Fly-Buck™ Coupled Inductors

for Ultra-compact Isolated DC-DC Converters

Coilcraft

Fly-Buck Topology Overview

The Fly-Buck topology from Texas Instruments is becoming a very popular solution for low-power isolated DC-to-DC applications. It combines the advantages of the flyback and synchronous buck converter topologies to achieve a simple, isolated design with a smaller size and lower BOM cost.

Fly-Buck converters with Coilcraft's ultra-compact, low profile off-the-shelf coupled inductors in place of custom transformers enable designers to address challenges of board space, low profile, EMI and overall solution cost.

Coilcraft's Fly-Buck Solution

Coilcraft offers a variety of coupled inductors designed for a wide range of input voltages and high isolation voltage. Available in several package sizes and turns ratios, they provide the flexibility to generate single, dual, triple (or more) well regulated, isolated outputs for applications requiring low-current auxiliary and bias supplies.

Selecting Fly-Buck Coupled Inductors

Similar to when designing a buck converter, the primary inductance is chosen to keep ripple current at a desired level.

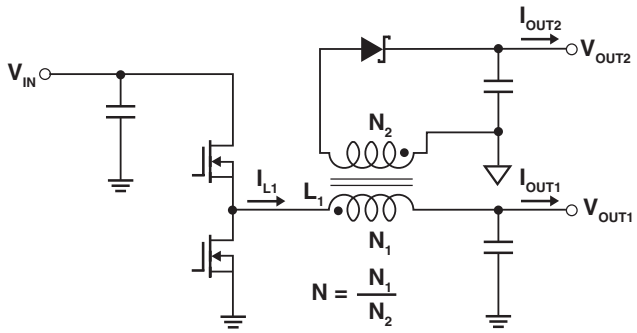
$$\Delta I_{L1} = \frac{V_{IN\,(max)} - V_{OUT1}}{L_1 \cdot F_{SW}} \cdot \frac{V_{OUT1}}{V_{IN\,(max)}}$$

Calculate the peak current for the primary winding:

$$I_{L1(peak)} = I_{OUT1} + \frac{I_{OUT2}}{N} + \frac{\Delta I_{L1}}{2}$$

And determine turns ratio and duty cycle:

$$V_{OUT1} = D \cdot V_{IN} \qquad V_{OUT2} = \frac{V_{OUT1}}{N}$$



By adding additional windings to the Fly-Buck coupled inductor, triple or quad outputs can be generated.

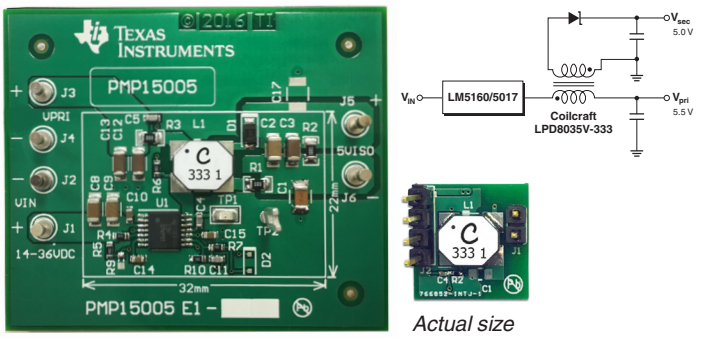
Design Examples

LPD8035V-333 for Dual Outputs

- Designed in Dual output Isolated Fly-Buck reference design: ***TI's PMP15005***
- 14V to 36Vin, 2.25W (5V@225mA) dual output; one non-isolated primary and one isolated secondary

LPD8035V-333 for Dual Outputs

- Designed in 2.5W Bipolar Isolated Fly-Buck reference design: ***TI's PMP15006***
- 18V to 30Vin, 2.5W (5V@250mA) dual output; one non-isolated primary and one isolated secondary



Actual size

Texas Instruments PMP15005 and PMP15006 evaluation boards using the LM5160/LM5017 in a Fly-Buck topology with the primary and secondary outputs both set to 5V nominal.

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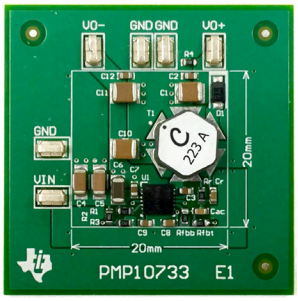
Design Examples (continued):

TA7848-AE for Dual Outputs

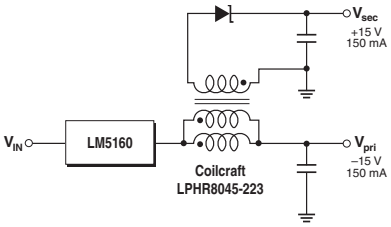
- Designed in Dual Output Non-Isolated Fly-Buck Reference Design: ***TI's PMP10733***
- 5V to 20Vin, 4.5W (±15V@150mA) dual output; one non-isolated primary and one isolated secondary

LPH8045 (1:0.5:1 turns ratio, 33µH) for Triple Outputs

- 4.5V to 36Vin, three outputs; -10V non-isolated primary, 5V and 10V isolated secondaries



Actual size

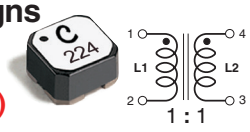


Texas Instruments PMP10733 uses the LM5160 in a Fly-Buck-Boost topology with the primary-side output set to to a negative voltage. This reduces the turns ratio of the transformer, allowing operation at lower input voltage and better line and load regulation performance.

Featured Products

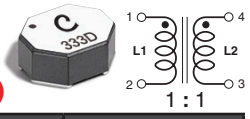
Coilcraft offers many off-the-shelf coupled inductors that meet Fly-Buck design requirements. We also specialize in designing custom coupled inductors with different sizes, turns ratios or inductance values if none of our standard coupled inductors meet your specific design requirements. Contact us at **lpr@coilcraft.com**.

1:1 Miniature High-Isolation Coupled Inductors for Dual Output Fly-Buck Designs



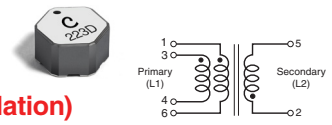
LPD5030V Series
Featured Values (1000Vrms Isolation)

Inductance (µH)	Leakage Inductance (µH)	Ipeak (A)
4.7	0.109	1.90
6.8	0.109	1.55
10	0.130	1.30
33	0.195	0.67
150	0.456	0.31
220	0.541	0.24



LPD8035V Series
Featured Values (1500Vrms Isolation)

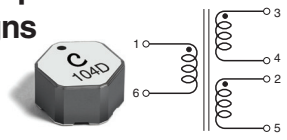
Inductance (µH)	Leakage Inductance (µH)	Ipeak (A)
10	0.150	1.0
33	0.351	1.0
150	0.871	1.0



TA7848-AE Series
Featured Value (1000Vrms Isolation)

Turns Ratio	Inductance (µH)	Leakage Inductance (µH)
1 : 1.05	20	0.82

Three-winding Miniature Coupled Inductors for Triple Output Fly-Buck Designs



LPH8045 Series
Featured Values

Turns Ratio	Inductance (µH)	Isat (A) (10% drop)
1 : 1 : 1	22	1.7
1 : 0.5 : 1	33	1.9
1 : 1 : 1.25	33	0.68

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