

Positive-Voltage Regulators



Rev.1. Jan. 2010.



VSP MIKRON

78LXX

- 3-Terminal Regulators
- Output Current Up to 100mA
- No External Components
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting
- Direct Replacement for Fairchild μ A78L00 Series

DESCRIPTION

This series of fixed-voltage monolithic integrated circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high-current voltage regulators. Each of these regulators can deliver up to 100mA of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a Zener diode-resistor combination, an effective improvement in output impedance can be obtained together with lower-bias current.

Nominal output voltage	Regulator
5V	78L05
6V	78L06
8V	78L08
9V	78L09
10V	78L10
12V	78L12
15V	78L15
18V	78L18
24V	78L24

SELECT PACKAGE TO-92 (TOP VIEW)



Absolute maximum ratings over operating temperature range (unless otherwise noted)

	78L05 thru 78L10	78L12 thru 78L18	78L24	UNIT
Input voltage	30	35	40	V
Operating free-air, case, or virtual junction temperature range	0 to 150	0 to 150	0 to 150	°C
Storage temperature range	-65 to 150	-65 to 150	-65 to 150	
Lead temperature 1.6 mm (1/16 inch) from case for 10 seconds	260	260	260	

Recommended operating conditions

Parameter	MIN	MAX	UNIT	
Input voltage, V_I	78L05	7	20	V
	78L06	8	20	
	78L08	10.5	23	
	78L09	11.5	24	
	78L10	12.5	25	
	78L12	14.5	27	
	78L15	17.5	30	
	78L18	20.5	33	
	78L24	26.5	39	
Output current, I_o		100	mA	
Operating virtual junction temperature, T_J	0	125	°C	

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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		3.8	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		3.9	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.

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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		4	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
	$V_I=13V$ 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		4.1	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	

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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		4.2	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				0.1	

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		4.3	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	

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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		4.6	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		4.7	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	

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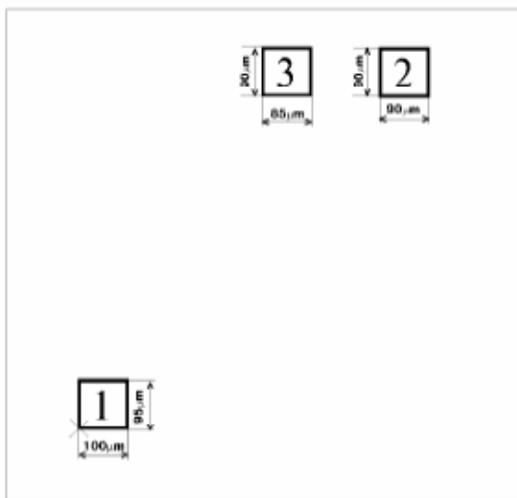
78L24 electrical characteristics at specified virtual junction temperature, $V_I=32V$, $I_O=40mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L24			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		4.8	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	

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Pad Location µA78L00



Chip size 1.0 x 1.2 mm

Wafer Thickness: 460±30µm (or 350±30µm,
280±30µm)
Top metal: AlSi
Backside metal: - (or Ti-Ni (V)-Ag)
Wafer size: 100 mm

Pad №	Pad Name	X(µm)	Y(µm)
1	GROUND	150	150
2	INPUT	870	1060
3	OUTPUT	580	1060