TX8C1260 Datasheet

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Reversion History

Date	Version	Descriptions	Reviser
2022/09/06	V1.0	Create from The Chinese copy.	ZJ、HLW
2022/09/12	V1.1	Check and modify some description.	ZJ

Contents

1 Product Overview

1.1 Introduction

TX8C1260 is an **8051 core** MCU with high performance and low power consumption, whose operating frequency is up to **48MHz**. It has **16K bytes** flash memory (EEPROM support) and **2K bytes SRAM**.

Analog resources: one **12-bit 500Ksps SARADC.**

Timer resources: six **16-bit** advanced timers (each advanced timer supports three pair of dead band/complementary PWM), five **16-bit** general timer (supports Capture, Count and PWM functions),one **16-bit** wake-up timer(supports Capture, Count and PWM functions), one **8-bit** beep timers (supports Capture and Count functions) and one watchdog timer.

Standard communication interface: one **SPI** interface、one IIC interface and two **UART** interfaces（UART supports DMA mode）.

LED display：

Support 8COM x 12SEG.

GPIO:

Built in 30K pull-down resistor, multiple drive gears can be configured, each IO can be used as an input of ADC, and each IO can be used as an IO interrupt wake-up port.

It supports a wide range of voltage supply. The operating voltage ranges from **2.4V to 5.5V** (supports battery application scenarios), and the operating temperature range is **-40℃~ 105℃**. A variety of power-saving working modes ensure the requirements of low-power applications, and the lowest power consumption mode is about **5uA**.

TX8C1260 provides **QFN20、TSSSOP20、SSOP20、SSOP28、SOP20、SOP16、SOP8** packaging forms. And according to different packaging forms, the peripheral resource configuration in the device is not the same.

Applications:

- small home appliance
- electronic cigarettes
- Bluetooth charging bin and wireless charging

- Toys
- Include 003 series MCU products.

1.2 Features

- **Core**
  - ultra-high speed 8051 core (1T)
  - instructions are fully compatible with the traditional 8051
  - maximum operating frequency: 48MHz
  - 32 interrupt sources, supporting two-level priority hardware
  - support on-line download
  - support code encryption
  - support no power-down program
- **Operating Voltage**
  - 2.4V to 5.5V wide voltage range power supply
- **Memory**
  - 16K byte Flash, which is used to store user code and supports EEPROM (typical value of erasure times: 100,000 cycle)
  - 2K byte RAM
- **Clock**
  - internal 1~48MHz high-precision HIRC, supporting calibration (error ±1%)
  - internal 64KHz low-speed LIRC, supporting calibration (error ±1%)
  - external 32.768KHz low-speed crystal oscillator requires external capacitance
- **Reset**
  - power on reset
  - low voltage reset
  - reset pin reset
  - watchdog overflows reset
  - provide 8 levels of low voltage detection voltage (2.0/2.2/2.4/2.7/3.0/3.7/4.0/4.3V)
- **Digital -Peripherals**

- one SPI high-speed serial interface that supports master and slave mode
- One IIC interface,support master and slave mode
- two UART interfaces, up to 4Mbps data rate,UART1 support DMA mode.

- **Timer Resources**
  - Six 16-bit advanced timers, and each supports three pair of complementary outputs or six independent PWM outputs (with the same cycle and independent duty cycle configuration), supports dead band insertion and event braking functions, and supports single pulse mode
  - Five 16-bit general timer that supports Capture, Count, and PWM functions
  - one **16-bit** wake-up timer(supports Capture, Count and PWM functions)
  - one **8-bit** beep timers (supports Capture and Count functions)
  - one watchdog timer
- **LED Display**
  - Support 8COM x 12SEG
- **High Security**
  - support 32-bit CRC check to ensure data accuracy
- **Low Power Consumption**
  - support low-power modes of Idle, Stop and Sleep
  - static power consumption （5uA at 25℃, 3uA at 25℃, 3.3V）
  - low power consumption wake-up time is less than 100us
- **A high Precision 12-bit Analog-To-Digital Converter (ADC)**
  - the convert clock supports maximum frequency of 10MHz and maximum speed of 500Ksps
  - offset correction step is 2mV, DNL +/-2 INL +/-4, ENOB 10bit
  - external input channels can select any IO ,and have 2 analog channels
  - ADC supports external VCC and internal 2.0/2.4/3.0/3.6/4.2V as reference
  - support built-in reference voltage sampling
- **GPIO**
  - all ports can input and output 5V signals
  - all support rising edge/falling edge/bilateral edge interruption
  - All support Pull up and Pull down resistance function
  - all support the wake-up function

- programmable driving capability, driving current range of 4mA ~ 64mA, each gear can be adjusted by about 4mA.
- support open-drain low and high output mode.
- support independently controlled pull-up and pull-down resistance of 30KΩ

- **High Reliability**
  - ESD HBM 6KV
  - Latch-up ±200 mA at 25℃
- **96-bit Chip Unique ID (UID)**
- **Encapsulation**
  - TSSOP20
  - SSOP20/SSOP28
  - QFN20
  - SOP8/SOP16/SOP20
- **Operating Temperature Range**
  - -40℃ ~ 105℃

1.3 Pin Assignment

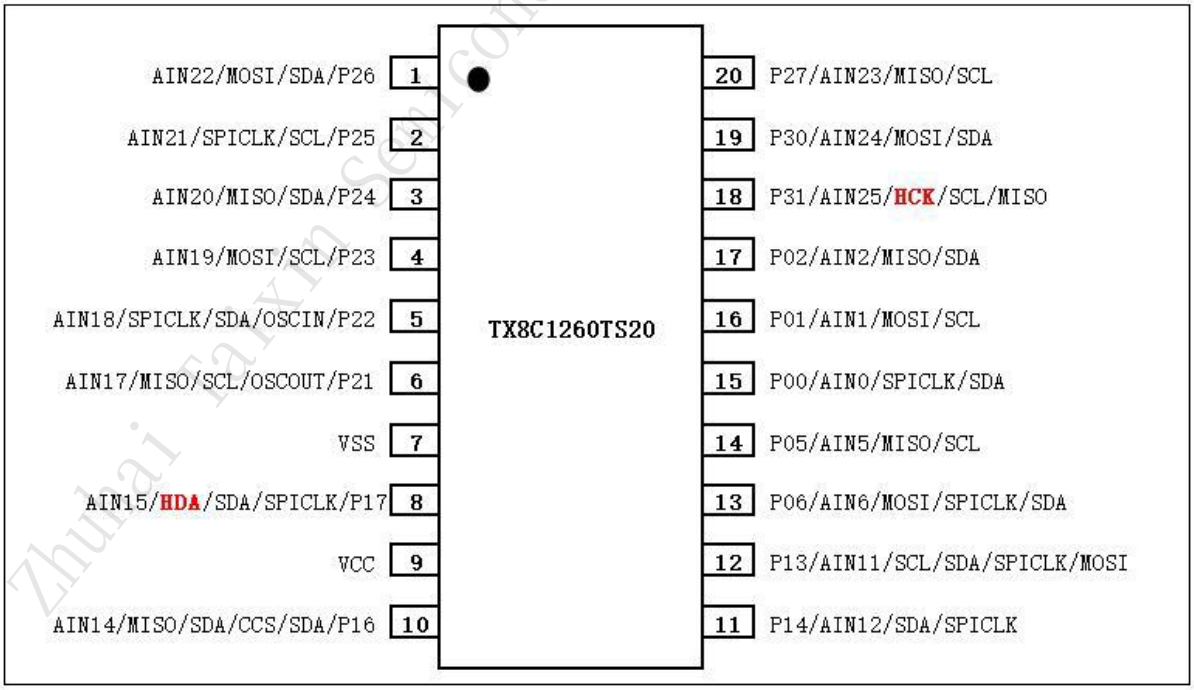


Figure 1-1 Pin of TX8C1260TS20（TSSOP20）

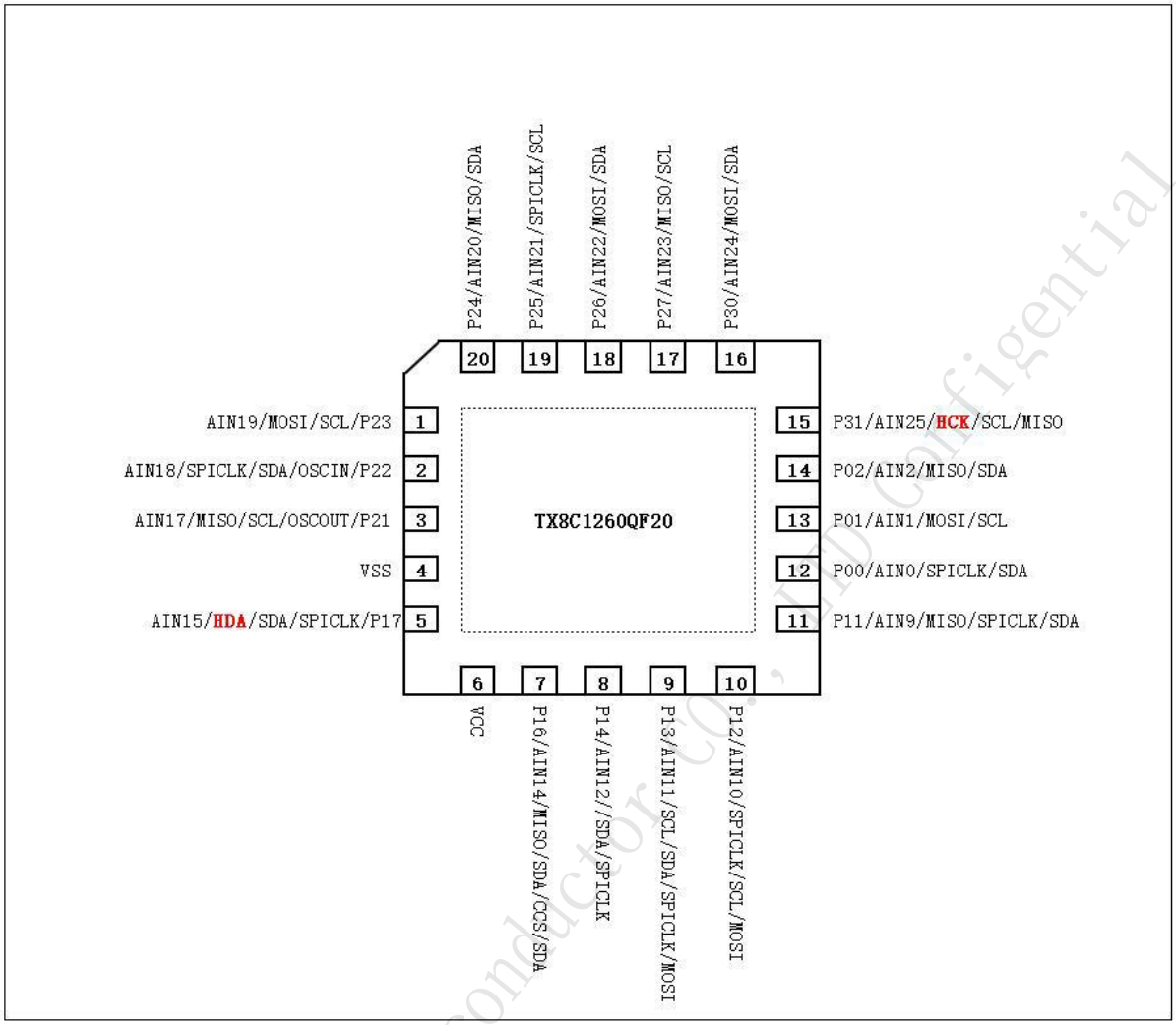


Figure 1-2 Pin of TX8C1260QF20（QFN20）

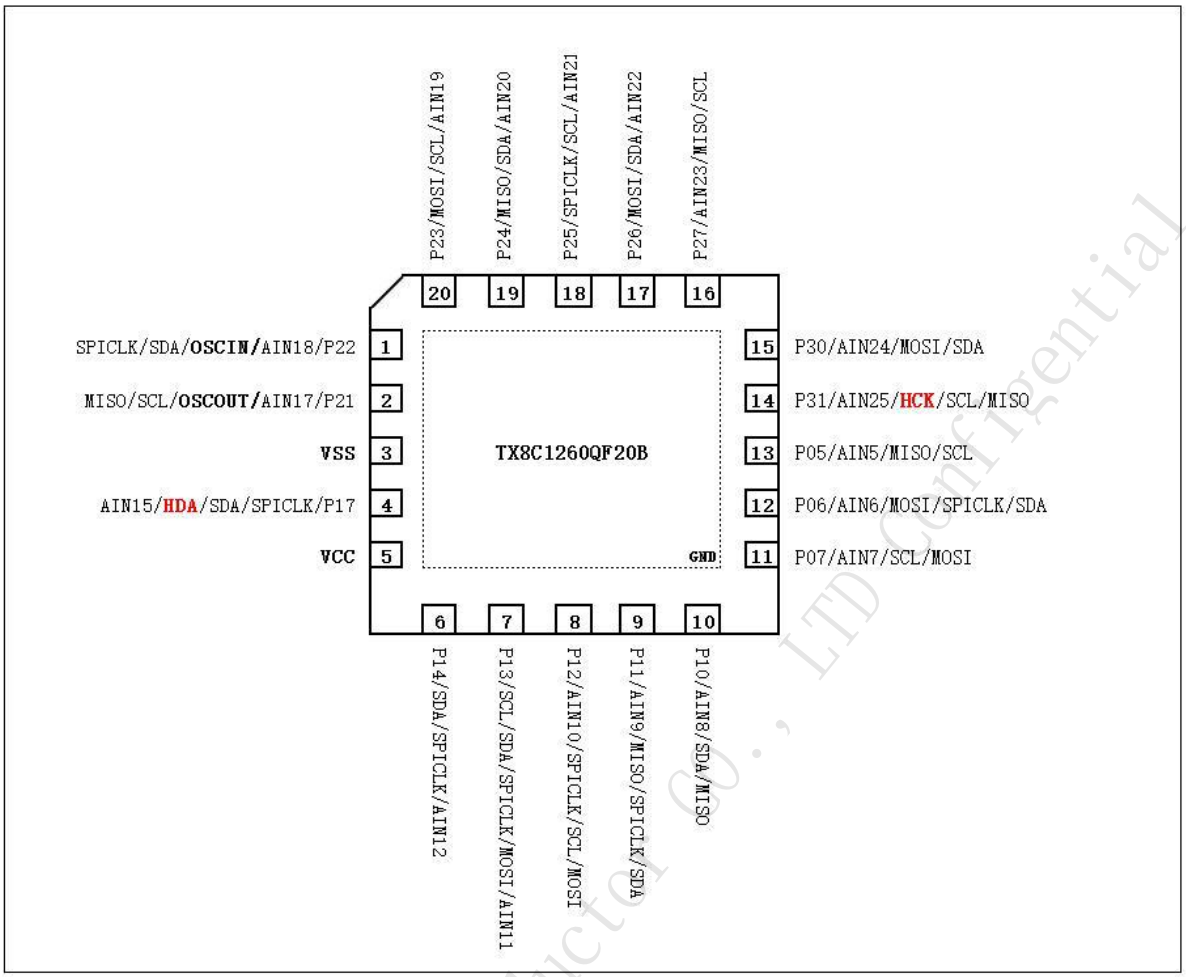


Figure 1-3 Pin of TX8C1260QF20B (QFN20)

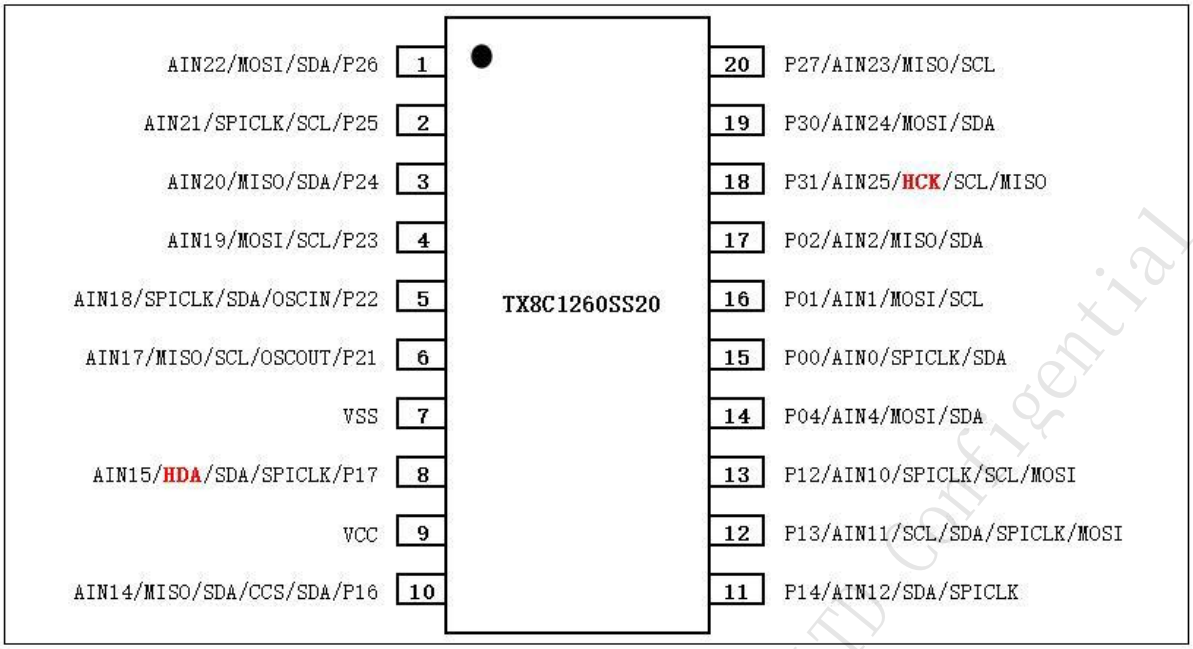


Figure 1-4 Pin of TX8C1260SS20（SSOP20）

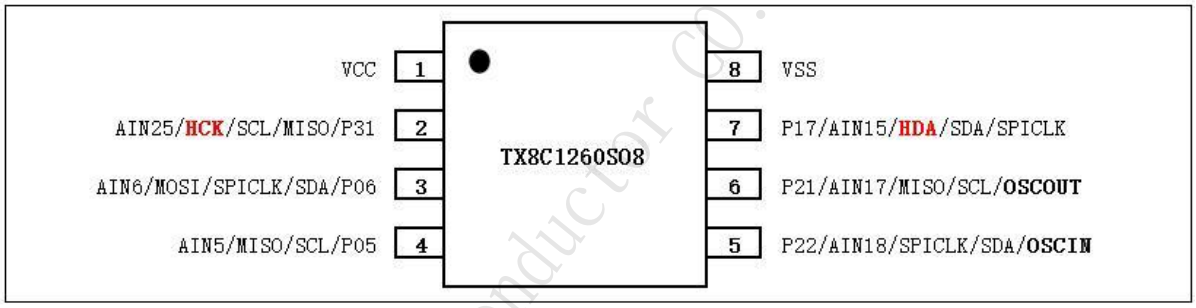


Figure 1-5 Pin of TX8C1260S08（SOP8）

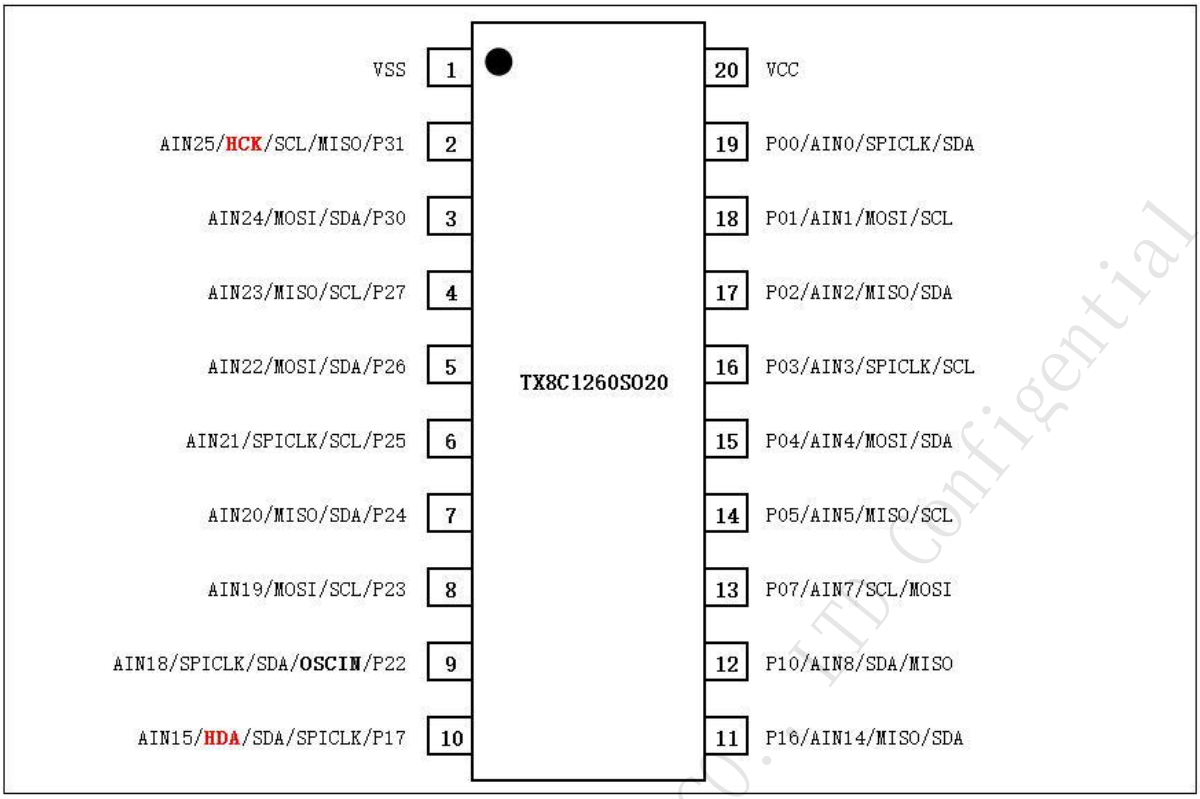


Figure 1-6 Pin of TX8C1260SO20 (SOP20)

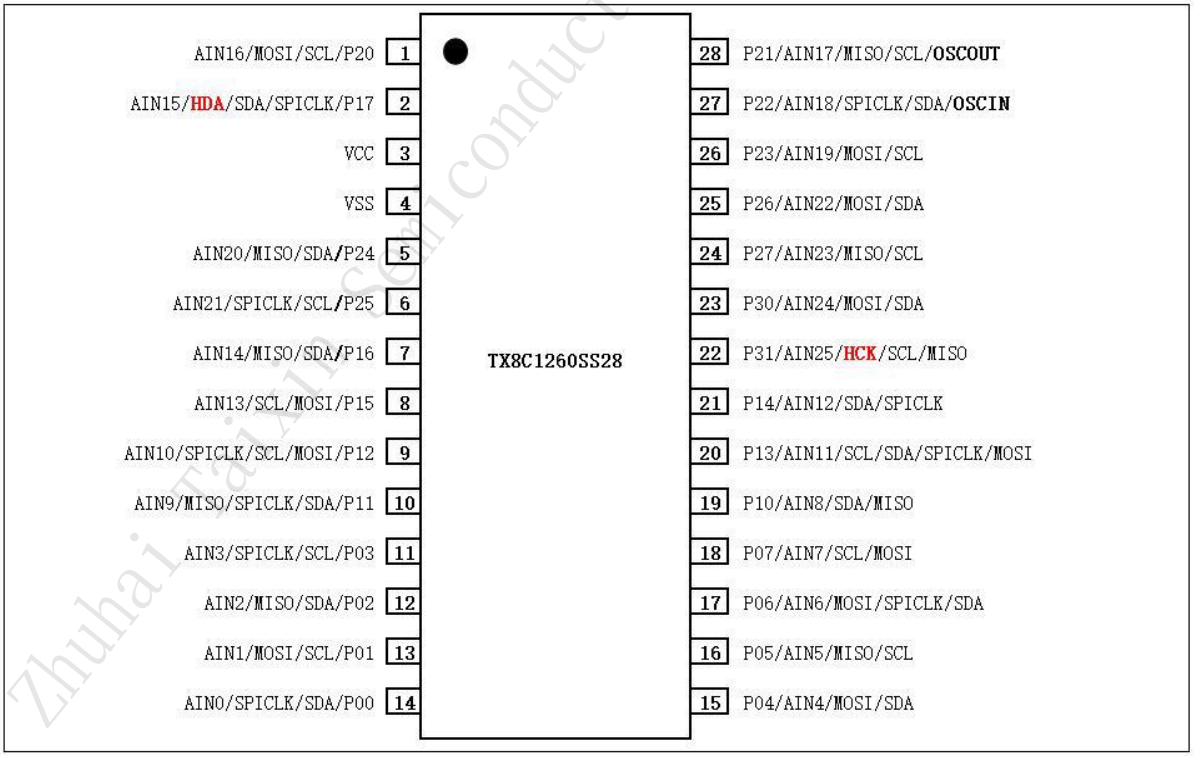


Figure 1-7 Pin of TX8C1260SS28（SSOP28）

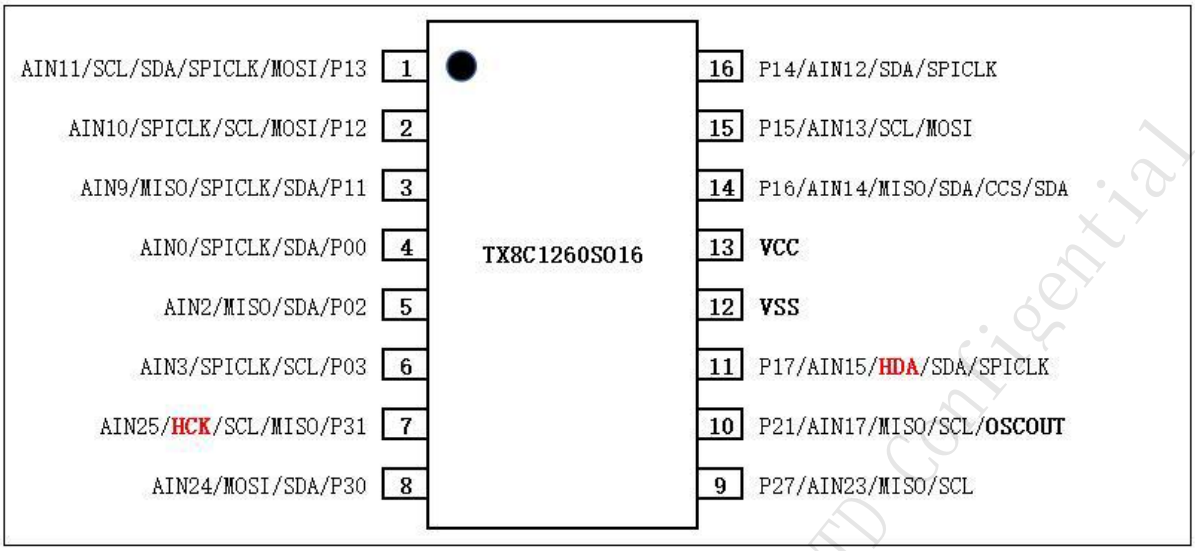


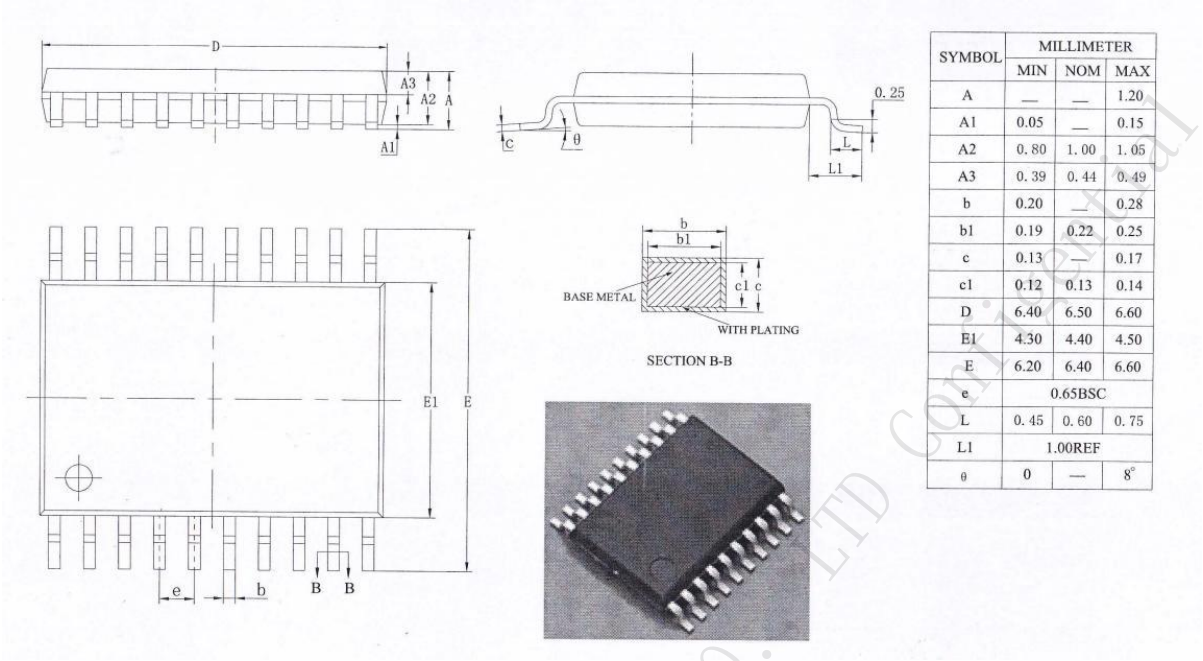
Figure 1-8 Pin of TX8C1260SO16（SOP16）

1.4 Encapsulate Information

The models of TX8C1260 series are shown in the following table:

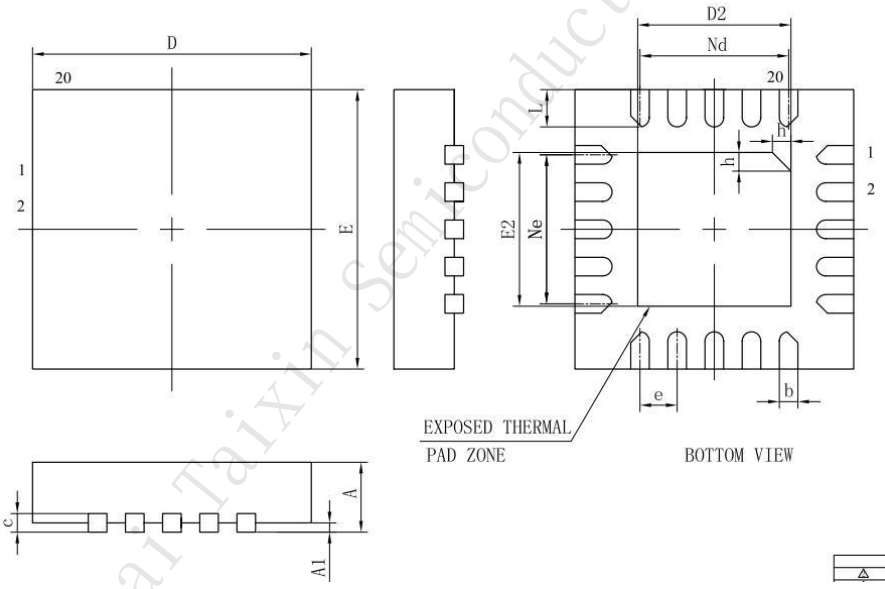
Model	Encapsulation	Packing
TX8C1260TS20	TSSOP20	in tube
TX8C1260QF20	QFN20	tape reel
TX8C1260QF20B	QFN20	tape reel
TX8C1260SS20	SSOP20	in tube
TX8C1260SO8	SOP8	in tube
TX8C1260SO20	SOP20	in tube
TX8C1260SS28	SSOP28	in tube
TX8C1260SO16	SOP16	in tube

1.5 Package Dimensions



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.80	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	—	0.28
b1	0.19	0.22	0.25
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	6.40	6.50	6.60
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00REF		
θ	0	—	8°

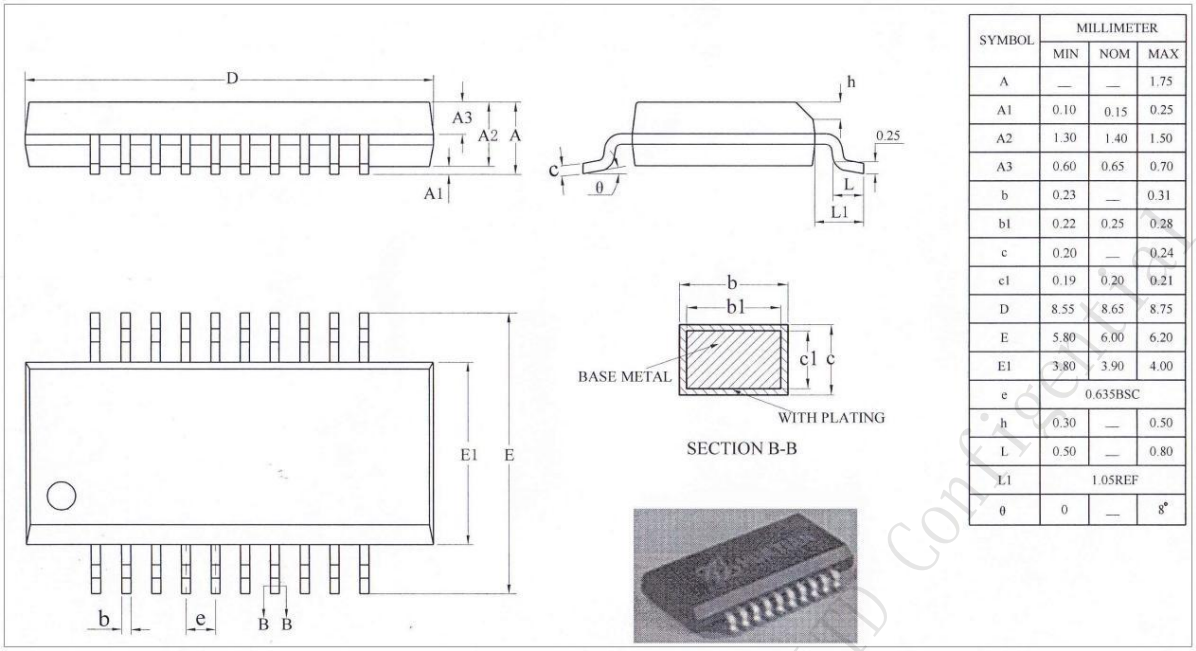
Figure 1-9 Encapsulation POD of TSSOP20



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.15	0.20	0.25
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	1.55	1.65	1.75
e	0.40BSC		
Ne	1.60BSC		
Nd	1.60BSC		
E	2.90	3.00	3.10
E2	1.55	1.65	1.75
L	0.35	0.40	0.45
h	0.20	0.25	0.30
L/F载体尺寸 (Note1)	75*75		

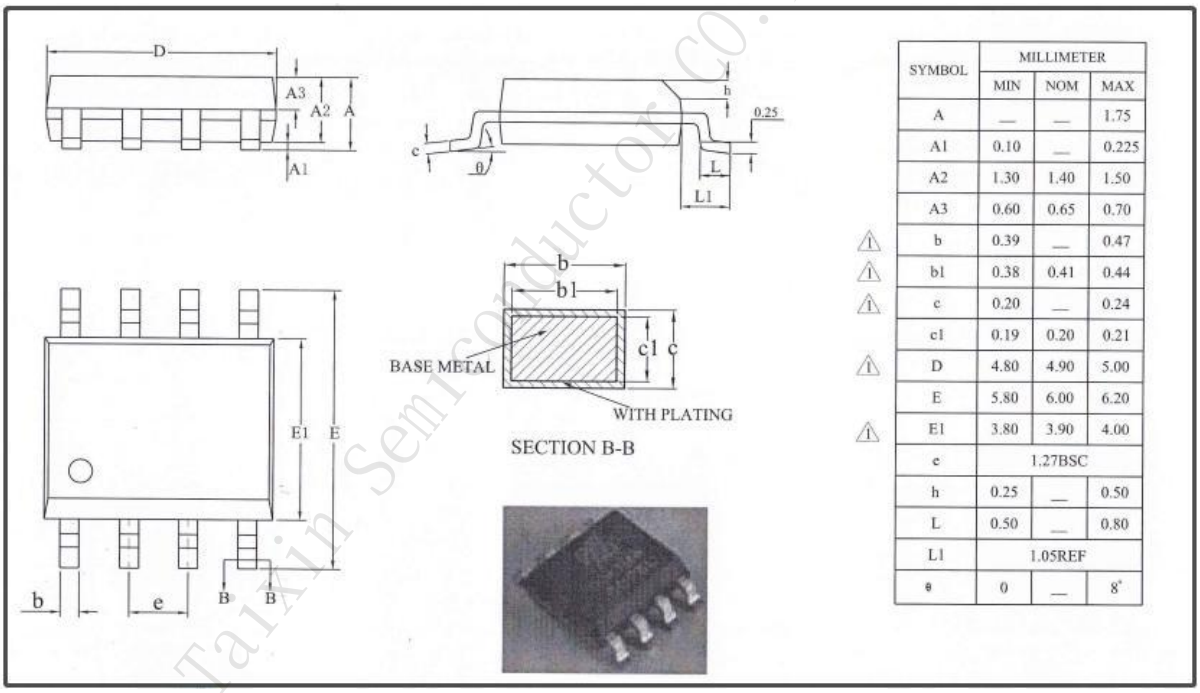
△	更改公司名称	李万强	2011.7.5

Figure 1-10 Encapsulation POD of QFN20



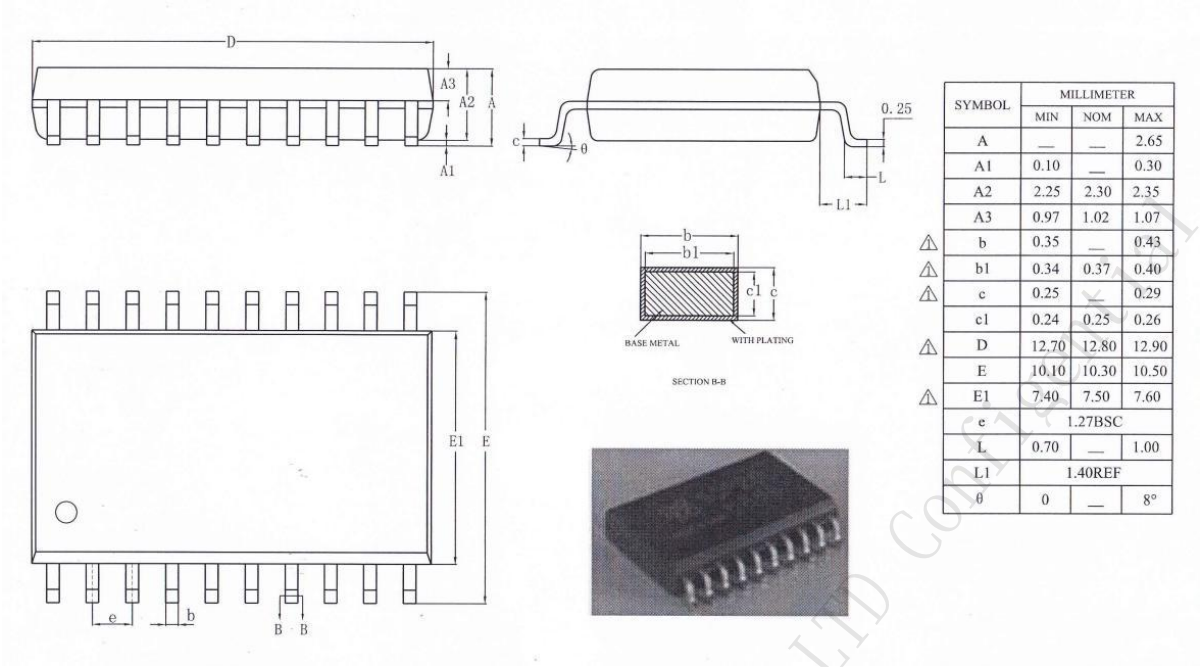
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	0.15	0.25
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.23	—	0.31
b1	0.22	0.25	0.28
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	0.635BSC		
h	0.30	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

Figure 1-11 Encapsulation POD of SSOP20



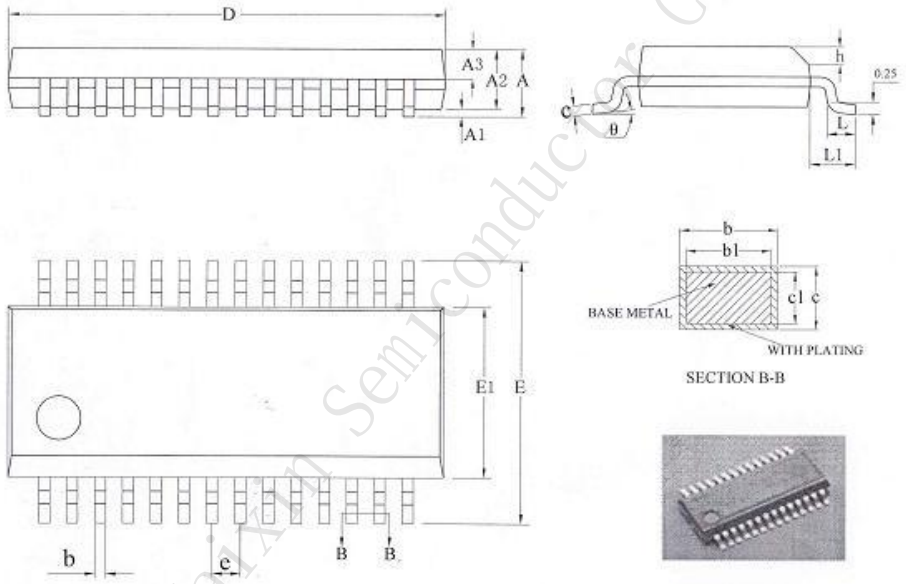
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
① b	0.39	—	0.47
① b1	0.38	0.41	0.44
① c	0.20	—	0.24
c1	0.19	0.20	0.21
① D	4.80	4.90	5.00
E	5.80	6.00	6.20
① E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

Figure 1-12 Encapsulation POD of SOP8



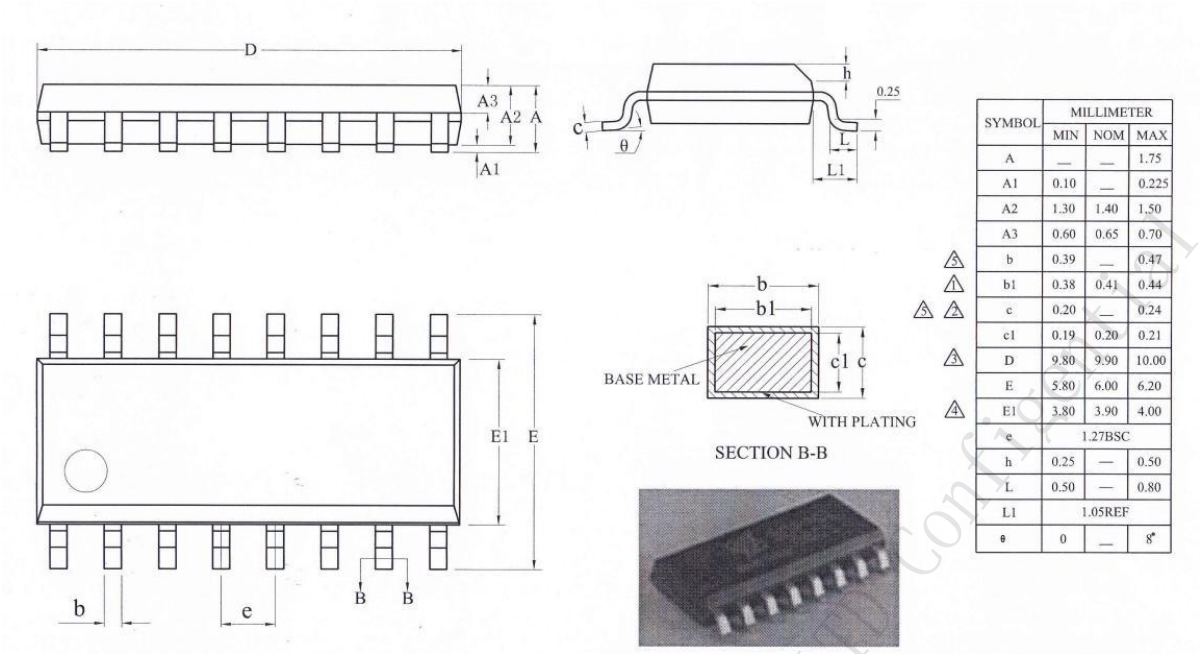
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	2.65
A1	0.10	—	0.30
A2	2.25	2.30	2.35
A3	0.97	1.02	1.07
⚠ b	0.35	—	0.43
⚠ b1	0.34	0.37	0.40
⚠ c	0.25	—	0.29
c1	0.24	0.25	0.26
⚠ D	12.70	12.80	12.90
E	10.10	10.30	10.50
⚠ E1	7.40	7.50	7.60
e	1.27BSC		
L	0.70	—	1.00
L1	1.40REF		
θ	0	—	8°

Figure 1-13 Encapsulation POD of SOP20



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.05	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.23	—	0.31
b1	0.22	0.25	0.28
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	0.635BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05BSC		
θ	0°	—	8°

Figure 1-14 Encapsulation POD of SSOP28



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

Figure 1-15 Encapsulation POD of SOP16

1.6 Pin Description

Pin name	*I/O*	*Functional description*	*Reset state*	*Reuse function*
VCC	A	Power	-	nothing
VSS	A	Ground	-	nothing
P00	I/O	P0 ports Each port can be set as input or output mode The input module enables internal pull-up The output module can set open-drain output	These pins default to high resistance input	P00 AIN0 [ADC external channel 0] SPICLK[SPI CLK] SDA[I2C SDA]
P01				P01 AIN1 [ADC external channel 1] MOSI[SPI MOSI] SCL[I2C SCL]
P02				P02 AIN2 [ADC external channel 2] MISO[SPI MISO] SDA[I2C SDA]

P03				P03 AIN3 [ADC external channel 3] SPICLK[SPI CLK] SCL[I2C SCL]
P04				P04 AIN4 [ADC external channel 4] MOSI[SPI MOSI] SDA[I2C SDA]
P05				P05 AIN5 [ADC external channel 5] MISO[SPI MISO] SCL[I2C SCL]
P06				P06 AIN6 [ADC external channel 6] MOSI[SPI MOSI] SPICLK[SPI CLK] SDA[I2C SDA]
P07				P07 AIN7 [ADC external channel 7] SCL[I2C SCL] MOSI[SPI MOSI]
P10	I/O	P1 ports Each port can be set as input or output mode The input module enables internal pull-up The output module can set open-drain output	pins default to high resistance input	P10 AIN8 [ADC external channel 8] SDA[I2C SDA] MISO[SPI MISO]
P11				P11 AIN9 [ADC external channel 9] MISO[SPI MISO] SPICLK[SPI CLK] SDA[I2C SDA]
P12				P12 AIN10 [ADC external channel 10]

				SPICLK[SPI CLK] **SCL**[I2C SCL] **MOSI**[SPI MOSI]
P13				**P13** **AIN11** [ADC external channel 11] **SCL**[I2C SCL] **SDA**[I2C SDA] **SPICLK**[SPI CLK] **MOSI**[SPI MOSI]
P14				**P14** **AIN12** [ADC external channel 12] **SDA**[I2C SDA] **SPICLK**[SPI CLK]
P15				**P15** **AIN13** [ADC external channel 13] **SCL**[I2C SCL] **MOSI**[SPI MOSI]
P16				**P16** **AIN14** [ADC external channel 14] **CCS** [constant current source analog pin] **SDA**[I2C SDA] **MISO**[SPI MISO]
P17				**P17** **AIN15**[ADC external channel 15] **HDA** [burn / debug data pin] **SDA**[I2C SDA] **SPICLK**[SPI CLK]
P20	I/O	P2 ports Each port can be set as input or output mode The input module enables	pins default to high resistance input	**P20** **AIN16**[ADC external channel 16] **SCL**[I2C SCL] **MOSI**[SPI MOSI]

P21		internal pull-up The output module can set open-drain output		P21 AIN17[ADC external channel 17] OSCOUT[oscillator output pin] SCL[I2C SCL] MISO[SPI MISO]
P22				P22 AIN18[ADC external channel 18] OSCIN[oscillator input pin] SPICLK[SPI CLK] SDA[I2C SDA]
P23				P23 AIN19[ADC external channel 19] SCL[I2C SCL] MOSI[SPI MOSI]
P24				P24 AIN20[ADC external channel 20] MISO[SPI MISO] SDA[I2C SDA]
P25				P25 AIN21[ADC external channel 21] SPICLK[SPI CLK] SCL[I2C SCL]
P26				P26 AIN22[ADC external channel 22] SDA[I2C SDA] MOSI[SPI MOSI]
P27				P27 AIN23[ADC external channel 23] SCL[I2C SCL] MISO[SPI MISO]
P30	I/O	P3 ports Each port can be set as	pins default to high resistance	P30 AIN24[ADC external channel 24]

		input or output mode The input module enables internal pull-up The output module can set open-drain output	input	**SDA**[I2C SDA] **MOSI**[SPI MOSI]
P31				**P31** **AIN25**[ADC external channel 25] **HCK** [burn / debug clock pin] **SCL**[I2C SCL] **MISO**[SPI MISO]

IO function description, Table 1.5.1 is IO analog function and digital function of non arbitrary maping.

Table 1.5.1 IO analog function and digital function of non arbitrary mapping description table

Function Number	*Function Name*	*Functional description*
1	AIN0~26	ADC external input channel 0~26
2	OSCIN/OSCOUT	External OSC input/output
3	HCK	Program/Debug Function CLK input
4	HDA	Program/Debug Function DAT input and output
5	SCL	I2C CLK
6	SDA	I2C DATA
7	SPICLK	SPI CLK
8	MOSI	SPI MOSI
9	MISO	SPI MISO

Table 1.5.2 IO digital function of arbitrary mapping description table

Function Number	*Function Name*	*Functional description*
1	UART1_TX	Uart1 TX output
2	UART0_TX	Uart0 TX output
3	STMR5_PWM	Super Timer 5 PWM output
4	STMR4_PWM	Super Timer 4 PWM output
5	STMR3_PWM	Super Timer 3 PWM output
6	STMR2_PWM	Super Timer 2 PWM output
7	STMR1_PWM	Super Timer 1 PWM output
8	STMR0_PWM	Super Timer 0 PWM output
9	BUZ	Beep PWM output
10	WUT_PWM/CLK	Wakeup Timer PWM output/CLK_TO_IO output
11	TMR4_PWM	Normal Timer4 PWM output
12	TMR3_PWM	Base Timer3 PWM output
13	TMR2_PWM	Base Timer2 PWM output
14	TMR1_PWM	Base Timer1 PWM output
15	TMR0_PWM	Base Timer0 PWM output

16	TMR0_CAP	Base Timer0 Capture input
17	TMR1_CAP	Base Timer1 Capture input
18	TMR2_CAP	Base Timer2 Capture input
19	TMR3_CAP	Base Timer3 Capture input
20	TMR4_CAP0	Normal Timer4 Capture0 input
21	TMR4_CAP1	Normal Timer4 Capture1 input
22	TMR4_CAP2	Normal Timer4 Capture2 input
23	UART0_RX	Uart0 RX input
24	UART1_RX	Uart1 RX input
25	WUT_CAP	Wake up Timer Capture input
26	WKUP_IN0	IO Wake up Channel 0 input
27	WKUP_IN1	IO Wake up Channel 1 input
28	WKUP_IN2	IO Wake up Channel 2 input
29	WKUP_IN3	IO Wake up Channel 3 input
30	FB_IN	IO Fault Break input
31	ADC_ETR	ADC External IO Trigger input

2 Electrical Parameters

2.1 Absolute Maximum Rating

Signal	Parameter	Condition	Min	Typ	Max	Unit
V_{VCC}	Operating voltage	-	2.4	5	5.5	V
V_{VCCA}	Operating voltage of analog part (ADC / DAC not used)	-	2.4	5	5.5	V
	Operating voltage of analog part (using ADC / DAC)	-	2.8	5	5.5	
$Vpin$	Pin input voltage	-	GND-0.3	-	VCC+0.3	V
T_A	Operating temperature	-	-40	-	105	℃

T_{ST}	Storage temperature	-	-55	-	150	℃
I_{vcc}	Total current of VCC and VCCA	-	-	-	50	mA
I_{vss}	Total current of VSS	-	-	-	50	mA

2.2 DC Electrical Characteristics

VCC - VSS = 2.4V ~ 5.5V, T_A = 25℃

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{VCC}	Operating voltage	Fsys=0 to 48Mhz	2.4	5	5.5	V
V_{VCCA}	Operating voltage of analog part (ADC / DAC not used)	Fsys=0 to 48Mhz	2.4	5	5.5	V
	Operating voltage of analog part (using ADC / DAC)	Fsys=0 to 48Mhz	2.8	5	5.5	
I_{VCC}	Normal operating mode	VCC=5V, Fsys=48Mhz, all peripherals and oscillator are turned off	-	5.38	-	mA
		VCC=5V, Fsys=24Mhz, all peripherals and oscillator are turned off	-	3.82	-	mA
		VCC=5V, Fsys=16Mhz, all peripherals and oscillator are turned off	-	3.30	-	mA
		VCC=5V, Fsys=8Mhz, all peripherals and oscillator are turned off	-	2.75	-	mA
		VCC=5V, Fsys=64Khz,				

		all peripherals and oscillator are turned off	-	895	-	uA
		VCC=3.3V, Fsys=48Mhz, all peripherals and oscillator are turned off	-	5.04	-	mA
		VCC=3.3V, Fsys=24Mhz, all peripherals and oscillator are turned off	-	3.62	-	mA
		VCC=3.3V, Fsys=16Mhz, all peripherals and oscillator are turned off	-	3.13	-	mA
		VCC=3.3V, Fsys=8Mhz, all peripherals and oscillator are turned off	-	2.63	-	mA
		VCC=3.3V,Fsys=64Khz all peripherals and oscillator are turned off	-	842	-	uA
I_{sleep}	Sleep current	VDD=5V, all peripherals are turned off and IO wakes up	-	5.4	-	uA
		VDD=3.3V, all peripherals are turned off and IO wakes up	-	3.4	-	uA
V_{IL}	Low voltage input	-	VSS	-	0.3VCC	V
V_{IH}	High voltage input	-	0.5VCC	-	VCC	V
R_{PU}	Equivalent pull-up resistance	-	-	25	-	kΩ
R_{PD}	Equivalent pull-down resistance	-	-	25	-	kΩ
C_{IO}	Capacitance of I / O pin	-	2.5	3	3.5	pF
V_{OL}	Low voltage output	Without load	-	-	0.1VCC	V
V_{OH}	High voltage output	Without load	0.9VCC	-	-	V

2.3 AC Electrical Characteristics

2.3.1. Operating Conditions During Power-On And Power-Down

Table 2-1 Operating conditions during power-on and power-down

Symbol	Parameter	Condition	Min	Max	Unit
t_{VCC}	V_{VCC}	T_A = 27℃	5	-	uS
t_{VCCA}	V_{VCCA}		5	-	uS

Table 2-2 Status during power-on and power-down

Chip status	Power on			Power down	
	Power on protection	Power on reset	Normal operation	Low power reset	Power down reset
supply voltage (V)	<1.8	1.8 - 2.4	>2.4	<1.85	<1.65
System power consumption (uA)	<0.2	>300	Power on normally, and the power consumption is determined by the frequency of the system clock and peripherals.	≈300	<0.2

2.3.2. Internal Reset And Power-Control Module Features

Symbol	Parameter	Condition	Min	Typ	Max	Unit
VCC_{PVD}	Level of programmable voltage detector	LVDCON0[4:2]=0x0, power-on/power-off detection threshold, TA=25℃	-	1.85/2.05	-	V
		LVDCON0[4:2]=0x1, power-on/power-off detection threshold, TA=25℃	-	2.05/2.25	-	V
		LVDCON0[4:2]=0x2, power-on/power-off detection threshold, TA=25℃	-	2.25/2.45	-	V

		LVDCON0[4:2]=0x3, power-on/power-off detection threshold, TA=25℃	-	2.50/2.75	-	V
		LVDCON0[4:2]=0x4, power-on/power-off detection threshold, TA=25℃	-	2.80/3.10	-	V
		LVDCON0[4:2]=0x5, power-on/power-off detection threshold, TA=25℃	-	3.40/3.70	-	V
		LVDCON0[4:2]=0x6, power-on/power-off detection threshold, TA=25℃	-	3.85/4.20	-	V
		LVDCON0[4:2]=0x7, power-on/power-off detection threshold, TA=25℃	-	4.15/4.50	-	V
$V_{PVDhyst}$	VCC hysteresis	-	-	-	-	mV

Note: The above data comes from the chip performance acceptance test and is not tested in production.

2.3.3. Characteristics Of External Clock Source

Low-speed External XOSC Clock:

Symbol	Parameter	Condition	Min	Typ	Max	Unit
f_{xoscm}	Frequency of user external clock			32768		Hz
V_{BIAS}	XOSCI/XOSCO bias level	-	-	770	-	mV
V_{xoh}	XOSCI input pin high level voltage	-	-	975	-	mV
V_{xol}	XOSCI input pin low level voltage	-	-	525	-	mV
$Duty_{(xoscm)}$	Duty cycle	-	42	-	58	%
I_L	XOSCI input leakage current	-	-	1.5		uA
ACC_{xoscm}	HSE accuracy	-	-	-	-	ppm
$t_{SU(xoscm)}$	Startup time	-	-	2		s

High-speed External XOSC Clock:

Symbol	Parameter	Condition	Min	Typ	Max	Unit
f_{xoscm}	Frequency of user external clock		4	16	40	Hz
V_{BIAS}	XOSCI/XOSCO bias level	-	-	770	-	mV
V_{xoh}	XOSCI input pin high level voltage	-	-	975	-	mV

V_{xol}	XOSCI input pin low level voltage	-	-	525	-	mV
$Duty_{(xoscm)}$	Duty cycle	-	42	-	58	%
I_L	XOSCI input leakage current	-	-	350		uA
ACC_{xoscm}	HSE accuracy	-	-	-	-	ppm
$t_{SU(xoscm)}$	Startup time	-	-	5		s

2.3.4. Characteristics Of Internal Clock Source

Table 2-3 HIRC oscillator characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{VCCA}	Supply voltage	-	2.4	5.0	5.5	V
f_{HRC}	frequency	TA=25℃,Test after triming	-	48	-	MHz
ACC_{HSI}	Accuracy of oscillator	-40℃至 105℃	-	-	-	%
$t_{SU(HSI)}$	Oscillator start time	-	-	60	-	us
$I_{VCCA(HSI)}$	Oscillator power consumption	Average power consumption	-	1.1	-	mA

Following shows HIRC value under all temperature and all supply voltages condition:

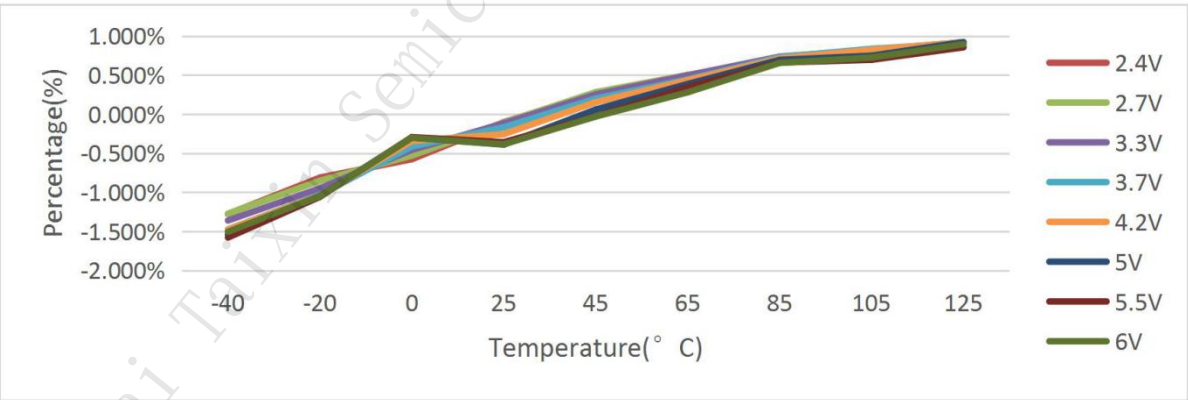


Figure 2-3 HIRC deviation under all voltage and all temperature

Table 2-4 LIRC oscillator characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
f_{LRC}	frequency	TA=25℃	-	64	-	kHz
$I_{DD(LSI)}$	Oscillator power consumption	-	-	0.5	-	uA

Following shows LIRC value under all temperature and all supply voltages condition:

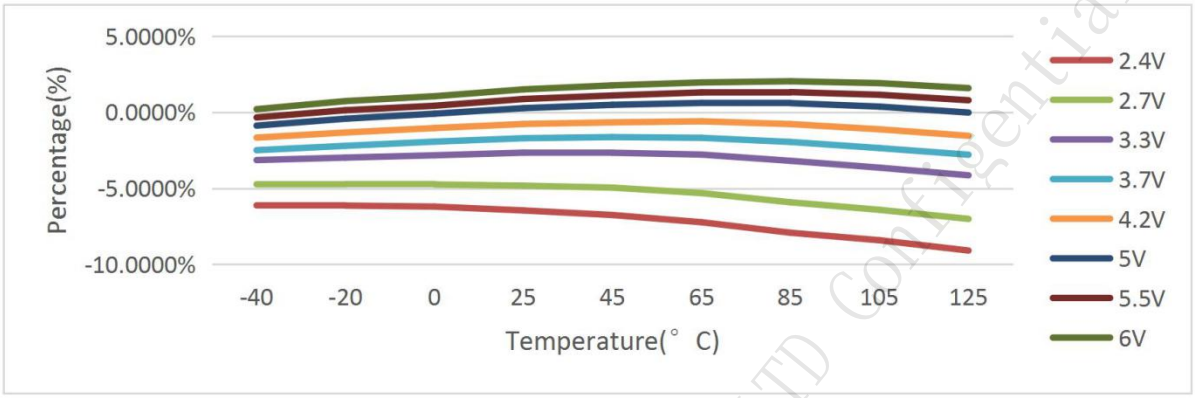


Figure 2-4 LIRC deviation under all voltage and all temperature

2.4 IO Driving Ability Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
IO	Source Current	VCC=5V, IO drive level is configured 0x00, VO=4V	-	2.5	-	mA
		VCC=5V, IO drive level is configured 0x1F, VO=4V	-	50	-	mA
		VCC=3.3V, IO drive level is configured 0x00, VO=2.64V	-	1	-	mA
		VCC=3.3V, IO drive level is configured 0x1F, VO=2.64V	-	25	-	mA
IO	Sink Current	VCC=5V, IO drive level is configured 0x00, VO=1V	-	9	-	mA
		VCC=5V, IO drive level is configured 0x1F, VO=1V	-	125	-	mA

		VCC=3.3V, IO drive level is configured 0x00, VO=0.66V	-	4.5	-	mA
		VCC=3.3V, IO drive level is configured 0x1F, VO=0.66V	-	70	-	mA

2.5 Analog Electrical Characteristics

2.4.1 12bit ADC Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{VCCA}	Supply voltage	-	2.8	5.0	5.5	V
I_{VCCA}	Current consumption	Internal 2.0V reference	-	460	-	uA
	Current consumption	Internal 2.4V reference	-	470	-	uA
	Current consumption	Internal VCCA reference	-	360	-	uA
f_{ADC}	ADC clock frequency	-	-	-	9.6	MHz
Fconv	Conversion rate	-	-	-	480	KHz
V_{AIN}	Conversion voltage range	Internal 2.0V reference	0	-	2.0	V
		Internal 2.4V reference	0	-	2.4	
R_{AIN}	External input impedance	-	-	-	-	Kohm
C_{ADC}	Internal sample and hold capacitance	-	-	-	-	pF
t_{STAB}	Power on time	-	-	-	1000	us
t_{conv}	Sampling time	-	5	-	256	Tclk
Enob	-	Input 1kHz	-	10	-	Bit

2.6 LogicFlash DC Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{prog}	Programming voltage	-	2.8	5.0	5.5	V
t_{prog}	Program time	-	-	160	-	us
t_{RC}	Read time	-	38	-	70	ns
t_{ERASEB}	Page erase time	-	-	100	-	ms
t_{ME}	Chip erase time	-	-	100	-	ms
I_{DD}	Supply current	read	3.7	-	4.5	mA
		program	-	8	-	mA
		erase	-	9	-	mA
NEND	Endurance	Erase and write 100,000 times in a high temperature environment of 105℃	-	100,000	-	cycle
t_{RET}	Data retention	After erasing and writing 100,000 times at room temperature, put it at 105℃ and bake at high temperature	-	10	-	year

2.7 EMC Characteristics

2.6.1 ESD Electrical Characteristics

Symbol	Ratings	Condition	Max	Unit
ESD	Electrostatic discharge (Human body mode)	TA = + 25℃, JEDEC EIA/JESD22-A114	6000	V
	Electrostatic discharge (Device Charged mode)	TA = + 25℃, JEDEC EIA/JESD22-C101-B	1000	V

2.6.2 Latch-Up Electrical Characteristics

Symbol	Parameter	Condition	Test Type	Min	Unit
LU	Static latch-up class	JEDEC STANDARD NO.78D NOVEMBER 2011	Class I (TA = +25 ℃)	±200	mA