

# MC78L00A Series, NCV78L00A

## 100 mA Positive Voltage Regulators

The MC78L00A Series of positive voltage regulators are inexpensive, easy-to-use devices suitable for a multitude of applications that require a regulated supply of up to 100 mA. Like their higher powered MC7800 and MC78M00 Series cousins, these regulators feature internal current limiting and thermal shutdown making them remarkably rugged. No external components are required with the MC78L00 devices in many applications.

These devices offer a substantial performance advantage over the traditional zener diode-resistor combination, as output impedance and quiescent current are substantially reduced.

### Features

- Wide Range of Available, Fixed Output Voltages
- Low Cost
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required
- Complementary Negative Regulators Offered (MC79L00A Series)
- Pb-Free Packages are Available
- NCV Prefix for Automotive and Other Applications Requiring Site and Control Changes

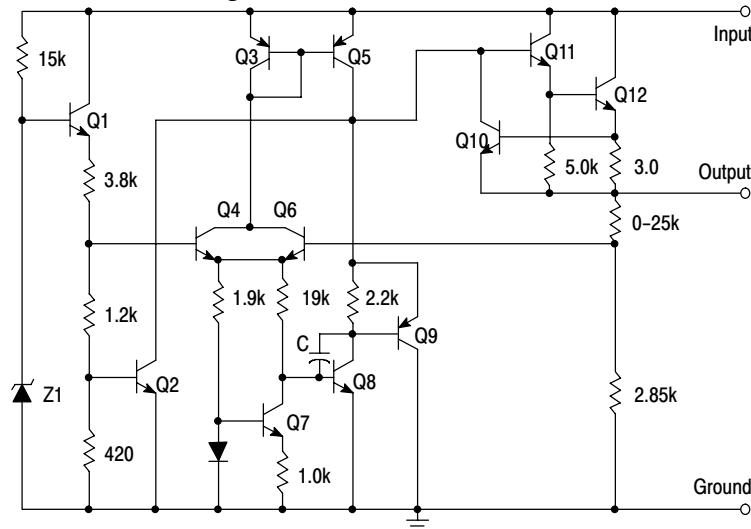


Figure 1. Representative Schematic Diagram

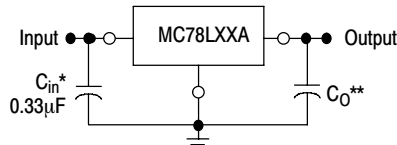


Figure 2. Standard Application

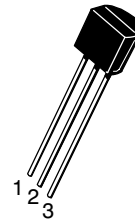
A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

\*  $C_{in}$  is required if regulator is located an appreciable distance from power supply filter.

\*\*  $C_O$  is not needed for stability; however, it does improve transient response.

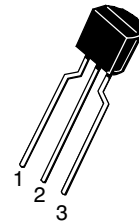


ON Semiconductor®



STRAIGHT LEAD  
BULK PACK

TO-92  
P SUFFIX  
CASE 029



BENT LEAD  
TAPE & REEL  
AMMO PACK

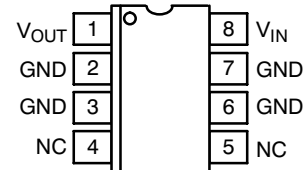
Pin: 1. Output  
2. Ground  
3. Input



SOIC-8\*  
D SUFFIX  
CASE 751

\*SOIC-8 is an internally modified SO-8 package. Pins 2, 3, 6, and 7 are electrically common to the die attach flag. This internal lead frame modification decreases package thermal resistance and increases power dissipation capability when appropriately mounted on a printed circuit board. SOIC-8 conforms to all external dimensions of the standard SO-8 package.

### PIN CONNECTIONS



(Top View)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 15 of this data sheet.

# MC78L00A Series, NCV78L00A

## MAXIMUM RATINGS (T<sub>A</sub> = +125°C, unless otherwise noted.)

Rating	Symbol	Value	Unit
Input Voltage (2.6 V–8.0 V) (12 V–18 V) (24 V)	V <sub>I</sub>	30 35 40	Vdc
Storage Temperature Range	T <sub>stg</sub>	–65 to +150	°C
Operating Junction Temperature Range	T <sub>J</sub>	–40 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

\*This device series contains ESD protection and exceeds the following tests:

Human Body Model 2000 V per MIL–STD–883, Method 3015

Machine Model Method 200 V

## ELECTRICAL CHARACTERISTICS (V<sub>I</sub> = 10 V, I<sub>O</sub> = 40 mA, C<sub>I</sub> = 0.33 μF, C<sub>O</sub> = 0.1 μF, –40°C < T<sub>J</sub> < +125°C (for MC78LXXAB, NCV78L05A), 0°C < T<sub>J</sub> < +125°C (for MC78LXXAC), unless otherwise noted.)

Characteristics	Symbol	MC78L05AC, AB, NCV78L05A			Unit
		Min	Typ	Max	
Output Voltage (T <sub>J</sub> = +25°C)	V <sub>O</sub>	4.8	5.0	5.2	Vdc
Line Regulation (T <sub>J</sub> = +25°C, I <sub>O</sub> = 40 mA) 7.0 Vdc ≤ V <sub>I</sub> ≤ 20 Vdc 8.0 Vdc ≤ V <sub>I</sub> ≤ 20 Vdc	Reg <sub>line</sub>	– –	55 45	150 100	mV
Load Regulation (T <sub>J</sub> = +25°C, 1.0 mA ≤ I <sub>O</sub> ≤ 100 mA) (T <sub>J</sub> = +25°C, 1.0 mA ≤ I <sub>O</sub> ≤ 40 mA)	Reg <sub>load</sub>	– –	11 5.0	60 30	mV
Output Voltage (7.0 Vdc ≤ V <sub>I</sub> ≤ 20 Vdc, 1.0 mA ≤ I <sub>O</sub> ≤ 40 mA) (V <sub>I</sub> = 10 V, 1.0 mA ≤ I <sub>O</sub> ≤ 70 mA)	V <sub>O</sub>	4.75 4.75	– –	5.25 5.25	Vdc
Input Bias Current (T <sub>J</sub> = +25°C) (T <sub>J</sub> = +125°C)	I <sub>IB</sub>	– –	3.8 –	6.0 5.5	mA
Input Bias Current Change (8.0 Vdc ≤ V <sub>I</sub> ≤ 20 Vdc) (1.0 mA ≤ I <sub>O</sub> ≤ 40 mA)	ΔI <sub>IB</sub>	– –	– –	1.5 0.1	mA
Output Noise Voltage (T <sub>A</sub> = +25°C, 10 Hz ≤ f ≤ 100 kHz)	V <sub>n</sub>	–	40	–	μV
Ripple Rejection (I <sub>O</sub> = 40 mA, f = 120 Hz, 8.0 Vdc ≤ V <sub>I</sub> ≤ 18 V, T <sub>J</sub> = +25°C)	RR	41	49	–	dB
Dropout Voltage (T <sub>J</sub> = +25°C)	V <sub>I</sub> – V <sub>O</sub>	–	1.7	–	Vdc

NOTE: NCV78L05A: T<sub>low</sub> = –40°C, T<sub>high</sub> = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

# MC78L00A Series, NCV78L00A

## ORDERING INFORMATION

Device	Output Voltage	Operating Temperature Range	Package	Shipping <sup>†</sup>
MC78L05ABD	5.0 V	$T_J = -40^\circ \text{ to } +125^\circ \text{C}$	SOIC-8	98 Units/Rail
MC78L05ABDG			SOIC-8	98 Units/Rail
MC78L05ABDR2			SOIC-8	2500 Tape & Reel
MC78L05ABDR2G			SOIC-8 (Pb-Free)	2500 Tape & Reel
NCV78L05ABDR2*			SOIC-8	2500 Tape & Reel
NCV78L05ABDR2G*			SOIC-8 (Pb-Free)	2500 Tape & Reel
MC78L05ABP			TO-92	2000 Units/Bag
MC78L05ABPG			TO-92 (Pb-Free)	2000 Units/Bag
NCV78L05ABPG*			TO-92 (Pb-Free)	2000 Units/Bag
MC78L05ABPRA			TO-92	2000 Tape & Reel
MC78L05ABPRAG			TO-92 (Pb-Free)	2000 Tape & Reel
NCV78L05ABPRAG*			TO-92 (Pb-Free)	2000 Tape & Reel
MC78L05ABPRE			TO-92	2000 Tape & Reel
MC78L05ABPREG			TO-92 (Pb-Free)	2000 Tape & Reel
NCV78L05ABPREG*			TO-92 (Pb-Free)	2000 Tape & Reel
MC78L05ABPRM			TO-92	2000 Ammo Pack
MC78L05ABPRMG			TO-92 (Pb-Free)	2000 Ammo Pack
NCV78L05ABPRMG*			TO-92 (Pb-Free)	2000 Ammo Pack
NCV78L05ABPRPG*			TO-92 (Pb-Free)	2000 Ammo Pack
MC78L05ACD			5.0 V	$T_J = 0^\circ \text{ to } +125^\circ \text{C}$
MC78L05ACDG	SOIC-8 (Pb-Free)	98 Units/Rail		
MC78L05ACDR2	SOIC-8	2500 Tape & Reel		
MC78L05ACDR2G	SOIC-8 (Pb-Free)	2500 Tape & Reel		
MC78L05ACP	TO-92	2000 Units/Bag		
MC78L05ACPG	TO-92 (Pb-Free)	2000 Units/Bag		
MC78L05ACPRA	TO-92	2000 Tape & Reel		
MC78L05ACPRA	TO-92 (Pb-Free)	2000 Tape & Reel		
MC78L05ACPRE	TO-92	2000 Tape & Reel		
MC78L05ACPREG	TO-92 (Pb-Free)	2000 Tape & Reel		
MC78L05ACPRM	TO-92	2000 Ammo Pack		
MC78L05ACPRMG	TO-92 (Pb-Free)	2000 Ammo Pack		
MC78L05ACPRP	TO-92	2000 Ammo Pack		
MC78L05ACPRPG	TO-92 (Pb-Free)	2000 Ammo Pack		

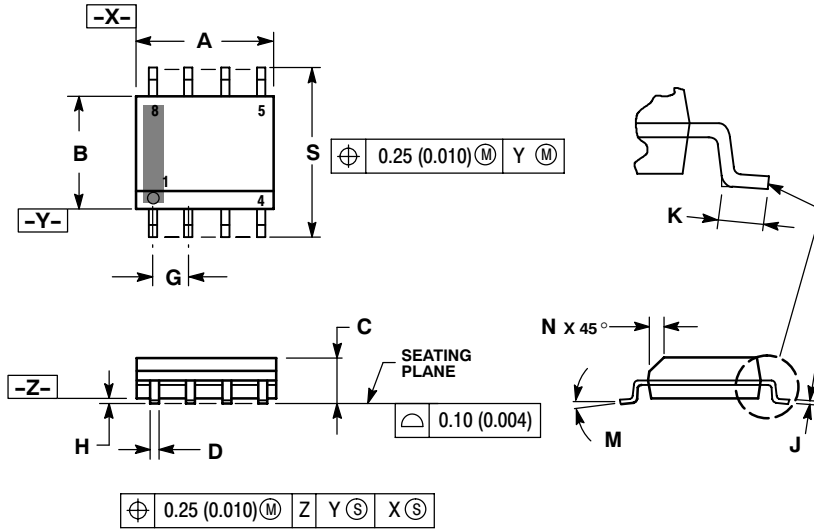
\*NCV78L05A:  $T_{low} = -40^\circ \text{C}$ ,  $T_{high} = +125^\circ \text{C}$ . Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MC78L00A Series, NCV78L00A

## PACKAGE DIMENSIONS

SOIC-8 NB  
D SUFFIX  
CASE 751-07  
ISSUE AJ

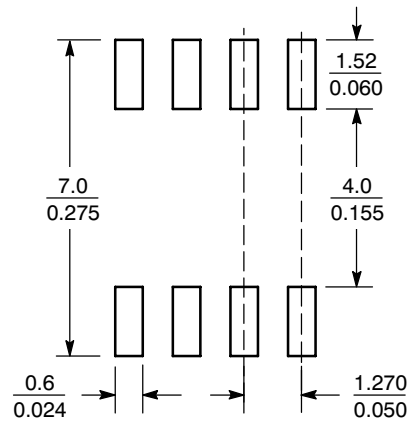


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

### SOLDERING FOOTPRINT\*



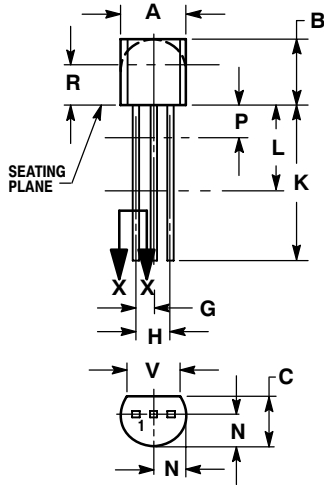
SCALE 6:1 ( $\frac{\text{mm}}{\text{inches}}$ )

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

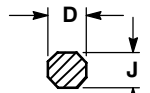
# MC78L00A Series, NCV78L00A

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
P SUFFIX  
CASE 29-11  
ISSUE AM



STRAIGHT LEAD  
BULK PACK

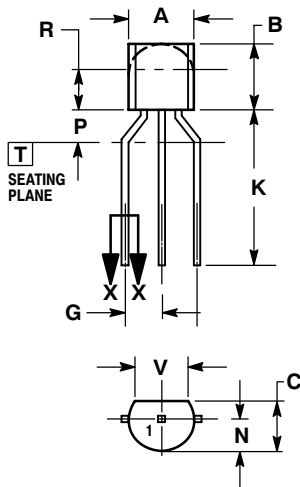


SECTION X-X

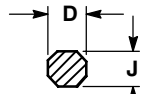
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---



BENT LEAD  
TAPE & REEL  
AMMO PACK



SECTION X-X

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---