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CAPACITORS

OS-CON™ Polymer Aluminum
SP-Cap™ Polymer Aluminum
POSCAP™ Polymer Tantalum
Gold Cap Electric Double Layer Radial Lead
Aluminum Electrolytic, Leaded
Aluminum Electrolytic, Surface Mount
Film, Leaded
Film, Surface Mount
### Capacitors

<table>
<thead>
<tr>
<th>Series</th>
<th>Voltage</th>
<th>Capacitance</th>
<th>ESR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-CAP: Polymer Aluminum - Surface Mount</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EEF-CD</td>
<td>2.5 – 16 VDC</td>
<td>2.2 – 220 μF</td>
<td>• Low ESR, high ripple current • 1.8 mm height, ESR 18 mΩ maximum</td>
</tr>
<tr>
<td>EEF-CS</td>
<td>4 – 35 VDC</td>
<td>68 – 120 μF</td>
<td>• 1.2 mm height • Low ESR 15 mΩ</td>
</tr>
<tr>
<td>EEF-CT</td>
<td>4 – 35 VDC</td>
<td>100 – 180 μF</td>
<td>• Low ESR, 15 mΩ</td>
</tr>
<tr>
<td>EEF-CX</td>
<td>2 – 35 VDC</td>
<td>100 – 560 μF</td>
<td>• Low ESR, high ripple current • 1.9 mm height, ESR 15 mΩ maximum</td>
</tr>
<tr>
<td>EEF-SR</td>
<td>2 – 6.3</td>
<td>68 – 220 μF</td>
<td>• 1 mm max height; Low ESR</td>
</tr>
<tr>
<td>EEF-LR</td>
<td>2 – 6.3</td>
<td>68 – 220 μF</td>
<td>• 1 mm max height; Low ESR, 3 terminals</td>
</tr>
<tr>
<td>EEF-UD</td>
<td>2 – 8 VDC</td>
<td>68 – 470 μF</td>
<td>• Low ESR, high ripple current • 2.8 mm height, ESR 15 mΩ maximum</td>
</tr>
<tr>
<td>EEF-UE</td>
<td>2 – 8 VDC</td>
<td>100 – 560 μF</td>
<td>• Low ESR, high ripple current • 4.2 mm height, ESR 12 mΩ maximum</td>
</tr>
<tr>
<td>EEF-GX</td>
<td>2 VDC</td>
<td>330 – 470 μF</td>
<td>• Super low ESR 3 mΩ</td>
</tr>
<tr>
<td>EEF-SL, -LT</td>
<td>2 – 2.5 VDC</td>
<td>100 – 330 μF</td>
<td>• Low ESL by structure of SP-Cap • 50% ESL of current products</td>
</tr>
<tr>
<td>EEF-LX</td>
<td>2 – 2.5 VDC</td>
<td>330 – 560 μF</td>
<td>• Low ESL by structure of SP-Cap • 50% ESL of current products</td>
</tr>
<tr>
<td>EEF-SS, -ST</td>
<td>2 – 2.5 VDC</td>
<td>180 – 330 μF</td>
<td>• Low ESL by structure of SP-Cap • 50% ESL of current products</td>
</tr>
<tr>
<td>EEF-SL, -SX</td>
<td>2 – 6.3 VDC</td>
<td>56 – 560 μF</td>
<td>• Excellent noise absorbent characteristics • Super low ESR (4.5 mΩ - 9 mΩ)</td>
</tr>
<tr>
<td>Series</td>
<td>Voltage</td>
<td>Capacitance</td>
<td>ESR</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>----------------------</td>
<td>-------</td>
</tr>
<tr>
<td>TPE</td>
<td>2 - 10 VDC</td>
<td>47 - 1500 μF</td>
<td>7 - 35 mΩ</td>
</tr>
<tr>
<td>TQC</td>
<td>16 - 35 VDC</td>
<td>3.9 - 150 μF</td>
<td>40 - 150 mΩ</td>
</tr>
<tr>
<td>TQS</td>
<td>16 - 35 VDC</td>
<td>6.8 - 3.3 μF</td>
<td>70 - 150 mΩ</td>
</tr>
<tr>
<td>TPF</td>
<td>2 - 10 VDC</td>
<td>150 - 1000 μF</td>
<td>5 - 15 mΩ</td>
</tr>
<tr>
<td>TPSF</td>
<td>2 VDC</td>
<td>270 μF</td>
<td>6 - 9 mΩ</td>
</tr>
<tr>
<td>TPB</td>
<td>4 - 10 VDC</td>
<td>33 - 470 μF</td>
<td>35 - 70 mΩ</td>
</tr>
<tr>
<td>TPC</td>
<td>6.3 - 12.5 VDC</td>
<td>10 - 330 μF</td>
<td>40 - 80 mΩ</td>
</tr>
<tr>
<td>TPG</td>
<td>2.5 - 12.5 VDC</td>
<td>33 - 220 μF</td>
<td>30 - 70 mΩ</td>
</tr>
<tr>
<td>TPI</td>
<td>2.5 - 10 VDC</td>
<td>4.7 - 150 μF</td>
<td>100 - 300 mΩ</td>
</tr>
<tr>
<td>TA</td>
<td>2.5 - 6.3 VDC</td>
<td>47 - 220 μF</td>
<td>9 - 70 mΩ</td>
</tr>
<tr>
<td>TH</td>
<td>2.5 - 10 VDC</td>
<td>68 - 470 μF</td>
<td>15 - 40 mΩ</td>
</tr>
<tr>
<td>TPH</td>
<td>6.3 VDC</td>
<td>47 μF</td>
<td>150 mΩ</td>
</tr>
<tr>
<td>TPE</td>
<td>2 - 10 VDC</td>
<td>47 - 1500 μF</td>
<td>7 - 35 mΩ</td>
</tr>
<tr>
<td>TQC</td>
<td>16 - 35 VDC</td>
<td>3.9 - 150 μF</td>
<td>40 - 150 mΩ</td>
</tr>
<tr>
<td>TQS</td>
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<td>6.8 - 3.3 μF</td>
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<td>6 - 9 mΩ</td>
</tr>
<tr>
<td>TPB</td>
<td>4 - 10 VDC</td>
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<td>35 - 70 mΩ</td>
</tr>
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<td>TPC</td>
<td>6.3 - 12.5 VDC</td>
<td>10 - 330 μF</td>
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</tr>
<tr>
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<td>TPI</td>
<td>2.5 - 10 VDC</td>
<td>4.7 - 150 μF</td>
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</tr>
<tr>
<td>TA</td>
<td>2.5 - 6.3 VDC</td>
<td>47 - 220 μF</td>
<td>9 - 70 mΩ</td>
</tr>
<tr>
<td>TH</td>
<td>2.5 - 10 VDC</td>
<td>68 - 470 μF</td>
<td>15 - 40 mΩ</td>
</tr>
<tr>
<td>TPH</td>
<td>6.3 VDC</td>
<td>47 μF</td>
<td>150 mΩ</td>
</tr>
</tbody>
</table>
## Aluminum Electrolytic, Leaded

<table>
<thead>
<tr>
<th>Series</th>
<th>Operating Temperature</th>
<th>(Working Voltage) Capacitance</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Purpose</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECA-__M</td>
<td>-40 ~ +85°C</td>
<td>(6.3 ~ 450 VDC) 0.1 ~ 22,000 µF</td>
<td>• General purpose, 2000 hours at 85°C • Compact size</td>
</tr>
<tr>
<td>ECA-__HG</td>
<td>-55 ~ +105°C</td>
<td>(6.3 ~ 450 VDC) 0.1 ~ 22,000 µF</td>
<td>• Long life: 1,000–2,000 hours at 105°C • Compact size</td>
</tr>
<tr>
<td>EEA-GA</td>
<td>-55 ~ +105°C</td>
<td>(10 ~ 50 VDC) 0.1 ~ 220 µF</td>
<td>• Long life: 1000 hours at 105°C • 7mm height</td>
</tr>
<tr>
<td>EEU-HD</td>
<td>-55 ~ +105°C</td>
<td>(10 ~ 50 VDC) 0.1 ~ 2200 µF</td>
<td>• Long life: 1000–2000 hours at 105°C • Case Size: 5mm x 11mm to 18mm x 35.5mm</td>
</tr>
<tr>
<td><strong>Miniature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECE-A__KA</td>
<td>-40 ~ +85°C</td>
<td>(4 ~ 50 VDC) 0.1 ~ 470 µF</td>
<td>• General purpose, 1,000 hours at 85°C • 7mm height</td>
</tr>
<tr>
<td>ECE-A__KK/KS</td>
<td>-40 ~ +85°C</td>
<td>(4 ~ 50 VDC) 0.1 ~ 330 µF</td>
<td>• General purpose, 1000 hours at 85°C • 5mm height</td>
</tr>
<tr>
<td><strong>Bi-Polar</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EEU-EB</td>
<td>-40 ~ +105°C</td>
<td>(10 ~ 450 VDC) 0.47 ~ 6,800 µF</td>
<td>• 2,000 hours at 85°C • Bi-Polar general purpose</td>
</tr>
<tr>
<td>EEU-ED</td>
<td>-25 ~ +105°C</td>
<td>(160 ~ 450 VDC) 10 ~ 330 µF</td>
<td>• Very long life 8,000–10,000 hours at 105°C • High Ripple Current</td>
</tr>
<tr>
<td>EEU-EE</td>
<td>-25 ~ +105°C</td>
<td>(160 ~ 450 VDC) 10 ~ 330 µF</td>
<td>• Very long life 8,000–10,000 hours at 105°C • High Ripple Current at high frequency</td>
</tr>
<tr>
<td>EEA/U-FC</td>
<td>-55 ~ +105°C</td>
<td>(6.3 ~ 100 VDC) 1.0 ~ 15,000 µF</td>
<td>• 1,000–5,000 hours at 105°C • Low impedance, miniature</td>
</tr>
<tr>
<td>EEU-FM</td>
<td>-40 ~ +105°C</td>
<td>(6.3 ~ 50 VDC) 22 ~ 6,800 µF</td>
<td>• Long life, 2,000–7,000 hours at 105°C • Low ESR, approximately half of FC</td>
</tr>
<tr>
<td>EEU-FR</td>
<td>-40 ~ +105°C</td>
<td>(6.3 ~ 63 VDC) 10 ~ 2,000 µF</td>
<td>• Ultra Low ESR: 12mΩ (20°C/100kHz) • 5000 hours (case sizes 5 and 6mm Ø) ~10,000 hours at 105°C</td>
</tr>
<tr>
<td>EEU-TA</td>
<td>-40 ~ +125°C</td>
<td>(10 ~ 63 VDC) 1 ~ 4,700 µF</td>
<td>• 2,000 hours at 125°C • Automotive applications</td>
</tr>
<tr>
<td>EEU-TP</td>
<td>-40 ~ +135°C</td>
<td>(25 ~ 35 VDC) 180 ~ 5,100 µF</td>
<td>• Low ESR: 14mΩ (120°C/100kHz) • Long Life: 125°C 2000 to 5000 hours (135° 1000 hours to 2000 hours)</td>
</tr>
</tbody>
</table>
### Surface Mount Aluminum Electrolytic Capacitors

<table>
<thead>
<tr>
<th>Series</th>
<th>Operating Temperature</th>
<th>(Working Voltage) Capacitance</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| EEE-_A/S     | -40 ~ +85°C           | [4 ~ 100 VDC] 0.1 ~ 1,500 μF | • General purpose, 2,000 hours at 85°C  
• Very compact size  
|              |                       |                              | • High Temperature Reflow (260°C) |
| EEE-HA       | -40 ~ +105°C          | [6.3 ~ 100 VDC] 0.1 ~ 1,500 μF | • Long life, 1,000~2,000 hours at 105°C  
• Very compact size |
| EEE-HB       | -40 ~ +105°C          | [6.3 ~ 50 VDC] 0.1 ~ 470 μF | • Long life, 2,000 hours at 105°C  
• 5.8 mm height (< Ø 6) |
| EEE-HC       | -40 ~ +105°C          | [6.3 ~ 50 VDC] 33 ~ 1,000 μF | • Long life, 3,000~5,000 hours at 105°C  
• 5.8 mm height (< Ø 6) |
| EEE-HD       | -40 ~ +105°C          | [6.3 ~ 50 VDC] 0.1 ~ 1000 μF | • Very long life, 5,000 hours at 105°C  
• Industrial grade |
| EEE-EB       | -25 ~ +105°C          | [160 ~ 450 VDC] 2.2 ~ 100 μF | • Large can size |
| EEE-TG       | -40 ~ +125°C          | [10 ~ 100 VDC] 10 ~ 4,700 μF | • High temperature, 2,000 hours at 125°C  
• Low ESR at low temperature |
| EEE-TK       | -40 ~ +125°C          | [10 ~ 35 VDC] 47 ~ 470 μF | • High temperature, 3,000 hours at 125°C  
• Low ESR at low temperature |
| EEE-TP       | -40 ~ +125°C          | [10 ~ 35 VDC] 47 ~ 470 μF | • Low ESR at Low Temperatures  
2,000~3,000 hours at 125°C |
| EEE-FT       | -55 ~ +105°C          | [6.3 ~ 50 VDC] 10 ~ 2,200 μF | • 2000 hours at 105°C  
• Low ESR in smaller package  
• High Temperature Reflow (260°C) |
| EEE-FP       | -55 ~ +105°C          | [6.3 ~ 35 VDC] 100 ~ 1,800 μF | • Very Low ESR, tantalum replacement  
• High Temperature Reflow (260°C) |
| EEE-FK       | -55 ~ +105°C          | [6.3 ~ 100 VDC] 3.3 ~ 6,800 μF | • Long life, 2,000~5,000 hours at 105°C  
• Low ESR, Tantalum replacement  
• Compact, wide size range: 4~18 mm (Ø) |
| EEE-FKS      | -55 ~ 105°C           | [6.3 ~ 50 VDC] 39 ~ 1800μF | • One size smaller than FK Series |
| EEE-FC       | -40 ~ +105°C          | [6.3 ~ 50 VDC] 1 ~ 1,500 μF | • 1,000 hours at 105°C  
• Low impedance |
| EEE-___A___N | -40 ~ +85°C           | [6.3 ~ 50 VDC] 0.22 ~ 47 μF | • General Purpose  
• 5.4 mm height (< Ø 6) |
| EEE-HP       | -40 ~ +105°C          | [6.3 ~ 50 VDC] 0.22 ~ 47 μF | • Industrial Grade  
• 5.8 mm height |
| Bi-Polar     |                       |                              |          |
| EEEH-ZA      | -55 ~ +105°C          | [25 ~ 63 VDC] 10 ~ 330 μF | • Up to 5,000 Hours at 105°C  
• Open Circuit Failure Mode  
• Low ESR, High Ripple Current |
| EEEH-ZC      | -55 ~ 125°C           | [25 ~ 80 VDC] 10 ~ 330μF | • Up to 4000 hours at 125°C  
• Open Circuit Failure Mode |
| EEEH-ZK      | -55 ~ 125°C           | [25 ~ 35 VDC] 33 ~ 470μF | • Large Capacitance  
• High Ripple Current |

**NOTE:**

Surface Mount Type RoHS Compliant Part Number Prefix:

- EEE  (Diameter: 3~10mm)
- EEV  (Diameter: 12.5~18mm)

For higher temperature reflow, use EEE (A_) suffix:

- 260°C Max. Reflow: AP & AR (4~10mm Ø)
- 245°C Max. Reflow: AQ & AM (12.5~18mm Ø)
<table>
<thead>
<tr>
<th>Series</th>
<th>Operating Temp.</th>
<th>Ratings</th>
<th>Features</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECW-FE</td>
<td>-40 ~ +105°C</td>
<td>0.1 ~ 4.7 µF</td>
<td>Boxed construction</td>
<td>Active Filter Circuits, High Frequency, High Current Circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>450 and 630VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECQ-E(H)</td>
<td>-40 ~ +105°C</td>
<td>0.1 ~ 2.2 µF</td>
<td>Smaller Size</td>
<td>Active filtering circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>450 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECQ-E(IF)</td>
<td>-40 ~ +85°C</td>
<td>0.001 ~ 10 µF</td>
<td>Wide capacitance range, Compact size</td>
<td>General purpose applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 ~ 1250 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECQ-E(IB)</td>
<td>-40 ~ +85°C</td>
<td>0.01 ~ 4.7 µF</td>
<td>Wide capacitance range, Miniaturized</td>
<td>General purpose applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECW-F(L)</td>
<td>-40 ~ +100°C</td>
<td>0.022 ~ 2.4 µF</td>
<td>Low Dissipation Factor, High Voltage</td>
<td>High Frequency, High Current Circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.01 ~ 1.3 µF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>630 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECW-F(B)</td>
<td>-40 ~ +105°C</td>
<td>0.022 ~ 0.47 µF</td>
<td>Low Dissipation Factor</td>
<td>High Frequency, High Current Circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECW-H(V)</td>
<td>-40 ~ +105°C</td>
<td>0.001 ~ 0.1 µF</td>
<td>Low Dissipation Factor</td>
<td>High pulse circuits (TV, display, electronic ballast)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800 ~ 2000 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECW-F(A)</td>
<td>-40 ~ +105°C</td>
<td>0.1 ~ 6.8 µF</td>
<td>Miniaturized Size, High Reliability Design</td>
<td>Active Filter in PFC Circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250/450/630 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECW-F(D)</td>
<td>-40 ~ +105°C</td>
<td>0.47 ~ 2.2 µF</td>
<td>Non-inductive, Stacked</td>
<td>High Frequency, High Current Circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>450 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECW-H(A)</td>
<td>-40 ~ +105°C</td>
<td>0.001 ~ 0.047 µF</td>
<td>Miniaturized Size, High Product Safety</td>
<td>Resonance circuits found in AC to DC Power Supplies, Active Filter in PFC Circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800/1600 VDC</td>
<td>Low Hum Noise</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECP-E</td>
<td>-40 ~ +70°C</td>
<td>10 µF ~ 60 µF</td>
<td>Rectangle type, High safety</td>
<td>DC Linkage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800/1100 VDC</td>
<td>Low hum noise</td>
<td></td>
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</tr>
<tr>
<td>ECQ-U(G)</td>
<td>-40 ~ +100°C</td>
<td>0.01 ~ 1.0 µF</td>
<td>Flame retardant case, Equipment with safety mechanism, UL, CSA, SEMKO, DEMKO, NEMKO, FIMKO, VDE, SEV approved (Class X1)</td>
<td>Noise suppressor for AC line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>300 VAC</td>
<td></td>
<td></td>
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<tr>
<td>(IEC384-14)</td>
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</tr>
<tr>
<td>ECQ-U(L)</td>
<td>-40 ~ +100°C</td>
<td>0.001 ~ 0.22 µF</td>
<td>Smaller size than ECQ-U(V) or ECQ-U(G)</td>
<td>High performance, Fuse Function in AC Line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250/500 VAC (UL, CSA)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>275 VAC (IEC384-14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECQ-U(A)</td>
<td>-40 ~ +105°C</td>
<td>0.001 ~ 0.12 µF</td>
<td>Smaller size than ECQ-U(V) or ECQ-U(G)</td>
<td>High performance, fuse function in AC line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 VDC</td>
<td>UL, CSA, VDE approved (Class X2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>630 VDC</td>
<td>Equipped with safety mechanism</td>
<td></td>
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</tr>
<tr>
<td>ECP-U(A)</td>
<td>-40 ~ +85°C</td>
<td>0.1 ~ 1.0 µF</td>
<td>Non-inductive, stacked, Ringer circuit telephone &amp; PBX</td>
<td>High performance, fuse function in AC line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 VDC</td>
<td>Miniature, Reflow soldering</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 VDC</td>
<td></td>
<td></td>
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</tbody>
</table>
Light Touch Switches
Detector Switches
Snap Action Switches
Interlock Switches
Operation Switches
Encoders
Potentiometers

ELECTROMECHANICAL
<table>
<thead>
<tr>
<th>Series</th>
<th>L x W x H (mm)</th>
<th>Operating Force</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVP-AW</td>
<td>3.0 x 2.0 x 0.6</td>
<td>1.6N (160 gf) 2.4N (240 gf) 3.3N (330 gf)</td>
<td>Laser welding technology • Built-in actuator • Super small sized • IP67 rated</td>
</tr>
<tr>
<td>EVP-BD</td>
<td>6.0 x 6.0 x 4.0</td>
<td>3.5 N (350 gf)</td>
<td>Tactile feeling with low audible sound;</td>
</tr>
<tr>
<td>EVP-AF</td>
<td>3.4 x 2.9 x 1.7</td>
<td>1.6 N (160 gf) 2.4 N (240 gf)</td>
<td>• Built-in actuator • IP67 Rated</td>
</tr>
<tr>
<td>EVP-BB</td>
<td>2.6 x 1.6 x 0.53</td>
<td>1.6 N (160 gf)</td>
<td>Smallest switch in lineup • Laser welded design • Built-in actuator • IP67 Rated</td>
</tr>
<tr>
<td>EVP-AF</td>
<td>3.0 x 2.6 x 0.65</td>
<td>1.6 N (160 gf) 2.4 N (240 gf) 3.4 N (340 gf)</td>
<td>• Built-in actuator for consistent tactile performance</td>
</tr>
<tr>
<td>EVP-AA</td>
<td>3.5 x 2.9 x 1.7</td>
<td>1.0 N (100 gf) 1.6 N (160 gf) 2.4 N (240 gf) 3.5 N (350 gf) 5.0 N (500 gf)</td>
<td>Super small-sized, thin profile • J-bent terminal • Wide range of operating force • Long operating life</td>
</tr>
<tr>
<td>EVQ-P6</td>
<td>4.1 x 4.1 x 0.35</td>
<td>1.0 N (100 gf) 1.6 N (160 gf) 2.4 N (240 gf)</td>
<td>Compact/Thin Profile • Long-life: up to 1,000,000 cycles min. • Optional push-plate for improved actuation • Optional ground terminal for ESD protection</td>
</tr>
<tr>
<td>EVQ-P2</td>
<td>4.7 x 3.5 x 2.5</td>
<td>1.0 N (100 gf) 1.6 N (160 gf) 2.4 N (240 gf) 2.5 N (250 gf) 3.5 N (350 gf) 5.0 N (500 gf)</td>
<td>J-bent terminals • Ground terminal optional • Middle Push: 0.7 mm • Short Push: 0.25 mm</td>
</tr>
<tr>
<td>EVQ-PL</td>
<td>4.9 x 4.9 x 0.8</td>
<td>1.0 N (100 gf) 1.6 N (160 gf) 2.6 N (260 gf)</td>
<td>Optional push-plate for improved actuation • GND terminal included</td>
</tr>
<tr>
<td>EVQ-P0</td>
<td>6.5 x 6.0 x 2.0</td>
<td>0.5 N (50 gf) 1.3 N (130 gf) 1.6 N (160 gf) 2.0 N (200gf) 2.6 N (260 gf) 3.5 N (350 gf) 5.0 N (500 gf)</td>
<td>Low cost • Wide selection of height and force • Wide push plate for reliable actuation • Over-stroke &amp; GND type available • Long operating life</td>
</tr>
<tr>
<td>EVQ-Q2</td>
<td>6.5 x 6.0 x 2.5 6.5 x 6.0 x 3.1 6.0 x 6.0 x 3.5</td>
<td>1.6 N (160 gf) 2.4 N (240 gf) 2.5 N (250 gf) 3.5 N (350 gf) 5.0 N (500 gf)</td>
<td>Without ground terminal (EVQ-PA) • With ground terminal (EVQ-PB)</td>
</tr>
<tr>
<td>EVQ-PA</td>
<td>6.0 x 6.0 x 4.3 6.0 x 6.0 x 5.0 6.0 x 6.0 x 7.0 6.0 x 6.0 x 9.5</td>
<td>1.0 N (100 gf) 1.6 N (160 gf) 2.6 N (260 gf)</td>
<td>Without or without ground terminal • Wide selection of height and force</td>
</tr>
<tr>
<td>EVQ-PB</td>
<td>6.0 mm dia. x 4.3 6.0 mm dia. x 5.0 6.0 mm dia. x 7.0 6.0 mm dia. x 9.5</td>
<td>1.0 N (100 gf) 1.3 N (130 gf) 1.6 N (160 gf) 2.6 N (260 gf)</td>
<td>Narrow width for space saving • SMT, bulk, radial-tape terminal types available</td>
</tr>
<tr>
<td>EVQ-11</td>
<td>6.0 mm dia. x 4.3 6.0 mm dia. x 5.0 6.0 mm dia. x 7.0 6.0 mm dia. x 9.5</td>
<td>1.0 N (100 gf) 1.3 N (130 gf) 1.6 N (160 gf) 2.6 N (260 gf)</td>
<td>Radial Taping • Forged terminals to improve mounting efficiency • Round shape for improved packaging density</td>
</tr>
<tr>
<td>EVQ-P0</td>
<td>6.2 x 6.2 x 7.45</td>
<td>0.74 N (74 gf) 1.3 N (130 gf)</td>
<td>Knob shape: De-centering, centering • Ideal for frequent usage such as mouse button</td>
</tr>
<tr>
<td>EVQ-PV</td>
<td>6.1 x 6.0 x 5.0</td>
<td>1.6 N (160 gf) 2.0 N (200 gf) 2.2 N (220 gf) 2.5 N (250 gf) 3.5 N (350 gf)</td>
<td>Push travel: 1.0 mm, 1.3 mm • Forged terminals • Large push plate for superior actuation</td>
</tr>
<tr>
<td>Series</td>
<td>L x W x H (mm)</td>
<td>Operating Force</td>
<td>Features</td>
</tr>
<tr>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>EVQ-P1</td>
<td>6.1 x 6.0 x 5.0</td>
<td>1.6 N (160 gf)</td>
<td>- Push travel: 1.0 mm, 1.3 mm</td>
</tr>
<tr>
<td>EVQ-PP</td>
<td></td>
<td>2.0 N (200 gf)</td>
<td>- Popular for automotive applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2 N (220 gf)</td>
<td>- J-bent terminal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5 N (250 gf)</td>
<td>- Large push plate for superior actuation</td>
</tr>
<tr>
<td>EVQ-Q1</td>
<td>8.5 x 8.5 x 6.5</td>
<td>4.0 N (400 gf)</td>
<td>- Ultra high force</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0 N (500 gf)</td>
<td>- Popular for automotive applications</td>
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<tr>
<td></td>
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<td></td>
<td>- Large push plate for superior actuation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- J-Bent Terminal</td>
</tr>
<tr>
<td>EVP-AQ</td>
<td>9.8 x 9.8 x 4.7</td>
<td>4.0 N (400 gf)</td>
<td>- World’s first open Center Space for LED</td>
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<td></td>
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<td>- Long travel of 1.0mm</td>
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<td>- 100K life</td>
</tr>
<tr>
<td>EVP-AX</td>
<td>3.0 x 2.6 x 0.7</td>
<td>0.7N/2.0N (70gf/200gf)</td>
<td>- Laser welding technology</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- Built in actuator</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Super small sized</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- IP67 rated</td>
</tr>
<tr>
<td>EVP-AT</td>
<td>3.4 x 1.7 x 1.6</td>
<td>1.6 N (160 gf)</td>
<td>- Low profile</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- High peel off strength</td>
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<td></td>
<td>- Edge mount</td>
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<td></td>
<td>- Built in actuator</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- IP67 rated</td>
</tr>
<tr>
<td>EVP-AV</td>
<td>2.8 x 2.3 x 1.95</td>
<td>1.6 N</td>
<td>- High Peel off strength</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Super small sized</td>
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<td></td>
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<td></td>
<td>- Edge Mount</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Built in actuator</td>
</tr>
<tr>
<td>EVP-AK</td>
<td>3.8 x 1.9 x 1.6</td>
<td>1.6 N (160 gf)</td>
<td>- Edge Mount Design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Laser Welded Design</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>- IP67 Rated</td>
</tr>
<tr>
<td>EVQ-P7</td>
<td>3.5 x 2.9 x 1.35</td>
<td>1.6 N (160 gf)</td>
<td>- High impact resistance</td>
</tr>
<tr>
<td>EVQ-P3</td>
<td></td>
<td>2.2 N (220 gf)</td>
<td>- Boss and L-terminal available</td>
</tr>
<tr>
<td>EVQ-AP7</td>
<td></td>
<td></td>
<td>- Boss and L-terminal available</td>
</tr>
<tr>
<td>EVQ-AP3</td>
<td></td>
<td></td>
<td>- Boss and L-terminal available</td>
</tr>
<tr>
<td>EVQ-APK</td>
<td></td>
<td></td>
<td>- Boss and L-terminal available</td>
</tr>
<tr>
<td>EVQ-APN</td>
<td>3.5 x 2.9 x 1.2</td>
<td>1.6 N (160 gf)</td>
<td>- High mounting strength</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2 N (220 gf)</td>
<td>- Allows for slim profile</td>
</tr>
<tr>
<td>EVQ-AE</td>
<td>4.5 x 2.25 x 2.9</td>
<td>1.6 N (160 gf)</td>
<td>- Improved soldering strength in the operating direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Long operational life</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Edge Mount</td>
</tr>
<tr>
<td>EVQ-APU</td>
<td>4.7 x 3.5 x 1.65</td>
<td>1.6 N (160 gf)</td>
<td>- High impact resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2 N (220 gf)</td>
<td>- Straight or J-bent terminals</td>
</tr>
<tr>
<td>EVQ-AP4</td>
<td>6.2 x 2.55 x 3.5</td>
<td>1.0 N (100 gf)</td>
<td>- Optional edge mount for ultra high impact resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.6 N (160 gf)</td>
<td>- 0.25 mm, 0.70 mm travel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4 N (240 gf)</td>
<td>- Life: 200 K to 1 Million cycles</td>
</tr>
<tr>
<td>EVQ-APC</td>
<td>7.5 x 7.1 x 9.25</td>
<td>1.0 N (100 gf)</td>
<td>- Without ground terminal</td>
</tr>
<tr>
<td>EVQ-APF</td>
<td>7.5 x 7.1 x 7.15</td>
<td>1.3 N (130 gf)</td>
<td>- Bulk (EVQ-PF) or radial taping (EVQ-PC)</td>
</tr>
<tr>
<td></td>
<td>7.5 x 7.1 x 7.85</td>
<td>1.6 N (160 gf)</td>
<td>- Wide selection of height and force</td>
</tr>
<tr>
<td></td>
<td>7.5 x 7.1 x 9.85</td>
<td>2.6 N (260 gf)</td>
<td></td>
</tr>
<tr>
<td>Series</td>
<td>Dimensions (mm)</td>
<td>Operating Force</td>
<td>Features</td>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Horizontal</td>
<td></td>
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</tr>
</tbody>
</table>
| Detector        | ESE-58                                                                          | 3.5 x 3.0 x 0.9         | 300 mN max (30 gf)                                                      | • Small form factor and thin profile  
|                 |                                                                                  |                         |                                                                          | • Normal close or normal open style  
|                 |                                                                                  |                         |                                                                          | • Positioning boss optional  
|                 |                                                                                  |                         |                                                                          | • Multiple actuation methods for design flexibility |
| 1HW Detector    |                                                                                  | Mounting height: 1.4 mm | 300 mN (30 gf)                                                          | • Small/thin profile  
|                 |                                                                                  | Outer dimensions:       |                                                                          | • Long over-travel  
|                 |                                                                                  | 5.8 mm x 4.15 mm        |                                                                          | • Usable as an operation switch (an input device) |
| 2W Detector     |                                                                                  | 7.5 mm x 5.6 mm x 3.0 mm| 350 mN (35 gf)                                                          | • Compact/thin profile  
|                 |                                                                                  | 7.5 mm x 5.6 mm x 4.45 mm|                                                                          | • Long over-travel  
|                 |                                                                                  |                          |                                                                          | • Usable as an operation switch (an input device) |
| Vertical        |                                                                                  | 3.35 x 2.2 x 1.5        | 250 mN max (25 gf)                                                      | • Small projected size |
| Detector        | ESE-16                                                                          |                         |                                                                          |
| 2 mm Size       |                                                                                  | Vertical mounting height: 4.1 mm | 300 mN (30 gf) | • Wiping contact construction  
| Type 2N         |                                                                                  | Horizontal mounting height: 2.1 mm |                        | • Operable in two directions: X-X or Y-Y  
|                 |                                                                                  | Horizontal with frame height: 2.95 mm |                      | • Extremely thin profile, SMD |
| Super Thin      |                                                                                  | Mounting height: 1.2 mm  | 300 mN (30 gf)                                                          | • For horizontal and vertical mounting (ESE-13)  
|                 |                                                                                  |                         |                                                                          | • For left and right side operation (ESE-18) |
| Horizontal Thin |                                                                                  | Mounting strength: 80 N  | 390 mN max.                                                             | • Increased the contact reliability and lifespan.  
<p>|                 |                                                                                  | Switch body height: 1.7 mm|                                                                          | • Lifespan: 100,000 operations or more |
| Snap Action Switches |  |  |  |  |  | Features |
|----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| <strong>Series</strong> | <strong>Op. Force (gf max.)</strong> | <strong>Max. Contact Rating</strong> | <strong>Low Resistive Load Ratings</strong> | <strong>Expected Electrical Life</strong> | <strong>Contact Material</strong> | <strong>Ratings</strong> |
| <strong>AEQ</strong> | 1.2N (Pin plunger) 1.7N (Leaf lever) 1.5N (Simulated leaf lever) | 100 μA at 3 VDC to 100 mA 30 VDC (Min. switching capacity 10 μA at 1 VDC) | 10 μA at 1 VDC | 2 × 10⁶ 3V DC 0.1mA | — | IP40 | Handles low level load 100 μA at 3 VDC to 100 mA 30 VDC |
| <strong>AH1</strong> | 0.74N 1.47N | 1.47N 3 A 125 V, 2 A 30 V DC | 5 mA 6 VDC 2 mA 12 VDC 1 mA 24 VDC | 3 × 10⁴ | Standard: Ag alloy Low-level: Au-clad Ag alloy | IP40 UL/CSA | Ultra-miniature size (12.8 × 6.5 mm 12.7 × 6 mm) Flux-resistant construction Flat terminal |
| <strong>AM1</strong> | 0.69N to 5.30N | 10 A 125, 250 VAC or 1 A 480 VAC | — | 5 × 10⁴ | Ag alloy | IP40 UL/UL | Versatile range for all applications |
| <strong>AV3</strong> | 1.47N | 3 A 30 VAC | — | 10⁴ | Ag alloy | IP40 UL/UL, ENEC/VDE | Contact gap of greater than 1mm Door inter-lock switch for OA equipment |
| <strong>AV4</strong> | 0.98N | Ag contact: 0.5 A 30 VDC Au contact: 0.1 A 30 VDC | — | 2 × 10⁶ (Au type: 2 × 10³) | Standard: Ag alloy Low-level: Au plating | IP40 | Super miniature size (7.5 × 2.5 × 5 mm) Solder terminal type with mounting holes available Mechanical life 3 × 10⁴ |
| <strong>AV6</strong> | 0.50N 1.50N | 0.1 A 30 VDC | — | 2 × 10⁶ | Au-clad Ag alloy | IP40 UL/UL, TUV | Using a connector for connections significantly improves operation effectiveness Contact reliability by using a simple dust prevention guard and gold-clad double layer contacts |
| <strong>AVT3</strong> | | | Standard: Ag alloy Long life version: 1.47N | 5 × 10⁴ | Standard: Ag alloy Low-level: Au-clad triple layer, double layer | IP40 UL/CSA, ENEC/VDE | Consistent quality and high precision through sophisticated automatic fabrication system Low-level circuit types available Long life version available |
| <strong>AVL3</strong> | 0.49N 0.98N | | | | | |
| <strong>AVM3</strong> | | | | | | |</p>
<table>
<thead>
<tr>
<th>Series</th>
<th>Op. Force (gF max.)</th>
<th>Max. Contact Rating</th>
<th>Low Resistive Load Ratings</th>
<th>Expected Electrical Life</th>
<th>Contact Material</th>
<th>Ratings</th>
<th>Features</th>
</tr>
</thead>
</table>
| ASQ    | 1.5N (Pin plunger)  
1.7N (Leaf lever)  
1.5N (Simulated leaf lever) | 100 mA  
30 VDC | 2 mA 5 VDC  
(Nominal)  
2 mA 105 (Low-level) | Au-clad | IP67 | • Compact size and ultra-long stroke  
• IP67  
• Silent operation |
| ASQM   | 1.2N (Pin Plunger)  
1.5N(Simulated Roller) | 50mA 16 VDC | 1mA 5 VDC  
(Nominal)  
3x10^5 (low level) | Au-Clad | IP67 | • Miniaturization  
• Contact pressure does not depend on the operation stroke  
• High contact reliability  
• High effective sealing for resistance against adverse environments |
| ABJ    | 1.23N  
1.96N  
2.45N (Long stroke) | Ag Alloy Contact:  
1.23N  
1 A 125 VAC  
1 A 30 VDC  
1.96N  
2 A 125 VAC  
2 A 30 VDC  
2.45N (Long stroke)  
1 A 125 VAC  
1 A 30 VDC  
Au Clad Contact:  
0.1 A 125 VAC  
0.1 A 30 VDC | 3 x 104  
(Ag alloy contact)  
105 (Au-clad contact) | Standard: Ag alloy  
Low-level: Au-clad | IP67  
UL/CSA | • Ultra-miniature size  
(12.8 × 6 × 6.5 mm)  
• Adoption of elastomer double molding technology and Ultrasonic swaging technology to uniform sealing in high production quantities  
• High environmental resistance (IP67) |
| ABS    | 0.98N  
1.47N | Ag Alloy Contact:  
2 A 125 VAC  
2 A 250 VAC  
2 A 30 VDC  
0.4 A 125 VDC  
Au Clad Contact: (triple, double layer)  
0.1 A 125 VAC  
0.1 A 250 VAC  
0.1 A 30 VDC | 5 x 104  
(Ag alloy contact)  
2 x 105 (Au-clad contact) | Standard: Ag alloy  
Low-level: Au-clad | IP67  
UL/C-UL  
ENEC/VDE | • Sub-miniature size  
(19.8 × 6.4 × 11.1 mm)  
• Adoption of Elastomer double molding technology and Ultrasonic swaging technology to uniform sealing in high production quantities  
• High environmental resistance (IP67) |
| ABV    | 0.98N  
1.96N | Ag Alloy Contact:  
5 A 250 VAC  
(O.F. min. 1.96N)  
3 A 250 VAC  
(O.F. 0.98N)  
Au Clad Contact:  
3 A 250 VAC  
(O.F. min. 1.96N)  
1 A 250 VAC  
(O.F. 0.98N) | 105 (Nominal)  
106 (Low-level) | Standard: Ag alloy  
Low-level: Au-clad | IP67  
UL/C-UL  
ENEC/VDE | • Miniature size  
(33 × 10.3 × 15.9 mm)  
• Adoption of Ultrasonic swaging technology and epoxy sealing to uniform sealing in high production quantities  
• High environmental resistance (IP67) |
# Interlock Switches; Operation Switches

## Electromechanical

<table>
<thead>
<tr>
<th>Series</th>
<th>Op. Force (gf max.)</th>
<th>Max. Contact Rating</th>
<th>Expected Electrical Life</th>
<th>Contact Material</th>
<th>Ratings</th>
<th>Features</th>
</tr>
</thead>
</table>
| AGX    | <Standard> 1 Form A: 3.92N 2 Form A: 3.92N 3 Form A: 5.88N High capacity: 1 Form A: 6.90N 2 Form A and 3 Form A: 5.88N | Standard: 10.1 A 250 V AC | $1 \times 10^6$ | Ag alloy | IP40 UL/C-UL, EN60947-5-5 | • Snap-in mounting  
• 14 mm depth  
• Contact gap of greater than 4 mm |
| AVI    | 1 Form A: 4.90N 1 Form B: 2.94N 1 Form A 1 Form B: 5.88N 2 Form A: 7.85N 3 Form A: 9.81N | 10.1 A 250 V AC | $5 \times 10^5$ | Ag alloy | IP40 UL/C-UL, EN60947-5-1 | • Dual restoration spring mechanism  
• Insulation distance 8 mm (snap-in mounting 2 form A and 3 form A) |

## Power Rocker Switches

<table>
<thead>
<tr>
<th>Series</th>
<th>Contact Arrangement</th>
<th>Contact Rating</th>
<th>Op. Force</th>
<th>Load</th>
<th>Mounting Method</th>
<th>Features</th>
</tr>
</thead>
</table>
| AJ7    | 1a, 2a              | 10A (Resistive) 4A (Motor load) 250VAC | 2.2N - 4N | 10A 250V AC 6A 250V AC | Snap-in, Square hole 12.9 x 19.4 mm (Panel thickness 1.25 to 2.0 mm) | • 0.187 quick-connect  
• Soldering  
• PC board  
• Right and left angle terminals |
| AJ8    | 1a, 2a              | 16A (Resistive) 4A (Motor load) 250VAC | 2.45N - 4.5N | 16A 250V AC | Snap-in, Square hole 12.9 x 19.4 mm (Panel thickness 1.25 to 2.0 mm) | • 0.250 quick-connect  
• Soldering  
• PC board  
• Right and left angle terminals |
| AJB    | 1a, 1c, 2a          | 16A (Resistive) 125 VAC 10A (Resistive) 4A (Motor load) 250 VAC | 4.9N (or less) | 16A 125V AC 10A 250V AC | Snap-in, Square hole 22 x 31.1 mm (Panel thickness 1.8 to 2.3 mm) | • Electromagnetic reset function  
• Comfortable operation  
• CT terminals adopted for coil terminals  
• Long life  
• Ability to withstand inrush current |
| AJHS   | 3a                  | 16A (Resistive) 4A (Motor load) 250 VAC 10mA 5 VDC | 4.9N (or less) | Power section: 16A 250V AC Signal section: 10mA 5V DC  | Snap-in, Square hole 22 x 31.1 mm (Panel thickness 1.8 to 2.3 mm) | • Incorporates a contact for low level circuit protection  
• High inrush current resistance  
• Light touch Operation  
• Cadmium-free contact compatibility |
<table>
<thead>
<tr>
<th>Series</th>
<th>Life (cycles)</th>
<th>Rotation Torque</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>18mm Square Waterproof</td>
<td>EVE-V9</td>
<td>30,000</td>
<td>50 mN·m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Water resistant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Highly responsive click sound and feel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• High precision and reliability</td>
</tr>
<tr>
<td>11 mm Square GS Encoders</td>
<td>EVE-V</td>
<td>30,000</td>
<td>3 to 20 mN·m</td>
</tr>
<tr>
<td></td>
<td>EVE-Y</td>
<td></td>
<td>• Low Profile</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Rework Type 3.5mm Body Height</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Through-Hole Type 4mm Body Height</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Integrated Push Switch 0.4mm or 1.5mm Travel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Minimum-Wobble Type Available</td>
</tr>
<tr>
<td>16 mm Square High Grade</td>
<td>EVE-P</td>
<td>1,000,000</td>
<td>3 to 25 mN·m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Smooth operating feel with minimal wobble</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Integrated Switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Long Life: 1,000,000 cycles minimum</td>
</tr>
<tr>
<td>Center Space 20/12mm, 27/18mm, 60/40mm</td>
<td>EVQ-V/W</td>
<td>30,000</td>
<td>3 to 20 mN·m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>35 mN·m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Open center space for LED and switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Allows for large knob design</td>
</tr>
</tbody>
</table>

**Encoders**

**Potentiometers**

<table>
<thead>
<tr>
<th>Series</th>
<th>Life (cycles)</th>
<th>Rotation Torque</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>9mm Rotary</td>
<td>EVU-E/F</td>
<td>10,000</td>
<td>1 to 20 mN·m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Multiple Bushing &amp; Height Configurations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Midpoint detent optional</td>
</tr>
<tr>
<td>10mm Sensor</td>
<td>EVW-AE</td>
<td>1,000,000</td>
<td>3 mN·m max.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Low profile, small size, long life</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• &lt;3% linearity</td>
</tr>
<tr>
<td>Center Space 39/20mm</td>
<td>EWW-YE/YG/YJ/YK</td>
<td>30,000</td>
<td>20 mN·m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Large center space for switch and LED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Low wobble of 0.25mm max</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Multiple detent options (5, 8, 29)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Automotive grade</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• With built-in LED option</td>
</tr>
</tbody>
</table>
WIRELESS CONNECTIVITY

Bluetooth® RF Modules
802.15.4 (Mesh) RF Modules
ISM (Industrial, Scientific, Medical) RF Modules
WiFi, WiFi + BT RF Modules
## WIRELESS CONNECTIVITY

### BLUETOOTH; MESH NETWORKING (802.15.4); ISM; WIFI

<table>
<thead>
<tr>
<th>Series</th>
<th>Size (mm)</th>
<th>Receiver Sensitivity</th>
<th>Max. Output Power</th>
<th>Power Supply</th>
<th>Freq. Range</th>
<th>I/Os</th>
<th>Interfaces</th>
<th>Max. Data Rate</th>
<th>Dev Kit</th>
<th>Dev Module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAN1315B/ PAN1325B</td>
<td>9.0 x 6.5 x 1.8 / 9.0 x 9.5 x 1.8</td>
<td>-93 dBm</td>
<td>+10.5 dBm</td>
<td>1.8 - 4.8 V</td>
<td>2.4 GHz</td>
<td>N/A</td>
<td>PCM, UART, I2S</td>
<td>3M bits/sec</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1315A/ PAN1325A ** ***</td>
<td>9.0 x 6.5 x 1.8 / 9.0 x 9.5 x 1.8</td>
<td>-93 dBm</td>
<td>+10.5 dBm</td>
<td>1.8 - 4.8 V</td>
<td>2.4 GHz</td>
<td>2</td>
<td>PCM, UART, I2S</td>
<td>3MBits/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1322 ***</td>
<td>15.6 x 8.7 x 1.8</td>
<td>-86 dBm</td>
<td>+4 dBm</td>
<td>2.9 - 4.1 V</td>
<td>2.4 GHz</td>
<td>&gt;15</td>
<td>GPIO, UART, JTAG</td>
<td>720K bits/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1455/ PAN1555 *</td>
<td>13.5 x 10.75 x 2.85 mm / 18.8 x 15.5 x 2.5</td>
<td>-86 dBm</td>
<td>+4 dBm</td>
<td>2.7 - 3.6 V</td>
<td>2.4 GHz</td>
<td>18</td>
<td>3x UART, I/C, SPI, ADC</td>
<td>3M bits/sec</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Bluetooth</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PAN1026</td>
<td>15.6 x 8.7 x 1.8</td>
<td>-88 dBm</td>
<td>+4 dBm</td>
<td>1.8 - 3.3V</td>
<td>2.4GHz</td>
<td>N/A</td>
<td>GPIO, UART</td>
<td>720K bits/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1316B/ PAN1326B</td>
<td>9.0 x 6.5 x 1.8 / 9.0 x 9.5 x 1.8</td>
<td>-93 dBm</td>
<td>+10.5 dBm</td>
<td>1.8 - 4.8 V</td>
<td>2.4 GHz</td>
<td>N/A</td>
<td>PCM, UART, I2S</td>
<td>3MBits/sec</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1316A/ PAN1326A ** ***</td>
<td>9.0 x 6.5 x 1.8 / 9.5 x 9.0 x 1.8</td>
<td>-93 dBm</td>
<td>+10.5 dBm</td>
<td>1.8 - 4.8 V</td>
<td>2.4 GHz</td>
<td>2</td>
<td>PCM, UART, I2S</td>
<td>3MBits/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1740</td>
<td>9.0 x 9.5 x 1.8</td>
<td>-93 dBm</td>
<td>0 dBm</td>
<td>2.35 - 3.3</td>
<td>2.4 GHz</td>
<td>2</td>
<td>GPIO, UART, SPI, PC, 3-axis QD, ADC</td>
<td>&lt; 10K bit/sec</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1760</td>
<td>15.6 x 8.7 x 1.8</td>
<td>-88 dBm</td>
<td>+4 dBm</td>
<td>1.8 - 2.3V</td>
<td>2.4 GHz</td>
<td>10</td>
<td>GPIO, UART</td>
<td>&lt; 10K bit/sec</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN1720/ PAN1720BR *</td>
<td>15.6 x 8.7 x 1.8</td>
<td>-94 dBm</td>
<td>+3 dBm</td>
<td>2.0 - 3.6 V</td>
<td>2.4 GHz</td>
<td>19</td>
<td>GPIO, UART (USB)</td>
<td>&lt; 10K bit/sec</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PAN1711/ PAN1711BR/ PAN1721/ PAN1721BR *</td>
<td>11.6 x 8.7 x 1.8 / 15.6 x 8.2 x 3</td>
<td>-94 dBm</td>
<td>0 dBm</td>
<td>2.0 - 3.6 V</td>
<td>2.4 GHz</td>
<td>19</td>
<td>I2C, GPIO, UART</td>
<td>&lt; 10K bit/sec</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Bluetooth Smart (Low Energy)</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>PAN1323 **</td>
<td>9.0 x 9.5 x 1.8</td>
<td>-93 dBm</td>
<td>+10 dBm</td>
<td>1.7 - 4.8 V</td>
<td>2.4 GHz</td>
<td>2</td>
<td>PCM, UART, I2S</td>
<td>3MBits/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PAN4561 *</td>
<td>35.0 x 15.0 x 3.8</td>
<td>-98 dBm @ 250 kbps / 10.5 dBm @ 0 dBm</td>
<td>2.7 - 3.4 V</td>
<td>2.4 GHz</td>
<td>39</td>
<td>GPIO, UART, A/D</td>
<td>250Kbs</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Mesh Networking (802.15.4)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PAN235x *</td>
<td>8.0 x 8.2 x 1.9</td>
<td>-104 dBm @ 2.4GHz/8.4Kbps</td>
<td>+10 dBm</td>
<td>1.8 - 3.6 V</td>
<td>300MHz - 2.4GHz</td>
<td>2</td>
<td>Output</td>
<td>GPIO, SPI</td>
<td>500K bits/sec</td>
<td>No</td>
</tr>
</tbody>
</table>

* = Operating Temp: -40 to +85º C
** = Operating Temp: -20 to +70º C (-40 to +85º C Optional)
*** = Not Recommended For New Designs

### WiFi (b/g/n)

<table>
<thead>
<tr>
<th>Series</th>
<th>Size (mm)</th>
<th>Receiver Sensitivity</th>
<th>Max. Output Power</th>
<th>Power Supply</th>
<th>Freq. Range</th>
<th>GPIO</th>
<th>Interfaces</th>
<th>Max. Data Rate</th>
<th>Dev Kit</th>
<th>Dev Module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WiFi (b/g/n) (Non Embedded)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAN9010/ PAN9020</td>
<td>22.75 x 13.5 x 2.42</td>
<td>-98 dBm</td>
<td>+18 dBm</td>
<td>2.0 - 3.6 V</td>
<td>2.4 GHz</td>
<td>N/A</td>
<td>USB 2.0 or SDIO</td>
<td>150Mbs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>WiFi (b/g/n) (Embedded)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAN9230 *</td>
<td>29.0 x 13.5 x 2.66</td>
<td>-98 dBm</td>
<td>+18 dBm</td>
<td>3.0 - 3.6 V</td>
<td>2.4 GHz</td>
<td>8</td>
<td>2 UARTs, QSPI</td>
<td>300Mbs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>WiFi (b/g/n) + BT + BLE (Non Embedded)</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAN9045/ PAN9055</td>
<td>26.0 x 13.5 x 2.40</td>
<td>-98 dBm</td>
<td>+18 dBm</td>
<td>3.0 - 3.6 V</td>
<td>2.4 GHz</td>
<td>N/A</td>
<td>USB 2.0, SDIO 3.0, HS UART</td>
<td>300Mbs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* = Operating Temp: -30 to +70º C
<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Range (Ω)</th>
<th>Resistance Tolerance (%)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERJ-XGNJ, 0*</td>
<td>0805</td>
<td>1/32</td>
<td>0, 10 ~ 1 M</td>
<td>± 5, jumper</td>
<td>± 200*</td>
<td>0.40 x 0.20 x 0.13</td>
<td>20,000</td>
<td>• Small size and lightweight</td>
</tr>
<tr>
<td>ERJ-XGNF*</td>
<td>0805</td>
<td>1/32</td>
<td>10 ~ 1 M</td>
<td>±1</td>
<td>± 200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERJ-1GNJ, 0</td>
<td>0201</td>
<td>1/20</td>
<td>0, 1.0 ~ 1 M</td>
<td>± 5, jumper</td>
<td>± 200*</td>
<td>0.60 x 0.3 x 0.23</td>
<td>15,000</td>
<td>• High reliability using metal glaze thick film resistive element and three layers of electrodes</td>
</tr>
<tr>
<td>ERJ-1GNF</td>
<td>0201</td>
<td>1/20</td>
<td>10 ~ 1 M</td>
<td>±1</td>
<td>± 200</td>
<td></td>
<td></td>
<td>• Compatible with automatic placement of bulk taping and bulk case packaging</td>
</tr>
<tr>
<td>ERJ-1HGD</td>
<td>0201</td>
<td>1/20</td>
<td>1 K to 1 M</td>
<td>± 0.5</td>
<td>± 50</td>
<td></td>
<td></td>
<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
<tr>
<td>ERJ-2SEJ, 0</td>
<td>0402</td>
<td>1/16</td>
<td>0, 1.0 ~ 2.2 M</td>
<td>± 5, jumper</td>
<td>± 200*</td>
<td>1.0 x 0.5 x 0.35</td>
<td>10,000</td>
<td>• AEC Q200 Certified</td>
</tr>
<tr>
<td>ERJ-2RKF</td>
<td>0402</td>
<td>1/16</td>
<td>10 ~ 1 M</td>
<td>±1</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• Halogen Free</td>
</tr>
<tr>
<td>ERJ-2HDR</td>
<td>0402</td>
<td>1/16</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERJ-2HDRK</td>
<td>0402</td>
<td>1/16</td>
<td>10 to 100 K to 1 M</td>
<td>± 0.5</td>
<td>± 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERJ-J3EYJ, 0</td>
<td>0603</td>
<td>1/10</td>
<td>0, 1.0 ~ 10 M</td>
<td>± 5, jumper</td>
<td>± 200*</td>
<td>1.6 x 0.8 x 0.45</td>
<td>5,000</td>
<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
<tr>
<td>ERJ-3EKF</td>
<td>0603</td>
<td>1/10</td>
<td>10 ~ 1 M</td>
<td>±1</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• AEC Q200 Certified</td>
</tr>
<tr>
<td>ERJ-3RED</td>
<td>0603</td>
<td>1/10</td>
<td>10 to 100 K to 1 M</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• Anti-Surge characteristics superior to standard metal film resistors</td>
</tr>
<tr>
<td>ERJ-3REDK</td>
<td>0603</td>
<td>1/10</td>
<td>10 to 100 K to 1 M</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
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<td>• High reliability</td>
</tr>
<tr>
<td>ERJ-4NEF</td>
<td>0605</td>
<td>1/8</td>
<td>10 ~ 2.2 M</td>
<td>±1</td>
<td>± 100</td>
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<td>• High power in small packages</td>
</tr>
<tr>
<td>ERJ-14NEF</td>
<td>0605</td>
<td>1/8</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• High temperature</td>
</tr>
<tr>
<td>ERJ-6FED</td>
<td>0605</td>
<td>1/8</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
<tr>
<td>ERJ-14NF</td>
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<td>1/8</td>
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<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
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<td>• Pulse tolerant</td>
</tr>
<tr>
<td>ERJ-14RDF</td>
<td>0605</td>
<td>1/8</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• High reliability</td>
</tr>
<tr>
<td>ERJ-6RDF</td>
<td>0605</td>
<td>1/8</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• High power</td>
</tr>
<tr>
<td>ERJ-8FED</td>
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<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
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<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
<tr>
<td>ERJ-14RDF</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• AEC Q200 Certified</td>
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<tr>
<td>ERJ-PB6</td>
<td>0605</td>
<td>1/4</td>
<td>200 ~ 1 M</td>
<td>± 0.1, ± 0.5</td>
<td>± 50</td>
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<td>• Pulse tolerant</td>
</tr>
<tr>
<td>ERJ-PB6K</td>
<td>0605</td>
<td>1/4</td>
<td>200 ~ 1 M</td>
<td>± 0.1, ± 0.5</td>
<td>± 50</td>
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<td>• High reliability</td>
</tr>
<tr>
<td>ERJ-12RDF</td>
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<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
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<td>• High power</td>
</tr>
<tr>
<td>ERJ-12RDF</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
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<td>• Meets ISO-9001 &amp; TS16949 standards</td>
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<td>ERJ-PB6</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
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<td></td>
<td>• AEC Q200 Certified</td>
</tr>
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<td>ERJ-12RDF</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
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<td>• Pulse tolerant</td>
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<td>ERJ-PB6K</td>
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<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
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<td></td>
<td>• High reliability</td>
</tr>
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<td>ERJ-12RDF</td>
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<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
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<td>• High power</td>
</tr>
<tr>
<td>ERJ-PB6</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
<tr>
<td>ERJ-PB6K</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
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<td></td>
<td>• AEC Q200 Certified</td>
</tr>
<tr>
<td>ERJ-12RDF</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• Pulse tolerant</td>
</tr>
<tr>
<td>ERJ-PB6K</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• High reliability</td>
</tr>
<tr>
<td>ERJ-12RDF</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• High power</td>
</tr>
<tr>
<td>ERJ-PB6</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
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<td>ERJ-PB6K</td>
<td>0605</td>
<td>1/4</td>
<td>100 to 100 K</td>
<td>± 0.5</td>
<td>± 100</td>
<td></td>
<td></td>
<td>• AEC Q200 Certified</td>
</tr>
</tbody>
</table>

*TCR listed is for 10 ~ 1 MΩ. Check data sheet for less than 10 Ω and greater than 1 MΩ.

*Not AEC Q200 Certified.
## Current Sensing Resistors

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Range (Ω)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERJ-2BS 0402</td>
<td>1/8 W</td>
<td>0.1 – 0.2</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>1.0 x 0.5 x 0.35</td>
<td>10,000</td>
<td><strong>Low Ohmic</strong></td>
</tr>
<tr>
<td>ERJ-2BQ 0402</td>
<td>1/8 W</td>
<td>0.22 – 1.0</td>
<td>± 1, ± 5</td>
<td>± 250</td>
<td>1.0 x 0.8 x 0.45</td>
<td>10,000</td>
<td><strong>Small size and lightweight</strong></td>
</tr>
<tr>
<td>ERJ-3RS 0603</td>
<td>1/10 W</td>
<td>0.1 – 0.2</td>
<td>± 1, ± 2, ± 5</td>
<td>± 250</td>
<td>2.0 x 1.25 x 0.6</td>
<td>5,000</td>
<td><strong>High reliability using metal glaze thick film resistive elements and three layers of electrodes</strong></td>
</tr>
<tr>
<td>ERJ-3RQ 0603</td>
<td>1/10 W</td>
<td>0.1 – 0.2</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>3.2 x 1.6 x 0.6</td>
<td>5,000</td>
<td><strong>Compatible with automatic placement of bulk taping and bulk case packaging</strong></td>
</tr>
<tr>
<td>ERJ-6RS 0805</td>
<td>1/8 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>3.2 x 2.5 x 0.6</td>
<td>5,000</td>
<td><strong>Meets ISO-9001 &amp; TS16949 standards</strong></td>
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<tr>
<td>ERJ-6RQ 0805</td>
<td>1/8 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>4.5 x 3.2 x 0.6</td>
<td>5,000</td>
<td><strong>AEC Q200 Certified</strong></td>
</tr>
<tr>
<td>ERJ-8RS 1206</td>
<td>1/4 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>5.0 x 2.5 x 0.6</td>
<td>5,000</td>
<td><strong>Halogen Free</strong></td>
</tr>
<tr>
<td>ERJ-8RQ 1206</td>
<td>1/4 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>6.4 x 3.2 x 0.6</td>
<td>4,000</td>
<td><strong>Low Ohmic</strong></td>
</tr>
<tr>
<td>ERJ-12RS 1812</td>
<td>1/8 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>10,000</td>
<td><strong>Small size and lightweight</strong></td>
<td></td>
</tr>
<tr>
<td>ERJ-14RS 1210</td>
<td>1/4 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>10,000</td>
<td><strong>High reliability using metal glaze thick film resistive elements and three layers of electrodes</strong></td>
<td></td>
</tr>
<tr>
<td>ERJ-14RQ 1210</td>
<td>1/4 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>10,000</td>
<td><strong>Compatible with automatic placement of bulk taping and bulk case packaging</strong></td>
<td></td>
</tr>
<tr>
<td>ERJ-12ZS 2010</td>
<td>1/2 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>5,000</td>
<td><strong>Meets ISO-9001 &amp; TS16949 standards</strong></td>
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<tr>
<td>ERJ-12ZQ 2010</td>
<td>1/2 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>5,000</td>
<td><strong>AEC Q200 Certified</strong></td>
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<tr>
<td>ERJ-14ZS 2512</td>
<td>1/2 W</td>
<td>0.22 – 0.91</td>
<td>± 1, ± 2, ± 5</td>
<td>± 200, ±250</td>
<td>5,000</td>
<td><strong>Halogen Free</strong></td>
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## Current Sensing Resistors

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Range (Ω)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERJ-2LW 0402</td>
<td>1/5 W</td>
<td>10 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>1.0 x 0.5 x 0.35</td>
<td>10,000</td>
<td><strong>Low Ohmic</strong></td>
</tr>
<tr>
<td>ERJ-2BW* 0402</td>
<td>1/4 W</td>
<td>0.047 – 0.2</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>1.6 x 0.8 x 0.55</td>
<td>5,000</td>
<td><strong>Small size and lightweight</strong></td>
</tr>
<tr>
<td>ERJ-3LW* 0402</td>
<td>1/4 W</td>
<td>5 m – 10 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>2.0 x 1.25 x 0.6</td>
<td>5,000</td>
<td><strong>High reliability using metal glaze thick film resistive elements and three layers of electrodes</strong></td>
</tr>
<tr>
<td>ERJ-3BW* 0603</td>
<td>1/4 W</td>
<td>20 m – 100 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>3.2 x 1.6 x 0.6</td>
<td>5,000</td>
<td><strong>Compatible with automatic placement of bulk taping and bulk case packaging</strong></td>
</tr>
<tr>
<td>ERJ-6BW 0805</td>
<td>1/3 W</td>
<td>10 m – 50 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>4.5 x 3.2 x 0.6</td>
<td>5,000</td>
<td><strong>Meets ISO-9001 &amp; TS16949 standards</strong></td>
</tr>
<tr>
<td>ERJ-8BW 1206</td>
<td>1/2 W</td>
<td>0.01 – 0.1</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>6.4 x 3.2 x 1.1</td>
<td>3,000</td>
<td><strong>AEC Q200 Certified</strong></td>
</tr>
<tr>
<td>ERJ-8CW 1206</td>
<td>1/2 W</td>
<td>10 m – 50 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>6.4 x 3.2 x 0.8</td>
<td>3,000</td>
<td><strong>Low Ohmic</strong></td>
</tr>
<tr>
<td>ERJ-8BW 1206</td>
<td>1/2 W</td>
<td>10 m – 50 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>6.4 x 3.2 x 0.8</td>
<td>3,000</td>
<td><strong>Meets ISO-9001 &amp; TS16949 standards</strong></td>
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<tr>
<td>ERJ-8CW 1206</td>
<td>1/2 W</td>
<td>10 m – 50 m</td>
<td>± 1, ± 5</td>
<td>± 300</td>
<td>6.4 x 3.2 x 0.8</td>
<td>3,000</td>
<td><strong>High Power</strong></td>
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*Not AEC Q200 Certified.*
## High Precision Chip Resistors

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Range</th>
<th>Resistance Tolerance (%)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERA-1A</td>
<td>0201</td>
<td>1/20 W</td>
<td>100 to 10 K</td>
<td>±0.1, ±0.25, ±0.5</td>
<td>±25</td>
<td>0.6 x 0.3 x 0.23</td>
<td>15,000</td>
<td>• Small size and lightweight</td>
</tr>
<tr>
<td>ERA-2A</td>
<td>0402</td>
<td>1/16 W</td>
<td>10 - 100 K</td>
<td>±0.1, ±0.25, ±0.5</td>
<td>±10, ±15, ±25, ±100</td>
<td>1.0 x 0.5 x 0.35</td>
<td>10,000</td>
<td>• High reliability</td>
</tr>
<tr>
<td>ERA-3A</td>
<td>0603</td>
<td>1/10 W</td>
<td>10 - 1000 K</td>
<td>±0.05, ±0.1, ±0.5</td>
<td>±10, ±15, ±25, ±50</td>
<td>1.6 x 0.8 x 0.45</td>
<td>5,000</td>
<td>• Low T.C.R. &amp; current noise</td>
</tr>
<tr>
<td>ERA-6A</td>
<td>0805</td>
<td>1/8 W</td>
<td>10 - 1 M</td>
<td>±0.05, ±0.1, ±0.5</td>
<td>±10, ±15, ±25, ±50</td>
<td>2.0 x 1.25 x 0.5</td>
<td>5,000</td>
<td>• High operating temperature capability: -55 to +155°C</td>
</tr>
<tr>
<td>ERA-8A</td>
<td>1206</td>
<td>1/4 W</td>
<td>10 - 1 M</td>
<td>±0.1, ±0.5</td>
<td>±10, ±15, ±25, ±50</td>
<td>3.2 x 1.6 x 0.6</td>
<td>5,000</td>
<td>• Halogen Free</td>
</tr>
<tr>
<td>ERA-2H</td>
<td>0402</td>
<td>1/16 W</td>
<td>10 - 100 K</td>
<td>±0.1, ±0.25, ±0.5</td>
<td>±10, ±15, ±25, ±100</td>
<td>1.0 x 0.5 x 0.35</td>
<td>10,000</td>
<td>• Reflow &amp; flow solderability</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>• Meets ISO-9001 &amp; TS16949 standards</td>
</tr>
<tr>
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<td>• AEC Q200 Certified</td>
</tr>
</tbody>
</table>

## Anti-Sulfurated Chip Resistors

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Value</th>
<th>Resistance Tolerance (%)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERJ-U01</td>
<td>0201</td>
<td>1/20 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±200</td>
<td>0.6 x 0.3 x 0.23</td>
<td>15,000</td>
<td>• Sulfur resistance</td>
</tr>
<tr>
<td>ERJ-U02</td>
<td>0402</td>
<td>0.1 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±200</td>
<td>1.0 x 0.5 x 0.35</td>
<td>10,000</td>
<td>• High reliability</td>
</tr>
<tr>
<td>ERJ-U03</td>
<td>0603</td>
<td>0.1 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>1.6 x 0.8 x 0.45</td>
<td>5,000</td>
<td>• Suitable for flow and re-flow soldering</td>
</tr>
<tr>
<td>ERJ-U06</td>
<td>0805</td>
<td>0.125 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>2.0 x 1.25 x 0.60</td>
<td>5,000</td>
<td>• ERJ-U: Au-based inner electrode</td>
</tr>
<tr>
<td>ERJ-U08</td>
<td>1206</td>
<td>0.25 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>3.2 x 1.6 x 0.60</td>
<td>5,000</td>
<td>• ERJ-U: Ag-Pd-based inner electrode</td>
</tr>
<tr>
<td>ERJ-U10</td>
<td>1210</td>
<td>0.5 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>3.2 x 2.5 x 0.60</td>
<td>5,000</td>
<td>• Sulfur resistance</td>
</tr>
<tr>
<td>ERJ-U12</td>
<td>1812</td>
<td>0.75 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>4.5 x 3.2 x 0.60</td>
<td>5,000</td>
<td>• High reliability</td>
</tr>
<tr>
<td>ERJ-U14</td>
<td>2010</td>
<td>0.75 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>5.0 x 2.5 x 0.60</td>
<td>5,000</td>
<td>• Suitable for flow and re-flow soldering</td>
</tr>
<tr>
<td>ERJ-U16</td>
<td>2512</td>
<td>1 W</td>
<td>10 to 1 M</td>
<td>±1</td>
<td>±100</td>
<td>6.4 x 3.2 x 0.60</td>
<td>4,000</td>
<td>• Sulfur resistance</td>
</tr>
<tr>
<td>ERJ-U24</td>
<td>0805</td>
<td>0.25 W</td>
<td>0.1 to 0.2</td>
<td>±1, ±2, ±5</td>
<td>±150</td>
<td>2.0 x 1.25 x 0.55</td>
<td>5,000</td>
<td>• Low Ohmic</td>
</tr>
<tr>
<td>ERJ-U28</td>
<td>0805</td>
<td>0.25 W</td>
<td>0.22 to 1</td>
<td>±1, ±2, ±5</td>
<td>±150</td>
<td>2.0 x 1.25 x 0.55</td>
<td>5,000</td>
<td>• Low Ohmic</td>
</tr>
</tbody>
</table>

## Array

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Value</th>
<th>Resistance Tolerance (%)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXB-U24</td>
<td>0402</td>
<td>1/16 W</td>
<td>10 to 1 M</td>
<td>±5</td>
<td>±200</td>
<td>1.0 x 1.0 x 0.35</td>
<td>10,000</td>
<td>• Array solution for high placement efficiency</td>
</tr>
<tr>
<td>EXB-U28</td>
<td>0402</td>
<td>1/16 W</td>
<td>10 to 1 M</td>
<td>±5</td>
<td>±200</td>
<td>2.0 x 1.0 x 0.35</td>
<td>10,000</td>
<td>• Ap-Pb-based inner electrode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• U24: 4 terminals, 2 resistors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• U28: 8 terminals, 4 resistors</td>
</tr>
</tbody>
</table>

## Wide Terminal

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Value</th>
<th>Resistance Tolerance (%)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERJ-C1</td>
<td>1020</td>
<td>2 W</td>
<td>10 m to 1</td>
<td>±1</td>
<td>Refer to Spec</td>
<td>2.5 x 5.0 x 0.55</td>
<td>5,000</td>
<td>• Wide Terminal</td>
</tr>
<tr>
<td>Series</td>
<td>Case Size</td>
<td>Power Rating (W)</td>
<td>Resistance Range (Ω)</td>
<td>Resistance Tolerance (%)</td>
<td>T.C.R. (ppm/dC)</td>
<td>LxWxT Dimensions (mm)</td>
<td>Qty. 7” Reel (pcs.)</td>
<td>Features</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
<td>----------------</td>
<td>----------------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>----------</td>
</tr>
<tr>
<td>ERJ-A1</td>
<td>1225</td>
<td>1.33 W</td>
<td>10 m ~ 10 k</td>
<td>± 1, ± 2, ± 5</td>
<td>Refer to Spec</td>
<td>6.4 x 3.2 x .55</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>ERJ-B1</td>
<td>1020</td>
<td>1 W, (2 W R &lt; 10 Ω)</td>
<td>10 m ~ 10 k</td>
<td>± 1, ± 2, ± 5</td>
<td>5.0 x 2.5 x .55</td>
<td>5,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERJ-B2</td>
<td>0612</td>
<td>0.75 W, (1 W R &lt; 10 Ω)</td>
<td>5 m ~ 1 M</td>
<td>± 1, ± 2, ± 5</td>
<td>Refer to Spec</td>
<td>3.2 x 1.6 x 0.65</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>ERJ-B3</td>
<td>0508</td>
<td>0.33 W, (0.5 W R &lt; 1 Ω)</td>
<td>20 m ~ 10 M</td>
<td>±1, ±2, ±5</td>
<td>Refer to Spec</td>
<td>2.0 x 1.25 x 0.5</td>
<td>5,000</td>
<td></td>
</tr>
</tbody>
</table>

**Wide Terminal Chip Resistors**

**High Power & Current Sensing**

**Axial Leaded Resistors**

**Standard**

<table>
<thead>
<tr>
<th>Series</th>
<th>Power Rating (W)</th>
<th>Resistance Range</th>
<th>Resistance Tolerance (%)</th>
<th>Dielectric Withstanding Voltage (VAC)</th>
<th>T.C.R. (ppm/dC)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERG-(X)1S</td>
<td>0.5</td>
<td>1 to 22 K</td>
<td>± 2</td>
<td>350</td>
<td>± 350</td>
<td></td>
</tr>
<tr>
<td>ERG-(X)1F</td>
<td></td>
<td></td>
<td>± 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERG-(X)2S</td>
<td>1</td>
<td>1 to 68 K</td>
<td>± 2</td>
<td>350</td>
<td>± 350</td>
<td></td>
</tr>
<tr>
<td>ERG-(X)2F</td>
<td></td>
<td></td>
<td>± 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERG-(X)3S</td>
<td>2</td>
<td>1 to 100 K</td>
<td>± 2</td>
<td>600</td>
<td>± 350</td>
<td></td>
</tr>
<tr>
<td>ERG-(X)3F</td>
<td></td>
<td></td>
<td>± 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERG-(X)5S</td>
<td>3</td>
<td>1 to 100 K</td>
<td>± 2</td>
<td>1000</td>
<td>± 300</td>
<td></td>
</tr>
<tr>
<td>ERG-(X)5F</td>
<td></td>
<td></td>
<td>± 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERG-(X)12S</td>
<td>0.5</td>
<td>51 K to 240 K</td>
<td>± 2, ± 5</td>
<td>500</td>
<td>± 200</td>
<td></td>
</tr>
<tr>
<td>ERG-1D</td>
<td></td>
<td>110 K to 330 K</td>
<td>± 2, ± 5</td>
<td>500</td>
<td>± 200</td>
<td></td>
</tr>
<tr>
<td>ERG-2D</td>
<td></td>
<td>110 K to 510 K</td>
<td>± 2, ± 5</td>
<td>700</td>
<td>± 200</td>
<td></td>
</tr>
<tr>
<td>ERG-3D</td>
<td></td>
<td>110 K to 750 K</td>
<td>± 2, ± 5</td>
<td>700</td>
<td>± 200</td>
<td></td>
</tr>
</tbody>
</table>

**High Power**

<table>
<thead>
<tr>
<th>Series</th>
<th>Power Rating (W)</th>
<th>Resistance Range</th>
<th>Resistance Tolerance (%)</th>
<th>Dielectric Withstanding Voltage (VAC)</th>
<th>T.C.R. (ppm/dC)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERG-12D</td>
<td>0.5</td>
<td>51 K to 240 K</td>
<td>± 2, ± 5</td>
<td>500</td>
<td>± 200</td>
<td></td>
</tr>
<tr>
<td>ERG-1D</td>
<td>1</td>
<td>110 K to 330 K</td>
<td>± 2, ± 5</td>
<td>500</td>
<td>± 200</td>
<td></td>
</tr>
<tr>
<td>ERG-2D</td>
<td>2</td>
<td>110 K to 510 K</td>
<td>± 2, ± 5</td>
<td>700</td>
<td>± 200</td>
<td></td>
</tr>
<tr>
<td>ERG-3D</td>
<td>3</td>
<td>110 K to 750 K</td>
<td>± 2, ± 5</td>
<td>700</td>
<td>± 200</td>
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</table>

**Low Ohmic**

<table>
<thead>
<tr>
<th>Series</th>
<th>Power Rating (W)</th>
<th>Resistance Range</th>
<th>Resistance Tolerance (%)</th>
<th>Dielectric Withstanding Voltage (VAC)</th>
<th>T.C.R. (ppm/dC)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERX-12L</td>
<td>0.5</td>
<td>22 to 82 m</td>
<td>± 2, ± 5</td>
<td>350</td>
<td>± 350</td>
<td></td>
</tr>
<tr>
<td>ERX-1L</td>
<td>1</td>
<td>22 to 82 m</td>
<td>± 2, ± 5</td>
<td>22 to 39 m: ± 1000</td>
<td>± 500</td>
<td></td>
</tr>
<tr>
<td>ERX-2L</td>
<td>2</td>
<td>22 to 82 m</td>
<td>± 2, ± 5</td>
<td>47 to 82 m: ± 500</td>
<td>± 500</td>
<td></td>
</tr>
</tbody>
</table>

**EIA Standard Resistance Values**

- E-96 Tolerance *1% | E-24 Tolerance *5\% 0.5\% 0.1%
# RESISTOR NETWORKS & ARRAYS

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Power Rating (W)</th>
<th>Resistance Range</th>
<th>Resistance Tolerance (%)</th>
<th>T.C.R. (ppm/°C)</th>
<th>LxWxT Dimensions (mm)</th>
<th>Qty. 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERA-38V</td>
<td>0603 x 4</td>
<td>1/16 W Element</td>
<td>100K-220 K</td>
<td>0.5</td>
<td>± 25</td>
<td>3.2 x 1.6 x 0.5</td>
<td>5,000</td>
<td>Thin Film</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1K-100 K</td>
<td>0.1, 0.25</td>
<td></td>
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</tr>
<tr>
<td>EXB-14V</td>
<td>0201 x 2</td>
<td>1/32 W Element</td>
<td>10 - 1 M</td>
<td>± 5</td>
<td>± 200 x</td>
<td>0.8 x 0.6 x 0.35</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>EXB-18V</td>
<td>0201 x 4</td>
<td>1/32 W Element</td>
<td>10 - 1 M</td>
<td>± 5</td>
<td>± 200 x</td>
<td>1.4 x 0.6 x 0.35</td>
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</tr>
<tr>
<td></td>
<td>Flat Term</td>
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</tr>
<tr>
<td>EXB-N8V</td>
<td>0402 x 4</td>
<td>1/32 W Element</td>
<td>1 - 1 M</td>
<td>± 5</td>
<td>± 600/100 x 10^-6/dC</td>
<td>2.0 x 1.0 x 0.45</td>
<td>10,000</td>
<td></td>
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<tr>
<td></td>
<td>Concave Term</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>EXB-24V</td>
<td>0402 x 2</td>
<td>1/16 W Element</td>
<td>1 - 1 M</td>
<td>± 5</td>
<td>± 200 x</td>
<td>1.0 x 1.0 x 0.35</td>
<td></td>
<td>• High density of resistors in single array chip</td>
</tr>
<tr>
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</tr>
<tr>
<td>EXB-28V</td>
<td>0402 x 4</td>
<td>1/16 W Element</td>
<td>1 - 1 M</td>
<td>± 5</td>
<td>± 600/100 x 10^-6/dC</td>
<td>2.0 x 1.0 x 0.35</td>
<td></td>
<td>• Improved placement efficiency (3 to 4 times greater) compared to flat chip type resistors</td>
</tr>
<tr>
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</tr>
<tr>
<td>EXB-34V</td>
<td>0603 x 2</td>
<td>1/16 W Element</td>
<td>1 - 1 M</td>
<td>± 5</td>
<td>± 200 x</td>
<td>1.6 x 1.6 x 0.55</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXB-38V</td>
<td>0603 x 4</td>
<td>1/16 W Element</td>
<td>1 - 1 M</td>
<td>± 5</td>
<td>± 200 x</td>
<td>3.2 x 1.6 x 0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chip Resistor Network</td>
<td></td>
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<td></td>
<td></td>
<td>• High density placement for digital signal applications.</td>
</tr>
<tr>
<td>EXB-E16</td>
<td>1506 Concave Term</td>
<td>1/40 W Element</td>
<td>100 - 470 K</td>
<td>± 5</td>
<td>± 200</td>
<td>3.8 x 1.6 x 0.45</td>
<td>4,000</td>
<td>• Superior mountability due to unique concave terminal</td>
</tr>
<tr>
<td>EXB-A10P</td>
<td>2512 Concave Term</td>
<td>1/16 W Element</td>
<td>47 - 1 M</td>
<td>± 5</td>
<td>± 200</td>
<td>4.0 x 2.1 x 0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chip Attenuator</td>
<td>EXB-24AT</td>
<td>1 / 25 W Package</td>
<td>Attenuation Range</td>
<td>± 0.3 dB</td>
<td>Characteristic Impedance</td>
<td>1.0 x 1.0 x 0.35</td>
<td>10,000</td>
<td>• Space saving design using unbalanced pie-type attenuator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 ~ 5 dB</td>
<td>± 0.5 dB</td>
<td>50 Ω</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 ~ 10 dB</td>
<td></td>
<td></td>
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</tbody>
</table>
INDUCTORS

Power Choke Coils
EMI Filters
Chip Choke Coils
## Power Choke Coils

<table>
<thead>
<tr>
<th>Series</th>
<th>Parts No</th>
<th>Size (mm)</th>
<th>Inductance</th>
<th>Rated Current</th>
<th>DCR (mΩ typ.)</th>
<th>Features</th>
</tr>
</thead>
</table>
| PCC-M1050ML | ETQ-PSM1R0YLC | 10.9 x 10 x 5 | 6.8µH ±20%  | 26.3, 31.5 | 1.75 | • Magnetic Shielding  
|            | ETQ-PSM1R5YLC |          | 1.0µH ±20%  | 23.0, 27.5 | 2.30 | • High Power, Low loss  
|            | ETQ-PSM5R0YLC |          | 2.0µH ±20%  | 16.2, 19.4 | 4.6  | • High Heat Resistance  
|            | ETQ-PSM4R7YFP | 5.5 x 5 x 4 | 4.7µH ±20%  | 4.0, 4.8A | 36.0 | • High Reliability  
|            | ETQ-PSM220YFP |          | 22µH ±20%  | 1.9, 2.3A | 16.3 | • High Bias Current  
| PCC-M0730L | ETQ-P3M1R68YLC | 10.9 x 10 x 5 | 6.8µH ±20%  | 9.8, 12.0 | 6.3  | • Temperature Stability  
| PCC-M0530M | ETQ-P3M2R24CFM | 8.7 x 7 x 3 | 0.24µH ±20% | 22A          | 1.12 | • Low Audible Noise  
|            | ETQ-P3M8R24CFM | 5.5 x 5 x 3 | 2.2µH ±20%  | 4.8, 5.8A | 22.6 | • Highly Efficient  
|            | ETQ-P3M3R3YFP |          | 3.3µH ±20%  | 4.1, 5.0A | 31.3 |                                  |
| PCC-M0540M | ETQ-P4M4R7YFP | 5.5 x 5 x 4 | 4.7µH ±20%  | 4.0, 4.8A | 36.0 |                                  |
|            | ETQ-P4M220YFP |          | 22µH ±20%  | 1.9, 2.3A | 16.3 |                                  |
| PCC-M0630M | ETQ-P3M6R80YFP | 6.5 x 6 x 3 | 0.68µH ±20% | 9.8, 12.0 | 6.3  |                                  |
|            | ETQ-P3M1R50YFP | 5.5 x 5 x 3 | 1.0µH ±20%  | 8.8, 10.7 | 7.9  |                                  |
| PCC-M0645M | ETQ-P4M6R80YFP | 6.5 x 6 x 4.5 | 6.8µH ±20%  | 4.1, 5.2A | 39.3 |                                  |
|            | ETQ-P4M100YFP |          | 10µH ±20%  | 3.3, 4.5 | 54.2 |                                  |
|            | ETQ-P4M70YFP |          | 47µH ±20%  | 1.8, 2.2A | 210  |                                  |
| PCC-M0754M | ETQ-P5M2R5YFM | 7.5 x 7 x 0.5 | 2.5µH ±20%  | 11.9, 14.0 | 7.6  |                                  |
|            | ETQ-P5M100YF |          | 10µH ±20%  | 5.7, 6.7 | 33   |                                  |
|            | ETQ-P5M150YF |          | 15µH ±20%  | 4.7, 5.5 | 36   |                                  |
|            | ETQ-P5M220YF |          | 22µH ±20%  | 3.0, 3.7 | 92   |                                  |
| PCC-M0854M | ETQ-P6M100YF | 8.5 x 8 x 0.5 | 2.5µH ±20%  | 11.9, 14.0 | 7.6  |                                  |
|            | ETQ-P6M50Y |          | 10µH ±20%  | 5.7, 6.7 | 33   |                                  |
|            | ETQ-P6M100YF |          | 15µH ±20%  | 4.7, 5.5 | 36   |                                  |
|            | ETQ-P6M220YF |          | 22µH ±20%  | 3.0, 3.7 | 92   |                                  |
| PCC-M1058M | ETQ-P5M101YGC | 10.7 x 10 x 0.5 | 1.45µH ±20% | 17.9, 21.4 | 3.8  |                                  |
|            | ETQ-P5M205Y |          | 2.5µH ±20%  | 15.1, 18.1A | 5.3 |                                  |
|            | ETQ-P5M305Y |          | 3.3µH ±20%  | 13.1, 15.7A | 7.1 |                                  |
|            | ETQ-P5M405Y |          | 4.7µH ±20%  | 10.9, 13.1A | 10.2 |                                  |
| PCC-M1054M | ETQ-P5M50Y | 10.7 x 10 x 0.5 | 1.5µH ±20%  | 19.5, 23.3 | 3.20 |                                  |
|            | ETQ-P5M60Y |          | 2.0µH ±20%  | 16.2, 19.4 | 4.6  |                                  |
|            | ETQ-P5M70Y |          | 2.5µH ±20%  | 16.3, 19.6A | 4.5  |                                  |
|            | ETQ-P5M80Y |          | 3.0µH ±20%  | 14.2, 17.0A | 6.0  |                                  |
| PCC-M1056M | ETQ-P5M100Y | 10.7 x 10 x 0.5 | 1.5µH ±20%  | 19.5, 23.3 | 3.20 |                                  |
|            | ETQ-P5M200Y |          | 2.0µH ±20%  | 16.2, 19.4 | 4.6  |                                  |
|            | ETQ-P5M300Y |          | 2.5µH ±20%  | 16.3, 19.6A | 4.5  |                                  |
|            | ETQ-P5M400Y |          | 3.0µH ±20%  | 14.2, 17.0A | 6.0  |                                  |
| PCC-M1050M | ETQ-P5M50Y | 10.7 x 10 x 0.5 | 1.5µH ±20%  | 19.5, 23.3 | 3.20 |                                  |
|            | ETQ-P5M60Y |          | 2.0µH ±20%  | 16.2, 19.4 | 4.6  |                                  |
|            | ETQ-P5M70Y |          | 2.5µH ±20%  | 16.3, 19.6A | 4.5  |                                  |
|            | ETQ-P5M80Y |          | 3.0µH ±20%  | 14.2, 17.0A | 6.0  |                                  |
| PCC-M1056M | ETQ-P5M100Y | 10.7 x 10 x 0.5 | 1.5µH ±20%  | 19.5, 23.3 | 3.20 |                                  |
|            | ETQ-P5M200Y |          | 2.0µH ±20%  | 16.2, 19.4 | 4.6  |                                  |
|            | ETQ-P5M300Y |          | 2.5µH ±20%  | 16.3, 19.6A | 4.5  |                                  |
|            | ETQ-P5M400Y |          | 3.0µH ±20%  | 14.2, 17.0A | 6.0  |                                  |
| PCC-M1056M | ETQ-P5M100Y | 10.7 x 10 x 0.5 | 1.5µH ±20%  | 19.5, 23.3 | 3.20 |                                  |
|            | ETQ-P5M200Y |          | 2.0µH ±20%  | 16.2, 19.4 | 4.6  |                                  |
|            | ETQ-P5M300Y |          | 2.5µH ±20%  | 16.3, 19.6A | 4.5  |                                  |
|            | ETQ-P5M400Y |          | 3.0µH ±20%  | 14.2, 17.0A | 6.0  |                                  |

*DC current causing temperature rise of 40K. Devices soldered by reflow on 4-layer PWB (1.6mm FR4) and measured at room temperature.

*DC current causing temperature rise of 40K. Devices soldered by reflow on multi-layer PWB with high heat dissipation performance. Note heat radiation constant per data sheet note.
<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Size (mm)</th>
<th>Inductance</th>
<th>Rated Current**a, **b</th>
<th>DCR</th>
<th>Features</th>
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<td>PCC-M0640M-LP</td>
<td>ETQP4M47R7VKX</td>
<td>8.5 x 8.0 x 4.0</td>
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<td>7.1, 8.3</td>
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<tr>
<td>PCC-M0630L</td>
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<tr>
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<tr>
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<td>ETQP3M15YFN</td>
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<td>PCC-M0630W</td>
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<td>2.3</td>
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<td></td>
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<td>ETQP3W1R5WFN</td>
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<td>6.6, 11</td>
<td>9.8</td>
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<td>ETQP3W2R2WFN</td>
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<td>ETQP3W3R3WFN</td>
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<td></td>
<td>ETQP3W4R7WFN</td>
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<td>4.70µH ±20%</td>
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<td>PCC-M0740L</td>
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<td>1.0</td>
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<td>ETQP4LR36AFM</td>
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<td>0.36µH ±20%</td>
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<td>ETQP4LR42AFM</td>
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<tr>
<td>PCC-M1040L</td>
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<td>ETQP4LR36WFC</td>
<td>11.5 x 10.0 x 4.0</td>
<td>0.36µH ±20%</td>
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<td>ETQP4LR56WFC</td>
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<td>0.56µH ±20%</td>
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<td>ETQP4LR45XFC</td>
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<td>0.45µH ±20%</td>
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<td>ETQP4LR36XFC</td>
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<td>0.36µH ±20%</td>
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<td>ETQP4LR68XFC</td>
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<td>PCC-M1040W</td>
<td>ETQP4WR15WFC</td>
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<td>13</td>
<td>4</td>
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<tr>
<td>PCC-M1250L</td>
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<tr>
<td>PCC-M125L</td>
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<tr>
<td>PCC-M1460L</td>
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<td>19.5, 23.3</td>
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<tr>
<td>PCC-M1050L</td>
<td>ETQP5M2R0YLC</td>
<td>10.9 x 10 x 5.0</td>
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<td>2.3, 2.9</td>
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<tr>
<td>PCC-D124H</td>
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<td>23</td>
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<td>ETQP3HR0R8FA</td>
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<td>PCC-D125H</td>
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<td>ETQP2H1R2BFA</td>
<td>13.0 x 12.9 x 4.9</td>
<td>1.22µH ±20%</td>
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<tr>
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<td>ETQP2H1R8BFA</td>
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<td>ETQP2H2R6BFA</td>
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<td>2.61µH ±20%</td>
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<tr>
<td>PCC-D126H</td>
<td>ETQP1H0R8BFA</td>
<td>13.0 x 12.9 x 6.8</td>
<td>0.60µH ±25%</td>
<td>26</td>
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<td>ETQP1H1R8BFA</td>
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<td>1.00µH ±20%</td>
<td>19</td>
<td>1.56</td>
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</tbody>
</table>

*a* DC current causing temperature rise of 40K. Devices soldered by reflow on 4-layer PWB (1.6mm FR4) and measured at room temperature.

*b* DC current causing temperature rise of 40K. Devices soldered by reflow on multi-layer PWB with high heat dissipation performance. Note heat radiation constant per data sheet note.
### Power Choke Coils

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Size (mm)</th>
<th>Inductance</th>
<th>Rated Current</th>
<th>DCR</th>
<th>Features</th>
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</thead>
<tbody>
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<td>PCC-D126F</td>
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<td>High Power, High Inductance (MnFe Core)</td>
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<td>ETQAF63R5BFA</td>
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<td>PCC-D1413H</td>
<td>ETQPH240DTV</td>
<td>14.7x13.2x13.1mm</td>
<td>24.0 (10A)</td>
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<td>25.8</td>
<td>Magnetic shielding</td>
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<td>ETQAF66R8LFA</td>
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<td>0.8µH ±30%</td>
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<td>2.24</td>
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<td>ETQAF61R0SFA</td>
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<tr>
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<td>ETQAF63R2SFA</td>
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<td>9.3A</td>
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<td>ETQAF63R3SFA</td>
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<td>8.2µH ±25%</td>
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### Chip Choke Coils

<table>
<thead>
<tr>
<th>Series</th>
<th>Size (mm)</th>
<th>Inductance Range</th>
<th>Saturation Rated Current</th>
<th>Features</th>
</tr>
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<tbody>
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<td>ELL-6G6</td>
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<td>ELL-4G–A</td>
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<td>0.22 ~ 1.90 mA</td>
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<td>ELL-6GG</td>
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<td>ELL-4PG</td>
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<td>ELL-6SH</td>
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<td>ELL-CTV</td>
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<td>ELL-VGG</td>
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<td>ELL-VGC–C</td>
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<td>1.00 ~ 100µH</td>
<td>0.18 ~ 1.40 mA</td>
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### EMI Filters

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<th>Series</th>
<th>Surface Mount Filters</th>
<th>Coil</th>
<th>Case Size</th>
<th>Impedance (Ω)</th>
<th>Tolerance</th>
<th>Cap. (pF)</th>
<th>Rated DC Current</th>
<th>DC Resistance Max (Ω)</th>
<th>Features</th>
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<td>ELL-4F6</td>
<td>ELK-E</td>
<td>1207</td>
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<td>For Filtering Digital Noise</td>
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<td>Stable Attenuation Characteristics</td>
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RELAYS

Power
PhotoMOS®
PhotoIC Coupler
Solid State
Automotive
Microwave Devices
Signal
## RELAYS

### General Purpose Power Relays

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<th>Series</th>
<th>Contact Arrangement</th>
<th>Nominal Switching Capacity (A)</th>
<th>Max. Switching Voltage (V)</th>
<th>Latching: Single Side Stable (S)</th>
<th>Nominal Operating Power</th>
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<tbody>
<tr>
<td>AHN</td>
<td>1a, 1c, 2c</td>
<td>10A 30VDC/250 VAC (1c)</td>
<td>250VAC, 30 VDC</td>
<td>S</td>
<td>AC (50Hz): 1.1 to 1.4VA (60Hz): 0.9 to 1.2VA DC: 0.53W</td>
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<td>5A 30VDC/250 VAC (2c)</td>
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<td>16A 30VDC/250 VAC (1a)</td>
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<tr>
<td>HC</td>
<td>1c, 2c, 3c, 4c, 4c twin</td>
<td>10A 250 VAC (1c)</td>
<td>250 VAC</td>
<td>S</td>
<td>AC (50Hz): 1.3VA (60Hz): 1.2VA DC: 0.9W to 1.0W</td>
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<td>7A 250 VAC (2c, 3c)</td>
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<td>5A 250 VAC (4c)</td>
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<td>3A 250 VAC (4c twin)</td>
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<td>HJ</td>
<td>2c, 4c</td>
<td>7A 30VDC/250 VAC(2c)</td>
<td>250VAC, 125 VDC</td>
<td>S</td>
<td>AC (50Hz): 1.2 to 1.5VA (60Hz): 1.0 to 1.3VA* DC: 0.9W to 1.1W</td>
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<td>HL</td>
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<td>10A 125/250 VAC (1c, 2c)</td>
<td>250 VAC</td>
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<td>AC: (50Hz) 1.3VA, (60Hz) 1.2VA DC: 0.9 to 1W</td>
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<td>15A 125 VAC (1c)</td>
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<td>SFS</td>
<td>2a2b, 3a1b, 4a2b, 5a1b, 3a3b</td>
<td>6A 250 VAC/30 VDC</td>
<td>250VAC, 125 VDC</td>
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<td>340mW (2a2b, 3a1b) 500mW (4a2b, 5a1b, 3a3b)</td>
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<td>6A 250 VAC, 6A 30 VDC</td>
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<td>ALA</td>
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<td>3A 125VAC, 5A 277 VAC</td>
<td>125VAC, 277 VAC</td>
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<td>ALDP</td>
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<td>277 VAC</td>
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<td>ALE</td>
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<td>16A 277 VAC</td>
<td>277 VAC</td>
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<td>400mW (std), 200mW (high sensitivity)</td>
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<td>ALF</td>
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<td>22A 250 VAC (Standard)</td>
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<td>33A 250 VAC (1.8mm contact gap High capacity type)</td>
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<td>ALZ</td>
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<td>30A 277 VAC (1a)</td>
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<td>1.92W (DC coil), 1.7 to 2.7VA (AC coil)</td>
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<td>HE-S</td>
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<td>HE-PV</td>
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<td>277 VAC</td>
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<td>48A 277 VAC</td>
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<td>80A 277 VAC</td>
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<td>Series</td>
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<td>Nominal Switching Capacity (A)</td>
<td>Max. Switching Voltage (V)</td>
<td>Latching: Single Side Stable (S)</td>
<td>Nominal Operating Power</td>
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<td>JS</td>
<td>1a, 1c, 1a (long life)</td>
<td>1a, 1c: 5A 30 VDC, 6A 277 VAC, 10A 125 VAC, 10A 250 VAC (NO) 1a (long life): 10A 250/277 VAC, 5A 30 VDC</td>
<td>250VAC, 100 VDC (0.5A)</td>
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<td>360mW</td>
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<tr>
<td>JTN</td>
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<tr>
<td>JTV</td>
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<tr>
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<td>10A 30 VDC, 125/277 VAC 1A 125 VAC</td>
<td>30 VDC, 277 VAC</td>
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<td>200mW(4.5 to 48VDC)</td>
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<tr>
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<td>5A 30VDC/250 VAC (1a, 1c, 2a, 2c) 10A 250 VAC/30 VDC (1a, 1c)</td>
<td>250 VAC, 30 VDC</td>
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<tr>
<td>LKP</td>
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<td>30 VDC, 277 VAC</td>
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<td>LKT</td>
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<td>277 VAC</td>
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<tr>
<td>LQ</td>
<td>1a, 1c</td>
<td>1a: 10A 125 VAC, 5A 250 VAC/30 VDC 1c: (N.O.) 10A 125 VAC, 5A 250 VAC/30 VDC (N.C.) 3A 125 VAC, 2A 250 VAC, 1A 30 VDC</td>
<td>250 VAC</td>
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<td>200mW (1a)</td>
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<tr>
<td>NC</td>
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<td>5A 250 VAC/30 VDC</td>
<td>250 VAC</td>
<td>S</td>
<td>2c DC: 360mW (740mW: 100VDC) 4c DC: 720mW (740mW: 100VDC)</td>
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<td>PAN</td>
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<td>5A 250VAC/30 VDC</td>
<td>110V DC, 250 VAC</td>
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<td>110mW (3 to 24VDC)</td>
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<td>PF</td>
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<td>6A 250 VAC</td>
<td>250 VAC</td>
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<td>170 mW (5-24 VDC) 217 mW (48 V DC) 175 mW (60 V DC)</td>
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<tr>
<td>PQ</td>
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<td>110VDC (0.3A), 250 VAC</td>
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<td>Nominal Switching Capacity (A)</td>
<td>Max. Switching Voltage (V)</td>
<td>Latching: Single Side Stable (S), 1 coil latching (L1), 2 coil latching (L2)</td>
<td>Nominal Operating Power</td>
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<td>ADJ</td>
<td>1a, 1b, 1c, 1a1b, 2a, 2b, 2c</td>
<td>16A 250 VAC (1a, 1b, 1c)</td>
<td>250 VAC</td>
<td>S, L1, L2</td>
<td>160mW(L1) 250mW(S, L2)</td>
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<td>ADJH</td>
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<td>50A 277 VAC</td>
<td>480 VAC</td>
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<td>1000mW(L1) 2000mW(L2)</td>
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<td>30A 250 VAC</td>
<td>250 VAC</td>
<td>L1, L2</td>
<td>500mW(L1) 1000mW(L2)</td>
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<td>DE</td>
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<td>10A 250 VAC/30 VDC (1a) 8A 250VAC/30 VDC (1a1b, 2a)</td>
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<td>DQM</td>
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<td>60A 250 VAC</td>
<td>250 VAC</td>
<td>L1, L2</td>
<td>500mW(L1) 1000mW(L2)</td>
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<td>DSP</td>
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<td>8A 250 VAC (1a) 5A 250 VAC/30 VDC (1a, 1a1b, 2a)</td>
<td>250 VAC, 125VDC(10.2A)</td>
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<td>DW</td>
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<td>8A 250 VAC(standard type) 16A 277 VAC (Inrush type)</td>
<td>277 VAC</td>
<td>L1, L2</td>
<td>200 (L1) 400 (L2)</td>
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<td>2a2b, 3a1b, 4a</td>
<td>4A 250 VAC, 3A 30 VDC</td>
<td>250 VAC, 48 VDC (30~48 VDC at less than 0.5 A)</td>
<td>S, L2</td>
<td>(3 to 24V) 200mW (48V) 355mW</td>
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<td>15A 250 VAC (2c) 10A 250 VAC (4c)</td>
<td>250 VAC, 30 VDC (48V DC: Max. 2A)</td>
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<td>380 VAC, 250 VDC</td>
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Load Voltage

- Load Voltage 0.11 - 0.2A
- Load Voltage 1A
- Load Voltage 1.1 - 2A
- Load Voltage 4A
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**Notes:**
- AQY212S, AQY222S, AQY222R1S, AQY225R1S: Different packaging options.
- AQY211R6P, AQY211R6T, AQY211R6V: Various output voltages.
- AQY277: Special package option for higher load voltages.
### PhotoIC Coupler; Solid State Relays

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<td>CW</td>
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<td>70A (1min @85C)</td>
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<td>45A (continued @85C)</td>
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<td>200A, 400 VDC</td>
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<td>300A, 400 VDC</td>
<td>37.9W (Inrush, approx. 0.1 sec.) 3.6W (Stable)</td>
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<td>AEV (Quiet)</td>
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<td>60A 400VDC</td>
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<td>Maximum Switching Voltage</td>
<td>Frequency Range (max)</td>
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<td>ARA</td>
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<td>3W @ 1GHz</td>
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<td>ARN</td>
<td>SPDT</td>
<td>6GHz</td>
<td>100W at 2GHz</td>
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<td>320mW (S), 400mW (L2)</td>
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<td>30 VDC</td>
<td>3GHz</td>
<td>10W @ 3GHz</td>
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<td>ARD</td>
<td>SPDT, Transfer, SP6T</td>
<td>30 VDC 100mA (indicator)</td>
<td>26.5GHz</td>
<td>12W @ 3Gh</td>
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<td>ARV</td>
<td>SPDT</td>
<td>18GHz (PIN)</td>
<td>50W @ 3Gh</td>
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<td>26.5GHz (SMA)</td>
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<td>1540mW (Transfer, Fail-safe with indicator)</td>
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<td>Max. Switching Voltage (V)</td>
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<td>Nominal Operating Power</td>
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<td>L1 and S (high sensitivity type): 100mW (1.5 to 12VDC), 120mW (24VDC)</td>
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<td>S, L1, S (high sensitivity)</td>
<td>L1 and S (high sensitivity type): 100mW (1.5 to 12VDC), 120mW (24VDC)</td>
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<td>S, L1</td>
<td>L1: 100mW (1.5 to 12VDC), 120mW (24VDC)</td>
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<td>S: 140mW (1.5 to 12VDC), 230mW (24VDC)</td>
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<td>2A 30 VDC</td>
<td>220 VDC, 250 VAC</td>
<td>S, L2</td>
<td>L1: 200mW (standard), 400mW (high sensitivity)</td>
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<td>L2: 180mW (standard), 360mW (high sensitivity)</td>
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<td>S, L1, L2</td>
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<td>L1: 70, 100mW</td>
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<td>L2: 140, 200mW</td>
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<tr>
<td>TX</td>
<td>2c</td>
<td>2A 30 VDC, 1A 30 VDC</td>
<td>220 VDC</td>
<td>S, L1, L2</td>
<td>L1: 100 mW (1.5 to 24 V DC)</td>
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<td>L2: 200 mW (1.5 to 24 V DC)</td>
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<td>2A 30 VDC (2c), 1A 30 VDC</td>
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<td>2c: 200mW (1.5 to 12VDC), 230mW (24VDC)</td>
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<td>2d M.B.B.: 250mW (1.5 to 12VDC), 270mW (24VDC)</td>
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<td>TX-S</td>
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<td>1A 30 VDC</td>
<td>110 VDC</td>
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<td>S: 50mW (1.5 to 12VDC), 70mW (24VDC)</td>
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<td>(TH type)</td>
<td>2c</td>
<td>2A 30 VDC</td>
<td>S, L1, L2</td>
<td>S: 140 mW (1.5 to 24 V DC), 270 mW (48 V DC)</td>
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<td>1A 30 VDC (2d M.B.B.)</td>
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<td>L1: 100 mW (1.5 to 24 V DC)</td>
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<td>S</td>
<td>S: 200 mW (1.5 to 24 V DC), 300 mW (48 V DC)</td>
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CONNECTORS

Narrow Pitch (Board to FPC)
Narrow Pitch (Board to Board)
FPC Connectors
Active Optical
Stacking for High Current
### CONNECTORS NARROW PITCH

#### Board to FPC

<table>
<thead>
<tr>
<th>Part Number (Socket)</th>
<th>AXG1*</th>
<th>AXG7**</th>
<th>AXG7***</th>
<th>AXE7**</th>
<th>AXFS**</th>
<th>AXE3**</th>
<th>AXE1**</th>
<th>AXE5**</th>
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<tbody>
<tr>
<td>Part Number (Header)</td>
<td>AXG2*</td>
<td>AXG8**</td>
<td>AXG8***</td>
<td>AXE8**</td>
<td>AXF6**</td>
<td>AXE4**</td>
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<td>AXE6**</td>
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<td>Mated Height (mm)</td>
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<td>Header (W) (mm)</td>
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#### Board to FPC & Board to Board

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<th>AXT1**</th>
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<th>AXT3***</th>
<th>AXK7**</th>
<th>AXK7**</th>
<th>AX5F**</th>
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<td>Socket (W) (mm)</td>
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#### Rated Current (contact)

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<td>Rated Voltage (AC/DC)</td>
<td>60V</td>
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#### Insertion/Removal Life*

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<th>30X</th>
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*Inspection Connectors Available @ 3000X    ::    Ambient Operating Temperature: -55 ~ +85°C
### Narrow Pitch, FPC Connectors

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<th>P5K</th>
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<td>Part Number (Header)</td>
<td>AXK6**</td>
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<td>Mated Height (mm)</td>
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<tr>
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<td>Header (W) (mm)</td>
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<td>80, 100</td>
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<td>80, 100</td>
<td>80, 100</td>
<td>80, 100</td>
<td>80, 100, 100</td>
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</table>

| Rated Current (Contact) | 0.5A |
| Max Current             | 10A  |
| Rated Voltage (AC/DC)   | 60V  |
| Insertion & Removal Life* | 50X  |

*Inspection Connectors Available @ 3000X :: Ambient Operating Temperature: -55 – +85°C

### FPC Connectors

<table>
<thead>
<tr>
<th>Series</th>
<th>Y3B</th>
<th>Y3BW</th>
<th>Y3BL</th>
<th>Y3BC</th>
<th>Y2B</th>
<th>Y5B</th>
<th>Y5BW</th>
<th>Y4BH</th>
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<tr>
<td>Part Number</td>
<td>AYF33**35</td>
<td>AYF33**65</td>
<td>AYF35**35</td>
<td>AYF36**35</td>
<td>AYF21**25</td>
<td>AYF53**35</td>
<td>AYF53**65T</td>
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<td>Mounting Height (mm)</td>
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<tr>
<td>Contact Pitch (mm)</td>
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<td>Terminal Pitch (mm)</td>
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<td>Dimension (W) (mm)</td>
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<th>10 - 19</th>
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<th>30 - 39</th>
<th>40 - 49</th>
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| Compatibility w/ FPC/FFC | FPC | FPC | FPC | FPC | FPC/FPC | FPC | FPC | FPC |
| Contact Structure        | Top & Bottom | Top & Bottom | Top & Bottom | Top & Bottom | Top & Bottom | Top & Bottom | Top & Bottom |
| Rated Current (Contact)  | 0.2A  | 0.2A  | 0.2A  | 0.2A  | 0.2A  | 0.5A  | 0.3A |
| Rated Voltage (AC/DC)    | 50V   |
| Insertion & Removal Life* | 30 X |
### Active Optical Connectors

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<tr>
<td>1 Channel - Bi Direction</td>
<td>2 Channel - Uni Direction</td>
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<tr>
<td><strong>Part Number (Integrated Cable and Plug)</strong></td>
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<tr>
<td>AYG4V1**</td>
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<td><strong>Part Number (Receptacle)</strong></td>
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<tr>
<td>AXK652B447M*</td>
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<tr>
<td><strong>Transmission Rate/Channel</strong></td>
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<td>20Mbps to 6 Gbps</td>
<td>20Mbps to 8 Gbps</td>
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<td>2kV</td>
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<td><strong>Cable Length</strong></td>
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<td>50mm, 500mm, 1000mm</td>
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<td><strong>Insertion &amp; Removal Life</strong></td>
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### Stacking Connectors for High Current

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<tbody>
<tr>
<td><strong>Part Number (Socket)</strong></td>
<td>AXF361500</td>
<td>AXF461500</td>
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<td><strong>Part Number (Header)</strong></td>
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<td><strong>Stacking Height in mm</strong></td>
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<td><strong>No of Contacts</strong></td>
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<tr>
<td><strong>Width (Socket) in mm</strong></td>
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<td><strong>Width (Header) in mm</strong></td>
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<td><strong>Total Rated Current Power Terminal</strong></td>
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<tr>
<td><strong>Insertion/Removal Life</strong></td>
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STORAGE MEDIA
SD Cards
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<th>NAND</th>
<th>Operating Temp</th>
<th>Data Transfer Rate (max) Read; Write</th>
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<td>RP-SDFC51DA1</td>
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<td></td>
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<td>SLC (60 k)</td>
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<td></td>
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<td>SLC (60 k)</td>
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<td>SD</td>
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SENSORS

Passive Infrared
Infrared Array Grid-EYE®
Air Pressure
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<th>Sensor</th>
<th>Series</th>
<th>Current Usage</th>
<th>Operating Voltage (VDC)</th>
<th>Circuit Stability Time</th>
<th>Range</th>
<th>Lens Color</th>
<th>Output</th>
<th>Detection Angle</th>
<th>Profile (mm)*</th>
<th>Lens Diameter (mm)</th>
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<tbody>
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<td>EKMB</td>
<td>1µA, 2µA, 6µA</td>
<td>2.3-4.0</td>
<td>1µA/2µA - 25s (typ.)</td>
<td>5m, 12m</td>
<td>White, Black, Pearl White</td>
<td>Digital</td>
<td>5m:94° (H), 82° (V)</td>
<td>5m:14.4 Standard Detection Type</td>
<td>5m:9.5 Standard Detection Type</td>
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<td>6µA - 30s (max.)</td>
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<td>12m:102° (H), 92° (V)</td>
<td>12m:20.2 Long Detection Type</td>
<td>12m:20.7 Long Detection Type</td>
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<td>12m, 6m, 3m: 40° (H), 105°(IV) Wall Installation Type</td>
<td>12m, 6m, 3m: 20.2 Wall installation type</td>
<td>12m, 6m, 3m: 20.7 Wall installation type</td>
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<td>2.2m : 44° (H), 44°(IV) Saturn Lens, Slight Motion</td>
<td>2.2m : 17.2 Saturn Lens (Slight Motion &amp; Standard Motion)</td>
<td>2.2m : 14.1 Saturn Lens (Slight Motion &amp; Standard Motion)</td>
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<td>2.2m : 90° (H), 90°(IV) Saturn Lens, Standard Motion</td>
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<td>EKMC</td>
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<td>3.0-6.0</td>
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<td>5m:94° (H), 82° (V)</td>
<td>5m:14.4 Standard Detection Type</td>
<td>5m:9.5 Standard Detection Type</td>
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<td>12m:20.2 Long Detection Type</td>
<td>12m:20.7 Long Detection Type</td>
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<td>12m, 6m, 3m: 20.2 Wall installation type</td>
<td>12m, 6m, 3m: 20.7 Wall installation type</td>
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<td>2.2m : 44° (H), 44°(IV) Saturn Lens, Slight Motion</td>
<td>2.2m : 17.2 Saturn Lens (Slight Motion &amp; Standard Motion)</td>
<td>2.2m : 14.1 Saturn Lens (Slight Motion &amp; Standard Motion)</td>
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<td>5m:100° (H), 82° (V)</td>
<td>10m: 110° (H), 93° (V)</td>
<td>10m: 110° (H), 93° (V)</td>
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<td>Digital</td>
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<td>10m: 110° (H), 93° (V)</td>
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*Profile measured from top of sensor to base (does not include pin length)
## Infrared Array Grid-Eye; Air Pressure Sensors

### Infrared Array Grid-Eye

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<tbody>
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<td>AMG8833</td>
<td>64 (8x8)</td>
<td>3.3VDC</td>
<td>High Gain</td>
<td>60°</td>
<td>10/1 fps</td>
<td>+0.25°C</td>
<td>0.15°C</td>
<td>0 – +80°C</td>
<td>0 – +80°C</td>
<td>11.6 (L), 8.0 (W), 4.3 (H)</td>
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<td>3.3VDC</td>
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<td>0.15°C</td>
<td>-20 – +100°C</td>
<td>-20 – +80°C</td>
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<tr>
<td>AMG8853</td>
<td>5VDC</td>
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<td>+0.25°C</td>
<td>0.15°C</td>
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<td>AMG8854</td>
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<td>+0.30°C</td>
<td>0.15°C</td>
<td>-20 – +100°C</td>
<td>-20 – +80°C</td>
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### Air Pressure

#### PS-A Series (Built-in amp & compensating circuit)
- **ADP51**
  - Pressure Range: 4kPA to 100kPA (±100kPA)
  - Precision: Standard: ±1.25% FS, Economy: ±4% FS
  - Drive Voltage / Current: Standard: 5V±0.25V DC, Economy: 3V±0.15V DC
  - Current Consumption: Standard: 10mA max., Economy: 5mA max.
  - Dimensions (mm)*: 7.2(L) x 7.0(W) x 6.5(H)
  - Pressure Inlet Hole Direction: Opposite to pins

#### PF/PS Series
- **ADP41**
  - Pressure Range: 4.9kPA to 980.7kPA
  - Precision: Low Pressure: ±2.5% FS
  - Drive Voltage / Current: 1 - 1.5mA
  - Current Consumption: Voltage input dependent
  - Dimensions (mm)*: 7.2(L) x 7.0(W) x 8.5(H)
  - Pressure Inlet Hole Direction: Opposite to pins

#### Air Pressure
- **ADP42**
  - Pressure Range: 4.9kPA to 980.7kPA
  - Precision: Low Pressure: ±2.5% FS
  - Drive Voltage / Current: 1 - 1.5mA
  - Current Consumption: Voltage input dependent
  - Dimensions (mm)*: 7.2(L) x 7.0(W) x 8.5(H)
  - Pressure Inlet Hole Direction: Same as pins

*Profile measured from top of sensor to base (does not include pin length)
Introduction The New Datasheet Shortcut Tool

Enter A Part Number... Get A Datasheet. It’s That Simple!
Diodes
ASSP
MOSFETs
### Diodes

<table>
<thead>
<tr>
<th>Type</th>
<th>Package</th>
<th>Series</th>
<th>Absolute Maximum Rating</th>
<th>Electrical Characteristics</th>
</tr>
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<tbody>
<tr>
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<td>VR (V)</td>
<td>IF (AV) (mA)</td>
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<td>IR max. (uA)</td>
<td>trr max. (ns)</td>
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<td>VF max. (ns)</td>
<td>IF (mA)</td>
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<tr>
<td>Switching Diode</td>
<td>Surface Mount</td>
<td>DA/BA</td>
<td>40 - 300</td>
<td>100 - 200</td>
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<td>0.1 - 1.0</td>
<td>3.0 - 60</td>
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<td>DB</td>
<td>20 - 60</td>
<td>30 - 5000</td>
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<td>0.3 - 3150</td>
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<td>0.37 - 1.0</td>
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<td>DB2xxx</td>
<td>12 - 60</td>
<td>100 - 1000</td>
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<td>0.3 - 3150</td>
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### ASSP

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<tr>
<th>Type</th>
<th>Package</th>
<th>Series</th>
<th>Operating Voltage (V)</th>
<th>Output Voltage (V)</th>
<th>Functions</th>
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<tbody>
<tr>
<td>High-Reliability DCDC with Integrated FET</td>
<td>SSOP024-P-0300F</td>
<td>HGF048-P-0707B</td>
<td>5.0 - 39.0</td>
<td>1.2 - 9.0</td>
<td>• Settable Oscillation Frequency Range: 200 kHz - 2.0 MHz</td>
</tr>
<tr>
<td>Lens</td>
<td>Multi-Ch DCDC with Integrated FET&amp;LDO</td>
<td>UBG009-P-1515AEA</td>
<td>HGF024-P-0404 Others</td>
<td>2.5 - 5.5</td>
<td>0.8 - 2.3</td>
</tr>
<tr>
<td>Hall Sensor ICs</td>
<td>Position Sensor ICs</td>
<td>SMINI-5DE</td>
<td>2.7 - 3.6 (Vcc)</td>
<td>3.0 - 5.5 (VCM)</td>
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<tr>
<td>Motor Drivers</td>
<td>Stepping Motor Drivers</td>
<td>SSOP032-P-0300B</td>
<td>HGF042-P-0400D Others</td>
<td>10 - 34 (VM)</td>
<td>Peak Current 0.8A - 2.5A</td>
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<td>Motor Drivers Special Functions</td>
<td>QFN044-P-0606D</td>
<td>2.7 - 3.6</td>
<td>Peak Current 0.8A - 2.5A</td>
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<td>3-Phase Brushless DC Motor Driver IC</td>
<td>HGFN024-A-0404</td>
<td>AN411xxA</td>
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<td>Brushed DC Motor Driver IC</td>
<td>WLSCP</td>
<td>HGFN034-P-0300A</td>
<td>AN44xxx/A</td>
<td>5v/24V system</td>
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<td>Matrix LED Drivers</td>
<td>XBGA012-W-1313AE</td>
<td>UBGA035-W-3333AEA Others</td>
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<td>Logic/LSI</td>
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<td>NFC Tag</td>
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<td>QFN 16 pins 3.2 x 4.2mm</td>
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<td>Touch key control MCU</td>
<td>SSOP 32 pins 11.0 x 8.1mm</td>
<td>LFQFP 64pins 16.0 x 16.0mm</td>
<td>MN101EFA-7</td>
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<td>ReRAM MCU</td>
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### MOSFETs

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<th>Electrical Characteristics</th>
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<td>Nch</td>
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### MOSFETs (Power Management)

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### MOSFETs (Lithium-ion Battery Protection)

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<td>VDSS (V)</td>
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<td>MOSFET + SBD</td>
<td>Surface Mount</td>
<td>FL</td>
<td>Pch</td>
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<td>MOSFET + SBD</td>
<td>Surface Mount</td>
<td>FM</td>
<td>Nch</td>
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<tr>
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<td>Surface Mount</td>
<td>MTM/FK</td>
<td>Nch x 2</td>
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<td>-20/20</td>
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<td>MOSFET + SBD</td>
<td>Surface Mount</td>
<td>MTM/FG</td>
<td>Pch + Nch</td>
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### MOSFETs + SBD

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<td>Surface Mount</td>
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<td>CSP</td>
<td>FCxB</td>
<td>Nch</td>
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<td>12.0 - 20</td>
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Did You Know?

GaN Technology Is Here. So Long Silicon!
Panasonic Can Unlock The Full Performance Of Gallium Nitride Power Technology

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- GaN Material Information
- X-GaN™ Transistors
- Benefits and Applications

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CIRCUIT PROTECTION

Thermistors
ZNK Surge Absorbers
Varistors
EMI Filters
Fuse Resistors
ESD Suppressors
## Thermistors

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size (EIA) LxWxH (mm)</th>
<th>Electrical Characteristics</th>
<th>Operating Temperature</th>
<th>Features</th>
</tr>
</thead>
</table>
| ERTJZ   | 0201 0.60x0.30x0.30mm     | 10k - 100k Ohm, +/-1%, +/-2% | -40 to +125°C         | • Surface Mount 0201, 0402, 0603  
• Highly Reliable  
• Multi-layer & Monolithic available  
• Lead Free (RoHS) |
|          | 0201 0.60x0.30x0.30mm     | 2k - 100k Ohm, +/-3%, +/-5% | -40 to +125°C         |          |
| ERTJ0   | 0402 1.0x0.50x0.50mm      | 10k - 100k Ohm, +/-1%, +/-2% | -40 to +125°C         |          |
|          | 0402 1.0x0.50x0.50mm      | 22 - 470k Ohm, +/-3%, +/-5% | -40 to +125°C         |          |
| ERTJ1   | 0603 1.60x0.8x0.8mm       | 10k, 100k Ohm, +/-1%, +/-2% | -40 to +125°C         |          |
|          | 0603 1.60x0.8x0.8mm       | 22 - 220k Ohm, +/-3%, +/-5% | -40 to +125°C         |          |
| ERTJ0-M | 0402 1.0x0.50x0.50mm      | 10k - 470k Ohm, +/-1%, +/-2%, +/-3%, +/-5% | -40 to +150°C         |          |
|          | 0603 1.60x0.8x0.8mm       | 10k - 220k Ohm, +/-1%, +/-2%, +/-3%, +/-5% | -40 to +150°C         | Automotive grade |

## ZNR Surge Absorbers

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size (EIA) LxWxH (mm)</th>
<th>Electrical Characteristics</th>
<th>Operating Temperature</th>
<th>Features</th>
</tr>
</thead>
</table>
| ERZexxA  | 5 to 14 mm f Disc         | Varistor voltages 200 to 1800 VDC Max Peak Currents 1200 to 10000A | -40 to +85°C         | • Safety Agency recognized  
• Replace next larger V Series devices |
| ERZ-VxxD | 5 to 20 mm Ø Disc         | Varistor Voltages: 18 to 1,800 VDC Max. Peak Currents: 125 to 6,500 A |          | • Large energy handling capabilities  
• UL / VDE / CSA Safety Certifications  
• QS9000 |
| ERZ-Y34Cxx | 34 x 47 mm               | Varistor Voltages: 170-745 VDC |          | • Very large surge withstand capability  
• Fast response to steep impulse voltage  
• Low clamping voltage for better surge protection |
| ERZ-CxxCk | 36.44 mm Ø               | VAC 130 to 575 vms         |          | • 3IL and CSA recognized  
• High energy handling capability (210 to 750 joules)  
• Common terminals for mounting and electrical connections |

## Varistors

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Case Size</th>
<th>Varistor Voltage</th>
<th>Max. Allowable Voltage (DC)</th>
<th>Capacitance (pF) 1MHz</th>
<th>Maximum ESD (IE061000-4-2)</th>
<th>Max Peak Current 8/20us 2x (A)</th>
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<tbody>
<tr>
<td>MLCV</td>
<td>EZ.JP1-M</td>
<td>0402</td>
<td>27 - 65</td>
<td>18 - 65</td>
<td>10 - 100</td>
<td>8kV</td>
<td>1 - 10</td>
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<tr>
<td>MLCV</td>
<td>EZ.JP1-M</td>
<td>0603</td>
<td>18 - 65</td>
<td>11 - 40</td>
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<td>MLCV</td>
<td>EZ.J20-M</td>
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<td>50 - 170</td>
<td>5 - 18</td>
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<td>EZ.JP8</td>
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<td>6.8 - 65</td>
<td>3.7 - 16</td>
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<td>MLCV</td>
<td>EZ.JP1</td>
<td>0603</td>
<td>12</td>
<td>6.7</td>
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<td>EZ.J20</td>
<td>0402</td>
<td>42, 45</td>
<td>30, 40</td>
<td>56, 27</td>
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<td>EZ.J21</td>
<td>0603</td>
<td>18 - 65</td>
<td>11 - 40</td>
<td>27 - 220</td>
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<td>MLCV Array</td>
<td>EZ.J55V</td>
<td>0504</td>
<td>12 - 170</td>
<td>6.7 - 18</td>
<td>3 - 220</td>
<td>8kV</td>
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<td>MLCV</td>
<td>EZ.J57V</td>
<td>0603</td>
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<td>6 - 30</td>
<td>1800 - 8200</td>
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<td>MLCV</td>
<td>EZ.J22V</td>
<td>0805</td>
<td>12 - 50</td>
<td>6 - 30</td>
<td>4700 - 22000</td>
<td>30kV</td>
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## Strontium Titanate
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<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Impedance (Ω)</th>
<th>Tolerance</th>
<th>Cap. (pF)</th>
<th>Rated DC Current</th>
<th>DC Resistance Max (Ω)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXC-14CE</td>
<td>0302</td>
<td>Common mode Z: 65, 90</td>
<td>±20%</td>
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<td>130 mA</td>
<td>2.5</td>
<td>• Low DC Resistance and Insertion Loss</td>
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<td>• Low Profile</td>
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<tr>
<td>EXC-24CG</td>
<td>0504</td>
<td>Common mode Z:24, 90</td>
<td>±20%</td>
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<td>160 mA, 100 mA</td>
<td>1.5, 3.0</td>
<td>• Meet The Mask-Test For HDMI</td>
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<td>• High Reliability</td>
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<tr>
<td>EXC-24CE</td>
<td>0504</td>
<td>Common mode Z:36 – 200</td>
<td>±25%</td>
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<td>130mA – 200 mA</td>
<td>1.0 – 2.70</td>
<td>• High-Q Impedance Available</td>
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<td>EXC-24CF</td>
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<td>• Magnetic Shield</td>
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<td>EXC-28CE</td>
<td>0804</td>
<td>Common mode Z:90 – 200</td>
<td>±25%</td>
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<td>130mA – 160 mA</td>
<td>1.5 – 2.50</td>
<td>• 2 Common Mode Noise Filters Per Package</td>
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<tr>
<td>EXC-28CG</td>
<td>0804</td>
<td>Common mode Z:90</td>
<td>±25%</td>
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<td>130 mA</td>
<td>3.0</td>
<td>• Magnetic Shield</td>
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<td>• Small Size</td>
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<td>EXC-24CB/CP</td>
<td>0504</td>
<td>Common mode Z:120 – 1000</td>
<td>±25%</td>
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<td>50mA – 500 mA</td>
<td>0.3 – 1.5</td>
<td>• Burst/Radiation Noise Reduction For Audio Circuits</td>
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<tr>
<td>EXC-24CN</td>
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<td>• Filtering Common &amp; Normal Mode Noises</td>
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<td>• Magnetic Shielding</td>
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<td>Chip Bead Cores</td>
<td>EXC-CL</td>
<td>0603 – 4532</td>
<td>Z: 25 – 115 Z: 27 – 60 Z: 60 – 1000</td>
<td>±25%</td>
<td>50mA – 2000 mA</td>
<td>0.1 – 1.0</td>
<td>• Effective Noise Suppression For Power Lines And High Speed Signal Lines</td>
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<td>EXC-ML</td>
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<td>EXC-3B</td>
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<td>Coil</td>
<td>ELK-E</td>
<td>1207</td>
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<td>10 – 33K</td>
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<td>• For Filtering Digital Noise</td>
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<td>• Stable Attenuation Characteristics Over Current Changes</td>
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<tr>
<td>Series</td>
<td>Case Size</td>
<td>Rated Current</td>
<td>Rated Functioning Temperature</td>
<td>Internal R at 25°C (Max)</td>
<td>Rated Voltage</td>
<td>Interrupting Rating at Rated Voltage</td>
<td>Features</td>
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<tr>
<td>ERB-RD</td>
<td>0402</td>
<td>0.25A – 3A</td>
<td>-40°C to +125°C</td>
<td>37m ~ 620 mΩ</td>
<td>32VDC</td>
<td>35A</td>
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<td>• Fast acting</td>
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<tr>
<td>ERB-RE</td>
<td>0603</td>
<td>0.5A – 5A</td>
<td>-40°C to +125°C</td>
<td>19m ~ 330 mΩ</td>
<td>32VDC</td>
<td>50A</td>
<td>• Small size</td>
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<tr>
<td>ERB-RG</td>
<td>1206</td>
<td>0.5A – 4A</td>
<td>-40°C to +125°C</td>
<td>35m ~ 560 mΩ</td>
<td>32VDC, 63VDC</td>
<td>50A</td>
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</tbody>
</table>

**Fuse Resistors**

**SMD**

**Micro Chip**

**Leaded**

**Thermal Cutoff**

<table>
<thead>
<tr>
<th>Series</th>
<th>Case Size</th>
<th>Capacitance</th>
<th>LxWxT (mm) Dimensions</th>
<th>Qty, 7” Reel (pcs.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZA-EG1A</td>
<td>0201</td>
<td>C = 0.04 pF</td>
<td>0.6 x 0.3 x 0.23</td>
<td>15,000</td>
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<tr>
<td>EZA-EG2A</td>
<td>0402</td>
<td>C = 0.10 pF</td>
<td>1.0 x 0.5 x 0.38</td>
<td>10,000</td>
<td>• Good ESD Suppression</td>
</tr>
<tr>
<td>EZA-EG3A</td>
<td>0603</td>
<td>C = 0.05 pF</td>
<td>1.6 x 0.8 x 0.5</td>
<td>5,000</td>
<td>• Good ESD Withstanding</td>
</tr>
<tr>
<td>EZA-EGCA</td>
<td>0805</td>
<td>C = 0.25 pF</td>
<td>(4 Per Pkg.)</td>
<td>5,000</td>
<td>• Low Capacitance</td>
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</table>

**ESD Suppressors**

**EZA-EG1A**

**EZA-EG2A**

**EZA-EG3A**

**EZA-EGCA**
Pyrolytic Graphite Sheet (PGS)
Soft PGS
Semi-Sealing Material (SSM)
Graphite-PAD
NASBIS Insulating Sheet
## THERMAL MANAGEMENT

### PYROLYTIC GRAPHITE SHEET (PGS)

<table>
<thead>
<tr>
<th>Type</th>
<th>Thickness (µm)</th>
<th>Part Number</th>
<th>Standard Sheet Size (mm²)</th>
<th>PGS Thermal Conductivity (a-b plane) (W/(m·K))</th>
<th>PGS Electrical Conductivity (S/cm)</th>
<th>PGS Density (g/cm³)</th>
<th>PGS Extensional Strength (MPa)</th>
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<tbody>
<tr>
<td>S Type</td>
<td>100 µm</td>
<td>EYG-S091210</td>
<td>90 x 115 mm²</td>
<td>700 W/(m·K)</td>
<td>10000 S/cm</td>
<td>0.85 g/cm³</td>
<td>19.6 MPa</td>
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<td></td>
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<td>EYG-S121810</td>
<td>115 x 180 mm²</td>
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<tr>
<td></td>
<td></td>
<td>EYG-S182310</td>
<td>180 x 230 mm²</td>
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<tr>
<td></td>
<td>70 µm</td>
<td>EYG-S091207</td>
<td>90 x 115 mm²</td>
<td>1000 W/(m·K)</td>
<td>10000 S/cm</td>
<td>1.21 g/cm³</td>
<td>20.0 MPa</td>
</tr>
<tr>
<td></td>
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<td>EYG-S121807</td>
<td>115 x 180 mm²</td>
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<td>EYG-S182307</td>
<td>180 x 230 mm²</td>
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<tr>
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<td>50 µm</td>
<td>EYG-S091205</td>
<td>90 x 115 mm²</td>
<td>1300 W/(m·K)</td>
<td>10000 S/cm</td>
<td>1.70 g/cm³</td>
<td>20.0 MPa</td>
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<tr>
<td></td>
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<td>EYG-S121805</td>
<td>115 x 180 mm²</td>
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<td>EYG-S182305</td>
<td>180 x 230 mm²</td>
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<td>40 µm</td>
<td>EYG-S091204</td>
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<td>EYG-S121804</td>
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<td>25 µm</td>
<td>EYG-S091203</td>
<td>90 x 115 mm²</td>
<td>1600 W/(m·K)</td>
<td>20000 S/cm</td>
<td>1.90 g/cm³</td>
<td>30.0 MPa</td>
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<td>EYG-S121803</td>
<td>115 x 180 mm²</td>
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</tr>
</tbody>
</table>

| A-A Type | 70 µm | EYG-A091207A | 90 x 115 mm² | 1000 W/(m·K) | 10000 S/cm | 1.21 g/cm³ | 20.0 MPa |
| | | EYG-A121807A | 115 x 180 mm² | | | | |
| | 50 µm | EYG-A091205A | 90 x 115 mm² | 1300 W/(m·K) | 10000 S/cm | 1.70 g/cm³ | 20.0 MPa |
| | | EYG-A121805A | 115 x 180 mm² | | | | |
| | 40 µm | EYG-A091204A | 90 x 115 mm² | 1350 W/(m·K) | 10000 S/cm | 1.80 g/cm³ | 25.0 MPa |
| | | EYG-A121804A | 115 x 180 mm² | | | | |
| | 25 µm | EYG-A091203A | 90 x 115 mm² | 1600 W/(m·K) | 20000 S/cm | 1.90 g/cm³ | 30.0 MPa |
| | | EYG-A121803A | 115 x 180 mm² | | | | |
| | 17 µm | EYG-A091202A | 90 x 115 mm² | 1750 W/(m·K) | 20000 S/cm | 2.10 g/cm³ | 40.0 MPa |
| | | EYG-A121802A | 115 x 180 mm² | | | | |
| | 10 µm | EYG-A091201A | 90 x 115 mm² | 1950 W/(m·K) | 20000 S/cm | 2.13 g/cm³ | 40.0 MPa |
| | | EYG-A121801A | 115 x 180 mm² | | | | |

| A-F Type | 50 µm | EYG-A091205F | 90 x 115 mm² | 1300 W/(m·K) | 10000 S/cm | 1.70 g/cm³ | 20.0 MPa |
| | | EYG-A121805F | 115 x 180 mm² | | | | |
| | 40 µm | EYG-A091204F | 90 x 115 mm² | 1350 W/(m·K) | 10000 S/cm | 1.80 g/cm³ | 25.0 MPa |
| | | EYG-A121804F | 115 x 180 mm² | | | | |
| | 17 µm | EYG-A091202F | 90 x 115 mm² | 1650 W/(m·K) | 20000 S/cm | 2.10 g/cm³ | 40.0 MPa |
| | | EYG-A121802F | 115 x 180 mm² | | | | |
| | 10 µm | EYG-A091201F | 90 x 115 mm² | 1950 W/(m·K) | 20000 S/cm | 2.13 g/cm³ | 40.0 MPa |
| | | EYG-A121801F | 115 x 180 mm² | | | | |

<p>| A-M Type | 70 µm | EYG-A091207M | 90 x 115 mm² | 1000 W/(m·K) | 10000 S/cm | 1.21 g/cm³ | 22.0 MPa |
| | | EYG-A121807M | 115 x 180 mm² | | | | |
| | 50 µm | EYG-A091205M | 90 x 115 mm² | 1300 W/(m·K) | 10000 S/cm | 1.70 g/cm³ | 20.0 MPa |
| | | EYG-A121805M | 115 x 180 mm² | | | | |
| | 40 µm | EYG-A091204M | 90 x 115 mm² | 1350 W/(m·K) | 10000 S/cm | 1.80 g/cm³ | 25.0 MPa |
| | | EYG-A121804M | 115 x 180 mm² | | | | |
| | 25 µm | EYG-A091203M | 90 x 115 mm² | 1600 W/(m·K) | 20000 S/cm | 1.90 g/cm³ | 30.0 MPa |
| | | EYG-A121803M | 115 x 180 mm² | | | | |
| | 17 µm | EYG-A091202M | 90 x 115 mm² | 1750 W/(m·K) | 20000 S/cm | 2.10 g/cm³ | 40.0 MPa |
| | | EYG-A121802M | 115 x 180 mm² | | | | |
| | 10 µm | EYG-A091201M | 90 x 115 mm² | 1950 W/(m·K) | 20000 S/cm | 2.13 g/cm³ | 40.0 MPa |
| | | EYG-A121801M | 115 x 180 mm² | | | | |</p>
<table>
<thead>
<tr>
<th>Type</th>
<th>PGS Thickness (µm)</th>
<th>Part Number</th>
<th>Standard Sheet Size (mm²)</th>
<th>PGS Thermal Conductivity (a-b plane) (W/(m·K))</th>
<th>PGS Electrical Conductivity (S/cm)</th>
<th>PGS Density (g/cm³)</th>
<th>PGS Extensional Strength (MPa)</th>
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<tr>
<td>Graphite Sheet With 6 µm Acrylic Adhesive And 10 µm Polyester Tape</td>
<td>50 µm</td>
<td>EYG-A091205DF</td>
<td>90 × 115 mm²</td>
<td>1300 W/(m·K)</td>
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<td>1.70 g/cm³</td>
<td>20.0 MPa</td>
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<td>EYG-A121805DF</td>
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<td>40 µm</td>
<td>EYG-A091204DF</td>
<td>90 × 115 mm²</td>
<td>1350 W/(m·K)</td>
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<td>17 µm</td>
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<td>70 µm</td>
<td>EYG-A091207PA</td>
<td>90 × 115 mm²</td>
<td>1000 W/(m·K)</td>
<td>10000 S/cm</td>
<td>1.21 g/cm³</td>
<td>22.0 MPa</td>
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### SOFT PGS, SSM, GRAPHITE-PAD

**THERMAL MANAGEMENT**

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### Elastomer Thickness (mm)

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<td>EYG-E0912X0D</td>
<td>19.48°C-cm²/W</td>
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### Semi-Sealing Material (SSM)

<table>
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<tr>
<th>Thickness (mm)</th>
<th>Part Number</th>
<th>Standard Sheet Size (mm²)</th>
<th>Thermal Conductivity (a-b plane) (W/(m·K))</th>
<th>Thermal Conductivity (c plane) (W/(m·K))</th>
<th>Thermal Resistance (K·cm²/W @ 600kPa)</th>
<th>Operating Temperature Range (°C)</th>
<th>Compressibility (%) @ 600 kPa</th>
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<tbody>
<tr>
<td>0.5 mm</td>
<td>EYG-T3535A05A</td>
<td>35 x 35 mm²</td>
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<td>0.6°C-cm²/W</td>
<td>40%</td>
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<td>PGS Thickness (µm)</td>
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<td>Operating Temperature Range (°C)</td>
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