XC6206 Series

Low ESR Cap.Compatible Positive Voltage Regulators

■GENERAL DESCRIPTION

The XC6206 series are highly precise, low power consumption, 3 terminal, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provides large currents with a significantly small dropout voltage.

The XC6206 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 currrent limiter's foldback circuit operates as a short circuit protection as well as the output current limiter for the output pin.

Output voltages are internally by laser trimming technologies. It is selectable in 0.1V increments within a range of 1.2V to 5.0V.

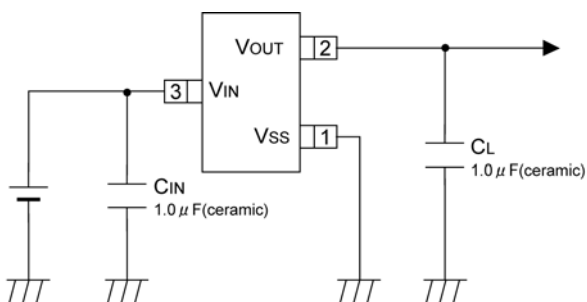SOT-23, SOT-89, TO-92 and USP-6B packages are available.

■APPLICATIONS

● Battery powered equipment

● Reference voltage sources

● Cameras, video cameras

● Portable AV systems

● Mobile phones

● Portable games

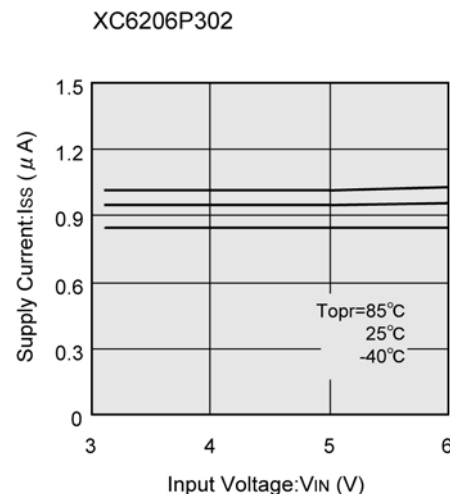● Cordless phones,
  wireless communication equipment

■FEATURES

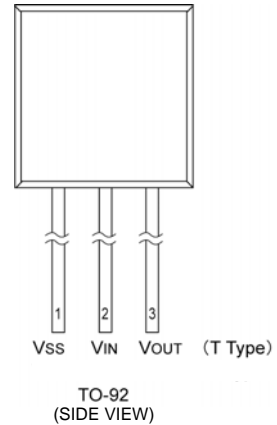|	
Maximum Output Current	: 200mA (3.0V type)
Dropout Voltage	: 250mV @ 100mA (3.0V type)
Maximum Operating Voltage	: 6.0V
Output Voltage Range	: 1.2V ~ 5.0V (0.1V increments)
Highly Accurate	: $\pm2\%@V_{OUT}\geqq1.5V$
	$\pm30mV@V_{OUT}<1.5V$
	$(\pm1\% @V_{OUT}\geqq2.0V)$
Low Power Consumption	: $1.0\mu A$ (TYP.)
Low ESR Capacitor	: Ceramic capacitor compatible
Protection	: Current Limit Circuit Built-in
Operating Ambient Temperature	: -40℃~ +85℃
Packages	: SOT-23
	SOT-89
	TO-92
	USP-6B
Environmentally Friendly	: EU RoHS Compliant, Pb Free

■TYPICAL APPLICATION CIRCUIT

■TYPICAL PERFORMANCE CHARACTERISTICS

XC6206P302

■PIN CONFIGURATION

VIN
3

1 | 2
Vss   VOUT

SOT-23
(TOP VIEW)

Vss   VIN   VOUT

SOT-89
(TOP VIEW)

VOUT 6
NC 5
VIN 4

1 NC
2 Vss
3 NC
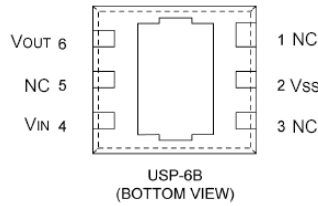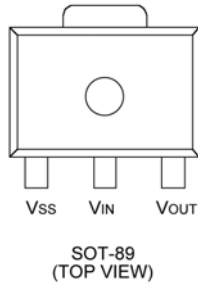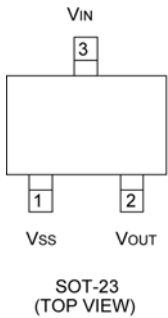
USP-6B
(BOTTOM VIEW)

*The dissipation pad for the USP-6B package should be solder-plated in recommended mount pattern and metal masking so as to enhance mounting strength and heat release.
If the pad needs to be connected to other pins, it should be connected to the pin number 4 (V_{IN}).

Vss   VIN   VOUT   (T Type)

TO-92
(SIDE VIEW)

■PIN ASSIGNMENT

PIN NUMBER				PIN NAME	FUNCTIONS
SOT-23	SOT-89	USP-6B	TO-92		
1	1	2	1	V_{SS}	Ground
3	2	4	2	V_{IN}	Power Input
2	3	6	3	V_{OUT}	Output
-	-	1, 3, 5	-	NC	No Connection

■PRODUCT CLASSIFICATION

●Ordering Information

XC6206P ①②③④⑤-⑥ [*1]

DESIGNATOR	ITEM	SYMBOL	DESCRIPTION
①②	Output Voltage	12~50	e.g. V_{OUT}: 3.0V→①=3, ②=0
③	Accuracy	2	± 2% (V_{OUT}≧1.5V), ±30mV (V_{OUT}<1.5V)
		1	±1% (V_{OUT}≧2.0V)
④⑤-⑥	Packages (Order Unit)	MR	SOT-23 (3,000/Reel)
		MR-G	SOT-23 (3,000/Reel)
		PR	SOT-89 (1,000/Reel)
		PR-G	SOT-89 (1,000/Reel)
		DR	USP-6B (3,000/Reel)
		DR-G	USP-6B (3,000/Reel)
		TH	TO-92 (T type), Paper type (2,000/Tape)
		TH-G	TO-92 (T type), Paper type (2,000/Tape)
		TB	TO-92 (T type), Bag type (500/Bag)
		TB-G	TO-92 (T type), Bag type (500/Bag)

[*1] The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.

■BLOCK DIAGRAM
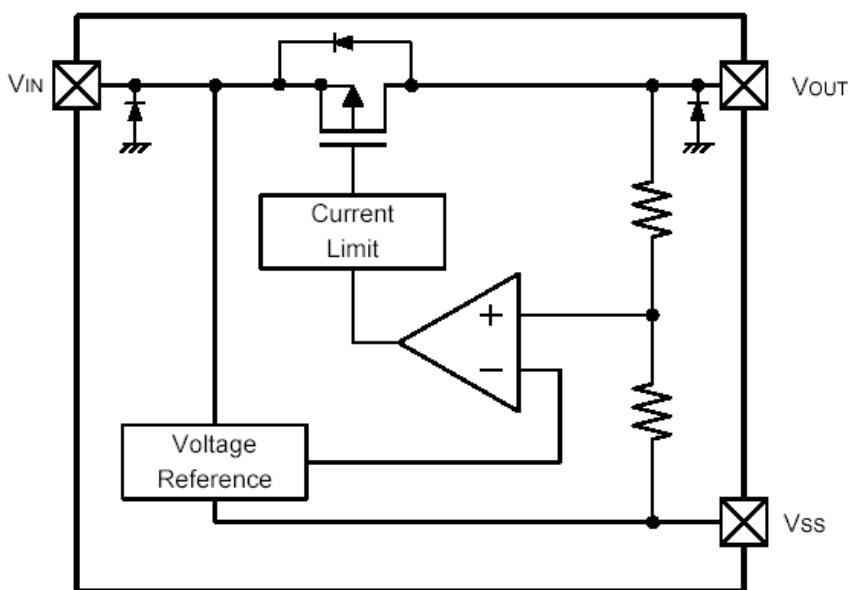
*Diodes inside the circuit are an ESD protection diode and a parasitic diode.

■ABSOLUTE MAXIMUM RATINGS

Ta=25°C

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V$_{IN}$	7.0	V
Output Current		I$_{OUT}$	500 *	mA
Output Voltage		V$_{OUT}$	V$_{SS}$ – 0.3 ~ V$_{IN}$ + 0.3	V
Power Dissipation	SOT-23	Pd	250	mW
	SOT-89		500	
	USP-6B		100	
	TO-92		300	
Operating Ambient Temperature		Topr	- 40 ~ + 85	$^{\circ}$C
Storage Temperature		Tstg	- 55 ~ + 125	$^{\circ}$C

* I$_{OUT}$=Pd / (V$_{IN}$-V$_{OUT}$)

TOIREX

■ELECTRICAL CHARACTERISTICS

● XC6206P series   Ta=25 °C

PARAMETER	SYMBOL	CONDITIONS[1]	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage [4]	$V_{OUT(E)}$[3]	I_{OUT}=30mA	x 0.98	$V_{OUT(T)}$[2]	x 1.02	V	①
				E-1			
Maximum Output Current	I_{OUTMAX}	-	E-2	-	-	mA	①
Load Regulation	$\triangle V_{OUT}$	$V_{OUT(T)}$>1.8V: 1mA≦I_{OUT}≦100mA $V_{OUT(T)}$≦1.8V: 1mA≦I_{OUT}≦50mA	-	-	E-3	mV	①
Dropout Voltage [5]	Vdif1	I_{OUT}=30mA	-	E-4		mV	①
	Vdif2	$V_{OUT(T)}$>1.8V: I_{OUT}=100mA $V_{OUT(T)}$≦1.8V: I_{OUT}=60mA	-	E-5		mV	
Supply Current	I_{DD}	V_{CE}=V_{IN}	-	1.0	3.0	μA	②
Line Regulation	$\dfrac{\triangle V_{OUT}}{\triangle V_{IN} \cdot V_{OUT}}$	$V_{OUT(T)}$<4.5V:$V_{OUT(T)}$+1.0V≦V_{IN}≦6.0V $V_{OUT(T)}$≧4.5V:5.5V≦V_{IN}≦6.0V I_{OUT}=30mA	-	0.05	0.25	%/V	①
Input Voltage	V_{IN}	-	1.8	-	6.0	V	-
Output Voltage Temperature Characteristics	$\dfrac{\triangle V_{OUT}}{\triangle Topr \cdot V_{OUT}}$	I_{OUT}=30mA -40 °C≦Topr≦85 °C	-	±100	-	ppm/°C	①
Short Circuit Current	Ishort	V_{IN}=V_{OUT}+1.5V, V_{OUT}=V_{SS}	-	E-6	-	mA	①

NOTE:

* 1 Unless otherwise stated, V_{IN} = $V_{OUT(T)}$ + 1.0V

* 2 $V_{OUT(T)}$:Nominal voltage

* 3 $V_{OUT(E)}$:Effective output voltage (Ie. The output voltage when "$V_{OUT(T)}$+1.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.)

* 4 For output voltage accuracy, Please refer to E-1 table.

* 5 Vdif =V_{IN1} -V_{OUT1}

  V_{OUT1} :A voltage equal to 98% of the output voltage whenever an amply stabilized {$V_{OUT(T)}$ + 1.0V} is input with each I_{OUT}.

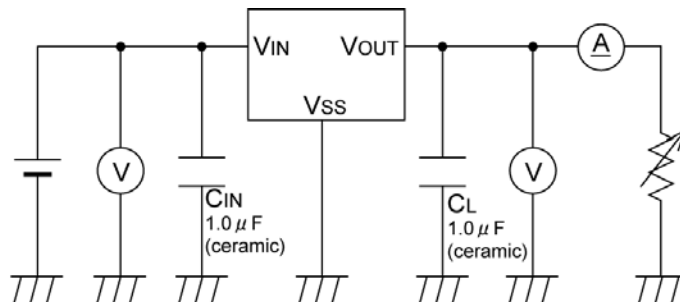 V_{IN1} :The input voltage when V_{OUT1} appears as input voltage is gradually decreased.

■ELECTRICAL CHARACTERISTICS (Continued)
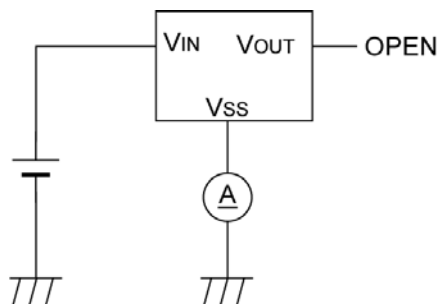
● Electrical Characteristics Chart

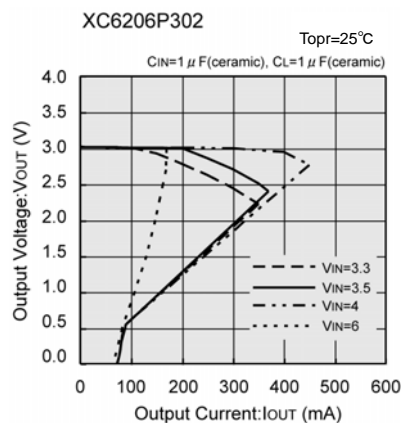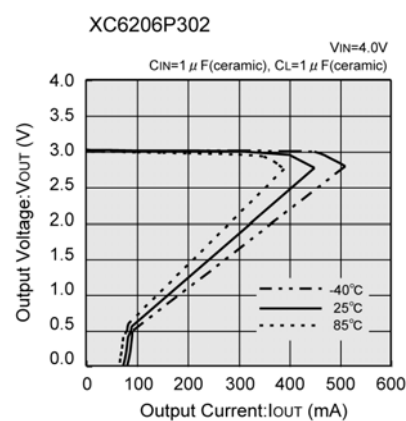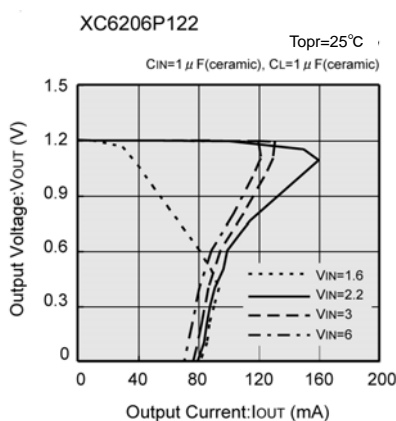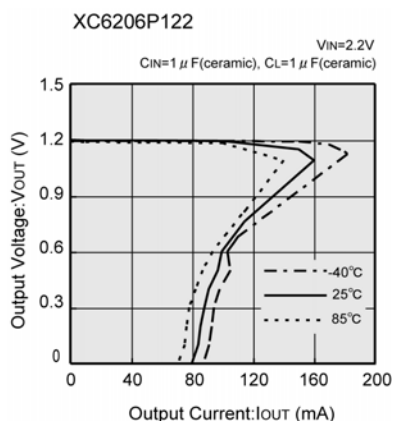|	E-1				E-2	E-3	E-4		E-5		E-6
PARAMETER	OUTPUT VOLTAGE				MAX. OUTPUT CURRENT	LOAD REGULATION	DROPOUT VOLTAGE 1		DROPOUT VOLTAGE 2		SHORT CURRENT
NOMINAL VOLTAGE	2% ACCURACY		1% ACCURACY								
VOUT(T)	VOUT(E) (V)		VOUT(E) (V)		IOUTMAX (mA)	△VOUT (mV)	Vdif1 (mV)		Vdif2 (mV)		Ishort (mA)
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	TYP.
1.2	1.170	1.230			60	40	460	760	700	960	180
1.3	1.270	1.330			60	40	400	650	700	960	180
1.4	1.370	1.430			60	40	350	590	580	860	180
1.5	1.470	1.530	Not Available		60	40	300	510	580	860	155
1.6	1.568	1.632			80	45	250	450	450	810	155
1.7	1.666	1.734			80	45	200	410	450	810	155
1.8	1.764	1.836			80	45	150	390	350	780	155
1.9	1.862	1.938			80	45	100	370	350	780	130
2.0	1.960	2.040	1.980	2.020	120	50	100	370	350	710	130
2.1	2.058	2.042	2.079	2.121	120	50	100	370	350	710	130
2.2	2.156	2.244	2.178	2.222	120	50	100	370	350	710	130
2.3	2.254	2.346	2.277	2.323	120	50	100	370	350	710	130
2.4	2.352	2.448	2.376	2.424	120	50	100	370	350	710	130
2.5	2.450	2.550	2.475	2.525	150	55	100	370	350	710	130
2.6	2.548	2.652	2.574	2.626	150	55	100	370	350	710	130
2.7	2.646	2.754	2.673	2.727	150	55	100	370	350	710	130
2.8	2.744	2.856	2.772	2.828	150	55	100	370	350	710	130
2.9	2.842	2.958	2.871	2.929	150	55	100	370	350	710	130
3.0	2.940	3.060	2.970	3.030	200	60	75	350	250	680	100
3.1	3.038	3.162	3.069	3.131	200	60	75	350	250	680	100
3.2	3.136	3.264	3.168	3.232	200	60	75	350	250	680	100
3.3	3.234	3.366	3.267	3.333	200	60	75	350	250	680	100
3.4	3.332	3.468	3.366	3.434	200	60	75	350	250	680	100
3.5	3.430	3.570	3.465	3.535	200	60	75	350	250	680	100
3.6	3.528	3.672	3.564	3.636	200	60	75	350	250	680	100
3.7	3.626	3.774	3.663	3.737	200	65	75	350	250	680	100
3.8	3.724	3.876	3.762	3.838	200	65	75	350	250	680	100
3.9	3.822	3.978	3.861	3.939	200	65	75	350	250	680	100
4.0	3.920	4.080	3.960	4.040	250	70	60	320	200	630	100
4.1	4.018	4.182	4.059	4.141	250	70	60	320	200	630	100
4.2	4.116	4.284	4.158	4.242	250	70	60	320	200	630	100
4.3	4.214	4.386	4.257	4.343	250	70	60	320	200	630	100
4.4	4.312	4.488	4.356	4.444	250	70	60	320	200	630	100
4.5	4.410	4.590	4.455	4.545	250	70	60	320	200	630	100
4.6	4.508	4.692	4.554	4.646	250	75	60	320	200	630	100
4.7	4.606	4.794	4.653	4.747	250	75	60	320	200	630	100
4.8	4.704	4.896	4.752	4.848	250	75	60	320	200	630	100
4.9	4.802	4.998	4.851	4.949	250	75	60	320	200	630	100
5.0	4.900	5.100	4.950	5.050	250	80	50	290	175	600	100

TOREX

■TEST CIRCUITS

Circuit ①

Circuit ②

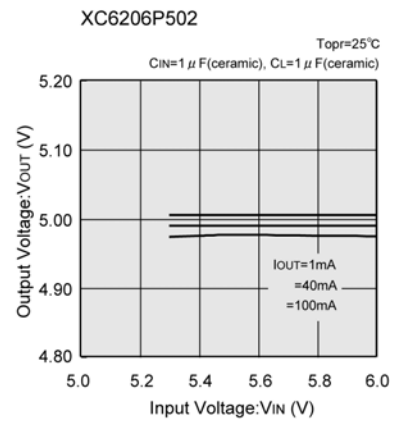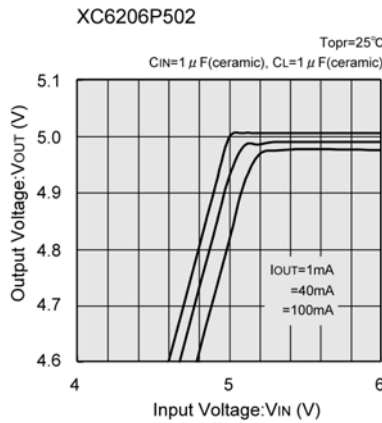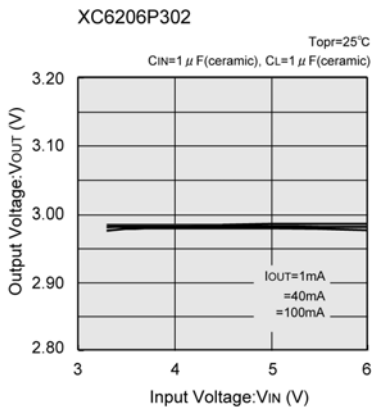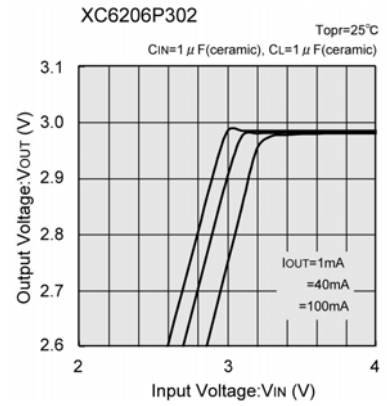# ■TYPICAL PERFORMANCE CHARACTERISTICS

(1) Output Voltage vs. Output Current

XC6206P122
$V_{IN}=2.2V$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P302
$V_{IN}=4.0V$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P502
$V_{IN}=6V$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

(2) Current Limit

XC6206P122
$V_{IN}=2.2V$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P122
$T_{opr}=25℃$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P302
$V_{IN}=4.0V$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P302
$T_{opr}=25℃$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P502
$V_{IN}=6V$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)

XC6206P502
$T_{opr}=25℃$
$C_{IN}=1\mu F$(ceramic), $C_L=1\mu F$(ceramic)
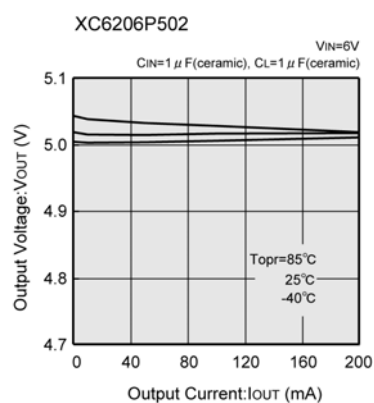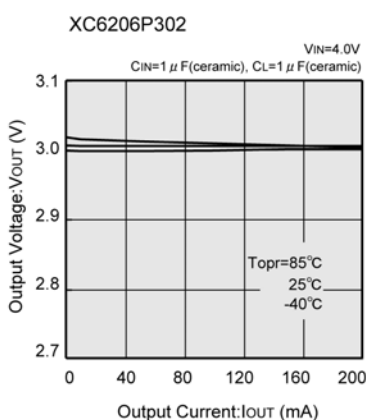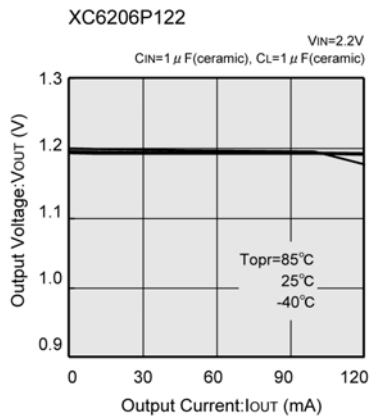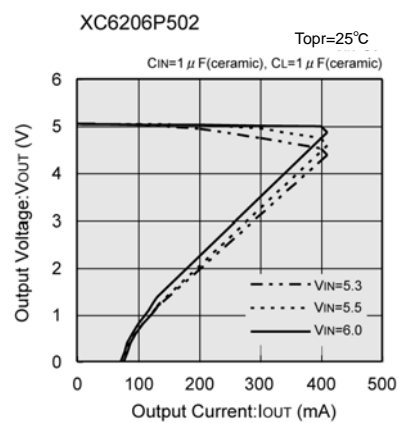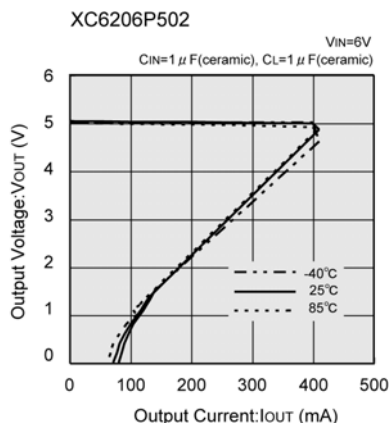
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(3) Output Voltage vs. Input Voltage
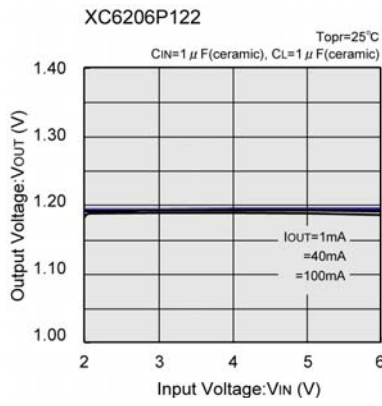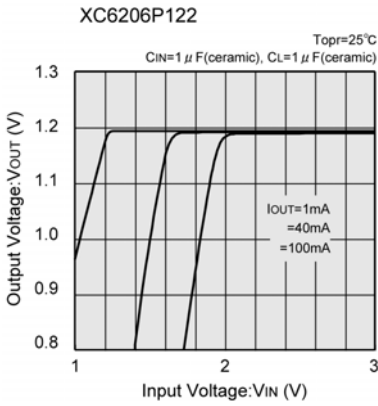
(4) Dropout Voltage vs. Output Current
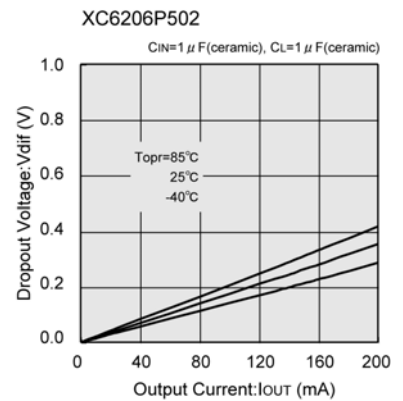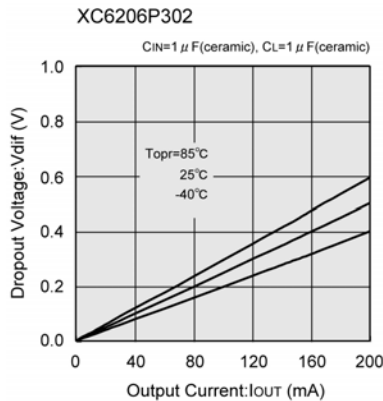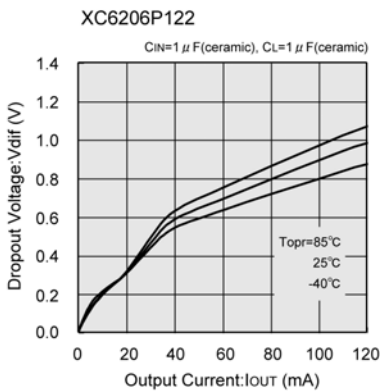
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

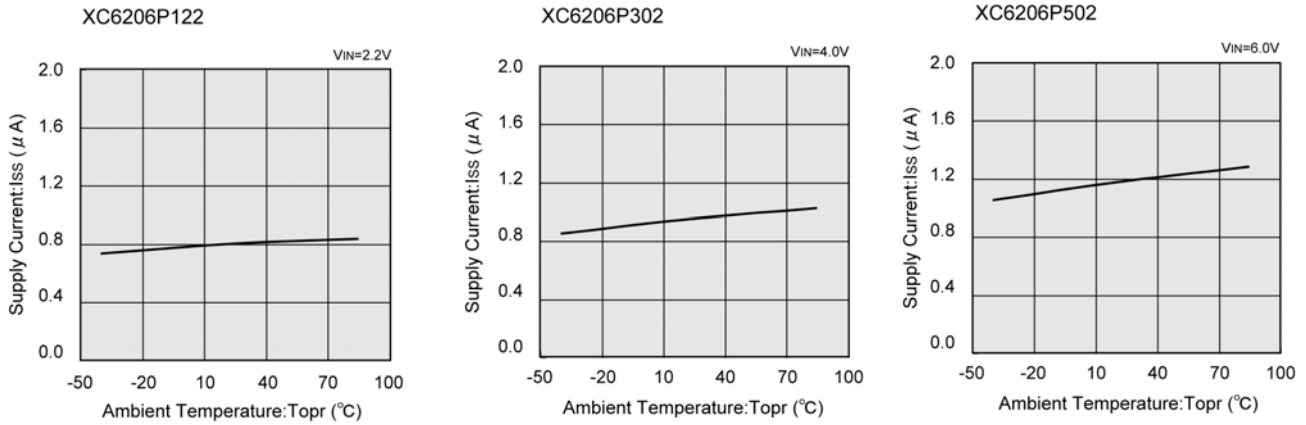## (5) Supply Current vs. Input Voltage
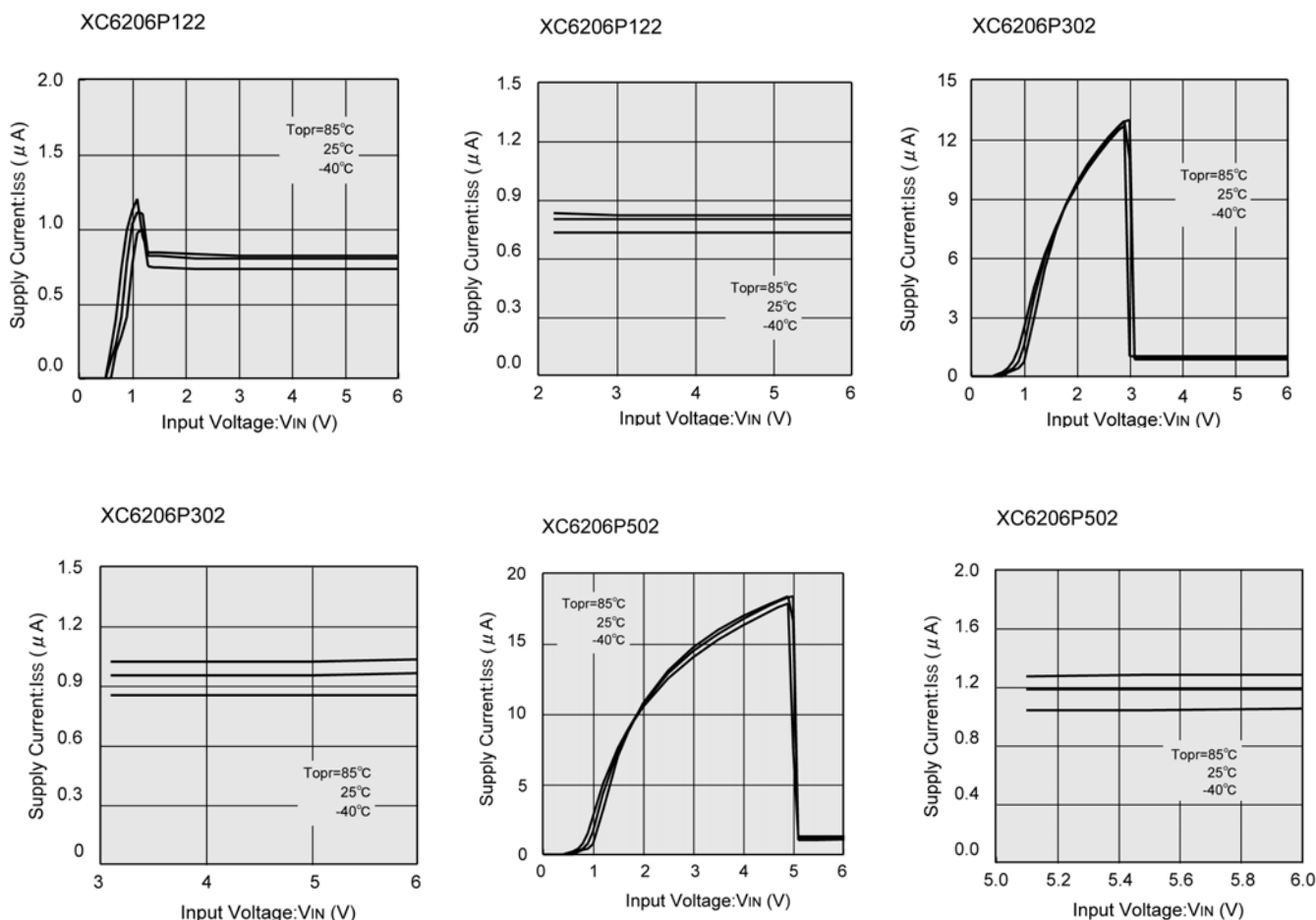
XC6206P122

XC6206P122

XC6206P302

XC6206P302

XC6206P502

XC6206P502

(6) Output Voltage vs. Ambient Temperature

XC6206P122

XC6206P302

XC6206P502
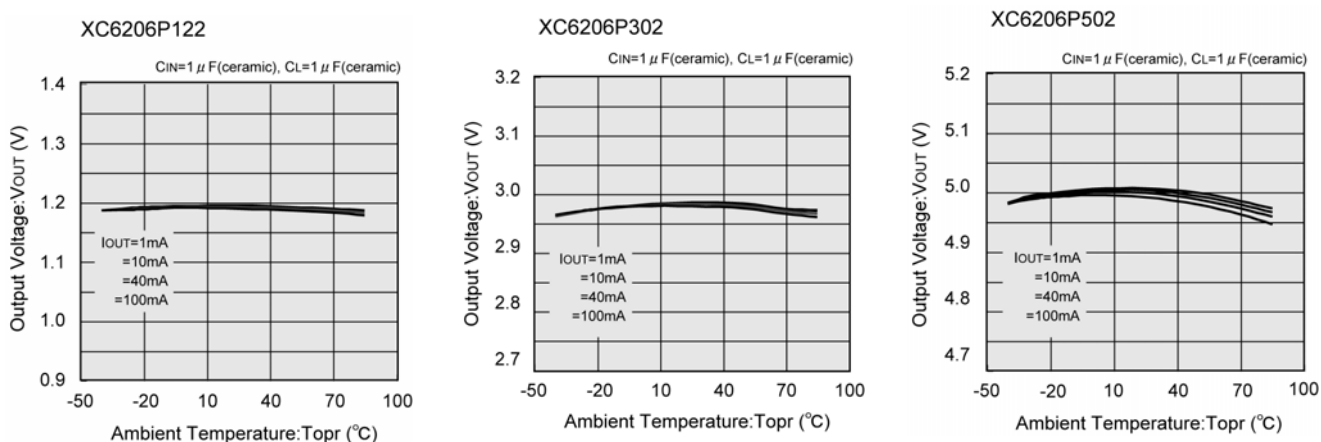
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(7) Output Voltage vs. Ambient Temperature

XC6206P122

XC6206P302

XC6206P502

(8) Input Transient Response 1

XC6206P122

XC6206P302

XC6206P502

XC6206P122

XC6206P122

XC6206P302

XC6206P502
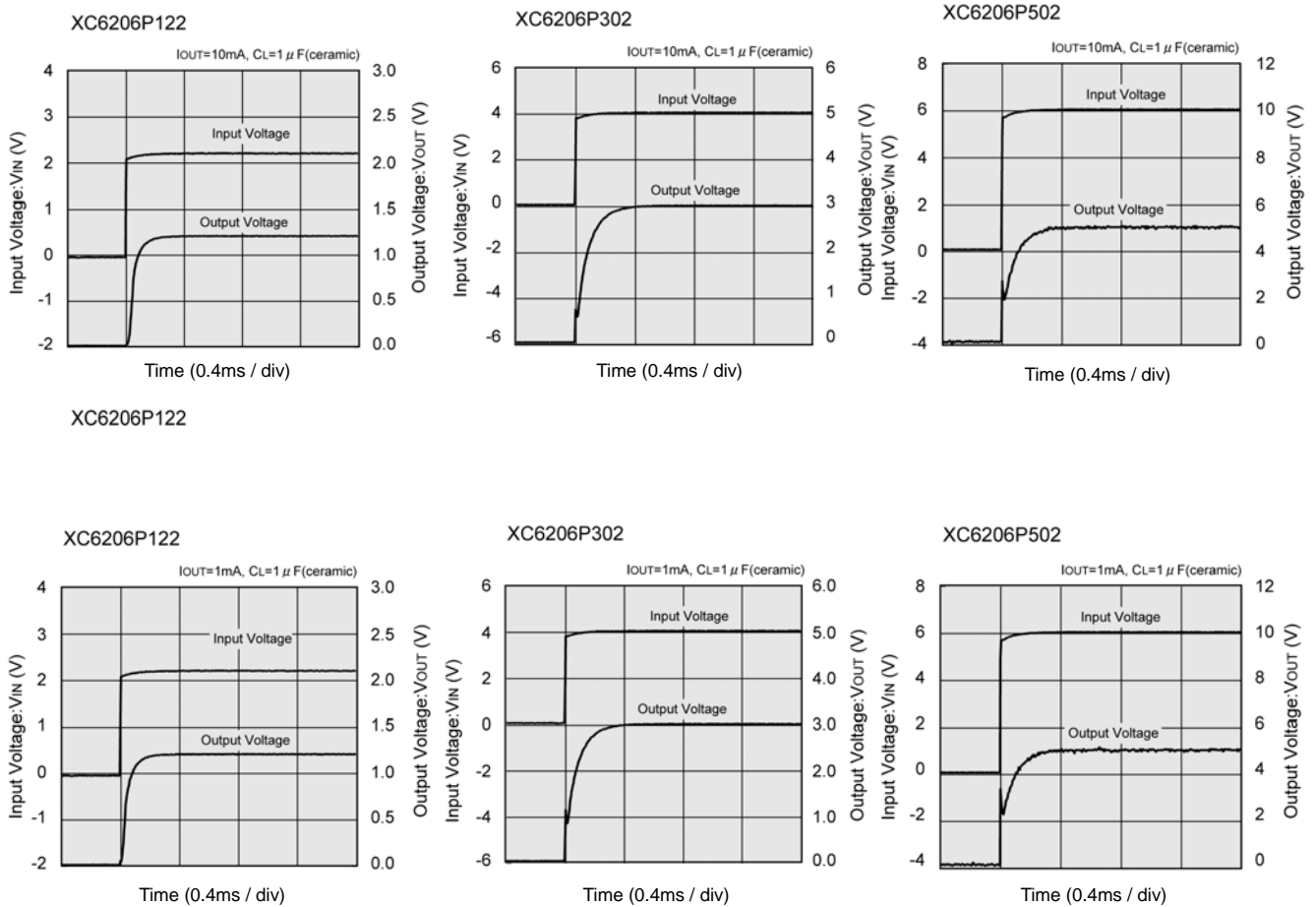
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(9) Input Transient Response 2
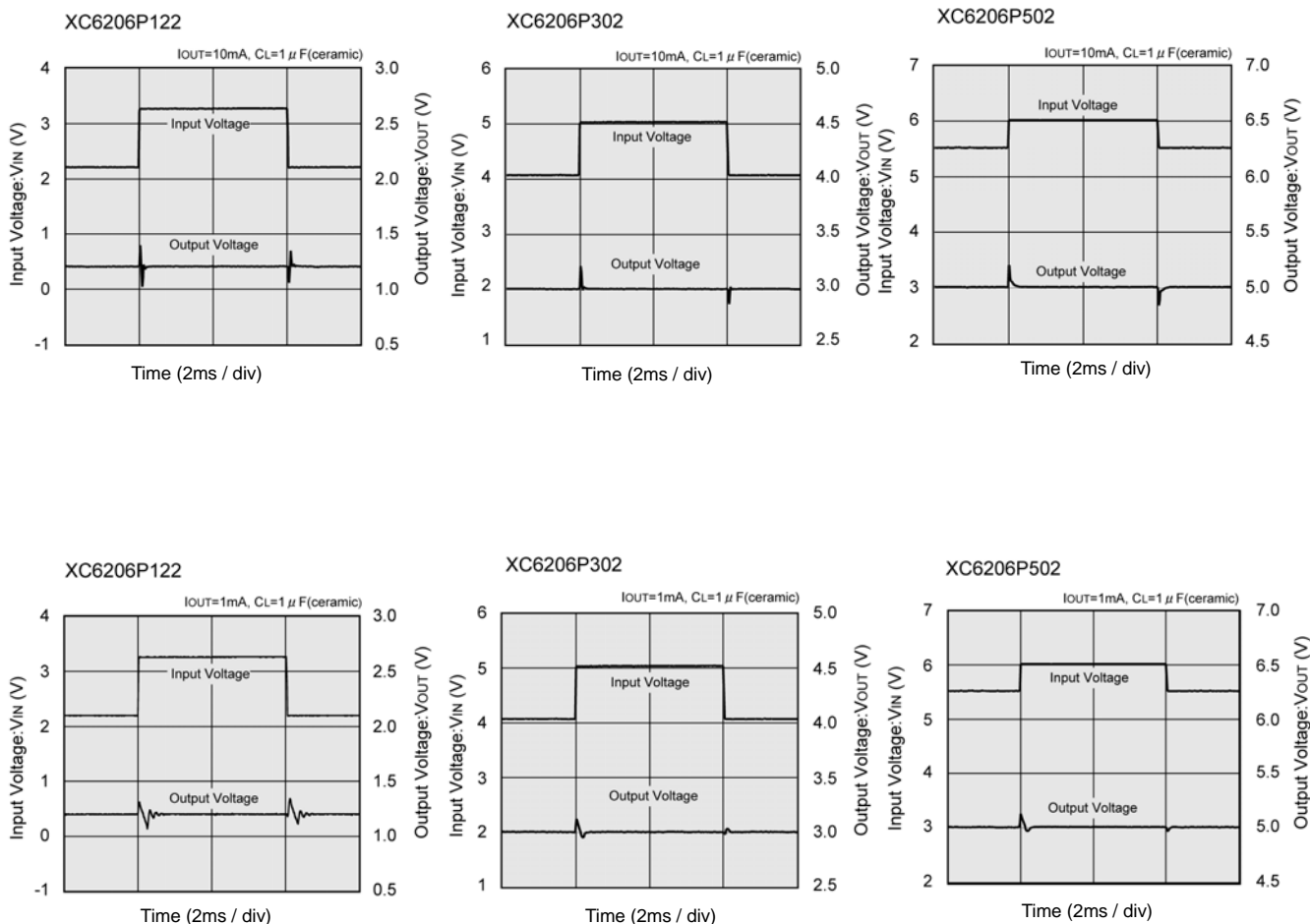
(10) Load Transient Response
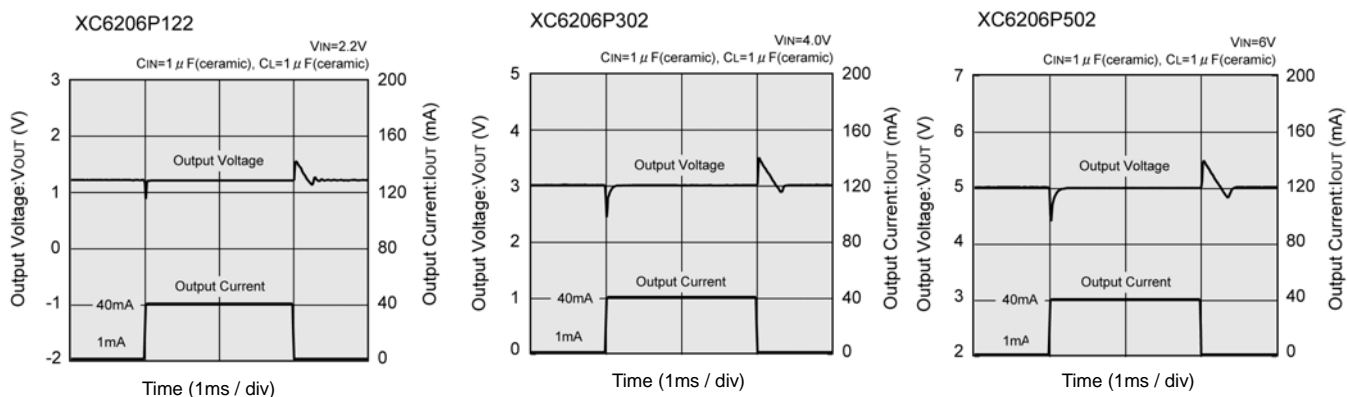
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)
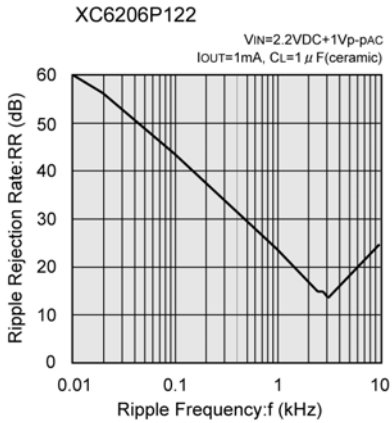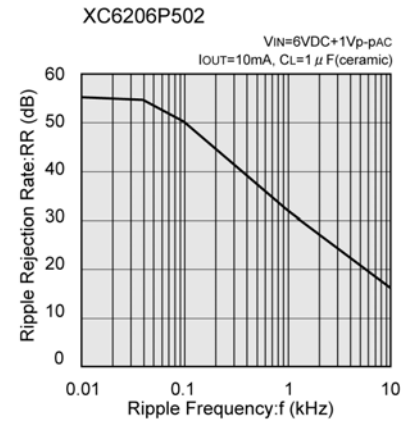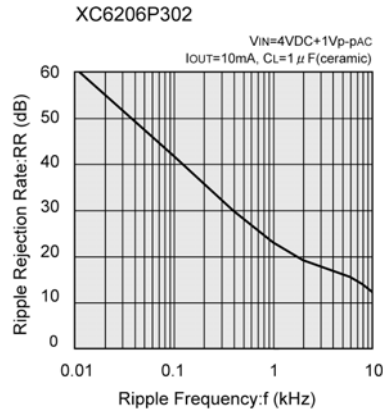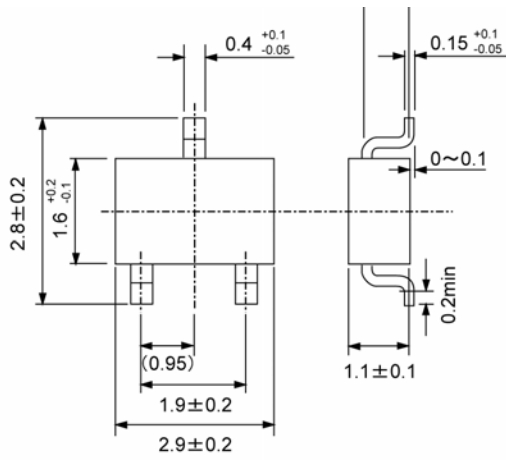
(11) Ripple Rejection Rate

XC6206P122

V_{IN}=2.2VDC+1Vp-pAC
I_{OUT}=10mA, C_L=1μF(ceramic)

XC6206P302

V_{IN}=4VDC+1Vp-pAC
I_{OUT}=10mA, C_L=1μF(ceramic)

XC6206P502

V_{IN}=6VDC+1Vp-pAC
I_{OUT}=10mA, C_L=1μF(ceramic)

XC6206P122

V_{IN}=2.2VDC+1Vp-pAC
I_{OUT}=1mA, C_L=1μF(ceramic)

XC6206P302

V_{IN}=4VDC+1Vp-pAC
I_{OUT}=1mA, C_L=1μF(ceramic)

XC6206P502

V_{IN}=6VDC+1Vp-pAC
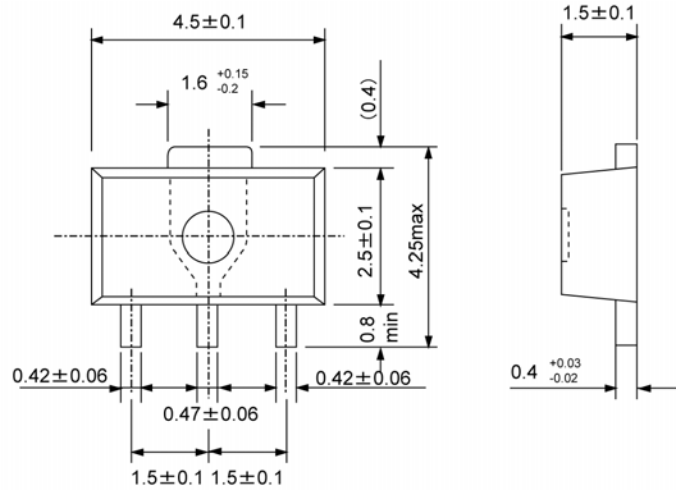I_{OUT}=1mA, C_L=1μF(ceramic)
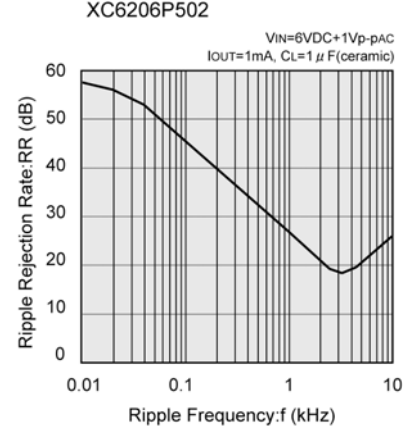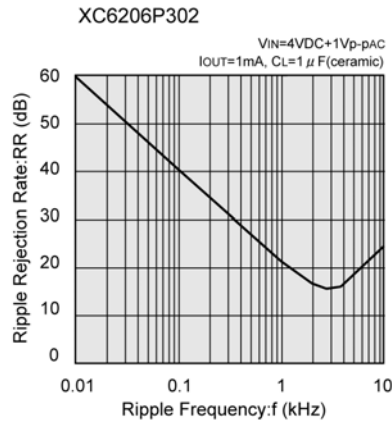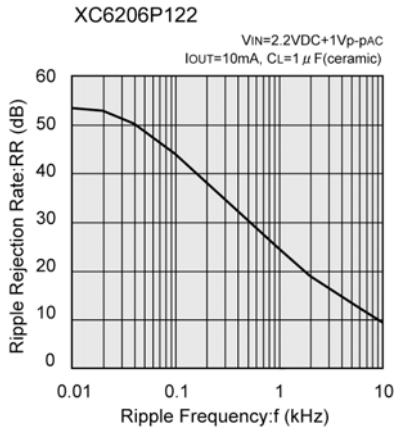
■PACKAGING INFORMATION

●SOT-23

Unit : mm

●SOT-89

Unit : mm

●USP-6B

Unit : mm

●TO-92
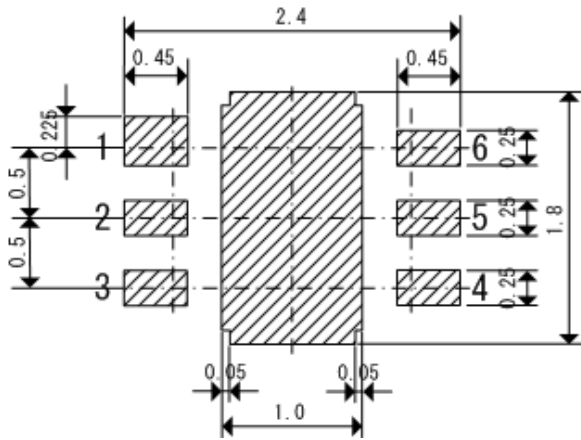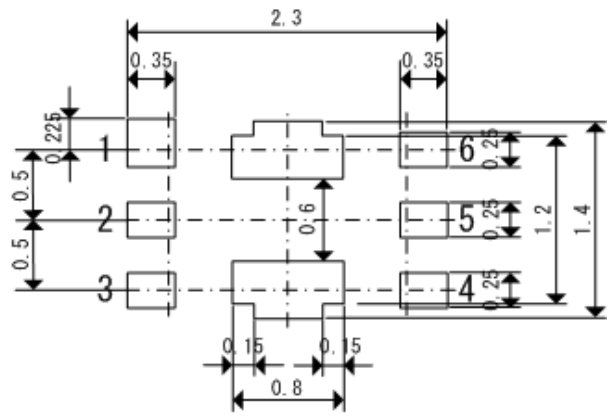
Unit : mm

1PIN INDENT

TOREX
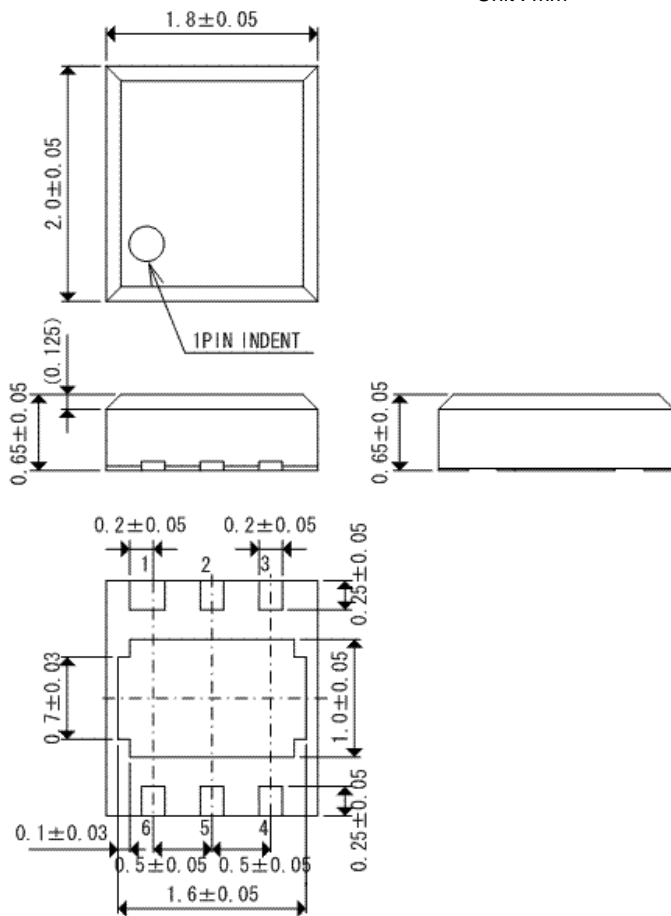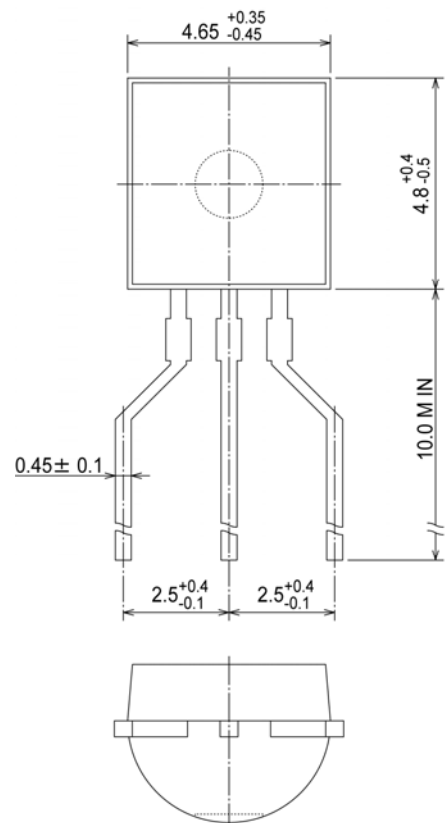
■PACKAGING INFORMATION (Continued)

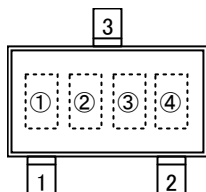●USP-6B Reference Pattern Layout

●USP-6B Reference Metal Mask Design

■MARKING RULE

● SOT-23, SOT-89

SOT-23
(TOP VIEW)
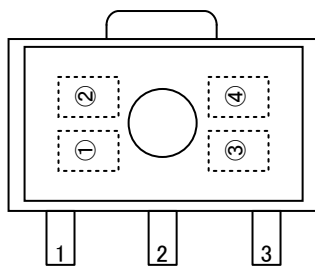
SOT-89
(TOP VIEW)

① represents product number

MARK	PRODUCT SERIES
6	XC6206P*****

② represents 3 pins regulator

MARK		PRODUCT SERIES
VOLTAGE＝0.1 ~ 3.0V	VOLTAGE＝3.1 ~ 6.0V	PRODUCT SERIES
5	6	XC6206P*****

③ represents output voltage

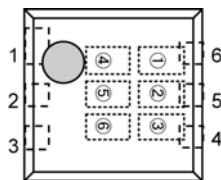| MARK	VOLTAGE (V)			MARK	OUTPUT VOLTAGE (V)		
0	-	3.1	-	F	1.6	4.6	-
1	-	3.2	-	H	1.7	4.7	-
2	-	3.3	-	K	1.8	4.8	-
3	-	3.4	-	L	1.9	4.9	-
4	-	3.5	-	M	2.0	5.0	-
5	-	3.6	-	N	2.1	-	-
6	-	3.7	-	P	2.2	-	-
7	-	3.8	-	R	2.3	-	-
8	-	3.9	-	S	2.4	-	-
9	-	4.0	-	T	2.5	-	-
A		4.1	-	U	2.6	-	-
B	1.2	4.2	-	V	2.7	-	-
C	1.3	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 repeated. (G, I, J, O, Q, W excluded)

*No character inversion used.

■MARKING RULE (Continued)

●USP-6B

USP-6B
(TOP VIEW)

①② represents product number

MARK		PRODUCT SERIES
①	②	
0	6	XC6206P***D*

③ represents 3 pins regulator

MARK	PRODUCT SERIES
P	XC6206P***D*

④⑤ represents output voltage

MARK		OUTPUT VOLTAGE(V)	PRODUCT SERIES
④	⑤		
3	3	3.3	XC6206P33*D*
5	0	5.0	XC6206P50*D*

⑥ represents production lot number

  0 to 9, A to Z repeated. (G, I, J, O, Q, W excluded)

 *No character inversion used.

● TO-92

6206

①②③④

⑤⑥
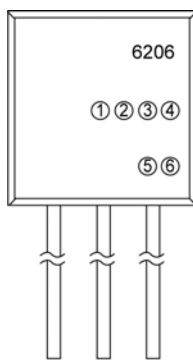
TO-92 (T Type)
(SIDE VIEW)

① represents type of regulator

MARK	PRODUCT SERIES
P	XC6206P*****

②③ represents output voltage

MARK		VOLTAGE (V)	PRODUCT SERIES
②	③		
3	3	3.3	XC6206P33***
5	0	5	XC6206P50***

④ represents output voltage accuracy

MARK	OUTPUT VOLTAGE ACCURACY	PRODUCT SERIES
1	±1%	XC6206P**1**
2	±2%	XC6206P**2**

⑤ represents least significant digit of the production year

MARK	PRODUCTION YEAR
3	2003
4	2004

⑥ represents production lot number

  0 to 9, A to Z repeated. (G, I, J, O, Q, W excluded)

*No character inversion used.