



78RXX

LINEAR INTEGRATED CIRCUIT

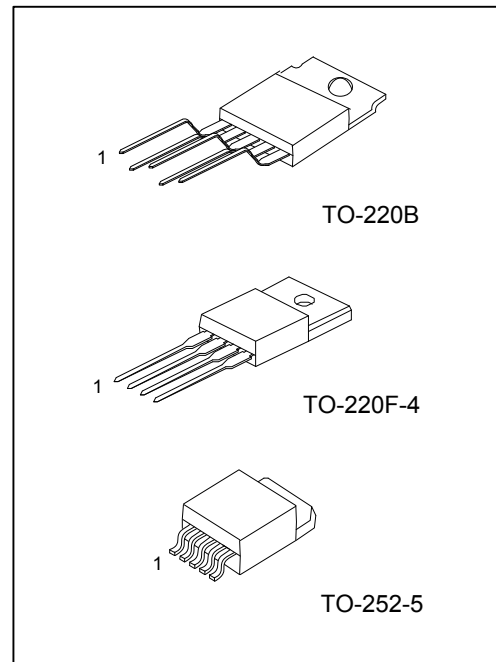
LOW DROPOUT VOLTAGE REGULATOR

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

- * $I_{OUT}=1A$; $V_{OUT}=3.3V, 5V, 9V, 12V$ (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-TN5-R	78RXXG-TN5-R	TO-252-5	Tape Reel

Note: xx: output voltage, refer to Marking Information

78RXXL-TB5-T (1)Packing Type (2)Package Type (3)Lead Free (4)Voltage Code		(1) R: Tape Reel, T: Tube (2) TB5: TO-220B, TF4: TO-220F-4, TN5: TO-252-5 (3) G: Halogen Free, L: Lead Free (4) xx: refer to Marking Information
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■ MARKING INFORMATION

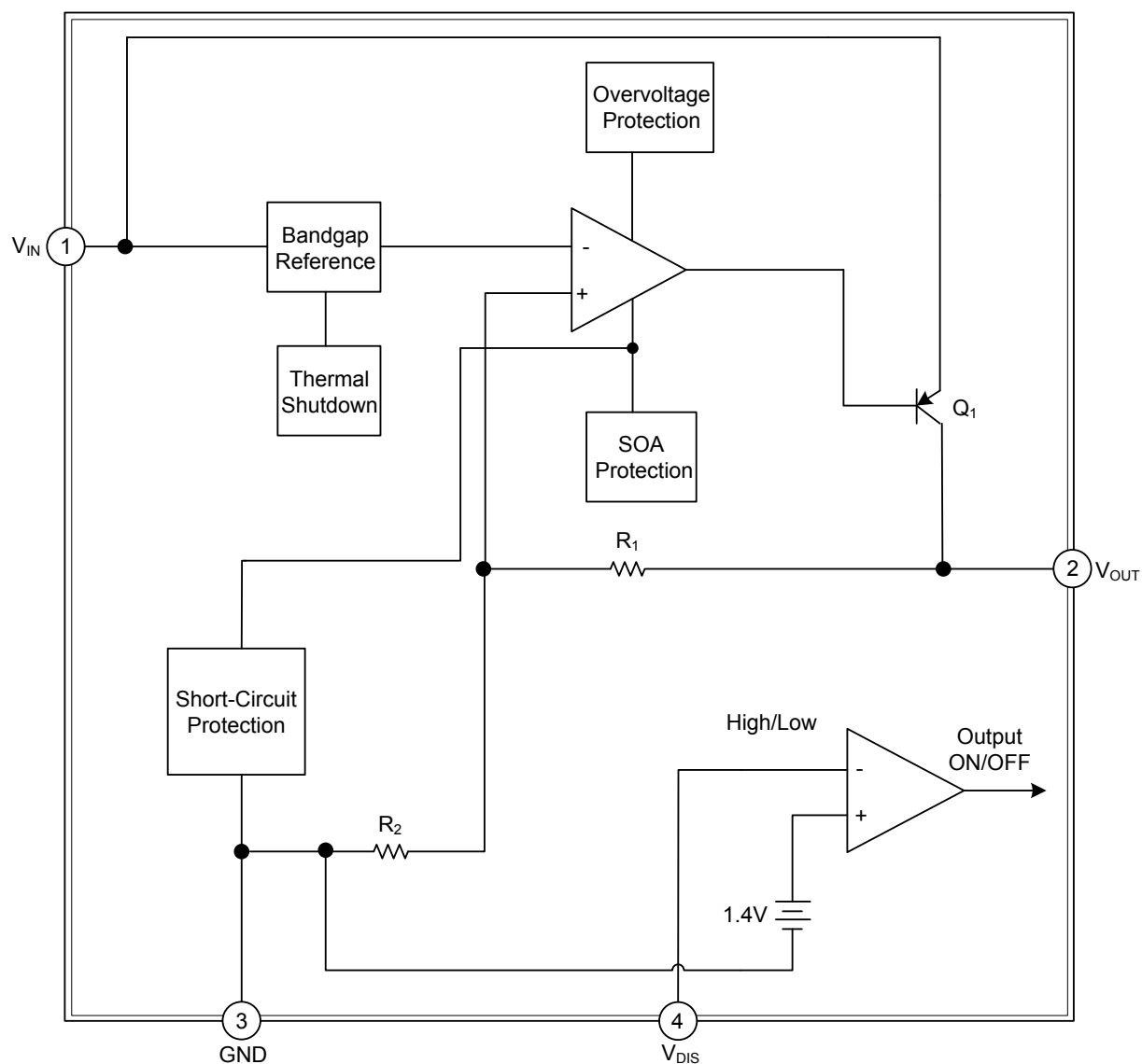
PACKAGE	VOLTAGE CODE	MARKING
TO-220F-4	33: 3.3V 05: 5.0V 09: 9.0V 12: 12V	The diagram shows a rectangular marking area divided into three horizontal sections. The top section contains the text "UTC". Below it is a row of four boxes; the first two contain "78R" and the last one contains "X". Below that is another row of five boxes. Arrows point from the left and right sides of the middle row of boxes to labels: "Voltage Code" on the left and "L: Lead Free" / "G: Halogen Free" on the right. Arrows point from the left and right sides of the bottom row of boxes to labels: "LOT Code" on the left and "Date Code" on the right.
TO-220B/ TO-252-5	33: 3.3V 05: 5.0V 09: 9.0V 12: 12V 00: ADJ	

■ PIN DESCRIPTIONS

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

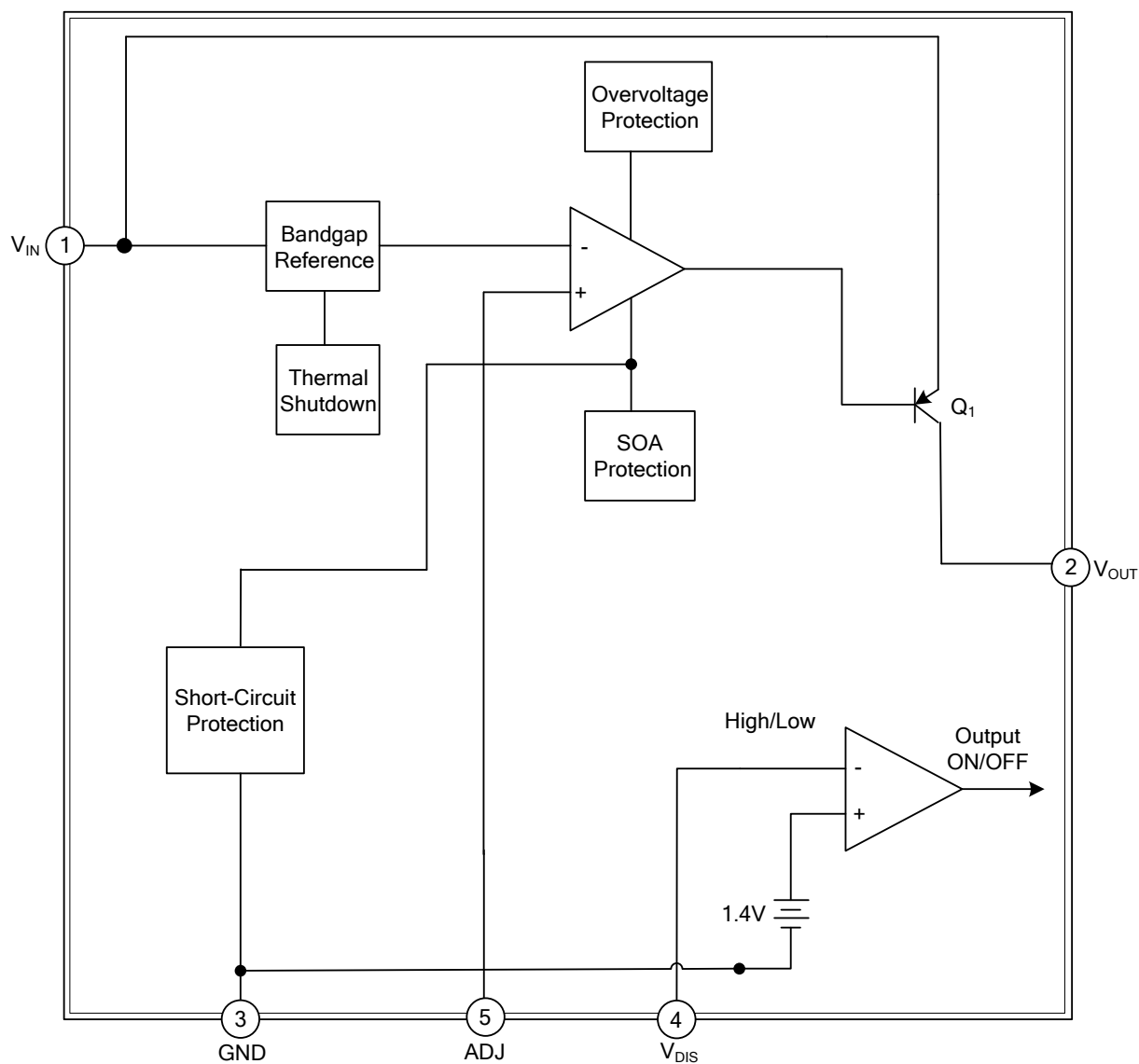
■ BLOCK DIAGRAM

Fixed Output Voltage Versions



■ BLOCK DIAGRAM

Adjustable Output Voltage Versions



■ 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-252-5		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 DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220B/TO-220F-4	θ_{JA}	62.5	°C/W
	TO-252-5		110	°C/W
Junction to Case	TO-220B/TO-220F-4	θ_{JC}	4	°C/W
	TO-252-5		12	°C/W

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

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

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
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}	$4V < V_{IN} < 10V$		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 78R05 ($V_{IN}=7V$)

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage		V_{OUT}	$V_{IN} = 7V$	4.88	5	5.12	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}	$6V < V_{IN} < 12V$		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 78R09 ($V_{IN}=11V$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
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	$I_{OUT} = 0A$			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 78R12 ($V_{IN}=14V$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
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}	$13V < V_{IN} < 25V$		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

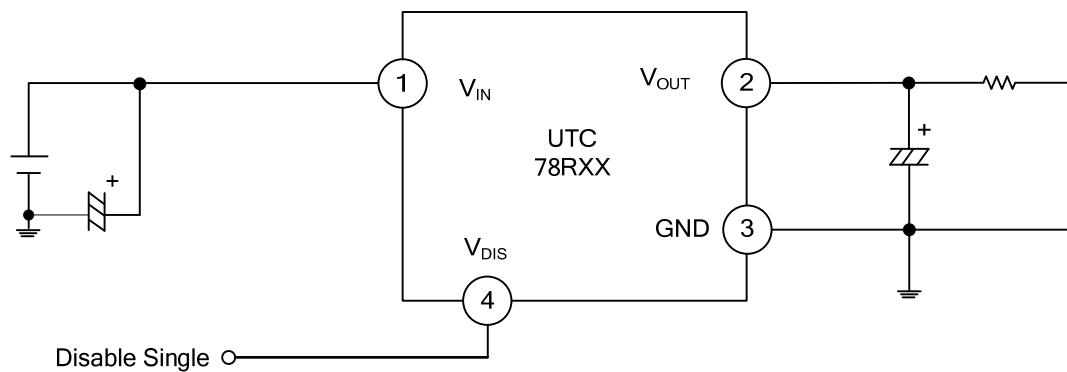
For 78R00-ADJ

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
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	$I_{OUT} = 0A$			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

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

■ TYPICAL APPLICATION CIRCUIT

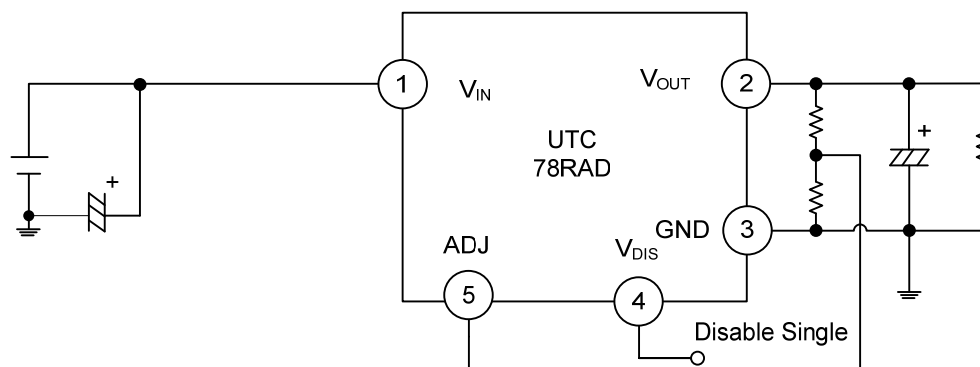
Fixed Output Voltage Versions



* 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

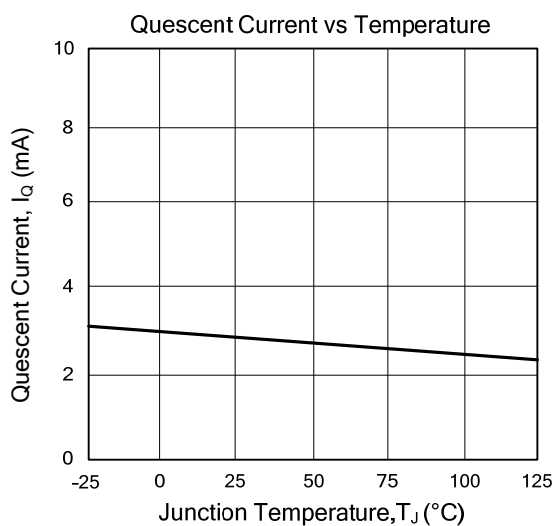
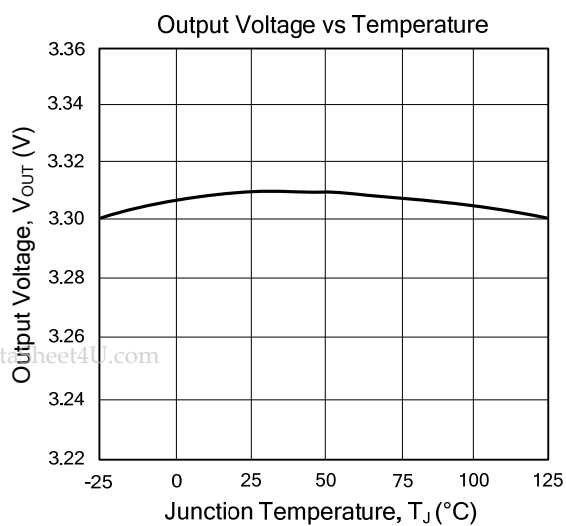
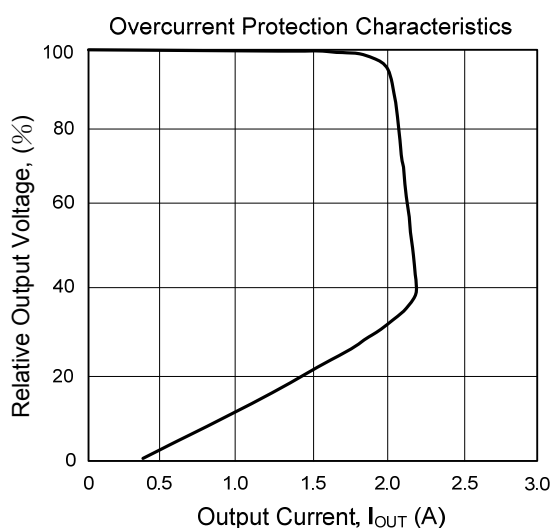
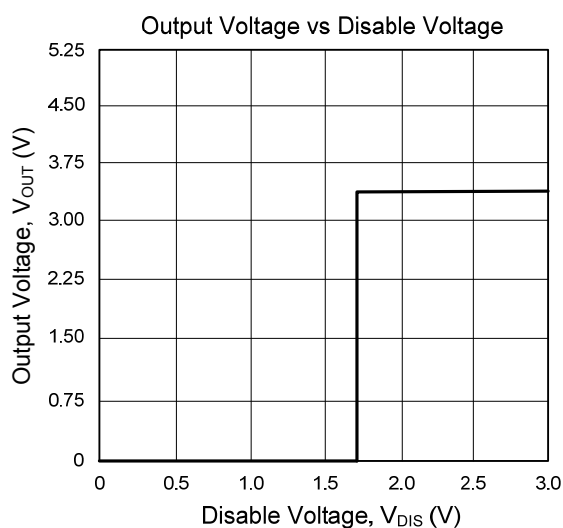
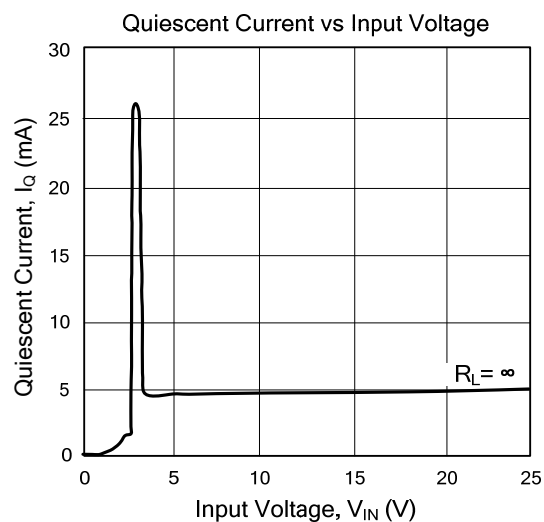
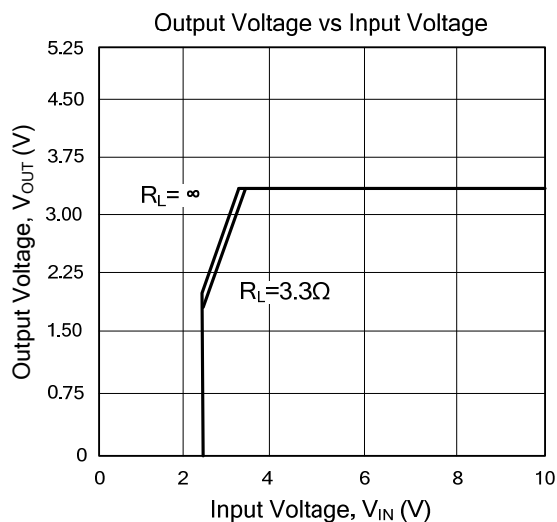


* C_I is required if regulator is located an appreciable distance from power supply filter. [$C_I > 0.33\mu\text{F}$ (Electrolytic)]

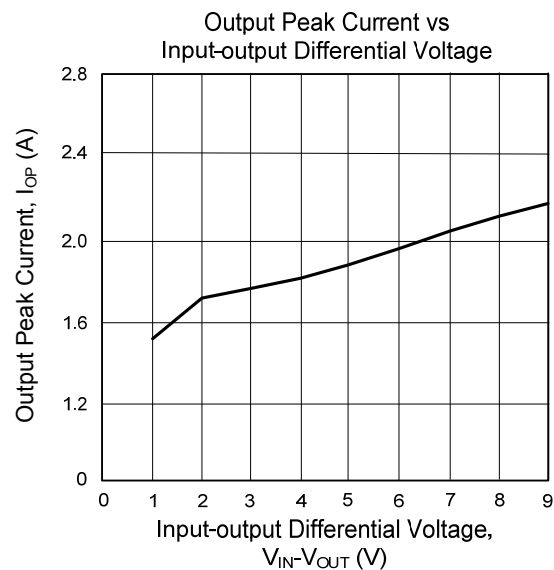
* C_O improves stability and transient response. [$C_O > 47\mu\text{F}$ (Electrolytic)]

■ TYPICAL CHARACTERISTICS

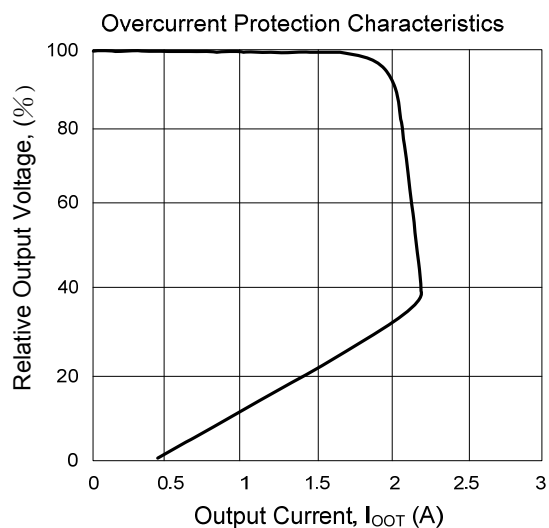
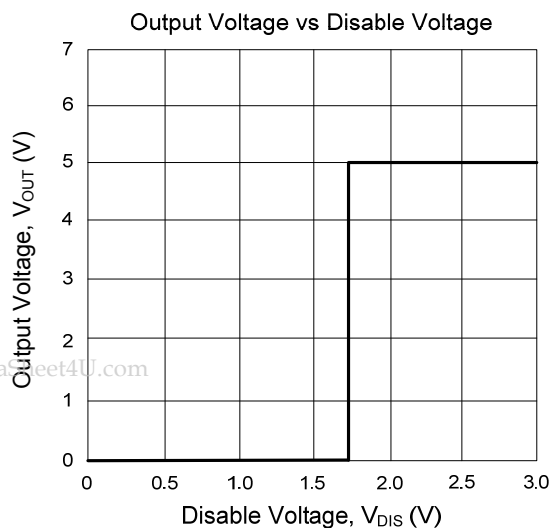
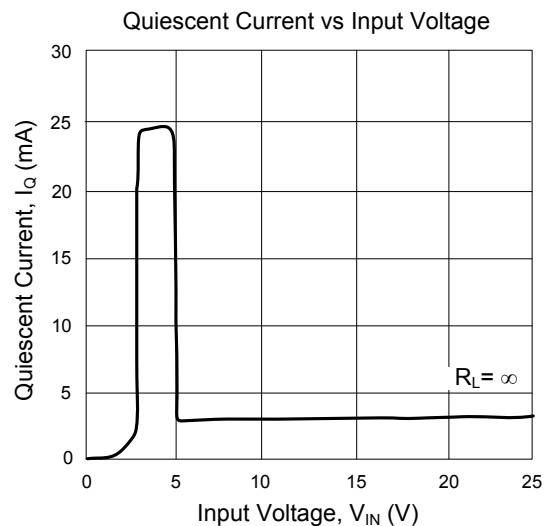
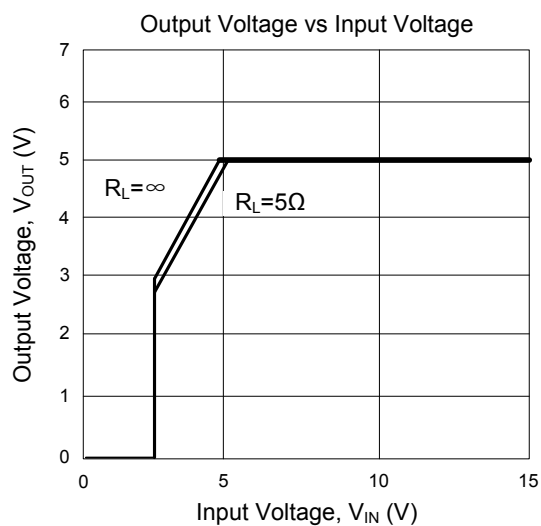
(1) 78R33



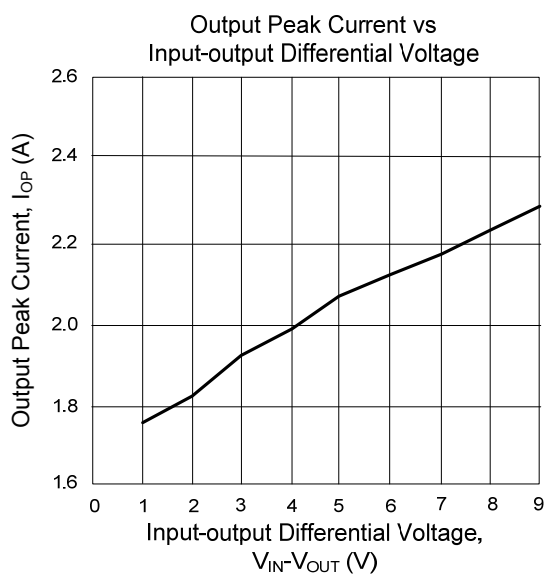
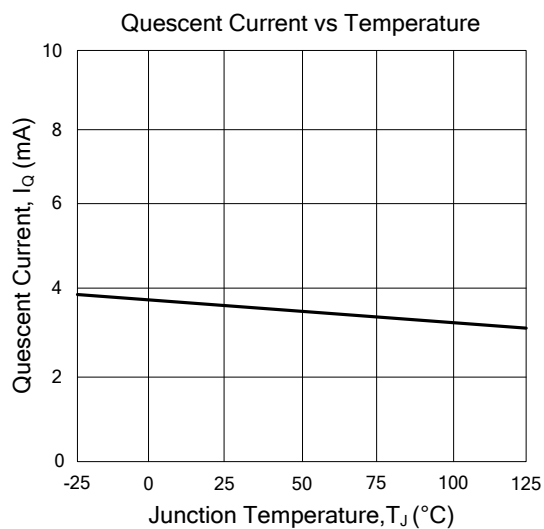
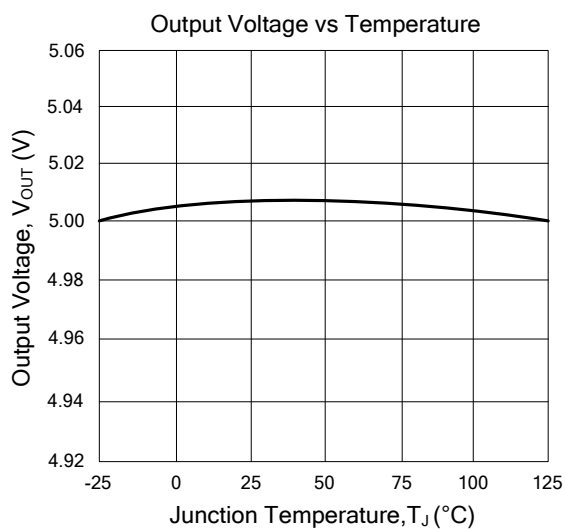
■ TYPICAL CHARACTERISTICS(Cont.)



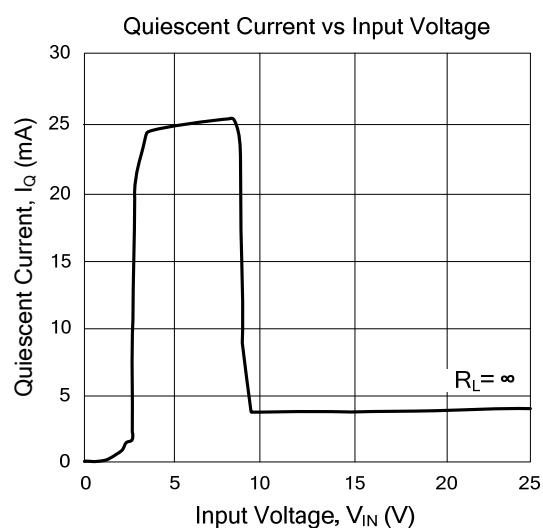
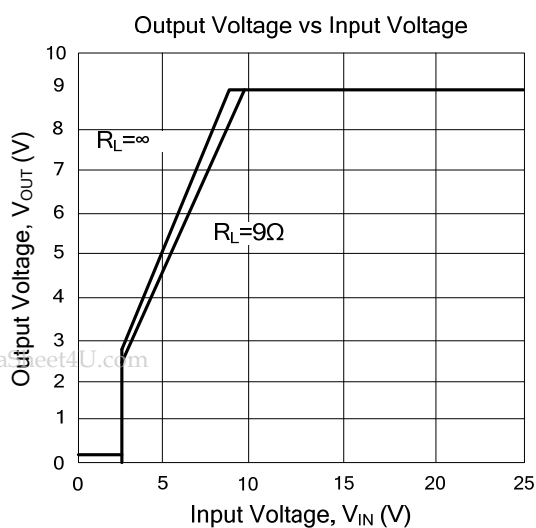
(2) 78R05



■ TYPICAL CHARACTERISTICS(Cont.)

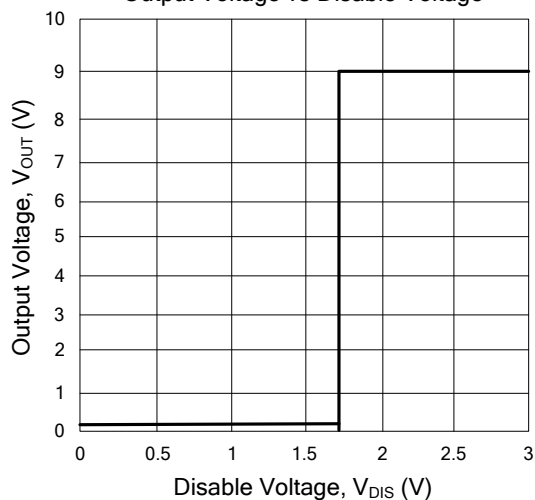


(3) 78R09

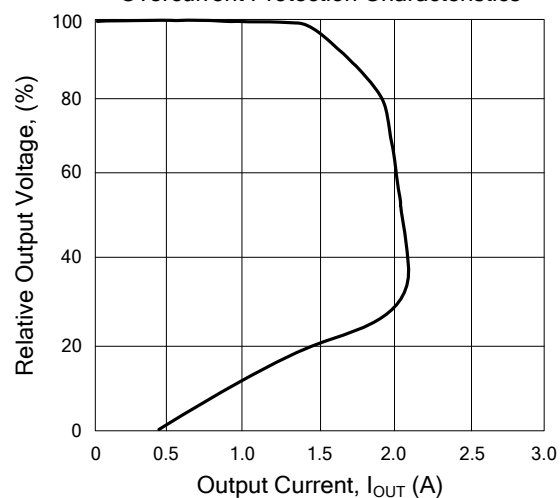


TYPICAL CHARACTERISTICS(Cont.)

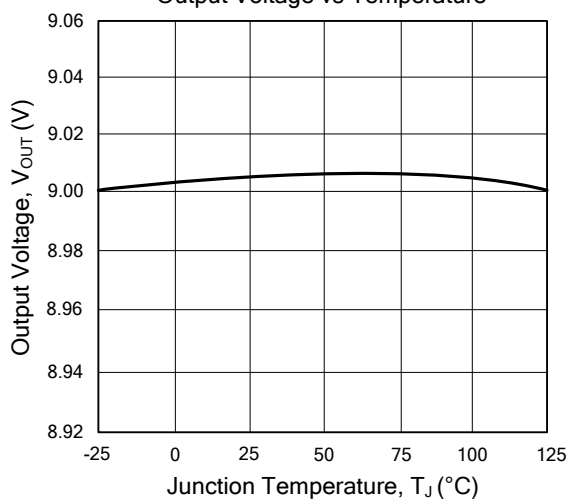
Output Voltage vs Disable Voltage



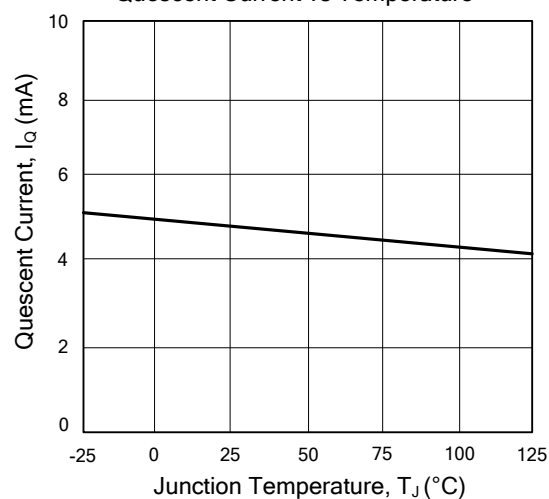
Overcurrent Protection Characteristics



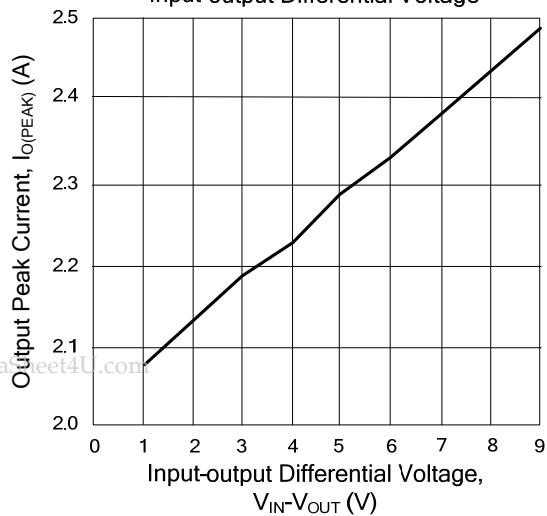
Output Voltage vs Temperature



Quiescent Current vs Temperature



Output Peak Current vs Input-output Differential Voltage



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