

## LM78LXX Series

### 3-Terminal Positive Regulators

#### General Description

The LM78LXX series of three terminal positive regulators is available with several fixed output voltages making them useful in a wide range of applications. When used as a zener diode/resistor combination replacement, the LM78LXX usually results in an effective output impedance improvement of two orders of magnitude, and lower quiescent current. These regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow the LM78LXX to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment.

The LM78LXX is available in the plastic TO-92 (Z) package, the plastic SO-8 (M) package and a chip sized package (8-Bump micro SMD) using National's micro SMD package technology. With adequate heat sinking the regulator can deliver 100 mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors is provided to limit inter-

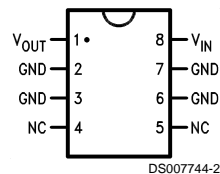
nal power dissipation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shutdown circuit takes over preventing the IC from overheating.

#### Features

- LM78L05 in micro SMD package
- Output voltage tolerances of  $\pm 5\%$  over the temperature range
- Output current of 100 mA
- Internal thermal overload protection
- Output transistor safe area protection
- Internal short circuit current limit
- Available in plastic TO-92 and plastic SO-8 low profile packages
- No external components
- Output voltages of 5.0V, 6.2V, 8.2V, 9.0V, 12V, 15V
- See AN-1112 for micro SMD considerations

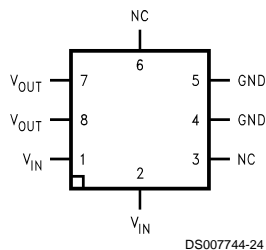
#### Connection Diagrams

SO-8 Plastic (M)  
(Narrow Body)

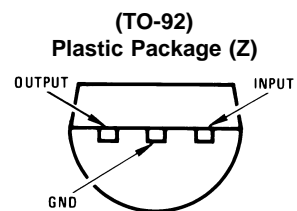


Top View

8-Bump micro SMD

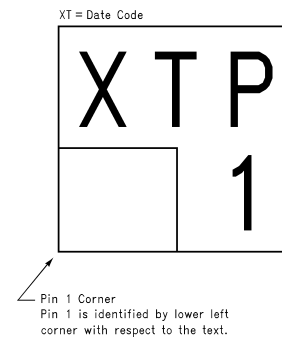


Top View  
(Bump Side Down)



Bottom View

micro SMD Marking Orientation



Top View

**Absolute Maximum Ratings** (Note 1)

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

Power Dissipation (Note 5)	Internally Limited
Input Voltage	35V
Storage Temperature	-65°C to +150°C

Operating Junction Temperature

SO-8

0°C to 125°C

micro SMD

-40°C to 85°C

Soldering Information

Infrared or Convection (20 sec.)

235°C

Wave Soldering (10 sec.)

260°C (lead time)

ESD Susceptibility (Note 2)

1kV

**LM78LXX Electrical Characteristics** Limits in standard typeface are for  $T_J = 25^\circ\text{C}$ , **Bold typeface applies over 0°C to 125°C for SO-8 package and -40°C to 85°C for micro SMD package.** Limits are guaranteed by production testing or correlation techniques using standard Statistical Quality Control (SQC) methods. Unless otherwise specified:  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ .

**LM78L05**Unless otherwise specified,  $V_{IN} = 10\text{V}$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_O$	Output Voltage		4.8	5	5.2	V
		$7\text{V} \leq V_{IN} \leq 20\text{V}$ $1\text{ mA} \leq I_O \leq 40\text{ mA}$ (Note 3)	<b>4.75</b>		<b>5.25</b>	
		$1\text{ mA} \leq I_O \leq 70\text{ mA}$ (Note 3)	<b>4.75</b>		<b>5.25</b>	
$\Delta V_O$	Line Regulation	$7\text{V} \leq V_{IN} \leq 20\text{V}$		18	75	mV
		$8\text{V} \leq V_{IN} \leq 20\text{V}$		10	54	
$\Delta V_O$	Load Regulation	$1\text{ mA} \leq I_O \leq 100\text{ mA}$		20	60	mV
		$1\text{ mA} \leq I_O \leq 40\text{ mA}$		5	30	
$I_Q$	Quiescent Current			3	5	mA
$\Delta I_Q$	Quiescent Current Change	$8\text{V} \leq V_{IN} \leq 20\text{V}$ $1\text{ mA} \leq I_O \leq 40\text{ mA}$			<b>1.0</b> <b>0.1</b>	
$V_n$	Output Noise Voltage	$f = 10\text{ Hz to } 100\text{ kHz}$ (Note 4)		40		$\mu\text{V}$
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	$f = 120\text{ Hz}$ $8\text{V} \leq V_{IN} \leq 16\text{V}$	47	62		dB
$I_{PK}$	Peak Output Current			140		mA
$\frac{\Delta V_O}{\Delta T}$	Average Output Voltage Tempco	$I_O = 5\text{ mA}$		-0.65		$\text{mV}/^\circ\text{C}$
$V_{IN}(\text{Min})$	Minimum Value of Input Voltage Required to Maintain Line Regulation			6.7	7	V
$\theta_{JA}$	Thermal Resistance (8-Bump micro SMD)			230.9		$^\circ\text{C}/\text{W}$

**LM78L62AC**Unless otherwise specified,  $V_{IN} = 12\text{V}$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_O$	Output Voltage		5.95	6.2	6.45	V
		$8.5\text{V} \leq V_{IN} \leq 20\text{V}$ $1\text{ mA} \leq I_O \leq 40\text{ mA}$ (Note 3)	<b>5.9</b>		<b>6.5</b>	
		$1\text{ mA} \leq I_O \leq 70\text{ mA}$ (Note 3)	<b>5.9</b>		<b>6.5</b>	
$\Delta V_O$	Line Regulation	$8.5\text{V} \leq V_{IN} \leq 20\text{V}$		65	175	mV
		$9\text{V} \leq V_{IN} \leq 20\text{V}$		55	125	
$\Delta V_O$	Load Regulation	$1\text{ mA} \leq I_O \leq 100\text{ mA}$		13	80	mV
		$1\text{ mA} \leq I_O \leq 40\text{ mA}$		6	40	

**LM78L62AC** (Continued)Unless otherwise specified,  $V_{IN} = 12V$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$I_Q$	Quiescent Current			2	5.5	mA
$\Delta I_Q$	Quiescent Current Change	$8V \leq V_{IN} \leq 20V$ $1 \text{ mA} \leq I_O \leq 40 \text{ mA}$			1.5 0.1	
$V_n$	Output Noise Voltage	$f = 10 \text{ Hz to } 100 \text{ kHz}$ (Note 4)		50		$\mu V$
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	$f = 120 \text{ Hz}$ $10V \leq V_{IN} \leq 20V$	40	46		dB
$I_{PK}$	Peak Output Current			140		mA
$\frac{\Delta V_O}{\Delta T}$	Average Output Voltage Tempco	$I_O = 5 \text{ mA}$		-0.75		$\text{mV}/^\circ\text{C}$
$V_{IN} \text{ (Min)}$	Minimum Value of Input Voltage Required to Maintain Line Regulation			7.9		V

**LM78L82AC**Unless otherwise specified,  $V_{IN} = 14V$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_O$	Output Voltage		7.87	8.2	8.53	V
		$11V \leq V_{IN} \leq 23V$ $1 \text{ mA} \leq I_O \leq 40 \text{ mA}$ (Note 3)	7.8		8.6	
		$1 \text{ mA} \leq I_O \leq 70 \text{ mA}$ (Note 3)	7.8		8.6	
$\Delta V_O$	Line Regulation	$11V \leq V_{IN} \leq 23V$		80	175	mV
		$12V \leq V_{IN} \leq 23V$		70	125	
$\Delta V_O$	Load Regulation	$1 \text{ mA} \leq I_O \leq 100 \text{ mA}$		15	80	
		$1 \text{ mA} \leq I_O \leq 40 \text{ mA}$		8	40	
$I_Q$	Quiescent Current			2	5.5	mA
$\Delta I_Q$	Quiescent Current Change	$12V \leq V_{IN} \leq 23V$ $1 \text{ mA} \leq I_O \leq 40 \text{ mA}$			1.5 0.1	
$V_n$	Output Noise Voltage	$f = 10 \text{ Hz to } 100 \text{ kHz}$ (Note 4)		60		$\mu V$
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	$f = 120 \text{ Hz}$ $12V \leq V_{IN} \leq 22V$	39	45		dB
$I_{PK}$	Peak Output Current			140		mA
$\frac{\Delta V_O}{\Delta T}$	Average Output Voltage Tempco	$I_O = 5 \text{ mA}$		-0.8		$\text{mV}/^\circ\text{C}$
$V_{IN} \text{ (Min)}$	Minimum Value of Input Voltage Required to Maintain Line Regulation			9.9		V

**LM78L09AC**Unless otherwise specified,  $V_{IN} = 15V$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_O$	Output Voltage		8.64	9.0	9.36	V
		$11.5V \leq V_{IN} \leq 24V$ $1 \text{ mA} \leq I_O \leq 40 \text{ mA}$ (Note 3)	8.55		9.45	
		$1 \text{ mA} \leq I_O \leq 70 \text{ mA}$ (Note 3)	8.55		9.45	

**LM78L09AC** (Continued)Unless otherwise specified,  $V_{IN} = 15V$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$\Delta V_O$	Line Regulation	$11.5V \leq V_{IN} \leq 24V$		100	200	mV
		$13V \leq V_{IN} \leq 24V$		90	150	
$\Delta V_O$	Load Regulation	$1 mA \leq I_O \leq 100 mA$		20	90	mV
		$1 mA \leq I_O \leq 40 mA$		10	45	
$I_Q$	Quiescent Current			2	5.5	mA
$\Delta I_Q$	Quiescent Current Change	$11.5V \leq V_{IN} \leq 24V$			<b>1.5</b>	
		$1 mA \leq I_O \leq 40 mA$			<b>0.1</b>	
$V_n$	Output Noise Voltage			70		$\mu V$
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	$f = 120 Hz$ $15V \leq V_{IN} \leq 25V$	38	44		dB
$I_{PK}$	Peak Output Current			140		mA
$\frac{\Delta V_O}{\Delta T}$	Average Output Voltage Tempco	$I_O = 5 mA$		-0.9		$mV/^{\circ}C$
$V_{IN} (Min)$	Minimum Value of Input Voltage Required to Maintain Line Regulation			10.7		V

**LM78L12AC**Unless otherwise specified,  $V_{IN} = 19V$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_O$	Output Voltage		11.5	12	12.5	V
		$14.5V \leq V_{IN} \leq 27V$ $1 mA \leq I_O \leq 40 mA$ (Note 3)	<b>11.4</b>		<b>12.6</b>	
		$1 mA \leq I_O \leq 70 mA$ (Note 3)	<b>11.4</b>		<b>12.6</b>	
$\Delta V_O$	Line Regulation	$14.5V \leq V_{IN} \leq 27V$		30	180	mV
		$16V \leq V_{IN} \leq 27V$		20	110	
$\Delta V_O$	Load Regulation	$1 mA \leq I_O \leq 100 mA$		30	100	mV
		$1 mA \leq I_O \leq 40 mA$		10	50	
$I_Q$	Quiescent Current			3	5	mA
$\Delta I_Q$	Quiescent Current Change	$16V \leq V_{IN} \leq 27V$			<b>1</b>	
		$1 mA \leq I_O \leq 40 mA$			<b>0.1</b>	
$V_n$	Output Noise Voltage			80		$\mu V$
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	$f = 120 Hz$ $15V \leq V_{IN} \leq 25$	40	54		dB
$I_{PK}$	Peak Output Current			140		mA
$\frac{\Delta V_O}{\Delta T}$	Average Output Voltage Tempco	$I_O = 5 mA$		-1.0		$mV/^{\circ}C$
$V_{IN} (Min)$	Minimum Value of Input Voltage Required to Maintain Line Regulation			13.7	14.5	V

**LM78L15AC**Unless otherwise specified,  $V_{IN} = 23V$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_O$	Output Voltage		14.4	15.0	15.6	V
		$17.5V \leq V_{IN} \leq 30V$ $1 mA \leq I_O \leq 40 mA$ (Note 3)	<b>14.25</b>		<b>15.75</b>	
		$1 mA \leq I_O \leq 70 mA$ (Note 3)	<b>14.25</b>		<b>15.75</b>	
$\Delta V_O$	Line Regulation	$17.5V \leq V_{IN} \leq 30V$		37	250	mV
		$20V \leq V_{IN} \leq 30V$		25	140	
$\Delta V_O$	Load Regulation	$1 mA \leq I_O \leq 100 mA$		35	150	mV
		$1 mA \leq I_O \leq 40 mA$		12	75	
$I_Q$	Quiescent Current			3	5	mA
$\Delta I_Q$	Quiescent Current Change	$20V \leq V_{IN} \leq 30V$			<b>1</b>	
		$1 mA \leq I_O \leq 40 mA$			<b>0.1</b>	
$V_n$	Output Noise Voltage			90		$\mu V$
$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	Ripple Rejection	$f = 120 Hz$ $18.5V \leq V_{IN} \leq 28.5V$	37	51		dB
$I_{PK}$	Peak Output Current			140		mA
$\frac{\Delta V_O}{\Delta T}$	Average Output Voltage Tempco	$I_O = 5 mA$		-1.3		mV/°C
$V_{IN} (Min)$	Minimum Value of Input Voltage Required to Maintain Line Regulation			16.7	17.5	V

**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Electrical specifications do not apply when operating the device outside of its stated operating conditions.

**Note 2:** Human body model, 1.5 k $\Omega$  in series with 100 pF.

**Note 3:** Power dissipation  $\leq 0.75W$ .

**Note 4:** Recommended minimum load capacitance of 0.01  $\mu F$  to limit high frequency noise.

**Note 5:** Typical thermal resistance values for the packages are:

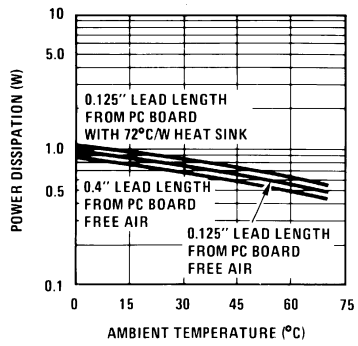
**Z** Package:  $\theta_{JC} = 60 ^\circ C/W$ ,  $\theta_{JA} = 230 ^\circ C/W$

**M** Package:  $\theta_{JA} = 180 ^\circ C/W$

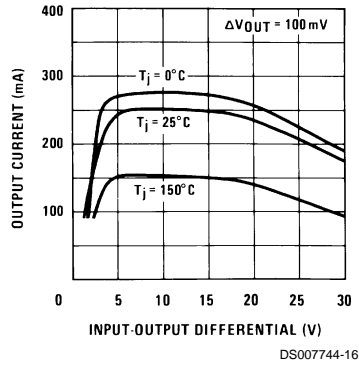
**micro SMD** Package:  $\theta_{JA} = 230.9 ^\circ C/W$

# Typical Performance Characteristics

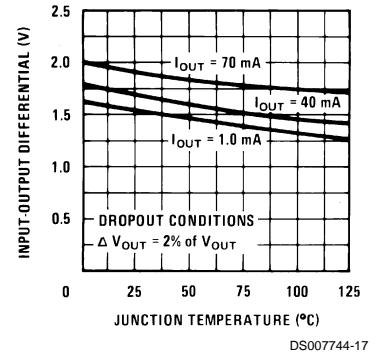
Maximum Average Power Dissipation (Z Package)



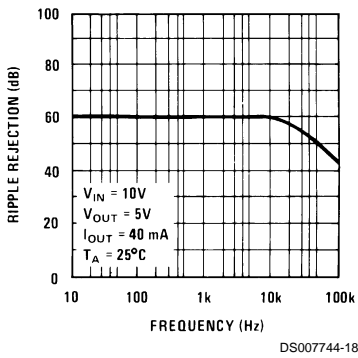
Peak Output Current



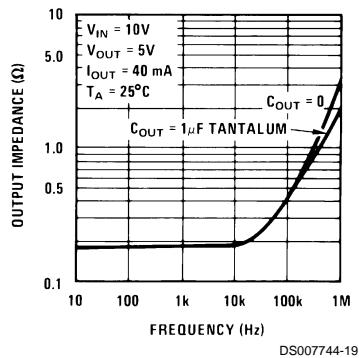
Dropout Voltage



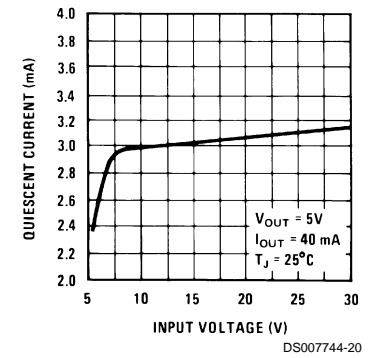
Ripple Rejection



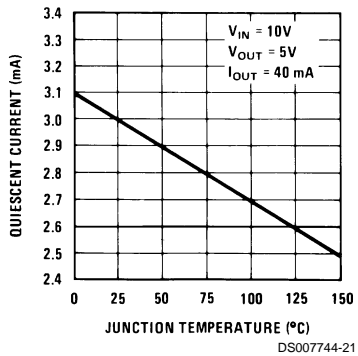
Output Impedance



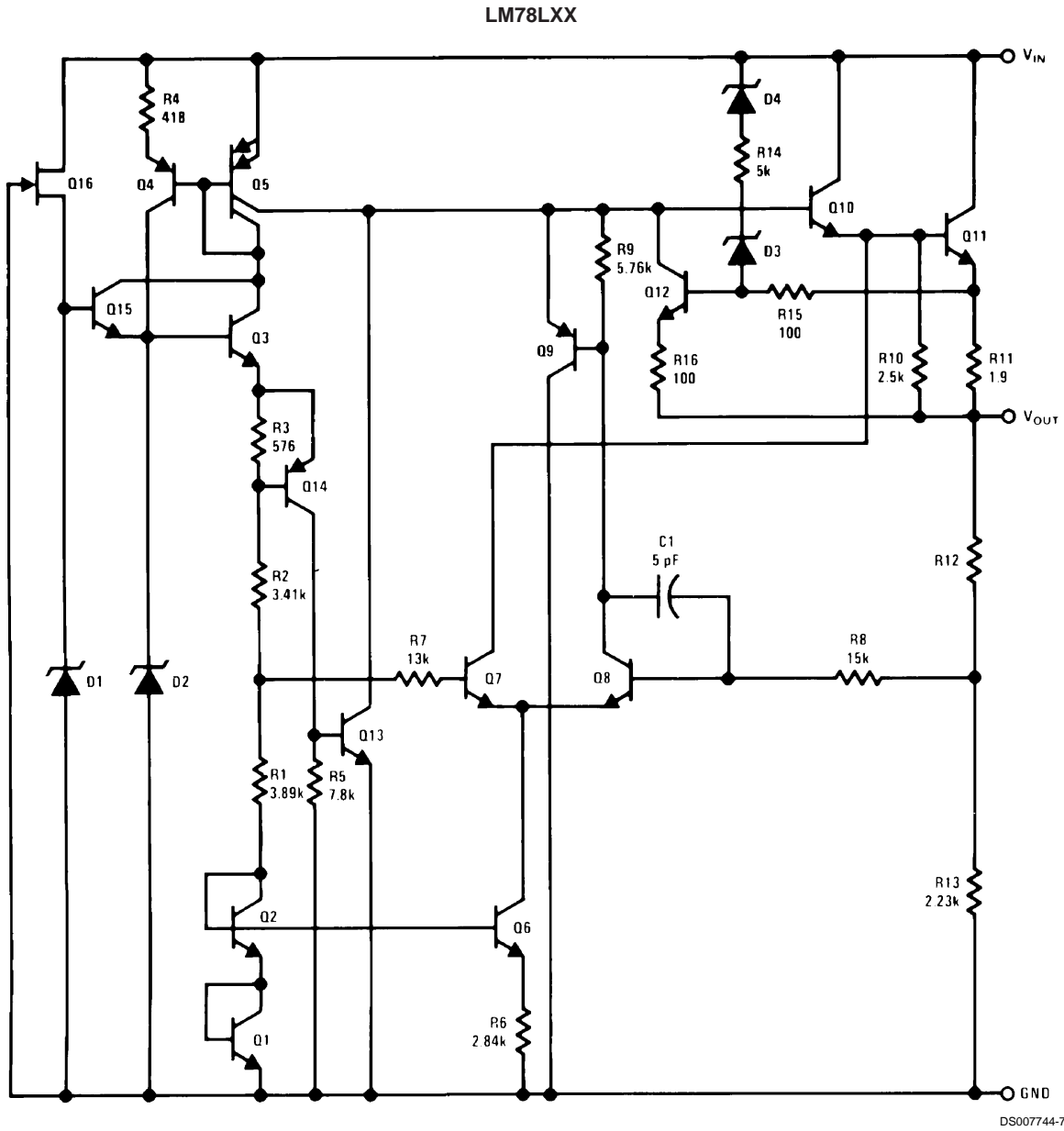
Quiescent Current



Quiescent Current

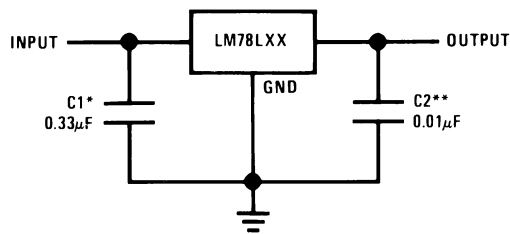


# Equivalent Circuit



## Typical Applications

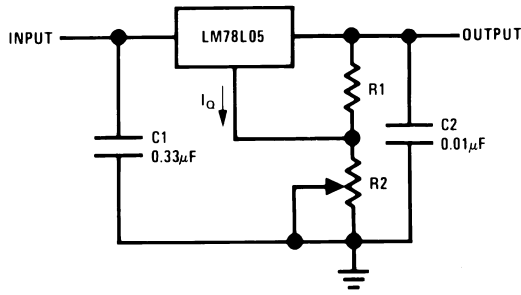
### Fixed Output Regulator



\*Required if the regulator is located more than 3" from the power supply filter.  
 \*\*See (Note 4) in the electrical characteristics table.

# Typical Applications (Continued)

## Adjustable Output Regulator

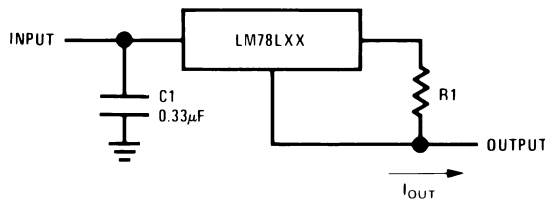


DS007744-9

$$V_{OUT} = 5V + (5V/R1 + I_Q) R2$$

$$5V/R1 > 3 I_Q, \text{ load regulation } (L_r) \approx [(R1 + R2)/R1] (L_r \text{ of LM78L05})$$

## Current Regulator

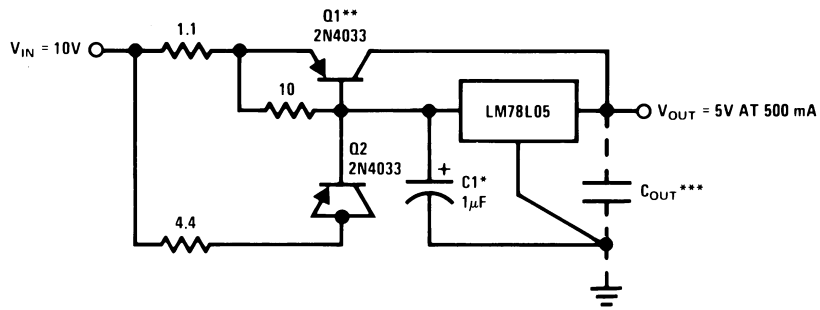


DS007744-10

$$I_{OUT} = (V_{OUT}/R1) + I_Q$$

$>I_Q = 1.5 \text{ mA}$  over line and load changes

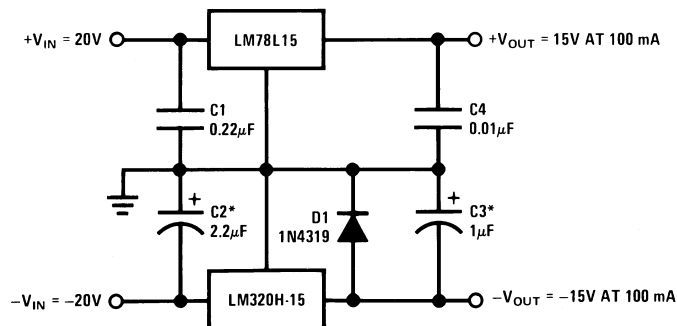
## 5V, 500 mA Regulator with Short Circuit Protection



DS007744-11

\*Solid tantalum.  
 \*\*Heat sink Q1.  
 \*\*\*Optional: Improves ripple rejection and transient response.  
 Load Regulation: 0.6%  $0 \leq I_L \leq 250 \text{ mA}$  pulsed with  $t_{ON} = 50 \text{ ms}$ .

## ±15V, 100 mA Dual Power Supply

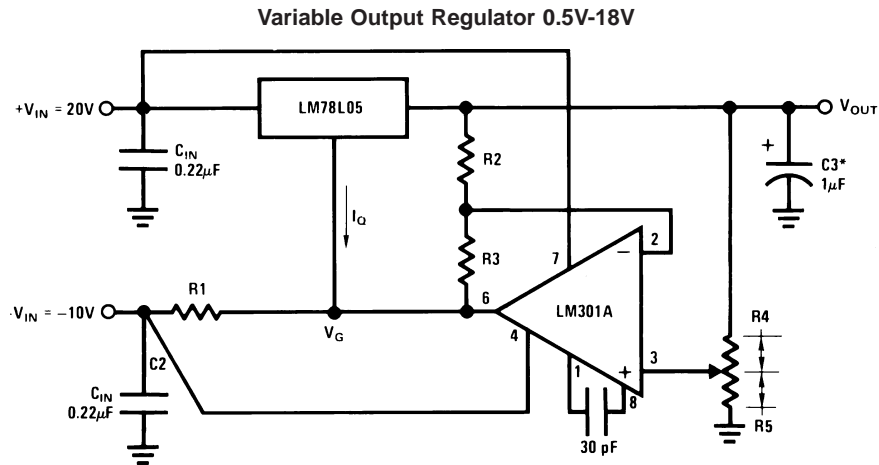


DS007744-12

\*Solid tantalum.



## Typical Applications (Continued)



DS007744-13

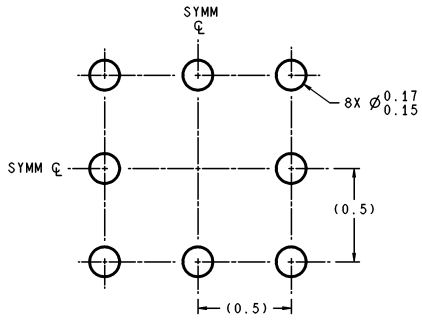
\*Solid tantalum.

$$V_{OUT} = V_G + 5V, R1 = (-V_{IN}/I_Q \text{ LM78L05})$$

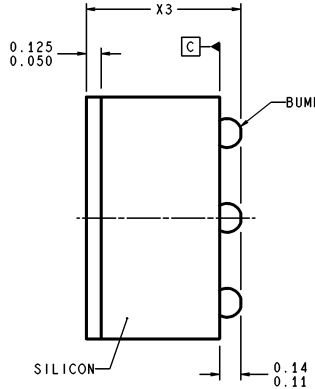
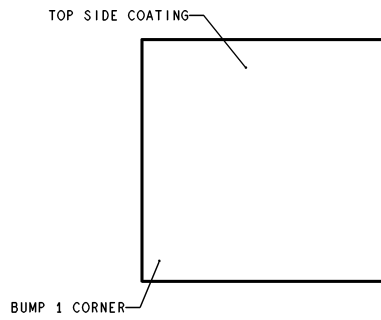
$$V_{OUT} = 5V (R2/R4) \text{ for } (R2 + R3) = (R4 + R5)$$

$$\text{A } 0.5V \text{ output will correspond to } (R2/R4) = 0.1 \text{ } (R3/R4) = 0.9$$

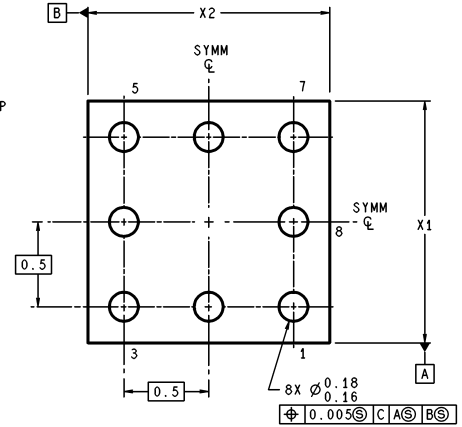
**Physical Dimensions** inches (millimeters) unless otherwise noted



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS



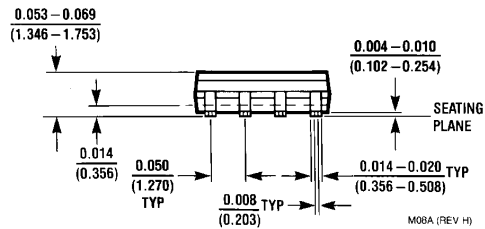
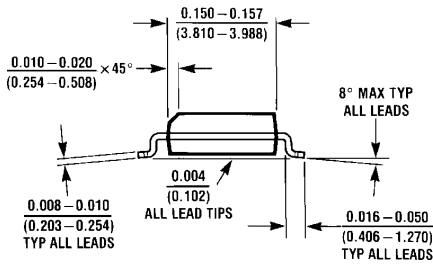
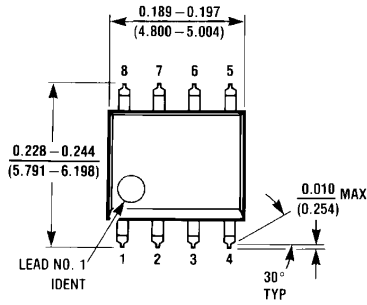
BPA08XXX (Rev B)

NOTES: UNLESS OTHERWISE SPECIFIED

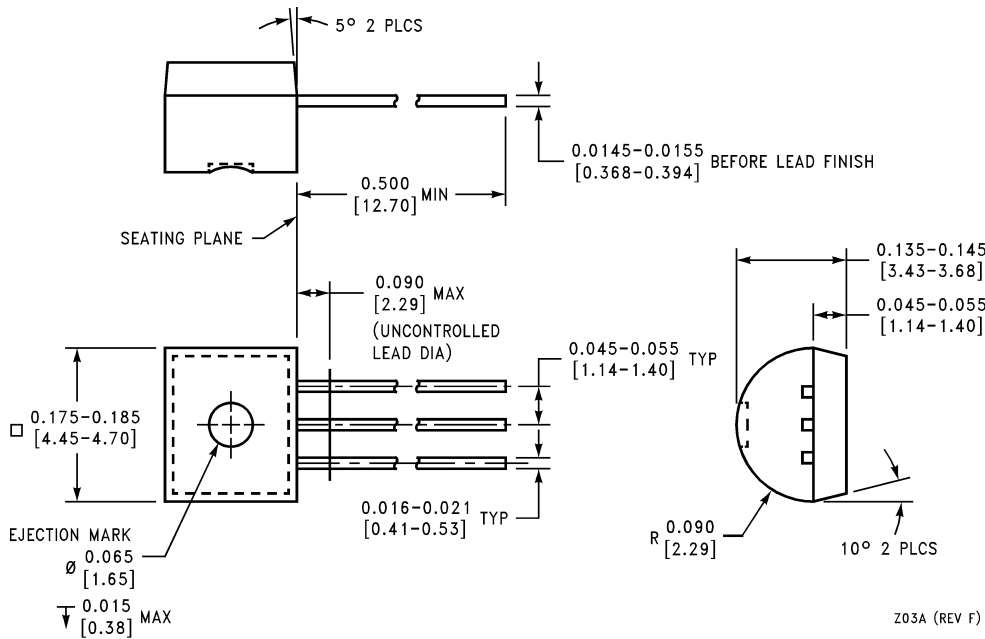
1. EPOXY COATING
2. 63Sn/37Pb EUTECTIC BUMP
3. RECOMMEND NON-SOLDER MASK DEFINED LANDING PAD.
4. PIN 1 IS ESTABLISHED BY LOWER LEFT CORNER WITH RESPECT TO TEXT ORIENTATION. REMAINING PINS ARE NUMBERED COUNTERCLOCKWISE.
5. XXX IN DRAWING NUMBER REPRESENTS PACKAGE SIZE VARIATION WHERE  $X_1$  IS PACKAGE WIDTH,  $X_2$  IS PACKAGE LENGTH AND  $X_3$  IS PACKAGE HEIGHT.
6. REFERENCE JEDEC REGISTRATION MO-211, VARIATION BC.

**8-Bump micro SMD**  
**Order Number LM78L05IBP or LM78L05IBPX**  
**NS Package Number BPA08AAB**  
 $X_1 = 1.285$   $X_2 = 1.285$   $X_3 = 0.850$

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**S.O. Package (M)**  
**Order Number LM78L05ACM, LM78L12ACM or LM78L15ACM**  
**NS Package Number M08A**



**Molded Offset TO-92 (Z)**  
**Order Number LM78L05ACZ, LM78L09ACZ, LM78L12ACZ,**  
**LM78L15ACZ, LM78L62ACZ or LM78L82ACZ**  
**NS Package Number Z03A**

## Notes

**LIFE SUPPORT POLICY**

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



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## LM78L05 3-Terminal Positive Regulators

See Also: [LM3480](#) - better line/load/dropout voltage

### Contents

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Parametric Table	
Multiple Output Capability	No
On/Off Pin	No
Input Voltage, min (Volt)	6.70
Input Voltage, max (Volt)	35
Output Current, max	100 mA
Output Voltage (Volt)	5

### General Description

The LM78LXX series of three terminal positive regulators is available with several fixed output voltages making them useful in a wide range of applications. When used as a zener diode/resistor combination replacement, the LM78LXX usually results in an effective output impedance improvement of two orders of magnitude, and lower quiescent current. These regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow the LM78LXX to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment.

The LM78LXX is available in the plastic TO-92 (Z) package, the plastic SO-8 (M) package and a chip sized package (8-Bump micro SMD) using National's micro SMD package technology. With adequate heat sinking the regulator can deliver 100 mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors 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.

### Features

- LM78L05 in micro SMD package
- Output voltage tolerances of  $\pm 5\%$  over the temperature range
- Output current of 100 mA
- Internal thermal overload protection
- Output transistor safe area protection
- Internal short circuit current limit
- Available in plastic TO-92 and plastic SO-8 low profile packages
- No external components
- Output voltages of 5.0V, 6.2V, 8.2V, 9.0V, 12V, 15V
- See AN-1112 for micro SMD considerations

## Datasheet

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## Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetary Pricing		Std Pack Size	<a href="#">Package Marking</a>
	Type	# pins		SPICE	IBIS		Quantity	\$US each		
LM78L05IBP	MicroSMD	8	Full production	N/A	N/A	<a href="#">Samples</a> <a href="#">Buy Now</a>	1K+	\$0.1500	reel of 250	¢1¢IP \$I 1
LM78L05IBPX	MicroSMD	8	Full production	N/A	N/A	<a href="#">Buy Now</a>	1K+	\$0.1500	reel of 3000	¢1¢IP \$I 1
LM78L05ACM	<a href="#">SOIC NARROW</a>	8	Full production	N/A	N/A	<a href="#">24 Hour Samples</a> <a href="#">Buy Now</a>	2500+	\$0.1100	tube of 95	[logo]¢2¢T LM78L 05ACM
LM78L05ACMX	<a href="#">SOIC NARROW</a>	8	Full production	N/A	N/A	<a href="#">Buy Now</a>	2500+	\$0.1100	reel of 2500	[logo]¢2¢T LM78L 05ACM
LM78L05ACZ	<a href="#">TO 92</a>	3	Full production	N/A	N/A	<a href="#">Buy Now</a>	2500+	\$0.1130	box of 1800	[logo]¢2¢T LM78L 05ACZ
LM78L05 MWC	<a href="#">Wafer</a>		Full production	N/A	N/A				N/A	-

# Design Tools

Title	Size (in Kbytes)	Date	<input type="checkbox"/> View Online	<input type="checkbox"/> Download	<input type="checkbox"/> Receive via Email
LM78L05IBP Micro SMD Qualification Package	4172 Kbytes	17-Apr-2000	<a href="#">View Online</a>	<a href="#">Download</a>	<a href="#">Receive via Email</a>

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## Application Notes

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<b>AN-1081:</b> Application Note 1081 A Low Cost, Low Parts-Count DC/DC Converter With Multiple Outputs	45 Kbytes	2-Mar-99	<a href="#">View Online</a>	<a href="#">Download</a>	<a href="#">Receive via Email</a>
<b>AN-1112:</b> Application Note 1112 Micro SMD Wafer Level Chip Scale Package	620 Kbytes	20-Jun-01	<a href="#">View Online</a>	<a href="#">Download</a>	<a href="#">Receive via Email</a>
Application Note 1112 Micro SMD Wafer Level Chip Scale Package ( <b>JAPANESE</b> )	452 Kbytes		<input type="checkbox"/> View Online	<input type="checkbox"/> Download	<input type="checkbox"/> Receive via Email

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## LM78L12 3-Terminal Positive Regulators

See Also: [LM3480](#) - better line/load/dropout voltage

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**Parametric Table**

Multiple Output Capability	No
On/Off Pin	No
Input Voltage, min (Volt)	13.70
Input Voltage, max (Volt)	35
Output Current, max	100 mA
Output Voltage (Volt)	12

### General Description

The LM78LXX series of three terminal positive regulators is available with several fixed output voltages making them useful in a wide range of applications. When used as a zener diode/resistor combination replacement, the LM78LXX usually results in an effective output impedance improvement of two orders of magnitude, and lower quiescent current. These regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow the LM78LXX to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment.




The LM78LXX is available in the plastic TO-92 (Z) package, the plastic SO-8 (M) package and a chip sized package (8-Bump micro SMD) using National's micro SMD package technology. With adequate heat sinking the regulator can deliver 100 mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors 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.



# Features

- LM78L05 in micro SMD package
- Output voltage tolerances of  $\pm 5\%$  over the temperature range
- Output current of 100 mA
- Internal thermal overload protection
- Output transistor safe area protection
- Internal short circuit current limit
- Available in plastic TO-92 and plastic SO-8 low profile packages
- No external components
- Output voltages of 5.0V, 6.2V, 8.2V, 9.0V, 12V, 15V
- See AN-1112 for micro SMD considerations


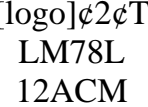

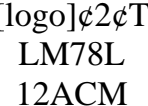

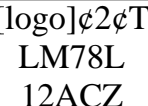
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# Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetary Pricing		Std Pack Size	<a href="#">Package Marking</a>
	Type	# pins		SPICE	IBIS		Quantity	\$US each		
LM78L12ACM	<a href="#">SOIC NARROW</a>	8	Full production	N/A	N/A	 Buy Now	2500+	\$0.1130	tube of 95	
LM78L12ACMX	<a href="#">SOIC NARROW</a>	8	Full production	N/A	N/A	 Buy Now	2500+	\$0.1130	reel of 2500	
LM78L12ACZ	<a href="#">TO 92</a>	3	Full production	N/A	N/A	 Buy Now	2500+	\$0.1130	box of 1800	

LM78L12AC MDC	<a href="#">Die</a>	Full production	N/A	N/A				tray of N/A	-
LM78L12AC MWC	<a href="#">Wafer</a>	Full production	N/A	N/A				N/A	-

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## LM78L15 3-Terminal Positive Regulators

See Also: [LM3480](#) - better line/load/dropout voltage

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**Parametric Table**

Multiple Output Capability	No
On/Off Pin	No
Input Voltage, min (Volt)	16.70
Input Voltage, max (Volt)	35
Output Current, max	100 mA
Output Voltage (Volt)	15

### General Description




The LM78LXX series of three terminal positive regulators is available with several fixed output voltages making them useful in a wide range of applications. When used as a zener diode/resistor combination replacement, the LM78LXX usually results in an effective output impedance improvement of two orders of magnitude, and lower quiescent current. These regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow the LM78LXX to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment.

The LM78LXX is available in the plastic TO-92 (Z) package, the plastic SO-8 (M) package and a chip sized package (8-Bump micro SMD) using National's micro SMD package technology. With adequate heat sinking the regulator can deliver 100 mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors 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.

# Features

- LM78L05 in micro SMD package
- Output voltage tolerances of  $\pm 5\%$  over the temperature range
- Output current of 100 mA
- Internal thermal overload protection
- Output transistor safe area protection
- Internal short circuit current limit
- Available in plastic TO-92 and plastic SO-8 low profile packages
- No external components
- Output voltages of 5.0V, 6.2V, 8.2V, 9.0V, 12V, 15V
- See AN-1112 for micro SMD considerations

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# Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetary Pricing		Std Pack Size	<a href="#">Package Marking</a>
	Type	# pins		SPICE	IBIS		Quantity	\$US each		
LM78L15ACM	<a href="#">SOIC NARROW</a>	8	Full production	N/A	N/A	 Buy Now	2500+	\$0.1130	tube of 95	[logo]¢2¢T LM78L 15ACM
LM78L15ACMX	<a href="#">SOIC NARROW</a>	8	Full production	N/A	N/A	 Buy Now	2500+	\$0.1130	reel of 2500	[logo]¢2¢T LM78L 15ACM
LM78L15ACZ	<a href="#">TO 92</a>	3	Full production	N/A	N/A	 Buy Now	2500+	\$0.1130	box of 1800	[logo]¢2¢T LM78L 15ACZ

LM78L15AC MWC	<a href="#">Wafer</a>	Full production	N/A	N/A				N/A	-
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