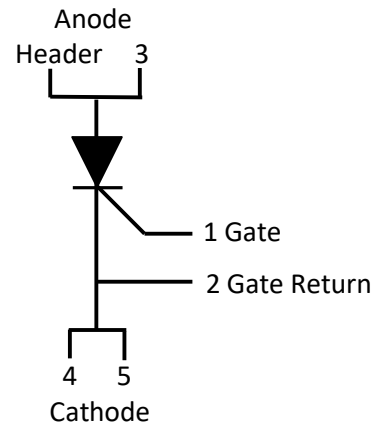
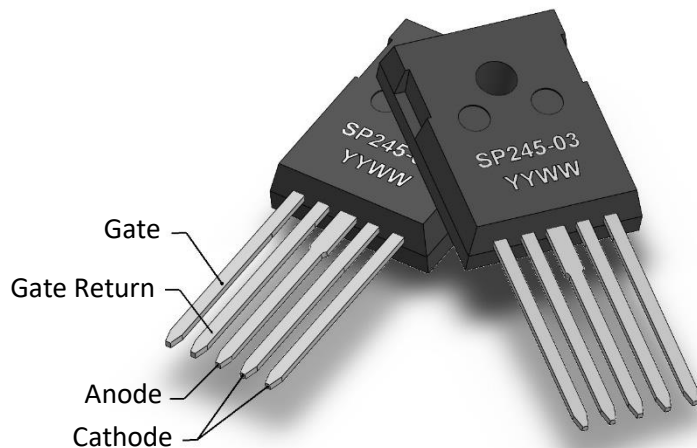


## SP245-03

# Solidtron™ Solid State Initiator Firing Switch, TO-247

**NOTICE:** This product is export controlled



### Description

The **Solidtron™ SP245-03** is an advanced high-voltage current-controlled thyristor packaged in a **JEDEC TO-247 (5L)** package.

Like all Solidtron™ products, the internal semiconductor employs high cell density and an advanced termination design to achieve high peak current capability, low conduction loss, low off-state leakage, negligible turn-on delay jitter, and most importantly, extremely high turn-on di/dt capability. It is ideally suited for a wide variety of capacitor discharge applications requiring precise timing and rapid energy transfer capability.

The JEDEC TO-247 (5L) package is an industry standard package in which the semiconductor is attached to a copper header utilizing 92.5Pb/5Sn/2.5Ag solder. The top of the chip is joined to the appropriate leads using a combination of 0.005" and 0.010" aluminum wire bonds. It is then molded with Hysol MG15F-0140 compound and its leads are tinned with 63Sn/10Pb solder.

The SP245-03 is intended to replace triggered spark gaps of similar voltage and current ratings.

### Features

- 1400V Repetitive Off-State Voltage
- VGK = 0V = OFF-STATE
- 100 kA/μs di/dt capability
- Low Turn-on Delay Time
- Low Conduction Loss
- 3.5kA Repetitive Surge Current

### Applications

- LEEFI detonators
- Electronic Safe and Arm Devices
- Ignition Safety Devices
- Firing Modules
- Capacitor Discharge Units

# Solidtron™ SP245-01

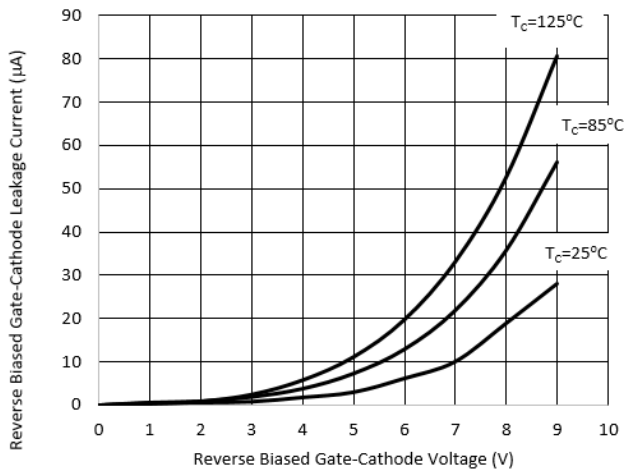
**Table 1 Maximum Ratings**

	Symbol	Value	Units
Repetitive Peak Off-State Voltage	$V_{DRM}$	1500	V
Repetitive Peak Reverse Voltage	$V_{RRM}$	-10	V
Off-State Rate of Change of Voltage Immunity ( $V_D=1500V$ )	$dv/dt$	1000	V/ $\mu$ Sec
Peak Non-Repetitive Surge Current (1/2 Sinusoid Pulse Duration =/ $<300nSec$ )	$I_{TSM}$	4000	A
Peak Repetitive Surge Current (1/2 Sinusoid Pulse Duration =/ $<300nSec$ )	$I_{TRM}$	3500	A
Rate of Change of Current	$di/dt$	100	kA/ $\mu$ Sec
Critical Capacitor Discharge Event Integral (Underdamped LCR Circuit)	$I^2t_{CRITICAL}$	TBD	A <sup>2</sup> sec
Repetitive Capacitor Discharge Event Integral (Underdamped LCR Circuit)	$I^2t_{REPETITIVE}$	2	A <sup>2</sup> sec
Continuous Gate-Cathode Reverse Voltage	$V_{GKS}$	-9	V
Forward Peak Gate Current (10 $\mu$ Sec Duration)	$I_{GM}$	10	A
Required Off-State Gate-Cathode Voltage	$V_{GDM}$	0	V
Operating Junction Temperature Range	$T_J$	-55 to +125	°C
Maximum Soldering Installation Temperature (See Moisture Sensitivity Caution)		220	°C
Storage Temperature Range (See Moisture Sensitivity & Solderability Cautions)		-55 to +150	°C

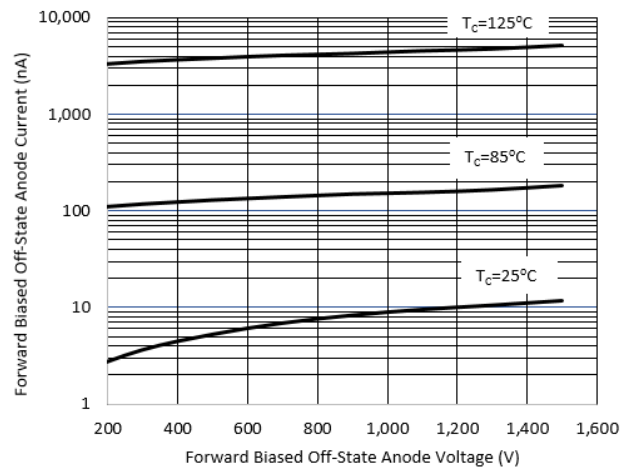
**Table 2 Electrical Characteristics**

Parameter	Symbol	Test Conditions	Measurements				
			Min	Typ	Max	Units	
Anode to Cathode Breakdown Voltage	$V_{BR}$	$V_{GK}= 0V, I_D=100\mu A, T_C \leq 125^\circ C$	1400			V	
Anode-Cathode Forward Off-State Current <i>See Figure 2.</i>	$I_{DRM}$	$V_{GK}= 0V, V_D=1500V$	$T_C=-55^\circ C$		60	nA	
			$T_C=25^\circ C$		11	100	nA
			$T_C=85^\circ C$		180	1000	nA
			$T_C=125^\circ C$		5	10	$\mu A$
Reverse Bias Gate-Cathode Breakdown Voltage	$V_{GRRM}$	$I_{GM}=150\mu A, T_C \leq 125^\circ C$	9	10		V	
Nine Volt Reverse Bias Gate-Cathode Leakage Current <i>See Figure 1.</i>	$I_{GM}$	$V_{GK}= -9V$	$T_C=25^\circ C$		28	$\mu A$	
			$T_C=85^\circ C$		57	$\mu A$	
			$T_C=125^\circ C$		80	$\mu A$	
Two Volt Reverse Bias Gate-Cathode Leakage Current <i>See Figure 1.</i>	$I_{GM}$	$V_{GK}= -2V$	$T_C=25^\circ C$		0.8	2	$\mu A$
			$T_C=85^\circ C$		1.9	4	$\mu A$
			$T_C=125^\circ C$		2.4	6	$\mu A$
Gate Trigger Voltage	$V_{GT}$	$V_D= 12V, I_D=1mA$	$T_C=25^\circ C$	450	500		mV
			$T_C=85^\circ C$	250	350		mV
			$T_C=125^\circ C$	200	250		mV
Gate Trigger Current	$I_{GT}$	$V_D= 12V, I_D=1mA, T_C \leq 125^\circ C$			100	$\mu A$	
Turn-on Delay Time	$t_{d(ON)}$	0.15 $\mu F$ Capacitor Discharge, $T_C=25^\circ C, I_{GT}= 500mA,$ $V_{DD}=1200V, L_S=15nH,$ $R_S=0.010\Omega=CVR$		30	60	nSec	
Rate of Change of Current	$di/dt$			65		kA/ $\mu$ sec	
Capacitor Discharge Event Integral	$I^2t$			1.38		A <sup>2</sup> sec	
Peak Anode Current	$I_{DM}$			3.2		kA	

# Solidtron™ SP245-01



**Figure 1** Typical Reverse Biased Gate-Cathode Leakage Characteristic



**Figure 2** Typical Forward Biased Off-State Anode-Cathode Leakage Characteristic

## Usage

The Gate Return lead provides a dedicated connection directly to the cathode of the semiconductor die. This connection consists of a single 0.005" aluminum wire bond. Although it is not mandatory that the Gate Return lead be used as an independent gate return path, its use in this fashion may reduce  $V=L \cdot di/dt$  induced stress on the gate driver components. **CAUTION: Due to the small diameter of its internal bond connection, using PIN 2 as an additional cathode connection is highly discouraged.**

## ESD Sensitivity

The **SP245-03** has been tested IAW MIL-STD-883 ESD-HBM (Human Body Model) to +/-2000V (Class 1C).

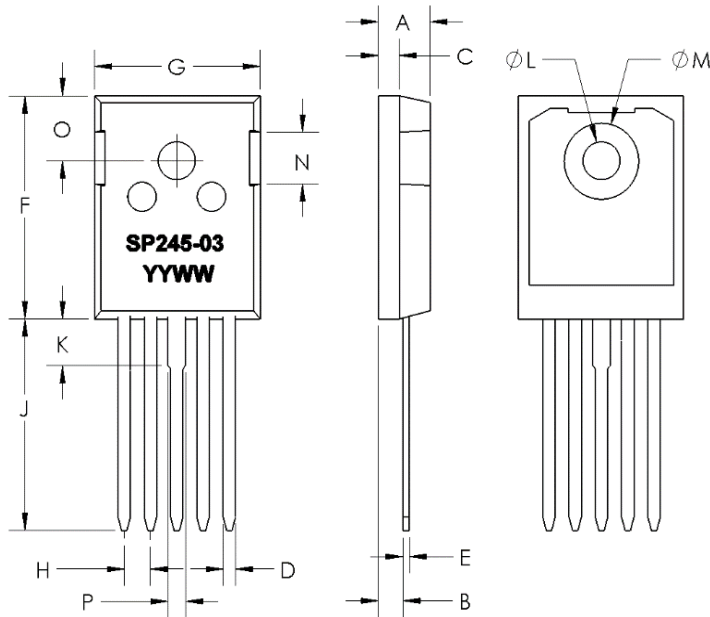
The **SP245-03** has been tested IAW ANSI/ESDA/JEDEC/JS-002-2014 for ESD-CDM (Charged Device Model) to +/-1500V (Class C5).

## Solderability

The leads of the **SP245-03** are tinned with 63Sn-37Pb solder. Please note that PbSn solder is subject to oxidation growth; however, at a slower rate than the underlying nickel plated leads. Conventional handling and storage practices associated with components having 63Sn-37Pb tinned leads may be applied.

# Solidtron™ SP245-01

## Markings and Dimensions



### DIMENSIONS ARE IN INCHES

DIMENSION	MIN.	MAX.
A	0.185	0.209
B	0.087	0.102
C	0.059	0.098
D	0.04	0.055
E	0.016	0.031
F	0.819	0.845
G	0.62	0.64
H	0.096	0.104
J	0.78	0.8
K	0.167	0.177
L	0.138	0.144
M		0.291
N	0.17	0.216
O	0.242	
P	0.065	0.07

### PART NUMBER

SP = SOLIDTRON™ PRODUCT  
 245 = CHIP TYPE  
 -03 = PACKAGE TYPE

### DATE CODE

YY = LAST 2 DIGITS OF CALENDAR YEAR  
 WW = WORK WEEK

## About Excelitas Technologies

Excelitas Technologies® is a photonics technology leader focused on delivering innovative, high-performance, market-driven solutions to meet the lighting, optronics, detection and optical technology needs of our OEM customers. Serving a vast array of applications across biomedical, scientific, safety, security, consumer products, semiconductor, industrial manufacturing, defense and aerospace sectors, Excelitas stands committed to enabling our customers' success in their end-markets. Our photonics team consists of 7,000 professionals working across North America, Europe and Asia, to serve our customers worldwide.

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