

# MC7800, MC7800A, MC7800AE, NCV7800

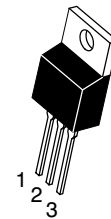


ON Semiconductor®

## 1.0 A Positive Voltage Regulators

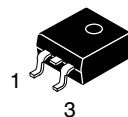
These voltage regulators are monolithic integrated circuits designed as fixed-voltage regulators for a wide variety of applications including local, on-card regulation. These regulators employ internal current limiting, thermal shutdown, and safe-area compensation. With adequate heatsinking they can deliver output currents in excess of 1.0 A. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

- Output Current in Excess of 1.0 A
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Voltage Offered in 1.5%, 2% and 4% Tolerance
- Available in Surface Mount D<sup>2</sup>PAK-3, DPAK-3 and Standard 3-Lead Transistor Packages
- NCV Prefix for Automotive and Other Applications Requiring Site and Control Changes
- Pb-Free Packages are Available



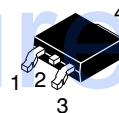
**TO-220-3  
T SUFFIX  
CASE 221AB**

Heatsink surface  
connected to Pin 2.



**D<sup>2</sup>PAK-3  
D2T SUFFIX  
CASE 936**

Heatsink surface (shown as terminal 4 in  
case outline drawing) is connected to Pin 2.



**DPAK-3  
DT SUFFIX  
CASE 369C**

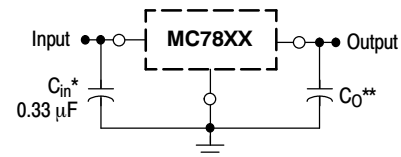
### MAXIMUM RATINGS (T<sub>A</sub> = 25°C, unless otherwise noted)

Rating	Symbol	Value			Unit
		369C	221A	936	
Input Voltage (5.0 - 18 V) (24 V)	V <sub>I</sub>	35 40			Vdc
Power Dissipation	P <sub>D</sub>	Internally Limited			W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	92	65	Figure 15	°C/W
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	5.0	5.0	5.0	°C/W
Storage Junction Temperature Range	T <sub>stg</sub>	-65 to +150			°C
Operating Junction Temperature	T <sub>J</sub>	+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.

### 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.

XX, These two digits of the type number indicate nominal voltage.

\* C<sub>in</sub> is required if regulator is located an appreciable distance from power supply filter.

\*\* C<sub>O</sub> is not needed for stability; however, it does improve transient response. Values of less than 0.1 μF could cause instability.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 23 of this data sheet.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 30 of this data sheet.

## MC7800, MC7800A, MC7800AE, NCV7800

**ELECTRICAL CHARACTERISTICS** ( $V_{in} = 10\text{ V}$ ,  $I_O = 500\text{ mA}$ ,  $T_J = T_{low}$  to  $125^\circ\text{C}$  (Note 1), unless otherwise noted)

Characteristic	Symbol	MC7805B, NCV7805			MC7805C			Unit
		Min	Typ	Max	Min	Typ	Max	
Output Voltage ( $T_J = 25^\circ\text{C}$ )	$V_O$	4.8	5.0	5.2	4.8	5.0	5.2	Vdc
Output Voltage ( $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P_D \leq 15\text{ W}$ ) $7.0\text{ Vdc} \leq V_{in} \leq 20\text{ Vdc}$ $8.0\text{ Vdc} \leq V_{in} \leq 20\text{ Vdc}$	$V_O$	- 4.75	- 5.0	- 5.25	4.75 -	5.0 -	5.25 -	Vdc
Line Regulation (Note 4) $7.5\text{ Vdc} \leq V_{in} \leq 20\text{ Vdc}$ , $1.0\text{ A}$ $8.0\text{ Vdc} \leq V_{in} \leq 12\text{ Vdc}$	$Reg_{line}$	- -	5.0 1.3	100 50	- -	0.5 0.8	20 10	mV
Load Regulation (Note 4) $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ ( $T_A = 25^\circ\text{C}$ )	$Reg_{load}$	- -	1.3 0.15	100 50	- -	1.3 1.3	25 25	mV
Quiescent Current	$I_B$	-	3.2	8.0	-	3.2	6.5	mA
Quiescent Current Change $7.0\text{ Vdc} \leq V_{in} \leq 25\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ ( $T_A = 25^\circ\text{C}$ )	$\Delta I_B$	- -	- -	- 0.5	- -	0.3 0.08	1.0 0.8	mA
Ripple Rejection $8.0\text{ Vdc} \leq V_{in} \leq 18\text{ Vdc}$ , $f = 120\text{ Hz}$	RR	-	68	-	62	83	-	dB
Dropout Voltage ( $I_O = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$ )	$V_I - V_O$	-	2.0	-	-	2.0	-	Vdc
Output Noise Voltage ( $T_A = 25^\circ\text{C}$ ) $10\text{ Hz} \leq f \leq 100\text{ kHz}$	$V_n$	-	10	-	-	10	-	$\mu\text{V}/V_O$
Output Resistance $f = 1.0\text{ kHz}$	$r_O$	-	0.9	-	-	0.9	-	$\text{m}\Omega$
Short Circuit Current Limit ( $T_A = 25^\circ\text{C}$ ) $V_{in} = 35\text{ Vdc}$	$I_{SC}$	-	0.2	-	-	0.6	-	A
Peak Output Current ( $T_J = 25^\circ\text{C}$ )	$I_{max}$	-	2.2	-	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	$TCV_O$	-	-0.3	-	-	-0.3	-	$\text{mV}/^\circ\text{C}$

- $T_{low} = 0^\circ\text{C}$  for MC78XXC, MC78XXAC,  
=  $-40^\circ\text{C}$  for NCV78XX, MC78XXB, MC78XXAB, and MC78XXAEB
- Load and line regulation are specified at constant junction temperature. Changes in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

## MC7800, MC7800A, MC7800AE, NCV7800

### ORDERING INFORMATION

Device	Nominal Voltage	Operating Temperature Range	Package	Shipping <sup>†</sup>
MC7805BT	5.0 V	T <sub>J</sub> = -40°C to +125°C	TO-220	50 Units /Rail
MC7805BTG			TO-220 (Pb-free)	50 Units /Rail
NCV7805BD2T*			D <sup>2</sup> PAK	50 Units /Rail
NCV7805BD2TG*			D <sup>2</sup> PAK (Pb-free)	50 Units /Rail
NCV7805BD2TR4*			D <sup>2</sup> PAK	800 / Tape & Reel
NCV7805BD2TR4G*			D <sup>2</sup> PAK (Pb-free)	800 / Tape & Reel
NCV7805BT*			TO-220	50 Units /Rail
NCV7805BTG*			TO-220 (Pb-free)	50 Units /Rail
MC7805CD2T		T <sub>J</sub> = 0°C to +125°C	D <sup>2</sup> PAK	50 Units /Rail
MC7805CD2TG			D <sup>2</sup> PAK (Pb-free)	50 Units /Rail
MC7805CD2TR4			D <sup>2</sup> PAK	800 / Tape & Reel
MC7805CD2TR4G			D <sup>2</sup> PAK (Pb-free)	800 / Tape & Reel
MC7805CDT			DPAK	75 Units / Rail
MC7805CDTG			DPAK (Pb-free)	75 Units / Rail
MC7805CDTRK			DPAK	2500 / Tape & Reel
MC7805CDTRKG			DPAK (Pb-free)	2500 / Tape & Reel
MC7805CT	TO-220		50 Units /Rail	
MC7805CTG	TO-220 (Pb-free)		50 Units /Rail	
NCV7805ABD2TR4G*	5.0 V	T <sub>J</sub> = -40°C to +125°C	D <sup>2</sup> PAK (Pb-free)	800 / Tape & Reel
MC7806ACT	6.0 V	T <sub>J</sub> = 0°C to +125°C	TO-220	50 Units /Rail
MC7806ACTG			TO-220 (Pb-free)	50 Units /Rail
MC7806BD2T		T <sub>J</sub> = -40°C to +125°C	D <sup>2</sup> PAK	50 Units /Rail
MC7806BD2TG			D <sup>2</sup> PAK (Pb-free)	50 Units /Rail
MC7806BD2TR4			D <sup>2</sup> PAK	800 / Tape & Reel
MC7806BD2TR4G			D <sup>2</sup> PAK (Pb-free)	800 / Tape & Reel
MC7806BT			TO-220	50 Units /Rail
MC7806BTG			TO-220 (Pb-free)	50 Units /Rail
MC7806CT		T <sub>J</sub> = 0°C to +125°C	TO-220	50 Units /Rail
MC7806CTG			TO-220 (Pb-free)	50 Units /Rail

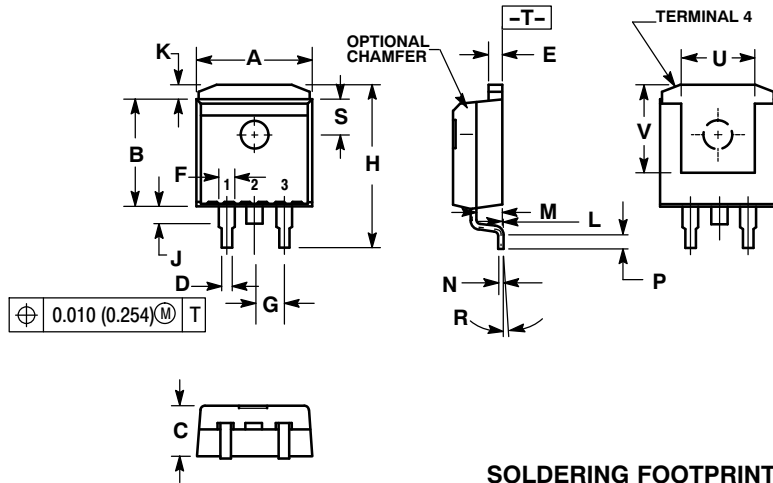
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*NCV devices: 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.

# MC7800, MC7800A, MC7800AE, NCV7800

## PACKAGE DIMENSIONS

**D<sup>2</sup>PAK-3**  
**D2T SUFFIX**  
 CASE 936-03  
 ISSUE B

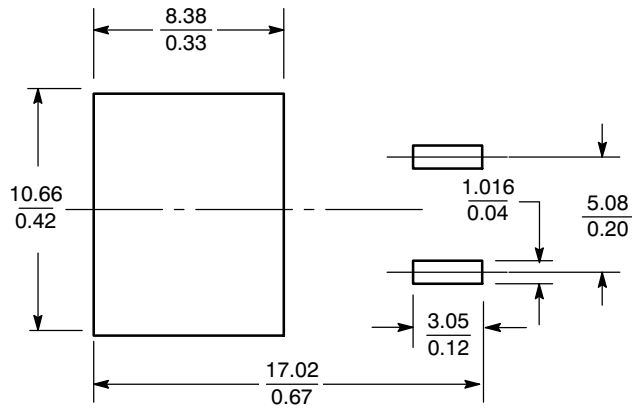


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. TAB CONTOUR OPTIONAL WITHIN DIMENSIONS A AND K.
4. DIMENSIONS U AND V ESTABLISH A MINIMUM MOUNTING SURFACE FOR TERMINAL 4.
5. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH OR GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.025 (0.635) MAXIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.386	0.403	9.804	10.236
B	0.356	0.368	9.042	9.347
C	0.170	0.180	4.318	4.572
D	0.026	0.036	0.660	0.914
E	0.045	0.055	1.143	1.397
F	0.051 REF		1.295 REF	
G	0.100 BSC		2.540 BSC	
H	0.539	0.579	13.691	14.707
J	0.125 MAX		3.175 MAX	
K	0.050 REF		1.270 REF	
L	0.000	0.010	0.000	0.254
M	0.088	0.102	2.235	2.591
N	0.018	0.026	0.457	0.660
P	0.058	0.078	1.473	1.981
R	5° REF		5° REF	
S	0.116 REF		2.946 REF	
U	0.200 MIN		5.080 MIN	
V	0.250 MIN		6.350 MIN	

**SOLDERING FOOTPRINT\***



**D<sup>2</sup>PAK-3**

SCALE 3:1 (mm/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.