

*500mA Output Current, High Speed LDO Regulators,  
Thermal Shutdown Function, Ceramic Capacitor Compatible*

- ◆ CMOS Low Power Consumption : 8  $\mu$  A (TYP.)
- ◆ Maximum Output Current : More than 500mA
- ◆ Current Limit Circuit Built-In
- ◆ Thermal Shutdown Circuit Built-In
- ◆ Ceramic Capacitor Compatible

### ■ GENERAL DESCRIPTION

The XC6214 series are highly precise, low noise, high current, positive voltage low dropout regulators. They are fabricated using Toohong CMOS process. The series features a voltage reference, an error amplifier, a current limiter, a thermal protection circuit, and a phase compensation circuit plus a driver transistor.

The output voltage is selectable in 100mV increments within the range of 1.5V to 5.0V. (Output voltage 1.5V, 1.8V, 2.5V, and 3.3V are standard products. Output voltage 3.0V is under development to be a standard product. Other than these voltages are available as semi-custom products.)

The series is also compatible with low ESR ceramic capacitors, which give added output stability. This stability can be maintained even during load fluctuations due to the excellent transient response of the series.

The over current protection circuit and the thermal shutdown circuit are built in. The over current protection circuit will operate when the output current reaches current limit level. The thermal shutdown circuit will operate when the junction temperature reaches temperature limit level.

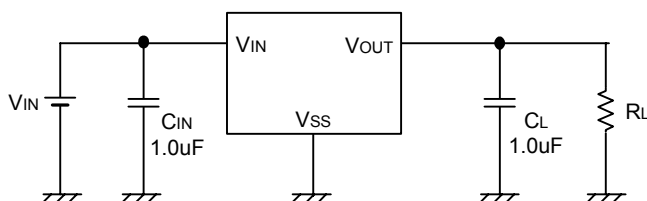
### ■ APPLICATIONS

- DVD, CD-ROM, HDD drive equipment
- Portable AV equipment (Cameras, VCRs, etc.)
- Wireless Communication equipment  
(Mobile & Cordless phone, etc.)
- Desktop computers, Note book computer, PDAs
- Network equipment (Wireless LAN etc.)
- Reference voltage
- Battery powered equipment

### ■ FEATURES

- Maximum Output Current** : More than 500mA  
(800mA limit)
- Dropout Voltage** : 500mV @  $I_{OUT} = 500mA$   
( $V_{OUT}=3.3V$ )
- Operating Voltage Range** : 1.8V ~ 6.0V
- Output Voltage** : 1.5V, 1.8V, 2.5V, 3.3V, (standard)  
3.0V (under development)  
Other voltages between 1.5V to 5.0V (semi-custom)
- High Accuracy** : Setting voltage accuracy  $\pm 2\%$
- Low Power Consumption** : 8  $\mu$  A (TYP.)
- Ripple Rejection Rate** : 40dB @ 1kHz
- Operating Temperature Range** : - 40°C ~ 85°C
- Packages** : SOT-26  
SOT-89

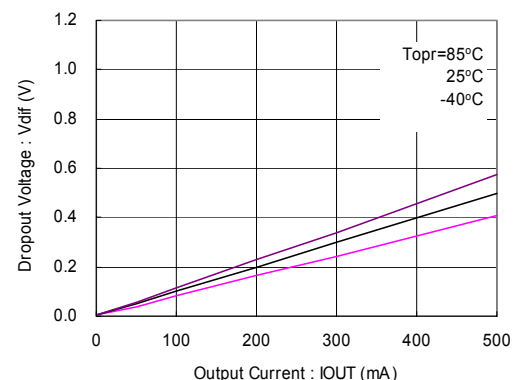
### ■ TYPICAL APPLICATION CIRCUIT



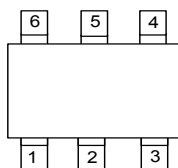
### ■ TYPICAL PERFORMANCE CHARACTERISTICS

○ Dropout Voltage vs. Output Current

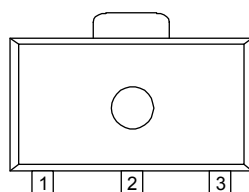
XC6214P332  
 $C_{IN}=C_L=1.0\mu F$ (ceramic)



## ■ PIN CONFIGURATION



SOT-26 (TOP VIEW)



SOT-89 (TOP VIEW)

\* The 2, 4 and 5 pins of the SOT-26 package are the common Vss pins in the package.  
For a heat design, in case of connecting the heat dissipation pad to a circuit,  
Please use the 2, 4, and 5 pins as the Vss pin on the PCB board

## ■ PIN ASSIGNMENT

| PIN NUMBER |        | PIN NAME | FUNCTIONS     |
|------------|--------|----------|---------------|
| SOT-26     | SOT-89 |          |               |
| 1          | 2      | VIN      | Power Input   |
| 2, 4, 5    | 1      | Vss      | Ground        |
| 3          | -      | NC       | No Connection |
| 6          | 3      | VOUT     | Output        |

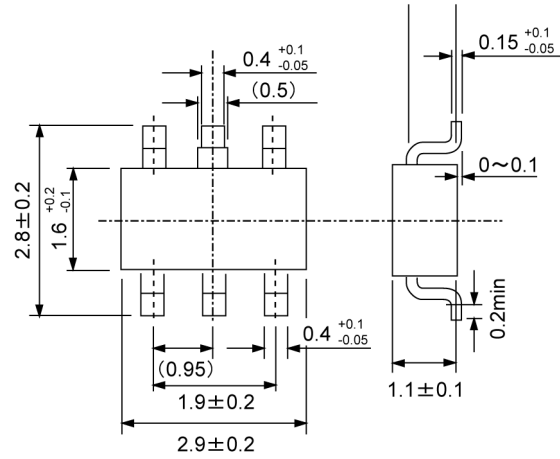
## ● Ordering Information

XC6214P ①②③④⑤

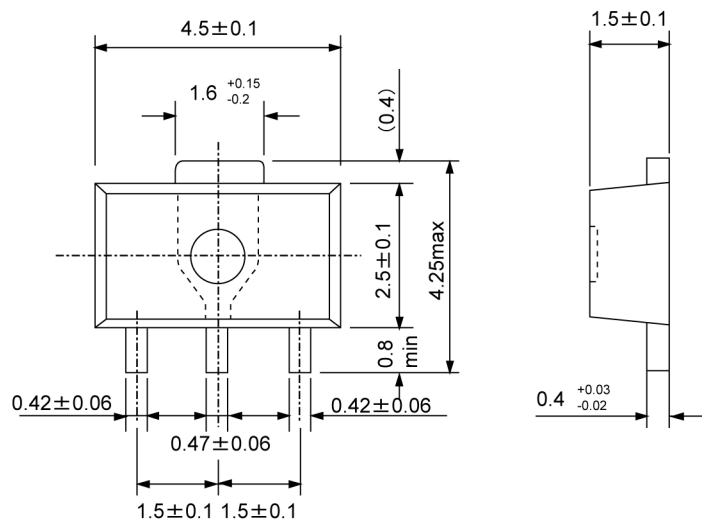
| DESIGNATOR | DESCRIPTION             | SYMBOL  | DESCRIPTION                                               |
|------------|-------------------------|---------|-----------------------------------------------------------|
| ① ②        | Output Voltage          | 15 ~ 50 | : ex.) 3.0V products → ①=3, ②=0                           |
| ③          | Output Voltage Accuracy | 2       | : Within $\pm 2\%$<br>ex.) 2.50V products → ①=2, ②=5, ③=2 |
| ④          | Package                 | M       | : SOT-26                                                  |
|            |                         | P       | : SOT-89                                                  |
| ⑤          | Device Orientation      | R       | : Embossed tape, standard feed                            |
|            |                         | L       | : Embossed tape, reverse feed                             |

## ■ PACKAGING INFORMATION

### ● SOT-26

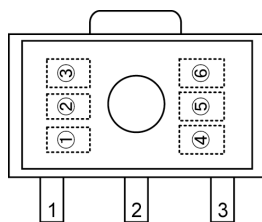


### ● SOT-89



## MARKING RULE

### ● SOT-89



SOT-89  
(TOP VIEW)

① Represents product series

| MARK | PRODUCT SERIES |
|------|----------------|
| D    | XC6214Pxx2xx   |

② Represents output voltage range

| MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|
| P    | 1.5 ~ 3.0   | XC6214Pxx2xx   |
| R    | 3.1 ~ 5.0   | XC6214Pxx2xx   |

③ Represents output voltage

| MARK | VOLTAGE (V) |     | MARK | 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    | -           | 4.2 | V    | 2.7         | -   |
| C    | -           | 4.3 | W    | 2.8         | -   |
| D    | -           | 4.4 | Y    | 2.9         | -   |
| E    | 1.5         | 4.5 | Z    | 3.0         | -   |

④ Represents the last digit of the production year (ex.)

| MARK | PRODUCTION YEAR |
|------|-----------------|
| 4    | 2004            |
| 5    | 2005            |

⑤ Represents the production month

| MARK | MONTH    | MARK | MONTH  | MARK | MONTH     |
|------|----------|------|--------|------|-----------|
| A    | January  | E    | May    | J    | September |
| B    | February | F    | June   | K    | October   |
| C    | March    | G    | July   | L    | November  |
| D    | April    | H    | August | M    | December  |

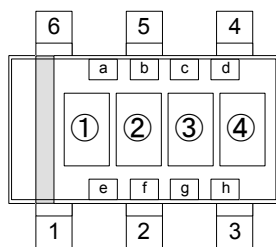
⑥ Represents production lot number

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

Note: No character inversion used.

## ■ MARKING RULE (Continued)

### ● SOT-26



SOT-26  
(TOP VIEW)

① Represents product series

| MARK | PRODUCT SERIES |
|------|----------------|
| D    | XC6214Pxx2xx   |

② Represents output voltage range

| MARK | VOLTAGE (V) | PRODUCT SERIES |
|------|-------------|----------------|
| P    | 1.5 ~ 3.0   | XC6214Pxx2xx   |
| R    | 3.1 ~ 5.0   | XC6214Pxx2xx   |

③ Represents output voltage

| MARK | VOLTAGE (V) |     | MARK | 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    | -           | 4.2 | V    | 2.7         | -   |
| C    | -           | 4.3 | W    | 2.8         | -   |
| D    | -           | 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 excepted).

Note: No character inversion used.

a, b, c, d Represents production year

| MARK |   |   |   | PRODUCTION YEAR |
|------|---|---|---|-----------------|
| a    | b | c | d |                 |
| -    | - | □ | - | 2004            |
| -    | - | - | □ | 2005            |
| □    | - | - | - | 2006            |
| -    | □ | - | - | 2007            |

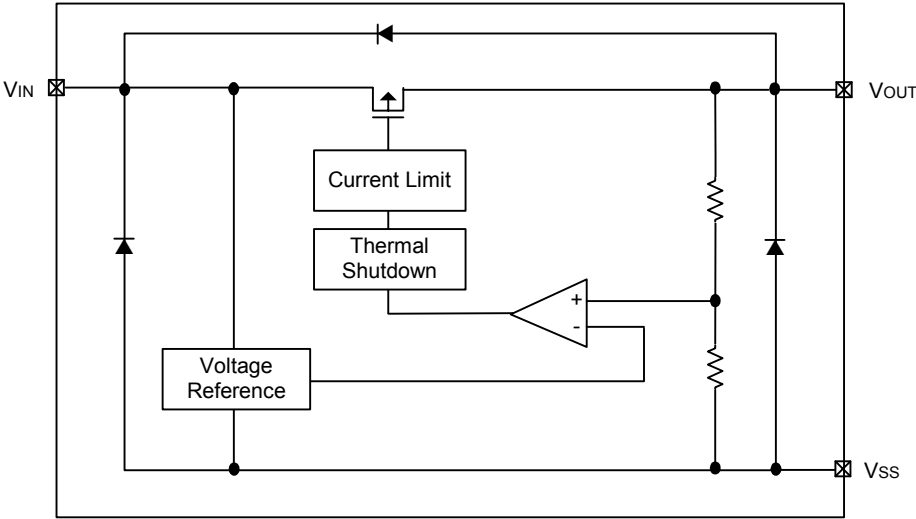
\*Markings of the year 2004 to 2007 are repeated from 2008.

ex.) 2004→2008, 2005→2009, 2006→2010, 2007→2011.

e, f, g, h Represents production month

| MARK |   |   |   | PRODUCTION MONTH | MARK |   |   |   | PRODUCTION MONTH |
|------|---|---|---|------------------|------|---|---|---|------------------|
| e    | f | g | h |                  | e    | f | g | h |                  |
| □    | - | - | - | January          | □    | □ | □ | - | July             |
| -    | □ | - | - | February         | -    | - | - | □ | August           |
| □    | □ | - | - | March            | □    | - | - | □ | September        |
| -    | - | □ | - | April            | -    | □ | - | □ | October          |
| □    | - | □ | - | May              | □    | □ | - | □ | November         |
| -    | □ | □ | - | June             | -    | - | □ | □ | December         |

## ■BLOCK DIAGRAM



## ■ABSOLUTE MAXIMUM RATINGS

$T_a=25^{\circ}\text{C}$

| PARAMETER                   |        | SYMBOL    | RATINGS                          | UNITS              |
|-----------------------------|--------|-----------|----------------------------------|--------------------|
| Input Voltage               |        | $V_{IN}$  | - 0.3 ~ + 6.5                    | V                  |
| Output Current *            |        | $I_{OUT}$ | 800 *                            | mA                 |
| Output Voltage              |        | $V_{OUT}$ | $V_{SS} - 0.3 \sim V_{IN} + 0.3$ | V                  |
| Power Dissipation           | SOT-26 | $P_d$     | **                               | mW                 |
|                             | SOT-89 |           | 500                              |                    |
| Operating Temperature Range |        | $T_{opr}$ | - 40 ~ + 85                      | $^{\circ}\text{C}$ |
| Storage Temperature Range   |        | $T_{stg}$ | - 55 ~ + 125                     | $^{\circ}\text{C}$ |

\*  $I_{OUT} \geq P_d / (V_{IN} - V_{OUT})$

\*\* Refer to ■POWER DISSIPATION

## ■ ELECTRICAL CHARACTERISTICS

### ● XC6214P152

Ta=25 °C

| PARAMETER                                     | SYMBOL                                                | CONDITIONS                                                          | MIN.  | TYP.  | MAX.  | UNITS    | CIRCUIT |
|-----------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|-------|-------|-------|----------|---------|
| Output Voltage                                | V <sub>OUT(E)</sub> (*1)                              | V <sub>IN</sub> =2.5V, I <sub>OUT</sub> =50mA                       | 1.470 | 1.500 | 1.530 | V        | ①       |
| Maximum Output Current                        | I <sub>OUTmax</sub>                                   | V <sub>IN</sub> =2.5V, V <sub>OUT</sub> =V <sub>OUT(E)</sub> × 0.90 | 500   | -     | -     | mA       | ①       |
| Load Regulation                               | ΔV <sub>OUT</sub>                                     | V <sub>IN</sub> =2.5V, 1mA ≤ I <sub>OUT</sub> ≤ 200mA               | -     | 20    | 50    | mV       | ①       |
| Dropout Voltage (*2)                          | V <sub>dif</sub>                                      | I <sub>OUT</sub> =500mA                                             | -     | 800   | 1200  | mV       | ①       |
| Supply Current                                | I <sub>SS</sub>                                       | V <sub>IN</sub> =2.5V                                               | -     | 8     | 15    | μA       | ②       |
| Line Regulation                               | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$  | I <sub>OUT</sub> =50mA<br>2.5V ≤ V <sub>IN</sub> ≤ 6.0V             | -     | 0.05  | 0.20  | % / V    | ①       |
| Input Voltage                                 | V <sub>IN</sub>                                       |                                                                     | 1.8   | -     | 6.0   | V        | -       |
| Output Voltage<br>Temperature Characteristics | $\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$ | I <sub>OUT</sub> =50mA<br>- 40°C ≤ T <sub>opr</sub> ≤ 85°C          | -     | ± 100 | -     | ppm / °C | ①       |
| Short-Circuit Current                         | I <sub>lim</sub>                                      | V <sub>IN</sub> =2.5V, V <sub>OUT</sub> =0V                         | -     | 50    | -     | mA       | ①       |

NOTE:

\*1: V<sub>OUT(E)</sub>: Effective output voltage (i.e. the output voltage when "V<sub>OUT(T)</sub>+1.0V" is provided at the V<sub>IN</sub> pin while maintaining a certain I<sub>OUT</sub> value.)

\*2: V<sub>dif</sub>= {V<sub>IN1</sub><sup>(4)</sup> - V<sub>OUT1</sub><sup>(3)</sup> }

\*3: V<sub>OUT1</sub>= A voltage equal to 98% of the output voltage whenever an amply stabilized I<sub>OUT</sub> {V<sub>OUT(T)</sub>+1.0V} is input.

\*4: V<sub>IN1</sub>=The Input Voltage when V<sub>OUT1</sub> appears as input voltage is gradually decreased.

\*5: Unless otherwise stated, {V<sub>IN</sub>=V<sub>OUT(T)</sub> +1.0V}

### ● XC6214P182

Ta=25 °C

| PARAMETER                                     | SYMBOL                                                | CONDITIONS                                                           | MIN.  | TYP.  | MAX.  | UNITS    | CIRCUIT |
|-----------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------|-------|-------|-------|----------|---------|
| Output Voltage                                | V <sub>OUT(E)</sub> (*1)                              | V <sub>IN</sub> =2.8V, I <sub>OUT</sub> =50mA                        | 1.764 | 1.800 | 1.836 | V        | ①       |
| Maximum Output Current                        | I <sub>OUTmax</sub>                                   | V <sub>IN</sub> =2.85V, V <sub>OUT</sub> =V <sub>OUT(E)</sub> × 0.90 | 500   | -     | -     | mA       | ①       |
| Load Regulation                               | ΔV <sub>OUT</sub>                                     | V <sub>IN</sub> =2.8V, 1mA ≤ I <sub>OUT</sub> ≤ 200mA                | -     | 20    | 50    | mV       | ①       |
| Dropout Voltage (*2)                          | V <sub>dif</sub>                                      | I <sub>OUT</sub> =500mA                                              | -     | 700   | 1050  | mV       | ①       |
| Supply Current                                | I <sub>SS</sub>                                       | V <sub>IN</sub> =2.8V                                                | -     | 8     | 15    | μA       | ②       |
| Line Regulation                               | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$  | I <sub>OUT</sub> =50mA<br>2.8V ≤ V <sub>IN</sub> ≤ 6.0V              | -     | 0.05  | 0.20  | % / V    | ①       |
| Input Voltage                                 | V <sub>IN</sub>                                       |                                                                      | 1.8   | -     | 6.0   | V        | -       |
| Output Voltage<br>Temperature Characteristics | $\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$ | I <sub>OUT</sub> =50mA<br>- 40°C ≤ T <sub>opr</sub> ≤ 85°C           | -     | ± 100 | -     | ppm / °C | ①       |
| Short-Circuit Current                         | I <sub>lim</sub>                                      | V <sub>IN</sub> =2.8V, V <sub>OUT</sub> =0V                          | -     | 50    | -     | mA       | ①       |

NOTE:

\*1: V<sub>OUT(E)</sub>: Effective output voltage (i.e. the output voltage when "V<sub>OUT(T)</sub>+1.0V" is provided at the V<sub>IN</sub> pin while maintaining a certain I<sub>OUT</sub> value.)

\*2: V<sub>dif</sub>= {V<sub>IN1</sub><sup>(4)</sup> - V<sub>OUT1</sub><sup>(3)</sup> }

\*3: V<sub>OUT1</sub>= A voltage equal to 98% of the output voltage whenever an amply stabilized I<sub>OUT</sub> {V<sub>OUT(T)</sub>+1.0V} is input.

\*4: V<sub>IN1</sub>=The Input Voltage when V<sub>OUT1</sub> appears as input voltage is gradually decreased.

\*5: Unless otherwise stated, {V<sub>IN</sub>=V<sub>OUT(T)</sub> +1.0V}

## ■ ELECTRICAL CHARACTERISTICS (Continued)

### ●XC6214P252

Ta=25 °C

| PARAMETER                                     | SYMBOL                                                | CONDITIONS                                                          | MIN.  | TYP.  | MAX.  | UNITS    | CIRCUIT |
|-----------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|-------|-------|-------|----------|---------|
| Output Voltage                                | V <sub>OUT(E)</sub> (*1)                              | V <sub>IN</sub> =3.5V, I <sub>OUT</sub> =50mA                       | 2.450 | 2.500 | 2.550 | V        | ①       |
| Maximum Output Current                        | I <sub>OUTmax</sub>                                   | V <sub>IN</sub> =3.5V, V <sub>OUT</sub> =V <sub>OUT(E)</sub> × 0.93 | 500   | -     | -     | mA       | ①       |
| Load Regulation                               | ΔV <sub>OUT</sub>                                     | V <sub>IN</sub> =3.5V, 1mA ≤ I <sub>OUT</sub> ≤ 200mA               | -     | 20    | 50    | mV       | ①       |
| Dropout Voltage (*2)                          | V <sub>dif</sub>                                      | I <sub>OUT</sub> =500mA                                             | -     | 600   | 900   | mV       | ①       |
| Supply Current                                | I <sub>SS</sub>                                       | V <sub>IN</sub> =3.5V                                               | -     | 8     | 15    | μA       | ②       |
| Line Regulation                               | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$  | I <sub>OUT</sub> =50mA<br>3.5V ≤ V <sub>IN</sub> ≤ 6.0V             | -     | 0.05  | 0.20  | % / V    | ①       |
| Input Voltage                                 | V <sub>IN</sub>                                       |                                                                     | 1.8   | -     | 6.0   | V        | -       |
| Output Voltage<br>Temperature Characteristics | $\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$ | I <sub>OUT</sub> =50mA<br>- 40°C ≤ T <sub>opr</sub> ≤ 85°C          | -     | ± 100 | -     | ppm / °C | ①       |
| Short-Circuit Current                         | I <sub>lim</sub>                                      | V <sub>IN</sub> =3.5V, V <sub>OUT</sub> =0V                         | -     | 50    | -     | mA       | ①       |

#### NOTE:

\*1: V<sub>OUT(E)</sub>: Effective output voltage (i.e. the output voltage when "V<sub>OUT(T)</sub>+1.0V" is provided at the V<sub>IN</sub> pin while maintaining a certain I<sub>OUT</sub> value.)

\*2: V<sub>dif</sub>={V<sub>IN1</sub><sup>(\*)</sup> - V<sub>OUT1</sub><sup>(\*)</sup>}

\*3: V<sub>OUT1</sub>= A voltage equal to 98% of the output voltage whenever an amply stabilized I<sub>OUT</sub> {V<sub>OUT(T)</sub>+1.0V} is input.

\*4: V<sub>IN1</sub>=The Input Voltage when V<sub>OUT1</sub> appears as input voltage is gradually decreased.

\*5: Unless otherwise stated, {V<sub>IN</sub>=V<sub>OUT(T)</sub> +1.0V}

### ●XC6214P302 (Under development)

Ta=25 °C

| PARAMETER                                     | SYMBOL                                                | CONDITIONS                                                          | MIN.  | TYP.  | MAX.  | UNITS    | CIRCUIT |
|-----------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|-------|-------|-------|----------|---------|
| Output Voltage                                | V <sub>OUT(E)</sub> (*1)                              | V <sub>IN</sub> =4.0V, I <sub>OUT</sub> =50mA                       | 2.940 | 3.000 | 3.060 | V        | ①       |
| Maximum Output Current                        | I <sub>OUTmax</sub>                                   | V <sub>IN</sub> =4.0V, V <sub>OUT</sub> =V <sub>OUT(E)</sub> × 0.96 | 500   | -     | -     | mA       | ①       |
| Load Regulation                               | ΔV <sub>OUT</sub>                                     | V <sub>IN</sub> =4.3V, 1mA ≤ I <sub>OUT</sub> ≤ 200mA               | -     | 20    | 50    | mV       | ①       |
| Dropout Voltage (*2)                          | V <sub>dif</sub>                                      | I <sub>OUT</sub> =500mA                                             | -     | 560   | 820   | mV       | ①       |
| Supply Current                                | I <sub>SS</sub>                                       | V <sub>IN</sub> =4.0V                                               | -     | 8     | 15    | μA       | ②       |
| Line Regulation                               | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$  | I <sub>OUT</sub> =50mA<br>4.0V ≤ V <sub>IN</sub> ≤ 6.0V             | -     | 0.05  | 0.20  | % / V    | ①       |
| Input Voltage                                 | V <sub>IN</sub>                                       |                                                                     | 1.8   | -     | 6.0   | V        | -       |
| Output Voltage<br>Temperature Characteristics | $\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$ | I <sub>OUT</sub> =50mA<br>- 40°C ≤ T <sub>opr</sub> ≤ 85°C          | -     | ± 100 | -     | ppm / °C | ①       |
| Short-Circuit Current                         | I <sub>lim</sub>                                      | V <sub>IN</sub> =4.0V, V <sub>OUT</sub> =0V                         | -     | 50    | -     | mA       | ①       |

#### NOTE:

\*1: V<sub>OUT(E)</sub>: Effective output voltage (i.e. the output voltage when "V<sub>OUT(T)</sub>+1.0V" is provided at the V<sub>IN</sub> pin while maintaining a certain I<sub>OUT</sub> value.)

\*2: V<sub>dif</sub>={V<sub>IN1</sub><sup>(\*)</sup> - V<sub>OUT1</sub><sup>(\*)</sup>}

\*3: V<sub>OUT1</sub>= A voltage equal to 98% of the output voltage whenever an amply stabilized I<sub>OUT</sub> {V<sub>OUT(T)</sub>+1.0V} is input.

\*4: V<sub>IN1</sub>=The Input Voltage when V<sub>OUT1</sub> appears as input voltage is gradually decreased.

\*5: Unless otherwise stated, {V<sub>IN</sub>=V<sub>OUT(T)</sub> +1.0V}

## ■ ELECTRICAL CHARACTERISTICS (Continued)

●XC6214P332

Ta=25 °C

| PARAMETER                                     | SYMBOL                                                | CONDITIONS                                                          | MIN.  | TYP.  | MAX.  | UNITS    | CIRCUIT |
|-----------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|-------|-------|-------|----------|---------|
| Output Voltage                                | V <sub>OUT(E)</sub> (*1)                              | V <sub>IN</sub> =4.3V, I <sub>OUT</sub> =50mA                       | 3.234 | 3.300 | 3.366 | V        | ①       |
| Maximum Output Current                        | I <sub>OUTmax</sub>                                   | V <sub>IN</sub> =4.3V, V <sub>OUT</sub> =V <sub>OUT(E)</sub> x 0.96 | 500   | -     | -     | mA       | ①       |
| Load Regulation                               | ΔV <sub>OUT</sub>                                     | V <sub>IN</sub> =4.3V, 1mA ≤ I <sub>OUT</sub> ≤ 200mA               | -     | 20    | 50    | mV       | ①       |
| Dropout Voltage (*2)                          | V <sub>dif</sub>                                      | I <sub>OUT</sub> =500mA                                             | -     | 500   | 750   | mV       | ①       |
| Supply Current                                | I <sub>SS</sub>                                       | V <sub>IN</sub> =4.3V                                               | -     | 8     | 15    | μA       | ②       |
| Line Regulation                               | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$  | I <sub>OUT</sub> =50mA<br>4.3V ≤ V <sub>IN</sub> ≤ 6.0V             | -     | 0.05  | 0.20  | % / V    | ①       |
| Input Voltage                                 | V <sub>IN</sub>                                       |                                                                     | 1.8   | -     | 6.0   | V        | -       |
| Output Voltage<br>Temperature Characteristics | $\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$ | I <sub>OUT</sub> =50mA<br>- 40°C ≤ T <sub>opr</sub> ≤ 85°C          | -     | ±100  | -     | ppm / °C | ①       |
| Short-Circuit Current                         | I <sub>lim</sub>                                      | V <sub>IN</sub> =4.3V, V <sub>OUT</sub> =0V                         | -     | 50    | -     | mA       | ①       |

### NOTE:

\*1: V<sub>OUT(E)</sub>: Effective output voltage (i.e. the output voltage when "V<sub>OUT(T)</sub>+1.0V" is provided at the V<sub>IN</sub> pin while maintaining a certain I<sub>OUT</sub> value.)

\*2: V<sub>dif</sub>= {V<sub>IN1</sub><sup>(\*4)</sup> - V<sub>OUT1</sub><sup>(\*3)</sup> }

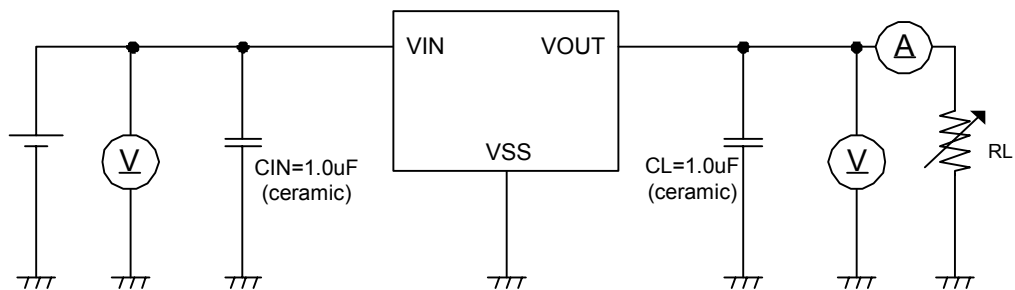
\*3: V<sub>OUT1</sub>= A voltage equal to 98% of the output voltage whenever an amply stabilized I<sub>OUT</sub> {V<sub>OUT(T)</sub>+1.0V} is input.

\*4: V<sub>IN1</sub>=The Input Voltage when V<sub>OUT1</sub> appears as input voltage is gradually decreased.

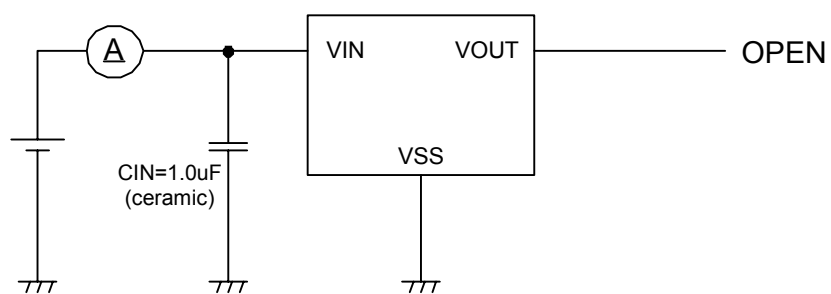
\*5: Unless otherwise stated, {V<sub>IN</sub>=V<sub>OUT(T)</sub> +1.0V}

## ■ TEST CIRCUITS

● Circuit ①



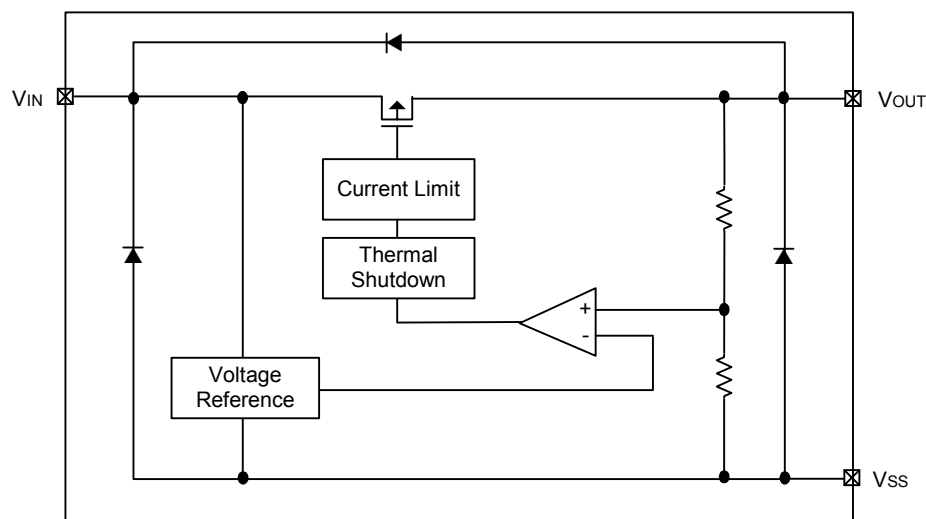
● Circuit ②



## ■ OPERATIONAL EXPLANATION

### <Output Voltage Regulator Control>

The voltage, divided by resistors R1 & R2, which are connected to the V<sub>OUT</sub> pin is compared with the internal reference voltage by the error amplifier. The P-channel MOSFET, which is connected to the V<sub>OUT</sub> pin, is then driven by the subsequent output signal. The output voltage at the V<sub>OUT</sub> pin is controlled & stabilized by negative feedback. The current limit circuit and over current protection operate in relation to the level of output current and heat.



### <Low ESR Capacitors>

With the XC6214 series regulator, a stable output voltage is achievable even if low ESR capacitors are used, as a phase compensation circuit is built-in to the regulator. In order to ensure the stability of the load transient response and line transient response, we suggest that an output capacitor (C<sub>L</sub>) be connected as close as possible, between the output pin (V<sub>OUT</sub>) and the V<sub>SS</sub> pin. Please use an output capacitor (C<sub>L</sub>) with a capacitance more than 0.1  $\mu$ F. We also suggest an input capacitor (C<sub>IN</sub>) of 0.1  $\mu$ F: this should be connected between V<sub>IN</sub> and V<sub>SS</sub> in order to stabilize input power source.

### <Current Limiter, Short-Circuit Protection>

The XC6214 series regulator offers a combination of current limit and circuit protection by means of a built-in fixed current limiter circuit and a foldback circuit. When the load current reaches the current limit level, the fixed current limiter operates and output voltage drops. As a result of this drop in output voltage, the foldback circuit operates, the output voltage drops further and output current decreases. When the output pin is shorted, a current of about 50mA flows.

### <Thermal Shutdown>

When the junction temperature of the built-in driver transistor reaches the temperature limit level (150°C TYP.), the thermal shutdown circuit operates and the driver transistor will be set to OFF. The thermal shutdown function will be released (automatically recovered) when the junction temperature decreases to the thermal shutdown release temperature level (125°C TYP.) and the IC re-starts the operation.

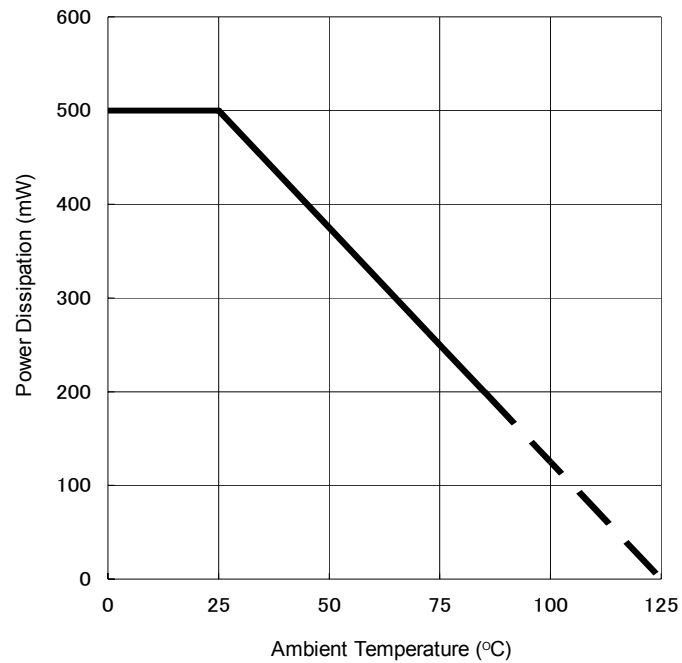
## ■ NOTES ON USE

1. Please use this IC within the stated absolute maximum ratings. The IC is liable to malfunction should the ratings be exceeded.
2. Where wiring impedance is high, operations may become unstable due to noise and/or phase lag depending on output current. Please strengthen V<sub>IN</sub> and V<sub>SS</sub> wiring in particular.
3. Please wire the input capacitor (C<sub>IN</sub>) and the output capacitor (C<sub>L</sub>) as close to the IC as possible.
4. Output voltage may increase when the IC is used at light load current (around 0 to 2 $\mu$ A) depending on temperature conditions, etc.

## ■ POWER DISSIPATION

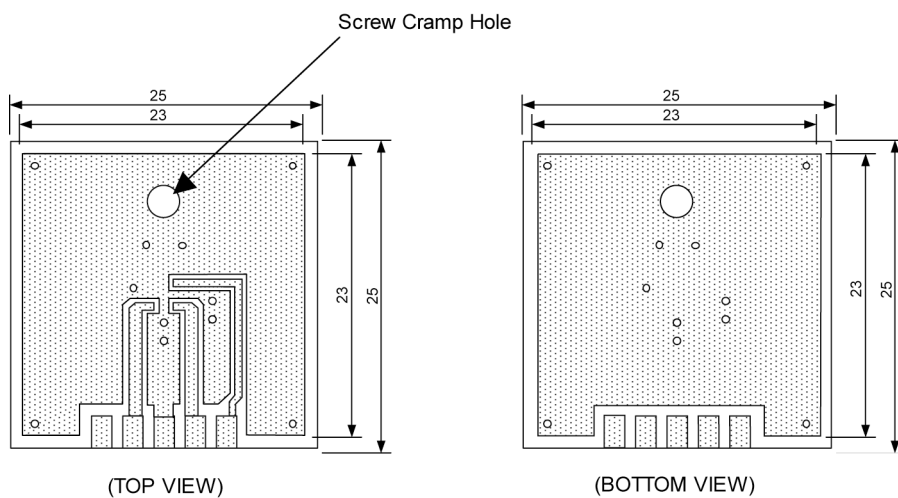
The 2, 4 and 5 pins of the SOT-26 package are the common Vss pins at the heat dissipation pads.

For increasing power dissipation of the package, please use the 2, 4, and 5 pins as the Vss pin on the PCB board.



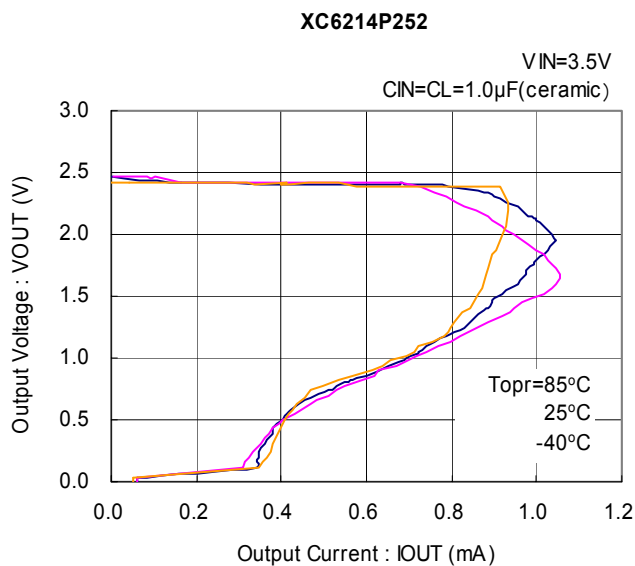
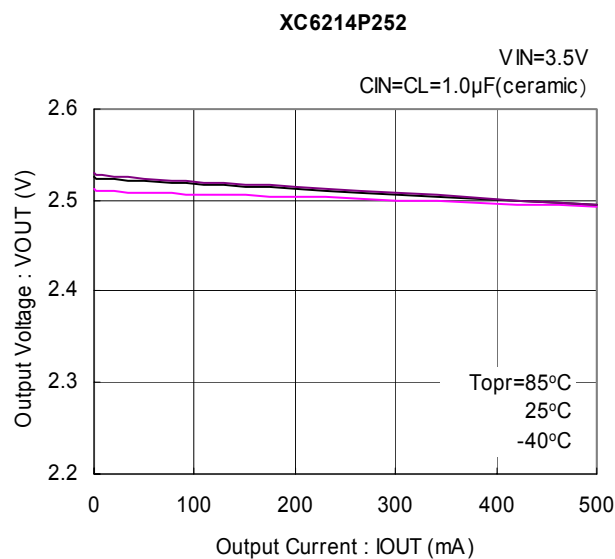
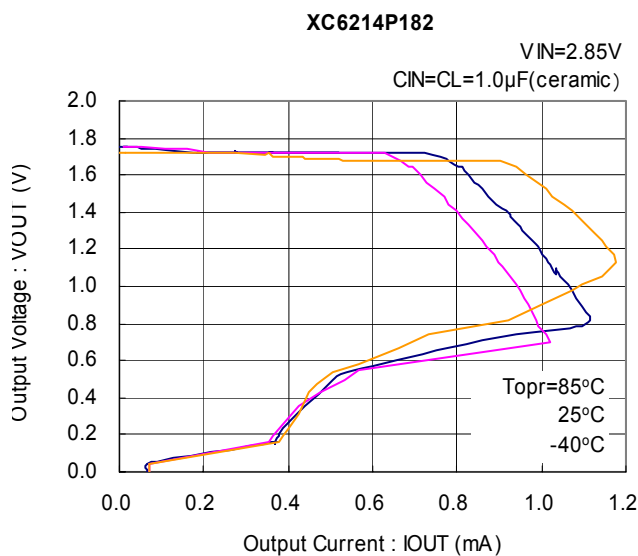
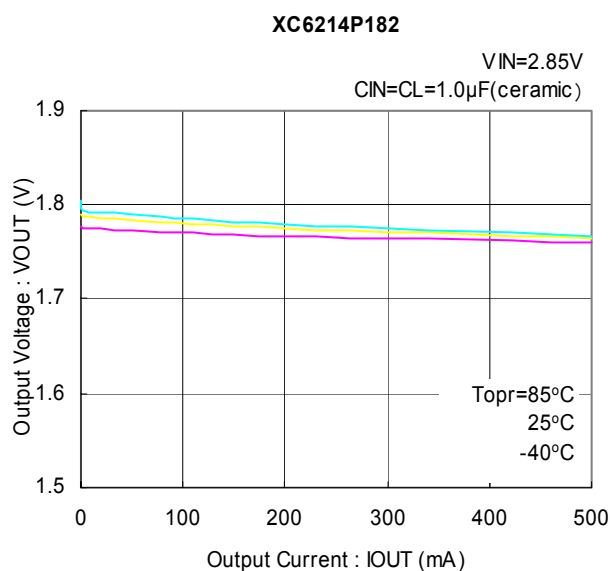
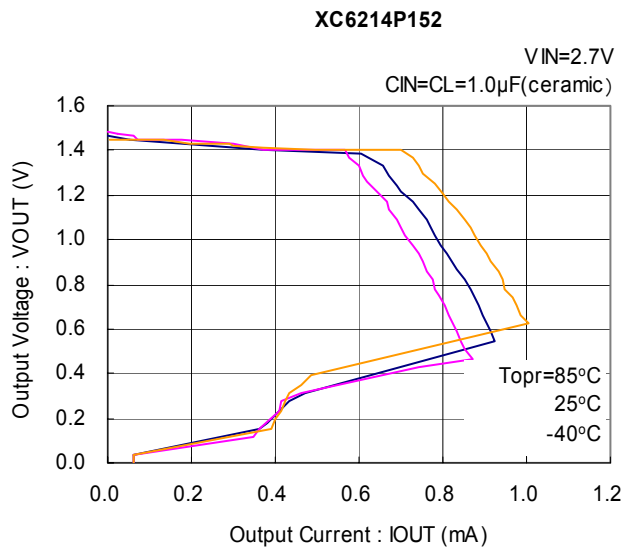
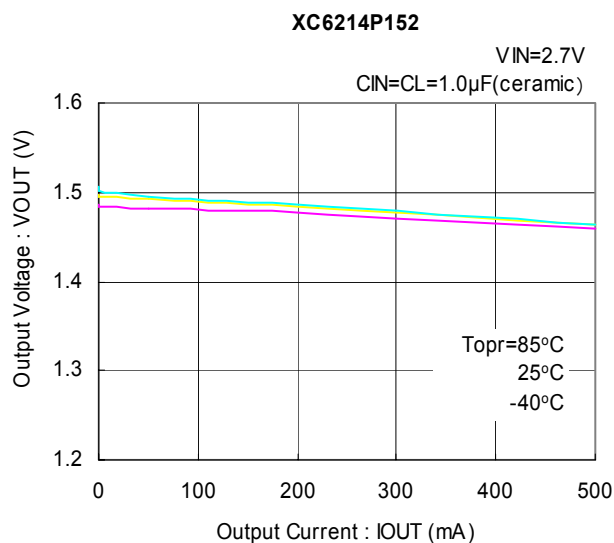
## ● SOT-26 PCB Specification

|                            |                   |
|----------------------------|-------------------|
| Material                   | : Glass epoxy G10 |
| Size                       | : 25mm × 25mm     |
| Board Thickness            | : 1.0mm           |
| Heat Dissipation Wire Size | : 23mm × 23mm     |
| Through Holes (eleven)     | : $\phi$ 0.5mm    |



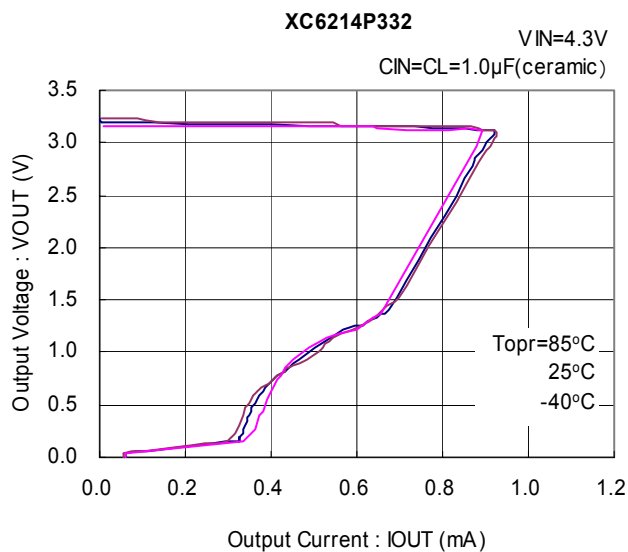
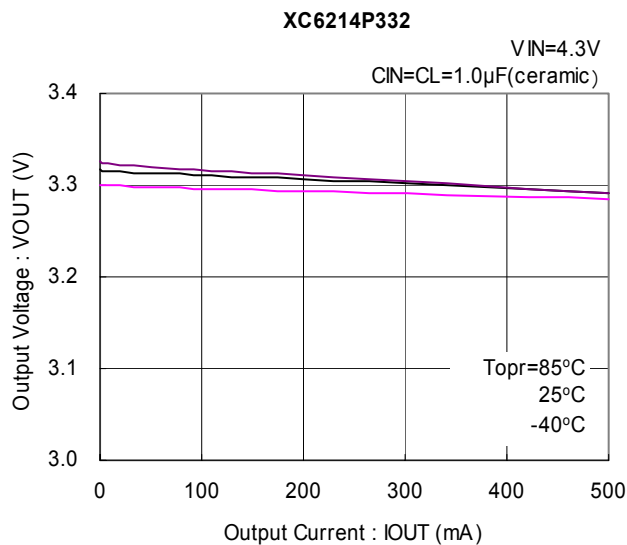
## TYPICAL PERFORMANCE CHARACTERISTICS

### (1) Output Voltage vs. Output Current

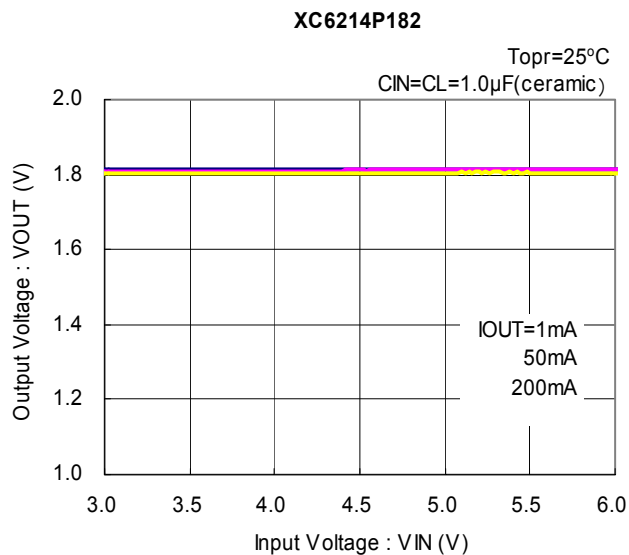
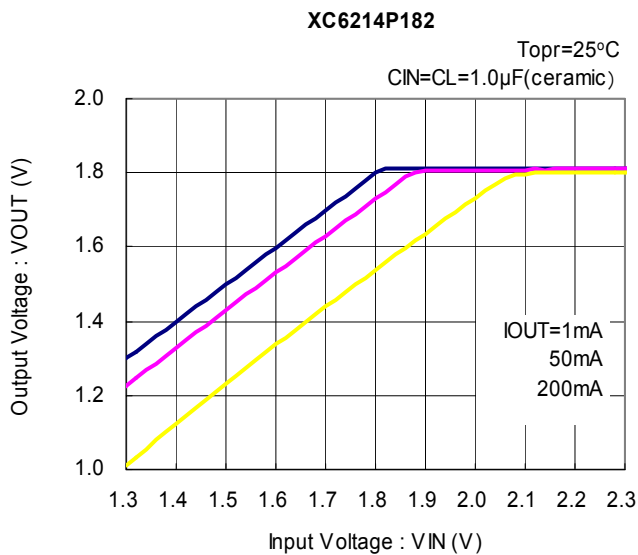
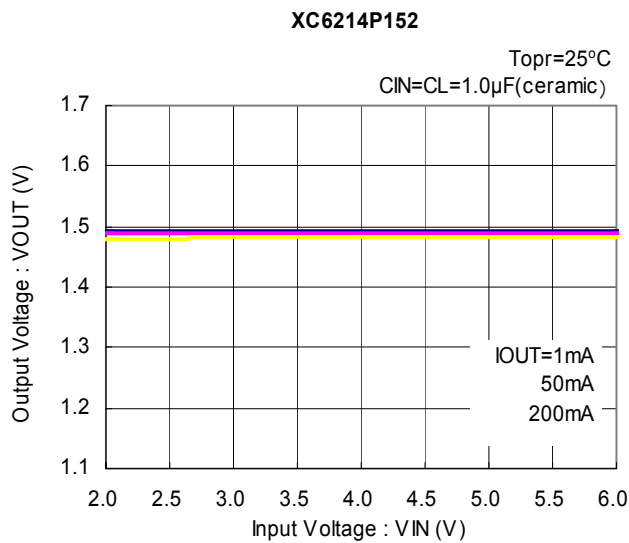
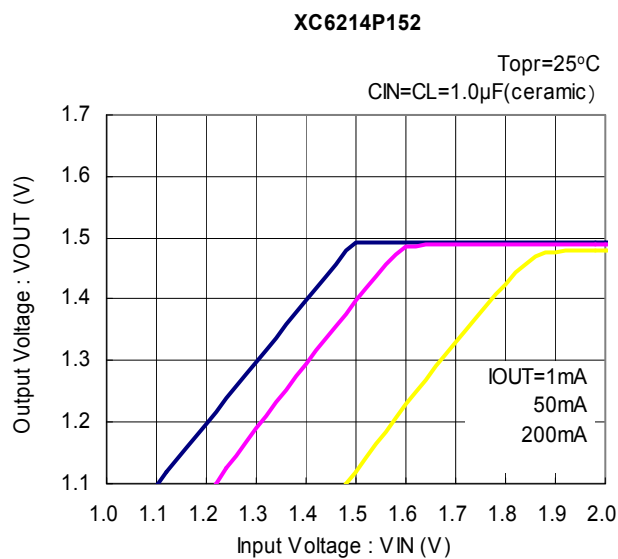


## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(1) Output Voltage vs. Output Current (Continued)

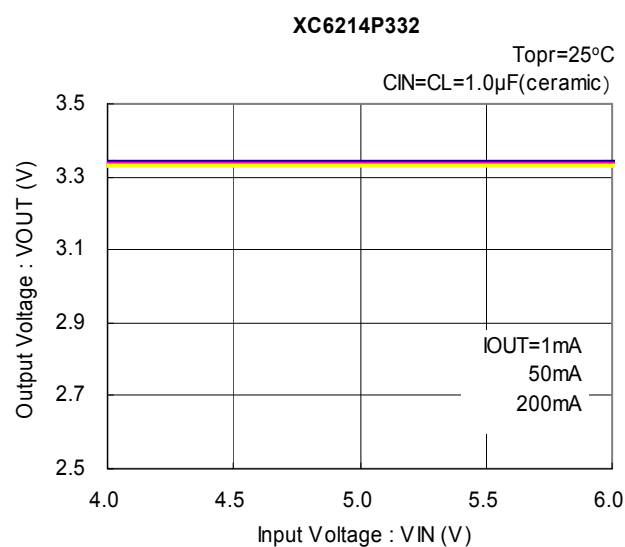
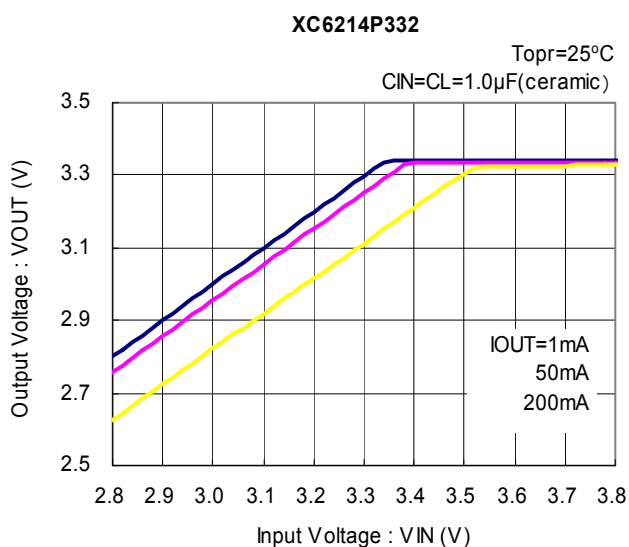
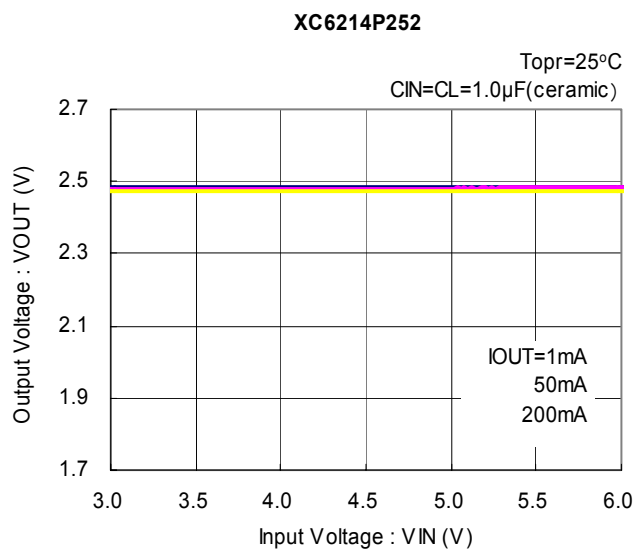
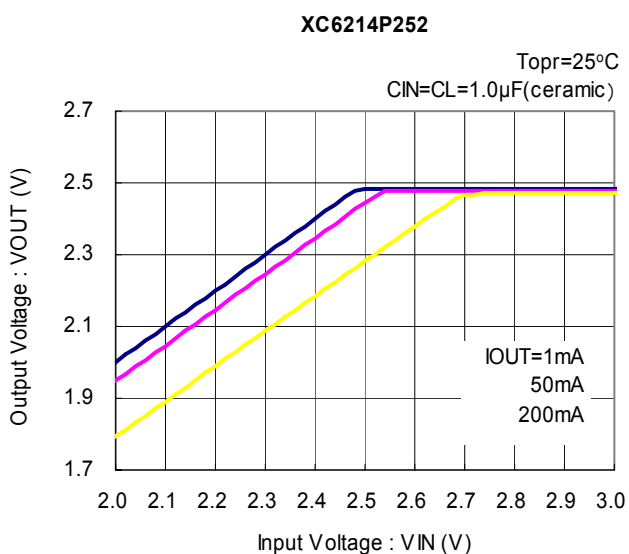


(2) Output Voltage vs. Input Voltage

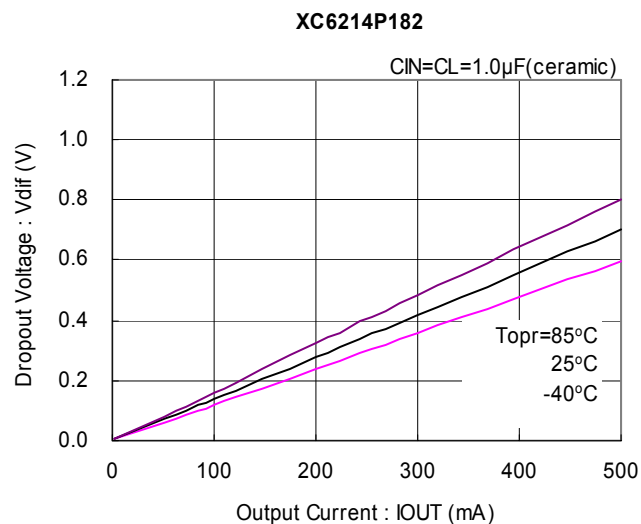
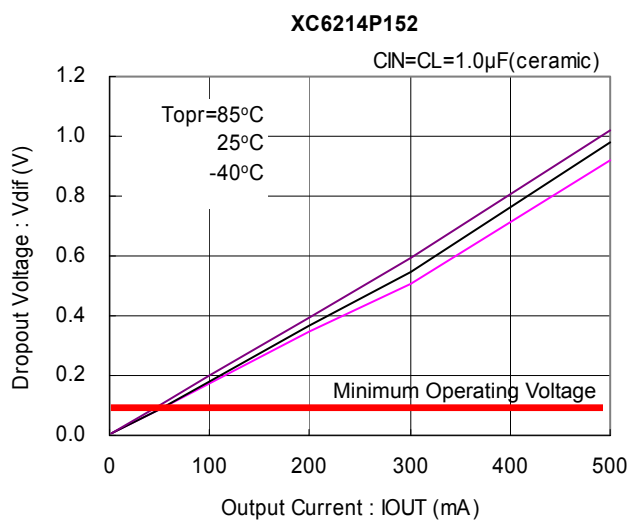


## ■ TYPICAL PERFORMANCE CHARACTER (Continued)

### (2) Output Voltage vs. Input Voltage (Continued)

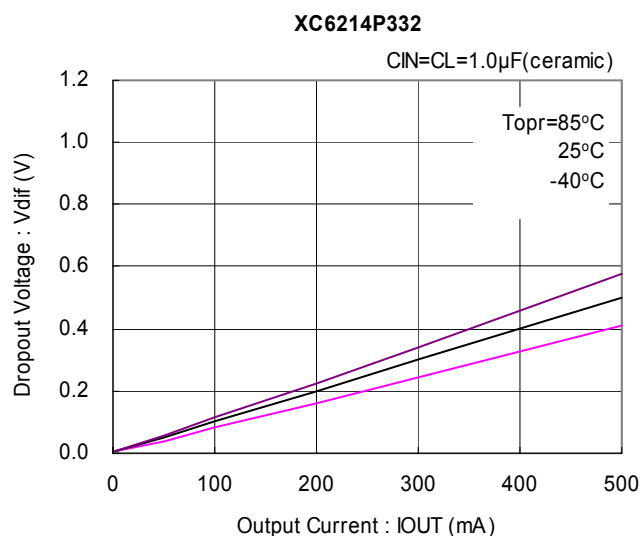
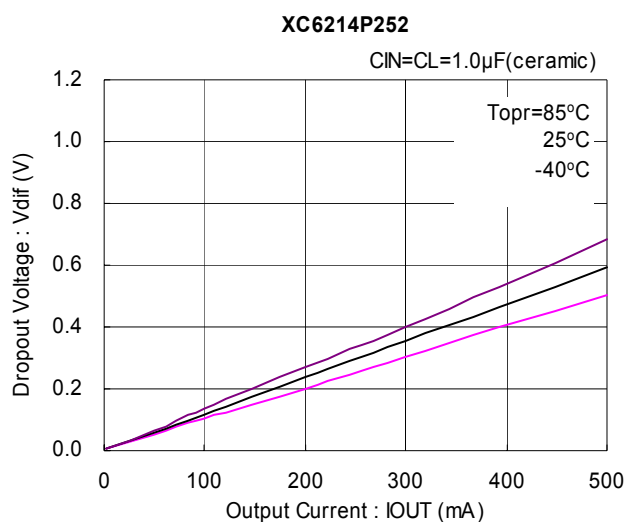


### (3) Dropout Voltage vs. Output Current

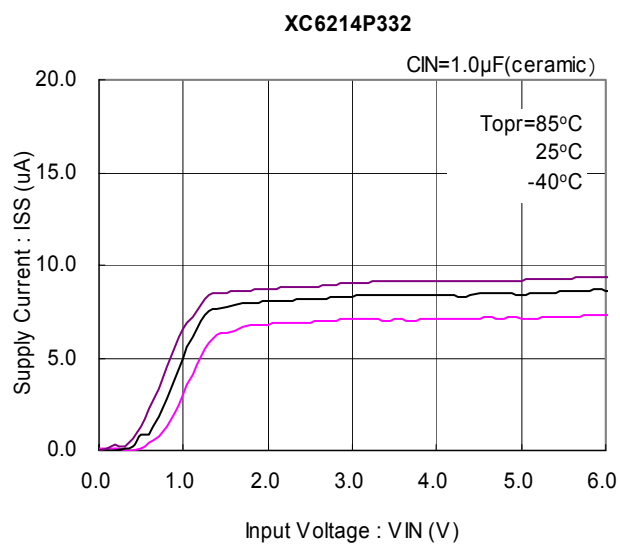
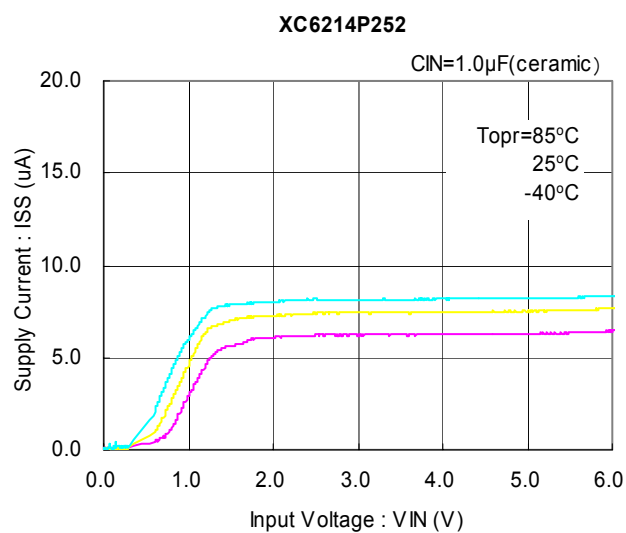
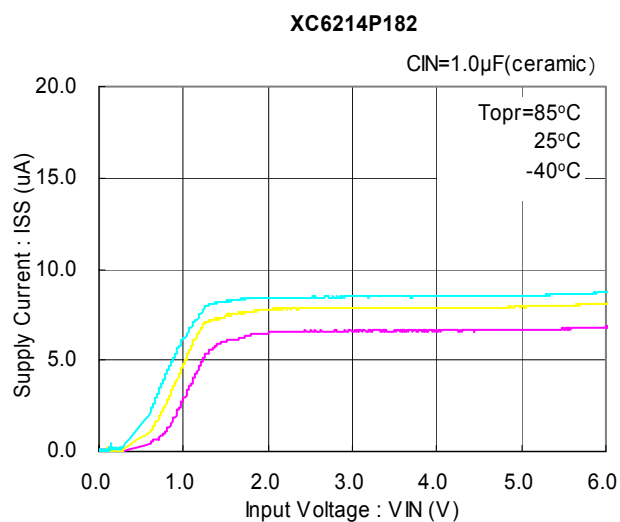
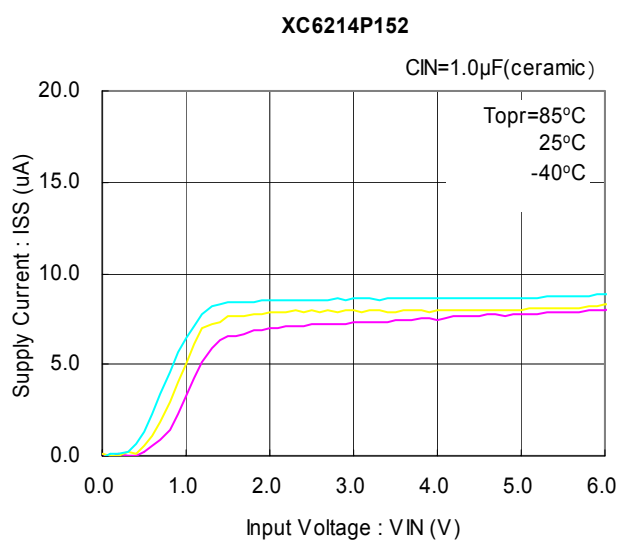


## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

### (3) Dropout Voltage vs. Output Current (Continued)

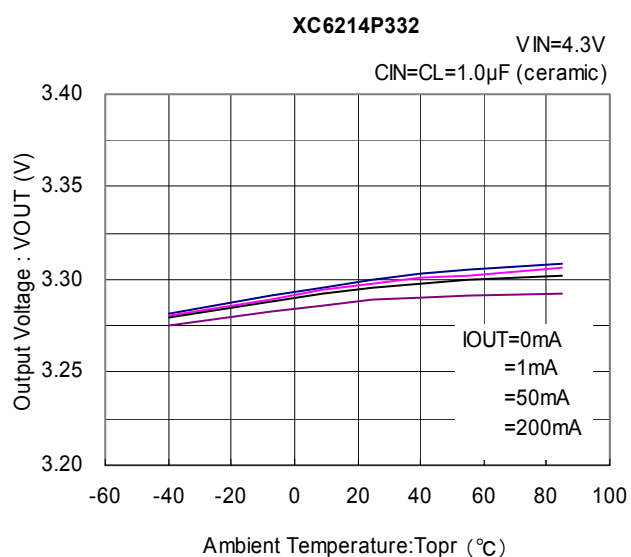
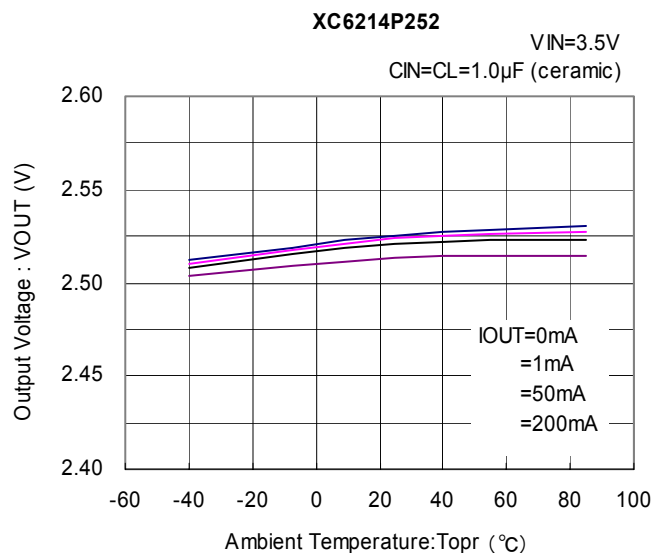
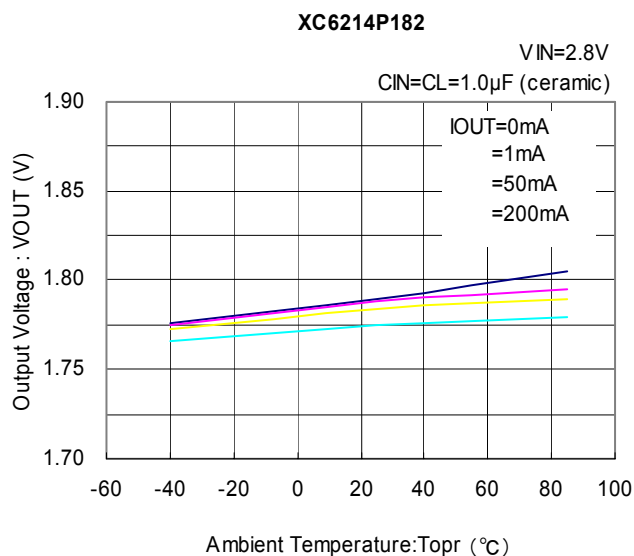
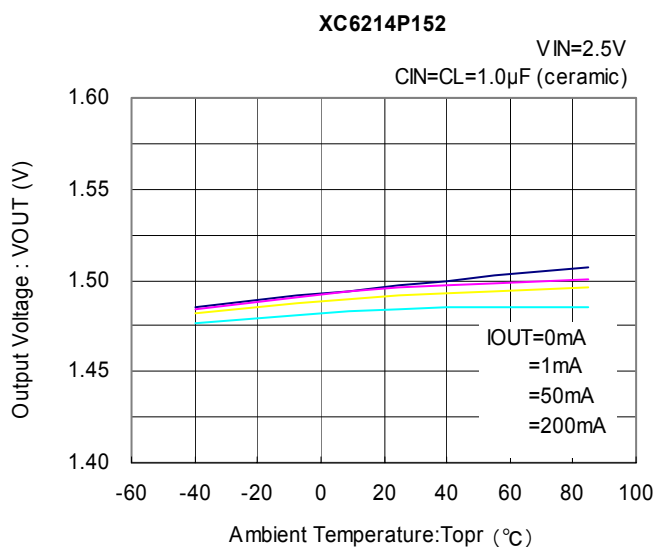


### (4) Supply Current vs. Input Voltage

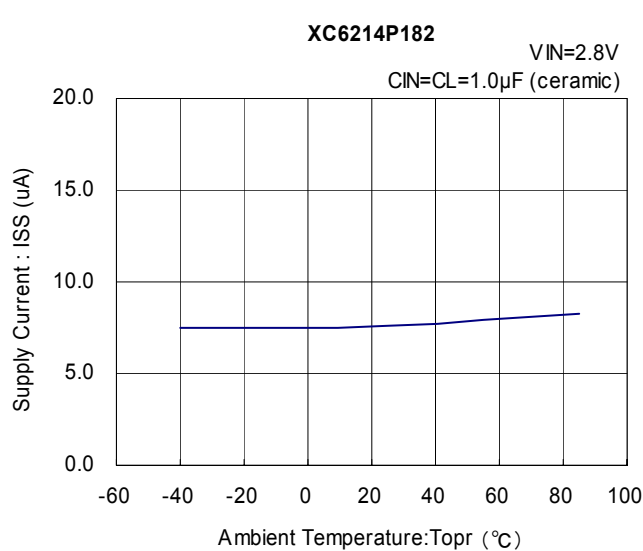
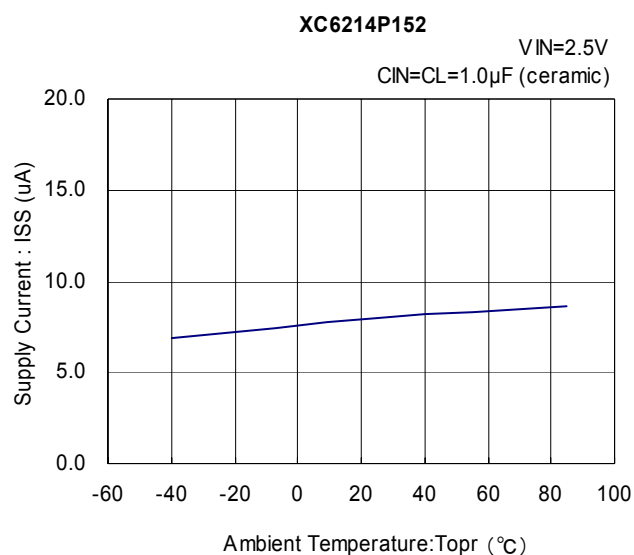


## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(5) Output Voltage vs. Ambient Temperature

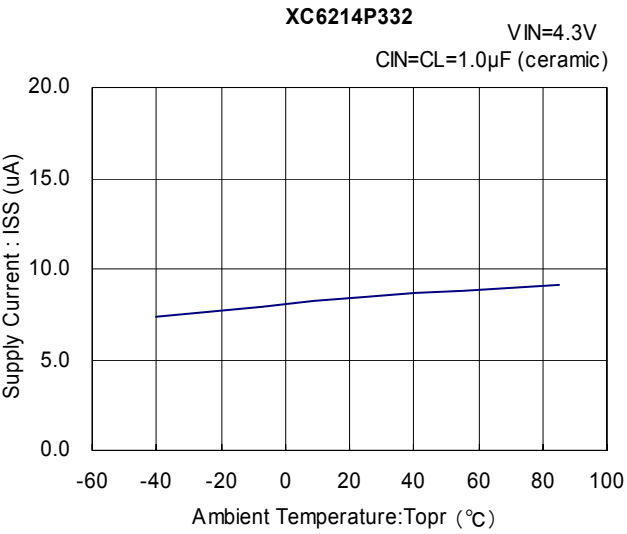
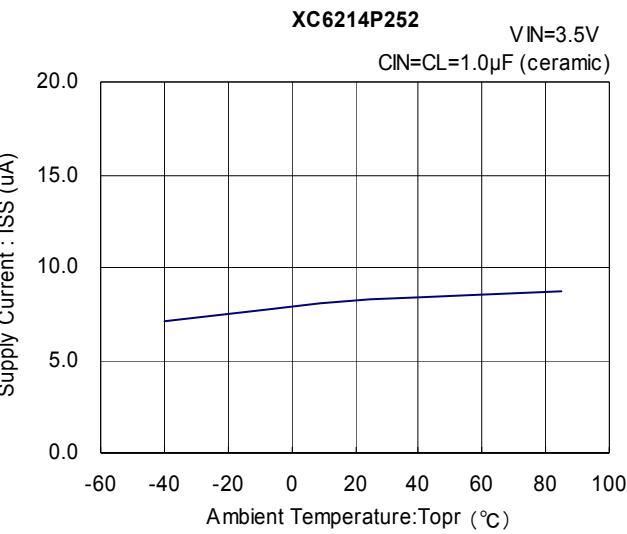


(6) Supply Current vs. Ambient Temperature



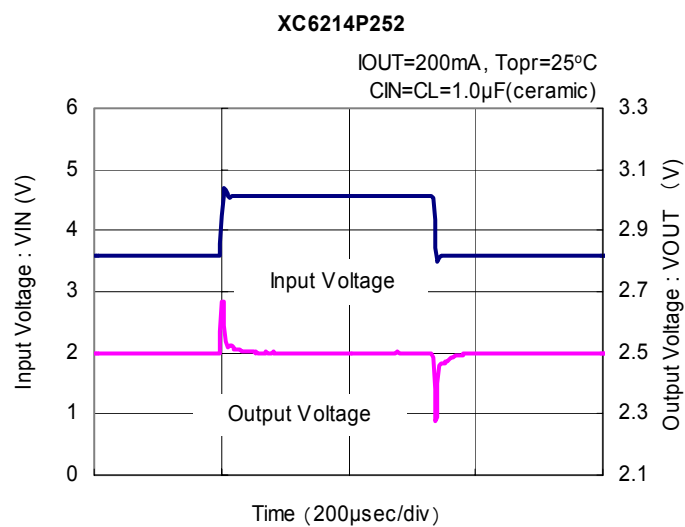
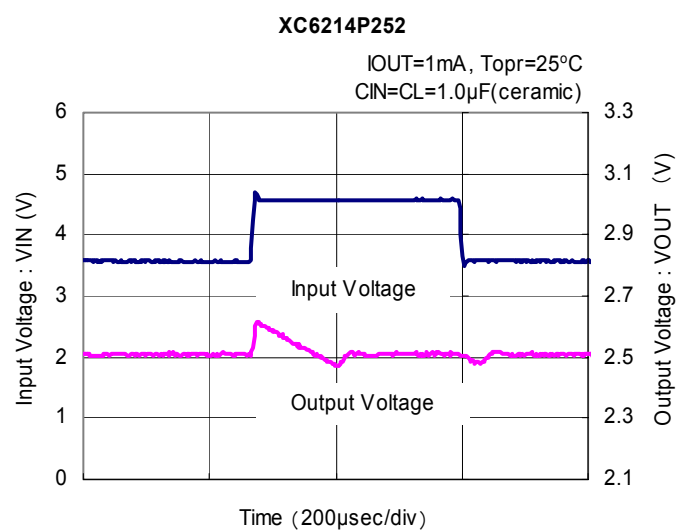
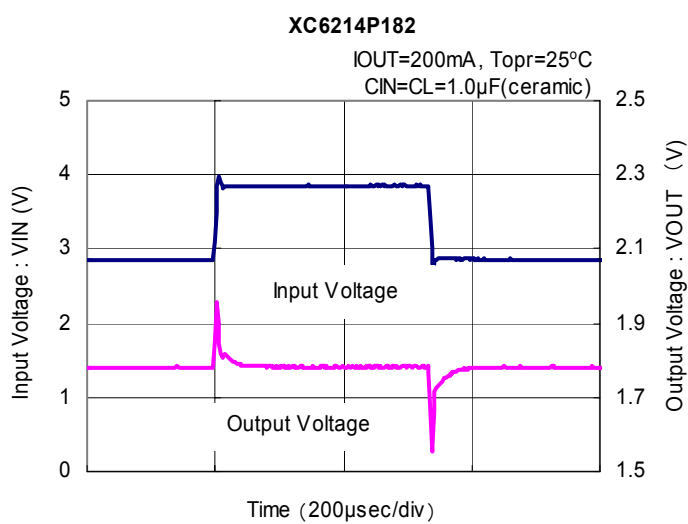
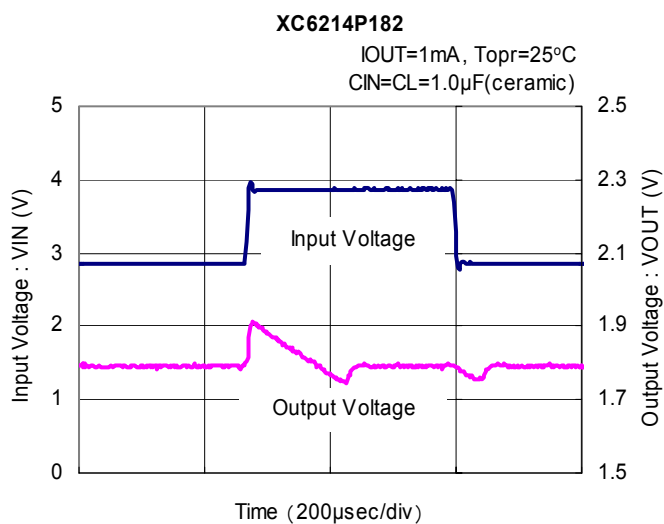
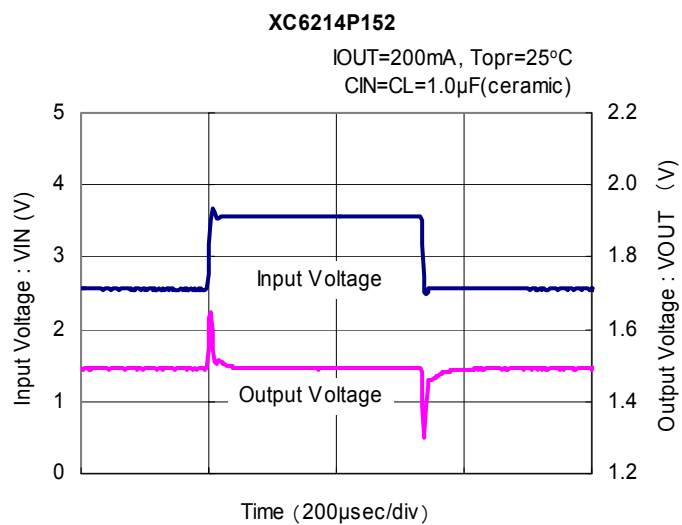
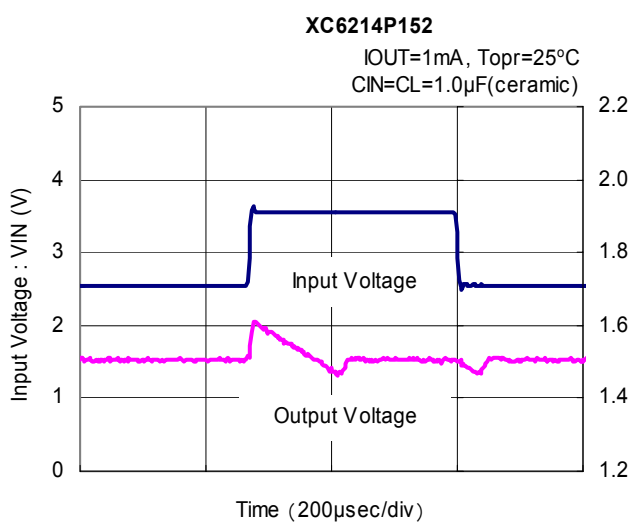
# ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(6) Supply Current vs. Ambient Temperature (Continued)



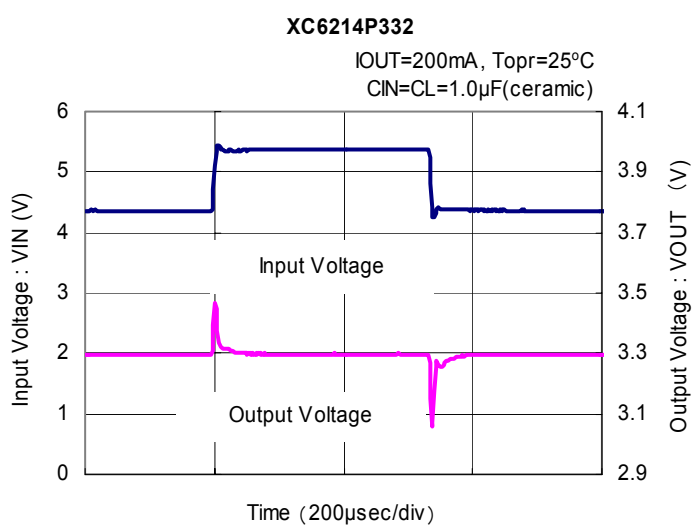
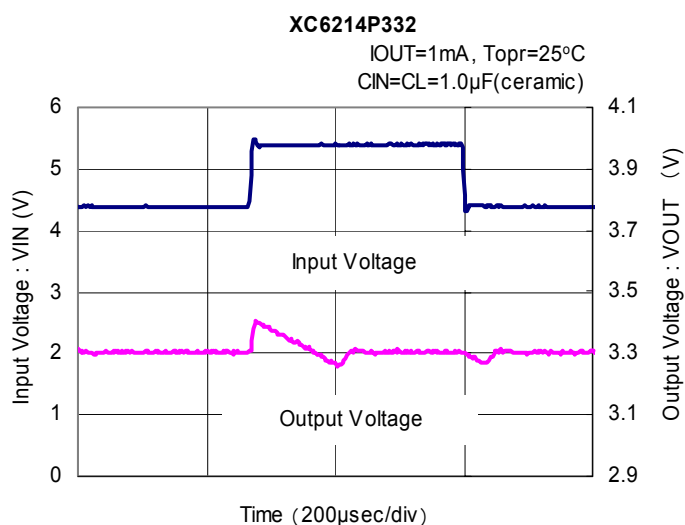
## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

### (7) Input Transient Response

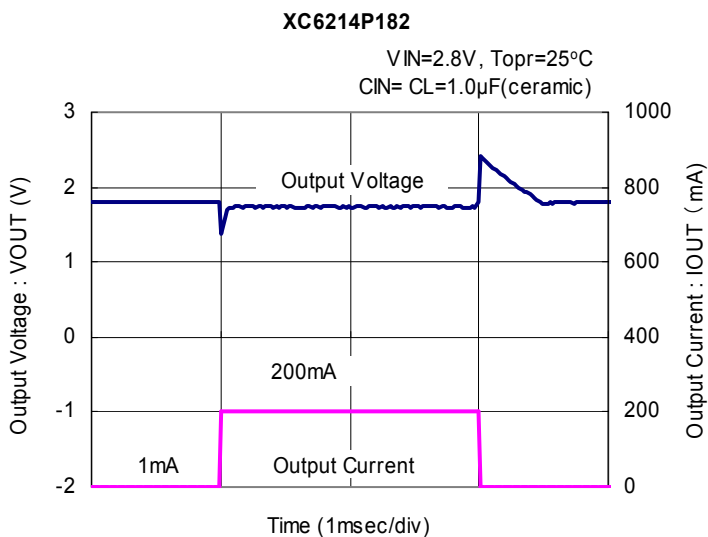
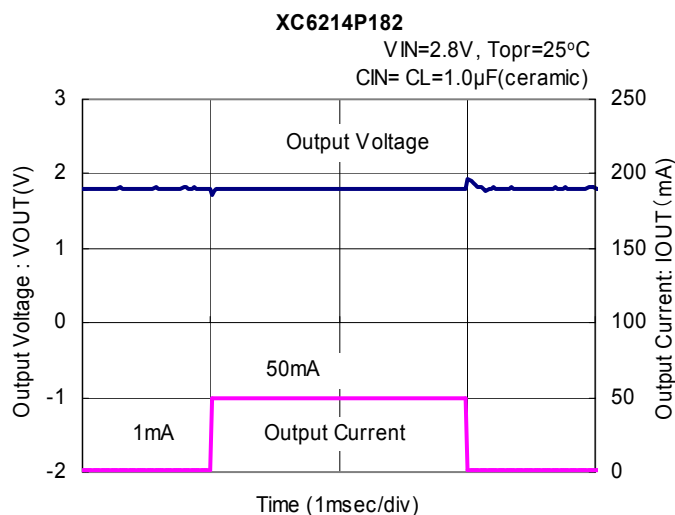
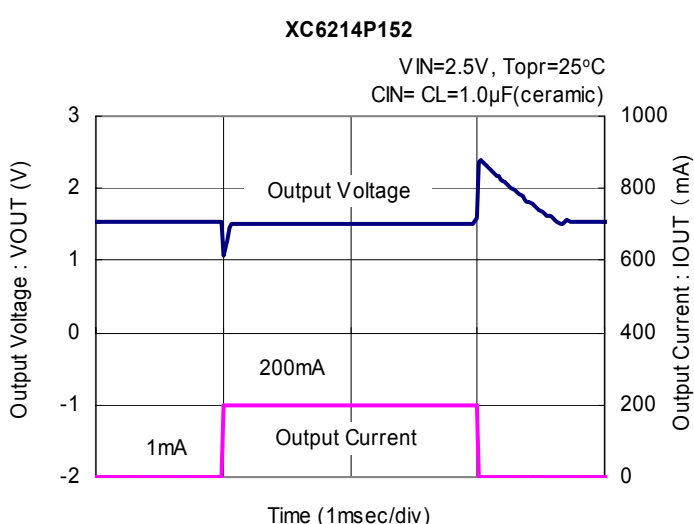
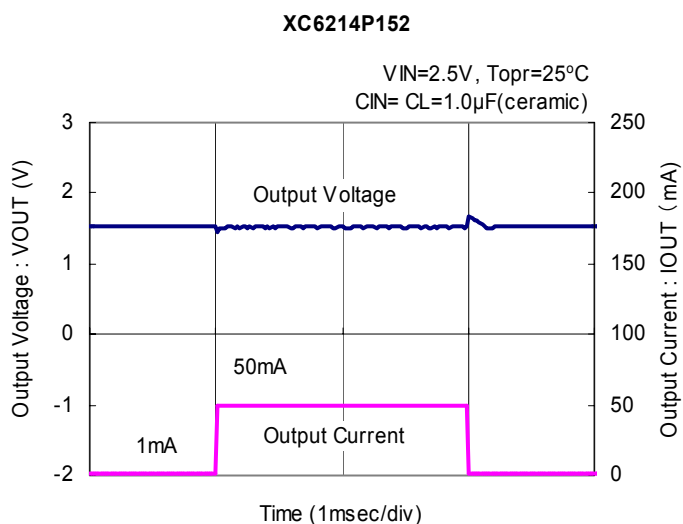


## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

### (7) Input Transient Response (Continued)

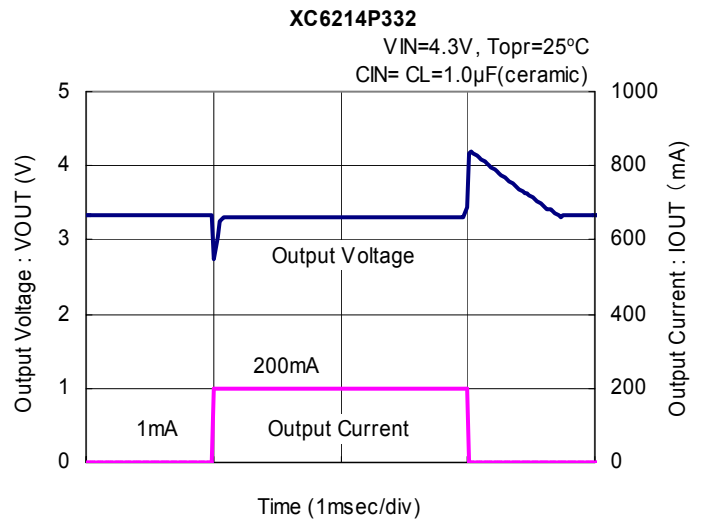
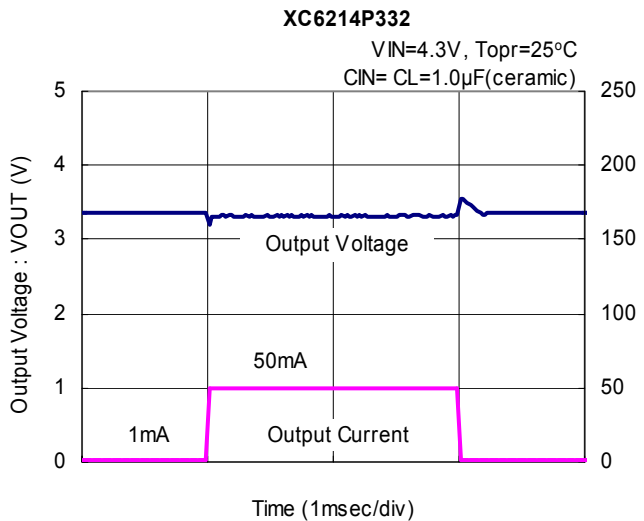
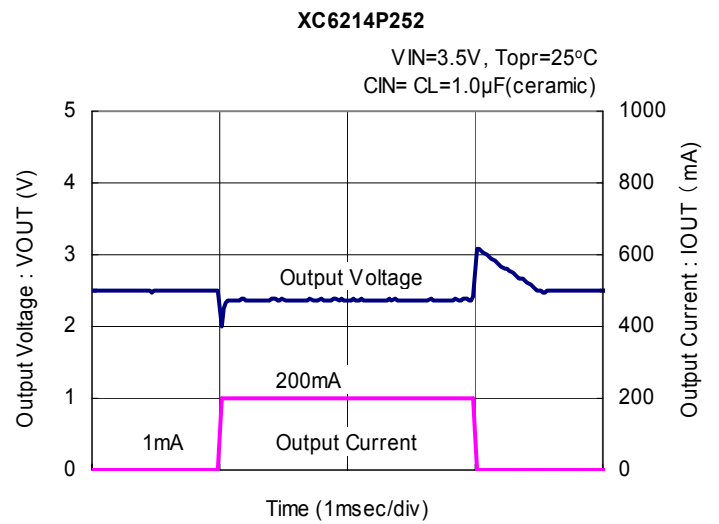
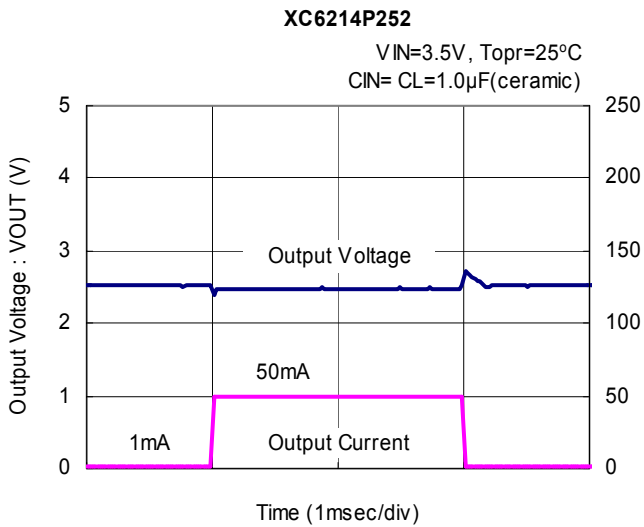


### (8) Load Transient Response

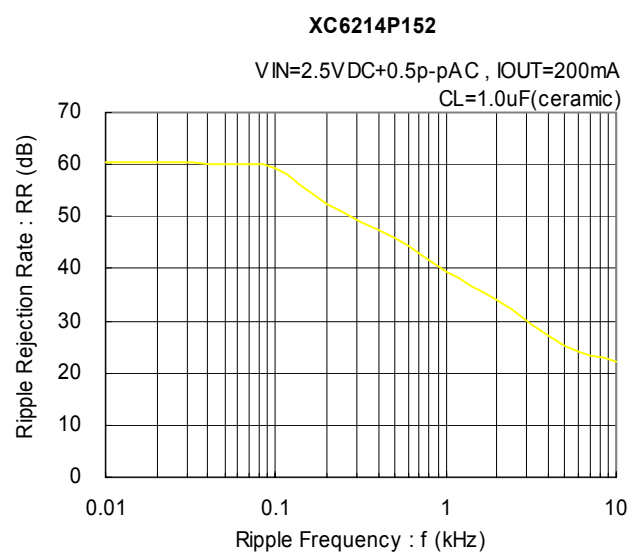
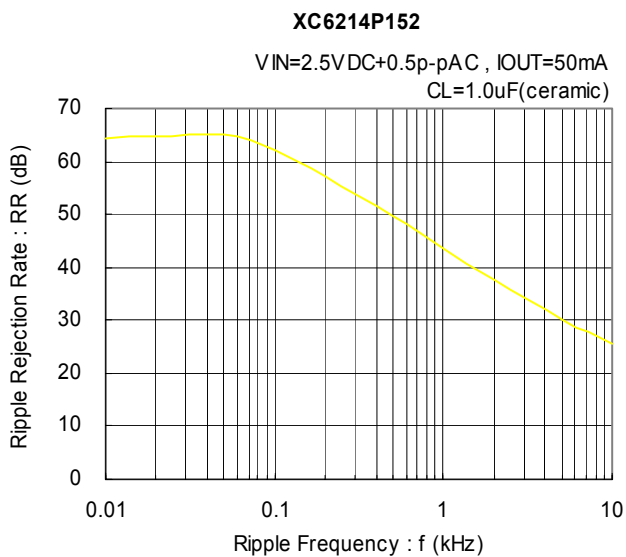


## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

### (8) Load Transient Response (Continued)



### (9) Ripple Rejection Rate



## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

### (9) Ripple Rejection Rate (Continued)

