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MC79M00 Series
500 mA Negative Voltage Regulators

The MC79M00 series of fixed output negative voltage regulators are intended as complements to the popular MC78M00 series devices.

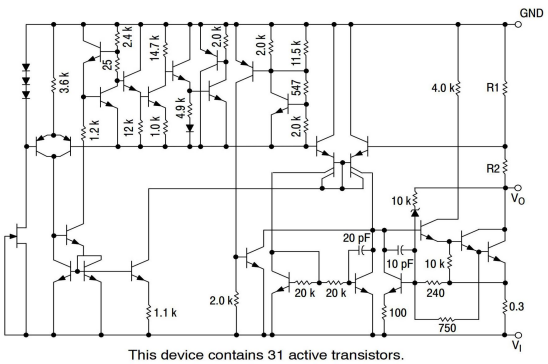
Available in fixed output voltage options of −5.0 V, −8.0 V, −12 V and −15 V, these regulators employ current limiting, thermal shutdown, and safe−area compensation, making them remarkably rugged under most operating conditions. With adequate heatsinking they can deliver output currents in excess of 0.5 A.

Features

- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe−Area Compensation
- Also Available in Surface Mount DPAK (DT) Package
- Pb−Free Packages are Available

DEVICE TYPE/NOMINAL OUTPUT VOLTAGE

Device	Nominal Output Voltage
MC79M05	−5.0 V
MC79M08	−8.0 V
MC79M12	−12 V
MC79M15	−15 V

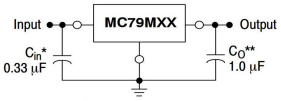


This device contains 31 active transistors.

Figure 1. Representative Schematic Diagram

THREE−TERMINAL NEGATIVE FIXED VOLTAGE REGULATORS

STANDARD APPLICATION



A common ground is required between the input and the output voltages. The input voltage must remain typically 1.1 V more negative even during the high point of the input ripple voltage.

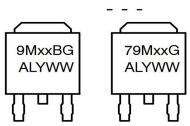
XX These two digits of the type number indicate nominal voltage.

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

** C_O improve stability and transient response.



DPAK−3
DT SUFFIX
CASE 369C



xx	= 05, 08, 12, or 15
y	= B or C
A	= Assembly Location
WL, L	= Wafer Lot
Y	= Year
WW	= Work Week
G	= Pb−Free Device

ORDERING INFORMATION

Device	Output Voltage Tolerance	Operating Temperature Range	Package	Shipping†
MC79M05BDTRKG	4.0%	T_J = −40°C to +125°C	DPAK (Pb−Free)	2500 Units / Reel
MC79M08BDTRKG			DPAK (Pb−Free)	2500 Units / Reel
MC79M12BDTRKG			DPAK (Pb−Free)	2500 Units / Reel
MC79M15BDTRKG			DPAK (Pb−Free)	2500 Units / Reel

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MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted.)

Rating	Symbol	Value	Unit
Input Voltage	V_I	−35	Vdc
Power Dissipation			
Case 221A (TO−220−3)			
T_A = 25°C	P_D	Internally Limited	W
Thermal Resistance, Junction−to−Ambient	θ_{JA}	65	°C/W
Thermal Resistance, Junction−to−Case	θ_{JC}	5.0	°C/W
Case 369C (DPAK−3)			
T_A = 25°C	P_D	Internally Limited	W
Thermal Resistance, Junction−to−Ambient	θ_{JA}	92	°C/W
Thermal Resistance, Junction−to−Case	θ_{JC}	6.0	°C/W
Storage Junction Temperature	T_{stg}	−65 to +150	°C
Operating Junction Temperature Range	T_J	−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

MC79M05B, C
ELECTRICAL CHARACTERISTICS (V_I = −10 V, I_O = 350 mA, T_{low} to T_{high} (Note 2), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	−4.8	−5.0	−5.2	Vdc
Line Regulation, T_J = 25°C (Note 1) −7.0 Vdc ≥ V_I ≥ −25 Vdc −8.0 Vdc ≥ V_I ≥ −18 Vdc	Reg_{line}	 – –	 7.0 2.0	 50 30	mV
Load Regulation, T_J = 25°C (Note 1) 5.0 mA ≤ I_O ≤ 500 mA	Reg_{load}	–	30	100	mV
Output Voltage −7.0 Vdc ≥ V_I ≥ −25 Vdc, 5.0 mA ≤ I_O ≤ 350 mA	V_O	−4.75	–	−5.25	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	4.3	8.0	mA
Input Bias Current Change −8.0 Vdc ≥ V_I ≥ −25 Vdc, I_O = 350 mA 5.0 mA ≤ I_O ≤ 350 mA, V_I = −10 V	ΔI_{IB}	 – –	 – –	 0.4 0.4	mA
Output Noise Voltage, T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V_n	–	40	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	66	–	dB
Dropout Voltage I_O = 500 mA, T_J = 25°C	V_I–V_O	–	1.1	–	Vdc
Average Temperature Coefficient of Output Voltage I_O = 5.0 mA, 0°C ≤ T_J ≤ 125°C	$\Delta V_O/\Delta T$	–	0.2	–	mV/°C

1. Load and line regulation are specified at constant temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
2. B = T_{low} to T_{high}, −40°C < T_J < 125°C C = T_{low} to T_{high}, 0°C < T_J < 125°C.

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MC79M00 Series

MC79M08B, C
ELECTRICAL CHARACTERISTICS (V_I = −10 V, I_O = 350 mA, T_{low} to T_{high} (Note 4), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	−7.7	−8.0	−8.3	Vdc
Line Regulation, T_J = 25°C (Note 3) −10.5 Vdc ≥ V_I ≥ −25 Vdc −11 Vdc ≥ V_I ≥ −21 Vdc	Reg_{line}	 – –	 5.0 3.0	 80 50	mV
Load Regulation, T_J = 25°C (Note 3) 5.0 mA ≤ I_O ≤ 500 mA	Reg_{load}	–	30	100	mV
Output Voltage −10.5 Vdc ≥ V_I ≥ −25 Vdc, 5.0 mA ≤ I_O ≤ 350 mA	V_O	−7.6	−8.0	−8.4	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	–	8.0	mA
Input Bias Current Change −10.5 Vdc ≥ V_I ≥ −25 Vdc, I_O = 350 mA 5.0 mA ≤ I_O ≤ 350 mA, V_I = −10 V	ΔI_{IB}	 – –	 – –	 0.4 0.4	mA
Output Noise Voltage, T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V_n	–	60	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	63	–	dB
Dropout Voltage I_O = 500 mA, T_J = 25°C	V_I–V_O	–	1.1	–	Vdc
Average Temperature Coefficient of Output Voltage I_O = 5.0 mA, 0°C ≤ T_J ≤ 125°C	$\Delta V_O/\Delta T$	–	0.4	–	mV/°C

3. Load and line regulation are specified at constant temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
4. B = T_{low} to T_{high}, −40°C < T_J < 125°C
   C = T_{low} to T_{high}, 0°C < T_J < 125°C

MC79M12B, C
ELECTRICAL CHARACTERISTICS (V_I = −19 V, I_O = 350 mA, T_{low} to T_{high} (Note 6), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	−11.5	−12	−12.5	Vdc
Line Regulation, T_J = 25°C (Note 5) −14.5 Vdc ≥ V_I ≥ −30 Vdc −15 Vdc ≥ V_I ≥ −25 Vdc	Reg_{line}	 – –	 5.0 3.0	 80 50	mV
Load Regulation, T_J = 25°C (Note 5) 5.0 mA ≤ I_O ≤ 500 mA	Reg_{load}	–	30	240	mV
Output Voltage −14.5 Vdc ≥ V_I ≥ −30 Vdc, 5.0 mA ≤ I_O ≤ 350 mA	V_O	−11.4	–	−12.6	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	4.4	8.0	mA
Input Bias Current Change −14.5 Vdc ≥ V_I ≥ −30 Vdc, I_O = 350 mA 5.0 mA ≤ I_O ≤ 350 mA, V_I = −19 V	ΔI_{IB}	 – –	 – –	 0.4 0.4	mA
Output Noise Voltage, T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V_n	–	75	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	60	–	dB
Dropout Voltage I_O = 500 mA, T_J = 25°C	V_I–V_O	–	1.1	–	Vdc
Average Temperature Coefficient of Output Voltage I_O = 5.0 mA, 0°C ≤ T_J ≤ 125°C	$\Delta V_O/\Delta T$	–	−0.8	–	mV/°C

5. Load and line regulation are specified at constant temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
6. B = T_{low} to T_{high}, −40°C < T_J < 125°C
   C = T_{low} to T_{high}, 0°C < T_J < 125°C

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MC79M15B, C
ELECTRICAL CHARACTERISTICS (V_I = −23 V, I_O = 350 mA, T_{low} to T_{high} (Note 8), unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	−14.4	−15	−15.6	Vdc
Line Regulation, T_J = 25°C (Note 7) −17.5 Vdc ≥ V_I ≥ −30 Vdc −18 Vdc ≥ V_I ≥ −28 Vdc	Reg_{line}	 – –	 5.0 3.0	 80 50	mV
Load Regulation, T_J = 25°C (Note 7) 5.0 mA ≤ I_O ≤ 500 mA	Reg_{load}	–	30	240	mV
Output Voltage −17.5 Vdc ≥ V_I ≥ −30 Vdc, 5.0 mA ≤ I_O ≤ 350 mA	V_O	−14.25	–	−15.75	Vdc
Input Bias Current (T_J = 25°C)	I_{IB}	–	4.4	8.0	mA
Input Bias Current Change −17.5 Vdc ≥ V_I ≥ −30 Vdc, I_O = 350 mA 5.0 mA ≤ I_O ≤ 350 mA, V_I = −23 V	ΔI_{IB}	 – –	 – –	 0.4 0.4	mA
Output Noise Voltage, T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz	V_n	–	90	–	μV
Ripple Rejection (f = 120 Hz)	RR	54	60	–	dB
Dropout Voltage I_O = 500 mA, T_J = 25°C	V_I–V_O	–	1.1	–	Vdc
Average Temperature Coefficient of Output Voltage I_O = 5.0 mA, 0°C ≤ T_J ≤ 125°C	$\Delta V_O/\Delta T$	–	−1.0	–	mV/°C

7. Load and line regulation are specified at constant temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
8. B = T_{low} to T_{high}, −40°C < T_J < 125°C
   C = T_{low} to T_{high}, 0°C < T_J < 125°C

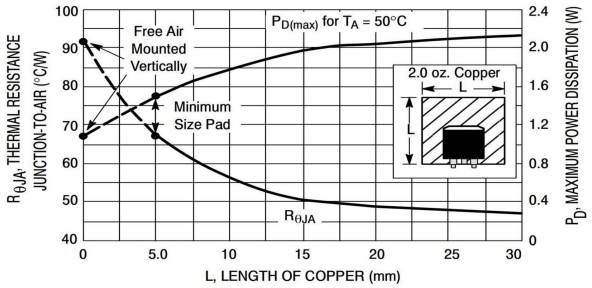

Figure 1. DPAK−3 Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

MC79M00 Series

Protection Diodes

When external capacitors are used with MC79M00 series regulator it is sometimes necessary to add protection diodes to prevent the capacitors from discharging through low current points into the regulator or from output polarity reversals. Generally, no protection diode is required for values of output capacitance less then 10μF. Figure 2 shows the MC79M15 with the recommended protection diodes.

- Opposite Polarity Protection

Diode D1 protects the regulator from output polarity reversals during startup, power off and short-circuit operation.

- Reverse-bias Protection

Diode D2 prevents output capacitor from discharging thru the MC79M15 during an input short circuit or fast switch off of power supply.

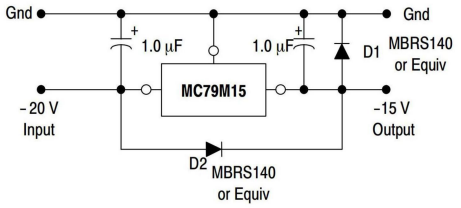

Figure 2. Protection Diodes

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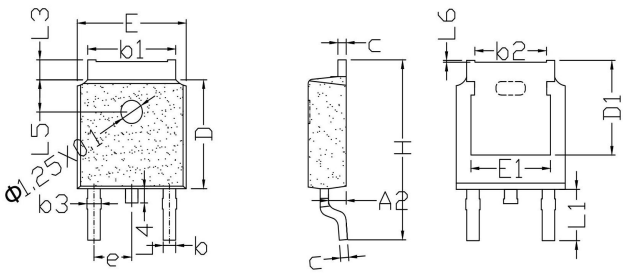
Ordering Information

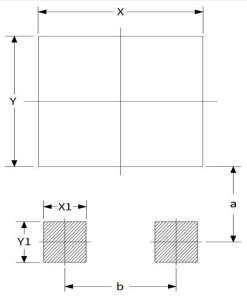
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TO-252	R3	0.305	2500	5000	25000	13''

Package Outline Dimensions (TO-252)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A2	0.90	1.10	0.035	0.043
b	0.66	0.86	0.026	0.034
b1	5.10	5.46	0.201	0.215
b2	4.27	4.37	0.168	0.172
b3	0.78	0.90	0.031	0.035
c	0.45	0.55	0.018	0.022
D	5.90	6.30	0.232	0.248
D1	5.35 REF.		0.211REF.	
E	6.30	6.70	0.248	0.264
E1	4.83 REF.		0.190 REF.	
e	2.18	2.38	0.086	0.094
H	9.80	10.4	0.386	0.409
L1	2.70	3.10	0.106	0.122
L3	0.80	1.20	0.031	0.047
L4	0.60	1.00	0.024	0.039
L5	1.8 REF.		0.071 REF.	
L6	-	0.12	-	0.005

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
a	3.70	-	0.146	-
b	4.37	-	0.172	-
X	-	5.80	-	0.228
X1	-	1.20	-	0.047
Y	-	5.85	-	0.230
Y1	-	2.00	-	0.079