

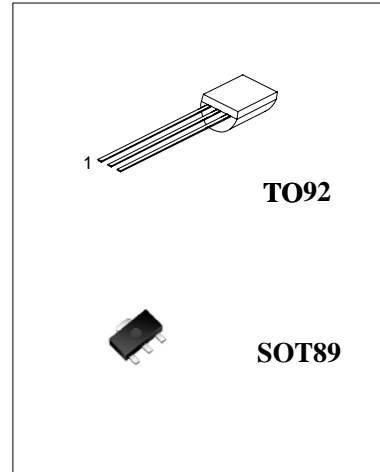
### 3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

#### DESCRIPTION

The 78LXX series of fixed voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply up to 100mA.

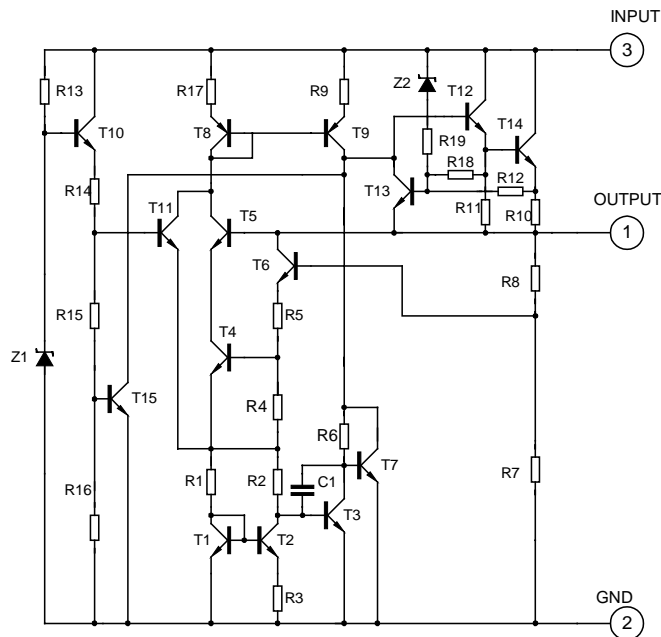
#### FEATURE

- \*Maximum output current of 100mA
- \*Output voltage of 5V,6V,8V,9V,10V,12V,15V and 24V
- \*Thermal overload protection
- \*Short circuit current limiting



1:Output 2:GND; 3:Input

#### BLOCK DIAGRAM



**ABSOLUTE MAXIMUM RATINGS** (Operating temperature range applies unless otherwise specified)

CHARACTERISTICS	SYMBOL	VALUE	UNITS
Input voltage(for Vo=5,8V) (for Vo=12,15V)	V <sub>I</sub>	25	V
	V <sub>I</sub>	35	V
Operating Junction Temperature Range	T <sub>OPR</sub>	-20~+120	°C
Storage Temperature Range	T <sub>STG</sub>	-55~+150	°C

**78L05 ELECTRICAL CHARACTERISTICS**

 (V<sub>I</sub>=10V, I<sub>o</sub>=40mA, 0<T<sub>j</sub><125°C, C<sub>1</sub>=0.33μF, C<sub>o</sub>=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>o</sub>	T <sub>j</sub> =25°C	4.8	5.0	5.2	V
		7V≤V <sub>I</sub> ≤20V, I <sub>o</sub> =1mA~40mA	4.75		5.25	V
		7V≤V <sub>I</sub> ≤V <sub>MAX</sub> , I <sub>o</sub> =1mA~70mA	4.75		5.25	V (note 2)
Load Regulation	ΔV <sub>o</sub>	T <sub>j</sub> =25°C, I <sub>o</sub> =1mA~100mA		11	60	mV
		T <sub>j</sub> =25°C, I <sub>o</sub> =1mA~40mA		5.0	30	mV
Line regulation	ΔV <sub>o</sub>	7V≤V <sub>I</sub> ≤20V, T <sub>j</sub> =25°C		8	150	mV
		8V≤V <sub>I</sub> ≤20V, T <sub>j</sub> =25°C		6	100	mV
Quiescent Current	I <sub>q</sub>			2.0	5.5	mA
Quiescent Current Change	ΔI <sub>q</sub>	8V≤V <sub>I</sub> ≤20V			1.5	mA
	ΔI <sub>q</sub>	1mA≤V <sub>I</sub> ≤40mA			0.1	mA
Output Noise Voltage	V <sub>N</sub>	10Hz≤f≤100kHz		40		μV
Temperature coefficient of V <sub>o</sub>	ΔV <sub>o</sub> /ΔT	I <sub>o</sub> =5mA		-0.65		mV/°C
Ripple Rejection	RR	8V≤V <sub>I</sub> ≤20V, f=120Hz, T <sub>j</sub> =25°C	41	80		dB
Dropout Voltage	V <sub>d</sub>	T <sub>j</sub> =25°C		1.7		V

**78L06 ELECTRICAL CHARACTERISTICS**

 (V<sub>I</sub>=12V, I<sub>o</sub>=40mA, 0<T<sub>j</sub><125°C, C<sub>1</sub>=0.33μF, C<sub>o</sub>=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>o</sub>	T <sub>j</sub> =25°C	5.75	6.0	6.25	V
		8.5V≤V <sub>I</sub> ≤20V, I <sub>o</sub> =1mA~40mA	5.7		6.3	V
		8.5V≤V <sub>I</sub> ≤V <sub>MAX</sub> , I <sub>o</sub> =1mA~70mA	5.7		6.3	V (note 2)
Load Regulation	ΔV <sub>o</sub>	T <sub>j</sub> =25°C, I <sub>o</sub> =1mA~100mA		12.8	80	mV
		T <sub>j</sub> =25°C, I <sub>o</sub> =1mA~70mA		5.8	40	mV
Line regulation	ΔV <sub>o</sub>	8.5V≤V <sub>I</sub> ≤20V, T <sub>j</sub> =25°C		64	175	mV
		9V≤V <sub>I</sub> ≤20V, T <sub>j</sub> =25°C		54	125	mV
Quiescent Current	I <sub>q</sub>			3.9	6.0	mA
Quiescent Current Change	ΔI <sub>q</sub>	9V≤V <sub>I</sub> ≤20V			1.5	mA
	ΔI <sub>q</sub>	1mA≤V <sub>I</sub> ≤40mA			0.1	mA
Output Noise Voltage	V <sub>N</sub>	10Hz≤f≤100kHz		49		μV
Temperature coefficient of V <sub>o</sub>	ΔV <sub>o</sub> /ΔT	I <sub>o</sub> =5mA		0.75		mV/°C
Ripple Rejection	RR	10V≤V <sub>I</sub> ≤20V, f=120Hz, T <sub>j</sub> =25°C	40	46		dB
Dropout Voltage	V <sub>d</sub>	T <sub>j</sub> =25°C		1.7		V

**78L08 ELECTRICAL CHARACTERISTICS**

(VI=14V, Io=40mA, 0&lt;Tj&lt;125°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	7.7	8.0	8.3	V
		10.5V≤Vi≤23V, Io=1mA~40mA	7.6		8.4	V
		10.5V≤Vi≤VMAX, Io=1mA~70mA	7.6		8.4	V (note 2)
Load Regulation	ΔVo	Tj=25°C, Io=1mA~100mA		15	80	mV
		Tj=25°C, Io=1mA~70mA		8.0	40	mV
Line regulation	ΔVo	10.5V≤Vi≤23V, Tj=25°C		10	175	mV
		11V≤Vi≤23V, Tj=25°C		8	125	mV
Quiescent Current	Iq		2.0	5.5	mA	
Quiescent Current Change	ΔIq	11V≤Vi≤23V			1.5	mA
	ΔIq	1mA≤Vi≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz		49		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.75		mV/°C
Ripple Rejection	RR	11V≤Vi≤23V, f=120Hz, Tj=25°C	39	70		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

**78L09 ELECTRICAL CHARACTERISTICS**

(VI=15V, Io=40mA, 0&lt;Tj&lt;125°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	8.64	9.0	9.36	V
		11.5V≤Vi≤24V, Io=1mA~40mA	8.55		9.45	V
		11.5V≤Vi≤VMAX, Io=1mA~70mA	8.55		9.45	V (note 2)
Load Regulation	ΔVo	Tj=25°C, Io=1mA~100mA		20	90	mV
		Tj=25°C, Io=1mA~40mA		10	45	mV
Line regulation	ΔVo	11.5V≤Vi≤24V, Tj=25°C		90	200	mV
		13V≤Vi≤24V, Tj=25°C		100	150	mV
Quiescent Current	Iq		2.0	6.0	mA	
Quiescent Current Change	ΔIq	13V≤Vi≤24V			1.5	mA
	ΔIq	1mA≤Vi≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz		49		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.75		mV/°C
Ripple Rejection	RR	12V≤Vi≤23V, f=120Hz, Tj=25°C	38	44		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

**78L10 ELECTRICAL CHARACTERISTICS**

(VI=16V, Io=40mA, 0&lt;Tj&lt;125°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	9.6	10.0	10.4	V
		12.5V≤Vi≤23V, Io=1mA~40mA	9.5		10.5	V
		12.5V≤Vi≤VMAX, Io=1mA~70mA	9.5		10.5	V (note 2)
Load Regulation	ΔVo	Tj=25°C, Io=1mA~100mA		20	94	mV
		Tj=25°C, Io=1mA~70mA		10	47	mV
Line regulation	ΔVo	12.5V≤Vi≤23V, Tj=25°C		100	220	mV
		14V≤Vi≤23V, Tj=25°C		200	170	mV
Quiescent Current	Iq		4.2	6.5	mA	
Quiescent Current Change	ΔIq	12.5V≤Vi≤23V			1.5	mA
	ΔIq	1mA≤Vi≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz		74		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.95		mV/°C
Ripple Rejection	RR	15V≤Vi≤23V, f=120Hz, Tj=25°C	38	43		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

**78L12 ELECTRICAL CHARACTERISTICS**

(VI=19V, Io=40mA, 0&lt;Tj&lt;125°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	11.5	15	15.6	V
		14.5V≤Vi≤27V, Io=1mA~40mA	11.4		12.6	V
		14.5V≤Vi≤VMAX, Io=1mA~70mA	11.4		12.6	V (note 2)
Load Regulation	ΔVo	Tj=25°C, Io=1mA~100mA		25	150	mV
		Tj=25°C, Io=1mA~40mA		12	75	mV
Line regulation	ΔVo	14.5V≤Vi≤27V, Tj=25°C		25	300	mV
		16V≤Vi≤27V, Tj=25°C		20	250	mV
Quiescent Current	Iq		2.0	6.0	mA	
Quiescent Current Change	ΔIq	16V≤Vi≤27V			1.5	mA
	ΔIq	1mA≤Vi≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz		80		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.0		mV/°C
Ripple Rejection	RR	15V≤Vi≤25V, f=120Hz, Tj=25°C	37	65		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

**78L15 ELECTRICAL CHARACTERISTICS**

(VI=23V, Io=40mA, 0&lt;Tj&lt;125°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	14.4	15	15.6	V
		17.5V≤Vi≤30V, Io=1mA~40mA	14.25		15.75	V
		17.5V≤Vi≤VMAX, Io=1mA~70mA	14.25		15.75	V (note 2)
Load Regulation	ΔVo	Tj=25°C, Io=1mA~100mA		20	150	mV
		Tj=25°C, Io=1mA~70mA		25	150	mV
Line regulation	ΔVo	17.5V≤Vi≤30V, Tj=25°C		25	150	mV
		20V≤Vi≤30V, Tj=25°C		15	75	mV
Quiescent Current	Iq			2.2	6.5	mA
Quiescent Current Change	ΔIq	20V≤Vi≤30V			1.5	mA
	ΔIq	1mA≤Vi≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz		90		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.3		mV/°C
Ripple Rejection	RR	18.5V≤Vi≤28.5V, f=120Hz, Tj=25°C	34	63		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

**78L18 ELECTRICAL CHARACTERISTICS**

(VI=27V, Io=40mA, 0&lt;Tj&lt;125°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	17.3	18	18.7	V
		21V≤Vi≤33V, Io=1mA~40mA	17.1		18.9	V
		21V≤Vi≤VMAX, Io=1mA~70mA	17.1		18.9	V (note 2)
Load Regulation	ΔVo	Tj=25°C, Io=1mA~100mA		30	170	mV
		Tj=25°C, Io=1mA~40mA		15	85	mV
Line regulation	ΔVo	21V≤Vi≤33V, Tj=25°C		145	300	mV
		22V≤Vi≤33V, Tj=25°C		135	250	mV
Quiescent Current	Iq			2.0	6.0	mA
Quiescent Current Change	ΔIq	21V≤Vi≤33V			1.5	mA
	ΔIq	1mA≤Vi≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz		150		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.8		mV/°C
Ripple Rejection	RR	23V≤Vi≤33V, f=120Hz, Tj=25°C	34	48		dB
Dropout Voltage	Vd	Tj=250°C		1.7		V

### 78L24 ELECTRICAL CHARACTERISTICS

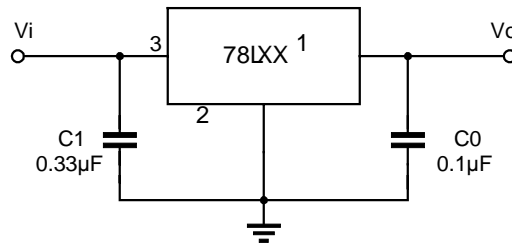
( $V_i=33V, I_o=40mA, 0 < T_j < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$ , unless otherwise specified)(Note 1)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_j=25^\circ C$	23	24	25	V
		$27V \leq V_i \leq 38V, I_o=1mA \sim 40mA$	22.8		25.2	V
		$27V \leq V_i \leq V_{MAX}, I_o=1mA \sim 70mA$	22.8		25.2	V (note 2)
Load Regulation	$\Delta V_o$	$T_j=25^\circ C, I_o=1mA \sim 100mA$		40	200	mV
		$T_j=25^\circ C, I_o=1mA \sim 40mA$		20	100	mV
Line regulation	$\Delta V_o$	$27V \leq V_i \leq 38V, T_j=25^\circ C$		160	300	mV
		$28V \leq V_i \leq 38V, T_j=25^\circ C$		150	250	mV
Quiescent Current	$I_q$			2.2	6.0	mA
Quiescent Current Change	$\Delta I_q$	$27V \leq V_i \leq 38V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$		200		$\mu V$
Temperature coefficient of $V_o$	$\Delta V_o / \Delta T$	$I_o=5mA$		-2.0		$mV/^\circ C$
Ripple Rejection	RR	$27V \leq V_i \leq 38V, f=120Hz, T_j=25^\circ C$	34	45		dB
Dropout Voltage	$V_d$	$T_j=25^\circ C$		1.7		V

Note 1: The Maximum steady state usable output current and input voltage are very dependent on the heating sinking and/or lead temperature length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of test.

Note 2: Power dissipation < 0.75W

### TYPICAL APPLICATION



Note 1: To specify an output voltage, substitute voltage value for "XX".

Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.