

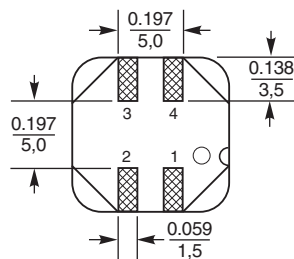
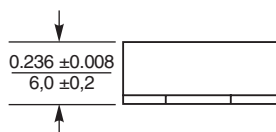
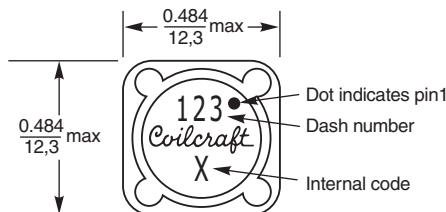
High Reliability Coupled Inductors ML590PND



The ML590PND series of shielded coupled inductors was designed specifically for high temperature applications – up to 155°C. The excellent coupling coefficient ($k \geq 0.94$) 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.

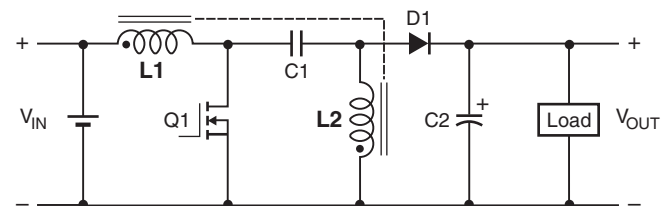
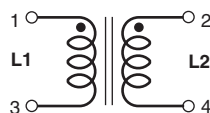
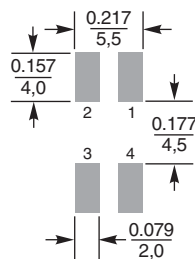
These parts provide high inductance, high efficiency and excellent current handling in a very rugged part. They are well suited for use as VRM inductors in high-current DC-DC and VRM/VRD controllers.

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 $\frac{\text{inches}}{\text{mm}}$

Recommended 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 I_{rms} current, +105°C to +155°C with derated current

Storage temperature Component: –55°C to +155°C.
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)

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

ML590PND Series (1260)

Part number ¹	Inductance ² (µH)	DCR max ³ (Ohms)	SRF (MHz) ⁴		Isat (A) ⁵			Irms (A)	
			min	typ	10% drop	20% drop	30% drop	both windings ⁶	one winding ⁷
ML590PND472MLZ	4.7 ±20%	0.036	30.0	38.0	9.00	10.18	11.08	3.16	4.47
ML590PND562MLZ	5.6 ±20%	0.040	24.0	30.0	8.00	9.06	9.84	3.00	4.24
ML590PND682MLZ	6.8 ±20%	0.048	22.0	27.0	7.00	8.00	8.64	2.75	3.88
ML590PND822MLZ	8.2 ±20%	0.052	21.0	26.0	6.44	7.38	7.98	2.63	3.72
ML590PND103MLZ	10 ±20%	0.060	18.0	22.0	5.40	6.32	6.88	2.45	3.46
ML590PND123MLZ	12 ±20%	0.074	16.0	20.0	5.30	6.18	6.70	2.21	3.12
ML590PND153MLZ	15 ±20%	0.085	14.4	18.0	4.60	5.30	5.80	2.06	2.92
ML590PND183MLZ	18 ±20%	0.097	13.0	16.0	4.50	5.22	5.68	1.93	2.73
ML590PND223MLZ	22 ±20%	0.116	12.0	15.0	4.00	4.62	5.02	1.76	2.49
ML590PND273MLZ	27 ±20%	0.124	10.0	13.0	3.60	4.14	4.50	1.70	2.41
ML590PND333MLZ	33 ±20%	0.134	10.0	12.4	3.30	3.80	4.14	1.64	2.32
ML590PND393MLZ	39 ±20%	0.142	9.6	12.0	3.00	3.48	3.82	1.59	2.25
ML590PND473MLZ	47 ±20%	0.174	9.3	11.6	2.70	3.12	3.40	1.44	2.03
ML590PND563MLZ	56 ±20%	0.198	8.4	10.5	2.50	2.90	3.14	1.35	1.91
ML590PND683MLZ	68 ±20%	0.216	8.0	10.0	2.30	2.66	2.88	1.29	1.83
ML590PND823MLZ	82 ±20%	0.274	6.9	8.6	2.10	2.40	2.60	1.15	1.62
ML590PND104MLZ	100 ±20%	0.322	6.2	7.8	1.90	2.18	2.38	1.06	1.50
ML590PND124KSZ	120 ±10%	0.418	5.5	6.8	1.60	1.84	2.04	0.93	1.31
ML590PND154KSZ	150 ±10%	0.476	5.1	6.4	1.50	1.76	1.92	0.87	1.23
ML590PND184KSZ	180 ±10%	0.536	4.9	6.1	1.40	1.64	1.78	0.82	1.16
ML590PND224KSZ	220 ±10%	0.691	4.4	5.5	1.30	1.48	1.60	0.72	1.02
ML590PND274KSZ	270 ±10%	0.806	3.4	4.3	1.10	1.30	1.40	0.67	0.95
ML590PND334KSZ	330 ±10%	1.09	3.2	4.0	1.00	1.16	1.26	0.57	0.81
ML590PND394KSZ	390 ±10%	1.20	2.9	3.6	0.950	1.11	1.23	0.55	0.77
ML590PND474KSZ	470 ±10%	1.59	2.4	3.0	0.900	0.994	1.09	0.48	0.67
ML590PND564KSZ	560 ±10%	1.81	2.2	2.8	0.800	0.908	0.948	0.45	0.63
ML590PND684KSZ	680 ±10%	2.06	2.1	2.6	0.700	0.804	0.874	0.42	0.59
ML590PND824KSZ	820 ±10%	2.65	2.0	2.5	0.640	0.732	0.802	0.37	0.52
ML590PND105KSZ	1000 ±10%	3.06	1.9	2.4	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

C = Custom screening (please specify when ordering)

- 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.
- 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.
- SRF measured using an Agilent/HP 4191A or equivalent. When leads are connected in parallel, SRF is the same value.
- 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.
- Equal current when applied to each winding simultaneously that causes a 40°C temperature rise from 25°C ambient. See temperature rise calculation.
- 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 = $(I_{L1}^2 + I_{L2}^2) \times \text{DCR}$ in Watts (W)

Temperature rise (t) = Winding power loss $\times \frac{55.6^\circ\text{C}}{\text{W}}$

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

Example 1. 590PND153 (Equal current in each winding)

Winding power loss = $(2.06^2 + 2.06^2) \times 0.085 = 0.721 \text{ W}$

$$t = 0.721 \text{ W} \times \frac{55.6^\circ\text{C}}{\text{W}} = 40^\circ\text{C}$$

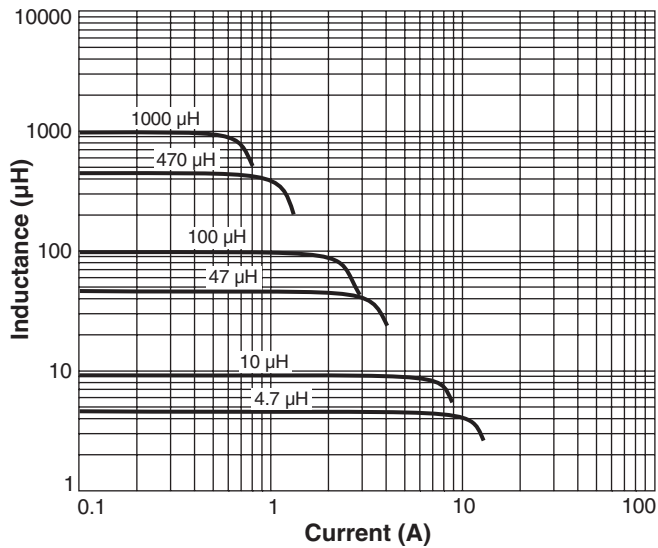
Example 2. 590PND153 ($I_{L1} = 2.4 \text{ A}$, $I_{L2} = 1.3 \text{ A}$)

Winding power loss = $(2.4^2 + 1.3^2) \times 0.085 = 0.633 \text{ W}$

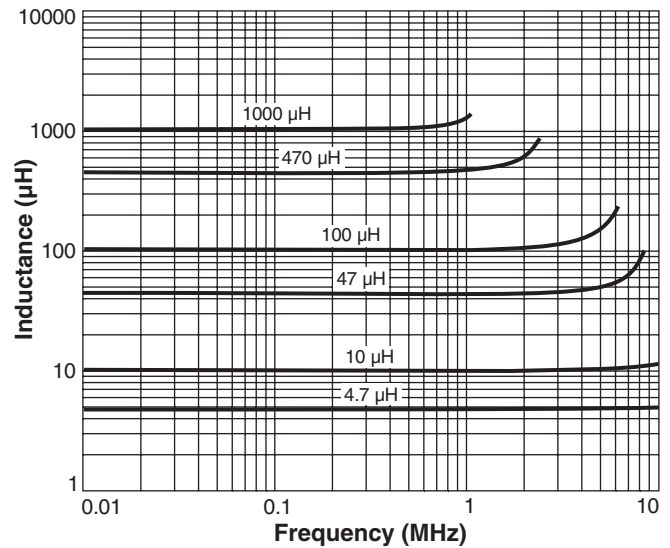
$$t = 0.633 \text{ W} \times \frac{55.6^\circ\text{C}}{\text{W}} = 35.2^\circ\text{C}$$

ML590PND Series (1260)

Typical L vs Current



Typical L vs Frequency



Current Derating

