LOW NOISE 150mA LDO REGULATOR
R1122N SERIES

OUTLINE

The R1122N Series are voltage regulator ICs with high output voltage accuracy, extremely low supply current, low ON-resistance and high ripple rejection by CMOS process. Each of these voltage regulator ICs consists of a voltage reference unit, an error amplifier, resistors, a current limit circuit, and a chip enable circuit. These ICs perform with low dropout voltage and a chip enable function.

The line transient response and load transient response of the R1122N Series are excellent, thus these ICs are very suitable for the power supply for hand-held communication equipment. The output voltage of these ICs is fixed with high accuracy.

Since the package for these ICs are SOT-23-5 (Mini-mold) package, high density mounting of the ICs on boards is possible.

FEATURES

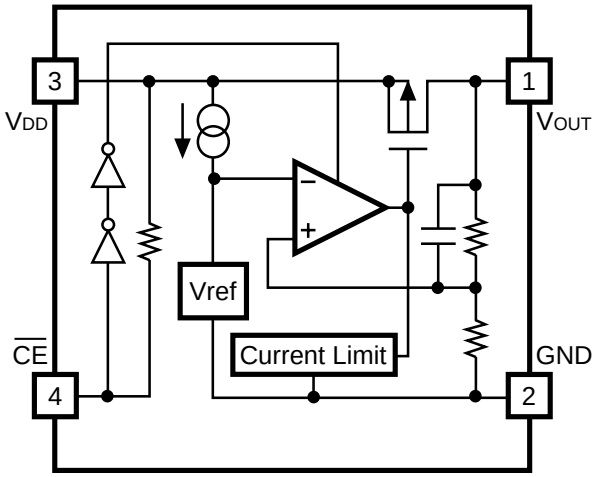
- Ultra-Low Supply Current.....TYP. 100μA
- Standby Mode .....TYP. 0.1μA
- Low Dropout Voltage .....TYP. 0.19V (I_{OUT} = 100mA, 3V Output type)
- High Ripple Rejection.....TYP. 80dB (f = 1kHz)
- Low Temperature-Drift Coefficient of Output Voltage .....TYP. ±100ppm/°C
- Excellent Line Regulation .....TYP. 0.05%/V
- High Accuracy Output Voltage.....±2.0%
- Small Package .....SOT-23-5 (Mini-mold)
- Output Voltage .....Stepwise setting with a step of 0.1V in the range of 1.5V to 5.0V is possible.
- Built-in chip enable circuit (2 Types; A: active “L”, B: active “H”)
- Built-in Fold-back protection circuit .....Short Current Typ. 30mA
- Pinout .....Similar to the TK112, TK111
- Ceramic Capacitors are Recommendable to be used with this IC.

APPLICATIONS

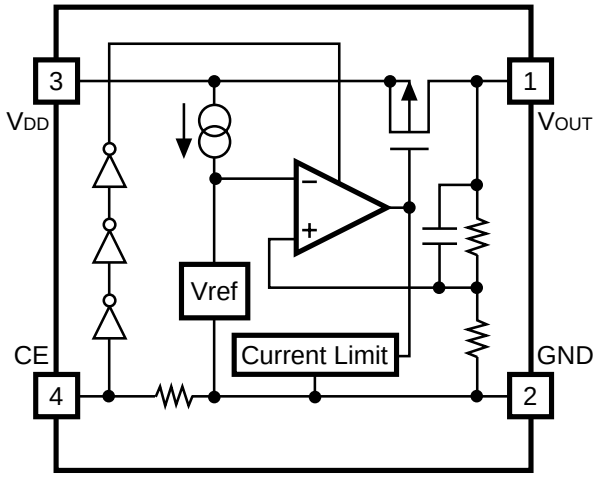
- Power source for cellular phones such as GSM, CDMA, PCS and so forth.
- Power source for domestic appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.

■ BLOCK DIAGRAM

R1122NXX1A



R1122NXX1B



■ SELECTION GUIDE

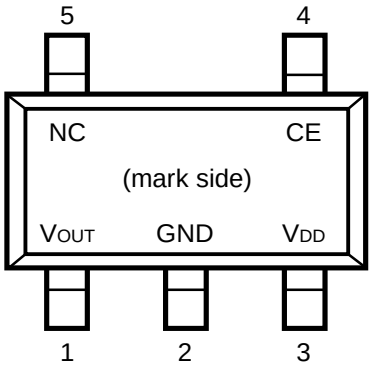
The output voltage, the active type, the packing type, and the taping type for the ICs can be selected at the user's request. The selection can be made by designating the part number as shown below :

R1122NXX1X-XX ←Part Number
↑ ↑ ↑
a b c

Code	Contents
a	Setting Output Voltage (V_{OUT}) : Stepwise setting with a step of 0.1V in the range of 1.5V to 5.0V is possible.
b	Designation of Active Type : A : active “L” type B : active “H” type
c	Designation of Taping Type : Ex. TR, TL (refer to Taping Specifications; TR type is the standard direction.)

■ PIN CONFIGURATION

SOT-23-5



■ PIN DESCRIPTION

Pin No.	Symbol	Description
1	V_{OUT}	Output pin
2	GND	Ground Pin
3	V_{DD}	Input Pin
4	$\overline{CE}$ or CE	Chip Enable Pin
5	NC	No Connection

■ ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	7.0	V
V_{CE}	Input Voltage (CE or $\overline{CE}$ Pin)	-0.3 ~ V_{IN}+0.3	V
V_{OUT}	Output Voltage	-0.3~ V_{IN}+0.3	V
I_{OUT}	Output Current	200	mA
P_D	Power Dissipation	250	mW
Topt	Operating Temperature Range	-40 ~ 85	°C
Tstg	Storage Temperature Range	-55 ~ 125	°C

■ ELECTRICAL CHARACTERISTICS

● R1122NXX1A

Topt = 25°C

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit
V_{OUT}	Output Voltage	V_{IN} = Set V_{OUT}+1V 1mA ≤ I_{OUT} ≤ 30mA	V_{OUT} ×0.98		V_{OUT} ×1.02	V
I_{OUT}	Output Current	V_{IN} = Set V_{OUT}+1V When V_{OUT} = Set V_{OUT}-0.1V	150			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN} = Set V_{OUT}+1V 1mA ≤ I_{OUT} ≤ 80mA		12	40	mV
V_{DIF}	Dropout Voltage	refer to the ELECTICAL CHARACTERISTICS by OUTPUT VOLTAGE				
I_{SS}	Supply Current	V_{IN} = Set V_{OUT}+1V		100	170	μA
Istandby	Supply Current (Standby)	V_{IN} = V_{CE} = Set V_{OUT}+1V		0.1	1.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	Set V_{OUT}+0.5V ≤ V_{IN} ≤ 8V I_{OUT} = 30mA		0.05	0.20	%/V
RR	Ripple Rejection	f = 1KHz, Ripple 0.5Vp-p V_{IN} = Set V_{OUT}+1V		80		dB
V_{IN}	Input Voltage		2.0		6.0	V
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	I_{OUT} = 30mA -40°C ≤ Topt ≤ 85°C		±100		ppm /°C
Ilim	Short Current Limit	V_{OUT} = 0V		30		mA
R_{PU}	$\overline{CE}$ Pull-up Resistance		2.5	5	10	MΩ
V_{CEH}	$\overline{CE}$ Input Voltage "H"		1.5		V_{IN}	V
V_{CEL}	$\overline{CE}$ Input Voltage "L"		0		0.25	V
en	Output Noise	BW = 10Hz ~ 100kHz		30		μVrms

● R1122NXX1B

Topt=25°C

Symbol	Item	Conditions	MIN.	TYP.	MAX.	Unit
V_{OUT}	Output Voltage	V_{IN} = Set V_{OUT}+1V 1mA ≤ I_{OUT} ≤ 30mA	V_{OUT} ×0.98		V_{OUT} ×1.02	V
I_{OUT}	Output Current	V_{IN} = Set V_{OUT}+1V When V_{OUT} = Set V_{OUT}-0.1V	150			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN} = Set V_{OUT}+1V 1mA ≤ I_{OUT} ≤ 80mA		12	40	mV
V_{DIF}	Dropout Voltage	refer to the ELECTICAL CHARACTERISTICS by OUTPUT VOLTAGE				
I_{SS}	Supply Current	V_{IN} = Set V_{OUT}+1V		100	170	μA
Istandby	Supply Current (Standby)	V_{IN} = Set V_{OUT}+1V V_{CE} = GND		0.1	1.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	Set V_{OUT}+0.5V ≤ V_{IN} ≤ 8V I_{OUT} = 30mA		0.05	0.20	%/V
RR	Ripple Rejection	f = 1KHz, Ripple 0.5Vp-p V_{IN} = Set V_{OUT}+1V		80		dB
V_{IN}	Input Voltage		2.0		6.0	V
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	I_{OUT} = 30mA -40°C ≤ Topt ≤ 85°C		±100		ppm /°C
Ilim	Short Current Limit	V_{OUT} = 0V		30		mA
R_{PD}	CE Pull-down Resistance		2.5	5	10	MΩ
V_{CEH}	CE Input Voltage "H"		1.5		V_{IN}	V
V_{CEL}	CE Input Voltage "L"		0		0.25	V
en	Output Noise	BW = 10Hz ~ 100kHz		30		μVrms

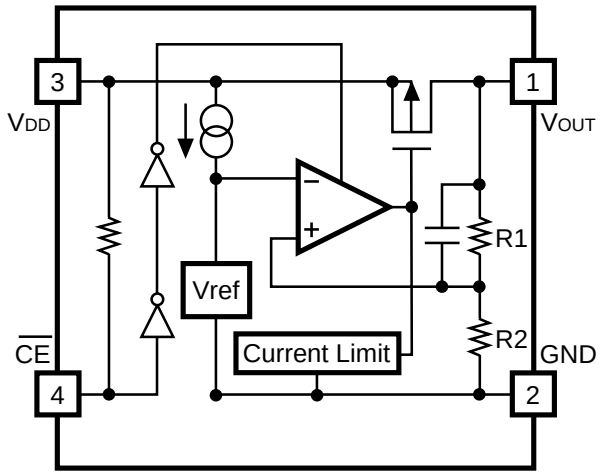
● ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

Topt = 25°C

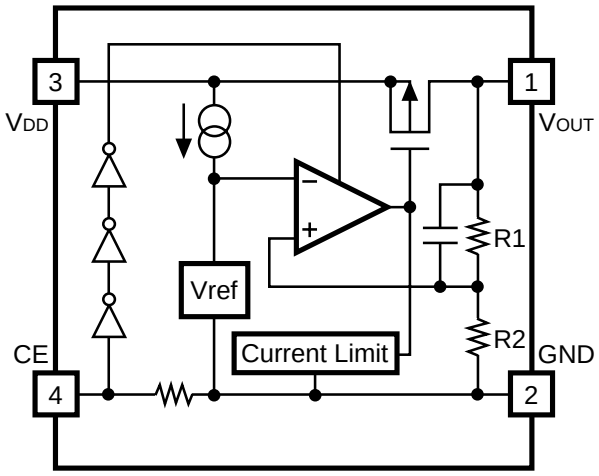
Output Voltage V_{OUT} (V)	Dropout Voltage V_{DIF} (V)		
	Conditions	TYP.	MAX.
1.5 ≤ V_{OUT} ≤ 1.6	I_{OUT} = 100mA	0.32	0.55
1.7 ≤ V_{OUT} ≤ 1.8		0.28	0.47
1.9 ≤ V_{OUT} ≤ 2.3		0.25	0.35
2.4 ≤ V_{OUT} ≤ 2.7		0.20	0.29
2.8 ≤ V_{OUT} ≤ 5.0		0.19	0.26

■ OPERATION

R1122XX1A



R1122XX1B



In these ICs, fluctuation of Output Voltage, V_{OUT} is detected by Feed-back Registers, R1 and R2, and the result is compared with a reference voltage by Error Amplifier, so that a constant voltage is output.

A current limit circuit for protection at short mode, and a chip enable circuit are included.

■ TEST CIRCUITS

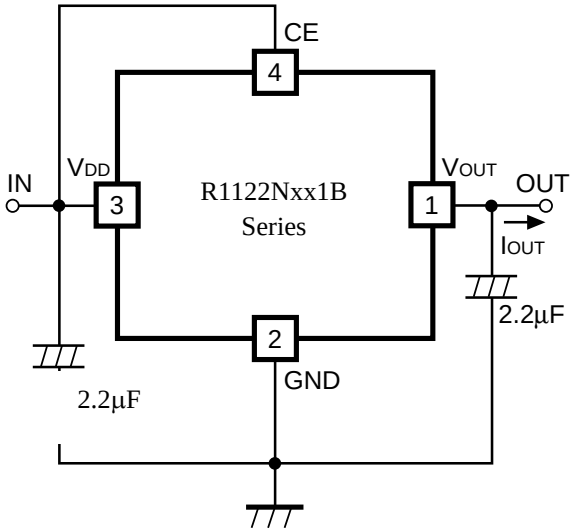


Fig.1 Standard test Circuit

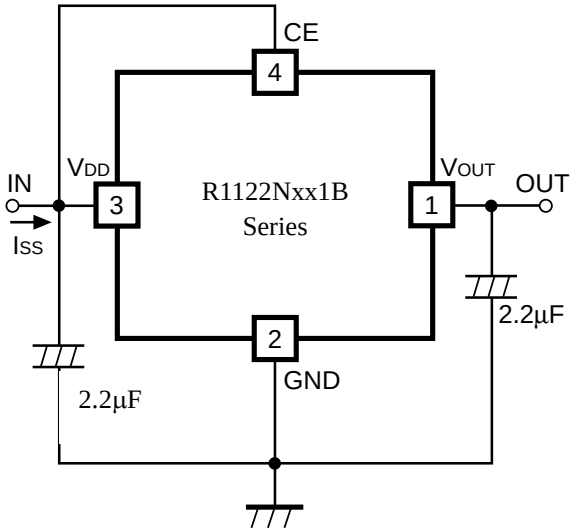


Fig.2 Supply Current Test Circuit

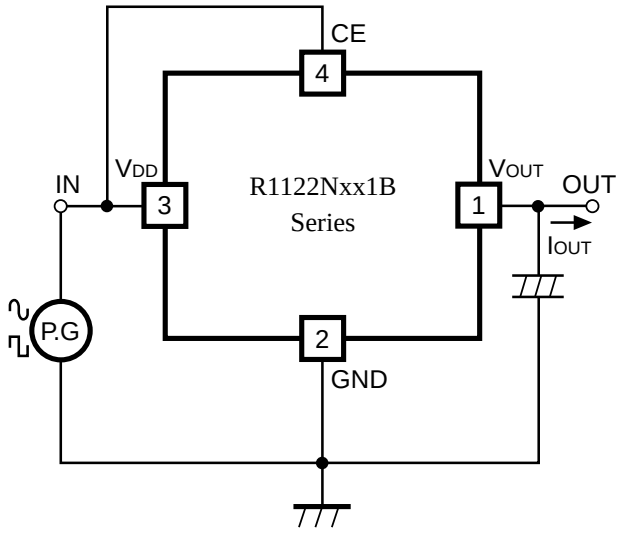


Fig.3 Ripple Rejection, Line Transient Response Test Circuit

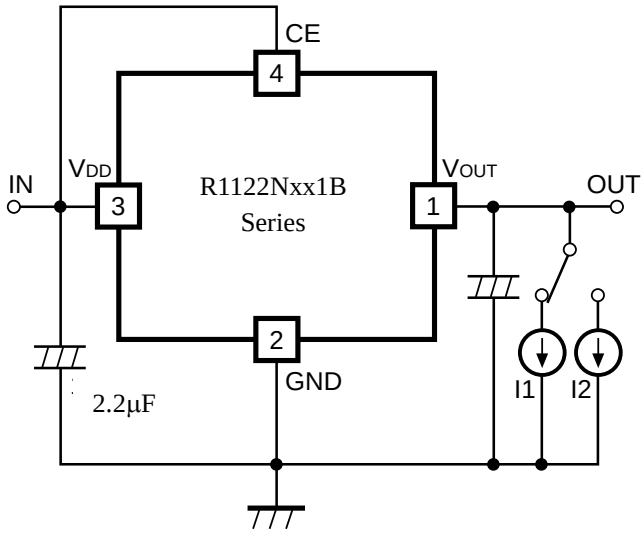


Fig.4 Load Transient Response Test Circuit

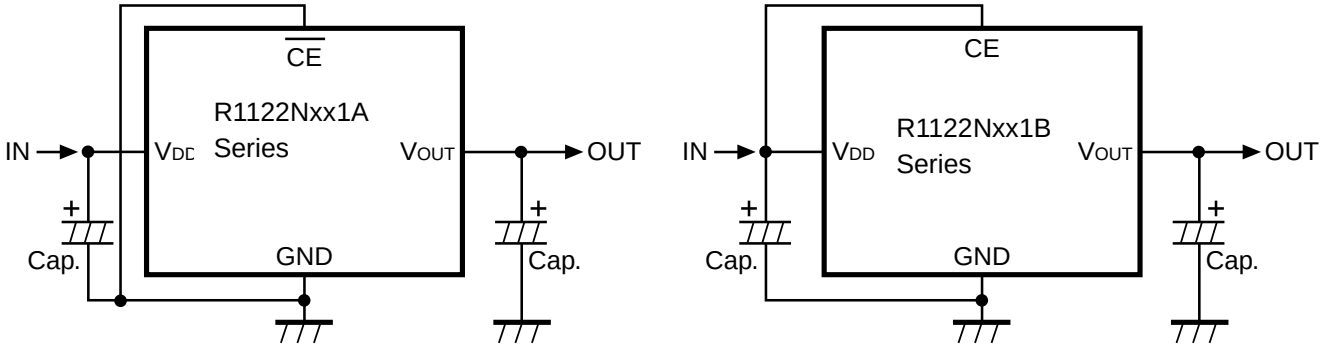
■ TECHNICAL NOTES

When using these ICs, consider the following points:

Phase Compensation
In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, be sure to use a capacitor COUT with good frequency characteristics and ESR (Equivalent Series Resistance).
(note: When the additional ceramic capacitors are connected to the Output Pin with Output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)
Recommended Capacitors; GRM40X5R225K6.3 (Murata)
GRM40-034X5R335K6.3 (Murata)
GRM40-034X5R475K6.3 (Murata)

PCB Layout
Make VDD and GND line sufficient. When the impedance of these is high, it would be a cause of picking up the noise or unstable operation. Connect a capacitor with a capacitance of 2.2μF or more between VDD and GND pin as close as possible. Set external components, especially output capacitor as close as possible to the ICs and make wiring shortest.

■ TYPICAL APPLICATION

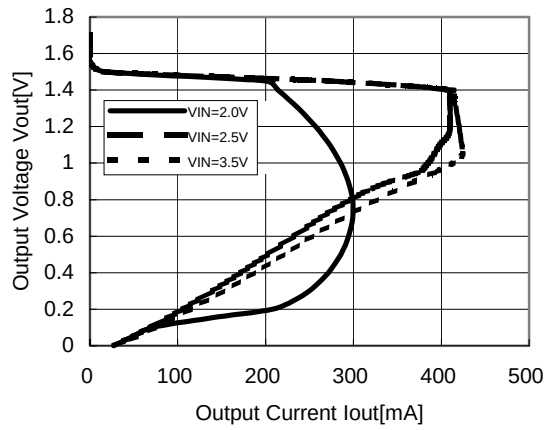


(External Components)
Output Capacitor; Ceramic 2.2μF(Set Output Voltage in the range from 2.5 to 5.0V)
Ceramic 4.7μF (Set Output Voltage in the range from 1.5 to 2.5V)
Input Capacitor; Ceramic 2.2μF

■ TYPICAL CHARACTERISTICS

1) Output Voltage vs. Output Current

R11x2N151B



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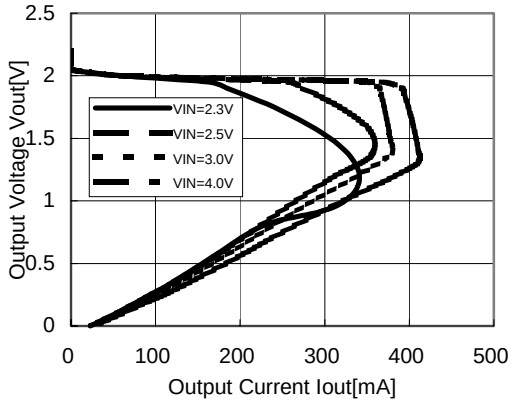

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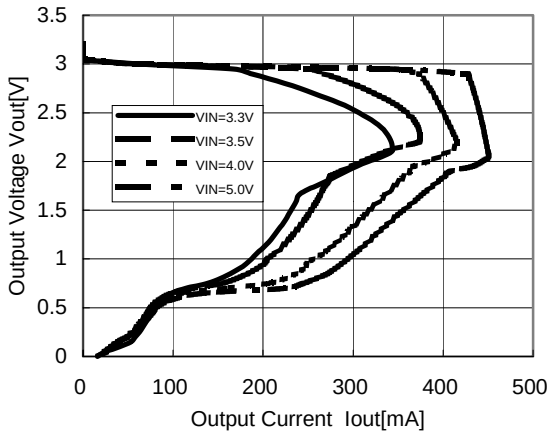

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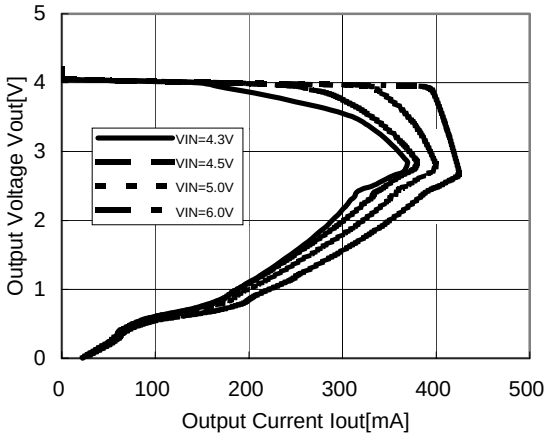
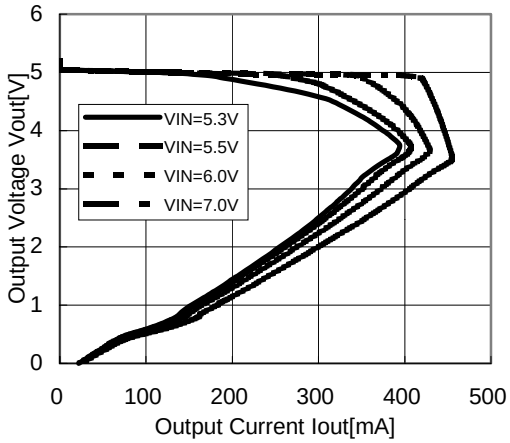
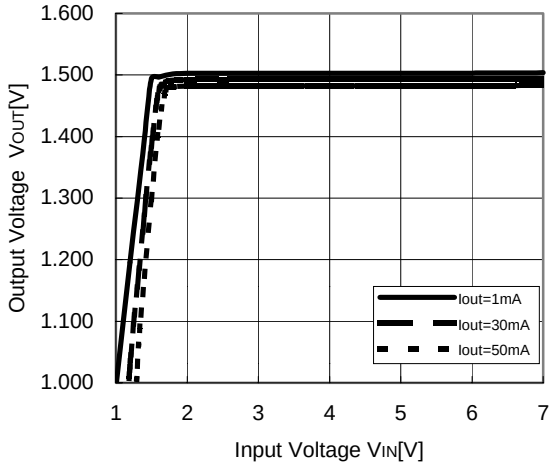


R11x2N501B



2) Output Voltage vs. Input Voltage

R11x2N151B



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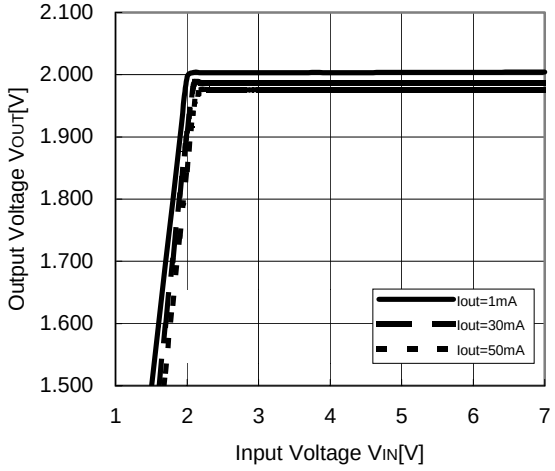

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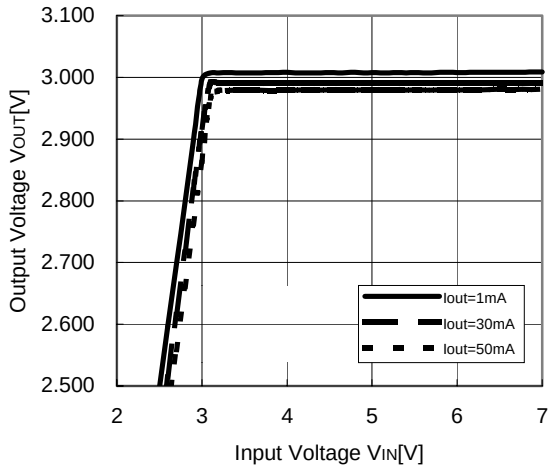

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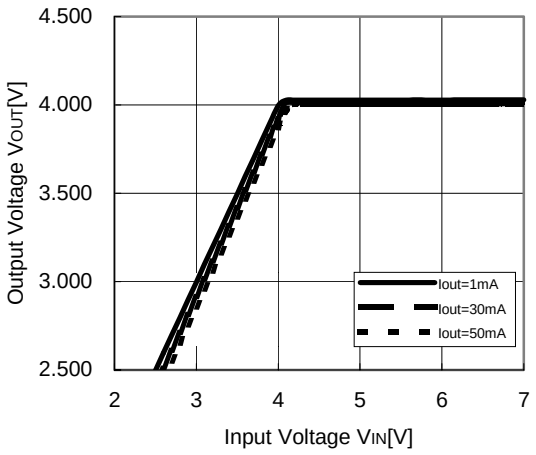

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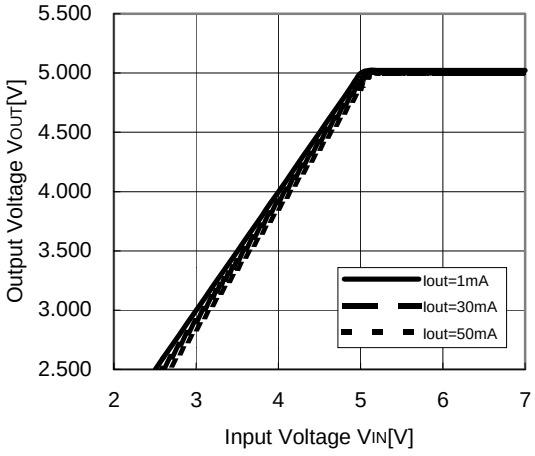
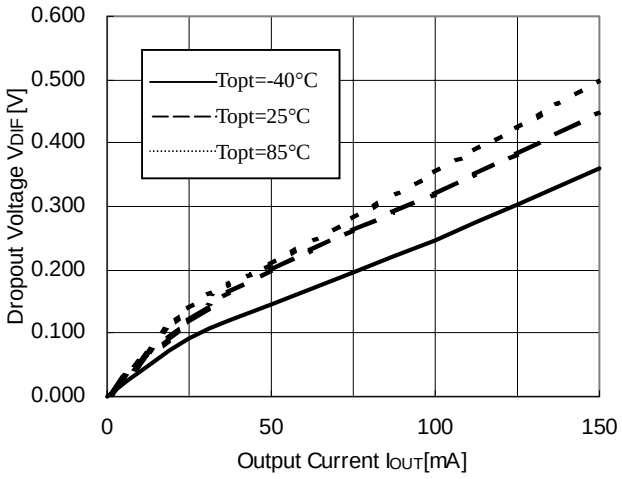


3) Dropout Voltage vs. Output Current

R11x2N151B



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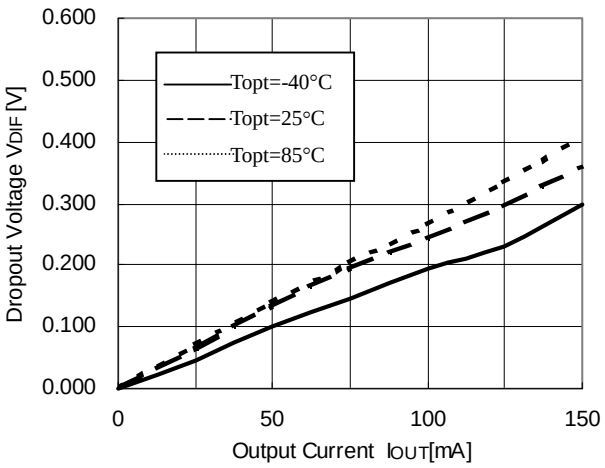

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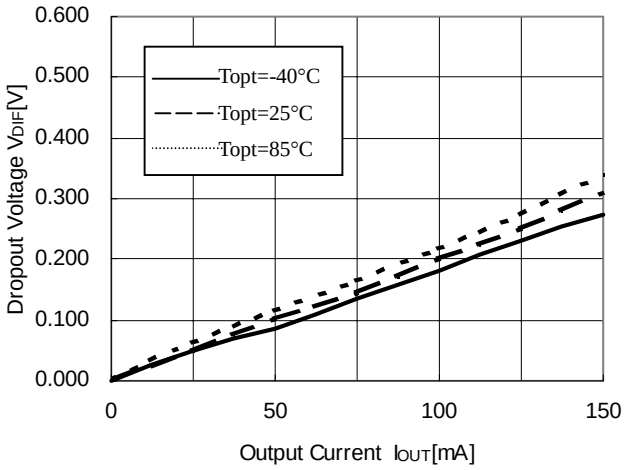

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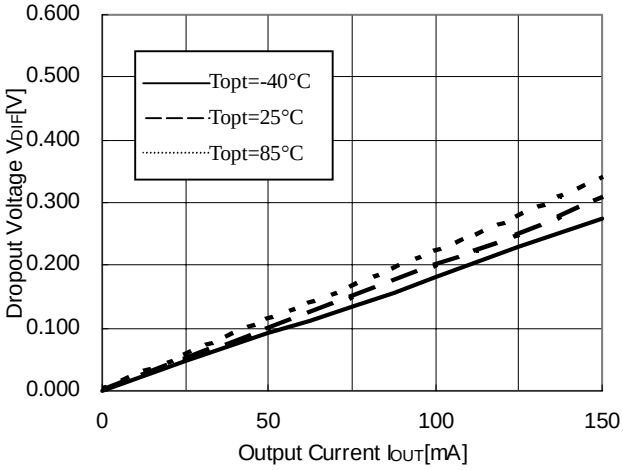

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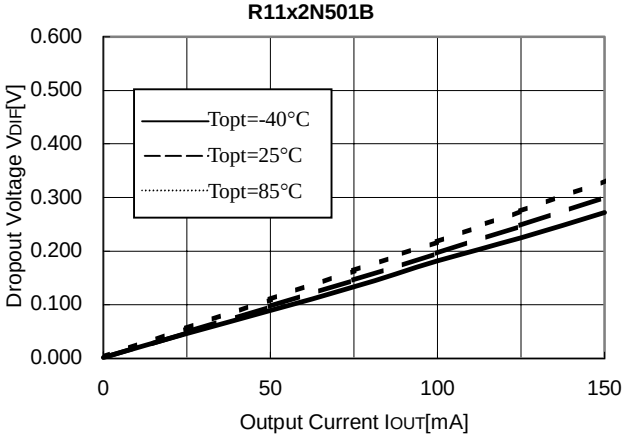
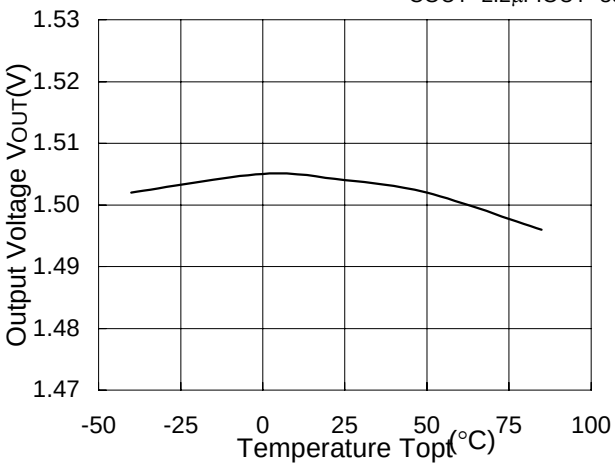
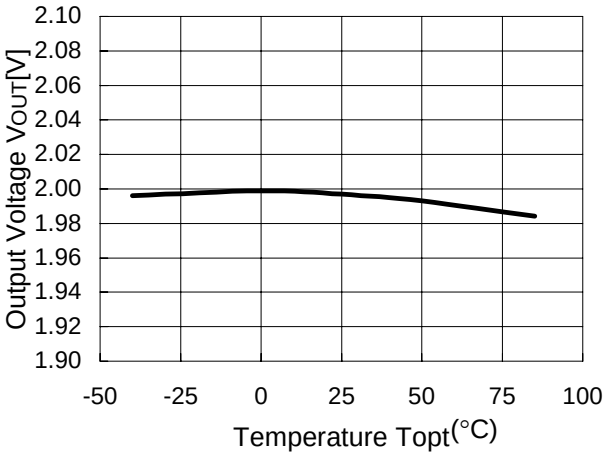


4) Output Voltage vs. Temperature

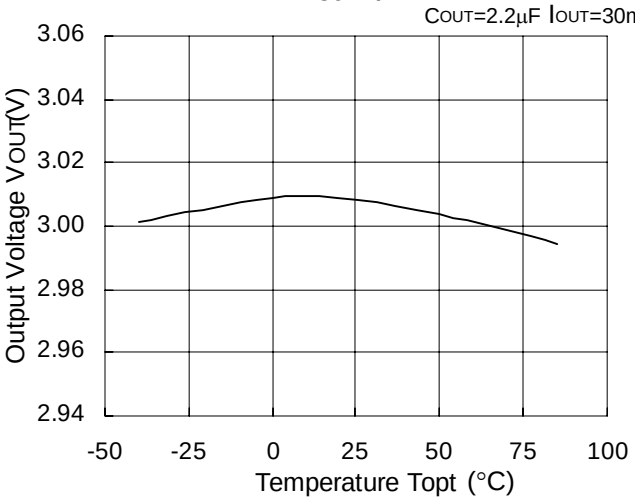
R11x2N151A/B VIN=2.5V CIN=1µF COUT=2.2µFIOUT=30mA



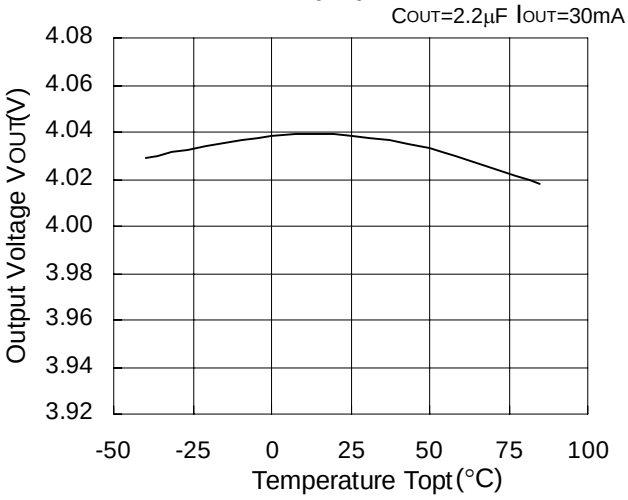
R11x2N201B VIN=3.0V CIN=1µF COUT=2.2µF IOUT=30mA



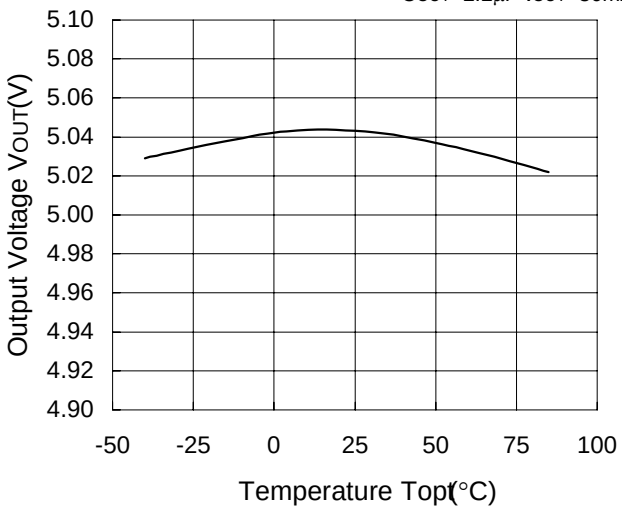
R11x2N301A/B VIN=4.0V CIN=1µF COUT=2.2µF IOUT=30mA



R11x2N401A/B VIN=5.0V CIN=1µF COUT=2.2µF IOUT=30mA

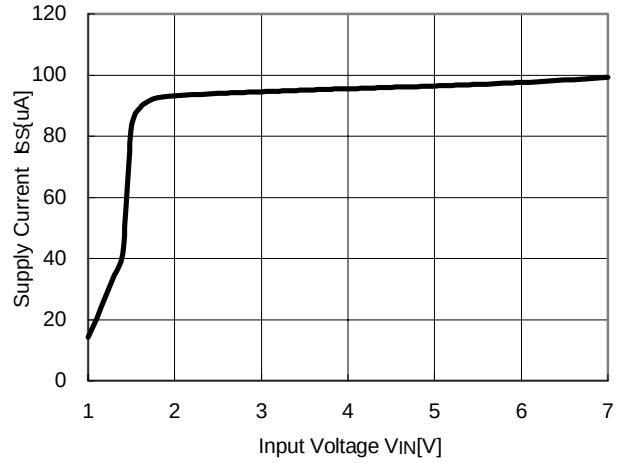


R11x2N501A/B VIN=6.0V CIN=1µF COUT=2.2µF IOUT=30mA



5) Supply Current vs. Input Voltage

R11x2N151B



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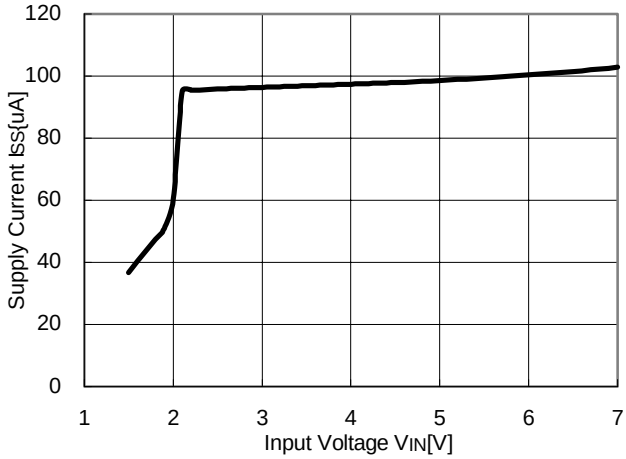

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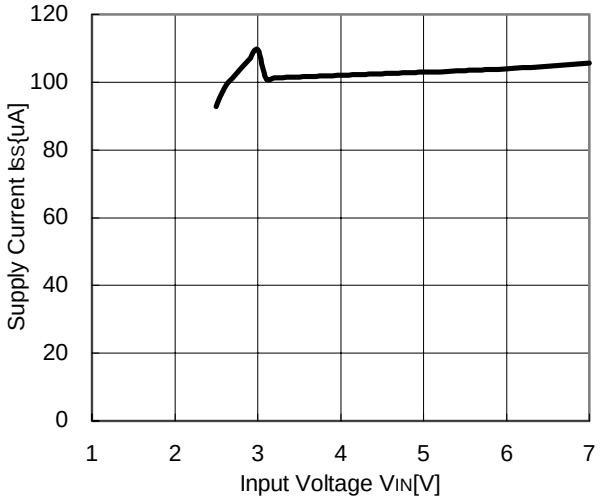

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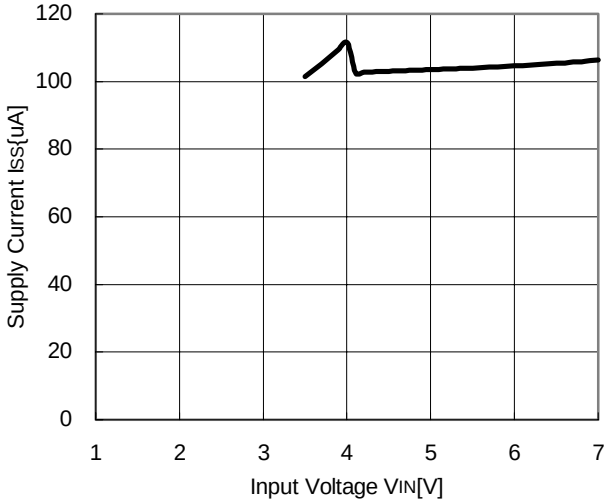

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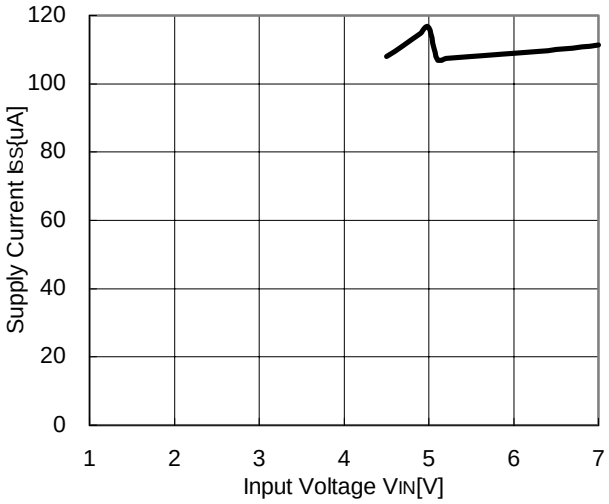
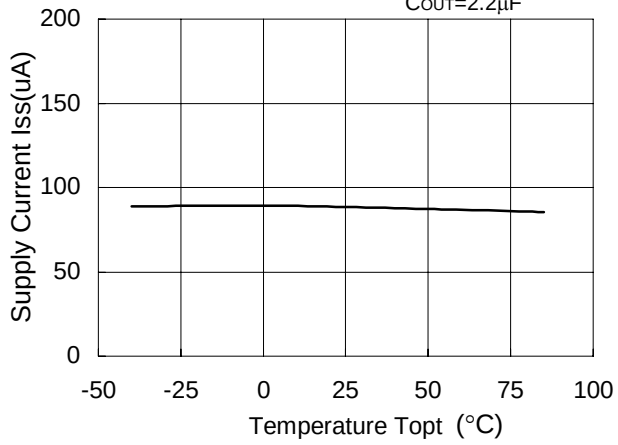
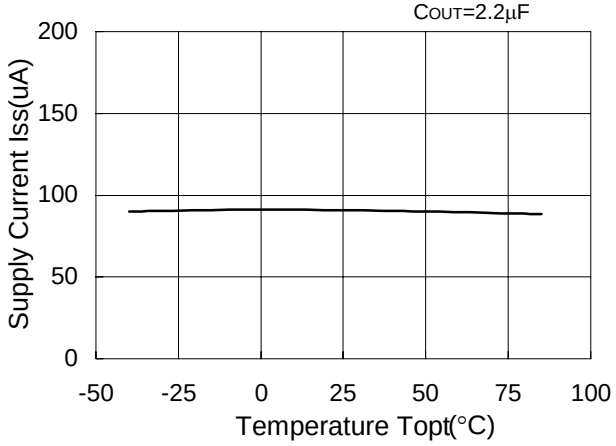


6) Supply Current vs. Temperature

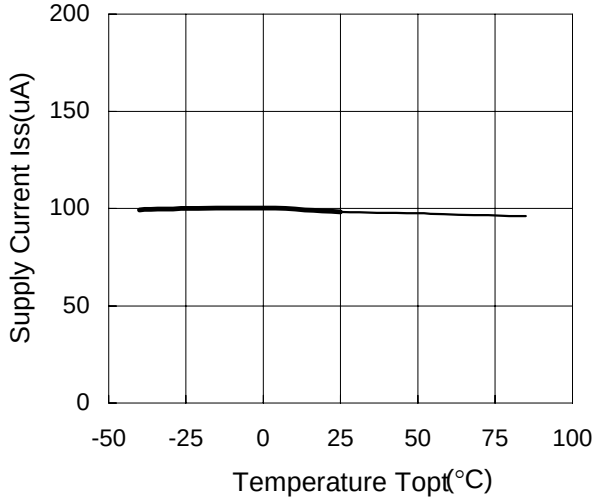
R11x2N151A/B V_{IN}=2.5V C_{IN}=1μF C_{OUT}=2.2μF



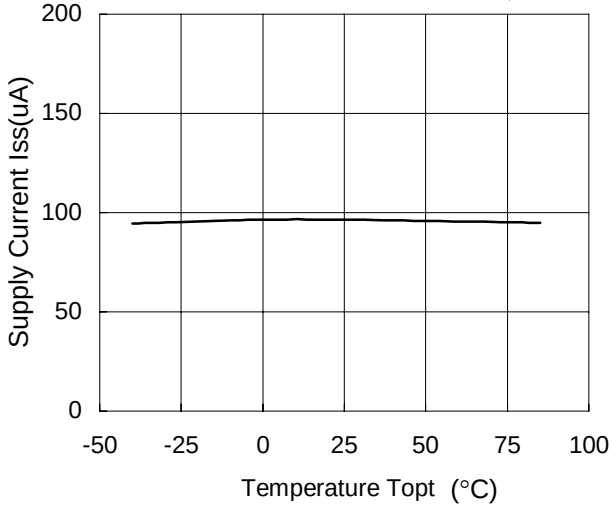
R11x2N201A/B V_{IN}=3.0V C_{IN}=1μF C_{OUT}=2.2μF



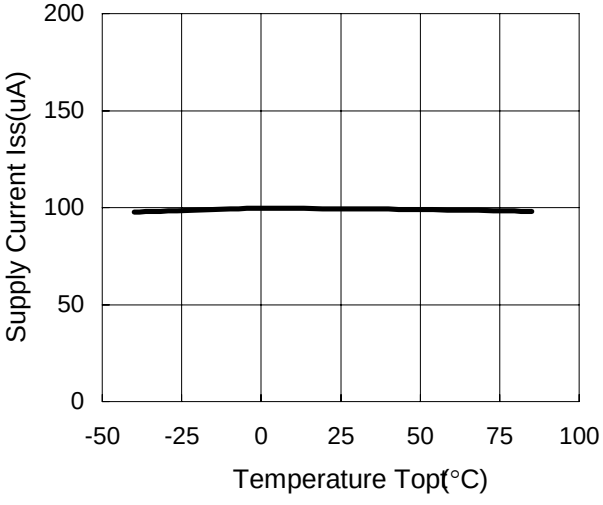
R11x2N301A/B V_{IN}=4.0V C_{IN}=1μF C_{OUT}=2.2μF



R11x2N401A/B V_{IN}=5.0V C_{IN}=1μF C_{OUT}=2.2μF

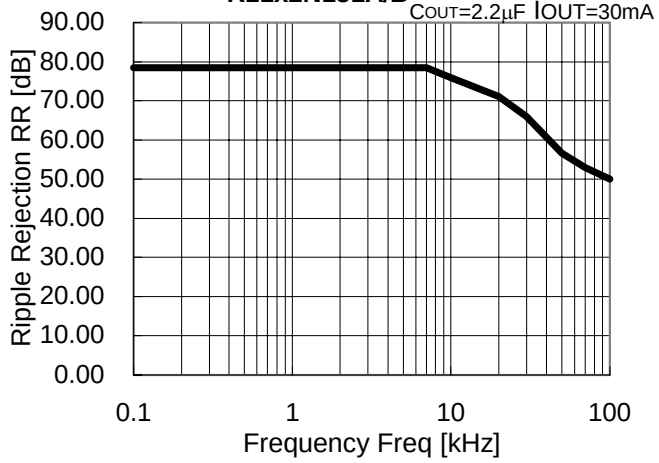


R11x2N501A/B V_{IN}=6.0V C_{IN}=1μF C_{OUT}=2.2μF

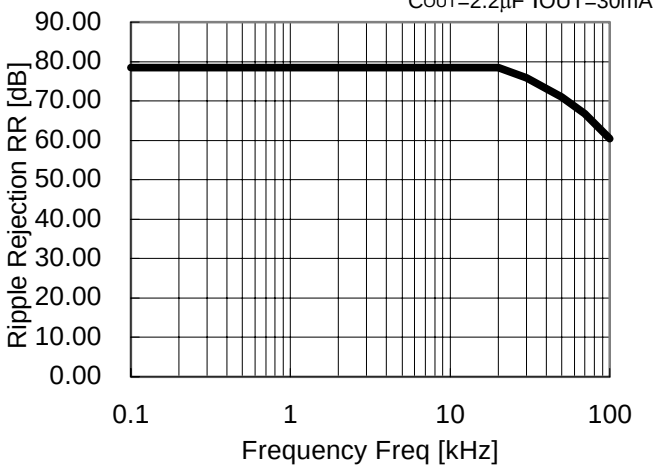


7) Ripple Rejection vs. Frequency

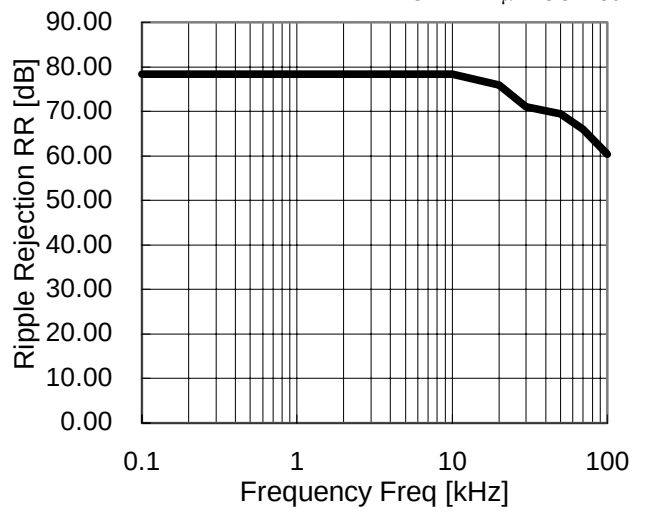
R11x2N151A/B V_{IN}=2.5V+0.5Vp-p C_{OUT}=2.2µF I_{OUT}=30mA



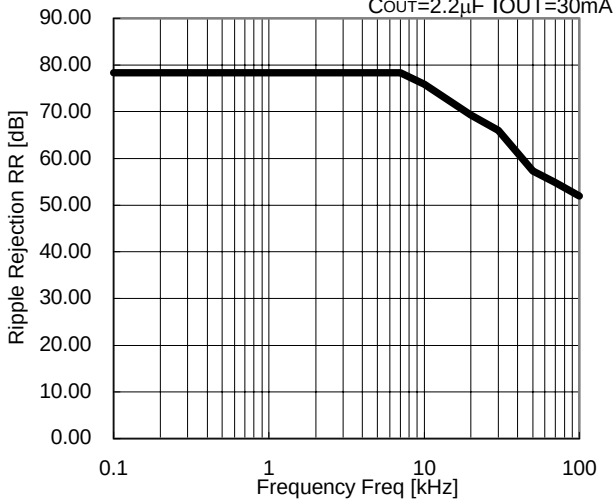
R11x2N201A/B V_{IN}=3.0V+0.5Vp-p C_{OUT}=2.2µF I_{OUT}=30mA



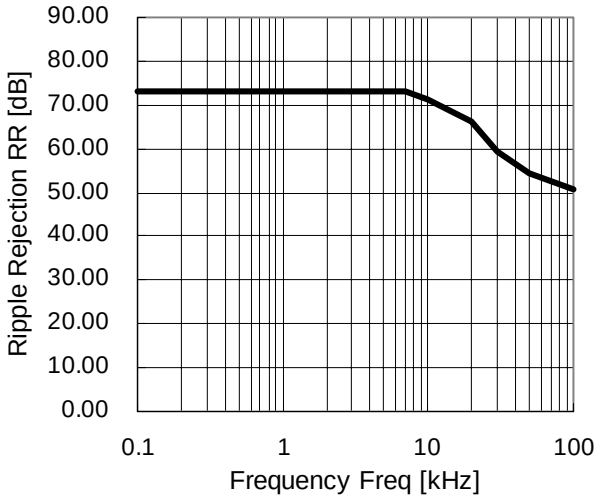
R11x2N301A/B V_{IN}=4.0V+0.5Vp-p C_{OUT}=2.2µF I_{OUT}=30mA



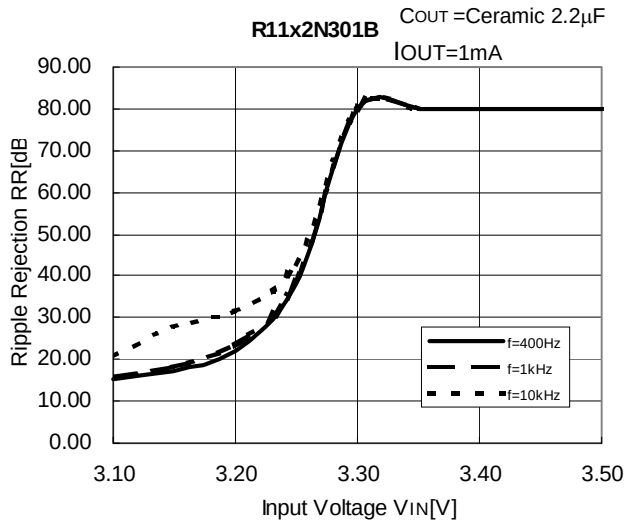
R11x2N401A/B V_{IN}=5.0V+0.5Vp-p C_{OUT}=2.2µF I_{OUT}=30mA

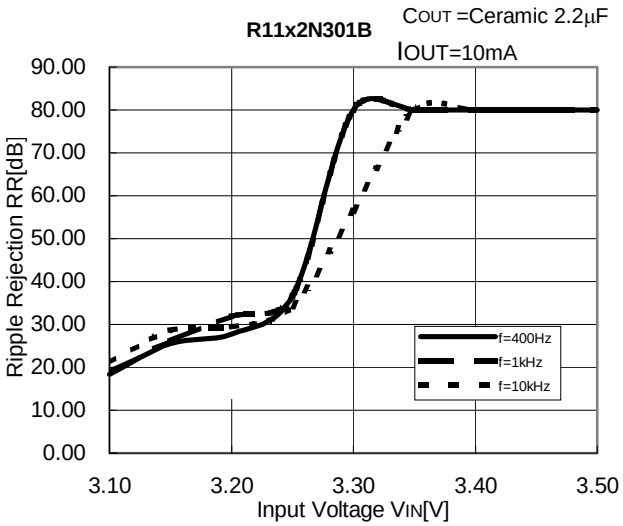


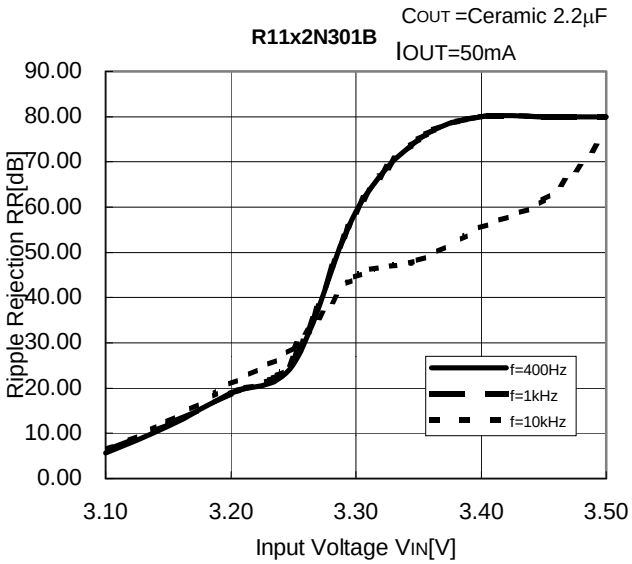
R11x2N501A/B V_{IN}=6.0V+0.5Vp-p C_{OUT}=2.2µF I_{OUT}=30mA



8) Ripple Rejection vs. Input Voltage (DC bias)



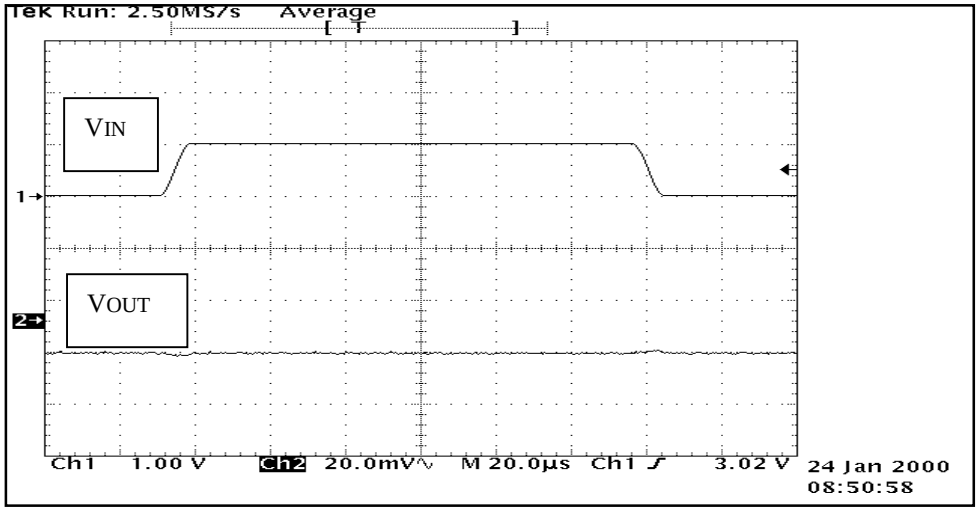




9) Input Transient Response

R11X2N151B

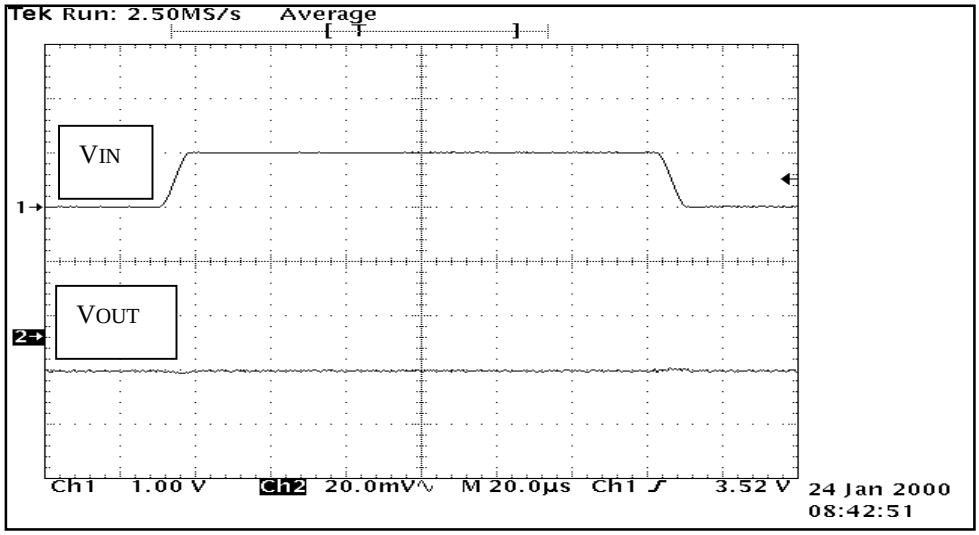
Topt=25°C



VIN=2.5V<-->3.5V
IOUT=30mA
CIN =none
COUT=2.2µF
tr/tf=5µs

R11X2N201B

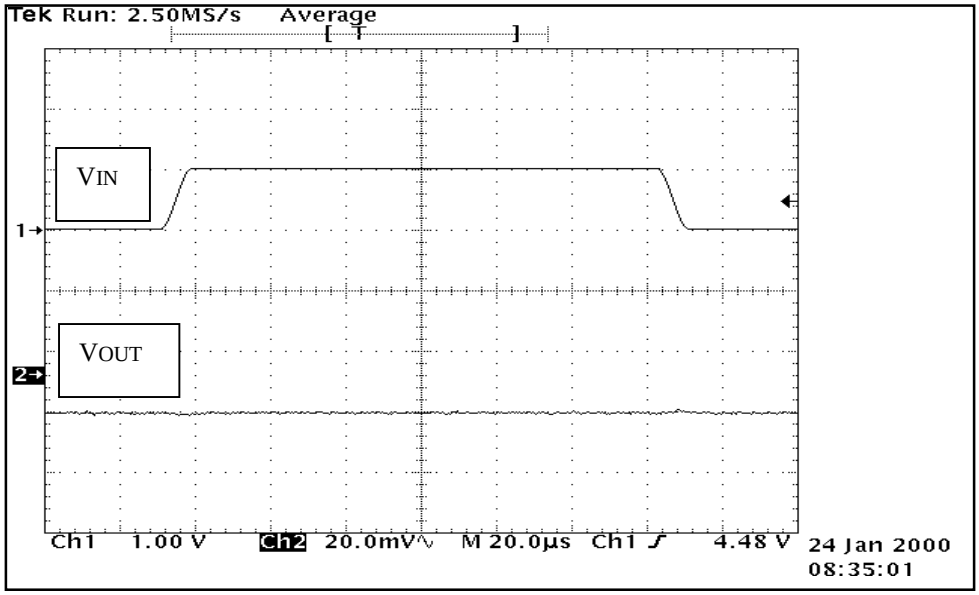
Topt=25°C



VIN=3.0V<-->4.0V
IOUT=30mA
CIN =none
COUT=2.2µF
tr/tf=5µs

R11X2N301B

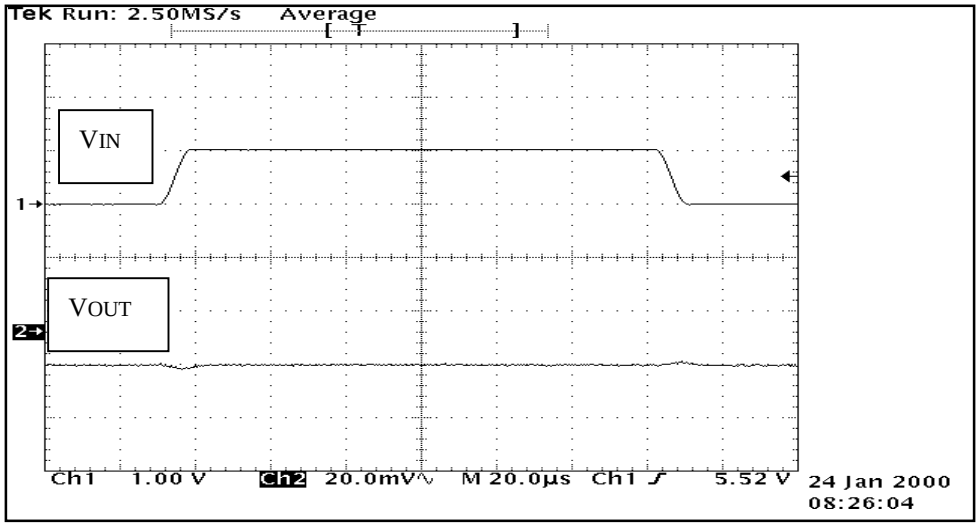
Topt=25°C



VIN=4.0V<-->5.0V
IOUT=30mA
CIN =none
COUT=2.2µF
tr/tf=5µs

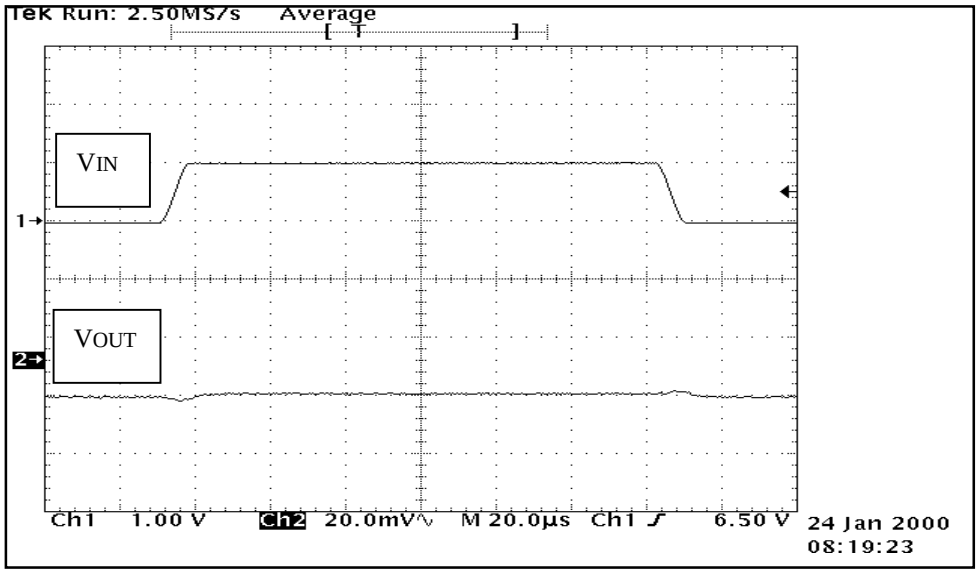
R11X2N401B

Topt=25°C



VIN=5.0V<-->6.0V
IOUT=30mA
CIN =none
COUT=2.2µF
tr/tf=5µs

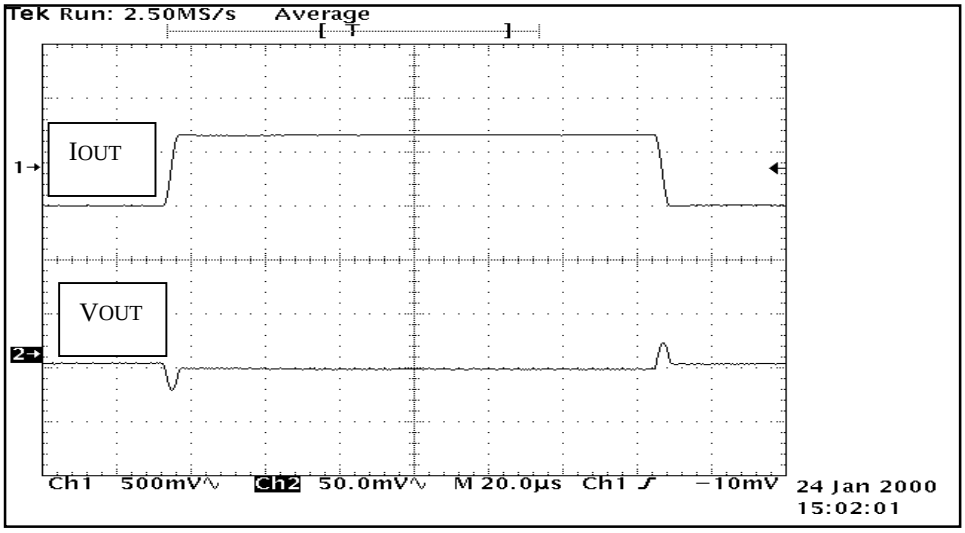
R11X2N501B Topt=25°C



VIN=6.0V<-->7.0V
IOUT=30mA
CIN =none
COUT=2.2µF
tr/tf=5µs

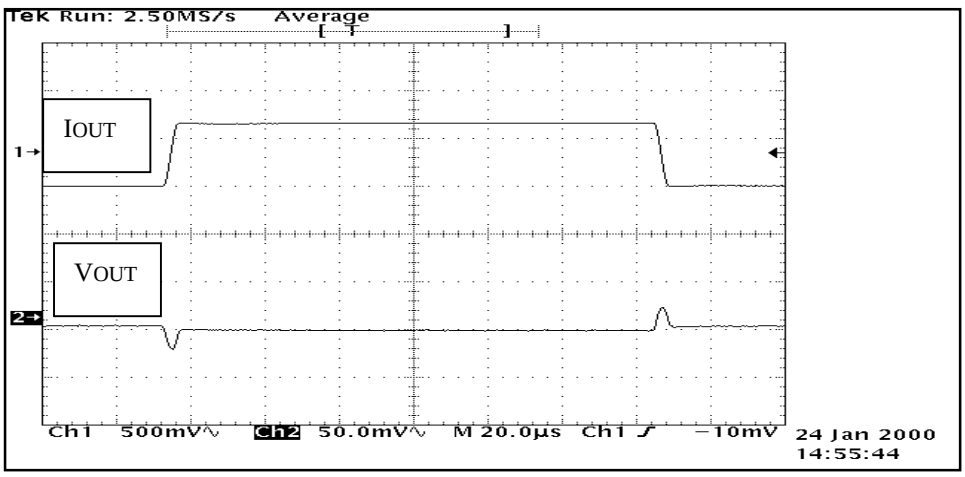
10) Load Transient Response

R11X2N151B Topt=25°C



IOUT=50mA<-->100mA
VIN=2.5V
CIN=2.2µF
COUT=2.2µF
tr/tf=5 s

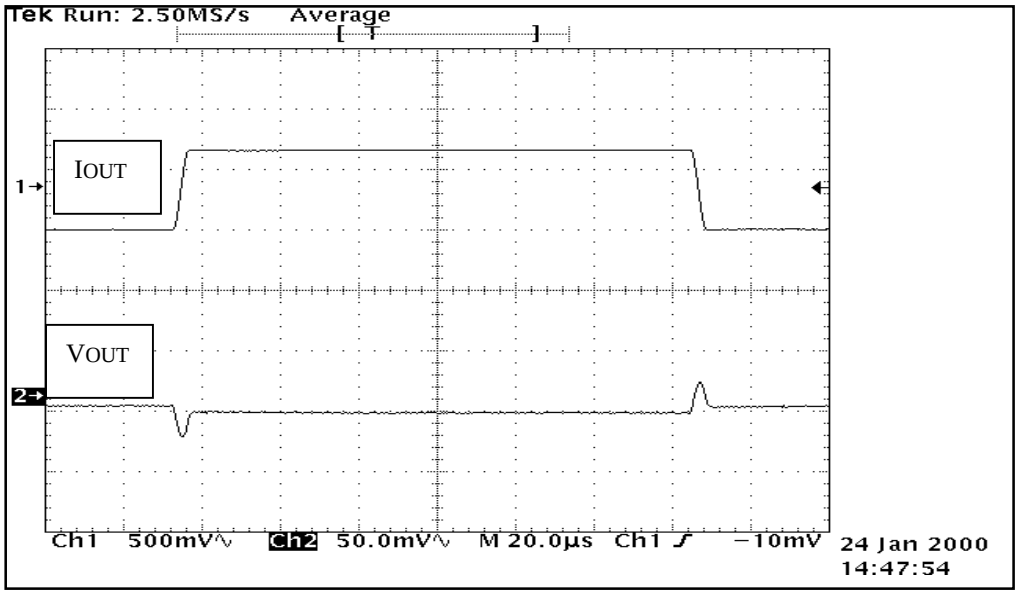
R11X2N201B Topt=25°C



IOUT=50mA<-->100mA
VIN=3.0V
CIN=2.2µF
COUT=2.2µF
tr/tf=5µs

R11X2N301B

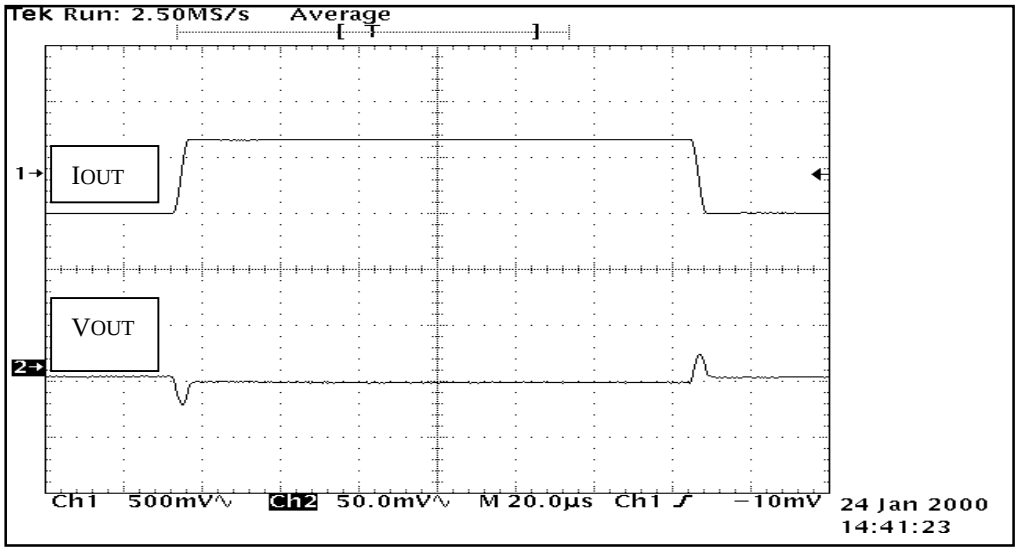
Topt=25°C



IOUT=50mA<-->100mA
VIN=4.0V
CIN=2.2µF
COUT=2.2µF
tr/tf=5µs

R11X2N401B

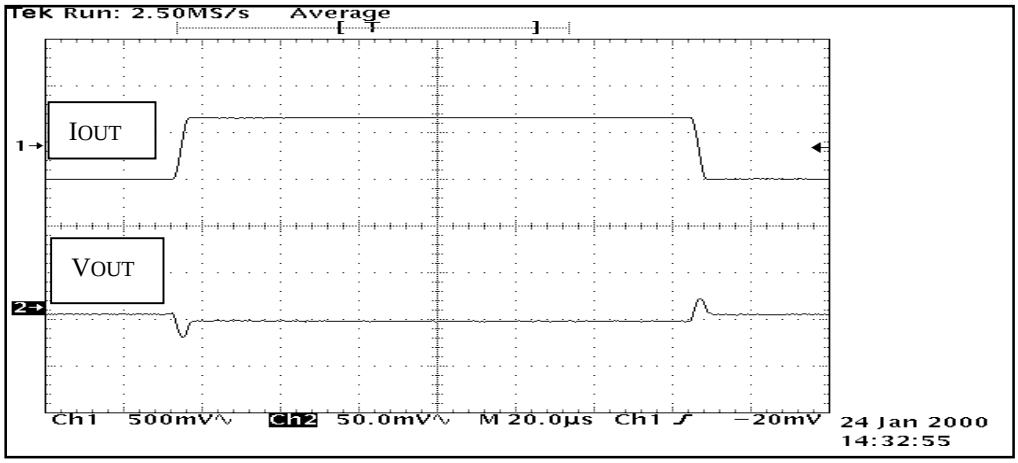
Topt=25°C



IOUT=50mA<-->100mA
VIN=5.0V
CIN=2.2µF
COUT=2.2µF
tr/tf=5µs

R11X2N501B

Topt=25°C



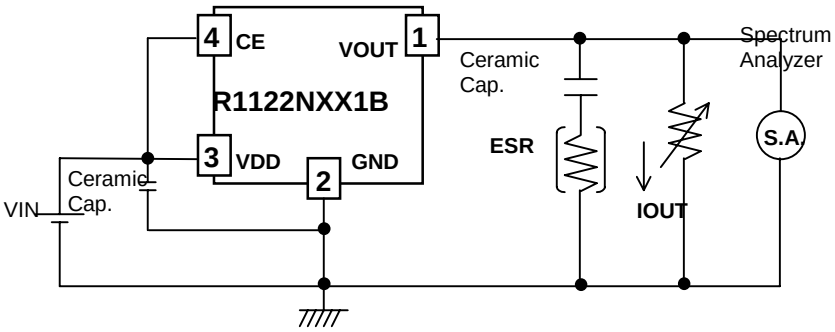
IOUT=50mA<-->100mA
VIN=6.0V
CIN=2.2µF
COUT=2.2µF
tr/tf=5µs

■ TECHNICAL NOTES

When using these ICs, be sure to consider following points:

- Make V_{DD} and GND line sufficient. When the impedance of these is high, there is a case to pick up the noise or not to work correctly.
- Connect the capacitor with a capacitance as much as 2.2μF between V_{DD} and GND as close as possible.
- Set external components, especially Output Capacitor, as close as possible to the ICs and make wiring shortest.

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, be sure to use a capacitor C_{OUT} with good frequency characteristics and ESR (Equivalent Series Resistance) of which is in the range described as follows:



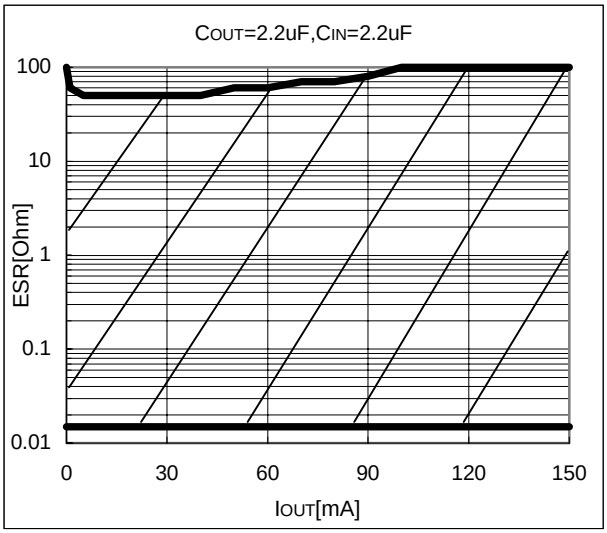
Measuring Circuit for white noise; R1122NXX1B

The relations between I_{OUT} (Output Current) and ESR of Output Capacitor are shown below. The conditions when the white noise level is under 40μV(Avg.) are marked as the hatched area in the graph.
(note: When the additional ceramic capacitors are connected to the Output Pin with Output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

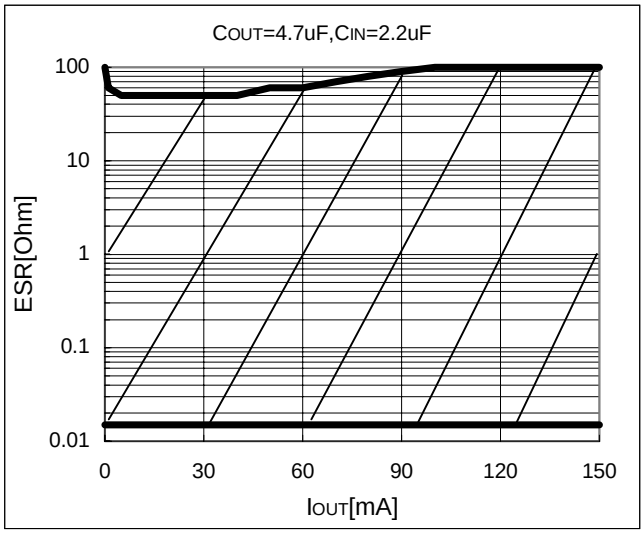
<measuring conditions>

(1) $V_{IN}=V_{OUT}+1V$
(2) Frequency band :10Hz to 1MHz
(3) Temperature : 25°C

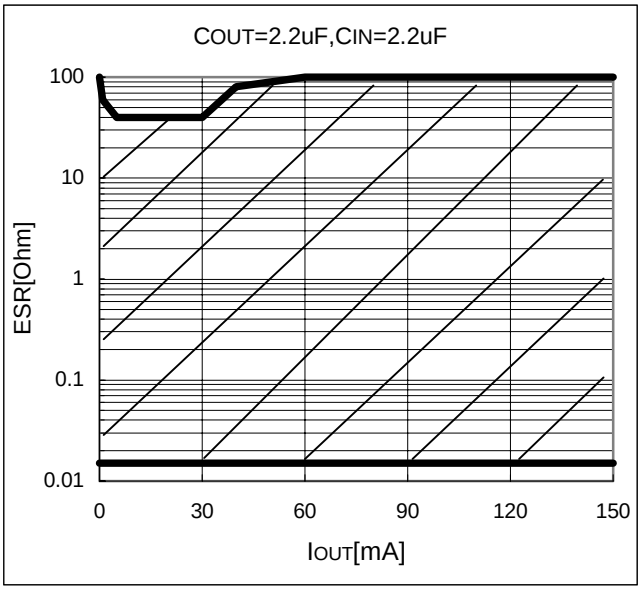
R11X2N151B



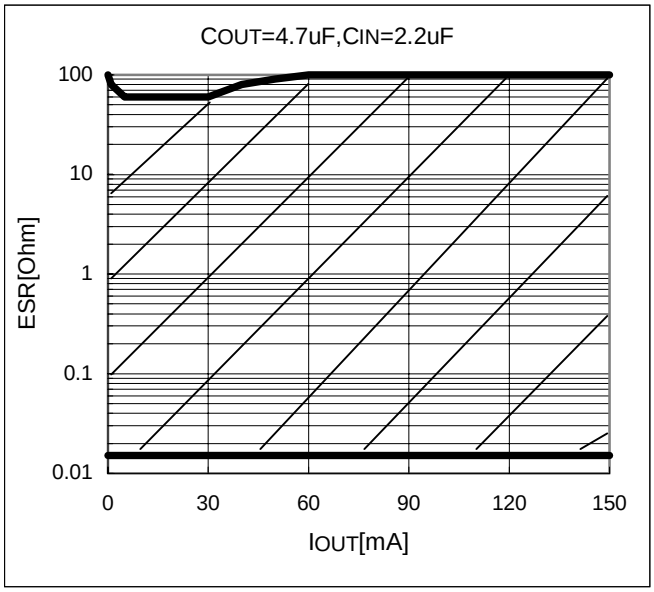
R11X2N151B



R11X2N301B



R11X2N301B



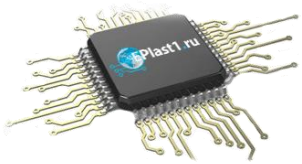
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.