Implementing USB Type-C charging presents challenges to design engineers. Littelfuse temperature indicator solutions help protect cables from dangerous overheating due to resistive faults from power line to ground.
setP™ Key Characteristics

<table>
<thead>
<tr>
<th>Function</th>
<th>Applications</th>
<th>Ordering Number</th>
<th>Indicating Temperature</th>
<th>Resistance @ 25°C</th>
<th>Indicating Resistance</th>
<th>Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over-temperature Protection</td>
<td>Captive cable USB Type-C Chargers</td>
<td>SETP0805-100-SE</td>
<td>100°C ±10°</td>
<td>12Ω or less</td>
<td>35kΩ or greater</td>
<td>0805</td>
</tr>
<tr>
<td>Over-temperature Protection</td>
<td>USB Type-C to Type-C Cables</td>
<td>SETP0805-100-CC</td>
<td>100°C ±10°</td>
<td>6Ω or less</td>
<td>35kΩ or greater</td>
<td>0805</td>
</tr>
</tbody>
</table>

**Keeps the Plug Surface Cool**

**Problem Condition**

- More Power
- Smaller pin-to-pin
- Universal Fit

Higher Risk

Easier for contamination or deformed pins to cause a fault. Higher power increases risk of thermal event.

**Surface Temperature During Over-temperature Fault**

- Unprotected Cable
- USB-IF Max Surface Temp*
- Cable with setP™ Protection

*C Reference temperature set by USB-IF within Table 5-6 of ‘USB Type-C ECN Active Cable’

**Circuit Diagram & Protection Explanation**

setP™, located inside the Type-C plug, senses the temperature of the USB Type-C Connector.

- Charger is connected to the AC power line and cable is connected to the mobile device
- Fault occurs causing heat (either at charger or mobile device side),
  1. setP™ senses heat, then resistance (R_setP) increase
  2. R_setP increase causes voltage on CC Line to increase beyond specified value*
  3. System assumes cable detached due to voltage on CC being higher than specified value*, thus VBUS power is turned off

- The system is protected
- To clear the fault: Disconnect the cable and remove debris

* VOpen value is defined by USB-IF as either 1.65V or 2.75V

New Product Brief

Type-C is quickly becoming the industry standard connector