MCL1005-470-R Datasheet

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DiGi Electronics Part Number	MCL1005-470-R-DG
Manufacturer	Eaton - Electronics Division
Manufacturer Product Number	MCL1005-470-R
Description	FIXED IND 47NH 200MA 1.1 OHM SMD
Detailed Description	47 nH Unshielded Multilayer Inductor 200 mA 1.1Ohm Max 0402 (1005 Metric)

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RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
MCL1005-470-R	Eaton - Electronics Division
Series:	Product Status:
MCL1005	Active
Type:	Material - Core:
Multilayer	-
Inductance:	Tolerance:
47 nH	±5%
Current Rating (Amps):	Current - Saturation (Isat):
200 mA	-
Shielding:	DC Resistance (DCR):
Unshielded	1.1Ohm Max
Q @ Freq:	Frequency - Self Resonant:
8 @ 100MHz	1GHz
Ratings:	Operating Temperature:
-	-55°C ~ 125°C
Inductance Frequency - Test:	Features:
100 MHz	-
Mounting Type:	Package / Case:
Surface Mount	0402 (1005 Metric)
Supplier Device Package:	Size / Dimension:
0402	0.039" L x 0.020" W (1.00mm x 0.50mm)
Height - Seated (Max):	
0.026" (0.65mm)	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8504.50.8000	

Technical Data **10925** Effective June 2019

MCL1005

Multilayer chip inductor

Product features

- 0402 (1005 metric) package
- High self resonant frequency (SRF)
- Multilayer monolithic construction yields high reliability
- Suitable for wave and reflow soldering
- Inductance range from 1.0 nH to 360 nH
- Moisture sensitivity level (MSL): 1

Applications

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

Environmental data

- Operating temperature range: -55 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant

Pb HALOGEN HF FREE RoHS

Powering Business Worldwide

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)
MCL1005-1R0-R	1.0 ±0.3nH	400	0.10	10000	8	100	50
MCL1005-1R1-R	1.1 ±0.3nH	400	0.10	10000	8	100	50
MCL1005-1R2-R	1.2 ±0.3nH	400	0.10	10000	8	100	50
MCL1005-1R3-R	1.3 ±0.3nH	400	0.10	10000	8	100	50
MCL1005-1R5-R	1.5 ±0.3nH	300	0.10	6000	8	100	50
MCL1005-1R6-R	1.6 ±0.3nH	300	0.12	6000	8	100	50
MCL1005-1R8-R	1.8 ±0.3nH	300	0.12	6000	8	100	50
MCL1005-2R0-R	2.0 ±0.3nH	300	0.15	6000	8	100	50
MCL1005-2R2-R	2.2 ±0.3nH	300	0.15	6000	8	100	50
MCL1005-2R4-R	2.4 ±0.3nH	300	0.15	6000	8	100	50
MCL1005-2R7-R	2.7 ±0.3nH	300	0.15	6000	8	100	50
MCL1005-3R0-R	3.0 ±0.3nH	300	0.20	6000	8	100	50
MCL1005-3R3-R	3.3 ±0.3nH	300	0.20	6000	8	100	50
MCL1005-3R6-R	3.6 ±0.3nH	300	0.20	4000	8	100	50
MCL1005-3R9-R	3.9 ±0.3nH	300	0.20	4000	8	100	50
MCL1005-4R3-R	4.3 ±0.3nH	300	0.20	4000	8	100	50
MCL1005-4R7-R	4.7 ±0.3nH	300	0.25	4000	8	100	50
MCL1005-5R1-R	5.1 ±0.3nH	300	0.25	4000	8	100	50
MCL1005-5R6-R	5.6 ±0.3nH	300	0.25	4000	8	100	50
MCL1005-6R2-R	6.2 ±0.3nH	300	0.30	3900	8	100	50
MCL1005-6R8-R	6.8	300	0.30	3900	8	100	50
MCL1005-7R5-R	7.5	300	0.40	3700	8	100	50
MCL1005-8R2-R	8.2	300	0.40	3600	8	100	50
MCL1005-9R1-R	9.1	300	0.40	3400	8	100	50
MCL1005-100-R	10	300	0.40	3200	8	100	50
MCL1005-120-R	12	300	0.50	2700	8	100	50
MCL1005-150-R	15	300	0.50	2300	8	100	50
MCL1005-180-R	18	300	0.60	2100	8	100	50
MCL1005-200-R	20	300	0.60	2000	8	100	50
MCL1005-220-R	22	300	0.60	1900	8	100	50
MCL1005-270-R	27	300	0.70	1600	8	100	50
MCL1005-330-R	33	200	0.80	1300	8	100	50
MCL1005-390-R	39	200	1.00	1200	8	100	50
MCL1005-430-R	43	200	1.10	1100	8	100	50
MCL1005-470-R	47	200	1.10	1000	8	100	50
MCL1005-560-R	56	200	1.20	750	8	100	50
MCL1005-680-R	68	180	1.40	750	8	100	50
MCL1005-820-R	82	150	2.40	750	8	100	50
MCL1005-101-R	100	150	2.60	700	8	100	50

1. Test frequency and voltage are for OCL and Q at +25 °C
2. Resistance to soldering heat: +260 ±5 °C for 10 ± 1 second
3. At low temperature resistance (-55 ±2°C) the inductance change is within ±10% and the Q within ±20%
4. At high temperature resistance (+125 ±2°C) the inductance change is within ±10% and the Q within ±20%
5. At high temperature load (+125 ±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: MCL1005-xxx-R
   MCL1005 = Product code and size
   xxx= inductance value in nH, R= decimal point,
   If no R is present then last character equals number of zeros
   -R suffix = RoHS compliant

MCL1005
Multilayer chip inductor

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)
MCL1005-121-R	120	150	2.80	600	8	100	50
MCL1005-151-R	150	100	3.20	550	8	100	50
MCL1005-181-R	180	100	3.70	500	8	100	50
MCL1005-221-R	220	100	4.00	450	8	100	50
MCL1005-271-R	270	100	4.50	400	8	100	50
MCL1005-331-R	330	50	7.00	350	6	50	50
MCL1005-361-R	360	50	7.50	300	6	50	50

1. Test frequency and voltage are for OCL and Q at +25 °C
2. Resistance to soldering heat: +260 ±5 °C for 10 ± 1 second
3. At low temperature resistance (-55 ±2°C) the inductance change is within ±10% and the Q within ±20%
4. At high temperature resistance (+125 ±2°C) the inductance change is within ±10% and the Q within ±20%
5. At high temperature load (+125 ±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: MCL1005-xxx-R
   MCL1005 = Product code and size
   xxx= inductance value in nH, R= decimal point,
   If no R is present then last character equals number of zeros
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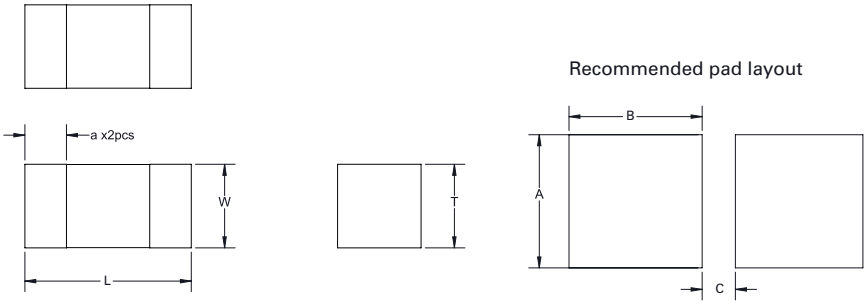
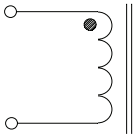
Dimensions (mm)



Schematic



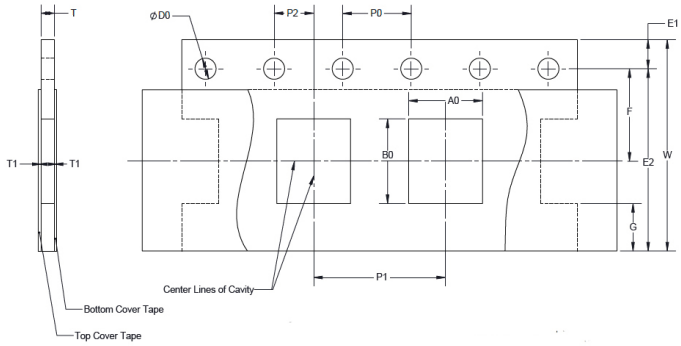
Part Number	L	W	T	a	A	B	C
MCL1005-xxx-R	1.0 ±0.15	0.50 ±0.15	0.50 ±0.15	0.25 ±0.10	0.85 ±0.10	0.8 ±0.10	0.2 ±0.10

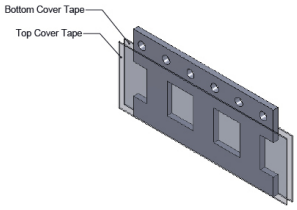
No part marking
All soldering surfaces to be coplanar within 0.1 millimeters
Tolerances are ±0.2 millimeters unless stated otherwise
Pad layout tolerances are ±0.1 millimeters unless stated otherwise
Do not route traces or vias underneath the inductor

Packaging information (mm)

Drawing not to scale

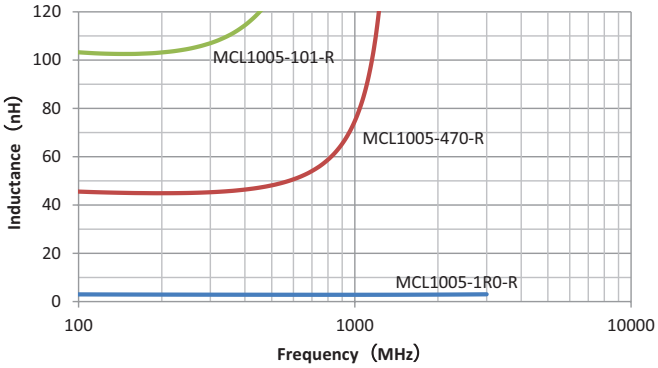
Supplied in tape and reel packaging, 10000 parts per 7" diameter reel



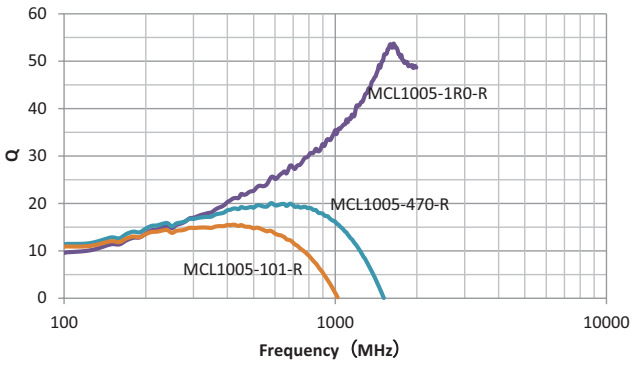


W ±0.3	8.00
F±0.05	3.50
E1±0.10	1.75
E2 Min	6.25
P0±0.10	4.00
P1±0.05	2.00
P2±0.1	2.00
D0+0.10/-0	1.50
A0	0.65±0.10
B0	1.15±0.10
T Max	0.8
T1 Max	na

Inductance vs frequency



Q vs frequency



Solder reflow profile

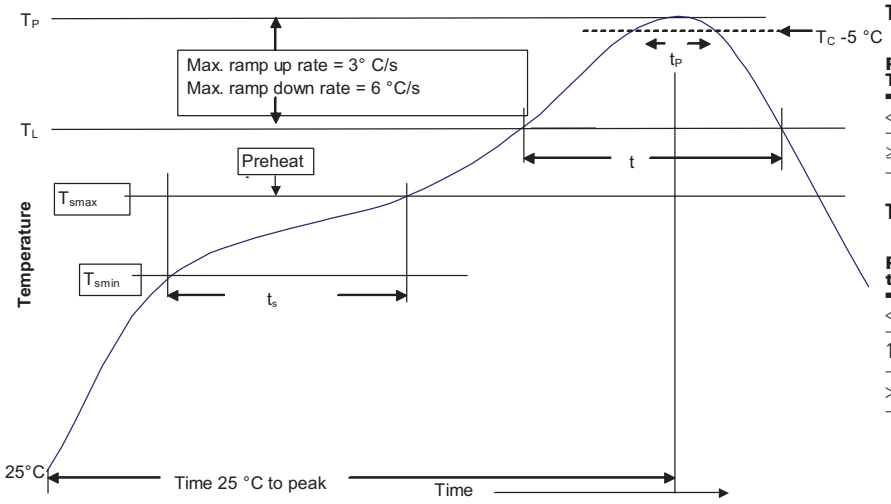


Table 1 - Standard SnPb solder (T_C)

Package Thickness	Volume mm3 <350	Volume mm3 ≥350
<2.5 mm)	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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

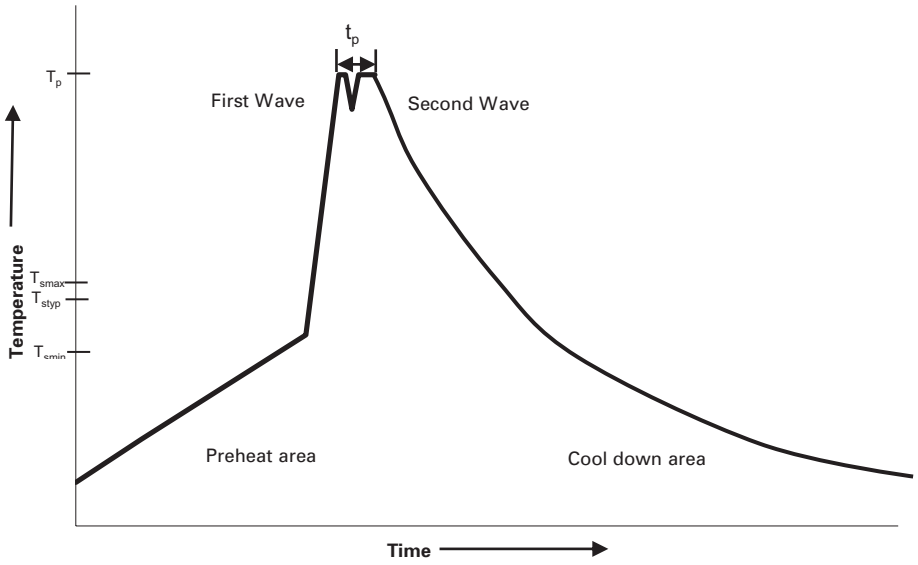
Package thickness	Volume mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

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) Time at liquidous (t_L)		183 °C 60-150 seconds	217 °C 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
Δ 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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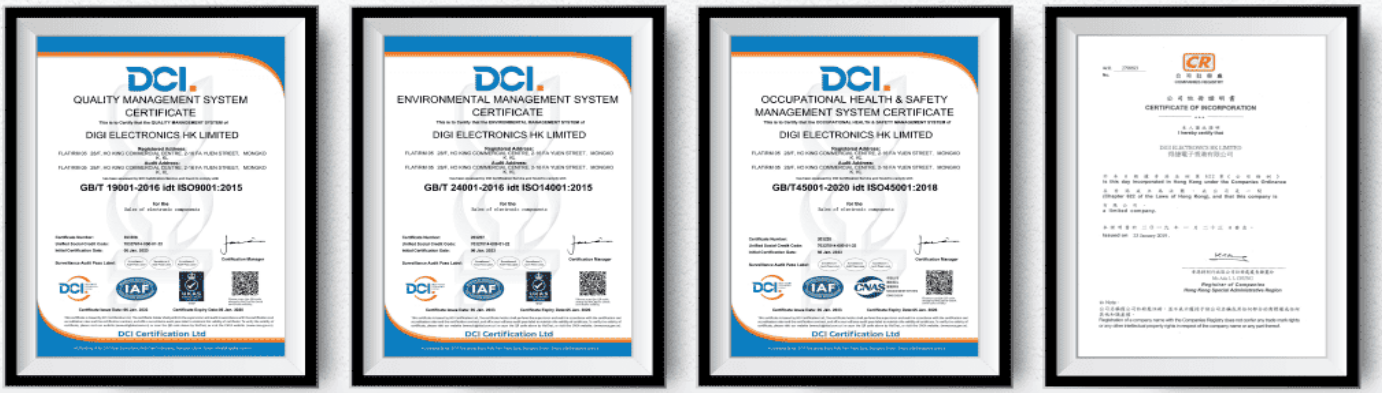

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