

UTC UR6225

CMOS IC

POSITIVE VOLTAGE REGULATOR

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.

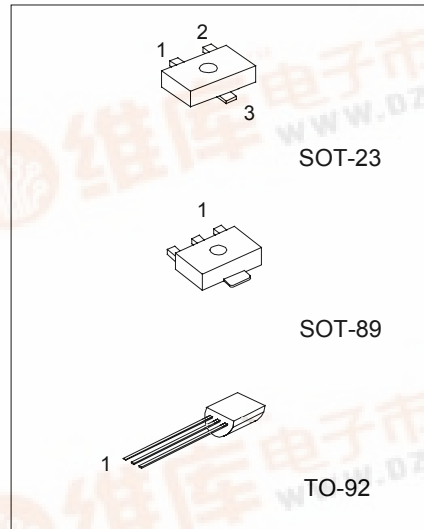
The UTC UR6225 consists of a high-precision voltage reference, an error amplification circuit, and a current limited output driver. Transient response to load variations have improved in comparison to the existing series.

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 $\pm 2\%$
($\pm 1\%$ for semi-custom products)
- * Low Power Consumption: Typ. $2.0 \mu A$ @ $V_{OUT} = 5.0V$
- * Output Voltage Temperature Characteristics
: Typ. $\pm 100 \text{ppm}/^\circ\text{C}$
- * Input Stability : Typ. $0.2\%/V$
- * Small Input-Output Differential
: $I_{OUT} = 100\text{mA}$ @ $V_{OUT} = 5.0V$ with a 0.12V differential.

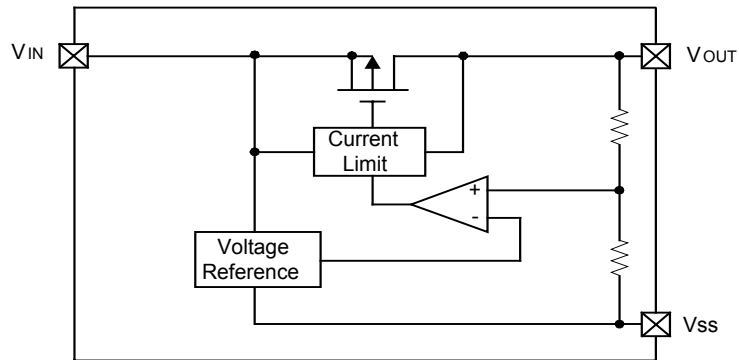
APPLICATIONS

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



* Pb-free plating product number: UR6225L

BLOCK DIAGRAM



MARKING INFORMATION

PACKAGE	VOLTAGE CODE	PIN 1	PIN 2	PIN 3	MARKING
SOT-89	20:2.0V	Vss	Vin	Vout	
	21:2.1V				
	22:2.2V				
	23:2.3V				
	24:2.4V				
	25:2.5V				
	26:2.6V				
27:2.7V	28:2.8V	Vout	Vss	Vin	
28:2.8V					
29:2.9V					
30:3.0V					
31:3.1V					
32:3.2V					
33:3.3V					
34:3.4V	35:3.5V	Vss	Vin	Vout	
35:3.5V					
36:3.6V					
37:3.7V					
38:3.8V					

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V _{IN}	12	V
Output Current	I _{OUT}	500	mA
Output Voltage	V _{OUT}	V _{SS} -0.3 ~ V _{IN} +0.3	V
Continuous Total Power Dissipation	P _D	150	mW
SOT-23		500	
SOT-89 TO-92		300	
Operating Ambient Temperature	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +125	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C, 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	ΔV _{OUT}	V _{IN} =6.0V 1mA≤I _{OUT} ≤100mA		40	80	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =100mA		120	300	mV
	1	V _{dif2}	I _{OUT} =200mA		380	600	mV
Supply Current	2	I _{SS}	V _{IN} =6.0V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	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	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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	ΔV _{OUT}	V _{IN} =5.0V 1mA≤I _{OUT} ≤100mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =100mA		170	330	mV
	1	V _{dif2}	I _{OUT} =200mA		400	630	mV
Supply Current	2	I _{SS}	V _{IN} =5.0V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	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	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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)} ≥2.97V	165			mA
Load Stability	1	ΔV _{OUT}	V _{IN} =4.3V 1mA≤I _{OUT} ≤86mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =86mA		180	360	mV
	1	V _{dif2}	I _{OUT} =172mA		400	700	mV
Supply Current	2	I _{SS}	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≤V _{IN} ≤10.0V		0.2	0.3	%/V
Input Voltage		V _{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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)} ≥2.7V	150			mA
Load Stability	1	ΔV _{OUT}	V _{IN} =4.0V 1mA≤I _{OUT} ≤80mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =80mA		180	360	mV
	1	V _{dif2}	I _{OUT} =160mA		400	700	mV
Supply Current	2	I _{SS}	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≤V _{IN} ≤10.0V		0.2	0.3	%/V
Input Voltage		V _{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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)} ≥2.565V	142.5			mA
Load Stability	1	ΔV _{OUT}	V _{IN} =3.85V 1mA≤I _{OUT} ≤77mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =77mA		180	360	mV
	1	V _{dif2}	I _{OUT} =154mA		400	700	mV
Supply Current	2	I _{SS}	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≤V _{IN} ≤10.0V		0.2	0.3	%/V
Input Voltage		V _{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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	ΔV _{OUT}	V _{IN} =3.8V 1mA≤I _{OUT} ≤76mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =76mA		180	360	mV
	1	V _{dif2}	I _{OUT} =152mA		400	700	mV
Supply Current	2	I _{SS}	V _{IN} =3.8V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	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	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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	ΔV _{OUT}	V _{IN} =3.6V 1mA≤I _{OUT} ≤72mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =72mA		180	360	mV
	1	V _{dif2}	I _{OUT} =144mA		400	700	mV
Supply Current	2	I _{SS}	V _{IN} =3.6V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	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	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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	ΔV _{OUT}	V _{IN} =3.5V 1mA≤I _{OUT} ≤70mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =70mA		180	360	mV
	1	V _{dif2}	I _{OUT} =140mA		400	700	mV
Supply Current	2	I _{SS}	V _{IN} =3.5V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	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	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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)} ≥1.89V	105			mA
Load Stability	1	ΔV _{OUT}	V _{IN} =3.1V 1mA≤I _{OUT} ≤62mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =62mA		180	360	mV
	1	V _{dif2}	I _{OUT} =124mA		400	700	mV
Supply Current	2	I _{SS}	V _{IN} =3.1V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I _{OUT} =40mA 3.1V≤V _{IN} ≤10.0V		0.2	0.3	%/V
Input Voltage		V _{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

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)} ≥1.8V	100			mA
Load Stability	1	ΔV _{OUT}	V _{IN} =3.0V 1mA≤I _{OUT} ≤60mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =60mA		180	360	mV
	1	V _{dif2}	I _{OUT} =120mA		400	700	mV
Supply Current	2	I _{SS}	V _{IN} =3.0V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I _{OUT} =40mA 3.0V≤V _{IN} ≤10.0V		0.2	0.3	%/V
Input Voltage		V _{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

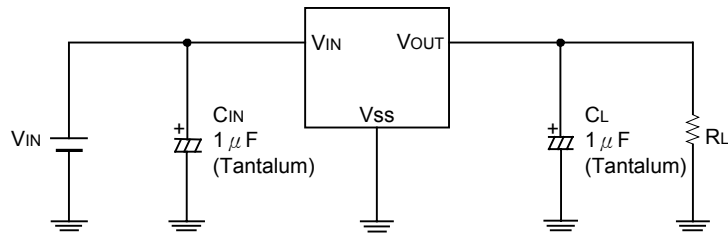
UR6225-1.8V (Note1)

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)} ≥1.62V	90			mA
Load Stability	1	ΔV _{OUT}	V _{IN} =2.8V 1mA≤I _{OUT} ≤60mA		45	90	mV
Input-Output Voltage Differential(Note3)	1	V _{dif1}	I _{OUT} =56mA		180	360	mV
	1	V _{dif2}	I _{OUT} =112mA		400	700	mV
Supply Current	2	I _{SS}	V _{IN} =2.8V		2.0	4.5	μA
Input Stability	1	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I _{OUT} =40mA 2.8V≤V _{IN} ≤10.0V		0.2	0.3	%/V
Input Voltage		V _{IN}				10	V
Output Voltage Temperature Characteristics	1	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \times V_{OUT}}$	I _{OUT} =40mA -40°C≤T _{opr} ≤85°C		±100		ppm/°C

Note:

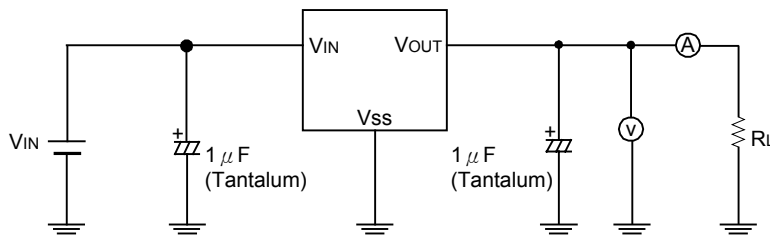
1. V_{OUT(T)}=Specified Output Voltage.
2. V_{OUT(E)}=Effective Output Voltage (i.e. the output voltage when "V_{OUT(T)}+1.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).
3. V_{dif}= {V_{IN1} (Note4)-V_{OUT (E)}}
4. V_{IN1}= The input voltage at the time 98% of V_{OUT(E)} is output (input voltage has been gradually reduced).

TYPICAL APPLICATION CIRCUIT

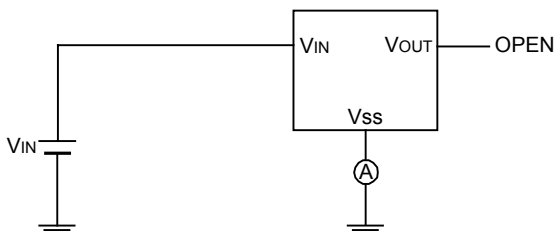


TEST CIRCUITS

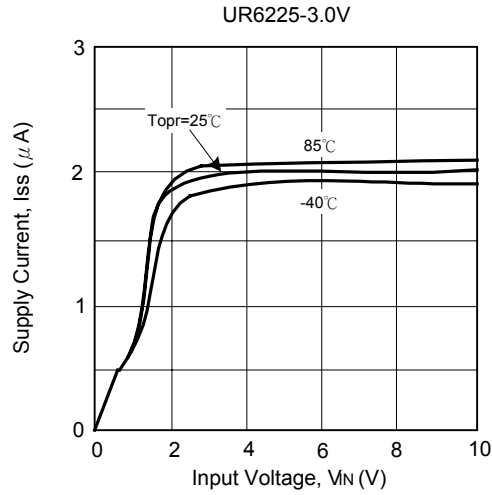
Circuit 1



Circuit 2

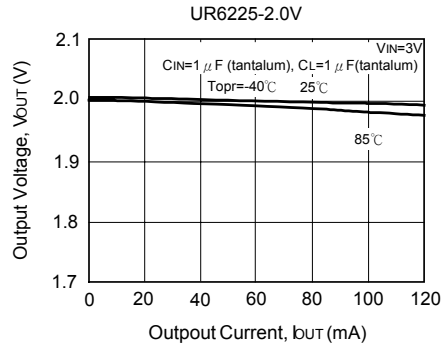
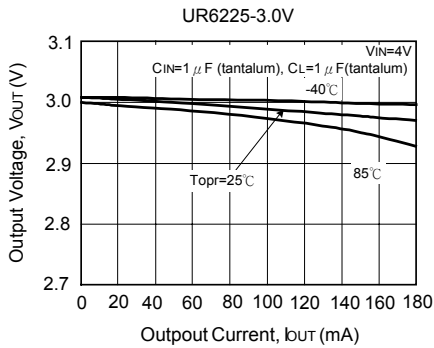
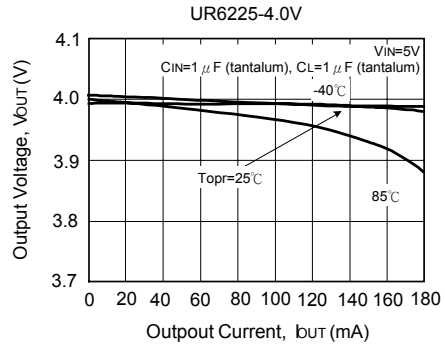
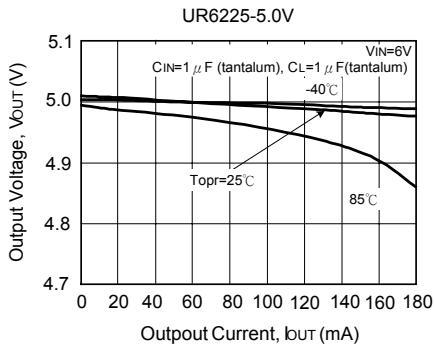


TYPICAL PERFORMANCE CHARACTERISTIC

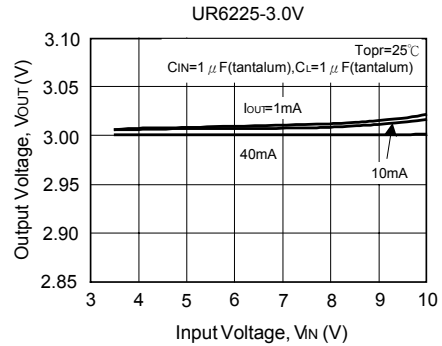
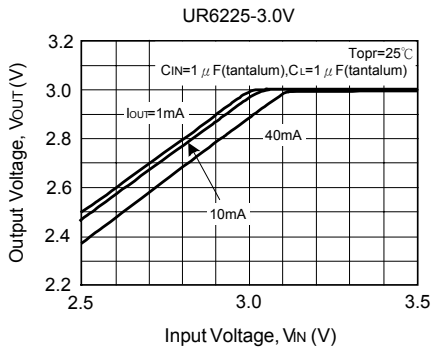
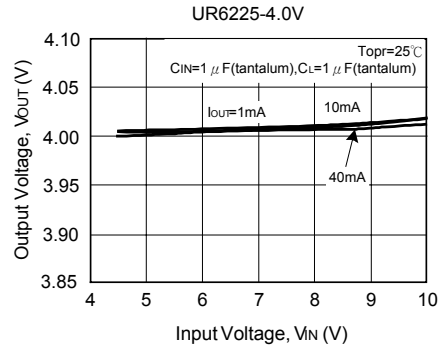
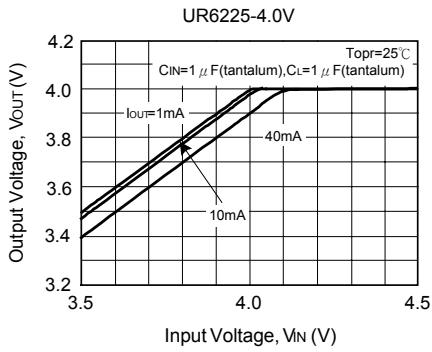
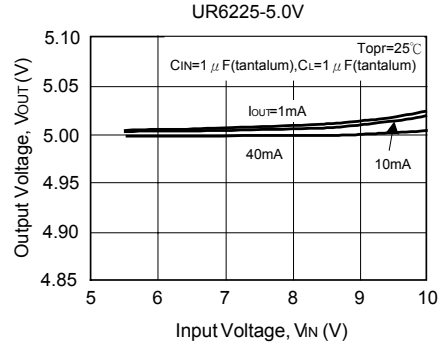
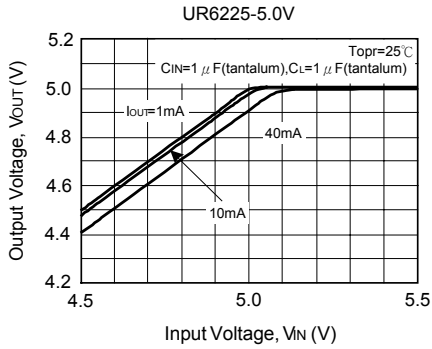


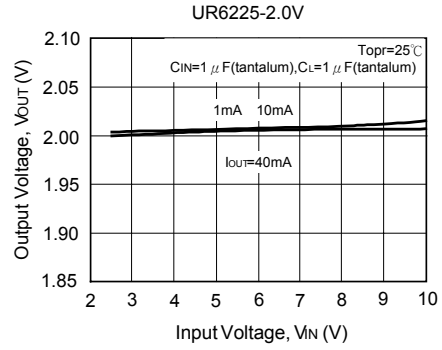
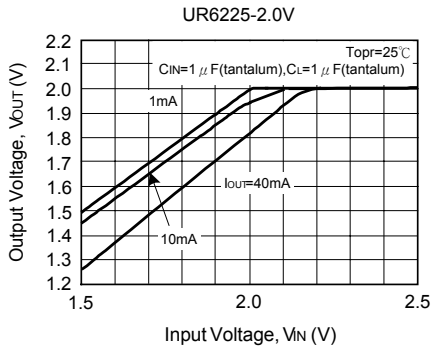
TYPICAL PERFORMANCE CHARACTERISTICS

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

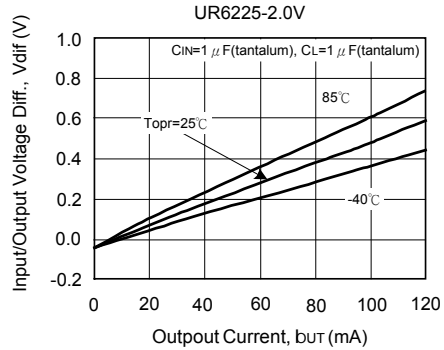
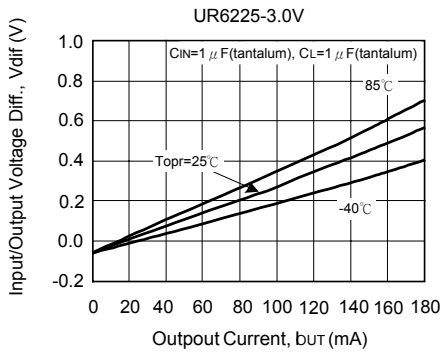
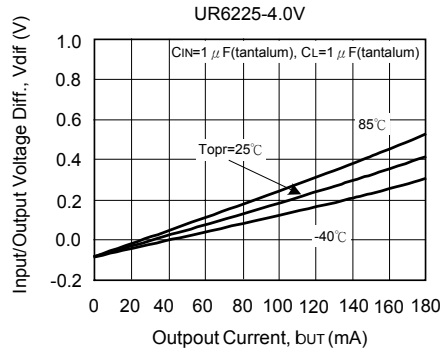
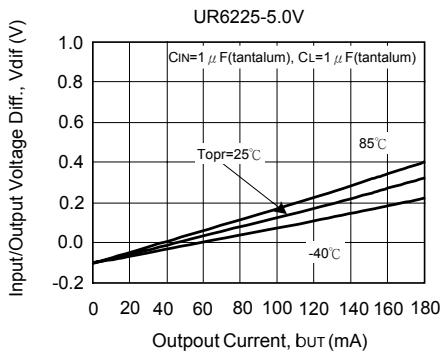


(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

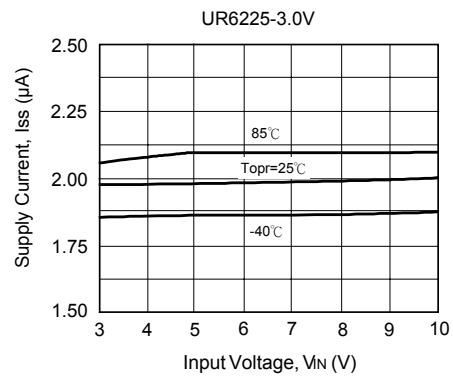
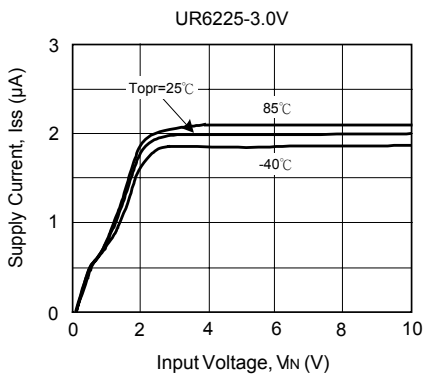
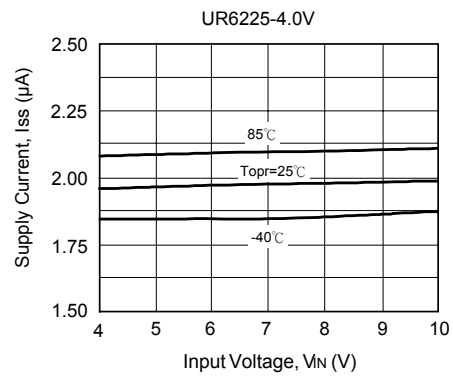
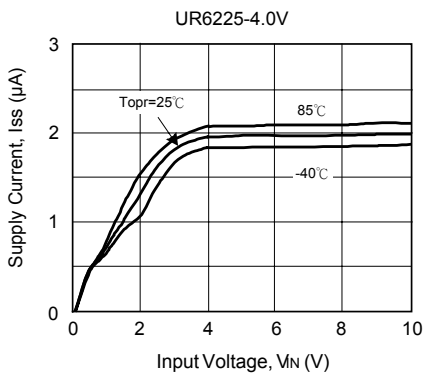
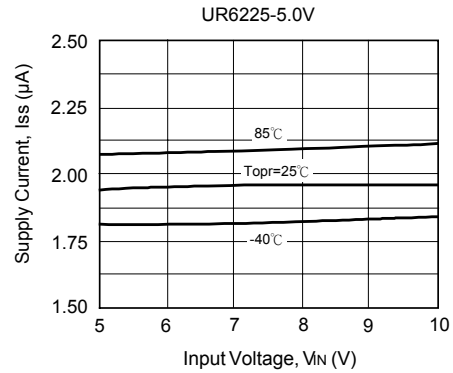
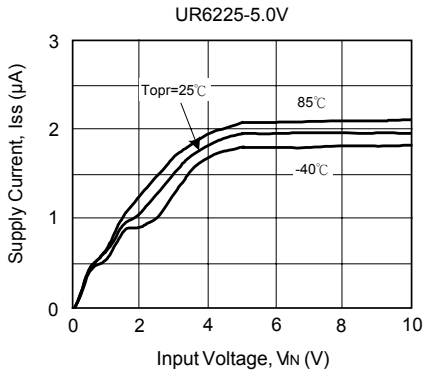


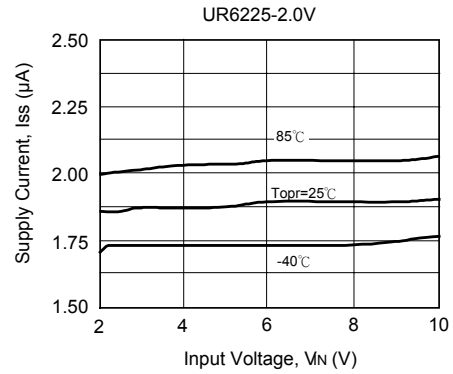
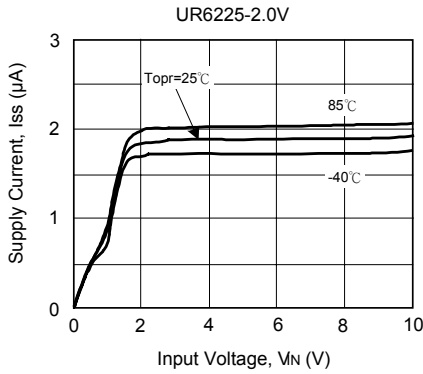


(3) INPUT/OUTPUT VOLTAGE DIFFERENTIAL vs. OUTPUT CURRENT

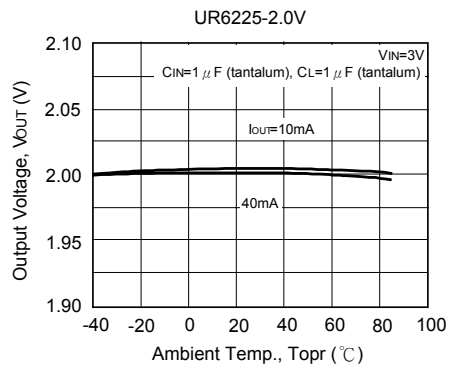
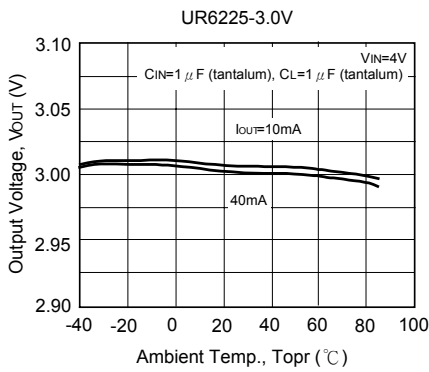
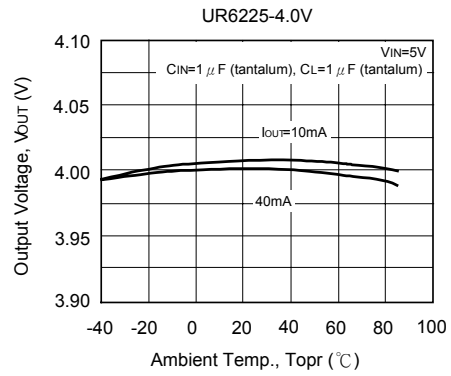
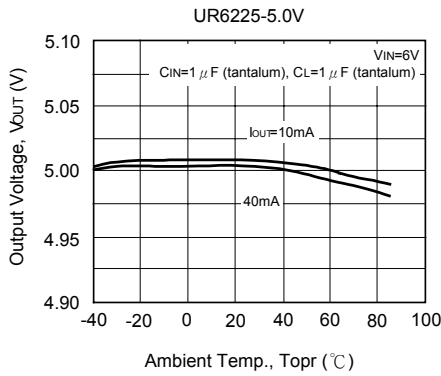


(4) SUPPLY CURRENT vs. INPUT VOLTAGE

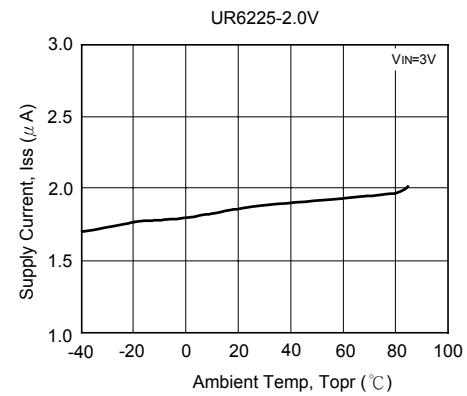
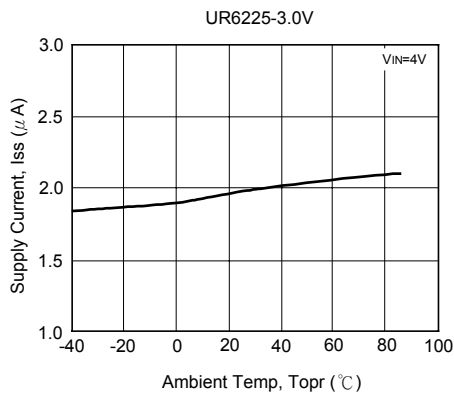
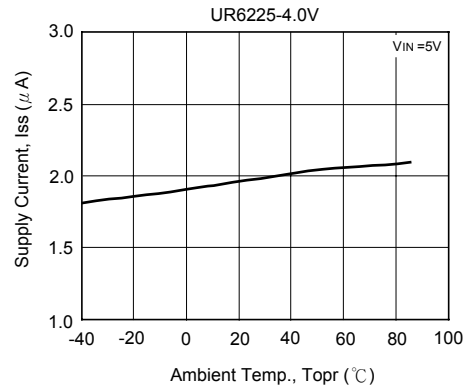
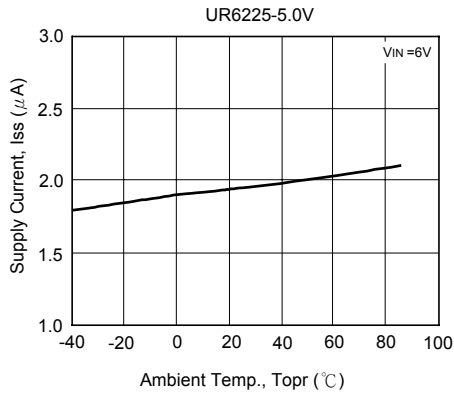




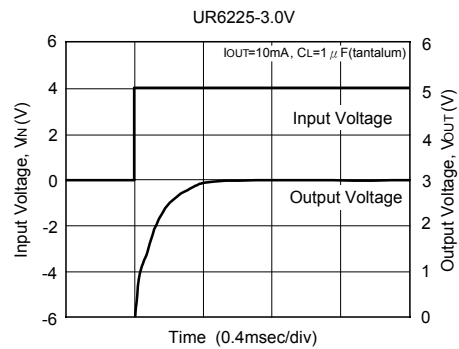
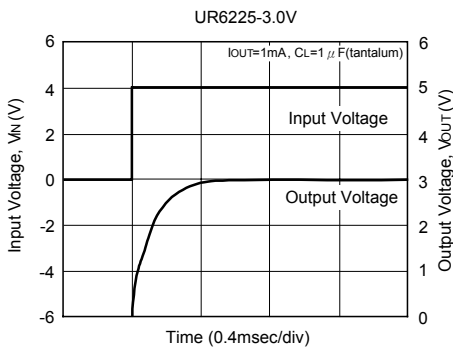
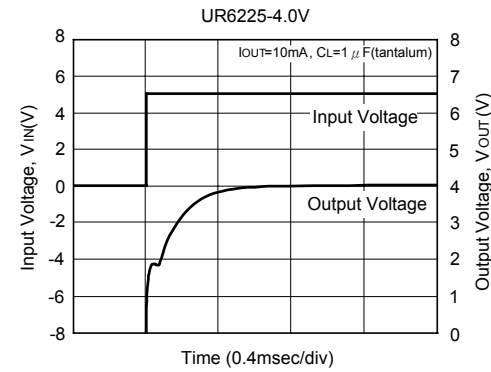
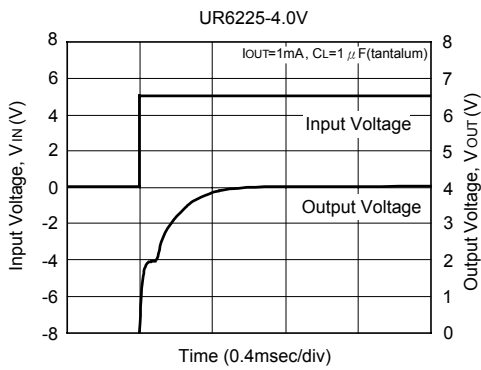
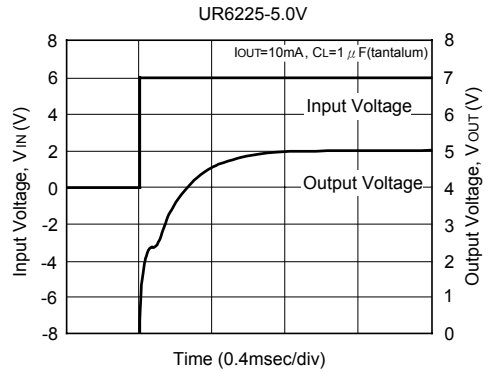
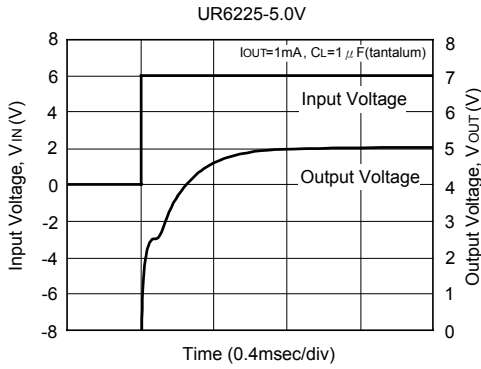
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

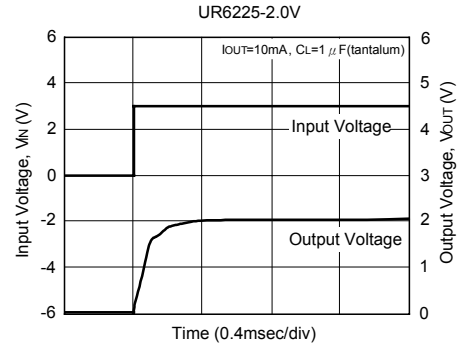
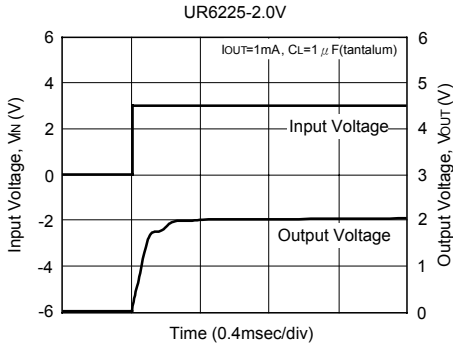


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

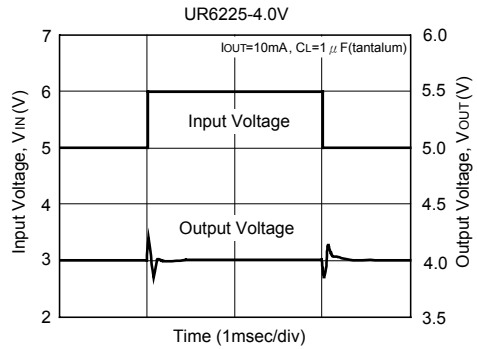
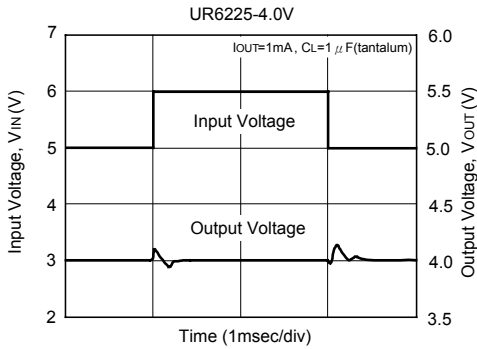
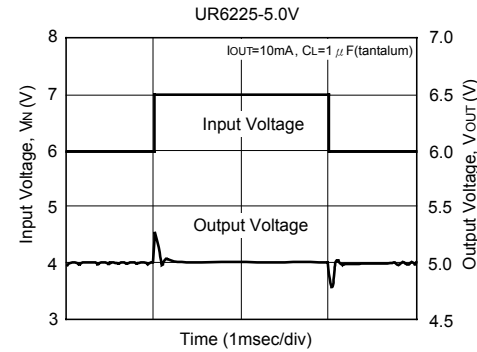
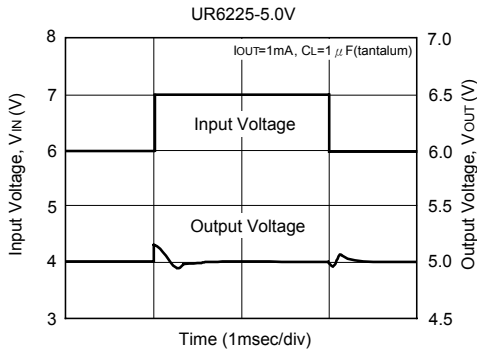


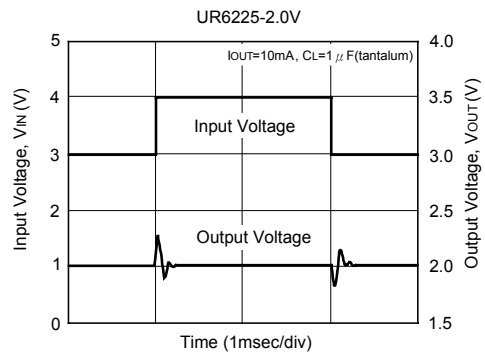
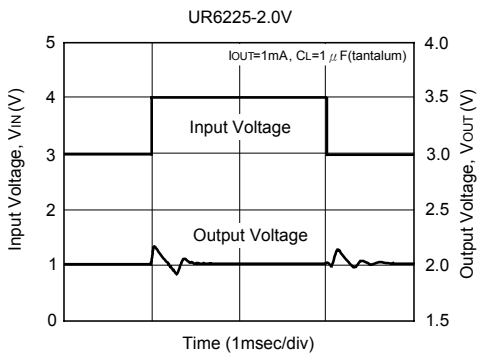
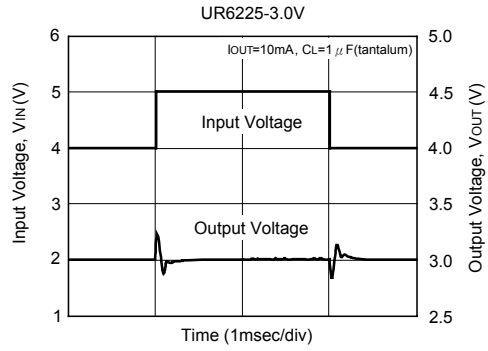
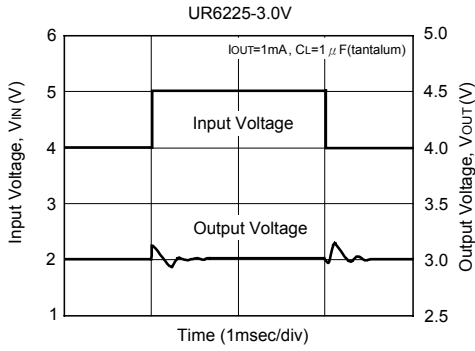
(7) INPUT TRANSIENT RESPONSE 1



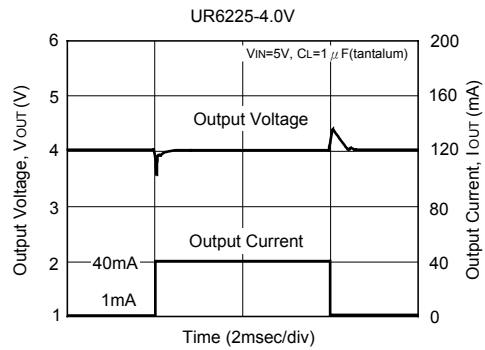
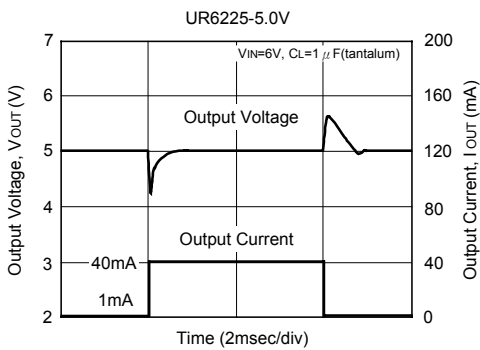


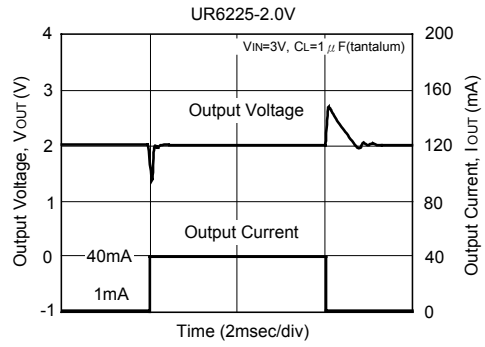
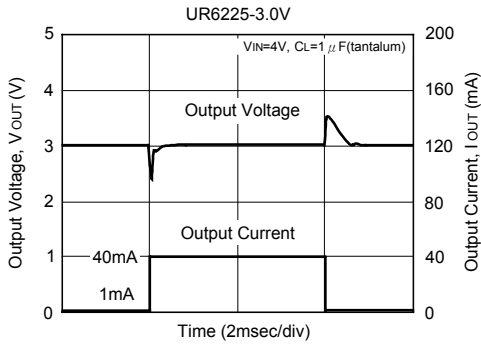
(8) INPUT TRANSIENT RESPONSE 2



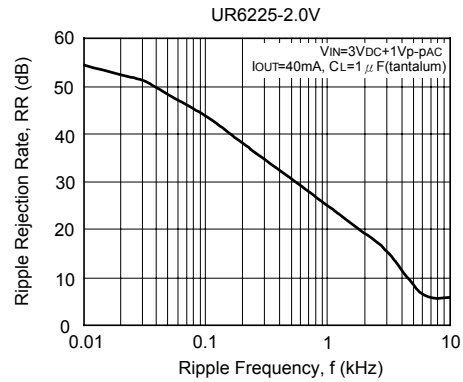
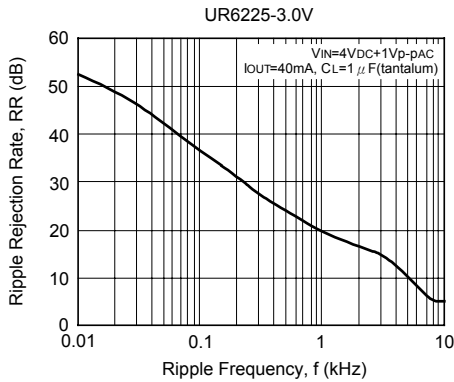
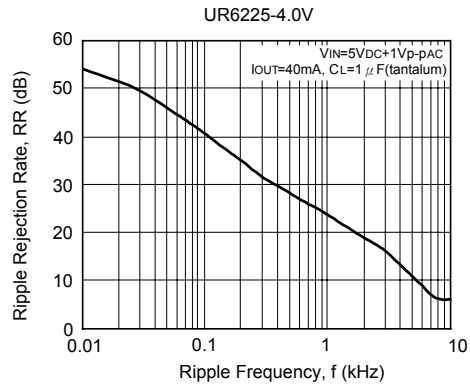
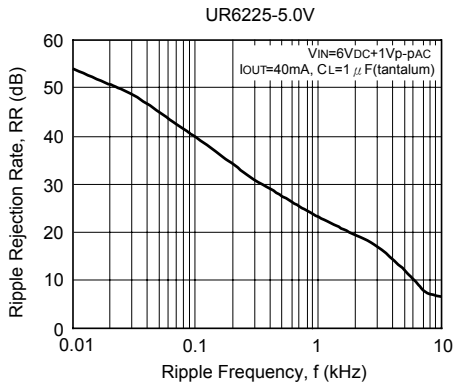


(9) LOAD TRANSIENT RESPONSE





(10) RIPPLE REJECTION RATE



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