 144x8 bits SRAM, and 128 bytes split to 4 banks.
- 2 bi-directional I/O ports (10 I/O pins)
  - P07-P00 has wake-up function, Pullup function and external interrupt function.
  - P21-P20 has wake-up function, Pullup function and external interrupt function.
- Clock Sources
  - HRC(32KHz~8MHz)
  - Crystal oscillator (32768Hz~20MHz)
  - LRC(200KHz)
- 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
- Touch sensor

- 8 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 :**

- SG8F080P 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.

### 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.
P21 ~ P20	I/O	I/O port. These ports have Wake-up function, external interrupt function and pullup function.
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.
TS7 ~ TS0	I	Touch sensor signal input.
VC2	I	Comparator input.
VC1	I	Comparator input.

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.

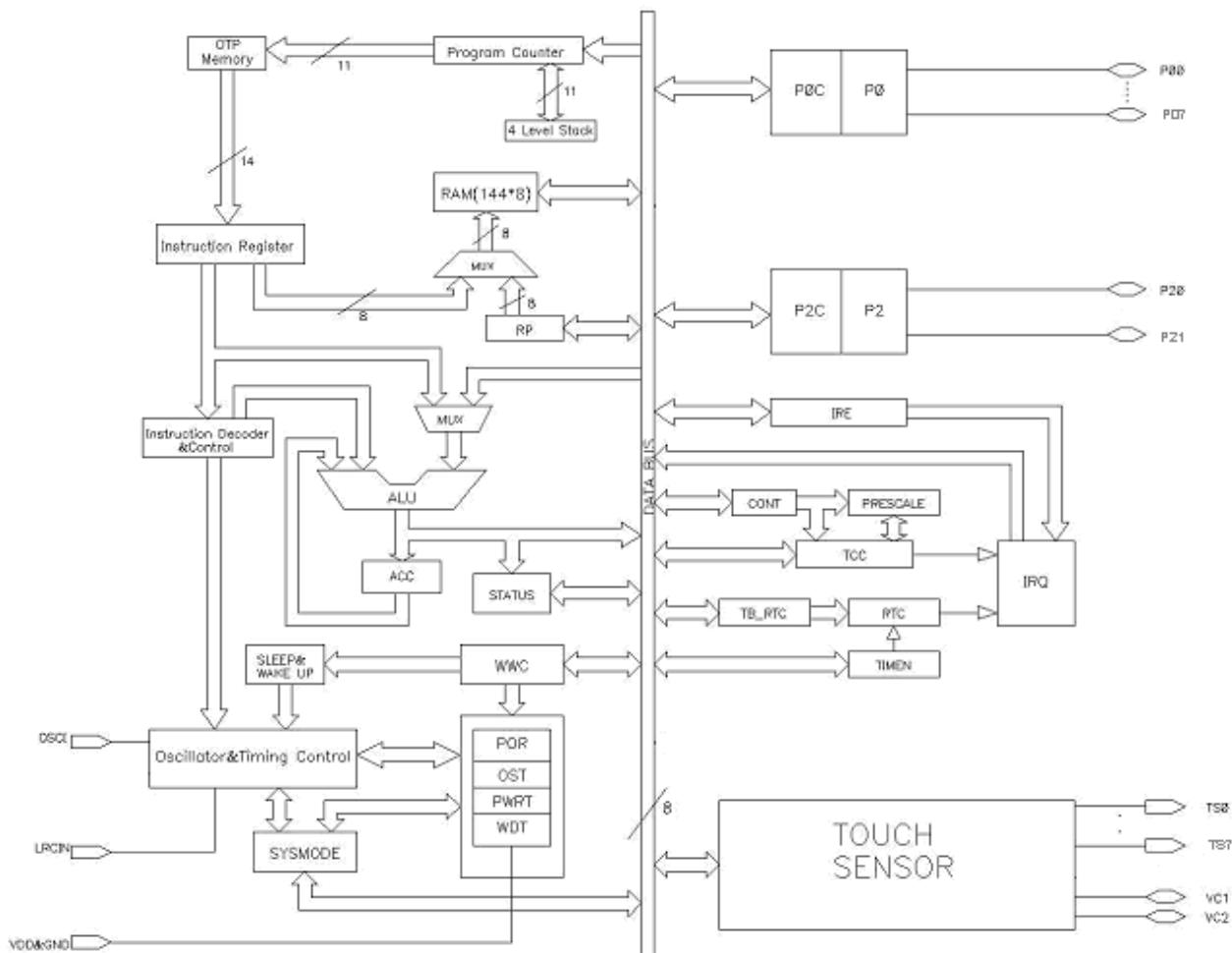
TS2 – DIN, program data input port.

TS1 – DCLK, program clock input port.

TS0 – CEB, chip enable port.



## 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	°C
Storage Temperature (Tst)	-50~+100	°C
Operating Frequency (Fop)	32K~20M	Hz
ESD-HBM(Human Body Mode)	4000(min.)	V

## 6. ELECTRICAL CHARACTERISTICS

### 6.1 DC CHARACTERISTICS

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

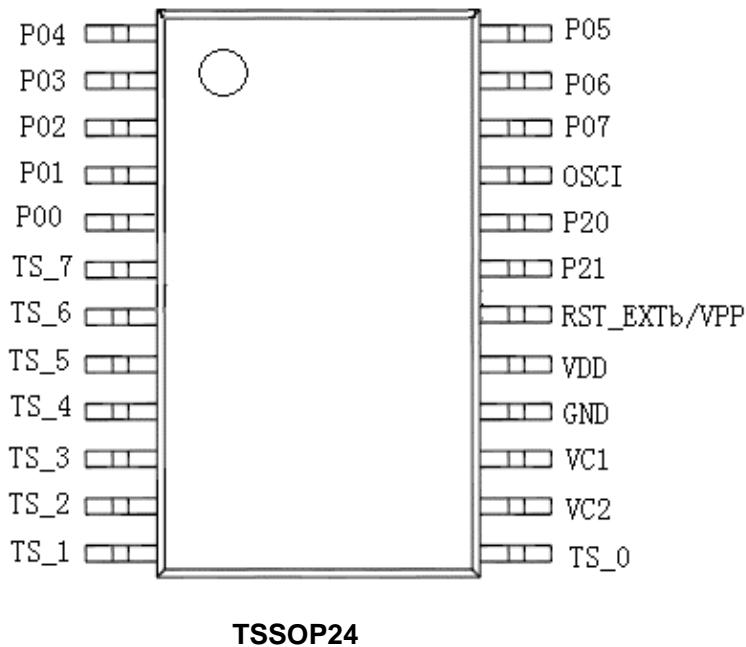
Symbol	Parameter		Min.	Type	Max.	Unit	Test condition
<b>VDD</b>	Operating voltage		2.4		5.5	V	-
<b>I<sub>sb</sub></b>	Operating current	Sleep	-	1	3	uA	MCU, XTAL(or HRC) and LRC oscillator turn off
<b>I<sub>op1</sub></b>		IDLE	-	4	6	uA	MCU turn off, XTAL(or HRC) turn off and LRC oscillator turn on
<b>I<sub>op2</sub></b>		Slow	-	25	30	uA	MCU turn on, XTAL(or HRC) turn off and LRC oscillator turn on
<b>I<sub>op3</sub></b>		Normal	-	0.55	0.7	mA	MCU turn on, XTAL(or HRC) and LRC turn on
<b>V<sub>ih1</sub></b>	Input high voltage		-	2	-	V	Vdd=5V
<b>V<sub>il1</sub></b>	Input low voltage		-	1	-	V	Vdd=5V
<b>V<sub>oh1</sub></b>	Output high voltage		4.5	-	-	V	Vdd=5V, I <sub>oh</sub> =4mA
<b>V<sub>ol1</sub></b>	Output low voltage		-	-	0.5	V	Vdd=5V, I <sub>ol</sub> =10mA
<b>I<sub>oh1</sub></b>	I/O output high current		3	4		mA	Vdd=5V, V <sub>oh</sub> =4.5V
<b>I<sub>ol1</sub></b>	I/O output low current		9	10		mA	Vdd=5V, V <sub>ol</sub> =0.5V
<b>R<sub>up</sub></b>	Pull-up resistor			75		KΩ	Vdd=5V

## 6.2 AC CHARACTERISTICS

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test condition
<b>F<sub>LRC</sub></b>	Internal RC Oscillator Frequency	-	200K	-	Hz	VDD=3V
<b>F<sub>HRC</sub></b>	External RC Oscillator Frequency	32K	-	8M	Hz	-
<b>F<sub>XTAL</sub></b>	Crystal Oscillator Frequency	32768	-	20M	Hz	-
<b>T<sub>CYC</sub></b>	Instruction Cycle Time	-	2/Fosc	-	S	-
<b>T<sub>POR</sub></b>	POR Timer Period	-	33	-	ms	VDD=3V FOSC = 2MHz
<b>T<sub>RST</sub></b>	Reset Active Width	1	500		us	VDD=3V FOSC = 2MHz
<b>T<sub>WDT</sub></b>	Watch Dog Timer Period	-	20	-	ms	VDD = 3V
<b>DF/F</b>	RC OSC Frequency Stability	-	-	10	%	<u>Fosc(3V)-Fosc(2.4V)</u> <u>Fosc(2.4V)</u>



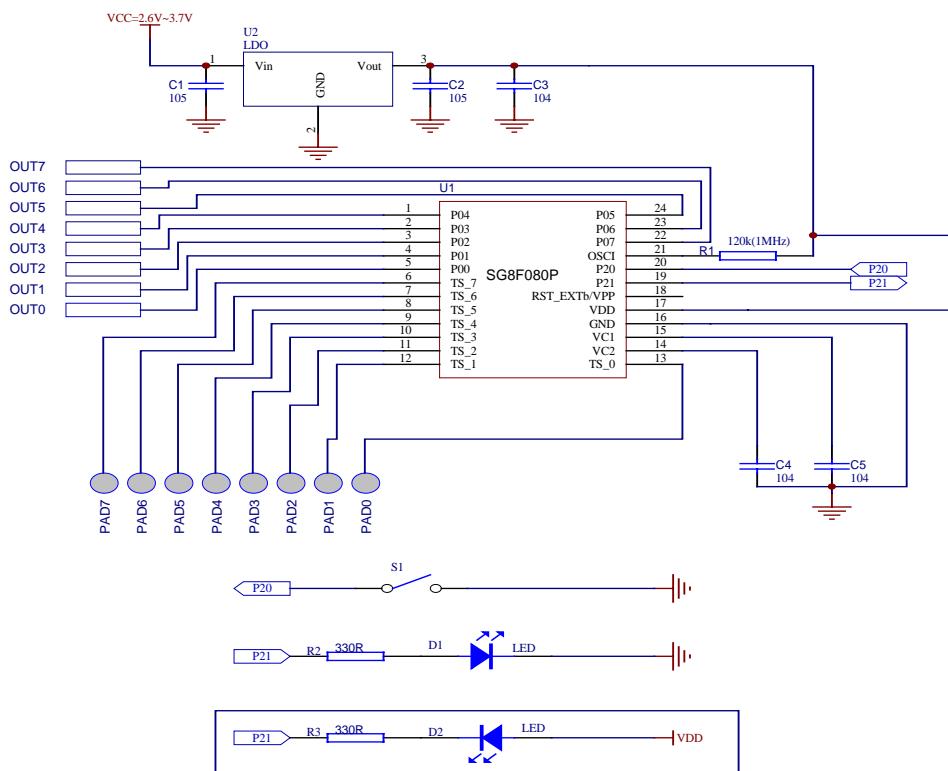
## 7. PACKAGE



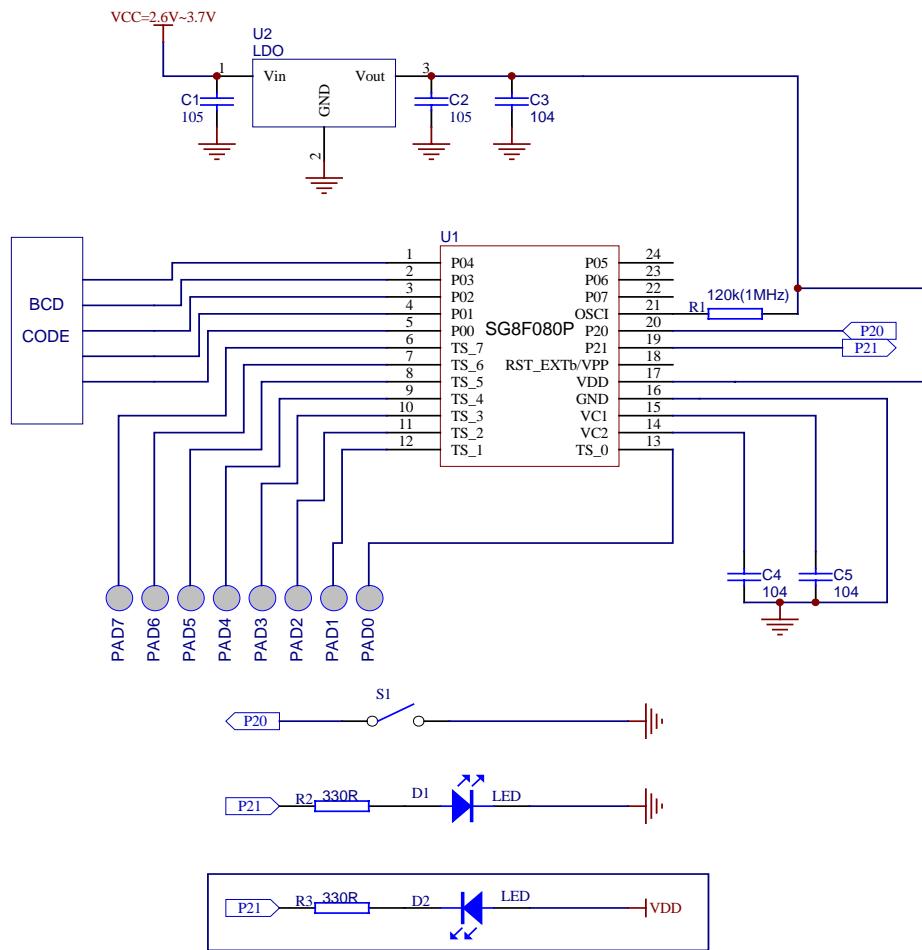
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## 8. APPLICATION CIRCUIT

TYPE 1 —— OCOO (One Channel One Out)



## Type 2 —— BCD Code Output



## The relation of RC oscillator frequency and resistor (HZ)

1. VDD=5.0V

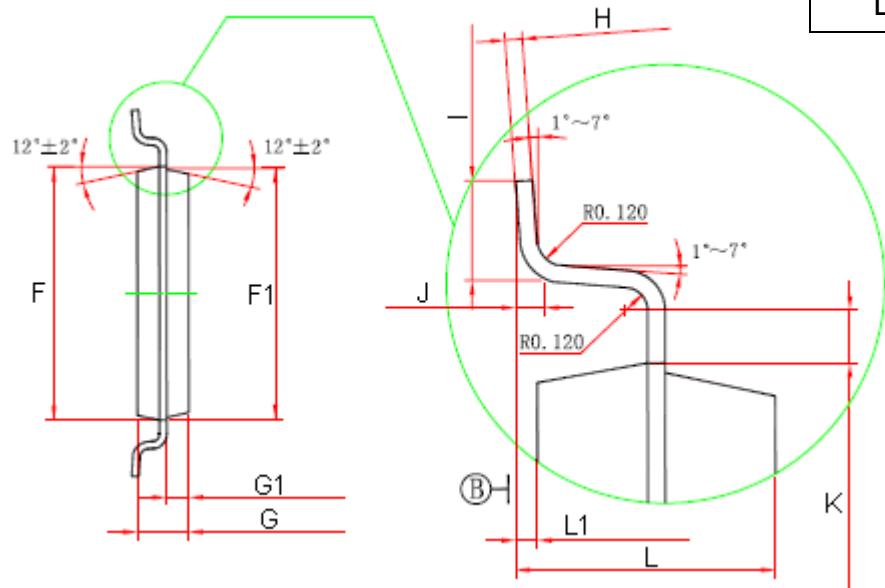
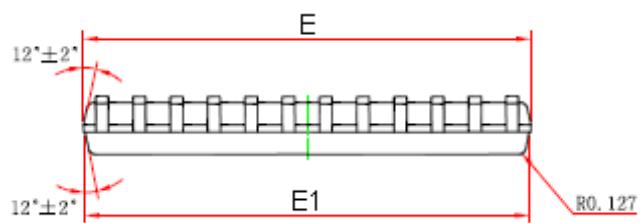
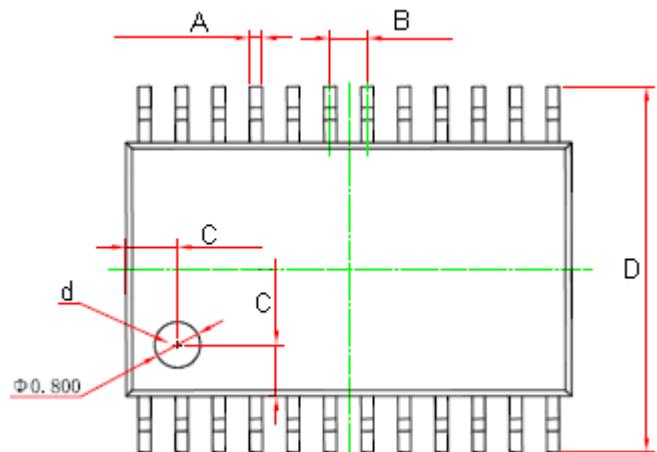
R <sub>OSC</sub> (OHM)	1K	3.9K	9.1K	20K	56K	120K	300K	4.7M
F <sub>REQ</sub> (HZ)	10M	8M	6M	4M	2M	1M	455K	32K

2. VDD=3.3V

R <sub>OSC</sub> (OHM)	3.6K	15K	47K	120K	300K	4.7M
F <sub>REQ</sub> (HZ)	6M	4M	2M	1M	455K	32K



## 9. PACKAGE DESCRIPTION



SYMBOL	SIZE(mm)
A	0.19~0.30
B	0.650
C	0.900
D	6.400±0.150
E	7.800±0.100
E1	7.740±0.100
F	4.400±0.100
F1	4.340±0.100
G	0.900±0.100
G1	0.387±0.030
H	0.09~0.20
I	0.600±0.100
J	0.250
K	0.250(0.200min)
L	1.100max
L1	0.02~0.150

## 10. REVISION HISTORY

Version	Update date	Revised Content	Revised By	Confirmed By
V1.0	2007-8-6	Original version	Joan	Alan
V1.1	2007-9-25	1.Modify the Block Diagram 2.Modify the Application Circuit 3.Modify the Absolute Maximum Rating 4.Add the Electrical Characteristics	Kate	Alan