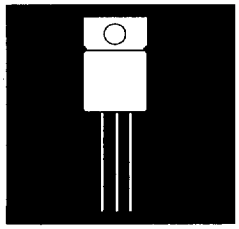
0.6 VOLT LOW DROPOUT NEGATIVE FIXED VOLTAGE REGULATOR



Three Terminal, Fixed Voltage, 1 Amp Low Dropout Voltage Regulator In Hermetic JEDEC TO-257AA Package

FEATURES

- Similar To Industry Standard LM2990
- Dropout Voltage Typically 0.6 V @ I_O = 1 A
- Output Current in Excess of 1 A
- Low Quiescent Current
- Internal Short Circuit Protection
- Isolated Hermetic Package

DESCRIPTION

These three terminal fixed negative voltage regulators are designed to provide 1.0A with high efficiency. It has the ability to source 1A of output current with a typical dropout voltage of .6V and a maximum of 1V over the entire temperature range. It is supplied in the hermetic TO-257 package and is ideally suited for Military applications where small size and high reliability is required.

ABSOLUTE MAXIMUM RATINGS

Input Voltage . . . . . -26V to 0.3 V dc
Output Voltage . . . . . -5V, -12V, -15V dc
Operating Junction Temperature Range . . . . . - 55°C to + 125°C
Storage Temperature Range . . . . . - 65°C to + 150°C
Lead Temperature (Soldering 10 seconds) . . . . . 300°C
Thermal Resistance:
θ_{JC} (Isolated) . . . . . 4.2°C/W
θ_{JA} . . . . . 42°C/W
Maximum Output Current 1.2A

3.3

ELECTRICAL CHARACTERISTICS, P/N OM2990-5 (5Volt)

Test Conditions are $-55°C \le T_A \le 125°C$, $V_{IN} = -10$ V, $C_{OUT} = 47$ µF (unless otherwise specified).

Parameter	Symbol	Test Conditions	Notes	Min.	Max.	Unit
Output Voltage	V_{OUT}	5 mA ≤ I_O ≤ 1 A	1	-5.10	-4.90	V
			2	-5.25	-4.75	
Quiescent Current	I_Q	I_O ≤ 1 A	1		5	mA
		I_O = 1 A, V_{IN} = -5 V	1		50	
Line Regulation	V_{RLN}	-6 V ≤ V_{IN} ≤ -26 V, I_{OUT} = 5 mA	1		45	mV
Load Regulation	V_{RLD}	50 mA ≤ I_{OUT} ≤ 1 A	1		45	mV
Dropout Voltage	V_{DO}	ΔV_O ≤ 100 mV, I_{OUT} = 1 A	2		1	V
		ΔV_O ≤ 100 mV, I_{OUT} = 100 mA	2		300	mV
Output Noise Voltage	V_{ON}	I_O = 5 mA, 10 Hz - 100 Hz	1 3		750	µV rms
Short Circuit Current	I_{OS}	R_L = 1 Ω	1	1.27		A
Maximum Output Current	I_{OS}		1	1.27		A
Ripple Rejection	R_R	V_{ripple} = 1 V_{rms}, I_{OUT} = 5 mA, f = 1 kHz	1	50		dB

Notes: 1. T_A = 25°C.
2. Over full operating temperature range.
3. Guaranteed not tested

ELECTRICAL CHARACTERISTICS, P/N OM2990-12 (12Volt)

Test Conditions are $-55°C \le T_A \le 125°C$, $V_{IN} = -17$ V, $C_{OUT} = 47$ µF (unless otherwise specified).

Parameter	Symbol	Test Conditions	Notes	Min.	Max.	Unit
Output Voltage	V_{OUT}	5 mA ≤ I_O ≤ 1 A	1	-12.24	-11.76	V
			2	-12.60	-11.40	
Quiescent Current	I_Q	I_O ≤ 1 A	1		5	mA
		I_O = 1 A, V_{IN} = -12 V	1		50	
Line Regulation	V_{RLN}	-13V ≤ V_{IN} ≤ -26 V, I_{OUT} = 5 mA	1		65	mV
Load Regulation	V_{RLD}	50 mA ≤ I_{OUT} ≤ 1 A	1		55	mV
Dropout Voltage	V_{DO}	ΔV_O ≤ 100 mV, I_{OUT} = 1 A	2		1	V
		ΔV_O ≤ 100 mV, I_{OUT} = 100 mA	2		300	mV
Output Noise Voltage	V_{ON}	I_O = 5 mA, 10 Hz - 100 Hz	1 3		1500	µV rms
Short Circuit Current	I_{OS}	R_L = 1 Ω	1	.75		A
Maximum Output Current	I_{OS}		1	1.18		A
Ripple Rejection	R_R	V_{ripple} = 1 V_{rms}, I_{OUT} = 5 mA, f = 1 kHz	1	42		dB

Notes: 1. T_A = 25°C.
2. Over full operating temperature range.
3. Guaranteed not tested

3.3

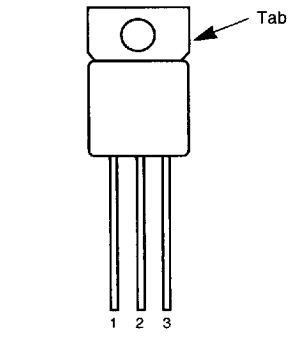
ELECTRICAL CHARACTERISTICS, P/N OM2990-15 (15Volt)

Test Conditions are -55°C ≤ T_A ≤ 125°C, V_{IN} = -20 V, C_{OUT} = 47 µF (unless otherwise specified).

Parameter	Symbol	Test Conditions	Notes	Min.	Max.	Unit
Output Voltage	V_{OUT}	5 mA ≤ I_O ≤ 1 A	1	-15.30	-14.70	V
			2	-15.75	-14.25	
Quiescent Current	I_Q	I_O ≤ 1 A	1		5	mA
		I_O = 1 A, V_{IN} = -15 V	1		50	
Line Regulation	V_{RLN}	-16 V ≤ V_{IN} ≤ -26 V, I_{OUT} = 5 mA	1		65	mV
Load Regulation	V_{RLD}	50 mA ≤ I_{OUT} ≤ 1 A	1		55	mV
Dropout Voltage	V_{DO}	ΔV_O ≤ 100 mV, I_{OUT} = 1 A	2		1	V
		ΔV_O ≤ 100 mV, I_{OUT} = 100 mA	2		300	mV
Output Noise Voltage	V_{ON}	I_O = 5 mA, 10 Hz - 100 Hz	1 3		1800	µV rms
Short Circuit Current	I_{OS}	R_L = 1 Ω	1	.63		A
Maximum Output Current	I_{OS}		1	1.18		A
Ripple Rejection	R_R	V_{ripple} = 1 V_{rms}, I_{OUT} = 5 mA, f = 1 kHz	1	42		dB

Notes: 1. T_A = 25°C.
2. Over full operating temperature range.
3. Guaranteed not tested

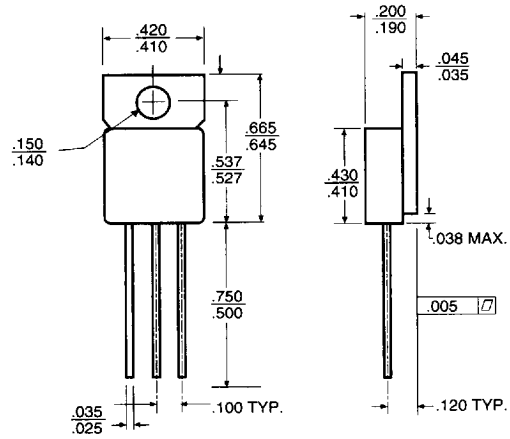
PIN CONNECTION



Front View

Pin 1: G_{ND} Pin 3: V_{OUT}
Pin 2: V_{IN} Tab: Isolated

MECHANICAL OUTLINE



NOTES
- Case is metal/hermetically sealed
- Isolated Tab

3.3

Omnirel

DEFINITION OF TERMS

DROPOUT VOLTAGE: The input-output differential at which the circuit ceases to regulate against further reduction in input voltage. Measured when the output voltage has dropped 100 mV from the nominal value obtained at (Vout + 5V) input, dropout voltage is dependent upon load current and junction temperature.

INPUT VOLTAGE: The DC voltage applied to the input terminals with respect to ground.

INPUT-OUTPUT DIFFERENTIAL: The voltage difference between the unregulated input voltage and the regulated output voltage for which the regulator will operate.

LINE REGULATION: The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

LOAD REGULATION: The change in ouput voltage for a change in load current at constant chip temperature.

OUTPUT NOISE VOLTAGE: The rms AC voltage at the output, with constant load and no input ripple, measured over a specified frequency range.

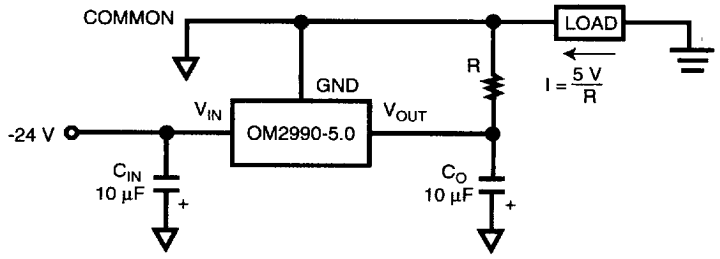
QUIESCENT CURRENT: That part of the positive input current that does not contribute to the positive load current. The regulator ground lead current.

RIPPLE REJECTION: The ratio of the peak-to-peak input ripple voltage to the peak-to-peak output ripple voltage.

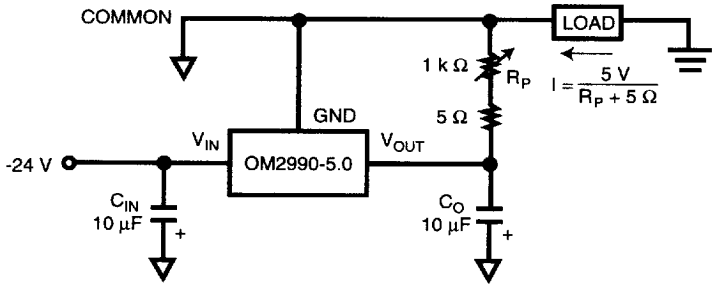
TEMPERATURE STABILITY OF Vout: The percentage change in ouput voltage for a thermal variation from room temperature to either temperature extreme.

TYPICAL APPLICATIONS

Fixed Current Sink



Adjustable Current Sink



3.3

APPLICATION HINTS

EXTERNAL CAPACITORS

The OM2990 regulator requires an ouput capacitor to maintain stability. The capacitor must be at least 10 µF aluminum electrolytic or 1 µF solid tantalum. The output capacitor's ESR must be less than 10Ω, or the zero added to the regulator frequency response by the ESR could reduce the phase margin, creating oscillations. An input capacitor, of at least 1 µF solid tantalum or 10 µF aluminum electrolytic, is also needed if the regulator is situated more than 6" from the input power supply filter.

FORCING THE OUTPUT POSITIVE

Due to an internal clamp circuit, the OM2990 can withstand positive voltages on its output. If the voltage source pulling the output positive is DC, the current must be limited to 1.5A. A current over 1.5A fed back into the OM2990 could damage the device. The OM2990 output can also withstand fast positive voltage transients up to 26V, without any current limiting of the source. However, if the transients have a duration of over 1 ms, the output should be clamped with a Schottky diode to ground.