



LM79XX

LINEAR INTEGRATED CIRCUIT

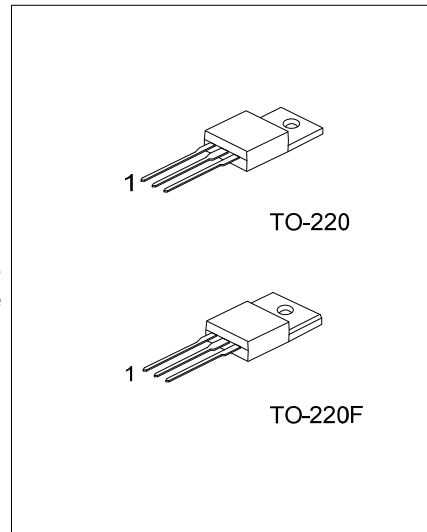
3 TERMINAL 1A NEGATIVE VOLTAGE REGULATOR

■ 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
- * Short Circuit Protection



■ ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free	Halogen Free		1	2	3	
LM79xx-TA3-T	LM79xxL-TA3-T	LM79xxG-TA3-T	TO-220	G	I	O	Tube
LM79xx-TF3-T	LM79xxL-TF3-T	LM79xxG-TF3-T	TO-220F	G	I	O	Tube

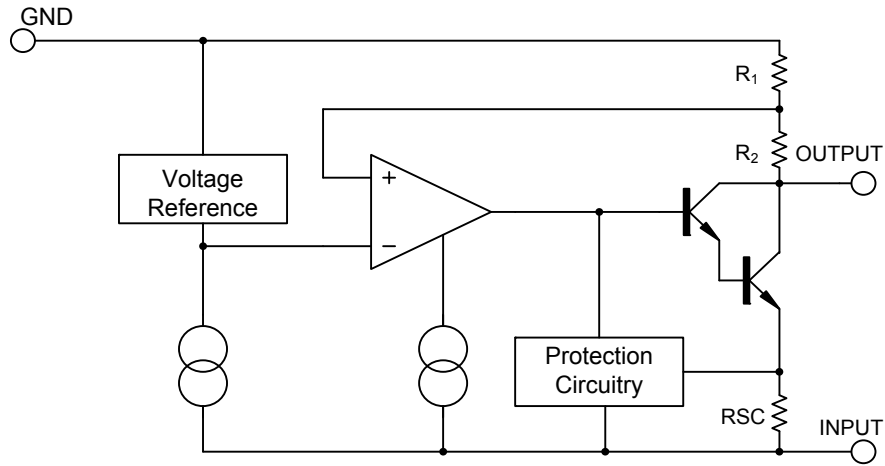
Note: O: Output G: GND I: Input

<p>LM79xxL-TA3-T</p>	<p>(1) Packing Type (2) Package Type (3) Lead Plating (4) Output Voltage Code</p>	<p>(1) T: Tube (2) TA3: TO-220, TF3: TO-220F (3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn (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 08: -8.0V 09: -9.0V 12: -12V 15: -15V 18: -18V 24: -24V	<p>Voltage Code ← Lot Code ←</p> <p>UTC LM79 □□ □ □□□□□</p> <p>→ L: Lead Free → G: Halogen Free → Date Code</p> <p>1 2 3</p>

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_a=25°C)

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	°C
Storage Temperature	T _{STG}	-65 ~ +150	°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	θ _{JA}	65	°C /W
Junction to Case	θ _{JC}	5	°C /W

■ ELECTRICAL CHARACTERISTICS

(I_{OUT}=0.5A, T_J=0°C~125°C, C_I=2.2uF, C_O=1uF, unless otherwise specified)

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _{OUT}	T _J =25°C	-4.80	-5.0	-5.20	V
		V _{IN} =-7V~-20V I _{OUT} =5mA~1A, P _D ≤ 15W	-4.75		-5.25	V
Dropout Voltage	V _D	I _{OUT} =1A T _J =25°C		2		V
Line Regulation	ΔV _{OUT}	V _{IN} =-7V~-25V T _J =25°C		10	100	mV
		V _{IN} =-8V~-12V T _J =25°C				mV
Load Regulation	ΔV _{OUT}	I _{OUT} =5mA~1A T _J =25°C		10	100	mV
		I _{OUT} =250mA~750mA T _J =25°C		3	50	mV
Quiescent Current	I _Q	T _J =25°C		3	6	mA
Quiescent Current Change	ΔI _Q	I _{OUT} =5mA~1A		0.05	0.5	mA
		V _{IN} =-7V~-25V		0.1	1.3	mA
Output Noise Voltage	eN	f=10Hz~100kHz T _a =25°C		100		μV
Output Voltage Drift	ΔV _{OUT} /ΔT	I _{OUT} =5mA		-0.4		mV/°C
Ripple Rejection	RR	V _{IN} =-8V~-18V, f=120Hz	54	60		dB
Peak Current	I _{PEAK}	T _J =25°C		2.2		A
Short Circuit Current	I _{SC}	V _{IN} =-35V T _a =25°C		300		mA

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _{OUT}	T _J =25°C	-5.76	-6.00	-6.24	V
		V _{IN} =-8V~-21V, I _{OUT} =5mA~1A, P _D ≤ 15W	-5.70		-6.30	V
Dropout Voltage	V _D	I _{OUT} =1.0A T _J =25°C		2		V
Line Regulation	ΔV _{OUT}	V _{IN} =-8V~-25V T _J =25°C		10	120	mV
		V _{IN} =-9V~-13V T _J =25°C		5	60	mV
Load Regulation	ΔV _{OUT}	I _{OUT} =5mA~1A T _J =25°C		10	120	mV
		I _{OUT} =250mA~750mA T _J =25°C		3	60	mV
Quiescent Current	I _Q	T _J =25°C		3	6	mA
Quiescent Current Change	ΔI _Q	I _{OUT} =5mA~1A		0.05	0.5	mA
		V _{IN} =-8V~-25V		0.1	1.3	mA
Output Noise Voltage	eN	f=10Hz~100kHz T _a =25°C		130		μV

LM79XX

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■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.5		mV/°C
Ripple Rejection	RR	$V_{IN}=-9V\sim-19V$, $f=120Hz$	54	60		dB
Peak Current	I_{PEAK}			2.2		A
Short Circuit Current	I_{SC}	$V_{IN}=-35V$		300		mA

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	ΔV_{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	ΔV_{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	ΔI_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		μV
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.6		mV/°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
Short Circuit Current	I_{SC}	$V_{IN}=-35V$, $T_a=25^\circ C$		300		mA

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	ΔV_{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	ΔV_{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	ΔI_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		μV
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.6		mV/°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
Short Circuit Current	I_{SC}	$V_{IN}=-35V$, $T_a=25^\circ C$		300		mA

■ 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	ΔV_{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	ΔV_{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	ΔI_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		μV
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
Short Circuit Current	I_{SC}	$V_{IN}=-35V$, $T_a=25^{\circ}C$		300		mA

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	ΔV_{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	ΔV_{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	ΔI_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		μV
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
Short Circuit Current	I_{SC}	$V_{IN}=-35V$, $T_a=25^{\circ}C$		300		mA

■ 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	ΔV_{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	ΔV_{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	ΔI_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		μV
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
Short Circuit Current	I_{SC}	$V_{IN}=-35V$ $T_a=25^{\circ}C$		300		mA

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	ΔV_{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	ΔV_{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	ΔI_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		μV
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
Short Circuit Current	I_{SC}	$V_{IN}=-35V$ $T_a=25^{\circ}C$		300		mA

■ APPLICATION CIRCUITS

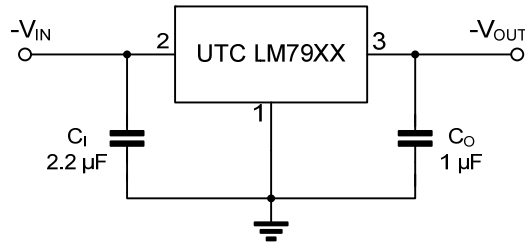


Fig.1 Fixed output regulator

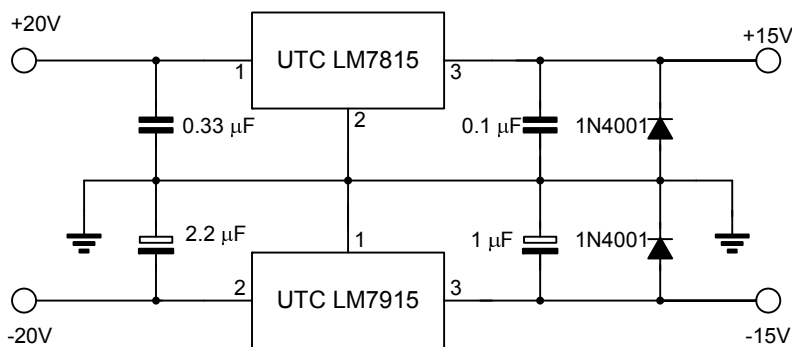


Fig.2 Split power supply(+15V,1A)

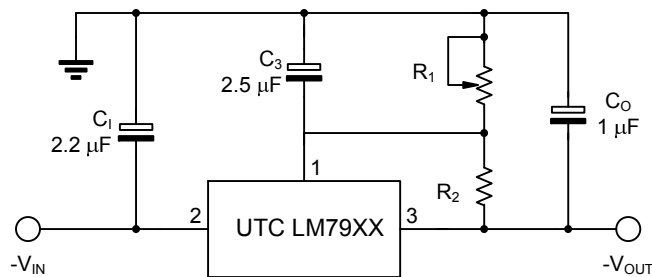


Fig.3 Circuit for increasing output voltage

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