

ZR431

ABSOLUTE MAXIMUM RATING

Cathode Voltage (V _Z)	20V	Power Dissipation (T_{amb}=25°C, T_{Jmax}=150°C)	
Cathode Current	150mA	SOT23	330mW
Operating Temperature	-40 to 85°C	TO92	780mW
Storage Temperature	-55 to 125°C	SOT223	2W

Recommended Operating Conditions

	Min	Max
Cathode Voltage	V _{ref}	20V
Cathode Current	50μA	100mA

ELECTRICAL CHARACTERISTICS TEST CONDITIONS (Unless otherwise stated): T_{amb}=25°C

PARAMETER	SYMBOL	VALUE			UNITS	CONDITIONS
		MIN	TYP	MAX		
Reference Voltage	V _{ref}	2.45	2.50	2.55	V	I _L =10mA (Fig1), V _Z =V _{ref}
		2.475	2.50	2.525		
		2.487	2.50	2.513		
Deviation of Reference Input Voltage over Temperature	V _{dev}		8.0	17	mV	I _L =10mA, V _Z =V _{ref} T _a =full range (Fig1)
Ratio of the change in Reference Voltage to the Change in Cathode Voltage	$\frac{\Delta V_{ref}}{\Delta V_Z}$		-1.85	-2.7	mV/V	V _Z from V _{ref} to 10V I _Z =10mA (Fig2)
			-1.0	-2.0	mV/V	V _Z from 10V to 20V I _Z =10mA (Fig2)
Reference Input Current	I _{ref}		0.12	1.0	μA	R1=10k, R2=O/C, I _L =10mA (Fig2)
Deviation of Reference Input Current over Temperature	ΔI _{ref}		0.04	0.2	μA	R1=10k, R2=O/C, I _L =10mA T _a =full range (Fig2)
Minimum Cathode Current for Regulation	I _{Zmin}		35	50	μA	V _Z =V _{ref} (Fig1)
Off-state Current	I _{Zoff}			0.1	μA	V _Z =20V, V _{ref} =0V (Fig3)
Dynamic Output Impedance	R _Z			0.75	Ω	V _Z =V _{ref} (Fig1), f=0Hz

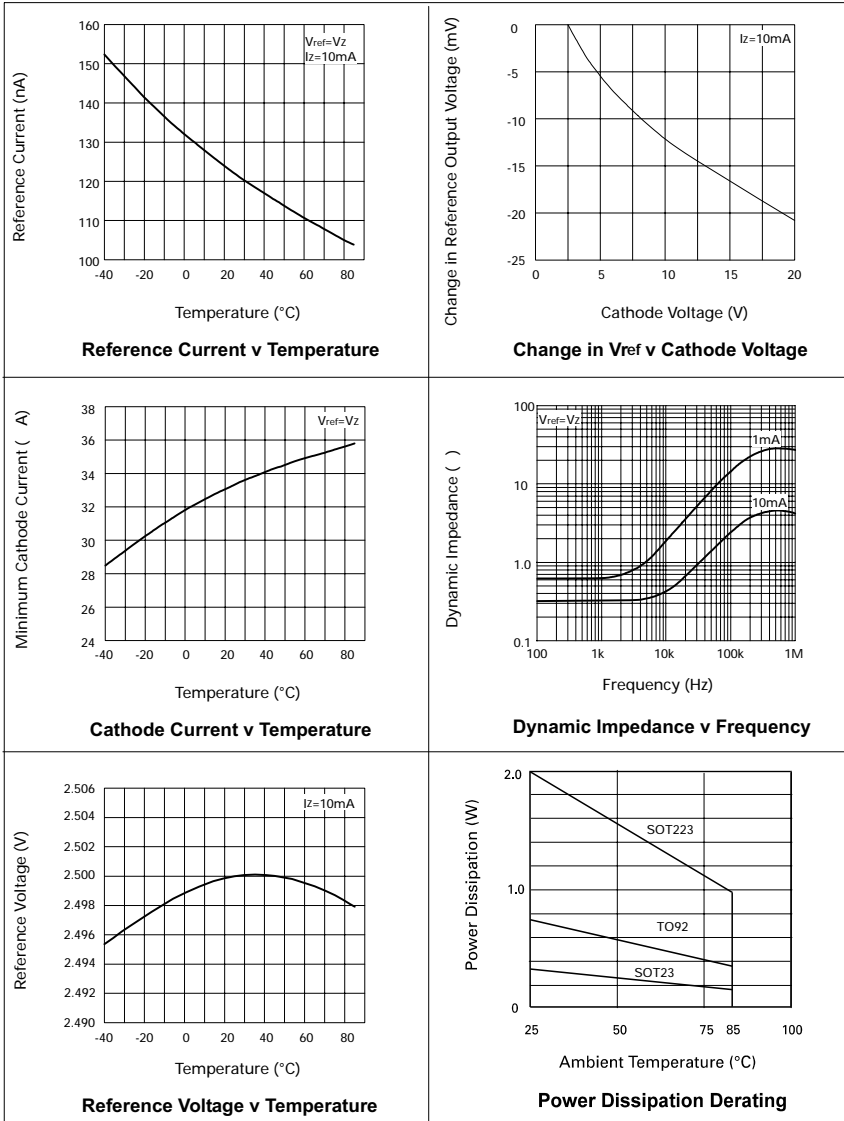
⁽¹⁾ 0.5% SOT23 only.

For definitions of reference voltage temperature coefficient and dynamic output impedance see NOTES following DC TEST CIRCUITS



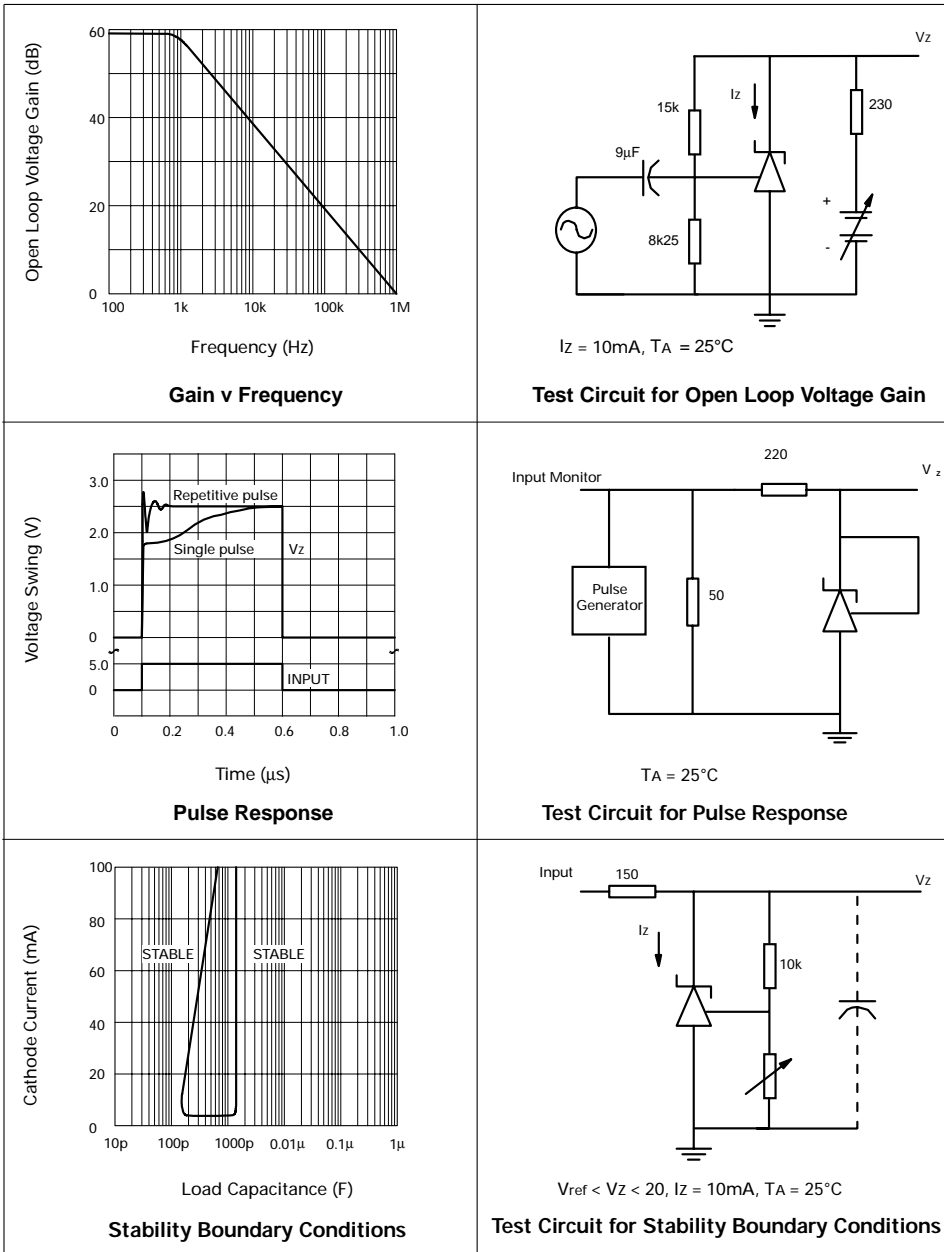
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TYPICAL CHARACTERISTICS



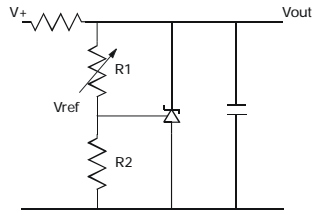
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TYPICAL CHARACTERISTICS



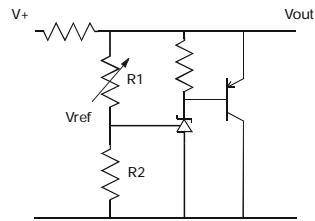
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APPLICATION CIRCUITS



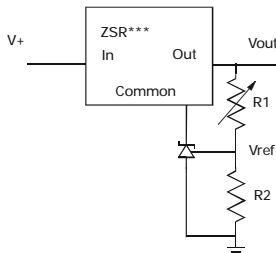
$$V_{out} = \left(1 + \frac{R1}{R2}\right) V_{ref}$$

SHUNT REGULATOR



$$V_{out} = \left(1 + \frac{R1}{R2}\right) V_{ref}$$

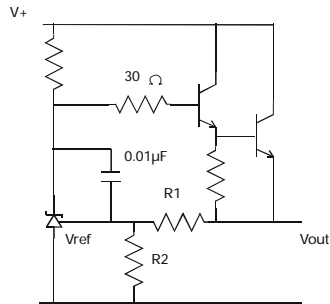
HIGHER CURRENT SHUNT REGULATOR



$$V_{out,MIN} = V_{ref} + V_{reg}$$

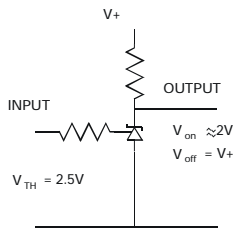
$$V_{out} = \left(1 + \frac{R1}{R2}\right) V_{ref}$$

OUTPUT CONTROL OF A THREE TERMINAL FIXED REGULATOR

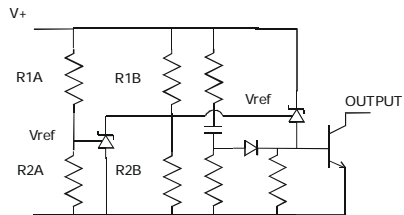


$$V_{out} = \left(1 + \frac{R1}{R2}\right) V_{ref}$$

SERIES REGULATOR



SINGLE SUPPLY COMPARATOR WITH TEMPERATURE COMPENSATED THRESHOLD



$$\text{Low limit} = \left(1 + \frac{R1B}{R2B}\right) V_{ref}$$

$$\text{High limit} = \left(1 + \frac{R1A}{R2A}\right) V_{ref}$$

OVER VOLTAGE / UNDER VOLTAGE PROTECTION CIRCUIT

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DC TEST CIRCUITS

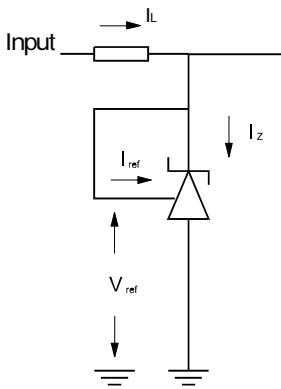


Fig 1 - Test Circuit for $V_z = V_{ref}$

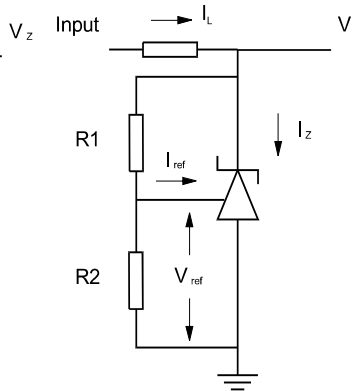


Fig 2 - Test Circuit for $V_z > V_{ref}$

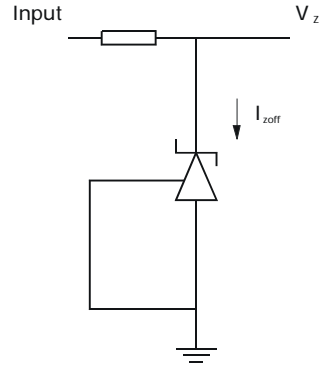
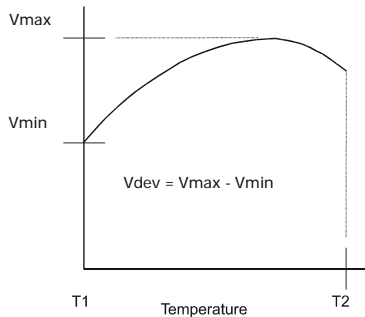


Fig 3 - Test Circuit for Off State current

NOTES

Deviation of reference input voltage, V_{dev} , is defined as the maximum variation of the reference input voltage over the full temperature range.

The average temperature coefficient of the reference input voltage, V_{ref} is defined as:



$$V_{ref} (ppm/^{\circ}C) = \frac{V_{dev} \times 1000000}{V_{ref} (T1 - T2)}$$

The dynamic output impedance, R_z , is defined as:

$$R_z = \frac{\Delta V_z}{\Delta I_z}$$

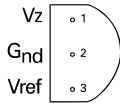
When the device is programmed with two external resistors, R_1 and R_2 , (fig 2), the dynamic output impedance of the overall circuit, R' , is defined as:

$$R' = R_z \left(1 + \frac{R_1}{R_2}\right)$$

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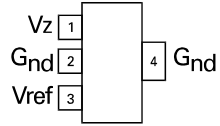
CONNECTION DIAGRAMS

TO92 Package Suffix - C



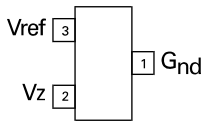
Bottom View

SOT223 Package Suffix - G



Top View -
Pin 4 floating or connected to pin 2

SOT23 Package Suffix - F



Top View

ORDERING INFORMATION

Part Number	Package	Tol. %	Part Mark
ZR431C01	TO92	1.0	ZR43101
ZR431C	TO92	2.0	ZR431
ZR431G01	SOT223	1.0	ZR43101
ZR431G	SOT223	2.0	ZR431
ZR431F005	SOT23	0.5	43R
ZR431F01	SOT23	1.0	43B
ZR431F	SOT23	2.0	43A