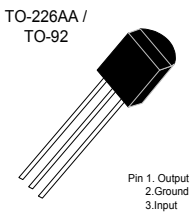
THREE-TERMINAL LOW CURRENT POSITIVE VOLTAGE REGULATORS

The IL78LXX, A Series of positive voltage regulators are inexpensive, easy-to-use devices suitable for a multitude of applications that require a regulated supply of up to 100 mA. These regulators feature internal current limiting and thermal shutdown making them remarkably rugged. No external components are required with the IL78LXX devices in many applications.

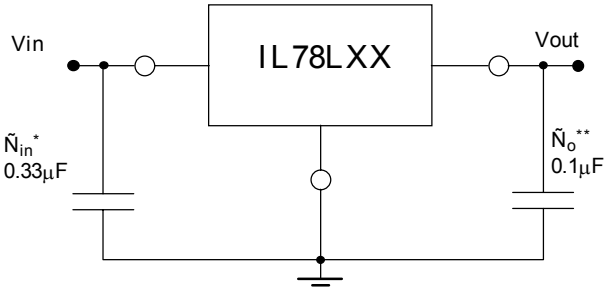
These devices offer a substantial performance advantage over the traditional zener diode-resistor combination, as output impedance and quiescent current are substantially reduced.



FEATURES

- Wide Range of Available, Fixed Output Voltages
- Low Cost
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required
- Complementary Negative Regulators Offered (IL79LXX Series)
- Available in either ±5% (AC) or ±10% (C) Selections

Standard application



A common ground is required between the input and the output voltages. The input voltage must remaintypically 2.0 V above the output voltage even during the low point on the input ripple voltage.
*C in is required if regulator is located an appreciable distance from power supply filter.
**C O is not needed for stability; however, it does improve transient response.

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage (2.6 V-8.0 V) (12V-18V) (24V)	V_I	30 35 40	Vdc
Storage Temperature Range	Tstg	-65 to +150	°C
Operating Junction Temperature Range	TJ	010+150	°C

INTEGRAL

IL78L05 *ELECTRICAL CHARACTERISTICS*

(V_I=10 V, Io= 40 mA, C_I = 0.33 μF, Co = 0.1 μF, -40°C < T_J < +125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	4.6	5.0	5.4	Vdc
Line Regulation (T_J = +25°C, Io =40 mA) 7.0 Vdc ≤Vi ≤ 20 Vdc 7.1 8.0 Vdc ≤Vi ≤ 20 Vdc	Reg_{line}	 - -	 55 45	 200 150	mV
Load Regulation (T_J = +25°C, 1.0 mA ≤ Io ≤ 100 mA) (T_J = +25°C, 1.0mA ≤ Io ≤ 40 mA)	Peg_{load}	 - -	 11 5.0	 60 30	mV
Output Voltage (7.0≤Vdc≤Vi≤20Vdc, 1.0 mA≤Io≤40 mA) (Vi=10 V, 1.0 mA≤Io≤70 mA)	VO	 4.5 4.5	 - -	 5.5 5.5	Vdc
Input Bias Current (T_J = +25°C) (T_J =+125°C)	I_{IB}	 - -	 3.8 -	 6.0 5.5	mA
Input Bias Current Change (8.0 Vdc≤Vi≤20 Vdc) (1.0 mA≤Io≤40 mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	mA
Output Noise Voltage (T_A=+25°C, 10 Hz≤f≤100 kHz)	Vn	-	40	-	μV
Ripple Rejection (Io = 40 mA, f= 120 Hz, 8.0 Vdc≤Vi≤18 V, T_J= +25°C)	RR	40	49	-	dB
Dropout Voltage (T_J = +25°C)	Vi-Vo	-	1.7	-	Vdc

IL78L08 *ELECTRICAL CHARACTERISTICS*

(Vi=14V, Io =40mA, Ci=0,33μF, Co=0,1μF, -40°C<T_J< +125°C), unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = +25°C)	VO	7.36	8.0	8.64	Vdc
Line Regulation (T_J = +25°C, Io = 40 mA) 10.5Vdc£≤Vi≤23Vdc 11 Vdc ≤ Vi ≤£ 23 Vdc	Reg_{line}	 - -	 20 12	 200 150	mV
Load Regulation (T_J = +25°C, 1.0 mA ≤ Io ≤£ 100 mA) (T_J = +25°C, 1.0 mA ≤Io ≤ 40 mA)	Peg_{load}	 - -	 15 6.0	 80 40	mV
Output Voltage (10.5≤Vdc≤Vi≤£23Vdc, 1.0 mA ≤Io≤40 mA) (Vi =14V, 1.0 mA≤Io≤70 mA)	VO	 7.2 7.2	 - -	 8.8 8.8	Vdc
Input Bias Current (T_J = +25°C) (T_J = +125°C)	I_{IB}	 - -	 3.0	 6.0 5.5	mA
Input Bias Current Change (11 Vdc ≤Vi ≤ 23 Vdc) (1.0 mA ≤ Io ≤ 40 mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	mA
Output Noise Voltage (T_A = +25°C, 10 Hz 5 15100 kHz)	Vn	-	52	-	nV
Ripple Rejection (IQ = 40 mA, 1 s 120 Hz, 12 V 5 V[< 23 V, T_J = +25°C)	RR	36	55	-	dB
Dropout Voltage (T_J » +25°C)	VI-VQ	-	1.7	-	Vdc

IL78L09 *ELECTRICAL CHARACTERISTICS*

(Vi=15V, Io=40mA,Ci=0.33μF,Co=0.1μF,-40°C<Tj<+125°C, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = +25°C)	Vo	8.3	9.0	9.7	Vdc
Line Regulation (T_J = +25°C, Io = 40 mA) 11.5Vdc ≤Vi≤ £24Vdc 12Vdc ≤Vi< 24Vdc	Reg_{line}	 - -	 20 12	 200 150	mV
Load Regulation (T_J =. +25°≤C, 1.0 mA ≤£Io ≤ 100 mA) (T_J = +25°C, 1.0 mA ≤ Io ≤ 40 mA)	Reaload	 - -	 15 6.0	 90 40	mV
Output Voltage (11.5Vdc≤Vi≤£24Vdc, 1.0 mA < Io≤ 40mA) (Vi= 15V, 1.0 mA ≤ Io ≤ 70 mA)	Vo	 8.1 8.1	 - -	 9.9 9.9	Vdc
Input Bias Current (T_J = +25°C) (T_J = +125°C)	I_{IB}	 - -	 3.0 -	 6.0 5.5	mA
Input Bias Current Change (11 Vdc ≤ Vi ≤ 23 Vdc) (1.0mA ≤Io ≤40mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	mA
Output Noise Voltage (T_A = +25°C, 10 Hz ≤ f ≤100 kHz)	Vn	-	52	-	μV
Ripple Rejection (Io = 40 mA, f= 120 Hz, 13V≤Vi≤ 24 V, T_J=+25°C)	RR	36	55	-	dB
Dropout Voltage (T_J = +25°C)	Vi-Vo	-	1.7	-	Vdc

IL78L12 *ELECTRICAL CHARACTERISTICS*

(Vi =19 V, Io =40 mA, Ci = 0.33 μF, Co = 0.1 μF, -40°C < T_J < +125°C, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = +25°C)	Vo	11.1	12	12.9	Vdc
Line Regulation (T_J = +25°C. I_Q = 40 mA) 14.5Vdc ≤Vi ≤27Vdc 16 Vdc ≤Vi ≤ 27 Vdc	Reg_{line}	 - -	 120 100	 250 200	mV
Load Regulation (T_J = +25°C, 1.0 mA ≤ Io ≤ 100 mA) (T_J = +25°C, 1.0 mA ≤ Io ≤ 40 mA)	Peg_{load}	 - -	 20 10	 100 50	mV
Output Voltage (14.5Vdc ≤ Vi ≤ 27Vdc, 1.0mA≤Io≤ 40mA) (Vi = 19V, 1.0mA <Io ≤ 70mA)	Vo	 10.8 10.8	 - -	 13.2 13.2	Vdc
Input Bias Current (T_J = +25°C) (T_J = +125°C)	I_{IB}	 - -	 4.2 -	 6.5 6.0	mA
Input Bias Current Change (16Vdc ≤ Vi ≤ 27Vdc) (1.0 mA ≤ Io ≤ 40 mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	mA
Output Noise Voltage (T_A = +25°C, 10Hz ≤ f ≤ 100 kHz)	Vn	-	80	-	pV
Ripple Rejection (Io = 40 mA, f= 120 Hz, 15V ≤ Vi ≤ 25V,T_J=+25°C)	RR	36	42	-	dB
Dropout Voltage (T_J = +25°C)	Vi-Vo	"	1.7	-	Vdc

IL78L15 *ELECTRICAL CHARACTERISTICS*

(Vi = 23 V, Io = 40 mA, Ci = 0.33 μF, Co= 0.1 μF, -40°C < T_J < +125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = +25°C)	Vo	13.8	15	16.2	Vdc
Line Regulation (T_J = +25°C, Io = 40mA) 17.5Vdc ≤Vi ≤ 30Vdc 20Vdc ≤ Vi ≤ 30Vdc	Reg_{line}	 - -	 130 110	 300 250	mV
Load Regulation (T_J = +25°C, 1.0 mA ≤ Io ≤ 100 mA) (T_J = +25°C, 1.0 mA ≤£ Io < 40 mA)	Peg_{load}	 - -	 25 12	 150 75	mV
Output Voltage (17.5Vdc≤Vi≤ 30Vdc, 1.0 mA≤Io≤ 40 mA) (Vi = 23V, 1.0mA ≤£Io≤ 70 mA)	Vo	 13.5 13.5	 - -	 16.5 16.5	Vdc
Input Bias Current (T_J = +25°C) (T_J = +125°C)	I_{IB}	 - -	 4.4 -	 6.5 6.0	mA
Input Bias Current Change (20Vdc ≤ Vi ≤ 30Vdc) (1.0mA ≤ Io ≤ 40 mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	mA
Output Noise Voltage (T_A = +25°C, 10Hz ≤ f ≤ 100 kHz)	Vn	-	90	-	nV
Ripple Rejection (Io = 40 mA, f =120 Hz, 18.5V ≤ Vi ≤ 28.5V, T_J = +25°C)	RR	33	39	-	dB
Dropout Voltage (T_J = +25°C)	Vi-Vo	-	1.7	-	Vdc

IL78L18 *ELECTRICAL CHARACTERISTICS*

(Vi = 27 V, Io = 40 mA, Ci = 0.33 μF, Co = 0.1 μF. 0°C < T_J < +125°C, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = +25°C)	V_O	16.6	18	19.4	Vdc
Line Regulation (T_J = +25°C, Io= 40 mA) 20.7Vdc ≤ Vi ≤ 33Vdc 21 Vdc ≤ Vi < 33Vdc	Reg_{line}		 32 27	 325 275	mV
Load Regulation (T_J = +25°C, 1.0 mA ≤ Io ≤ 100 mA) (T_J = +25°C, 1.0 mA ≤ Io ≤ 40 mA)	Peg_{load}	 - -	 30 15	 170 85	mV
Output Voltage (21.4Vdc≤Vi≤33Vdc, 1.0 mA ≤Io≤ 40 mA) (20.7Vdc≤ Vi≤33Vdc, 1.0mA ≤Io≤ 40 mA) (Vi = 27 V, 1.0mA ≤Io≤ 70 mA) (Vi = 27V, 1.0mA ≤Io≤ 70mA)	Vo	 16.2 16.2	 - -	 19.8 19.8	Vdc
Input Bias Current (T_J = +25°C) (T_J = +125°C)	I_{IB}	 - -	 3.1 -	 6.5 6.0	mA
Input Bias Current Change (22Vdc ≤ Vi ≤ 33Vdc) (21Vdc ≤ Vi ≤ 33 Vdc) (1.0mA ≤ Io ≤ 40 mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	mA
Output Noise Voltage (T_A=+25°C,10Hz ≤ Io ≤ lOOkHz)	Vn	-	150	-	nV
Ripple Rejection (Io = 40 mA,f = 120 Hz, 23 V ≤ Vi ≤ 33 V, T_J = +25°C)	RR	32	46	-	dB
Dropout Voltage (T_J = +25°C)	Vi-Vo	-	1.7	-	Vdc

IL78L24 *ELECTRICAL CHARACTERISTICS*

(Vi = 33 V, Io = 40 mA, Ci = 0.33 μF. Co = 0.1 μF, 0°C < T_J < +125°C, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J = +25°C)	V_O	22.1	24	25.9	Vdc
Line Regulation (T_J = +25°C, Io = 40 mA) 27.5 Vdc ≤Vi ≤ 38 Vdc 28 Vdc ≤ Vi ≤ 38 Vdc	Reg_{line}	 - -	 35 30	 350 300	mV
Load Regulation (T_J = +25°C, 1.0 mA ≤ Io £≤ 100 mA) (T_J = +25°C, 1.0 mA ≤ Io ≤ 40 mA)	Reg_{load}	 - -	 40 20	 200 100	mV
Output Voltage (28Vdc ≤Vi≤ 38Vdc, 1.0 mA ≤ Io ≤40 mA) (27Vdc ≤Vi≤ 33Vdc, 1.0 mA ≤ Io ≤70 mA)	V_O	 21.6 21.6	 - -	 26.4 26.4	Vdc
Input Bias Current (T_J = +25°C) (T_J = +125°C)	I_{IB}	 - -	 3.1 -	 6.5 6.0	mA
Input Bias Current Change (28 Vdc ≤ Vi ≤£ 38 Vdc) (1.0 mA ≤ Io ≤ 40 mA)	ΔI_{IB}	 - -	 - -	 1.5 0.2	rnA
Output Noise Voltage (T_A = +25°C, 10Hz ≤ f ≤ 100 kHz)	Vn	-	200	-	nV
Ripple Rejection (Io = 40 mA, f= 120 Hz, 29V ≤ Vi ≤ 35V, T_J = +25°C)	RR	30	43	-	dB
Dropout Voltage (T_J = +25°C)	Vi-Vo	-	1.7	-	Vdc