Large-Current Power Inductors MPLCV

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 µH
MPLCV	0645 0654 1054		The first two digits represent the inductance value. The third digit inidcates the number of zeros to be added. R = decimal point Example: 4R7 = 4.7 µH

Performance Characteristics

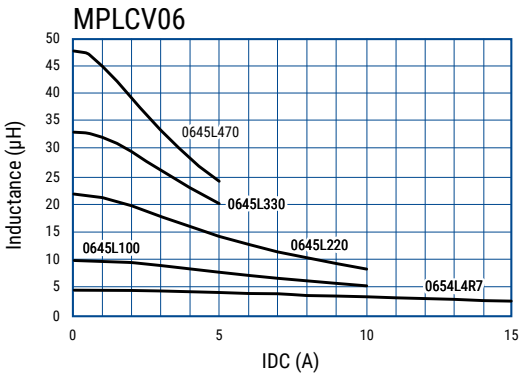
Item	Performance Characteristics
Operating Temperature	–55°C to +155°C (including self-temperature rise)
Rated Inductance Range	4.7 – 47.0 µH at 100 kHz, 1 mA
Inductance Tolerance	±20%
Rated DC Resistance Range	20 – 175 mΩ
DC Resistance Tolerance	±10%
Rated Current Range	2.1 – 7.1 A

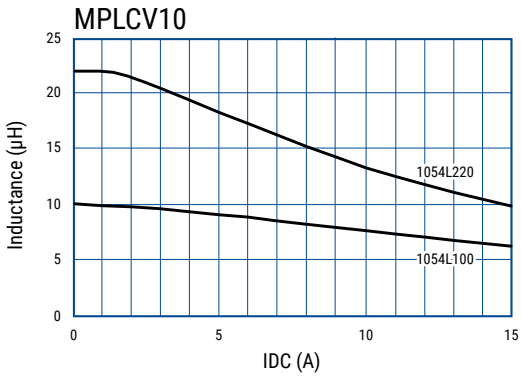
Table 1 – Ratings & Part Number Reference

Part Number	Inductance (µH) at 100 kHz, 1 mA	Inductance Tolerance	DC Resistance (mΩ) ±10%	Rated Current (A)	
				Irms[1] (Ref.)	Isat[2] (Ref.)
MPLCV0645L100	10.0	±20%	45	4.0	6.5
MPLCV0654L4R7	4.7	±20%	20	6.3	10.5
MPLCV0654L220	22.0	±20%	94	3.0	4.2
MPLCV0654L330	33.0	±20%	140	2.6	4.0
MPLCV0654L470	47.0	±20%	175	2.1	3.0
MPLCV1054L100	10.0	±20%	25	7.1	12.0
MPLCV1054L220	22.0	±20%	47	5.5	7.0

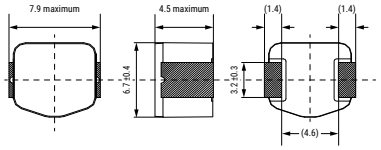
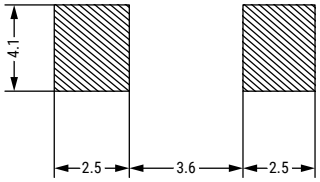
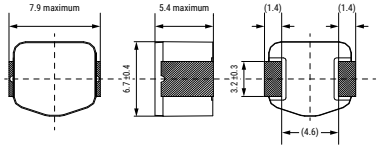
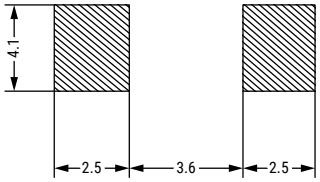
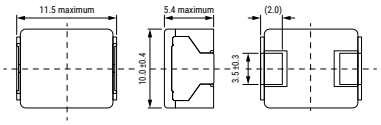
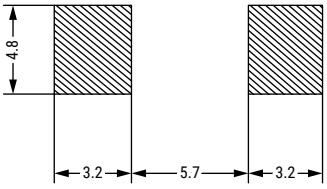
[1] *T = 40 K rise at rated current*
[2] *Inductance drop 30% at rated current*

DC-Superposed Characteristics



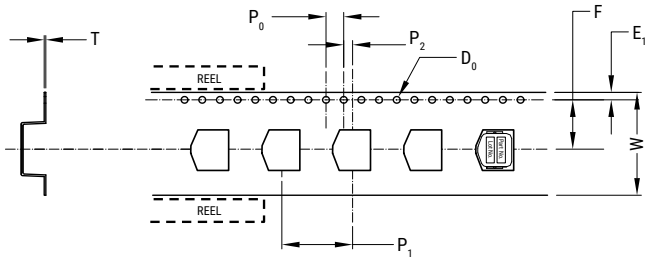


Dimensions

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

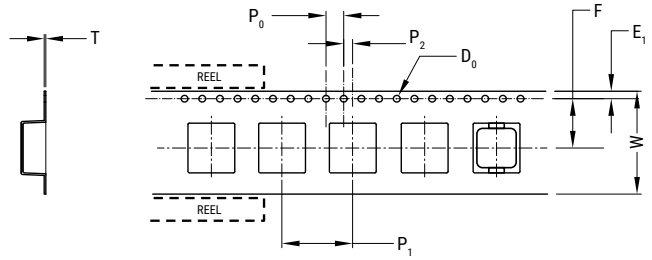
Taping Specification

Dimensions of Indented Square Hole Plastic Tape



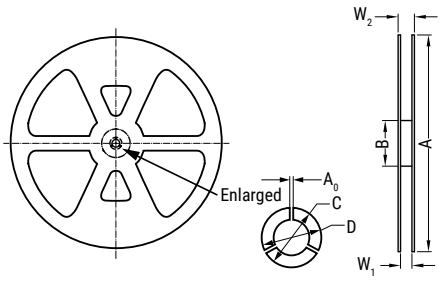
Case Size	Reel Quantity		Dimensions (mm)							
			W	F	E_1	P_1	P_2	P_0	øD_0	T
MPLCV0645 MPLCV0654	1,000	Tolerance	±0.30	±0.10	±0.10	±0.10	±0.10	±0.10	±0.05	±0.05
		Nominal	16.00	7.50	1.75	12.00	2.00	4.00	1.55	0.40

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
MPLCV1054	1,000	Tolerance	±0.30	±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



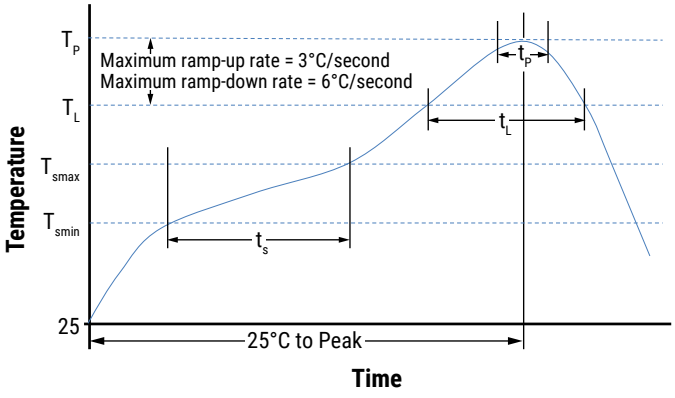
Case Size		Dimensions (mm)						
		A	B	C	D	A_0	W_1	W_2
MPLCV0645 MPLCV0654	Tolerance	±2.0	±2.0	±0.2	±0.8	±0.5		
	Nominal	ø380	ø80	ø13.0	ø21.0	2.3	17.5	21.5
MPLCV1054	Tolerance	±2.0	±2.0	±0.2	±0.8	±0.5		
	Nominal	ø380	ø80	ø13.0	ø21.0	2.3	25.5	29.5

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 MPLCV06xx 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.

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 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 indicted or that other measures may not be required.