



# DATA SHEET

## MLCC Chip Capacitor Size 1812

**Serie: I11009**

|              |            |                                    |
|--------------|------------|------------------------------------|
| Mat. Code    | <b>X7R</b> | Material: <b>X7R= X7R Material</b> |
| Voltage Code | <b>201</b> | Voltage: <b>201= 200Volt</b>       |
| Range Code   | <b>155</b> | Range: <b>155= 1,5µf</b>           |

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1812**

Serie No.: **I11009**

Customer:

|       |        |      |        |        |        |           |           |      |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. |      | 1 from 14  |

# EDCON-COMPONENTS



## Structure of Chip Capacitor



| No | Name                |
|----|---------------------|
| 1  | Ceramic dielectric  |
| 2  | Inner Electrode     |
| 3  | Substrate Electrode |
| 4  | Nickel Layer        |
| 5  | Tin Layer           |

## Nominal Capacitance Unit (pf)

| Ordering Code | Actual Value |
|---------------|--------------|
| 0P5           | 0,5pf        |
| 1R0           | 1,0pf        |
| 102           | 1000pf       |
| 224           | 220000pf     |

Note: The first two digits are significant; third digit denotes number of zeros after range; P= decimal point

## Capacitance Tolerance

| Ord. Code | B     | C      | D     | F    | G    | J    | K   | M   | S              | Z              |
|-----------|-------|--------|-------|------|------|------|-----|-----|----------------|----------------|
| Tolerance | 0,1pf | 0,25pf | 0,5pf | 1,0% | 2,0% | 5,0% | 10% | 20% | +.50%<br>/-20% | +.80%<br>/-20% |

Note: These capacitance tolerance B,C,D are just applicable th capacitance that eqals to or less.

## Dielectric Style

| Dielectric Code | CG         | HG | LG | PH | RH | SH | TH | UJ | SL | X   | B   | E   | F   |
|-----------------|------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| Dielectric      | COG<br>NPO | HG | LG | PH | RH | SH | TH | UJ | SL | X5R | X7R | Z5U | Y5V |

## Drawing



## Dimensions (mm)

| Chip-Size Code | L    | W    | T    | WB   |
|----------------|------|------|------|------|
| 1812           | 4,50 | 3,20 | <2,5 | 0,75 |

Note: We can design according to customer special requirements

## Rated Voltage (V)

| Code | Actual Value |
|------|--------------|
| 6V3  | 6,3          |
| 500  | 50           |
| 201  | 200          |
| 102  | 1000         |

Note: The first two digits are significant; third digit denotes number of zeros after range; P= decimal point

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# EDCON-COMPONENTS



## Terminal Material Styles

| Ordering Code | Termination Material            |
|---------------|---------------------------------|
| <b>S</b>      | (Silver Solderable Termination) |
| <b>C</b>      | (Copper Solderable Termination) |
| <b>N</b>      | (Nickel Barrier Termination)    |

## Application

Hi-Q COG capacitance are ideally suited for RF and Microwave application requiring high Q, low ESR, and high resonant frequency

## Temperature Coefficient / Characteristics

| Dielectric | Temperature Coefficient | Temperature Point               |
|------------|-------------------------|---------------------------------|
| COG/NPO    | . 0 +/- 30 ppm/°C       | +.20°C > -55°C > +20°C > +125°C |
| HG         | -.33 +/-30 ppm/°C       | +.20°C > -55°C > +20°C > +85°C  |
| LG         | -.75 +/-30 ppm/°C       | +.20°C > -55°C > +20°C > +85°C  |
| CH         | 0 +/-60 ppm/°C          | +.20°C > -55°C > +20°C > +85°C  |
| PH         | -.150 +/-60 ppm/°C      | +.20°C > -55°C > +20°C > +85°C  |
| RH         | -.220 +/-60 ppm/°C      | +.20°C > -55°C > +20°C > +85°C  |
| SH         | -.330 +/-60 ppm/°C      | +.20°C > -55°C > +20°C > +85°C  |
| TH         | -.470 +/-60 ppm/°C      | +.20°C > -55°C > +20°C > +85°C  |
| UJ         | -.750 +/-120 ppm/°C     | +.20°C > -55°C > +20°C > +85°C  |
| SL         | -.1000 +140 ppm/°C      | +.20°C > -55°C > +20°C > +85°C  |
| X7R        | . +/-15%                | +.20°C > -55°C > +20°C > +125°C |
| X5R        | . +/-15%                | +.20°C > -55°C > +20°C > +85°C  |
| Z5U        | -.56% ~ +22%            | +.20°C > -55°C > +20°C > +85°C  |
| Y5V        | -.80% ~ +30%            | +.20°C > -55°C > +20°C > +85°C  |

Note: Nominal Temperature coefficient and allowed tolerance of class 1 are decided by the changing of the capacitance between 20°C and 85°C

## Note for CQ

The following Q value is just confirmed by general customer. If there is a higher requirement for Q value requirements, we can design and produce according to the special requirements.

For the customer whose requirements for frequency is between 1MHz and 2,4GHz or higher frequency, we can design it according to their requirements. The frequency of CQ is a little bit higher than that of CF. Please choose them according to your requirements.

| Capacitance (pf) | Q value at 300MHz |      | Capacitance (pf) | Q value at 300MHz |      | Capacitance (pf) | Q value at 300MHz |      |
|------------------|-------------------|------|------------------|-------------------|------|------------------|-------------------|------|
|                  | O805              | O603 |                  | O805              | O603 |                  | O805              | O603 |
| 4,7              | 1000              | 800  | 11               | 450               | 360  | 24               | 200               | 160  |
| 5,2              | 900               | 720  | 12               | 400               | 320  | 27               | 175               | 140  |
| 5,6              | 850               | 680  | 13               | 375               | 300  | 30               | 150               | 120  |
| 6,2              | 800               | 640  | 14               | 350               | 280  | 33               | 140               | 112  |
| 6,8              | 700               | 560  | 15               | 325               | 260  | 36               | 130               | 104  |
| 7,5              | 650               | 20   | 16               | 300               | 240  | 39               | 120               | 96   |
| 8,2              | 575               | 460  | 18               | 250               | 200  | 43               | 110               | 88   |
| 9,1              | 525               | 420  | 20               | 225               | 180  | 47               | 100               | 80   |
| 10               | 500               | 400  | 22               | 215               | 172  |                  |                   |      |

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| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE      | 25.10.2010 | Customer: |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 3 from 14 |            |           |

# EDCON-COMPONENTS



## Note for CF

The following Q value is just confirmed by general customer. If there is a higher requirement for Q value requirements, we can design and produce according to the special requirements.

For the customer whose requirements for frequency is between 1MHz and 2,4GHz or higher frequency, we can design it according to their requirements. The frequency of CQ is a little bit higher than that of CF. Please choose them according to your requirements.

| Capacitance (pf) | Q value at 300MHz |      | Capacitance (pf) | Q value at 300MHz |      | Capacitance (pf) | Q value at 300MHz |      |
|------------------|-------------------|------|------------------|-------------------|------|------------------|-------------------|------|
|                  | O805              | O603 |                  | O805              | O603 |                  | O805              | O603 |
| 4,7              | 400               | 320  | 20               | 90                | 72   | 91               | 24                | 20   |
| 5,2              | 36                | 288  | 22               | 86                | 69   | 100              | 22                | 18   |
| 5,6              | 340               | 272  | 24               | 80                | 64   | 110              | 20                | 16   |
| 6,2              | 320               | 256  | 27               | 70                | 56   | 120              | 28                | 15   |
| 6,8              | 280               | 224  | 30               | 60                | 48   | 130              | 16                | 13   |
| 7,5              | 260               | 208  | 33               | 56                | 45   |                  |                   |      |
| 8,2              | 230               | 184  | 36               | 52                | 42   |                  |                   |      |
| 9,1              | 210               | 168  | 39               | 48                | 39   |                  |                   |      |
| 10               | 200               | 160  | 43               | 44                | 36   |                  |                   |      |
| 11               | 180               | 144  | 47               | 40                | 32   |                  |                   |      |
| 12               | 160               | 128  | 51               | 36                | 29   |                  |                   |      |
| 13               | 150               | 120  | 56               | 34                | 28   |                  |                   |      |
| 14               | 140               | 112  | 62               | 32                | 26   |                  |                   |      |
| 15               | 130               | 104  | 68               | 30                | 24   |                  |                   |      |
| 16               | 120               | 96   | 75               | 28                | 23   |                  |                   |      |
| 18               | 100               | 80   | 82               | 26                | 20   |                  |                   |      |

## High Voltage MLCC

Middle & High Voltage MLCC is a kind of special design MLCC that bases on the technology of general MLCC. This kind of MLCC has stable high voltage reliability and suitable to SMT. Middle & High Voltage MLCC is widely applicable for many direct high voltage circuits in which it can improve the performance of the circuit.

## Application

- Analog & Digital modems
- LAN & WAN Interface
- Lighting Ballast Circuits
- Voltage Multipliers
- DC-DC-Converter
- Back-Lighting Inverters

## Measurement Method for High Voltage MLCC

| Rated Voltage Range | Measuring Method                                                           |
|---------------------|----------------------------------------------------------------------------|
| 500V ≤ Vr ≤ 1000V   | Force 150% Rated Voltage for 5seconds. Max. current should not exceed 50mA |
| 1000V ≤ Vr ≤ 2000V  | Force 120% Rated Voltage for 5seconds. Max. current should not exceed 50mA |
| 2000V ≤ Vr ≤ 5000V  | Force 120% Rated Voltage for 5seconds. Max. current should not exceed 10mA |

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Part No.: **I11009**

|       |        |      |        |        |        |           |           |           |            |           |
|-------|--------|------|--------|--------|--------|-----------|-----------|-----------|------------|-----------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE      | 25.10.2010 | Customer: |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 4 from 14 |            |           |

# EDCON-COMPONENTS



## Reliability Test

| Item                           | Technical specification      |                                          |        |                              | Test Methods and Remarks   |             |                              |  |
|--------------------------------|------------------------------|------------------------------------------|--------|------------------------------|----------------------------|-------------|------------------------------|--|
| Capacitance                    | Class I                      | Should be within the specified tolerance |        | Capacitance                  | Measuring Frequency        |             | Measuring Voltage            |  |
|                                |                              |                                          |        | ≤1000pf                      | 1MHz +/- 10%               |             | 1,0 Tol. 0,2Vrms             |  |
|                                |                              |                                          |        | ≥1000pf                      | 1KHz +/- 10%               |             |                              |  |
| DF, tan Dissipation<br>Favctor | Class II                     | Should be within the specified tolerance |        | C≤10μF                       | Test Frequency 1KHZ +/-10% |             |                              |  |
|                                |                              |                                          |        | Test Voltage 1,0 +/- 0,2Vrms |                            |             |                              |  |
|                                |                              |                                          |        | X7R, Y5V                     |                            |             |                              |  |
|                                |                              |                                          |        | C>10μF                       | Test Frequency 1KHZ +/-10% |             |                              |  |
|                                |                              |                                          |        | Test Voltage 1,0 +/- 0,2Vrms |                            |             |                              |  |
|                                |                              |                                          |        | Z5U                          |                            |             |                              |  |
|                                | Test Frequency 1KHZ +/-10%   |                                          |        |                              |                            |             |                              |  |
|                                | Test Voltage 1,0 +/- 0,2Vrms |                                          |        |                              |                            |             |                              |  |
|                                | Class I                      | DF≤ 0,15%                                |        | Capacitance                  | Measuring Frequency        |             | Measuring Voltage            |  |
|                                |                              |                                          |        | ≤1000pf                      | 1MHz +/- 10%               |             | 1,0 Tol. 0,2Vrms             |  |
| ≥1000pf                        |                              |                                          |        | 1KHz +/- 10%                 |                            |             |                              |  |
| Class II                       | X7R                          | >50V                                     | 25V    | 16V                          | 10V                        | 6,3V        | C= 10μF                      |  |
|                                |                              | ≤ 2,5%                                   | ≤ 3,5% | ≤ 3,5%                       | ≤ 5%                       | ≤ 5%        | Test Frequency 1KHZ +/-10%   |  |
|                                |                              |                                          |        |                              |                            | ≤ 10%       | Test Voltage 1,0 +/- 0,2Vrms |  |
|                                |                              |                                          |        |                              |                            | ( C≥ 3,3μF) |                              |  |

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| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE      | 25.10.2010 | Customer: |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 5 from 14 |            |           |

# EDCON-COMPONENTS



## Reliability Test

|                                       |                                                                                                        |                        |                        |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
|---------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------|------------------------|-------------------------------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|--|--|
| DF, tan Dissipation Factor            | Class II                                                                                               | Y5V / Z5U              | ≥25V                   | 16V                                                         | 10V    | 6,3V                                                                                                                                                                                          | C= 10μF X7R; Y5V             |  |  |  |
|                                       |                                                                                                        |                        | ≤ 7,0%                 | ≤12,5%                                                      | ≤12,5% | ≤12,5%                                                                                                                                                                                        | Test Frequency 120Hz +/-20Hz |  |  |  |
|                                       |                                                                                                        |                        | ( C < 1,0μF)           |                                                             |        |                                                                                                                                                                                               | Test Voltage 0,5 +/- 0,1Vrms |  |  |  |
|                                       |                                                                                                        |                        | ≤ 9,0%                 |                                                             |        |                                                                                                                                                                                               | Test Frequency 0,1KHz        |  |  |  |
| ( C ≥ 1,0μF)                          | Test Voltage 0,5 +/- 0,05Vrms                                                                          |                        |                        |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
| (IR) Insulation Resistance            | Class I                                                                                                | C ≤ 10nf, Ri ≥ 50000MΩ |                        | Measuring Voltage: Rated Voltage<br>Duration: 60Sec. +/- 5s |        |                                                                                                                                                                                               |                              |  |  |  |
|                                       |                                                                                                        | C > 10nf, Ri ≥ 500S    |                        |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
|                                       | Class II                                                                                               | X7R                    | C ≤ 25nf, Ri ≥ 10000MΩ |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
|                                       |                                                                                                        |                        | C > 25nf, Ri ≥ 100S    |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
| Y5V / Z5U                             |                                                                                                        | C ≤ 25nf, Ri ≥ 4000MΩ  |                        |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
|                                       |                                                                                                        | C > 25nf, Ri ≥ 100S    |                        |                                                             |        |                                                                                                                                                                                               |                              |  |  |  |
| Item                                  | Technical Specification                                                                                |                        |                        |                                                             |        | Test Method and Remarks                                                                                                                                                                       |                              |  |  |  |
| (DWV) Dielectric Withstanding Voltage | No Breakdown or damage                                                                                 |                        |                        |                                                             |        | Measuring Voltage:<br>Class I: 300% Rated Voltage<br>Class II: 250% Rated Voltage<br>Duration : 5 +/-1sec<br>Charge / Discharge Current : 50mA max.<br>This method excludes high voltage MLCC |                              |  |  |  |
| Solderability                         | At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage: |                        |                        |                                                             |        | Solder Temperature: 235°C +/- 5°C<br>Duration : 2 +/-0,5sec                                                                                                                                   |                              |  |  |  |

|                                 |
|---------------------------------|
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| <b>1812</b>                     |
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| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 6 from 14 |            |           |

# EDCON-COMPONENTS



## Reliability Test

|                                                        |                                                                                                |                       |             |              |     |                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------|-------------|--------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resistance to Soldering Heat                           | Item                                                                                           | NPO to SL             | X7R         | Y5V          | Z5U | Preheating conditions: 100 to 200°C +/- 10°C 2mon.<br>Solder Temperature: 265°C +/- 5°C Duration 5sec. +/- 1sec.<br>Clean the capacitor with solvent and examine it with a 10x(min) microscope.<br>Recovery time : 24hrs +/-2hrs<br>Recovery conditions: Room temperature |
|                                                        | C/C                                                                                            | ≤ 0,5%                | . -5 ~ +10% | . -10 ~ +20% |     |                                                                                                                                                                                                                                                                           |
|                                                        | DF                                                                                             | Same to initial Value |             |              |     |                                                                                                                                                                                                                                                                           |
|                                                        | IR                                                                                             | Same to initial Value |             |              |     |                                                                                                                                                                                                                                                                           |
|                                                        | Apperance: No visible damage. At least 95% of the terminal electrode is covered by new solder. |                       |             |              |     |                                                                                                                                                                                                                                                                           |
| Resistance to Flexure of Substrate ( Bending Strength) | Apperance: No visible damage.                                                                  |                       |             |              |     | <p>Test Board: Al2O3 or PCB<br/>                 Wrap: 1mm<br/>                 Speed 0,5mm/sec.<br/>                 Unit: mm<br/>                 The measurement should be mader with the board in bending position.</p>                                               |
|                                                        | C/C                                                                                            | ≤ +/- 10%             |             |              |     |                                                                                                                                                                                                                                                                           |

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| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 7 from 14 |            |           |

# EDCON-COMPONENTS



## Reliability Test

| Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Technical specification                                                                                   |                                                                                                                                                                                            | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------|--------------------------------------------|--------------------------------------|---|--------------------|---------------------------------------------------------------------------|---|----------------------------------------------------------------------------|----|-------------------------------------|--------------------|-----|
| Termination Adhesion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No visible damage                                                                                         |                                                                                                                                                                                            | Applied Force: 5N<br>Duration: 10sec +/- 1sec                                                                                                                                                                                                                                                                                                                                                                                                 |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| Temperature Cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Class I : $\leq \pm 1\%$ or 1pf whichever is larger.<br>Class II: B: $\leq \pm 10\%$ E,F: $\leq \pm 20\%$ |                                                                                                                                                                                            | Preheating conditions: up-category temperature 1hrs<br>Recovery time: 24hrs +/-1hrs<br>Initial Measurement<br>Cycling Tiems 5times, 1cycle, 4steps                                                                                                                                                                                                                                                                                            |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                            | <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low-category temp. (NPO / X7R / Y5V / Z5U)</td> <td>30</td> </tr> <tr> <td>2</td> <td>Normal Temp. (+20)</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Up-category temp. (NPO / X7R / Y5V / Z5U)</td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal Temp. (+20)</td> <td>2~3</td> </tr> </tbody> </table> | Step                                              | Temperature (°C)                                                                                                                                                                           | Time (min)                  | 1                             | Low-category temp. (NPO / X7R / Y5V / Z5U) | 30                                   | 2 | Normal Temp. (+20) | 2~3                                                                       | 3 | Up-category temp. (NPO / X7R / Y5V / Z5U)                                  | 30 | 4                                   | Normal Temp. (+20) | 2~3 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                            | Step                                                                                                                                                                                                                                                                                                                                                                                                                                          | Temperature (°C)                                  | Time (min)                                                                                                                                                                                 |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                             | Low-category temp. (NPO / X7R / Y5V / Z5U)        | 30                                                                                                                                                                                         |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                            | 2                                                                                                                                                                                                                                                                                                                                                                                                                                             | Normal Temp. (+20)                                | 2~3                                                                                                                                                                                        |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Up-category temp. (NPO / X7R / Y5V / Z5U)                                                                 | 30                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Normal Temp. (+20)                                                                                        | 2~3                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| Recovery time after test 24hrs +/- 2hrs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| <table border="1"> <tr> <td rowspan="3">C/C</td> <td>Class I <math>\leq \pm 2\%</math> or 1pf whichever is larger</td> <td rowspan="3">Temperature: 40°C +/-2°C<br/>Humidity: 90~95% RH<br/>Voltage: Rated Voltage<br/>Duration: 500hrs<br/>Charge/Discharge Current: 50mA max.<br/>Recovery Time; 24hrs (Class I) or 48hrs (Class II)</td> </tr> <tr> <td>Class II B: <math>\leq \pm 10\%</math></td> </tr> <tr> <td>Class II E,F: <math>\leq \pm 30\%</math></td> </tr> <tr> <td>DF</td> <td>Not more than twice of initial value</td> <td></td> </tr> <tr> <td rowspan="2">IR</td> <td>Class I: <math>R_i \geq 2500M\Omega</math> <math>R_i/C_r \geq 25sec</math> whichever is smaller</td> <td></td> </tr> <tr> <td>Class II: <math>R_i \geq 1000M\Omega</math> <math>R_i/C_r \geq 25sec</math> whichever is smaller</td> <td></td> </tr> <tr> <td colspan="3">Visual Apperance: No visible damage</td> </tr> </table> |                                                                                                           |                                                                                                                                                                                            | C/C                                                                                                                                                                                                                                                                                                                                                                                                                                           | Class I $\leq \pm 2\%$ or 1pf whichever is larger | Temperature: 40°C +/-2°C<br>Humidity: 90~95% RH<br>Voltage: Rated Voltage<br>Duration: 500hrs<br>Charge/Discharge Current: 50mA max.<br>Recovery Time; 24hrs (Class I) or 48hrs (Class II) | Class II B: $\leq \pm 10\%$ | Class II E,F: $\leq \pm 30\%$ | DF                                         | Not more than twice of initial value |   | IR                 | Class I: $R_i \geq 2500M\Omega$ $R_i/C_r \geq 25sec$ whichever is smaller |   | Class II: $R_i \geq 1000M\Omega$ $R_i/C_r \geq 25sec$ whichever is smaller |    | Visual Apperance: No visible damage |                    |     |
| C/C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Class I $\leq \pm 2\%$ or 1pf whichever is larger                                                         | Temperature: 40°C +/-2°C<br>Humidity: 90~95% RH<br>Voltage: Rated Voltage<br>Duration: 500hrs<br>Charge/Discharge Current: 50mA max.<br>Recovery Time; 24hrs (Class I) or 48hrs (Class II) |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Class II B: $\leq \pm 10\%$                                                                               |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Class II E,F: $\leq \pm 30\%$                                                                             |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| DF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Not more than twice of initial value                                                                      |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| IR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Class I: $R_i \geq 2500M\Omega$ $R_i/C_r \geq 25sec$ whichever is smaller                                 |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Class II: $R_i \geq 1000M\Omega$ $R_i/C_r \geq 25sec$ whichever is smaller                                |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| Visual Apperance: No visible damage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |
| Moisture Resistance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |                                                                                                                                                                                            |                             |                               |                                            |                                      |   |                    |                                                                           |   |                                                                            |    |                                     |                    |     |

Note: Pretreatment (only for class 2 capacitor)

Pretradtment (only for class 2 capacitor) is a method to treat the capacitor before measurement. First place the capacitor in the up-category temperasture or other specified higher temperature environment for 1 hour. Then recovery the capacitor at standard pressure conditions for 24hours +/-1hrs..

**MLCC Chip Capacitor Size 1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |      |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. |      | 8 from 14  |

Customer:



# EDCON-COMPONENTS



## Package Conditions



Dimension of paper taping for size 0603, 0805, 1206



Dimension of paper taping for size 0402



| Paper Size<br>Size Code | A     | B     | C     | D     | E     | F     | G     | H     | J     | T     |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0603                    | 1,10  | 1,90  | 8,00  | 3,50  | 1,75  | 4,00  | 2,00  | 4,00  | 1,50  | 1,10  |
|                         | ±0,20 | ±0,20 | ±0,20 | ±0,05 | ±0,10 | ±0,10 | ±0,10 | ±0,10 | ±0,10 | below |
| 0805                    | 1,45  | 2,30  | 8,00  | 3,50  | 1,75  | 4,00  | 2,00  | 4,00  | 1,50  | 1,10  |
|                         | ±0,20 | ±0,20 | ±0,20 | ±0,05 | ±0,10 | ±0,10 | ±0,10 | ±0,10 | ±0,10 | below |
| 1206                    | 1,80  | 3,40  | 8,00  | 3,50  | 1,75  | 4,00  | 2,00  | 4,00  | 1,50  | 1,10  |
|                         | ±0,20 | ±0,20 | ±0,20 | ±0,05 | ±0,10 | ±0,10 | ±0,10 | ±0,10 | ±0,10 | below |

| Code | W1    | L1    | D     | C     | B     | P1    | P2    | P0    | d     | t     |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0402 | 0,65  | 1,15  | 8,0   | 3,5   | 1,75  | 2     | 2     | 4     | 1,5   | 0,8   |
|      | ±0,20 | ±0,20 | ±0,20 | ±0,05 | ±0,10 | ±0,05 | ±0,05 | ±0,05 | ±0,10 | below |

**MLCC Chip Capacitor Size 1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |           |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|-----------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE      | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 9 from 14 | Customer:  |



## Package Conditions

Dimension of paper taping for size 0805 ~ 1812



| Paper Size Size Code | A             | B             | C              | D             | E             | F             | G             | H             | J             | T             |
|----------------------|---------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 0805                 | 1,55<br>±0,20 | 2,35<br>±0,20 | 8,00<br>±0,20  | 3,50<br>±0,05 | 1,75<br>±0,10 | 4,00<br>±0,10 | 2,00<br>±0,10 | 4,00<br>±0,10 | 1,50<br>±0,10 | 1,50<br>below |
| 1206                 | 1,95<br>±0,20 | 3,60<br>±0,20 | 8,00<br>±0,20  | 3,50<br>±0,05 | 1,75<br>±0,10 | 4,00<br>±0,10 | 2,00<br>±0,10 | 4,00<br>±0,10 | 1,50<br>±0,10 | 1,50<br>below |
| 1210                 | 2,70<br>±0,10 | 3,42<br>±0,10 | 8,00<br>±0,10  | 3,50<br>±0,05 | 1,75<br>±0,10 | 4,00<br>±0,10 | 2,00<br>±0,10 | 4,00<br>±0,10 | 1,55<br>±0,10 | 1,55<br>±0,10 |
| 1808                 | 2,20<br>±0,10 | 4,95<br>±0,10 | 12,00<br>±0,10 | 5,50<br>±0,05 | 1,75<br>±0,10 | 4,00<br>±0,10 | 2,00<br>±0,10 | 4,00<br>±0,10 | 1,50<br>±0,10 | 1,80<br>±0,10 |
| 1812                 | 3,66<br>±0,10 | 4,95<br>±0,10 | 12,00<br>±0,10 | 5,50<br>±0,05 | 1,75<br>±0,10 | 8,00<br>±0,10 | 2,00<br>±0,10 | 4,00<br>±0,10 | 1,55<br>±0,10 | 1,85<br>±0,10 |



**MLCC Chip Capacitor Size 1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |      |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. |      | 10 from 14 |

Customer:

# EDCON-COMPONENTS



## Package Conditions



Dimension of Reel (mm)

|          | A             | B   | C            | D            | E              | F            | G          |
|----------|---------------|-----|--------------|--------------|----------------|--------------|------------|
| 7' Reel  | Ø178<br>± 2,0 | 3,0 | Ø13<br>± 0,5 | Ø21<br>± 0,8 | Ø50 or<br>more | Ø10<br>± 1,5 | 12<br>max. |
| 13' Reel | Ø330±<br>2,0  | 3,0 | Ø13<br>± 0,5 | Ø21<br>± 0,8 | Ø50 or<br>more | Ø10<br>± 1,5 | 12<br>max. |

## Taping Specification

Paper Taping



Embossed Taping



Standard: 0,1N < peeling strength < 0,7N

No paper dirty remains on the scotch when peeling, and sticks to top an bottem tape

**MLCC Chip Capacitor Size 1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |      |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. |      | 11 from 14 |

Customer:

# EDCON-COMPONENTS



## Packing Quantity

| Size | Packing Style Quantity |       |       |       |
|------|------------------------|-------|-------|-------|
|      | PT                     | ET    | BC    | BP    |
| 0402 | 10000                  | ----- | 20000 | 5000  |
| 0603 | 5000                   | ----- | 15000 | 5000  |
| 0805 | 5000                   | 2500  | 10000 | 5000  |
| 1206 | 5000                   | 2500  | 5000  | 5000  |
| 1210 | -----                  | 2000  | ----- | 2000  |
| 1808 | -----                  | 2000  | ----- | 2000  |
| 1812 | -----                  | 2000  | ----- | 2000  |
| 2225 | -----                  | ----- | ----- | 500   |
| 3035 | -----                  | ----- | ----- | ----- |

Note: We can choose packing style and quantity can be according to the customer requirement

## Soldering Informations

### Storage Methods

The guaranteed period for solderability is 6 month ( Under deliver package conditions).

Storage conditions:

Temperature: 5~40°C

Relative Humidity: 20~70%

### Precautions for use

The Multilayer Ceramic Capacitor (MLCC) may fail in a short circuit modern in an open circuit mode when subjected to severe conditions of electrical and / or mechanical stress beyond the specified rating and specified conditions in the specification, which will result in burn out, flaming or glowing in the worst case.

Following precautions for safety and Application Notes shall be taken in your major consideration. If you have a question about the precautions für handling, please consult our engineering department of our factory.

### Manual Soldering

Manual Soldering can pose a great risk of ceramic thermal cracks in capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator careless may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and pay much attention to the selection of the soldering iron tip and temperature contact of the tip.

**MLCC Chip Capacitor Size  
1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |      |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. |      | 12 from 14 |

Customer:



Soldering Profile Curve

Classification Reflow Profile (JEDEC J-STD-020C)



Too much solder  
Cracks tend occur due to large stress



Not enough solder  
Weak holding force may cause bad connection between the capacitor and PCB



**MLCC Chip Capacitor Size 1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |      |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. |      | 13 from 14 |

Customer:

# EDCON-COMPONENTS



## Ordering Information

| Serie | Range | Material | Voltage | Capacitance Tolerance | Termination Material | No Function | No Function | ROHS | Packing |  |
|-------|-------|----------|---------|-----------------------|----------------------|-------------|-------------|------|---------|--|
|-------|-------|----------|---------|-----------------------|----------------------|-------------|-------------|------|---------|--|

|               |            |            |            |          |          |          |          |          |           |  |
|---------------|------------|------------|------------|----------|----------|----------|----------|----------|-----------|--|
| <b>I11009</b> | <b>155</b> | <b>X7R</b> | <b>201</b> | <b>K</b> | <b>N</b> | <b>N</b> | <b>N</b> | <b>R</b> | <b>TR</b> |  |
|---------------|------------|------------|------------|----------|----------|----------|----------|----------|-----------|--|

|                               |                   |                          |                     |                    |                              |                       |                       |                            |                        |                      |
|-------------------------------|-------------------|--------------------------|---------------------|--------------------|------------------------------|-----------------------|-----------------------|----------------------------|------------------------|----------------------|
| MLCC Chip Capacitor Size 1812 | <b>155=</b> 1,5µf | <b>X7R=</b> X7R Material | <b>201=</b> 200Volt | <b>K=</b> Tol. 10% | <b>S=</b> Silver Termination | <b>N=</b> No Function | <b>N=</b> No Function | <b>R=</b> Rohs Conform     | <b>TR=</b> Tape / Reel |                      |
|                               |                   |                          |                     |                    | <b>C=</b> Copper Termination |                       |                       | <b>N=</b> NON Rohs Conform |                        | <b>BU=</b> Bulk Ware |
|                               |                   |                          |                     |                    | <b>N=</b> Nickel Termination |                       |                       |                            |                        |                      |

**MLCC Chip Capacitor Size 1812**

Part No.: **I11009**

|       |        |      |        |        |        |           |           |            |            |
|-------|--------|------|--------|--------|--------|-----------|-----------|------------|------------|
| DRW:  | Jason  | CHKD | Wilson | MATL:  | Wilson | TOLERANCE | Mason     | DATE       | 25.10.2010 |
| APPD: | Schumi |      |        | FINISH | Jamy   |           | Sheet No. | 14 from 14 |            |

Customer: