

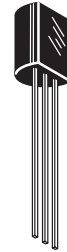
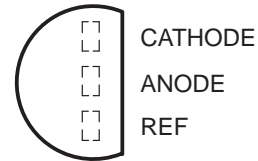
- Temperature Compensated
- Programmable Output Voltage
- Low Output Resistance
- Low Output Noise
- Sink Capability up to 100 mA

description

The TL430 is a 3-terminal adjustable shunt regulator, featuring excellent temperature stability, wide operating current range, and low output noise. The output voltage can be set by two external resistors to any desired value between 3 V and 30 V. The TL430 can replace zener diodes in many applications, providing improved performance.

The TL430C is characterized for operation from 0°C to 70°C.

LP PACKAGE
(TOP VIEW)



symbol



AVAILABLE OPTIONS

T _A	PACKAGED DEVICES	CHIP FORM (Y)
	PLASTIC (LP)	
0°C to 70°C	TL430CLP	TL430Y

The LP package is available taped and reeled. Add R suffix to device type (e.g., TL430CLPR). Chip forms are tested at 25°C.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

TL430

ADJUSTABLE SHUNT REGULATORS

SLVS050B – JUNE 1976 – REVISED JULY 1999

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Regulator voltage (see Note 1)	30 V
Continuous regulator current	150 mA
Package thermal impedance, θ_{JA} (see Notes 2 and 3):	156°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, T_{stg}	–65°C to 150°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. All voltage values are with respect to the anode terminal.
 2. Maximum power dissipation is a function of $T_J(\max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(\max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can impact reliability.
 3. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

	MIN	MAX	UNIT
Regulator voltage, V_Z	V_{ref}	30	V
Regulator current, I_Z	2	100	mA
Operating free-air temperature range, T_A	TL430C	0	70 °C

electrical characteristics over recommended operating conditions, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST FIGURE	TEST CONDITIONS	TL430C			UNIT
			MIN	TYP	MAX	
$V_{I(ref)}$ Reference input voltage	1	$V_Z = V_{I(ref)}$, $I_Z = 10\text{ mA}$	2.5	2.75	3	V
$\alpha V_{I(ref)}$ Temperature coefficient of reference input voltage	1	$V_Z = V_{I(ref)}$, $I_Z = 10\text{ mA}$, $T_A = 0^\circ\text{C}$ to 70°C		120		ppm/°C
$I_{I(ref)}$ Reference input current	2	$I_Z = 10\text{ mA}$, $R1 = 10\text{ k}\Omega$, $R2 = \infty$		3	10	μA
I_{ZK} Regulator current near lower knee of regulation range	1	$V_Z = V_{I(ref)}$		0.5	2	mA
I_{ZK} Regulator current at maximum limit of regulation range	1	$V_Z = V_{I(ref)}$		50		mA
	2	$V_Z = 5\text{ V}$ to 30 V , See Note 4		100		
r_z Differential regulator resistance (see Note 5)	1	$V_Z = V_{I(ref)}$, $\Delta I_Z = (52 - 2)\text{ mA}$		1.5	3	W
V_n Noise voltage	2	$f = 0.1\text{ Hz}$ to 10 Hz	$V_Z = 3\text{ V}$	50		μV
			$V_Z = 12\text{ V}$	200		
			$V_Z = 30\text{ V}$	650		

- NOTES:
4. The average power dissipation, $V_Z \cdot I_Z \cdot \text{duty cycle}$, must not exceed the maximum continuous rating in any 10-ms interval.
 5. The regulator resistance for $V_Z > V_{I(ref)}$, r_z , is given by:

$$r_z' = r_z \left(1 + \frac{R1}{R2} \right)$$

electrical characteristics over recommended operating conditions, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER		TEST FIGURE	TEST CONDITIONS		TL430Y			UNIT	
					MIN	TYP	MAX		
V _{I(ref)}	Reference input voltage	1	V _Z = V _{I(ref)} ,	I _Z = 10 mA	2.5	2.75	3	V	
I _{I(ref)}	Reference input current	2	I _Z = 10 mA, R2 = ∞	R1 = 10 kΩ,	3			10	μA
I _{ZK}	Regulator current near lower knee of regulation range	1	V _Z = V _{I(ref)}		0.5			2	mA
I _{ZK}	Regulator current at maximum limit of regulation range	1	V _Z = V _{I(ref)}		50				mA
		2	V _Z = 5 V to 30 V, See Note 4		100				
r _Z	Differential regulator resistance (see Note 5)	1	V _Z = V _{I(ref)} , . . . ΔI _Z = (52 – 2) mA		1.5			3	W
V _n	Noise voltage	2	f = 0.1 Hz to 10 Hz	V _Z = 3 V	50				μV
				V _Z = 12 V	200				
				V _Z = 30 V	650				

NOTES: 4. The average power dissipation, $V_Z \cdot I_Z \cdot \text{duty cycle}$, must not exceed the maximum continuous rating in any 10-ms interval.
5. The regulator resistance for $V_Z > V_{I(\text{ref})}$, r_Z , is given by:

$$r_Z' = r_Z \left(1 + \frac{R_1}{R_2} \right)$$

PARAMETER MEASUREMENT INFORMATION

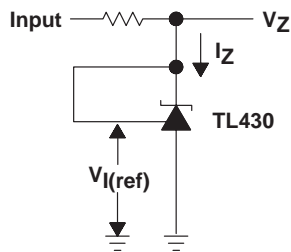


Figure 1. Test Circuit for $V_Z = V_{I(\text{ref})}$

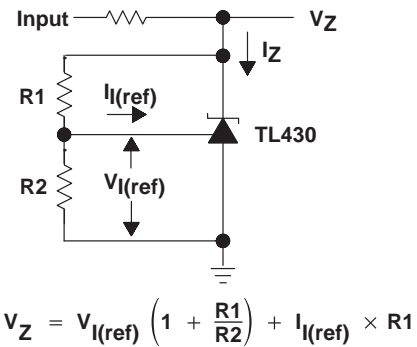


Figure 2. Test Circuit for $V_Z > V_{I(\text{ref})}$

TL430

ADJUSTABLE SHUNT REGULATORS

SLVS050B – JUNE 1976 – REVISED JULY 1999

TYPICAL CHARACTERISTICS

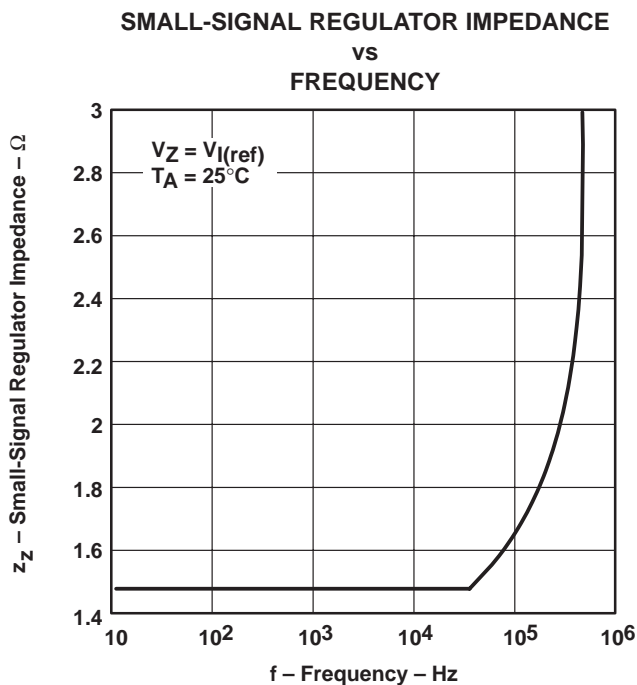


Figure 3

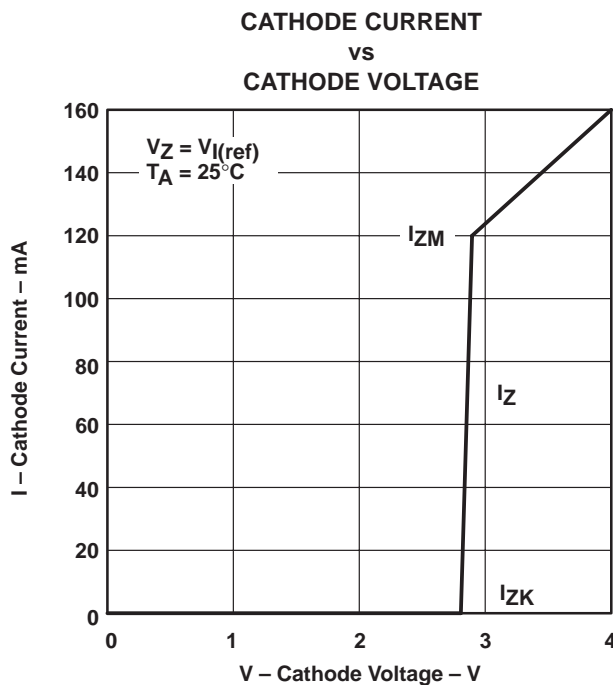


Figure 4

APPLICATION INFORMATION

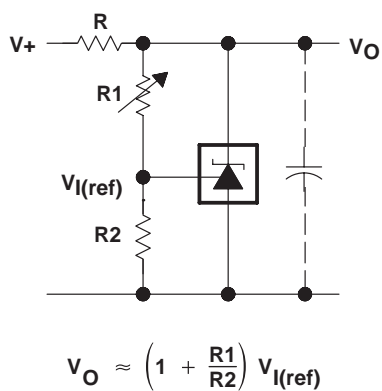


Figure 5. Shunt Regulator

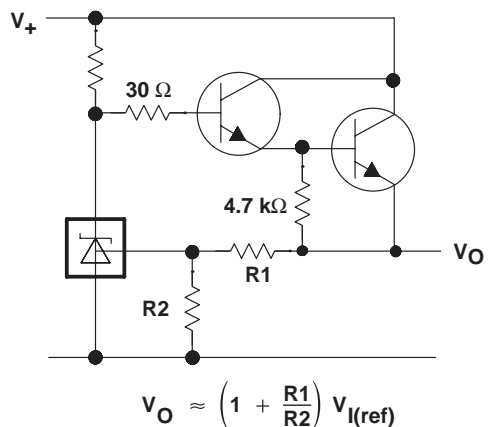


Figure 6. Series Regulator

APPLICATION INFORMATION

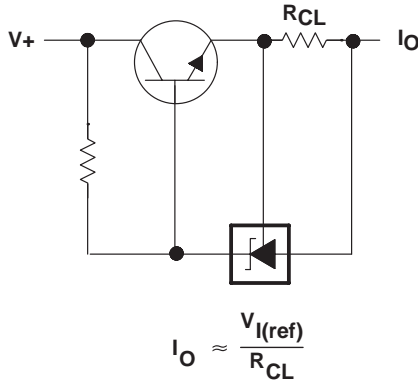
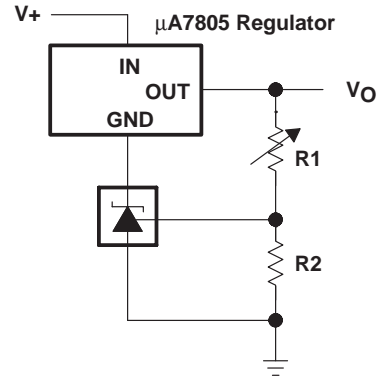


Figure 7. Current Limiter



$$V_O = \left(1 + \frac{R_1}{R_2}\right) V_{I(\text{ref})}$$

$$\text{Min } V_O = V_{I(\text{ref})} + 5V$$

Figure 8. Output Control of a 3-Terminal Fixed Regulator

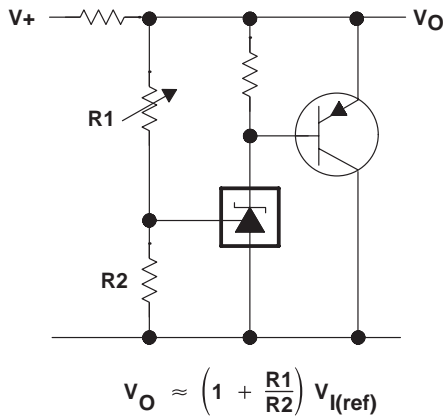


Figure 9. Higher-Current Applications

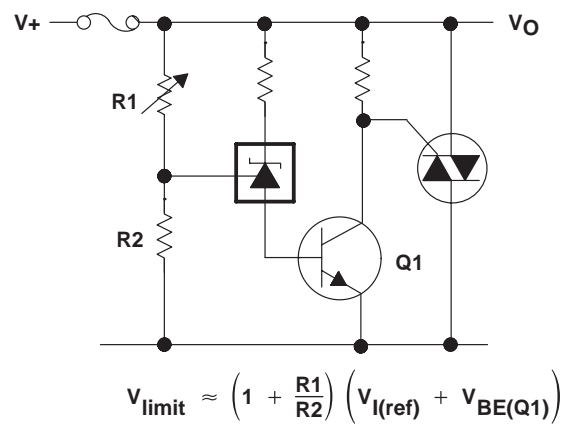


Figure 10. Crowbar

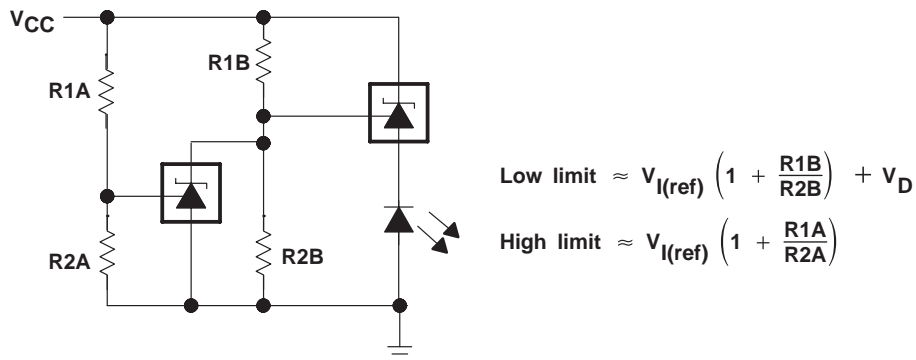


Figure 11. V_{CC} Monitor

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.