

# 1 Overview

STC8F family of MCUs are single clock/machine cycle (which is also called 1T) microcontrollers produced by STC Co. Ltd. It is a new generation of 8051 core MCU with wide voltage range, high speed, high reliability, low power and super strong anti- interference. STC8F family of MCUs use STC ninth generation encryption technology so that they can not be decrypted. They have a fully compatible instruction set with traditional 8051 family of microcontroller. With the enhanced kernel, STC8F family of MCUs are faster than the traditional 8051 MCU at about 11.2~13.2 times.

High precision of  $\pm 0.3\%$  R/C clock is integrated in MCU with  $\pm 1\%$  temperature drift under the temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , and  $\pm 0.6\%$  temperature drift under normal temperature range from  $-20^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$ . The frequency of RC clock can be set from 5MHz to 30MHz when programming a MCU using ISP. Moreover, high reliable reset circuit with 4 level optional reset threshold voltage is integrated in MCU. So, external expensive crystal and the external reset circuit can be eliminated completely.

There are three optional clock sources inside the MCU, internal 24MHz high precision IRC, internal 32KHz low speed IRC, external 4MHz~33MHz oscillator or external clock signal. The clock source can be freely chosen in the user code. After the clock source is selected, it can be 8-bit divided freely, and then be supplied to the CPU and the peripherals.

Two low power modes are provided in MCU: the IDLE mode and the STOP mode. In IDLE mode, CPU stops executing instructions, but all peripherals are still working. At this moment, the power consumption is about 1.5mA at 6MHz working frequency. The STOP mode is the power off mode. At this moment, the CPU and all peripherals stop working, and the power consumption can be reduced to about 0.1uA.

Rich digital peripherals and analog peripherals are provided in MCU, including 4 serial ports, 5 timers, 4 sets of PCA, 8 groups of enhanced PWM and I2C, SPI, 16 channels 12 bit ADC and comparator, which can meet almost all the needs of users when designing a product.

The enhanced dual data pointers are integrated in the STC8F family of microcontrollers. Using program control, the function of automatic increasing or decreasing of data pointer and automatic switching of two sets of data pointers can be realized.

Product	UART	Timers	ADC	Enhanced PWM	PCA	Comparator	I <sup>2</sup> C	SPI
STC8F8K64S4A10	●	●	●	●	●	●	●	●
STC8A8K64S4A12	●	●	●	●	●	●	●	●
STC8F2K64S4	●	●			●	●	●	●

## 2 Features

### 2.1 Features and Prices of STC8F1K08S2 family

#### ✓ Prices of different selections

Microcontroller Model	Operating Voltage (V)	Flash Program Memory 100K times bytes	Large Capacity Expansion SRAM bytes	Powerful dual DPTR Increase or Decrease	EEPROM 100K times bytes	I/O maximum number	Serial ports Power-down wake-up	SPI	I <sup>2</sup> C	Timer/Counter(External Pow-down Wake-up)	16 bits advanced PWM Timers	15 bits Enhanced PWM(Dead Zone Control)	PCA/CCP/PWM(can be external interrupt)	Power-down wake-up timer	15 High speed ADC(8 PWM as 8D/A use)	Comparators(1 A/D ext brownout detection)	Internal Low-vol Detection interrupt Pow-wk	Watchdog Reset timer	Internal Reset(optional reset threshold vol)	Internal Clock(24MHz Adjustable)	External clock output and reset	Program encrypted transmission	Set password for next update procedure	Support RS485 download	Support USB download	Online simulation	Footprint			2018 new product inf					
																											TSSOP20	SOP16	SOP8						
STC8F1K08S2	2.0-5.5	8K	1.2K	2	3K	18	2	Yes	Yes	3	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	¥1.15	¥1.1	-	May Sample delivery
STC8F1K08S	2.0-5.5	8K	1.2K	2	3K	18	1	Yes	Yes	3	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	?	May Sample delivery

#### ✓ Core

- ✓ Enhanced 8051 Core with single clock per machine cycle (1T)
- ✓ Fully compatible instruction set with traditional 8051
- ✓ 14 interrupt sources and 4 interrupt priority levels
- ✓ Online debugging is supported

#### ✓ Operating voltage

- ✓ 2.0 to 5.5V
- ✓ Built-in LDO

#### ✓ Operating temperature

- ✓ -40°C~85°C

#### ✓ Flash memory

- ✓ Up to 11Kbytes of Flash memory to be used to store user code
- ✓ Configurable EEPROM size, 512bytes single page erased, can be repeatedly erased more than 100 thousand times.
- ✓ In-System-Programming, ISP in short, can be used to update the application code, no need for programmer.
- ✓ Online debugging with single chip is supported, and no emulator is needed. The number of breakpoints is unlimited theoretically.

#### ✓ SRAM

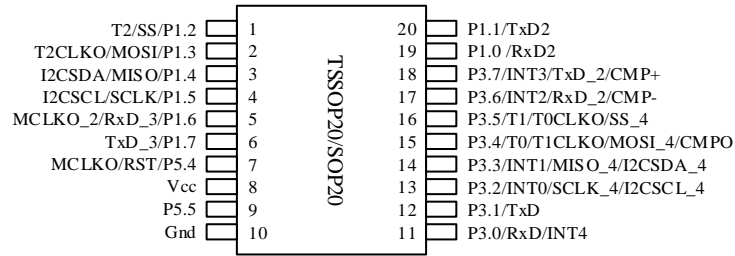
- ✓ 128 bytes internal direct access RAM
- ✓ 128 bytes internal indirect access RAM
- ✓ 1024 bytes internal extended RAM

- ✓ **Clock**
  - ✓ Internal 24MHz high precise R/C clock IRC
    - ⊕ Error:  $\pm 0.3\%$
    - ⊕ Temperature drift:  $\pm 1.0\%$  at the temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  and  $\pm 0.6\%$  at the temperature range of  $-20^{\circ}\text{C}$  to  $65^{\circ}\text{C}$
  - ✓ Internal 32KHz low speed IRC with large error
  
- ✓ **Reset**
  - ✓ Hardware reset
    - ⊕ Power-on reset
    - ⊕ Reset by reset pin with high reset pulse
    - ⊕ Watch dog timer reset
    - ⊕ Low voltage detection reset. 4 low voltage detection levels are provided, 2.2V, 2.4V, V2.7, V3.0
  - ✓ Software reset
    - ⊕ Writing the reset trigger register using software
  
- ✓ **Interrupts**
  - ✓ 14 interrupt sources: INT0, INT1, INT2, INT3, INT4, timer0, timer1, timer2, uart1, uart2, LVD, SPI, I<sup>2</sup>C, comparator
  - ✓ 4 interrupt priority levels
  
- ✓ **Digital peripherals**
  - ✓ 3 16-bit timers: timer0, timer1, timer2. Where the mode 3 of timer0 has the Non Maskable Interrupt (NMI in short) function. Mode 0 of timer0 and timer1 is 16-bit Auto-reload mode.
  - ✓ 2 high speed UARTs: uart1, uart2. whose baud rate clock source may be fast as FOSC/4
  - ✓ SPI: Master mode, slave mode or master/slave automatic switch mode are supported.
  - ✓ I<sup>2</sup>C: Master mode or slave mode are supported.
  
- ✓ **Analog peripherals**
  - ✓ Comparator
  
- ✓ **GPIO**
  - ✓ Up to 18GPIOs: P0.0~P0.7, P1.0~P1.7, P5.4~P5.5
  - ✓ 4 modes for all GPIOs: quasi-bidirectional mode, push-pull output mode, open drain mode, high-impedance input mode
  
- ✓ **Package**
  - ✓ TSSOP20, SOP16, SOP8

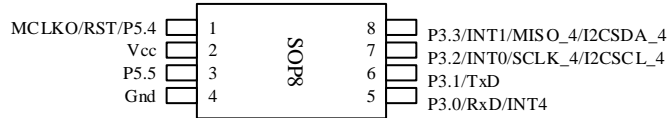
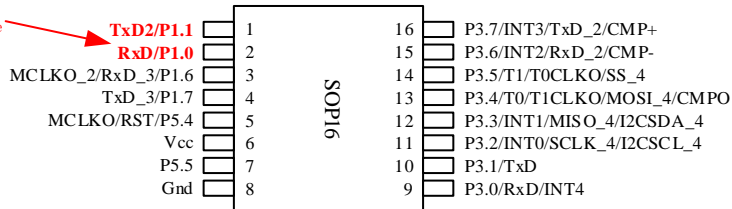
# 3 Pinouts and pin descriptions

## 3.1 Pinouts

### 3.1.1 STC8F1K08S2 family pinouts



Note: The P1.0 and P1.1 pins are not the same as the STC8F2K series.



## 3.2 Pin descriptions

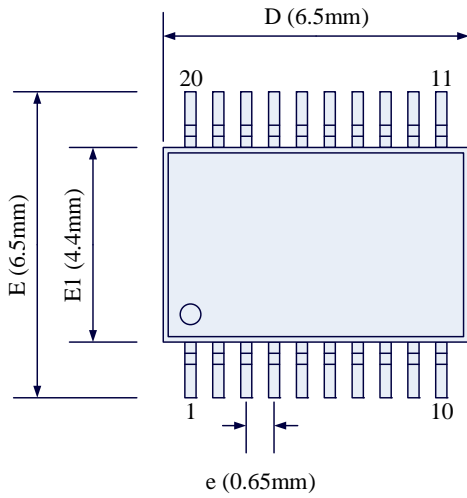
### 3.2.1 STC8F1K08S2 family pin descriptions

Number			Name	Class	Instruction
TSSOP20	SOP16	SOP8			
20	1		P1.1	I/O	Standard IO Pins
			TxD2	O	Serial Port 2 Transport Pin
1			P1.2	I/O	Standard IO Pins
			SS	I	SPI Host output slave input
			T2	I	Timer 2 external clock input
2			P1.3	I/O	Standard IO Pins
			MOSI	I/O	SPI master output slave input
			T2CLKO	O	Timer 2 clock frequency output
3			P1.4	I/O	Standard IO Pins
			MISO	I/O	SPI master input slave output
			SDA	I/O	I2C interface data line
4			P1.5	I/O	Standard IO Pins
			SCLK	I/O	SPI Clock pin
			SCL	I/O	I2C Clock pin
5	3		P1.6	I/O	Standard IO Pins
			RxD_3	I	Serial Port 1 Receive Pin
			XTALO	O	Output pin of external crystal
			MCLKO_2	O	Main clock frequency output
6	4		P1.7	I/O	Standard IO Pins
			TxD_3	O	Serial Port 1 Transport Pin
			XTALI	I	External crystal/external clock input pin
7	5	1	P5.4	I/O	Standard IO Pins
			RST	I	Reset pin
			MCLKO	O	Main clock frequency output
8	6	2	Vcc	VCC	VCC
9	7	3	P5.5	I/O	Standard IO Pins
10	8	4	Gnd	GND	GND
11	9	5	P3.0	I/O	Standard IO Pins
			RxD	I	Serial Port 1 Receive Pin
			INT4	I	External interrupt 4

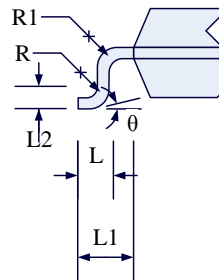
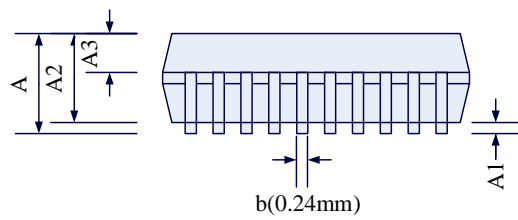
Number			Name	Class	Instruction
TSSOP20	SOP16	SOP8			
12	10	6	P3.1	I/O	Standard IO Pins
			TxD	O	Serial Port 1 Transport Pin
13	11	7	P3.2	I/O	Standard IO Pins
			INT0	I	External interrupt 0
			SCL_4	I/O	I2C Clock line
			SCLK_4	I/O	SPI Clock line
14	12	8	P3.3	I/O	Standard IO Pins
			INT1	I	External interrupt 1
			SDA_4	I/O	I2C interface data line
			MISO_4	I/O	SPI master input slave output
15	13		P3.4	I/O	Standard IO Pins
			T0	I	Timer 0 external clock input
			T1CLKO	O	Timer 1 clock frequency output
			MOSI_4	I/O	SPI master output slave input
			CMPO	O	Comparator output
16	14		P3.5	I/O	Standard IO Pins
			T1	I	Timer 1 external clock input
			T0CLKO	O	Timer 0 clock divider output
			SS_4	I	SPI slave select pin (host output)
17	15		P3.6	I/O	Standard IO Pins
			INT2	I	External interrupt 2
			WR_2	O	External bus write signal line
			RxD_2	I	Serial Port 1 Receive Pin
			CMP-	I	Comparator negative input
18	16		P3.7	I/O	Standard IO Pins
			INT3	I	External Interrupt 3
			RD_2	O	External bus read signal line
			TxD_2	O	Serial Port 1 Transport Pin
			CMP+	I	Comparator positive input
19	2		P1.0	I/O	Standard IO Pins
			RxD2	I	Serial Port 2 Receive Pin

# 4 Package characteristics

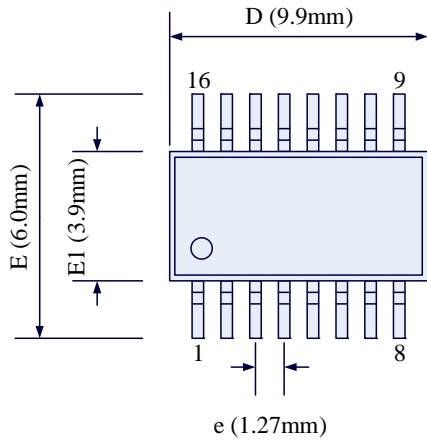
## 4.1 TSSOP20 package mechanical data



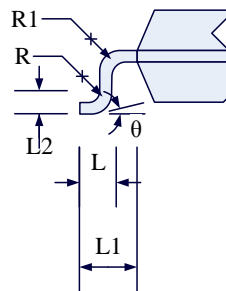
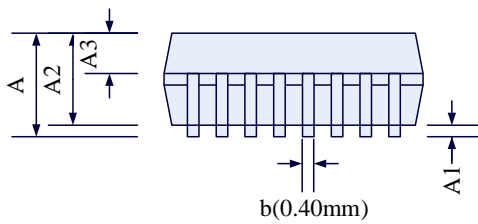
general size			
units of measurement: mm			
SYMBOL	MIN	TYP	MAX
A	-	-	1.20
A1	0.05	-	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	0.24	0.28
D	6.40	6.50	6.60
E	6.20	6.50	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00REF		
L2	0.25BSC		
R1	0.09	-	-
R2	0.09	-	-



## 4.2 SOP16 package mechanical data

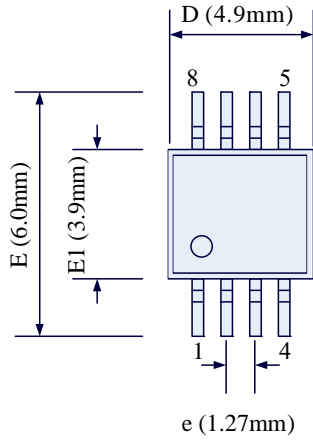


general size			
units of measurement: mm			
SYMBOL	MIN	TYP	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.35	0.40	0.45
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R1	0.07	-	-
R2	0.07	-	-





### 4.3 SOP8 package mechanical data



general size			
units of measurement: mm			
SYMBOL	MIN	TYP	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.35	0.40	0.45
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R1	0.07	-	-
R2	0.07	-	-

