

SP245-03

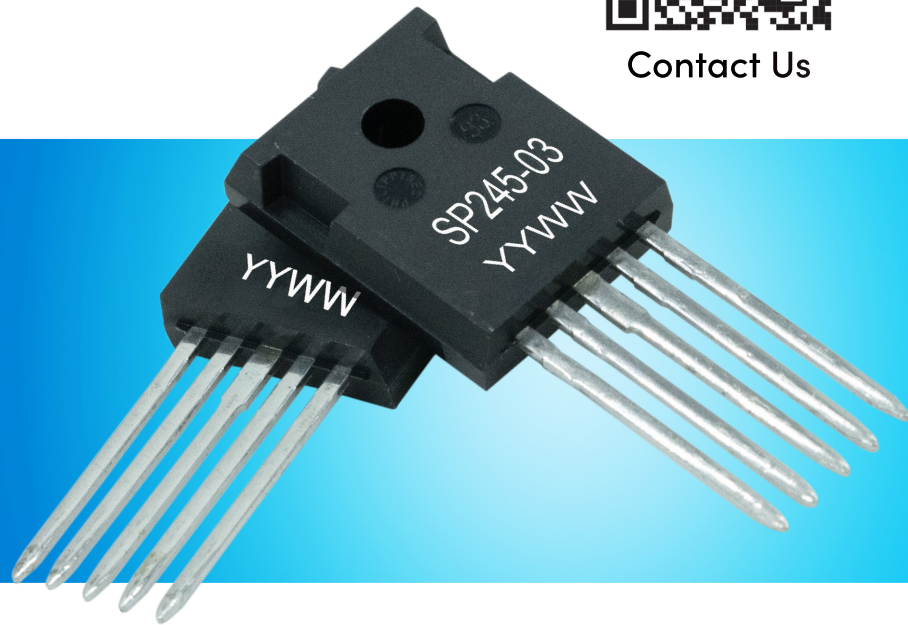
Solidtron™ Solid State Initiator
Switch, TO-247 (5L)



Contact Us

High-Speed Solid State Switching for Capacitor Discharge Systems

EXPORT CLASSIFICATION: ECCN 3A001.g



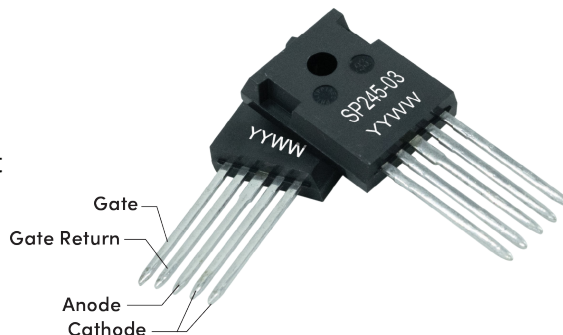
The Solidtron™ SP245-03 is an advanced high-voltage current-controlled thyristor packaged in a JEDEC TO-247 (5L) package. Like all Solidtron™ products, the internal semiconductor employs high cell density and an advanced termination design to achieve high peak current capability, low conduction loss, 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
- $V_{GK} = 0V = \text{OFF-STATE}$
- 100 kA/ μs di/dt capability
- Low Turn-on Delay Time
- Low Conduction Loss
- 3.5kA Repetitive Surge Current
- High current density
- Simple gate triggering



Applications

- Capacitive Discharge Circuits
- Solid State Surge Protection
- Ignition Circuits

Teledyne Energetics

Aerospace & Defense Electronics

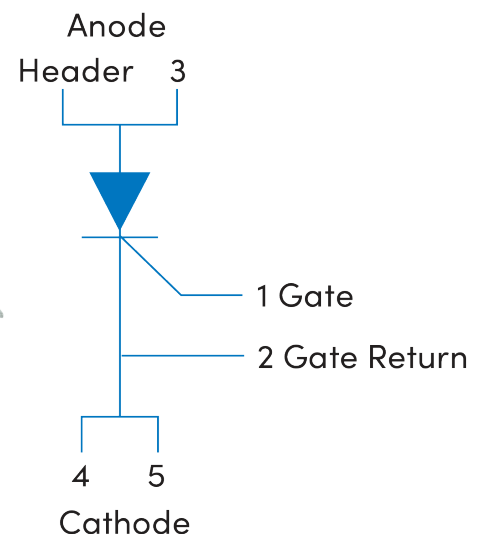


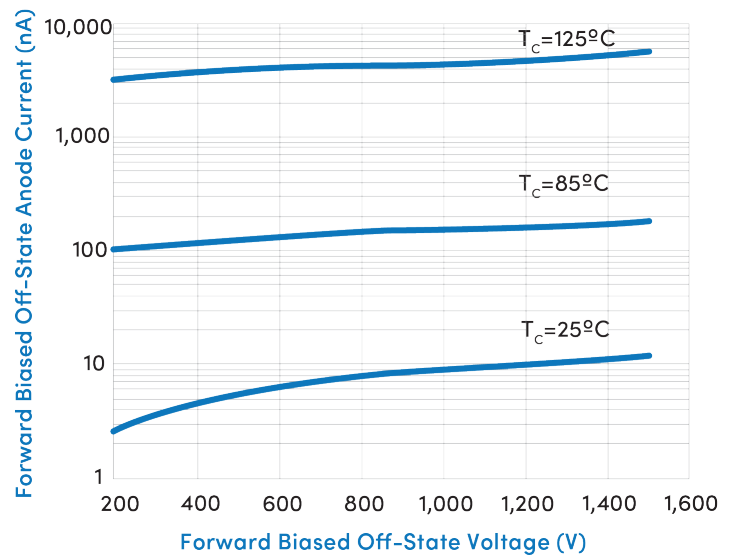
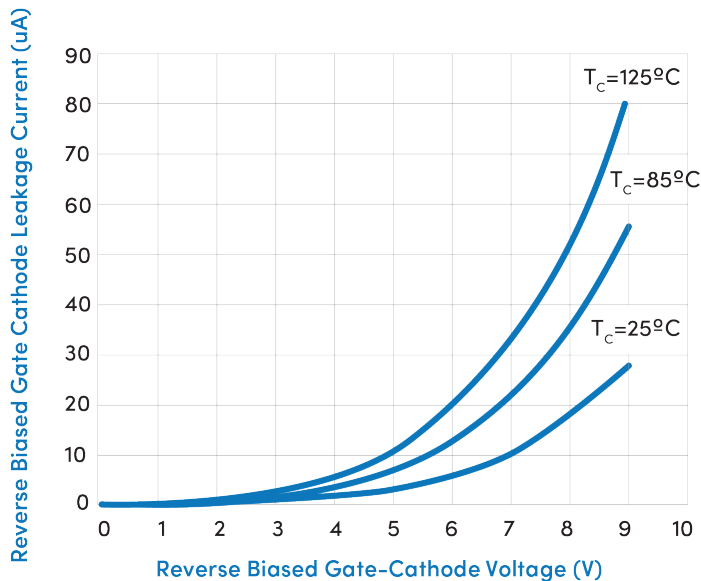
Table 1 Maximum Ratings

	Symbol	Value	Units
Repetitive Peak Off-State Voltage	V_{DRM}	1400	V
Repetitive Peak Reverse Voltage	V_{RRM}	-10	V
Off-State Rate of Change of Voltage Immunity ($V_D=1500V$)	dv/dt	1000	V/ μ Sec
Peak Non-Repetitive Surge Current (1/2 Sinusoid Pulse Duration $\leq 300nSec$)	I_{TSM}	4000	A
Peak Repetitive Surge Current (1/2 Sinusoid Pulse Duration $\leq 300nSec$)	I_{TRM}	3500	A
Rate of Change of Current	di/dt	100	kA/ μ Sec
Repetitive Capacitor Discharge Event Integral (Underdamped LCR Circuit)	$I^2t_{REPETITIVE}$	2	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	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

Measurements							
Parameter	Symbol	Test Conditions		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 (See Figure 2)	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	μA
			$T_c = 125^\circ C$		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 (See Figure 1)	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 (See Figure 1)	I_{GM}	$V_{GK} = -2V$	$T_c = 25^\circ C$		0.8	2	μA
			$T_c = 85^\circ C$		1.9	4	μA
			$T_c = 125^\circ C$		2.4	6	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 μ F Capacitor Discharge, $T_c=25^\circ\text{C}$, $I_{GT}=500\text{mA}$, $V_{DD}=1200\text{V}$, $L_S=15\text{nH}$, $R_S=0.01\ \Omega=\text{CVR}$		30	60	nSec
Rate of Change of Current	di/dt			65		kA / μsec
Capacitor Discharge Event Integral	I^2t			1.38		A ² sec
Peak Anode Current	I_{DM}			3.2		kA



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

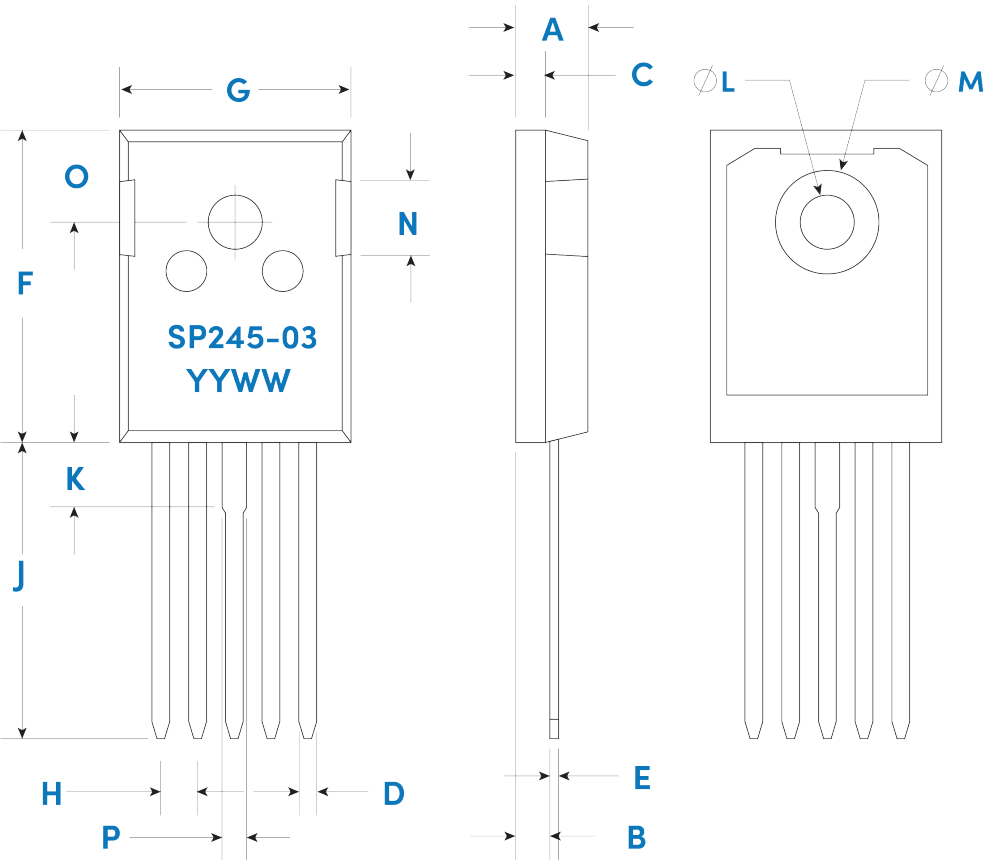
The SP245-03 has been tested IAW MIL-STD-883 ESD-HBM (Human Body Model) to +/-2000V (Class 1C).

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.

Markings & Dimensions (inches)



Part Number

SP = Solidtron™ Product
245 = Chip Type
-03 = Package Type

Date Code

YY = Last 2 Digits of Calendar Year
WW = Work Week

Dimension	Min.	Max.
A	0.185	0.209
B	0.187	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