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Power Magnetics Component Roundup

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Automotive applications continue to drive the development of many standard inductors as manufacturers seek to meet demands for smaller surface-mount parts with higher performance in dc-dc converters and filter circuits. Many of these AEC-Q200-certified inductors also target dc-dc converters and switched-mode power supplies in industrial applications. And beyond these environmentally challenging designs, there are many high-performance VRMs and dc-dc converters for which suppliers are developing smaller, more advanced inductors.

Meanwhile, gate-drive and flyback circuits are creating demand for many of the latest off-the-shelf transformers. Recently released parts address a range of applications, including automotive and industrial, but also telecom and datacom, motor control, lighting and other SMPS uses. Some, including new planars, are tailored for high-frequency designs or high voltage. A new choke series is also highlighted.

Read this article to learn about recent developments in power inductors and transformers introduced over the past nine months. This article represents a follow-up to the Power Magnetics Component Update published in the August 2018 issue and other magnetics articles published in How2Power Today.

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Power Inductors

Power Inductor Is Magnetically Shielded

SUMIDA's CDB80D62 is a high-current inductor in a magnetically shielded, surface-mount structure. It features a low-loss ferrite core, with low DCR tolerance and high efficiency. The inductor measures 22.2 mm (l) ×8.2 mm (W) ×6.6 mm (H) max. and operates over a temperature range of -40℃ to +125℃ (including the coil's self-temperature rise). For additional specs see the table.

Applications include multi-phase and Vcore regulators; voltage regulator modules (VRMs), such as server and desktop, CPU; GPU; ASIC; graphics cards and battery-power systems. For more information, see the website.

Table. CDB80D62 specifications.

Part Name	Inductance (μH) and tolerance [1]	DCR (mΩ) at 20℃ and tolerance	Saturation current (A) max.(Typ.)[2]		Temperature rise currrent (A)[3]
			20℃	125℃	
CDB80D62NP-R23MC	0.23 ± 20%	0.47 ± 15%	76.00 (90.00)	59.00 (70.00)	55.00

Notes: 1. Measuring frequency inductance at 1 MHz. 2. Saturation current: this indicates the value of dc current when the inductance becomes 20% lower than its initial value. 3. Temperature rise current: the actual value of dc current when temperature of coils becomes △T=40℃ (Ta=20℃).

AEC-Q200 Inductors Use Latest Composite Molded Core Materials

TT Electronics' HA72L series molded inductors are designed with the latest composite molded core materials to maximize inductance, temperature performance and saturation current while minimizing dc resistance and physical size. The result is a compact, surface-mount component that operates in demanding environments with saturation currents up to 80 A.

Mechanically robust, magnetically shielded and resistant to corrosion in humid environments, the inductors are ideal for high power density automotive applications where size is critical and AEC-Q200 performance is specified. Such applications include high efficiency dc-dc converters using high switching frequencies to 3 MHz as well as EMI and low pass dc ripple filters in high-temperature environments where these molded inductors deliver clean power in a small, lightweight surface mount package.

Among the main target applications for the HA72L series are LED drivers, automotive LCD/LED displays, engine and transmission control units, diesel injection drivers, dc-dc converters for entertainment/navigation systems, noise suppression for motors, braking, windshield wipers, power steering, seats and mirrors, heating and ventilation blowers.

TT Electronics' rugged HA72L is magnetically shielded, can handle high transient inrush current spikes and has been designed for a maximum operating temperature range of -55°C to +155°C. The inductors come in sizes

ranging from from 4 x 4 mm up to 17 x 17 mm, featuring an inductance range from 0.1 up to 100 µH, a heating current range from 1.2 A up to 60 A, and a frequency range from 1 kHz up to 3 MHz. All components are halogen and lead-free.

RoHS compliant and AEC-Q200 certified, TT Electronics' HA72L series inductors will be of interest to automotive industry system designers, component engineers and design engineers, and also for use in industrial applications including switch mode power supplies, automation systems and dc-dc converters.

Further information on TT Electronics' new HA72L molded power inductors series, see these web pages: HA72L-0420, HA72L-0530, HA72L-0624, HA72L-0630, HA72L-1040, HA72L-1050, HA72L-1250, HA72L-1265, and HA72L-1770.

Inductors Bring High Performance To Automotive And Industrial Applications

Pulse Electronics Power BU's PM220X series surface-mount Inductors for automotive and industrial applications offer the same quality performance as the recently released PA500X series for commercial applications with the addition of an elevated operating temperature rating up to 155°C.

"We identified a need in the marketplace for an SMT inductor that could withstand the higher operating temperatures required by automotive applications. The new PM220X series is AEC-Q200 and can handle high transient current spikes without saturation."

These high-current, composite core inductors deliver automotive-grade reliability and meet IATF 16949 manufacturing standards. Other features include soft saturation characteristics, low-profile high-current flat wires, larger terminations for lower DCR and stronger solder-joint reliability, excellent temperature stability and the ability to handles high transient current spikes without saturation.

For more information, see the data sheet. To inquire about lead times, competitive pricing, samples and more, just contact us or use our quote form.

Thin-Film Metal Inductors Address Space Constraints In ADAS Applications

TDK's TFM252012ALVA thin-film metal power inductors can be connected directly to a 12-V car battery while maintaining small dimensions with a footprint of just 2.5 mm × 2.0 mm and a height of 1.2 mm. Thanks to the magnetic metal core these inductors offer a rated current of 1.6 A and an inductance of 4.7 µH. Furthermore, they are able to withstand severe temperature environments with an operating temperature range of -55 °C to +150 °C (including increase by self-heating) and are therefore especially suited for automotive power circuits.

According to the company, to date there have been no thin-film metal inductors on the market featuring a footprint smaller than 9 mm^2 that can be used coupled to a 12-V car battery. The TFM252012ALVA inductor achieves a 40-V rating with a footprint smaller than 9 mm^2, thanks to the material technologies and structural design unique to TDK.

The number of automotive ECUs necessary for implementing advanced driver assistance systems (ADASs) and thereby the number of inductors for power circuits used in these units have increased. However, because the number of parts has been increasing while mounting space is limited, there is a growing demand for small-size electronic parts featuring high performance and reliability.

TDK is responding to such market needs with products like the TFM2520ALVA inductor. Other applications for this AEC-Q200-qualified inductor include power trains, car telematics (infotainment) systems, and various automotive ECUs. For more information, see the data sheet.

Molded Power Inductors Mimimize Losses

Coilcraft's XGL4020 series high-performance, molded power inductors are said to feature the industry's lowest dc losses and extremely low ac losses for a wide range of dc-dc converters (from hundreds of kilohertz up to 5+ MHz). Additional performance improvements include a wider range of inductance values and improved Irms current ratings.

The XGL4020 is available in twelve inductance values from 0.33 to 8.2 µH, with current ratings up to 15.2 A and soft saturation characteristics. According to Coilcraft, it offers the lowest DCR currently available in the market—up to 45% lower than Coilcraft's next lowest soft-saturation products.

XGL4020 series inductors are qualified to AEC-Q200 Grade 1 standards (-40° to +125°C ambient) with a maximum part temperature of +165°C and exhibit no thermal aging issues, making them suitable for automotive and other harsh-environment applications. They feature RoHS-compliant, tin-silver-over-copper terminations and are halogen free. Their composite construction also minimizes audible buzzing.

Free evaluation samples of the XGL4020 series are available online at www.coilcraft.com. For more information, contact Len Crane at lcrane@coilcraft.com.

2-in-1 High-Temperature Inductor Targets LED Headlights, Other Uses

SUMIDA's CDRCH12D78BT150 is a 2-in-1 high-temperature inductor which can be used in power circuits for automotive applications. It is RoHS compliant and AEC-Q200 qualified, and well suited for use in LED headlights, dc-dc converters and 1:1 transformers. This magnetically shielded inductor features a ferrite drum core construction, measures 12.5 mm × 12.5 mm × 8.0 mm max. and operates over a temperature range of -40°C~+150°C (including the coil's self-temperature rise). Inductance values and other key specs are shown in the table. For more information, see the product page.

Table. Key specifications for CDRCH12D78BT150 inductor with leads connected in series (pin 1 to pin 4 or pin 2 to pin 3 short). Also available with leads connected in parallel (pin 1,2 to pin 3,4, pin 1 and pin 2, pin 3 and pin 4) short and with leads connected in series (pin 1 to pin 4 or pin 2 to pin 3 short).

Part Name	Inductance (µH) (±20%)[1]	DCR (mΩ) max.(typ.)	Saturation current (A) max.(typ.) [2]	Temperature rise currrent (A) (typ.) [3]
CDRCH12D78BT150NP-4R7NC	4.7±30%	44.0 (35.0)	12.80 (15.00)	(4.10)
CDRCH12D78BT150NP-6R8NC	6.8±30%	55.0 (44.0)	11.00 (13.20)	(3.70)
CDRCH12D78BT150NP-100MC	10±20%	70.0 (56.0)	9.60 (11.20)	(3.40)
CDRCH12D78BT150NP-	15±20%	79.0 (63.0)	8.00 (9.40)	(3.10)

150MC				
CDRCH12D78BT150NP-220MC	22±20%	113 (90.0)	6.40 (7.60)	(2.60)
CDRCH12D78BT150NP-330MC	33±20%	180 (144.0)	5.40 (6.40)	(2.10)
CDRCH12D78BT150NP-470MC	47±20%	216 (173)	4.40 (5.20)	(1.70)
CDRCH12D78BT150NP-680MC	68±20%	312 (250)	3.60 (4.40)	(1.50)
CDRCH12D78BT150NP-101MC	100±20%	433 (347)	3.00 (3.60)	(1.25)
CDRCH12D78BT150NP-151MC	150±20%	718 (575)	2.50 (3.00)	(0.90)
CDRCH12D78BT150NP-221MC	220±20%	1070 (853)	2.00 (2.40)	(0.78)
CDRCH12D78BT150NP-331MC	330±20%	1550 (1240)	1.60 (2.00)	(0.63)
CDRCH12D78BT150NP-471MC	470±20%	2310 (1850)	1.40 (1.60)	(0.50)

Notes:

1. Measuring frequency at 100 kHz, 0.1 V. 2. Saturation current: The value of dc current when the inductance becomes 30% lower than its initial value. 3. Temperature rise current: The actual value of dc current when the temperature of coil becomes ⊿T=40℃. (Ta=20℃)

SMD Power Inductor Has Low DCR

SUMIDA's CDPH79D72 is a high current and low DCR power inductor. This magnetically shielded inductor contains a Mn-Zn ferrite BAR CORE and a Ni-Zn ferrite POT CORE, which ensures high current and reduces magnetic leakage interference. Offered in 2.2- or 6.8-µH values, it measures 8.8 mm × 8.2 mm × 7.5 mm max. and operates over a temperature range of -40℃～+125℃ (including the coil's self-temperature rise). Additional specs are listed in the table.

Applications include filter chokes for dc-dc converters, single and multiphase buck converters, and input filter inductors for dc-dc converters. For more information see the product page.

Table. CDPH79D72 specifications.

Part Name	Inductance (μH) and tolerance [1]	DCR (mΩ) and tolerance at 20℃	Saturation current (A) Max.(Typ.) [2]	Temperature rise currrent (A) [3]
CDPH79D72NP-2R2MC	2.20 ± 20%	4.60 ± 10%	10.00 (12.50)	(16.50)
CDPH79D72NP-6R8MC	6.80 ± 20%	22.50 ± 10%	6.00 (7.50)	(5.50)

Notes: 1. Measuring condition: 100 kHz. 2. Saturation current: This indicates the value of dc current when the inductance becomes 30% lower than its initial value. (Ta =20℃). 3. Temperature rise current: The value of dc current when the temperature of coil becomes △T=40℃. (Ta=20℃).

Inductor Operates To +180 °C For Under Hood Applications

Vishay Intertechnology's IHLP-6767GZ-8A is an automotive-grade IHLP low-profile, high-current inductor in the 6767 case size. To save space in under-the-hood automotive applications, the Vishay Dale IHLP-6767GZ-8A combines a continuous high operating temperature up to +180 °C with a low profile of 7 mm.

The AEC-Q200-qualified device is optimized for energy storage in dc-dc converters up to 2 MHz. It also provides excellent attenuation of noise in high-current filtering applications up to the SRF of the inductor.

With its high operating temperature, the device is designed for filtering and dc-dc conversion in engine and transmission control units, diesel injection drivers, and other under the hood applications, in addition to noise suppression for motors, windshield wipers, power mirrors and seats, HID and LED lighting, and heating and ventilation blowers.

The IHLP-6767GZ-8A features high efficiency with typical DCR from 0.89 mΩ to 52.7 mΩ and a wide range of inductance values from 0.47 μH to 47.0 μH. The device provides rated current to 76.0 A and handles high transient current spikes without saturation.

Packaged in a 100% lead (Pb)-free shielded, composite construction that reduces buzz to ultralow levels, the inductor offers high resistance to thermal shock, moisture, and mechanical shock. The IHLP-6767GZ-8A is RoHS-compliant, halogen-free, and Vishay Green.

Samples and production quantities of the new inductor are available now. Pricing in 1,000-piece quantities begins at $2.50 per piece.

Inductor In 5050 Case Operates To +155 °C

Vishay Intertechnology's Vishay Dale IHLP-5050EZ-5A is an automotive-grade low-profile, high current inductor in the 5050 case size. The part combines a high operating temperature to +155 °C with a low profile of 5 mm to save space in under-the-hood applications.

The AEC-Q200 qualified device is optimized for energy storage in dc-dc converters up to 2 MHz. It also provides excellent attenuation of noise in high current filtering applications up to the SRF of the inductor.

With its high operating temperature, the device is designed for filtering and dc-dc conversion in engine and transmission control units, diesel injection drivers, and entertainment/navigation systems, in addition to noise

suppression for motors, windshield wipers, power mirrors and seats, HID and LED lighting, and heating and ventilation blowers.

The IHLP-5050EZ-5A features high efficiency with typical DCR from 0.69 mΩ to 188.0 mΩ and a wide range of inductance values from 0.22 µH to 82.0 µH. The device provides rated current to 69.24 A and handles high transient current spikes without saturation.

Packaged in a 100% lead (Pb)-free shielded, composite construction that reduces buzz to ultra low levels, the inductor offers high resistance to thermal shock, moisture, and mechanical shock. The IHLP-5050EZ-5A is RoHS-compliant, halogen-free, and Vishay Green.

Samples and production quantities of the new inductor are available now. Pricing in 10,000-piece quantities begins at $0.96 per piece.

Transformers

Gate-Drive Transformers For Demanding Battery Management Systems

TT Electronics' HA42A and HA86A series gate-drive transformers for the automotive and industrial markets are miniature-surface mount devices well suited for high-efficiency battery management systems where size and reliability are critical.

These gate-drive transformers are meant for use in space-constrained scenarios to deliver controlling pulses while isolating the MOSFET and the controlling drive circuit. Mechanically robust with lower leakage inductance, they provide significantly reduced turn-on and turn-off delay time which results in better performance. The HA86A design boasts higher current capability and lower temperature rise performance for HV/EV battery management systems.

Made of a toroid core ferrite material, the HA42A and HA86A boast roll-off inductance characteristics that maintain high efficiency without affecting temperature. AEC-Q200 certification and RoHS compliance meet the performance and reliability requirements demanded by today's automotive applications.

"High performance and reliability are key characteristics of a wide range of current and yet-to-be-developed applications. Nowhere is this more apparent than in automotive and industrial," said Raj Kumar Singaraju, Global Product Line director, Magnetics, TT Electronics. For further information see the HA42A datasheet and the HA86A datasheet.

High-Frequency Wire-Wound Transformers For CCM Flybacks

Pulse Electronics Power BU's PA4470.XXXNL high-frequency wire-wound transformers are designed to deliver high reliability and performance in a continuous-mode flyback circuit which provides both the regulation and the isolation required for datacom and industrial applications.

The transformers are well suited for low-power isolated designs where 3.3 V, 5 V, and 12 V is needed to be generated from 24-V or 48-V bus architectures. They support a variety of applications in the datacom and industrial industries including isolated power design, sensor interfaces, isolated telecom converters, power over Ethernet, industrial control, motor control and switched-mode power supplies.

Designed for power levels up to 1.8 W, the transformers are offered in 8-pin packages with a footprint of 9.5 mm x 8.0 mm max and a height of 6.0

mm max. The units feature 1650 Vdc of isolation. For more information, see the data sheet. To inquire about lead times, competitive pricing, samples and more, just contact us or use our quote form.

Flyback Transformer Is Tailored To High-Voltage Reference Design

SUMIDA's CEFD2010 (0399-T208) and CEP1311E (10380-T030) are surface-mount flyback transformers designed for Analog Devices' LT8304-1 isolated no-opto flyback converter reference design, which is optimized for high-voltage applications up to 1000 V. Applications include power supplies in industrial, automotive, medical, and telecom applications. The transformers operate over a -40°C to 125°C temperature range and are RoHS compliant without exemption, and have REACH compliance. For more information see the CEFD2010 product page and CEP1311E product page.

Extended Rail Flyback Transformers Meet Isolation Specs Without Flying Leads

Würth Elektronik 's MID-OLRM flyback transformers feature an extended rail that eliminates need for flying leads.

"For the past 30 years, the RM packages have required flying leads to meet reinforced insulation and creepage and clearance distances. We decided to change this by adding an extended rail to existing RM packages, eliminating the need to have flying leads. This package also meets the stringent IEC61558-2-16 standard with reinforced insulation," explained Swaroop Vaidyanath, product marketing engineer at Würth Elektronik.

Available with single or dual 5-V, 12-V, or 24-V outputs, these flyback transformers feature a small footprint, high power density, and grounded cores for improved EMC performance. These transformers are best suited for white goods, industrial controls, metering, LED lighting, offline flyback power supplies, space-constrained power supplies, and smart adapter applications. For more information, see the product page.

Planar Transformers Are Optimized For 200- to 700-kHz Switching

Premier Magnetics' PTxxx series of frequency-optimized planar transformers offer models with ratings to 250 W, and are designed for forward converter, full/half bridge and active clamp applications using switching frequencies between 200 kHz and 700 kHz. Proprietary layout techniques for the circuit board windings result in optimization of transformer impedance and interwinding capacitance effects in the desired operating frequency range.

The PT series devices provide excellent isolation (up to 2250 Vdc), operate over a wide temperature range (-40°C to +125°C), demonstrate excellent efficiency (up to 99%), and provide exceptional heat dissipation (due to their planar construction vs. classic wire-wound transformers). The PTxxx transformers are priced at $1.60 to $3.25 each in OEM quantities.

Chokes

Small Form Factor Common Mode Chokes Handle Up To 9 A

Pulse Electronics Power BU's PA4339.XXXNLT is a small form factor common-mode choke series for switched mode power supplies. Designed in a low profile of 3.8 mm max, this series is the most compact power line common mode choke on the market today for currents up to 9 Adc, according to the company. The compact design allows for a higher impedance per unit volume when compared to other chokes.

The PA4339.XXXNLT chokes are available in a wide range of current/impedance offerings from 140 Ω and 9A to 1300 Ω and 2.5 A. These devices are said to exhibit excellent high-frequency impedance characteristics and are appropriate for applications below 80 Vdc.

"The attenuation characteristics of the PA4339 series suppresses common-mode conducted noise and are offered in a compact SMT design ensuring that power density is maintained while reducing EMI," said Geoffrey Wildman, global marketing manager at Pulse Electronics.

For more information, see the data sheet. To inquire about lead times, competitive pricing, samples and more, contact the company or use its quote form.