



General description

The WS337L is an adjustable 3-terminal negative voltage regulator capable of supplying 100mA over a 1.2V to 37V output range. It is exceptionally easy to use and requires only two external resistors to set the output voltage. Furthermore, both line and load regulation are better than standard fixed regulators. Also, the WS337L is packaged in a standard TO-92 transistor package which is easy to use. In addition to higher performance than fixed regulators, the WS337L offers full overload protection. 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, only a single 1 μ F solid tantalum output capacitor is needed unless the device is situated more than 6 inches from the input filter capacitors, in which case an input bypass is needed. A larger 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 WS337L is useful in a wide variety of other applications. Since the regulator is "floating" and sees only the 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 WS337L can be used as a precision current regulator. Supplies with electronic shutdown can be achieved by clamping the adjustment terminal to ground that program the output to 1.2V where most loads draw little current.

The WS337L is available in a standard TO-92 transistor package and a SO-8 surface mount package. The WS337 is rated for operation over a 0°C to +70°C range.

FEATURES

- Adjustable output down to 1.2V
- Guaranteed 100mA output current
- Line regulation typically 0.01%/V
- Load regulation typically 0.1%
- Current limit constant with temperature
- Eliminates the need to stock many voltages
- Standard 3-lead transistor package
- 80 dB ripple rejection
- Output is short circuit protected



ELECTRICAL CHARACTERISTICS ^{♠1}

Power dissipation	Internally Limited	Storage Temperature	-55°C to +150°C
Input-Output Voltage Differential	40v	Lead Temperature	
Operating Junction		Plastic Package (Soldering 4 sec.)	260°C
Temperature Range	-0°C to +70°C	ESD rating to be determined.	

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
ADJUSTMENT PIN CURRENT			50	100	μ A
ADJUSTMENT PIN CURRENT CHANGE	$5\text{mA} \leq I_{\text{OUT}} \leq 100\text{mA}$ $3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 40\text{V}$		0.2	5	μ A
REFERENCE VOLTAGE	$3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 40\text{V}$, $\clubsuit_3$ $10\text{mA} \leq I_{\text{OUT}} \leq 100\text{mA}$, $P \leq 625\text{mW}$	-1.3	-1.25	-1.2	V
LINE REGULATION	$3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 40\text{V}$, $\clubsuit_2$		0.02	0.07	%/V
LOAD REGULATION	$5\text{mA} \leq I_{\text{OUT}} \leq 100\text{mA}$, $\clubsuit_2$		0.3	1.5	%
TEMPERATURE STABILITY	$T_{\text{MIN}} \leq T_{\text{J}} \leq T_{\text{MAX}}$		0.65		%
MINIMUM LOAD CURRENT	$ V_{\text{IN}} - V_{\text{OUT}} \leq 40\text{V}$		3.5	5	mA
	$3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 15\text{V}$		2.2	3.5	mA
CURRENT LIMIT	$3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 13\text{V}$	100	200	320	mA
	$ V_{\text{IN}} - V_{\text{OUT}} = 40\text{V}$	25	50	120	mA
RMS OUTPUT NOISE, % OF VOUT	$T_{\text{A}} = 25^\circ\text{C}$, $10\text{Hz} - f - 10\text{KHz}$		0.03		%
RIPPLE REJECTION RATIO	$V_{\text{OUT}} = -10\text{V}$, $F = 120\text{Hz}$, $C_{\text{ADJ}} = 0$		65		dB
	$C_{\text{ADJ}} = 10 \mu\text{F}$	66	80		dB
LONG-TERM STABILITY	$T_{\text{A}} = 70^\circ\text{C}$		0.3	1	%

^{♠1} : Unless otherwise specified, these specifications apply $0^\circ\text{C} \leq T_{\text{J}} \leq 70^\circ\text{C}$ for the WS337L; $V_{\text{IN}} - V_{\text{OUT}} = 5\text{V}$ and $I_{\text{OUT}} = 40\text{mA}$. Although power dissipation is internally limited, these specifications are applicable for power dissipation up to 625mW. I_{MAX} is 100mA.

^{♠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.

^{♠3} : Thermal resistance of the TO-92 package is $180^\circ\text{C}/\text{W}$ junction to ambient with 0.4" leads from a PC board and $160^\circ\text{C}/\text{W}$ junction to ambient with 0.125" lead length to PC board. The M package θ_{JA} is $180^\circ\text{C}/\text{W}$ in still air