



## LM341 Series 3-Terminal Positive Regulators

### General Description

The LM341-XX series of three terminal regulators is available with several fixed output voltages making them useful in a wide range of applications. One of these is local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow these regulators to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment. Although designed primarily as fixed voltage regulators these devices can be used with external components to obtain adjustable voltages and currents.

The LM341-XX series is available in TO-202 and TO-220 plastic packages allowing these regulators to deliver over 0.5A if adequate heat sinking is provided. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistor is provided to limit internal power dissipation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shutdown circuit takes over preventing the IC from overheating.

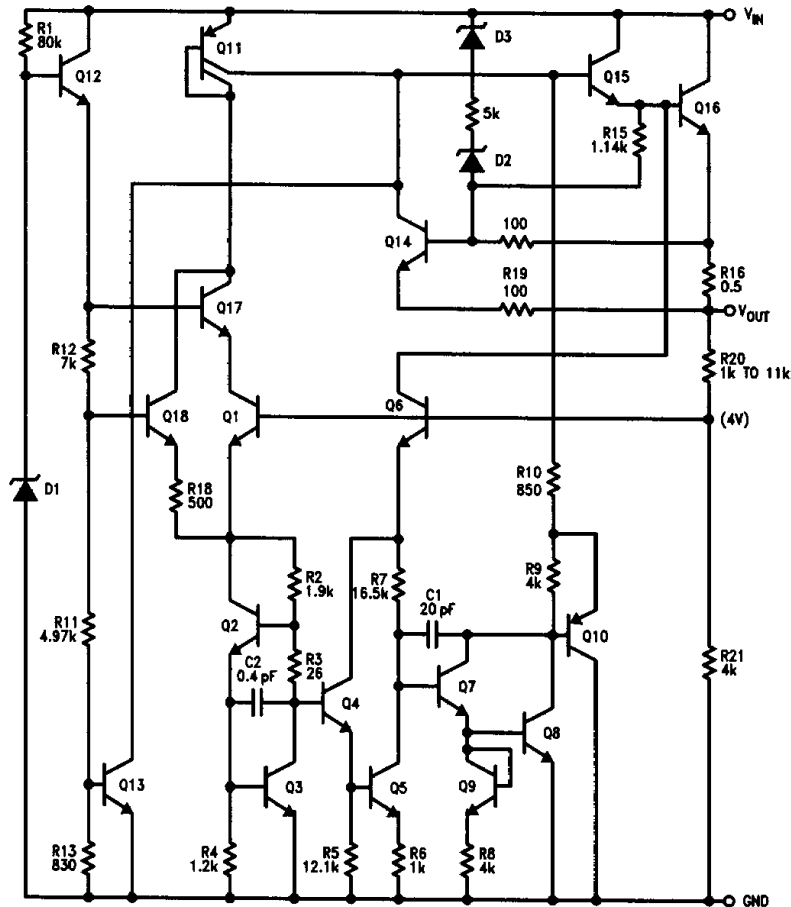
Considerable effort was expended to make the LM341-XX series of regulators easy to use and minimize the number of external components. It is not necessary to bypass the output, although this does improve transient response. Input bypassing is needed only if the regulator is located far from the filter capacitor of the power supply.

For output voltage other than 5V, 12V and 15V the LM117 series provides an output voltage range from 1.2V to 57V.

### Features

- Output current in excess of 0.5A
- Internal thermal overload protection
- No external components required
- Output transistor safe area protection
- Internal short circuit current limit
- Available in plastic TO-202 and TO-220 package
- Special circuitry allows start-up even if output is pulled to negative voltage ( $\pm$  supplies)

### Schematic Diagram



TL/H/10484-1

**Absolute Maximum Ratings** (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Input Voltage 35V  
 Internal Power Dissipation Internally Limited  
 Operating Temperature Range 0°C to +70°C

Maximum Junction Temperature +125°C  
 Storage Temperature Range -65°C to +150°C  
 Lead Temperature (Soldering, 10 sec.) +230°C  
 ESD Susceptibility TBD

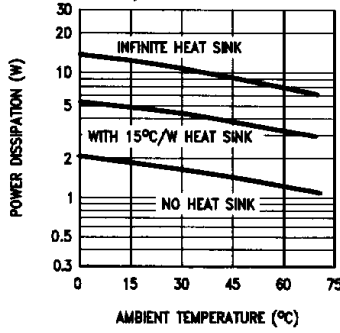
**Electrical Characteristics**  $T_A = 0^\circ\text{C}$  to  $+70^\circ\text{C}$ ,  $I_O = 500$  mA, unless otherwise noted

Output Voltage			5V	12V	15V	Units							
Input Voltage (unless otherwise noted)			10V	19V	23V								
Symbol	Parameter	Conditions	Min	Typ	Max	Min	Typ	Max					
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	4.8	5	5.2	11.5	12	12.5	14.4	15	15.6	V	
		$P_D \leq 7.5\text{W}$ , $5\text{ mA} \leq I_O \leq 500\text{ mA}$ and $V_{\text{MIN}} \leq V_{\text{IN}} \leq V_{\text{MAX}}$	4.75		5.25	11.4		12.6	14.25		15.75	V	
$\Delta V_O$	Line Regulation	$T_J = 25^\circ\text{C}$ , $I_O = 100\text{ mA}$			50			120			150	mV	
		$T_J = 25^\circ\text{C}$ , $I_O = 500\text{ mA}$			100			240			300	mV	
			(7.2 $\leq V_{\text{IN}} \leq 25$ )			(14.5 $\leq V_{\text{IN}} \leq 30$ )			(17.6 $\leq V_{\text{IN}} \leq 30$ )				
$\Delta V_O$	Load Regulation	$T_J = 25^\circ\text{C}$ , $5\text{ mA} \leq I_O \leq 500\text{ mA}$			100			240			300	mV	
$\Delta V_O$	Long Term Stability				20			48			60	mV/khrs	
$I_Q$	Quiescent Current	$T_J = 25^\circ\text{C}$			4			10			4	10	mA
$\Delta I_Q$	Quiescent Current Change	$T_J = 25^\circ\text{C}$ $5\text{ mA} \leq I_O \leq 500\text{ mA}$			0.5			0.5			0.5	mA	
		$T_J = 25^\circ\text{C}$ $V_{\text{MIN}} \leq V_{\text{IN}} \leq V_{\text{MAX}}$			1			1			1	mA	
			(7.5 $\leq V_{\text{IN}} \leq 25$ )			(14.8 $\leq V_{\text{IN}} \leq 30$ )			(18 $\leq V_{\text{IN}} \leq 30$ )				
$V_n$	Output Noise Voltage	$T_J = 25^\circ\text{C}$ , $f = 10\text{ Hz} - 100\text{ kHz}$			40			75			90	$\mu\text{V}$	
$\frac{\Delta V_{\text{IN}}}{\Delta V_{\text{OUT}}}$	Ripple Rejection	$f = 120\text{ Hz}$			78			71			69	dB	
	Input Voltage Required to Maintain Line Regulation	$T_J = 25^\circ\text{C}$ , $I_O = 500\text{ mA}$			7.2			14.5			17.6	V	
	Thermal Resistance Junction to Case	P Package			12			12			12	$^\circ\text{C}/\text{W}$	
		T Package			5			5			5	$^\circ\text{C}/\text{W}$	
	Thermal Resistance Junction to Ambient	P Package			70			70			70	$^\circ\text{C}/\text{W}$	
		T Package			60			60			60	$^\circ\text{C}/\text{W}$	

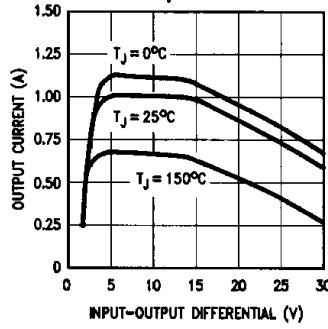
**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

# Typical Performance Characteristics

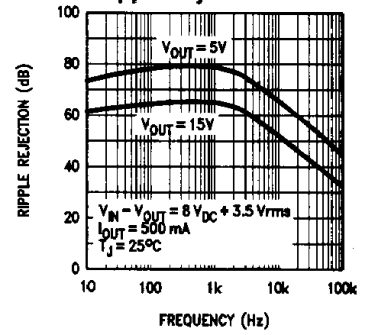
**Maximum Average Power Dissipation**



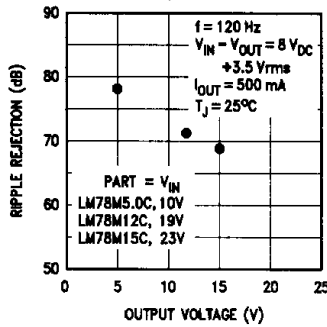
**Peak Output Current**



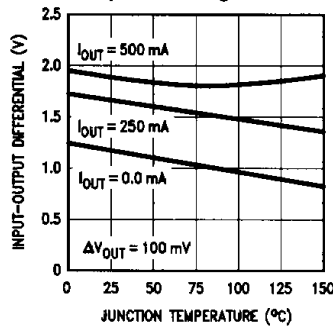
**Ripple Rejection**



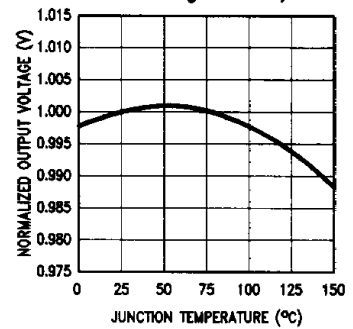
**Ripple Rejection**



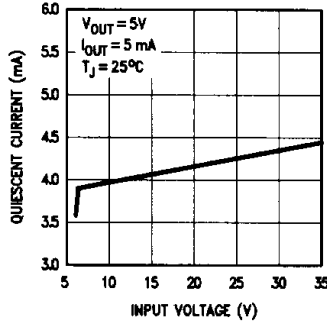
**Dropout Voltage**



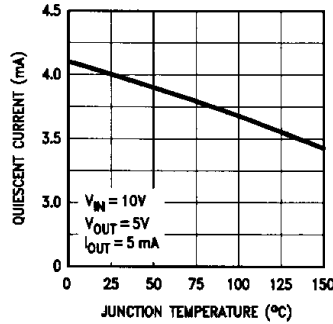
**Output Voltage (Normalized to 1V at  $T_J = 25^\circ\text{C}$ )**



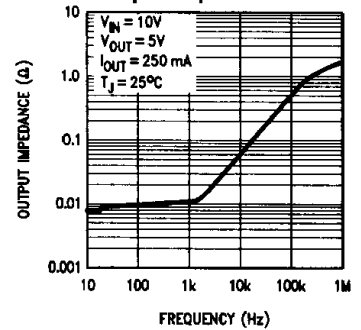
**Quiescent Current**



**Quiescent Current**

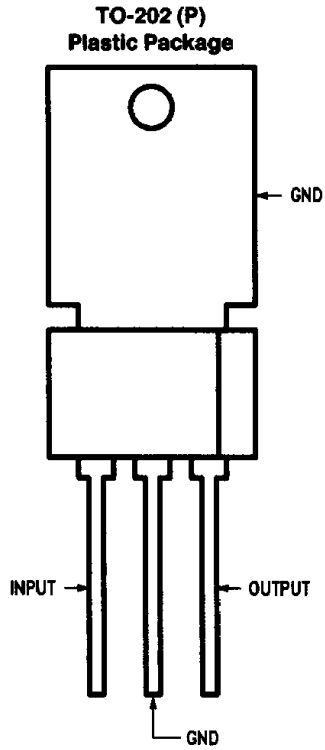


**Output Impedance**



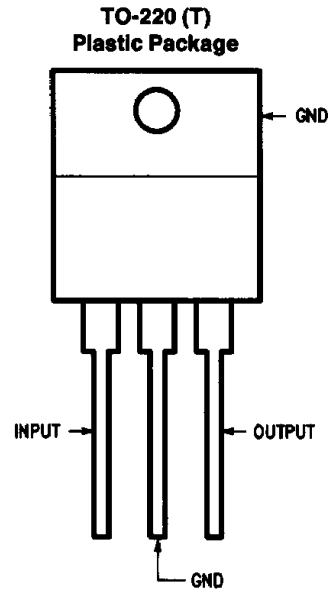
TL/H/10484-4

### Connection Diagrams



**Order Numbers**  
LM341P-5.0  
LM341P-12  
LM341P-15  
**See NS Package Number P03A**

TL/H/10484-2



**Order Numbers**  
LM341T-5.0  
LM341T-12  
LM341T-15  
**See NS Package Number T03B**

TL/H/10484-3