

LL431

LINEAR INTEGRATED CIRCUIT

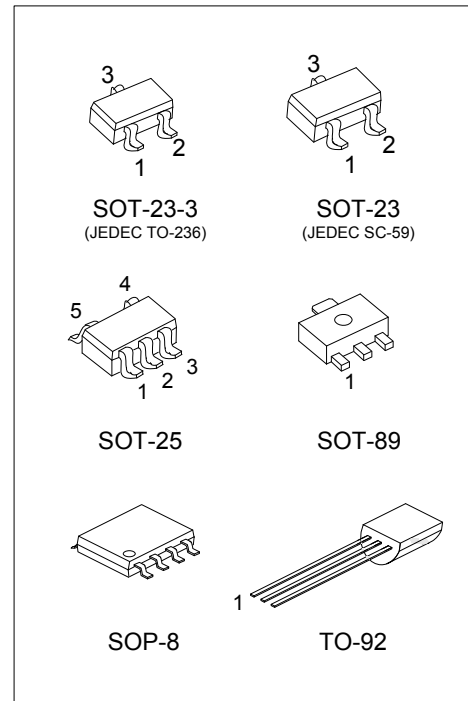
PROGRAMMABLE PRECISION REFERENCE

DESCRIPTION

The UTC **LL431** 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 36 V with two external resistors. It can be used in provides very wide applications including shunt regulator, series regulator, switching regulator, voltage reference and others.

FEATURES

- *Programmable output Voltage to 36V.
- *Sink current capability of 1.0 to 100mA.
- *Equivalent full-range temperature coefficient of 50ppm/ °C typical for operation over full rated operating temperature range.



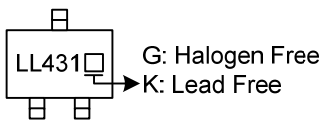
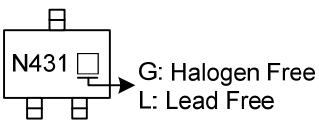
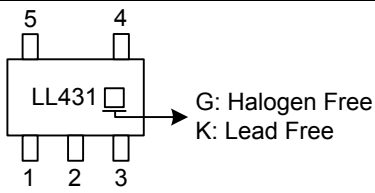
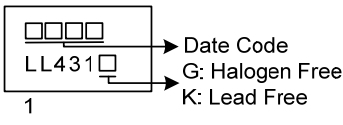
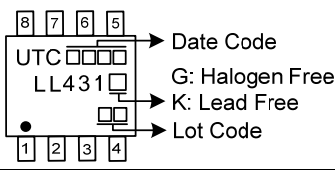
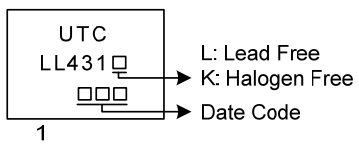
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
LL431K-AB3-R	LL431G-AB3-R	SOT-89	R	A	K	-	-	-	-	-	Tape Reel
LL431K-AE2-R	LL431G-AE2-R	SOT-23-3	R	K	A	-	-	-	-	-	Tape Reel
LL431NSL-AE2-R	LL431NSG-AE2-R	SOT-23-3	K	R	A	-	-	-	-	-	Tape Reel
LL431K-AE3-R	LL431G-AE3-R	SOT-23	R	K	A	-	-	-	-	-	Tape Reel
LL431NSK-AE3-R	LL431NSG-AE3-R	SOT-23	K	R	A	-	-	-	-	-	Tape Reel
LL431K-AF5-R	LL431G-AF5-R	SOT-25	X	X	K	R	A	-	-	-	Tape Reel
LL431K-S08-R	LL431G-S08-R	SOP-8	K	A	A	X	X	A	A	R	Tape Reel
LL431K-T92-B	LL431G-T92-B	TO-92	R	A	K	-	-	-	-	-	Tape Box
LL431K-T92-K	LL431G-T92-K	TO-92	R	A	K	-	-	-	-	-	Bulk
LL431K-T92-R	LL431G-T92-R	TO-92	R	A	K	-	-	-	-	-	Tape Reel

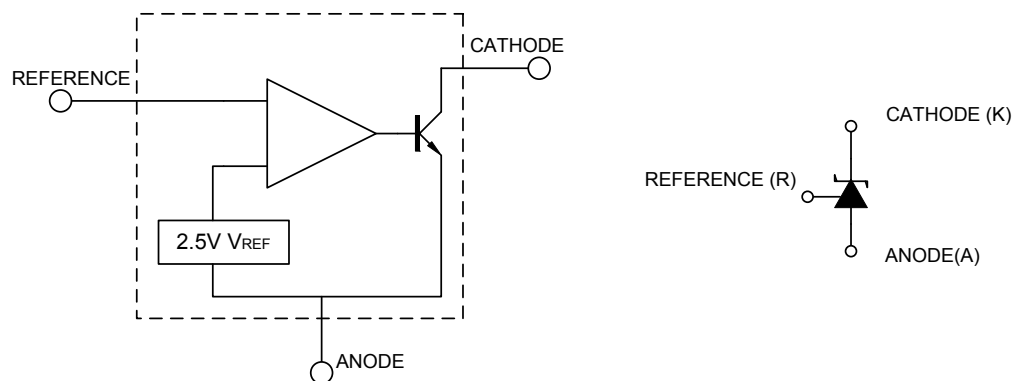
Note: Pin Code: R: Reference A: Anode K: Cathode X: No Connection

LL431G-AB3-R (1)Packing Type (2)Package Type (3)Green Package	(1) B: Tape Box, K: Bulk, R: Tape Reel (2) AB3: SOT-89, AE2: SOT-23-3, AE3: SOT-23, AF5: SOT-25, S08:SOP-8, T92: TO-92 (3) G: Halogen Free, K: Lead Free G: Halogen Free, L: Lead Free Only for TL431NS Type
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MARKING

SOT-23-3 / SOT-23 (LL431)	SOT-23-3 / SOT-23 (LL431NS)	SOT-25
		
SOT-89	SOP-8	TO-92
		

BLOCK DIAGRAM



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

PARAMETER		SYMBOL	RATINGS	UNIT
Cathode Voltage		V_{KA}	37	V
Cathode Current Range(Continuous)		I_{KA}	-100 ~ +150	mA
Reference Input Current		I_{REF}	-0.05 ~ +10	mA
Power Dissipation	SOT-89	P_D	500	mW
	SOT-23-3/SOT-23		300	mW
	SOT-25			
	SOP-8		600	mW
	TO-92		770	mW
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

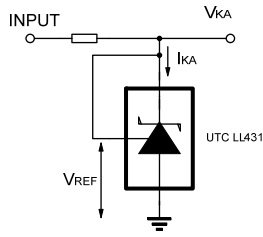
■ **RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	RATINGS	UNIT
Cathode Voltage	V_{KA}	$V_{REF} \sim 36$	V
Cathode Current	I_{KA}	1 ~ 100	mA

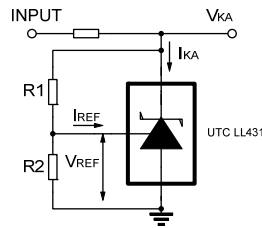
■ **ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Reference Input Voltage	V _{REF}	V _{KA} =V _{REF} , I _{KA} =10mA	LL431-A	2.483	2.495	2.507	V
			LL431-1	2.470	2.495	2.520	V
			LL431-2	2.520	-	2.545	V
			LL431-3	2.445	-	2.470	V
Deviation of reference Input Voltage Over temperature	ΔV _{REF} /ΔT	V _{KA} =V _{REF} , I _{KA} =10mA 0°C ≤ T _A ≤ 70°C			4.5	17	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, R1=10kΩ, R2=∞			1.5	4	μA
Deviation of Reference Input Current Over Full Temperature Range	ΔI _{REF} /ΔT	I _{KA} =10mA, R1=10kΩ, R2=∞ T _A =full Temperature			0.4	1.2	μA
Minimum Cathode Current for Regulation	I _{KA(MIN)}	V _{KA} =V _{REF}				100	μA
Off-State Cathode Current	I _{KA(OFF)}	V _{KA} =36V, V _{REF} =0			0.05	0.1	μA
Dynamic Impedance	Z _{KA}	V _{KA} =V _{REF} , I _{KA} =1 to 100mA f≤1.0kHz			0.5		Ω

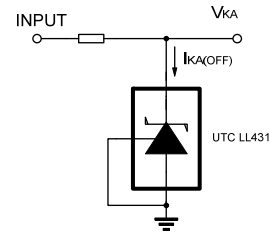
■ TEST CIRCUIT



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

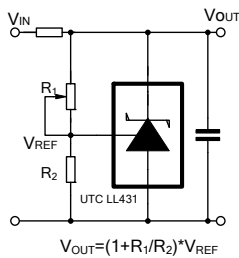


For $V_{KA} \cong V_{REF}$

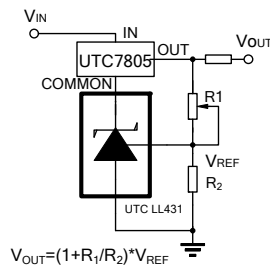


For $I_{KA(OFF)}$

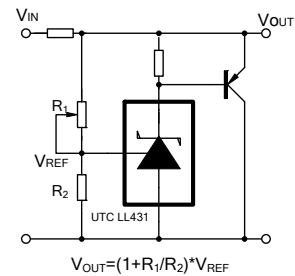
■ APPLICATION CIRCUIT



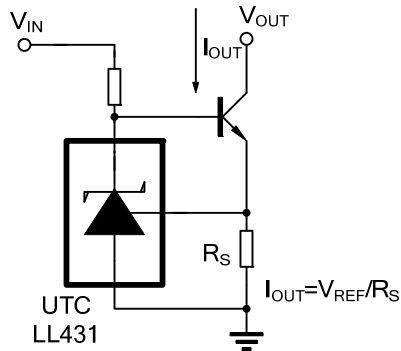
Shutdown Regulator



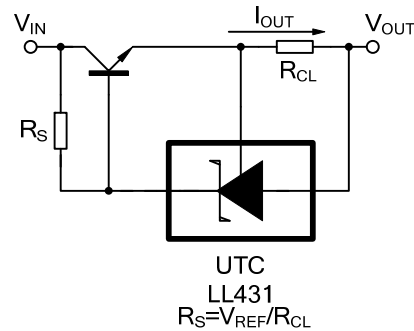
Output Control of a Three-Terminal Fixed Regulator



Higher-current Shunt Regulator

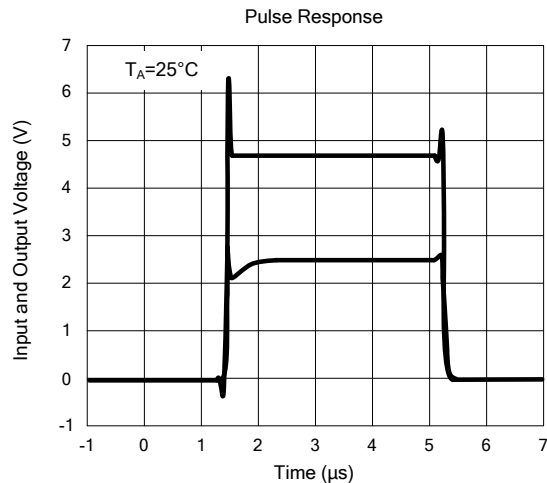
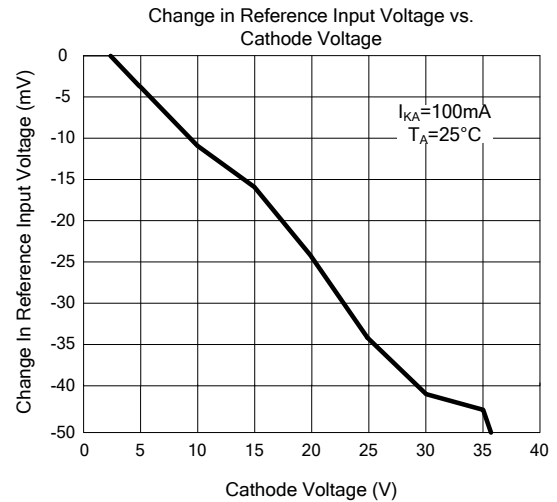
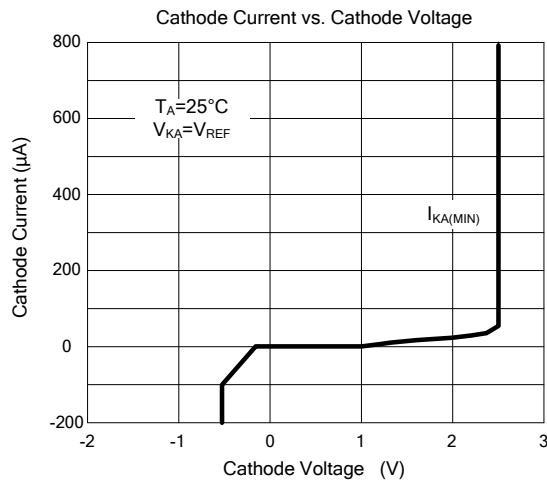


Constant-current Sink



Current Limiting or Current Source

■ TYPICAL CHARACTERISTICS



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