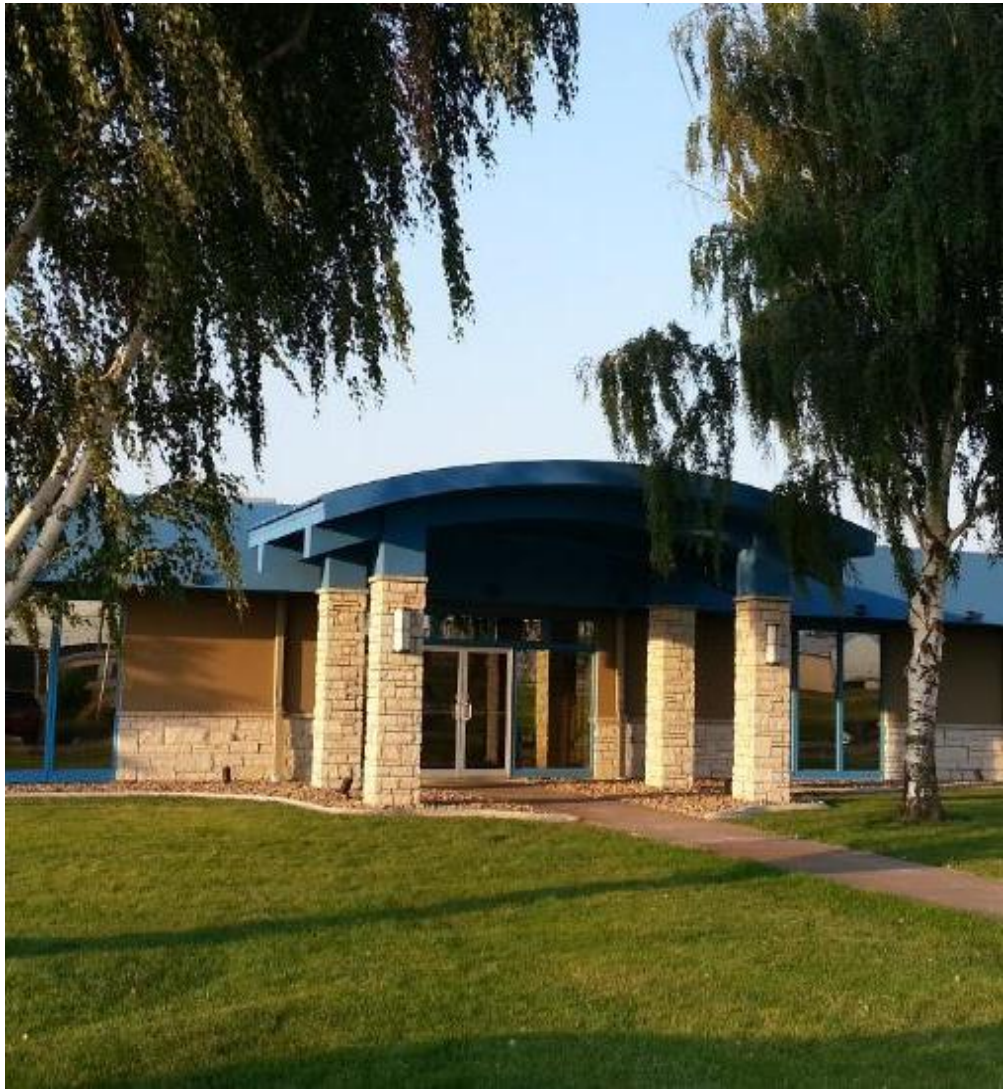

BUILT TO WIN
VISHAY EVERY DAY
AMERICAS SALES CONFERENCE
Inductors Division
VISHAY
The DNA of tech.®

Vishay Inductors Division



- Inductors division headquarters
  - Yankton, South Dakota, USA
- Founded in 1960, over 65 years of inductor manufacturing
- Total division employees – 3300
- 10 factories in USA, Dominican Republic, Israel, China, and Mexico
- Mike Husman, Sr. VP, Inductor Segment Head

Vishay Inductors Division

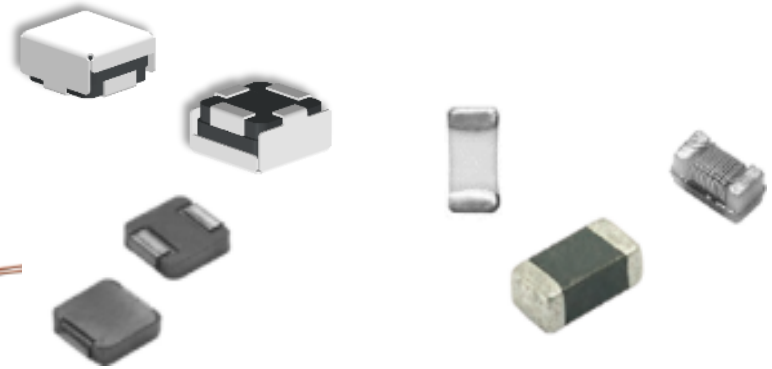
Custom Magnetics

One of the largest suppliers in North America for:

- Implantable magnetics and antennas
- Aerospace, space-grade, and military applications
- Alternate energy
- Industrial applications
- High current automotive applications
- Haptic feedback devices

Standard Magnetics

- Worldwide leader in IHLP (composite inductor) technology
- Automotive
- Computer / consumer
- Industrial applications
- Power inductors, RF, ferrite beads, etc.
- Wireless charging

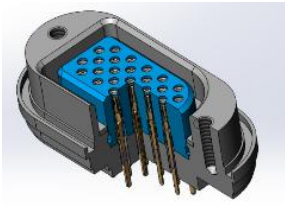


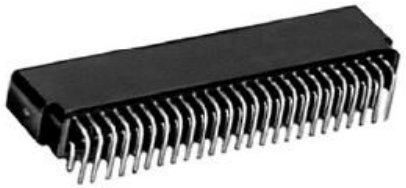
Frequency Control Devices

- Crystals
- Oscillators
- Automotive
- Space

High Reliability Connectors

- Microminiature
- Edgeboard
- Hermetically sealed





Inductors Division Facility Location

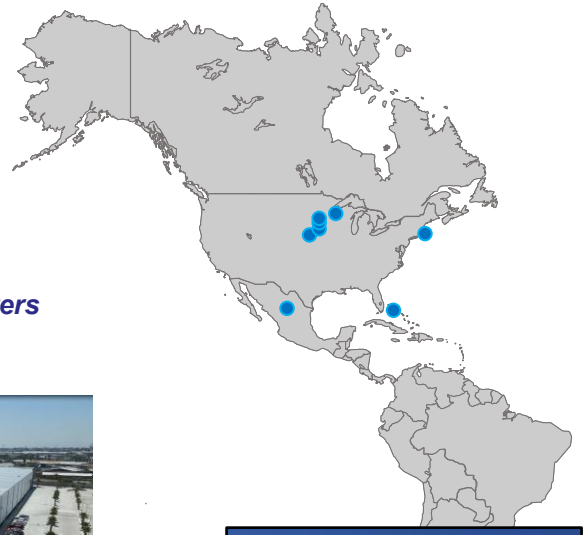
Marshall, MN
Vishay HiRel
Medical / Implantable

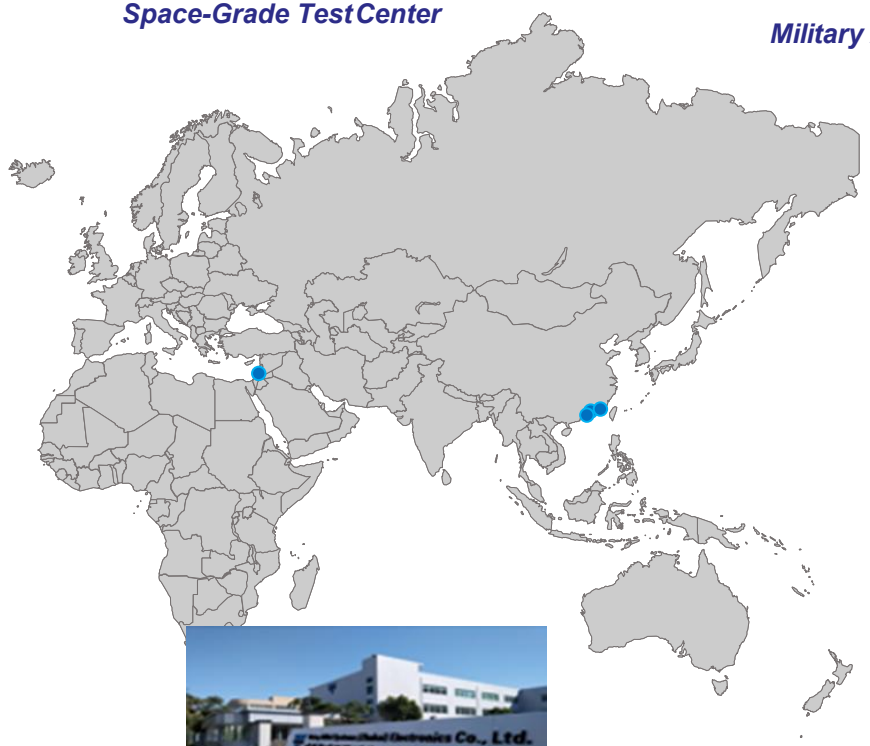
Montevideo, MN
Vishay HiRel
Sub Assemblies

Duluth, MN
Vishay HiRel
Power Modules
Space-Grade Test Center

Dover, NH
Vishay HiRel
Military / Avionics / Industrial

Yankton, SD
Inductors Division Headquarters
Medical Implantable
Military / Avionics





Be'er Sheva, Israel
Vishay Dale
Manufacturing

La Laguna, MX
Vishay Dale Manufacturing

Santo Domingo
Dominican Republic
Vishay HiRel Manufacturing

Zhuhai City
Guangdong Province, P.R.C
Vishay HiRel Manufacturing

Danshui
Guangdong Province, P.R.C.
Vishay Dale Manufacturing

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Vishay La Laguna – Power Inductors Factory

Reasons for Additional Power Inductors Factory in 2021

- Outgrew Yankton in 1998, Beer Sheva in 2010, Danshui in 2020
- Needed more floorspace
- Desire to have duplicate mass production site outside China
- Desire to have lower labor costs
- Desire to have lower logistics costs to Americas and Europe
- ***It was not about tariffs***

Inductors Powering the Future

Inductors Division

Custom Magnetics

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Custom Magnetics

Do you think selling custom magnetics is:

Or:

Custom Magnetics – We Sometimes Hear…….

Time consuming – long gestation period before sales are realized

Arduous – lot's of information required by the division that can be difficult to get from customers

Better opportunites that don't require as much work for other products

Ordeal to navigate long lead times for samples

Onerous process to get a new design, datasheet, and quotes for these products

But wait – custom magnetics are no longer **TABOO**

Custom Magnetics – in Reality They Are:

Yes – you can do this! We have a focused team and method to streamline the process

ASPs are higher than almost all other standard components

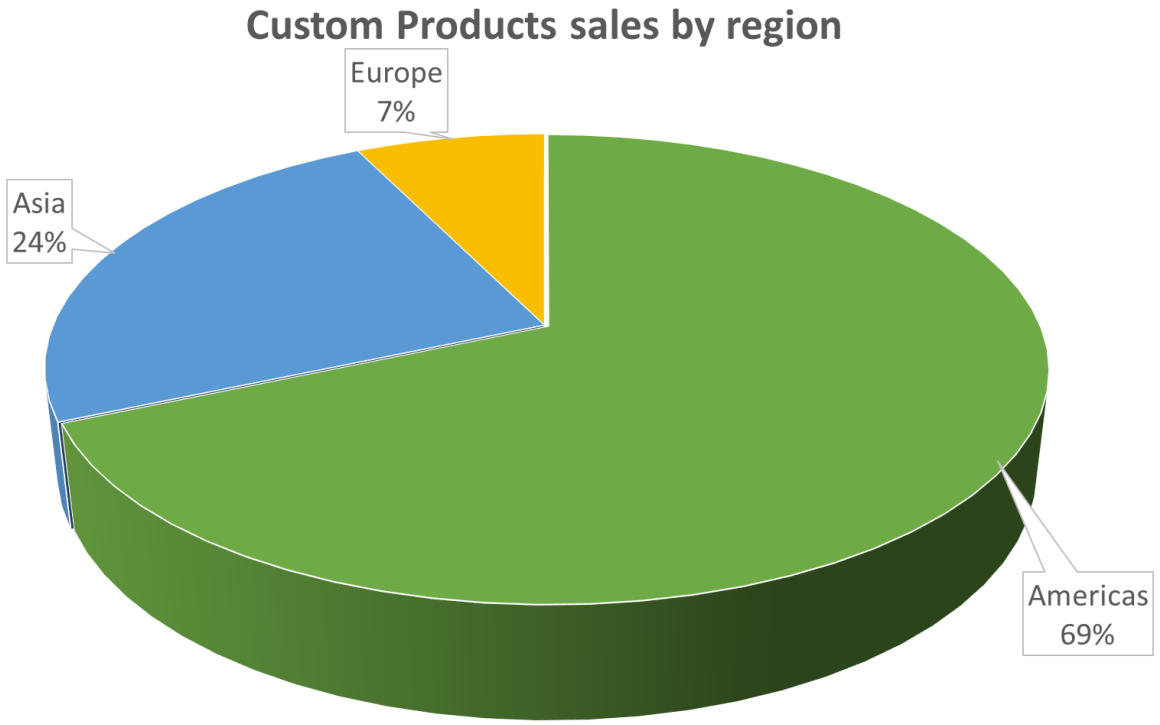
Helps to get an audience with design engineers to get beyond purchasing gatekeepers

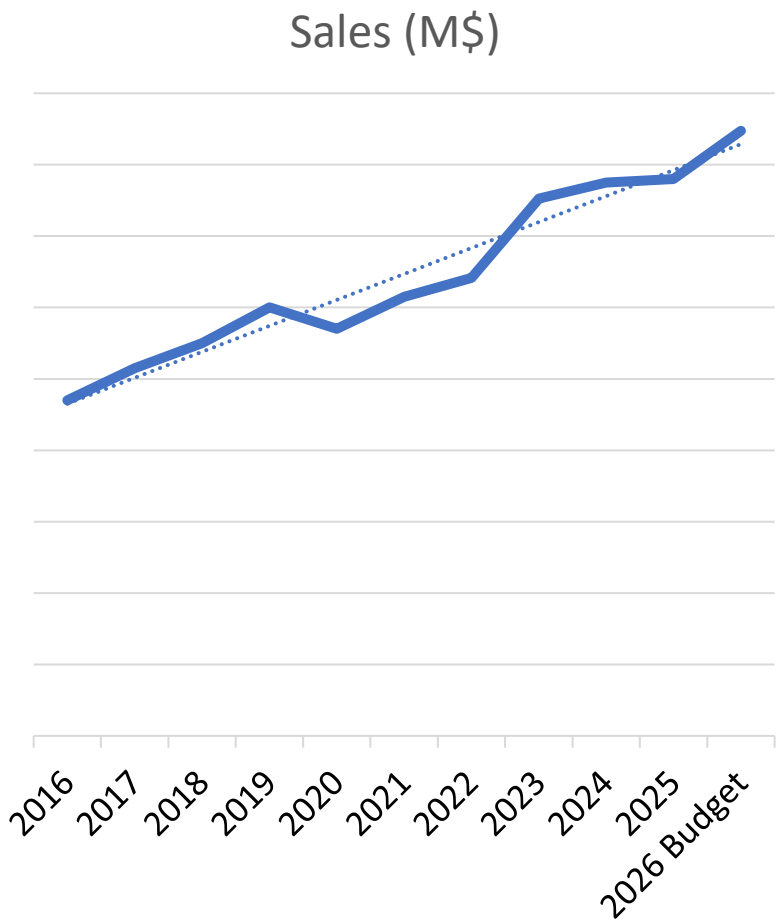
Objective and timely review by the division for quick feedback

Opportunity to win long term, ongoing business along associated selling of standard components

! Here's how to make custom magnetics your **YAHOO!**

Custom Magnetics are Significant!





Focus on the Correct Markets

MEDICAL

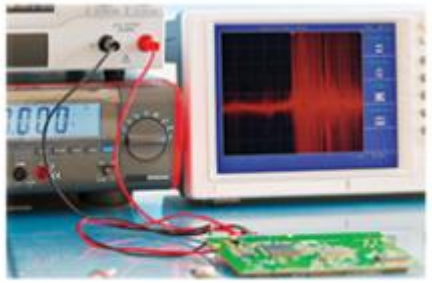
AVIONICS

MILITARY

SPACE

INDUSTRIAL CONTROLS

AUTOMOTIVE



TEST AND MEASUREMENTS

Focus on Niche Markets for Custom Magnetics

- Medical, avionics, aerospace, automotive, industrial, and power control
- Certified by BSI in ISO 14001, ISO 45001, ISO 13485, AS9100, and IATF16949

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Markets Segments and Customers Served

Medical

- **Medtronic, Neuro, Covidien, Navigation**
  - Surgical navigation, energy platforms
  - Neuro monitors, implantable XFMR
- **Boston Scientific**
  - Implantable XFMR, telemetry coils
  - Prostrate treatment
- **Abbott**
  - Implantables, telemetry coils
- **Philips Healthcare**
  - External delibs, neuro monitors
  - MRI amplifiers
- **Zoll Medical**
  - External deliberators
- **Analogic**
  - Medical imaging
- **Fujifilm- PCI**
  - MRI amplifiers
- **Cochlear**
  - Implantable hearing solutions
- **Endotronix**
  - Heart monitors

Medtronic

Cochlear®

Boston Scientific
Advancing science for life™

analogic

PHILIPS

FUJIFILM

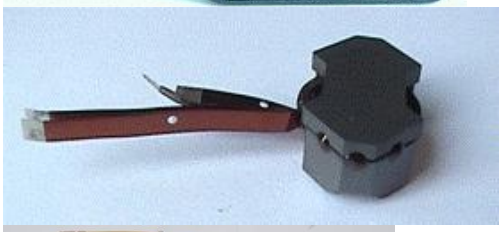
ZOLL

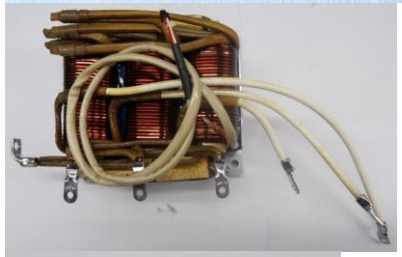
Abbott

Markets Segments and Customers Served

Avionics and Aerospace

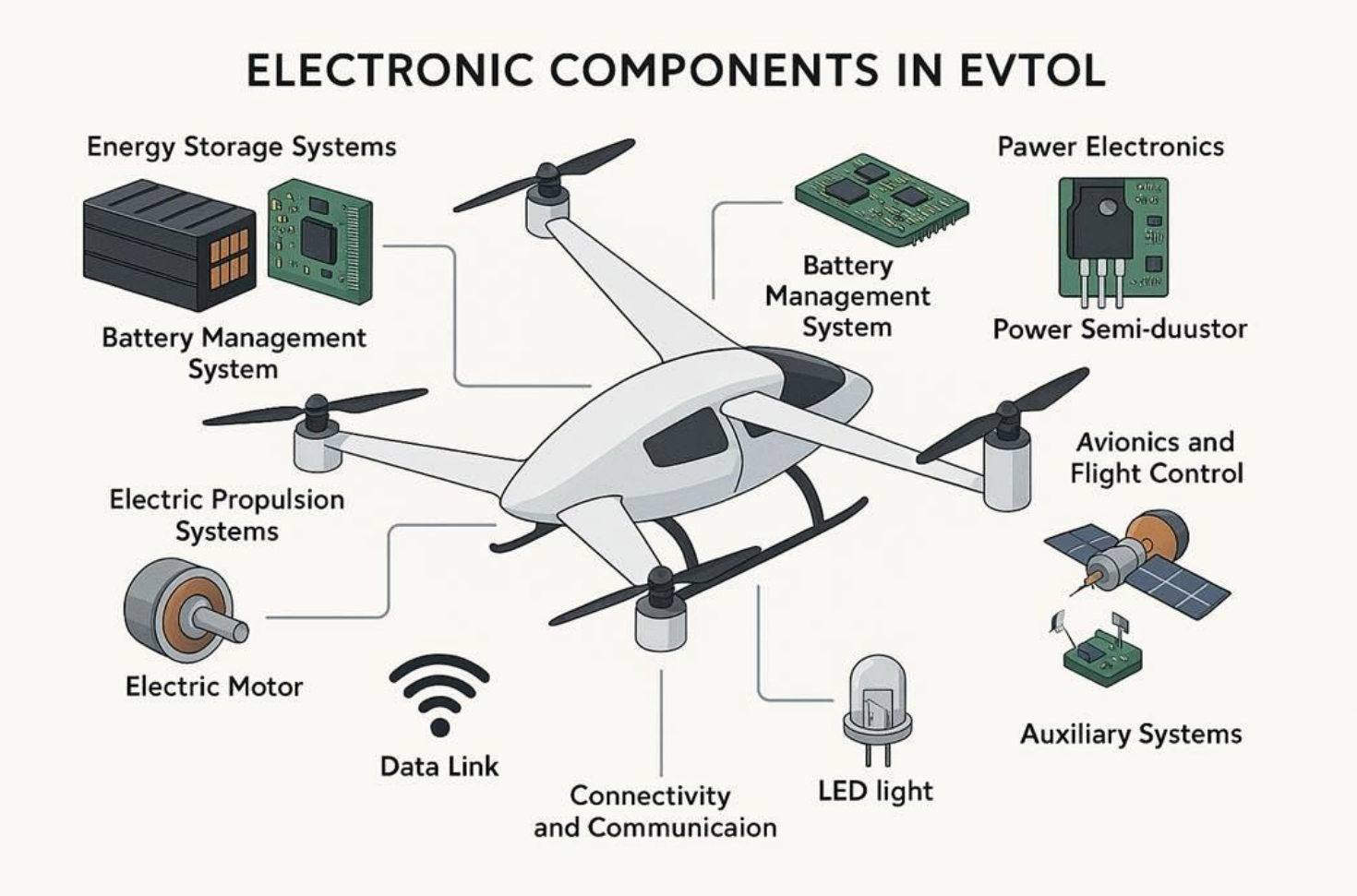
- Astronics
  - Aerospace power systems
  - Flight entertainment
- Honeywell Aerospace
  - Aircraft, JDAM
  - Avionics
- Crane
  - Satellites
- GE Aviation
  - Generators
- AIRBUS
  - Aircraft





Markets Segments and Customers Served – "Greenfield"

- **Avionics and Aerospace**
  'X' TOL
  - Moog
    - Volocopters
  - Beta
    - Off-board charging
    - Avionics
  - Targets
    - Joby
    - Archer
    - Wisk
    - Etc.
  - Major AMS engaged



Markets Segments and Customers Served

- **Military Opportunities Abound!**
  - Honeywell
  - Lockheed
  - RTX (Raytheon & Collins)
  - BAE
  - L3Harris
  - Northrop Grumman
  - Elbit
  - Leonardo / DRS
  - Moog
  - General Dynamics
  - Boeing
  - GE Aerospace
  - Anduril
  - Palantir
  - CACI

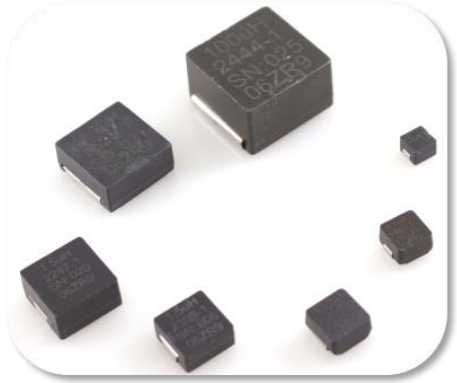
Applications

- Radar
- Avionics Systems
- Missile Systems
- Power Trains
- Motor Controllers
- Communication Systems
- Night Vision

Markets Segments and Customers Served

Space - the Next Frontier

- Northrop Grumman
- Lockheed
- Amazon
- Space X
- L3Harris
- NASA / JPL
- Space Dynamic Labs
- MDA
- Busek
- Exoterra
- Blue Origin



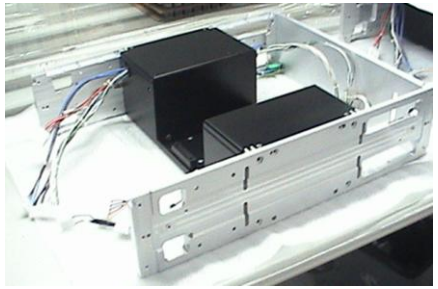
NEW!

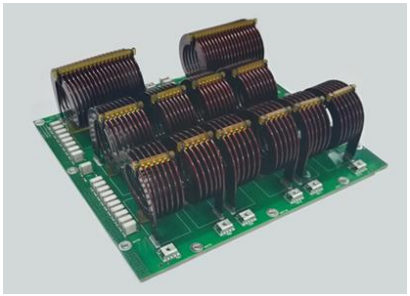
NEW!

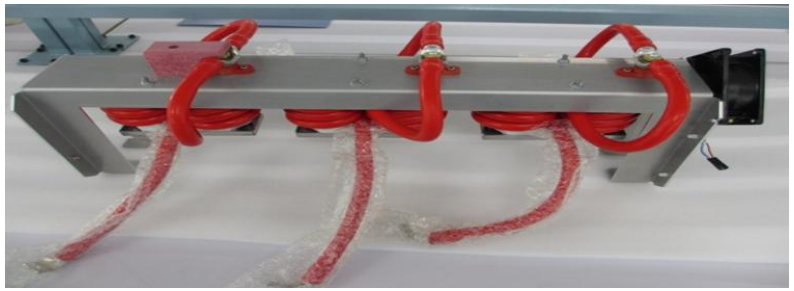
Custom and customizable standard space-grade magnetic solutions. Designed for use in critical ground, LEO, MEO, GEO, deep space, and planetary applications. Multiple Screening levels available up to MIL-STD-981

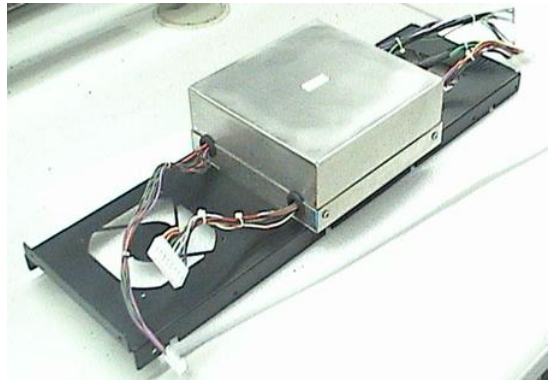
Markets Segments and Customers Served

- **Industrial Controls, Power Controls, Renewable Energy, Analytical, and Industrial**









Advanced Energy

FLUKE.

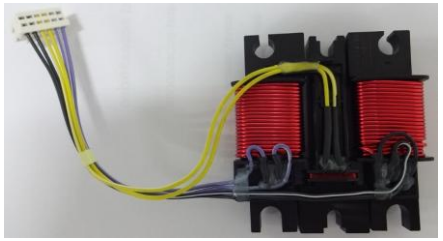
KEITHLEY
A Tektronix Company

dcbel

mks

Markets Segments and Customers Served

- Automotive
  - *Touch Screen*
    - *Actuator Coils*



  - *Electronic Steering Systems*
    - CM Chokes and Inductors

  - *Electronic Braking Systems*
    - Filter Inductor

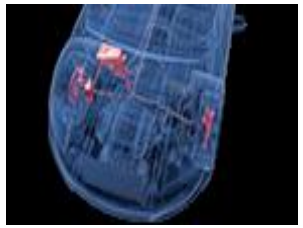
Targeted Automotive Applications for Custom Magnetics

DC/DC Converters –
Inductors, differential mode chokes, common mode chokes, transformers – flyback, gate drives

On-Board Chargers –
Inductors, transformers – resonant

Electric Motor Drives DC/AC –
Common mode chokes, differential mode chokes, inductors, transformers – full-bridge, gate drive, flyback

Power Steering Modules –
High current common mode chokes, differential mode chokes

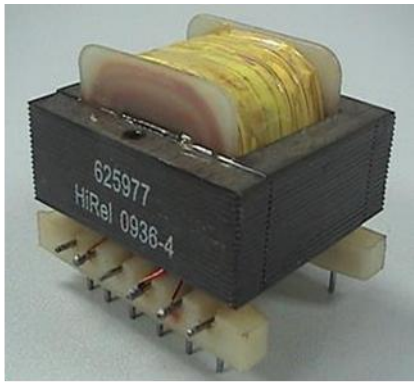


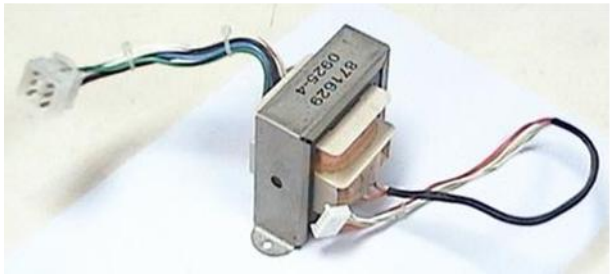
Electronic Braking Modules–
High current differential mode chokes, high current common mode chokes

Haptic Actuators –
Actuator coils

Markets Segments and Customers Served

Testing and Measurement





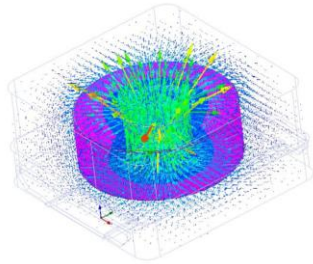
KEITHLEY
A Tektronix Company

KEYSIGHT TECHNOLOGIES

Agilent

FLUKE

Vishay Custom Magnetics Paths to Market



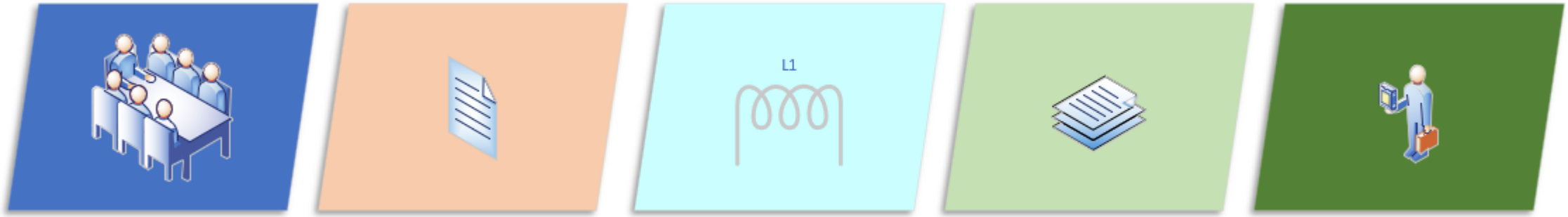
Custom Designs

- Solutions based on specific customer requirements in performance, size, and safety
- Intensive design work together with customer engineering teams
- In-house design, simulation, and testing
- Focus markets: Aerospace and defense, medical, industrial

Customizable Standard Products

- Customer independent products
- Provide baseline size / performance that can be customized to customer specifications
- Advantages
  - Common materials / processes
  - Lower costs for customized products
  - Available from stock
  - Fast turn-around for samples and production
- Focus markets: automotive, industrial

Custom Magnetic Design Process Workflow



Collect design input and assign design team

Create design proposal and share with customer

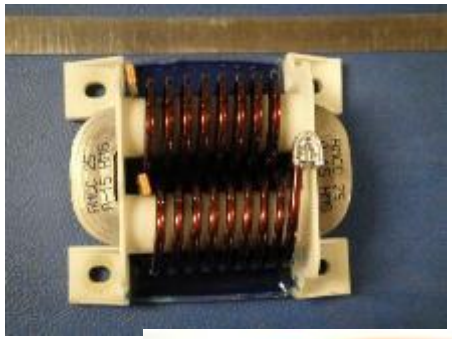
Samples offered to customer

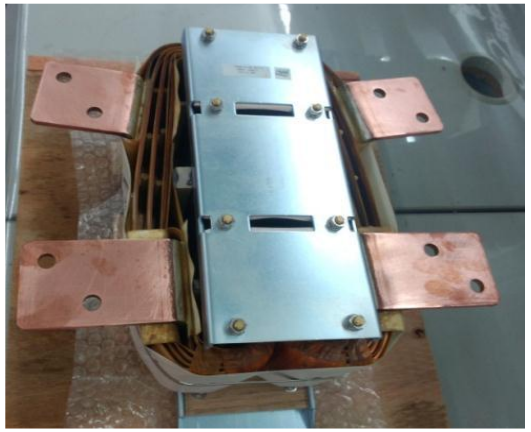
Customers provide feedback

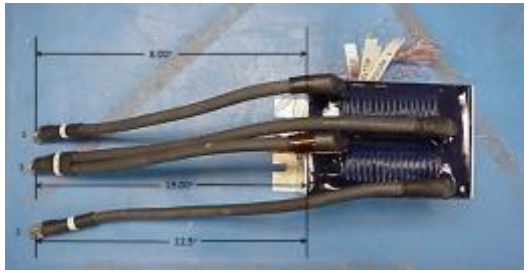
Design is finalized and quoted

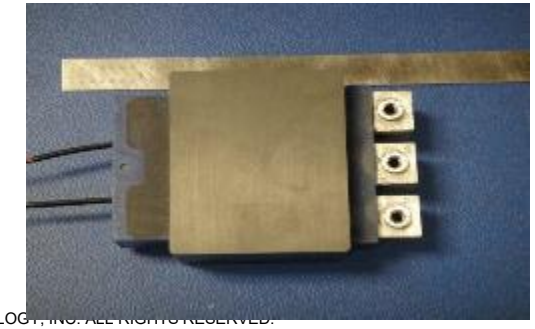
- Quick design process with direct communication with the design team
- Samples available as soon as two weeks, depending on material readiness

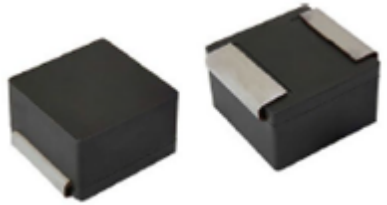
Board Custom Product Portfolio



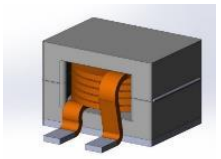


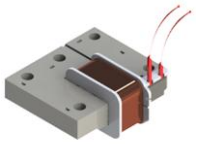


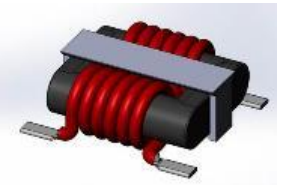




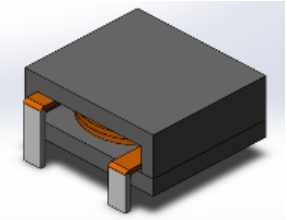
Customizable Standard Products

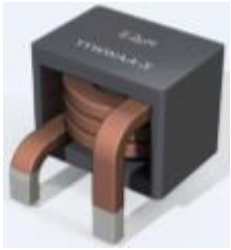






- **Customizable “standard” products provide:**
  - Baseline size / performance that can be customized to customer specifications
  - Products
    - High current, thermally stable inductors (IHDM, IHDF, IHDV, IHDC)
    - Common mode chokes (ICMS)
    - Gate drive transformers (MGDT, uGDT)
    - Hybrid planar transformers (MTPL)
    - Flyback transformers (IFBT)
    - Space-grade IHLPs (SGIHLP)
    - Space-grade hybrid planar transformers (SGTPL)
    - Space-grade common mode chokes (SGCM)
    - Haptic feedback devices (IHPT, IHPC)
  - Advantages
    - Common materials / processes
      - Lower costs for customized products
      - Available from stock
    - Fast turn-around for samples and production
    - Base models in VSSC and catalog distribution





Space-Grade Magnetics

MIL-STD-981 Compliant

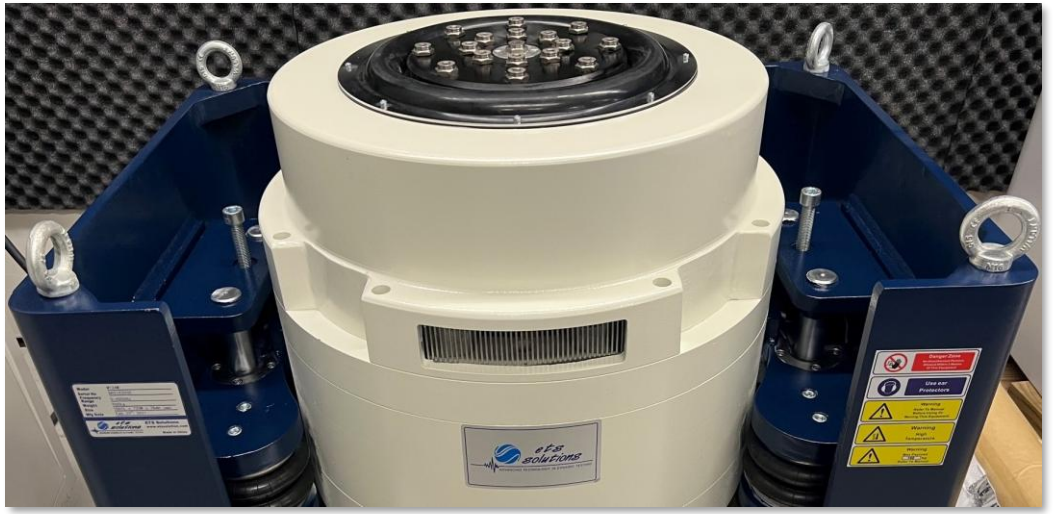
SGIHLP
Power Inductor

SGTPL
Planar Transformer

SGCM
Nanocrystalline Core
Common Mode Choke

Vishay In-House Reliability Test Capabilities

- Parts built and tested to: MIL-PRF-27, MIL-STD-981, and EEE-INST-002
- Electrical testing per MIL-STD-202.
- Environmental testing per MIL-STD-202.
- Physical testing per MIL-STD-202
- In-house test labs allow for short test lead times
- Includes in-house:
  - Radiographic and computed tomography (CT)
  - Thermal shock testing with continuity monitoring
  - Vibration
  - Shock testing

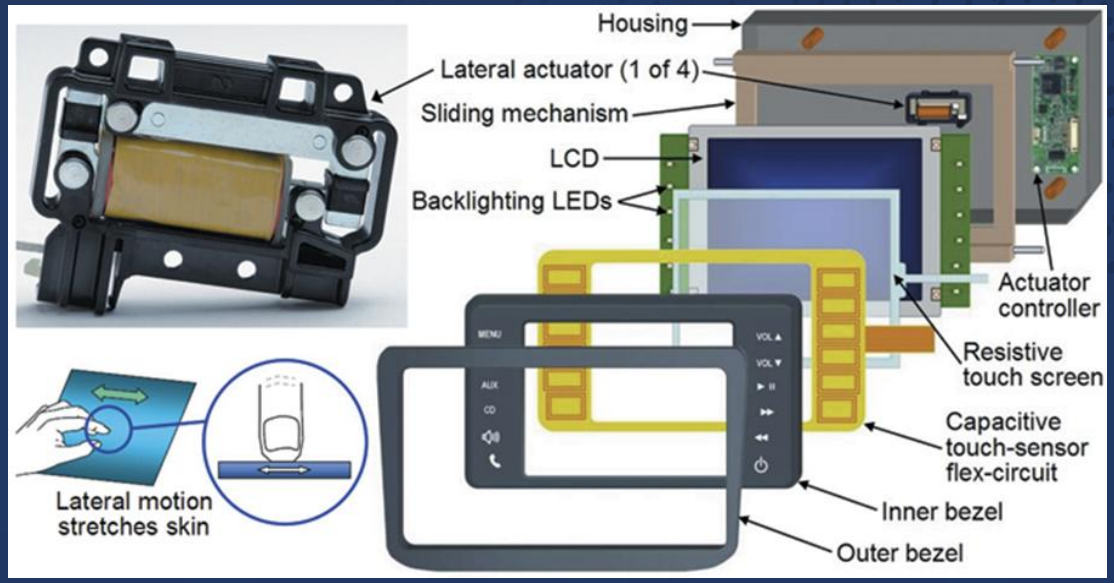


Space Grade Product Line Screening Table

SGIHLP® Screening Code	Levels of Screening
S	MIL-STD-981 Class S Group A/B Screen
B	MIL-STD-981 Class B Group A/B Screen
E2	EEE-INST-002 Level 2 Screening
E3	EEE-INST-002 Level 3 Screening
L	Vishay's custom screening plan (LEO)
P	Basic production screen – product is not MIL-STD-981 compliant

Inductors Division

Haptic Actuators



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What is Haptic Feedback?

- Haptic feedback is the use of tactile effects to communicate with users by touch
- Advanced vibration patterns and waveforms can be created to convey information to a user or operator
- This allows a user to experience relatable vibrations according to the situation on fingers, hands, or other body parts
- The word “haptics” is derived from the Greek phrase “I touch”

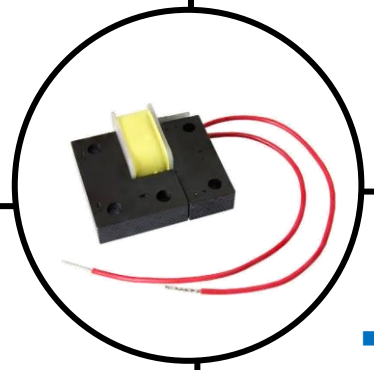
IHPT-1411 – Haptic Feedback Actuator

Market Segments / Applications

- Touchscreens and displays in automotive, industrial, and medical sectors
- Button clusters, rotary knobs, joysticks
- Haptic feedback for noisy environments and underwater

What You Should Know

- Two-piece electromagnetic device that converts electrical energy into linear motion
- Requires return mechanism in form of springs or elastomeric rings



Features

AUTOMOTIVE GRADE

- As low as 8 V – 16 V operating voltage
- Solenoid construction provides high impulse vibration and quick response time for clear feedback in noisy environments
- Actuator can drive a 0.5 kg load to 6 g of acceleration with a 12 V, 5 ms pulse

Our Advantage

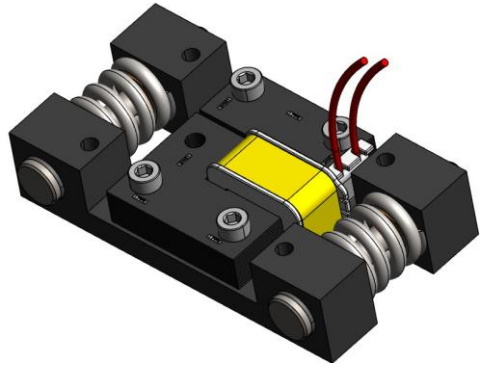
- Crisp haptic effects at low drive voltages (eliminates need for 50 V – 200 V boost stage)
- Less Expensive and more robust than piezoelectric actuators

immersion

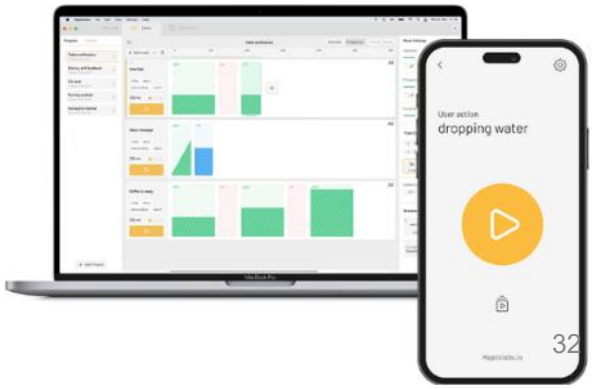
- Immersion license included
- Customization possible

Implementing Haptics Has Never Been Easier

- Vishay is offering the IHPC, which provides the necessary mounting and return spring hardware that the customer can use for prototyping or small production runs, simplifying the mechanical aspect of haptics implementation
- Creating haptic experiences and converting them to driving algorithms is challenging
  - This can be labor intensive
  - Requires an intimate knowledge of the IHPT and the IC driver
- Vishay has partnered with Hapticlabs to provide a “no coding” solution for driving the IHPT: Hapticlabs - No-code haptics
- Hapticlabs provides a variety of available haptic experiences, plus the user has the ability to develop custom experiences through an easy to use graphics interface



- Haptic experiences can be developed in minutes instead of days
- Customized IHPT development kits for easy haptic experimentation with IHPT are available at DigiKey and Mouser. Kits will be made available to sales / FAEs for customer demos
- Trial phone demo is available here: iOS/Android Hapticlabs Demo. It’s fun to download and see the capabilities of the Hapticlabs software on your phone!



SMD Power Inductors

Composite and Ferrite Core Inductor Products

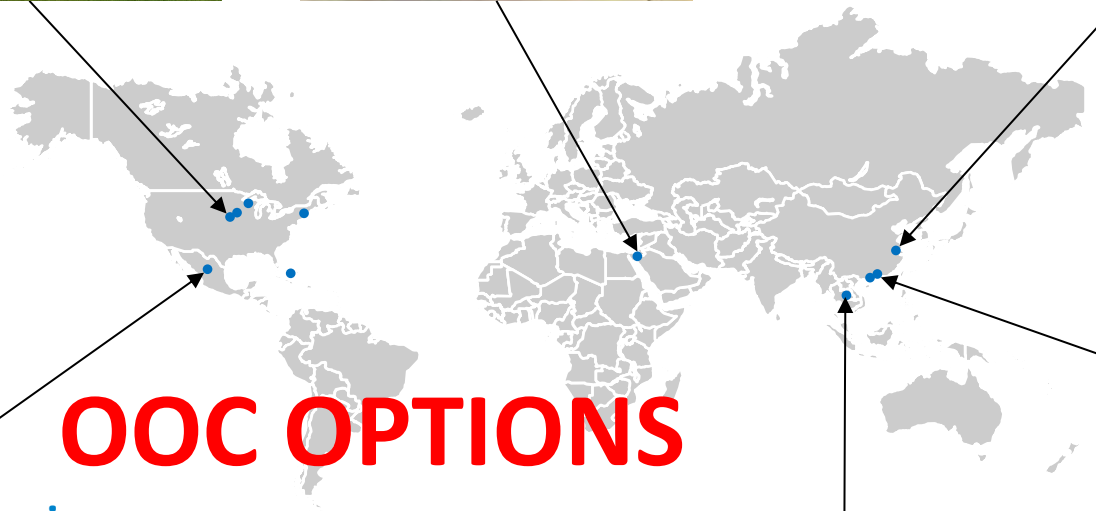
VISHAY
The DNA of tech.®

INDUCTORS DIVISION LOCATIONS
COMPOSITE INDUCTOR MANUFACTURING

Yankton, SD
Inductors Division Headquarters
Medical Implantable
Military/Avionics
ISO-9001, ISO-13485, ISO-14001, AS9100 & IATF16949
OHSAS 18001

Be'er Sheva, Israel
Vishay Inductors Division
Manufacturing
ISO-9001,
ISO-14001, IATF16949, OHSAS 18001

Kunshan, China
Vishay Partnership
Manufacturing
ISO-9001, ISO-14001, IATF16949



OOC OPTIONS

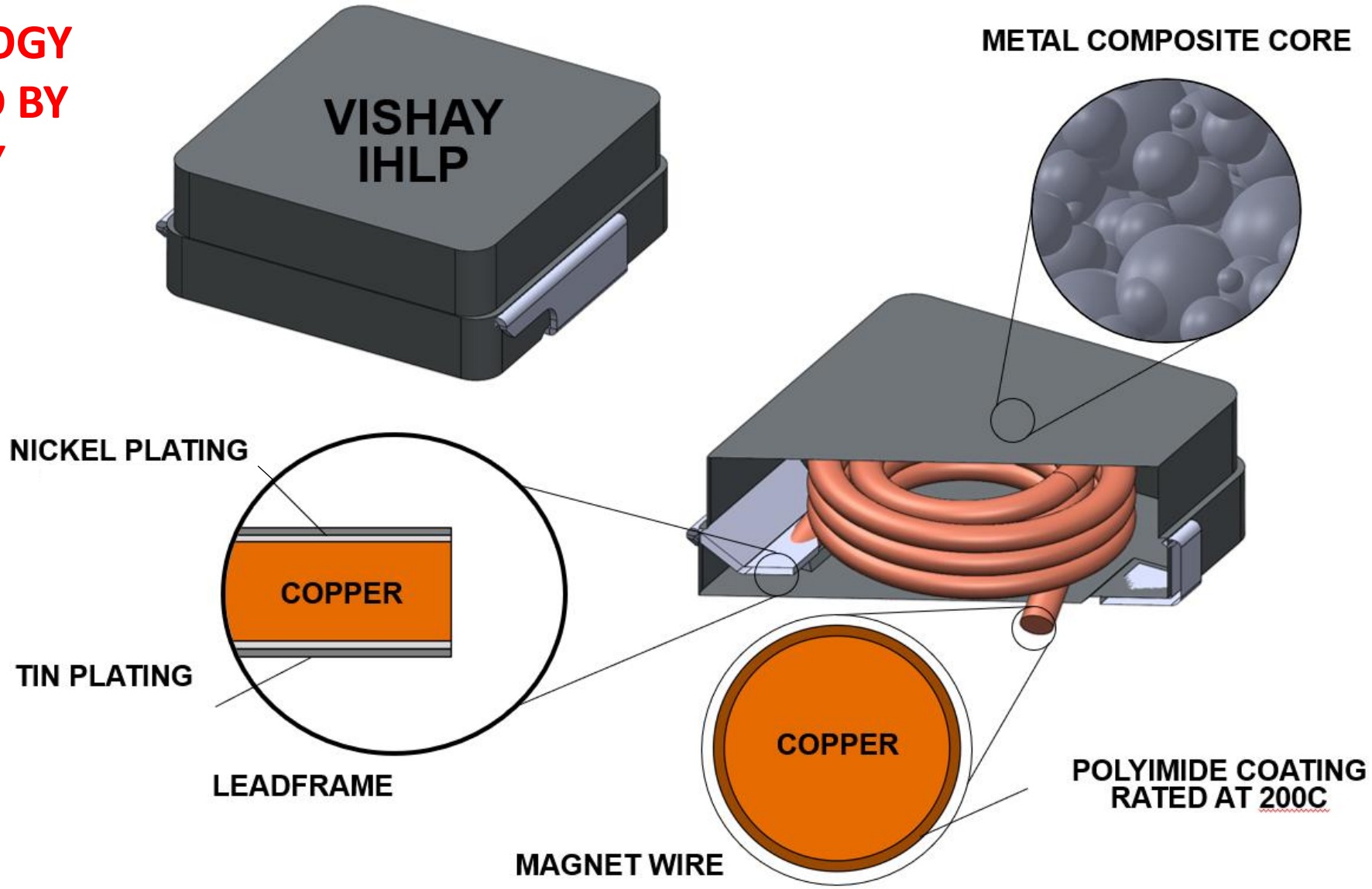
Mexico
Vishay Inductors Division
Manufacturing
ISO-9001, ISO-14001, IATF16949
NEW

Thailand
Vishay Partnership
Manufacturing
NEW

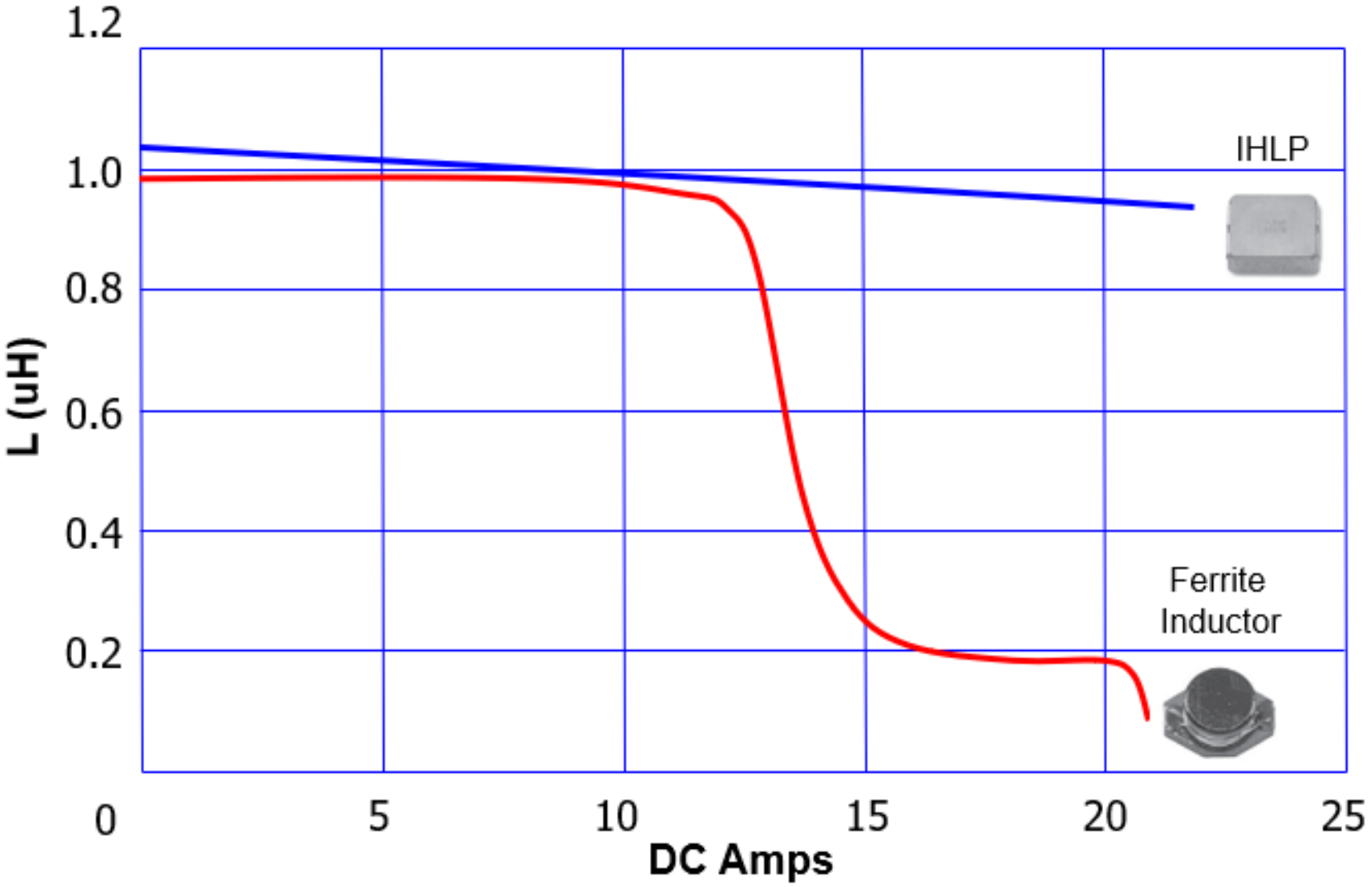
Danshui
Guangdong Province, P.R.C.
Vishay Inductors Division
Manufacturing
ISO-9001, ISO-14001 &
IATF16949, OHSAS 18001

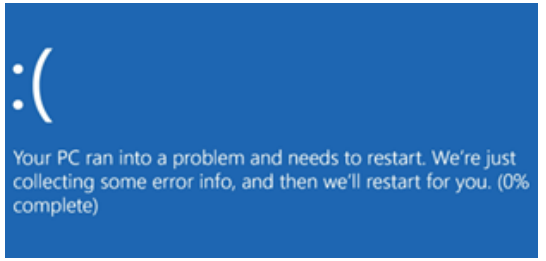
VISHAY COMPOSITE POWER INDUCTOR TECHNOLOGY

TECHNOLOGY INVENTED BY VISHAY

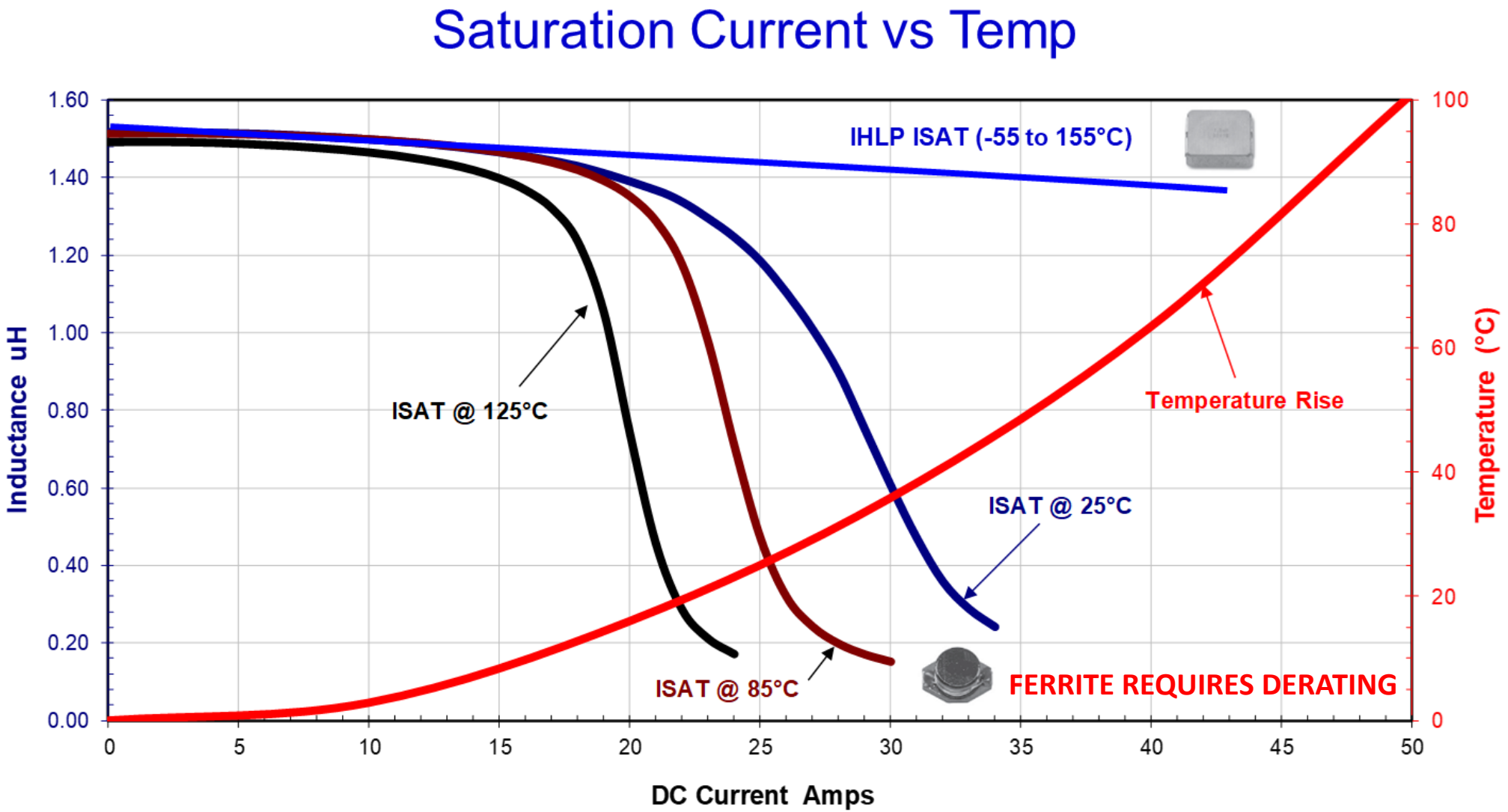


COMPOSITE POWER INDUCTOR ADVANTAGES – SOFT SATURATION





COMPOSITE POWER INDUCTOR ADVANTAGES – NO CURIE TEMP

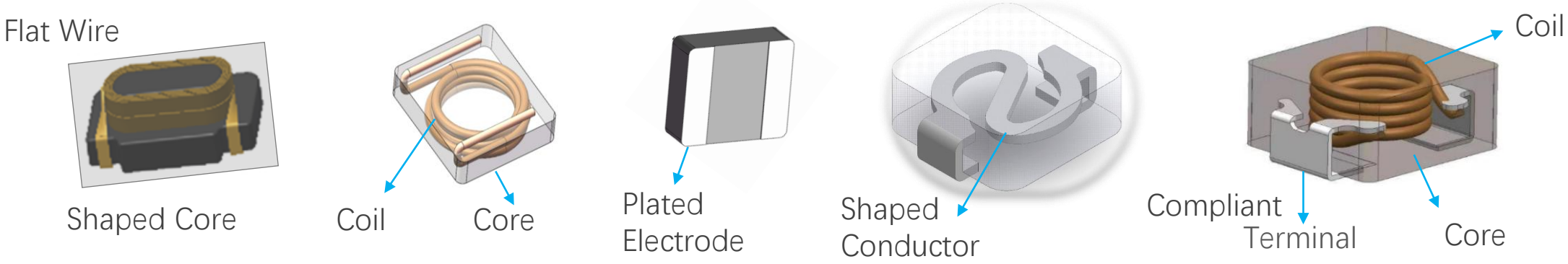


COMPOSITE POWER INDUCTOR TECHNOLOGY ADVANTAGES

- ✓ SOFT SATURATION PROVIDES CIRCUIT STABILITY
- ✓ STABLE INDUCTANCE OVER TEMPERATURE (NO CURIE TEMP)
- ✓ FULLY SELF SHIELDED CONSTRUCTION (MINIMIZES EMI)
- ✓ SUPERIOR HEAT TRANSFER VS ASSEMBLED INDUCTOR
- ✓ ROBUST COMPOSITE CONSTRUCTION FOR SUPERIOR SHOCK AND VIBE

COMPLETE PRODUCT STRUCTURE AND DESIGN PORTFOLIO

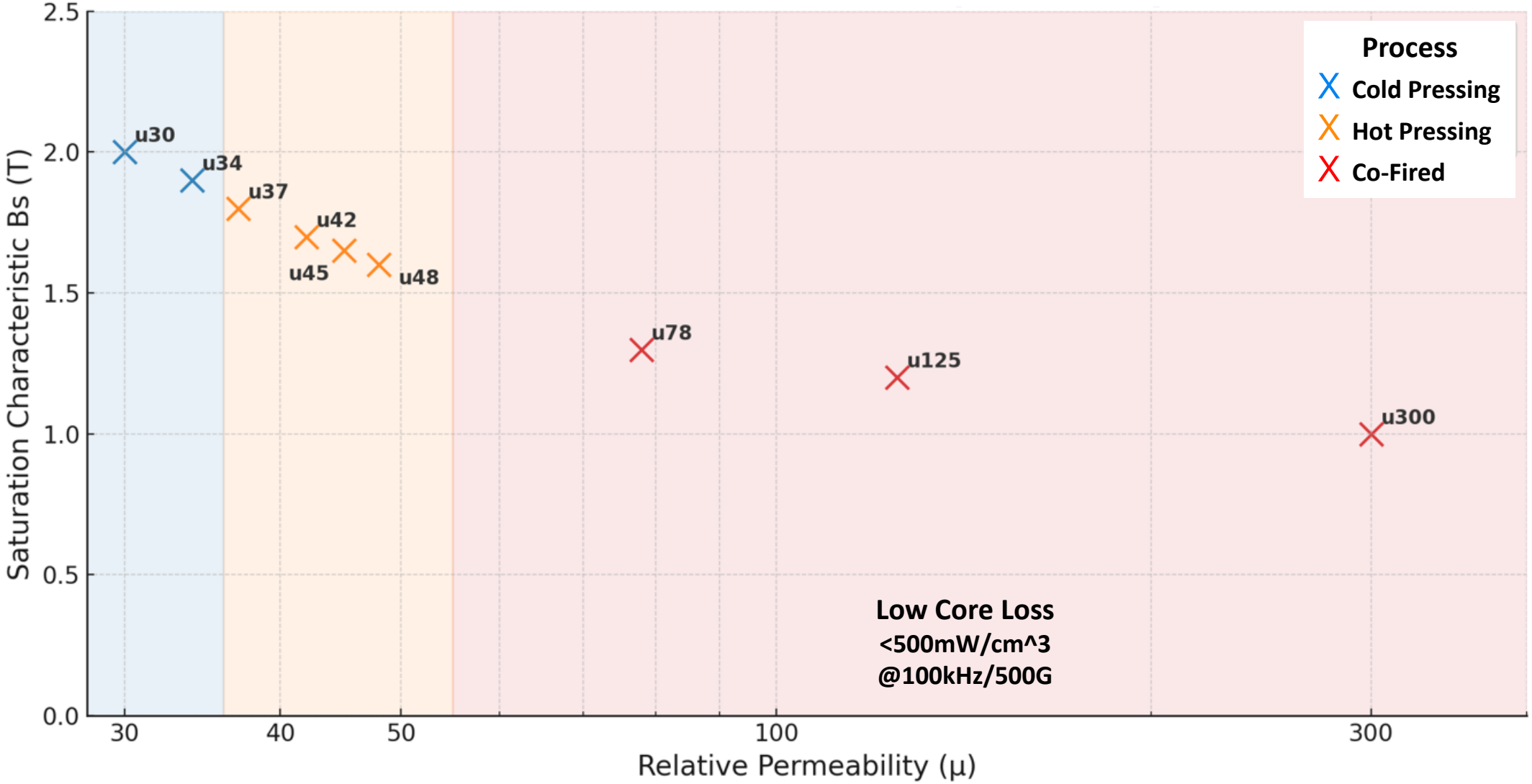
Cutting Edge Technology in Materials and Processes that Deliver Industry Leading Performance



Component	Technology	Process
Coil / Conductor	■ Round Wire Coil ■ Flat Wire Coil ■ Shaped Conductor	■ Helical Winding ■ Flat Winding ■ Forming
Core / Body	■ Carbonyl Iron ■ Various Alloys ■ Amorphous	■ Cold & Hot Pressing ■ Pressure Molding ■ Co-Fired
Terminal Style	■ Leadframe Terminal ■ Self-Leaded Conductor ■ Plated Terminal	■ Ultrasonic & Laser Welding ■ Forming ■ Plating

✓ According to the market demand for product features, there will be different design combinations, accordingly there will also be different manufacturing processes.

CORE MATERIAL PERMEABILITY ROADMAP



SURFACE MOUNT COMPOSITE POWER INDUCTORS IHLP/IHLL

- **Vishay has the widest range of sizes and inductance values* of any supplier!**
  - 16 footprints (1.0uH current rating shown in amps)
    - **0402 1.0x0.5 (1A) 2026**
    - **0605 1.4x1.2 (2A) 2026**
    - **0805 2.0x1.2 (3A) New**
    - **0806 2.0x1.6 (3A) New**
    - **1008 2.5x2.0 (4A) New**
    - **1210 3.2x2.5 (6A) New**
    - **1212 3mm^2 (6A)**
    - **1616 4mm^2 (8A)**
    - **2020 5mm^2 (10A)**
    - **2525 6mm^2 (14A)**
    - **3232 8mm^2 (20A)**
    - **4040 10mm^2 (25A)**
    - **5050 13mm^2 (33A)**
    - **6767 17mm^2 (50A)**
    - **7575 19mm^2 (55A)**
    - **8787 22mm^2 (80A)**
  - Height profiles from **<0.5** to 13.0mm
  - Sn, SnPb and Gold Terminations
  - Values from 25nH to >100uH
  - Up to 180°C operation

***NOTE: NON-STANDARD PROFILES & INDUCTANCE VALUES AVAILABLE AS STD COST COMPONENTS**

AUTOMOTIVE GRADE

IHSL Commercial Power Inductors

FORM FACTOR FLEXIBLITY… NOT JUST SQUARE

Image for reference only.

FEATURES

- Magnetically shielded construction.
- Handles high transient current spikes without saturation.
- 100% lead (Pb) free and RoHS compliant.
- 11.5 x 7.0 x 4.0mm SMD package

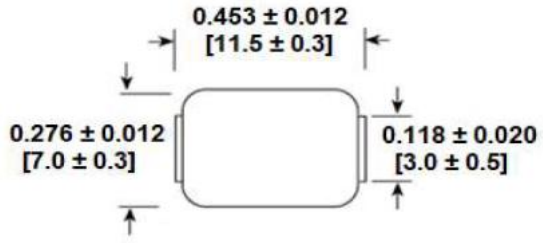
Pb-free RoHS COMPLIANT HALOGEN FREE GREEN (5-2008)

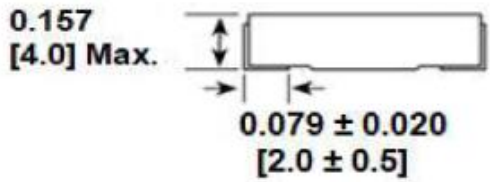
APPLICATIONS

- PDA/Notebook/Desktop/Server applications.
- Point-of-load modules
- Battery powered devices.
- In-line filter
- Data networking and storage systems

STANDARD ELECTRICAL SPECIFICATIONS

PART NUMBER	L_O (µH) INDUCTANCE ± 20% AT 100kHz, 0.25V, 0A	DCR (mΩ) 25 °C		HEAT RATING CURRENT DC TYP. (A)[1]	SATURATION CURRENT DC TYP. (A)		SRF TYP. (MHz)
		Typ.	Max.		20% drop[2]	30% drop[3]	
IHSL4428DZEZR15M1Z	0.15	0.48	0.50	45.0	90.0	100.0	--





Ultra High Current Inductors

Where? For high computing power, multiphase converters, servers, data centers, LC filters

- Fast switching > 500kHz
- Tight ripple control
- Ideal for converting low-level IC voltage - 12V to 1V
- High load capable up to 100A due to **ultra-low DCR**

LOW PROFILE OR VERTICAL MOUNT

IHVR-4025JZ-3Z

100 to 150nH
110A
10.3 x 6.4 x 10mm

IHSR-1616BZ-01

AUTOMOTIVE GRADE

33 to 68nH
35A
4.5 x 4.1 x 1.2mm

IHSR-2525CZ-5A

AUTOMOTIVE GRADE

80 to 100nH
55A
7.4 x 6.7 x 3.0mm

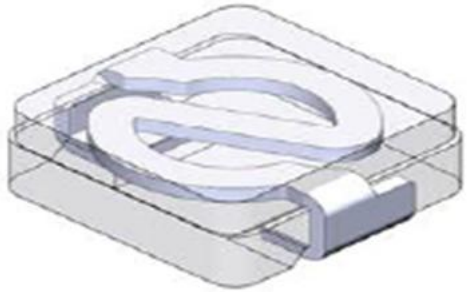
IHSR-4040DZ-5A

AUTOMOTIVE GRADE

130nH
70A
11.3 x 10.3 x 4.0mm

IHSR-6767GZ-5A

AUTOMOTIVE GRADE



220nH
100A
18 x 17 x 7.0mm

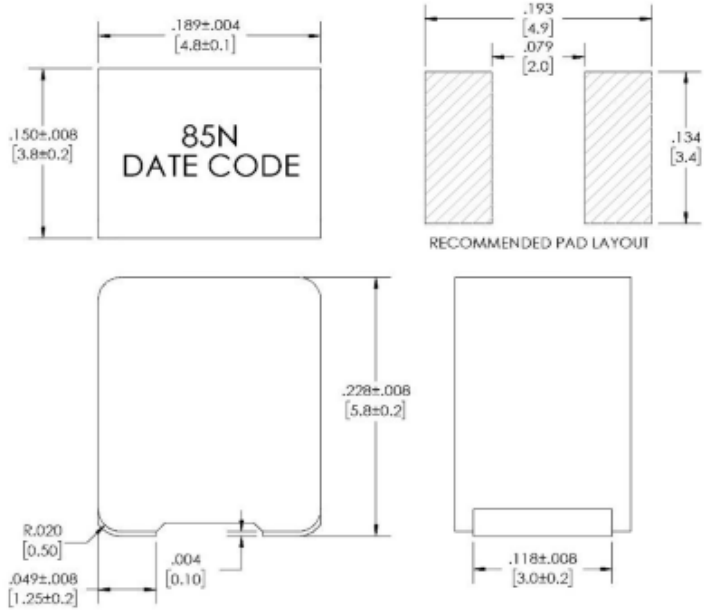
VISHAY
The DNA of tech.®

Small Footprint, Ultra Low DCR, High Saturation Inductors

PRELIMINARY ELECTRICAL SPECIFICATIONS

PART NUMBER	Lo INDUCTANCE µH ±20% @100KHz, .25V, 0A	DCR mOhms TYPICAL$_7$ 25°C	DCR mOhms MAX$_7$ 25°C	HEAT RATING CURRENT DC AMPS$_3$ TYPICAL	SATURATION CURRENT DC AMPS$_4$ TYPICAL	SATURATION CURRENT DC AMPS$_5$ TYPICAL	SRF (MHz) TYPICAL
IHVR1915FZEZ85NM5Z	0.085	0.240	0.270	53.0	62.0	80.0	280

IDEAL FOR HIGH END GPU POWER



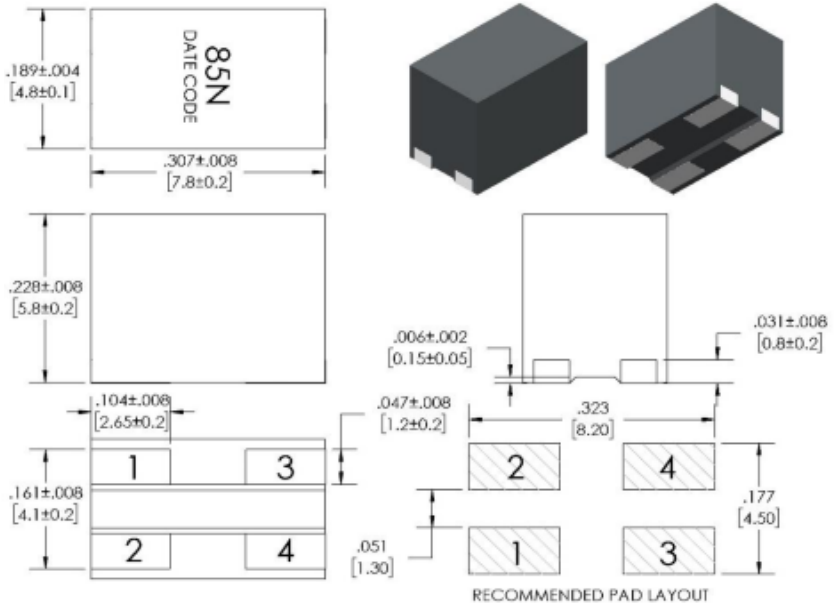
NOTES:

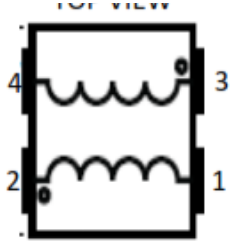
1. All test data is referenced to 25°C ambient.
2. Operating Temperature Range - 55°C to + 155°C
3. DC current (A) that will cause an approximate ΔT of 40°C.
4. DC current (A) that will cause Lo to drop approximately 20%
5. DC current (A) that will cause Lo to drop approximately 30%
6. The part temperature (ambient + temp rise) should not exceed max operating temperature$_2$ under worst case operating conditions. Circuit design, component placement, PWB trace size and thickness, airflow component placement, PWB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.

Small Footprint, Ultra Low DCR, Dual Inductor

PRELIMINARY ELECTRICAL SPECIFICATIONS							
PART NUMBER	Lo INDUCTANCE µH ±20% @100KHz, .25V, 0A	DCR mOhms TYPICAL$_7$ 25°C	DCR mOhms MAX$_7$ 25°C	HEAT RATING CURRENT DC AMPS$_3$ TYPICAL	SATURATION CURRENT DC AMPS$_4$ TYPICAL	SATURATION CURRENT DC AMPS$_5$ TYPICAL	SRF (MHz) TYPICAL
IHVD3019FZEZ85NM5Z	0.085	0.240	0.270	53.0	62.0	80.0	280

SPACE SAVING DUAL INDUCTOR
IDEAL FOR HIGH END GPU POWER





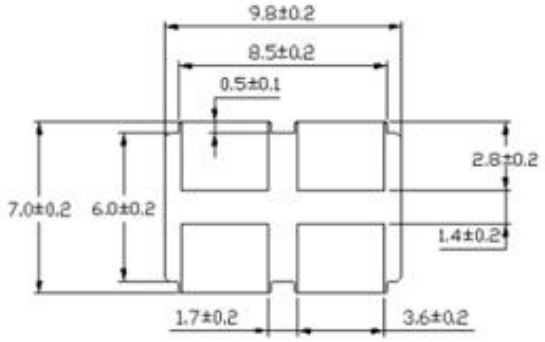
NOTES:

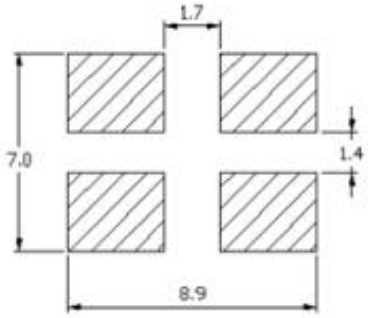
1. All test data is referenced to 25°C ambient.
2. Operating Temperature Range - 55°C to + 155°C
3. DC current (A) that will cause an approximate ΔT of 40°C.
4. DC current (A) that will cause Lo to drop approximately 20%
5. DC current (A) that will cause Lo to drop approximately 30%
6. DCR measured at locations indicated 1 - 2 or 3 - 4 on drawing.
7. Coplanarity of 4 terminals: 0.004" [0.10]
8. The part temperature (ambient + temp rise) should not exceed max operating temperature$_2$ under worst case operating conditions. Circuit design, component placement, PWB trace size and thickness, airflow component placement, PWB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.

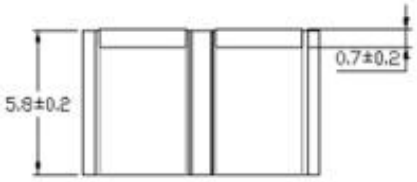
CO-FIRED DUAL INDUCTOR IHVD4027FZEZR85M1C

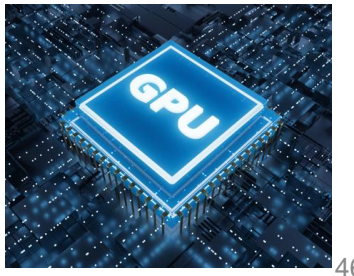
Part Number	L0 (nH) ±20%	DCR (mΩ)		IDC (Amp) Δ40℃		ISAT (Amp) 40% @25℃		Coupling Coefficient
		Typical	Maximum	Typical	Maximum	Typical	Maximum	Minimum
IHVD4027FZEZR85M1C	85.0	0.14	0.16	68.0	58.0	88.0	75.0	0.05

IDEAL FOR 12V to 1V DUAL PHASE POWER MODULES USED IN HIGH END GPU POWER









VISHAY www.vishay.com

IHLL-242NDZ-AZ

Vishay Dale

Low DCR, Automotive Power Inductor

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

AUTOMOTIVE ADAS/AI INDUCTOR

FEATURES

- Magnetically shielded construction.
- Handles high transient current spikes without saturation.
- 100% lead (Pb) free and RoHS compliant.
- 6.0 x 6.0 x 4.0mm SMD package
- AEC-Q200 qualified

APPLICATIONS

- PDA/Notebook/Desktop/Server applications.
- Point-of-load modules
- Battery powered devices.
- In-line filter
- Data networking and storage systems

STANDARD ELECTRICAL SPECIFICATIONS

PART NUMBER	L_O INDUCTANCE ± 20% AT 1MHz, 1V, 0A (µH)	DCR TYP. 25 °C (mΩ)	DCR MAX. 25 °C (mΩ)	HEAT RATING CURRENT DC TYP. (A)[1]	SATURATION CURRENT DC TYP. (A)		SRF TYP. (MHz)
					20% drop[2]	30% drop[3]	
IHLL242NDZEZ85NMAZ	0.085	0.36	0.40	53	62	80	280

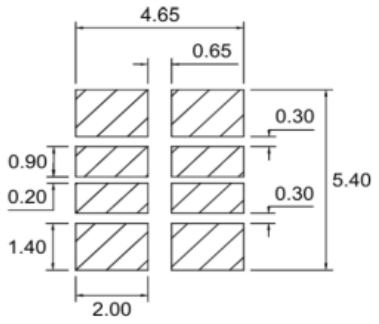
DUAL TRANS-INDUCTOR (TLVR) IDTL2020DZEZR05M5Z

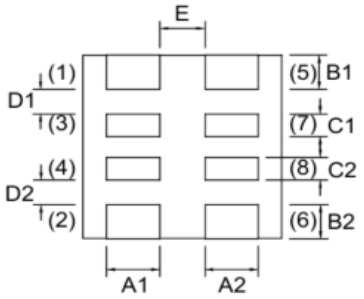
STANDARD ELECTRICAL SPECIFICATIONS

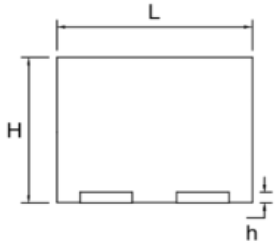
PART NUMBER	PINS	L_o (µH) INDUCTANCE ± 20% AT 0A	DCR (mΩ) 20 °C		HEAT RATING CURRENT DC TYP. (A)[1]	SATURATION CURRENT DC TYP (A)[2]	COUPLING COEFFICIENT k
			Typ.	Max.			
IDTL2020DZEZR05M5Z	(1) - (2)	0.05	0.37	0.45	39	84	0.78
	(3) - (4)	0.05	1.48	1.80	19	84	
	(5) - (6)	0.05	0.37	0.45	39	84	0.78
	(7) - (8)	0.05	1.48	1.80	19	84	

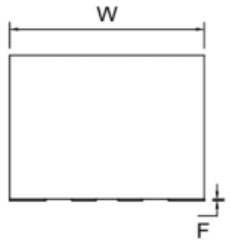
DIMENSIONS in millimeters

Typical Pad Layout





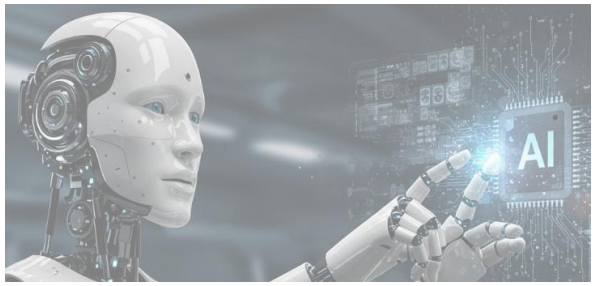


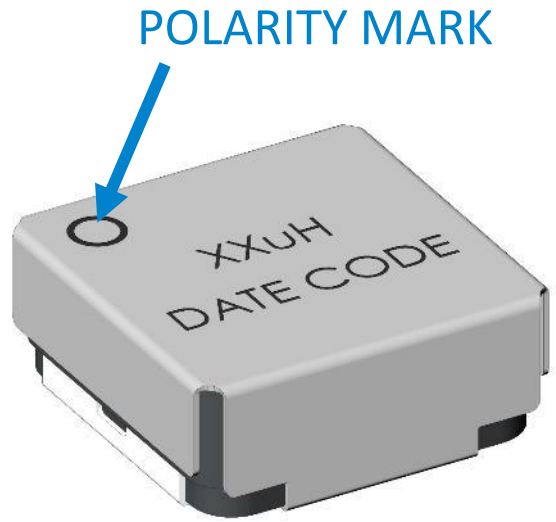


L	4.85 ± 0.15
W	4.85 ± 0.15
H	3.90 ± 0.10
A1,A2	1.30 ± 0.20
B1,B2	0.90 ± 0.20
C1,C2	0.60 ± 0.15
D1,D2	0.65 ± 0.15
E	1.10 ± 0.15
F	0.015 ~ 0.030
h	0.30 Ref

B Field and E Field Shielded IHLE® Inductor

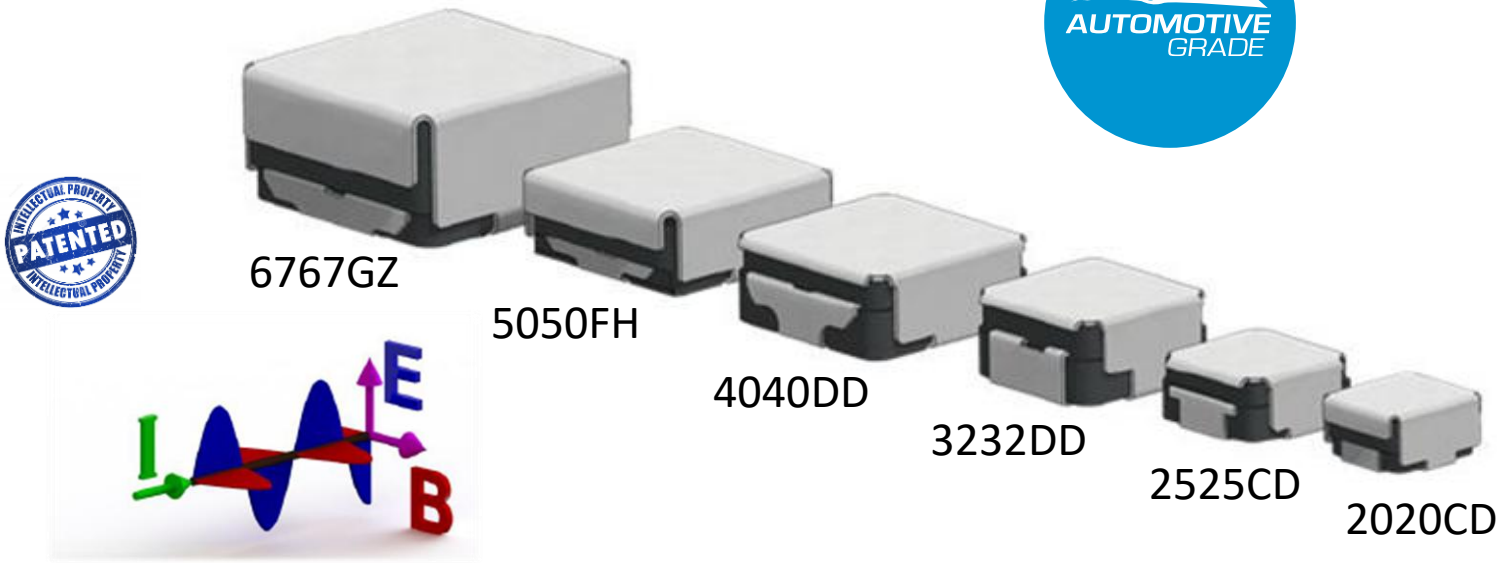
- Special Shielded IHLP Inductor
- Significant EMI Reduction
- Prevent circuit malfunction
- 6 footprints available
- NEW 6767 size

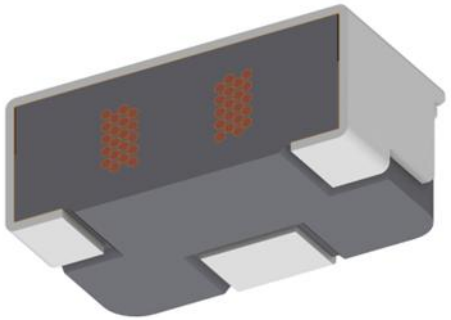




NEW IHLE-6767

AUTOMOTIVE GRADE



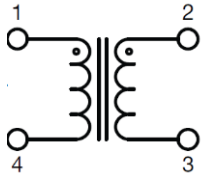


Integrated E-field shielding

IHCL-4040DZ-XX

IHCL-4040 Series

Patented Coupled Power Inductor



AUTOMOTIVE GRADE

Advantages

- Magnetically shield construction minimizes leakage
- High temperature up to 155°C
- Coupling is > 90%
- High thermal stability over ferrites
- High saturation rating

UPGRADED IHCL COMING IN 2026…

- **HIGHER VOLTAGE RATING**
- **HIGHER EFFICIENCY**

Reference Design

IHCL-4040

IHLD-2525GG-A1

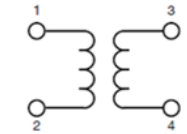
IHLD Series

2-in-1 Package, High Current, Dual Inductor

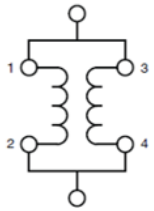
Advantages

- Saves board space and assembly time
- Ideal for multiphase converters or Class D audio amplifier
- Magnetically shielded composite construction minimizes leakage flux (compared to ferrite inductors)
- Linear saturation reduces total harmonic distortion (THD)

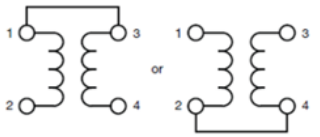
Connections Possible



Standard (separate)

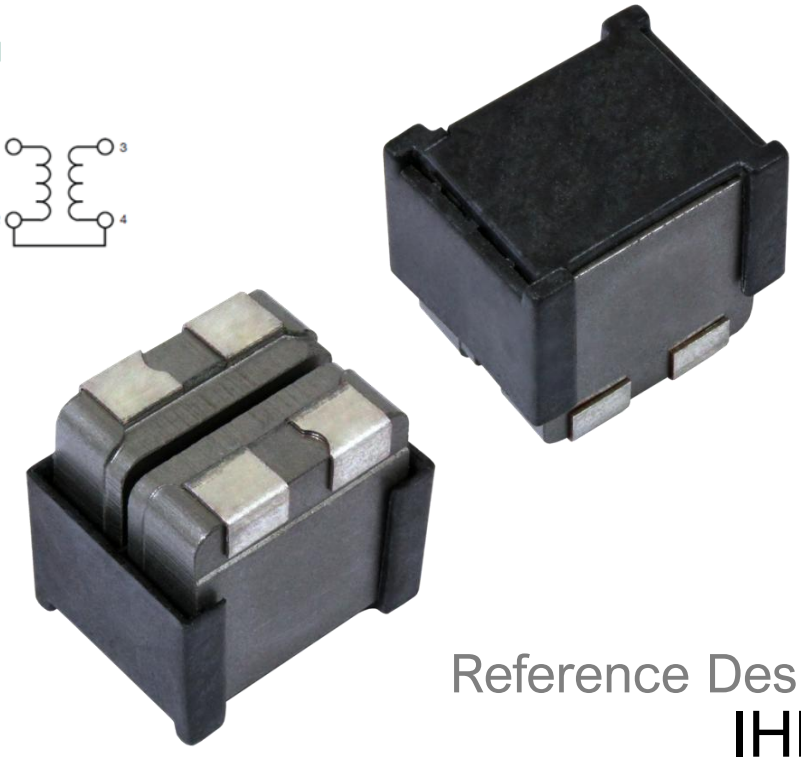


Parallel



Series

AUTOMOTIVE GRADE



Reference Design

IHLD

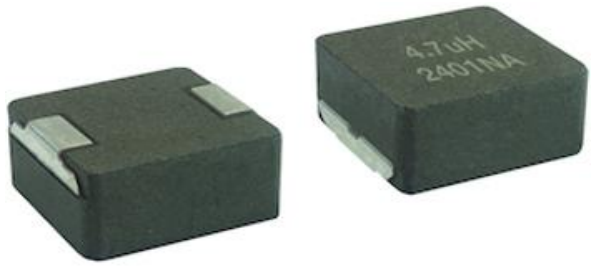
IHLP-AP Series

Low AC Loss Power Inductor

AUTOMOTIVE GRADE

Advantages

- Up to 60% lower AC losses than traditional powdered iron core
- Ideal for high ripple applications
- Excellent saturation rating
- Minimizes need for cooling



Reference Design

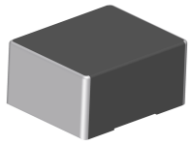
IHLP5050

Miniature IHLP

Benchmark for 0806 Size

2.0 x 1.6 x 1.2 mm

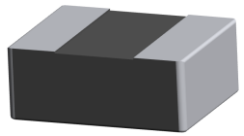
IHLP-0806AB-5A AUTOMOTIVE GRADE



0.22µH 5.8A
⋮
0.47µH 4.6A

2.5 x 2.0 x 1.2 mm

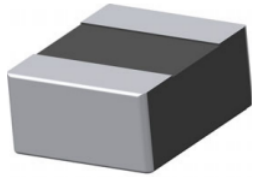
IHLP-1008AB-5A AUTOMOTIVE GRADE



0.15µH 6.5A
⋮
2.2µH 2.6A

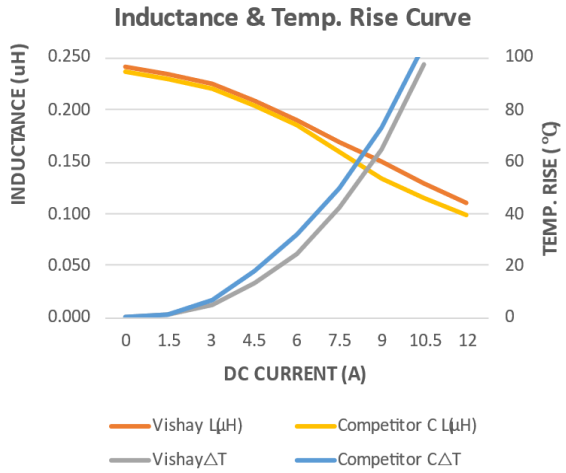
3.0 x 2.5 x 1.2 mm

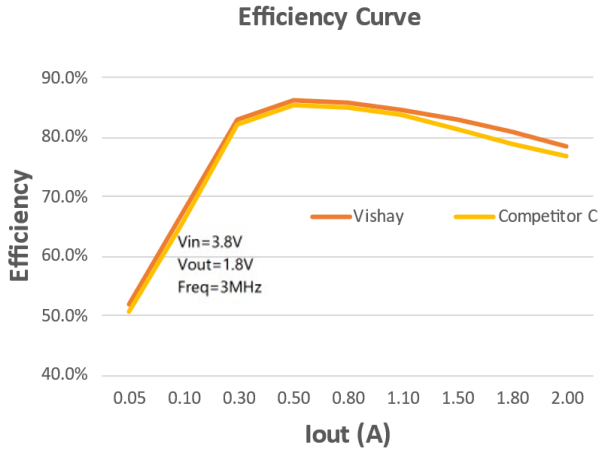
IHLP-1210AB/BZ-5A AUTOMOTIVE GRADE



0.22µH 16A
⋮
4.7µH 3.0A

Vendor	Part No.	L_0 (µH)	Dimension (mm)	DCR (mΩ)		Idc (A)		Isat (A)	
				Typ.	Max.	Typ.	Max.	Typ.	Max.
Vishay	201210-R24	0.24	2.0*1.2*1.0	13	17	7.0	6.4	7.2	6.7
Competitor C	201210-R24	0.24	2.0*1.2*1.0	17	20	5.3	4.7	6.2	5.6





✓ Vishay's 201210-R24 product has better high current efficiency because of lower DCR and higher saturation current

- *Rated at **30 Volts** and up to **165°C** operation temperature*
- *Samples available now*

***Applications**: SSD modules, ADAS, IoT , Handheld Devices*

Original Loss Calculator Tool

[Products - Inductors - IHLP® Inductor Loss Calculator Tool Landing Page - IHLP® inductor loss calculator tool | Vishay]

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Instructions | Help

Choose Calculator Type: Boost

Applications: Automotive

Family: IHLP

Case Size: 3232

Series: DZ-5A

IHLP-3232DZ-5A - 3.3 boost µH Ind. Loss Calculator

Inputs: Enter data into yellow fields

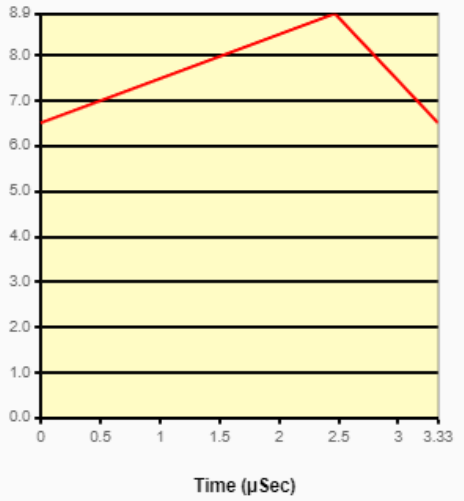
Frequency =		300000	Hz	ET_{ckt}	7.95	V-usec
Output Current =		2	Amps	F(eff)	248622.8	Hertz
Ambient Temp =		25	°C	Res	0.017774	Ohms
Volts In =		3.3	Volts	I_{max}	8.92	Amps
Volts Out =		12	Volts	I_{min}	6.51	Amps
V_{SW} =		0.08	Volts	I_{ripple}	2.41	Amps
V_D =		0.5	Volts	Duty	0.74	
I_{ind} =		7.7	Amps	P_{core}	0.237	Watts
ET_{100} =		2.136	V-usec	P_{dc}	1.058	Watts
B_{pk} =		372.2	G	P_{ac}	0.097	Watts
A	0.346	Inch	8.79	mm	P_{tot}	1.392	Watts
B	0.325	Inch	8.26	mm	Temp. Coeff.	17.6	°C/W
C	0.158	Inch	4.0	mm	Temp Rise	24.5	°C
					Comp Temp	49.5	°C
Reference Cost	1.2						

Select Inductance:

- 0.22µH
- 0.47µH
- 0.68µH
- 1µH
- 2.2µH
- 3.3µH (selected)
- 4.7µH
- 5.6µH
- 10µH
- 15µH
- 22µH
- 33µH
- 47µH

Ratings

Inductance	3.3	µH
25° C DC Res	0.0154	Ohms
Isat	11.8	Amps
I(Heat)	11.3	Amps



NEW Loss Calculator Design Tool

Step 1) Enter limits/parameters

Step 2) Generates Top 10 inductors

IHLP® DESIGN CALCULATOR EXPRESS

Vishay's Design Calculator Express was designed to allow the user to quickly determine the best IHLx inductor for their Buck or Boost converter.

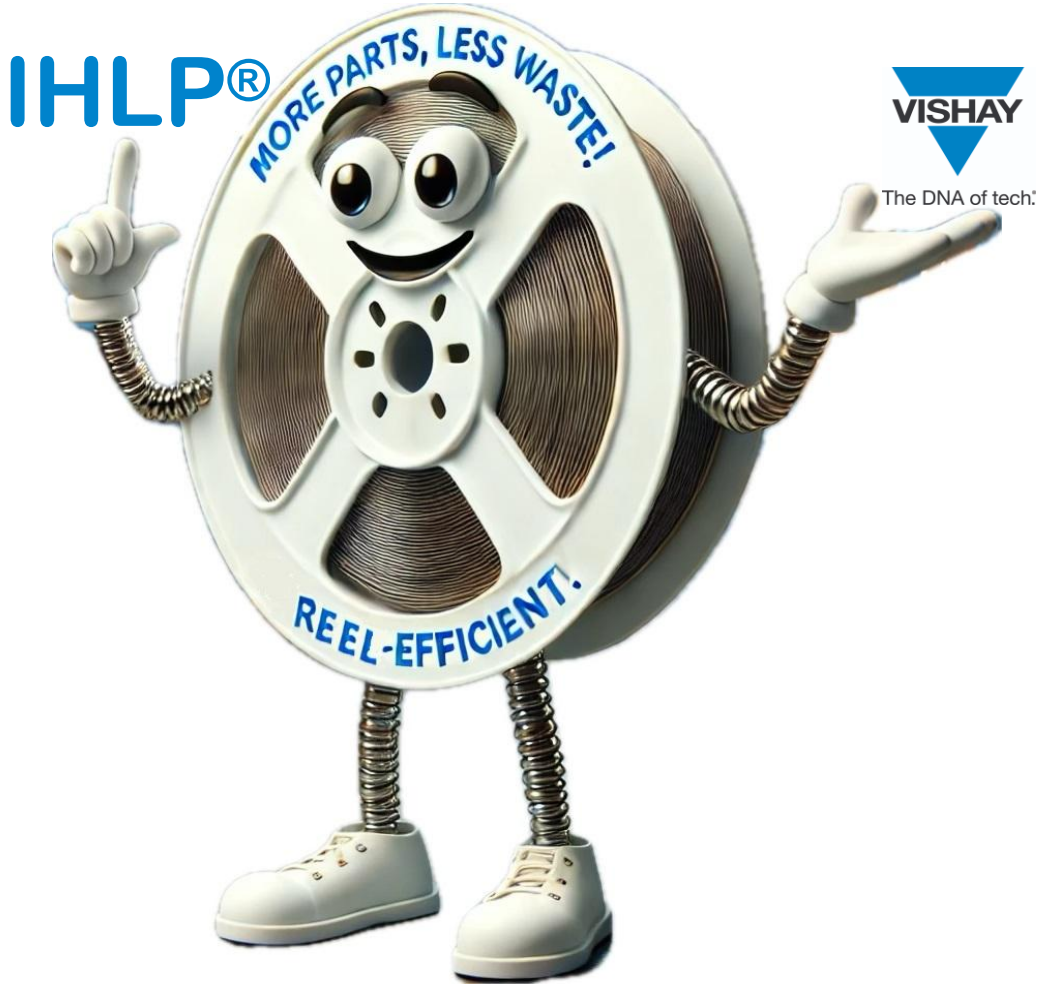
Inputs: Enter data into yellow fields			
DC/DC Converter Type	Buck		
Max Footprint	4040	10.0	mm^2
Max Profile	4.0	mm	DZ
P/N Type	Automotive		
Vin	12	Volts	
Vout	1.2	Volts	
Switching Frequency	300,000	Hz	
Output Current	5	Amps	
Ambient Temp	25	°C	
Pk-Pk Ripple Target %	30%	1.5	Amps pk-pk
Calculated Imax		5.8	Amps pk-pk
Calculated Duty Cycle		10%	
Calculated min L for desired ripple		2.4	uH
Inductor Current for Boost Converter		N/A	Amps

Reset All

Results									
Rank	IHLP P/N	Footprint mm^2	Profile mm	Nominal L uH	Nom L Ripple A	Inductor Temp °C	Rated Operating Temp °C	Total Inductor Loss W	Inductor Efficiency
1	IHLP4040DZER3R3M8A	10.0	4.0	3.300	1.09	36.1	180	0.426	92.9%
2	IHLP4040DZER3R3M5A	10.0	4.0	3.300	1.09	36.1	155	0.426	92.9%
3	IHLP4040DZER4R7M1A	10.0	4.0	4.700	0.77	38.1	125	0.440	92.7%
4	IHLP3232DZER3R3M1A	8.0	4.0	3.300	1.09	35.5	125	0.466	92.2%
5	IHLP4040DZER4R7M8A	10.0	4.0	4.700	0.77	37.1	180	0.478	92%
6	IHLP4040DZER4R7M5A	10.0	4.0	4.700	0.77	37.1	155	0.478	92%
7	IHLP4040DZER4R7MA1	10.0	4.0	4.700	0.77	37.6	125	0.491	91.8%
8	IHLP4040DZER3R3MA1	10.0	4.0	3.300	1.09	40.8	125	0.493	91.8%
9	IHLP3232DZER3R3M8A	8.0	4.0	3.300	1.09	33.8	180	0.498	91.7%
10	IHLP3232DZER3R3M5A	8.0	4.0	3.300	1.09	33.8	155	0.498	91.7%

Products - Inductors - IHLP® Design Calculator Express | Vishay

EK Pack Codes – Maximizes Parts Per Reel



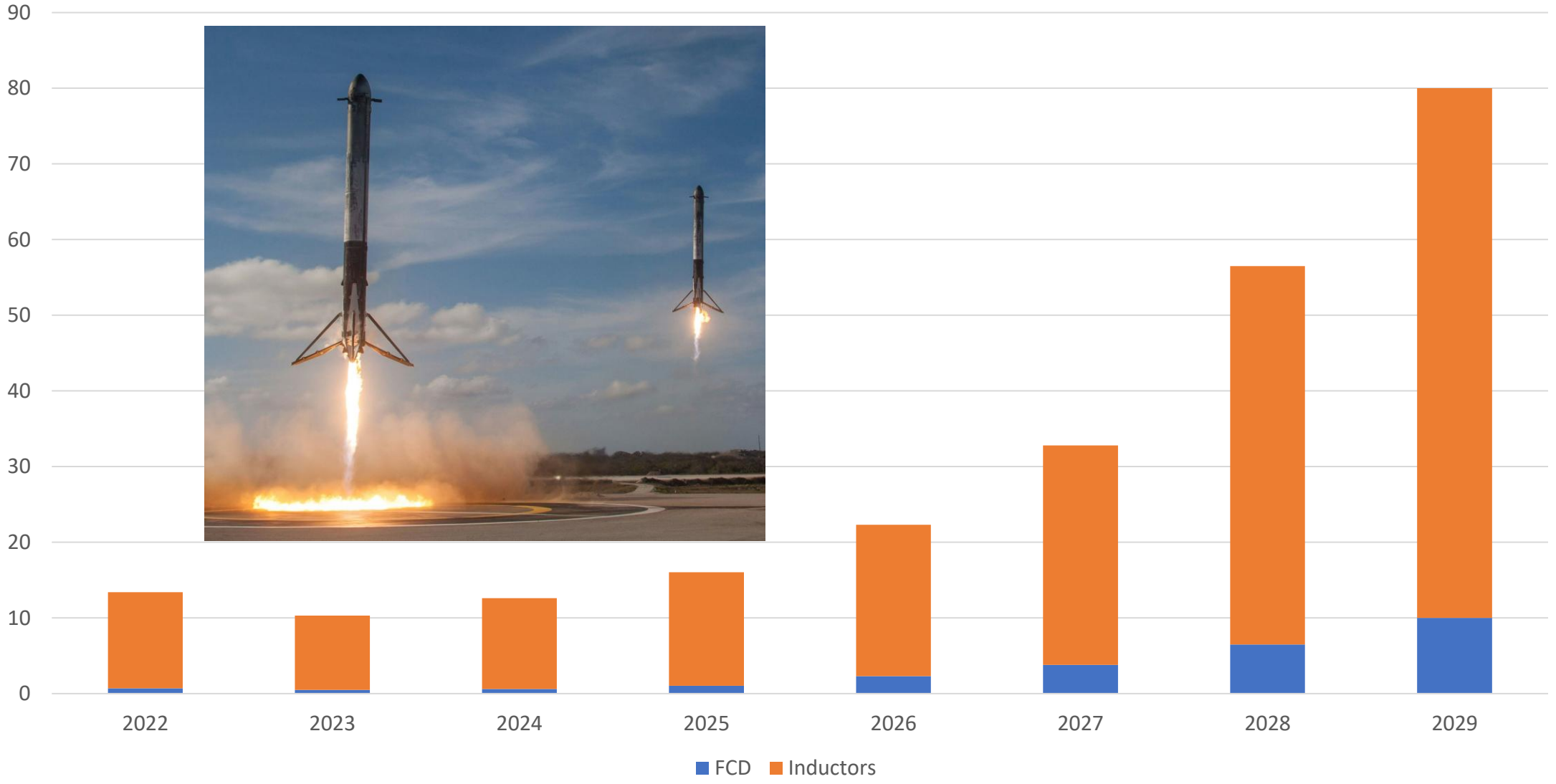
New Expansion Products

Inductors, Transformers, Filter Chokes and Specialty Parts

VISHAY

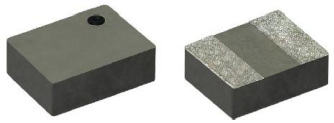
The DNA of tech.®

Expansion Product Revenue ($M USD)

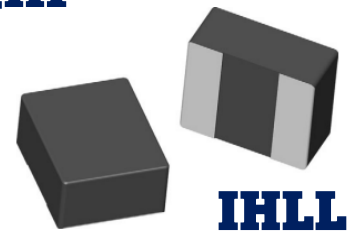


Power Inductors – More Than IHLP
More Than 2000 New Part Numbers!

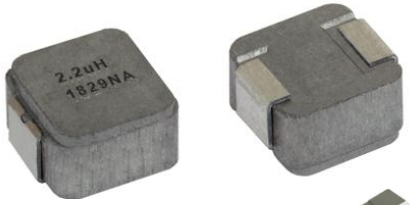
Composite (Powdered Iron)



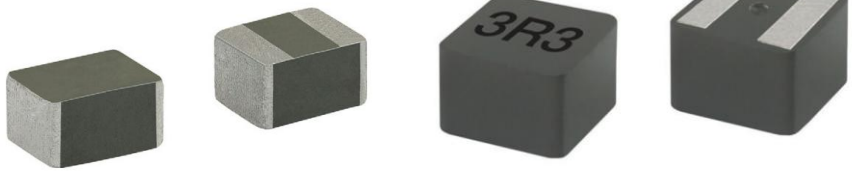
IHHP



IHLL



IHLP



IHAC & IHGC

- Inductance: 0.05 uH – 100 uH
- Low profile
- Soft saturation
- High power density
- Shielded construction
- Temperatures up to 180 °C
- 100 kHz – 5 MHz

Ferrite and Drum Core

- Inductance up to 300 uH
- Lower cost
- High ripple current
- RF filtering or impedance matching (> 5 MHz)
- High impedance for noise suppression applications
- Higher voltage isolation

IFSC

IFDC

IDCP

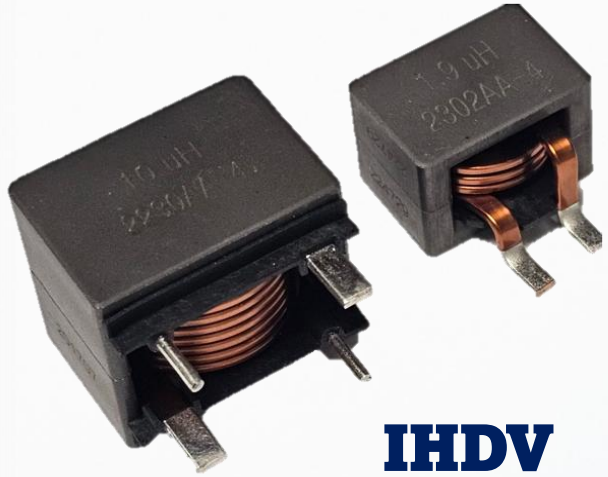
IMSC

IDCS

IFLR

10-12 week lead time and high capacity

High Voltage Power Inductors

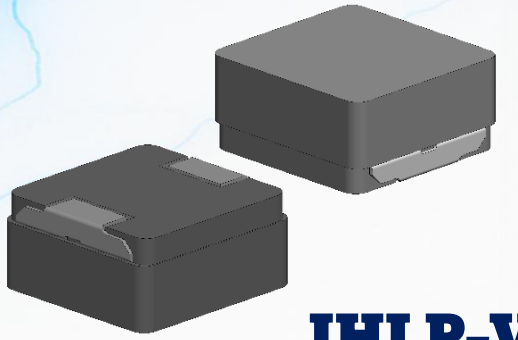


180 °C
Operating Temp

1.5 kV
Voltage Rating **Highest**

IHDV

IHDM



IHLP-V

200 V
Voltage Rating

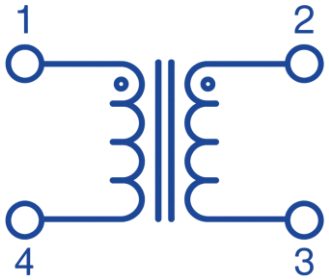
Market Segments

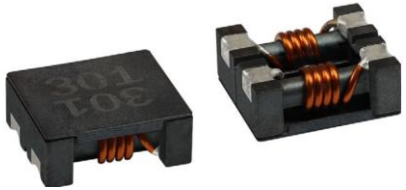
- Automotive OBCs
- PFC chokes
- HV DC battery filters
- 120 Vac / 400 W automotive inverters

Common Mode Chokes

IFLN

High impedance filtering





ICM

Higher current

ICMS

Highest current rating

Highest temperature (180 °C)

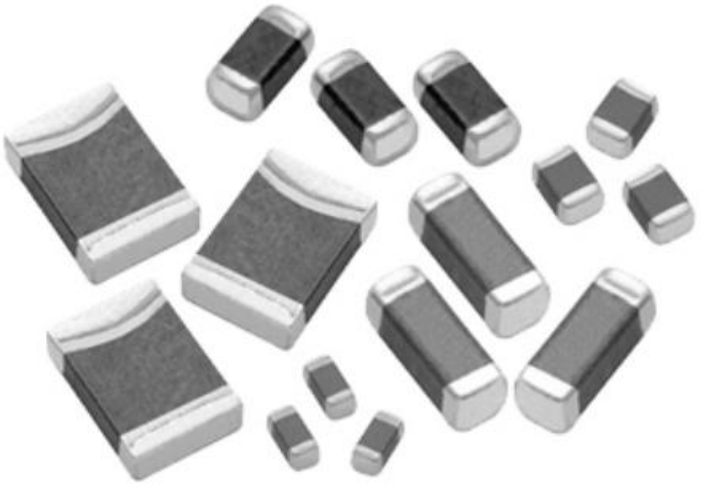
Highest voltage (1.5 kV)

High Frequency Filtering and RF Inductors

Ferrite Beads

ILHB

0402 – 1210 Sizes



Transformers

CUSTOMIZABLE

High Power Transformers

MRTI

Flyback Transformers

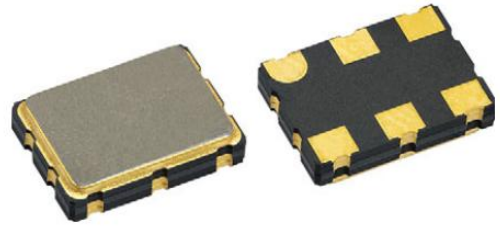
IFBT

Frequency Control Devices

Everyone needs crystals and oscillators!

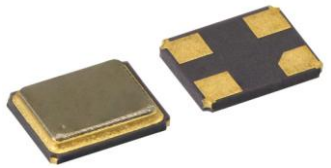
What do we ask customers?

1. Who are they using now
2. Have they had any problems….. almost always YES

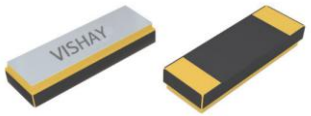


XO

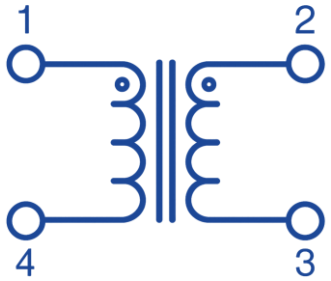
We have new robust products to solve our customers' problems!



XT



Coupled Power Inductors



Ferrite or Composite Transformer-Inductors

IHTL

TLVR Topologies

FERRITE Coupled Inductors

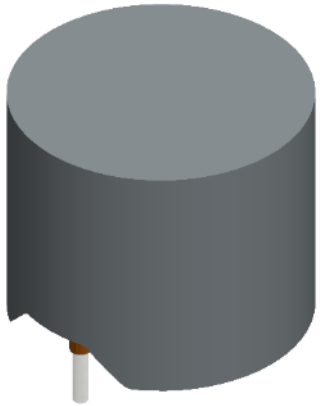
IFCL

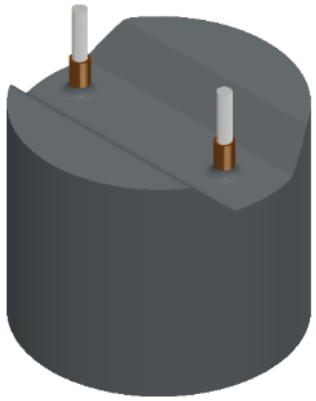
Up to 1 mH, high voltage

Market Segment

Automotive SEPIC circuits, LED applications

IPTH-0750





NEW!

600V+ Operating Voltage

800V & 1kV+ In Development

Ultra-Low Core Loss, High Voltage, Low DCR

VISHAY

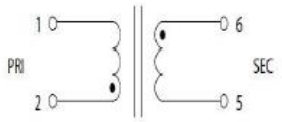
The DNA of tech.®

COMING SOON!

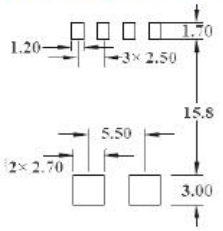
IFSC2525 SERIES

IFCT SERIES

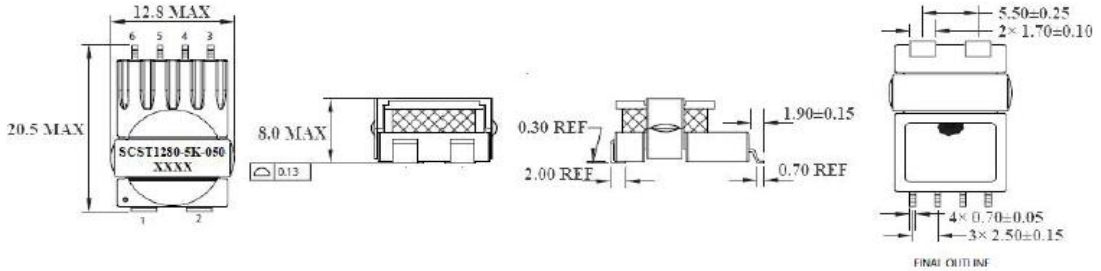
Schematic

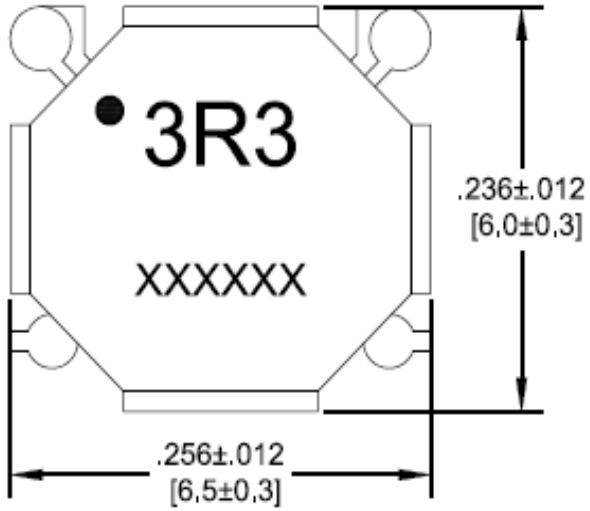


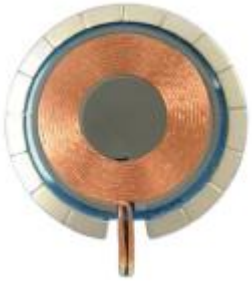
Reference Land Pattern



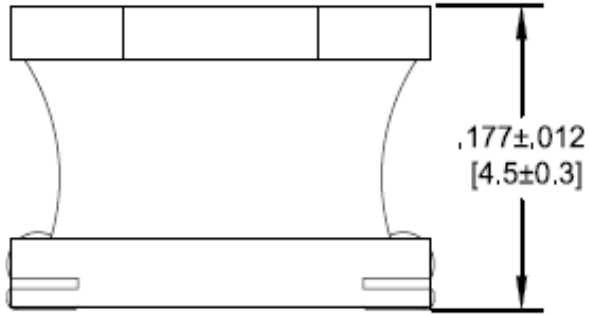
• Dimensions(mm)







Qi 2.0



Vishay Inductors More Than Just IHLP!

VISHAY

The DNA of tech.®

Q&A Session

VISHAY
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