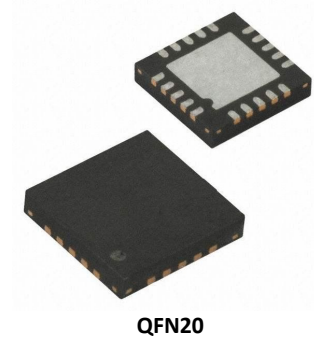


16bit, 4/8 Channels, 200KSPS, SAR ADC

PRODUCT DESCRIPTION

MS5182N/MS5189N is a 4/8 channel, 16 bit, charge redistribution successive approximation analog-to-digital converter. It uses single power supply. MS5182N/MS5189N integrates a no missing 16-bit SAR ADC, a low crosstalk multiplexer, an internal low-drift reference voltage source (optional 2.5V or 4.096V), a temperature sensor, an optional single-pole filter, and a sequencer that is useful when multiple channels are sequentially sampled. MS5182N/MS5189N uses the SPI interface to configure registers and receive converted data. The SPI interface uses a separate power supply (VIO).

MS5182N/MS5189N is packaged in a small QFN20 with operating temperature ranging from -40°C to +120°C.



QFN20

FEATURES

- No Missing Resolution: 16bit
- Integrated Multiplexer: 4 (MS5182N), 8 (MS5189N)
- Optional Input Configurations: Unipolar and Bipolar Inputs, Single-ended and Differential Inputs
- INL (@External Reference 2.048V): +0.4LSB (Typical), ±1.5LSB (Maximum)
- Dynamic Range: 93.8dB
- SINAD: 92.5dB (20kHz), THD: -100dB (20kHz)
- Analog Input Range: 0 to VREF (VREF up to VDD)
- Multiple VREF: Internal 2.5V or 4.096V, External
- Internal Temperature Sensor
- Channel Sequencer
- Single Power Supply Operation: 2.3V to 5.5V
Logical Power Supply: 1.8V to 5.5V
- Serial Interface: SPI, MICROWIRE, QSPI and DSP compatible
- Standby Current: 50nA

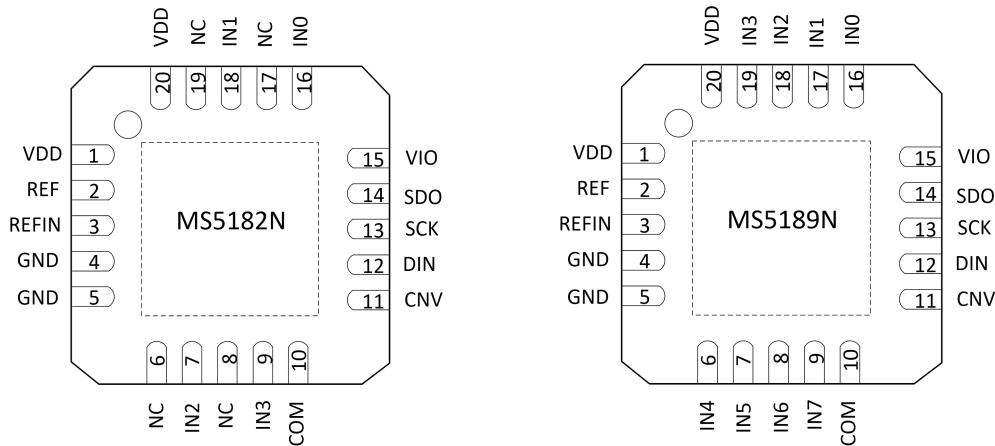
APPLICATIONS

- Multichannel System Monitoring
- Battery-powered Equipment
- Medical Devices: ECG, EKG
- Mobile Communication: GPS
- Power Line Monitoring
- Seismic Data Acquisition System
- Instruments and Instruments
- Process Control

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS5182N	QFN20	MS5182
MS5189N	QFN20	MS5189

PIN CONFIGURATION

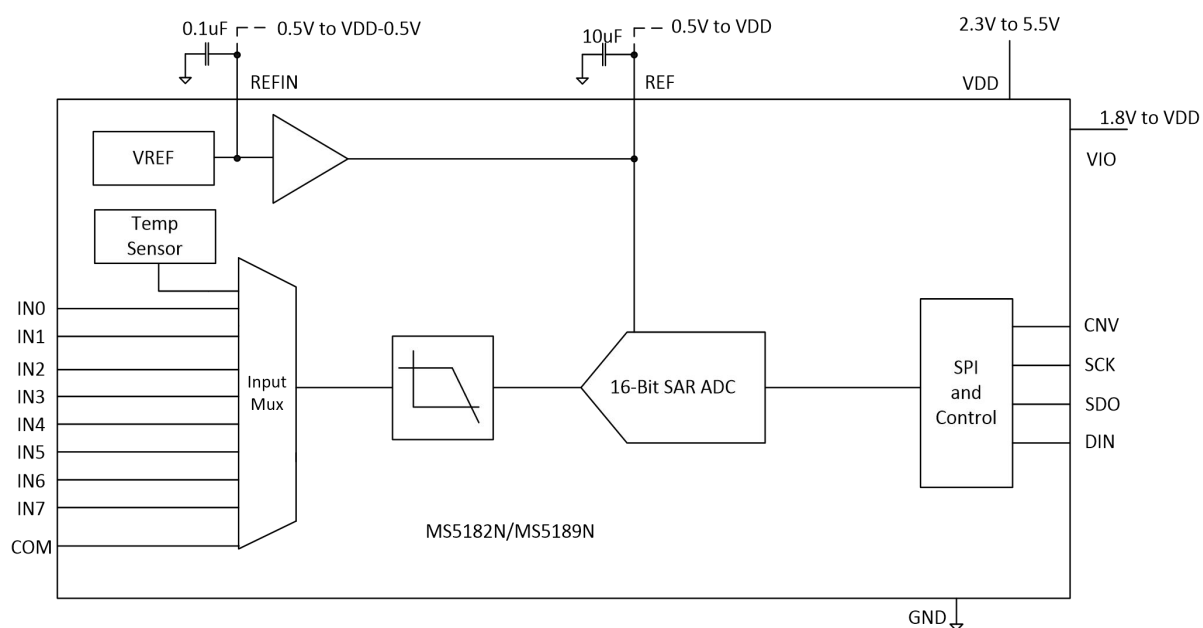


PIN DESCRIPTION

Pin	Name		Type	Description
	MS5182N	MS5189N		
1,20	VDD	VDD	-	Power Supply. Minimum 3.0V when using internal reference source 2.5V; Minimum 4.5V when using internal reference source 4.096V
2	REF	REF	I/O	Reference Voltage Input/Output. A decoupling capacitor of 10uF is required. This pin can output 2.5V or 4.096V reference voltage when enabling internal reference source. When the internal reference source is disabled and the internal buffer is enabled, the REFIN external reference voltage is output to the REF PIN through the buffer.
3	REFIN	REFIN	I/O	Internal Reference Output/voltage Buffer Input Pin. When an internal reference source is used, the internal output is a buffer-free reference voltage and a 0.1uF decoupling capacitor is required. When the internal reference voltage buffer is enabled, a reference source from 0.5V to (VDD-0.5V) can be applied and buffered to the REF pin.
4	GND	GND	-	Ground
5	GND	GND	-	Ground
6	NC	IN4	I	MS5182N: No Connect MS5189N: Analog Input Channel 4
7	IN2	IN5	I	MS5182N: Analog Input Channel 2 MS5189N: Analog Input Channel 5

Pin	Name		Type	Description
	MS5182N	MS5189N		
8	NC	IN6	I	MS5182N: No Connect MS5189N: Analog Input Channel 6
9	IN3	IN7	I	MS5182N: Analog Input Channel 3 MS5189N: Analog Input Channel 7
10	COM	COM	I	Common Voltage Input. All input channels (IN7~IN0) can reference a common voltage of 0V or 0.5×VREF.
11	CNV	CNV	I	Convert Control Input. Start the conversion at the CNV rising edge. During the conversion, if the CNV remains low, the busy indicator is enabled.
12	DIN	DIN	I	Data Input. Used to write 14-bit configuration registers.
13	SCK	SCK	I	Serial Data Clock Input.
14	SDO	SDO	O	Serial Data Output.
15	VIO	VIO	-	Digital Interface Power Supply.
16	IN0	IN0	I	Analog Input Channel 0.
17	NC	IN1	I	MS5182N: No Connect MS5189N: Analog Input Channel 1
18	IN1	IN2	I	MS5182N: Analog Input Channel 1 MS5189N: Analog Input Channel 2
19	NC	IN3	I	MS5182N: No Connect MS5189N: Analog Input Channel 3
-	EPAD	EPAD	-	Thermal Pad, Recommend to connect to system ground

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	Range	Unit
Power Supply Range	VDD	-0.3 ~ +7.0	V
Analog Input Range	IN	-0.3 ~ VDD+0.3	V
Reference Voltage Range	VREFIN	-0.3 ~ VDD+0.3	V
Digital Input Range		-0.3 ~ VIO+0.3	V
Digital Output Range		-0.3 ~ VIO+0.3	V
Input Current		10	mA
Operating Temperature Range		-40 ~ 120	°C
Storage Temperature Range	Tstg	-60 ~ 150	°C
Lead Temperature(10 sec)		260	°C
ESD(HBM)		4000	V

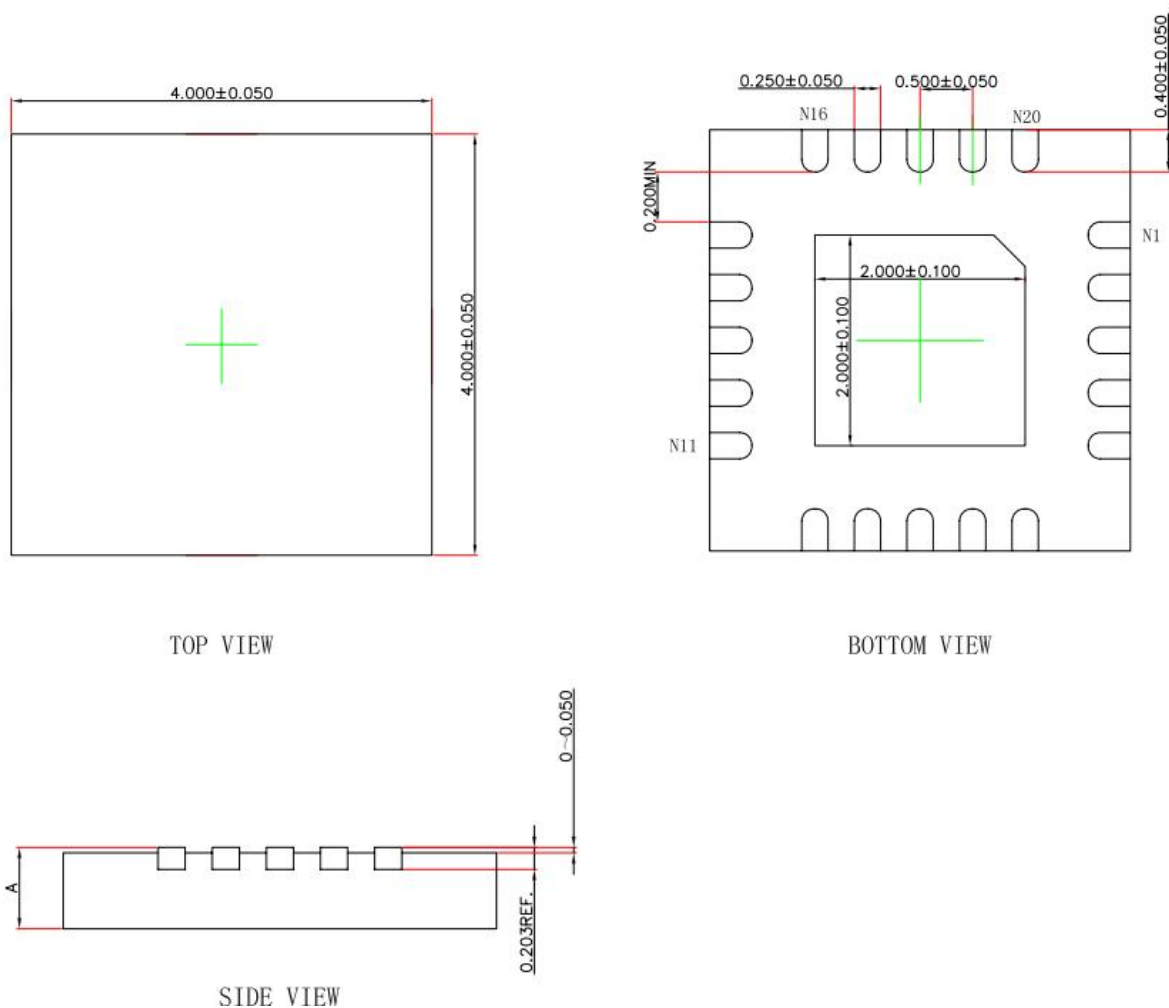
ELECTRICAL CHARACTERISTICS

VDD = 2.3 V to 5.5 V, VIO = 1.8 V to VDD, Reference Voltage (VREF) = VDD, TA = -40°C to +120°C.

Parameter	Condition	Min	Typ	Max	Unit
Analog Inputs					
Analog Input Range	Unipolar mode	0		+VREF	V
	Bipolar mode	-VREF/2		+VREF/2	
Absolute Input Voltage	Positive input, unipolar and bipolar modes	-0.1		VREF+0.1	V
	Negative or COM input, unipolar mode	-0.1		+0.1	V
	Negative or COM input, bipolar mode	VREF/2-0.1	VREF/2	VREF/2+0.1	V
Analog Input CMRR	Fin=200kHz		68		dB
Leakage Current@25°C	Acquisition phase		1		nA
Conversion Rate					
Full Bandwidth	VDD=4.5V to 5.5V	0		200	kSPS
	VDD=2.3V to 4.5V	0		200	kSPS
1/4 Bandwidth	VDD=4.5V to 5.5V	0		50	kSPS
	VDD=2.3V to 4.5V	0		50	kSPS
Transient Response	Full Bandwidth,full scale step			2	us
	1/4 Bandwidth,full scale step			12	us
Accuracy					
No Missing Codes			16		Bits
INL	Reference voltage (VREF) = 2.048V	-1.5	±0.4	+1.5	LSB
DNL	Reference voltage (VREF) = 2.048V	-1	±0.25	+1	LSB
Transition Noise	REF=VDD=5V		0.5		LSB
Gain Error		-8	±1	+8	LSB
Gain Error Match		-4	±0.5	+4	LSB
Gain Error Temp Drift			±1		ppm/°C
Offset Error	VDD=4.5V to 5.5V	-8	±1	+8	LSB
	VDD=2.3V to 4.5V		±5		LSB
Offset Error Match		-4	±0.5	+4	LSB
Offset Error Temp Drift			±1		ppm/°C
Power Supply Sensitivity	VDD=5V±5%		±1.5		LSB

Parameter	Condition	Min	Typ	Max	Unit
Dynamic Characteristics					
SNR	Fin=20kHz,VREF=5V	92.5	93.5		dB
	Fin=20kHz,internal VREF=4.096V	91	92.3		
THD	Fin=20kHz		-100		dB
SFDR	Fin=20kHz		110		dB
Crosstalk between Channels	Fin=100kHz		-125		dB
Sampling Dynamic					
-3dB Input BW	Full bandwidth		1.6		MHz
	1/4 bandwidth		0.4		MHz
Aperture Delay	VDD=5V		2.5		ns
Internal VREF					
REF Output	2.5V@25°C	2.490	2.500	2.510	V
	4.096V@25°C	4.086	4.096	4.106	V
REFIN Output	2.5V@25°C		1.2		V
	4.096V@25°C		2.3		V
REF Output Current			±300		uA
Temperature Drift			±10		ppm/°C
Line Regulation	VDD=5V±5%		±15		ppm/V
Settling Time	CREF=10uF		4		ms
External VREF					
Input Range	REF input	0.5		VDD+0.3	V
	REFIN input	0.5		VDD-0.5	V
Input Current	200kSPS,VREF=5V		50		uA
Temperature Sensor					
Output Voltage	@25°C		183		mV
Temperature Sensitivity			1		mV/°C

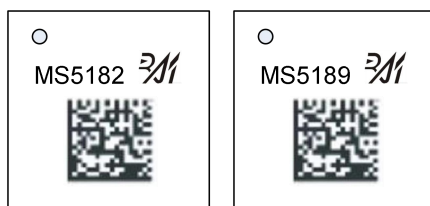
Parameter	Condition	Min	Typ	Max	Unit
Logic Inputs					
Input Low Voltage		-0.3		+0.3×VIO	V
Input High Voltage		0.7×VIO		VIO+0.3	V
Input Currents		-1		+1	uA
Logic Outputs					
Output High Voltage	Isource=-500uA	VIO-0.3			V
Output Low Voltage	Isink=+500uA			0.4	V
Output Short Current				80	mA
Power Supply					
VDD		2.3		5.5	V
VIO		1.8		VDD+0.3	V
Standy Current	VDD=VIO=5V, 25°C		50		nA
Power current	VDD=2.5V, 100kSPS		0.7		mA
	VDD=2.5V, 200kSPS		1.4		
	VDD=5V, 200kSPS		2.5	3	
	VDD=5V, 200kSPS, internal VREF		3.2	4	
Temperature Range					
Temperature Range	Tmin to Tmax	-40		120	°C

PACKAGE OUTLINE DIMENSIONS
QFN20(4x4)


Symbol	Dimensions in Millimeters		
	Min	Typ	Max
A	0.700	0.750	0.800

MARKING and PACKAGING SPECIFICATIONS

1. Marking Drawing Description



Product Name: MS5182, MS5189

Product Code: XXXXXXX

2. Marking Drawing Demand

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

3. Packaging Specifications

Device	Package	Piece/Reel	Reel/Box	Piece/Box	Box/Carton	Piece/Carton
MS5182N	QFN20	4000	1	4000	8	32000
MS5189N	QFN20	4000	1	4000	8	32000

STATEMENT

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- 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.



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