

LR1102

CMOS IC

LOW NOISE 150mA LDO REGULATOR

DESCRIPTION

The UTC **LR1102** families are CMOS-based voltage regulator ICs with extremely low supply current, high output voltage accuracy, high Ripple Rejection and chip enable circuit.

These ICs performance are excellent and with SOT-25 package, thus these ICs are very suitable for hand-held communication equipment.

FEATURES

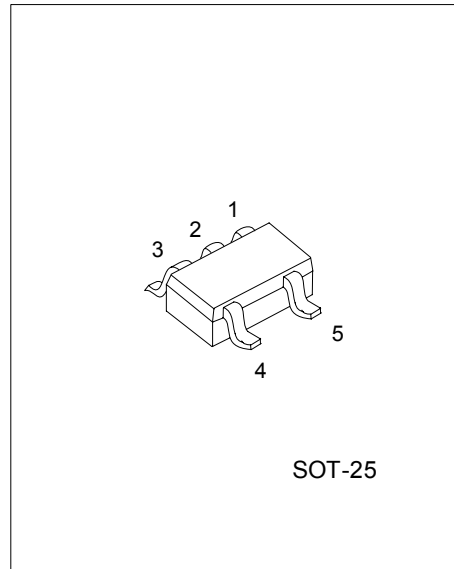
- * Ultra-low supply current : Typ. 35 μ A
- * Standby mode: typ. 0.1 μ A
- * Low dropout voltage: Typ. 0.2V ($I_{OUT} = 100mA$)
- * Excellent Line Regulation: Typ. 0.05%/V
- * High Ripple Rejection: Typ. 70dB (f = 1kHz)

ORDERING INFORMATION

Order Number		Package	Pin Assignment					Packing
Normal	Lead Free Plating		1	2	3	4	5	
LR1102x-xx-AF5-R	LR1102xL-xx-AF5-R	SOT-25	I	G	C	N	O	Tape Reel

Note: Pin Assignment: I:V_{DD} O:V_{OUT} G:GND C: CE/ \overline{CE} N: No Connection

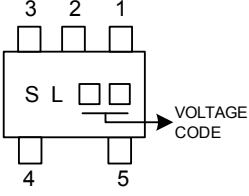
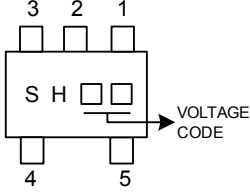
<p>LR1102xL-xx-AF5-R</p>	<p>(1) Packing Type (1) R: Tape Reel</p> <p>(2) Package Type (2) AF5: SOT-25</p> <p>(3) Output Voltage Code (3) xx: refer to Marking Information</p> <p>(4) Lead Plating (4) L: Lead Free Plating Blank: Pb/Sn</p> <p>(5) Active (5) A: Low B: High</p>
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SOT-25

*Pb-free plating product number: LR1102L

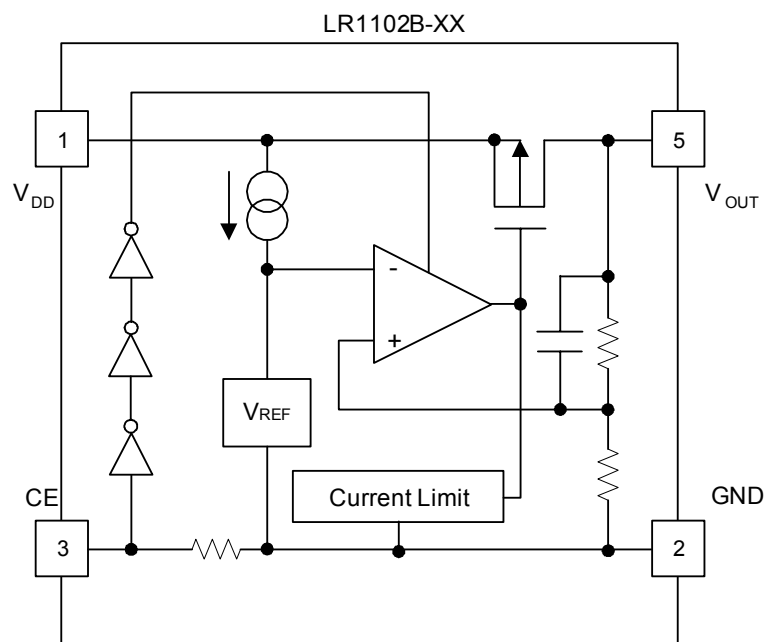
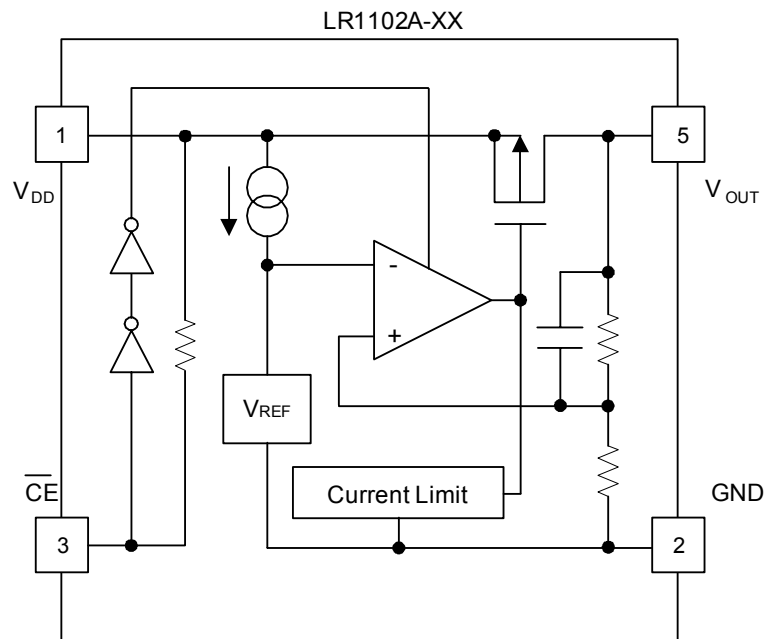
MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING	
SOT-25	50:5.0V	<p>For LR1102A-XX</p> 	<p>For LR1102B-XX</p> 
	35:3.5V		
	33:3.3V		
	30:3.0V		
	2J:2.85V		
	28:2.8V		
	27:2.7V		
	25:2.5V		
	18:1.8V		
	15:1.5V		

PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V _{DD}	Input Pin
2	GND	Ground Pin
3	CE/CE	Chip Enable Pin
4	NC	No Connection
5	V _{OUT}	Output Pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	9	V
Input Voltage	V_{CE}	-0.3 ~ $V_{IN}+0.3$	V
Output Voltage	V_{OUT}	-0.3 ~ $V_{IN}+0.3$	V
Output Current	I_{OUT}	200	mA
Power Dissipation	P_D	250	mW
Junction Temperature	T_J	+125	
Operating Temperature	T_{OPR}	-20 ~ +85	
Storage Temperature	T_{STG}	-40 ~ +150	

Note1. 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.

2. The device is guaranteed to meet performance specification within 0 ~ +70 operating temperature range and assured by design from -20 ~ +85 .

■ ELECTRICAL CHARACTERISTICS

LR1102A-XX ($T_{OPR}=25$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$V_{IN}=\text{Set } V_{OUT} + 1V, 1mA \leq I_{OUT} \leq 30mA$	$V_{OUT} \times 0.98$		$V_{OUT} \times 1.02$	V
Output Current	I_{OUT}	Refer to the Electrical Characteristics by Output Voltage				
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=\text{Set } V_{OUT} + 1V, 1mA \leq I_{OUT} \leq 80mA$		12	40	mV
Dropout Voltage	V_{DIF}	Refer to the Electrical Characteristics by Output Voltage				
Supply Current	I_{SS}	$V_{IN}=\text{Set } V_{OUT} + 1V$		10	20	μA
Supply Current (Standby)	I_{ST-BY}	$V_{IN}=V_{CE}=\text{Set } V_{OUT} + 1V$		0.1	1.0	μA
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	Set $V_{OUT} + 0.5V \leq V_{IN} \leq 8V, I_{OUT}=30mA$		0.05	0.20	%/V
Ripple Rejection	RR	f=1kHz, Ripple 0.5Vp-p $V_{IN}=\text{Set } V_{OUT} + 1V$		70		dB
Input Voltage	V_{IN}		2		8	V
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 30mA, -20 \leq T_{OPR} \leq 85$		± 100		ppm/
Short Current Limit	I_{LIMIT}	$V_{OUT}=0V$		200		mA
CE Pull-up Resistance	R_{PU}		2.5	5.0	10.0	$M\Omega$
CE Input Voltage "H"	V_{CEH}		1.5		V_{IN}	V
CE Input Voltage "L"	V_{CEL}		0.00		0.25	V
Output Noise	eN	$B_W = 10Hz \sim 100kHz$		30		μV_{rms}

LR1102B-XX ($T_{OPR}=25$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$V_{IN}=\text{Set } V_{OUT} + 1V, 1mA \leq I_{OUT} \leq 30mA$	$V_{OUT} \times 0.98$		$V_{OUT} \times 1.02$	V
Output Current	I_{OUT}	Refer to the Electrical Characteristics by Output Voltage				
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=\text{Set } V_{OUT} + 1V, 1mA \leq I_{OUT} \leq 80mA$		12	40	mV
Dropout Voltage	V_{DIF}	Refer to the Electrical Characteristics by Output Voltage				
Supply Current	I_{SS}	$V_{IN}=\text{Set } V_{OUT} + 1V$		10	20	μA
Supply Current (Standby)	I_{ST-BY}	$V_{IN}=\text{Set } V_{OUT} + 1V, V_{CE}=\text{GND}$		0.1	1.0	μA
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	Set $V_{OUT} + 0.5V \leq V_{IN} \leq 8V, I_{OUT}=30mA$		0.05	0.20	%/V
Ripple Rejection	RR	f=1kHz, Ripple 0.5Vp-p $V_{IN}=\text{Set } V_{OUT} + 1V$		70		dB
Input Voltage	V_{IN}		2		8	V
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 30mA, -20 \leq T_{OPR} \leq 85$		± 100		ppm/
Short Current Limit	I_{LIMIT}	$V_{OUT}=0V$		200		mA
CE Pull-down Resistance	R_{PD}		2.5	5.0	10.0	$M\Omega$
CE Input Voltage "H"	V_{CEH}		1.5		V_{IN}	V
CE Input Voltage "L"	V_{CEL}		0.00		0.25	V
Output Noise	eN	$B_W = 10Hz \sim 100kHz$		30		μV_{rms}

■ ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

($T_{OPR}=25$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Current	I_{OUT}	$V_{IN} - V_{OUT} = 1.0V$	$1.5 \leq V_{OUT} \leq 1.7$	100			mA
			$1.8 \leq V_{OUT} \leq 5.0$	150			
Dropout Voltage	V_D	$I_{OUT} = 100mA$	$V_{OUT} = 1.5V$			0.8	V
			$V_{OUT} = 1.6V$			0.7	V
			$V_{OUT} = 1.7V$			0.5	V
			$1.8 \leq V_{OUT} \leq 1.9$		0.20	0.40	V
			$2.0 \leq V_{OUT} \leq 2.4$		0.20	0.35	V
			$2.5 \leq V_{OUT} \leq 2.7$		0.18	0.30	V
			$2.8 \leq V_{OUT} \leq 3.3$		0.18	0.25	V
			$3.4 \leq V_{OUT} \leq 5.0$		0.15	0.22	V

■ TEST CIRCUITS

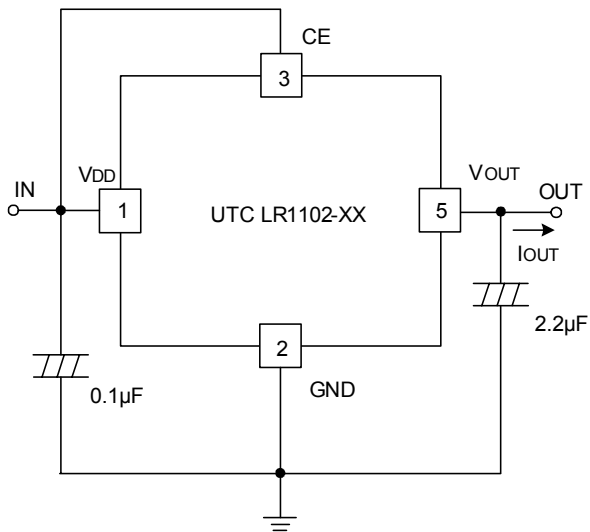


Fig.1 Standard Test Circuit

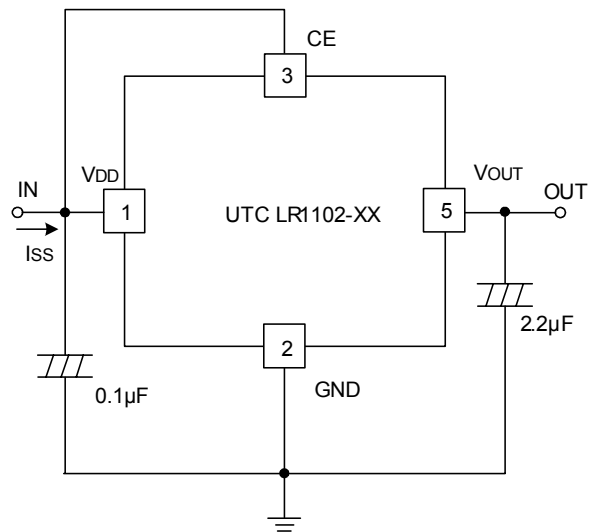


Fig.2 Supply Current Test Circuit

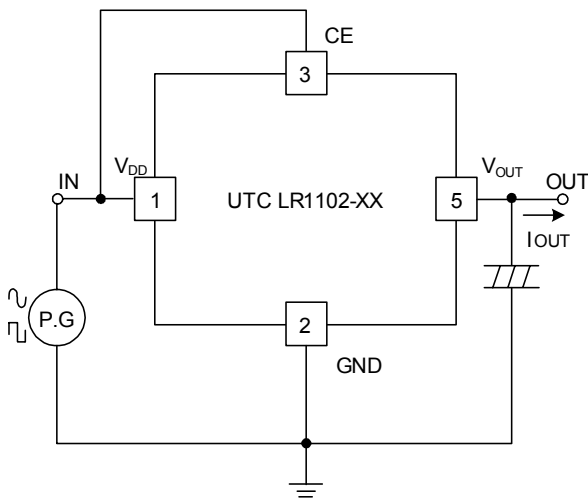


Fig.3 Ripple Rejection, Line Transient Response Test Circuit

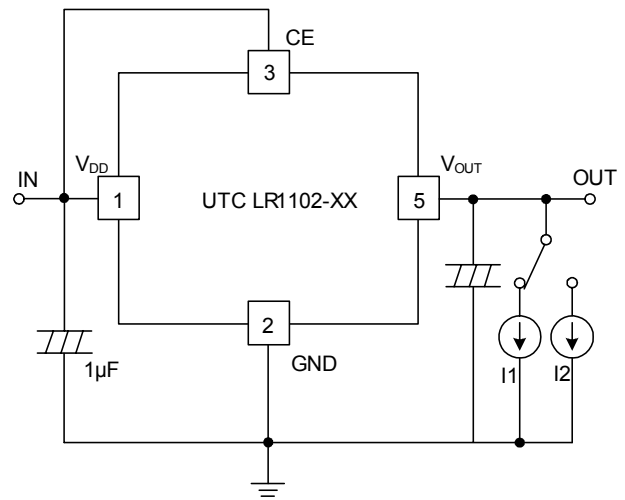
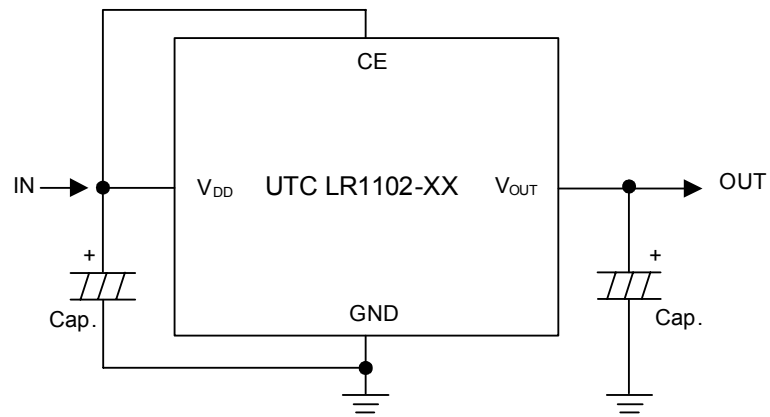


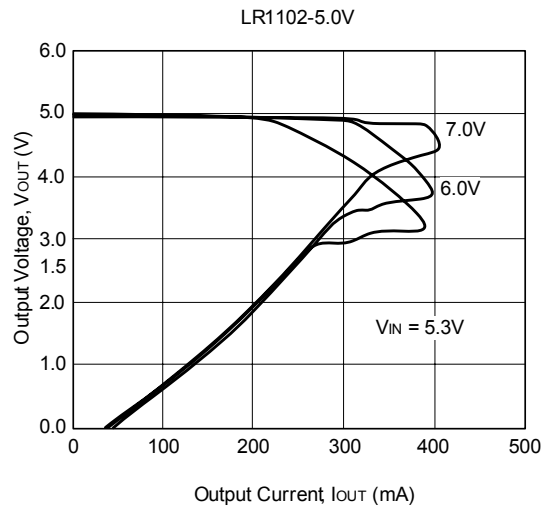
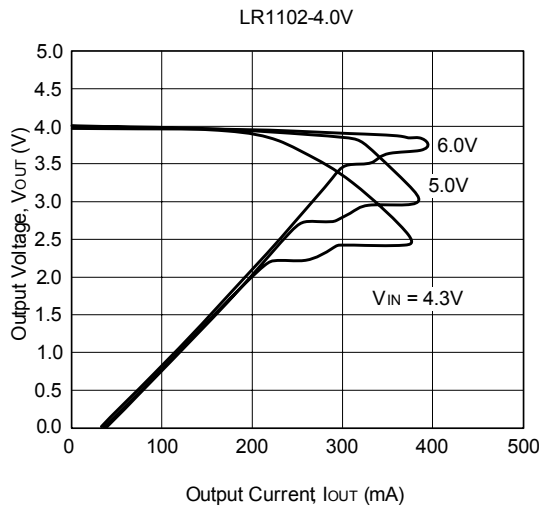
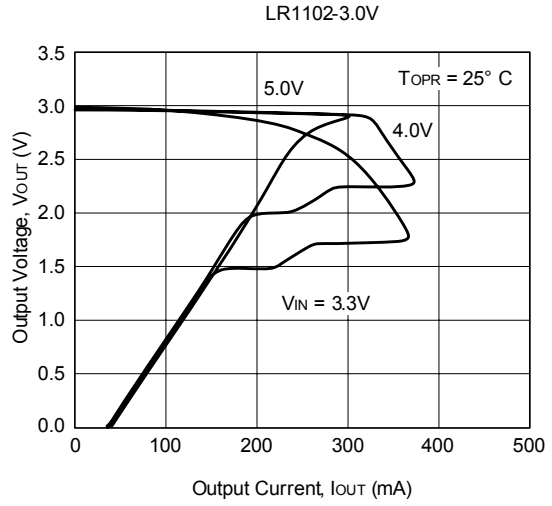
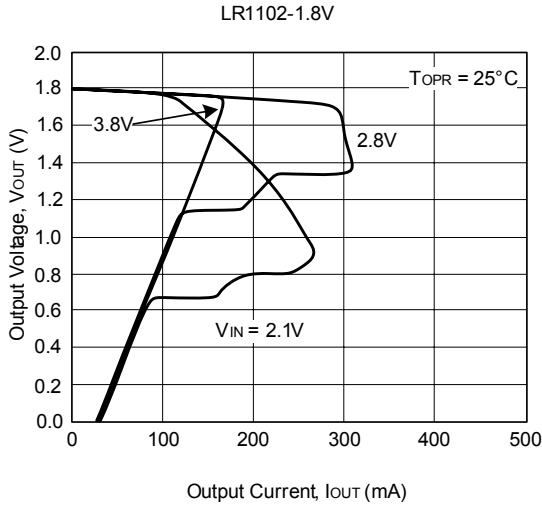
Fig.4 Load Transient Response Test Circuit

■ TYPICAL APPLICATION

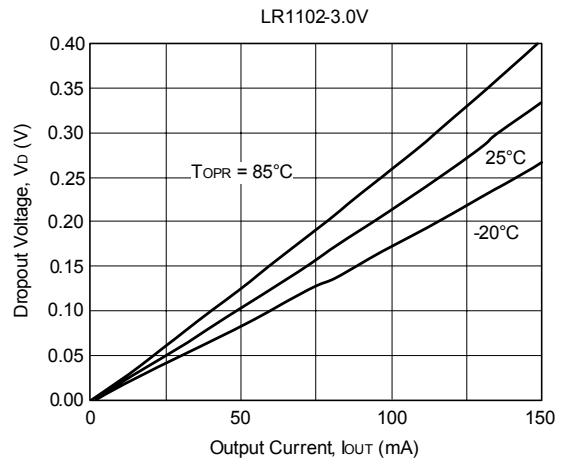
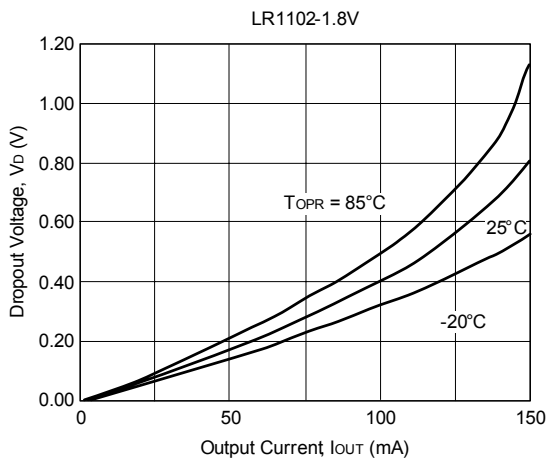


■ TYPICAL CHARACTERISTICS

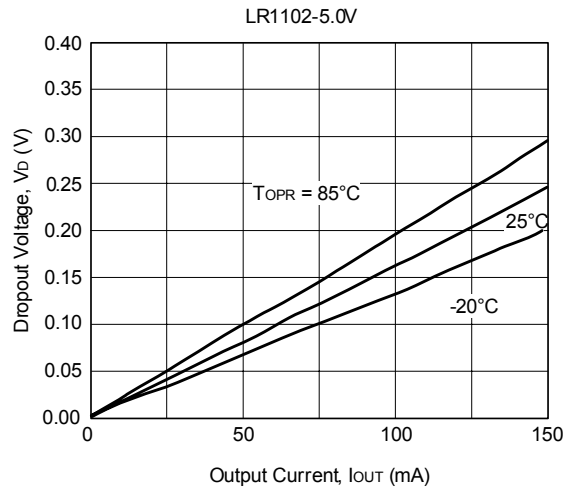
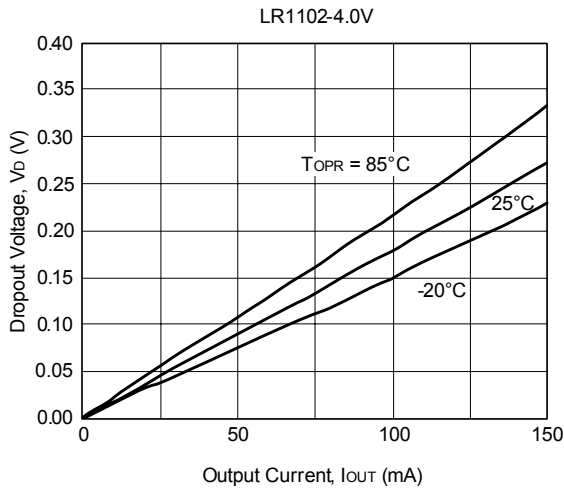
1. Output Voltage vs. Output Current



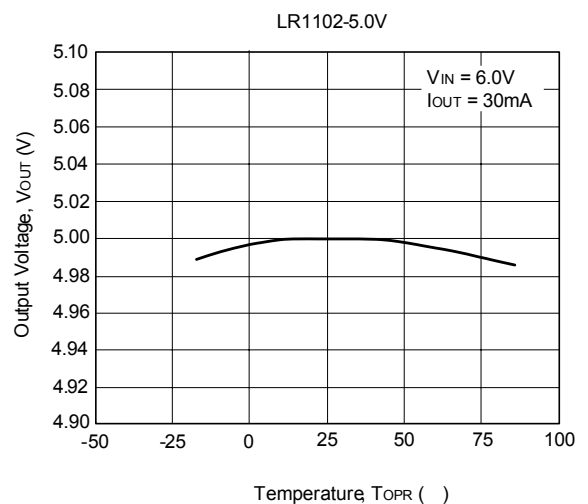
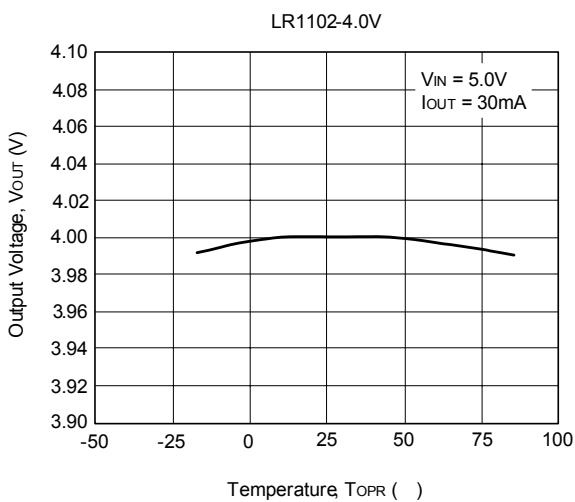
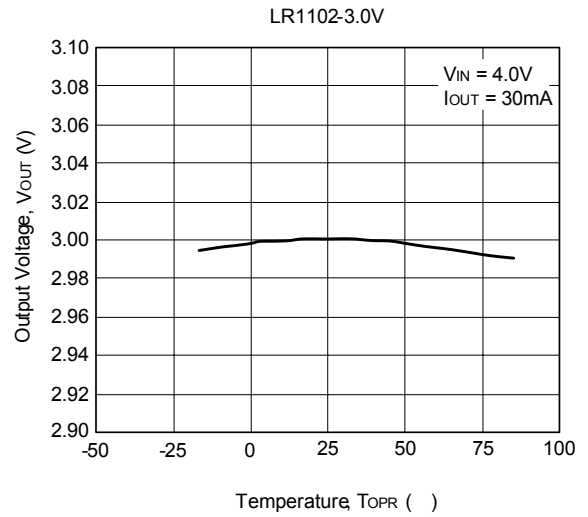
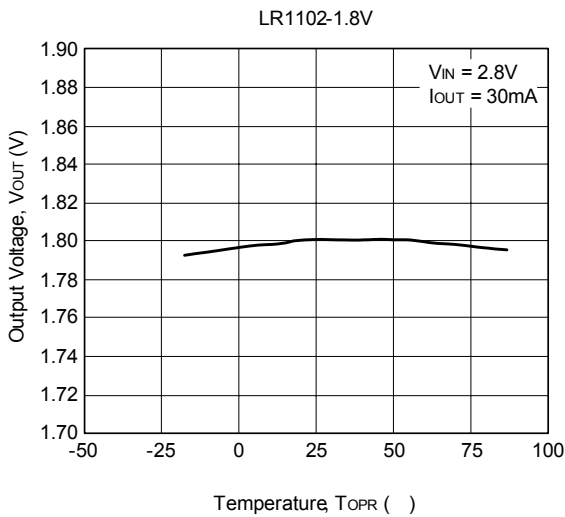
2. Dropout Voltage vs. Output Current



■ TYPICAL CHARACTERISTICS(Cont.)

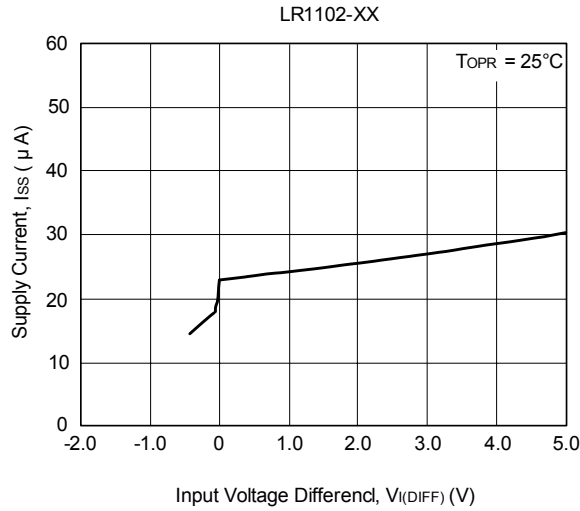


3. Output Voltage vs. Temperature

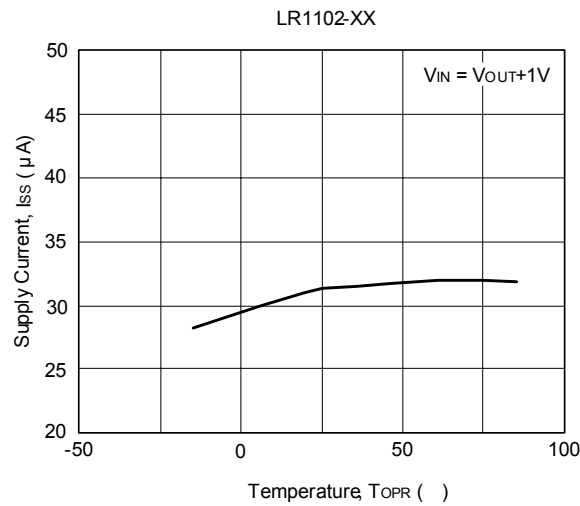


■ TYPICAL CHARACTERISTICS(Cont.)

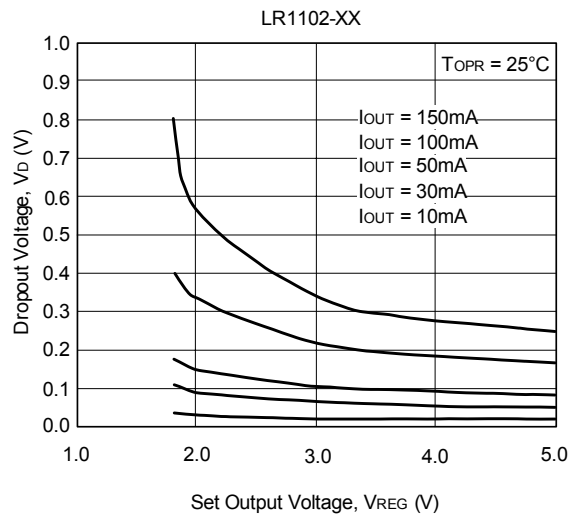
4. Supply Current vs. Input Voltage



5. Supply Current vs. Temperature

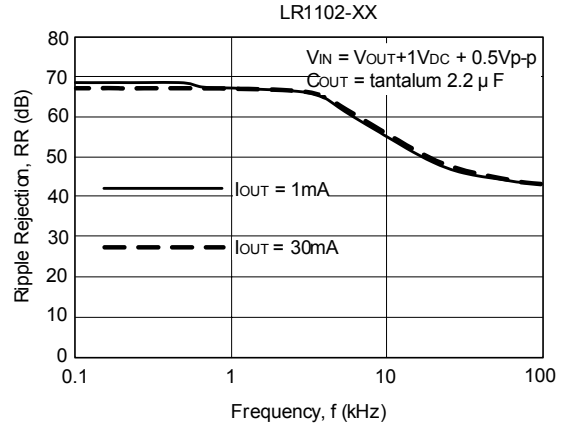
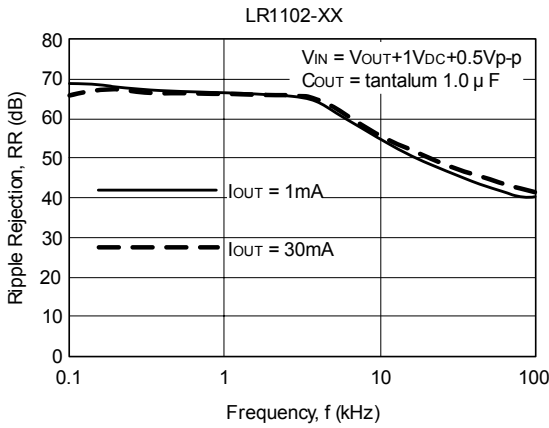


6. Dropout Voltage vs. Set Output Voltage

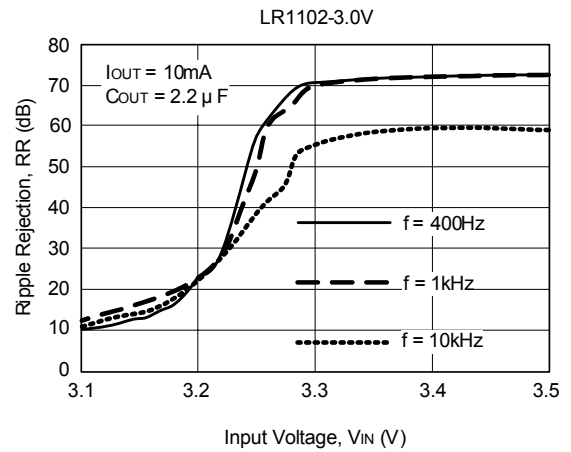
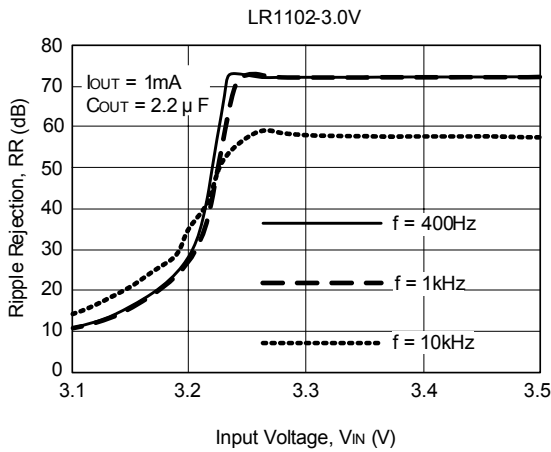


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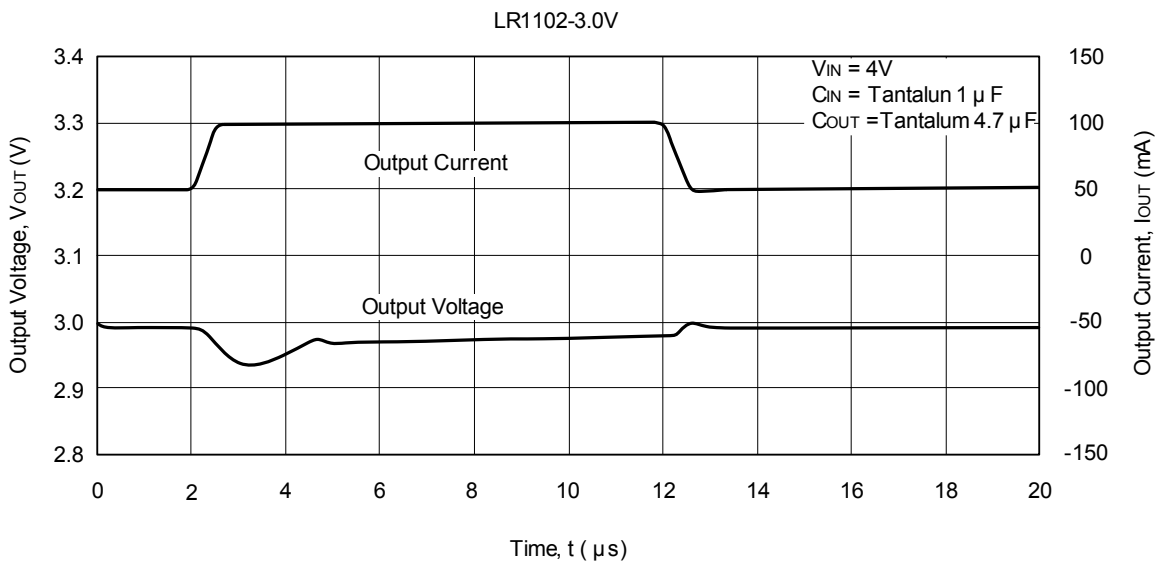
7. Ripple Rejection vs. Frequency



8. Ripple Rejection vs. Input Voltage (DC bias)



9. Load Transient Response



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