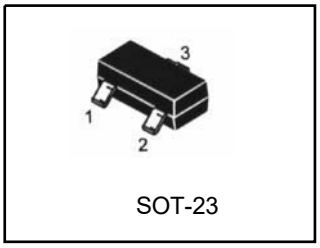
PROGRAMMABLE PRECISION REFERENCE

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 Vref(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.



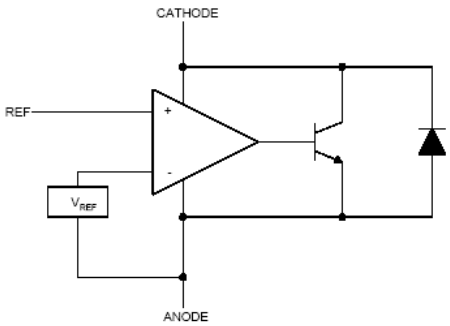
SOT-23 1: Ref; 2: Cathode; 3: Anode

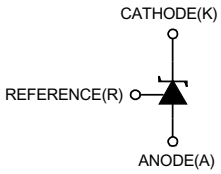
FEATURES

- Programmable output Voltage to 36V.
- Low dynamic output impedance 0.2Ω
- Sink current capability of 1 to 100mA.
- Equivalent full-range temperature coefficient of 50ppm/°C typical for operation over full rated operating temperature range.

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	Iref	-0.05 ~ +10	mA
Operating Junction Temperature	Tj	150	°C
Operating Ambient Temperature	Topr	-40 ~ +125	°C
Storage Temperature Temperature	Tstg	-65 ~ +150	°C
Thermal Resistance(note)	RΘJA	230	°C/W
Thermal Resistance(note)	RΘJC	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 (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Reference Input Voltage *	Vref	$V_{KA}=V_{REF}, I_{KA}=10mA$			2.50 2.495		V
Deviation of reference Input Voltage Over temperature(note 1)	ΔVref/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	ΔVref /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	Iref	$I_{KA}=10mA, R1=10k\Omega, R2=\infty$			1	2	μA
Deviation of Reference Input Current Over Full Temperature Range	ΔIref/ΔT	$I_{KA}=10mA, R1=10k\Omega, R2=\infty$ 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：TMIN= -40 °C,TMAX=+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

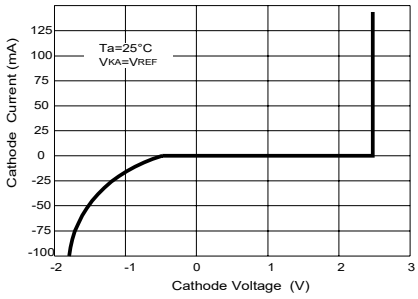


Fig 2 Cathode Current Vs Cathode Voltage

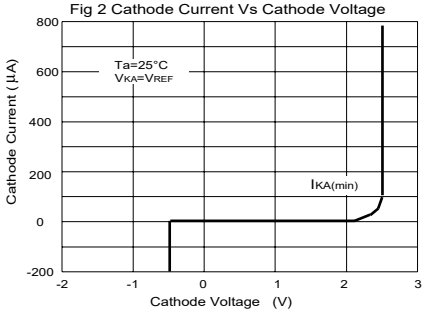


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

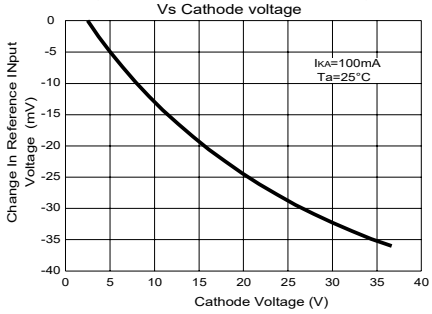


Fig 4 Pulse Response

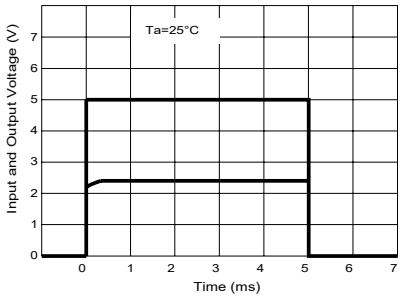


Fig 5 Dynamic Impedance Vs Frequency

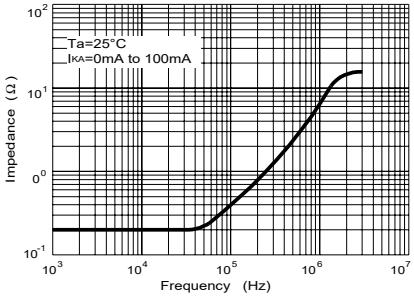
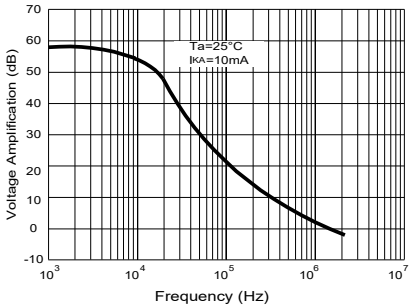
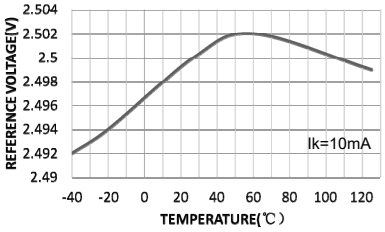
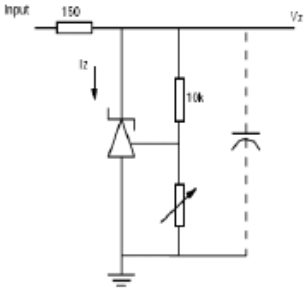


Fig 6 Small Signal Voltage Amplification Vs Frequency



Reference Voltage vs. Temperature

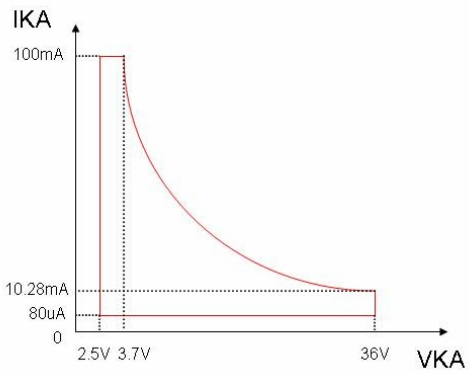




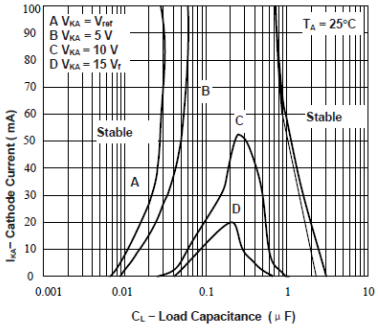
Vref < Vz < 20, Iz = 10mA, TA = 25°C

Test Circuit for Stability Boundary Conditions

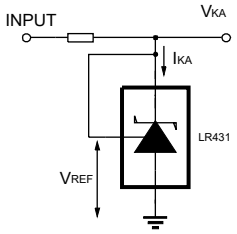
Cathode Current Vs Cathode Voltage in the Stable Area



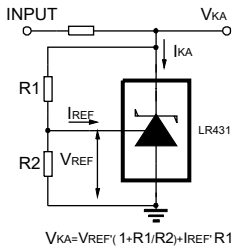
Stability Boundary Conditions



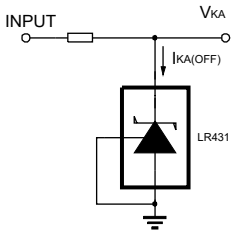
TEST CIRCUIT



Test Circuit For VKA=VREF

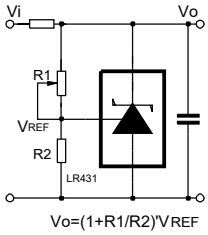


Test Circuit for VKA >= VREF

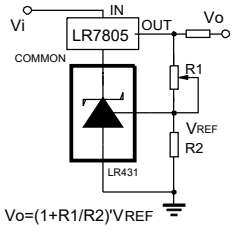


Test Circuit For IKA(OFF)

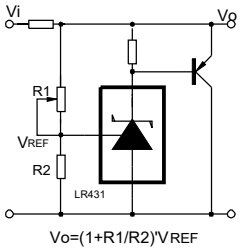
APPLICATION CIRCUIT



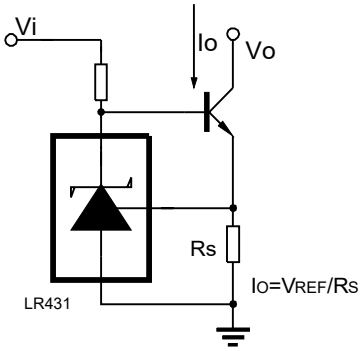
Shutdown Regulator



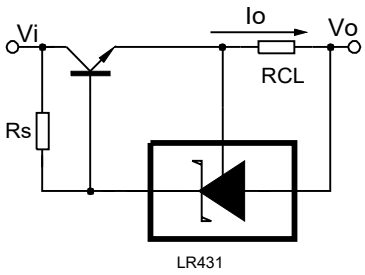
Output Control of a Three -Terminal Fixed Regulator



Higher-current Shunt Regulator

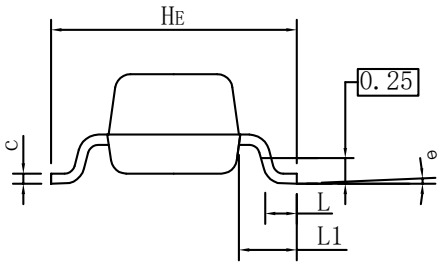


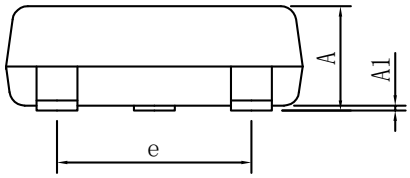
Constant-current Sink

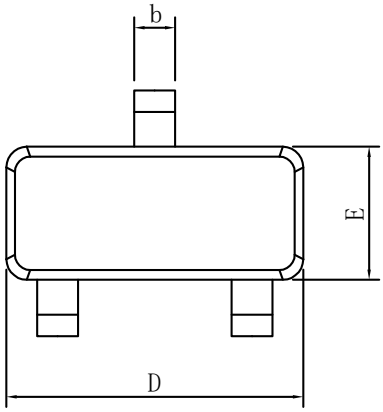


Current Limiting or Current Source

SOT-23 PACKAGE OUTLINE DIMENSIONS

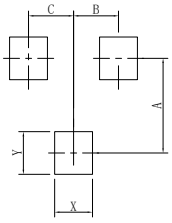






SOT23			
DIM	MIN	NOR	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.30	0.40	0.50
c	0.10	0.17	0.20
D	2.80	2.90	3.00
E	1.20	1.30	1.40
e	1.80	1.90	2.00
L	0.20	0.40	0.60
L1	0.60REF		
HE	2.20	2.40	2.60
θ	0°	-	10°
All Dimensions in mm			

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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