FAIRCHILD
A Schlumberger Company

μA78M00 Series 3-Terminal Positive Voltage Regulators

Linear Division Voltage Regulators

Description

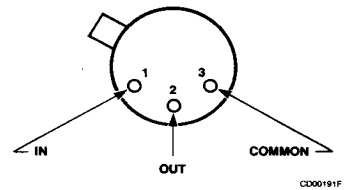
The μA78M00 series of 3-terminal medium current positive voltage regulators is constructed using the Fairchild Planar Epitaxial process. These regulators employ internal current-limiting, thermal shutdown and safe-area compensation making them essentially indestructible. If adequate heat sinking is provided, they can deliver in excess of 0.5 A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single-point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

- **Output Current In Excess Of 0.5 A**
- **No External Components**
- **Internal Thermal Overload Protection**
- **Internal Short Circuit Current-Limiting**
- **Output Transistor Safe-Area Compensation**
- **Available In JEDEC TO-220 And TO-39 Packages**
- **Output Voltages Of 5 V, 6 V, 8 V, 12 V, 15 V, And 24 V**
- **Available In Extended Temperature Range**

Absolute Maximum Ratings

Storage Temperature Range	
TO-39 Metal Can	−65°C to +175°C
TO-220 Package	−65°C to +150°C
Operating Junction Temperature Range	
Extended (μA78M00M)	−55°C to +150°C
Commercial (μA78M00C)	0°C to +150°C
Lead Temperature	
TO-39 Metal Can (soldering, 60 s)	300°C
TO-220 Package (soldering, 60 s)	265°C
Power Dissipation	Internally Limited
Input Voltage	
5.0 V to 15 V	35 V
24 V	40 V

Connection Diagram TO-39 Package (Top View)

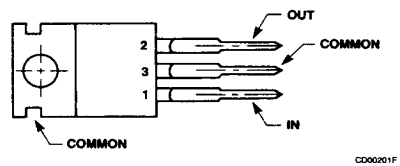


Lead 3 connected to case.

Order Information

Device Code	Package Code	Package Description
μA78M05HM	FC	Metal
μA78M06HM	FC	Metal
μA78M08HM	FC	Metal
μA78M12HM	FC	Metal
μA78M15HM	FC	Metal
μA78M24HM	FC	Metal
μA78M05HC	FC	Metal
μA78M06HC	FC	Metal
μA78M08HC	FC	Metal
μA78M12HC	FC	Metal
μA78M15HC	FC	Metal
μA78M24HC	FC	Metal

Connection Diagram TO-220 Package (Top View)

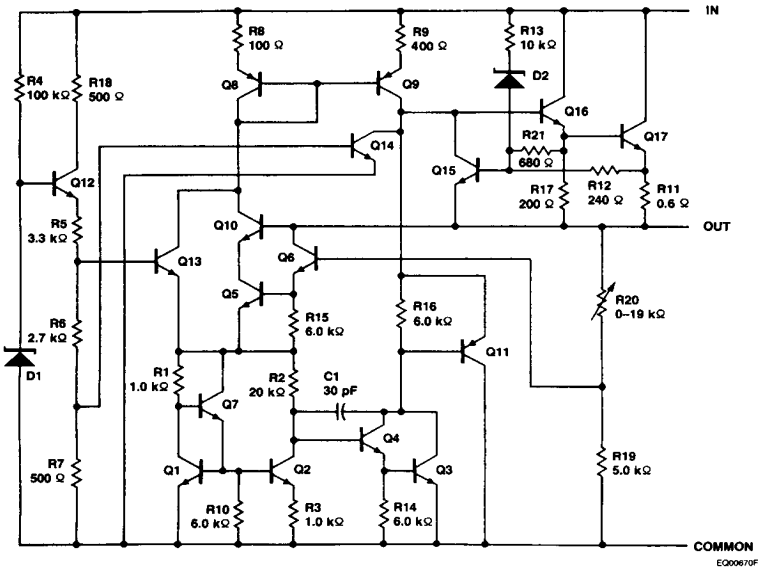


Lead 3 connected to case.

Order Information

Device Code	Package Code	Package Description
μA78M05UC	GH	Molded Power Pack
μA78M06UC	GH	Molded Power Pack
μA78M08UC	GH	Molded Power Pack
μA78M12UC	GH	Molded Power Pack
μA78M15UC	GH	Molded Power Pack
μA78M24UC	GH	Molded Power Pack

Equivalent Circuit



μA78M05

Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 10$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		4.8	5.0	5.2	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	7.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA		3.0	50	mV
				8.0 V $\leq V_I \leq$ 20 V, $I_O = 200$ mA		1.0	25	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		20	50	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	25	
V_O	Output Voltage		8.0 V $\leq V_I \leq$ 20 V, 5.0 mA $\leq I_O \leq$ 350 mA		4.7		5.3	V
I_Q	Quiescent Current		$T_J = 25°C$			4.5	7.0	mA
ΔI_Q	Quiescent Current Change	with line	8.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz $\leq f \leq$ 100 kHz			8.0	40	μV/V_O
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $T_J = 25°C$		62	80		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0	2.5	V

μA78M05 (Cont.)
Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 10$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic	Condition[1]		Min	Typ	Max	Unit
I_{OS}	Output Short Circuit Current	$T_J = 25°C$, $V_I = 35$ V			300	600	mA
I_{pk}	Peak Output Current	$T_J = 25°C$		0.5	0.7	1.4	A
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage	$I_O = 5.0$ mA	$-55°C \leq T_A \leq +25°C$			0.4	mV/°C/ V_O
			$+25°C \leq T_A \leq +125°C$			0.3	

μA78M05C
Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 10$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		4.8	5.0	5.2	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	7.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA		3.0	100	mV
				8.0 V $\leq V_I \leq$ 20 V, $I_O = 200$ mA		1.0	50	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		20	100	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	50	
V_O	Output Voltage		7.0 V $\leq V_I \leq$ 20 V, 5.0 mA $\leq I_O \leq$ 350 mA		4.75		5.25	V
I_Q	Quiescent Current		$T_J = 25°C$			4.5	8.0	mA
ΔI_Q	Quiescent Current Change	with line	8.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz $\leq f \leq$ 100 kHz			40		μV
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $T_J = 25°C$		62	80		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0		V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			300		mA
I_{pk}	Peak Output Current		$T_J = 25°C$			700		mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA			1.0		mV/°C

μA78M06

Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 11$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		5.75	6.0	6.25	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	8.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA		5.0	60	mV
				9.0 V $\leq V_I \leq$ 20 V, $I_O = 200$ mA		1.5	30	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		20	60	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	30	
V_O	Output Voltage		9.0 V $\leq V_I \leq$ 21 V, 5.0 mA $\leq I_O \leq$ 350 mA		5.7		6.3	V
I_Q	Quiescent Current		$T_J = 25°C$			4.5	7.0	mA
ΔI_Q	Quiescent Current Change	with line	9.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz $\leq f \leq$ 100 kHz			8.0	40	μV/V_O
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $T_J = 25°C$		59	80		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0	2.5	V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			300	600	mA
I_{pk}	Peak Output Current		$T_J = 25°C$		0.5	0.7	1.4	A
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA	$-55°C \leq T_A \leq +25°C$			0.4	mV/°C/ V_O
				$+25°C \leq T_A \leq +125°C$			0.3	

μA78M06C

Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 11$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		5.75	6.0	6.25	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	8.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA		5.0	100	mV
				9.0 V $\leq V_I \leq$ 20 V, $I_O = 200$ mA		1.5	50	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		20	120	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	60	
V_O	Output Voltage		8.0 V $\leq V_I \leq$ 21 V, 5.0 mA $\leq I_O \leq$ 350 mA		5.7		6.3	V
I_Q	Quiescent Current		$T_J = 25°C$			4.5	8.0	mA
ΔI_Q	Quiescent Current Change	with line	9.0 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	

μA78M06C (Cont.)
Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 11$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF unless otherwise specified.

Symbol	Characteristic	Condition[1]	Min	Typ	Max	Unit
N_O	Noise	$T_A = 25°C$, 10 Hz ≤ f ≤ 100 kHz		45		μV
$\Delta V_I/\Delta V_O$	Ripple Rejection	f = 2400 Hz, $I_O = 125$ mA, $T_J = 25°C$	59	80		dB
V_{DO}	Dropout Voltage	$T_A = 25°C$		2.0		V
I_{OS}	Output Short Circuit Current	$T_J = 25°C$, $V_I = 35$ V		270		mA
I_{pk}	Peak Output Current	$T_J = 25°C$		700		mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage	$I_O = 5.0$ mA		0.5		mV/°C

μA78M08
Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 14$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		7.7	8.0	8.3	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	10.5 V ≤ V_I ≤ 25 V, I_O = 200 mA		6.0	60	mV
				11 V ≤ V_I ≤ 20 V, I_O = 200 mA		2.0	30	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA ≤ I_O ≤ 500 mA		25	80	mV
				5.0 mA ≤ I_O ≤ 200 mA		10	40	
V_O	Output Voltage		11.5 V ≤ V_I ≤ 23 V, 5.0 mA ≤ I_O ≤ 350 mA		7.6		8.4	V
I_Q	Quiescent Current		$T_J = 25°C$			4.6	7.0	mA
ΔI_Q	Quiescent Current Change	with line	11.5 V ≤ V_I ≤ 25 V, I_O = 200 mA				0.8	mA
		with load	5.0 mA ≤ I_O ≤ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz ≤ f ≤ 100 kHz			8.0	40	μV/V_O
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $T_J = 25°C$		56	80		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0	2.5	V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			300	600	mA
I_{pk}	Peak Output Current		$T_J = 25°C$		0.5	0.7	1.4	A
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA	$-55°C \leq T_A \leq +25°C$			0.4	mV/°C
				$+25°C \leq T_A \leq +125°C$			0.3	

μA78M08C
Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 14$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		7.7	8.0	8.3	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	10.5 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA		6.0	100	mV
				11 V $\leq V_I \leq$ 20 V, $I_O = 200$ mA		2.0	50	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		25	160	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	80	
V_O	Output Voltage		10.5 V $\leq V_I \leq$ 23 V, 5.0 mA $\leq I_O \leq$ 350 mA		7.6		8.4	V
I_Q	Quiescent Current		$T_J = 25°C$			4.6	8.0	mA
ΔI_Q	Quiescent Current Change	with line	10.5 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz $\leq f \leq$ 100 kHz			52		μV
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $T_J = 25°C$		56	80		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0		V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			250		mA
I_{pk}	Peak Output Current		$T_J = 25°C$			700		mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA			0.5		mV/°C

μA78M12
Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 19$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		11.5	12.0	12.5	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	14.5V $\leq V_I \leq$ 30 V, $I_O = 200$ mA		8.0	60	mV
				16 V $\leq V_I \leq$ 25 V, $I_O = 200$ mA		2.0	30	mV
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		25	120	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	60	
V_O	Output Voltage		15.5 V $\leq V_I \leq$ 27 V, 5.0 mA $\leq I_O \leq$ 350 mA		11.4		12.6	V
I_Q	Quiescent Current		$T_J = 25°C$			4.8	7.0	mA
ΔI_Q	Quiescent Current Change	with line	15 V $\leq V_I \leq$ 30 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	mA

μA78M12 (Cont.)
Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 19$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic	Condition[1]		Min	Typ	Max	Unit
N_O	Noise	$T_A = 25°C$, 10 Hz ≤ f ≤ 100 kHz			8.0	40	μV/V_O
$\Delta V_I/\Delta V_O$	Ripple Rejection	f = 2400 Hz, $V_I = 17$ V, $I_O = 125$ mA, $T_J = 25°C$		55	80		dB
V_{DO}	Dropout Voltage	$T_A = 25°C$			2.0	2.5	V
I_{OS}	Output Short Circuit Current	$T_J = 25°C$, $V_I = 35$ V			300	600	mA
I_{pk}	Peak Output Current	$T_J = 25°C$		0.5	0.7	1.4	A
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage	$I_O = 5.0$ mA	$-55°C \leq T_A \leq +25°C$			0.4	mV/°C/ V_O
			$+25°C \leq T_A \leq +125°C$			0.3	

μA78M12C
Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 19$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		11.5	12.0	12.5	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	14.5 V ≤ V_I ≤ 30 V, $I_O = 200$ mA		8.0	100	mV
				16 V ≤ V_I ≤ 25 V, $I_O = 200$ mA		2.0	50	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA ≤ I_O ≤ 500 mA		25	240	mV
				5.0 mA ≤ I_O ≤ 200 mA		10	120	
V_O	Output Voltage		14.5 V ≤ V_I ≤ 27 V, 5.0 mA ≤ I_O ≤ 350 mA		11.4		12.6	V
I_Q	Quiescent Current		$T_J = 25°C$			4.8	8.0	mA
ΔI_Q	Quiescent Current Change	with line	14.5 V ≤ V_I ≤ 30 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA ≤ I_O ≤ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz ≤ f ≤ 100 kHz			75		μV
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $V_I = 17$ V, $T_J = 25°C$		55	80		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0		V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			240		mA
I_{pk}	Peak Output Current		$T_J = 25°C$			700		mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA			1.0		mV/°C

μA78M15
Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 23$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		14.4	15.0	15.6	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	17.5 V $\leq V_I \leq$ 30 V, $I_O = 200$ mA		10	60	mV
				20 V $\leq V_I \leq$ 28 V, $I_O = 200$ mA		3.0	30	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		25	150	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	75	
V_O	Output Voltage		18.5 V $\leq V_I \leq$ 30 V, 5.0 mA $\leq I_O \leq$ 350 mA		14.25		15.75	V
I_Q	Quiescent Current		$T_J = 25°C$			4.8	7.0	mA
ΔI_Q	Quiescent Current Change	with line	18.5 V $\leq V_I \leq$ 30 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, 10 Hz $\leq f \leq$ 100 kHz			8.0	40	μV/V_O
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $V_I = 20$ V, $T_J = 25°C$		54	70		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0	2.5	V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			300	600	mA
I_{pk}	Peak Output Current		$T_J = 25°C$		0.5	0.7	1.4	A
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA	$-55°C \leq T_A \leq +25°C$			0.4	mV/°C/V_O
				$+25°C \leq T_A \leq +125°C$			0.3	

μA78M15C
Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 23$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic	Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage	$T_J = 25°C$		14.4	15.0	15.6	V
$V_{R\ LINE}$	Line Regulation	$T_J = 25°C$	17.5 V $\leq V_I \leq$ 30 V, $I_O = 200$ mA		10	100	mV
			20 V $\leq V_I \leq$ 28 V, $I_O = 200$ mA		3.0	50	
$V_{R\ LOAD}$	Load Regulation	$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		25	300	mV
			5.0 mA $\leq I_O \leq$ 200 mA		10	150	
V_O	Output Voltage	17.5 V $\leq V_I \leq$ 30 V, 5.0 mA $\leq I_O \leq$ 350 mA		14.25		15.75	V
I_Q	Quiescent Current	$T_J = 25°C$			4.8	8.0	mA

μA78M15C (Cont.)
Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 23$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]	Min	Typ	Max	Unit
ΔI_Q	Quiescent Current Change	with line	$17.5 \text{ V} \leq V_I \leq 30$ V, $I_O = 200$ mA			0.8	mA
		with load	$5.0 \text{ mA} \leq I_O \leq 350$ mA			0.5	
N_O	Noise		$T_A = 25°C$, $10 \text{ Hz} \leq f \leq 100$ kHz		90		μV
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $V_I = 20$ V, $T_J = 25°C$	54	70		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$		2.0		V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V		240		mA
I_{pk}	Peak Output Current		$T_J = 25°C$		700		mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA		1.0		mV/°C

μA78M24
Electrical Characteristics $-55°C \leq T_A \leq 125°C$, $V_I = 33$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		23.0	24.0	25.0	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	27 V $\leq V_I \leq$ 38 V, $I_O = 200$ mA		10	60	mV
				30 V $\leq V_I \leq$ 36 V, $I_O = 200$ mA		5.0	30	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	5.0 mA $\leq I_O \leq$ 500 mA		30	240	mV
				5.0 mA $\leq I_O \leq$ 200 mA		10	120	
V_O	Output Voltage		28 V $\leq V_I \leq$ 38 V, 5.0 mA $\leq I_O \leq$ 350 mA		22.8		25.2	V
I_Q	Quiescent Current		$T_J = 25°C$			5.0	7.0	mA
ΔI_Q	Quiescent Current Change	with line	28 V $\leq V_I \leq$ 38 V, $I_O = 200$ mA				0.8	mA
		with load	5.0 mA $\leq I_O \leq$ 350 mA				0.5	
N_O	Noise		$T_A = 25°C$, $10 \text{ Hz} \leq f \leq 100$ kHz			8.0	40	μV/V_O
$\Delta V_I/\Delta V_O$	Ripple Rejection		f = 2400 Hz, $I_O = 125$ mA, $V_I = 30$ V, $T_J = 25°C$		50	70		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0	2.5	V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			300	600	mA
I_{pk}	Peak Output Current		$T_J = 25°C$		0.5	0.7	1.4	mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA	$-55°C \leq T_A \leq +25°C$			0.4	mV/°C/ V_O
				$+25°C \leq T_A \leq +125°C$			0.3	

μA78M24C

Electrical Characteristics $0°C \leq T_A \leq 125°C$, $V_I = 33$ V, $I_O = 350$ mA, $C_I = 0.33$ μF, $C_O = 0.1$ μF, unless otherwise specified.

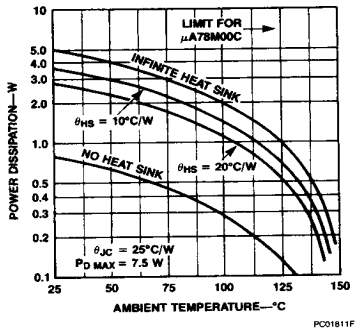
Symbol	Characteristic		Condition[1]		Min	Typ	Max	Unit
V_O	Output Voltage		$T_J = 25°C$		23.0	24.0	25.0	V
$V_{R\ LINE}$	Line Regulation		$T_J = 25°C$	$27\ V \leq V_I \leq 38\ V$, $I_O = 200$ mA		10	100	mV
				$28\ V \leq V_I \leq 36\ V$, $I_O = 200$ mA		5.0	50	
$V_{R\ LOAD}$	Load Regulation		$T_J = 25°C$	$5.0\ mA \leq I_O \leq 500$ mA		30	480	mV
				$5.0\ mA \leq I_O \leq 200$ mA		10	240	
V_O	Output Voltage		$27\ V \leq V_I \leq 38\ V$, $5.0\ mA \leq I_O \leq 350$ mA		22.8		25.2	V
I_Q	Quiescent Current		$T_J = 25°C$			5.0	8.0	mA
ΔI_Q	Quiescent Current Change	with line	$27\ V \leq V_I \leq 38\ V$, $I_O = 200$ mA				0.8	mA
		with load	$5.0\ mA \leq I_O \leq 350$ mA				0.5	
N_O	Noise		$T_A = 25°C$, $10\ Hz \leq f \leq 100$ kHz			170		μV
$\Delta V_I/\Delta V_O$	Ripple Rejection		$f = 2400$ Hz, $I_O = 125$ mA, $V_I = 30$ V, $T_J = 25°C$		50	70		dB
V_{DO}	Dropout Voltage		$T_A = 25°C$			2.0		V
I_{OS}	Output Short Circuit Current		$T_J = 25°C$, $V_I = 35$ V			240		mA
I_{pk}	Peak Output Current		$T_J = 25°C$			700		mA
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage		$I_O = 5.0$ mA			1.2		mV/°C

Note

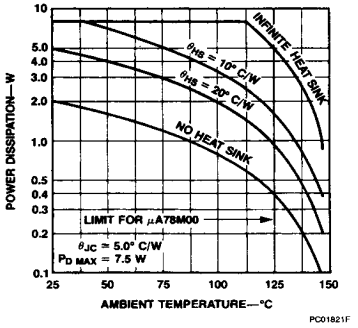
1. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ($T_W \leq 10$ ms, duty cycle $\leq 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.

Typical Performance Curves

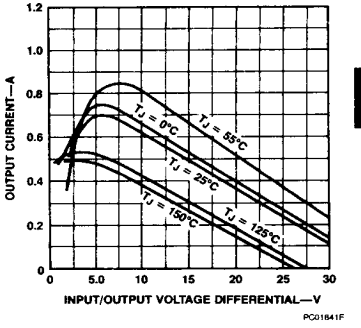
Worst Case Power Dissipation vs Ambient Temperature (TO-39)



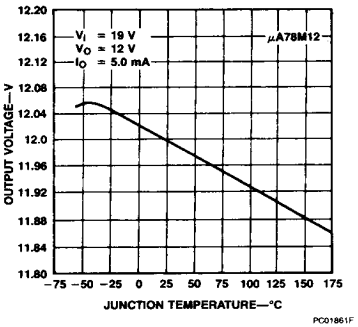
Worst Case Power Dissipation vs Ambient Temperature (TO-220)



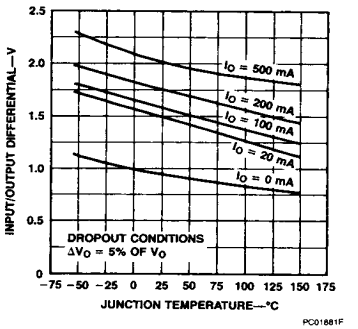
Peak Output Current vs Input/Output Voltage Differential



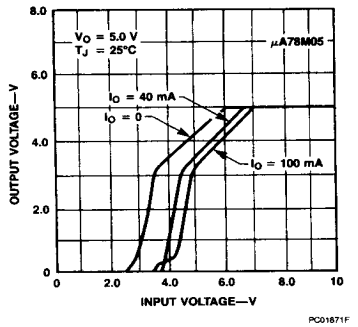
Output Voltage vs Junction Temperature



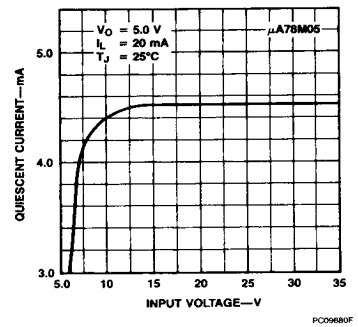
Dropout Voltage vs Junction Temperature



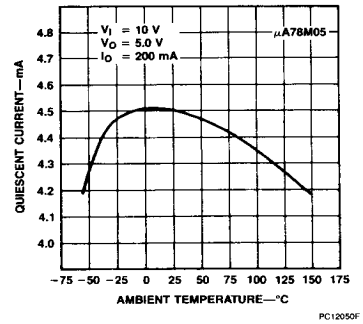
Dropout Characteristics



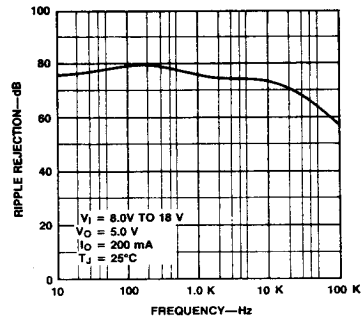
Quiescent Current vs Input Voltage



Quiescent Current vs Temperature



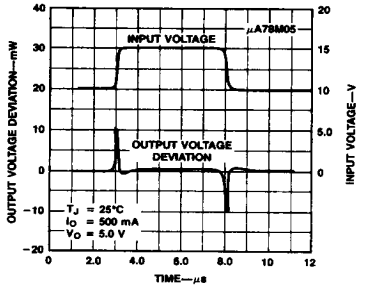
Ripple Rejection vs Frequency



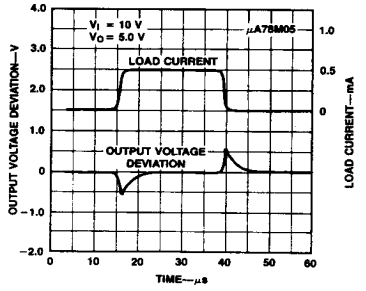
Note
Other μA78M00 Series devices have similar curves.

Typical Performance Curves (Cont.)

Line Transient Response



Load Transient Response



Design Considerations

The μA78M00 fixed voltage regulator series has thermal-overload protection from excessive power, internal short circuit protection which limits the circuit's maximum current, and output transistor safe-area compensation for reducing the output short circuit current as the voltage across the pass transistor is increased.

Although the internal power dissipation is limited, the junction temperature must be kept below the maximum specified temperature (150°C for μA78M00, 125°C for μA78M00C) in order to meet data sheet specifications. To calculate the maximum junction temperature or heat sink required, the following thermal resistance values should be used:

Package	Typ θJC	Max θJC	Typ θJA	Max θJA
TO-39	18	25	120	140
TO-220	3.0	5.0	60	40

$$P_{D\ MAX} = \frac{T_{J\ Max} - T_A}{\theta_{JC} + \theta_{CA}} \text{ or}$$

$$= \frac{T_{J\ Max} - T_A}{\theta J_A} \text{ (Without a heat sink)}$$

$$\theta_{CA} = \theta_{CS} + \theta_{SA}$$

Solving for T_J:

$T_J = T_A + P_D(\theta_{JC} + \theta_{CA})$ or

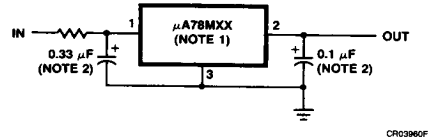
$= T_A + P_D\ \theta_{JA}$ (Without a heat sink)

Where:

- T_J = Junction Temperature
- T_A = Ambient Temperature
- P_D = Power Dissipation
- θ_{JC} = Junction to case thermal resistance
- θ_{CA} = Case-to-ambient thermal resistance
- θ_{CS} = Case-to-heat sink to resistance
- θ_{SA} = Heat sink-to-ambient thermal resistance
- θ_{JA} = Junction-to-ambient thermal resistance

Typical Applications

Fixed Output Regulator



Notes

1. To specify an output voltage, substitute voltage value for "XX".
2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulator.