

## ElecSuper SuperTVS – 400W Transient Voltage Suppressor

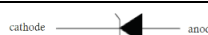
## 1. Features

- For surface mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- Meets MSL level 1, per J-STD-020
- IEC 61000-4-2(ESD)  $\pm 30\text{KV}$ (air)  $\pm 30\text{KV}$ (contact)
- 400W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical IR less than 1 $\mu\text{A}$  above 10V
- Plastic package has underwriters laboratory flammability 94V-0
- High Temperature soldering: 260 $^{\circ}\text{C}$ /10 seconds at terminals

## 2. Mechanical Data

- Case: JEDEC DO-214AC. Molded plastic over glass passivated junction
- Terminal: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Standard Packaging: 12mm tape
- Weight: 0.07g

## 3. Marking Information

| BI- directional                                                                     | UNI-directional                                                                     | Marking                                                                |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  |  | XXXX= Product type marking code (See Electrical Characteristics Table) |
|  |  |                                                                        |

## 4. Maximum Ratings and Characteristics

Ratings at 25° ambient temperature unless otherwise specified

| Rating                                                                                                    | Symbol             | Value     | Units |
|-----------------------------------------------------------------------------------------------------------|--------------------|-----------|-------|
| Peak pulse power dissipation at 10/1000us waveform (Note1,2)                                              | P <sub>PPM</sub>   | 400       | W     |
| Peak pulse current of at 10/1000us waveform                                                               | I <sub>PPM</sub>   | See Table | A     |
| Steady state power dissipation at TA=50°C                                                                 | P <sub>M(AV)</sub> | 3.3       | W     |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load (JEDEC Method) (Note3) | I <sub>FSM</sub>   | 40        | A     |

## SMAJ SERIES

Rev-1.4

|                                                                                |                 |            |      |
|--------------------------------------------------------------------------------|-----------------|------------|------|
| Operating junction and Storage Temperature Range                               | $T_J, T_{STG}$  | -65 to 150 | °C   |
| Typical thermal resistance junction to lead                                    | $R_{\theta JL}$ | 30         | °C/W |
| Typical thermal resistance junction to ambient                                 | $R_{\theta JA}$ | 120        | °C/W |
| Maximum instantaneous forward voltage @ at 25A for unidirectional only (Note4) | $V_F$           | 3.5/5      | V    |
| Maximum instantaneous forward voltage @ at 1A for unidirectional only          | $V_F$           | 1.5        | V    |

Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig.2.
2. Mounted on 5.0mm×5.0mm copper pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.
4.  $V_F<3.5\text{V}$  for devices of  $V_{BR}<200\text{V}$  and  $V_F<5.0\text{V}$  for devices of  $V_{BR}>201\text{V}$ .

5. Electrical Characteristics ( $T_A=25^\circ\text{C}$ )

| Part Number | Part Number | Marking |    | Reverse Stand off Voltage $V_R$ | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |      | Test Current $I_T$ | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ | Maximum Peak Pulse Current $I_{PP}$ | Maximum Reverse Leakage $I_R$ @ $V_R$ | ROHS2.0 |
|-------------|-------------|---------|----|---------------------------------|--------------------------------------------|------|--------------------|-------------------------------------------|-------------------------------------|---------------------------------------|---------|
|             |             | UNI     | BI |                                 | MIN                                        | MAX  |                    |                                           |                                     |                                       |         |
| SMAJ5.0A    | SMAJ5.0CA   | AE      | WE | 5                               | 6.4                                        | 7    | 10                 | 9.2                                       | 43.5                                | 400                                   | y       |
| SMAJ6.0A    | SMAJ6.0CA   | AG      | WG | 6                               | 6.67                                       | 7.37 | 10                 | 10.3                                      | 38.8                                | 400                                   | y       |
| SMAJ6.5A    | SMAJ6.5CA   | AK      | WK | 6.5                             | 7.22                                       | 7.98 | 10                 | 11.2                                      | 35.7                                | 250                                   | y       |
| SMAJ7.0A    | SMAJ7.0CA   | AM      | WM | 7                               | 7.78                                       | 8.6  | 10                 | 12                                        | 33.3                                | 100                                   | y       |
| SMAJ7.5A    | SMAJ7.5CA   | AP      | WP | 7.5                             | 8.33                                       | 9.21 | 1                  | 12.9                                      | 31                                  | 80                                    | y       |
| SMAJ8.0A    | SMAJ8.0CA   | AR      | WR | 8                               | 8.89                                       | 9.83 | 1                  | 13.6                                      | 29.4                                | 50                                    | y       |
| SMAJ8.5A    | SMAJ8.5CA   | AT      | WT | 8.5                             | 9.44                                       | 10.4 | 1                  | 14.4                                      | 27.8                                | 20                                    | y       |
| SMAJ9.0A    | SMAJ9.0CA   | AV      | WV | 9                               | 10                                         | 11.1 | 1                  | 15.4                                      | 26                                  | 10                                    | y       |
| SMAJ10A     | SMAJ10CA    | AX      | WX | 10                              | 11.1                                       | 12.3 | 1                  | 17                                        | 23.5                                | 5                                     | y       |
| SMAJ11A     | SMAJ11CA    | AZ      | WZ | 11                              | 12.2                                       | 13.5 | 1                  | 18.2                                      | 22                                  | 1                                     | y       |
| SMAJ12A     | SMAJ12CA    | BE      | XE | 12                              | 13.3                                       | 14.7 | 1                  | 19.9                                      | 20.1                                | 1                                     | y       |
| SMAJ13A     | SMAJ13CA    | BG      | XG | 13                              | 14.4                                       | 15.9 | 1                  | 21.5                                      | 18.6                                | 1                                     | y       |
| SMAJ14A     | SMAJ14CA    | BK      | XK | 14                              | 15.6                                       | 17.2 | 1                  | 23.2                                      | 17.2                                | 1                                     | y       |
| SMAJ15A     | SMAJ15CA    | BM      | XM | 15                              | 16.7                                       | 18.5 | 1                  | 24.4                                      | 16.4                                | 1                                     | y       |
| SMAJ16A     | SMAJ16CA    | BP      | XP | 16                              | 17.8                                       | 19.7 | 1                  | 26                                        | 15.4                                | 1                                     | y       |
| SMAJ17A     | SMAJ17CA    | BR      | XR | 17                              | 18.9                                       | 20.9 | 1                  | 27.6                                      | 14.5                                | 1                                     | y       |
| SMAJ18A     | SMAJ18CA    | BT      | XT | 18                              | 20                                         | 22.1 | 1                  | 29.2                                      | 13.7                                | 1                                     | y       |
| SMAJ20A     | SMAJ20CA    | BV      | XV | 20                              | 22.2                                       | 24.5 | 1                  | 32.4                                      | 12.3                                | 1                                     | y       |
| SMAJ22A     | SMAJ22CA    | BX      | XX | 22                              | 24.4                                       | 26.9 | 1                  | 35.5                                      | 11.3                                | 1                                     | y       |
| SMAJ24A     | SMAJ24CA    | BZ      | XZ | 24                              | 26.7                                       | 29.5 | 1                  | 38.9                                      | 10.3                                | 1                                     | y       |

## SMAJ SERIES

Rev-1.4

| Part Number | Part Number | Marking |    | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_r$ |      | Test Current $I_r$ (mA) | Maximum Clamping Voltage $V_C @ I_{PP}$ (V) | Maximum Peak Pulse Current $I_{PP}$ (A) | Maximum Reverse Leakage $I_R @ V_R$ ( $\mu A$ ) | ROHS2.0 |
|-------------|-------------|---------|----|-----------------------------------------|--------------------------------------------|------|-------------------------|---------------------------------------------|-----------------------------------------|-------------------------------------------------|---------|
|             |             |         |    |                                         |                                            |      |                         |                                             |                                         |                                                 |         |
| UNI         | BI          | UNI     | BI |                                         | MIN                                        | MAX  | (mA)                    | (V)                                         |                                         |                                                 |         |
| SMAJ26A     | SMAJ26CA    | CE      | YE | 26                                      | 28.9                                       | 31.9 | 1                       | 42.1                                        | 9.5                                     | 1                                               | y       |
| SMAJ28A     | SMAJ28CA    | CG      | YG | 28                                      | 31.1                                       | 34.4 | 1                       | 45.4                                        | 8.8                                     | 1                                               | y       |
| SMAJ30A     | SMAJ30CA    | CK      | YK | 30                                      | 33.3                                       | 36.8 | 1                       | 48.4                                        | 8.3                                     | 1                                               | y       |
| SMAJ33A     | SMAJ33CA    | CM      | YM | 33                                      | 36.7                                       | 40.6 | 1                       | 53.3                                        | 7.5                                     | 1                                               | y       |
| SMAJ36A     | SMAJ36CA    | CP      | YP | 36                                      | 40                                         | 44.2 | 1                       | 58.1                                        | 6.9                                     | 1                                               | y       |
| SMAJ40A     | SMAJ40CA    | CR      | YR | 40                                      | 44.4                                       | 49.1 | 1                       | 64.5                                        | 6.2                                     | 1                                               | y       |
| SMAJ43A     | SMAJ43CA    | CT      | YT | 43                                      | 47.8                                       | 52.8 | 1                       | 69.4                                        | 5.8                                     | 1                                               | y       |
| SMAJ45A     | SMAJ45CA    | CV      | YV | 45                                      | 50                                         | 55.3 | 1                       | 72.7                                        | 5.5                                     | 1                                               | y       |
| SMAJ48A     | SMAJ48CA    | CX      | YX | 48                                      | 53.3                                       | 58.9 | 1                       | 77.4                                        | 5.2                                     | 1                                               | y       |
| SMAJ51A     | SMAJ51CA    | CZ      | YZ | 51                                      | 56.7                                       | 62.7 | 1                       | 82.4                                        | 4.9                                     | 1                                               | y       |
| SMAJ54A     | SMAJ54CA    | RE      | ZE | 54                                      | 60                                         | 66.3 | 1                       | 87.1                                        | 4.6                                     | 1                                               | y       |
| SMAJ58A     | SMAJ58CA    | RG      | ZG | 58                                      | 64.4                                       | 71.2 | 1                       | 93.6                                        | 4.3                                     | 1                                               | y       |
| SMAJ60A     | SMAJ60CA    | RK      | ZK | 60                                      | 66.7                                       | 73.7 | 1                       | 96.8                                        | 4.1                                     | 1                                               | y       |
| SMAJ64A     | SMAJ64CA    | RM      | ZM | 64                                      | 71.1                                       | 78.6 | 1                       | 103                                         | 3.9                                     | 1                                               | y       |
| SMAJ70A     | SMAJ70CA    | RP      | ZP | 70                                      | 77.8                                       | 86   | 1                       | 113                                         | 3.5                                     | 1                                               | y       |
| SMAJ75A     | SMAJ75CA    | RR      | ZR | 75                                      | 83.3                                       | 92.1 | 1                       | 121                                         | 3.3                                     | 1                                               | y       |
| SMAJ78A     | SMAJ78CA    | RT      | ZT | 78                                      | 86.7                                       | 95.8 | 1                       | 126                                         | 3.2                                     | 1                                               | y       |
| SMAJ85A     | SMAJ85CA    | RV      | ZV | 85                                      | 94.4                                       | 104  | 1                       | 137                                         | 2.9                                     | 1                                               | y       |
| SMAJ90A     | SMAJ90CA    | RX      | ZX | 90                                      | 100                                        | 111  | 1                       | 146                                         | 2.7                                     | 1                                               | y       |
| SMAJ100A    | SMAJ100CA   | RZ      | ZZ | 100                                     | 111                                        | 123  | 1                       | 162                                         | 2.5                                     | 1                                               | y       |
| SMAJ110A    | SMAJ110CA   | SE      | VE | 110                                     | 122                                        | 135  | 1                       | 177                                         | 2.3                                     | 1                                               | y       |
| SMAJ120A    | SMAJ120CA   | SG      | VG | 120                                     | 133                                        | 147  | 1                       | 193                                         | 2.1                                     | 1                                               | y       |
| SMAJ130A    | SMAJ130CA   | SK      | VK | 130                                     | 144                                        | 159  | 1                       | 209                                         | 1.9                                     | 1                                               | y       |
| SMAJ150A    | SMAJ150CA   | SM      | VM | 150                                     | 167                                        | 185  | 1                       | 243                                         | 1.6                                     | 1                                               | y       |
| SMAJ160A    | SMAJ160CA   | SP      | VP | 160                                     | 178                                        | 197  | 1                       | 259                                         | 1.5                                     | 1                                               | y       |
| SMAJ170A    | SMAJ170CA   | SR      | VR | 170                                     | 189                                        | 209  | 1                       | 275                                         | 1.5                                     | 1                                               | y       |
| SMAJ180A    | SMAJ180CA   | ST      | VT | 180                                     | 201                                        | 222  | 1                       | 292                                         | 1.4                                     | 1                                               | y       |
| SMAJ200A    | SMAJ200CA   | SV      | VV | 200                                     | 224                                        | 247  | 1                       | 324                                         | 1.2                                     | 1                                               | y       |
| SMAJ220A    | SMAJ220CA   | SX      | VX | 220                                     | 246                                        | 272  | 1                       | 356                                         | 1.1                                     | 1                                               | y       |
| SMAJ250A    | SMAJ250CA   | SZ      | VZ | 250                                     | 279                                        | 309  | 1                       | 405                                         | 1                                       | 1                                               | y       |
| SMAJ300A    | SMAJ300CA   | TE      | UE | 300                                     | 335                                        | 371  | 1                       | 486                                         | 0.8                                     | 1                                               | y       |
| SMAJ350A    | SMAJ350CA   | TG      | UG | 350                                     | 391                                        | 432  | 1                       | 567                                         | 0.7                                     | 1                                               | y       |
| SMAJ400A    | SMAJ400CA   | TK      | UK | 400                                     | 447                                        | 494  | 1                       | 648                                         | 0.6                                     | 1                                               | y       |
| SMAJ440A    | SMAJ440CA   | TM      | UM | 440                                     | 492                                        | 543  | 1                       | 713                                         | 0.6                                     | 1                                               | y       |

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

6. Ratings and Characteristic Curves (TA =25°C unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

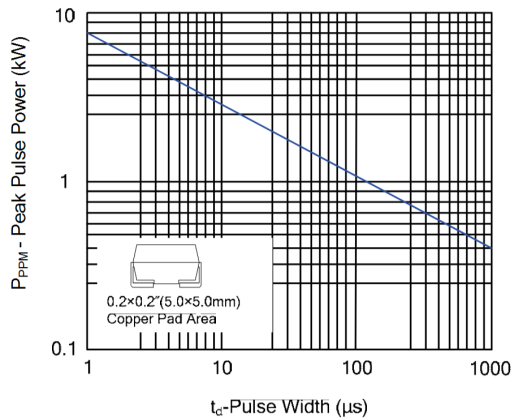


Figure 2 Pulse Derating Curve

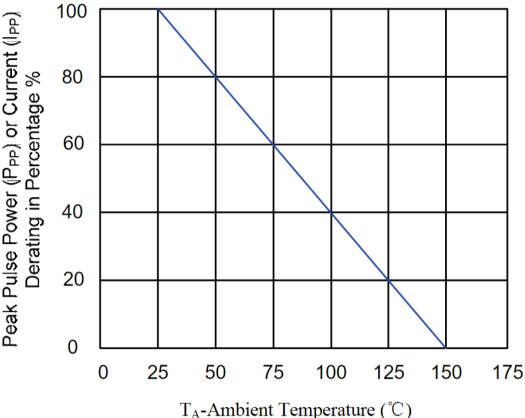


Figure 3 Pulse Waveform

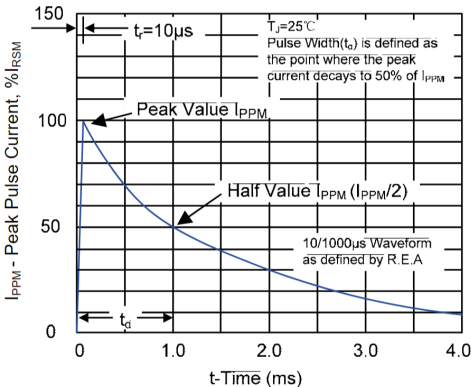


Figure 4 Typical Junction Capacitance

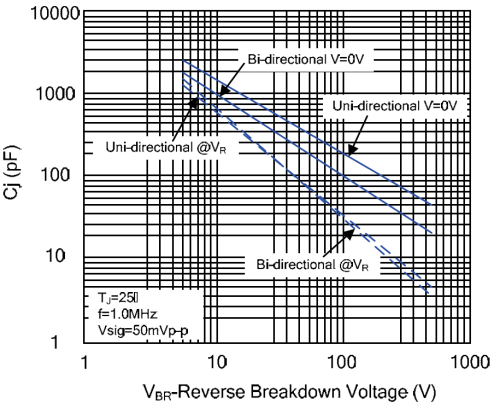


Figure 5 Steady State Power Dissipation Derating Curve

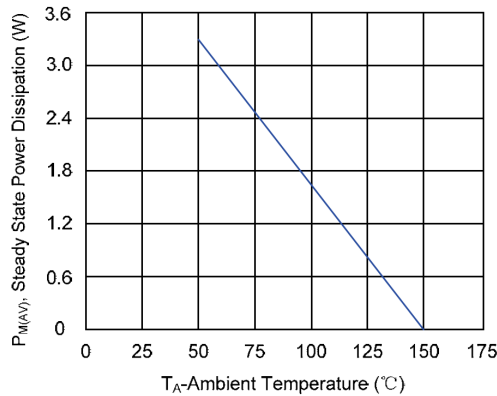
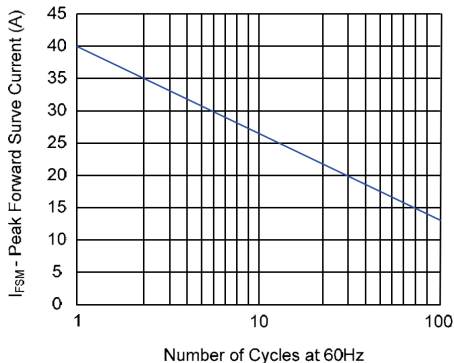


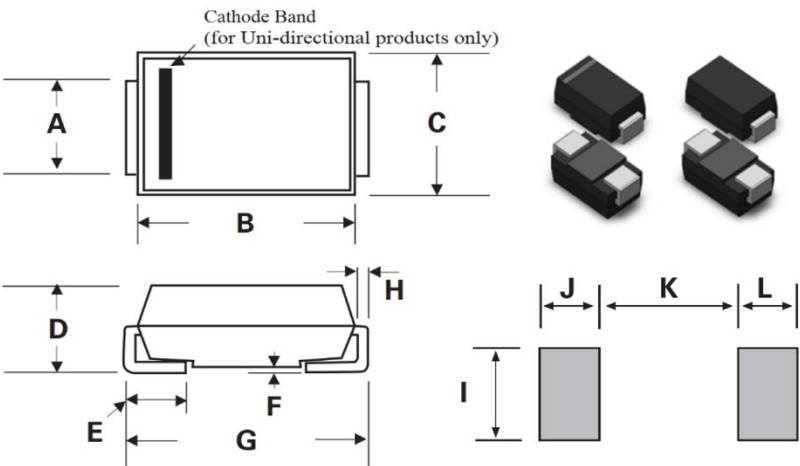
Figure 6 Maximum Non-Repetitive Forward Surge Current  
Uni-Directional Only



SMAJ SERIES

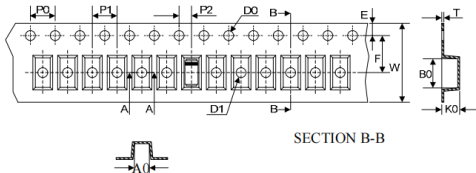
Rev-1.4

7. Dimension (SMA/DO-214AC)



| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.049  | 0.065 | 1.25        | 1.65  |
| B          | 0.157  | 0.177 | 3.99        | 4.5   |
| C          | 0.1    | 0.11  | 2.54        | 2.79  |
| D          | 0.078  | 0.09  | 1.98        | 2.29  |
| E          | 0.03   | 0.06  | 0.78        | 1.52  |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.194  | 0.208 | 4.93        | 5.28  |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.07   | -     | 1.8         | -     |
| J          | 0.082  | -     | 2.1         | -     |
| K          | -      | 0.09  | -           | 2.3   |
| L          | 0.082  | -     | 2.1         | -     |

8. Packaging

|          |                                                                                     |                |
|----------|-------------------------------------------------------------------------------------|----------------|
| Tape     |  |                |
|          | Symbol                                                                              | Dimension (mm) |
|          | W                                                                                   | 12.00±0.20     |
|          | P0                                                                                  | 4.00±0.10      |
|          | P1                                                                                  | 4.00±0.10      |
|          | P2                                                                                  | 2.00±0.10      |
|          | D0                                                                                  | Φ1.5±0.10      |
|          | D1                                                                                  | Φ1.5±0.10      |
|          | E                                                                                   | 1.75±0.10      |
|          | F                                                                                   | 5.50±0.05      |
|          | A0                                                                                  | 2.79±0.10      |
|          | B0                                                                                  | 5.33±0.10      |
|          | K0                                                                                  | 2.55±0.15      |
| T        | 0.25±0.05                                                                           |                |
| 7" Reel  | D2                                                                                  | Φ178.0±2.0     |
|          | D3                                                                                  | Φ50.0Min.      |
|          | D4                                                                                  | Φ13.0±0.5      |
|          | W1                                                                                  | 16.0±2.0       |
|          | Quantity: 1000PCS                                                                   |                |
| 13" Reel | D5                                                                                  | Φ330.0±2.0     |
|          | D6                                                                                  | Φ13.5±0.5      |
|          | H                                                                                   | 2.5±1.0        |
|          | W2                                                                                  | 16.0±2.0       |
|          | Quantity: 5000PCS                                                                   |                |

**DISCLAIMER**

ELECSUPER SUPERTVS PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with ElecSuper products. You are solely responsible for

- (1) selecting the appropriate ElecSuper products for your application;
- (2) designing, validating and testing your application;
- (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements.

These resources are subject to change without notice. ElecSuper grants you permission to use these resources only for development of an application that uses the ElecSuper products described in the resource. Other reproduction and display of these resources are prohibited. No license is granted to any other ElecSuper intellectual property right or to any third party intellectual property right. ElecSuper disclaims responsibility for, and you will fully indemnify ElecSuper and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources. ElecSuper's products are provided subject to ElecSuper's Terms of Sale or other applicable terms available either on [www.elecsuper.com](http://www.elecsuper.com) or provided in conjunction with such ElecSuper products. ElecSuper's provision of these resources does not expand or otherwise alter ElecSuper's applicable warranties or warranty disclaimers for ElecSuper products.