



LR1116/B

LINEAR INTEGRATED CIRCUIT

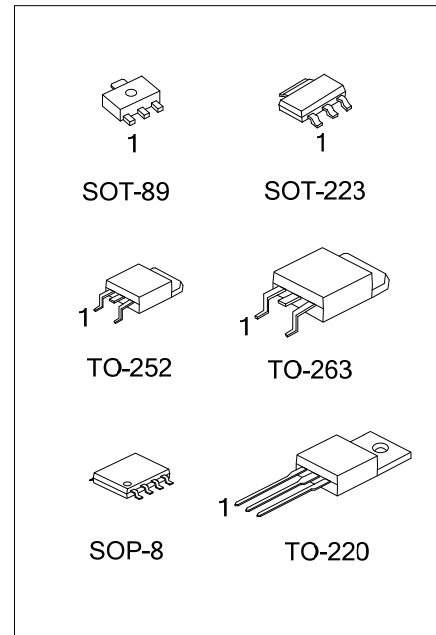
LOW DROP POSITIVE VOLTAGE REGULATORS

DESCRIPTION

The UTC **LR1116/B** is a low drop voltage regulator able to provide up to 0.8/0.5A of output current. Output consists of PNP power transistor. So that dropout voltage can be extremely low.

FEATURES

- * 2.85V Device are Suitable for SCSI-2 Active Termination
- * Output Current up to 0.8/0.5A
- * Internal Current and Thermal Limit
- * Available in $\pm 1\%$ (at 25°C) and 2% in all Temperature



ORDERING INFORMATION

Ordering Number		Package	② Pin Assignment			③ Packing
Lead Free	Halogen Free		Pin Code	1	2	
LR1116①L-xx-AA3-A-R	LR1116①G-xx-AA3-②-③	SOT-223	A	G	O	R: Tape Reel T: Tube
LR1116①L-xx-AB3-A-R	LR1116①G-xx-AB3-②-③	SOT-89	B	O	G	
LR1116①L-xx-TA3-D-T	LR1116①G-xx-TA3-②-③	TO-220	C	G	I	
LR1116①L-xx-TN3-A-R	LR1116①G-xx-TN3-②-③	TO-252	D	I	G	
LR1116①L-xx-TQ2-D-R	LR1116①G-xx-TQ2-②-③	TO-263			O	
LR1116①L-xx-S08-R	LR1116①G-xx-S08-R	SOP-8	GOOlxOOx			

- Notes: 1. ①: Current code: Blank: 0.8A B: 0.5A
 2. Pin Assignment: I:V_{IN} O:V_{OUT} G:GND x: NC
 3. xx: Output Voltage, Refer to Marking Information.

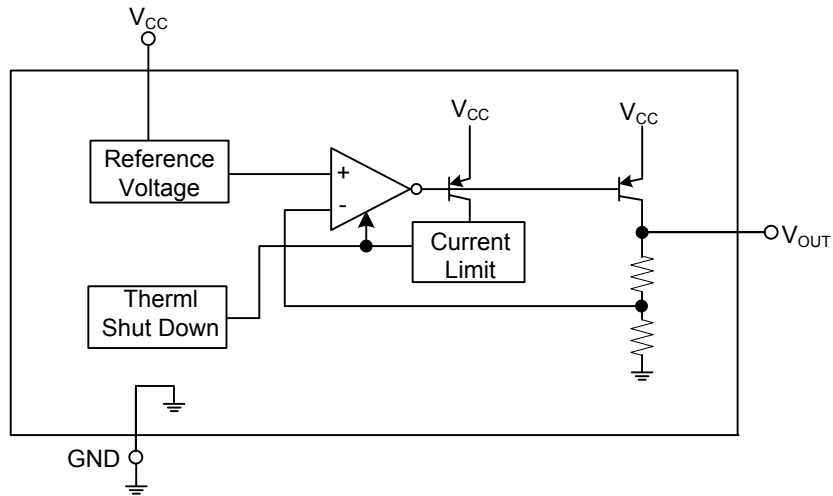
<p>LR1116①L-xx-AA3-A-R</p> <ul style="list-style-type: none"> (1) Packing Type (2) Pin Assignment (3) Package Type (4) Output Voltage Code (5) Lead Free (6) Current Code 	<ul style="list-style-type: none"> (1) R: Tape Reel, T: Tube (2) Refer to Pin Assignment (3) AA3: SOT-223, AB3: SOT-89, TA3: TO-220 TN3: TO-252, TQ2: TO-263, S08: SOP-8 (4) xx: Refer to Marking Information (5) G: Halogen Free, L: Lead Free (6) Blank: 0.8A, B: 0.5A
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MARKING INFORMATION

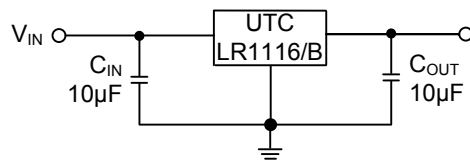
PACKAGE	VOLTAGE CODE	MARKING
SOT-89		<p>Diagram of SOT-89 package marking: A 3-pin package with markings: Date Code (XX), Current Code (1116), Voltage Code, Pin Code, L: Lead Free, G: Halogen Free.</p>
SOT-223	12 :1.2V 15 :1.5V 18 :1.8V 25 :2.5V 2J :2.85V 30 :3.0V 33 :3.3V 36 :3.6V 50 :5.0V	<p>Diagram of SOT-223 package marking: A 3-pin package with markings: Current Code (LR1116), Voltage Code (XX), L: Lead Free, G: Halogen Free, Pin Code, Date Code.</p>
TO-220 TO-252 TO-263		<p>Diagram of TO-220/252/263 package marking: A 3-pin package with markings: Current Code (UTC), Pin Code (LR1116), Voltage Code (XX), L: Lead Free, G: Halogen Free, LOT Code, Date Code.</p>

Note: Current code: Blank: 0.8A B: 0.5A

■ BLOCK DIAGRAM



■ APPLICATION CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
DC Input Voltage	V_{IN}	15	V
Operating Junction Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-40 ~ +150	°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	RATINGS	UNIT
Junction to Case	SOT-223/SOT-89	15	°C/W
	SOP-8	20	°C/W
	TO-252	8	°C/W
	TO-220/TO-263	4	°C/W

■ ELECTRICAL CHARACTERISTICS

($T_A=25^\circ\text{C}$, refer to the test circuits, $T_J=-0 \sim 125^\circ\text{C}$, $C_O=10\mu\text{F}$, unless otherwise specified).

For LR1116/B-1.2V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5\text{V}$, $I_{OUT}=10\text{mA}$, $T_J=25^\circ\text{C}$	1%	1.188	1.2	1.212	V
			2%	1.176		1.224	
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2\text{V})\sim 15\text{V}$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	1.176	1.2	1.224	V	
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2\text{V})\sim 15\text{V}$, $I_{OUT}=0\text{mA}$		0.1	0.6	%	
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2\text{V}$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%	
Temperature Stability	ΔV_{OUT}			0.5		%	
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^\circ\text{C}$		0.3		%	
Operating Input Voltage	V_{IN}	$I_{OUT}=100\text{mA}$			15	V	
Quiescent Current	I_D	$V_{IN}\leq 10\text{V}$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5\text{V}$, $T_J=25^\circ\text{C}$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10\text{Hz}\sim 10\text{KHz}$, $T_J=25^\circ\text{C}$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40\text{mA}$, $f=120\text{Hz}$, $T_J=25^\circ\text{C}$ $V_{IN}=V_{OUT}+2.5\text{V}$, $V_{RIPPLE}=1\text{V}_{PP}$	60	75		dB	
Dropout Voltage	V_D	$I_{OUT}=100\text{mA}$		0.9	1.0	V	
		$I_{OUT}=500\text{mA}$		1.1	1.3	V	
		$I_{OUT}=800\text{mA}$ (only for LR1116)		1.2	1.4	V	
Thermal Regulation		$T_A=25^\circ\text{C}$, 30ms Pulse		0.01	0.10	%/W	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For LR1116/B-1.5V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	1%	1.485	1.5	1.515	V
			2%	1.470		1.530	
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	1.470	1.5	1.530	V	
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%	
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%	
Temperature Stability	ΔV_{OUT}			0.5		%	
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%	
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V	
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10Hz\sim 10KHz, T_J=25^{\circ}C$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D	$I_{OUT}=100mA$		0.6	0.75	V	
		$I_{OUT}=500mA$		0.80	0.95	V	
		$I_{OUT}=800mA$ (only for LR1116)		0.95	1.1	V	
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W	

For LR1116/B-1.8V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	1%	1.782	1.8	1.818	V
			2%	1.764		1.836	
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	1.764	1.8	1.836	V	
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%	
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%	
Temperature Stability	ΔV_{OUT}			0.5		%	
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%	
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V	
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10Hz\sim 10KHz, T_J=25^{\circ}C$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D	$I_{OUT}=100mA$		0.4	0.5	V	
		$I_{OUT}=500mA$		0.6	0.8	V	
		$I_{OUT}=800mA$ (only for LR1116)		0.8	0.95	V	
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For LR1116/B-2.5V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	1%	2.475	2.5	2.525	V
			2%	2.450		2.550	
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	2.45	2.5	2.55	V	
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%	
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%	
Temperature Stability	ΔV_{OUT}			0.5		%	
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%	
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V	
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10Hz\sim 10KHz, T_J=25^{\circ}C$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D	$I_{OUT}=100mA$		0.16	0.3	V	
		$I_{OUT}=500mA$		0.4	0.6	V	
		$I_{OUT}=800mA$ (only for LR1116)		0.6	0.8	V	
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W	

For LR1116/B-2.85V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	1%	2.822	2.85	2.878	V
			2%	2.793		2.907	
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	2.793	2.85	2.907	V	
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%	
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%	
Temperature Stability	ΔV_{OUT}			0.5		%	
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%	
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V	
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10Hz\sim 10KHz, T_J=25^{\circ}C$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D	$I_{OUT}=100mA$		0.16	0.3	V	
		$I_{OUT}=500mA$		0.45	0.6	V	
		$I_{OUT}=800mA$ (only for LR1116)		0.6	0.8	V	
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For LR1116/B-3.0V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	2.970	3.0	3.030	V
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	2.940	3.0	3.060	V
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100		μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	V_D	$I_{OUT}=100mA$		0.16	0.3	V
		$I_{OUT}=500mA$		0.45	0.6	V
		$I_{OUT}=800mA$ (only for LR1116)		0.6	0.8	V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W

For LR1116/B-3.3V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	3.267	3.3	3.333	V
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	3.234	3.3	3.366	V
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100		μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	V_D	$I_{OUT}=100mA$		0.16	0.3	V
		$I_{OUT}=500mA$		0.4	0.6	V
		$I_{OUT}=800mA$ (only for LR1116)		0.6	0.8	V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W

■ ELECTRICAL CHARACTERISTICS (Cont.)

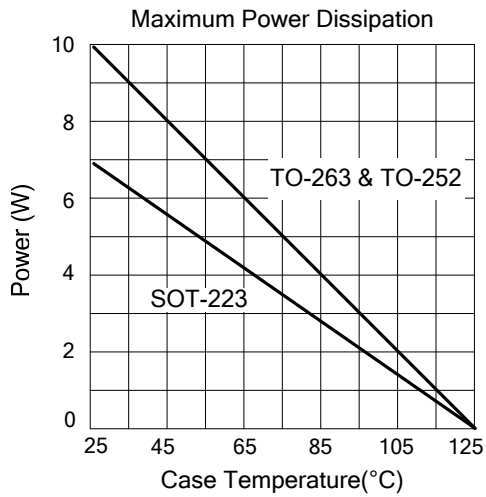
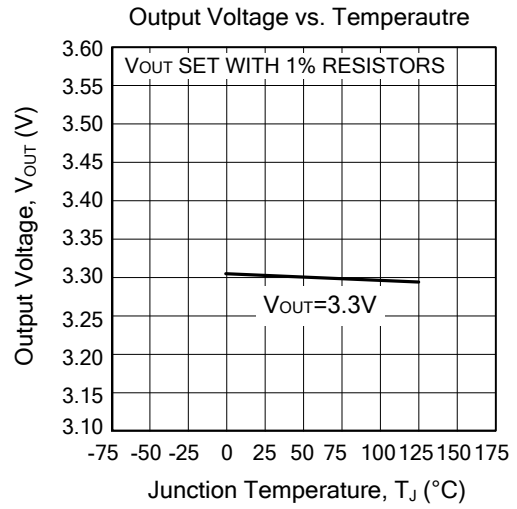
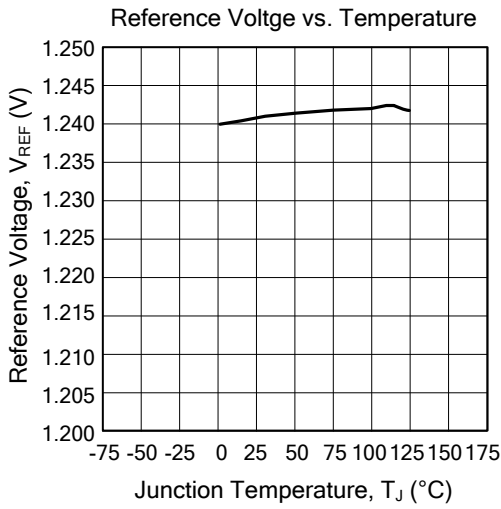
For LR1116/B-3.6V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	3.564	3.6	3.636	V
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	3.528	3.6	3.672	V
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100		μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	V_D	$I_{OUT}= 100mA$		0.16	0.3	V
		$I_{OUT}= 500mA$		0.4	0.6	V
		$I_{OUT}= 800mA$ (only for LR1116)		0.6	0.8	V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W

For LR1116/B-5.0V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	4.95	5.0	5.05	V
Output Voltage	V_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	4.90	5.0	5.10	V
Line Regulation	ΔV_{OUT}	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J=125^{\circ}C$		0.3		%
Operating Input Voltage	V_{IN}	$I_{OUT}=100mA$			15	V
Quiescent Current	I_D	$V_{IN}\leq 10V$		5	10	mA
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+4.5V, T_J=25^{\circ}C$	800	950	1200	mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100		μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C$ $V_{IN}=V_{OUT}+2.5V, V_{RIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	V_D	$I_{OUT}= 100mA$		0.16	0.3	V
		$I_{OUT}= 500mA$		0.4	0.6	V
		$I_{OUT}= 800mA$ (only for LR1116)		0.6	0.8	V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W

■ TYPICAL PERFORMANCE CHARACTERISTICS



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