

## Overview

The KEMET MPLCV metal composite inductors are ideal for use in DC to DC switching power supplies for automotive applications. The combination of composite core material and round wire allows these inductors to be used in applications with high switching frequencies and where efficiency is important.

## Applications

- Automotive ECU applications
- LED head lights
- Meter cluster panels
- Head-up displays (HUD)
- Electric water pumps (EWP)
- Electric oil pumps (EOP)
- Electric power steering (EPS)

## Benefits

- Metal composite powder
- Operating temperature up to +155°C
- High current
- Low DCR
- Low acoustic noise
- Low magnetic flux leakage
- AEC-Q200 qualified



## Part Number System

| MPLCV  | 0645                 | L        | 100  |
|--------|----------------------|----------|--|
| Series | Size Code            | Inductor | Inductance Code $\mu\text{H}$  |
| MPLCV  | 0645<br>0654<br>1054 |          | <p>The first two digits represent the inductance value. The third digit indicates the number of zeros to be added.</p> <p>R = decimal point</p> <p>Example:<br/>4R7 = 4.7 <math>\mu\text{H}</math></p> |

## Performance Characteristics

| Item                      | Performance Characteristics                       |
|---------------------------|---|
| Operating Temperature     | -55°C to +155°C (including self-temperature rise) |
| Rated Inductance Range    | 4.7 – 47.0 $\mu$ H at 100 kHz, 1 mA               |
| Inductance Tolerance      | $\pm$ 20%   |
| Rated DC Resistance Range | 20 – 175 m $\Omega$                               |
| DC Resistance Tolerance   | $\pm$ 10%   |
| Rated Current Range       | 2.1 – 7.1 A                                       |

**Table 1 – Ratings & Part Number Reference**

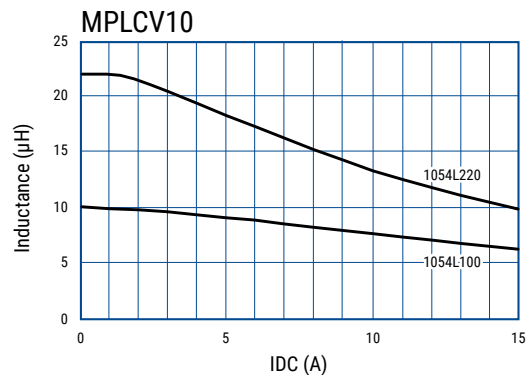
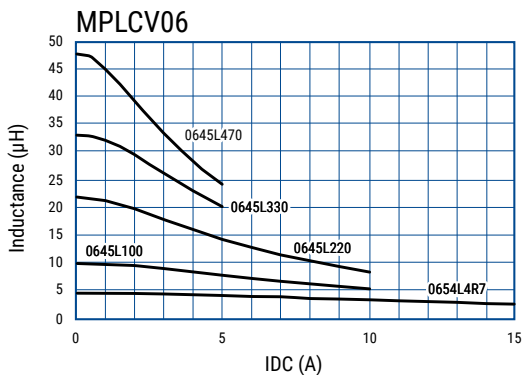
| Part Number   | Inductance ( $\mu$ H)<br>at 100 kHz, 1 mA | Inductance<br>Tolerance | DC Resistance (m $\Omega$ )<br>$\pm$ 10% | Rated Current (A)                    |                                      |
|---------------|---|-------------------------|--|--------------------------------------|--------------------------------------|
|               |   |                         |  | I <sub>rms</sub> <sup>1</sup> (Ref.) | I <sub>sat</sub> <sup>2</sup> (Ref.) |
| MPLCV0645L100 | 10.0                                      | $\pm$ 20%               | 45                                       | 4.0                                  | 6.5                                  |
| MPLCV0654L4R7 | 4.7                                       | $\pm$ 20%               | 20                                       | 6.3                                  | 10.5                                 |
| MPLCV0654L220 | 22.0                                      | $\pm$ 20%               | 94                                       | 3.0                                  | 4.2                                  |
| MPLCV0654L330 | 33.0                                      | $\pm$ 20%               | 140                                      | 2.6                                  | 4.0                                  |
| MPLCV0654L470 | 47.0                                      | $\pm$ 20%               | 175                                      | 2.1                                  | 3.0                                  |
| MPLCV1054L100 | 10.0                                      | $\pm$ 20%               | 25                                       | 7.1                                  | 12.0                                 |
| MPLCV1054L220 | 22.0                                      | $\pm$ 20%               | 47                                       | 5.5                                  | 7.0                                  |

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

<sup>2</sup> Inductance drop 30% at rated current

All electrical characteristics data is referenced to 20°C.

## DC-Superposed Characteristics

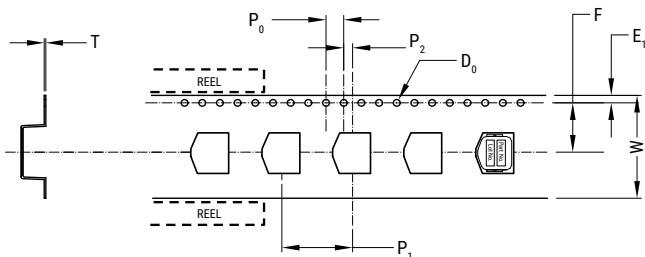


## Dimensions

| Case Size | Dimensions (mm) | Land Pattern (mm) |
|-----------|-----------------|-------------------|
| MPLCV0645 |                 |                   |
| MPLCV0654 |                 |                   |
| MPLCV1054 |                 |                   |

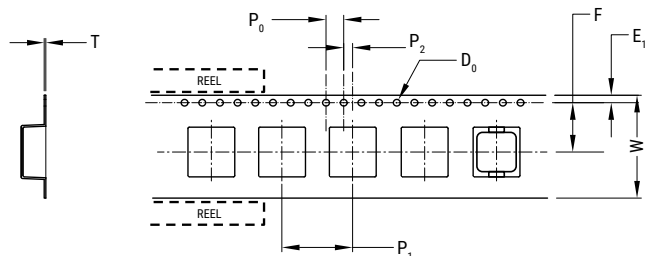
## Taping Specification

### Dimensions of Indented Square Hole Plastic Tape



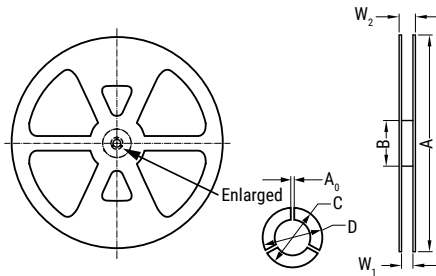
| Case Size | Reel Quantity |           | Dimensions (mm) |       |                |                |                |                |                 |       |       |
|-----------|---------------|-----------|-----------------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|
|           |               |           | W               | F     | E <sub>1</sub> | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | ∅D <sub>0</sub> | T     |       |
| MPLCV0645 | 1,000         | Tolerance | ±0.30           | ±0.10 | ±0.10          | ±0.10          | ±0.10          | ±0.10          | ±0.10           | ±0.05 | ±0.05 |
| MPLCV0654 |               | Nominal   | 16.00           | 7.50  | 1.75           | 12.00          | 2.00           | 4.00           | 1.55            | 0.40  |       |

### 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> | ∅D <sub>0</sub> | T     |       |
| MPLCV1054 | 1,000         | 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



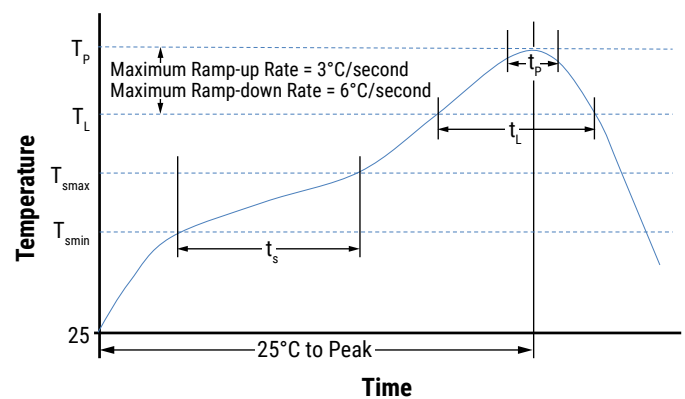
| Case Size |           | Dimensions (mm)   |                  |                    |                    |           |       |       |
|-----------|-----------|-------------------|------------------|--------------------|--------------------|-----------|-------|-------|
|           |           | A                 | B                | C                  | D                  | $A_0$     | $W_1$ | $W_2$ |
| MPLCV0645 | Tolerance | $\pm 2.0$         | $\pm 2.0$        | $\pm 0.2$          | $\pm 0.8$          | $\pm 0.5$ |       |       |
| MPLCV0654 | Nominal   | $\varnothing 380$ | $\varnothing 80$ | $\varnothing 13.0$ | $\varnothing 21.0$ | 2.3       | 17.5  | 21.5  |
| MPLCV1054 | Tolerance | $\pm 2.0$         | $\pm 2.0$        | $\pm 0.2$          | $\pm 0.8$          | $\pm 0.5$ |       |       |
|           | Nominal   | $\varnothing 380$ | $\varnothing 80$ | $\varnothing 13.0$ | $\varnothing 21.0$ | 2.3       | 25.5  | 29.5  |

## 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 ( $T_p$ )                            | 250°C for MPLCV06xx<br>245°C for MPLCV1xxx |
| 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                          |



## 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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## Export Control

### For customers in Japan

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

### For customers outside Japan

Inductors should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destruction weapons (nuclear, chemical, biological weapons or missiles), or any other weapons.

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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.

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