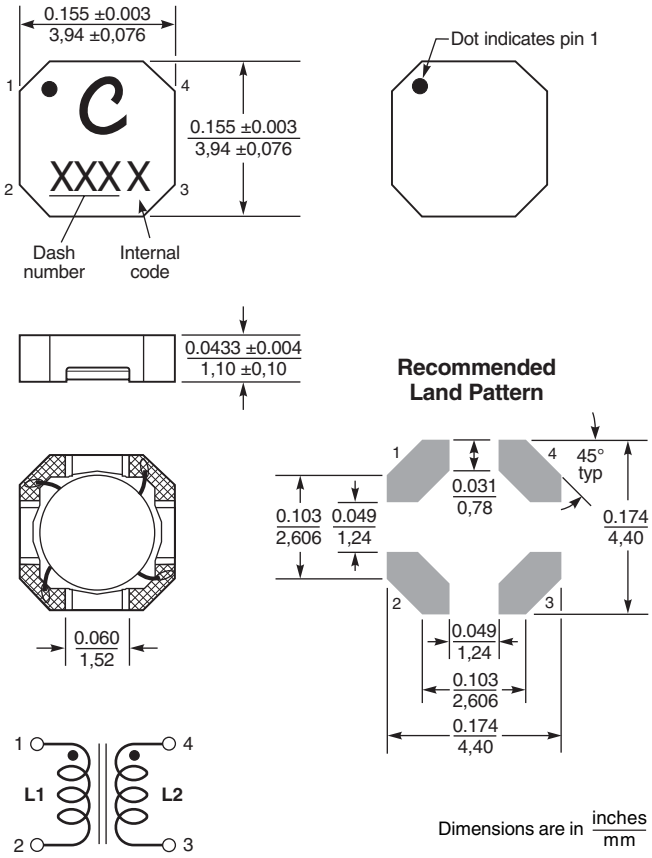
Coupled Inductors–LPD4012

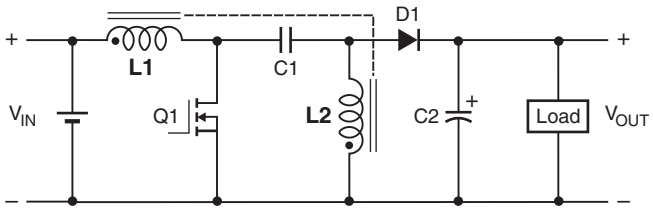
For SEPIC and other Applications

The LPD4012 coupled miniature shielded inductors are only 1,1 mm high and 4 mm square. Their excellent coupling coefficient (k ≥ 0.94) makes them 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 efficiency and excellent current handling in a rugged, low cost part.

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.





Typical SEPIC schematic

Refer to Application Note, Document 639, "Selecting Coupled Inductors for SEPIC Applications." Visit http://www.coilcraft.com/apps/sepic/selector_2.cfm for the Coilcraft on-line SEPIC Inductor Selector tool.

Core material Ferrite

Core and winding loss See www.coilcraft.com/coupledloss

Weight 54 – 64 mg

Terminations RoHS compliant silver-palladium-platinum-glass frit. Other terminations available at additional cost.

Ambient temperature –40°C to +85°C with Irms current, +85°C to +125°C with derated current

Storage temperature Component: –40°C to +125°C. Packaging: –40°C to +80°C

Winding to winding isolation 100 V

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)

Failures in Time (FIT) / Mean Time Between Failures (MTBF) 38 per billion hours / 26,315,789 hours, calculated per Telcordia SR-332

Packaging 1000/7″ reel; 3500/13″ reel Plastic tape: 12 mm wide, 0.25 mm thick, 8 mm pocket spacing, 1.32 mm pocket depth

Recommended pick and place nozzle OD: 4 mm; ID: ≤2 mm

PCB washing Only pure water or alcohol recommended

Specifications subject to change without notice.
Please check our website for latest information.

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Coupled Inductors for SEPIC Applications – LPD4012 Series

Part number[1]	Inductance[2] (µH)	DCR max[3] (Ohms)	SRF typ[4] (MHz)	Isat (A)[5] 10% drop	20% drop	30% drop	Irms (A) both windings[6]	one winding[7]
LPD4012-331NL_	0.33 ±30%	0.042	255	5.2	5.4	5.6	1.87	2.65
LPD4012-561NL_	0.56 ±30%	0.087	185	3.7	3.8	3.9	1.30	1.84
LPD4012-821NL_	0.82 ±30%	0.100	130	3.2	3.3	3.4	1.21	1.72
LPD4012-152NL_	1.5 ±30%	0.185	86	2.50	2.81	2.91	1.15	1.62
LPD4012-222NL_	2.2 ±30%	0.235	70	2.30	2.40	2.50	0.95	1.35
LPD4012-332NL_	3.3 ±30%	0.320	48	1.80	1.90	2.00	0.75	1.06
LPD4012-472ML_	4.7 ±20%	0.500	39	1.60	1.70	1.80	0.65	0.92
LPD4012-562ML_	5.6 ±20%	0.620	32	1.50	1.60	1.60	0.55	0.78
LPD4012-682ML_	6.8 ±20%	0.530	31	1.20	1.52	1.63	0.60	0.86
LPD4012-822ML_	8.2 ±20%	0.600	29	1.10	1.20	1.30	0.55	0.78
LPD4012-103ML_	10 ±20%	0.750	25	0.98	1.00	1.10	0.50	0.71
LPD4012-153ML_	15 ±20%	1.13	21	0.90	0.92	0.93	0.43	0.60
LPD4012-223ML_	22 ±20%	1.63	15	0.70	0.82	0.84	0.34	0.48
LPD4012-333ML_	33 ±20%	1.83	12	0.37	0.57	0.58	0.31	0.44
LPD4012-473ML_	47 ±20%	2.52	8.8	0.33	0.39	0.40	0.28	0.39
LPD4012-683ML_	68 ±20%	3.23	7.8	0.27	0.36	0.37	0.25	0.36
LPD4012-823ML_	82 ±20%	3.66	7.3	0.27	0.27	0.29	0.23	0.31
LPD4012-104ML_	100 ±20%	4.76	6.1	0.22	0.28	0.29	0.20	0.27
LPD4012-124ML_	120 ±20%	5.54	5.3	0.21	0.26	0.27	0.19	0.27
LPD4012-154ML_	150 ±20%	6.90	4.6	0.18	0.26	0.27	0.17	0.23
LPD4012-184ML_	180 ±20%	8.75	4.1	0.16	0.21	0.23	0.14	0.18
LPD4012-224ML_	220 ±20%	11.24	3.3	0.15	0.16	0.17	0.12	0.17
LPD4012-334ML_	330 ±20%	17.00	2.8	0.13	0.16	0.16	0.10	0.14

1. Please specify **termination** and **packaging** codes:

LPD4012-564M L C

Termination: **L** = RoHS compliant Silver-palladium-platinum-glass frit. Special order: **T** = RoHS tin-silver-copper (95.5/4/0.5) or **S** = non-RoHS tin-lead (63/37).

Packaging: **C** = 7″ machine-ready reel. EIA-481 embossed plastic tape (1000 parts per full reel).
B = Less than full reel. In tape, but not machine ready. To have a leader and trailer added ($25 charge), use code letter D instead.
D = 13″ machine-ready reel. EIA-481 embossed plastic tape. Factory order only, not stocked (3500 parts per full reel).

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 = Winding power loss $\times \frac{135°C}{W}$

Examples for LPD4012-152ML:

Equal current in each winding (1.05 A):

Winding power loss = $(1.05^2 + 1.05^2) \times 0.134 = 0.296$ W

Temperature rise = $0.296 \text{ W} \times \frac{135°C}{W} = 40°C$

Unequal current (I_{L1} = 1.3 A, I_{L2} = 0.7 A):

Winding power loss = $(1.3^2 + 0.7^2) \times 0.134 = 0.292$ W

Temperature rise = $0.292 \text{ W} \times \frac{135°C}{W} = 39.4°C$

Coupled Inductor Core and Winding Loss Calculator

This web-based utility allows you to enter frequency, peak-to-peak (ripple) current, and Irms current to predict temperature rise and overall losses, including core loss. Visit www.coilcraft.com/coupledloss.

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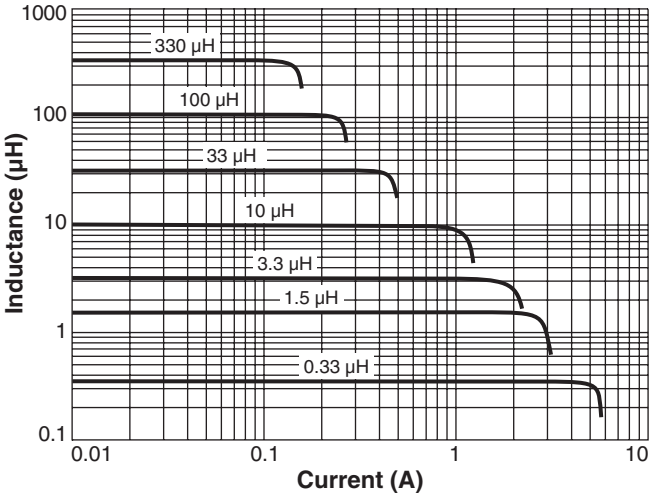
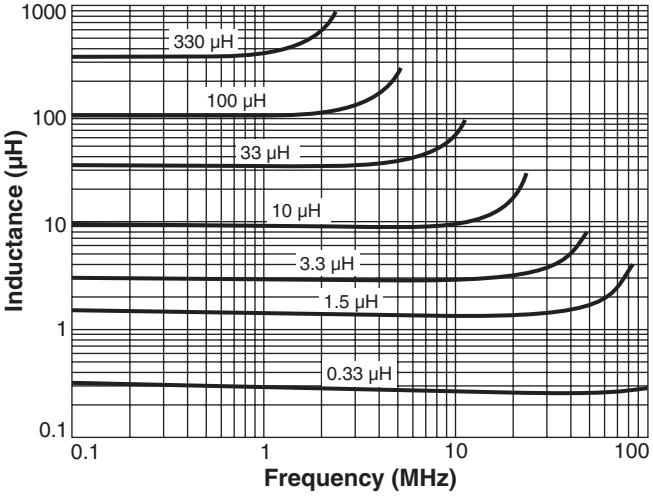
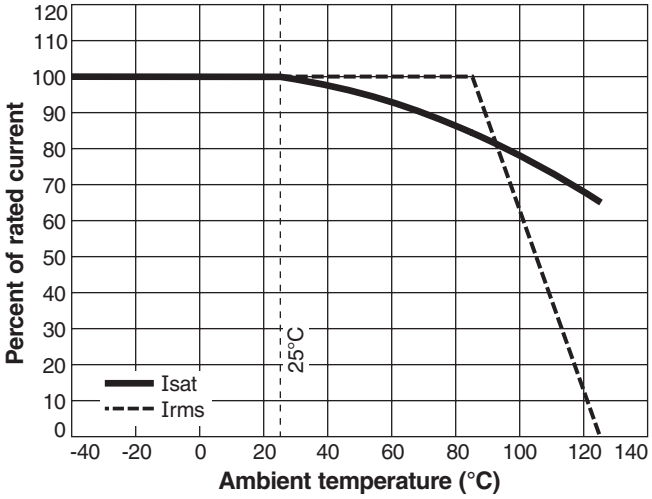
Typical L vs Current



Typical L vs Frequency



Typical Current Derating



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