

FEATURES

Capacitance ranging from 0.5pF to 330 μF
 Voltage rating of 4V - 200V
 Size 0201 to 2225
 Lead-free terminations, RoHS Compliant

»» APPLICATIONS

Typical applications include critical timing, tuning, circuits requiring low loss, circuits with pulse, high current, decoupling, bypass, filtering, transient voltage suppression, blocking and energy storage.

»» ORDERING INFORMATION

| Series | Case size | Dielectric | Rated voltage | Capacitance | Capacitance tolerance | Termination finish | Packaging |
|----------------|--|------------------|--|--|---|--------------------|-----------|
| CC41-class I | 0201 0402 0603 | CG X7R X5R | 4V 6.3V 10V | Refer to Capacitance and Rated Voltage Range | B=±0.10pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20% | N=100% Sn | T=7" Reel |
| CT41G-class II | 0805 1206 1210 1812 2220 2225 | | 16V 25V 35V 50V 100V 200V | | | | |

»» DIMENSIONS

Unit:mm

| Appearance | Case Size | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2220 | 2225 |
|------------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | L | 0.60 ± 0.03 | 1.00 ± 0.20 | 1.60 ± 0.20 | 2.00 ± 0.30 | 3.20 ± 0.30 | 3.20 ± 0.40 | 4.50 ± 0.40 | 5.70 ± 0.50 | 5.70 ± 0.50 |
| | W | 0.30 ± 0.03 | 0.50 ± 0.20 | 0.80 ± 0.20 | 1.25 ± 0.20 | 1.60 ± 0.30 | 2.50 ± 0.30 | 3.20 ± 0.30 | 5.00 ± 0.50 | 6.50 ± 0.60 |
| | Tmax | 0.35 | 0.70 | 1.00 | 1.45 | 1.90 | 2.80 | 3.50 | 4.20 | 4.20 |
| | t | 0.15 ± 0.05 | 0.25 ± 0.10 | 0.35 ± 0.25 | 0.50 ± 0.25 | 0.50 ± 0.35 | 0.60 ± 0.30 | 0.90 ± 0.60 | 0.90 ± 0.60 | 0.90 ± 0.60 |

»» ELECTRICAL CHARACTERISTICS

| NO. | Item | Specification Limits | Measuring Conditions |
|-----|-----------------------|--|--|
| 1 | Capacitance | Within specified tolerance | |
| 2 | Dissipation Factor | CG $C_R \leq 30\text{pF}$ $tg \delta \leq \frac{1}{(400+20C_R)}$ $C_R > 30\text{pF}$ $tg \delta \leq 10 \times 10^{-4}$ | CG: $C_R \leq 1000\text{pF}$ 1MHz±10% 0.5V~5Vrms $C_R > 1000\text{pF}$ 1kHz±10% 1V±0.2Vrms X7R & X5R: $C_R \leq 10\mu\text{F}$ 1kHz±10% 1V±0.2Vrms $C_R > 10\mu\text{F}$ 120Hz±10% 0.5V±0.2Vrms |
| | | X7R X5R 4V ≤ U _R < 16V $tg \delta \leq 1000 \times 10^{-4}$ 16V ≤ U _R < 25V $tg \delta \leq 700 \times 10^{-4}$ 25V ≤ U _R < 50V $tg \delta \leq 500 \times 10^{-4}$ U _R ≥ 50V $tg \delta \leq 350 \times 10^{-4}$ ※Note: C _R ≥ 1μF tgδ ≤ 10%; Size 0201,0402,0603 tgδ ≤ 10%; | |
| 3 | Insulation Resistance | CG: 10000MΩ or 100MΩ · μF whichever is less X7R & X5R: 4000MΩ or 100MΩ · μF whichever is less | Voltage shall be applied with follow conditions: U _R < 10V U _R 10 ≤ U _R < 100V 10V 100 ≤ U _R < 500V 100V U _R ≥ 500V 500V Voltage applying time shall be 60 ± 5 seconds. Charging and discharging current shall be 50mA or less. |
| 4 | Dielectric Strength | No breakdown or visual defects | 250% of DC rated voltage for 5 seconds, charging and discharging current shall be 50mA or less. |

» ELECTRICAL CHARACTERISTICS

| NO. | Item | Specification Limits | Measuring Conditions |
|-----|-----------------------|---------------------------------------|---|
| 1 | Capacitance | Within specified tolerance | CG: 1kHz±10% 1.0Vrms±0.2V |
| 2 | Dissipation Factor | CG | $tg\delta \leq 0.1\%$ |
| | | X7R | $tg\delta \leq 2.5\%$ |
| 3 | Insulation Resistance | 10000MΩ or 500MΩ·μF whichever is less | CG: $C_s \leq 1000pF$ 1.0MHz±10% 1.0Vrms±0.2V X7R: $C_s > 1000pF$ 1.0kHz±10% 1.0Vrms±0.2V Voltage shall be applied with follow conditions for 60±5 seconds: $U_i = 250V$ 250V $U_i \geq 500V$ 500V Charging and discharging current shall be 50mA or less. |
| 4 | Dielectric Strength | No breakdown or visual defects | Voltage shall be applied with follow conditions for 5 seconds: $U_i = 250V$ 2.0U _i $U_i = 500V$ 1.5U _i $U_i \geq 1000V$ 1.2U _i Charging and discharging current shall be 50mA or less. |

» CAPCITANCE AND RATED VOLTAGE RANGE

CC48

| Case size | 0603 | | | 0805 | | | 1206 | | | 1210 | | | 1808 | | | 1812 | | | 2220 | | | 2225 | | | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|------|-----|-----|------|-----|-----|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| Rated voltage(V) | 250 | 500 | 250 | 500 | 630 | 1k | 250 | 500 | 630 | 1k | 2k | 250 | 500 | 630 | 1k | 2k | 3k | 250 | 500 | 630 | 1k | 2k | 3k | 250 | 500 | 630 | 1k | 2k | 3k | | | | | | | |
| cap (pF) | 10 | 12 | 15 | 18 | 22 | 27 | 33 | 39 | 47 | 56 | 68 | 82 | 100 | 120 | 150 | 180 | 220 | 270 | 330 | 390 | 470 | 560 | 680 | 820 | 1000 | 1200 | 1500 | 1800 | 2200 | 2700 | 3300 | 3900 | 4700 | 5600 | 6800 | 8200 |
| cap (μF) | .010 | .012 | .015 | .018 | .022 | .027 | .033 | .039 | .047 | .056 | .068 | .082 | .10 | .12 | .15 | .18 | .22 | .27 | .33 | .39 | .47 | .56 | .68 | .82 | 1.0 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |

CG

» CAPCITANCE AND RATED VOLTAGE RANGE

CT48

| Case size | 0603 | | | 0805 | | | 1206 | | | 1210 | | | 1808 | | | 1812 | | | 2220 | | | 2225 | | | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Rated voltage(V) | 250 | 500 | 250 | 500 | 630 | 1k | 250 | 500 | 630 | 1k | 2k | 250 | 500 | 630 | 1k | 2k | 3k | 250 | 500 | 630 | 1k | 2k | 3k | 250 | 500 | 630 | 1k | 2k | 3k | | | | | | | |
| cap (pF) | 100 | 120 | 150 | 180 | 220 | 270 | 330 | 390 | 470 | 560 | 680 | 820 | 1000 | 1200 | 1500 | 1800 | 2200 | 2700 | 3300 | 3900 | 4700 | 5600 | 6800 | 8200 | 10000 | 12000 | 15000 | 18000 | 22000 | 27000 | 33000 | 39000 | 47000 | 56000 | 68000 | 82000 |
| cap (μF) | .010 | .012 | .015 | .018 | .022 | .027 | .033 | .039 | .047 | .056 | .068 | .082 | .10 | .12 | .15 | .18 | .22 | .27 | .33 | .39 | .47 | .56 | .68 | .82 | 1.0 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |

X7R



FEATURES

Capacitance ranging from 0.5pF~330μF
 Voltage rating of 6.3V~3kV
 Size 0805~2225
 Lead-free terminations, RoHS Compliant

APPLICATIONS

Typical applications include critical timing, tuning, circuits requiring low loss, circuits with pulse, high current, decoupling, bypass, filtering, transient voltage suppression, blocking and energy storage.

ORDERING INFORMATION

| Series | Case size | Dielectric | Rated voltage | Capacitance | Capacitance tolerance | Wire form | Packaging |
|---------------|----------------------|------------------|-------------------------------------|--|--|-----------|---------------------|
| CC4-class I | 0805 1206 1210 | CG X7R X5R | 6.3V, 10V 16V, 25V 50V, 100V | Refer to Capacitance and Rated Voltage Range | B=±0.1pF C=±0.25pF D=±0.5pF J=±5% K=±10% M=±20% | L H | See Packaging Style |
| CT4G-class II | 1812 2225 | | 250V, 500V 630V, 1KV 2KV, 3KV | | | | |

DIMENSIONS

| Size code | 0805 | 0805 | 1206 | 1210 | 1812 | 2225 |
|--------------|----------|----------|----------|----------|-----------|-----------|
| Wmax | 4.85 | 4.85 | 5.86 | 5.86 | 7.14 | 8.62 |
| Hmax | 4.16 | 4.16 | 4.36 | 4.80 | 6.00 | 8.62 |
| Tmax | 3.70 | 3.70 | 4.10 | 4.20 | 4.20 | 4.20 |
| F | 2.54±0.1 | 5.08±0.1 | 5.08±0.1 | 5.08±0.1 | 5.08±0.12 | 5.08±0.12 |
| d | 0.5±0.05 | 0.5±0.05 | 0.5±0.05 | 0.5±0.05 | 0.6±0.05 | 0.6±0.05 |
| Length(Lmin) | 25.4 | 25.4 | 25.4 | 25.4 | 25.4 | 25.4 |
| Appearance | | | | | | |
| Wire form | L | H | H | H | H | H |

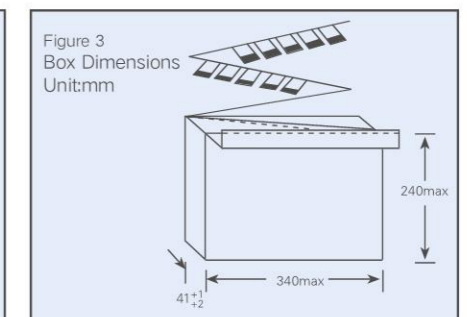
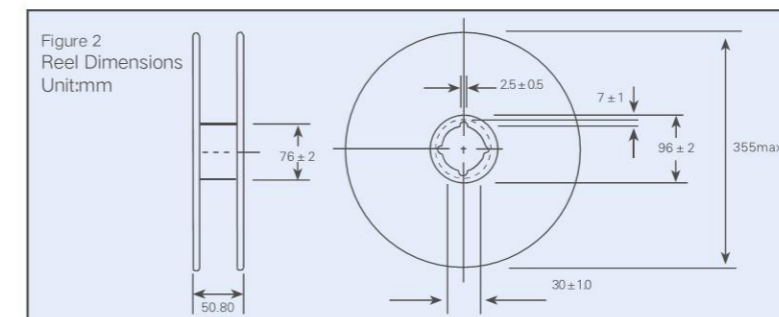
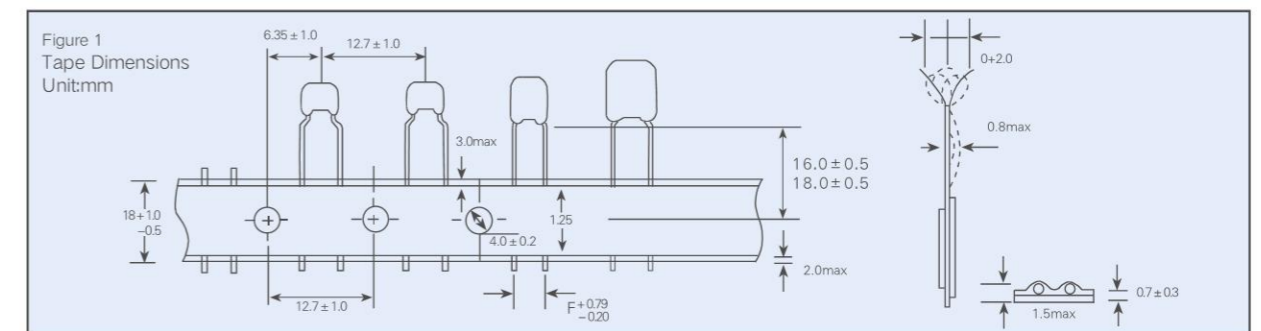
ELECTRICAL CHARACTERISTICS

| NO. | Item | Specification Limits | Measuring Conditions |
|-----|-----------------------|--|--|
| 1 | Capacitance | Within specified tolerance | |
| 2 | Dissipation Factor | CG: $C_R \leq 30\text{pF}$ $\text{tg } \delta \leq \frac{1}{(400+20C_R)}$ $C_R > 30\text{pF}$ $\text{tg } \delta \leq 10 \times 10^{-4}$ X7R: $4V \leq U_R < 16V$ $\text{tg } \delta \leq 1000 \times 10^{-4}$ $16V \leq U_R < 25V$ $\text{tg } \delta \leq 700 \times 10^{-4}$ X5R: $25V \leq U_R < 50V$ $\text{tg } \delta \leq 500 \times 10^{-4}$ $U_R \geq 50V$ $\text{tg } \delta \leq 350 \times 10^{-4}$ ※ Note: $C_R \geq 1\mu\text{F}$ $\text{tg } \delta \leq 10\%$; | CG: $C_R \leq 1000\text{pF}$ 1MHz±10% 0.5V~5Vrms $C_R > 1000\text{pF}$ 1kHz±10% 1V±0.2Vrms X7R & X5R: $C_R \leq 10\mu\text{F}$ 1kHz±10% 1V±0.2Vrms $C_R > 10\mu\text{F}$ 120Hz±10% 0.5V±0.2Vrms |
| 3 | Insulation Resistance | CG: 10000MΩ or 100MΩ · μF whichever is less X7R & X5R: 4000MΩ or 100MΩ · μF whichever is less | Voltage shall be applied with follow conditions: $U_R < 10V$ U_R $10 \leq U_R < 100V$ 10V $100 \leq U_R < 500V$ 100V $U_R \geq 500V$ 500V Voltage applying time shall be 60±5 seconds. Charging and discharging current shall be 50mA or less. |
| 4 | Dielectric Strength | No breakdown or visual defects | Voltage shall be applied with follow conditions for 5 seconds: $U_R \leq 200V$ 2.5 U_R $U_R = 250V$ 2.0 U_R $U_R = 500V$ 1.5 U_R $U_R \geq 1000V$ 1.2 U_R Charging and discharging current shall be 50mA or less. |

PACKAGING

PACKAGING STYLE

T=Bulk, A=Tape/Reel, B=Tape/Ammo



» CAPACITANCE AND RATED VOLTAGE RANGE

| Size code | 0805 | | | | | | | | | | 1206 | | | | | | 1210 | | | | | | 1812 | | | | | | 2225 | | | | | | | | | | | | | | | |
|-------------------|------|-----|-----|-----|-----|-----|----|----|-----|-----|------|-----|-----|----|----|----|------|-----|-----|-----|-----|-----|------|----|----|----|-----|-----|------|-----|-----|----|----|----|----|----|-----|-----|-----|-----|-----|----|----|----|
| Wire form | L.H | | | | | H | | | | | H | | | | | | H | | | | | | H | | | | | | | | | | | | | | | | | | | | | |
| Rated voltage (V) | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 2k | 3k | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 2k | 3k | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 2k | 3k | 25 | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 2k | 3k |
| cap (pF) | 0.5 | 1.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.2 | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.8 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2.7 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3.9 | 4.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5.6 | 6.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 39 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 47 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 56 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 68 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| cap (μF) | .010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .015 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .022 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .027 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .033 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .039 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .047 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .056 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .068 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | .082 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

RADIAL LEADS CERAMIC CAPACITOR

»» CAPACITANCE AND RATED VOLTAGE RANGE

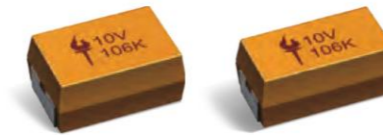
| Size code | 1812 | | | | | | | | | | | | 2225 | | | | | | | | | | | |
|------------------|-------|----|----|----|----|-----|-----|-----|-----|-----|----|----|------|----|-----|-----|-----|-----|-----|----|----|----|--|--|
| | H | | | | | | | | | | | | H | | | | | | | | | | | |
| Wire form | H | | | | | | | | | | | | H | | | | | | | | | | | |
| Rated voltage(V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 2k | 3k | 50 | 100 | 200 | 250 | 500 | 630 | 1k | 2k | 3k | | |
| cap (pF) | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| | 120 | | | | | | | | | | | | | | | | | | | | | | | |
| | 150 | | | | | | | | | | | | | | | | | | | | | | | |
| | 180 | | | | | | | | | | | | | | | | | | | | | | | |
| | 220 | | | | | | | | | | | | | | | | | | | | | | | |
| | 270 | | | | | | | | | | | | | | | | | | | | | | | |
| | 330 | | | | | | | | | | | | | | | | | | | | | | | |
| | 390 | | | | | | | | | | | | | | | | | | | | | | | |
| | 470 | | | | | | | | | | | | | | | | | | | | | | | |
| | 560 | | | | | | | | | | | | | | | | | | | | | | | |
| | 680 | | | | | | | | | | | | | | | | | | | | | | | |
| | 820 | | | | | | | | | | | | | | | | | | | | | | | |
| | 1000 | | | | | | | | | | | | | | | | | | | | | | | |
| | 1200 | | | | | | | | | | | | | | | | | | | | | | | |
| | 1500 | | | | | | | | | | | | | | | | | | | | | | | |
| | 1800 | | | | | | | | | | | | | | | | | | | | | | | |
| | 2200 | | | | | | | | | | | | | | | | | | | | | | | |
| | 2700 | | | | | | | | | | | | | | | | | | | | | | | |
| | 3300 | | | | | | | | | | | | | | | | | | | | | | | |
| | 3900 | | | | | | | | | | | | | | | | | | | | | | | |
| | 4700 | | | | | | | | | | | | | | | | | | | | | | | |
| | 5600 | | | | | | | | | | | | | | | | | | | | | | | |
| | 6800 | | | | | | | | | | | | | | | | | | | | | | | |
| | 8200 | | | | | | | | | | | | | | | | | | | | | | | |
| cap (μF) | .010 | | | | | | | | | | | | | | | | | | | | | | | |
| | .012 | | | | | | | | | | | | | | | | | | | | | | | |
| | .015 | | | | | | | | | | | | | | | | | | | | | | | |
| | .018 | | | | | | | | | | | | | | | | | | | | | | | |
| | .022 | | | | | | | | | | | | | | | | | | | | | | | |
| | .027 | | | | | | | | | | | | | | | | | | | | | | | |
| | .033 | | | | | | | | | | | | | | | | | | | | | | | |
| | .039 | | | | | | | | | | | | | | | | | | | | | | | |
| | .047 | | | | | | | | | | | | | | | | | | | | | | | |
| | .056 | | | | | | | | | | | | | | | | | | | | | | | |
| | .068 | | | | | | | | | | | | | | | | | | | | | | | |
| | .082 | | | | | | | | | | | | | | | | | | | | | | | |
| | .10 | | | | | | | | | | | | | | | | | | | | | | | |
| | .12 | | | | | | | | | | | | | | | | | | | | | | | |
| | .15 | | | | | | | | | | | | | | | | | | | | | | | |
| | .18 | | | | | | | | | | | | | | | | | | | | | | | |
| | .22 | | | | | | | | | | | | | | | | | | | | | | | |
| | .27 | | | | | | | | | | | | | | | | | | | | | | | |
| | .33 | | | | | | | | | | | | | | | | | | | | | | | |
| | .39 | | | | | | | | | | | | | | | | | | | | | | | |
| | .47 | | | | | | | | | | | | | | | | | | | | | | | |
| | .56 | | | | | | | | | | | | | | | | | | | | | | | |
| | .68 | | | | | | | | | | | | | | | | | | | | | | | |
| | .82 | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.5 | | | | | | | | | | | | | | | | | | | | | | | |
| | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| | 3.3 | | | | | | | | | | | | | | | | | | | | | | | |
| | 4.7 | | | | | | | | | | | | | | | | | | | | | | | |
| | 6.8 | | | | | | | | | | | | | | | | | | | | | | | |
| | 10.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 22.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 33.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 47.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 150.0 | | | | | | | | | | | | | | | | | | | | | | | |
| | 220.0 | | | | | | | | | | | | | | | | | | | | | | | |

■ X7R
■ X5R

MOLDED SURFACE MOUNT CERAMIC CAPACITOR

FEATURES

Epoxy molded, good sealing.
 High physical strength, good humidity resistance.
 Capacitance ranging from 0.1 μF to 10 μF
 Voltage rating of 6V-50V
 Operating temperature rang:
 -55°C~85°C for X5R
 -55°C~125°C for X7R
 Lead-free terminations, RoHS and Reach Compliant



»» APPLICATIONS

Typical applications include decoupling, bypass, filtering, surge suppression.

»» ORDERING INFORMATION

| CT45 | 0805 | X5R | 10V | 106 | M | T |
|--------|-----------|------------|---------------------------------------|--|-----------------------|---------------------|
| Series | Size code | Dielectric | Rated voltage | Capacitance | Capacitance tolerance | Packaging |
| CT45 | A B | X7R X5R | 6V 10V 16V 25V 35V 50V | First two digits represent significant figures. Third digit specifies number of zeros. Example: 106=10,000,000pF | K=±10% M=±20% | T=Bulk E=7" Reel |

»» DIMENSIONS

Unit:mm

Side View

End View

Bottom View

| Size code | EIA code | L ± 0.20 | W ± 0.20 -0.10 | H ± 0.20 -0.10 | W1 ± 0.20 | A ± 0.30 -0.20 | S min |
|-----------|----------|----------|-------------------|-------------------|-----------|-------------------|-------|
| A | 3216-18 | 3.20 | 1.60 | 1.60 | 1.20 | 0.80 | 1.10 |
| B | 3528-21 | 3.50 | 2.80 | 1.90 | 2.20 | 0.80 | 1.40 |

» ELECTRICAL CHARACTERISTICS

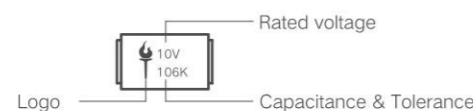
| Item | Specification Limits | Measuring Conditions | | | | | | | | | |
|-----------------------------|--|---|---------|-----------|---------|---------------------|-------------------|--------------------|------------------|------------------|--------------------|
| Operating Temperature Range | X7R: -55°C to +125°C X5R: -55°C to +85°C | — | | | | | | | | | |
| Capacitance | Within specified tolerance | <table border="1"> <thead> <tr> <th>Item</th> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>$C_R \leq 10 \mu F$</td> <td>1.0kHz $\pm 10\%$</td> <td>1.0Vrms $\pm 0.2V$</td> </tr> <tr> <td>$C_R > 10 \mu F$</td> <td>120Hz $\pm 10\%$</td> <td>0.5Vrms $\pm 0.2V$</td> </tr> </tbody> </table> | Item | Frequency | Voltage | $C_R \leq 10 \mu F$ | 1.0kHz $\pm 10\%$ | 1.0Vrms $\pm 0.2V$ | $C_R > 10 \mu F$ | 120Hz $\pm 10\%$ | 0.5Vrms $\pm 0.2V$ |
| Item | Frequency | | Voltage | | | | | | | | |
| $C_R \leq 10 \mu F$ | 1.0kHz $\pm 10\%$ | 1.0Vrms $\pm 0.2V$ | | | | | | | | | |
| $C_R > 10 \mu F$ | 120Hz $\pm 10\%$ | 0.5Vrms $\pm 0.2V$ | | | | | | | | | |
| Dissipation Factor | $U_R \geq 25V$ $tg \delta \leq 10\%$; $U_R < 25V$ $tg \delta \leq 5.0\%$; | | | | | | | | | | |
| Insulation Resistance | 4000M Ω or 100M $\Omega \mu F$ whichever is less | Rated voltage applied for 60 \pm 5 seconds, charge and discharge current limited to 50mA (max). | | | | | | | | | |
| Dielectric Strength | No breakdown or visual defects | 250% of DC rated voltage for 5 seconds, charging and discharging current shall be 50mA or less. | | | | | | | | | |
| Temperature characteristics | $\pm 15\%$ | Capacitance change with reference to +25°C and 0 Vdc applied. | | | | | | | | | |

» CAPACITANCE AND RATED VOLTAGE RANGE

| Size code | A | | | | | | B | | | | | | |
|--------------|---|----|----|----|----|----|---|----|----|----|----|----|--|
| | 6 | 10 | 16 | 25 | 35 | 50 | 6 | 10 | 16 | 25 | 35 | 50 | |
| cap 104 (pF) | | | | | | | | | | | | | |
| 154 | | | | | | | | | | | | | |
| 224 | | | | | | | | | | | | | |
| 334 | | | | | | | | | | | | | |
| 474 | | | | | | | | | | | | | |
| 684 | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | |
| 225 | | | | | | | | | | | | | |
| 335 | | | | | | | | | | | | | |
| 475 | | | | | | | | | | | | | |
| 685 | | | | | | | | | | | | | |
| 106 | | | | | | | | | | | | | |
| 156 | | | | | | | | | | | | | |

X7R
 X5R

» MARKING



FEATURES

Capacitance ranging from 0.1pF to 0.1 μF
 Voltage ratings of 50V – 3600V
 Operating temperature rang of -55°C to +125°C
 Lead-free termination, RoHS Compliant

» APPLICATIONS

Applications include RF power amplifiers, low noise amplifiers.

» ORDERING INFORMATION

| Series | Size code | Capacitance | Capacitance tolerance | Rated voltage | Termination finish | Packaging |
|--------|--|--|--|---|---|---------------------|
| CC41AC | 0805 | 101 | J | 10V | Z | T |
| CC41AC | 0402 0505 0603 0805 1206 1210 1111 2225 4040 | First two digits represent significant figures. Third digit specifies number of zeros. | A= $\pm 0.05pF$ B= $\pm 0.1pF$ C= $\pm 0.25pF$ D= $\pm 0.5pF$ F= $\pm 1\%$ G= $\pm 2\%$ J= $\pm 5\%$ | 250=25V 500=50V 151=150V 201=200V 251=250V 301=300V 501=500V 102=1000V 122=1200V 152=1500V 252=2500V 362=3600V | G=Gold Z= Tin/ Lead solder plated (4% Pb minimum) | T=Bulk E=7" Reel |

» DIMENSIONS

| Appearance | Case Size | 0402 | 0505 | 0603 | 0805 | 1206 | 1210 | 1111 | 2225 | 4040 |
|------------|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
| | L | 1.00 \pm 0.15 | 1.40 \pm 0.40 | 1.60 \pm 0.25 | 2.00 \pm 0.30 | 3.18 \pm 0.25 | 3.18 \pm 0.25 | 2.80 \pm 0.50 | 5.70 \pm 0.80 | 10.50 \pm 0.70 |
| | W | 0.50 \pm 0.15 | 1.40 \pm 0.40 | 0.80 \pm 0.25 | 1.25 \pm 0.30 | 1.58 \pm 0.25 | 2.41 \pm 0.25 | 2.80 \pm 0.50 | 6.35 \pm 0.80 | 9.50 \pm 0.50 |
| | Tmax | 0.61 | 1.45 | 1.00 | 1.40 | 1.27 | 1.52 | 2.60 | 4.50 | 4.50 |
| | t | 0.25 \pm 0.15 | 0.40 \pm 0.30 | 0.40 \pm 0.25 | 0.50 \pm 0.35 | 0.50 \pm 0.25 | 0.50 \pm 0.25 | 0.45 \pm 0.30 | 0.80 \pm 0.60 | 0.80 \pm 0.60 |

Unit:mm

» ELECTRICAL CHARACTERISTICS

| No. | Dissipation Factor | Dielectric Strength | Insulation Resistance (25°C) | Q or Dissipation Factor C ≥ 3pF | ESR C ≥ 3pF | Temperature characteristics |
|----------------------|---|--|--|---|---|--|
| Specification Limits | $\text{tg } \delta \leq 15 \times 10^{-4}$ | No breakdown or visual defects | $\text{IR} \geq 100000\text{M}\Omega$ | 0402 $Q \times f \times C \geq 400$ 0505 $Q \times f \times C \geq 500$ 0603 $Q \times f \times C \geq 600$ 0805, 1206, 1210 和1111 $Q \times f \times C \geq 800$ 2225, 4040 $Q \times f \times C \geq 1000$ | 0402 $\text{ESR} \leq 0.40\Omega$ 0505, 0603 $\text{ESR} \leq 0.35\Omega$ 0805 $\text{ESR} \leq 0.30\Omega$ 1206, 1210, 1111, 2225 和4040 $\leq 0.25\Omega$ | (0 ± 30)ppm/°C |
| Measuring Conditions | $C_r \leq 1000\text{pF}$: 1.0 MHz ± 10% 0.5V~5V; $C_r > 1000\text{pF}$: 1.0 kHz ± 10% 1.0Vrms ± 0.2V | Voltage shall be applied with follow conditions for 5 seconds: $U_r < 500\text{V}$ 2.5U _r $500 \leq U_r \leq 1000\text{V}$ 1.5U _r $U_r > 1000\text{V}$ 1.2U _r Charging and discharging current shall be 50mA or less. | Rated voltage applied for 2 minutes, charge and discharge current limited to 50mA (max). | f: GHz C: pF | — | Capacitance change with reference to +25°C |

» CAPCITANCE AND RATED VOLTAGE RANGE

CC41AC (0 ± 30)PPM/K)

| Case size | 0402 | | 0505 | | 0603 | | 0805 | | 1206 | | | 1111 | | | | 1210 | | | 2225 | | | | | 4040 | | | | |
|------------------|------|----|------|-----|------|-----|------|-----|------|----|-----|------|-----|-----|-----|------|-----|-----|------|------|------|-----|-----|------|------|------|------|--|
| Rated voltage(V) | 25 | 50 | 150 | 250 | 250 | 250 | 100 | 200 | 500 | 50 | 100 | 200 | 500 | 100 | 200 | 500 | 300 | 500 | 1200 | 1500 | 2500 | 200 | 500 | 1000 | 1600 | 2500 | 3600 | |
| 0R1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0R9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4R3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4R7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5R1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5R6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6R2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6R8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7R5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8R2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9R1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 240 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 360 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 430 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 510 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 620 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 750 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

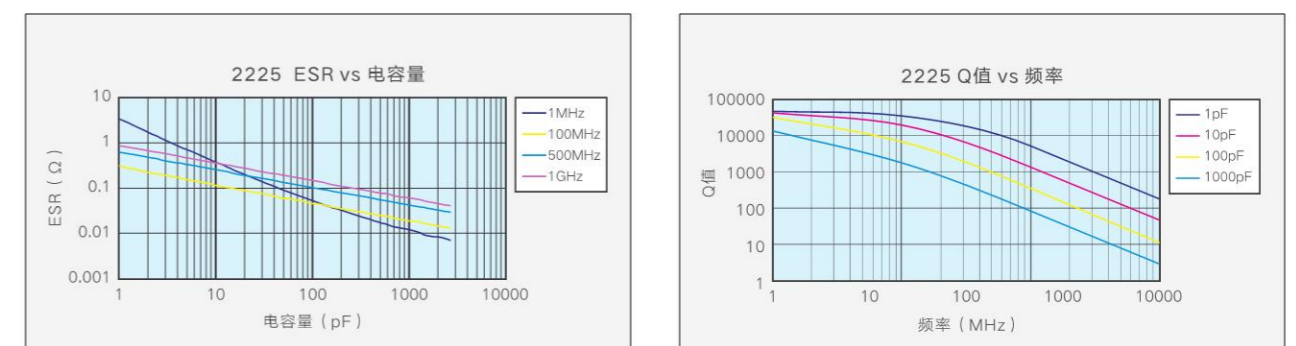
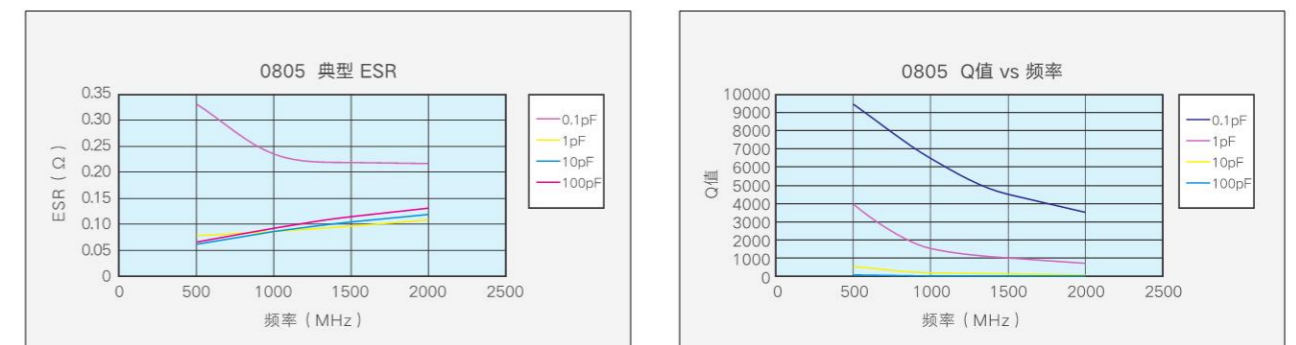
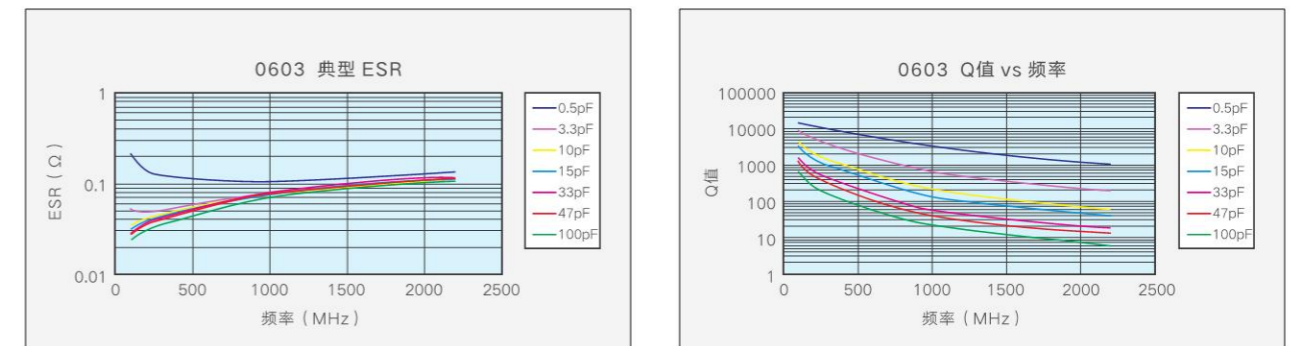
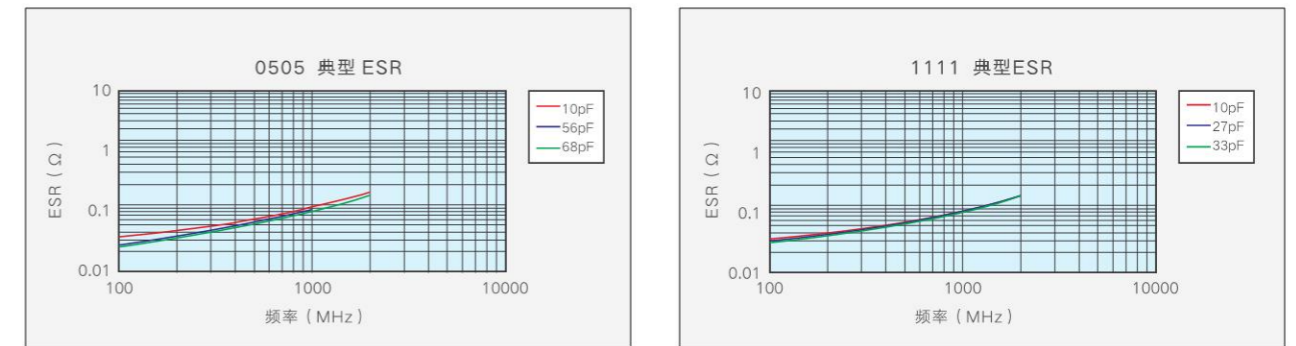
» CAPCITANCE AND RATED VOLTAGE RANGE

CC41AC (0 ± 30)ppm/K)

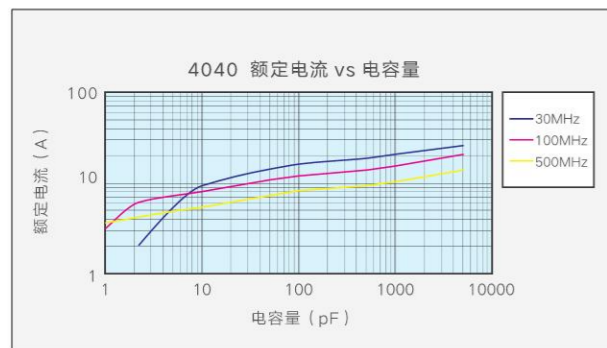
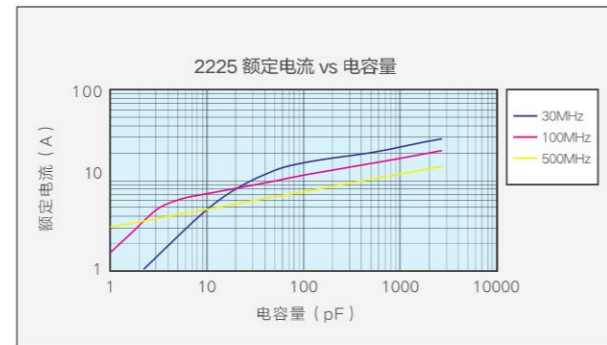
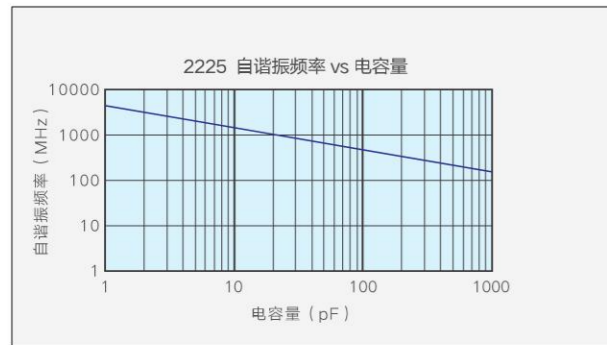
| Case size | 0402 | | 0505 | | 0603 | | 0805 | | 1206 | | | 1111 | | | 1210 | | | 2225 | | | | | 4040 | | | | |
|------------------|------|----|------|-----|------|-----|------|-----|------|----|-----|------|-----|-----|------|-----|-----|------|------|------|------|-----|------|------|------|------|------|
| Rated voltage(V) | 25 | 50 | 150 | 250 | 250 | 250 | 100 | 200 | 500 | 50 | 100 | 200 | 500 | 100 | 200 | 500 | 300 | 500 | 1200 | 1500 | 2500 | 200 | 500 | 1000 | 1600 | 2500 | 3600 |
| 910 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 111 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 121 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 131 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 161 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 181 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 201 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 241 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 301 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 361 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 431 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 511 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 621 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 751 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 911 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 112 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 132 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 162 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 202 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 242 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 302 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 362 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 432 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 502 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 512 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

» CHARACTERISTIC

CC41AC (0 ± 30)ppm/K)



»» CHARACTERISTIC



»» STORAGE

To maintain the solderability of terminal electrodes and to keep packaging materials in good condition, care must be taken to control temperature and humidity.

· Recommended conditions

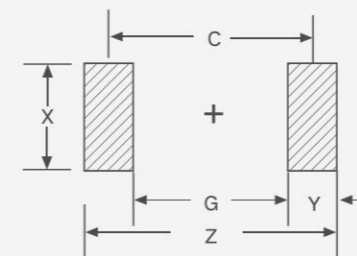
Temperature : Below 40°C , Humidity : Below 70% RH

Even under ideal storage conditions, solderability of capacitor is deteriorated as time passes, so capacitors shall be used within 12 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.

»» HEAT TREATMENT

The capacitance values of high dielectric constant capacitors will gradually decrease with the passage of time, so care shall be taken to design circuits. Even if capacitance value decreases as time passes, it will get back to the initial value by a heat treatment at 150°C for 1 hour.

»» CHIP CAPACITOR LAND PATTERN DESIGN RECOMMENDATIONS



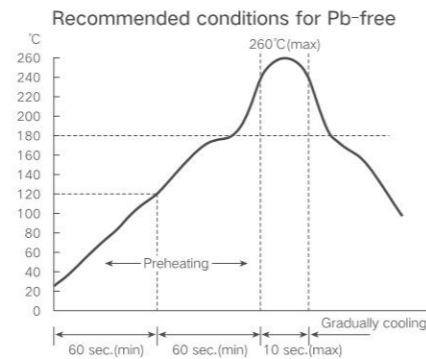
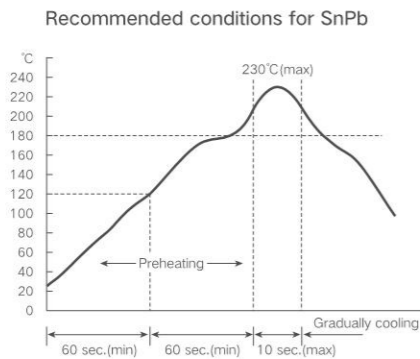
| Reflow | | Unit: mm | | | | | | | |
|--------|------|----------|------|------|------|------|------|------|--|
| Size | Z | | G | | X | | Y | | |
| | min | max | min | max | min | max | min | max | |
| 0201 | 0.60 | 0.90 | 0.20 | 0.30 | 0.25 | 0.40 | 0.20 | 0.30 | |
| 0402 | 1.00 | 1.60 | 0.40 | 0.60 | 0.40 | 0.60 | 0.30 | 0.50 | |
| 0603 | 1.70 | 2.60 | 0.50 | 1.00 | 0.60 | 1.00 | 0.60 | 0.80 | |
| 0805 | 2.00 | 3.80 | 0.60 | 1.20 | 0.90 | 1.60 | 0.70 | 1.30 | |
| 1206 | 3.80 | 5.70 | 1.80 | 2.50 | 1.20 | 2.00 | 1.00 | 1.60 | |
| 1210 | 3.80 | 5.70 | 1.80 | 2.50 | 1.80 | 3.20 | 1.00 | 1.60 | |
| 1812 | 4.90 | 7.50 | 2.50 | 3.70 | 2.30 | 3.50 | 1.20 | 1.90 | |
| 2220 | 5.60 | 9.30 | 3.20 | 4.70 | 3.50 | 5.00 | 1.20 | 2.30 | |
| 2225 | 5.60 | 9.30 | 3.20 | 4.70 | 3.50 | 6.80 | 1.20 | 2.30 | |

| Wave | | Unit: mm | | | | | | | |
|------|------|----------|------|------|------|------|------|------|--|
| Size | Z | | G | | X | | Y | | |
| | min | max | min | max | min | max | min | max | |
| 0603 | 1.70 | 2.60 | 0.50 | 1.00 | 0.60 | 1.00 | 0.60 | 0.80 | |
| 0805 | 2.60 | 4.40 | 1.00 | 1.40 | 0.90 | 1.60 | 0.70 | 1.30 | |
| 1206 | 3.80 | 5.70 | 1.80 | 2.50 | 1.20 | 2.00 | 1.00 | 1.60 | |
| 1210 | 3.80 | 5.70 | 1.80 | 2.50 | 1.80 | 3.20 | 1.00 | 1.60 | |

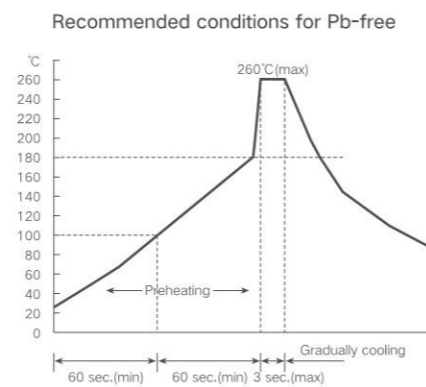
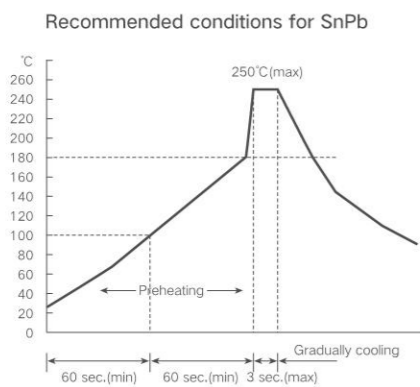
»» SOLDERING

Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.

[Reflow Soldering]

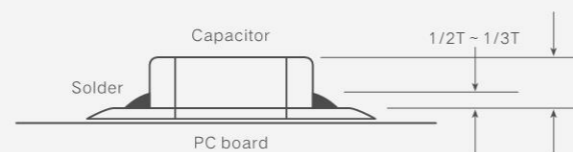


[Wave Soldering]

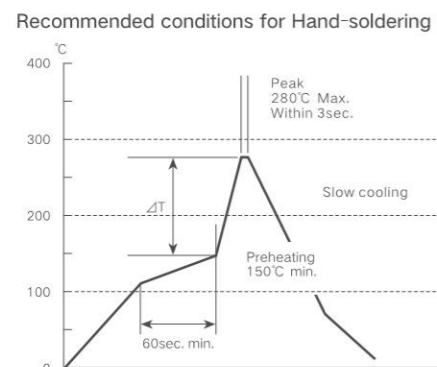


CAUTION:

Wave soldering must not be applied to capacitors designated as for reflow soldering only.



[Hand soldering]



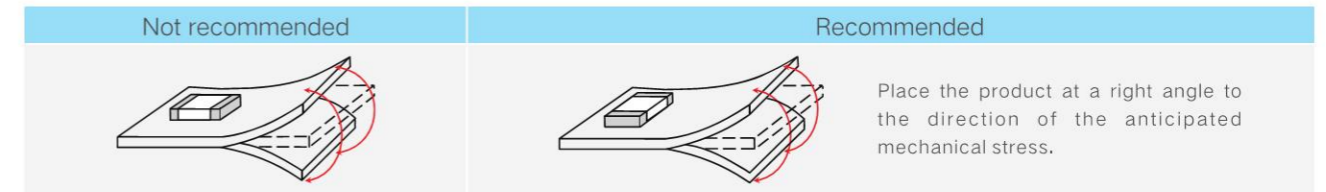
| Size | ΔT |
|--------------|----------------------------|
| 1206 or less | $\leq 150^{\circ}\text{C}$ |
| 1210 or more | $\leq 130^{\circ}\text{C}$ |

CAUTION:

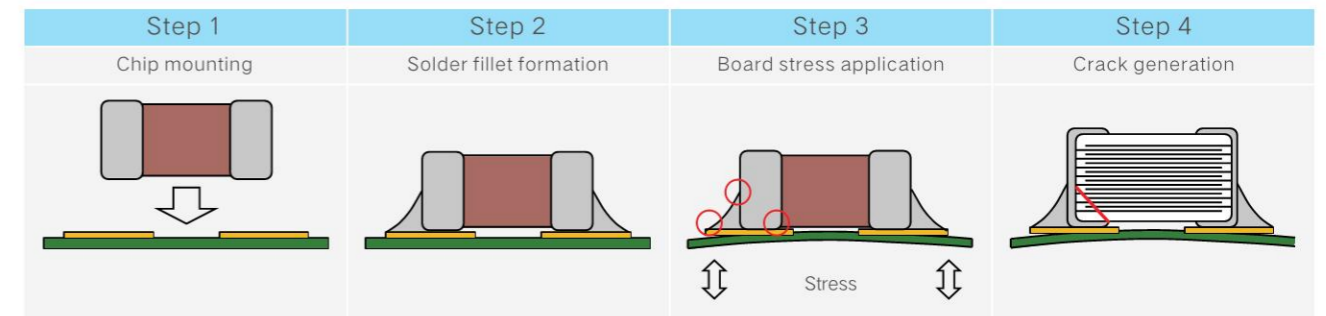
1. Use a maximum tip diameter of 1.0 mm.
2. The soldering iron shall not directly touch capacitors. soldering for 1 times.

»» SOLDERING

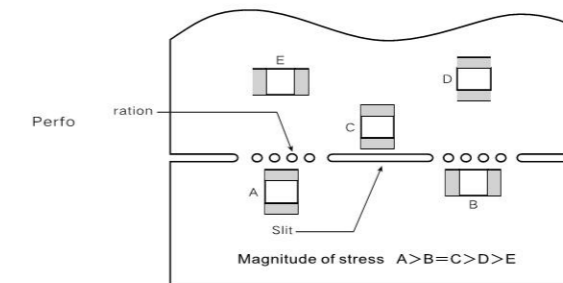
1. The following is examples of good and bad capacitor layouts, capacitors shall be located to minimize any possible mechanical stresses from board warp or deflection.



Capacitor was cracked by external mechanical stress such as board distortion and twist applied after mounting.



2. The amount of mechanical stresses given will vary depending on capacitor layout. Please refer to the right figure.



3. When PCB is split, the amount of mechanical stress on the capacitors can vary according to the method used. The following methods are listed in order from most stressful to least stressful: push-back, slit, V-grooving, and perforation. Thus, please consider the PCB split methods as well as chip location.

»» ADJUSTMENT OF MOUNTING MACHINE

When the bottom dead center of a pick-up nozzle is too low, excessive force is imposed on capacitors and causes damages. To avoid this, the following points shall be considerable.

1. The bottom dead center of the pick-up nozzle shall be adjusted to the surface level of PCB without the board deflection.
2. The pressure of nozzle shall be adjusted between 1 and 3 N static loads.
3. To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins or back-up pins shall be used on the other side of the PCB. The following diagrams show typical example of good and bad pick-up nozzle placement:

