

OUTLINE

The R1180x Series are CMOS-based voltage regulator ICs with high output voltage accuracy, extremely low supply current, and low ON-resistance. Each of these ICs consists of a voltage reference unit, an error amplifier, resistor-net for voltage setting, a current limit circuit which prevents the destruction by excess current, and so on. The output voltage of these ICs is fixed with high accuracy. B version has a chip enable pin, therefore ultra-low consumption current standby mode can be realized with the pin.

Since the packages for these ICs are SOT-23-5 (R1180N Series), SC-82AB (R1180Q Series), and SON1612-6 (R1180D Series), therefore high density mounting of the ICs on boards is possible.

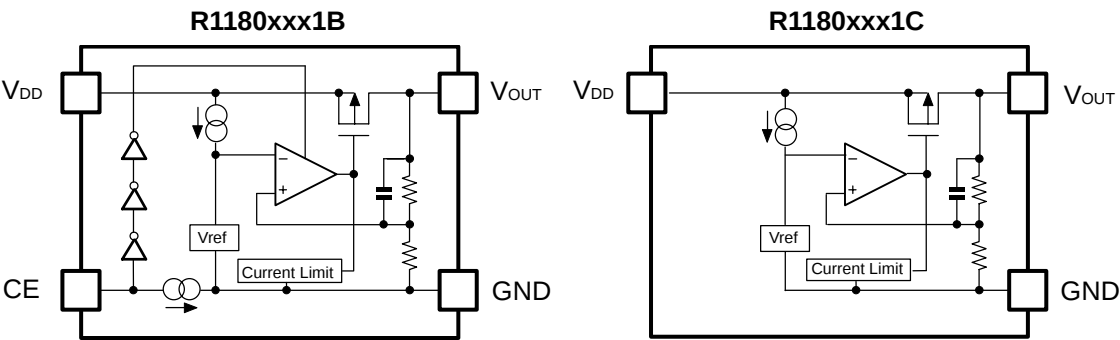
FEATURES

- Low Supply Current Typ. 1 μ A(Except the current through CE pull-down circuit)
- Standby Mode Typ. 0.1 μ A
- Low Dropout Voltage..... Typ. 0.25V (I_{OUT} =150mA 3.0V Output type)
- Low Temperature-Drift Coefficient of Output Voltage Typ. ± 100 ppm/ $^{\circ}$ C
- Good Line Regulation Typ. 0.05%/V
- High Output Voltage Accuracy $\pm 2.0\%$
- Small Packages SOT-23-5(R1180N)/SC-82AB(R1180Q)/
SON1612-6 (R1180D)
- Output Voltage Stepwise setting with a step of 0.1V in the range of 1.2V to
3.6V is possible
- Built-in Fold Back Protection Circuit Typ. 40mA (Current at short mode)
- Ceramic capacitors are recommended to be used with this IC 0.1 μ F

APPLICATIONS

- Stable voltage reference.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.

BLOCK DIAGRAMS



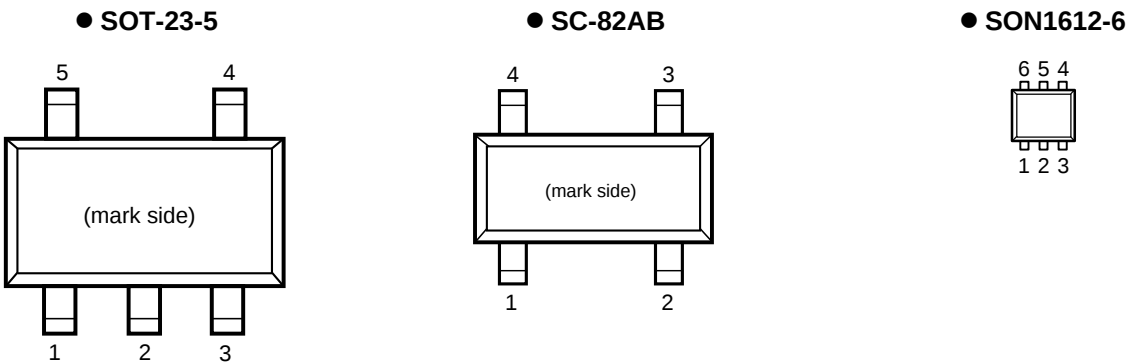
SELECTION GUIDE

The output voltage, version, and the taping type for the ICs can be selected at the user's request.
The selection can be made with designating the part number as shown below:

R1180xxx1x-TR ←Part Number
 ↑ ↑ ↑ ↑
 a b c d

Code	Contents
a	Designation of Package Type : N: SOT-23-5 (Mini mold) Q: SC-82AB (Super-mini mold) D: SON1612-6
b	Setting Output Voltage (V _{OUT}) : Stepwise setting with a step of 0.1V in the range of 1.2V to 3.6V is possible.
c	Designation of Active Type : B : active high type C : without chip enable circuit
d	Designation of Taping Type : Ex. TR (refer to Taping Specifications; TR type is the standard direction.)

PIN CONFIGURATION



PIN DESCRIPTIONS

• SC-82AB (R1180Qxx1B/C)

Pin No	Symbol	Pin Description
1	CE or NC	Chip Enable Pin or No Connection
2	GND	Ground Pin
3	V _{OUT}	Output pin
4	V _{DD}	Input Pin

• SOT-23-5 (R1180Nxx1B/C)

Pin No	Symbol	Pin Description
1	V _{DD}	Input Pin
2	GND	Ground Pin
3	CE or NC	Chip Enable Pin or No Connection
4	NC	No Connection
5	V _{OUT}	Output pin

• SON1612-6 (R1180Dxx1B/C)

Pin No	Symbol	Pin Description
1	V _{DD}	Input Pin
2	GND	Ground Pin
3	V _{OUT}	Output pin
4	NC	No Connection
5	GND	Ground Pin
6	CE or NC	Chip Enable Pin or No Connection

ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	6.5	V
V_{CE}	Input Voltage(CE Pin)	6.5	V
V_{OUT}	Output Voltage	$-0.3 \sim V_{IN}+0.3$	V
I_{OUT}	Output Current	180	mA
P_D	Power Dissipation(SC82-AB)	150	mW
	Power Dissipation(SOT23-5)	250	
	Power Dissipation(SON1612-6)	500 ^{*Note1}	
T_{opt}	Operating Temperature Range	$-40 \sim 85$	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range	$-55 \sim 125$	$^{\circ}\text{C}$

*Note 1: This specification is at mounted on board.

P_D depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

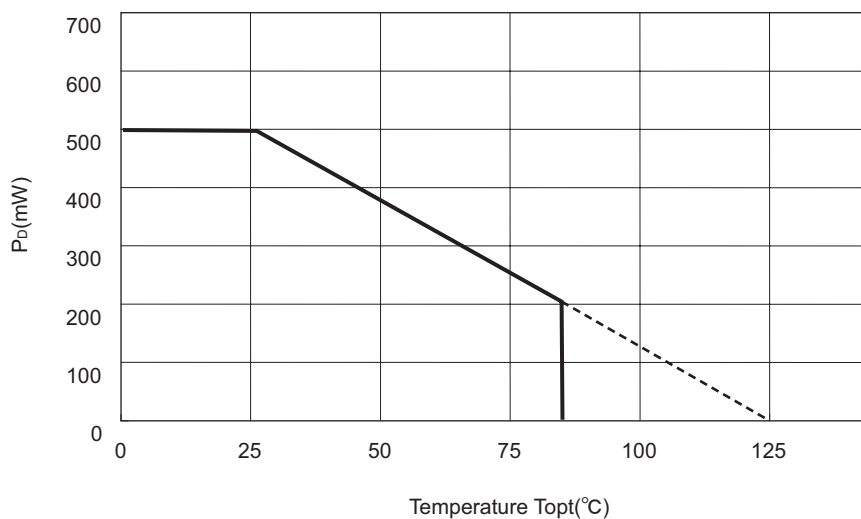
***Measurement Conditions**

Environment: Mounted on board (Wind velocity 0m/s)

Board Material: FR-4 (2-layer)

Board dimensions : 40mm × 40mm × t1.6mm

Copper Area : 50%



ELECTRICAL CHARACTERISTICS

• R1180xxx1B/R1180xxx1C

T_{opt}=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V _{OUT}	Output Voltage	V _{IN} = Set V _{OUT} +1V 1μA ≤ I _{OUT} ≤ 30mA	V _{OUT} ×0.980		V _{OUT} ×1.020	V
I _{OUT}	Output Current	V _{IN} - V _{OUT} = 1.0V	150			mA
ΔV _{OUT} /ΔI _{OUT}	Load Regulation	V _{IN} = Set V _{OUT} +1V 1μA ≤ I _{OUT} ≤ 150mA		20	40	mV
V _{DIF}	Dropout Voltage	Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE				
I _{SS}	Supply Current	V _{IN} = Set V _{OUT} +1V, I _{OUT} =0mA		1.0	1.5	μA
I _{standby}	Supply Current (Standby)	V _{IN} = Set V _{OUT} +1V V _{CE} = GND(B version)		0.1	1.0	μA
ΔV _{OUT} /ΔV _{IN}	Line Regulation	Set V _{OUT} +0.5V ≤ V _{IN} ≤ 6.0V I _{OUT} = 30mA		0.05	0.20	%/V
V _{IN}	Input Voltage		1.7		6.0	V
ΔV _{OUT} /ΔT	Output Voltage Temperature Coefficient	I _{OUT} = 30mA -40°C ≤ T _{opt} ≤ 85°C		±100		ppm/°C
I _{LIM}	Short Current Limit	V _{OUT} = 0V		40		mA
I _{PD}	CE Pull-down Constant Current	(R1180xxx1B)		0.35		μA
V _{CEH}	CE Input Voltage "H"	(R1180xxx1B)	1.2		6.0	V
V _{CEL}	CE Input Voltage "L"	(R1180xxx1B)	0.0		0.3	V

• ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

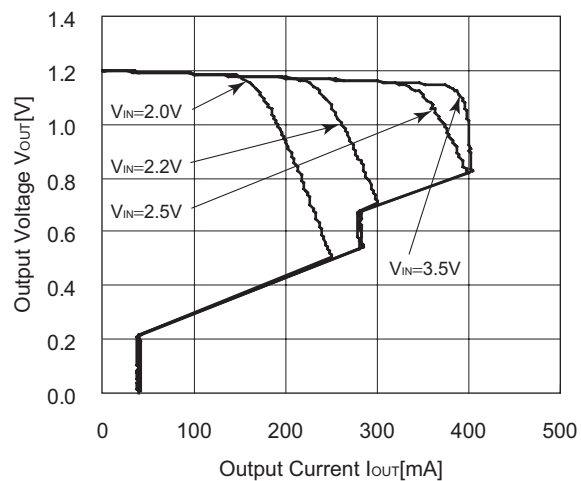
T_{opt} = 25°C

Output Voltage V _{OUT} (V)	Dropout Voltage		
	V _{DIF} (V)		
	Condition	Typ.	Max.
1.2 ≤ V _{OUT} < 1.3	I _{OUT} = 150mA	0.85	1.20
1.3 ≤ V _{OUT} < 1.4		0.75	1.10
1.4 ≤ V _{OUT} < 1.5		0.65	1.00
1.5 ≤ V _{OUT} < 1.7		0.60	0.90
1.7 ≤ V _{OUT} < 1.9		0.50	0.75
1.9 ≤ V _{OUT} < 2.1		0.40	0.65
2.1 ≤ V _{OUT} < 2.8		0.35	0.55
2.8 ≤ V _{OUT} ≤ 3.6		0.25	0.40

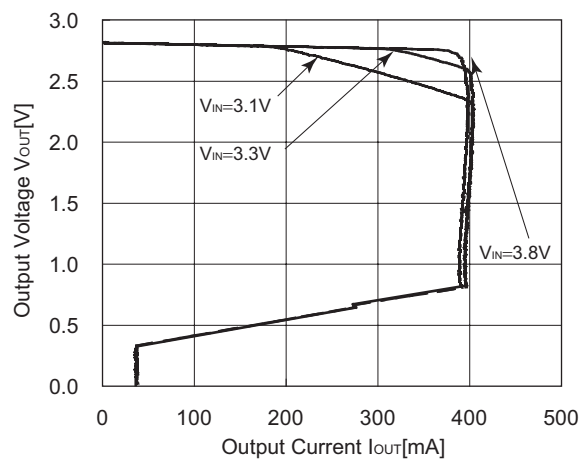
TYPICAL CHARACTERISTICS

1) Output Voltage vs. Output Current (T_{opt}=25°C)

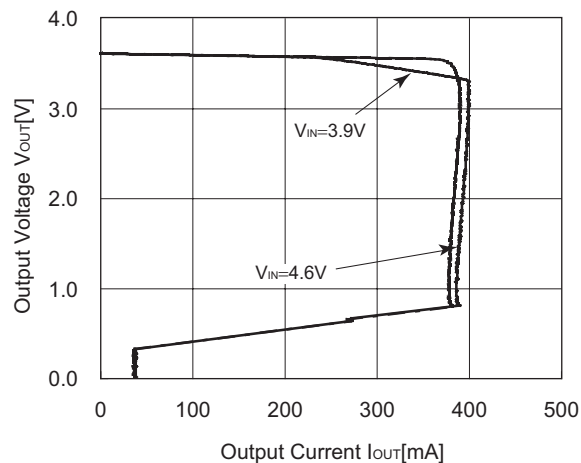
R1180x121x



R1180x281x

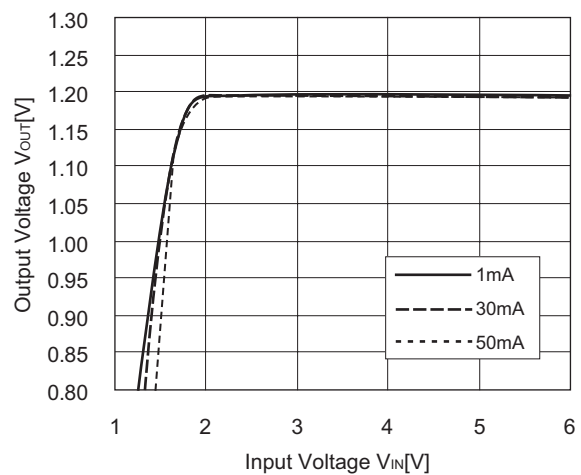


R1180x361x

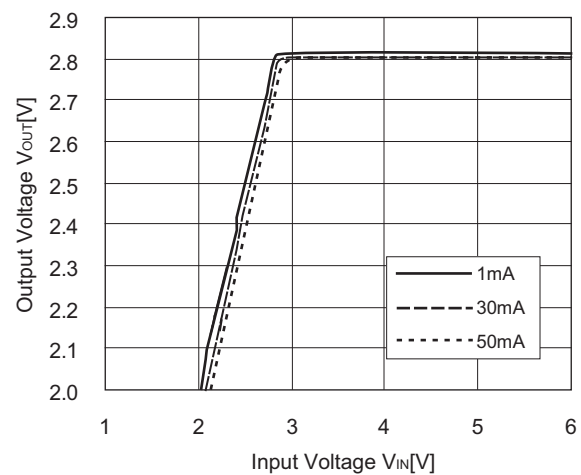


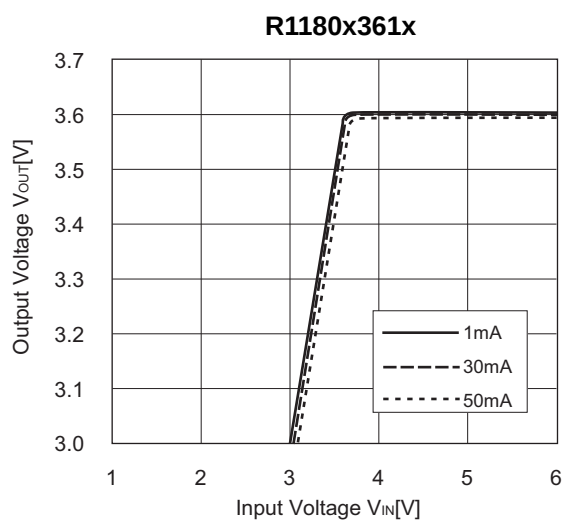
2) Output Voltage vs. Input Voltage (T_{opt}=25°C)

R1180x121x

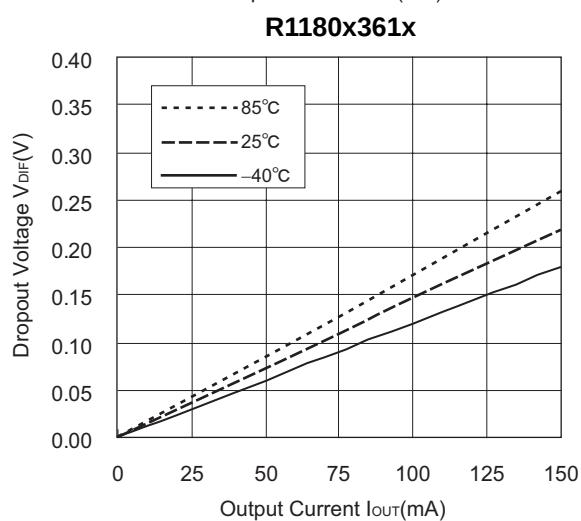
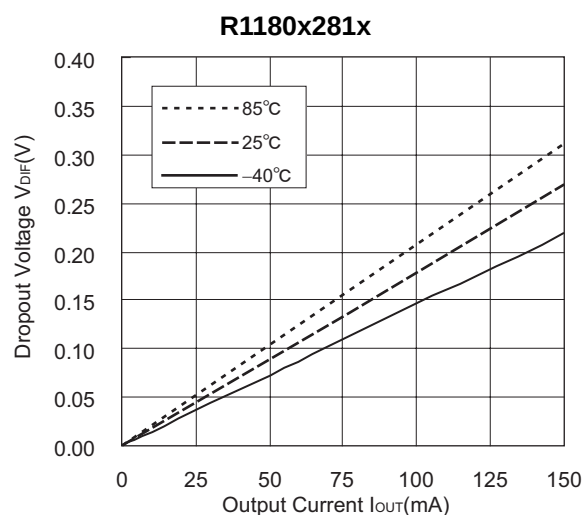
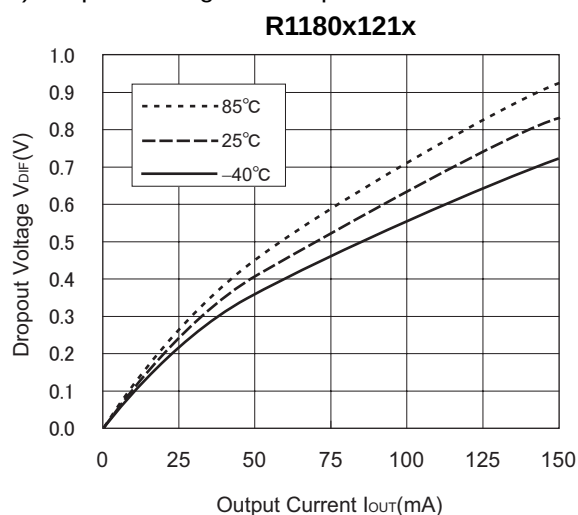


R1180x281x





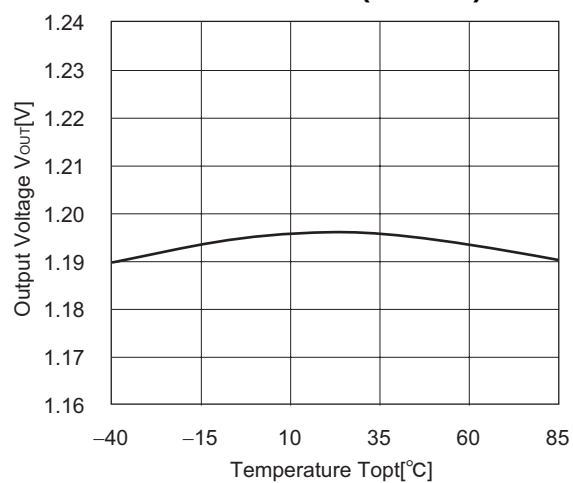
3) Dropout Voltage vs. Output Current



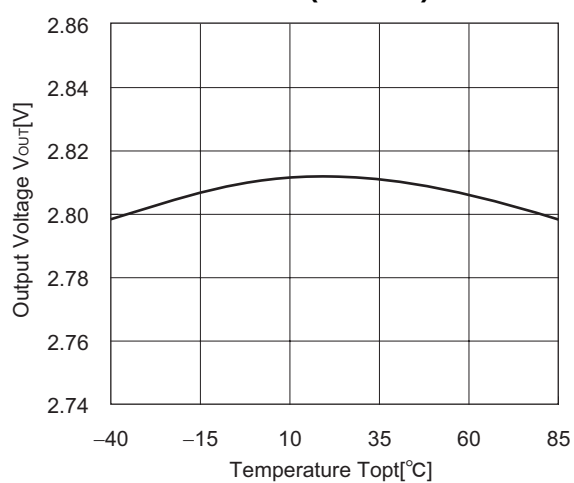
R1180x

4) Output Voltage vs. Temperature ($I_{OUT}=30\text{mA}$)

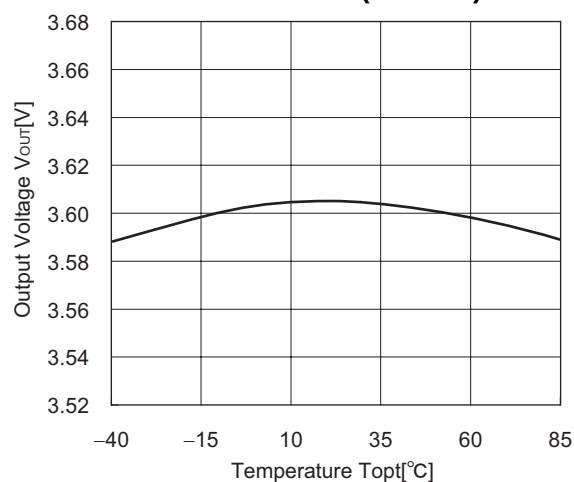
R1180x121x ($V_{IN}=2.2\text{V}$)



R1180x281x ($V_{IN}=3.8\text{V}$)

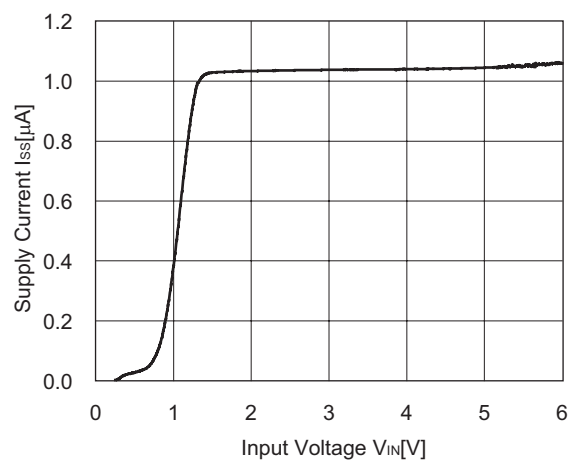


R1180x361x ($V_{IN}=4.6\text{V}$)

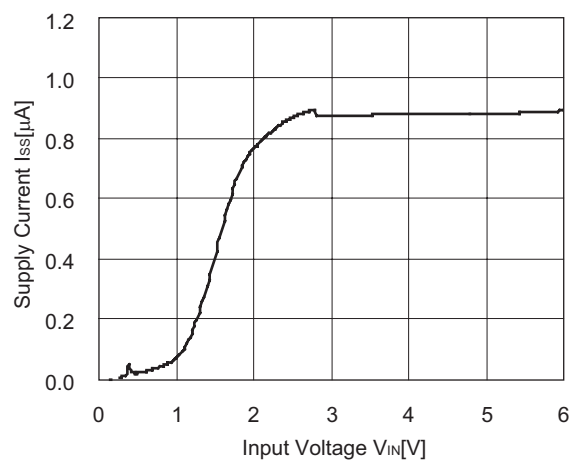


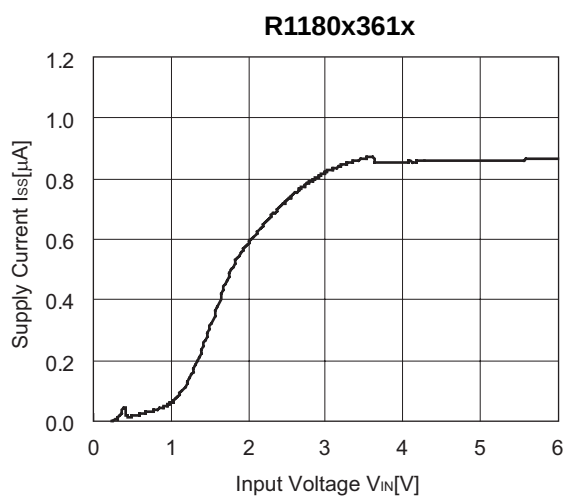
5) Supply Current vs. Input Voltage ($T_{opt}=25^\circ\text{C}$)

R1180x121x

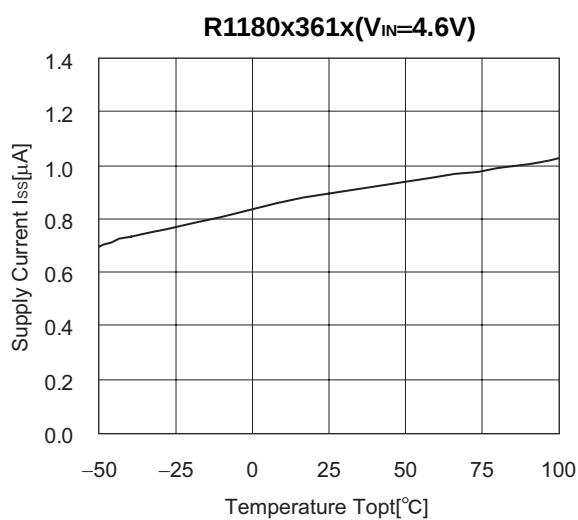
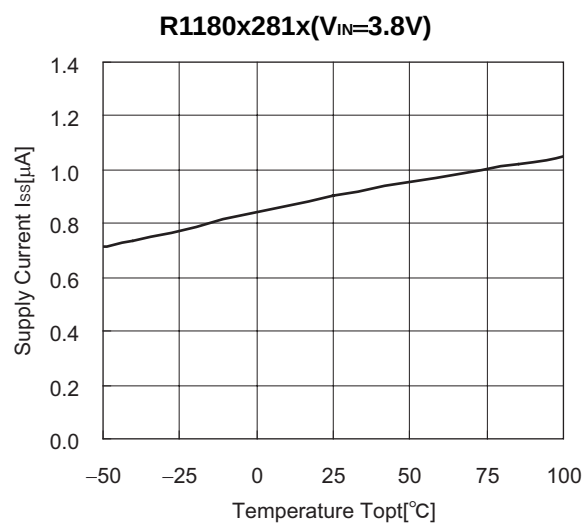
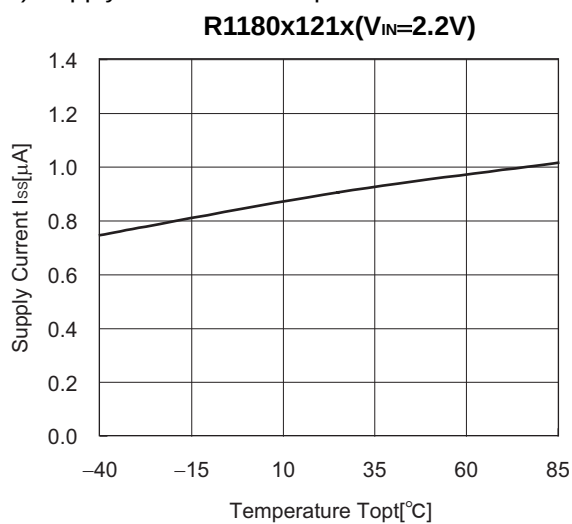


R1180x281x



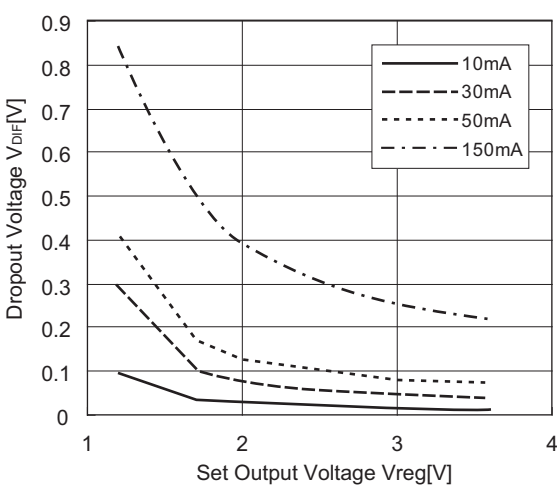


6) Supply Current vs. Temperature

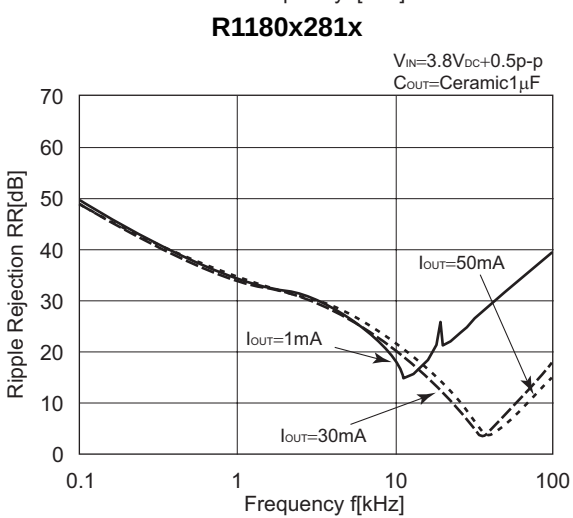
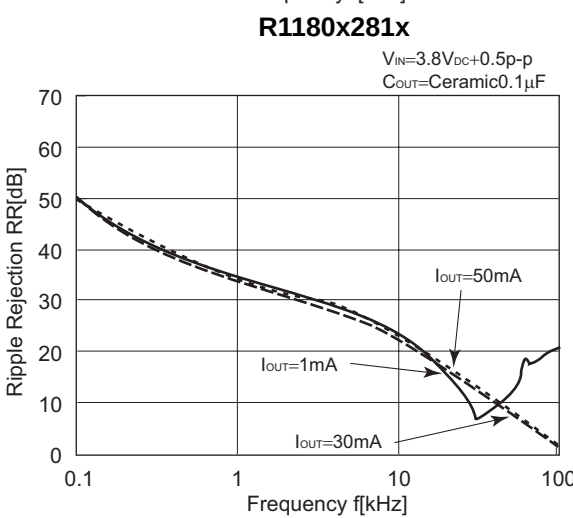
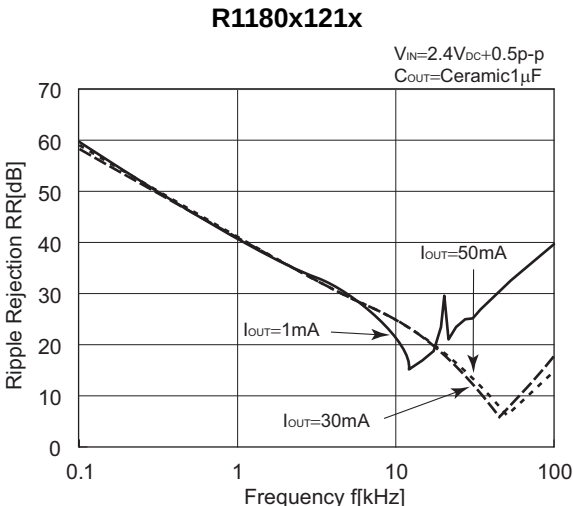
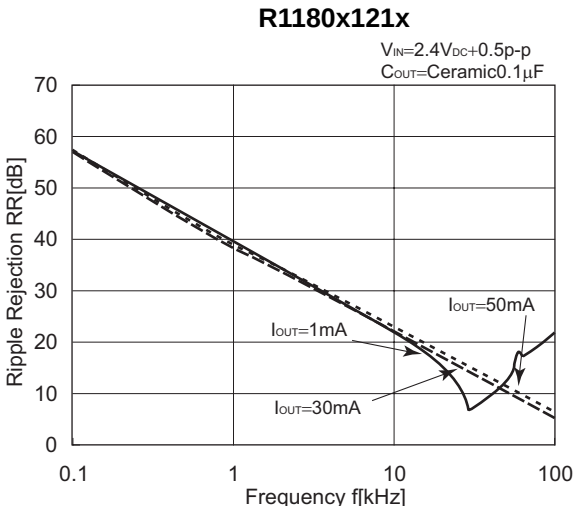


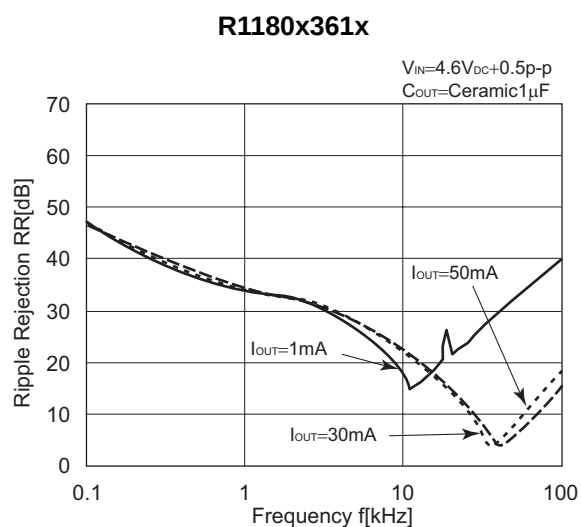
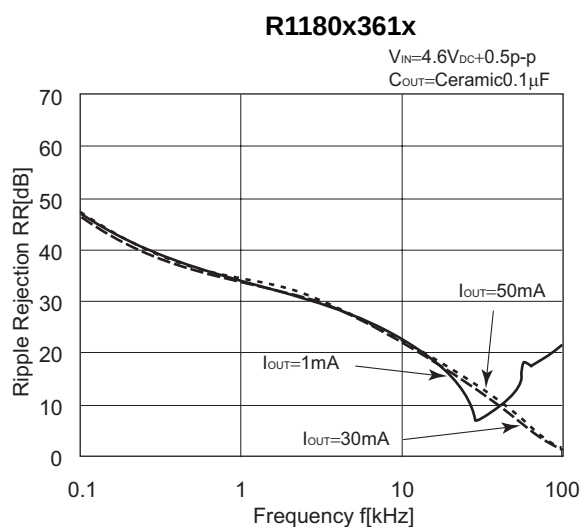
R1180x

7) Dropout Voltage vs. Set Output Voltage (T_{opt}=25°C)

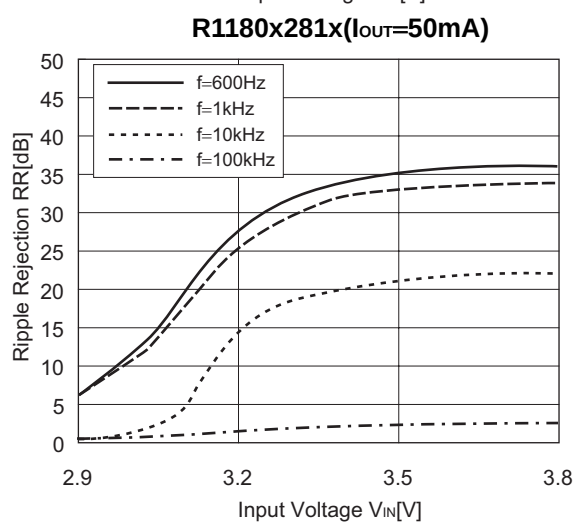
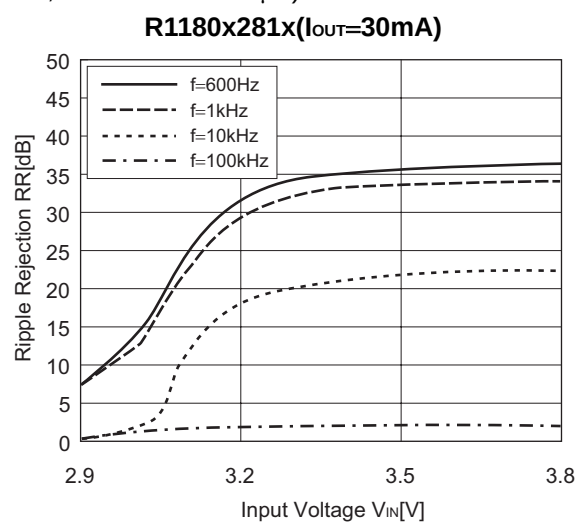
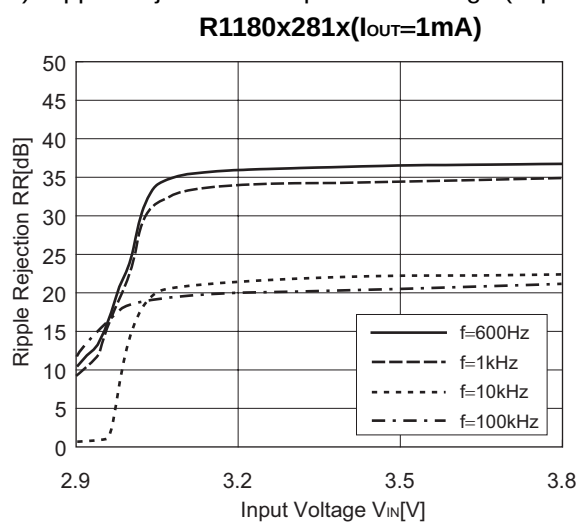


8) Ripple Rejection vs. Frequency (C_{IN}=none)



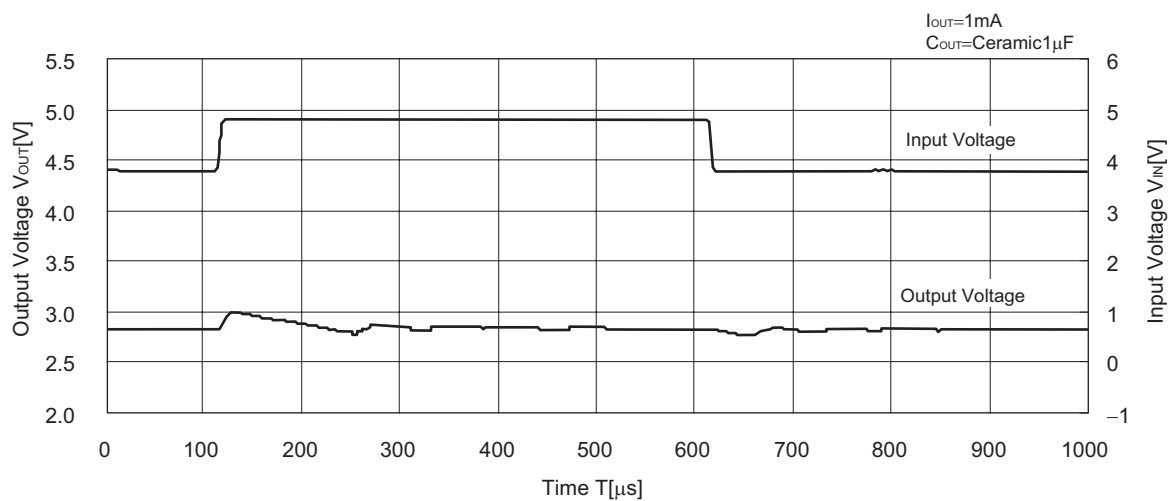


9) Ripple Rejection vs. Input Bias Voltage ($T_{opt}=25^{\circ}C$, $C_{IN}=none$, $C_{OUT}=ceramic0.1\mu F$)

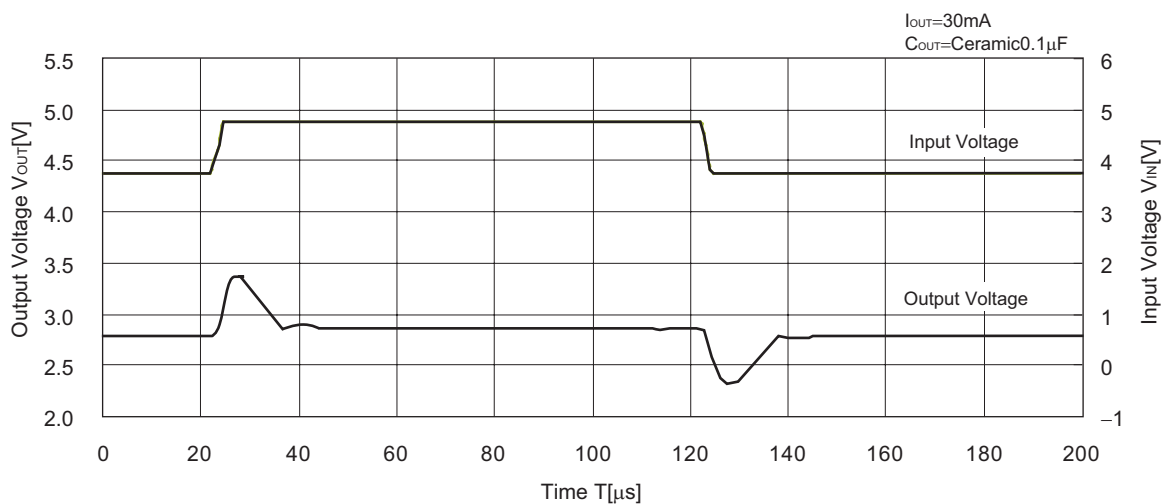


10) Input Transient Response ($C_{IN}=none$, $t_r=t_f=5\mu s$)

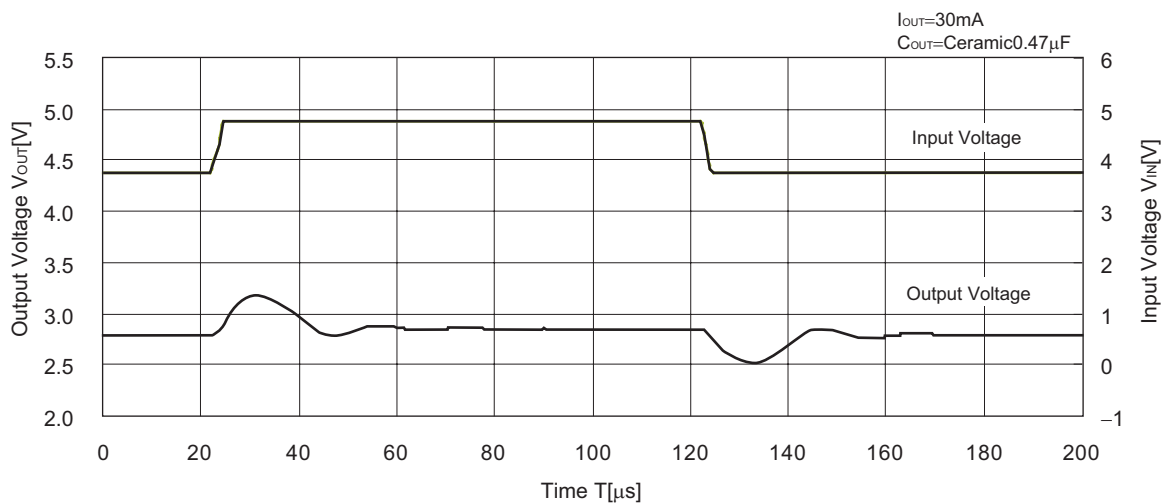
R1180x281x

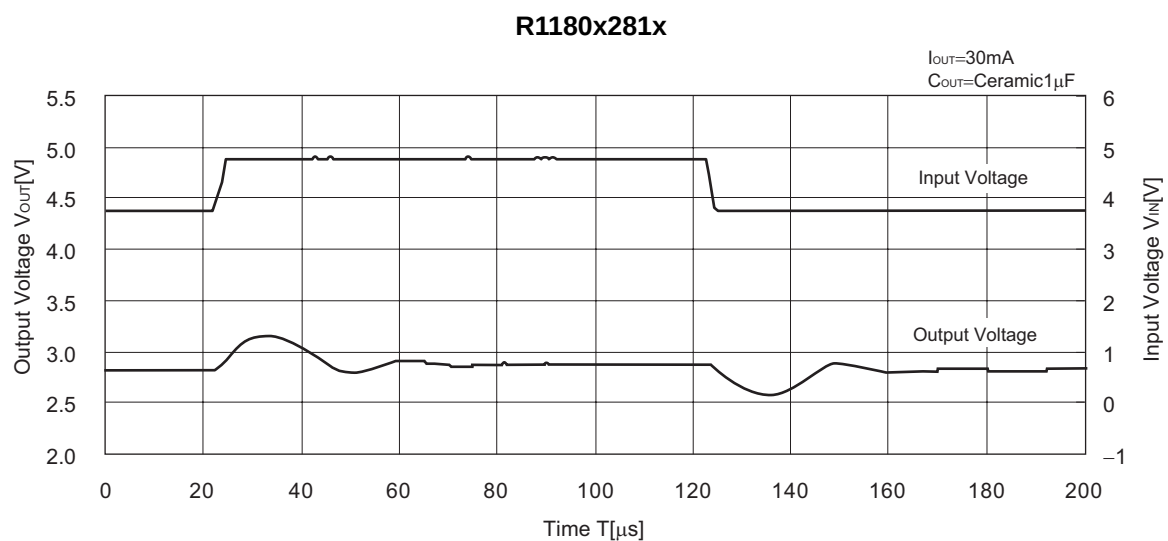


R1180x281x

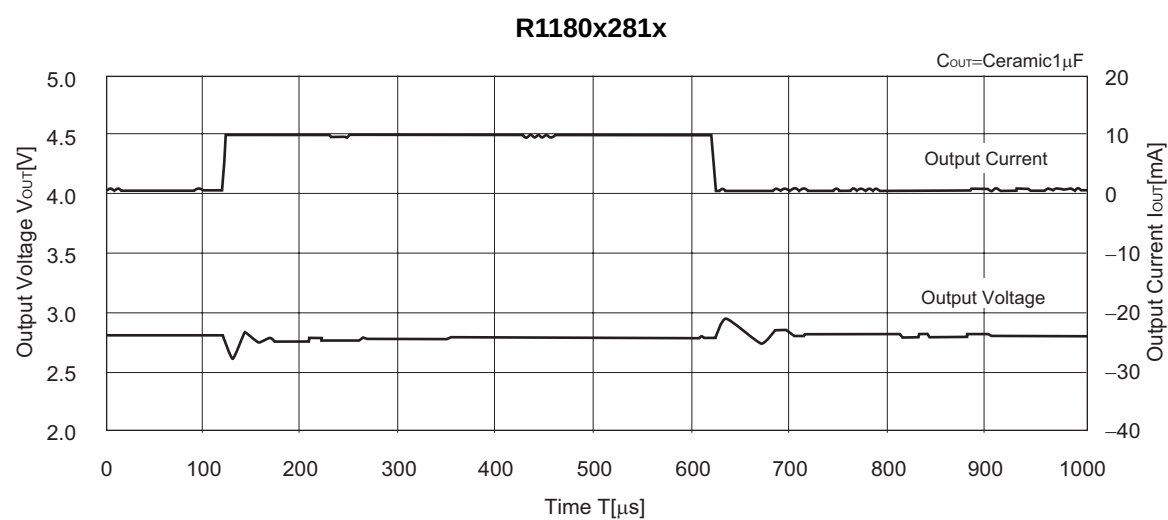
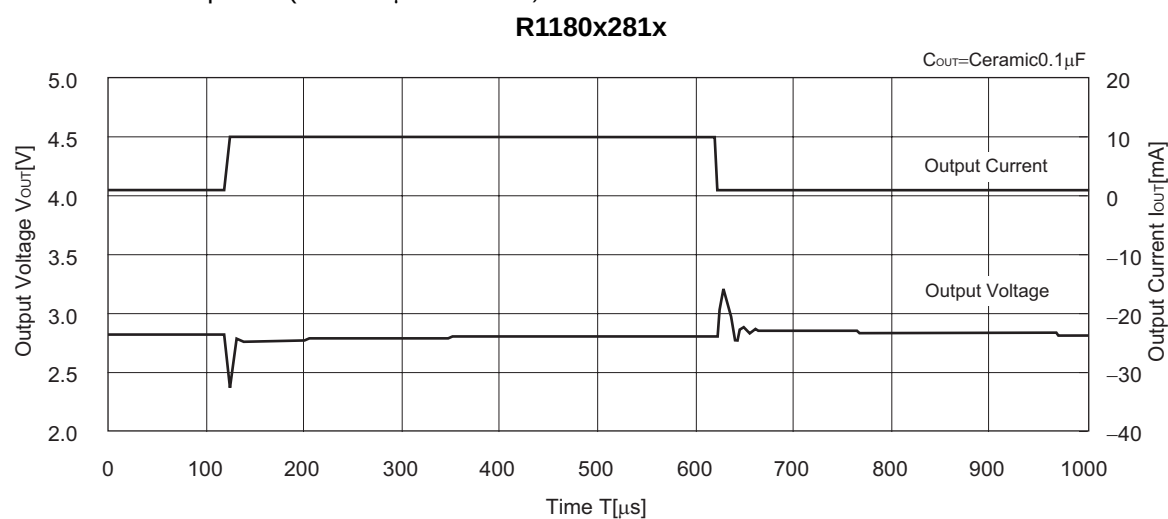


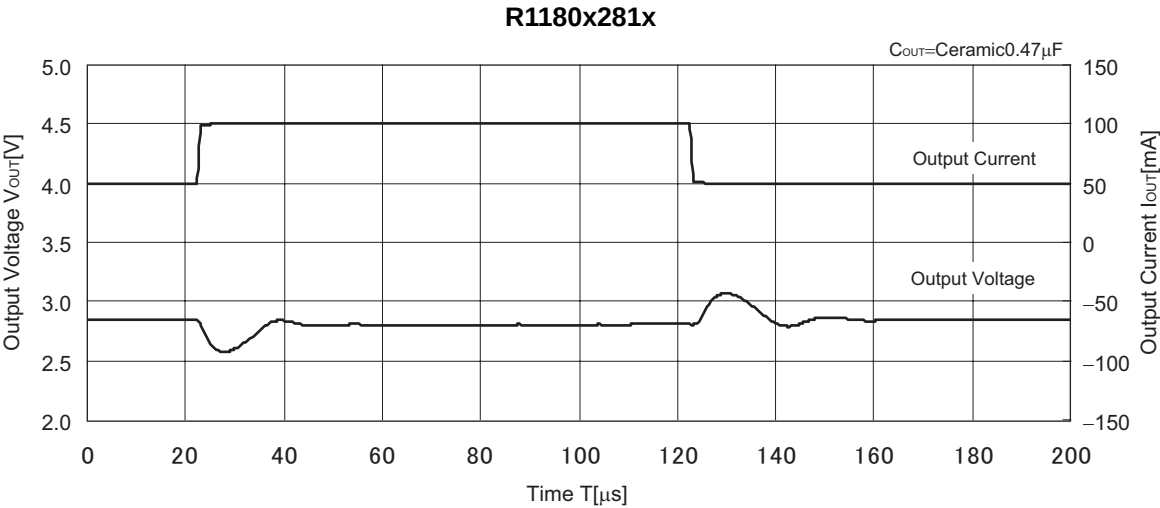
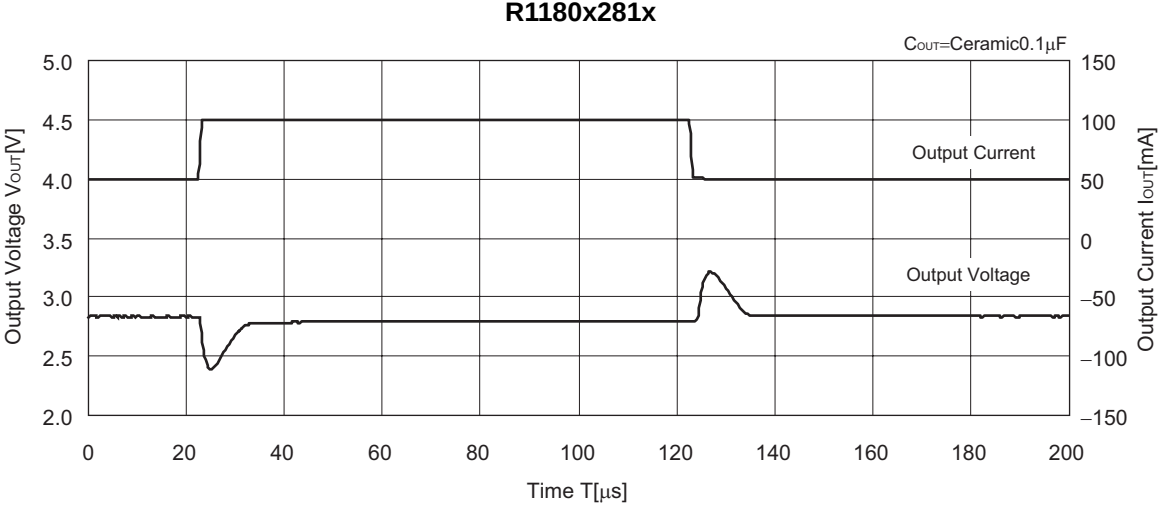
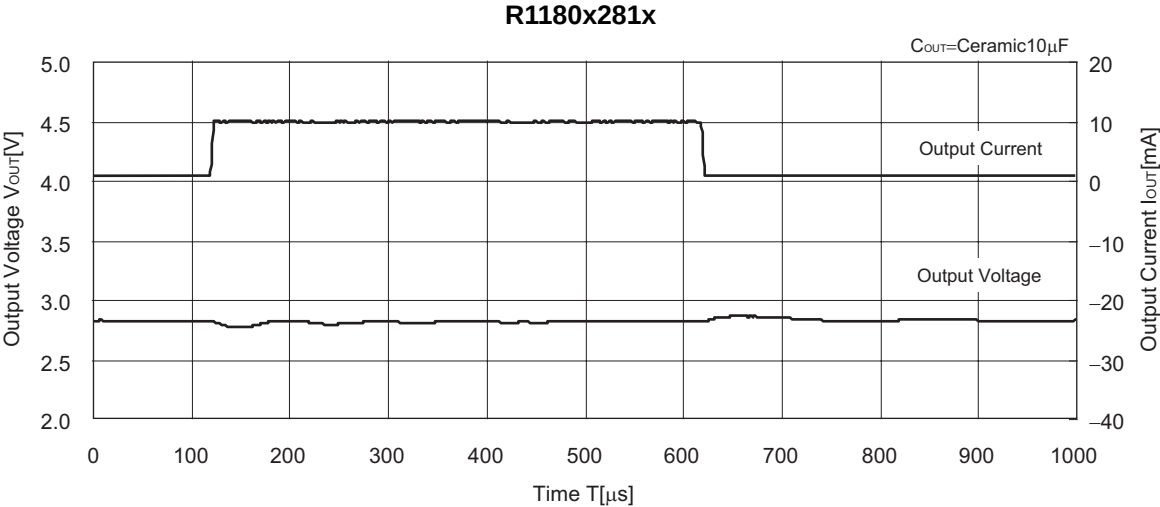
R1180x281x

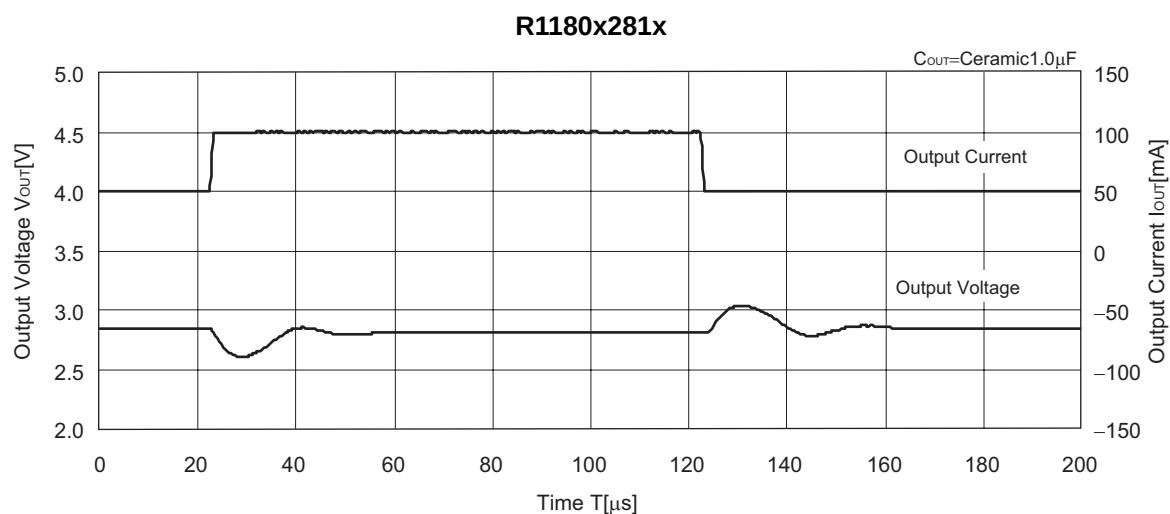




11) Load Transient Response ($t_r=t_f=0.5\mu\text{s}$ $V_{IN}=3.8\text{V}$)

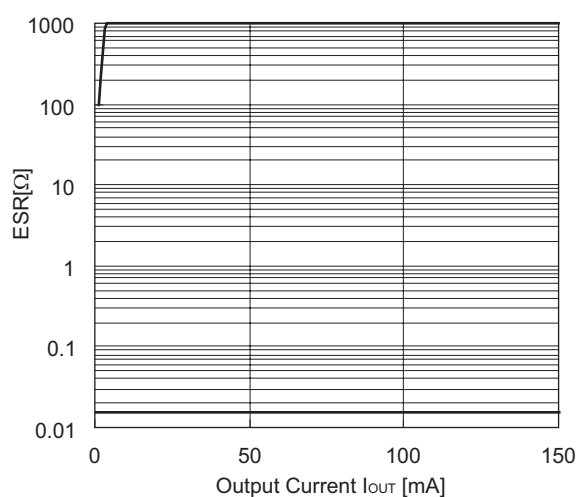




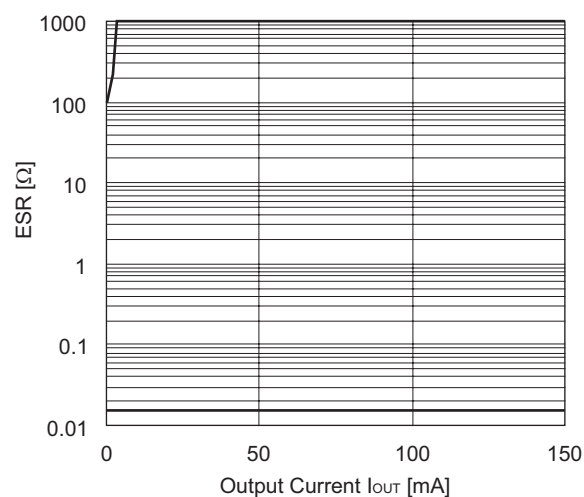


12) ESR vs. Output Current

R1180x121x($C_{IN} = \text{Ceramic } 1.0\mu\text{F}$, $C_{OUT} = \text{Ceramic } 0.1\mu\text{F}$)



R1180x281x($C_{IN} = \text{Ceramic } 1.0\mu\text{F}$, $C_{OUT} = \text{Ceramic } 0.1\mu\text{F}$)



The relations between I_{OUT} (Output Current) and ESR of an output capacitor are shown above. The conditions when the white noise level is under $40\mu V$ (Avg.) are marked as the hatched area in the graph.

<Measurement conditions>

- (1) $V_{IN} = V_{OUT} + 1V$
- (2) Frequency Band: 10Hz to 2MHz (BW=30Hz)
- (3) Temperature: -40°C to 85°C