TS79M00 series

3-Terminal Medium Current Negative Voltage Regulator

Pin assignment:
1. Ground
2. Input
3. Output

(Heatsink surface connected to Pin 2)

Voltage Range - 5V to - 24V
Output Current up to 0.5A

General Description

The TS79M00 Series negative voltage regulators are identical to the popular TS7900 Series devices, except that they are specified for only half the output current. Like the TS7900 devices, the TS79M00 Series 3-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 heatsink is 500mA

This series is offered in 3-pin TO-220, TO-252 package.

Features

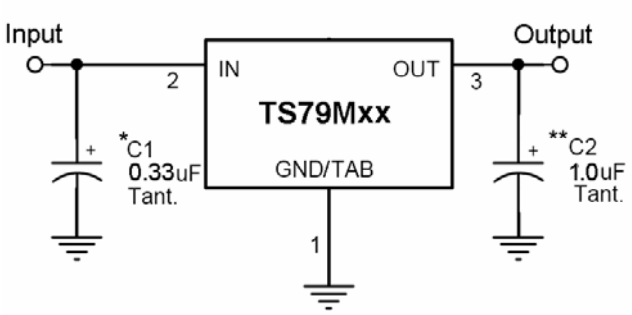
- ✧ Output current up to 0.5A
- ✧ No external components required
- ✧ Internal thermal overload protection
- ✧ Internal short-circuit current limiting
- ✧ Output transistor safe-area compensation
- ✧ Output voltage offered in 4% tolerance

Ordering Information

Part No.	Operating Temp.	Package
TS79MxxCZ	-20 ~ +125°C	TO-220
TS79MxxCP		TO-252

Note: Where xx denotes voltage option.

Standard Application



A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the Input ripple voltage.

XX = these two digits of the type number indicate voltage.

* = Cin is required if regulator is located an appreciable distance from power supply filter.

** = Co is not needed for stability; however, it does improve transient response.

Absolute Maximum Rating

Input Voltage		Vin *	- 35	V
Input Voltage		Vin **	- 40	V
Power Dissipation	TO-220	Without heatsink	2	W
	TO-220	Pt ***	15	
	TO-252	Without heatsink	1	
Operating Junction Temperature Range		T_J	-20 ~ +125	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C

Note : * TS79M05 to TS79M18
** TS79M24
*** Follow the derating curve

TS79M05 Electrical Characteristics

(Vin= -10V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output voltage	Vout	Tj=25 °C		- 4.80	- 5	- 5.20	V
		-7.5V≤Vin≤ -20V, 5mA≤Iout≤350mA, PD≤5W		- 4.75	- 5	- 5.25	
Line Regulation	REGline	Tj=25 °C	-7.5V≤Vin≤ -25V, Io=200mA	--	3	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	20	100	
			5mA≤Iout≤200mA	--	10	50	
Quiescent Current	Iq	Iout=0, Tj=25 °C		--	4	8	mA
Quiescent Current Change	ΔIq	-7.5V≤Vin≤ -25V		--	--	0.5	
		5mA≤Iout≤350mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	40	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -8V≤Vin≤ -18V		54	66	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-0.2	--	mV/ °C

TS79M06 Electrical Characteristics

(Vin= -11V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 5.75	- 6	- 6.25	V
		-8.5V≤Vin≤ -21V, 5mA≤Iout≤350mA, PD≤5W		- 6.3	- 6	- 6.3	
Line Regulation	REGline	Tj=25 °C	-8.5V≤Vin≤ -25V, Io=200mA	--	3	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500A	--	20	120	
			5mA≤Iout≤200mA	--	10	60	
Quiescent Current	Iq	Iout=0, Tj=25 °C		--	4	8	mA
Quiescent Current Change	ΔIq	-8.5V≤Vin≤ -25V		--	--	0.5	
		5mA≤Iout≤350mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	40	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -9V≤Vin≤ -19V		54	66	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-0.2	--	mV/ °C

- Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

TS79M08 Electrical Characteristics

(Vin= -14V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 7.69	- 8	- 8.32	V
		-10.5V≤Vin≤ -23V, 5mA≤Iout≤350mA, PD≤5W		- 7.61	- 8	- 8.40	
Line Regulation	REGline	Tj=25 °C	-10.5V≤Vin≤ -25V, Io=200mA	--	6	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	25	160	
			5mA≤Iout≤200mA	--	10	80	
Quiescent Current	Iq	Iout=0, Tj=25 °C		--	4	8	mA
Quiescent Current Change	ΔIq	-10.5V≤Vin≤ -25V		--	--	0.5	
		5mA≤Iout≤350mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	60	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -11V≤Vin≤ -21V		54	63	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-0.4	--	mV/ °C

TS79M09 Electrical Characteristics

(Vin= -15V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 8.65	- 9	- 9.36	V
		-11.5V≤Vin≤ -23V, 5mA≤Iout≤350mA, PD≤5W		- 8.57	- 9	- 9.45	
Line Regulation	REGline	Tj=25 °C	-11.5V≤Vin≤ -26V Io=200mA	--	6	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	25	180	
			5mA≤Iout≤200mA	--	10	90	
Quiescent Current	Iq	Iout=0, Tj=25 °C		--	4	8	mA
Quiescent Current Change	ΔIq	-11.5V≤Vin≤ -26V		--	--	0.5	
		5mA≤Iout≤350mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	60	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -12V≤Vin≤ -22V		54	63	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-0.4	--	mV/ °C

- Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

TS79M12 Electrical Characteristics

(Vin= -19V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 11.53	- 12	- 12.48	V
		-14.5V≤Vin≤ -27V, 5mA≤Iout≤350mA, PD ≤5W		- 11.42	- 12	- 12.60	
Line Regulation	REGline	Tj=25 °C	-14.5V≤Vin≤ -30V, Io=200mA	--	8	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	25	240	
			0mA≤Iout≤200mA	--	10	120	
Quiescent Current	Iq	Tj=25 °C, Iout=0		--	4	8	mA
Quiescent Current Change	ΔIq	-14.5V≤Vin≤ -30V		--	--	0.5	
		5mA≤Iout≤200mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	70	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -15V≤Vin≤ -25V		54	60	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-0.8	--	mV/ °C

TS79M15 Electrical Characteristics

(Vin= -23V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter		Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 14.42	- 15	- 15.60	V
		-17.5V≤Vin≤ -30V, 5mA≤Iout≤350mA, PD ≤5W		- 14.28	- 15	- 15.75	
Line Regulation	REGline	Tj=25 °C	-17.5V≤Vin≤ -30V, Io=200mA	--	8	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	25	300	
			5mA≤Iout≤200mA	--	10	150	
Quiescent Current	Iq	Tj=25 °C, Iout=0		--	5	8	mA
Quiescent Current Change	ΔIq	-17.5V≤Vin≤ -30V		--	--	0.5	
		5mA≤Iout≤350mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	90	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -18V≤Vin≤ -28V		54	60	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-1.0	--	mV/ °C

- Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

TS79M18 Electrical Characteristics

(Vin= -27V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 17.30	- 18	- 18.72	V
		-21V≤Vin≤ -33V, 5mA≤Iout≤350mA, PD ≤5W		- 17.14	- 18	- 18.90	
Line Regulation	REGline	Tj=25 °C	-21V≤Vin≤ -33V, Io=200mA	--	8	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	25	360	
			5mA≤Iout≤200mA	--	10	180	
Quiescent Current	Iq	Tj=25 °C, Iout=0		--	5	8	mA
Quiescent Current Change	ΔIq	-21V≤Vin≤ -33V		--	--	0.5	
		5mA≤Iout≤350nA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	110	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -21V≤Vin≤ -31V		54	60	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-1.0	--	mV/ °C

TS79M24 Electrical Characteristics

(Vin=- 33V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	Vout	Tj=25 °C		- 23.07	- 24	- 24.96	V
		-27V≤Vin≤ -38V, 5mA≤Iout≤350mA, PD ≤5W		- 22.85	- 24	- 25.20	
Line Regulation	REGline	Tj=25 °C	-27V≤Vin≤ -38V, Io=200mA	--	10	50	mV
Load Regulation	REGload	Tj=25 °C	5mA≤Iout≤500mA	--	30	480	
			5mA≤Iout≤200mA	--	10	240	
Quiescent Current	Iq	Iout=0, Tj=25 °C		--	5	9	mA
Quiescent Current Change	ΔIq	-27V≤Vin≤ -38V		--	--	0.5	
		5mA≤Iout≤350mA		--	--	0.5	
Output Noise Voltage	Vn	10Hz≤f≤100KHz, Tj=25 °C		--	170	--	uV
Ripple Rejection Ratio	RR	f=120Hz, -27V≤Vin≤ -37V		50	60	--	dB
Voltage Drop	Vdrop	Iout=350mA, Tj=25 °C		--	2	--	V
Peak Output Current	Io peak	Tj=25 °C		--	0.7	--	A
Temperature Coefficient of Output Voltage	ΔVout/ ΔTj	Iout=5mA, 0 °C≤Tj≤125 °C		--	-1.0	--	mV/ °C

- Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

Electrical Characteristics Curve

FIGURE 1 - Worst Case Power Dissipation v.s. Ambient Temperature

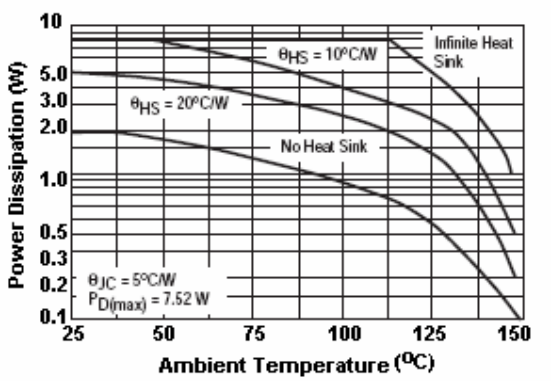


FIGURE 2 - Peak Output Current v.s. Dropout Voltage

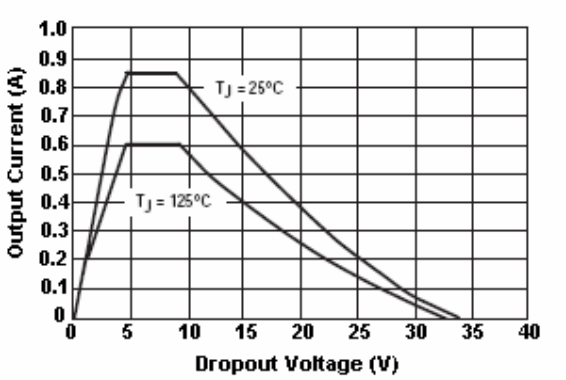


FIGURE 3 – Quiescent Current v.s. Input Voltage

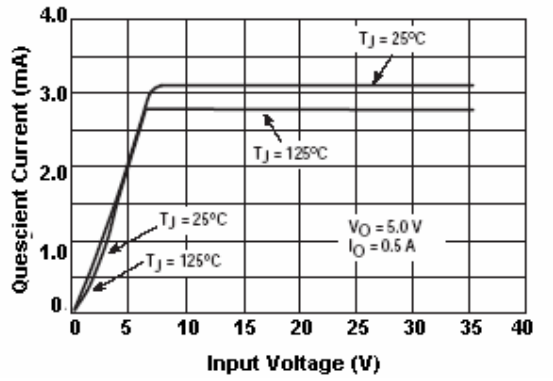


FIGURE 4 –Dropout Voltage v.s. Junction Temperature

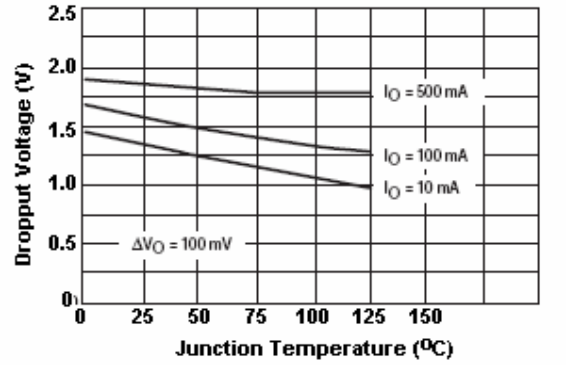


FIGURE 5 – Quiescent Current v.s. Output Current

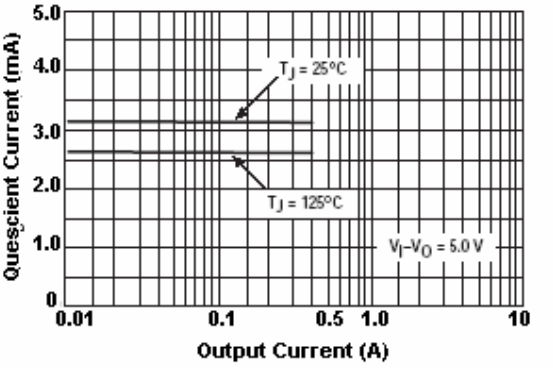
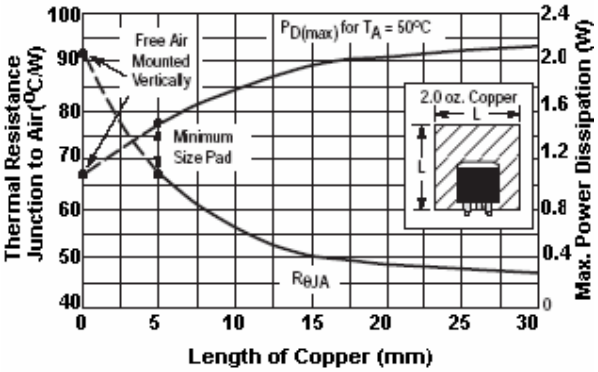
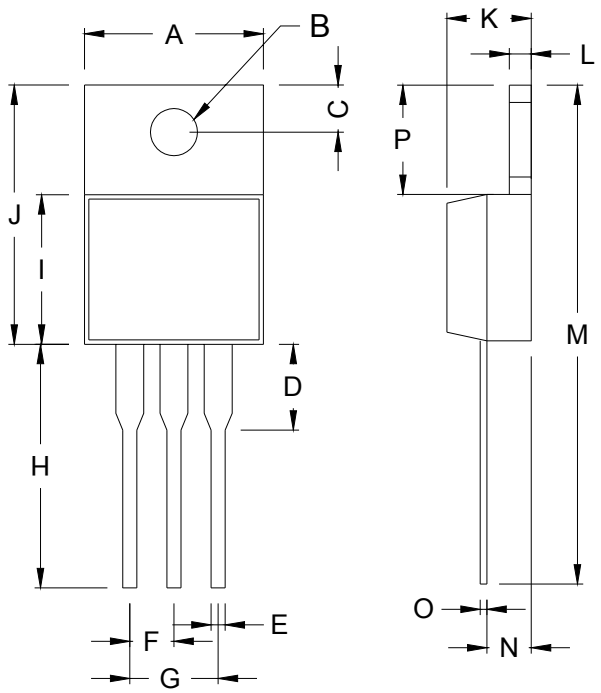


FIGURE 6 – TO-252 Thermal Resistance and Pd(max) v.s. P.C.B Copper Length

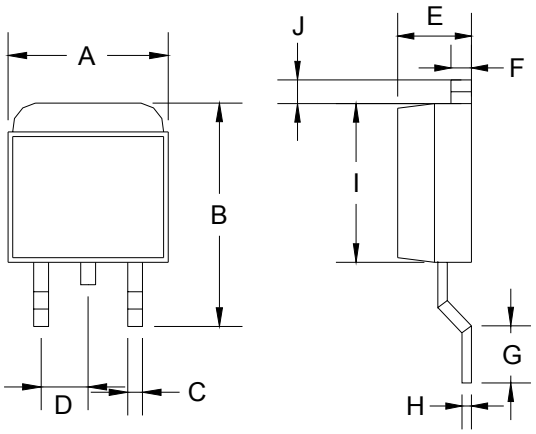


TO-220 Mechanical Drawing



TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	3.240	4.440	0.128	0.175
C	2.440	2.940	0.096	0.116
D	-	6.350	-	0.250
E	0.381	1.106	0.015	0.040
F	2.345	2.715	0.092	0.058
G	4.690	5.430	0.092	0.107
H	12.700	14.732	0.500	0.581
I	8.382	9.017	0.330	0.355
J	14.224	16.510	0.560	0.650
K	3.556	4.826	0.140	0.190
L	0.508	1.397	0.020	0.055
M	27.700	29.620	1.060	1.230
N	2.032	2.921	0.080	0.115
O	0.255	0.610	0.010	0.024
P	5.842	6.858	0.230	0.270

TO-252 Mechanical Drawing



TO-252 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.570	6.840	0.259	0.269
B	9.250	10.400	0.364	0.409
C	0.550	0.700	0.022	0.028
D	2.560	2.670	0.101	0.105
E	2.300	2.390	0.090	0.094
F	0.490	0.570	0.019	0.022
G	1.460	1.580	0.057	0.062
H	0.520	0.570	0.020	0.022
I	5.340	5.550	0.210	0.219
J	1.460	1.640	0.057	0.065