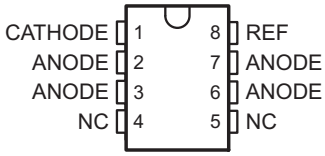
Programmable Precision Reference

LR431XD

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.



SOP-8

FEATURES

Programmable output Voltage to 36V.

Low dynamic output impedance 0.2Ω

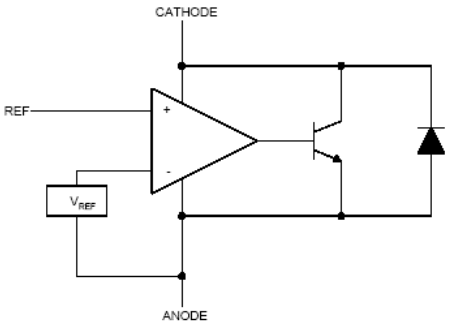
Sink current capability of 1 to 100mA.

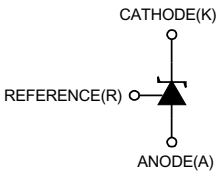
Equivalent full-range temperature coefficient of 50ppm/°C typical for operation over full rated operating temperature range.

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	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

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)

Characteristic		Symbol	Test conditions		MIN	TYP	MAX	UNIT
Reference Input Voltage 1	0.5%	Vref	$V_{KA}=V_{REF}, I_{KA}=10mA$		2.488	2.50	2.512	V
	1%				2.475	2.50	2.525	
Deviation of reference Input Voltage Over temperature		ΔVref	$V_{KA}=V_{REF}, I_{KA}=10mA$ $T_{MIN}\le T_A\le T_{MAX}$			4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		$\Delta V_{ref}/\Delta V_{KA}$	$I_{KA}=10mA$	$\Delta V_{KA}=10V\sim V_{REF}$		-1.0	-2.7	mV/V
				$\Delta V_{KA}=36V\sim 10V$		-0.5	-2.0	
Reference Input Current		Iref	$I_{KA}=10mA, R1=10k\Omega, R2=\infty$			1	2	μA
Deviation of Reference Input Current Over Ful l 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)	$V_{KA}=V_{REF}$			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 $f\le 1.0kHz$			0.15	0.5	Ω

CLASSIFICATION OF V_{ref} AND PACKAGE

Device	LR431AD	LR431BD
Rank	0.5%	1%
Range(V)	2.487~2.512	2.475~2.525
Marking	L431AD	L431BD
Package	SOP-8	SOP-8

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1 Cathode Current Vs Cathode Voltage

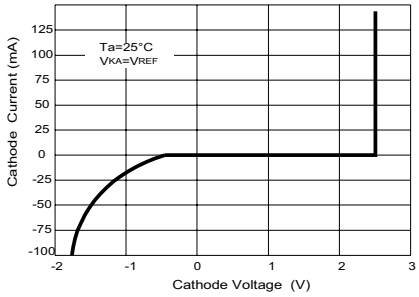


Fig 2 Cathode Current Vs Cathode Voltage

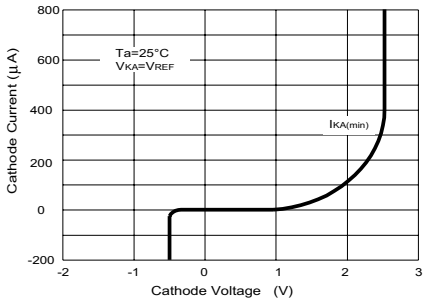


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

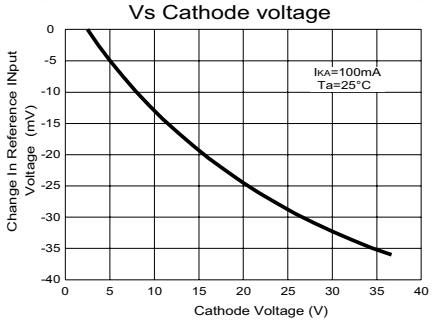


Fig 4 Pulse Response

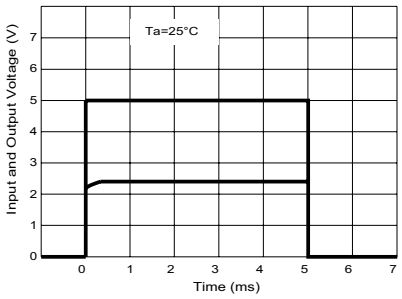


Fig 5 Dynamic Impedance Vs Frequency

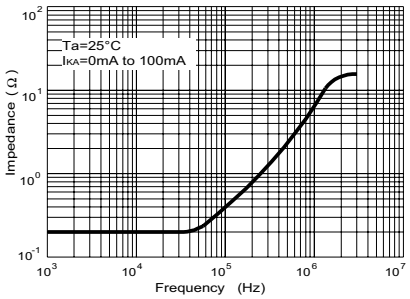
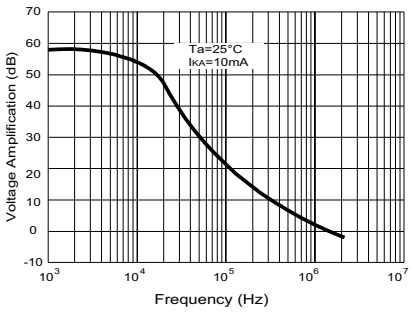


Fig 6 Small Signal Voltage Amplification Vs Frequency



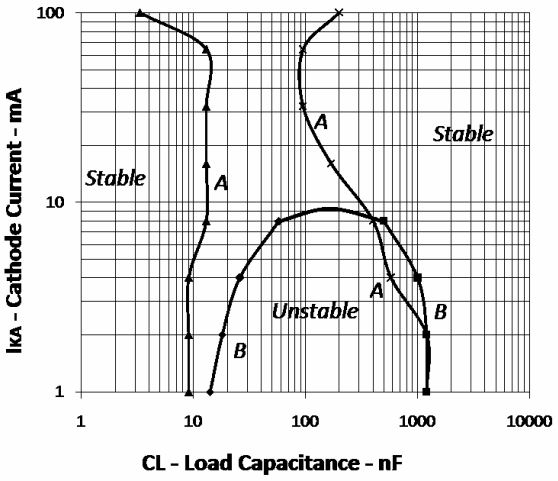


Fig7.Stability Boundary Conditions(Ta=25 ° C)

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

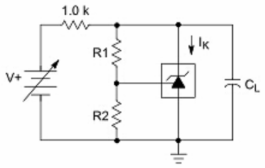


Fig8.Test Circurt for Fig7

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

TEST CIRCUIT

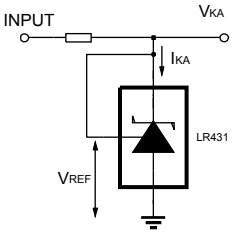


Fig9 Test Circuit For VKA=VREF

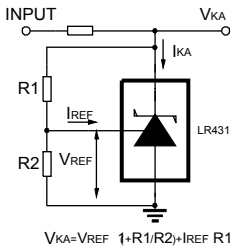


Fig10 Test Circuit for VKA >= VREF

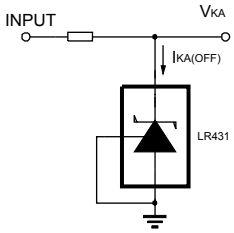


Fig11 Test Circuit For IKA(OFF)

APPLICATION CIRCUIT

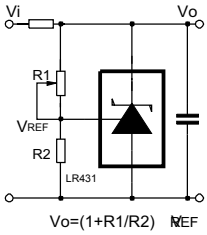


Fig12 Shutdown Regulator

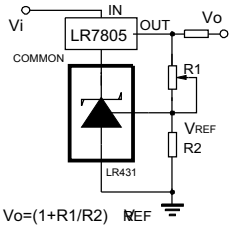


Fig13 Output Control of a Three -Terminal Fixed Regulator

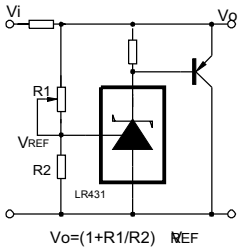


Fig14 Higher-current Shunt Regulator

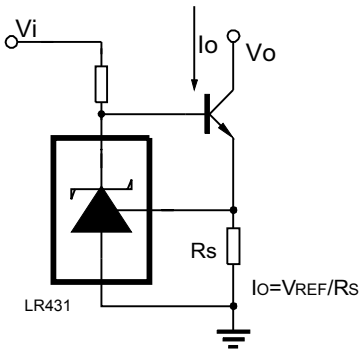


Fig15 Constant-current Sink

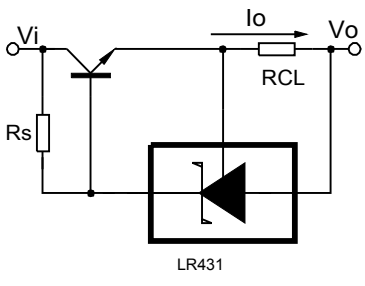
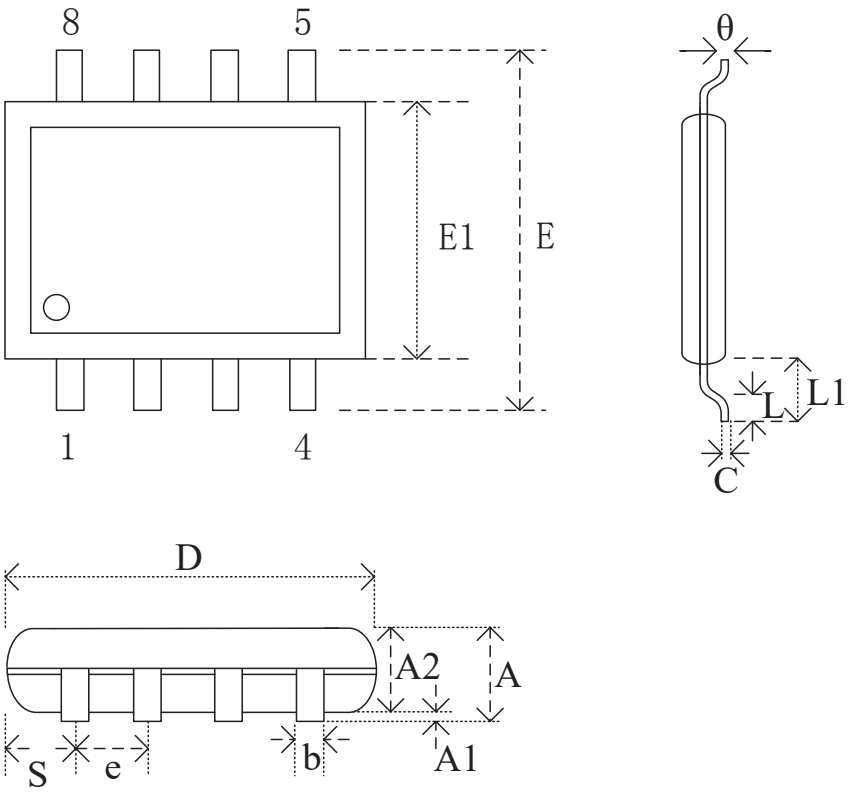


Fig16 Current Limiting or Current Source

Package 8-Pin SOP 150-mil



Dimensions

Symbol / Unit		A	A1	A2	b	C	D	E	E1	e	L	L1	S	θ
mm	Min		0.10	1.35	0.36	0.15	4.77	5.80	3.80		0.46	0.85	0.41	0
	Nom		0.15	1.45	0.41	0.20	4.90	5.99	3.90	1.27	0.66	1.05	0.54	5
	Max	1.75	0.20	1.55	0.51	0.25	5.03	6.20	4.00		0.86	1.25	0.67	8
Inch	Min		0.004	0.053	0.014	0.006	0.188	0.228	0.150		0.018	0.033	0.016	0
	Nom		0.006	0.057	0.016	0.008	0.193	0.236	0.154	0.05	0.026	0.041	0.021	5
	Max	0.069	0.008	0.061	0.020	0.010	0.198	0.244	0.158		0.034	0.049	0.026	8

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