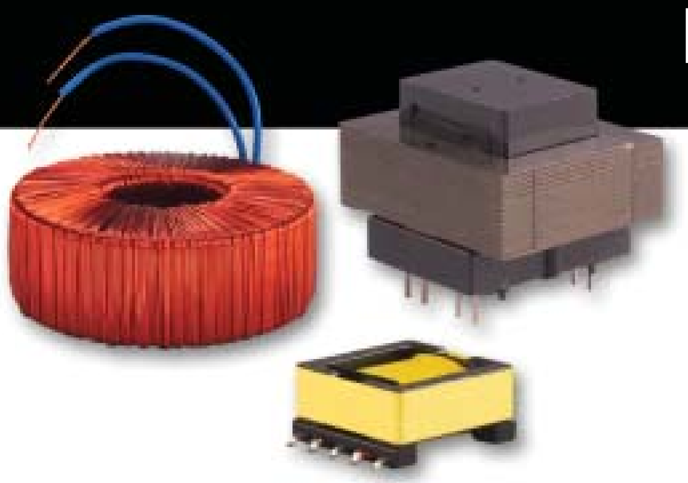
TRANSFORMERS, INDUCTORS, AND COILS

DESIGN GUIDE



PROVIDING GLOBAL
DESIGN, MANUFACTURING
AND PROCUREMENT CAPABILITIES

actown

OEM GROUP...*TRANSFORMING THE FUTURE*

MISSION STATEMENT

Actown Electrocoil Inc. strives to be a global corporation serving the requirements of non-commodity transformer and coil markets with the goal to create the highest level of value for market leading customers through technical cooperation and collaboration, and world-class service.

THE COMPANY

Actown Electrocoil Inc. was formed back in 1952 as a modest coil-winding house in the suburbs of Chicago. Through strategic acquisitions, partnerships, and joint ventures, Actown Electrocoil Inc. has grown into a leading transformer and coil supplier with extensive global design, manufacturing, and procurement capabilities.

QUALITY STATEMENT

Actown Electrocoil Inc. provides quality products and services to the customer utilizing objective driven quality processes in the manufacturing environment. We strive to understand each customer's requirements in delivery, quality, and support, and use these goals as the basis for the specific quality system(s). Based on the ISO model, the quality system(s) utilizes such programs as FMEA, SPC, SPAP, PPAP, and First Article Inspections to prepare our quality planning for the manufacturing process.

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DESIGN CONSIDERATIONS

BASIC DESIGN EQUATION

Actown Electrocoil Inc. has developed its engineering capabilities extensively to allow us to provide the customer the most optimal design which maximizes performance and minimizes cost.

The following equation shows how the various design variables can be manipulated to achieve the desired outputs. It should be noted that changing one parameter can and will change the other parameters as well:

$$\mathcal{E} = 4.44\ B\ N\ A_c\ f \times 10^{-8}*$$

Where	$\mathcal{E}$ is the induced voltage, volts
	B is the maximum induction, gauss
	N is the number of turns in the windings
	A_c is the cross-section of the magnetic material, cm^2
	f is the frequency, Hz

* For a sine wave condition

From the equation, we can see how the parameters interact with each other. In most transformer design situations, $\mathcal{E}$ is already set. The following cases show what happens when one variable is changed and how it affects the other variables...again, holding $\mathcal{E}$ constant.

1. **Increase B**

   The turns would decrease, reducing copper losses. However, increasing B increases core losses resulting in higher core temperatures.

2. **Increase N**

   B would decrease, reducing core losses. Increasing N leads to higher copper losses and requires extra room for more windings. Higher copper losses means higher winding temperatures and reduced efficiencies. Extra room for windings means a larger component.

3. **Increase A_c**

   B would be decreased yielding lower core loss per unit weight, however, the weight would increase offsetting some of that gain. An increased area means longer lengths of wire increasing copper losses. This would result in a larger and heavier transformer. Excessive core heating may reduce your B value thus reducing the efficiency.

4. **Increase f**

   B would decrease, possibly resulting in lower core losses. However, as you move to higher frequencies, core losses could become more significant. A switch to ferrite will minimize these losses but at a cost of decreased B. However, the efficiency gains from a higher frequency will more than offset the lower B. The higher frequency would also allow for a smaller transformer, N and/or A_c would decrease.

Confusing...yes. Confusing to us...no

As a very simplified example, an engineer would get a request for a transformer with specified output voltages, power capabilities, and frequency. Based on these requirements, the engineer would determine the type, material, and size of core. Then, using the above relationships, and taking into account the window area, current densities, core, copper, and if applicable, gap losses, the number and size of primary turns is determined. The core and copper losses will determine the temperature rise. To achieve maximum efficiency, the core loss should be equal to the copper loss. From here, knowing the required secondary voltage, the designer would determine the number of secondary turns by using a form of the widely used equation:

$$V_{sec} = (N_{sec}/N_{pri})\ V_{pri}$$

Where	V_{sec} is the secondary voltage
	V_{pri} is the primary voltage
	N_{sec}/N_{pri} is the ratio of secondary turns to primary turns

Your choice of magnetics is an important one in that it plays a crucial role in the performance, size, and reliability of your circuit.

Frequency has become a strategic variable. Switching power supplies have become so popular because of their ability to operate at high frequencies, thus increasing their efficiency. A switching power supply that supplies the same performance requirements of a linear power supply can be many times smaller in size. Since the induced voltage in a transformer is dependent upon the changing magnetic flux, the more you change the flux (higher frequency), the smaller and more efficient the transformer becomes.

With higher frequencies however, different considerations come into play. With lower frequencies, core material selection is driven by core saturation considerations. Eddy current losses are low so steel laminations can be considered. With higher frequencies, core material selection is driven by core loss considerations. Eddy currents can be significant. Here ferrites are commonly used because their high electrical resistivity minimizes eddy current losses. However, there is a price to be paid for the reduced core losses, and that is that ferrites have lower saturation and permeability values.

What are ferrites? Ferrites are dense, homogeneous ceramic structures made by mixing iron oxide with oxides or carbonates of one or more metals such as manganese, zinc, nickel, or magnesium.

The choice of magnetics will be influenced by several factors:

1. Circuit topology used, usually chosen to yield the best combination of minimum power transistor off voltage and peak current stresses. Cost and component count must also be taken into account.
2. Operating frequency of the circuit.
3. Power requirements.
4. Regulation needed.
5. Cost.
6. Efficiency.
7. Input/output voltages.
8. Permissible temperature rise.
9. Volume/weight/height requirements.

These variables will determine the transformer core material, configuration, and size, along with the winding parameters.

POWER SUPPLY CONVERTER STYLE VS. CORE SELECTION

	FLYBACK	FORWARD	PUSH-PULL
E core	Good	Good	Average
EFD core	Not good	Good	Good
ETD core	Average	Good	Good
RM core	Average	Good	Average
EP core	Not good	Good	Average
POT core	Not good	Good	Average

More about cores will be said later in this section.

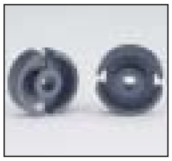
CORE SELECTION

Ferrite cores are best suited for high frequency applications and steel laminations are best suited for low frequency applications. Both materials are available in a variety of grades, each best suited for different specific operating conditions. The following cores are all ferrite, except where otherwise indicated.

STEEL LAMINATED CORES

These cores are made up of many layers of thin metallic alloy sheets. This is to keep down the losses due to eddy currents. Alloys could include nickel, silicon, etc.

POT CORES



These cores almost completely surround the windings, which aid in reducing EMI (electromagnetic interference). However, the difficulty in bringing the wiring out of the core minimizes its use in power applications.

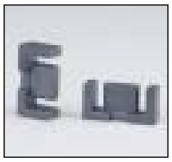
DOUBLE SLAB AND RM CORES

These are similar to pot cores, except there is a larger area in which the wiring can be brought out of the core. This allows for larger wiring, which makes these better suited for power applications.

E CORES

These are the most common cores used in power applications. They are cost effective, allow for simple bobbin winding, and are easy to assemble. E cores do not, however, offer self-shielding.

EFD CORES

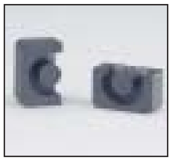


EFD cores are a flattened version of the E cores. EFD cores are commonly used where a low profile design is needed. Available in through-hole and surface-mount bobbin configurations.

EC/ETD CORES

These are similar to E cores except the center post is round. A round center post allows for a shorter turn length (approximately 11%), reducing copper losses.

EP CORES

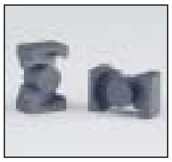


These are similar to pot cores except their overall shape is rectangular.

ER CORES

ER cores combine high inductance with low height.

PQ CORES



These cores are some of the newer styles of ferrite cores. To maximize efficiency, core loss should equal copper loss. The geometry of these cores allow for transformer designs that maximize efficiencies while minimizing the required volume.

TOROIDS

Toroidal cores are very good at maximizing electrical efficiencies. Higher flux densities are possible, allowing for smaller and lighter cores. Radiated EMI is reduced since the windings, which completely cover the core, act as a shield. Toroid cores come in either laminated steel or ferrite.

GAPPED CORES

Gapped cores can be used to control the inductance and to raise the Q of the inductor. Gapping usually occurs when there is a threat of saturation that would increase current levels and overheat the core. The basis of the gapped core is the shearing of the hysteresis loop and reducing the permeability of the material.

Q stands for Q Factor, which is the efficiency of the inductor. It is the ratio of series inductive reactance to loss resistance.

LOSSES

Losses fall into two categories: core losses and copper (winding) losses. It is these losses that keep your transformers from operating ideally.

CORE LOSSES

Eddy Current Losses

Eddy current core losses can be approximated by the following equation:

$$P = \frac{(k\,B\,2\,f^2\,D^2)}{\rho}$$

Where **P** is the eddy current losses, W

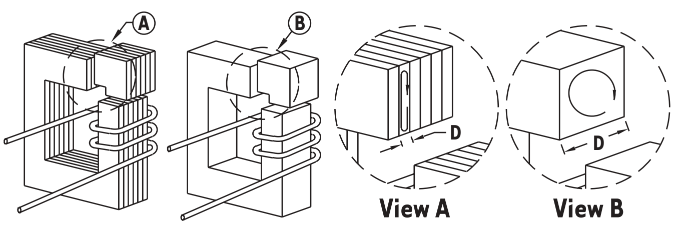
k is a constant depending on the shape of the core

B is the maximum induction, Gauss

f is the frequency, Hz

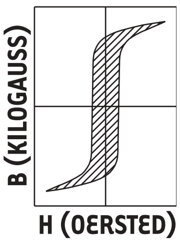
D is the thickness of the narrowest dimension of the core perpendicular to the flux, cm

ρ is the electrical resistivity, ohm-cm



Ferrites have a much larger "ρ" than laminations which reduce their losses. Also note that the loss will increase by the square of the frequency or thickness of the critical dimension.

Hysteresis Losses



Hysteresis core losses are small compared to eddy current losses. Ferrite materials were developed with narrow hysteresis loops. Since hysteresis dissipation is proportional to the area enclosed by the hysteresis loop, the narrow loops greatly reduces the hysteresis losses.

COPPER LOSSES

I^2R losses

These losses are due to current flowing through a conductor with resistance. They can be approximated by the following relationship (for copper at 70˚F):

$$P = 0.022\,L\,(I / D)^2$$

Where **P** is the copper losses, W

L is the length of the winding, m

I is the rms current of the winding

D is the diameter of the conductor, mm

Skin Effect Losses (higher frequencies)

The skin effect is caused by eddy currents induced in a wire by the magnetic field of the current carried by the wire itself. Skin effect causes current to flow only in a thin skin on the outer periphery of the wire. The depth of the skin is inversely proportional to the square root of the frequency, as shown below. Skin effect thus increases resistance and related losses.

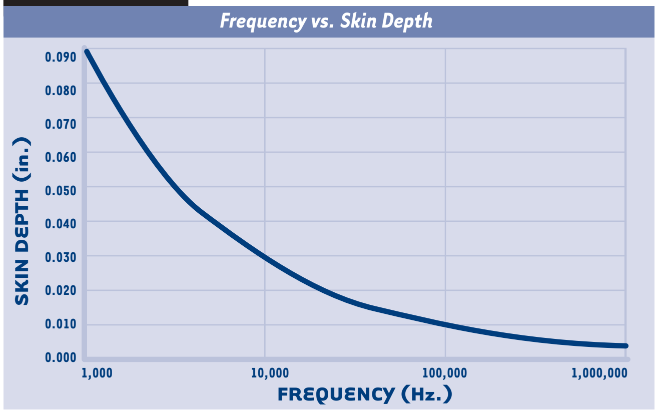
$$S = 2837/\sqrt{f}$$

Where **S** is the skin depth in mils

f is the frequency in Hz

Skin depth is defined as the distance below the surface when the current density has fallen to 37% of its value at the surface. Litz wire, which is multiple stranded wire, can be used to minimize skin effect losses. Litz wire is relatively expensive however.

SKIN EFFECT



Proximity Effect Losses (higher frequencies)

The proximity effect is caused by eddy currents induced in wires by the magnetic fields of currents in adjacent wires or adjacent layers of the coil. Proximity effect losses are greater than skin effect losses.

PART 2: CUSTOM TRANSFORMER & COIL SOLUTIONS

Actown Electrocoil Inc. has the capability and expertise to provide complete solutions to your custom coil and transformer needs. Actown can guide you from initial concept and design all the way through to final production and testing.

If you are starting with a concept, Actown Engineering will work with you on developing a fully compliant design utilizing the latest in magnetic design principles.

If you already have a complete specification, Actown can offer global manufacturing support.

Custom Design Capabilities

Actown Engineering utilizes a wide range of manufacturing processes to solve the challenges of the unique custom designs needed by our customers. From low voltage products to high voltage designs with maximized corona prevention, Actown has the solution. Our experience and dedication to excellence has allowed us to serve well the medical, aircraft, automotive, electrical protection, solenoid valve, vending, power supply, inherently safe lighting, and clutch markets, to name just a few.

BOBBIN WINDING

Standard and unique custom bobbin designs. Ferrite cores or laminated designs for switching and linear power supplies. Through hole or surface mount configurations. Shrouded designs for European applications.

TOROID WINDING

Utilizing both ferrite and laminated cores in various sizes. High Frequency power inductors, line frequency power transformers, high accuracy current sense transformers. PC and chassis mount styles.

SELF-SUPPORTING (BONDED) COILS

Utilized in applications where space is tight. Electric brakes, solenoid valves, and electric clutches are typical applications.

PAPER-SECTION WINDING

Fine wire winding for high voltage applications that require high dielectric strength between winding layers. Paper-section winding coupled with vacuum impregnation encapsulation (see next page) results in a nearly impervious high voltage coil.

VALUE-ADDED SERVICES

Actown Electrocoil Inc. can provide various value-added services to better serve your needs, including circuit board design, layout, assembly, and lead preparation.

Various encapsulation methods can be used to protect and/or enhance the performance of the wound coil and transformer.

TRANSFER MOLDING

This encapsulation method is very successful in applications that require chemical resistance and high-wear characteristics. Actown utilizes universal mold base designs or dedicated mold bases in either conventional or shuttle presses where the use of thermoset materials are required.

INJECTION MOLDING

Injection molding is an economical method of encapsulating where the use of thermoplastic materials are required.

LIQUID CAST

Liquid cast is a method of encapsulation that reduces the start-up tooling costs generally associated with high volume encapsulation methods and is a solution for many low volume applications.

VACUUM IMPREGNATION

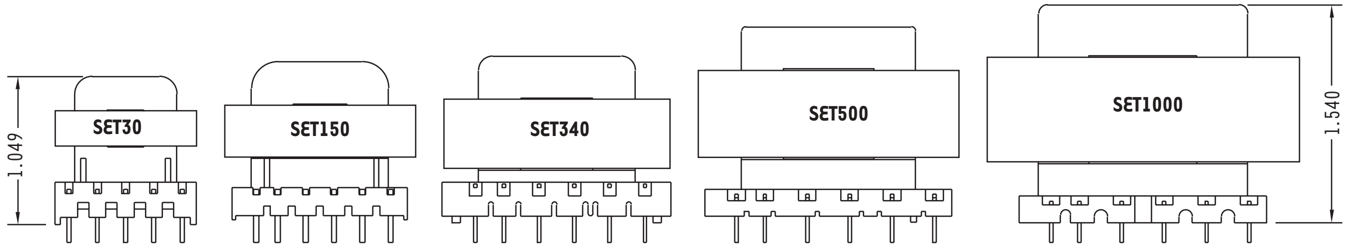
High performance applications, such as Military, Aerospace, Medical, and High-Voltage often require an extra level of protection and isolation. Vacuum impregnation with epoxies and/or varnishes can ensure this high level of performance and endurance.

PART 3: SWITCHMODE TRANSFORMERS

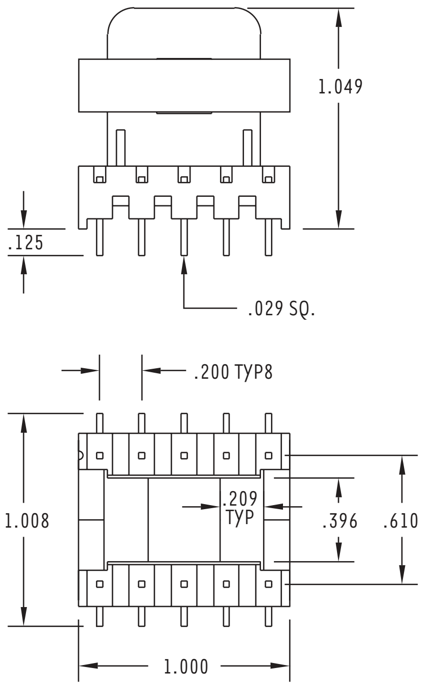
FERRITE E CORE TRANSFORMERS

- Cost effective design provides economical solutions
- Standard configurations provide fast turnaround
- Can be designed to meet various domestic and international safety agency approvals
- Ideal for switching power supplies up to 1000 Watts

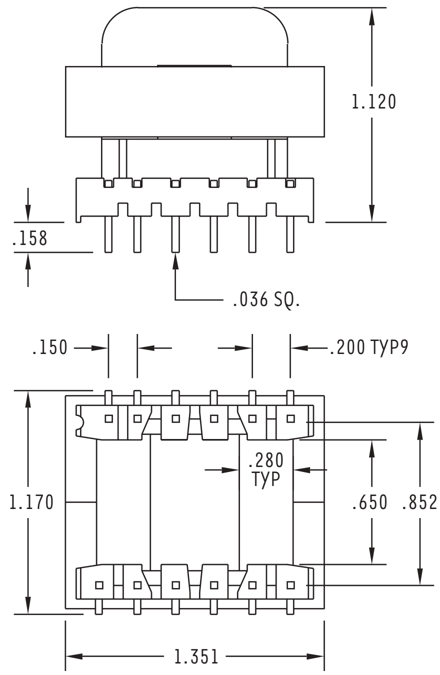
	SET30	SET150	SET340	SET500	SET1000
Power Capacity @ 100 kHz	30 W	150 W	340 W	500 W	1000 W
a_e (eff. cross-sectional area)	0.394 cm^2	0.813 cm^2	1.517 cm^2	2.346cm^2	3.398cm^2
l_e (mean mag. path length)	4.899 cm	6.942 cm	7.75 cm	8.89 cm	10.654 cm
a_w (bobbin winding area)	0.534 cm^2	1.174 cm^2	1.296 cm^2	1.467 cm^2	2.224 cm^2
Required Board Space	1.00" x 1.01"	1.17" x 1.36"	1.35" x 1.60"	1.54" x 1.85"	1.86" x 2.21"
Typical max. Height	1.05"	1.14"	1.18"	1.39"	1.54"
Average length per turn	2.13"	2.87"	3.38"	3.9"	4.65"



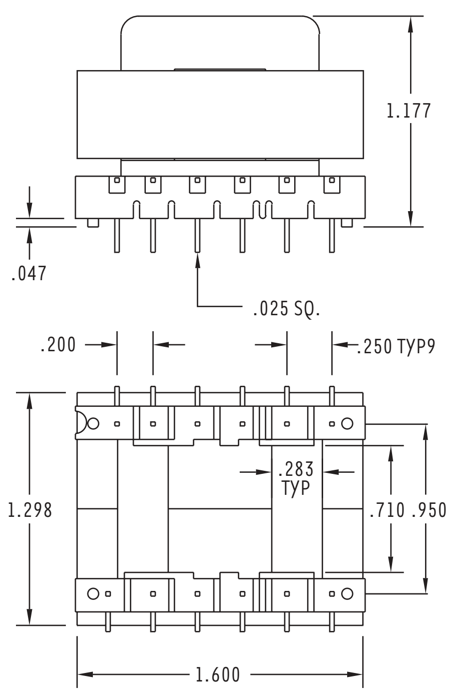
30W	150W	340W	500W	1000W



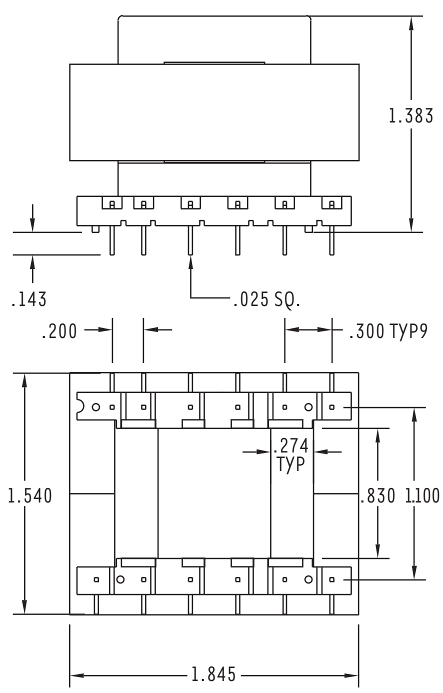
SET30



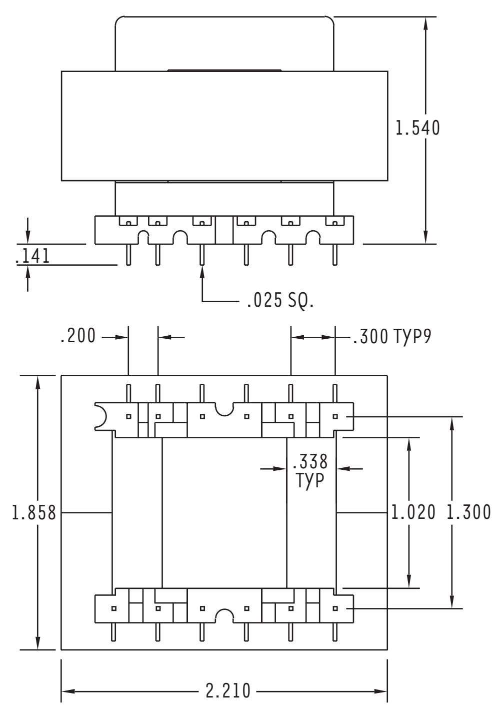
SET150



SET340



SET500

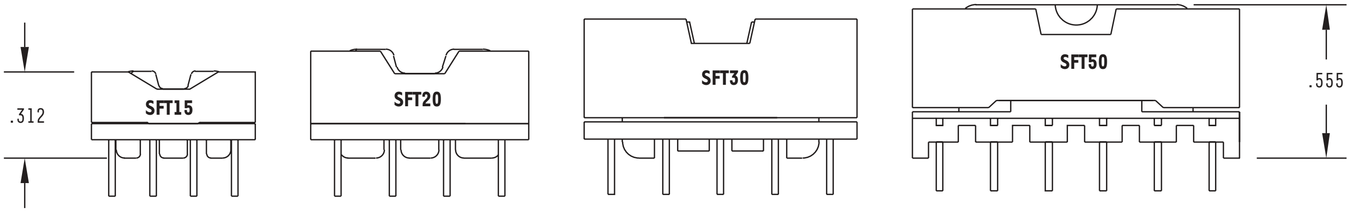


SET1000

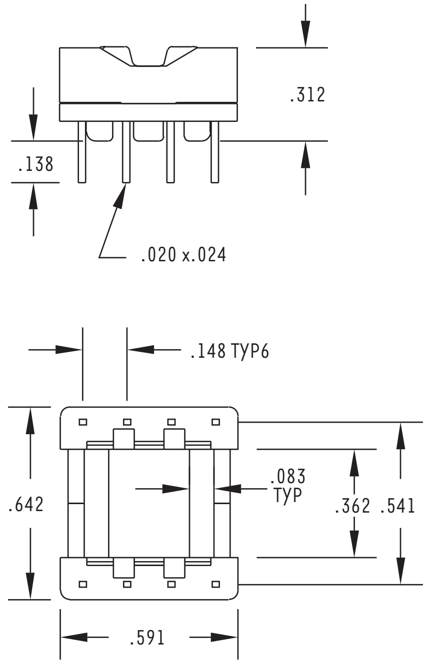
FERRITE EFD CORE (THROUGH-HOLE) TRANSFORMERS

- Low profile design for critical height applications
- Available in through-hole configurations
- Can be designed to meet various safety agency approvals

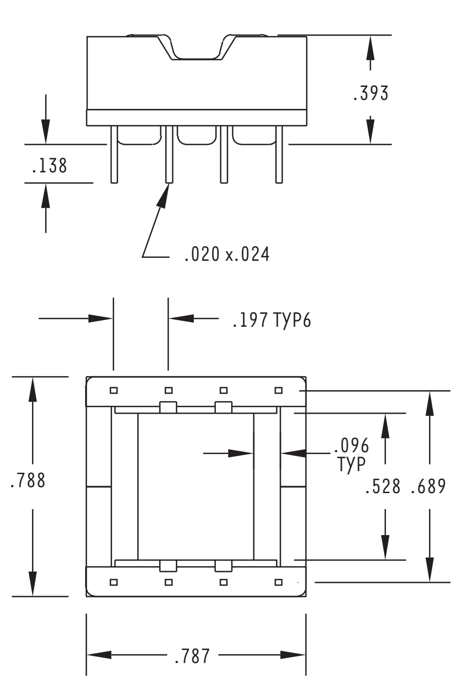
	SFT15	SFT20	SFT30	SFT50
Power Capacity @ 100 kHz	15 W	20 W	30 W	50 W
a_e (eff. cross-sectional area)	0.15 cm^2	0.31 cm^2	0.58 cm^2	0.69 cm^2
l_e (mean mag. path length)	3.40 cm	4.70 cm	5.70 cm	6.80 cm
a_w (bobbin winding area)	0.191 cm^2	0.327 cm^2	0.481 cm^2	0.615 cm^2
Required Board Space	0.60" x 0.65"	0.79" x 0.79"	0.99" x 1.03"	1.19" x 1.38"
Typical max. Height	0.312"	0.393"	0.505"	0.555"
Average length per turn	1.416"	1.551"	1.964"	2.212"



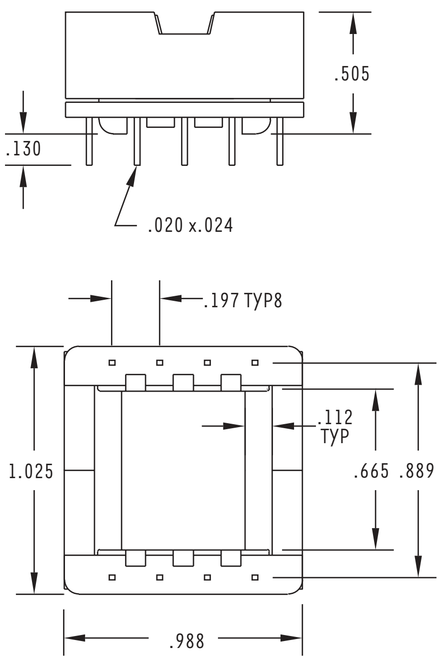
15W	20W	30W	50W



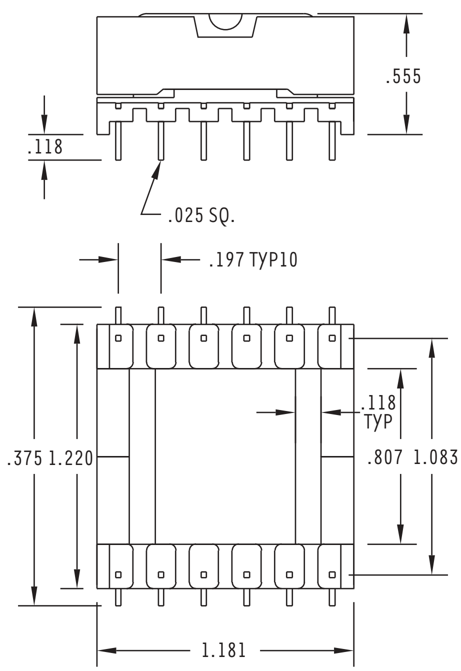
SFT15



SFT20



SFT30

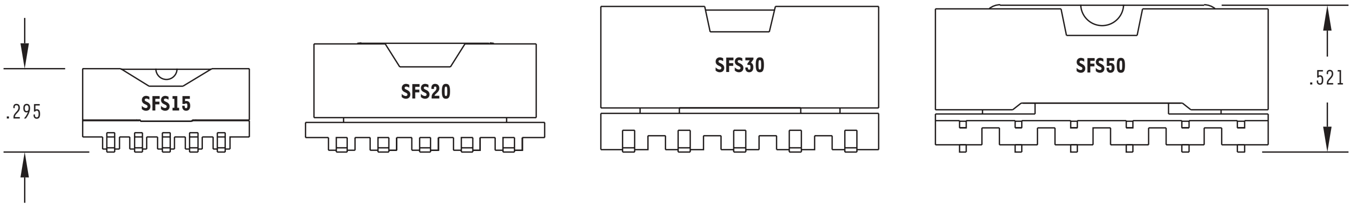


SFT50

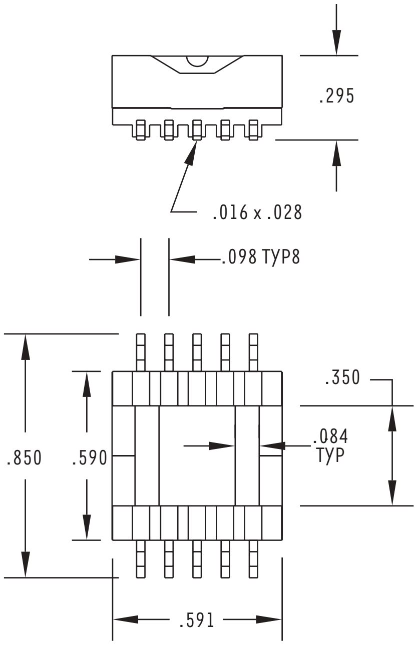
FERRITE EFD CORE (SURFACE-MOUNT) TRANSFORMERS

- Low profile design for critical height applications
- Available in surface-mount configurations
- Can be designed to meet various safety agency approvals

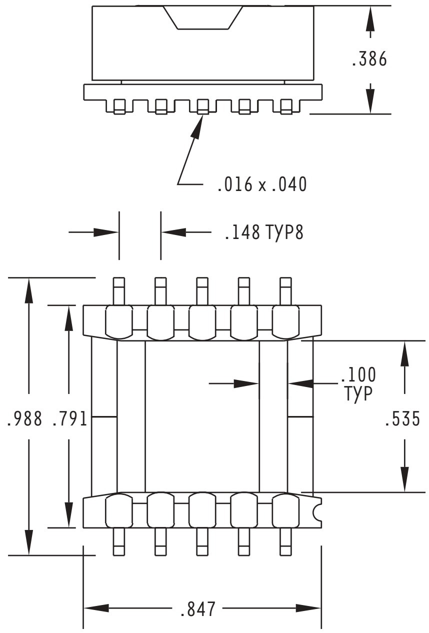
	SFS15	SFS20	SFS30	SFS50
Power Capacity @ 100 kHz	15 W	20 W	30 W	50 W
a_e (eff. cross-sectional area)	0.15 cm^2	0.31 cm^2	0.58 cm^2	0.69 cm^2
l_e (mean mag. path length)	3.40 cm	4.70 cm	5.70 cm	6.80 cm
a_w (bobbin winding area)	0.191 cm^2	0.327 cm^2	0.481 cm^2	0.615 cm^2
Required Board Space	0.60" x 0.85"	0.85" x 0.99"	0.99" x 1.24"	1.19" x 1.40"
Typical max. Height	0.295"	0.386"	0.516"	0.521"
Average length per turn	1.416"	1.551"	1.964"	2.212"



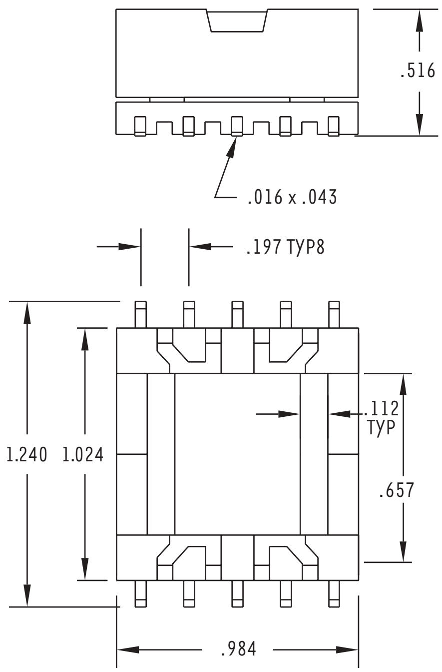
15W | 20W | 30W | 50W



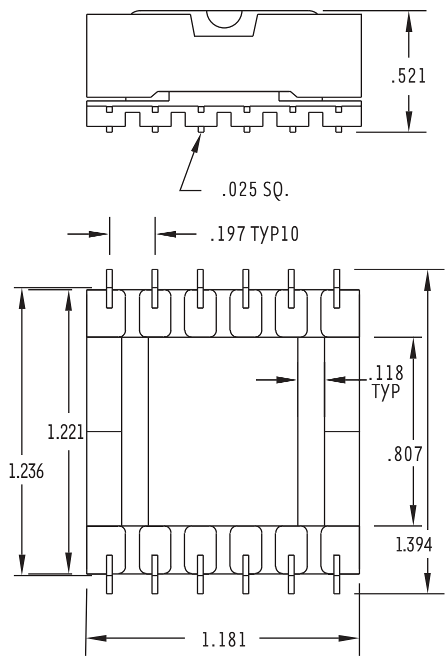
SFS15



SFS20



SFS30

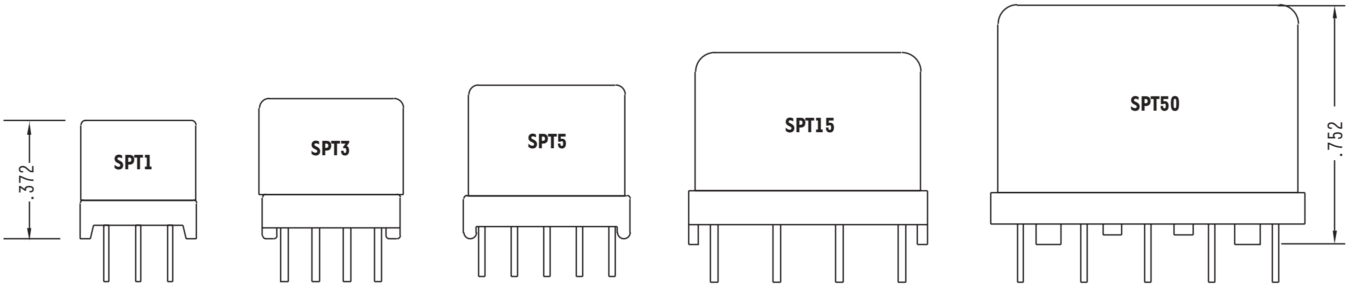


SFS50

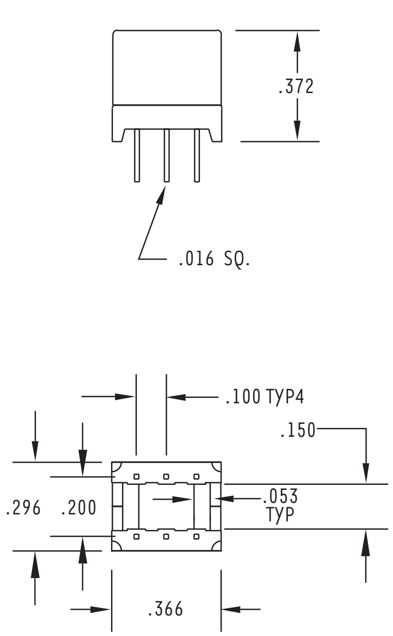
FERRITE EP CORE TRANSFORMERS

- Good RFI/EMI shielding for reduced noise emissions
- Windings almost completely surrounded by the core
- Can be designed to meet various safety agency approvals

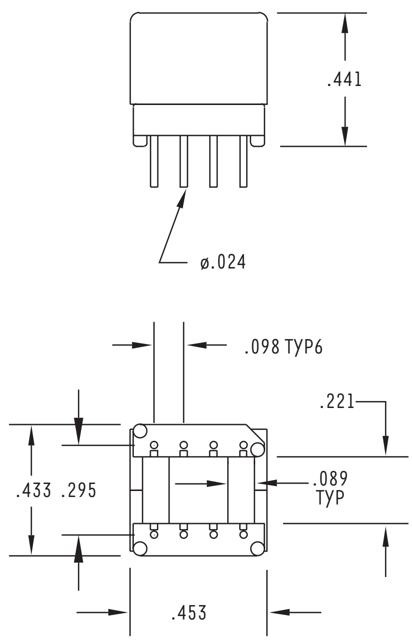
	SPT1	SPT3	SPT5	SPT15	SPT50
Power Capacity @ 100 kHz	1 W	3 W	5 W	15 W	50 W
a_e (eff. cross-sectional area)	0.103 cm^2	0.113 cm^2	0.195 cm^2	0.43 cm^2	0.78 cm^2
l_e (mean mag. path length)	1.57 cm	1.92 cm	2.42 cm	3.4 cm	3.98 cm
a_w (bobbin winding area)	0.051 cm^2	0.127 cm^2	0.167 cm^2	0.524 cm^2	0.860 cm^2
Required Board Space	0.30" x 0.37"	0.44" x 0.46"	0.53" x 0.53"	0.76" x 0.76"	0.87" x 0.99"
Typical max. Height	0.38"	.45"	0.49"	0.61"	0.76"
Average length per turn	0.723"	0.860"	0.934"	1.138"	1.617"



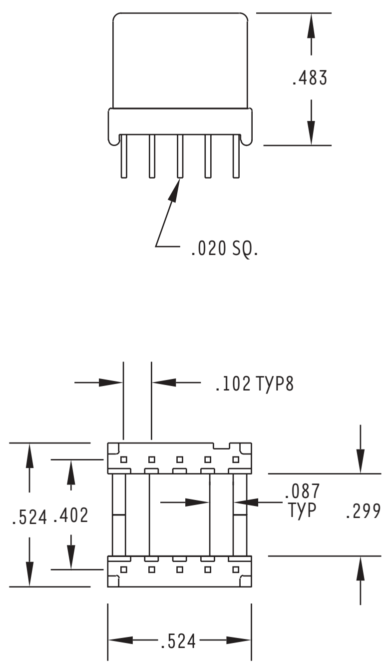
1W	3W	5W	15W	50W



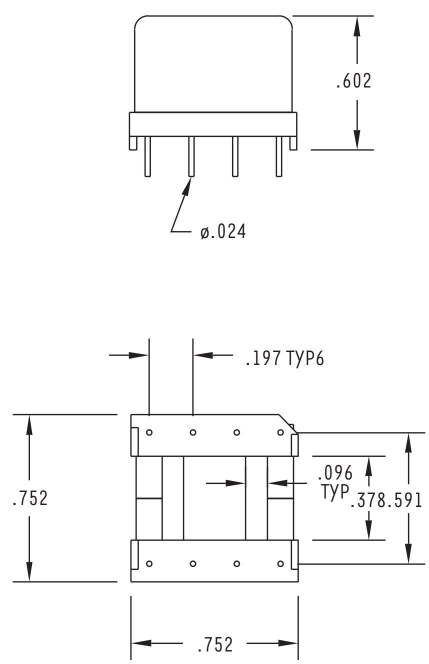
SPT1



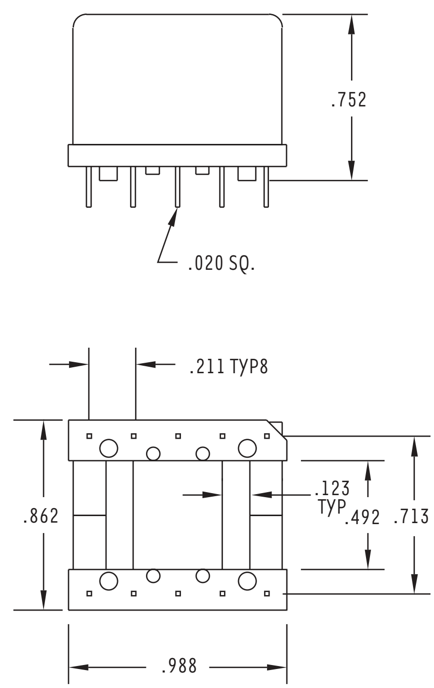
SPT3



SPT5



SPT15

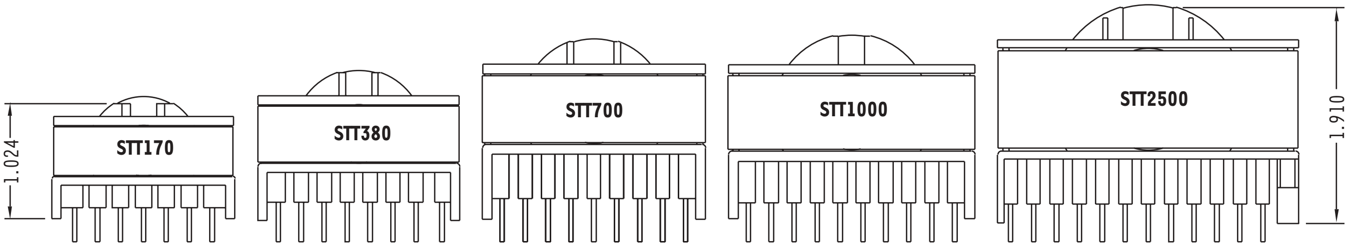


SPT50

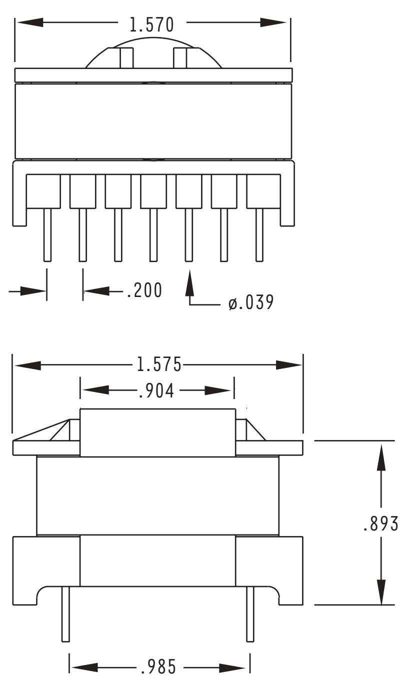
FERRITE ETD CORE TRANSFORMERS

- Round center post allows for shorter turn lengths, approximately 11%
- Can be designed to meet various safety agency approvals

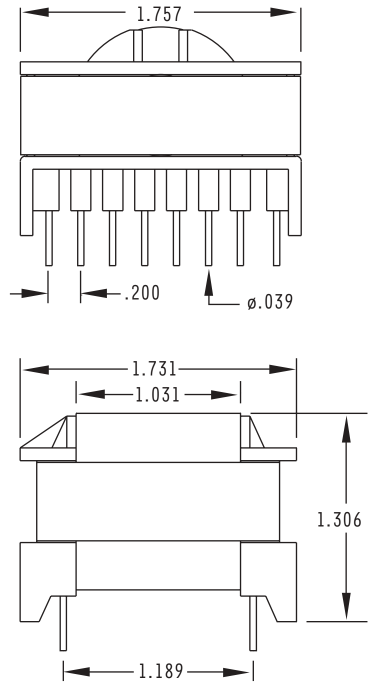
	STT170	STT380	STT700	STT1000	STT2500
Power Capacity @ 100 kHz	170 W	380 W	700 W	1000 W	2500 W
a_e (eff. cross-sectional area)	.99 cm^2	1.27 cm^2	1.76 cm^2	2.15 cm^2	3.68 cm^2
l_e (mean mag. path length)	7.9cm	9.3 cm	10.4 cm	11.4 cm	13.9 cm
a_w (bobbin winding area)	1.23 cm^2	1.74 cm^2	2.13 cm^2	2.71 cm^2	3.72 cm^2
Required Board Space	1.58" x 1.60"	1.75" x 1.75"	1.96" x 2.02"	2.12" x 2.12"	2.60" x 2.63"
Typical max. Height	1.03"	1.30"	1.57"	1.61"	1.91"
Average length per turn	2.4"	2.64"	3.0"	3.36"	4.2"



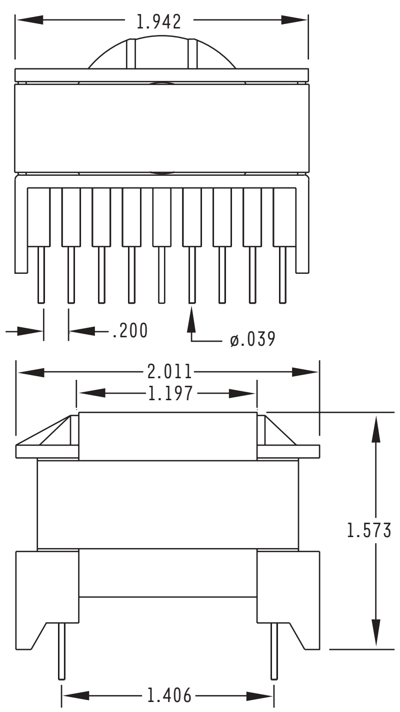
170W 380W 700W 1000W 2500W



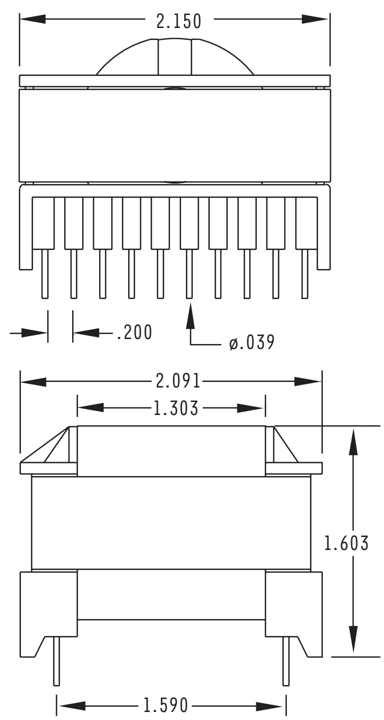
STT170



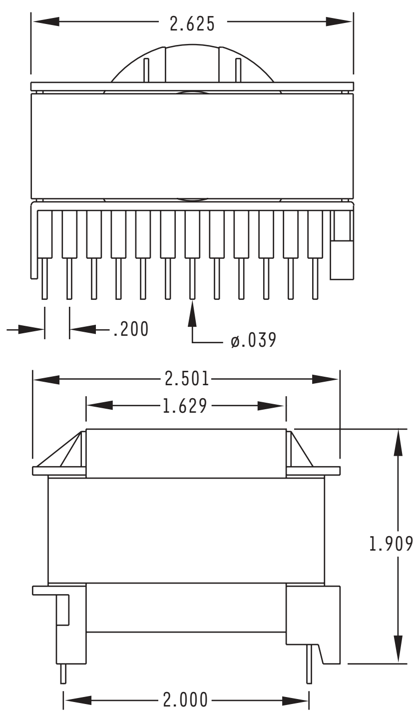
STT380



STT700



STT1000



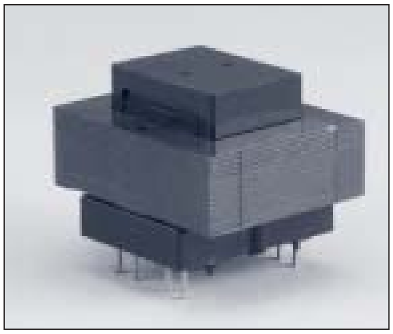
STT2500

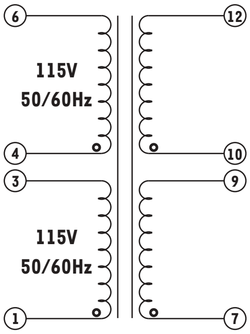
EI CORE CIRCUIT BOARD & CHASSIS MOUNT

- Printed circuit board mount for a power range of 2.5VA to 56VA
- Chassis mount for a power range of 25VA to 175VA
- Provides high-isolation in low power applications
- Inherently high quality, high isolation design
- Can be designed to meet various domestic and international safety agency approvals

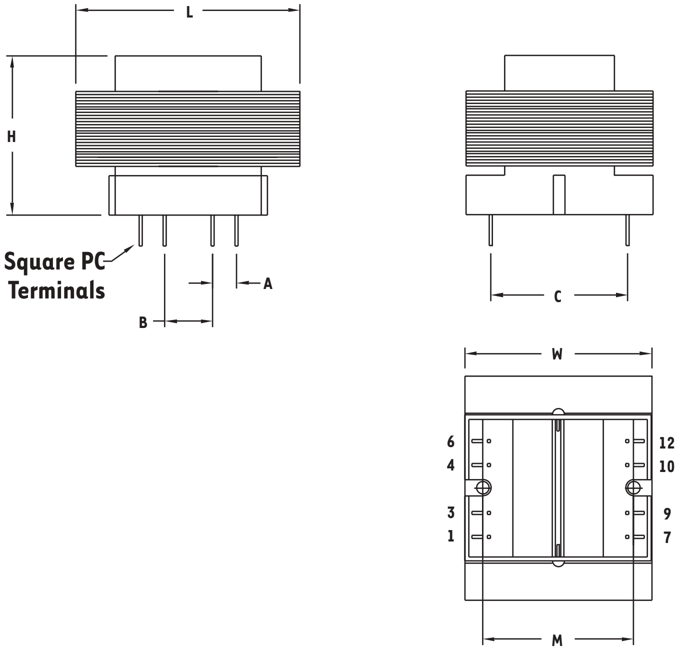
SPECIFICATIONS

Dielectric Strength	*4000VRMS Hipot*
Primaries	*Dual primaries 115V/230V, 50/60Hz*
Secondaries	*Series or parallel*
Electrostatic Shield	*Not necessary*
Insulation	*Class F, 155° C*
Flammability	*Bobbin UL rated 94V-0*





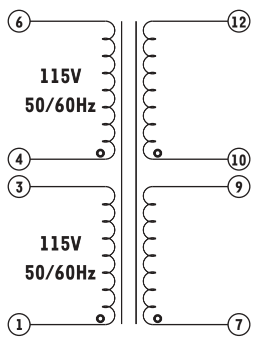
∘ Indicates Like Polarity



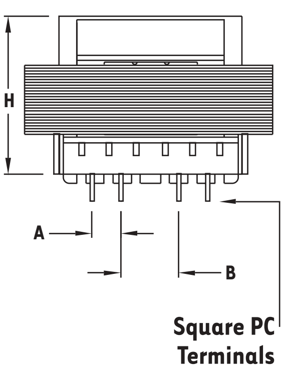
Part No.	VA Capacity	Secondary RMS Rating	
		Series	Parallel
LIT2.5-10	2.5	10VCT @ 0.25A	5V @ 0.5A
LIT2.5-12	2.5	12.6VCT @ 0.20A	6.3V @ 0.40A
LIT2.5-16	2.5	16VCT @ 0.15A	8V @ 0.30A
LIT2.5-20	2.5	20VCT @ 0.12A	10V @ 0.24A
LIT2.5-24	2.5	24VCT @ 0.10A	12V @ 0.20A
LIT2.5-28	2.5	28VCT @ 0.09A	14V @ 0.18A
LIT2.5-36	2.5	36VCT @ 0.07A	18V @ 0.14A
LIT5-10	5	10VCT @ 0.50A	5V @ 1.00A
LIT5-12	5	12.6VCT @ 0.40A	6.3V @ 0.80A
LIT5-16	5	16VCT @ 0.31A	8V @ 0.62A
LIT5-20	5	20VCT @ 0.25A	10V @ 0.50A
LIT5-24	5	24VCT @ 0.21A	12V @ 0.42A
LIT5-28	5	28VCT @ 0.18A	14V @ 0.36A
LIT5-36	5	36VCT @ 0.14A	18V @ 0.28A
LIT10-10	10	10VCT @ 1.00A	5V @ 2.00A
LIT10-12	10	12.6VCT @ 0.80A	6.3V @ 1.60A
LIT10-16	10	16VCT @ 0.62A	8V @ 1.25A
LIT10-20	10	20VCT @ 0.50A	10V @ 1.00A
LIT10-24	10	24VCT @ 0.42A	12V @ 0.84A
LIT10-28	10	28VCT @ 0.36A	14V @ 0.72A
LIT10-36	10	36VCT @ 0.28A	18V @ 0.56A

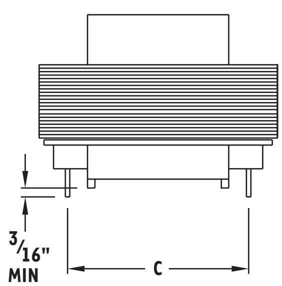
Don't see what you need? Call Actown for a custom solution.

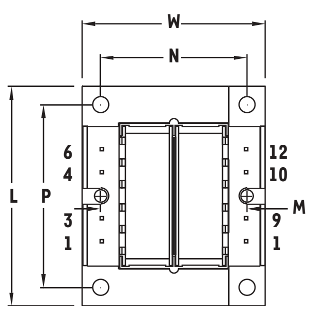
VA (size)	Dimensions						Mtg. Dim.			Mtg. Screw		Weight
	L	W	H	A	B	C	M	N	P	Size	Qty	
2.5	1.62"	1.31"	1.09"	0.20"	0.25"	1.0"	1.06"	–	–			0.25lbs
2.5	41.3mm	33.3mm	27.7mm	5.08mm	6.35mm	25.4mm	26.9mm	–	–			0.11kg
5	1.62"	1.31"	1.34"	0.20"	0.40"	1.0"	1.06"	–	–			0.37lbs
5	41.3mm	33.3mm	34.0mm	5.08mm	10.16mm	25.4mm	26.9mm	–	–			0.168kg
10	1.87"	1.56"	1.37"	0.20"	0.40"	1.14"	1.25"	–	–			0.53lbs
10	47.6mm	39.7mm	34.9mm	5.08mm	10.16mm	29.0mm	31.7mm	–	–			0.240kg
20	2.25"	1.87"	1.58"	0.40"	0.40"	1.46"	1.50"	–	–	#4	2	0.90lbs
20	57.2mm	47.6mm	40.1mm	10.2mm	10.2mm	37.1mm	38.1mm	–	–			0.41kg
30	2.62"	2.19"	1.58"	0.550"	0.275"	1.680"	–	1.75"	2.18"	#6	4	1.15lbs
30	66.7mm	55.6mm	40.1mm	13.9mm	7.0mm	42.7mm	–	44.4mm	55.5mm			0.52kg
56	3.00"	2.50"	1.82"	0.600"	0.300"	1.900"	–	2.00"	2.50"	#6	4	1.70lbs
56	76.2mm	63.5mm	46.2mm	15.2mm	7.6mm	48.3mm	–	50.8mm	6.35mm			0.77kg



o Indicates Like Polarity

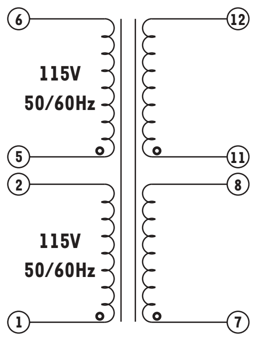




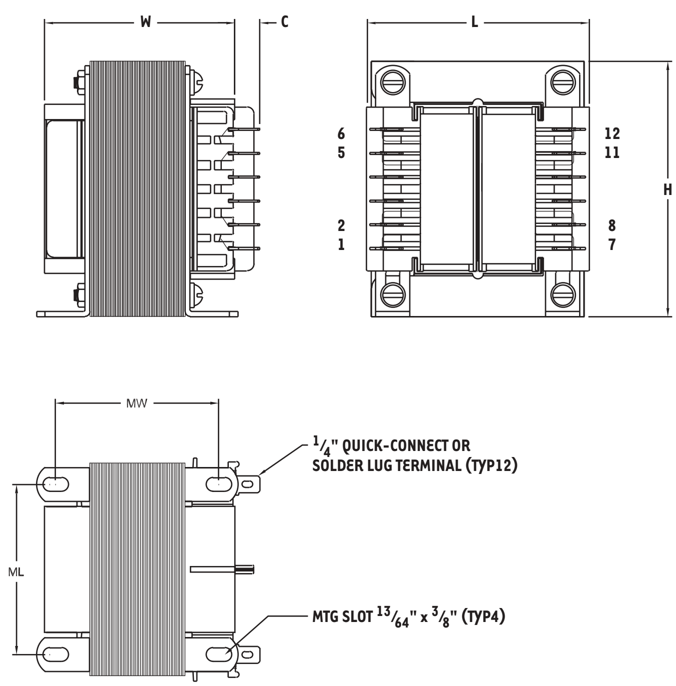


Part No.	VA Capacity	Secondary RMS Rating	
		Series	Parallel
LIT20-10	20	10VCT @ 2.0A	5V @ 4.0 A
LIT20-12	20	12.6VCT @ 1.6A	6.3V @ 3.2 A
LIT20-16	20	16VCT @ 1.25A	8V @ 2.5 A
LIT20-20	20	20VCT @ 1.0A	10V @ 2.0 A
LIT20-24	20	24VCT @ 0.83A	12V @ 1.66 A
LIT20-28	20	28VCT @ 0.72A	14V @ 1.44 A
LIT20-36	20	36VCT @ 0.56A	18V @ 1.12 A
LIT30-10	30	10VCT @ 3.0A	5V @ 6.0 A
LIT30-12	30	12.6VCT @ 2.4A	6.3V @ 4.8 A
LIT30-16	30	16VCT @ 1.9A	8V @ 3.8 A
LIT30-20	30	20VCT @ 1.5A	10V @ 3.0 A
LIT30-24	30	24VCT @ 1.25A	12V @ 2.5 A
LIT30-28	30	28VCT @ 1.06A	14V @ 2.12 A
LIT30-36	30	36VCT @ 0.82A	18V @ 1.64 A
LIT56-10	56	10VCT @ 5.6A	5V @ 11.2 A
LIT56-12	56	12.6VCT @ 4.4 A	6.3V @ 8.8 A
LIT56-16	56	16VCT @ 3.5 A	8V @ 7.0 A
LIT56-20	56	20VCT @ 2.8 A	10V @ 5.6 A
LIT56-24	56	24VCT @ 2.33 A	12V @ 4.66 A
LIT56-28	56	28VCT @ 2.0 A	14V @ 4.0 A
LIT56-36	56	36VCT @ 1.56 A	18V @ 3.12 A

Don't see what you need? Call Actown for a custom solution.



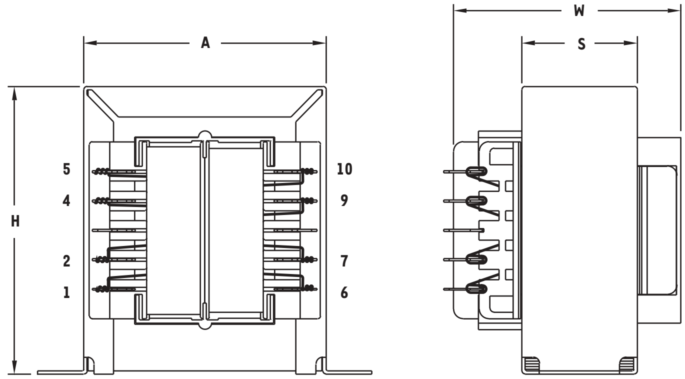
o Indicates Like Polarity

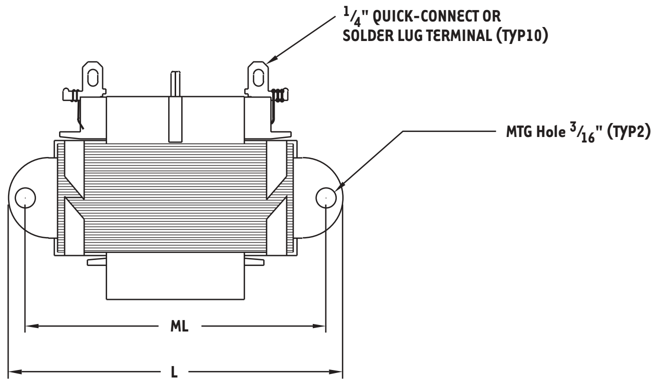


MOUNTING STYLE B

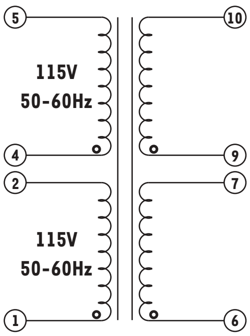
Part No.	VA Capacity	Secondary RMS Rating	
		Series	Parallel
LIC25-10	25	10VCT @ 2.5A	5V @ 5.0A
LIC25-12	25	12.6VCT @ 2.0A	6.3V @ 4.0A
LIC25-16	25	16VCT @ 1.6A	8V @ 3.2A
LIC25-20	25	20VCT @ 1.25A	10V @ 2.5A
LIC25-24	25	24VCT @ 1.0A	12V @ 2.0A
LIC25-28	25	28VCT @ 0.9A	14V @ 1.86A
LIC25-36	25	36VCT @ 0.7A	18V @ 1.4A
LIC25-230	25	230VCT @ 0.11A	115V @ 0.22A
LIC43-10	43	10VCT @ 4.3A	5V @ 8.6A
LIC43-12	43	12.6VCT @ 3.4A	6.3V @ 6.8A
LIC43-16	43	16VCT @ 2.7A	8V @ 5.4A
LIC43-20	43	20VCT @ 2.2A	10V @ 4.4A
LIC43-24	43	24VCT @ 1.8A	12V @ 3.6A
LIC43-28	43	28VCT @ 1.5A	14V @ 3.0A
LIC43-36	43	36VCT @ 1.2A	18V @ 2.4A
LIC43-230	43	230VCT @ 0.19A	115V @ 0.38A
LIC80-10	80	10VCT @ 8.0A	5V @ 16.0A
LIC80-12	80	12.6VCT @ 6.3A	6.3V @ 12.6A
LIC80-16	80	16VCT @ 5.0A	8V @ 10.0A
LIC80-20	80	20VCT @ 4.0A	10V @ 8.0A
LIC80-24	80	24VCT @ 3.3A	12V @ 6.6A
LIC80-28	80	28VCT @ 2.8A	14V @ 5.6A
LIC80-36	80	36VCT @ 2.2A	18V @ 4.4A
LIC80-230	80	230VCT @ 0.35A	115V @ 0.7A
LIC130-10	130	10VCT @ 13.0A	5V @ 26.0A
LIC130-12	130	12.6VCT @ 10.3A	6.3V @ 20.6A
LIC130-16	130	16VCT @ 8.1A	8V @ 16.2A
LIC130-20	130	20VCT @ 6.5A	10V @ 13.0A
LIC130-24	130	24VCT @ 5.4A	12V @ 10.8A
LIC130-28	130	28VCT @ 4.6A	14V @ 9.2A
LIC130-36	130	36VCT @ 3.6A	18V @ 7.2A
LIC130-230	130	230VCT @ 0.57A	115V @ 1.14A
LIC175-10	175	10VCT @ 17.5A	5V @ 35.0A
LIC175-12	175	12.6VCT @ 14.0A	6.3V @ 28.0A
LIC175-16	175	16VCT @ 11.0A	8V @ 22.0A
LIC175-20	175	20VCT @ 8.8A	10V @ 17.6A
LIC175-24	175	24VCT @ 7.3A	12V @ 14.6A
LIC175-28	175	28VCT @ 6.25A	14V @ 12.5A
LIC175-36	175	36VCT @ 4.8A	18V @ 9.6A
LIC175-230	175	230VCT @ 0.76A	115V @ 1.52A

Don't see what you need? Call Actown for a custom solution.





MOUNTING STYLE C



o Indicates Like Polarity

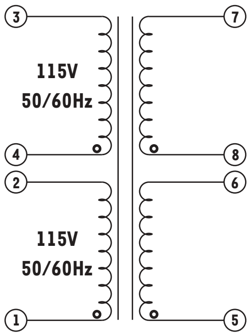
VA (size)	Dimensions						Terminals	Mtg. Dim.		Weight	Mtg Style
	L	W	H	A	B	C		ML	MW		
25	2.81"	1.89"	2.31"	2.00"	1.12"	.31"	.187"	2.37"		1.25lbs	C
25	71.4mm	48.0mm	58.7mm	50.8mm	28.6mm	7.9mm	4.75mm	60.3mm		0.57kg	
43	3.12"	1.89"	2.68"	2.28"	1.12"	.31"	.187"	2.81"		1.6lbs	C
43	79.4mm	48.0mm	68.2mm	57.91mm	28.6mm	7.9mm	4.75mm	71.4mm		0.73kg	
80	2.50"	2.28"	3.00"		1.37"	.31"	.187"	2.00"	2.18"	2.8lbs	B
80	63.5mm	57.9mm	76.2mm		35.0mm	7.9mm	4.75mm	50.8mm	55.5mm	1.27kg	
130	2.81"	2.67"	3.37"		1.56"	.37"	0.25"	2.25"	2.50"	4.1lbs	B
130	71.4mm	67.8mm	85.7mm		39.6mm	9.5mm	6.35mm	57.2mm	63.5mm	1.86kg	
175	3.12"	2.80"	3.75"		1.56"	.37"	0.25"	2.50"	2.50"	5.5lbs	B
175	79.4mm	71.1mm	95.3mm		39.6mm	9.5mm	6.35mm	63.5mm	63.5mm	2.49kg	

UI CORE LOW PROFILE

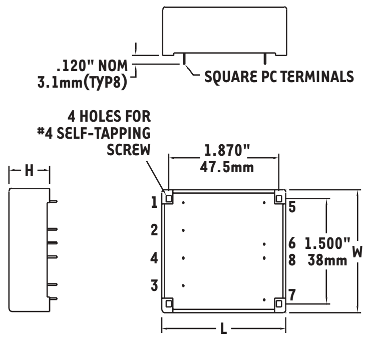
- Low-profile for critical height applications
- Fully encapsulated to meet international agency approvals
- Can be designed to meet various domestic and international safety agency approvals

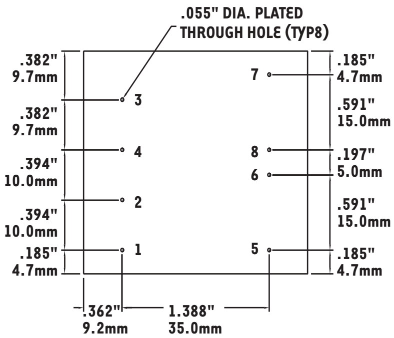
SPECIFICATIONS

Power	*2VA – 30VA*
Dielectric Strength	*4000VRMS Hipot*
Primaries	*Dual primaries 115/230V, 50/60Hz*
Secondaries	*Series or parallel*
Electrostatic Shield	*Not necessary*
Insulation	*Class B, 130˚ C*



o Indicates Like Polarity



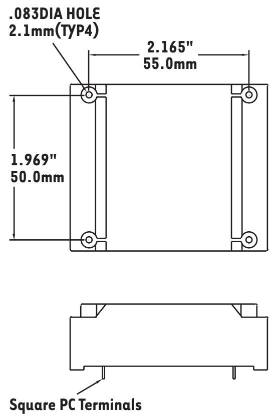


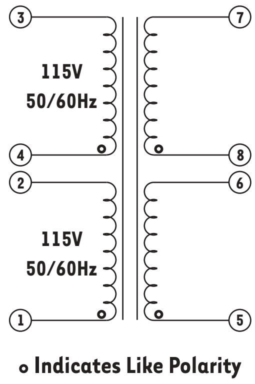
PCB DRILL PATTERN

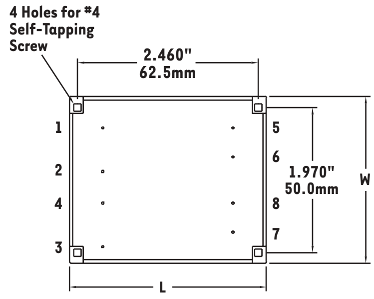
VA (size)	Dimensions			Weight
	L	W	H	
2	2.10"	1.75"	0.69"	4.6oz
2	53.4mm	44.4mm	17.5mm	0.13kg
4	2.10"	1.75"	0.77"	5.4oz
4	53.4mm	44.4mm	19.5mm	0.15kg
6	2.10"	1.75"	0.89"	6.9oz
6	53.4mm	44.4mm	22.5mm	0.20kg

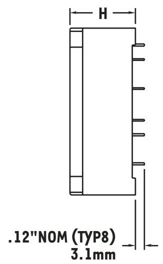
Part No.	VA Capacity	Secondary RMS Rating	
		Series	Parallel
LUT2-10	2	10VCT @ 200mA	5V @ 400mA
LUT2-12	2	12VCT @ 170mA	6V @ 340mA
LUT2-16	2	16VCT @ 125mA	8V @ 250mA
LUT2-20	2	20VCT @ 100mA	10V @ 200mA
LUT2-24	2	24VCT @ 85mA	12V @ 170mA
LUT2-30	2	30VCT @ 70mA	15V @ 140mA
LUT2-34	2	34VCT @ 60mA	17V @ 120mA
LUT2-40	2	40VCT @ 50mA	20V @ 100mA
LUT2-56	2	56VCT @ 40mA	28V @ 80mA
LUT2-230	2	230VCT @ 9mA	115V @ 18mA
LUT4-10	4	10VCT @ 400mA	5V @ 800mA
LUT4-12	4	12VCT @ 335mA	6V @ 670mA
LUT4-16	4	16VCT @ 250mA	8V @ 500mA
LUT4-20	4	20VCT @ 200mA	10V @ 400mA
LUT4-24	4	24VCT @ 170mA	12V @ 340mA
LUT4-30	4	30VCT @ 135mA	15V @ 270mA
LUT4-34	4	34VCT @ 120mA	17V @ 240mA
LUT4-40	4	40VCT @ 100mA	20V @ 200mA
LUT4-56	4	56VCT @ 70mA	28V @ 140mA
LUT4-230	4	230VCT @ 18mA	115V @ 36mA
LUT6-10	6	10VCT @ 600mA	5V @ 1.20A
LUT6-12	6	12VCT @ 500mA	6V @ 1.00A
LUT6-16	6	16VCT @ 375mA	8V @ 750mA
LUT6-20	6	20VCT @ 300mA	10V @ 600mA
LUT6-24	6	24VCT @ 250mA	12V @ 500mA
LUT6-30	6	30VCT @ 200mA	15V @ 400mA
LUT6-34	6	34VCT @ 180mA	17V @ 360mA
LUT6-40	6	40VCT @ 150mA	20V @ 300mA
LUT6-56	6	56VCT @ 110mA	28V @ 220mA
LUT6-230	6	230VCT @ 25mA	115V @ 50mA

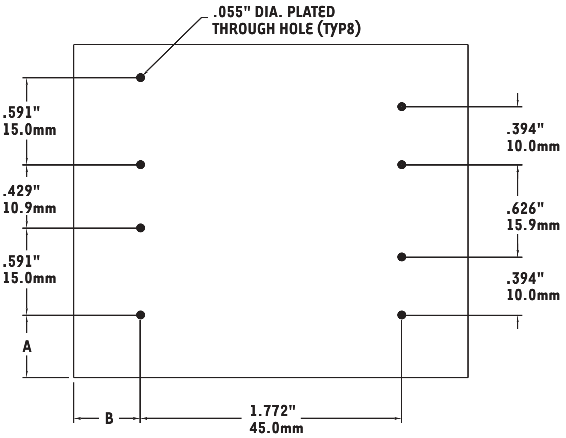
Don't see what you need? Call Actown for a custom solution.











PCB DRILL PATTERN

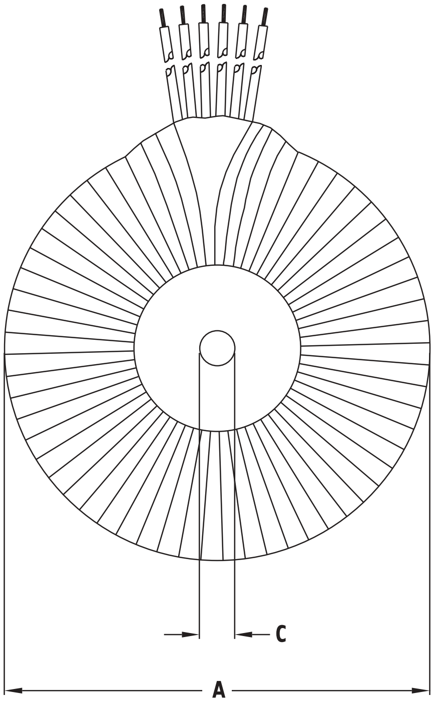
VA (size)	Dimensions			Weight
	L	W	H	
10	2.66"	2.26"	0.89"	10.3oz
10	68.0mm	57.4mm	22.7mm	0.29kg
14	2.66"	2.26"	0.98"	11.9oz
14	68.0mm	57.4mm	24.8mm	0.34kg
18	2.66"	2.26"	1.11"	14.1oz
18	68.0mm	57.4mm	28.1mm	0.40kg
24	2.68"	2.26"	1.24"	16.5oz
24	68.0mm	57.4mm	31.6mm	0.47kg
30	2.68"	2.26"	1.40"	19.7oz
30	68.0mm	57.4mm	35.6mm	0.58kg

Part No.	VA Capacity	Secondary RMS Rating	
		Series	Parallel
LUT10-10	10	10VCT @ 1.00A	5V @ 2.00A
LUT10-12	10	12VCT @ 835mA	6V @ 1.67A
LUT10-16	10	16VCT @ 625mA	8V @ 1.25A
LUT10-20	10	20VCT @ 500mA	10V @ 1.00A
LUT10-24	10	24VCT @ 420mA	12V @ 840mA
LUT10-30	10	30VCT @ 335mA	15V @ 670mA
LUT10-34	10	34VCT @ 300mA	17V @ 600mA
LUT10-40	10	40VCT @ 250mA	20V @ 500mA
LUT10-56	10	56VCT @ 180mA	28V @ 360mA
LUT10-230	10	230VCT @ 45mA	115V @ 90mA
LUT14-10	14	10VCT @ 1.40A	5V @ 2.80A
LUT14-12	14	12VCT @ 1.20A	6V @ 2.40A
LUT14-16	14	16VCT @ 875mA	8V @ 1.75A
LUT14-20	14	20VCT @ 700mA	10V @ 1.40A
LUT14-24	14	24VCT @ 600mA	12V @ 1.20A
LUT14-30	14	30VCT @ 470mA	15V @ 940mA
LUT14-34	14	34VCT @ 415mA	17V @ 830mA
LUT14-40	14	40VCT @ 350mA	20V @ 700mA
LUT14-56	14	56VCT @ 250mA	28V @ 500mA
LUT14-230	14	230VCT @ 60mA	115V @ 120mA
LUT18-10	18	10VCT @ 1.80A	5V @ 3.60A
LUT18-12	18	12VCT @ 1.50A	6V @ 3.00A
LUT18-16	18	16VCT @ 1.15A	8V @ 2.30A
LUT18-20	18	20VCT @ 900mA	10V @ 1.80A
LUT18-24	18	24VCT @ 750mA	12V @ 1.50A
LUT18-30	18	30VCT @ 600mA	15V @ 1.20A
LUT18-34	18	34VCT @ 530mA	17V @ 1.06A
LUT18-40	18	40VCT @ 450mA	20V @ 900mA
LUT18-56	18	56VCT @ 320mA	28V @ 640mA
LUT18-230	18	230VCT @ 80mA	115V @ 160mA
LUT24-10	24	10VCT @ 2.40A	5V @ 4.80A
LUT24-12	24	12VCT @ 2.00A	6V @ 4.00A
LUT24-16	24	16VCT @ 1.50A	8V @ 3.00A
LUT24-20	24	20VCT @ 1.20A	10V @ 2.40A
LUT24-24	24	24VCT @ 1.00A	12V @ 2.00A
LUT24-30	24	30VCT @ 800mA	15V @ 1.60A
LUT24-34	24	34VCT @ 700mA	17V @ 1.40A
LUT24-40	24	40VCT @ 600mA	20V @ 1.20A
LUT24-56	24	56VCT @ 430mA	28V @ 860mA
LUT24-230	24	230VCT @ 105mA	115V @ 210mA
LUT30-10	30	10VCT @ 3.00A	5V @ 6.00A
LUT30-12	30	12VCT @ 2.50A	6V @ 5.00A
LUT30-16	30	16VCT @ 1.90A	8V @ 3.80A
LUT30-20	30	20VCT @ 1.50A	10V @ 3.00A
LUT30-24	30	24VCT @ 1.25A	12V @ 2.50A
LUT30-30	30	30VCT @ 1.00A	15V @ 2.00A
LUT30-34	30	34VCT @ 900mA	17V @ 1.80A
LUT30-40	30	40VCT @ 750mA	20V @ 1.50A
LUT30-56	30	56VCT @ 550mA	28V @ 1.10A
LUT30-230	30	230VCT @ 130mA	115V @ 260mA

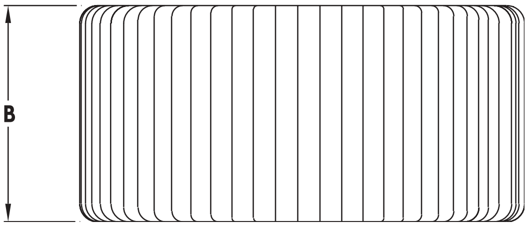
Don't see what you need? Call Actown for a custom solution.

TOROIDS

- Low profile
- Reduced RFI/EMI noise emissions
- Higher flux densities possible resulting in smaller and lighter transformers
- Rated 50/60Hz
- Can be designed to meet various domestic and international safety agency approvals, UL2601, "Medical Electrical Equipment"

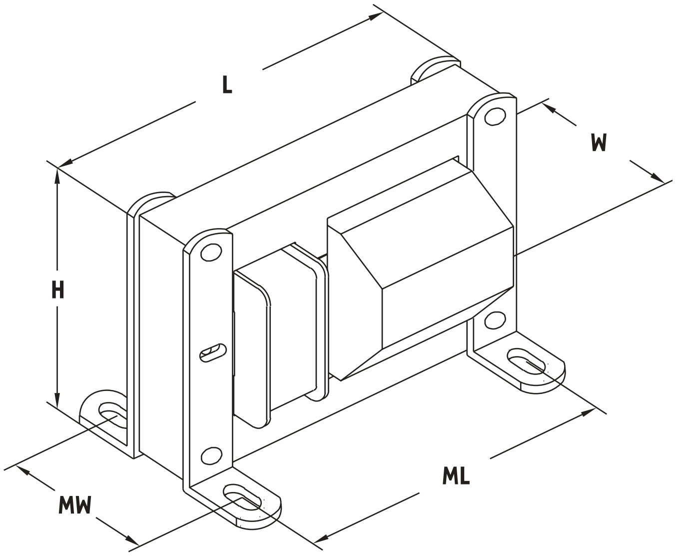


VA	A	B	C	Weight (lb)
15	2.50"	1.38"	0.19"	0.8
30	2.75"	1.38"	0.19"	1.0
50	3.25"	1.50"	0.19"	2.0
80	3.88"	1.50"	0.19"	2.3
125	3.88"	1.75"	0.25"	2.7
175	4.50"	1.75"	0.25"	4.1
225	4.50"	2.00"	0.25"	5.0
300	4.50"	2.25"	0.25"	6.5
400	5.00"	2.63"	0.38"	9.0
500	5.50"	2.50"	0.38"	10.0
625	5.75"	3.13"	0.38"	11.0
750	6.00"	3.25"	0.38"	12.5
1000	6.50"	3.25"	0.50"	14.0
1500	8.00"	3.00"	0.50"	26.0



HIGH VOLTAGE CORE & FRAME

- Vacuum impregnated to eliminate insulation damaging corona
- Can be designed to meet various safety agency approvals

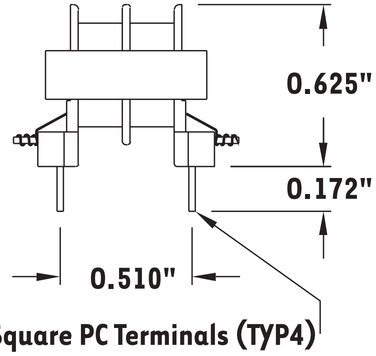


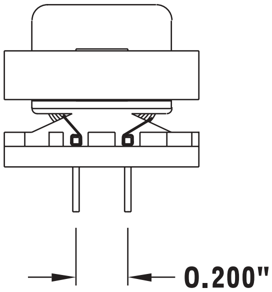
Part Number	Input Voltage	Output Voltage	Current mA	Dimensions				
				L	H	W	MW	ML
LCC-3500-120	120	3500	8	3.81"	3.0"	1.93"	1.62"	3.31"
LCC-3600-120	120	3600	30	5.5"	3.62"	2.5"	1.75"	5.0"
LCC-4200-120	120	4200	8	3.81"	3.0"	2.04"	1.75"	3.31"
LCC-4250-120*	120	4250	8	3.81"	2.87"	2.25"	1.5"	3.31"
LCC-5000-120	120	5000	10	4.75"	3.62"	2.37"	1.75"	4.25"
LCC-3450-120	120	3K,4K,5K	10	3.81"	3.0"	2.04"	1.75"	3.31"
LCC-3500-240	240	3500	8	3.81"	3.0"	1.93"	1.62"	3.31"
LCC-11000-120**	120	11000	20	6.00"	5.87"	3.87"	2.12"	4.37"
LCC-6500-120	120	6500	20	4.7"	3.62"	2.75"	1.93"	4.25"
LCC-4200-240*	240	4200	8	3.81"	2.75"	2.53"	1.75"	3.31"

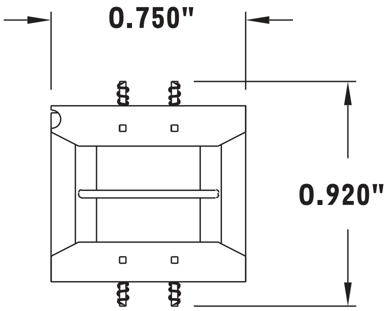
*includes internal capacitor **not as shown

COMMON MODE E-CORES CME SERIES

Common mode chokes are designed to help meet domestic and international requirements for safety and RFI/EMI. Placing common mode chokes in the input circuits of electrical equipment will help keep RFI/EMI within specified levels.

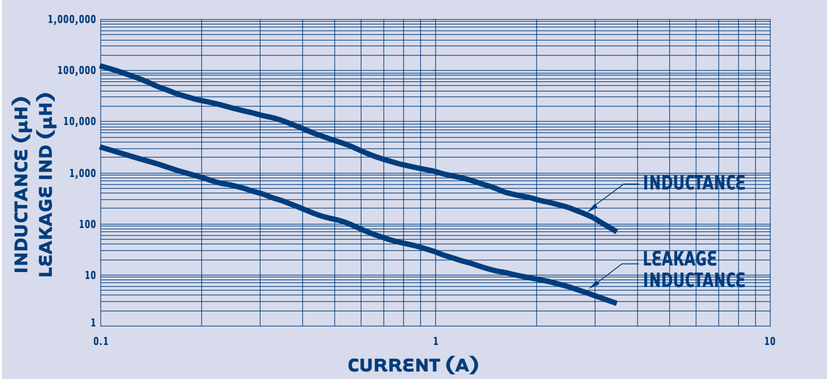






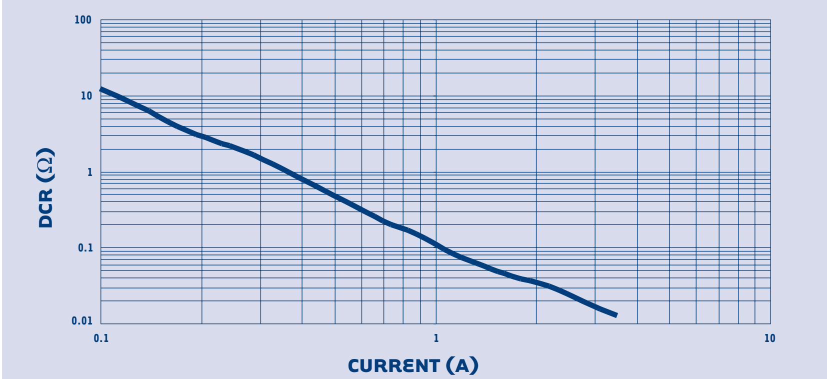
MODEL CME-1

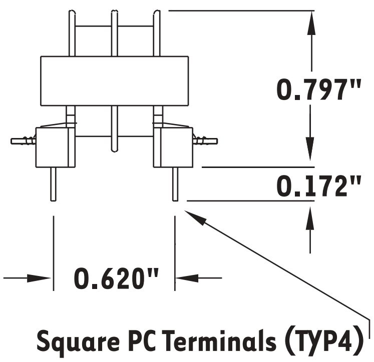
Current vs. Inductance *Current vs. Leakage Inductance*

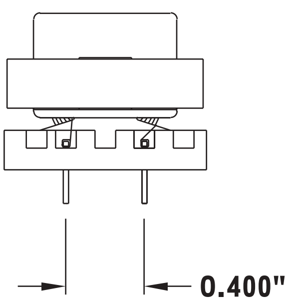


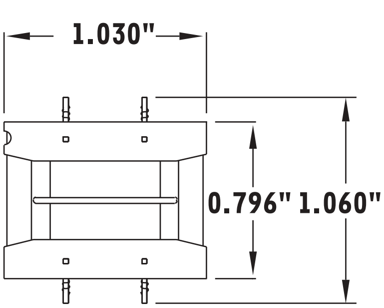
MODEL CME-1

Current vs. DCR



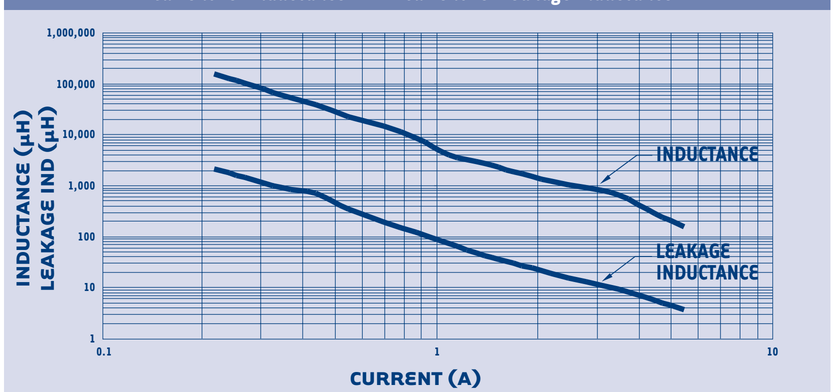






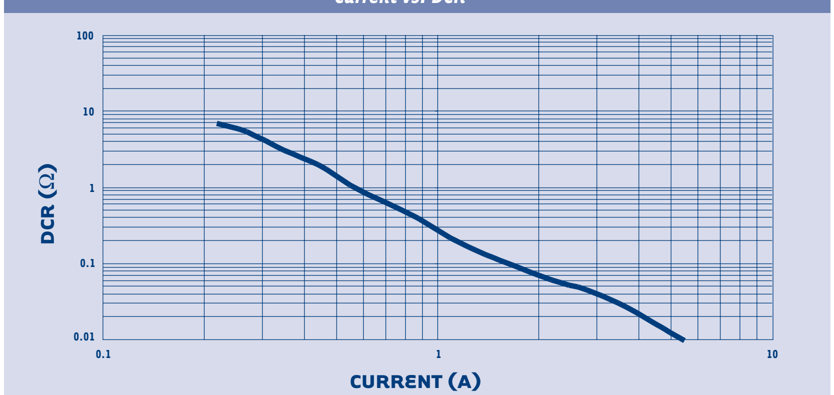
MODEL CME-2

Current vs. Inductance *Current vs. Leakage Inductance*



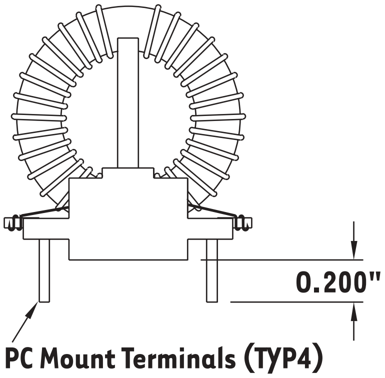
MODEL CME-2

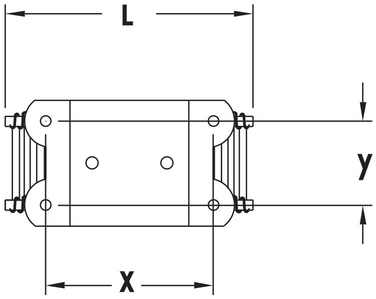
Current vs. DCR

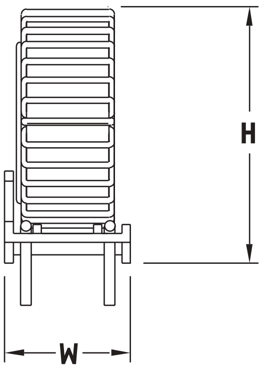


COMMON MODE TOROIDS–VERTICAL CMT SERIES

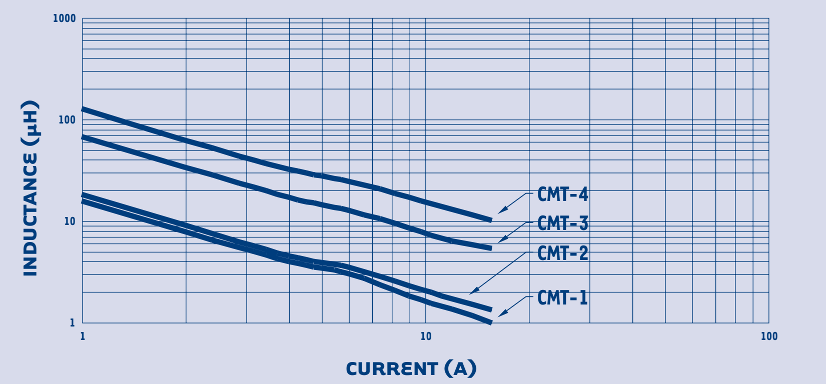
- Common mode toroids are very effective filtering in-phase signals of equal magnitude
- Helps keep RFI/EMI emissions within acceptable limits



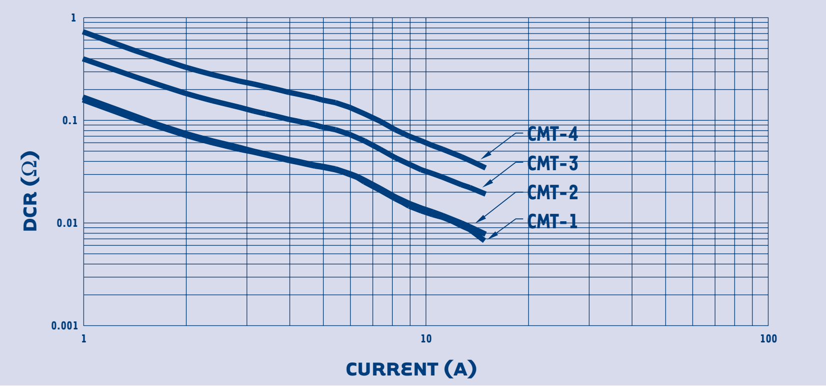




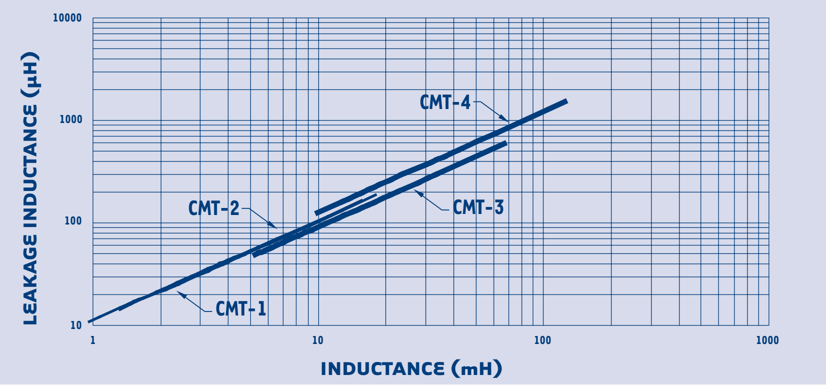
MODEL CMT



MODEL CMT



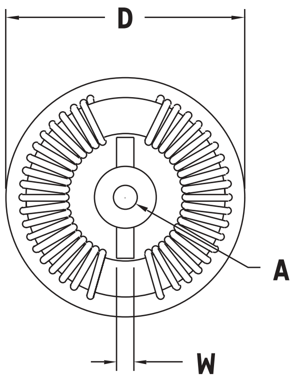
MODEL CMT

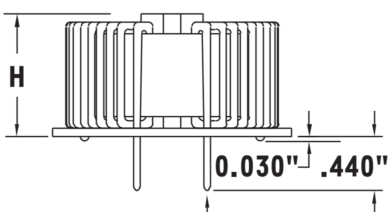


	H Nominal	L Nominal	W Nominal	X Nominal	y Nominal
1	1.150"	1.200"	0.615"	0.800"	0.400"
2	1.250"	1.375"	0.825"	0.900"	0.600"
3	1.700"	1.712"	0.925"	1.200"	0.700"
4	2.225"	2.000"	1.105"	1.500"	0.900"

COMMON MODE TOROIDS-HORIZONTAL CMH SERIES

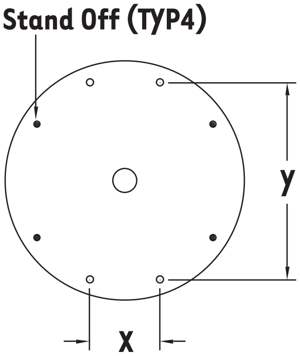
- Common mode toroids are very effective filtering in-phase signals of equal magnitude
- Helps keep RFI/EMI emissions within acceptable limits





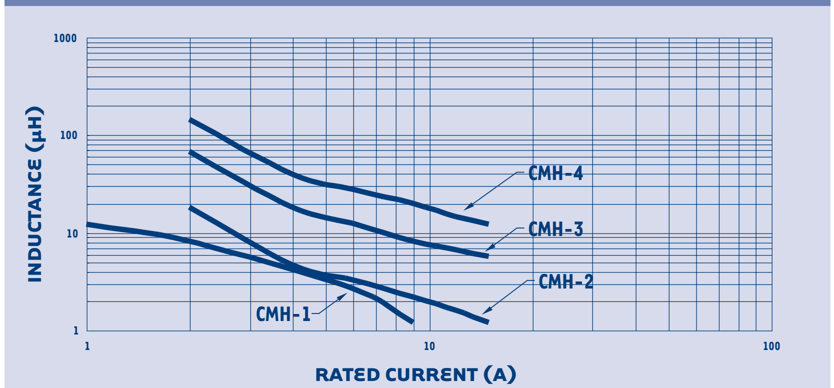
PC Mount Terminals (TYP4)

Stand Off (TYP4)



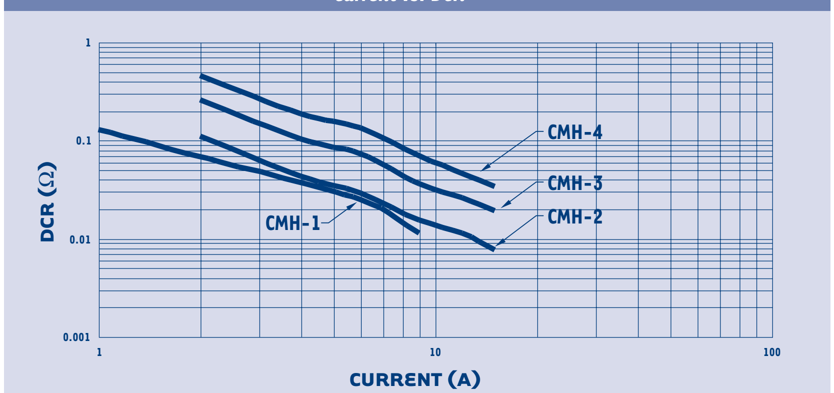
MODEL CMH

Current vs. Inductance



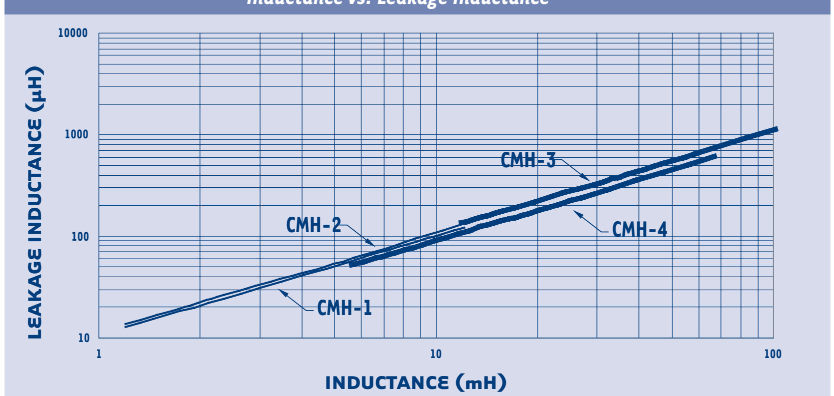
MODEL CMH

Current vs. DCR



MODEL CMH

Inductance vs. Leakage Inductance

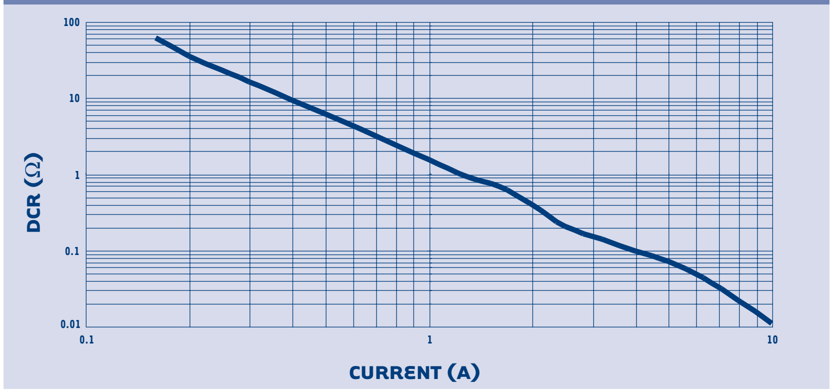


	A Nominal	D Nominal	H Nominal	W Nominal	X Nominal	y Nominal
1	N/A	1.000"	0.625"	0.085"	0.300"	0.825"
2	N/A	1.210"	0.625"	0.093"	0.330"	1.052"
3	0.170"	1.700"	0.920"	0.120"	0.500"	1.414"
4	0.170"	2.320"	1.100"	0.120"	0.500"	2.060"

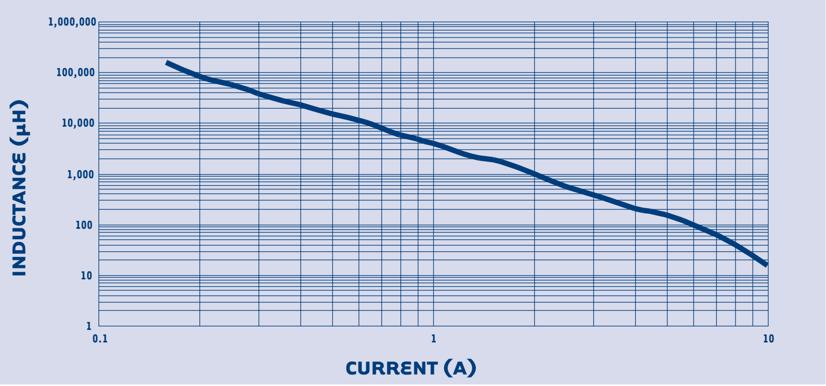
PC MOUNT INDUCTORS IPC SERIES

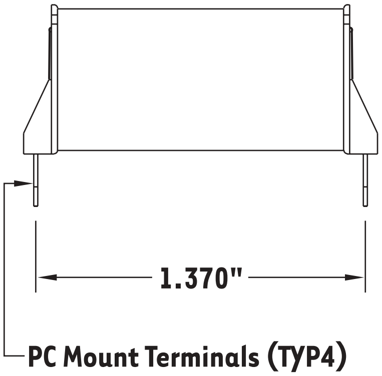
These high current, compact inductors are good for RFI/EMI filtering in switching power supplies, power filter networks, and other RFI/EMI applications

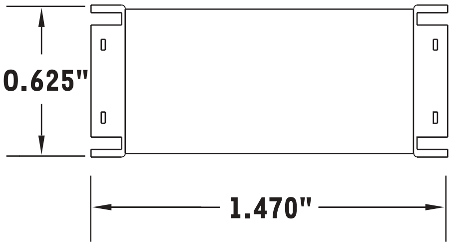
MODEL IPC

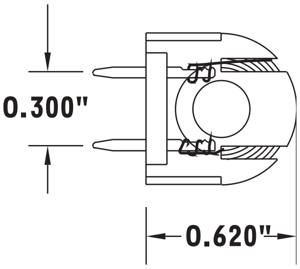


MODEL IPC



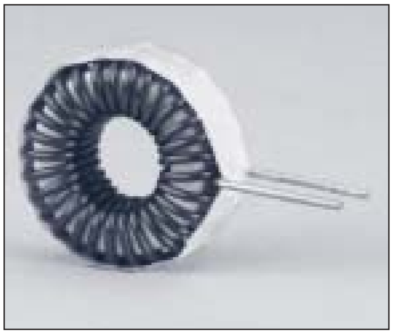


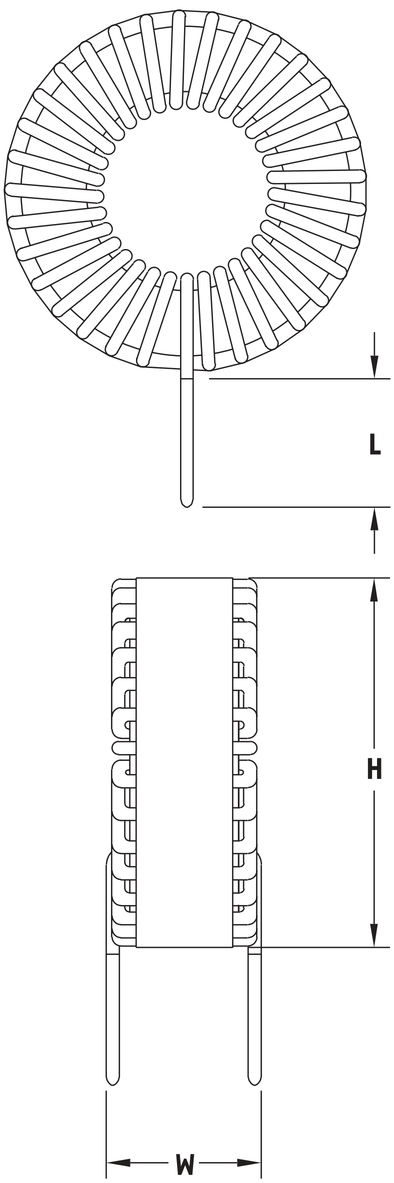




SWINGING CHOKES-TOROIDAL IST SERIES

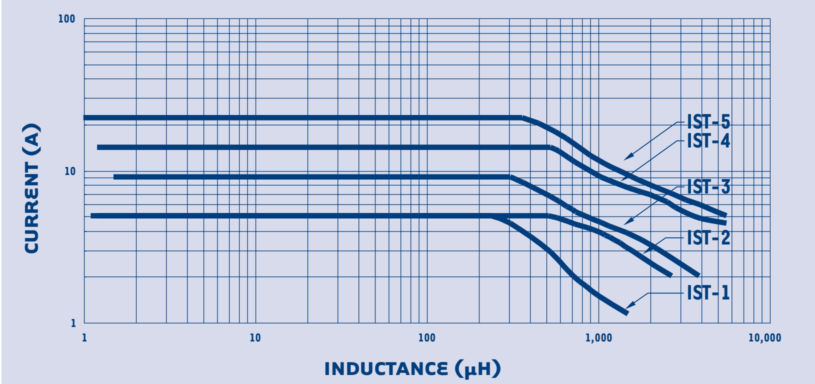
Swinging chokes are well suited for applications requiring a known inductance change with changing current demands. Switching power supplies are a typical example





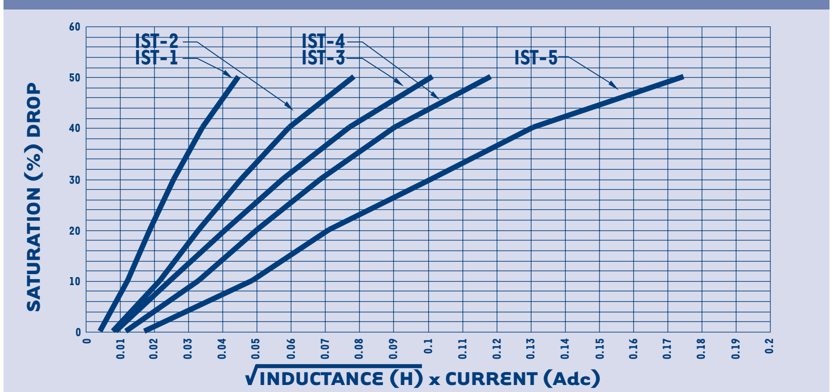
MODEL IST

Inductance vs. Current



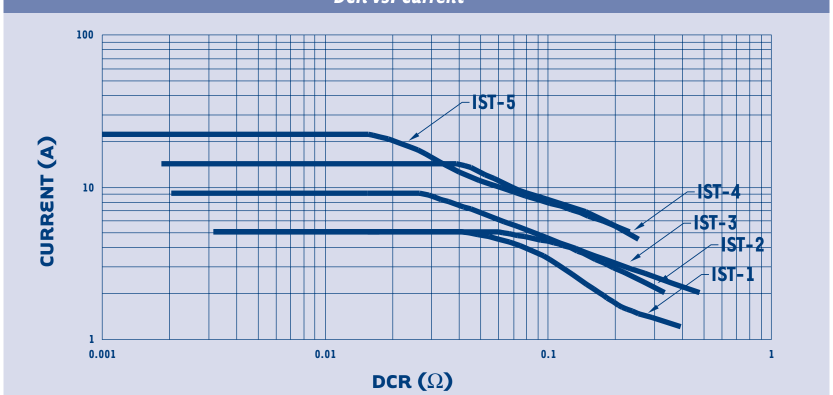
MODEL IST

Inductance and Current vs. Saturation



MODEL IST

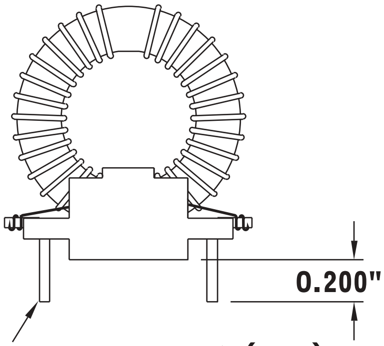
DCR vs. Current

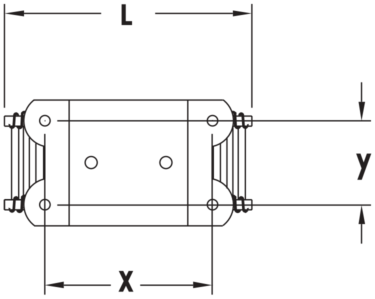


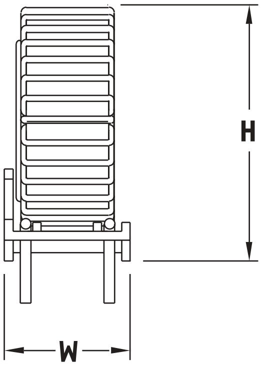
	H Nominal	L Nominal	W Nominal
1	1.050"	0.500"	0.500"
2	1.350"	0.500"	0.850"
3	1.730"	0.500"	0.850"
4	1.950"	0.500"	1.050"
5	2.500"	0.500"	1.400"

SWINGING CHOKES W/HEADER-TOROIDAL ISC SERIES

Same as swinging chokes but has a header for increased durability

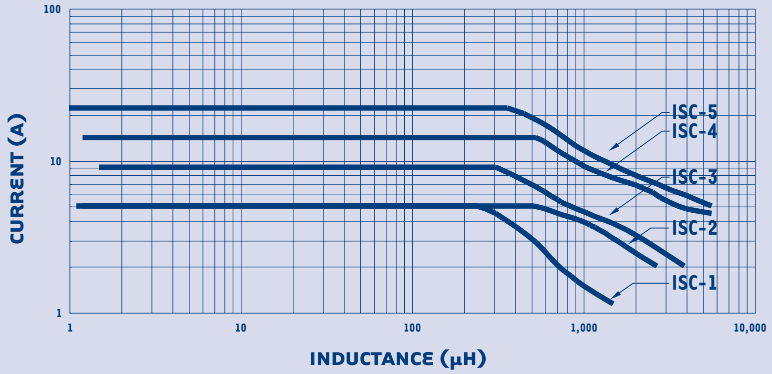






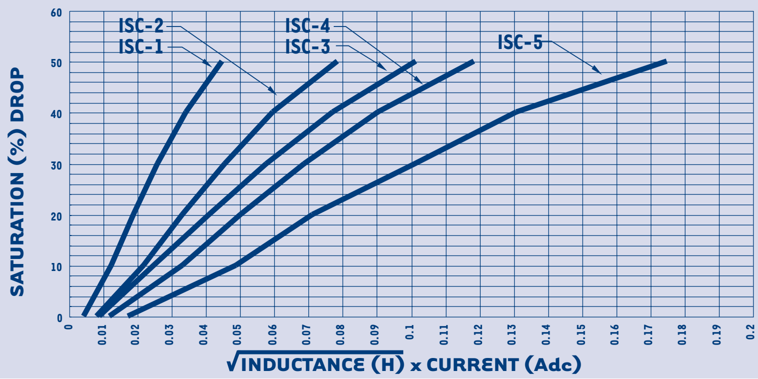
MODEL ISC

Inductance vs. Current



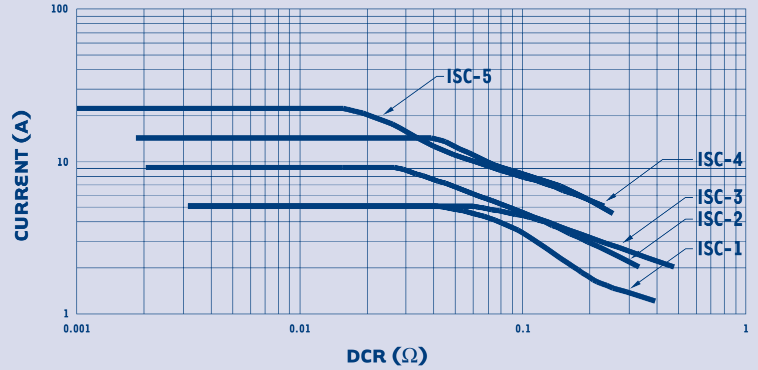
MODEL ISC

Inductance and Current vs. Saturation



MODEL ISC

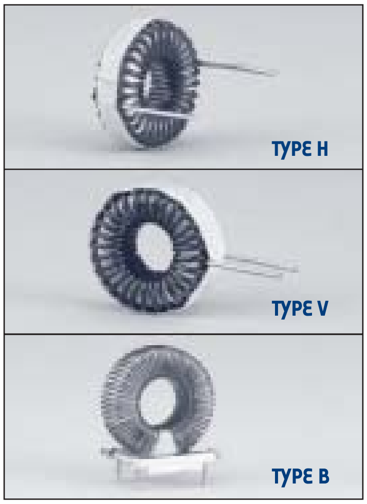
DCR vs. Current

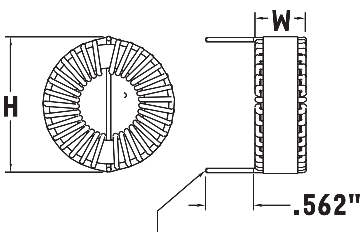


	H Nominal	L Nominal	W Nominal	X Nominal	y Nominal
1	1.150"	1.200"	0.615"	0.800"	0.400"
2	1.450"	1.375"	0.825"	0.900"	0.600"
3	1.750"	1.375"	0.825"	0.900"	0.600"
4	2.100"	1.712"	0.925"	1.200"	0.700"
5	2.650"	2.000"	1.105"	1.500"	0.900"

TOROIDAL SWITCHMODE INDUCTORS ISM SERIES

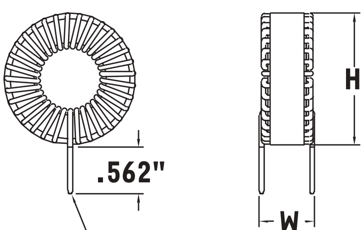
These toroids are good for power applications
as used in switching power supplies





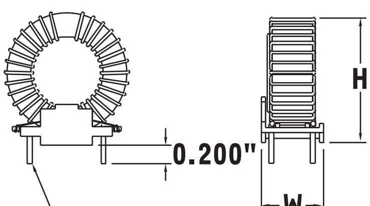
PC Mount Terminals (TYP2)

TYPE H

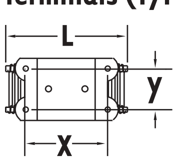


PC Mount Terminals (TYP2)

TYPE V



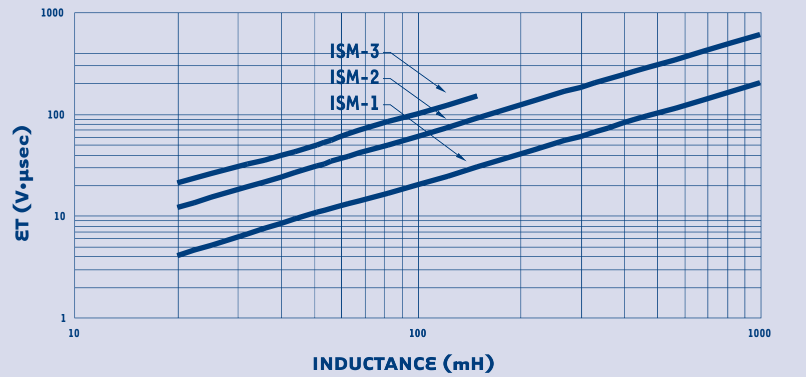
PC Mount Terminals (TYP4)



TYPE B

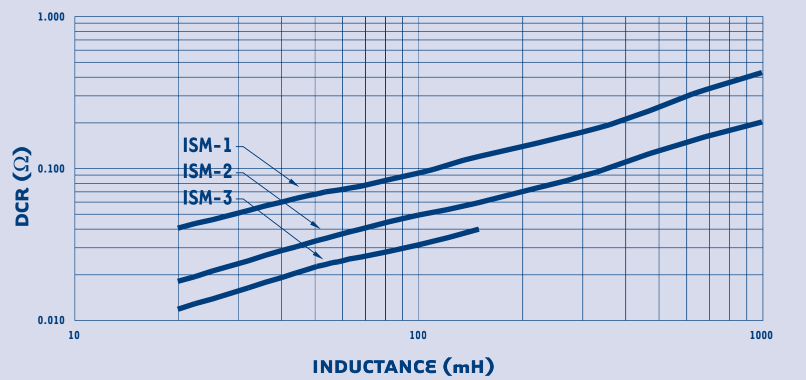
MODEL ISM

Inductance vs. ET



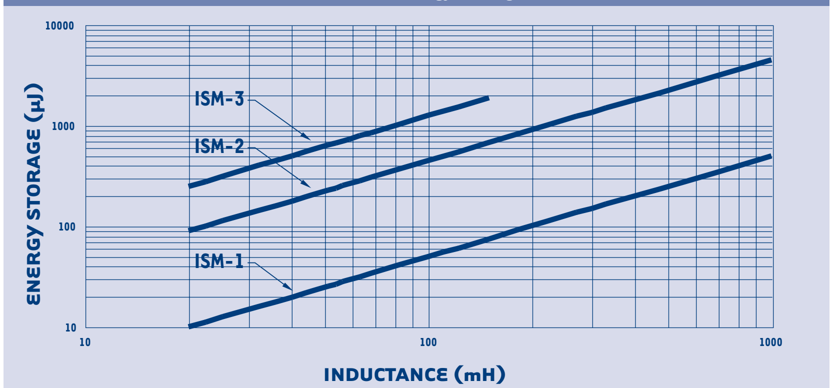
MODEL ISM

Inductance vs. DCR

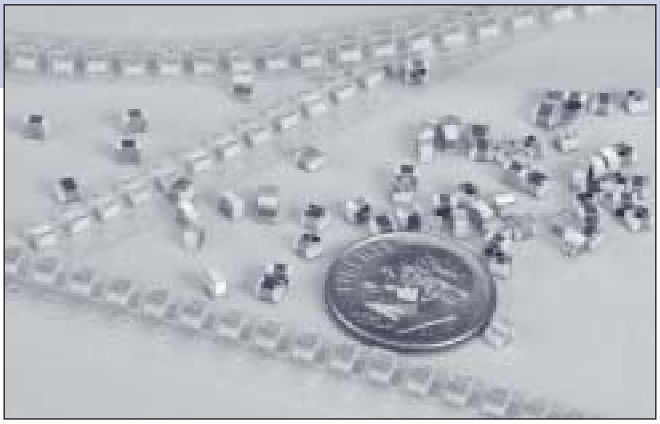


MODEL ISM

Inductance vs. Energy Storage



		H	L	W	X	Y	CURRENT RATING
TYPE B	ISM-1	.700" to 1.080"	.600" to .980"	.600" to .700"	.600" to .800"	.250" to .400"	1A
	ISM-2	.850" to 1.900"	.750" to 1.800"	.600" to 1.100"	.800" to 1.500"	.400" to .900"	3A
	ISM-3	.950" to 1.350"	.850" to 1.250"	.600" to .800"	.800" to .900"	.400" to .600"	5A
TYPE H&V	ISM-1	.600" to .980"		.275" to .475"			1A
	ISM-2	.750" to 1.800"		.320" to .800"			3A
	ISM-3	.850" to 1.250"		.425" to .625"			5A



Design

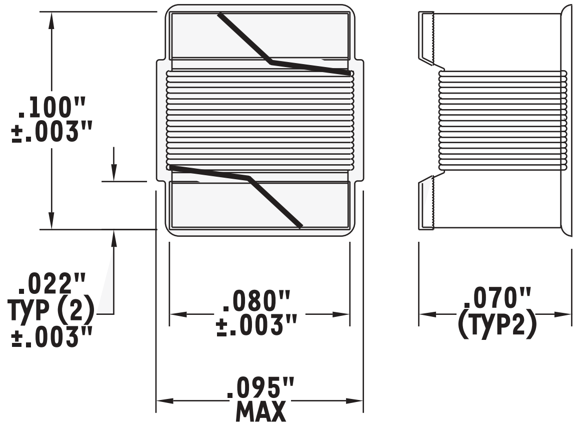
- Wire wound, open coil on ceramic core with flat film cover
- Inductance range: 20 to 1200 nH

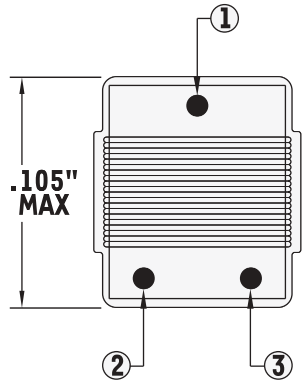
ENVIRONMENTAL	
Operating Temperature:	-40° C to +125° C
Temperature Shock:	-40° C (30 min.) to +85° C (30 min.);10 cycles with 20 second transitions
Static Humidity:	20 days at 90 to 95% RH

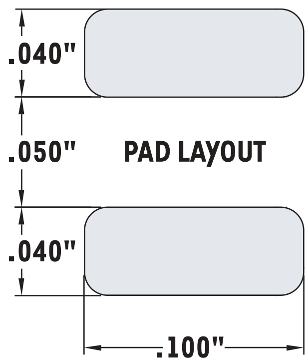
MECHANICAL	
Resistance to Solder Heat:	260° C +/- 5° C with RMA solder flux; dip 10 to 11 seconds in (63Sn /37Pb) solder
Random Vibration:	6 Gs RMS or 0.04 G/Hz power spectral density; 10 to 2000 Hz for 15 minutes per each of 3 axes
Mechanical Shock:	One half sine pulse (8700 Gs for 0.3 milliseconds) 6 times per each of 3 axes
Shear (Push) Test:	1000 mg shear force using dynamometer
Tape & Reel:	7100 per reel

Operating Life

- Tested 1000 hours at +85° C at full rated current
- Contact Actown Electrocoil Inc. for details of testing and additional parameters.







ORDERING CODE:

A 1008 - ____ - ____

Product Code — A
Size — 1008
Inductance (NH)
Inductance tolerance 2,5,10%

SAFETY AGENCY APPROVALS

Safety Agency Approvals

Actown's products can be designed to meet your specific safety agency requirements. We have designed and built products to comply with many different agencies, including UL, VDE, CSA, etc.

Limitation of Liability

Actown's liability for defective or nonconforming Products, whether based on breach of warranty, negligent manufacture or product liability, is exclusively limited to repair or replacement, at Actown's election, of such Products. Actown assumes no risk and shall be subject to no liability for any damages or loss resulting from the specific use or application made of the Products. Actown's liability for any other claim, whether based on breach of contact, negligence or product liability, relating to the Products shall not exceed the price paid to Buyer for such Products. In no event will Actown be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Actown or otherwise.

Warranty

Actown Electrocoil Inc. warrants that the Products sold to Buyer hereunder will be free from defects in material and workmanship furnished by Actown and will conform, within normal commercial tolerances, to applicable specifications. This warranty shall apply only where Buyer has given Actown written notice of such defect or nonconformity within ninety (90) days after delivery of the Products by Actown and the warranty does not extend to any Product which has been subjected to abuse, misuse, neglect or accident, nor to any Product which has been repaired or altered by other than Actown. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, DESCRIPTION, QUALITY PRODUCTIVENESS, OR OTHERWISE.

Part Number Anatomy

<table>
<tr><th>Transformers</th><th>S</th><th>E</th><th>T</th><th>30 -</th><th>10 -</th><th>120</th></tr>
<tr><td></td><td colspan="2">S-Switchmode
L-Linear</td><td colspan="2">T-Through-hole Mount
S-Surface Mount
C-Chassis Mount</td><td colspan="2">Secondary Output Voltage (optional)</td></tr>
<tr><td colspan="2"></td><td>E-E core
F-EFD Core
P-EP Core
T-ETD Core
I-EI Core
U-UI Core
C-Core&Frame
R-Toroid</td><td></td><td colspan="2">Power (optional)</td><td>Input Voltage (optional)</td></tr>
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Inductors	
CME Series	Common Mode E-Cores
CMT Series	Common Mode Toroids (Vertical)
CMH Series	Common Mode Toroids (Horizontal)
IPC Series	PC Mount Inductors
IST Series	Swinging Chokes-Toroidal
ISC Series	Swinging Chokes with Header-Toroidal
ISM Series	Toroidal Switchmode Inductors

NOTES


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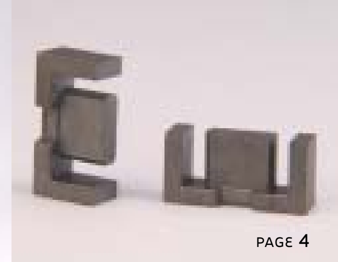
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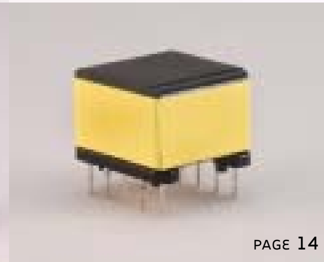
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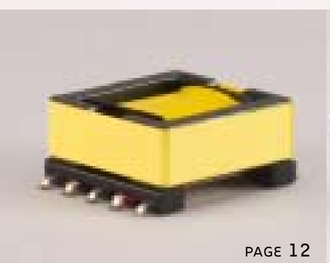
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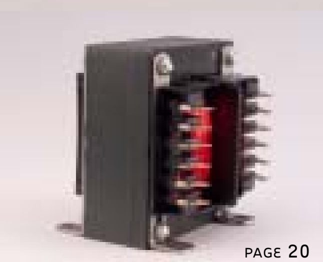
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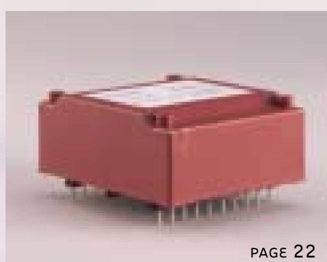
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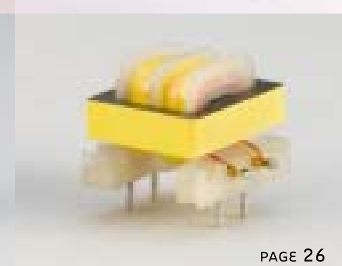
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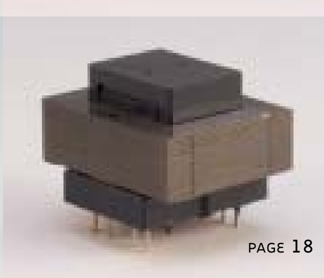
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