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**

■Applications

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

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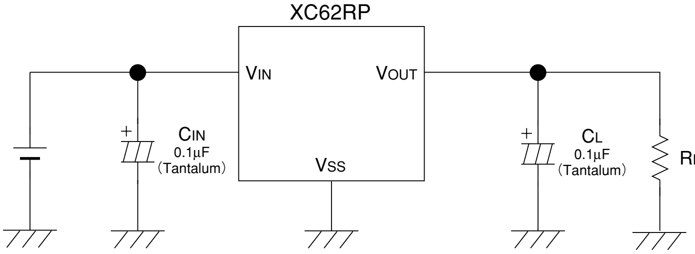
■General Description

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.

■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)

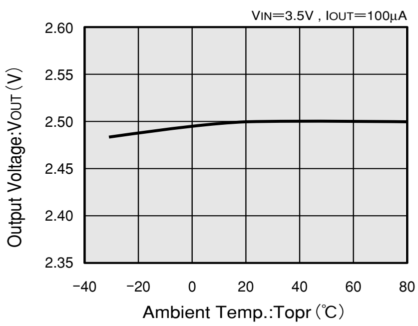
■Typical Application Circuit



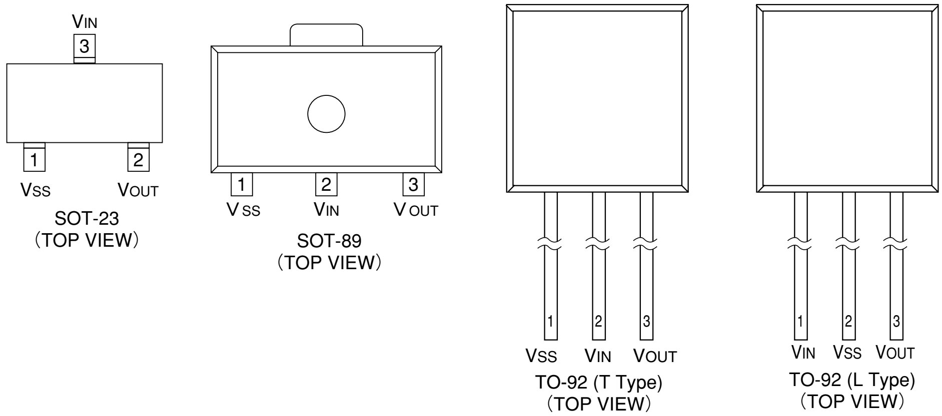
Please use with a load capacitance (C_L) of less than 0.1μF.

■Typical Performance Characteristic

XC62RP2502 (2.5V)



■Pin Configuration



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■Pin Assignment

PIN NUMBER				PIN NAME	FUNCTION
SOT-23	SOT-89	TO-92 (T)	TO-92 (L)		
1	1	1	2	V_{SS}	Ground
3	2	2	1	V_{IN}	Supply Voltage Input
2	3	3	3	V_{OUT}	Output

■Product Classification

●Ordering Information

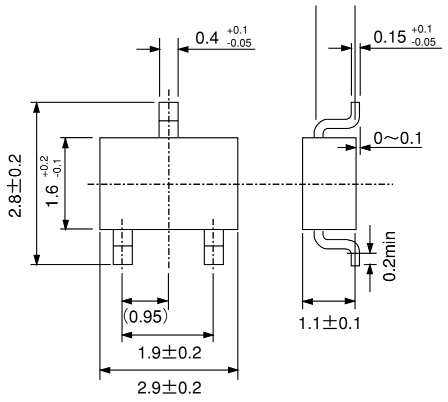
X C 6 2 R X X X X X X X

a (1st X), b (2nd–3rd X), c, d, e, f

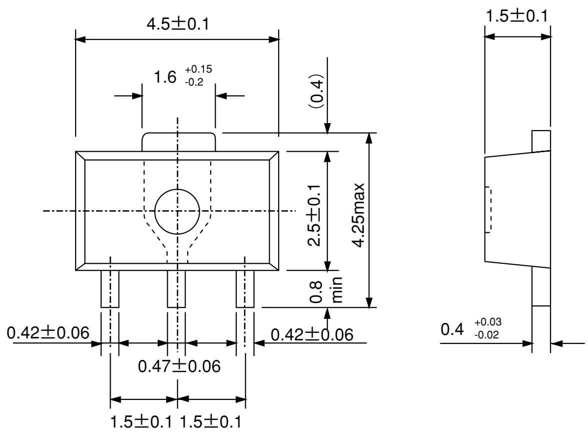
DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Polarity of Output Voltage: P: + (Positive)	e	Package Type M=SOT-23 P=SOT-89 T=TO-92 (Standard) L=TO-92 (Custom pin configuration)
b	Output Voltage 15=1.5V 30=3.0V		
c	Temperature Coefficients: 0=±100ppm (Typical)	f	Device Orientation R=Embossed Tape (Standard 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



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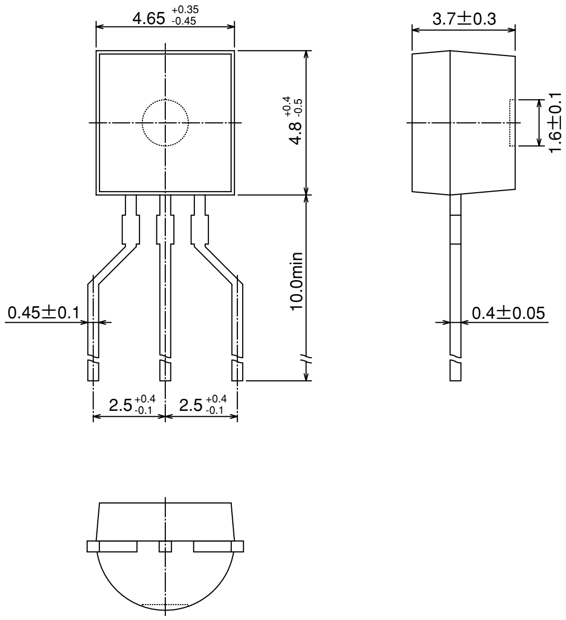
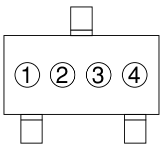
●TO-92

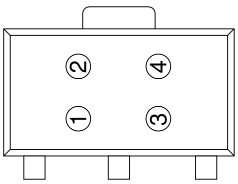


■Marking

●SOT-23, SOT-89



SOT-23
(TOP VIEW)



SOT-89
(TOP VIEW)

① Not Used.

② Represents the integer of the Output Voltage

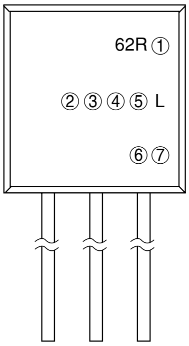
SYMBOL	VOLTAGE(V)
A	0.③
B	1.③
C	2.③
D	3.③

③ Represents the decimal number of the Output Voltage

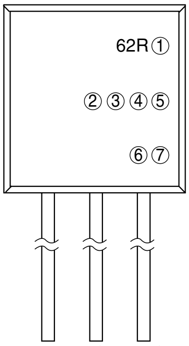
SYMBOL	VOLTAGE(V)	SYMBOL	VOLTAGE(V)
A	②.0	F	②.5
B	②.1	H	②.6
C	②.2	K	②.7
D	②.3	L	②.8
E	②.4	M	②.9

④ Represents the assembly lot no.
Based on internal standards

●TO-92



TO-92（L Type）
(TOP VIEW)



TO-92（T Type）
(TOP VIEW)

① Represents the polarity of Output Voltage

DESIGNATOR	CONFIGURATION
P	+

④ Represents the temperature characteristics

DESIGNATOR	TEMPERATURE CHARACTERISTICS
0	TPY±100ppm

⑤ Represents the Detect Voltage Accuracy

DESIGNATOR	DETECT VOLTAGE ACCURACY
1	within ±1%（semi-custom）
2	within ±2%

⑥ Represents a least significant digit of the produced year

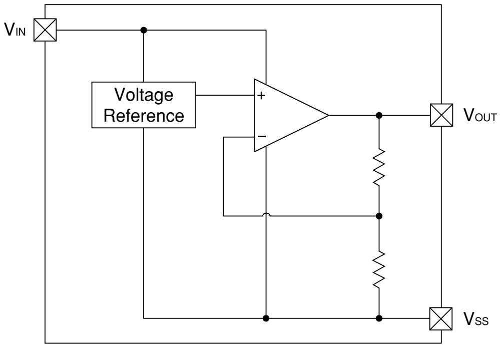
DESIGNATOR	PRODUCED YEAR
0	2000
1	2001

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		Topr	-30 ~ +80	°C
Storage Temperature		Tstg	-40 ~ +125	°C

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

■Electrical Characteristics

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

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=100µA V_{IN}=2.6V	1.568	1.600	1.632	V	1
Maximum Output Current	I_{OUT} max	V_{IN}=2.6V,$V_{OUT}(E)\geq V_{OUT}(T)$x0.95	4.0			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=2.6V 100µA≤I_{OUT}≤300µA		20	40	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=100µA		30	80	mV	1
	Vdif2	I_{OUT}=300µA		50	140	mV	1
Supply Current	Iss	V_{IN}=2.6V		3.0	5.8	µA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT}=100µA 2.6V≤V_{IN}≤6.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=100mA -30°C≤Topr≤80°C		±100		ppm/°C	1

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

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=100µA V_{IN}=3.0V	1.960	2.000	2.040	V	1
Maximum Output Current	I_{OUT} max	V_{IN}=3.0V,$V_{OUT}(E)\geq V_{OUT}(T)$x0.95	6.0			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=3.0V 100µA≤I_{OUT}≤300µA		20	40	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=100µA		30	80	mV	1
	Vdif2	I_{OUT}=300µA		50	140	mV	1
Supply Current	Iss	V_{IN}=3.0V		3.2	6.2	µA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT}=100µA 3.0V≤V_{IN}≤6.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=100mA -30°C≤Topr≤80°C		±100		ppm/°C	1

XC62RP2502 $V_{OUT}(T)$=2.5V (Note1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=100 µA 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)≥ V_{OUT}(T)x0.95	8.0			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=3.5V 100 µA≤I_{OUT}≤300 µA		20	40	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=100 µA		30	80	mV	1
	Vdif2	I_{OUT}=300 µA		50	140	mV	1
Supply Current	Iss	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 µA 3.5V≤V_{IN}≤6.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=100mA -30°C≤Topr≤80°C		±100		ppm/°C	1

XC62RP3002 $V_{OUT}(T)$=3.0V (Note1)

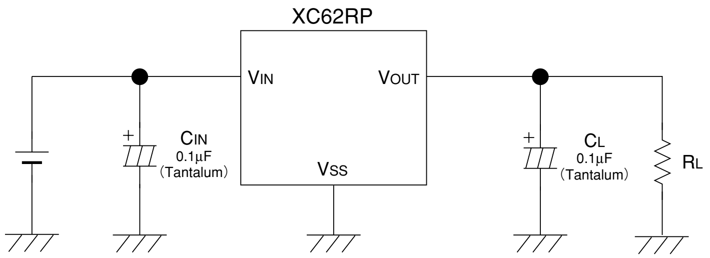
Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=100 µA 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)≥ V_{OUT}(T)x0.95	10.0			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=4.0V 100 µA≤I_{OUT}≤300 µA		20	40	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=100 µA		30	80	mV	1
	Vdif2	I_{OUT}=300 µA		50	140	mV	1
Supply Current	Iss	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 µA 4.0V≤V_{IN}≤6.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				6.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=100mA -30°C≤Topr≤80°C		±100		ppm/°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. Vdif= {$V_{IN}1$ (Note5)-$V_{OUT}1$ (Note4)}
4. $V_{OUT}1$= A voltage equal to 98% of the Output Voltage whenever an amply stabilised I_{OUT} {V_{OUT}(T)+1.0V} is input.
5. $V_{IN}1$= The Input Voltage when $V_{OUT}1$ appears as Input Voltage is gradually decreased.

■Typical Application Circuit

●Standard Circuit



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

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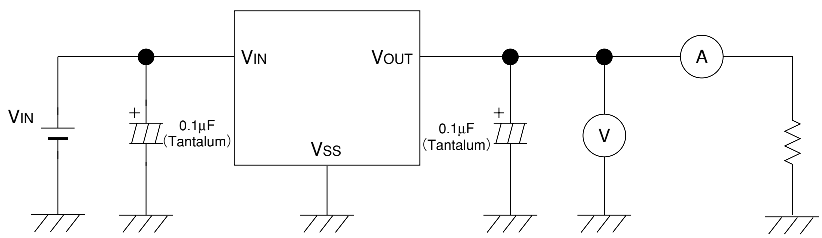
■Directions for use

●Notes on Use

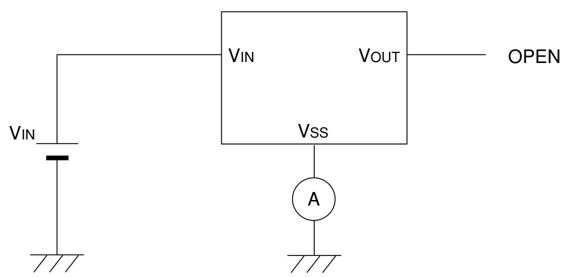
1. Please use with a load capacitance, C_L, of less than 0.1µF and in 0.01µF steps.
2. Since short-circuit protection is not built-in, the IC may be damaged by rush current should the output pin be connected to the Ground pin.
3. When the load capacitance, C_L, is small, overshoot will be produced when 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

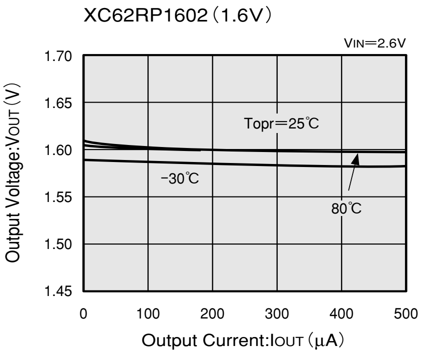


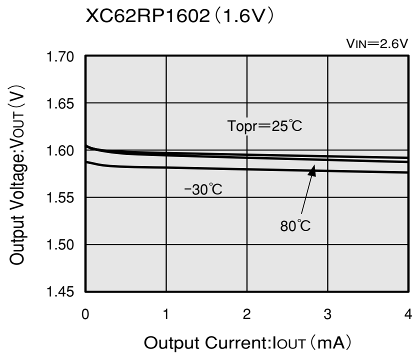
Circuit 2

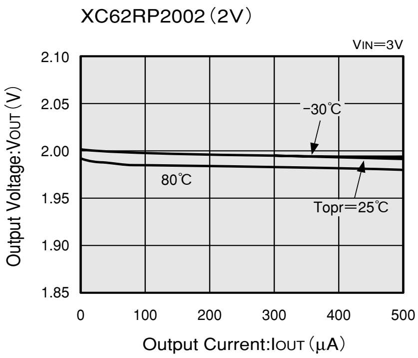


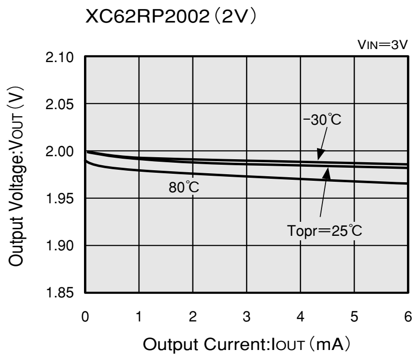
■Typical Performance Characteristics

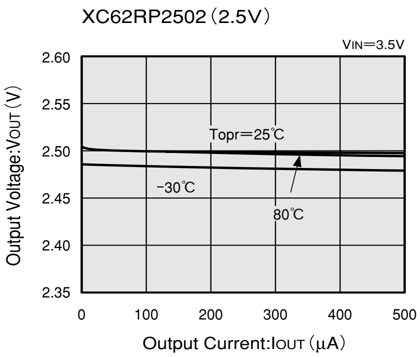
(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

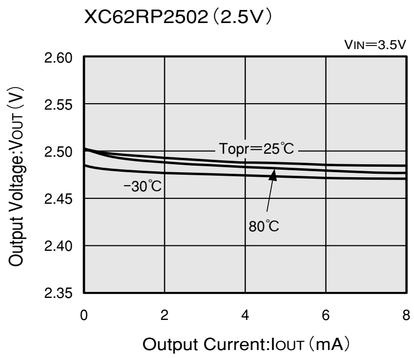


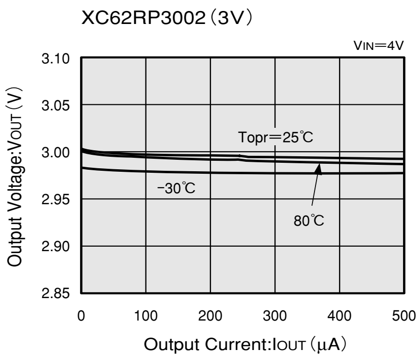


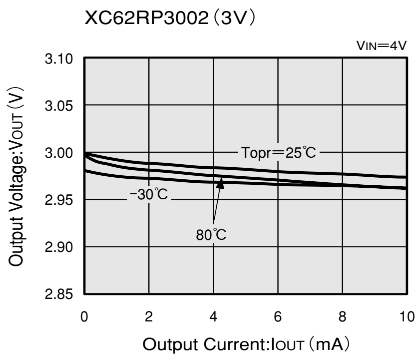












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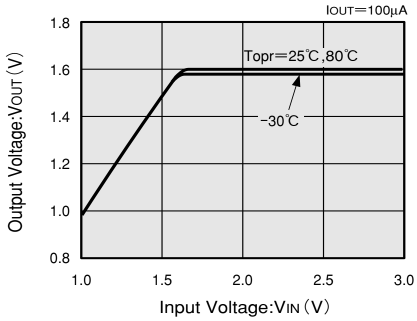
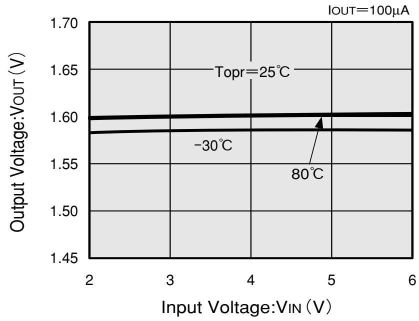
(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

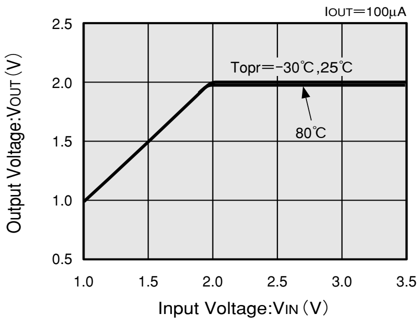
XC62RP1602 (1.6V)



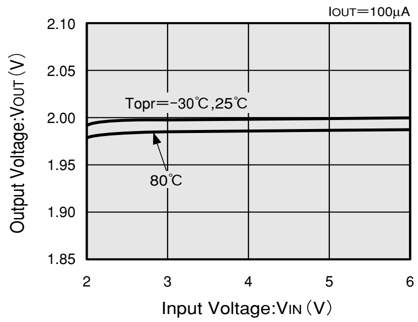
XC62RP1602 (1.6V)



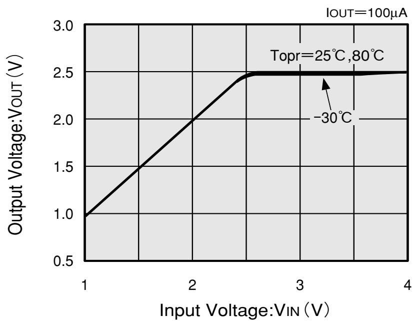
XC62RP2002 (2V)



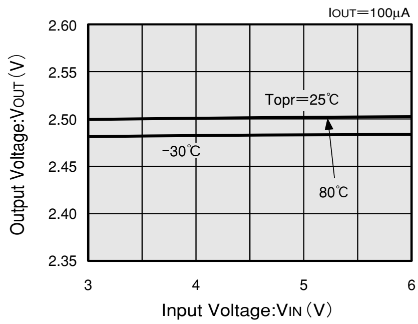
XC62RP2002 (2V)



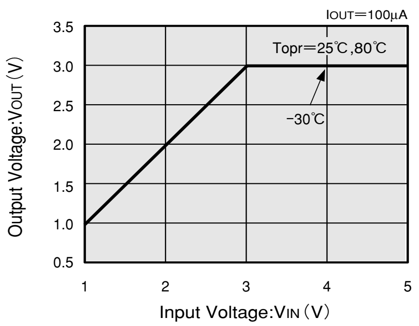
XC62RP2502 (2.5V)



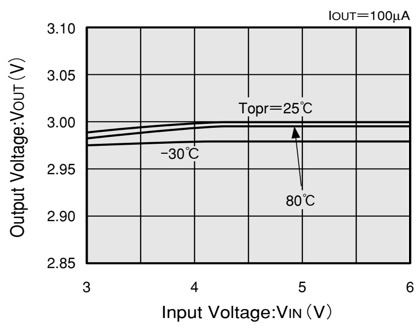
XC62RP2502 (2.5V)



XC62RP3002 (3V)

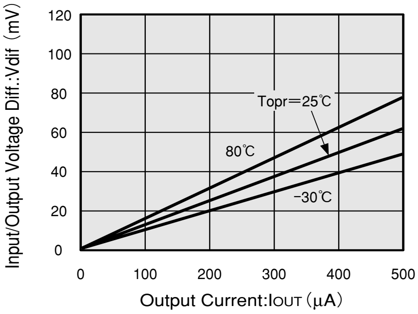


XC62RP3002 (3V)

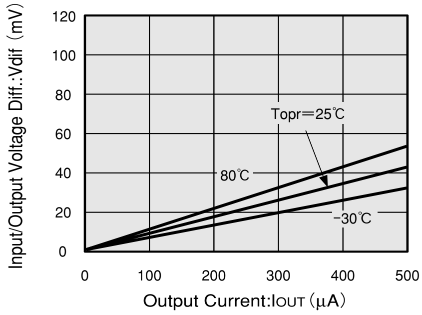


(3) INPUT/OUTPUT VOLTAGE DIFFERENTIAL vs. OUTPUT CURRENT

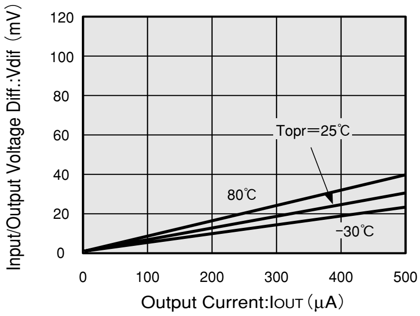
XC62RP1602 (1.6V)



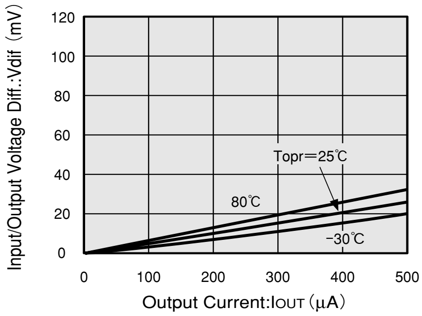
XC62RP2002 (2V)



XC62RP2502 (2.5V)

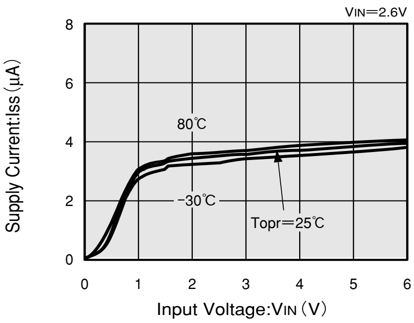


XC62RP3002 (3V)

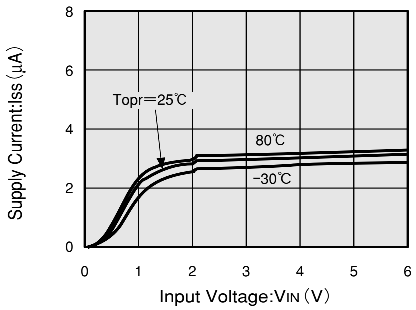


(4) SUPPLY CURRENT vs. INPUT VOLTAGE

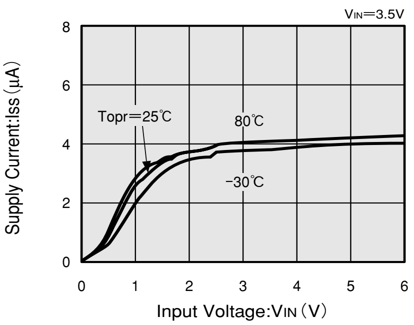
XC62RP1602 (1.6V)



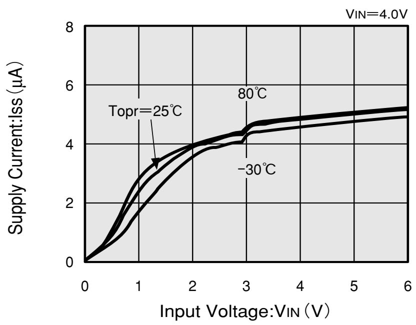
XC62RP2002 (2V)



XC62RP2502 (2.5V)



XC62RP3002 (3V)



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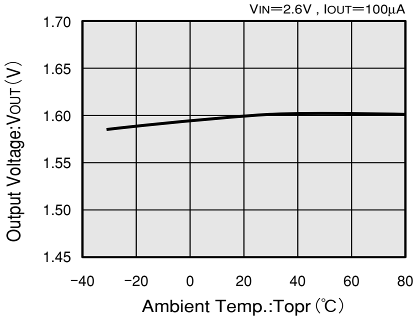
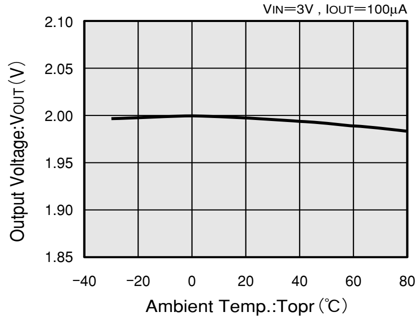
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

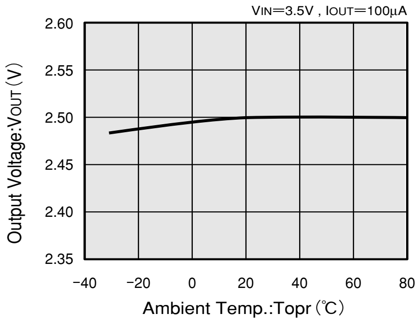
XC62RP1602 (1.6V)



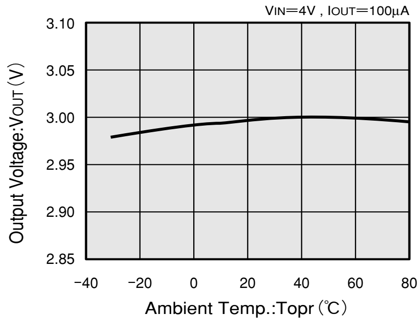
XC62RP2002 (2V)



XC62RP2502 (2.5V)

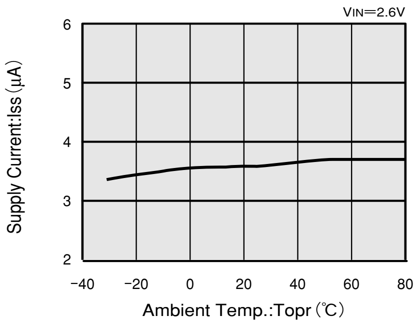


XC62RP3002 (3V)

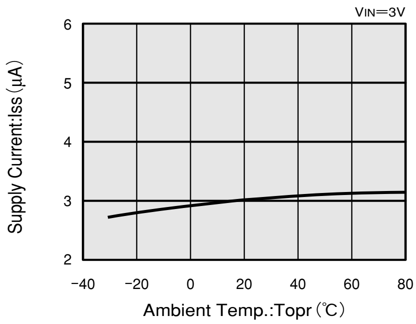


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

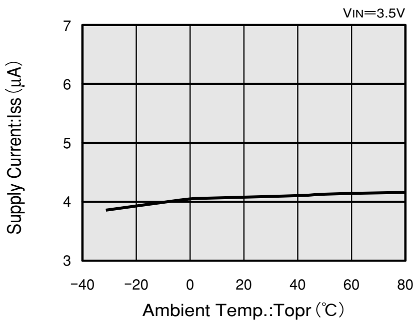
XC62RP1602 (1.6V)



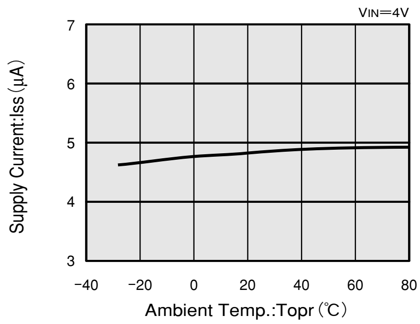
XC62RP2002 (2V)



XC62RP2502 (2.5V)

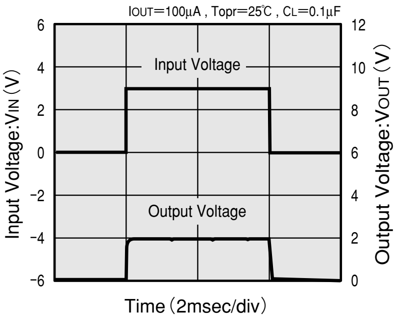


XC62RP3002 (3V)

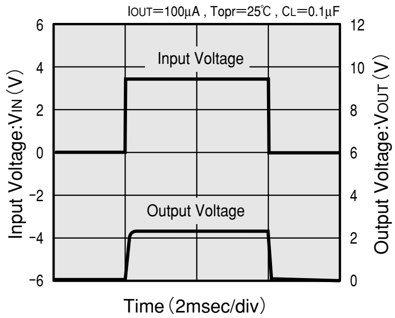


(7) INPUT TRANSIENT RESPONSE 1

XC62RP2002 (2V)



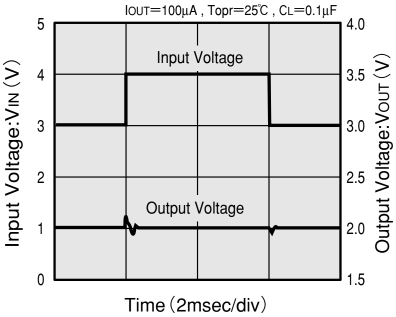
XC62RP2502 (2.5V)



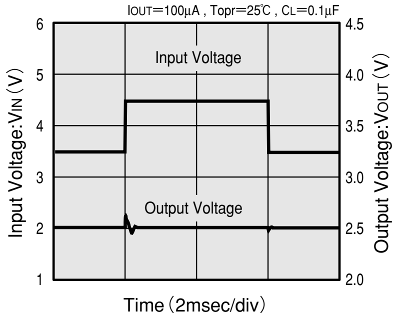
3

(8) INPUT TRANSIENT RESPONSE 2

XC62RP2002 (2V)

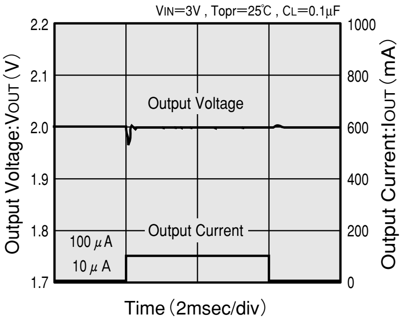


XC62RP2502 (2.5V)



(9) LOAD TRANSIENT RESPONSE

XC62RP2002 (2V)



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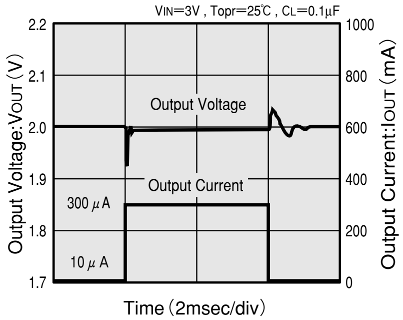

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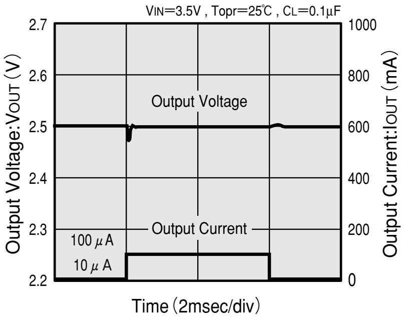

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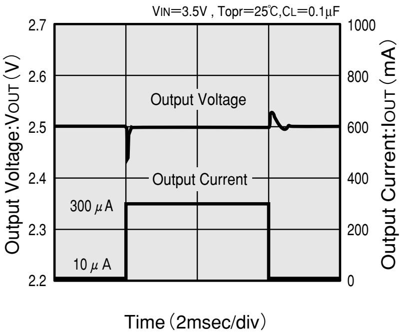

(10) RIPPLE REJECTION

XC62RP2502 (2.5V)