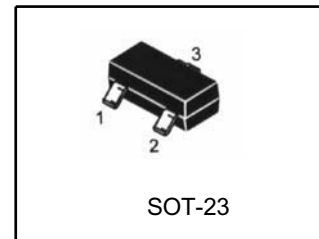


Programmable Precision Reference

LR431ATSLT1G

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.

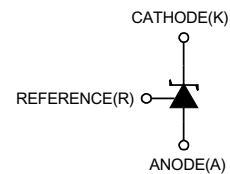
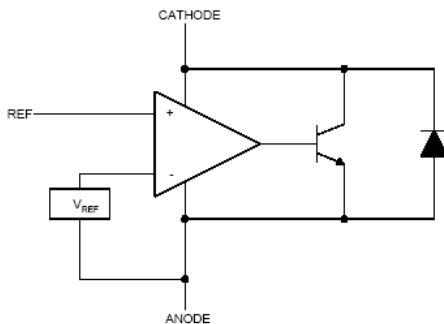


SOT-23 1: Ref; 2: Cathode; 3: Anode

FEATURES

- Programmable output Voltage to 36V.
- Low dynamic output impedance 0.2Ω
- Sink current capability of 1 to 100mA.
- Equivalent full-range temperature coefficient of $50\text{ppm}/^\circ\text{C}$ typical for operation over full rated operating temperature range.
- We declare that material of product compliance with ROHS requirements.
- ESD: HBM 4000V

BLOCK DIAGRAM



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

PARAMETER	SYMBOL	VALUE	UNIT
Cathode Voltage	V _{KA}	36	V
Cathode Current Range(Continuous)	I _{KA}	-100 ~ +150	mA
Reference Input Current Range	I _{ref}	-0.05 ~ +10	mA
Operating Junction Temperature	T _j	150	°C
Thermal Resistance	θ _{JA}	206	°C/W
Operating Ambient Temperature	T _{opr}	-40 ~ +125	°C
Storage Temperature	T _{stg}	-65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS

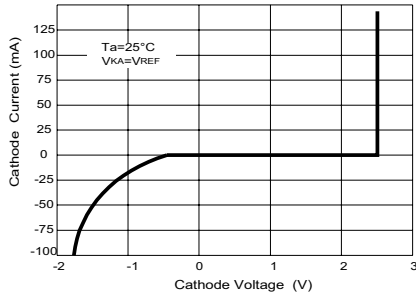
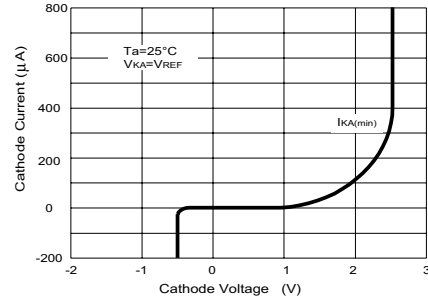
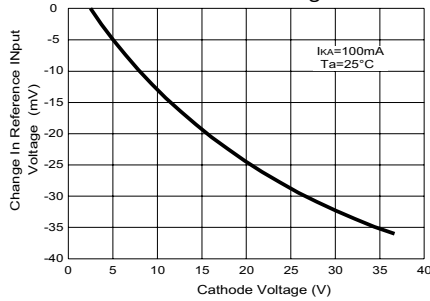
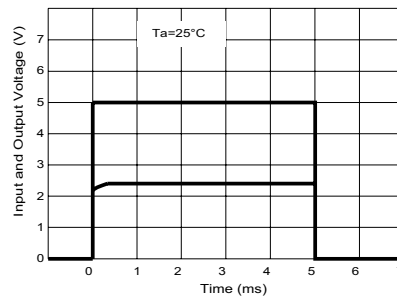
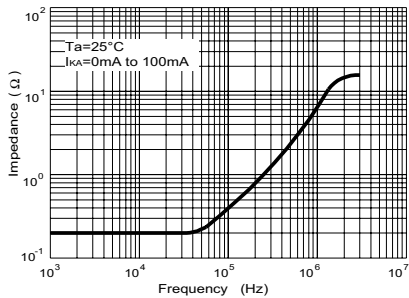
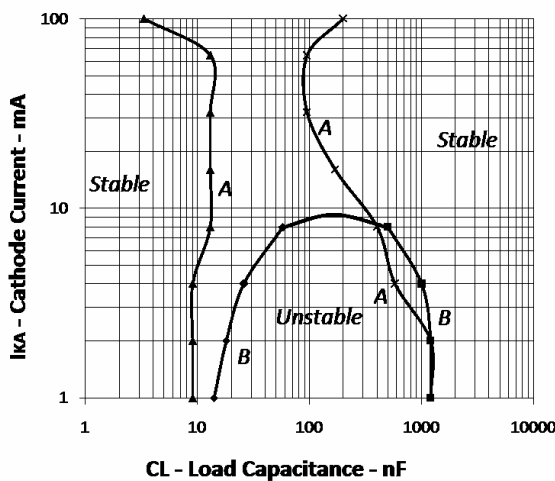
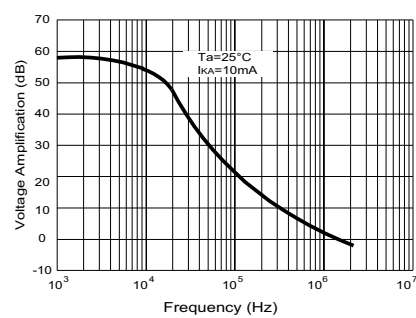
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Cathode Voltage	V _{KA}	V _{REF}		36	V
Cathode Current	I _{KA}	0.5		100	mA

ELECTRICAL CHARACTERISTICS(T_a=25°C, unless otherwise specified)

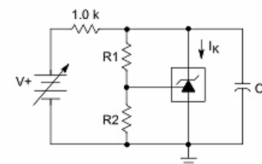
Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT	
Reference Input Voltage 1	V _{ref}	V _{KA} =V _{REF} , I _{KA} =10mA	2.488	2.50	2.512	V	
			2.475	2.50	2.525		
			2.450	2.50	2.550		
Reference Input Voltage 2*	V _{ref}	V _{KA} =V _{REF} , I _{KA} =10mA	2.483	2.495	2.507	V	
			2.470	2.495	2.520		
			2.445	2.495	2.545		
Deviation of reference Input Voltage Over temperature	ΔV _{ref}	V _{KA} =V _{REF} , I _{KA} =10mA T _{MIN} ≤T _A ≤T _{MAX}		4.5	25	mV	
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	ΔV _{ref} /ΔV _{KA}	I _{KA} =10mA	ΔV _{KA} =10V~V _{REF}		-1.0	-2.7	mV/V
			ΔV _{KA} =36V~10V		-0.5	-2.0	
Reference Input Current	I _{ref}	I _{KA} =10mA, R ₁ =10kΩ, R ₂ =∞		1	2	μA	
Deviation of Reference Input Current Over Full Temperature Range	ΔI _{ref} /ΔT	I _{KA} =10mA, R ₁ =10kΩ, R ₂ =∞, T _A =full Temperature		0.2	0.4	μA	
Minimum cathode current for regulation	I _{KA} (min)	V _{KA} =V _{REF}		0.3	0.5	mA	
Off-state cathode Current	I _{KA} (OFF)	V _{KA} =36V, V _{REF} =0		0.05	0.5	μA	
Dynamic Impedance	Z _{KA}	V _{KA} =V _{REF} , I _{KA} =1 to 100mA f≤1.0kHz		0.15	0.5	Ω	

CLASSIFICATION OF V_{ref} AND PACKAGE

Type	RanK	Range(V)	Marking	Package	T _{opr}
LR431ATSLT1G	0.5%	2.488~2.512	RAS	SOT-23	-40~+125 °C
LR431BTSLT1G	1%	2.475~2.525	RBS	SOT-23	-40~+125 °C
LR431APSLT1G	0.5%	2.483~2.507	RCS	SOT-23	-40~+125 °C
LR431BPSLT1G	1%	2.470~2.520	RDS	SOT-23	-40~+125 °C

TYPICAL PERFORMANCE CHARACTERISTICS
Fig 1 Cathode Current Vs Cathode Voltage

Fig 2 Cathode Current Vs Cathode Voltage

Fig 3 Change in Reference Input Voltage Vs Cathode voltage

Fig 4 Pulse Response

Fig 5 Dynamic Impedance Vs Frequency

Fig 6 Small Signal Voltage Amplification Vs Frequency

Fig7.Stability Boundary Conditions(Ta=25 ° C)

Note:The region C is not unstable when test current is above 1mA,


Fig8.Test Circuit for Fig7

Unstable region	VKA(V)	R1(KΩ)	R2(KΩ)
A	Vref	0	∞
B	5	10	10
C	10	30	10

TEST CIRCUIT

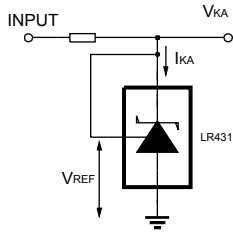


Fig9 Test Circuit For $V_{KA}=V_{REF}$

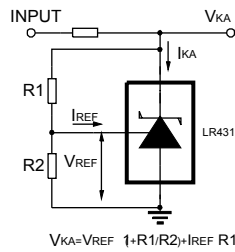


Fig10 Test Circuit for $V_{KA} \geq V_{REF}$

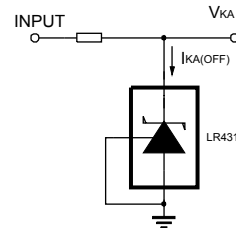


Fig11 Test Circuit For $I_{KA(OFF)}$

APPLICATION CIRCUIT

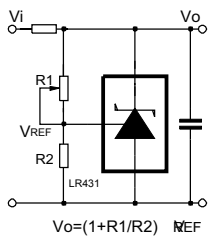


Fig12 Shutdown Regulator

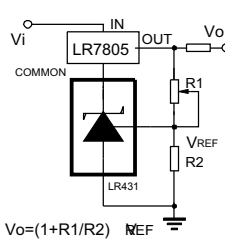


Fig13 Output Control of a Three-Terminal Fixed Regulator

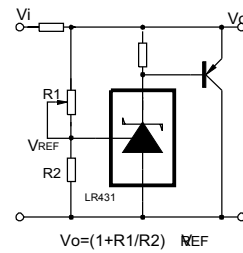


Fig14 Higher-current Shunt Regulator

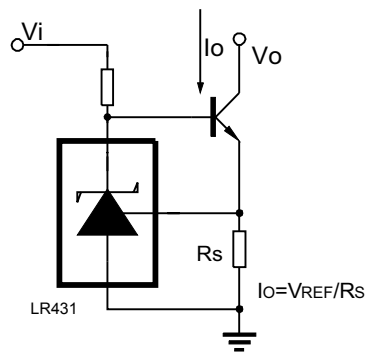


Fig15 Constant-current Sink

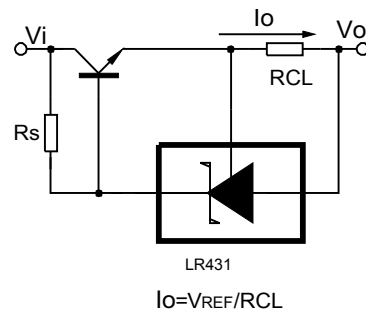
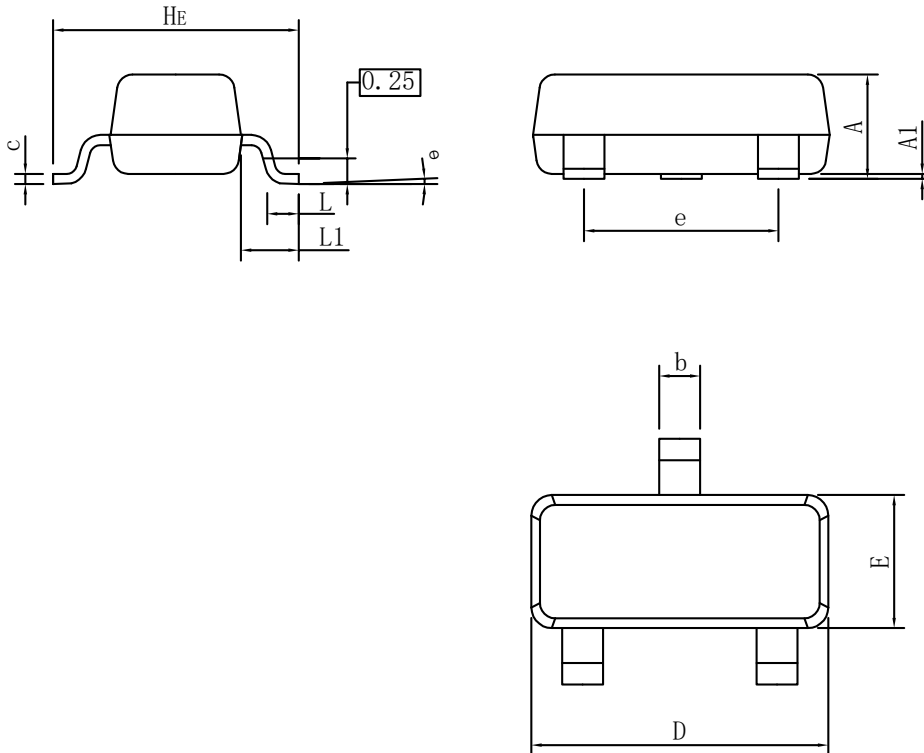


Fig16 Current Limiting or Current Source

SOT-23 PACKAGE OUTLINE DIMENSIONS


SOT23			
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 $Ra0.4 \pm 0.2\mu m$
2. Bottom package surface finish $Ra0.7 \pm 0.2\mu m$
3. Side package surface finish $Ra0.4 \pm 0.2\mu m$