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.
New Product Brief

**setPTM 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>39kΩ 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>39kΩ or greater</td>
<td>0805</td>
</tr>
</tbody>
</table>

**Keeps the Plug Surface Cool**

**Problem Condition**

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

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

**Surface Temperature During Over-temperature Fault**

*Reference temperature set by USB-IF within Table 6-14 of the USB Type-C Cable and Connector Specification.*

**Circuit Diagram & Protection Explanation**

*setPTM, 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. setPTM senses heat, then resistance (RsetP) increase
  2. RsetP 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

Type-C is quickly becoming the industry standard connector.