AUK Semiconductor

S78LxxF

Positive-Voltage Regulators

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, on effective improvement in output impedance can be obtained together with lover-bias current.

Features

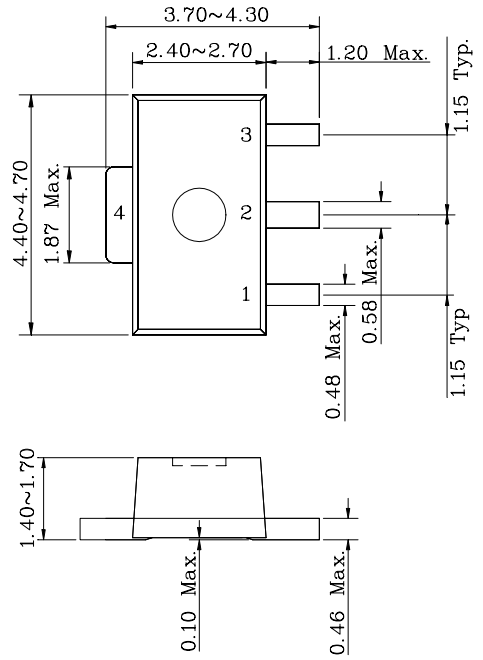
- 3-Terminal Regulators
- Output Current of 100mA
- No External Components
- Thermal Overload Protection
- Short-Circuit Limit Protection

Ordering Information

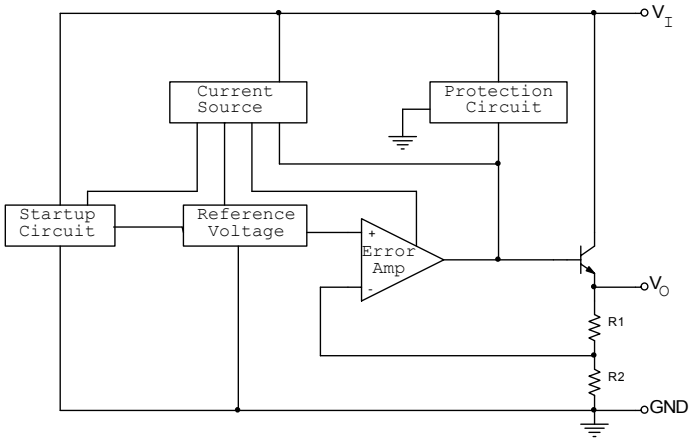
Type NO.	Marking	Package Code
S78LxxF	xx	SOT-89

xx:Voltage Code (05:5V, 06:6V, 08:8V, 09:9V, 10:10V,12:12V,15:15V,18:18V,24:24V)

Outline Dimensions (Unit : mm)



BLOCK DIAGRAM



PIN Connections

1. Output voltage
2. GND
3. Input voltage

Absolute maximum ratings

Ta=25°C

Characteristics	Symbol	Rating		Unit
Input Voltage	V_I	S78L05 Thru S78L10	30	V
		S78L12 Thru S78L18	35	
		S78L24	40	
Power Dissipation	P_D	500		mW
Junction Temperature	T_J	150		℃
Storage Temperature Range	T_{stg}	-55 ~ +150		℃

Device Selection Guide

Device	Output Voltage
S78L05F	5V
S78L06F	6V
S78L08F	8V
S78L09F	9V
S78L10F	10V
S78L12F	12V
S78L15F	15V
S78L18F	18V
S78L24F	24V

Electrical Characteristics

(Electrical Characteristics at V_I=10V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L05			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	4.80	5	5.20	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=7V ~ 20V	0℃≤T_J≤125℃	4.75	-	5.25	
		I_O=1 ㎃ ~ 70 ㎃ V_I=10V		4.75	-	5.25	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=7V ~ 20V	T_J=25℃	-	32	150	㎷
		V_I=8V ~ 20V		-	26	100	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	15	60	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	8	30	
Quiescent Current	I_{QC}	-	T_J=25℃	-	3.8	6	㎃
			T_J=125℃	-		5.5	
Quiescent Current Change	$\triangle I_{QC}$	V_I=8V ~ 20V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=8V ~ 18V, f=120 ㎐	0℃≤T_J≤125℃	41	49		㏈

Electrical Characteristics

(Electrical Characteristics at V_I=11V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L06			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	5.75	6	6.25	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=8V ~ 20V	0℃≤T_J≤125℃	5.70	-	6.30	
		I_O=1 ㎃ ~ 70 ㎃ V_I=11V		5.70	-	6.30	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=8V ~ 20V	T_J=25℃	-	35	175	㎷
		V_I=9V ~ 20V		-	29	125	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	16	80	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	9	40	
Quiescent Current	I_{QC}	-	T_J=25℃	-	3.9	6	㎃
			T_J=125℃	-		5.5	
Quiescent Current Change	$\triangle I_{QC}$	V_I=9V ~ 20V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=9V ~ 19V, f=120 ㎐	0℃≤T_J≤125℃	40	48		㏈

* 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 ㎌ capacitor across the input and a 0.1 ㎌ capacitor across the output.

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

Electrical Characteristics

(Electrical Characteristics at V_I=14V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L08			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	7.70	8	8.30	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=10.5V ~ 23V	0℃≤T_J≤125℃	7.60	-	8.40	
		I_O=1 ㎃ ~ 70 ㎃ V_I=14V		7.60	-	8.40	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=10.5V ~ 23V	T_J=25℃	-	42	175	㎷
		V_I=11V ~ 23V		-	36	125	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	18	80	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	10	40	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4	6	㎃
			T_J=125℃	-		5.5	
Quiescent Current Change	$\triangle I_{QC}$	V_I=11V ~ 23V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=13V ~ 23V, f=120 ㎐	0℃≤T_J≤125℃	37	46		dB

Electrical Characteristics

(Electrical Characteristics at V_I=16V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L09			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	8.60	9	9.40	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=12V ~ 24V	0℃≤T_J≤125℃	8.55	-	9.45	
		I_O=1 ㎃ ~ 70 ㎃ V_I=16V		8.55	-	9.45	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=12V ~ 24V	T_J=25℃	-	45	175	㎷
		V_I=13V ~ 24V		-	40	125	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	19	90	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	11	40	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4.1	6	㎃
			T_J=125℃	-		5.5	
Quiescent Current Change	$\triangle I_{QC}$	V_I=13V ~ 24V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=15V ~ 25V, f=120 ㎐	0℃≤T_J≤125℃	38	45		dB

*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 ㎌ capacitor across the input and a 0.1 ㎌ capacitor across the output.

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

Electrical Characteristics

(Electrical Characteristics at V_I=17V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L10			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	9.60	10	10.4	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=13V ~ 25V	0℃≤T_J≤125℃	9.50	-	10.5	
		I_O=1 ㎃ ~ 70 ㎃ V_I=17V		9.50	-	10.5	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=13V ~ 25V	T_J=25℃	-	51	175	㎷
		V_I=14V ~ 25V		-	42	125	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	20	90	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	11	40	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4.2	6	㎃
			T_J=125℃	-		5.5	
Quiescent Current Change	$\triangle I_{QC}$	V_I=14V ~ 25V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=15V ~ 25V, f=120 ㎐	0℃≤T_J≤125℃	37	44		㏈

Electrical Characteristics

(Electrical Characteristics at V_I=19V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L12			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	11.5	12	12.5	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=14V ~ 27V	0℃≤T_J≤125℃	11.4	-	12.5	
		I_O=1 ㎃ ~ 70 ㎃ V_I=19V		11.4	-	12.6	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=14.5V ~ 27V	T_J=25℃	-	55	250	㎷
		V_I=16V ~ 27V		-	49	200	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	22	100	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	13	50	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4.3	6.5	㎃
			T_J=125℃	-		5	
Quiescent Current Change	$\triangle I_{QC}$	V_I=16V ~ 27V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=15V ~ 25V, f=120 ㎐	0℃≤T_J≤125℃	37	42		㏈

* 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 ㎌ capacitor across the input and a 0.1 ㎌ capacitor across the output.

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

Electrical Characteristics

(Electrical Characteristics at V_I=23V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L15			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	14.40	15	15.60	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=17.5V ~ 30V	0℃≤T_J≤125℃	14.25	-	15.75	
		I_O=1 ㎃ ~ 70 ㎃ V_I=23V		14.25	-	15.75	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=17.5V ~ 30V	T_J=25℃	-	65	300	㎷
		V_I=19V ~ 30V		-	58	250	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	25	150	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	15	75	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4.6	6.5	㎃
			T_J=125℃	-		6	
Quiescent Current Change	$\triangle I_{QC}$	V_I=19V ~ 30V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=18.5V ~ 28.5V f=120 ㎐	0℃≤T_J≤125℃	34	39		dB

Electrical Characteristics

(Electrical Characteristics at V_I=26V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L18			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	17.3	18	18.7	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=20.5V ~ 33V	0℃≤T_J≤125℃	17.1	-	18.9	
		I_O=1 ㎃ ~ 70 ㎃ V_I=26V		17.1	-	18.9	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=20.5V ~ 33V	T_J=25℃	-	70	360	㎷
		V_I=22V ~ 33V		-	64	300	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	27	180	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	19	90	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4.7	6.5	㎃
			T_J=125℃	-		6	
Quiescent Current Change	$\triangle I_{QC}$	V_I=22V ~ 33V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=21.5V ~ 31.5V f=120 ㎐	0℃≤T_J≤125℃	32	36		dB

* 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 ㎌ capacitor across the input and a 0.1 ㎌ capacitor across the output.

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Electrical Characteristics

(Electrical Characteristics at V_I=32V, I_O=40 ㎃, C_I=0.33 ㎌, C_O=0.1 ㎌, 0℃≤T_J≤125℃, Unless otherwise specified)

Parameter	Symbol	Test Condition*		S78L24			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	-	T_J=25℃	23.0	24	25.0	V
		I_O=1 ㎃ ~ 40 ㎃ V_I=26.5V ~ 39V	0℃≤T_J≤125℃	22.8	-	25.2	
		I_O=1 ㎃ ~ 70 ㎃ V_I=32V		22.8	-	25.2	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=26.5V ~ 39V	T_J=25℃	-	95	480	㎷
		V_I=29V ~ 39V		-	78	400	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=1 ㎃ ~ 100 ㎃	T_J=25℃	-	41	240	㎷
		I_O=1 ㎃ ~ 40 ㎃		-	28	120	
Quiescent Current	I_{QC}	-	T_J=25℃	-	4.8	6.5	㎃
			T_J=125℃	-		6	
Quiescent Current Change	$\triangle I_{QC}$	V_I=28V ~ 39V	0℃≤T_J≤125℃	-	-	1.5	㎃
		I_O=1 ㎃ ~ 40 ㎃		-	-	0.1	
Dropout Voltage	V_{DROP}	-	T_J=25℃	-	1.7	-	V
Ripple Rejection	RR	V_I=27.5V ~ 37.5V f=120 ㎐	0℃≤T_J≤125℃	30	33		㏈

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