XC6203



Series

(Large Current) Positive Voltage Regulators

- **♦**CMOS Low Power Consumption (16μA max)
- ◆Dropout Voltage: 150mV@ 100mA,
 - 300mV @ 200mA
- **♦**Maximum Output Current
 - : more than 400mA (3.3V)
- ♦Highly Accurate: ± 2%
- ◆SOT-89 / SOT-223 / TO-92 Package

■General Description

The XC6203E 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 XC6203E consists of a driver transistor, a precision reference voltage and an error amplifier. Output voltage is selectable in 0.1V steps between a voltage of 1.8V and 6.0V.

SOT-89 (500mW), SOT-223 (1200mW) and TO-92 (300mW) package.

■Applications

- Battery Powered Equipment
- ●Reference Voltage Sources
- ●Cameras, Video Cameras
- ●CD-ROMs, DVDs
- ●Palmtops
- ●Portable Audio Video Equipment

Features

Maximum Output Current: 400mAMaximum Operating Voltage: 8V

Output Voltage Range : 1.8V ~ 6.0V

(selectable in 0.1V steps)

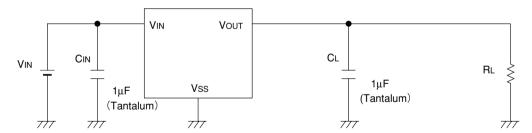
 $\begin{tabular}{lll} \begin{tabular}{lll} Highly Accurate & : $\pm 2\%$ \\ Low Power Consumption & : TYP 8.0 μA \\ Output Voltage Temperature Characteristics \\ \end{tabular}$

: TYP ±100ppm/°C

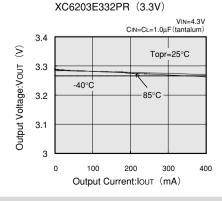
Operational Temperature Range: -40°C ~ 85°C

Ultra Small Packages : SOT-89, SOT223, TO-92

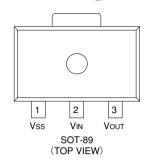
■Typical Application Circuit

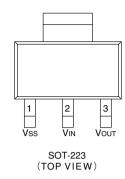


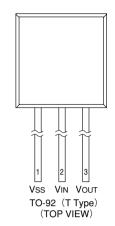
■Typical Performance Characteristic

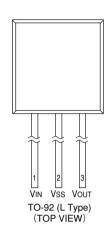


■Pin Configuration









■Pin Assignment

PIN NUMBER		PIN NAME	FUNCTION	
SOT-89/SOT223/TO-92 (T)	TO-92 (L)	FIN NAIVIE	TONCTION	
1	2	Vss	Ground	
2	1	Vin	Power Input	
3	3	Vout	Output	

■Product Classification

●Ordering Information

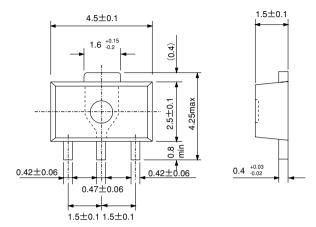
XC6203 123456

DESIGNATOR	SYMBOL	DESCRIPTION	DESIGNATOR	SYMBOL	DESCRIPTION		
①		Type of Regulator		Package Type			
	Р	Current limiter circuit built-in		Р	SOT-89		
	Г	Carrent infilter circuit built-in	(5)	F	SOT-223		
	Е	Nie groupent lineiten gineriit briit in		Т	TO-92 (Standard)		
		No current limiter circuit built-in		L	TO-92 (Custom pin configuration)		
				Device Orientation			
	18~ 60 & A	e.g. 252 : 2.5V, Accuracy ±2%		R	Embossed Tape (Standard Feed)		
234		28A: 2.85V, Accuracy ±2%*	6	L	Embossed Tape (Reverse Feed)		
		"A" indicates voltage of 50mV steps		Н	Paper Type (TO-92)		
				В	Bag (TO-92)		

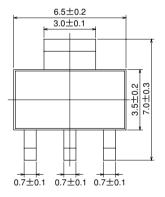
Note*: Output Voltage in 50mV steps is applied only for 2.85V type. Accuracy of $\pm 1\%$ is available as custom-designed products.

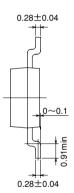
■Packaging Information

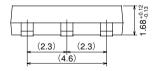
●SOT-89

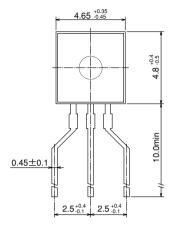


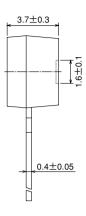
●SOT-223







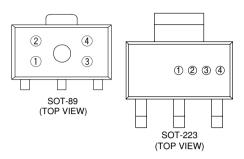






■Marking

●SOT-89, SOT-223



① Represents the product name

DESIGNATOR	PRODUCT NAME	
3	XC6203 * * * * *	

2 Represents the type of regulator

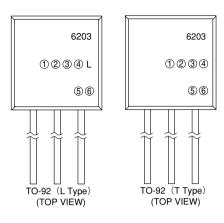
DESIGNATOR			PRODUCT NAME
VOLTAGE=0.1~3.0V VOLTAGE=3.1~6.0V		VOLTAGE=2.85V	
5	6	7	XC6203P****
2	3	4	XC6203E****

3 Represents the output voltage

DESIGNATOR	OUTPUT VOLTAGE (V)			DESIGNATOR	OUTP	UT VOLTAGE	(V)
0	_	3.1	_	F	_	4.6	_
1	_	3.2	_	Н	_	4.7	_
2	-	3.3	_	K	1.8	4.8	_
3	ı	3.4	_	L	1.9	4.9	_
4	I	3.5	_	М	2.0	5.0	_
5	ı	3.6	_	N	2.1	5.1	_
6	_	3.7	_	Р	2.2	5.2	_
7	_	3.8	_	R	2.3	5.3	_
8	_	3.9	_	S	2.4	5.4	_
9	_	4.0	_	Т	2.5	5.5	_
Α	_	4.1	_	U	2.6	5.6	_
В	_	4.2	_	V	2.7	5.7	_
С	_	4.3	_	X	2.8	5.8	2.85
D	_	4.4	_	Y	2.9	5.9	_
E	_	4.5	_	Z	3.0	6.0	_

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

●TO-92



Represents the type of regulator

DESIGNATOR	PRODUCT NAME
Р	XC6203P****
E	XC6203E****

234 Represents the output voltage

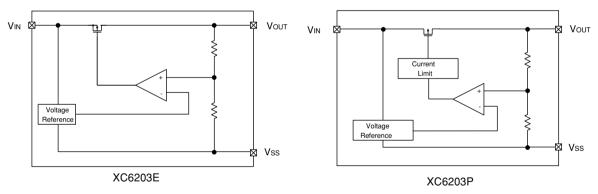
D	DESIGNATOR		DESIGNATOR VOLTAGE VOLT			VOLTAGE	PRODUCT NAME
2	3	4	(V)	ACCURACY(%)	PRODUCT NAME		
3	3	2	3.3	±2	XC6203*33***		
5	0	2	5.0	±2	XC6203*50***		
2	8	Α	2.85	±2	XC6203*28A**		

5 Represents a least significant digit of the produced year

DESIGNATOR	PRODUCED YEAR
0	2000
1	2001

Denotes the production lot number
 0 to 9, A to Z repeated(G.I.J.O.Q.W excepted)
 Note: Character inversion is not used

■Block Diagram



■Absolute Maximum Ratings

Ta=25°C

			14-25 0	
PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		VIN	12	٧
Output Current		IOUT	500	mA
Output Voltage		Vout	Vss-0.3~VIN+0.3	V
	SOT-89		500	
Power Dissipation	SOT-223	Pd	1,200 ^(NOTE)	mW
	TO-92		300	
Operating Ambient Temperature		Topr	− 40∼+85	°C
Storaç	ge Temperature	Tstg	−40~ +125	°C

Note: Circuits board mounting: Double-sided board

■Electrical Characteristics

XC6203X182 VOUT(T)=1.8V (Note 1)

Ta=25°C

7.000.007.100							
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
) (Noto2)	VIN=2.8V	1.704	4.000	1.000	V	
Output Voltage	VOUT(E) (Note2)	IOUT=40mA	1.764	1.800	1.836	V	
	IOUTmax	VIN=2.8V	400			mA	
Maximum Output Current	IOUTHIAX	VOUT≥VOUT(E) ×0.90	400			MA	
Land Danidakan	AMOUT	VIN=2.8V		40	100	\/	
Load Regulation	ΔVOUT	1mA≤lOUT≤200mA		40	100	mV	
Dropout Voltage (Note3)	Vdif1	IOUT=100mA	200		300	,,	
Dropout Voltage (*****)	Vdif2	IOUT=200mA		400	600 n	mV	
Supply Current	ISS	VIN=2.8V		8.0	16.0	μΑ	
Line Regulation	ΔVOUT	IOUT=40mA		0.2	0.3	%/V	
Line negulation	ΔVIN• ΔVOUT	2.8V≤VIN≤8.0V		0.2	0.3	%/ V	
Input Voltage	VIN				8	V	
Output Voltage	Δ VOUT	IOUT=40mA		±100		ppm	
Temperature Characteristics	ΔTopr•VOUT	-40°C≤Topr≤85°C		100		/°C	
Short Circuit Current	llim	VIN=2.8V		60		mA	
(XC6203P Series Only)	IIIIII	VOUT=0V		00		IIIA	

XC6203X252 VOUT(T)=2.5V (Note 1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Output Voltage	VOUT(E)(Note2)	VIN=3.5V	2.450	2.500	2.550	V	
Output Voltage	VOUT (E) (*********	IOUT=40mA	2.450	2.500	2.550	, v	
Maximum Output Current	IOUTmax	VIN=3.5V	400			mA	
	IOUTIIIAX	$VOUT>VOUT(E) \times 0.93$	400			mA	
Load Regulation	Δ VOUT	VIN=3.5V		40	100	mV	
	Δ ۷ΟΟ1	1mA≤lOUT≤200mA		40	100	IIIV	
Dropout Voltage (Note3)	Vdif1	IOUT=100mA		170 250		mV	
Diopout voltage	Vdif2	IOUT=200mA		320	500 mv	IIIV	
Supply Current	Iss	VIN=3.5V		8.0	16.0	μА	
Line Regulation	ΔVOUT	IOUT=40mA	0.2	0.3	%/V		
Line Hegulation	ΔVIN•ΔVOUT	3.5V≤VIN≤8.0V		0.2	0.3	%/V	
Input Voltage	VIN				8	V	
Output Voltage	ΔVOUT	IOUT=40mA		±100		ppm	
Temperature Characteristics	ΔTopr•VOUT	-40°C≤Topr≤85°C	100			/°C	
Short Circuit Current	llim	VIN=3.5V				mA	
(XC6203P Series Only)	111/11	VOUT=0V		60			

XC6203X302 VOUT(T)=3.0V (Note 1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Output Voltage	VOUT(E)(Note2)	VIN=4V	2.940	3.000	3.060	v	
Output Voltage	VOOT(L)	IOUT=40mA	2.010	0.000	0.000	•	
Maximum Output Current	lOUTmax	VIN=4V	400			mA	
Maximum Output Current	IOUTHIAX	VOUT≥VOUT(E) X0.96	400			MA	
Land Danidation	AMOUT	VIN=4V		40	100	mV	
Load Regulation	ΔVOUT	1mA≤lOUT≤200mA		40	100	mv	
Dropout Voltage (Note3)	Vdif1	IOUT=100mA		150	220	\/	
Dropout Voltage (***)	Vdif2	IOUT=200mA		300	420	mV	
Supply Current	Iss	VIN=4V		8.0	16.0	μА	
Line Regulation	ΔVOUT	IOUT=40mA		0.0	0.3	0/ A/	
Line negulation	Δ VIN• Δ VOUT	4V≤VIN≤8.0V	0.2		0.3	%/V	
Input Voltage	VIN				8	V	
Output Voltage	ΔVOUT	IOUT=40mA		±100		ppm	
Temperature Characteristics	ΔTopr•VOUT	-40°C≤Topr≤85°C	±100			/°C	
Short Circuit Current	llim	VIN=4V		60		mA	
(XC6203P Series Only)	III/II	VOUT=0V		60		IIIA	

XC6203X332 VOUT(T)=3.3V (Note 1)

Ta=25°C

X00200X002 V001(1/=3.3V						
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	VOUT(E)(Note2)	VIN=4.3V	3.234	3.300	3.366	V
		IOUT=40mA				
Maximum Output Current	IOUTmax	VIN=4.3V	400			A
		VOUT≥VOUT(E) ×0.96				mA
Load Regulation	ΔVOUT	VIN=4.3V		40	100	mV
		1mA≤lOUT≤200mA				
Dropout Voltage (Note3)	Vdif1	IOUT=100mA		150	220	mV
	Vdif2	IOUT=200mA		300	420	
Supply Current	ISS	VIN=4.3V		8.0	16.0	μΑ
Line Regulation	ΔVOUT	IOUT=40mA		0.2	0.3	0/ 0/
	Δ VIN• Δ VOUT	4.3V≤VIN≤8.0V				%/V
Input Voltage	VIN				8	V
Output Voltage	ΔVOUT	IOUT=40mA		±100		ppm
Temperature Characteristics	ΔTopr•VOUT	-40°C≤Topr≤85°C				/°C
Short Circuit Current	llim	VIN=4.3V		60		mA
(XC6203P Series Only)		VOUT=0V				IIIA

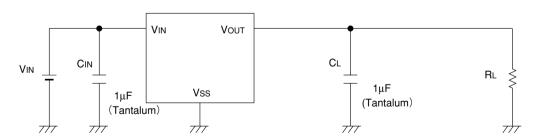
VOUT (T) =5.0V (Note 1) XC6203X502

XC6203X502 Vout (T)=5.0V (Note 1)								
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS		
Output Voltage	VOUT (E) (Note2)	VIN=6.0V	4.900	5.000	5.100	V		
		IOUT=40mA						
Maximum Output Current	IOUTmax	VIN=6.0V	400			mA		
		Vout≥Vout(E) ×0.96				11173		
Load Regulation	ΔVOUT	VIN=6.0V		40	100	mV		
		1mA≤lOUT≤200mA						
Dropout Voltage (Note3)	Vdif1	IOUT=100mA		100	180	mV		
	Vdif2	IOUT=200mA		200	320			
Supply Current	ISS	VIN=6.0V		10.0	20.0	μΑ		
Line Regulation	ΔVOUT	IOUT=40mA		0.2	0.3	%/V		
	Δ VIN• Δ VOUT	6.0V≤VIN≤8.0V						
Input Voltage	VIN				8	V		
Output Voltage	ΔVOUT	IOUT=40mA		±100		ppm		
Temperature Characteristics	∆Topr•VOUT	-40°C≤Topr≤85°C				/°C		
Short Circuit Current	llim	VIN=6.0V		60		mA		
(XC6203P Series Only)		VOUT=0V				ША		

Note : 1. Vout(T) = Specified Output Voltage.

- 2. Vou $\tau(E)$ = Effective Output Voltage (i.e. the output voltage when "Vou $\tau(T)$ +1.0V" is provided at the Vin pin while maintaining a certain lou τ value).
- 3. Vdif = VIN1 VOUT1
- 4. Vout1 = A voltage equal to 98% of the output voltage when "Vout(T)+1.0V" is input.e
- 5. VIN1 = The input voltage when Vout1 is output following a gradual decrease in the input voltage.

■Typical Application Circuit

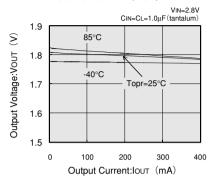


■Typical Performance Characteristics

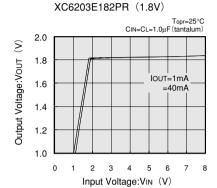
●XC6203E182PR

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

XC6203E182PR (1.8V)

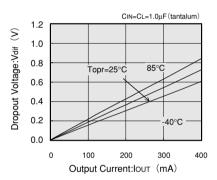


(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE



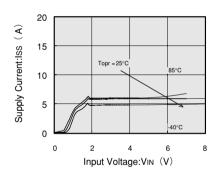
(3) DROPOUT VOLTAGE vs. OUTPUT CURRENT

XC6203E182PR (1.8V)



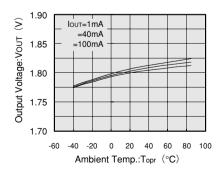
(4) SUPPLY CURRENT vs. INPUT VOLTAGE

XC6203E182PR (1.8V)



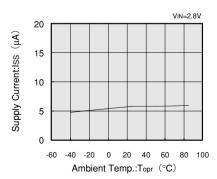
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

XC6203E182PR (1.8V)

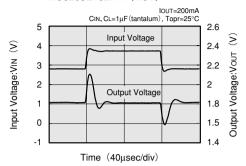


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

XC6203E182PR (1.8V)

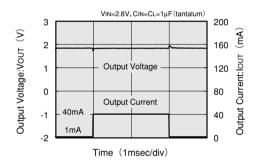


XC6203E182PR (1.8V)

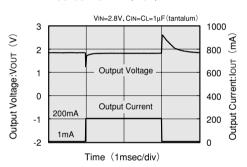


(8) LOAD TRANSIENT RESPONSE

XC6203E182PR (1.8V)

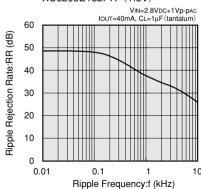


XC6203E182PR (1.8V)

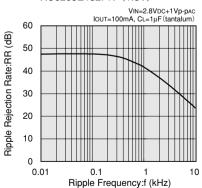


(9) RIPPLE REJECTION RATE

XC6203E182PR (1.8V)



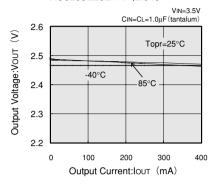
XC6203E182PR (1.8V)



●XC6203E252PR

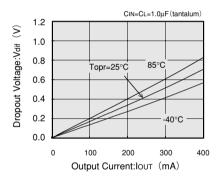
(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

XC6203E252PR (2.5V)



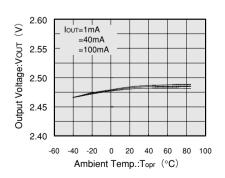
(3) DROPOUT VOLTAGE vs. OUTPUT CURRENT

XC6203E252PR (2.5V)



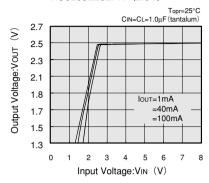
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

XC6203E252PR (2.5V)



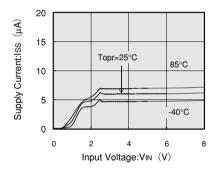
(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE

XC6203E252PR (2.5V)



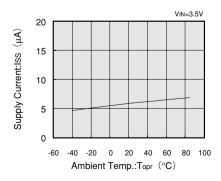
(4) SUPPLY CURRENT vs. INPUT VOLTAGE

XC6203E252PR (2.5V)

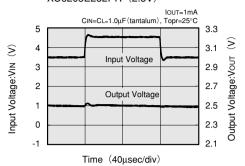


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

XC6203E252PR (2.5V)



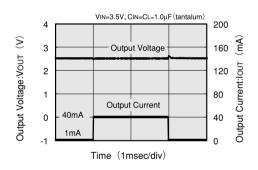
XC6203E252PR (2.5V)



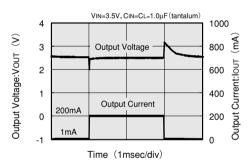
XC6203E252PR (2.5V) IOUT=200mA CIN=CL=1.0μF(tantalum), Topr=25°C 5 3.3 \leq 3.1 4 Input Voltage:Vin (V) Input Voltage Output Voltage:Vo∪T 3 2.9 2 2.7 Output Voltage 2.5 1 0 2.3 -1 2.1 Time (40µsec/div)

(8) LOAD TRANSIENT RESPONSE

XC6203E252PR (2.5V)

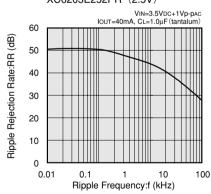


XC6203E252PR (2.5V)

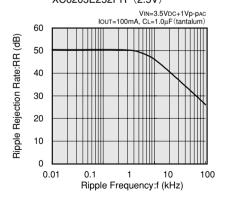


(9) RIPPLE REJECTION RATE

XC6203E252PR (2.5V)



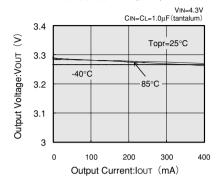
XC6203E252PR (2.5V)



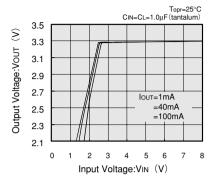
●XC6203E332PR

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

XC6203E332PR (3.3V)

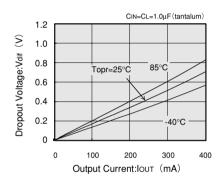


(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE XC6203E332PR (3.3V)



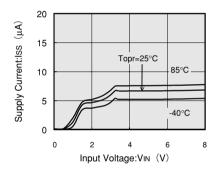
(3) DROPOUT VOLTAGE vs. OUTPUT CURRENT

XC6203E332PR (3.3V)



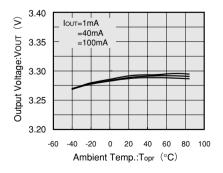
(4) SUPPLY CURRENT vs. INPUT VOLTAGE

XC6203E332PR (3.3V)



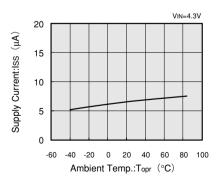
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

XC6203E332PR (3.3V)

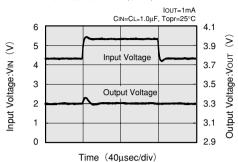


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

XC6203E332PR (3.3V)



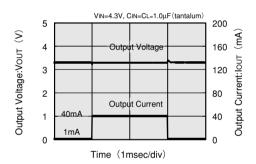
XC6203E332PR (3.3V)



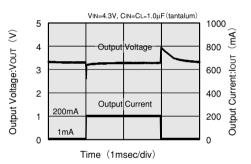
XC6203E332PR (3.3V) IOUT=200mA CIN=CL=1.0µF, Topr=25°C 4.1 6 8 5 3.9 Input Voltage:Vin (V) Output Voltage:Vour Input Voltage 4 3.7 3 3.5 Output Voltage 2 3.3 1 3.1 0 2.9 Time (40µsec/div)

(8) LOAD TRANSIENT RESPONSE

XC6203E332PR (3.3V)

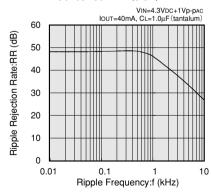


XC6203E332PR (3.3V)

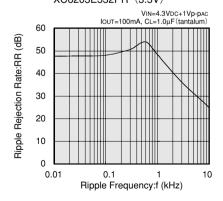


(9) RIPPLE REJECTION RATE

XC6203E332PR (3.3V)



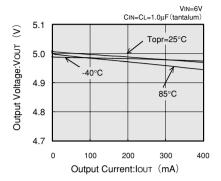
XC6203E332PR (3.3V)



●XC6203E502PR

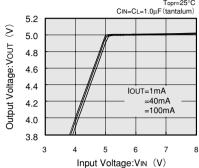
(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

XC6203E502PR (5.0V)



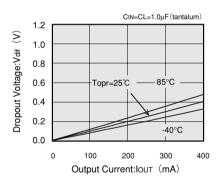
XC6203E502PR (5.0V) Topr=25°C CIN=CL=1.0μF(tantalum)

(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE



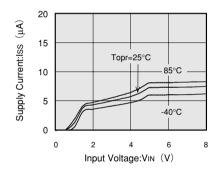
(3) DROPOUT VOLTAGE vs. OUTPUT CURRENT

XC6203E502PR (5.0V)



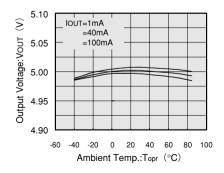
(4) SUPPLY CURRENT vs. INPUT VOLTAGE

XC6203E502PR (5.0V)



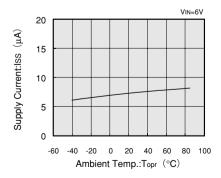
(5) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

XC6203E502PR (5.0V)

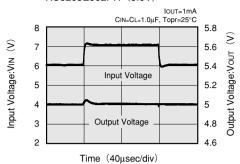


(6) SUPPLY CURRENT vs. AMBIENT TEMPERATURE

XC6203E502PR (5.0V)



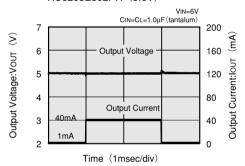
XC6203E502PR (5.0V)

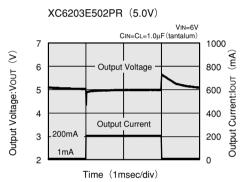


XC6203E502PR (5.0V) IOUT=200mA CIN=CL=1.0µF, Topr=25°C 5.8 8 $\widehat{\leq}$ 8 7 5.6 Output Voltage:Vour Input Voltage:Vin 6 5.4 5 Input Voltage 5.2 4 5 3 4.8 Output Voltage 2 4.6 Time $(40 \,\mu\,\text{sec/div})$

(8) LOAD TRANSIENT RESPONSE

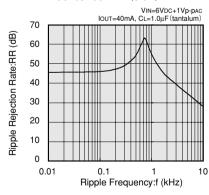
XC6203E502PR (5.0V)

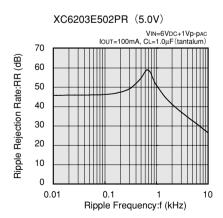




(9) RIPPLE REJECTION RATE

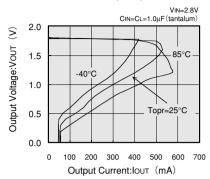
XC6203E502PR (5.0V)



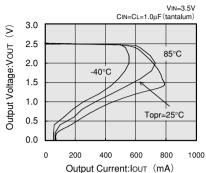


(10) OUTPUT VOLTAGE vs. OUTPUT CURRENT

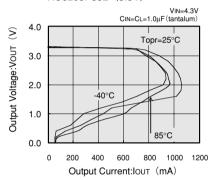




XC6203P252 (2.5V)



XC6203P332 (3.3V)



XC6203P502 (5.0V)

