

NOTICE: This product is export controlled

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

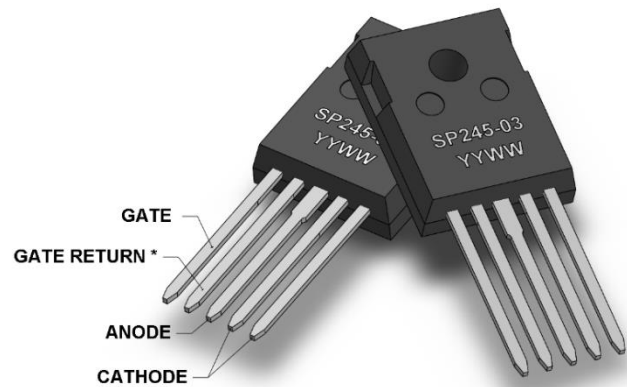
Like all Solidtron products, the internal semiconductor employs high cell density and an advanced high voltage termination design to achieve high peak current capability, low conduction loss, low off-state leakage, negligible turn-on delay jitter, and high turn-on dI/dt capability. It is ideally suited 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** replaces the SMCTAA32N14A10. Like its predecessor, it is intended to replace triggered spark gaps of similar voltage and current ratings.

Key Product Features

- 1400V Repetitive Off-State Voltage
- $V_{GK} = 0V = OFF$
- 100 kA/ μs dI/dt capability
- Low Turn-on and Conduction Losses
- < 100nSec Turn-on Delay Time
- 3.5kA Repetitive Surge Current



*The **Gate Return** lead provides a dedicated connection directly to the cathode of the semiconductor die. Internally, this connection consists of a single 0.005" aluminum bond wire.

Although it is not mandatory with CCS Devices that the Gate return lead be used as an independent gate driver return path, its use in this fashion may reduce $V=L*dI/dt$ induced stress on other gate driver components.

Due to the small diameter of its internal wire bond connection, using this pin (pin2) as an additional cathode connection is highly discouraged.

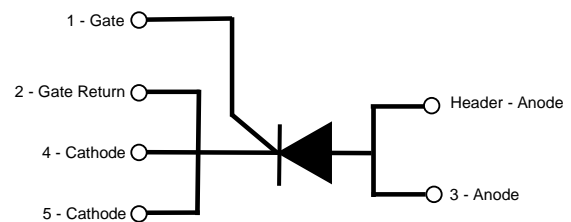


Table 1. Maximum Ratings

	Symbol	Value	Units
Repetitive Peak Off-State Voltage (Note 1.)	V_{DRM}	1400	V
Repetitive Peak Reverse Voltage	V_{RRM}	-10	V
Off-State Rate of Change of Voltage Immunity ($V_D=1400V$)	dv/dt	1000	V/ μ 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/ μ Sec
Repetitive Capacitor Discharge Event Integral (Underdamped LCR Circuit) (Note 2.)	$I^2t_{REPETITIVE}$	2.0	A ² sec
Critical Capacitor Discharge Event Integral (Underdamped LCR Circuit) (Note 2.)	$I^2t_{CRITICAL}$	TBD	A ² sec
Continuous Gate-Cathode Reverse Voltage	V_{GKS}	-9	V
Forward Peak Gate Current (10 μ 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	$^{\circ}C$
Maximum Soldering Installation Temperature		220	$^{\circ}C$
Storage Temperature Range (See Moisture Sensitivity & Solderability Cautions)		-55 to +150	$^{\circ}C$

Note 1. Repetitive Peak Off-State Voltage rating is limited by the external lead clearance of this package

Note 2. See Application Notes

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}	$V_{GK} = 0V, V_D = 1400V$	$T_C = -55^\circ C$		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	μA
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	μA	
			$T_C = 85^\circ C$		57	μA	
			$T_C = 125^\circ C$		80	μA	
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	μA	
			$T_C = 85^\circ C$		1.9	μA	
			$T_C = 125^\circ C$		2.4	μA	
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	μA	
Turn-on Delay Time	$t_{d(ON)}$	0.15 μF Capacitor Discharge,		30	60	nSec	
Rate of Change of Current	dI/dt	$T_C = 25^\circ C, I_{GT} = 500mA,$		65		$kA/\mu sec$	
Capacitor Discharge Event Integral	I^2t	$V_{DD} = 1200V, L_S = 15nH,$		1.38		A^2sec	
Peak Anode Current	I_{DM}	$R_S = 0.010\Omega = CVR$		3.2		kA	

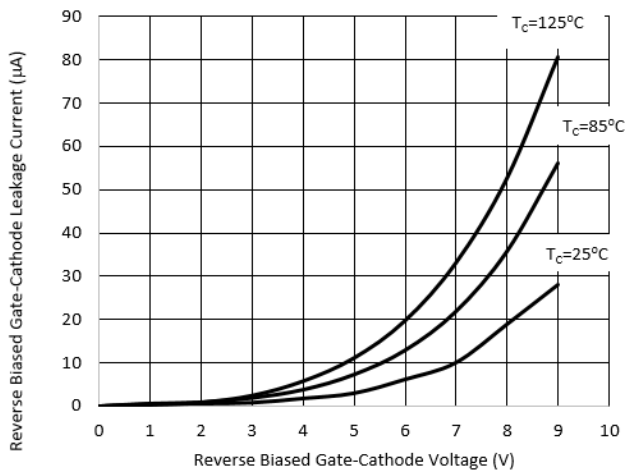


Figure 1. Typical Reverse Biased Gate-Cathode Leakage Characteristic

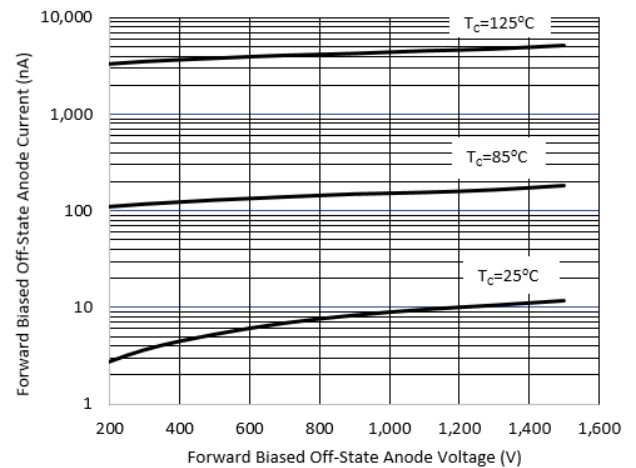


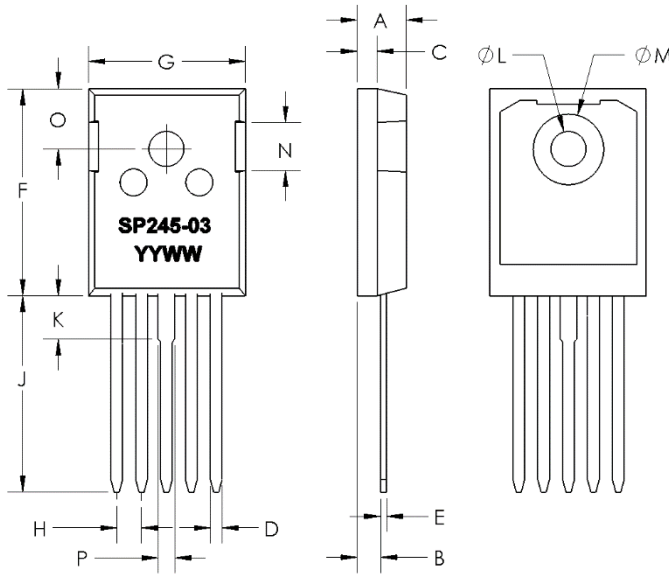
Figure 2. Typical Forward Biased Off-State Anode-Cathode Leakage Characteristic

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)**.

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 = SILICON POWER
245 = CHIP TYPE
-03 = PACKAGE TYPE

DATE CODE

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

Ordering Information

Be certain to specify the complete part number and description listed in Table 3. when requesting a quotation or placing an order.

Table 3. Ordering Information

Part Number	Description	Qty per Tube
SP245-03	Solid State Initiator Firing Switch, TO-247 5L, 63Sn-37Pb lead finish	30

Application Notes

Available

- [Triggering a Current Controlled Solidtron \(CCS\) Device](#)

Under Development

- Gate Driver designs for the CCS Device
 - Suggested Circuits & Critical Layout Considerations
- Capacitor Discharge Event Integral (i^2t)

Table 4. Typical Application Parameters

	Value	Units
Off-State Anode Voltage (<1 hour)	1250	V
Repetitive Peak Forward Anode Current (1/2 Cycle Pulse Width = 160nSec)	2.7	kA
Repetitive Peak Reverse Anode Current (1/2 Cycle Pulse Width = 160nSec)	2.2	kA
Off-State Rate of Change of Voltage (dv/dt) immunity	≤200	V/mSec
Operational Case Temperature	-55 to 85	°C
Rate of Change of Anode Current (dI/dt)	65	kA/μSec
Peak Forward Gate Current (≤20uSec pulse)	500	mA
Event Repetition Rate	<1	Hz



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End users of this product shall comply with all applicable DOD, ITAR, EAR, USML laws and regulations.