



UR233

LINEAR INTEGRATED CIRCUIT

LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATORS

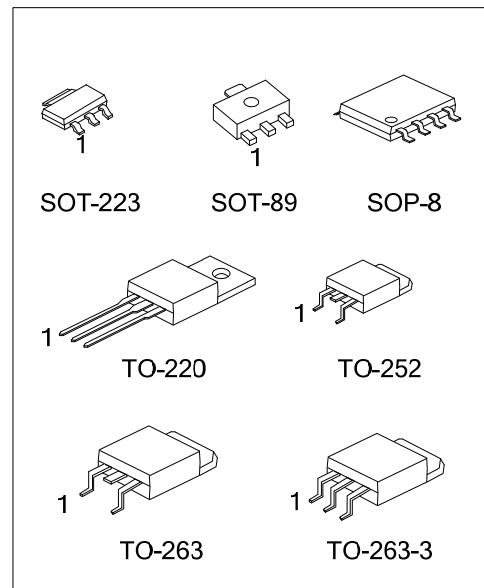
DESCRIPTION

The UTC **UR233** is a LOW DROP Voltage Regulator able to provide up to 0.8A of Output Current, available even in adjustable version ($V_{REF}=1.25V$). High efficiency is assured by NPN pass transistor. In fact in the case, unlike than PNP one, the Quiescent Current flows mostly into the load. Only a very common $10\mu F$ minimum capacitor is needed for stability. On chip trimming allows the regulator to reach a very tight output voltage tolerance, within $\pm 1\%$ at $25^\circ C$. The ADJUSTABLE **UR233** is pin to pin compatible with the other standard Adjustable voltage regulators maintaining the better performances in terms of Drop and Tolerance.

FEATURES

- *Low dropout voltage (1.5V Typ.)
- *Output current up to 0.8A
- *Fixed output voltage of: 1.7V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, 5.0V
- *Adjustable version availability ($V_{REF}=1.25V$)
- *Internal current and thermal limit
- *Available in $\pm 1\%$ (at $25^\circ C$) and 2% in all temperature range
- *Supply voltage rejection: 75dB (TYP)

ORDERING INFORMATION

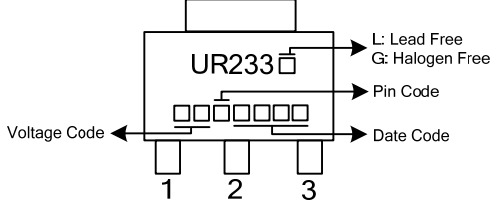
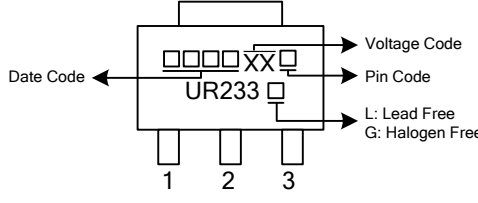
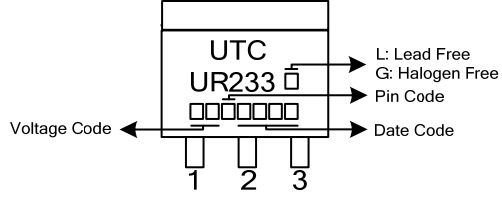
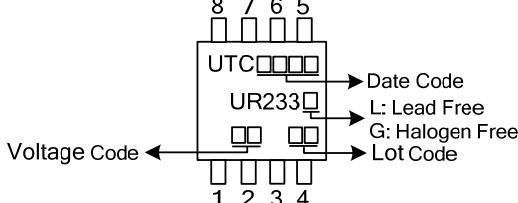


Ordering Number		Package	① Pin Assignment	② Packing
Lead Free	Halogen Free			
UR233L-xx-AA3-①-②	UR233G-xx-AA3-①-②	SOT-223	A: GOI B: OGI C: GIO D: IGO	R: Tape Reel T: Tube
UR233L-xx-AB3-①-②	UR233G-xx-AB3-①-②	SOT-89		
UR233L-xx-TA3-①-②	UR233G-xx-TA3-①-②	TO-220		
UR233L-xx-TN3-①-②	UR233G-xx-TN3-①-②	TO-252		
UR233L-xx-TQ2-①-②	UR233G-xx-TQ2-①-②	TO-263		
UR233L-xx-TQ3-①-②	UR233G-xx-TQ3-①-②	TO-263-3		
UR233L-xx-S08-①-②	UR233G-xx-S08-①-②	SOP-8		

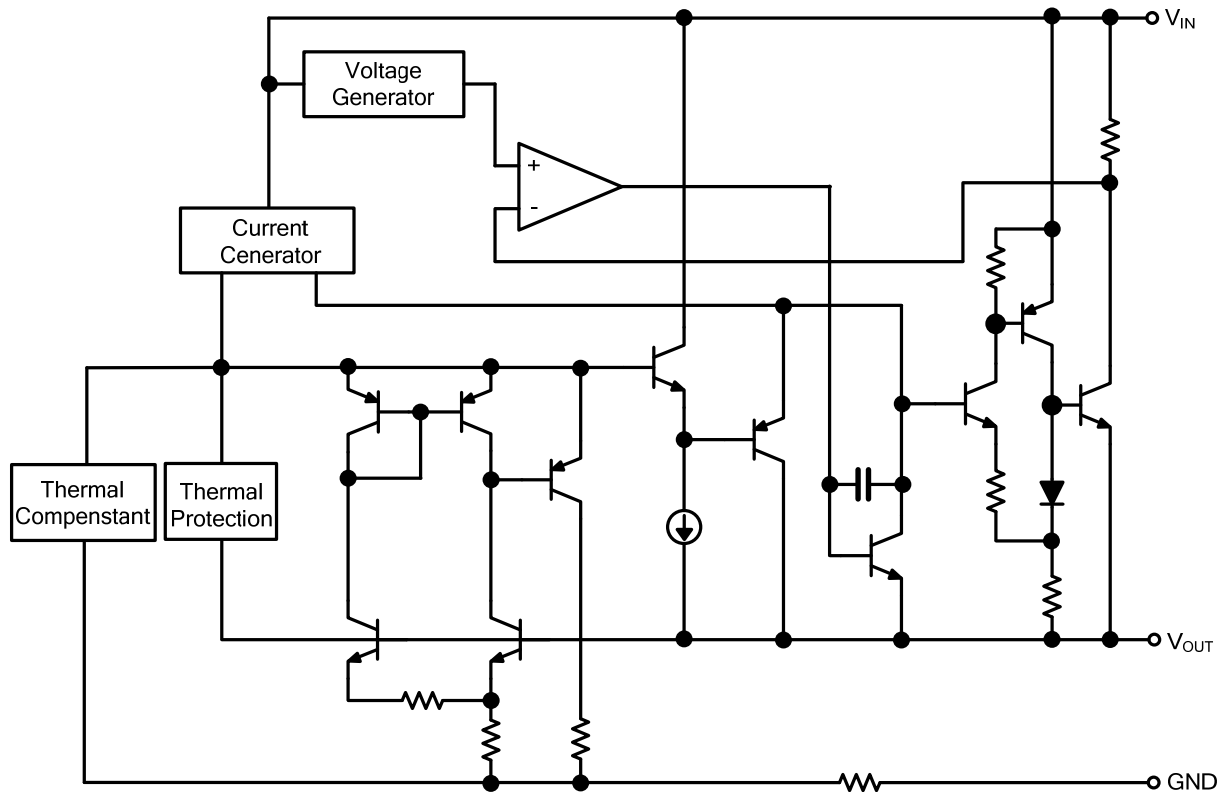
Note: Pin Assignment: I: V_{IN} O: V_{OUT} G: GND

<p>UR233L-xx-AA3-①-②</p> <ul style="list-style-type: none"> (1) Packing Type (2) Pin Assignment (3) Package Type (4) Output Voltage Code (5) Lead Free 	<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, TQ3: TO-263-3, S08: SOP-8 (4) xx: refer to Marking Information (5) G: Halogen Free, L: Lead Free
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223		 <p>Diagram of SOT-223 package marking. The top surface shows 'UR233' followed by a small square. Below it is a row of five squares. The leftmost square is labeled 'Voltage Code'. The middle square is labeled 'Pin Code'. The rightmost square is labeled 'Date Code'. The bottom surface shows pins 1, 2, and 3. Arrows point to 'L: Lead Free' and 'G: Halogen Free' on the right side.</p>
SOT-89		 <p>Diagram of SOT-89 package marking. The top surface shows 'UR233' followed by a small square. Below it is a row of five squares. The leftmost square is labeled 'Date Code'. The middle square is labeled 'Pin Code'. The rightmost square is labeled 'Voltage Code'. The bottom surface shows pins 1, 2, and 3. Arrows point to 'L: Lead Free' and 'G: Halogen Free' on the right side.</p>
TO-220 TO-252 TO-263 TO-263-3		 <p>Diagram of TO-220, TO-252, TO-263, and TO-263-3 package marking. The top surface shows 'UTC' followed by 'UR233' and a small square. Below it is a row of five squares. The leftmost square is labeled 'Voltage Code'. The middle square is labeled 'Pin Code'. The rightmost square is labeled 'Date Code'. The bottom surface shows pins 1, 2, and 3. Arrows point to 'L: Lead Free' and 'G: Halogen Free' on the right side.</p>
SOP-8		 <p>Diagram of SOP-8 package marking. The top surface shows 'UTC' followed by 'UR233' and a small square. Below it is a row of five squares. The leftmost square is labeled 'Voltage Code'. The middle square is labeled 'Date Code'. The rightmost square is labeled 'Lot Code'. The bottom surface shows pins 1, 2, 3, and 4. Arrows point to 'L: Lead Free' and 'G: Halogen Free' on the right side.</p>

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	VALUE	UNIT
DC Input Voltage		V_{IN}	12	V
Power Dissipation	SOT-223	P_D	0.740	W
	SOT-89		0.571	
	SOP-8		0.625	
	TO-252		1.471	
	TO-220		1.820	
	TO-263		2.222	
Operating Junction Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +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	RATING	UNIT
Junction-to-Ambient	SOT-223	θ_{JA}	135	°C/W
	SOT-89		175	
	SOP-8		160	
	TO-252		68	
	TO-220		55	
	TO-263		45	
Junction-to-Case	SOT-223	θ_{JC}	19	°C/W
	SOT-89		48	
	SOP-8		45	
	TO-252		7.5	
	TO-220		15	
	TO-263		7.8	

■ ELECTRICAL CHARACTERISTICS ($T_J=0 \sim 125^\circ\text{C}$, unless otherwise specified)

For UR233-1.7

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=3.7\text{V}$, $I_{OUT}=10\text{mA}$, $T_J=25^\circ\text{C}$	$\pm 1\%$	1.683	1.700	1.717	V
Output Voltage	V_{OUT}	$V_{IN}=3.1 \sim 10\text{V}$, $I_{OUT}=2 \sim 800\text{mA}$	$\pm 2\%$	1.666		1.734	V
Line Regulation	ΔV_{OUT}	$V_{IN}=3.1 \sim 10\text{V}$, $I_{OUT}=2\text{mA}$		1	6	mV	
Load Regulation	ΔV_{OUT}	$V_{IN}=3.1\text{V}$, $I_{OUT}=2 \sim 800\text{mA}$		1	10	mV	
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}	$I_{OUT}=100\text{mA}$			12	V	
Quiescent Current	I_Q	$V_{IN}=10\text{V}$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=6.7\text{V}$, $T_J=25^\circ\text{C}$	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	$I_{OUT}=40\text{mA}$, $f=120\text{Hz}$, $T_J=25^\circ\text{C}$, $V_{IN}=4.7\text{V}$, $V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D				1.50	V	
Thermal Regulation		$T_A=25^\circ\text{C}$, 30ms Pulse		0.01	0.10	%/W	

■ ELECTRICAL CHARACTERISTICS(Cont.)

For UR233-1.8

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=3.8V, I_{OUT}=10mA, T_J=25^{\circ}C$	$\pm 1\%$	1.782	1.800	1.818	V
Output Voltage	V_{OUT}	$V_{IN}=3.2 \sim 10V, I_{OUT}=2 \sim 800mA$	$\pm 2\%$	1.764		1.836	V
Line Regulation	ΔV_{OUT}	$V_{IN}=3.2 \sim 10V, I_{OUT}=2mA$		1	6		mV
Load Regulation	ΔV_{OUT}	$V_{IN}=3.2V, I_{OUT}=2 \sim 800mA$		1	10		mV
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}	$I_O=100mA$			12		V
Quiescent Current	I_Q	$V_{IN}=10V$		5	10		mA
Output Current	I_{OUT}	$V_{IN}=6.8V, T_J=25^{\circ}C$	800	950	1200		mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100			μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=4.8V, V_{RIPPLE}=1V_{PP}$	60	75			dB
Dropout Voltage	V_D				1.50		V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10		%/W

For UR233-2.5

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=4.5V, I_{OUT}=10mA, T_J=25^{\circ}C$	$\pm 1\%$	2.475	2.500	2.525	V
Output Voltage	V_{OUT}	$V_{IN}=3.9 \sim 10V, I_{OUT}=2 \sim 800mA$	$\pm 2\%$	2.450		2.550	V
Line Regulation	ΔV_{OUT}	$V_{IN}=3.9 \sim 10V, I_{OUT}=2mA$		1	6		mV
Load Regulation	ΔV_{OUT}	$V_{IN}=3.9V, I_{OUT}=2 \sim 800mA$		1	10		mV
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}	$I_{OUT}=100mA$			12		V
Quiescent Current	I_Q	$V_{IN}=10V$		5	10		mA
Output Current	I_{OUT}	$V_{IN}=7.5V, T_J=25^{\circ}C$	800	950	1200		mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100			μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=5.5V, V_{RIPPLE}=1V_{PP}$	60	75			dB
Dropout Voltage	V_D				1.50		V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10		%/W

■ ELECTRICAL CHARACTERISTICS(Cont.)

For UR233-2.85

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=4.85V, I_{OUT}=10mA, T_J=25^{\circ}C$	$\pm 1\%$	2.822	2.85	2.878	V
Output Voltage	V_{OUT}	$V_{IN}=4.25 \sim 10V, I_{OUT}=2 \sim 800mA$	$\pm 2\%$	2.793		2.907	V
Line Regulation	ΔV_{OUT}	$V_{IN}=4.25 \sim 10V, I_{OUT}=2mA$		1	6	mV	
Load Regulation	ΔV_{OUT}	$V_{IN}=4.25V, I_{OUT}=2 \sim 800mA$		1	10	mV	
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}	$I_{OUT}=100mA$			12	V	
Quiescent Current	I_Q	$V_{IN}=10V$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=7.85V, T_J=25^{\circ}C$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=5.85V, V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D				1.50	V	
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W	

For UR233-3.0

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=5V, I_{OUT}=10mA, T_J=25^{\circ}C$	$\pm 1\%$	2.97	3.00	3.03	V
Output Voltage	V_{OUT}	$V_{IN}=4.5 \sim 12V, I_{OUT}=2 \sim 800mA$	$\pm 2\%$	2.94		3.06	V
Line Regulation	ΔV_{OUT}	$V_{IN}=4.5 \sim 12V, I_{OUT}=2mA$		1	6	mV	
Load Regulation	ΔV_{OUT}	$V_{IN}=4.5V, I_{OUT}=2 \sim 800mA$		1	10	mV	
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}	$I_{OUT}=100mA$			12	V	
Quiescent Current	I_Q	$V_{IN}=12V$		5	10	mA	
Output Current	I_{OUT}	$V_{IN}=8V, T_J=25^{\circ}C$	800	950	1200	mA	
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=6V, V_{RIPPLE}=1V_{PP}$	60	75		dB	
Dropout Voltage	V_D				1.50	V	
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10	%/W	

■ ELECTRICAL CHARACTERISTICS(Cont.)

For UR233-3.3

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=5.3V, I_{OUT}=10mA, T_J=25^{\circ}C$	$\pm 1\%$	3.267	3.300	3.333	V
Output Voltage	V_{OUT}	$V_{IN}=4.8 \sim 12V, I_{OUT}=2 \sim 800mA$	$\pm 2\%$	3.234		3.366	V
Line Regulation	ΔV_{OUT}	$V_{IN}=4.8 \sim 12V, I_{OUT}=2mA$		1	6		mV
Load Regulation	ΔV_{OUT}	$V_{IN}=4.8V, I_{OUT}=2 \sim 800mA$		1	10		mV
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}	$I_{OUT}=100mA$			12		V
Quiescent Current	I_Q	$V_{IN}=12V$		5	10		mA
Output Current	I_{OUT}	$V_{IN}=8.3V, T_J=25^{\circ}C$	800	950	1200		mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100			μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=6.3V, V_{RIPPLE}=1V_{PP}$	60	75			dB
Dropout Voltage	V_D				1.50		V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10		%/W

For UR233-5.0

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=7V, I_{OUT}=10mA, T_J=25^{\circ}C$	$\pm 1\%$	4.95	5.00	5.05	V
Output Voltage	V_{OUT}	$V_{IN}=6.5 \sim 12V, I_{OUT}=2 \sim 800mA$	$\pm 2\%$	4.90		5.10	V
Line Regulation	ΔV_{OUT}	$V_{IN}=6.5 \sim 12V, I_{OUT}=2mA$		1	10		mV
Load Regulation	ΔV_{OUT}	$V_{IN}=6.5V, I_{OUT}=2 \sim 800mA$		1	15		mV
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}	$I_{OUT}=100mA$			12		V
Quiescent Current	I_Q	$V_{IN}=12V$		5	10		mA
Output Current	I_{OUT}	$V_{IN}=10V, T_J=25^{\circ}C$	800	950	1200		mA
Output Noise Voltage	e_N	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100			μV
Supply Voltage Rejection	SVR	$I_{OUT}=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=8V, V_{RIPPLE}=1V_{PP}$	60	75			dB
Dropout Voltage	V_D				1.50		V
Thermal Regulation		$T_A=25^{\circ}C, 30ms$ Pulse		0.01	0.10		%/W

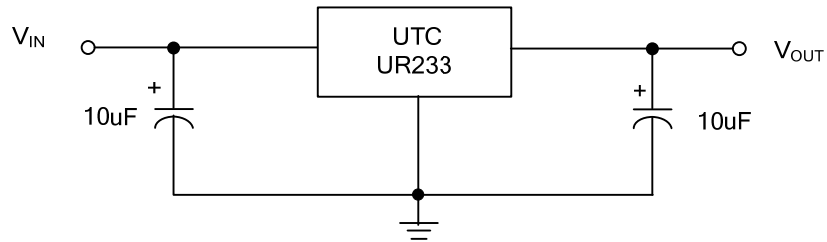
■ ELECTRICAL CHARACTERISTICS(Cont.)

UR233-ADJ

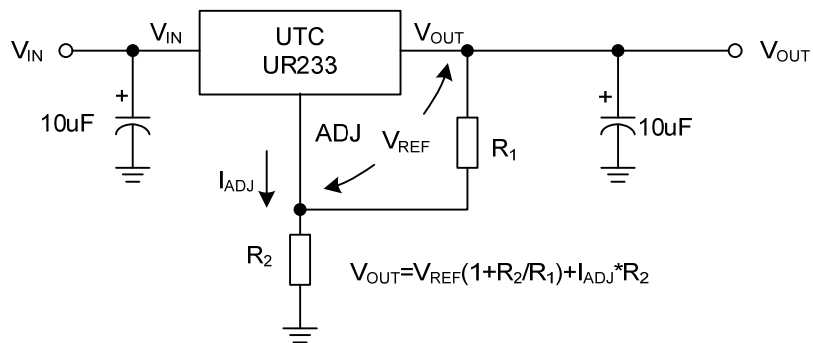
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Reference Voltage	V_{REF}	$V_{IN} - V_{OUT} = 2V, I_{OUT} = 10mA, T_J = 25^\circ C$	$\pm 1\%$	1.238	1.25	1.262	V
Reference Voltage	V_{REF}	$V_{IN} = V_{OUT} + 1.5V \sim 10V, I_{OUT} = 10 \sim 800mA$	$\pm 2\%$	1.225		1.275	V
Line Regulation	ΔV_{OUT}	$V_{IN} = V_{OUT} + 1.5V \sim 10V, I_{OUT} = 10mA$		0.035	0.200		%
Load Regulation	ΔV_{OUT}	$V_{IN} - V_{OUT} = 3V, I_{OUT} = 10 \sim 800mA$		0.10	0.400		%
Temperature Stability	ΔV_{OUT}			0.50			%
Long Term Stability	ΔV_{OUT}	1000 hrs, $T_J = 125^\circ C$		0.3			%
Operating Input Voltage	V_{IN}				12		V
Adjustment Pin Current	I_{ADJ}	$V_{IN} \leq 12V$		60	120		μA
Adjustment Pin Current Change	ΔI_{ADJ}	$V_{IN} = V_{OUT} + 1.5V \sim 10V, I_{OUT} = 10 \sim 800mA$		1	5		μA
Minimum Load Current	$I_{OUT(MIN)}$	$V_{IN} = 12V$		2	5		mA
Output Current	I_{OUT}	$V_{IN} - V_{OUT} = 5V, T_J = 25^\circ C$	800	950	1200		mA
Output Noise (%Vo)	e_N	$B = 10Hz \sim 10KHz, T_J = 25^\circ C$		0.003			%
Supply Voltage Rejection	SVR	$I_{OUT} = 40mA, f = 120Hz, T_J = 25^\circ C, V_{IN} - V_{OUT} = 3V, V_{RIPPLE} = 1V_{PP}$	60	75			dB
Dropout Voltage	V_D				1.50		V
Thermal Regulation		$T_A = 25^\circ C, 30ms$ Pulse		0.01	0.10		%/W

■ APPLICATION CIRCUITS

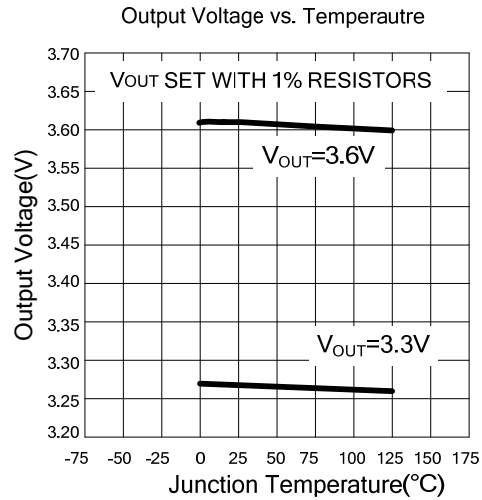
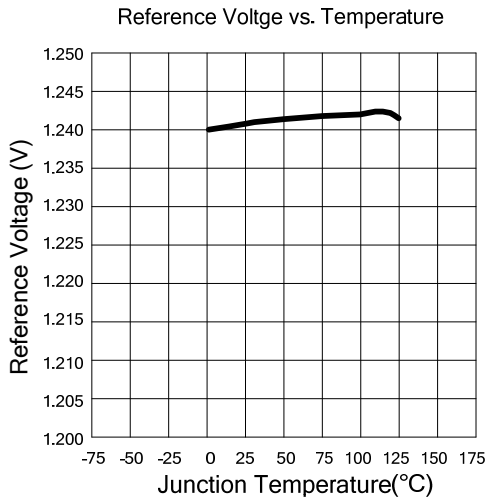
FIXED VOLTAGE



ADJUSTABLE



■ TYPICAL CHARACTERISTICS



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