



## LM79XX

## LINEAR INTEGRATED CIRCUIT

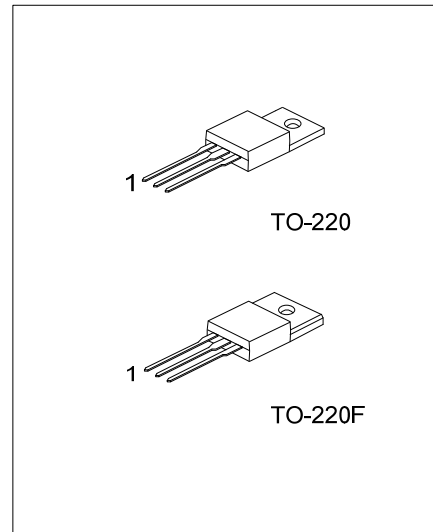
### 3 TERMINAL 1A NEGATIVE VOLTAGE REGULATOR

#### DESCRIPTION

The UTC **LM79XX** series of three-terminal negative regulators is available 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.

#### FEATURES

- \* Output Current Up to 1A
- \* -5V, -6V, -8V, -9V, -12V, -15V, -18V, -24V Output Voltage Available
- \* Thermal Overload Protection



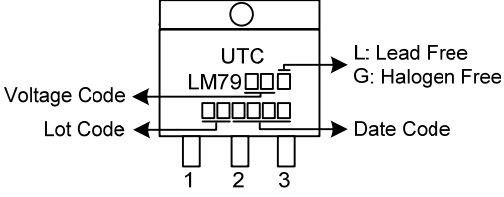
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
LM79xxL-TA3-T	LM79xxG-TA3-T	TO-220	G	I	O	Tube
LM79xxL-TF3-T	LM79xxG-TF3-T	TO-220F	G	I	O	Tube

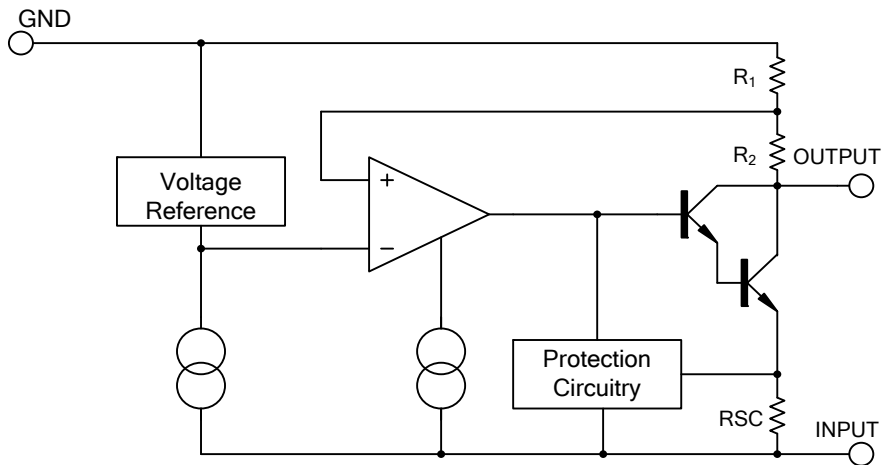
Note: Pin Assignment: O: Output G: GND I: Input

<p>LM79xxL-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package (4)Output Voltage Code</p>	<p>(1) T: Tube (2) TA3: TO-220, TF3: TO-220F (3) L: Lead Free, G: Halogen Free and Lead Free (4) xx: refer to Marking Information</p>
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### MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
TO-220 TO-220F	05: -5.0V 06: -6.0V 07: -7.0V 08: -8.0V 09: -9.0V 12: -12V 15: -15V 18: -18V 24: -24V	 <p>UTC LM79□□□□ Voltage Code Lot Code 1 2 3 L: Lead Free G: Halogen Free Date Code</p>

### BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATING	UNIT
Input Voltage	$V_{IN}$	-35	V
Output Current	$I_{OUT}$	1	A
Power Dissipation	$P_D$	Internally Limited	W
Operating Temperature	$T_{OPR}$	-40 ~ +85	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$\theta_{JA}$	65	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	5	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS

( $I_{OUT}=0.5\text{A}$ ,  $T_J=0^\circ\text{C}\sim 125^\circ\text{C}$ ,  $C_1=2.2\mu\text{F}$ ,  $C_0=1\mu\text{F}$ , unless otherwise specified)

For UTC LM7905 ( $V_{IN}=-10\text{V}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^\circ\text{C}$	-4.80	-5.0	-5.20	V
		$V_{IN}=-7\text{V}\sim -20\text{V}$ $I_{OUT}=5\text{mA}\sim 1\text{A}$ , $P_D \leq 15\text{W}$	-4.75		-5.25	V
Dropout Voltage	$V_D$	$I_{OUT}=1\text{A}$ , $T_J=25^\circ\text{C}$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-7\text{V}\sim -25\text{V}$ , $T_J=25^\circ\text{C}$		10	100	mV
		$V_{IN}=-8\text{V}\sim -12\text{V}$ , $T_J=25^\circ\text{C}$		5	60	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5\text{mA}\sim 1\text{A}$ , $T_J=25^\circ\text{C}$		10	100	mV
		$I_{OUT}=250\text{mA}\sim 750\text{mA}$ , $T_J=25^\circ\text{C}$		3	50	mV
Quiescent Current	$I_Q$	$T_J=25^\circ\text{C}$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5\text{mA}\sim 1\text{A}$		0.05	0.5	mA
		$V_{IN}=-7\text{V}\sim -25\text{V}$		0.1	1.3	mA
Output Noise Voltage	eN	$f=10\text{Hz}\sim 100\text{kHz}$ , $T_A=25^\circ\text{C}$		100		$\mu\text{V}$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5\text{mA}$		-0.4		$\text{mV}/^\circ\text{C}$
Ripple Rejection	RR	$V_{IN}=-8\text{V}\sim -18\text{V}$ , $f=120\text{Hz}$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^\circ\text{C}$		2.2		A

### ■ ELECTRICAL CHARACTERISTICS(Cont.)

#### For UTC LM7906 ( $V_{IN}=-11V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-5.76	-6.00	-6.24	V
		$V_{IN}=-8V\sim-21V$ , $I_{OUT}=5mA\sim 1A$ , $P_D \leq 15W$	-5.70		-6.30	V
Dropout Voltage	$V_D$	$I_{OUT}=1.0A$ , $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-8V\sim-25V$ , $T_J=25^{\circ}C$		10	120	mV
		$V_{IN}=-9V\sim-13V$ , $T_J=25^{\circ}C$		5	60	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ , $T_J=25^{\circ}C$		10	120	mV
		$I_{OUT}=250mA\sim 750mA$ , $T_J=25^{\circ}C$		3	60	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-8V\sim-25V$		0.1	1.3	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ , $T_A=25^{\circ}C$		130		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.5		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-9V\sim-19V$ , $f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

#### For UTC LM7907 ( $V_{IN}=-13V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-6.72	-7.00	-7.28	V
		$V_{IN}=-9.5V\sim-22V$ , $I_{OUT}=5mA\sim 1A$ , $P_D \leq 15W$	-6.65		-7.35	V
Dropout Voltage	$V_D$	$I_{OUT}=1.0A$ , $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-9.5V\sim-25V$ , $T_J=25^{\circ}C$		10	110	mV
		$V_{IN}=-10.5V\sim-15V$ , $T_J=25^{\circ}C$		5	70	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ , $T_J=25^{\circ}C$		10	140	mV
		$I_{OUT}=250mA\sim 750mA$ , $T_J=25^{\circ}C$		3	70	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-10.5V\sim-25V$		0.1	1.3	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ , $T_A=25^{\circ}C$		130		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.5		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-10.5V\sim-21.5V$ , $f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

### ■ ELECTRICAL CHARACTERISTICS(Cont.)

#### For UTC LM7908 ( $V_{IN}=-14V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-7.68	-8.0	-8.32	V
		$V_{IN}=-10.5V\sim-23V$ , $I_{OUT}=5mA\sim 1A$ , $P_D \leq 15W$	-7.60		-8.40	V
Dropout Voltage	$V_D$	$I_{OUT}=1A$ , $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-10.5V\sim-25V$ , $T_J=25^{\circ}C$		10	160	mV
		$V_{IN}=-11.5V\sim-17V$ , $T_J=25^{\circ}C$		5	80	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ , $T_J=25^{\circ}C$		12	160	mV
		$I_{OUT}=250mA\sim 750mA$ , $T_J=25^{\circ}C$		4	80	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-11.5V\sim-25V$		0.1	1.0	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ , $T_A=25^{\circ}C$		175		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.6		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-11.5V\sim-21.5V$ , $f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

#### For UTC LM7909 ( $V_{IN}=-15V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-8.64	-9.0	-9.36	V
		$V_{IN}=-11.5V\sim-23V$ , $I_{OUT}=5mA\sim 1A$ , $P_D \leq 15W$	-8.55		-9.45	V
Dropout Voltage	$V_D$	$I_{OUT}=1A$ , $T_J=25^{\circ}C$		2.0		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-11.5V\sim-26V$ , $T_J=25^{\circ}C$		10	180	mV
		$V_{IN}=-12V\sim-18V$ , $T_J=25^{\circ}C$		5	90	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ , $T_J=25^{\circ}C$		12	180	mV
		$I_{OUT}=250mA\sim 750mA$ , $T_J=25^{\circ}C$		4	90	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-11.5V\sim-26V$		0.1	1.0	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ , $T_A=25^{\circ}C$		175		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.6		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-12.5V\sim-22.5V$ , $f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

### ■ ELECTRICAL CHARACTERISTICS(Cont.)

#### For UTC LM7912 ( $V_{IN}=-18V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-11.52	-12.0	-12.48	V
		$V_{IN}=-14.5V\sim-27V$ , $I_{OUT}=5mA\sim 1A$ , $P_D \leq 15W$	-11.40		-12.60	V
Dropout Voltage	$V_D$	$I_{OUT}=1A$ , $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-14.5V\sim-30V$ , $T_J=25^{\circ}C$		12	240	mV
		$V_{IN}=-16V\sim-22V$ , $T_J=25^{\circ}C$		6	120	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ , $T_J=25^{\circ}C$		12	240	mV
		$I_{OUT}=250mA\sim 750mA$ , $T_J=25^{\circ}C$		4	120	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-14.5V\sim-30V$		0.1	1.0	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ , $T_A=25^{\circ}C$		200		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.8		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-15V\sim-25V$ , $f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

#### For UTC LM7915 ( $V_{IN}=-23V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-14.40	-15.0	-15.60	V
		$V_{IN}=-17.5V\sim-30V$ , $I_{OUT}=5mA\sim 1A$ , $P_D \leq 15W$	-14.25		-15.75	V
Dropout Voltage	$V_D$	$I_{OUT}=1A$ , $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-17.5V\sim-30V$ , $T_J=25^{\circ}C$		12	300	mV
		$V_{IN}=-20V\sim-26V$ , $T_J=25^{\circ}C$		6	150	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ , $T_J=25^{\circ}C$		12	300	mV
		$I_{OUT}=250mA\sim 750mA$ , $T_J=25^{\circ}C$		4	150	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-17.5V\sim-30.5V$		0.1	1.0	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ , $T_A=25^{\circ}C$		250		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.9		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-18.5V\sim-28.5V$ , $f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

### ■ ELECTRICAL CHARACTERISTICS(Cont.)

#### For UTC LM7918 ( $V_{IN}=-27V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-17.28	-18.0	-18.72	V
		$V_{IN}=-21V\sim-33V$ $I_{OUT}=5mA\sim 1A, P_D \leq 15W$	-17.10		-18.90	V
Dropout Voltage	$V_D$	$I_{OUT}=1A$ $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-21V\sim-33V$ $T_J=25^{\circ}C$		15	360	mV
		$V_{IN}=-24V\sim-30V$ $T_J=25^{\circ}C$		8	180	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ $T_J=25^{\circ}C$		15	360	mV
		$I_{OUT}=250mA\sim 750mA$ $T_J=25^{\circ}C$		5.0	180	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-21V\sim-32V$		0.1	1.0	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ $T_A=25^{\circ}C$		300		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-22V\sim-32V, f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

#### For UTC LM7924 ( $V_{IN}=-33V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	-23.04	-24	-24.96	V
		$V_{IN}=-27V\sim-38V$ $I_{OUT}=5mA\sim 1A, P_D \leq 15W$	-22.80		-25.20	V
Dropout Voltage	$V_D$	$I_{OUT}=1.0A$ $T_J=25^{\circ}C$		2		V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-27V\sim-38V$ $T_J=25^{\circ}C$		15	480	mV
		$V_{IN}=-30V\sim-36V$ $T_J=25^{\circ}C$		8	240	mV
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1A$ $T_J=25^{\circ}C$		15	480	mV
		$I_{OUT}=250mA\sim 750mA$ $T_J=25^{\circ}C$		5.0	240	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_{OUT}=5mA\sim 1A$		0.05	0.5	mA
		$V_{IN}=-27V\sim-38V$		0.1	1.0	mA
Output Noise Voltage	eN	$f=10Hz\sim 100kHz$ $T_A=25^{\circ}C$		400		$\mu V$
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1		$mV/^{\circ}C$
Ripple Rejection	RR	$V_{IN}=-28V\sim-38V, f=120Hz$	54	60		dB
Peak Current	$I_{PEAK}$	$T_J=25^{\circ}C$		2.2		A

## ■ APPLICATION CIRCUITS

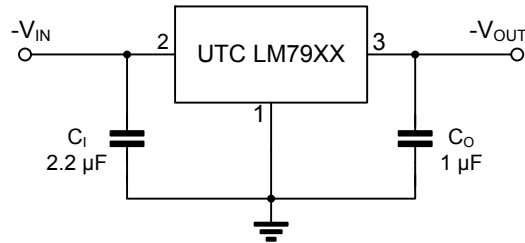


Fig.1 Fixed output regulator

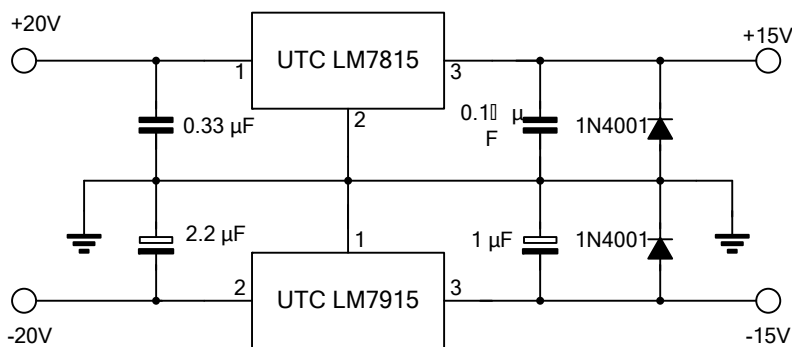


Fig.2 Split power supply(+15V,1A)

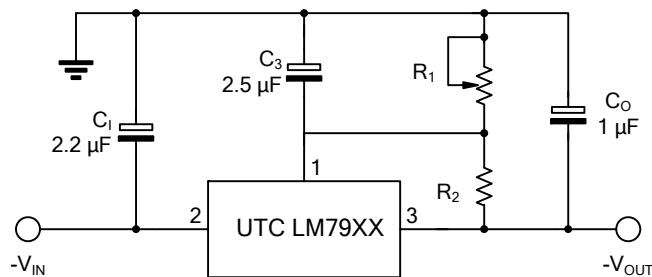


Fig.3 Circuit for increasing output voltage

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