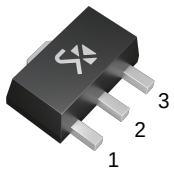
78L05A THRU 78L15A

3-Terminal Positive Voltage Regulator

FEATURE

- Maximum output current of 200mA
- Output voltage of 5V/6V/8V/9V/10V/12V/15V
- 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	Units
Input voltage	V_{IN}	30	V
Output Current	I_{OUT}	200	mA
Junction Temperature	T_J	+125	℃
Operating Temperature	T_{OPR}	-40~+120	℃
Storage Temperature Range	T_{STG}	-40~+150	℃

78L05A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 10 V, IO = 80 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≤V_I≤20V,I_O=1mA~80mA	4.75		5.25	V
		I_O=1mA~140mA	4.75		5.25	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, I_O=1mA~200mA		15	60	mV
		Tj=25°C, I_O=1mA~80mA		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
	ΔIq	1mA≤V_I≤80mA			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

78L06A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 12 V, IO = 80 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	Unit
Output Voltage	V_O	Tj=25°C	5.75	6.0	6.25	V
		8V≤V_I≤21V,I_O=1mA~80mA	5.7		6.3	V
		I_O=1mA~140mA	5.7		6.3	V (Note 1)
Load Regulation	ΔVo	Tj=25°C,I_O=1mA~200mA		18	60	mV
		Tj=25°C,I_O=1mA~80mA		12	30	mV
Line regulation	ΔVo	8.5V≤V_I≤20V,Tj=25°C		12	150	mV
		9V≤V_I≤20V,Tj=25°C		6	100	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	9V≤V_I≤20V			1.5	mA
	ΔIq	1mA≤V_I≤80mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz, Tj=25°C		50		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.75		mV/°C
Ripple Rejection	RR	9V≤V_I≤20V,f=120Hz,Tj=25°C	38	46		dB
Dropout Voltage	Vd			1.7		V

78L08A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 14 V, IO = 80 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~80mA	7.6		8.4	V
		I_O=1mA~140mA	7.6		8.4	V (Note1)
Load Regulation	ΔVo	Tj=25°C, I_O=1mA~200mA		24	80	mV
		Tj=25°C, I_O=1mA~80mA		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
	ΔIq	1mA≤V_I≤80mA			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

78L09A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 15 V, IO = 80 mA, C1 = 0.33 μF, C2 = 0.1 μF)

Characteristic	Symbol	Test conditions	MIN	TYP	MAX	Unit
Output Voltage	Vo	Tj=25°C	8.64	9.0	9.36	V
		11V≤VI≤24V,IO=1mA~80mA	8.55		9.45	V
		IO=1mA~140mA	8.55		9.45	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, IO=1mA~200mA		27	80	mV
		Tj=25°C, IO=1mA~80mA		18	40	mV
Line regulation	ΔVo	11.5V≤VI≤23V,Tj=25°C		18	225	mV
		12V≤VI≤23V,Tj=25°C		9	150	mV
Quiescent Current	Iq	Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	12V≤VI≤23V			1.5	mA
	ΔIq	1mA≤VI≤80mA			0.1	mA
Output Noise Voltage	VN	10Hz≤f≤100kHz, Tj=25°C		70		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		0.85		mV/°C
Ripple Rejection	RR	12V≤VI≤23V,f=120Hz,Tj=25°C	36	44		dB
Dropout Voltage	Vd			1.7		V

78L10A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 16 V, IO = 80 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~80mA	9.5		10.5	V
		IO=1mA~140mA	9.5		10.5	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, IO=1mA~200mA		30	90	mV
		Tj=25°C, IO=1mA~80mA		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
	ΔIq	1mA≤VI≤80mA			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

78L12A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 19 V, IO = 80 mA, C1 = 0.33 μF, C2 = 0.1 μF)

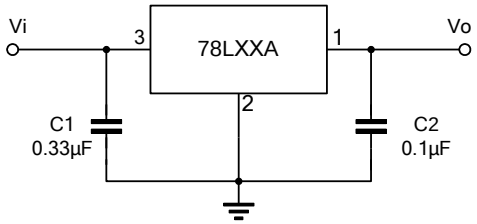
Characteristic	Symbol	Test conditions	MIN	TYP	MAX	Unit
Output Voltage	Vo	Tj=25°C	11.5	12	12.6	V
		14V≤VI≤27V,IO=1mA~80mA	11.4		12.6	V
		IO=1mA~140mA	11.4		12.6	V (Note 1)
Load Regulation	ΔVo	Tj=25°C, IO=1mA~200mA		36	100	mV
		Tj=25°C, IO=1mA~80mA		24	50	mV
Line regulation	ΔVo	14.5V≤VI≤27V,Tj=25°C		24	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
	ΔIq	1mA≤VI≤80mA			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

78L15A Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 21 V, IO = 80 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~80mA	14.25		15.75	V
		IO=1mA~140mA	14.25		15.75	V (Note 1)
Load Regulation	ΔVo	Tj=25°C,IO=1mA~200mA		45	150	mV
		Tj=25°C,IO=1mA~80mA		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
	ΔIq	1mA≤VI≤80mA			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

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 78L33A Output Voltage vs Ambient Temperature

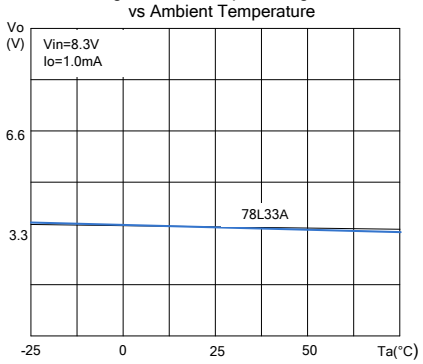


Fig.2 78L33A Quiescent Current vs Output Current

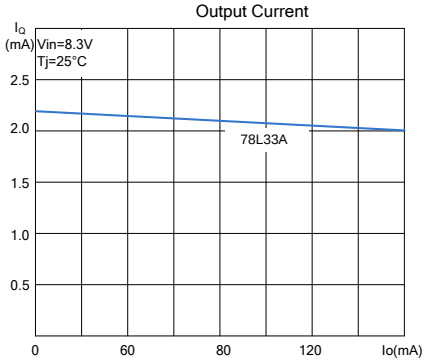


Fig.3 78L33A Quiescent Current vs Input

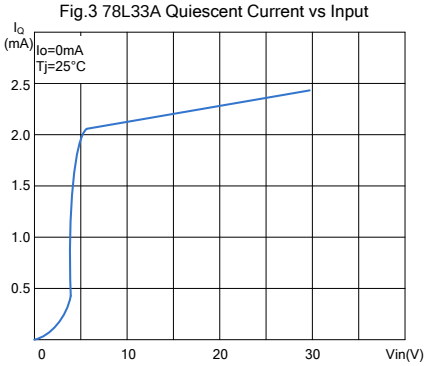


Fig.4 78L33A Thermal Shutdown

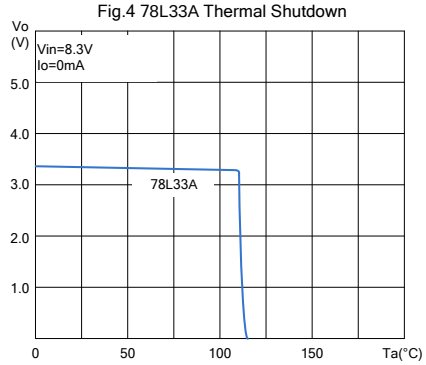


Fig.5 78L33A Output Characteristics

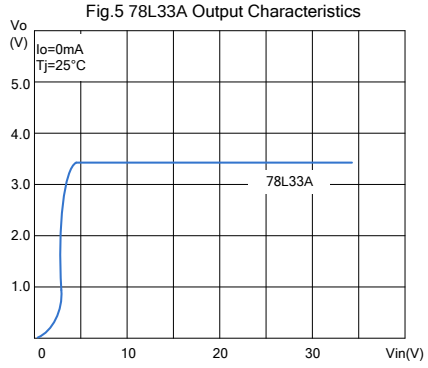
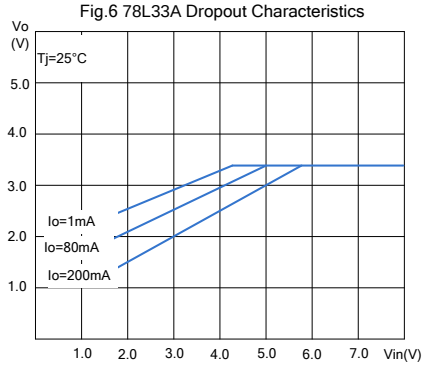


Fig.6 78L33A Dropout Characteristics



SOT-89 PACKAGE OUTLINE **Unit：mm**