

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 078060 111065 118082 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 _{rms} ¹ (Ref.) | I _{sat} ² (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 |

¹ T = 40 K rise at rated current

² 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

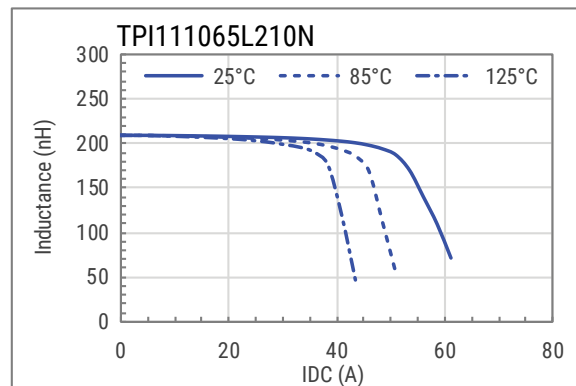
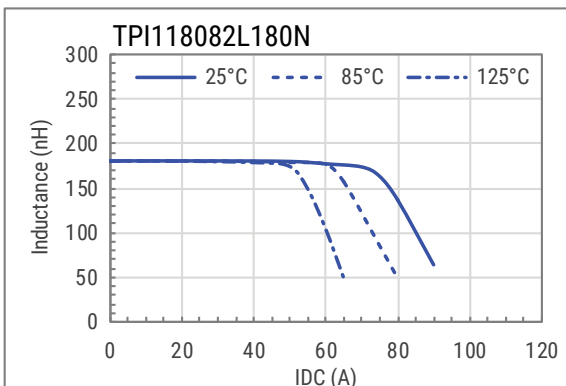
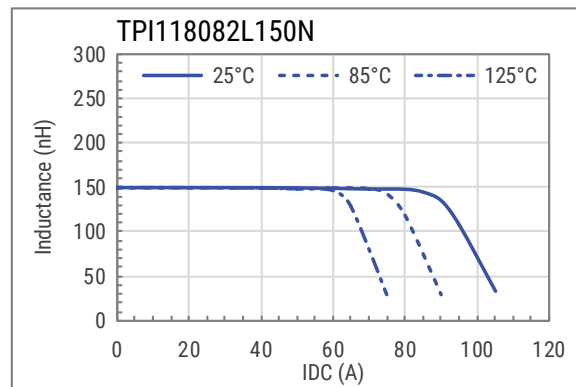
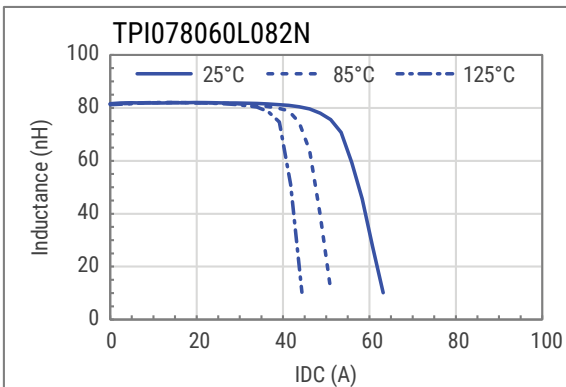
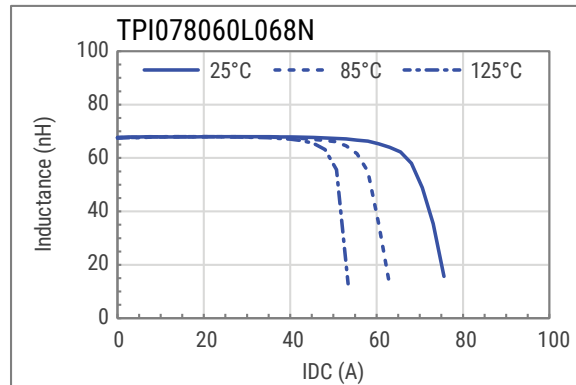
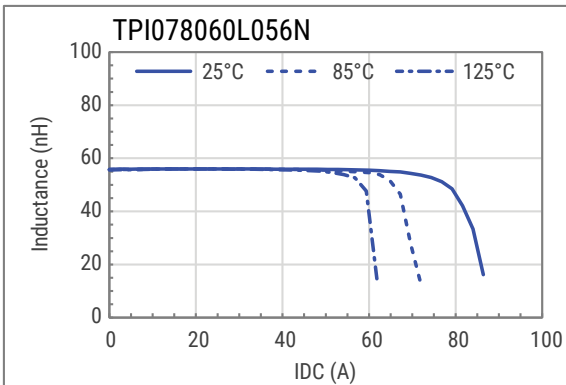
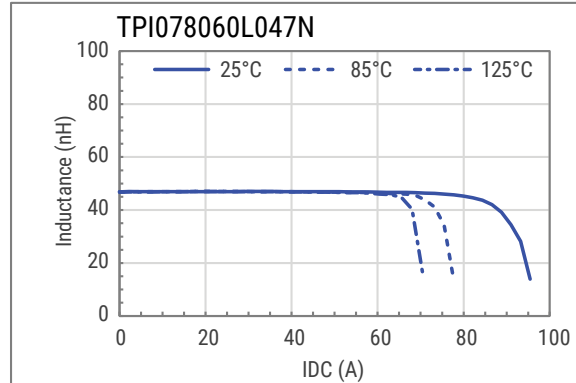
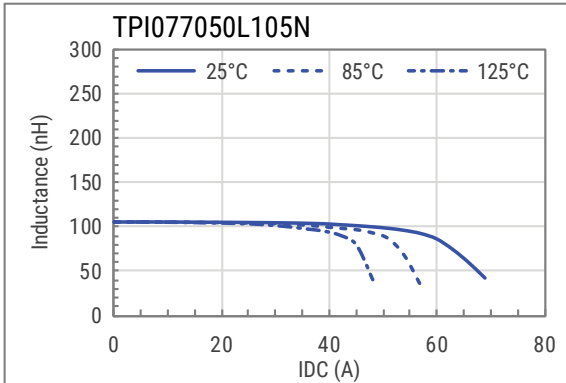
| Part Number | Inductance (nH) at 100 kHz, 1 mA | Inductance Tolerance | DC Resistance (mΩ) | Rated Current (A) | | | |
|----------------|----------------------------------|----------------------|--------------------|--------------------------------------|--------------------------------------|------|-------|
| | | | | I _{rms} ¹ (Ref.) | I _{sat} ² (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 |

¹ T = 40 K rise at rated current

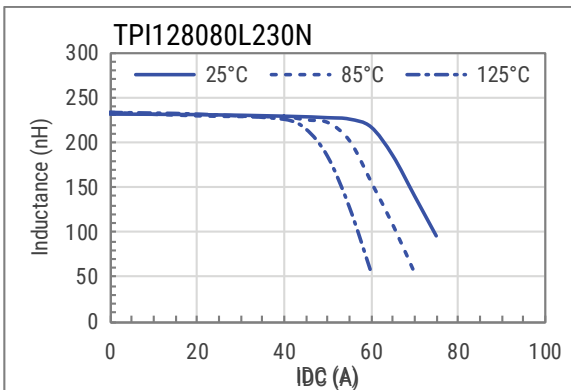
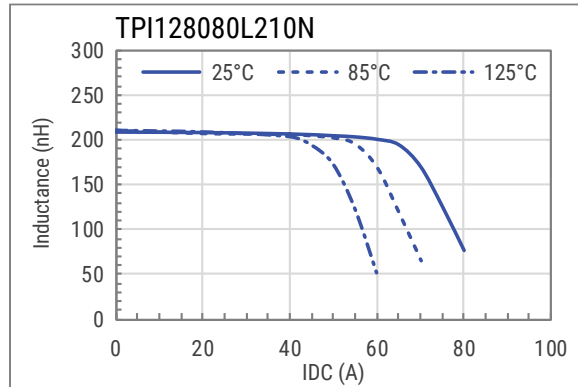
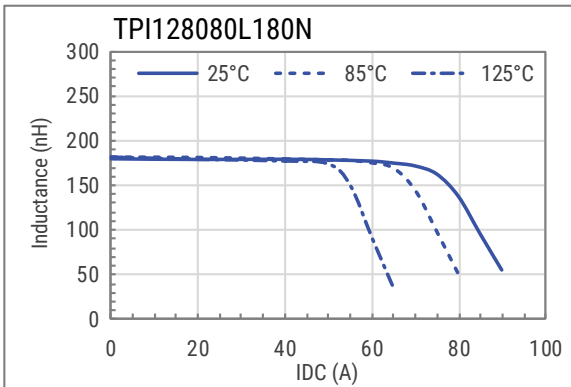
² Inductance drop 20% at rated current

All electrical characteristics data is referenced to 25°C.

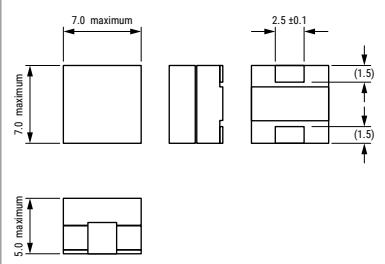
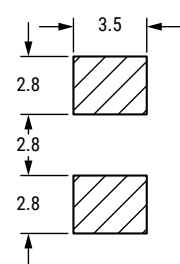
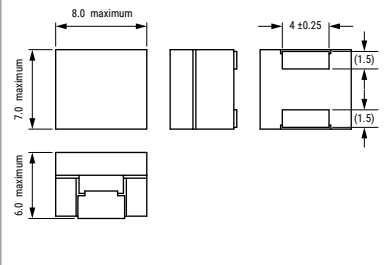
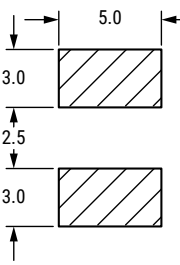
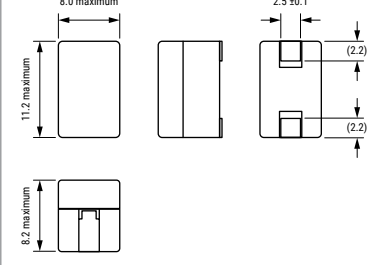
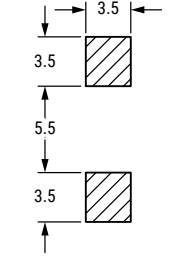
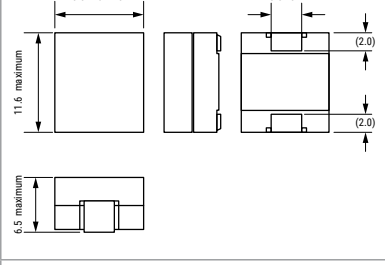
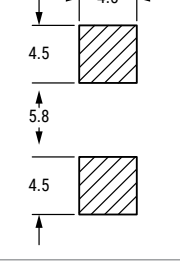
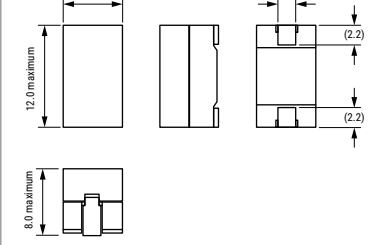
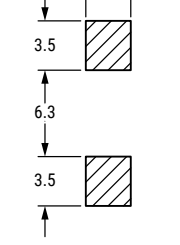
DC-Superposed Characteristics



DC-Superposed Characteristics cont.

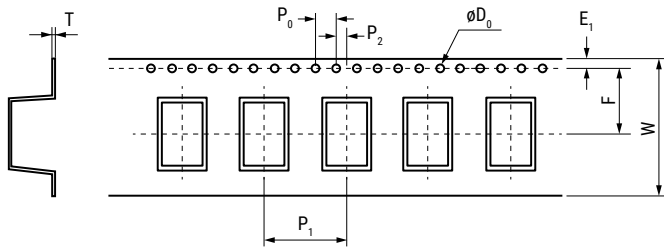


Dimensions

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

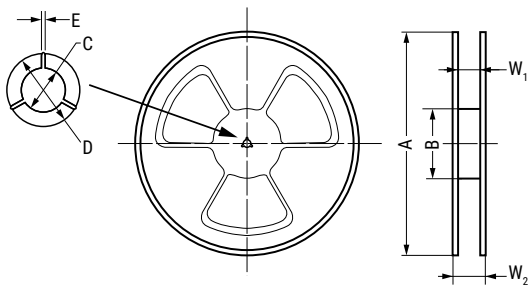
Taping Specification

Dimensions of Indented Square Hole Plastic Tape



| Case Size | Reel Quantity | | Dimensions (mm) | | | | | | | | |
|-----------|---------------|-----------|-----------------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|
| | | | W | F | E ₁ | P ₁ | P ₂ | P ₀ | øD ₀ | 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



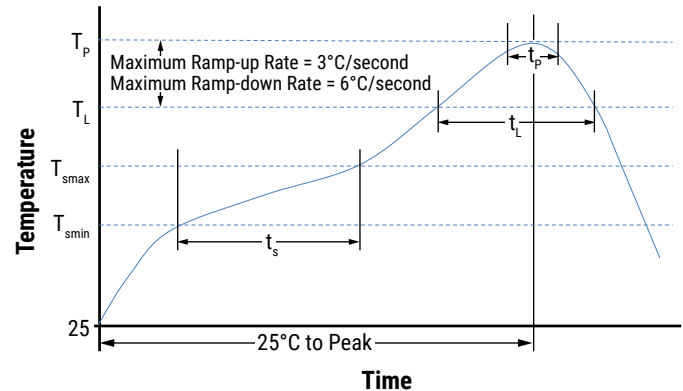
| Case Size | | Dimensions (mm) | | | | | | |
|-----------|-----------|-----------------|------|-------|-------|------|----------------|----------------|
| | | A | B | C | D | E | W ₁ | W ₂ |
| TPI077050 | Tolerance | ±2.0 | ±1.0 | ±0.2 | ±0.2 | ±0.3 | | |
| | Nominal | ø330 | ø100 | ø13.2 | ø21.5 | 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 |
|---|---|
| Preheat/Soak | |
| 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 250°C for 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.

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