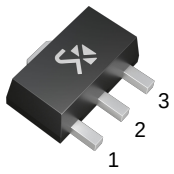
78L44K THRU 78L18K

3-Terminal Positive Voltage Regulator

FEATURE

- Maximum output current of 100mA
- Output voltage of 4.4V/5V/6V/8V/9V/10V/12V/15V/18V
- Thermal overload protection
- Short circuit current limiting



1：OUT 2：GND 3：IN

SOT-89 PLASTIC PACKAGE

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

Characteristic		Symbol	Value	Unit
Input voltage	V_{OUT}=4.4~10V	V_{IN}	30	V
	V_{OUT}=12~18V		35	
Output Current		I_{OUT}	100	mA
Junction Temperature		T_J	+125	°C
Operating Temperature		T_{OPR}	-40~+125	°C
Storage Temperature Range		T_{STG}	-40~+150	°C

78L44K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 10 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	4.22	4.4	4.58	V
		6.4V≤V_I≤19.4V,I_O=1mA~40mA	4.18		4.62	V
		I_O=1mA~70mA	4.18		4.62	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, I_O=1mA~100mA		15	60	mV
		Tj=25°C, I_O=1mA~40mA		10	30	mV
Line regulation	ΔVo	7V≤V_I≤20V,Tj=25°C		10	150	mV
		8V≤V_I≤20V,Tj=25°C		5	100	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	8V≤V_I≤20V			1.5	mA
		1mA≤I_O≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz, Tj=25°C		40		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.65		mV/°C
Ripple Rejection	RR	8V≤V_I≤18V,f=120Hz,Tj=25°C	40	49		dB
Dropout Voltage	Vd			1.7		V

78L05K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 10 V, IO =40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	4.8	5.0	5.2	V
		7V≤VI≤20V,IO=1mA~40mA	4.75		5.25	V
		IO=1mA~70mA	4.75		5.25	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, IO=1mA~100mA		15	60	mV
		Tj=25°C, IO=1mA~40mA		10	30	mV
Line regulation	ΔVo	7V≤VI≤20V,Tj=25°C		10	150	mV
		8V≤VI≤20V,Tj=25°C		5	100	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	8V≤VI≤20V			1.5	mA
		1mA≤IO≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		40		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.65		mV/°C
Ripple Rejection	RR	8V≤VI≤18V,f=120Hz,Tj=25°C	40	49		dB
Dropout Voltage	Vd			1.7		V

78L06K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 12 V, IO =40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	VO	Tj=25°C	5.75	6.0	6.25	V
		8V≤VI≤21V,IO=1mA~40mA	5.7		6.3	V
		IO=1mA~70mA	5.7		6.3	V (Note 1)
Load Regulation	ΔVo	Tj=25°C,IO=1mA~100mA		18	60	mV
		Tj=25°C,IO=1mA~40mA		12	30	mV
Line regulation	ΔVo	8.5V≤VI≤20V,Tj=25°C		12	150	mV
		9V≤VI≤20V,Tj=25°C		6	100	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	9V≤VI≤20V			1.5	mA
		1mA≤ IO≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		50		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.75		mV/°C
Ripple Rejection	RR	9V≤VI≤20V,f=120Hz,Tj=25°C	38	46		dB
Dropout Voltage	Vd			1.7		V

78L08K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 14 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_O	Tj=25°C	7.7	8.0	8.3	V
		10V≤V_I≤23V,I_O=1mA~40mA	7.6		8.4	V
		I_O=1mA~70mA	7.6		8.4	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, I_O=1mA~100mA		24	80	mV
		Tj=25°C, I_O=1mA~40mA		16	40	mV
Line regulation	ΔVo	10.5V≤V_I≤23V,Tj=25°C		16	175	mV
		11V≤V_I≤23V,Tj=25°C		8	125	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	11V≤V_I≤23V			1.5	mA
		1mA≤ I_O≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz, Tj=25°C		60		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.8		mV/°C
Ripple Rejection	RR	12V≤V_I≤23V,f=120Hz,Tj=25°C	36	45		dB
Dropout Voltage	Vd			1.7		V

78L09K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0°C≤ TJ ≤ 125°C, VI = 15 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_O	Tj=25°C	8.64	9.0	9.36	V
		11V≤V_I≤24V,I_O=1mA~40mA	8.55		9.45	V
		I_O=1mA~70mA	8.55		9.45	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, I_O=1mA~100mA		27	80	mV
		Tj=25°C, I_O=1mA~40mA		18	40	mV
Line regulation	ΔVo	11.5V≤V_I≤23V,Tj=25°C		18	225	mV
		12V≤V_I≤23V,Tj=25°C		9	150	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	12V≤V_I≤23V			1.5	mA
		1mA≤I_O≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz, Tj=25°C		70		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.85		mV/°C
Ripple Rejection	RR	12V≤V_I≤23V,f=120Hz,Tj=25°C	36	44		dB
Dropout Voltage	Vd			1.7		V

78L10K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 16 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	9.6	10.0	10.4	V
		12V≤VI≤25V,IO=1mA~40mA	9.5		10.5	V
		IO=1mA~70mA	9.5		10.5	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, IO=1mA~100mA		30	90	mV
		Tj=25°C, IO=1mA~40mA		20	45	mV
Line regulation	ΔVo	12.5V≤VI≤23V,Tj=25°C		20	230	mV
		13V≤VI≤23V,Tj=25°C		10	170	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	13V≤VI≤23V			1.5	mA
		1mA≤IO≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		60		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.9		mV/°C
Ripple Rejection	RR	14V≤VI≤23V,f=120Hz,Tj=25°C	36	45		dB
Dropout Voltage	Vd			1.7		V

78L12K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 19 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	11.5	12	12.6	V
		14V≤VI≤27V,IO=1mA~40mA	11.4		12.6	V
		IO=1mA~70mA	11.4		12.6	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, IO=1mA~100mA		36	100	mV
		Tj=25°C, IO=1mA~40mA		24	50	mV
Line regulation	ΔVo	14.5V≤VI≤27V,Tj=25°C		24	250	mV
		16V≤VI≤27V,Tj=25°C		12	200	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	16V≤VI≤27V			1.5	mA
		1mA≤IO≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		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	36	42		dB
Dropout Voltage	Vd			1.7		V

78L15K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 23 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

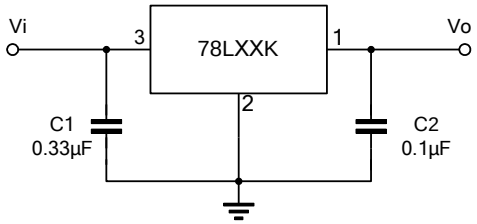
Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	14.4	15	15.6	V
		17V≤VI≤30V,IO=1mA~40mA	14.25		15.75	V
		IO=1mA~70mA	14.25		15.75	V (Note 1)
Load Regulation	ΔVo	Tj=25°C,IO=1mA~100mA		45	150	mV
		Tj=25°C,IO=1mA~40mA		30	75	mV
Line regulation	ΔVo	17.5V≤VI≤30V,Tj=25°C		30	300	mV
		20V≤VI≤30V,Tj=25°C		15	250	mV
Quiescent Current	Iq	Tj=25°C		2.2	6.0	mA
Quiescent Current Change	ΔIq	20V≤VI≤30V			1.5	mA
		1mA≤IO≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		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	33	39		dB
Dropout Voltage	Vd			1.7		V

78L18K Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI =26 V, IO = 40 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	17.3	18	18.7	V
		20V≤VI≤33V,IO=1mA~40mA	17.1		18.9	V
		IO=1mA~70mA	17.1		18.9	V (Note 1)
Load Regulation	ΔVo	Tj=25°C,IO=1mA~100mA		27	180	mV
		Tj=25°C,IO=1mA~40mA		19	90	mV
Line regulation	ΔVo	20.5V≤VI≤33V,Tj=25°C		70	360	mV
		22V≤VI≤33V,Tj=25°C		64	300	mV
Quiescent Current	Iq	Tj=25°C		4.7	6.5	mA
Quiescent Current Change	ΔIq	22V≤VI≤33V			1.5	mA
		1mA≤IO≤40mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		90		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		1.3		mV/°C
Ripple Rejection	RR	21.5V≤VI≤31.5V,f=120Hz,Tj=25°C	32	36		dB
Dropout Voltage	Vd			1.7		V

Note 1:Power dissipation<0.75W.

TYPICAL APPLICATION



Note 1: To specify an output voltage,substitue 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 78L05K/09K Output Voltage vs Junction Temperature

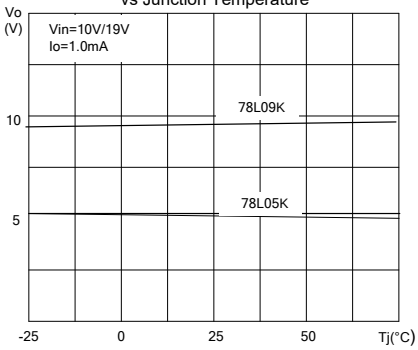


Fig.2 78L05K/09K Quiescent Current vs Output Current

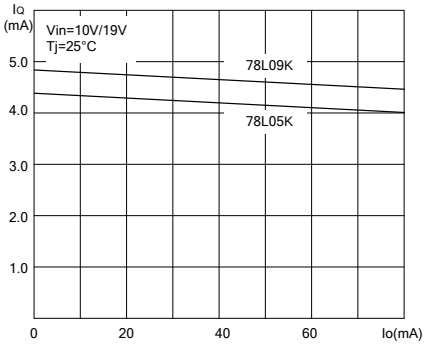


Fig.3 78L05K Quiescent Current vs Input

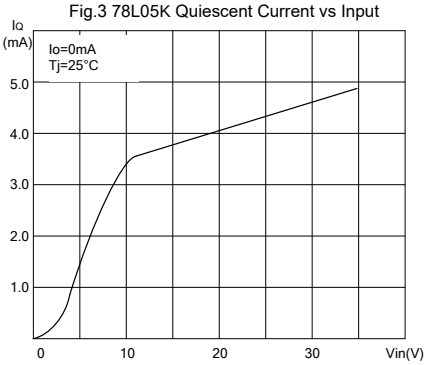


Fig.4 78L05K/09K Thermal Shutdown

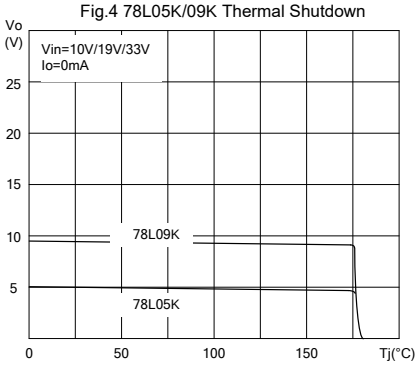


Fig.5 78L05K/09K Output Characteristics

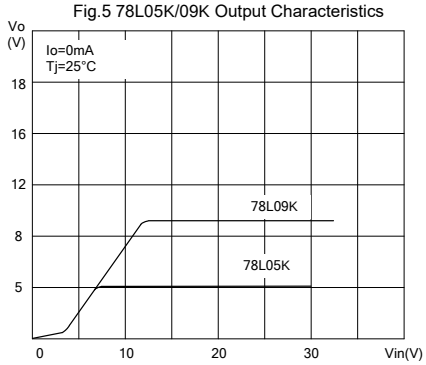


Fig.6 78L05K Dropout Characteristics

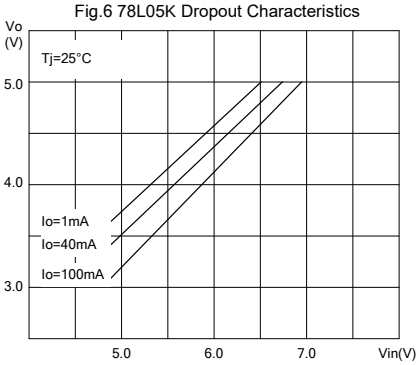


Fig.7 Dropout Characteristics

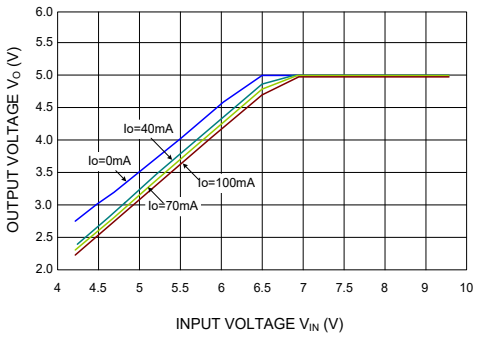
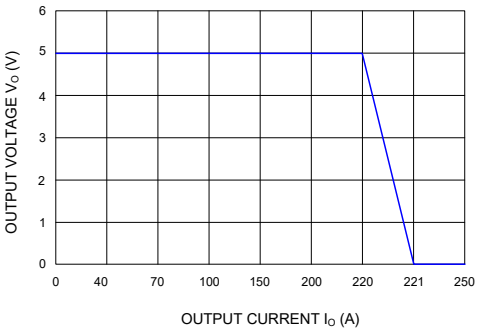


Fig.8 Current Cut-off Grid Voltage



SOT-89 PACKAGE OUTLINE **Unit：mm**