



Voltage Regulators

LM340

LM340 series voltage regulators

general description

The LM340-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 LM340-XX series is available in two power packages. Both the plastic TO-220 and metal TO-3 packages allow these regulators to deliver over 1.0A if adequate heat sinking is provided. Even with over 1.0A of output current available the regulators are essentially blow-out proof. 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 LM340-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.

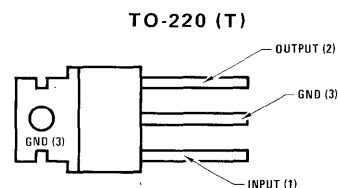
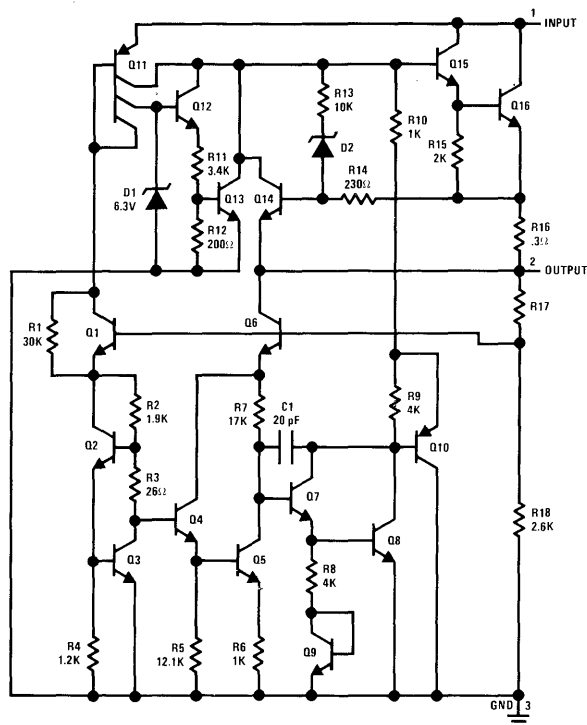
features

- Output current in excess of 1A
- Internal thermal overload protection
- No external components required
- Output transistor safe area protection
- Internal short circuit current limit
- Available in plastic TO-220 and metal TO-3 packages

voltage range

LM340-05	5V	LM340-15	15V
LM340-06	6V	LM340-18	18V
LM340-08	8V	LM340-24	24V
LM340-12	12V		

schematic and connection diagrams

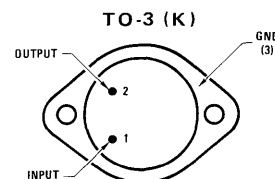


TOP VIEW

Order Numbers:

LM340-05T LM340-15T
LM340-06T LM340-18T
LM340-08T LM340-24T
LM340-12T

See Package 26



BOTTOM VIEW

Order Numbers:

LM340-05K LM340-15K
LM340-06K LM340-18K
LM340-08K LM340-24K
LM340-12K

See Package 18

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absolute maximum ratings

Input Voltage ($V_O = 5V$ through $18V$)	35V
($V_O = 24V$)	40V
Internal Power Dissipation (Note 1)	Internally Limited
Operating Temperature Range	0°C to 70°C
Maximum Junction Temperature	
TO-3 Package	150°C
TO-220 Package	125°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature	
TO-3 Package (Soldering, 10 sec)	300°C
TO-220 Package (Soldering, 10 sec)	230°C

electrical characteristics

LM340-05 ($V_{IN} = 10V$, $I_{OUT} = 500\text{ mA}$, $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^{\circ}\text{C}$	4.8	5.0	5.2	V
Line Regulation	$T_j = 25^{\circ}\text{C}$, $7V \leq V_{IN} \leq 25V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			50 100	mV mV
Load Regulation	$T_j = 25^{\circ}\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5A$			100	mV
Output Voltage	$7V \leq V_{IN} \leq 20V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	4.75		5.25	V
Quiescent Current	$T_j = 25^{\circ}\text{C}$		6.0	10	mA
Quiescent Current Change	$7V \leq V_{IN} \leq 25V$ $5\text{ mA} \leq I_{OUT} \leq 1.5A$			1.3 0.5	mA mA
Output Noise Voltage	$T_A = 25^{\circ}\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		40		μV
Long Term Stability				20	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		70		dB
Dropout Voltage	$T_j = 25^{\circ}\text{C}$, $I_{OUT} = 1.0A$		2.0		V

LM340-06 ($V_{IN} = 11V$, $I_{OUT} = 500\text{ mA}$, $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^{\circ}\text{C}$	5.75	6.0	6.25	V
Line Regulation	$T_j = 25^{\circ}\text{C}$, $8V \leq V_{IN} \leq 25V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			60 120	mV mV
Load Regulation	$T_j = 25^{\circ}\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5A$			120	mV
Output Voltage	$8V \leq V_{IN} \leq 21V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	5.7		6.3	V
Quiescent Current	$T_j = 25^{\circ}\text{C}$		6.0	10	mA
Quiescent Current Change	$8V \leq V_{IN} \leq 25V$ $5\text{ mA} \leq I_{OUT} \leq 1.5A$			1.3 0.5	mA mA
Output Noise Voltage	$T_A = 25^{\circ}\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		45		μV
Long Term Stability				24	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		65		dB
Dropout Voltage	$T_j = 25^{\circ}\text{C}$, $I_{OUT} = 1.0A$		2.0		V

Note 1: Thermal resistance without a heat sink for junction to case temperature is 4.0°C/W for the TO-3 package and 2.0°C/W for the TO-220 package. Thermal resistance for case to ambient temperature is 35°C/W for the TO-3 package and 50°C/W for the TO-220 package.

electrical characteristics (con't)**LM340-08** ($V_{IN} = 14V$, $I_{OUT} = 500\text{ mA}$, $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^{\circ}\text{C}$	7.7	8.0	8.3	V
Line Regulation	$T_j = 25^{\circ}\text{C}$, $10.5V \leq V_{IN} \leq 25V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			80 160	mV mV
Load Regulation	$T_j = 25^{\circ}\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5A$			160	mV
Output Voltage	$10.5V \leq V_{IN} \leq 23V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	7.6		8.4	V
Quiescent Current	$T_j = 25^{\circ}\text{C}$		6.0	10	mA
Quiescent Current Change	$10.5V \leq V_{IN} \leq 25V$ $5\text{ mA} \leq I_{OUT} \leq 1.5A$			1.0 0.5	mA mA
Output Noise Voltage	$T_A = 25^{\circ}\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		52		μV
Long Term Stability				32	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		62		dB
Dropout Voltage	$T_j = 25^{\circ}\text{C}$, $I_{OUT} = 1.0A$		2.0		V

LM340-12 ($V_{IN} = 19V$, $I_{OUT} = 500\text{ mA}$, $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^{\circ}\text{C}$	11.5	12.0	12.5	V
Line Regulation	$T_j = 25^{\circ}\text{C}$, $14.5V \leq V_{IN} \leq 30V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			120 240	mV mV
Load Regulation	$T_j = 25^{\circ}\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5A$			240	mV
Output Voltage	$14.5V \leq V_{IN} \leq 27V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	11.4		12.6	V
Quiescent Current	$T_j = 25^{\circ}\text{C}$		6.0	10	mA
Quiescent Current Change	$14.5V \leq V_{IN} \leq 30V$ $5\text{ mA} \leq I_{OUT} \leq 1.5A$			1.0 0.5	mA mA
Output Noise Voltage	$T_A = 25^{\circ}\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		75		μV
Long Term Stability				48	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		61		dB
Dropout Voltage	$T_j = 25^{\circ}\text{C}$, $I_{OUT} = 1.0A$		2.0		V

LM340-15 ($V_{IN} = 23V$, $I_{OUT} = 500\text{ mA}$, $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^{\circ}\text{C}$	14.4	15.0	15.6	V
Line Regulation	$T_j = 25^{\circ}\text{C}$, $17.5V \leq V_{IN} \leq 30V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			150 300	mV mV
Load Regulation	$T_j = 25^{\circ}\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5A$			300	mV
Output Voltage	$17.5V \leq V_{IN} \leq 30V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	14.25		15.75	V
Quiescent Current	$T_j = 25^{\circ}\text{C}$		6.0	10	mA
Quiescent Current Change	$17.5V \leq V_{IN} \leq 30V$ $5\text{ mA} \leq I_{OUT} \leq 1.5A$			1.0 0.5	mA mA
Output Noise Voltage	$T_A = 25^{\circ}\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		90		μV
Long Term Stability				60	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		60		dB
Dropout Voltage	$T_j = 25^{\circ}\text{C}$, $I_{OUT} = 1.0A$		2.0		V

electrical characteristics (con't)

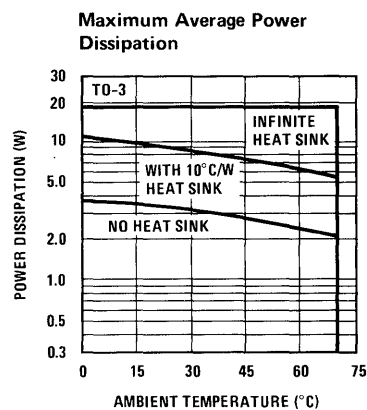
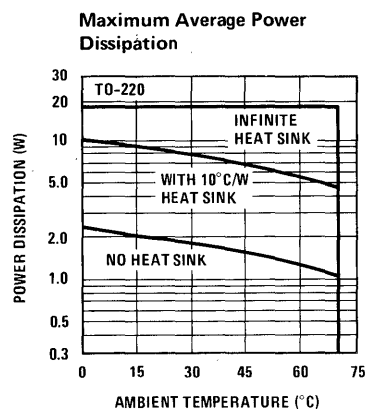
LM340-18 ($V_{IN} = 27V$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$, unless otherwise specified)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^\circ\text{C}$	17.3	18.0	18.7	V
Line Regulation	$T_j = 25^\circ\text{C}$, $21V \leq V_{IN} \leq 33V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			180 360	mV mV
Load Regulation	$T_j = 25^\circ\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$			360	mV
Output Voltage	$21V \leq V_{IN} \leq 33V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	17.1		18.9	V
Quiescent Current	$T_j = 25^\circ\text{C}$		6.0	10	mA
Quiescent Current Change	$21V \leq V_{IN} \leq 33V$ $5\text{ mA} \leq I_{OUT} \leq 1.0A$			1.0 0.5	mA mA
Output Noise Voltage	$T_A = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		110		μV
Long Term Stability				72	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		59		dB
Dropout Voltage	$T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0A$		2.0		V

LM340-24 ($V_{IN} = 33V$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$, unless otherwise specified)

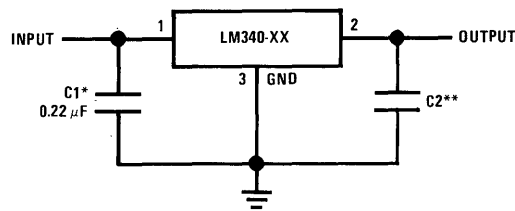
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	$T_j = 25^\circ\text{C}$	23.0	24.0	25.0	V
Line Regulation	$T_j = 25^\circ\text{C}$, $27V \leq V_{IN} \leq 38V$ $I_{OUT} = 100\text{ mA}$ $I_{OUT} = 500\text{ mA}$			240 480	mV mV
Load Regulation	$T_j = 25^\circ\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$			480	mV
Output Voltage	$27V \leq V_{IN} \leq 38V$, $5\text{ mA} \leq I_{OUT} \leq 1.0A$ $P_D \leq 15W$	22.8		25.2	V
Quiescent Current	$T_j = 25^\circ\text{C}$		6.0	10	mA
Quiescent Current Change	$27V \leq V_{IN} \leq 38V$ $5\text{ mA} \leq I_{OUT} \leq 1.0A$			1.0 0.5	mA mA
Output Noise Voltage	$T_A = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		170		μV
Long Term Stability				96	mV
Ripple Rejection	$I_{OUT} = 20\text{ mA}$, $f = 120\text{ Hz}$		56		dB
Dropout Voltage	$T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0A$		2.0		V

typical performance characteristics



typical applications

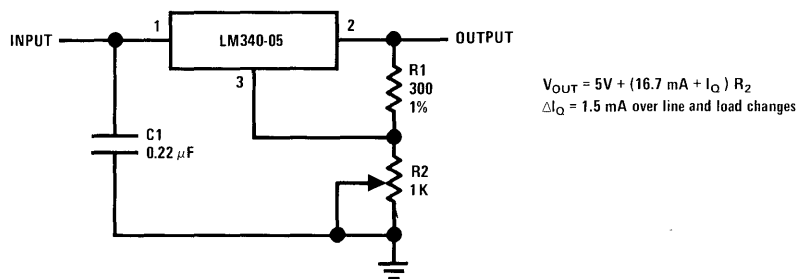
Fixed Output Regulator



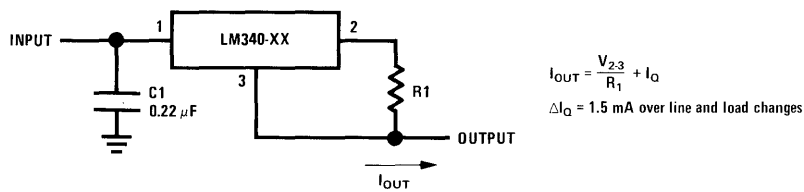
*Required if the regulator is located far from the power supply filter.

**Although no output capacitor is needed for stability, it does help transient response.
(If needed use 0.1 μF, ceramic, disc.)

Adjustable Output Regulator



Current Regulator



High Current Voltage Regulator

