

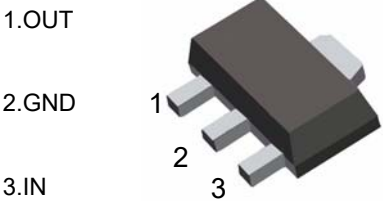
DESCRIPTION

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
- *Continuous total dissipation PD: 0.5 W (Ta = 25 ℃)
- *Thermal resistance,junction to case: 20 ℃/W
- *Output voltage of 3V,3.3V,5V,6V,8V,9V,10V,12V ,15V, 18V and 24V
- *Thermal overload protection
- *Short circuit current limiting

SOT-89



ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

CHARACTERISTICS		SYMBOL	VALUE	UNITS
Input voltage	V _{OUT} =3~10V	V _{IN}	30	V
	V _{OUT} =12~18V		35	
	V _{OUT} =24V		40	
Output Current		I _{OUT}	100	mA
Junction Temperature		T _J	+125	℃
Operating Temperature		T _{OPR}	-40~+120	
Storage Temperature Range		T _{STG}	-40~+150	
Lead temperature 1.6mm (1/16inch) from case for 10 seconds		T _{LEAD}	260	

Recommended operating conditions

Parameter		MIN	MAX	UNITS
Input voltage,V _i	78L03	5.5	18	V
	78L33	5.5	18	
	78L05	7	20	
	78L06	8	20	
	78L08	10.5	23	
	78L09	11.5	24	
	78L10	12.5	25	
	78L12	14.5	27	
	78L15	15.5	30	
	78L18	20.5	33	
	78L24	26.5	39	
Output current, I _o			100	mA
Operating virtual junction temperature, T _J		0	125	℃

3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

78L03 electrical characteristics at specified virtual junction temperature, $V_I=8V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L03			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	2.88	3	3.12	V
	$I_O=1mA$ to 40mA $V_I=5.5V$ to 18V	0 to 125°C	2.85	3	3.15	
	$I_O=1mA$ to 70mA		2.85	3	3.15	
Input regulation	$V_I=5.5V$ to 18V	25°C		28	120	mV
	$V_I=6V$ to 18V			23	80	
Ripple rejection	$V_I=6V$ to 16V, $f=120Hz$	25°C	43	51		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		13	50	mV
	$I_O=1mA$ to 40mA			7	35	
Output noise voltage	$f=10Hz-100Hz$	25°C		40		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		2.4	6	mA
		125°C			5.5	
Bias current change	$V_I=6V$ to 18V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

78L33 electrical characteristics at specified virtual junction temperature, $V_I=8.5V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L33			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	3.168	3.3	3.432	V
	$I_O=1mA$ to 40mA $V_I=5.5V$ to 18V	0 to 125°C	3.135	3.3	3.465	
	$I_O=1mA$ to 70mA		3.135	3.3	3.465	
Input regulation	$V_I=5.5V$ to 18V	25°C		30	130	mV
	$V_I=7V$ to 18V			25	90	
Ripple rejection	$V_I=7V$ to 16V, $f=120Hz$	25°C	42	50		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		14	55	mV
	$I_O=1mA$ to 40mA			7	35	
Output noise voltage	$f=10Hz-100Hz$	25°C		41		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		2.4	6	mA
		125°C			5.5	
Bias current change	$V_I=7V$ to 18V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

**78L05 electrical characteristics at specified virtual junction temperature, $V_I=10V$, $I_O=40mA$
(unless otherwise noted)**

PARAMETER	TEST CONDITIONS*		78L05			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	4.8	5	5.2	V
	$I_O=1mA$ to 40mA $V_I=7V$ to 20V	0 to 125°C	4.75	5	5.25	
	$I_O=1mA$ to 70mA		4.75	5	5.25	
Input regulation	$V_I=7V$ to 20V	25°C		32	150	mV
	$V_I=8V$ to 20V			26	100	
Ripple rejection	$V_I=8V$ to 18V, $f=120Hz$	25°C	41	49		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		15	60	mV
	$I_O=1mA$ to 40mA			8	30	
Output noise voltage	$f=10Hz-100Hz$	25°C		42		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		2.6	6	mA
		125°C			5.5	
Bias current change	$V_I=8V$ to 20V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

**78L06 electrical characteristics at specified virtual junction temperature, $V_I=11V$, $I_O=40mA$
(unless otherwise noted)**

PARAMETER	TEST CONDITIONS*		78L06			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	5.75	6	6.25	V
	$I_O=1mA$ to 40mA $V_I=8V$ to 20V	0 to 125°C	5.7	6	6.3	
	$I_O=1mA$ to 70mA		5.7	6	6.3	
Input regulation	$V_I=8V$ to 20V	25°C		35	175	mV
	$V_I=9V$ to 20V			29	125	
Ripple rejection	$V_I=9V$ to 19V, $f=120Hz$	25°C	40	48		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		16	80	mV
	$I_O=1mA$ to 40mA			9	40	
Output noise voltage	$f=10Hz-100Hz$	25°C		46		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		2.7	6	mA
		125°C			5.5	
Bias current change	$V_I=9V$ to 20V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

78L08 electrical characteristics at specified virtual junction temperature, $V_I=14V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L08			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	7.7	8	8.3	V
	$I_O=1mA$ to 40mA $V_I=10.5V$ to 23V	0 to 125°C	7.6	8	8.4	
	$I_O=1mA$ to 70mA		7.6	8	8.4	
Input regulation	$V_I=10.5V$ to 23V	25°C		42	175	mV
	$V_I=11V$ to 23V			36	125	
Ripple rejection	$V_I=13V$ to 23V, $f=120Hz$	25°C	37	46		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		18	80	mV
	$I_O=1mA$ to 40mA			10	40	
Output noise voltage	$f=10Hz-100Hz$	25°C		54		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		2.8	6	mA
		125°C			5.5	
Bias current change	$V_I=11V$ to 23V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

78L09 electrical characteristics at specified virtual junction temperature, $V_I=16V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L09			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	8.6	9	9.4	V
	$I_O=1mA$ to 40mA $V_I=12V$ to 24V	0 to 125°C	8.55	9	9.45	
	$I_O=1mA$ to 70mA		8.55	9	9.45	
Input regulation	$V_I=12V$ to 24V	25°C		45	175	mV
	$V_I=12V$ to 24V			40	125	
Ripple rejection	$V_I=15V$ to 25V, $f=120Hz$	25°C	38	45		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		19	90	mV
	$I_O=1mA$ to 40mA			11	40	
Output noise voltage	$f=10Hz-100Hz$	25°C		58		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		2.9	6	mA
		125°C			5.5	
Bias current change	$V_I=13V$ to 24V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

78L10 electrical characteristics at specified virtual junction temperature, $V_I=17V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L10			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	9.6	10	10.4	V
	$I_O=1mA$ to 40mA $V_I=13V$ to 25V	0 to 125°C	9.5	10	10.5	
	$I_O=1mA$ to 70mA		9.5	10	10.5	
Input regulation	$V_I=13V$ to 25V	25°C		51	175	mV
	$V_I=14V$ to 25V			42	125	
Ripple rejection	$V_I=15V$ to 25V, $f=120Hz$	25°C	37	44		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		20	90	mV
	$I_O=1mA$ to 40mA			11	40	
Output noise voltage	$f=10Hz-100Hz$	25°C		62		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		3.0	6	mA
		125°C			5.5	
Bias current change	$V_I=14V$ to 25V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA					

78L12 electrical characteristics at specified virtual junction temperature, $V_I=19V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L12			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	11.5	12	12.5	V
	$I_O=1mA$ to 40mA $V_I=14V$ to 27V	0 to 125°C	11.4	12	12.6	
	$I_O=1mA$ to 70mA		11.4	12	12.6	
Input regulation	$V_I=14V$ to 27V	25°C		55	250	mV
	$V_I=16V$ to 27V			49	200	
Ripple rejection	$V_I=15V$ to 25V, $f=120Hz$	25°C	37	42		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		22	100	mV
	$I_O=1mA$ to 40mA			13	50	
Output noise voltage	$f=10Hz-100Hz$	25°C		70		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		3.1	6.5	mA
		125°C			6	
Bias current change	$V_I=16V$ to 27V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

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3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

**78L15 electrical characteristics at specified virtual junction temperature, $V_I=23V$, $I_O=40mA$
(unless otherwise noted)**

PARAMETER	TEST CONDITIONS*		78L15			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	14.4	15	15.6	V
	$I_O=1mA$ to 40mA $V_I=17.5V$ to 30V	0 to 125°C	14.25	15	15.75	
	$I_O=1mA$ to 70mA		14.25	15	15.75	
Input regulation	$V_I=17.5V$ to 30V	25°C		65	300	mV
	$V_I=19V$ to 30V			58	250	
Ripple rejection	$V_I=18.5V$ to 28.5V, $f=120Hz$	25°C	34	39		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		25	150	mV
	$I_O=1mA$ to 40mA			15	75	
Output noise voltage	$f=10Hz-100Hz$	25°C		82		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		3.4	6.5	mA
		125°C			6	
Bias current change	$V_I=19V$ to 30V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

**78L18 electrical characteristics at specified virtual junction temperature, $V_I=26V$, $I_O=40mA$
(unless otherwise noted)**

PARAMETER	TEST CONDITIONS*		78L18			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	17.3	18	18.7	V
	$I_O=1mA$ to 40mA $V_I=20.5V$ to 33V	0 to 125°C	17.1	18	18.9	
	$I_O=1mA$ to 70mA		17.1	18	18.9	
Input regulation	$V_I=20.5V$ to 33V	25°C		70	360	mV
	$V_I=22V$ to 33V			64	300	
Ripple rejection	$V_I=21.5V$ to 31.5V, $f=120Hz$	25°C	32	36		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		27	180	mV
	$I_O=1mA$ to 40mA			19	90	
Output noise voltage	$f=10Hz-100Hz$	25°C		89		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		3.5	6.5	mA
		125°C			6	
Bias current change	$V_I=22V$ to 33V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS

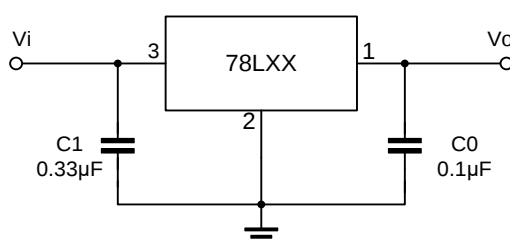
**78L24 electrical characteristics at specified virtual junction temperature, $V_I=32V$, $I_O=40mA$
(unless otherwise noted)**

PARAMETER	TEST CONDITIONS*		/ 24			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	23	24	25	V
	$I_O=1mA$ to 40mA $V_I=26.5V$ to 39V	0 to 125°C	22.8	24	25.2	
	$I_O=1mA$ to 70mA		22.8	24	25.2	
Input regulation	$V_I=26.5V$ to 39V	25°C		95	480	mV
	$V_I=29V$ to 39V			78	400	
Ripple rejection	$V_I=27.5V$ to 37.5V, $f=120Hz$	25°C	30	33		dB
Output regulation	$I_O=1mA$ to 100mA	25°C		41	240	mV
	$I_O=1mA$ to 40mA			28	120	
Output noise voltage	$f=10Hz-100Hz$	25°C		97		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		3.6	6.5	mA
		125°C			6	
Bias current change	$V_I=28V$ to 39V	0 to 125°C			1.5	
	$I_O=1mA$ to 40mA				0.1	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

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.

TYPICAL PERFORMANCE CHARACTERISTICS

Fig.1 78L05/12 Output Voltage vs Ambient Temperature

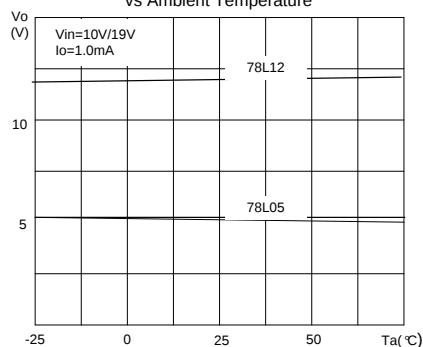


Fig.2 78L05/12 Quiescent Current vs Output Current

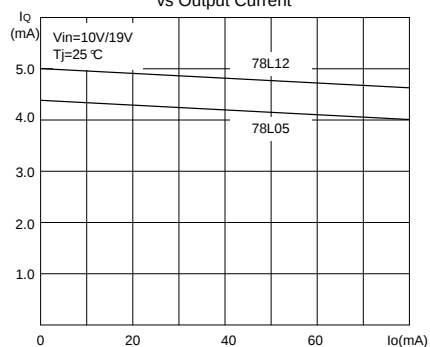


Fig.3 78L05 Quiescent Current vs Input

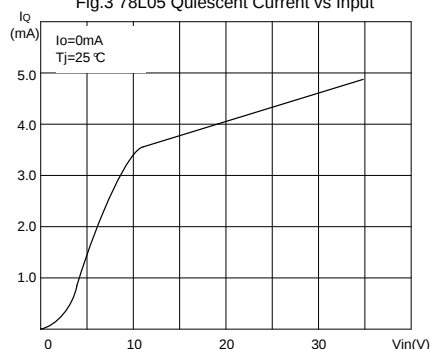


Fig.4 78L05/12 Thermal Shutdown

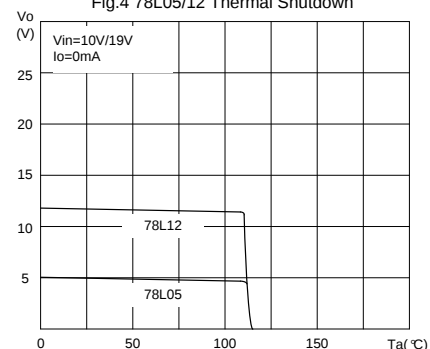


Fig.5 78L05/12 Output Characteristics

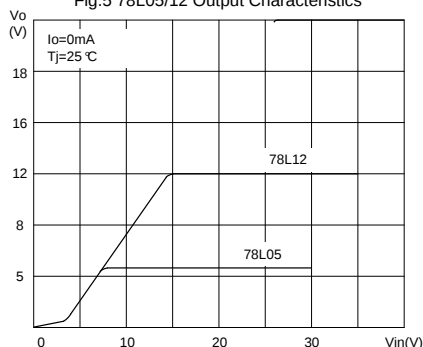
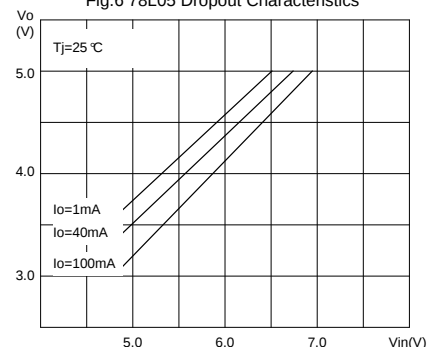
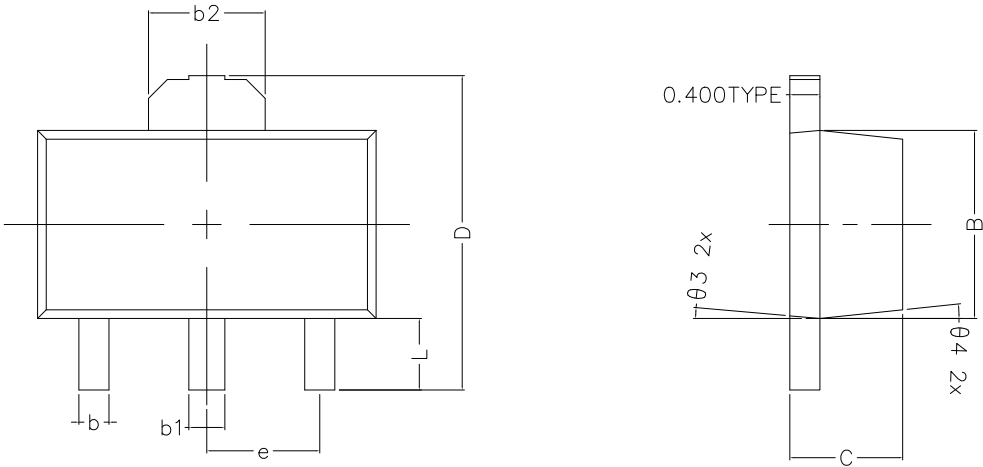


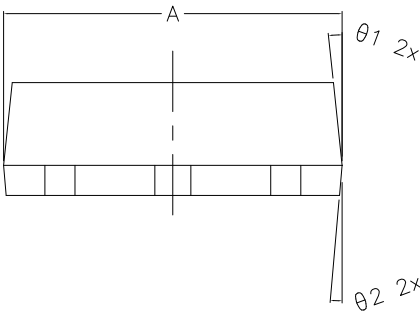
Fig.6 78L05 Dropout Characteristics



SOT89 PACKAGE OUTLINE DIMENSIONS



TOP VIEW



COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A	4.450	4.550	4.650
B	2.450	2.550	2.650
C	1.400	1.500	1.600
D	4.100	4.200	4.300
L	0.850	0.950	1.050
b	0.350	0.400	0.450
b1	0.430	0.480	0.530
b2	1.500	1.550	1.600
e	1.500TYPE		
$\theta 1$	6° TYPE		
$\theta 2$	5° TYPE		
$\theta 3$	5° TYPE		
$\theta 4$	6° TYPE		