

FAN4040

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 to $100\text{ppm}/^{\circ}\text{C}$
- Small package
- Extended operating current range

Applications

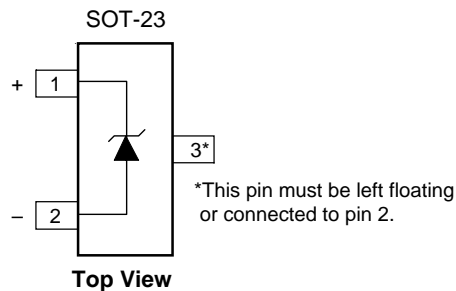
- Portable equipment
- Disk drives
- Instrumentation
- Audio equipment
- Data acquisition systems

Description

The FAN4040 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 four output voltage tolerances (0.1%, 0.2%, 0.5% and 1%). They also have excellent temperature coefficients, to $100\text{ppm}/^{\circ}\text{C}$ for the tighter tolerance grades. The FAN4040 series has an extended operating current range, sinking as much as 25mA.

The FAN4040 series is available in SOT-23 package.

Connection Diagrams



Absolute Maximum Ratings¹

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

| Parameter | Min. | Max. | Unit |
|---------------------------------------|------------------------------|------|------|
| Continuous cathode current, I_K | -30 | 30 | mA |
| Power dissipation | See Dissipation Rating Table | | |
| 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.

Recommended Operating Conditions

| Parameter | Min. | Max. | Unit |
|--|-------|------|------|
| Continuous cathode current, I_K | 0.025 | 25 | mA |
| Operating temperature range in free air, T_A | -40 | 85 | °C |

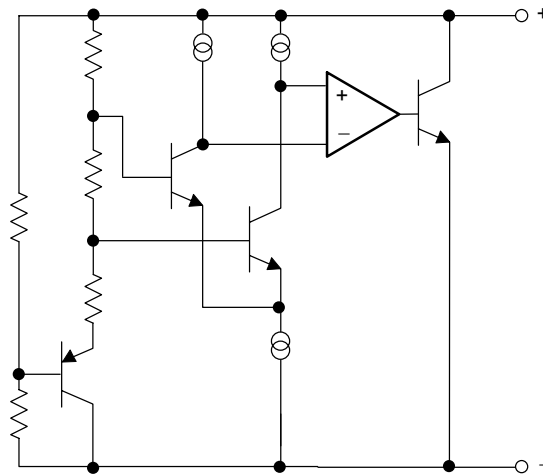
Dissipation Rating Table

| Package | Power Rating $T_A \leq 25^\circ\text{C}$ | Derating Factor $T_A \geq 25^\circ\text{C}$ | Power Rating $T_A = 70^\circ\text{C}$ |
|--------------------|---|--|--|
| SOT23 ¹ | 306mW | 3.0mW/°C | 168mW |

Note:

1. It is recommended to connect pin 3 to pin 2 to ensure optimal thermal performance.

Equivalent Schematic



Guaranteed Electrical Characteristics, FAN4040-2.5

(T_A = 25°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 | D | |
| V _R | Reverse Breakdown Voltage | I _K = 100µA | 2.500 | 2.500 | 2.500 | 2.500 | V* |
| TCV _R | Reverse Breakdown Voltage Tolerance | I _K = 100µA | ±2.5 • ±19 | ±5.0 ±21 | ±12 ±29 | ±25 ±49 | mV mV |
| I _{RMIN} | Minimum Operating Current | | • 65 | 65 | 65 | 70 | µA |
| ΔV _R /ΔT | Reverse Breakdown Voltage Temperature Coefficient | I _K = 1mA | • ±100 | ±100 | ±100 | ±150 | ppm/°C |
| ΔV _R (ΔI _K) | Reverse Breakdown Voltage Change with Operating Current | I _{RMIN} ≤ I _K ≤ 1mA | • 1.2 | 1.2 | 1.2 | 1.5 | mV |
| | | 1mA ≤ I _K ≤ 15mA | • 8.0 | 8.0 | 8.0 | 10.0 | mV |
| | | 1mA ≤ I _K ≤ 25mA | 10 | 10 | 10 | 12 | mV* |
| Z _{KA} | Reverse Dynamic Impedance | I _K =1mA, f=120Hz, I _{AC} =0.1I _K | 0.8 | 0.8 | 0.9 | 1.1 | Ω* |
| e _N | Wideband Noise | I _K =100µA, 10Hz ≤ f ≤ 10kHz | 35 | 35 | 35 | 35 | µV _{RMS} * |
| ΔV _R | Reverse Breakdown Voltage Long-term Stability | t=1000hrs, T=25°C, I _K =100µA | 120 | 120 | 120 | 120 | ppm* |

*Typical.

Guaranteed Electrical Characteristics, FAN4040-3.3

(T_A = 25°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 | D | |
| V _R | Reverse Breakdown Voltage | I _K = 100µA | 3.300 | 3.300 | 3.300 | 3.300 | V* |
| TCV _R | Reverse Breakdown Voltage Tolerance | I _K = 100µA | ±3.3 • ±25 | ±6.6 ±28 | ±17 ±38 | ±33 ±65 | mV mV |
| I _{RMIN} | Minimum Operating Current | | • 70 | 70 | 70 | 75 | µA |
| ΔV _R /ΔT | Reverse Breakdown Voltage Temperature Coefficient | I _K = 1mA | • ±100 | ±100 | ±100 | ±150 | ppm/°C |
| ΔV _R (ΔI _K) | Reverse Breakdown Voltage Change with Operating Current | I _{RMIN} ≤ I _K ≤ 1mA | • 1.2 | 1.2 | 1.2 | 1.5 | mV |
| | | 1mA ≤ I _K ≤ 15mA | • 10 | 10 | 10 | 13 | mV |
| | | 1mA ≤ I _K ≤ 25mA | 12 | 12 | 12 | 15 | mV* |
| Z _{KA} | Reverse Dynamic Impedance | I _K =1mA, f=120Hz, I _{AC} =0.1I _K | 1.0 | 1.0 | 1.0 | 1.3 | Ω* |
| e _N | Wideband Noise | I _K =100µA, 10Hz ≤ f ≤ 10kHz | 70 | 70 | 70 | 70 | µV _{RMS} * |
| ΔV _R | Reverse Breakdown Voltage Long-term Stability | t=1000hrs, T=25°C, I _K =100µA | 120 | 120 | 120 | 120 | ppm* |

*Typical.

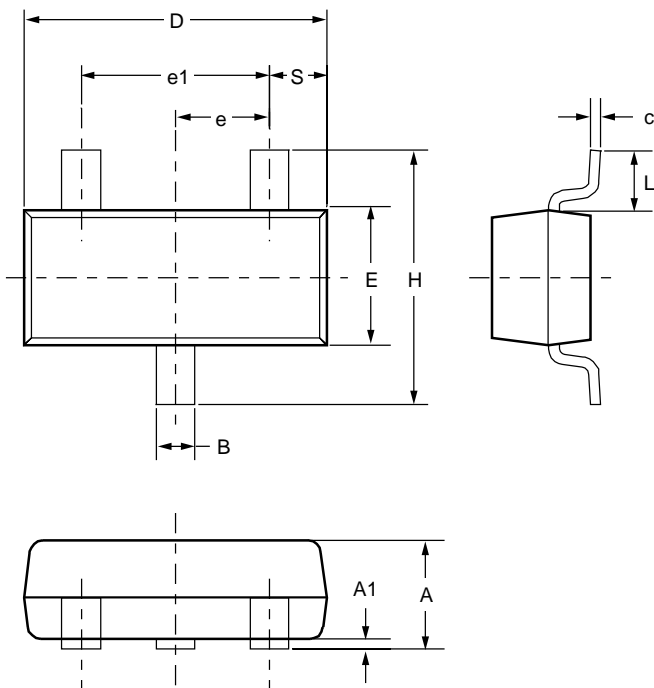
Mechanical Dimensions

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 | | |

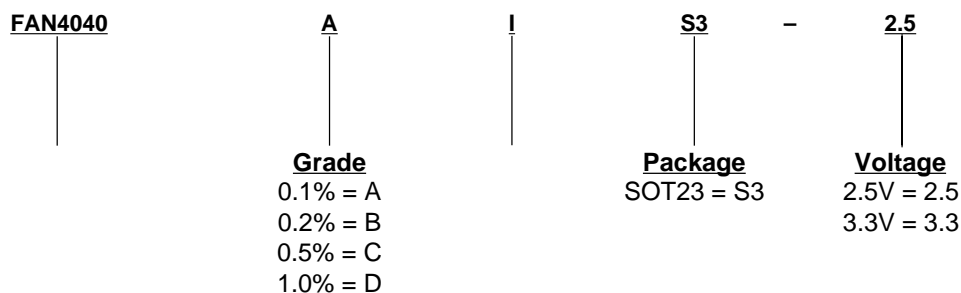
Notes:

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

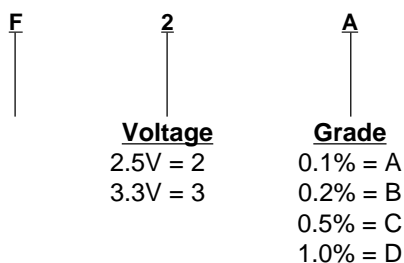
Example: FAN4040AIS3-2.5



SOT-23 Package Marking Information

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

Example: F2A



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