



## LR1116/B

## LINEAR INTEGRATED CIRCUIT

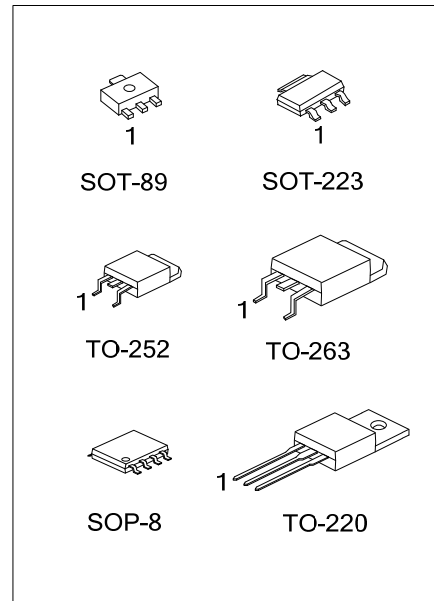
### LOW DROP POSITIVE VOLTAGE REGULATORS

#### 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



#### ORDERING INFORMATION

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

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

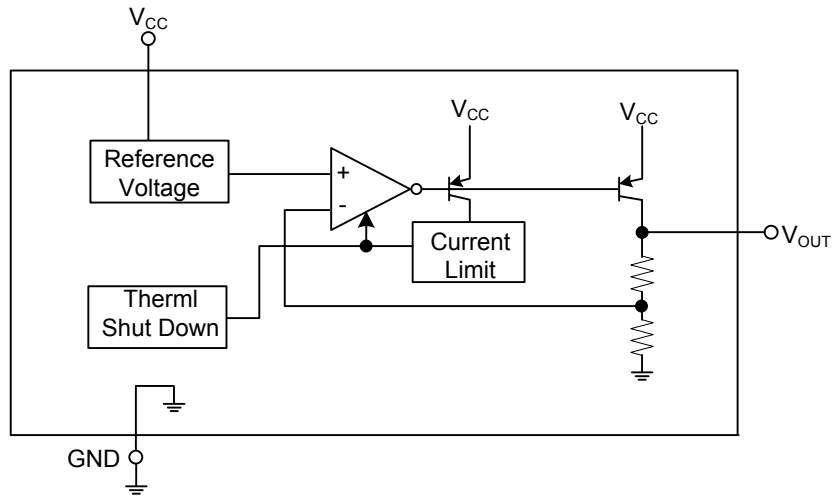
<p>LR1116①G-xx-AA3-②-③</p>	<p>(1) T: Tube, R: Tape Reel          (2) Refer to Pin Assignment          (3) AA3: SOT-223, AB3: SOT-89, TA3: TO-220          TN3: TO-252, TQ2: TO-263, S08: SOP-8          (4) xx: Refer to Marking Information          (5) G: Halogen Free and Lead Free, L: Lead Free          (6) Blank: 0.8A, B: 0.5A</p>
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### MARKING INFORMATION

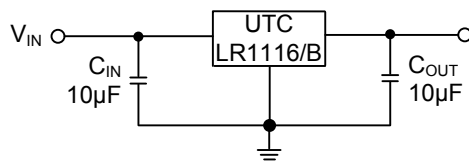
PACKAGE	VOLTAGE CODE	MARKING
SOT-89	12 :1.2V 15 :1.5V 18 :1.8V 25 :2.5V 2J :2.85V 30 :3.0V 33 :3.3V 36 :3.6V 50 :5.0V	
SOT-223		
TO-220 TO-252 TO-263		
SOP-8		

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	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5\text{V}$ , $I_{OUT}=10\text{mA}$ , $T_J=25^\circ\text{C}$	1.176	1.2	1.224	V
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	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2\text{V})\sim 15\text{V}$ , $I_{OUT}=0\text{mA}$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2\text{V}$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu\text{V}$
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	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V$ , $I_{OUT}=10mA$ , $T_J=25^{\circ}C$	1.470	1.5	1.530	V
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	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ , $I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V$ , $I_{OUT}=10mA$ , $T_J=25^{\circ}C$	1.764	1.8	1.836	V
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	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ , $I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V$ , $I_{OUT}=10mA$ , $T_J=25^{\circ}C$	2.450	2.5	2.550	V
Output Voltage	$V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	2.45	2.5	2.55	V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ , $I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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			0.01	0.10	%/W	

For LR1116/B-2.85V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V$ , $I_{OUT}=10mA$ , $T_J=25^{\circ}C$	2.793	2.85	2.907	V
Output Voltage	$V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	2.793	2.85	2.907	V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ , $I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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			0.01	0.10	%/W	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For LR1116/B-3.0V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	2.940	3.0	3.060	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	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	3.234	3.3	3.366	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	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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

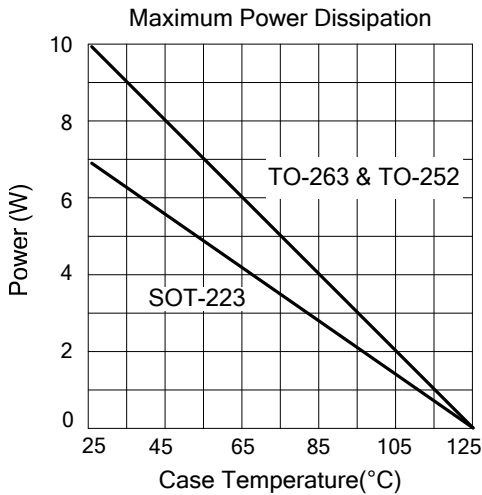
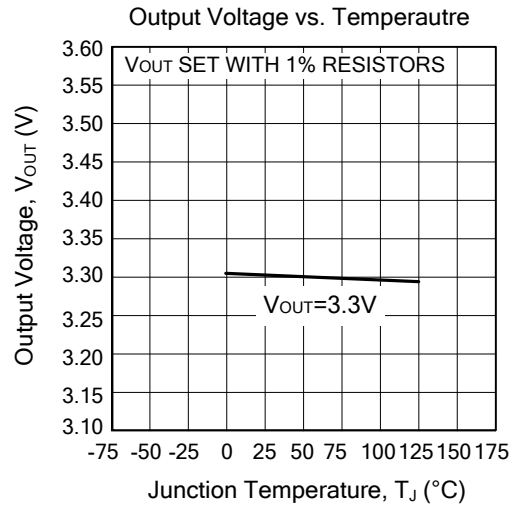
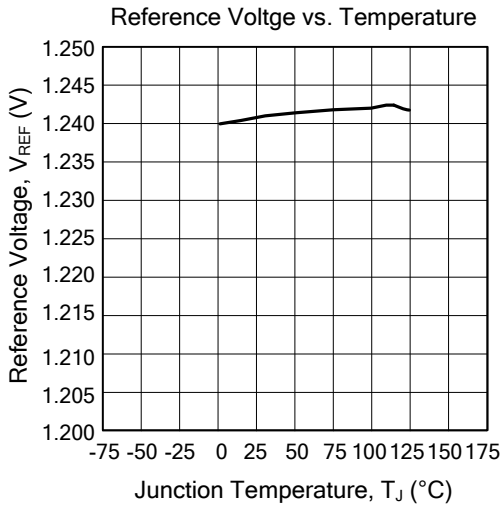
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	3.528	3.6	3.672	V
Output Voltage	$V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA	3.528	3.6	3.672	V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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	$V_{OUT}$	$V_{IN}=V_{OUT}+1.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	4.90	5.0	5.10	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	$\Delta V_{OUT}$	$V_{IN}=(V_{OUT}+2V)\sim 15V, I_{OUT}=0mA$		0.1	0.6	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+2V$ LR1116 : $I_{OUT}=0$ to 800mA LR1116B : $I_{OUT}=0$ to 500mA		2	3	%
Temperature Stability	$\Delta V_{OUT}$			0.5		%
Long Term Stability	$\Delta V_{OUT}$	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		$\mu V$
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



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.