

# MCL2012V2

## Multilayer chip inductor



### Product features

- 0805 (2012 metric) package
- High self resonant frequency (SRF)
- Multilayer monolithic construction yields high reliability
- Suitable for wave and reflow soldering
- Inductance range from 1.5 nH to 470 nH
- Moisture sensitivity level (MSL): 1

### Applications

- Industrial connectivity (IoT)
- Wireless communications
  - Bluetooth
  - WiFi
  - Antenna
- Machine-to-machine (M2M)
- Mobile phones
- Wearable devices
- Wireless LAN
- Computing/gaming consoles
- Broadband components
- RF transceiver modules

### Environmental data

- Operating temperature range: -40 °C to +85 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



Product specifications

Part number	OCL (nH) ±5%	I Rated (mA) maximum	DCR (Ω) maximum @ +25°C	SRF (MHz) minimum	Q minimum	Test frequency (MHz)	Test voltage (mV)
MCL2012V2-1R5-R	1.5 ± 0.3nH	500	0.10	6000	10	100	50
MCL2012V2-1R8-R	1.8 ± 0.3nH	500	0.10	6000	10	100	50
MCL2012V2-2R2-R	2.2 ± 0.3nH	500	0.10	6000	10	100	50
MCL2012V2-2R7-R	2.7 ± 0.3nH	500	0.10	5500	12	100	50
MCL2012V2-3R0-R	3.0 ± 0.3nH	500	0.13	5000	12	100	50
MCL2012V2-3R3-R	3.3 ± 0.3nH	500	0.13	5000	12	100	50
MCL2012V2-3R9-R	3.9 ± 0.3nH	500	0.15	4500	12	100	50
MCL2012V2-4R7-R	4.7 ± 0.3nH	500	0.20	4000	12	100	50
MCL2012V2-5R6-R	5.6 ± 0.3nH	500	0.23	3500	15	100	50
MCL2012V2-6R8-R	6.8	500	0.25	3000	15	100	50
MCL2012V2-8R2-R	8.2	500	0.28	2500	15	100	50
MCL2012V2-100-R	10	500	0.30	2200	15	100	50
MCL2012V2-120-R	12	500	0.35	2000	15	100	50
MCL2012V2-150-R	15	500	0.40	1800	15	100	50
MCL2012V2-180-R	18	300	0.45	1600	15	100	50
MCL2012V2-220-R	22	300	0.50	1500	15	100	50
MCL2012V2-270-R	27	300	0.55	1400	15	100	50
MCL2012V2-330-R	33	300	0.60	1300	15	100	50
MCL2012V2-390-R	39	300	0.65	1100	15	100	50
MCL2012V2-470-R	47	300	0.70	1000	18	100	50
MCL2012V2-560-R	56	300	0.75	900	18	100	50
MCL2012V2-680-R	68	300	0.80	850	18	100	50
MCL2012V2-820-R	82	300	0.90	800	18	100	50
MCL2012V2-101-R	100	300	0.90	700	18	100	50
MCL2012V2-121-R	120	300	0.95	600	13	100	50
MCL2012V2-151-R	150	300	1.20	550	13	100	50
MCL2012V2-181-R	180	300	1.30	500	13	100	50
MCL2012V2-221-R	220	300	1.50	400	12	100	50
MCL2012V2-271-R	270	300	1.80	350	12	100	50
MCL2012V2-331-R	330	300	2.00	300	12	50	50
MCL2012V2-391-R	390	300	2.00	250	10	50	50
MCL2012V2-471-R	470	300	2.00	200	10	50	50

1. Test frequency and voltage is for OCL and Q at +25 °C
2. Resistance to soldering heat: +260 ±5 °C for 10 ± 1 second
3. At low temperature resistance (-40 ±2°C) the inductance change is within ±10% and the Q within ±20%
4. At high temperature resistance (+85 ±2°C) the inductance change is within ±10% and the Q within ±20%
5. At high temperature load (+85 ±2°C) the inductance change is within ±10% and the Q within ±20%

6. Rated I: When rated I is applied to the product, self-temperature rise will be 40 °C or less.
7. Part Number Definition: MCL2012V2-xxx-R  
MCL2012 = Product code and size  
V2= Version inductor  
xxx= inductance value in nH, R= decimal point,  
If no R is present then last character equals number of zeros  
-R suffix = RoHS compliant

Dimensions (mm)



Schematic



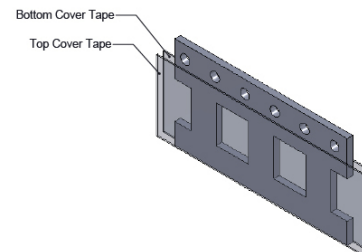
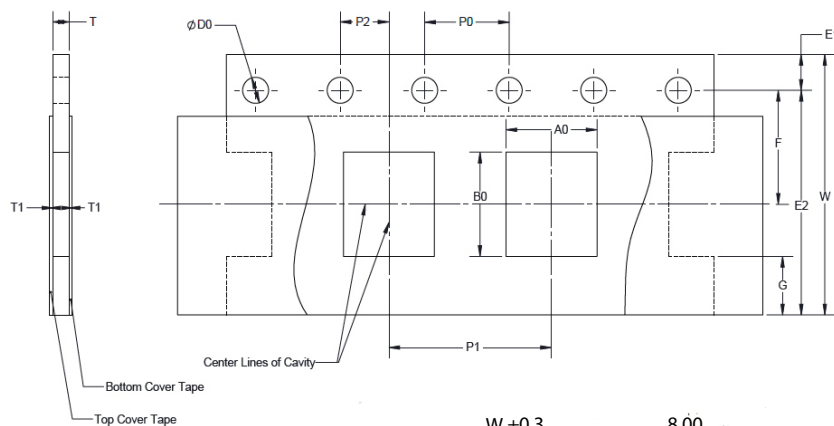
Part Number	L	W	T	a	A	B	C
MCL2012V2-xxx-R	2.0 ±0.20	1.2 ±0.20	0.90 ±0.20	0.50 ±0.30	1.6 ±0.10	1.2 ±0.10	04 ±0.10

No part marking  
All soldering surfaces to be coplanar within 0.1 millimeters  
Tolerances are ±0.2 millimeters unless stated otherwise  
Pad layout tolerances are ±0.1 millimeters unless stated otherwise  
Do not route traces or vias underneath the inductor

Packaging information (mm)

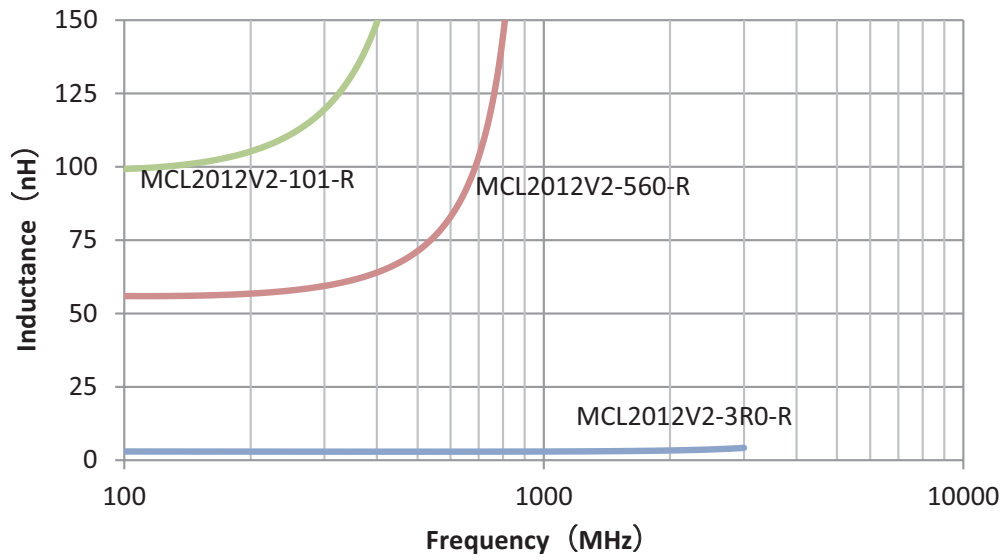
Drawing not to scale

Supplied in tape and reel packaging, 4000 parts per 7" diameter reel

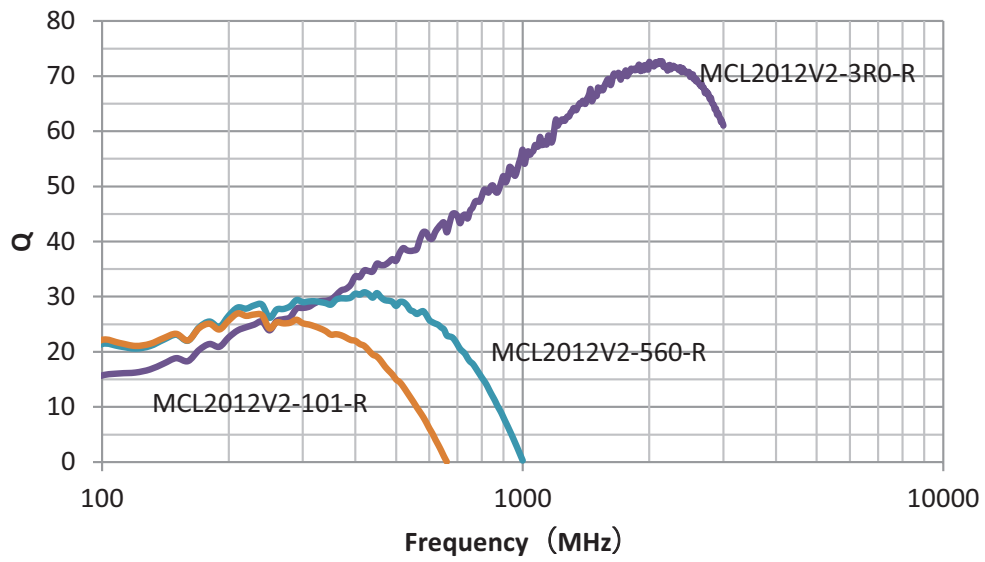


W ±0.3	8.00
F ±0.05	3.50
E1 ±0.10	1.75
E2 Min	6.25
P0 ±0.10	4.00
P1 ±0.2	4.00
P2 ±0.1	2.00
D0 +0.10/-0	1.50
A0	1.5 ±0.20
B0	2.3 ±0.20
T Max	1.10
T1 Max	na

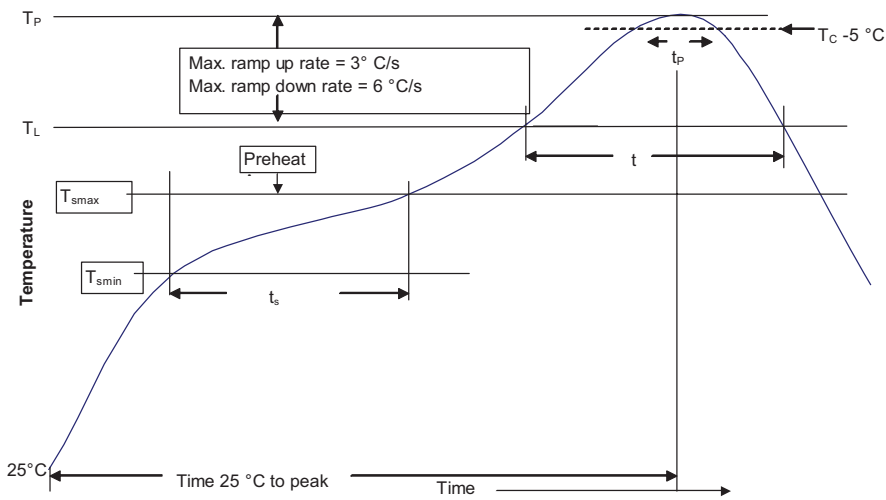
Inductance vs frequency



Q vs frequency



**Solder reflow profile**



**Table 1 - Standard SnPb solder ( $T_C$ )**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm)	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) free solder ( $T_C$ )**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

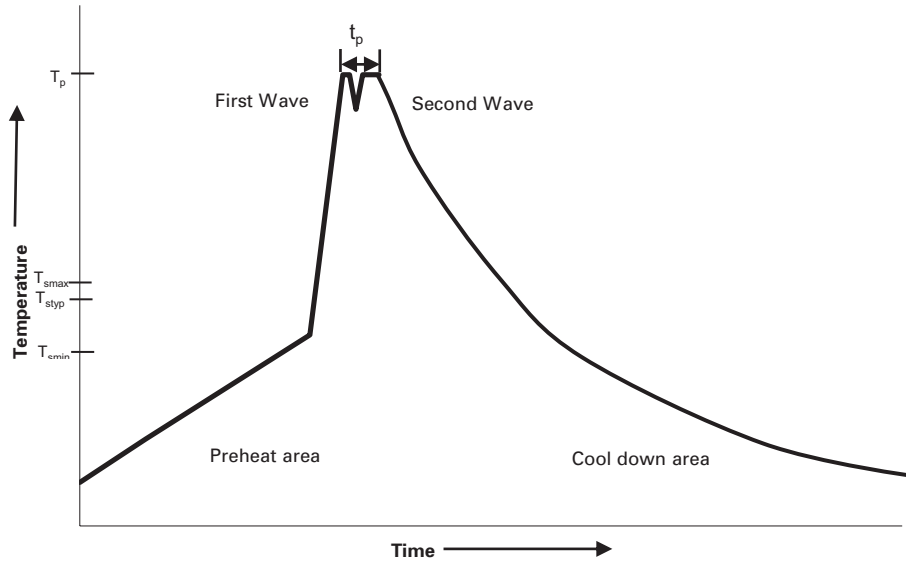
**Reference J-STD-020**

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. ( $T_{smin}$ )	100 °C	150 °C
• Temperature max. ( $T_{smax}$ )	150 °C	200 °C
• Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60-120 seconds
Average ramp up rate $T_{smax}$ to $T_p$	3 °C/ second max.	3 °C/ second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time at liquidous ( $t_L$ )	60-150 seconds	60-150 seconds
Peak package body temperature ( $T_p$ )*	Table 1	Table 2
Time ( $t_p$ )** within 5 °C of the specified classification temperature ( $T_C$ )	10 seconds**	10 seconds**
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

\* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.

\*\* Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

**Wave solder profile**



**Reference EN 61760-1:2006**

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat		
• Temperature min. ( $T_{smin}$ )	100 °C	100 °C
• Temperature typ. ( $T_{styp}$ )	120 °C	120 °C
• Temperature max. ( $T_{smax}$ )	130 °C	130 °C
• Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	70 seconds	70 seconds
$\Delta$ preheat to max Temperature	150 °C max.	150 °C max.
Peak temperature ( $T_p$ )*	235 °C – 260 °C	250 °C – 260 °C
Time at peak temperature ( $t_p$ )	10 seconds max 5 seconds max each wave	10 seconds max 5 seconds max each wave
Ramp-down rate	~ 2 K/s min ~3.5 K/s typ ~5 K/s max	~ 2 K/s min ~3.5 K/s typ ~5 K/s max
Time 25 °C to 25 °C	4 minutes	4 minutes

**Manual solder**

+350 °C, 4-5 seconds. (by soldering iron), generally manual, hand soldering is not recommended.

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**Eaton**  
**Electronics Division**  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
www.eaton.com/electronics

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