



## 78RXXX

## LINEAR INTEGRATED CIRCUIT

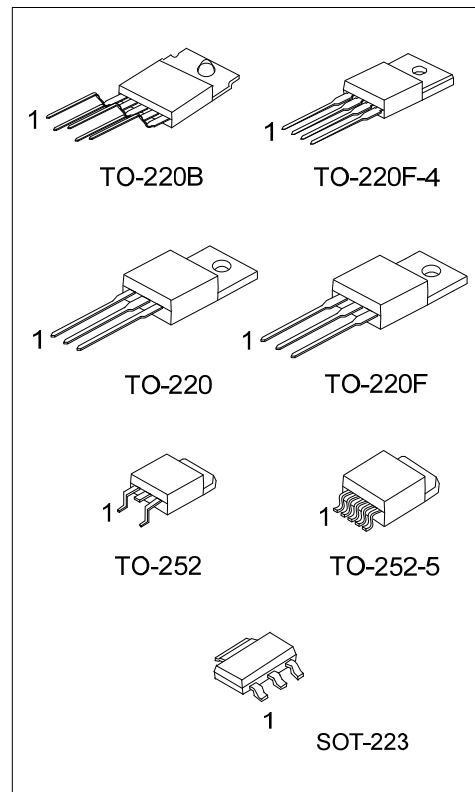
### LOW DROPOUT VOLTAGE REGULATOR

#### DESCRIPTION

As the UTC linear integrated LDO, the UTC **78RXXX** shows a high current, high accuracy, and specially low-dropout voltage. The features are: maximum 500mV dropout voltage, very low ground current. Cause the series have been designed for high current loads, so they are also used in lower current, extremely low dropout-critical systems (in which their tiny dropout voltage and ground current values are important attributes).

#### FEATURES

- \*  $I_{OUT}=1A$  ;  $V_{OUT}=1.5V, 1.8V, 3.3V, 5V, 6V, 9V, 10V, 12V, 15V$  (Typ.)  
With ADJ version
- \* Built in ON/OFF Control Terminal
- \* Built in Over Current Protection, Over Heat Protection Function



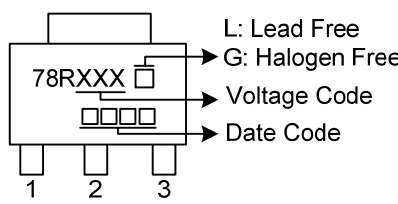
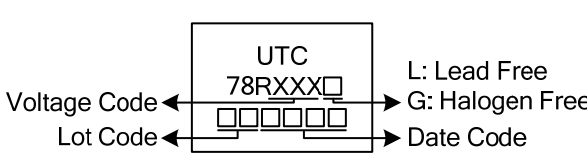
#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
78RXXXL-AA3-R	78RXXXG-AA3-R	SOT-223	Tape Reel
78RXXXL-TA3-T	78RXXXG-TA3-T	TO-220	Tube
78RXXXL-TB5-T	78RXXXG-TB5-T	TO-220B	Tube
78RXXXL-TF3-T	78RXXXG-TF3-T	TO-220F	Tube
78RXXXL-TF4-T	78RXXXG-TF4-T	TO-220F-4	Tube
78RXXXL-TN3-R	78RXXXG-TN3-R	TO-252	Tape Reel
78RXXXL-TN5-R	78RXXXG-TN5-R	TO-252-5	Tape Reel

Note: xxx: output voltage, refer to Marking Information

<p>78RXXXG-AA3-R</p>	<p>(1) T: Tube, R: Tape Reel  (2) AA3: SOT-223, TA3: TO-220, TB5: TO-220B  TF3: TO-220F, TF4: TO-220F-4, TN3: TO-252,  TN5: TO-252-5  (3) G: Halogen Free and Lead Free, L: Lead Free  (4) xx: refer to Marking Information</p>
----------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### MARKING INFORMATION

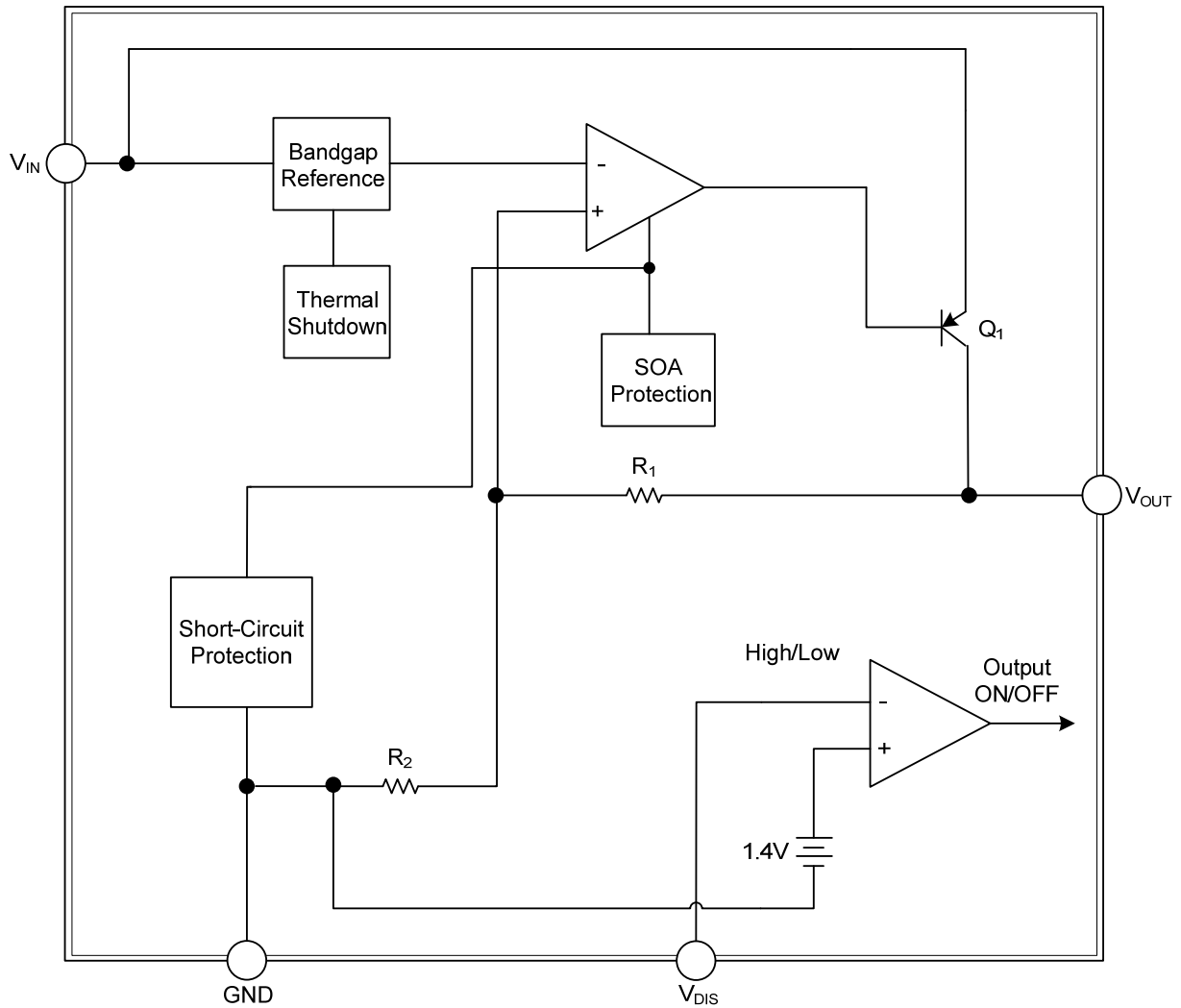
PACKAGE	VOLTAGE CODE	MARKING
SOT-223	1P5:1.5V 1P8:1.8V 3P3:3.3V 05:5.0V 06:6.0V 09:9.0V	 <p>L: Lead Free G: Halogen Free Voltage Code Date Code</p>
TO-220 TO-220F TO-220F-4 TO-252 TO-252-5	10: 10V 12:12V 15: 15V	
TO-220B	1P5:1.5V 1P8:1.8V 3P3:3.3V 05:5.0V 06:6.0V 09:9.0V 10: 10V 12:12V AD:ADJ	 <p>L: Lead Free G: Halogen Free Voltage Code Lot Code Date Code</p>

### PIN DESCRIPTIONS

PIN NO.				PIN NAME	PIN FUNCTION
TO-220F-4	TO-220B	SOT-223 TO-220 TO-220F TO-252	TO-252-5		
1	1	1	1	$V_{IN}$	Input voltage pin
2	2	3	3	$V_{OUT}$	Output voltage pin
3	3	2	5	GND	GND
4	4	-	2	$V_{DIS}$	Disable signal input pin
-	5	-	-	ADJ	Adjustable input pin
-	-	-	4	NC	No Connect

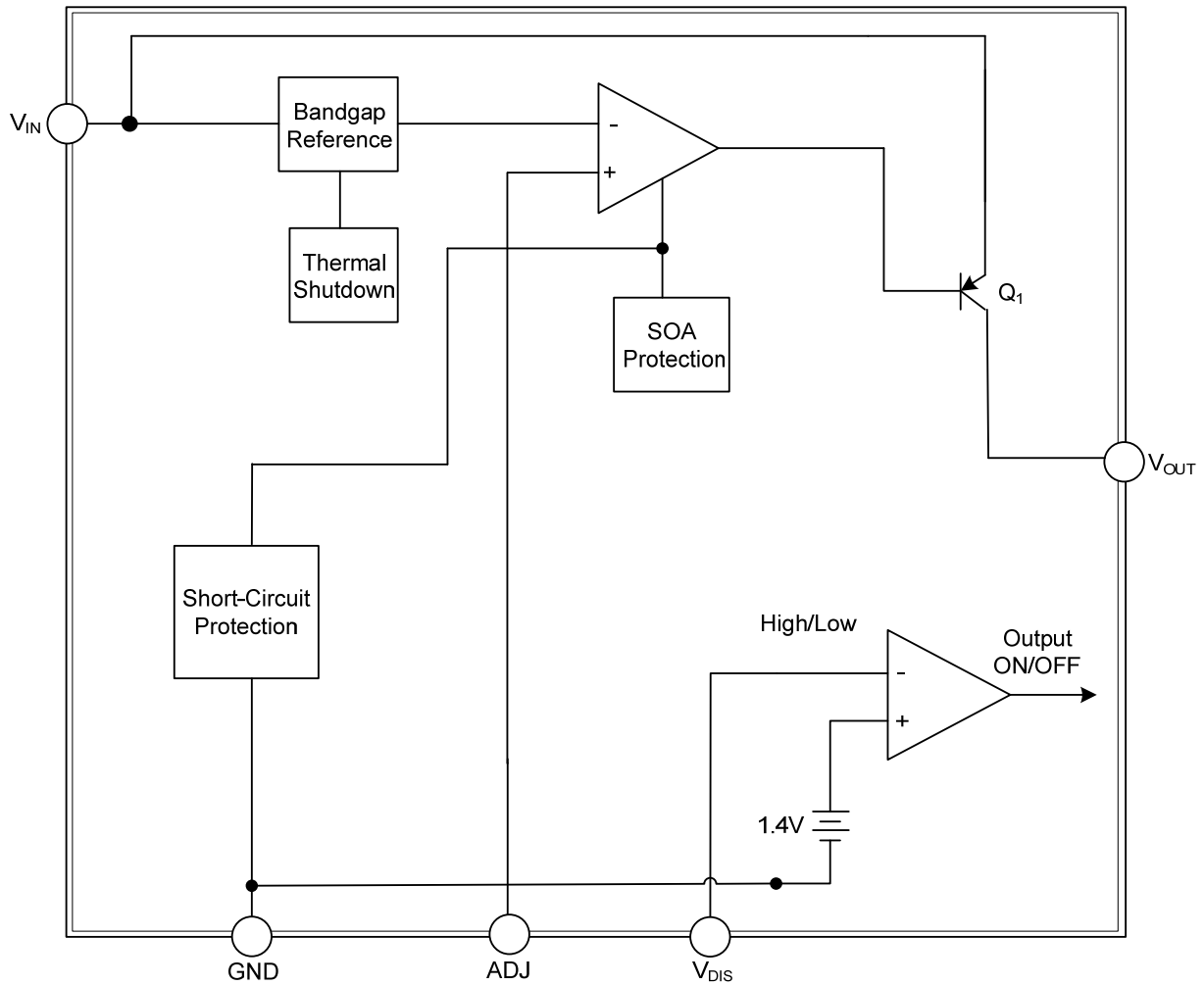
## ■ BLOCK DIAGRAM

### Fixed Output Voltage Versions



## ■ BLOCK DIAGRAM

### Adjustable Output Voltage Version



■ ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified.)

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		$V_{IN}$	35	V
Disable Voltage		$V_{DIS}$	35	V
Output Current		$I_{OUT}$	1.0	A
Power Dissipation	SOT-223	$P_D$	0.67	W
	TO-220/TO-220B		1.2	W
	TO-220F/TO-220F-4			
	TO-252/TO-252-5		0.8	W
Junction Temperature		$T_J$	+150	°C
Operating Temperature		$T_{OPR}$	-40 ~ +125	°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	SOT-223	$\theta_{JA}$	150	°C/W
	TO-220/TO-220B		83	°C/W
	TO-220F/TO-220F-4			
	TO-252/TO-252-5		125	°C/W
Junction to Case	SOT-223	$\theta_{JC}$	15	°C/W
	TO-220/TO-220B		5	°C/W
	TO-220F			
	TO-220F-4		8	°C/W
	TO-252/TO-252-5		12	°C/W

■ ELECTRICAL CHARACTERISTICS ( $I_{OUT}=0.5A$ ,  $T_A = 25^\circ C$ , unless otherwise specified)

For 78R1P5 ( $V_{IN}=4.5V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN}=4.5V$	1.45	1.5	1.55	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$		2.7	3.0	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$4.5V < V_{IN} < 8.5V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

For 78R1P8 ( $V_{IN}=4.8V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN}=4.8V$	1.75	1.8	1.85	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$		2.4	2.7	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$4.5V < V_{IN} < 9V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78R3P3 ( $V_{IN}=5V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 5V$	3.22	3.3	3.38	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$			1.0	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$4.5V < V_{IN} < 10V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

For 78R05 ( $V_{IN}=7V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 7V$	4.88	5	5.12	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$		0.6	0.7	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$6V < V_{IN} < 12V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

For 78R06 ( $V_{IN}=8V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 8V$	5.85	6	6.15	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$		0.6	0.7	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$7V < V_{IN} < 13V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

For 78R09 ( $V_{IN}=11V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 11V$	8.78	9	9.22	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$			0.5	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$10V < V_{IN} < 25V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78R10 ( $V_{IN}=12V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 12V$	9.75	10	10.25	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$			0.5	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$11V < V_{IN} < 26V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		Db
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

For 78R12 ( $V_{IN}=15V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 15V$	11.70	12	12.30	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$			0.5	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$13 V < V_{IN} < 29V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		Db
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

For 78R15 ( $V_{IN}=20V$ )

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = 20V$	14.70	15	15.30	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$			0.5	V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$16V < V_{IN} < 30V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

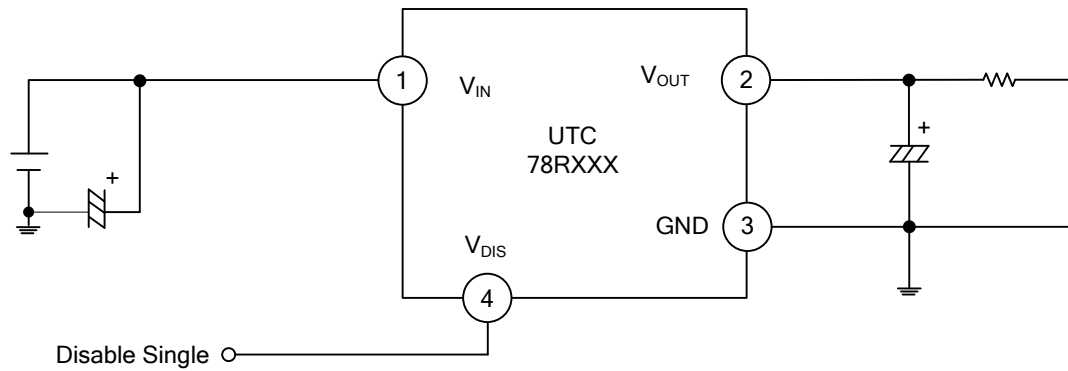
For 78RXXX-ADJ

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$		1.22	1.25	1.28	V
Dropout Voltage		$V_D$	$I_{OUT} = 1A$		3.5		V
Load Regulation		$\Delta V_{OUT}$	$5mA < I_{OUT} < 1A$		0.1	2.0	%
Line Regulation		$\Delta V_{OUT}$	$V_O+1V < V_{IN} < V_O+7V$		0.5	2.5	%
Quiescent Current		$I_Q$	$I_{OUT} = 0 A$			10	mA
Ripple Rejection		RR	(Note)	45	55		dB
Disable Voltage	High	$V_{DISH}$	Output Active	2.0			V
	Low	$V_{DISL}$	Output Disabled			0.8	V
Disable Bias Current	High	$I_{DISH}$	$V_{DIS} = 2.7V$			0.02	mA
	Low	$I_{DISL}$	$V_{DIS} = 0.4V$			0.4	mA

Note: These guaranteed parameters, are not 100% tested in production.

## ■ TYPICAL APPLICATION CIRCUIT

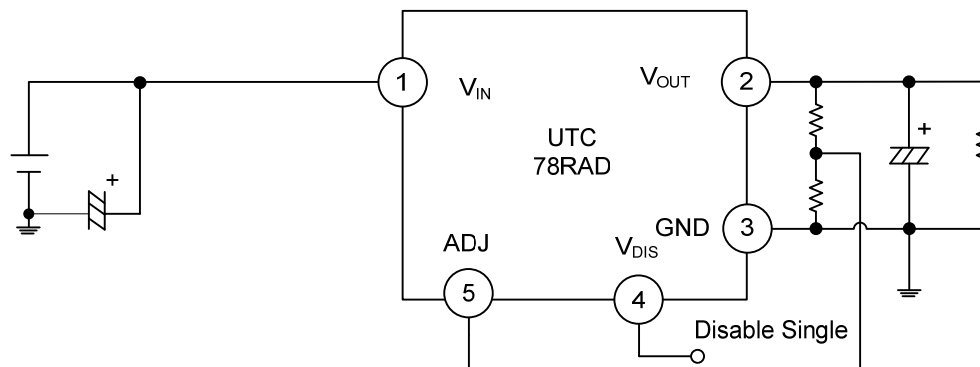
### Fixed Output Voltage Versions



\*  $C_i$  is required if regulator is located an appreciable distance from power supply filter. [ $C_i > 0.33\mu\text{F}$  (Electrolytic)]

\*  $C_o$  improves stability and transient response. [ $C_o > 47\mu\text{F}$ (Electrolytic)]

### Adjustable Output Voltage Version

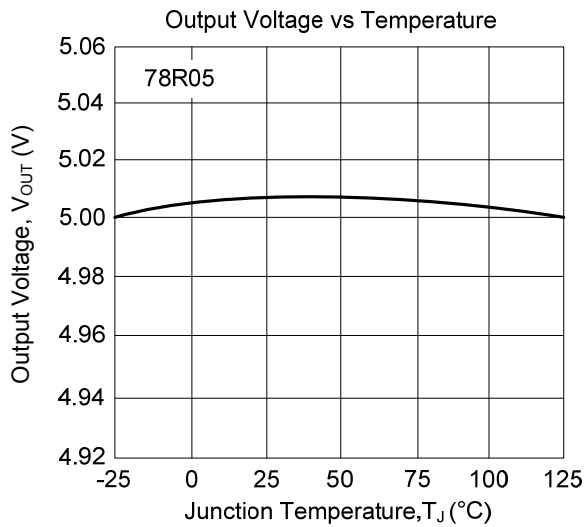


\*  $C_i$  is required if regulator is located an appreciable distance from power supply filter. [ $C_i > 0.33\mu\text{F}$  (Electrolytic)]

\*  $C_o$  improves stability and transient response. [ $C_o > 47\mu\text{F}$ (Electrolytic)]



■ TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.