



Overview

The KEMET MPEV metal composite inductors are ideal for use in DC to DC switching power supplies for automotive applications. The metal composite core has high saturation characteristics maintaining functionality with high current transients and is characterized by temperature stable inductance. The high heat resistance propriety of the inductor has been further improved and allows for operating temperature up to +180°C.

Applications

Automotive ECU applications such as:

- LED headlights
- Meter cluster panels
- Head-up displays (HUD)
- Electric water pumps (EWP)
- Electric oil pumps (EOP)
- Electric power steering (EPS)

Benefits

- Metal composite powder
- Shielded construction, SMD configuration
- Inductance range from 0.47 – 47.00 μ H
- Operating temperature up to +180°C
- Low acoustic noise
- Low magnetic flux leakage
- AEC-Q200 qualified



Part Number System

| MPEV | 1 | D0630 | L | 1R5 |
|--------|---------|--|----------|--|
| Series | Version | Size Code | Inductor | Inductance Code μ H |
| MPEV | 1 | D0630 = 6x6x3.0 mm D1040 = 10x10x4.0 mm | | <p>The first two digits represent the inductance value. The third digit indicates the number of zeros to be added. R = decimal point</p> <p>Examples: 100 = 10.00 μH R68 = 0.68 μH 1R5 = 1.50 μH 101 = 100.00 μH</p> |

Performance Characteristics

| Item | Performance Characteristics |
|---------------------------|---|
| Operating Temperature | -55°C to +180°C (including self-temperature rise) |
| Rated Inductance Range | 0.47 – 47.00 µH at 100 kHz, 1 mA |
| Inductance Tolerance | ±20% |
| Rated DC Resistance Range | 2.4 – 186.3 mΩ maximum |
| Rated Current Range | 2.7 – 26.4 A |

Table 1 – Ratings & Part Number Reference

| Part Number | Inductance (µH) at 100 kHz, 1 mA | Inductance Tolerance | DC Resistance (mΩ) Typical | DC Resistance (mΩ) Maximum | Rated Current (A) | | | Self-Resonance Frequency (MHz) | Weight (g) |
|----------------|----------------------------------|----------------------|----------------------------|----------------------------|---|---|---|--------------------------------|------------|
| | | | | | I _{rms} ¹ (Reference) | I _{sat} ² (Reference) | I _{sat} ³ (Reference) | | |
| MPEV1D0630LR47 | 0.47 | ±20% | 3.50 | 4.00 | 18.7 | 15.0 | 21.0 | 70.0 | 0.62 |
| MPEV1D0630LR68 | 0.68 | ±20% | 5.30 | 6.20 | 15.1 | 11.5 | 17.0 | 55.0 | 0.62 |
| MPEV1D0630L1R0 | 1.00 | ±20% | 7.10 | 8.20 | 13.1 | 9.0 | 13.0 | 43.0 | 0.62 |
| MPEV1D0630L1R5 | 1.50 | ±20% | 11.00 | 12.70 | 10.5 | 7.0 | 11.0 | 38.0 | 0.62 |
| MPEV1D0630L2R2 | 2.20 | ±20% | 15.90 | 18.30 | 8.7 | 6.5 | 9.0 | 30.0 | 0.62 |
| MPEV1D0630L3R3 | 3.30 | ±20% | 26.30 | 30.30 | 6.8 | 5.0 | 7.0 | 26.0 | 0.62 |
| MPEV1D0630L4R7 | 4.70 | ±20% | 31.80 | 36.70 | 6.2 | 4.5 | 6.5 | 21.0 | 0.62 |
| MPEV1D0630L6R8 | 6.80 | ±20% | 44.20 | 50.90 | 5.2 | 4.0 | 5.5 | 16.0 | 0.62 |
| MPEV1D0630L100 | 10.00 | ±20% | 67.80 | 78.00 | 4.2 | 3.5 | 4.5 | 15.0 | 0.62 |
| MPEV1D0630L150 | 15.00 | ±20% | 113.20 | 130.20 | 3.3 | 3.0 | 4.0 | 13.0 | 0.62 |
| MPEV1D0630L220 | 22.00 | ±20% | 162.00 | 186.30 | 2.7 | 2.5 | 3.5 | 9.6 | 0.62 |
| MPEV1D1040LR47 | 0.47 | ±20% | 2.10 | 2.40 | 26.4 | 29.0 | 42.0 | 65.0 | 2.20 |
| MPEV1D1040LR68 | 0.68 | ±20% | 2.70 | 3.20 | 23.1 | 23.0 | 34.5 | 47.0 | 2.20 |
| MPEV1D1040L1R0 | 1.00 | ±20% | 3.30 | 3.80 | 21.1 | 19.5 | 29.0 | 35.0 | 2.20 |
| MPEV1D1040L1R5 | 1.50 | ±20% | 4.60 | 5.40 | 17.7 | 18.0 | 26.0 | 30.0 | 2.20 |
| MPEV1D1040L2R2 | 2.20 | ±20% | 6.80 | 7.90 | 14.6 | 13.0 | 18.5 | 23.0 | 2.20 |
| MPEV1D1040L3R3 | 3.30 | ±20% | 11.10 | 12.80 | 11.4 | 11.0 | 15.0 | 18.0 | 2.20 |
| MPEV1D1040L4R7 | 4.70 | ±20% | 13.80 | 15.90 | 10.3 | 10.0 | 14.0 | 17.0 | 2.20 |
| MPEV1D1040L6R8 | 6.80 | ±20% | 20.90 | 24.10 | 8.3 | 8.0 | 11.5 | 14.0 | 2.20 |
| MPEV1D1040L100 | 10.00 | ±20% | 29.60 | 34.10 | 7.0 | 7.5 | 10.5 | 11.0 | 2.20 |
| MPEV1D1040L150 | 15.00 | ±20% | 44.50 | 51.20 | 5.7 | 5.5 | 8.5 | 8.0 | 2.20 |
| MPEV1D1040L220 | 22.00 | ±20% | 66.20 | 76.10 | 4.7 | 5.0 | 7.0 | 7.0 | 2.20 |
| MPEV1D1040L330 | 33.00 | ±20% | 104.10 | 119.70 | 3.7 | 3.5 | 5.0 | 5.0 | 2.20 |
| MPEV1D1040L470 | 47.00 | ±20% | 158.80 | 182.60 | 3.0 | 3.0 | 4.0 | 4.5 | 2.20 |
| Part Number | Inductance (µH) at 100 kHz, 1 mA | Inductance Tolerance | DC Resistance (mΩ) Typical | DC Resistance (mΩ) Maximum | I _{rms} ¹ | I _{sat} ² | I _{sat} ³ | Self-Resonance Frequency (MHz) | Weight (g) |
| | | | | | Rated Current (A) | | | | |

¹ T = 40 K rise at rated current

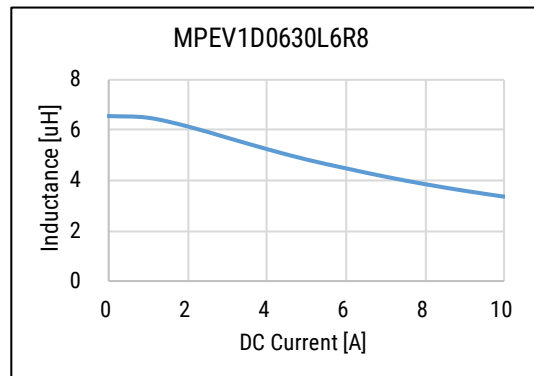
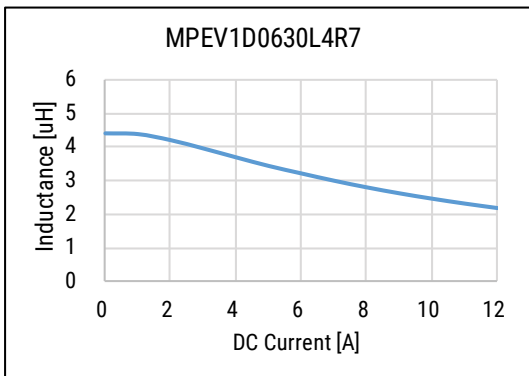
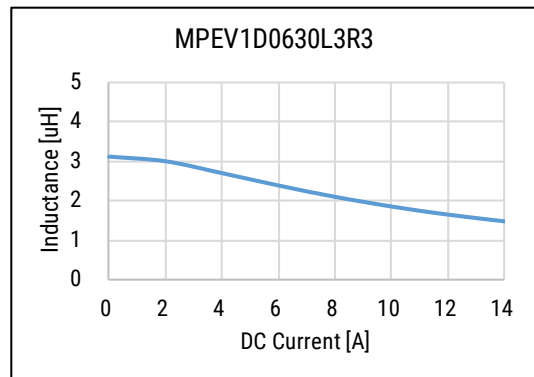
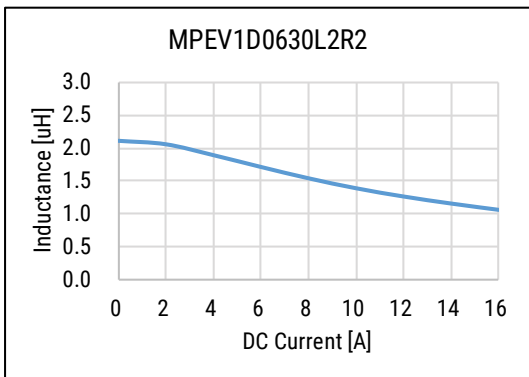
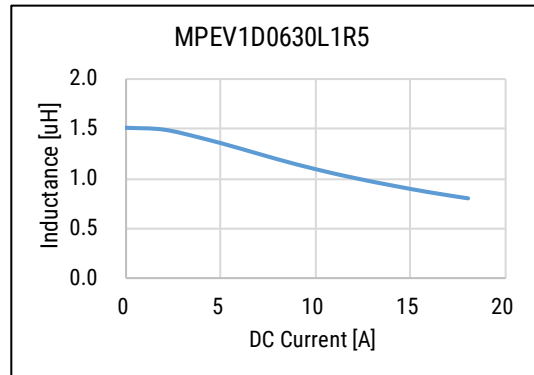
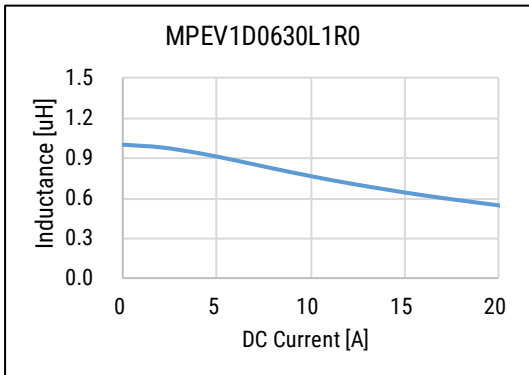
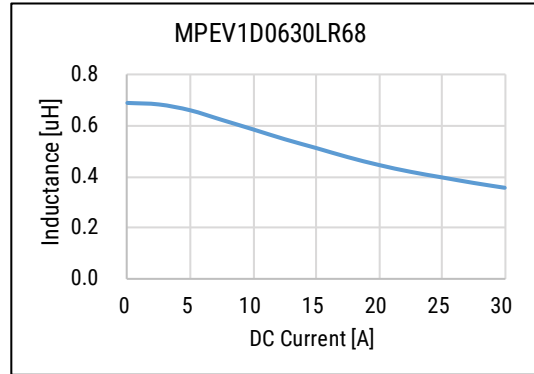
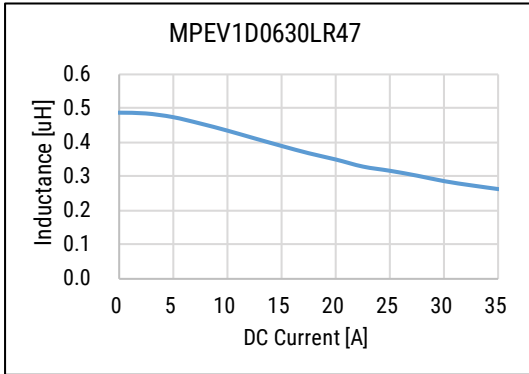
² Inductance drop 20% at rated current

³ Inductance drop 30% at rated current

All electrical characteristics data is referenced to 25°C.

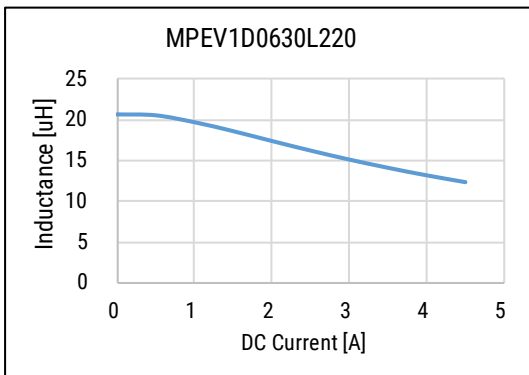
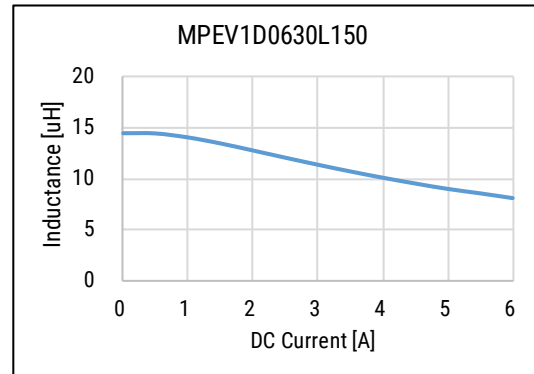
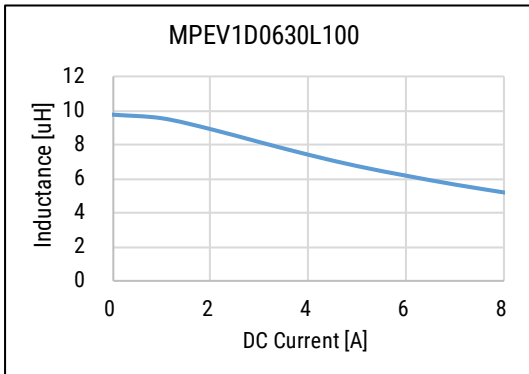
DC-Superposed Characteristics

MPEV1D0630



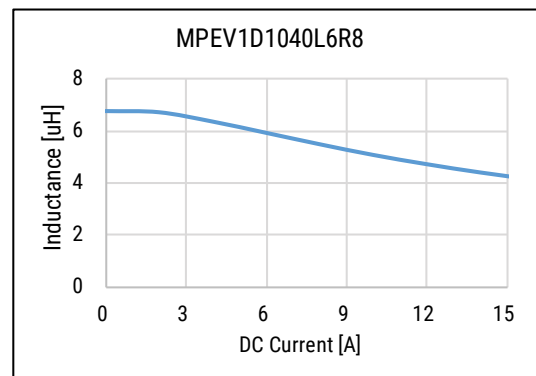
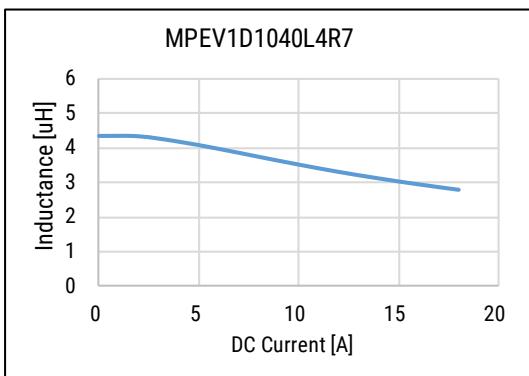
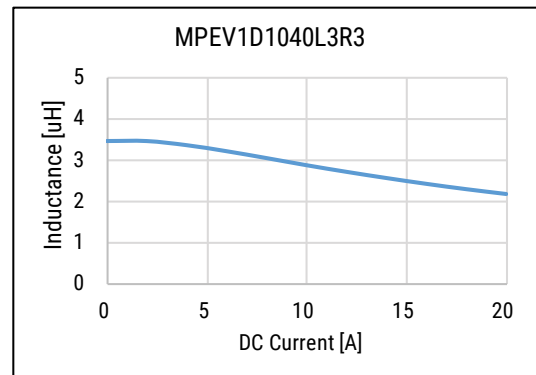
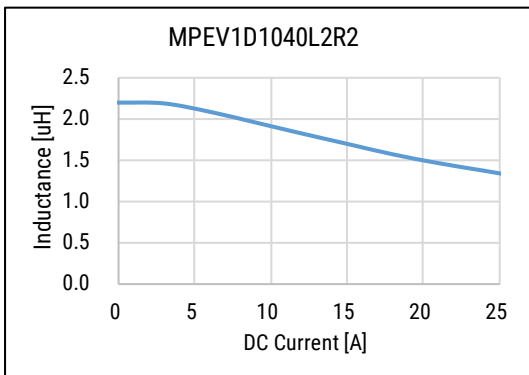
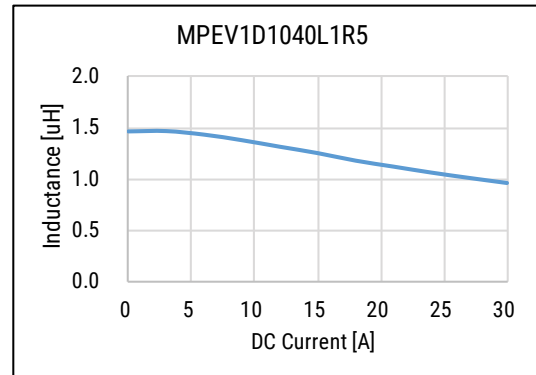
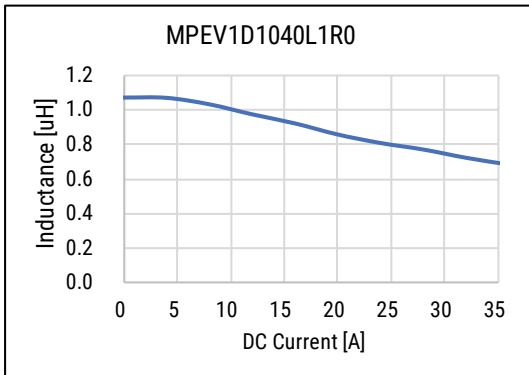
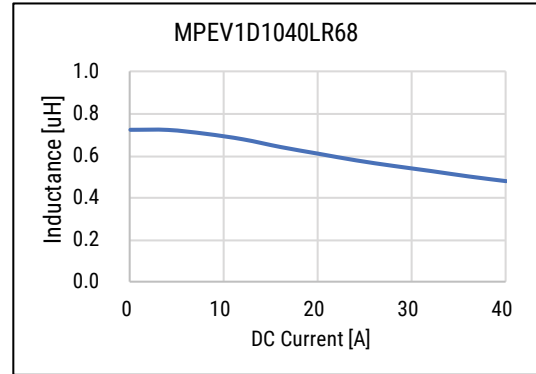
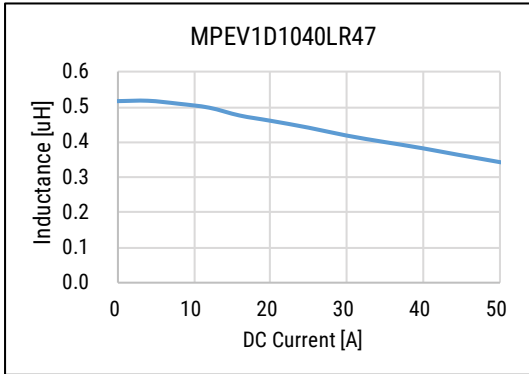
DC-Superposed Characteristics cont.

MPEV1D0630 cont.



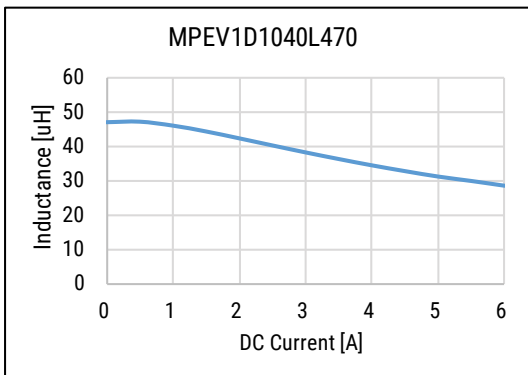
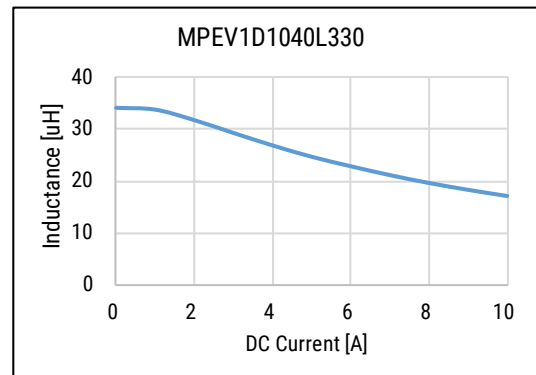
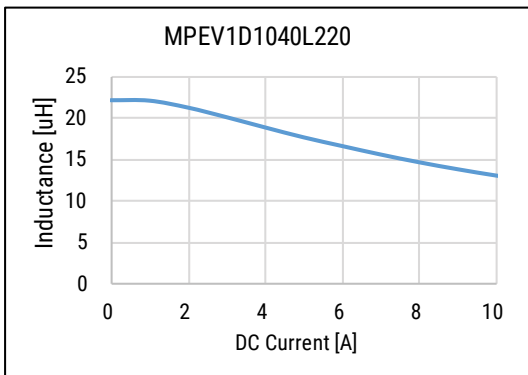
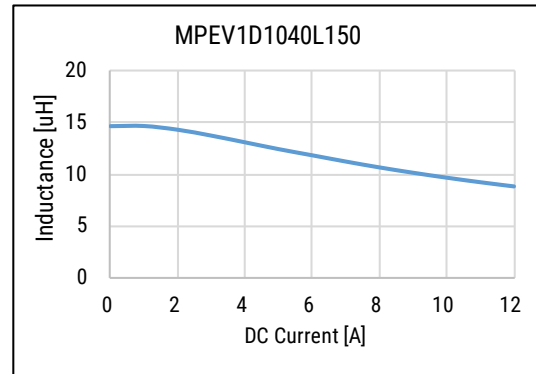
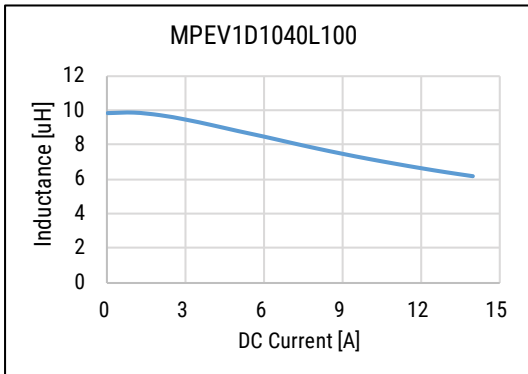
DC-Superposed Characteristics cont.

MPEV1D1040



DC-Superposed Characteristics cont.

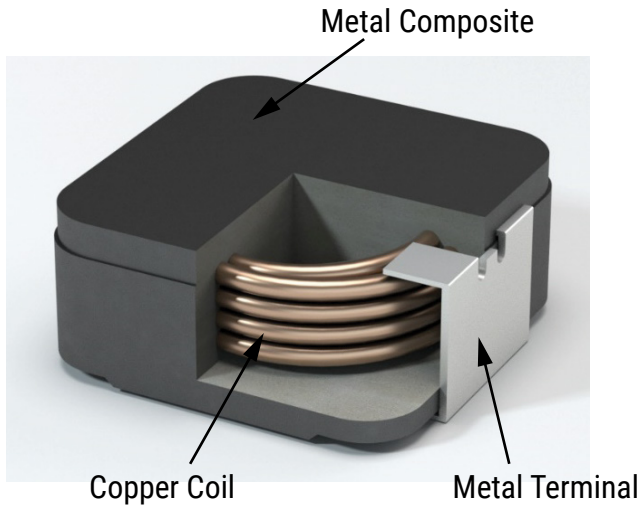
MPEV1D1040 cont.



Dimensions

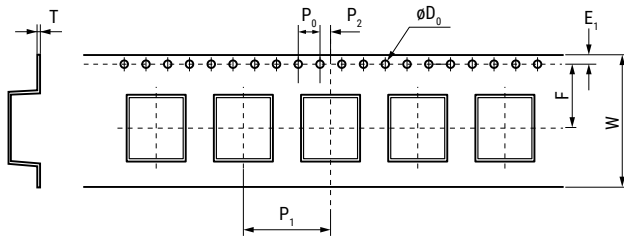
| Case Size | Dimensions (mm) | Land Pattern (mm) |
|--|--|--|
| MPEV1D0630 | <p>Technical drawing of MPEV1D0630 inductor showing top, side, and end views with dimensions: 7.0±0.25, 3.0 maximum, 1.3, 1.3, 6.5±0.2, 3.2±0.3.</p> | <p>Land pattern diagram for MPEV1D0630 showing dimensions: 8.255, 3.429, 3.429.</p> |
| MPEV1D1040 For values up to 1.5 μH or below | <p>Technical drawing of MPEV1D1040 inductor (low inductance) showing top, side, and end views with dimensions: 10.8±0.3, 4.0 maximum, 2.0, 2.0, 10.0±0.2, 3.0±0.3.</p> | <p>Land pattern diagram for MPEV1D1040 (low inductance) showing dimensions: 12.192, 4.953, 5.842.</p> |
| MPEV1D1040 For values from 2.2 μH or above | <p>Technical drawing of MPEV1D1040 inductor (high inductance) showing top, side, and end views with dimensions: 10.8±0.30, 4.0 maximum, 2.0, 2.0, 10.0±0.2, 4.7±0.3.</p> | <p>Land pattern diagram for MPEV1D1040 (high inductance) showing dimensions: 12.065, 3.251, 5.817.</p> |

Construction



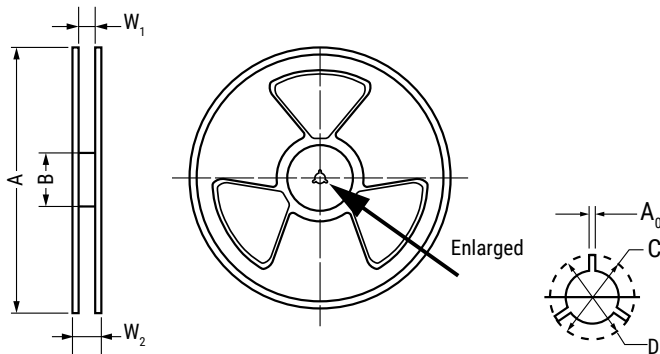
Taping Specification

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 | |
| MPEV1D0630 | 1,500 | Tolerance | ±0.30 | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.05 |
| | | Nominal | 16.00 | 7.50 | 1.75 | 12.00 | 2.00 | 4.00 | 1.55 | 0.40 | |
| MPEV1D1040 | 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 | |

Reel Specifications



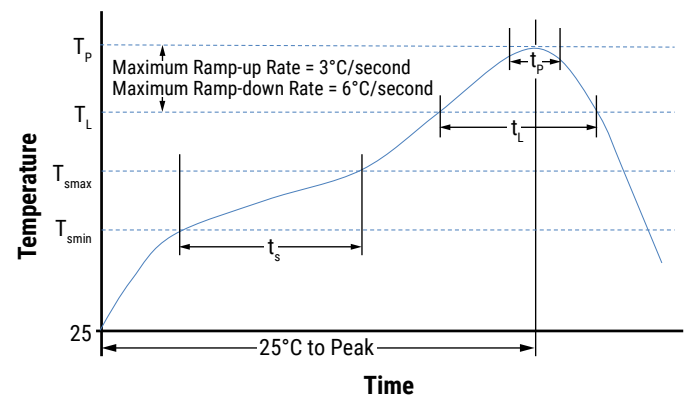
| Case Size | | Dimensions (mm) | | | | | | |
|------------|-----------|-----------------|------|-------|-------|----------------|----------------|----------------|
| | | A | B | C | D | A ₀ | W ₁ | W ₂ |
| MPEV1D0630 | Tolerance | ±2.0 | ±2.0 | ±0.2 | ±0.8 | ±0.5 | | |
| | Nominal | ∅330 | ∅100 | ∅13.2 | ∅21.5 | 2.5 | 16.9 | 21.3 |
| MPEV1D1040 | Tolerance | ±3.0 | ±2.0 | ±0.5 | ±0.8 | ±0.5 | | |
| | Nominal | ∅330 | ∅100 | ∅13.0 | ∅21.5 | 2.6 | 25.0 | 29.4 |

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) | 250°C for MPEV1D0630 245°C for MPEV1D1040 |
| 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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