

SS881X Brief Datasheet

**8-bit low-power Flash microcontroller
with integrated charge/discharge
management**



SiNH MICRO
昇生微电子

Revision 2.3
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Contents

1. Introduction	2
1.1 Feature	3
1.2 System Diagram	5
1.3 Ordering information	6
1.4 Pin Description	10
2. Electrical Characteristics	18
2.1 Absolute Maximum	18
2.2 Recommended Operating Conditions	18
Responsibility Statement	19
Revision Modification Record	20

1. Introduction

SS881X is Sinhmicro's AD Flash MCU series with integrated charge and discharge management, built-in rich interface functions, flexible configuration modes, and different low power consumption options. This product is mainly used in portable intelligent electronic devices that require charging and intelligent control, bringing simplified peripheral costs, excellent performance, and flexible and convenient development.

SS881X has built-in 8-bit MCU compatible with 8051 instruction set, the highest frequency is 12MHz. After optimization, most 1-byte instructions can be executed in a single clock cycle. Built-in 192 bytes of RAM are used for data caching, 8K bytes of Flash support multiple code updates, and 128 bytes of EEPROM are used to save special user information.

SS881X also integrates a power management unit and a charging management unit. Supports battery or 5V adapter power supply, supports charging of batteries with different specifications and different capacities, provides full software real-time configurable charging voltage and current settings, and combines built-in detection and protection mechanisms such as undervoltage, overvoltage, overcurrent, and overtemperature, Can provide efficient and safe power solutions. It supports 5 working modes: normal, low speed, idle, standby and hibernation. While providing high performance, it provides a variety of low power consumption options to support battery-powered devices and scenarios. The typical power consumption in sleep mode is 3uA, and the typical power consumption in standby mode is 30uA.

SS881X contains a wealth of peripherals, up to 16 bidirectional I / O ports (SS8819 only 12 I / O), some I / O support high current constant current drive, 2 external interrupt EINT0 / 1, 12-bit 8-channel differential ADC, 2 analog comparators, 1 UART, 1 I2C, 1 SCOM interface for driving and controlling the broken code display, 1 serial distribution port supporting cascade control, 1 programmable frequency output unit, 1 debugging interface for debugging and programming.

SS881X has a built-in 16-bit timer / counter. These two timers / counters can independently output two PWM signals with adjustable cycle and duty cycle (can be configured as a breathing lamp mode automatically controlled by hardware). It also contains a 13-bit timer, supports automatic reload, supports up to 4 comparison outputs or capture inputs, and can simultaneously output 4 PWM signals with the same frequency and different duty cycles. These 4 PWM signals can support higher precision duty cycle mode.

Typical application scenarios of SS881X series chips: smart TWS earphone charging cabin, smart personal care equipment, smart portable electrical appliances.

1.1 Feature

- Enhanced 8-bit microcontroller compatible with the 8051 instruction set
 - 12MHz Maximum main frequency is 12MHz
 - Maximum main frequency is 12MHz
- Program storage space (Flash): 8K bytes
- Data storage space (RAM): 192 bytes Special storage space (EEPROM): 128 bytes
- Operating voltage: 2.8 - 5.5V
- Oscillator :
 - 32KHz Low-speed RC oscillator LORC, 32KHz
 - High Speed RC Oscillator HIRC, 12MHz
- Two 16-bit timers/counters
 - Supports PWM mode, can provide 2 general PWM outputs
 - Supports hardware breathing light mode
- Sixteen bi-directional I / O ports (4 channels support high current drive mode)
- Integrated 12-bit, 8-channel Wide-voltage ADC
 - Internal battery voltage, charge current monitoring
 - The two channels support high-gain mode and can be used in current, micro-voltage and other measurement scenarios
- Integrated simulation comparator
- Support battery or adapter power supply
- Built-in linear charging management unit, can charge single-cell lithium battery, lithium iron phosphate battery, nickel metal hydride battery, etc.
 - The charging voltage level is finely adjustable, conventional 50mV / step
 - Finely adjustable charge current range, minimum 50mA/step, also available in small current control mode of 12mA/step
 - Maximum charging current 1000mA
 - Automatic overtemperature loop current control
 - Automatic input undervoltage loop current control
 - Timed charging protection

- Power supply pin (VIN) supports up to 14V voltage for Normal Voltage Version, and up to 40V volatage for High Voltage Version
- Ultra low power consumption
 - Support normal, low speed, idle, standby, sleep and other working modes
 - Sleep typical power consumption 3uA, there are four IO wake-up sources in this mode
- Support power-up, external pin, watchdog timer, VCC low voltage, debugger and software exception six reset methods
- Integrated stall adjustable low voltage detection module
- Integrated VIN over-voltage/over-current protection module
- Integrated system over-temperature detection module
- Support the whole firmware burning upgrade

1.2 System Diagram

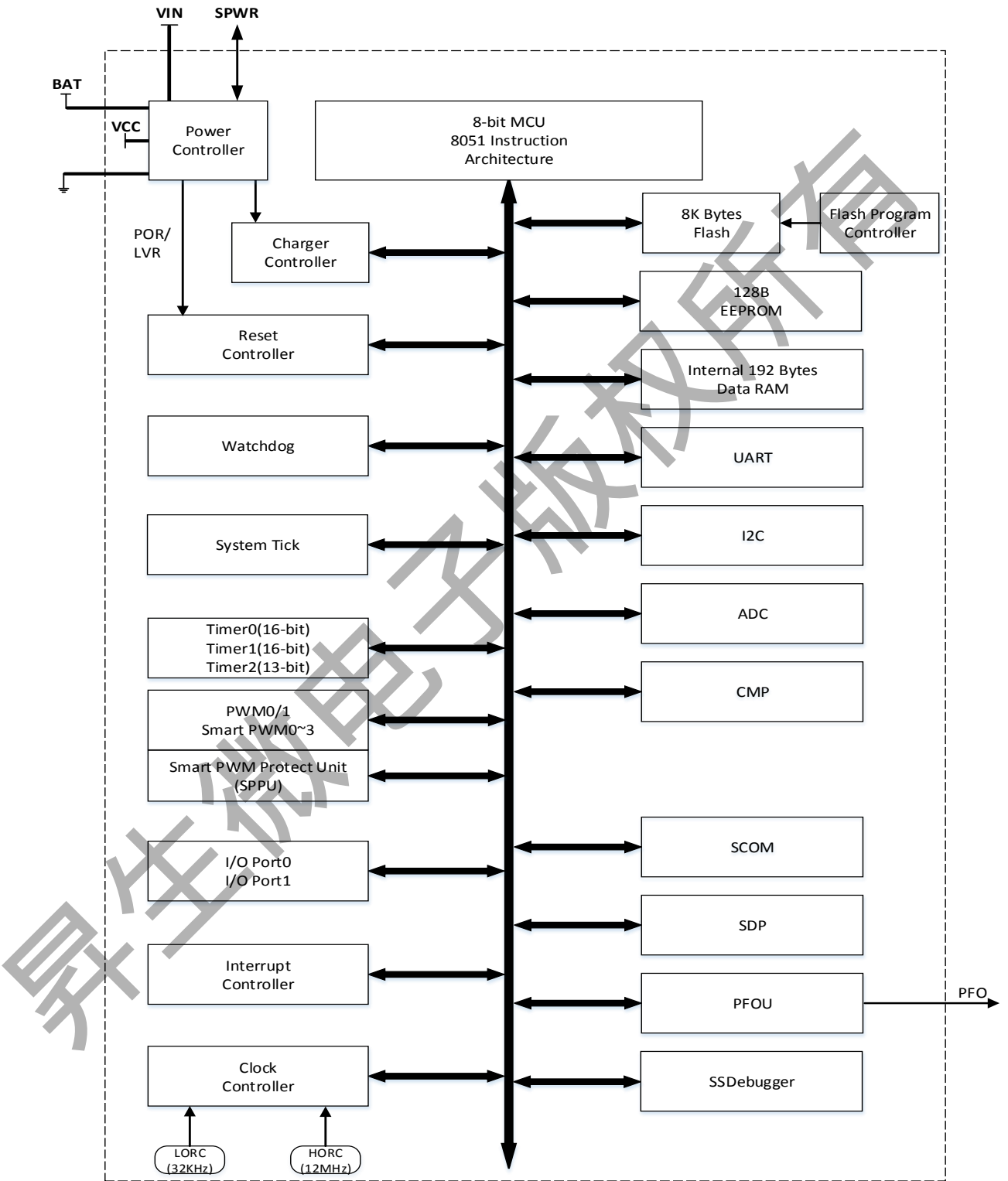
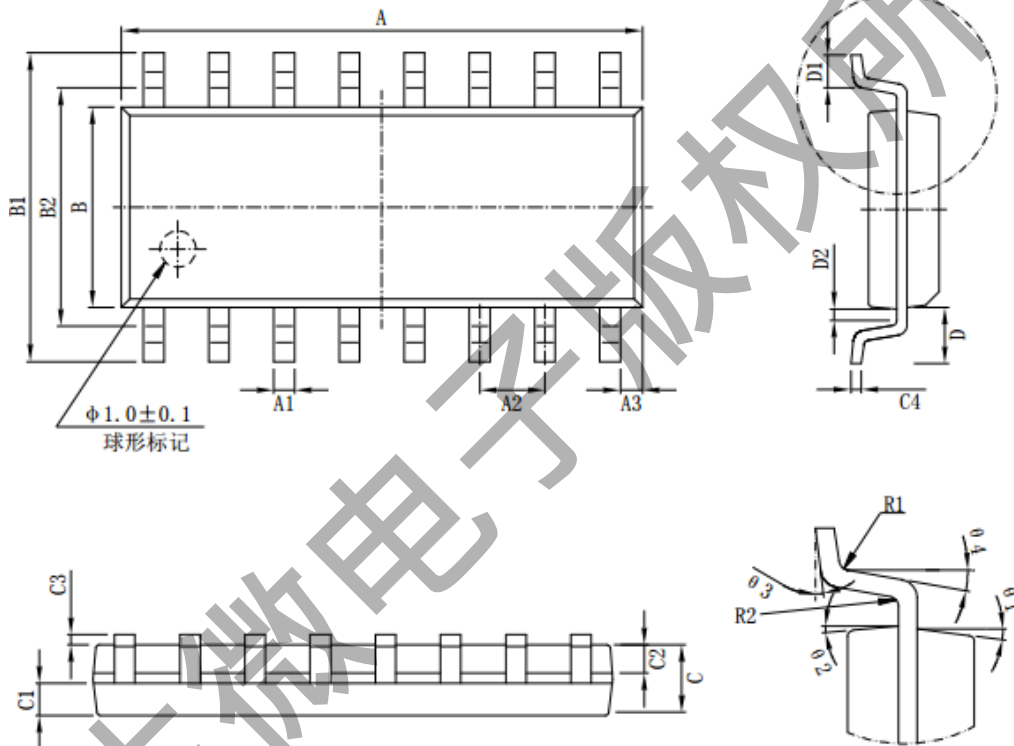


Figure 1 SS881X System Diagram

1.3 Ordering information

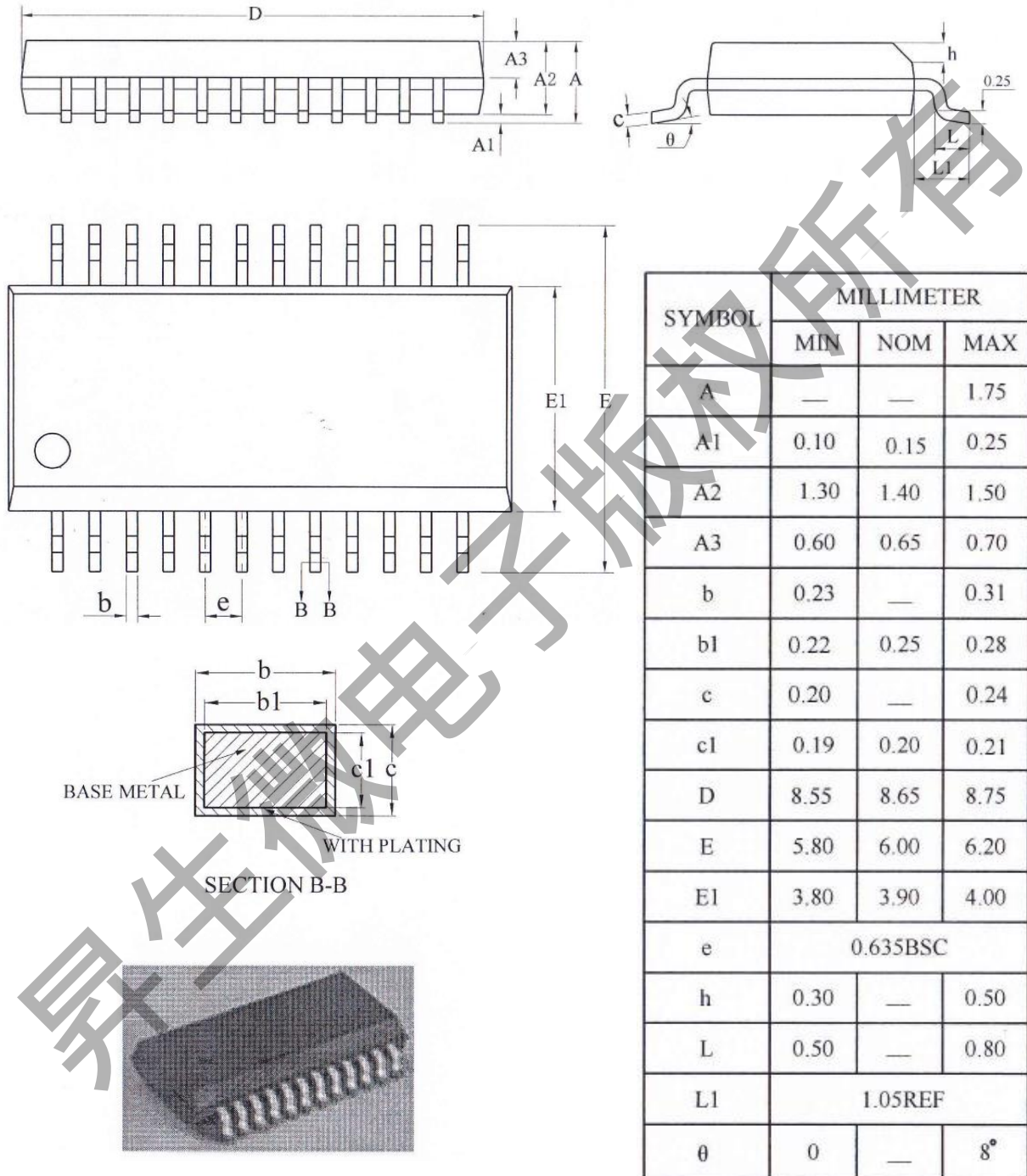
Product Num	Package Type	Package Size
SS8819	SOP16	9.9x3.9x1.5mm
SS881A	SSOP24	8.65x3.90x1.40mm
SS881Q	QFN24	4x4x0.75mm
SS881H	QFN24	4x4x0.85mm

SS8819 Package Schematic Diagram

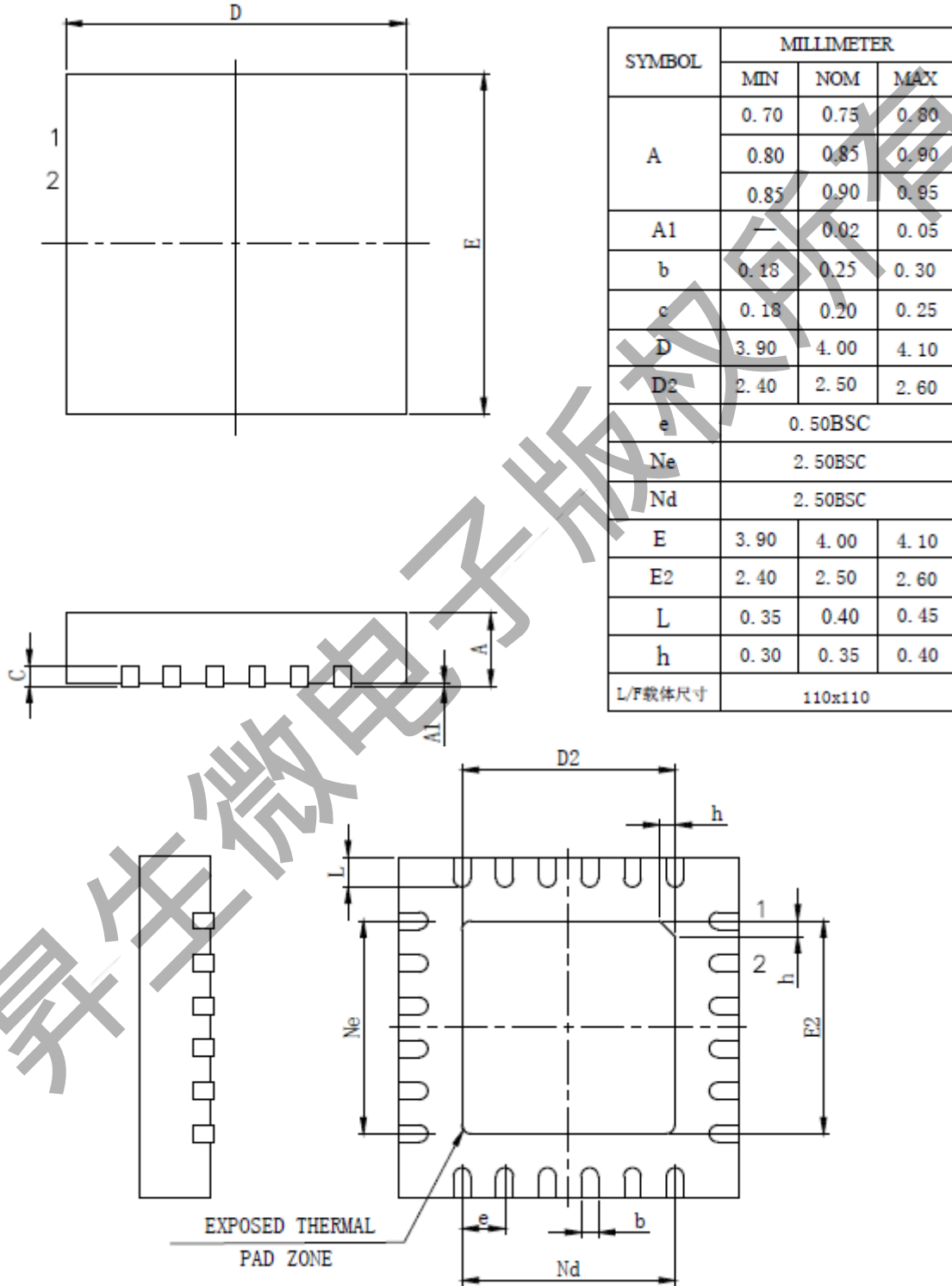


	Min (mm)	Max (mm)		Min (mm)	Max (mm)
A	9.80	10.00	C4	0.203	0.2333
A1	0.365	0.456	D	1.05TYP	
A2	1.27 TYP		D1	0.40	0.70
A3	0.302TYP		D2	0.15	0.25
B	3.85	3.95	R1	0.20 TYP	
B1	5.84	6.24	R2	0.20 TYP	
B2	5.000TYP		0.1	8°~12°TYP4	
C	1.40	1.60	0.2	8°~12°TYP4	
C1	0.61	0.71	0.3	8°~12°TYP4	
C2	0.54	0.64	0.4	0°~8°TYP4	
C3	0.05	0.25		4°~12°TYP4	

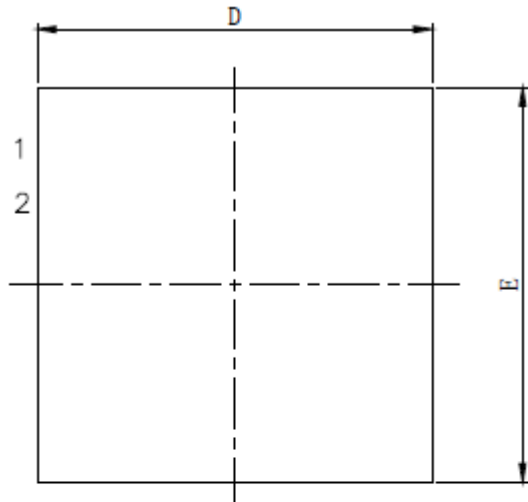
SS881A Package Schematic Diagram



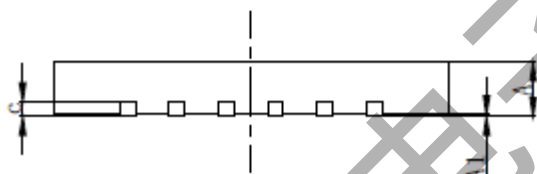
SS881Q Package Schematic Diagram



SS881H Package Schematic Diagram

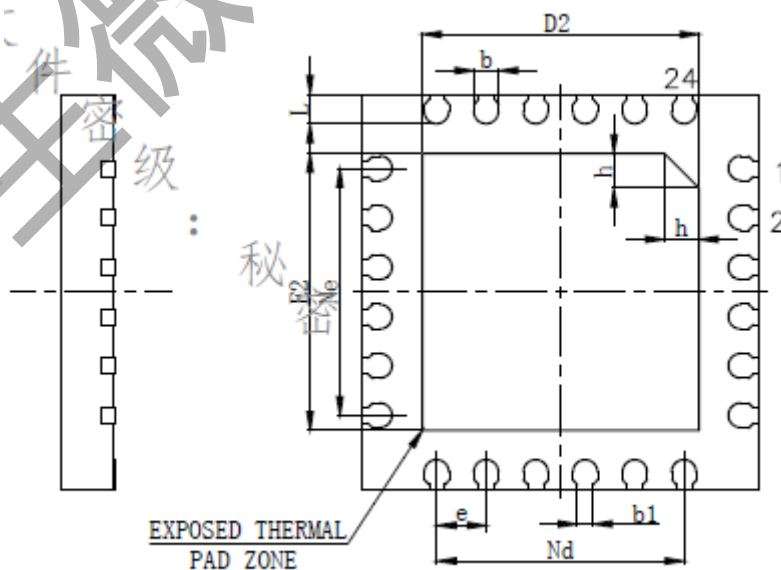


TOP VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.45	0.50	0.55
	0.50	0.55	0.60
	0.80	0.85	0.90
A1	0	0.02	0.05
b	0.20	0.25	0.30
b1	0.16REF		
c	0.10	0.15	0.20
D	3.90	4.00	4.10
D2	2.70	2.80	2.90
e	0.50BSC		
Ne	2.50BSC		
Nd	2.50BSC		
E	3.90	4.00	4.10
E2	2.70	2.80	2.90
L	0.25	0.30	0.35
h	0.30	0.35	0.40
L/载体尺寸	122X122		



BOTTOM VIEW

1.4 Pin Description

- Including power supply pin, GPIO port, ADC and other analog functions, PWM and other digital functions and other types
- Most pins multiplex multiple functions, which function can be selected by MFP register

The pin diagram is as follows (for detailed pin information, please refer to the following table):

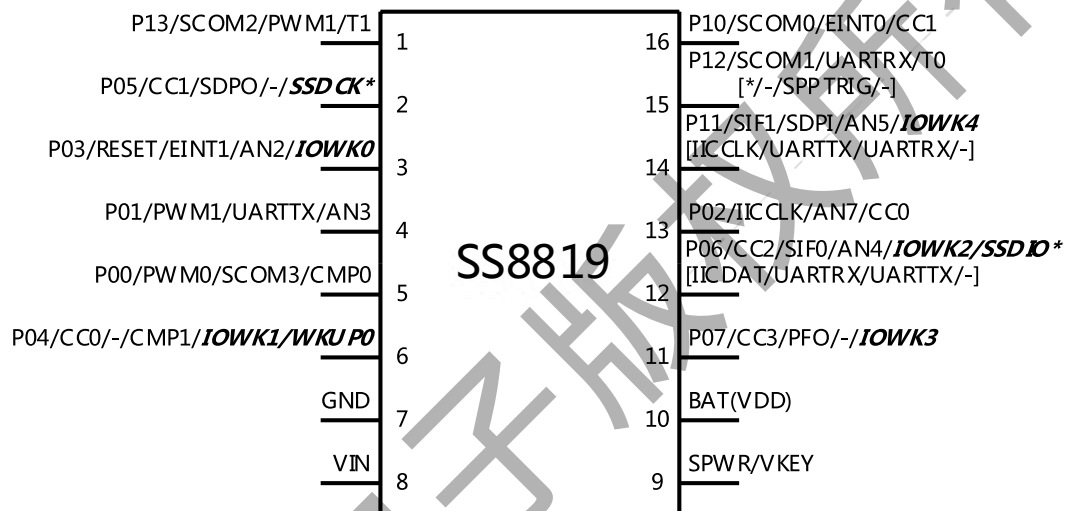


Figure 2 SS8819 Pin diagram

Table SS8819 (SOP16) pin Description

Pin Name	Pin No.	Pin Functions					
		F0	F1	F2	F3	EXT0	EXT1
P00	5	P00	PWM0	SCOM3	CMP0	-	-
P01	4	P01	PWM1	UARTTX	AN3	-	-
P02	13	P02	IICCLK	AN7	CC0	-	-
P03	3	P03	RESET	EINT1	AN2	Standby awoken (IOWK0)	-
P04	6	P04	CC0	-	CMP1	Standby awoken (IOWK1)	awaken from sleep (WKUP0, High level wake-up)
P05	2	P05	CC1	SDPO	-	-	SSDCK

							(Pull down while startup)
P06	12	P06	CC2	SIF0	AN4	Standby awoken (IOWK2)	SSDIO (Pull down while startup)
		IICDAT	UARTRX	UARTTX	-		
P07	11	P07	CC3	PFO	-	Standby awoken (IOWK3)	-
P10	16	P10	SCOM0	EINT0	CC1	-	-
P11	14	P11	SIF1	SDPI	AN5	Standby awoken (IOWK4)	-
		IICCLK	UARTTX	UARTRX	-		
P12	15	P12	SCOM1	UARTRX	T0	-	-
		-	-	SPPTRIG	-	-	-
P13	1	P13	SCOM2	PWM1	T1	-	-
VIN	8	-	-	-	-	DCIN access	-
SPWR/ VKEY	9	-	-	-	-	Power input /output	analog key
BAT	10	-	-	-	-	Battery pin / Chip Power supply	-
GND	7	-	-	-	-	GND	-

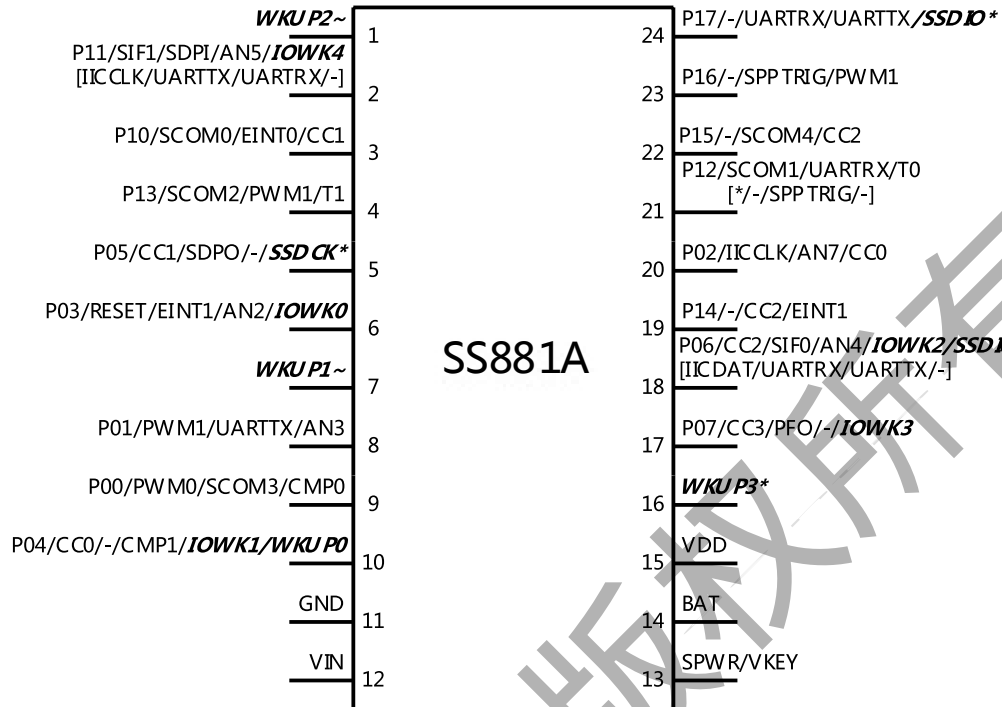


Figure 3 SS881A Pin diagram

Table SS881A (SSOP24) pin information

Pin Name	Pin No.	Pin Function					
		F0*	F1	F2	F3	EXT0*	EXT1
P00	9	P00*	PWM0	SCOM3	CMP0	-	-
P01	8	P01	PWM1	UARTTX	AN3	-	-
P02	20	P02	IICLK	AN7	CC0	-	-
P03	6	P03	RESET	EINT1	AN2	Standby awoken (IOWK0)	-
P04	10	P04	CC0	-	CMP1	Standby awoken (IOWK1)	awoken from sleep (WKUP0, High level wake-up)
P05	5	P05	CC1	SDPO	-	-	SSDCK (Pull down while startup)
P06	18	P06	CC2	SIF0	AN4	Standby awoken (IOWK2)	SSDIO (Pull down while
		IICDAT	UARTRX	UARTTX	-		

							startup)
P07	17	P07	CC3	PFO	-	Standby awaken (IOWK3)	-
P10	3	P10	SCOM0	EINT0	CC1	-	-
P11	2	P11	SIF1	SDPI	AN5	Standby awaken (IOWK4)	-
		IICCLK	UARTTX	UARTRX	-		
P12	21	P12	SCOM1	UARTRX	T0	-	-
		-	-	SPPTRIG	-	-	-
P13	4	P13	SCOM2	PWM1	T1	-	-
P14	19	P14	-	CC2	EINT1	-	-
P15	22	P15	-	SCOM4	CC2	-	-
P16	23	P16	-	SPPTRIG	PWM1	-	-
P17	24	P17	-	UARTRX	UARTTX	-	SSDIO (Pull down while startup)
WKUP1	7	-	-	-	-	-	awaken from sleep (WKUP1, Double edge wake)
WKUP2	1	-	-	-	-	-	awaken from sleep (WKUP2, Double edge wake)
WKUP3	16	-	-	-	-	-	awaken from sleep (WKUP3, Low level wake-up)
VIN	12	-	-	-	-	Adapter input power	-
SPWR/ VKEY	13	-	-	-	-	Power input /output	analog key
BAT	14	-	-	-	-	Battery access	-
VDD	15	-	-	-	-	System power supply	-
GND	11	-	-	-	-	GND	-

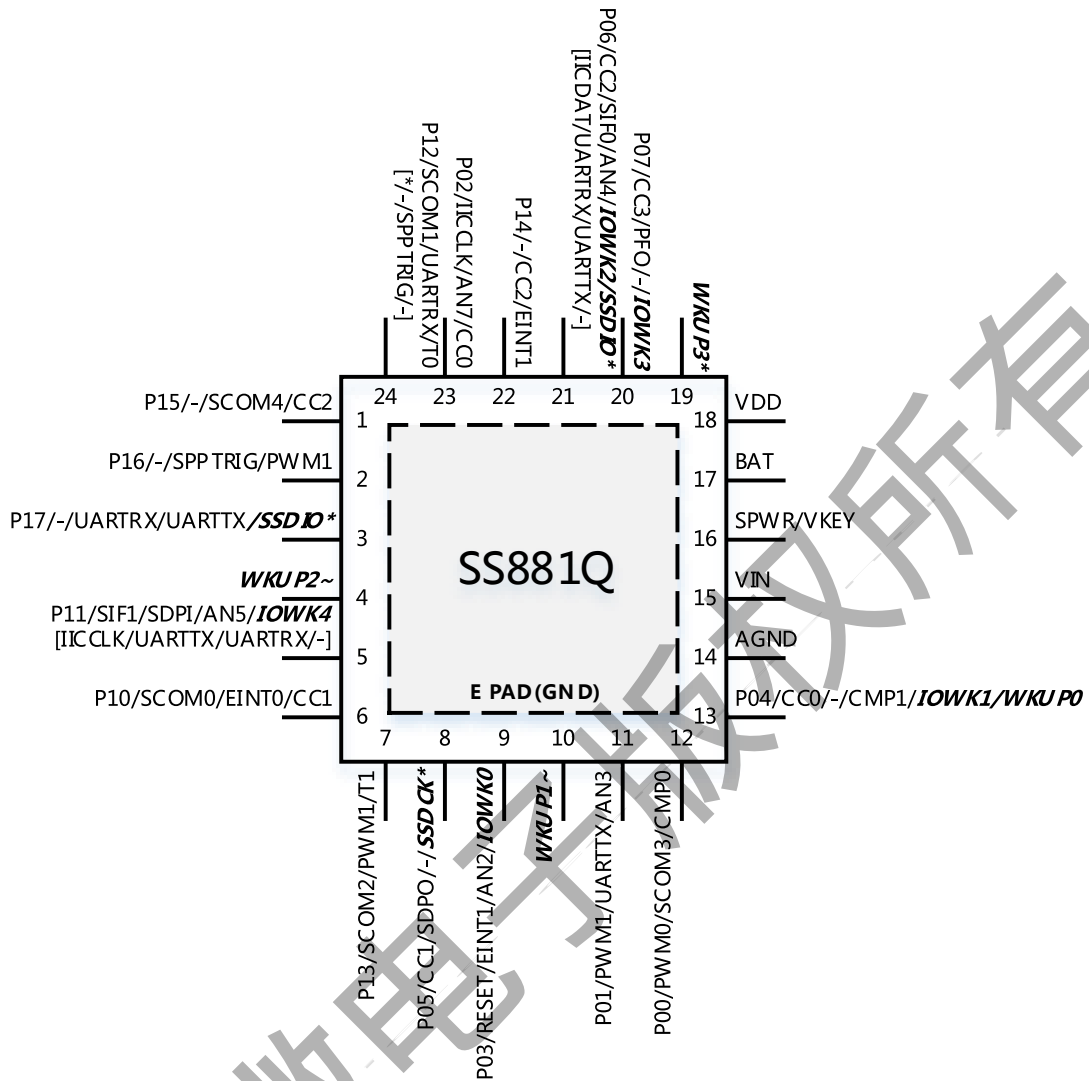


Figure 4 SS881Q Pin diagram

Table SS881Q (QFP24) pin information

Pin Name	Pin No.	Pin Function					
		F0*	F1	F2	F3	EXT0*	EXT1
P00	12	P00*	PWM0	SCOM3	CMP0	-	-
P01	11	P01	PWM1	UARTTX	AN3	-	-
P02	23	P02	IICLK	AN7	CC0	-	-
P03	9	P03	RESET	EINT1	AN2	Standby awoken (IOWK0)	-
P04	13	P04	CC0	EINT0	CMP1	Standby awoken (IOWK1)	awaken from sleep (WKUP0, High level wake-up)

P05	8	P05	CC1	SDPO	-	-	SSDCK (Pull down while startup)
P06	21	P06	CC2	SIF0	AN4	Standby awoken (IOWK2)	SSDIO (Pull down while startup)
		<i>IICDAT</i>	<i>UARTRX</i>	<i>UARTTX</i>	-		
P07	20	P07	CC3	PFO	-	Standby awoken (IOWK3)	-
P10	6	P10	SCOM0	EINT0	CC1	-	-
P11	5	P11	SIF1	SDPI	AN5	Standby awoken (IOWK4)	-
		<i>IICCLK</i>	<i>UARTTX</i>	<i>UARTRX</i>	-		
P12	24	P12	SCOM1	UARTRX	T0	-	-
		-	-	<i>SPPTRIG</i>	-	-	-
P13	7	P13	SCOM2	PWM1	T1	-	-
P14	22	P14	-	CC2	EINT1	-	-
P15	1	P15	-	SCOM4	CC2	-	-
P16	2	P16	-	SPPTRIG	PWM1	-	-
P17	3	P17	-	UARTRX	UARTTX	-	SSDIO (Pull down while startup)
WKUP1	10	-	-	-	-	-	awaken from sleep (WKUP1, Double edge wake)
WKUP2	4	-	-	-	-	-	awaken from sleep (WKUP2, Double edge wake)
WKUP3	19	-	-	-	-	-	awaken from sleep (WKUP3, Low level wake-up)
VIN	15	-	-	-	-	DCIN access	-
SPWR/ VKEY	16	-	-	-	-	Power input /output	analog key
VDD	18	-	-	-	-	System power supply	-
BAT	17	-	-	-	-	Battery access	-
AGND	14	-	-	-	-	Analog GND	-
GND (EPAD)	25	-	-	-	-	Digital GND	-

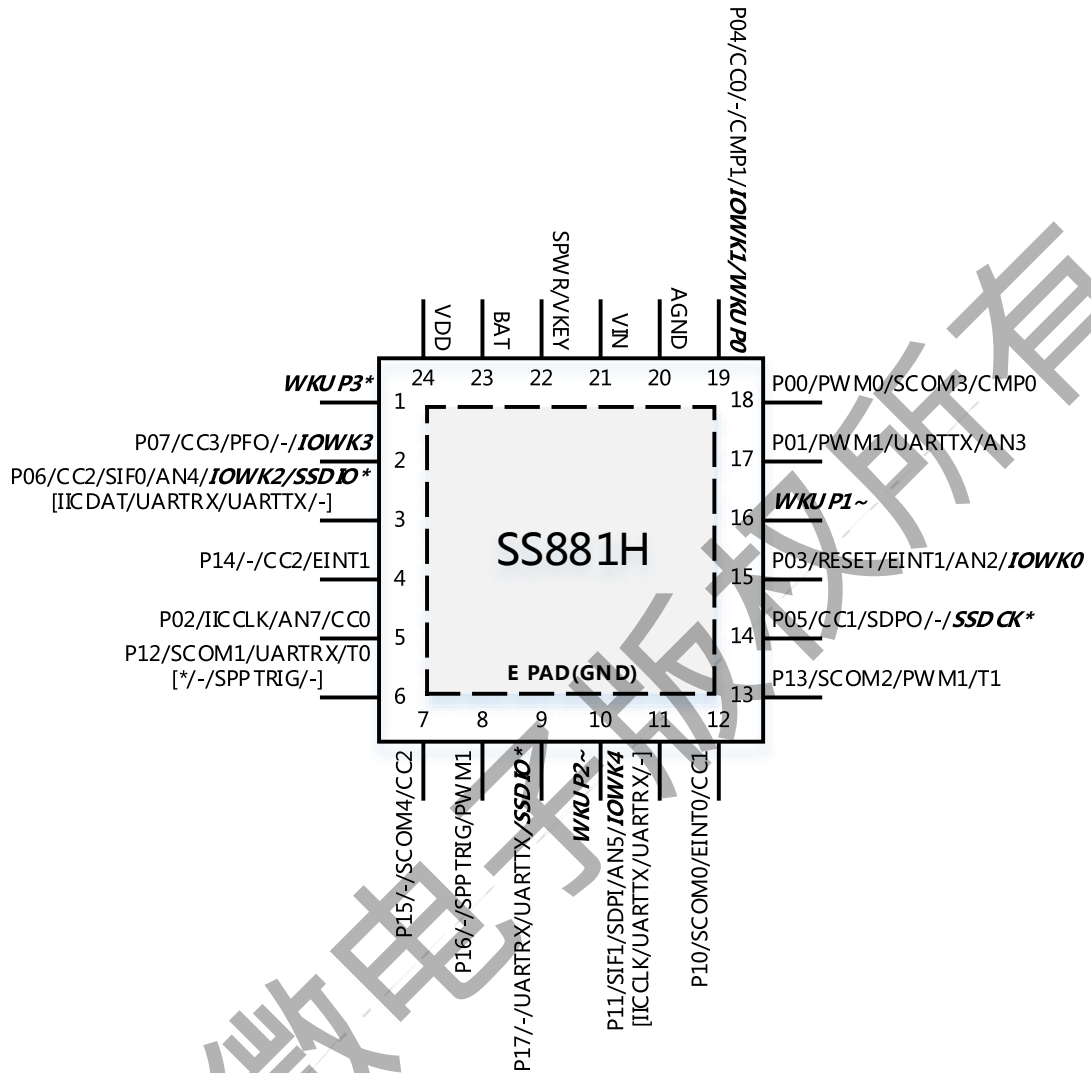


Figure 5 SS881H Pin diagram

Table SS881H (QFP24) pin information

Pin Name	Pin No.	Pin Function					
		F0*	F1	F2	F3	EXT0*	EXT1
P00	18	P00*	PWM0	SCOM3	CMP0	-	-
P01	17	P01	PWM1	UARTTX	AN3	-	-
P02	5	P02	IICLK	AN7	CC0	-	-
P03	15	P03	RESET	EINT1	AN2	Standby awoken (IOWK0)	-
P04	19	P04	CC0	-	CMP1	Standby awoken (IOWK1)	awaken from sleep (WKUP0, High level wake-up)

P05	14	P05	CC1	SDPO	-	-	SSDCK (Pull down while startup)
P06	3	P06	CC2	SIF0	AN4	Standby awoken (IOWK2)	SSDIO (Pull down while startup)
		<i>IICDAT</i>	<i>UARTRX</i>	<i>UARTTX</i>	-		
P07	2	P07	CC3	PFO	-	Standby awoken (IOWK3)	-
P10	12	P10	SCOM0	EINT0	CC1	-	-
P11	11	P11	SIF1	SDPI	AN5	Standby awoken (IOWK4)	-
		<i>IICCLK</i>	<i>UARTTX</i>	<i>UARTRX</i>	-		
P12	6	P12	SCOM1	UARTRX	T0	-	-
		-	-	<i>SPPTRIG</i>	-	-	-
P13	13	P13	SCOM2	PWM1	T1	-	-
P14	4	P14	-	CC2	EINT1	-	-
P15	7	P15	-	SCOM4	CC2	-	-
P16	8	P16	-	SPPTRIG	PWM1	-	-
P17	9	P17	-	UARTRX	UARTTX	-	SSDIO (Pull down while startup)
WKUP1	16	-	-	-	-	-	awaken from sleep (WKUP1, Double edge wake)
WKUP2	10	-	-	-	-	-	awaken from sleep (WKUP2, Double edge wake)
WKUP3	1	-	-	-	-	-	awaken from sleep (WKUP3, Low level wake-up)
VIN	21	-	-	-	-	DCIN access	-
SPWR/ VKEY	22	-	-	-	-	Power input /output	analog key
VDD	24	-	-	-	-	System power supply	-
BAT	23	-	-	-	-	Battery access	-
AGND	20	-	-	-	-	Analog GND	-
GND (EPAD)	25	-	-	-	-	Digital GND	-

2. Electrical Characteristics

2.1 Absolute Maximum

Parameter	Symbol	Value	Unit
Port input voltage	VIN(Normal Voltage Version)	-0.3 ~ 14	V
	VIN(High Voltage Version)	-0.3 ~ 40	V
	BAT	-0.3~7.5	V
	SPWR/VKEY	-0.3~7.5	V
	VCC	-0.3~7.5	V
Junction Temperature	T _J	-40 ~ 150	°C
Storage Temperature	T _{stg}	-60 ~ 150	°C
Working Temperature	T _A	-40~85	°C
ESD Level (HBM)	ESD	4	KV

* Exceeding these ratings may damage the device

2.2 Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
input voltage	VIN	4.5	5	5.5	V
	BAT	2.7	3.7	4.35	V
	VCC	2.7	3.7	4.35	V
	SPWR/ VKEY	4.5	5	5.5	V
Working Temperature	T _A	-10		70	°C

* The device is not guaranteed to function outside of its operating conditions

Responsibility Statement

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Revision Modification Record

2019-08-12	Rev 1.0	initial
2019-09-10	Rev 1.1	Add Package schematic Diagram
2020-06-01	Rev 2.0	Add SS881QH
2020-06-12	Rev 2.1	Add SS881QH Package Information
2020-06-22	Rev 2.2	Change SS881QH to SS881H
2020-06-23	Rev 2.3	Remove EINT0 function from P04



www.sinhmicro.com

0756-3366910

Sales: sales@sinhmicro.com

Support: support@sinhmicro.com