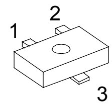
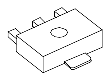
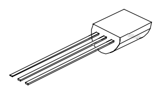
POSITIVE VOLTAGE REGULATOR



SOT-23



SOT-89



TO-92

* Pb-free plating product number: UR6225L

DESCRIPTION

The UTC UR6225 is a positive voltage output, three-pin regulator, that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and laser trimming technologies.

The UTC UR6225 consists of a high-precision voltage reference, an error amplification circuit, and a current limited output driver. Transient response to load variations have improved in comparison to the existing series.

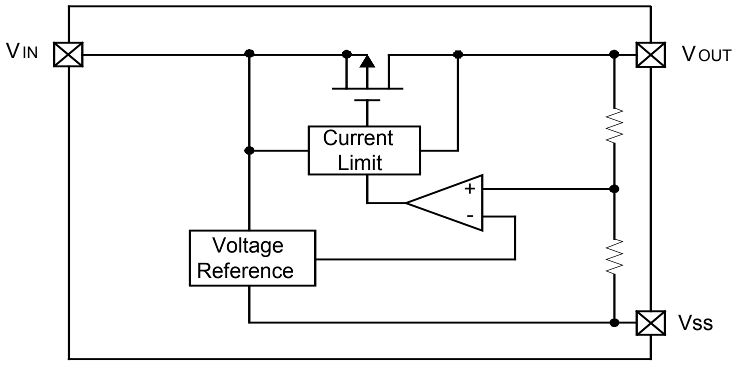
FEATURES

* Maximum Output Current: 250mA
  (within max. power dissipation, V_{OUT} = 5.0V)
* Output Voltage Range: 2.0V ~ 6.0V in 0.1V increments
  (1.5V ~ 1.9V for custom products)
* Highly Accurate: Output voltage ±2%
  (±1% for semi-custom products)
* Low Power Consumption: Typ. 2.0 μA @ V_{OUT}=5.0V
* Output Voltage Temperature Characteristics
  : Typ. ±100ppm/℃
* Input Stability : Typ. 0.2%/V
* Small Input-Output Differential
  :I_{OUT} = 100mA @ V_{OUT} = 5.0V with a 0.12V differential.

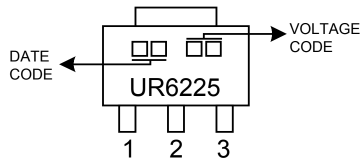
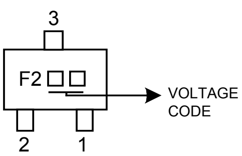
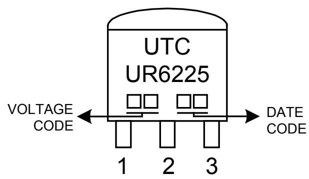
APPLICATIONS

* Battery Powered Equipment
* Palmtops
* Portable Cameras and Video Recorders
* Reference Voltage Sources

BLOCK DIAGRAM



MARKING INFORMATION

<table>
<tr><th>PACKAGE</th><th colspan="2">VOLTAGE CODE</th><th>PIN 1</th><th>PIN 2</th><th>PIN 3</th><th>MARKING</th></tr>
<tr><td>SOT-89</td><td rowspan="3">20:2.0V
21:2.1V
22:2.2V
23:2.3V
24:2.4V
25:2.5V
26:2.6V
27:2.7V
28:2.8V
2J:2.85V
29:2.9V
30:3.0V
31:3.1V
32:3.2V
33:3.3V
34:3.4V
35:3.5V
36:3.6V
37:3.7V
38:3.8V</td><td rowspan="3">39:3.9V
40:4.0V
41:4.1V
42:4.2V
43:4.3V
44:4.4V
45:4.5V
46:4.6V
50:5.0V
51:5.1V
52:5.2V
53:5.3V
54:5.4V
55:5.5V
56:5.6V
57:5.7V
58:5.8V
59:5.9V
60:6.0V</td><td>Vss</td><td>Vin</td><td>Vout</td><td></td></tr>
<tr><td>SOT-23</td><td>Vout</td><td>Vss</td><td>Vin</td><td></td></tr>
<tr><td>TO-92</td><td>Vss</td><td>Vin</td><td>Vout</td><td></td></tr>
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ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	12	V
Output Current	I_{OUT}	500	mA
Output Voltage	V_{OUT}	Vss-0.3 ~ V_{IN}+0.3	V
Continuous Total Power Dissipation SOT-23	P_D	150	mW
SOT-89		500	
TO-92		300	
Operating Ambient Temperature	Topr	-40 ~ +85	℃
Storage Temperature	Tstg	-40 ~ +125	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃, unless otherwise noted.)

UR6225-5.0V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	V_{OUT}(E)(Note2)	I_{OUT}=40mA, V_{IN}=6.0V	4.900	5.000	5.100	V
Maximum Output Current	1	I_{OUT}(max)	V_{IN}=6.0V, V_{OUT}(E)≥4.5V	250			mA
Load Stability	1	△V_{OUT}	V_{IN}=6.0V, 1mA≤I_{OUT}≤100mA		40	80	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=100mA		120	300	mV
	1	Vdif2	I_{OUT}=200mA		380	600	mV
Supply Current	2	Iss	V_{IN}=6.0V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 6.0V≤V_{IN}≤10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA, -40℃≤Topr≤85℃		±100		ppm/℃

UR6225-4.0V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	V_{OUT}(E)(Note2)	I_{OUT}=40mA, V_{IN}=5.0V	3.920	4.000	4.080	V
Maximum Output Current	1	I_{OUT}(max)	V_{IN}=5.0V, V_{OUT}(E)≥3.6V	200			mA
Load Stability	1	△V_{OUT}	V_{IN}=5.0V, 1mA≤I_{OUT}≤100mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=100mA		170	330	mV
	1	Vdif2	I_{OUT}=200mA		400	630	mV
Supply Current	2	Iss	V_{IN}=5.0V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA, 5.0V≤V_{IN}≤10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA, -40℃≤Topr≤85℃		±100		ppm/℃

UR6225-3.3V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	$V_{OUT}(E)$(Note2)	I_{OUT}=40mA, V_{IN}=4.3V	3.234	3.300	3.366	V
Maximum Output Current	1	$I_{OUT}(max)$	V_{IN}=4.3V, $V_{OUT}(E) \geqslant$ 2.97V	165			mA
Load Stability	1	ΔV_{OUT}	V_{IN}=4.3V 1mA $\leqslant I_{OUT} \leqslant$ 86mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=86mA		180	360	mV
	1	Vdif2	I_{OUT}=172mA		400	700	mV
Supply Current	2	Iss	V_{IN}=4.3V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 4.3V $\leqslant V_{IN} \leqslant$ 10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃ $\leqslant$ Topr $\leqslant$ 85℃		±100		ppm/℃

UR6225-3.0V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	$V_{OUT}(E)$(Note2)	I_{OUT}=40mA, V_{IN}=4.0V	2.940	3.000	3.060	V
Maximum Output Current	1	$I_{OUT}(max)$	V_{IN}=4.0V, $V_{OUT}(E) \geqslant$ 2.7V	150			mA
Load Stability	1	ΔV_{OUT}	V_{IN}=4.0V 1mA $\leqslant I_{OUT} \leqslant$ 80mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=80mA		180	360	mV
	1	Vdif2	I_{OUT}=160mA		400	700	mV
Supply Current	2	Iss	V_{IN}=4.0V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 4.0V $\leqslant V_{IN} \leqslant$ 10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃ $\leqslant$ Topr $\leqslant$ 85℃		±100		ppm/℃

UR6225-2.85V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	$V_{OUT}(E)$(Note2)	I_{OUT}=40mA, V_{IN}=3.85V	2.793	2.85	2.907	V
Maximum Output Current	1	$I_{OUT}(max)$	V_{IN}=3.85V, $V_{OUT}(E) \geqslant$ 2.565V	142.5			mA
Load Stability	1	ΔV_{OUT}	V_{IN}=3.85V 1mA $\leqslant I_{OUT} \leqslant$ 77mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=77mA		180	360	mV
	1	Vdif2	I_{OUT}=154mA		400	700	mV
Supply Current	2	Iss	V_{IN}=3.85V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 3.85V $\leqslant V_{IN} \leqslant$ 10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃ $\leqslant$ Topr $\leqslant$ 85℃		±100		ppm/℃

UR6225-2.8V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	V_{OUT}(E)(Note2)	I_{OUT}=40mA, V_{IN}=3.8V	2.744	2.800	2.856	V
Maximum Output Current	1	I_{OUT}(max)	V_{IN}=3.8V, V_{OUT}(E)≥2.52V	140			mA
Load Stability	1	△V_{OUT}	V_{IN}=3.8V 1mA≤I_{OUT}≤76mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=76mA		180	360	mV
	1	Vdif2	I_{OUT}=152mA		400	700	mV
Supply Current	2	Iss	V_{IN}=3.8V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 3.8V≤V_{IN}≤10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃≤Topr≤85℃		±100		ppm/℃

UR6225-2.6V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	V_{OUT}(E)(Note2)	I_{OUT}=40mA, V_{IN}=3.6V	2.548	2.600	2.652	V
Maximum Output Current	1	I_{OUT}(max)	V_{IN}=3.6V, V_{OUT}(E)≥2.34V	130			mA
Load Stability	1	△V_{OUT}	V_{IN}=3.6V 1mA≤I_{OUT}≤72mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=72mA		180	360	mV
	1	Vdif2	I_{OUT}=144mA		400	700	mV
Supply Current	2	Iss	V_{IN}=3.6V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 3.6V≤V_{IN}≤10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃≤Topr≤85℃		±100		ppm/℃

UR6225-2.5V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	V_{OUT}(E)(Note2)	I_{OUT}=40mA, V_{IN}=3.5V	2.45	2.500	2.55	V
Maximum Output Current	1	I_{OUT}(max)	V_{IN}=3.5V, V_{OUT}(E)≥2.25V	125			mA
Load Stability	1	△V_{OUT}	V_{IN}=3.5V 1mA≤I_{OUT}≤70mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=70mA		180	360	mV
	1	Vdif2	I_{OUT}=140mA		400	700	mV
Supply Current	2	Iss	V_{IN}=3.5V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 3.5V≤V_{IN}≤10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃≤Topr≤85℃		±100		ppm/℃

UR6225-2.1V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	$V_{OUT}(E)$(Note2)	I_{OUT}=40mA, V_{IN}=3.1V	2.058	2.100	2.142	V
Maximum Output Current	1	$I_{OUT}(max)$	V_{IN}=3.1V, $V_{OUT}(E)\geqslant$1.89V	105			mA
Load Stability	1	$\triangle V_{OUT}$	V_{IN}=3.1V 1mA$\leqslant I_{OUT}\leqslant$62mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=62mA		180	360	mV
	1	Vdif2	I_{OUT}=124mA		400	700	mV
Supply Current	2	Iss	V_{IN}=3.1V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 3.1V$\leqslant V_{IN}\leqslant$10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃$\leqslant$Topr$\leqslant$85℃		±100		ppm/℃

UR6225-2.0V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	$V_{OUT}(E)$(Note2)	I_{OUT}=40mA, V_{IN}=3.0V	1.960	2.000	2.040	V
Maximum Output Current	1	$I_{OUT}(max)$	V_{IN}=3.0V, $V_{OUT}(E)\geqslant$1.8V	100			mA
Load Stability	1	$\triangle V_{OUT}$	V_{IN}=3.0V 1mA$\leqslant I_{OUT}\leqslant$60mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=60mA		180	360	mV
	1	Vdif2	I_{OUT}=120mA		400	700	mV
Supply Current	2	Iss	V_{IN}=3.0V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 3.0V$\leqslant V_{IN}\leqslant$10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃$\leqslant$Topr$\leqslant$85℃		±100		ppm/℃

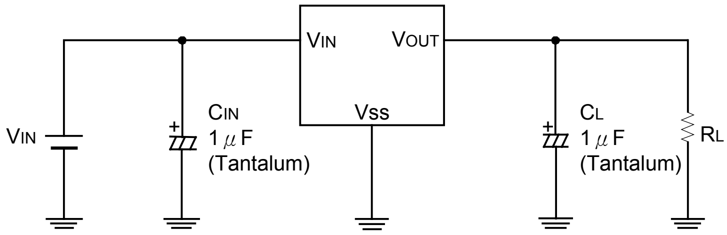
UR6225-1.8V (Note1)

PARAMETER	CIRCUIT	SYMBOL	TEST CONDITONS	MIN	TYP	MAX	UNIT
Output Voltage	1	$V_{OUT}(E)$(Note2)	I_{OUT}=40mA, V_{IN}=2.8V	1.764	1.800	1.836	V
Maximum Output Current	1	$I_{OUT}(max)$	V_{IN}=2.8V, $V_{OUT}(E)\geqslant$1.62V	90			mA
Load Stability	1	$\triangle V_{OUT}$	V_{IN}=2.8V 1mA$\leqslant I_{OUT}\leqslant$60mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	Vdif1	I_{OUT}=56mA		180	360	mV
	1	Vdif2	I_{OUT}=112mA		400	700	mV
Supply Current	2	Iss	V_{IN}=2.8V		2.0	4.5	μA
Input Stability	1	$\frac{\triangle V_{OUT}}{\triangle V_{IN} \times V_{OUT}}$	I_{OUT}=40mA 2.8V$\leqslant V_{IN}\leqslant$10.0V		0.2	0.3	%/V
Input Voltage		V_{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\triangle V_{OUT}}{\triangle Topr \times V_{OUT}}$	I_{OUT}=40mA -40℃$\leqslant$Topr$\leqslant$85℃		±100		ppm/℃

Note:

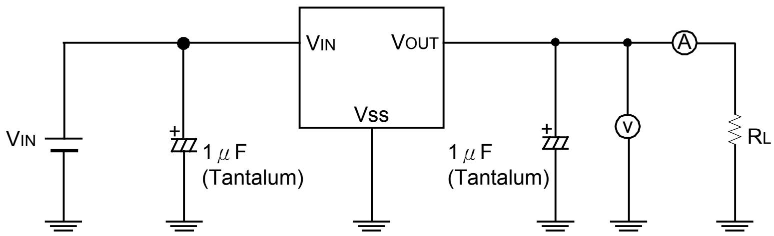
1. $V_{OUT}(T)$=Specified Output Voltage.
2. $V_{OUT}(E)$=Effective Output Voltage (i.e. the output voltage when "$V_{OUT}(T)$+1.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).
3. Vdif= {$V_{IN}1$ (Note4)-V_{OUT} (E)}
4. $V_{IN}1$= The input voltage at the time 98% of $V_{OUT}(E)$ is output (input voltage has been gradually reduced).

TYPICAL APPLICATION CIRCUIT

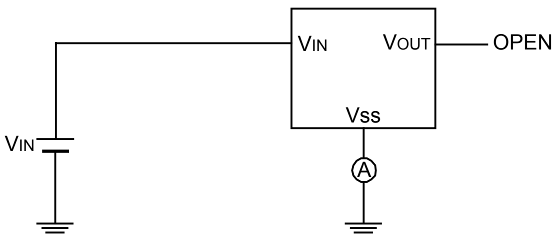


TEST CIRCUITS

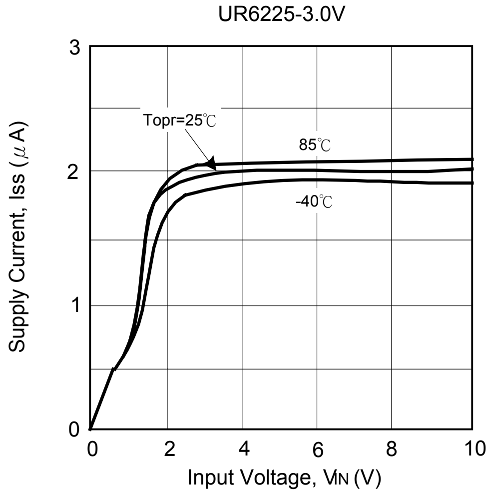
Circuit 1



Circuit 2

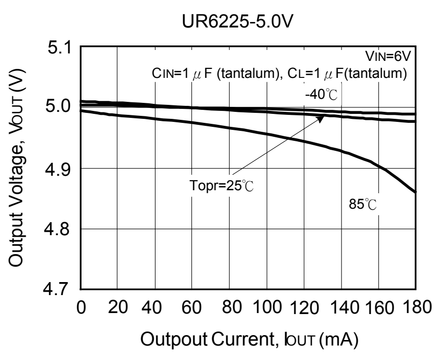


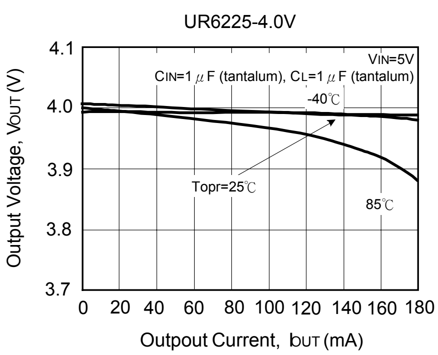
TYPICAL PERFORMANCE CHARACTERISTIC

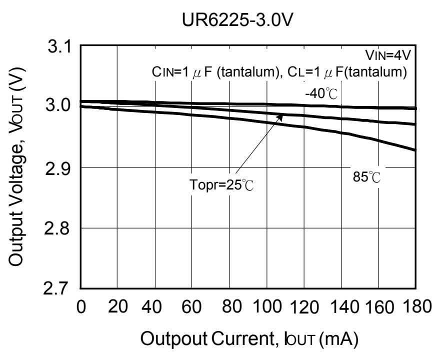


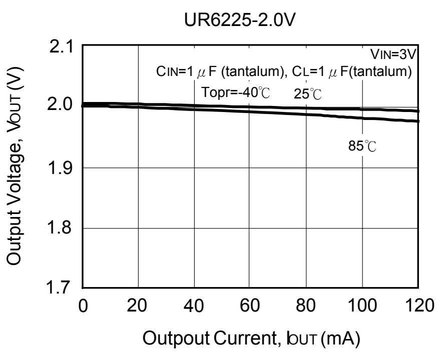
TYPICAL PERFORMANCE CHARACTERISTICS

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

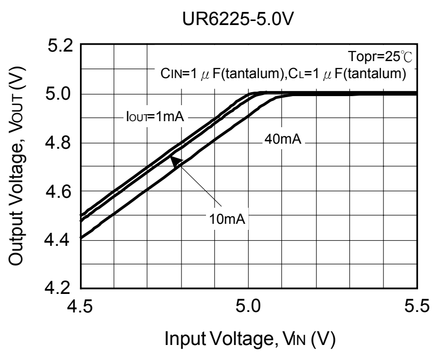


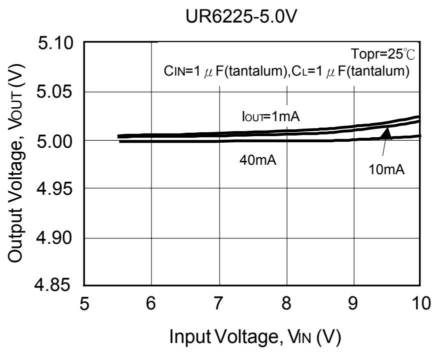


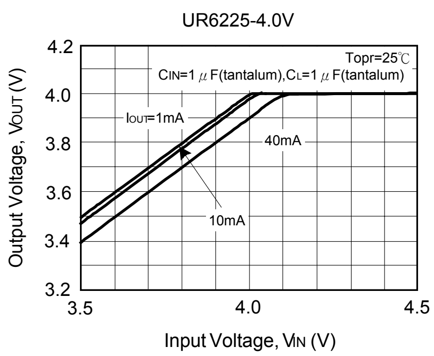


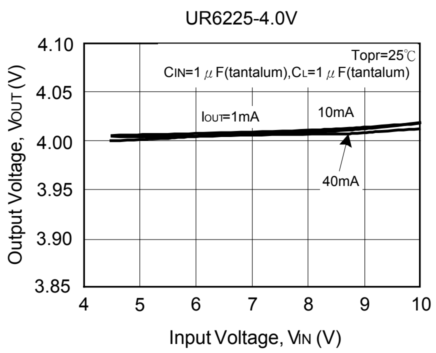


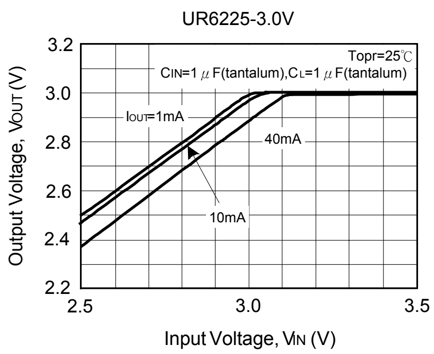
(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

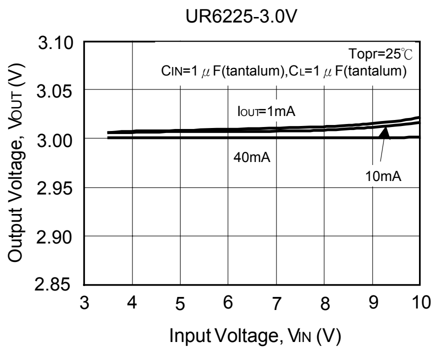


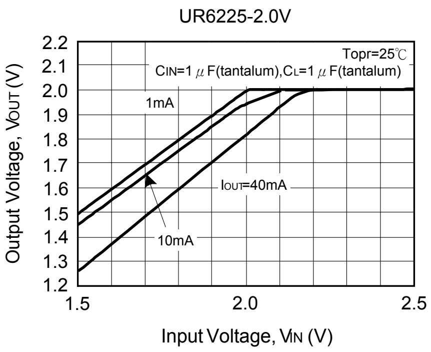


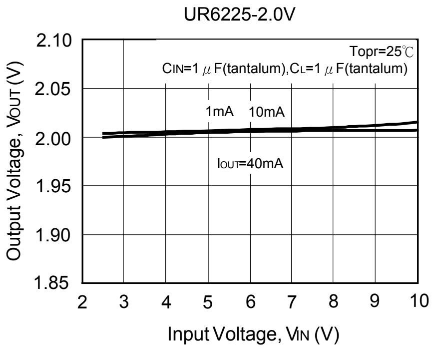




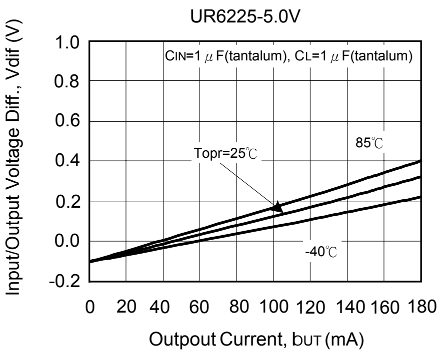


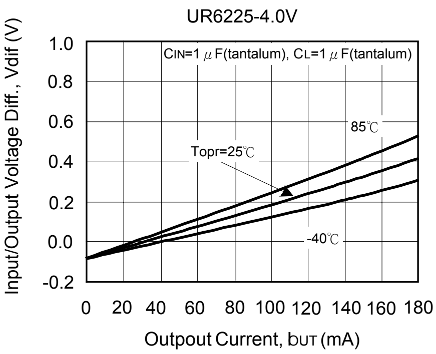


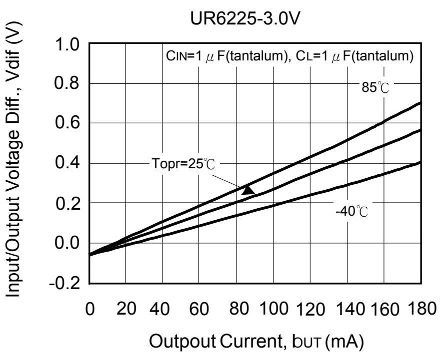


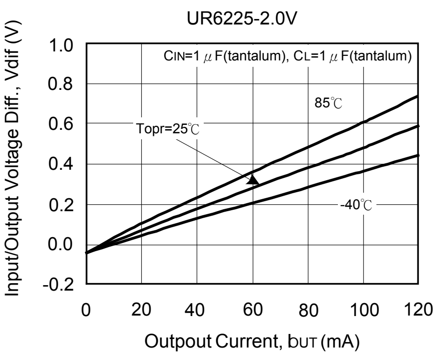


(3) INPUT/OUTPUT VOLTAGE DIFFERENTIAL vs. OUTPUT CURRENT

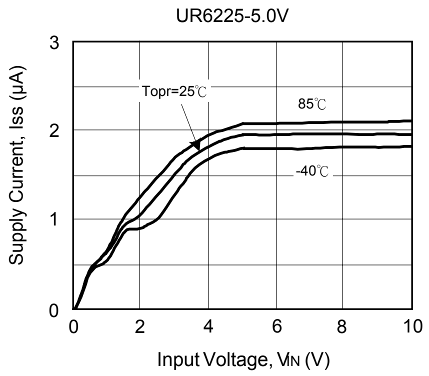


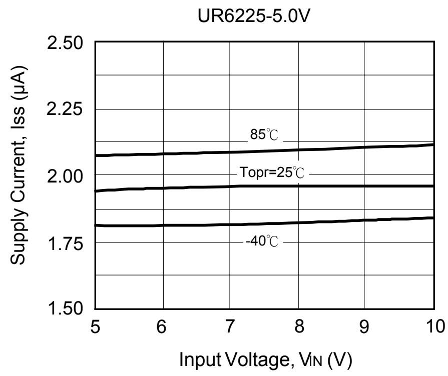


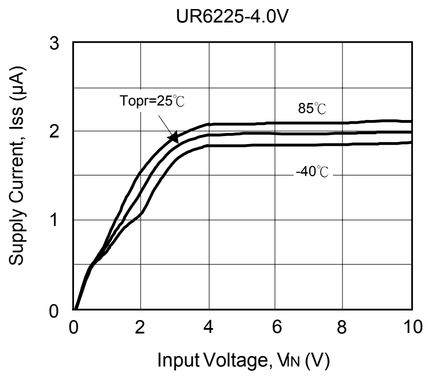


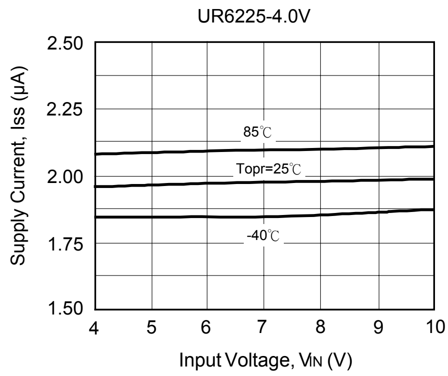


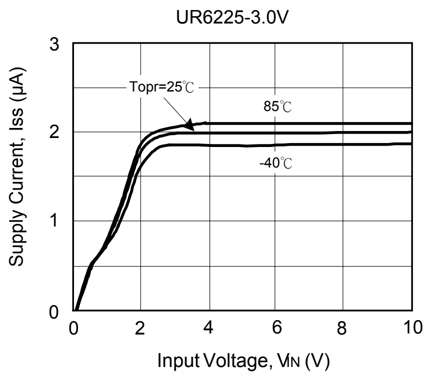
(4) SUPPLY CURRENT vs. INPUT VOLTAGE

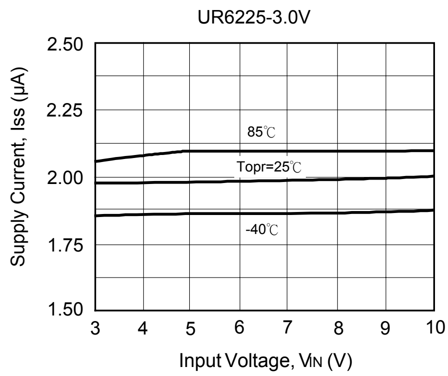


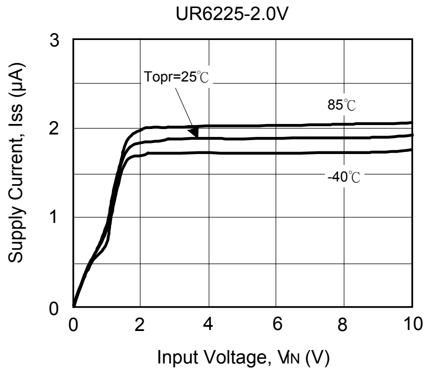


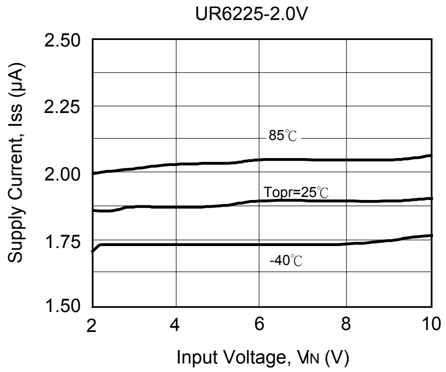




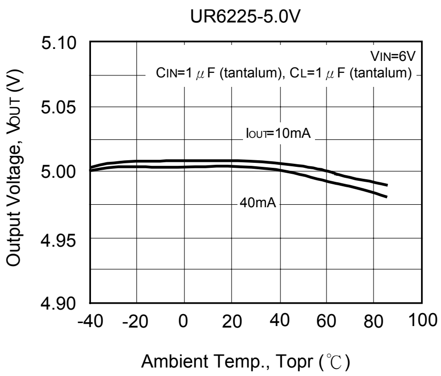


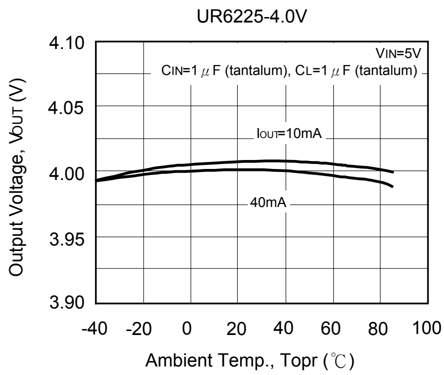


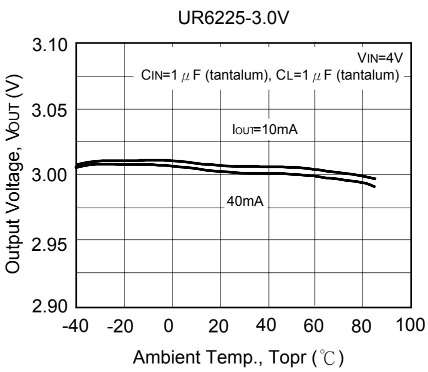


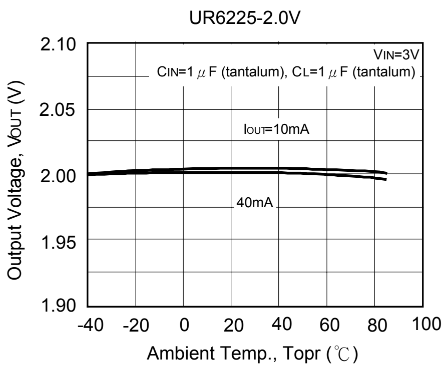


(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

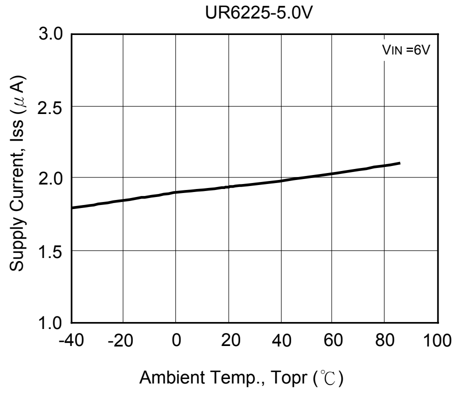


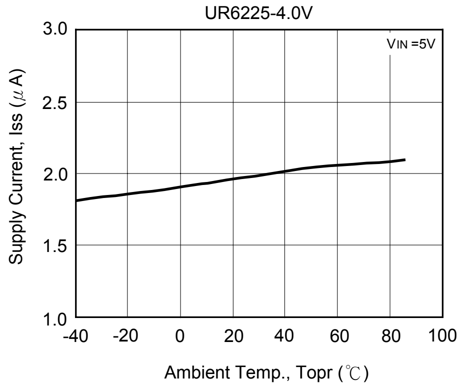


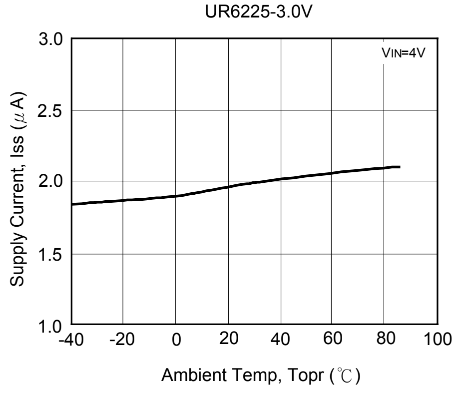


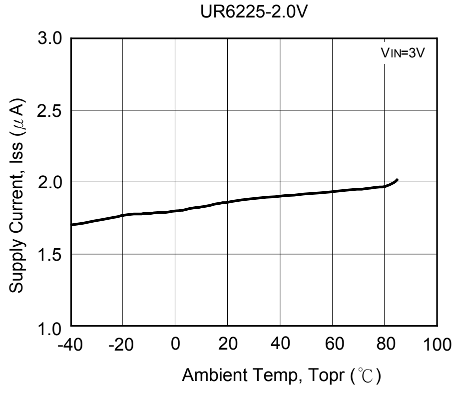


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE



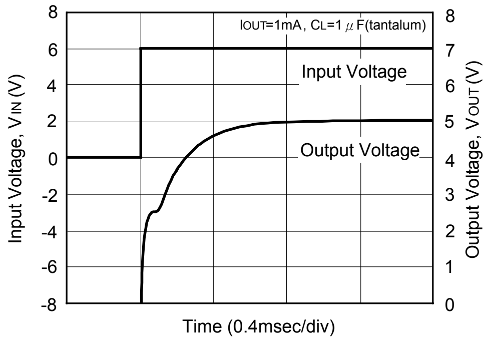




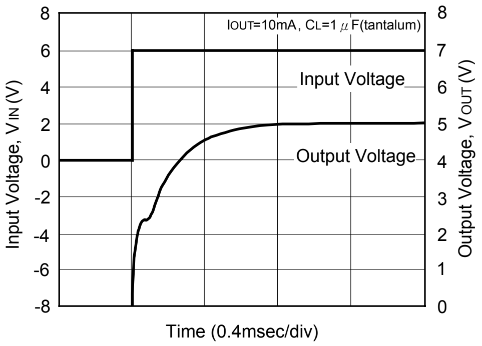


(7) INPUT TRANSIENT RESPONSE 1

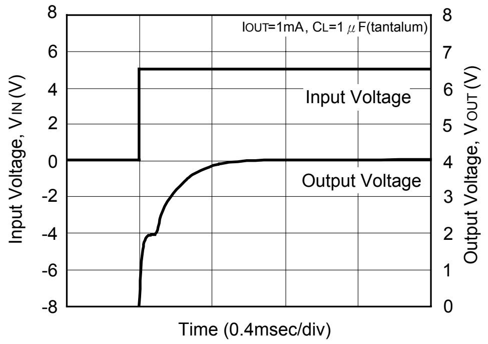
UR6225-5.0V



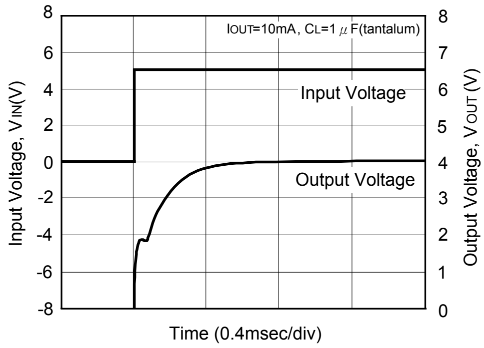
UR6225-5.0V



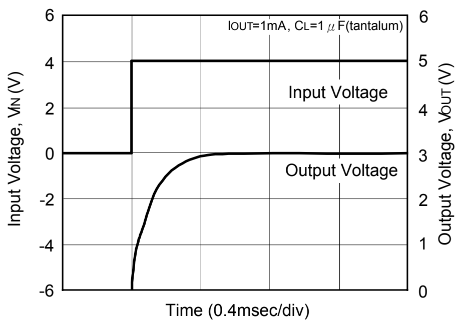
UR6225-4.0V



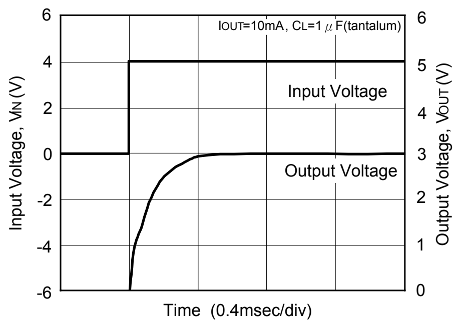
UR6225-4.0V

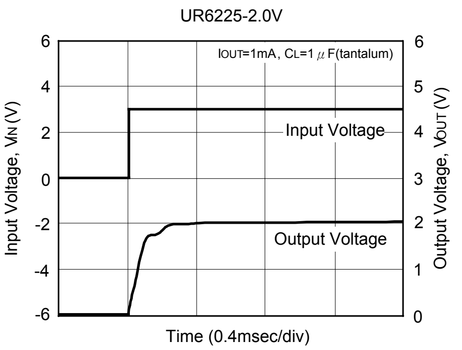


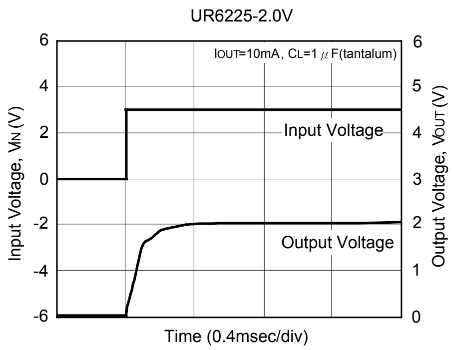
UR6225-3.0V



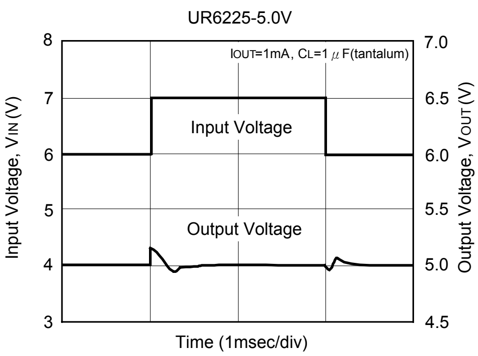
UR6225-3.0V

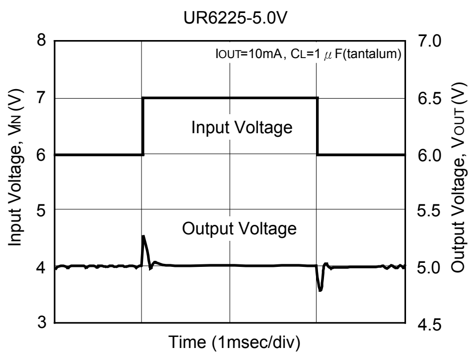


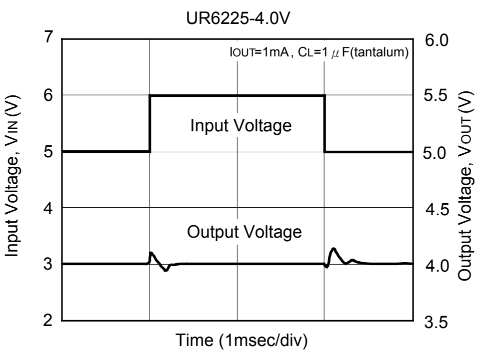


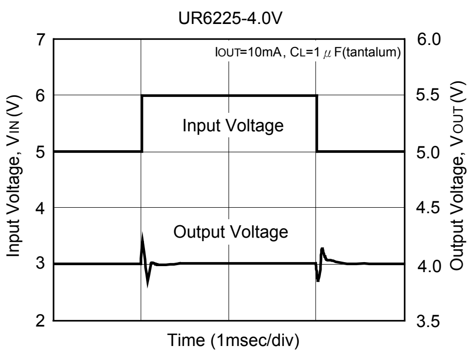


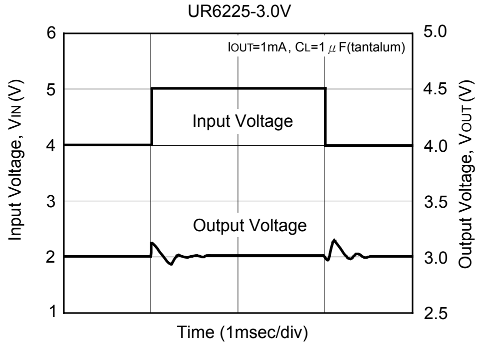
(8) INPUT TRANSIENT RESPONSE 2

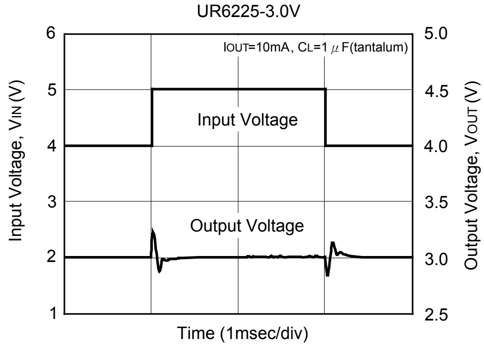


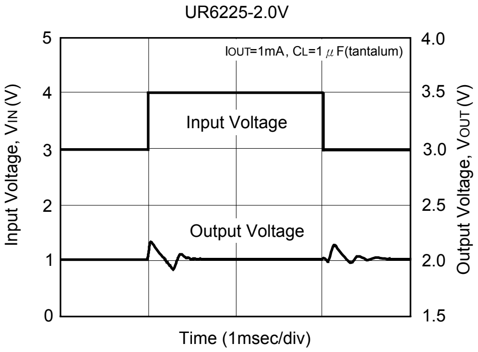


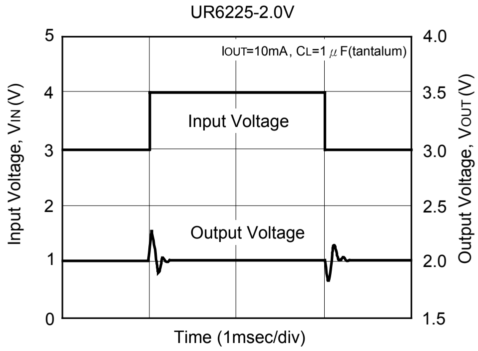




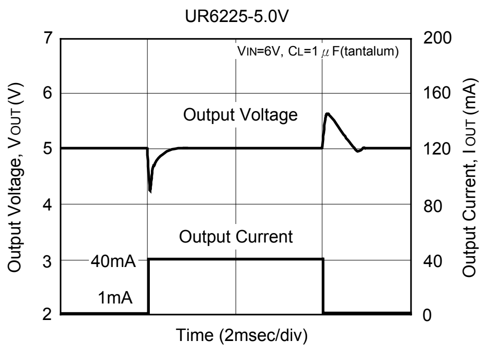


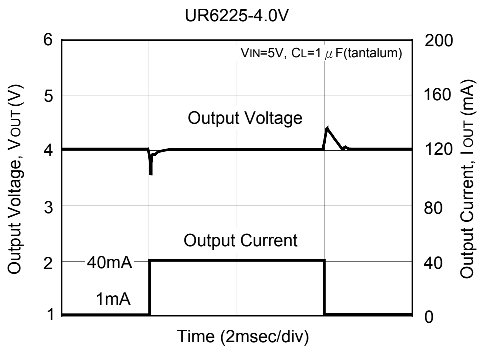




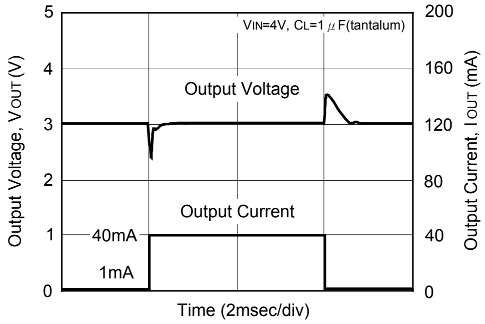


(9) LOAD TRANSIENT RESPONSE

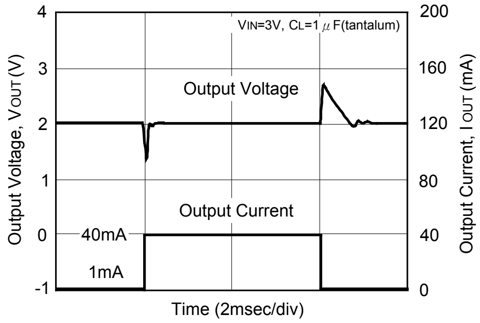




UR6225-3.0V

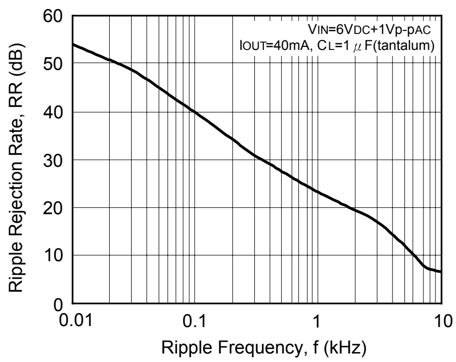


UR6225-2.0V

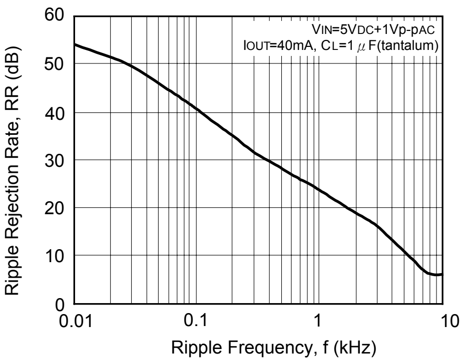


(10) RIPPLE REJECTION RATE

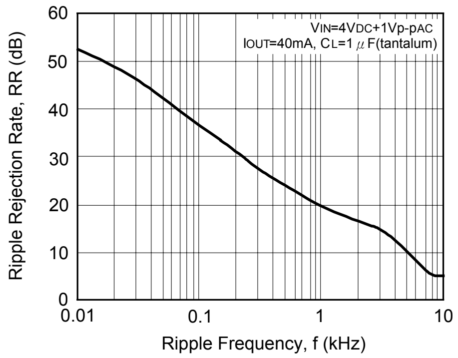
UR6225-5.0V



UR6225-4.0V



UR6225-3.0V



UR6225-2.0V