RICOH

R1100D SERIES

ULTRA SMALL PACKAGE VOLTAGE REGULATOR

NO.EA-117-111018

OUTLINE

The R1100D Series are CMOS-based voltage regulator ICs with high accuracy output voltage and ultra-low supply current developed. Each of these ICs consists of a driver transistor, a voltage reference unit, an error amplifier, resistors for setting output voltage and a current limit circuit.

The output voltage of these ICs is fixed with high accuracy.

Even if V_{OUT} is shorted to the GND, the included current limit circuit protects the ICs from the destruction.

Since the package for these ICs is SON1408-3, high density mounting of the ICs on boards is possible.

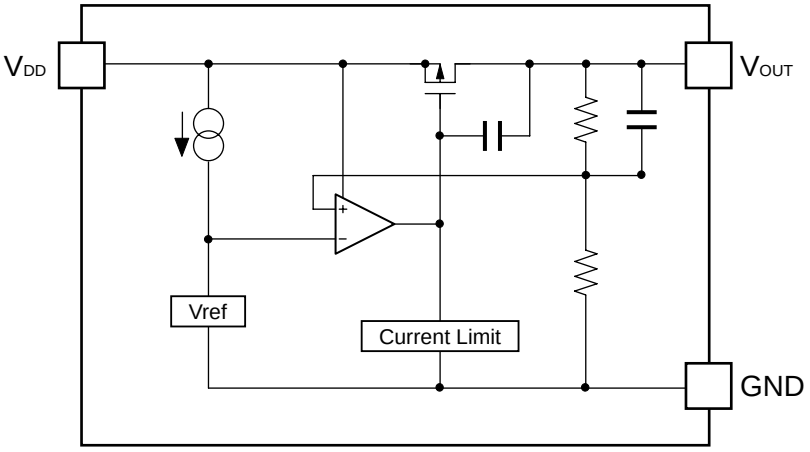
FEATURES

- Supply current ..... Typ. 0.8μA (V_{OUT}=1.0V, V_{DD}=3.0V)
- Dropout Voltage ..... Typ. 20mV (I_{OUT}=1mA, V_{OUT}=3.0V)
- Output Voltage ..... 0.9V to 4.0V (0.1V steps)
  (For other voltages, please refer to MARK INFORMATIONS.)
- Output Voltage Accuracy ..... ±2.0%(1.2V ≤ V_{OUT} ≤ 4.0V),
  ±24mV(V_{OUT} <1.2V)
- Temperature-Drift Coefficient of Output Voltage ..... Typ. ±100ppm/°C
- Line Regulation ..... Typ. 0.05%/V
- Package SON1408-3
- Built-in Fold Back Protection Circuit ..... Typ. 40mA (Current at short mode)
- Ceramic capacitors are recommended to be used with this IC .....0.1μF or more

APPLICATIONS

- Power source for battery-powered equipment.
- Power source for cameras, VCRs, camcorders, hand-held audio instruments and hand-held communication equipment.
- Precision voltage references.

BLOCK DIAGRAM



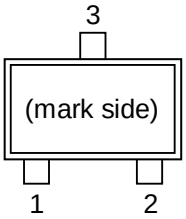
SELECTION GUIDE

The output voltage for the ICs can be selected at the user's request.

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R1100Dxx1C-TR-F	SON1408-3	9,000 pcs	Yes	Yes
xx: The output voltage can be designated in the range from 0.9V(09) to 4.0V(40) in 0.1V steps. (For other voltages, please refer to MARK INFORMATIONS.)				

PIN CONFIGURATION

● **SON1408-3**



PIN DESCRIPTION

● **SON1408-3**

Pin No	Symbol	Pin Description
1	V_{OUT}	Output pin
2	V_{DD}	Input Pin
3	GND	Ground Pin

ABSOLUTE MAXIMUM RATINGS

(GND=0V)

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	6.5	V
V_{OUT}	Output Voltage	V_{SS}–0.3 to V_{IN}+0.3	V
I_{OUT}	Output Current	180	mA
P_D	Power Dissipation * (SON1408-3)	250	mW
T_{opt}	Operating Temperature Range	-40 to 85	°C
T_{stg}	Storage Temperature Range	-55 to~ 125	°C

∗) For Power Dissipation, please refer to PACKAGE INFORMATION.

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field.
The functional operation at or over these absolute maximum ratings is not assured.

ELECTRICAL CHARACTERISTICS

- **R1100D301C**

Topt=25°C

Symbol	Item	Test Conditions	Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	V_{IN}=5.0V 10μA ≤ I_{OUT} ≤ 10mA	2.940	3.000	3.060	V
I_{OUT}	Output Current	V_{IN}=5.0V	100			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN}=5.0V, 1mA ≤ I_{OUT} ≤ 50mA		35	60	mV
V_{DIF}	Dropout Voltage	I_{OUT}=1mA		20	30	mV
I_{SS}	Supply Current	V_{IN}=5.0V		1.5	3.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	I_{OUT}=1mA Set V_{OUT}+0.5V ≤ V_{IN} ≤ 6.0V	−0.20		0.20	%/V
V_{IN}	Input Voltage				6.0	V
$\Delta V_{OUT}/\Delta Topt$	Output Voltage Temperature Coefficient	I_{OUT}=10mA −40°C ≤ Topt ≤ 85°C		±100		ppm/°C
I_{SC}	Short Current Limit	V_{OUT}=0V		40		mA

ELECTRICAL CHARACTERISTICS BY OUTPUT VOLTAGE

Topt=25°C

Part Number	Output Voltage				Output Current			Load Regulation			Dropout Voltage		
	V_{OUT}[V]				I_{OUT}[mA]			ΔVOUT/ΔIOUT[mV]			V_{DIF}[mV]		
	Conditions	MIN.	TYP.	MAX.	Conditions	MIN.	TYP.	Conditions	TYP.	MAX.	Conditions	TYP.	MAX.
R1100D091C	V_{IN}-Set V_{OUT} =2.0V, 10μA ≤ I_{OUT} ≤ 10mA	0.876	0.900	0.924	V_{IN}-Set V_{OUT} =2.0V	35		V_{IN}-Set V_{OUT} =2.0V, 1mA ≤ I_{OUT} ≤ 20mA	7.5	20	I_{OUT} =1mA	380	750
R1100D101C		0.976	1.000	1.024								280	700
R1100D111C		1.076	1.100	1.124								200	600
R1100D121C		1.176	1.200	1.224									
R1100D131C		1.274	1.300	1.326								100	400
R1100D141C		1.372	1.400	1.428									
R1100D151C		1.470	1.500	1.530		65		V_{IN}-Set V_{OUT} =2.0V, 1mA ≤ I_{OUT} ≤ 35mA	20	40		50	100
R1100D161C		1.568	1.600	1.632									
R1100D171C		1.666	1.700	1.734								25	50
R1100D181C		1.764	1.800	1.836									
R1100D191C		1.862	1.900	1.938									
R1100D201C		1.960	2.000	2.040									
R1100D211C		2.058	2.100	2.142									
R1100D221C		2.156	2.200	2.244									
R1100D231C		2.254	2.300	2.346									
R1100D241C		2.352	2.400	2.448									
R1100D251C		2.450	2.500	2.550									
R1100D261C		2.548	2.600	2.652									
R1100D271C		2.646	2.700	2.754									
R1100D281C		2.744	2.800	2.856									
R1100D291C		2.842	2.900	2.958									
R1100D301C		2.940	3.000	3.060		100		V_{IN}-Set V_{OUT} =2.0V, 1mA ≤ I_{OUT} ≤ 50mA	35	60		20	30
R1100D311C		3.038	3.100	3.162									
R1100D321C		3.136	3.200	3.264									
R1100D331C		3.234	3.300	3.366									
R1100D341C		3.332	3.400	3.468									
R1100D351C		3.430	3.500	2.570									
R1100D361C		3.528	3.600	3.672									
R1100D371C		3.626	3.700	3.774									
R1100D381C		3.724	3.800	3.876									
R1100D391C		3.822	3.900	3.978									
R1100D401C		3.920	4.000	4.080									

ELECTRICAL CHARACTERISTICS

(Common characteristics)

Symbol	Item	Test Conditions	Min.	Typ.	Max.	Unit
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	I_{OUT}=1mA Set V_{OUT}+0.5V ≤ V_{IN} ≤ 6V	-0.20		0.20	%/V
V_{IN}	Input Voltage		(1.2)		6.0	V
$\Delta V_{OUT}/\Delta Topt$	Output Voltage Temperature Coefficient	I_{OUT}=10mA −40°C ≤ Topt ≤ 85°C		±100		ppm/°C
I_{SC}	Short Current Limit	V_{OUT}=0V		40		mA

ELECTRICAL CHARACTERISTICS BY OUTPUT VOLTAGE

Symbol	Item	Output Voltage	Conditions	Min.	Typ.	Max.	Unit
I_{SS}	Supply Current	0.9V ≤ V_{OUT} ≤ 1.0V	V_{IN}=Set V_{OUT}+2.0V		0.8	1.8	μA
		1.1V ≤ V_{OUT} ≤ 1.4V			1.0	2.4	
		1.5V ≤ V_{OUT} ≤ 2.0V			1.2	2.7	
		2.1V ≤ V_{OUT} ≤ 4.0V			1.5	3.0	

RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

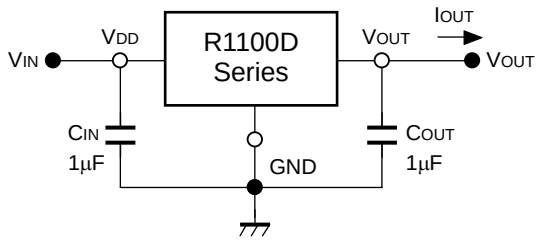
All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

OPERATION

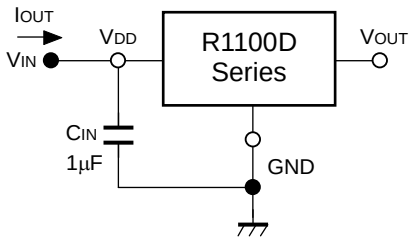
These ICs, the output voltage V_{OUT} is detected by Feedback Resisters, and the detected output voltage is compare with a reference voltage by the error amplifier, so that a constant voltage is output.

A current limit circuit against short protection and a chip enable circuit are included.

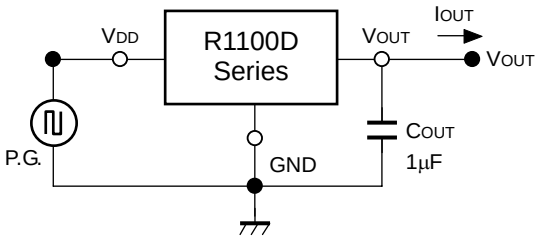
TEST CIRCUITS



Standard Test Circuit



Test Circuit for Supply Current



Test Circuit for Line Transient Response

TECHNICAL NOTES

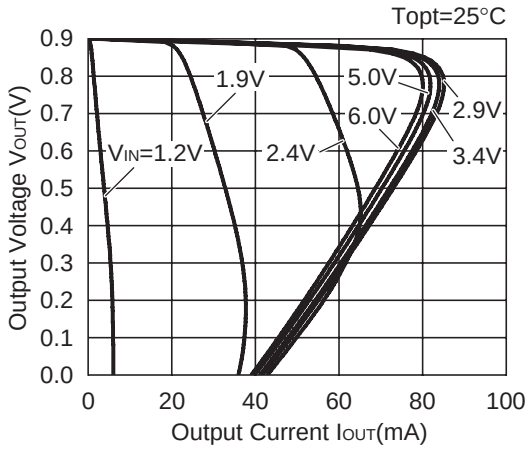
In R1100D Series, a constant voltage can be obtained without using capacitors. However, when the wire connected V_{IN} is long, use a capacitor. Output noise can be reduced with using capacitor.

Insert capacitors with the capacitance of 0.1μF to 2.2μF between input/output pins and GND pin as close as possible.

TYPICAL CHARACTERISTICS

1) Output Voltage vs. Output Current

R1100D091C



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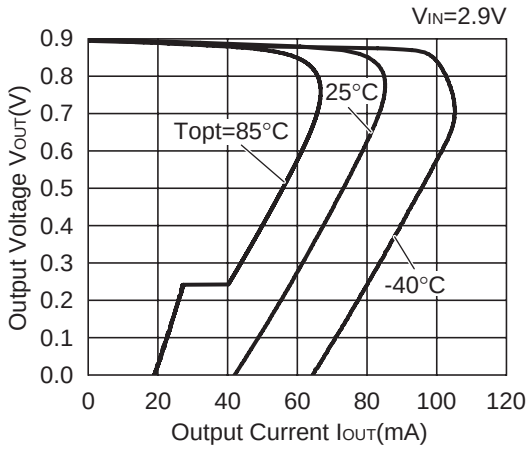

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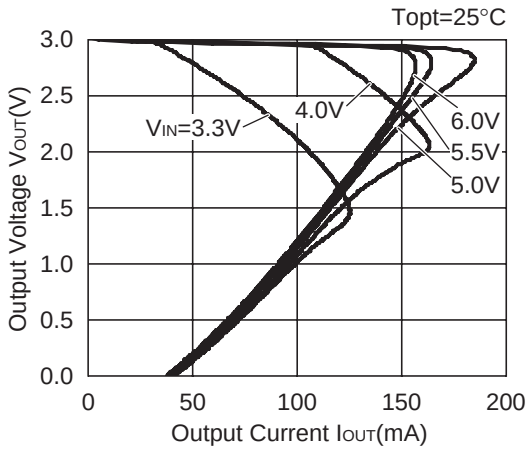

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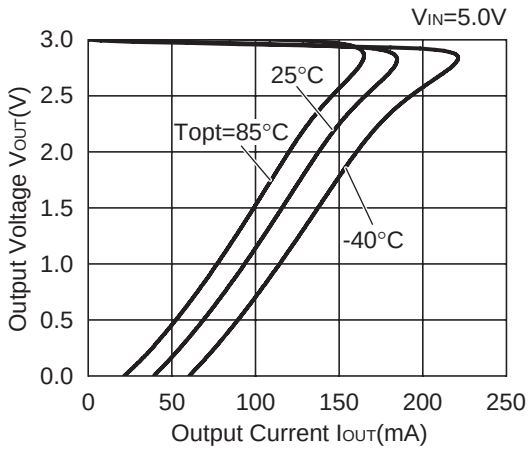

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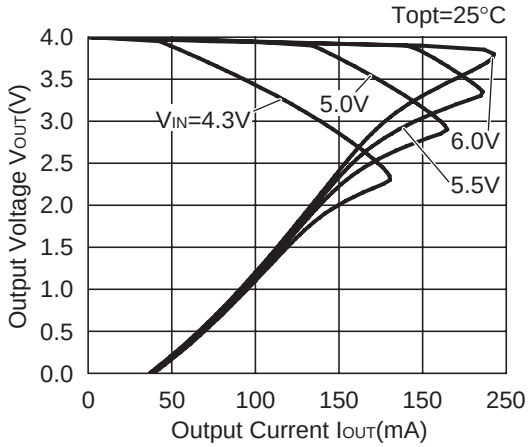

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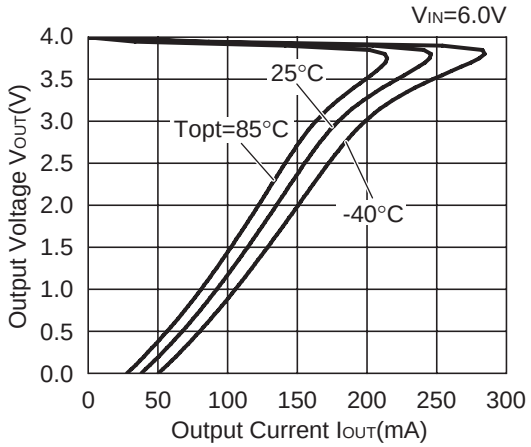
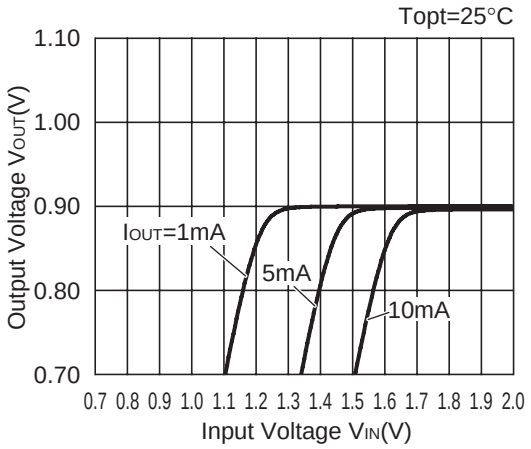


RICOH

2) Output Voltage vs. Input Voltage

R1100D091C



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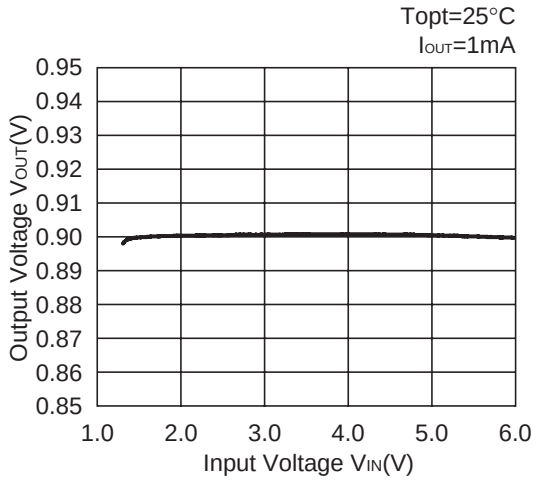

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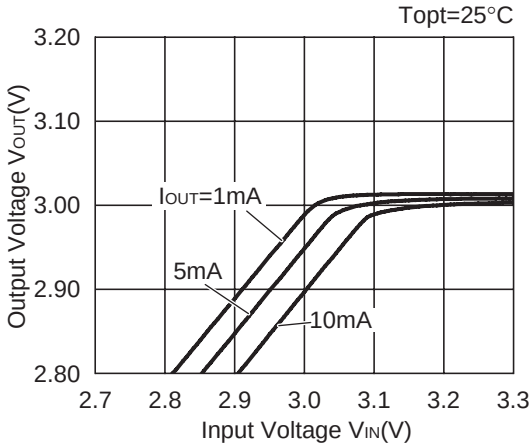

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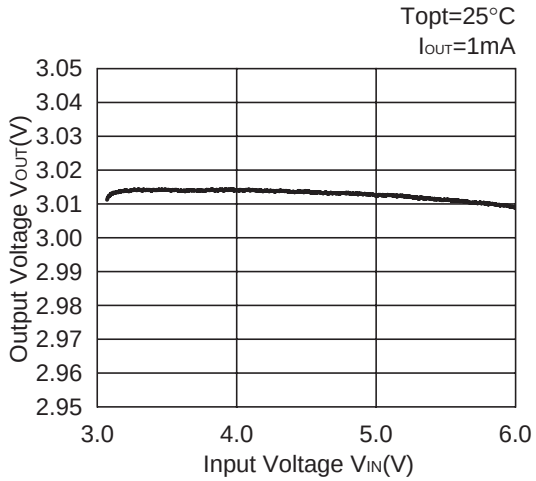

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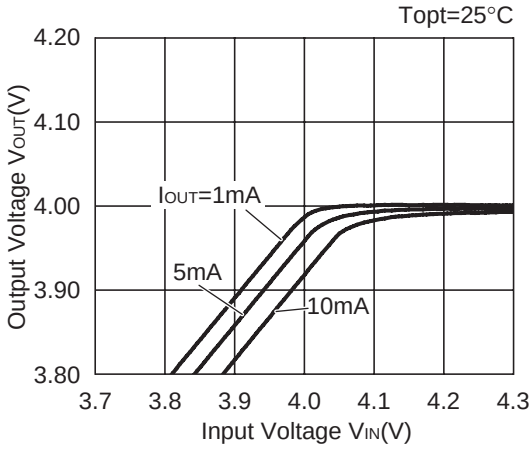

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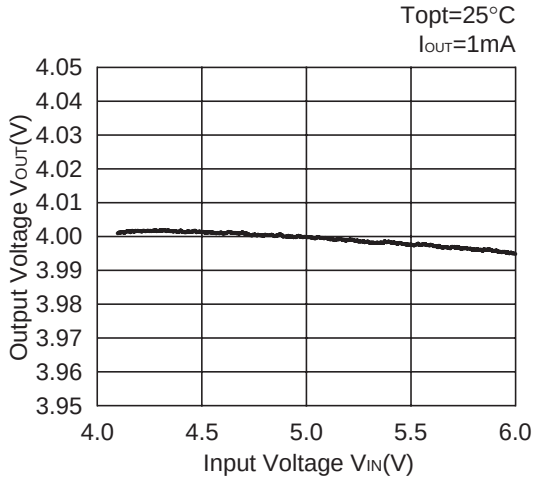
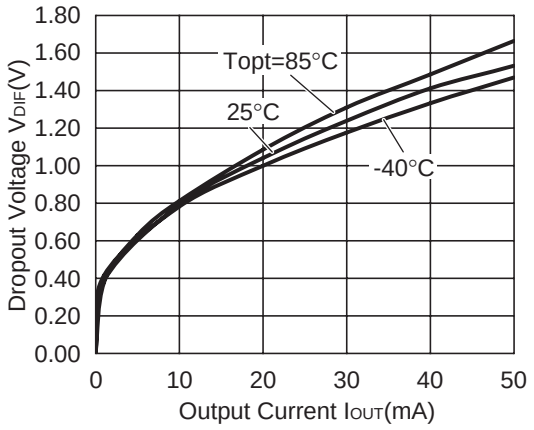


3) Dropout Voltage vs. Output Current

R1100D091C



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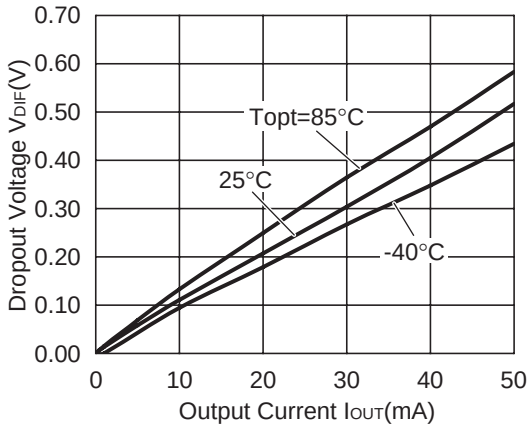

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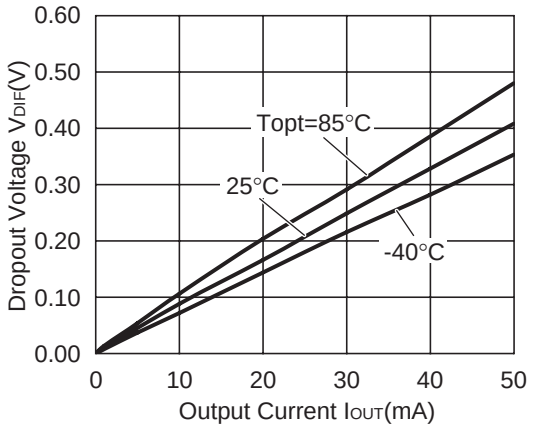
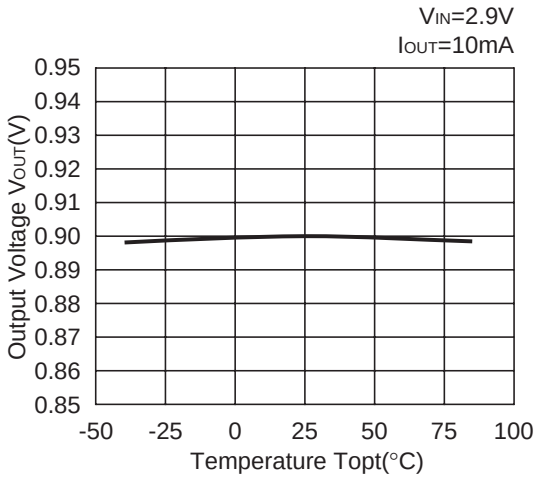


4) Output Voltage vs. Temperature

R1100D091C



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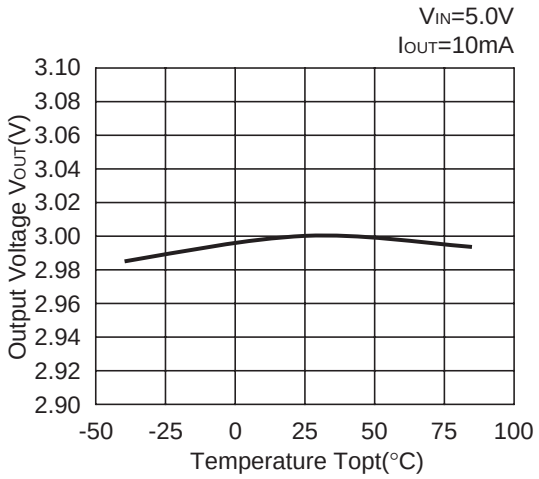

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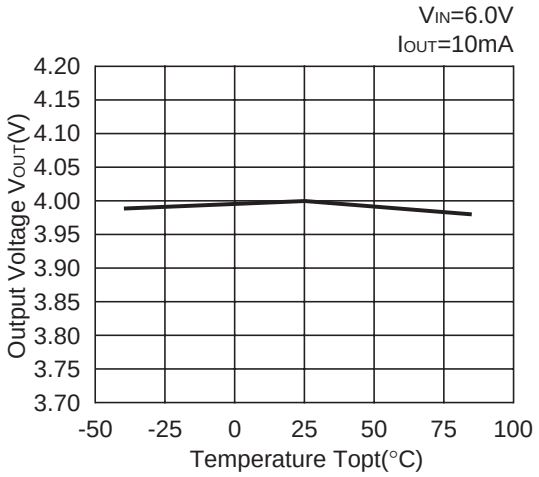
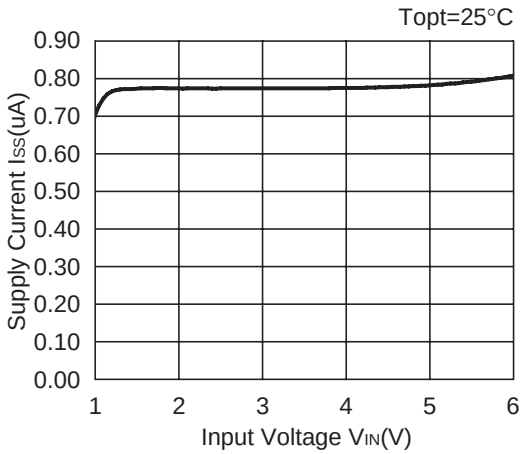


5) Supply Current vs. Input Voltage

R1100D091C



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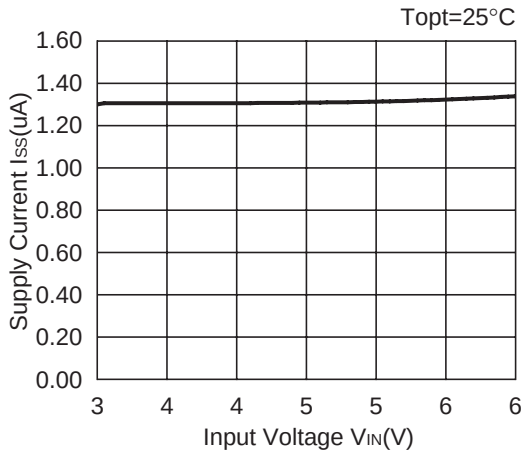

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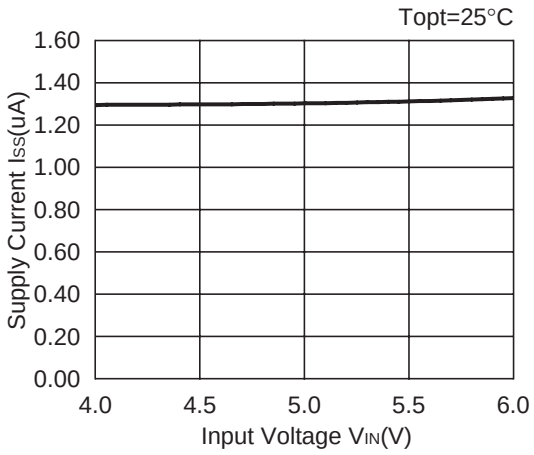
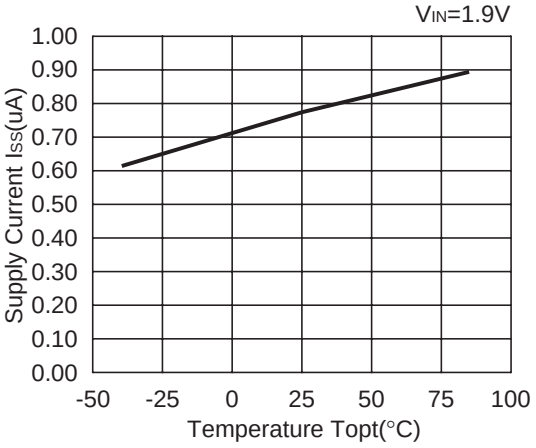


6) Supply Current vs. Temperature

R1100D091C



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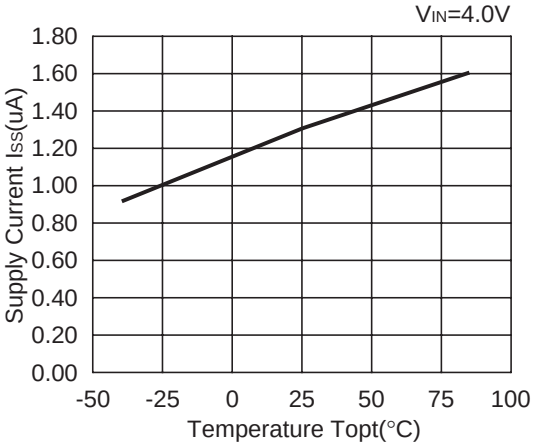

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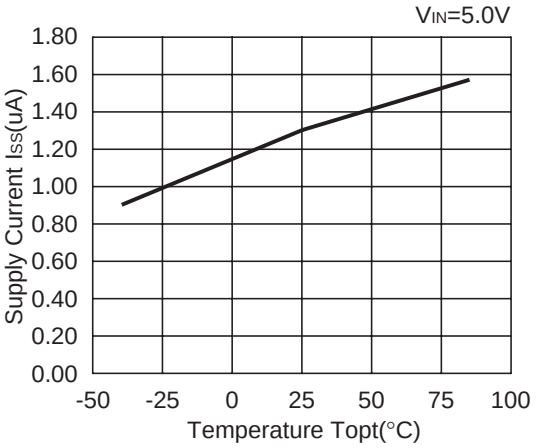
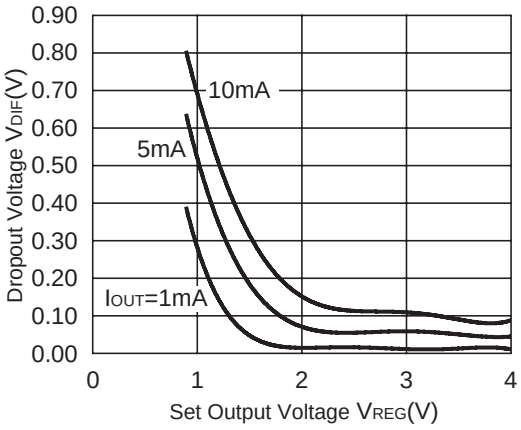


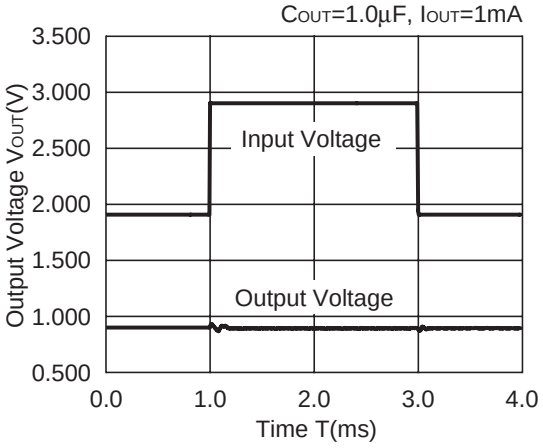
7) Dropout Voltage vs. Set Output Voltage

R1100Dxx1C



8) Line Transient Response

R1100D091C



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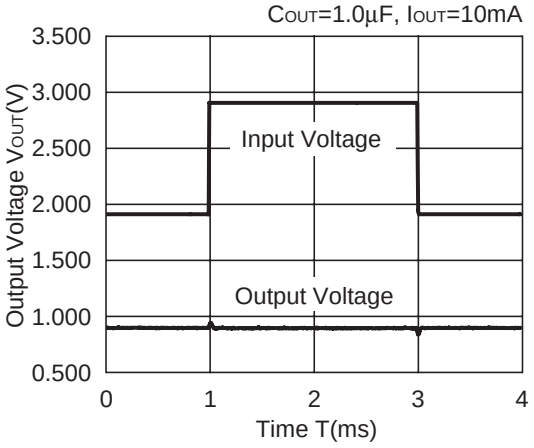

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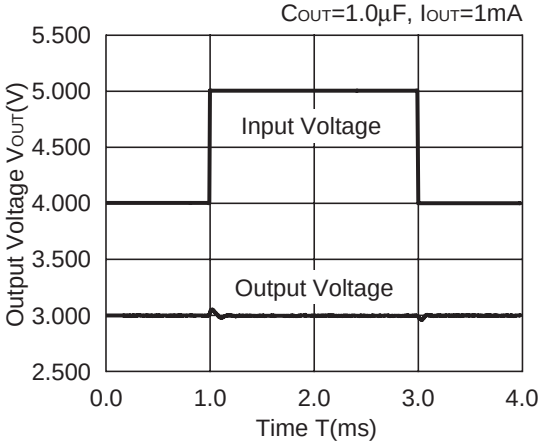

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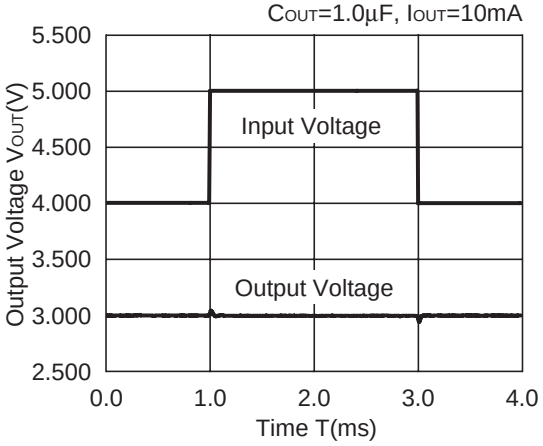
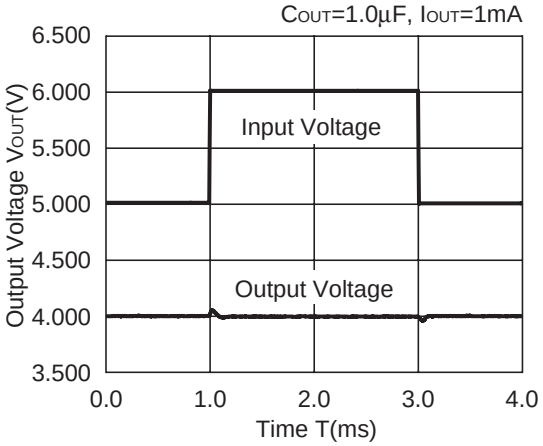


R1100D401C



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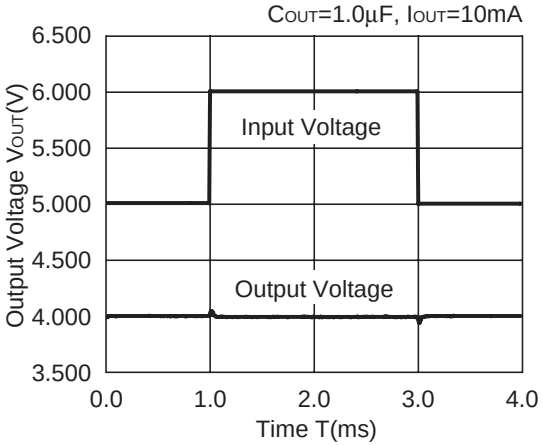
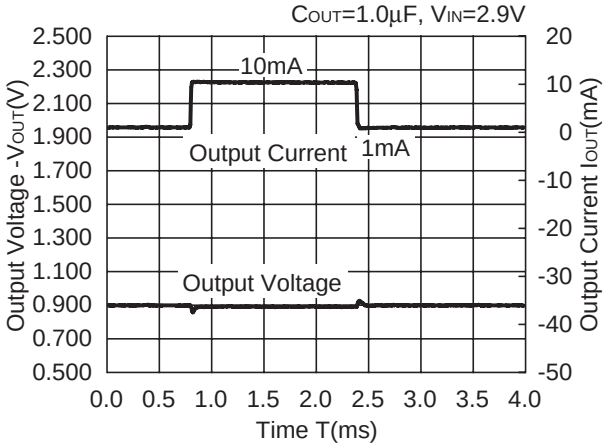
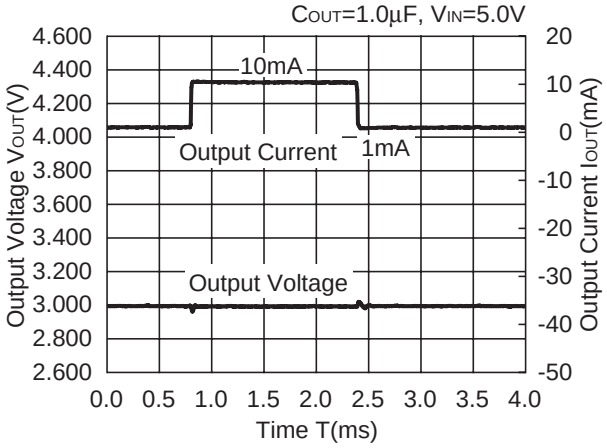


9) Load Transient Response

R1100D091C



R1100D301C



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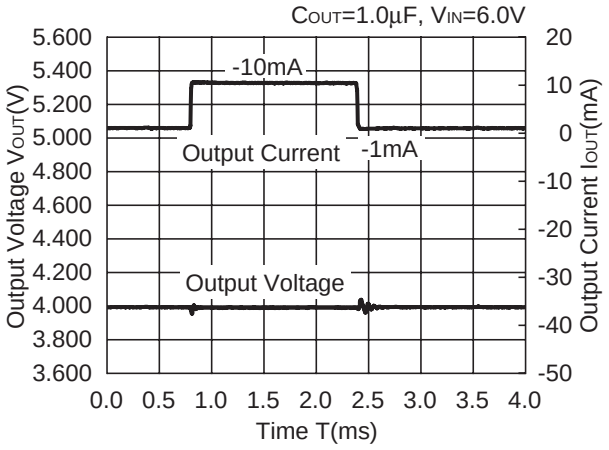
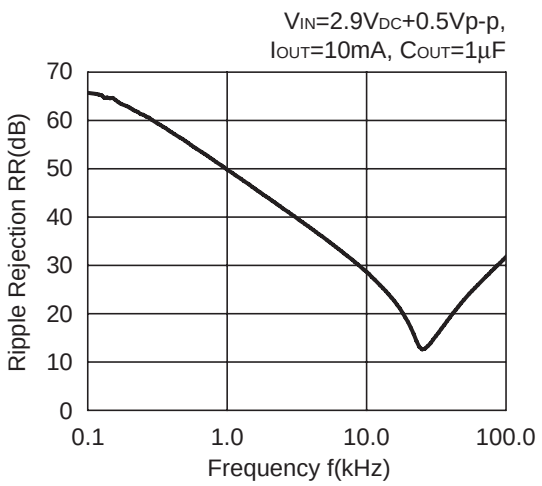


10) Ripple Rejection vs. Frequency

R1100D091C



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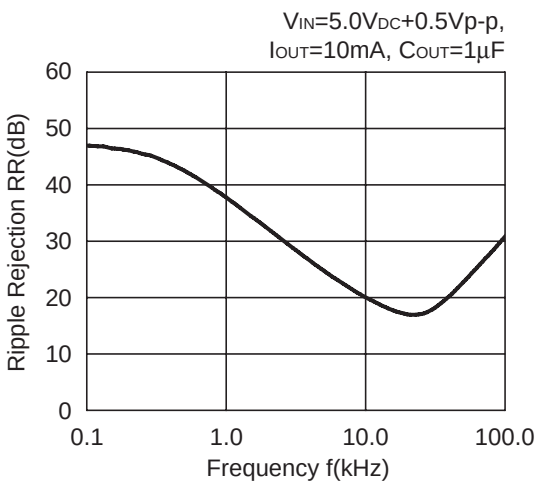

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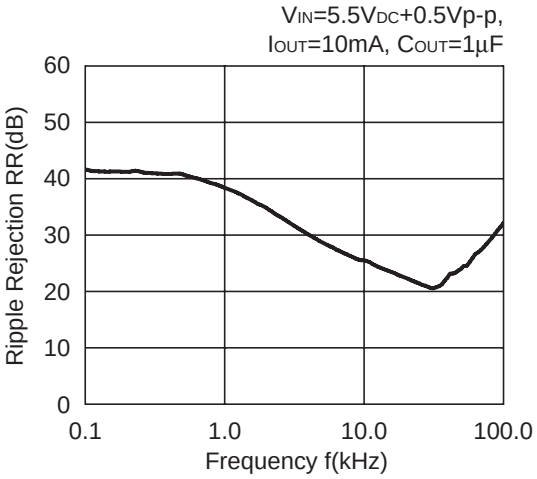
R1100D401C


VIN=5.5VDC+0.5Vp-p,
IOUT=10mA, COUT=1µF
Ripple Rejection RR(dB)
60
50
40
30
20
10
0
0.1
1.0
10.0
100.0
Frequency f(kHz)

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