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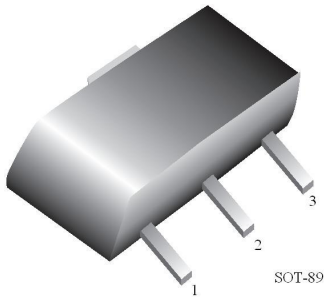
78LXXPRG



1:Output 2:GND 3:Input

3-Terminal Positive Regulators

The 78LXX series of three terminal positive regulators is available with several fixed output voltages (eg. 5V, 6V, 8V, 9V, 12V & 15V) making them useful in a wide range of applications.

Note : "G" in Part Number stands for Lead Free Part.

Absolute Maximum Ratings* T_A=25 °C unless otherwise noted

Symbol	Parameter	Value	Units
V_I	Input Voltage	30	V
P_D	Power Dissipation	500	mW
T_{OPR}	Operating Temperature Range	-25 to +125	°C
T_J, T_{STG}	Operating & Storage Junction Temperature Range	-55 to +150	°C

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

Electrical Characteristics

78L05 (5V Voltage Regulator) (V_I=10V, I_O=40mA, 0 °C<T_J<125 °C, CI=0.33uF, CO=0.1uF, unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_O	Output Voltage	T_J = 25 °C	4.80	5.00	5.20	V
		7V ≤ V_I ≤ 20V, 1mA ≤ I_O ≤ 40mA	4.75	5.00	5.25	V
		7V ≤ V_I ≤ 20V, 1mA ≤ I_O ≤ 70mA	4.75	5.00	5.25	V (note)
ΔV_O	Load Regulation	T_J = 25 °C, 1mA ≤ I_O ≤ 100mA		11	60	mV
		T_J = 25 °C, 1mA ≤ I_O ≤ 40mA		5	30	mV
ΔV_O	Line Regulation	T_J = 25 °C, 7V ≤ V_I ≤ 20V		32	150	mV
		T_J = 25 °C, 8V ≤ V_I ≤ 20V		26	100	mV
Iq	Quiescent Current	T_J = 25 °C		3.8	6.0	mA
ΔIq	Quiescent Current Change	8V ≤ V_I ≤ 20V			1.5	mA
		1mA ≤ I_O ≤ 40mA			0.1	mA
V_N	Output Noise Voltage	10Hz ≤ f ≤ 100Hz		42		uV
RR	Ripple Rejection	T_J = 25 °C, 8V ≤ V_I ≤ 18V, f = 120Hz	41	80		dB

Vd	Dropout Voltage	T_J = 25 °C		1.7		V

Marking for ML78L05PRG = 8A

78L06 (6V Voltage Regulator)

(V_I=11V, I_O=40mA, 0 °C<T_J<125 °C, CI=0.33uF, CO=0.1uF, unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_O	Output Voltage	T_J = 25 °C	5.75	6.00	6.25	V
		8V ≤ V_I ≤ 20V, 1mA ≤ I_O ≤ 40mA	5.70	6.00	6.30	V
		8V ≤ V_I ≤ 20V, 1mA ≤ I_O ≤ 70mA	5.70	6.00	6.30	V (note)
ΔV_O	Load Regulation	T_J = 25 °C, 1mA ≤ I_O ≤ 100mA		16	80	mV
		T_J = 25 °C, 1mA ≤ I_O ≤ 40mA		9	40	mV
ΔV_O	Line Regulation	T_J = 25 °C, 8.5V ≤ V_I ≤ 20V		35	175	mV
		T_J = 25 °C, 9V ≤ V_I ≤ 20V		29	125	mV
Iq	Quiescent Current	T_J = 25 °C		3.9	6.0	mA
ΔIq	Quiescent Current Change	9V ≤ V_I ≤ 20V			1.5	mA
		1mA ≤ I_O ≤ 40mA			0.1	mA
V_N	Output Noise Voltage	10Hz ≤ f ≤ 100Hz		46		uV
RR	Ripple Rejection	T_J = 25 °C, 9V ≤ V_I ≤ 19V, f = 120Hz	40	48		dB
Vd	Dropout Voltage	T_J = 25 °C		1.7		V

78L08 (8V Voltage Regulator)

(V_I=14V, I_O=40mA, 0 °C<T_J<125 °C, CI=0.33uF, CO=0.1uF, unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_O	Output Voltage	T_J = 25 °C	7.70	8.00	8.30	V
		10.5V ≤ V_I ≤ 23V, 1mA ≤ I_O ≤ 40mA	7.60	8.00	8.40	V
		10.5V ≤ V_I ≤ 23V, 1mA ≤ I_O ≤ 70mA	7.60	8.00	8.40	V (note)
ΔV_O	Load Regulation	T_J = 25 °C, 1mA ≤ I_O ≤ 100mA		18	80	mV
		T_J = 25 °C, 1mA ≤ I_O ≤ 40mA		10	40	mV
ΔV_O	Line Regulation	T_J = 25 °C, 10.5V ≤ V_I ≤ 23V		42	175	mV
		T_J = 25 °C, 11V ≤ V_I ≤ 23V		36	125	mV
Iq	Quiescent Current	T_J = 25 °C		4.0	6.0	mA
ΔIq	Quiescent Current Change	11V ≤ V_I ≤ 23V			1.5	mA
		1mA ≤ I_O ≤ 40mA			0.1	mA
V_N	Output Noise Voltage	10Hz ≤ f ≤ 100Hz		54		uV
RR	Ripple Rejection	T_J = 25 °C, 13V ≤ V_I ≤ 23V, f = 120Hz	37	46		dB
Vd	Dropout Voltage	T_J = 25 °C		1.7		V

Marking for ML78L08PRG = 8D

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78L09 (9V Voltage Regulator) (V_I=15V, I_O=40mA, 0 °C<T_J<125 °C, CI=0.33uF, CO=0.1uF, unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_O	Output Voltage	T_J = 25 °C	8.64	9.00	9.36	V
		12V ≤ V_I ≤ 24V, 1mA ≤ I_O ≤ 40mA	8.55	9.00	9.45	V
		12V ≤ V_I ≤ 24V, 1mA ≤ I_O ≤ 70mA	8.55	9.00	9.45	V (note)
ΔV_O	Load Regulation	T_J = 25 °C, 1mA ≤ I_O ≤ 100mA		19	90	mV
		T_J = 25 °C, 1mA ≤ I_O ≤ 40mA		11	40	mV
ΔV_O	Line Regulation	T_J = 25 °C, 12V ≤ V_I ≤ 24V		45	175	mV
		T_J = 25 °C, 13V ≤ V_I ≤ 24V		40	125	mV
Iq	Quiescent Current	T_J = 25 °C		4.1	6.0	mA
ΔIq	Quiescent Current Change	12V ≤ V_I ≤ 24V			1.5	mA
		1mA ≤ I_O ≤ 40mA			0.1	mA
V_N	Output Noise Voltage	10Hz ≤ f ≤ 100Hz		58		uV
RR	Ripple Rejection	T_J = 25 °C, 15V ≤ V_I ≤ 25V, f = 120Hz		45		dB
Vd	Dropout Voltage	T_J = 25 °C		1.7		V

Marking for ML78L09PRG = 8E

78L12 (12V Voltage Regulator) (V_I=19V, I_O=40mA, 0 °C<T_J<125 °C, CI=0.33uF, CO=0.1uF, unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_O	Output Voltage	T_J = 25 °C	11.50	12.00	12.25	V
		14.5V ≤ V_I ≤ 27V, 1mA ≤ I_O ≤ 40mA	11.40	12.00	12.60	V
		14.5V ≤ V_I ≤ 27V, 1mA ≤ I_O ≤ 70mA	11.40	12.00	12.60	V (note)
ΔV_O	Load Regulation	T_J = 25 °C, 1mA ≤ I_O ≤ 100mA		22	100	mV
		T_J = 25 °C, 1mA ≤ I_O ≤ 40mA		13	50	mV
ΔV_O	Line Regulation	T_J = 25 °C, 14.5V ≤ V_I ≤ 27V		55	250	mV
		T_J = 25 °C, 16V ≤ V_I ≤ 27V		49	200	mV
Iq	Quiescent Current	T_J = 25 °C		4.3	6.5	mA
ΔIq	Quiescent Current Change	16V ≤ V_I ≤ 27V			1.5	mA
		1mA ≤ I_O ≤ 40mA			0.1	mA
V_N	Output Noise Voltage	10Hz ≤ f ≤ 100Hz		70		uV
RR	Ripple Rejection	T_J = 25 °C, 15V ≤ V_I ≤ 25V, f = 120Hz	37	42		dB
Vd	Dropout Voltage	T_J = 25 °C		1.7		V

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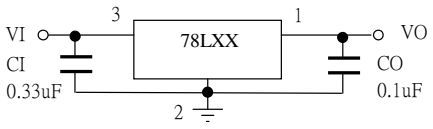
78L15 (15V Voltage Regulator) (V_I=23V, I_O=40mA, 0 °C<T_J<125 °C, CI=0.33uF, CO=0.1uF, unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_O	Output Voltage	T_J = 25 °C	14.40	15.00	15.60	V
		17.5V ≤ V_I ≤ 30V, 1mA ≤ I_O ≤ 40mA	14.25	15.00	15.75	V
		V_I = 23V, 1mA ≤ I_O ≤ 70mA	14.25	15.00	15.75	V (note)
ΔV_O	Load Regulation	T_J = 25 °C, V_I = 23V, 1mA ≤ I_O ≤ 100mA		25	150	mV
		T_J = 25 °C, V_I = 23V, 1mA ≤ I_O ≤ 40mA		15	75	mV
ΔV_O	Line Regulation	T_J = 25 °C, 17.5V ≤ V_I ≤ 30V, I_O = 40mA		65	300	mV
		T_J = 25 °C, 19V ≤ V_I ≤ 30V, I_O = 40mA		58	250	mV
Iq	Quiescent Current	T_J = 25 °C		4.6	6.5	mA
ΔIq	Quiescent Current Change	19V ≤ V_I ≤ 30V, I_O = 40mA			1.5	mA
		V_I = 23V, 1mA ≤ I_O ≤ 40mA			0.1	mA
V_N	Output Noise Voltage	10Hz ≤ f ≤ 100Hz		82		uV
RR	Ripple Rejection	T_J = 25 °C, 18.5V ≤ V_I ≤ 28.5V, f = 120Hz	34	39		dB
Vd	Dropout Voltage	T_J = 25 °C		1.7		V

Marking for ML78L015PRG = 8I

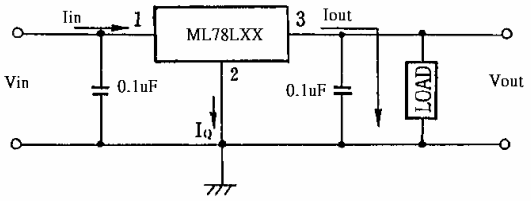
Typical Application



Note : Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulator.

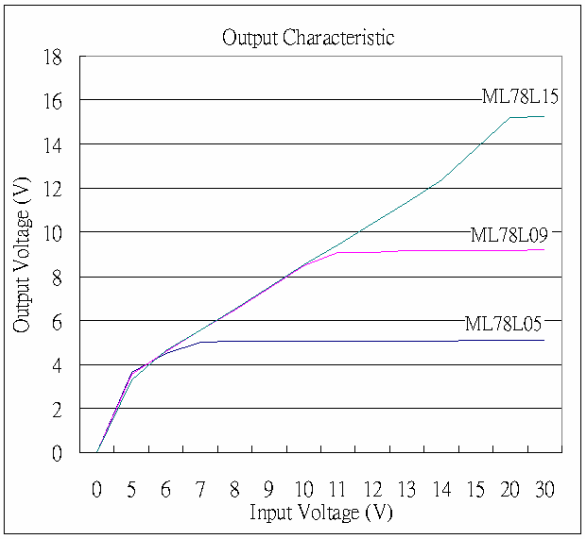
■ Test Circuit

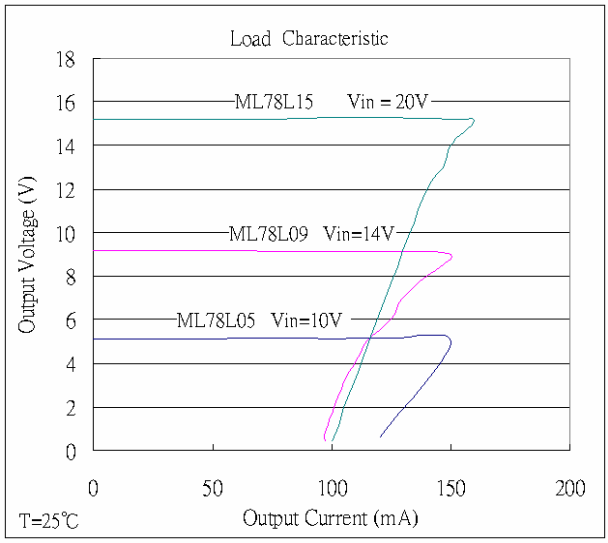
1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage

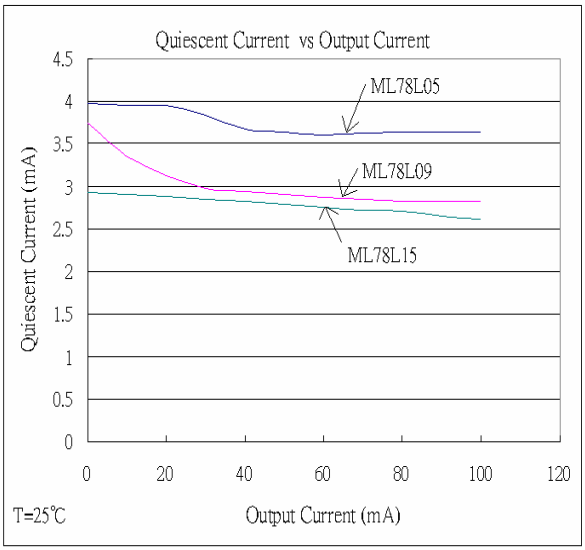


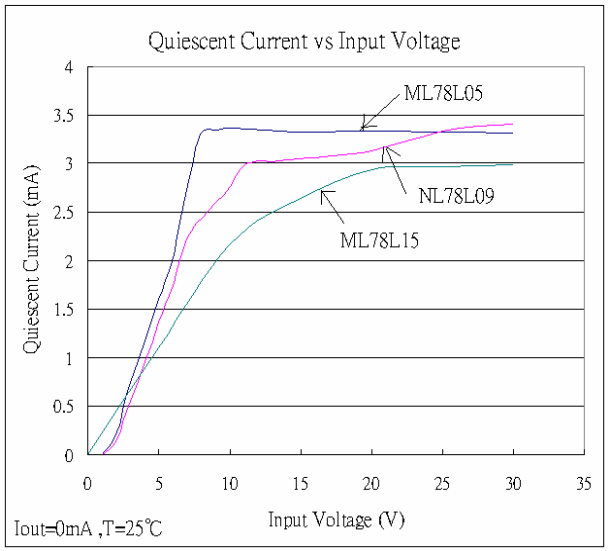
$I_Q = I_{IN} - I_O$

■ Typical Characteristic









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■ Typical Characteristic