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LM317T
Integrated Circuit
3–Terminal Adjustable Positive
Voltage Regulator

Description:

The LM317T is an adjustable 3–terminal positive voltage regulator in a TO220 type package capable of supplying in excess of 1.5A over a 1.2V to 37V output range. This device is exceptionally easy to use and both line and load regulation are better than standard fixed regulators.

In addition to higher performance than fixed regulators, the LM317T offers full overload protection available only in IC's. Included on the chip are current limit, thermal overload protection and safe area protection. All overload protection circuitry remains fully functional even if the adjustment terminal is disconnected.

Normally, no capacitors are needed unless the device is situated far from the input filter capacitors in which case an input bypass is needed. An optional output capacitor can be added to improve transient response. The adjustment terminal can be bypassed to achieve very high ripple rejection ratios which are difficult to achieve with standard 3–terminal regulators.

Besides replacing fixed regulators, the LM317T is useful in a wide variety of other applications. Since the regulator is "floating" and sees only the input–to–output differential voltage, supplies of several hundred volts can be regulated as long as the maximum input to output differential is not exceeded.

Also, it makes an especially simple adjustable switching regulator, a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the LM317T can be used as a precision current regulator. Supplies with electronic shutdown can be achieved by clamping the adjustment terminal to GND which programs the output to 1.2V where most loads draw little current.

Features:

- Adjustable Output Down to 1.2V
- Guaranteed 1.5A Output Current
- Line Regulation Typically 0.01%/V
- Load Regulation Typically 0.1%
- Current Limit Constant with Temperature
- 100% Electrical Burn–In
- Eliminates the Need to Stock Many Voltages
- 80dB Ripple Rejection

Absolute Maximum Ratings:

Power Dissipation, P_D . . . . . Internally Limited
Input–Output Voltage Differential, $V_I–V_O$ 40V
Operating Junction Temperature Range, T_J . . . . . 0° to +125°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C
Typical Thermal Resistance, Junction–to–Case, R_{thJC} . . . . . 4°C/W
Lead Temperature (During Soldering, 10sec), T_L . . . . . +300°C

Electrical Characteristics: ($0° \le T_J \le +125°C$, $V_{IN}-V_{OUT} = 5V$, $I_O = 500mA$, $I_{MAX} = 1.5A$, Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Line Regulation	Reg_{line}	$T_A = +25°C$, $3V \le (V_{IN}-V_{OUT}) \le 40V$, Note 2		–	0.01	0.04	%/V
		$3V \le (V_{IN}-V_{OUT}) \le 40V$		–	0.02	0.07	%/V
Load Regulation	Reg_{load}	$T_A = +25°C$, $10mA \le I_O \le 1_{MAX}$, Note 2	$V_{OUT} \le 5V$	–	5	25	mV
			$V_{OUT} \ge 5V$	–	0.1	0.5	%
		$10mA \le I_O \le 1_{MAX}$, Note 2	$V_{OUT} \le 5V$	–	20	70	mV
			$V_{OUT} \ge 5V$	–	0.3	1.5	%
Thermal Regulation		$T_A = +25°C$, 20ms Pulse		–	0.04	0.07	%/W
Adjustment Pin Current	I_{Adj}			–	50	100	≤A
Adjustment Pin Current Change	$\ge I_{Adj}$	$10mA \le I_L \le I_{MAX}$, $2.5V \le (V_{IN}-V_{OUT}) \le 40V$		–	0.2	5.0	≤A
Reference Voltage	V_{ref}	$3V \le (V_{IN}-V_{OUT}) \le 40V$, $10mA \le I_O \le 1_{MAX}$, $P \le P_{MAX}$		1.20	1.25	1.30	V
Temperature Stability	T_S	$0° \le T_J \le +125°C$		–	1	–	%
Minimum Load Current	I_{Lmin}	$(V_{IN}-V_{OUT}) \le 40V$		–	3.5	10	mA
Maximum Output Current Limit	I_{max}	$V_{IN}-V_{OUT} \le 15V$		1.5	2.2	–	A
		$V_{IN}-V_{OUT} = 40V$		–	0.4	–	A
RMS Output Noise, % of V_{OUT}	N	$T_A = +25°C$, $10Hz \le f \le 10kHz$		–	0.003	–	%
Ripple Rejection Ratio	RR	$V_{OUT} = 10V$, f = 120Hz		–	65	–	dB
			$C_{ADJ} = 10≤F$	66	80	–	dB
Long Term Stability	S	$T_A = +125°C$, 1000 Hours		–	0.3	1.0	%

Note 1. Although power dissipation is internally limited, these specifications are applicable for power dissipations of 20W.

Note 2. Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.