FIXED 2.5 AND 5 VOLT MINIATURE VOLTAGE REGULATORS

ISSUE 4 - MARCH 2002

ZMR SERIES

DEVICE DESCRIPTION

The ZMR series of three terminal fixed positive voltage regulators feature internal current limit and will shut down under thermal overload conditions making the devices difficult to destroy.

The circuit design offers an exceptionally low quiescent current, only 30μA for the 2.5 volt device, ideal for low power applications. The initial devices in the series regulate to 2.5 or 5 volts with a drive capability up to 50mA, however, the flexible design will allow other voltage selections to be made.

The device is designed with space saving in mind and is available in the small outline SOT23 package. The device is also available in through hole TO92 package.

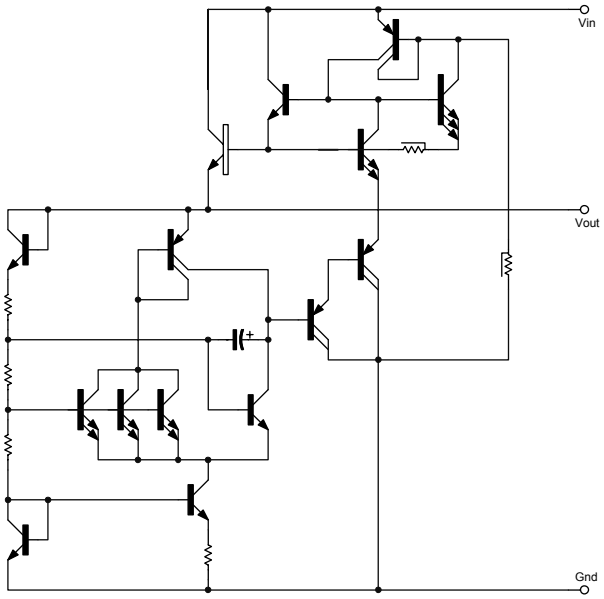
FEATURES

- Small outline SOT23 package
- TO92 package
- 2.5V and 5V output
- 22.5V maximum input voltage (ZMR25H)
- 25V maximum input voltage (ZMR50H)
- Output current up to 50mA
- Very low Quiesent current (30μA)
- Unconditionally stable
- Other output voltages possible
- Internal short circuit current limit

VOLTAGE RANGE

ZMR250	2.5V
ZMR500	5.0V
ZMR25H	2.5V
ZMR50H	5.0V

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Input voltage (ZMR25H) 22.5V ZMR250 20V
(ZMR50H) 25V ZMR500 20V

Package power dissipation SOT23 500mW (Note 3)
(T_{amb}=25 °C) TO92 600mW

Output current (I_O) 100mA

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. Maximum power dissipation for the SOT23 package, is calculated assuming that the device is mounted on a ceramic substrate measuring 15 x 15 x 0.6mm.

ZMR25H
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 22.5V 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 22.5V		5	15	mV
ΔV_O	Load Regulation	I_O=0 to 50mA I_O=0 to 10mA		20 12	30	mV mV
I_s	Supply Current	T_j=-55 to 125°C		30	40	µA
ΔI_s	Supply Current Change	I_O=0 to 50mA V_{in}=4.5 to 22.5V		1 2	±10 10	µA µA
V_n	Output Noise Voltage	f=10Hz to 10KHz		65		µV rms
$\Delta V_{in}/\Delta V_O$	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
$\Delta V_O/\Delta T$	Average Temperature Coefficient of V_O	I_O=5.0mA T_j=-55 to 125°C		0.275	0.700	mV/°C

ZMR SERIES

ZMR50H
ELECTRICAL CHARACTERISTICS
TEST CONDITIONS (Unless otherwise stated):T_j=25°C, I_O=10mA, V_{in}=10V

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 25V I_O=0 to 50mA T_j=-55 to 125°C	4.780		5.175	V
ΔV_O	Line Regulation	V_{in}=7 to 25V		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 25V		1 2	±10 10	µA µA
V_n	Output Noise Voltage	f=10Hz to 10KHz		90		µV rms
$\Delta V_{in}/\Delta V_O$	Ripple Rejection	V_{in}=8 to 18V f=120Hz	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=5.0mA T_j=-55 to 125°C		0.275	0.700	mV/°C

ZMR250
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 I_O=0 to 10mA		20 12	30	mV mV
I_s	Supply Current	T_j=-55 to 125°C		30	40	µA
ΔI_s	Supply Current Change	I_O=0 to 50mA V_{in}=4.5 to 20V		1 2	±10 10	µA µA
V_n	Output Noise Voltage	f=10Hz to 10KHz		65		µV rms
$\Delta V_{in}/\Delta V_O$	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
$\Delta V_O/\Delta T$	Average Temperature Coefficient of V_O	I_O=5.0mA T_j=-55 to 125°C		0.275	0.700	mV/°C

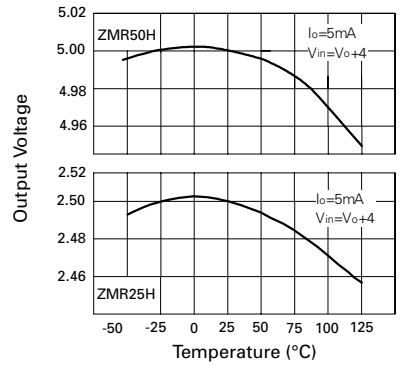
ZMR SERIES

ZMR500
ELECTRICAL CHARACTERISTICS
TEST CONDITIONS (Unless otherwise stated):T_j=25°C, I_O=10mA, V_{in}=10V

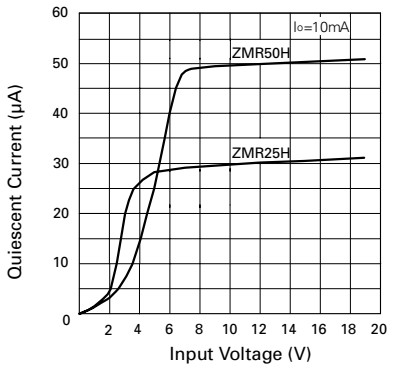
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
V_O	Output Voltage		4.875	5	5.125	V
		I_O=0 to 50mA T_j=-55 to 125°C	4.780		5.160	V
		V_{in}=7 to 20V I_O=0 to 50mA T_j=-55 to 125°C	4.780		5.175	V
ΔV_O	Line Regulation	V_{in}=7 to 20V		5	15	mV
ΔV_O	Load Regulation	I_O=0 to 50mA I_O=0 to 10mA		25 15	40	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=10Hz to 10KHz		90		µV rms
$\Delta V_{in}/\Delta V_O$	Ripple Rejection	V_{in}=8 to 18V f=120Hz	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=5.0mA T_j=-55 to 125°C		0.275	0.700	mV/°C

ZMR SERIES

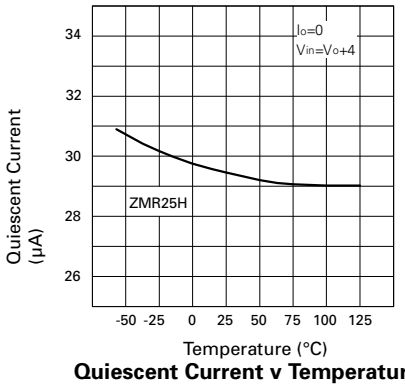
TYPICAL CHARACTERISTICS



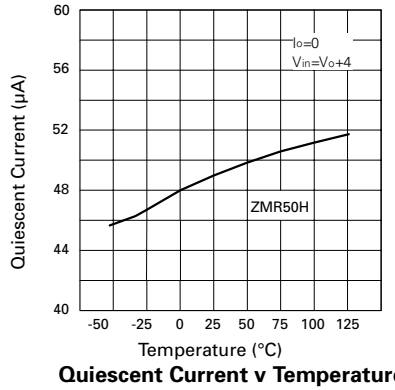
Output Voltage Temperature



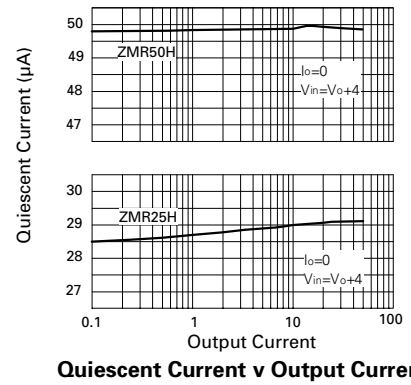
Quiescent Current v Voltage



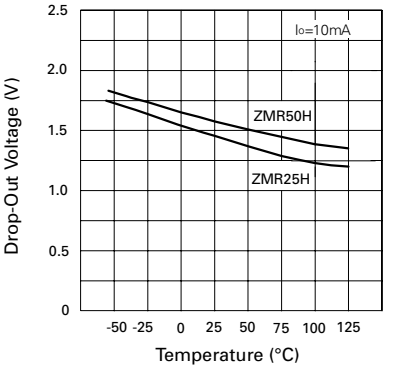
Quiescent Current v Temperature



Quiescent Current v Temperature



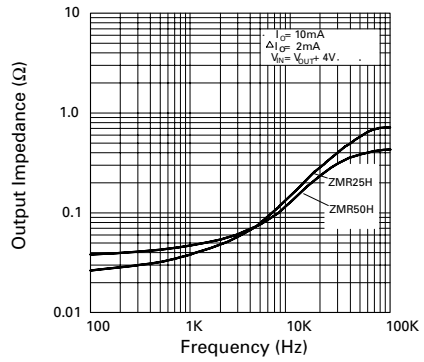
Quiescent Current v Output Current



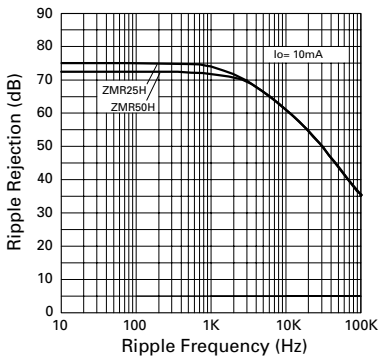
Drop-Out Voltage v Temperature

ZMR SERIES

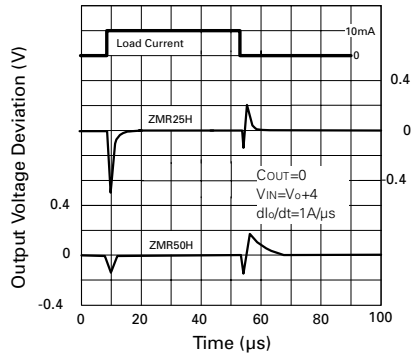
TYPICAL CHARACTERISTICS



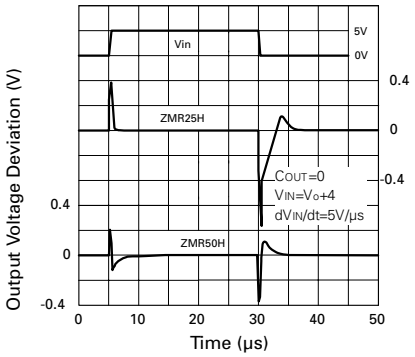
Output Impedance v Frequency



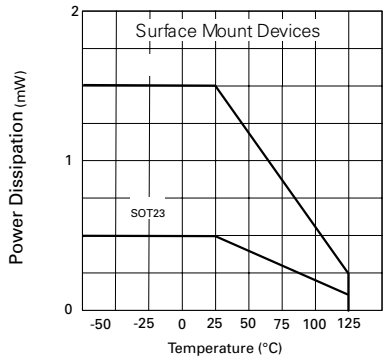
Ripple Rejection v Ripple Frequency



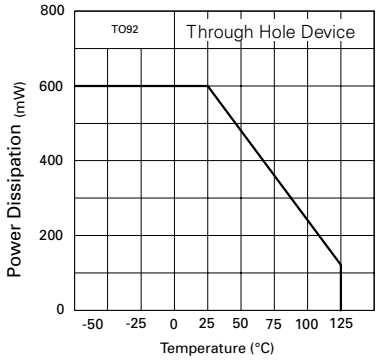
Load Transient Response



Line Transient Response

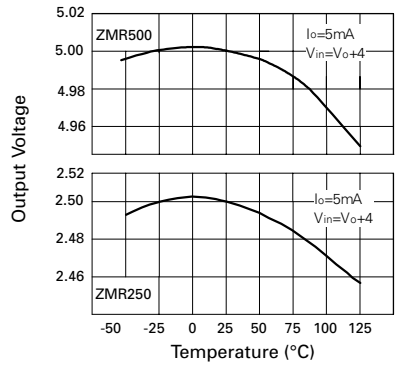


Power Derating

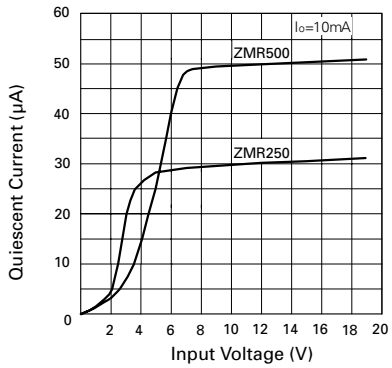


Power Derating

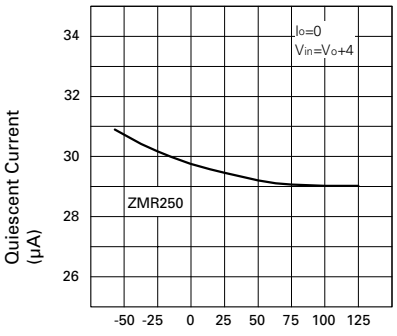
TYPICAL CHARACTERISTICS



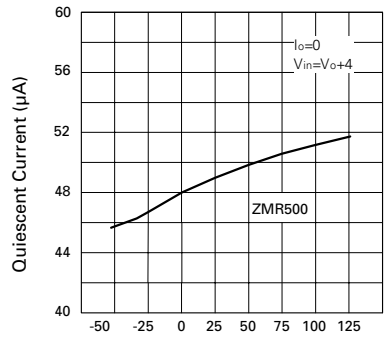
Output Voltage Temperature



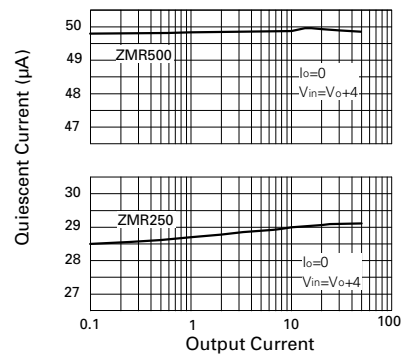
Quiescent Current v Voltage



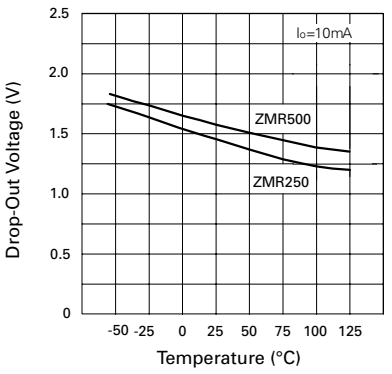
Quiescent Current v Temperature



Quiescent Current v Temperature



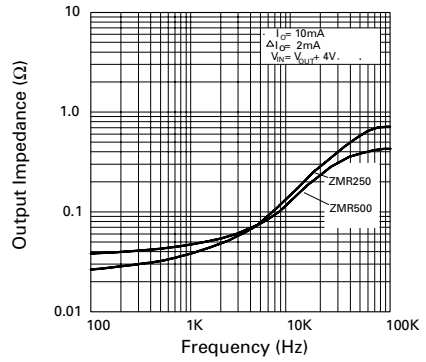
Quiescent Current v Output Current



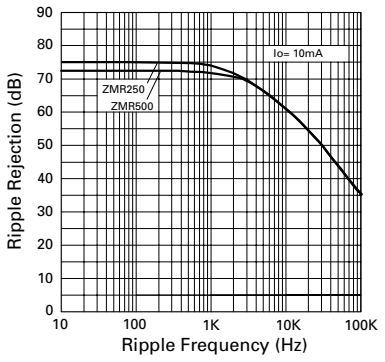
Drop-Out Voltage v Temperature

ZMR SERIES

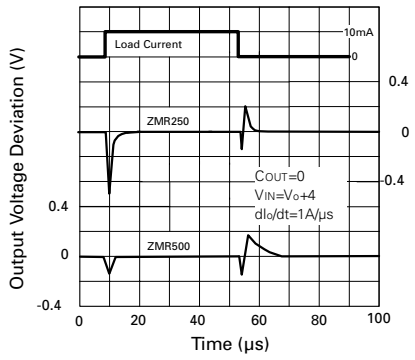
TYPICAL CHARACTERISTICS



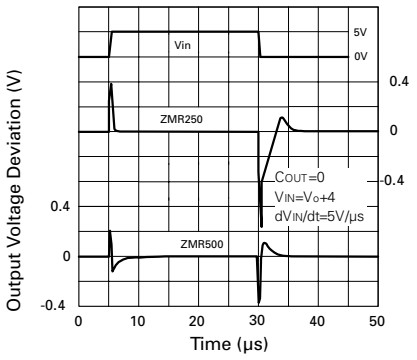
Output Impedance v Frequency



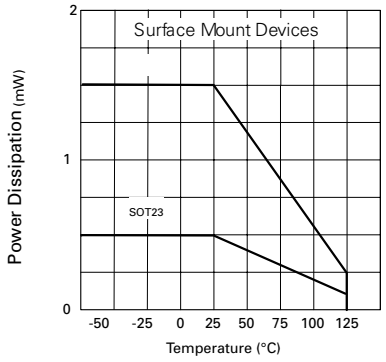
Ripple Rejection v Ripple Frequency



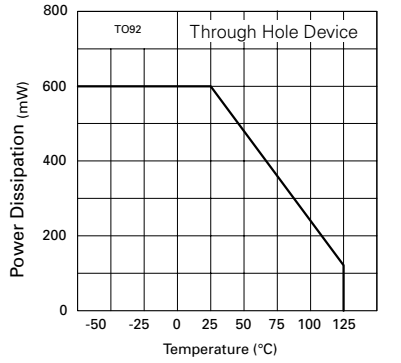
Load Transient Response



Line Transient Response



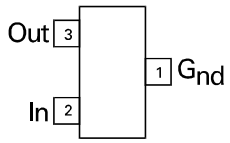
Power Derating



Power Derating

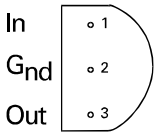
CONNECTION DIAGRAMS

SOT23 Package Suffix – F



Top View

TO92 Package Suffix – C



Bottom View

ORDERING INFORMATION

Part Number	Package	Part Mark
ZMR250C	TO92	ZMR250
ZMR250F	SOT23	25K
ZMR25HC	T092	ZMR25H
ZMR25HF	SOT23	25X
ZMR500C	TO92	ZMR500
ZMR500F	SOT23	50K
ZMR50HC	TO92	ZMR50H
ZMR50HF	SOT23	5OR

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