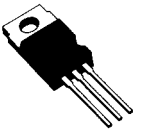
VERY LOW DROP VOLTAGE REGULATOR

- OUPUT CURRENT IN EXCESS OF 400mA
- INPUT/OUTPUT DROP TYP. 0.25V at 150mA OVER FULL TEMPERATURE RANGE
- OVERVOLTAGE PROTECTION (± 40V)
- REVERSE POLARITY PROTECTION
- FOLDBACK CURRENT LIMITING
- THERMAL SHUTDOWN
- VERY LOW QUIESCENT CURRENT



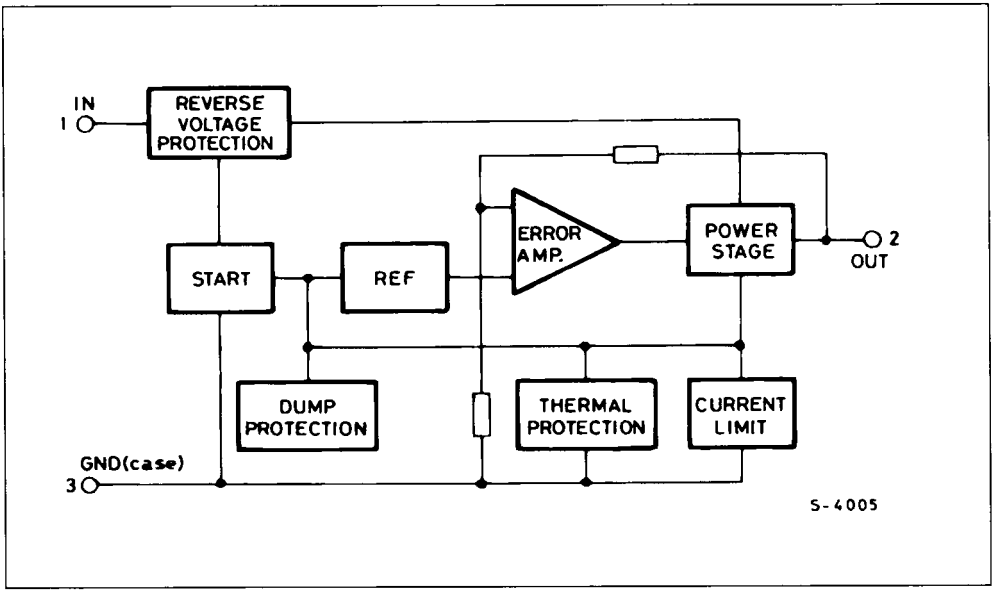
TO 220

ORDER CODE : LM2930A

DESCRIPTION

The LM2930A is an improved version of the LM2930 5V voltage regulator which features an output current rating of 400mA with a dropout voltage of 0.4V typ. (T_j = 25°C). At 150mA the dropout voltage falls to 0.2V. Moreover, the LM2930A includes ± 40V input overvoltage protections plus reverse polarity protection, thermal shutdown and foldback current limiting. Designed primarily for automotive applications, the LM2930A protects both itself and the load from load dump field decays transients and incorrect battery connection. The low voltage drop of this device allows correct operation even during starting when the battery voltage can fall below 6V. The LM2930A is available in a T0-220 plastic power package.

BLOCK DIAGRAM



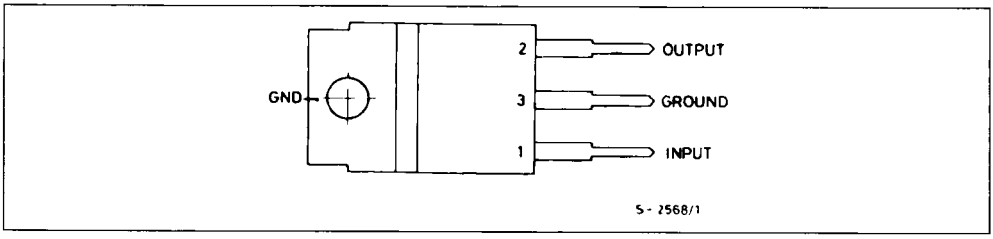
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_I	DC Input Voltage	35	V
	DC Input Reverse Voltage	– 18	V
	Transient Input Overvoltage :		
	Load Dump :	+ 40	V
	5ms ≤ T_{rise} ≤ 10ms,		
	τ_f Fall Time Constant = 100ms,		
	R_{source} ≥ 0.5Ω		
	Field Decay :	– 40	V
	5ms ≤ t_{fall} ≤ 10ms		
	t_r Rise Time Constant = 33ms,		
	R_{source} ≤ 10Ω		
T_j, T_{stg}	Junction and Storage Temperature Range	– 55 to 150	°C

THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	4	°C/W

PIN CONNECTION (top view)

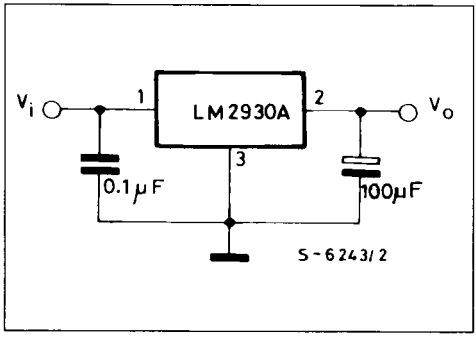


TEST AND APPLICATION CIRCUIT

The output capacitor is required for stability. Though the 100 µF shown is the minimum recommended value, actual size and type may vary depending upon the application load and temperature range. Capacitor effective series resistance (ESR) also factors in the IC stability. Since ESR varies from one brand to the next, some bench work may be required to determine the minimum capacitor value to use in production. Worst-case is usually determined at the minimum ambient temperature and maximum load expected.

Output capacitors can be increased in size to any desired value above the minimum. One possible purpose of this would be to maintain the output voltages during brief conditions of negative input transients that might be characteristic of a particular system.

Capacitors must also be rated at all ambient temperature expected in the system. Many aluminum type electrolytics will freeze at temperatures less than – 30 °C, reducing their effective capacitance to zero. To maintain regulator stability down to – 40 °C, capacitors rated at that temperature (such as tantalums) must be used.



ELECTRICAL CHARACTERISTICS (V_i = 14.4 V, Co = 100 µF, T_j = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	6 V ≤ V_i ≤ 26 V (*), 5 mA ≤ I_o ≤ 400 mA	4.80	5.00	5.20	V
ΔV_o	Line Regulation	6 V ≤ V_i ≤ 26 V, I_o = 5 mA		5	50	mV
ΔV_o	Load Regulation	5 mA ≤ I_o ≤ 400 mA		15	75	mV
R_o	Output Impedance	100 mA_{DC} & 10 mArms, 100 Hz – 10 KHz		200		mΩ
I_d	Quiescent Current	I_o = 5 mA I_o = 150 mA		0.8 22	2 40	mA mA
e_N	Output Noise Voltage	10 Hz – 100 KHz		140		µVrms
LTS	Long Term Stability			20		mV/1000 hr
SVR	Supply Voltage Rejection	f_o = 120 Hz $V_i = V_o + 3\ V + 2\ V_{PP}$ Co = 100 µF		60		dB
I_o	Current Limit			800		mA
$V_i - V_o$	Dropout Voltage	I_o = 150 mA I_o = 400 mA		0.2 0.4	0.4 0.7	V V
I_{SC}	Output Short Circuit Current (foldback condition)			350	500	mA

⊗ **Note :** For a DC voltage 26 V < Vi < 35 V the device is not operating

ELECTRICAL CHARACTERISTICS (V_i = 14.4 V, C_O = 100 µF, – 40 ≤ T_j ≤ 125 °C (see note1) unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	6.5 V ≤ Vi ≤ 26 V, 5 mA ≤ I_o ≤ 400 mA	4.70	5.00	5.30	V
ΔV_o	Line Regulation	6.5 V ≤ V_i ≤ 26 V, I_o = 5 mA		10	75	mV
ΔV_o	Load Regulation	5 mA ≤ I_o ≤ 400 mA		22	110	mV
I_d	Quiescent Current	I_o = 5 mA I_o = 150 mA		1.2 40	3 70	mA mA
I_o	Current Limit			870		mA
$V_i - V_o$	Dropout Voltage	I_o = 150 mA I_o = 400 mA		0.25 0.5	0.5 0.9	V V
I_{sc}	Output Short Circuit Current (foldback condition)			230		mA

Note : 1. Design limits are guaranteed by statistical control on production samples over the indicated temperature and supply voltage ranges. These limits are not used to calculate outgoing quality levels.