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MC78M00, MC78M00A, Series
500 mA Positive Voltage Regulators

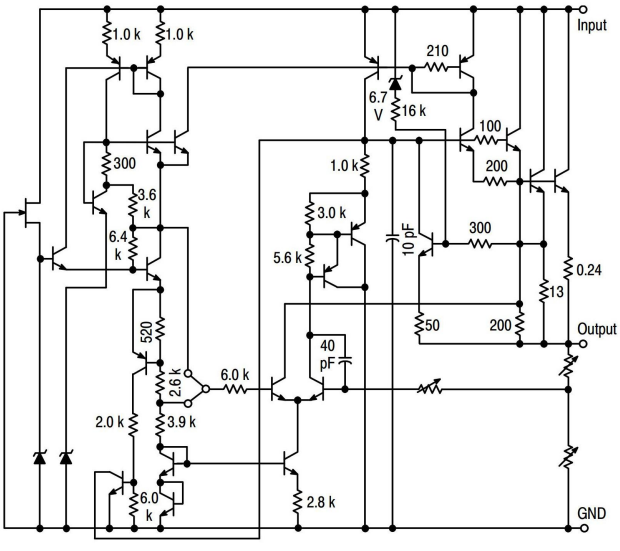
Description

The MC78M00/MC78M00A Series positive voltage regulators are identical to the popular MC7800 Series devices, except that they are specified for only half the output current. Like the MC7800 devices, the MC78M00 three−terminal regulators are intended for local, on−card voltage regulation.

Internal current limiting, thermal shutdown circuitry and safe−area compensation for the internal pass transistor combine to make these devices remarkably rugged under most operating conditions. Maximum output current, with adequate heatsinking is 500 mA.

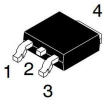
Features

- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe−Area Compensation
- MC78M00A High Accuracy (±2%)
  Available for 5.0 V, 8.0 V, 12 V and 15 V
- These are Pb−Free Devices



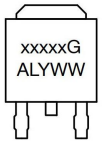
This device contains 28 active transistors.

Figure 1. Representative Schematic Diagram



DPAK−3
DT SUFFIX
CASE 369C

MARKINGDIAGRAMS



Heatsink surface
connected to Pin 2.

xx = Voltage Option
XX = Appropriate Suffix Options
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

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

xxxxx = Device Type and Voltage Option Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

Pin 1. Input
2. Ground
3. Output

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MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted) (Note 1)

Rating	Symbol	Value	Unit
Input Voltage (5.0 V–18 V) (20 V–24V)	V_I	 35 40	Vdc
Power Dissipation (Package Limitation) Plastic Package, T Suffix T_A = 25°C Thermal Resistance, Junction-to-Air Thermal Resistance, Junction-to-Case Plastic Package, DT Suffix T_A = 25°C Thermal Resistance, Junction-to-Air Thermal Resistance, Junction-to-Case	 P_D θ_{JA} θ_{JC} P_D θ_{JA} θ_{JC}	 Internally Limited 70 5.0 Internally Limited 92 5.0	°C/W
Operating Junction Temperature Range	T_J	+150	°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. 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.

MC78M05B/AB ELECTRICAL CHARACTERISTICS (V_I = 10 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5 W, unless otherwise noted) (Note 2)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C) MC78M05B MC78M05AB	V_O	 4.8 4.9	 5.0 5.0	 5.2 5.1	Vdc
Output Voltage Variation (7.0 Vdc ≤ V_I ≤ 20 Vdc, 5.0 mA ≤ I_O ≤ 350 mA) MC78M05B MC78M05AB	V_O	 4.75 4.80	 – –	 5.25 5.20	Vdc
Line Regulation (T_J = 25°C, 7.0 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA)	Reg_{line}	–	3.0	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 20 10	 100 50	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.0	mA
Quiescent Current Change (8.0 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	40	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 8.0 V ≤ V_I ≤ 18 V) (I_O = 300 mA, f = 120 Hz, 8.0 ≤ V_I ≤ 18 V, T_J = 25°C)	RR	 62 62	 – 80	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.2	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

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MC78M06C/B ELECTRICAL CHARACTERISTICS

(V_I = 11 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5.0 W, unless otherwise noted) (Note 3)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	5.75	6.0	6.25	Vdc
Output Voltage Variation (8.0 Vdc ≤ V_I ≤ 21 Vdc, 5.0 mA ≤ I_O ≤ 350 mA)	V_O	5.7	–	6.3	Vdc
Line Regulation (T_J = 25°C, 8.0 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA)	Reg_{line}	–	5.0	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 Ma) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 20 10	 120 60	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.0	mA
Quiescent Current Change (9.0 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	45	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 9.0 V ≤ V_I ≤ 19 V) (I_O = 300 mA, f = 120 Hz, 9.0 V ≤ V_I ≤ 19 V, T_J = 25°C)	RR	 59 59	 – 80	 – –	dB
Dropout Voltage (T_J = 25°C)	$V_I - V_O$	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.2	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

MC78M08C/AC/B/AB, NCV78M08B ELECTRICAL CHARACTERISTICS

(V_I = 14 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5 W, unless otherwise noted) (Note 3)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C) MC78M08B/ MC78M08AB	V_O	 7.70 7.84	 8.0 8.0	 8.30 8.16	Vdc
Output Voltage Variation (10.5 Vdc ≤ V_I ≤ 23 Vdc, 5.0 mA ≤ I_O ≤ 350 mA) MC78M08B/ MC78M08AB	V_O	 7.6 7.7	 – –	 8.4 8.3	Vdc
Line Regulation (T_J = 25°C, 10.5 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA)	Reg_{line}	–	6.0	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 25 10	 160 80	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.0	mA
Quiescent Current Change (10.5 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	52	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 11.5 V ≤V_I ≤ 21.5 V) (I_O = 300 mA, f = 120 Hz, 11.5 V ≤V_I ≤ 21.5 V, T_J = 25°C)	RR	 56 56	 – 80	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.2	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

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MC78M09C/B, NCV78M09B ELECTRICAL CHARACTERISTICS

(V_I = 15 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5.0 W, unless otherwise noted) (Note 4)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	8.64	9.0	9.45	Vdc
Output Voltage Variation (11.5 Vdc ≤ V_I ≤ 23 Vdc, 5.0 mA ≤ I_O ≤ 350 mA)	V_O	8.55	–	9.45	Vdc
Line Regulation (T_J = 25°C, 11.5 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA)	Reg_{line}	–	6.0	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 25 10	 180 90	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.0	mA
Quiescent Current Change (11.5 Vdc ≤ V_I ≤ 25 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	52	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 12.5 V ≤V_I ≤ 22.5 V) (I_O = 300 mA, f = 120 Hz, 12.5 V ≤V_I ≤ 22.5 V, T_J = 25°C)	RR	 56 56	 – 80	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.2	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

MC78M12C/AC/B/AB, NCV78M12B ELECTRICAL CHARACTERISTICS

(V_I = 19 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5 W, unless otherwise noted) (Note 4)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C) MC78M12B/ MC78M12AB	V_O	 11.50 11.76	 12 12	 12.50 12.24	Vdc
Output Voltage Variation (14.5 Vdc ≤ V_I ≤ 27 Vdc, 5.0 mA ≤ I_O ≤ 350 mA) MC78M12B/ MC78M12AB	V_O	 11.4 11.5	 – –	 12.6 12.5	Vdc
Line Regulation (T_J = 25°C, 14.5 Vdc ≤ V_I ≤ 30 Vdc, I_O = 200 mA)	Reg_{line}	–	8.0	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 25 10	 240 120	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.0	mA
Quiescent Current Change (14.5 Vdc ≤ V_I ≤ 30 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	75	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 15 V ≤V_I ≤ 25 V) (I_O = 300 mA, f = 120 Hz, 15 V ≤V_I ≤ 25 V, T_J = 25°C)	RR	 55 55	 – 80	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.3	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

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MC78M15B/AB ELECTRICAL CHARACTERISTICS

(V_I = 23 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le 5$ W, unless otherwise noted) (Note 5)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C) MC78M15B/MC78M15AB	V_O	 14.4 14.7	 15 15	 15.6 15.3	Vdc
Output Voltage Variation (17.5 Vdc ≤ V_I ≤ 30 Vdc, 5.0 mA ≤ I_O ≤ 350 mA) MC78M15B/MC78M15AB	V_O	 14.25 14.40	 – –	 15.75 15.60	Vdc
Input Regulation (T_J = 25°C, 17.5 Vdc ≤ V_I ≤ 30 Vdc, I_O = 200 mA)	Reg_{line}	–	10	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 25 10	 300 150	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.0	mA
Quiescent Current Change (17.5 Vdc ≤ V_I ≤ 30 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	90	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 18.5 V ≤ V_I ≤ 28.5 V) (I_O = 300 mA, f = 120 Hz, 18.5 V ≤ V_I ≤ 28.5 V, T_J = 25°C)	RR	 54 54	 – 70	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.3	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

MC78M18C/B ELECTRICAL CHARACTERISTICS

(V_I = 27 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le 5$ W, unless otherwise noted) (Note 5)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	17.3	18	18.7	Vdc
Output Voltage Variation (21 Vdc ≤ V_I ≤ 33 Vdc, 5.0 mA ≤ I_O ≤ 350 mA)	V_O	17.1	–	18.9	Vdc
Line Regulation (T_J = 25°C, 21 Vdc ≤ V_I ≤ 33 Vdc, I_O = 200 mA)	Reg_{line}	–	10	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 30 10	 360 180	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.5	mA
Quiescent Current Change (21 Vdc ≤ V_I ≤ 33 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	100	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 22 V ≤ V_I ≤ 32 V) (I_O = 300 mA, f = 120 Hz, 22 V ≤ V_I ≤ 32 V, T_J = 25°C)	RR	 53 53	 – 70	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.3	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

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MC78M20C/B ELECTRICAL CHARACTERISTICS

(V_I = 29 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5.0 W, unless otherwise noted) (Note 6)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	19.2	20	20.8	Vdc
Output Voltage Variation (23 Vdc ≤ V_I ≤ 35 Vdc, 5.0 mA ≤ I_O ≤ 350 mA)	V_O	19	–	21	Vdc
Line Regulation (T_J = 25°C, 23 Vdc ≤ V_I ≤ 35 Vdc, I_O = 200 mA)	Reg_{line}	–	10	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 30 10	 400 200	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	6.5	mA
Quiescent Current Change (23 Vdc ≤ V_I ≤ 35 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	110	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 24 V ≤ V_I ≤ 34 V) (I_O = 300 mA, f = 120 Hz, 24 V ≤ V_I ≤ 34 V, T_J = 25°C)	RR	 52 52	 – 70	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C, V_I = 35 V)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.5	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

MC78M24C/B ELECTRICAL CHARACTERISTICS

(V_I = 33 V, I_O = 350 mA, T_J = T_{low} to T_{high}, $P_D \le$ 5.0 W, unless otherwise noted) (Note 6)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C)	V_O	23	24	25	Vdc
Output Voltage Variation (27 Vdc ≤ V_I ≤ 38 Vdc, 5.0 mA ≤ I_O ≤ 350 mA)	V_O	22.8	–	25.2	Vdc
Line Regulation (T_J = 25°C, 27 Vdc ≤ V_I ≤ 38 Vdc, I_O = 200 mA)	Reg_{line}	–	10	50	mV
Load Regulation (T_J = 25°C, 5.0 mA ≤ I_O ≤ 500 mA) (T_J = 25°C, 5.0 mA ≤ I_O ≤ 200 mA)	Reg_{load}	 – –	 30 10	 480 240	mV
Input Bias Current (T_J = 25°C)	I_{IB}	–	3.2	7.0	mA
Quiescent Current Change (27 Vdc ≤ V_I ≤ 38 Vdc, I_O = 200 mA) (5.0 mA ≤ I_O ≤ 350 mA)	ΔI_{IB}	 – –	 – –	 0.8 0.5	mA
Output Noise Voltage (T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz)	V_n	–	170	–	μV
Ripple Rejection (I_O = 100 mA, f = 120 Hz, 28 V ≤ V_I ≤ 38 V) (I_O = 300 mA, f = 120 Hz, 28 V ≤ V_I ≤ 38 V, T_J = 25°C)	RR	 50 50	 – 70	 – –	dB
Dropout Voltage (T_J = 25°C)	V_I–V_O	–	2.0	–	Vdc
Short Circuit Current Limit (T_J = 25°C)	I_{OS}	–	350	–	mA
Average Temperature Coefficient of Output Voltage (I_O = 5.0 mA)	$\Delta V_O/\Delta T$	–	±0.5	–	mV/°C
Peak Output Current (T_J = 25°C)	I_O	–	700	–	mA

6. T_{low} = 0°C for MC78MxxAC, C
   = –40°C for MC78MxxAB, B
   T_{high} = +125°C for MC78MxxAB, AC, B, C

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DEFINITIONS

Line Regulation – The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

Load Regulation – The change in output voltage for a change in load current at constant chip temperature.

Maximum Power Dissipation – The maximum total device dissipation for which the regulator will operate within specifications.

Input Bias Current – That part of the input current that is not delivered to the load.

Output Noise Voltage – The rms AC voltage at the output, with constant load and no input ripple, measured over a specified frequency range.

Long Term Stability – Output voltage stability under accelerated life test conditions with the maximum rated voltage listed in the devices' electrical characteristics and maximum power dissipation.

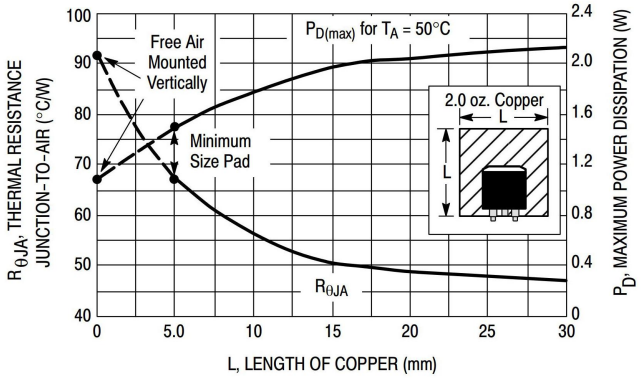

Figure 2. DPAK Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

ORDERING INFORMATION

Device	Output Voltage	Temperature Range	Package	Marking	Shipping†
MC78M05ABDTRKG	5.0 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M05A	2500 / Tape & Reel
MC78M05BDTRKG	5.0 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M05B	2500 / Tape & Reel
MC78M08BDTRKG	8.0 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M08B	2500 Units / Tape & Reel
MC78M09BDTRKG	9.0 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M09B	2500 Units / Tape & Reel
MC78M12ABDTRKG	12 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M12A	2500 Units / Tape & Reel
MC78M12BDTRKG	12 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M12B	2500 Units / Tape & Reel
MC78M15ABDTRKG	15 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M15A	2500 Units / Tape & Reel
MC78M15BDTRKG	15 V	T_J = −40° to +125°C	DPAK−3 (Pb−Free)	8M15B	2500 Units / Tape & Reel

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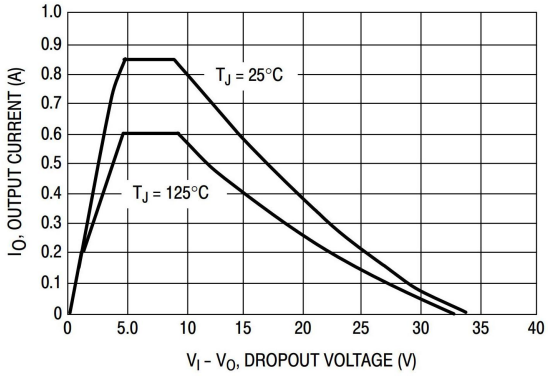

Figure 4. Peak Output Current versus Dropout Voltage

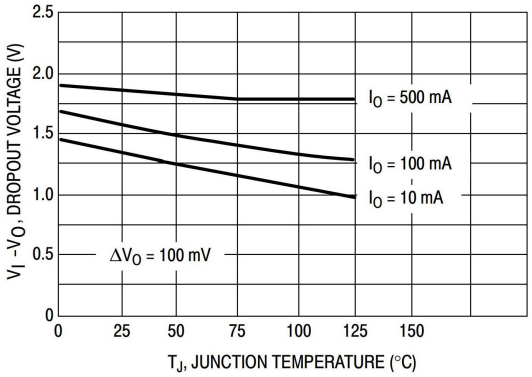

Figure 5. Dropout Voltage versus Junction Temperature

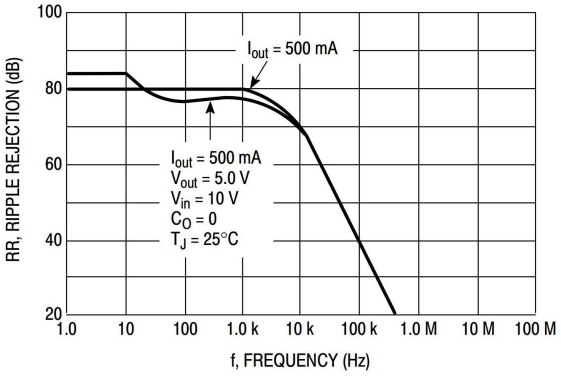

Figure 6. Ripple Rejection versus Frequency

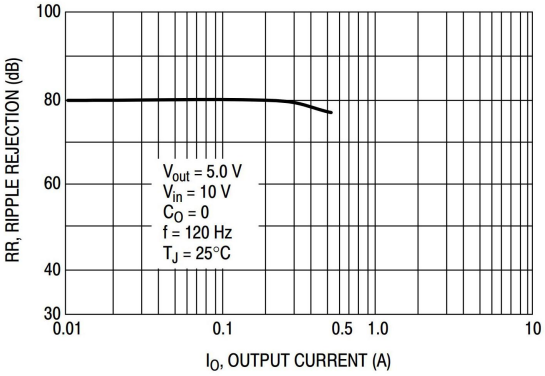

Figure 7. Ripple Rejection versus Output Current

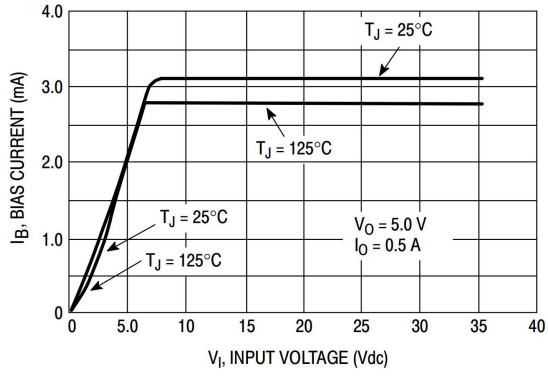

Figure 8. Bias Current versus Input Voltage

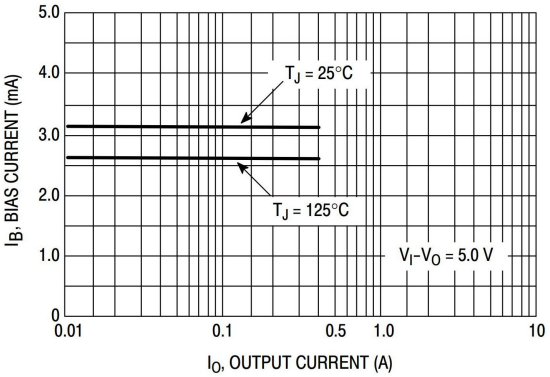

Figure 9. Bias Current versus Output Current

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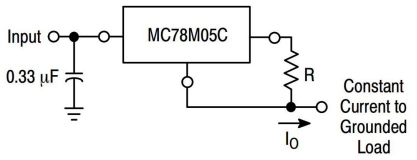
APPLICATIONS INFORMATION

Design Considerations

The MC78M00/MC78M00A Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe−Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33 μF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.



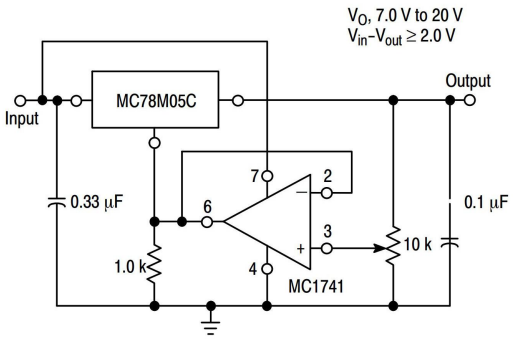
The MC78M00 regulators can also be used as a current source when connected as above. In order to minimize dissipation the MC78M05C is chosen in this application. Resistor R determines the current as follows:

$$I_O = \frac{5.0\ V}{R} + I_{IB}$$

I_{IB} = 1.5 mA over line and load changes.

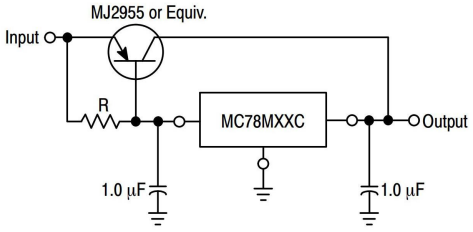
For example, a 500 mA current source would require R to be a 10 Ω, 10 W resistor and the output voltage compliance would be the input voltage less 7.0 V.

Figure 10. Current Regulator



The addition of an operational amplifier allows adjustment to higher or intermediate values while retaining regulation characteristics. The minimum voltage obtainable with this arrangement is 2.0 V greater than the regulator voltage.

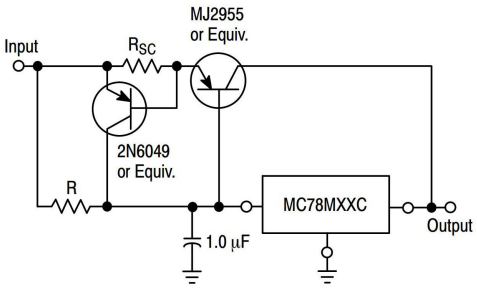
Figure 11. Adjustable Output Regulator



XX = 2 digits of type number indicating voltage.

The MC78M00 series can be current boosted with a PNP transistor. The MJ2955 provides current to 5.0 A. Resistor R in conjunction with the V_{BE} of the PNP determines when the pass transistor begins conducting; this circuit is not short circuit proof. Input−output differential voltage minimum is increased by V_{BE} of the pass transistor.

Figure 12. Current Boost Regulator



XX = 2 digits of type number indicating voltage.

The circuit of Figure 12 can be modified to provide supply protection against short circuits by adding a short circuit sense resistor, R_{SC}, and an additional PNP transistor. The current sensing PNP must be able to handle the short circuit current of the three−terminal regulator .Therefore, a 4.0 A plastic power transistor is specified.

Figure 13. Current Boost with Short Circuit Protection

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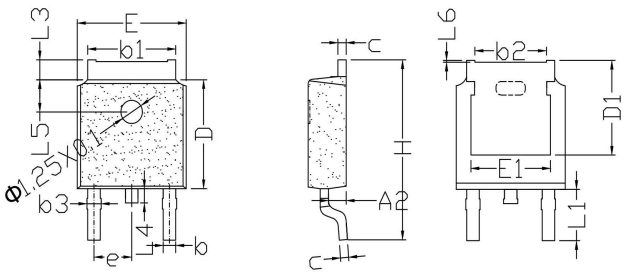
Ordering Information

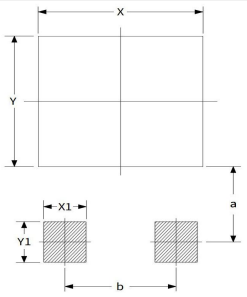
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TO-252	R3	0.305	2500	5000	25000	13''

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