

28V Operation High Speed Voltage Regulators with Stand-by Function

■ GENERAL DESCRIPTION

The XC6701 series are positive voltage regulator ICs manufactured using CMOS process with 28V of operation voltage. The series consists of 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 0.1V increments within the range of 1.8V to 18V which fixed by laser trimming technologies. The output stabilization capacitor (C_L) is also compatible with low ESR ceramic capacitors.

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

The CE function enables the output to be turned off and the IC becomes a stand-by mode resulting in greatly reduced power consumption. Packages are selectable depending on the applications from SOT-25, SOT-89, SOT-89-5, USP-6C, SOT-223, and TO-252.

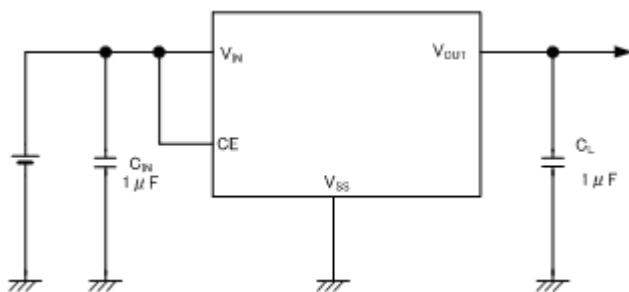
■ APPLICATIONS

- Car audio, Car navigation systems
- Note PCs / Tablet PCs
- Mobile devices / terminals
- Digital still cameras / Camcorders
- Smart phones / Mobile phones
- Multi-function power supplies

■ FEATURES

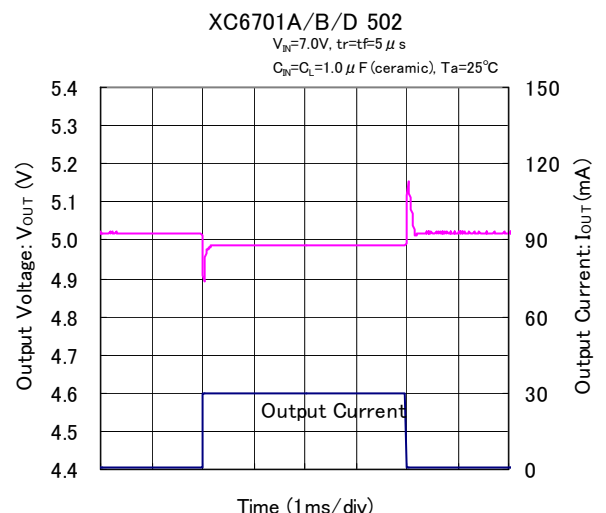
- Max Output Current** : More than 150mA (200mA limit)
($V_{IN}=V_{OUT}+3.0V$)
- Dropout Voltage** : 300mV@ $I_{OUT}=20mA$
- Input Voltage Range** : 2.0V~28.0V
- Output Voltage Range** : 1.8V~18.0V (0.1V increments)
- High Accuracy** : $\pm 2\%$
- Low Power Consumption** : 50 μA ($V_{OUT}=5.0V$)
- Stand-by Current** : Less than 0.1 μA
- High Ripple Rejection** : 50dB@1kHz
- Operating Ambient Temperature** : -40°C~+85°C (XC6701B/D)
-40°C~+105°C (XC6701A)
- Low ESR Capacitor** : Ceramic Capacitor Compatible
(Internal Phase Compensation)
- Packages** : SOT-25, SOT-89, SOT-89-5,
USP-6C, SOT-223, TO-252
- Environmentally Friendly** : EU RoHS Compliant, Pb Free

■ TYPICAL APPLICATION CIRCUITS



XC6701B Series
With CE function

■ TYPICAL PERFORMANCE CHARACTERISTICS



PIN CONFIGURATION



* The dissipation pad for the USP-6C package should be solder-plated in reference 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 V_{SS} (No. 5) pin.

PIN ASSIGNMENT

XC6701A/B Series

| PIN NUMBER | | | PIN NAME | FUNCTIONS |
|------------|----------|--------|------------------|----------------|
| SOT-25 | SOT-89-5 | USP-6C | | |
| 1 | 5 | 6 | V _{IN} | Power Input |
| 2 | 2 | 5 | V _{SS} | Ground |
| 3 | 4 | 2, 4 | NC | No connection |
| 4 | 3 | 3 | CE | ON/OFF Control |
| 5 | 1 | 1 | V _{OUT} | Output |

XC6701D Series

| PIN NUMBER | | | PIN NAME | FUNCTIONS |
|------------|---------|--------|------------------|-------------|
| SOT-89 | SOT-223 | TO-252 | | |
| 3 | 3 | 1 | V _{IN} | Power Input |
| 2 | 2 | 2 | V _{SS} | Ground |
| 1 | 1 | 3 | V _{OUT} | Output |

PIN FUNCTION ASSIGNMENT

XC6701A/B Series

| CE(Chip Enable) | IC Operation State ON/OFF |
|-----------------|---------------------------|
| CE"H" Level | Operation ON |
| CE"L" Level | Operation OFF |
| CE"OPEN" | Operation Undefined |

*CE pin should not be left open. Each should have a certain voltage.

■ PRODUCT CLASSIFICATION

● Ordering Information

XC6701①②③④⑤⑥ - ⑦^(*)

| DESIGNATOR | ITEM | SYMBOL | DESCRIPTION |
|---------------------|--------------------------|--------|---|
| ① | Type | A | Fixed Output Voltage, Active High ($-40^{\circ}\text{C} \leq \text{Topr} \leq 105^{\circ}\text{C}$) |
| | | B | Fixed Output Voltage, Active High ($-40^{\circ}\text{C} \leq \text{Topr} \leq 85^{\circ}\text{C}$) |
| | | D | Fixed Output Voltage, No CE function ($-40^{\circ}\text{C} \leq \text{Topr} \leq 85^{\circ}\text{C}$) |
| ②③ | Output Voltage | 18~J0 | For the voltage within 1.8V ~9.9V; e.g. 2.5V \Rightarrow 25 5.0V \Rightarrow 50 |
| | | | For the voltage above 10.0V; e.g. 11.6V \Rightarrow B6 15.2V \Rightarrow F2 18.0V \Rightarrow J0 |
| ④ | Output Voltage Accuracy | 2 | $\pm 2\%$ accuracy |
| ⑤⑥-⑦ ^(*) | Packages (Order Unit) | MR-G | SOT-25 (3,000pcs/Reel) (Only Type A,B) |
| | | PR-G | SOT-89-5 (1,000pcs/Reel) (Only Type A,B) |
| | | ER-G | USP-6C (3,000pcs/Reel) (Only Type A,B) |
| | | FR-G | SOT-223 (1,000pcs/Reel) (Only Type D) |
| | | JR-G | TO-252 (2,500pcs/Reel) (Only Type D) |
| | | PR-G | SOT-89 (1,000pcs/Reel) (Only Type D) |

^(*) The "-G" suffix denotes Halogen and Antimony free as well as being fully EU RoHS compliant.

■ BLOCK DIAGRAMS

● XC6701A/B Series (SOT-25, SOT-89-5, USP-6C)



● XC6701D Series (SOT-89, SOT-223, TO-252)



ABSOLUTE MAXIMUM RATINGS

●XC6701A Series

Ta=25°C

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|------------------------------------|----------|------------------|---|------|
| Input Voltage | | V _{IN} | V _{SS} -0.3~30 | V |
| Output Current | | I _{OUT} | 300 ^{(*)1} | mA |
| Output Voltage | | V _{OUT} | V _{SS} -0.3~V _{IN} +0.3 | V |
| CE Input Voltage | | V _{CE} | V _{SS} -0.3~30 | V |
| Power Dissipation | SOT-25 | Pd | 250 | mW |
| | | | 600 (PCB mounted) ^{(*)2} | |
| | SOT-89-5 | | 500 | |
| | | | 1300 (PCB mounted) ^{(*)2} | |
| | USP-6C | | 120 | |
| 1000 (PCB mounted) ^{(*)2} | | | | |
| Operating Ambient Temperature | | Topr | -40~+105 | °C |
| Storage Temperature | | Tstg | -55~+125 | °C |

*1: $I_{OUT} \leq Pd / (V_{IN} - V_{OUT})$

*2: The power dissipation figure shown is PCB mounted. Please refer to page 27 for details.

●XC6701B Series

Ta=25°C

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|------------------------------------|----------|------------------|---|------|
| Input Voltage | | V _{IN} | V _{SS} -0.3~30 | V |
| Output Current | | I _{OUT} | 300 ^{(*)1} | mA |
| Output Voltage | | V _{OUT} | V _{SS} -0.3~V _{IN} +0.3 | V |
| CE Input Voltage | | V _{CE} | V _{SS} -0.3~30 | V |
| Power Dissipation | SOT-25 | Pd | 250 | mW |
| | | | 600 (PCB mounted) ^{(*)2} | |
| | SOT-89-5 | | 500 | |
| | | | 1300 (PCB mounted) ^{(*)2} | |
| | USP-6C | | 120 | |
| 1000 (PCB mounted) ^{(*)2} | | | | |
| Operating Ambient Temperature | | Topr | -40~+85 | °C |
| Storage Temperature | | Tstg | -55~+125 | °C |

*1: $I_{OUT} \leq Pd / (V_{IN} - V_{OUT})$

*2: The power dissipation figure shown is PCB mounted. Please refer to page 27 for details.

●XC6701D Series

Ta=25°C

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|------------------------------------|---------|------------------|---|------|
| Input Voltage | | V _{IN} | V _{SS} -0.3~30 | V |
| Output Current | | I _{OUT} | 300 ^{(*)1} | mA |
| Output Voltage | | V _{OUT} | V _{SS} -0.3~V _{IN} +0.3 | V |
| Power Dissipation | SOT-89 | Pd | 500 | mW |
| | | | 1000 (PCB mounted) ^{(*)2} | |
| | SOT-223 | | 300 | |
| | | | 1500 (PCB mounted) ^{(*)2} | |
| | TO-252 | | 500 | |
| 1800 (PCB mounted) ^{(*)2} | | | | |
| Operating Ambient Temperature | | Topr | -40~+85 | °C |
| Storage Temperature | | Tstg | -55~+125 | °C |

*1: $I_{OUT} \leq Pd / (V_{IN} - V_{OUT})$

*2: The power dissipation figure shown is PCB mounted. Please refer to page 27 for details.

■ ELECTRICAL CHARACTERISTICS

Ta=25°C

●XC6701A/Bxx2 Series

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT | CIRCUIT | |
|---|---|--|---------------------------|------|------|------|---------|---|
| Output Voltage | V _{OUT(E)} | I _{OUT} =10mA, V _{CE} =V _{IN} | E2-0 | | | V | ① | |
| Maximum Output Current | I _{OUTMAX} | V _{IN} =V _{OUT(T)} +3.0V, V _{CE} =V _{IN} (V _{OUT(T)} ≥3.0V) | 150 | - | - | mA | ① | |
| | | V _{IN} =V _{OUT(T)} +3.0V, V _{CE} =V _{IN} (V _{OUT(T)} <3.0V) | 100 | - | - | mA | ① | |
| Load Regulation | ΔV _{OUT} | 1mA≤I _{OUT} ≤50mA, V _{CE} =V _{IN} 1.8V≤V _{OUT(T)} ≤5.0V | - | 50 | 90 | mV | ① | |
| | | 1mA≤I _{OUT} ≤50mA, V _{CE} =V _{IN} 5.1V≤V _{OUT(T)} ≤12.0V | - | 110 | 175 | | | |
| | | 1mA≤I _{OUT} ≤50mA, V _{CE} =V _{IN} 12.1V≤V _{OUT(T)} ≤18.0V | - | 180 | 275 | | | |
| Dropout Voltage 1 | V _{dif1} | I _{OUT} =20mA, V _{CE} =V _{IN} | E2-1 | | | mV | ① | |
| Dropout Voltage 2 | V _{dif2} | I _{OUT} =100mA, V _{CE} =V _{IN} | E2-2 | | | mV | ① | |
| Supply Current | I _{SS} | 1.8V≤V _{OUT(T)} ≤5.0V | 11 | 50 | 105 | μA | ② | |
| | | 5.1V≤V _{OUT(T)} ≤12.0V | 11 | 60 | 115 | | | |
| | | 12.1V≤V _{OUT(T)} ≤18.0V | 11 | 65 | 125 | | | |
| Stand-by Current | I _{STB} | V _{CE} =V _{SS} | - | 0.01 | 0.10 | μA | ② | |
| Line Regulation 1 | ΔV _{OUT} / (ΔV _{IN} · V _{OUT}) | V _{OUT(T)} +2.0V≤V _{IN} ≤28.0V I _{OUT} =5mA, V _{CE} =V _{IN} | - | 0.05 | 0.10 | %/V | ① | |
| Line Regulation 2 | ΔV _{OUT} / (ΔV _{IN} · V _{OUT}) | V _{OUT(T)} +2.0V≤V _{IN} ≤28.0V I _{OUT} =13mA, V _{CE} =V _{IN} | - | 0.15 | 0.30 | %/V | ① | |
| Input Voltage | V _{IN} | | 2.0 | - | 28.0 | V | - | |
| Output Voltage Temperature Characteristics | ΔV _{OUT} / (ΔTa · V _{OUT}) | I _{OUT} =20mA, V _{CE} =V _{IN} | XC6701A -40°C≤Ta≤105°C | - | ±100 | - | ppm/°C | ① |
| | | | XC6701B -40°C≤Ta≤85°C | | | | | |
| Power Supply Rejection Ratio | PSRR | V _{IN} =[V _{OUT(T)} +2.0V]V _{DC} +0.5V _{P-PAC} I _{OUT} =20mA, f=1kHz, V _{CE} =V _{IN} | - | 50 | - | dB | ③ | |
| Short Current | I _{SHORT} | V _{IN} =V _{OUT(T)} +2.0V, V _{CE} =V _{IN} | - | 40 | - | mA | ① | |
| CE "H" Level Voltage | V _{CEH} | V _{IN} =28.0V | 1.1 | - | 28.0 | V | ① | |
| CE "L" Level Voltage | V _{CEL} | V _{IN} =28.0V | 0 | - | 0.35 | V | ① | |
| CE "H" Level Current | I _{CEH} | V _{IN} =V _{CE} =28.0V | -0.1 | - | 0.1 | μA | ① | |
| CE "L" Level Current | I _{CEL} | V _{IN} =28.0V, V _{CE} =V _{SS} | -0.1 | - | 0.1 | μA | ① | |
| Thermal Shutdown Detect Temperature | T _{TSD} | Junction Temperature | - | 150 | - | °C | ① | |
| Thermal Shutdown Release Temperature | T _{TSR} | Junction Temperature | - | 125 | - | °C | ① | |
| Hysteresis Width | T _{TSD} -T _{TSR} | Junction Temperature | - | 25 | - | °C | - | |

NOTE:

*1: V_{OUT(T)}: Nominal output voltage

*2: V_{OUT(E)}: Effective output voltage

(i.e. the output voltage when "V_{OUT(T)}+2.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.)

*3: V_{dif}={V_{IN1}^{Note 5} - V_{OUT1}^{Note 4}}

*4: V_{OUT1}: In case of V_{OUT(T)} < 3.0V, the V_{OUT1} is equal to 98% of the V_{OUT(T)} when a stabilized input voltage is applied in V_{OUT(T)}+3.0V.
: In case of V_{OUT(T)} ≥ 3.0V, the V_{OUT1} is equal to 98% of the V_{OUT(T)} when a stabilized input voltage is applied in V_{OUT(T)}+2.0V.

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

*6: Unless otherwise stated, V_{IN}=V_{OUT(T)}+2.0V.

■ ELECTRICAL CHARACTERISTICS (Continued)

● XC6701Dxx2 Series

Ta=25°C

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT | CIRCUIT |
|--|--|--|------|-----------|------|---------------|---------|
| Output Voltage | $V_{OUT(E)}$ | $I_{OUT}=10\text{mA}$ | E2-0 | | | V | ① |
| Maximum Output Current | I_{OUTMAX} | $V_{IN}=V_{OUT(T)}+3.0\text{V}$ ($V_{OUT(T)}\geq 3.0\text{V}$) | 150 | - | - | mA | ① |
| | | $V_{IN}=V_{OUT(T)}+3.0\text{V}$ ($V_{OUT(T)}< 3.0\text{V}$) | 100 | - | - | mA | ① |
| Load Regulation | ΔV_{OUT} | $1\text{mA}\leq I_{OUT}\leq 50\text{mA}$ $1.8\text{V}\leq V_{OUT(T)}\leq 5.0\text{V}$ | - | 50 | 90 | mV | ① |
| | | $1\text{mA}\leq I_{OUT}\leq 50\text{mA}$ $5.1\text{V}\leq V_{OUT(T)}\leq 12.0\text{V}$ | - | 110 | 175 | | |
| | | $1\text{mA}\leq I_{OUT}\leq 50\text{mA}$ $12.1\text{V}\leq V_{OUT(T)}\leq 18.0\text{V}$ | - | 180 | 275 | | |
| Dropout Voltage1 | Vdif1 | $I_{OUT}=20\text{mA}$ | E2-1 | | | mV | ① |
| Dropout Voltage2 | Vdif2 | $I_{OUT}=100\text{mA}$ | E2-2 | | | mV | ① |
| Supply Current | I_{SS} | $1.8\text{V}\leq V_{OUT(T)}\leq 5.0\text{V}$ | 11 | 50 | 105 | μA | ② |
| | | $5.1\text{V}\leq V_{OUT(T)}\leq 12.0\text{V}$ | 11 | 60 | 115 | | |
| | | $12.1\text{V}\leq V_{OUT(T)}\leq 18.0\text{V}$ | 11 | 65 | 125 | | |
| Line Regulation1 | $\frac{\Delta V_{OUT}}{(\Delta V_{IN} \cdot V_{OUT})}$ | $V_{OUT(T)}+2.0\text{V}\leq V_{IN}\leq 28.0\text{V}$ $I_{OUT}=5\text{mA}$ | - | 0.05 | 0.10 | %/V | ① |
| Line Regulation2 | $\frac{\Delta V_{OUT}}{(\Delta V_{IN} \cdot V_{OUT})}$ | $V_{OUT(T)}+2.0\text{V}\leq V_{IN}\leq 28.0\text{V}$ $I_{OUT}=13\text{mA}$ | - | 0.15 | 0.30 | %/V | ① |
| Input Voltage | V_{IN} | | 2.0 | - | 28.0 | V | - |
| Output Voltage Temperature Characteristics | $\frac{\Delta V_{OUT}}{(\Delta T_a \cdot V_{OUT})}$ | $I_{OUT}=20\text{mA}$ $-40^\circ\text{C}\leq T_a\leq 85^\circ\text{C}$ | - | ± 100 | - | ppm/°C | ① |
| Power Supply Rejection Ratio | PSRR | $V_{IN}=[V_{OUT(T)}+2.0\text{V}]+0.5V_{P-PAC}$ $I_{OUT}=20\text{mA}$, $f=1\text{kHz}$ | - | 50 | - | dB | ③ |
| Short Current | I_{SHORT} | $V_{IN}=V_{OUT(T)}+2.0\text{V}$ | - | 40 | - | mA | ① |
| Thermal Shutdown Detect Temperature | T_{TSD} | Junction Temperature | - | 150 | - | °C | ① |
| Thermal Shutdown Release Temperature | T_{TSR} | Junction Temperature | - | 125 | - | °C | ① |
| Hysteresis Width | $T_{TSD}-T_{TSR}$ | Junction Temperature | - | 25 | - | °C | - |

NOTE:

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

*2: $V_{OUT(E)}$: Effective output voltage

(i.e. the output voltage when " $V_{OUT(T)}+2.0\text{V}$ " is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.)

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

*4: V_{OUT1} : In case of $V_{OUT(T)} < 3.0\text{V}$, the V_{OUT1} is equal to 98% of the $V_{OUT(T)}$ when a stabilized input voltage is applied in $V_{OUT(T)}+3.0\text{V}$.
: In case of $V_{OUT(T)} \geq 3.0\text{V}$, the V_{OUT1} is equal to 98% of the $V_{OUT(T)}$ when a stabilized input voltage is applied in $V_{OUT(T)}+2.0\text{V}$.

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

*6: Unless otherwise stated, $V_{IN}=V_{OUT(T)}+2.0\text{V}$.

■ ELECTRICAL CHARACTERISTICS (Continued)

● Voltage Chart

| SYMBOL | E2-0 | | E2-1 | | E2-2 | |
|----------------------------------|-------------------------------------|-------|---|------|--|------|
| PARAMETER | OUTPUT VOLTAGE (V) (2% products) | | DROPOUT VOLTAGE 1 (mV) $I_{OUT}=20mA$ | | DROPOUT VOLTAGE 2 (mV) $I_{OUT}=100mA$ | |
| NOMINAL OUTPUT VOLTAGE (V) | V_{OUT} | | V_{dif1} | | V_{dif2} | |
| $V_{OUT(T)}$ (V) | MIN. | MAX. | TYP. | MAX. | TYP. | MAX. |
| 1.8 | 1.764 | 1.836 | 550 | 710 | 2200 | 2700 |
| 1.9 | 1.862 | 1.938 | 550 | 710 | 2200 | 2700 |
| 2.0 | 1.960 | 2.040 | 450 | 600 | 1900 | 2600 |
| 2.1 | 2.058 | 2.142 | 450 | 600 | 1900 | 2600 |
| 2.2 | 2.156 | 2.244 | 390 | 520 | 1700 | 2200 |
| 2.3 | 2.254 | 2.346 | 390 | 520 | 1700 | 2200 |
| 2.4 | 2.352 | 2.448 | 390 | 520 | 1700 | 2200 |
| 2.5 | 2.450 | 2.550 | 310 | 450 | 1500 | 1900 |
| 2.6 | 2.548 | 2.652 | 310 | 450 | 1500 | 1900 |
| 2.7 | 2.646 | 2.754 | 310 | 450 | 1500 | 1900 |
| 2.8 | 2.744 | 2.856 | 310 | 450 | 1500 | 1900 |
| 2.9 | 2.842 | 2.958 | 310 | 450 | 1500 | 1900 |
| 3.0 | 2.940 | 3.060 | 260 | 360 | 1300 | 1700 |
| 3.1 | 3.038 | 3.162 | 260 | 360 | 1300 | 1700 |
| 3.2 | 3.136 | 3.264 | 260 | 360 | 1300 | 1700 |
| 3.3 | 3.234 | 3.366 | 260 | 360 | 1300 | 1700 |
| 3.4 | 3.332 | 3.468 | 260 | 360 | 1300 | 1700 |
| 3.5 | 3.430 | 3.570 | 260 | 360 | 1300 | 1700 |
| 3.6 | 3.528 | 3.672 | 260 | 360 | 1300 | 1700 |
| 3.7 | 3.626 | 3.774 | 260 | 360 | 1300 | 1700 |
| 3.8 | 3.724 | 3.876 | 260 | 360 | 1300 | 1700 |
| 3.9 | 3.822 | 3.978 | 260 | 360 | 1300 | 1700 |
| 4.0 | 3.920 | 4.080 | 220 | 320 | 1100 | 1500 |
| 4.1 | 4.018 | 4.182 | 220 | 320 | 1100 | 1500 |
| 4.2 | 4.116 | 4.284 | 220 | 320 | 1100 | 1500 |
| 4.3 | 4.214 | 4.386 | 220 | 320 | 1100 | 1500 |
| 4.4 | 4.312 | 4.488 | 220 | 320 | 1100 | 1500 |
| 4.5 | 4.410 | 4.590 | 220 | 320 | 1100 | 1500 |
| 4.6 | 4.508 | 4.692 | 220 | 320 | 1100 | 1500 |
| 4.7 | 4.606 | 4.794 | 220 | 320 | 1100 | 1500 |
| 4.8 | 4.704 | 4.896 | 220 | 320 | 1100 | 1500 |
| 4.9 | 4.802 | 4.998 | 220 | 320 | 1100 | 1500 |
| 5.0 | 4.900 | 5.100 | 190 | 280 | 1000 | 1300 |
| 5.1 | 4.998 | 5.202 | 190 | 280 | 1000 | 1300 |
| 5.2 | 5.096 | 5.304 | 190 | 280 | 1000 | 1300 |
| 5.3 | 5.194 | 5.406 | 190 | 280 | 1000 | 1300 |
| 5.4 | 5.292 | 5.508 | 190 | 280 | 1000 | 1300 |
| 5.5 | 5.390 | 5.610 | 190 | 280 | 1000 | 1300 |
| 5.6 | 5.488 | 5.712 | 190 | 280 | 1000 | 1300 |
| 5.7 | 5.586 | 5.814 | 190 | 280 | 1000 | 1300 |
| 5.8 | 5.684 | 5.916 | 190 | 280 | 1000 | 1300 |
| 5.9 | 5.782 | 6.018 | 190 | 280 | 1000 | 1300 |
| 6.0 | 5.880 | 6.120 | 190 | 280 | 1000 | 1300 |

■ ELECTRICAL CHARACTERISTICS (Continued)

● Voltage Chart (Continued)

| SYMBOL | E2-0 | | E2-1 | | E2-2 | |
|----------------------------------|-------------------------------------|--------|---|------|--|------|
| PARAMETER | OUTPUT VOLTAGE (V) (2% products) | | DROPOUT VOLTAGE 1 (mV) $I_{OUT}=20mA$ | | DROPOUT VOLTAGE 2 (mV) $I_{OUT}=100mA$ | |
| NOMINAL OUTPUT VOLTAGE (V) | V_{OUT} | | V_{dif1} | | V_{dif2} | |
| $V_{OUT(T)}$ (V) | MIN. | MAX. | TYP. | MAX. | TYP. | MAX. |
| 6.1 | 5.978 | 6.222 | 190 | 280 | 1000 | 1300 |
| 6.2 | 6.076 | 6.324 | 190 | 280 | 1000 | 1300 |
| 6.3 | 6.174 | 6.426 | 190 | 280 | 1000 | 1300 |
| 6.4 | 6.272 | 6.528 | 190 | 280 | 1000 | 1300 |
| 6.5 | 6.370 | 6.630 | 170 | 230 | 800 | 1150 |
| 6.6 | 6.468 | 6.732 | 170 | 230 | 800 | 1150 |
| 6.7 | 6.566 | 6.834 | 170 | 230 | 800 | 1150 |
| 6.8 | 6.664 | 6.936 | 170 | 230 | 800 | 1150 |
| 6.9 | 6.762 | 7.038 | 170 | 230 | 800 | 1150 |
| 7.0 | 6.860 | 7.140 | 170 | 230 | 800 | 1150 |
| 7.1 | 6.958 | 7.242 | 170 | 230 | 800 | 1150 |
| 7.2 | 7.056 | 7.344 | 170 | 230 | 800 | 1150 |
| 7.3 | 7.154 | 7.446 | 170 | 230 | 800 | 1150 |
| 7.4 | 7.252 | 7.548 | 170 | 230 | 800 | 1150 |
| 7.5 | 7.350 | 7.650 | 170 | 230 | 800 | 1150 |
| 7.6 | 7.448 | 7.752 | 170 | 230 | 800 | 1150 |
| 7.7 | 7.546 | 7.854 | 170 | 230 | 800 | 1150 |
| 7.8 | 7.644 | 7.956 | 170 | 230 | 800 | 1150 |
| 7.9 | 7.742 | 8.058 | 170 | 230 | 800 | 1150 |
| 8.0 | 7.840 | 8.160 | 170 | 230 | 800 | 1150 |
| 8.1 | 7.938 | 8.262 | 130 | 190 | 700 | 950 |
| 8.2 | 8.036 | 8.364 | 130 | 190 | 700 | 950 |
| 8.3 | 8.134 | 8.466 | 130 | 190 | 700 | 950 |
| 8.4 | 8.232 | 8.568 | 130 | 190 | 700 | 950 |
| 8.5 | 8.330 | 8.670 | 130 | 190 | 700 | 950 |
| 8.6 | 8.428 | 8.772 | 130 | 190 | 700 | 950 |
| 8.7 | 8.526 | 8.874 | 130 | 190 | 700 | 950 |
| 8.8 | 8.624 | 8.976 | 130 | 190 | 700 | 950 |
| 8.9 | 8.722 | 9.078 | 130 | 190 | 700 | 950 |
| 9.0 | 8.820 | 9.180 | 130 | 190 | 700 | 950 |
| 9.1 | 8.918 | 9.282 | 130 | 190 | 700 | 950 |
| 9.2 | 9.016 | 9.384 | 130 | 190 | 700 | 950 |
| 9.3 | 9.114 | 9.486 | 130 | 190 | 700 | 950 |
| 9.4 | 9.212 | 9.588 | 130 | 190 | 700 | 950 |
| 9.5 | 9.310 | 9.690 | 130 | 190 | 700 | 950 |
| 9.6 | 9.408 | 9.792 | 130 | 190 | 700 | 950 |
| 9.7 | 9.506 | 9.894 | 130 | 190 | 700 | 950 |
| 9.8 | 9.604 | 9.996 | 130 | 190 | 700 | 950 |
| 9.9 | 9.702 | 10.098 | 130 | 190 | 700 | 950 |
| 10.0 | 9.800 | 10.200 | 130 | 190 | 700 | 950 |

■ **ELECTRICAL CHARACTERISTICS (Continued)**

● **Voltage Chart (Continued)**

| SYMBOL | E2-0 | | E2-1 | | E2-2 | |
|----------------------------------|-------------------------------------|--------|---|------|--|------|
| PARAMETER | OUTPUT VOLTAGE (V) (2% products) | | DROPOUT VOLTAGE 1 (mV) $I_{OUT}=20mA$ | | DROPOUT VOLTAGE 2 (mV) $I_{OUT}=100mA$ | |
| NOMINAL OUTPUT VOLTAGE (V) | V_{OUT} | | V_{dif1} | | V_{dif2} | |
| $V_{OUT(T)}$ (V) | MIN. | MAX. | TYP. | MAX. | TYP. | MAX. |
| 10.1 | 9.898 | 10.302 | 120 | 170 | 650 | 850 |
| 10.2 | 9.996 | 10.404 | 120 | 170 | 650 | 850 |
| 10.3 | 10.094 | 10.506 | 120 | 170 | 650 | 850 |
| 10.4 | 10.192 | 10.608 | 120 | 170 | 650 | 850 |
| 10.5 | 10.290 | 10.710 | 120 | 170 | 650 | 850 |
| 10.6 | 10.388 | 10.812 | 120 | 170 | 650 | 850 |
| 10.7 | 10.486 | 10.914 | 120 | 170 | 650 | 850 |
| 10.8 | 10.584 | 11.016 | 120 | 170 | 650 | 850 |
| 10.9 | 10.682 | 11.118 | 120 | 170 | 650 | 850 |
| 11.0 | 10.780 | 11.220 | 120 | 170 | 650 | 850 |
| 11.1 | 10.878 | 11.322 | 120 | 170 | 650 | 850 |
| 11.2 | 10.976 | 11.424 | 120 | 170 | 650 | 850 |
| 11.3 | 11.074 | 11.526 | 120 | 170 | 650 | 850 |
| 11.4 | 11.172 | 11.628 | 120 | 170 | 650 | 850 |
| 11.5 | 11.270 | 11.730 | 120 | 170 | 650 | 850 |
| 11.6 | 11.368 | 11.832 | 120 | 170 | 650 | 850 |
| 11.7 | 11.466 | 11.934 | 120 | 170 | 650 | 850 |
| 11.8 | 11.564 | 12.036 | 120 | 170 | 650 | 850 |
| 11.9 | 11.662 | 12.138 | 120 | 170 | 650 | 850 |
| 12.0 | 11.760 | 12.240 | 120 | 170 | 650 | 850 |
| 12.1 | 11.858 | 12.342 | 120 | 170 | 650 | 850 |
| 12.2 | 11.956 | 12.444 | 120 | 170 | 650 | 850 |
| 12.3 | 12.054 | 12.546 | 120 | 170 | 650 | 850 |
| 12.4 | 12.152 | 12.648 | 120 | 170 | 650 | 850 |
| 12.5 | 12.250 | 12.750 | 120 | 170 | 650 | 850 |
| 12.6 | 12.348 | 12.852 | 120 | 170 | 650 | 850 |
| 12.7 | 12.446 | 12.954 | 120 | 170 | 650 | 850 |
| 12.8 | 12.544 | 13.056 | 120 | 170 | 650 | 850 |
| 12.9 | 12.642 | 13.158 | 120 | 170 | 650 | 850 |
| 13.0 | 12.740 | 13.260 | 120 | 170 | 650 | 850 |
| 13.1 | 12.838 | 13.362 | 120 | 170 | 650 | 850 |
| 13.2 | 12.936 | 13.464 | 120 | 170 | 650 | 850 |
| 13.3 | 13.034 | 13.566 | 120 | 170 | 650 | 850 |
| 13.4 | 13.132 | 13.668 | 120 | 170 | 650 | 850 |
| 13.5 | 13.230 | 13.770 | 120 | 170 | 650 | 850 |
| 13.6 | 13.328 | 13.872 | 120 | 170 | 650 | 850 |
| 13.7 | 13.426 | 13.974 | 120 | 170 | 650 | 850 |
| 13.8 | 13.524 | 14.076 | 120 | 170 | 650 | 850 |
| 13.9 | 13.622 | 14.178 | 120 | 170 | 650 | 850 |
| 14.0 | 13.720 | 14.280 | 120 | 170 | 650 | 850 |

■ OUTPUT VOLTAGE CHART (Continued)

● Voltage Chart (Continued)

| SYMBOL | E2-0 | | E2-1 | | E2-2 | |
|----------------------------------|-------------------------------------|--------|---|------|--|------|
| PARAMETER | OUTPUT VOLTAGE (V) (2% products) | | DROPOUT VOLTAGE 1 (mV) $I_{OUT}=20mA$ | | DROPOUT VOLTAGE 2 (mV) $I_{OUT}=100mA$ | |
| NOMINAL OUTPUT VOLTAGE (V) | V_{OUT} | | V_{dif1} | | V_{dif2} | |
| $V_{OUT(T)}$ (V) | MIN. | MAX. | TYP. | MAX. | TYP. | MAX. |
| 14.1 | 13.818 | 14.382 | 120 | 170 | 650 | 850 |
| 14.2 | 13.916 | 14.484 | 120 | 170 | 650 | 850 |
| 14.3 | 14.014 | 14.586 | 120 | 170 | 650 | 850 |
| 14.4 | 14.112 | 14.688 | 120 | 170 | 650 | 850 |
| 14.5 | 14.210 | 14.790 | 120 | 170 | 650 | 850 |
| 14.6 | 14.308 | 14.892 | 120 | 170 | 650 | 850 |
| 14.7 | 14.406 | 14.994 | 120 | 170 | 650 | 850 |
| 14.8 | 14.504 | 15.096 | 120 | 170 | 650 | 850 |
| 14.9 | 14.602 | 15.198 | 120 | 170 | 650 | 850 |
| 15.0 | 14.700 | 15.300 | 120 | 170 | 650 | 850 |
| 15.1 | 14.798 | 15.402 | 120 | 170 | 650 | 850 |
| 15.2 | 14.896 | 15.504 | 120 | 170 | 650 | 850 |
| 15.3 | 14.994 | 15.606 | 120 | 170 | 650 | 850 |
| 15.4 | 15.092 | 15.708 | 120 | 170 | 650 | 850 |
| 15.5 | 15.190 | 15.810 | 120 | 170 | 650 | 850 |
| 15.6 | 15.288 | 15.912 | 120 | 170 | 650 | 850 |
| 15.7 | 15.386 | 16.014 | 120 | 170 | 650 | 850 |
| 15.8 | 15.484 | 16.116 | 120 | 170 | 650 | 850 |
| 15.9 | 15.582 | 16.218 | 120 | 170 | 650 | 850 |
| 16.0 | 15.680 | 16.320 | 120 | 170 | 650 | 850 |
| 16.1 | 15.778 | 16.422 | 120 | 170 | 650 | 850 |
| 16.2 | 15.876 | 16.524 | 120 | 170 | 650 | 850 |
| 16.3 | 15.974 | 16.626 | 120 | 170 | 650 | 850 |
| 16.4 | 16.072 | 16.728 | 120 | 170 | 650 | 850 |
| 16.5 | 16.170 | 16.830 | 120 | 170 | 650 | 850 |
| 16.6 | 16.268 | 16.932 | 120 | 170 | 650 | 850 |
| 16.7 | 16.366 | 17.034 | 120 | 170 | 650 | 850 |
| 16.8 | 16.464 | 17.136 | 120 | 170 | 650 | 850 |
| 16.9 | 16.562 | 17.238 | 120 | 170 | 650 | 850 |
| 17.0 | 16.660 | 17.340 | 120 | 170 | 650 | 850 |
| 17.1 | 16.758 | 17.442 | 120 | 170 | 650 | 850 |
| 17.2 | 16.856 | 17.544 | 120 | 170 | 650 | 850 |
| 17.3 | 16.954 | 17.646 | 120 | 170 | 650 | 850 |
| 17.4 | 17.052 | 17.748 | 120 | 170 | 650 | 850 |
| 17.5 | 17.150 | 17.850 | 120 | 170 | 650 | 850 |
| 17.6 | 17.248 | 17.952 | 120 | 170 | 650 | 850 |
| 17.7 | 17.346 | 18.054 | 120 | 170 | 650 | 850 |
| 17.8 | 17.444 | 18.156 | 120 | 170 | 650 | 850 |
| 17.9 | 17.542 | 18.258 | 120 | 170 | 650 | 850 |
| 18.0 | 17.640 | 18.360 | 120 | 170 | 650 | 850 |

■ OPERATIONAL EXPLANATION



<Output Voltage Control>

The voltage divided by resistors R1 & R2 is compared with the internal reference voltage by the error amplifier. The P-channel MOSFET, which is connected to the V_{OUT} pin, is then driven by the subsequent output signal. The output voltage at the V_{OUT} pin is controlled and stabilized by a system of negative feedback. The current limit circuit, short protect circuit and thermal protection circuit operate in relation to the level of output current and heat generation. Further, the IC's internal circuitry can be shutdown via the CE pin's signal.

<Short-Circuit Protection>

The XC6701 series includes a current fold-back circuit as a short circuit protection. When the load current reaches the current limit level, the current fold-back circuit operates and output voltage drops. The output voltage drops further and output current decreases. When the output pin is shorted, a current of about 30mA flows.

<CE Pin>

The IC's internal circuitry can be shutdown via the signal from the CE pin with the XC6701A/B series. In shutdown mode, output at the V_{OUT} pin will be pulled down by R1 and R2 to the V_{SS} level. Note that as the XC6701B series' operations will become unstable with the CE pin open. We suggest that you use this IC with either a V_{IN} voltage or a V_{SS} voltage input at the CE pin. If this IC is used with the correct specifications for the CE pin, the operational logic is fixed and the IC will operate normally. However, supply current may increase as a result of through current in the IC's internal circuitry if a medium voltage is applied.

<Thermal Shutdown>

When the junction temperature of the built-in driver transistor reaches the temperature limit level (150°C TYP.), the thermal protection circuit operates and the driver transistor will be set to OFF. The IC resumes its operation when the thermal shutdown function is released and the IC's operation is automatically restored because the junction temperature drops to the level of the thermal shutdown release voltage.

<Minimum Operating Voltage>

For the stable operation of the IC, over 2.0V of input voltage is necessary. The output voltage may not be generated normally if the input voltage is less than 2.0V.

■ NOTES ON USE

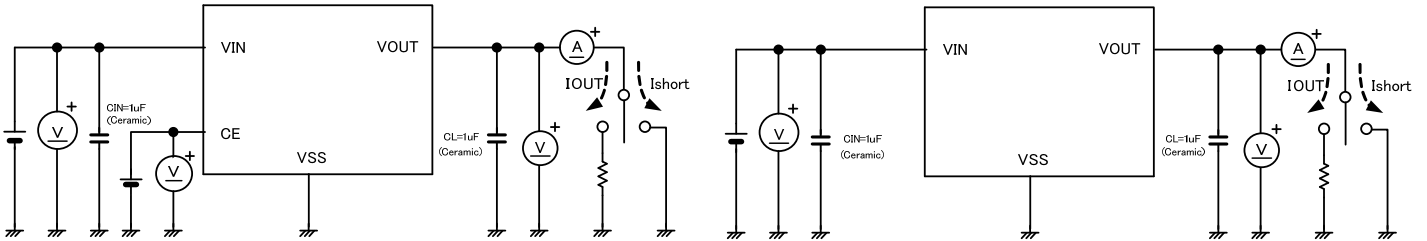
1. For temporary, transitional voltage drop or voltage rising phenomenon, the IC is liable to malfunction should the ratings be exceeded.
2. Where wiring impedance is high, operations may become unstable due to the noise and/or phase lag depending on output current. Please strengthen V_{IN} and V_{SS} wiring in particular.
3. Phase compensation inside the IC is performed in the XC6701 series. Therefore, an abnormal oscillation does not occur even if there is no output capacitor C_L . An input capacitor C_{IN} around $0.1 \mu F \sim 1.0 \mu F$ between the V_{IN} pin and the V_{SS} pin is required for input stability. Also, the output voltage fluctuation such as under shoot or over shoot, which occurs because of the load change can be controlled by placing the output capacitor C_L around $0.1 \mu F \sim 1.0 \mu F$ between the V_{OUT} pin and V_{SS} pin. The input capacitor (C_{IN}) and the output capacitor (C_L) should be placed to the IC as close as possible with a shorter wiring.
4. When the IC is operated with no load, the output voltage may increase in the high temperature beyond operating range.
5. Torex places an importance on improving our products and its reliability.
However, by any possibility, we would request user fail-safe design and post-aging treatment on system or equipment.

TEST CIRCUITS

Circuit ①

●XC6701A/B Series

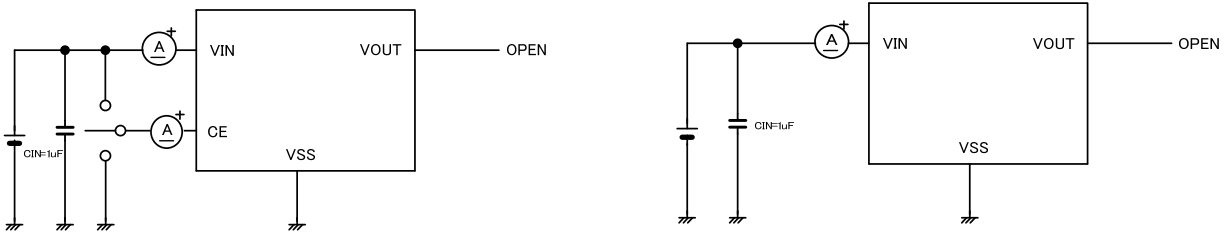
●XC6701D Series



Circuit ②

●XC6701A/B Series

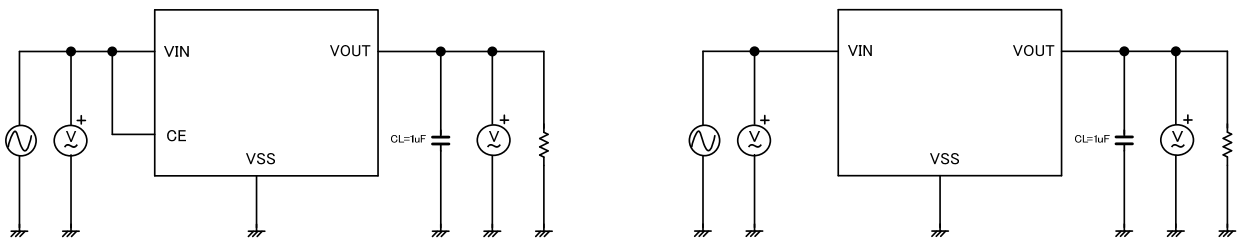
●XC6701D Series



Circuit ③

●XC6701A/B Series

●XC6701D Series



TYPICAL PERFORMANCE CHARACTERISTICS

(1) Output Voltage vs. Output Current

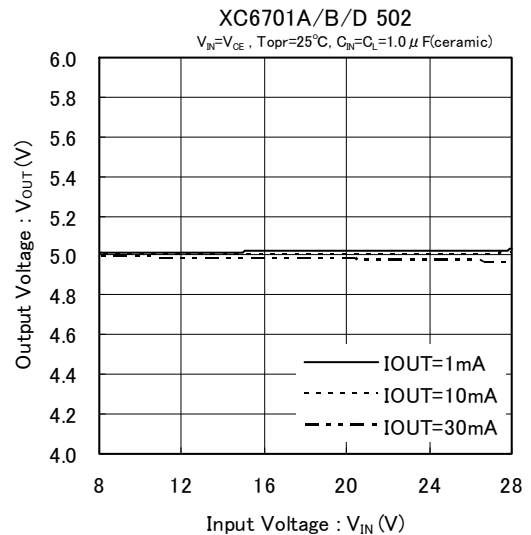
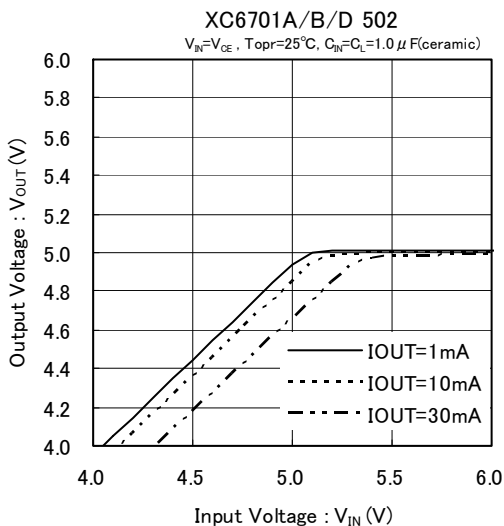
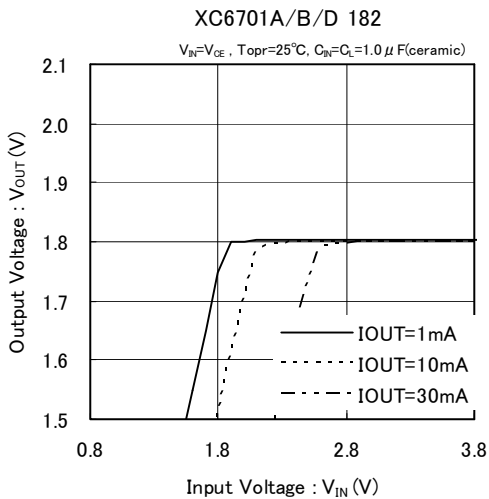


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

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

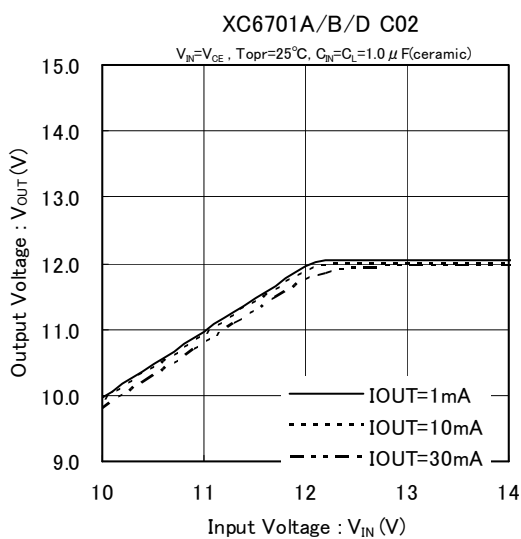


(2) Output Voltage vs. Input Voltage



■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

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



(3) Dropout Voltage vs. Output Current

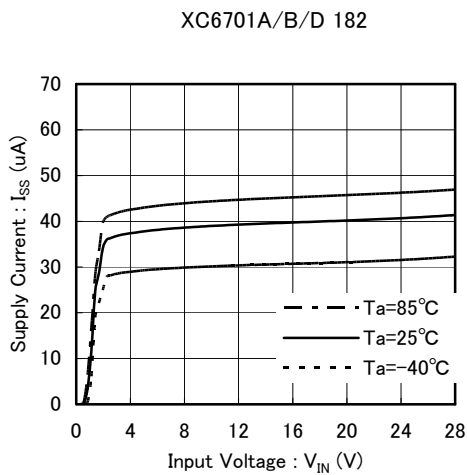


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

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

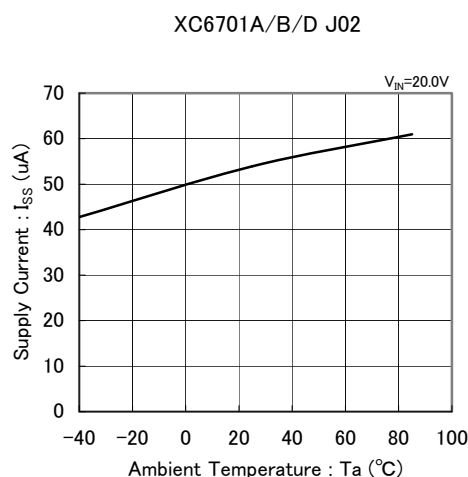


(4) Supply Current vs. Input Voltage



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

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



(5) Output Voltage vs. Ambient Temperature



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(5) Output Voltage vs. Ambient Temperature (Continued)

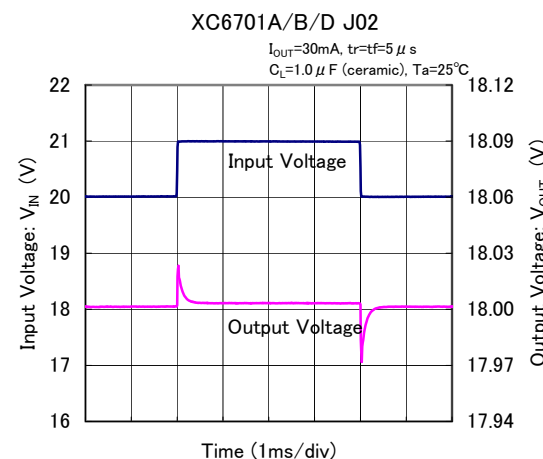
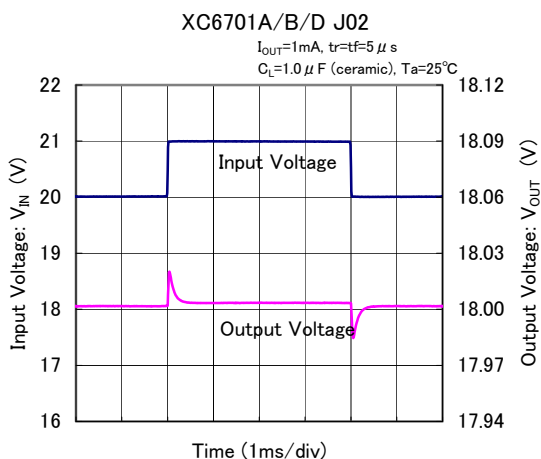
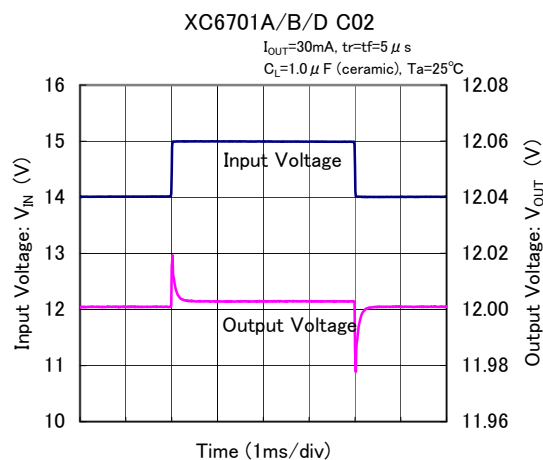
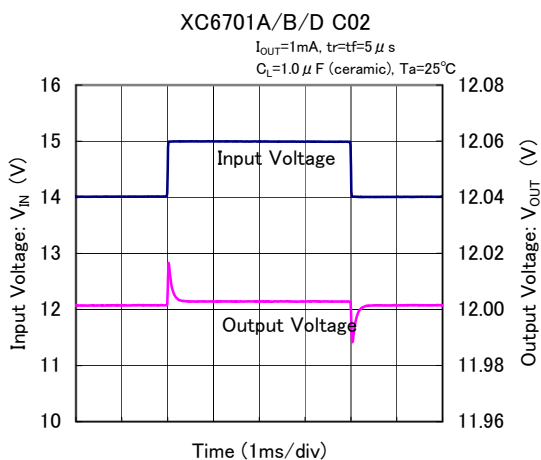


(6) Input Transient Response



■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(6) Input Transient Response (Continued)

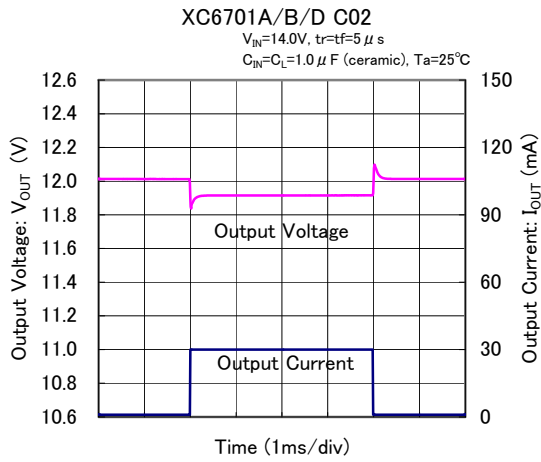


(7) Load Transient Response

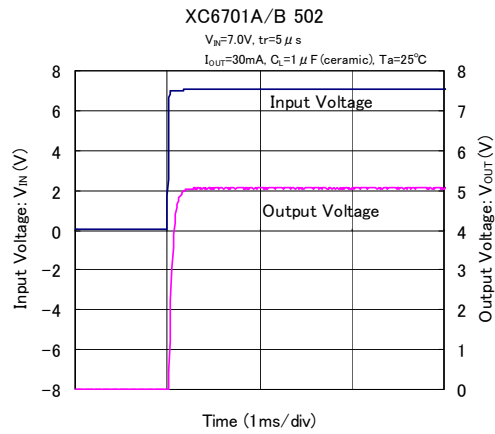
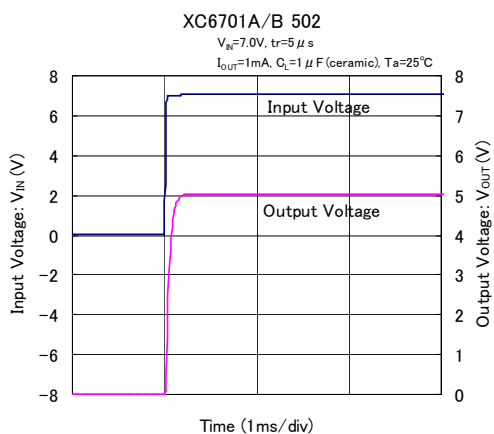
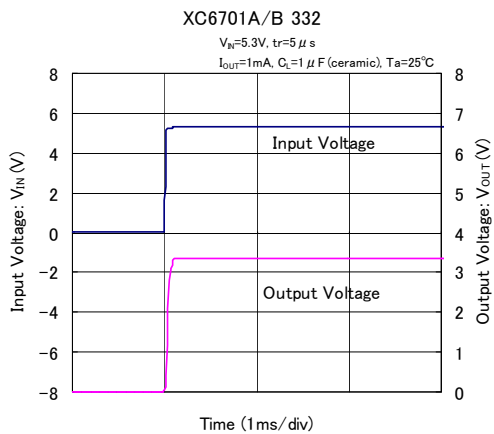


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(7) Load Transient Response (Continued)

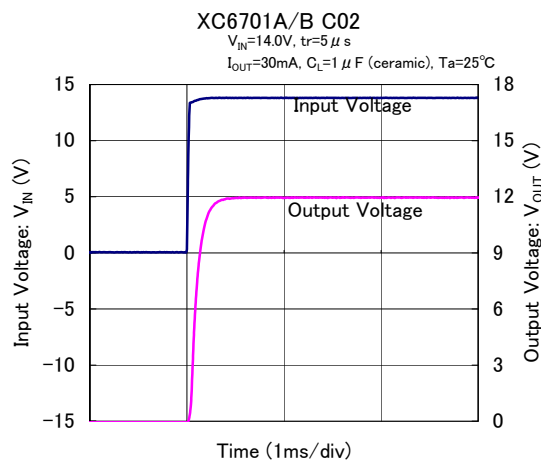
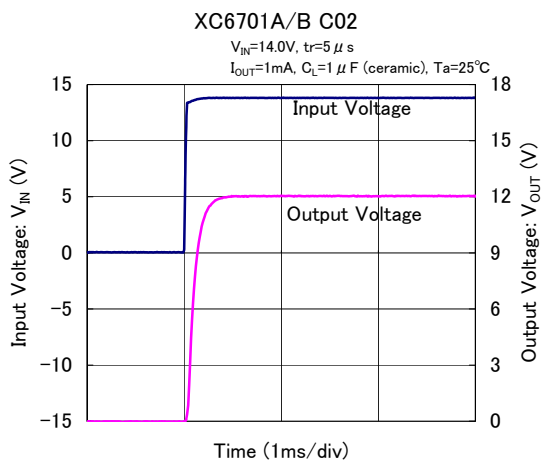


(8) Rising Response Time



■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(8) Rising Response Time (Continued)

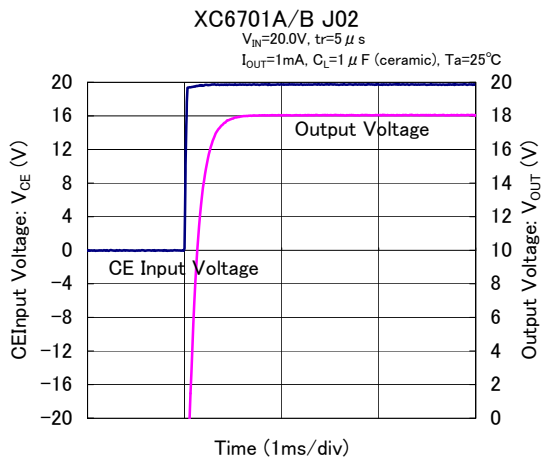
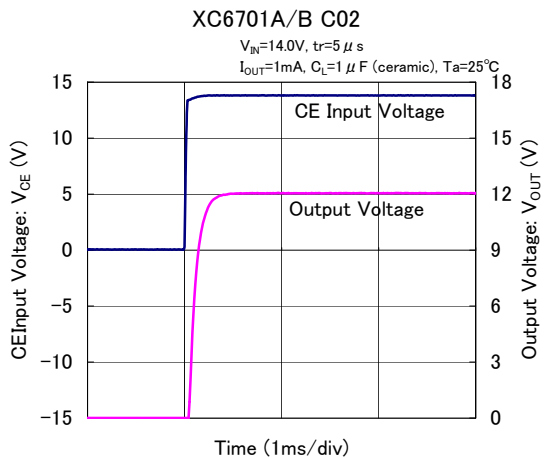
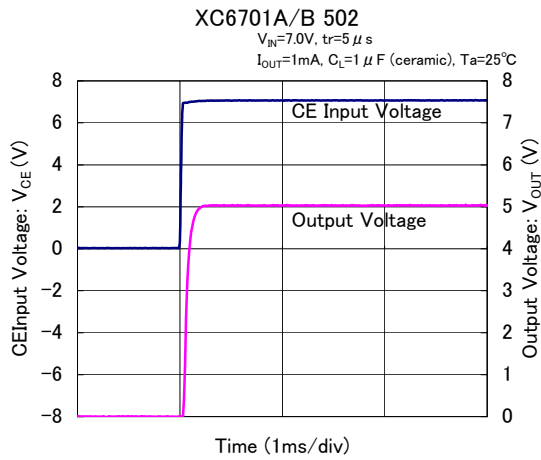


(9) CE Rising Response Time



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(9) CE Rising Response Time (Continued)



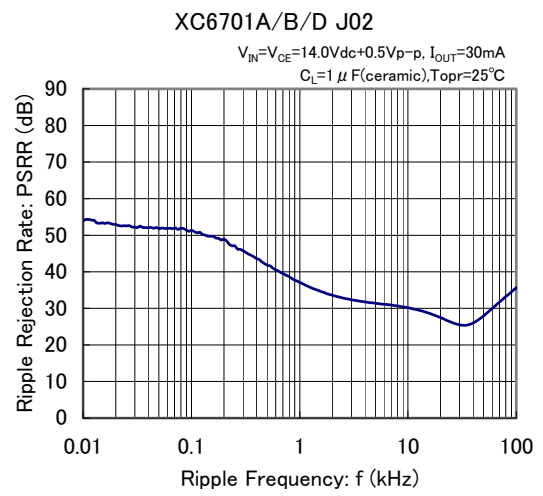
■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(10) Ripple Rejection Rate



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(10) Ripple Rejection Rate (Continued)



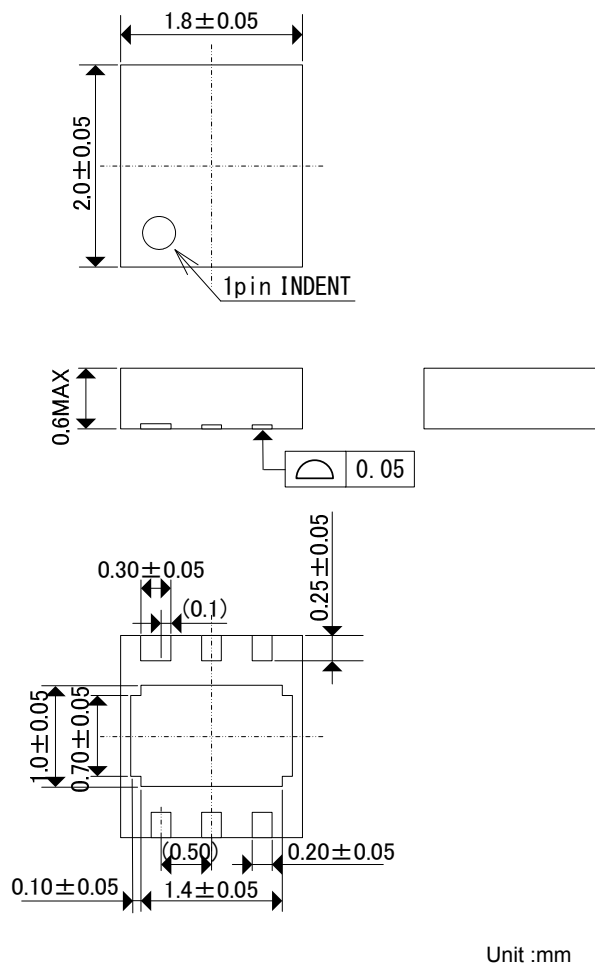
PACKAGING INFORMATION

● SOT-25



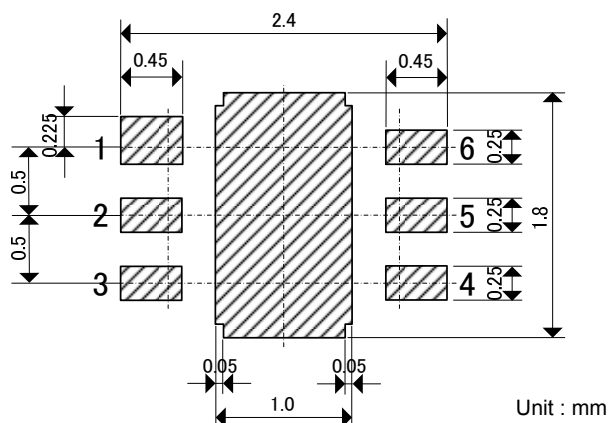
Unit : mm

● USP-6C



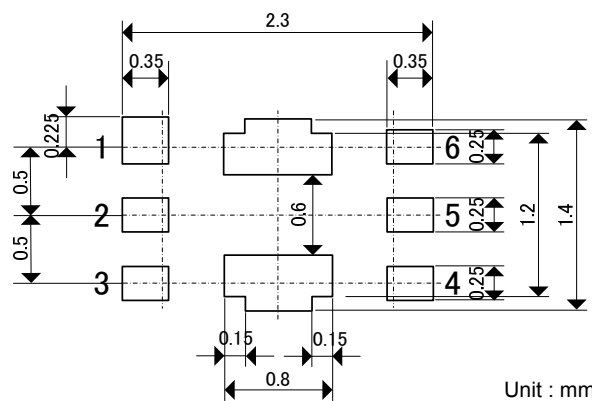
Unit : mm

● USP-6C Reference Pattern Layout



Unit : mm

● USP-6C Reference Metal Mask Design



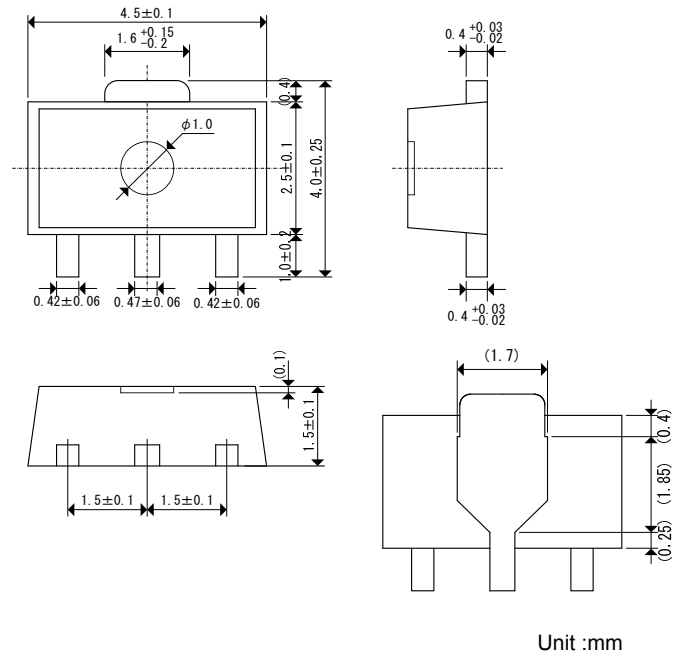
Unit : mm

PACKAGING INFORMATION (Continued)

● SOT-223



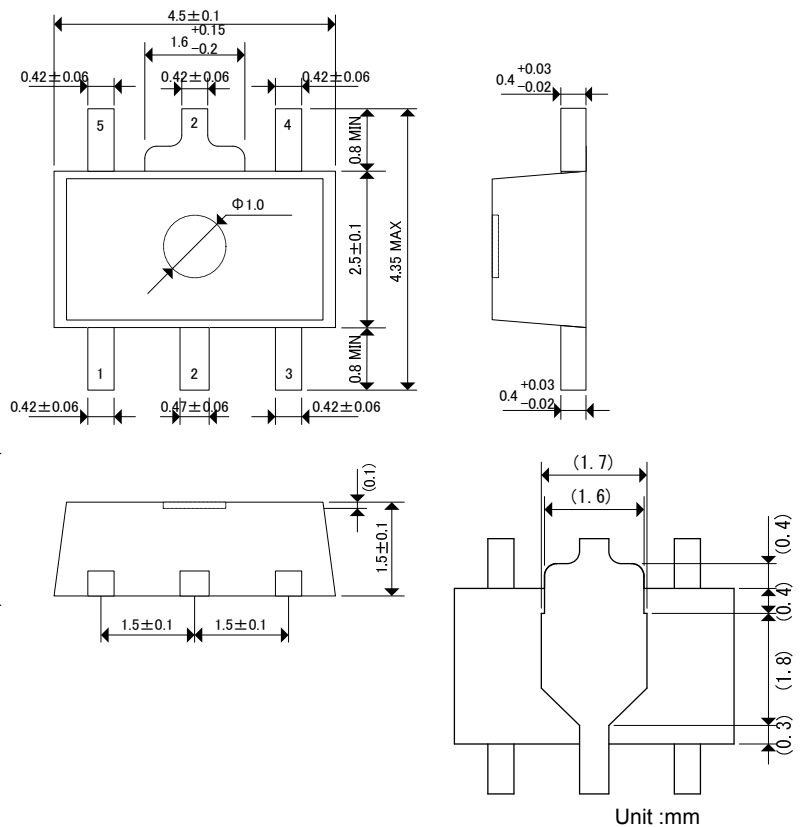
● SOT-89



● TO-252



● SOT-89-5



■ PACKAGING INFORMATION (Continued)

● SOT-25 Power Dissipation

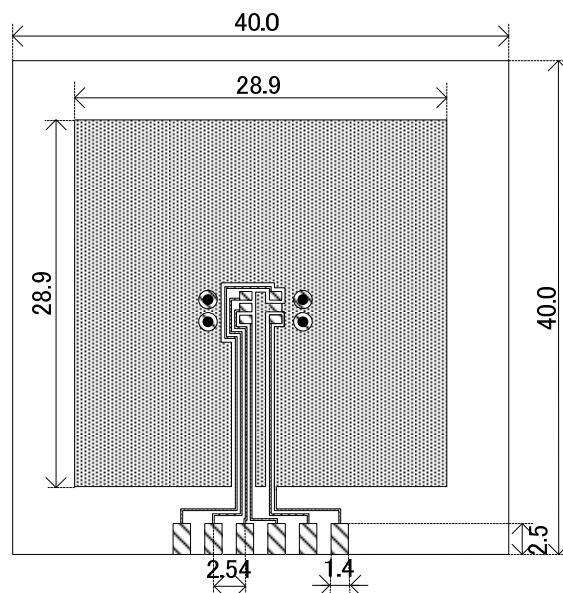
Power dissipation data for the SOT-25 is shown in this page.

The value of power dissipation varies with the mount board conditions.

Please use this data as the reference data taken in the following condition.

1. Measurement Condition

- Condition: Mount on a board
- Ambient: Natural convection
- Soldering: Lead (Pb) free
- Board: Dimensions 40 x 40 mm (1600 mm² in one side)
Copper (Cu) traces occupy 50% of the board area
In top and back faces
Package heat-sink is tied to the copper traces
(Board of SOT-26 is used.)
- Material: Glass Epoxy (FR-4)
- Thickness: 1.6 mm
- Through-hole: 4 x 0.8 Diameter

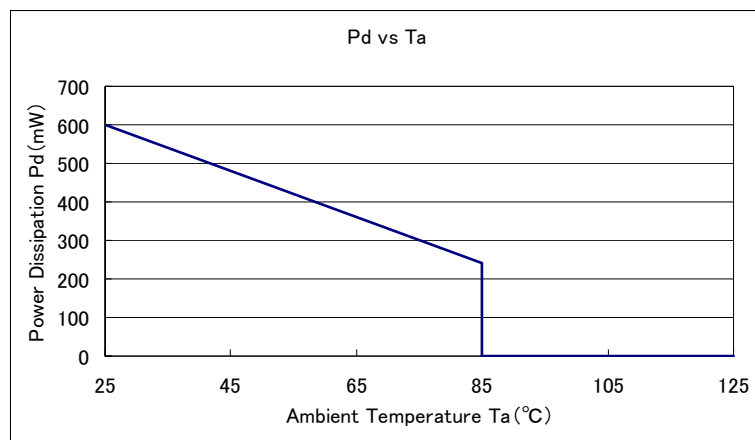


Evaluation Board (Unit: mm)

2. Power Dissipation vs. Ambient Temperature (85°C)

Board Mount (T_j max = 125°C)

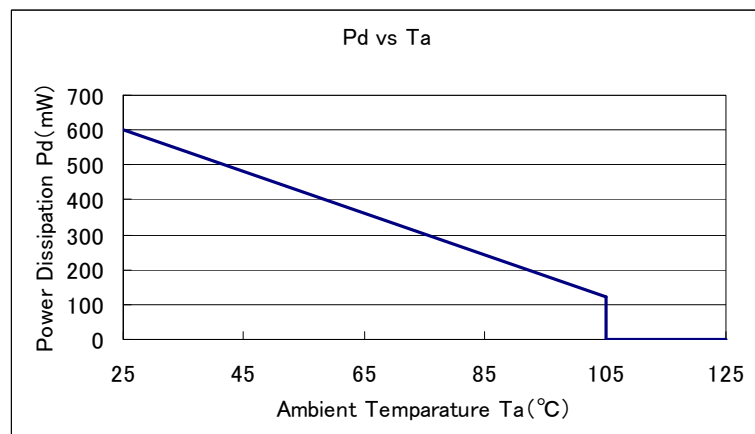
| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 600 | 166.67 |
| 85 | 240 | |



3. Power Dissipation vs. Ambient Temperature (105°C)

Board Mount (T_j max = 125°C)

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 600 | 166.67 |
| 105 | 120 | |



PACKAGING INFORMATION (Continued)

SOT-89-5 Power Dissipation

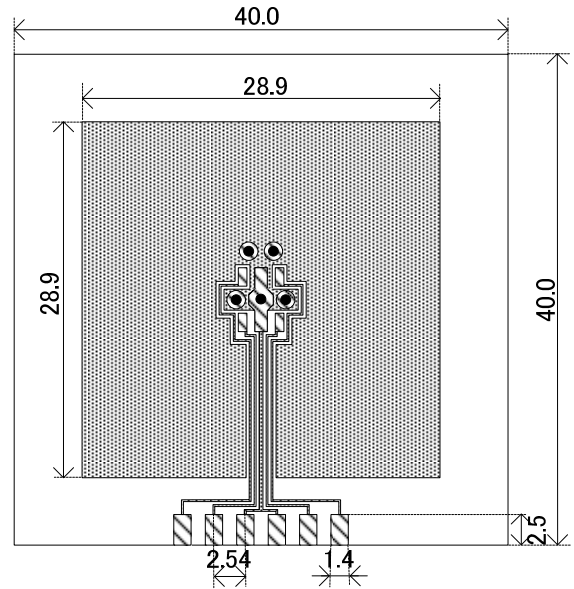
Power dissipation data for the SOT-89-5 is shown in this page.

The value of power dissipation varies with the mount board conditions.

Please use this data as the reference data taken in the following condition.

1. Measurement Condition

- Condition: Mount on a board
- Ambient: Natural convection
- Soldering: Lead (Pb) free
- Board: Dimensions 40 x 40 mm (1600 mm² in one side)
Copper (Cu) traces occupy 50% of the board area
In top and back faces
Package heat-sink is tied to the copper traces
- Material: Glass Epoxy (FR-4)
- Thickness: 1.6 mm
- Through-hole: 5 x 0.8 Diameter



Evaluation Board (Unit: mm)

2. Power Dissipation vs. Ambient Temperature (85°C)

Board Mount (T_j max = 125°C)

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1300 | 76.92 |
| 85 | 520 | |



3. Power Dissipation vs. Ambient Temperature (105°C)

Board Mount (T_j max = 125°C)

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1300 | 76.92 |
| 105 | 260 | |



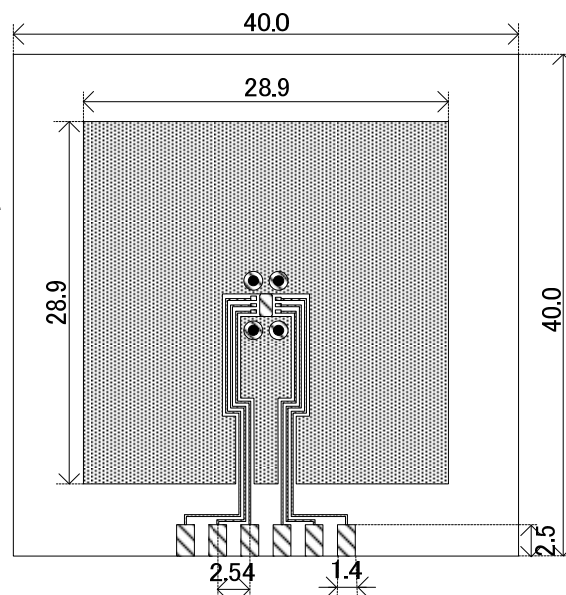
■ PACKAGING INFORMATION (Continued)

● USP-6C Power Dissipation

Power dissipation data for the USP-6C is shown in this page.
The value of power dissipation varies with the mount board conditions.
Please use this data as the reference data taken in the following condition.

1. Measurement Condition

- Condition: Mount on a board
- Ambient: Natural convection
- Soldering: Lead (Pb) free
- Board: Dimensions 40 x 40 mm (1600 mm² in one side)
Copper (Cu) traces occupy 50% of the board area
In top and back faces
Package heat-sink is tied to the copper traces
- Material: Glass Epoxy (FR-4)
- Thickness: 1.6 mm
- Through-hole: 4 x 0.8 Diameter

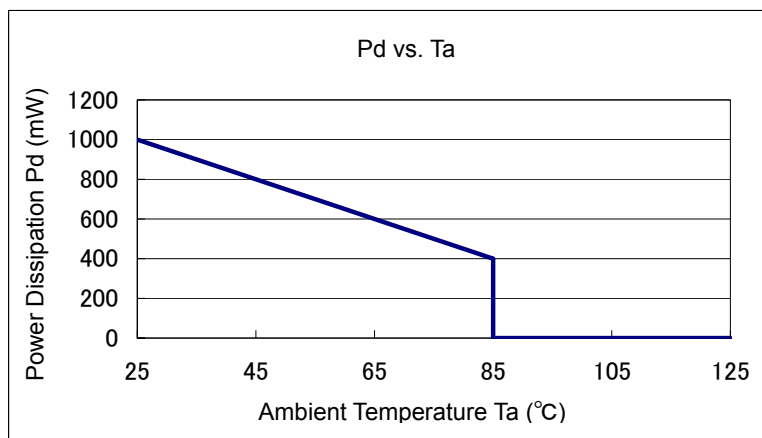


Evaluation Board (Unit: mm)

2. Power Dissipation vs. Ambient Temperature (85°C)

Board Mount (T_j max = 125°C)

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1000 | 100.00 |
| 85 | 400 | |



3. Power Dissipation vs. Ambient Temperature (105°C)

Board Mount (T_j max = 125°C)

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1000 | 100.00 |
| 105 | 200 | |



PACKAGING INFORMATION (Continued)

SOT-223 Power Dissipation

Power dissipation data for the SOT-223 is shown in this page.
 The value of power dissipation varies with the mount board conditions.
 Please use this data as the reference data taken in the following condition.

1. Measurement Condition

- Condition: Mount on a board
- Ambient: Natural convection
- Soldering: Lead (Pb) free
- Board: Dimensions 40 x 40 mm (1600 mm² in one side)
 Copper (Cu) traces occupy 50% of the board area
 In top and back faces
 Package heat-sink is tied to the copper traces
- Material: Glass Epoxy (FR-4)
- Thickness: 1.6 mm
- Through-hole: 4 x 0.8 Diameter



Evaluation Board (Unit: mm)

2. Power Dissipation vs. Ambient Temperature

Board Mount ($T_j \text{ max} = 125^\circ\text{C}$)

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1500 | 66.67 |
| 85 | 600 | |



PACKAGING INFORMATION (Continued)

● TO-252 Power Dissipation

Power dissipation data for the TO-252 is shown in this page.

The value of power dissipation varies with the mount board conditions.

Please use this data as the reference data taken in the following condition.

1. Measurement Condition

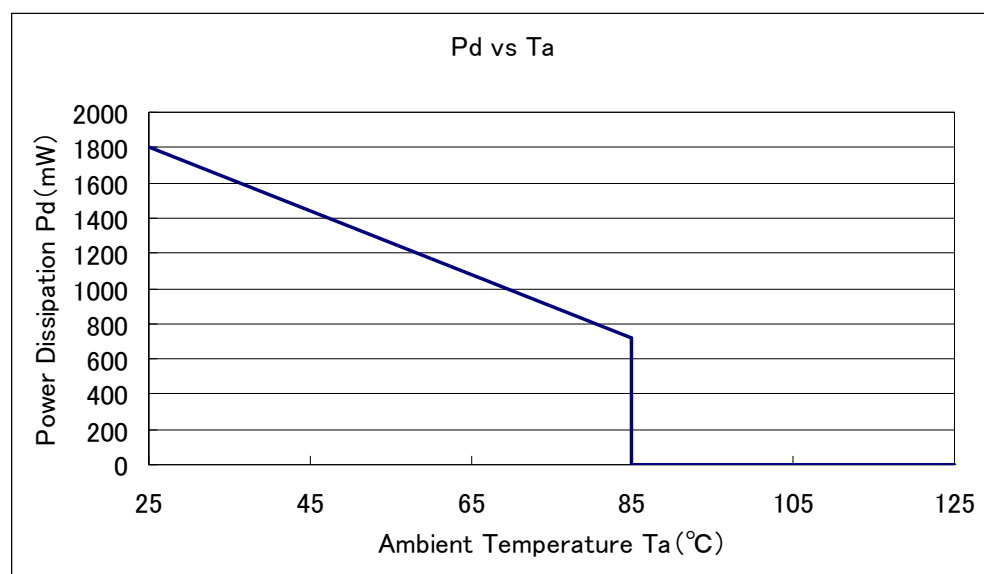
| | |
|---------------|--|
| Condition: | Mount on a board |
| Ambient: | Natural convection |
| Soldering: | Lead (Pb) free |
| Board: | Dimensions 40 x 40 mm (1600 mm ² in one side) Copper (Cu) traces occupy 50% of the board area In top and back faces Package heat-sink is tied to the copper traces |
| Material: | Glass Epoxy (FR-4) |
| Thickness: | 1.6 mm |
| Through-hole: | 4 x 0.8 Diameter |



Evaluation Board (Unit: mm)

2. Power Dissipation vs. Ambient Temperature

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1800 | 55.56 |
| 85 | 720 | |



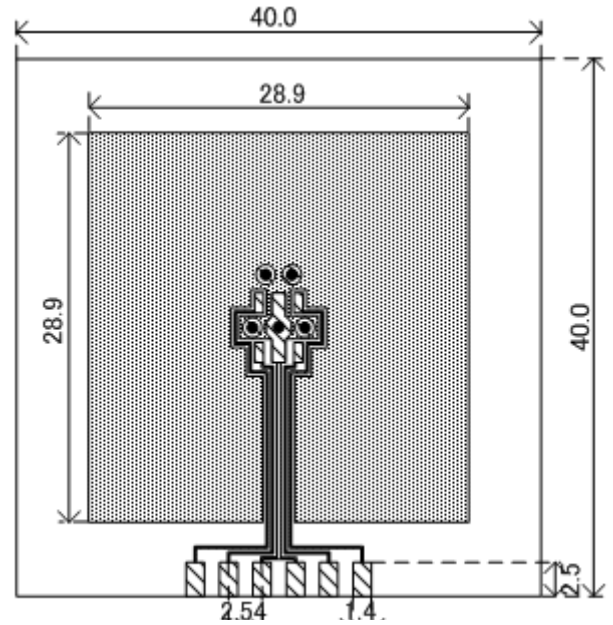
PACKAGING INFORMATION (Continued)

● SOT-89 Power Dissipation

Power dissipation data for the SOT-89 is shown in this page.
 The value of power dissipation varies with the mount board conditions.
 Please use this data as the reference data taken in the following condition.

1. Measurement Condition

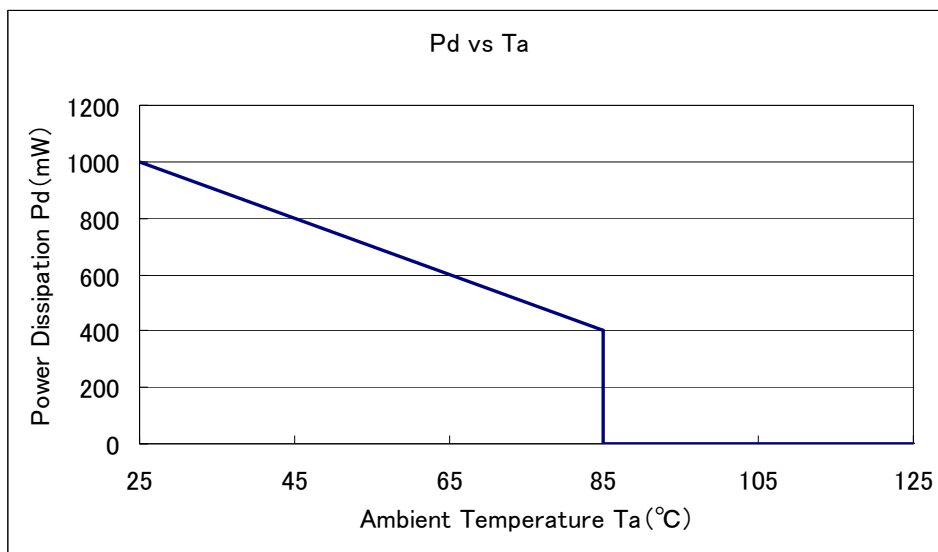
- Condition: Mount on a board
- Ambient: Natural convection
- Soldering: Lead (Pb) free
- Board: Dimensions 40 x 40 mm (1600 mm² in one side)
 Copper (Cu) traces occupy 50% of the board area
 In top and back faces
 Package heat-sink is tied to the copper traces
- Material: Glass Epoxy (FR-4)
- Thickness: 1.6 mm
- Through-hole: 4 x 0.8 Diameter



Evaluation Board (Unit: mm)

2. Power Dissipation vs. Ambient Temperature

| Ambient Temperature (°C) | Power Dissipation Pd (mW) | Thermal Resistance (°C/W) |
|--------------------------|---------------------------|---------------------------|
| 25 | 1000 | 100.00 |
| 85 | 400 | |



MARKING RULE

(mark header : ①~③) *Mark header does not change with a lot.

① represents product series

| MARK | PRODUCT SERIES |
|------|----------------|
| 8 | XC6701***** |

② represents type of regulators and output voltage

| MARK | TYPE | OUTPUT VOLTAGE (V) | PRODUCT SERIES |
|------|-----------|--------------------|-----------------|
| 0 | A/B | 1.8~3.0 | XC6701 A/B***** |
| 1 | | 3.1~6.0 | |
| 2 | | 6.1~9.0 | |
| 3 | | 9.1~12.0 | |
| A | | 12.1~15.0 | |
| B | 15.1~18.0 | | |
| 4 | D | 1.8~3.0 | XC6701D***** |
| 5 | | 3.1~6.0 | |
| 6 | | 6.1~9.0 | |
| 7 | | 9.1~12.0 | |
| C | | 12.1~15.0 | |
| D | 15.1~18.0 | | |

SOT-25



SOT-89



SOT-89-5



SOT-223



MARKING RULE (Continued)

③ represents output voltage

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

TO-252



USP-6C



④⑤ represents production lot number

01, ..., 09, 10, 11, ..., 99, 0A, ..., 0Z, 1A, ..., 9Z, A0, ..., Z9, AA, ..., ZZ repeated.

(G, I, J, O, Q, W excluded)

*No character inversion used.