3-Terminal 1.0A Negative voltage Regulators

Features

. No external components required

. Internal Thermal shutdown and SOA protection

. Output Voltages (-5V, -6V, -8V, -9V, -10V, -12V, -15V, -18V, -24V)

. Output voltage offered in 2% and 4% Tolerance

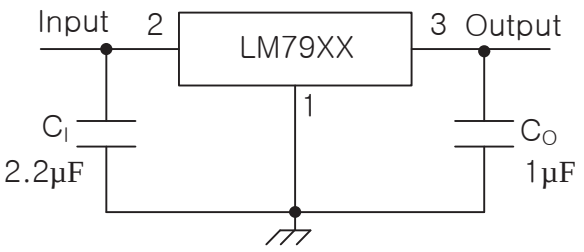
. Pb- Free Packages are available

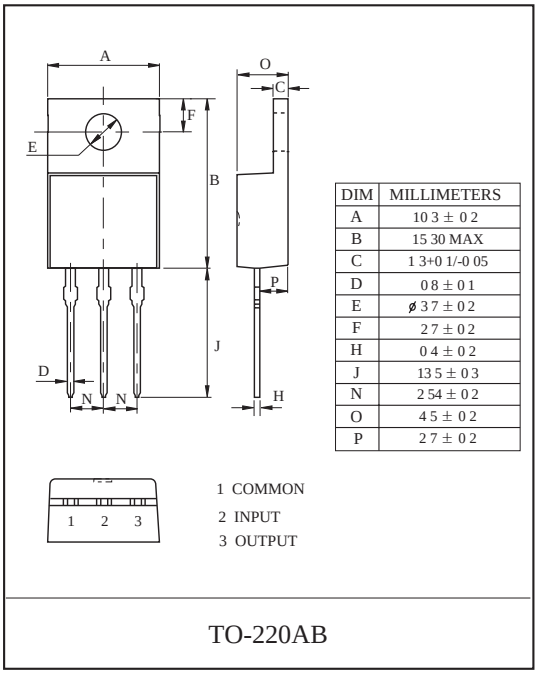
. High ESD Level (HBM>8,000V, MM>800V)

Maximum Ratings (T_A=25 °C, unless otherwise noted)

Rating	Symbol	Rating	Unit
Input Voltage (-5V – -18V)	V_I	-35	V
(-24V)		-40	
Power Dissipation	P_D	Internally Limited	W
Thermal Resistance of Junction to Ambient	$R\theta_{JA}$	65	°C/W
Thermal Resistance of Junction to Case	$R\theta_{JC}$	5	°C/W
Storage Junction Temperature	T_{STG}	-65 ~ 150	°C
Operating Junction Temperature	T_J	+ 150	°C

Standard Application





DIM	MILLIMETERS
A	10.3 ± 0.2
B	15.30 MAX
C	1.3+0.1/-0.05
D	0.8 ± 0.1
E	ø3.7 ± 0.2
F	2.7 ± 0.2
H	0.4 ± 0.2
J	13.5 ± 0.3
N	2.54 ± 0.2
O	4.5 ± 0.2
P	2.7 ± 0.2

TO-220AB

LM7905P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-10V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-4.8	-5.0	-5.2	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -7V ≥ V_{IN} ≥ -20V	-4.75	-5.0	-5.25	
Line regulation (T_J=25°C) (**Note 1)**	R_{egline}	-7.0V ≥ V_{IN} ≥ -25V			100	mV
		-8.0V ≥ V_{IN} ≥ -12V			50	
Load regulation (T_J=25°C) (**Note 1)**	R_{egload}	5.0 mA ≤ I_O ≤ 1.5A			100	mV
		250 mA ≤ I_O ≤ 750 mA			50	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-8.0V ≥ V_{IN} ≥ -25V			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-0.4		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		40		µV/V_O
Ripple rejection	RR	-8.0V ≥ V_{IN} ≥ -18V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7906P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-11V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-5.75	-6.0	-6.25	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -8V ≥ V_{IN} ≥ -21V	-5.7	-6.0	-6.3	
Line regulation (T_J=25°C) (**Note 1)**	Regline	-8.0V ≥ V_{IN} ≥ -25V			120	mV
		-9.0V ≥ V_{IN} ≥ -13V			60	
Load regulation (T_J=25°C) (**Note 1)**	Regload	5.0 mA ≤ I_O ≤ 1.5A			120	mV
		250 mA ≤ I_O ≤ 750 mA			60	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-8.0V ≥ V_{IN} ≥ -25V			1.3	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-0.5		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		130		µV/V_O
Ripple rejection	RR	-9.0V ≥ V_{IN} ≥ -19V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7908P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-14V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-7.7	-8.0	-8.3	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -10.5V ≥ V_{IN} ≥ -23V	-7.6	-8.0	-8.4	
Line regulation (T_J=25°C)	R_{egline}	-10.5V ≥ V_{IN} ≥ -25V			160	mV
(**Note 1)**		-11.5V ≥ V_{IN} ≥ -17V			80	
Load regulation (T_J=25°C)	R_{egload}	5.0 mA ≤ I_O ≤ 1.5A			160	mV
(**Note 1)**		250 mA ≤ I_O ≤ 750 mA			80	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-10.5V ≥ V_{IN} ≥ -25V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-0.6		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		175		µV/V_O
Ripple rejection	RR	-11.5V ≥ V_{IN} ≥ -21.5V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7909P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-15V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-8.65	-9.0	-9.35	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -11.5V ≥ V_{IN} ≥ -24V	-8.6	-9.0	-9.4	
Line regulation (T_J=25°C) (**Note 1)**	Regline	-11.5V ≥ V_{IN} ≥ -25V			180	mV
		-12V ≥ V_{IN} ≥ -17V			90	
Load regulation (T_J=25°C) (**Note 1)**	Regload	5.0 mA ≤ I_O ≤ 1.5A			180	mV
		250 mA ≤ I_O ≤ 750 mA			90	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-11.5V ≥ V_{IN} ≥ -26V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-0.6		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		175		µV/V_O
Ripple rejection	RR	-13V ≤≥ V_{IN} ≥ -23V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7910P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-16V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-9.6	-10	-10.4	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -12.5V ≥ V_{IN} ≥ -25V	-9.5	-10	-10.5	
Line regulation (T_J=25°C) (**Note 1)**	R_{egline}	-12.5V ≥ V_{IN} ≥ -25V			200	mV
		-13V ≥ V_{IN} ≥ -25V			100	
Load regulation (T_J=25°C) (**Note 1)**	R_{egload}	5.0 mA ≤ I_O ≤ 1.5A			200	mV
		250 mA ≤ I_O ≤ 750 mA			100	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-12.5V ≥ V_{IN} ≥ -29V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-1.0		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		280		µV/V_O
Ripple rejection	RR	-13V ≥ V_{IN} ≥ -23V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7912P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-19V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-11.5	-12	-12.5	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -14.5V ≥ V_{IN} ≥ -27V	-11.4	-12	-12.6	
Line regulation (T_J=25°C) (**Note 1)**	Regline	-14.5V ≥ V_{IN} ≥ -30V			240	mV
		-16V ≥ V_{IN} ≥ -22V			120	
Load regulation (T_J=25°C) (**Note 1)**	Regload	5.0 mA ≤ I_O ≤ 1.5A			240	mV
		250 mA ≤ I_O ≤ 750 mA			120	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-14.5V ≥ V_{IN} ≥ -30V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-0.8		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		200		µV/V_O
Ripple rejection	RR	-15V ≥ V_{IN} ≥ -25V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7915P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-23V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-14.4	-15	-15.6	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -17.5V ≥ V_{IN} ≥ -30V	-14.25	-15	-15.75	
Line regulation (T_J=25°C) (**Note 1)**	R_{egline}	-17.5V ≥ V_{IN} ≥ -30V			300	mV
		-20V ≥ V_{IN} ≥ -26V			150	
Load regulation (T_J=25°C) (**Note 1)**	R_{egload}	5.0 mA ≤ I_O ≤ 1.5A			300	mV
		250 mA ≤ I_O ≤ 750 mA			150	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-17.5V ≥ V_{IN} ≥ -30V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-0.9		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		250		µV/V_O
Ripple rejection	RR	-18.5V ≥ V_{IN} ≥ -28.5V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7918P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-27V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-17.3	-18	-18.7	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -21V ≥ V_{IN} ≥ -33V	-17.1	-18	-18.9	
Line regulation (T_J=25°C) (**Note 1)**	R_{egline}	-21V ≥ V_{IN} ≥ -33V			360	mV
		-24V ≥ V_{IN} ≥ -30V			180	
Load regulation (T_J=25°C) (**Note 1)**	R_{egload}	5.0 mA ≤ I_O ≤ 1.5A			360	mV
		250 mA ≤ I_O ≤ 750 mA			180	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-21V ≥ V_{IN} ≥ -33V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-1.0		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		300		µV/V_O
Ripple rejection	RR	-22V ≥ V_{IN} ≥ -32V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

LM7924P Electrical characteristics

(T_J = 0 to 125 °C, V_{IN}=-33V, I_O=500 mA, C_I=2.2 µF, C_O=1.0 µF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	T_J=25°C	-23	-24	-25	V
		5mA ≤ I_O ≤ 1.0A, P_D≤15W -27V ≥ V_{IN} ≥ -38V	-22.8	-24	-25.25	
Line regulation (T_J=25°C)	R_{egline}	-27V ≥ V_{IN} ≥ -38V			480	mV
(**Note 1)**		-30V ≥ V_{IN} ≥ -36V			180	
Load regulation (T_J=25°C)	R_{egload}	5.0 mA ≤ I_O ≤ 1.5A			480	mV
(**Note 1)**		250 mA ≤ I_O ≤ 750 mA			240	
Quiescent current	I_Q	T_J=25°C			6	mA
Quiescent current change	Δ I_Q	5.0 mA ≤ I_O ≤ 1.0 A			0.5	mA
		-27V ≥ V_{IN} ≥ -38V			1.0	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5 mA		-1.0		mV/°C
Output noise voltage	V_N	10 Hz ≤ f ≤ 100 KHz, T_A=25°		400		µV/V_O
Ripple rejection	RR	-28V ≥ V_{IN} ≥ -38V, f=120 Hz	54	60		dB
Dropout voltage	V_{DROP}	I_O = 1.0A, T_J=25°C		1.3		V
Short circuit current limit	I_{SC}	V_{IN} = -35V, T_A=25°C		500		mA
Peak output current	I_{PK}	T_J=25°C		2.2		A

Note 1 Line and Load regulation are specified at constant junction temperature. Changes of V_O due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

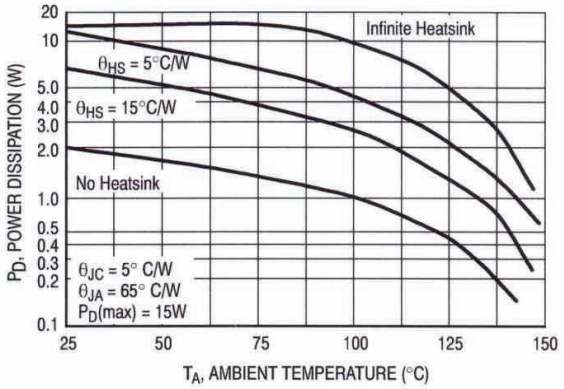


Figure 2. Worst Case Power Dissipation as a Function of Ambient Temperature

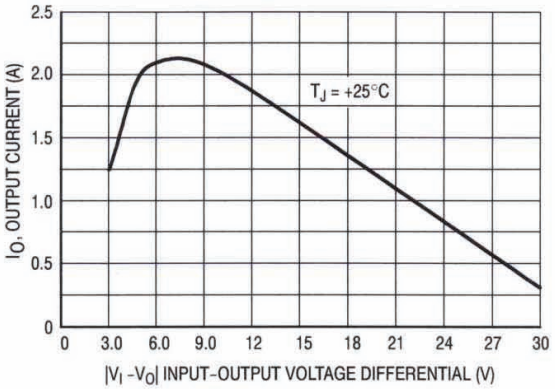


Figure 3. Peak Output Current as a Function of Input−Output Differential Voltage

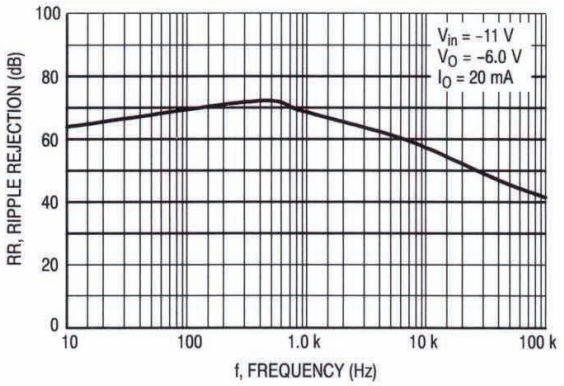


Figure 4. Ripple Rejection as a Function of Frequency

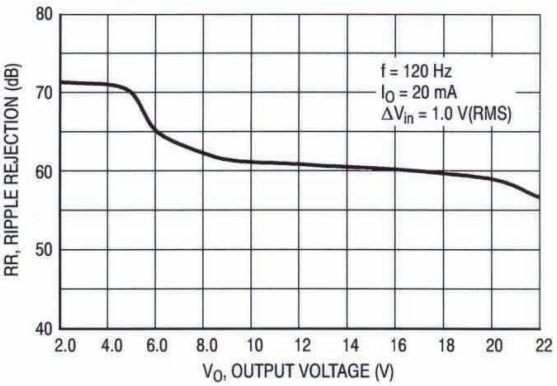


Figure 5. Ripple Rejection as a Function of Output Voltage

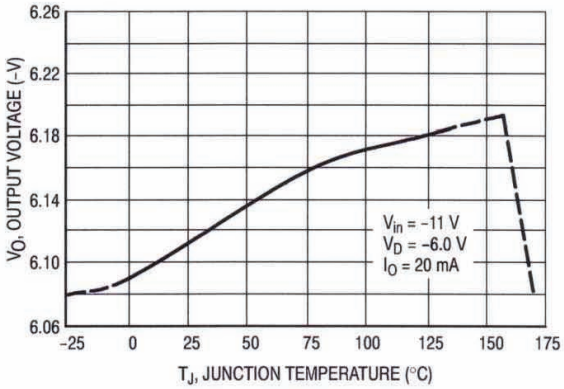


Figure 6. Output Voltage as a Function of Junction Temperature

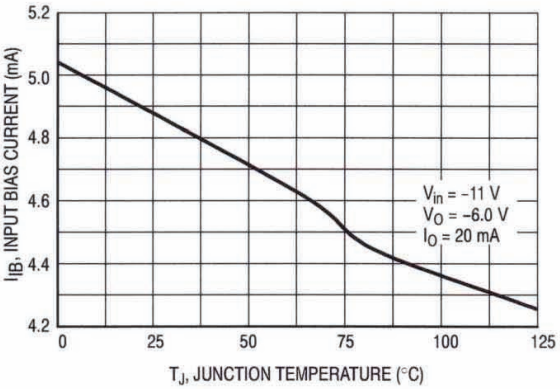


Figure 7. Quiescent Current as a Function of Temperature