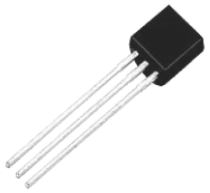
3-TERMINAL 0.1A NEGATIVE VOLTAGE REGULATOR LM79LXX

FEATURES

- Output Current Up to 100mA
- No External Components
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting
- Output Voltage of 5V, 6V, 8V, 9V, 12V, 15V, 18V and 24V
- Moisture Sensitivity Level 3

TO-92 PKG



SOT-89 PKG

DESCRIPTION

This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high current voltage regulators.

Each of these regulators can deliver up to 100mA of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained together with lower-bias current.

ORDERING INFORMATION

Device	Package
LM79LXX	TO-92 (Bulk)
LM79LXXTA	TO-92 (Taping)
LM79LXXF	SOT-89

XX : Output Voltage = 05, 06, 08, 09, 12, 15, 18, 24

Absolute Maximum Ratings

CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	LM79L05 ~ LM79L09	V_{IN}	-	-30	V
	LM79L12 ~ LM79L18		-	-35	
	LM79L24		-	-40	
Maximum Power Dissipation at T_A = 25°C / TO-92		P_{DMax}	-	0.770	W
Thermal Resistance Junction-To-Ambient / TO-92		θ_{JA}	-	162	℃/W
Lead Temperature (Soldering, 10 sec)		T_{SOL}	-	260	℃
Storage Temperature Range		T_{STG}	-65	150	℃
Operating Junction Temperature Range		T_{JOPR}	0	150	℃

Recommended Operating Conditions

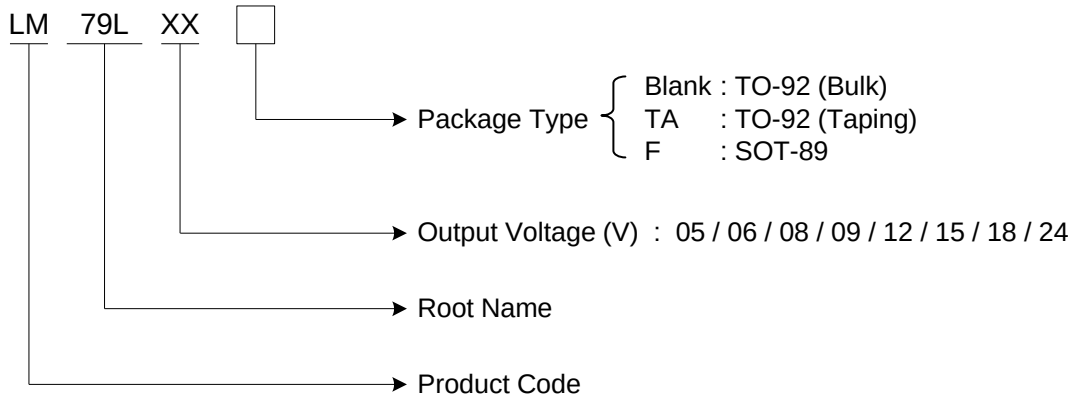
CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	LM79L05	V_{IN}	-7	-20	V
	LM79L06		-8	-20	
	LM79L08		-10.5	-23	
	LM79L09		-11.5	-24	
	LM79L12		-14.5	-27	
	LM79L15		-17.5	-30	
	LM79L18		-20.5	-33	
	LM79L24		-27	-38	
Output Current		Io	-	100	mA
Operating Virtual Junction Temperature		T_J	0	125	℃

Ordering Information

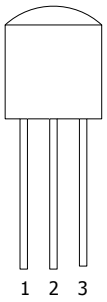
V_{OUT}	Package	Order No.	Description	Supplied As	Status
5.0V	TO-92	LM79L05	0.1A, Negative	Bulk	Active
		LM79L05TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L05F	0.1A, Negative	Reel	Active
6.0V	TO-92	LM79L06	0.1A, Negative	Bulk	Active
		LM79L06TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L06F	0.1A, Negative	Reel	Active
8.0V	TO-92	LM79L08	0.1A, Negative	Bulk	Active
		LM79L08TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L08F	0.1A, Negative	Reel	Active
9.0V	TO-92	LM79L09	0.1A, Negative	Bulk	Active
		LM79L09TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L09F	0.1A, Negative	Reel	Active
12V	TO-92	LM79L12	0.1A, Negative	Bulk	Active
		LM79L12TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L12F	0.1A, Negative	Reel	Active
15V	TO-92	LM79L15	0.1A, Negative	Bulk	Active
		LM79L15TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L15F	0.1A, Negative	Reel	Active

Ordering Information (Continued)

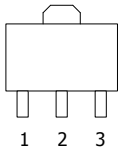
V_{OUT}	Package	Order No.	Description	Supplied As	Status
18V	TO-92	LM79L18	0.1A, Negative	Bulk	Active
		LM79L18TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L18F	0.1A, Negative	Reel	Active
24V	TO-92	LM79L24	0.1A, Negative	Bulk	Active
		LM79L24TA	0.1A, Negative	Taping	Active
	SOT-89	LM79L24F	0.1A, Negative	Reel	Active



PIN CONFIGURATION



TO-92

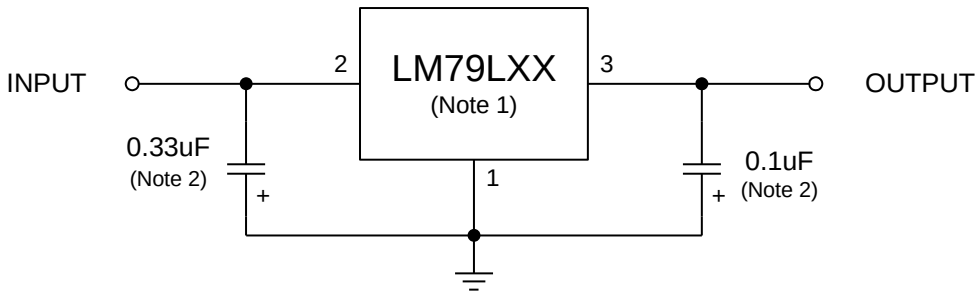


SOT-89

PIN DESCRIPTION

Pin No.	TO-92 / SOT-89 **3 LEAD**	
	Name	Function
1	GND	Ground
2	V_{IN}	Input Voltage
3	V_{OUT}	Output Voltage

TYPICAL APPLICATION



Note 1. To specify an output voltage, substitute voltage for "XX".
Note 2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

ELECTRICAL CHARACTERISTICS

LM79L05 (At specified virtual junction temperature, V_{IN} = -10V, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-4.8	-5	-5.2	V
		1mA ≤ Io ≤ 40mA -7V ≤ V_{IN} ≤ 20V	0℃ ~ 125℃	-4.75	-5	-5.25	
		1mA ≤ Io ≤ 70mA		-4.75	-5	-5.25	
Line Regulation	ΔV_{LINE}	-7V ≤ V_{IN} ≤ -20V	25℃		32	150	mV
		-8V ≤ V_{IN} ≤ -20V			26	100	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		15	60	mV
		1mA ≤ Io ≤ 40mA			8	30	
Bias Current	I_B		25℃		3.8	6	mA
			125℃			5.5	
Bias Current Change	ΔI_B	-8V ≤ V_{IN} ≤ -20V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		42		uV
Ripple Rejection	RR	-8V ≤ V_{IN} ≤ -18V, f=120Hz	25℃	41	49		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L06 (At specified virtual junction temperature, V_{IN} = -11V, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-5.76	-6	-6.24	V
		1mA ≤ Io ≤ 40mA -8V ≤ V_{IN} ≤ -21V	0℃ ~ 125℃	-5.7	-6	-6.3	
		1mA ≤ Io ≤ 70mA		-5.7	-6	-6.3	
Line Regulation	ΔV_{LINE}	-8V ≤ V_{IN} ≤ -21V	25℃		50	150	mV
		-9V ≤ V_{IN} ≤ -21V			45	110	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		12	70	mV
		1mA ≤ Io ≤ 40mA			5.5	35	
Bias Current	I_B		25℃			6	mA
			125℃			5.5	
Bias Current Change	ΔI_B	-9V ≤ V_{IN} ≤ -21V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		50		uV
Ripple Rejection	RR	-9V ≤ V_{IN} ≤ -19V, f=120Hz	25℃	39	47		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L08 (At specified virtual junction temperature, V_{IN} = -14V, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-7.7	-8	-8.3	V
		1mA ≤ Io ≤ 40mA -10.5V ≤ V_{IN} ≤ -23V	0℃ ~ 125℃	-7.6	-8	-8.4	
		1mA ≤ Io ≤ 70mA		-7.6	-8	-8.4	
Line Regulation	ΔV_{LINE}	-10.5V ≤ V_{IN} ≤ -23V	25℃		20	175	mV
		-11V ≤ V_{IN} ≤ -23V			12	125	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		18	80	mV
		1mA ≤ Io ≤ 40mA			9	42	
Bias Current	I_B		25℃			6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-11V ≤ V_{IN} ≤ -23V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		60		uV
Ripple Rejection	RR	-12V ≤ V_{IN} ≤ -23V, f=120Hz	25℃	42	49		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L09 (At specified virtual junction temperature, V_{IN} = -15V, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-8.64	-9	-9.36	V
		1mA ≤ Io ≤ 40mA -11V ≤ V_{IN} ≤ -24V	0℃ ~ 125℃	-8.55	9	-9.45	
		1mA ≤ Io ≤ 70mA		-8.55	9	-9.45	
Line Regulation	ΔV_{LINE}	-11V ≤ V_{IN} ≤ -24V	25℃		80	200	mV
		-12V ≤ V_{IN} ≤ -24V			20	160	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		17	90	mV
		1mA ≤ Io ≤ 40mA			8	45	
Bias Current	I_B		25℃		3.8	6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-12V ≤ V_{IN} ≤ -24V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		64		uV
Ripple Rejection	RR	-8V ≤ V_{IN} ≤ -18V, f=120Hz	25℃	35	43		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L12 (At specified virtual junction temperature, V_{IN} = -19V, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-11.5	-12	-12.5	V
		1mA ≤ Io ≤ 40mA -14.5V ≤ V_{IN} ≤ -27V	0℃ ~ 125℃	-11.4	-12	-12.6	
		1mA ≤ Io ≤ 70mA		-11.4	-12	-12.6	
Line Regulation	ΔV_{LINE}	-14.5V ≤ V_{IN} ≤ -27V	25℃		50	250	mV
		-16V ≤ V_{IN} ≤ -27V			40	200	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		24	100	mV
		1mA ≤ Io ≤ 40mA			15	50	
Bias Current	I_B		25℃			6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-16V ≤ V_{IN} ≤ -27V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		70		uV
Ripple Rejection	RR	-15V ≤ V_{IN} ≤ -25V, f=120Hz	25℃	37	42		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L15 (At specified virtual junction temperature, V_{IN} = -23V, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-14.4	-15	-15.6	V
		1mA ≤ Io ≤ 40mA -17.5V ≤ V_{IN} ≤ -30V	0℃ ~ 125℃	-14.25	-15	-15.75	
		1mA ≤ Io ≤ 70mA		-14.25	-15	-15.75	
Line Regulation	ΔV_{LINE}	-17.5V ≤ V_{IN} ≤ -30V	25℃		65	300	mV
		-27V ≤ V_{IN} ≤ -30V			58	250	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		25	150	mV
		1mA ≤ Io ≤ 40mA			15	75	
Bias Current	I_B		25℃		4.2	6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-20V ≤ V_{IN} ≤ -30V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		82		uV
Ripple Rejection	RR	-18.5V ≤ V_{IN} ≤ -28.5V, f=120Hz	25℃	37	44		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L18 (At specified virtual junction temperature, V_{IN} = -26V, Io = 40mA (Unless otherwise noted)

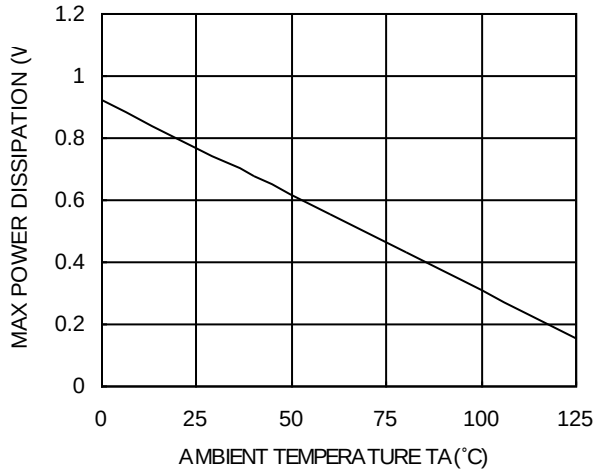
PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-17.3	-18	-18.7	V
		1mA ≤ Io ≤ 40mA -20.5V ≤ V_{IN} ≤ -33V	0℃ ~ 125℃	-17.1	-18	-18.9	
		1mA ≤ Io ≤ 70mA		-17.1	-18	-18.9	
Line Regulation	ΔV_{LINE}	-20.7V ≤ V_{IN} ≤ -33V	25℃		70	360	mV
		-21V ≤ V_{IN} ≤ -33V			64	300	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		27	180	mV
		1mA ≤ Io ≤ 40mA			19	90	
Bias Current	I_B		25℃		4.7	6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-21V ≤ V_{IN} ≤ -33V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		82		uV
Ripple Rejection	RR	-23V ≤ V_{IN} ≤ -33V, f=120Hz	25℃	32	36		dB
Dropout Voltage	V_D		25℃		1.7		V

LM79L24 (At specified virtual junction temperature, V_{IN} = -32V, Io = 40mA (Unless otherwise noted)

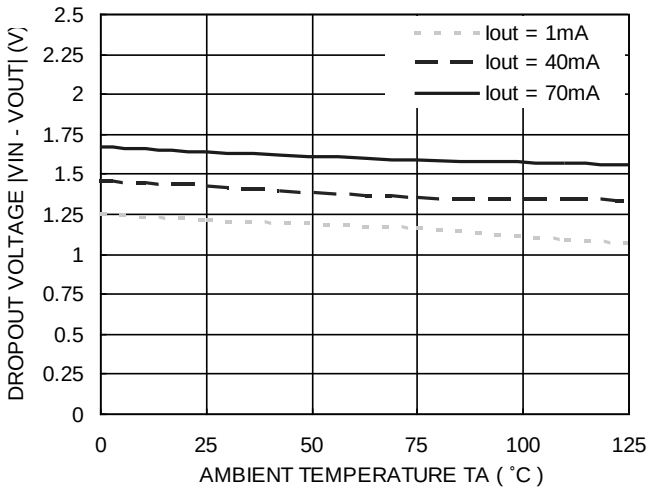
PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-23	-24	-25	V
		1mA ≤ Io ≤ 40mA -27V ≤ V_{IN} ≤ -38V	0℃ ~ 125℃	-22.8	-24	-25.2	
		1mA ≤ Io ≤ 70mA		-22.8	-24	-25.2	
Line Regulation	ΔV_{LINE}	-27V ≤ V_{IN} ≤ -38V	25℃		95	480	mV
		-28V ≤ V_{IN} ≤ -38V			78	400	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		41	240	mV
		1mA ≤ Io ≤ 40mA			28	120	
Bias Current	I_B		25℃		4.8	6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-21V ≤ V_{IN} ≤ -38V	0℃ ~ 125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		82		uV
Ripple Rejection	RR	-29V ≤ V_{IN} ≤ -35V, f=120Hz	25℃	30	33		dB
Dropout Voltage	V_D		25℃		1.7		V

Note 1. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.
Note 2. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

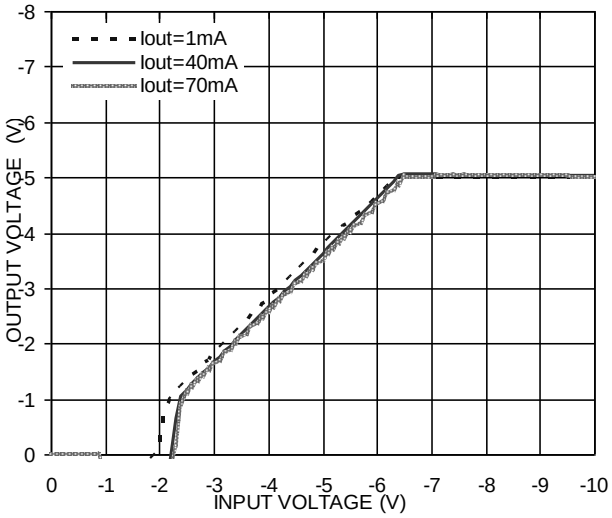
TYPICAL OPERATING CHARACTERISTICS



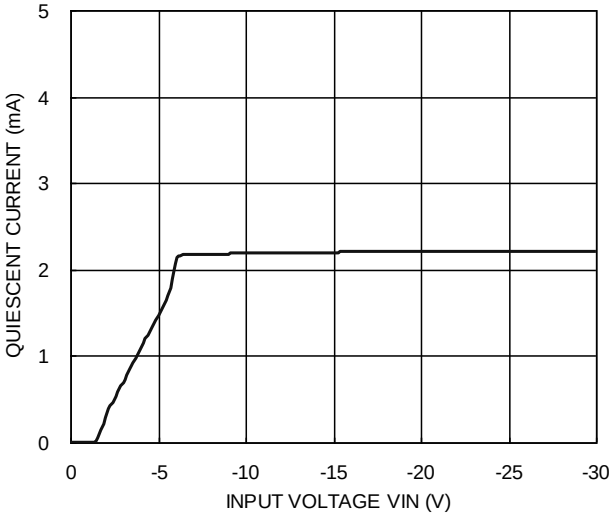
Power Dissipation vs. Ambient Temperature, TO-92



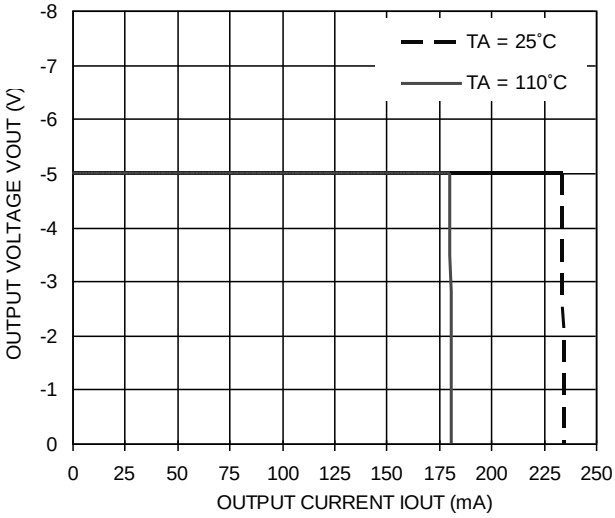
Dropout Voltage vs. Ambient Temperature



Output Voltage vs. Input Voltage



Quiescent Current vs. Input Voltage



Output Voltage vs. Output Current

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