19-6355; Rev 5; 1/16

备有评估板

MAX6070/MAX6071

低噪声、高精度系列电压基准

概述

MAX6070/MAX6071为超低噪声、低漂移电压基准，采用小型6引脚SOT23封装。输出电压为2.5V时，器件的1/f噪声电压仅为4.8μV_{P-P}，温漂6ppm/°C (最大值)。MAX6070/MAX6071耗流150μA，可吸入/源出高达10mA负载电流。低漂移和低噪声指标有利于提高系统精度，理想用于高精度工业设计。MAX6070提供噪声滤波器选项，满足宽带应用的要求。

器件采用6引脚SOT23封装，工作在-40°C至+125°C扩展级工业温度范围。另外提供2.5V选项，采用6引脚、0.78mm x 1.41mm晶圆级封装(WLP)。

应用

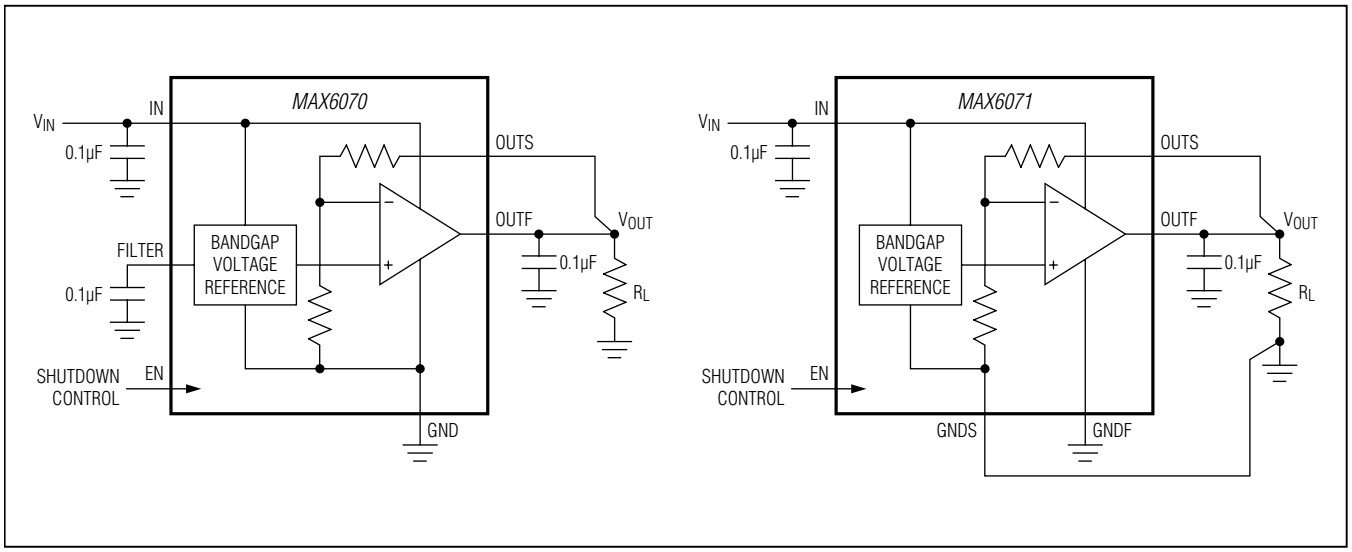
- 高精度工业与过程控制
- 精密仪表
- 高分辨率ADC和DAC
- 精密电流源

优势和特性

- 6引脚SOT23封装减小系统电路板空间
- 在工作温度和时间范围内具有稳定的性能，提高系统精度
  - ±0.04%高初始精度
  - 1.5ppm/°C (典型值)、6ppm/°C (最大值)低温漂
  - 输出2.5V时，具有4.8μV_{P-P} 超低噪声(0.1Hz至10Hz)
  - 200mV低压差
  - 85dB较高纹波抑制
- 150μA低电源电流，降低功耗
- 滤波器选项，有助于降低高频噪声
- 输出选项：1.25V、1.8V、2.048V、2.5V、3.0V、3.3V、4.096V和5.0V，覆盖常见电压，适用于宽范围应用
- 0.78mm x 1.41mm WLP封装，0.35mm焊球间距

定购信息和选型指南在数据资料的最后给出。

典型工作电路



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有关价格、供货及订购信息，请联络Maxim亚洲销售中心：10800 852 1249 (北中国区)，10800 152 1249 (南中国区)，或访问Maxim的中文网站：www.maximintegrated.com/cn。

Absolute Maximum Ratings

OUTF to GNDS, GNDF, GND.....-0.3V to the lower of (V_{IN} + 0.3V), +6V
OUTS to GNDS, GNDF, GND .....-0.3V to +6V
IN to GNDS, GNDF, GND .....-0.3V to +6V
EN to GNDS, GNDF, GND .....-0.3V to +6V
FILTER to GND.....-0.3V to the lower of (V_{IN} + 0.3V), +6V
GNDS to GNDF .....-0.3V to +0.3V

Continuous Power Dissipation (T_A = +70°C)
SOT23 (derate 4.3mW/°C above +70°C)..... 347.8mW
WLP (derate 10.2mW/°C above 70°C 816mW
Operating Temperature Range ..... -40°C to +125°C
Junction Temperature .....+150°C
Storage Temperature Range..... -65°C to +150°C
Soldering Temperature (reflow) .....+260°C
Lead Temperature (soldering, 10s) .....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Package Thermal Characteristics (Note 1)

SOT23
Junction-to-Ambient Thermal Resistance (θ_{JA}).....230°C/W
Junction-to-Case Thermal Resistance (θ_{JC}).....76°C/W

Note 1: Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to **www.maximintegrated.com/thermal-tutorial**.

Electrical Characteristics—MAX607__AUT12 (V_{OUT} = 1.250V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		13	100	µV/V
			T_A = T_{MIN} to T_{MAX}			125	
Load Regulation		0mA < I_{OUT} < 10mA, sink			70	150	µV/mA
		0mA < I_{OUT} < 10mA, source			100	150	
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			35		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			3.6		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF			5.0		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			2.5		
Ripple Rejection		Frequency = 60Hz			100		dB

Electrical Characteristics—MAX607__AUT12 (V_{OUT} = 1.250V) (continued)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		6		ms
			MAX6071		20		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		6		ms
			MAX6071		60		µs
Capacitive-Load Stability Range		$I_{OUT} \leq$ 10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		2.7		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			130	200	µA
		T_A = T_{MIN} to T_{MAX}				260	
Shutdown Supply Current	I_{SD}					6	µA
ENABLE							
Enable Input Current	I_{EN}			-1		+1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}					0.3 x V_{IN}	

Electrical Characteristics—MAX607__AUT18 (V_{OUT} = 1.800V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift(Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		35	150	µV/V
			T_A = T_{MIN} to T_{MAX}			200	
Load Regulation		0mA < I_{OUT} < 10mA, sink			120	200	µV/mA
		0mA < I_{OUT} < 10mA, source			120	200	
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			35		ppm
Thermal Hysteresis		(Note 5)			85		ppm

Electrical Characteristics—MAX607__AUT18 (V_{OUT} = 1.800V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			6		μV_{P-P}
		MAX6071 thermal noise, 10Hz to 10kHz C_{OUT} = 0.1µF			7		μV_{RMS}
		MAX6070 thermal noise, 10Hz to 10kHz C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			5		
Ripple Rejection		Frequency = 60Hz			89		dB
Turn-On Settling Time	t_R	Settling to 0.01% C_{OUT} = 0.1µF	MAX6070 C_{FILTER} = 0.1µF		6		ms
			MAX6071		32		µs
Enable Settling Time	t_{EN}	Settling to 0.01% C_{OUT} = 0.1µF	MAX6070 C_{FILTER} = 0.1µF		6		ms
			MAX6071		60		µs
Capacitive-Load Stability Range		I_{OUT} ≤10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		2.7		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			130	200	µA
		T_A = T_{MIN} to T_{MAX}				260	
Shutdown Supply Current	I_{SD}					6	µA
ENABLE							
Enable Input Current	I_{EN}			-1		1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}					0.3 x V_{IN}	

Electrical Characteristics—MAX607__AUT21 (V_{OUT} = 2.048V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		50	180	µV/V
			T_A = T_{MIN} to T_{MAX}			225	

Electrical Characteristics—MAX607__AUT21 (V_{OUT} = 2.048V) (continued)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Load Regulation		0mA < I_{OUT} < 10mA, sink			135	225	µV/mA
		0mA < I_{OUT} < 10mA, source			135	225	
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			35		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			6.4		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz C_{OUT} = 0.1µF			8.6		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			6.3		
Ripple Rejection		Frequency = 60Hz			86		dB
Turn-On Settling Time	t_R	Settling to 0.01% C_{OUT} = 0.1µF	MAX6070 C_{FILTER} = 0.1µF		6.2		ms
			MAX6071		25		µs
Enable Settling Time	t_{EN}	Settling to 0.01% C_{OUT} = 0.1µF	MAX6070 C_{FILTER} = 0.1µF		6.2		ms
			MAX6071		65		µs
Capacitive-Load Stability Range		I_{OUT} ≤10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		2.7		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			130	200	µA
		T_A = T_{MIN} to T_{MAX}				260	
Shutdown Supply Current	I_{SD}					6	µA
ENABLE							
Enable Input Current	I_{EN}			-1		+1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}				0.3 x V_{IN}		

Electrical Characteristics—MAX607__AUT25 (V_{OUT} = 2.500V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		60	145	µV/V
			T_A = T_{MIN} to T_{MAX}			175	
Load Regulation		0mA < I_{OUT} < 10mA, sink			80	140	µV/mA
		0mA < I_{OUT} < 10mA, source			75	125	
Dropout Voltage		I_{OUT} = 10mA, T_A = T_{MIN} to T_{MAX} (Note 4)			110	230	mV
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			40		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			4.8		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF			6		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			3		
Noise Spectral Density		MAX6071 thermal noise, f = 1kHz, C_{OUT} = 0.1µF			60		$nV/\sqrt{Hz}$
		MAX6070 thermal noise, f = 1kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			30		
Ripple Rejection		Frequency = 60Hz			84		dB
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		30		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		75		µs
Capacitive-Load Stability Range		I_{OUT} ≤ 10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		2.8		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			150	235	µA
		T_A = T_{MIN} to T_{MAX}				300	
Shutdown Supply Current	I_{SD}				0.6	6	µA

Electrical Characteristics—MAX607__AUT25 (V_{OUT} = 2.500V) (continued)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
ENABLE/SHUTDOWN						
Enable Input Current	I_{EN}		-1		+1	µA
Enable Logic-High	V_{IH}		0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}				0.3 x V_{IN}	V

Electrical Characteristics—MAX607__ANT25 (V_{OUT} = 2.5V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{IN} = C_{OUT} = 0.1µF, T_A = 0°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		T_A = +25°C		-0.1		+0.1	%
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}				2.7	10	ppm/°C
Line Regulation		Over specified V_{IN} range	T_A = +25°C		60	300	µV/V
			T_A = T_{MIN} to T_{MAX}			350	
Load Regulation		0mA < I_{OUT} < 10mA, sink			80	200	µV/mA
		0mA < I_{OUT} < 10mA, source			75	180	
Dropout Voltage		I_{OUT} = 10mA, T_A = T_{MIN} to T_{MAX} (Note 4)			110	230	mV
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			16		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			4.8		$µV_{P-P}$
		10Hz to 10kHz, C_{OUT} = 0.1µF			6		$µV_{RMS}$
Noise Spectral Density		f_{SW} = 1kHz, C_{OUT} = 0.1µF			60		$nV/\sqrt{Hz}$
Ripple Rejection		Frequency = 60Hz			84		dB
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF			30		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF			75		µs
Capacitive-Load Stability Range		I_{OUT} ≤ 10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		2.8		5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			160	250	µA
		T_A = T_{MIN} to T_{MAX}				320	
Shutdown Supply Current	I_{SD}				0.6	6	µA
ENABLE/SHUTDOWN							
Enable Input Current	I_{EN}			-1		+1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}					0.3 x V_{IN}	

Electrical Characteristics—MAX607__AUT30 (V_{OUT} = 3.000V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		90	200	µV/V
			T_A = T_{MIN} to T_{MAX}			260	
Load Regulation		0mA < I_{OUT} < 10mA, sink			90	170	µV/mA
		0mA < I_{OUT} < 10mA, source			90	150	
Dropout Voltage		I_{OUT} = 10mA, T_A = T_{MIN} to T_{MAX} (Note 4)			80	150	mV
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			40		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			4.6		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF			7.8		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			5.0		
Ripple Rejection		Frequency = 60Hz			80		dB
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		9.7		ms
			MAX6071		40		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		9.7		ms
			MAX6071		75		µs
Capacitive-Load Stability Range		I_{OUT} ≤ 10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		3.2		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			150	235	µA
		T_A = T_{MIN} to T_{MAX}				300	
Shutdown Supply Current	I_{SD}				0.6	6	µA
ENABLE/SHUTDOWN							
Enable Input Current	I_{EN}			-1		+1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}					0.3 x V_{IN}	

Electrical Characteristics—MAX607__ AUT33 (V_{OUT} = 3.300V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		90	220	µV/V
			T_A = T_{MIN} to T_{MAX}			285	
Load Regulation		0mA < I_{OUT} < 10mA, sink			100	190	µV/mA
		0mA < I_{OUT} < 10mA, source			100	165	
Dropout Voltage		I_{OUT} = 10mA, T_A = T_{MIN} to T_{MAX} (Note 4)			65	150	mV
Output Current	I_{OUT}			-10		10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			40		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			10		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF			9		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			6		
Ripple Rejection		Frequency = 60Hz			78		dB
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		42		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		75		µs
Capacitive-Load Stability Range		I_{OUT} ≤10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		3.5		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			160	240	µA
		T_A = T_{MIN} to T_{MAX}				330	
Shutdown Supply Current	I_{SD}				0.6	6	µA
ENABLE/SHUTDOWN							
Enable Input Current	I_{EN}			-1		1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}					0.3 x V_{IN}	

Electrical Characteristics—MAX607__AUT41 (V_{OUT} = 4.096V)

(V_{IN} = +5.0V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		100	250	µV/V
			T_A = T_{MIN} to T_{MAX}			350	
PARAMETER	**SYMBOL**	**CONDITIONS**		**MIN**	**TYP**	**MAX**	**UNITS**
Load Regulation		0mA < I_{OUT} < 10mA, sink			125	225	µV/mA
		0mA < I_{OUT} < 10mA, source			135	225	
Dropout Voltage		I_{OUT} = 10mA, T_A = T_{MIN} to T_{MAX} (Note 4)			75	150	mV
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from VIN			25		
Long-Term Stability		1000 hours at T_A = +25°C			35		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			9.6		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF			12		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			9		
Ripple Rejection		Frequency = 60Hz			80		dB
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		40		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		85		µs
Capacitive-Load Stability Range		I_{OUT} ≤ 10mA		0.1		10	µF
INPUT							
Supply Voltage	V_{IN}	Guaranteed by line regulation		4.3		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C			150	235	µA
		T_A = T_{MIN} to T_{MAX}				350	
Shutdown Supply Current	I_{SD}					6	µA
ENABLE							
Enable Input Current	I_{EN}			-1		+1	µA
Enable Logic-High	V_{IH}			0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}					0.3 x V_{IN}	

Electrical Characteristics—MAX607__AUT50 (V_{OUT} = 5.000V)

(V_{IN} = +5.5V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUTPUT							
Output Voltage Accuracy		MAX6070A/MAX6071A, T_A = +25°C		-0.04		+0.04	%
		MAX6070B/MAX6071B, T_A = +25°C		-0.08		+0.08	
Output Voltage Temperature Drift (Note 3)	TCV_{OUT}	MAX6070A/MAX6071A			1.5	6	ppm/°C
		MAX6070B/MAX6071B			2.0	8	
Line Regulation		Over specified V_{IN} range	T_A = +25°C		200	400	µV/V
			T_A = T_{MIN} to T_{MAX}			500	
Load Regulation		0mA < I_{OUT} < 10mA, sink			160	275	µV/mA
		0mA < I_{OUT} < 10mA, source			160	275	
Dropout Voltage		I_{OUT} = 10mA, T_A = T_{MIN} to T_{MAX} (Note 6)			60	150	mV
Output Current	I_{OUT}			-10		+10	mA
Short-Circuit Current	I_{SC}	Sourcing to ground			25		mA
		Sinking from V_{IN}			25		
Long-Term Stability		1000 hours at T_A = +25°C			35		ppm
Thermal Hysteresis		(Note 5)			85		ppm
DYNAMIC CHARACTERISTICS							
Noise Voltage	e_{OUT}	1/f noise, 0.1Hz to 10Hz, C_{OUT} = 0.1µF			9		$µV_{P-P}$
		MAX6071 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF			15		$µV_{RMS}$
		MAX6070 thermal noise, 10Hz to 10kHz, C_{OUT} = 0.1µF, C_{FILTER} = 0.1µF			12		
Ripple Rejection		Frequency = 60Hz			74		dB
Turn-On Settling Time	t_R	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		50		µs
Enable Settling Time	t_{EN}	Settling to 0.01%, C_{OUT} = 0.1µF	MAX6070, C_{FILTER} = 0.1µF		10		ms
			MAX6071		100		µs
Capacitive-Load Stability Range		I_{OUT} ≤ 10mA		0.1		10	µF

Electrical Characteristics—MAX607__AUT50 (V_{OUT} = 5.000V) (continued)

(V_{IN} = +5.5V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT						
Supply Voltage	V_{IN}	Guaranteed by line regulation	5.2		5.5	V
Quiescent Supply Current	I_{IN}	T_A = +25°C		160	250	µA
		T_A = T_{MIN} to T_{MAX}			330	
Shutdown Supply Current	I_{SD}				6	µA
ENABLE						
Enable Input Current	I_{EN}		-1		+1	µA
Enable Logic-High	V_{IH}		0.7 x V_{IN}			V
Enable Logic-Low	V_{IL}				0.3 x V_{IN}	

Note 2: Limits are 100% production tested at T_A = +25°C. Specifications where T_A < +25°C or T_A > +25°C are guaranteed by design and characterization.

Note 3: Temperature coefficient is calculated using the “box method” which measures temperature drift as the maximum voltage variation over a specified temperature range. The unit of measurement is ppm/°C.

Note 4: Dropout voltage is defined as the minimum differential voltage (V_{IN} - V_{OUT}) at which V_{OUT} decreases by 0.2% from its original value at V_{IN} = 5.0V.

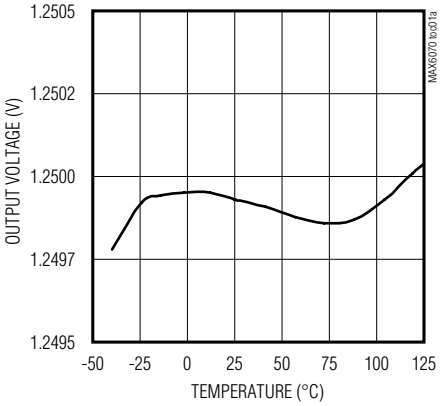
Note 5: Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from T_{MAX} to T_{MIN}.

Note 6: Dropout voltage is defined as the minimum differential voltage (V_{IN} – V_{OUT}) at which V_{OUT} decreases by 0.2% from its original value at V_{IN} = 5.5V.

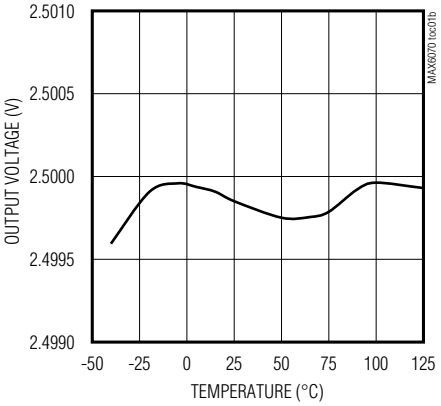
典型工作特性

(T_A = +25°C, unless otherwise noted.)

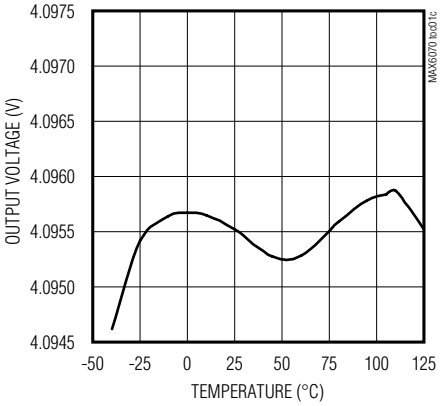
MAX6071_12 OUTPUT VOLTAGE TEMPERATURE DRIFT



MAX6071_25 OUTPUT VOLTAGE TEMPERATURE DRIFT

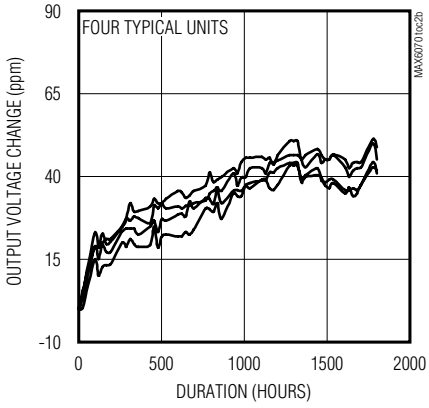


MAX6071_41 OUTPUT VOLTAGE TEMPERATURE DRIFT

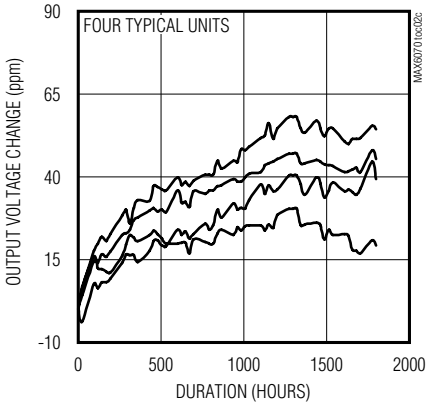


MAX6070_12 OUTPUT VOLTAGE LONG-TERM DRIFT

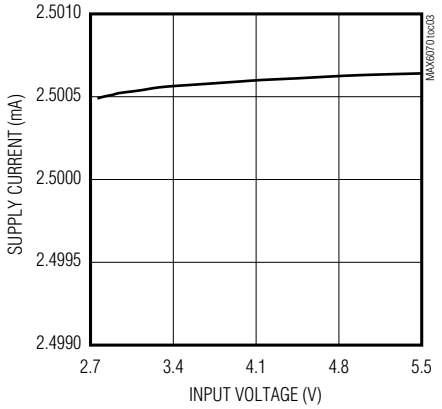
MAX6070_25 OUTPUT VOLTAGE LONG-TERM DRIFT



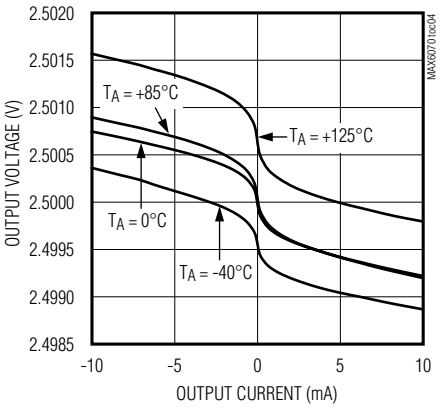
MAX6070_41 OUTPUT VOLTAGE LONG-TERM DRIFT



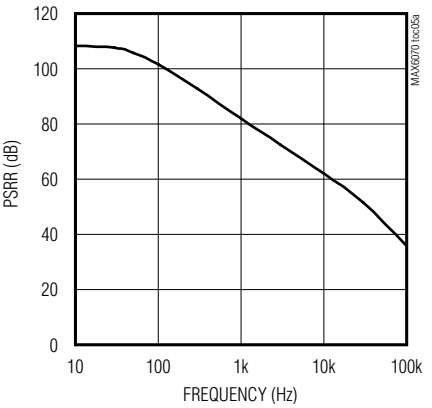
MAX6071_25 LINE REGULATION



MAX6071_25 LOAD REGULATION



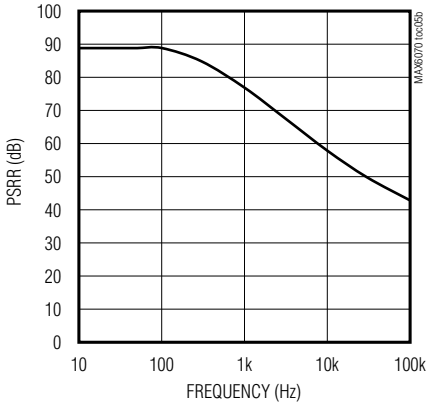
MAX6071_12 PSRR vs. FREQUENCY



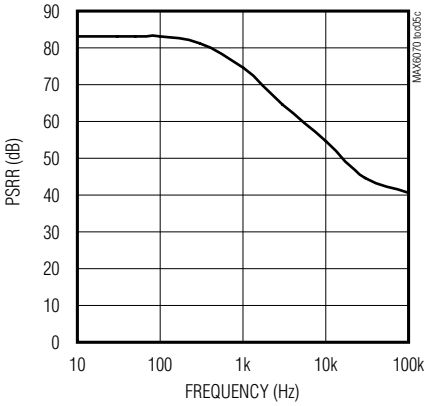
典型工作特性(续)

(T_A = +25°C, unless otherwise noted.)

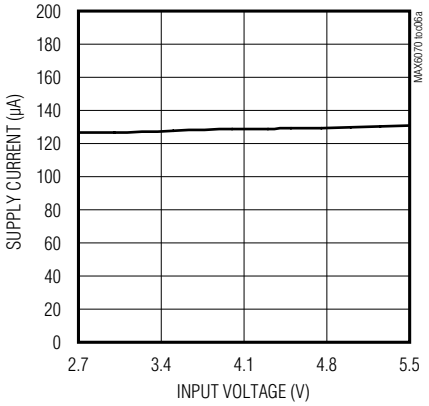
MAX6071_25
PSRR vs. FREQUENCY



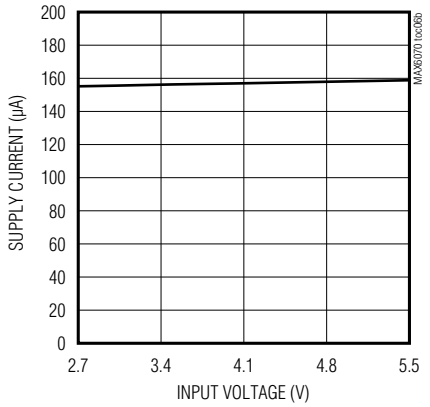
MAX6071_41
PSRR vs. FREQUENCY



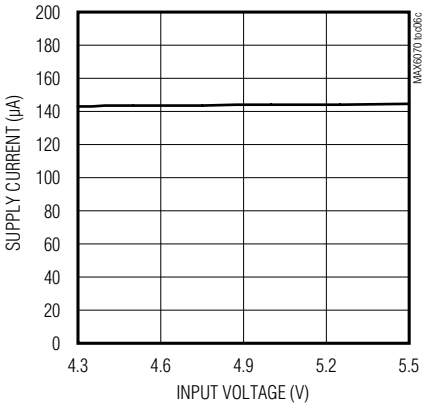
MAX6071_12
SUPPLY CURRENT vs. INPUT VOLTAGE



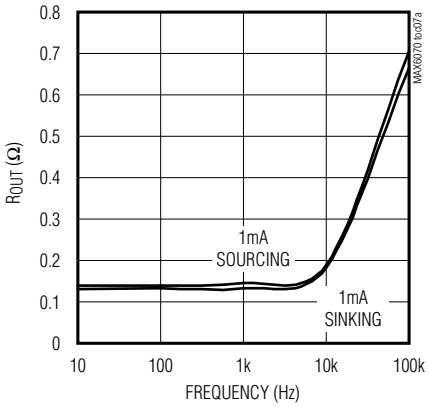
MAX6071_25
SUPPLY CURRENT vs. INPUT VOLTAGE



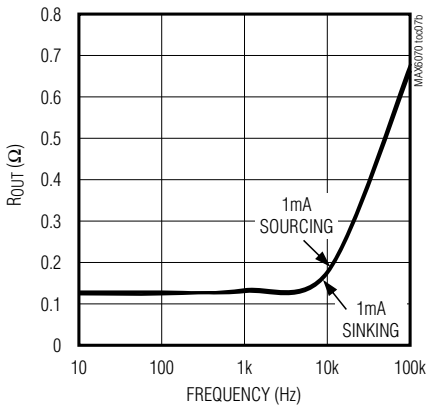
MAX6071_41
SUPPLY CURRENT vs. INPUT VOLTAGE



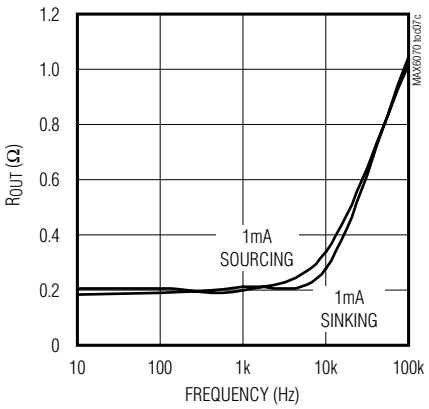
MAX6071_12
ROUT vs. FREQUENCY



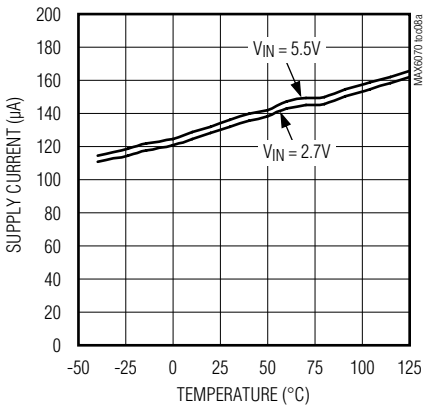
MAX6071_25
ROUT vs. FREQUENCY



MAX6071_41
ROUT vs. FREQUENCY



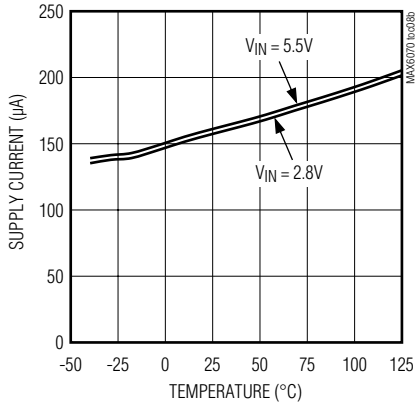
MAX6071_12
SUPPLY CURRENT vs. TEMPERATURE



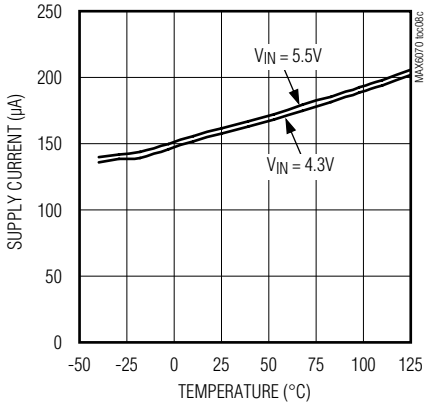
典型工作特性(续)

(T_A = +25°C, unless otherwise noted.)

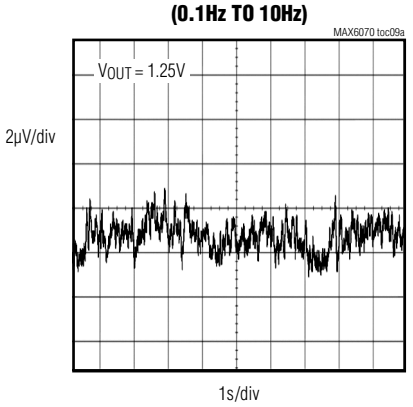
MAX6071_25 SUPPLY CURRENT vs. TEMPERATURE



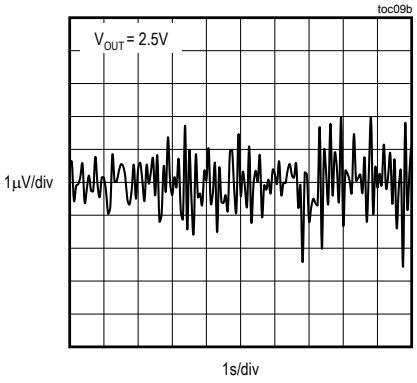
MAX6071_41 SUPPLY CURRENT vs. TEMPERATURE



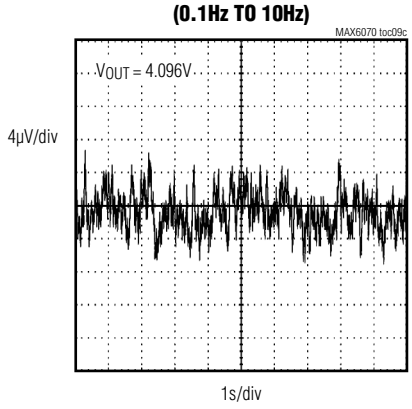
MAX6070_12 OUTPUT NOISE (0.1Hz TO 10Hz)



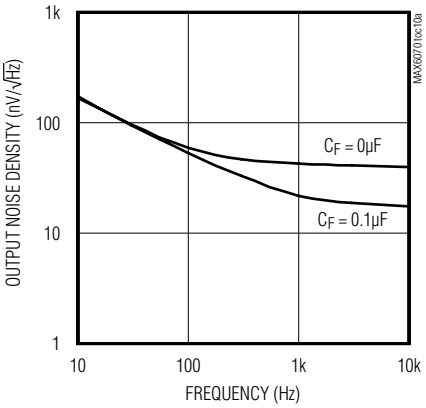
MAX6070_25 OUTPUT NOISE (0.1Hz To 10Hz) (SOT23)



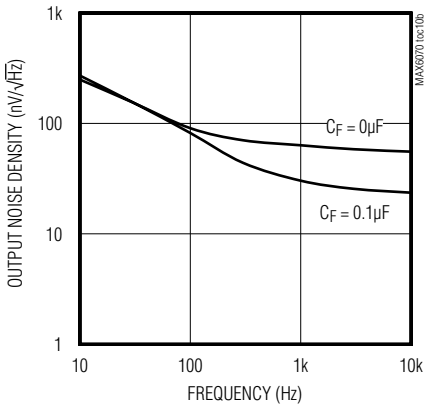
MAX6070_41 OUTPUT NOISE (0.1Hz TO 10Hz)



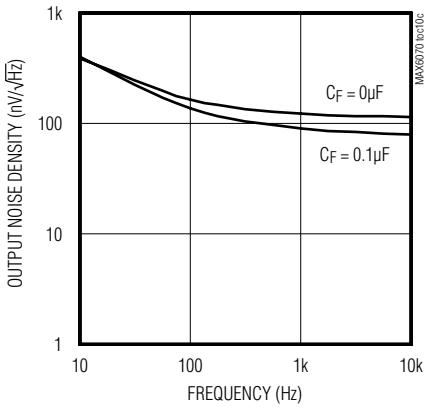
MAX6070_12 OUTPUT NOISE DENSITY vs. FREQUENCY



MAX6070_25 OUTPUT NOISE DENSITY vs. FREQUENCY



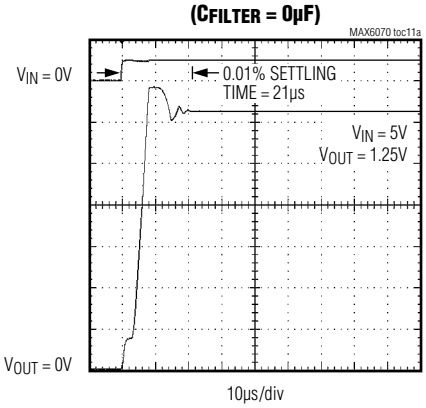
MAX6070_41 OUTPUT NOISE DENSITY vs. FREQUENCY



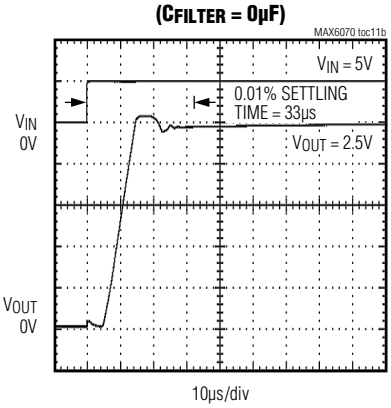
典型工作特性(续)

(T_A = +25°C, unless otherwise noted.)

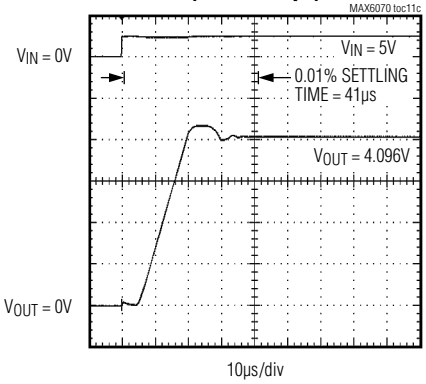
MAX6070_12 TURN-ON TRANSIENT (C_{FILTER} = 0µF)



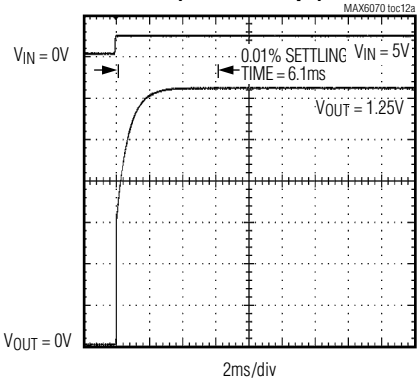
MAX6070_25 TURN-ON TRANSIENT (C_{FILTER} = 0µF)



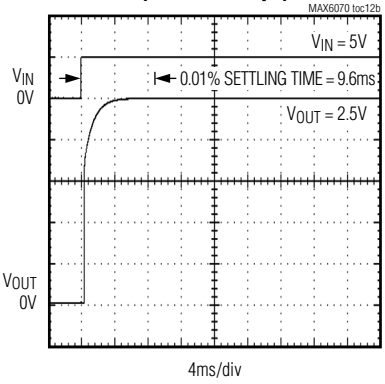
MAX6070_41 TURN-ON TRANSIENT (C_{FILTER} = 0µF)



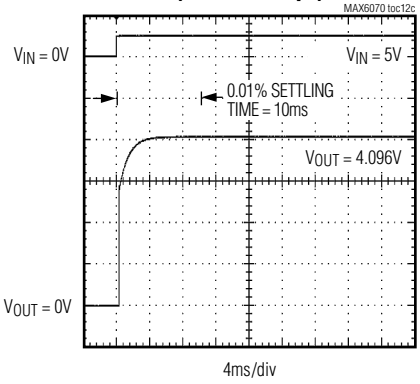
MAX6070_12 TURN-ON TRANSIENT (C_{FILTER} = 0.1µF)



MAX6070_25 TURN-ON TRANSIENT (C_{FILTER} = 0.1µF)



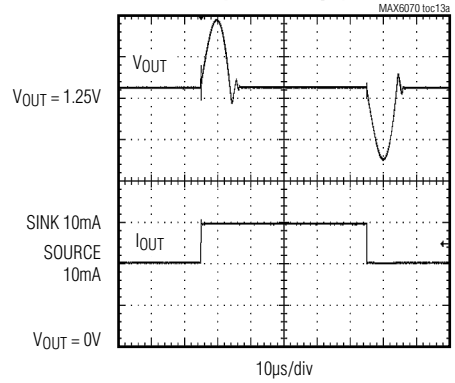
MAX6070_41 TURN-ON TRANSIENT (C_{FILTER} = 0.1µF)



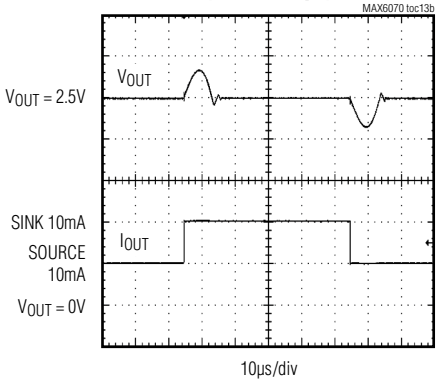
典型工作特性(续)

(T_A = +25°C, unless otherwise noted.)

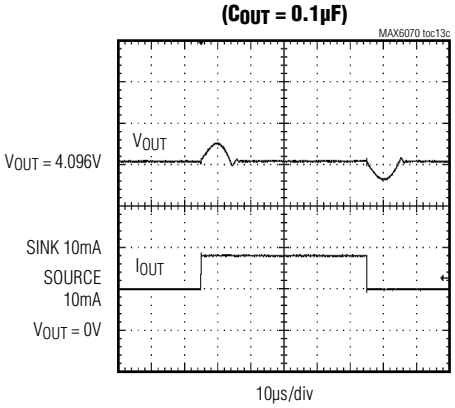
MAX6071_12 ±10mA LOAD TRANSIENT (C_{OUT} = 0.1µF)



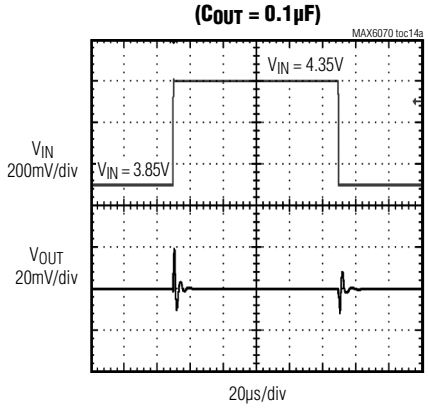
MAX6071_25 ±10mA LOAD TRANSIENT (C_{OUT} = 0.1µF)



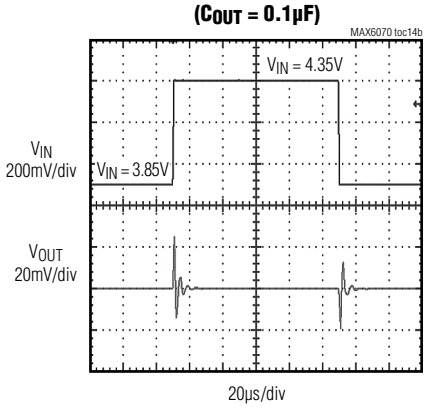
MAX6071_41 ±10mA LOAD TRANSIENT (C_{OUT} = 0.1µF)



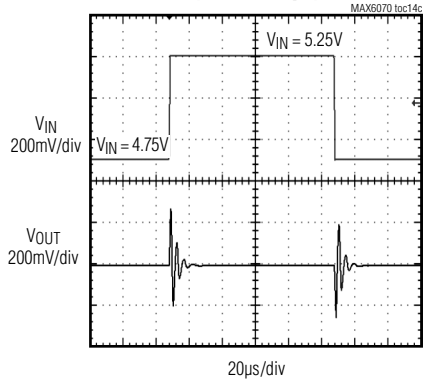
MAX6070_12 LINE TRANSIENT (C_{OUT} = 0.1µF)



MAX6070_25 LINE TRANSIENT (C_{OUT} = 0.1µF)



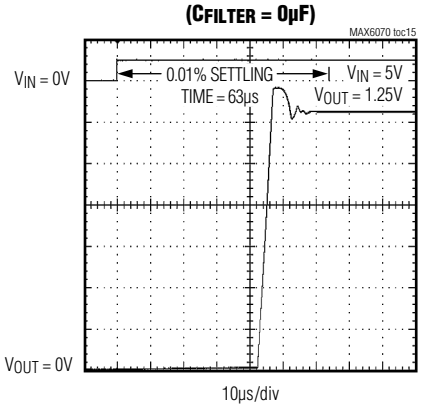
MAX6070_41 LINE TRANSIENT (C_{OUT} = 0.1µF)



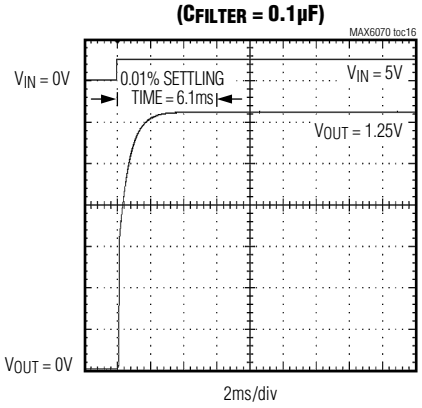
典型工作特性(续)

(T_A = +25°C, unless otherwise noted.)

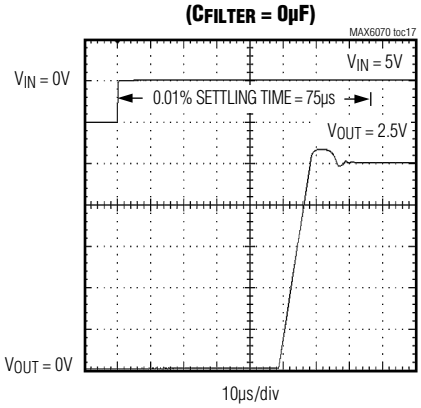
MAX6070_12 ENABLE TRANSIENT (C_{FILTER} = 0µF)



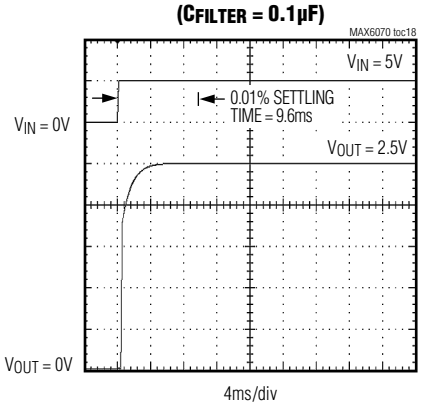
MAX6070_12 ENABLE TRANSIENT (C_{FILTER} = 0.1µF)



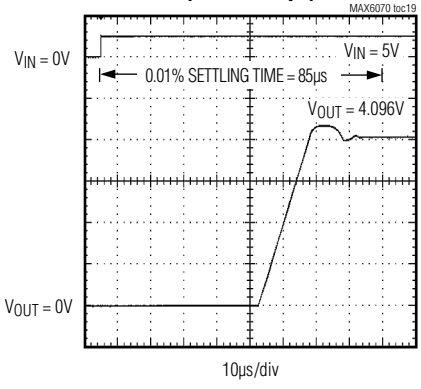
MAX6070_25 ENABLE TRANSIENT (C_{FILTER} = 0µF)



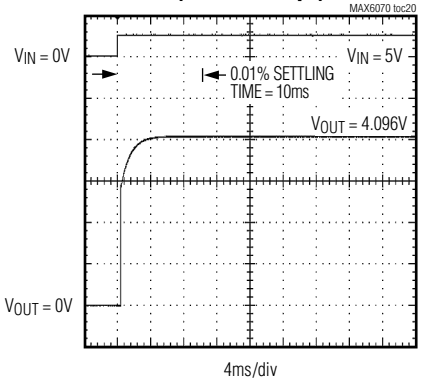
MAX6070_25 ENABLE TRANSIENT (C_{FILTER} = 0.1µF)



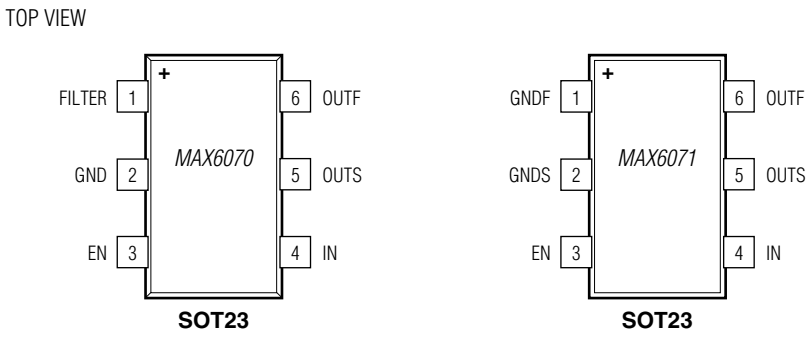
MAX6070_41 ENABLE TRANSIENT (C_{FILTER} = 0µF)



MAX6070_41 ENABLE TRANSIENT (C_{FILTER} = 0.1µF)



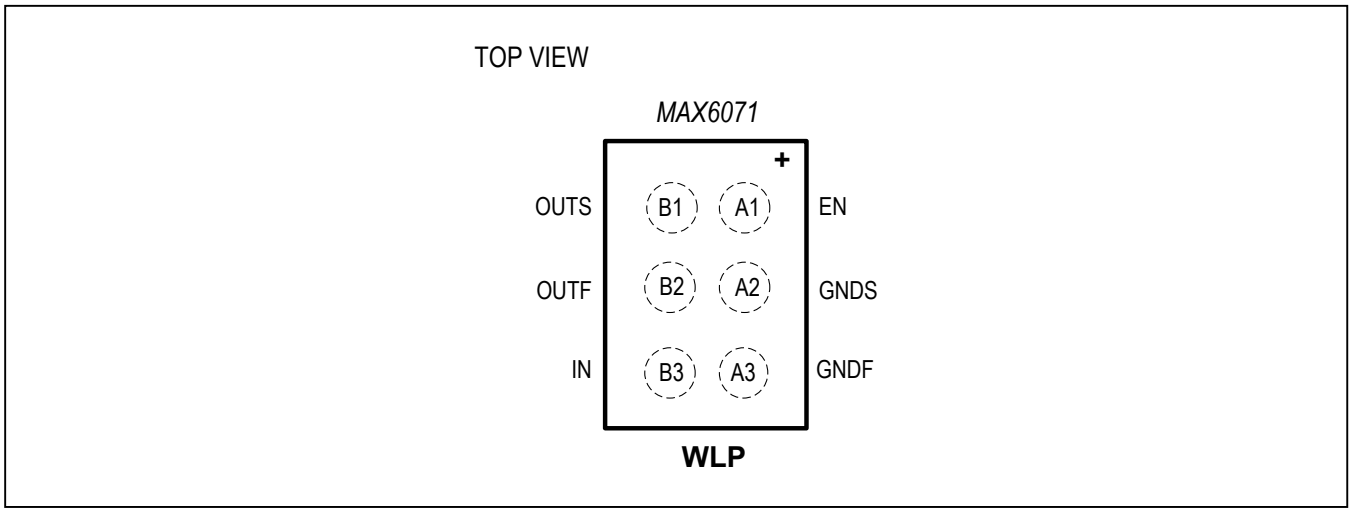
引脚配置



引脚说明

引脚		名称	功能
MAX6070	**MAX6071**		
1	—	FILTER	滤波器输入。FILTER与地之间连接0.1µF陶瓷电容，提供高频旁路。不使用时可浮空。
—	1	GNDF	加载地。
2	—	GND	地。
-	2	GNDS	检测地。连接到负载地。
3	3	EN	使能，驱动为高电平时使能器件；驱动为低电平时关闭器件。
4	4	IN	电源输入。
5	5	OUTS	电压基准检测输出。
6	6	OUTF	电压基准加载输出，在靠近负载处将OUTF短路至OUTS。利用电容(0.1µF至10µF)将OUTF旁路至GND。

焊球配置



焊球说明

焊球	名称	功能
A1	EN	使能，驱动为高电平时使能器件；驱动为低电平时禁止器件。
A2	GNDS	检测地，连接到负载地。
A3	GNDF	加载地。
B1	OUTS	电压基准检测输出。
B2	OUTF	电压基准加载输出，在靠近负载处将OUTF短路至OUTS。利用电容(0.1µF至10µF)将OUTF旁路至GNDF。
B3	IN	电源输入。通过0.1µF电容连接至GNDF。

详细说明

宽带噪声抑制(FILTER)

为了改善MAX6070对宽带噪声及瞬态电源噪声的抑制，在FILTER与GND之间连接0.1µF电容(见*典型工作电路*)，大电容无益于降低噪声。输出为2.5V时，连接0.1µF电容能够在1kHz处将噪声谱密度从60nV/√Hz降至30nV/√Hz。输入引脚的噪声会影响输出噪声，但可利用IN和GND引脚之间的旁路电容降低这一干扰，图1所示。

输出旁路

MAX6070/MAX6071需要0.1µF至10µF的输出旁路电容，输出电容尽量靠近OUTF安装。在驱动开关电容负载或负载电流快速变化的应用场合，采用0.1µF与大负载电容并联的方式，以减小等效串联电阻(ESR)。大容值、低ESR有助于降低基准输出的瞬变。

供电电流

MAX6070/MAX6071耗流为150µA，几乎与供电电压无关，随供电电压的变化仅为1.6µA/V。

热滞

热滞是器件遍历其整个工作温度范围前、后在T_A = +25°C时的输出电压变化。典型热滞值为85ppm。

启动时间

器件通常在30µs内启动并将电压稳定到最终值的0.01%范围之内。0.1µF的噪声抑制电容将MAX6070的导通时间增加至10ms。

输出加载和检测

MAX6070/MAX6071提供独立的加载输出(OUTF)连接，为负载及通过检测引脚(OUTS)调节负载电压的电路输入提供电流。该配置抵消MAX6070/MAX6071与负载之间连接线上的压降。使用独立的加载和检测输出能够实现开尔文连接时，在需要高精度电压的点将OUTF连接至负载，将OUTS连接至OUTF (见图1)。MAX6071具有相同类型的开尔文连接，以抵消接地回路线上的压降。将负载连接至地，将GNDS连接至地，尽量靠近负载的接地连接(见图2)。

关断

MAX6070/MAX6071具有高电平有效的使能引脚(EN)。将EN拉低时，禁止输出，阻性负载连接至地，将静态电流强制为小于1µA。负载典型值为200kΩ。将EN拉高时，为常规工作模式。

应用信息

宽带噪声抑制

图1所示为典型的噪声抑制滤波器应用电路。注意，使用宽带噪声滤波器将增大导通时间。

高分辨率DAC和基准，采用单电源供电

图2所示的典型电路为高分辨率、16位MAX541 DAC提供基准。

精密电流源

图3所示为提供精密电流源的典型电路。OUTF输出为双极晶体管提供偏置电流，OUTS和GNDS检测电阻上的电压并相应调节OUTF源出的电流。

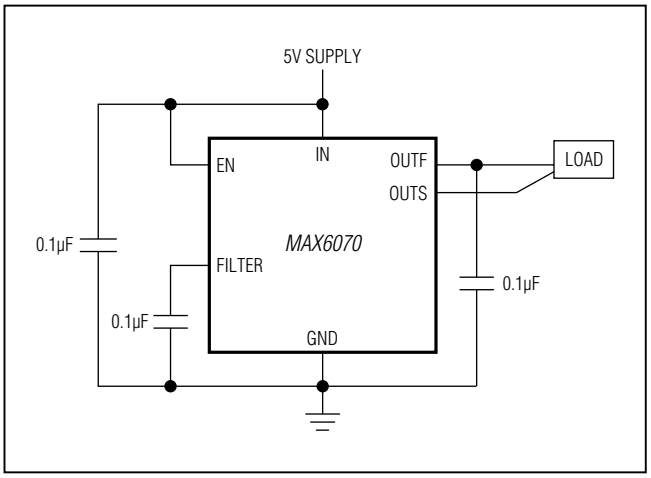


图1. 基准输出开尔文连接

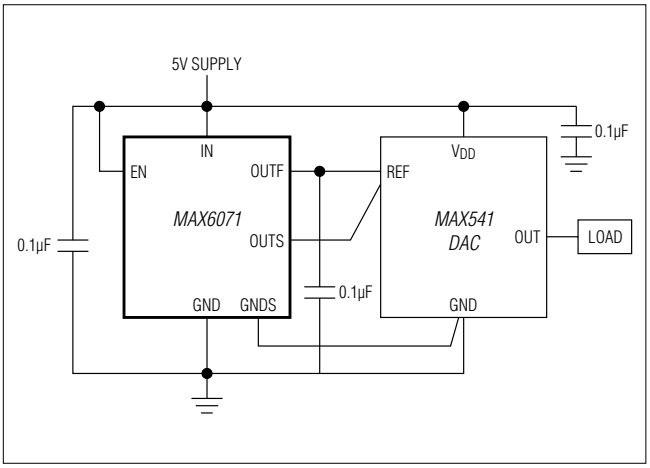


图2. 基准接地开尔文连接

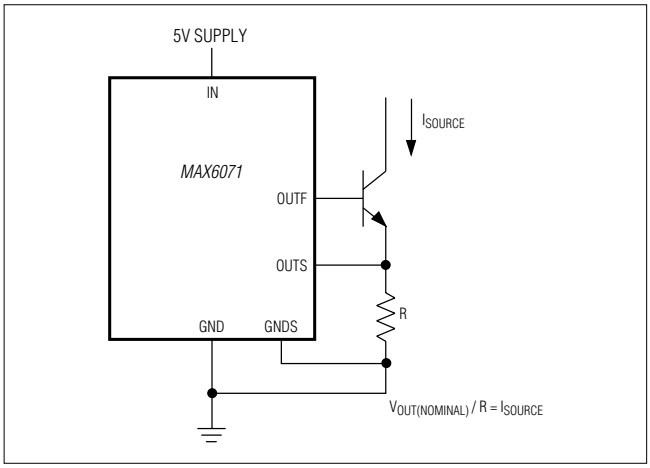


图3. 精密电流源

选型指南

器件	滤波器	V_{OUT} (V)	精度(%)	顶标
MAX6070AAUT12+T	Yes	1.25	0.04	+ACPF
MAX6070AAUT18+T	Yes	1.8	0.04	+ACPH
MAX6070AAUT21+T	Yes	2.048	0.04	+ACPJ
MAX6070AAUT25+T	Yes	2.5	0.04	+ACPL
MAX6070AAUT30+T	Yes	3.0	0.04	+ACPN
MAX6070AAUT33+T	Yes	3.3	0.04	+ACPP
MAX6070AAUT41+T	Yes	4.096	0.04	+ACPR
MAX6070AAUT50+T	Yes	5.0	0.04	+ACPV
MAX6070AAUT50/V+T	Yes	5.0	0.04	+ACTR
MAX6070BAUT12+T	Yes	1.25	0.08	+ACPG
MAX6070BAUT12/V+T	Yes	1.25	0.08	+ACSP
MAX6070BAUT18+T	Yes	1.8	0.08	+ACPI
MAX6070BAUT21+T	Yes	2.048	0.08	+ACPK
MAX6070BAUT25+T	Yes	2.5	0.08	+ACPM
MAX6070BAUT25/V+T	Yes	2.5	0.08	+ACTS
MAX6070BAUT30+T	Yes	3.0	0.08	+ACPO
MAX6070BAUT33+T	Yes	3.3	0.08	+ACPQ
MAX6070BAUT41+T	Yes	4.096	0.08	+ACPS
MAX6070BAUT41/V+T	Yes	4.1	0.08	+ACTT
MAX6070BAUT50+T	Yes	5.0	0.08	+ACPW
MAX6071AAUT12+T	No	1.25	0.04	+ACPX

/V表示通过汽车标准认证的器件。
+表示无铅(Pb)/符合RoHS标准的封装。
T = 卷带包装。

选型指南(续)

器件	滤波器	V_{OUT} (V)	精度(%)	顶标
MAX6071AAUT18+T	No	1.8	0.04	+ACPZ
MAX6071AAUT21+T	No	2.048	0.04	+ACQB
MAX6071AAUT25+T	No	2.5	0.04	+ACQD
MAX6071AAUT30+T	No	3.0	0.04	+ACQF
MAX6071AAUT33+T	No	3.3	0.04	+ACQH
MAX6071AAUT41+T	No	4.096	0.04	+ACQJ
MAX6071AAUT50+T	No	5.0	0.04	+ACQN
MAX6071BAUT12+T	No	1.25	0.08	+ACPY
MAX6071BAUT18+T	No	1.8	0.08	+ACQA
MAX6071BAUT21+T	No	2.048	0.08	+ACQC
MAX6071BAUT25+T	No	2.5	0.08	+ACQE
MAX6071ANT25+T	No	2.5	0.1	+F
MAX6071BAUT25/V+T	No	2.5	0.08	+ACTU
MAX6071BAUT30+T	No	3.0	0.08	+ACQG
MAX6071BAUT33+T	No	3.3	0.08	+ACQI
MAX6071BAUT41+T	No	4.096	0.08	+ACQK
MAX6071BAUT41/V+T	No	4.1	0.08	+ACTV
MAX6071BAUT50+T	No	5.0	0.08	+ACQO
MAX6071BAUT50/V+T	No	5.0	0.08	+ACTW

定购信息

器件	温度范围	引脚-封装
MAX6070_AUT_ _+T	-40°C至+125°C	6 SOT23
MAX6071_AUT_ _+T	-40°C至+125°C	6 SOT23
MAX6071ANT25+T	-40°C至+125°C	6 WLP

+表示无铅(Pb)/符合RoHS标准的封装。
T = 卷带包装。

注：*MAX6070/MAX6071分为A级和B级，具有不同的输出电压。请从选型指南表中选择相应的等级和输出电压，将后缀插入至以上空白处，构成完整的器件号。*

芯片信息

PROCESS: BIPOLAR

封装信息

如需最近的封装外形信息和焊盘布局(占位面积)，请查询**www.maximintegrated.com/cn/design/packaging**。请注意，封装编码中的"+"、"#"或"-"仅表示RoHS状态。封装图中可能包含不同的尾缀字符，但封装图只与封装有关，与RoHS状态无关。

封装类型	封装编码	外形编号	焊盘布局编号
SOT23-6	U6+5	**21-0058**	**90-0175**
6 WLP	N60B1+1	**21-0744**	参见 **应用笔记1891**

修订历史

修订号	修订日期	说明	修改页
0	10/12	最初版本。	—
1	1/13	数据资料中增加了2.048V、3.0V和5.0V选项。更新*概述*、*优势和特性*、*Absolute Maximum Ratings*，*电气特性表*和*选型指南*。	1–9, 17, 18
2	3/13	数据资料中增加1.8V和3.3V选项。修订*概述*、*优势和特性*、*Electrical Characteristics*和*选型指南*。	1, 2–12, 21, 22
3	2/14	增加MAX6070B汽车级封装。	21
4	7/15	数据资料中增加汽车级封装，修订TOC9b。修订*优势和特性*部分。	1, 16, 22, 23
5	1/16	增加WLP封装选项内容，以及相关的*Electrical Characteristics*表、封装图和*焊球说明*表。	1, 2, 7, 19, 22