

## Low Temperature Drift, Low Power Dissipation Voltage Reference

### FEATURES

- MSR020: Output Voltage 2.048V  
MSR040: Output Voltage 4.096V
- Initial Precision:  $\pm 0.05\%$  (Max)
- Operating Temperature Range:  
-40°C to +125°C
- Output Current:  $\pm 1.3\text{mA}$
- Quiescent Current: 750 $\mu\text{A}$ @5V
- Power Supply: VREF+0.15V to 5.5V
- SOT23-5 Package

### APPLICATIONS

- Precision Data Acquisition System
- Portable and Battery-powered Devices
- Industry Instrument
- Test Device and Power Monitor

### PRODUCT DESCRIPTION

The MSR020/MSR040 is a low temperature drift, low power dissipation and high-precision CMOS voltage reference, which is featured by initial precision of  $\pm 0.05\%$  and low power dissipation.

The features, low output voltage hysteresis and low long-term output voltage drift, could further improve stability and system reliability. In addition, it is characterized by small-outline and low operating current, which is suitable for portable and battery-powered applications.

The MSR020/MSR040 is available in SOT23-5 package. The operating temperature ranges from -40°C to 125°C.

### PRODUCT SPECIFICATION

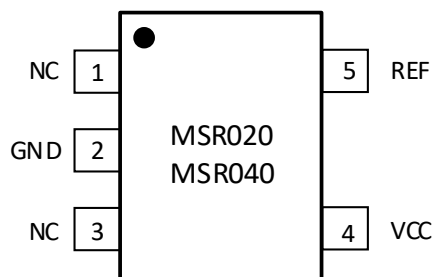
Part Number	Package	Marking	Grade	Maximum Temperature Drift (ppm/°C)
MSR020	SOT23-5	R020	A	5
			B	10
			C	30
			D	60
MSR040	SOT23-5	R040	A	5
			B	10
			C	30
			D	60

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## PIN CONFIGURATION



## PIN DESCRIPTION

Pin	Name	Type	Description
1	NC	-	Not Connection
2	GND	-	Ground
3	NC	-	Not Connection
4	VCC	-	Power Supply
5	REF	O	Reference Output MSR020: Output 2.048V; MSR040: Output 4.096V

**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.

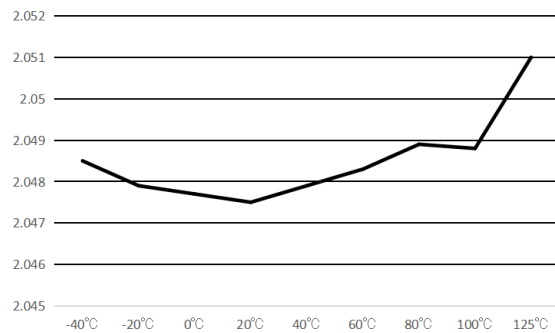
Parameter	Symbol	Ratings	Unit
Power Supply	$V_{CC}$	-0.3 ~ +6.5	V
Power Supply Difference	$V_{CC-GND}$	-0.3 ~ +6.5	V
Operating Temperature	$T_A$	-40 ~ +125	°C
Storage Temperature	$T_{STG}$	-65 ~ +150	°C
Maximum Junction Temperature	$T_{JMAX}$	150	°C
Lead Temperature(10s)	$T_{SOLDER}$	260	°C
ESD (HBM)	$V_{ESD}$	4000	V

# ELECTRICAL CHARACTERISTICS

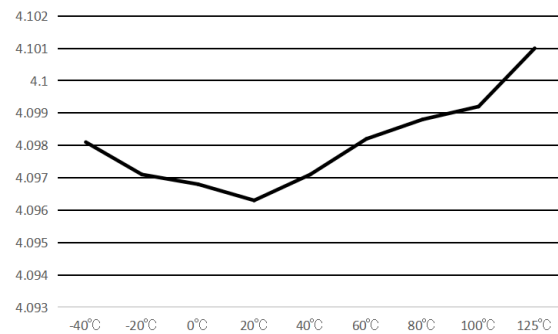
$V_{CC}=5V$ ,  $T_A=25^{\circ}C$

Parameter	Condition	Min	Typ	Max	Unit
Output Voltage	MSR020, $C_L=1\mu F$		2.048		V
	MSR040, $C_L=1\mu F$		4.096		V
Precision		-0.05%		+0.05%	%
Output Voltage Temperature Drift	Grade A, $-40^{\circ}C$ to $85^{\circ}C$			5	ppm/ $^{\circ}C$
	Grade B, $-40^{\circ}C$ to $85^{\circ}C$			10	
	Grade C, $-40^{\circ}C$ to $85^{\circ}C$			30	
	Grade D, $-40^{\circ}C$ to $85^{\circ}C$			60	
Output Voltage Noise	$f=0.1Hz$ to $10Hz$		20		$\mu V_{pp}$
Output Voltage Noise Density	$f=1kHz$		0.3		ppm/ $\sqrt{Hz}$
Power Supply Rejection Ratio	$V_{CC}=5V\pm0.5V$		-70		dB
Output Short-circuit Current			1.35		mA
Start-up Time	MSR020, External $10\mu F$ Capacitor		18		ms
	MSR040, External $10\mu F$ Capacitor		35		ms
Power Supply		$V_{REF}+0.15$		5.5	V
Power Supply Current	MSR020		750		$\mu A$
	MSR040		800		$\mu A$

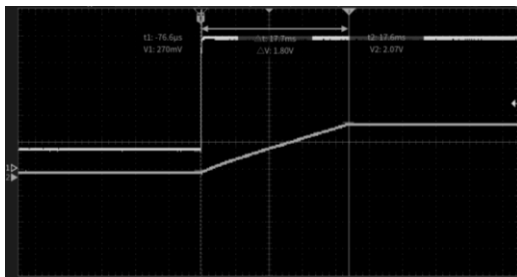
## TYPICAL CHARACTERISTICS DIAGRAM



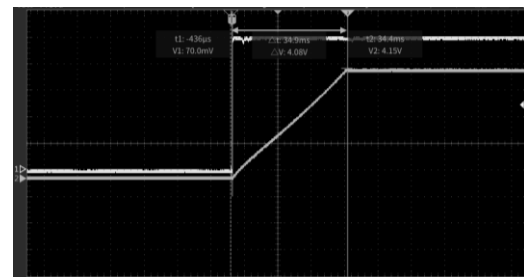
MSR020: Output Voltage Temperature Drift (VCC=5V)



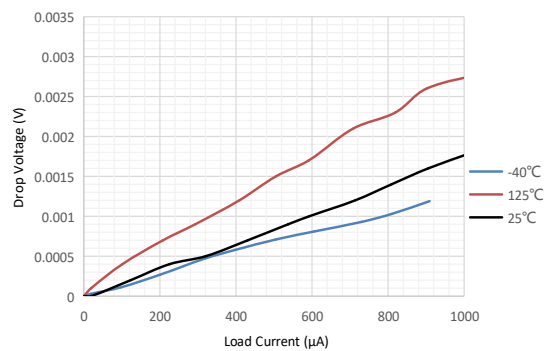
MSR040: Output Voltage Temperature Drift (VCC=5V)



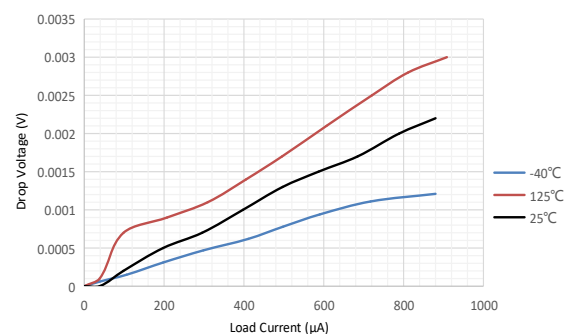
MSR020: Start-up Time with 10µF Load Capacitor



MSR040: Start-up Time with 10µF Load Capacitor



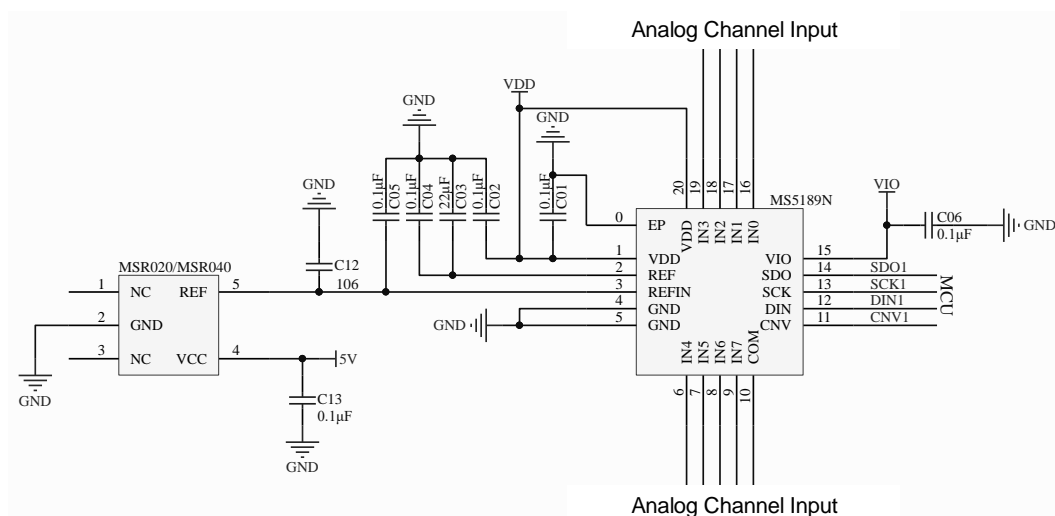
MSR020: Drop Voltage VS. Load Current



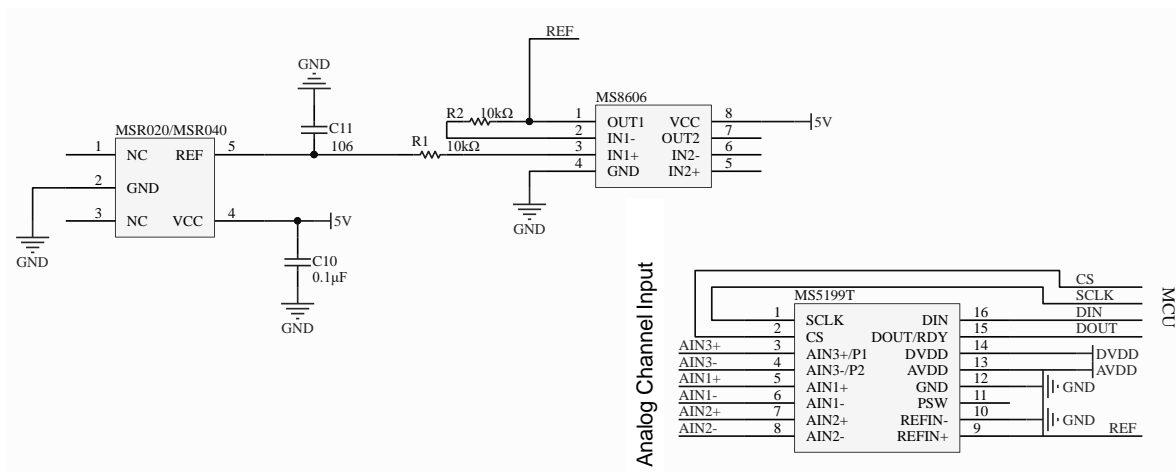
MSR040: Drop Voltage VS. Load Current

## TYPICAL APPLICATION DIAGRAM

1. Provide high-precision, low temperature drift external reference for the MS518X, SAR ADC.

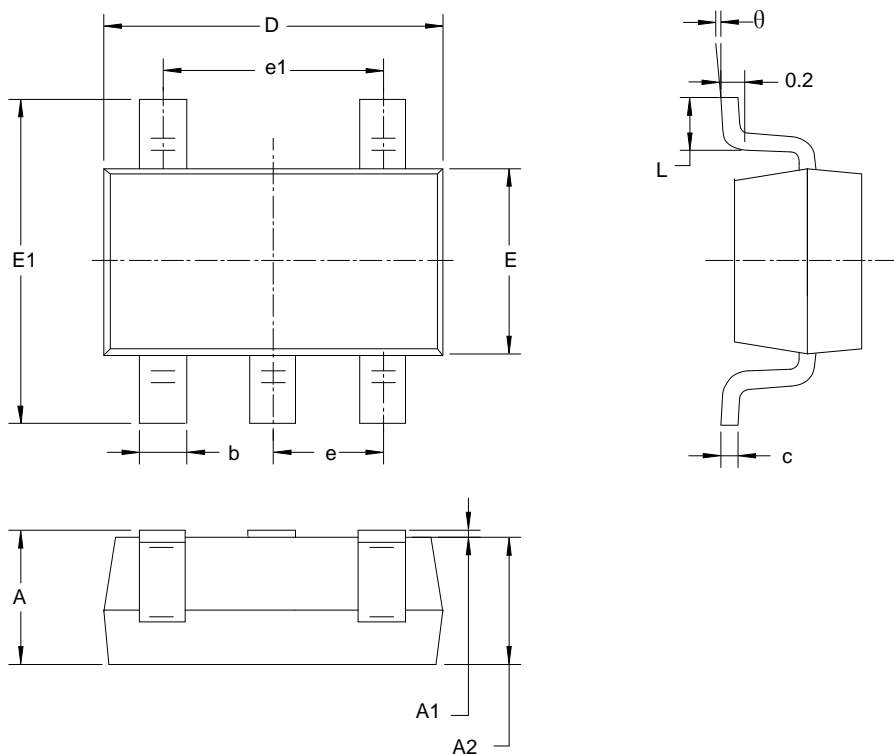


2. Provide high-precision, low temperature drift external reference for the MS519X,  $\Sigma$ - $\Delta$  ADC.



# PACKAGE OUTLINE DIMENSIONS

SOT23-5

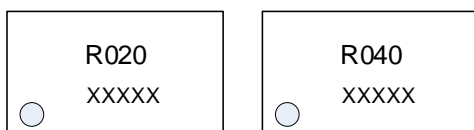


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



## MARKING and PACKAGING SPECIFICATION

### 1. Marking Drawing Description



Product Name: R020, R040

Product Code: XXXXX

### 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
MSR020	SOT23-5	3000	10	30000	4	120000
MSR040	SOT23-5	3000	10	30000	4	120000

**STATEMENT**

- All Revision Rights of Datasheets Reserved for Ruimeng. Don't release additional notice.  
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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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