



## Overview

The KEMET MPGV metal composite inductors are ideal for use in DC to DC switching power supplies for automotive applications. The metal composite core has high saturation capabilities maintaining functionality with high current transients and is characterized by temperature stable inductance. The durability has been further improved and allows for vibration resistance of up to 50 G.

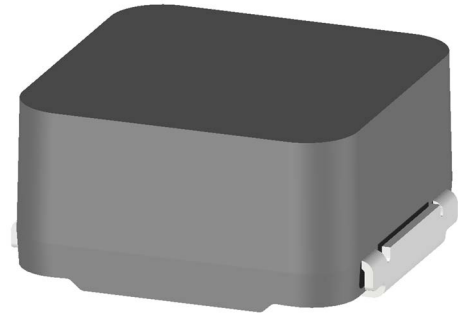
## Applications

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
- 50 G vibration resistance
- Inductance range from 0.47 – 47.00  $\mu$ H
- Operating temperature up to +155°C
- Low acoustic noise
- Low magnetic flux leakage
- AEC-Q200 qualified



## Part Number System

MPGV	1	D1054	L	1R5
Series	Version	Size Code	Inductor	Inductance Code $\mu$ H
MPGV	1	D1054 = 10 x 10 x 5.4 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 <math>\mu</math>H R68 = 0.68 <math>\mu</math>H 1R5 = 1.50 <math>\mu</math>H</p>

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to +155°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	1.9 – 135.2 mΩ maximum
Rated Current Range	3.6 – 30.9 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)
					I <sub>rms</sub> <sup>1</sup> (Reference)	I <sub>sat</sub> <sup>2</sup> (Reference)	I <sub>sat</sub> <sup>3</sup> (Reference)	
MPGV1D1054LR47	0.47	±20%	1.60	1.90	30.9	39.0	51.0	46.0
MPGV1D1054LR68	0.68	±20%	2.30	2.80	25.6	28.0	38.0	37.0
MPGV1D1054L1R0	1.00	±20%	2.80	3.20	23.2	24.0	34.0	32.0
MPGV1D1054L1R5	1.50	±20%	3.90	4.50	19.7	19.5	28.0	24.0
MPGV1D1054L2R2	2.20	±20%	5.50	6.30	16.6	19.0	26.5	21.0
MPGV1D1054L3R3	3.30	±20%	7.20	8.30	14.5	16.5	23.0	16.0
MPGV1D1054L4R7	4.70	±20%	11.80	13.60	11.3	13.0	18.5	14.0
MPGV1D1054L6R8	6.80	±20%	17.00	19.60	9.4	11.0	15.0	10.0
MPGV1D1054L100	10.00	±20%	26.00	29.90	7.6	8.5	12.5	9.5
MPGV1D1054L150	15.00	±20%	34.20	39.30	6.6	7.0	11.0	7.5
MPGV1D1054L220	22.00	±20%	44.60	51.30	5.8	5.5	8.5	6.5
MPGV1D1054L330	33.00	±20%	74.00	85.10	4.5	5.0	7.5	5.0
MPGV1D1054L470	47.00	±20%	117.60	135.20	3.6	4.0	6.0	4.0
Part Number	Inductance (µH) at 100 kHz, 1 mA	Inductance Tolerance	DC Resistance (mΩ) Typical	DC Resistance (mΩ) Maximum	I <sub>rms</sub> <sup>1</sup>	I <sub>sat</sub> <sup>2</sup>	I <sub>sat</sub> <sup>3</sup>	Self-Resonance Frequency (MHz)
					Rated Current (A)			

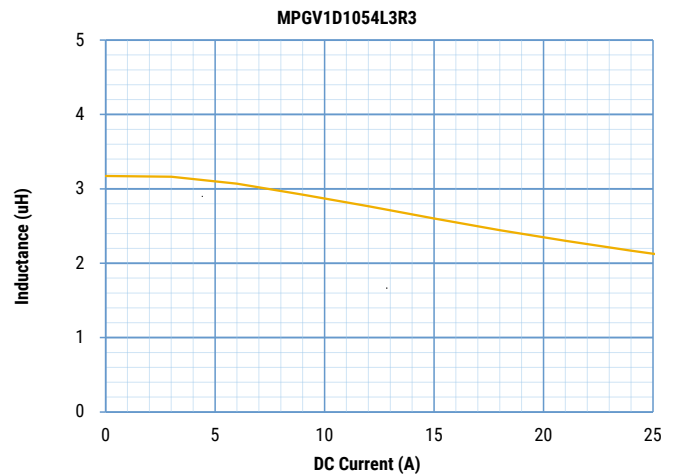
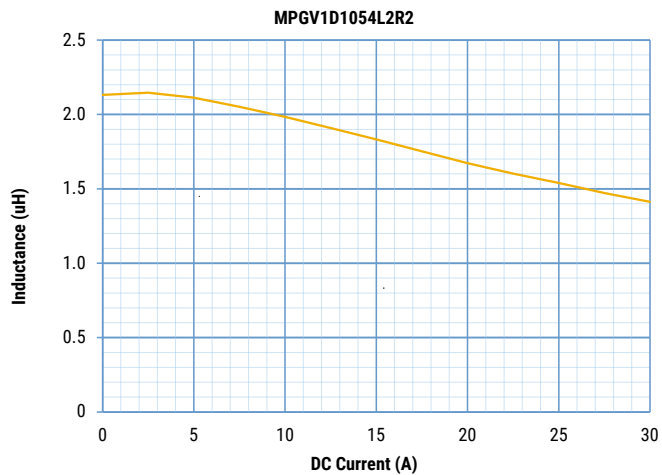
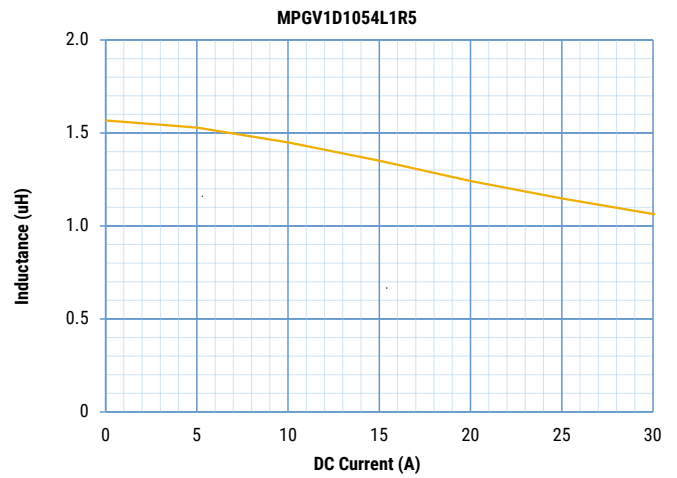
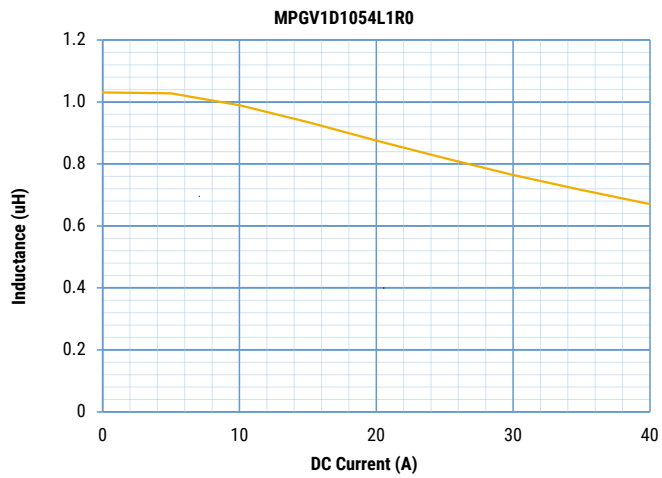
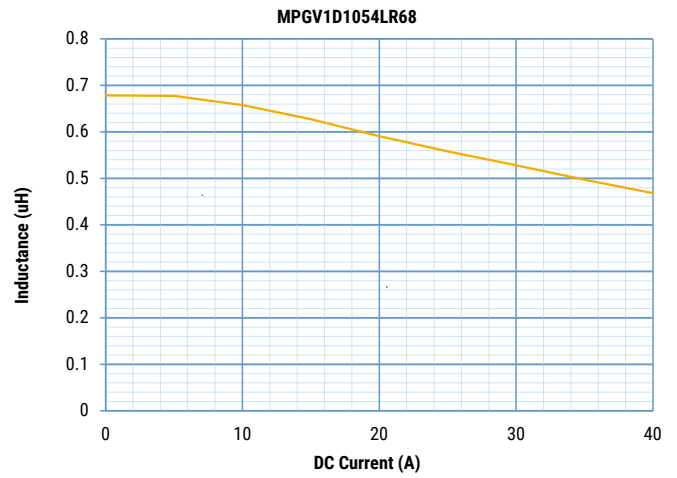
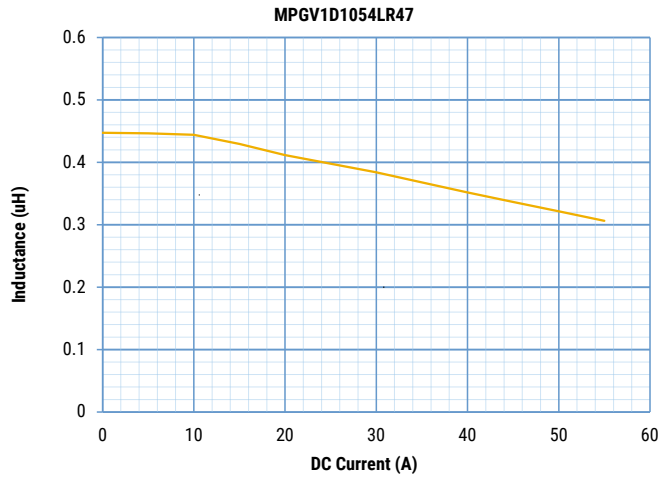
<sup>1</sup> T = 40 K rise at rated current

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

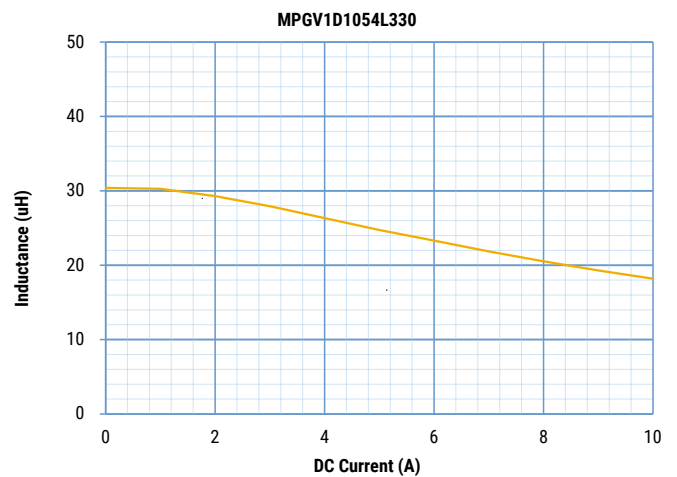
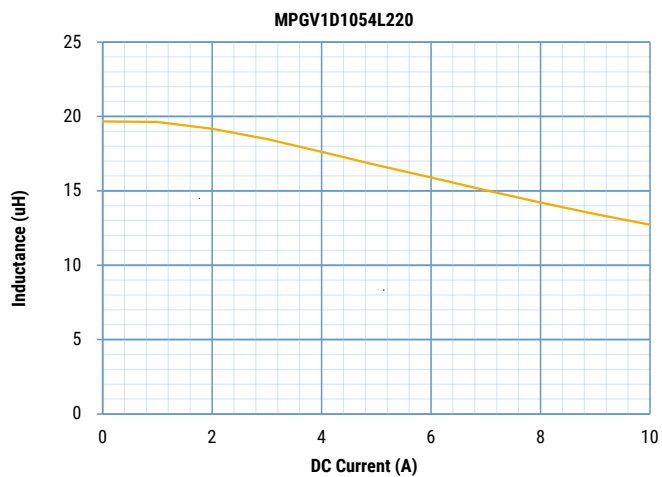
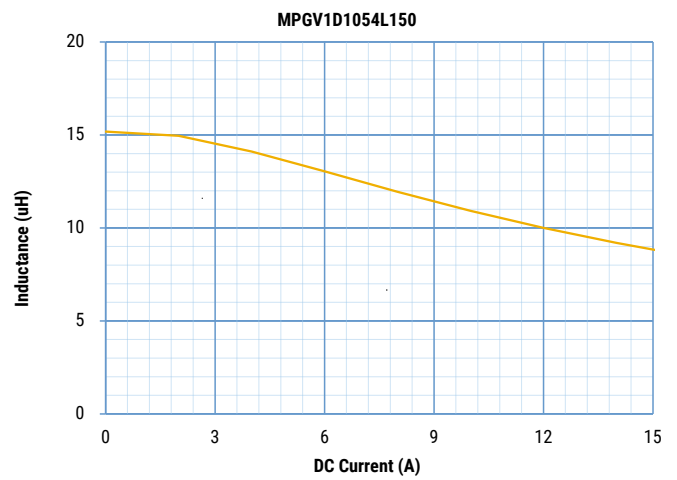
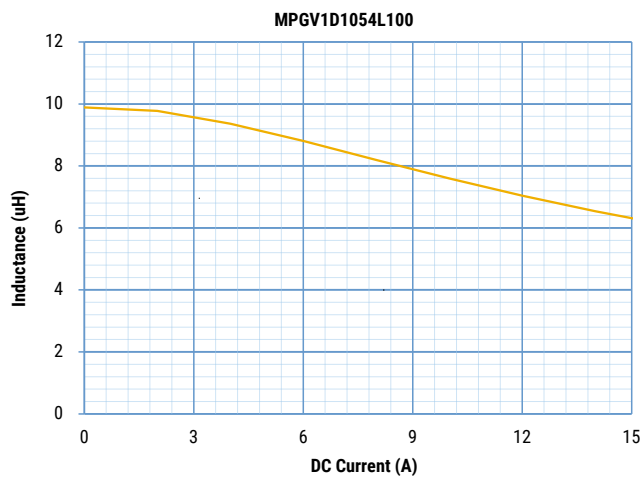
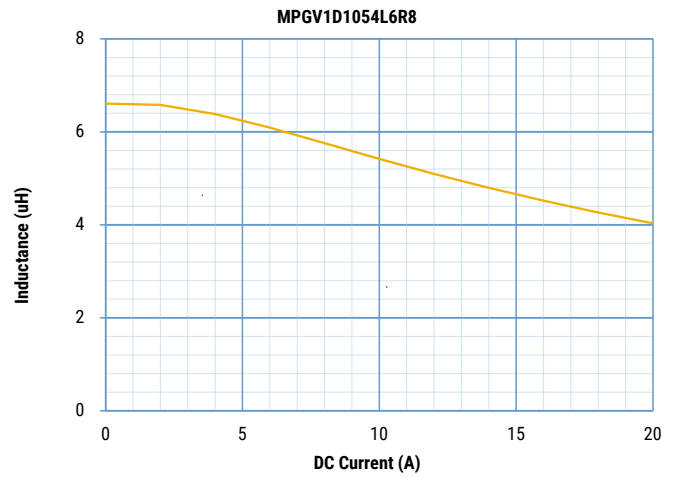
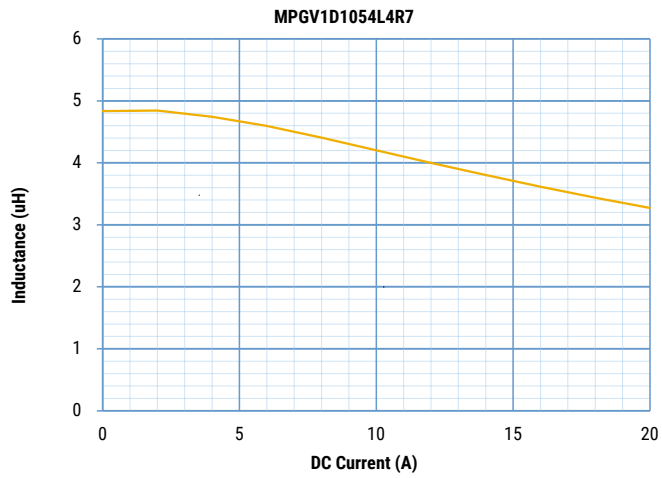
<sup>3</sup> Inductance drop 30% at rated current

All electrical characteristics data is referenced to 25°C.

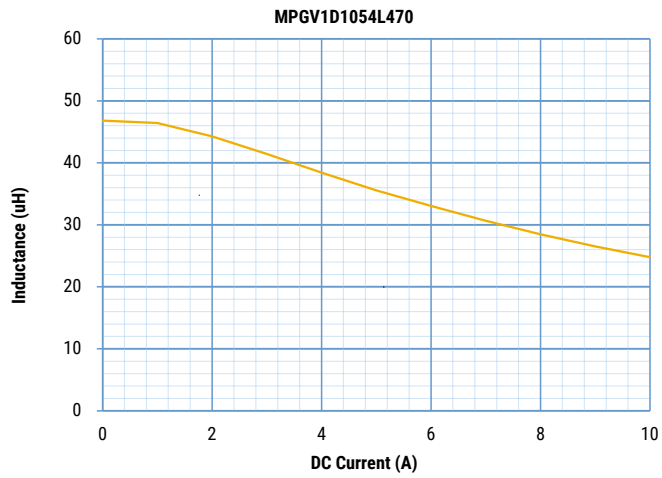
## DC-Superposed Characteristics



## DC-Superposed Characteristics cont.



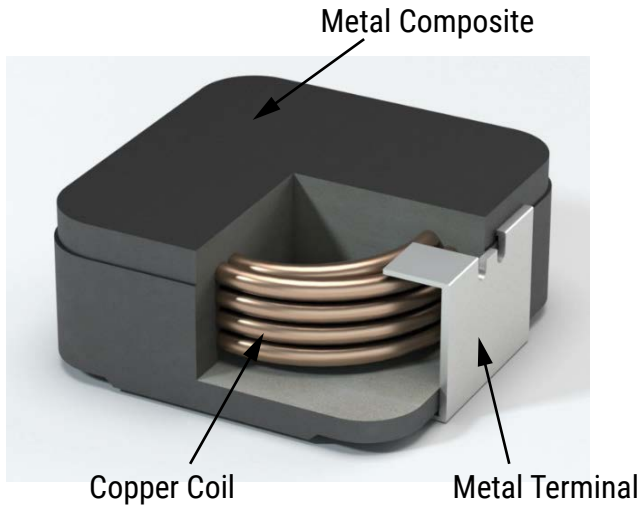
## DC-Superposed Characteristics cont.



## Dimensions

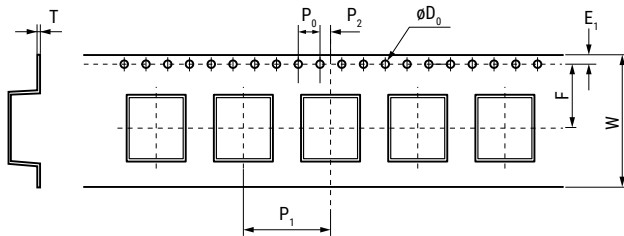
Case Size	Dimensions (mm)	Land Pattern (mm)
MPGV1D1054		

## Construction



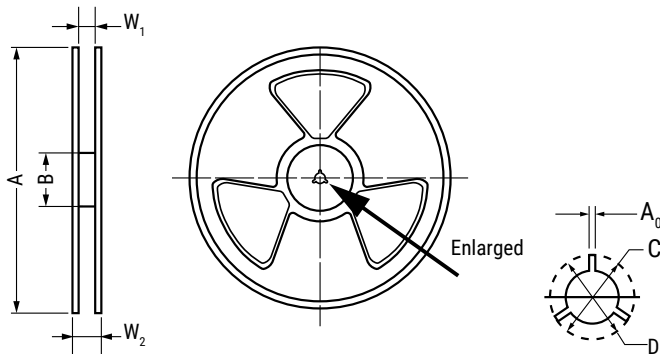
## Taping Specification

### 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	
MPGV1D1054	500	Tolerance	±0.3	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.05	±0.05
		Nominal	24.0	11.5	1.75	16.0	2.0	4.0	1.55	0.4	

## Reel Specifications



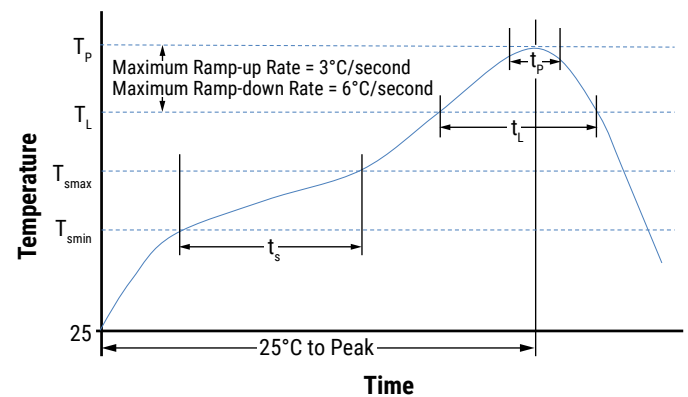
Case Size		Dimensions (mm)						
		A	B	C	D	A <sub>0</sub>	W <sub>1</sub>	W <sub>2</sub>
MPGV1D1054	Tolerance	±3.0	±2.0	±0.5	±0.8	±0.5		
	Nominal	ø330	ø100	ø13.0	ø21.5	2.6	25.0	29.4

## 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 MPGV1D1054
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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