



TL431LL

Preliminary

LINEAR INTEGRATED CIRCUIT

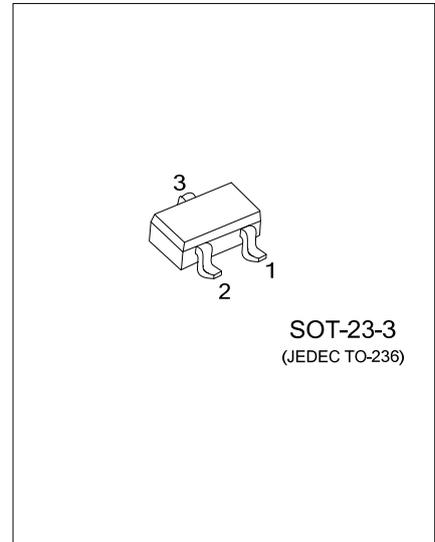
LOW CATHODE CURRENT ADJUSTABLE PRECISION SHUNT REGULATOR

DESCRIPTION

The UTC **TL431LL** is an adjustable shunt regulator with three-terminal and thermal stable with full operation range. It features include sharp turn-on characteristics, low output impedance and low temperature coefficient, so Zener diode can be replaced by UTC **TL431LL** in many applications, for example, charger devices, switching power supply and other adjustable regulators.

Any value between V_{REF} (2.5V) and the corresponding maximum cathode voltage (36V) can be set to by UTC **TL431LL**.

The UTC **TL431LL** is offered in two grade initial voltage tolerance at 25°C, 0.5%, and 1%.



FEATURES

- * High stability under capacitive load
- * Programmable precise output voltage from 2.5V to 36V
- * Sink current capacity from 50μA to 100mA
- * Low minimum cathode current for regulation:
10μA (Typ.), 50μA (Max.)
- * Low temperature deviation: 4.5mV typical
- * Low output noise
- * Wide operating range: -40°C~125°C

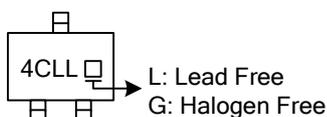
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
TL431LLK-AE2-R	TL431LLG-AE2-R	SOT-23-3	K	R	A	Tape Reel

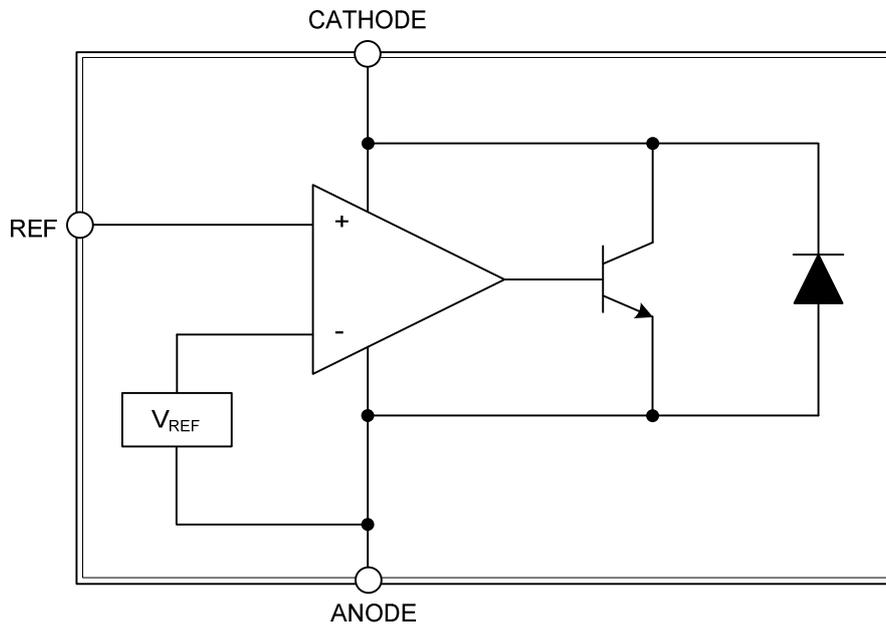
Note: Pin Code: K: Cathode R: Reference A: Anode

<p>TL431LLK-AE2-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) R: Tape Reel (2) AE2: SOT-23-3 (3) K: Lead Free, G: Halogen Free</p>
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MARKING



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Cathode Voltage	V_{KA}	40	V
Cathode Current Range (Continuous)	I_{KA}	-100~150	mA
Reference Input Current Range	I_{REF}	10	mA
Power Dissipation	P_D	370	mW
Junction Temperature	T_J	150	°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}	0.05~100	mA
Operating Ambient Temperature Range	T_A	-40~125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ_{JC}	113	°C/W

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

PARAMETER	Test Circuit	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	0.5%	V_{REF}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	2.487	2.500	2.512	V
	1.0%			2.475	2.500	2.525	V
Deviation of Reference Voltage Over Full Temperature Range	1	ΔV_{REF}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	0~70°C	4.5	8	mV
				-40~85°C	4.5	10	mV
				-40~125°C	4.5	16	mV
Ratio of Change in Reference Voltage to the Change in Cathode Voltage	2	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_{KA}=10\text{mA}$	$\Delta V_{KA}=10\text{V} \sim V_{REF}$	-1.0	-2.7	mV/V
				$\Delta V_{KA}=36\text{V} \sim 10\text{V}$	-0.5	-2.0	mV/V
Reference Current	2	I_{REF}	$I_{KA}=10\text{mA}, R1=10\text{k}\Omega, R2=\infty$		0.035	0.5	μA
Deviation of Reference Current Over Full Temperature Range	2	ΔI_{REF}	$I_{KA}=10\text{mA}, R1=10\text{k}\Omega, R2=\infty, T_A=-40 \sim 125^\circ\text{C}$		0.03	0.3	μA
Minimum Cathode Current for Regulation	1	$I_{KA}(\text{Min})$	$V_{KA}=V_{REF}$		10	50	μA
Off-state Cathode Current	3	$I_{KA}(\text{Off})$	$V_{KA}=36\text{V}, V_{REF}=0$		0.05	1.0	μA
Dynamic Impedance	1	Z_{KA}	$V_{KA}=V_{REF}, I_{KA}=1 \sim 100\text{mA}, f \leq 1.0\text{kHz}$		0.5		Ω

■ TEST CIRCUIT

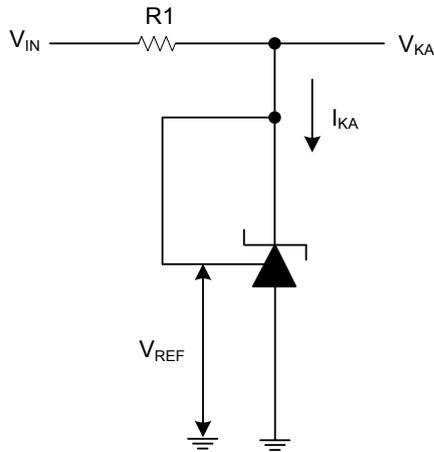


Figure 1. Test Circuit 4 for $V_{KA}=V_{REF}$

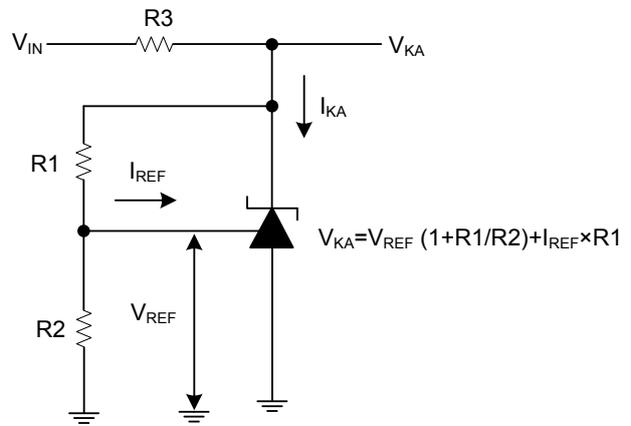


Figure 2. Test Circuit 5 for $V_{KA}>V_{REF}$

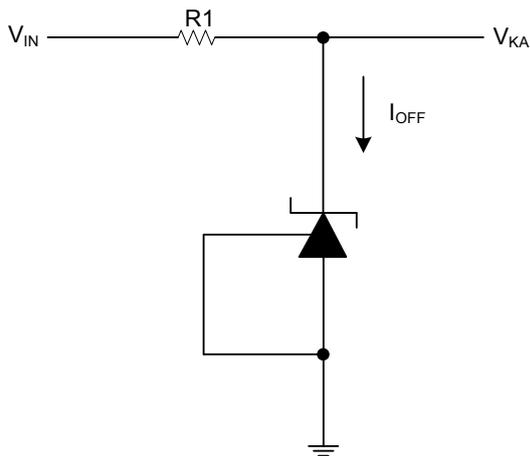


Figure 3. Test Circuit 6 for I_{OFF}

■ TYPICAL APPLICATION CIRCUIT

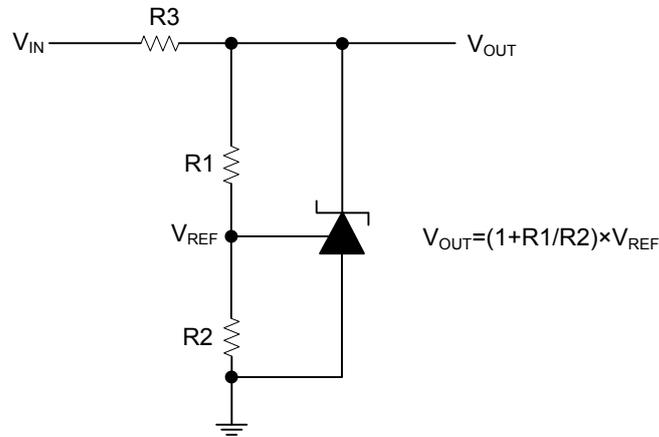


Figure 4. Shunt Regulator

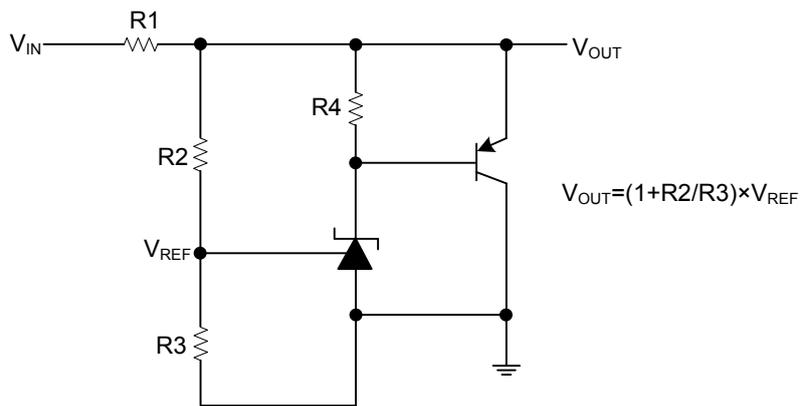


Figure 5. High Current Shunt Regulator

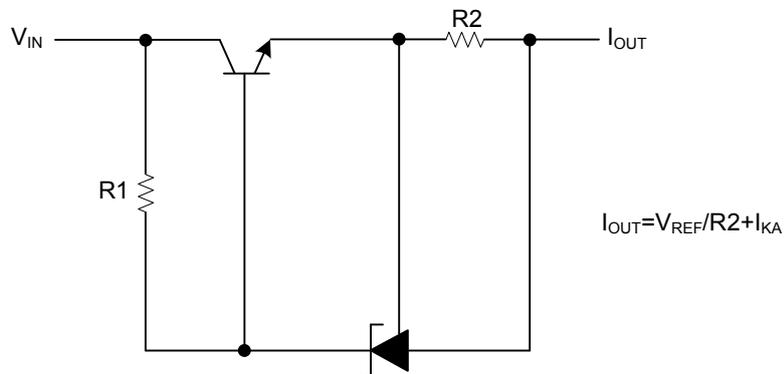


Figure 6. Current Source or Current Limit

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