

L5431

# High-Precision Variable Shunt Voltage Regulator

## Overview

The L5431 is a high-precision variable shunt voltage regulator IC whose output voltage can be set to a value from approximately 2.5V to 36V by using external resistors. Because of low output resistance and fast pulse response, the L5431 can be most suitably used as high-precision voltage reference, high-speed comparator, or zener diode.

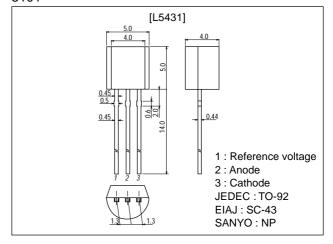
## **Features**

- Excellent temperature characteristic of Vref : 50ppm/°C (typ)
- Output voltage settable : Approximately 2.5V to 36V.
- Output flow-in current range: 1mA to 100mA
- Low dynamic resistance :  $0.15\Omega$  (typ)
- Fast response.
- Low output noise voltage.
- Small-sized TO-92.

## **Package Dimensions**

unit:mm

3101



## **Specifications**

#### **Maximum Ratings** at $Ta = 25^{\circ}C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Voltage Applied across Cathode and Anode	V <sub>KA</sub> max	Referenced to anode	37	V
Cathode Current	I <sub>K</sub> max		-100 to +150	mA
Reference Voltage Pin Input Current	Iref		-0.05 to +10	mA
Allowable Power Dissipation	Pd max	Ta≤25°C	750	mW
Operating Temperature	Topr		-20 to +85	°C
Storage Temperature	Tstg		-65 to +150	°C

#### **Recommended Operating Conditions** at $Ta = 25^{\circ}C$

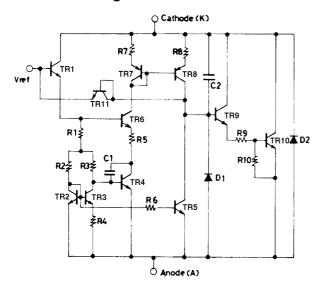
Parameter	Symbol	Conditions	Ratings	Unit
Voltage Applied across Cathode and Anode	V <sub>KA</sub>		Vref to 36	V
Cathode Current	ΙK	Stabilized state	1 to 100	mA

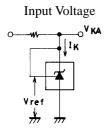
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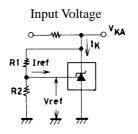
## **Electrical Characteristics** at Ta = 25°C

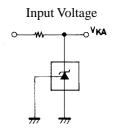
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	Offic
Reference Voltage	Vref	V <sub>KA</sub> =Vref, I <sub>K</sub> =10mA : Fig.1	2440	2495	2550	mV
Reference Voltage Change with Temperature (Note1)	ΔVref (Ta)	VKA=Vref, IK=10mA, Ta=0 to +70°C : Fig.1		8	17	mV
Vref Change Ratio to V <sub>KA</sub>	ΔVref ΔV <sub>KA</sub>	I <sub>K</sub> =10mA, ΔV <sub>KA</sub> =10V to Vref : Fig.2		-1.4	-2.7	mV/V
		$I_{K}$ =10mA, $\Delta V_{KA}$ =36V to 10V : Fig.2		-1.0	-2.0	mV/V
Reference Voltage Pin Input Current Change with Temperature (Note1)	∆Iref (Ta)	$I_{KA}$ =10mA, R1=10kΩ, R2=∞, Ta=0 to +70°C : Fig.2		2	4	μΑ
Minimum Cathode Current	IKMIN	V <sub>KA</sub> =Vref, regulation availabe : Fig1		0.4	1	mA
OFF-Stage Cathode Current	I <sub>Koff</sub>	V <sub>KA</sub> =36V, Vref=0 : Fig.3		0.1	1	μΑ
Dynamic Resistance (Note2)	Z <sub>KA</sub>	V <sub>KA</sub> =Vref, f≤1kHz, I <sub>K</sub> =1 to 100mA : Fig.1		0.15	0.5	Ω

## **Equivalent Circuit Diagram**

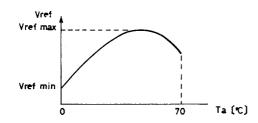






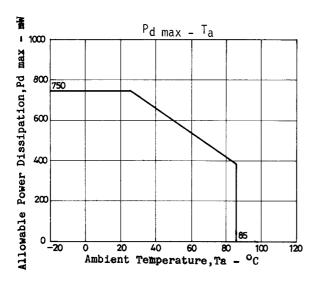


Note1 :  $\Delta Vref$  (Ta) is defined by using Vref max and Vref min as follows :  $\Delta Vref$  (Ta)=Vref max - Vref min



Note2: The dynamic resistance is defined as follows:

$$\mid \Delta Z_{KA} | = \frac{\Delta V_{KA}}{\Delta I_K}$$



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