XC6201 Series — Positive Voltage Regulators

Feb. 7, 01 Ver. VII

- ◆ **CMOS Low Power Consumption**
- ◆ **Dropout Voltage : 200mV @ 80mA**
- ◆ **Output Current : 150mA (Minimum)**
- ◆ **Highly Accurate : ± 2%**
- ◆ **Output Voltage Range : 1.7V ~ 6.0V**
- ◆ **SOT-25 / SOT-89 Package**
- ◆ **Capacitors can be Tantalum or Ceramic**

■ Applications

- ● Mobile phones
- ● Cordless phones
- ● Cameras, video recorders
- ● Portable games
- ● Portable AV equipment
- ● Reference voltage
- ● Battery powered equipment

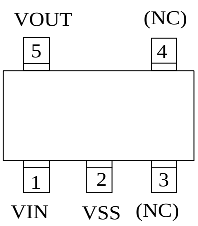
■ General Description

The XC6201 series are highly precise, low power consumption, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provides large currents with a significantly small dropout voltage. The XC6201 consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error amplifier. Output voltage is selectable in 0.1V steps between 1.7V ~ 6.0V.
SOT-25 (150mW) and SOT-89 (500mW) packages are available.

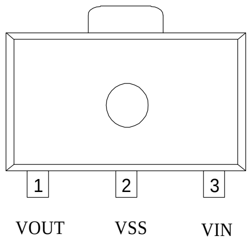
■ Features

Maximum Output Current : 150mA (MIN.)
Dropout Voltage : 200mV @ 80mA
Maximum Operating Voltage : 10V
Output Voltage Range : 1.7V ~ 6.0V (selectable in 0.1V steps)
Highly Accurate : ± 2%
Low Power Consumption : TYP 2.0 μA
Operational Temperature Range : -40°C ~ 85°C
Ultra Small Packages : SOT-25 (150mW), SOT-89 (500mW)
Capacitors can be Tantalum or Ceramic

■ Pin Configuration



SOT-25
(TOP VIEW)

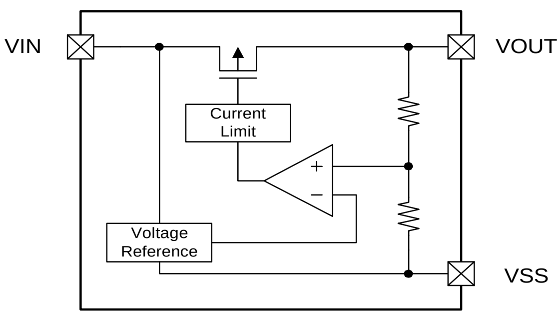


SOT - 89
(TOP VIEW)

■ Pin Assignment

PIN NUMBER		PIN NAME	FUNCTION
SOT-25	SOT-89		
5	1	VOUT	Output
2	2	VSS	Ground
1	3	VIN	Power Input
3	-	(NC)	No Connection
4	-	(NC)	No Connection

■ 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}	VSS - 0.3 ~ VIN + 0.3	V
Power Dissipation	SOT-23	Pd	150	mW
	SOT-89	Pd	500	mW
Operating Temp.		Topr	- 40 ~ + 85	°C
Storage Temp.		Tstg	- 40 ~ + 125	°C

TOREX

■ Ordering Information

X C 6 2 0 1 P c d e f

↑ ↑

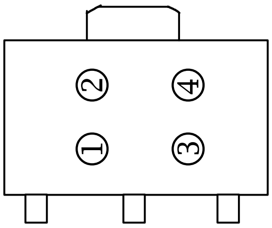
a b

DESIGNATOR	SYMBOL	DESCRIPTION
a	1	Indicates the product number
b	P	Type of regulator 3-pin
c	17~60	Output Voltage e.g. 30 : 3.0V 50 : 5.0V

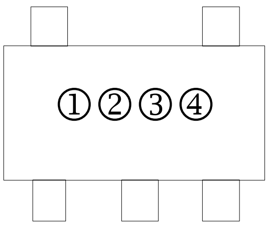
DESIGNATOR	SYMBOL	DESCRIPTION
d	1/2	Output Voltage Accuracy e.g.1 : ±1.0% 2 : ±2.0%
e		Package Type
	M	M=SOT-25
	P	P=SOT-89
f		Device Orientation
	R	Embossed Tape:standard loading
	L	Embossed Tape:reverse loading

■Marking Rule

SOT-89



SOT-25



① Represents the product name

SYMBOL	PRODUCT NAME
1	XC6201PXXXXX

② Represents the type of regulator

VOLTAGE(V)	0.1~3.0	3.1~6.0	6.1~9.0		
SYMBOL	5	6	7	NAME	XC6201PXXXXX

③ Represents the Output Voltage

SYMBOL	OUTPUT VOLTAGE (V)			SYMBOL	OUTPUT VOLTAGE (V)		
	5	6	7		5	6	7
0	-	3.1	-	F	-	4.6	-
1	-	3.2	-	H	1.7	4.7	-
2	-	3.3	-	K	1.8	4.8	-
3	-	3.4	-	L	1.9	4.9	-
4	-	3.5	-	M	2.0	5.0	-
5	-	3.6	-	N	2.1	5.1	-
6	-	3.7	-	P	2.2	5.2	-
7	-	3.8	-	R	2.3	5.3	-
8	-	3.9	-	S	2.4	5.4	-
9	-	4.0	-	T	2.5	5.5	-
A	-	4.1	-	Y	2.6	5.6	-
B	-	4.2	-	V	2.7	5.7	-
C	-	4.3	-	X	2.8	5.8	-
D	-	4.4	-	Y	2.9	5.9	-
E	-	4.5	-	Z	3.0	6.0	-

④ Represents the assembly lot no.

0~9, A~Z repeated (G, I, J, O, Q, W excepted)

■ Electrical Characteristics

XC6201P272 VOUT(T) = 2.7V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	VOUT(E) (Note2)	IOUT=40mA VIN=3.7V	2.646	2.700	2.754	V	2
Maximum Output Current	IOUT max	VIN=4.0V, VOUT(E) ≥ 2.43V	100			mA	2
Load Regulation	ΔVOUT	VIN=4.0V 1mA ≤ IOUT≤ 80mA		15	40	mV	2
Dropout Voltage (Note 3)	Vdif1	IOUT=80mA		200	370	mV	2
	Vdif2	IOUT=160mA		450	710	mV	2
Supply Current	ISS	VIN=4.0V		2.0	5.0	μA	1
Line Regulation	ΔVOUT / ΔVIN · VOUT	IOUT=40mA 4.0V ≤ VIN ≤ 10.0V		0.2	0.3	%/V	2
Input Voltage	VIN				10	V	-
Output Voltage Temperature Characteristics	ΔVOUT / ΔTopr · VOUT	IOUT=40mA -40°C ≤ Topr ≤ 85°C		±100		ppm/°C	2

XC6201P332 VOUT(T) = 3.3V

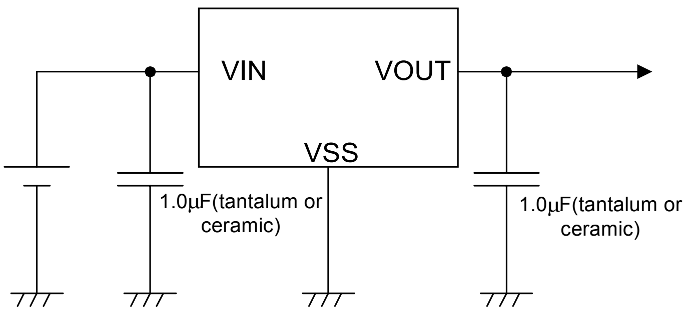
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	VOUT(E) (Note2)	IOUT=40mA VIN=4.3V	3.234	3.300	3.366	V	2
Maximum Output Current	IOUT max	VIN=4.3V, VOUT(E) ≥ 2.97V	150			mA	2
Load Regulation	ΔVOUT	VIN=4.3V 1mA ≤ IOUT≤ 80mA		20	50	mV	2
Dropout Voltage (Note 3)	Vdif1	IOUT=80mA		200	360	mV	2
	Vdif2	IOUT=160mA		450	700	mV	2
Supply Current	ISS	VIN=4.3V		2.0	5.0	μA	1
Line Regulation	ΔVOUT / ΔVIN · VOUT	IOUT=40mA 4.3V ≤ VIN ≤ 10.0V		0.2	0.3	%/V	2
Input Voltage	VIN				10	V	-
Output Voltage Temperature Characteristics	ΔVOUT / ΔTopr · VOUT	IOUT=40mA -40°C ≤ Topr ≤ 85°C		±100		ppm/°C	2

XC6201P502 VOUT(T) = 5.0V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	VOUT(E) (Note2)	IOUT=40mA VIN=6.0V	4.900	5.000	5.100	V	2
Maximum Output Current	IOUT max	VIN=6.0V, VOUT(E) ≥ 4.5V	200			mA	2
Load Regulation	ΔVOUT	VIN=6.0V 1mA ≤ IOUT≤ 100mA		30	70	mV	2
Dropout Voltage (Note 3)	Vdif1	IOUT=100mA		160	340	mV	2
	Vdif2	IOUT=200mA		400	600	mV	2
Supply Current	ISS	VIN=6.0V		2.0	6.0	μA	1
Line Regulation	ΔVOUT / ΔVIN · VOUT	IOUT=40mA 6.0V ≤ VIN ≤ 10.0V		0.2	0.3	%/V	2
Input Voltage	VIN				10	V	-
Output Voltage Temperature Characteristics	ΔVOUT / ΔTopr · VOUT	IOUT=40mA -40°C ≤ Topr ≤ 85°C		±100		ppm/°C	2

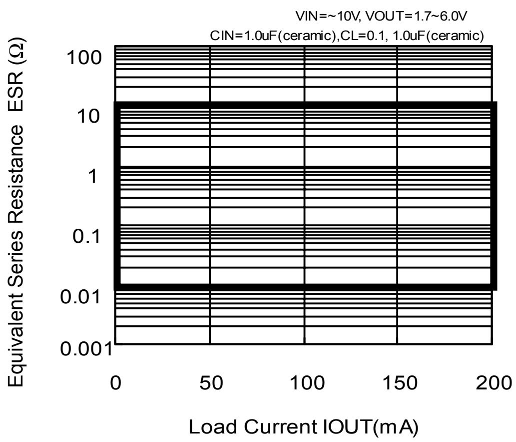
Note : 1. VOUT(T) = Specified Output Voltage.
2. VOUT(E) = Effective Output Voltage (i.e. the output voltage when "VOUT(T)+1.0V" is provided while maintaining a certain IOUT value).
3. Vdif = { VIN1 (Note5) - VOUT1 (Note4) }
4. VOUT1 = A voltage equal to 98% of the output voltage when a stabilised (VOUT (T) + 1.0V) is input.
5. VIN1 = The input voltage at the time VOUT1 is output (input voltage has been gradually reduced).

■ Typical Application



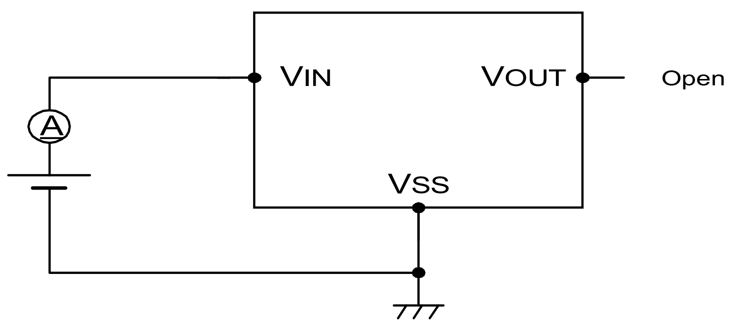
< External Capacitors>
XC6201 requires an output capacitor between VOUT pin and VSS pin, in order to obtain stable output voltage. The output capacitor should be greater than 0.1μF except when using low ESR capacitor (e.g. ceramic capacitors) which should be lower than 10μF.
In addition, an input capacitor is required between VIN pin and VSS pin to stabilize the input power supply.

Capacitors	Conditions
tantalum capacitor	greater than 0.1μF
low ESR capacitor (e.g. ceramic capacitor)	0.1μF ~ 10μF

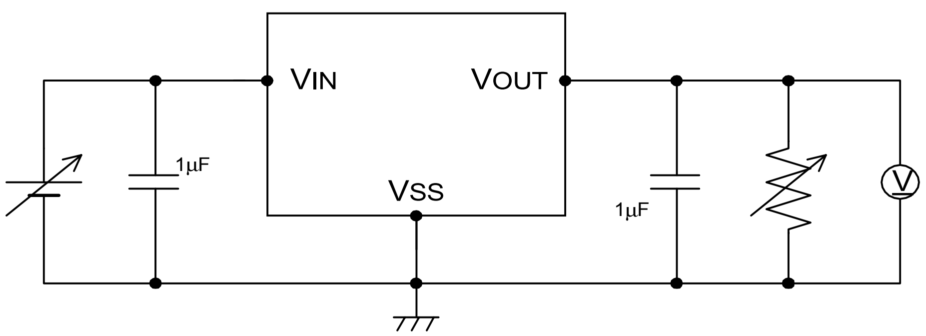


■ Measuring Circuits

Measuring Circuit 1 : Supply Current

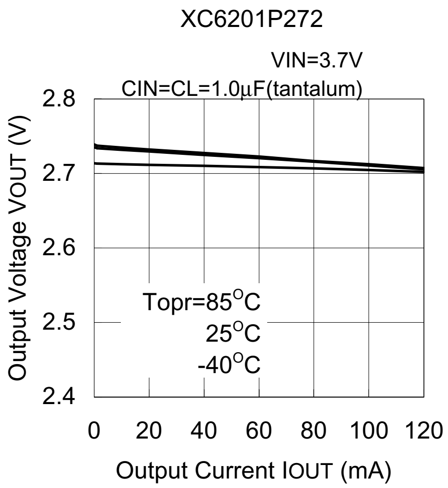


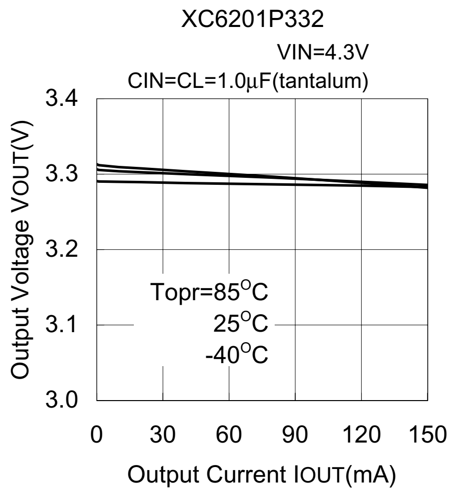
Measuring Circuit 2 : Output Voltage, Oscillation Check, Line Regulation, Dropout Voltage, Load Regulation

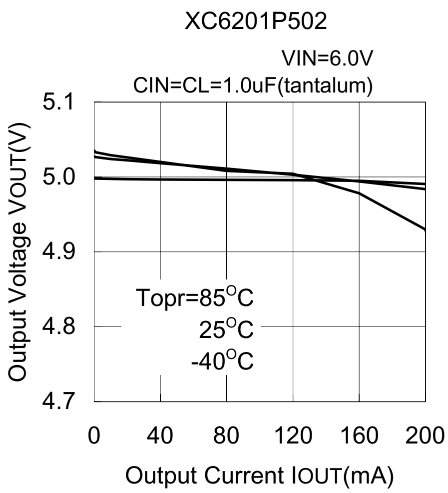


■ XC6201P

(1)Output Voltage vs. Output Current







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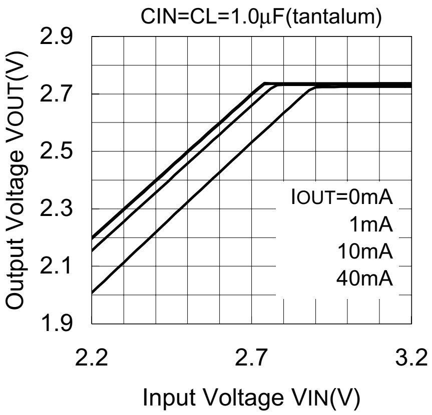
(2)Output Voltage vs. Input Voltage

XC6201P272



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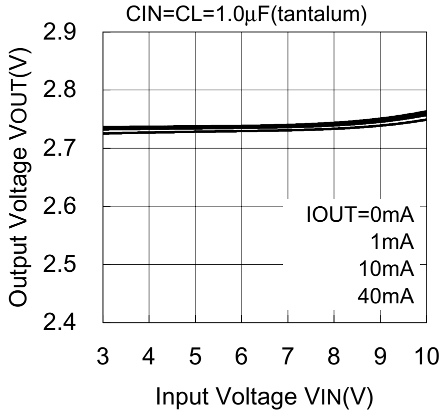
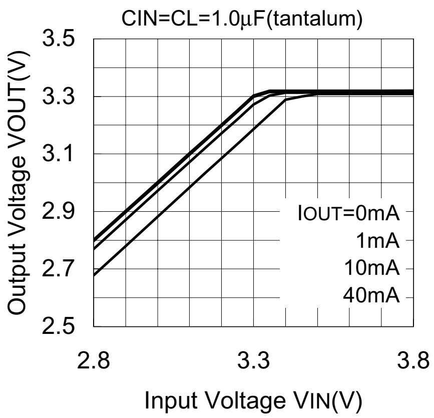


XC6201P332



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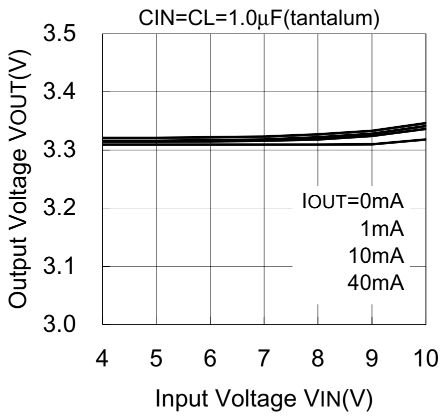
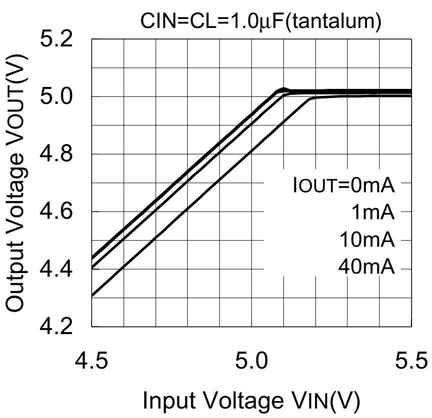
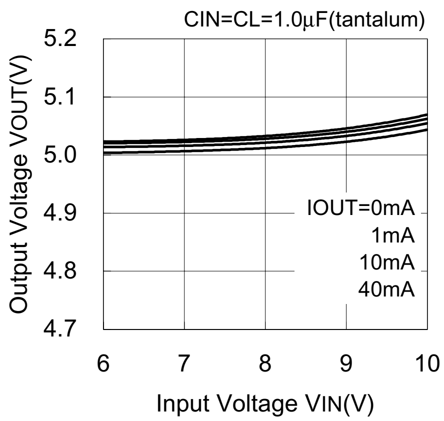


XC6201P502

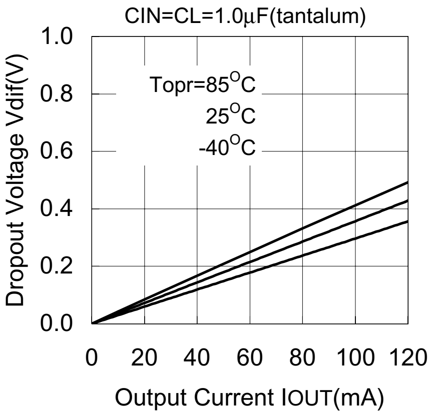


XC6201P502



(3)Dropout Voltage vs. Output Current

XC6201P272



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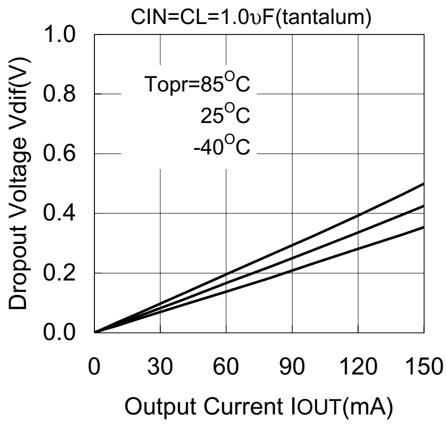

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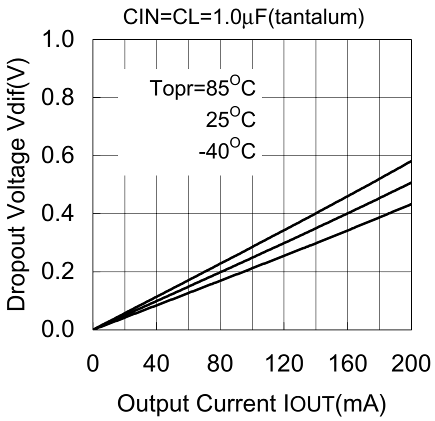
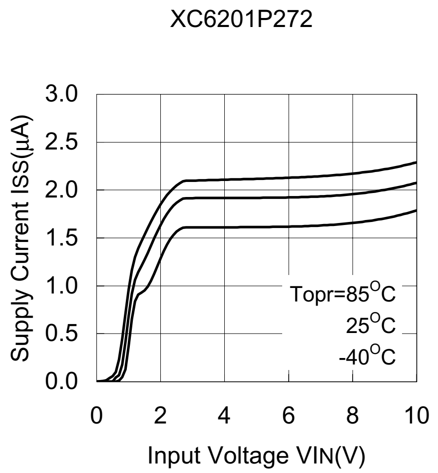
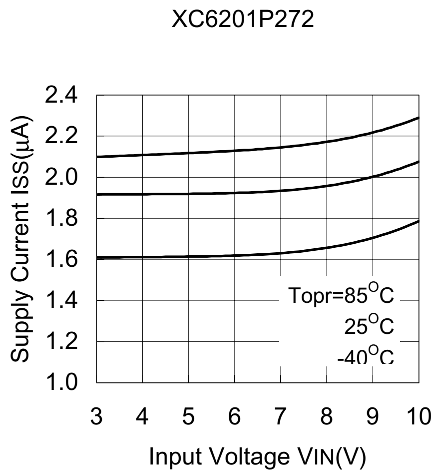
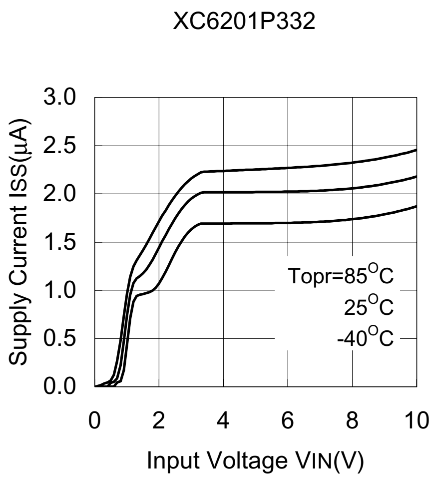
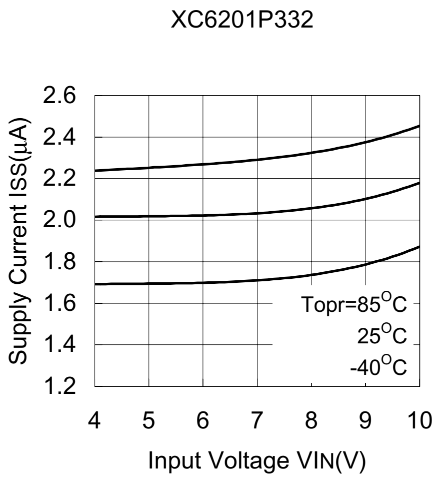


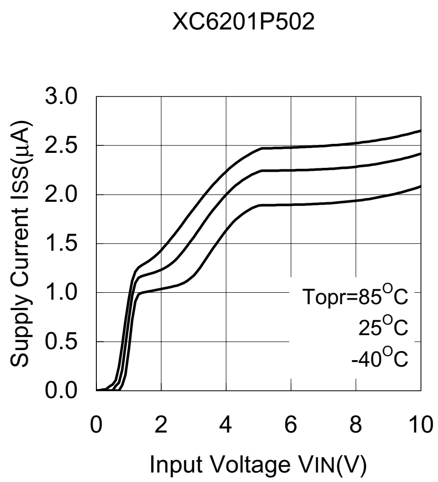
(4)Supply Current vs. Input Voltage

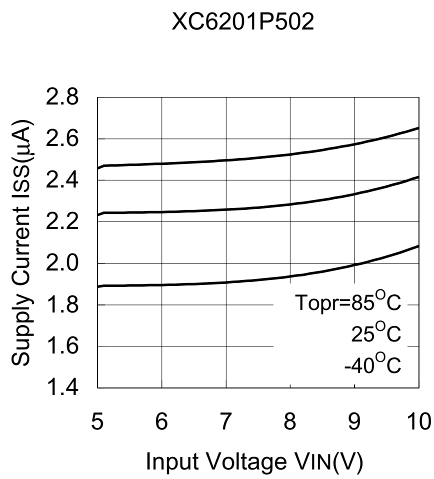




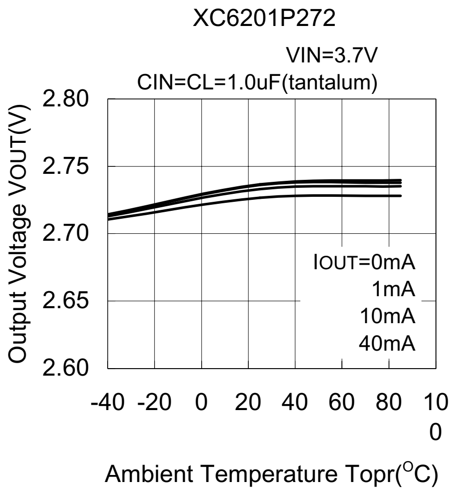


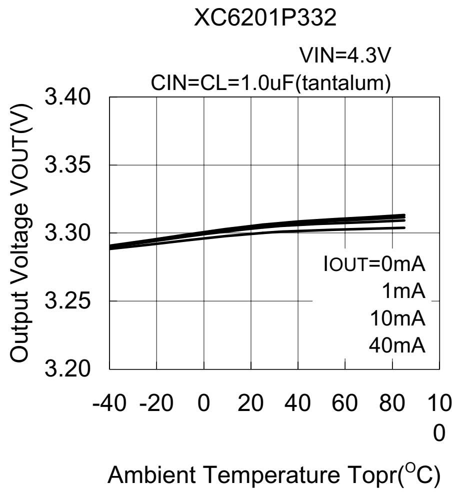


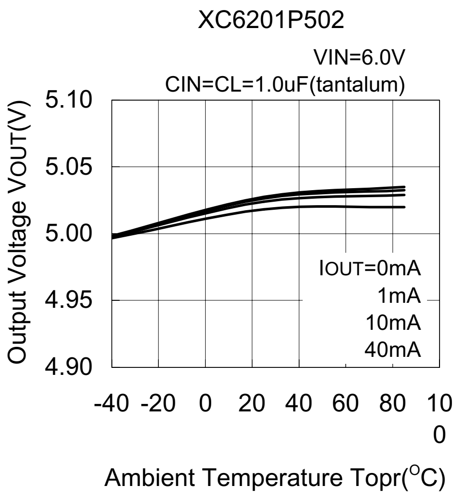




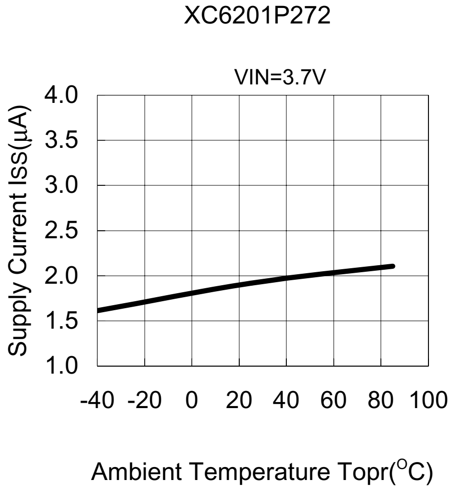
(5)Output Voltage vs. Ambient Temperature

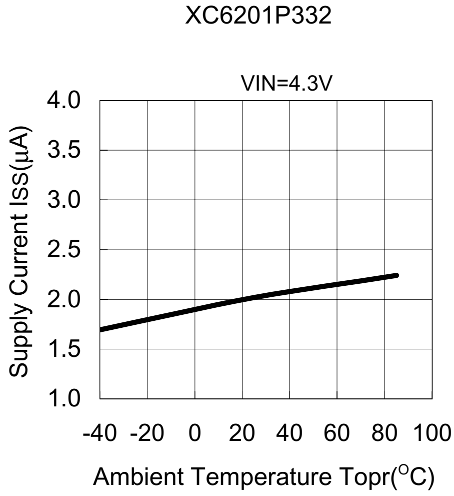


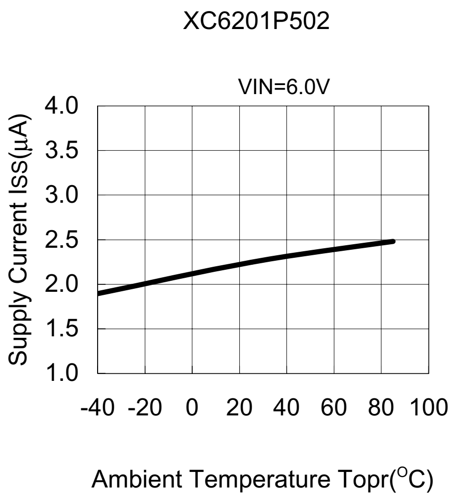




(6)Supply Current vs. Ambient Temperature



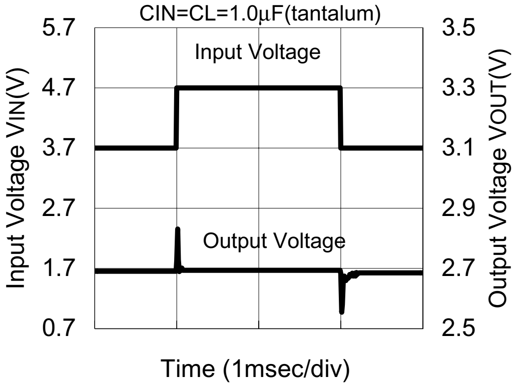




(7)Input Transient Response

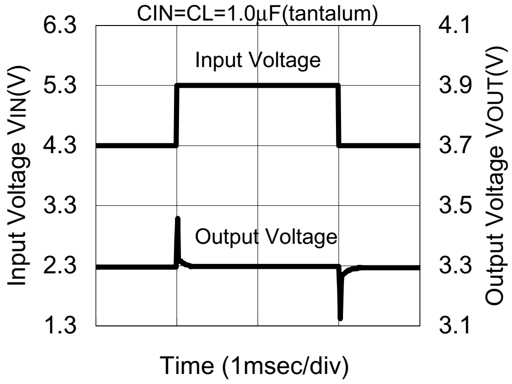
XC6201P272

VIN=3.7V, IOUT=40mA
CIN=CL=1.0µF(tantalum)



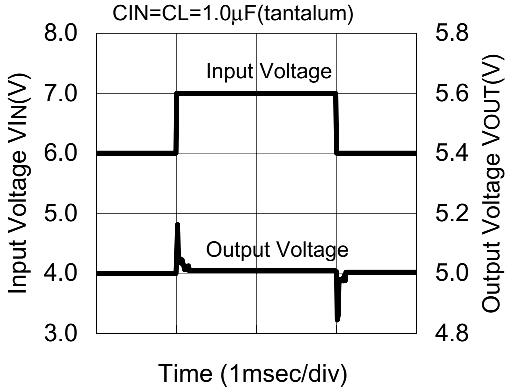
XC6201P332

VIN=4.3V, IOUT=40mA
CIN=CL=1.0µF(tantalum)

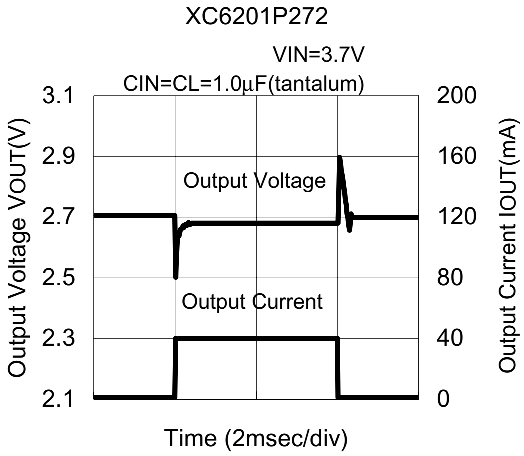


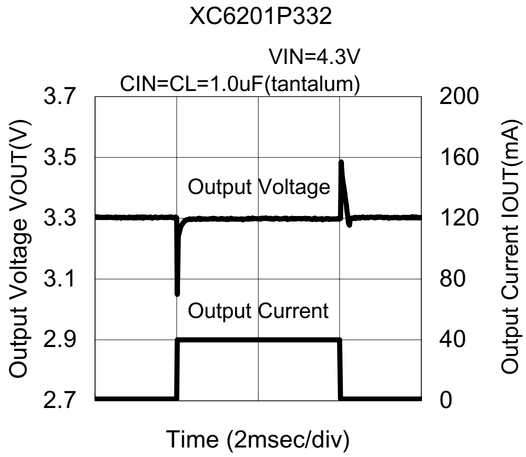
XC6201P502

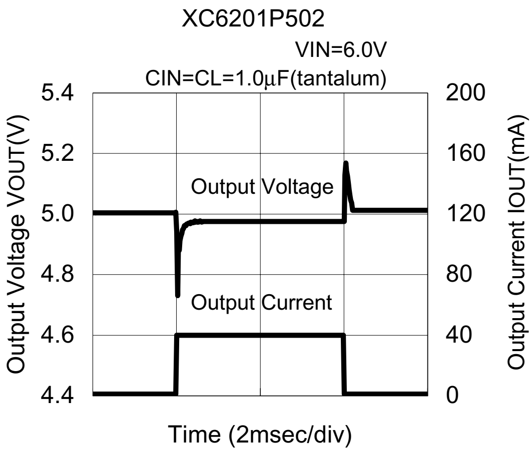
VIN=6.0V, IOUT=40mA
CIN=CL=1.0µF(tantalum)



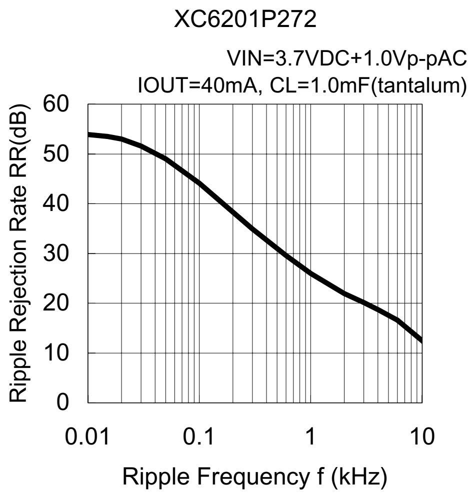
(8)Load Transient Response

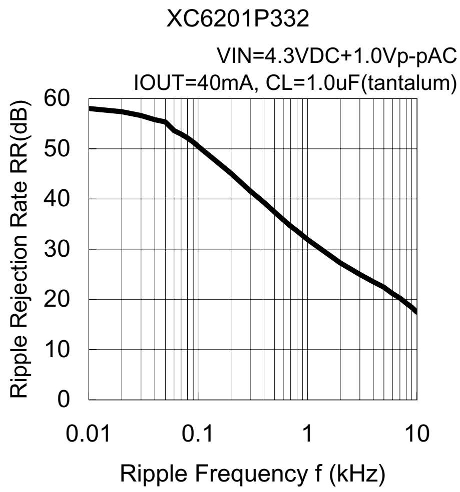


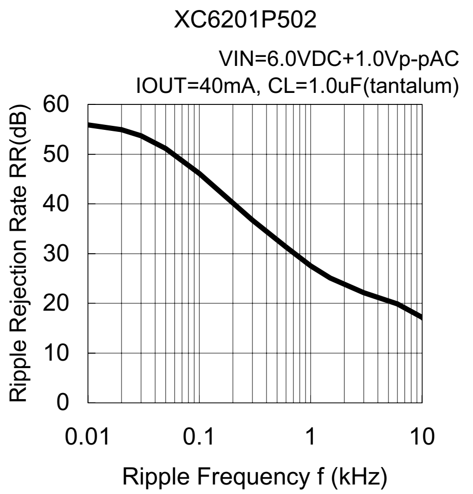




(9)Ripple Rejection Rate







(10)Output Noise Density