

# TTP Series

## Distributed Temperature Monitoring Platform



### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com](http://www.littelfuse.com)

### Electrical Specifications

Recommended operating conditions

Name	Description	Value	Units
$V_{DD}$	Power supply range	3.3 to 5.5	V
$R_p$	Pull up resistor value when $V_{DD} = 3.3$ to $5.5$ V	200 ( $\pm 5\%$ )	k $\Omega$

Absolute maximum ratings

Name	Description	Value	Units
$V_{max}$	Voltage	6	V
$I_{max}$	Current	6	mA
-	Dielectric withstand. Tested per MIL-STD-202 Test Method 301	2500	V
-	Minimum bend radius	1	mm

### Description

The TTape™ platform is a distributed temperature monitoring technology for battery packs that helps to improve the detection of localized cell overheating. This device helps to increase the lifetime of batteries and provides thermal runaway protection.

### Features

- Simple integration with existing BMS solutions complementing NTCs
- No calibration or temperature look-up tables needed
- Pressure sensitive adhesive for simple and quick installation
- AEC-Q200 Qualified

### Benefits

- Over-temperature monitoring of many cells or large area with single MCU input
- Helps the MCU to wake from sleep mode at overtemperature events
- <1s response for temperature monitoring
- Extremely thin device suitable for conformal installation
- Increased spatial resolution of temperature monitoring

### Applications

- Li-ion battery packs
- Large area, distributed, temperature monitoring

### Operating Conditions

Device continues to meet all specifications and performance criteria System capable of detecting  $T_{L1}$

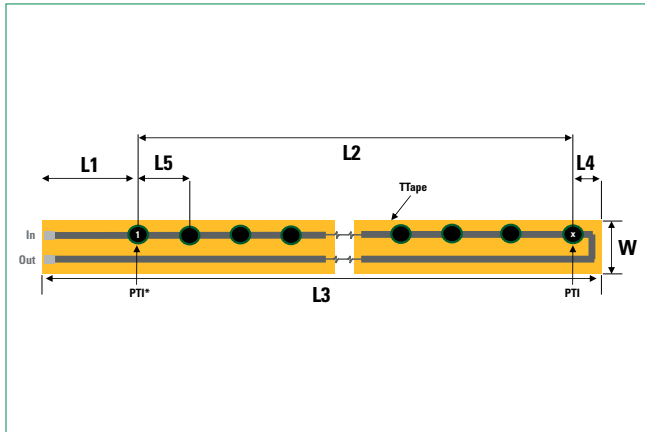
Specification	Value	Units
Operating temperature	-40 to +85	°C
Storage temperature	-40 to +55	°C
Pressure on PTI	<1500	Pa

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### Dimensions

Part Number: TTP0335F010  
Measurement: mm



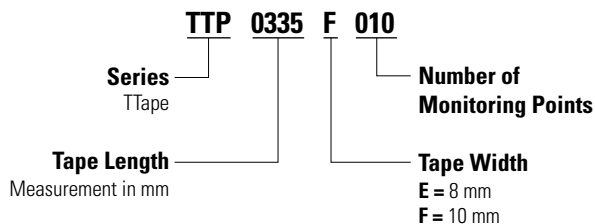
#### Note:

\* Printed Temperature Indicator (Monitoring Point or Individual Sensing Element on TTape device)

Parameter		TTP 0335 F 010 sample	Customized design
Number of Printed Thermal Indicators (PTIs)		10	≤50
Position of the first thermal indicator from the tape edge	L1	45±0,5 mm	≥15 mm
Distance between first and last thermal indicator	L2	274±0,5 mm	depending on design
TTape device total length	L3	337±0,5 mm	<1 m (typical)*
Distance between the last thermal indicator and the end of the tape	L4	17 mm±0,5 mm	≥10 mm
Pitch between Printed Thermal Indicators (PTIs) (can vary from PTI to PTI)	L5	30 mm±0,5 mm	≥10 mm
Tape width	W	10±0,5 mm	8 mm
Diameter of Printed Thermal Indicators (PTIs)		≤5 mm	≤5 mm
Device Thickness		< 500 μm	< 500 μm

Note: \* < 8 m (stitching option available)

### Part Numbering System

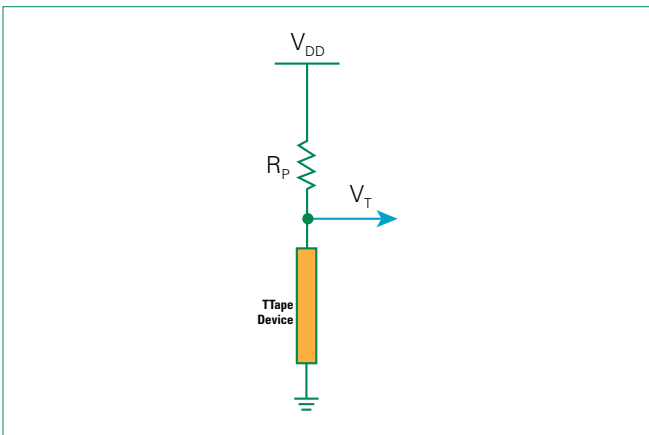
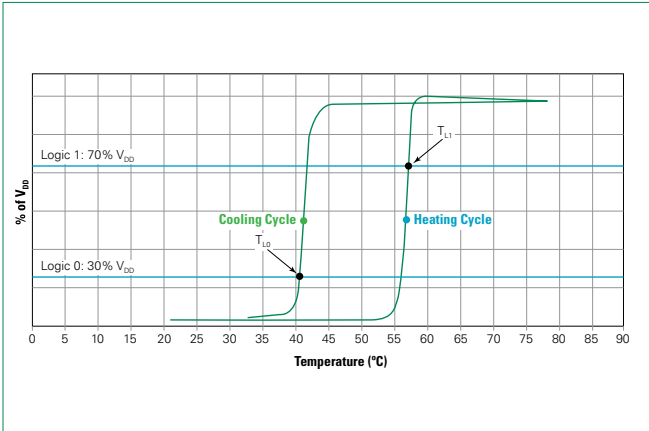


#### Notes:

Part number and dimensions are for standard sample devices.

TTape device will be customized to the geometrical needs of the application.

### Temperature Indication Characteristics



Name	Temperature (°C) <sup>1</sup>		
	Typical <sup>2,3</sup>	Tolerance	Description
$T_{L1}$	58	± 3	Logic value one occurs when temperature is equal or higher than this value during heating
$T_{L0}$	42	± 3	Logic value zero occurs when cooling

#### Notes:

- Using 10-bit or better A/D recommended
- Specification applies when less than 11 monitoring Points are heated and cooled simultaneously. Typical values for  $T_{L1}$  and  $T_{L0}$  decrease approximately 3 °C when simultaneously heating and cooling between 11 and 25 Monitoring Points.
- After performing AEC-Q200 'Biased Humidity' test, which applies 85 °C at 85% relative humidity for 1000 hours, trip temperature will decrease.  $T_{L1}$  will be greater than 45 °C and  $T_{L0}$  will be greater than 30 °C.

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