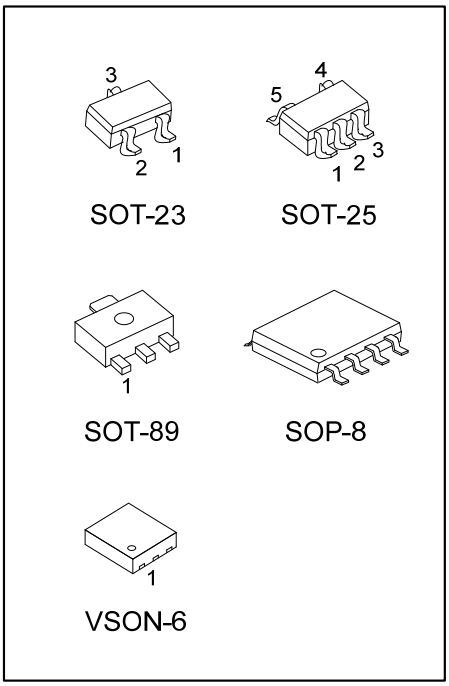
LR1106

CMOS IC

LARGE CURRENT POSITIVE VOLTAGE REGULATORS



■ DESCRIPTION

The UTC **LR1106** series are positive voltage regulators that developed in CMOS technology with highly precise, low power consumption. It is capable of large currents with a significantly small dropout voltage.

The device consists of a driver transistor, a precision reference voltage and an error amplifier. Basically, output voltage is selectable in 0.1V step form 1.8V to 6.0V, 2.85V also is available.

■ FEATURES

* Maximum Output Current : 400mA
* Maximum Operating Voltage : 8V
* Highly Accurate : ± 2%
* Low Power Consumption : TYP 8.0μA
* Output Voltage Temperature Characteristics : TYP ±100ppm/°C

■ ORDERING INFORMATION

Ordering Number		Pin Assignment								Package	Packing
Lead Free	Halogen Free	1	2	3	4	5	6	7	8		
LR1106L-xx-AB3-B-R	LR1106G-xx-AB3-B-R	O	G	I	-	-	-	-	-	SOT-89	Tape Reel
LR1106L-xx-AB3-C-R	LR1106G-xx-AB3-C-R	G	I	O	-	-	-	-	-	SOT-89	Tape Reel
LR1106L-xx-AE3-3-R	LR1106G-xx-AE3-3-R	O	G	I	-	-	-	-	-	SOT-23	Tape Reel
LR1106L-xx-AF5-R	LR1106G-xx-AF5-R	I	G	E	N	O	-	-	-	SOT-25	Tape Reel
LR1106L-xx-S08-R	LR1106G-xx-S08-R	O	N	G	N	E	N	N	I	SOP-8	Tape Reel
LR1106L-xx-V26-B-R	LR1106G-xx-V26-B-R	I	N	O	N	G	E	-	-	VSON-6	Tape Reel

Note: Pin Assignment: I:V_{IN} O:V_{OUT} G:GND N: No Connection E: Enable
xx: Output Voltage, refer to Marking Information.

LR1106L-xx-AB3-B-R

(1) Packing Type
(2) Pin Code
(3) Package Type
(4) Output Voltage Code
(5) Lead Plating

(1) R: Tape Reel
(2) Refer to Pin Assignment
(3) AB3: SOT-89, AE3: SOT-23, AF5: SOT-25, S08: SOP-8, V26-B: VSON-6
(4) xx: Refer to Marking Information
(5) G: Halogen Free, L: Lead Free

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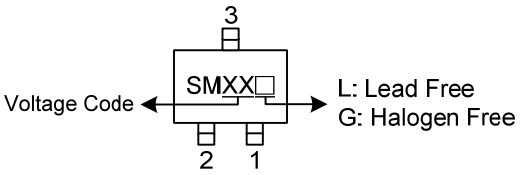
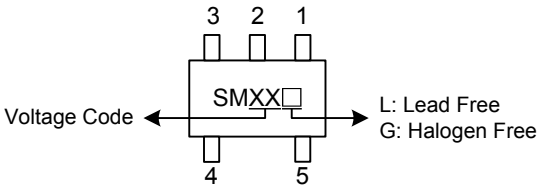
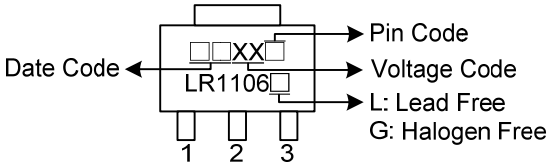
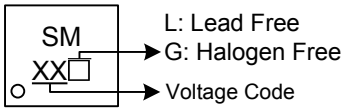
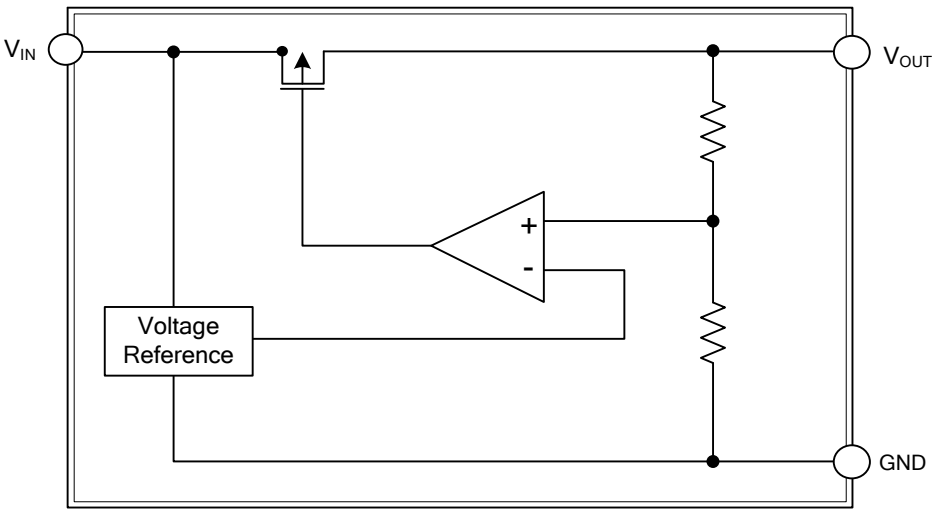
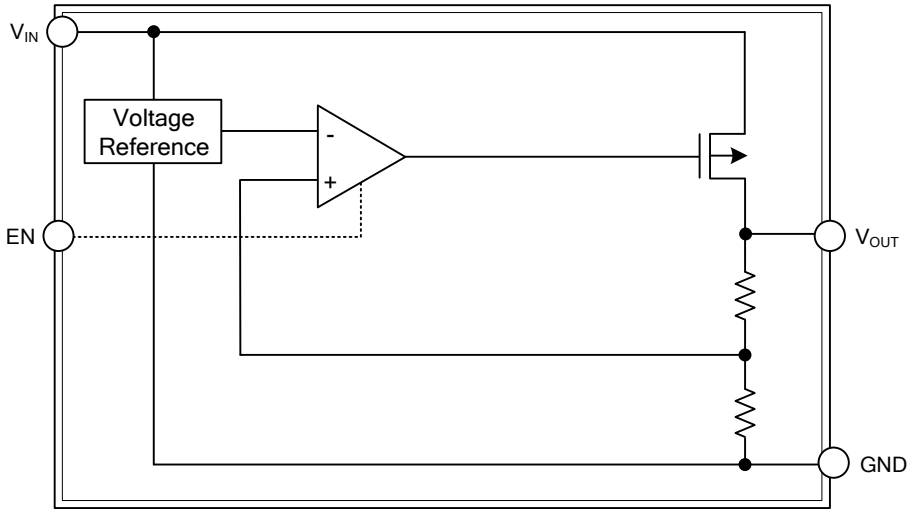
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	PIN CODE	1	2	3	4	5	6	MARKING
SOT-23	18:1.8V 22:2.2V 25:2.5V 27:2.7V 28:2.8V 2J:2.85V 30:3.0V 31:3.1V 33:3.3V 35:3.5V 50:5.0V	3	O	G	I	-	-	-	
SOT-25		-	I	G	E	N	O	-	
SOT-89		B	O	G	I	-	-	-	
		C	G	I	O	-	-	-	
VSON-6		-	I	N	O	N	G	C	

■ BLOCK DIAGRAM



For SOT-89 / SOT-23 Package



For SOP-8 / VSON-6 / SOT-25 Package

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V_{IN}	8	V
Output Voltage		V_{OUT}	V_{SS} -0.3 ~ V_{IN}+0.3	V
Output Current		I_{OUT}	400	mA
Power Dissipation	SOT-25/SOT-23	P_D	300	mW
	SOT-89/SOP-8		500	mW
	VSON-6		1000	mW
Operating Ambient Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-40 ~ +125	°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.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified.)

For LR1106-18

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=2.8V, I_{OUT}=40mA	1.764	1.800	1.836	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=2.8V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		200	300	mV
	V_{D2}	I_{OUT}=200mA		400	600	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=2.8V, V_{OUT}≥V_{OUT}× 0.90	400			mA
Supply Current	I_{SS}	V_{IN}=2.8V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=2.8V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=2.8V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=2.8V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 2.8V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

For LR1106-22

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.2V, I_{OUT}=40mA	2.156	2.200	2.244	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=3.2V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		200	300	mV
	V_{D2}	I_{OUT}=200mA		400	600	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=3.2V, V_{OUT}≥V_{OUT}× 0.90	400			mA
Supply Current	I_{SS}	V_{IN}=3.2V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=3.2V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=3.2V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=3.2V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 3.2V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

■ ELECTRICAL CHARACTERISTICS(Cont.)

For LR1106-25

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.5V, I_{OUT}=40mA	2.450	2.500	2.550	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=3.5V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		170	250	mV
	V_{D2}	I_{OUT}=200mA		320	500	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=3.5V, V_{OUT}≥V_{OUT}× 0.93	400			mA
Supply Current	I_{SS}	V_{IN}=3.5V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=3.5V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=3.5V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=3.5V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 3.5V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

For LR1106-27

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.7V, I_{OUT}=40mA	2.646	2.700	2.754	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=3.7V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		170	250	mV
	V_{D2}	I_{OUT}=200mA		320	500	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=3.7V, V_{OUT}≥V_{OUT}× 0.93	400			mA
Supply Current	I_{SS}	V_{IN}=3.7V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=3.7V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=3.7V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=3.7V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 3.7V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

For LR1106-28

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.8V, I_{OUT}=40mA	2.744	2.800	2.856	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=3.8V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		170	250	mV
	V_{D2}	I_{OUT}=200mA		320	500	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=3.8V, V_{OUT}≥V_{OUT}× 0.93	400			mA
Supply Current	I_{SS}	V_{IN}=3.8V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=3.8V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=3.8V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=3.8V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 3.8V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

■ ELECTRICAL CHARACTERISTICS(Cont.)

For LR1106-2J(2.85V)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.85V, I_{OUT}=40mA	2.793	2.850	2.907	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=3.85V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		170	250	mV
	V_{D2}	I_{OUT}=200mA		250	500	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=3.85V, V_{OUT}≥V_{OUT}× 0.93	400			mA
Supply Current	I_{SS}	V_{IN}=3.85V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=3.85 to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=3.85V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=3.85V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 3.85V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

For LR1106-30

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=4.0V, I_{OUT}=40mA	2.940	3.000	3.060	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=4.0V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		150	220	mV
	V_{D2}	I_{OUT}=200mA		300	420	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=4.0V, V_{OUT}≥V_{OUT}× 0.96	400			mA
Supply Current	I_{SS}	V_{IN}=4.0V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=4.0V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=4.0V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=4.0V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 4V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

For LR1106-31

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=4.1V, I_{OUT}=40mA	3.038	3.100	3.162	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=4.1V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		150	220	mV
	V_{D2}	I_{OUT}=200mA		300	420	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=4.1V, V_{OUT}≥V_{OUT}× 0.96	400			mA
Supply Current	I_{SS}	V_{IN}=4.1V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=4.1V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=4.1V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=4.1V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 4V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

■ ELECTRICAL CHARACTERISTICS(Cont.)

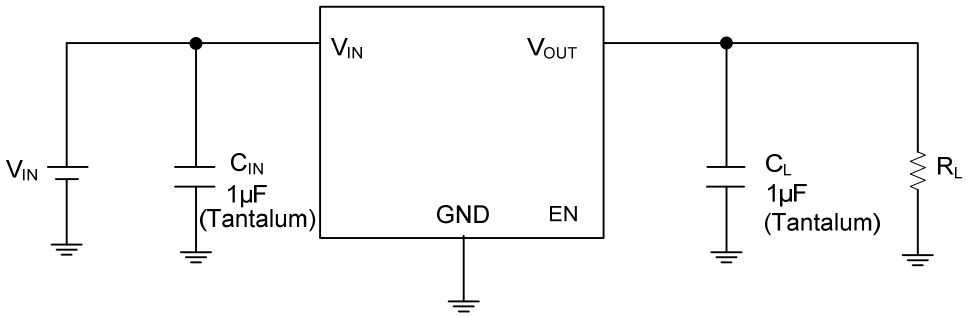
For LR1106-33

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=4.3V, I_{OUT}=40mA	3.234	3.300	3.366	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=4.3V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		150	220	mV
	V_{D2}	I_{OUT}=200mA		300	420	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=4.3V, V_{OUT}≥V_{OUT}× 0.96	400			mA
Supply Current	I_{SS}	V_{IN}=4.3V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=4.3V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=4.3V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=4.3V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 4.3V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

For LR1106-50

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=6.0V, I_{OUT}=40mA	4.900	5.000	5.100	V
Input Voltage	V_{IN}				8	V
Load Regulation	ΔV_{OUT}	V_{IN}=6.0V, 1mA≤I_{OUT}≤200mA		40	100	mV
Dropout Voltage	V_{D1}	I_{OUT}=100mA		100	180	mV
	V_{D2}	I_{OUT}=200mA		200	320	
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=6.0V, V_{OUT}≥V_{OUT}× 0.96	400			mA
Supply Current	I_{SS}	V_{IN}=6.0V, V_{EN}=V_{IN}		30.0	50.0	μA
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}			0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=6.0V to 8V		1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=6.0V to 8V	V_{IN}/2+0.8		V_{IN}	V
	V_{EL}	V_{IN}=6.0V to 8V	0		0.4	V
Line Regulation	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 6.0V≤V_{IN}≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{\triangle V_{OUT}}{\triangle T_{OPR} \times V_{OUT}}$	I_{OUT}=40mA		±100		ppm/°C

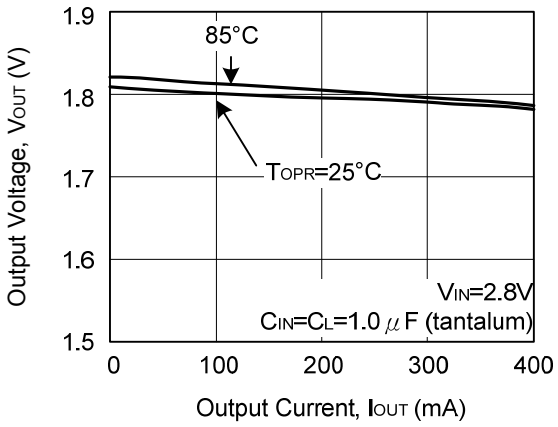
■ TYPICAL APPLICATION CIRCUIT



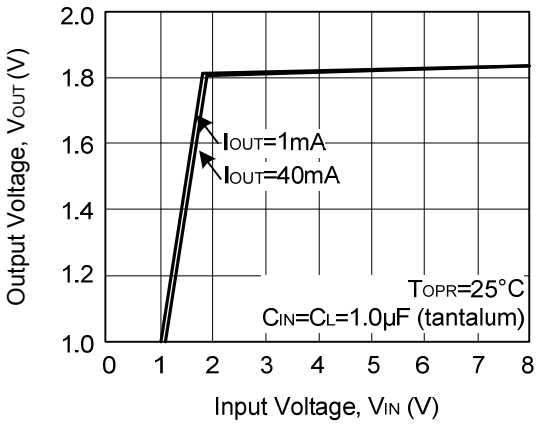
■ TYPICAL CHARACTERISTICS

(1) LR1106-18

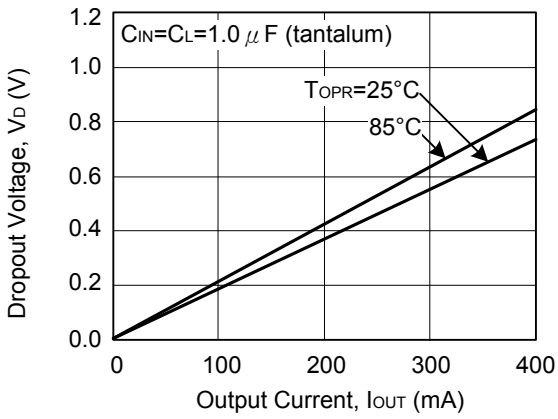
Output Voltage vs. Output Current



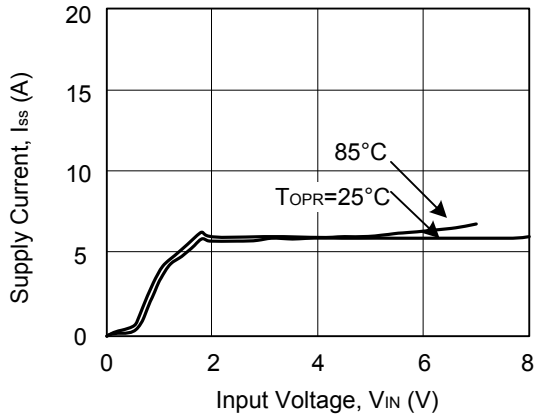
Output Voltage vs. Input Voltage



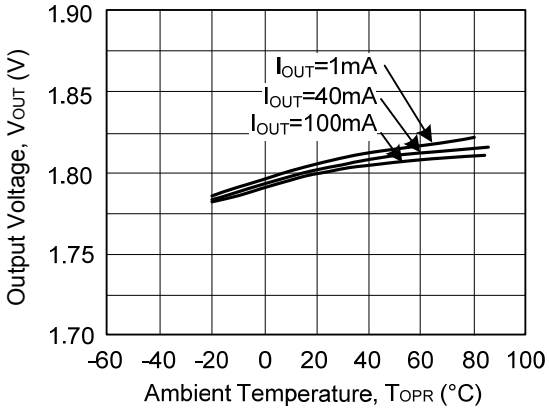
Dropout Voltage vs. Output Current



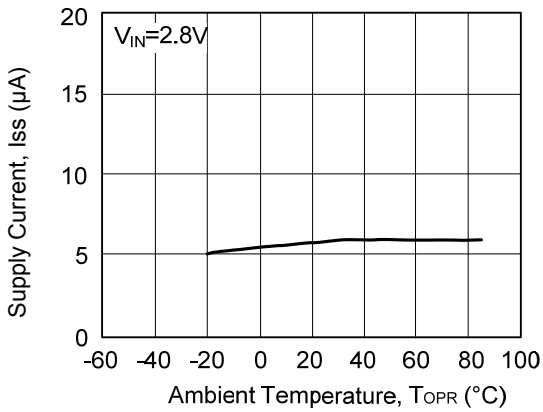
Supply Current vs. Input Voltage



Output Voltage vs Ambient Temperature

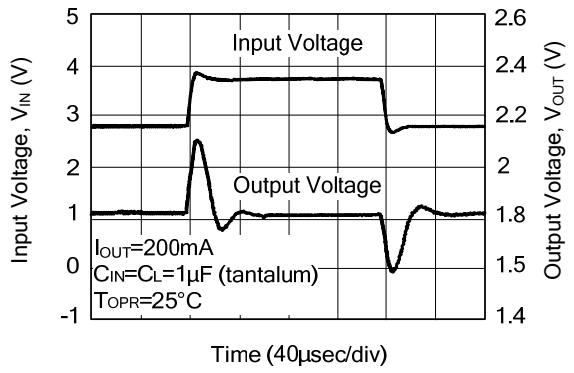


Supply Current vs Ambient Temperature

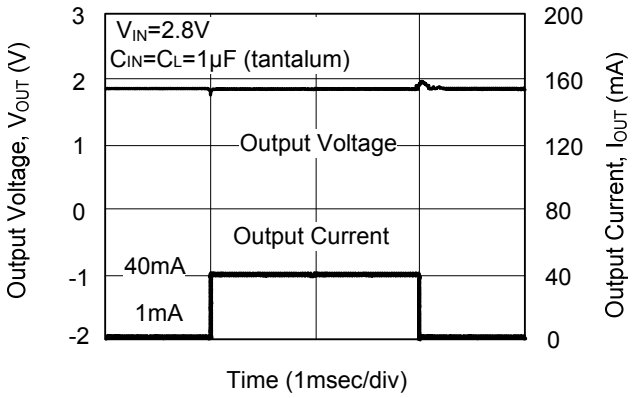


■ TYPICAL CHARACTERISTICS (Cont.)

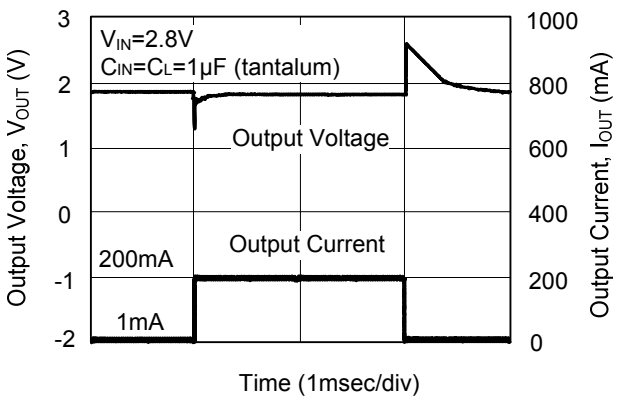
Input Transient Response



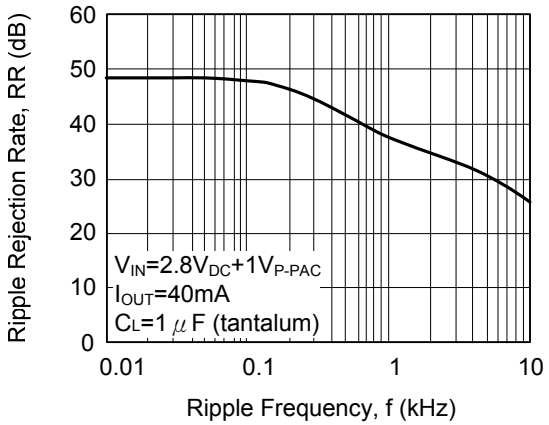
Load Transient Response



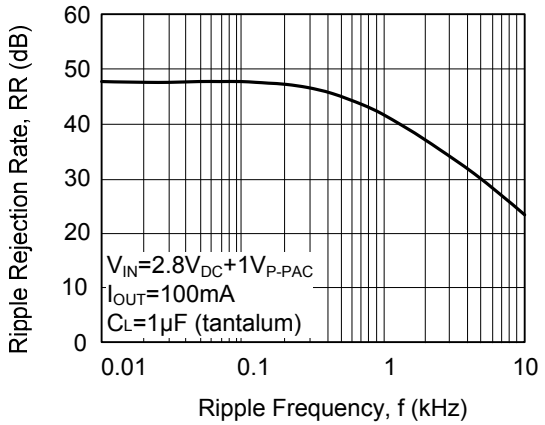
Load Transient Response



Ripple Rejection Rate



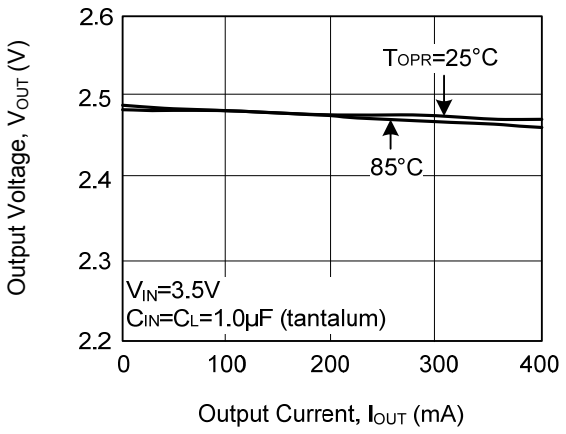
Ripple Rejection Rate



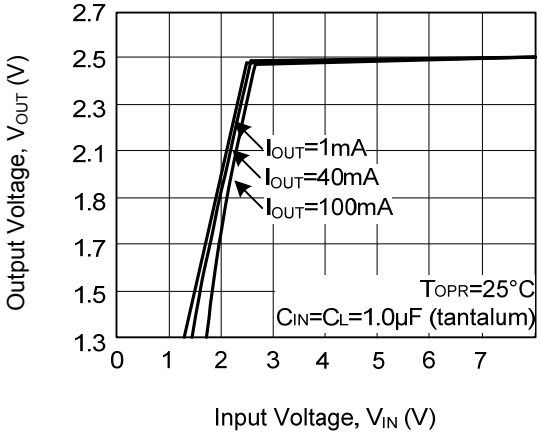
■ TYPICAL CHARACTERISTICS (Cont.)

(2) LR1106-25

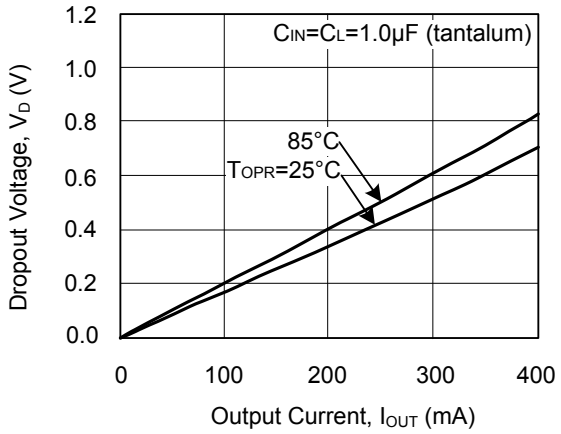
Output Voltage vs Output Current



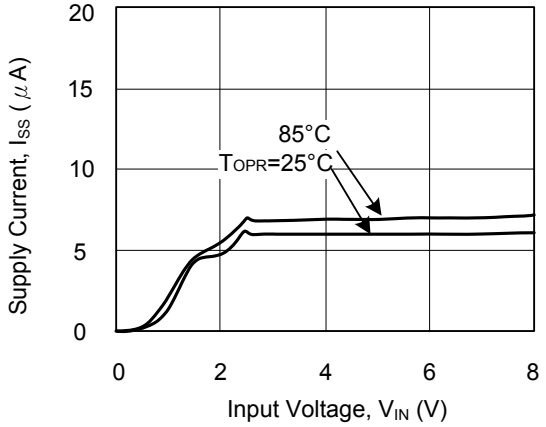
Output Voltage vs Input Voltage



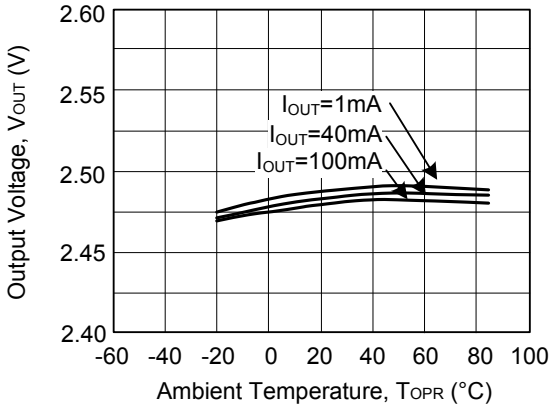
Dropout Voltage vs Output Current



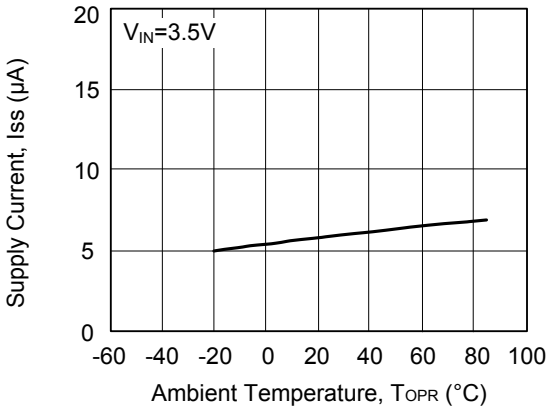
Supply Current vs Input Voltage



Output Voltage vs Ambient Temperature

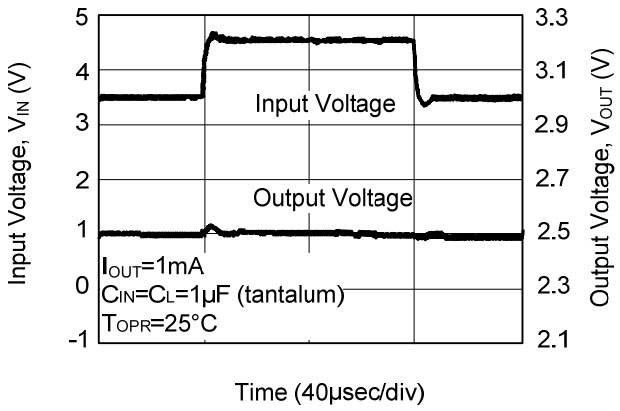


Supply Current vs Ambient Temperature

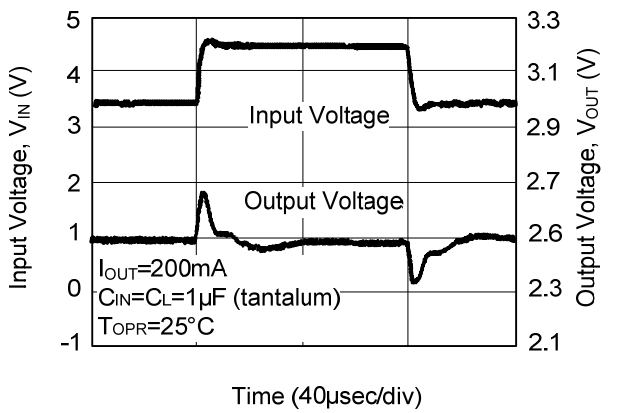


■ TYPICAL CHARACTERISTICS (Cont.)

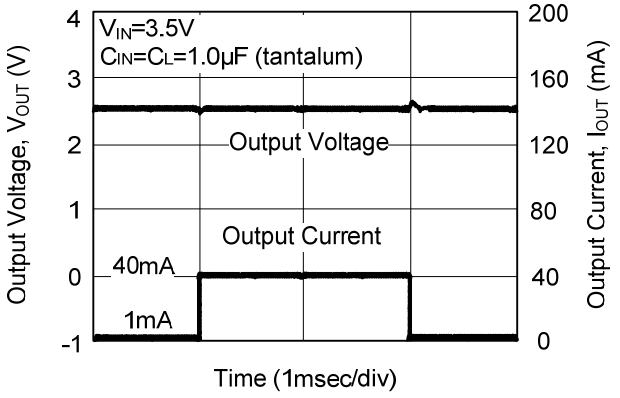
Input Transient Response



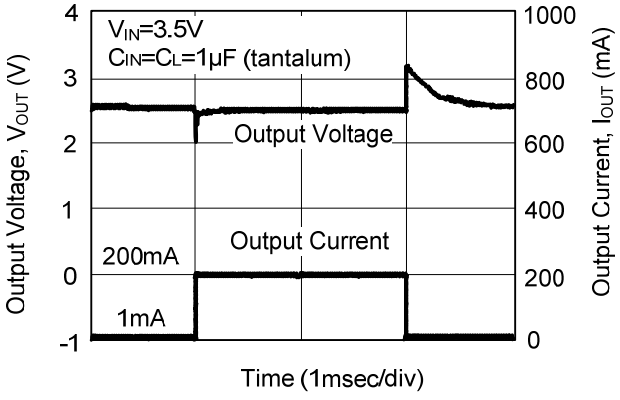
Input Transient Response



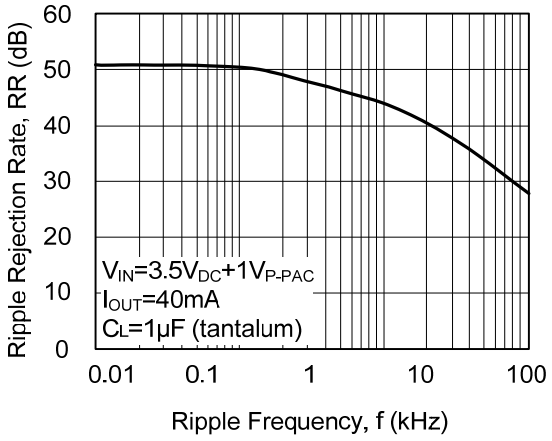
Load Transient Response



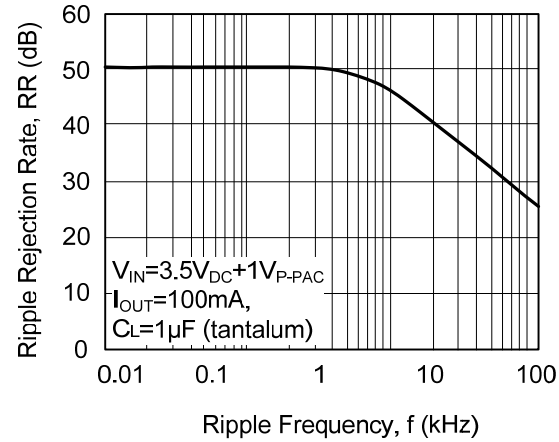
Load Transient Response



Ripple Rejection Rate



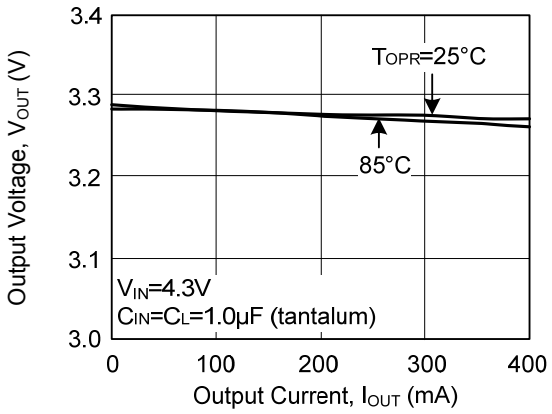
Ripple Rejection Rate



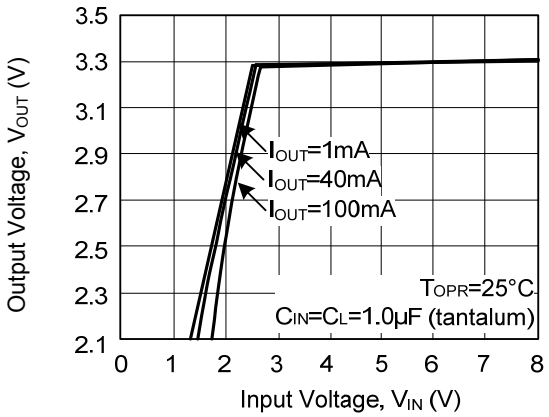
■ TYPICAL CHARACTERISTICS (Cont.)

(3) LR1106-33

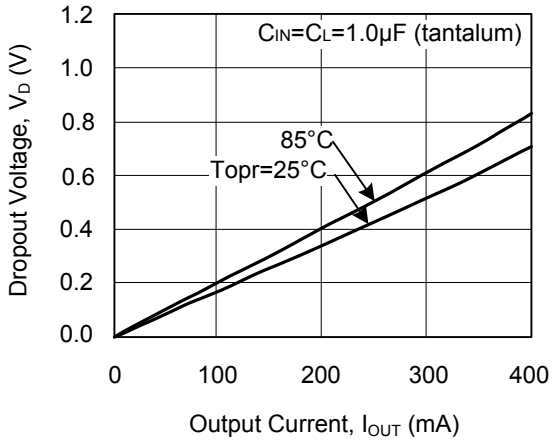
Output Voltage vs Output Current



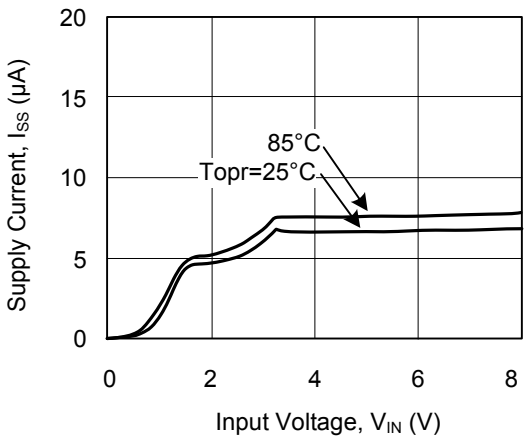
Output Voltage vs Input Voltage



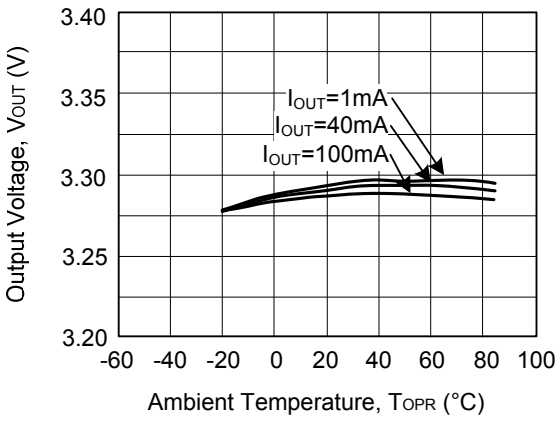
Dropout Voltage vs Output Current



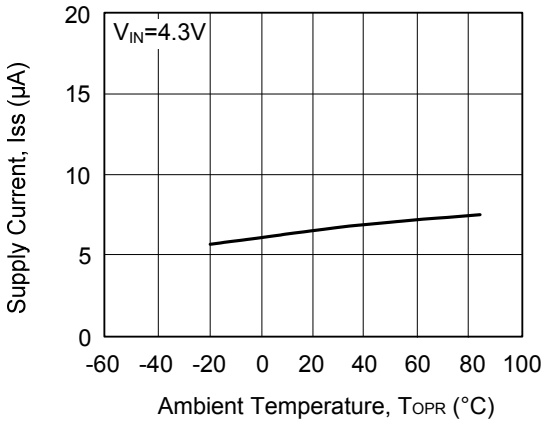
Supply Current vs Input Voltage



Output Voltage vs Ambient Temperature

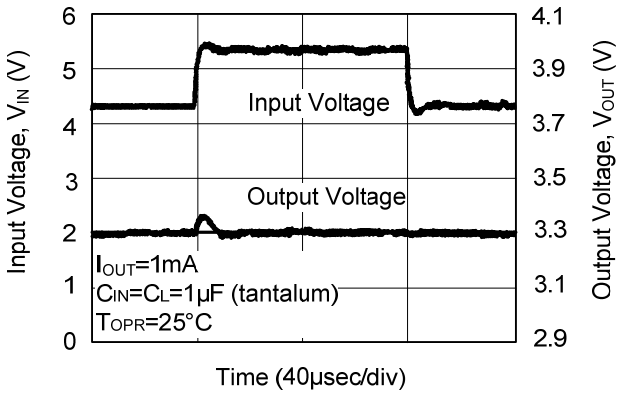


Supply Current vs Ambient Temperature

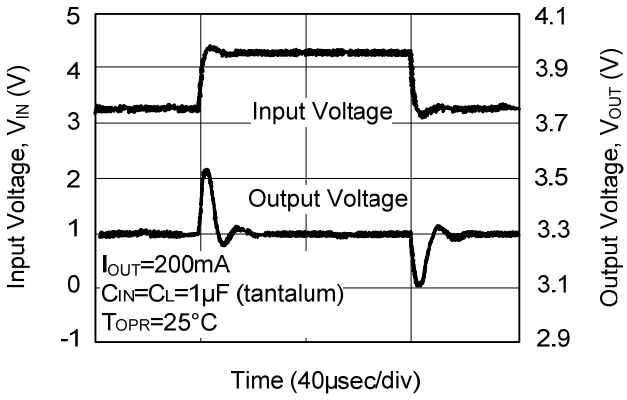


■ TYPICAL CHARACTERISTICS (Cont.)

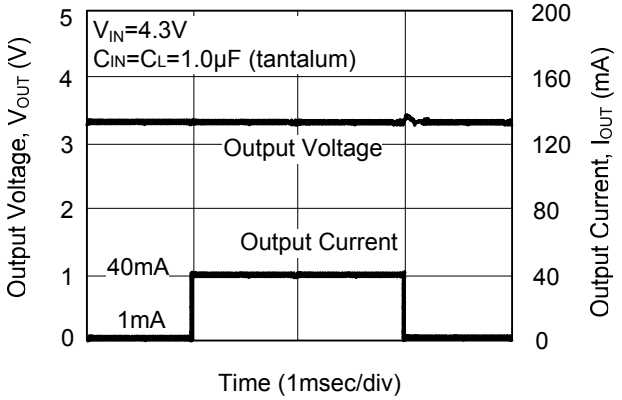
Input Transient Response



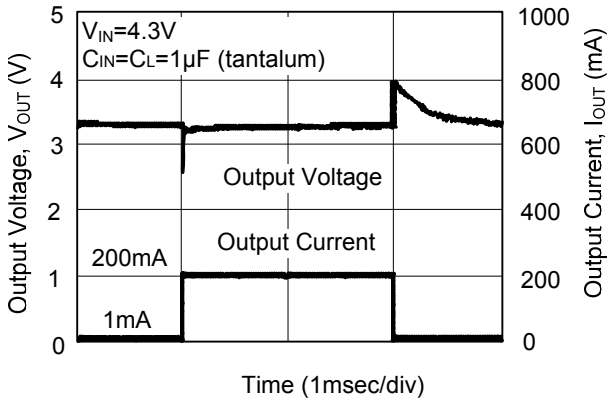
Input Transient Response



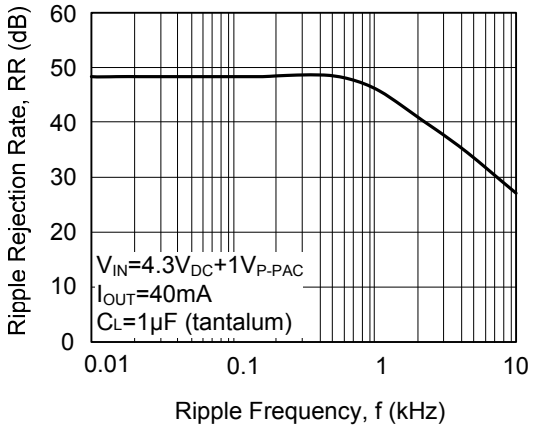
Load Transient Response



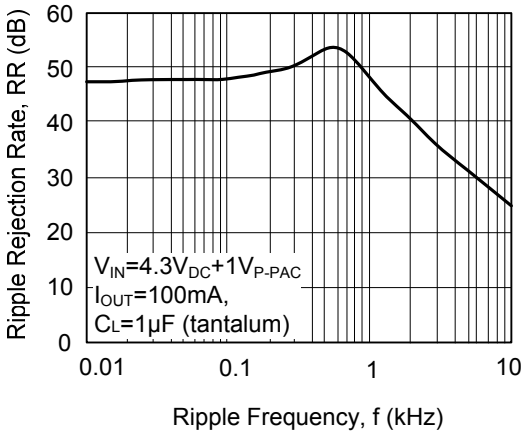
Load Transient Response



Ripple Rejection Rate



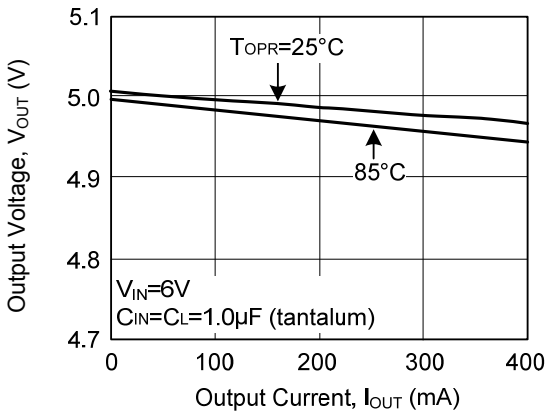
Ripple Rejection Rate



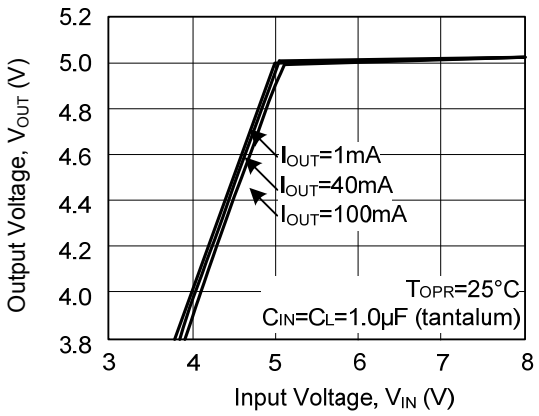
■ TYPICAL CHARACTERISTICS (Cont.)

(4) LR1106-50

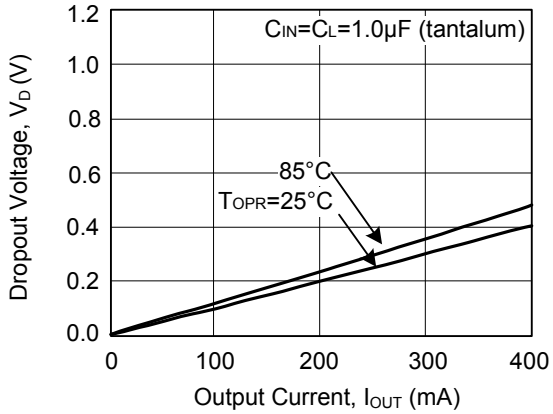
Output Voltage vs Output Current



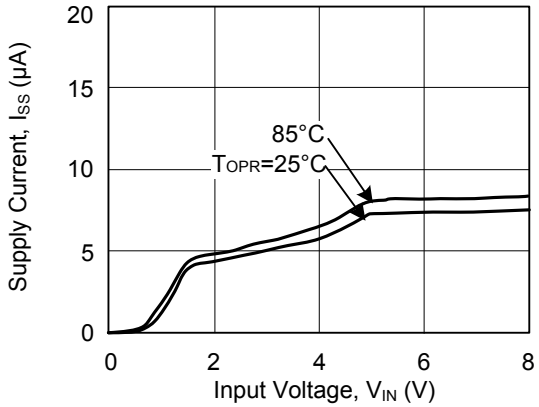
Output Voltage vs Inpent Voltage



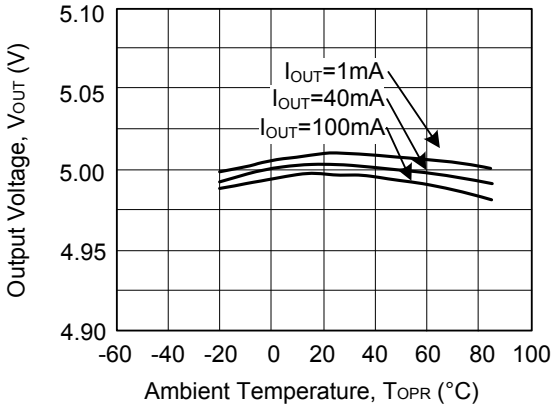
Dropout Voltage vs Output Current



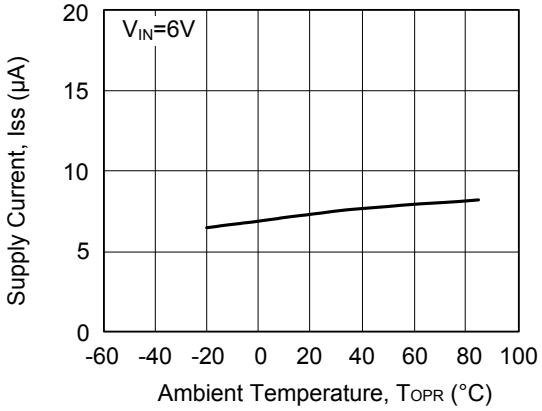
Supply Current vs Input Voltage



Output Voltage vs Ambient Temperature

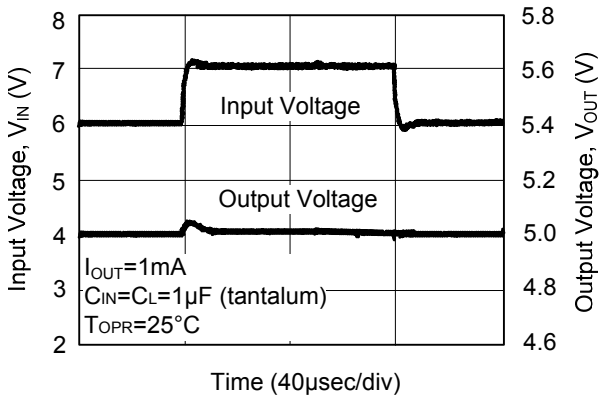


Supply Current vs Ambient Temperature

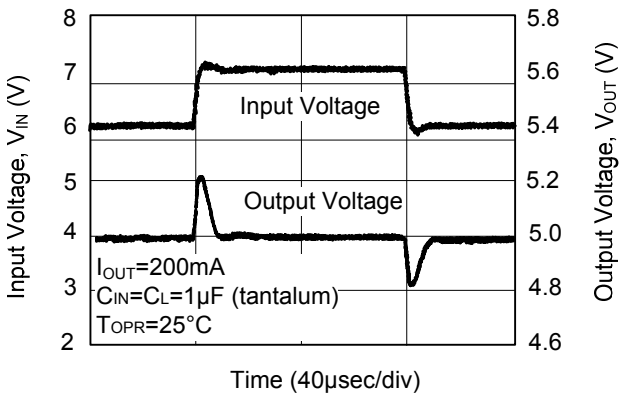


■ TYPICAL CHARACTERISTICS (Cont.)

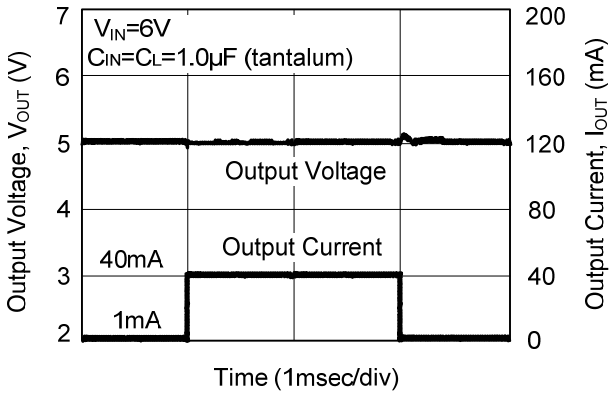
Input Transient Response



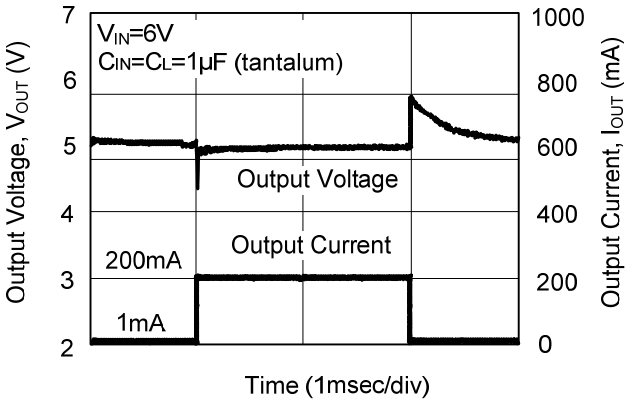
Input Transient Response



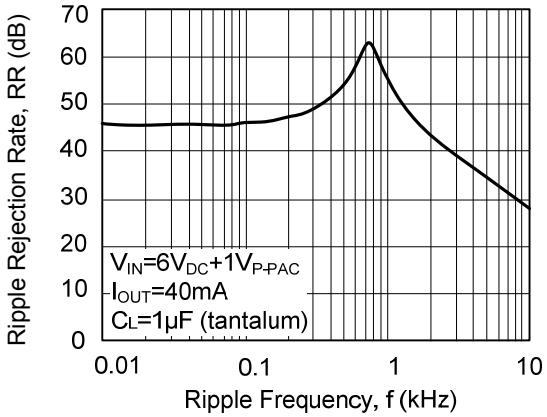
Load Transient Response



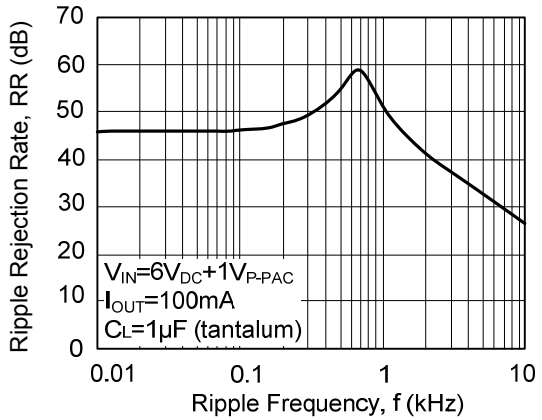
Load Transient Response



Ripple Rejection Rate



Ripple Rejection Rate



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