XC62FP

Series

Positive Voltage Regulators

TOIREX

3

- ◆CMOS Low Power Consumption
- ◆Small Input-Output Voltage Differential : 0.12V @ 100mA, 0.38V @ 200mA
- ◆Maximum Output Current : 250mA (V_{OUT}=5.0V)
- ◆Output Voltage Range : 2.0V~6.0V
- ◆Highly Accurate : ±2% (±1%)

■Applications

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

■General Description

The XC62FP series is a group of positive voltage output, three-pin regulators, that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and laser trimming technologies.

The XC62FP consists of a high-precision voltage reference, an error amplification circuit, and a current limited output driver. Transient response to load variations have improved in comparison to the existing series.

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

■Features

Maximum Output Current : 250mA (within max. power dissipation, V_{OUT} = 5.0V)

Output Voltage Range : 2.0V ~ 6.0V in 0.1V increments (1.5V ~ 1.9V for custom products)

Highly Accurate: Output voltage ±2% (±1% for semi-custom products)

Low Power Consumption : Typ. 2.0μA @ V_{OUT}=5.0V

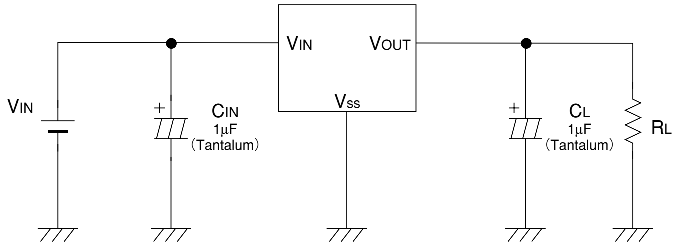
Output Voltage Temperature Characteristics : Typ. ±100ppm/°C

Input Stability : Typ. 0.2%/V

Small Input-Output Differential : I_{OUT} = 100mA @ V_{OUT} = 5.0V with a 0.12V differential.

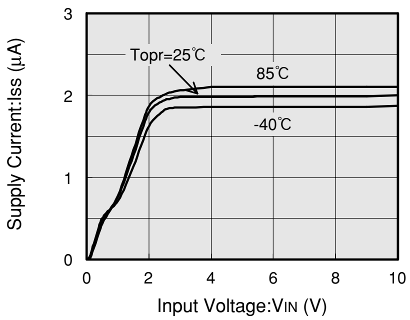
Ultra Small Packages : SOT-23 (150mW) mini-mold, SOT-89 (500mW) mini-power mold TO-92 (300mW)

■Typical Application Circuit

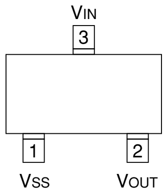


■Typical Performance Characteristic

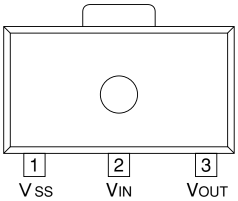
XC62FP3002 (3V)



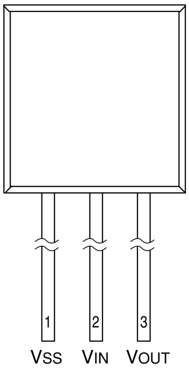
■Pin Configuration



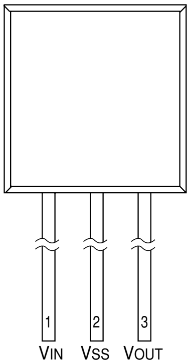
SOT-23
(TOP VIEW)



SOT-89
(TOP VIEW)



TO-92 (T Type)
(TOP VIEW)



TO-92 (L Type)
(TOP VIEW)

■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}	Regulated voltage output

■Product Classification

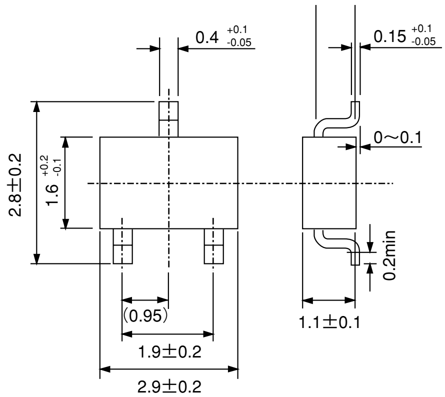
●Ordering Information

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

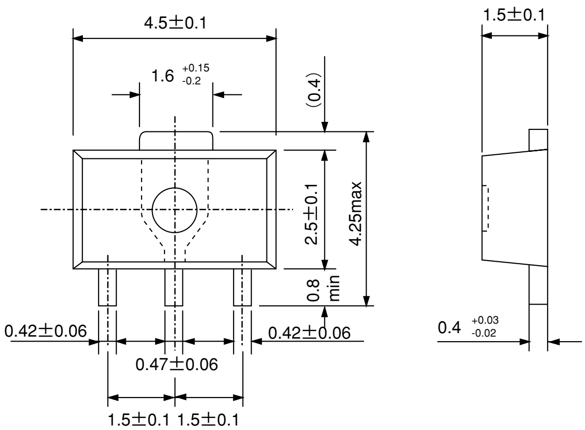
DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Polarity of Output Voltage: P: + (Positive)	e	Package Type M=SOT-23 P=SOT-89 T=TO-92 (Standard) L=TO-92 (Custom pin configuration)
b	Output Voltage 30=3.0V 50=5.0V		
c	Temperature Coefficients: 0=±100ppm (typical)	f	Device Orientation R=Embossed Tape (Standard 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

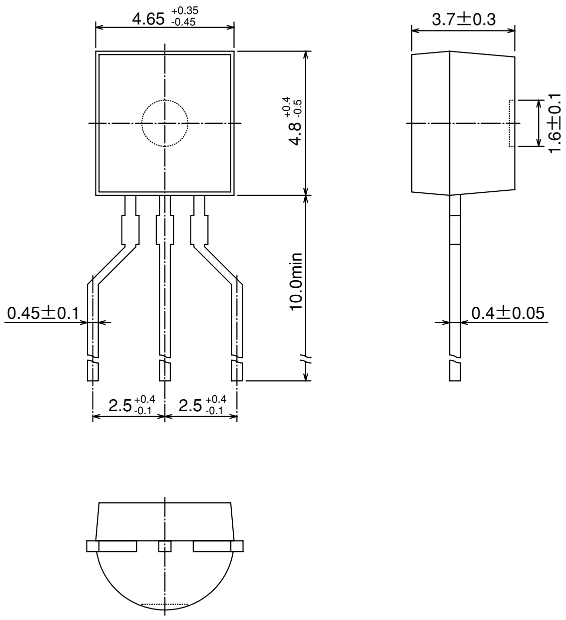
●SOT-23



●SOT-89



●TO-92



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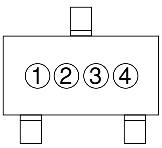
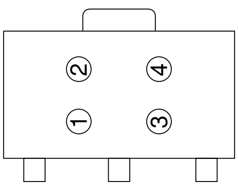
■Marking

●SOT-23, SOT-89



SOT-23
(TOP VIEW)



SOT-89
(TOP VIEW)

① Represents the integer of the Output Voltage

SYMBOL	VOLTAGE(V)	SYMBOL	VOLTAGE(V)
1	1.②	5	5.②
2	2.②	6	6.②
3	3.②		
4	4.②		

② Represents the decimal number of the Output Voltage

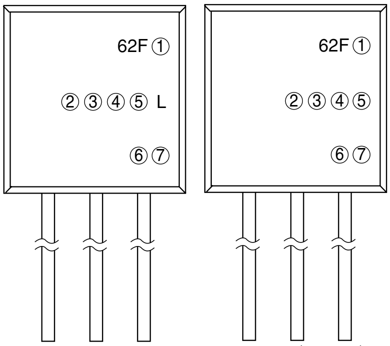
SYMBOL	VOLTAGE(V)	SYMBOL	VOLTAGE(V)
A	①.0	F	①.5
B	①.1	H	①.6
C	①.2	K	①.7
D	①.3	L	①.8
E	①.4	M	①.9

③ Based on internal standards

SYMBOL
0

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	CMOS

④ Represents the temperature characteristics

DESIGNATOR	TEMPERATURE CHARACTERISTICS
0	TPY±100ppm

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)

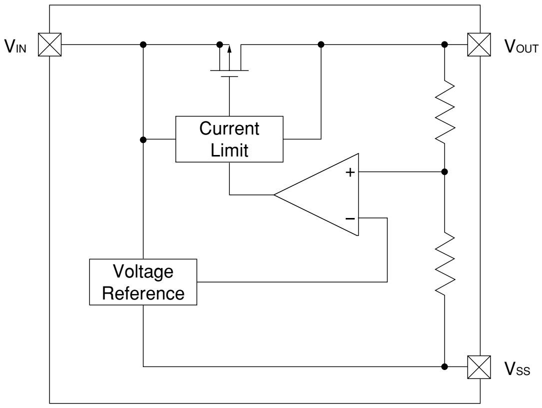
②③ Represents the Detect Voltage

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

⑤ Represents the Detect Voltage Accuracy

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

■Block Diagram



■Absolute Maximum Ratings

Ta=25°C

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V_{IN}	12	V
Output Current		I_{OUT}	500	mA
Output Voltage		V_{OUT}	V_{SS}-0.3 ~ V_{IN}+0.3	V
Continuous Total Power Dissipation	SOT-23	P_d	150	mW
	SOT-89		500	
	TO-92		300	
Operating Ambient Temperature		T_{opr}	−40 ~ +85	°C
Storage Temperature		T_{stg}	−40 ~ +125	°C

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■Electrical Characteristics

XC62FP5002 $V_{OUT}(T)$=5.0V (Note1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=40mA V_{IN}=6.0V	4.900	5.000	5.100	V	1
Maximum Output Current	I_{OUT} max	V_{IN}=6.0V, V_{OUT}(E) ≥ 4.5V	250			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=6.0V 1mA ≤ I_{OUT} ≤ 100mA		40	80	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=100mA		120	300	mV	1
	Vdif2	I_{OUT}=200mA		380	600	mV	1
Supply Current	I_{SS}	V_{IN}=6.0V		2.0	4.5	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT}=40mA 6.0V ≤ V_{IN} ≤ 10.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=40mA -40°C ≤ Topr ≤ 85°C		±100		ppm/°C	1

XC62FP4002 $V_{OUT}(T)$=4.0V (Note1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=40mA V_{IN}=5.0V	3.920	4.000	4.080	V	1
Maximum Output Current	I_{OUT} max	V_{IN}=5.0V, V_{OUT}(E) ≥ 3.6V	200			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=5.0V 1mA ≤ I_{OUT} ≤ 100mA		45	90	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=100mA		170	330	mV	1
	Vdif2	I_{OUT}=200mA		400	630	mV	1
Supply Current	I_{SS}	V_{IN}=5.0V		2.0	4.5	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT}=40mA 5.0V ≤ V_{IN} ≤ 10.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=40mA -40°C ≤ Topr ≤ 85°C		±100		ppm/°C	1

XC62FP3002 $V_{OUT}(T)$=3.0V (Note1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=40mA 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) ≥ 2.7V	150			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=4.0V 1mA ≤ I_{OUT} ≤ 80mA		45	90	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=80mA		180	360	mV	1
	Vdif2	I_{OUT}=160mA		400	700	mV	1
Supply Current	I_{SS}	V_{IN}=4.0V		2.0	4.5	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT}=40mA 4.0V ≤ V_{IN} ≤ 10.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=40mA -40°C ≤ Topr ≤ 85°C		±100		ppm/°C	1

XC62FP2002 $V_{OUT}(T)$=2.0V (Note1)

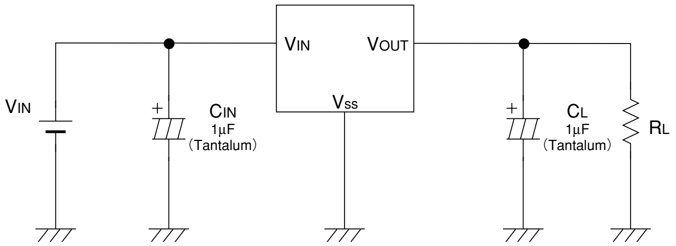
Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V_{OUT} (E) (Note2)	I_{OUT}=40mA 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) ≥ 1.8V	100			mA	1
Load Stability	ΔV_{OUT}	V_{IN}=3.0V 1mA ≤ I_{OUT} ≤ 60mA		45	90	mV	1
Input -Output Voltage Differential (Note3)	Vdif1	I_{OUT}=60mA		180	360	mV	1
	Vdif2	I_{OUT}=120mA		400	700	mV	1
Supply Current	I_{SS}	V_{IN}=3.0V		2.0	4.5	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT}=40mA 3.0V ≤ V_{IN} ≤ 10.0V		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot V_{OUT}}$	I_{OUT}=40mA -40°C ≤ Topr ≤ 85°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= {$V_{IN}1$ (Note4)-V_{OUT} (E)}
4. $V_{IN}1$= The input voltage at the time 98% of $V_{OUT}(E)$ is output (input voltage has been gradually reduced).

■Typical Application Circuit

●Standard Circuit

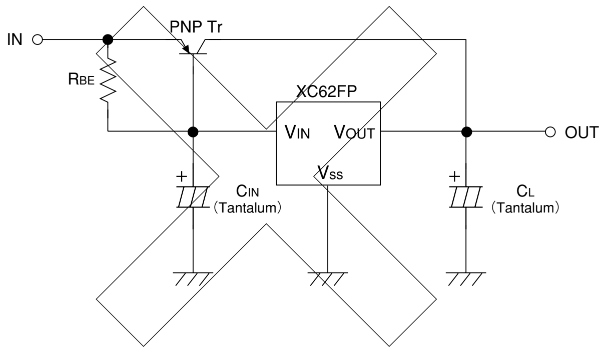


■Directions for use

●Notes on Use

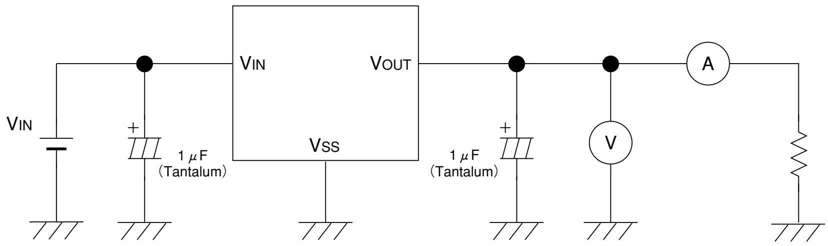
1. Please use this IC within the stipulated absolute maximum ratings as the IC is liable to malfunction outside of such parameters.
2. There is a possibility that oscillation may occur as a result of the impedance present between the power supply and the IC's input. Where impedance is 10Ω or more, please use a capacitor (C_{IN}) of at least 1μF.
   With a large output current, operations can be stabilised by increasing capacitor size (C_{IN}). If C_{IN} is small and capacitor size (C_L) is increased, there is a possibility of oscillation due to input impedance.
   In such cases, operations can be stabilised by either increasing the size of C_{IN} or decreasing the size of C_L.
3. Please ensure that output current (I_{OUT}) is less than Pd ÷ (V_{IN} -V_{OUT}) and does not exceed the stipulated Continuous Total Power Dissipation value (Pd) for the package.
4. Should you wish to increase output current (I_{OUT}) and/or have the capability to exceed the stipulated Pd value, using a current boost circuit (similar to the one shown below) is likely to lead to oscillation.
   With such applications, we recommend use of a boost type voltage regulator, such as the Torex XC62EP series.

Current Boost Circuit : Poor Example

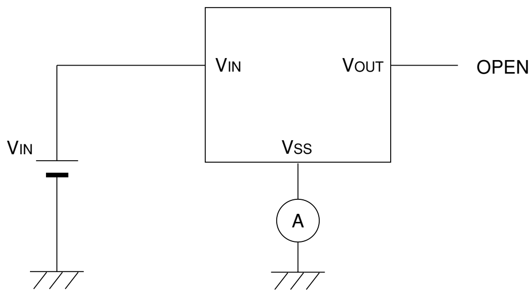


■Test Circuits

Circuit 1



Circuit 2



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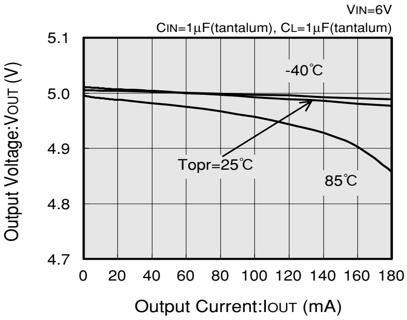
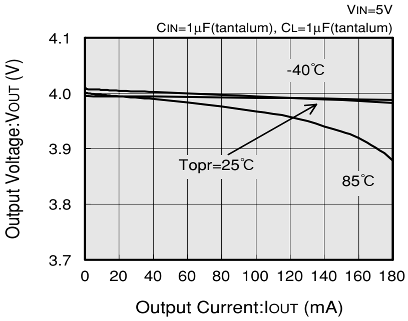
■Typical Performance Characteristics

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

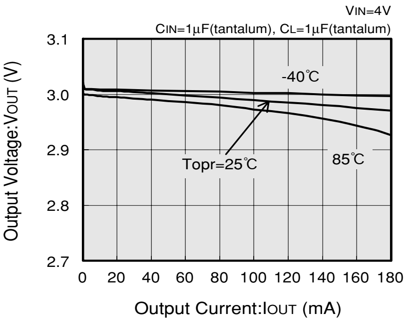
XC62FP5002 (5V)



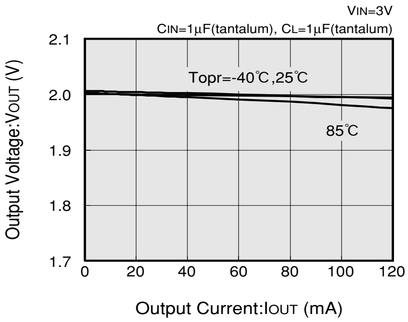
XC62FP4002 (4V)



XC62FP3002 (3V)

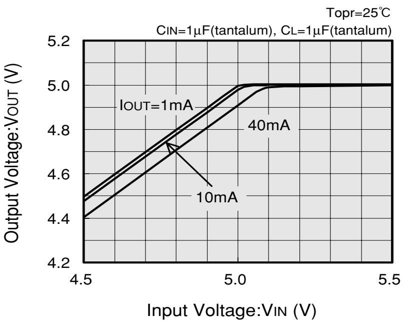


XC62FP2002 (2V)

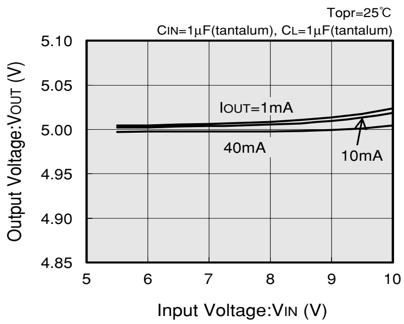


(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

XC62FP5002 (5V)



XC62FP5002 (5V)



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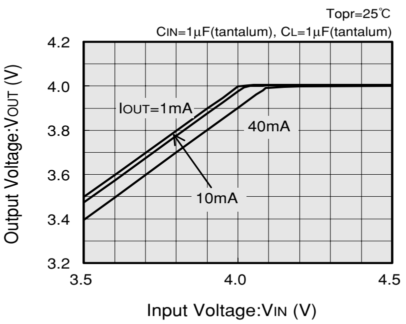
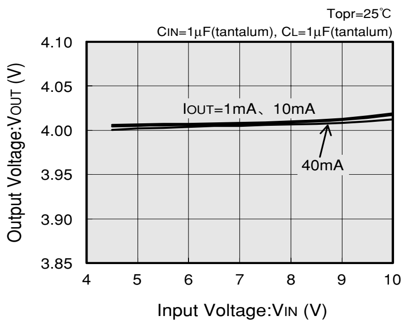


XC62FP4002 (4V)



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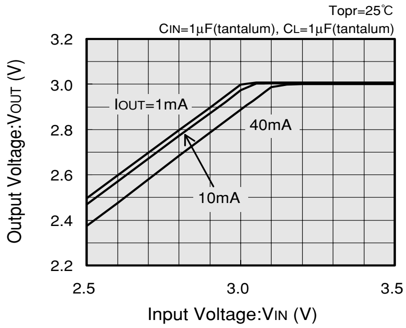
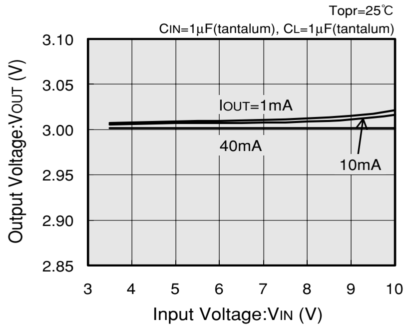
(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

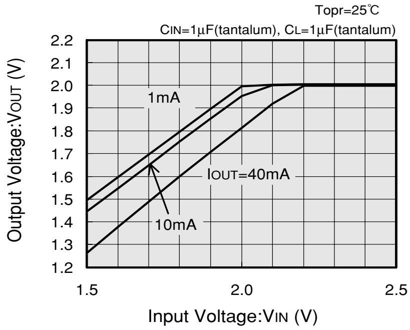
XC62FP3002 (3V)



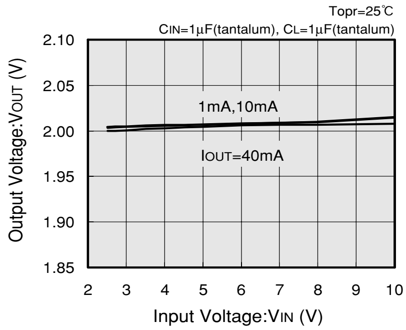
XC62FP3002 (3V)



XC62FP2002 (2V)

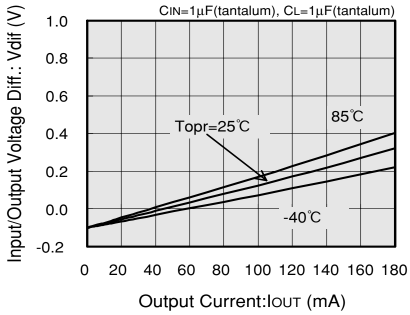


XC62FP2002 (2V)

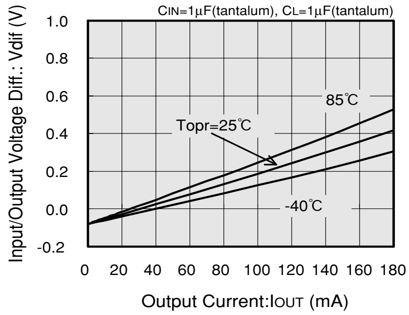


(3) INPUT/OUTPUT VOLTAGE DIFFERENTIAL vs. OUTPUT CURRENT

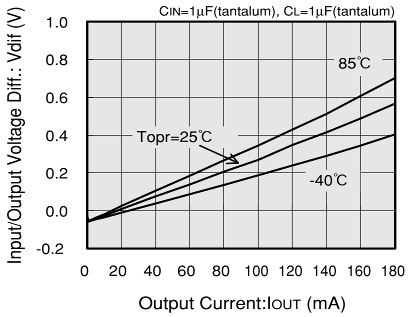
XC62FP5002 (5V)



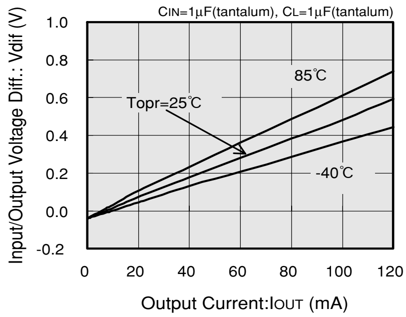
XC62FP4002 (4V)



XC62FP3002 (3V)

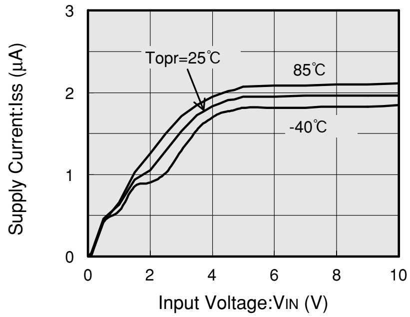


XC62FP2002 (2V)

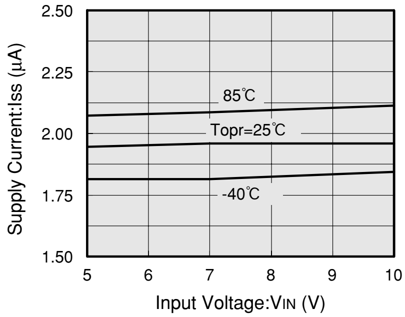


(4) SUPPLY CURRENT vs. INPUT VOLTAGE

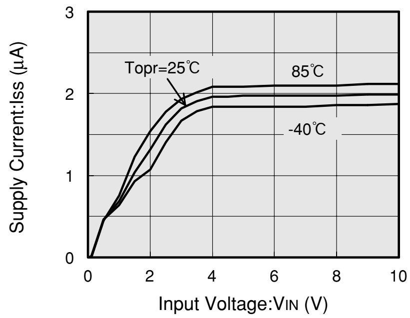
XC62FP5002 (5V)



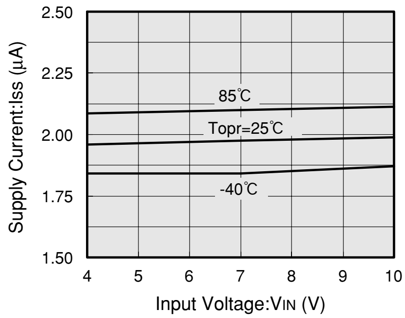
XC62FP5002 (5V)



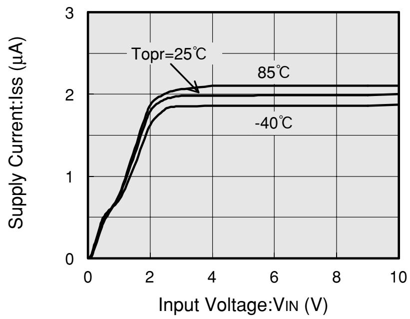
XC62FP4002 (4V)



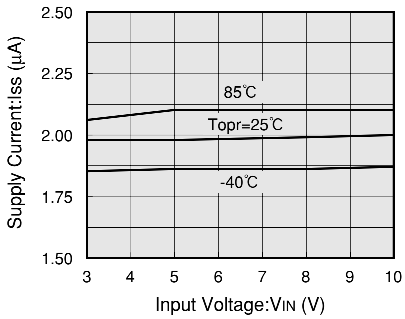
XC62FP4002 (4V)



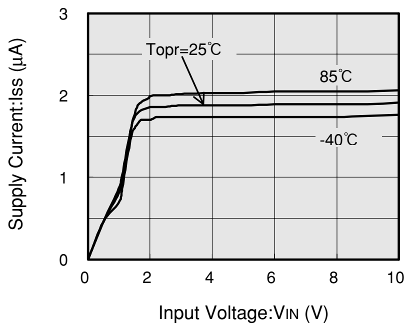
XC62FP3002 (3V)



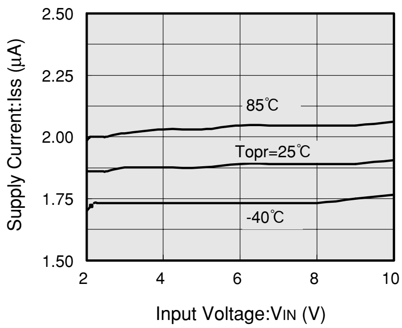
XC62FP3002 (3V)



XC62FP2002 (2V)



XC62FP2002 (2V)



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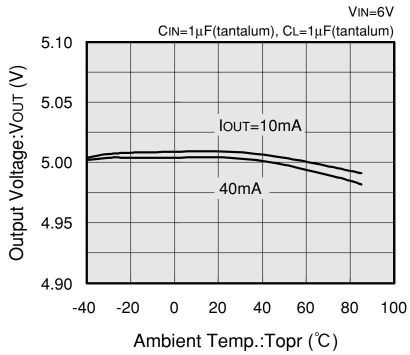
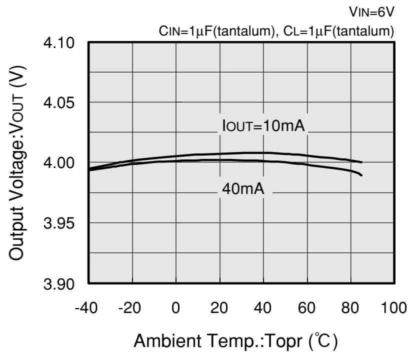
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

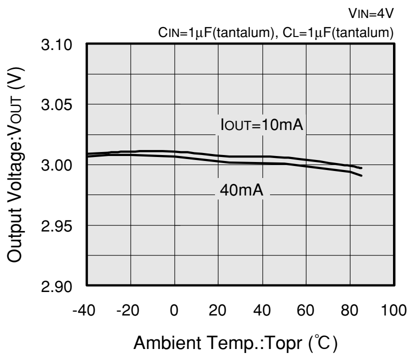
XC62FP5002 (5V)



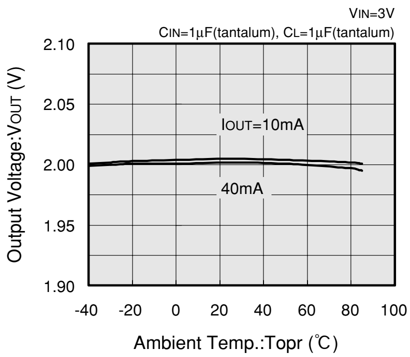
XC62FP4002 (4V)



XC62FP3002 (3V)

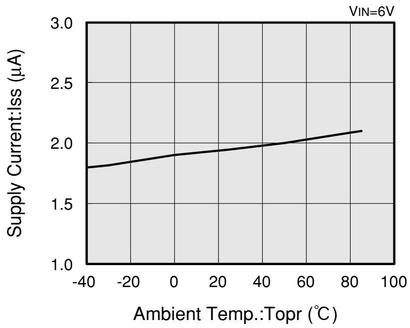


XC62FP2002 (2V)

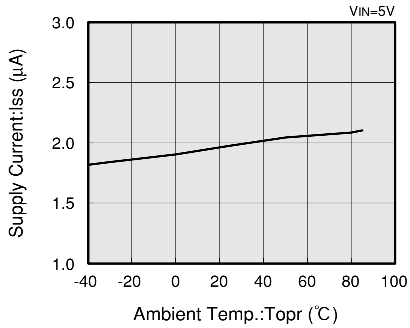


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

XC62FP5002 (5V)



XC62FP4002 (4V)



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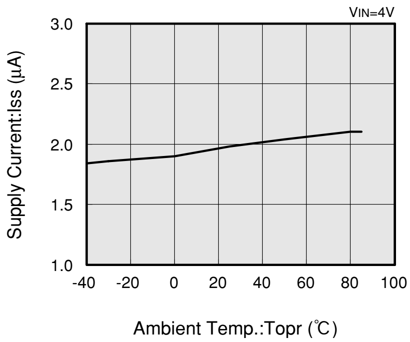

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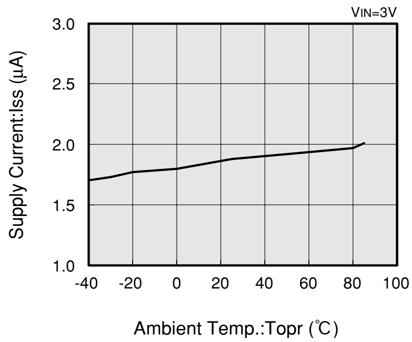

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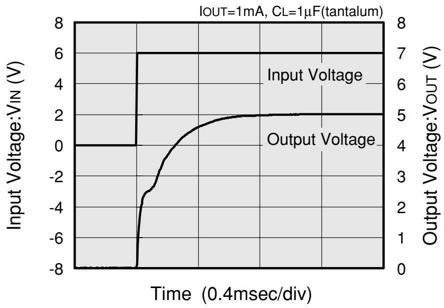
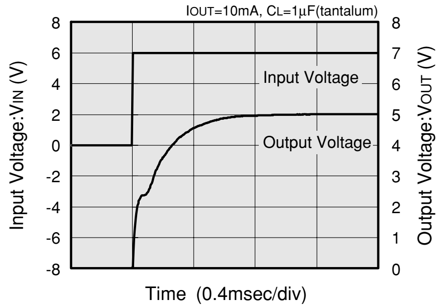
(7) INPUT TRANSIENT RESPONSE 1

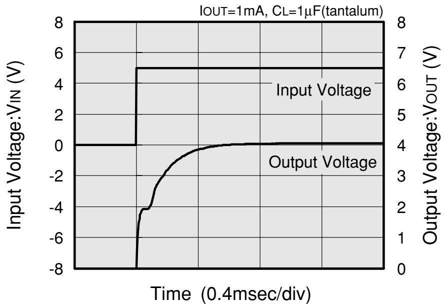
XC62FP5002 (5V)



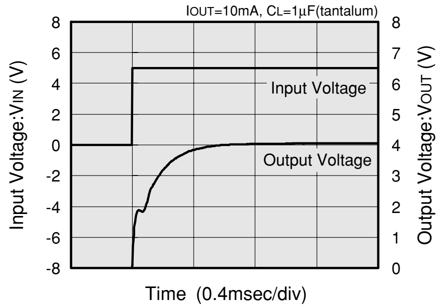
XC62FP5002 (5V)



XC62FP4002 (4V)



XC62FP4002 (4V)



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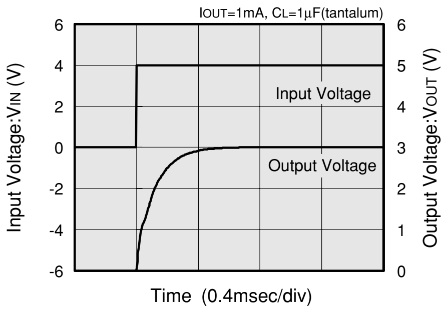

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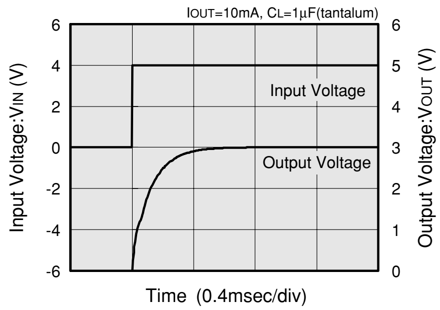

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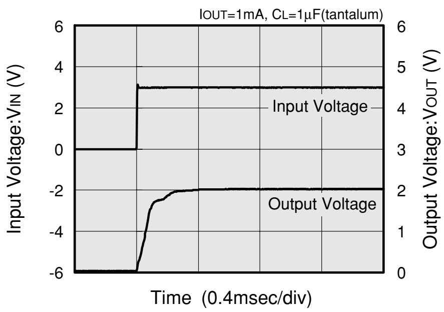
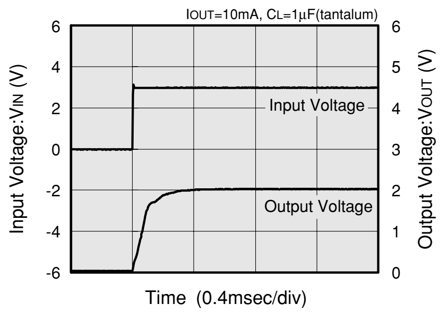
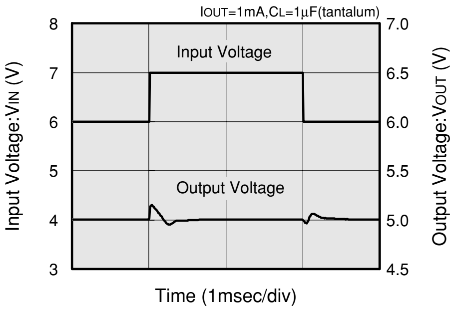


XC62FP2002 (2V)

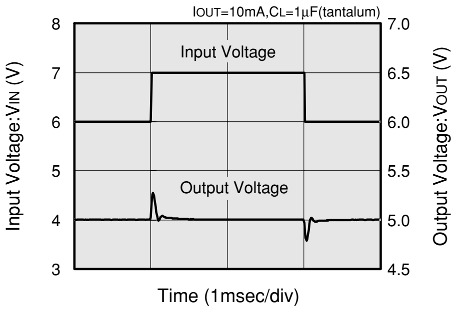


(8) INPUT TRANSIENT RESPONSE 2

XC62FP5002 (5V)



XC62FP5002 (5V)



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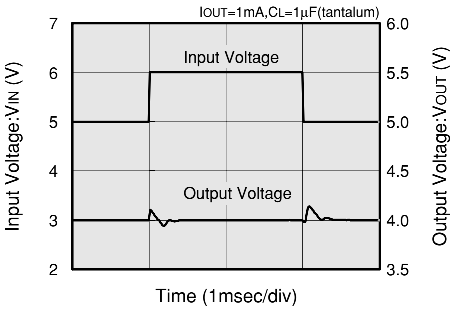

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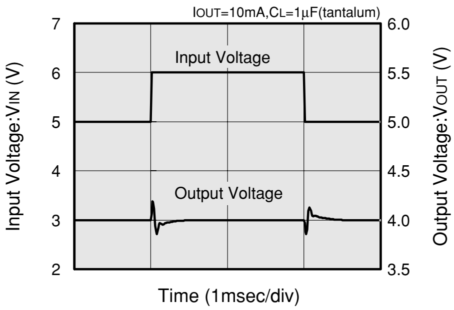

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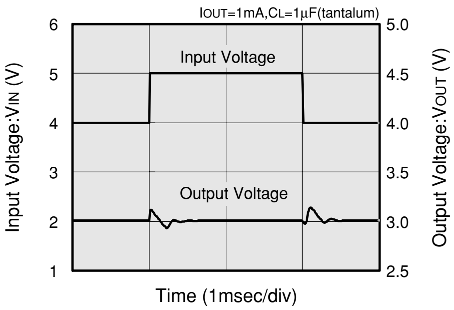

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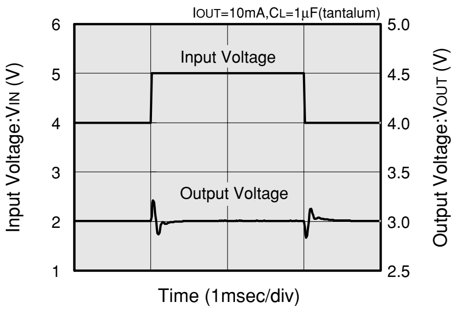
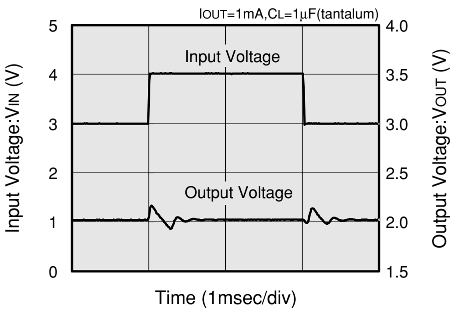


XC62FP2002 (2V)



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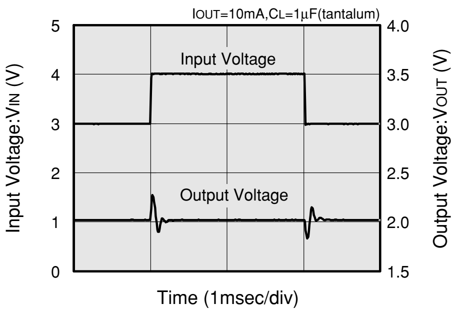

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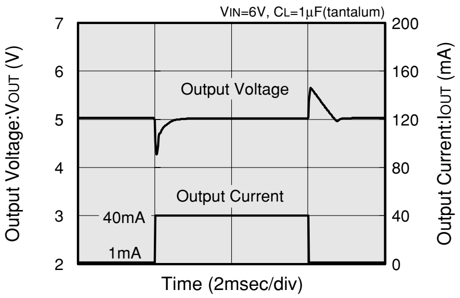
(9) LOAD TRANSIENT RESPONSE

XC62FP5002 (5V)



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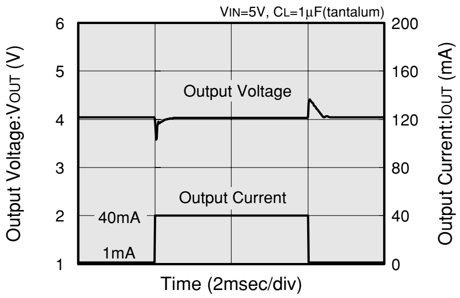

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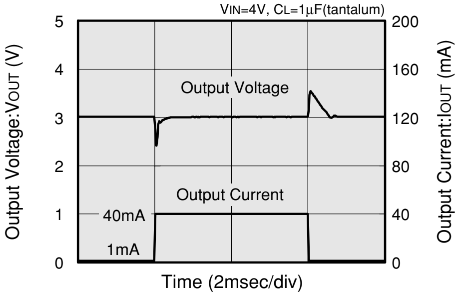

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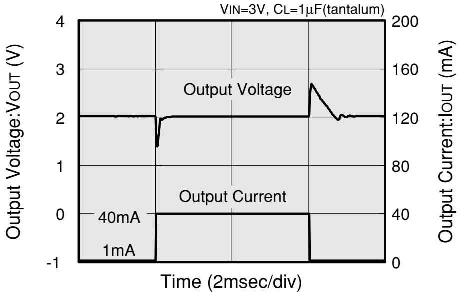
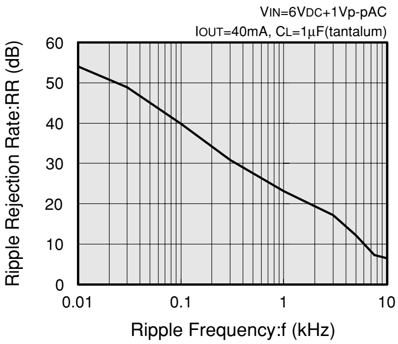


(10) RIPPLE REJECTION RATE

XC62FP5002 (5V)



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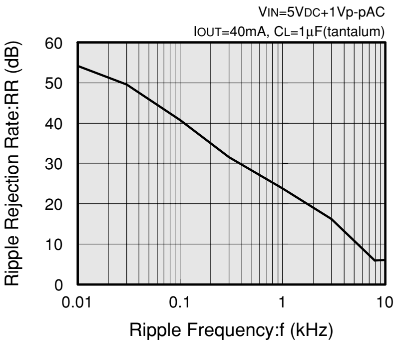

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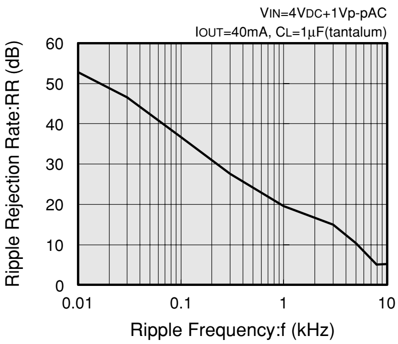

XC62FP2002 (2V)