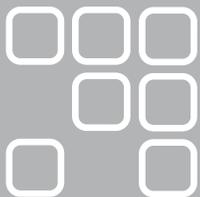




# Magnetic Components

## Solutions Guide

[www.ttiinc.com](http://www.ttiinc.com)



The World's Leading Passive and Connector Specialist

chip inductor

resonant circuit

film

flyback transformer

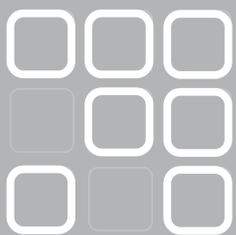
inductor

rf inductor

shielded

low profile

ferrite bead inductor





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TTI's commitment to quality, product knowledge, and customer service regularly results in recognition and awards from our manufacturers.



### Why Buy from TTI?

From its modest beginning in 1971, TTI has steadily grown to become the world's leading passive and connector specialist in the electronic component industry. The company was founded on the premise that passive purchasing could be made more efficient by offering superior specialized customer-driven service provided by product knowledgeable representatives. TTI's commitment to the customer remains as valid today as it has always been. TTI offers:

- World Class Line Card
- Product Knowledgeable Experts
- Broader and Deeper Product Inventories
- Leading Edge Technology Products
- Global Distribution Centers
- Quality and Reliability
- Supply Chain Solutions

### World Class Line Card

TTI is an authorized distributor for several leading manufacturers in the world. Close partnerships with these premier manufacturers have allowed TTI to provide the bill of material coverage needed from a leading-edge logistics provider.

### Product Knowledgeable Experts

TTI has a team of specialists with more product experience and knowledge than any other distributor. All TTI employees participate in company-wide training programs, plus every one of our sales branches has a team of product managers on-site to provide that extra support that customers need. Through the years these exceptional specialists have become, and remained, the most knowledgeable in the electronic component industry.

### Broader and Deeper Inventories

TTI maintains extensive inventories by stocking more than 500,000 parts with more than 80% available for immediate delivery. That's more interconnect, passive, electromechanical, and discrete parts than from any other source. We continue to remain committed to breadth and depth of inventory, ensuring availability of C and D class parts as well as commodity parts.

### Leading Edge Technology Products

The manufacturers TTI partners with are the companies that lead the industry into new component technologies. For customers, this means that TTI enlists the help of the manufacturers who can help solve any design challenge. Our product groups also focus on new product introductions to ensure we have the very latest and most technologically-advanced products readily available from stock.

### Global Distribution Centers

TTI has more than 1.2 million square feet of automated warehousing in North America, Europe, and Asia. All are linked into our global warehouse management system to ensure superior customer service and overall business efficiencies. Wherever you are in the world, TTI can support you.

### Quality and Reliability

TTI offers its customers an ongoing commitment to quality and service excellence. We implemented Total Quality Management in 1989 and have been ISO9000 registered since 1993. We were the first distributor to have all of our global warehouse locations ISO registered and have since upgraded to ISO9001:2000 and AS9100B in North America and AS9120 in Europe. With one global documentation system that ensures that every TTI branch and warehouse in the world follow the same processes. Year after year, customers rate our quality and management practices to be among the very best in the industry. This is especially important when the products are the typical high mix, low value parts on which we have built our reputation.



**1-800-CALL-TTI**

The World's Leading Passive and Connector Specialist



TTI offers a diverse portfolio of supply chain solutions. The driving engine behind superior supply chain management is the Advanced Inventory Management (AIM) reservation system. This proprietary system uses sophisticated algorithms coupled with TTI's expansive inventory to ensure continuity of supply. TTI also provides several personalized extranet products and services for customers that assist in managing their supply chain online and in real time.

## Advanced Inventory Management

### ➤ MRP1

MRP1 is TTI's forecasting tool that allows the customer to send a weekly MRP forecast file to TTI. Automatic release of material is offered through the mapping of customer-specified release requirements.

### ➤ TALON

This new web-based stock room management system supports lean manufacturing concepts and is designed to dramatically lower both the acquisition costs and inventory costs for TTI's customers. This single system can be used to support all suppliers eliminating the need to have many individual supply chain programs with a group of disparate vendors.



**TALON** features include:

- Online or offline remote stock room management
- Internet based e-commerce with all suppliers
- Complete bar code capability, generates labels, and supports PDA scanning
- 40+ standard reports for inventory/supply chain management
- Bar code kanban ordering or min/max electronic kanban ordering
- Inventory modules support multi-site, multi-national stock rooms

## Direct Link Services

TTI offers an extensive array of extranet services. These products allow online e-commerce with a direct connection to TTI's inventory and order management systems. To access any of these services, contact the nearest TTI sales representative at 1-800-CALL-TTI (225-5884).

### ➤ ezReview

ezReview allows registered customers to view their supply chain online. This portal provides access to view AIM inventory reservations. Additionally, customers can download "what if" reports to determine what level of upside requirements can be supported.

### ➤ ezBuy

ezBuy customers can order online from their inventory reserved by TTI. In addition to ordering these contracted items, the customer can also make general purchases, view available inventory, and schedule releases.

### ➤ ezScan

Customers who prefer material control through a kanban pull system can benefit from TTI's ezScan product. ezScan is a symbol personal digital assistant (PDA) with Windows CE Pocket PC software that supports the user of 2D bar code labels. This low cost solution only requires a personal computer with an Internet connection. Order releases automatically trigger shipments from reserved inventory.

### ➤ Order Status

Customers can check the status of all open orders placed online with TTI's Order Status service. TTI provides direct links to the freight carriers that allows real-time tracking of shipments from TTI to the customer.



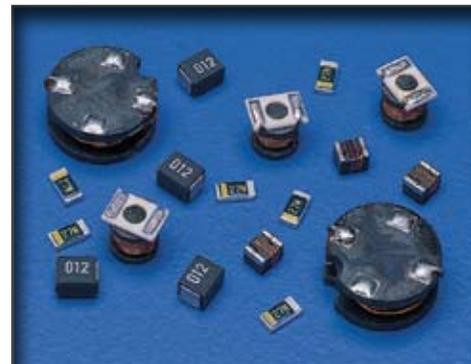


## Magnetic Components

### Inductors

#### What is an Inductor?

It is a length of conductor, usually wire, that is normally wound into a coil and around a core to concentrate the magnetic force (field) and maximize the inductance. The more turns of wire in the coil, the higher the inductance value. Some people refer to surface mount inductors as “coils,” or “L chips,” as L is the symbol for inductance.



#### Where do you Find Them?

Inductors can be found in all facets of electronic design, so they are not specific to one application area. They can range from industrial control applications, like test equipment or process control devices; to networking applications, like ADSL modems or set-top boxes; to power applications, like DC/DC converters and switching power supplies.

Capacitors typically outnumber inductors about 10:1 on printed circuit boards. Inductors are on **every** board application that has current running through it.

#### What Does it Do?

Its primary properties are to resist changes in AC (alternating current) and to store energy in its magnetic field. This is important because these properties allow an inductor to do several things in a circuit. Inductors can help complete a resonant circuit, which allows you to select a specific frequency. They can create a matching impedance, which allows for effective and efficient data transmission. They can also act as a filter or choke in a circuit, which allows you to attenuate (block out) unwanted noise. And lastly, they also can help to smooth out the spikes of ripple in AC current.

#### How Does it Work?

When current passes through an inductor, the current causes a magnetic field to be generated. The magnetic field stores the energy from this current. Once the magnetic field has been generated, it will oppose any change in current, which is called inductance.

#### Why Wouldn't you use a Resistor Instead of an Inductor?

For a DC (direct current) device, current only flowing one direction, a resistor is exactly what you would use. Although in an AC device, with current flowing in alternating directions, an inductor is the better choice. As the name implies, a resistor resists current — which works fine for a DC device. But with AC devices, your components need to store and release energy to be more effective. Both inductors and capacitors do this and are used more often in the alternation of AC circuits.

#### Doesn't a Capacitor Store and Release Energy like an Inductor?

A capacitor does store and release energy, but it does it differently, thus the differences on how these two devices affect a circuit. A capacitor basically affects voltage in an AC circuit opposed to an inductor which affects current in an AC circuit. In many cases you will find an inductor coupled with a capacitor for usage in your AC circuits.



## Transformers

### What is a Transformer?

A transformer is a magnetic component made up of two or more windings of copper wire with a core running down the middle of these windings. The windings are insulated from each other but in very close proximity. It transfers electrical energy from one electric circuit to another, without changing the frequency, via a magnetic field. The transfer usually takes place with a change of AC voltage and current.



### What Does it Do?

There are three major areas of the market highlighted in this solutions guide: power applications, LAN/telecommunications applications, and broadband/RF applications (high-frequency applications which are often classified as DSL applications in the broadband/RF market instead of telecommunications; however, this solutions guide will primarily focus on the broadband/RF market).

Its main function in power applications (cell phone, digital camera, electric razor, calculator recharger, printers, **anything** that plugs into your outlet, etc.) is to “transform” incoming AC voltage from your outlet, typically 110V to 120V, down to a voltage level that your end products can use. For instance, to recharge a cell phone’s battery, you must plug the phone into the recharger and into your 110V outlet. If you were to hook your phone up to the outlet without the use of a transformer, your phone would probably explode as these types of batteries typically operate on a voltage of around 4.8V. The transformer “steps down” the voltage from 110V to 4.8V so that your batteries can recharge at the correct voltage. It also provides electrical isolation, that protects the device that you are powering.

In LAN and telecommunications applications, its main function is to provide electrical isolation (external voltage from internal voltage) and matched impedance between different parts of electrical circuits. This allows these circuits to be placed in close proximity on the same board so they can handle voltage signals without causing circuit damage or data distortion.

Its main function in broadband/RF applications (cable/RF) is to match “BAL-anced” circuits to “UN-bal-anced” circuits (e.g., Balun transformers), to create a matched impedance between the cable bringing in the signal and the signal needed for the end product, as well as provide electrical isolation.

### How Does it Work?

The transformer works by having the “primary winding” of wire accept the incoming voltage from the power source. The AC current in the primary winding creates an alternating magnetic field in either an air, iron (or soft iron), or laminated steel core. The change of current, as we learned in inductors, creates an opposition voltage. In the secondary winding, the magnetic field in the core creates current and the corresponding voltage. The voltage in the secondary winding is controlled by the ratio of turns of wire compared to the primary winding. So if the primary and secondary windings have the same number of turns, then the primary and secondary voltage will be the same. If the secondary winding has half as many turns as the primary, then the voltage in the secondary winding will be half of the voltage in the primary. Normally this is accomplished by changing the thickness of wire used.



For stepping down incoming voltage from a higher level to a lower level, a very thin wire is used on the primary winding so as to get more turns than on the secondary winding (and vice versa for stepping up a voltage). It is important to understand that once the transformer steps down the high-voltage AC current into low-voltage AC current, this low-voltage AC current gets changed to low-voltage DC current. On the reverse side of the transformer there will typically be diodes that act like a rectifier, turning the AC current into DC current. This is important because all rechargeable devices use DC current, as well as most small electronics. Typically, any small motorized device will use a DC motor, as opposed to an AC motor, since they are less expensive to make.

## Ferrite Beads

### What are they and What do they Do?

A ferrite bead is a passive electronic component used to remove unwanted electrical noise (EMI). It is sometimes referred to as a surface mount ferrite bead, a ferrite bead, a chip bead, an EMI bead core, a leaded ferrite bead inductor, or a leaded ferrite bead. These devices are offered in through-hole, surface mount, or arrays and packaged in bulk or tape-and-reel.

Ferrites are the least expensive and simplest method of eliminating EMI — given their moderate filtering is up to the job at hand. In cases where 5dB or less of “cleanup” is required, a “simple” ferrite bead may be a sufficient solution. In many cases, a circuit needs just 3dB to 5dB of filtering to become EMI-compliant. A ferrite bead may be the most size-efficient and cost-efficient solution, while helping keep circuit complexity to a minimum. The most common applications include DC power line and general and high-speed signal line filtering ferrite beads are a noise limiting filter type. This means they dissipate the energy of the unwanted frequencies in the form of heat — not to ground as the 3-terminal capacitor or other more complex filters do. This is a key point: Does the customer need “slight” filtering, and has no ground or questionable ground? If so, ferrite beads may be the answer. Filtering of roughly 5dB and above requires more serious action; those more complex solutions each require a good circuit ground point.

## Magnetics

CHOKES / COILS / BEADS / INDUCTORS																	
	API Delevan	AVX	Bourns	J.W. Miller	KEMET	KOA	Murata	Panasonic	Pulse	TDK	TT Electronics	BI Technologies	Tyco Electronics	Coev Magnetics	Vishay	Dale	Yageo
Chokes	◆		◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Coils	◆		◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
DC/DC Converter			◆			◆	◆	◆	◆	◆							
Ferrite Arrays			◆			◆	◆	◆	◆	◆	◆	◆				◆	◆
Ferrite Beads	◆		◆	◆	◆	◆	◆	◆	◆	◆					◆	◆	◆
Ferrite Cores	◆					◆				◆							
Inductors	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Power Inductors	◆		◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Toroid Inductors	◆			◆					◆		◆	◆	◆	◆	◆	◆	◆
Transformers	◆		◆	◆				◆	◆	◆	◆	◆	◆	◆	◆	◆	◆





# Cross Reference

Manufacturers	Inductors				Ferrite Beads	
	Multilayer	Wirewound	Film	Power	Chip Beads	Arrays
API Delevan	Cxxxx	xxxx, Sxxxx, Pxxxx		PD, SPD	EMI	
AVX			Lxxxx			
BI Technologies	BCL, BTC, BML/BMC	HM11, HM13, HM15, HM50, HM51, HM53, HM54		HM55, HM56, HM62, HM64, HM65, HM66, HM69, HM70, HM71, HM72, HM73, HM75, HM76, HM77, HM78, HM79, HM79S, HM100	BMB	
Bourns	CE, CF, CI, CS, CV	CM, CW		SDR, SRP, SRR, SRU	MG, MH, MT, MU, MZ	MA
Bourns/J.W. Miller	PMxxxxS, PMxxxxH	PMxxxxC, PMxxxx		PM1355, PM1608, PM3316, PM5022, PMxxx, PM3340, PMxx	PM2000	
Central Tech	CTLL, CTML	CT, CTMC		CTDO, CTDT, CTGS		
Coilcraft	xxxxLS, xxxxHT, xxxxHQ, xxxxCS, xxxxHS, xxxxCT			DO, DS, DT		
Fair-Rite					25, 27	
KEMET	CK, CKP, HK, LK, NK	LB, LBC, LBH, LBM, LBMF, LEM, LEMC, LEMF		CB, CBC, CBL, CBMF, N, NP, NR	BK, BKP, FBMH	
KOA	MCL, MHL, PL	KL32, KQ, KQC	KL73	KE, KS, LPC, PL, SDR, SDS, SLF	CZB, CZP	FBA
Murata	LQG, LQM	LQH, LQW	LQP		BLM	BLA
Panasonic	ELJ-RE, ELJ-RF	ELJ-ND, ELJ-FA, ELJ-EA, ELJ-SA, ELJ-FB, ELJ-FR		ELL, ETQ	EXC-3B, EXC-CL, EXC-ML	EXC-28B
Pulse		PE-xxxxCD, PE-xxxxCM, PE-xxxxFT		P0770, P0751, P0762, P0250, P1252, PG0063, PA0390, PA0648, PF0382, PF0504, PG0015, PF0698, PF0581		
Steward					HI, HZ, LI, MI, DM	
TDK	MLF, MLG, MLK	NL, NLC, NLCV, NLFC, NLFV, NLV		RLF, SLF, VLF	ACB, MMZ, MPZ	MEA, MZA
Toko	LL, LLU, LLV	LLB, LLQ, LLM	LLP	D312, D412, D52, D53, D62, D63, D73, D10, E123, D124, EH125, D128		
Tyco Electronics		L		DH, DN, DQ, DS, DT, DU, DX, DZ, SC, SMT		
Vishay	ILC, ILSB	IMC, IMCH, ISC	IFC, IFCB	IHLP, IHSM, IDC, IDCS, IDCP	ILB, ILBB, ILHB	ILAS
Yageo	CL, CLH, LCN	HC, LCN, NL, NLC		HC, SCD, SCDS, SDS, SDT, SLF, SSL, STD	FB, GB, NB, PB, PBJ, SB, SBJ, UPB	BA

Manufacturers in red are distributed by TTI "xxxx" represents standard case size



# API Delevan

## Tradition

Established in 1947, API Delevan offers the largest selection of surface mount and through-hole inductors, chokes, coils, and transformers. API Delevan focuses on industry standard devices, and specializes in providing circuit solution and application specific magnetics.

## Focus

API Delevan is dedicated to producing high-quality magnetics. Our strength lies in listening to and working closely with our customers. We continuously introduce innovative new designs and manufacture to the highest automation levels obtainable. Our core products have become industry standards, and we provide exceptional customer service with speed and flexibility.



## Reliability

API Delevan manufactures the highest quality and most reliable inductors available. We supply more military-qualified magnetics than any other manufacturer and are the **only** qualified supplier to MIL-PRF-39010. API Delevan maintains more than 26 QPLs on MIL-PRF-15305, and more than 23 slash sheets to MIL-PRF-83446 and MIL-PRF-27. We also support MIL-STD-981, as well as provide a variety of COTS designs. More than 50 years of design and manufacturing experience is built into our standard and custom magnetic product offerings, ensuring customer confidence when choosing API Delevan.

## Leadership

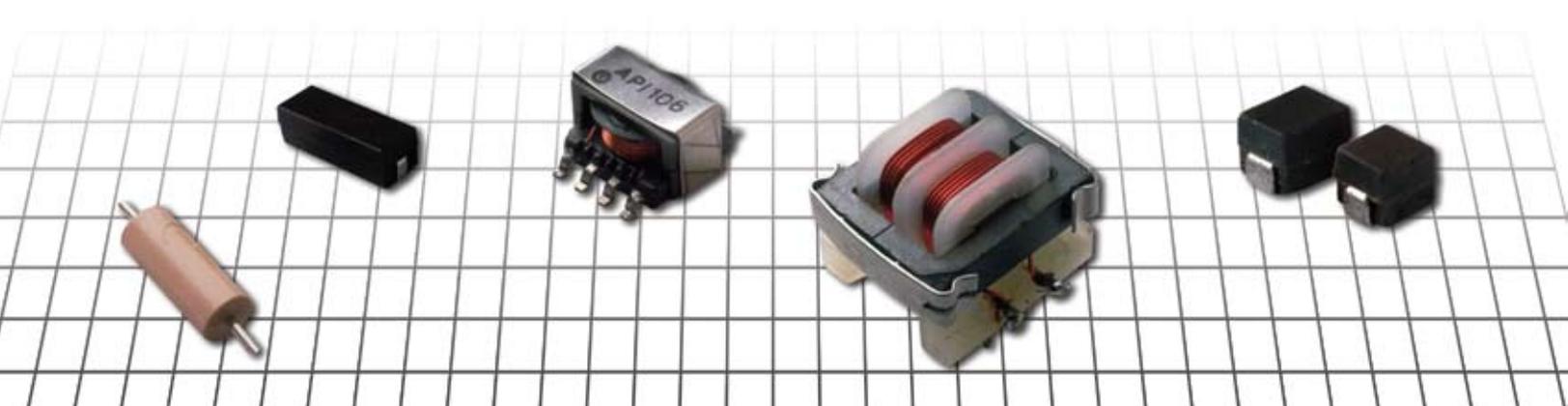
API Delevan leads the military, aerospace, and medical markets as the best source for high reliability magnetics. In addition to our standard product, we continue to offer new designs with the current catalog carrying over 150 different series of products. In 1994, we became one of the first registered ISO-9001 magnetic suppliers and have upgraded to ISO 9001:2000. In 2006, we achieved AS9100-2004 certification, which represents the first international quality management system standard for the aerospace industry.

## Innovation

API Delevan is **the** source for application specific and circuit solution magnetics. We offer tight tolerances to 1% of nominal, full military temperature ranges, epoxy molded construction, shielded and temperature stable designs, including high temperature designs to 220°C. Our in-house design specialists cater to design engineers — meeting and exceeding the most demanding requirements.

## Service

API Delevan offers our customers the personal attention necessary to satisfy their magnetics needs. Our experience in engineering, manufacturing, quality, and customer service allows us to provide circuit solutions to the industry. API Delevan and our distribution partners work together to enhance our customers' experience.





## API Delevan Inductors

	Series	Features	Benefits
Surface Mount Wirewound Inductors	1008, 1210, 1812	Epoxy molded construction with tight tolerances available to $\pm 1\%$	Industry standard package sizes offering a full military temperature range in a general purpose RF coil
	S1008, S1210, S1812, S4924	Superior magnetic shielding, lowering the coupling percentage	Controls and reduces EMI
	2510, 1330, 1331	SMT equivalents to popular qualified axial leaded inductors, QPL to M83446	Eases conversion from through-hole to surface mount
	103, 3090, 106, 4379	Most inductance per unit volume, QPL & COTS to M83446	Extremely high performance in small geometries for thick film hybrids
	SMB2.5	Flat wire, wound SMT ferrite beads	High current, high impedance beads
	4426, 5526	Air coils with an optional dissolvable cap for tuning	High frequency applications
	P1812, P1330, 4922, 8532	Molded miniature power chokes in industry standard sizes	Low resistance/High current
	CM6149, CM6296, CM6350, CM6460, CM6560	Common mode transformers with a full military temperature range	Five sizes to meet a variety of requirements with excellent coplanarity for board mounting
Through-hole Wirewound Inductors	0819, 1025, 1537, 2500	MIL-PRF-15305 QPL inductors for the most demanding requirements, tight tolerances available to $\pm 1\%$	20+ types for general purpose and RF applications
	0925, 1641, 4307	Superior magnetic shielding, lowering the coupling percentage	Controls and reduces EMI
	2020, 2727, 4445	Radial leaded, molded toroids	High Q and excellent thermal stability
	ER1025, ER1537, ER1641	M39010 QPL, highest reliability inductor	Unequaled performance, not available from any other supplier in the world
	2256, 2474, 4590	Power chokes, some available in molded styles to meet demanding environments	Low resistance/High current
	PT, PTHF, PTKM	Power toroids in various mounting configurations	High saturation levels and great shielding performance



### **A World Leader in Innovation**

AVX, a recognized leader in the global passive electronic component and interconnect products industry, is at the forefront of technology, design, manufacturing, and supply. AVX enjoys significant competitive advantages including the benefit of global manufacturing and distribution provided by 24 manufacturing facilities in 12 countries. This assures customers of the most efficient balance of demand and production capability in response to their just-in-time inventory requirements. With research and development centers in five locations around the world (United States, Northern Ireland, England, France, and Israel), AVX has fostered customer relationships involving the design and technology for new and advanced products to fulfill special product requirements.



AVX continues to invest heavily in R&D, bringing many new products to market during the past year and holding more than 175 active patents worldwide. AVX is set apart from the competition by our broad array of specialty product offerings that include ceramic and tantalum capacitors, connectors, thick and thin film capacitors, thin film inductors, resistors, ferrites, and integrated passive components. AVX also has the advantage of the partnership with Kyocera Corporation of Japan and the wide breadth of products, as well as technology, that they offer. AVX enjoys a balance between high volume commodity products and the increasingly innovative advanced products offerings.

### **Accu-L<sup>®</sup> Technology**

The Accu-L<sup>®</sup> SMD inductor is based on thin film multilayer technology. This technology provides a level of control on the electrical and physical characteristics of the component which gives consistent characteristics within a lot and lot-to-lot.

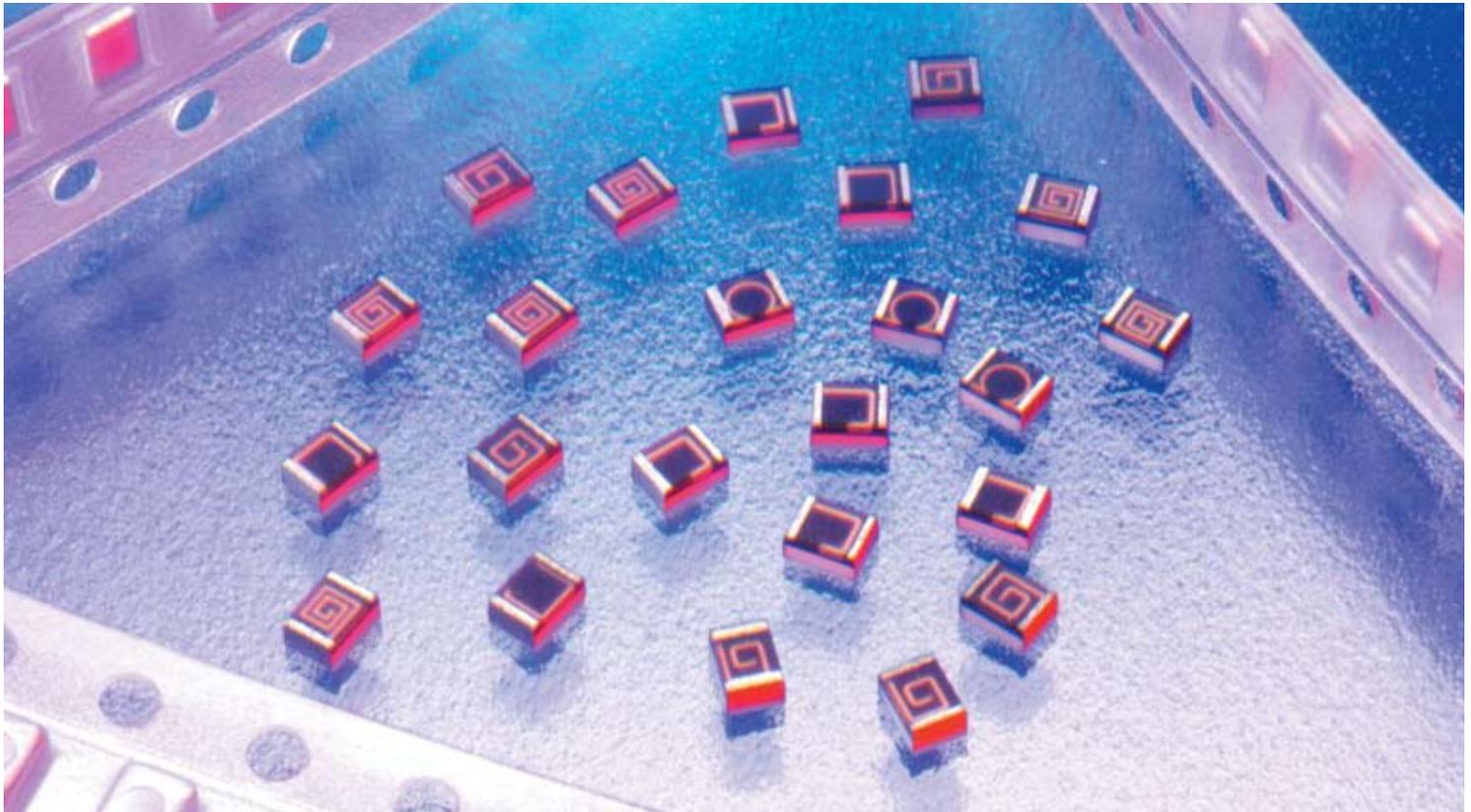
The original design provides small size, excellent high frequency performance and rugged construction for reliable automatic assembly. The Accu-L<sup>®</sup> inductor is particularly suited for the telecommunications industry where there is a continuing trend toward miniaturization and increasing frequencies. The Accu-L<sup>®</sup> inductor meets both the performance and tolerance requirements of present cellular frequencies 450MHz and 900MHz and of future frequencies, such as 1700MHz, 1900MHz, and 2400MHz.

## AVX Thin Film Inductors

	Series	Features	Benefits	Applications
Inductors	L0402 L0603 L0805	<ul style="list-style-type: none"> <li>High self-resonant frequency</li> <li>RF power capability</li> <li>Ultra-tight tolerance</li> </ul>	<ul style="list-style-type: none"> <li>High Q</li> <li>Low profile</li> </ul>	<ul style="list-style-type: none"> <li>Mobile Communications</li> <li>Satellite TV Receivers</li> <li>GPS · Filters</li> <li>Matching Networks</li> </ul>

## AVX Thin Film Inductor Part Numbering System

L	0805	4R7	D	E	W	TR
	Size	Inductance	Tolerance	Specification	Termination	Packaging
Inductors	0402 0603 0805	<p>Expressed in nH (2 significant digits + number of zeros); For values &lt; 10nH, letter R denotes decimal point.</p> <p>Example: 220: 22nH 4R7: 4.7nH</p>	<p>L ≤ 4.7nH B: ±0.1nH C: ±0.2nH D: ±0.5nH</p> <p>L ≥ 10nH F: ±1% (0603 only) G: ±2% J: ±5%</p> <p>4.7nH &lt; L &lt; 10nH B: ±0.1nH (0603 only) C: ±0.2nH (0603 only) D: ±0.5nH</p>	<p>E: Accu-L® 0805 Technology G: Accu-L® 0603 Technology H: Accu-L® 0402 Technology</p>	<p>N: LGA 100% tin (0402 only) S: 100% tin W: Nickel solder coated (Sn 63, Pb 37)</p>	<p>TR: Tape &amp; Reel (3,000/reel)</p>





BI Technologies designs and manufactures surface mount inductors, through-hole coils and transformers of ferrite, powdered iron, and other advanced magnetic materials for appliances, medical and office equipment, communication devices and networks. As a leading power inductor supplier, BI delivers a wide range of magnetics including low-profile, surface mount designs for notebook and laptop computers; miniature packages for wireless devices, PDAs and other space-limited applications, as well as surface mount and through-hole high-current devices for switching power supplies and motor controls.



## Signal Magnetics

### LAN/WAN/ISDN

Model	HS91	HS92	HS93
Industry Style	Single Port 100/1000Mb	10Base-T Ethernet AUI Transformer	T1/CEPT/ISDN Transformer
Turns Ratio (Chip to Media Side)	1:1, $\sqrt{2}$ :1	1:1, 1ct:2ct	1:1:1, 1:2ct, 1ct:2ct, 1:2
Operating Temp. Range	0°C to 70°C	0°C to 70°C	0°C to 70°C
Insertion Loss	-1.0 Typ. 1 to 100MHz		
Rise Time	2.5ns, Typ.		
Return Loss	-11 to -18dB, 0.1MHz - 100MHz		
Common Mode Rejection	-35 to -45dB, 0.1MHz - 100MHz		
Cross Talk	-38 to -40dB, 0.1MHz - 100MHz		
Insulation Voltage, Minimum	1,500Vrms	2,000Vrms	2,000Vrms
Inductance	350 $\mu$ H @ 100KHz	90 $\mu$ H - 140 $\mu$ H @ 100KHz	1.2mH - 22mH @ 100KHz
Leakage Inductance		0.1 $\mu$ H - 0.2 $\mu$ H @ 100KHz	0.5 $\mu$ H - 11 $\mu$ H @ 100KHz
Interwinding Capacitance		10pF - 12pF @ 100KHz	35pF - 100pF @ 100KHz
DC Resistance		0.3 $\Omega$ - 0.6 $\Omega$	0.7 $\Omega$ - 2.4 $\Omega$
Mounting Style	Surface Mount	Surface Mount	Surface Mount/Through-Hole

### DSL Coupling Transformers

Model	HT81	HT82	HT83
Industry Style	HDSL Transformer	VDSL Transformer	Common Mode Choke*
Turns Ratio (Chip to Media Side)	1ct, 2ct:1.8ct, 2st	1:1, 1:1:1	
Insertion Loss	1.0dB Max. @ 40KHz	0.5dB to 0.8dB @ 0.2MHz to 30MHz	
Return Loss	16.5dB to 20dB @ Mid. Band	10dB to 22dB @ 0.2MHz to 30MHz	
Longitudinal Balance	50dB to 55dB @ 5 to 320KHz	30dB to 40dB @ 0.2MHz to 3MHz	
THD	-70dB to -75dB	-70dB	
Inductance @ 10KHz	2mH - 3mH	175 $\mu$ H - 250 $\mu$ H	24 $\mu$ H - 4mH
Cross Talk	-38dB to -40dB, 0.1MHz - 100MHz		
Common Mode Attenuation			20dB to 45dB
Parallel Impedance @ 10KHz			7.5k $\Omega$
Mounting Style	Through-Hole	Surface Mount/Through-Hole	Surface Mount/Through-Hole

Specifications subject to change without notice.  
 \*For applications up to 25.92Mb/s.



## Power Magnetics

### Transformers

Model	HM31	HM32	HM33	HM41	HM80
Industry Style	Current Sense	Current Sense	Current Sense	Gate Drive	ISDN Isolation
Inductance Range	1.3mH - 195mH	0.2mH - 85mH	180 $\mu$ H - 980 $\mu$ H	138 $\mu$ H - 860 $\mu$ H	2.7mH - 27mH
Turns Ratio	1:25 - 1:300	1:10 - 1:200	1:30 - 1:70	1:0.67 - 1:2	1:0.6 - 1:2.5
Operating Frequency	20KHz plus	20KHz plus	250KHz plus	20KHz - 300KHz	Supports ISDN 192Kb/s
DC Resistance Range	0.7 $\Omega$ - 11.0 $\Omega$	0.2 $\Omega$ - 4.5 $\Omega$	1.0 $\Omega$ - 4.75 $\Omega$	0.072 $\Omega$ - 0.156 $\Omega$	0.9 $\Omega$ - 15 $\Omega$
Core Type	Toroid	Toroid	EE	Toroid	Varies
Operating Case Temp. Range	-25°C to 105°C	-25°C to 105°C	-25°C to 105°C	-25°C to 85°C	0°C to 85°C

### Surface Mount Inductors and Ferrite Beads

Model	BTC	BML/BMC	BMB/ BMB High Current	HM70	HM73
Industry Style	0402/0603 Inductor	0402 to 1206 Inductor	0402 to 1812/0603 to 1812 Chip Beads	Surface Mount Inductor	Surface Mount Inductor
Inductance Range	0.2nH - 100nH	1.5mH - 3 $\mu$ H		0.7 $\mu$ H - 10 $\mu$ H	0.01 $\mu$ - 10 $\mu$ H
Impedance Range			7 $\Omega$ - 2,200 $\Omega$ / 50 $\Omega$ - 600 $\Omega$		
DC Resistance Range	0.1 $\Omega$ - 7.5 $\Omega$	0.10 $\Omega$ - 2.75 $\Omega$	0.05 $\Omega$ - 1.0 $\Omega$ / 0.01 $\Omega$ - 0.3 $\Omega$	1.226 $\Omega$ - 15m $\Omega$	0.5M - 23.1m $\Omega$
Current Rating	75mA - 800mA	1mA - 300mA	50mA - 600mA 0.5A - 6A	9A - 31A	5.6A - 40A
Core Type	Thin Film on Ceramic	Monolithic	Monolithic	X-Core	ER
Operating Case Temp. Range	-40°C to 125°C	-40°C to 125°C	-25°C to 85°C	-40°C to 180°C	-40°C to 135°C

Model	HM66	HM68	HM72A	HM77	HM78
Industry Style	Surface Mount Inductor	Button Inductor Indicator	Surface Mount Inductor	Surface Mount Inductor	Surface Mount Inductor
Inductance Range	1 $\mu$ H - 330 $\mu$ H	2.2 $\mu$ H - 47 $\mu$ H	1 $\mu$ H - 1,070 $\mu$ H	10 $\mu$ H - 1,000 $\mu$ H	
DC Resistance Range	0.008W - 1.54W	0.081W - 2.34W	0.55mW - 332mW	4.56mW - 1,480mW	5.2mW - 5.2W
Current Rating	0.22A - 10.0A	0.48A - 1.9A	1.8A - 35A	0.71A - 13.3A	0.2A - 12A
Core Type	Shielded Drum	Drum	Composite	Toroid	Shielded Drum Core
Operating Case Temp. Range	-40°C to 85°C	-40°C to 100°C	40°C to 155°C	-40°C to 105°C	-40°C to 85°C

### Through-hole Inductors

Model	HM11	HM15	HM53	HM55	HM56
Industry Style	Rod Core Inductor	Encapsulated Inductor	Output Inductor	Power Inductor	High Current Cube Inductor
Inductance Range	0.21 $\mu$ H - 28 $\mu$ H	150 $\mu$ H - 1,000 $\mu$ H	1.4 $\mu$ H - 1000 $\mu$ H	0.4 $\mu$ H - 6.0 $\mu$ H	0.22 $\mu$ H - 1.30 $\mu$ H
DC Resistance Range	0.9m $\Omega$ - 43m $\Omega$ 5.5A - 31A	0.5 $\Omega$ - 1.7 $\Omega$ 0.5A - 1.7A	2.6m $\Omega$ - 680 $\Omega$ 1.9A - 29.5A	9A - 40A	0.60m $\Omega$ - 2.20m $\Omega$ 25A - 80A
Core Type	Ferrite Rod	Toroid	Toroid	Shielded Drum	Composite Ferrite
Operating Case Temp. Range	-25°C to 105°C	-40°C to 125°C	-40°C to 155°C		-40°C to 125°C

### Common Mode Chokes

Model	HM67	HM19	HM28
Industry Style	Surface Mount C.M.	Toroid Style	Buckle Style
Inductance Range	5 $\mu$ H - 4.7MH	1mH - 16mH	0.45mH - 120mH
DC Resistance Range	5.8m $\Omega$ - 403m $\Omega$ 5.6A - 40A	0.02 $\Omega$ - 0.24 $\Omega$ 0.2A - 1.0A	0.08 $\Omega$ - 2.7 $\Omega$ 1.8A - 7.5A
Voltage Rating	300V	250V	250V
Core Type	Toroid	Toroid	Buckle
Operating Case Temp. Range	-40°C to 125°C	-25°C to 105°C	-25°C to 105°C

Specifications subject to change without notice. We are capable of any core type.



*Reliable Electronic Solutions*

### Adding Value

One of Bourns' key strengths as an industry leader lies in our ability to utilize core technologies to provide products and solutions for our customers' applications. Integrating technologies that capture functionality, add value, and reduce overall cost offer quantifiable results of these efforts.

### Quality Commitment

Bourns commitment to quality is embedded in every discipline of the corporation. Customer satisfaction is essential to every Bourns employee. All team members receive training in their specific area of responsibility to ensure the highest level of performance. Our goal is to satisfy customers on a global basis while achieving sound growth with technological products of innovative design, superior quality, and exceptional value. The systems in place at Bourns entities ensure management of appropriate activities during concept development, prototype, and production.



### A Commitment to Excellence

Inductive components have been part of the Bourns product line for more than 30 years. Currently offering 20 models of chip inductors and 86 models of power inductors or common mode chokes, Bourns inductive components are used in a wide variety of applications including cellular phones, keyless entry, cable television, global positioning systems, DC/DC converters, and power supplies.

Bourns offers standard, off-the-shelf inductor products and special units designed for use in computer, communication, instrumentation, industrial, and medical applications. Products for telecom are designed to meet UL1950 and EN 90650 requirements.

Bourns offers 81 standard models of power inductors, with customer specific models available upon request. Twenty (20) non-shielded models are sized from 3mm to 22mm with current rating up to 35A, and 61 shielded models range from 2mm to 18mm, with current rating up to 50A. Bourns also offers 20 chip inductor models with four different design technologies including wirewound and multilayer.

### Inductors

Bourns products include surface mount chip inductors, power chokes, chip beads, chip bead arrays, as well as radial-leaded and axial-leaded inductors. These components are used in computer, communication, instrumentation, industrial, and medical applications.

### Transformers

Bourns transformer products are small reliable surface mount devices. They are found in computer, communication, instrumentation, industrial, and medical equipment in line matching, ISDN interface, and RF applications.

## Bourns Chip Inductors and Power Inductors

Construction	Series	Features	Benefits	Applications	
Chip Inductors	Multilayer Ceramic	CE CI	<ul style="list-style-type: none"> <li>• Small size</li> <li>• Self-resonant frequency (SRF) up to 6000KHz</li> <li>• Available in E12 decade values</li> </ul>	<ul style="list-style-type: none"> <li>• Conserves board space</li> <li>• Operates in RF circuits</li> <li>• Right value for the application</li> </ul>	<ul style="list-style-type: none"> <li>• Telecom</li> <li>• Video Circuits</li> <li>• Global Positioning Systems</li> </ul>
	Multilayer Ferrite	CF	<ul style="list-style-type: none"> <li>• High Q</li> <li>• Shielded</li> <li>• High current rating</li> </ul>	<ul style="list-style-type: none"> <li>• Greater efficiency</li> <li>• Minimizes EMI</li> <li>• Use in high power applications</li> </ul>	<ul style="list-style-type: none"> <li>• Computer</li> <li>• High-density Board Layouts</li> <li>• LAN</li> </ul>
		CS CV	<ul style="list-style-type: none"> <li>• High Q</li> <li>• Shielded</li> <li>• Small size</li> </ul>	<ul style="list-style-type: none"> <li>• Greater efficiency</li> <li>• Minimizes EMI</li> <li>• Conserves board space</li> </ul>	<ul style="list-style-type: none"> <li>• Computer</li> <li>• High-density Board Layouts</li> </ul>
	Wirewound	CM	<ul style="list-style-type: none"> <li>• Molded body</li> <li>• Wide inductance range (1nH to 1000µH)</li> </ul>	<ul style="list-style-type: none"> <li>• Resists heat and humidity</li> <li>• Design flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• LAN</li> <li>• Telecom</li> <li>• Modem</li> </ul>
CW		<ul style="list-style-type: none"> <li>• Very high Q</li> <li>• Small size</li> <li>• Cost-effective design</li> </ul>	<ul style="list-style-type: none"> <li>• Greater efficiency</li> <li>• Conserves board space</li> <li>• More economical</li> </ul>	<ul style="list-style-type: none"> <li>• Cellular Phones</li> <li>• Cable TV</li> <li>• VCRs</li> </ul>	
Power Inductors	Wirewound	SDR	<ul style="list-style-type: none"> <li>• Non-shielded</li> <li>• Wide inductance range (0.8µH to 15mH)</li> <li>• 14 models</li> </ul>	<ul style="list-style-type: none"> <li>• More economical</li> <li>• Design flexibility</li> <li>• Right choke for application</li> </ul>	<ul style="list-style-type: none"> <li>• Power Supplies</li> <li>• DC/DC Converters</li> <li>• Industrial Applications</li> </ul>
		SRR	<ul style="list-style-type: none"> <li>• Shielded</li> <li>• Wide inductance range (0.8µH to 15mH)</li> <li>• 15 models</li> </ul>	<ul style="list-style-type: none"> <li>• Minimizes EMI</li> <li>• Design flexibility</li> <li>• Right choke for application</li> </ul>	<ul style="list-style-type: none"> <li>• Power Supplies</li> <li>• DC/DC Converters</li> <li>• Industrial Applications</li> </ul>

## Bourns Chip Inductor Part Numbering System

	Structure	Model <sup>1</sup> (EIA Size)	Value Range	Current Range	Tolerance Codes
C: Chip Inductors	CE: Multilayer Ceramic	CE201210	1.5nH - 470nH	300mA	D: ±0.3nH; J: ±5%
	CI: Multilayer Ceramic	CI100505 (402), CI160808 (603), CI201210 (805)	1.0nH - 470nH	100mA - 300mA	D: ±0.3nH; J: ±5%
	CF: Multilayer Ferrite	CF252016 (1008), CF322513(1206), CF453215 (1812)	0.1µH - 33µH	70mA - 800mA	K: ±10%
	CS: Multilayer Ferrite	CS160808 (603), CS201212 (805), CS321613 (1206)	0.027µH - 33µH	5mA - 300mA	K: ±10%
	CM: Laser-cut Winding	CM100505 (402), CM160808 (603)	1.0nH - 100nH	140mA - 500mA	D: ±0.3nH; J: ±5%
	CM: Wirewound	CM201212 (805), CM252016 (1008), CM322522 (1206), CM453232 (1812)	0.01nH - 1000nH	30mA - 800mA	M: ±20%, K: ±10%
	CV: Multilayer Ferrite	CV201210	0.047µH - 33µH	5mA - 300mA	K: ±10%
CW: Wirewound	CW160808 (603), CW201212 (805), CW252016 (1008)	1.8nH - 4700nH	170mA - 700mA	M: ±20%, K: ±10%, J: ±5%	

<sup>1</sup> Six numbers after the two alpha characters indicate the size of the chip inductor in mm ( e.g. 100505 = 1.0 x 0.5 x 0.5 mm)

## Bourns Power Inductor Part Numbering System

	Structure	Model <sup>2</sup>	Value Range	Current Range	Tolerance Codes	Example
S: Power Inductors	SDR: Non-Shielded	SDR0302, SDR0403, SDR0503, SDR0602, SDR0603, SDR0604, SDR0703, SDR0805, SDR0906, SDR1005, SDR1006, SDR1030, SDR1045, SDR1105, SDR1305, SDR1307, SDR1806, SDR2207, SDR7030, SDR7045	0.8µH - 15mH	0.02A - 16A	M: ±20%, K: ±10%, J: ±5%, Y: ±15%	SDR0604-1R2M
	SRR: Shielded	SRR0603, SR0604, SRR0618, SRR0804, SRR0805, SRR0906, SRR0908, SRR1003, SRR1005, SRR1205, SRR1206, SRR1208, SRR1240, SRR1260, SRR1280, SRR1305, SRR1806, SRR3011, SRR4011, SRR6603, SRR7032, SRR7045	0.47µH - 15mH	0.04A - 20A	M: ±20%, Y: ±15%, K: ±10%, Z: ±25%	SRR1806-102M
	SRP: Shielded	SRP1040, SRP1045, SRP1050, SRP1055, SRP1204, SRP1205, SRP1206, SRP1235, SRP1250, SRP1255, SRP1280, SRP7030, SRP7050, SRP8040	0.1µH - 10µH	3A - 50A	M: ±20%, Y: ±15%	SRP1040-2R2M
	SRU: Shielded	SRU1028, SRU1038, SRU1048, SRU1063, SRU2009, SRU2011, SRU2013, SRU2016, SRU3009, SRU3011, SRU3014, SRU3028, SRU5011, SRU5016, SRU5018, SRU5028, SRU6011, SRU6013, SRU6025, SRU8028, SRU8043	0.8µH - 100µH	0.19A - 7.8A	Y: ±30%	SRU3028-680Y

<sup>2</sup> Four numbers after the three alpha characters indicate the length/diameter and height (e.g. SDR0604 = 6mm x 4mm). The only exception is SDR6603, which is 6.6mm x 3.0mm

## Bourns Type SRU Power Inductor Lab Kit Summary

Sample Kit Number	Models in Kit	Number of Values	Qty per Value
SRU10-LAB1	SRU1028, SRU1038, SRU1048	18 (6 per model)	3
SRU20-LAB1	SRU2009, SRU2013, SRU2016	18 (6 per model)	3
SRU30-LAB1	SRU3011, SRU3017, SRU3028	18 (6 per model)	3
SRU50-LAB1	SRU5011, SRU5018, SRU5028	18 (6 per model)	3
SRU60-LAB1	SRU6011, SRU6018, SRU6025	18 (6 per model)	3



### Experienced Magnetics Experts

When Bourns acquired J.W. Miller in May 2006, we added more than 80 years of magnetics experience to complement our nearly 40 years of offering magnetics products. The J.W. Miller brand name has become synonymous with high-quality inductors and magnetics solutions – both standard and custom – for a wide range of applications.

### Inductors Are Our Specialty

The Bourns/J.W. Miller line of high-quality coils, chokes, inductors, and transformers include both surface mount and through-hole configurations, but has an emphasis on inductors. Our breadth and depth of inductor selection is unmatched in the industry. Whether you need a chip inductor, power inductor, shielded power inductor, or a high current toroid inductor, Bourns/J.W. Miller has the solution.



### Custom Capabilities

Our products can be found in a variety of industries, ranging from consumer electronics (such as flat-panel entertainment displays) to dairy equipment, medical applications, and everything in between. This versatility has allowed Bourns/J.W. Miller to grow its custom capabilities to an unequalled level in the industry. Our engineers are ready to discuss your custom device requirement.

### Engineering Support

The Bourns/J.W. Miller engineering team can provide assistance from the initial design phase, to samples, to prototypes, to production. We can recommend the most suitable device for high-frequency applications or components with special magnetic shielding to reduce radiation emissions. Our assistance early in the design cycle ensures that the electronics components selected will provide the best performance possible for each individual application.

### Meeting New Market Demands

Meeting changing market demands with continual product innovations has played an important role in our long history of success. New products such as the SRP series of high-current power inductors, or the 200°C-rated high-temperature, high-current toroidal inductor, are just two recent examples of our product innovation capabilities. Bourns/J.W. Miller is committed to meeting future technology requirements that provide optimal performance.



## J.W. Miller Magnetic Products

Product	Series	Features & Benefits	Applications
Surface Mount High Current Ferrite Chip Beads	PM2000	<ul style="list-style-type: none"> <li>High current capacity up to 5A</li> <li>Low DC resistance</li> <li>Low cost</li> </ul>	EMI Suppression, Cordless Phones, Handheld Organizers, High-frequency Wireless Communication Devices, Computer Peripherals, Printers, Network Cards, Industrial Electronics, Electronic Entertainment Devices
Surface Mount Multi-Six Pack, Inductors and Transformers	PM600, PM610, PM620	<ul style="list-style-type: none"> <li>Six windings offer many inductor or transformer configurations</li> <li>High magnetic coupling</li> <li>Non-gapped and gapped core construction</li> <li>Low noise radiation</li> <li>Compact size and low profile</li> </ul>	<b>Inductors:</b> Buck, Boost, Buck-boost, Coupled, Input, Output, Choke, Filter, Resonant, High Q, EMI/ RFI Filtering, Differential Forward Common Mode <b>Transformers:</b> Flyback, Forward, Push-pull, Bridge, Multiple Outputs, Inverter, Step-up, Step-down, Gate Drive, Base Drive, Signal, Wide Band, Pulse, Impedance, Isolation, Converter
Surface Mount Inductors and Transformers	PM3602, PM3604	<ul style="list-style-type: none"> <li>Two independent windings that can be used as an inductor or transformer</li> <li>Windings can be connected externally in parallel or in series</li> <li>Toroid coil for low radiation</li> </ul>	PDA, Flash Memory, Notebook Computers, Battery Chargers, DC/DC Converters, Network Cards
Surface Mount, CCFL Inverter Transformers	PM61300	<ul style="list-style-type: none"> <li>6W rated power</li> </ul>	LCD Flat Panel Displays, Notebook/Palmtop Computers, Portable Instruments, Automotive, Retail Terminals
Surface Mount Chip Inductors	PM1008S, PM1210H	<ul style="list-style-type: none"> <li>EMI filtering</li> <li>Used at resonant circuit</li> <li>Superior reliability</li> <li>High self-resonant frequency</li> </ul>	Cellular Phones, PDA, Pagers, Hand-held Organizers, High-frequency Wireless Communication Devices, Notebook Computers, Printers, Network Cards, Industrial Electronics, Electronic Entertainment Devices
Surface Mount Power Inductors	PM3308, PM3340, PM74SB, PM125S	<ul style="list-style-type: none"> <li>EMI filtering (Used at switching converters)</li> <li>High current carrying capability</li> <li>Low loss ferrite core for high frequency applications</li> </ul>	Cell Phones, PDA, Flash Memory Programmers, Notebook Computers, Battery Chargers, DC/DC Converters, Network Cards, Switching Boards, Industrial Electronics, Electronic Entertainment Devices
Surface Mount High Current Toroidal Inductors	PM2110, PM2120	<ul style="list-style-type: none"> <li>EMI filtering, Low radiation</li> <li>Energy storage for switching converters</li> <li>High current carrying capability</li> </ul>	EMI Filtering, Output Chokes, Smoothing Coils, Power Storage for Switch Mode Power Supplies
Conformal Coated Axial Inductors	77F, 78F, 8230, 5300	<ul style="list-style-type: none"> <li>High Q, ideal for use in resonant circuits</li> <li>Epoxy dipped construction to protect from harsh environments</li> </ul>	Telecommunication, Signal Processing, Computer Peripherals, Network Routers, Data Switchers, Consumer Electronics: Audio, CB & Radios, TV, VCR, DVD, DSS Set-top Boxes, Car Navigation Systems, Game Consoles
Radial Leaded Inductors	RL110, RL110S, RL855, RL875, RL875S, RL895	<ul style="list-style-type: none"> <li>EMI filtering, Low cost</li> <li>Power storage for switching converters</li> <li>High current carrying capability</li> <li>RL110S, RL875S magnetic shielded construction for low radiation</li> </ul>	
Universal Wound, Varnished Inductors	70F, 73F, 74F, 4600, 6300	<ul style="list-style-type: none"> <li>Wide inductance range</li> <li>High self-resonant frequency</li> <li>High Q, ideal for use in resonant circuits</li> <li>High voltage handling capability</li> <li>Varnish coated for coil protection</li> </ul>	Transmitters and Receivers, LC Resonant Circuit, Global Positioning Systems, Consumer Electronics: Audio, CB & Radios, TV, VCR, DVD, DSS Set-top Boxes, Car Navigation Systems, Game Consoles
High Current Inductor and Hash Chokes	1110, 1120, 1130, 1140, 5200, 5500, 5600, 5800, 5900	<ul style="list-style-type: none"> <li>EMI filtering</li> <li>Power storage for switching converters</li> <li>High current carrying capability</li> <li>Varnish or heat shrink tubing to protect winding</li> </ul>	EMI Filtering, Output Chokes, Smoothing Coils, Power Storage for Switch Mode Power Supplies
Toroidal Inductors	2000, 2100, 2200, 2300, 2100HT, 2200HT, 2300HT, 5700, 6700, 7000	<ul style="list-style-type: none"> <li>EMI filtering, Low radiation energy storage for switching converters</li> <li>High current carrying capability</li> <li>2100HT, 2200HT, 2300HT: High-temperature application up to 200°C</li> </ul>	EMI Filtering, Output Chokes, Smoothing Coils, Power Storage for Switch Mode Power Supplies



### Unsurpassed Service

At KEMET, our components are passive. Our company is anything but.

You simply won't find an electronic components manufacturer more passionate about customer service, more determined to find new technological solutions to customer problems, and more committed to product quality and on-time delivery, for the lowest total cost of ownership possible. It's how we've helped customers succeed for more than 85 years, and how we're helping them succeed today.

KEMET components are fundamental elements used in every type of electronic equipment, including computers, telecommunication, automotive electronics, military electronics, medical electronics, and consumer electronics.

### Surface Mount Inductors

KEMET offers a full line of multilayer and wirewound surface mount inductors. These components are used in a variety of industries, including telecom, computers, entertainment, industrial and networking. Products include shielded power inductors, chip inductors for conductive noise suppression in power and signal lines, as well as RF inductors for frequency matching.

KEMET inductors are made with leading edge material technology and precision manufacturing processes. This can make a significant difference in a circuit.

### EMI Supression

As the electronics industry continues the trend towards miniaturization and increased functionality, issues with electro magnetic interference (EMI) continue to increase. As regulatory requirements tighten, engineers must pay close attention to emissions their products create.

KEMET offers a high-quality line of ferrite beads to combat radiant noise in both power lines and signal lines. Offered in both standard and high current versions, these ferrite beads are available in case sizes as small as 0201(BK).



## KEMET Inductors

Application	Construction	Series	Sizes	Comments
Filtering on Signal Line	Multilayer	LK	0402 to 0805	High Q, low inductance values, small case sizes
	Wirewound	LBM	0806	High Q, high inductance values, narrow tolerance achieved with bottom surface electrodes
Noise Reduction on Power Supply Line	Multilayer	CK	0603, 0805	Multilayer block structure yields higher reliability
	Wirewound	LB	0603 to 1207	Available with super low DC resistance (LBR) and high current ratings
		LBC	0805 to 1007	High current
		LBMF	0603	High efficiency design with bottom surface electrodes
Power Inductor for Switching Regulator	Multilayer	CKP	1008, 1206	Low profile, low DC resistance
	Wirewound	CBL	0805	Low Profile, high current
		CBMF	0603	High efficiency design with bottom surface electrodes
		CB	0805 to 1007	Low DC resistance
		CBC	0805 to 1210	High Current
		NR	3010 to 10050	High current, low profile, original magnetically shielded, shock-proof structure
Radio Frequency Inductor	Multilayer	HK	0201 to 0805	Designed for applications above 100MHz, low inductance values, excellent Q and SRF properties



## KEMET Ferrite Beads

Application	Construction	Series	Sizes	Comments
EMI Suppression (Ferrite Beads)	Multilayer	BK	0201 - 0805	Wide range of material types and broad impedance range targeted for signal lines
		BKP	0402 - 0805	For power lines, low DC resistance
	Wirewound	FBMH	0603 - 1812	High current & impedance
		FBMJ	0603 - 1806	High current, several material combinations available to target specific frequency ranges



## Advancing Technology

As you search for new products to solve your design problem and fit your production schedule, look to KOA Speer Electronics. Through product addition and leading edge designs, we have significantly expanded our surface mount magnetic line to include molded wirewound, thin film, high Q, power, multilayer ferrite inductors, choke coils, spring chips, ferrite beads, three-terminal capacitors, capacitor/resistor and capacitor/inductor chips. Our magnetic line addresses specific applications including line filtering and signal smoothing applications, high-frequency line filtering applications, DC/DC power conversion and power supply, and reduce noise at high frequencies. All of these new surface mount products feature the smallest size and highest performance available. And they come with the same great quality, delivery, and technical support you expect from KOA Speer Electronics.

## Magnetics

### Wirewound

KQ series (0402 to 1008 sizes), utilizing wirewound technology, is useful in high-density surface mount applications, offers a high Q and low DC resistance and are designed for low loss, high output and low power consumption. They are ideal for use in high frequency applications in the computer and telecommunications industries, portable wireless equipment and power amplifiers. KL32, 1210 molded wirewound inductor with its flat top allows for better, more accurate pick and placement for the utilization in high frequency line filtering and signal smoothing applications. High Q is achieved by the wirewound structure and is ideal for high density mounting and addresses the size and weight concerns for a wide variety of uses in electronics equipment including automotive, telecommunications, and computers.



### Multilayer

MCL and MHL series utilize multilayer technology to eliminate cross-talk and ensure high reliability through a wide temperature and humidity range. Sizes range from 0402 to 1206 with a nickel barrier and solder overcoat that allows for solderability and solder leach resistance. All styles are designed with superior termination bonding strength and are ideal for noise suppression at high frequencies.



### Thin Film

KL73 thin film chip inductors, with chip sizes ranging from 0201 to 1206, provide a narrow inductance deviation with a complete range of inductance values. It is ideal for use in high volume and small size applications and is an excellent choice for high frequency circuit matching applications such as computers, telecommunications, and SAW filters.

### Power

LPC (offered in five sizes: 4045 to 12065) and SDR (0604 to 1006) wirewound power type, SDS (0804 to 1208), power choke coil series, are ideal for DC/DC power conversions and are designed for use in power applications where high current handling capabilities and small package are required. The PL3225 high current type power choke coil can achieve high inductance while maintaining electrical performance, all in a very low profile package. KS mountable spring type inductor, with a wide range of sizes (2004 to 3007) and an extremely high Q, offers low DC resistance, large allowable current, and high SRF. The

SLF0905 surface mounting type thin and common mode choke coil provides superior filtering performance without distorting the signal.

### EMI/RFI Filtering

CZB and CZP multilayer ferrite beads are magnetically-shielded and designed to reduce noise at high frequencies. Standard EIA packages include 0402 to 1206. KGM three-terminal capacitors (0603 to 1206) allow it to perform large attenuation at high frequencies, offer small size and high rated DC current with plated terminal that provide excellent solder resistance. KC series, a three-terminal capacitor/inductor noise filter, offer sharper cut-off characteristics for noise reduction in data lines, perform with little reflection and exceptional EMI attenuation for a wide frequency band, and are available in three sizes: 0603, 0805, and 1206. KCR1206 series three-terminal capacitor/resistor chip filter drives radiated noise to ground and performs in circumstances in which the ground condition is unstable. The chip is designed for use in high-speed (1MHz to 100MHz) data line applications for reflecting wave prevention, overshoot and undershoot correction, and also noise reduction in interface lines for clock lines in digital equipment. FBA1J4 multilayer ferrite chip bead arrays have an insulation resistance of 1GΩ and are designed for suppressing noise in signal I/O lines featuring multiple circuits in a single package.



## KOA Inductors

	Construction	Series	Features	Benefits	Applications
Inductors	Wirewound Ferrite Core	KL32	<ul style="list-style-type: none"> <li>Epoxy molded, flameproof</li> <li>Available from 0.005<math>\mu</math>H - 330<math>\mu</math>H</li> <li>Self-resonant from 5MHz - 2.7GHz</li> <li>Q Factor: 11 - 30</li> </ul>	<ul style="list-style-type: none"> <li>Flat top design allows for better, more accurate pick &amp; placement</li> <li>Can be utilized as a drop in replacement for competitor parts</li> </ul>	<ul style="list-style-type: none"> <li>Line Filtering and Signal Smoothing Applications</li> <li>Automotive</li> <li>Computer</li> <li>Consumer</li> </ul>
	Wirewound Aircore	KQ	<ul style="list-style-type: none"> <li>Nominal Inductance: 1.0nH - 100mH</li> <li>Operating Temp. Range: -40°C to 125°C</li> <li>Q Factor: 15 - 65</li> </ul>	<ul style="list-style-type: none"> <li>High Q and self-resonant frequency</li> <li>Flat top design offers excellent mountability, solderability, and reliability</li> </ul>	<ul style="list-style-type: none"> <li>For Movable Wireless Equipment and Power Amplifier Circuit</li> </ul>
	High Current Wirewound Aircore	KQC	<ul style="list-style-type: none"> <li>Nominal Inductance: 1.2nH - 27nH</li> <li>DC Current: 0.90A - 2.30A</li> <li>DC Resistance Max.: 0.020<math>\Omega</math> - 0.120<math>\Omega</math></li> </ul>	<ul style="list-style-type: none"> <li>Low DC resistance &amp; high allowable DC current</li> <li>Low profile style 0.027" typical</li> </ul>	<ul style="list-style-type: none"> <li>Telecommunications Equipment</li> <li>Mobile Phone</li> </ul>
	Thin Film	KL73	<ul style="list-style-type: none"> <li>Inductance: 0.56nH - 100nH</li> <li>Self resonant up to 14GHz</li> </ul>	<ul style="list-style-type: none"> <li>Smaller sizes allows for high density mounting</li> <li>Ideal for high frequency requirements</li> </ul>	<ul style="list-style-type: none"> <li>High-frequency Line Filtering</li> <li>Computer</li> <li>Telecommunications</li> </ul>
	Multilayer Ferrite	MCL & MHL	<ul style="list-style-type: none"> <li>MCL: Nominal Inductance: 0.047<math>\mu</math>H - 33<math>\mu</math>H</li> <li>Q Factor: 10 - 50</li> <li>MHL: Nominal Inductance: 1.0nH - R12nH</li> <li>Q Factor: 8 - 12</li> </ul>	<ul style="list-style-type: none"> <li>Monolithic structure provides high reliability in a wide temperature and humidity range</li> <li>Superior termination bond strengthening</li> </ul>	<ul style="list-style-type: none"> <li>Designed to Reduce Noise at High Frequencies</li> <li>Sound &amp; Video Cards</li> <li>Cellular Phones</li> <li>Radar Detectors</li> </ul>
	Wirewound Power Type	LPC	<ul style="list-style-type: none"> <li>Inductance: 680nH - 6.8mH</li> <li>Q Factor: 10 - 40</li> <li>DC Current: 120mA - 10A</li> </ul>	<ul style="list-style-type: none"> <li>Variable sizes offered</li> <li>Custom configurations are available</li> </ul>	<ul style="list-style-type: none"> <li>DC/DC Conversion</li> <li>Power Supply Applications</li> </ul>
	Wirewound Power Type	SDR	<ul style="list-style-type: none"> <li>Nominal Inductance: 10<math>\mu</math>H - 820<math>\mu</math>H</li> <li>DC Resistance Max.: 0.6<math>\Omega</math> - 2.55<math>\Omega</math></li> <li>Allowable DC Current Max.: 0.24A - 2.60A</li> </ul>	<ul style="list-style-type: none"> <li>Low DC resistance</li> <li>High current capability up to 2A</li> <li>Suitable for reflow soldering</li> </ul>	
	Power Choke Coil Type	SDS	<ul style="list-style-type: none"> <li>Nominal Inductance @ 1KHz: 2.2<math>\mu</math>H - 15,000<math>\mu</math>H</li> <li>DC Resistance: 0.027<math>\Omega</math> - 1,700<math>\Omega</math></li> </ul>	<ul style="list-style-type: none"> <li>Excellent combination of low DC resistance to high inductance and high current ratings</li> </ul>	<ul style="list-style-type: none"> <li>DC/DC Conversion</li> <li>LCD Displays</li> <li>Digital Cameras</li> </ul>
	Planar Type	PL	<ul style="list-style-type: none"> <li>Nominal Inductance: 1.1<math>\mu</math>H - 5.1<math>\mu</math>H</li> <li>DC Resistance Max.: 0.11<math>\Omega</math> - 0.60<math>\Omega</math></li> <li>Measured Frequency: 1MHz</li> </ul>	<ul style="list-style-type: none"> <li>Extremely low profile (0.5<math>\pm</math>0.1mm in 3.2mm x 2.5mm size)</li> <li>High current type with allowable current 800mA</li> <li>Eddy current loss is suppressed by a proprietary structural design</li> </ul>	<ul style="list-style-type: none"> <li>DC/DC Converter and Power Modules for Cellular Phones, DSC, DVC, PDAs</li> </ul>
	Spring Chip Type	KS	<ul style="list-style-type: none"> <li>Nominal Inductance: 5.6nH - 33nH</li> <li>DC Resistance Max.: 10m<math>\Omega</math> - 40m<math>\Omega</math></li> <li>SRF: 2.0GHz - 5.0GHz</li> </ul>	<ul style="list-style-type: none"> <li>Low DC resistance/large allowable current</li> <li>High SRF and excellent high frequency characteristics</li> <li>Mountable spring type inductor with high Q</li> </ul>	<ul style="list-style-type: none"> <li>High-frequency Circuits of Portable Wireless Equipment</li> </ul>
Common Mode Choke Type	SLF	<ul style="list-style-type: none"> <li>Nominal Inductance: 10<math>\mu</math>H - 2,000<math>\mu</math>H</li> <li>DC Resistance Max.: 80m<math>\Omega</math> - 420m<math>\Omega</math></li> </ul>	<ul style="list-style-type: none"> <li>Surface mounting type thin and common mode choke coil</li> </ul>	<ul style="list-style-type: none"> <li>Power Supply and Noise Clearance on Signal Line</li> </ul>	
Ferrite Beads	Ferrite Beads Standard & Power	CZB & CZP	<ul style="list-style-type: none"> <li>Impedance @ 100MHz: 10<math>\Omega</math> - 2,200<math>\Omega</math></li> <li>DC Resistance Max.: 0.02<math>\Omega</math> - 1.5<math>\Omega</math></li> <li>Allowable DC Current Max.: 50mA - 3,000mA</li> </ul>	<ul style="list-style-type: none"> <li>Ideal for reducing noise at high frequencies</li> <li>Magnetic field internal to part</li> <li>Excellent solderability—nickel barrier with solder overcoat</li> </ul>	<ul style="list-style-type: none"> <li>Noise Suppression</li> <li>Vehicle Navigation Systems</li> <li>Data Communications Industries</li> <li>Sound &amp; Video Cards</li> </ul>
	Ferrite Bead Array	FBA	<ul style="list-style-type: none"> <li>Impedance @ 100MHz: 30<math>\Omega</math> - 1000<math>\Omega</math></li> <li>DC Resistance Max.: 0.1<math>\Omega</math> - 7<math>\Omega</math></li> <li>Allowable DC Current Max.: 100mA - 400mA</li> <li>Operating Temperature: -55°C to 125°C</li> </ul>	<ul style="list-style-type: none"> <li>Noise suppression in signal I/O lines and circuits requiring multiple chip beads</li> <li>Multiple circuits in a single package</li> <li>Standard or high speed characteristics</li> </ul>	<ul style="list-style-type: none"> <li>Telecommunications</li> <li>Data Communications Industries</li> <li>Computer</li> </ul>
Three-Terminal	Three-Terminal Capacitor	KGM	<ul style="list-style-type: none"> <li>Capacitance Range: 22pF - 100,000pF</li> <li>Rated Voltage DC: 16V - 50V</li> <li>Temperature Range: -25°C to 85°C</li> </ul>	<ul style="list-style-type: none"> <li>Low ESL performs large attenuation at high frequencies</li> <li>Small size, high rated DC current</li> </ul>	<ul style="list-style-type: none"> <li>Noise Reduction for OA and FA Equipment</li> <li>DC Power Line</li> <li>Vcc Line for Gate Array</li> </ul>
	Three-Terminal Capacitor/Resistor	KCR	<ul style="list-style-type: none"> <li>Capacitance Range: 22pF - 220pF</li> <li>Resistance: 50<math>\Omega</math>, 100<math>\Omega</math></li> <li>Power Rating: 1/16W</li> </ul>	<ul style="list-style-type: none"> <li>Improved reduction of radiated noise</li> <li>Capacitor/resistor filter</li> <li>Noise reduction in a variety of circuits</li> </ul>	<ul style="list-style-type: none"> <li>Noise Reduction in a Variety of Circuits in Computer, Telecommunications, and Networking Industries</li> </ul>
	Three-Terminal Inductor/Capacitor	KC	<ul style="list-style-type: none"> <li>Capacitance Range: 9.5pF - 340pF</li> <li>Inductance Range: 3.0nH - 67nH</li> <li>Rated Current DC: 200mA</li> </ul>	<ul style="list-style-type: none"> <li>Shaper cut-off characteristics for noise reduction</li> <li>Exceptional EMI attenuation for a wide frequency band</li> </ul>	<ul style="list-style-type: none"> <li>Noise Reduction for Signal Circuits, Clock Output Signal Line, In/Out Video Line (for Extremely High Resolution)</li> </ul>

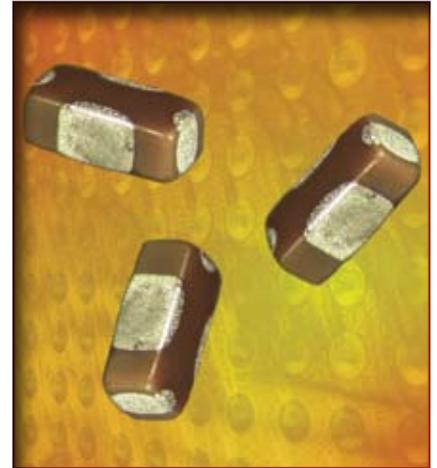


### Committed to Quality and Development

Murata Electronics is a global leader in the design, manufacture, and sale of ceramic-based passive electronic components and modules. Committed to the development of advanced electronic materials and leading edge, multi-functional, high-density modules, Murata utilizes gallium arsenide (GaAs) and multilayer LTCC technology as core components of next generation products.

### EMI Suppression Products

As requirements continue to tighten regarding electromagnetic compatibility (EMC), design engineers are forced to pay closer attention to the emissions created by their products. High-frequency noise, common mode noise and high-voltage surge are all indicative of electromagnetic interference (EMI). The emissions are highly damaging to electronic equipment as well as its components. Committed to the development of leading edge products, Murata has combined its ceramic dielectric and ferrite technologies to produce high-performance EMI suppression filters to combat this problem.



Murata's EMI suppression filter line consists of the following products: ferrite beads and terminal capacitors for high-frequency noise suppression, as well as common mode chokes for common mode noise suppression. These products have the ability to handle electromagnetic interference without signal distortion, which places these filters a step above others in its class.

### Surface Mount Inductors

Murata Electronics, a world leading innovator in electronics manufactures a full line of magnetic products, which includes the most extensive offering of surface mount inductors. These devices are used in a wide variety of applications in a wide range of markets including networking, telecommunications, and computers and peripherals.



## Murata Chip Inductors

Construction		Series	Features	Benefits	Applications	
Chip Inductors	Monolithic	Ferrite	LQM18F, LQM18N, LQM21N LQM21D, LQM21F, LQM21P, LQM31F, LQM31P	<ul style="list-style-type: none"> <li>• Magnetically shielded</li> <li>• Cost effective</li> <li>• Compact size</li> </ul>	<ul style="list-style-type: none"> <li>• Lower emissions</li> <li>• High-density mounting</li> </ul>	<ul style="list-style-type: none"> <li>• Computer Peripherals</li> <li>• Test Equipment</li> <li>• Networking Devices</li> </ul>
		Ceramic	LQG15H, LQG18H	<ul style="list-style-type: none"> <li>• High Q at high frequencies</li> <li>• Cost effective</li> <li>• Compact size</li> </ul>	<ul style="list-style-type: none"> <li>• Better bandwidth</li> <li>• Ideal for RF circuits</li> <li>• High-density mounting</li> </ul>	<ul style="list-style-type: none"> <li>• Wireless Devices · PDA</li> <li>• WLAN · Telecom</li> </ul>
	Film	LQP02T, LQP03T, LQP15M,	<ul style="list-style-type: none"> <li>• Tight tolerance</li> <li>• Ultra low profile</li> <li>• High self resonance freq.</li> </ul>	<ul style="list-style-type: none"> <li>• Tuning not required</li> <li>• Excellent for impedance matching</li> <li>• Compact size 0201</li> </ul>	<ul style="list-style-type: none"> <li>• PA Modules</li> <li>• GPS · Pager</li> <li>• Wireless Devices</li> </ul>	
	Wirewound	Ferrite	LQH2MC, LQH3NP, LQH31M, LQH32M, LQH32P, LQH43M, LQH3ER, LQH31C, LQH32C, LQH43C, LQH55D, LQH66S	<ul style="list-style-type: none"> <li>• Wide inductance range</li> <li>• Low DCR</li> <li>• High rated current</li> </ul>	<ul style="list-style-type: none"> <li>• Less voltage drop, heat and power consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Computer Peripherals</li> <li>• Power Supplies</li> <li>• Networking Equipment</li> </ul>
Ceramic		LQW15A, LQW18A, LQW2BH, LQW31H, LQH31H	<ul style="list-style-type: none"> <li>• High Q at high frequencies</li> <li>• Low DCR</li> <li>• Compact size</li> </ul>	<ul style="list-style-type: none"> <li>• Better bandwidth</li> <li>• Less voltage drop, heat and power consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Wireless Devices</li> <li>• WLAN · PDA · Telecom</li> </ul>	

## Murata Chip Inductor Part Numbering System

LQ	W	15	A	N	4N7	C	0	0	L
	Structure	Dimension	Applications	Category	Inductance	Tolerance	Features	Electrode	Packaging
Surface Mount Inductors	G: Multilayer (Air Core) H: Winding (Ferrite Core) M: Multilayer (Ferrite Core) P: Film Type W: Winding Type (Air Core)	02: 0.4 x 0.2mm 03: 0.6 x 0.3mm 15: 1.0 x 0.5mm 18: 1.6 x 0.8mm 21: 2.0 x 1.25mm 2B: 2.0 x 1.5mm 31: 3.2 x 1.6mm 32: 3.2 x 2.5mm 3E: 3.5 x 3.2mm 43: 4.5 x 3.2mm 55: 5.7 x 5.0mm 66: 6.3 x 6.3mm	H: High Q Type N: Resonant Circuit D: Choke Circuit F: Choke Circuit M: Film Type A: High Q Type	N: Standard H: Automotive	4N7: 4.7nH	B: ±0.1nH C: ±0.2nH D: ±0.5nH G: ±2% H: ±3% J: ±5% K: ±10% M: ±20% N: ±30% S: ±0.3nH W: ±0.5nH	0: Standard	0: Solder Plating 2: Sn Plating	L: 7" Tape K: 13" Tape B: Bulk

## Murata Ferrite Beads

Series	Features	Applications
BLMxxA	<ul style="list-style-type: none"> <li>• Suitable for flow and reflow soldering</li> <li>• Wide temperature range</li> <li>• High impedance characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• I/O Ports</li> <li>• DC Power Lines</li> <li>• Signal Lines</li> </ul>
BLMxxB	<ul style="list-style-type: none"> <li>• Designed for operating frequencies from 10MHz to 100MHz</li> <li>• High impedance characteristics</li> <li>• Small size</li> <li>• Low DSR</li> <li>• Suitable for flow and reflow soldering</li> </ul>	<ul style="list-style-type: none"> <li>• Computers and Peripheral Equipment</li> <li>• Consumer Products</li> <li>• High-speed Circuits</li> <li>• Suitable for Circuits with Unstable Grounds</li> </ul>
BLMxxE	<ul style="list-style-type: none"> <li>• For GHz range with low DC resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Notebook Computers</li> <li>• Cellular Phones</li> </ul>
BLMxxG	<ul style="list-style-type: none"> <li>• High GHz band general use</li> </ul>	<ul style="list-style-type: none"> <li>• Computers</li> <li>• High-speed Digital Equipment</li> <li>• WLAN</li> </ul>
BLMxxH	<ul style="list-style-type: none"> <li>• High impedance in the GHz range</li> <li>• Small size</li> <li>• Suitable for circuits with unstable ground</li> </ul>	<ul style="list-style-type: none"> <li>• Computers and Peripherals</li> <li>• High-speed Circuits</li> </ul>
BLMxxP	<ul style="list-style-type: none"> <li>• Suitable for high frequency noise suppression over a wide frequency range</li> <li>• Current rating up to 6A</li> <li>• Small size</li> <li>• Low DSR</li> </ul>	<ul style="list-style-type: none"> <li>• High-current DC Power Lines</li> <li>• Circuits where a Stable Ground is Unavailable</li> </ul>
BLMxxR	<ul style="list-style-type: none"> <li>• Low signal distortion</li> <li>• Small size</li> <li>• High impedance characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Digital Interface Circuits</li> </ul>

## Murata Ferrite Bead Part Numbering System

BL	M	15	AG	100	S	N	1	L
	Type	Dimensions	Characteristics	Impedance	Performance	Category	Circuits	Packaging
Ferrite Beads	A: Array M: Monolithic	02: 01005 03: 0201 15: 0402 18: 0603 21: 0805 31: 1206 41: 1806	A: General Use B: High-speed Signal Lines P: Power Lines RK: Digital Interface HG: For GHz Band General Use HD: For GHz Band High-speed Signal Lines EG: For GHz Band General Use (Low DCR)	100: 10Ω	S: Sn Plating	N: STD F: For Automotive Electronics Use	1: 1 Circuit 4: 2 Circuits	K: 13" Plastic Reel L: 7" Plastic Reel D: 7" Paper Reel J: 13" Paper Reel B: Bulk



# Panasonic

## ideas for life

### Innovation And Quality

Panasonic Industrial Company's Electronic Components Division is one of the industry's largest suppliers of standard and custom electronic components. Our wide product offering, coupled with our global manufacturing and sales capabilities, as well as our commitment to customer service make us a preferred vendor to the world's most famous original equipment manufacturers of high-tech electronic products.

From the smallest resistor to the highest technology wireless communications modules, Panasonic offers it all. Choosing Panasonic means more than selecting a name you know and trust. It means choosing the best quality components the industry can offer.

Panasonic provides components and design solutions to leading manufacturers in the consumer electronics, telecommunications, computer, and home appliance industries, among others.

Panasonic provides a wide range of chip bead core and bead core array products to meet all your noise suppression needs.

### Inductors

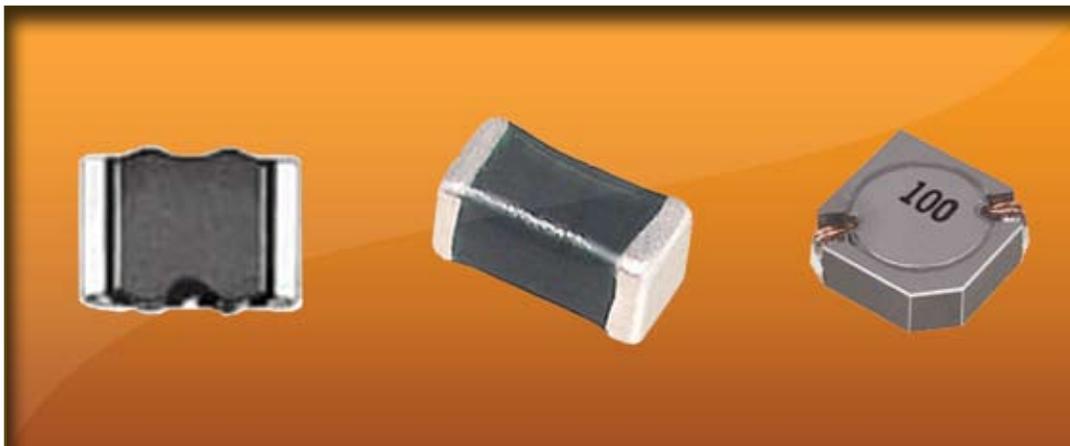
Panasonic's surface mount inductors offer you a wide range of choices of inductance values, case sizes, Q factors, and current capabilities.

### Choke Coils

Panasonic's surface mount choke coils offer you a wide range of technology choices, inductance values, current capabilities, and all having low DC resistance to meet your most demanding applications.

### EMI Suppression

Panasonic's inductive-type filtering components offer you a wide range of options to help you minimize the effects of transients, spurious signals, and electromagnetic interference propagation.



## Panasonic Chip Inductors, Choke Coils and Ferrite Beads

Product	Series	Features	Benefits	Applications	
Ferrite Beads	Chip	EXC-3B, EXC-CL, EXC-ML	<ul style="list-style-type: none"> <li>Effective noise suppression for power line or high-speed signal line</li> <li>Price effective</li> </ul>	<ul style="list-style-type: none"> <li>High impedance for high-speed signal lines</li> <li>Low DC resistance for power line</li> </ul>	<ul style="list-style-type: none"> <li>Computer Peripherals</li> <li>Power Supply Equipment</li> <li>Networking Equipment</li> </ul>
	Common Mode Noise Filter Chip	EXC-24CE, EXC-24CG	<ul style="list-style-type: none"> <li>Common mode noise suppression</li> <li>Magnetic field</li> </ul>	<ul style="list-style-type: none"> <li>Effective noise suppression</li> <li>Small size and light weight</li> </ul>	<ul style="list-style-type: none"> <li>Digital Audio</li> <li>Video Equipment</li> <li>Personal Computer</li> </ul>
	2 Mode Noise Filter Chip	EXC-24CB, EXC-24CP	<ul style="list-style-type: none"> <li>Burst noise suppression</li> <li>Suppress both common mode noise and normal mode noise</li> </ul>	<ul style="list-style-type: none"> <li>Acoustic quality improvement of mobile phone and portable audio equipment</li> <li>Small size and light weight</li> </ul>	<ul style="list-style-type: none"> <li>Receiver, Speaker, Microphone, and Headset Lines of Mobile Phone</li> <li>Digital Audio</li> <li>Video Equipment</li> </ul>
	Chip Bead Array	EXC-28B	<ul style="list-style-type: none"> <li>Effective noise suppression for high-speed signal line</li> <li>Low cross talk characteristics</li> </ul>	<ul style="list-style-type: none"> <li>High impedance for high-speed signal line</li> <li>Small size and light weight</li> </ul>	<ul style="list-style-type: none"> <li>Digital Equipment</li> <li>PCs and Peripherals</li> <li>Digital Audio</li> <li>Video Equipment</li> </ul>
SMD Chip Inductors	Non-Magnetic Ceramic Core	ELJ-RF, ELJ-RE, ELJ-PF, ELL-PE, ELJ-QF	<ul style="list-style-type: none"> <li>Low inductance</li> <li>Tight tolerance</li> <li>Stable L value</li> </ul>	<ul style="list-style-type: none"> <li>Compact size</li> <li>Cost effective</li> <li>High Q</li> </ul>	<ul style="list-style-type: none"> <li>High Frequency</li> </ul>
	Wirewound	ELJ-FC, ELJ-FA, ELJ-SA, EJ-FB	<ul style="list-style-type: none"> <li>Wide range of commonly used values</li> </ul>	<ul style="list-style-type: none"> <li>Suitable for various applications</li> </ul>	<ul style="list-style-type: none"> <li>General Use</li> </ul>
	Wirewound High Current	ELJ-PF, ELJ-PC, ELJ-PA, ELJ-PB	<ul style="list-style-type: none"> <li>Large DC current capability</li> </ul>	<ul style="list-style-type: none"> <li>Suitable as choke coils in power line applications</li> </ul>	<ul style="list-style-type: none"> <li>High Power</li> </ul>
	Wirewound Low RDC	ELJ-EA	<ul style="list-style-type: none"> <li>Low DC resistance</li> </ul>	<ul style="list-style-type: none"> <li>Suitable as choke coils in power line applications</li> </ul>	<ul style="list-style-type: none"> <li>Low DC Resistance</li> </ul>
SMD Choke Coils	Magnetic Shielded Type	ELL-6xH, ELL-ATV/CTV, ELL-VEG/VFG/VGG, ELL-4FG-A/4GG/4LG-A, ELL-SFG, ELC-6GN, ELL-5PS, ELL-6PG	<ul style="list-style-type: none"> <li>Wide range of compact sizes</li> <li>Current ratings</li> <li>Low DC resistance</li> </ul>	<ul style="list-style-type: none"> <li>Suitable for various portable applications</li> </ul>	<ul style="list-style-type: none"> <li>Communication</li> <li>PC &amp; Peripherals</li> </ul>
SMD Power Choke Coils	1 Flat Coil/Metal Composite Core 2 Edgewise Coil/New Dust Core 3 Edgewise Coil/New Dust Core 4 Edgewise Coil/New Dust Core 5 Spiral Coil w/Flat Wire/New Dust Core 6 Spiral Core w/Flat Wire/Mn Core	1 ETQ-P4LxxxWFC (M104L) 2 ETQ-P3HxxxBFA (D124H) 3 ETQ-P2HxxxBFA (D125H) 4 ETQ-P1HxxxBFA (D126H) 5 ETQ-P1HxxxBFA (D126F) 6 ETQ-P6FxxxFA (F126F) 7 ETQ-PAFxxxFA (F179F) ETQ-P5MxxxYFx ETQ-P5LxxxFA	<ul style="list-style-type: none"> <li>Low DC Resistance,</li> <li>High saturation currents</li> </ul>	<ul style="list-style-type: none"> <li>Less loss</li> <li>Lower self heating</li> </ul>	<ul style="list-style-type: none"> <li>S.M.P.S. Converters</li> </ul>

### Panasonic SMD Chip Inductor Part Numbering System

ELJ	FA	221	J	F
Prefix	Series	Nominal Inductance	Tolerance	Packaging
ELJ: SMD Chip Inductor	FA, RF, RE, ND, NC, NA, FC, SA, FB, PF, PE, QF, PC, PA, PB, EA	2N2: 2.20 nH 22N: 22.00 nH R22: 0.22 μH 2R2: 2.20 μH 220: 22.00 μH 221: 222.00 μH 102: 1000.00 μH	D: 0.30 nH J: 5.00 % K: 10.00 % M: 20.00 %	Tape & Reel

### Panasonic SMD Choke Coil Part Numbering System

Prefix	Outer Size	Height	Structure	Inductance	Tolerance	Option	Suffix
ELL	4	G	G	220	M	(Not Applicable)	(Not Applicable)

### Panasonic SMD Power Choke Coil Part Numbering System

Prefix	Classification	Size	Winding	Inductance Tolerance	Core	Packaging	Suffix
ETQ	P	6	F	1R6	S	F	A



## At the Leading Edge

Pulse is a worldwide leader in electronic component and subassembly design and manufacturing. Pulse's wide array of power and signal products are used in computing, networking and communications, power conversion, defense, aerospace, automotive, and consumer electronics. With state-of-the-art custom designs and catalog products, Pulse is a complete source for electronic OEMs, contract manufacturers, and ODMs. Pulse is a participating member of IEEE, ATIS, ETSI, HDMI, the DSL Forum, the San Diego Telecom Council, and MoCA®.



## Power Products

Pulse supplies a full range of products for high-frequency switching and low-frequency laminated power supply applications from simple through-hole inductors to state-of-the-art, high-density, surface mount planar transformers. Switching power magnetics include power inductors, wirewound and planar power transformers, current sense and gate drive transformers, and common mode chokes. Laminated power magnetics include encapsulated and open-frame transformers and flame transformers used in HVAC. Most Pulse Power catalog products are available in RoHS and Pb-free soldering compliant versions.

## LAN Components

Pulse offers the most comprehensive line of LAN magnetics and connectors with integrated magnetics available to the worldwide OEM market. We offer a complete line of data networking magnetics modules optimized for 10Base-T, 10/100Base-T, Gigabit, and 10GBase-T applications. Our competencies also include an array of specific application solutions, such as high-density, PoE and PoE+, and Industrial Ethernet applications. By working closely with leading IC manufacturers, our modules ensure compatibility with each transceiver. The modules are available in surface mount, low profile packaging with single, dual and quad-port configurations, including RJ-45 and RJ-45/USB combination filtered connector packages known as PulseJack.

## RF Chip Inductors

Pulse's RF chip inductors provide high-quality filtering in mobile phones, wireless applications, digital cameras, disk drives and audio equipment. The inductors are also used in RF modules for telecom, automotive and consumer electronic applications. These RF chip inductors use wirewound

technology with ceramic or ferrite cores in industry standard sizes and footprints. Pulse's RF chip inductor series is matched in performance to the industry competition with full compatibility and operating frequency ranges.

## Telecommunications Products

Pulse provides a broad portfolio of magnetics for telecom infrastructure equipment, customer premises equipment, audio interface applications, and emerging applications such as VoIP xDSL HomePNA, home phone line and the like. Transformers and integrated transformer modules support T1/E1/ISDN-PRI, T3/E3/STS-1, ISDN-S, ISDN-U, Digital Audio, and DDS. Package options include surface mount, through-hole, single, dual, quad and octal for standard and extended temperatures. Many parts meet ANSI, ITU and ETSI requirements, and many are recognized by UL, TUV, Austel and/or CSA. Numerous models incorporate Pulse's patented "Interlock Base" construction, ensuring high reliability.

## Broadband: xDSL, HPN

Pulse leads the way with a broad range of components that enable twisted pair copper, fiber and coaxial cable to deliver high-speed services to homes and businesses. These high performance transformers, inductors and splitter/filter modules support xDSL, VoIP, IPTV, CPE splitters, CO splitters (some are custom), MoCA and home phone line and power line networks. The transformers are designed to exceed ANSI and ETSI standards and have excellent THD performance and small footprints. Surface mount models are available upon request. Offering convenient and cost effective design solutions, splitter/filter modules are part of the SMART™ and Smarter™ family. This line of components are also used in

cable modems and consumer electronics that provide home networking services.

## RF and Cable Products

Pulse offers a comprehensive line of RF magnetic components for use in multimedia applications including cable TV, set-top boxes, gateway devices, Fiber to the Premises (FTTP) components, Telco TV, IPTV and residential video distribution. Technologies supported are Multimedia over Coax (MoCA) and HPNA®/Coax. Platforms include diplex filters, triplexers, single filter designs, transformers/baluns, directional couplers and RF splitter/combiners. These surface mount and through-hole components have minimal insertion loss and excellent return loss to ease the development and manufacturing of today's RF network equipment.

## Military and Aerospace Products

Military and aerospace components range from commercial-off-the-shelf (COTS) power inductors and transformers, ethernet interface transformers, data bus couplers, and delay lines to custom electronic components for military and aerospace applications. Catalog and custom designs include a comprehensive range of high performance solutions and packaging for QPL and non-QPL MIL-STD-1553 interface transformers, various MIL-STD-1553 data bus couplers and QPL and non-QPL active and passive delay lines. Also, Copperhead™ transformers and transceivers support a variety of high-speed applications that includes Fibre Channel, Gigabit Ethernet, SONET, HDTV, IEEE1394B, SMPTE, Ethernet, and AFDX buses. The magnetics and the packaging for military and aerospace parts are designed to meet the most rugged and demanding requirements for military, aerospace, and industrial applications.

## Pulse Magnetic Products

	Product	Features	Benefits
LAN	· Ethernet Transformer Modules and Connectors with Integrated Magnetics · 10Base-T, 10/100Base-T, 1000Base-T, and 10GBase-T	· IEEE 802.3 and ANSI X3.263 compliant · Low profile, small footprint package · Fine tuned to specific IC manufacturers' chipsets · Single, dual, and quad discrete 10, 10/100, 1GBase-T packages · 1x1, 1xN, 2xN, low profile integrated connector modules	· Reliability, high performance, low insertion loss · Established reference designs · Excellent EMI suppression · Design flexibility for both standard and high-density designs · Only SMT quad gigabit transformer module available
	· Industrial Temperature Ethernet Transformers and Connectors with Integrated Magnetics · HX and JX Series (10/100 and 10/100/1000Base-T Applications)	· IEEE 802.3 and ANSI X3.263 compliant · Fine tuned to specific IC manufacturers' chipsets · Extended operating temperature range of -40°C to 85°C · Single, dual, quad, 1x1, 1xN, and 2xN platforms	· Reliability, high performance, low insertion loss · Established reference designs · Designed for harsh industrial environments · Design flexibility for both standard and high-density designs
	· PoE and PoE+ Capable Ethernet Transformers and Connectors with Integrated Magnetics	· IEEE 802.3at and IEEE 802.3af · PoE: 48V, 350mA, 15W · PoE+: 48V, 720mA, 30W · Single, dual, quad, 1x1, 1xN, and 2xN platforms	· Reliability, high performance, low insertion loss · Design flexibility for both standard and high-density designs
	· 10G Base-T Ethernet Transformers and Connectors with Integrated Magnetics	· IEEE 10G Base-T compliant · Fine tuned with major 10G IC manufacturers · Standard, low profile, and reduced footprint single transformer design · Low profile 1x1 integrated connector module	· IEEE 10GBase-T compliant · Design flexibility with 3 different discrete magnetic packages and 1x1 integrated connector module
Telecom	T1/E1/CEPT/ISDN-Pri	· Matched to leading transceiver ICs · Safety compliance	
	T3/DS3/E3/STS-1	· Matched to leading transceiver ICs · Various packaging options · Integrated protection modules	· Synergistic with line card T3/DS3/E3/STS-1 · Flexibility of design
	ISDN-S/U	· Matched to leading transceiver ICs · Safety compliance	
	DDS/Switched 56	· Matched to Level One LXT441	· Works in telephone sets, PBX, CO switches
	Audio Voice Band	· Optimized insertion/return loss for audio frequency range	· Works in telephone sets, PBX, CO switches
RF Chip Inductors	SONET/SDH	· Dual design supports TX & RX circuitry or PHY chip TX cable and monitor outputs	· Flexibility of design
	0402CD Series	· Ultra small, ultra low profile	· Matched to industry competition
	0603CD Series	· Excellent Q and SRF	· For high-grade RF networks
	0805CD/CM Series	· Industry standard package size	· CD series are direct cross reference
	0805FT Series	· Ferrite and alumina cores	· Industry standard performance
	1008CD/CM Series 1008CQ Series	· Specific tolerances from 1% to 10% · High Q values and Ioc values	· Flexibility for lower cost design · High self resonant frequency
Broadband (xDSL, HPNA®)	· VDSL Products · Hybrid Transformers · Line Transformers · Common Mode Chokes	· Small size line transformers · Matched to leading IC manufacturers' chipsets · Through-hole (THT) and surface mount (SMT)	· Early availability of practical solutions · New products always in development
	· ADSL Products · Transformers · Inductors · Common Mode Chokes	· IEC 950 approved for supplementary insulation at working voltages up to 250V · Matched to a variety of IC vendor chipsets · Excellent THD characteristics	· International safety compliance · Equipment compatibility · Choice of approved solutions · Excellent reach performance
	HDSL/HDSL2/G.SHDSL Transformers	· UL1950 approved for supplementary insulation at working voltages up to 250V · Excellent THD characteristics	· Safety compliance · Choice of approved solutions · Excellent reach performance
	· Home Phone Line · Networking Products · Transformers · Filters	· Meets Home PNATM 1M8 and 10M8 specifications · IEC 950 approved for supplementary insulation at working voltages up to 250V · Matched to a variety of IC vendor chipsets	· Home PNA™ testing compliance · Choice of approved solutions
	· Home power line · Networking Products · Transformers · Filters	· Compliant to HomePlug® standards · IEC 950 compliant construction · Matched to a variety of IC vendors	· Ease of development · Choice of approved solutions
	· xDSL Splitter Modules (SMART™ and SmartER™ series)	· For Americas, Asia, and Europe standards · Common footprint for the whole series · Fully tested low pass filter solution · VDSL compliant modules	· Saves the engineering time to design compliant filters · Compact designs allowing higher number of lines per board
	RF and Cable	RF Transformers	· 0.5MHz to 1500MHz · Small footprint: 0.150" x 0.150" · Low height—miniature SMT package · 5MHz to 165MHz
RF Diplexer Filters		· Enclosed components with F Connector designs · SMT designs for built-in applications · Available for extreme temperature applications · MoCA® and HPNA®/Coax qualified products	· Maximum performance with minimal RFI · High volume production capability · Market priced · Custom designs
Splitters, Combiners		· Wide variety of size and applications · Discrete designs, modular and die cast housing units	· Designed to meet expanding industry requirements
Power	Inductors	· All popular platforms: toroids, SLICs, drum cores, flat-coils, beads · Through-hole (THT) and surface mount (SMT) · Tape-and-reel packaging for surface mount parts	· Used in DC/DC switching power supplies and filters · Established supplier with one-stop shopping · Compatible with automated assembly in many cases · Many matched with standard semiconductor switcher ICs
	High-Frequency Power Transformers	· Conventional wirewound or planar · Most popular platforms available · 0A to 26A, 1W to 250W, 20kHz to 1MHz · Multiple secondaries · Tape-and-reel packaging for surface mount parts	· Used in DC/DC switcher applications · High power density and efficiency · Compatible with automated assembly in many cases · Custom versions available · Many matched with standard semiconductor switcher ICs
	Low-Frequency Laminated Power Transformers	· Open frame or encapsulated · 0.08VA to 175VA, 50/60Hz operation · Popular secondary voltage options · UL, CSA, TuV, and VDE agency approvals	· Established supplier with one-stop shopping · World wide safety agency approvals · Encapsulated transformers offer: superior heat dissipation, sealed units tolerate harsh environments, vacuum-sealed encapsulation technology, compatible with automated assembly techniques · Custom versions available
	Common Mode Chokes	· UL safety agency approval on many designs · Through-hole and surface mount	· Noise filtering for switching power supplies · Custom versions available
	Current Sense Transformers	· UL safety agency approval on many designs · Through-hole and surface mount	· Provides current feedback, drive, and isolation · Custom versions available
	Military/Aerospace	MIL-STD-1553B Data Bus Interface Transformers	· MIL-PRF-21038 QPL and non-QPL · COTS · Through-hole and surface mount
MIL-STD-1553B Data Bus Couplers		· Single- and multi-stub · Inline	· High performance and high reliability · Highly adaptable
Copperhead™ Transceivers/Transformers		· Fibre Channel · Gigabit Ethernet · IEEE 1394B · SMTPE/HDTV	· Military temperature range · Low transmit/receive jitter · Low power dissipation · Pick-and-place compatible
Military/Aerospace Ethernet		· IEEE 802.3 and ANSI X3.263 compliant · Compatible with most IC manufacturers' chipsets · Built-in common mode choke	· Military temperature and qualification available · Reliability, high performance, low insertion loss · Established reference designs · Designed for harsh environments · AutoMDIX facilitates cabling crossover correction
Delay Lines		· MIL-PRF-83531 QPL active · MIL-PRF-83532 QPL passive	· MIL-PRF-883 versions · Military temperature and qualification
Catalog Inductors and Transformers	· Shielded inductors · Current and gate drive transformers · Common mode chokes to 14A · Power inductors to 38A · 1,500V to 3,000V insulation	· Ruggedized for military/aerospace use · MIL-PRF-27 qualification available · POGO and SLED mounting available	



## The Innovator, the Leader, the Source for Magnetic Solutions

TDK was established in 1935, as the world's first commercial manufacturer of ferrite, a magnetic material. Since then, TDK has marketed a wide range of passive products and services that make full use of magnetic material technologies centered on ferrite and ceramics.

### TDK Ferrite Beads and Bead Arrays

TDK offers a complete line of ferrite beads to deter radiated noise in both signal and power applications. TDK's MMZ chip beads, with up to seven different ferrite materials, offers low  $R_{dc}$  and high impedance to manage a wide spectrum of frequency ranges. The MPZ Series is designed to eliminate noise in DC power applications with maximum current up to 6A. And for increased savings in manufacturing and board space, there's TDK's MZA series of ferrite bead arrays... four lines of filtering in one convenient package.

### TDK Filter Solutions

To meet the growing demand for filter products on high speed digital lines, TDK provides filters for common mode and differential mode applications. TDK's ACM series common mode filters are designed to match the specific frequencies of high-speed digital interfaces like USB 2.0, IEEE1394, DVI, and HDMI. Our ZJYS and ZCYS toroidal cores chokes work in low-current xDSL systems and high-current systems like Ethernet and CANbus. And the MCZ Series of multilayer common mode filters can be applied in both differential and common mode designs.

### TDK Multilayer Ceramic and Ferrite Inductors

TDK is responding to the cutting-edge design needs of small digital devices with multilayer ceramic inductors. The large winding area of the ceramic MLG series lends to the high Q in the MHz band. And TDK's ceramic MLK series combines high SRF with high Q to support signal-processing circuits up to 5GHz. Our MLF series is a ferrite magnetically sealed multilayer inductor for high-density applications where shielding is a must.

### TDK Wirewound SMD Inductors

TDK's core technology of ferrite material development has lead to the industry's largest selection of wirewound SMD inductors. There are high Q narrow tolerance inductors for signal lines and large current choke or low  $R_{dc}$  choke inductors for power applications. From the world renowned NL series to the new super low profile VLF series, shielded or unshielded, TDK has an inductor to suit your needs.



## TDK Magnetic Products

	Products	Description	Features	Applications
Ferrite Beads	MMZ Series 1005, 1608, and 2012 case sizes	Up to 500mA Up to 3,000Ω impedance Low DCR	Low cost filtering solution, multiple materials to choose, minimal effect on signal quality, high current without sacrificing case size, wide temperature range	• General Filtering Needs for Electromagnetic Susceptibility and Radiation for Signal Applications
	MPZ Series 1005, 1608, and 2012 case sizes	Up to 6A Up to 1,000Ω impedance Very low DCR	High-current version of the MMZ	• General Filtering Needs for Electromagnetic Susceptibility and Radiation for Power Applications
	MZA Series Ferrite Bead Array	Low power two-line and four-line ferrite bead array 1210, 2010, and 3216 case sizes	Saves board space and placement costs, price equivalent to discrete components	• General Filtering Needs on Multiple Data Lines
Filters	ACF451832 and ACF321825	Low current T-filter 300mA	Three components in a single package (two ferrites and one capacitor – small case size)	• Specific Filtering Needs when Ferrites do not Provide Enough Protection and Attenuation for Electromagnetic Susceptibility and Radiation
	ACH4518C, ACH3218, ACH32C	High current T-filter 1.5A, 2A, 6A		• Specific Filtering Needs on Multiple Data Lines • LC Filtering
	MEA Series 3-Terminal Filter Array	Low power four-line ferrite bead and capacitor array 2010 and 3216 case sizes		• Specific Filtering Needs where High Order Filters are Necessary
	MEM Series T-Filter	Low current T-filter with high Q inductors, 100mA to 1A		
Common Mode Chokes	ACM & ACM-D Series	Drum core common mode choke, magnetically shielded with ferrite case, 200mA to 6A	Filters common mode noise without degrading the differential signal	• <b>Smaller Case Size (2mm x 1.2mm low current):</b> High-speed Digital Signals such as USB 2.0, Serial ATA, IEEE 1394, etc. • <b>Larger Case Size:</b> Power Filtering for Power Supplies, etc.
	ZJYS & ZCYS Series	Torroidal core common mode choke		• ZCYS: Low Current, Low Profile Version for xDSL • ZJYS: High-current Version (2A to 5A) for Ethernet, Telco Filtering, Power Filtering, CAN Bus Filtering
	MCZ Series	Multilayer common mode choke		• Low Power, Low Speed Applications such as Speakers, Microphones, USB 1.1, etc.
High Frequency Ceramic & Ferrite Multilayer Inductors	MLG Series 0603, 1005, and 1608 case sizes	Monolithic ceramic inductor	High SRF and high Q (polarized)	• High-frequency Cellular, Telecom, 2GHz
	MLK Series 0603 and 1005 case sizes	Monolithic ceramic inductor	High SRF and high Q (non-polarized)	• High-frequency Cellular, Telecom, (small package) 5GHz
	MLF Series 1005, 1608, and 2012 case sizes	Monolithic ferrite shielded inductor	High Q value, 5% tolerance available in low inductance values	• RF Circuits, Filters, SAW Matching, and Specific-frequency Noise Reduction
Wirewound Inductors	NL & NLC Series 2520, 3225, and 5650 case sizes	Molded wirewound inductor	Wide inductance range, high Q, and high IDC	• Signal and Power Applications • NLC Provides Lower R <sub>DC</sub>
	NLV & NLCV Series 2520 and 3225, case sizes	Molded wirewound inductor		• Signal and Power Applications • NLCV Provides Lower R <sub>DC</sub>
	SLF & RLF Series 6mm to 12mm case sizes	Shielded wirewound inductor	Variety of inductance plus low to medium current capacity rating	• DC/DC Converters as Input/Output Inductors, Buck/Boost Regulators • SLF Provides a Higher Current than NL, NLC, NLB, NLCV Inductors at Low R <sub>DC</sub>
	VLF Series 3mm to 12mm case sizes	Shielded wirewound inductor	Variety of inductance ranges in extremely low profile square package	• DC/DC Converters • Low Coil Resistance for Large Currents • Cellular, Disc Drives, LCD Displays, PDAs, and Portables



# Tyco Electronics

Authorized Distributor

## Tyco Electronics Advantage

Tyco Electronics offers a broad product line of magnetic devices including switch mode power supply transformers and inductors, custom power inductors and chokes, Ethernet magnetic modules, power toroid inductors, industry standard drum cores, digital telecom line interface transformers, broadband signal splitters and filters, and T1/E1 line interface modules designed to enhance performance, improve reliability, simplify design and reduce costs. Our unique highly automated approach to design and manufacturing has helped us achieve lead times that are among the industry's shortest. We enhance our customers' development process with experienced custom design engineering support to establish performance criteria and provide quick turnaround on prototype builds.

## Broadband and T1/E1 Magnetics

Magnetics developed in cooperation with major IC companies and with designers of telecom equipment for global communications applications. Many are used in reference designs on the market today. Products include line interface transformers, transmit and receive filters, and common mode chokes.

## Networking Magnetics

Discrete and integrated magnetics developed in cooperation with leading IC companies for optimized chipset performance in the LAN, Ethernet, VoIP and HPNA applications.

## Power Magnetics

A broad range of custom and standard products, including drum core inductors and filters, common mode chokes, and switch mode power supply transformers and inductors. All products offered in a complete range of inductance and operating current values. Design and engineering services are also available to help develop custom power magnetic solutions for unique applications.





## Tyco Electronics Products

	Product	Features	Benefits
Broadband	<b>Line Interface and Filter Inductors</b>	<ul style="list-style-type: none"> <li>Excellent THD performance</li> <li>Compatible with major IC manufacturers' chipsets</li> <li>Industry standard footprints</li> <li>Provide robust UL/IEC safety isolation barrier</li> </ul>	<ul style="list-style-type: none"> <li>Minimizes noise</li> <li>IC manufacturers' approval leads to reduced risk and faster design cycle</li> <li>Fits layout standards</li> </ul>
	<b>SMD Isolation Transformers</b>	<ul style="list-style-type: none"> <li>Designed for T1/E1 applications</li> <li>Provides 75Ω and 120Ω RX/TX outputs in a single chip</li> <li>Available in dual, quad and octal configurations</li> <li>Compatible with major IC manufacturers' chipsets</li> </ul>	<ul style="list-style-type: none"> <li>Multiple impedance outputs options provide flexibility</li> <li>Configurations available for most applications</li> <li>IC manufacturers' approval leads to reduced risk and faster design cycle</li> </ul>
	<b>SMOX Isolation Transformers</b>	<ul style="list-style-type: none"> <li>T3/E3 Channel support</li> <li>Supports 1, 2, 3 or 4 channel configurations</li> <li>Compatible with major IC manufacturers' chipsets</li> <li>Return loss meets CCITT, G.703 requirements</li> </ul>	<ul style="list-style-type: none"> <li>Configurations available for most applications</li> <li>IC manufacturers' approval leads to reduced risk and faster design cycle</li> <li>Designs are T3/E3 Application ready</li> </ul>
Networking	<b>HB Series 10/100 Base-T</b>	<ul style="list-style-type: none"> <li>Single, dual and quad port configurations available</li> <li>Compatible with major IC manufacturers' chipsets</li> <li>Choice of circuits to optimize system performance</li> <li>Meets supplementary isolation requirements for TNV/SELV applications</li> </ul>	<ul style="list-style-type: none"> <li>Configurations available for any application</li> <li>IC manufacturers' approval leads to reduced risk and faster design cycle</li> <li>Offers development flexibility with single part</li> </ul>
	<b>GB Series 10/100/1000 Base-T</b>	<ul style="list-style-type: none"> <li>Single and dual port configurations available</li> <li>Compatible with major IC manufacturers' chipsets</li> <li>Low profile design for height sensitive applications available</li> <li>Choice of circuits to optimize system performance</li> </ul>	<ul style="list-style-type: none"> <li>IC manufacturers' approval leads to reduced risk and faster design cycle</li> <li>Unique package dimension allows mounting directly behind stacked or ganged RJ45 connectors</li> </ul>
	<b>Common Mode Chokes</b>	<ul style="list-style-type: none"> <li>Various form factors and frequency options available</li> <li>Single and dual port configurations available</li> <li>IEEE and USB 2.0 specific designs</li> </ul>	<ul style="list-style-type: none"> <li>Configurations available for any application</li> <li>Designs are USB Application ready</li> </ul>
Power	<b>Unshielded Drum Core Inductors</b>	<ul style="list-style-type: none"> <li>0.1A to 30A current range</li> <li>0.3μH to 1,000μH inductance range</li> <li>Industry standard footprint</li> </ul>	<ul style="list-style-type: none"> <li>Wide variety of products available</li> <li>Fits layout standards</li> </ul>
	<b>Shielded Drum Core Inductors</b>	<ul style="list-style-type: none"> <li>0.02A to 24A current range</li> <li>1.0μH to 1,000μH inductance range</li> <li>Industry standard footprint</li> </ul>	<ul style="list-style-type: none"> <li>Wide variety of products available</li> <li>Fits layout standards</li> </ul>
	<b>DX Series Power Inductors</b>	<ul style="list-style-type: none"> <li>Up to 50A current capability</li> <li>6.4mm maximum height</li> <li>Low DC resistance</li> <li>No internal solder joints</li> <li>High temperature ratings</li> </ul>	<ul style="list-style-type: none"> <li>High Power</li> <li>Low Profile</li> <li>High circuit efficiency</li> <li>High reliability</li> </ul>
	<b>SC Series Chokes</b>	<ul style="list-style-type: none"> <li>0.2A to 7.9A current range</li> <li>0.47μH to 1,200μH inductance range</li> <li>Series and parallel configurations available</li> </ul>	<ul style="list-style-type: none"> <li>Wide variety of products available</li> </ul>
	<b>Surface Mount Inductors</b>	<ul style="list-style-type: none"> <li>Wide selection</li> <li>Product line available for National Semiconductor's Simple Switchers™</li> </ul>	<ul style="list-style-type: none"> <li>Applications in Power Supplies, Filters, RF</li> </ul>
	<b>Transformers</b>	<ul style="list-style-type: none"> <li>Wide selection</li> <li>Multiple coil configurations</li> <li>Surface mount and through-hole version available</li> </ul>	<ul style="list-style-type: none"> <li>Multiple coil design allows customization for each application</li> </ul>
	<b>DC Filter Modules</b>	<ul style="list-style-type: none"> <li>5A to 30A current range</li> </ul>	<ul style="list-style-type: none"> <li>Board ready solution minimizes design time</li> <li>Filters noise from DC/DC Converters, switching power supplies, other board level EMI sources</li> </ul>
	<b>Custom Inductors and Transformers</b>	<ul style="list-style-type: none"> <li>Magnetics custom designed for unique applications</li> </ul>	<ul style="list-style-type: none"> <li>Optimize designs for your application</li> </ul>



## A Leader in Magnetics

Vishay's magnetic products encompass a complete range of inductors, transformers and custom magnetics. Vishay is particularly well-known for its miniature inductors and miniature magnetics, targeted at products needing high-performance, high Q and small package size.

### Inductors

Surface mount and axial lead inductors from Vishay are available in a wide range of sizes and electrical specifications making them ideal for use in disk drives, telecommunications, instrumentation, medical equipment and automotive systems. Vishay manufactures an inductor for every design problem from EMI/RFI suppression and impedance matching to band pass filters.

### Power Inductors

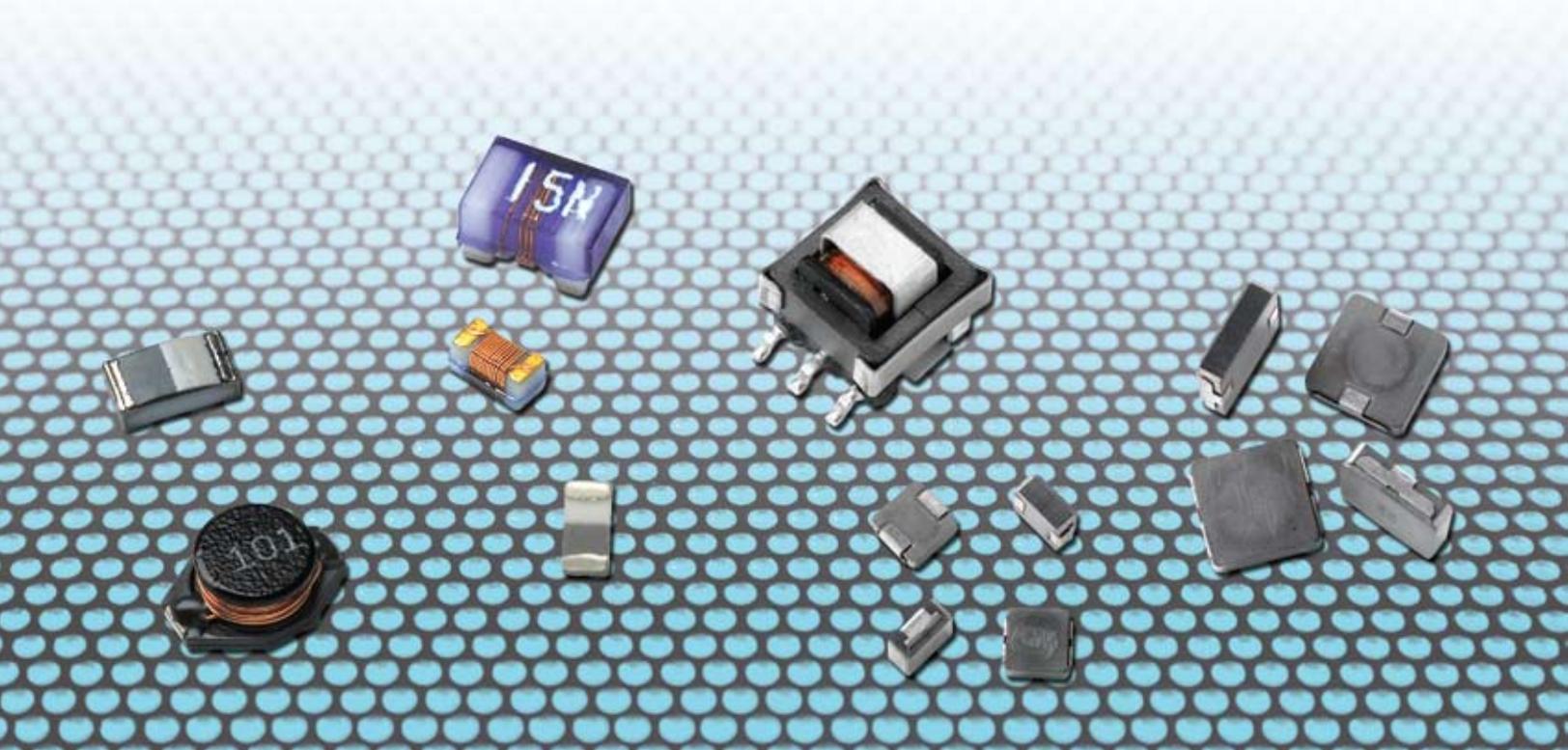
Vishay has become the industry leader in Power Inductors. The patented IHLP line has become widely accepted in today's market and is being used in a wide range of applications from telecommunications to automotive. Vishay also offers a wide variety of industry standard drum core inductors and other surface mount high current parts.

### Transformers

Transformers from Vishay are available in a wide range of sizes and electrical specifications. They are ideal for use in telecommunications, instrumentation, medical equipment, automotive systems, and military/aerospace. Termination styles include both surface mount and through-hole pin transformers. Vishay makes a transformer for practically every design situation; impedance matching, power conversion, isolation, step-up/step-down, etc. Custom configurations are available on many models.

### EMI Suppressors

Vishay offers surface mount ferrite beads (ILB, ILBB) in sizes from 0402 to 1812, high current ferrite beads (ILHB) in sizes from 0603 to 1812, and ferrite bead arrays (ILAS) in the 1206 size. All have a wide range of impedance values.





## Vishay Dale SMD Chip Inductors

Product	Size	Inductance Range	Q Min.	SRF Min.	Rated Current	Construction	Applications	
SMD Chip Inductors	IMC	0402, 0603	1.0nH - 150nH	14 - 30	1,100MHz - 6,000MHz	90mA - 500mA	Laser Spiral	<ul style="list-style-type: none"> <li>Communications Applications such as Cellular Phones, Pagers, PDAs, Television Tuners, Radios, etc.</li> <li>Video Applications such as VCR, Televisions, DVD, and Game Consoles</li> </ul>
	ILC	0402, 0603, 0805	1.0nH - 270nH	8 - 18	300MHz - 10,000MHz	100mA - 300mA	Multilayer Ceramic	
	IFC	0603, 0805	1.5nH - 47nH	10 - 18	1,060MHz - >15,000MHz	300mA - 1,000mA	Photolythic	
	IFCB	0402, 0603	1.0nH - 68nH	5 - 13	1,000MHz - 13,000MHz	90mA - 800mA	Thin Film	
	IMC	0402-01, 0603-01, 0805-01, 1008	1.0nH - 47,000nH	13 - 60	17MHz - 6,900MHz	45mA - 1,360mA	Wirewound	
	IMCH	1812	1.0μH - 330μH	10 - 20	4MHz - 200MHz	90mA - 1,050mA	Wirewound	
	IMC	1210, 1812, 2220	0.010μH - 10,000μH	10 - 50	0.5MHz - 1,000MHz	25mA - 1,800mA	Wirewound	
ISC	1210, 1812	0.010μH - 1,000μH	30 - 50	2MHz - 1,000MHz	66mA - 810mA	Wirewound		

## Vishay Dale Power Inductors

Product	Size	Inductance Range	DCR	Rated Current	Applications	
Power Inductors	IHL P	1616AB-01	0.047μH - 1.0μH	3.75Ω - 50.0Ω	4A - 13A	<ul style="list-style-type: none"> <li>Notebooks/Desktops/Servers</li> <li>High-current POL Converters</li> <li>Low Profile, High-current Power Supplies</li> <li>Battery-powered Devices</li> <li>DC/DC Converters in Distributed Power Systems</li> <li>DC/DC Converter for FPGA</li> </ul>
		1616AB-11	0.047μH - 2.2μH	3.3Ω - 100.0Ω	2.75A - 15A	
		1616BZ-01	0.1μH - 2.2μH	5.0Ω - 90.0Ω	2.85A - 11A	
		1616BZ-11	0.1μH - 4.7μH	4.5Ω - 150.0Ω	2A - 12A	
		2525AH-01	0.1μH - 4.7μH	3.5Ω - 78.0Ω	3A - 18A	
		2525BD-01	0.1μH - 10μH	1.7Ω - 129.0Ω	2.5A - 30A	
		2525CZ-01	0.1μH - 10μH	1.7Ω - 105.0Ω	3A - 35.5A	
		2525CZ-11	1.0μH - 22μH	8.0Ω - 135.0Ω	2.9A - 12.5A	
		2525EZ-01	0.56μH - 10μH	3.6Ω - 71.3Ω	4.5A - 20A	
		4040DZ-01	0.19μH - 10μH	0.95Ω - 36.5Ω	6.8A - 40A	
		4040DZ-11	0.19μH - 100μH	0.8Ω - 270.0Ω	2.5A - 40A	
	5050CE-01	0.1μH - 10μH	0.96Ω - 34.0Ω	7A - 43A		
	5050EZ-01	0.1μH - 10μH	0.60Ω - 25.5Ω	9A - 55A		
	5050FD-01	0.1μH - 10μH	0.50Ω - 16.8Ω	10A - 60A		
IDCP	1813, 2218, 3020, 3114, 3722, 3916	1μH - 820μH	33Ω - 2,550Ω	0.24A - 3.8A	<ul style="list-style-type: none"> <li>Power Supply for VCR, Television, Computers</li> <li>DC/DC Converters,</li> <li>DC/AC Inverters</li> </ul>	
IDCS	2512, 5020, 7328	1μH - 10,000μH	21Ω - 32,800Ω	0.02A - 5.0A	<ul style="list-style-type: none"> <li>Power Line Filtering, RFI Suppression, DC/DC Converters</li> </ul>	
IDC	2512, 5020, 7328	1μH - 1,000μH	9Ω - 13,800Ω	0.07A - 8.6A		
IHSM	3825, 4825, 5832, 7832	1μH - 18,000μH	0.11Ω - 44,100Ω	0.11A - 6A		

## Vishay Dale Inductor Part Numbering System

	IMC	1210	10	10%	TR
	Series	Size	Value	Tolerance	Packaging
Chip Inductors	IMC	0402-1812	1nH - 18,000μH	0.3nH, 5%, 10%, 20%, 25% (varies by series)	TR: Tape & Reel Blank: Bulk
	IFC	0603-0805			
	ILC	0402, 0603			
	ISC	1210, 1812			
	ILS	2515, 3825			
	ILSB	0603-1206			
Power Inductors	IHLP	2525 CZ-01, 5050(xx)-01	1nH - 18,000μH	0.3nH, 5%, 10%, 20%, 25% (varies by series)	TR: Tape & Reel Blank: Bulk
	IHSM	3825,4825,5832,7832			
	IDC	2512, 5020, 7328			
	IDCS	2512, 5020, 7328			
	IDCP	1813, 2218, 3020, 3114, 3722, 3916			

## Vishay Dale Ferrite Beads

Product	Size	Impedance	DCR	Rated Current	Applications	
Ferrite Beads	ILB/ILBB	0402, 0603, 0805, 1206, 1210, 1806, 1812	7Ω - 2,200Ω	0.05Ω - 1.0Ω	50mA - 600mA	<ul style="list-style-type: none"> <li>Filtering Between Analog and Digital Circuitry</li> <li>Isolation Between RF Circuits and Logic Devices</li> <li>Power Supply Filtering &amp; High-frequency EMI Prevention</li> </ul>
	ILAS	1206	60Ω - 1,000Ω	0.12Ω - 0.80Ω	50mA - 300mA	
	ILHB	0603, 0805, 1206, 1806, 1812	30Ω - 1,300Ω	0.015Ω - 0.10Ω	2A - 6A	

## Vishay Dale Ferrite Bead Part Numbering System

	ILBB	0603	100	25%	TR
	Series	Size	Value	Tolerance	Packaging
Ferrite Beads	ILBB	0402-0805, 1210-1812	7Ω - 2,200Ω	25% Standard	TR: Tape & Reel Blank: Bulk
	ILB	1206 (only)			
	IHLB	0603-1812			

# YAGEO

## Looking to the Future

As hardware prices continue to fall, electronics industry experts predict that all electronics manufacturing firms will be transformed into service enterprises over the next decade. That transformation is already a fact at Yageo, with continuous growth as a supplier of passive components compelling the corporation to define itself as a service enterprise early on.

In the fast-paced electronics field, Yageo firmly believes that playing a proactive role in the industry supply chain requires a clear vision of emerging trends and customer requirements. The corporation's global deployment strategy has thus always been based on providing customers with comprehensive passive component solutions. So wherever customers go, Yageo is right beside them, providing innovative service around the globe.

## Flexibility of Components

Yageo provides all types of precision resistors, chip arrays, MLCCs, E-caps, and chip inductor products used in SMT manufacturing processes. With the addition of different brand names to our product line, we can provide an optimized mix of product series and levels from multiple brands to meet a wide range of customer requirements.

Yageo works hard to make things easy for customers. So now you can place an order at the touch of a button, and the passive components you ordered will arrive at your production line on time. To integrate distribution, production lines, and information flows, Yageo invested three years in an e-business platform that went online in the year 2000, establishing an electronic link between customers, suppliers, and factories.

## Meeting the Demand

In a previous era, shipping lead times for Japanese vendors often exceeded 60 days. That won't work today, and Yageo led the way in making two-month lead times a thing of the past. We are dedicated to the notion that stock burdens for passive components should not be borne by customers. Nor should customers be exposed to the risk of sudden changes in end-product design.

We therefore made a substantial investment to construct a 30,000 square meter Just-In-Time warehouse at our Taiwan headquarters. The first JIT warehouse in Taiwan, it remains a model facility that still attracts visits from global customers. The success of our JIT also led Yageo to duplicate our efficient 24-hour delivery practice in Europe, China, and beyond, where our seven JIT warehouses around the world are meeting the demands of global customers for greater efficiency.



## Yageo Chip Inductors, Ferrite Beads, and Transformers

Construction		Series	Features	Benefits	Applications	
Chip Inductors	Multilayer	Ferrite	SB, PB, NB, GB, BA, SBJ, PBJ, UPB	<ul style="list-style-type: none"> <li>Miniature size</li> <li>Narrow band</li> <li>Large current</li> </ul>	<ul style="list-style-type: none"> <li>Lower emissions</li> <li>Narrow tolerance</li> <li>High frequency impedance</li> </ul>	<ul style="list-style-type: none"> <li>Computers</li> <li>Consumer Video &amp; Audio</li> <li>Networking Devices</li> </ul>
		Ceramic	CL, NL, NLC, CLH, LCN, HC, HQ	<ul style="list-style-type: none"> <li>High frequency range</li> <li>High Q · High IDC</li> </ul>	<ul style="list-style-type: none"> <li>Suitable for RF</li> <li>Laminated structure</li> <li>High density mounting</li> </ul>	<ul style="list-style-type: none"> <li>Wireless Handheld</li> <li>WLAN / PBX</li> <li>Computers</li> </ul>
	Power	Wirewound	STD, SCD, SDT, SCDS, SSL, SDS, SSL_HC, SLF	<ul style="list-style-type: none"> <li>Wire inductance</li> <li>High current rated</li> <li>High saturation</li> </ul>	<ul style="list-style-type: none"> <li>Less voltage drop</li> <li>Magnetic shielding against radiation</li> </ul>	<ul style="list-style-type: none"> <li>Computers</li> <li>Industrial Power Supply</li> <li>Telecom</li> <li>Wireless Devices</li> </ul>
Ferrite Beads	(Not Applicable)	FB	<ul style="list-style-type: none"> <li>Narrow band</li> <li>Miniature size</li> <li>High resistance to heat and humidity</li> </ul>	<ul style="list-style-type: none"> <li>Narrow tolerance</li> <li>Small &amp; rugged</li> <li>High current carrying capacity</li> </ul>	<ul style="list-style-type: none"> <li>Wireless Handheld</li> <li>GPS, TDMA , CDMA</li> <li>PC, Motherboards</li> </ul>	
Transformers	(Not Applicable)	TFE0501H, TFE0502H, TFE0701H	<ul style="list-style-type: none"> <li>Sturdy construction</li> <li>Current sensing</li> <li>Uniform in size</li> <li>Wide range of inductance</li> </ul>	<ul style="list-style-type: none"> <li>High reliability</li> <li>Ideal for automatic insertion</li> <li>Precision performance</li> </ul>	<ul style="list-style-type: none"> <li>Computers</li> <li>Telecom, Networking</li> <li>Industrial, Power Supply</li> </ul>	

## Yageo Inductor Part Numbering System

SSL	0804	T	4R7	M	S	
Series	Size	Package / Style	Value	Tolerance	SMD	
Inductors	STD	0804, 1109	T	100 - 122 (10μH - 1,200μH)	K:10%, M: 20%	S
	SCD	0403, 0504, 0703, 0705, 1004, 1005	T	1R0 - 102 (1.0μH - 1,000μH)	K:10%, M: 20%	S
	SDT	0402, 0804	T	1R0 - 101 (1.0μH - 100μH)	M: 20%	S
	SCDS	62B, 64B, 73, 74, 124, 125, 127	T	1R2 - 473 (1.2μH - 47,000μH)	M: 20%	S
	SSL	0400, 0401, 0402, 0802, 0804, 0810, 1306	T	1R0 - 472 (1.0μH - 4,700μH)	M: 20%	S
	SSL_HC	0503, 0804, 1306	HC (High Current)	R33 - 101 (0.33μH - 100μH)	M: 20%	S
	SDS	0402, 0804, 1306	T	1R0 - 103 (1.0μH - 10,000μH)	M: 20%	S
	SDS_BL	0402	BL (Backlight)	101 - 103 (100μH - 10,000μH)	M: 20%	S
RF Inductors	SLF	0628, 0728, 0730, 0732, 0745, 1045, 1255, 1265, 1275	T	1R2 - 152 (1.2μH - 1,500μH)	M: 20%	S
	CLH	1005, 1608, 2012	T	1N0 - R82 (1.0μH - 820nH)	S: ±0.3nH J: 5% K: 10%	S
	LCN	0402, 0603, 0805, 1008, 1206	T	1N0 - 1R2 (1.0μH - 1,200nH)	G: 2% J: 5% K: 10%, M: 20%	S
	LCN_HC	0603	HC (High Current)	1N6 - 24N (1.6μH - 24nH)	J: 5%, K: 10%	S
	LCN_LS	1008	LS (High Q)	1R2 - 100 (1.2μH - 10μH)	J: 5%, K: 10%	S
Chip Inductors	LCN_PS	1008	PS (Power Shielded)	1R0 - 102 (1.0μH - 1,000μH)	J: 5%, K: 10%	S
	NLC	565050	T (Tape)	102	K: 10%	S
	CL	160808, 160812, 201209, 201212, 321611	T (Tape), B (Bulk)	47N - 180 (0.047μH - 18μH)	M: 20%, K: 10%	S
	NL	201614, 252018, 322522, 453232, 565050	T (Tape), B (Bulk)	5N0 - 822 (0.005 - 8,200μH)	J: 5%, K:10%, M: 20%	S
NLC	252018, 322522, 453232, 565050	T (Tape), B (Bulk)	1.0 - 102 (0.1 - 1,000μH)	J: 5%, K:10%, M: 20%	S	

## Yageo Ferrite Bead Part Numbering System

SB	K	201209	T	070	Y	S	
Series	Mat	Size	Package	Value	Tolerance	SMD	
Ferrite Beads	SB	Y or K	100505, 160808, 201209, 321611, 321616, 322513, 451616, 453215	T (Tape), B (Bulk)	060 - 272 (6Ω - 2,700Ω)	Y (25%)	S
	NB	Q	100505, 160808, 201209, 321611	T (Tape), B (Bulk)	060 - 272 (6Ω - 2,700Ω)	Y (25%)	S
	GB	K	160808, 201209, 321611, 321616, 322513, 451616, 453215	T (Tape), B (Bulk)	070 - 202 (7Ω - 2,000Ω)	Y (25%)	S
	PB	Y	100505, 160808, 201209, 321611, 322513, 451616, 453215	T (Tape), B (Bulk)	100 - 152 (10Ω - 1,500Ω)	Y (25%)	S
	BA (Array)	Y	321609(1206)	T (Tape), B (Bulk)	300 - 102 (30Ω - 1,000Ω)	Y (25%)	S



## Glossary

**Ampere (A, amp):** Unit of measure for electrical current.

**Chip Inductor:** A chip inductor is the surface mount version of the leaded through hole inductor. Its basic function is to oppose a change in current.

**Choke Circuit:** A choke circuit consists of an inductor in series with a circuit in which the inductor behaves as a choke (EMI filter) by providing suppression to high frequencies and allowing low frequencies to pass.

**Coils:** Components made from wire, wound around a core.

**Current (unit Amp):** Flow of electrons, measured in amperes. One ampere will flow when 1V is provided to a circuit which has a resistance of  $1\Omega$ .

**Direct Current Resistance (acronym DCR):** DCR is the resistance of an inductor due to the resistance of the wire used in the winding, measured with no AC running through it, and expressed as a maximum value in Ohms. The lower the DCR the better.

**Electromagnetic Compatibility (acronym EMC):** When two electronic systems work in harmony.

**Electromagnetic Interference (acronym EMI):** Broad spectrum noise or interfering signals.

**Electrostatic:** Electricity produced by the impact of two surfaces.

**Equivalent Series Inductance (acronym ESL):** Inductance characteristic of the component in the circuit.

**Equivalent Series Resistance (acronym ESR):** Resistance characteristic of the component in the circuit.

**Ferrite:** A material that provides a magnetic field for filtering and power applications. Hard: Magnetic material; Soft: Non-magnetic material. Ferrite is commonly used in the form of beads, rods, powder and blocks to absorb EMI on wires, cables and other components and circuitry.

**Ferrite Bead:** A ferrite bead is a passive electronic component used to remove unwanted electrical noise, known as electro-magnetic interference (EMI). It is a low pass filter that removes unwanted noise by providing high filtering performance (impedance) over a range of frequencies.

**Film Inductor:** Film inductors are manufactured in a similar manner to ICs using a film photolithography process, which permits tight tolerance, low inductance (suitable for RF applications), and small size (suitable for the telecommunications industry).

**Flyback Transformer (acronym FPT):** Transformer generating high voltage in the horizontal output state of TV receiver.

**Henry (symbol H):** The unit of inductance that indicates the induced force of 1V when the current is varied at 1A per second.

**Impedance (symbol Z):** The total opposition to the flow of alternating current in a circuit or component containing both resistance and capacitance. It is also the unit used to measure the suppression capabilities of an inductor used in choke applications. As the frequency increases, so does the resistance of the inductor which provides the suppression.



**Inductance** (symbol **L**): The property of a system or component which allows it to store a magnetic field as evidenced by the rate of increase in magnetic flux with an increase in current. Measured in Henries.

**Inductor**: Any coiled conductor, with or without a magnetic core, which is used to introduce inductive reactants into a circuit. Also, a component used to store energy in the form of a magnetic field. An inductor is a coil that opposes changes in current, and its unit of measure (inductance) is the Henry.

**Isolation Transformer**: A high common-mode impedance device used in the power mains to break ground loops.

**L Chip**: Chip inductors are sometimes referred to as “L Chips.”

**Low Profile**: Components designed with “lower than standard heights” to save space and allow clearance when mounted on PCBs.

**Multilayer Inductor**: Monolithic inductors consist of an integrated multilayered process that is available with a ferrite or ceramic structure. Typically the ferrite structured monolithic inductors are magnetically shielded and possess moderately high inductance values (suitable for DC filtering applications). The ceramic structured inductors possess low inductance and high Q characteristics at high frequencies (suitable for RF applications). Both structures are available in small case sizes and are cost effective.

**Q** (symbol **Q**): see *Quality Factor*.

**Quality Factor** (symbol **Q**): The quality factor represents the actual efficiency of the inductor. For resonant circuits the higher the Q, the better the inductor will perform. For choke circuits Q is not important.

**Resonant Circuit**: A resonant circuit consists of an inductor in parallel with a capacitor which forms a circuit that will select a specific frequency.

**Shielded Inductor**: Shielded inductors prevent the radiation of magnetic waves from interfering with other circuitry.

**Self-Resonant Frequency** (acronym **SRF**): The inductor’s self-resonant frequency is the frequency at which the inductor looks electrically capacitive rather than inductive, and is expressed as a minimum value in megahertz (MHz). The higher the SRF, the higher the inductor’s effective frequency range. It is not recommended to use an inductor beyond its SRF limit.

**Transformer**: A device that can alter a 120V, 60 cycle AC current from the wall and transform it down to a more usable voltage required by a particular circuit. A magnetic device that allows voltage to be stepped up, stepped down, isolated, or split when utilized in an electronic circuit.

**Tolerance**: The allowable deviation from the inductor’s stated value. Usually specified as a percent (i.e.  $\pm 2\%$ ).

**Wirewound Inductor**: Wirewound inductors consist of copper wire wound on a ferrite or ceramic core. These inductors are very versatile in that they can be assembled to achieve high current capabilities (suitable for DC power line filtering with higher currents), high inductance values (suitable for lower frequency applications), or high Q characteristics (suitable for RF applications). Wirewound inductors are available with a shielded structure that prevents unwanted signals from escaping and interfering with other components.

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