



# High Isolation Voltage Magnetics

ISO 9001  
CERTIFIED

INDUCTORS • SWITCHMODE TRANSFORMERS • GATE DRIVERS • CURRENT SENSORS

## Bicron High Isolation Voltage Magnetics offer:

- Superior insulation design and testing for stringent partial discharge (corona) levels. Results: Long product life
- Automatic Test Equipment (ATE) for fast, efficient, documented testing with SPC data. Results: 100% assured performance to specifications
- Over 30 years experience in designing High Isolation Voltage Systems

## The Bicron Advantage

- High Efficiency
- High Performance
- Isolation Potentials up to 40KV
- Corona-free up to 20KV
- High Reliability
- Superior Insulation system

## Applications:

- Special Switchmode Power Supplies (SMPS) for capital equipment, medical systems
- Gate Drives for capital equipment

## The Bicron Benefits

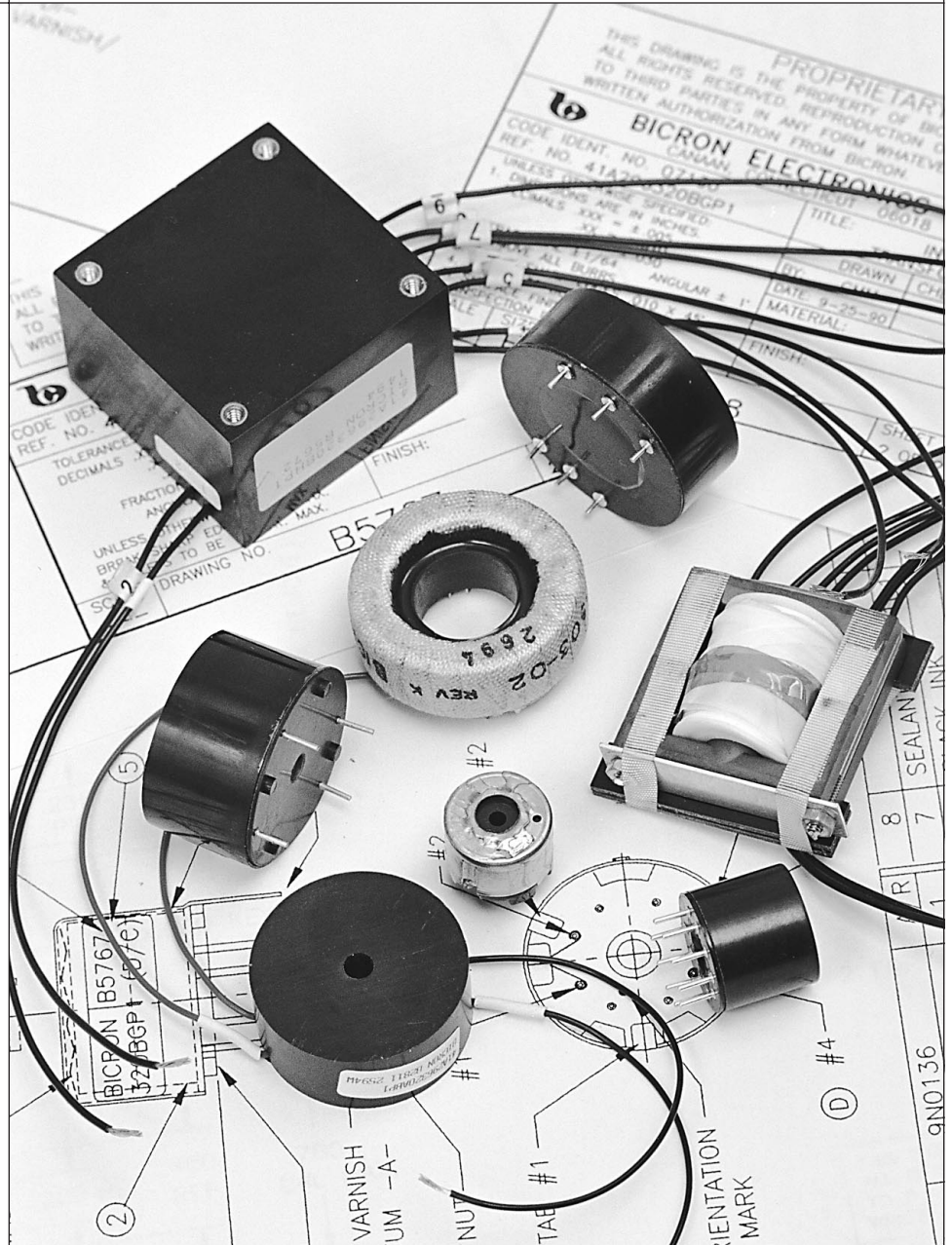
- Our engineers work with you to optimize your circuit or total system
- ISO 9001 Certified
- U.S. Design and Manufacture with Global Sourcing Partners
- Value Added Capabilities
- Standard product designs easily and economically modified for special requirements

*"Excellence Through Teamwork"*



**BICRON** Electronics Company

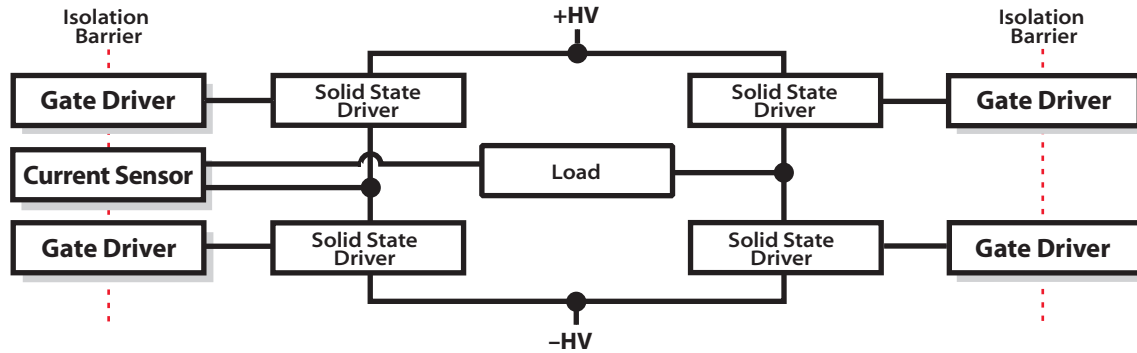
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**Could your product fail prematurely due to the effects of corona?  
See page four for one of the major advantages Bicron can offer!**



## High Endurance Custom Magnetics Applied To Isolated Full Wave Power Switch

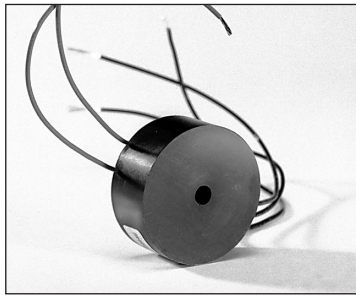


### Isolated Gate Driver

Part No. B3521-01

A specialized Bicron transformer used in the driving gate circuit (capacitance) of a power MOSFET.

Under specified applications, the core will not saturate or become non-linear. The normal working voltage between primary and secondary is 250Vrms.



#### Typical Specifications:

Turns Ratio ..... 1:1:1  
 Primary V • μsec ..... 500  
 Primary Inductance ..... 38mH min.  
 Excitation Current ..... 10mA max  
 Output Requirements .. 8.5V(1000Ω parallel 1000pF)  
 Duty Cycle ..... 25%  
 Operating Frequency ..... 10KHz  
 Leakage Inductance ..... 12μH/sec shorted  
 Interwind Capacity ..... 130pF  
 Corona Inception ..... >300 Vac  
 Hi-Pot ..... 1500Vrms for 60 sec.

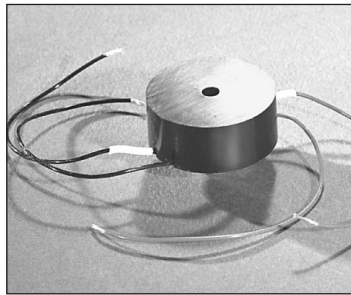
Size:  
 Diameter ..... 1.5-inches (38mm)  
 Height ..... 0.625-inches(16mm)

### Isolated Gate Driver

Part No. B2811-01

A high fidelity SCR firing pulse transformer used in sophisticated heavy equipment.

This transformer is designed to produce pulses with very short rise times. It is PC board mountable and can be secured to the printed circuit board using a #6 screw, nut and washer.



#### Typical Specifications:

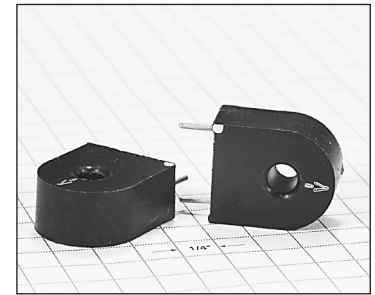
Rise Time into Shorted  
 Secondary Winding ..... <1msec.  
 Output Pulse ..... >6A  
 Drive Source ..... 3-5Ω  
 Secondary Load ..... 5-25Ω  
 Turns Ratio ..... 1:1.333  
 Primary V • μsec ..... 180  
 Primary Current .... 1.5Arms 60Hz fault 6Adc @85°C  
 Primary Inductance ..... 0.9-1.4mH  
 Secondary Current ..... 1.5Arms  
 Secondary Inductance ..... 1-2.5mH  
 Output Requirements ..... 6A Peak, 2A @1μsec  
 Duty Cycle ..... 12%  
 Operating Frequency ..... 12.5KHz  
 Leakage Inductance ..... 8μH/sec shorted  
 Interwind Capacity ..... 50pF  
 Corona Inception ..... >1000Vac

Size:  
 Diameter ..... 1.5-inches (38mm)  
 Height ..... 0.75-inches(19mm)

### Feedback Current Sensors

Part Nos. B7077-01, -02, -03

A specialized series of current sensors ideal for isolated feedback control circuitry. These sensors are fully encapsulated and PC board mountable.



#### Typical Specifications:

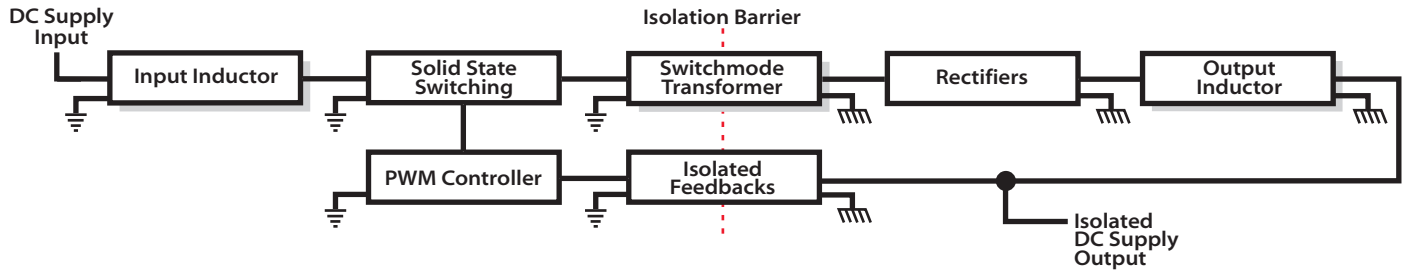
**B7077-01**  
 Number of turns ..... 100±3  
 DCR ..... 1.4Ω  
 Inductance @1KHz ..... 20mH minimum

**B7077-02**  
 Number of turns ..... 200±5  
 DCR ..... 4.5Ω  
 Inductance @1KHz ..... 80mH minimum

**B7077-03**  
 Number of turns ..... 50±1  
 DCR ..... 0.5Ω  
 Inductance @1KHz ..... 5mH minimum

Size (All Models):  
 Diameter ..... 0.67 inches (17mm)  
 Height ..... 0.80 inches (20.3mm)  
 Thickness ..... 0.38 inches (9.7mm)

## High Endurance Custom Magnetics Applied To Isolated DC-DC Converters



### Input Inductor

Part No. B3111-01

An example of a toroidal inductor with excellent energy storage capacity designed for use as an input filter inductor in a switching power supply.

Environmentally sealed and shock resistant, this inductor may be bolted onto a printed circuit board through a center mounting hole.



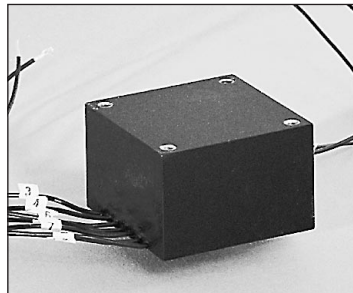
#### Typical Specifications:

Nominal Inductance ..... 450 $\mu$ H@3.6A  
 Operating Frequency ..... 100KHz  
 Waveshape:  
 Voltage across inductor:100KHz squarewave  
 Positive value equal to input voltage, 40-90V.  
 Negative value equal to output voltage,  
 95-115V, minus input voltage.  
 Duty Cycle ..... 0.5-6.1 $\mu$ sec.  
 Input Current ..... 3.6Adc max.  
 Output Current ..... 1.8Adc max.  
 Inductance ..... 450 $\mu$ H $\pm$ 10%@3.6Adc  
 DC Resistance ..... 0.33  
 Hi-Pot (Leakage Current>500 $\mu$ A) ..... 300V, 60 sec.  
 Overload .... 112% max rated current load for 8 hrs.  
 Thermal Shock ..... 1 hr @-55 $^{\circ}$ C, 1 hr @+85 $^{\circ}$ C  
 Size:  
 Diameter ..... 1.5-inches (38mm)  
 Height ..... 1-inch (25.4 mm)

### Switchmode Transformer

Part No. B8494-01

An example of a switchmode isolation transformer designed for Hi-Rel and long life. Note the specification defining Corona and Hi-Pot. The transformer is environmentally sealed and cast in epoxy and contains an electrostatic shield.



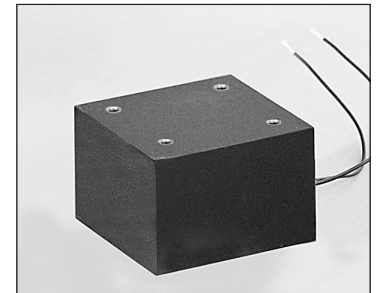
#### Typical Specifications

Nominal Peak to Peak Input ..... 200Vdc  
 Secondary Windings(CenterTapped): ...+5Vdc,  $\pm$ 22Vdc  
 Winding Currents @50% ..... 6A, 3.5A  
 Output Power ..... 70W  
 Operating Frequency ..... 25KHz  $\pm$ 10%  
 Inductance:  
 Primary ..... 8.6 $\mu$ H  
 Leakage ..... 115 $\mu$ H max.  
 Magnetizing Current @ 20Vrms, 25KHz .. 27mA max.  
 Regulation ..... User circuit/system dependant  
 DC Resistance:  
 Primary ..... 0.166 $\Omega$   
 Secondaries ..... 0.041 $\Omega$ , 0.014 $\Omega$   
 Interwinding Capacitance ..... 25pF  
 Corona:  
 Inception ..... >2300Vac  
 Extinction ..... > 2000Vac  
 Hi-Pot (Leakage Current<750 $\mu$ A)  
 Primary ..... 4700V for 60 sec.  
 Secondary ..... 300V for 60 sec.  
 Size:  
 Width ..... 2-inches (50.8mm)  
 Length ..... 2-inches (50.8mm)  
 Height ..... 1.39-inches (35.3mm)

### Output Inductor

Part No. B3414-01

A second example of a toroidal inductor, this time designed for use as an output filter inductor in a switching power supply.



#### Typical Specifications:

Nominal Inductance ..... 2.3mH @5A  
 Operating Frequency ..... 20KHz  
 Input Current ..... 5Adc (average)  
 Output Current ..... 5Adc max.  
 Inductance ..... 2.3mH $\pm$ 10% @5Adc  
 DC Resistance ..... 0.08 $\Omega$   
 Hi-Pot ..... 300V for 60 sec.  
 Overload .... 112% max. rated current load for 8 hrs  
 Thermal Shock ..... 1hr,-55 $^{\circ}$ C, 1hr +85 $^{\circ}$ C  
 Size:  
 Width ..... 2.5-inches (63.5mm)  
 Length ..... 2.5-inches (63.5mm)  
 Height ..... 1.87-inches (47.6mm)  
 Mounting:  
 Four 6-32 threaded inserts, 1.62-inches (41.3mm)  
 square pattern



# Long Term Reliability by Design



**Have your High Isolation Voltage Magnetics been designed with Corona in mind?**

**Will your products see premature failure due to Corona?**

**Do you know your supplier's capability to supply reliable transformers?**

Bicron's **High Isolation Voltage Magnetics** are designed, manufactured and tested to ensure moisture and vibration resistance, heat dissipation, and insulation integrity.

However, it is Bicron's Corona testing experience that clearly distinguishes Bicron's capability from others.

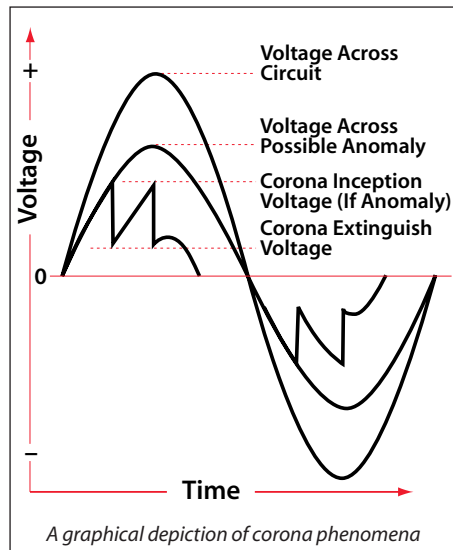
## **Partial Discharge (Corona) Testing:**

Partial discharge, as defined by ASTM, is a "type of localized discharge resulting from transient gaseous ionization in an insulation system when the voltage stress exceeds a critical value."

The partial discharge (Corona) level has a pronounced effect on the life of the transformer.

As the voltage stress is increased, anomalies in the insulation system will result in partial discharge or Corona inception. As the voltage stress is reduced, Corona extinction will occur.

The partial discharge cycle repeats rapidly during the operation of the coil. The excess energy dissipated during these repeating cycles causes deterioration of the insulation system resulting in premature failure of the coil.



*A graphical depiction of corona phenomena*

Corona testing requires specialized equipment and cannot be performed with standard dielectric or induced voltage testers.

**Bicron has over 30 years of experience in assuring product reliability through a combination of advanced design, carefully controlled manufacturing methods, and state-of-the-art product testing.**

Partial discharge (Corona) can be minimized by choosing a supplier skilled in Corona abatement that has very extensive design experience, repeatable manufacturing processes, and the proper test equipment and procedures to measure Corona inception and extinction levels.

**Here are three of the most important tests Bicron commonly applies to verify high performance in magnetic components:**

### **1) Applied Voltage or Dielectric Test**

A high voltage AC or DC test voltage is applied between the windings, and from the windings to ground. The test is designed to verify the adequacy of the system in terms of coupling capacitance (AC) or resistance (DC).

### **2) Induced Voltage Test**

The Induced Voltage Test reveals defects that might eventually result in a shorted turn and excessive excitation current. This test is important when winding layers are not insulated.

### **3) Partial Discharge (Corona) Test**

The partial discharge test is a nondestructive method of identifying the potential for premature insulation breakdown. The test is capable of detecting small defects in the insulation system that could lead to catastrophic transformer failure. (See Partial Discharge (Corona) Testing).



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