LM4041
1.225V Precision micropower shunt voltage reference

Description

The LM4041 is a bandgap circuit designed to achieve a precision micro-power voltage reference of 1.225 V. The device is available in the small outline SOT23 surface mount packages which is ideal for applications where space saving is important.

The LM4041 is available to 0.5% C grade for precision applications. Excellent performance is maintained over the 60μA to 12mA operating current range with a typical temperature coefficient of only 20ppm/°C.

The device has been designed to be highly tolerant of capacitive loads so maintaining excellent stability.

This device offers a pin for pin compatible alternative to the LM4041 voltage reference.

Features

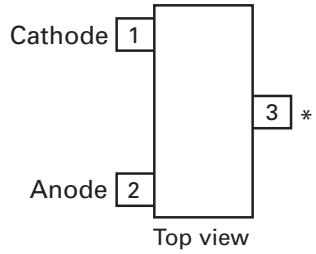
- Small packages: SOT23
- No output capacitor required
- Output voltage tolerance
  - LM4041C ±0.5% at 25°C
  - LM4041D ±1% at 25°C
- Low output noise
  (10 Hz to 10kHz) 60μVrms
- Wide operating current range 60μA to 12mA
- Extended temperature range -40°C to +125°C
- Low temperature coefficient 100ppm/°C (max)

Applications

- Battery powered equipment
- Precision power supplies
- Portable instrumentation
- Portable communications devices
- Notebook and palmtop computers
- Data acquisition systems

Pinout information

LM4041_12F (SOT23)



* Pin 3 must be left floating or connected to pin 2

Ordering information

25°C tol.	Voltage (V)	Order code	Pack	Part mark	Status	Reel size	Tape width	Quantlty per reel
0.5%	1.225	LM4041CFTA	SOT23	R1C	Preview	7", 180mm	8mm	3000
1%	1.225	LM4041DFTA	SOT23	R1D	Preview	7", 180mm	8mm	3000

Absolute maximum ratings

Continuous reverse current (I_{KA}) 20mA

Continuous forward current (I_{REF}) 10mA

Operating junction temperature ..... -40°C to 150°C

Storage temperature ..... -55°C to 150°C

Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability.

Unless otherwise stated voltages specified are relative to the ANODE pin.

Package thermal data

Package	Θ_{JA}	P_{DIS} T_{amb} =25°C, T_J = 150°C
SOT23	380°C/W	330mW

Recommended operating conditions

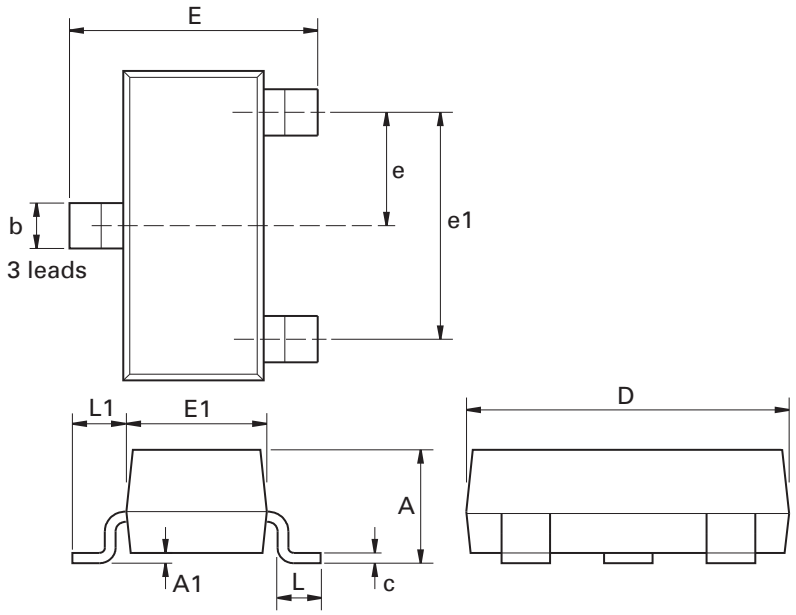
	Min.	Max.	Units
Reverse current	0.06	15	mA
Operating ambient temperature range	-40	125	°C

Electrical characteristics

Over recommended operating conditions, T_{amb} = 25°C, unless otherwise stated. LM4041C and LM4041D have initial tolerances of 0.5% and 1% respectively.

Symbol	Parameter	Conditions		Typ.	LM4041C Limits	LM4041D Limits	Units
			T_{amb}				
V_{REF}	Reverse breakdown voltage	I_R = 100 µA	25°C	1.225			V
	Reverse breakdown voltage tolerance	I_R = 100µA	25°C		±6	±12	mV
			-40 to 85°C		±14	±24	
			-40 to 125°C		±18.4	±31	
I_{RMIN}	Minimum operating current		25°C	45	60	65	µA
			-40 to 85°C		65	70	
			-40 to 125°C		68	73	
$\Delta V_R/\Delta T$	Average reverse breakdown voltage temperature coefficient	I_R = 10 mA	-40 to 125°C	±20			ppm/°C
		I_R = 1 mA,		±15	±100	±150	
		I_R = 100 µA		±15			
$\Delta V_R/\Delta I_R$	Reverse breakdown change with current	$I_{RMIN} < I_R <$ 1mA	25°C	0.7	1.5	2.0	mV
			-40 to 85°C		2.0	2.5	
			-40 to 125°C		2.0	2.5	
		1mA < $I_R <$ 12 mA	25°C	2.5	6.0	8.0	
			-40 to 85°C		8.0	10.0	
			-40 to 125°C		8.0	10.0	
Z_R	Dynamic output impedance	I_R = 1mA, f = 120Hz $I_{AC} = 0.1I_R$		0.5	1.5	2.0	Ω
e_n	Noise voltage	I_R = 100µA 10Hz < f < 10kHz		60			μV_{RMS}
ΔV_R	Long term stability (non cumulative)	t = 1000Hrs I_R = 100µA		120			ppm

Package outline - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
C	0.085	0.120	0.003	0.008	L	0.25	0.62	0.018	0.024
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.0375 NOM		-	-	-	-	-

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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Zetex sales offices

Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Kustermann-park Balanstraße 59 D-81541 München Germany Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Zetex Inc 700 Veterans Memorial Highway Hauppauge, NY 11788 USA Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com	Zetex (Asia Ltd) 3701-04 Metroplaza Tower 1 Hing Fong Road, Kwai Fong Hong Kong Telephone: (852) 26100 611 Fax: (852) 24250 494 asia.sales@zetex.com	Zetex Semiconductors plc Zetex Technology Park, Chadderton Oldham, OL9 9LL United Kingdom Telephone: (44) 161 622 4444 Fax: (44) 161 622 4446 hq@zetex.com