

# FAN4050

## Precision Micropower Shunt Voltage Reference

### Features

- Fixed 2.500V and 3.300V
- Tolerances to  $\pm 0.1\%$  (25°C)
- Low output noise
- Low temperature coefficient, 50ppm/°C max
- Small package: SOT-23
- Extended operating current range

### Applications

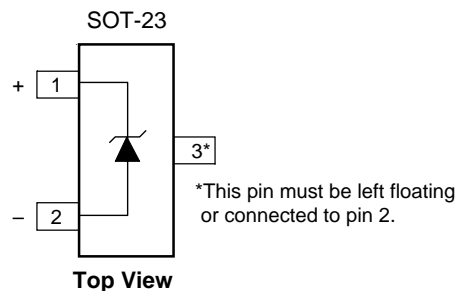
- Portable equipment
- Disk drives
- Instrumentation
- Audio equipment
- Data acquisition systems

### Description

The FAN4050 series of precision shunt references are ideal for space- and cost-sensitive applications. They are available in two output voltages (2.500V and 3.300V) and with a variety of output voltage tolerances (0.1%, 0.2%, and 0.5%). They also have excellent temperature coefficients, 50ppm/°C.

The FAN4050 series is available in the SOT-23 package.

### Connection Diagram



# Absolute Maximum Ratings<sup>1</sup>

Ratings are over full operating free-air temperature range unless otherwise noted.

Parameter	Min.	Max.	Unit
Continuous cathode current, I <sub>K</sub>	-30	+30	mA
Power dissipation <sup>2</sup>		280	mW
Storage Temperature Range	-65	150	°C
Lead Temperature (Soldering, 10 sec.)		300	°C

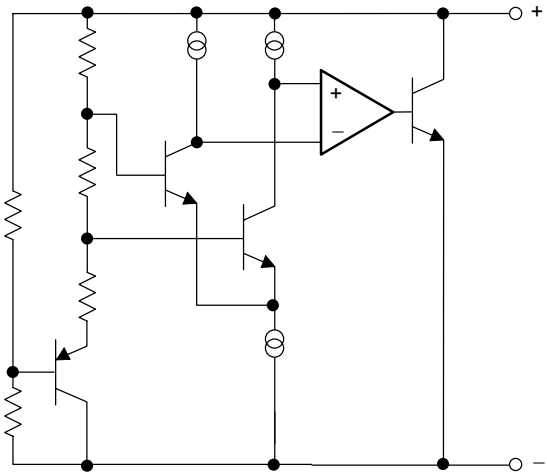
Notes:

- 1. Functional operation under these conditions is not implied. Permanent damage may occur if the device is subjected to conditions outside these ratings.
- 2. It is recommended to connect pin 3 to pin 2 in the SSOT23 package to ensure optimal thermal performance.

# Recommended Operating Conditions

Parameter	Min.	Max.	Unit
Continuous cathode current, I <sub>K</sub>	0.07	15	mA
Operating temperature range in free air, T <sub>A</sub>	-40	85	°C

# Equivalent Schematic



## Guaranteed Electrical Characteristics, FAN4050-2.5

( $T_A = 25^\circ\text{C}$  unless otherwise specified, in free air)

The • denotes specifications which apply over the full operating temperature range.

Symbol	Parameter	Conditions	Limits			Units
			A	B	C	
$V_R$	Reverse Breakdown Voltage	$I_K = 100\mu\text{A}$	2.500	2.500	2.500	V*
$\text{TCV}_R$	Reverse Breakdown Voltage Tolerance	$I_K = 100\mu\text{A}$	• $\pm 2.5$ • $\pm 11$	$\pm 5.0$ $\pm 14$	$\pm 13$ $\pm 21$	mV mV
$I_{R\text{MIN}}$	Minimum Operating Current		• 65	65	65	$\mu\text{A}$
$\Delta V_R / \Delta T$	Reverse Breakdown Voltage Temperature Coefficient	$I_K = 100\mu\text{A}$	• $\pm 50$	$\pm 50$	$\pm 50$	ppm/ $^\circ\text{C}$
$\Delta V_R (\Delta I_K)$	Reverse Breakdown Voltage Change with Operating Current	$I_{R\text{MIN}} \leq I_K \leq 1\text{mA}$ $1\text{mA} \leq I_K \leq 15\text{mA}$ $1\text{mA} \leq I_K \leq 25\text{mA}$	• 1.2 • 8.0 10	1.2 8.0 10	1.2 8.0 10	mV mV mV*
$Z_{KA}$	Reverse Dynamic Impedance	$I_K = 1\text{mA}$ , $f = 120\text{Hz}$ , $I_{AC} = 0.1I_K$	0.3	0.3	0.3	$\Omega^*$
$e_N$	Wideband Noise	$I_K = 100\mu\text{A}$ , $10\text{Hz} \leq f \leq 10\text{kHz}$	35	35	35	$\mu\text{V}_{\text{RMS}}^*$
$\Delta V_R$	Reverse Breakdown Voltage Long-term Stability	$t = 1000\text{hrs}$ , $T = 25^\circ\text{C}$ , $I_K = 100\mu\text{A}$	120	120	120	ppm*

\*Typical.

## Guaranteed Electrical Characteristics, FAN4050-3.3

( $T_A = 25^\circ\text{C}$  unless otherwise specified, in free air)

The • denotes specifications which apply over the full operating temperature range.

Symbol	Parameter	Conditions	Limits			Units
			A	B	C	
$V_R$	Reverse Breakdown Voltage	$I_K = 100\mu\text{A}$	3.300	3.300	3.300	V*
$\text{TCV}_R$	Reverse Breakdown Voltage Tolerance	$I_K = 100\mu\text{A}$	• $\pm 3.3$ • $\pm 25$	$\pm 6.6$ $\pm 28$	$\pm 17$ $\pm 38$	mV mV
$I_{R\text{MIN}}$	Minimum Operating Current		• 70	70	70	$\mu\text{A}$
$\Delta V_R / \Delta T$	Reverse Breakdown Voltage Temperature Coefficient	$I_K = 100\mu\text{A}$	• $\pm 50$	$\pm 50$	$\pm 50$	ppm/ $^\circ\text{C}$
$\Delta V_R (\Delta I_K)$	Reverse Breakdown Voltage Change with Operating Current	$I_{R\text{MIN}} \leq I_K \leq 1\text{mA}$ $1\text{mA} \leq I_K \leq 15\text{mA}$ $1\text{mA} \leq I_K \leq 25\text{mA}$	• 1.2 • 10 12	1.2 10 12	1.2 10 12	mV mV mV
$Z_{KA}$	Reverse Dynamic Impedance	$I_K = 1\text{mA}$ , $f = 120\text{Hz}$ , $I_{AC} = 0.1I_K$	0.5	0.5	0.5	$\Omega^*$
$e_N$	Wideband Noise	$I_K = 100\mu\text{A}$ , $10\text{Hz} \leq f \leq 10\text{kHz}$	70	70	70	$\mu\text{V}_{\text{RMS}}^*$
$\Delta V_R$	Reverse Breakdown Voltage Long-term Stability	$t = 1000\text{hrs}$ , $T = 25^\circ\text{C}$ , $I_K = 100\mu\text{A}$	120	120	120	ppm*

\*Typical.

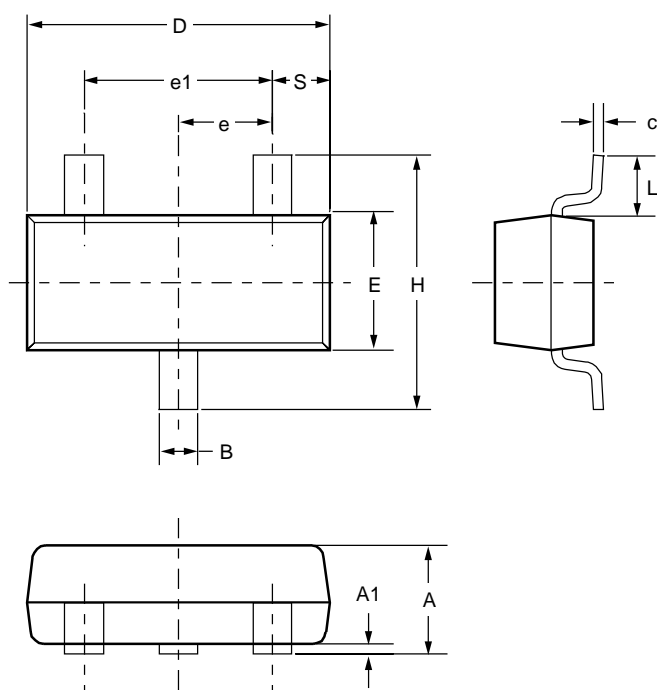
## Mechanical Dimensions

### SOT-23 Package

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.035	.044	.89	1.12	
A1	.0004	.004	.01	.10	
B	.012	.020	.30	.50	
c	.003	.008	.08	.20	
D	.110	.120	2.80	3.04	
E	.047	.055	1.20	1.40	
e	.037 BSC		.95 BSC		
e1	.075 BSC		1.90 BSC		
H	.083	.104	2.10	2.64	
L	.021 REF		.54 REF		
S	.016 Nom		.395 Nom		

**Notes:**

1. Dimensions are inclusive of plating.
2. Dimensions are exclusive of mold flash & metal burr.
3. Comply to JEDEC TO-236.
4. This drawing is for matrix leadframe only.



## Ordering Information

Example: FAN4050AIS3-2.5

FAN4050

<u>A</u>	<u>I</u>	<u>S3</u>	-	<u>2.5</u>
<b>Grade</b>		<b>Package</b>		<b>Voltage</b>
0.1% = A		SOT23 = S3		2.5V = 2.5
0.2% = B				3.3V = 3.3
0.5% = C				

## SSOT-23 Package Marking Information

Only 3 fields of marking are possible on an SSOT-23. This table gives the meaning of these fields.

Example: FCA

<u>F</u>	<u>C</u>	<u>A</u>
<b>Voltage</b>	<b>Grade</b>	
2.5V = C	0.1% = A	
3.3V = H	0.2% = B	
	0.5% = C	

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