



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.

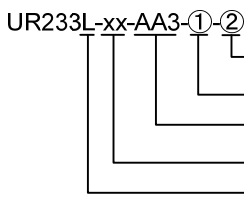
FEATURES

- *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	GOOIxOOx	

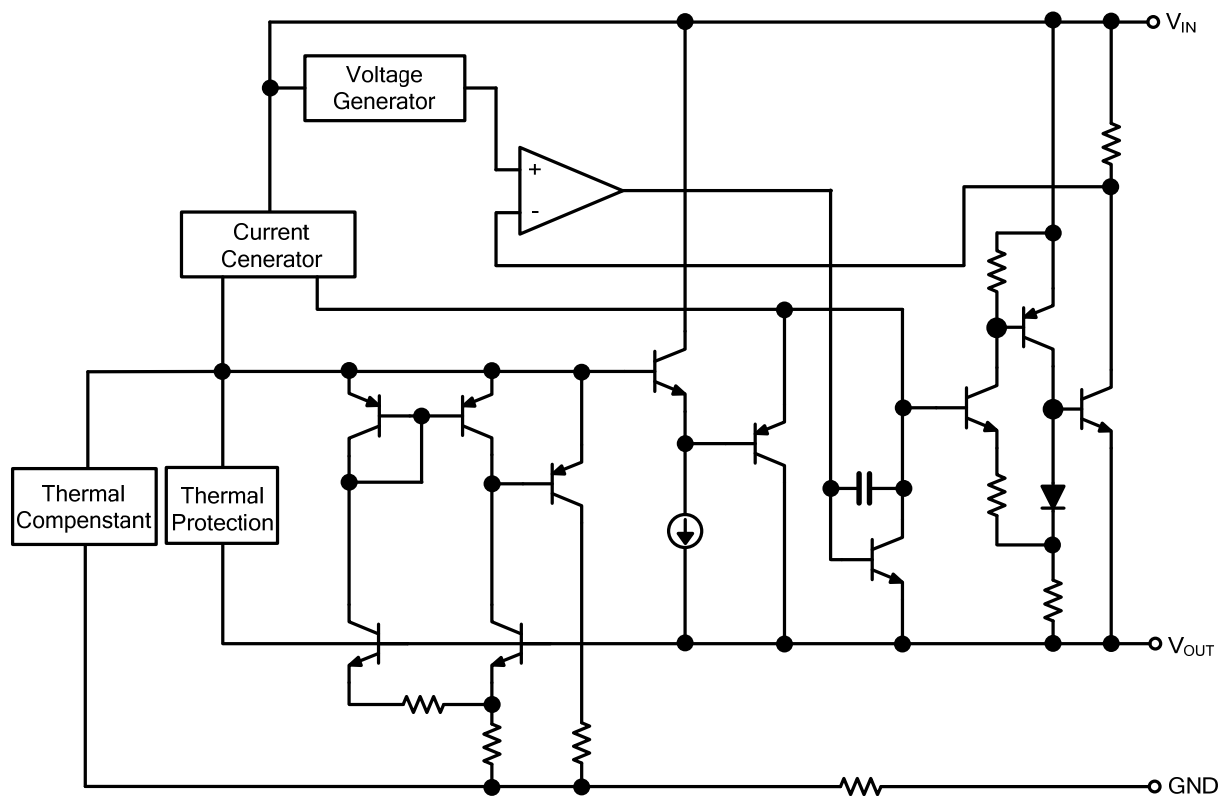
Note: Pin Assignment: I: V_{IN} O: V_{OUT} G: GND

	(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	17:1.7V 18:1.8V 25:2.5V 2J:2.85V 30:3.0V 33:3.3V 50:5.0V AD:ADJ	
SOT-89		
TO-220 TO-252 TO-263 TO-263-3		
SOP-8		

■ 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

for OR200-110

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{OUT}	V _{IN} =3.8V, I _{OUT} =10mA, T _J =25°C	±1%	1.782	1.800	1.818	V
Output Voltage	V _{OUT}	V _{IN} =3.2 ~ 10V, I _{OUT} =2 ~ 800mA	±2%	1.764		1.836	V
Line Regulation	ΔV _{OUT}	V _{IN} =3.2 ~ 10V, I _{OUT} =2mA			1	6	mV
Load Regulation	ΔV _{OUT}	V _{IN} =3.2V, I _{OUT} =2 ~ 800mA			1	10	mV
Temperature Stability	ΔV _{OUT}				0.5		%
Long Term Stability	ΔV _{OUT}	1000 hrs, T _J =125°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°C		800	950	1200	mA
Output Noise Voltage	e _N	B=10Hz ~ 10KHz, T _J =25°C			100		μV
Supply Voltage Rejection	SVR	I _{OUT} =40mA, f=120Hz, T _J =25°C, V _{IN} =4.8V, V _{RI} PPLE=1V _{PP}		60	75		dB
Dropout Voltage	V _D					1.50	V
Thermal Regulation		T _A =25°C, 30ms Pulse			0.01	0.10	%/W

For UR233-2.5

OF CR25-2.5

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{OUT}	V _{IN} =4.5V, I _{OUT} =10mA, T _J =25°C	±1%	2.475	2.500	2.525	V
Output Voltage	V _{OUT}	V _{IN} =3.9 ~ 10V, I _{OUT} =2 ~ 800mA	±2%	2.450		2.550	V
Line Regulation	ΔV _{OUT}	V _{IN} =3.9 ~ 10V, I _{OUT} =2mA			1	6	mV
Load Regulation	ΔV _{OUT}	V _{IN} =3.9V, I _{OUT} =2 ~ 800mA			1	10	mV
Temperature Stability	ΔV _{OUT}				0.5		%
Long Term Stability	ΔV _{OUT}	1000 hrs, T _J =125°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°C		800	950	1200	mA
Output Noise Voltage	e _N	B=10Hz ~ 10KHz, T _J =25°C			100		μV
Supply Voltage Rejection	SVR	I _{OUT} =40mA, f=120Hz, T _J =25°C, V _{IN} =5.5V, V _{RI} PPLE =1V _{PP}		60	75		dB
Dropout Voltage	V _D					1.50	V
Thermal Regulation		T _A =25°C, 30ms Pulse			0.01	0.10	%/W

■ ELECTRICAL CHARACTERISTICS(Cont.)

For UR233-2.85

OF CR205-2.85

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{OUT}	V _{IN} =4.85V, I _{OUT} =10mA, T _J =25°C	±1%	2.822	2.85	2.878	V
Output Voltage	V _{OUT}	V _{IN} =4.25 ~ 10V, I _{OUT} =2 ~ 800mA	±2%	2.793		2.907	V
Line Regulation	ΔV _{OUT}	V _{IN} =4.25 ~ 10V, I _{OUT} =2mA			1	6	mV
Load Regulation	ΔV _{OUT}	V _{IN} =4.25V, I _{OUT} =2 ~ 800mA			1	10	mV
Temperature Stability	ΔV _{OUT}				0.5		%
Long Term Stability	ΔV _{OUT}	1000 hrs, T _J =125°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°C		800	950	1200	mA
Output Noise Voltage	e _N	B=10Hz ~ 10KHz, T _J =25°C			100		μV
Supply Voltage Rejection	SVR	I _{OUT} =40mA, f=120Hz, T _J =25°C, V _{IN} =5.85V, V _{RIPPLE} =1V _{PP}		60	75		dB
Dropout Voltage	V _D					1.50	V
Thermal Regulation		T _A =25°C. 30ms Pulse			0.01	0.10	%/W

For UR233-3.0

For UR255-S-5

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{OUT}	V _{IN} =5V, I _{OUT} =10mA, T _J =25°C	±1%	2.97	3.00	3.03	V
Output Voltage	V _{OUT}	V _{IN} =4.5 ~ 12V, I _{OUT} =2 ~ 800 mA	±2%	2.94		3.06	V
Line Regulation	ΔV _{OUT}	V _{IN} =4.5 ~ 12V, I _{OUT} =2mA			1	6	mV
Load Regulation	ΔV _{OUT}	V _{IN} =4.5V, I _{OUT} =2 ~ 800mA			1	10	mV
Temperature Stability	ΔV _{OUT}				0.5		%
Long Term Stability	ΔV _{OUT}	1000 hrs, T _J =125°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°C		800	950	1200	mA
Output Noise Voltage	e _N	B=10Hz ~ 10KHz, T _J =25°C			100		μV
Supply Voltage Rejection	SVR	I _{OUT} =40mA, f=120Hz, T _J =25°C, V _{IN} =6V, V _{RIPPLE} =1V _{PP}		60	75		dB
Dropout Voltage	V _D					1.50	V
Thermal Regulation		T _A =25°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.)

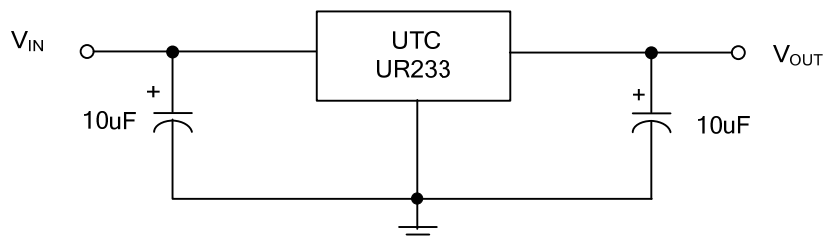
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CR035 REV

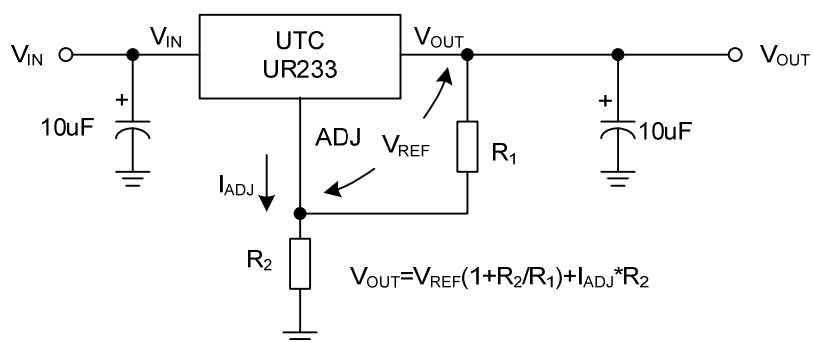
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Reference Voltage	V _{REF}	V _{IN} - V _{OUT} =2V, I _{OUT} =10mA, T _J =25°C	±1%	1.238	1.25	1.262	V
Reference Voltage	V _{REF}	V _{IN} = V _{OUT} +1.5V ~ 10V, I _{OUT} =10 ~ 800mA	±2%	1.225		1.275	V
Line Regulation	ΔV _{OUT}	V _{IN} = V _{OUT} +1.5V ~ 10V, I _{OUT} =10mA			0.035	0.200	%
Load Regulation	ΔV _{OUT}	V _{IN} - V _{OUT} =3V, I _{OUT} =10 ~ 800mA			0.10	0.400	%
Temperature Stability	ΔV _{OUT}				0.50		%
Long Term Stability	ΔV _{OUT}	1000 hrs, T _J =125°C			0.3		%
Operating Input Voltage	V _{IN}					12	V
Adjustment Pin Current	I _{ADJ}	V _{IN} ≤12V			60	120	μA
Adjustment Pin Current Change	ΔI _{ADJ}	V _{IN} = V _{OUT} +1.5V ~ 10V, I _{OUT} =10 ~ 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°C		800	950	1200	mA
Output Noise (%Vo)	e _N	B=10Hz ~ 10KHz, T _J =25°C			0.003		%
Supply Voltage Rejection	SVR	I _{OUT} =40mA, f=120Hz, T _J =25°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°C, 30ms Pulse			0.01	0.10	%/W

■ APPLICATION CIRCUITS

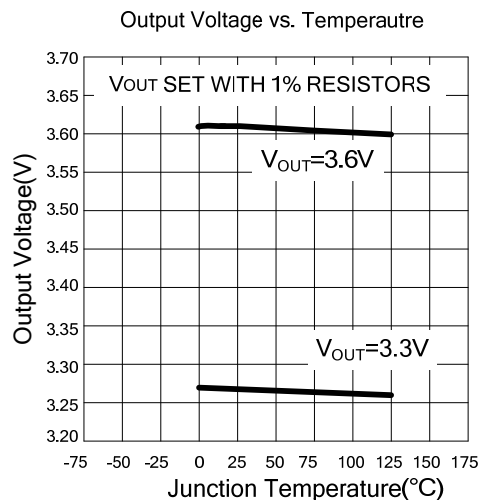
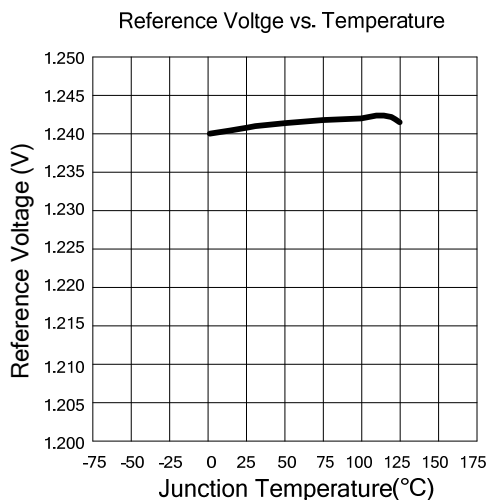
FIXED VOLTAGE



ADJUSTABLE



■ TYPICAL CHARACTERISTICS



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