FAN4041

Precision Micropower Shunt Voltage Reference

Features

- Adjustable shunt reference
- Tolerances to ±0.5% (25°C)
- Low output noise
- Low temperature coefficient to 100 ppm/°C max
- Small packages
- Extended operating current range

Applications

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

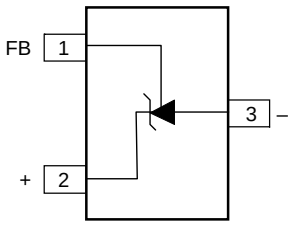
Description

The FAN4041 adjustable precision shunt references are ideal for space- and cost-sensitive applications. They are available with output voltage tolerances of 0.5% and 1%. They also have excellent temperature coefficients, to 100ppm/°C for the tighter tolerance grades. The FAN4041 series has an extended operating current range, sinking as much as 25mA.

The FAN4041 series is available in SOT-23 and TO-92 packages.

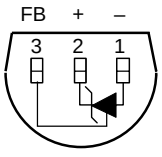
Connection Diagrams

SOT-23



Top View

TO-92



Bottom View

Absolute Maximum Ratings[1]

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		
Maximum Output Voltage (FAN4041)		12	V
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.

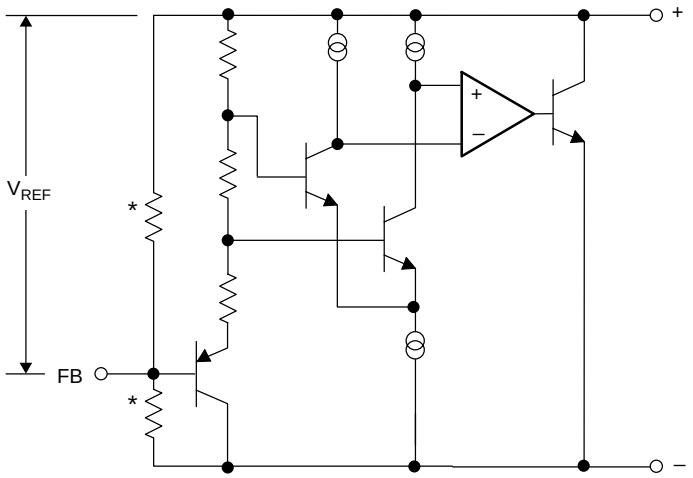
Recommended Operating Conditions

Parameter	Min.	Max.	Unit
Continuous cathode current, I_K	0.07	25	mA
Operating temperature range in free air, T_A	-40	85	°C
Output Voltage Range (FAN4041)	1.24	10	V

Dissipation Rating Table

Package	Power Rating $T_A \leq 25°C$	Derating Factor $T_A \geq 25°C$	Power Rating $T_A = 70°C$
TO-92	550mW	5.5mW/°C	302mW
SOT23	306mW	3.0mW/°C	168mW

Equivalent Schematic



*External adjust components.

Guaranteed Electrical Characteristics, FAN4041

(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 C	Limits D	Units
V_{REF}	Reference Voltage	I_K = 100µA, V_{OUT} = 5V		1.220	1.220	V*
TCV_{Ref}	Reference Voltage Tolerance	I_K = 100µA, V_{OUT} = 5V	 •	±6.2 ±14	±12 ±24	mV mV
I_{RMIN}	Mimimum Operating Current		•	65	70	µA
$\Delta V_{REF}/\Delta T$	Reference Voltage Temperature Coefficient	I_K = 1mA	•	±100	±150	ppm/°C
ΔV_{REF} (ΔI_K)	Reference Voltage Change with Operating Current	$I_{RMIN} \le I_K \le$1mA 1mA ≤ I_K ≤ 12mA 1mA ≤ I_K ≤ 25mA	• • 	2.0 8 12	2.5 10 15	mV mV mV*
ΔV_{REF} (ΔV_O)	Reference Voltage Change with Output Voltage	I_μ =1mA	•	-2.5	-3.0	mV/V
I_{FB}	Feedback Current		•	120	200	nA
Z_{KA}	Reverse Dynamic Impedance	I_K=1mA, f=120Hz, I_{AC}=0.1I_K V_{OUT} = V_{REF} V_{OUT} = 10V	 	 0.3 2	 0.3 2	 Ω* Ω*
e_N	Wideband Noise	I_K=100µA, V_{OUT} = V_{REF} 10Hz ≤ f ≤ 10kHz		20	20	μV_{RMS}*
ΔV_{REF}	Reference Voltage Long-term Stability	t=1000hrs, T=25°C, I_K=100µA		120	120	ppm*

*Typical.

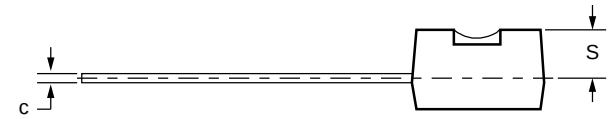
Mechanical Dimensions

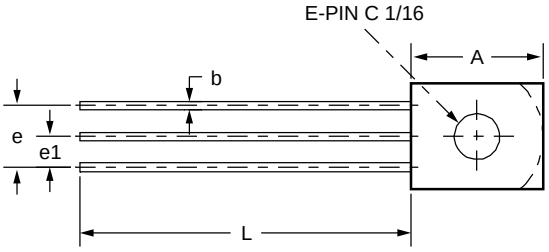
TO-92 Package

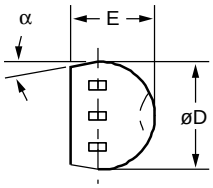
Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.170	.210	4.32	5.33	
b	.015	.021	.38	.53	
c	.014	.020	.36	.51	
øD	.175	.205	4.45	5.21	
E	.125	.165	3.18	4.19	
e	.095	.105	2.41	2.67	
e1	.045	.055	1.14	1.40	
L	.500	—	12.70	—	
S	.080	.115	2.03	2.92	
α	4°	6°	4°	6°	

Notes:

1. Package outline exclusive of any mold flashes dimension.
2. Package outline exclusive of burr dimension.







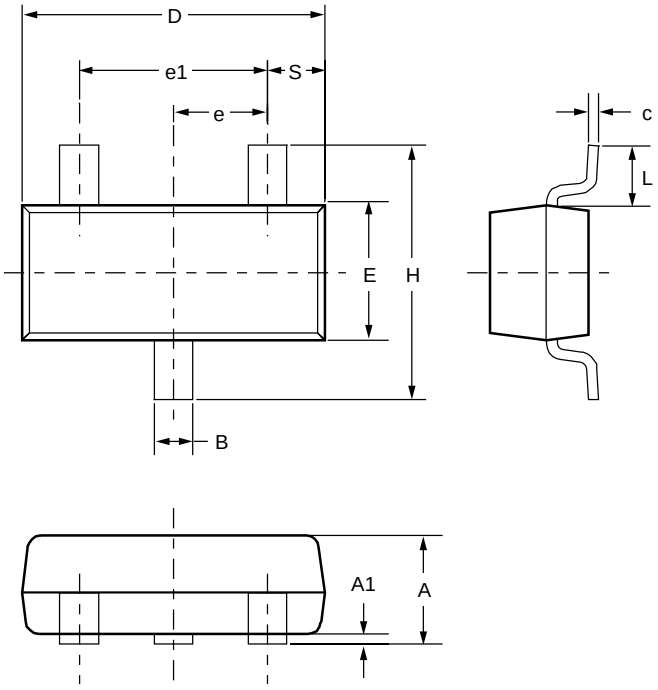
Mechanical Dimensions (continued)

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		

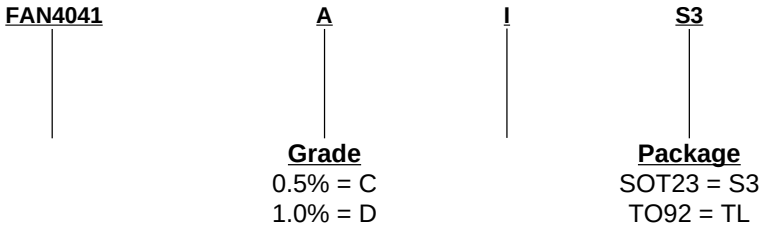
Notes:

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: FAN4041CIS3



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: FAC