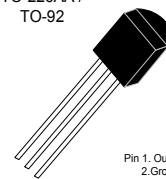


THREE-TERMINAL LOW CURRENT POSITIVE VOLTAGE REGULATORS

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.

TO-226AA /
TO-92

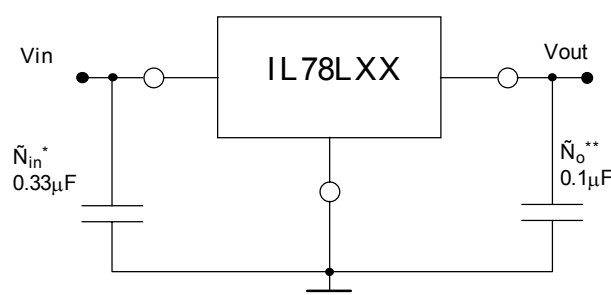


Pin 1. Output
2. Ground
3. Input

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 $\pm 5\%$ (AC) or $\pm 10\%$ (C) Selections

Standard application



A common ground is required between the input and the output voltages. The input voltage must remain typically 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	0 to +150	°C

IL78LXX

IL78L05 ELECTRICAL CHARACTERISTICS

($V_i=10\text{ V}$, $I_o=40\text{ mA}$, $C_i=0.33\text{ }\mu\text{F}$, $C_o=0.1\text{ }\mu\text{F}$, $-40^\circ\text{C} < T_J < +125^\circ\text{C}$ unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage ($T_J=+25^\circ\text{C}$)	V_o	4.6	5.0	5.4	Vdc
Line Regulation ($T_J=+25^\circ\text{C}$, $I_o=40\text{ mA}$) $7.0\text{ Vdc} \leq V_i \leq 20\text{ Vdc}$ $7.1\text{ } 8.0\text{ Vdc} \leq V_i \leq 20\text{ Vdc}$	Reg_{line}	-	55 45	200 150	mV
Load Regulation ($T_J=+25^\circ\text{C}$, $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$) ($T_J=+25^\circ\text{C}$, $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$)	Reg_{load}	-	11 5.0	60 30	mV
Output Voltage ($7.0 \leq V_{dc} \leq V_i \leq 20\text{Vdc}$, $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$) ($V_i=10\text{ V}$, $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$)	V_o	4.5 4.5	-	5.5 5.5	Vdc
Input Bias Current ($T_J=+25^\circ\text{C}$) ($T_J=+125^\circ\text{C}$)	I_{IB}	-	3.8	6.0 5.5	mA
Input Bias Current Change ($8.0\text{ Vdc} \leq V_i \leq 20\text{ Vdc}$) ($1.0\text{ mA} \leq I_o \leq 40\text{ mA}$)	ΔI_{IB}	-	-	1.5 0.2	mA
Output Noise Voltage ($T_A=+25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$)	V_n	-	40	-	μV
Ripple Rejection ($I_o=40\text{ mA}$, $f=120\text{ Hz}$, $8.0\text{ Vdc} \leq V_i \leq 18\text{ V}$, $T_J=+25^\circ\text{C}$)	RR	40	49	-	dB
Dropout Voltage ($T_J=+25^\circ\text{C}$)	V_i-V_o	-	1.7	-	Vdc

IL78L08 ELECTRICAL CHARACTERISTICS

($V_i=14\text{ V}$, $I_o=40\text{ mA}$, $C_i=0.33\text{ }\mu\text{F}$, $C_o=0.1\text{ }\mu\text{F}$, $-40^\circ\text{C} < T_J < +125^\circ\text{C}$), unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage ($T_J=+25^\circ\text{C}$)	V_o	7.36	8.0	8.64	Vdc
Line Regulation ($T_J=+25^\circ\text{C}$, $I_o=40\text{ mA}$) $10.5\text{Vdc} \leq V_i \leq 23\text{Vdc}$ $11\text{ Vdc} \leq V_i \leq 23\text{ Vdc}$	Reg_{line}	-	20 12	200 150	mV
Load Regulation ($T_J=+25^\circ\text{C}$, $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$) ($T_J=+25^\circ\text{C}$, $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$)	Reg_{load}	-	15 6.0	80 40	mV
Output Voltage ($10.5 \leq V_{dc} \leq V_i \leq 23\text{Vdc}$, $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$) ($V_i=14\text{ V}$, $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$)	V_o	7.2 7.2	-	8.8 8.8	Vdc
Input Bias Current ($T_J=+25^\circ\text{C}$) ($T_J=+125^\circ\text{C}$)	I_{IB}	-	3.0	6.0 5.5	mA
Input Bias Current Change ($11\text{ Vdc} \leq V_i \leq 23\text{ Vdc}$) ($1.0\text{ mA} \leq I_o \leq 40\text{ mA}$)	ΔI_{IB}	-	-	1.5 0.2	mA
Output Noise Voltage ($T_A=+25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$)	V_n	-	52	-	nV
Ripple Rejection ($I_o=40\text{ mA}$, $f=120\text{ Hz}$, $12\text{ V} \leq V_i < 23\text{ V}$, $T_J=+25^\circ\text{C}$)	RR	36	55	-	dB
Dropout Voltage ($T_J=+25^\circ\text{C}$)	V_i-V_o	-	1.7	-	Vdc

IL78LXX

IL78L09 ELECTRICAL CHARACTERISTICS

($V_i=15V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$, $-40^\circ C < T_j < +125^\circ C$, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage ($T_j = +25^\circ C$)	V_o	8.3	9.0	9.7	Vdc
Line Regulation ($T_j = +25^\circ C$, $I_o = 40 mA$) $11.5Vdc \leq V_i \leq 24Vdc$ $12Vdc \leq V_i < 24Vdc$	Reg_{line}	-	20 12	200 150	mV
Load Regulation ($T_j = +25^\circ C$, $1.0 mA \leq I_o \leq 100 mA$) ($T_j = +25^\circ C$, $1.0 mA \leq I_o \leq 40 mA$)	Reg_{load}	-	15 6.0	90 40	mV
Output Voltage ($11.5Vdc \leq V_i \leq 24Vdc$, $1.0 mA < I_o \leq 40mA$) ($V_i = 15V$, $1.0 mA \leq I_o \leq 70 mA$)	V_o	8.1 8.1	- -	9.9 9.9	Vdc
Input Bias Current ($T_j = +25^\circ C$) ($T_j = +125^\circ C$)	I_{IB}	- -	3.0 -	6.0 5.5	mA
Input Bias Current Change ($11 Vdc \leq V_i \leq 23 Vdc$) ($1.0mA \leq I_o \leq 40mA$)	ΔI_{IB}	- -	- -	1.5 0.2	mA
Output Noise Voltage ($T_A = +25^\circ C$, $10 Hz \leq f \leq 100 kHz$)	V_n	-	52	-	μV
Ripple Rejection ($I_o = 40 mA$, $f = 120 Hz$, $13V \leq V_i \leq 24 V$, $T_j = +25^\circ C$)	RR	36	55	-	dB
Dropout Voltage ($T_j = +25^\circ C$)	$V_i - V_o$	-	1.7	-	Vdc

IL78L12 ELECTRICAL CHARACTERISTICS

($V_i = 19 V$, $I_o = 40 mA$, $C_i = 0.33 \mu F$, $C_o = 0.1 \mu F$, $-40^\circ C < T_j < +125^\circ C$, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage ($T_j = +25^\circ C$)	V_o	11.1	12	12.9	Vdc
Line Regulation ($T_j = +25^\circ C$, $I_o = 40 mA$) $14.5Vdc \leq V_i \leq 27Vdc$ $16 Vdc \leq V_i \leq 27 Vdc$	Reg_{line}	-	120 100	250 200	mV
Load Regulation ($T_j = +25^\circ C$, $1.0 mA \leq I_o \leq 100 mA$) ($T_j = +25^\circ C$, $1.0 mA \leq I_o \leq 40 mA$)	Reg_{load}	-	20 10	100 50	mV
Output Voltage ($14.5Vdc \leq V_i \leq 27Vdc$, $1.0mA \leq I_o \leq 40mA$) ($V_i = 19V$, $1.0mA \leq I_o \leq 70mA$)	V_o	10.8 10.8	- -	13.2 13.2	Vdc
Input Bias Current ($T_j = +25^\circ C$) ($T_j = +125^\circ C$)	I_{IB}	- -	4.2 -	6.5 6.0	mA
Input Bias Current Change ($16Vdc \leq V_i \leq 27Vdc$) ($1.0 mA \leq I_o \leq 40 mA$)	ΔI_{IB}	- -	- -	1.5 0.2	mA
Output Noise Voltage ($T_A = +25^\circ C$, $10Hz \leq f \leq 100 kHz$)	V_n	-	80	-	pV
Ripple Rejection ($I_o = 40 mA$, $f = 120 Hz$, $15V \leq V_i \leq 25V$, $T_j = +25^\circ C$)	RR	36	42	-	dB
Dropout Voltage ($T_j = +25^\circ C$)	$V_i - V_o$	"	1.7	-	Vdc

IL78LXX

IL78L15 ELECTRICAL CHARACTERISTICS

($V_i = 23\text{ V}$, $I_o = 40\text{ mA}$, $C_i = 0.33\text{ }\mu\text{F}$, $C_o = 0.1\text{ }\mu\text{F}$, $-40^\circ\text{C} < T_J < +125^\circ\text{C}$ unless otherwise noted.)

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

IL78L18 ELECTRICAL CHARACTERISTICS

($V_i = 27\text{ V}$, $I_o = 40\text{ mA}$, $C_i = 0.33\text{ }\mu\text{F}$, $C_o = 0.1\text{ }\mu\text{F}$, $0^\circ\text{C} < T_J < +125^\circ\text{C}$, unless otherwise noted.)

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

IL78LXX

IL78L24 ELECTRICAL CHARACTERISTICS

($V_i = 33\text{ V}$, $I_o = 40\text{ mA}$, $C_i = 0.33\text{ }\mu\text{F}$, $C_o = 0.1\text{ }\mu\text{F}$, $0^\circ\text{C} < T_J < +125^\circ\text{C}$, unless otherwise noted.)

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