XC6206 Series

Low ESR Cap. Compatible, Positive Voltage Regulators

TOREX

June 18, 2004 V6

- CMOS Low Power Consumption
- Dropout Voltage 160V @ 100mA
  400mV @ 200mA
- Output Current more than 250mA <5.0V type>
- Highly Accurate ± 2%
- Output Voltage Range 1.2V to 5.0V
- Current Limiter Circuit Built-in
- Low ESR Ceramic Capacitor Compatible

■ APPLICATIONS

- ❍ Battery powered equipment
- ❍ Reference voltage sources
- ❍ Cameras, Video cameras
- ❍ Portable AV systems
- ❍ Mobile phones
- ❍ Communication tools
- ❍ Portable games

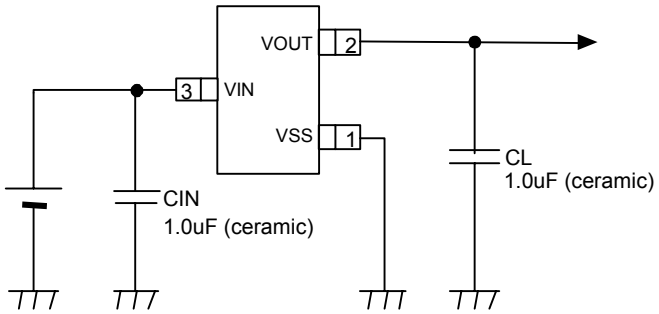
■ GENERAL DESCRIPTION

The XC6206 series are precise, low power consumption, high voltage, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provides large currents with a significantly small dropout voltage.
The XC6206 series consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error correction circuit.
The series is compatible with low ESR ceramic capacitors. The current limiter's foldback circuit also operates as a short protect for the output current limiter and the output pin.
Output voltage can be set internally by laser trimming technologies. It is selectable in 100mV increments within a range of 1.2V to 5.0V.
SOT-23, SOT-89, TO-92 and USP-6B packages are available.

■ FEATURES

Maximum Output Current	250mA (5.0V type)
Dropout Voltage	160mV@100mA (5.0V type)
Maximum Operating Voltage	6.0V
Output Voltage Range	1.2V to 5.0V
	(100mV increments)
Highly Accurate	± 2%
Low Power Consumption	1.0 μA (TYP.)
Operational Temperature Range	- 40°C to 85°C
Ultra Small Packages	SOT-23
	SOT-89
	USP-6B
	TO-92
Low ESR ceramic capacitor compatible	

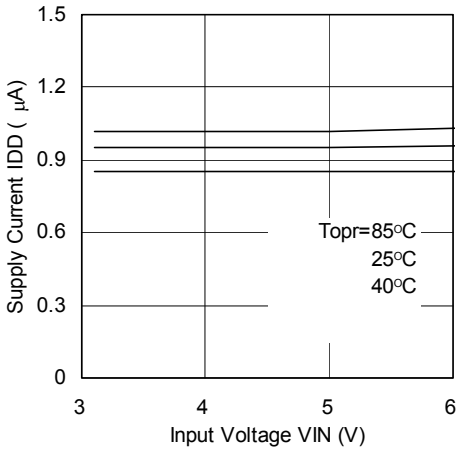
■ TYPICAL APPLICATION CIRCUIT



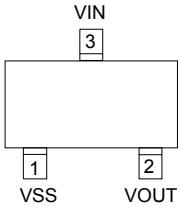
SOT-23 (TOP VIEW)

■ TYPICAL PERFORMANCE CHARACTERISTICS

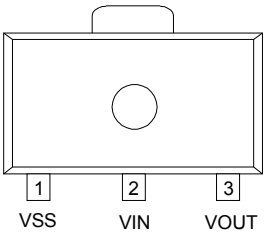
XC6206P302



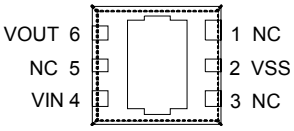
■ PIN CONFIGURATION



SOT-23
(TOP VIEW)

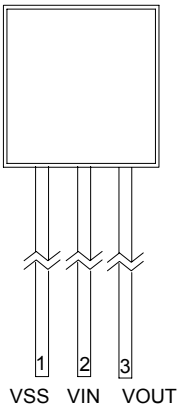


SOT-89
(TOP VIEW)

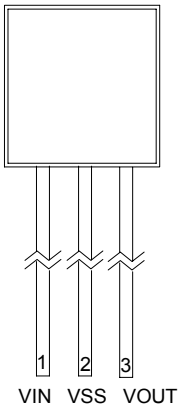


USP-6B
(BOTTOM VIEW)

*** Please do not connect a heat dissipation. pad to the circuitry. If the pad needs to be connected to other pins, it should be noted that the pin configuration of the USP-6B package is different depending on the IC series.**



TO-92, T type
(TOP VIEW)



TO-92, L type
(TOP VIEW)

■ PIN ASSIGNMENT

PIN NUMBER					PIN NAME	FUNCTIONS
SOT-23	SOT-89	TO-92 (T)	TO-92 (L)	USP-6B		
1	1	1	2	2	VSS	Ground
3	2	2	1	4	VIN	Power Input
2	3	3	3	6	VOUT	Output
-	-	-	-	1, 3, 5	NC	No Connection

■ PRODUCT CLASSIFICATION

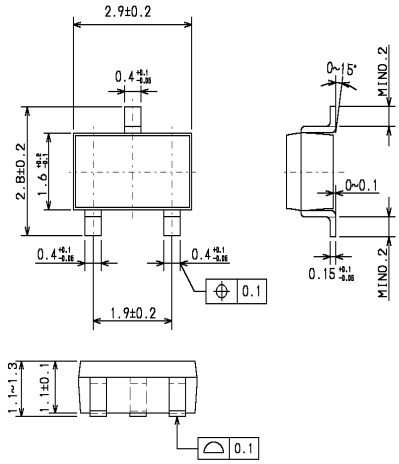
❍ Ordering Information

XC6206P ①②③④⑤

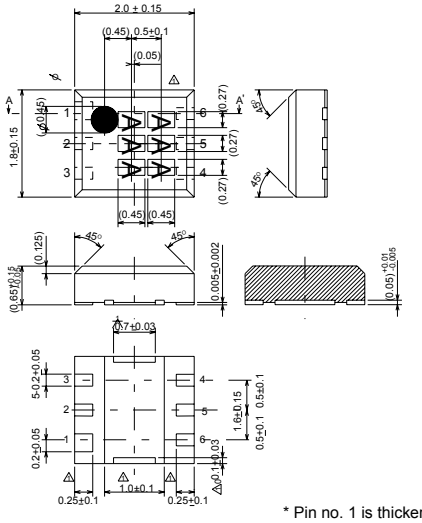
DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
① ②	Output Voltage	Integer	ex.) VOUT = 3.0V ⇨ ② = 3, ③ = 0
③	Output Accuracy	2	±2.0% ⇨ ④ = 2
④	Packages	M	SOT-23
		P	SOT-89
		D	USP-6B
		T	TO-92 (Standard)
		L	TO-92 (Custom pin configuration)
⑤	Taping Direction	R	Embossed tape, standard feed
		L	Embossed tape, reverse feed
		H	Fanfold paper type (TO-92)
		B	Bulk, bag (TO-92)

■ PACKAGING INFORMATION

❍ SOT-23

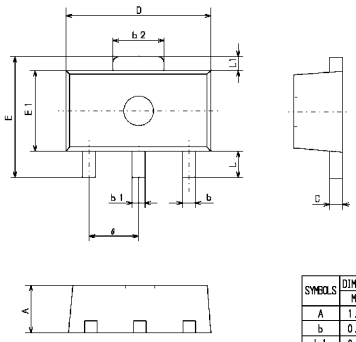


❍ USP-6B



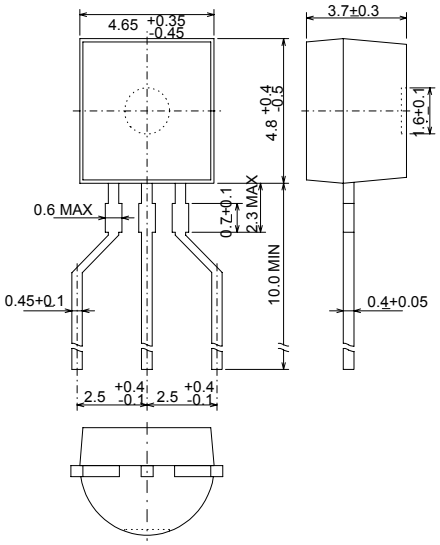
* Pin no. 1 is thicker than other pins.

❍ SOT-89

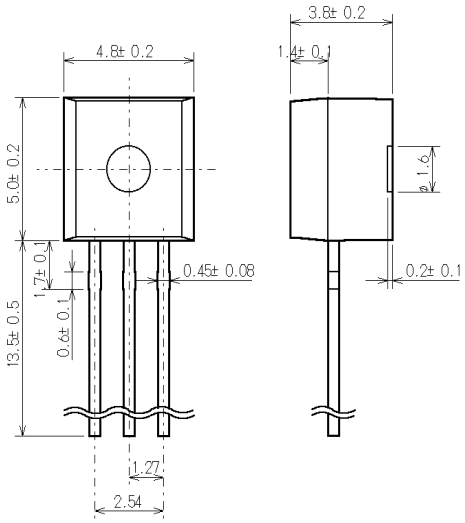


SYMBOLS	DIMENSIOS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.40	1.50	1.60
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
b2	1.40	1.60	1.75
C	0.38	0.40	0.43
D	4.40	4.50	4.60
E	—	—	4.25
E1	2.40	2.50	2.60
e	1.40	1.50	1.60
L	0.80	—	—
L1	—	0.40	—

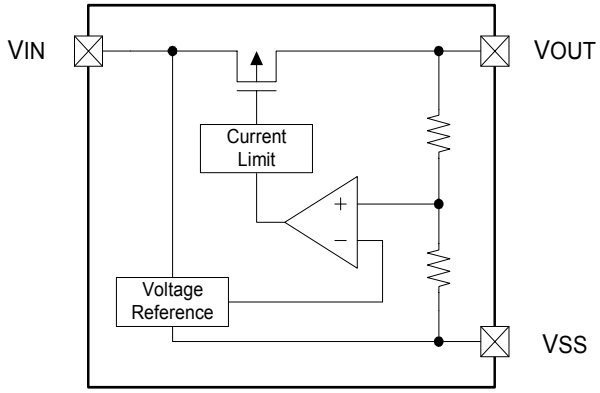
❍ TO-92 (Fanfold paper type :TH&LH)



❍ TO-92 (Bulk, Bag : TB&LB)



■ BLOCK DIAGRAM

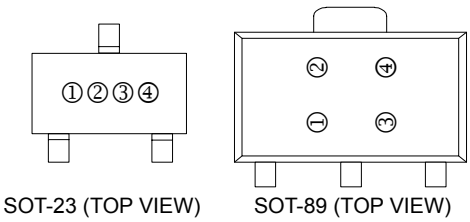


■ MARKING RULE

❍ SOT-23 & SOT-89

① Represents product series

SYMBOL	PRODUCT SERIES
6	XC6206Pxxxxx



SOT-23 (TOP VIEW)

SOT-89 (TOP VIEW)

② Represents three pins regulator

SYMBOL		PRODUCT SERIES
VOLTAGE : 0.1 ~ 3.0V	VOLTAGE : 3.1 ~ 6.0V	
5	6	XC6206Pxxxxx

③ Represents output voltage

SYMBOL	OUTPUT VOLTAGE			SYMBOL	OUTPUT VOLTAGE		
0	-	3.1	-	F	1.6	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	-	-
6	-	3.7	-	P	2.2	-	-
7	-	3.8	-	R	2.3	-	-
8	-	3.9	-	S	2.4	-	-
9	-	4.0	-	T	2.5	-	-
A		4.1	-	U	2.6	-	-
B	1.2	4.2	-	V	2.7	-	-
C	1.3	4.3	-	X	2.8	-	-
D	1.4	4.4	-	Y	2.9	-	-
E	1.5	4.5	-	Z	3.0	-	-

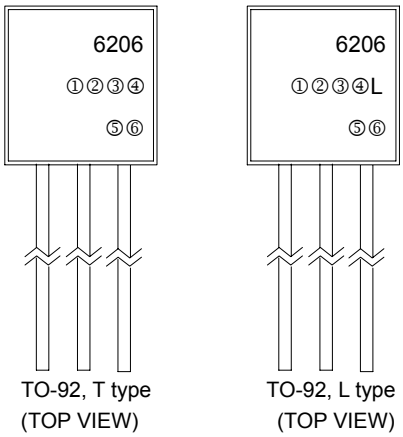
④ Represents production lot number
0 to 9, A to Z, reversed character of 0 to 9 and A to Z repeated. (G, I, J, O, Q, W excepted)

■ MARKING RULE (Continued)

❍ TO-92

① Represents product series

SYMBOL	PRODUCT SERIES
P	XC6206PxxxTx



TO-92, T type (TOP VIEW)

TO-92, L type (TOP VIEW)

②③ Represents output voltage

SYMBOL		OUTPUT VOLTAGE	PRODUCT SERIES
②	③		
3	3	3.3	XC6206P33xTx
5	0	5.0	XC6206P50xTx

④ Represents detect voltage accuracy

SYMBOL	DETECT VOLTAGE ACCRACY	PRODUCT SERIES
1	Within ± 1 %	XC6206Pxx1Tx
2	Within ± 2 %	XC6206Pxx2Tx

⑤ Represents a least significant digit of the produced year

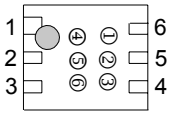
SYMBOL	YEAR
0	2000
1	2001
2	2002
3	2003
4	2004

⑥ Represents the production lot number
0 to 9, A to Z, repeated. (G, I, J, O, Q, W excepted)
* No character inversion is used.

❍ USP-6B

① ② Represents product series

SYMBOL		PRODUCT SERIES
①	②	
0	6	XC6206PxxxDx



USP-6B (TOP VIEW)

③ Represents three pins regulator

SYMBOL	TYPE	PRODUCT SERIES
P	Three pins regulator	XC6206PxxxDx

④ ⑤ Represents output voltage

SYMBOL		OUTPUT VOLTAGE (V)	PRODUCT SERIES
①	②		
3	3	3.3	XC6206P33xDx
5	0	5.0	XC6206P50xDx

⑥ Represents the production lot number
0 to 9, A to Z reversed (G, I, J, O, Q, W excepted)
* No character inversion is used.

■ ABSOLUTE MAXIMUM RATINGS

Ta=25°C

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		VIN	6.0	V
Output Current		IOUT	500 *	mA
Output Voltage		VOUT	VSS – 0.3 ~ VIN + 0.3	V
Power Dissipation	SOT-23	Pd	250	mW
	SOT-89		500	
	USP-6B		100	
	TO-92		300	
Operating Temperature Range		Topr	- 40 ~ + 85	°C
Storage Temperature Range		Tstg	- 55 ~ + 125	°C

* IOUT=Pd / (VIN-VOUT)

■ ELECTRICAL CHARACTERISTICS

❍ XC6206B302 (3.0V product)

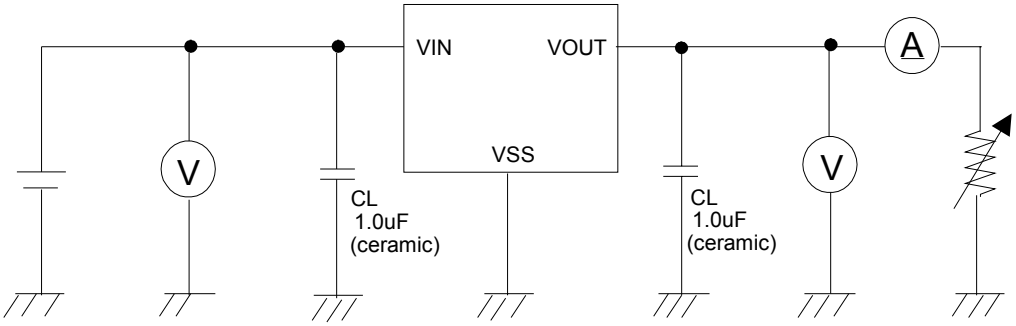
Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MAX	TYP	MIN	UNITS	CIRCUIT
Output Voltage	VOUT(E) (note 2)	IOUT=40mA	x 0.98 2.940	VOUT(T) 3.000	x 1.02 3.060	V	①
Maximum Output Current	IOUTMAX		200	-	-	mA	①
Load Regulation	△VOUT	1mA≦IOUT≦100mA	-	25	-	mV	①
Dropout Voltage	Vdif1	IOUT=30mA	-	80	-	mV	①
	Vdif2	IOUT=100mA	-	250	-	mV	
Supply Current	IDD	VIN=4.0V	-	1.0	-	μA	②
Line Regulation	△VOUT/ △VIN•VOUT	VOUT(T)+1.0V≦VIN≦6.0V IOUT=40mA	-	0.01	0.30	%/V	①
Input Voltage	VIN		1.8	-	6.0	V	-
Output Voltage Temperature Characteristics	△VOUT/ △Topr•VOUT	IOUT=40mA -40°C≦Topr≦85°C	-	100	-	ppm/°C	①
Short Circuit Current	Ishort	VIN=VOUT+1.5V, VOUT=VSS	-	100	-	mA	①

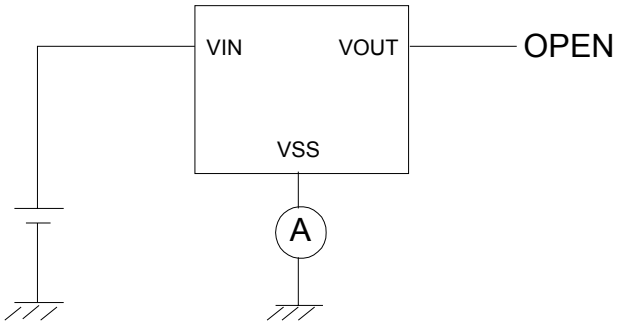
(note 1) VOUT(T) = Specified output voltage
(note 2) VOUT(E) = Effective output voltage
(I.e. the output voltage when "VOUT(T)+1.0V" is provided at the VIN pin while maintaining a certain IOUT value.)
(note 3) Vdif={VIN1(NOTE5)-VOUT1(NOTE4)}
(note 4) VOUT=A voltage equal to 98% of the output voltage whenever an amply stabilized IOUT {VOUT(T)+1.0V} is input.
(note 5) VIN=The Input Voltage when VOUT appears as Input Voltage is gradually decreased.
(note 6) Unless otherwise stated, VIN=VOUT(T)+1.0V.

■ TEST CIRCUITS

Circuit ①



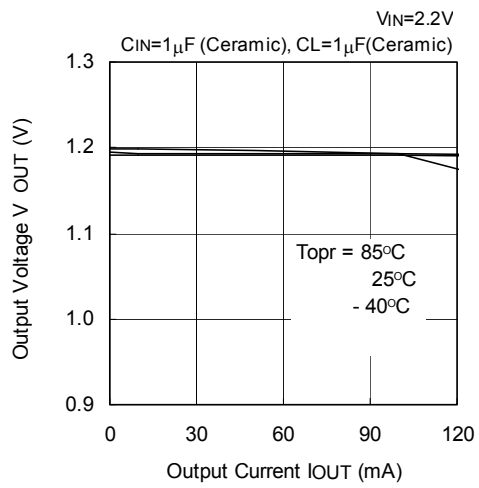
Circuit ②



■ ELECTRICAL CHARACTERISTICS

(1) Output Voltage vs. Output Current

XC6206P122



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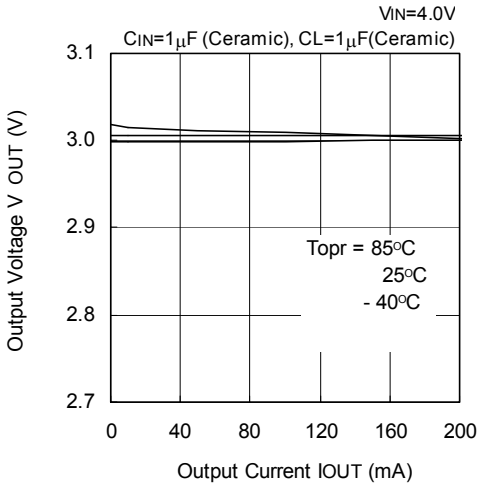

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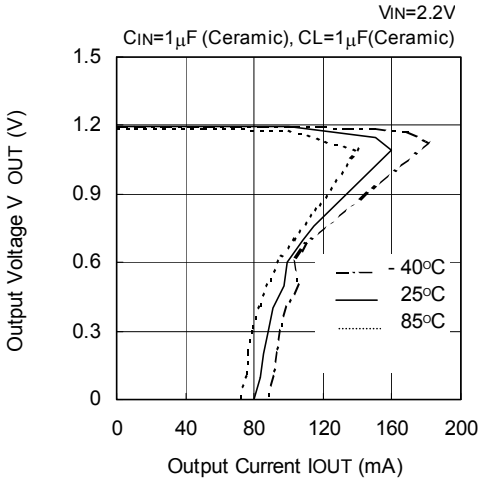
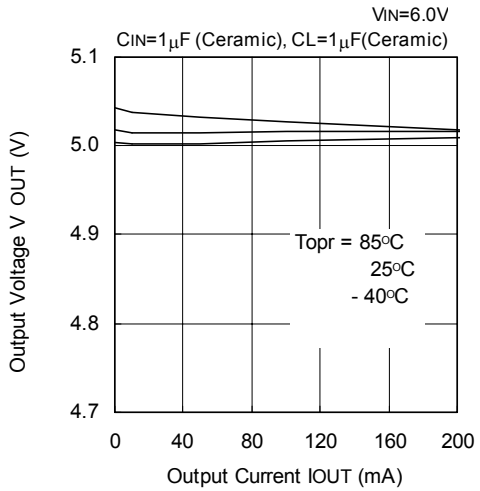


(2) Current Limit

XC6206P502



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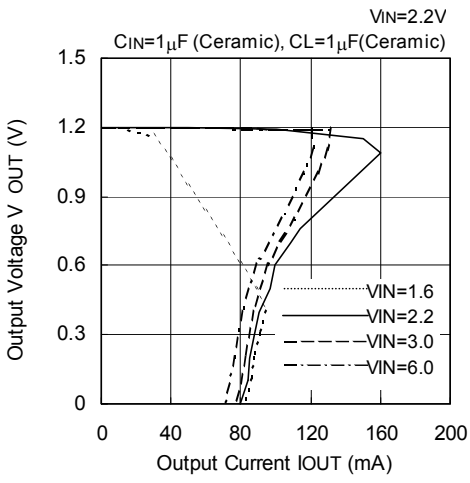
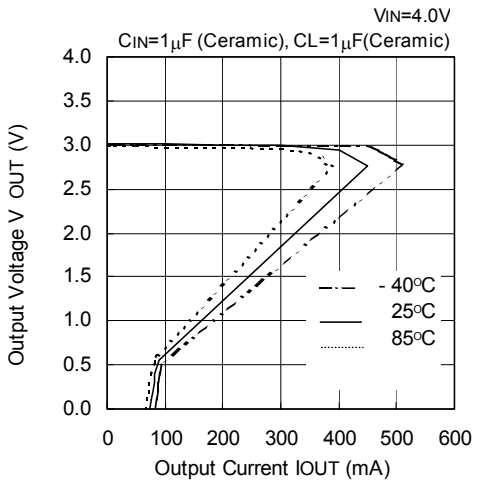


■ ELECTRICAL CHARACTERISTICS (Continued)

(2) Current Limit (Continued)

XC6206P302



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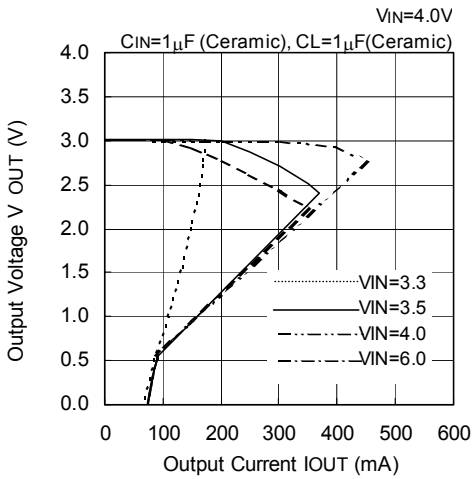

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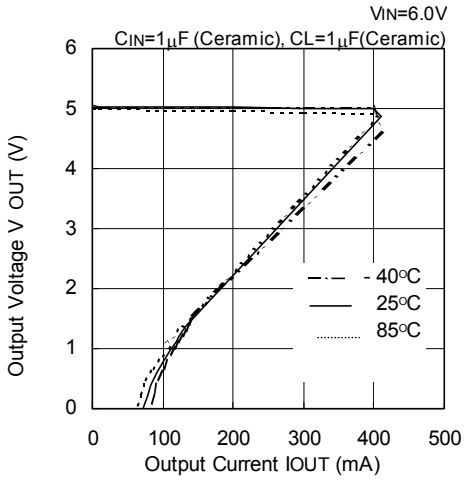

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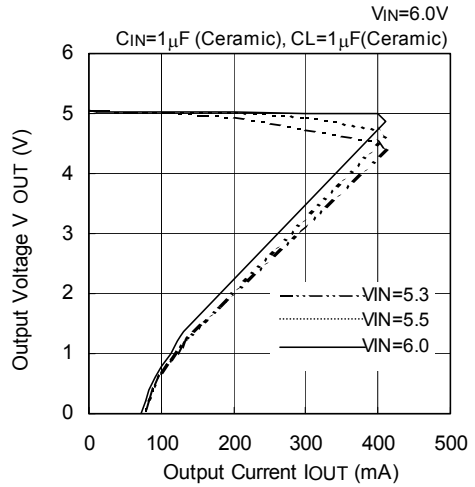
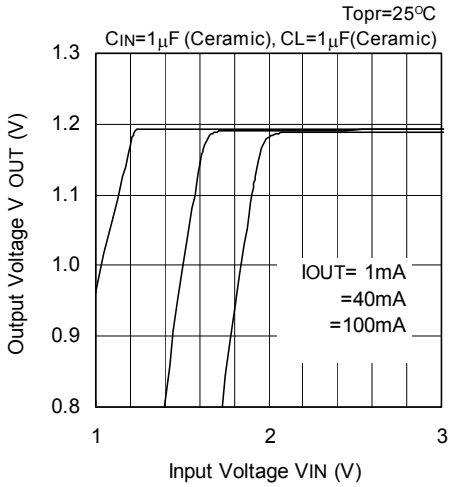


(3) Output Voltage vs. Input Voltage

XC6206P122



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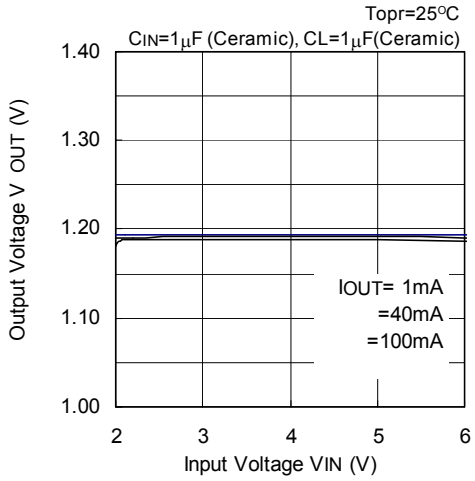
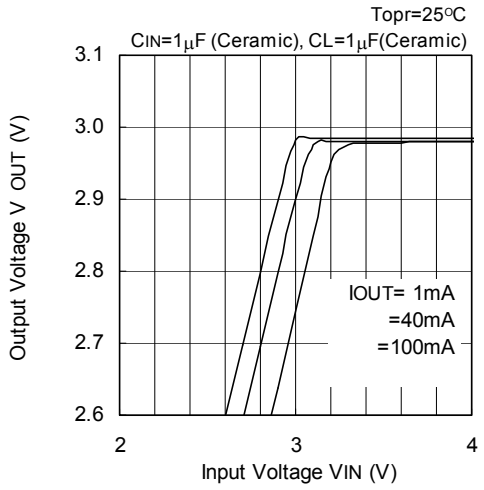


■ ELECTRICAL CHARACTERISTICS (Continued)

(3) Output Voltage vs. Input Voltage (Continued)

XC6206P302



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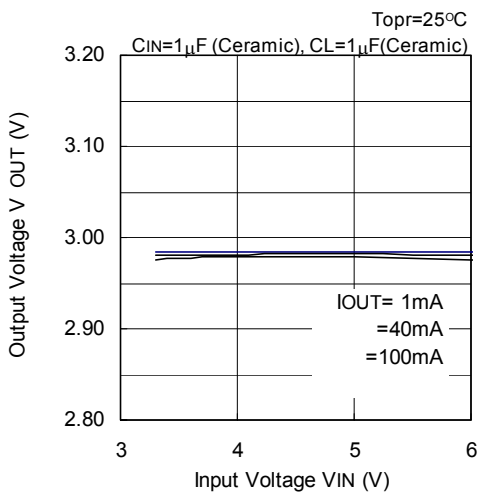

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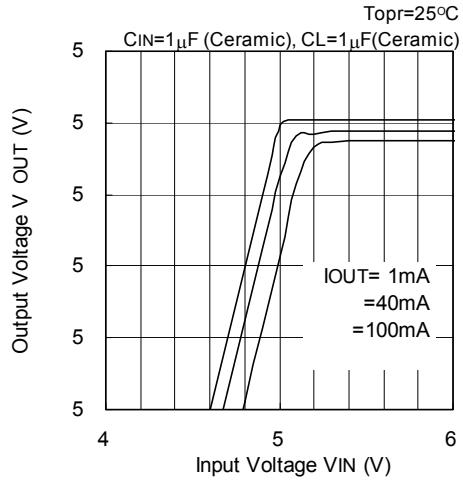

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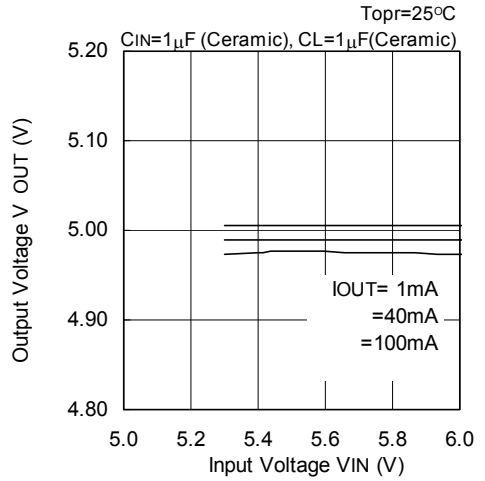
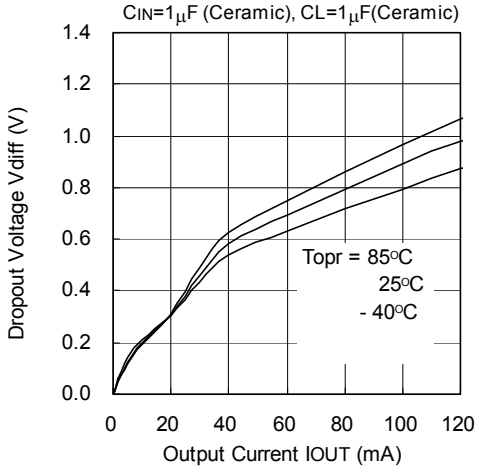


(4) Dropout Voltage vs. Output Current

XC6206P122



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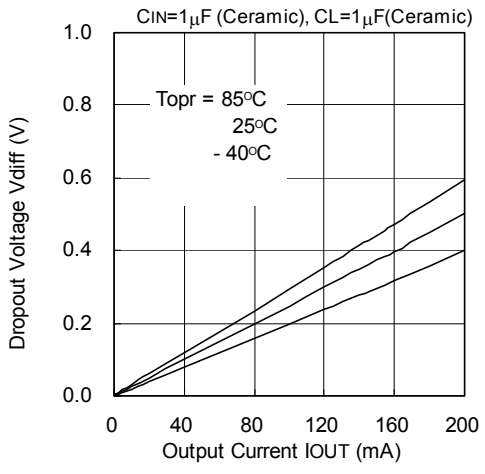
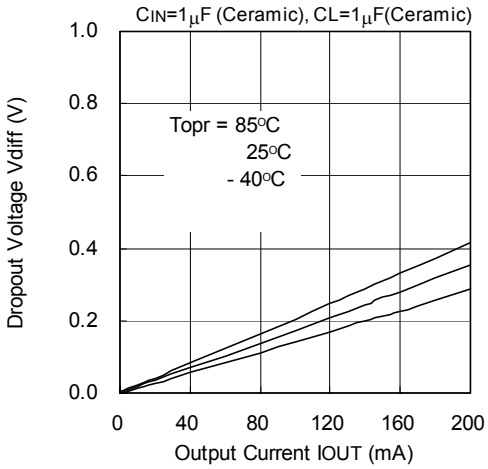


■ ELECTRICAL CHARACTERISTICS (Continued)

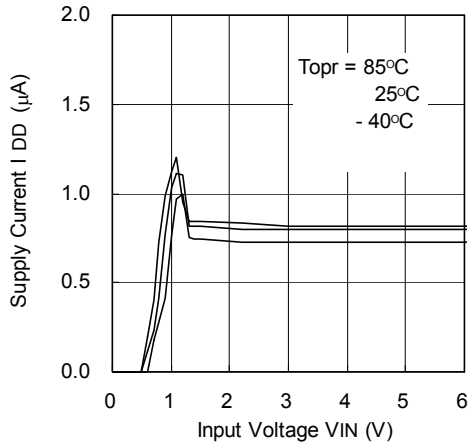
(4) Dropout Voltage vs. Output Current (Continued)

XC6206P502



(5) Supply Current vs. Input Voltage

XC6206P122



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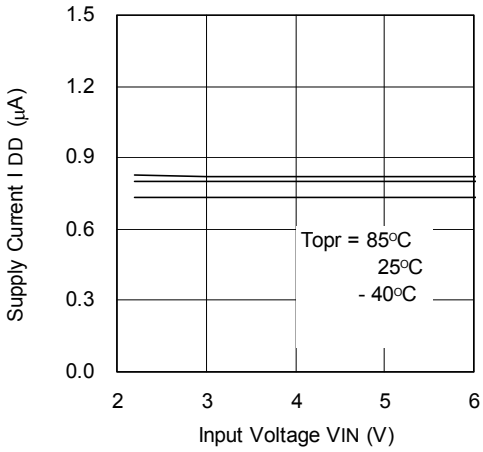

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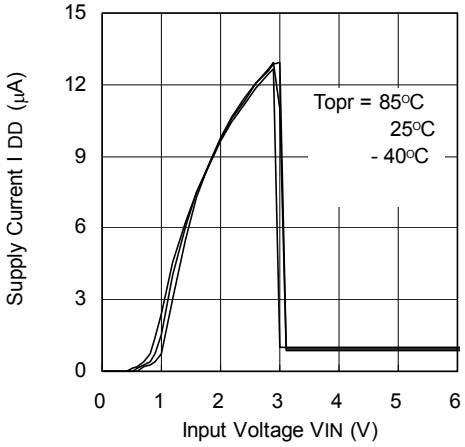

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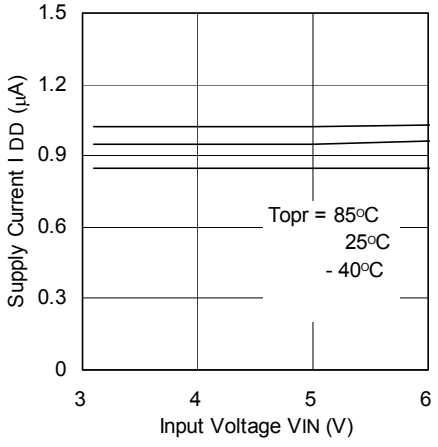
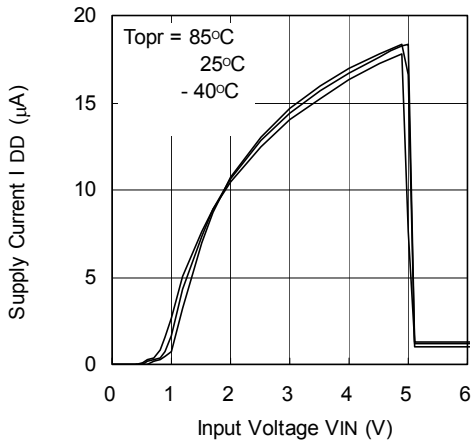


■ ELECTRICAL CHARACTERISTICS (Continued)

(5) Supply Current vs. Input Voltage (Continued)

XC6206P502



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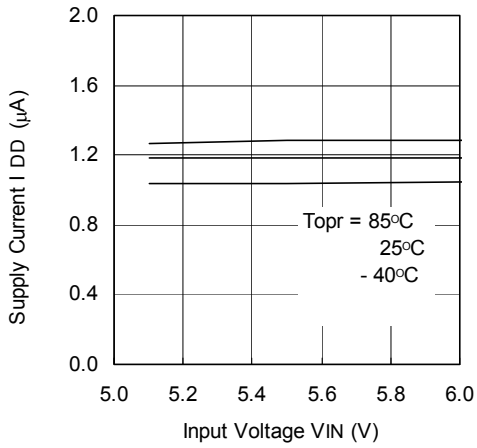
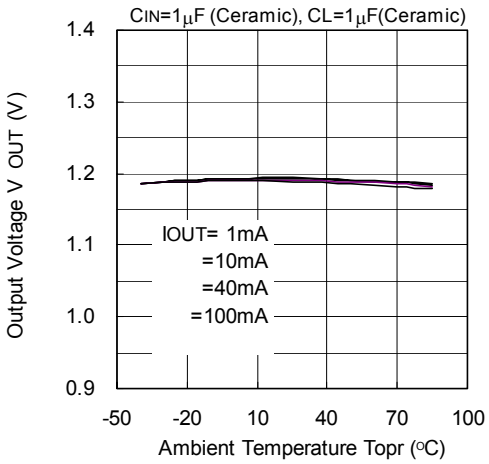


(6) Output Voltage vs. Ambient Temperature

XC6206P122



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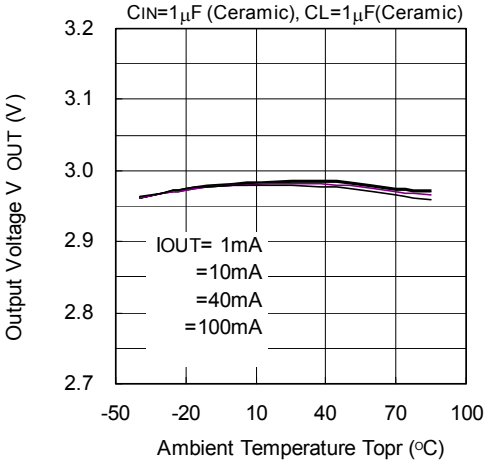

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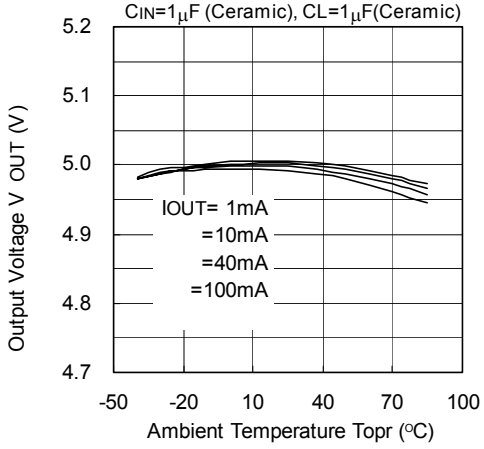
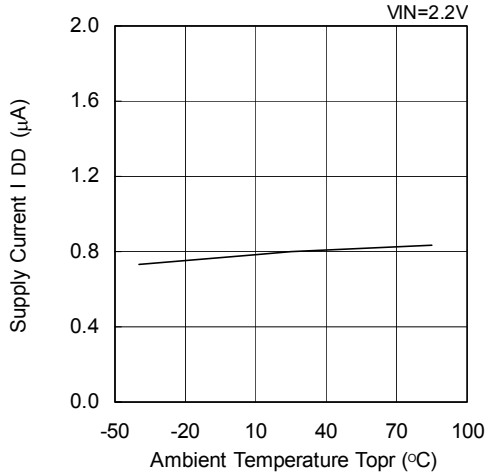


■ ELECTRICAL CHARACTERISTICS (Continued)

(7) Supply Current vs. Ambient Temperature

XC6206P122



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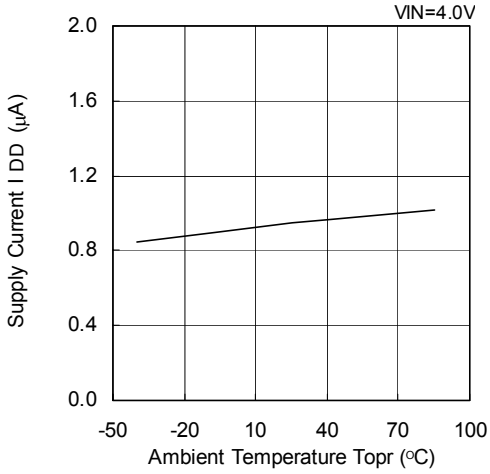

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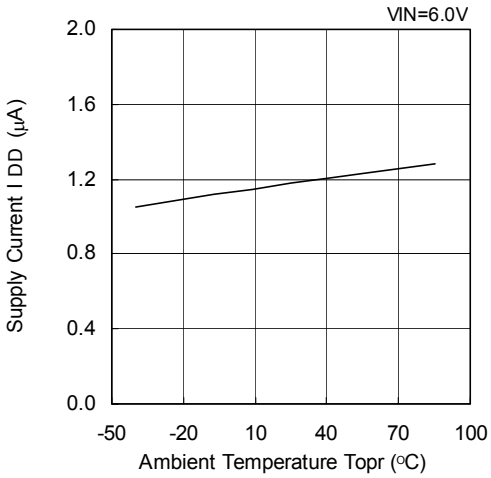
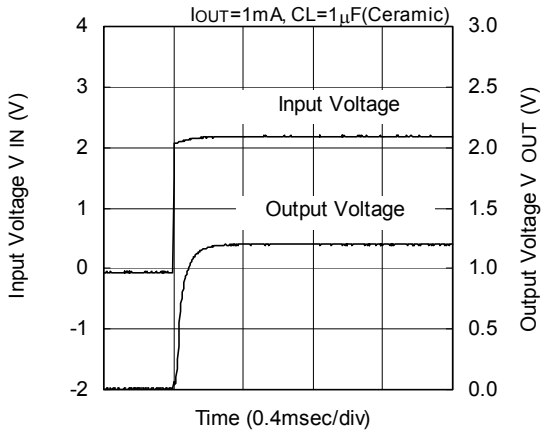


(8) Input Transient Response 1

XC6206P122



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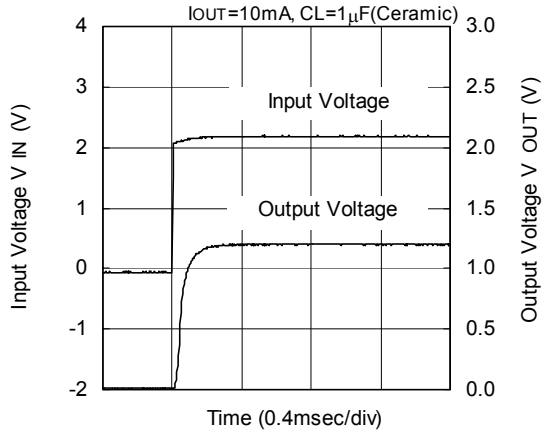
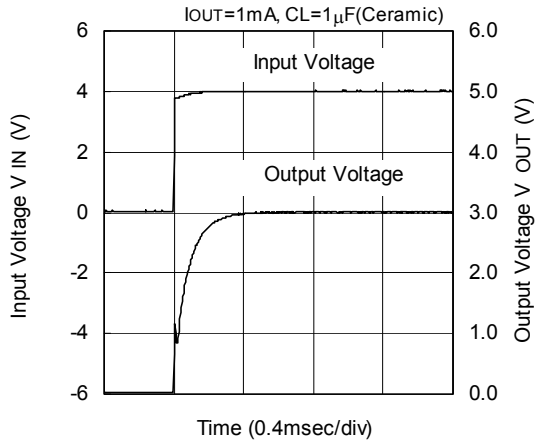


■ **ELECTRICAL CHARACTERISTICS (Continued)**

(8) Input Transient Response 1 (Continued)

XC6206P302



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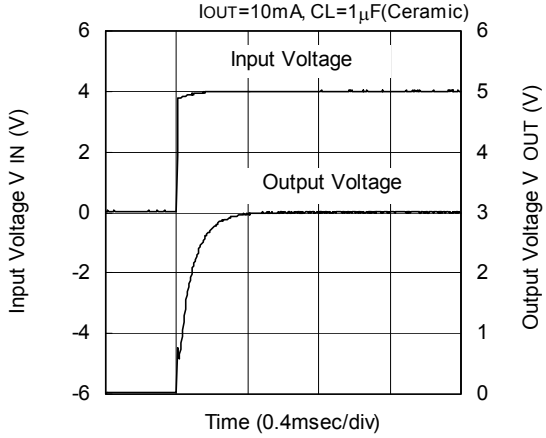

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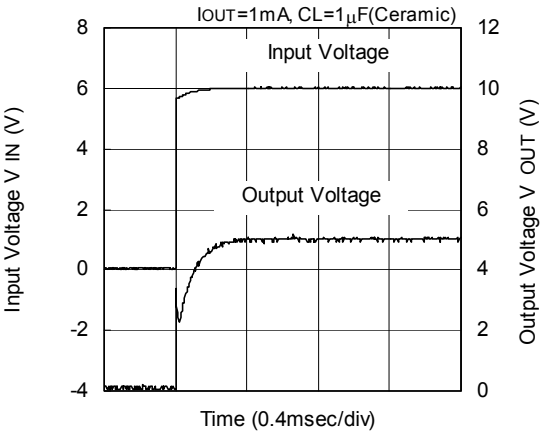

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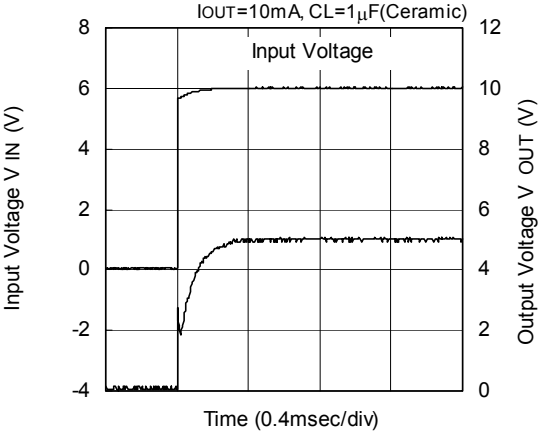
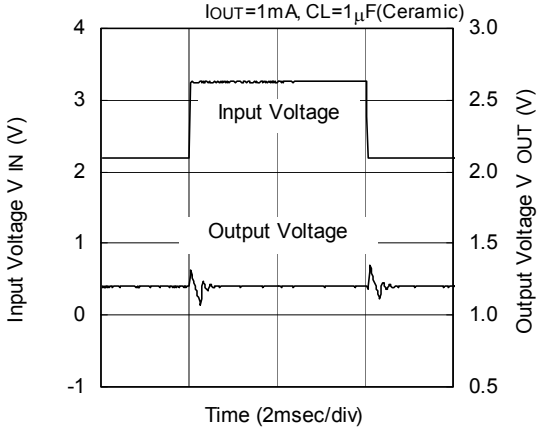


(9) Input Transient Response 2

XC6206P122



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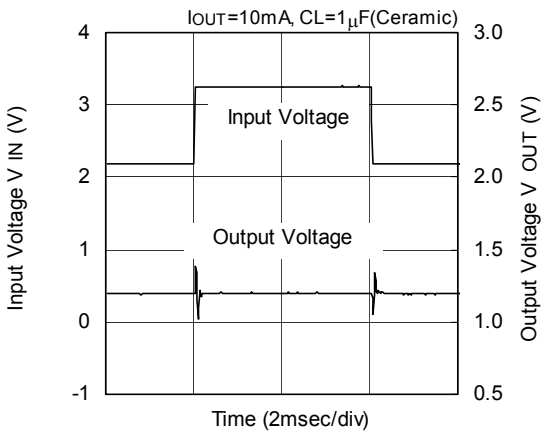
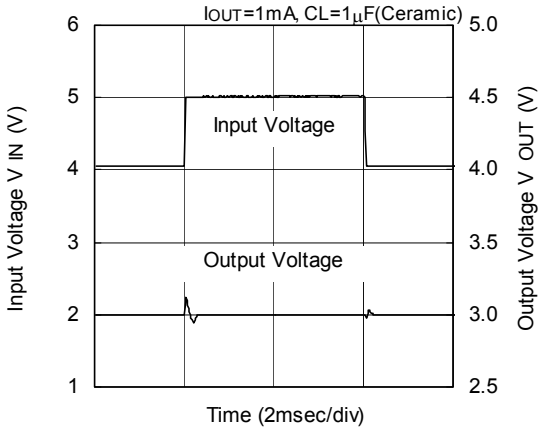


■ **ELECTRICAL CHARACTERISTICS (Continued)**

(9) Input Transient Response 2 (Continued)

XC6206P302



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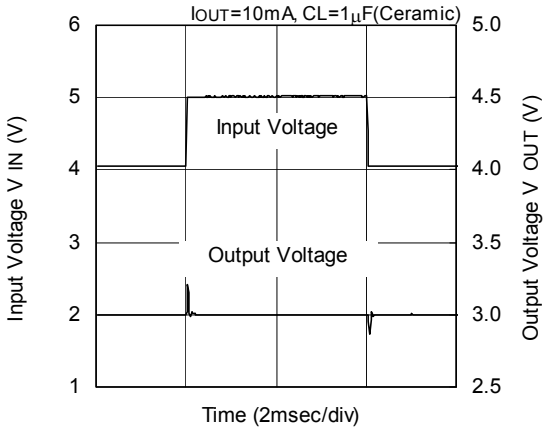

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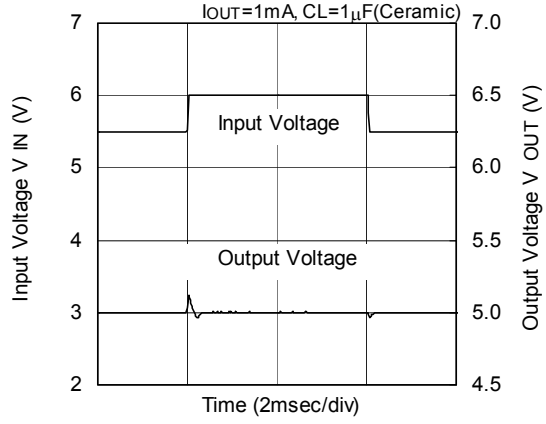

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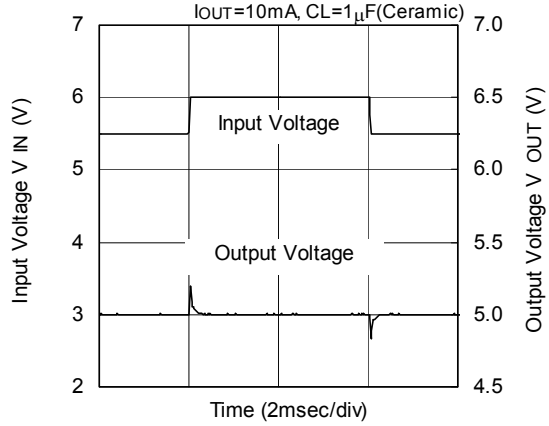
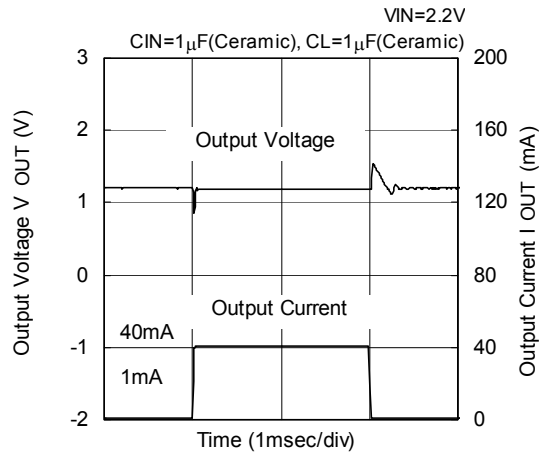


(10) Load Transient Response

XC6206P122



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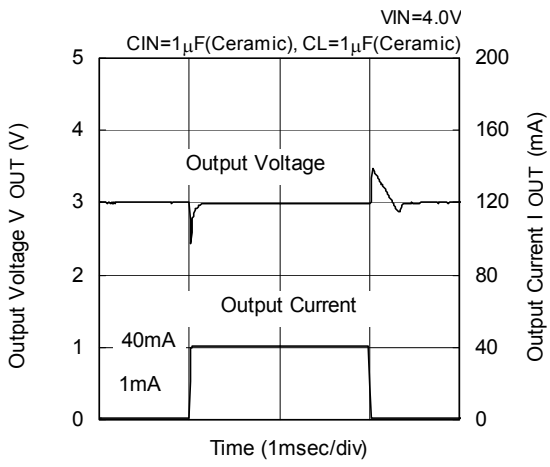
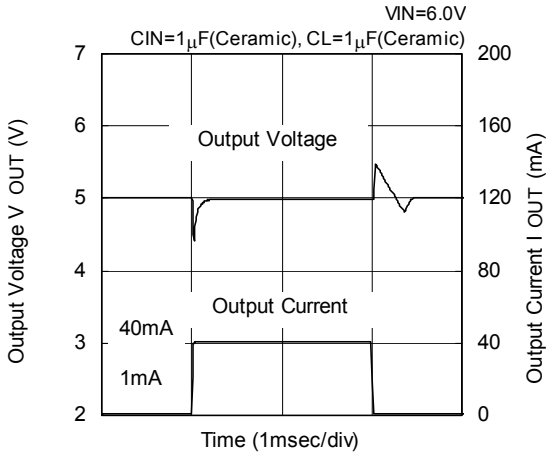


■ ELECTRICAL CHARACTERISTICS (Continued)

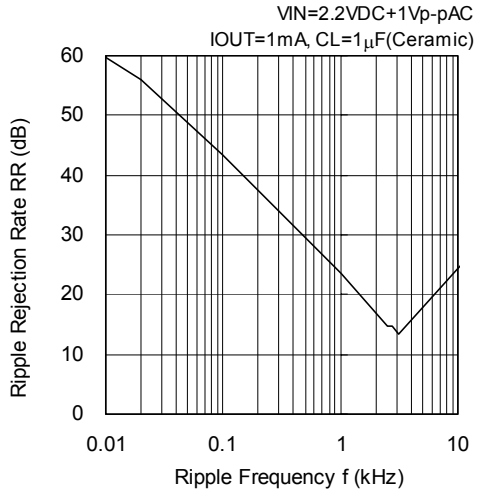
(10) Load Transient Response (Continued)

XC6206P502



(11) Ripple Rejection Rate

XC6206P122



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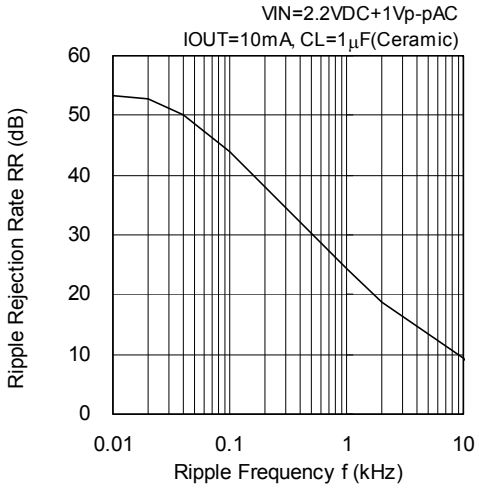

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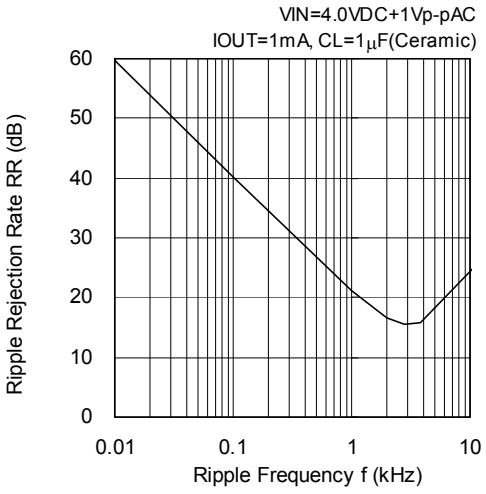

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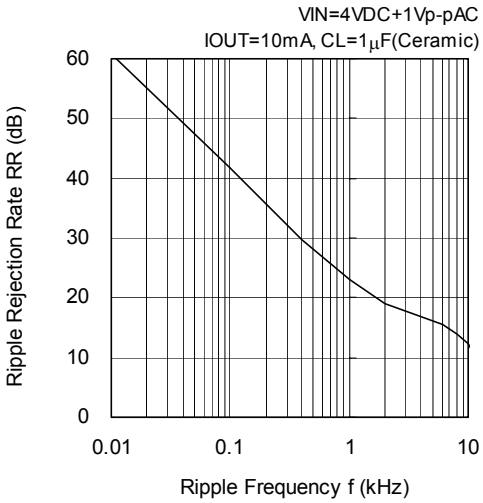

■ **ELECTRICAL CHARACTERISTICS (Continued)**

(11) Ripple Rejection Rate