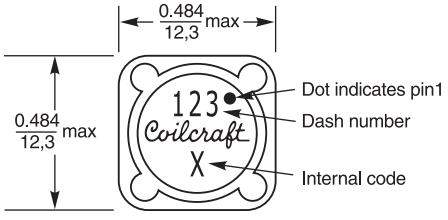
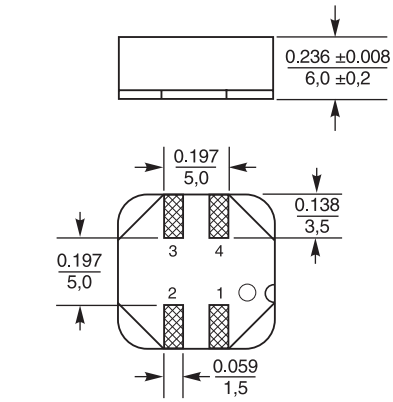
High Reliability Coupled Inductors ML590PND

The ML590PND series of shielded coupled inductors was designed specifically 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.

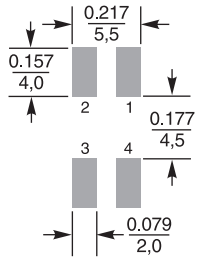
They can also be used as two single inductors connected in series or parallel, as a common mode choke or as a 1 : 1 transformer.

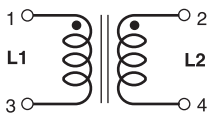


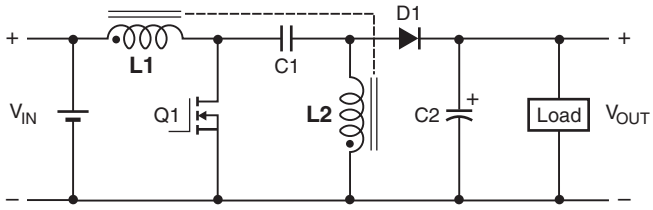


Dimensions are in inches / mm

Suggested Land Pattern







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: 2.8 – 3.2 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

Winding to winding isolation 500 Vrms

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, 0.35 mm thick, 16 mm pocket spacing, 6.6 mm pocket depth

Specifications subject to change without notice.
Please check our website for latest information. Document ML703-1 Revised 07/13/12

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ML590PND Series (1260)

Part number[1]	Inductance[2] (µH)	DCR max[3] (OhML)	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]
ML590PND472MLZ	4.7 ±20%	0.036	30.0	38.0	0.98	0.20	9.00	10.18	11.08	3.16	4.47
ML590PND562MLZ	5.6 ±20%	0.040	24.0	30.0	0.98	0.20	8.00	9.06	9.84	3.00	4.24
ML590PND682MLZ	6.8 ±20%	0.048	22.0	27.0	0.98	0.24	7.00	8.00	8.64	2.75	3.88
ML590PND822MLZ	8.2 ±20%	0.052	21.0	26.0	0.98	0.25	6.44	7.38	7.98	2.63	3.72
ML590PND103MLZ	10 ±20%	0.060	18.0	22.0	0.99	0.26	5.40	6.32	6.88	2.45	3.46
ML590PND123MLZ	12 ±20%	0.074	16.0	20.0	0.99	0.28	5.30	6.18	6.70	2.21	3.12
ML590PND153MLZ	15 ±20%	0.085	14.4	18.0	0.99	0.32	4.60	5.30	5.80	2.06	2.92
ML590PND183MLZ	18 ±20%	0.097	13.0	16.0	0.99	0.40	4.50	5.22	5.68	1.93	2.73
ML590PND223MLZ	22 ±20%	0.116	12.0	15.0	0.98	0.67	4.00	4.62	5.02	1.76	2.49
ML590PND273MLZ	27 ±20%	0.124	10.0	13.0	0.99	0.50	3.60	4.14	4.50	1.70	2.41
ML590PND333MLZ	33 ±20%	0.134	10.0	12.4	0.99	0.65	3.30	3.80	4.14	1.64	2.32
ML590PND393MLZ	39 ±20%	0.142	9.6	12.0	0.99	1.09	3.00	3.48	3.82	1.59	2.25
ML590PND473MLZ	47 ±20%	0.174	9.3	11.6	0.99	0.80	2.70	3.12	3.40	1.44	2.03
ML590PND563MLZ	56 ±20%	0.198	8.4	10.5	0.99	0.75	2.50	2.90	3.14	1.35	1.91
ML590PND683MLZ	68 ±20%	0.216	8.0	10.0	>0.99	0.57	2.30	2.66	2.88	1.29	1.83
ML590PND823MLZ	82 ±20%	0.274	6.9	8.6	0.99	1.52	2.10	2.40	2.60	1.15	1.62
ML590PND104MLZ	100 ±20%	0.322	6.2	7.8	0.99	1.41	1.90	2.18	2.38	1.06	1.50
ML590PND124KLZ	120 ±10%	0.418	5.5	6.8	0.99	1.34	1.60	1.84	2.04	0.93	1.31
ML590PND154KLZ	150 ±10%	0.476	5.1	6.4	0.99	1.52	1.50	1.76	1.92	0.87	1.23
ML590PND184KLZ	180 ±10%	0.536	4.9	6.1	0.99	1.80	1.40	1.64	1.78	0.82	1.16
ML590PND224KLZ	220 ±10%	0.691	4.4	5.5	>0.99	1.60	1.30	1.48	1.60	0.72	1.02
ML590PND274KLZ	270 ±10%	0.806	3.4	4.3	>0.99	2.23	1.10	1.30	1.40	0.67	0.95
ML590PND334KLZ	330 ±10%	1.09	3.2	4.0	>0.99	2.39	1.00	1.16	1.26	0.57	0.81
ML590PND394KLZ	390 ±10%	1.20	2.9	3.6	>0.99	3.72	0.950	1.11	1.23	0.55	0.77
ML590PND474KLZ	470 ±10%	1.59	2.4	3.0	>0.99	2.89	0.900	0.994	1.09	0.48	0.67
ML590PND564KLZ	560 ±10%	1.81	2.2	2.8	>0.99	2.55	0.800	0.908	0.948	0.45	0.63
ML590PND684KLZ	680 ±10%	2.06	2.1	2.6	>0.99	5.76	0.700	0.804	0.874	0.42	0.59
ML590PND824KLZ	820 ±10%	2.65	2.0	2.5	>0.99	2.86	0.640	0.732	0.802	0.37	0.52
ML590PND105KLZ	1000 ±10%	3.06	1.9	2.4	>0.99	4.32	0.590	0.674	0.728	0.34	0.49

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

   ML590PND105KLZ

   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. 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 $\times \frac{55.6°C}{W}$

$\Delta t = (I_{L1}^2 + I_{L2}^2) \times DCR \times \frac{55.6°C}{W}$

Example 1. 590PND153 (Equal current in each winding)
Winding power loss = $(2.06^2 + 2.06^2) \times 0.085 = 0.721$ W

$\Delta t = 0.721 \text{ W} \times \frac{55.6°C}{W} = 40°C$

Example 2. 590PND153 ($I_{L1} = 2.4$ A, $I_{L2} = 1.3$ A)
Winding power loss = $(2.4^2 + 1.3^2) \times 0.085 = 0.633$ W

$\Delta t = 0.633 \text{ W} \times \frac{55.6°C}{W} = 35.2°C$

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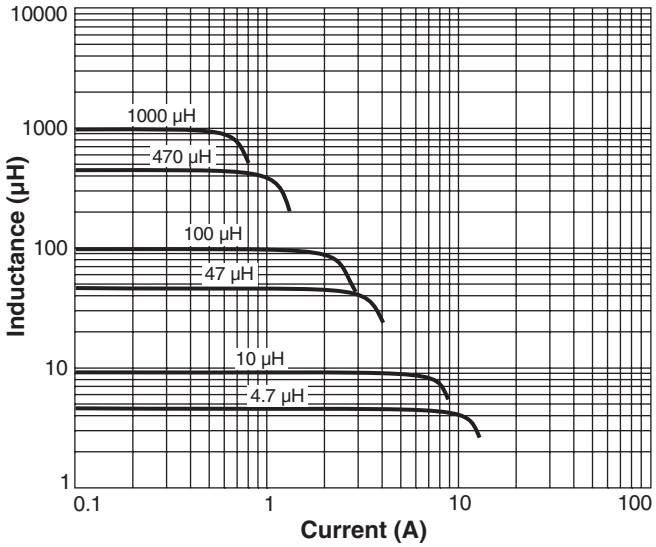
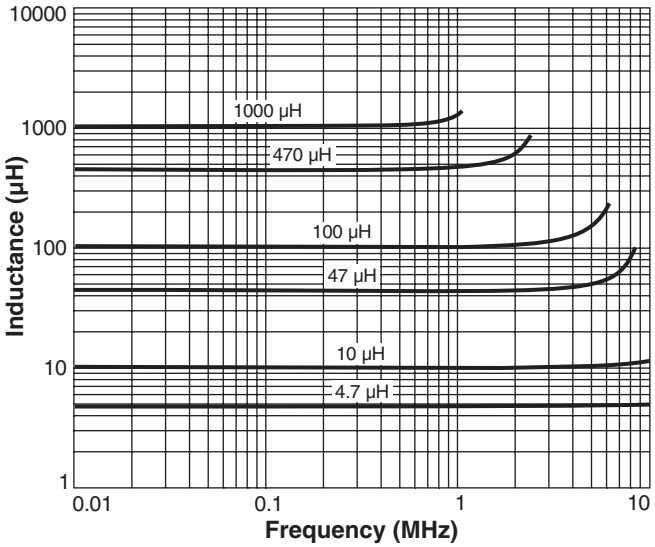
ML590PND Series (1260)

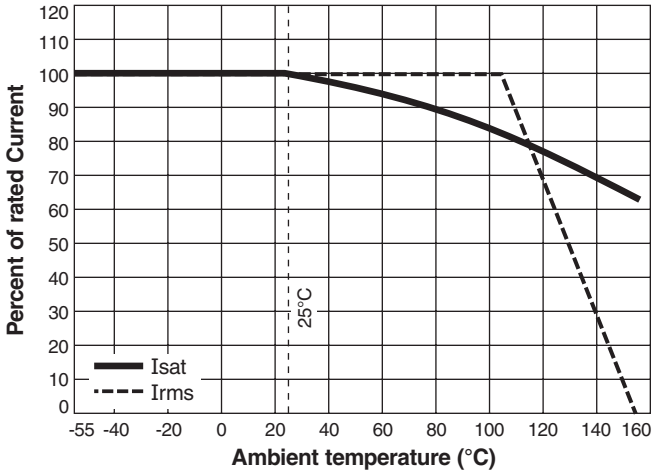
Typical L vs Current



Typical L vs Frequency



Current Derating



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