

100kΩ 精确匹配电阻分压器, SOT23 封装

概述

MAX5490 精密电阻分压器由两个精确匹配的电阻组成, 分别接分压器两端和中心点。该器件提供 0.035% (A 级), 0.05% (B 级) 和 0.1% (C 级) 的高精度电阻匹配度。MAX5490 具有极低的电阻比例温度系数, -55°C 到 $+125^{\circ}\text{C}$ 时为 $1\text{ppm}/^{\circ}\text{C}$ (典型值), 端到端电阻为 $100\text{k}\Omega$ 。电阻比例从 1:1 至 100:1 可调。提供五种标准电阻比例 (见表 1), 用户也可以定制电阻比例。MAX5490 对于要求精确电阻匹配和低温漂的高精度增益设定应用非常理想。

MAX5490 采用节省空间的 3 引脚 SOT23 封装, 工作在 -55°C 至 $+125^{\circ}\text{C}$ 军品级温度范围。

应用

工业过程控制
仪表
精确增益设定
医疗设备
自动测试设备
基站

特性

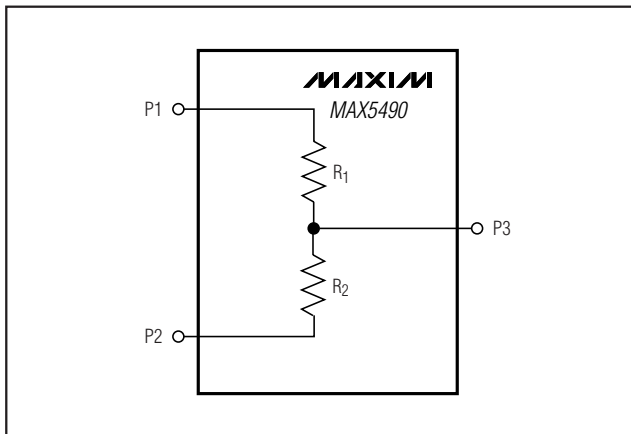
- ◆ 电阻比例: 从 1:1 到 100:1
- ◆ 用户可定制电阻比例
- ◆ 精确的初始比例精度
 - 0.035% (MAX5490A)
 - 0.05% (MAX5490B)
 - 0.1% (MAX5490C)
- ◆ 低至 $1\text{ppm}/^{\circ}\text{C}$ (典型值) 的电阻比例温漂
- ◆ R1 和 R2 上允许高达 80V 的电压
- ◆ 微型 3 引脚 SOT23 封装

订购信息*

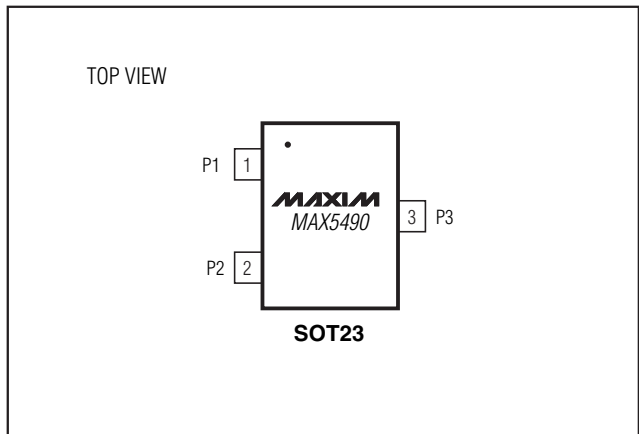
PART	TEMP RANGE	PIN-PACKAGE	RATIO ACCURACY (%)
MAX5490_A_ ___-T	-55°C to $+125^{\circ}\text{C}$	3 SOT23-3	0.035
MAX5490_B_ ___-T	-55°C to $+125^{\circ}\text{C}$	3 SOT23-3	0.05
MAX5490_C_ ___-T	-55°C to $+125^{\circ}\text{C}$	3 SOT23-3	0.1

* 详细信息见如何订购部分。

方框图



引脚配置



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ABSOLUTE MAXIMUM RATINGS

Voltage Between P1 and P2.....	100V	Operating Temperature Range	-55°C to +125°C
Maximum Current into Any Pin	±1.00mA	Junction Temperature	+150°C
Continuous Power Dissipation (T _A = +70°C)		Storage Temperature Range	-65°C to +150°C
3-Pin SOT23 (derate 7.1mW/°C above +70°C).....	571.4mW	Lead Temperature (soldering, 10s)	+300°C
3-Pin SOT23 (θ _{J-A})	141°C/W		

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.

DC ELECTRICAL CHARACTERISTICS

(T_A = -55°C to +125°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Initial Resistor Ratio Error (Note 2)		MAX5490_A, T _A = +25°C			±0.035	%
		MAX5490_B, T _A = +25°C			±0.05	
		MAX5490_C, T _A = +25°C			±0.1	
Resistance-Ratio Temperature Coefficient (Note 3)		1:1 ≤ ratio ≤ 10:1		1	2	ppm/°C
		10:1 ≤ ratio ≤ 25:1		2	4	
Absolute Temperature Coefficient of Resistance	TCR	(Note 4)		35		ppm/°C
Voltage Coefficient of Resistance	VCR	(Note 5)		0.1		ppm/V
End-to-End Resistance (R ₁ + R ₂)		T _A = +25°C	95	100	105	kΩ
Continuous Working Voltage Between P1 and P2	V _{P1-P2}		-80		+80	V
Continuous Current		I _{R1} , I _{R2}			840	μA
P1, P2, P3 Capacitance				2		pF
Maximum Power Rating				67.2		mW
Resistance Ratio Long-Term Stability		2000 hours at +70°C		±0.03		%
-3dB Bandwidth	f _{3dB}	1:1 ratio (Note 6)		3		MHz
Thermal Noise				45		μVRMS
Current Noise		In accordance with MIL-STD-2020 method 30B		-25		dB

Note 1: The MAX5490 is 100% production tested at T_A = +25°C. Specifications over -55°C to +125°C are guaranteed by design and characterization.

Note 2: Testing conditions: T_A = +25°C, V_{P1-P2} = 10V and 80V.

Note 3: Resistance-ratio temperature coefficient is defined as $\left| \frac{\Delta \left(\frac{R_1}{R_2} \right)}{\frac{R_1}{R_2} \times \Delta T} \right|$ and is guaranteed by design, not production tested.
For ratios from 25:1 to 100:1, contact factory.

Note 4: Absolute TCR is defined as $\left| \frac{\Delta(R_1 + R_2)}{(R_1 + R_2) \times \Delta T} \right|$ and is tested at 10V and 80V.

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DC ELECTRICAL CHARACTERISTICS (continued)

($T_A = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}\text{C}$.) (Note 1)

Note 5: Resistance-ratio voltage coefficient is defined as

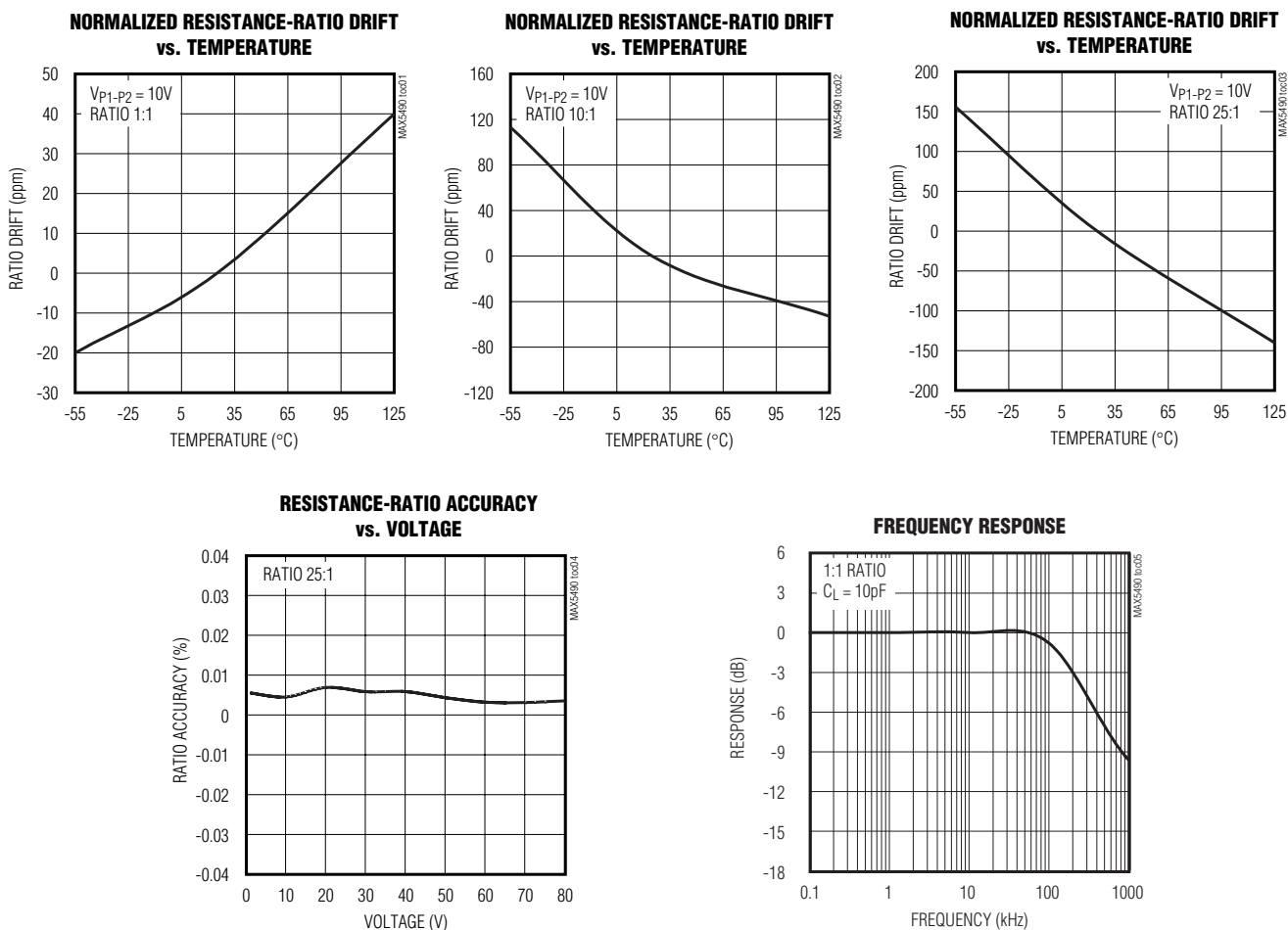
$$\left| \frac{\Delta \left(\frac{R_1}{R_2} \right)}{\frac{R_1}{R_2} \times \Delta V} \right|$$

and is guaranteed by design, not production tested.

Note 6: Calculate bandwidth by using $\frac{1}{2\pi RC}$, where $C = C_{P3}$ and $R = \frac{R_1 \times R_2}{R_1 + R_2}$.

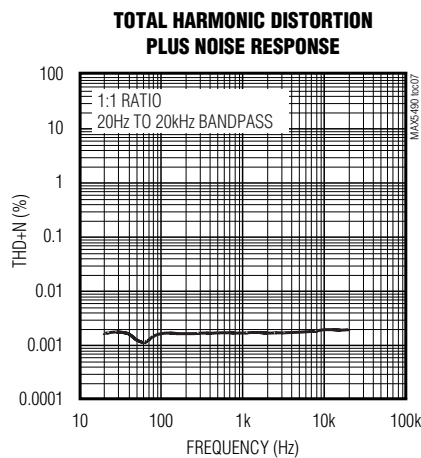
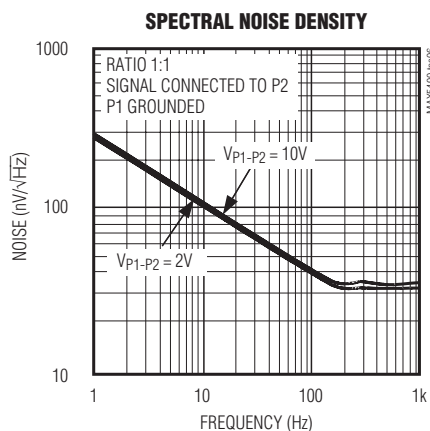
典型工作特性

($V_{P1-P2} = 10\text{V}$, $T_A = +25^{\circ}\text{C}$, unless otherwise noted.)



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典型工作特性(续)

(V_{P1-P2} = 10V, T_A = +25°C, unless otherwise noted.)

引脚说明

引脚	名称	功能
1	P1	R ₁ 连接端
2	P2	R ₂ 连接端
3	P3	设置点连接端

详细说明

如方框图所示, MAX5490 由两个精密, 低比例漂移电阻组成, 其端到端阻值为 100kΩ (R₁ + R₂)。P3 是分压器的设置点。MAX5490 的最大工作电压为 80V。此器件具有 1:1 至 100:1 的宽范围电阻比例 (R₁/R₂), 十分适合精密运放的增益/衰减控制。其最高 0.035% 的初始比例精度和低至 1ppm/°C 的比例漂移可增强系统精度。

应用信息

自发热和误差

在 P1 和 P2 之间加电压会导致器件因功率损耗而发热。在高电压应用中, 要考虑由于自发热引起的电阻比例温度

系数误差。最差的自发热情况出现在工作电压达到其额定最大值时。此时功率损耗约为:

$$P_{\text{DISS}} = \frac{(V_{\text{MAX}})^2}{R} = \frac{(80\text{V})^2}{100\text{k}\Omega} = 64\text{mW}$$

对于 3 引脚的 SOT23 封装, 从结到周围环境的 $\theta_{\text{J-A}}$ 为 141°C/W。可计算出所产生的温升:

$$\Delta T = 64\text{mW} \times 141^\circ\text{C/W} = 9.02^\circ\text{C}$$

如果比例温度系数是 1ppm/°C (典型值), 由自发热引起的总误差为:

$$9.02^\circ\text{C} \times 1\text{ppm}/^\circ\text{C} = 9.02\text{ppm}$$

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典型应用

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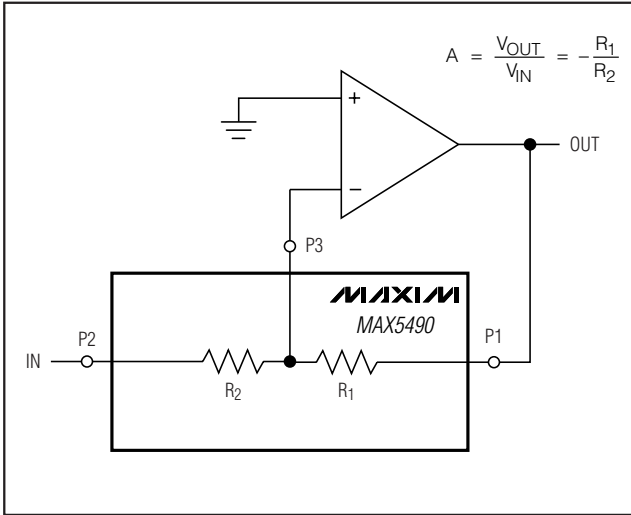


图 1. 反相放大器配置

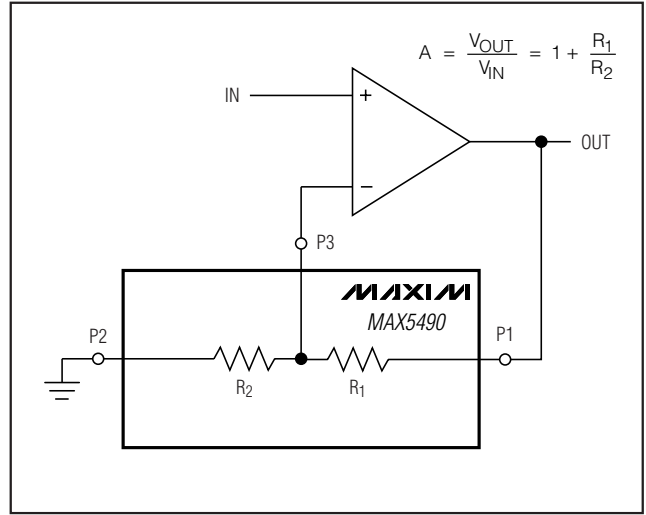


图 2. 同相放大器配置

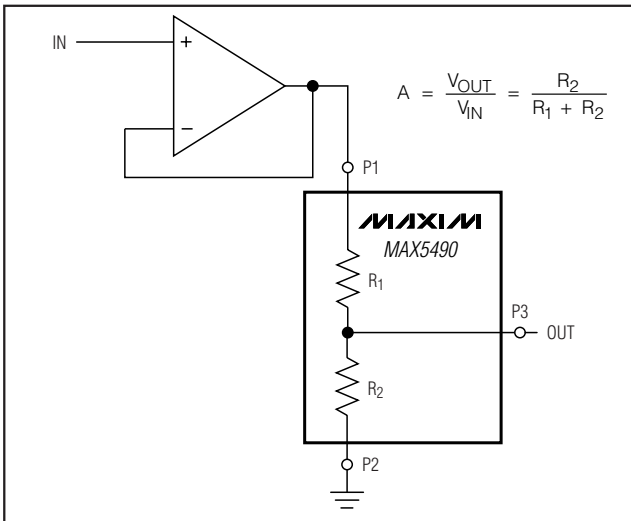


图 3. 缓冲衰减器

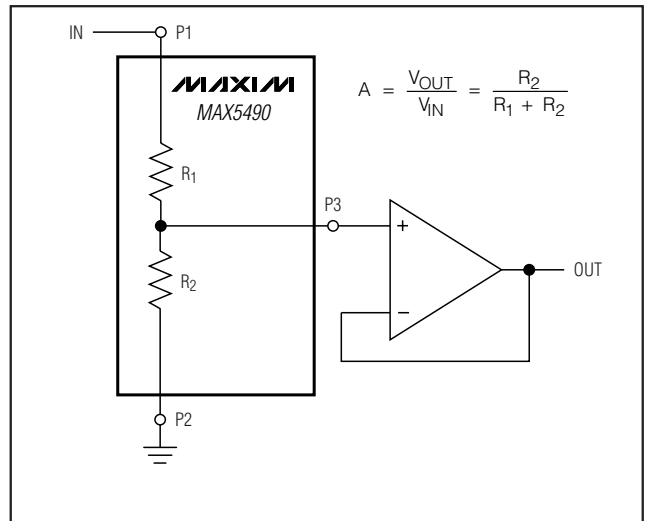
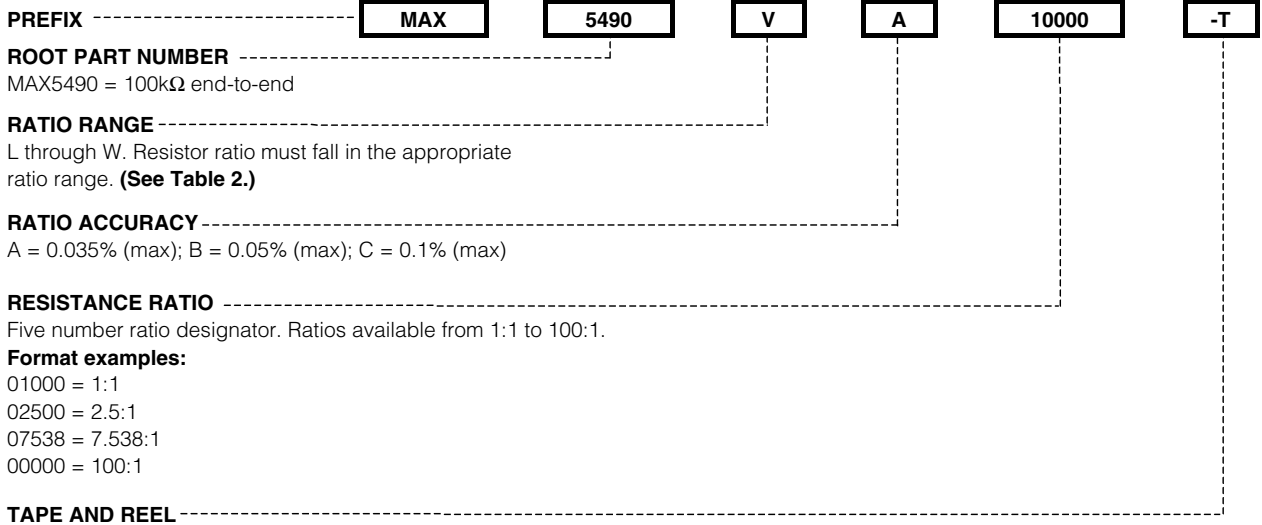


图 4. 带缓冲的衰减器

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如何订购



Example Part Numbers

PART NUMBER	RESISTOR-RATIO RANGE	RESISTOR-RATIO ACCURACY (% MAX)	RESISTOR RATIO
MAX5490PA02500-T	2.000 to 2.999	0.035	2.5:1
MAX5490RB03000-T	3.000 to 3.999	0.05	3:1
MAX5490UA07538-T	7.538 to 9.999	0.035	7.538:1
MAX5490VC10000-T	10.000 to 19.999	0.1	10:1

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表 1. 标准比例*

PART NUMBER	RESISTOR RATIO	RESISTOR-RATIO SUFFIX	RESISTOR-RATIO ACCURACY (% MAX)	TOP MARK
MAX5490GA01000-T	1:1	01000	0.035	FZQG
MAX5490GB01000-T	1:1	01000	0.05	FZQH
MAX5490GC01000-T	1:1	01000	0.1	FZQI
MAX5490MA02000-T	2:1	02000	0.035	FZRQ
MAX5490MB02000-T	2:1	02000	0.05	FZRR
MAX5490MC02000-T	2:1	02000	0.1	FZRS
MAX5490TA05000-T	5:1	05000	0.035	FZQJ
MAX5490TB05000-T	5:1	05000	0.05	FZQK
MAX5490TC05000-T	5:1	05000	0.1	FZQL
MAX5490VA10000-T	10:1	10000	0.035	FZQP
MAX5490VB10000-T	10:1	10000	0.05	FZQQ
MAX5490VC10000-T	10:1	10000	0.1	FZQR
MAX5490XA25000-T	25:1	25000	0.035	FZQV
MAX5490XB25000-T	25:1	25000	0.05	FZQW
MAX5490XC25000-T	25:1	25000	0.1	FZQX

*对于标准比例产品没有最小订购量要求。也可提供 1:1 至 100:1 范围的非标准比例产品, 最小订购量为 10,000 片。详情请与工厂联系。

表 2. 比例范围

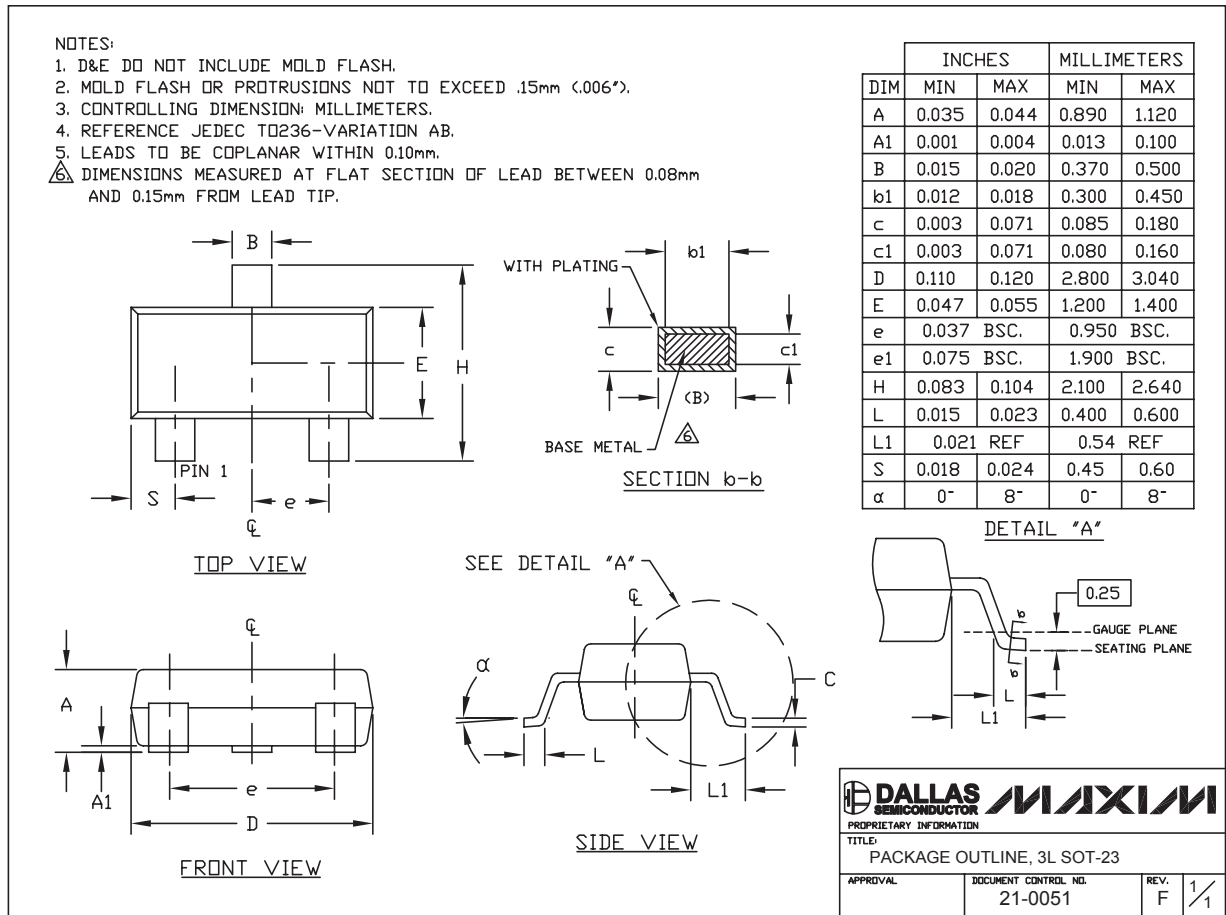
LETTER SUFFIX	RESISTOR-RATIO RANGE
G	1.0 to 1.099
H	1.1 to 1.199
J	1.2 to 1.399
K	1.4 to 1.599
L	1.6 to 1.899
M	1.9 to 2.099
N	2.1 to 2.499
P	2.5 to 2.999
R	3.0 to 3.499
S	3.5 to 4.499
T	4.5 to 5.999
U	6.0 to 8.999
V	9.0 to 13.999
W	14.0 to 24.999
X	25.0 to 49.999
Y	50.0 to 74.999
Z	75.0 to 100.0

芯片信息

TRANSISTOR COUNT: 0
PROCESS: BiCMOS

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封装信息

(本数据资料提供的封装图可能不是最近的规格, 如需最近的封装外型信息, 请查询 www.maxim-ic.com.cn/packages。)

SOT23 LEPS

MAXIM 北京办事处

北京 8328 信箱 邮政编码 100083

免费电话: 800 810 0310

电话: 010-6211 5199

传真: 010-6211 5299

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