

Low Noise, Low Power Consumption, 24-bit Σ - Δ ADC

PRODUCT DESCRIPTION

The MS5180T is a 24-bit ADC with low power consumption, low noise and differential input, which is suitable for high-precision measurement applications. It integrates low noise input buffer, low noise instrumentation amplifier and adopts external differential reference voltage. It also integrates on-chip oscillators.

The chip adopts internal clocks, output data rate can set the data update rate to 16.7Hz and 10Hz. Power supply ranges from 2.7V to 5.25V. The MS5180T is available in TSSOP16 package.



TSSOP16

FEATURES

- Programmable Filtering
Conversion Rate: 10Hz or 16.7Hz
- Integrated Low Noise, Programmable Gain Instrumentation Amplifier
- PIN-programmable Power down and Reset
- Integrated Internal OSC
- Integrated Internal Bridge Power Supply Switch
- Current: Typical Value: 115 μ A @PGA=1
Typical Value: 330 μ A @PGA=128
- Integrated 50Hz/60Hz Limiting Filter
- Integrated 2-wire Serial Interface
- Power Supply: 2.7V to 5.25V
- Operating Temperature: -40°C to 105°C

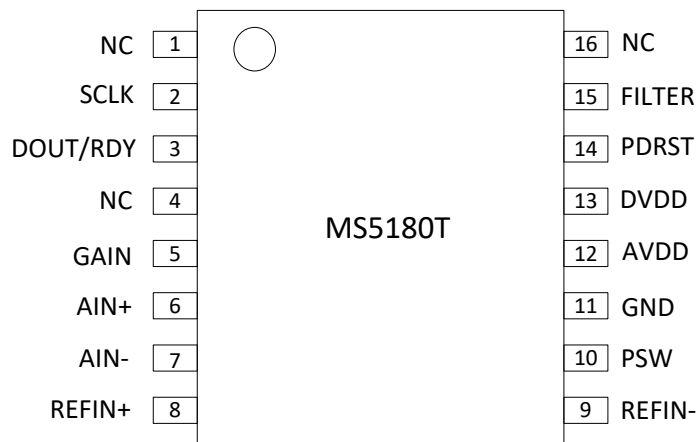
APPLICATIONS

- Weighing Apparatus
- Pressure Measurement
- Gas Analysis and Blood Analysis
- Industrial Process Control and Instrument
- Portable Instruments

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS5180T	TSSOP16	MS5180T

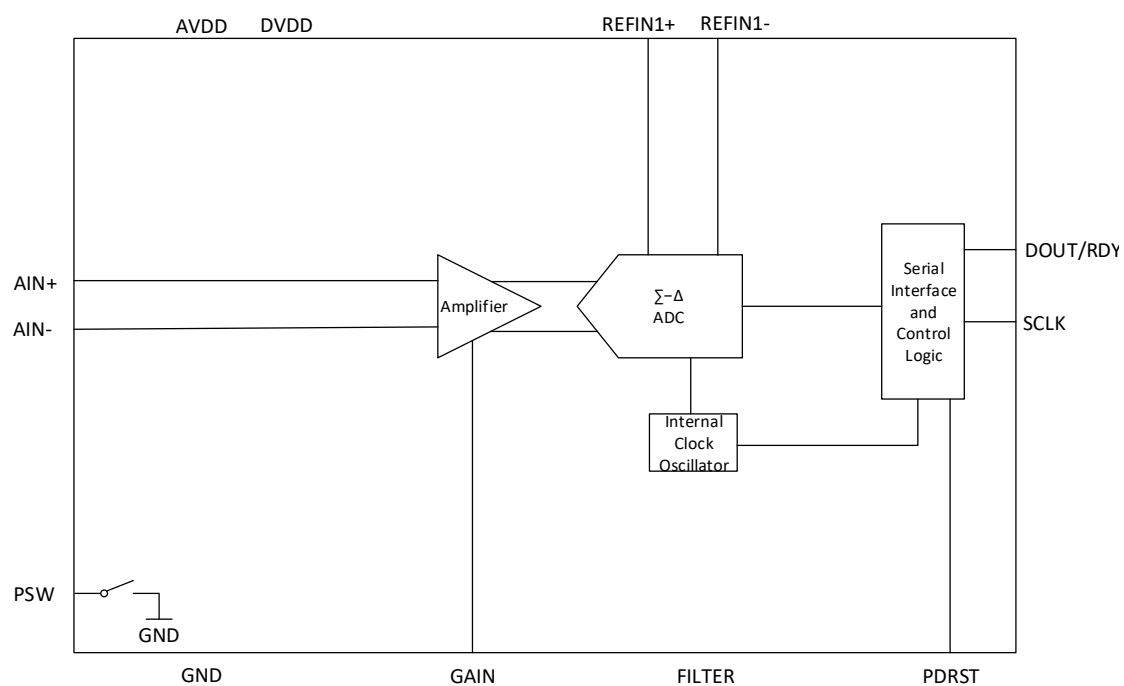
PIN CONFIGURATION



PIN DESCRIPTION

Pin	Name	Type	Description
1,4,16	NC	-	No Connection
2	SCLK	I	Serial Clock Input
3	DOUT/RDY	O	Serial Data Output/Data Ready Output Pin
5	GAIN		Gain Control. When it is low, GAIN=128; When it is high, GAIN=1
6	AIN+	I	Analog Channel Positive Input Pin
7	AIN-	I	Analog Channel Negative Input Pin
8	REFIN+	I	Reference Voltage Positive Input Pin
9	REFIN-	I	Reference Voltage Negative Input Pin
10	PSW	I	Low-side Power Supply Switch to GND
11	GND	-	Ground
12	AVDD	-	Analog Power Supply (2.7V~5.25 V)
13	DVDD	-	Digital Interface Power Supply Pin, between 2.7V and 5.25 V
14	PDRST	I	Power down and Reset Port When it is low, the chip is in power-down mode, the low-side power supply switch is enabled; When it is high, the chip is reset, data can be normally conversed.
15	FILTER	I	Filter Selection High: Conversion rate is 10Hz; Low: Conversion rate is 16.7Hz.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Any exceeding absolute maximum rating application causes permanent damage to device. Because long-time absolute operation state affects device reliability. Absolute ratings just conclude from a series of extreme tests. It doesn't represent chip can operate normally in these extreme conditions.

Parameter	Symbol	Ratings	Unit
Analog Power Supply Range	AVDD	-0.3 ~ +7.0	V
Digital Power Supply Range	DVDD	-0.3 ~ +7.0	V
Analog Input Voltage Range	AIN	-0.3 ~ AVDD+0.3	V
Reference Voltage Range	VREFIN	-0.3 ~ AVDD+0.3	V
Digital Input Voltage Range		-0.3 ~ DVDD+0.3	V
Digital Output Voltage Range	V(LE)	-0.3 ~ DVDD+0.3	V
Input Port Current		10	mA
Operating Temperature Range		-40 ~ 105	°C
Storage Temperature Range	T _{STG}	-65 ~ 150	°C
Soldering Temperature(10s)		260	°C
ESD(HBM)		4000	V

ELECTRICAL CHARACTERISTICS

AVDD=2.7V to 5.25V; DVDD=2.7V to 5.25V; GND=0V; Unless otherwise noted, parameters are in full temperature range.

Parameter	Condition	Min	Typ	Max	Unit
ADC Channel					
Output Rate			10/16.7		Hz
No Missing Codes Accuracy			24		Bits
Accuracy	See “Output Noise and Resolution”				
Output Noise and Rate	See “Output Noise and Resolution”				
Integral Nonlinearity			±6		ppm of FSR
Offset Error	GAIN=128,FILTER=1		±6		μV
	GAIN=1,FILTER=1		±200		
	GAIN=128,FILTER=0		±1		
	GAIN=1,FILTER=0		±2		
Offset Error Temperature Drift	GAIN=128		±10		nV/°C
	GAIN=1,FILTER=1		±150		
	GAIN=1,FILTER=0		±10		
Full-scale Error			±10		μV
Gain Temperature Drift			1		ppm/°C
Common-mode Rejection Ratio	GAIN=1,AIN=1V@DC		90		dB
	GAIN=128,AIN=7.81mV@DC		90		
	@50Hz±1Hz,60Hz±1Hz		110		
Power Supply Rejection Ratio	GAIN=128, FILTER=1, AIN=7.81mV		100		dB
	GAIN=128, FILTER=0, AIN=7.81mV		120		
Analog Input					
Differential Input Voltage Range		±VREF/gain			V
Absolute Input Voltage	GAIN=1	0.1		AVDD-0.1	V
	GAIN=128,FILTER=0	0.45		AVDD-1.1	
	GAIN=128,FILTER=1@AVDD≤3.6	1.1		AVDD-1.1	
	GAIN=128,FILTER=1@AVDD>3.6	1.5		AVDD-1.5	
Buffer	GAIN=1			±1	nA
Analog Input Current	GAIN=128			±250	pA

Parameter	Condition	Min	Typ	Max	Unit
Reference Voltage					
Reference Voltage		0.5		AVDD	V
Reference Voltage Input Average Current			400		nA/V
Reference Voltage Input Average Current Temperature Drift			±0.03		nA/V/°C
Common-mode Rejection			100		dB
Low-side Power Supply Switch					
On-resistance			7	9	Ω
Allowable Current				30	mA
Clock					
Clock Frequency			64±3%		kHz
Clock Duty Cycle			50:50		%
Logic Inputs					
High-level Input Threshold	DVDD=5V	1.4		2	V
	DVDD=3V	0.9		2	V
Low-level Input Threshold	DVDD=5V	0.8		1.7	V
	DVDD=3V	0.4		1.35	V
SCLK Input Hysteresis	DVDD=5V	0.1		0.17	V
	DVDD=3V	0.06		0.13	V
Digital Logic Outputs					
High-level Output	DVDD=3V, ISOURCE=100μA	DVDD-0.6			V
	DVDD=5V, ISOURCE=200μA	4			V
Low-level Output	DVDD=3V, ISINK=100μA			0.4	V
	DVDD=5V, ISINK=1.6mA			0.4	V
Floating-state Leakage Current				±10	μA
Floating-state Output Capacitance			10		pF
Power Consumption					
Power Supply	AVDD	2.7		5.25	V
	DVDD	2.7		5.25	V

Parameter	Condition	Min	Typ	Max	Unit
Power Supply Current	GAIN=1,AVDD=3V		115		μA
	GAIN=1,AVDD=5V		130	160	
	GAIN=128,AVDD=3V		330		
	GAIN=128,AVDD=5V		420	500	
Power-down Current			10		μA

OUTPUT NOISE and RESOLUTION (REFERENCE VOLTAGE=2.5V)

The following table lists the MS5180T output RMS noise for some update rates and gain settings. These numbers are typical, and the condition is that differential input voltage is 0V. It must be noted that effective resolution is calculated by RMS noise. These numbers are typical, and effective accuracy is rounded to the nearest LSB.

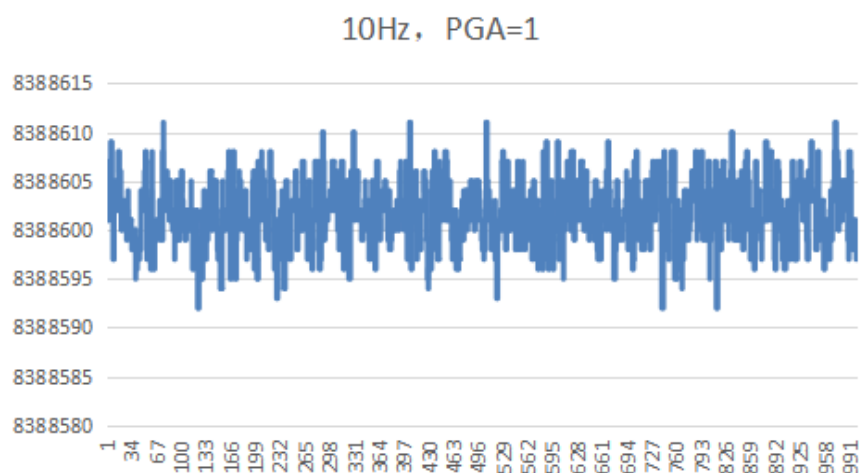
The MS5180T Using 2.5V External Reference Voltage,

The Relation between the Relative Gain of Output Noise Effective Value(μ V) and Conversion Rate

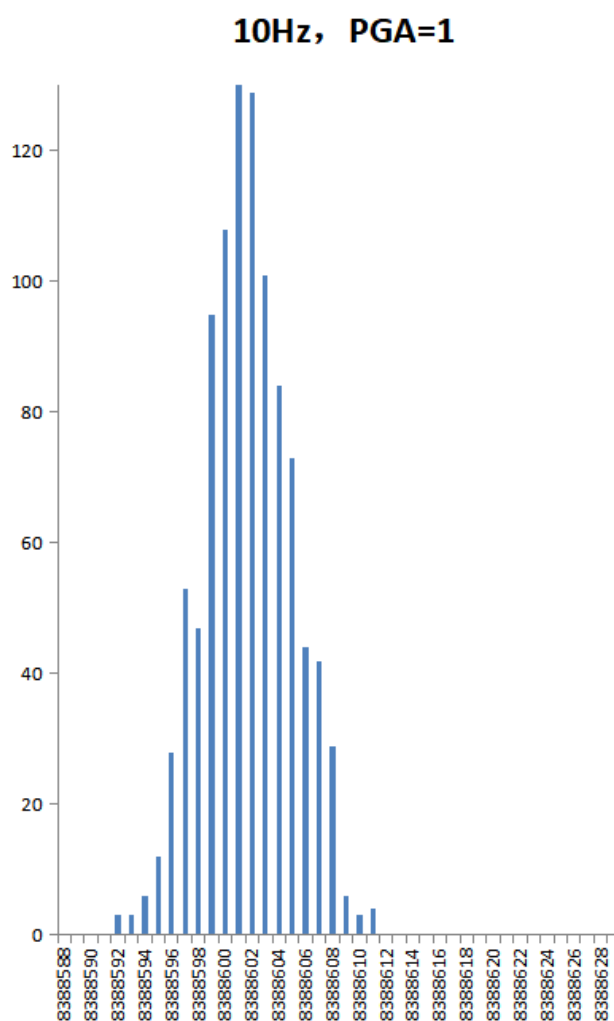
Conversion Rate	Gain: 1	Gain: 128
10Hz	0.8579	0.0712
16.7Hz	1.2192	0.0822

Conversion Rate	Gain: 1	Gain: 128
10Hz	19.7	16.2
16.7Hz	19.2	16.1

TYPICAL CHARACTERISTICS CURVE

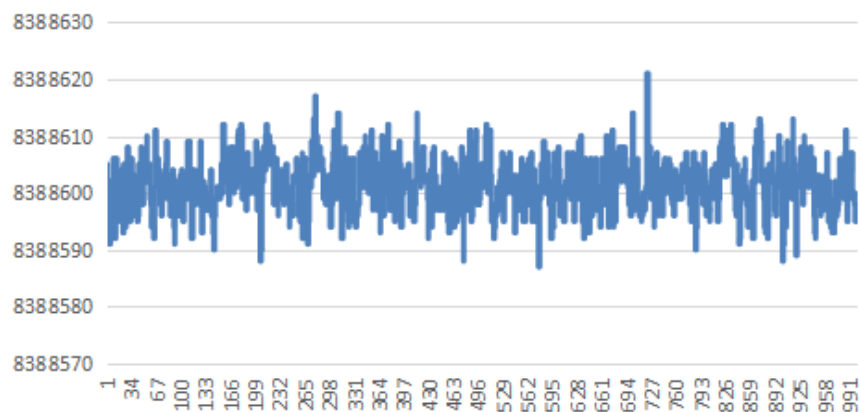


The MS5180T Noise (AVDD=4V, External Reference 2.5V, Gain = 1, Update Rate = 10 Hz)



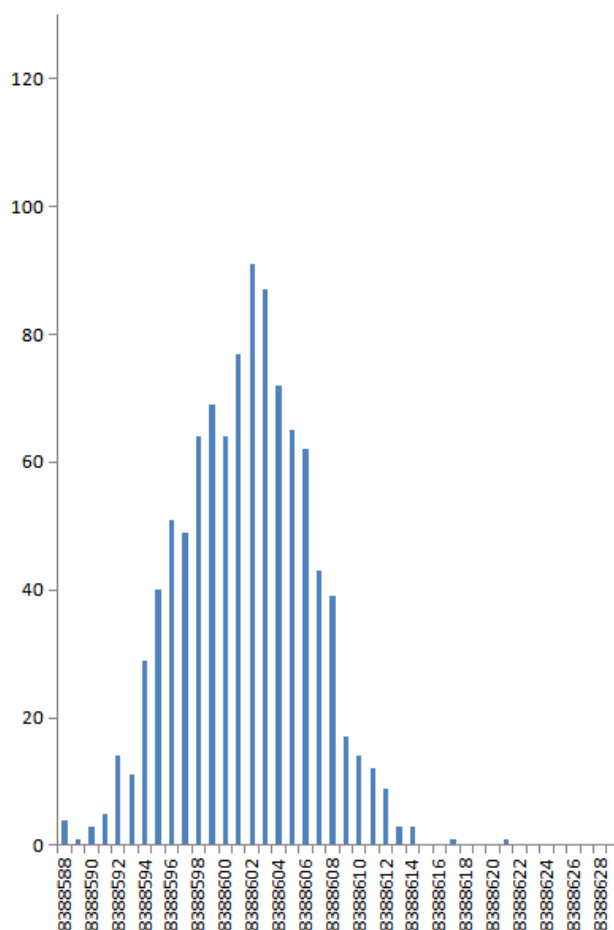
The MS5180T Noise Distribution Bar Chart (AVDD=4V, Internal Reference, Gain = 1, Update Rate = 10 Hz)

16.7Hz, PGA=1



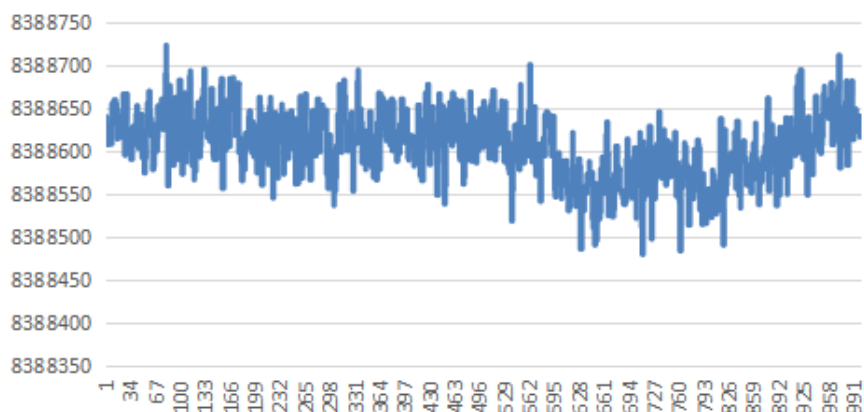
The MS5180T Noise (AVDD=4V, External Reference 2.5V, Gain = 1, Update Rate = 16.7 Hz)

16.7Hz, PGA=1



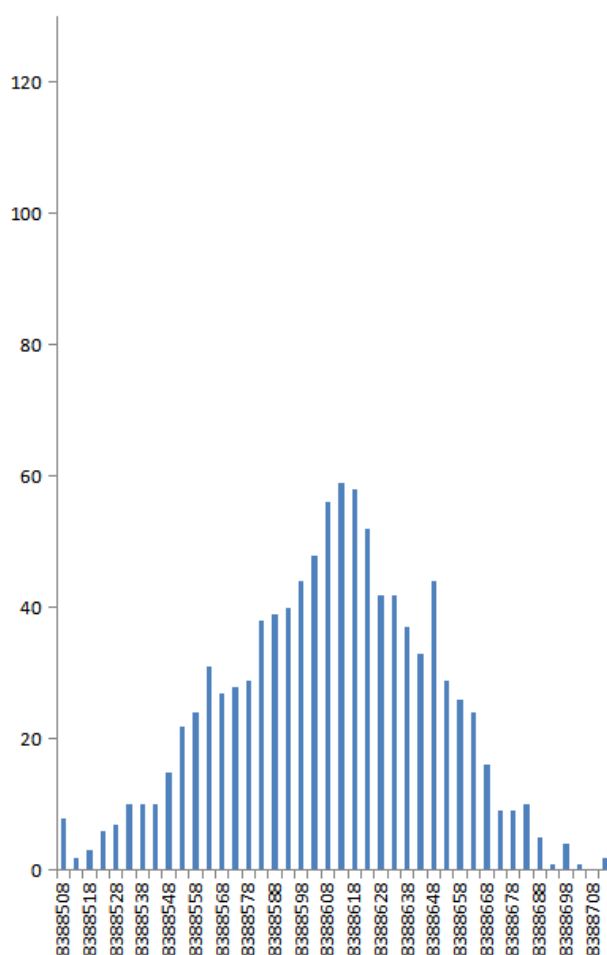
The MS5180T Noise Distribution Bar Chart (AVDD=4V, Internal Reference, Gain = 1, Update Rate = 16.7Hz)

10Hz, PGA=128



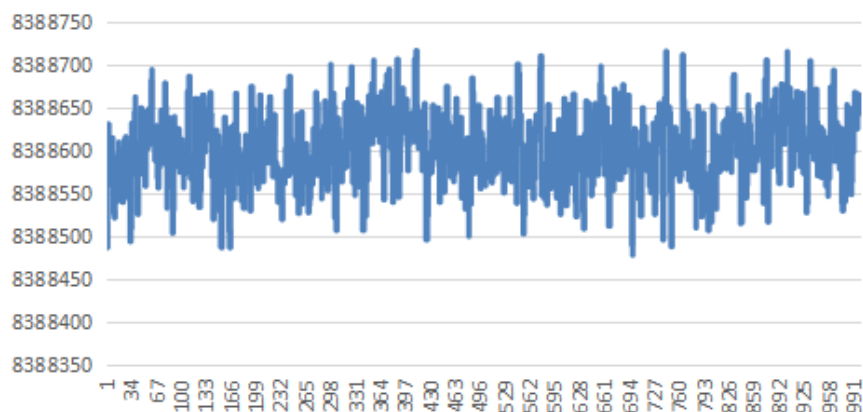
The MS5180T Noise (AVDD=4V, External Reference 2.5V, Gain = 128, Update Rate = 10 Hz)

10Hz, PGA=128



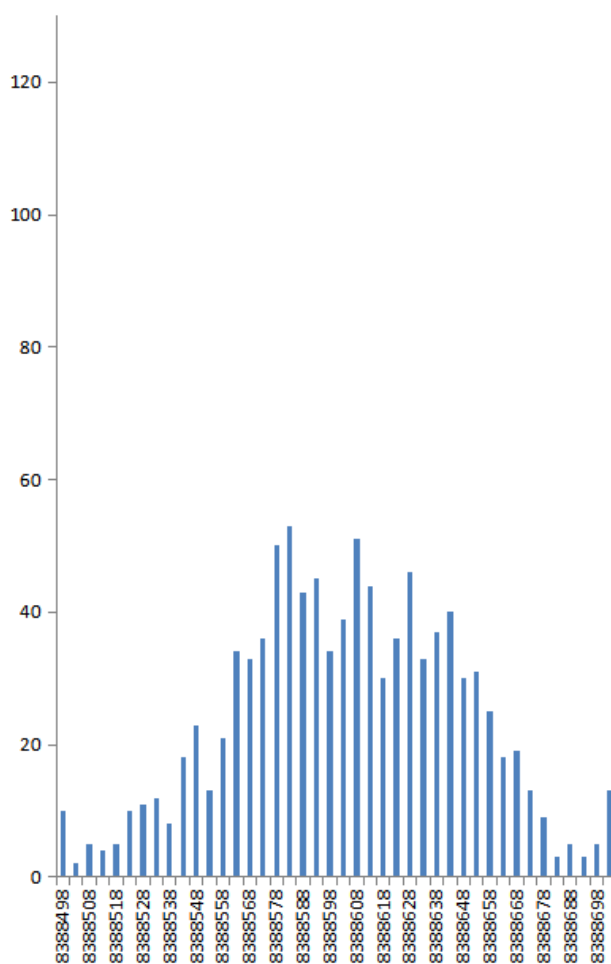
The MS5180T Noise Distribution Bar Chart (AVDD=4V, Internal Reference, Gain = 128, Update Rate = 10 Hz)

16.7Hz, PGA=128



The MS5180T Noise (AVDD=4V, External Reference 2.5V, Gain = 128, Update Rate = 16.7 Hz)

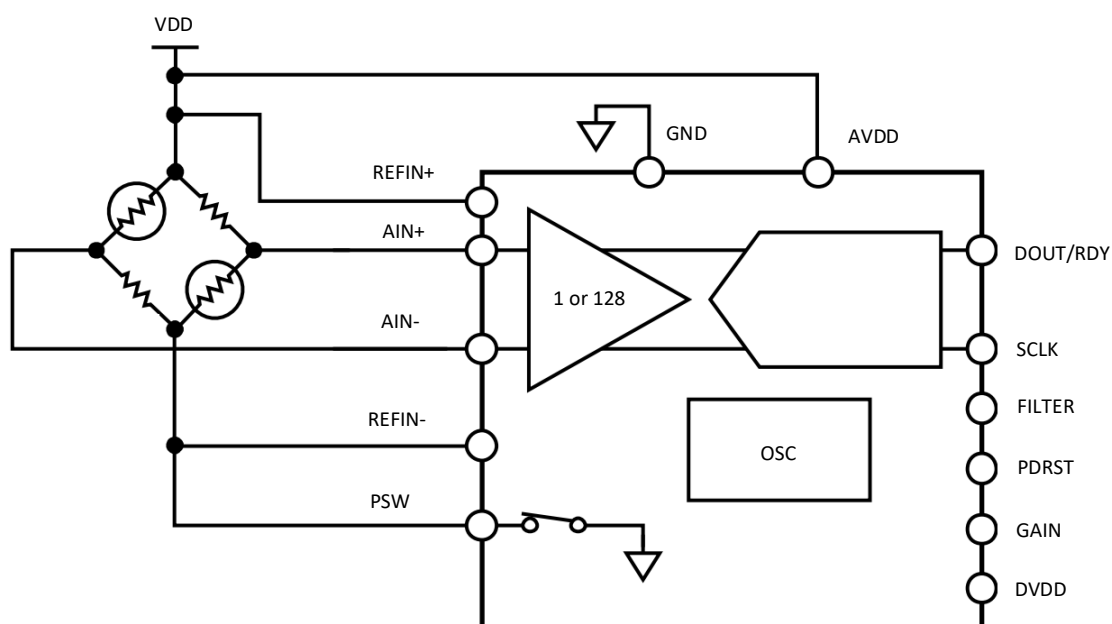
16.7Hz, PGA=128



The MS5180T Noise Distribution Bar Chart (AVDD=4V, Internal Reference, Gain = 128, Update Rate = 16.7Hz)

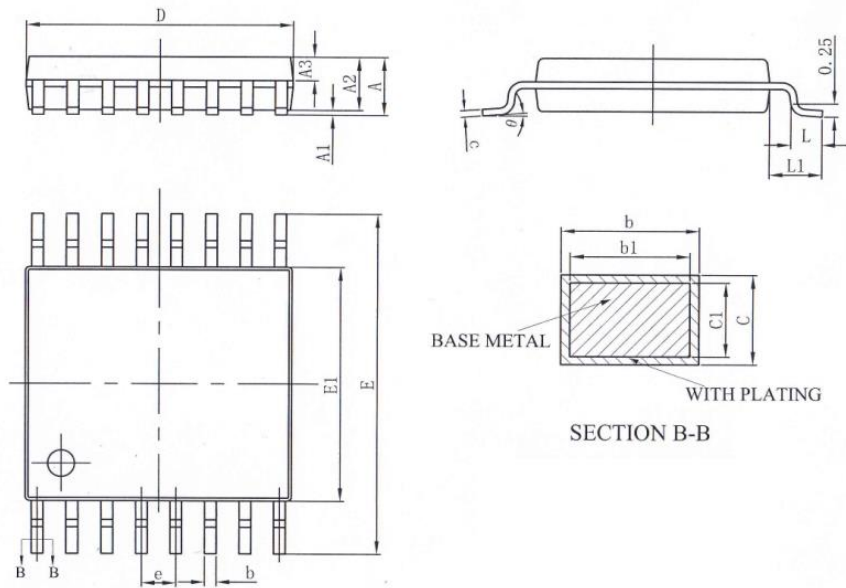
TYPICAL APPLICATION

The following figure is a sketch map of the MS5180T used as a weighing apparatus.

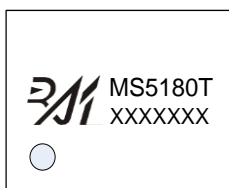


PACKAGE OUTLINE DIMENSIONS

TSSOP16



Symbol	Dimensions in Millimeters		
	Min	Typ	Max
A	-	-	1.20
A1	0.05	-	0.15
A2	0.90	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	-	0.29
b1	0.19	0.22	0.25
c	0.13	-	0.18
c1	0.12	0.13	0.14
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
θ	0	-	8°

MARKING and PACKAGING SPECIFICATIONS**1. Marking Drawing Description**

Product Name: MS5180T

Product Code: XXXXXXX

2. Marking Drawing Demand

Laser printing, contents in the middle, font type Arial.

3. Packaging Specification

Device	Package	Piece/Reel	Reel/Box	Piece/Box	Box/Carton	Piece/Carton
MS5180T	TSSOP16	3000	1	3000	8	24000

STATEMENT

- All Revision Rights of Datasheets Reserved for Ruimeng. Don't release additional notice.
Customer should get latest version information and verify the integrity before placing order.
- When using Ruimeng products to design and produce, purchaser has the responsibility to observe safety standard and adopt corresponding precautions, in order to avoid personal injury and property loss caused by potential failure risk.
- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

**MOS CIRCUIT OPERATION PRECAUTIONS**

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

- 1、The operator shall ground through the anti-static wristband.
- 2、The equipment shell must be grounded.
- 3、The tools used in the assembly process must be grounded.
- 4、Must use conductor packaging or anti-static materials packaging or transportation.



+86-571-89966911



Rm701, No.9 Building, No. 1 WeiYe Road, Puyan Street, Binjiang District, Hangzhou, Zhejiang



[http:// www.relmon.com](http://www.relmon.com)