

High Voltage Positive Voltage Regulators

GENERAL DESCRIPTION

The XC6202 series are highly precise, low power consumption, high voltage input, positive voltage regulators manufactured using CMOS and laser trimming technologies. The XC6202 consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error correction circuit.

Output voltage is selectable in 100mV steps from 1.8V ~ 18V. The series are also compatible with low ESR ceramic capacitors which give added output stability.

Since the current limiter circuit is built-in, the IC is protected against overshoot currents at such times of output shorts etc.

SOT-23 (150mW), SOT-89 (500mW), TO-92 (300mW), SOT-223 (1200mW) and USP-6B (100mW) packages are available.

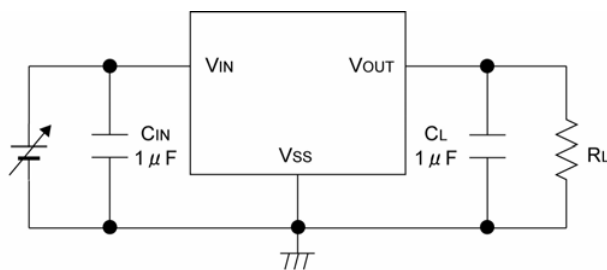
APPLICATIONS

- Battery powered equipment
- Reference voltage
- Cameras, video cameras
- Palmtops

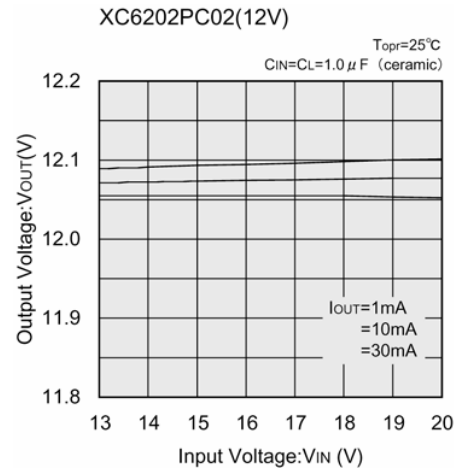
FEATURES

- Maximum Output Current** : 150mA (within Pd)
- Maximum Operational Voltage** : 20V
- Output Voltage Range** : 1.8V ~ 18V (0.1V increments)
- Highly Accurate** : $\pm 2\%$
- Low Power Consumption** : 10 μ A (TYP.)
- Line Regulation** : 0.01% / V (TYP.)
- Dropout Voltage** : 200mV @ 30mA
670mV @ 100mA
- Operational Temperature Range** : -40 ~ 85
- Low ESR Capacitor Compatible** : Ceramic capacitor
- Current Limiter Circuit Built-In**
- Small Packages** : SOT-23 (150mW),
SOT-89 (500mW),
TO-92 (300mW),
SOT-223 (1200mW),
USP-6B (100mW)

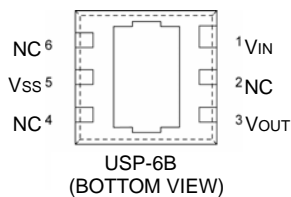
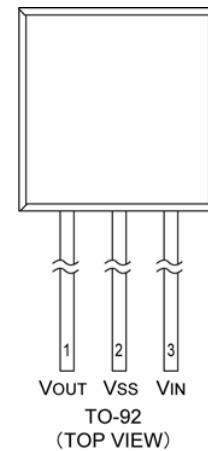
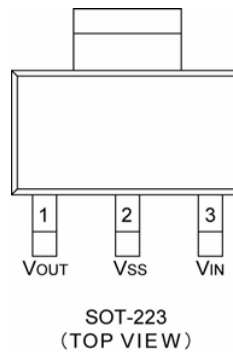
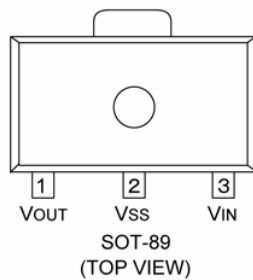
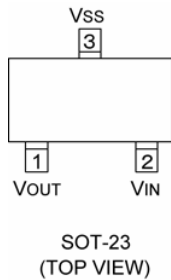
TYPICAL APPLICATION CIRCUIT



TYPICAL PERFORMANCE CHARACTERISTICS



PIN CONFIGURATION



*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 VSS (No.5) pin.

PIN ASSIGNMENT

| PIN NUMBER | | | PIN NAME | FUNCTION |
|------------|--------------------------|---------|----------|---------------|
| SOT-23 | SOT-89/TO-92/ SOT-223 | USP-6B | | |
| 1 | 1 | 3 | VOUT | Output |
| 3 | 2 | 5 | Vss | Ground |
| 2 | 3 | 1 | VIN | Power Input |
| - | - | 2, 4, 6 | NC | No connection |

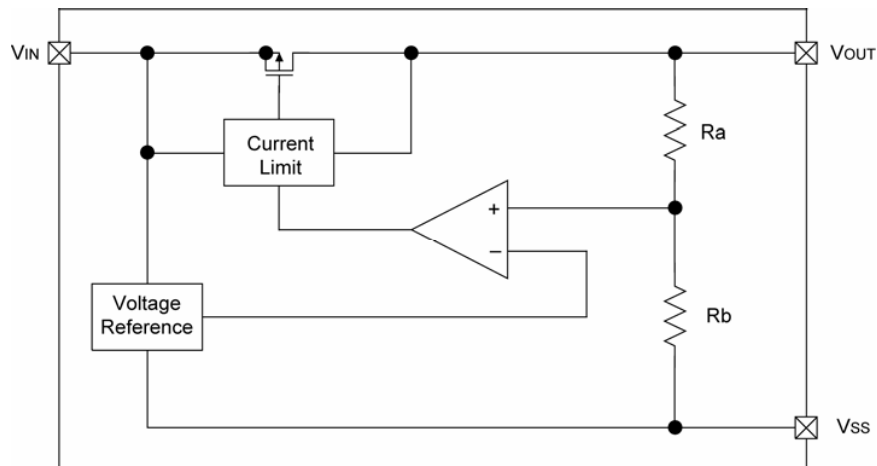
PRODUCT CLASSIFICATION

Ordering Information

XC6202P

| DESIGNATOR | DESCRIPTION | SYMBOL | DESCRIPTION |
|------------|--------------------|---------|---|
| | Output Voltage | 18 ~ J0 | : For the voltage above 10V, see the example 10=A, 11=B 12=C, 13=D, 14=E, 15=F, 16=G, 17=H, 18=J e.g. VOUT= 3.0V :3, :0 VOUT= 12V :C, :0 VOUT= 15V :F, :0 |
| | Accuracy | 2 | : ± 2% |
| | Packages | M | : SOT-23 |
| | | P | : SOT-89 |
| | | T | : TO-92 |
| | | F | : SOT-223 |
| | | D | : USP-6B |
| | Device Orientation | R | : Embossed tape, standard feed |
| | | L | : Embossed tape, reverse feed |
| | | H | : Paper Tape (TO-92) |
| | | B | : Bag (TO-92) |

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Ta = 25

| PARAMETER | | SYMBOL | RATINGS | UNITS |
|-----------------------------|---------|------------------|---|-------|
| Input Voltage | | V _{IN} | 22.0 | V |
| Output Current | | I _{OUT} | 500 | mA |
| Output Voltage | | V _{OUT} | V _{SS} -0.3 ~ V _{IN} +0.3 | V |
| Power Dissipation | SOT-25 | P _d | 150 | mW |
| | SOT-89 | | 500 | |
| | TO-92 | | 300 | |
| | USP-6B | | 100 | |
| | SOT-223 | | 1,200* | |
| Operating Temperature Range | | T _{opr} | -40 ~ +85 | |
| Storage Temperature Range | | T _{stg} | -55 ~ +125 | |

* Circuits board mounting: Double-sided board

ELECTRICAL CHARACTERISTICS

XC6202P182

$V_{OUT(T)}=1.8V$ ^{(*)1}

$T_{opr}=25$

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS | CIRCUIT |
|--|---|--|-------|-----------|-------|---------|---------|
| Output Voltage | $V_{OUT(E)}$ ^{(*)2} | $V_{IN}=2.8V$ $I_{OUT}=30mA$ | 1.764 | 1.800 | 1.836 | V | |
| Maximum Output Current | I_{OUTmax} | $V_{IN}=2.8V$ $V_{OUT} < V_{OUT(E)} \times 0.9$ | 60 | - | - | mA | |
| Load Regulation | V_{OUT} | $V_{IN}=2.8V$ $1mA < I_{OUT} < 60mA$ | - | 10 | 80 | mV | |
| Dropout Voltage ^{(*)3} | V_{dif1} | $I_{OUT}=30mA$ | - | 340 | 470 | mV | |
| | V_{dif2} | $I_{OUT}=100mA$ | - | 1000 | 1500 | | |
| Supply Current | I_{SS} | $V_{IN}=2.8V$ | - | 10 | 24 | μA | |
| Line Regulation | $\frac{V_{OUT}}{V_{IN} \cdot V_{OUT}}$ | $I_{OUT}=1mA$ $2.8V < V_{IN} < 20V$ | - | 0.01 | 0.20 | %/V | |
| Input Voltage | V_{IN} | | - | - | 20 | V | - |
| Output Voltage Temperature Characteristics | $\frac{V_{OUT}}{T_{opr} \cdot V_{OUT}}$ | $I_{OUT}=30mA$ $-40 < T_{opr} < 85$ | - | ± 100 | - | ppm/ | |
| Short-circuit Current | I_{short} | $V_{IN}=3.8V$ | - | 40 | - | mA | |

XC6202P332

$V_{OUT(T)}=3.3V$ ^{(*)1}

$T_{opr}=25$

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS | CIRCUIT |
|--|---|--|-------|-----------|-------|---------|---------|
| Output Voltage | $V_{OUT(E)}$ ^{(*)2} | $V_{IN}=4.3V$ $I_{OUT}=30mA$ | 3.234 | 3.300 | 3.366 | V | |
| Maximum Output Current | I_{OUTmax} | $V_{IN}=4.3V$ $V_{OUT} < V_{OUT(E)} \times 0.9$ | 150 | - | - | mA | |
| Load Regulation | V_{OUT} | $V_{IN}=4.3V$ $1mA < I_{OUT} < 100mA$ | - | 25 | 90 | mV | |
| Dropout Voltage ^{(*)3} | V_{dif1} | $I_{OUT}=30mA$ | - | 200 | 280 | mV | |
| | V_{dif2} | $I_{OUT}=100mA$ | - | 670 | 900 | | |
| Supply Current | I_{SS} | $V_{IN}=4.3V$ | - | 10 | 24 | μA | |
| Line Regulation | $\frac{V_{OUT}}{V_{IN} \cdot V_{OUT}}$ | $I_{OUT}=1mA$ $4.3V < V_{IN} < 20V$ | - | 0.01 | 0.20 | %/V | |
| Input Voltage | V_{IN} | | - | - | 20 | V | - |
| Output Voltage Temperature Characteristics | $\frac{V_{OUT}}{T_{opr} \cdot V_{OUT}}$ | $I_{OUT}=30mA$ $-40 < T_{opr} < 85$ | - | ± 100 | - | ppm/ | |
| Short-circuit Current | I_{short} | $V_{IN}=5.3V$ | - | 40 | - | mA | |

ELECTRICAL CHARACTERISTICS (Continued)

XC6202P502 $V_{OUT(T)}=5.0V$ ^(*)

$T_{opr}=25$

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS | CIRCUIT |
|--|---|--|-------|-----------|------|---------|---------|
| Output Voltage | $V_{OUT(E)}$ ^(**) | $V_{IN}=6V$ $I_{OUT}=30mA$ | 4.900 | 5.000 | 5100 | V | |
| Maximum Output Current | I_{OUTmax} | $V_{IN}=6V$ $V_{OUT} < V_{OUT(E)} \times 0.9$ | 200 | - | - | mA | |
| Load Regulation | V_{OUT} | $V_{IN}=6V$ $1mA < I_{OUT} < 100mA$ | - | 30 | 100 | mV | |
| Dropout Voltage ^(**3) | V_{dif1} | $I_{OUT}=30mA$ | - | 130 | 190 | mV | |
| | V_{dif2} | $I_{OUT}=100mA$ | - | 440 | 550 | | |
| Supply Current | I_{SS} | $V_{IN}=6V$ | - | 10 | 24 | μA | |
| Line Regulation | $\frac{V_{OUT}}{V_{IN} \cdot V_{OUT}}$ | $I_{OUT}=1mA$ $6V < V_{IN} < 20V$ | - | 0.01 | 0.20 | %/V | |
| Input Voltage | V_{IN} | | - | - | 20 | V | - |
| Output Voltage Temperature Characteristics | $\frac{V_{OUT}}{T_{opr} \cdot V_{OUT}}$ | $I_{OUT}=30mA$ $-40 < T_{opr} < 85$ | - | ± 100 | - | ppm/ | |
| Short-circuit Current | I_{short} | $V_{IN}=7V$ | - | 40 | - | mA | |

XC6202PC02 $V_{OUT(T)}=12V$ ^(*)

$T_{opr}=25$

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS | CIRCUIT |
|--|---|---|--------|-----------|--------|---------|---------|
| Output Voltage | $V_{OUT(E)}$ ^(**) | $V_{IN}=13V$ $I_{OUT}=30mA$ | 11.760 | 12.000 | 12.240 | V | |
| Maximum Output Current | I_{OUTmax} | $V_{IN}=13V$ $V_{OUT} < V_{OUT(E)} \times 0.9$ | 200 | - | - | mA | |
| Load Regulation | V_{OUT} | $V_{IN}=13V$ $1mA < I_{OUT} < 100mA$ | - | 60 | 230 | mV | |
| Dropout Voltage ^(**3) | V_{dif1} | $I_{OUT}=30mA$ | - | 90 | 150 | mV | |
| | V_{dif2} | $I_{OUT}=100mA$ | - | 290 | 380 | | |
| Supply Current | I_{SS} | $V_{IN}=13V$ | - | 12 | 28 | μA | |
| Line Regulation | $\frac{V_{OUT}}{V_{IN} \cdot V_{OUT}}$ | $I_{OUT}=1mA$ $13V < V_{IN} < 20V$ | - | 0.01 | 0.20 | %/V | |
| Input Voltage | V_{IN} | | - | - | 20 | V | - |
| Output Voltage Temperature Characteristics | $\frac{V_{OUT}}{T_{opr} \cdot V_{OUT}}$ | $I_{OUT}=30mA$ $-40 < T_{opr} < 85$ | - | ± 100 | - | ppm/ | |
| Short-circuit Current | I_{short} | $V_{IN}=14V$ | - | 40 | - | mA | |

ELECTRICAL CHARACTERISTICS (Continued)

XC6202PJ02

$V_{OUT(T)}=18V$ ⁽¹⁾

$T_{opr}=25$

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS | CIRCUIT |
|--|---|---|--------|-----------|--------|---------|---------|
| Output Voltage | $V_{OUT(E)}$ ⁽²⁾ | $V_{IN}=19V$ $I_{OUT}=30mA$ | 17.640 | 18.000 | 18.360 | V | |
| Maximum Output Current | I_{OUTmax} | $V_{IN}=19V$ $V_{OUT} = V_{OUT(E)} \times 0.9$ | 200 | - | - | mA | |
| Load Regulation | V_{OUT} | $V_{IN}=19V$ $1mA \leq I_{OUT} \leq 100mA$ | - | 120 | 380 | mV | |
| Dropout Voltage ⁽³⁾ | V_{dif1} | $I_{OUT}=30mA$ | - | 80 | 150 | mV | |
| | V_{dif2} | $I_{OUT}=100mA$ | - | 280 | 380 | | |
| Supply Current | I_{SS} | $V_{IN}=19V$ | - | 15 | 30 | μA | |
| Line Regulation | $\frac{V_{OUT}}{V_{IN} \cdot V_{OUT}}$ | $I_{OUT}=1mA$ $19V \leq V_{IN} \leq 20V$ | - | 0.01 | 0.20 | %/V | |
| Input Voltage | V_{IN} | | - | - | 20 | V | - |
| Output Voltage Temperature Characteristics | $\frac{V_{OUT}}{T_{opr} \cdot V_{OUT}}$ | $I_{OUT}=30mA$ $-40 \leq T_{opr} \leq 85$ | - | ± 100 | - | ppm/ | |
| Short-circuit Current | I_{short} | $V_{IN}=20V$ | - | 40 | - | mA | |

*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 certain I_{OUT} value).

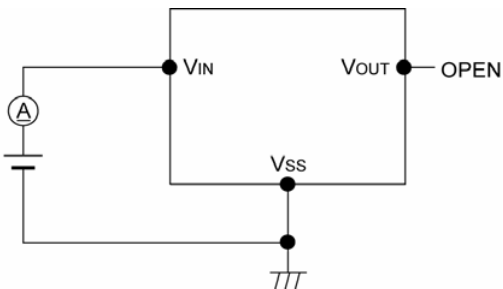
*3. $V_{dif} = \{V_{IN1}^{(5)} - V_{OUT1}^{(4)}\}$

*4. V_{OUT1} = A voltage equal to 98% of the output voltage when " $V_{OUT(T)} + 1.0V$ " is input.

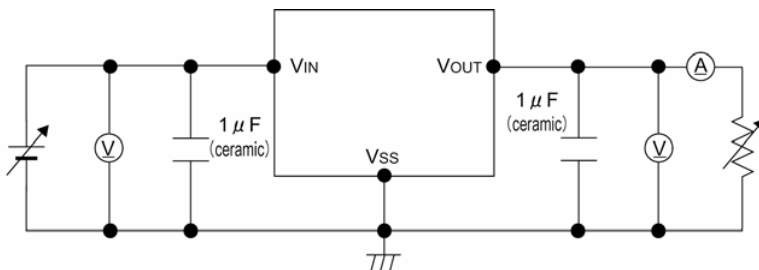
*5. V_{IN1} = The input voltage when V_{OUT1} is output following a gradual decrease in the input voltage.

TEST CIRCUITS

CIRCUIT



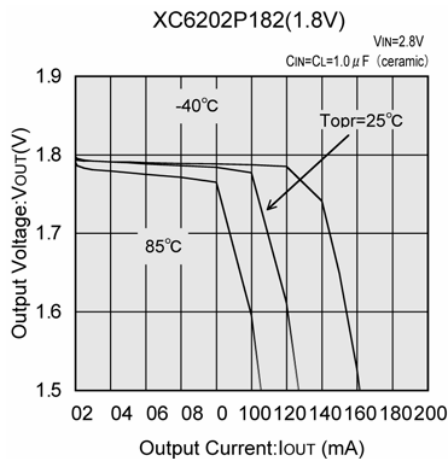
CIRCUIT



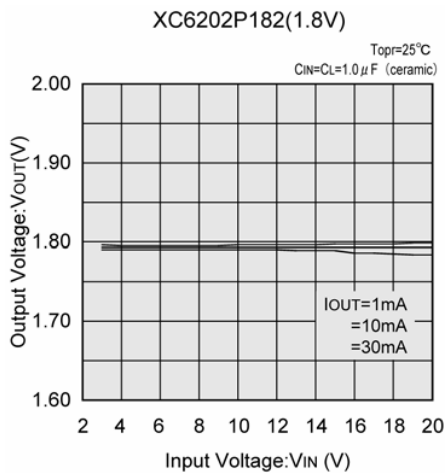
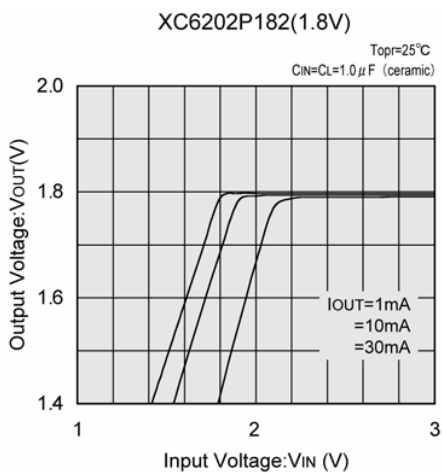
TYPICAL PERFORMANCE CHARACTERISTICS

XC6202P182

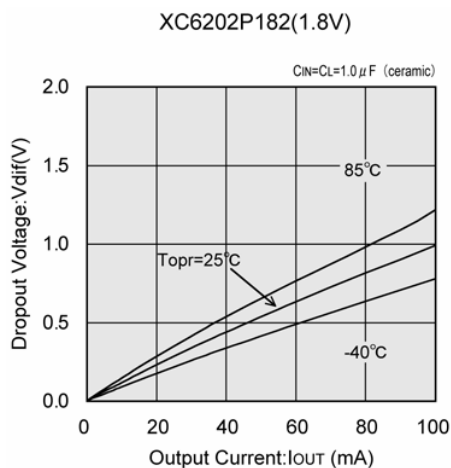
(1) Output Voltage vs. Output Current



(2) Output Voltage vs. Input Voltage



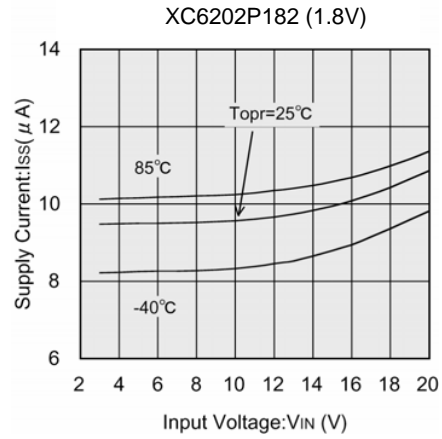
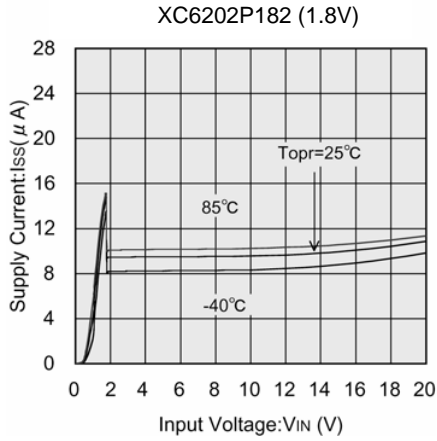
(3) Dropout Voltage vs. Output Current



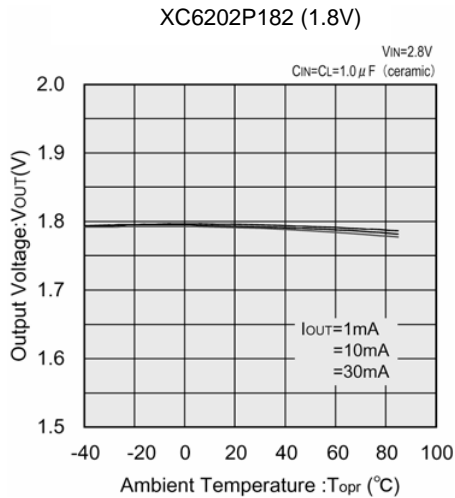
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P182 (Continued)

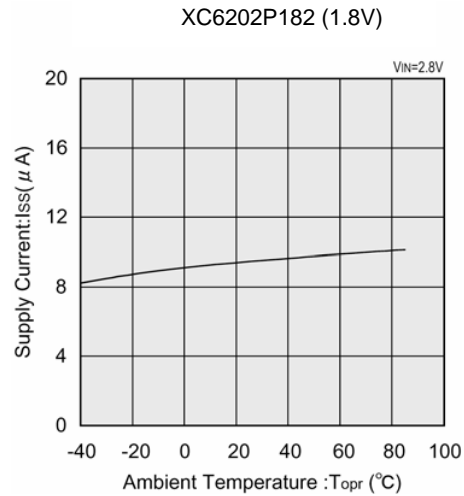
(4) Supply Current vs. Input Voltage



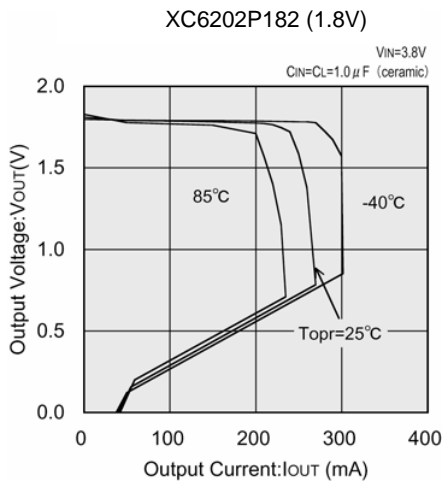
(5) Output Voltage vs. Ambient Temperature



(6) Supply Current vs. Ambient Temperature



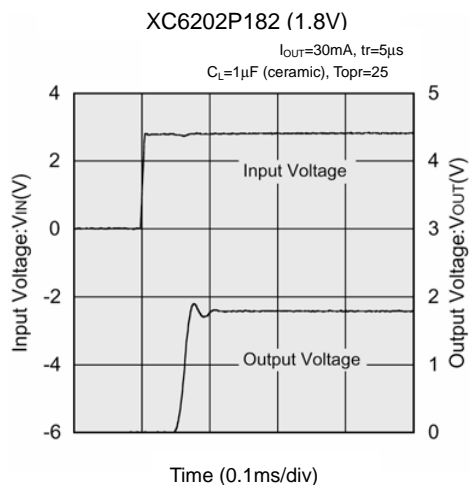
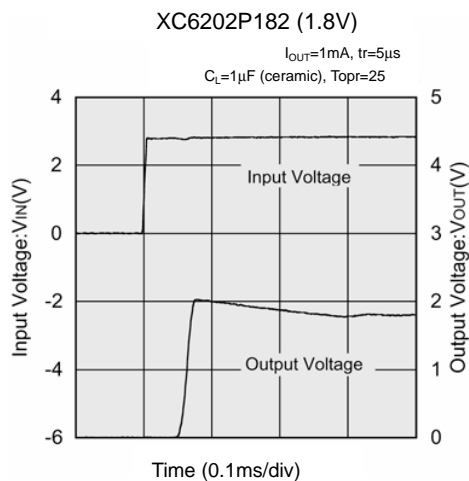
(7) Current Limiter Circuit



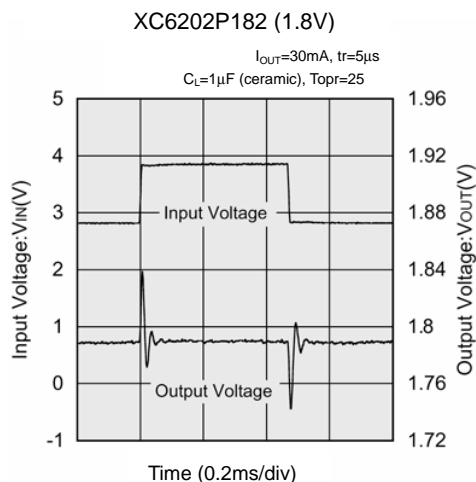
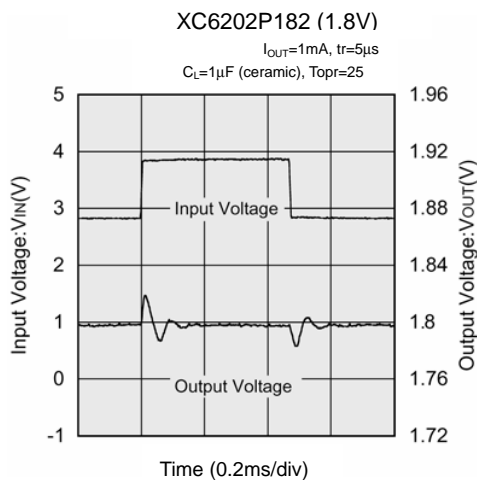
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P182 (Continued)

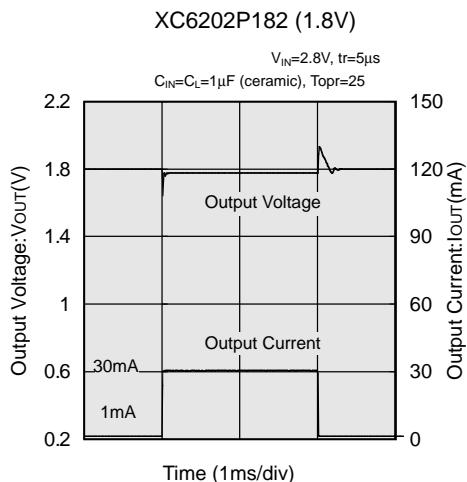
(8) Input Transient Response 1



(9) Input Transient Response 2



(10) Load Transient Response

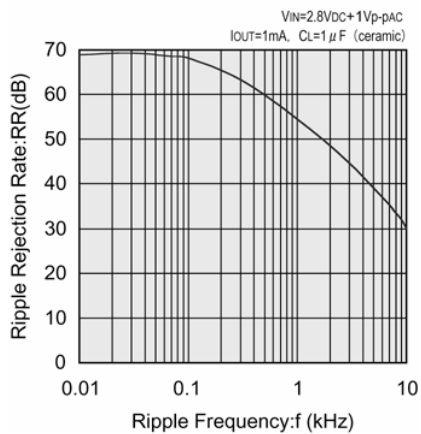


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

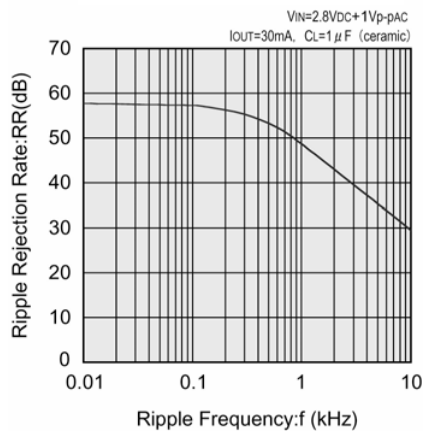
XC6202P182 (Continued)

(11) Ripple Rejection Rate

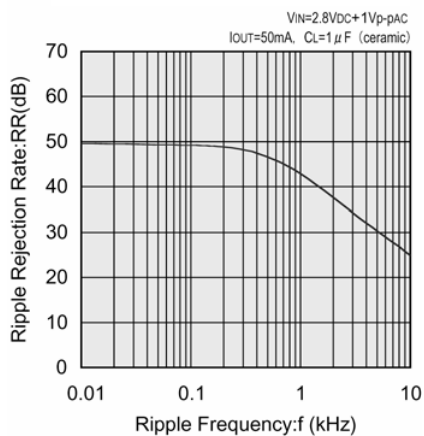
XC6202P182 (1.8V)



XC6202P182 (1.8V)



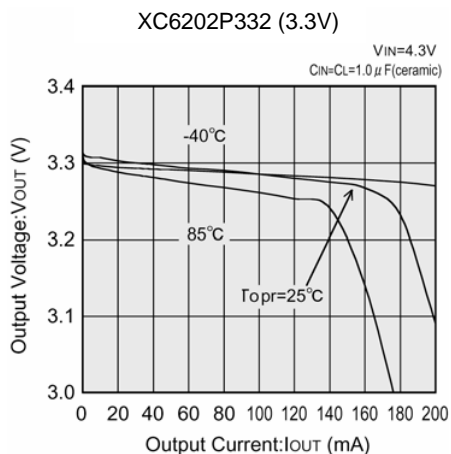
XC6202P182 (1.8V)



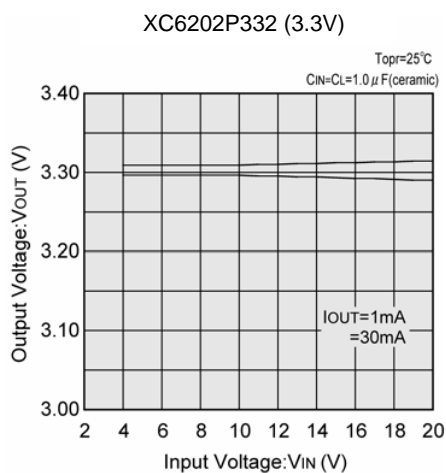
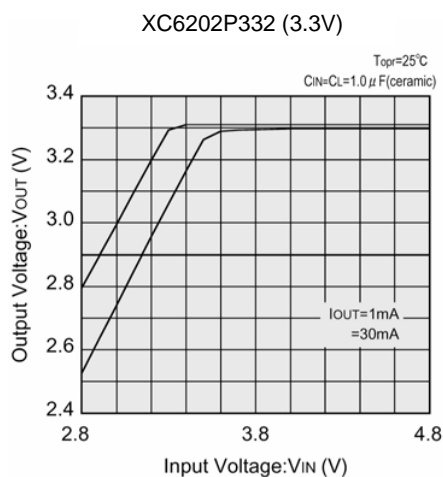
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P332

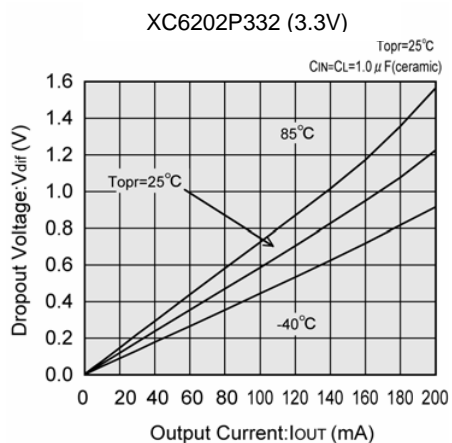
(1) Output Voltage vs. Output Current



(2) Output Voltage vs. Input Voltage



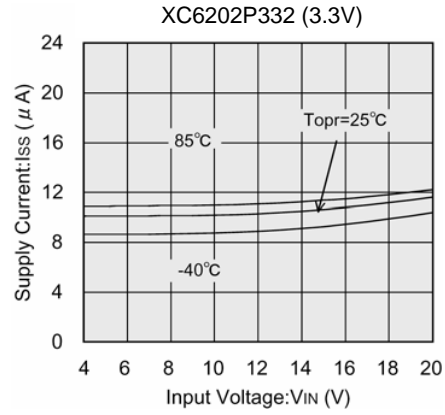
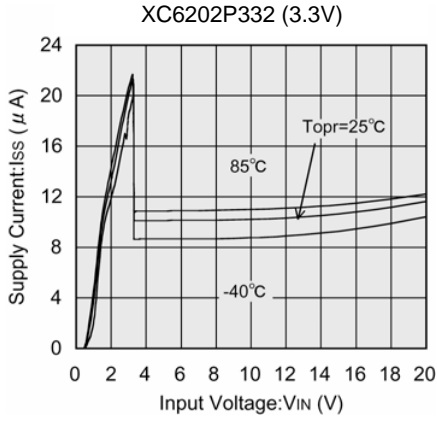
(3) Dropout Voltage vs. Output Current



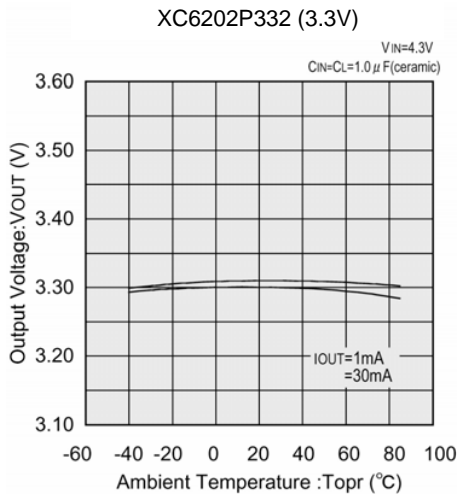
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P332 (Continued)

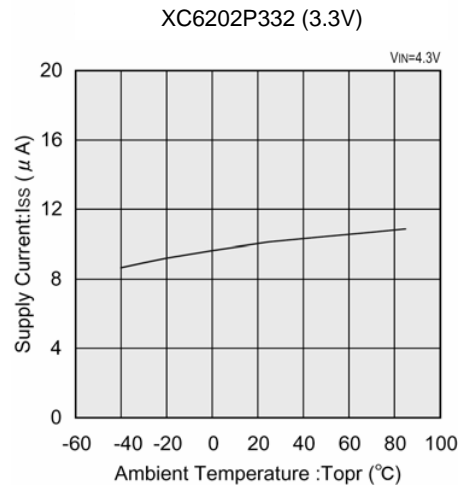
(4) Supply Current vs. Input Voltage



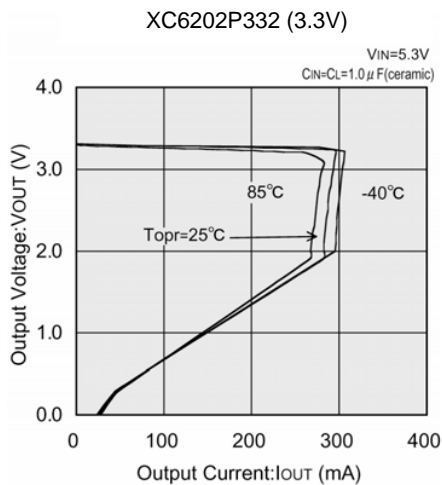
(5) Output Voltage vs. Ambient Temperature



(6) Supply Current vs. Ambient Temperature



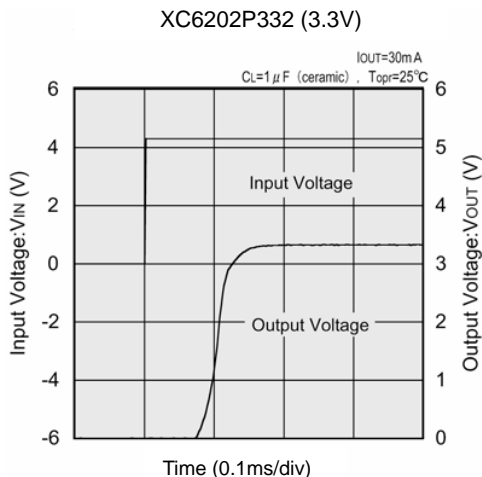
(7) Current Limiter Circuit



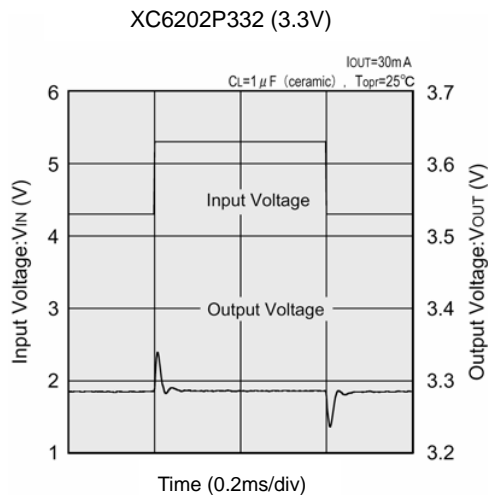
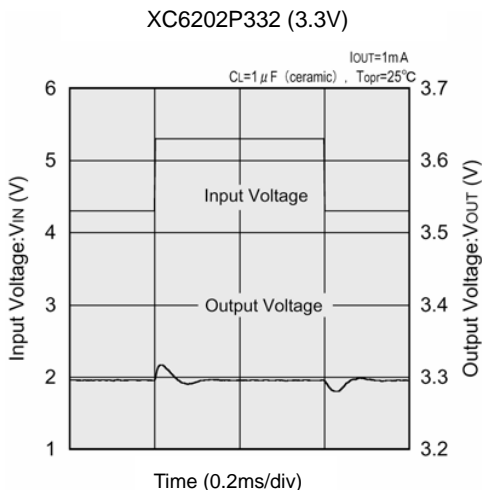
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P332 (Continued)

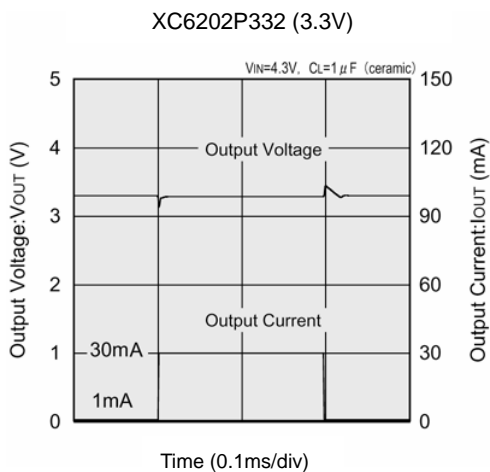
(8) Input Transient Response 1



(9) Input Transient Response 2



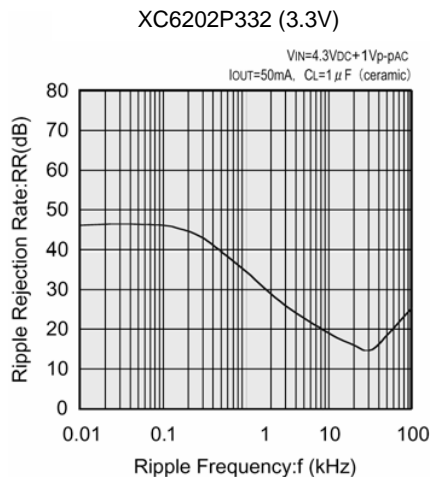
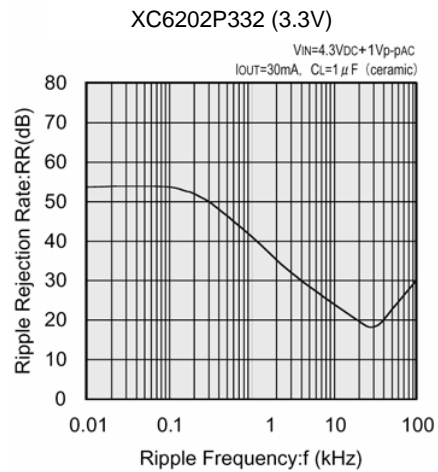
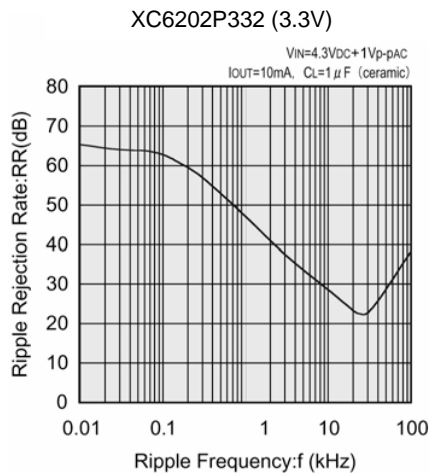
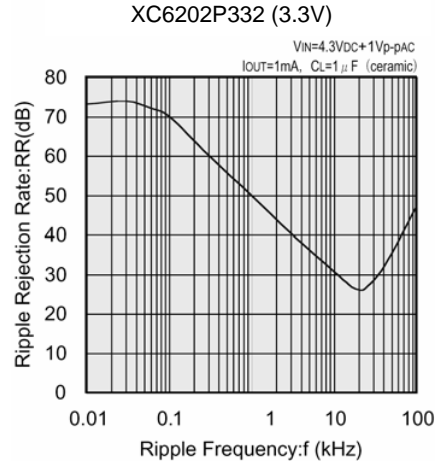
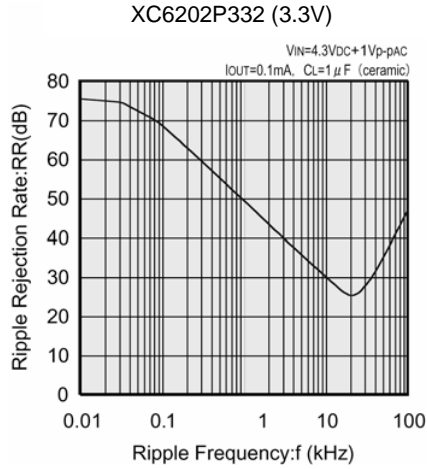
(10) Load Transient Response



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P332 (Continued)

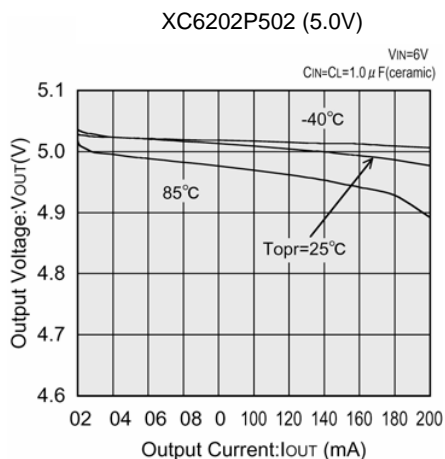
(11) Ripple Rejection Rate



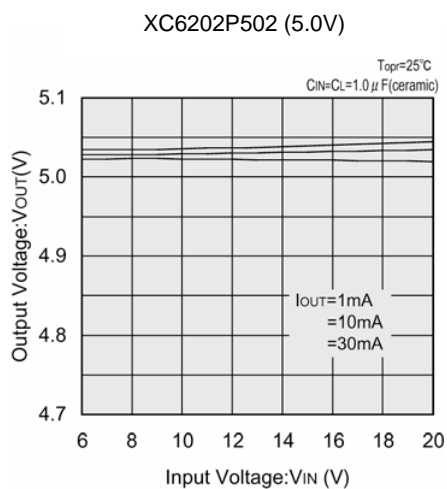
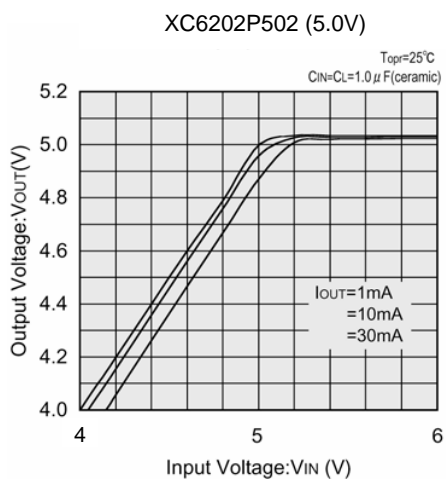
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P502

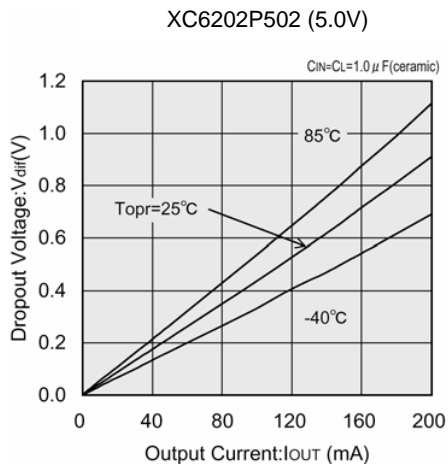
(1) Output Voltage vs. Output Current



(2) Output Voltage vs. Input Voltage



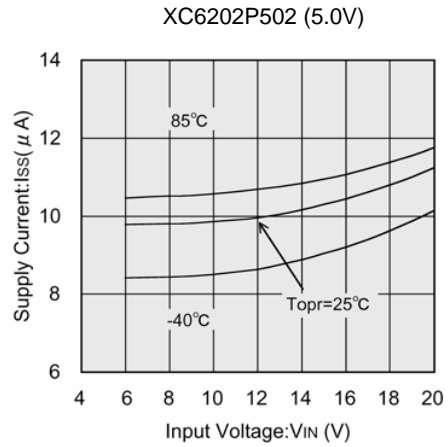
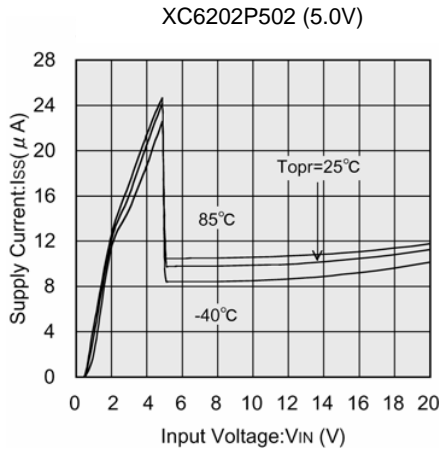
(3) Dropout Voltage vs. Output Current



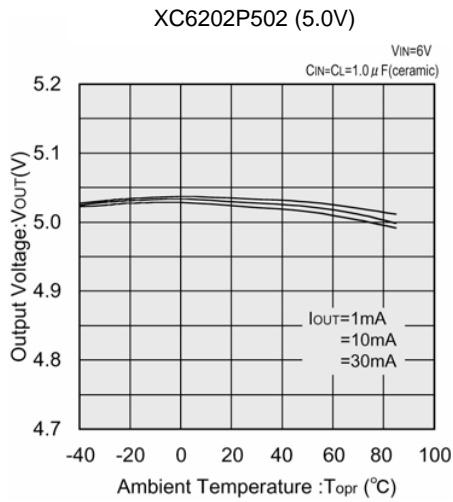
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P502 (Continued)

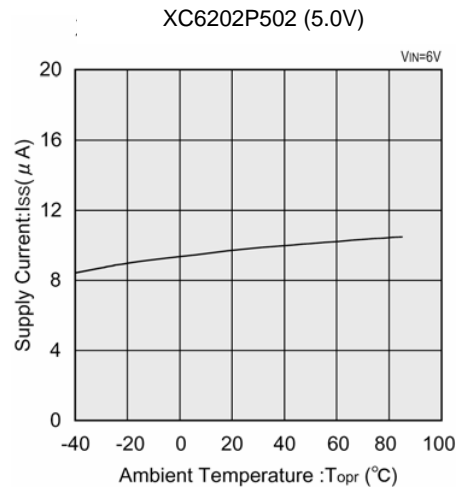
(4) Supply Current vs. Input Voltage



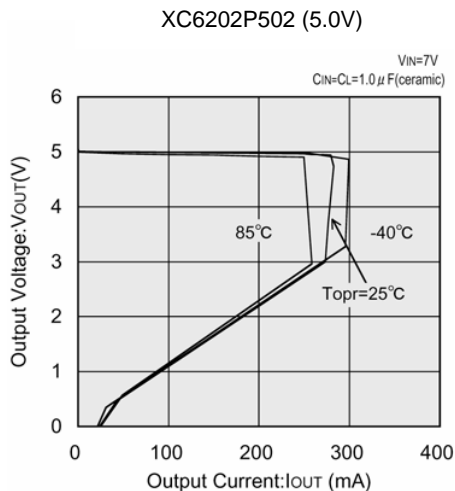
(5) Output Voltage vs. Ambient Temperature



(6) Supply Current vs. Ambient Temperature



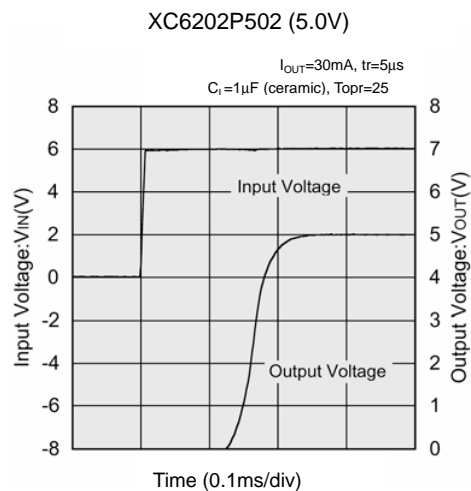
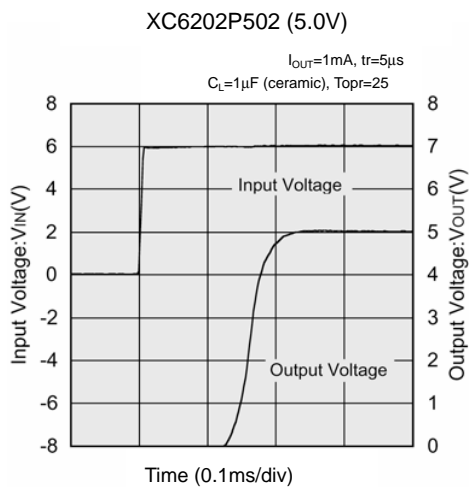
(7) Current Limiter Circuit



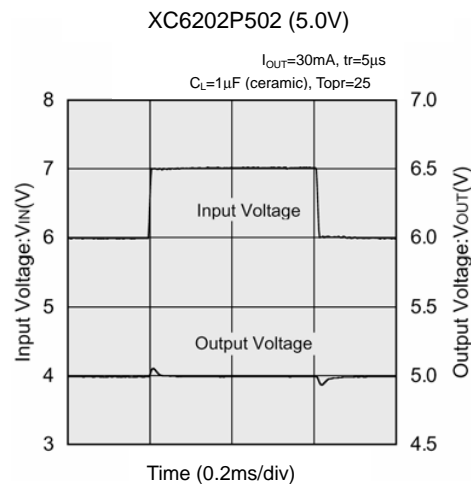
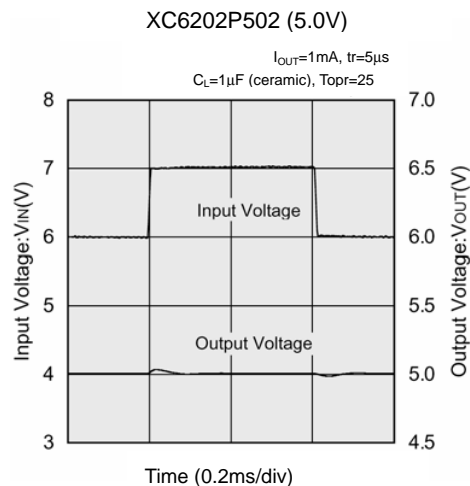
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202P502 (Continued)

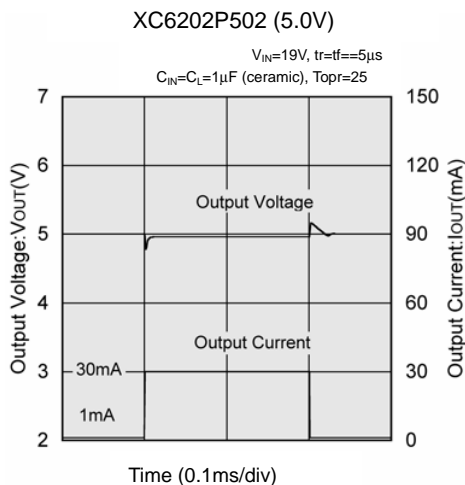
(8) Input Transient Response 1



(9) Input Transient Response 2



(10) Load Transient Response

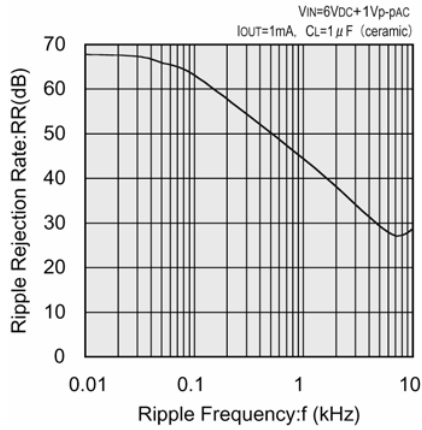


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

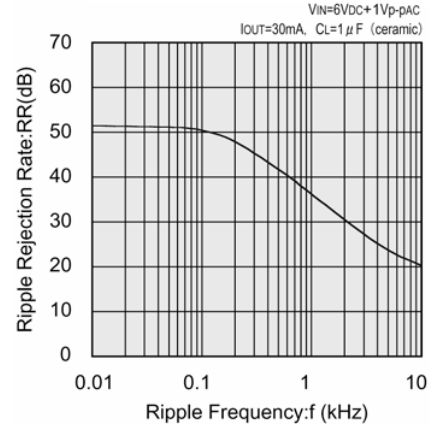
XC6202P502 (Continued)

(11) Ripple Rejection Rate

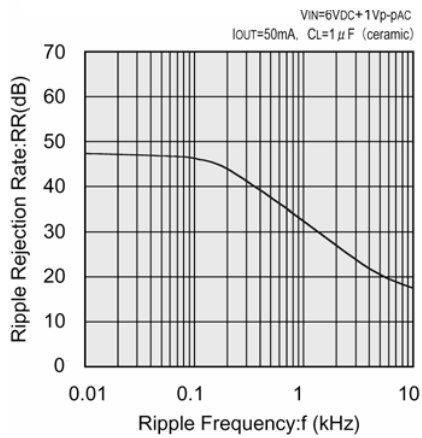
XC6202P502 (5.0V)



XC6202P502 (5.0V)



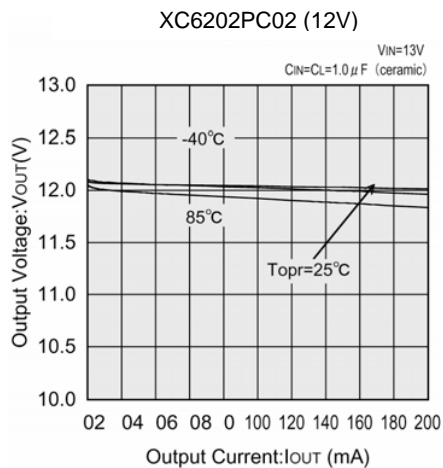
XC6202P502 (5.0V)



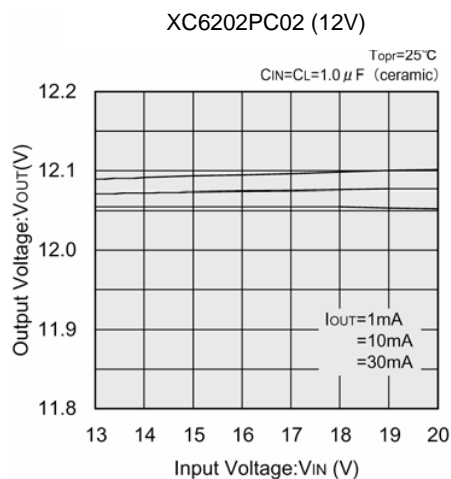
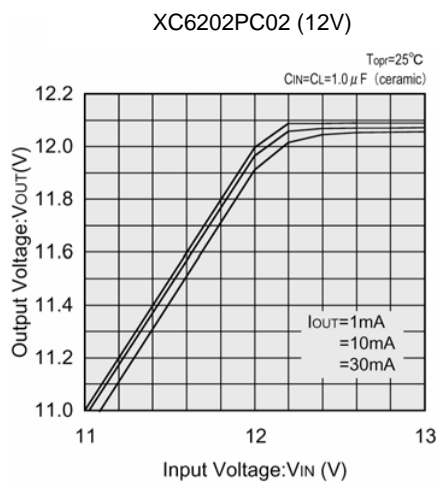
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202PC02

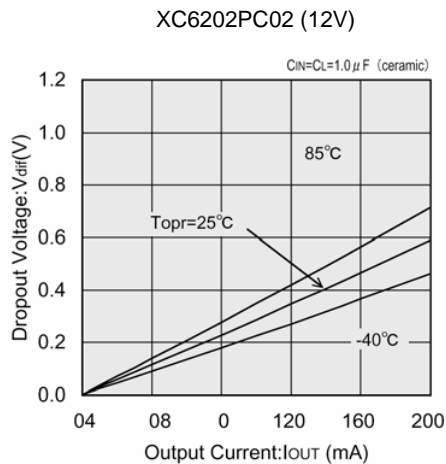
(1) Output Voltage vs. Output Current



(2) Output Voltage vs. Input Voltage



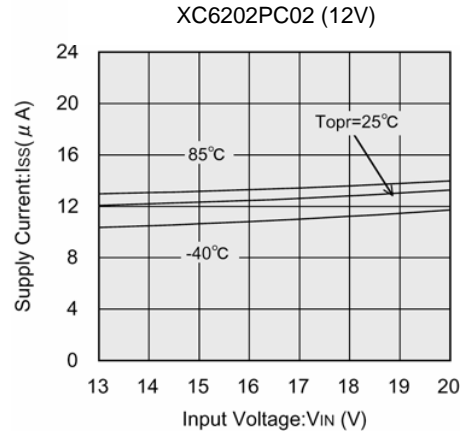
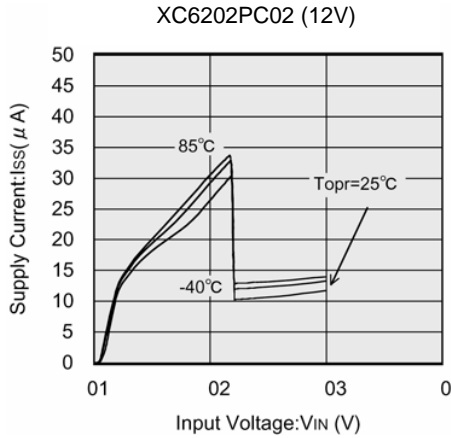
(3) Dropout Voltage vs. Output Current



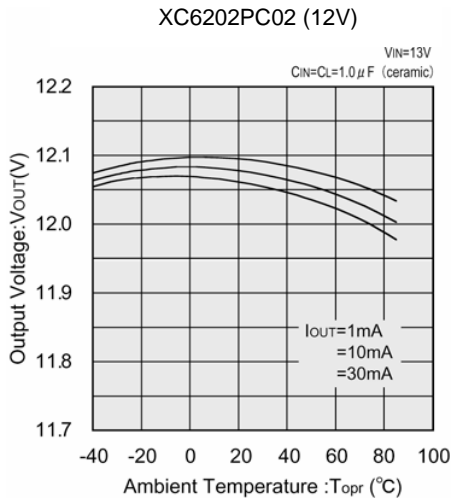
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202PC02 (Continued)

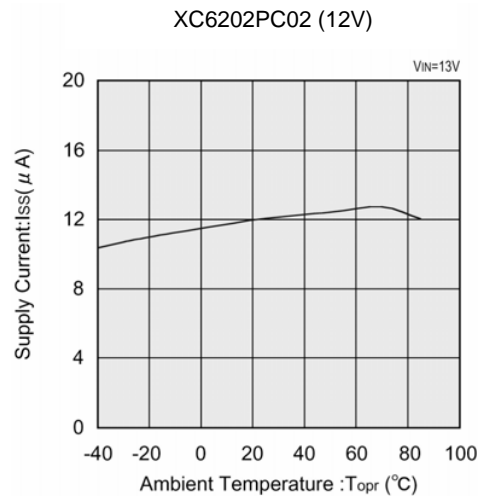
(4) Supply Current vs. Input Voltage



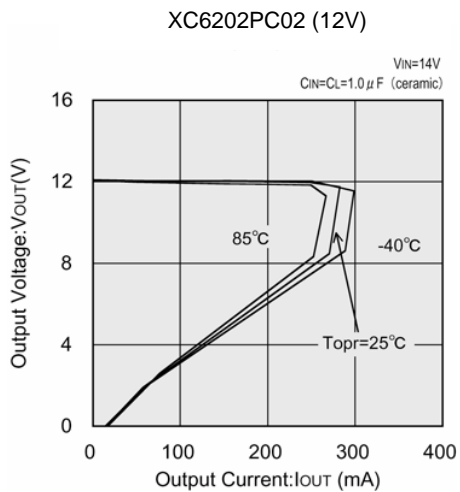
(5) Output Voltage vs. Ambient Temperature



(6) Supply Current vs. Ambient Temperature



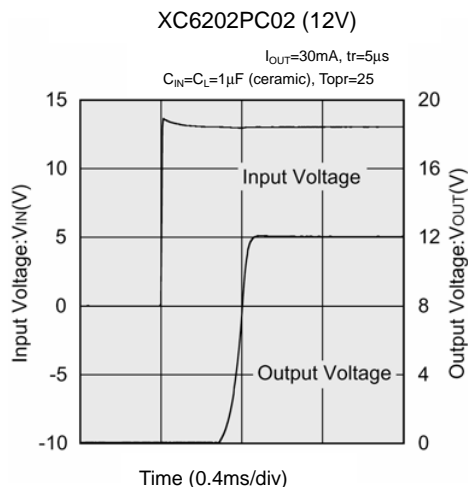
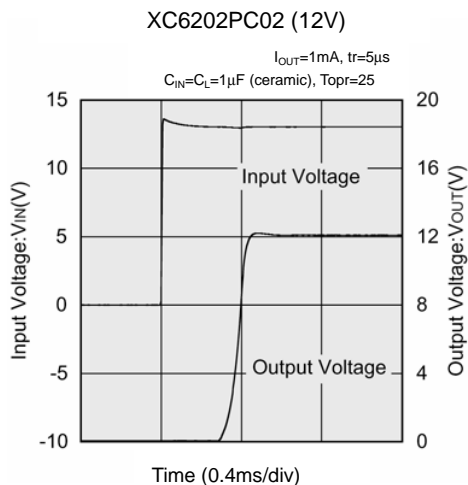
(7) Current Limiter Circuit



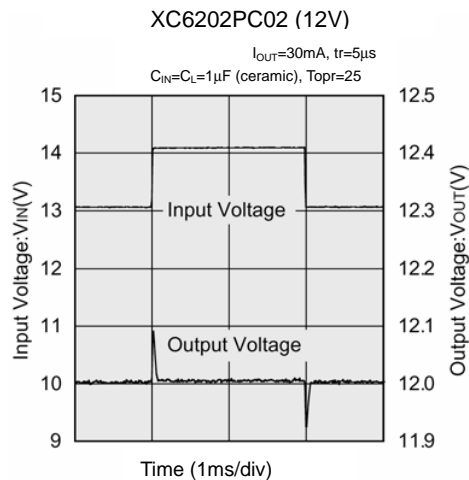
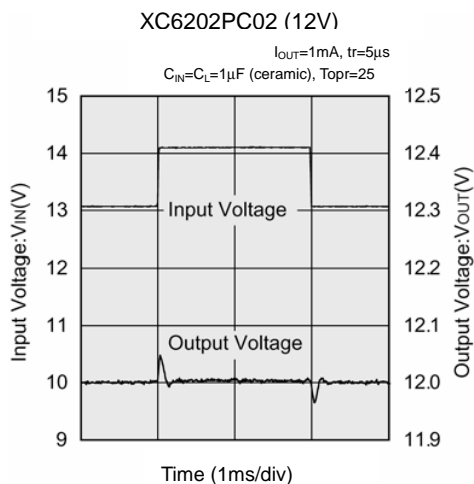
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202PC02 (Continued)

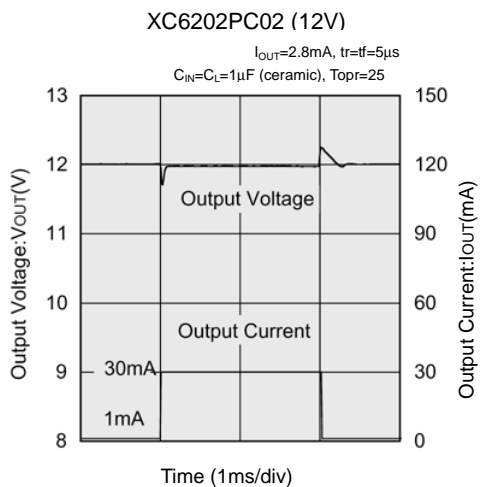
(8) Input Transient Response 1



(9) Input Transient Response 2



(10) Load Transient Response

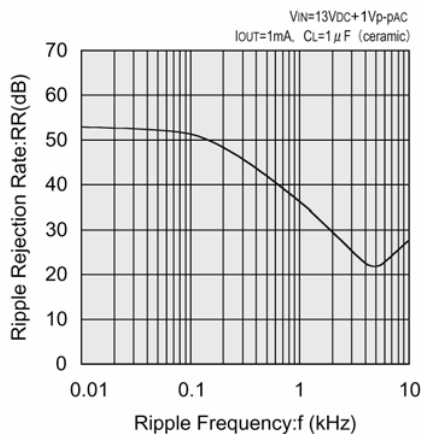


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

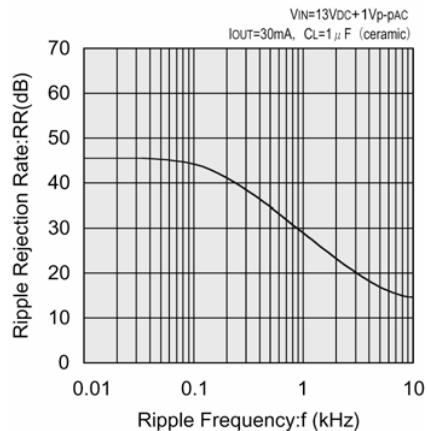
XC6202PC02 (Continued)

(11) Ripple Rejection Rate

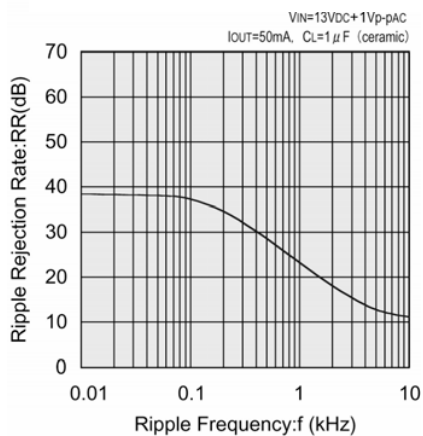
XC6202PC02 (12V)



XC6202PC02 (12V)



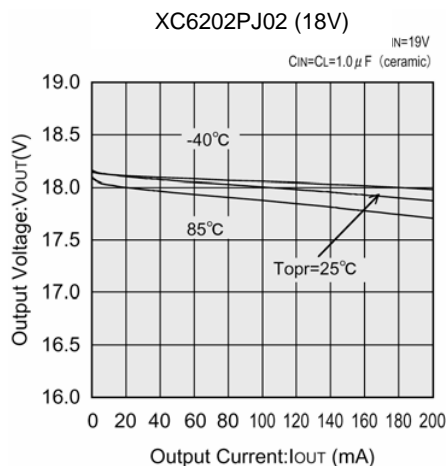
XC6202PC02 (12V)



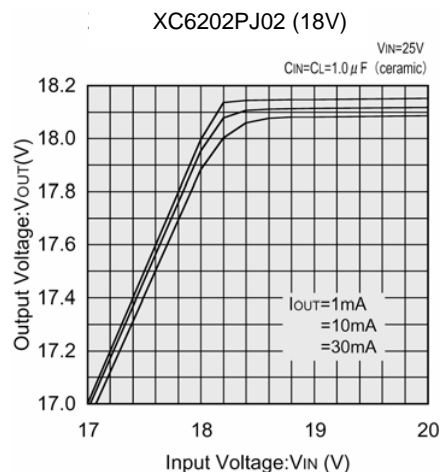
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202PJ02

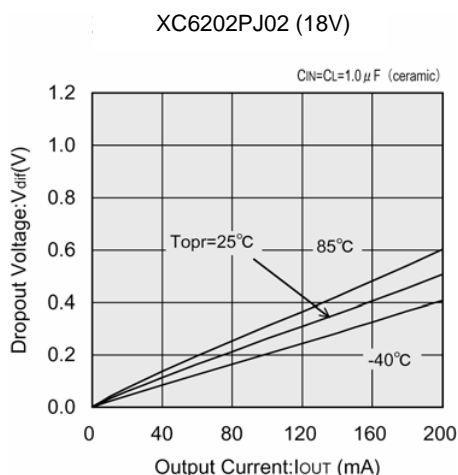
(1) Output Voltage vs. Output Current



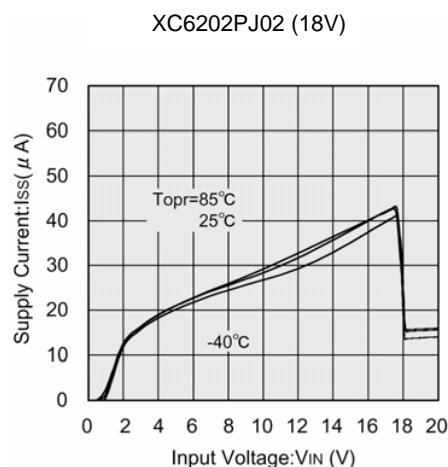
(2) Output Voltage vs. Input Voltage



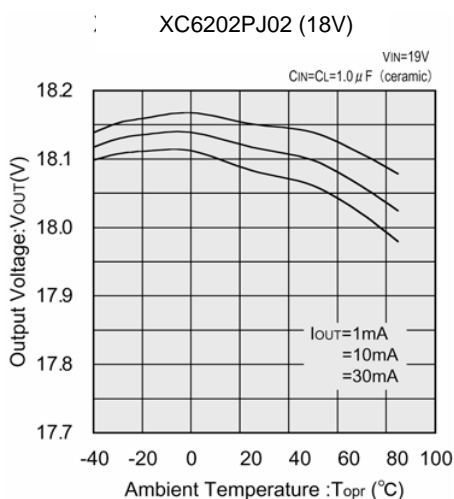
(3) Dropout Voltage vs. Output Current



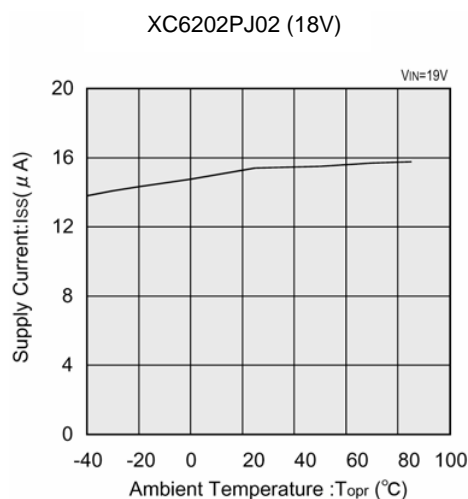
(4) Supply Current vs. Input Voltage



(5) Output Voltage vs. Ambient Temperature



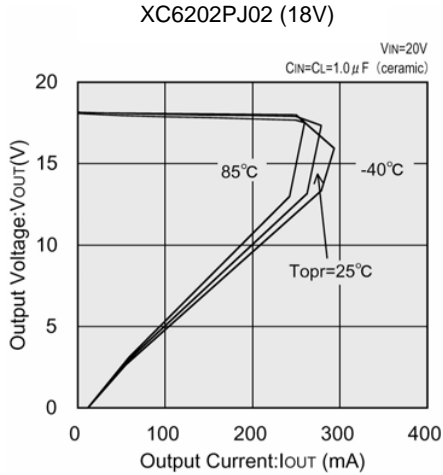
(6) Supply Current vs. Ambient Temperature



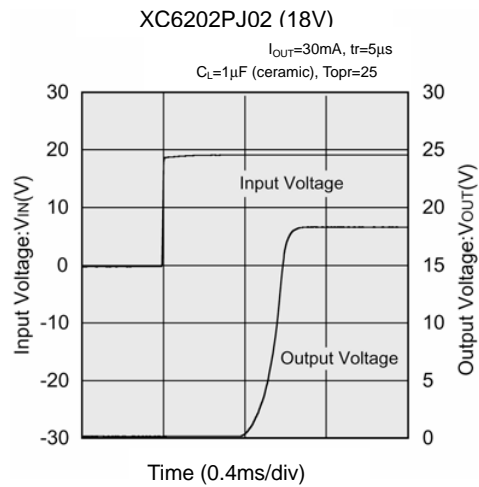
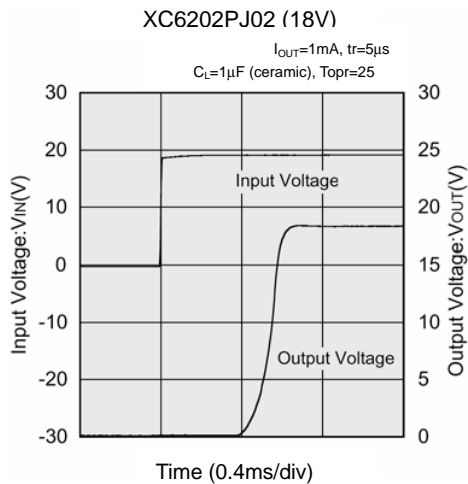
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202PJ02 (Continued)

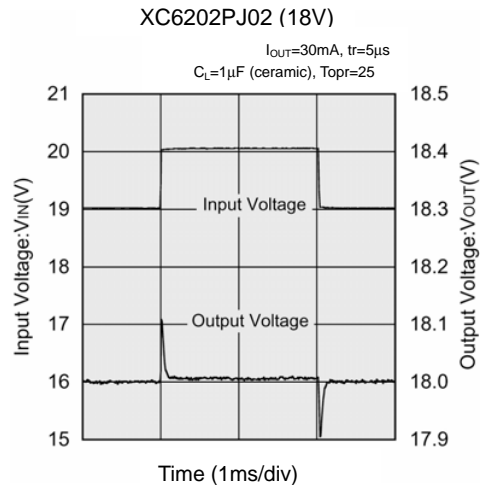
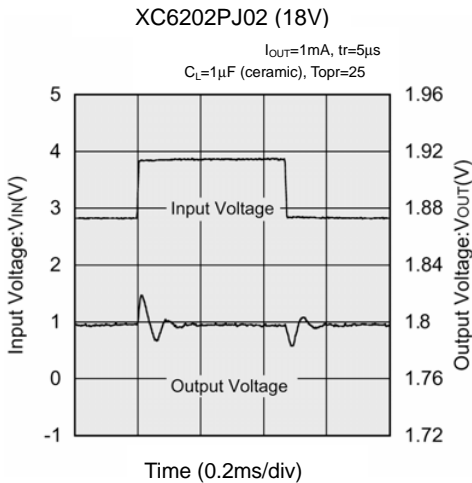
(7) Current Limiter Circuit



(8) Input Transient Response 1



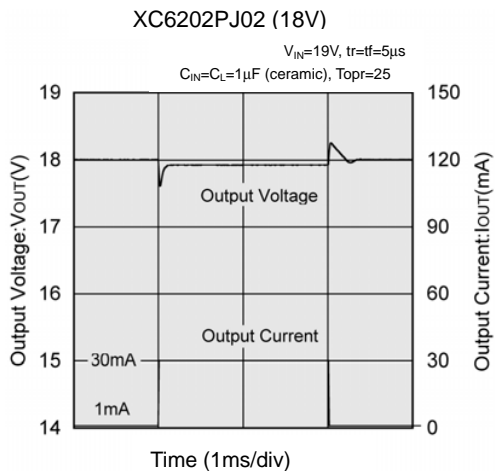
(9) Input Transient Response 2



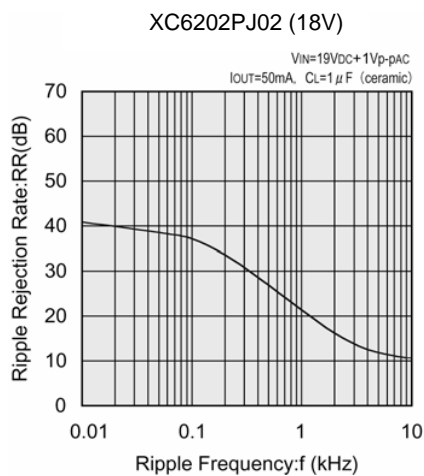
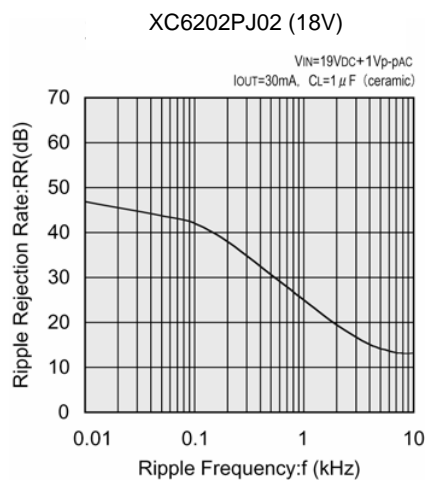
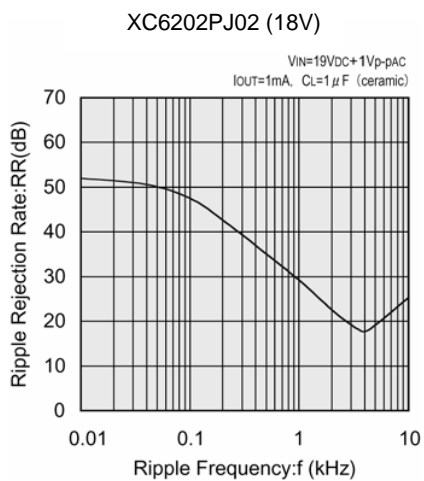
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

XC6202PJ02 (Continued)

(10) Load Transient Response

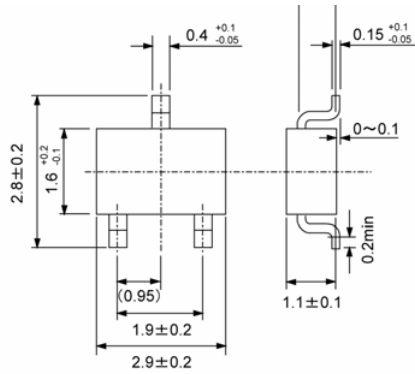


(11) Ripple Rejection Rate

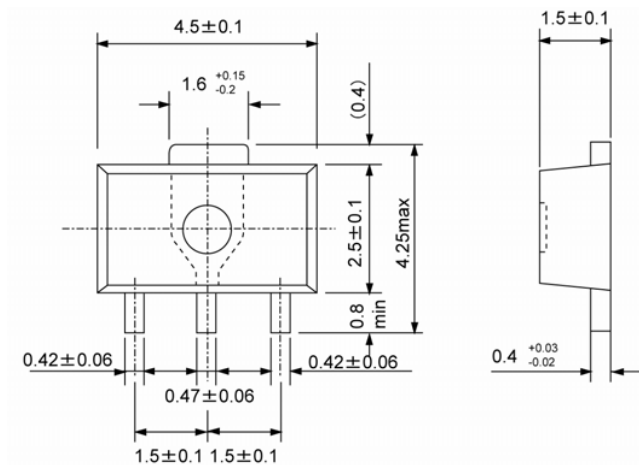


PACKAGING INFORMATION

SOT-23

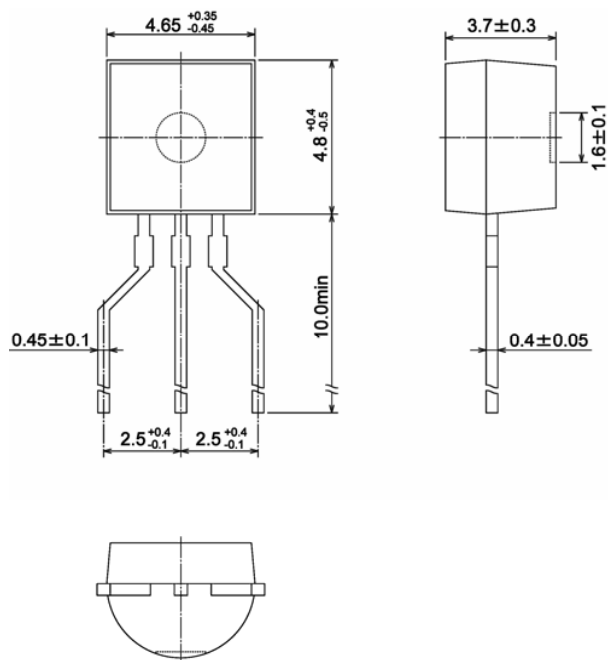


SOT-89

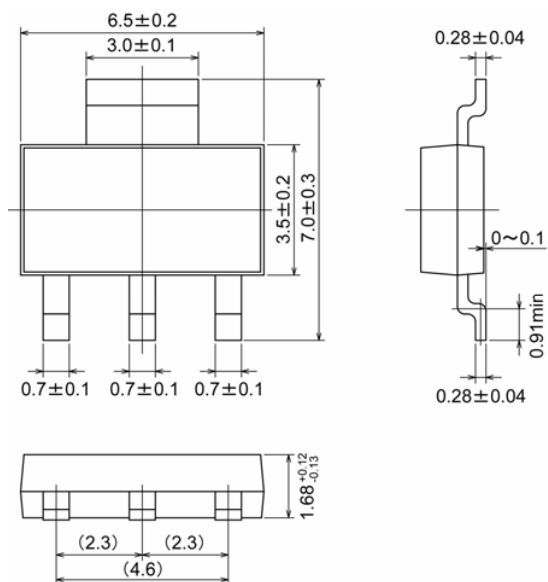


PACKAGING INFORMATION (Continued)

TO-92

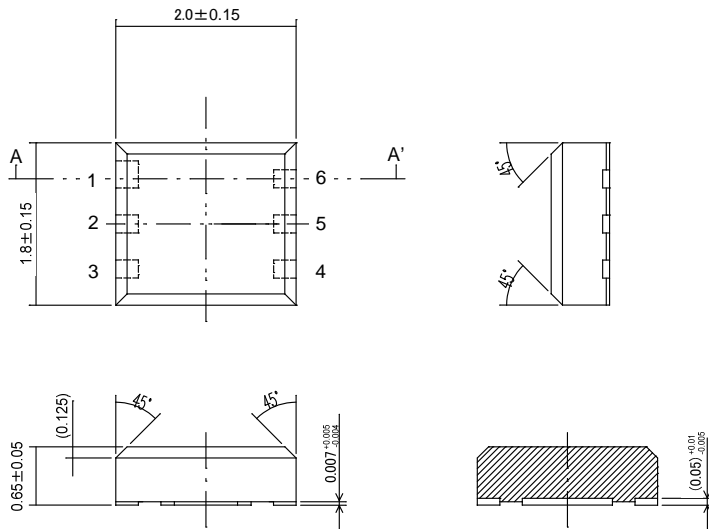


SOT-223

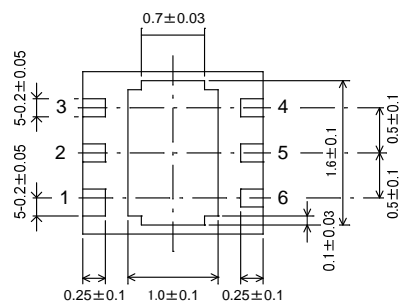


PACKAGING INFORMATION (Continued)

USP-6B

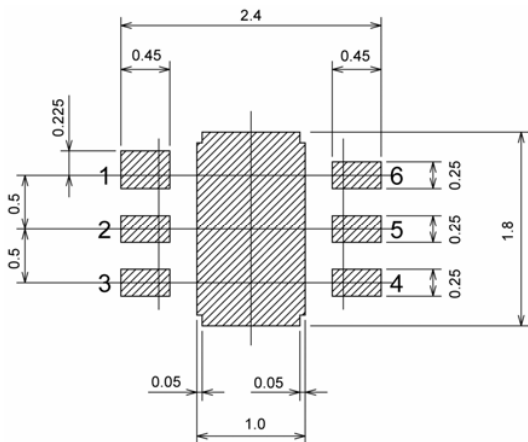


A-A' cross section

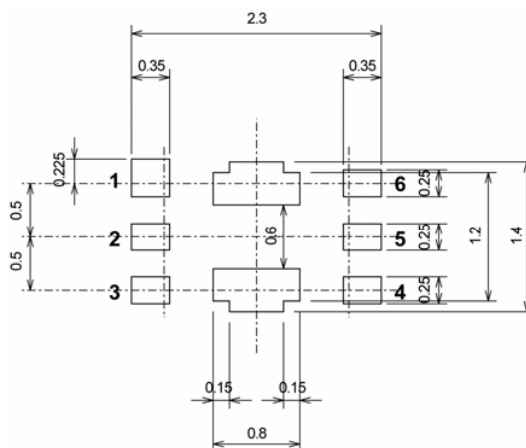


Note: Pin 1 is larger than the other pins

USP-6B Recommended Pattern Layout

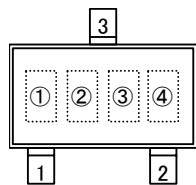


USP-6B Recommended Metal Mask Design

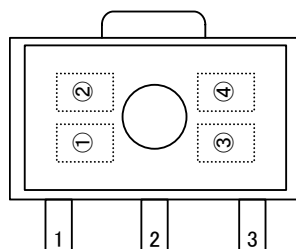


MARKING RULE

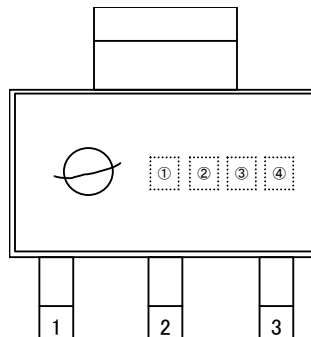
SOT-23, SOT-89, SOT-223



SOT-23
(TOP VIEW)



SOT-89
(TOP VIEW)



SOT-223
(TOP VIEW)

Represents product series

| MARK | PRODUCT SERIES |
|------|----------------|
| 2 | XC6202Pxxxx |

Represents output voltage range

| MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|
| 4 | 0.1 ~ 3.0 | XC6202Pxxxx |
| 5 | 3.1 ~ 6.0 | |
| 6 | 6.1 ~ 9.0 | |
| 7 | 9.1 ~ 12.0 | |
| 8 | 12.1 ~ 15.0 | |
| 9 | 15.1 ~ 18.0 | |

Represents output voltage

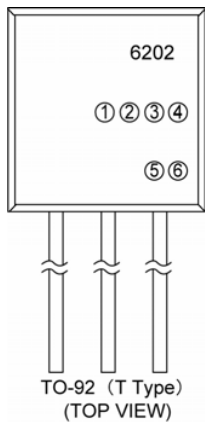
| MARK | VOLTAGE (V) | | | | | MARK | VOLTAGE (V) | | | | | | |
|------|-------------|-----|-----|------|------|------|-------------|-----|-----|-----|------|------|------|
| 0 | - | 3.1 | 6.1 | 9.1 | 12.1 | 15.1 | F | - | 4.6 | 7.6 | 10.6 | 13.6 | 16.6 |
| 1 | - | 3.2 | 6.2 | 9.2 | 12.2 | 15.2 | H | - | 4.7 | 7.7 | 10.7 | 13.7 | 16.7 |
| 2 | - | 3.3 | 6.3 | 9.3 | 12.3 | 15.3 | K | 1.8 | 4.8 | 7.8 | 10.8 | 13.8 | 16.8 |
| 3 | - | 3.4 | 6.4 | 9.4 | 12.4 | 15.4 | L | 1.9 | 4.9 | 7.9 | 10.9 | 13.9 | 16.9 |
| 4 | - | 3.5 | 6.5 | 9.5 | 12.5 | 15.5 | M | 2.0 | 5.0 | 8.0 | 11.0 | 14.0 | 17.0 |
| 5 | - | 3.6 | 6.6 | 9.6 | 12.6 | 15.6 | N | 2.1 | 5.1 | 8.1 | 11.1 | 14.1 | 17.1 |
| 6 | - | 3.7 | 6.7 | 9.7 | 12.7 | 15.7 | P | 2.2 | 5.2 | 8.2 | 11.2 | 14.2 | 17.2 |
| 7 | - | 3.8 | 6.8 | 9.8 | 12.8 | 15.8 | R | 2.3 | 5.3 | 8.3 | 11.3 | 14.3 | 17.3 |
| 8 | - | 3.9 | 6.9 | 9.9 | 12.9 | 15.9 | S | 2.4 | 5.4 | 8.4 | 11.4 | 14.4 | 17.4 |
| 9 | - | 4.0 | 7.0 | 10.0 | 13.0 | 16.0 | T | 2.5 | 5.5 | 8.5 | 11.5 | 14.5 | 17.5 |
| A | - | 4.1 | 7.1 | 10.1 | 13.1 | 16.1 | U | 2.6 | 5.6 | 8.6 | 11.6 | 14.6 | 17.6 |
| B | - | 4.2 | 7.2 | 10.2 | 13.2 | 16.2 | V | 2.7 | 5.7 | 8.7 | 11.7 | 14.7 | 17.7 |
| C | - | 4.3 | 7.3 | 10.3 | 13.3 | 16.3 | X | 2.8 | 5.8 | 8.8 | 11.8 | 14.8 | 17.8 |
| D | - | 4.4 | 7.4 | 10.4 | 13.4 | 16.4 | Y | 2.9 | 5.9 | 8.9 | 11.9 | 14.9 | 17.9 |
| E | - | 4.5 | 7.5 | 10.5 | 13.5 | 16.5 | Z | 3.0 | 6.0 | 9.0 | 12.0 | 15.0 | 18.0 |

Represents production lot number

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

MARKING RULE(Continued)

TO-92 (T TYPE)



Represents type of regulator

| MARK | PRODUCT SERIES |
|------|----------------|
| P | XC6202Pxxxx |

Represents integer of the output voltage

| MARK | VOLTAGE (V) | PRODUCT SERIES | MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|------|-------------|----------------|
| 1 | 1.x | XC6202P1xxxx | A | 10.x | XC6202PAxxxx |
| 2 | 2.x | XC6202P2xxxx | B | 11.x | XC6202PBxxxx |
| 3 | 3.x | XC6202P3xxxx | C | 12.x | XC6202PCxxxx |
| 4 | 4.x | XC6202P4xxxx | D | 13.x | XC6202PDxxxx |
| 5 | 5.x | XC6202P5xxxx | E | 14.x | XC6202PExxxx |
| 6 | 6.x | XC6202P6xxxx | F | 15.x | XC6202PFxxxx |
| 7 | 7.x | XC6202P7xxxx | G | 16.x | XC6202PGxxxx |
| 8 | 8.x | XC6202P8xxxx | H | 17.x | XC6202PHxxxx |
| 9 | 9.x | XC6202P9xxxx | J | 18.x | XC6202PJxxxx |

Represents decimal number of output voltage

| MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|
| 3 | x.3 | XC6202Px3xxx |
| 0 | x.0 | XC6202Px0xxx |

Represents detect voltage accuracy

| MARK | DETECT VOLTAGE ACCURACY | PRODUCT SERIES |
|------|-------------------------|----------------|
| 2 | Within $\pm 2\%$ | XC6202Pxx2xx |
| 1 | Within $\pm 1\%$ | XC6202Pxx1xx |

Represents a least significant digit of production year

| MARK | PRODUCTION YEAR |
|------|-----------------|
| 3 | 2003 |
| 4 | 2004 |

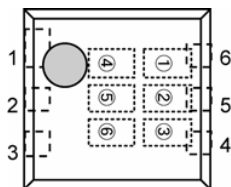
Represents production lot number

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

Note: No character inversion used.

MARKING RULE (Continued)

USP-6B



USP-6B
(TOP VIEW)

Represents product series

| MARK | | PRODUCT SERIES |
|------|---|----------------|
| | | |
| 0 | 2 | XC6202PxxxDx |

Represents type of regulator

| MARK | PRODUCT SERIES |
|------|----------------|
| P | XC6202Pxxxx |

Represents integer of the output voltage

| MARK | VOLTAGE (V) | PRODUCT SERIES | MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|------|-------------|----------------|
| 1 | 1.x | XC6202P1xxDx | A | 10.x | XC6202PAxxDx |
| 2 | 2.x | XC6202P2xxDx | B | 11.x | XC6202PBxxDx |
| 3 | 3.x | XC6202P3xxDx | C | 12.x | XC6202PCxxDx |
| 4 | 4.x | XC6202P4xxDx | D | 13.x | XC6202PDxxDx |
| 5 | 5.x | XC6202P5xxDx | E | 14.x | XC6202PExxDx |
| 6 | 6.x | XC6202P6xxDx | F | 15.x | XC6202PFxxDx |
| 7 | 7.x | XC6202P7xxDx | G | 16.x | XC6202PGxxDx |
| 8 | 8.x | XC6202P8xxDx | H | 17.x | XC6202PHxxDx |
| 9 | 9.x | XC6202P9xxDx | J | 18.x | XC6202PJxxDx |

Represents decimal number of output voltage

| MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|
| 3 | X.3 | XC6202Px3xDx |
| 0 | X.0 | XC6202Px0xDx |

Represents production lot number

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

Note: No character inversion used.

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