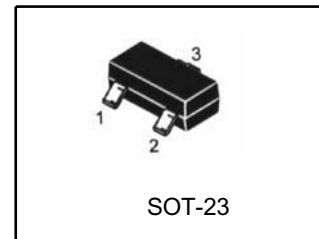


## Programmable Precision Reference

# LR431AKLT1G

### DESCRIPTION

The LR431 is a three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between  $V_{ref}$  (approximately 2.5V) and 36V with two external resistors. It provides very wide applications, including shunt regulator, series regulator, switching regulator, voltage reference and others.

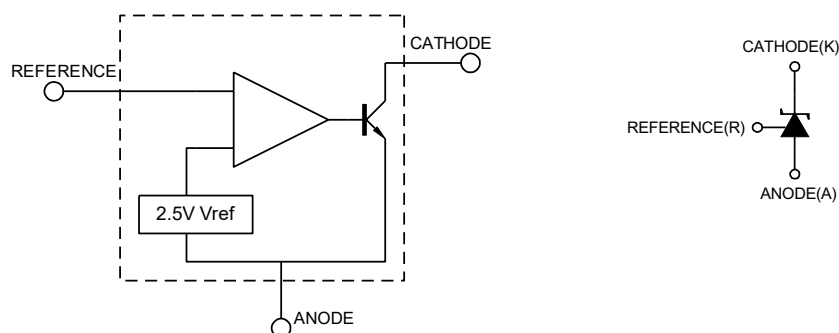


SOT-23 1: Ref; 2: Cathode; 3: Anode

### FEATURES

- Low Dynamic output impedance 0.1 $\Omega$  (Typ)
- Adjustable output voltage
- Fast turn-on response
- Sink current capability of 0.1mA to 100mA
- Low output noise
- Industrial temperature range
- Excellent temperature coefficient 25ppm/ $^{\circ}$ C
- Electrostatic discharge voltage 2.5kV

### BLOCK DIAGRAM



**ABSOLUTE MAXIMUM RATINGS** (Operating temperature range applies unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Cathode Voltage	V <sub>KA</sub>	40	V
Cathode Current Range(Continuous)	I <sub>KA</sub>	-100 ~ +150	mA
Reference Input Current Range	I <sub>ref</sub>	-0.05 ~ +10	mA
Operating Junction Temperature	T <sub>j</sub>	150	°C
Thermal Resistance	θ <sub>JA</sub>	206	°C/W
Operating Ambient Temperature	T <sub>opr</sub>	-40 ~ +125	°C
Storage Temperature	T <sub>stg</sub>	-65 ~ +150	°C

**RECOMMENDED OPERATING CONDITIONS**

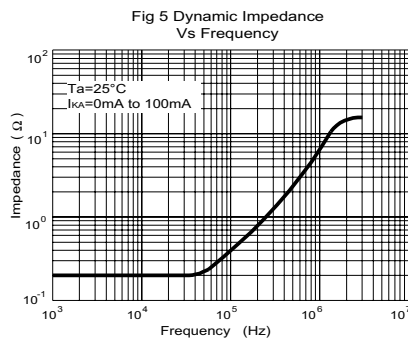
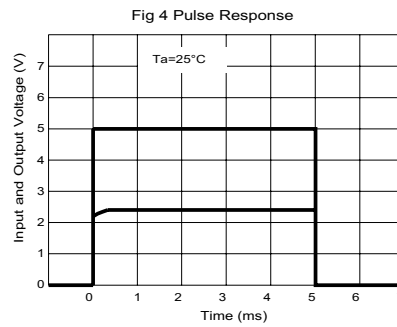
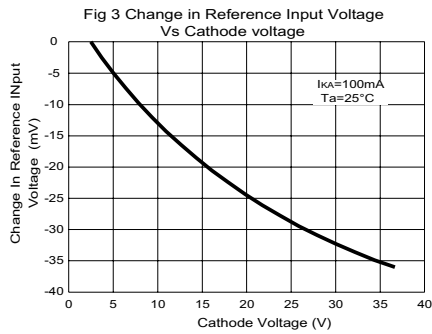
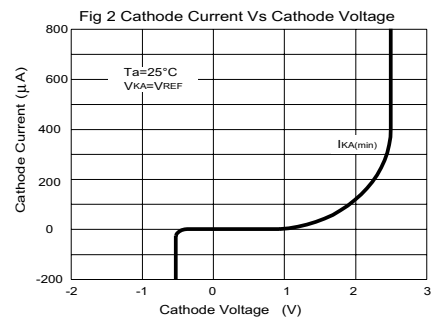
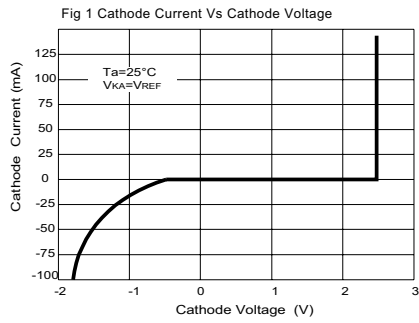
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Cathode Voltage	V <sub>KA</sub>	V <sub>REF</sub>		36	V
Cathode Current	I <sub>KA</sub>	0.3		100	mA

**ELECTRICAL CHARACTERISTICS**(T<sub>a</sub>=25°C, unless otherwise specified)

Characteristic		Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Input Voltage 1	0.5%	V <sub>ref</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA	2.488	2.50	2.512	V
	1%			2.475	2.50	2.525	
	2%			2.450	2.50	2.550	
Reference Input Voltage 2	0.5%	V <sub>ref</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA	2.483	2.495	2.507	V
	1%			2.470	2.495	2.520	
	2%			2.445	2.495	2.545	
Deviation of reference Input Voltage Over temperature		ΔV <sub>ref</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA T <sub>MIN</sub> ≤ T <sub>A</sub> ≤ T <sub>MAX</sub>		8	17	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		ΔV <sub>ref</sub> /ΔV <sub>KA</sub>	I <sub>KA</sub> =10mA	ΔV <sub>KA</sub> =10V~V <sub>REF</sub>	-2.7	-1.0	mV/V
				ΔV <sub>KA</sub> =36V~10V	-2	-0.4	
Reference Input Current		I <sub>ref</sub>	I <sub>KA</sub> =10mA, R <sub>1</sub> =10kΩ, R <sub>2</sub> =∞		0.5	1.2	μA
Deviation of Reference Input Current Over Full Temperature Range		ΔI <sub>ref</sub> /ΔT	I <sub>KA</sub> =10mA, R <sub>1</sub> =10kΩ, R <sub>2</sub> =∞, T <sub>A</sub> =full Temperature		0.4	1.2	μA
Minimum cathode current for regulation		I <sub>KA</sub> (min)	V <sub>KA</sub> =V <sub>REF</sub>		0.08	0.3	mA
Off-state cathode Current		I <sub>KA</sub> (OFF)	V <sub>KA</sub> =36V, V <sub>REF</sub> =0		0.01	0.8	μA
Dynamic Impedance		Z <sub>KA</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =0.2 to 100mA f ≤ 1.0kHz		0.1	0.37	Ω

**CLASSIFICATION OF V<sub>ref</sub> AND PACKAGE**

Type	RanK	Range(V)	Marking	Package	T <sub>opr</sub>
LR431AKLT1G	0.5%	2.488~2.512	AK	SOT-23	-40~+125 °C
LR431BKLT1G	1%	2.475~2.525	BK	SOT-23	-40~+125 °C
LR431APKLT1G	0.5%	2.483~2.507	CK	SOT-23	-40~+125 °C
LR431BPKLT1G	1%	2.470~2.520	DK	SOT-23	-40~+125 °C

**TYPICAL PERFORMANCE CHARACTERISTICS**


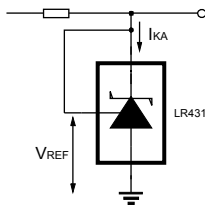
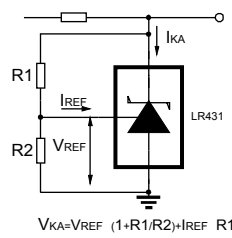
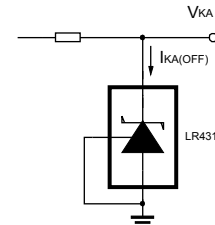
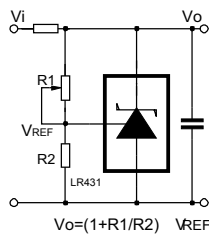
**TEST CIRCUIT**

 Fig 5 Test Circuit For  $V_{KA}=V_{REF}$ 

 Fig 6 Test Circuit for  $V_{KA} \geq V_{REF}$ 

 Fig 7 Test Circuit For  $I_{KA(OFF)}$ 
**APPLICATION CIRCUIT**


Fig 9 Shutdown Regulator

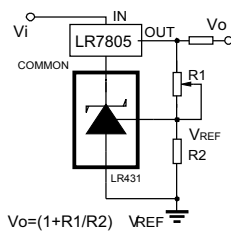


Fig 10 Output Control of a Three-Terminal Fixed Regulator

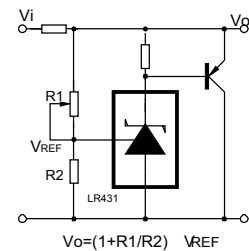


Fig 11 Higher-current Shunt Regulator

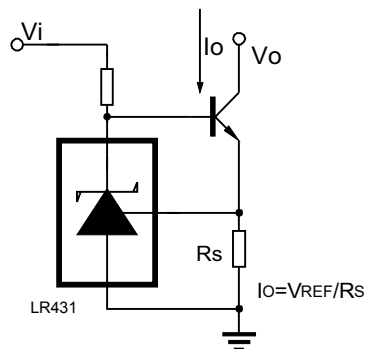


Fig 12 Constant-current Sink

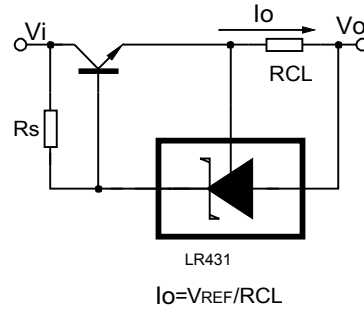
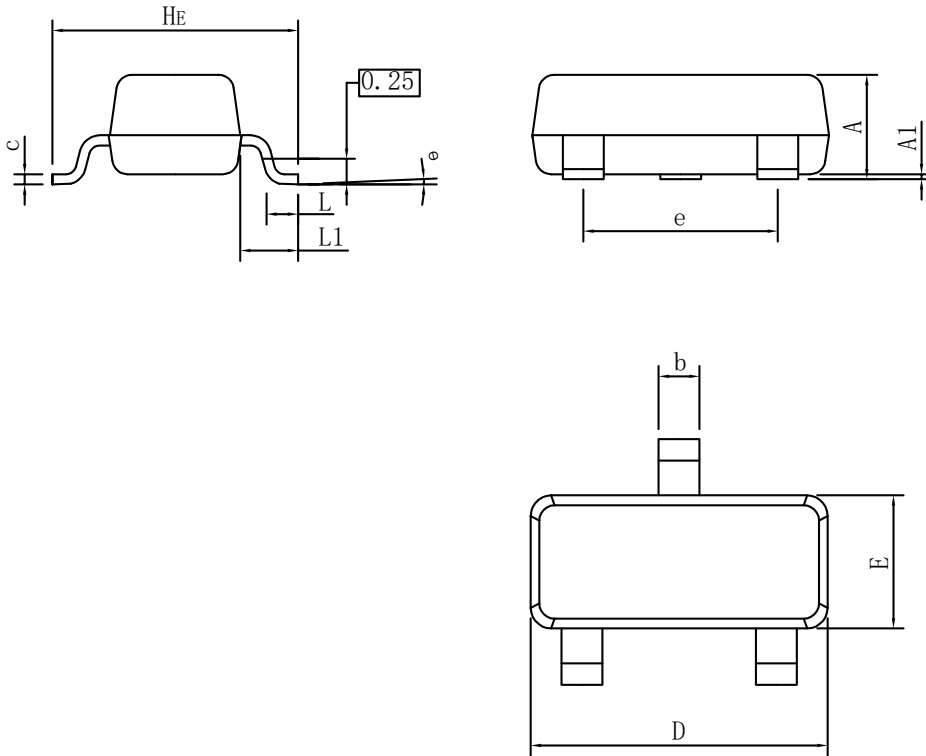


Fig 13 Current Limiting or Current Source

**SOT-23 PACKAGE OUTLINE DIMENSIONS**


SOT23E			
DIM	MIN	NOR	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.30	0.40	0.50
c	0.10	0.17	0.20
D	2.80	2.90	3.00
E	1.20	1.30	1.40
e	1.80	1.90	2.00
L	0.20	0.40	0.60
L1	0.60REF		
HE	2.20	2.40	2.60
θ	0°	-	10°
All Dimensions in mm			

**GENERAL NOTES**

1. Top package surface finish Ra0.4±0.2um
2. Bottom package surface finish Ra0.7±0.2um
3. Side package surface finish Ra0.4±0.2um