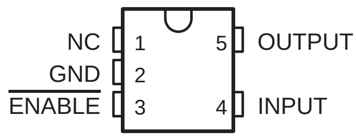
- **Low Drift . . . 30 ppm/°C (max)**
- **±0.5% Output-Voltage Tolerance**
- **Low Quiescent Current . . . 180 μA (max)**
- **Shutdown Feature**
- **Standby Current . . . –50 μA (max)**
- **Packaged In Plastic SOT-23 Package**

DBV PACKAGE
(TOP VIEW)



description

The TL461 is a precision series voltage reference with a very low temperature drift of 30 ppm/°C, and an output voltage tolerance of 0.5%. The TL461 offers a power-saving advantage over three-terminal precision shunt regulators and voltage references that must conduct the full-load current when operated in the reverse-breakdown region. In addition, the shutdown feature of the device provides low standby current. This device is ideal for use with handheld and battery-operated equipment, switching power supplies, dc-dc converters, A/D and D/A converters, and in low-power precision regulator applications.

The TL461 device is characterized for operation from –40°C to 85°C.

PRODUCT PREVIEW

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

Input voltage . . . . 30 V
Package thermal impedance, θ_{JA} (see Note 1) . . . . 347°C/W
Operating virtual junction temperature range, T_J . . . . 0°C to 150°C
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.

NOTE 1: Package thermal impedance is calculated in accordance with JESD 51.

recommended operating conditions

		MIN	MAX	UNIT
Input voltage, V_I	TL461-33	4.7		V
	TL461-05	6.4		
Output current, I_O			20	mA
Operating free-air temperature range, T_A		–40	85	°C
Operating virtual-junction temperature range, T_J		0	125	°C

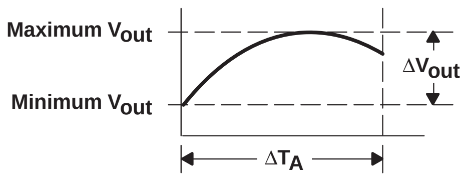
PRODUCT PREVIEW

electrical characteristics at 25°C free-air temperature, $V_{in} = V_{out} + 2.5$ V, $I_{out} = 0$ (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_O	Output voltage	TL461-33		25°C	3.284	3.3	3.317	V
		TL461-05		25°C	4.975	5	5.025	
αV_{out}	Output voltage temperature coefficient (see Note 2)		$T_{min} < T_j < T_{max}$	–40°C to 85°C		10	30	ppm/°C
ΔV_O	Line regulation		7.5 V < V_{in} < 20 V	25°C		3.1	6.3	mV
				–40°C to 85°C			8.1	
ΔV_O	Load regulation sourcing		I_{out} = 100 μA	25°C		2.2	3	mV
				–40°C to 85°C			4	
			I_{out} = 10 mA	25°C		14	27	
				–40°C to 85°C			35	
			I_{out} = 20 mA	25°C		22	40	
				–40°C to 85°C			50	
	Dropout voltage		I_{out} = 10 mA	–40°C to 85°C			1.4	V
I_O	Output current		V_{out} = GND	25°C		40		mA
	Reverse leakage		V_{in} = –15 V	–40°C to 85°C		0.5	10	μA
	Quiescent current			25°C		125	180	μA
				–40°C to 85°C			225	
	Standby current			–40°C to 85°C			50	μA
	$\overline{\text{ENABLE}}$ bias current		$\overline{\text{ENABLE}}$ = 0.8 V	–40°C to 85°C		7		μA
			$\overline{\text{ENABLE}}$ = 2 V			0.05		
	Output noise voltage (see Note 3)		0.1 Hz < f < 10 Hz	25°C		20		μV_{pp}
			10 Hz < f < 1 kHz			20		μV_{rms}
	Long-term stability of output voltage (see Note 4)			25°C		70		ppm/√kHz

NOTES: 2. Temperature coefficient is measured by dividing the change in output voltage by the specified temperature range.

$$\left|\alpha_{V_{out}}\right| \left(\frac{ppm}{°C}\right) = \frac{\left(\frac{\Delta V_{out}}{V_{out\ at\ 25°C}}\right) \times 10^6}{\Delta T_A}$$



Where:
ΔT_A is the recommended operating free-air temperature range of the device.
$\alpha_{V_{out}}$ can be positive or negative, depending on whether minimum V_{out} or maximum V_{out}, respectively, occurs at the lower temperature.

3. Peak-to-peak noise is measured with a single high-pass filter at 0.1 Hz and two-pole low-pass filter at 10 Hz. The unit is enclosed in a still-air environment to eliminate thermocouple effects on the leads. The test time is 10 seconds. RMS noise is measured with a single high-pass filter at 10 Hz and a two-pole low-pass filter at 1 kHz. The resulting output is full-wave rectified, then integrated for a fixed period, making the final reading an average rather than RMS. A correction factor of 1.1 converts from average to RMS. A second correction of 0.88 corrects for the nonideal bandpass of the filters.
4. Long-term stability typically has a logarithmic characteristic. Therefore, stability changes after 1000 hours tend to be much smaller than before that time. Total drift in the second thousand hours is normally less than one third of that of the first thousand hours, with a continuing trend toward reduced drift with time. Significant improvement in long-term drift can be realized by preconditioning the device with a 100-hour to 200-hour, 125°C burn-in. Long-term stability also is affected by differential stresses between the device and the board material that are created during board assembly.

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IMPORTANT NOTICE