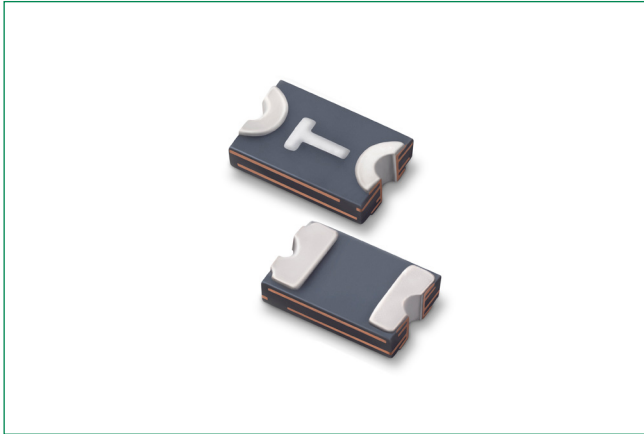




**setP™**

Temperature Indicators for USB Type-C



### Agency Approvals

Agency	Agency File Number
	E74889
	J 50313999

### Description

The Littelfuse setP™ temperature indicator helps protect USB Type-C plugs from overheating. It has been designed to the unique specifications of USB Type-C and is capable of helping to protect even the highest levels of USB Power Delivery.

### Features & Benefits

- Compact footprint: 0805 mils (2.0 x 1.2mm)
- Sensitive and reliable temperature indication
- SMD compatible with reflow soldering process
- Zero IR loss contribution
- Easy part selection
- USB Power Delivery compliant
- Protects systems with 100W or higher power
- Evaluated to UL 1434 and Annex J of IEC 60730-1

### Applications

- USB-C power adapters
- USB Type-C Plugs
- Chargers with captive Type-C Cables
- USB-C to USB-C Cable
- Fast charging standards and protocols compliant with USB-C and USB-PD

### Temperature Indication Characteristics

Part Number	Marking Code	Indicating Temperature (°C)			Resistance (Ω)	
		Min	Typical <sup>1</sup>	Max	Max at 25°C <sup>2</sup>	R <sub>ind</sub> <sup>3</sup>
SETP0805-100-SE	T	90	100	110	12	35,000
SETP0805-100-CC	V	90	100	110	6	35,000

#### Notes:

1. T<sub>ind</sub> = Typical indicating temperature: Typical temperature when device switches to indicating resistance (R<sub>ind</sub>)
2. Maximum post reflow resistance measured at 25°C in still air
3. R<sub>ind</sub> = Indicating resistance when device reaches the indicating temperature (T<sub>ind</sub>)

# setPTM<sup>TM</sup>

## Temperature Indicators for USB Type-C

### Electrical Characteristics

Part Number	I <sub>hold</sub> <sup>1</sup> (A)	I <sub>trip</sub> <sup>2</sup> (A)	V <sub>max</sub> <sup>3</sup> (Vdc)	I <sub>max</sub> <sup>4</sup> (A)	P <sub>d</sub> <sup>5</sup> typ. (W)	Maximum Time-To-Trip		Resistance	
						Current (A)	Time (Sec.)	R <sub>min</sub> <sup>6</sup> (Ω)	R <sub>1max</sub> <sup>7</sup> (Ω)
SETP0805-100-SE	0.06	0.25	6	1	0.6	0.3	1	0.5	12
SETP0805-100-CC	0.075	0.30	6	1	0.6	0.3	5	0.5	6

**Notes:**

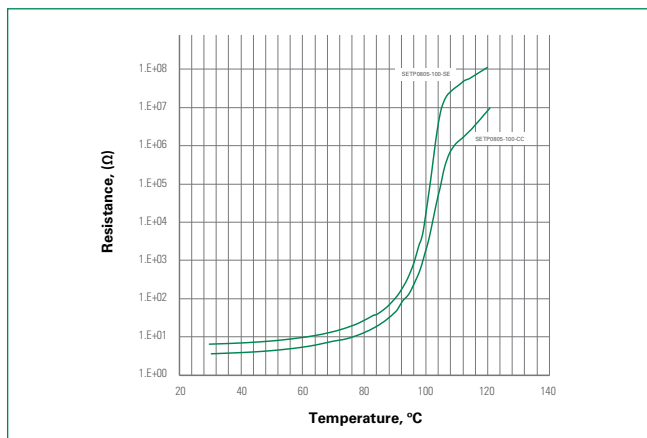
- I<sub>hold</sub> = Ihold should be higher than Vconn requirements when used in a USB-C receptacle port
- I<sub>trip</sub> = Trip current; minimum current at which the device will trip in 20°C still air
- V<sub>max</sub> = Maximum voltage device can withstand without damage at rated current (I<sub>max</sub>)
- I<sub>max</sub> = Maximum fault current device can withstand without damage at rated voltage (V<sub>max</sub>)
- P<sub>d</sub> = Power dissipated from device when in the tripped state at 20°C still air

- R<sub>min</sub> = Minimum resistance of device in initial (un-soldered) state
- R<sub>1max</sub> = Maximum resistance of device at 20°C measured one hour after tripping or reflow Soldering of 260°C for 20 seconds

(Values specified were determined using PCBs with 0.115in x 1.0in ounce copper traces)

**Caution:** Operation beyond the specified rating may result in damage and possible arcing and flame

### Resistance Vs. Temperature Curve



### Environmental Specifications

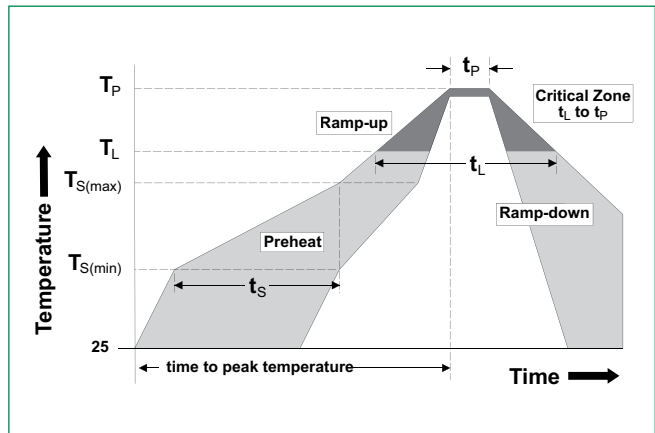
<b>Operating Temperature</b>	-40°C to +85°C
<b>Maximum Device Surface Temperature in Tripped State</b>	110°C
<b>Passive Aging</b>	+70°C 1000 hours ≤ R <sub>1max</sub> after test
<b>Humidity Aging</b>	+60°C, 90% R.H., 1000 hours ≤ R <sub>1max</sub> after test
<b>Thermal Shock</b>	MIL-STD-202, Method 215 No change -40°C to +85°C, 10 Cycles
<b>Solvent Resistance</b>	MIL-STD-202, Method 215 No change
<b>Vibration</b>	MIL-STD-883, Method 2007, Condition A No change
<b>Moisture Sensitivity Level</b>	Level 2a, J-STD-020

### Physical Specifications

<b>Terminal Material</b>	Solder-Plated Copper (Solder Material: Matte Tin (Sn))
<b>Lead Solderability</b>	Meets EIA Specification RS186-9E, ANSI/J-STD-002, Category 3.

### Soldering Parameters

<b>Profile Feature</b>	Pb-Free Assembly	
<b>Average Ramp-Up Rate (T<sub>S(max)</sub> to T<sub>p</sub>)</b>	3°C/second max	
<b>Pre Heat:</b>	Temperature Min (T <sub>S(min)</sub> )	150°C
	Temperature Max (T <sub>S(max)</sub> )	200°C
	Time (Min to Max) (t <sub>s</sub> )	60 – 120 secs
<b>Time Maintained Above:</b>	Temperature (T <sub>L</sub> )	217°C
	Temperature (t <sub>L</sub> )	60 – 150 seconds
<b>Peak / Classification Temperature (T<sub>p</sub>)</b>	260 <sup>+0/-5</sup> °C	
<b>Time within 5°C of actual peak Temperature (t<sub>p</sub>)</b>	30 seconds max	
<b>Ramp-down Rate</b>	2°C/second max	
<b>Time 25°C to peak Temperature (T<sub>p</sub>)</b>	8 minutes Max.	



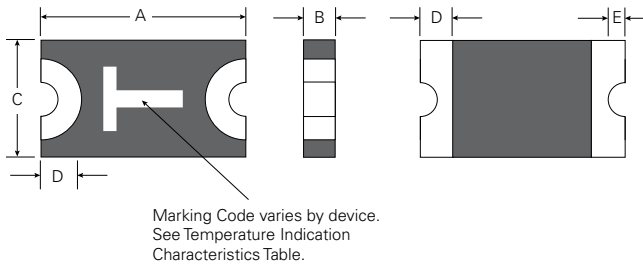
- All temperature refer to topside of the package, measured on the package body surface
- If reflow temperature exceeds the recommended profile, devices may not meet the performance requirements
- Recommended reflow methods: IR, vapor phase oven, hot air oven, N<sub>2</sub> environment for lead
- Recommended maximum paste thickness is 0.25mm (0.010 inch)
- Devices can be cleaned using standard industry methods and solvents
- Devices can be reworked using the standard industry practices

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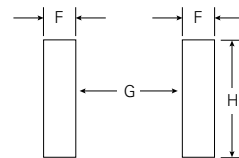
## Temperature Indicators for USB Type-C

### Dimensions

#### Product Dimensions

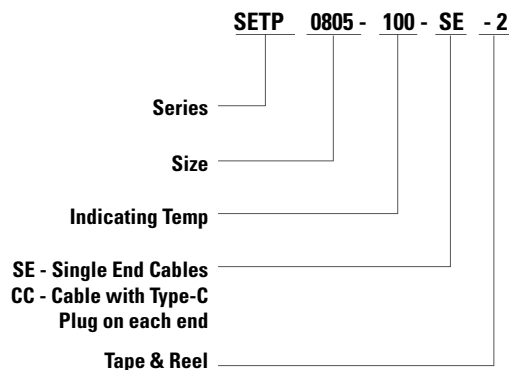


#### Solder Pad Layout



Part Number	Device Dimension																Solder Pad							
	A				B				C				D				E		F		G		H	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		
SETP0805-100-SE	0.079	0.087	2.00	2.20	0.017	0.024	0.43	0.60	0.051	0.059	1.30	1.50	0.010	0.030	0.25	0.75	0.003	0.076	0.039	1.00	0.047	1.20	0.059	1.50
SETP0805-100-CC	0.079	0.087	2.00	2.20	0.014	0.024	0.35	0.60	0.051	0.059	1.30	1.50	0.010	0.030	0.25	0.75	0.003	0.076	0.039	1.00	0.047	1.20	0.059	1.50

### Part Ordering Number System



### Packaging

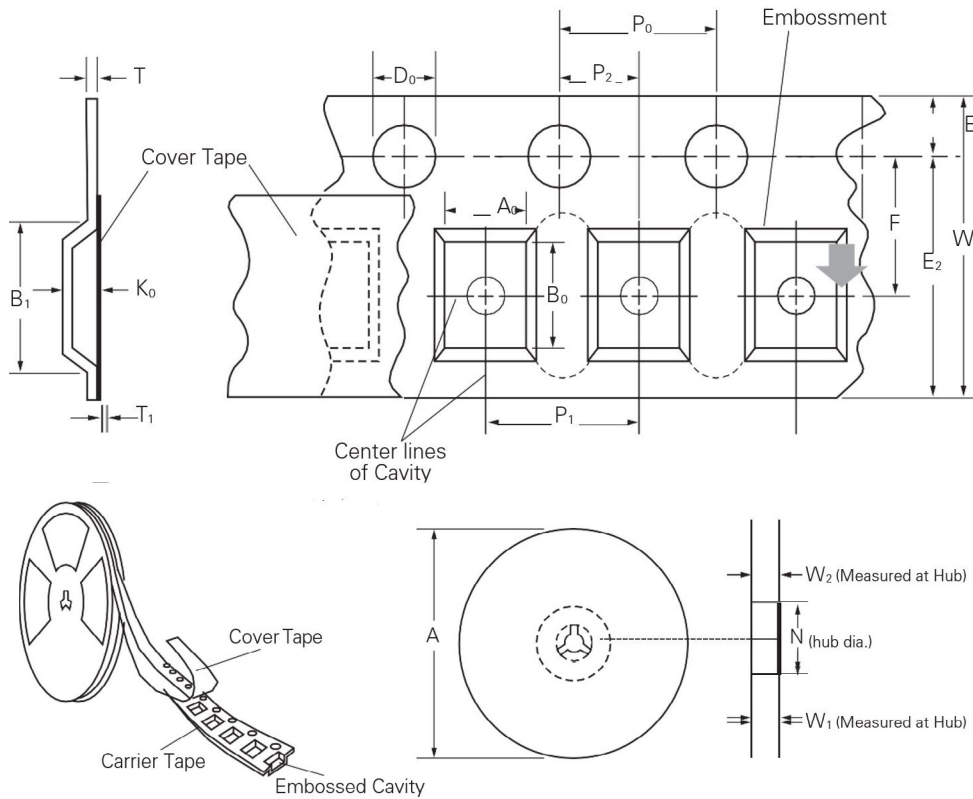
Part Number	Ordering Number	Minimum Order Quantity	Packaging Option	Quantity
SETP0805-100-SE	RF4795-000	20,000	Tape & Reel	4,000
SETP0805-100-CC	RF4819-000	20,000	Tape & Reel	4,000

### Installation and Handling Guidelines

- Operation of these devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire.
- These devices are intended to protect against the effects of temporary over-current or over-temperature conditions and are not intended to perform as protective devices where such conditions are expected to be repetitive or prolonged in duration.
- Exposure to silicon-based oils, solvents, electrolytes, acids, and similar materials can adversely affect the performance of these PPTC devices.
- These devices undergo thermal expansion under fault conditions, and thus shall be provided with adequate space and be protected against mechanical stresses.
- Circuits with inductance may generate a voltage (L di/dt) above the rated voltage of the PPTC device.
- Hand-soldering of PTC devices on boards is generally not recommended. Users shall define and verify this process if needed.
- Consult Littelfuse when the device is to be applied with thermal processes other than reflow process on the circuit board, such as molding, encapsulation. User should evaluate molding materials used in the charging cable applications to ensure there are no adverse effect on the PTC devices.

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**Tape and Reel Specifications**



	<b>SETP0805-100-SE</b>
W	8.0 ± 0.30
P <sub>0</sub>	4.0 ± 0.10
P <sub>1</sub>	4.0 ± 0.10
P <sub>2</sub>	2.0 ± 0.05
A <sub>0</sub>	1.70 ± 0.10
B <sub>0</sub>	2.45 ± 0.10
B <sub>1</sub> max.	4.35
D <sub>0</sub>	1.55 ± 0.05
F	3.50 ± 0.05
E <sub>1</sub>	1.75 ± 0.10
E <sub>2</sub> min.	6.25
T max.	0.3
T <sub>1</sub> max.	0.1
K <sub>0</sub>	0.86 ± 0.10
A max.	179
N min.	53.5
W <sub>1</sub>	9.5 ± 0.5
W <sub>2</sub> max.	15

**Standard Pack Quantity: 4,000 pcs**  
**Minimum Order Quantity: 20,000 pcs**

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).