UNISONIC TECHNOLOGIES CO., LTD

78RXXX

LOW DROPOUT VOLTAGE REGULATOR

TO-220B

TO-220F-4

TO-252-5

TO-252

## ◼ 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, 12V, 15V (Typ.)
* With ADJ version
* Internal overcurrent protection, internal thermal shutdown
* Internal overvoltage protection, internal short-circuit protection
* Output disable function
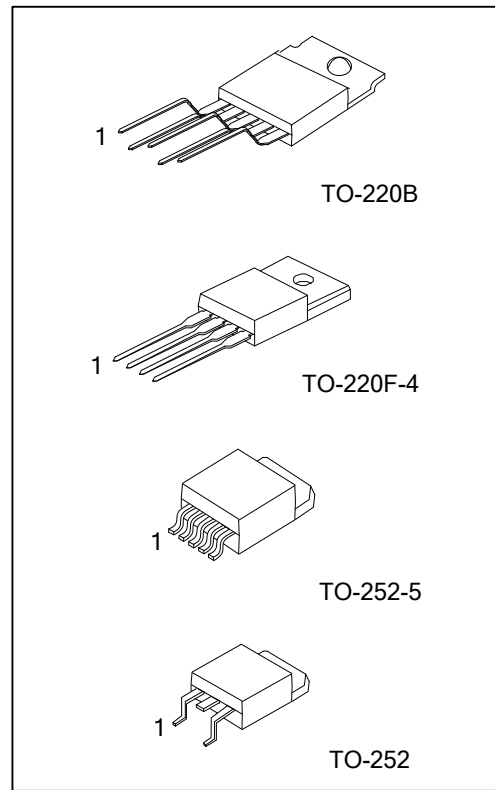
◼ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
78RXXXL-TB5-T	78RXXXG-TB5-T	TO-220B	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: xx: output voltage, refer to Marking Information

78R**XXX**G-TB5-T	
├── (1)Packing Type	(1) T: Tube, R: Tape Reel
├── (2)Package Type	(2) TB5: TO-220B, TF4: TO-220F-4, TN3: TO-252, TN5: TO-252-5
├── (3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free
└── (4)Voltage Code	(4) xx: refer to Marking Information

QW-R102-035.M

■ **MARKING INFORMATION**

PACKAGE	VOLTAGE CODE	MARKING
TO-220F-4 TO-252 TO-252-5	1P5: 1.5V 1P8:1.8V 3P3:3.3V 05:5.0V 06:6.0V 09:9.0V 12:12V 15: 15V	Voltage Code ← UTC 78RXXX□ → L: Lead Free / G: Halogen Free Lot Code ← □□□□□□ → Date Code
TO-220B	1P5: 1.5V 1P8:1.8V 3P3:3.3V 05:5.0V 09:9.0V 12:12V 00:ADJ	

■ **PIN DESCRIPTIONS**

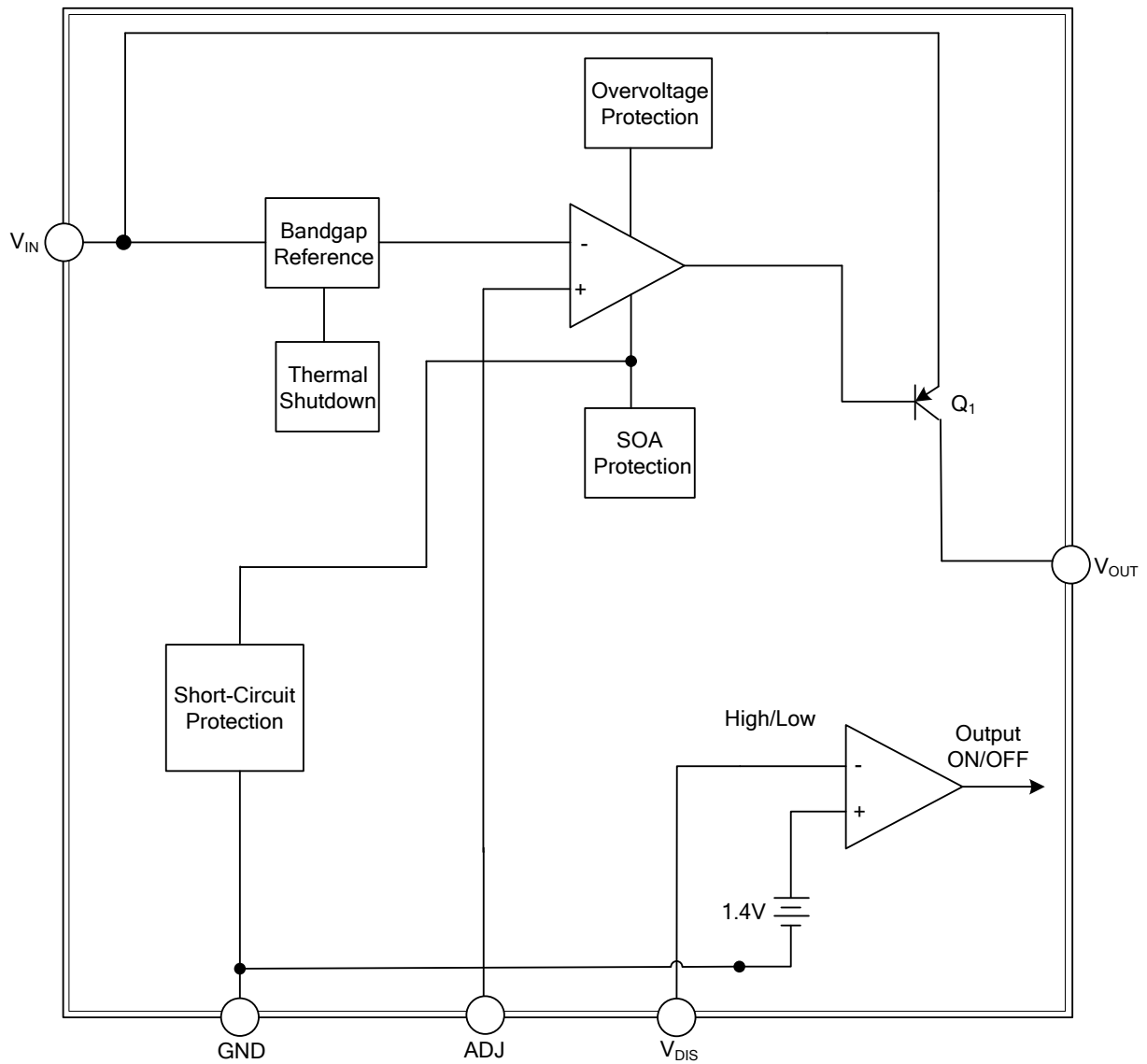| PIN NO.				PIN NAME	PIN FUNCTION
TO-220F-4	TO-220B	TO-252	TO-252-5		
1	1	1	1	V_{IN}	Input voltage pin
2	2	3	3	V_{OUT}	Output voltage pin
3	3	2	5	GND	GND
4	4	-	2	V_{DIS}	Disable signal input pin
-	5	-	-	ADJ	Adjustable input pin
-	-	-	4	NC	

■ **BLOCK DIAGRAM**

Fixed Output Voltage Versions
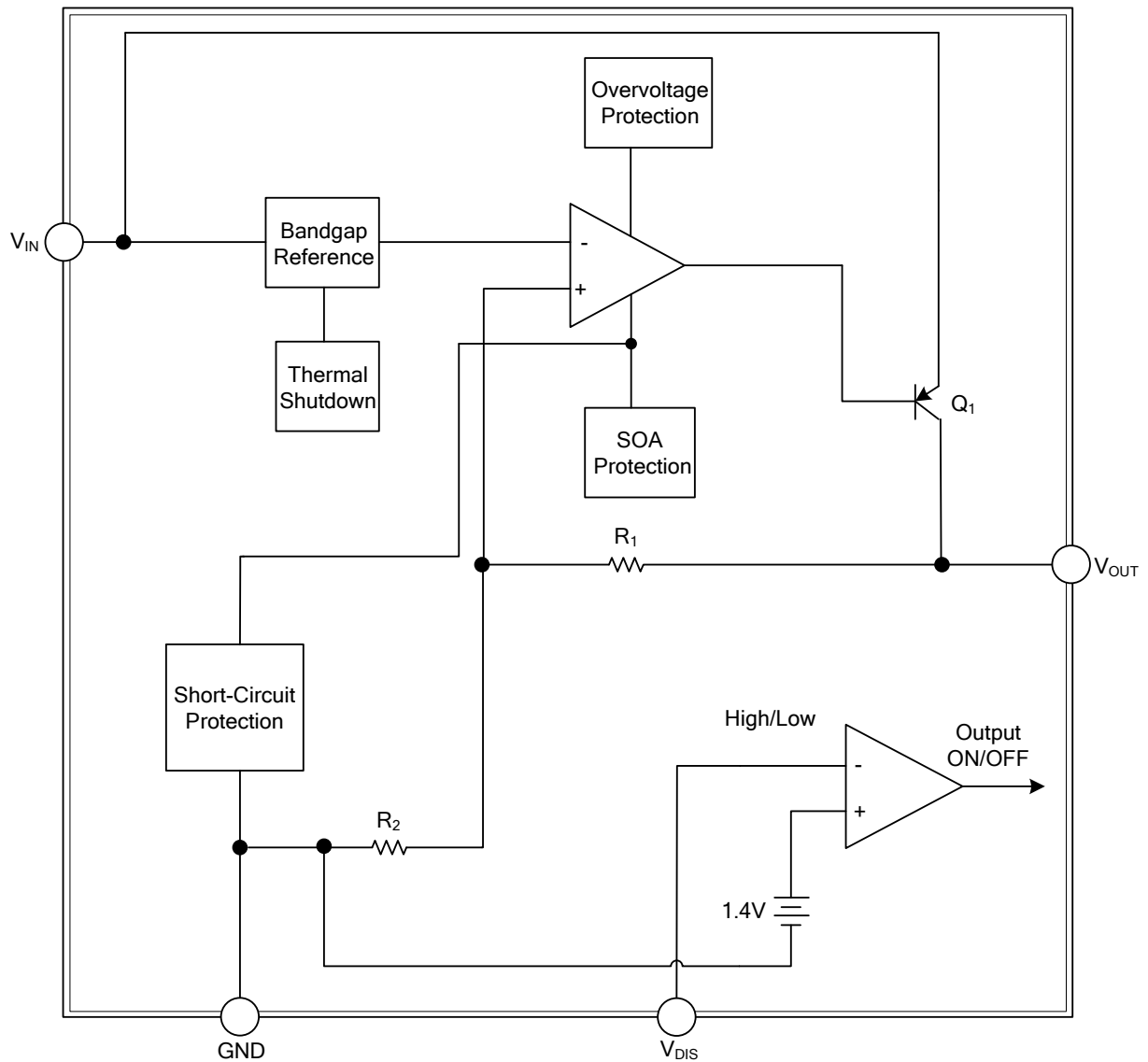
■ **BLOCK DIAGRAM**

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	TO-220B/TO-220F-4	P_D	1.5	W
	TO-252/TO-252-5		1	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-40 ~ +85	°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 RESISTANCES CHARACTERISTICS**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220B/TO-220F-4	θ_{JA}	83	°C/W
	TO-252/TO-252-5		125	°C/W
Junction to Case	TO-220B/TO-220F-4	θ_{JC}	8	°C/W
	TO-252/TO-252-5		12	°C/W

■ **ELECTRICAL CHARACTERISTICS** (I_{OUT} =0.5A, T_A = 25°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	1.46	1.5	1.54	V
Dropout Voltage		V_D	I_{OUT} = 1A		2.7	3.0	V
Load Regulation		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{OUT}	7V < 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 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		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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

78RXXX

LINEAR INTEGRATED CIRCUIT

■ **ELECTRICAL CHARACTERISTICS(Cont.)**

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

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		V_{OUT}	V_{IN} =15V	11.71	12	12.29	V
Dropout Voltage		V_D	I_{OUT} = 1A			0.5	V
Load Regulation		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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	14.625	15	15.375	V
Dropout Voltage		V_D	I_{OUT} = 1A			0.5	V
Load Regulation		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{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		ΔV_{OUT}	5mA < I_{OUT} < 1A		0.1	2.0	%
Line Regulation		ΔV_{OUT}	Vo+1V< V_{IN} < Vo+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.
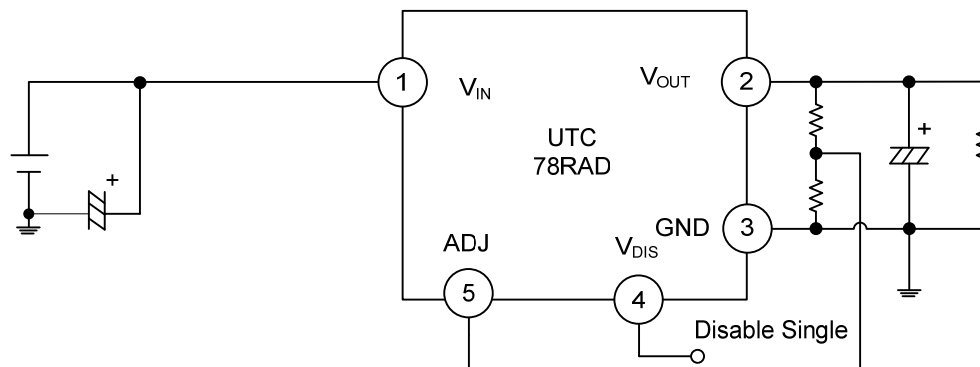
■ **TYPICAL APPLICATION CIRCUIT**

Fixed Output Voltage Versions
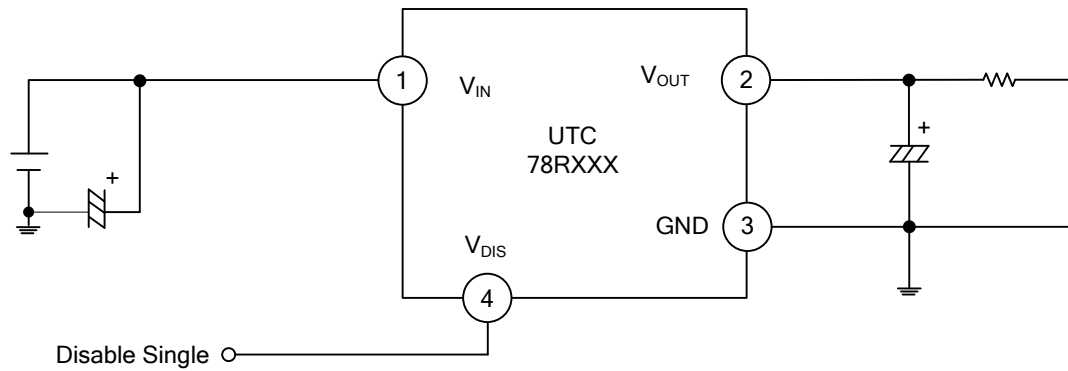
* C_I is required if regulator is located an appreciable distance from power supply filter. [C_I > 0.33μF (Electrolytic)]
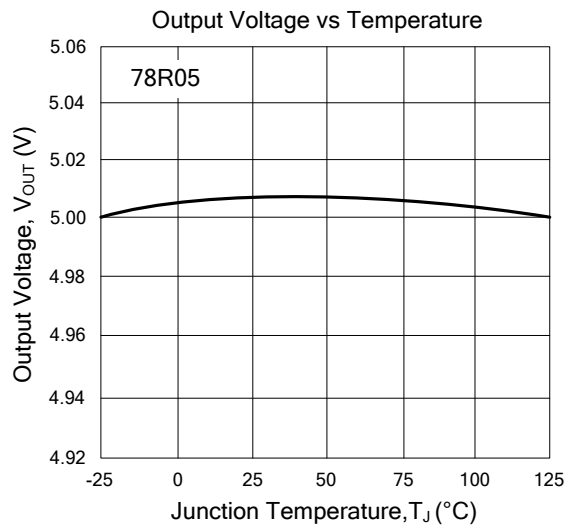* Co improves stability and transient response. [C_O > 47μF(Electrolytic)]

Adjustable Output Voltage Version

* C_I is required if regulator is located an appreciable distance from power supply filter. [C_I > 0.33μF (Electrolytic)]
* Co improves stability and transient response. [C_O > 47μF(Electrolytic)]

■ **TYPICAL CHARACTERISTICS**

Output Voltage vs Temperature

78R05

(graph: Output Voltage, V_{OUT} (V) vs Junction Temperature, T_J (°C))

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