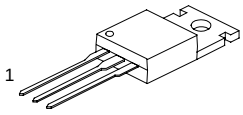
3 TERMINAL 1A POSITIVE VOLTAGE REGULATORS



TO-220

1:INPUT; 2:GND; 3:OUTPUT

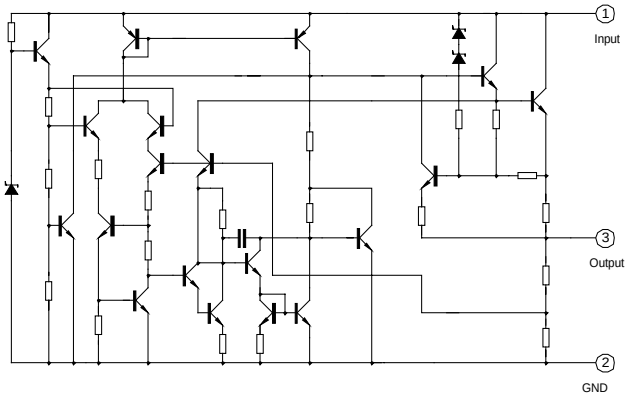
DESCRIPTION

The UTC78XX series o three-terminal positive regulators are available in TO-220 package and with several fixed output voltage, making them useful in a wide range of application. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided ,they can deliver over 1A output current, Although designed as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

FEATURES

*Output current up to 1A
*5V;6V;8V;9V;10V;12V;15V;18V;24V output voltage available
*Thermal overload protection
*Short circuit protection
*Output transistor SOA protection

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

Characteristic	Symbol	Value	Unit
Input voltage (for Vo=5V to 18V) (forVo=24V)	Vi	 35 40	 V V
Thermal resistance junction-air	$R_{\theta JA}$	65	°C/W
Thermal resistance junction-cases	$R_{\theta JC}$	5	°C/W
Operating Temperature	Topr	0~ +125	°C
Storage Temperature	Tstg	-65 ~ +150	°C

UTC7805 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=10V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	4.8	5.0	5.2	V
		5.0mA<Io<1.0A,Po<15W Vi=7V to 20V	4.75	5.00	5.25	V
Line regulation	ΔVo	Tj=25°C,Vi=7V to 25V		4.0	100	mV
		Tj=25°C,Vi=8V to 12V		1.6	50	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		9	100	mV
		Tj=25°C,Io=250mA to 750mA		4	50	mV
Quiescent current	I_Q	Tj=25°C		5.0	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A		0.03	0.5	mA
		Vi=7V to 25V		0.3	1.3	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-0.8		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		42		μV
Ripple rejection	RR	f=120Hz, Vi=8V to 18V	62	73		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		15		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		230		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7806 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=11V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	5.75	6.00	6.25	V
		5.0mA<Io<1.0A,Po<15W Vi=8V to 21V	5.7	6.0	6.3	V
Line regulation	ΔVo	Tj=25°C,Vi=8V to 25V		5	120	mV
		Tj=25°C,Vi=9V to 13V		1.5	60	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		9	130	mV
		Tj=25°C,Io=250mA to 750mA		3	60	mV
Quiescent current	I_Q	Tj=25°C		5.0	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=8V to 25V			1.3	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-0.8		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		45		μV
Ripple rejection	RR	f=120Hz, Vi=9V to 19V	59	75		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		19		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		250		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7808 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=14V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	7.7	8.0	8.3	V
		5.0mA<Io<1.0A,Po<15W Vi=10.5V to 23V	7.6	8.0	8.4	V
Line regulation	ΔVo	Tj=25°C,Vi=10.5V to 25V		5.0	160	mV
		Tj=25°C,Vi=11.5V to 17V		2.0	80	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		10	160	mV
		Tj=25°C,Io=250mA to 750mA		5.0	80	mV
Quiescent current	I_Q	Tj=25°C		5.0	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A		0.05	0.5	mA
		Vi=11.5V to 25V		0.5	1.0	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-0.8		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		52		μV
Ripple rejection	RR	f=120Hz, Vi=11.5V to 21.5V	56	73		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		17		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		230		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7809 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=15V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	8.65	9.00	9.35	V
		5.0mA<Io<1.0A,Po<15W Vi=11.5V to 24V	8.6	9.0	9.4	V
Line regulation	ΔVo	Tj=25°C,Vi=11.5V to 25V		6	180	mV
		Tj=25°C,Vi=12V to 25V		2	90	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		12	180	mV
		Tj=25°C,Io=250mA to 750mA		4	90	mV
Quiescent current	I_Q	Tj=25°C		5.0	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=11.5V to 26V			1.3	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-1		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		58		μV
Ripple rejection	RR	f=120Hz, Vi=13V to 23V	56	71		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		15		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		250		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7810 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=16V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	9.6	10	10.4	V
		5.0mA<Io<1.0A,Po<15W Vi=12.5V to 25V	9.5	10	10.5	V
Line regulation	ΔVo	Tj=25°C,Vi=12.5V to 25V		10	200	mV
		Tj=25°C,Vi=13V to 20V		3	100	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		12	200	mV
		Tj=25°C,Io=250mA to 750mA		4	100	mV
Quiescent current	I_Q	Tj=25°C		5.0	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=12.5V to 29V			1.0	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-1		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		58		μV
Ripple rejection	RR	f=120Hz, Vi=14V to 24V	56	71		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		17		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		250		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7812 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=16V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	11.5	12.0	12.5	V
		5.0mA<Io<1.0A,Po<15W Vi=14.5V to 27V	11.4	12	12.6	V
Line regulation	ΔVo	Tj=25°C,Vi=14.5V to 30V		10	240	mV
		Tj=25°C,Vi=16V to 22V		3	120	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		11	240	mV
		Tj=25°C,Io=250mA to 750mA		5.0	120	mV
Quiescent current	I_Q	Tj=25°C		5.1	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=14.5V to 30V			1.0	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-1		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		76		μV
Ripple rejection	RR	f=120Hz, Vi=15V to 25V	55	71		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		18		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		230		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7815 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=23V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	14.4	15.0	15.6	V
		5.0mA<Io<1.0A,Po<15W Vi=17.5V to 30V	14.25	15	15.75	V
Line regulation	ΔVo	Tj=25°C,Vi=17.5V to 30V		11	300	mV
		Tj=25°C,Vi=20V to 26V		3	150	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		12	300	mV
		Tj=25°C,Io=250mA to 750mA		4	150	mV
Quiescent current	I_Q	Tj=25°C		5.2	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=17.5V to 305V			1.0	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-1		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		90		μV
Ripple rejection	RR	f=120Hz, Vi=18.5V to 28.5V	54	70		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		19		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		250		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7818 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=23V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	17.3	18.0	18.7	V
		5.0mA<Io<1.0A,Po<15W Vi=21V to 33V	17.1	18	18.9	V
Line regulation	ΔVo	Tj=25°C,Vi=21V to 33V		15	360	mV
		Tj=25°C,Vi=24V to 30V		5	180	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		15	360	mV
		Tj=25°C,Io=250mA to 750mA		5.0	180	mV
Quiescent current	I_Q	Tj=25°C		5.2	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=21V to 32V			1.0	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-1		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		110		μV
Ripple rejection	RR	f=120Hz, Vi=22V to 32V	53	69		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		22		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		250		mA
peak current	Ipk	Tj=25°C		2.2		A

UTC7824 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,0<Tj<125°C,Io=500mA,Vi=33V,Ci=0.33μF, Co=0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	23	24	25	V
		5.0mA<Io<1.0A,Po<15W Vi=27V to 38V	22.8	24	25.2	V
Line regulation	ΔVo	Tj=25°C,Vi=27V to 38V		17	480	mV
		Tj=25°C,Vi=30V to 36V		6	240	mV
Load regulation	ΔVo	Tj=25°C,Io=5.0mA to 1.5A		15	480	mV
		Tj=25°C,Io=250mA to 750mA		5.0	240	mV
Quiescent current	I_Q	Tj=25°C		5.2	8	mA
Quiescent current change	ΔI_Q	Io=5mA to 1.0A			0.5	mA
		Vi=27V to 38V			1.0	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		-1.5		mV/°C
Output noise voltage	V_N	f=10Hz to 100kHz,Ta=25°C		160		μV
Ripple rejection	RR	f=120Hz, Vi=28V to 38V	50	67		dB
Dropout voltage	Vo	Io=1.0A,Tj=25°C		2		V
Output resistance	Ro	f=1kHz		28		mΩ
Short circuit current	Isc	Vi=35V,Ta=25°C		230		mA
peak current	Ipk	Tj=25°C		2.2		A

TEST CIRCUITS

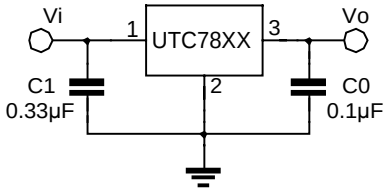


FIG.1 DC PARAMETERS

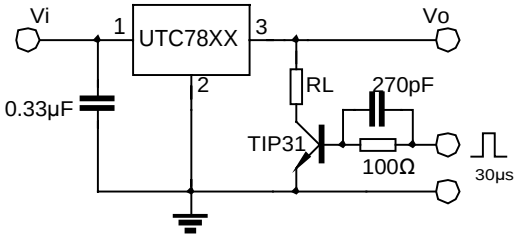


FIG.2 LOAD REGULATION

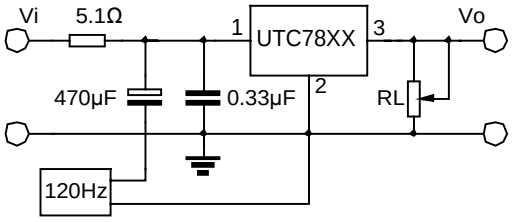


FIG.3 RIPPLE REJECTION

APPLICATION CIRCUITS

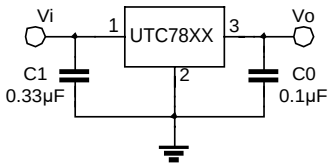


Fig.4 Fixed output regulator

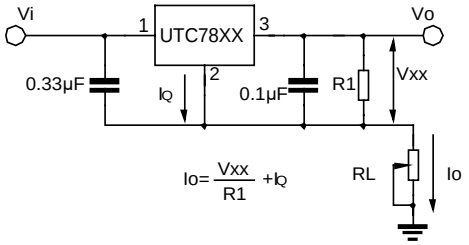


Fig.5 Constant current regulator

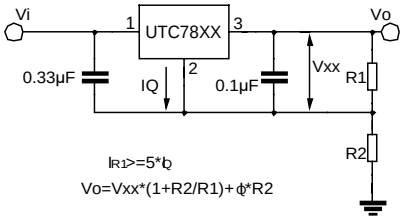


Fig.6 Circuit for increasing Regulator output voltage

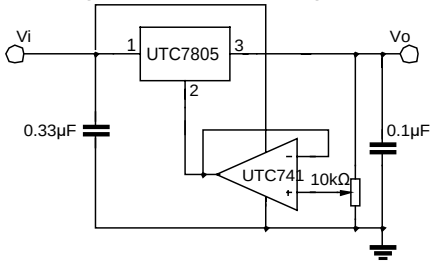


Fig.7 Adjustable output

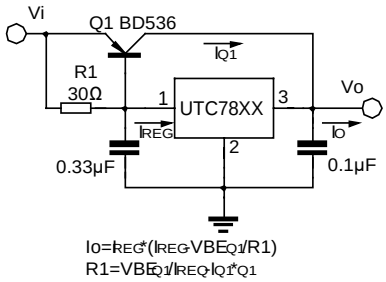


Fig.8 High current with voltage regulator

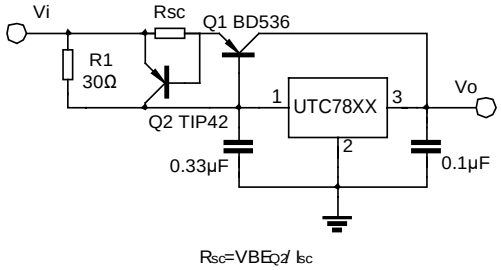


Fig.9 High output curent short circuit protection

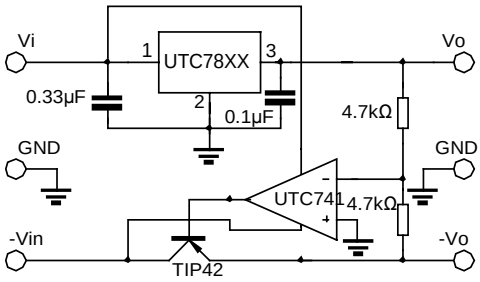


Fig.10 Tracking voltage regulator

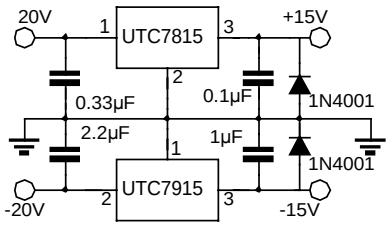


Fig.11 Split power supply(±15V,1A)

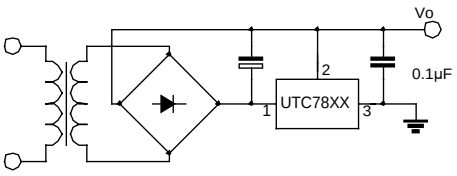


Fig.12 Negative output voltage ciruit

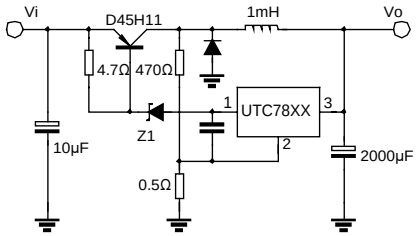


Fig.13 switching regulator

TYPICAL PERFORMANCE CHARACTERISTICS

Fig.14 Quiescent current

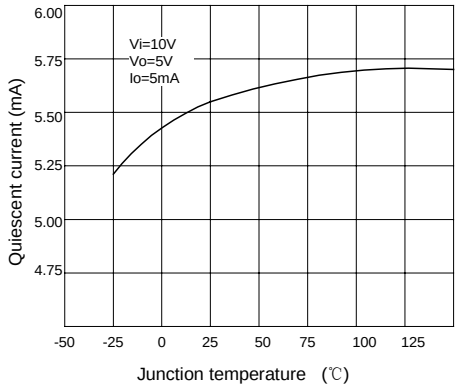


Fig.15 Output voltage

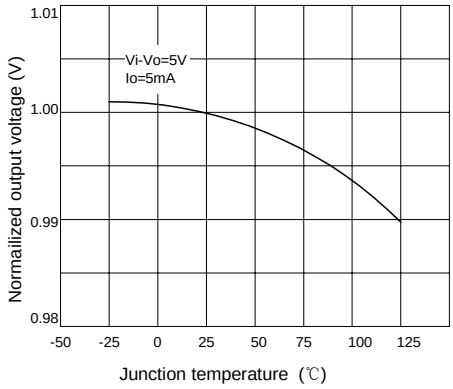


Fig.16 Peak output current

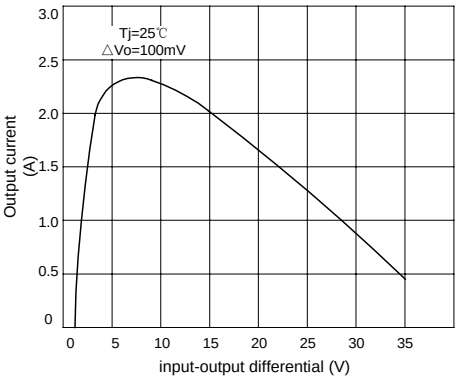


Fig.17 Quiescent current