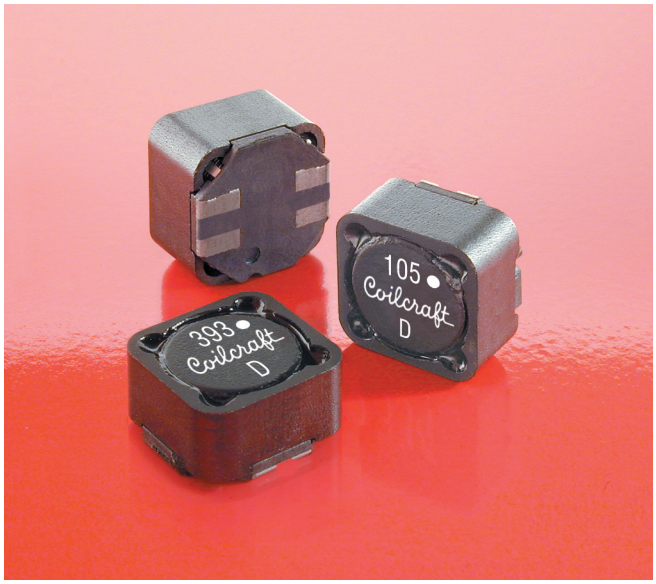
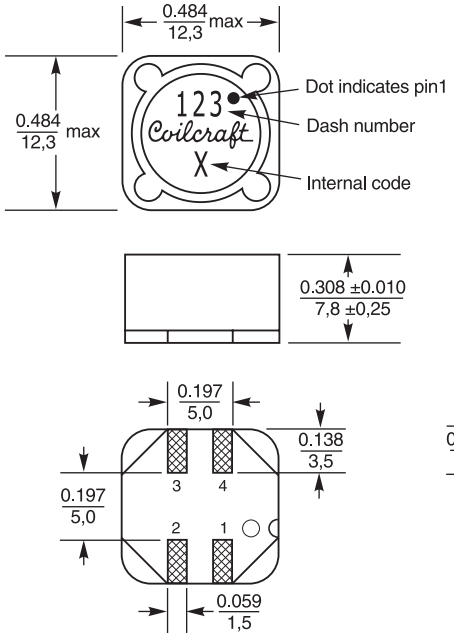
High Reliability Coupled Inductors ML612PND



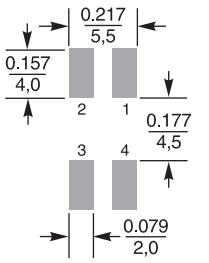
The ML612PND series of coupled inductors was designed for high temperature applications – up to 155°C. The excellent coupling coefficient (k ≥ 0.98) makes it ideal for use in SEPIC applications. In SEPIC topologies, the required inductance for each winding in a coupled inductor is half the value needed for two separate inductors, allowing selection of a part with lower DCR and higher current handling.

These inductors provide high inductance, high efficiency, excellent current handling and 500 V isolation in a very rugged part. They are well suited for use as VRM inductors in high-current DC-DC and VRM/VRD controllers.

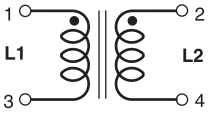
They can also be used as two single inductors connected in series or parallel, as a common mode choke or as a 1 : 1 transformer.

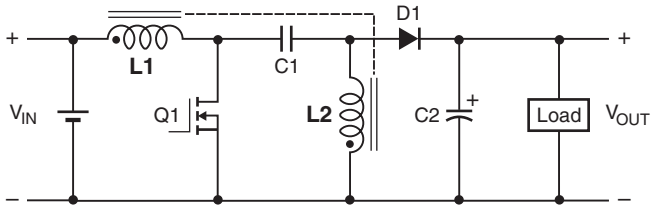


Suggested Land Pattern



Dimensions are in inches / mm





Typical SEPIC schematic
Refer to Application Note, Document 639,
"Selecting Coupled Inductors for SEPIC Applications"

Core material Ferrite

Terminations Matte tin over nickel over phos bronze.

Weight: 3.8 g – 4.6 g

Ambient temperature –55°C to +105°C with Irms current, +105°C to +155°C with derated current

Storage temperature Component: –55C to +155°C. Tape and reel packaging: –55°C to +80°C

Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

Moisture Sensitivity Level (MSL) 1 (unlimited floor life at <30°C / 85% relative humidity)

Winding-to-winding and winding-to-core isolation 500 Vrms

Enhanced crush-resistant packaging 500/13″ reel; Plastic tape: 24 mm wide, 0.4 mm thick, 16 mm pocket spacing, 8.1 mm pocket depth

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CRITICAL PRODUCTS & SERVICES

Specifications subject to change without notice.
Please check our website for latest information. Document ML704-1 Revised 07/13/12

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ML612PND Series (1278)

Part number[1]	Inductance[2] (µH)	DCR max[3] (Ohms)	SRF (MHz)[4] min	SRF (MHz)[4] typ	Coupling coefficient typ	Leakage L typ (µH)	Isat (A)[5] 10% drop	Isat (A)[5] 20% drop	Isat (A)[5] 30% drop	Irms (A) both windings[6]	Irms (A) one winding[7]
ML612PND472MLZ	4.7 ±20%	0.040	26.0	33.0	0.98	0.22	13.90	15.20	16.36	3.16	4.47
ML612PND562MLZ	5.6 ±20%	0.046	24.0	30.0	0.98	0.23	13.38	14.86	15.74	2.87	4.06
ML612PND682MLZ	6.8 ±20%	0.048	18.0	23.0	0.98	0.22	12.10	13.56	14.20	2.81	3.98
ML612PND822MLZ	8.2 ±20%	0.055	16.0	20.0	0.98	0.34	10.30	11.52	12.20	2.76	3.90
ML612PND103MLZ	10 ±20%	0.058	14.0	17.0	0.98	0.34	8.80	10.00	10.66	2.56	3.62
ML612PND123MLZ	12 ±20%	0.062	12.0	15.0	0.98	0.36	8.20	9.18	9.74	2.48	3.50
ML612PND153MLZ	15 ±20%	0.072	10.0	13.0	0.99	0.41	7.40	8.36	9.03	2.30	3.25
ML612PND183MLZ	18 ±20%	0.080	9.6	12.0	0.99	0.37	6.50	7.38	7.86	2.18	3.08
ML612PND223MLZ	22 ±20%	0.096	8.8	11.0	0.99	0.41	6.00	6.80	7.26	1.99	2.81
ML612PND273MLZ	27 ±20%	0.120	8.0	10.0	0.99	0.43	5.80	6.56	7.02	1.78	2.52
ML612PND333MLZ	33 ±20%	0.150	7.6	9.5	0.99	0.56	5.50	6.10	6.52	1.59	2.25
ML612PND393MLZ	39 ±20%	0.161	6.8	8.5	0.99	0.64	4.70	5.26	5.60	1.54	2.18
ML612PND473MLZ	47 ±20%	0.180	6.0	7.5	0.99	0.70	3.70	4.34	4.60	1.45	2.05
ML612PND563MLZ	56 ±20%	0.190	5.6	7.0	0.99	0.76	3.60	4.18	4.50	1.41	2.00
ML612PND683MLZ	68 ±20%	0.210	5.2	6.5	0.99	0.88	3.50	4.04	4.32	1.35	1.90
ML612PND823MLZ	82 ±20%	0.280	4.0	5.0	0.99	0.85	3.30	3.72	4.02	1.16	1.65
ML612PND104MLZ	100 ±20%	0.300	3.6	4.5	>0.99	0.90	2.80	3.24	3.46	1.13	1.59
ML612PND124KLZ	120 ±10%	0.410	3.4	4.3	0.99	1.31	2.60	2.94	3.16	0.96	1.36
ML612PND154KLZ	150 ±10%	0.460	3.3	4.1	>0.99	1.46	2.20	2.54	2.70	0.91	1.29
ML612PND184KLZ	180 ±10%	0.510	3.2	4.0	>0.99	0.93	2.10	2.42	2.58	0.86	1.22
ML612PND224KLZ	220 ±10%	0.690	2.7	3.4	>0.99	1.54	1.90	2.16	2.28	0.74	1.05
ML612PND274KLZ	270 ±10%	0.900	2.5	3.1	>0.99	1.17	1.70	1.94	2.10	0.65	0.92
ML612PND334KLZ	330 ±10%	1.02	2.3	2.9	0.99	4.14	1.50	1.70	1.84	0.61	0.86
ML612PND394KLZ	390 ±10%	1.12	2.2	2.7	>0.99	1.64	1.40	1.60	1.70	0.58	0.82
ML612PND474KLZ	470 ±10%	1.53	1.8	2.2	>0.99	0.25	1.30	1.50	1.60	0.50	0.70
ML612PND564KLZ	560 ±10%	1.69	1.6	2.0	>0.99	2.68	1.20	1.34	1.46	0.47	0.67
ML612PND684KLZ	680 ±10%	2.29	1.4	1.7	>0.99	2.11	1.00	1.08	1.22	0.41	0.58
ML612PND824KLZ	820 ±10%	2.55	1.1	1.4	>0.99	2.39	0.900	1.04	1.18	0.39	0.55
ML612PND105KLZ	1000 ±10%	2.87	1.0	1.3	>0.99	4.28	0.850	0.948	1.05	0.37	0.52

1. When ordering, please specify **testing** code:

   ML612PND105KLZ

   Testing: **Z** = COTS
   H = Screening per Coilcraft CP-SA-10001
   N = Screening per Coilcraft CP-SA-10004
2. Inductance shown for each winding, measured at 100 kHz, 0.1 Vrms, 0 Adc on an Agilent/HP 4284A LCR meter or equivalent. When leads are connected in parallel, inductance is the same value. When leads are connected in series, inductance is four times the value.
3. DCR is for each winding. When leads are connected in parallel, DCR is half the value. When leads are connected in series, DCR is twice the value.
4. SRF measured using an Agilent/HP 4191A or equivalent. When leads are connected in parallel, SRF is the same value.
5. Typical DC current, at which the inductance drops the specified amount from its value without current. It is the sum of the current flowing in both windings.
6. Equal current when applied to each winding simultaneously that causes a 40°C temperature rise from 25°C ambient. See temperature rise calculation.
7. Maximum current when applied to one winding that causes a 40°C temperature rise from 25°C ambient. See temperature rise calculation.
8. Electrical specifications at 25°C.

Refer to Doc 639 "Selecting Coupled Inductors for SEPIC Applications."
Refer to Doc 362 "Soldering Surface Mount Components" before soldering.

Temperature rise calculation based on specified Irms

Winding power loss = $(I_{L1}^2 + I_{L2}^2) \times$ DCR in Watts (W)

Temperature rise (Δt) = Winding power loss $\times \frac{52.6°C}{W}$

$\Delta t = (I_{L1}^2 + I_{L2}^2) \times DCR \times \frac{52.6°C}{W}$

Example 1. MSD1278T-153ML (Equal current in each winding)
Winding power loss = $(2.3^2 + 2.3^2) \times 0.072 = 0.761$ W

$\Delta t = 0.761 \text{ W} \times \frac{52.6°C}{W} = 40°C$

Example 2. MSD1278T-153ML ($I_{L1} = 2.4$ A, $I_{L2} = 1.3$ A)
Winding power loss = $(2.4^2 + 1.3^2) \times 0.072 = 0.536$ W

$\Delta t = 0.536 \text{ W} \times \frac{52.6°C}{W} = 28.2°C$

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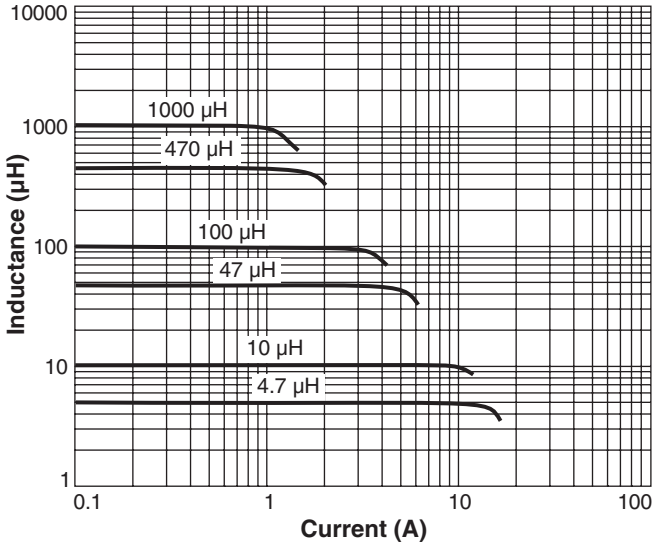
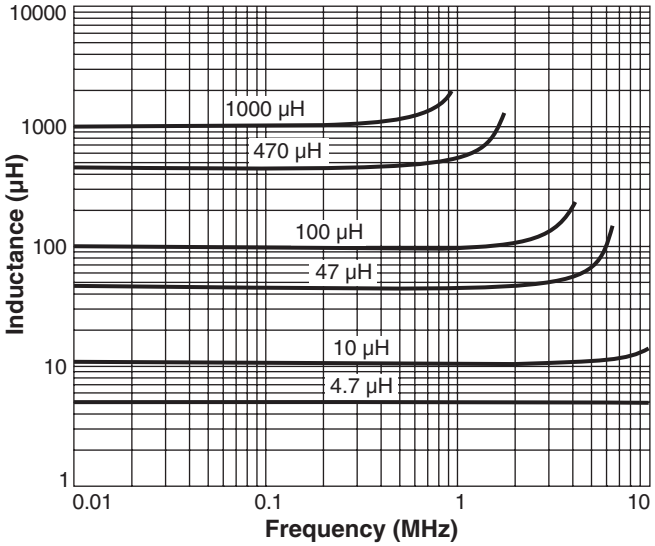
ML612PND Series (1278)

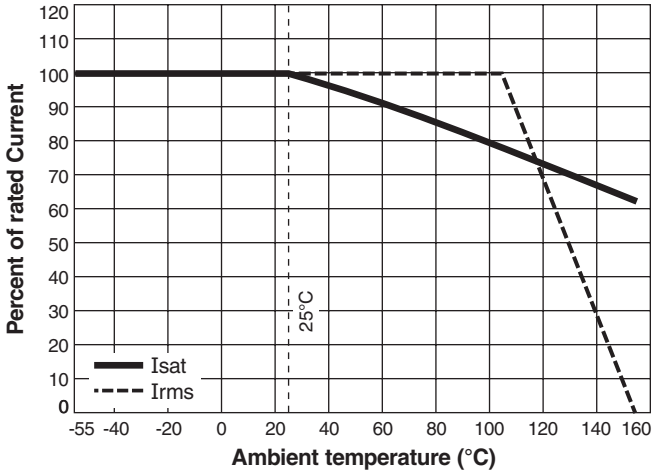
Typical L vs Current



Typical L vs Frequency



Current Derating



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