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This Magnetics Product Roundup highlights recently introduced transformers, inductors, chokes, cores, and magnetics design software suitable for power electronics applications.

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Shielded SMT Inductors Feature High Current, Small Size

Introduced in February at the APEC conference, the SMP1210S surface mount inductor series from Gowanda Electronics combines high current, shielding and small size with inductance values from 1.0 μH to 100 μH and current ratings from 205 mA to 1384 mA dc. Saturation current ratings range from 200 mA to 2060 mA dc. The SMP1210S is designed for use in power applications including filters for dc-dc converters, switched-mode power supplies, and other power supply applications.



SMP1210S surface mount inductor series from Gowanda Electronics

Coupling is less than 4% with 1 mm of spacing between components. The recommended footprint is 1.78 mm by 3.05 mm by 3.3 mm. Operating temperature is -55°C to +125 °C. For more details, see the [Product Information page](#) or email sales@gowanda.com.

Amorphous And Nanocrystalline Cores Come Standard Or Custom

[Payton Group International](#) is offering standard and custom cores manufactured from amorphous and nanocrystalline materials. The amorphous materials exhibit exceptional magnetic qualities owing to their metallic properties and their lack of a crystalline structure. The nanocrystalline materials are soft magnetic materials with properties that are superior to permalloys, ferrites, and even amorphous cobalt-based alloys.

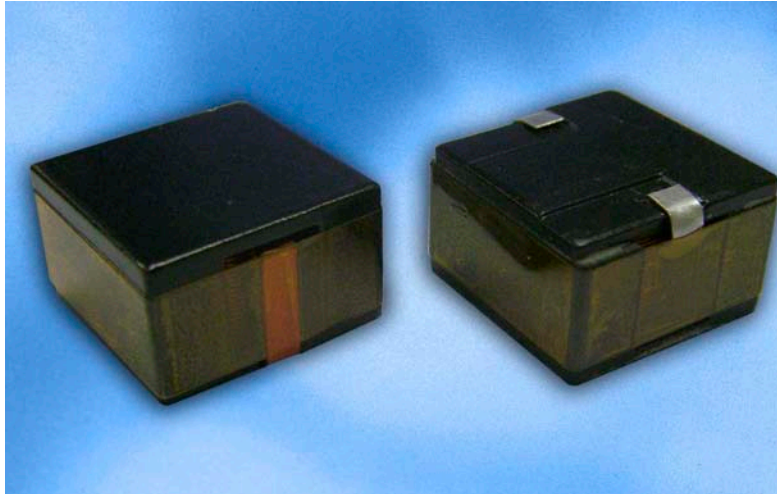
Core material	Current transformer applications, Initial permeability	Power transformer applications		Inductor applications	
		P at 1T/400 Hz, W/kg	P at 0.2T/20 kHz, W/kg	Flux density (T)	P 0.1T/100 kHz (mW/cm ³)
Silicon steel	3000	18	63	---	---
Ferrite	15,000	N/A	15	0.5	100
Permalloy	50,000	---	---	---	---
Powder Permalloy	---	---	---	0.8	800
Powder Iron	---	----	---	1.8	6500
Co Amorphous	100,000	---	---	---	---
Fe Amorphous	---	2	8	1.5	500
Nanocrystalline	100,000	1.8	2	---	---

The benefits of the amorphous and nanocrystalline cores include high permeability, high saturation flux density, lower weight and volume, wide operating temperature range, low losses at variable frequencies, energy savings and cost effectiveness. Target applications include switched-mode power supplies, UPS PFC circuits, welding power supplies, and high-speed rail power. Other uses include current, power and pulse transformers; high-frequency chokes, and common-mode chokes. Full magnetic properties of amorphous and nanocrystalline materials can be achieved in unbonded and uncut cores such as toroidal cores. When these materials are used in bonded and cut cores, their magnetic properties degrade.

Small SMT Inductors Deliver High Efficiency

At the APEC conference last month in Palm Springs, TT electronics BI Technologies introduced the HA73 Series of inductors featuring a high saturation core material and an operating frequency up to 800 kHz, yet measuring just 19.2 mm x 19.6 mm x 12.2 mm. Targeting buck and boost converters in automotive applications, these inductors feature high current ratings and high inductance values. The devices are built with powdered iron cores in larger-than-normal sizes for these cores.

“The core material utilized in these inductors enables them to offer high power density with superior efficiency and minimal power losses in an extremely small package,” said Donna Schaefer, application engineering manager for TT electronics’ BI Technologies. “The complete package design and core materials makes these inductors ideal for use in dc-dc converter power applications.”



The HA73 Series inductors from BI Technologies.

The HA73 Series inductors feature a typical rated inductance range from 13.5 μH to 29.5 μH , with a typical rated current range from 6.5 A to 9 A, depending on the device. Heating current ranges from 8 A to 12 A, with a saturation current from 9 A to 13 A. Typical dc resistance for the inductor ranges from 12.8 m Ω to 28.6 m Ω . Operating temperature ranges from -40°C to +155°C, and maximum temperature rise is +50°C. BI Technologies will also produce devices outside these specifications to meet customer requirements.

Typical pricing for the HA73 Series ranges from \$1.40 to \$1.58 each in quantities of 10,000 pieces. For more information, email sales@ttelectronics-na.com; or visit www.bitechnologies.com/products/magnetics_list.htm.

Cost-Effective Inductors Target High-Rel Applications

At the recent APEC conference, RAF Tabtronics announced a line of SMD Power Inductors for high-reliability applications. The SESI Power Inductors feature a low-profile (13.7 mm max) ruggedized high-grade package with an operating ambient temperature range of -55°C to +125°C. The inductors are highly customizable with either SMD or thru-hole pin-outs and flexibility in the number of terminations. The components also feature improved heat dissipation and a heatsinkable design



SESI power inductors from RAF Tabtronics.

SESI Power Inductors can replace traditional magnetics in a cost-effective, low-profile and high-grade package. All the material used for SESI manufacturing is compliant with the requirements of space or aerospace

environments and have been qualified for severe environments by many contracting authorities. For data sheets, see www.raftabtronics.com.

Inductors Handle High Currents

In recent months, West Coast Magnetics introduced two series of inductors. The 306 series inductor is highly suited to switched-mode power supply applications at frequencies up to 500 kHz. Thanks to its low-loss ferrite core, this inductor can handle high ripple currents. It also features a gapped core, which increases B_{sat} , allowing it to handle high peak currents. The datasheet includes a plot of inductance vs. I_{dc} . This plot enables you to choose precisely the right part number for your application. For more information, see http://wcmagnetics.com/catalog/highcurrent-pwr_inductor.php.



West Coast Magnetics' 306 series inductors.

The 308 series power inductors deliver high performance in a small, light, low-cost package. They handle high dc currents and high ac ripple currents from 60 Hz up to 500 kHz. These inductors offer exceptional reliability with an operating temperature rating of 200°C and they can be ordered using West Coast Magnetics' Shaped Foil Technology, which combines the low DCR of a foil winding with the low ac winding resistance of litz wire. For more information, see <http://wcmagnetics.com/images/pdf/wcm308.pdf> and http://wcmagnetics.com/catalog/shapedfoil-smd_inductor.php or email sales@wcmagnetics.com.



The 308 series power inductors from West Coast Magnetics.

Video Demos Performance of Low-Profile Inductors

A 4-minute video posted on the Vishay Intertechnology website explains the benefits of using IHLP low-profile, high-current inductors. The IHLP inductors are designed to handle high transient current spikes without hard saturation. The video features a saturation current performance test that highlights the superior performance of IHLP devices at rated currents of 5 A and 25 A.

The hard saturation of other technologies results in a dramatic fall-off in inductance down to almost nothing when current is raised. The soft saturation of IHLP devices, however, allows inductance to roll off slowly. By keeping inductance as stable as possible, the IHLP devices are optimized for voltage regulator module (VRM) and dc-dc converter applications in end products including next-generation mobile devices; notebooks, and desktop computers. To view the video demo, go to www.vishay.com/landingpage/videos/demo_ihlp.html.

Cores Optimize Chokes For Solar Power Inverters

At this year's Intersolar trade show in Munich this June, [SMP Sintermetalle Prometheus](#) (SMP) will present chokes for use in inverters in photovoltaic systems. These components feature low losses, very low stray fields and a compact design, which significantly increases the chokes'—and therefore the inverters'—energy efficiency. SMP uses core materials made of powder composites with low magnetostriction that have been designed specifically for this application.



SMP's chokes for inverters in photovoltaic systems.

The SMP-developed materials have low magnetostriction and exceptionally low eddy current and hysteresis losses, making the inverters in which they are used highly efficient. Their encapsulated design ensures that the power converters emit only low-intensity stray fields. Compact choke design is another important aspect. SMP's chokes occupy 25% less space than conventional designs. In addition, the chokes operate extremely quietly, which allows their use in residential areas.

Inductors Shrink Footprints for Class D Audio

ICE Components recently introduced three new series of through-hole inductors for use in class D audio amplifiers. The 1D17A series, 1D14A series and 1D10A series all feature small footprints, shielded design for low EMI, and cores made from ferrite material designed for audio applications. The three series offer similar values of inductance, but their footprints and package dimensions, as well as their key electrical specs are different as shown in Tables 1 and 2.

Table 1. Footprint and package dimensions for ICE Components inductors for Class D audio.

Series	Footprint (mm)	Full Package Dimensions (mm) max dims.
1D17A	12.5 x 8.5	18.2 (l) x 16.0 (w) x 19.3 (h)
1D14A	9.2 x 5.3	15.0 (l) x 10.5 (w) x 16.3 (h)
1D10A	7.0 x 3.6	11.5 (l) x 7.5 (w) x 11.0 (h)

Table 2. Electrical specifications for ICE Components inductors for Class D audio.

Part number	Ls ($\mu\text{H} \pm 20\%$)	Max DCR (m Ω)	I _{SAT} (A dc)	I _{DC} (A dc)
1D17A-100 M	10	18	31	6
1D17A-150 M	15	18	21	6
1D17A-220 M	22	18	15	6
1D17A-330 M	33	18	10	6
1D14A-100 M	10	9	11	7.5
1D14A-150 M	15	16	11	6.5
1D14A-220 M	22	16	7.5	6.5
1D14A-330 M	33	16	5	6.5
1D10A-100 M	10	20.5	7.5	4.5
1D10A-150 M	15	20.5	5	4.5
1D10A-220 M	22	20.5	3.5	4.5
1D10A-330 M	33	20.5	2	4.5

Toroidal Cores Come in Large Sizes

Magnetics is in the process of adding five new sizes to its line of large powder core toroids. These cores are intended for use in high-current applications, particularly solar power inverters. The new cores include the very large 165-mm outer diameter (OD) core, which will be available this month; a 133-mm OD core, which will be available in Q3; and the 62-mm, 74-mm, and 102-mm OD cores, which will be available in May. Core materials include Kool M μ , MPP, and High Flux.

The company has also introduced T, a new power ferrite material suitable for power transformers and inductors operating from 20 kHz to 750 kHz and over a wide temperature range. With this new material, minimum ac losses are achieved over a wider temperature range (30°C to 110°C) than existing ferrite materials such as Magnetics' R. Target applications include automotive, high-efficiency switched-mode power supplies, temperature-sensitive circuits, ballasts and lighting, and handheld or mobile devices. Initial permeability at 3000 $\pm 20\%$ at 25°C, ≤ 10 kHz, and < 0.5 mT. For more information, see www.mag-inc.com.

Flat-Wire Inductor Offers High Saturation-Current Ratings

From Würth Elektronik, the WE-HCF SMD flat-wire inductor features very low core losses, shielded design, excellent saturation characteristics with saturation current ratings up to 75 A. Units are designed to operate from -40°C to +125°C.



Würth Elektronik's WE-HCF SMD flat-wire inductor.

Inductance values range from 0.7 μH to 10 μH with corresponding current ratings ranging from 32 A down to 16 A. The corresponding range for saturation current ratings is 75 A down to 23 A. Target applications include high-efficiency dc-dc converters including single- and multi-phase buck converters. For more specifications, see the [production description](#)

Magnetics Design Software Solves Laminated Cores

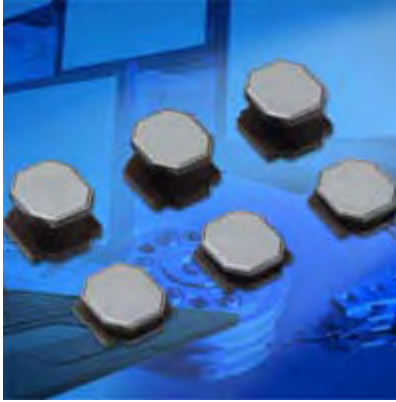
Ansoft's PExrpt, software for the design, analysis, and optimization of transformers and inductors used in power electronics, now includes new features such as the ability to solve laminated cores, a new core library from Metglas, and a new electrical steel core library. The company also updated links/compatibility to its Maxwell and Simplorer tools.

Combining classical and finite element analysis techniques, this software determines core size and shape, air gaps, and winding strategy for optimum reliability and performance and other user-specified criteria. For more information, see www.ansoft.com.

5- x 5-mm Inductors Boast High DC Bias Ratings

From Taiyo Yuden, the NRS5020 and NR5040 wire-wound power inductors are said to offer the industry's best dc bias characteristics for 5-mm square power inductors with performance that is comparable to existing 6.0-mm x 6.0-mm inductors. The NRS5020 features a maximum height of 2.0 mm, while the NR5040 has a maximum height of 4.0 mm.

The NRS5020's dc bias allowed current is 2.0 A at an inductance of 4.7 μH , which is 25% higher than the 1.6 A offered by Taiyo Yuden's previous same-shaped product. Meanwhile, the dc resistance (60 m Ω , inductance 4.7 μH) of this new inductor is 20% lower than the previous product (75 m Ω). The NR5040 features a rated current of 2.3 A at an inductance of 10 μH .



Taiyo Yuden's NRS5020 and NR5040 wire-wound power inductors.

Both the NRS5020 and the NR5040 are designed for use in dc-dc converters in the latest digital equipment. The thin NRS5020 is ideal for small devices, including netbook PCs, Blu-ray drives and digital SLR cameras. The NR5040 is recommended for flat panel TVs, Blu-ray disc recorders and more. Currently available in volume quantities, the NRS5020 and the NR5040 are priced at \$0.30/unit in sample quantities. For more details, see the [press release](#), which contains additional specifications and links to the data sheets.

Stepup/Flyback Transformers Suit Energy Harvesting

The LPR6235 series of low-profile, miniature transformers from Coilcraft provide low-voltage stepup in energy harvesting applications. Selected by Linear Technology for use with the LTC3108 stepup converter, the transformers measure 6 mm x 6 mm x 3.5 mm and feature a coupling coefficient $K > 0.95$, 100-V winding-to-winding isolation, and different turns ratios for voltage stepup and stepdown applications.



Coilcraft's LPR6235 low-profile, miniature transformers for energy harvesting.

For more information, see <http://www.coilcraft.com/lpr6235.cfm>.

Power Inductors Receive MIL-PRF-27 Qualification

In February, Gowanda Electronics, introduced three "MLP" surface-mount power inductor series which have been added to the military's Defense Supply Center Columbus (DSCC) Qualified Products List (QPL) for MIL-PRF-27. The military MIL-PRF-27 specification addresses various categories of electronic components, including surface-mount power inductors and high-current surface-mount power inductors for use in electronic and communication applications.

The MLP5025 series is qualified to MIL-PRF-27/367A while the company's MLP1812 series meets MIL-PRF-27/368A and the MLP8527 series meets MIL-PRF-27/370A. By introducing these lead-containing MLP inductors, Gowanda is responding to a need conveyed by organizations in the military market for more QPL-approved inductor suppliers.

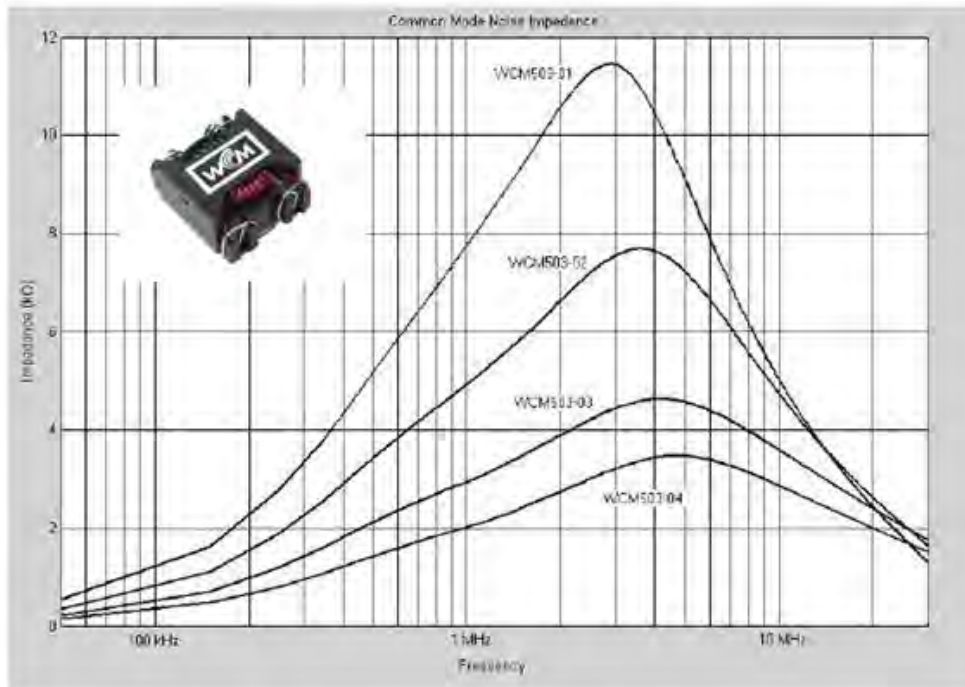
Table. Key specifications for MLP surface-mount power inductor series.

Series	Inductance range (μH)	Current rating (A)	DCR max (Ω)
MLP5025	0.22 to 22000	7.00 to 0.050	0.0080 to 160
MLP1812	1.0 to 330	1.050 to 0.090 A	0.113 to 15.240
MLP8527	1.0 to 18000	6.27 to 0.09	0.009 to 40.0

Gowanda's three MLP series were designed for power applications in military, aerospace and defense communities. This includes use in communication, guidance, and security applications, as well as in radar, test & evaluation, and special mission applications. Data sheets are available at www.gowanda.com/products_qpl/power_surface_mount.asp.

Chokes Deliver High Attenuation in Small Size

West Coast Magnetics recently introduced two series of chokes. The 503 series of common-mode chokes provide a high degree of noise attenuation in a small surface-mount design. Typical common-mode noise impedance is 1 k Ω from 300 kHz to 30 MHz. With a continuous RMS current rating of up to 12 A, these chokes can handle a peak current of 30 A for a short duration of time. The series includes chokes with a minimum impedance of 1280 μH (model 503-1), 857 μH (503-2), 519 μH (503-3), 320 μH (503-4), 169 μH (503-5), 95.3 μH (503-6), and 42.3 μH (503-7). These chokes are available in tape and reel in larger quantities. For more information, see <http://wcmagnetics.com/catalog/12amp-cmchoke.php> or email sales@wcmagnetics.com.



West Coast Magnetics' 503 series of common-mode chokes with high noise attenuation.

The 504 series of common-mode chokes also provides a high level of noise attenuation in a small package. With a continuous RMS current rating in excess of 20 A, these chokes can actually handle up to 50 A for a short duration of time. The series includes chokes with a minimum impedance of 1290 μH (model WCM 504-1), 809 μH (model WCM 504-2), 439 μH (model WCM 504-3), 271 μH (model WCM 504-4), 143 μH (model WCM 504-5), and 110 μH (model WCM 504-6). These models feature 3 mm of creepage and clearance for safety agency compliance. Other models are available with 0 mm clearance. For more information, see <http://wcmagnetics.com/images/pdf/wcm504.pdf> or email sales@wcmagnetics.com.

Gate And Signal Transformer Permits Pick and Place

ICE Components has introduced the X-Coil gate and signal transformer featuring small footprint, low profile, and a flat-top surface suitable for pick-and-place equipment. These RoHS-compliant units feature a footprint measuring 3.81 mm x 4.18 mm and full package dimensions of 5.67 mm x 5.11 mm x 3.25 mm. Inductance values include 100 μ H, 140 μ H, 31 μ H and 86 μ H. For additional details, see www.icecomponents.com/c-111-X-Coil.aspx.

For more new magnetics products see the following stories from recent issues of How2Power Today:

[Round-Wire Inductors Outperform Flat-Coil Inductors](#)

[A User-Configurable Planar Transformer](#)

[Vertical Mount: Not a Tall Order for Planar Magnetics](#)

[Wide-bandwidth Injection Transformer Replaces Multiple Devices](#)

[Planar Transformer Enables Size Reduction for Welding](#)

[Wirewound Inductors Save Space In DC-DC Converters](#)