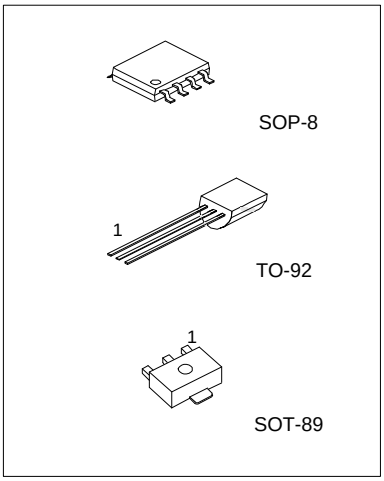
UTC TL431 LINEAR INTEGRATED CIRCUIT

PROGRAMMABLE PRECISION REFERENCE



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

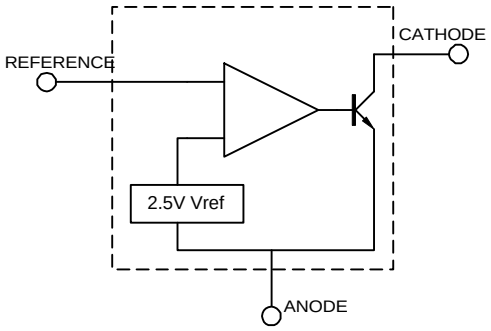
DESCRIPTION

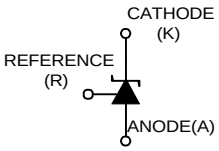
The UTC TL431 is a three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between Vref(approximately 2.5V) and 36 V with two external resistors. It provides very wide applications, including shunt regulator, series regulator, switching regulator, voltage reference and others.

FEATURES

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

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	Iref	-0.05 ~ +10	mA
Power Dissipation			
TO-92	P_D	500	mW
SOP-8		300	mW
SOT-89		350	mW
Operating Junction Temperature	Tj	150	°C
Operating Ambient Temperature	Topr	0 ~ +70	°C
Storage 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}	1		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		2.440	2.495	2.550	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	17	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=10kΩ,R2=∞			1.5	4	μA
Deviation of Reference Input Current Over Full Temperature Range	ΔIref/ΔT	I_{KA}=10mA,R1=10kΩ,R2=∞ T_A=full Temperature			0.4	1.2	μA
Minimum Cathode Current for Regulation	I_{KA}(min)	$V_{KA}=V_{REF}$			0.45	1.0	mA
Off-State Cathode Current	I_{KA}(OFF)	V_{KA}=36V,V_{REF}=0			0.05	1.0	μA
Dynamic Impedance	Z_{KA}	$V_{KA}=V_{REF}$,I_{KA}=1 to 100mA f1.0kHz			0.15	0.5	Ω

Note:T_{MIN}=0°C,T_{MAX}=+70°C

Remark: Reference voltage of =-1% tolerance is also available per customer' s request.

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1 Cathode Current Vs Cathode Voltage

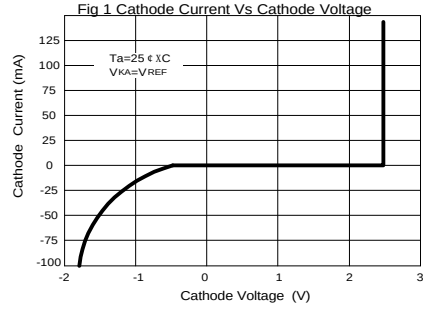


Fig 2 Cathode Current Vs Cathode Voltage

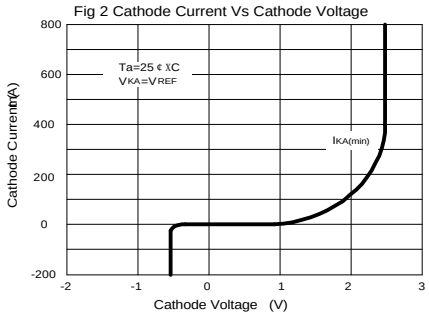


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

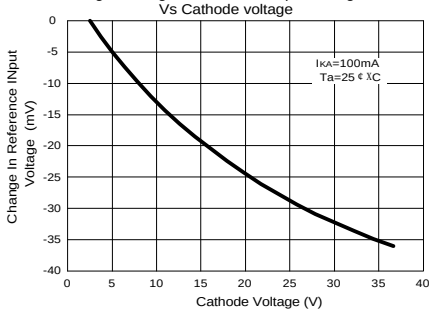


Fig 4 Pulse Response

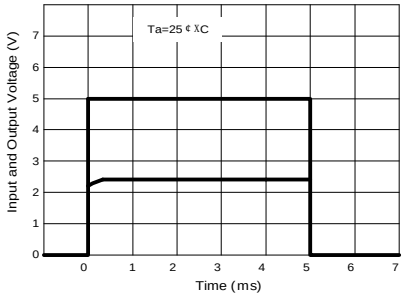


Fig 5 Dynamic Impedance Vs Frequency

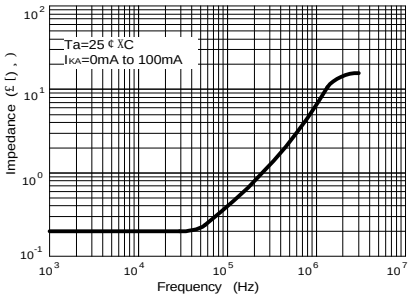
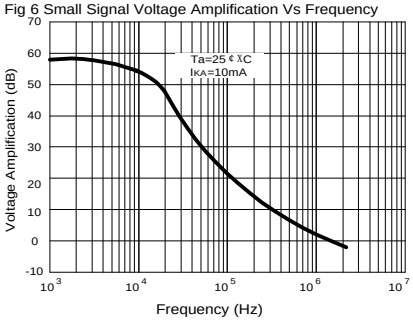


Fig 6 Small Signal Voltage Amplification Vs Frequency



TEST CIRCUIT

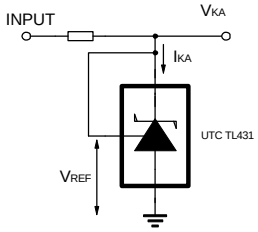


Fig 7 Test Circuit For $V_{KA}=V_{REF}$

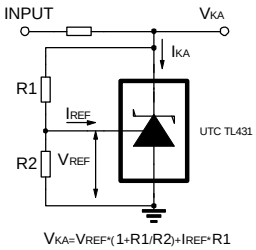


Fig 8 Test Circuit for $V_{KA} >= V_{REF}$

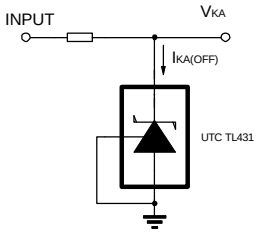


Fig 9 Test Circuit For $I_{KA(OFF)}$

APPLICATION CIRCUIT

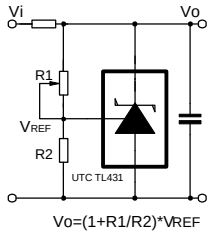


Fig 10 Shutdown Regulator

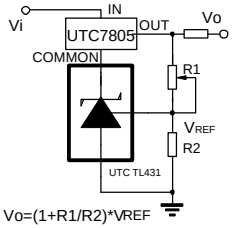


Fig 11 Output Control of a Three -Terminal Fixed Regulator

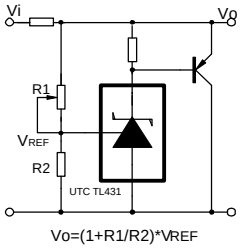


Fig 12 Higher-current Shunt Regulator

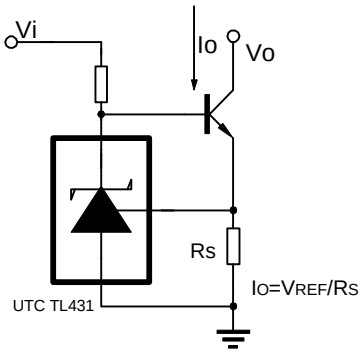


Fig 13 Constant-current Sink

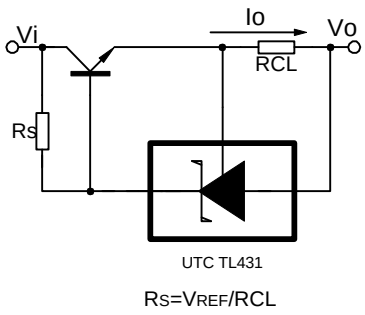


Fig 14 Current Limiting or Current Source