

PROGRAMMABLE PRECISION REFERENCE

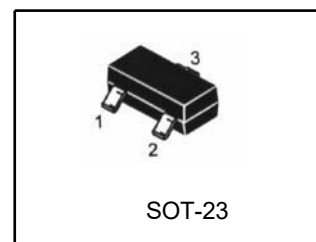
LR431xxTLT1G

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.

FEATURES

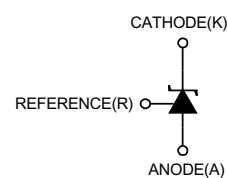
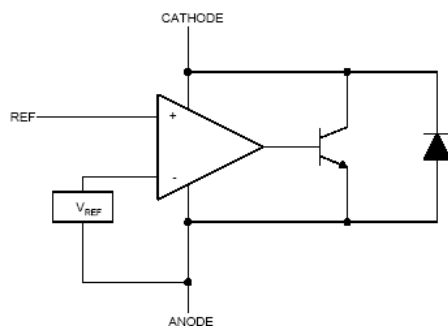
- ' Programmable output Voltage to 36V.
- ' Low dynamic output impedance 0.2Ω
- ' Sink current capability of 1 to 100mA.
- ' Equivalent full-range temperature coefficient of 50ppm/ $^{\circ}\text{C}$ typical for operation over full rated operating temperature range.



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

Pb-Free package is available

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
Operating Ambient Temperature	T _{opr}	-40 ~ +125	°C
Storage Temperature	T _{stg}	-65 ~ +150	°C
Thermal Resistance(note)	ROJA	230	°C/W
Thermal Resistance(note)	ROJC	90	°C/W
Power Dissipation(note)	PD	500	mW

Note: PCB size:30.0mm×25.0mm×1.6mm(FR4); Cu thickness:35um

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)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Input Voltage *	V _{ref}	V _{KA} =V _{REF} , I _{KA} =10mA		2.50 2.495		V
Deviation of reference Input Voltage Over temperature(note 1)	ΔV _{ref} /ΔT	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} ΔV _{KA} =36V~10V		-1.0 -0.5	-2.7 -2.0	mV/V
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}		50	85	μA
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

Note1: T_{MIN}= -40 °C, T_{MAX}=+125°C

*In order to match the special request of customer

*** CLASSIFICATION OF V_{ref} AND PACKAGE**

Type	RanK	Marking	Package
LR431ATLT1G	0.5%	RA2	SOT-23
LR431BTLT1G	1%	RB2	SOT-23
LR431APTLT1G	0.5%	RA3	SOT-23
LR431BPTLT1G	1%	RB3	SOT-23

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1 Cathode Current Vs Cathode Voltage

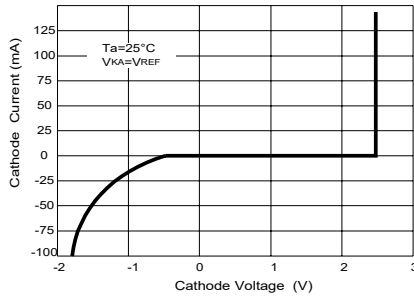


Fig 2 Cathode Current Vs Cathode Voltage

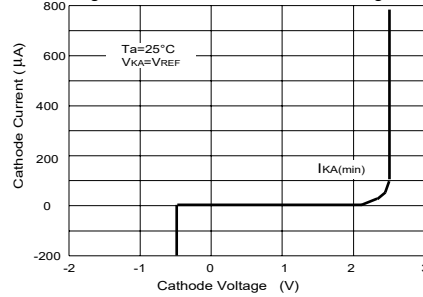


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

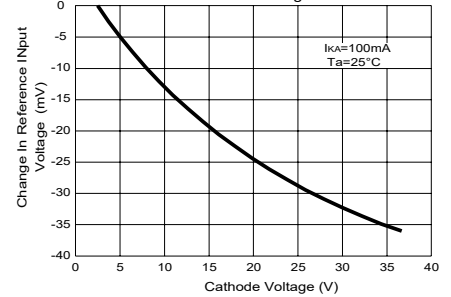


Fig 4 Pulse Response

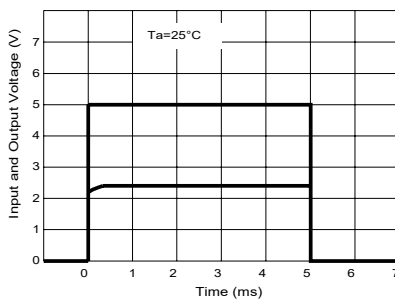


Fig 5 Dynamic Impedance Vs Frequency

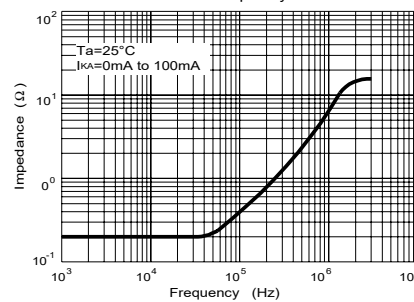
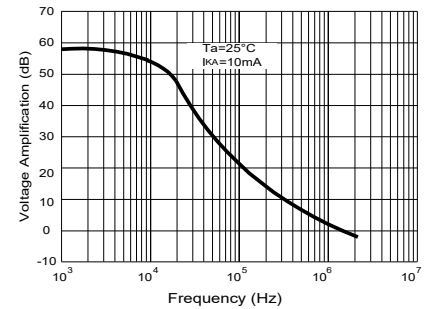
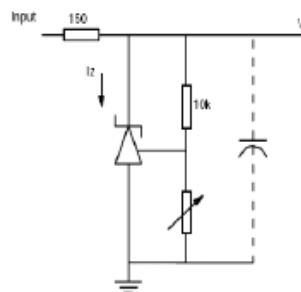
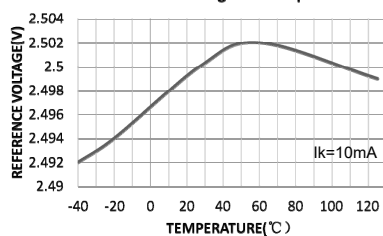


Fig 6 Small Signal Voltage Amplification Vs Frequency



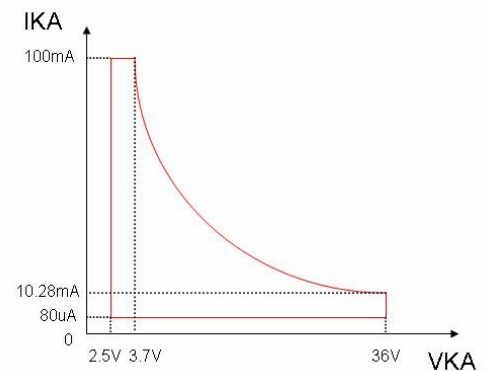
Reference Voltage vs. Temperature



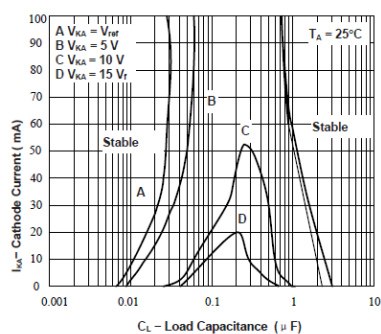
$V_{ref} < V_Z < 20$, $I_Z = 10mA$, $T_A = 25^\circ C$

Test Circuit for Stability Boundary Conditions

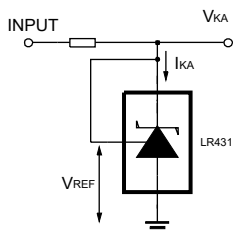
Cathode Current Vs Cathode Voltage in the Stable Area



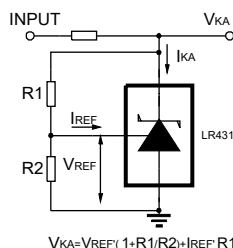
Stability Boundary Conditions



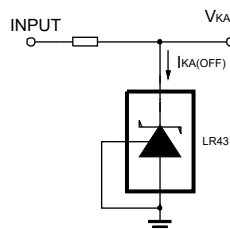
TEST CIRCUIT



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

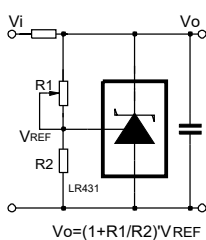


Test Circuit for $V_{KA} \geq V_{REF}$

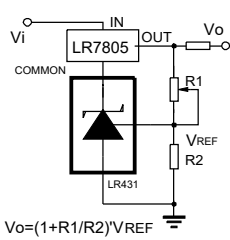


Test Circuit For $I_{KA(OFF)}$

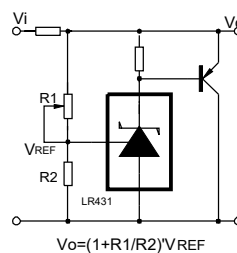
APPLICATION CIRCUIT



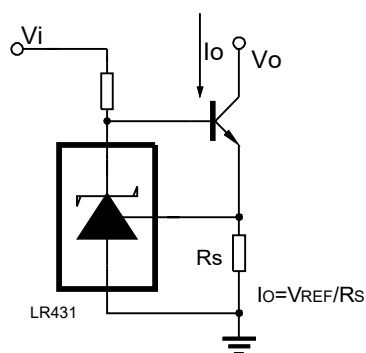
Shutdown Regulator



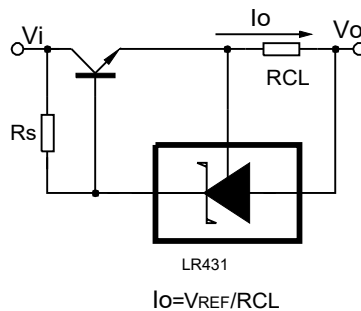
Output Control of a Three-Terminal Fixed Regulator



Higher-current Shunt Regulator

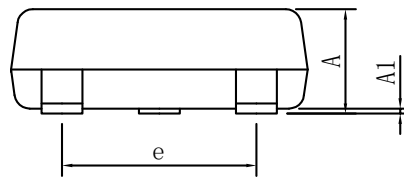
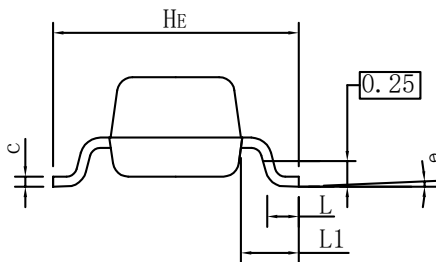


Constant-current Sink

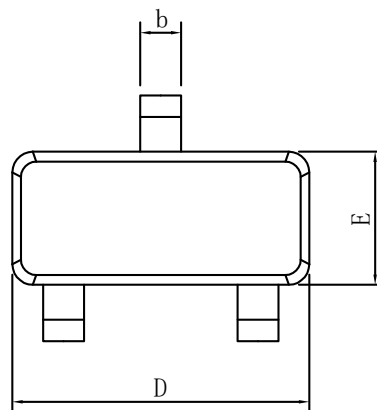


Current Limiting or Current Source

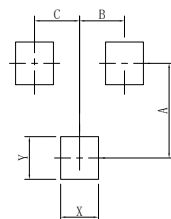
SOT-23 PACKAGE OUTLINE DIMENSIONS



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			



Suggested Pad layout



SOT23E	
DIM	(mm)
X	0.80
Y	0.90
A	2.00
B	0.95
C	0.95

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

REVISION HISTORY

Version	Description	Update by	Update Date
1.5	根据最新芯片规格书更新电参数信息	陈帅	2023-12-04



DISCLAIMER

- Curve guarantee in the specification. The curve of test items with electric parameter is used as quality guarantee. The curve of test items without electric parameter is used as reference only.
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