

## Overview

The KEMET TPI ferrite core inductors are designed for a very low core loss. Its flat wire, “one turn through the construction” design, enables high efficiency at large currents. The core material is ideal for high switching frequency applications.

The TPI series offers two solutions. One set of parts are DC optimized inductors for hard SW topology, 12 V power distribution. The other set comprises AC optimized inductors for soft SW topology, 48 V power distribution. These AC optimized inductors were developed for STC (Switched Tank Convertor) technology.

## Applications

- Hard-switching topology for DC/DC conversion
- Soft-switching topology for AC resonant conversion
- Point of loads (POL)
- Servers and storage
- Supercomputers
- Various decentralized power supplies

## Benefits

- One turn coil ferrite
- Operating temperature up to +125°C
- High switching frequency
- Low core loss
- Low DCR
- High current
- Low self-heating
- AC optimized inductor reduce close to 50% the total loss compared to conventional inductor due to optimized structure and material designed for STC technology



## Part Number System

| TPI    | 128080   | L        | 180                | N            |
|--------|--|----------|--------------------|--------------|
| Series | Size Code                                      | Inductor | Inductance Code nH | Version      |
| TPI    | 077050<br>078060<br>111065<br>118082<br>128080 |          | xxx = xxx nH       | N = Standard |

## Performance Characteristics

| Item                    | Performance Characteristics   |
|-------------------------|---|
| Operating Temperature   | -40°C to +125°C (including self-temperature rise)                   |
| Rated Inductance Range  | 47 – 230 nH at 100 kHz, 1 mA  |
| Inductance Tolerance    | ±10% (except ±20% for TPI077050L105N)                               |
| Rated DC Resistance     | 0.29 – 0.32 mΩ  |
| DC Resistance Tolerance | ±5% (except ±9.5% for TPI077050L105N and ±10.0% for TPI078060L***N) |
| Rated Current           | 36 – 53 A   |

**Table 1 – Ratings & Part Number Reference – DC Optimized TPI Inductors**

| Part Number    | Inductance (nH) at 100 kHz, 1 mA | Inductance Tolerance | DC Resistance (mΩ) | Rated Current (A)                    |                                      |      |       |
|----------------|----------------------------------|----------------------|--------------------|--------------------------------------|--------------------------------------|------|-------|
|                |                                  |                      |                    | I <sub>rms</sub> <sup>1</sup> (Ref.) | I <sub>sat</sub> <sup>2</sup> (Ref.) |      |       |
|                |                                  |                      |                    |                                      | 25°C                                 | 85°C | 125°C |
| TPI077050L105N | 105                              | ±20%                 | 0.32 ±9.5%         | 36                                   | 60                                   | 51   | 44    |
| TPI118082L150N | 150                              | ±10%                 | 0.29 ±5.0%         | 50                                   | 93                                   | 79   | 67    |
| TPI118082L180N | 180                              | ±10%                 | 0.29 ±5.0%         | 50                                   | 79                                   | 67   | 57    |
| TPI111065L210N | 210                              | ±10%                 | 0.29 ±5.0%         | 50                                   | 54                                   | 46   | 38    |
| TPI128080L180N | 180                              | ±10%                 | 0.29 ±5.0%         | 50                                   | 78                                   | 68   | 54    |
| TPI128080L210N | 210                              | ±10%                 | 0.29 ±5.0%         | 50                                   | 70                                   | 60   | 52    |
| TPI128080L230N | 230                              | ±10%                 | 0.29 ±5.0%         | 50                                   | 64                                   | 56   | 50    |

<sup>1</sup> T = 40 K rise at rated current

<sup>2</sup> Inductance drop 20% at rated current

All electrical characteristics data is referenced to 25°C.

**Table 2 – Ratings & Part Number Reference – AC Optimized TPI Inductors**

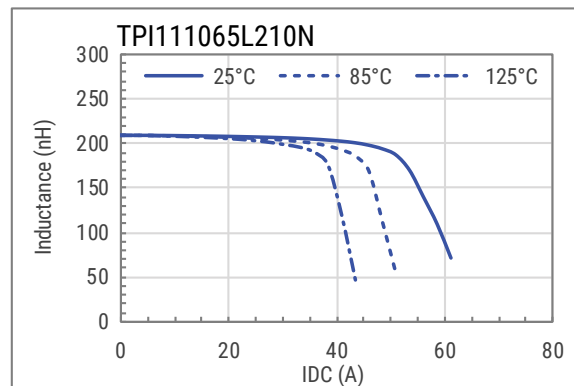
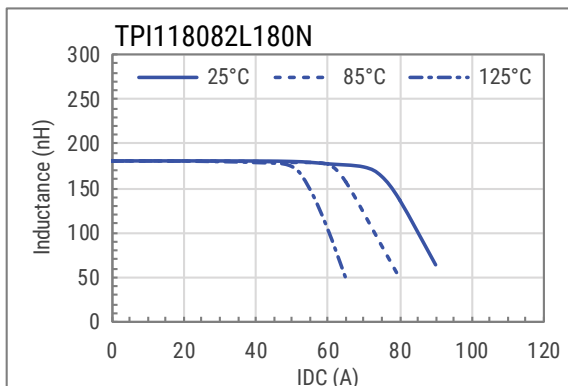
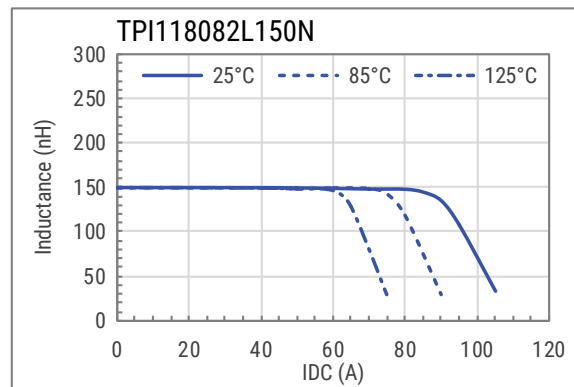
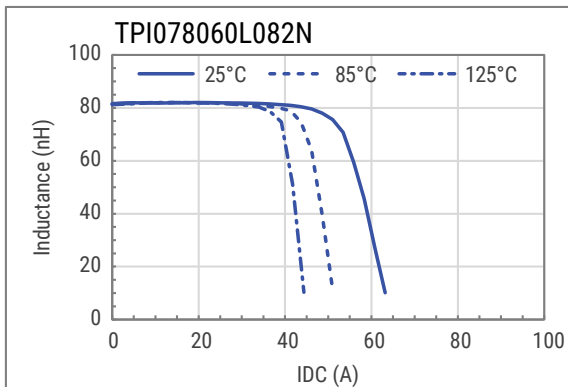
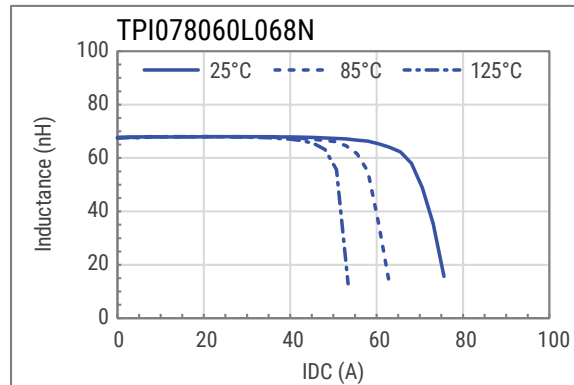
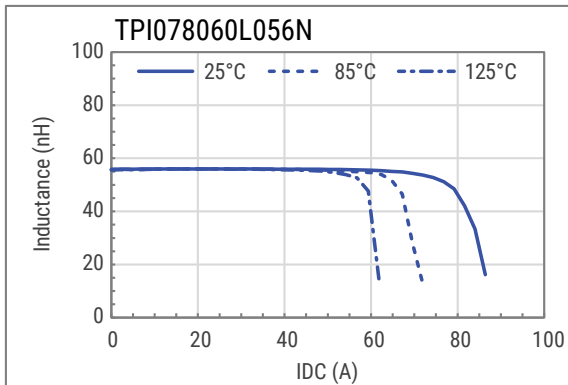
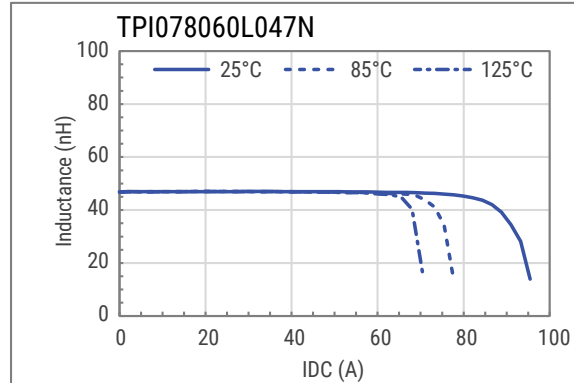
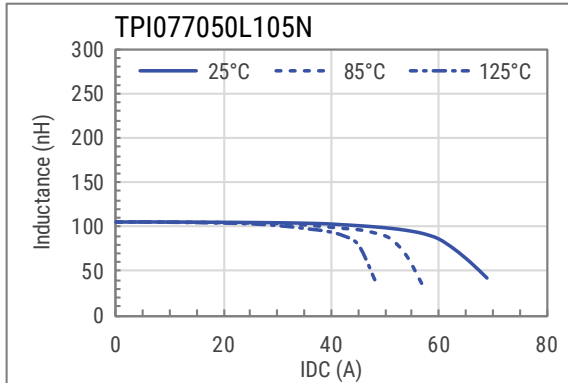
| Part Number    | Inductance (nH) at 100 kHz, 1 mA | Inductance Tolerance | DC Resistance (mΩ) | Rated Current (A)                    |                                      |      |       |
|----------------|----------------------------------|----------------------|--------------------|--------------------------------------|--------------------------------------|------|-------|
|                |                                  |                      |                    | I <sub>rms</sub> <sup>1</sup> (Ref.) | I <sub>sat</sub> <sup>2</sup> (Ref.) |      |       |
|                |                                  |                      |                    |                                      | 25°C                                 | 85°C | 125°C |
| TPI078060L047N | 47                               | ±10%                 | 0.31 ±10.0%        | 53                                   | 90                                   | 75   | 67    |
| TPI078060L056N | 56                               | ±10%                 | 0.31 ±10.0%        | 53                                   | 81                                   | 67   | 58    |
| TPI078060L068N | 68                               | ±10%                 | 0.31 ±10.0%        | 53                                   | 69                                   | 58   | 50    |
| TPI078060L082N | 82                               | ±10%                 | 0.31 ±10.0%        | 53                                   | 54                                   | 46   | 40    |

<sup>1</sup> T = 40 K rise at rated current

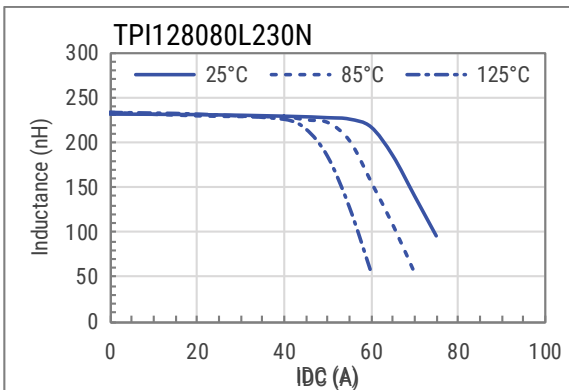
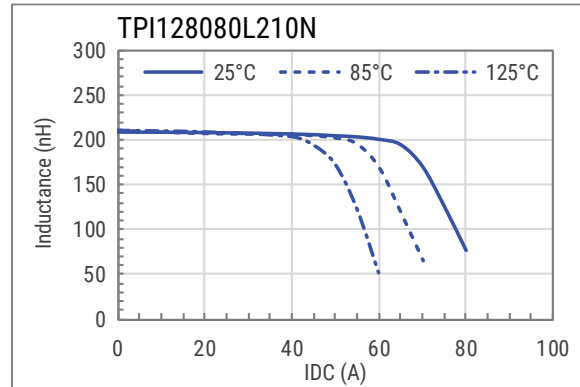
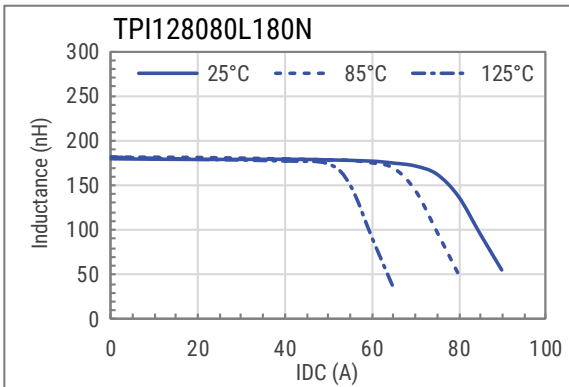
<sup>2</sup> Inductance drop 20% at rated current

All electrical characteristics data is referenced to 25°C.

## DC-Superposed Characteristics



## DC-Superposed Characteristics cont.

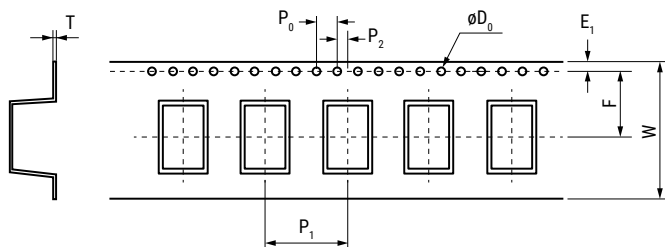


## Dimensions

| Case Size | Dimensions (mm) | Land Pattern (mm) |
|-----------|-----------------|-------------------|
| TPI077050 |                 |                   |
| TPI078060 |                 |                   |
| TPI118082 |                 |                   |
| TPI111065 |                 |                   |
| TPI128080 |                 |                   |

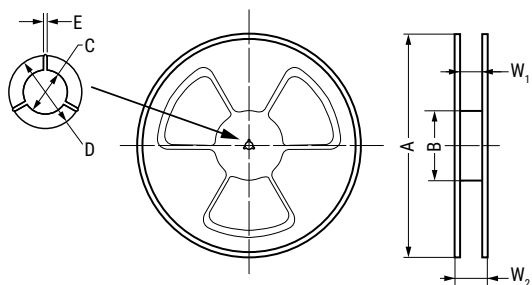
## Taping Specification

### Dimensions of Indented Square Hole Plastic Tape



| Case Size | Reel Quantity |           | Dimensions (mm) |       |                |                |                |                |                 |       |       |
|-----------|---------------|-----------|-----------------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|
|           |               |           | W               | F     | E <sub>1</sub> | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | øD <sub>0</sub> | T     |       |
| TPI077050 | 1,000         | Tolerance | ±0.30           | ±0.10 | ±0.10          | ±0.10          | ±0.10          | ±0.10          | ±0.10           | ±0.05 | ±0.05 |
|           |               | Nominal   | 16.00           | 7.50  | 1.75           | 12.00          | 2.00           | 4.00           | 1.55            | 0.40  |       |
| TPI078060 | 1,000         | Tolerance | ±0.30           | ±0.10 | ±0.10          | ±0.10          | ±0.10          | ±0.10          | ±0.10           | ±0.05 | ±0.05 |
|           |               | Nominal   | 16.00           | 7.50  | 1.75           | 12.00          | 2.00           | 4.00           | 1.55            | 0.40  |       |
| TPI118082 | 400           | Tolerance | ±0.30           | ±0.10 | ±0.10          | ±0.10          | ±0.10          | ±0.10          | ±0.10           | ±0.05 | ±0.05 |
|           |               | Nominal   | 24.00           | 11.50 | 1.75           | 16.00          | 2.00           | 4.00           | 1.55            | 0.40  |       |
| TPI111065 | 500           | Tolerance | ±0.30           | ±0.10 | ±0.10          | ±0.10          | ±0.10          | ±0.10          | ±0.10           | ±0.05 | ±0.05 |
|           |               | Nominal   | 24.00           | 11.50 | 1.75           | 16.00          | 2.00           | 4.00           | 1.55            | 0.40  |       |
| TPI128080 | 400           | Tolerance | ±0.30           | ±0.10 | ±0.10          | ±0.10          | ±0.10          | ±0.10          | ±0.10           | ±0.05 | ±0.05 |
|           |               | Nominal   | 24.00           | 11.50 | 1.75           | 16.00          | 2.00           | 4.00           | 1.55            | 0.40  |       |

## Reel Specifications



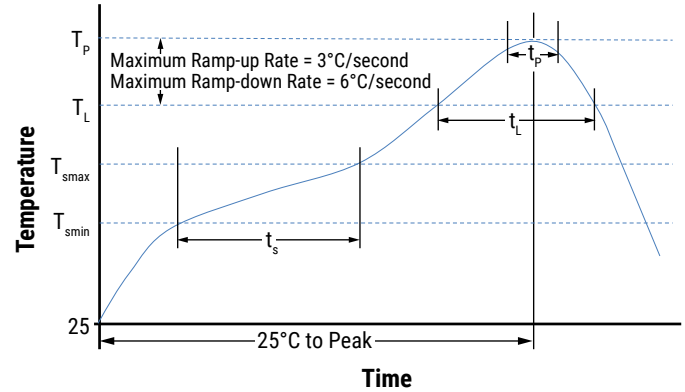
| Case Size |           | Dimensions (mm) |      |       |       |      |                |                |
|-----------|-----------|-----------------|------|-------|-------|------|----------------|----------------|
|           |           | A               | B    | C     | D     | E    | W <sub>1</sub> | W <sub>2</sub> |
| TPI077050 | Tolerance | ±2.0            | ±1.0 | ±0.2  | ±0.2  | ±0.3 |                |                |
|           | Nominal   | ø330            | ø100 | ø13.2 | ø21.5 | 2.0  | 16.5           | 20.9           |
| TPI078060 | Tolerance | ±2.0            | ±1.0 | ±0.2  | ±0.2  | ±0.3 |                |                |
|           | Nominal   | ø380            | ø80  | ø13.0 | ø21.0 | 2.3  | 17.5           | 21.5           |
| TPI118082 | Tolerance | ±2.0            | ±1.0 | ±0.2  | ±0.2  | ±0.3 |                |                |
|           | Nominal   | ø330            | ø100 | ø13.2 | ø21.5 | 2.3  | 24.5           | 28.9           |
| TPI111065 | Tolerance | ±2.0            | ±1.0 | ±0.2  | ±0.2  | ±0.3 |                |                |
|           | Nominal   | ø330            | ø100 | ø13.2 | ø21.5 | 2.0  | 24.5           | 28.9           |
| TPI128080 | Tolerance | ±2.0            | ±1.0 | ±0.2  | ±0.2  | ±0.3 |                |                |
|           | Nominal   | ø330            | ø100 | ø13.2 | ø21.5 | 2.0  | 24.5           | 28.9           |

## Soldering Process

### Recommended Reflow Soldering Profile

Reference ICP/JEDEC J-STD-020E

| Profile Feature                                       | Pb-Free Assembly  |
|---|---|
| <b>Preheat/Soak</b>                                   |   |
| Temperature minimum ( $T_{smin}$ )                    | 150°C   |
| Temperature maximum ( $T_{smax}$ )                    | 200°C   |
| Time ( $t_s$ ) from $T_{smin}$ to $T_{smax}$          | 60 – 120 seconds  |
| Ramp-up rate ( $T_L$ to $T_p$ )                       | 3°C/second maximum  |
| Liquidous Temperature ( $T_L$ )                       | 217°C   |
| Time Above Liquidous ( $t_L$ )                        | 60 – 150 seconds  |
| Peak Temperature ( $T_p$ )                            | 245°C for TPI1xxxxx<br>250°C for<br>TPI077050 and TPI078060 |
| Time within 5°C of Maximum Peak temperature ( $t_p$ ) | 30 seconds maximum  |
| Ramp-down Rate ( $T_p$ to $T_L$ )                     | 6°C/second maximum  |
| Time 25°C to Peak Temperature                         | 8 minutes maximum   |



## Environmental Compliance

All KEMET SMD Inductors are RoHS compliant.



## Handling Precautions

Inductors should be stored in normal working environments. While the inductors themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage.

KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 70% relative humidity. Atmospheres should be free of chlorine and sulfur bearing compounds. Temperature fluctuations should be minimized to avoid condensation on the parts.

For optimized solderability, inductors' stock should be used promptly, preferably within six months of receipt.

## KEMET Electronics Corporation Sales Offices

For a complete list of our global sales offices, please visit [www.kemet.com/sales](http://www.kemet.com/sales).

---

### Disclaimer

YAGEO Corporation and its affiliates do not recommend the use of commercial or automotive grade products for high reliability applications or manned space flight.

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

Statements of suitability for certain applications are based on KEMET Electronics Corporation's ("KEMET") knowledge of typical operating conditions for such applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by KEMET with reference to the use of KEMET's products is given gratis, and KEMET assumes no obligation or liability for the advice given or results obtained.

Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

When providing KEMET products and technologies contained herein to other countries, the customer must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the International Traffic in Arms Regulations (ITAR), the US Export Administration Regulations (EAR) and the Japan Foreign Exchange and Foreign Trade Act.

*KEMET is a registered trademark of KEMET Electronics Corporation.*