

XC62RP

Series



Positive Voltage Regulators for Voltage Reference Source

- ◆CMOS Low Power Consumption
- ◆Input-Output Voltage Differential
: 140mV @ 300μA
- ◆Maximum Output Current
: 6.0mA (2.0V)
- ◆Highly Accurate : ±2% (±1%)
- ◆Output Voltage Range: 1.5V~3.5V
- ◆No Load Power Consumption
: 3.2μA (2.0V)
- ◆SOT-23/SOT-89/TO-92 Package

General Description

The XC62RP series are highly precise, low power consumption, positive voltage regulators, for voltage reference source, manufactured using CMOS and laser trimming technologies.

SOT-23 (150mW), SOT-89 (500mW) and TO-92 (300mW) packages are available.

Applications

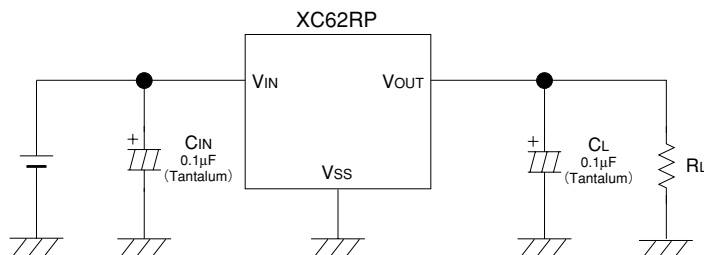
- Battery Powered Equipment
- Reference Voltage Sources
- Cameras and Video Recorders
- Palmtops

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Features

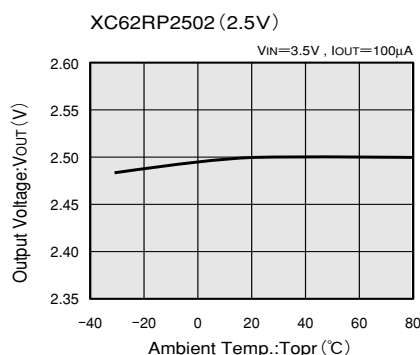
- Maximum Output Current** : 6.0mA (within max. power dissipation, $V_{OUT}=2.0V$)
- Output Voltage Range** : 1.5V ~ 3.5V in 0.1V increments
- Highly Accurate** : Set-up Voltage ±2%
(±1% for semi-custom products)
- Low Power Consumption** : TYP 3.2μA ($V_{OUT}=2.0$)
- Output Voltage Temperature Characteristics**
: TYP ±100ppm/°C
- Input Stability** : TYP 0.2%/V
- Ultra Small Packages** : SOT-23 (150mW) mini-mold
SOT-89 (500mW) mini-power mold
TO-92 (300mW)

Typical Application Circuit

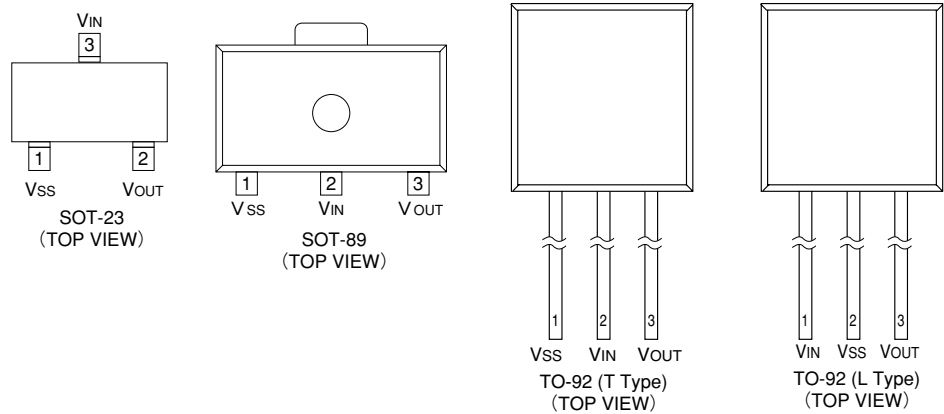


Please use with a load capacitance (C_L) of less than 0.1μF.

Typical Performance Characteristic



Pin Configuration



Pin Assignment

PIN NUMBER				PIN NAME	FUNCTION
SOT-23	SOT-89	TO-92 (T)	TO-92 (L)		
1	1	1	2	VSS	Ground
3	2	2	1	VIN	Supply Voltage Input
2	3	3	3	VOUT	Output

Product Classification

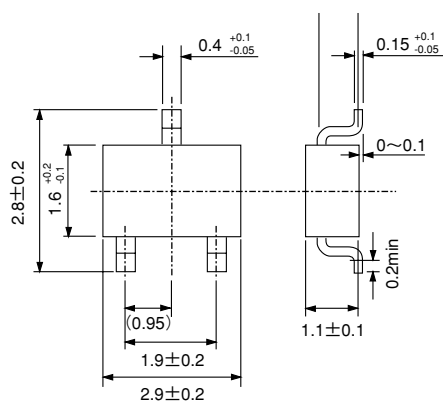
Ordering Information

X C 6 2 R X X X X X X X
 ↑ ↑ ↑ ↑ ↑ ↑
 a b c d e f

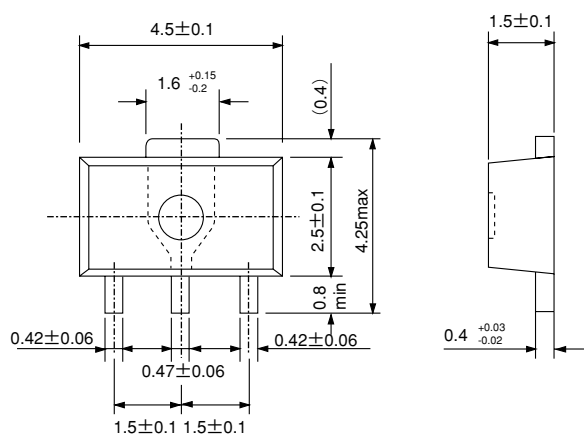
DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Polarity of Output Voltage: P: + (Positive)	e	Package Type M=SOT-23 P=SOT-89 T=TO-92 (Standard) L=TO-92 (Custom pin configuration)
b	Output Voltage 15=1.5V 30=3.0V		
c	Temperature Coefficients: 0=±100ppm (Typical)	f	Device Orientation R=Embossed Tape (Standard Feed) L=Embossed Tape (Reverse Feed) H=Paper Tape (TO-92) B=Bag (TO-92)
d	Output Voltage Accuracy: 1=±1.0% (Semi-custom) 2=±2.0%		

■ Packaging Information

● SOT-23

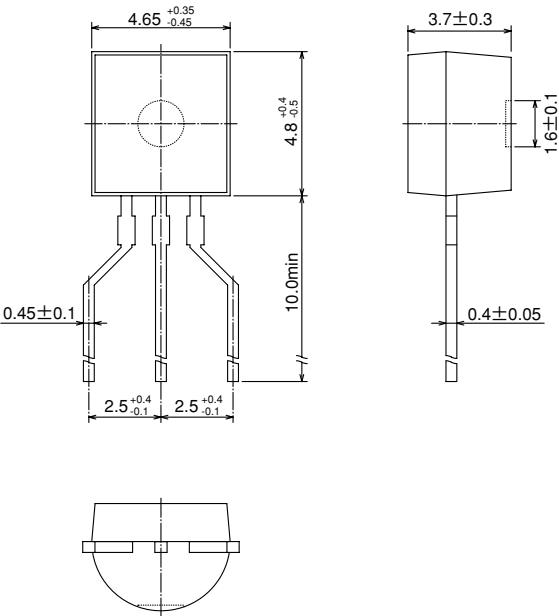


● SOT-89



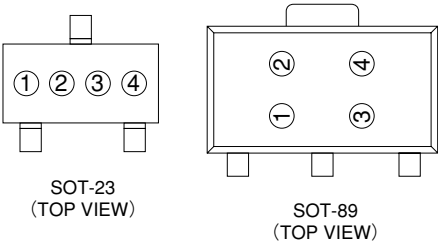
●TO-92

3



■Marking

●SOT-23, SOT-89



③ Represents the decimal number of the Output Voltage

SYMBOL	VOLTAGE(V)	SYMBOL	VOLTAGE(V)
A	②.0	F	②.5
B	②.1	H	②.6
C	②.2	K	②.7
D	②.3	L	②.8
E	②.4	M	②.9

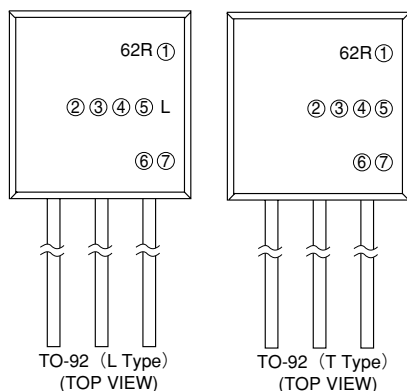
① Not Used.

② Represents the integer of the Output Voltage

SYMBOL	VOLTAGE(V)
A	0.③
B	1.③
C	2.③
D	3.③

④ Represents the assembly lot no.
Based on internal standards

●TO-92



① Represents the polarity of Output Voltage

DESIGNATOR	CONFIGURATION
P	+

④ Represents the temperature characteristics

DESIGNATOR	TEMPERATURE CHARACTERISTICS
0	TPY $\pm$ 100ppm

⑤ Represents the Detect Voltage Accuracy

DESIGNATOR	DETECT VOLTAGE ACCURACY
1	within $\pm 1\%$ (semi-custom)
2	within $\pm 2\%$

⑥ Represents a least significant digit of the produced year

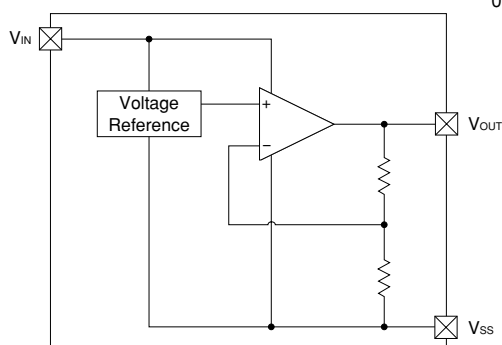
DESIGNATOR	PRODUCED YEAR
0	2000
1	2001

⑦ Denotes the production lot number
0 to 9, A to Z repeated (G.I.J.O.Q.W excepted)

②③ Represents the Detect Voltage

DESIGNATOR		VOLTAGE (V)
②	③	
3	3	3.3
5	0	5.0

■Block Diagram



■Absolute Maximum Ratings

Ta=25°C

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V _{IN}	12	V
Output Current		I _{OUT}	50	mA
Output Voltage		V _{OUT}	V _{SS} -0.3 ~ V _{IN} +0.3	V
Continuous Total Power Dissipation	SOT-23	Pd	150	mW
	SOT-89		500	
	TO-92		300	
Operating Ambient Temperature		T _{opr}	-30 ~ +80	°C
Storage Temperature		T _{stg}	-40 ~ +125	°C

Note: I_{OUT} must be less than Pd / (V_{IN}-V_{OUT}).

Electrical Characteristics

XC62RP1602 $V_{OUT}(T)=1.6V$ (Note1)

$T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=100\mu A$ $V_{IN}=2.6V$	1.568	1.600	1.632	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=2.6V, V_{OUT}(E) \geq V_{OUT}(T) \times 0.95$	4.0			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=2.6V$ $100\mu A \leq I_{OUT} \leq 300\mu A$		20	40	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=100\mu A$		30	80	mV	1
	V_{dif2}	$I_{OUT}=300\mu A$		50	140	mV	1
Supply Current	I_{SS}	$V_{IN}=2.6V$		3.0	5.8	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=100\mu A$ $2.6V \leq V_{IN} \leq 6.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=100mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1

XC62RP2002 $V_{OUT}(T)=2.0V$ (Note1)

$T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=100\mu A$ $V_{IN}=3.0V$	1.960	2.000	2.040	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=3.0V, V_{OUT}(E) \geq V_{OUT}(T) \times 0.95$	6.0			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=3.0V$ $100\mu A \leq I_{OUT} \leq 300\mu A$		20	40	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=100\mu A$		30	80	mV	1
	V_{dif2}	$I_{OUT}=300\mu A$		50	140	mV	1
Supply Current	I_{SS}	$V_{IN}=3.0V$		3.2	6.2	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=100\mu A$ $3.0V \leq V_{IN} \leq 6.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=100mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1

XC62RP2502 $V_{OUT}(T)=2.5V$ (Note1) $T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=100\mu A$ $V_{IN}=3.5V$	2.450	2.500	2.550	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=3.5V, V_{OUT}(E) \geq V_{OUT}(T) \times 0.95$	8.0			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=3.5V$ $100\mu A \leq I_{OUT} \leq 300\mu A$		20	40	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=100\mu A$		30	80	mV	1
	V_{dif2}	$I_{OUT}=300\mu A$		50	140	mV	1
Supply Current	I_{SS}	$V_{IN}=3.5V$		3.5	6.8	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=100\mu A$ $3.5V \leq V_{IN} \leq 6.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=100mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1

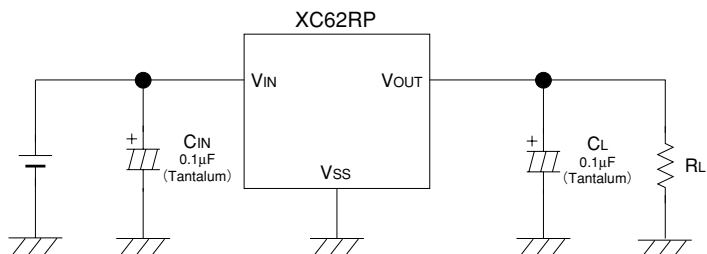
XC62RP3002 $V_{OUT}(T)=3.0V$ (Note1) $T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=100\mu A$ $V_{IN}=4.0V$	2.940	3.000	3.060	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=4.0V, V_{OUT}(E) \geq V_{OUT}(T) \times 0.95$	10.0			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=4.0V$ $100\mu A \leq I_{OUT} \leq 300\mu A$		20	40	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=100\mu A$		30	80	mV	1
	V_{dif2}	$I_{OUT}=300\mu A$		50	140	mV	1
Supply Current	I_{SS}	$V_{IN}=4.0V$		3.8	7.3	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=100\mu A$ $4.0V \leq V_{IN} \leq 6.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=100mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1

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. $V_{dif} = \{V_{IN1} \text{ (Note5)} - V_{OUT1} \text{ (Note4)}\}$ 4. V_{OUT1} = A voltage equal to 98% of the Output Voltage whenever an amply stabilised I_{OUT} ($V_{OUT}(T)+1.0V$) is input.5. V_{IN1} = The Input Voltage when V_{OUT1} appears as Input Voltage is gradually decreased.

Typical Application Circuit

Standard Circuit



Please use with a load capacitance (C_L) of less than $0.1\mu\text{F}$.

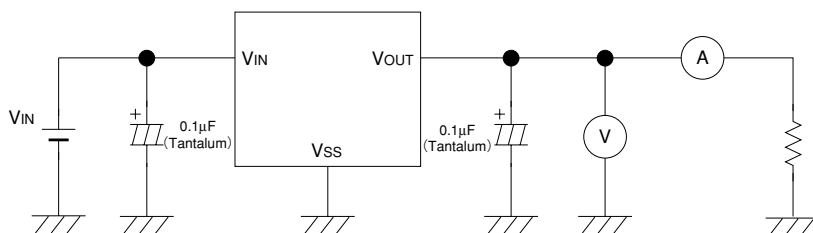
Directions for use

Notes on Use

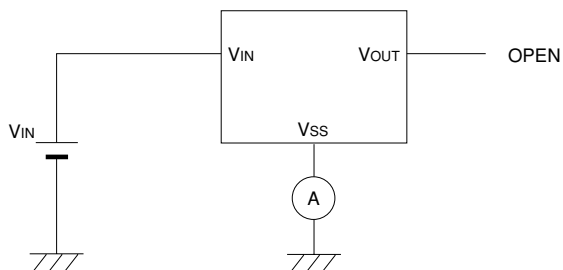
1. Please use with a load capacitance, C_L , of less than $0.1\mu\text{F}$ and in $0.01\mu\text{F}$ steps.
2. Since short-circuit protection is not built-in, the IC may be damaged by rush current should the output pin be connected to the Ground pin.
3. When the load capacitance, C_L , is small, overshoot will be produced when the power is switched on.
4. As the output pin's current is only a few μA , output voltage will increase should output be pulled-up by means of a resistor.

Test Circuits

Circuit 1

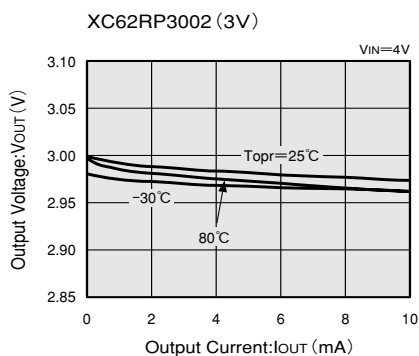
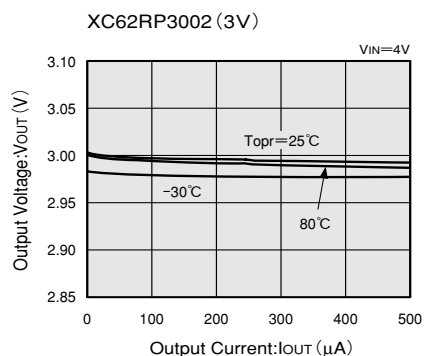
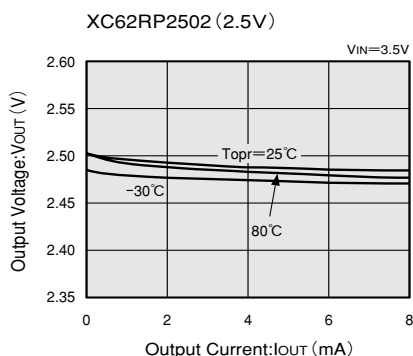
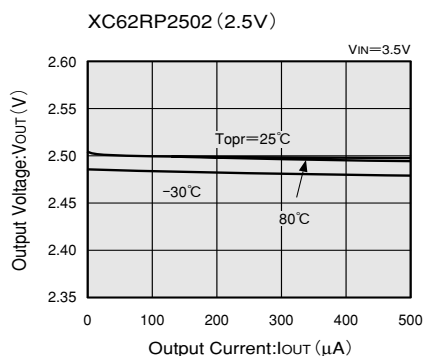
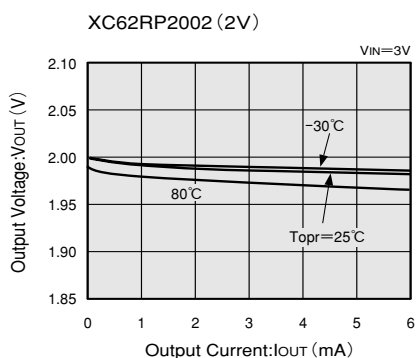
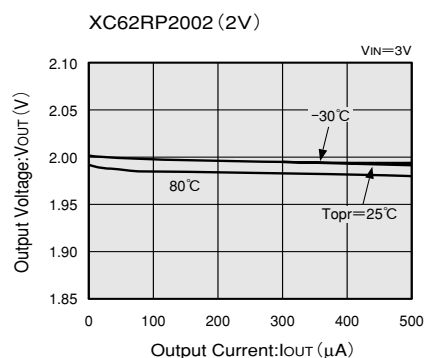
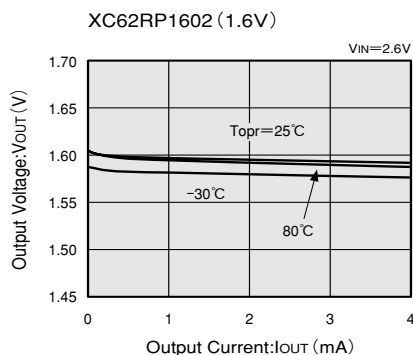
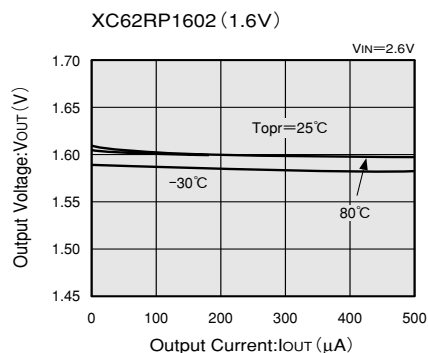


Circuit 2



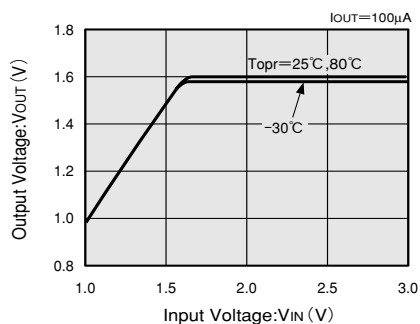
■ Typical Performance Characteristics

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

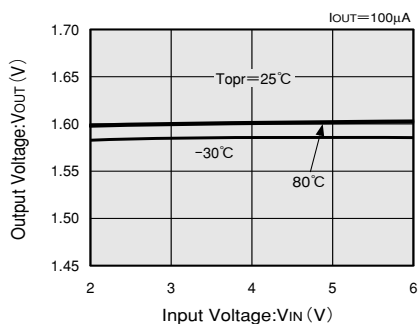


(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

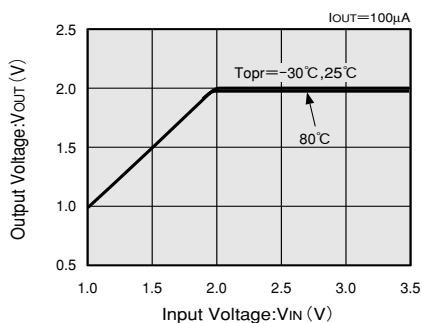
XC62RP1602 (1.6V)



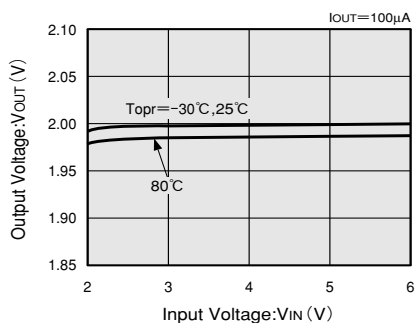
XC62RP1602 (1.6V)



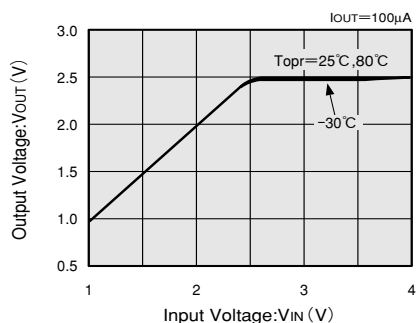
XC62RP2002 (2V)



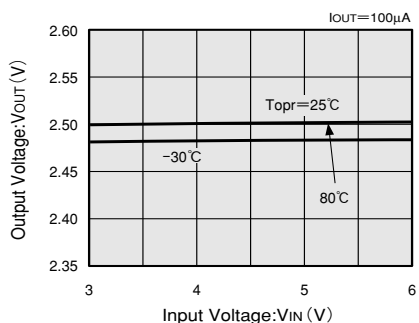
XC62RP2002 (2V)



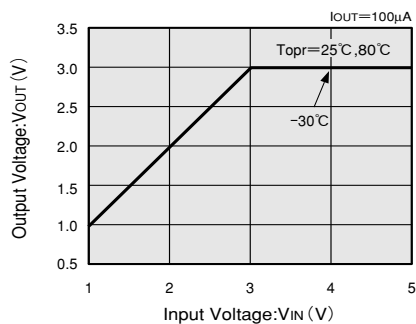
XC62RP2502 (2.5V)



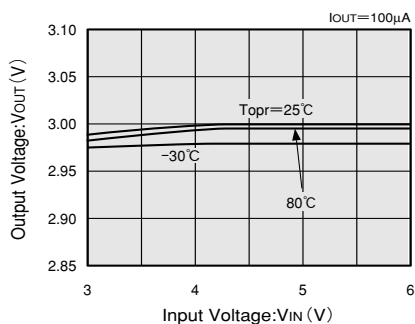
XC62RP2502 (2.5V)



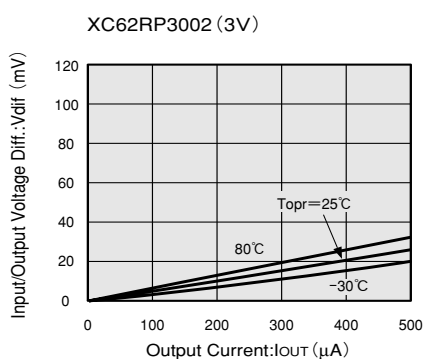
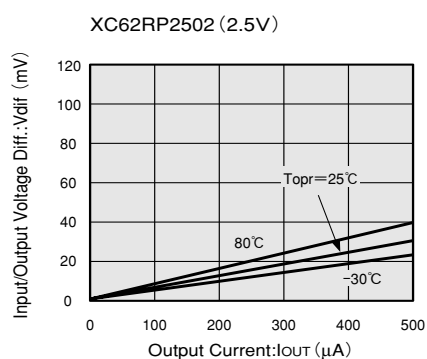
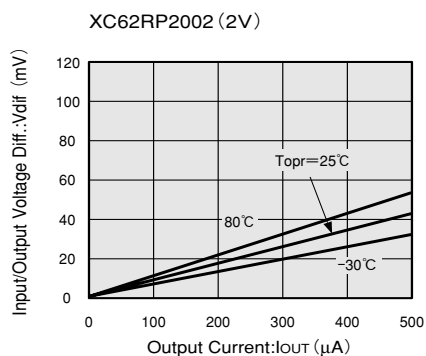
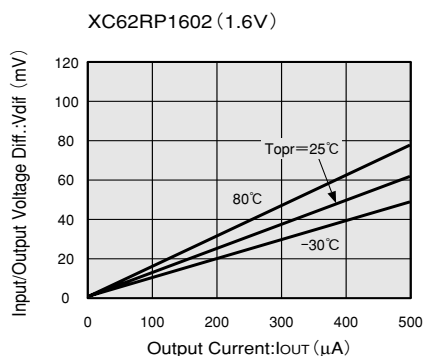
XC62RP3002 (3V)



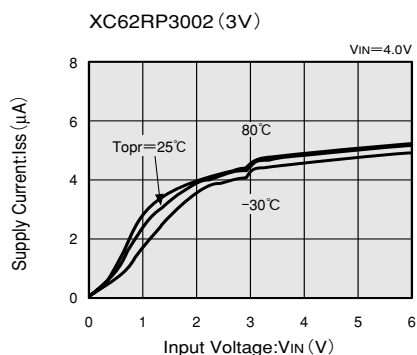
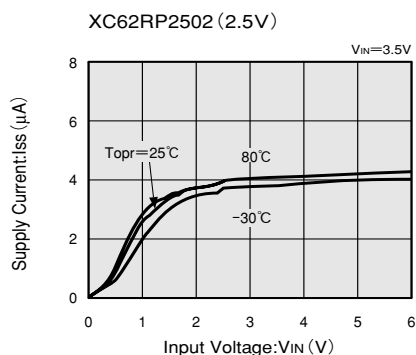
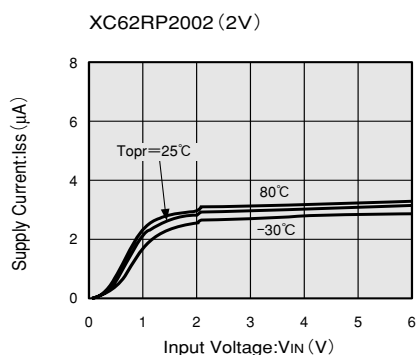
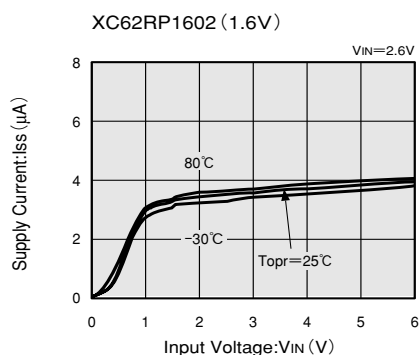
XC62RP3002 (3V)



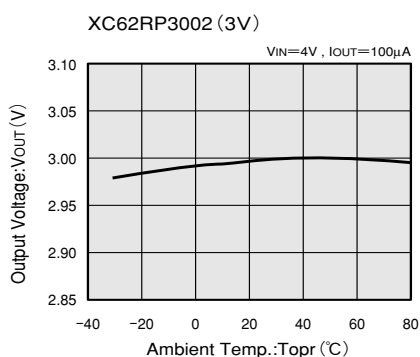
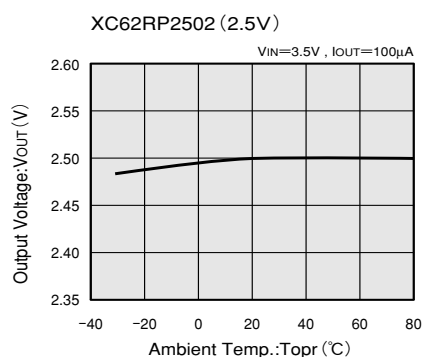
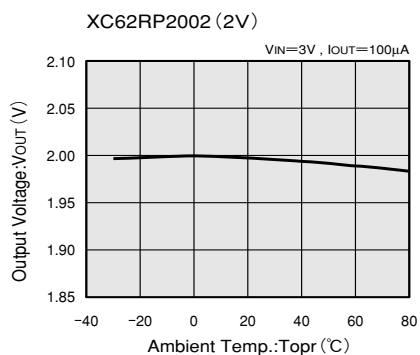
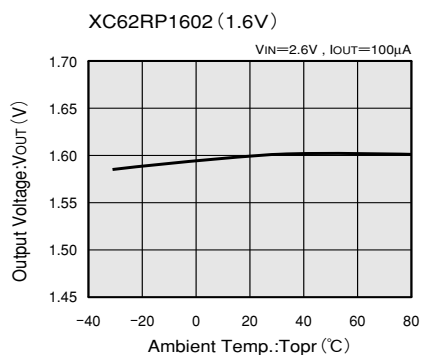
(3) INPUT/OUTPUT VOLTAGE DIFFERENTIAL vs. OUTPUT CURRENT



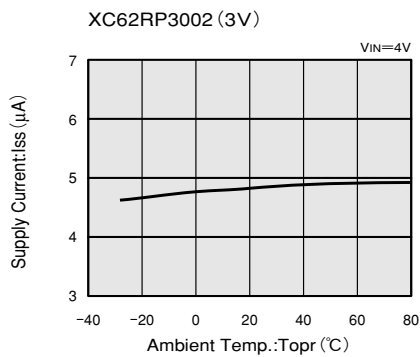
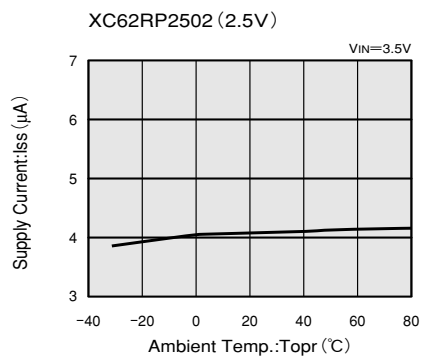
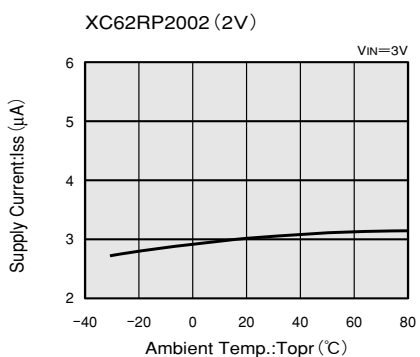
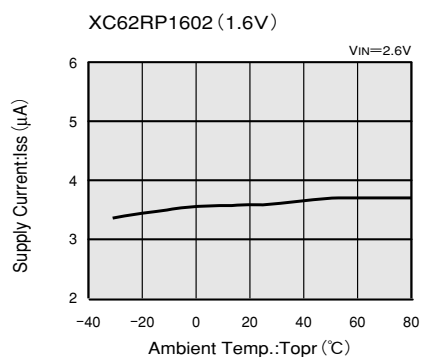
(4) SUPPLY CURRENT vs. INPUT VOLTAGE



(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

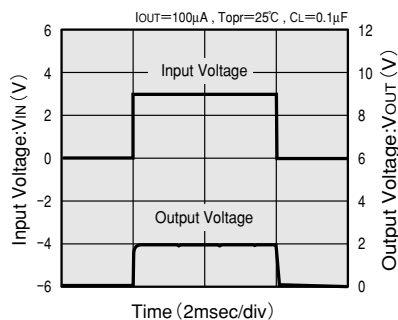


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

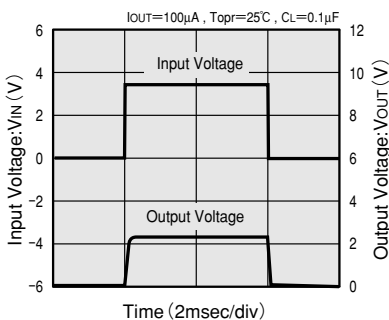


(7) INPUT TRANSIENT RESPONSE 1

XC62RP2002 (2V)

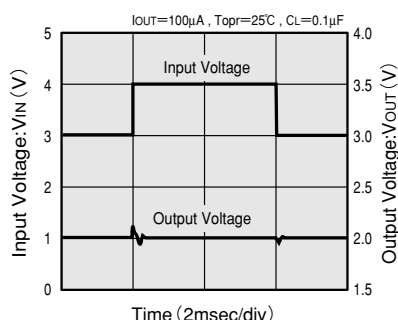


XC62RP2502 (2.5V)

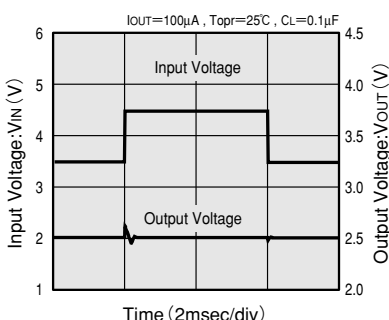


(8) INPUT TRANSIENT RESPONSE 2

XC62RP2002 (2V)

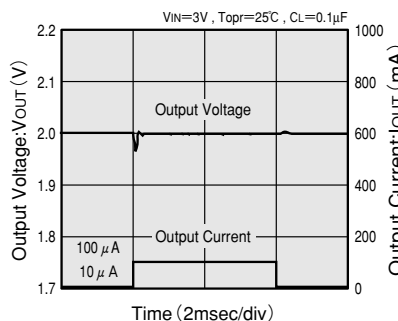


XC62RP2502 (2.5V)

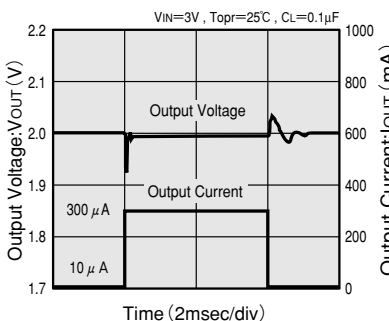


(9) LOAD TRANSIENT RESPONSE

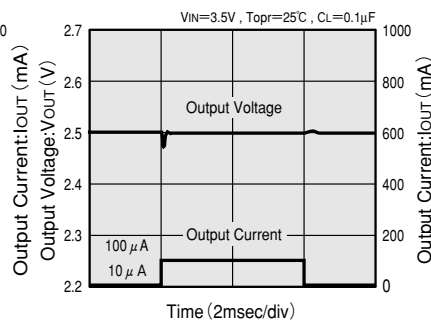
XC62RP2002 (2V)



XC62RP2002 (2V)

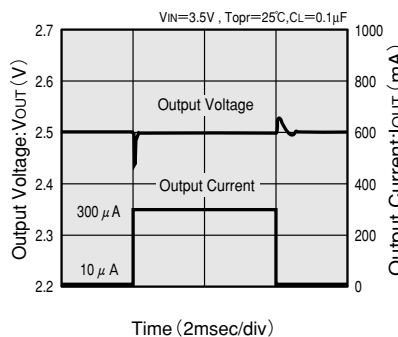


XC62RP2502 (2.5V)



(10) RIPPLE REJECTION

XC62RP2502 (2.5V)



XC62RP2502 (2.5V)

