



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 μ 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°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°C) and 2% in all temperature range
- *Supply voltage rejection: 75dB (TYP)

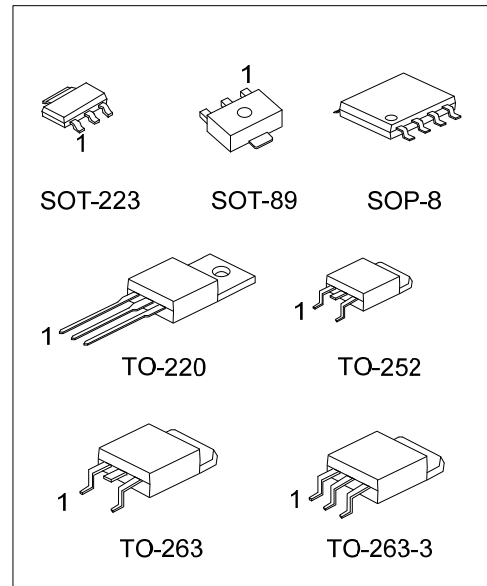
■ ORDERING INFORMATION

Ordering Number		Package	① Pin Assignment	② Packing
Normal	Lead Free Plating			
UR233-xx-AA3-①-②	UR233L-xx-AA3-①-②	SOT-223	A: GOI B: OGI C: GIO D: IGO	R: Tape Reel T: Tube
UR233-xx-AB3-①-②	UR233L-xx-AB3-①-②	SOT-89		
UR233-xx-TA3-①-②	UR233L-xx-TA3-①-②	TO-220		
UR233-xx-TN3-①-②	UR233L-xx-TN3-①-②	TO-252		
UR233-xx-TQ2-①-②	UR233L-xx-TQ2-①-②	TO-263		
UR233-xx-TQ3-①-②	UR233L-xx-TQ3-①-②	TO-263-3		
UR233-xx-S08-①-②	UR233L-xx-S08-①-②	SOP-8	GOOIxOOx	

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

■ ORDERING INFORMATION(Cont.)

<p>UR233L-xx-AA3-①-②</p>	<p>(1)Packing Type (2)Pin Assignment (3)Package Type (4)Output Voltage Code (5)Lead Plating</p>	<p>(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) L: Lead Free Plating, Blank: Pb/Sn</p>
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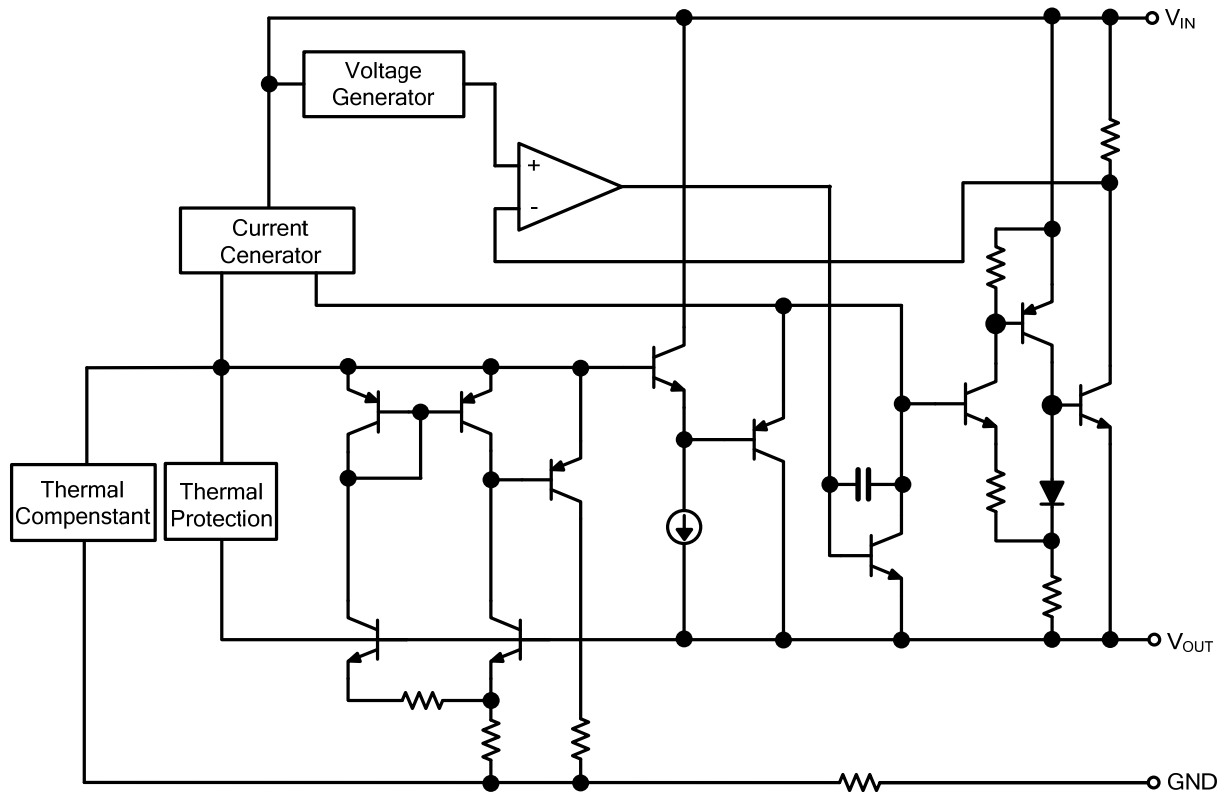


*Pb-free plating product number: UR233L

MARKING INFORMATION

PACKAGE	VOLTAGE CODE	PIN CODE	PIN 1	PIN 2	PIN 3	MARKING
SOT-223		A	GND	OUT	IN	
		B	OUT	GND	IN	
		C	GND	IN	OUT	
		D	IN	GND	OUT	
SOT-89	17:1.7V 18:1.8V 25:2.5V 2J:2.85V 30:3.0V 33:3.3V 50:5.0V AD:ADJ	A	GND	OUT	IN	
		B	OUT	GND	IN	
		C	GND	IN	OUT	
		D	IN	GND	OUT	
TO-220 TO-252 TO-263 TO-263-3		A	GND	OUT	IN	
		B	OUT	GND	IN	
		C	GND	IN	OUT	
		D	IN	GND	OUT	

■ 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}	$V_{IN}=3.7\text{V}$, $I_{OUT}=10\text{mA}$, $T_J=25^\circ\text{C}$	±1%	1.683	1.700	1.717	V
Output Voltage	V_{OUT}	$V_{IN}=3.1 \sim 10\text{V}$, $I_{OUT}=2 \sim 800\text{mA}$	±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	eN	$B=10\text{Hz} \sim 10\text{KHz}$, $T_J=25^\circ\text{C}$		100		μV	
Supply Voltage Rejection	SVR	$I_{OUT}=40\text{mA}$, $f=120\text{Hz}$, $T_J=25^\circ\text{C}$, $V_{IN}=4.7\text{V}$, $V_{RIPPLE}=1\text{Vpp}$	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	eN	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		100			μV
Supply Voltage Rejection	SVR	$I_O=40mA, f=120Hz, T_J=25^{\circ}C, V_{IN}=4.8V, V_{RIPPLE}=1V_{pp}$	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	eN	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		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	eN	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		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	eN	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		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	eN	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		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	eN	$B=10Hz \sim 10KHz, T_J=25^{\circ}C$		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

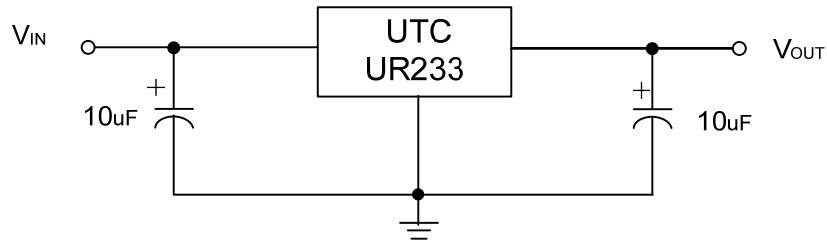
■ ELECTRICAL CHARACTERISTICS(Cont.)

UR233-ADJ

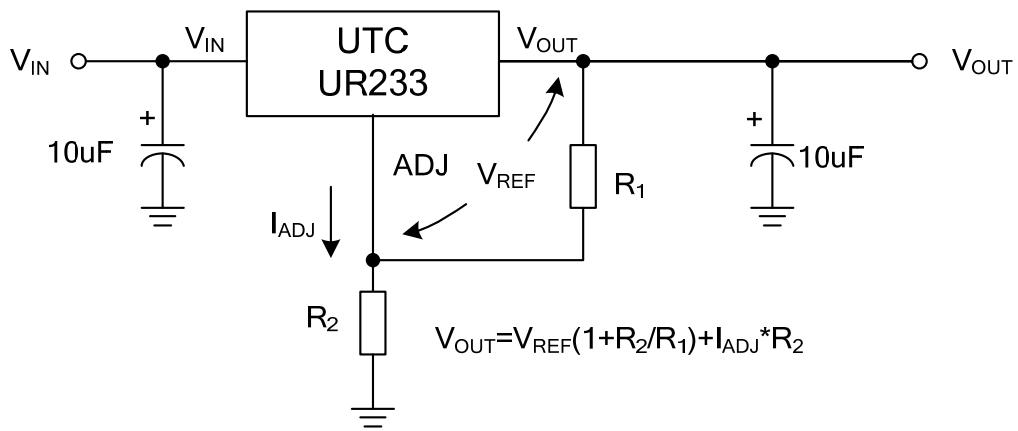
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Reference Voltage	V_{REF}	$V_{IN} - V_{OUT} = 2V, I_{OUT} = 10mA, T_J = 25^\circ C$	$\pm 1\%$	1.238	1.25	1.262	V
Reference Voltage	V_{REF}	$V_{IN} = V_{OUT} + 1.5V \sim 10V, I_{OUT} = 10 \sim 800mA$	$\pm 2\%$	1.225		1.275	V
Line Regulation	ΔV_{OUT}	$V_{IN} = V_{OUT} + 1.5V \sim 10V, I_{OUT} = 10mA$		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)	eN	$B = 10Hz \sim 10KHz, T_J = 25^\circ C$		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

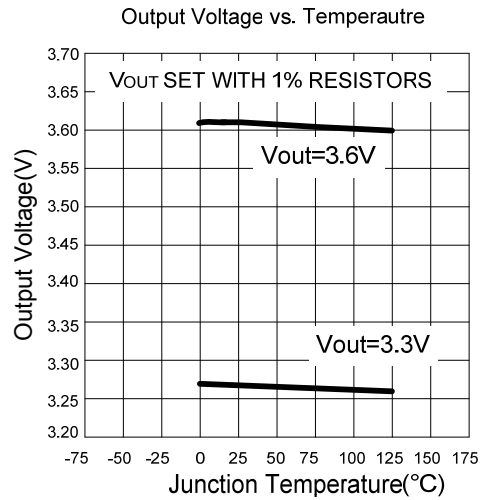
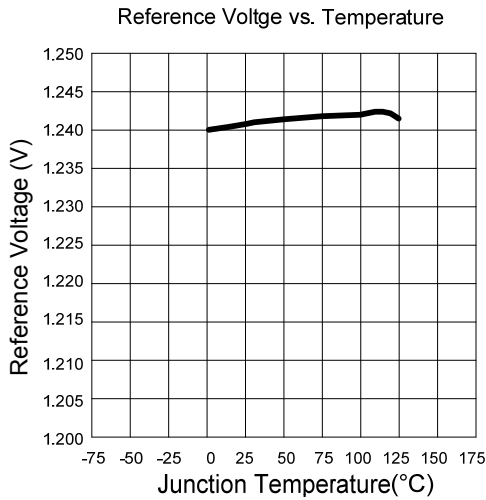
FIXED VOLTAGE



ADJUSTABLE



■ TYPICAL CHARACTERISTICS



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