ZRB500

PRECISION 5V MICROPOWER VOLTAGE REFERNCE

Description

The ZRB500 uses a bandgap circuit design to achieve a precision micropower voltage reference of 5.0 volts. The device is available in small outline surface mount packages, ideal for applications where space saving is important, as well as packages for through hole requirements.

The ZRB500 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZRB500 is recommended for operation between 50_A and 15mA and so is ideally suited to low power and battery powered applications.

Excellent performance is maintained to an absolute maximum of 25mA, however the rugged design and 20 volt processing allows the reference to withstand transient effects and currents up to 200mA. Superior switching capability allows the device to reach stable operating conditions in only a few microseconds.

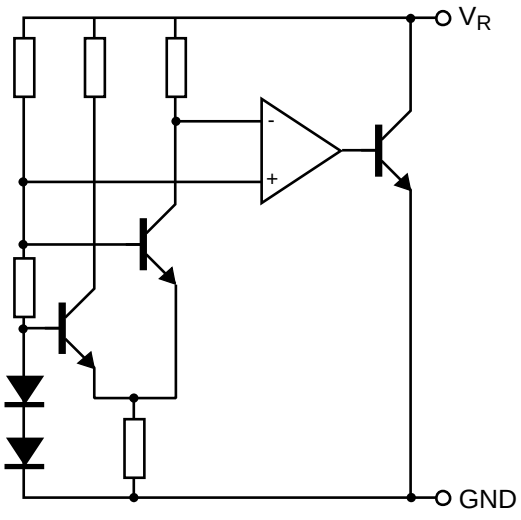
Features

- ± 2% and 1% tolerance
- Operating current 50_A to 15mA
- Typical TC 15ppm/°C
- Transient response, stable in less than 10µs
- Industrial temperature range
- Small outline SOT23 style package
- Green molding compound (No Br, Sb)

Applications

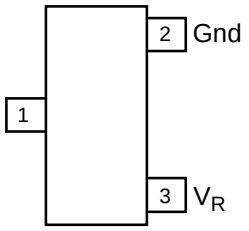
- Battery powered and portable equipment
- Metering and measurement systems
- Instrumentation
- Test equipment
- Data acquisition systems
- Precision power supplies

Typical Application Circuit



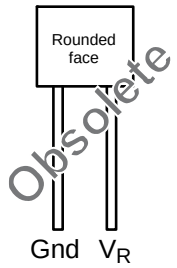
Pin Assignments

SOT23
package suffix - F

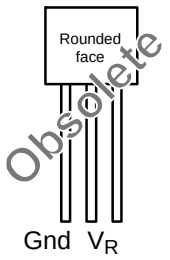


Pin 1 floating or connected to pin 2

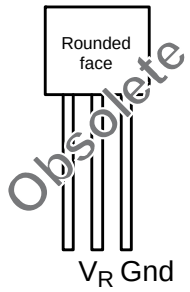
E-Line, 2 pin
package suffix - Y



E-Line, 3 pin, rev
package suffix - R



E-Line, 3 pin
package suffix - A



Absolute Maximum Ratings (Voltages to GND Unless Otherwise Stated)

Parameter	Rating	Unit
Reverse Current	25	mA
Forward Current	25	mA
Operating Temperature	-40 to 85	°C
Storage Temperature	-55 to 125	°C
Power Dissipation (T_{AMB} = 25°C) SOT23	330	mW

Electrical Characteristics (Test conditions: T_{amb} = 25°C, unless otherwise specified.)

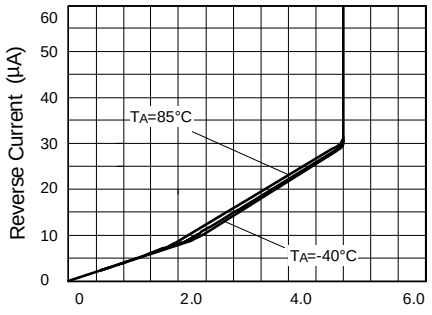
Symbol	Parameter	Condition	Min.	Typ.	Max.	Tol. (%)	Unit
V_R	Reverse breakdown voltage	I_R = 150µA	4.95 4.90	5.0 5.0	5.05 5.10	1 2	V
I_{MIN}	Minimum operating current			30	50		µA
I_R	Recommended operating current		0.05		15		mA
T_C(*)	Average reverse breakdown voltage temperature coefficient	$I_{R(MIN)}$ to $I_{R(MAX)}$		15	50		ppm/°C
R_S(†)	Slope resistance			0.33	1.5		Ω
Z_R	Reverse dynamic impedance	I_R = 1mA f = 100Hz $I_{AC} = 0.1I_R$		0.4	1		Ω
E_N	Wideband noise voltage	I_R = 150µA f = 10Hz to 10kHz		105			µV(rms)

Notes:

(*) $$T_C = \frac{(V_{R(MAX)} - V_{R(MIN)}) \times 1000000}{V_R \times (T_{(MAX)} - T_{(MIN)})}$$

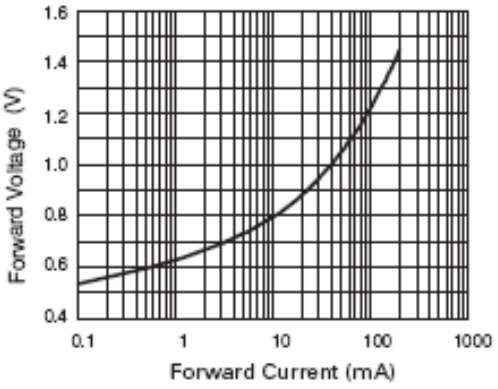
Note: $V_{R(MAX)}$ - $V_{R(MIN)}$ is the maximum deviation in reference voltage measured over the full operating temperature range.

(†) $$R_S = \frac{V_R \text{ Change } (I_{R(MIN)} \text{ to } I_{R(MAX)})}{I_{R(MAX)} - I_{R(MIN)}}$$

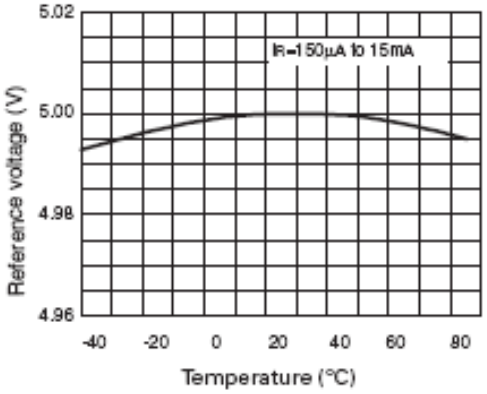


Reverse Characteristics

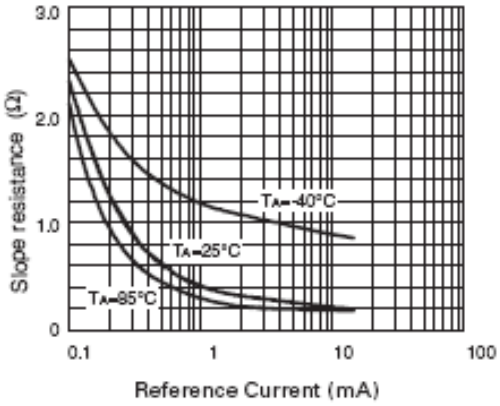
Typical Characteristics



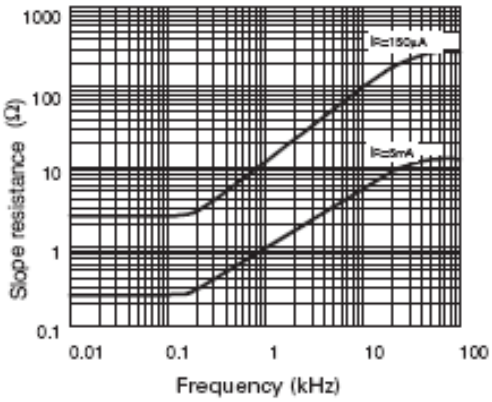
Forward Characteristics



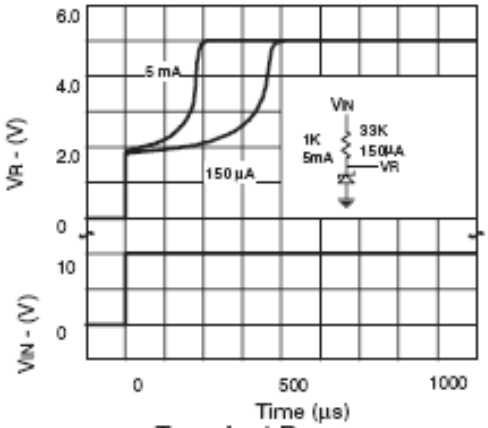
Temperature Drift



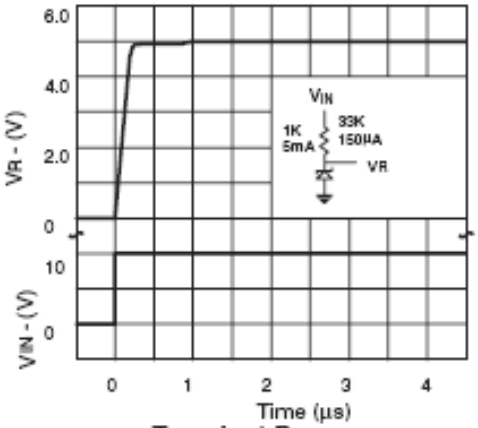
Slope Resistance v Current



Slope Resistance v Frequency



Transient Response
(Single Pulse)



Transient Response
(Repetitive Pulse)

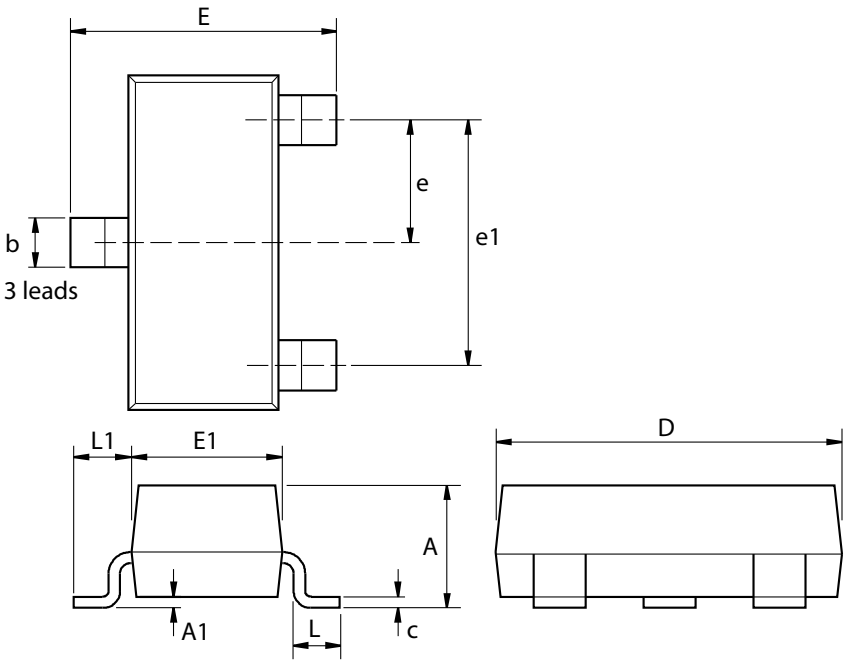
Ordering Information*

Order Reference	Tol (%)	Device Mark	Status (*)	Reel Size (inches)	Quantity per reel	Tape Width (mm)
ZRB500F01TA	1	50I	Released	7	3000	8
ZRB500F02TA	2	50H	Released	7	3000	8
ZRB500F03TA	3	50G	Obsolete	7	3000	8

Notes: *All ZRB500A variants (E-Line 3-pin), ZRB500Y variants (E-Line 2-pin), ZRB500R variants (E-Line 3-pin reversed) and ZRB500N8 variants (SO-8) are obsolete no longer available for sale. The closest alternative is the SOT23.

Package Outline Dimensions

SOT23

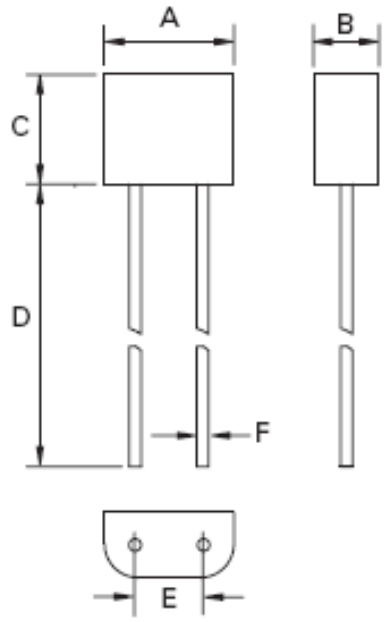


Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
c	0.085	0.20	0.003	0.008	L	0.25	0.60	0.0098	0.0236
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.037 NOM		-	-	-	-	-

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

Package Outline Dimensions

SO-8-EP

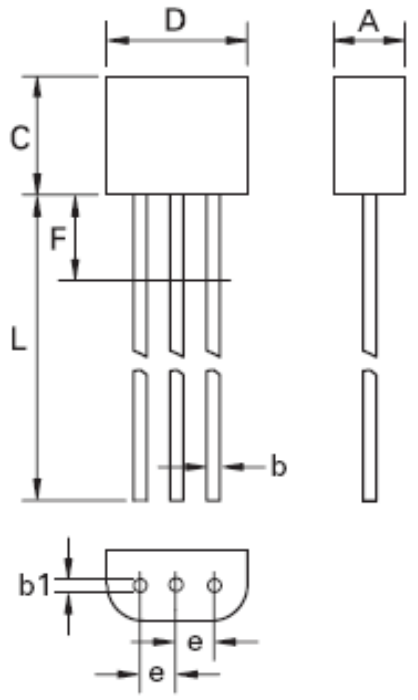


DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.37	4.77	0.17	0.18
B	2.16	2.41	0.085	0.095
C	3.61	4.01	0.14	0.16
D	13.00	13.97	0.51	0.55
E	2.54 NOM		0.10 NOM	
F	0.37	0.495	0.015	0.019

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

Package Outline Dimensions

E-Line, 3 pin rev.

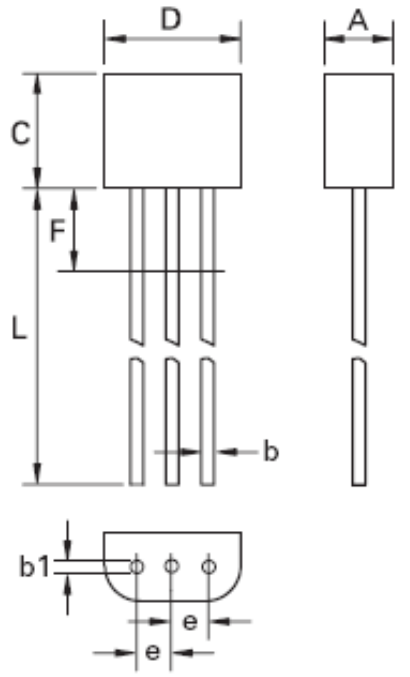


DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.16	2.41	0.085	0.095
b	0.41	0.495	0.016	0.0195
b1	0.41	0.495	0.016	0.0195
D	4.37	4.77	0.172	0.188
E	3.61	4.01	0.142	0.158
e	1.27 NOM		0.050 NOM	
F	—	2.50	—	0.098
L	13.00	13.97	0.512	0.550

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

Package Outline Dimensions

E-Line, 3 pin

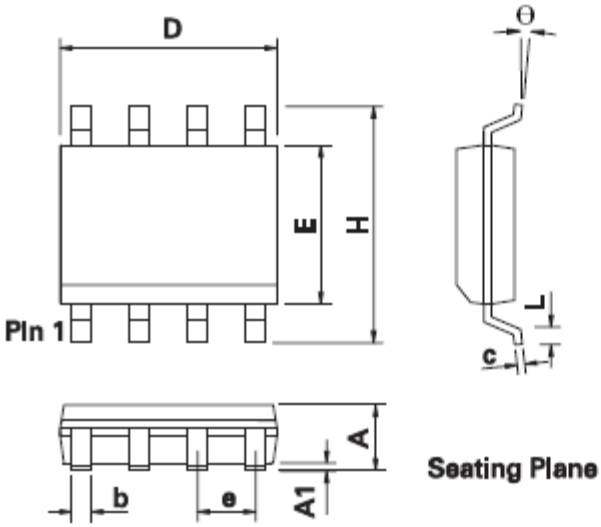


DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.16	2.41	0.085	0.095
b	0.41	0.495	0.016	0.0195
b1	0.41	0.495	0.016	0.0195
D	4.37	4.77	0.172	0.188
E	3.61	4.01	0.142	0.158
e	1.27 NOM		0.050 NOM	
F	—	2.50	—	0.098
L	13.00	13.97	0.512	0.550

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

Package Outline Dimensions

SO8



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	θ	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

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

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