500 m

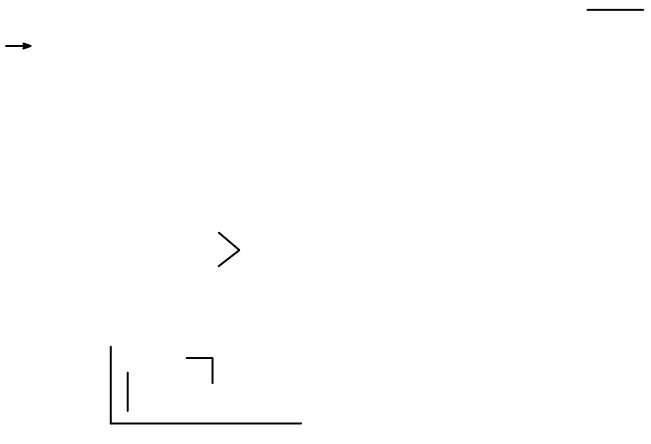
Description

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
- NCV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
- These are Pb−Free Devices



This device contains 28 active transistors.

Figure 1. Representative Schematic Diagram

MAXIMUM RATINGS

MC78M06C/B ELECTRICAL CHARACTERISTICS
(V_I = 11 V, I_O = 350 mA, T_J = T_{low} to T_{high}, P

MC78M15C/AC/B/AB, NCV78M15B ELECTRICAL CHARACTERISTICS

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

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = 25°C) MC78M15B/MC78M15C/NCV78M15B					

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					

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

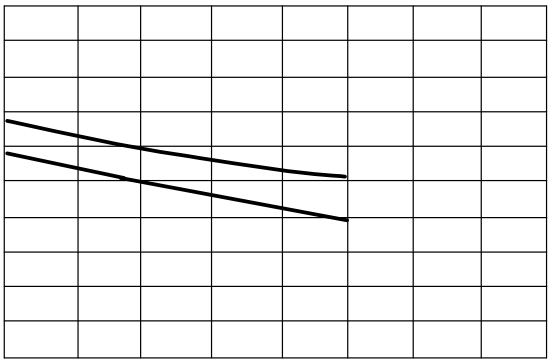


Figure 4. Peak Output Current versus Dropout Voltage

Figure 5. Dropout Voltage versus Junction Temperature

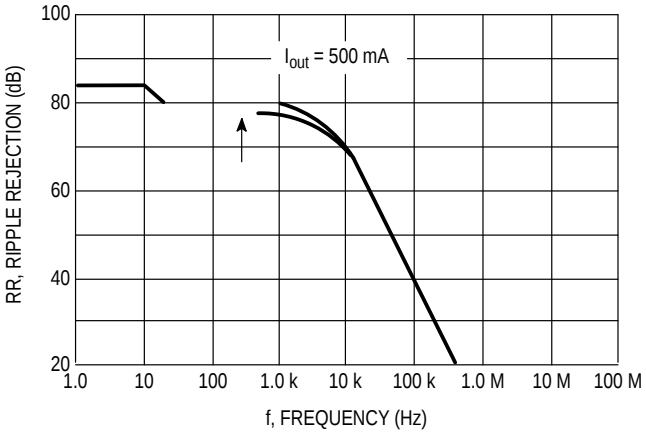


Figure 6. Ripple Rejection versus Frequency

Figure 7. Ripple Rejection versus Output Current

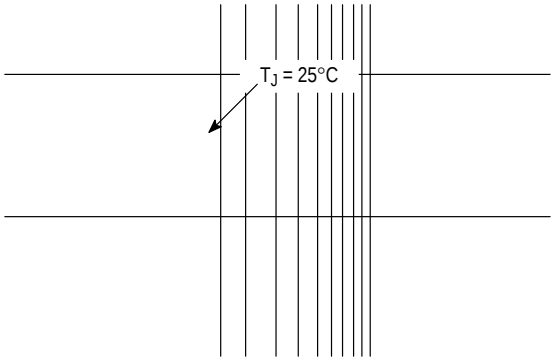


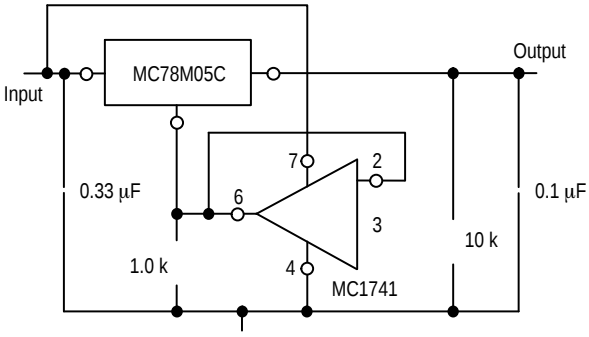
Figure 8. Bias Current versus Input Voltage

APPLICATIONS INFORMATION

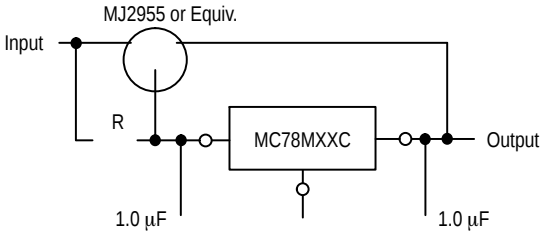
Design Considerations

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 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.



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.

ORDERING INFORMATION

Device	Output Voltage	Temperature Range	Package	Marking	Shipping†
MC78M05CDTG	5.0 V	T_J = 0° to +125°C	DPAK 3 (Pb Free)	78M05	75 Units / Rail
MC78M05CDTRKG	5.0 V	T_J = 0° to +125°C	DPAK 3 (Pb Free)	78M05	2500 / Tape & Reel
MC78M05ACDTRKG	5.0 V	T_J = 0° to +125°C	DPAK 3 (Pb Free)	8M05D	2500 / Tape & Reel
MC78M05CTG	5.0 V	T_J = 0° to +125°C	TO 220 (Pb Free)	78M05CT	50 Units / Rail
MC78M05ABDTG	5.0 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M05A	75 Units / Rail
MC78M05ABDTRKG	5.0 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M05A	2500 / Tape & Reel
NCV78M05ABDTRKG*	5.0 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M05A	2500 / Tape & Reel
MC78M05BDTG	5.0 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M05B	75 Units / Rail
MC78M05BDTRKG	5.0 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M05B	2500 / Tape & Reel

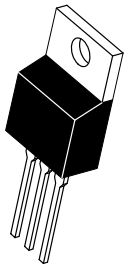
8M05B ˜fb)F% € L%2500dVTape&Reel ö˜TA*ƒ*–€3ä óhfb)$"^ô2b

78M05

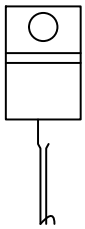
ORDERING INFORMATION (continued)

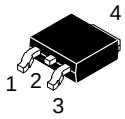
Device	Output Voltage	Temperature Range	Package	Marking	Shipping†
MC78M12ABDTRKG	12 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M12A	2500 Units / Tape & Reel
MC78M12BDTG	12 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M12B	75 Units / Rail
MC78M12BDTRKG	12 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M12B	2500 Units / Tape & Reel
NCV78M12BDTRKG*	12 V	T_J = 40° to +125°C	DPAK 3 (Pb Free)	8M12B	2500 Units / Tape & Reel
NCV78M12BT-125	12 V	T_J = 40° to +125°C			

TO−220, SINGLE GAUGE



SCALE 1:1





SCALE 1:1

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE G

DATE 31 MAY 2023

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 5:
PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 8:
PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE