

Descriptions

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.

Features

- 3-Terminal Regulators
- Output Current Up to 100mA
- No External Components
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting

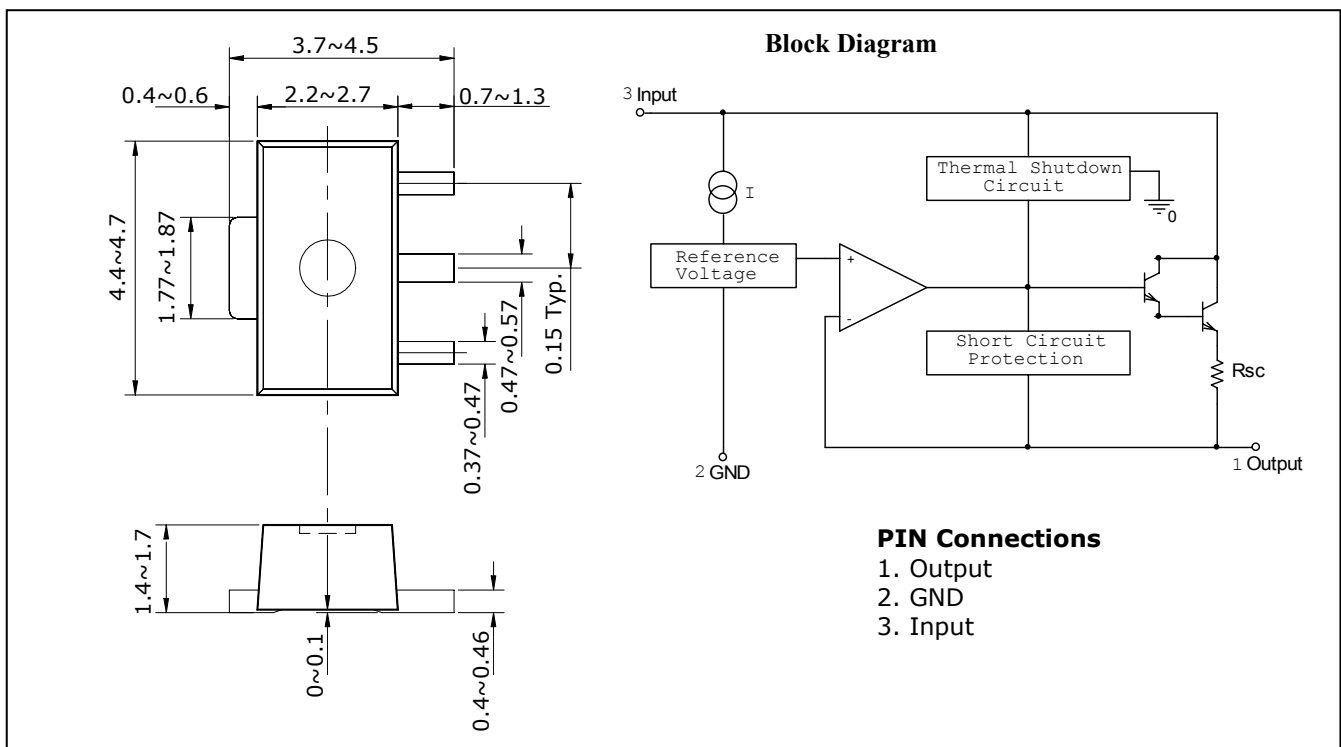
Ordering Information

Type NO.	Marking	Package Code
S78LxxF	xx□□	SOT-89

□□ : Monthly Code, Weekly Code

Outline Dimensions

unit : mm



Absolute maximum ratings

(Ta=25°C)

Characteristics	Symbol	Ratings		Unit
Operating Input Voltage	V _{IN}	S78L05 Thru S78L10	30	V
		S78L12 Thru S78L18	35	
		S78L24	40	
Power Dissipation	P _D	500		mW
Operating Temperature Range	T _{OPR}	-40 ~ +85		°C
Junction Temperature	T _J	150		°C
Storage Temperature Range	T _{STG}	-55 ~ +150		°C
Lead Temperature Time	T _{SOL}	260 (10sec)		°C

Recommended operating conditions

Parameter		Min.	Max.	Unit
Input Voltage, V _I	S78L05	7	20	V
	S78L06	8	20	
	S78L08	10.5	23	
	S78L09	11.5	24	
	S78L10	12.5	25	
	S78L12	14.5	27	
	S78L15	17.5	30	
	S78L18	20.5	33	
	S78L24	26.5	39	
Output current, I _O			100	mA

S78L05 Electrical Characteristics

($V_I=10V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L05			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	4.8	5	5.2	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=7\text{V to }20\text{V}$	0°C to 125°C	4.75	5	5.25	
	$I_O=1\text{mA to }70\text{mA}$		4.75	5	5.25	
Input regulation	$V_I=7\text{V to }20\text{V}$	25°C		32	150	mV
	$V_I=8\text{V to }20\text{V}$			26	100	
Ripple rejection	$V_I=8\text{V to }18\text{V}$, $f=120\text{Hz}$	0°C to 25°C	41	49		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		15	60	mV
	$I_O=1\text{mA to }40\text{mA}$			8	30	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		42		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		3.8	6	mA
		125°C			5.5	
Bias Current Change	$V_I=8\text{V to }20\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				0.1	

S78L06 Electrical Characteristics

($V_I=11V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L06			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	5.75	6	6.25	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=8\text{V to }20\text{V}$	0°C to 125°C	5.7	6	6.3	
	$I_O=1\text{mA to }70\text{mA}$		5.7	6	6.3	
Input regulation	$V_I=8\text{V to }20\text{V}$	25°C		35	175	mV
	$V_I=9\text{V to }20\text{V}$			29	125	
Ripple rejection	$V_I=9\text{V to }19\text{V}$, $f=120\text{Hz}$	0°C to 25°C	40	48		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		16	80	mV
	$I_O=1\text{mA to }40\text{mA}$			9	40	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		46		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		3.9	6	mA
		125°C			5.5	
Bias Current Change	$V_I=9\text{V to }20\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				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 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

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

S78L08 Electrical Characteristics

($V_I=14V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L08			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	7.7	8	8.3	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=10.5\text{V to }23\text{V}$	0°C to 125°C	7.6	8	8.4	
	$I_O=1\text{mA to }70\text{mA}$		7.6	8	8.4	
Input regulation	$V_I=10.5\text{V to }23\text{V}$	25°C		42	175	mV
	$V_I=11\text{V to }23\text{V}$			36	125	
Ripple rejection	$V_I=13\text{V to }23\text{V}$, $f=120\text{Hz}$	0°C to 25°C	37	46		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		18	80	mV
	$I_O=1\text{mA to }40\text{mA}$			10	40	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		54		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		4	6	mA
		125°C			5.5	
Bias Current Change	$V_I=11\text{V to }23\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				0.1	

S78L09 Electrical Characteristics

($V_I=16V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L09			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	8.6	9	9.4	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=12\text{V to }24\text{V}$	0°C to 125°C	8.55	9	9.45	
	$I_O=1\text{mA to }70\text{mA}$		8.55	9	9.45	
Input regulation	$V_I=12\text{V to }24\text{V}$	25°C		45	175	mV
	$V_I=13\text{V to }24\text{V}$			40	125	
Ripple rejection	$V_I=15\text{V to }25\text{V}$, $f=120\text{Hz}$	0°C to 25°C	38	45		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		19	90	mV
	$I_O=1\text{mA to }40\text{mA}$			11	40	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		58		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		4.1	6	mA
		125°C			5.5	
Bias Current Change	$V_I=13\text{V to }24\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				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 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

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

S78L10 Electrical Characteristics

($V_I=17V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L10			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	9.6	10	10.4	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=13\text{V to }25\text{V}$	0°C to 125°C	9.5	10	10.5	
	$I_O=1\text{mA to }70\text{mA}$		9.5	10	10.5	
Input regulation	$V_I=13\text{V to }25\text{V}$	25°C		51	175	mV
	$V_I=14\text{V to }25\text{V}$			42	125	
Ripple rejection	$V_I=15\text{V to }25\text{V}$, $f=120\text{Hz}$	0°C to 25°C	37	44		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		20	90	mV
	$I_O=1\text{mA to }40\text{mA}$			11	40	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		62		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		4.2	6	mA
		125°C			5.5	
Bias Current Change	$V_I=14\text{V to }25\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				0.1	

S78L12 Electrical Characteristics

($V_I=19V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L12			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	11.5	12	12.5	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=14\text{V to }27\text{V}$	0°C to 125°C	11.4	12	12.6	
	$I_O=1\text{mA to }70\text{mA}$		11.4	12	12.6	
Input regulation	$V_I=14.5\text{V to }27\text{V}$	25°C		55	250	mV
	$V_I=16\text{V to }27\text{V}$			49	200	
Ripple rejection	$V_I=15\text{V to }25\text{V}$, $f=120\text{Hz}$	0°C to 25°C	37	42		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		22	100	mV
	$I_O=1\text{mA to }40\text{mA}$			13	50	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		70		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		4.3	6.5	mA
		125°C			6	
Bias Current Change	$V_I=16\text{V to }27\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				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 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

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S78L15 Electrical Characteristics

($V_I=23V$, $I_O=40\text{ mA}$, $T_J=0\text{ }^\circ\text{C} \sim 125\text{ }^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L15			Unit
			Min.	Typ.	Max.	
Output Voltage**		25 $^\circ\text{C}$	14.4	15	15.6	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=17.5\text{V to }30\text{V}$	0 $^\circ\text{C to }125\text{ }^\circ\text{C}$	14.25	15	15.75	
	$I_O=1\text{mA to }70\text{mA}$		14.25	15	15.75	
Input regulation	$V_I=17.5\text{V to }30\text{V}$	25 $^\circ\text{C}$		65	300	mV
	$V_I=19\text{V to }30\text{V}$			58	250	
Ripple rejection	$V_I=18.5\text{V to }28.5\text{V}$, $f=120\text{Hz}$	0 $^\circ\text{C to }25\text{ }^\circ\text{C}$	34	39		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25 $^\circ\text{C}$		25	150	mV
	$I_O=1\text{mA to }40\text{mA}$			15	75	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25 $^\circ\text{C}$		82		μV
Dropout Voltage		25 $^\circ\text{C}$		1.7		V
Bias current		25 $^\circ\text{C}$		4.6	6.5	mA
		125 $^\circ\text{C}$			6	
Bias Current Change	$V_I=19\text{V to }30\text{V}$	0 $^\circ\text{C to }125\text{ }^\circ\text{C}$			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				0.1	

S78L18 Electrical Characteristics

($V_I=26V$, $I_O=40\text{ mA}$, $T_J=0\text{ }^\circ\text{C} \sim 125\text{ }^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L18			Unit
			Min.	Typ.	Max.	
Output Voltage**		25 $^\circ\text{C}$	17.3	18	18.7	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=20.5\text{V to }33\text{V}$	0 $^\circ\text{C to }125\text{ }^\circ\text{C}$	17.1	18	18.9	
	$I_O=1\text{mA to }70\text{mA}$		17.1	18	18.9	
Input regulation	$V_I=20.5\text{V to }33\text{V}$	25 $^\circ\text{C}$		70	360	mV
	$V_I=22\text{V to }33\text{V}$			64	300	
Ripple rejection	$V_I=21.5\text{V to }31.5\text{V}$, $f=120\text{Hz}$	0 $^\circ\text{C to }25\text{ }^\circ\text{C}$	32	36		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25 $^\circ\text{C}$		27	180	mV
	$I_O=1\text{mA to }40\text{mA}$			19	90	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25 $^\circ\text{C}$		89		μV
Dropout Voltage		25 $^\circ\text{C}$		1.7		V
Bias current		25 $^\circ\text{C}$		4.7	6.5	mA
		125 $^\circ\text{C}$			6	
Bias Current Change	$V_I=22\text{V to }33\text{V}$	0 $^\circ\text{C to }125\text{ }^\circ\text{C}$			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				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 0.33 μF capacitor across the input and a 0.1 μF capacitor across the output.

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S78L24 Electrical Characteristics

($V_I=32V$, $I_O=40\text{ mA}$, $T_J=0^\circ\text{C} \sim 125^\circ\text{C}$, Unless otherwise noted)

Parameter	Test Conditions*		S78L24			Unit
			Min.	Typ.	Max.	
Output Voltage**		25°C	23	24	25	V
	$I_O=1\text{mA to }40\text{mA}$ $V_I=26.5\text{V to }39\text{V}$	0°C to 125°C	22.8	24	25.2	
	$I_O=1\text{mA to }70\text{mA}$		22.8	24	25.2	
Input regulation	$V_I=26.5\text{V to }39\text{V}$	25°C		95	480	mV
	$V_I=29\text{V to }39\text{V}$			78	400	
Ripple rejection	$V_I=27.5\text{V to }37.5\text{V}, f=120\text{Hz}$	0°C to 25°C	30	33		dB
Output regulation	$I_O=1\text{mA to }100\text{mA}$	25°C		41	240	mV
	$I_O=1\text{mA to }40\text{mA}$			28	120	
Output noise voltage	$f=10\text{Hz to }100\text{KHz}$	25°C		97		uV
Dropout Voltage		25°C		1.7		V
Bias current		25°C		4.8	6.5	mA
		125°C			6	
Bias Current Change	$V_I=28\text{V to }39\text{V}$	0°C to 125°C			1.5	mA
	$I_O=1\text{mA to }40\text{mA}$				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 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

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