GENERAL DESCRIPTION

The XRP431L is a three-terminal adjustable shunt voltage regulator providing a highly accurate bandgap reference.

The XRP431L acts as an open-loop error amplifier with a 1.24V temperature compensation reference. The XRP431L has thermal stability, wide operating current of 100mA and broad temperature range of -40°C to 125°C, making it suitable for a variety of applications which require a low-cost, high performance solution. The XRP431L tolerance of 0.5% is proven to be sufficient to overcome all other errors in the system to virtually eliminate the need for trimming in the power supply manufacturer's assembly line and contribute a significant cost savings. The output voltage may be adjusted to any value between V_{REF} and 18 volts with two external resistors.

The XRP431L is available in RoHS compliant, "green"/halogen free 5-pin SOT23 package.

APPLICATIONS

- **Charger**
- **Switching Power Supplies**
- **Graphic Cards**
- **Monitors, VCRs, TVs**

FEATURES

- **0.5% Precise Output Voltage**
  - Adjustable 1.24V to 18V
- **Wide Operating Current**
  - 0.1mA to 100mA
- **Low Temperature Coefficient at 20ppm/°C**
- **Extended Temperature Range**
  - -40°C to +125°C
- **RoHS Compliant "Green"/Halogen Free 5-pin SOT23 Package**

The Product (s) mentioned in this data sheet are no longer being manufactured and may not be ordered (OBS)

TYPICAL APPLICATION DIAGRAM

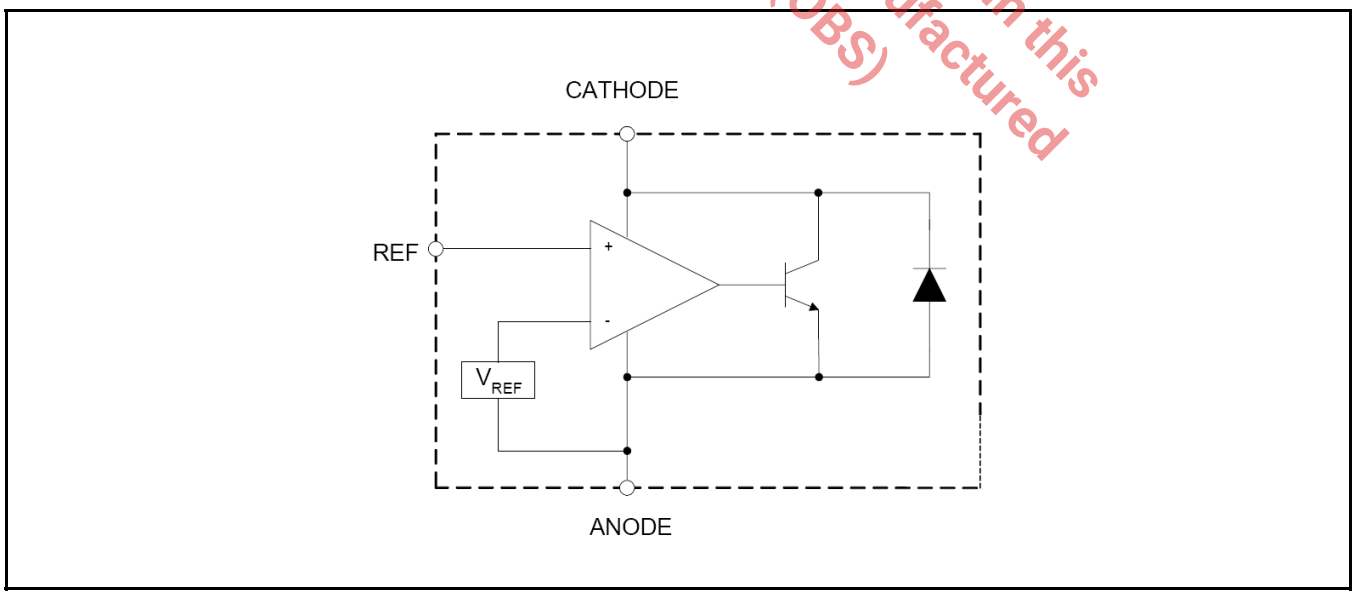

Fig. 1: XRP431L Application Diagram

ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

Cathode-Anode Voltage V_{KA} 20V
Operating Cathode Current (cont.) I_{KA} 100mA
Reference Input Current Range I_{REF} 10mA
Power Dissipation (Cont. 25°C) P_D 770mW
Junction Temperature ..... 150°C
Storage Temperature T_{STG} ..... -65°C to 150°C
ESD Rating (HBM - Human Body Model) 2kV

OPERATING RATINGS

Cathode-Anode Voltage V_{KA} ..... <18V
Operating Cathode Current (cont.) I_{KA} ..... <100mA
Ambient Temperature Range ..... -40°C to 125°C
Thermal Resistance θ_{JC} (SOT23-5) ..... 84.8°C/W

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ELECTRICAL SPECIFICATIONS

Specifications with standard type are for an Operating Ambient Temperature of T_A = 25°C only; limits applying over the full Operating Ambient Temperature range are denoted by a "•". Minimum and Maximum limits are guaranteed through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_A = 25°C, and are provided for reference purposes only.

Parameter	Min.	Typ.	Max.	Units		Conditions
Reference Voltage	1.234	1.240	1.246	V		Test circuit 1 $V_{KA}=V_{REF}$, I_{KA}=10mA
ΔV_{REF} with temperature T_C		2	10	mV		Test circuit 1 $V_{KA}=V_{REF}$, I_{KA}=10mA, 0°C ≤ T_A ≤ 70°C
		3	10	mV		Test circuit 1 $V_{KA}=V_{REF}$, I_{KA}=10mA, -40°C ≤ T_A ≤ 85°C
		4	15	mV	•	Test circuit 1 $V_{KA}=V_{REF}$, I_{KA}=10mA, -40°C ≤ T_A ≤ 125°C
Ratio of change in V_{REF} to Cathode Voltage ΔV_{REF} / ΔV_{KA}	-1.5	-0.5		mV/V		Test circuit 2 V_{REF} ≤ ΔV_{KA} ≤ 16V, I_{KA}=10mA
Reference Input Current I_{REF}		0.15	0.4	µA		Test circuit 2 I_{KA}=10mA, R1=10kΩ, R2=∞
I_{REF} Temperature Deviation ΔI_{REF}		0.1	0.4	µA	•	Test circuit 2 I_{KA}=10mA, R1=10kΩ, R2=∞
Minimum I_{KA} for Regulation $I_{KA(MIN)}$		55	80	µA		Test circuit 1 $V_{KA}=V_{REF}$
Off State Leakage $I_{KA(OFF)}$		40	100	nA		Test circuit 3 V_{KA}=18V, V_{REF}=0V
		10	50	nA		Test circuit 3 V_{KA}=6V, V_{REF}=0V
Dynamic Output Impedance Z_{KA}		0.05	0.15	Ω		Test circuit 1 $V_{KA}=V_{REF}$, f_Z≤1KHz, I_{KA}=1 to 100mA

BLOCK DIAGRAM

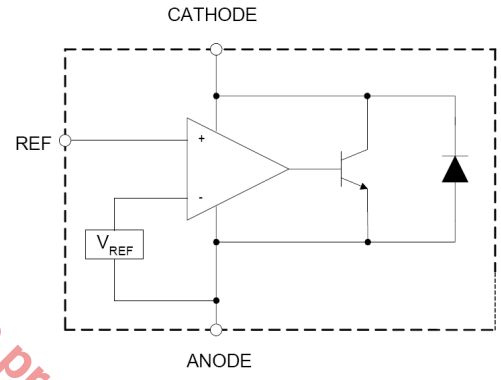

Fig. 2: XRP431L Block Diagram

PIN ASSIGNEMENT

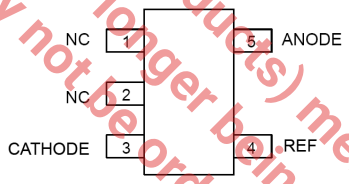

Fig. 3: XRP431L Pin Assignment

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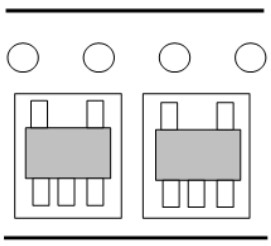
ORDERING INFORMATION

Part Number	Temperature Range	Marking	Package	Packing Quantity	Note 1	Note 2
XRP431LES5TRR3-F	-40°C≤T_A≤+125°C	GCWW	5-pin SOT23	3K/Tape & Reel	RoHS Compliant Halogen free	

"WW" = Work Week

Note that the XRP431L series is packaged in Tape and Reel with a reverse part orientation as per the following diagram



TYPICAL PERFORMANCE CHARACTERISTICS

All data taken at T_A = 25°C, unless otherwise specified - Schematic and BOM from Application Information section of this datasheet.

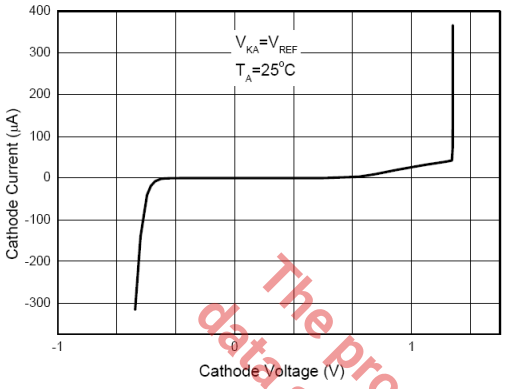


Fig. 4: Cathode Current vs Cathode Voltage

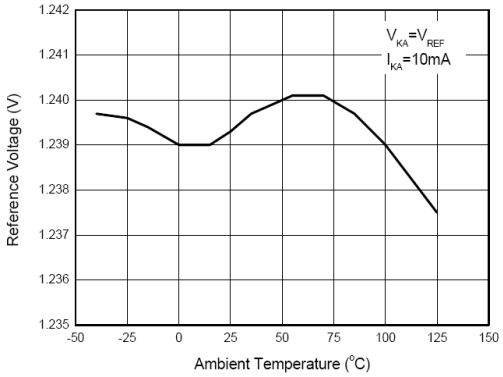


Fig. 5: Reference Voltage vs Ambient Temperature

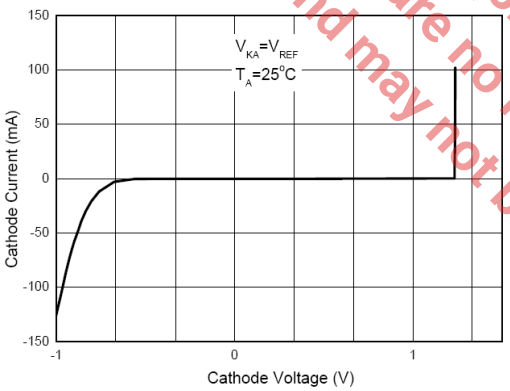


Fig. 6: Low Current Operating Characteristics

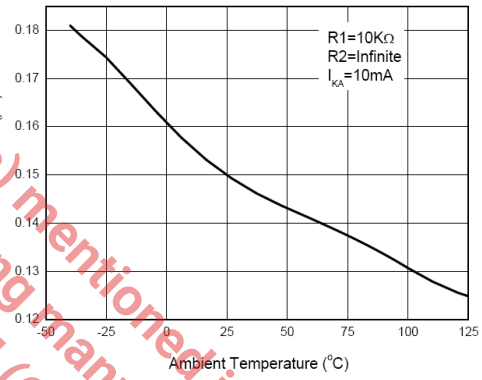


Fig. 7: Reference Input Current vs Ambient Temperature

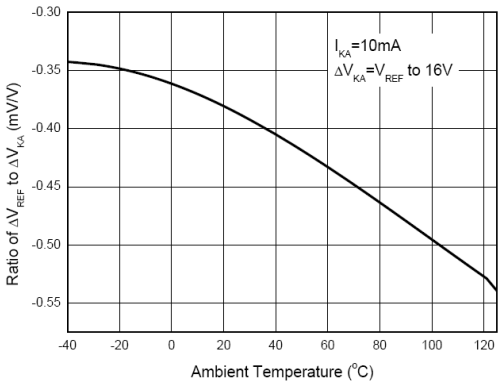


Fig. 8: ΔReference Voltage to ΔCathode Voltage Ratio

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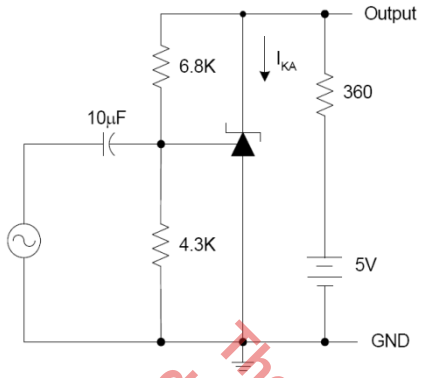

Fig. 9: Test Circuit for Gain vs Frequency Response

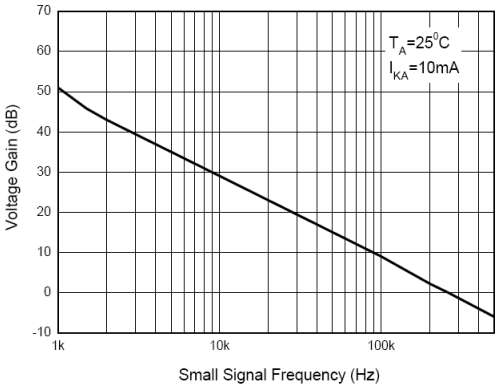

Fig. 10: Small Signal Gain vs Frequency

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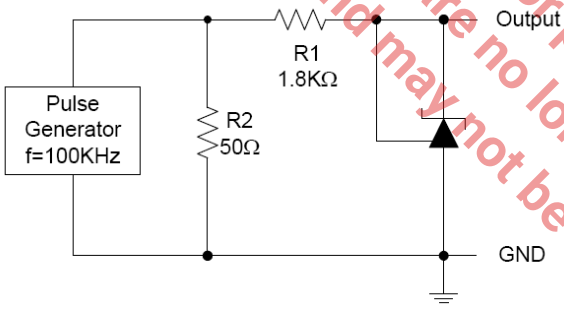


Fig. 11: Test Circuit for Pulse Response

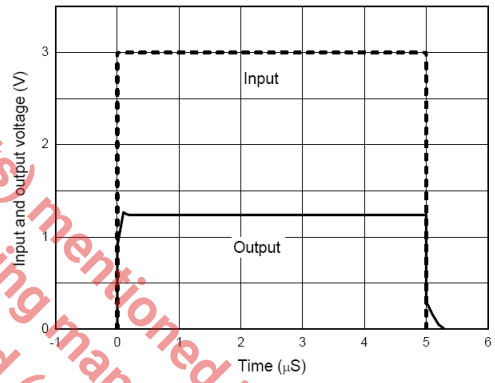


Fig. 12: Pulse Response

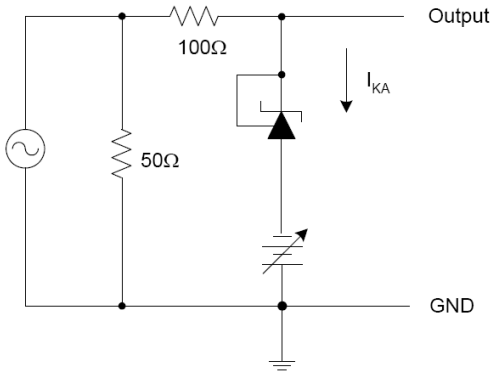


Fig. 13: Test Circuit for Dynamic Output Impedance

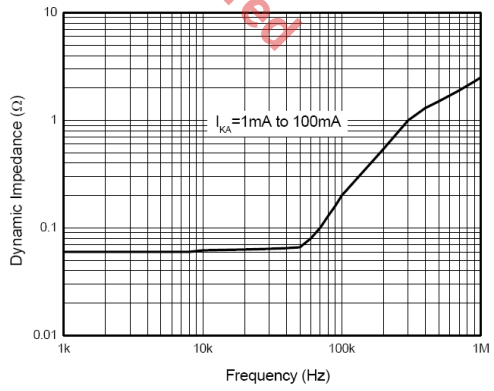
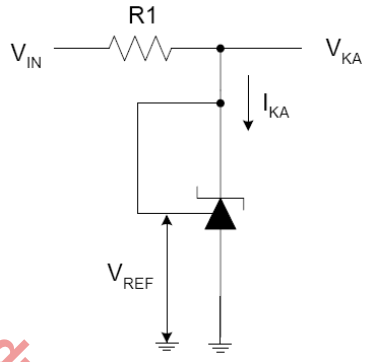


Fig. 14: Dynamic Output Impedance

TEST CIRCUITS

TEST CIRCUIT 1

Test circuit for $V_{KA}=V_{REF}$



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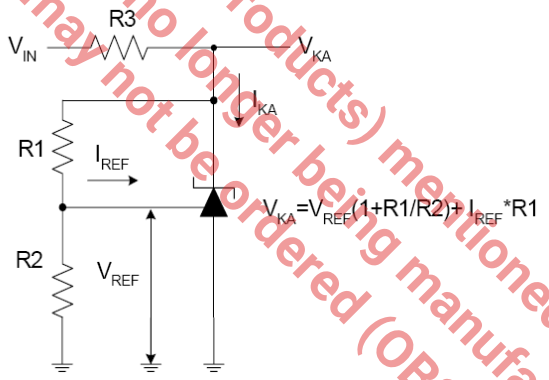
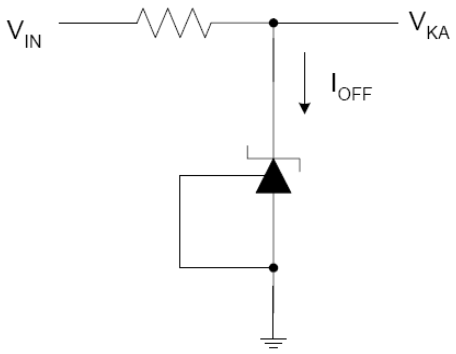
TEST CIRCUIT 2

Test circuit for $V_{KA} > V_{REF}$



TEST CIRCUIT 3

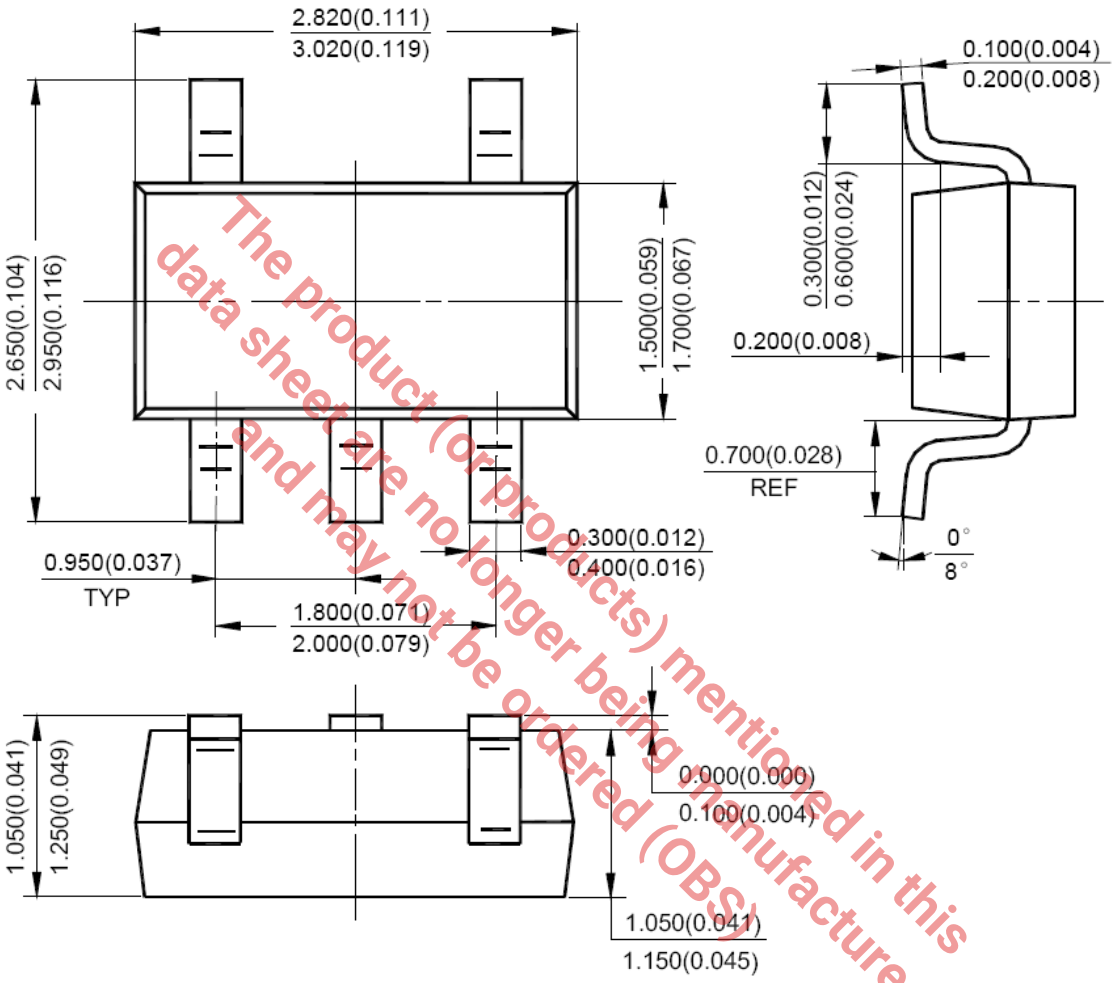
Test circuit for I_{KOFF}



PACKAGE SPECIFICATION

5-PIN SOT23

Unit: mm (inch)



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REVISION HISTORY

Revision	Date	Description
1.0.0	10/02/2009	Initial release of datasheet
1.1.0	03/24/2010	Modified part number to reflect RoHS compliant, "green'/halogen free compliance.
1.2.0	09/16/2010	Modified part number to reflect reverse part orientation in tape & reel and 3K/reel.

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