

Adjustable Precision Shunt Regulator

Features

- Precise Reference Voltage to 2.505V
- Guaranteed 0.5%, 1% and 2% Reference Voltage Tolerance
- Sink Current Capability, 1mA to 100mA
- Quick Turn-on
- Adjustable Output Voltage, $V_o = V_{ref}$ to 20V
- Low Operational Cathode Current, 150 μ A Typical
- 0.1 Ω Typical Output Impedance
- SOT-89, TO-92 and SOT-23 Packages

This device has a typical output impedance of 0.1 Ω . Active output circuitry provides a very sharp turn-on characteristic, making the WSL431 excellent replacements for zener diodes in many applications, including on-board Regulation and adjustable power supplies.

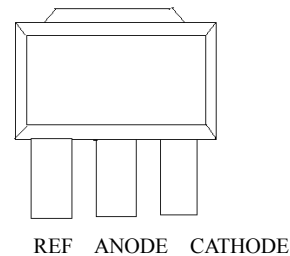
Applications

- Linear Regulators
- Adjustable Power Supply
- Switching Power Supply

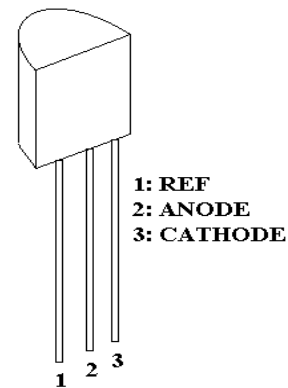
General Description

The WSL431 is a 3 terminal adjustable voltage reference with specified thermal stability over applicable commercial temperature ranges. Output voltage may be set to any value between V_{ref} (2.505V) and 20V with two external resistors (see Figure 2).

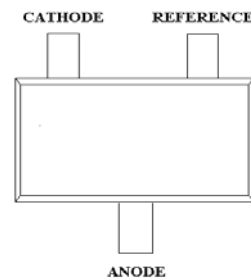
When used with a photocoupler, the WSL431 is an ideal voltage reference in isolated feedback circuits for 2.505V to 12V switching-mode power supplies.



SOT-89 (Top View)



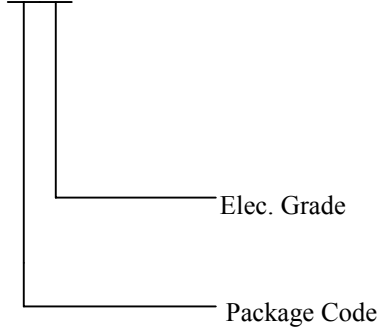
TO-92



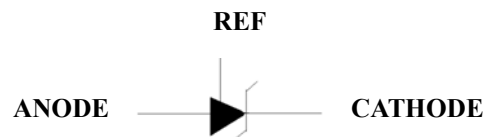
SOT-23 (Top View)

Winson reserves the right to make changes to improve reliability or manufacturability.

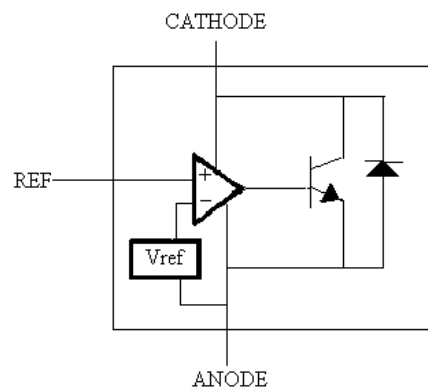
Ordering Information

<p>WSL431-XP□□</p> 	<p>Elec. Grad 2: 0.5% Reference Voltage Tolerance 3: 1% Reference Voltage Tolerance 4: 2% Reference Voltage Tolerance</p> <p>Package Code A: TO-92 C: SOT-23 N: SOT-89</p>
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Symbol



Functional Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{KA}	Cathode voltage	26	V
I_K	Continuous cathode current range	150	mA
I_{ref}	Reference current range	3	mA
T_A	Ambient temperature range	0 to 85	°C
T_J	Junction temperature range	0 to 125	°C
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_{SO}	Lead temperature range, T_s (Soldering, 10sec)	260	°C

Electrical Characteristics $T_A = 25^\circ\text{C}$ (unless otherwise noted)

Symbol	Parameter	Test Conditions	WSL431			Unit
			Min.	Typ.	Max.	
V_{ref}	$V_{KA}=V_{ref}$, $I_K=10\text{mA}$.	WSL431B	2.4925	2.505	2.5175	
		WSL431C	2.480	2.505	2.530	
		WSL431D	2.455	2.505	2.555	
$\Delta V_{ref}/T$	Reference Voltage Drift over Temp. range	$T_A=0$ to 85°C^{*1} , $I_K=10\text{mA}$.		4	20	mV
$\Delta V_{ref}/\Delta V_{KA}$	Voltage Ration (open loop gain)	$I_K=10\text{ mA}$, $V_{KA}=V_{ref}$ to $20V^{*2}$	- 4	- 1.6		mV/V
I_{ref}	Reference Current	$I_K=10\text{mA}$, $R_1=10K\Omega$, $R_2=\text{open}^{*2}$		0.4	3.5	μA
$\Delta I_{ref}/T$	Reference Current Drift	$I_K=10\text{ mA}$, $R_1=10K\Omega$, $R_2=\text{open}$, $T_A=0$ to 85°C^{*2}		0.4	1.2	μA
$I_{K(\min)}$	Min. Cathode Current	$V_{KA}=V_{ref}^{*1}$		0.15	0.4	mA
$I_{K(\text{off})}$	Off-state Cathode Current	$V_{KA}=20V$, $V_{ref}=0V^{*3}$		0.1	1	μA
Z_{KA}	Dynamic Impedance	$V_{KA}=V_{ref}$, $I_K=1\text{ mA}$ to 100mA , $f=1k\text{ Hz}^{*1}$	-0.4	-0.1		Ω

Notes: *1: use Figure 1
 *2: use Figure 2
 *3: use Figure 3

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Test figures

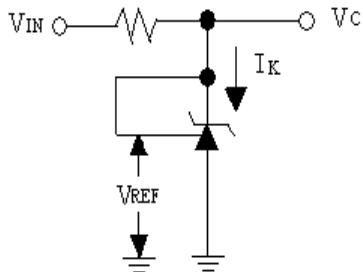


Figure 1. Test Circuit for $V_{KA}=V_{REF}$
 $V_O=V_{KA}=V_{REF}$

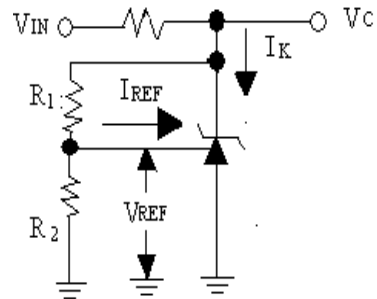


Figure 2. Test Circuit for $V_{KA}<V_{REF}$,
 $V_O=V_{KA}=V_{REF} \times (1+R_1/R_2)+I_{REF} \times R_1$

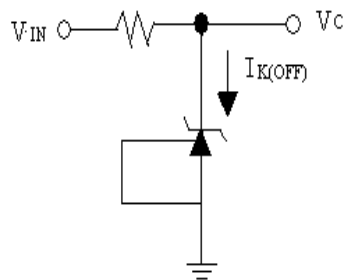
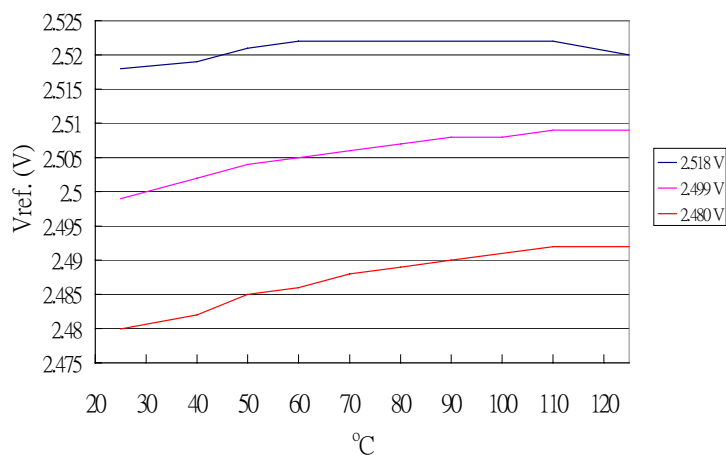


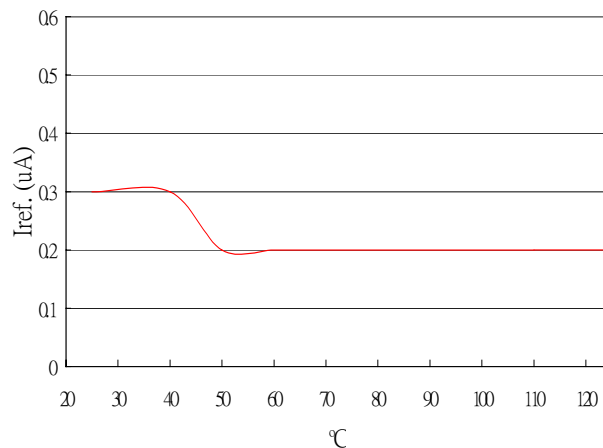
Figure 3. Test Circuit for $I_{K(off)}$

TYPICAL CHARACTERISTICS

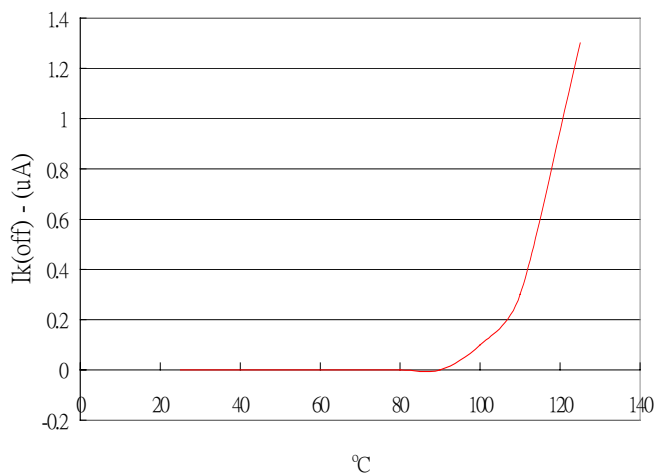
V_{ref} vs Free-Air Temperature



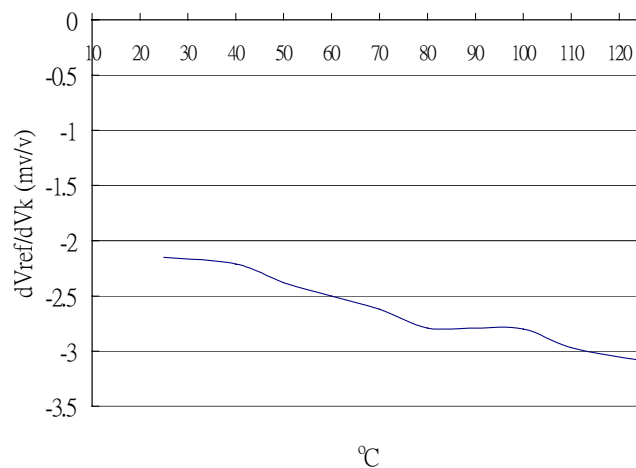
I_{ref} vs Free-Air Temperature



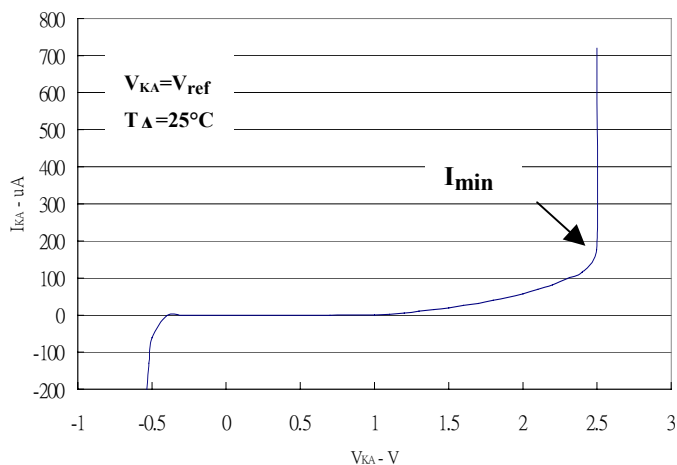
I_{k(off)} vs Free-Air Temperature



Ratio of Delta V_{ref} to Delta V_k vs Temperature



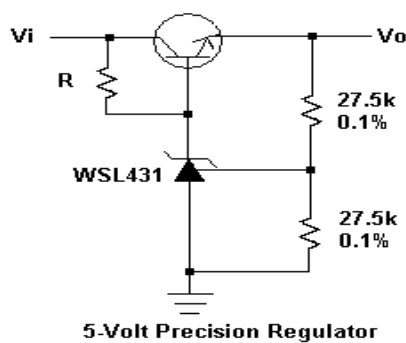
Cathode Current vs Cathode Voltage



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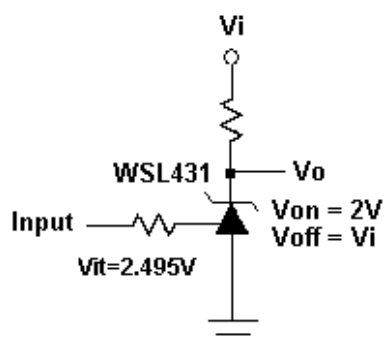
Application schematic

5-Volt Precision Regulator



*R_b should provide cathode current large than 0.4mA to maintain WSL431 work properly.

Figure 4.



Single-Supply Comparator with Temperature-Compensated Threshold

Figure 5.

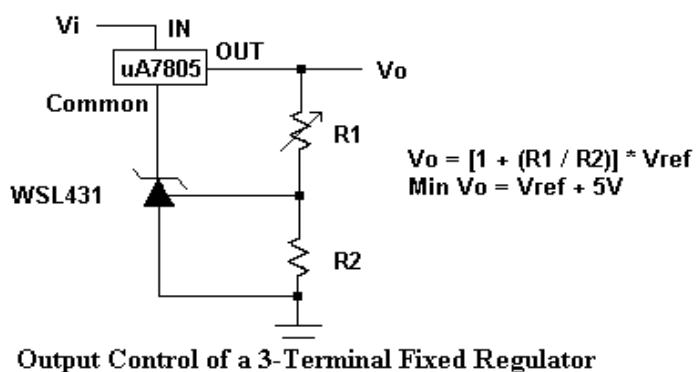


Figure 6.

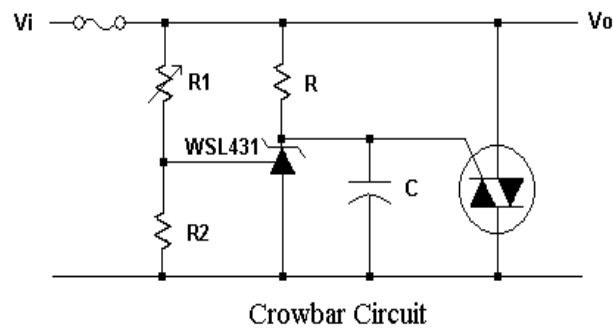


Figure 7.

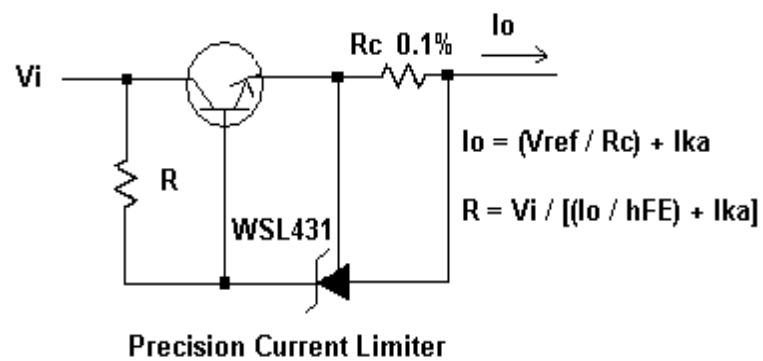


Figure 8.

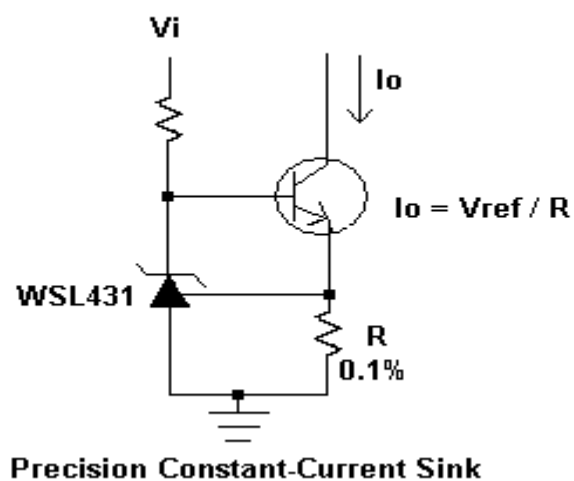


Figure 9.