

FIXED 2.5 AND 5 VOLT 3-TERMINAL VOLTAGE REFERENCES

ZTR250
ZTR500

ISSUE2 - DECEMBER 1996.

DEVICE DESCRIPTION

The ZTR250 and ZTR500 are precision three terminal references offering the lowest power dissipation available in a SOT23 package.

These devices are ideal for battery powered applications where power saving is important. These devices offer low power alternatives to other two terminal shunt references.

The ZTR devices do not require an external resistor and, in contrast to two terminal references, waste none of the battery power as load current varies. The ZTR only consumes 30µA supply current.

The two devices require as low as 1.4 volts between input and output for regulation. Output voltage tolerance is $\pm 2.5\%$, with a voltage variation of 0.275mV/°C over the -55°C to 125°C operating range.

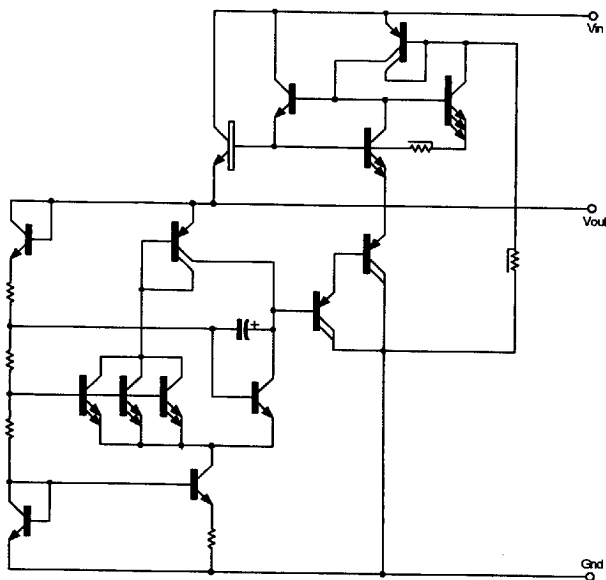
FEATURES

- Small outline SOT23 and SOT89 packages
- TO92 package
- 2.5V and 5V output
- Supply current independent of input voltage over temperature
- Output current up to 50mA
- Very low supply current (30µA)
- Unconditionally stable
- Internal short circuit current limit

APPLICATIONS

- Battery Powered Systems
- Portable and Hand Held Equipment
- Instrumentation
- Metering

SCHEMATIC DIAGRAM



CONNECTION TABLE

Pin	SOT23	SOT89	TO92
1	G _{nd}	V _R	In
2	In	G _{nd}	Gnd
3	Out	V _{in}	Out
4	—	G _{nd}	—
Pack	F	Z	C

see Connection Diagrams

ZTR250

ZTR500

ABSOLUTE MAXIMUM RATINGS

Input voltage	20V
Package power dissipation	SOT23 500mW
(T _{amb} =25 °C, T _{jmax} =150 °C)	TO92 600mW
	SOT89 1.5W
Output current (I _o)	200mA
Operating temperature	-55 to 125°C
Storage temperature	-65 to 150°C

Note:

1. The maximum operating input voltage and output current of the device will be governed by the maximum power dissipation of the selected package. Maximum package power dissipation is specified at 25 °C and must be linearly derated to zero at T_{amb}=125°C.

2. The following data represents pulse test conditions with junction temperatures as indicated at the initiation of the test. Continuous operation of the devices with the stated conditions might exceed the power dissipation limits of the chosen package.

3. This device does not contain a thermal shutdown circuit so care should be taken not to exceed the stated maximum power dissipation rating. Maximum power dissipation, for the SOT23 and SOT89 packages, is calculated assuming that the device is mounted on a ceramic substrate measuring 15 x 15 x 0.6mm.

ZTR250

ELECTRICAL CHARACTERISTICS

TEST CONDITIONS (Unless otherwise stated): T_j=25°C, I_o=10mA, V_{in}=6.5V

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
V _o	Output Voltage		2.438	2.5	2.563	V
		I _o =0 to 50mA T _j = -55 to 125°C	2.360		2.640	V
		V _{in} =4.5 to 20V I _o =0 to 50mA T _j = -55 to 125°C	2.360		2.640	V
ΔV _o	Line Regulation	V _{in} =4.5 to 20V		5	15	mV
ΔV _o	Load Regulation	I _o =0 to 50mA		20	30	mV
		I _o =0 to 10mA		12		mV
I _s	Supply Current	T _j = -55 to 125°C		30	40	μA
ΔI _s	Supply Current Change	I _o =0 to 50mA		1	±10	μA
		V _{in} =4.5 to 20V		2	10	μA
V _n	Output Noise Voltage	f=10Hz to 10KHz		65		μV rms
ΔV _{in} /ΔV _o	Ripple Rejection	V _{in} =6.3 to 18V f=120Hz	55	75		dB
V _{in}	Input Voltage Required To Maintain Regulation		4.2	3.9		V
ΔV _o /ΔT	Average Temperature Coefficient of V _o	I _o =5.0mA T _j = -55 to 125°C		0.275	0.700	mV/°C

ZTR250 ZTR500

ZTR500

ELECTRICAL CHARACTERISTICS

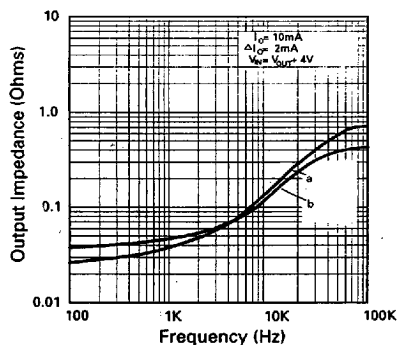
TEST CONDITIONS (Unless otherwise stated): $T_j = 25^\circ\text{C}$, $I_O = 10\text{mA}$, $V_{in} = 10\text{V}$

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
V_O	Output Voltage		4.875	5	5.125	V
		$I_O = 0$ to 50mA $T_j = -55$ to 125°C	4.780		5.160	V
		$V_{in} = 7$ to 20V $I_O = 0$ to 50mA $T_j = -55$ to 125°C	4.780		5.175	V
ΔV_O	Line Regulation	$V_{in} = 7$ to 20V		5	15	mV
ΔV_O	Load Regulation	$I_O = 0$ to 50mA $I_O = 0$ to 10mA		25 15	40	mV mV
I_s	Supply Current	$T_j = -55$ to 125°C		50	70	μA
ΔI_s	Supply Current Change	$I_O = 0$ to 50mA $V_{in} = 7$ to 20V		1 2	± 10 10	μA μA
V_n	Output Noise Voltage	$f = 10\text{Hz}$ to 10KHz		90		$\mu\text{V rms}$
$\Delta V_{in}/\Delta V_O$	Ripple Rejection	$V_{in} = 8$ to 18V $f = 120\text{Hz}$	55	72		dB
V_{in}	Input Voltage Required To Maintain Regulation		7	6.7		V
$\Delta V_O/\Delta T$	Average Temperature Coefficient of V_O	$I_O = 5.0\text{mA}$ $T_j = -55$ to 125°C		0.275	0.700	$\text{mV}/^\circ\text{C}$

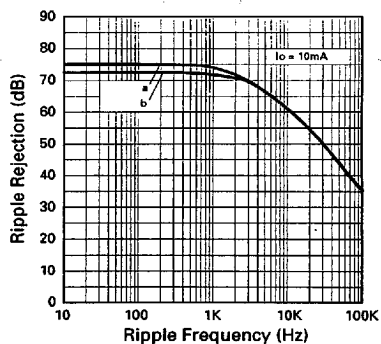
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ZTR250 ZTR500

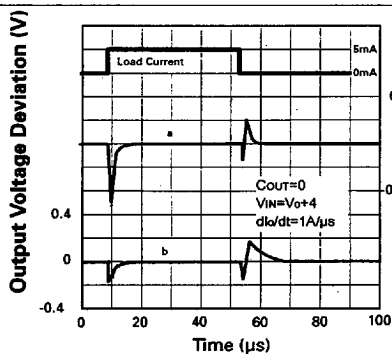
TYPICAL CHARACTERISTICS a=ZTR250: b=ZTR500



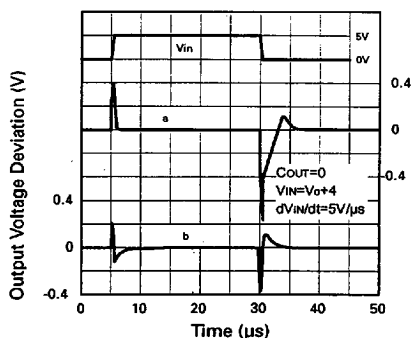
Output Impedance v Frequency



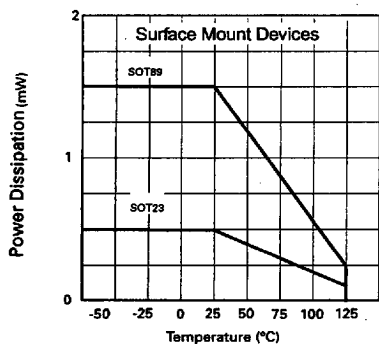
Ripple Rejection v Ripple Frequency



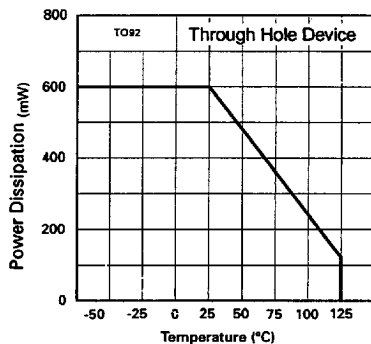
Load Transient Response



Line Transient Response



Power Derating

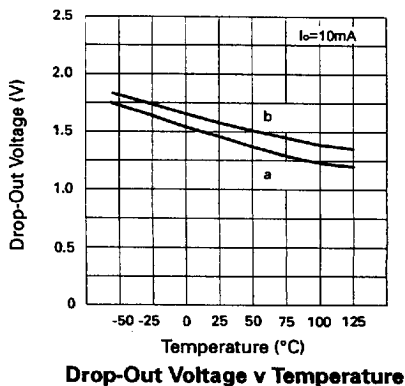
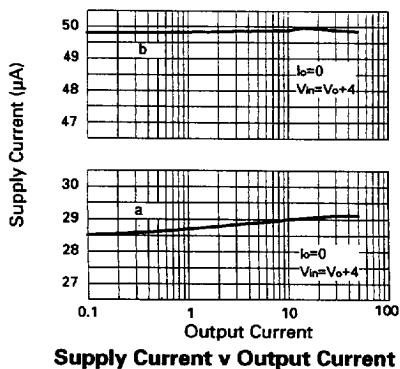
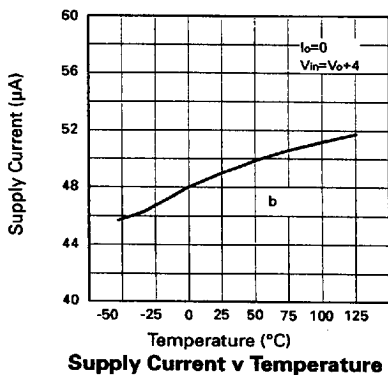
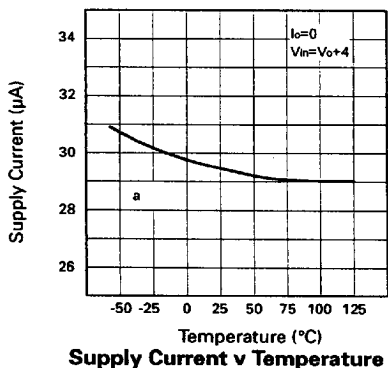
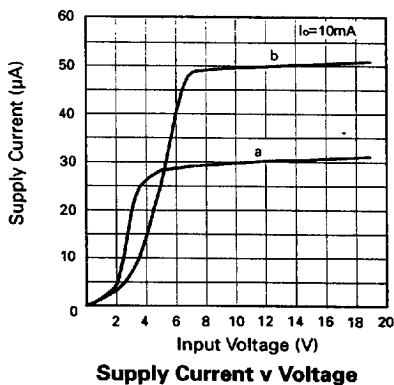
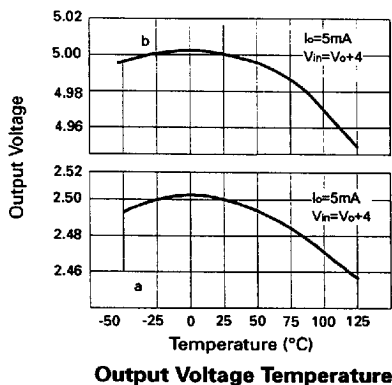


Power Derating

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ZTR250 ZTR500

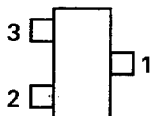
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ZTR250 ZTR500

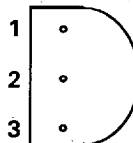
CONNECTION DIAGRAMS

SOT23 Package Suffix - F



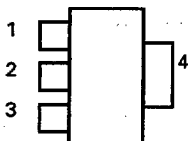
Top View

TO92 Package Suffix - C



Bottom View

SOT89 Package Suffix - Z



Top View

ORDERING INFORMATION

Part Number	Package	Part Mark
ZTR250F	SOT23	25T
ZTR250C	TO92	ZTR250
ZTR250Z	SOT89	25T
ZTR500F	SOT23	50N
ZTR500C	TO92	ZTR500
ZTR500Z	SOT89	50N

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