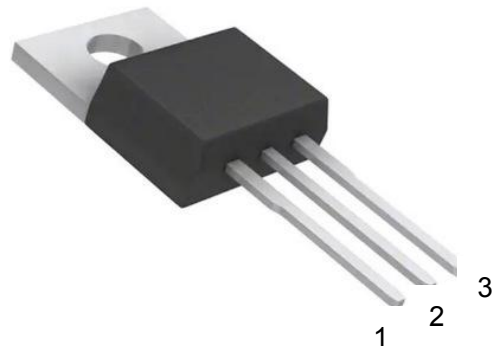


## DESCRIPTION

The WD78XX series of three-terminal positive regulators are available in TO-220 packages. 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 1.0A output current. Although designed as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

## TO-220



1:INPUT    2:GND    3:OUTPUT

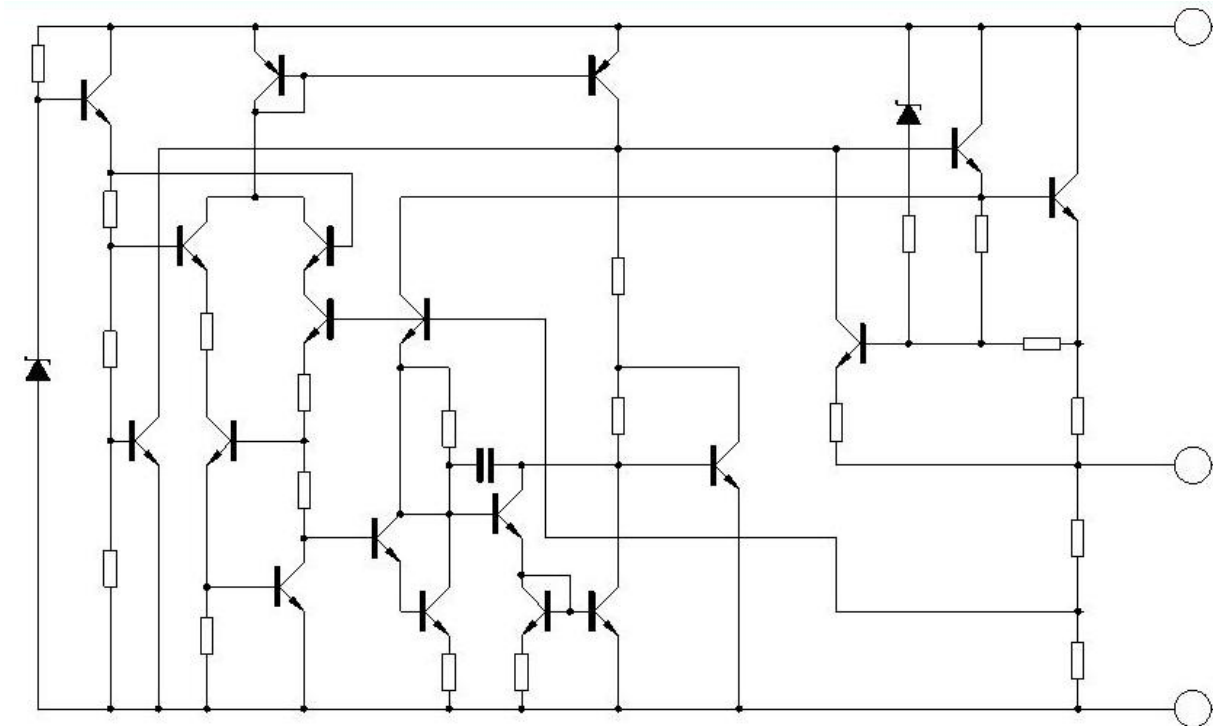
## FEATURES

- Output current up to 1.0A
- Thermal overload protection
- Short circuit protection
- Output transistor SOA protection

## ORDERING INFORMATION

Device	Marking	PARAMETERS
WD7805	WD7805 *****	Vin(max)=35V, Vout=5V, 1A, TO-220
WD7806	WD7806 *****	Vin(max)=35V, Vout=6V, 1A, TO-220
WD7808	WD7808*****	Vin(max)=35V, Vout=8V, 1A, TO-220
WD7809	WD7809 *****	Vin(max)=35V, Vout=9V, 1A, TO-220
WD7810	WD7810*****	Vin(max)=35V, Vout=10V, 1A, TO-220
WD7812	WD7812 *****	Vin(max)=35V, Vout=12V, 1A, TO-220
WD7815	WD7815 *****	Vin(max)=35V, Vout=15V, 1A, TO-220

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Input voltage	V <sub>i</sub>	35	V
Thermal resistance junction-air	R <sub>θJA</sub>	65	°C/W
Thermal resistance junction-cases	R <sub>θJC</sub>	5	°C/W
Operating Temperature	T <sub>opr</sub>	-20~+125	°C
Storage Temperature	T <sub>stg</sub>	-65~+150	°C

## ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C unless otherwise noted)

**(一) WD7805** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 10\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	$T_j = 25^\circ\text{C}$	4.80	5.00	5.20	V
		$5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$ , $V_i = 8\text{V}$ to $20\text{V}$	4.75	5.00	5.25	V
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $V_i = 7.5\text{V}$ to $20\text{V}$		4	100	mV
		$T_j = 25^\circ\text{C}$ , $V_i = 8\text{V}$ to $12\text{V}$		2	50	mV
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.0\text{A}$		9	100	mV
		$T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$		4	50	mV
Quiescent current	$I_q$	$T_j = 25^\circ\text{C}$		4.2	8	mA
Quiescent current change	$\Delta I_q$	$I_o = 5\text{mA}$ to $1.0\text{A}$		0.03	0.5	mA
		$V_i = 8\text{V}$ to $25\text{V}$ , $I_o = 500\text{mA}$		0.3	0.8	mA
Output voltage drift	$\Delta V_o / \Delta T$	$I_o = 5\text{mA}$		0.8		mV/ $^\circ\text{C}$
Output noise voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$		42		$\mu\text{V}/V_o$
Ripple rejection	RR	$F = 120\text{Hz}$ , $V_i = 8\text{V}$ to $18\text{V}$	62	73		dB
Dropout voltage	$V_o$	$I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$		2		V
Output resistance	$R_o$	$f = 1\text{KHz}$		15		$\text{m}\Omega$
Short circuit current	Isc	$V_i = 35\text{V}$ , $T_a = 25^\circ\text{C}$		200		mA

**(二) WD7806** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 11\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	$T_j = 25^\circ\text{C}$	5.75	6.0	6.25	V
		$5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$ , $V_i = 9\text{V}$ to $21\text{V}$	5.65	6	6.25	V
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $V_i = 8.5\text{V}$ to $25\text{V}$			120	mV
		$T_j = 25^\circ\text{C}$ , $V_i = 9\text{V}$ to $13\text{V}$			60	mV
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.0\text{A}$			120	mV
		$T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$			60	mV
Quiescent current	$I_q$	$T_j = 25^\circ\text{C}$		4.3	8	mA
Quiescent current change	$\Delta I_q$	$I_o = 5\text{mA}$ to $1.0\text{A}$			0.5	mA
		$V_i = 9\text{V}$ to $25\text{V}$ , $I_o = 500\text{mA}$			0.8	mA
Output voltage drift	$\Delta V_o / \Delta T$	$I_o = 5\text{mA}$		0.8		mV/ $^\circ\text{C}$
Output noise voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$		42		$\mu\text{V}/V_o$
Ripple rejection	RR	$F = 120\text{Hz}$ , $V_i = 9\text{V}$ to $19\text{V}$		68		dB
Dropout voltage	$V_o$	$I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$		2		V
Output resistance	$R_o$	$f = 1\text{KHz}$		17		$\text{m}\Omega$
Short circuit current	Isc	$V_i = 35\text{V}$ , $T_a = 25^\circ\text{C}$		200		mA

**(三) WD7808** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 14\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	$V_o$	$T_j = 25^\circ\text{C}$	7.84	8	8.16	V
		$5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$ , $V_i = 11.5\text{V}$ to $23\text{V}$	7.7	8	8.3	V
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $V_i = 10.5\text{V}$ to $25\text{V}$			160	mV
		$T_j = 25^\circ\text{C}$ , $V_i = 11\text{V}$ to $17\text{V}$			80	mV
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.0\text{A}$			160	mV
		$T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$			80	mV
Quiescent current	$I_Q$	$T_j = 25^\circ\text{C}$		4.3	8	mA
Quiescent current change	$\Delta I_Q$	$I_o = 5\text{mA}$ to $1.0\text{A}$			0.5	mA
		$V_i = 11.5\text{V}$ to $25\text{V}$ , $I_o = 500\text{mA}$			0.8	mA
Output voltage drift	$\Delta V_o / \Delta T$	$I_o = 5\text{mA}$		1.0		mV/ $^\circ\text{C}$
Output noise voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$		42		$\mu\text{V}/V_o$
Ripple rejection	RR	$F = 120\text{Hz}$ , $V_i = 11.5\text{V}$ to $21.5\text{V}$		62		dB
Dropout voltage	$V_o$	$I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$		2		V
Output resistance	$R_o$	$f = 1\text{KHz}$		18		$\text{m}\Omega$
Short circuit current	Isc	$V_i = 35\text{V}$ , $T_a = 25^\circ\text{C}$		200		mA

**(四) WD7809** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 15\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	$V_o$	$T_j = 25^\circ\text{C}$	8.82	9	9.18	V
		$5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$ , $V_i = 12.5\text{V}$ to $24\text{V}$	8.65	9	9.35	V
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $V_i = 11.5\text{V}$ to $26\text{V}$			180	mV
		$T_j = 25^\circ\text{C}$ , $V_i = 12\text{V}$ to $18\text{V}$			90	mV
Line regulation	$\Delta V_o$	$T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.0\text{A}$			180	mV
		$T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$			90	mV
Quiescent current	$I_Q$	$T_j = 25^\circ\text{C}$		4.3	8	mA
Quiescent current change	$\Delta I_Q$	$I_o = 5\text{mA}$ to $1.0\text{A}$			0.5	mA
		$V_i = 12.5\text{V}$ to $25\text{V}$ , $I_o = 500\text{mA}$			0.8	mA
Output voltage drift	$\Delta V_o / \Delta T$	$I_o = 5\text{mA}$		1.2		mV/ $^\circ\text{C}$
Output noise voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$		42		$\mu\text{V}/V_o$
Ripple rejection	RR	$F = 120\text{Hz}$ , $V_i = 12.5\text{V}$ to $22.5\text{V}$		61		dB
Dropout voltage	$V_o$	$I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$		2		V
Output resistance	$R_o$	$f = 1\text{KHz}$		18		$\text{m}\Omega$
Short circuit current	Isc	$V_i = 35\text{V}$ , $T_a = 25^\circ\text{C}$		200		mA

**(五) WD7810** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 16\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	9.7	10	10.3	V
		5.0mA<Io<1.0A, Po<15W, Vi=13.5V to 25V	9.6	10	10.4	V
Line regulation	ΔVo	Tj=25°C, Vi=12.5V to 28V		8	200	mV
		Tj=25°C, Vi=14V to 20V		4	100	mV
Line regulation	ΔVo	Tj=25°C, Io=5.0mA to 1.0A		18	200	mV
		Tj=25°C, Io=250mA to 750mA		8	100	mV
Quiescent current	Iq	Tj=25°C		4.3	8	mA
Quiescent current change	ΔIq	Io=5mA to 1.0A			0.5	mA
		Vi=13V to 28V, Io=500mA			0.8	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		1.3		mV/°C
Output noise voltage	VN	f=10Hz to 100kHz, Ta=25°C		42		uV/Vo
Ripple rejection	RR	F=120Hz, Vi=13V to 23V		61		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		200		mA

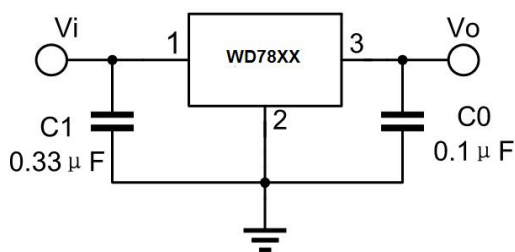
**(六) WD7812** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 19\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	11.5	12	12.5	V
		5.0mA<Io<1.0A, Po<15W, Vi=15.5V to 27V	11.4	12	12.6	V
Line regulation	ΔVo	Tj=25°C, Vi=14.5V to 30V			240	mV
		Tj=25°C, Vi=16V to 22V			120	mV
Line regulation	ΔVo	Tj=25°C, Io=5.0mA to 1.0A			240	mV
		Tj=25°C, Io=250mA to 750mA			120	mV
Quiescent current	Iq	Tj=25°C		4.4	8	mA
Quiescent current change	ΔIq	Io=5mA to 1.0A			0.5	mA
		Vi=15V to 30V, Io=500mA			0.8	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		1.5		mV/°C
Output noise voltage	VN	f=10Hz to 100kHz, Ta=25°C		42		uV/Vo
Ripple rejection	RR	F=120Hz, Vi=15V to 25V		60		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		200		mA

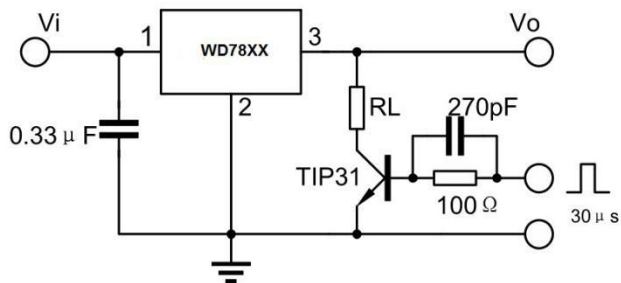
(七) **WD7815** (Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = 21\text{V}$ ,  $C_i = 0.33\mu\text{F}$ ,  $C_o = 0.1\mu\text{F}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Units
Output voltage	Vo	Tj=25°C	14.4	15	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		15	300	mV
		Tj=25°C, Vi=20V to 26V		7	150	mV
Line regulation	ΔVo	Tj=25°C, Io=5.0mA to 1.0A		25	300	mV
		Tj=25°C, Io=250mA to 750mA		10	150	mV
Quiescent current	Iq	Tj=25°C		5	8	mA
Quiescent current change	ΔIq	Io=5mA to 1.0A			0.5	mA
		Vi=18V to 30V, Io=500mA			0.8	mA
Output voltage drift	ΔVo/ΔT	Io=5mA		1.8		mV/°C
Output noise voltage	VN	f=10Hz to 100kHz, Ta=25°C		42		uV/Vo
Ripple rejection	RR	F=120Hz, Vi=18V to 28V		60		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		200		mA

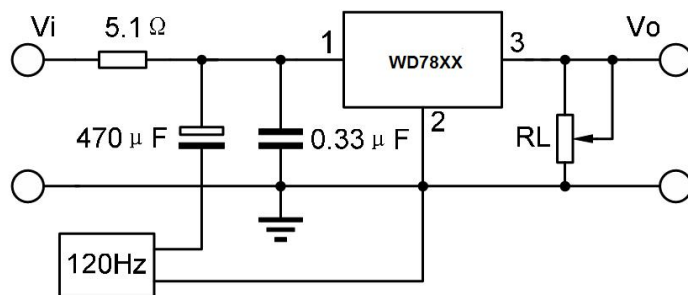
**TEST CIRCUITS**



**FIG1:DC PARAMETERS**

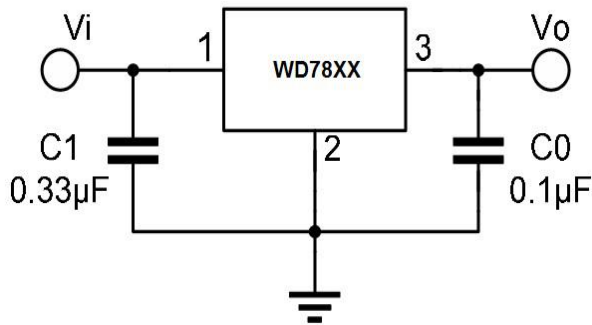


**FIG2:LOAD REGULATION**

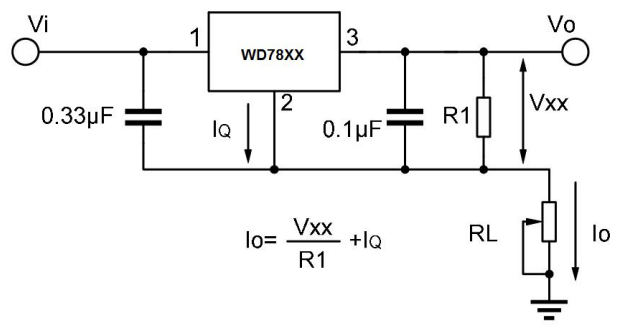


**FIG3:RIPPLE REJECTION**

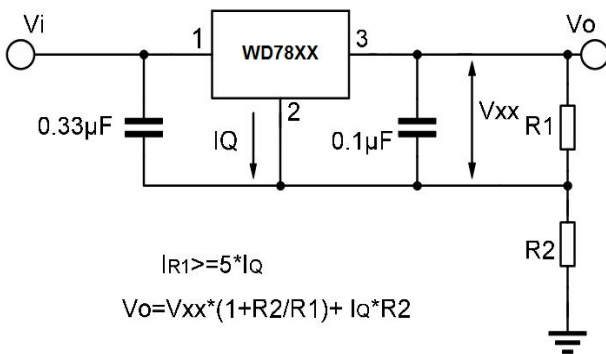
## APPLICATION CIRCUIT



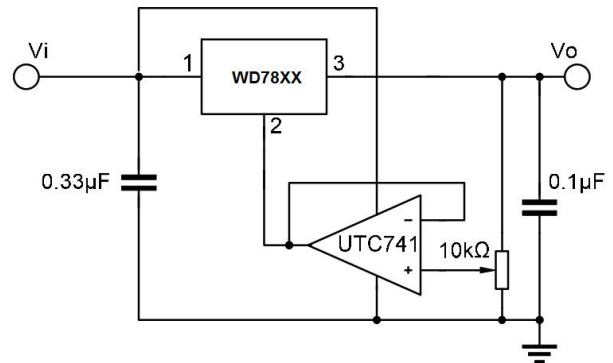
**FIG4:**Fixed out regulator



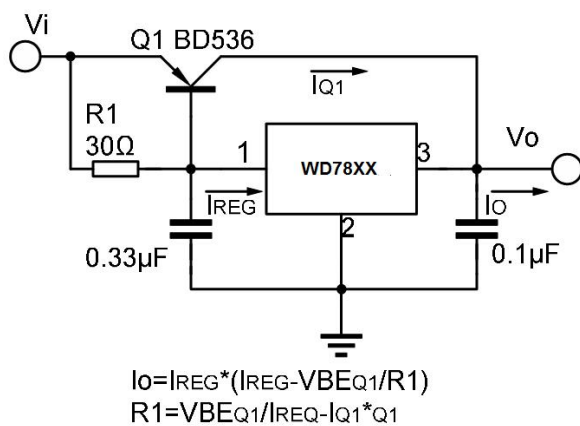
**FIG5:**Constant current regulator



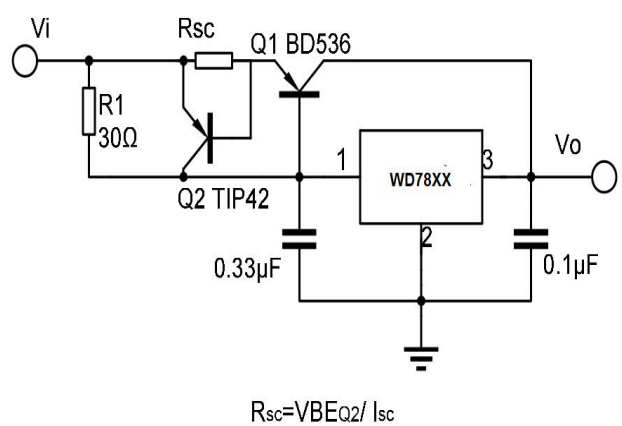
**FIG6:** For increasing Regulator output voltage



**FIG7:**Adjustable output

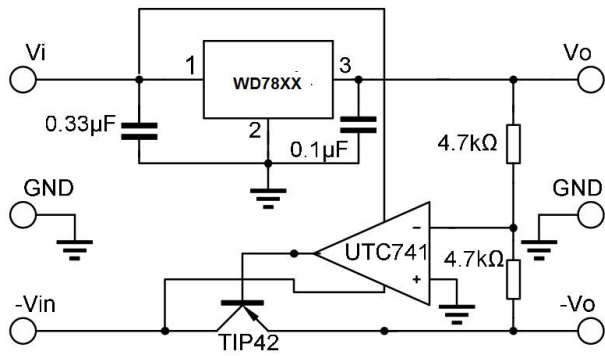


**FIG8:**Higt current with voltage regulator

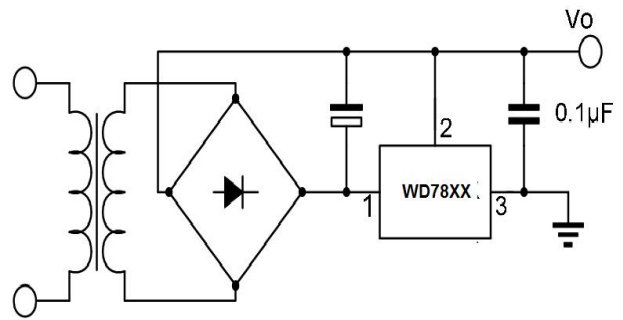


**FIG9:**High output current short ciucuit protection

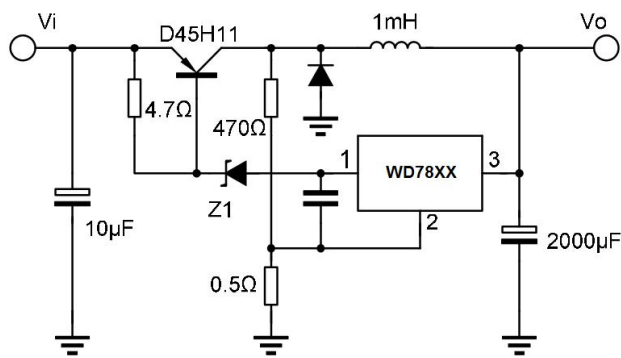




**FIG10:**Tracking voltage regulator



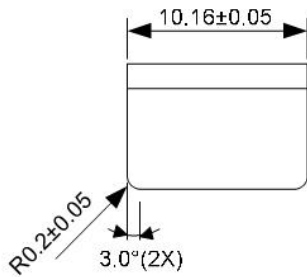
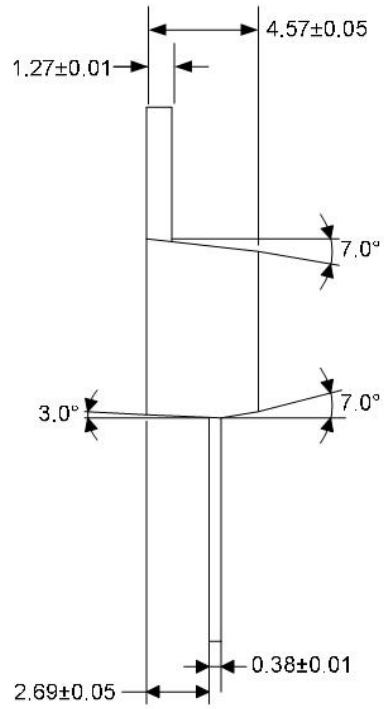
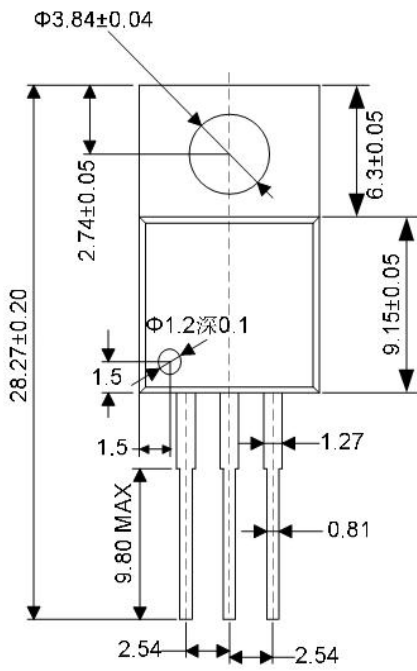
**FIG11:**Negative output voltage circuit



**FIG12:**Switching regulator

**PACKAGE DIMENSIONS**

**TO-220**



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[HT7550S](#) [AMS1117-3.3](#) [HT7150S](#) [78L12](#) [HT7550](#) [HT7533-1](#) [HXY6206I-2.5](#) [HT7133](#) [HT7533S](#) [662K](#)