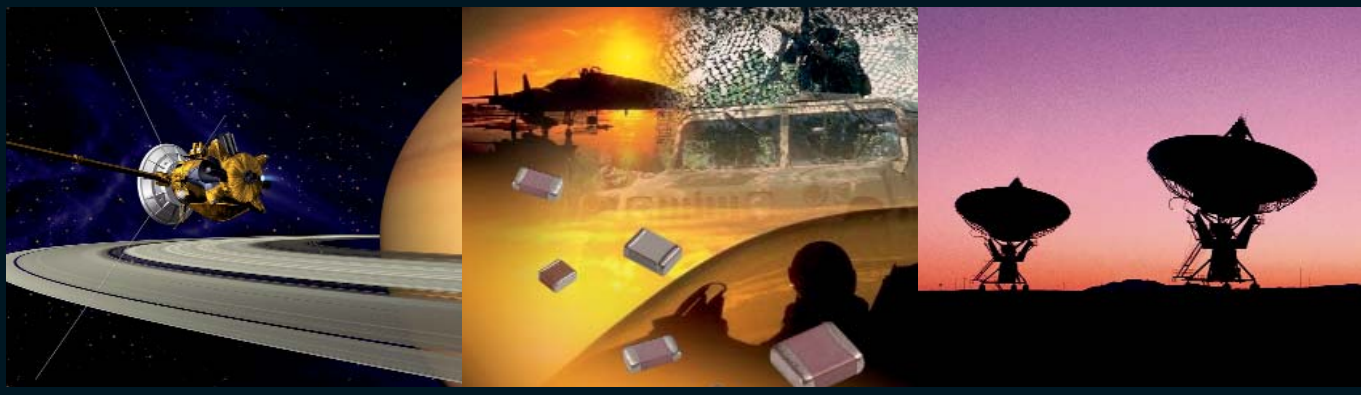
# AVX **European Space Agency and CECC Ceramic Capacitor Products**



Version 11.4

A KYOCERA GROUP COMPANY

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***All products to be considered Not RoHS Compliant unless otherwise indicated.***


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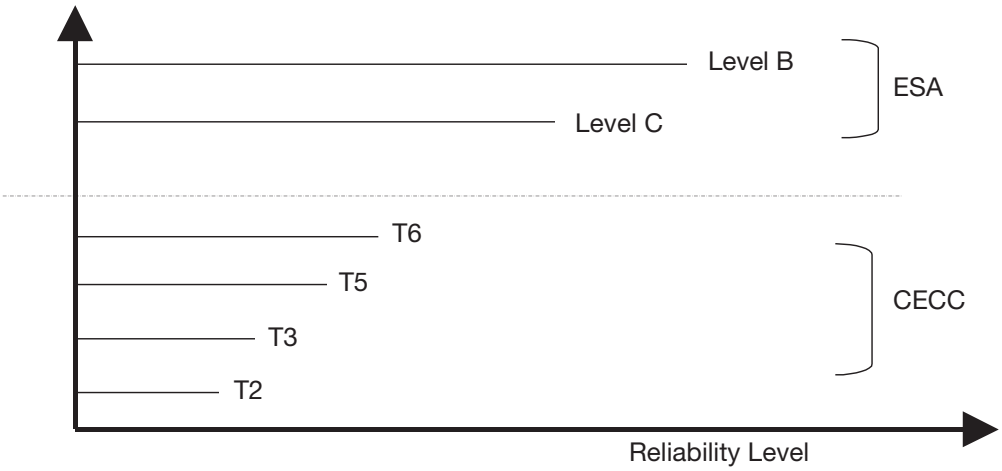
# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## AVAILABLE TYPES

MLC CHIPS vs ESA ESCC & vs CECC 32101-002, 003 (established reliability) from 25V up to 500V.

## AVAILABLE RELIABILITY LEVELS

| | | |
|---|---|---|
| ESA QUALIFIED - LEVEL B | NB | with or without LAT I, II or III |
| ESA QUALIFIED - LEVEL C | NC | |
| CECC + 100% Burn in /168H + Thermal shock + 85/85 humidity test + on 40 samples per batch + DPA | T6 | |
| CECC + 100% Burn in /168H + DPA | T5 | |
| CECC + 100% Burn in /48H + DPA | T3 | |
| CECC + DPA | T2 | |




- Level T5 & T6: Reliability Level = MIL S
- Level T3: Reliability Level = MIL R

## AVAILABLE RELIABILITY LEVELS SUMMARY/TYPES

| Types | Products | | Reliability Level | | |
|---|---|---|---|---|---|
| | | | T6 to T2 | Level B | Level C |
| MLC Chips | AN, AC & AD<br>12, 13, 14, 15, 20<br>(NP0, X7R) | **CECC** | X | | |
| MLC Chips<br>ESA Qualified/3009 | A...C NP0<br>A...Z X7R<br>A...G 2C1 | **ESA**<br>**ESCC** | | X | X |

## RELEVANT STANDARDS

| Type of Component | Reliability Level | |
|---|---|---|
| | T2 / T3 / T5 / T6 | Level B & C |
| MLC Chips | CECC 32101-002<br>32101-003<br>32101-801<br>(IEC 384-8-9-10) | ESA ESCC 3009 |

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## DIELECTRIC TYPES USED

**Type I**

- ▶ NP0 ▶ TPC Code: C

**Type II**

- ▶ X7R ▶ TPC Code: Z
- ▶ 2C1 ▶ TPC Code: G

## ELECTRICAL MEASUREMENT CONDITIONS FOR CECC CHIPS: T2 / T3 / T5 / T6

| **Type** | | **1** | **2** |
|---|---|---|---|
| TPC code | | **C** | **Z** |
| Classification | IEC/CECC<br>EIA<br>DIN<br>MIL | 1B<br>C0G<br>NP0<br>CG | 2R1<br>X7R |
| Capacitance change<br>With temperature & : | Ubias = 0<br>Ubias = UR | ±30ppm/°C | ± 15%<br>N.A. |
| Typical ageing (%/dec.) | | 0 | 1.5 |
| Reference temperature | | 22°C ±3°C | 22°C ±3°C |
| Capacitance and D.F. measurement | Frequency<br><br>Voltage | C ≤ 1000 pF F = 1MHz<br>C > 1000 pF F = 1 kHz<br>Um ≤ 5 Vrms | C ≤ 100 pF F = 1MHz<br>C > 100 pF F = 1 kHz<br>Um ≤ 0.3 Vrms ± 0.2 |
| Dissipation Factor (DF) | | C ≤ 50 pF DF < 1.5 (150/C + 7).$10^{-4}$<br>C>50 pF DF < 15.$10^{-4}$ | DF < 250 .$10^{-4}$ |
| Insulation Resistance under UR /1 mn | | For C ≤ 10nF: Ri > 100 GΩ or<br>For C > 10nF: Ri x Cr > 1000s | For C ≤ 10nF: Ri > 100 GΩ or<br>For C > 10nF: Ri x C > 1000s |
| Proof voltage | | For UR ≤ 100V : 2.5 x UR<br>For UR > 100V : 1.5 UR + 100V | For UR ≤ 100V: 2.5 x UR<br>For UR >100V: 1.5 x UR + 100V |

Note: ESA Chips are strictly measured vs ESA spec. 3009 + detail spec.

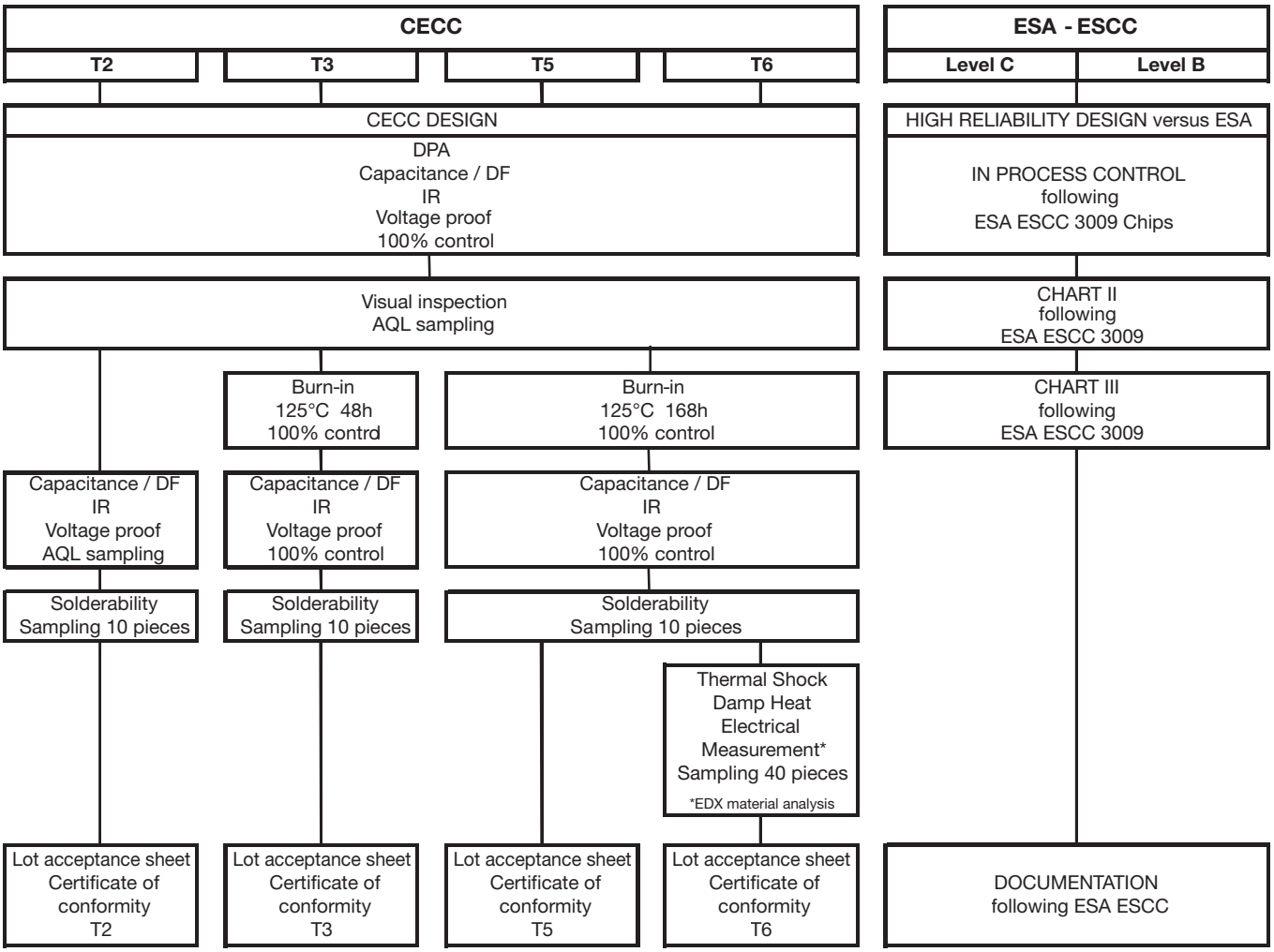
## ELECTRICAL MEASUREMENT CONDITIONS FOR ESA CHIPS: LEVEL B & C

| **Type** | | **1** | **2** | |
|---|---|---|---|---|
| TPC code | | **C** | **Z** | **G** |
| Classification | IEC/CECC<br>EIA<br>DIN<br>MIL | 1B<br>C0G<br>NP0<br>CG | 2R1<br>X7R | 2C1<br><br><br>BX |
| Capacitance change<br>With temperature & : | Ubias = 0<br>Ubias = UR | ±30ppm/°C | ± 20%<br>*-60/+20% | ± 20%<br>-30/+20% |
| Typical ageing (%/dec.) | | 0 | 1.5 | 1.5 |
| Reference temperature | | 22°C ±3°C | 22°C ±3°C | 22°C ±3°C |
| Capacitance and D.F. measurement | Frequency<br><br>Voltage | C ≤ 1000 pF F = 1MHz<br>C > 1000 pF F = 1 kHz<br>Um ≤ 5 Vrms | C ≤ 100 pF F = 1MHz<br>C > 100 pF F = 1 kHz<br>Um ≤ 1 Vrms | |
| Dissipation Factor (DF) | | C ≤ 50 pF DF < 1.5 (150/C + 7).$10^{-4}$<br>C>50 pF DF < 15.$10^{-4}$ | DF < 250 .$10^{-4}$ | |
| Insulation Resistance under UR /1 mn | | Ri > 100 GΩ | For C ≤ 10nF: Ri > 100 GΩ or<br>For C > 10nF: Ri x C > 1000s | |
| Proof voltage | | For UR < 500V : 2.5 x UR | For UR < 500V: 2.5 x UR<br>For UR = 500V: 2 x UR | |

*Typical value for this dielectric class
Note: ESA Chips are strictly measured vs ESA spec. 3009 + detail spec.

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## RELIABILITY LEVELS DESCRIPTION



# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## AVAILABLE TERMINATIONS

### Summary

| Type | CECC Level T2/T3/T5/T6 | ESA Level B & C | Remark |
|---|---|---|---|
| Ag - Pd - Pt | AC | A3.. | – |
| Nickel Barrier + Tin Lead Finish[1] | AN | A6... | Preferred Version |
| Nickel Barrier + Tin Finish[2] | AD | | |

[1] "No Pure Tin" terminations.
[2] Lead Free terminations.

## TERMINATION CODES FOR ESA MLC PARTS

| TPC Code eg: A.12 | ESA Version | |
|---|---|---|
| | Code | Termination |
| A312 | 03 | Silver Palladium Platinum |
| A612C...<br>A612G... | 06 | ESA Preferred Termination<br>Nickel Barrier + Tin Lead Finish |
| A612Z... | 07 | X7R Dielectric + ESA Preferred Termination<br>Nickel Barrier + Tin Lead Finish |

## PACKAGING

- Plastic Tape – Minimum Order Quantity: 1000p for CECC and ESA products
- Waffle Pack – Anti-static material only ESA Products – Minimum Order Quantity: 50p for ESA products
- Vacuum Pack only CECC Products – Minimum Order Quantity: 1Kp for CECC products

## MARKING

**Chips:**

| | | |
|---|---|---|
| CECC | T6/T5/T3/T2 | On packaging label only - versus TPC code |
| ESA Level | C & B | On packaging label only - versus ESA code |

## AVAILABLE CLIMATIC AND ELECTRIC TESTS

| Test P/N | Test Description | Qty. of Parts | Average Lead Time |
|---|---|---|---|
| XX00--5028--- | DPA versus EIA RS469 | 25/X + 25/Y | 1 to 2 weeks |
| MX00--5056--- | 85/85 Humidity test / ESA 3009 / 5.2.2<br>85°C / 85% HR / 1.5Vdc / 240h | 50 | 3 weeks |
| MX00--5059--- | 85/85 Humidity test / MIL STD 202 Method 103<br>40°C / 95 HR / 100Vdc / 240h | 50 | 3 weeks |
| MX00--5060--- | 85ºC/85º HR / 240h Humidity test | 12 | 3 weeks |
| XX00--5080-00 | 100% burn in (same as "5079" but limited to 48H) | 100% | 1 week |
| XX00--5079-00 | 100% burn in versus ESA 3009 (168H / 2x Ur) | 100% | 3 weeks |
| XX00--5090-00 | Halt test (accelerated burn-in 140°C / 3Ur) | 100pc | 4 weeks |
| XX00--5100-00 | Life test 1000 or 2000H versus ESA 3009/9.10 | 100pc | 7 or 14 weeks |
| XX00--5082-00 | Solderability test (bath method vs. ESA or CECC) | 20pc | 2 weeks |
| XX00--5091-00 | Electric test (Cr; DF; IR) 100% | 100% | Tbd |
| XX00--5092-00 | Rapid change of temperature (-55° to 125°C) | 50pc | Tbd |
| XX00--5093-00 | Climatic test sequence | 50pc | Tbd |
| XX00--5094-00 | Visual insp. Versus ESA or customer spec. | 100% | Tbd |

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## ESA QUALIFIED CHIPS TYPE I - NP0 (AVAILABLE RELIABILITY LEVEL: B & C)

| Size | TPC Code | Dielectric Class | Voltage (V) | Capacitance Range | | Tol % | Relevant Specification |
|---|---|---|---|---|---|---|---|
| | | | | min. | max. | | |
| 0805 | A.12C.. | NP0 | 50 & 100 | 4.7 | 1500pF | 1, 2, 5, 10 % | QPL - ESA ESCC 3009 - 003 |
| 1206 | A.20C.. | NP0 | 50 & 100 | 10 | 3900pF | | QPL - ESA ESCC 3009 - 022 |
| 1210 | A.13C.. | NP0 | 50 & 100 | 22 | 6800pF | ±0.5pF | QPL - ESA ESCC 3009 - 004 |
| 1812 | A.14C.. | NP0 | 50 & 100 | 0.1 | 15 nF | for C <10pF | QPL - ESA ESCC 3009 - 005 |
| 2220 | A.15C.. | NP0 | 50 & 100 | 0.47 | 33 nF | | QPL - ESA ESCC 3009 - 006 |

Available Terminations:
A3.. Silver Palladium Platinum (ESA variant 03) and
A6.. Nickel Barrier with Tin Lead Finish (ESA variant 06)

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## ESA QUALIFIED CHIPS TYPE II - 2C1 (AVAILABLE RELIABILITY LEVEL: B & C)

| Size | TPC Code | Dielectric Class | Voltage (V) | Capacitance Range | | Tol % | Qualified Following Specification |
|---|---|---|---|---|---|---|---|
| | | | | min. | max. | | |
| 0805 | A.12G | 2C1 | 100<br>50<br>25 | 820<br>3.9<br>10 | 10000 pF<br>27 nF<br>47 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 008 |
| 1206 | A.20G | 2C1 | 100<br>50<br>25 | 2.2<br>12<br>27 | 22 nF<br>68 nF<br>100 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 023 |
| 1210 | A.13G | 2C1 | 100<br>50<br>25 | 3.9<br>33<br>47 | 47 nF<br>120 nF<br>220 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 009 |
| 1812 | A.14G | 2C1 | 100<br>50<br>25 | 6.8<br>56<br>82 | 82 nF<br>270 nF<br>470 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 010 |
| 2220 | A.15G | 2C1 | 100<br>50<br>25 | 18<br>100<br>180 | 180 nF<br>680 nF<br>1000 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 011 |

Available Terminations:
A3.. Silver Palladium Platinum (ESA variant 03) and
A6.. Nickel Barrier with Tin Lead Finish (ESA variant 06)

## ESA QUALIFIED CHIPS TYPE II - X7R ESA VARIANT 07 (AVAILABLE RELIABILITY LEVEL: B & C)

| Size | TPC Code | Dielectric Class | Voltage (V) | Capacitance Range | | Tol % | Qualified Specification |
|---|---|---|---|---|---|---|---|
| | | | | min. | max. | | |
| 0805 | A612Z.. | X7R | 100<br>50<br>25 | 10nF<br>27nF<br>27nF | 47 nF<br>68 nF<br>100 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 008 |
| 1206 | A620Z.. | X7R | 100<br>50<br>25 | 27nF<br>47nF<br>47nF | 100 nF<br>150 nF<br>220 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 023 |
| 1210 | A613Z.. | X7R | 100<br>50<br>25 | 47nF<br>100nF<br>100nF | 220 nF<br>330 nF<br>470 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 009 |
| 1812 | A614Z.. | X7R | 100<br>50<br>25 | 82nF<br>220nF<br>220nF | 470 nF<br>680 nF<br>1000 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 010 |
| 2220 | A615Z.. | X7R | 100<br>50<br>25 | 180nF<br>470nF<br>470nF | 1000 nF<br>1500 nF<br>2200 nF | 5, 10, 20 | QPL - ESA ESCC 3009 - 011 |
| 1206 | A.20Z | X7R | 200<br>400 | 0.470<br>0.27 | 33 nF<br>4.7 nF | 5, 10, 20 | According to "ESA ESCC 3009" |
| 1210 | A.13Z | X7R | 200<br>400 | 0.680<br>0.680 | 68 nF<br>10 nF | 5, 10, 20 | |
| 1812 | A.14Z | X7R | 200<br>400 | 3.3<br>3.3 | 150 nF<br>47 nF | 5, 10, 20 | |
| 2220 | A.15Z | X7R | 200<br>400 | 6.8<br>6.8 | 270 nF<br>68 nF | 5, 10, 20 | |

One single termination type: A6.. Nickel Barrier with Tin Lead Finish

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## CECC CHIPS TYPE I – NP0 (AVAILABLE RELIABILITY LEVEL: T6 TO T2) CECC UPGRADED

| Size | TPC Code | Dielectric Class | Voltage (V) | Capacitance Range | | Tol % | Relevant Specification |
|---|---|---|---|---|---|---|---|
| | | | | min. | max. | | |
| 0805/ CEC2 | A. 12CF<br>A. 12CE<br>A. 12CD | NP0 | 200<br>100<br>50/25 | 4.7<br>4.7<br>4.7 | 470 pF<br>1800 pF<br>1800 pF | 1, 2, 5, 10%<br><br>±0.5pF if C < 10pF | IEC 384-8....10<br><br>CECC 32100 - 32101/801 |
| 1206/ CEC12 | A. 20CJ<br>A. 20CF<br>A. 20CE<br>A. 20CD | NP0 | 500<br>200<br>100<br>50/25 | 12<br>12<br>12<br>12 | 330 pF<br>1500 pF<br>4700 pF<br>4700 pF | | |
| 1210/ CEC4 | A. 13CJ<br>A. 13CF<br>A. 13CE<br>A. 13CD | NP0 | 500<br>200<br>100<br>50/25 | 15<br>15<br>15<br>15 | 1500 pF<br>2700 pF<br>10000 pF<br>10000 pF | | |
| 1812/ CEC6 | A. 14CJ<br>A. 14CF<br>A. 14CE<br>A. 14CD | NP0 | 500<br>200<br>100<br>50/25 | 100<br>100<br>100<br>100 | 1000 pF<br>5600 pF<br>18000 pF<br>18000 pF | | |
| 2220/ CEC7 | A. 15CJ<br>A. 15CF<br>A. 15CE<br>A. 15CD | NP0 | 500<br>200<br>100<br>50/25 | 470<br>470<br>470<br>470 | 3300 pF<br>12000 pF<br>39000 pF<br>39000 pF | | |

Note: 3 terminations available: Ag Pd Pt ► AC, Nickel Barrier with Tin Lead finish ► AN, Nickel Barrier with Tin finish ► AD
Size 2225 available on request

## CECC CHIPS TYPE II – X7R (AVAILABLE RELIABILITY LEVEL: T6 TO T2) CECC UPGRADED

| Size | TPC Code | Dielectric Class | Voltage (V) | Capacitance Range | | Tol % | Relevant Specification |
|---|---|---|---|---|---|---|---|
| | | | | min. | max. | | |
| 0805/ CNC2 | A. 12ZF<br>A. 12ZE<br>A. 12ZD | X7R | 200<br>100<br>50 | 0.33<br>0.33<br>0.33 | 18 nF<br>47 nF<br>100 nF | 5, 10 & 20% | IEC 384-8....10<br><br>CECC 32100 - 32101/801 |
| 1206/ CNC12 | A. 20ZJ<br>A. 20ZF<br>A. 20ZE<br>A. 20ZD | X7R | 500<br>200<br>100<br>50 | 1<br>1<br>1<br>1 | 8.2 nF<br>39 nF<br>100 nF<br>180 nF | | |
| 1210/ CNC4 | A. 13ZJ<br>A. 13ZF<br>A. 13ZE<br>A. 13ZD | X7R | 500<br>200<br>100<br>50 | 2.2<br>2.2<br>2.2<br>2.2 | 22 nF<br>100 nF<br>220 nF<br>330 nF | | |
| 1812/ CNC6 | A. 14ZJ<br>A. 14ZF<br>A. 14ZE<br>A. 14ZD<br>A. 14ZC | X7R | 500<br>200<br>100<br>50<br>25 | 2.7<br>2.7<br>2.7<br>2.7<br>1000 | 47 nF<br>180 nF<br>470 nF<br>680 nF<br>1000 nF | | |
| 2220/ CNC7 | A. 15ZJ<br>A. 15ZF<br>A. 15ZE<br>A. 15ZD | X7R | 500<br>200<br>100<br>50 | 4.7<br>4.7<br>4.7<br>4.7 | 68 nF<br>390 nF<br>1000 nF<br>1500 nF | | |

Note: 3 terminations available: Ag Pd Pt ► AC, Nickel Barrier with Tin Lead finish ► AN, Nickel Barrier with Tin finish ► AD
Size 2225 available on request

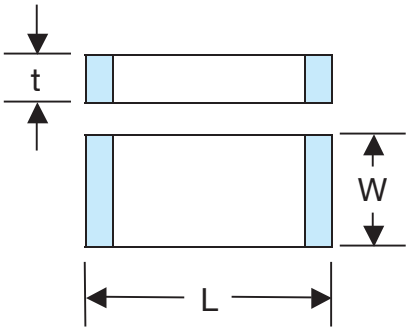
# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

## DIMENSIONS

### I - Chips T2/T3/T5/T6 (vs CECC) AN... AC... & AD...

mm (inches)

| Size | L | W | t max. |
|---|---|---|---|
| 0805 | 2.0 ± 0.3 (0.079 ± 0.012) | 1.25 ± 0.3 (0.049 ± 0.012) | 1.3 (0.051) |
| 1206 | 3.2 ± 0.3 (0.126 ± 0.012) | 1.6 ± 0.3 (0.063 ± 0.012) | 1.6 (0.063) |
| 1210 | 3.2 ± 0.3 (0.126 ± 0.012) | 2.5 ± 0.3 (0.098 ± 0.012) | 1.8 (0.071) |
| 1812 | 4.5 ± 0.3 (0.177 ± 0.012) | 3.2 ± 0.3 (0.126 ± 0.012) | 1.8 (0.071) |
| 2220 | 5.7 ± 0.4 (0.224 ± 0.016) | 5.0 ± 0.4 (0.197 ± 0.016) | 1.8 (0.071) |




### II - Chips Level B and C (vs ESA 3009) A3... & A6...

mm (inches)

| Size | L | | W | | Thickness max. (t) | | |
|---|---|---|---|---|---|---|---|
| | min. | max. | min. | max | NP0 Class | 2C1 Class | X7R Class |
| 0805 | 1.7 (0.067) | 2.3 (0.091) | 1.05 (0.041) | 1.45 (0.057) | 1.3 (0.051) | 1.8 (0.071) | 1.3 (0.051) |
| 1206 | 2.8 (0.110) | 3.6 (0.142) | 1.3 (0.051) | 1.9 (0.075) | 1.8 (0.071) | 2.3 (0.091) | 1.6 (0.063) |
| 1210 | 2.8 (0.110) | 3.6 (0.142) | 2.2 (0.087) | 2.8 (0.110) | 1.8 (0.071) | 2.3 (0.091) | 1.8 (0.071) |
| 1812 | 4.0 (0.157) | 5.0 (0.197) | 2.8 (0.110) | 3.6 (0.142) | 1.8 (0.071) | 2.3 (0.091) | 1.8 (0.071) |
| 2220 | 5.2 (0.205) | 6.2 (0.244) | 4.5 (0.177) | 5.5 (0.217) | 1.8 (0.071) | 2.3 (0.091) | 1.8 (0.071) |

Part thickness manufactured "according to ESA" exceed above limits.

## HOW TO ORDER

**A6** — **Chip**
ESA
A3 = AgPdPt Terminations
A6 = Nickel Barrier Terminations with Tin Lead Finish
CECC
AC = AgPdPt Terminations
AN = Nickel Barrier Terminations with Tin Lead Finish
AD = Nickel Barrier Terminations with Tin Finish

**14** — **Size**
12 = 0805
13 = 1210
14 = 1812
15 = 2220
20 = 1206
43 = 2225

**C** — **Class**
C = NP0
Z = X7R
G = 2C1

**E** — **Voltag**

**e**
C = 25
D = 50/63
E = 100
F = 200
G = 250
I = 400
J = 500

**0222** — **Capacitance**

Capacitance expressed by 2 significant figures
**7th digit:** 0 (zero)
**8th and 9th digits:** the 2 significant figures of the capacitance value.
**10th digit:**
- for values ▶ 10 pF and ▶ 990 µF: the number of ZEROS to be added to the capacitance value
- for values ▶ 1 pF and ▶ 9.9 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1
- for values <1 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01.

**Examples:** 1000 pF : 0102
8.2 pF : 0829
0.47 pF : 0478

Capacitance expressed by 3 significant figures
**7th, 8th and 9th digits:** the 3 significant figures of the capacitance value
**10th digit:**
- for values >100 pF and ▶ 990 µF: the number of ZEROS to be added to the capacitance value
- for values >10 pF and <100 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1
- for values >1 pF and <10 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01.

**Examples:** 196 pF: 1960
47.2 pF: 4729
8.28 pF: 8288

**K** — **Tolerance**

| C < 10 pF | Code |
|---|---|
| ± 0.5pF | D |
| **C ▶ 10 pF** | **Code** |
| ± 1% | F |
| ± 2% | G |
| ± 3% | H |
| ± 5% | J |
| ± 10% | K |
| ± 20% | M |

**NC** — **Suffix**

| ESA Level | TPC |
|---|---|
| B | NB |
| C | NC |
| C + Tape | 2J |
| CECC | |
| Burn-in 100% 168H +TS +HR | T6 |
| Burn-in 100% 168H | T5 |
| Burn-in 100% 48H | T3 |
| No Burn-in | T2 |
| T5 + Tape | 2K |
| T3 + Tape | 2L |
| T2 + Tape | 2Y |
| T6 + Tape | 24 |

**Not RoHS Compliant**

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

*For RoHS compliant products, please select correct termination style.*

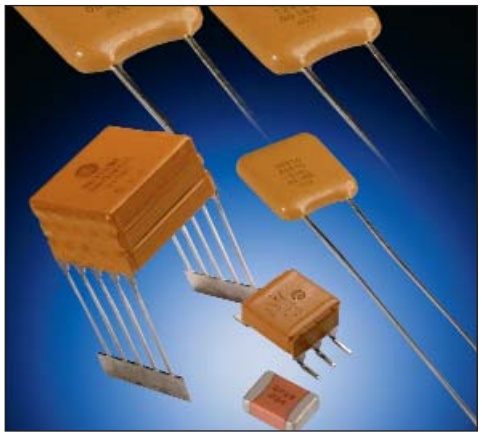
# ESCC Qualified SMPS Capacitors

## High Voltage Chip/Leaded Capacitors

### HIGH VOLTAGE CHIP CAPACITORS

Capacitors, Fixed, Chip, Ceramic Dielectric, Type II, High Voltage, Based on Styles 1812 and 1825 for use in ESCC space programs, according to ESCC Generic Specification 3009 and associated Detail Specification 3009/034 as recommended by the Space Components Coordination Group. (ranges in table below)

Note: Variants 01 to 12: metallized pads



| Size | Variant | Rated Voltage (kV) | Tolerance (%) | Capacitance Code (E12) |
|---|---|---|---|---|
| 1812 | 01 | 1.0 | ±10 | 392 - 223 |
| | 02 | | ±20 | |
| | 03 | 2.0 | ±10 | 152 - 182 |
| | 04 | | ±20 | |
| | 05 | 3.0 | ±10 | 821 - 102 |
| | 06 | | ±20 | |
| 1825 | 07 | 1.0 | ±10 | 273 - 563 |
| | 08 | | ±20 | |
| | 09 | 2.0 | ±10 | 222 - 682 |
| | 10 | | ±20 | |
| | 11 | 3.0 | ±10 | 821 - 392 |
| | 12 | | ±20 | |

### HOW TO ORDER

**Parts should be ordered using the ESCC variant number as follows:**

**3009034 XX B XXX**

**Detail Spec Number**

**Type Variant** (per table)

**Test Level**
C = Standard test level
B = Level C plus serialized and capacitance recorded before and after 100% burn-in.

**Capacitance Code**
The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e.
102 = 1000pF
103 = 10000pF

Eg 300903401C223

### HIGH VOLTAGE LEADED CAPACITORS

Capacitors, Fixed, Ceramic Dielectric, Type II, High Voltage, 1.0 to 5.0 kV, Based on Case Styles VR, CV and CH for use in ESCC space programs, according to ESCC Generic Specification 3001 and associated Detail Specification 3001/034 as recommended by the Space Components Coordination Group. (ranges in table)

Note 1: Lead Types
a - Leaded Radial (epoxy coated)
b - Leaded Radial (Polyurethane Varnish)
c - Straight Dual in Line
d - L Dual in Line

Note 2: Tolerances of ±10% and ±20% are available

| Case Size | Variant | Lead Type | Capacitance Code (E12) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1.0kV | 2.0kV | 3.0kV | 4.0kV | 5.0kV |
| VR30S | 01 | a | 392 - 203 | 152 - 182 | 821 - 102 | | |
| VR30 | 02 | a | 273 - 563 | 222 - 682 | 821 - 392 | | |
| VR40 | 03 | a | 473 - 124 | 822 - 153 | 472 - 103 | 182 - 222 | |
| VR50 | 04 | a | 154 - 274 | 183 - 333 | 123 - 183 | 562 - 822 | 332 - 392 |
| VR66 | 05 | a | 224 - 564 | 393 - 823 | 223 - 393 | 103 - 153 | 682 - 103 |
| VR84 | 06 | a | 684 - 105 | 473 - 154 | 473 - 683 | 183 - 393 | 123 - 183 |
| VR90 | 07 | a | 125 - 275 | 184 - 334 | 823 - 184 | 473 - 124 | 223 - 563 |
| CV41 | 08 | b | 473 - 124 | 822 - 153 | 472 - 103 | 182 - 222 | |
| CH41 | 09 | c | 473 - 124 | 822 - 153 | 472 - 103 | 182 - 222 | |
| CH41 | 10 | d | 473 - 124 | 822 - 153 | 472 - 103 | 182 - 222 | |
| CV51 | 11 | b | 154 - 274 | 183 - 333 | 123 - 183 | 562 - 822 | 332 - 392 |
| CH51 | 12 | c | 154 - 274 | 183 - 333 | 123 - 183 | 562 - 822 | 332 - 392 |
| CH51 | 13 | d | 154 - 274 | 183 - 333 | 123 - 183 | 562 - 822 | 332 - 392 |
| CV61 | 14 | b | 224 - 564 | 393 - 823 | 223 - 393 | 103 - 153 | 682 - 103 |
| CH61 | 15 | c | 224 - 564 | 393 - 823 | 223 - 393 | 103 - 153 | 682 - 103 |
| CH61 | 16 | d | 224 - 564 | 393 - 823 | 223 - 393 | 103 - 153 | 682 - 103 |
| CV76 | 17 | b | 684 - 105 | 473 - 154 | 473 - 683 | 183 - 393 | 123 - 183 |
| CH76 | 18 | c | 684 - 105 | 473 - 154 | 473 - 683 | 183 - 393 | 123 - 183 |
| CH76 | 19 | d | 684 - 105 | 473 - 154 | 473 - 683 | 183 - 393 | 123 - 183 |
| CV91 | 20 | b | 125 - 275 | 184 - 334 | 823 - 184 | 473 - 124 | 223 - 563 |
| CH91 | 21 | c | 125 - 275 | 184 - 334 | 823 - 184 | 473 - 124 | 223 - 563 |
| CH91 | 22 | d | 125 - 275 | 184 - 334 | 823 - 184 | 473 - 124 | 223 - 563 |

### HOW TO ORDER

**Parts should be ordered using the ESCC variant number as follows:**

**3001034 XX B XXX K X**

**Detail Spec Number**

**Type Variant** (per table above)

**Test Level**
C = Standard test level
B = Level C plus serialized and capacitance recorded before and after 100% burn-in.

**Capacitance Code**
The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e.
102 = 1000pF
103 = 10000pF

**Capacitance Tolerance**
K = 10%
M = 20%

**Voltage**
M = 1kV
P = 2kV
R = 3kV
S = 4kV
Z = 5kV

Eg 300103412C274KM

# ESCC Qualified SMPS Capacitors

## High Capacitance

## HIGH CAPACITANCE LEADED CAPACITORS

Capacitors, Fixed, Ceramic Dielectric, Type II, High Capacitance, Based on Case Styles BR, CV and CH for use in ESCC space programs, according to ESCC Generic Specification 3001 and associated Detail Specification 3001/030 as recommended by the Space Components Coordination Group. (see ranges in table below)

Note 1: Lead Types
- a - Leaded Radial (epoxy coated)
- b - Leaded Radial (Polyurethane Varnish)
- c - Straight Dual in Line
- d - L Dual in Line

Note 2: Tolerances of ±10% and ±20% are available

| Case Size | Variant | Figure | Capacitance Code (E12) | | | |
|---|---|---|---|---|---|---|
| | | | 50V | 100V | 200V | 500V |
| BR40 | 01 | a | 185 - 335 | 125 - 395 | 334 - 564 | 124 - 224 |
| BR50 | 02 | a | 395 - 565 | 225 - 395 | 684 - 105 | 274 - 394 |
| BR66 | 03 | a | 685 - 106 | 475 - 825 | 105 - 225 | 474 - 105 |
| BR72 | 04 | a | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| BR84 | 05 | a | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CV41 | 06 | b | 185 - 335 | 125 - 275 | 334 - 564 | 124 - 224 |
| CH41 | 07 | c | 185 - 335 | 125 - 275 | 334 - 564 | 124 - 224 |
| CH41 | 08 | d | 185 - 335 | 125 - 275 | 334 - 564 | 124 - 224 |
| CH42 | 09 | c | 395 - 685 | 335 - 565 | 684 - 125 | 274 - 474 |
| CH42 | 10 | d | 395 - 685 | 335 - 565 | 684 - 125 | 274 - 474 |
| CH43 | 11 | c | 825 - 106 | 685 - 825 | 155 - 185 | 564 - 684 |
| CH43 | 12 | d | 825 - 106 | 685 - 825 | 155 - 185 | 564 - 684 |
| CH44 | 13 | c | 126 | 106 | 225 | 824 - 105 |
| CH44 | 14 | d | 126 | 106 | 225 | 824 - 105 |
| CV51 | 15 | b | 395 - 565 | 225 - 395 | 684 - 105 | 274 - 394 |
| CH51 | 16 | c | 395 - 565 | 225 - 395 | 684 - 105 | 274 - 394 |
| CH51 | 17 | d | 395 - 565 | 225 - 395 | 684 - 105 | 274 - 394 |
| CH52 | 18 | c | 685 - 106 | 475 - 825 | 125 - 225 | 474 - 824 |
| CH52 | 19 | d | 685 - 106 | 475 - 825 | 125 - 225 | 474 - 824 |
| CH53 | 20 | c | 126 - 156 | 106 - 126 | 275 - 335 | 105 - 125 |
| CH53 | 21 | d | 126 - 156 | 106 - 126 | 275 - 335 | 105 - 125 |
| CH54 | 22 | c | 186 - 226 | 156 | 395 | 155 |
| CH54 | 23 | d | 186 - 226 | 156 | 395 | 155 |
| CV61 | 24 | b | 685 - 106 | 475 - 825 | 105 - 225 | 474 - 105 |
| CH61 | 25 | c | 685 - 106 | 475 - 825 | 105 - 225 | 474 - 105 |
| CH61 | 26 | d | 685 - 106 | 475 - 825 | 105 - 225 | 474 - 105 |
| CH62 | 27 | c | 126 - 226 | 106 - 156 | 275 - 475 | 105 - 185 |
| CH62 | 28 | d | 126 - 226 | 106 - 156 | 275 - 475 | 105 - 185 |
| CH63 | 29 | c | 276 - 336 | 186 - 226 | 565 - 685 | 225 - 275 |
| CH63 | 30 | d | 276 - 336 | 186 - 226 | 565 - 685 | 225 - 275 |
| CH64 | 31 | c | 396 | 276 - 336 | 825 - 106 | 335 |
| CH64 | 32 | d | 396 | 276 - 336 | 825 - 106 | 335 |
| CV71 | 33 | b | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CH71 | 34 | c | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CH71 | 35 | d | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CH72 | 36 | c | 226 - 396 | 186 - 276 | 395 - 685 | 185 - 335 |
| CH72 | 37 | d | 226 - 396 | 186 - 276 | 395 - 685 | 185 - 335 |

| Case Size | Variant | Figure | Capacitance Code (E12) | | | |
|---|---|---|---|---|---|---|
| | | | 50V | 100V | 200V | 500V |
| CH73 | 38 | c | 476 - 566 | 336 - 396 | 825 - 106 | 395 - 475 |
| CH73 | 39 | d | 476 - 566 | 336 - 396 | 825 - 106 | 395 - 475 |
| CH74 | 40 | c | 686 | 476 | 126 | 565 |
| CH74 | 41 | d | 686 | 476 | 126 | 565 |
| CV76 | 42 | b | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CH76 | 43 | c | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CH76 | 44 | d | 126 - 186 | 825 - 156 | 225 - 335 | 824 - 155 |
| CH77 | 45 | c | 226 - 396 | 186 - 276 | 395 - 685 | 185 - 335 |
| CH77 | 46 | d | 226 - 396 | 186 - 276 | 395 - 685 | 185 - 335 |
| CH78 | 47 | c | 476 - 566 | 336 - 396 | 825 - 106 | 395 - 475 |
| CH78 | 48 | d | 476 - 566 | 336 - 396 | 825 - 106 | 395 - 475 |
| CH79 | 49 | c | 686 | 476 | 126 | 565 |
| CH79 | 50 | d | 686 | 476 | 126 | 565 |
| CH81 | 51 | c | 156 - 226 | 126 - 186 | 225 - 395 | 824 - 155 |
| CH81 | 52 | d | 156 - 226 | 126 - 186 | 225 - 395 | 824 - 155 |
| CH82 | 53 | c | 276 - 476 | 226 - 396 | 475 - 825 | |
| CH82 | 54 | d | 276 - 476 | 226 - 396 | 475 - 825 | |
| CH83 | 55 | c | 566 - 686 | 476 - 566 | 106 - 126 | |
| CH83 | 56 | d | 566 - 686 | 476 - 566 | 106 - 126 | |
| CH84 | 57 | c | 826 | 686 | 156 | |
| CH84 | 58 | d | 826 | 686 | 156 | |
| CH86 | 59 | c | 226 - 336 | 156 - 276 | 395 - 685 | 155 - 225 |
| CH86 | 60 | d | 226 - 336 | 156 - 276 | 395 - 685 | 155 - 225 |
| CH87 | 61 | c | 396 - 686 | 336 - 566 | 825 - 156 | |
| CH87 | 62 | d | 396 - 686 | 336 - 566 | 825 - 156 | |
| CH88 | 63 | c | 826 - 107 | 686 - 826 | 186 - 226 | |
| CH88 | 64 | d | 826 - 107 | 686 - 826 | 186 - 226 | |
| CH89 | 65 | c | 127 | 107 | 276 | |
| CH89 | 66 | d | 127 | 107 | 276 | |
| CH91 | 67 | c | 396 - 476 | 336 - 396 | 825 - 106 | |
| CH91 | 68 | d | 396 - 476 | 336 - 396 | 825 - 106 | |
| CH92 | 69 | c | 566 - 107 | 476 - 826 | 126 - 226 | |
| CH92 | 70 | d | 566 - 107 | 476 - 826 | 126 - 226 | |
| CH93 | 71 | c | 127 - 157 | 107 - 127 | 276 - 336 | |
| CH93 | 72 | d | 127 - 157 | 107 - 127 | 276 - 336 | |
| CH94 | 73 | c | 187 | 157 | 396 | |
| CH94 | 74 | d | 187 | 157 | 396 | |

## HOW TO ORDER

### Parts should be ordered using the ESCC variant number as follows:

**3001030** — **Detail Spec Number**

**XX** — **Type Variant** (per table above)

**B** — **Test Level**
C = Standard test level
B = Level C plus serialized and capacitance recorded before and after 100% burn-in.

**XXX** — **Capacitance Code**
The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e.
102 = 1000pF
103 = 10000pF

**K** — **Capacitance Tolerance**
K = 10%
M = 20%

**X** — **Voltage**
C = 50V
E = 100V
G = 200V
L = 500V

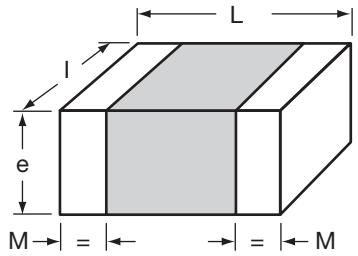
EG 300103018C106KC

**Lot Acceptance Testing is available for all our ESCC qualified ranges.**

LAT 1 42 samples → 12 mechanical + 20 life test + 6 for TC + 4 for solder
LAT 2 30 samples → 20 life test + 6 for TC + 4 for solder
LAT 3 10 samples → 6 for TC + 4 for solder

## ESCC DETAIL SPECIFICATION NO. 3009/034
## PHYSICAL DIMENSIONS

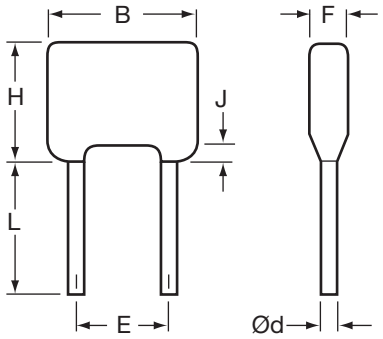
**Millimeters (Inches)**




| Symbol | Variants 01 to 06 | | Variants 07 to 12 | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| L | 4.20 (0.165) | 5.00 (0.197) | 4.20 (0.165) | 5.00 (0.197) |
| I | 2.80 (0.110) | 3.60 (0.142) | 5.67 (0.223) | 6.67 (0.263) |
| e | – | 3.00 (0.118) | – | 3.30 (0.130) |
| M | 0.25 (0.010) | 0.75 (0.030) | 0.25 (0.010) | 0.75 (0.030) |

## ESCC DETAIL SPECIFICATION NO. 3001/034
## PHYSICAL DIMENSIONS – VR STYLE

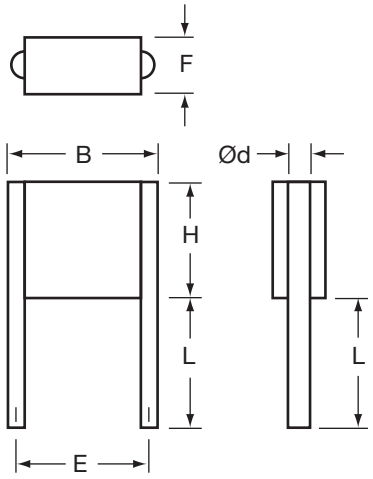
**Millimeters (Inches)**




| Variant | Case Size | B | Ød | | E | | F | H | J | L |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Min. | Max. | Min. | Max. | Max. | Max. | Max. | Min. |
| 01 | VR30S | 7.62 (0.300) | 0.46 (0.018) | 0.56 (0.022) | 4.58 (0.180) | 5.58 (0.220) | 5.00 (0.197) | 4.60 (0.181) | 1.50 (0.059) | 31.7 (1.248) |
| 02 | VR30 | 7.62 (0.300) | 0.46 (0.018) | 0.56 (0.022) | 4.58 (0.180) | 5.58 (0.220) | 5.00 (0.197) | 9.62 (0.379) | 1.50 (0.059) | 31.7 (1.248) |
| 03 | VR40 | 10.16 (0.400) | 0.46 (0.018) | 0.56 (0.022) | 4.58 (0.180) | 5.58 (0.220) | 5.00 (0.197) | 11.7 (0.461) | 1.50 (0.059) | 31.7 (1.248) |
| 04 | VR50 | 12.7 (0.500) | 0.59 (0.023) | 0.69 (0.027) | 9.66 (0.380) | 10.66 (0.420) | 5.10 (0.201) | 14.2 (0.559) | 1.50 (0.059) | 31.7 (1.248) |
| 05 | VR66 | 17.5 (0.689) | 0.86 (0.034) | 0.96 (0.038) | 14.2 (0.559) | 15.2 (0.598) | 6.40 (0.252) | 16.5 (0.650) | 1.50 (0.059) | 31.7 (1.248) |
| 06 | VR84 | 23.62 (0.930) | 0.86 (0.034) | 0.96 (0.038) | 20.4 (0.803) | 22.0 (0.866) | 6.40 (0.252) | 19.78 (0.779) | 1.50 (0.059) | 31.7 (1.248) |
| 07 | VR90 | 23.5 (0.925) | 0.86 (0.034) | 0.96 (0.038) | 20.4 (0.803) | 22.0 (0.866) | 6.40 (0.252) | 42.0 (1.654) | 1.50 (0.059) | 31.7 (1.248) |

## ESCC DETAIL SPECIFICATION NO. 3001/034
## PHYSICAL DIMENSIONS – CV STYLE

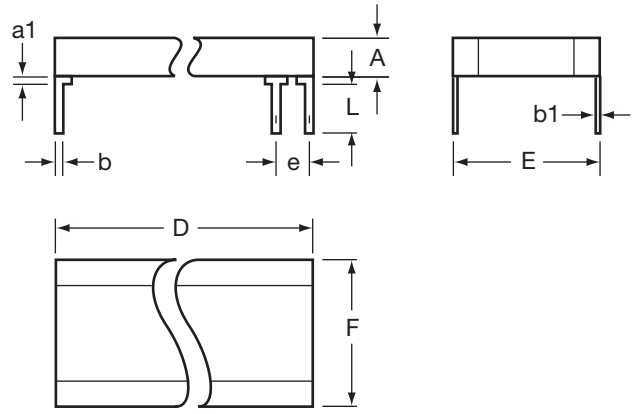
**Millimeters (Inches)**




| Variant | Case Size | B | Ød | | E | | F | H | L | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Min. | Max. | Min. | Max. | Max. | Max. | Min. | Max. |
| 08 | CV41 | 10.6 (0.417) | 0.65 (0.026) | 0.75 (0.030) | 7.70 (0.303) | 8.70 (0.343) | 3.80 (0.150) | 8.70 (0.343) | 22.0 (0.866) | 28.0 (1.102) |
| 11 | CV51 | 11.9 (0.469) | 0.85 (0.033) | 0.95 (0.037) | 9.66 (0.380) | 10.66 (0.420) | 3.80 (0.150) | 10.7 (0.421) | 22.0 (0.866) | 28.0 (1.102) |
| 14 | CV61 | 16.5 (0.650) | 0.85 (0.033) | 0.95 (0.037) | 14.74 (0.580) | 15.74 (0.620) | 3.80 (0.150) | 13.6 (0.535) | 22.0 (0.866) | 28.0 (1.102) |
| 17 | CV76 | 22.7 (0.894) | 0.85 (0.033) | 0.95 (0.037) | 20.4 (0.803) | 22.0 (0.866) | 3.80 (0.150) | 16.6 (0.654) | 22.0 (0.866) | 28.0 (1.102) |
| 20 | CV91 | 22.7 (0.894) | 1.15 (0.045) | 1.25 (0.049) | 20.4 (0.803) | 22.0 (0.866) | 3.80 (0.150) | 40.6 (1.598) | 22.0 (0.866) | 28.0 (1.102) |

## ESCC DETAIL SPECIFICATION NO. 3001/034
## PHYSICAL DIMENSIONS – CH STYLE, D.I.L.

**Millimeters (Inches)**



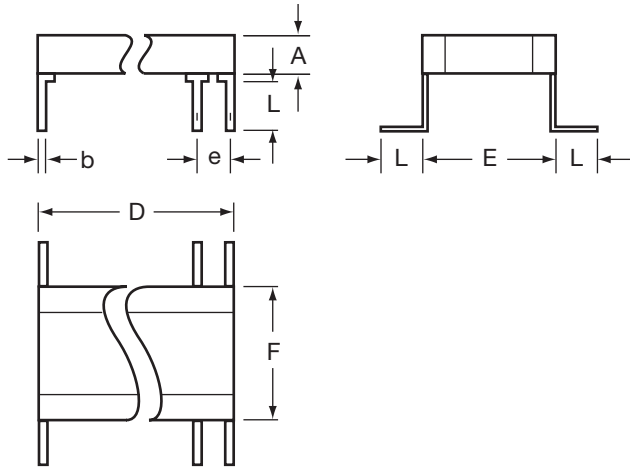

| Symbol | Min. | Max. | Notes |
|---|---|---|---|
| a1 | - | 2.00 (0.079) | 1 |
| b | 0.45 (0.018) | 0.55 (0.022) | 1 |
| b1 | 0.204 (0.008) | 0.304 (0.012) | 1 |
| e | 2.49 (0.098) | 2.59 (0.102) | 2 |
| L | 12.0 (0.472) | 14.0 (0.551) | 1 |

Notes: 1 – All leads
2 – Each space

| Variant | Case Size | A | D | E | | F |
|---|---|---|---|---|---|---|
| | | Max. | Max. | Min. | Max. | Max. |
| 07 | CH41 | 3.80 (0.150) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 09 | CH42 | 7.40 (0.291) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 11 | CH43 | 11.1 (0.437) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 13 | CH44 | 14.8 (0.583) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 16 | CH51 | 3.80 (0.150) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 18 | CH52 | 7.40 (0.291) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 20 | CH53 | 11.1 (0.437) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 22 | CH54 | 14.8 (0.583) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 25 | CH61 | 3.80 (0.150) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 27 | CH62 | 7.40 (0.291) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 29 | CH63 | 11.1 (0.437) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 31 | CH64 | 14.8 (0.583) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 34 | CH71 | 3.80 (0.150) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 36 | CH72 | 7.40 (0.291) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 38 | CH73 | 11.1 (0.437) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 40 | CH74 | 14.8 (0.583) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 43 | CH76 | 3.80 (0.150) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 45 | CH77 | 7.40 (0.291) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 47 | CH78 | 11.1 (0.437) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 49 | CH79 | 14.8 (0.583) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 51 | CH81 | 3.80 (0.150) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 53 | CH82 | 7.40 (0.291) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 55 | CH83 | 11.1 (0.437) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 57 | CH84 | 14.8 (0.583) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 59 | CH86 | 3.80 (0.150) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 61 | CH87 | 7.40 (0.291) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 63 | CH88 | 11.1 (0.437) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 65 | CH89 | 14.8 (0.583) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 67 | CH91 | 3.80 (0.150) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 69 | CH92 | 7.40 (0.291) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 71 | CH93 | 11.1 (0.437) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 73 | CH94 | 14.8 (0.583) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |

## ESCC DETAIL SPECIFICATION NO. 3001/034
## PHYSICAL DIMENSIONS – CH STYLE, L

**Millimeters (Inches)**



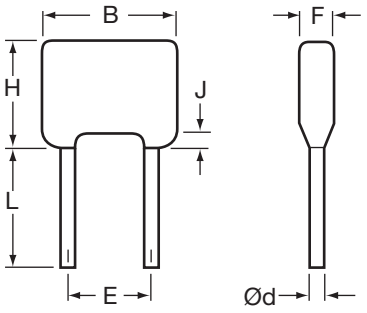

| Variant | Case Size | A | D | E | | F |
|---|---|---|---|---|---|---|
| | | Max. | Max. | Min. | Max. | Max. |
| 10 | CH41 | 3.80 (0.150) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 13 | CH51 | 3.80 (0.150) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 16 | CH61 | 3.80 (0.150) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 19 | CH76 | 3.80 (0.150) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 22 | CH91 | 3.80 (0.150) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |

| Symbol | Min. | Max. | Notes |
|---|---|---|---|
| b | 0.45 (0.018) | 0.55 (0.022) | 1 |
| e | 2.49 (0.098) | 2.59 (0.102) | 2 |
| L | 2.04 (0.080) | 3.01 (0.120) | 1 |

Notes: 1 – All leads
2 – Each space

## ESCC DETAIL SPECIFICATION NO. 3001/030
## PHYSICAL DIMENSIONS – BR STYLE

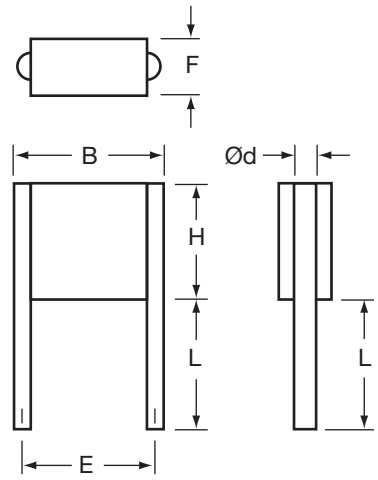
**Millimeters (Inches)**




| Variant | Case Size | B | Ød | | E | | F | H | J | L |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Min. | Max. | Min. | Max. | Max. | Max. | Max. | Min. |
| 01 | BR40 | 10.16 (0.400) | 0.46 (0.018) | 0.56 (0.022) | 4.58 (0.180) | 5.58 (0.220) | 5.00 (0.197) | 11.7 (0.461) | 1.50 (0.059) | 31.7 (1.248) |
| 02 | BR50 | 12.7 (0.500) | 0.59 (0.023) | 0.69 (0.027) | 9.66 (0.380) | 10.66 (0.420) | 5.10 (0.201) | 14.2 (0.559) | 1.50 (0.059) | 31.7 (1.248) |
| 03 | BR66 | 17.5 (0.689) | 0.86 (0.034) | 0.96 (0.038) | 14.2 (0.559) | 15.2 (0.598) | 6.40 (0.252) | 16.5 (0.650) | 1.50 (0.059) | 31.7 (1.248) |
| 04 | BR72 | 19.3 (0.760) | 0.86 (0.034) | 0.96 (0.038) | 14.74 (0.580) | 15.74 (0.620) | 6.40 (0.252) | 24.0 (0.945) | 1.50 (0.059) | 31.7 (1.248) |
| 05 | BR84 | 23.62 | 0.71 | 0.81 | 18.93 | 20.83 | 6.40 | 19.78 | 1.50 | 31.7 |

## ESCC DETAIL SPECIFICATION NO. 3001/030
## PHYSICAL DIMENSIONS – CV STYLE

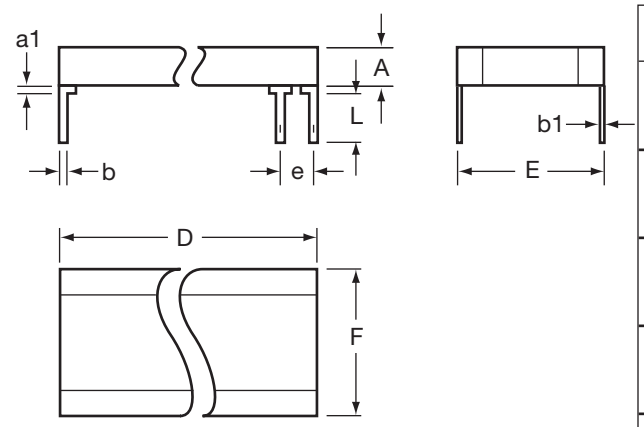
**Millimeters (Inches)**




| Variant | Case Size | B | Ød | | E | | F | H | L | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Min. | Max. | Min. | Max. | Max. | Max. | Min. | Max. |
| 06 | CV41 | 10.6 (0.417) | 0.65 (0.026) | 0.75 (0.030) | 7.70 (0.303) | 8.70 (0.343) | 3.80 (0.150) | 8.70 (0.343) | 22.0 (0.866) | 28.0 (1.102) |
| 15 | CV51 | 11.9 (0.469) | 0.85 (0.033) | 0.95 (0.037) | 9.66 (0.380) | 10.66 (0.420) | 3.80 (0.150) | 10.7 (0.421) | 22.0 (0.866) | 28.0 (1.102) |
| 24 | CV61 | 16.5 (0.650) | 0.85 (0.033) | 0.95 (0.037) | 14.74 (0.580) | 15.74 (0.620) | 3.80 (0.150) | 13.6 (0.535) | 22.0 (0.866) | 28.0 (1.102) |
| 33 | CV71 | 17.8 (0.701) | 0.85 (0.033) | 0.95 (0.037) | 14.74 (0.580) | 15.74 (0.620) | 3.80 (0.150) | 21.6 (0.850) | 22.0 (0.866) | 28.0 (1.102) |
| 42 | CV76 | 22.7 (0.894) | 0.85 (0.033) | 0.95 (0.037) | 20.4 (0.803) | 22.0 (0.866) | 3.80 (0.150) | 16.6 (0.654) | 22.0 (0.866) | 28.0 (1.102) |

## ESCC DETAIL SPECIFICATION NO. 3001/030
## PHYSICAL DIMENSIONS – CH STYLE, D.I.L.

Millimeters (Inches)



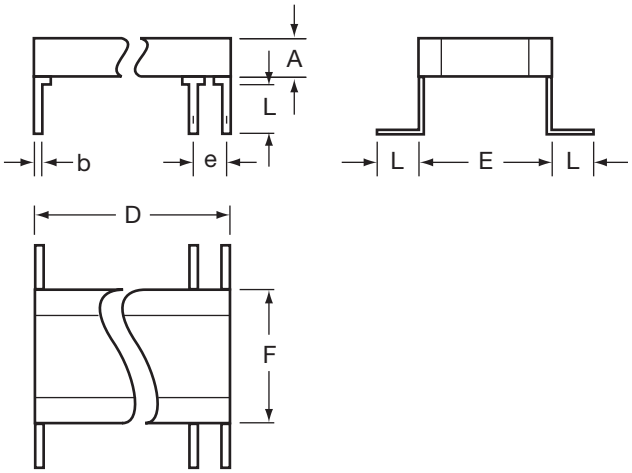

| Symbol | Min. | Max. | Notes |
|---|---|---|---|
| a1 | - | 2.00 (0.079) | 1 |
| b | 0.45 (0.018) | 0.55 (0.022) | 1 |
| b1 | 0.204 (0.008) | 0.304 (0.012) | 1 |
| e | 2.49 (0.098) | 2.59 (0.102) | 2 |
| L | 2.04 (0.080) | 3.04 (0.120) | 1 |

Notes: 1 – All leads
2 – Each space

| Variant | Case Size | A | D | E | | F |
|---|---|---|---|---|---|---|
| | | Max. | Max. | Min. | Max. | Max. |
| 07 | CH41 | 3.80 (0.150) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 09 | CH42 | 7.40 (0.291) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 11 | CH43 | 11.1 (0.437) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 13 | CH44 | 14.8 (0.583) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343) | 9.20 (0.362) |
| 16 | CH51 | 3.80 (0.150) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 18 | CH52 | 7.40 (0.291) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 20 | CH53 | 11.1 (0.437) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 22 | CH54 | 14.8 (0.583) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 25 | CH61 | 3.80 (0.150) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 27 | CH62 | 7.40 (0.291) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 29 | CH63 | 11.1 (0.437) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 31 | CH64 | 14.8 (0.583) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 34 | CH71 | 3.80 (0.150) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 36 | CH72 | 7.40 (0.291) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 38 | CH73 | 11.1 (0.437) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 40 | CH74 | 14.8 (0.583) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 43 | CH76 | 3.80 (0.150) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 45 | CH77 | 7.40 (0.291) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 47 | CH78 | 11.1 (0.437) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 49 | CH79 | 14.8 (0.583) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 51 | CH81 | 3.80 (0.150) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 53 | CH82 | 7.40 (0.291) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 55 | CH83 | 11.1 (0.437) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 57 | CH84 | 14.8 (0.583) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 59 | CH86 | 3.80 (0.150) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 61 | CH87 | 7.40 (0.291) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 63 | CH88 | 11.1 (0.437) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 65 | CH89 | 14.8 (0.583) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 67 | CH91 | 3.80 (0.150) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 69 | CH92 | 7.40 (0.291) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 71 | CH93 | 11.1 (0.437) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 73 | CH94 | 14.8 (0.583) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |

## ESCC DETAIL SPECIFICATION NO. 3001/030
## PHYSICAL DIMENSIONS – CH STYLE, L

Millimeters (Inches)




| Symbol | Min. | Max. | Notes |
|---|---|---|---|
| b | 0.45 (0.018) | 0.55 (0.022) | 1 |
| e | 2.49 (0.098) | 2.59 (0.102) | 2 |
| L | 2.04 (0.080) | 3.04 (0.120) | 1 |

Notes: 1 – All leads
2 – Each space

| Variant | Case Size | A | D | E | | F |
|---|---|---|---|---|---|---|
| | | Max. | Max. | Min. | Max. | Max. |
| 08 | CH41 | 3.80 (0.150) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343 | 9.20 (0.362) |
| 10 | CH42 | 7.40 (0.291) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343 | 9.20 (0.362) |
| 12 | CH43 | 11.1 (0.437) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343 | 9.20 (0.362) |
| 14 | CH44 | 14.8 (0.583) | 8.70 (0.343) | 7.70 (0.303) | 8.70 (0.343 | 9.20 (0.362) |
| 17 | CH51 | 3.80 (0.150) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 19 | CH52 | 7.40 (0.291) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 21 | CH53 | 11.1 (0.437) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 23 | CH54 | 14.8 (0.583) | 10.7 (0.421) | 9.66 (0.380) | 10.66 (0.420) | 10.7 (0.421) |
| 26 | CH61 | 3.80 (0.150) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 28 | CH62 | 7.40 (0.291) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 30 | CH63 | 11.1 (0.437) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 32 | CH64 | 14.8 (0.583) | 13.6 (0.535) | 13.5 (0.531) | 14.5 (0.571) | 14.9 (0.587) |
| 35 | CH71 | 3.80 (0.150) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 37 | CH72 | 7.40 (0.291) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 39 | CH73 | 11.1 (0.437) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 41 | CH74 | 14.8 (0.583) | 21.6 (0.850) | 14.74 (0.580) | 15.74 (0.620) | 16.8 (0.661) |
| 44 | CH76 | 3.80 (0.150) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 46 | CH77 | 7.40 (0.291) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 48 | CH78 | 11.1 (0.437) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 50 | CH79 | 14.8 (0.583) | 16.6 (0.654) | 19.52 (0.769) | 21.12 (0.831) | 21.6 (0.850) |
| 52 | CH81 | 3.80 (0.150) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 54 | CH82 | 7.40 (0.291) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 56 | CH83 | 11.1 (0.437) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 58 | CH84 | 14.8 (0.583) | 38.2 (1.504) | 9.66 (0.380) | 10.66 (0.420) | 12.0 (0.472) |
| 60 | CH86 | 3.80 (0.150) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 62 | CH87 | 7.40 (0.291) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 64 | CH88 | 11.1 (0.437) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 66 | CH89 | 14.8 (0.583) | 38.2 (1.504) | 14.74 (0.580) | 15.74 (0.620) | 18.9 (0.744) |
| 68 | CH91 | 3.80 (0.150) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 70 | CH92 | 7.40 (0.291) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 72 | CH93 | 11.1 (0.437) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |
| 74 | CH94 | 14.8 (0.583) | 40.6 (1.598) | 19.52 (0.769) | 21.12 (0.831) | 24.0 (0.945) |

## QPL CERTIFICATES

Types covered by similarity:

Tolerance (±): 0.5pF, 2, 5, 20%

Remarks:

| Procurement Specifications | Manufacturer | Nature of Approval | Supervising Authority | Date |
|---|---|---|---|---|
| Generic<br>ESCC 3009<br><br>Detail<br>ESCC 3009/003<br>3009/004<br>3009/005<br>3009/006<br>3009/022 | AVX/TPC<br>St. Apollinaire<br>France | Qualification<br>Extension<br>Requalification<br>Extension<br>Extension<br>Extension<br>Extension<br>Requalification<br>Extension<br>Extension<br>Extension | CNES<br>CNES<br>CNES<br>CNES<br>CNES<br>CNES<br>CNES<br>CNES<br>CNES<br>CNES<br>CNES | Feb 1983<br>Sep 1986<br>Apr 1992<br>Jan 1995<br>Jun 1998<br>Nov 2000<br>Jun 2003<br>Feb 2005<br>May 2007<br>June 2009<br>June 2011 |

Characteristics: Operating Temp Range (ºC), -55 to +125
Variants 01, 03 and 06 are qualified
Values covered by ESCC Specification defined below.

| Style | Model | Detail Spec | Variants | Cap Range (pF) | Rated Volt. (V) | Tolerance (±%) | TC (ppm/ºC) |
|---|---|---|---|---|---|---|---|
| 0805 | A_12C | 3000/003 | 01, 06 | 4.7 to 9.1 | 50,100 | 0.5pF | ±30 |
| | | | | 10 to 1500 | 50,100 | 1, 2, 5, 10 | |
| 1206 | A_20C | 3000/022 | 01, 06 | 10 to 3900 | 50,100 | 1, 2, 5, 10 | ±30 |
| 1210 | A_13C | 3000/004 | 01, 06 | 22 to 6800 | 50,100 | 1, 2, 5, 10 | ±30 |
| 1812 | A_14C | 3000/005 | 01, 06 | 100 to 15000 | 50,100 | 1, 2, 5, 10 | ±30 |
| 2220 | A_15C | 3000/006 | 01, 06 | 470 to 33000 | 50,100 | 1, 2, 5, 10 | ±30 |

CAPACITORS,
CERAMIC, FIXED,
CHIP, TYPE I

| Current Validity of Qualification | | Page |
|---|---|---|
| Certificate No. | Valid Until | 01-02 |
| 109 K | June 2013 | 001-1 |

## QPL CERTIFICATES

Characteristics:

| Style | Model | Detail Spec | Variants | Cap Range (pF) | Rated Volt. (V) | Tolerance (±%)) |
|---|---|---|---|---|---|---|
| 0805 | A_12G | 3009/008 | 01, 03, 06 | 10000 to 47000<br>3900 to 27000<br>820 to 10000 | 25<br>50<br>100 | 5, 10, 20<br>5, 10, 20<br>5, 10, 20 |
| 0805 | A612Z | 3009/008 | 07 | 27000 to 100000<br>27000 to 68000<br>10000 to 47000 | 25<br>50<br>100 | 5, 10, 20 |
| 1210 | A_13G | 3009/009 | 01, 03, 06 | 47000 to 220000<br>33000 to 120000<br>3900 to 47000 | 25<br>50<br>100 | 5, 10, 20<br>5, 10, 20<br>5, 10, 20 |
| 1210 | A613Z | 3009/009 | 07 | 100000 to 470000<br>100000 t0 330000<br>47000 to 220000 | 25<br>50<br>100 | 5, 10, 20 |
| 1812 | A_14G | 3009/010 | 01, 03, 06 | 82000 to 470000<br>56000 to 270000<br>6800 to 82000 | 25<br>50<br>100 | 5, 10, 20<br>5, 10, 20<br>5, 10, 20 |
| 1812 | A614Z | 3009/010 | 07 | 220000 to 1000000<br>220000 to 680000<br>82000 to 470000 | 250<br>50<br>100 | 5, 10, 20 |
| 2220 | A_15G | 3009/011 | 01, 03, 06 | 180000 to 1000000<br>100000 to 680000<br>18000 to 180000 | 25<br>50<br>100 | 5, 10, 20<br>5, 10, 20<br>5, 10, 20 |
| 2220 | A615Z | 3009/011 | 07 | 470000 to 2200000<br>470000 to 1500000<br>180000 to 1000000 | 25<br>50<br>100 | 5, 10, 20 |
| 1206 | A_20G | 3009/023 | 01, 03, 06 | 27000 to 100000<br>12000 to 68000<br>2200 to 22000 | 25<br>50<br>100 | 5, 10, 20<br>5, 10, 20<br>5, 10, 20 |
| 1206 | A620Z | 3009/023 | 07 | 47000 to 220000<br>47000 to 150000<br>27000 to 100000 | 25<br>50<br>100 | 5, 10, 20 |

| | | Current Validity of Qualification | | Page |
|---|---|---|---|---|
| | CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE II | Certificate No. | Valid Until | 01-02 |
| | | 110 K | June 2013 | 002-1B |

## AMERICAS

**AVX Myrtle Beach, SC**
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**AVX Northwest, WA**
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**AVX Midwest, IN**
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**AVX Mid/Pacific, CA**
Tel: 408-988-4900

**AVX Northeast, MA**
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**AVX Southwest, CA**
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