

# 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

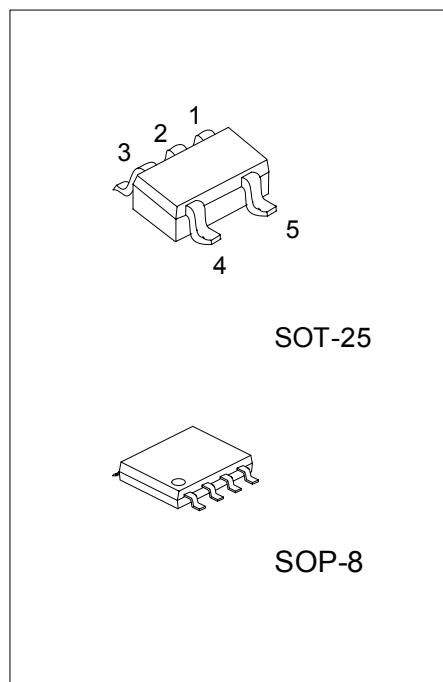
- \* Maximum Output Current : 400mA
- \* Maximum Operating Voltage : 8V
- \* Highly Accurate :  $\pm 2\%$
- \* Low Power Consumption : TYP 8.0  $\mu$ A
- \* Output Voltage Temperature Characteristics : TYP  $\pm 100$ ppm/ $^{\circ}$ C

### ORDERING INFORMATION

Order Number		Package	Pin Assignment								Packing
Normal	Lead Free Plating		1	2	3	4	5	6	7	8	
LR1106-xx-AF5-R	LR1106L-xx-AF5-R	SOT-25	I	G	E	N	O	-	-	-	Tape Reel
LR1106-xx-S08-R	LR1106L-xx-S08-R	SOP-8	O	N	G	N	E	N	N	I	Tape Reel
LR1106-xx-S08-T	LR1106L-xx-S08-T	SOP-8	O	N	G	N	E	N	N	I	Tube

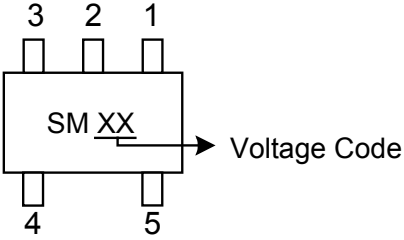
Note: Pin Assignment: I:V<sub>IN</sub> O:V<sub>OUT</sub> G:GND N: No Connection E: Enable  
xx: Output Voltage, refer to Marking Information.

<p>LR1106L-xx-AF5-R</p>	<p>(1)Packing Type (2)Package Type (3)Output Voltage Code (4)Lead Plating</p>	<p>(1) R: Tape Reel T: Tube (2) AF5: SOT-25, S08: SOP-8 (3) xx: refer to Marking Information (4) L: Lead Free Plating Blank: Pb/Sn</p>
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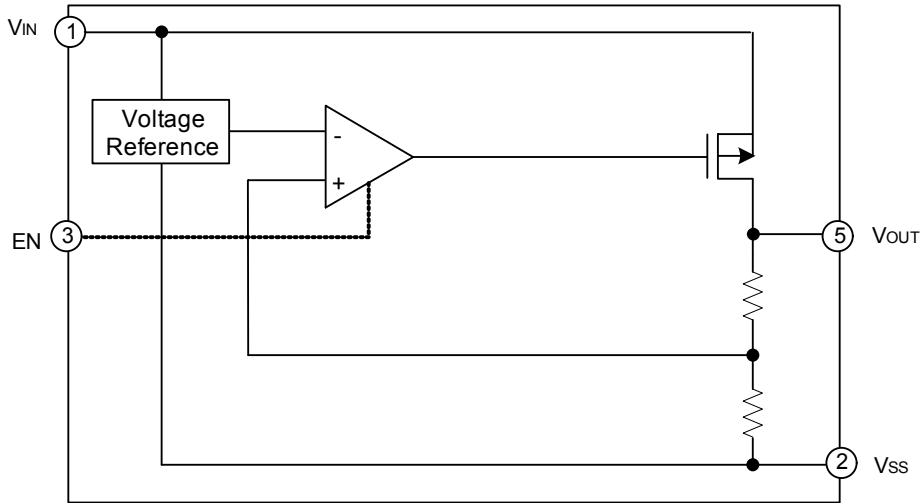


\*Pb-free plating product number: LR1106L

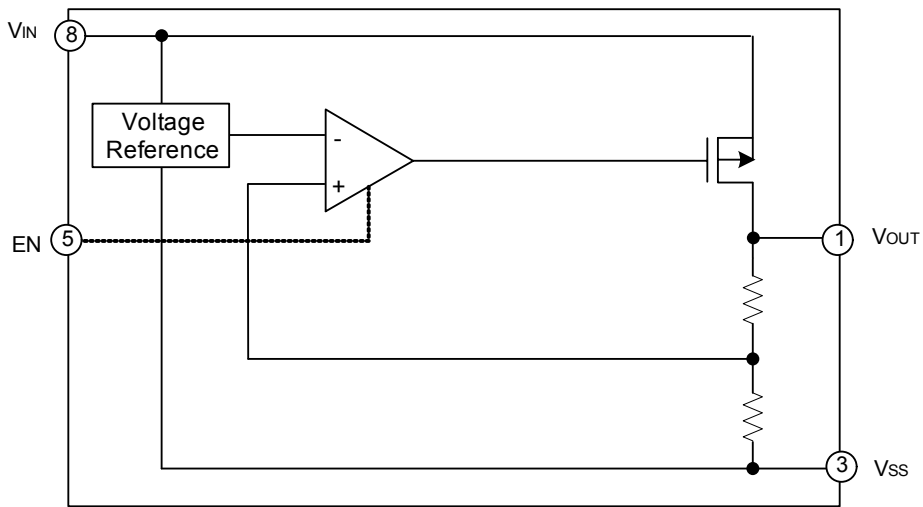
MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	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	

BLOCK DIAGRAM



For SOT-25 Package



For SOP-8 Package

■ ABSOLUTE MAXIMUM RATINGS (Ta=25 )

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V <sub>IN</sub>	12	V
Output Voltage	V <sub>OUT</sub>	V <sub>SS</sub> -0.3 ~ V <sub>IN</sub> +0.3	V
Output Current	I <sub>OUT</sub>	500	mA
Power Dissipation	P <sub>D</sub>	300	mW
Operating Ambient Temperature	T <sub>OPR</sub>	-40 ~ +85	
Storage Temperature	T <sub>STG</sub>	-40 ~ +125	

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 , unless otherwise specified.)

For LR1106-18

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =2.8V, I <sub>OUT</sub> =40mA	1.764	1.800	1.836	V
Input Voltage	V <sub>IN</sub>				8	V
Load Regulation	V <sub>OUT</sub>	V <sub>IN</sub> =2.8V, 1mA≤I <sub>OUT</sub> ≤200mA		40	100	mV
Dropout Voltage	V <sub>D1</sub>	I <sub>OUT</sub> =100mA		200	300	mV
	V <sub>D2</sub>	I <sub>OUT</sub> =200mA		400	600	
Maximum Output Current	I <sub>OUT(MAX)</sub>	V <sub>IN</sub> =2.8V, V <sub>OUT</sub> ≥V <sub>OUT</sub> × 0.90	400			mA
Supply Current	I <sub>SS</sub>	V <sub>IN</sub> =2.8V, V <sub>EN</sub> =V <sub>IN</sub>		30.0	50.0	μA
EN Input Bias Current	I <sub>EH</sub>	V <sub>EN</sub> =V <sub>IN</sub>			0.1	μA
	I <sub>EL</sub>	V <sub>EN</sub> =0, V <sub>IN</sub> =2.8V to 8V		1.0	3.0	
EN Input Threshold	V <sub>EH</sub>	V <sub>IN</sub> =2.6V to 7V	V <sub>IN</sub> /2+0.8		V <sub>IN</sub>	V
	V <sub>EL</sub>	V <sub>IN</sub> =2.6V to 7V	0		0.4	
Line Regulation	$\frac{V_{OUT}}{V_{IN}} \times V_{OUT}$	I <sub>OUT</sub> =40mA, 2.8V≤V <sub>IN</sub> ≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR}} \times V_{OUT}$	I <sub>OUT</sub> =40mA		± 100		ppm/

For LR1106-22

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.2V, I <sub>OUT</sub> =40mA	2.156	2.200	2.244	V
Input Voltage	V <sub>IN</sub>				8	V
Load Regulation	V <sub>OUT</sub>	V <sub>IN</sub> =3.2V, 1mA≤I <sub>OUT</sub> ≤200mA		40	100	mV
Dropout Voltage	V <sub>D1</sub>	I <sub>OUT</sub> =100mA		200	300	mV
	V <sub>D2</sub>	I <sub>OUT</sub> =200mA		400	600	
Maximum Output Current	I <sub>OUT(MAX)</sub>	V <sub>IN</sub> =3.2V, V <sub>OUT</sub> ≥V <sub>OUT</sub> × 0.90	400			mA
Supply Current	I <sub>SS</sub>	V <sub>IN</sub> =3.2V, V <sub>EN</sub> =V <sub>IN</sub>		30.0	50.0	μA
EN Input Bias Current	I <sub>EH</sub>	V <sub>EN</sub> =V <sub>IN</sub>			0.1	μA
	I <sub>EL</sub>	V <sub>EN</sub> =0, V <sub>IN</sub> =3.2V to 8V		1.0	3.0	
EN Input Threshold	V <sub>EH</sub>	V <sub>IN</sub> =2.6V to 7V	V <sub>IN</sub> /2+0.8		V <sub>IN</sub>	V
	V <sub>EL</sub>	V <sub>IN</sub> =2.6V to 7V	0		0.4	
Line Regulation	$\frac{V_{OUT}}{V_{IN}} \times V_{OUT}$	I <sub>OUT</sub> =40mA, 3.2V≤V <sub>IN</sub> ≤8.0V		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR}} \times V_{OUT}$	I <sub>OUT</sub> =40mA		± 100		ppm/

■ 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	$V_{OUT}$	$V_{IN}=3.5V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		170	250	mV
	$V_{D2}$	$I_{OUT}=200mA$		320	500	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=3.5V, V_{OUT} \geq V_{OUT} \times 0.93$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=3.5V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=3.5V$ to 8V		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V$ to 7V	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V$ to 7V	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$I_{OUT}=40mA, 3.5V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR} \times V_{OUT}}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

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	$V_{OUT}$	$V_{IN}=3.7V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		170	250	mV
	$V_{D2}$	$I_{OUT}=200mA$		320	500	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=3.7V, V_{OUT} \geq V_{OUT} \times 0.93$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=3.7V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=3.7V$ to 8V		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V$ to 7V	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V$ to 7V	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$I_{OUT}=40mA, 3.7V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR} \times V_{OUT}}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

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	$V_{OUT}$	$V_{IN}=3.8V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		170	250	mV
	$V_{D2}$	$I_{OUT}=200mA$		320	500	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=3.8V, V_{OUT} \geq V_{OUT} \times 0.93$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=3.8V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=3.8V$ to 8V		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V$ to 7V	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V$ to 7V	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$I_{OUT}=40mA, 3.8V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR} \times V_{OUT}}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

■ 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	$V_{OUT}$	$V_{IN}=3.85V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		170	250	mV
	$V_{D2}$	$I_{OUT}=200mA$		250	500	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=3.85V, V_{OUT} \geq V_{OUT} \times 0.93$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=3.85V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=3.85$ to 8V		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V$ to 7V	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V$ to 7V	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$I_{OUT}=40mA, 3.85V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR} \times V_{OUT}}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

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	$V_{OUT}$	$V_{IN}=4.0V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		150	220	mV
	$V_{D2}$	$I_{OUT}=200mA$		300	420	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=4.0V, V_{OUT} \geq V_{OUT} \times 0.96$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=4.0V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=4.0V$ to 8V		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V$ to 7V	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V$ to 7V	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$I_{OUT}=40mA, 4V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR} \times V_{OUT}}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

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	$V_{OUT}$	$V_{IN}=4.1V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		150	220	mV
	$V_{D2}$	$I_{OUT}=200mA$		300	420	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=4.1V, V_{OUT} \geq V_{OUT} \times 0.96$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=4.1V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=4.1V$ to 8V		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V$ to 7V	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V$ to 7V	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$I_{OUT}=40mA, 4V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR} \times V_{OUT}}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

■ ELECTRICAL CHARACTERISTICS(Cont.)

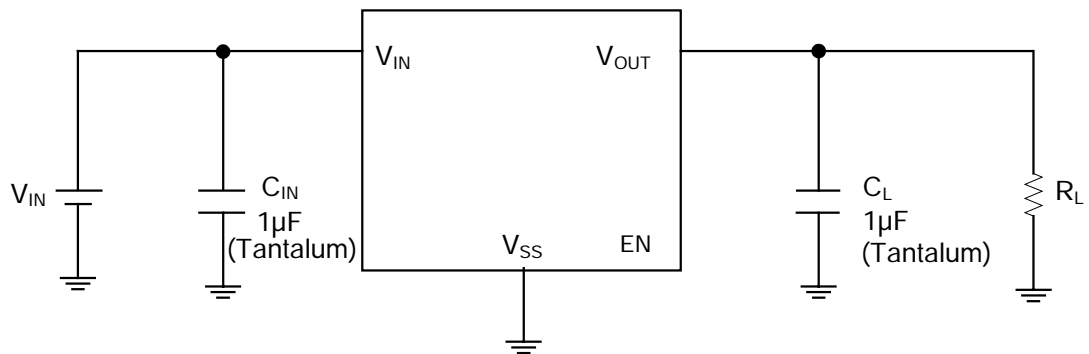
For LR1106-33

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	$V_{OUT}$	$V_{IN}=4.3V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		150	220	mV
	$V_{D2}$	$I_{OUT}=200mA$		300	420	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=4.3V, V_{OUT} \geq V_{OUT} \times 0.96$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=4.3V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=4.3V \text{ to } 8V$		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V \text{ to } 7V$	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V \text{ to } 7V$	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN}} \times V_{OUT}$	$I_{OUT}=40mA, 4.3V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR}} \times V_{OUT}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

For LR1106-50

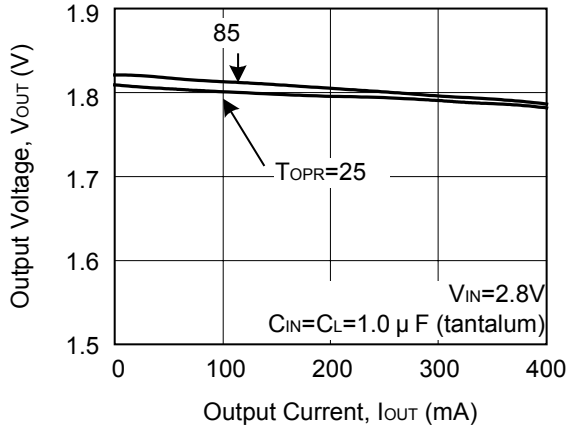
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=6.0V, I_{OUT}=40mA$	4.900	5.000	5.100	V
Input Voltage	$V_{IN}$				8	V
Load Regulation	$V_{OUT}$	$V_{IN}=6.0V, 1mA \leq I_{OUT} \leq 200mA$		40	100	mV
Dropout Voltage	$V_{D1}$	$I_{OUT}=100mA$		100	180	mV
	$V_{D2}$	$I_{OUT}=200mA$		200	320	
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}=6.0V, V_{OUT} \geq V_{OUT} \times 0.96$	400			mA
Supply Current	$I_{SS}$	$V_{IN}=6.0V, V_{EN}=V_{IN}$		30.0	50.0	$\mu A$
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$			0.1	$\mu A$
	$I_{EL}$	$V_{EN}=0, V_{IN}=6.0V \text{ to } 8V$		1.0	3.0	$\mu A$
EN Input Threshold	$V_{EH}$	$V_{IN}=2.6V \text{ to } 7V$	$V_{IN}/2+0.8$		$V_{IN}$	V
	$V_{EL}$	$V_{IN}=2.6V \text{ to } 7V$	0		0.4	V
Line Regulation	$\frac{V_{OUT}}{V_{IN}} \times V_{OUT}$	$I_{OUT}=40mA, 6.0V \leq V_{IN} \leq 8.0V$		0.2	0.5	%/V
Output Voltage Temperature Characteristics	$\frac{V_{OUT}}{T_{OPR}} \times V_{OUT}$	$I_{OUT}=40mA$		$\pm 100$		ppm/

■ TYPICAL APPLICATION CIRCUIT

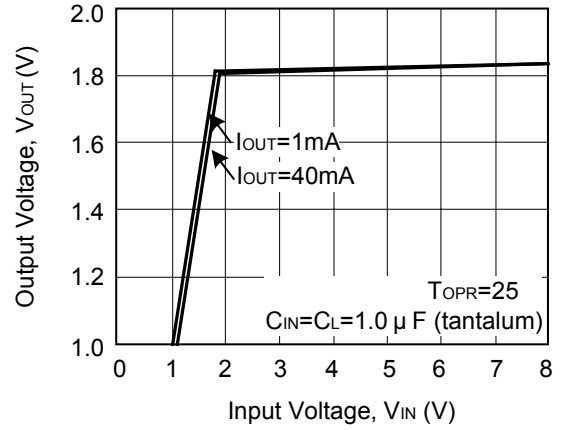


■ TYPICAL CHARACTERISTICS  
(1) LR1106-18

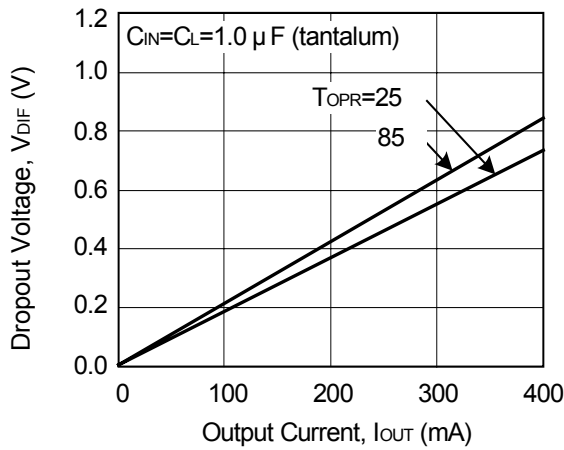
Output Voltage vs. Output Current



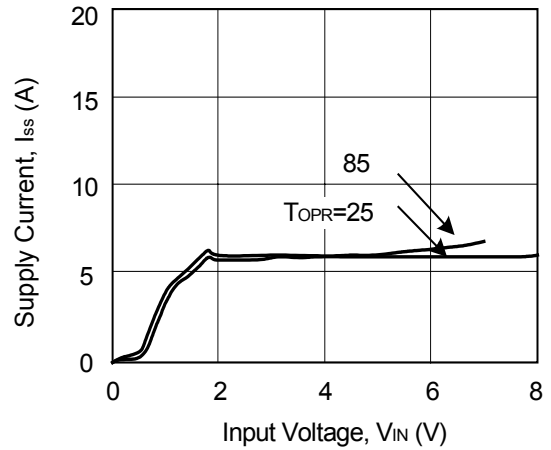
Output Voltage vs. Input Voltage



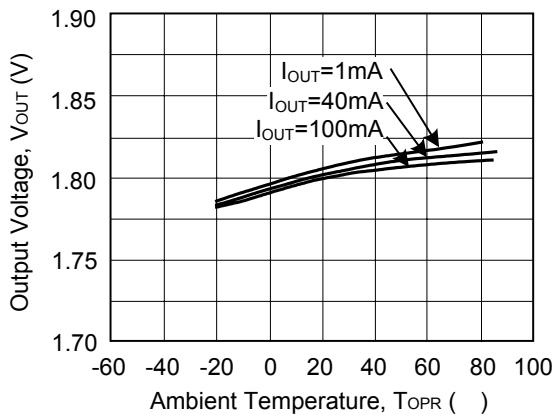
Dropout Voltage vs. Output Current



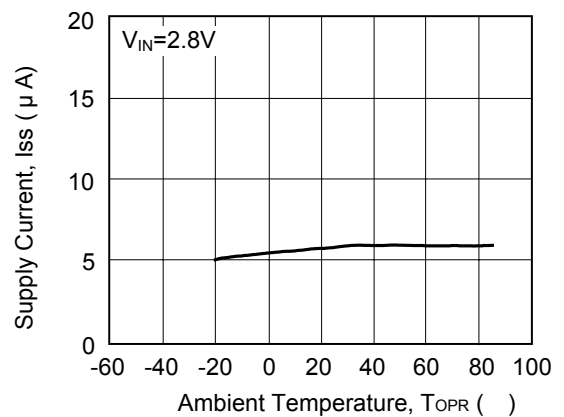
Supply Current vs. Input Voltage



Output Voltage vs Ambient Temperature

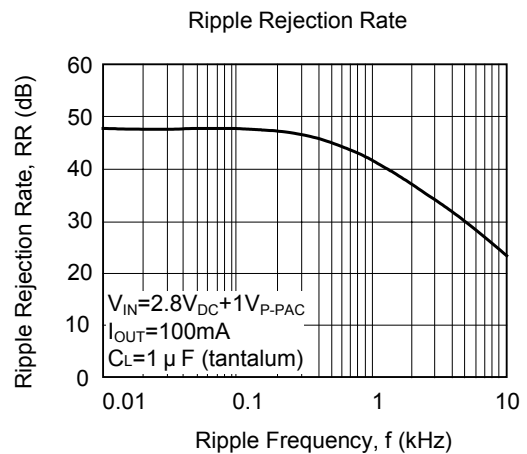
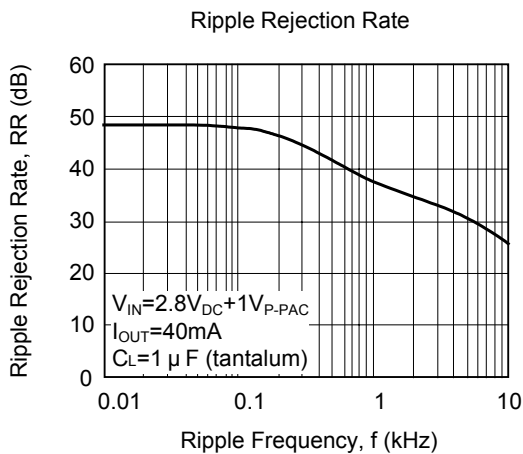
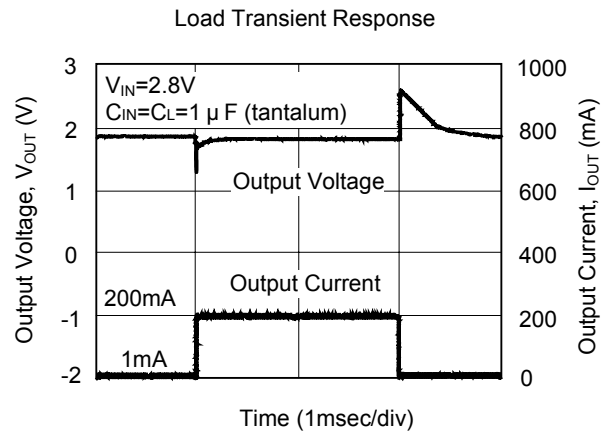
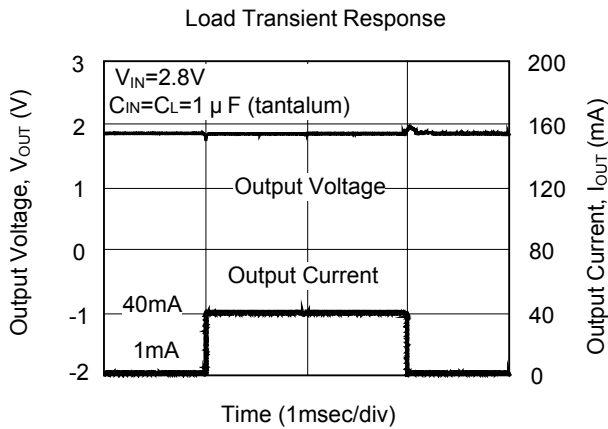
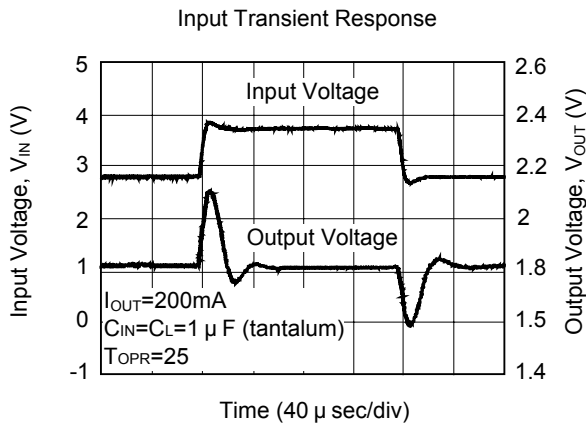


Supply Current vs Ambient Temperature



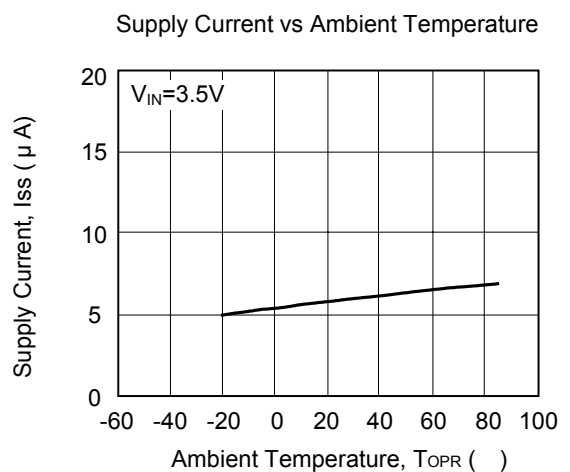
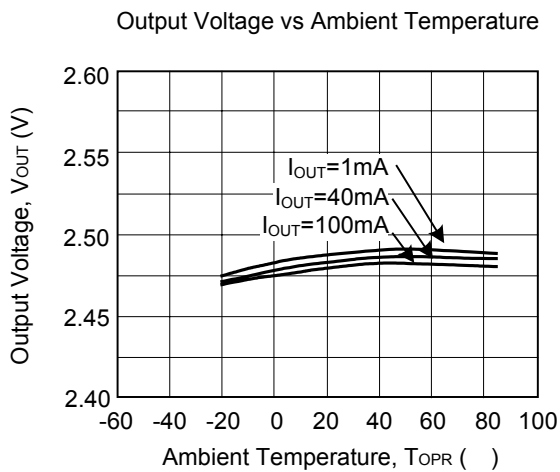
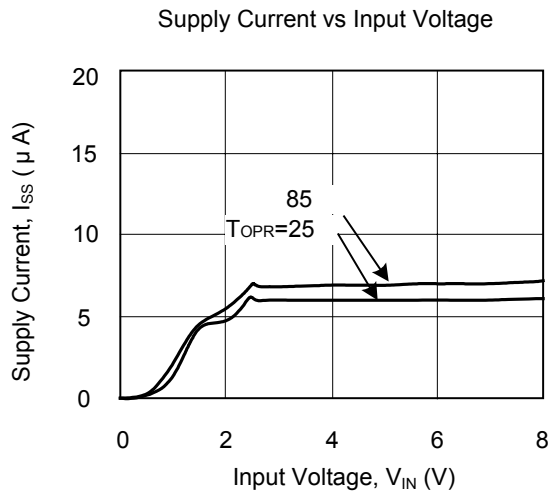
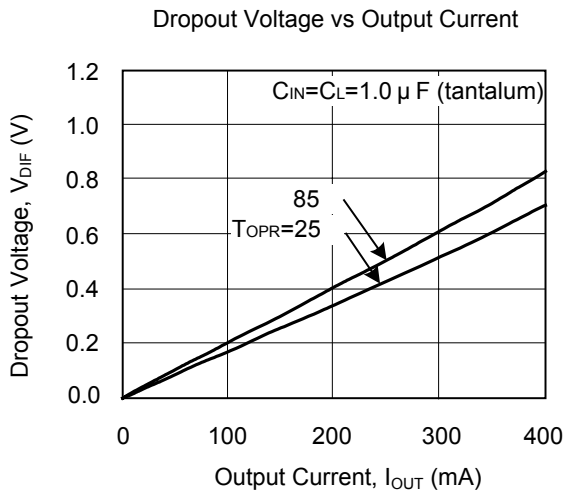
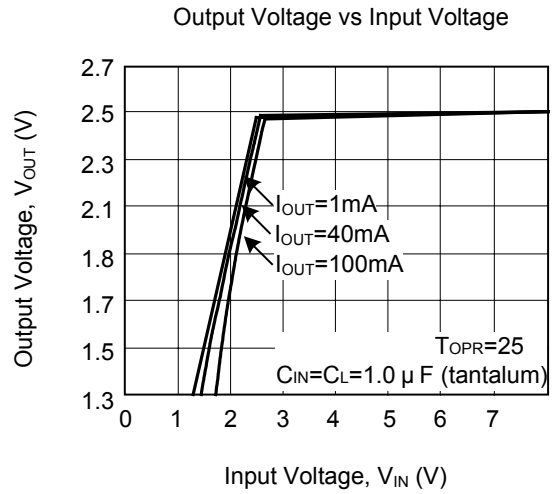
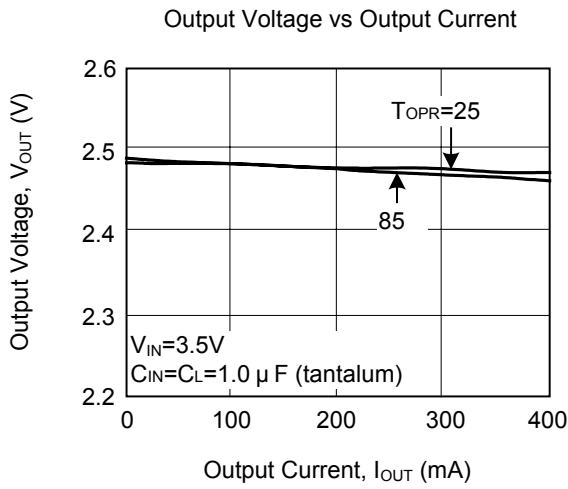


■ TYPICAL CHARACTERISTICS (Cont.)

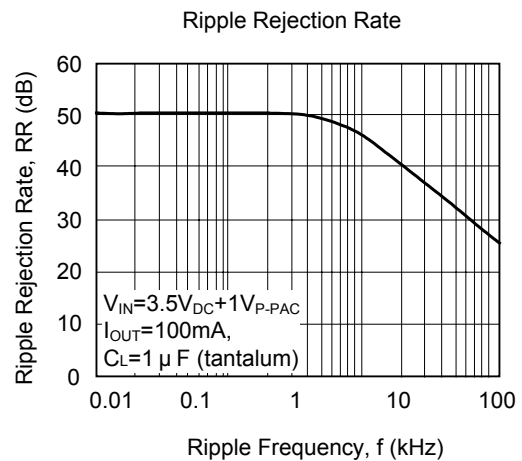
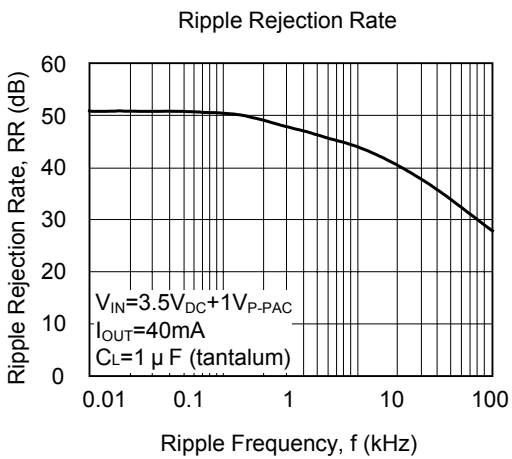
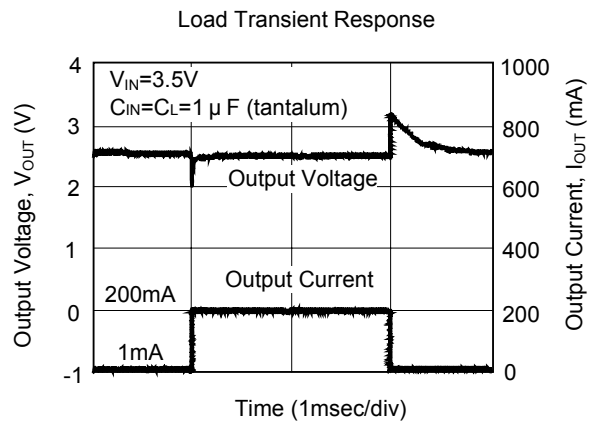
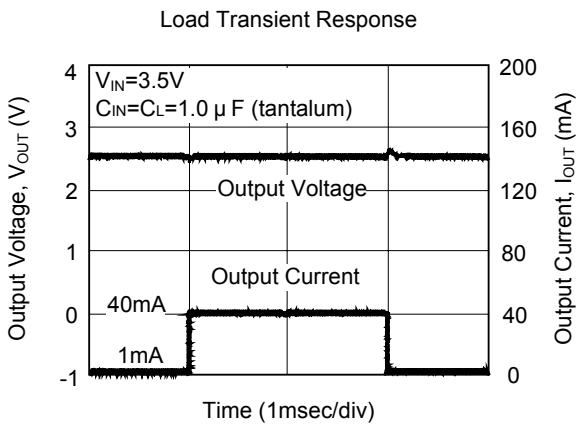
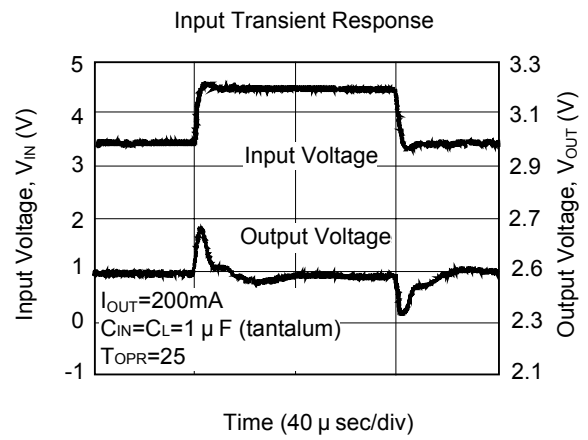
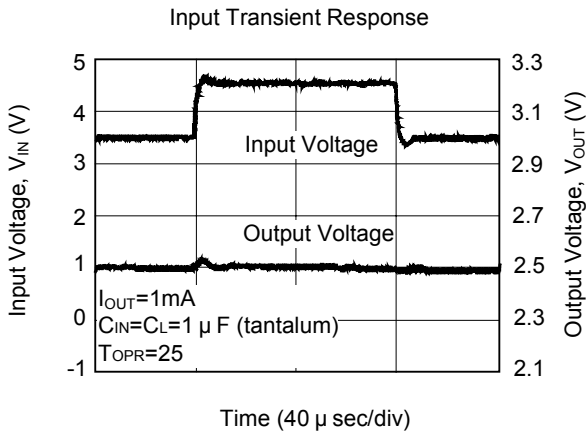


■ TYPICAL CHARACTERISTICS (Cont.)

(2) LR1106-25

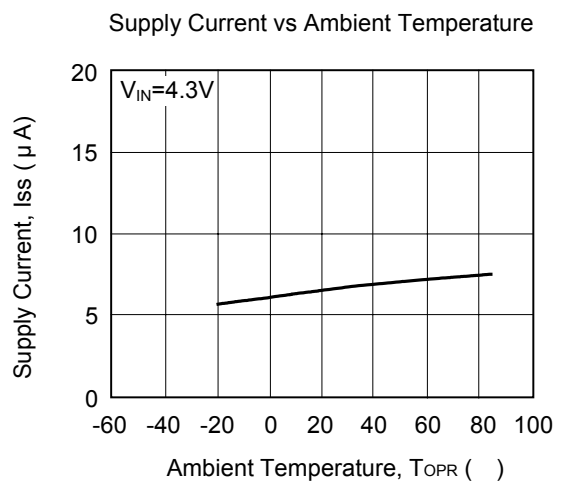
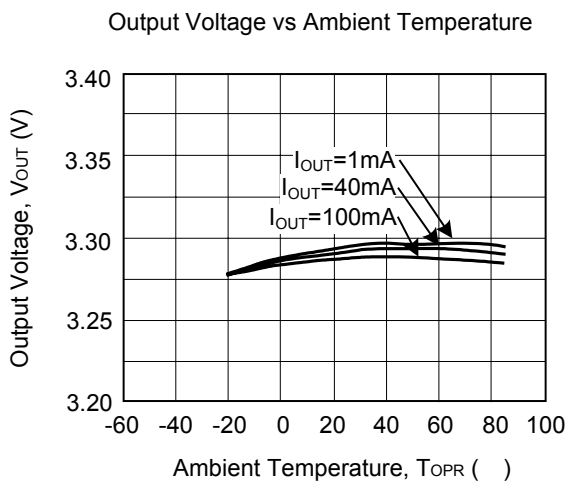
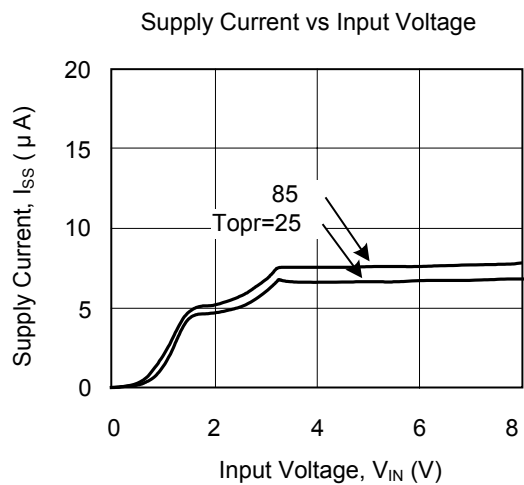
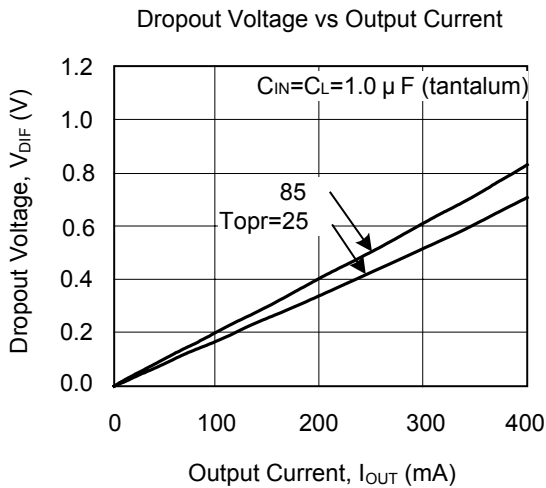
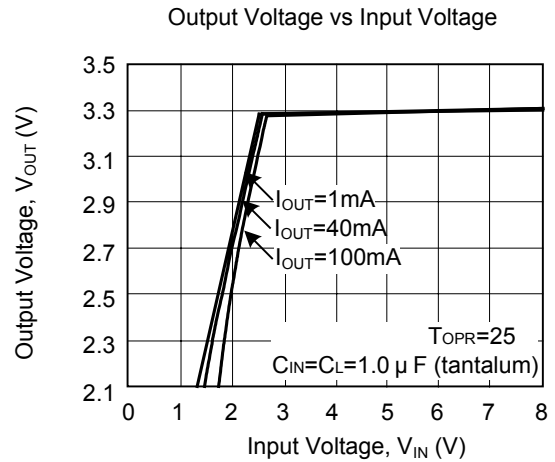
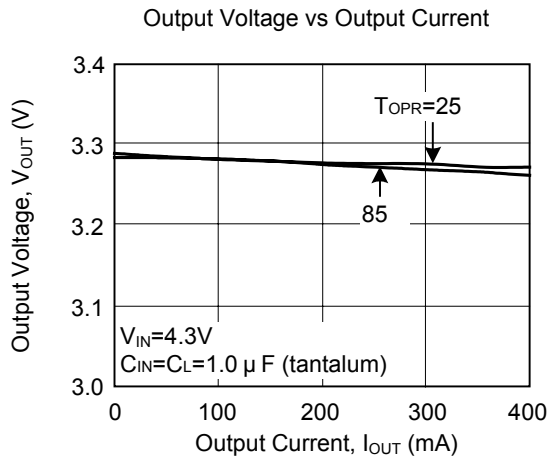


■ TYPICAL CHARACTERISTICS (Cont.)

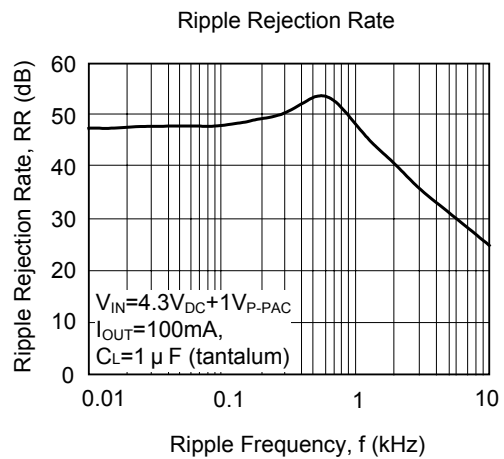
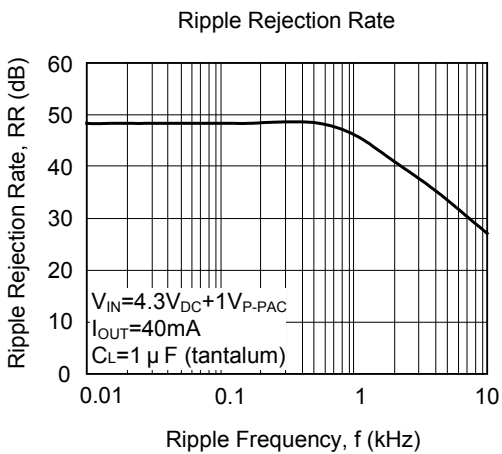
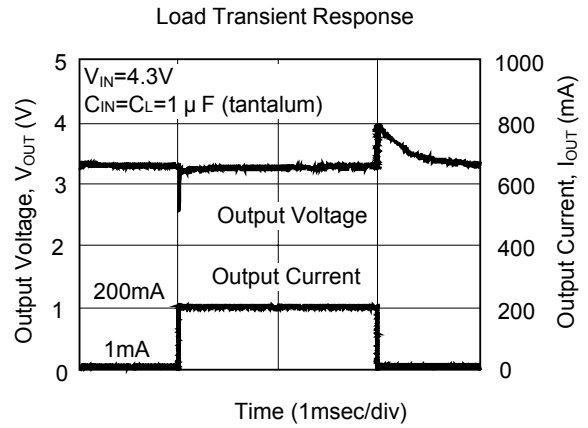
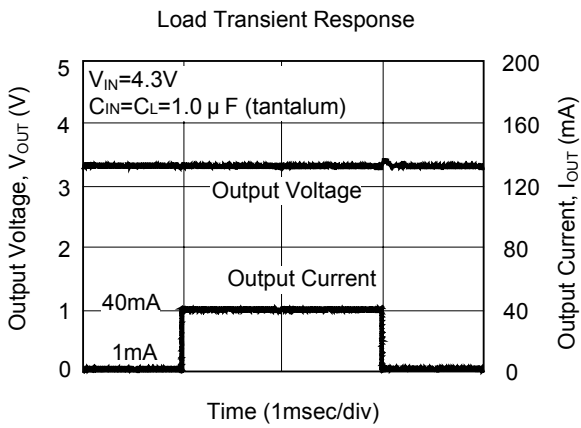
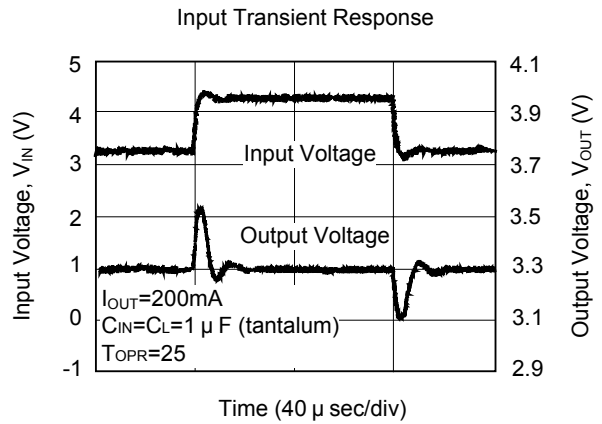
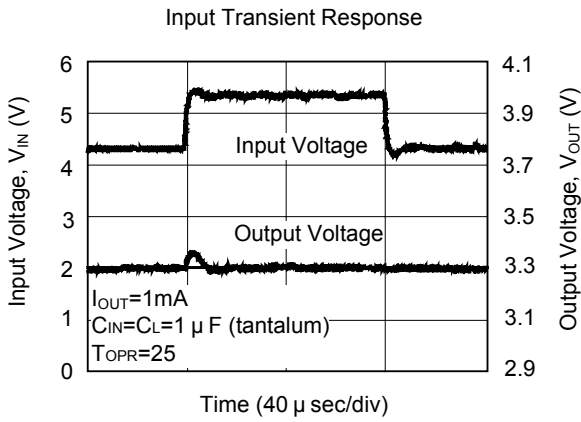


■ TYPICAL CHARACTERISTICS (Cont.)

(3) LR1106-33

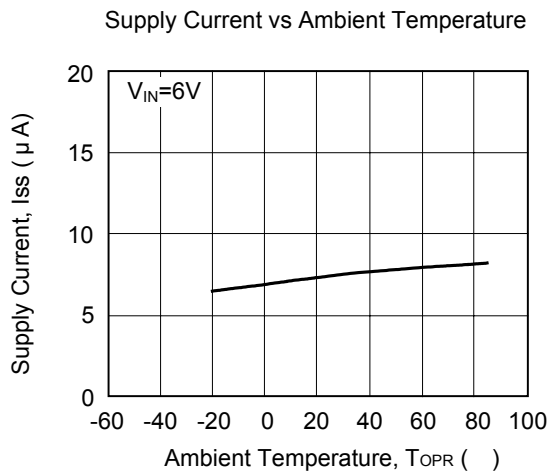
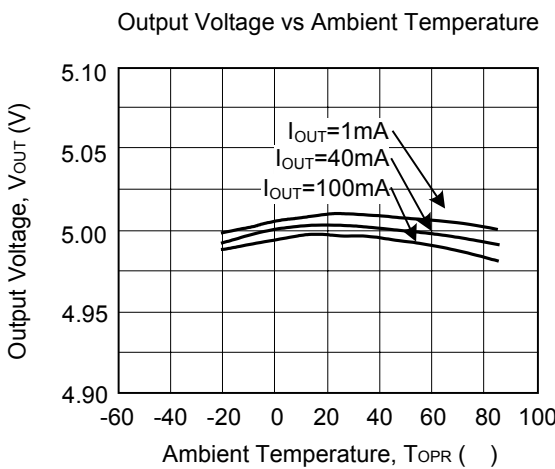
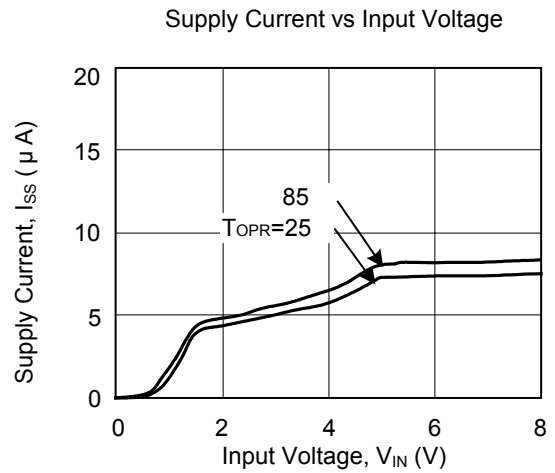
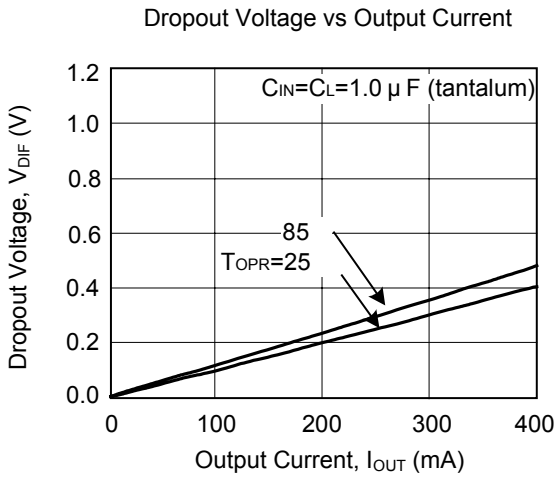
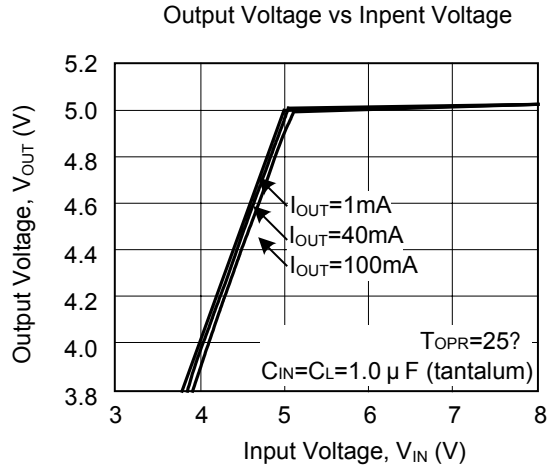
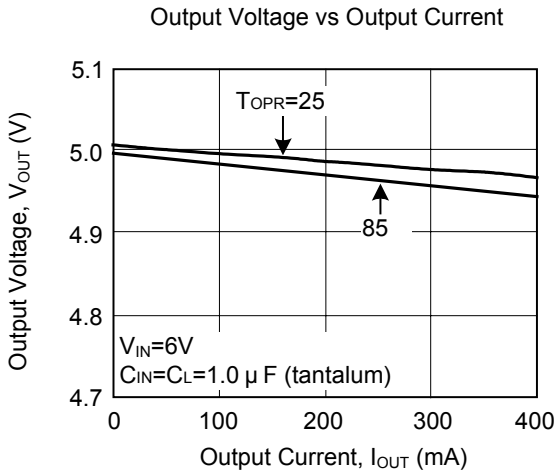


■ TYPICAL CHARACTERISTICS (Cont.)

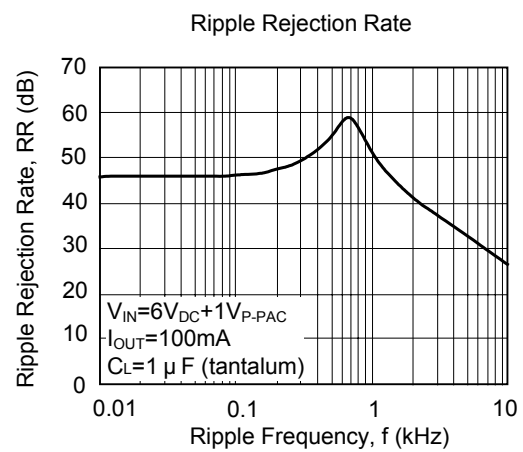
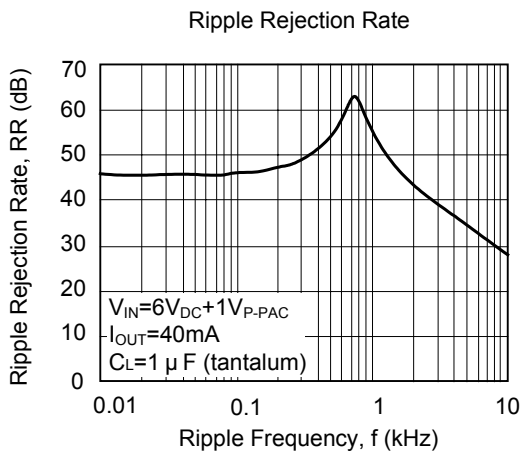
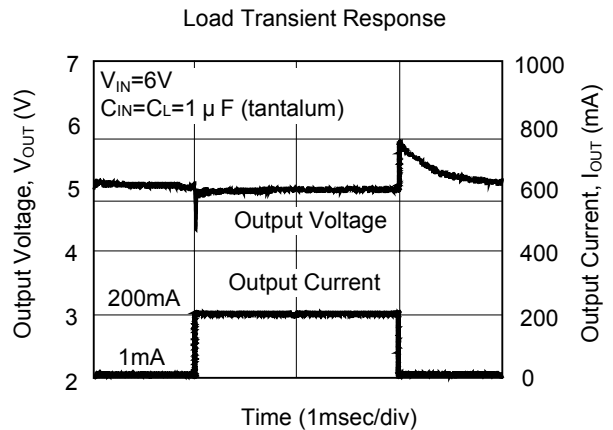
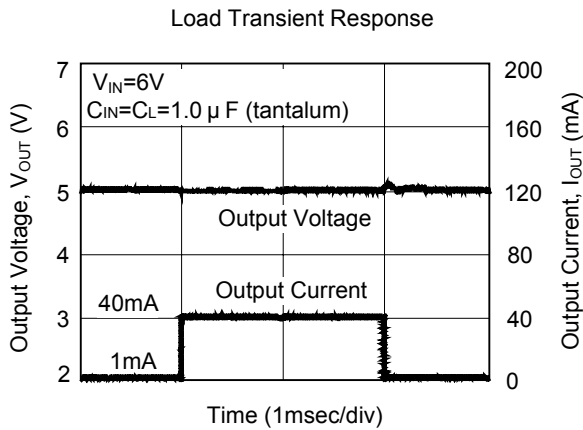
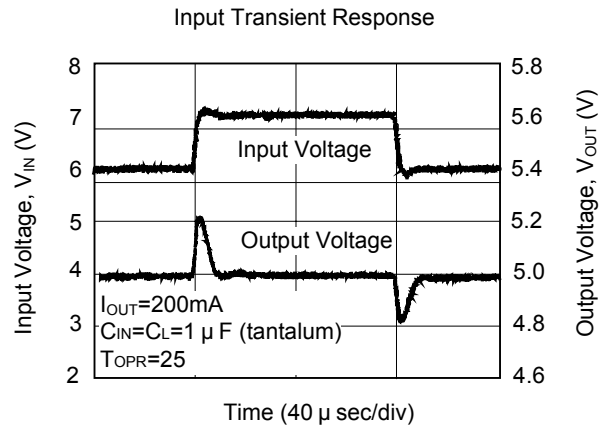
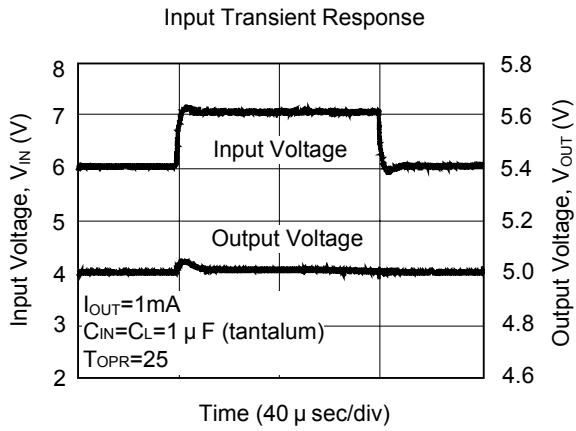


■ TYPICAL CHARACTERISTICS (Cont.)

(4) LR1106-50



■ TYPICAL CHARACTERISTICS (Cont.)



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