

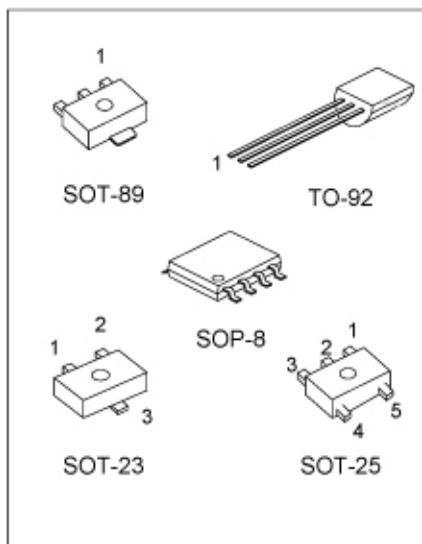
PROGRAMMABLE PRECISION REFERENCE

DESCRIPTION

The UTC TL431 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 provides very wide applications, including shunt regulator, series regulator, switching regulator, voltage reference and others.

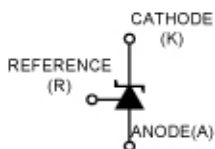
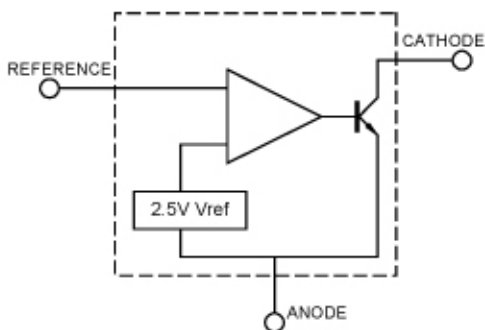
FEATURES

- *Programmable output Voltage to 36V.
- *Low dynamic output impedance 0.2 Ω .
- *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.



- SOP-8 1: Cathode; 2,3,6,7: Anode
8: Ref.; 4,5: N.C.
- TO-92 1: Ref.; 2: Anode; 3: Cathode
- SOT-89 1: Ref.; 2: Anode; 3: Cathode
- SOT-23 1: Cathode; 2: Ref.; 3: Anode
- SOT-25 1,2: NC; 3: Cathode; 4: Ref.; 5: Anode

BLOCK DIAGRAM



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

PARAMETER	SYMBOL	VALUE	UNIT
Cathode Voltage	V _{KA}	37	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 ~ +85	°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}	1		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	2.470	2.495	2.520	V
Deviation of reference Input Voltage Over temperature (note 1)	$\Delta V_{ref}/\Delta T$	V _{KA} =V _{REF} , I _{KA} =10mA T _{MIN} ≤ T _A ≤ T _{MAX}		4.5	17	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{ref}/\Delta V_{KA}$	I _{KA} =10mA $\Delta V_{KA}=10V \sim V_{REF}$ $\Delta V_{KA}=36V \sim 10V$		-1.0 -0.5	-2.7 -2.0	mV/V
Reference Input Current	I _{ref}	I _{KA} =10mA, R ₁ =10k Ω , R ₂ = ∞		1.5	4	μ A
Deviation of Reference Input Current Over Full Temperature Range	$\Delta I_{ref}/\Delta T$	I _{KA} =10mA, R ₁ =10k Ω , R ₂ = ∞ T _A =full Temperature		0.4	1.2	μ A
Minimum Cathode Current for Regulation	I _{KA} (min)	V _{KA} =V _{REF}		0.45	1.0	mA
Off-State Cathode Current	I _{KA} (OFF)	V _{KA} =36V, V _{REF} =0		0.05	1.0	μ A
Dynamic Impedance	Z _{KA}	V _{KA} =V _{REF} , I _{KA} =1 to 100mA f ≤ 1.0kHz		0.15	0.5	Ω

Note: T_{MIN}=0°C, T_{MAX}=+70°C

TEST CIRCUIT

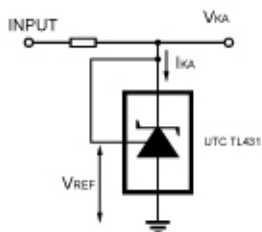


Fig 7 Test Circuit For $V_{KA}=V_{REF}$

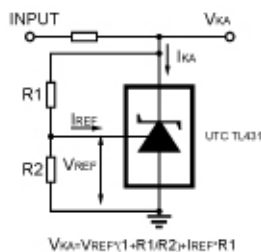


Fig 8 Test Circuit for $V_{KA} \geq V_{REF}$

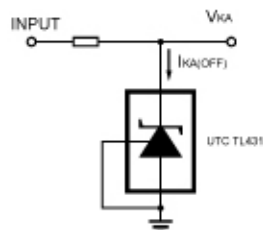


Fig 9 Test Circuit For $I_{KA(OFF)}$

APPLICATION CIRCUIT

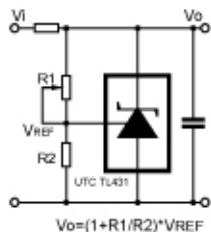


Fig 10 Shutdown Regulator

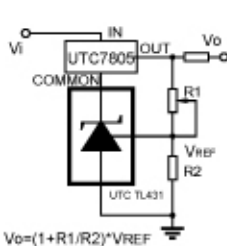


Fig 11 Output Control of a Three-Terminal Fixed Regulator

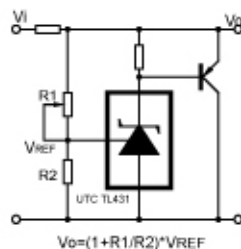


Fig 12 Higher-current Shunt Regulator

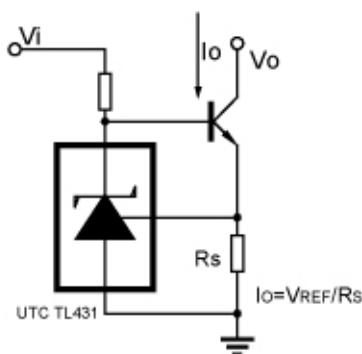


Fig 13 Constant-current Sink

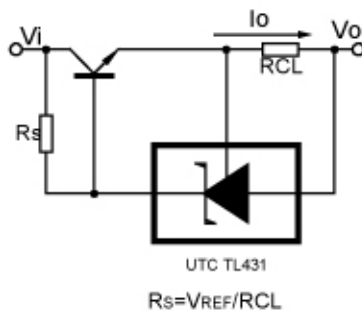


Fig 14 Current Limiting or Current Source