



78RXX

LINEAR INTEGRATED CIRCUIT

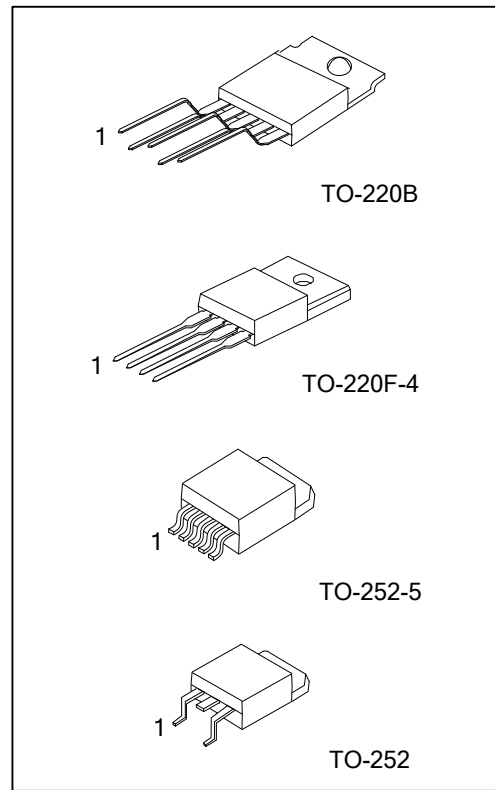
LOW DROPOUT VOLTAGE REGULATOR

■ DESCRIPTION

As the UTC linear integrated LDO, the UTC **78RXX** 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

- * $I_{OUT}=1A$; $V_{OUT}=1.5V, 1.8V, 3.3V, 5V, 6V, 9V, 12V$ (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		
78RXXL-TB5-T	78RXXG-TB5-T	TO-220B	Tube
78RXXL-TF4-T	78RXXG-TF4-T	TO-220F-4	Tube
78RXXL-TN3-R	78RXXG-TN3-R	TO-252	Tape Reel
78RXXL-TN5-R	78RXXG-TN5-R	TO-252-5	Tape Reel

Note: xx: output voltage, refer to Marking Information

<p>78RXXL-TB5-T</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package (4) Voltage Code 	<ul style="list-style-type: none"> (1) T: Tube, R: Tape Reel (2) TB5: TO-220B, TF4: TO-220F-4, TN3: TO-252, TN5: TO-252-5 (3) L: Lead Free, G: Halogen Free and Lead Free (4) xx: refer to Marking Information
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MARKING INFORMATION

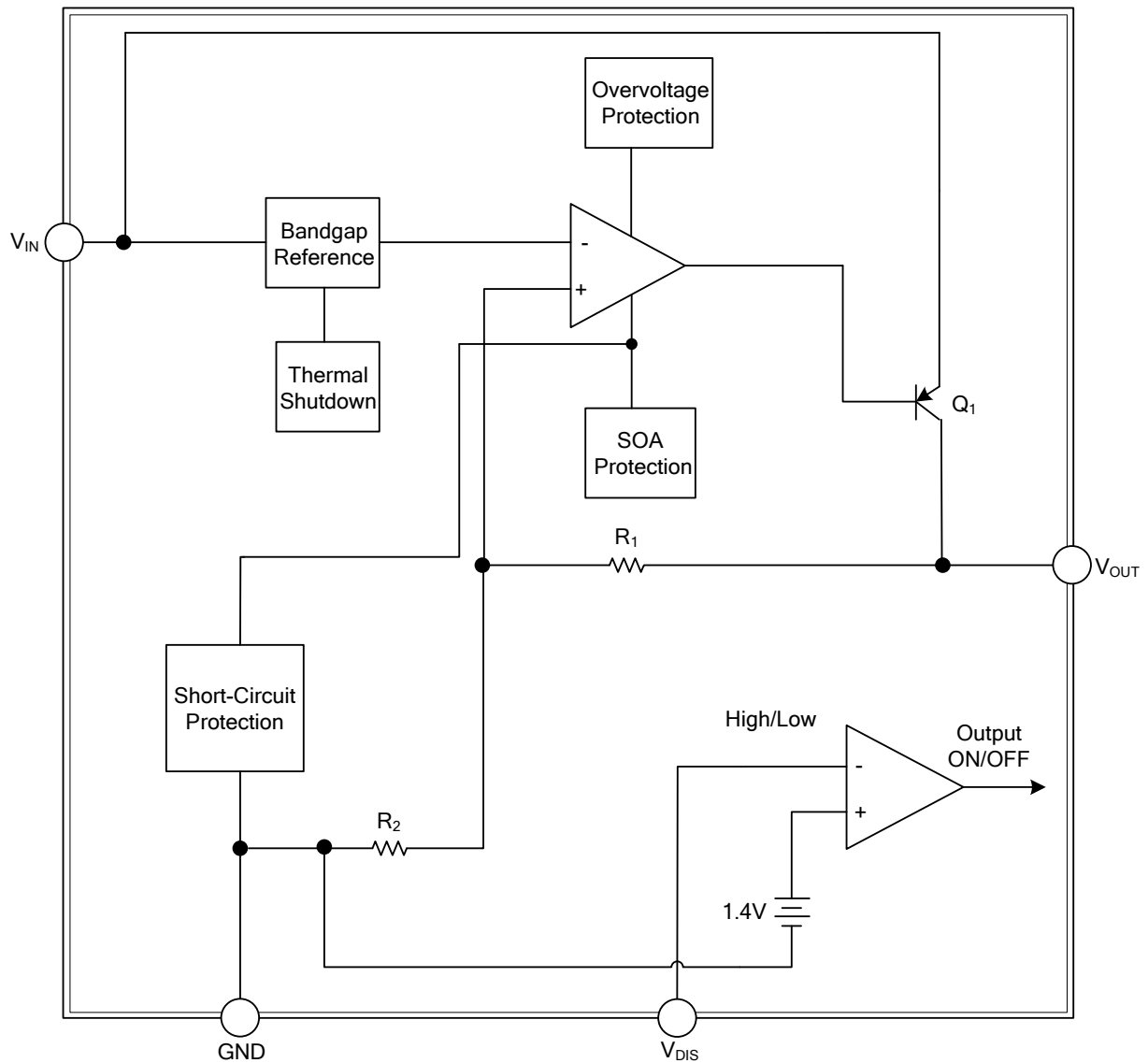
PACKAGE	VOLTAGE CODE	MARKING
TO-220F-4 TO-252 TO-252-5	15:1.5V 18:1.8V 05:5.0V 06:6.0V 09:9.0V 33:3.3V 12:12V	<p>UTC 78RXX□</p> <p>Voltage Code ← □ □ □ □ → L: Lead Free Lot Code ← □ □ □ □ → G: Halogen Free Date Code ← □ □ □ □ →</p>
TO-220B	15:1.5V 18:1.8V 05:5.0V 09:9.0V 33:3.3V 12:12V 00:ADJ	

PIN DESCRIPTIONS

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

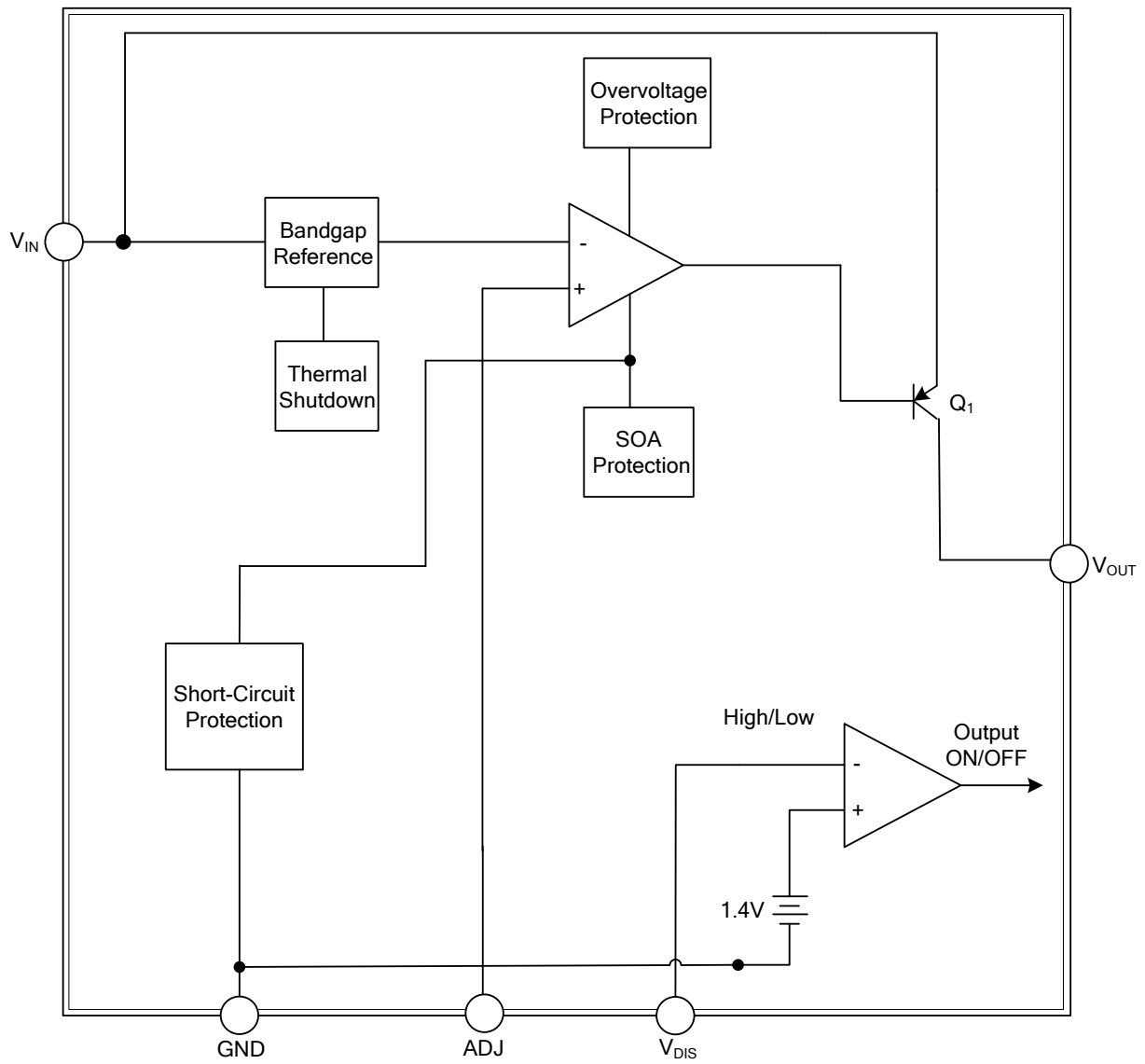
■ BLOCK DIAGRAM

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}	62.5	°C/W
	TO-252/TO-252-5		110	°C/W
Junction to Case	TO-220B/TO-220F-4	θ_{JC}	4	°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 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

■ ELECTRICAL CHARACTERISTICS(Cont.)

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}	2.0			V
	Low	V_{DISL}			0.8	V
Disable Bias Current	High	I_{DISH}			0.02	mA
	Low	I_{DISL}			-0.4	mA

For 78R12 ($V_{IN}=14V$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 14V$	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}	$13 V < V_{IN} < 25V$		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}	2.0			V
	Low	V_{DISL}			0.8	V
Disable Bias Current	High	I_{DISH}			0.02	mA
	Low	I_{DISL}			-0.4	mA

For 78R15 ($V_{IN}=4.5V$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}		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}	2.0			V
	Low	V_{DISL}			0.8	V
Disable Bias Current	High	I_{DISH}			0.02	mA
	Low	I_{DISL}			-0.4	mA

For 78R18 ($V_{IN}=4.8V$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}		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}	2.0			V
	Low	V_{DISL}			0.8	V
Disable Bias Current	High	I_{DISH}			0.02	mA
	Low	I_{DISL}			-0.4	mA

■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78R33 ($V_{IN}=5V$)

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	$I_{OUT} = 1A$			0.5	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

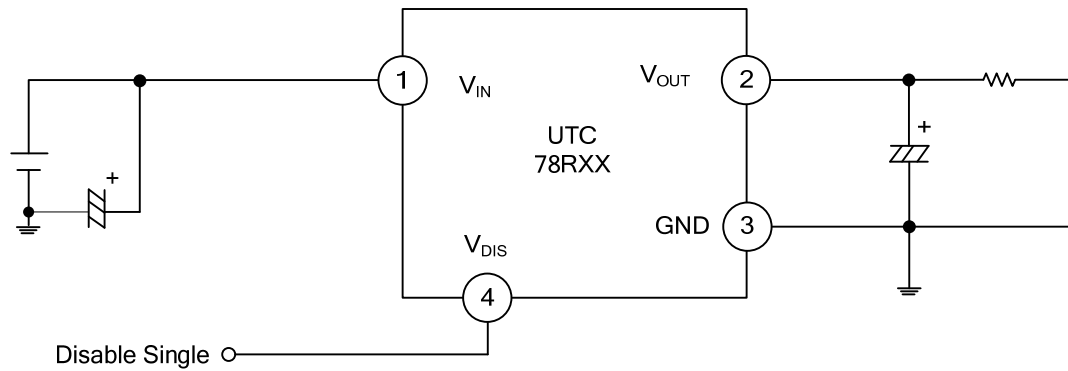
For 78R00-ADJ

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	V_{OUT}		1.22	1.25	1.28	V	
Dropout Voltage	V_D	$I_{OUT} = 1A$			0.5	V	
Load Regulation	ΔV_{OUT}	$5mA < I_{OUT} < 1A$		0.1	2.0	%	
Line Regulation	ΔV_{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

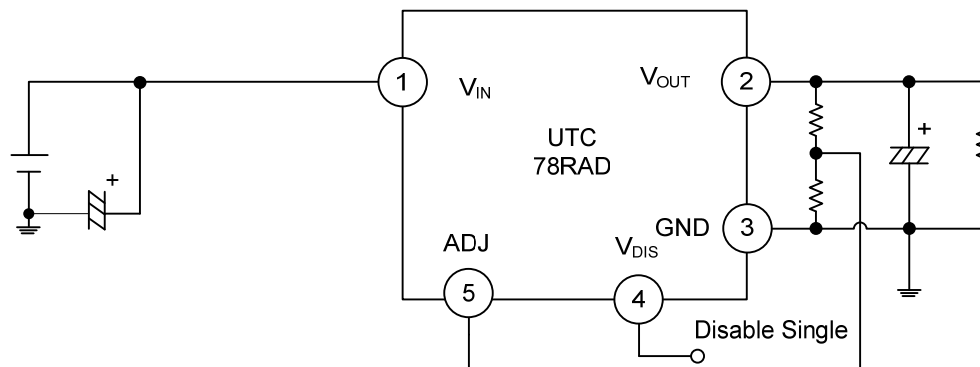
Fixed Output Voltage Versions



* 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

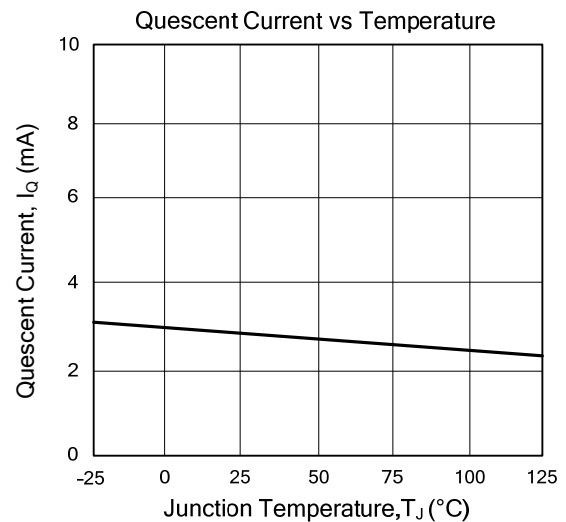
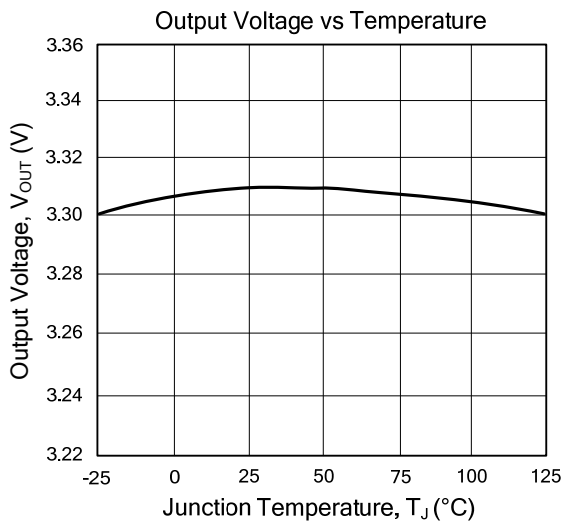
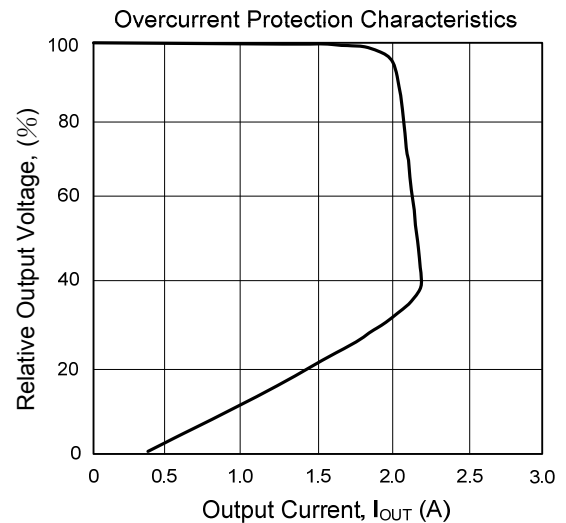
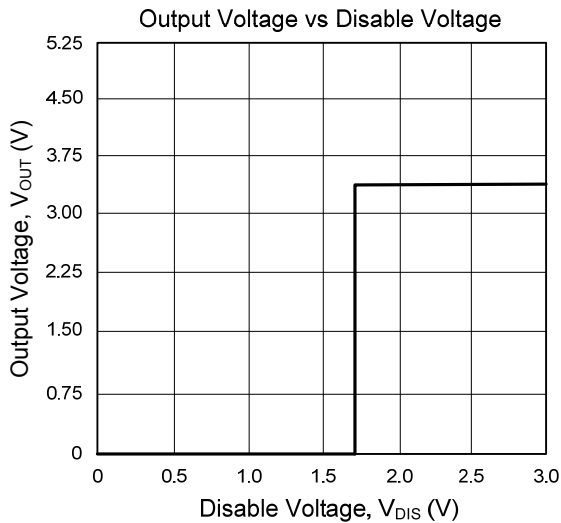
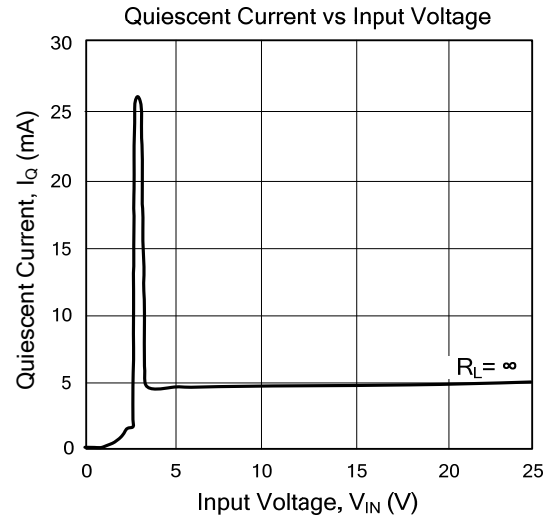
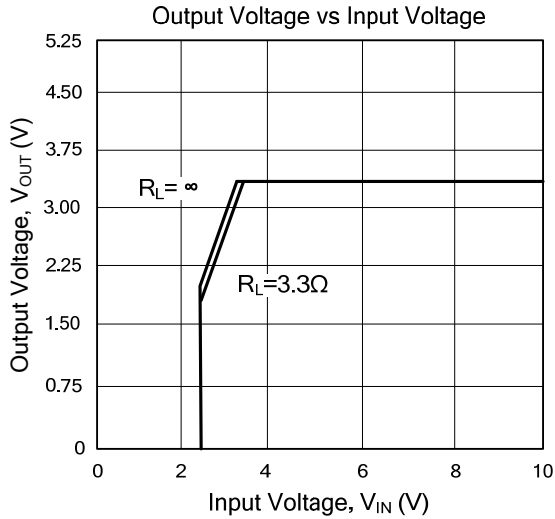


* C_i is required if regulator is located an appreciable distance from power supply filter. [$C_i > 0.33\mu\text{F}$ (Electrolytic)]

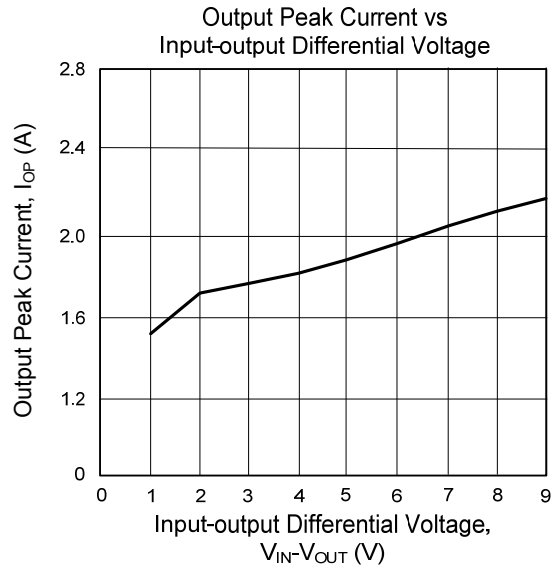
* C_o improves stability and transient response. [$C_o > 47\mu\text{F}$ (Electrolytic)]

■ TYPICAL CHARACTERISTICS

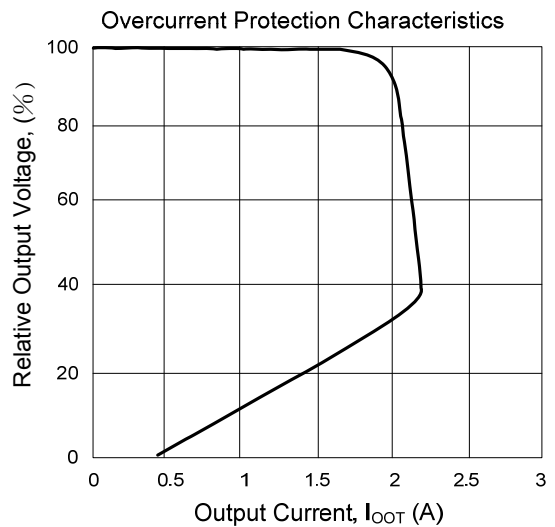
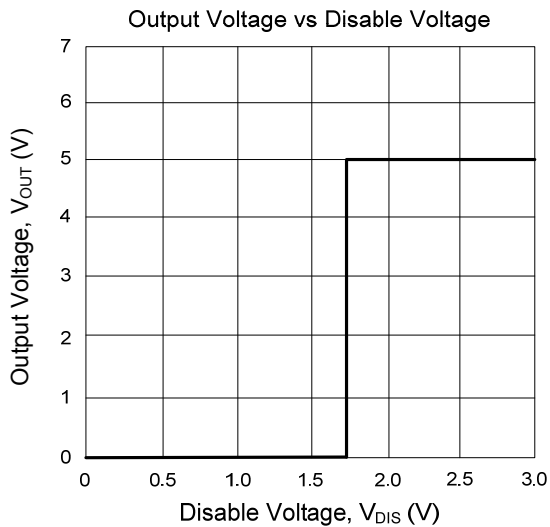
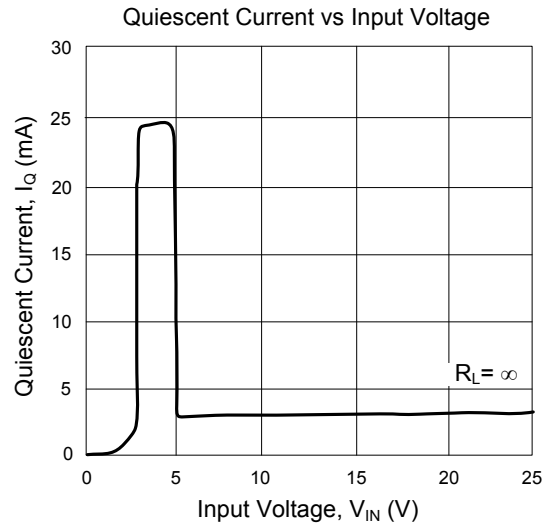
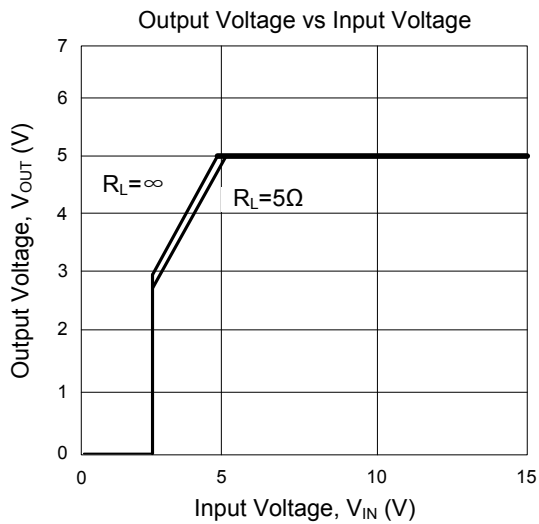
(1) 78R33



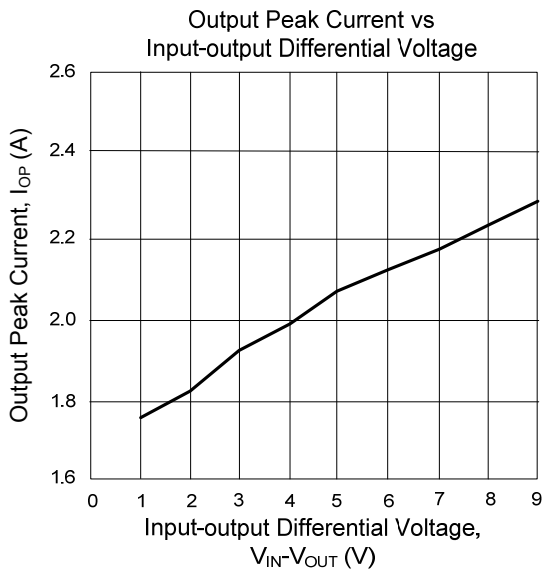
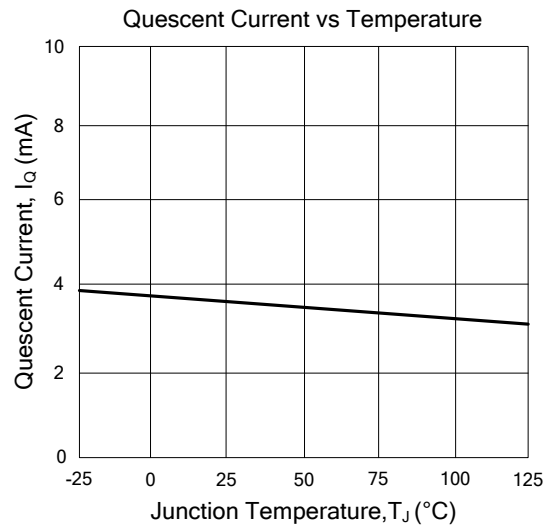
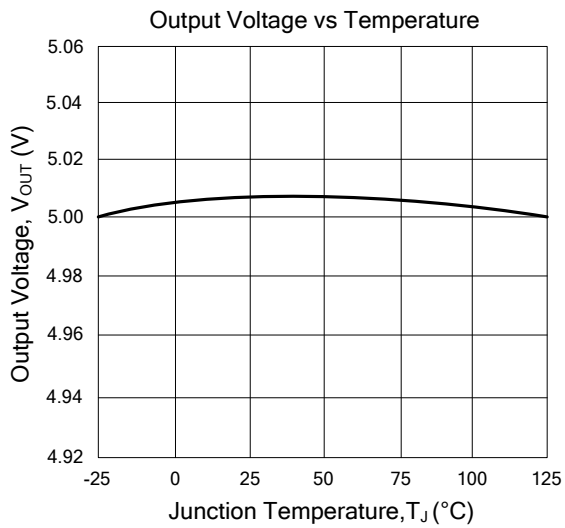
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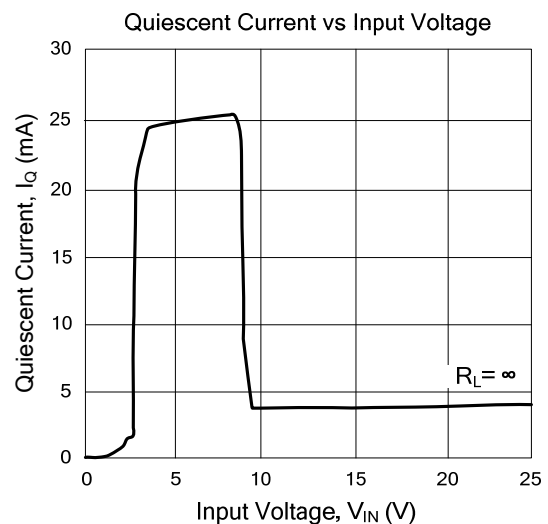
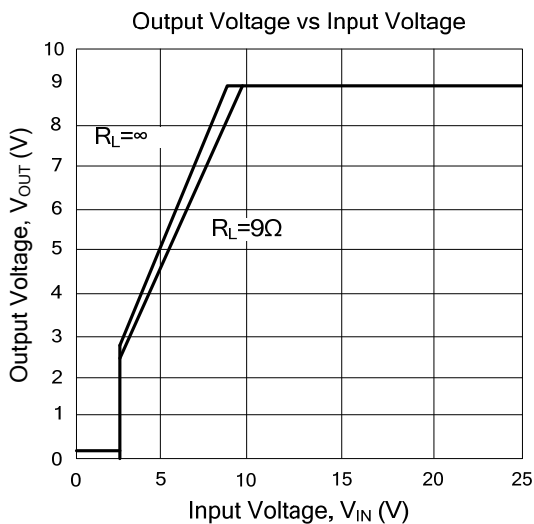
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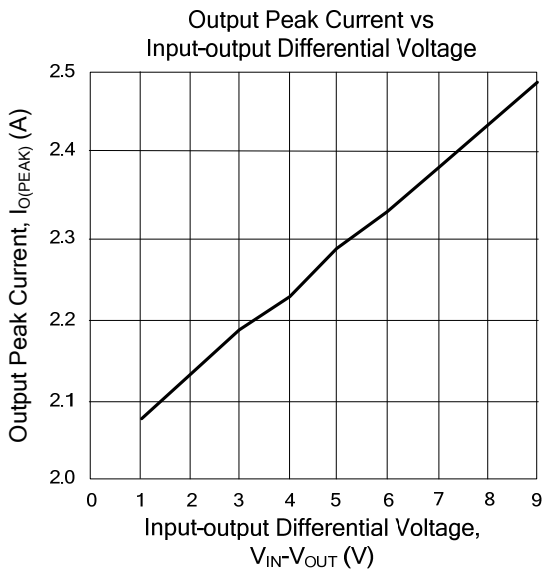
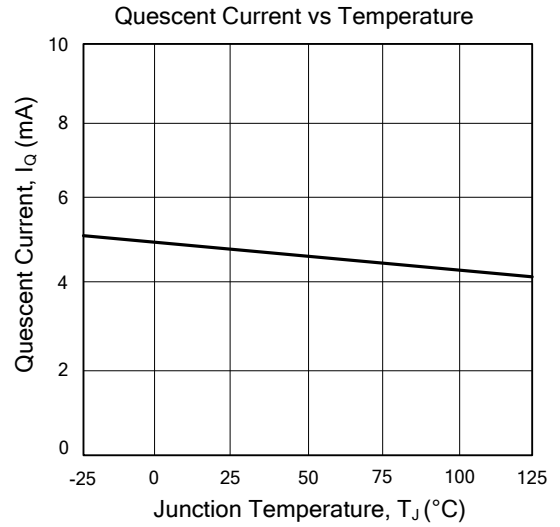
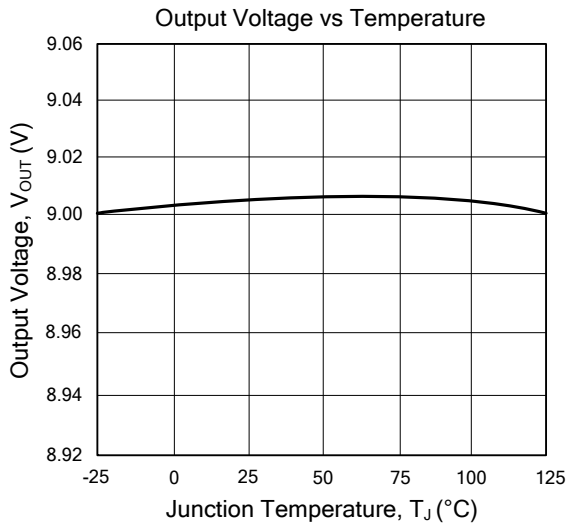
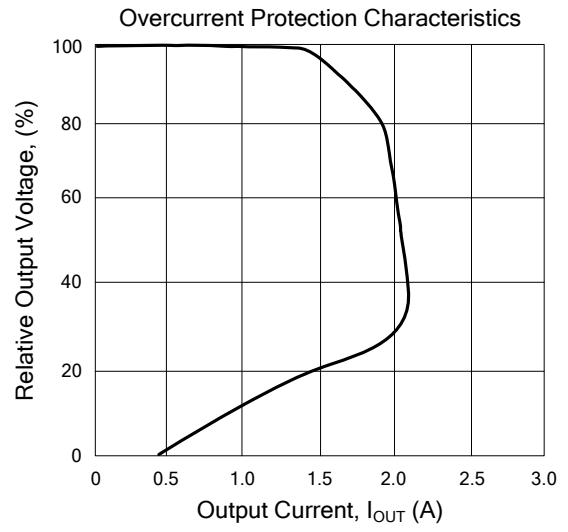
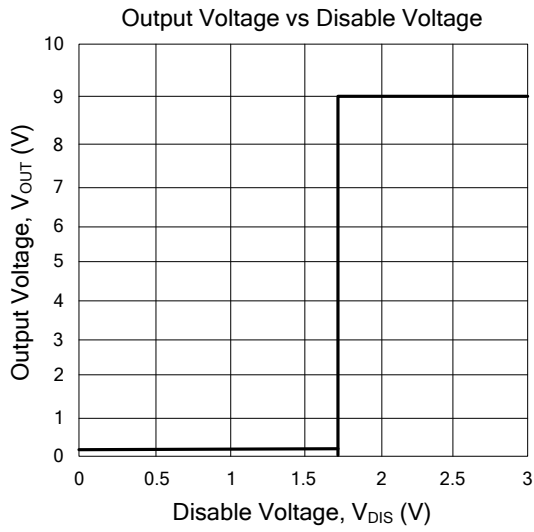
■ TYPICAL CHARACTERISTICS(Cont.)



(3) 78R09



■ TYPICAL CHARACTERISTICS(Cont.)



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