



## 78RXXX

## LINEAR INTEGRATED CIRCUIT

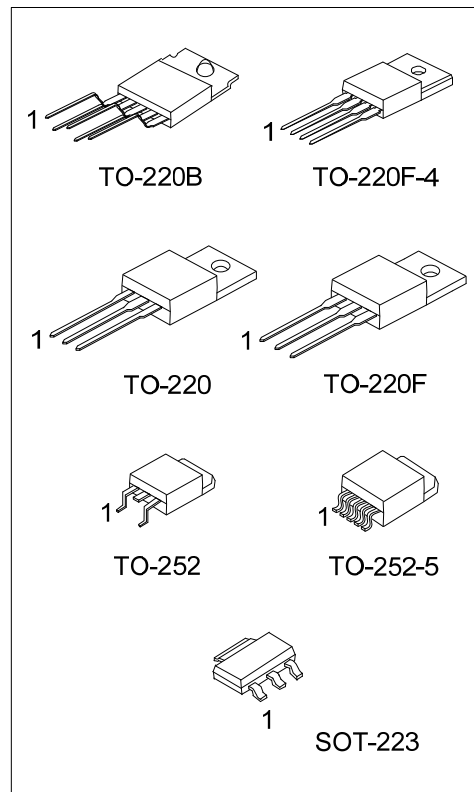
### LOW DROPOUT VOLTAGE REGULATOR

#### 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<sub>OUT</sub>=1A ; V<sub>OUT</sub>=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



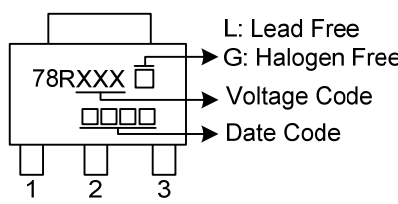
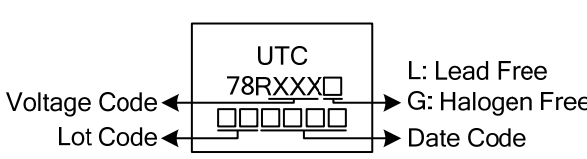
#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
78RXXXL-AA3-D-R	78RXXXG-AA3-D-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-D-R</p> <p>(1)Packing Type (2)Pin Assignment (3)Package Type (4)Green Package (5)Voltage Code</p>	<p>(1) T: Tube, R: Tape Reel (2) refer to Pin Assignment (3) AA3: SOT-223, TA3: TO-220, TB5: TO-220B TF3: TO-220F, TF4: TO-220F-4, TN3: TO-252, TN5: TO-252-5 (4) G: Halogen Free and Lead Free, L: Lead Free (5) xx: refer to Marking Information</p>
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### MARKING INFORMATION

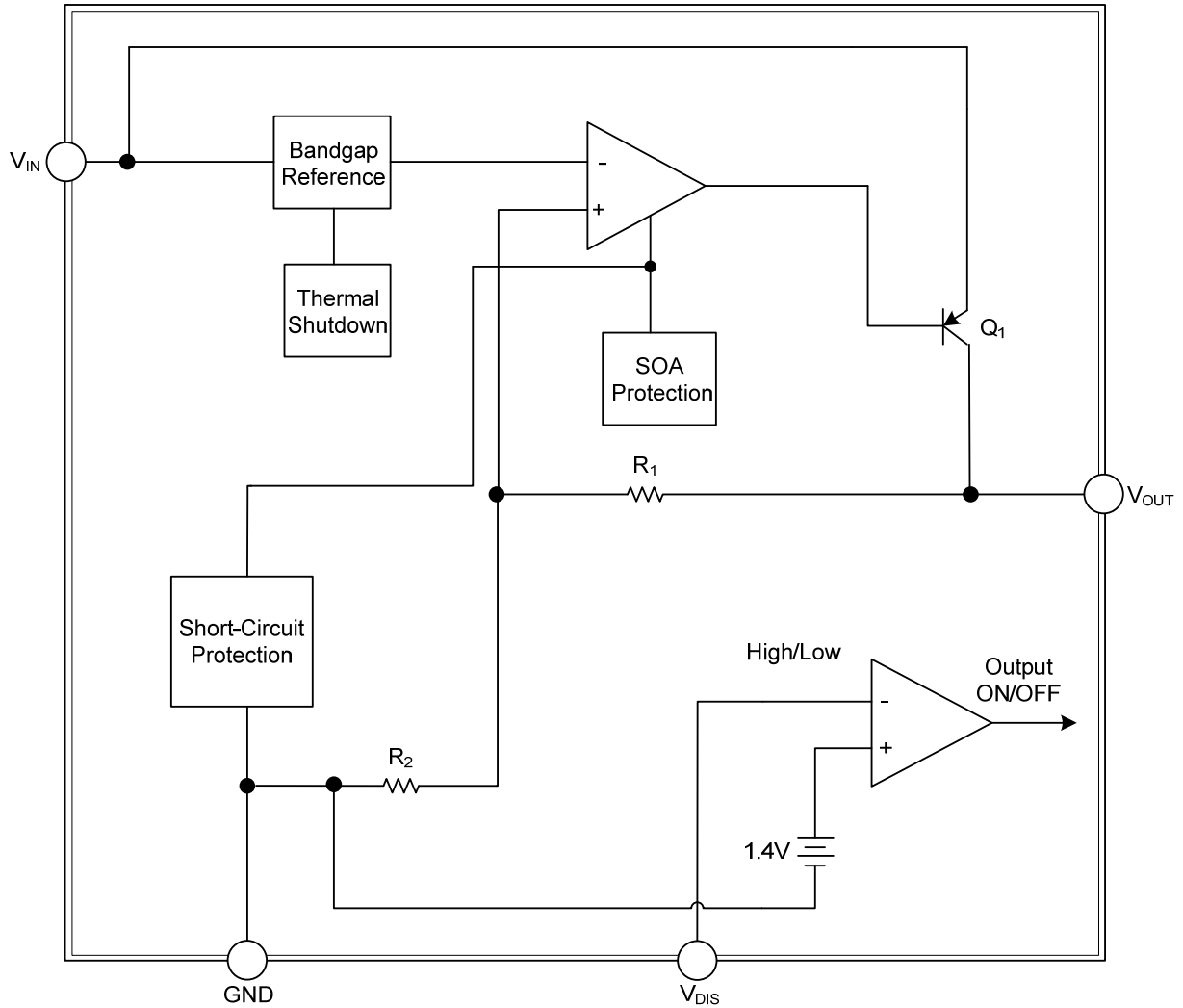
PACKAGE	VOLTAGE CODE	MARKING
SOT-223	1P5:1.5V 1P8:1.8V 3P3:3.3V 05:5.0V 06:6.0V 09:9.0V	 <p>L: Lead Free G: Halogen Free Voltage Code Date Code</p>
TO-220 TO-220F TO-220F-4 TO-252 TO-252-5	10: 10V 12:12V 15: 15V	
TO-220B	1P5:1.5V 1P8:1.8V 3P3:3.3V 05:5.0V 06:6.0V 09:9.0V 10: 10V 12:12V AD:ADJ	 <p>UTC 78RXXX Voltage Code Lot Code L: Lead Free G: Halogen Free 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 <sub>IN</sub>	Input voltage pin
	2	3	3	V <sub>OUT</sub>	Output voltage pin
	3	2	5	GND	GND
	4	-	2	V <sub>DIS</sub>	Disable signal input pin
-	5	-	-	ADJ	Adjustable input pin
-	-	-	4	NC	No Connect

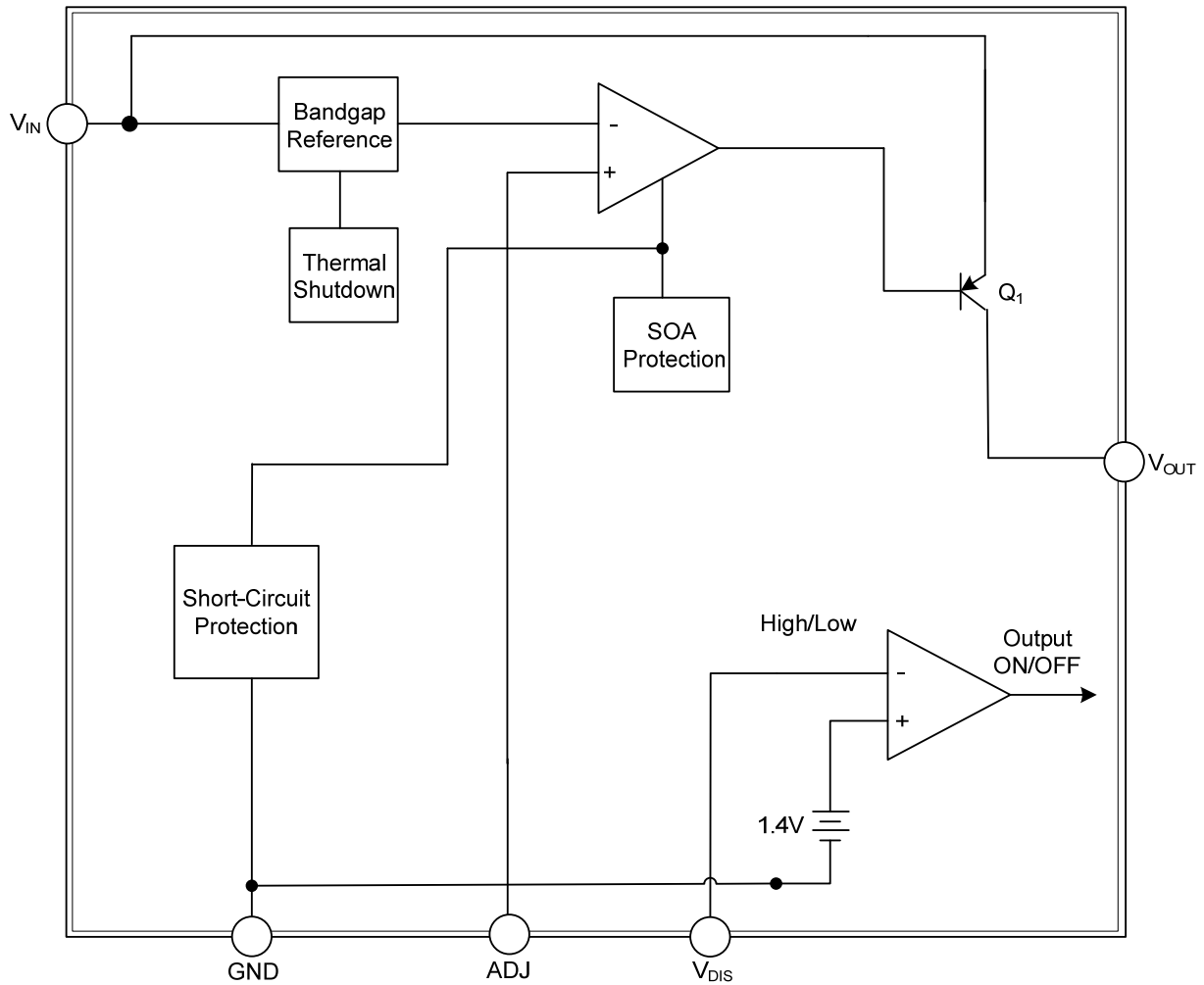
## ■ BLOCK DIAGRAM

### 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		$I_Q$	$I_{OUT}=0A$			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		$I_Q$	$I_{OUT}=0A$			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

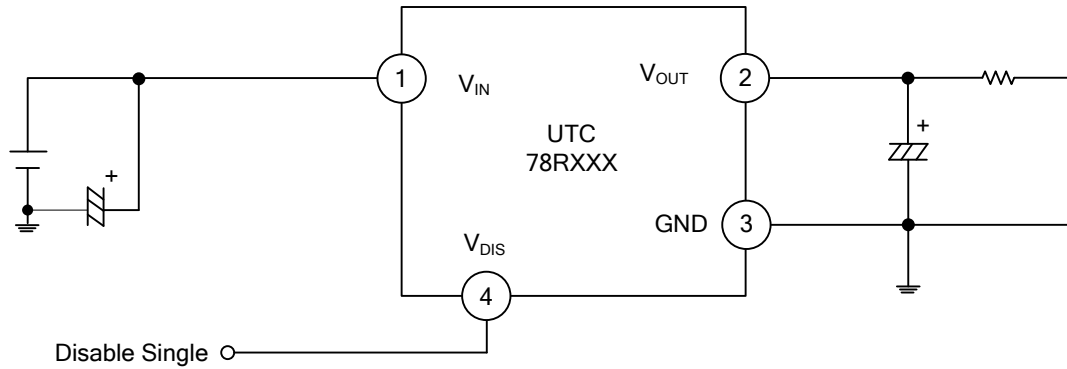
For 78RXXX-ADJ

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

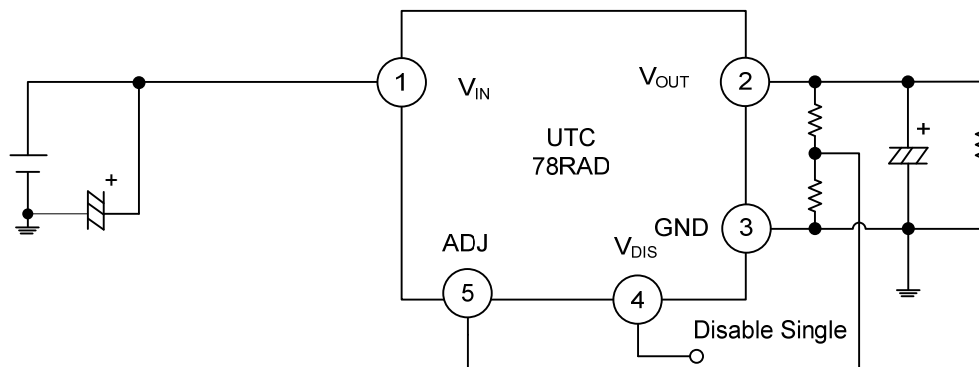
### Fixed Output Voltage Versions



\*  $C_i$  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

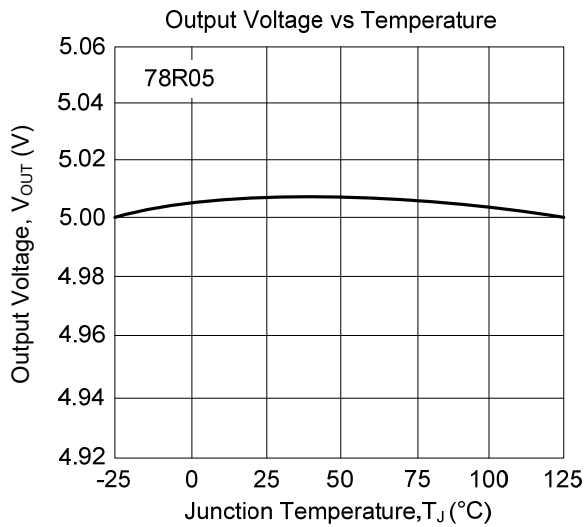


\*  $C_i$  is required if regulator is located an appreciable distance from power supply filter. [ $C_i > 0.33\mu\text{F}$  (Electrolytic)]

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



■ TYPICAL CHARACTERISTICS



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