HIGH ENERGY DEVICES LLC

SIG Series
Spark Gaps

Features
- Tight DC breakdown voltage during millions of discharges
- Operation at –65°C to +125°C with minimal change of DC breakdown
- Rugged Kovar and borosilicate glass construction
- Mil-Std shock and vibration certified
- Hermetically sealed design provides maximum integrity under extreme environmental conditions

Applications
- Ignition systems for aircraft starting cycle for capacitor discharge type exciters
- Gas fired igniters for commercial and industrial furnaces
- Pulse generators for single pulse and cycle timed applications
- Capacitor discharge ignition systems for jet engines
- Energy transfer for LASER applications

Description
The Spark Igniter Gap (SIG) Series of hermetically sealed gas discharge tubes are made for extended life applications where high reliability of constant breakdown voltage is needed. Special materials have been used for enhanced electron emission to provide millions of discharges with DC breakdown remaining within tight rated limits. Spark gaps with DC breakdown voltage in the range of 2.0 - 4.0kV are standard. All devices are bipolar and mounting in either direction is optional.

Ordering Information
A complete part number is represented by the digits below. Breakdown voltages are expressed in kV. Examples:
SIG2.0-10 is a 2kV SIG series device with outline 1 and threaded recess terminations on both ends.
SIG3.0-11 is a 3kV SIG series device with outline 1 and anode cap and threaded recess terminations.
SIG4.0-12 is a 4kV SIG series device with outline 1 and anode cap terminations on both ends.

Standard Voltages

Series	DC Breakdown Voltage (Nom)	Unit
SIG	2.0	kV
	3.0	kV
	4.0	kV

Devices in the SIG Series with other breakdown voltages are available upon request.

Product Series/ Part Number	Breakdown Voltage	Outline	Termination Option
SIGX.X-YZ	2.0 – 4.0kV	1	0, 1, 2

Termination Options:
0: Threaded recess
1: One anode cap;
One threaded recess
2: Two anode caps

All spark gaps are available with a .360 O.D. x .406 long end caps and/or #6 – 32 x .375 max threaded recess.

Specifications (@ 25°C)

Parameter	Conditions	Symbol	SIG2.0			SIG3.0			Units
			Min	Nom	Max	Min	Nom	Max	
Device Specifications									
DC Breakdown	100V/s	VBD	1.8	2.0	2.2	2.7	3.0	3.3	kV
Impulse Breakdown	7.0kV/µs	Vbd			5.0			5.0	kV
Insulation Resistance	100Vdc	IR	1,000			1,000			MΩ
Capacitance	1MHz	C			4			4	pF
Life Ratings									
Number of Life Shots	2.4mC/shot	N		1×10^7			1×10^7		Shots
Cumulative Charge Transfer During Life	3.6 Joules @ 3 pps	Q		24,000			24,000		Coulombs

Environmental Ratings

Parameter	Test Specifications
Shock Mil-Std-202	Test at 30 g's,11ms half sine waveform Method 213, Condition J
Vibration Mil-Std-202	Test at 10g's at 10-500Hz Method 204, Condition A
High and Low Temperature	Test at -65°C to +125°C for normal pulse life operation for 96 hours with DC breakdown contained within specified limits

Specifications (@ 25°C)

Parameter	Conditions	Symbol	SIG4.0			Units
			Min	Nom	Max	
DC Breakdown	100V/s	VBD	3.6	4.0	4.4	kV
Impulse Breakdown	7.0kV/µs	Vbd			5.0	kV
Insulation Resistance	100Vdc	IR	1,000			MΩ
Capacitance	1MHz	C			4	pF
Life Ratings						
Number of Life Shots	2.4mC/shot	N		1×10^7		Shots
Cumulative Charge Transfer During Life	3.6 Joules @ 3 pps	Q		24,000		Coulombs

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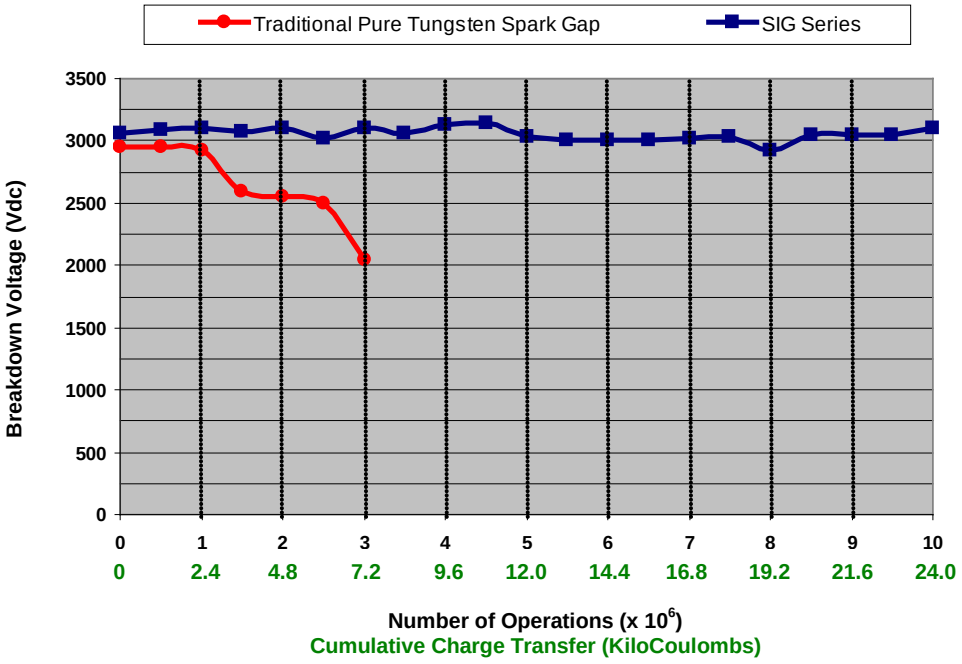
Figure 1

DC Breakdown as a Function of the Number of Operations
SIG Series Spark Gap vs. Traditional Pure Tungsten Spark Gap

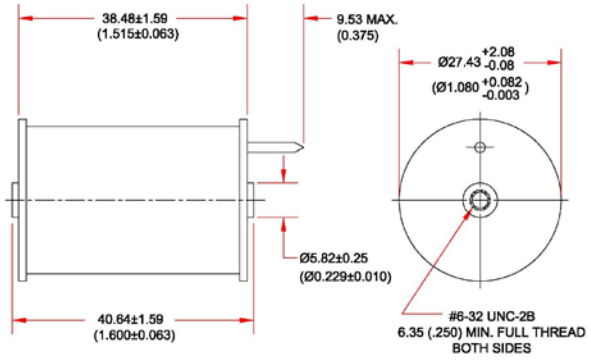


Note:
All spark gaps have been operated at energy levels of 3.6 Joules at 3 pps under 1/3 on/off cycle conditions.

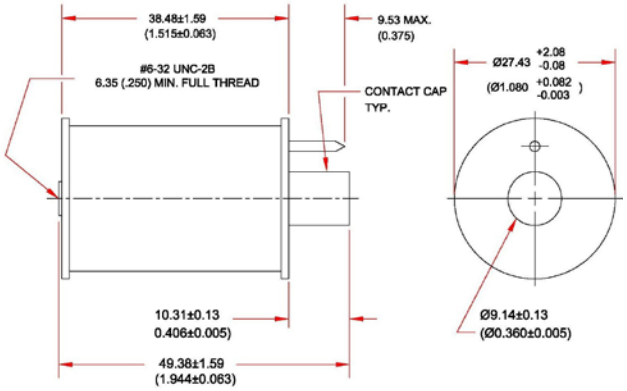
- The SIG Series Spark Gap was operated for 10 million shots with a total charge transfer of 24,000 coulombs. The breakdown voltage remained relatively constant at 3,000V and the insulation resistance measured greater than 1,000 MΩ.
- The Traditional Spark Gap (using the SIG Series configuration and pure Tungsten electrodes) was removed from test after operation of three (3) million shots with a total charge transfer of 7,200 coulombs due to rapid drop in DC breakdown voltage and IR levels less than 1,000 MΩ.

MECHANICAL DIMENSIONS
mm (inches)

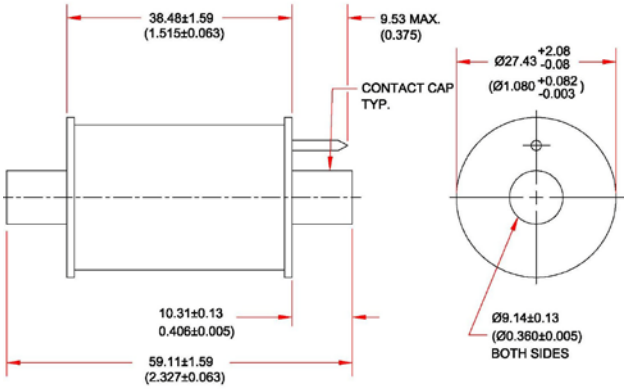
SIGX.X-10



SIGX.X-11



SIGX.X-12



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