**Power Magnetics Update**

by David G. Morrison, Editor, How2Power.com

This article presents an update on recently introduced power magnetic components. The products profiled here include coils for low-power wireless charging, inductors and transformers for dc-dc applications, and current transformers. Two of the products discussed here are small dc-dc converter modules employing embedded inductors, which highlight the ongoing trend of co-packaging magnetics in point-of-load converters. This article represents a follow-up to the *Power Magnetics Update* published in the August 2013 issue of How2Power Today.

The following products are described in this article:

- Wireless Charging Receiving Coil Works With Or Without Alignment Magnet
- Micro DC-DC Converters Feature Embedded Inductor With Proprietary Substrate
- Miniature Step-up Transformers Suit Energy Harvesting Applications
- Split-Core Current Transformers Offer 5-A Output
- High-Power Surface-Mount Inductors Are Tailored To Extreme Environments
- Tiny 10-A DC-DC Module With Built-In Inductor Achieves High Efficiency

**Wireless Charging Receiving Coil Works With Or Without Alignment Magnet**

From [Vishay Intertechnology](https://www.vishay.com), the IWAS-4832EC-50 is a powdered-iron-based, Wireless Power Consortium (WPC) compliant wireless-charging receiving coil optimized for use with or without an alignment magnet. Offering a durable construction and high-permeability shielding, the new coil provides high efficiency greater than 75% for the wireless charging of 7-V portable electronics.

Also known as the Vishay Dale Rx coil, this coil has been designed into a leading wireless power development kit, according to Vishay. For higher-voltage wireless power base stations and receivers, the IWAS-4832EC-50’s high-saturation powdered iron is not affected by permanent locating magnets, and the device blocks charging flux from sensitive components or batteries.

As an alternative to ferrite-based solutions, which can saturate in the presence of a strong magnetic field, the IWAS-4832EC-50 has magnetic saturation of 50% of inductance at 4000 gauss. The RoHS-compliant device features an inductance of 16.2 μH at 200 kHz with a ±5% inductance tolerance, a DCR of 366 mΩ at 25°C, and a Q of 30 min. at 200 kHz.

Samples and production quantities of the IWAS-4832EC-50 Rx coil are available now. For more information, see the [datasheet](https://www.vishay.com).  

**Micro DC-DC Converters Feature Embedded Inductor With Proprietary Substrate**

[Murata Americas](https://www.murata.com) has expanded its LXDC line, a micro DC-DC converter series that uses a unique ferrite substrate to embed the power inductor. The company combined a number of its proprietary materials and technical capabilities (specifically ferrite material expertise, multilayer processing, and power module design) to develop the 55F and 55K additions to the product line, which deliver ultra-compact size and superior EMI noise suppression, according to the vendor.
The micro dc-dc converter is well suited for applications that require a miniaturized footprint. Target uses include cellular phones, personal digital assistants (PDAs), mobile internet devices, digital cameras, eBooks, tablets, wireless LAN, Bluetooth, portable game consoles, music players, base station, and 12-V ac-dc adaptors.

A key feature of this embedded structure is that the IC can be mounted directly above the power inductor coil with almost no pattern length to diminish leakage radiation noise. The LXDC55KAAA-205, which measures 5.7 x 5.0 x 2.1 mm, allows for more versatility in distributed power architectures. In addition to better EMI noise suppression and a smaller size, it also provides an adjustable output voltage between 0.8 and 3.6 V. Furthermore, up to 3 A can be delivered with input ranging from 2.7 V to 5.5 V.

LXDC series samples are available for $3.00 in quantity. More information can be found at www.murataamericas.com/udcdc.

Miniature Step-up Transformers Suit Energy Harvesting Applications

Coilcraft’s 6-mm x 6-mm LPR6235 series coupled inductors can be used as step-up or flyback transformers in dc-dc converters or as autotransformers. According to the vendor, they are ideal for voltage step-up in energy harvesting applications and have been selected by Linear Technology for use with their LTC3108 and LTC3109 Ultralow Voltage Step-Up Converter and Power Managers.

These shielded parts measure just 6 mm square by 3.5 mm high. They feature an excellent coupling coefficient (k = 0.95) and are available with five turns ratios from 1:10 to 1:100 for a variety of voltage step-up and step-down applications. They offer 300-V winding-to-winding isolation and their combination of high Isat and low DCR provides high efficiency and excellent current handling in a rugged, low-cost design. Coilcraft also offers an even smaller LPR 4012 Series transformer that measures a mere 4 mm square by 1.1 mm high.

Both versions are RoHS compliant and offer a maximum reflow temperature of 260°C. Free evaluation samples and complete technical specifications are available at http://www.coilcraft.com/lpr6235.cfm and http://www.coilcraft.com/lpr4012.cfm, respectively. Or for more information, contact Len Crane at 847-639-6400 or lcrane@coilcraft.com.

Split-Core Current Transformers Offer 5-A Output

Accuenergy’s AcuSplitCTs series of high-accuracy, low-cost split-core current transformers (CTs) features industrial standard 5-A output, which is compatible with most of the power and energy meters on the market. The split-core CT is well suited for retro-fit projects, where power shutdown should be avoided. Traditionally, split core is not as accurate as solid-core CT, and costs four to five times more. However, with AcuSplitCT, the accuracy is said to be the same if not better than most solid-core CTs, and the price point is more competitive.

AcuSplitCTs have multiple installation mechanisms, including secure mounting on cable, bus and panel. Every CT comes with a free installation kit that can be used for all installation environments. For more information, see http://www.accuenergy.com/split-core-current-transformers-5a-output.
High-Power Surface-Mount Inductors Are Tailored To Extreme Environments

From TT electronics, the HM72E and HA72E series of molded inductors are engineered for high performance and cost effectiveness. These components use proprietary blends of alloy core materials that are optimized for high-temperature stability, high dc-bias capability, and low core losses while also minimizing oxidation.

The HM72E-06 series offers operating and storage temperatures ranging from -40°C to +155°C, a maximum temperature rise of 50°C, and operating frequencies up to 3 MHz. The HA72E-06 series offers similar ratings but is also AECQ-200 CERTIFIED (see the table.)

Table. Key specifications at 25°C for the HM72E-06 and HA72E-06 series of molded inductors.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Inductance(µH)</th>
<th>Heating Current(ADC)</th>
<th>Isat(ADC)</th>
<th>DCR(mΩ)</th>
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<td></td>
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Tiny 10-A DC-DC Module With Built-In Inductor Achieves High Efficiency

Texas Instruments has introduced three power management modules to its SIMPLE SWITCHER family, including the 10-A LMZ31710, which is said to provide the industry’s highest power efficiency in the smallest package—up to 50% than smaller than similar solutions. Housed in low-profile QFNs, the 10-A LMZ31710, 7-A LMZ31707 and 4-A LMZ31704 combine a dc-dc converter with power MOSFETs, a shielded inductor and passives, providing a complete power management solution with as few as three external components.

According to the vendor, the modules combine the efficiency of a synchronous switching regulator at greater than 95% with the simplicity of a linear regulator, while eliminating loop compensation design, inductor selection and complex layout challenges. Each device is pin-to-pin compatible and features precision enable and soft-start pins, and current sharing for scalability from 4 A to 60 A.

These power modules drive power-dense applications in a variety of markets including industrial, communications infrastructure, medical, and test and measurement. For more information, samples and evaluation modules, visit www.ti.com/lmz31710-pr. The SIMPLE SWITCHER power modules are available in volume now. The 10-A LMZ31710 is priced at $8.95 in 1,000-unit quantities, while the 7-A LMZ31707 is $6.50 and the 4-A LMZ31704 is $5.25.