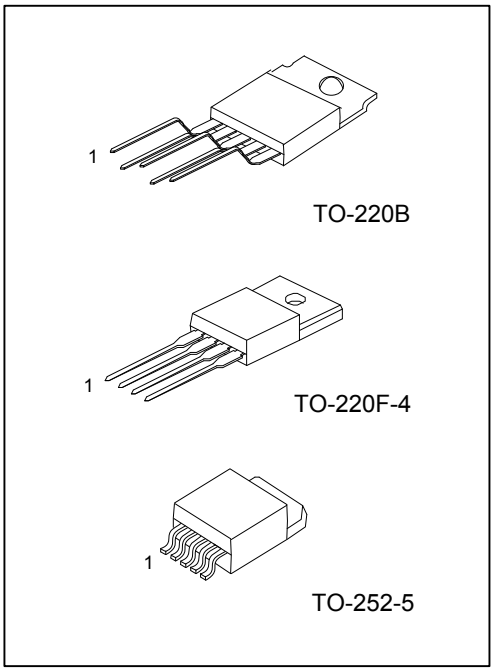
LOW DROPOUT VOLTAGE REGULATOR



■ 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 (typ)
* With ADJ version
* Internal overcurrent protection, internal thermal shutdown
* Internal overvoltage protection, internal short-circuit protection
* Output disable function

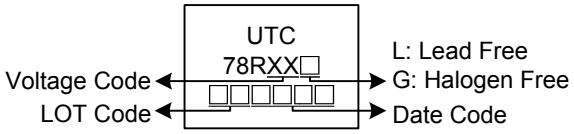
■ ORDERING INFORMATION

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 Plating (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

■ MARKING INFORMATION

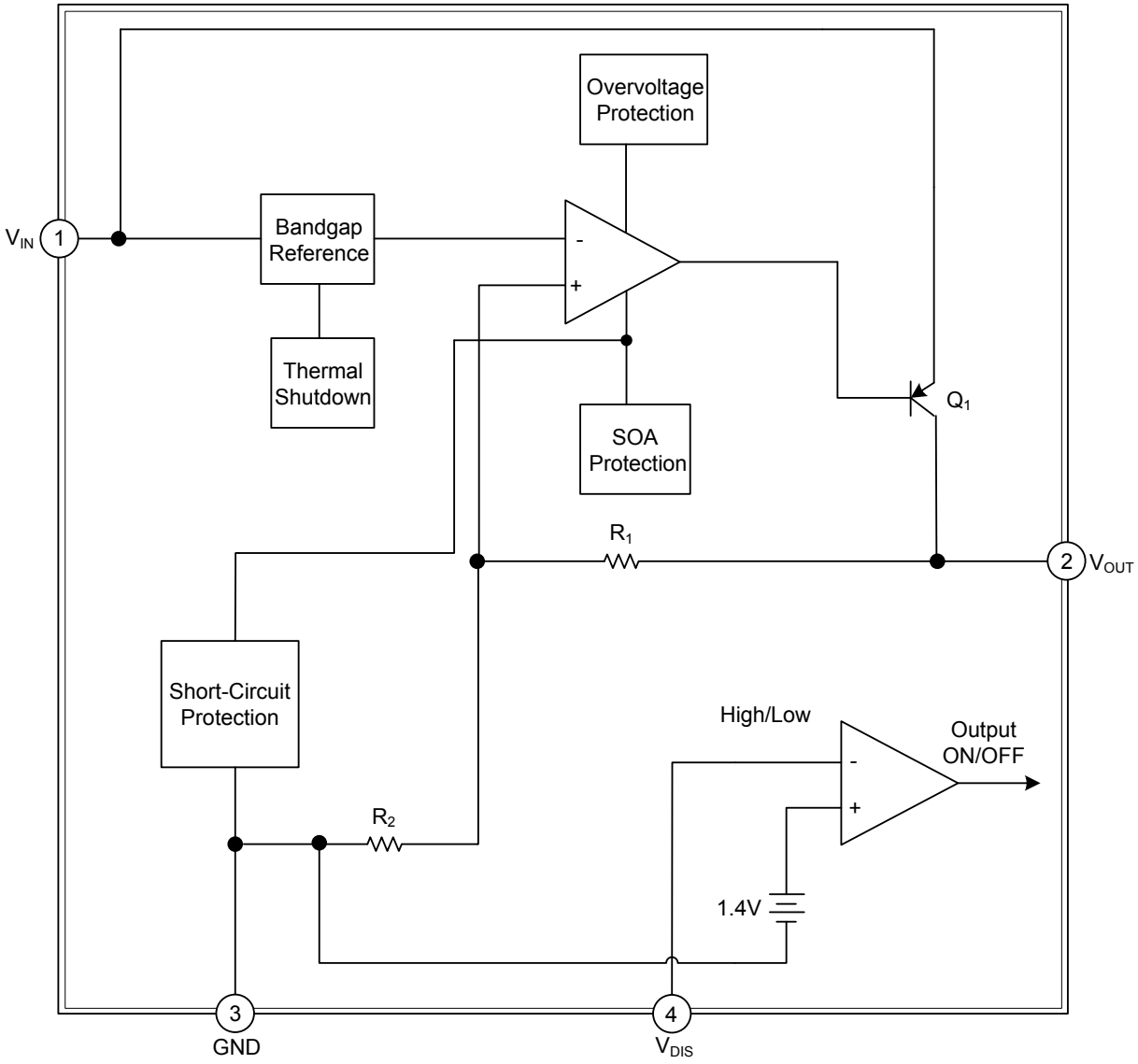
PACKAGE	VOLTAGE CODE	MARKING
TO-220F-4	33: 3.3V 05: 5.0V 09: 9.0V	
TO-220B	33: 3.3V 05: 5.0V 09: 9.0V AD: ADJ	
TO-252-5	05: 5.0V	

■ 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

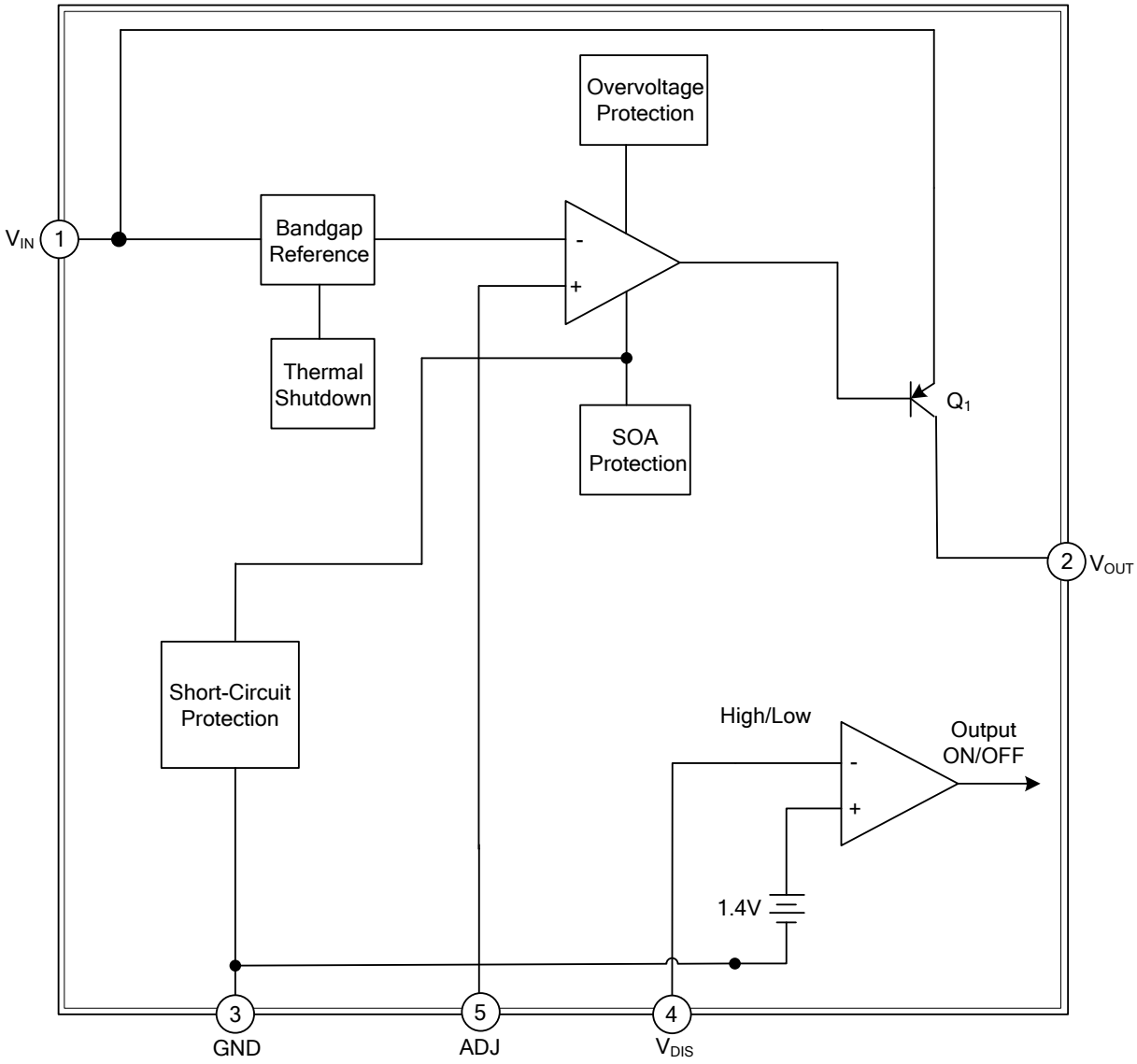
■ BLOCK DIAGRAM

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}	-20 ~ +80	°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	θ_{JA}	62.5	°C/W
	TO-220F-4		62.5	°C/W
	TO-252-5		110	°C/W
Junction to Case	TO-220B	θ_{JC}	1.67	°C/W
	TO-220F-4		3.68	°C/W
	TO-252-5		2.5	°C/W

■ ELECTRICAL CHARACTERISTICS (I_{OUT} =0.5A, T_A = 25°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} = 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	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} = 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	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} = 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

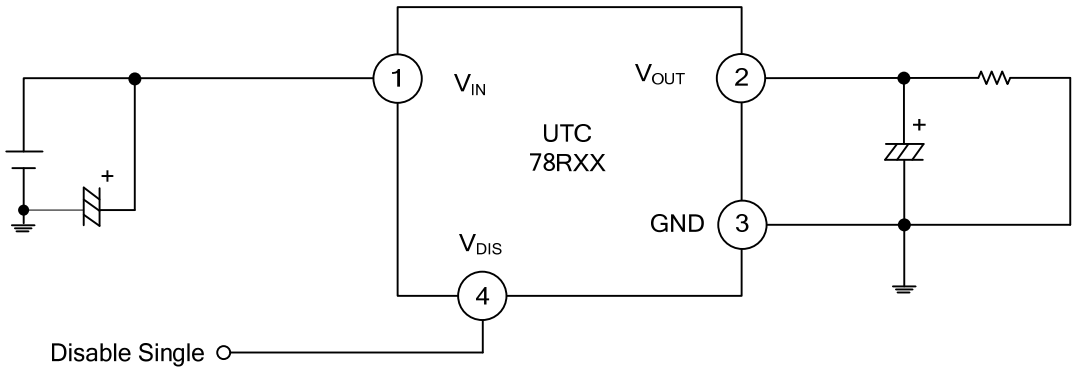
For 78RAD-ADJ

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}	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.

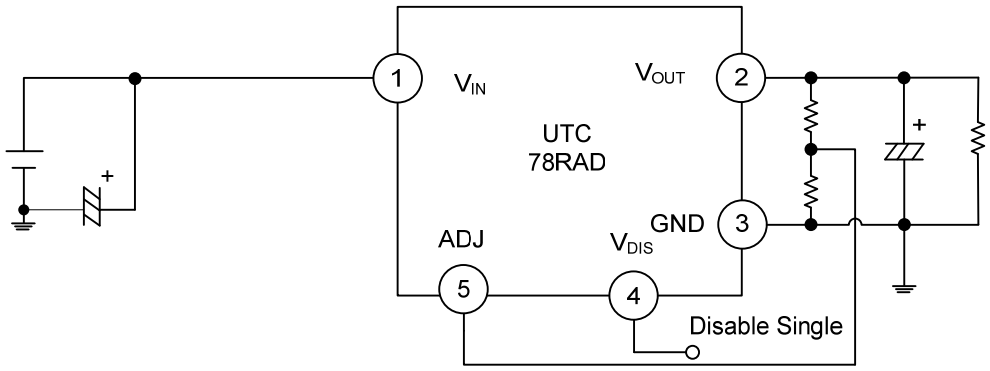
■ TYPICAL APPLICATION CIRCUIT

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

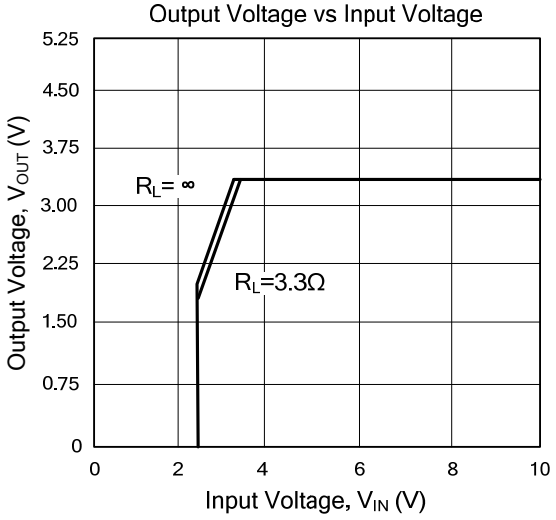


* C_I is required if regulator is located an appreciable distance from power supply filter. [C_I > 0.33μF (Electrolytic)]
* Co improves stability and transient response. [C_O > 47μF(Electrolytic)]

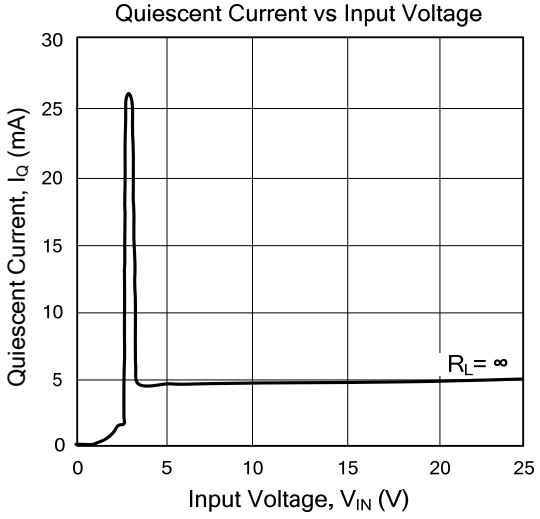
■ TYPICAL CHARACTERISTICS

(1) 78R33

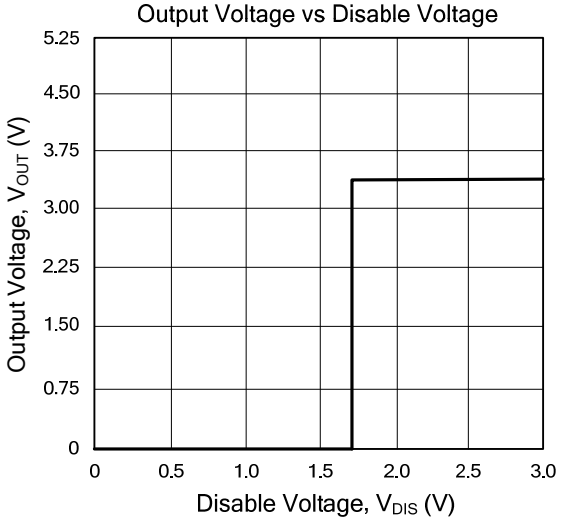
Output Voltage vs Input Voltage



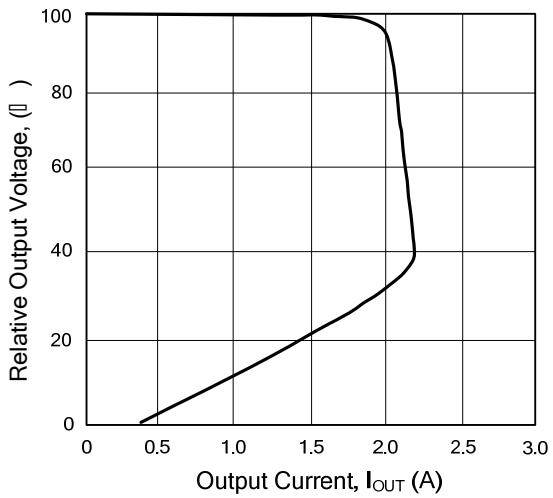
Quiescent Current vs Input Voltage



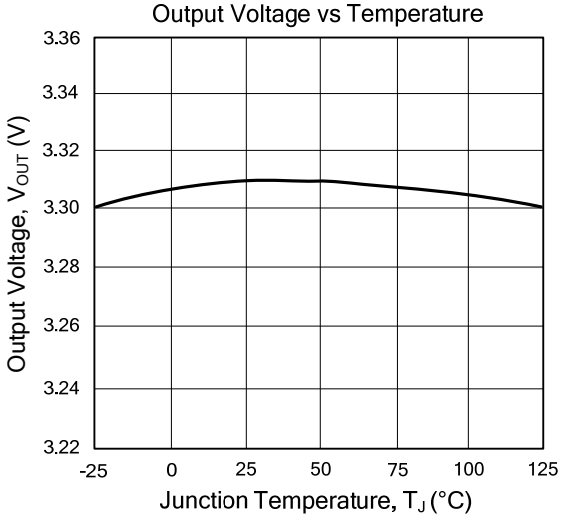
Output Voltage vs Disable Voltage



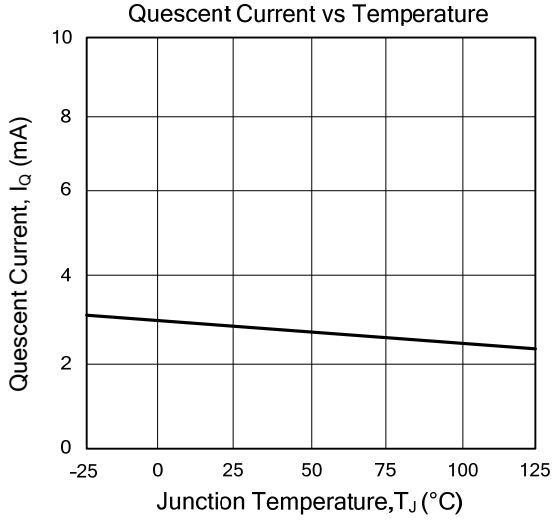
Overcurrent Protection Characteristics



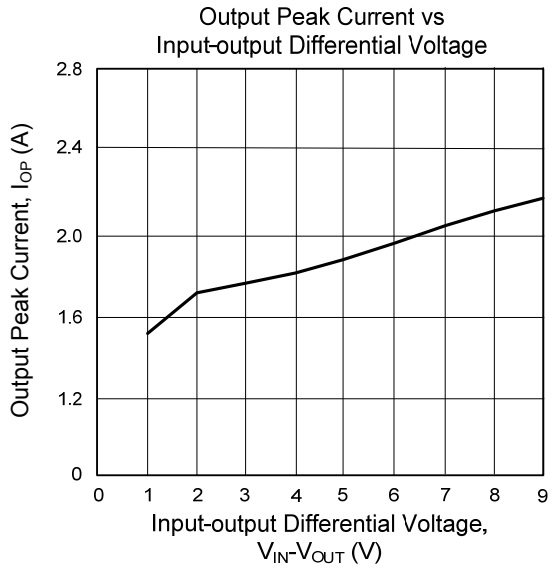
Output Voltage vs Temperature



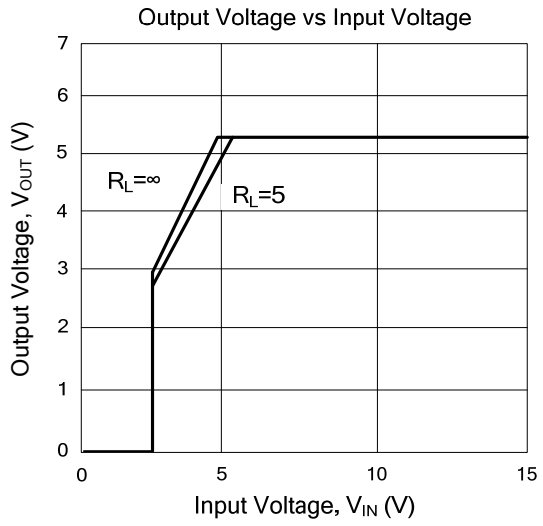
Quescent Current vs Temperature

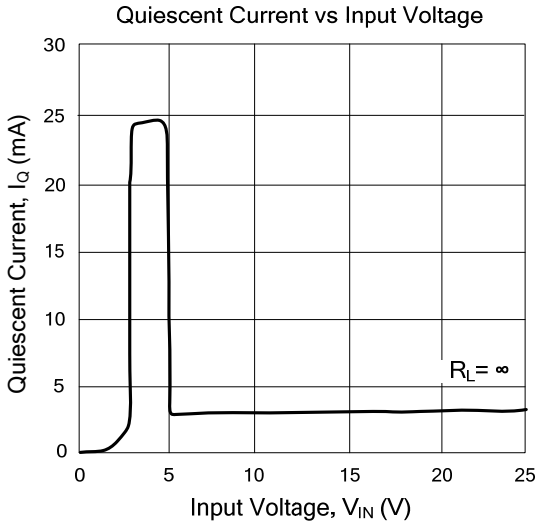


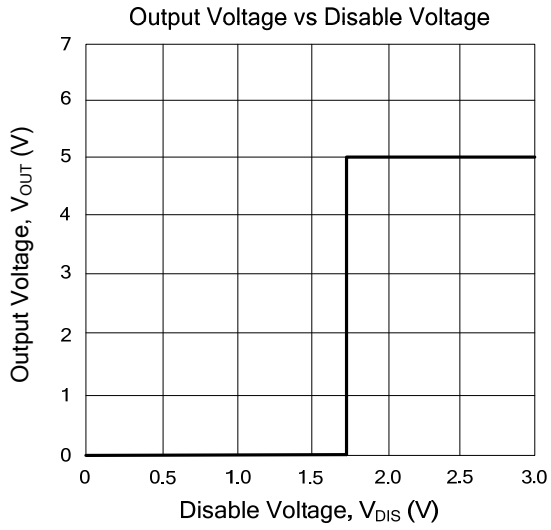
■ TYPICAL CHARACTERISTICS(Cont.)

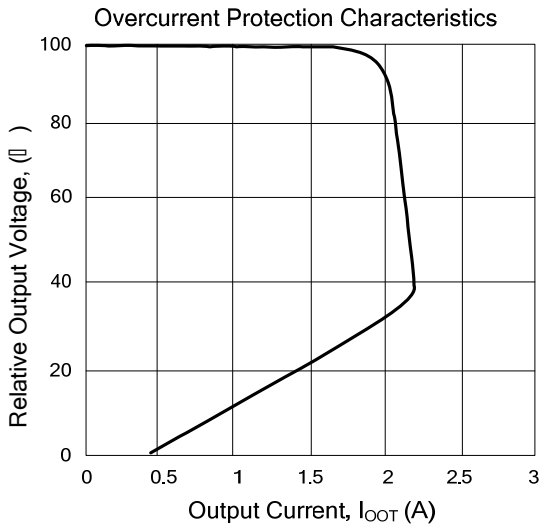


(2) 78R05



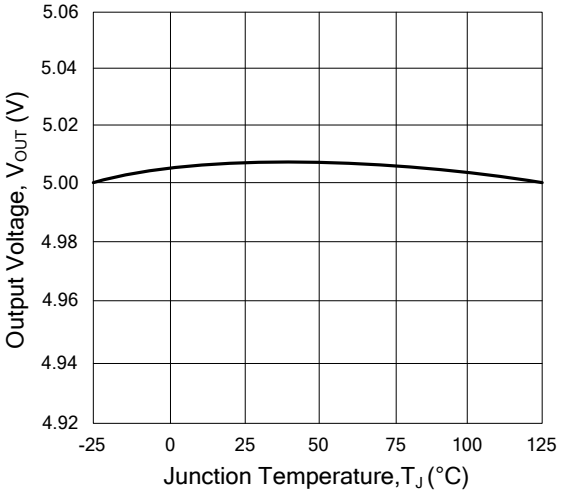




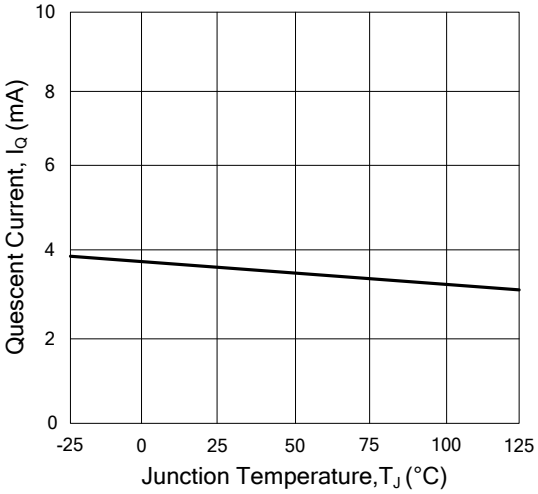


■ TYPICAL CHARACTERISTICS(Cont.)

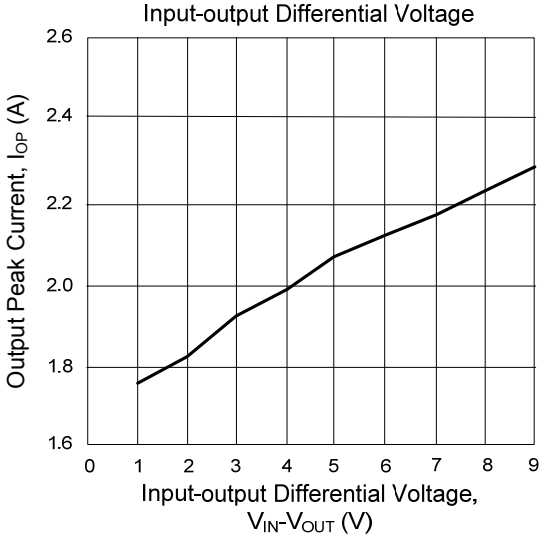
Output Voltage vs Temperature



Quescent Current vs Temperature

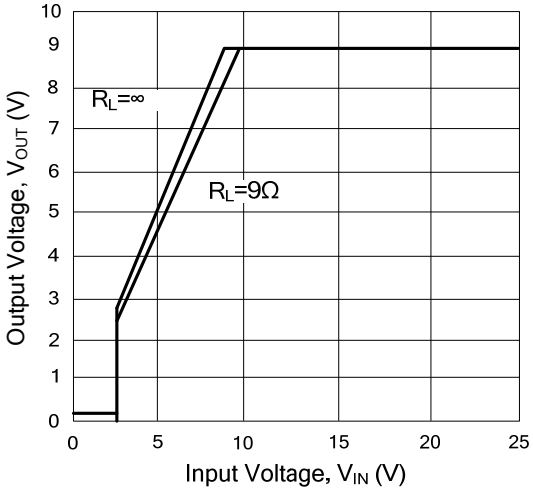


Output Peak Current vs
Input-output Differential Voltage

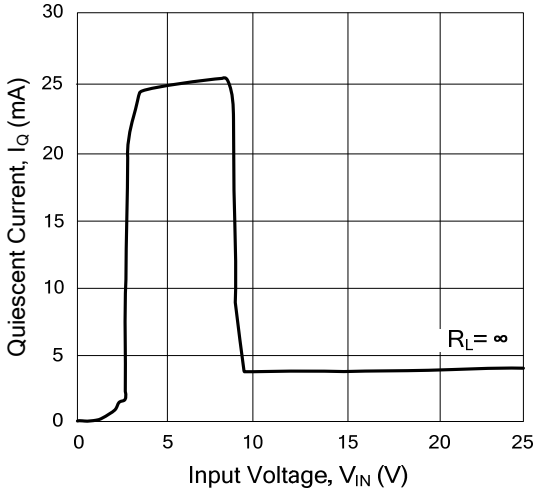


(3) 78R09

Output Voltage vs Input Voltage

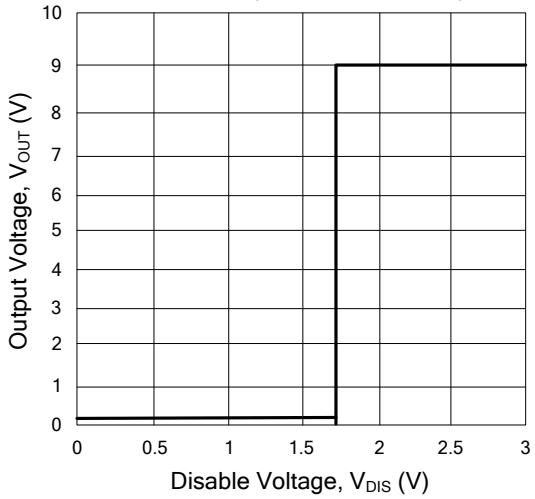


Quiescent Current vs Input Voltage

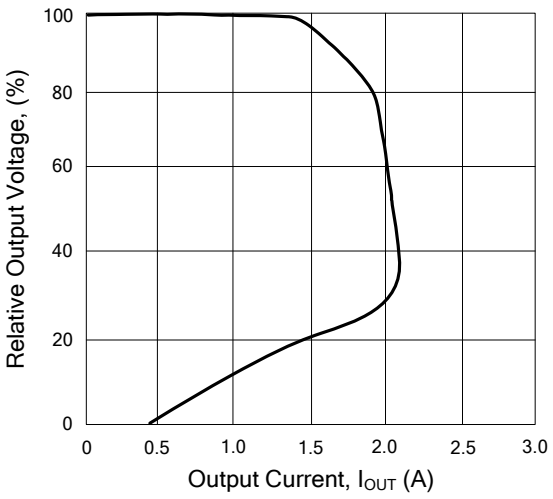


■ TYPICAL CHARACTERISTICS(Cont.)

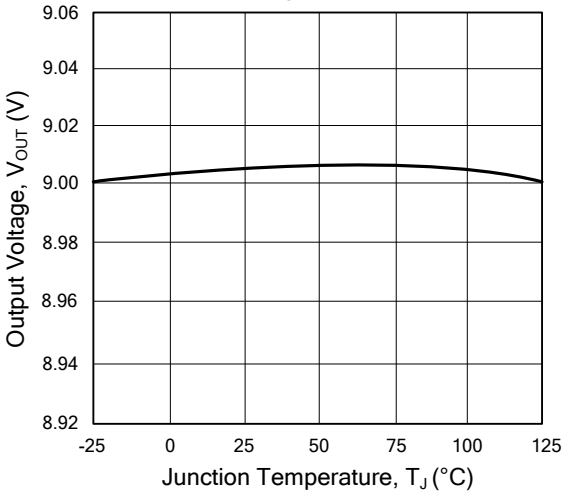
Output Voltage vs Disable Voltage



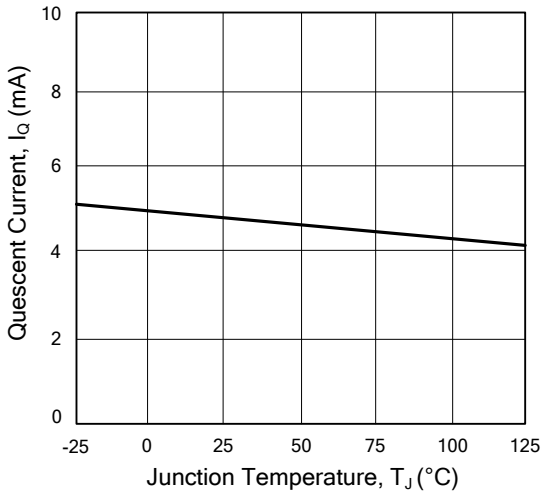
Overcurrent Protection Characteristics



Output Voltage vs Temperature



Quescent Current vs Temperature



Output Peak Current vs
Input-output Differential Voltage