Voltage Regulators

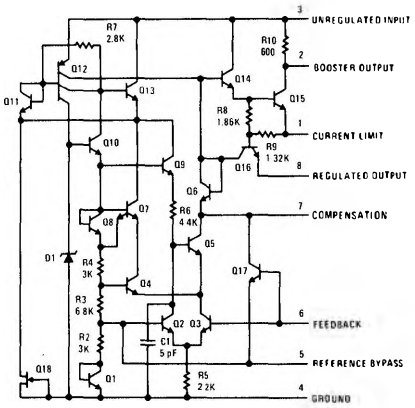
LM305A voltage regulator general description

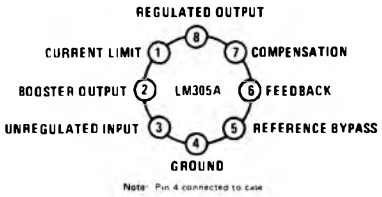
The LM305A is a positive voltage regulator designed primarily for commercial series regulator applications. By itself, it will supply output currents up to 45 mA; but external transistors can be added to provide any desired load current. The circuit features extremely low standby current drain, and provision is made for either linear or foldback current limiting. Important characteristics are:

- 45 mA output current without external pass transistor
- Output currents in excess of 10A possible by adding external transistors
- Maximum input voltage = 50V
- Output voltage adjustable from 4.5V to 40V
- Can be used as either a linear or a switching regulator

The LM305A is also useful in a wide range of other applications such as a shunt regulator, a current regulator or a temperature controller.

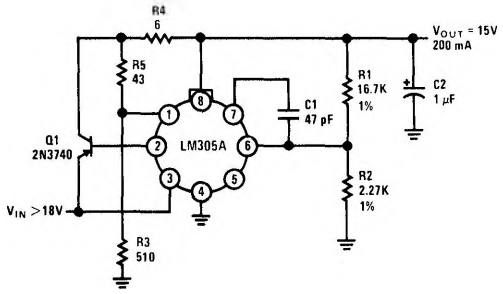
schematic and connection diagrams



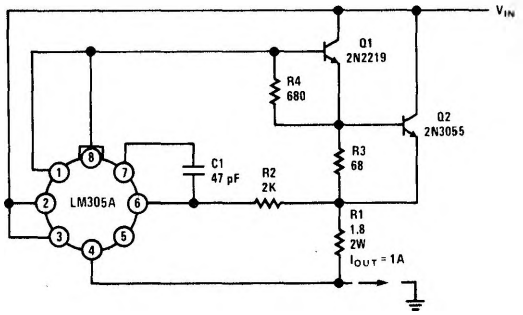


typical applications

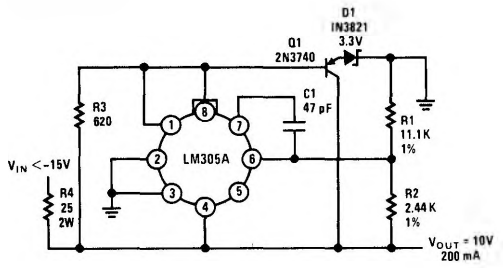
Linear Regulator with Foldback Current Limiting



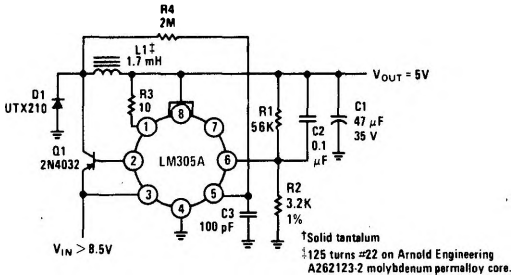
Current Regulator



Shunt Regulator



Switching Regulator



absolute maximum ratings

Input Voltage	50V
Input-Output Voltage Differential	40V
Power Dissipation (Note 1)	800 mW
Operating Temperature Range	0°C to 70°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 60 sec)	300°C

electrical characteristics (Note 2)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range		8.5		50	V
Output Voltage Range		4.5		40	V
Output-Input Voltage Differential		3.0		30	V
Load Regulation (Note 3)	$0 \leq I_O \leq 45$ mA				
	$R_{SC} = 0\Omega$, $T_A = 25°C$		0.02	0.2	%
	$R_{SC} = 0\Omega$, $T_A = 70°C$		0.03	0.4	%
	$R_{SC} = 0\Omega$, $T_A = 0°C$		0.03	0.4	%
Line Regulation	$V_{IN} - V_{OUT} \leq 5V$		0.025	0.06	%/V
	$V_{IN} - V_{OUT} > 5V$		0.015	0.03	%/V
Ripple Rejection	$C_{REF} = 10\ \mu F$, f = 120 Hz		0.003		%/V
Temperature Stability	$0°C \leq T_A \leq 70°C$		0.3	1.0	%
Feedback Sense Voltage		1.55	1.7	1.85	V
Output Noise Voltage	10 Hz ≤ f ≤ 10 kHz				
	$C_{REF} = 0$		0.005		%
	$C_{REF} > 0.1\ \mu F$		0.002		%
Current Limit Sense Voltage (Note 4)	$R_{SC} = 10\Omega$, $T_A = 25°C$, $V_{OUT} = 0V$	225	300	375	mV
Standby Current Drain	$V_{IN} = 50V$		0.8	2.0	mA
Long Term Stability			0.1	1.0	%

Note 1: For operating at elevated temperatures, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance of 45°C/W junction to case or 150°C/W junction to ambient.

Note 2: These specifications apply for an operating temperature between 0°C and 70°C, for input and output voltages within the ranges given, and for a divider impedance seen by the feedback terminal of 2 KΩ, unless otherwise specified. The load and line regulation specifications are for constant junction temperature. Temperature drift effects must be taken into account separately when the unit is operating under conditions of high dissipation.

Note 3: The output currents given, as well as the load regulation, can be increased by the addition of external transistors. The improvement factor will be roughly equal to the composite current gain of the added transistors.

Note 4: With no external pass transistor.