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, $Vo = V_{ref}$ to 20V
- Low Operational Cathode Current, 150μA Typical
- 0.1Ω Typical Output Impedance
- SOT-89 , TO-92 and SOT-23 Packages

Applications

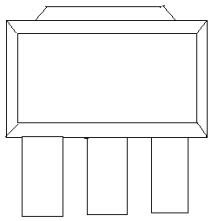
- Linear Regulators
- Adjustable Power Supply
- Switching Power Supply

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 Vref (2.505V) and 20V with two external resistors (see Figure 2).

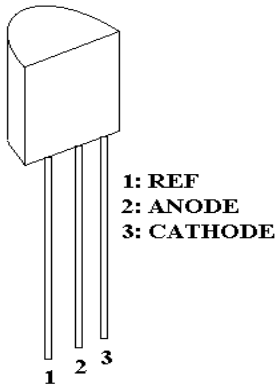
When used with a photocoupler, the WSL431 is an ideal voltage reference in isolated feedback circuits for 2.505V to 12V switching-mode power supplies.

This device has a typical output impedance of o.1Ω. 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.

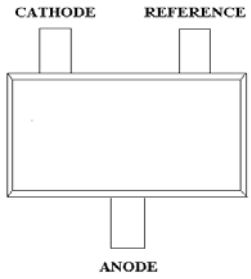


REF ANODE CATHODE

SOT-89 (Top View)



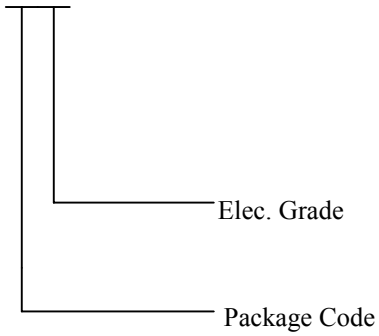
TO-92



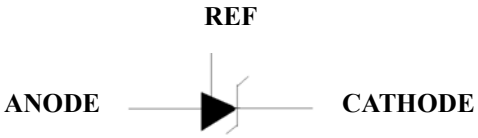
SOT-23 (Top View)

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

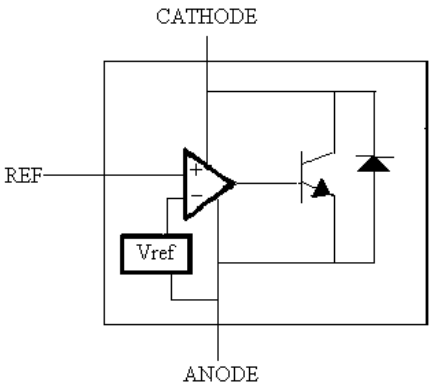
Ordering Information

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

Symbol



Functional Diagram



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Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{KA}	Cathode voltage	26	V
I_K	Continuous cathode current range	150	mA
Iref	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˚C (unless otherwise noted)

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

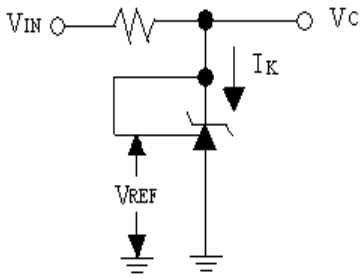


Figure 1. Test Circuit for $V_{KA}=V_{REF}$
$V_O=V_{KA}=V_{REF}$

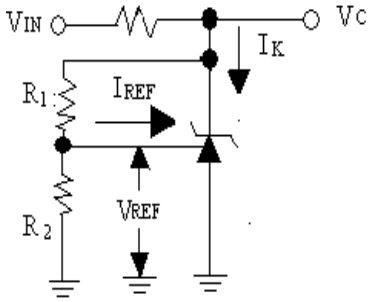


Figure 2. Test Circuit for $V_{KA}<V_{REF}$,
$V_O=V_{KA}=V_{REF}\times(1+R_1/R_2)+I_{REF}\times R_1$

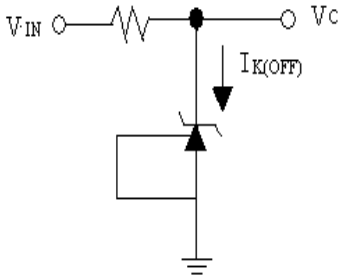
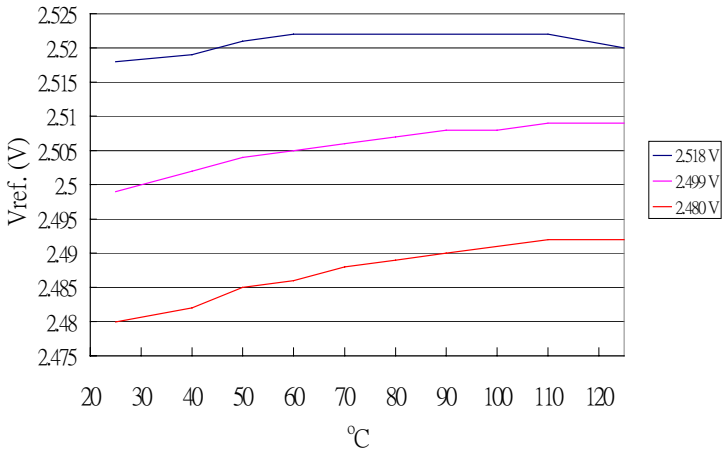


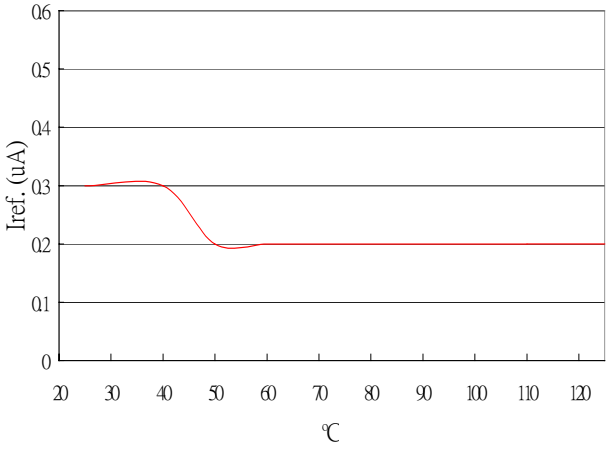
Figure 3. Test Circuit for $I_{k(off)}$

TYPICAL CHARACTERISTICS

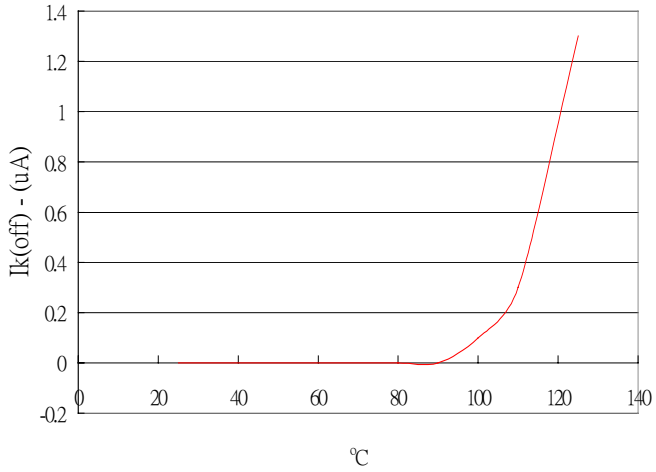
Vref. vs Free-Air Temperature



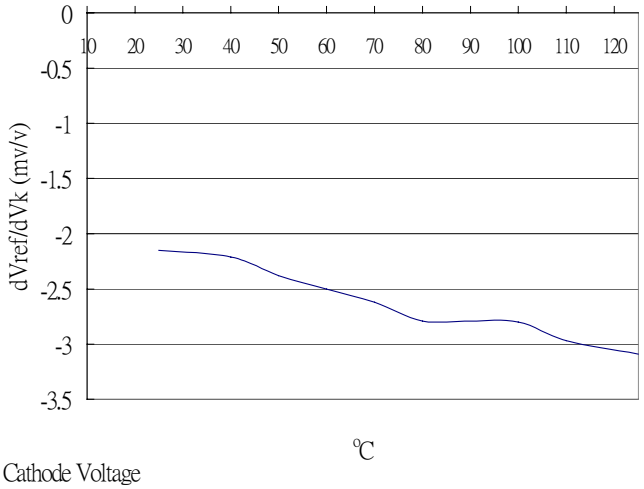
Iref vs Free-Air Temperature



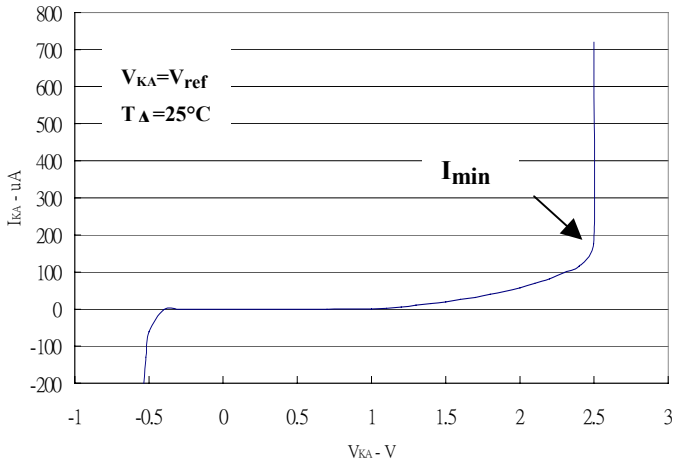
Ik(off) vs Free-Air Temperature



Ratio of Delta Vref to Delta Vk vs Temperature



Cathode Current vs Cathode Voltage



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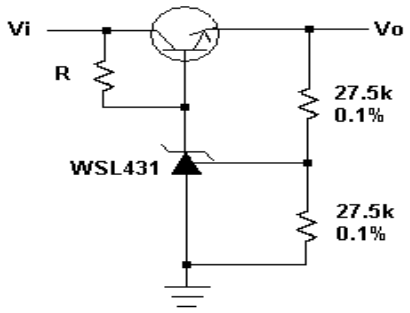
Application schematic

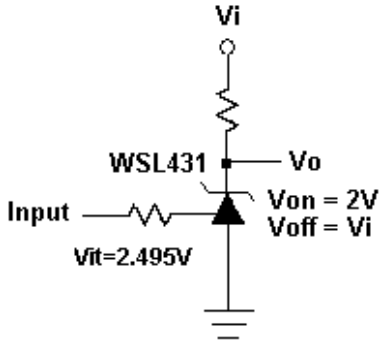
5-Volt Precision Regulator



5-Volt Precision Regulator

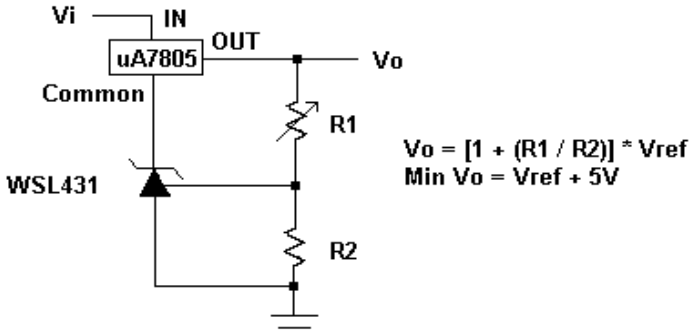
*R_b should provide cathode current large than 0.4mA to maintain WSL431work properly.

Figure 4.



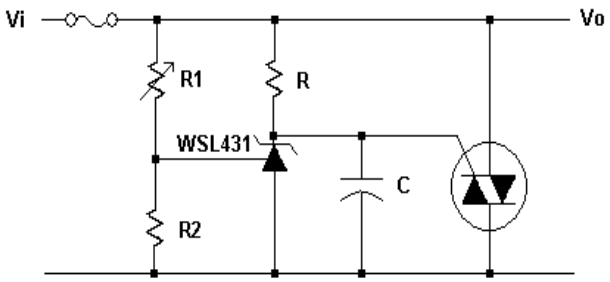
Single-Supply Comparator with Temperature-Compensated Threshold

Figure 5.



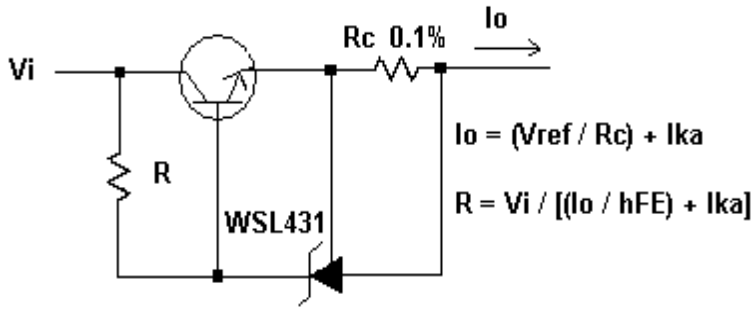
Output Control of a 3-Terminal Fixed Regulator

Figure 6.



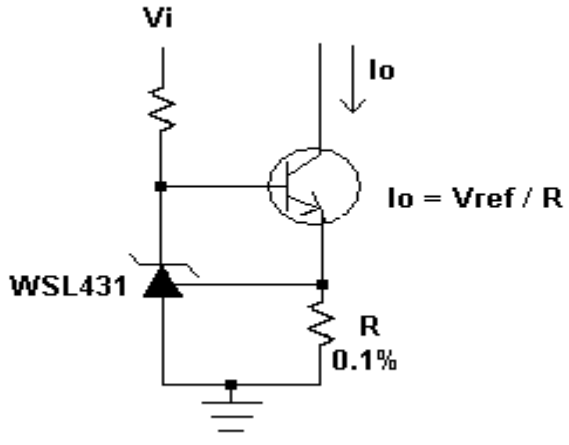
Crowbar Circuit

Figure 7.



Precision Current Limiter

Figure 8.



Precision Constant-Current Sink

Figure 9.