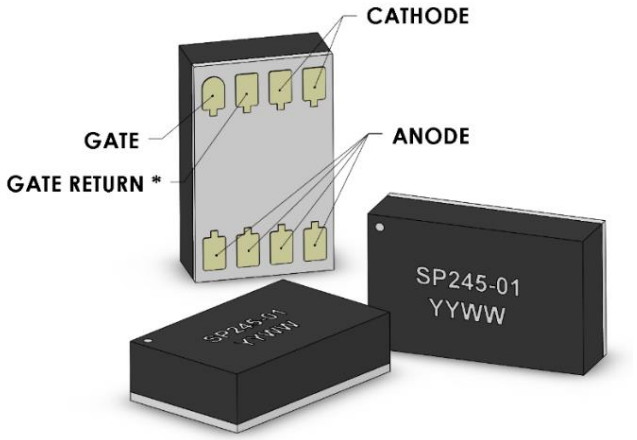
***NOTICE:* This product is export controlled**

The **SP245-01** is an advanced high-voltage current-controlled thyristor packaged in a **C-Pak** SMT package. The **SP245-01T** is identical to the SP245-01 with the exception that its pads have been robotically tinned with 63Sn37Pb solder prior to final testing.

Like all Solidtron products, the internal semiconductor employs high cell density and an advanced planer 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 **C-Pak** is a custom surface mount package in which the semiconductor is attached to a metalized ceramic substrate using 90Pb10Sn solder, wire bonded using 0.010" aluminum wire bonds, and then encapsulated using Hysol FP4653 epoxy. The **C-Pak** is specifically designed to be compliant with IPC 2221A Section 6.3 Electrical Clearance (any elevation).

The **SP245-01** is intended to replace triggered spark gaps of similar voltage and current ratings.



The **Gate Return pad provides a dedicated connection directly to the cathode of the semiconductor die. This connection consists of a single 0.010" aluminum bond wire.*

*Using the Gate Return pad as an independent gate driver return path reduces V=L*dI/dt induced stress on the gate driver components.*

With C-Pak Solidtron devices, the Gate Return pad may, alternatively, be used as an additional Cathode pad; however, its internal connection possesses only 40% of the I²t capability of each of the other Cathode pads. Using it in this fashion must be qualified by the customer for their specific application.

Key Product Features

- 1500V 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

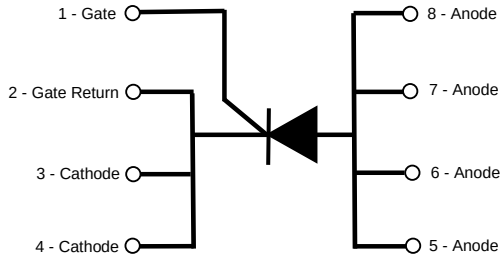


Table 1. Maximum Ratings	Symbol	Value	Units
Repetitive Peak Off-State Voltage	V_{DRM}	1500	V
Repetitive Peak Reverse Voltage	V_{RRM}	-10	V
Off-State Rate of Change of Voltage Immunity (V_D=1500V)	dv/dt	1000	V/µSec
Peak Non-Repetitive Surge Current (1/2 Sinusoid Pulse Duration =/<300nSec)	I_{TSM}	4000	A
Peak Repetitive Surge Current (1/2 Sinusoid Pulse Duration =/<300nSec)	I_{TRM}	3500	A
Rate of Change of Current	dI/dt	100	kA/µSec
Critical Capacitor Discharge Event Integral (Underdamped LCR Circuit) (Note 1.)	$I^2t_{CRITICAL}$	TBD	A^2sec
Repetitive Capacitor Discharge Event Integral (Underdamped LCR Circuit) (Note 1.)	$I^2t_{REPETITIVE}$	2	A^2sec
Continuous Gate-Cathode Reverse Voltage	V_{GKS}	-9	V
Forward Peak Gate Current (10µSec 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

Note 1. Unique characteristic associated with initiator firing – 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=100µA, $T_C \leq 125°C$		1500			V
Anode-Cathode Forward Off-State Current *See Figure 2.*	I_{DRM}	V_{GK}= 0V, V_D=1500V	T_C=-55°C			60	nA
			T_C=25°C		10	100	nA
			T_C=85°C		190	1000	nA
			T_C=125°C		5	10	µA
Reverse Bias Gate-Cathode Breakdown Voltage	V_{GRRM}	I_{GM}=150µA, $T_C \leq 125°C$		9	10		V
Nine Volt Reverse Bias Gate-Cathode Leakage Current *See Figure 1.*	I_{GM}	V_{GK}= -9V	T_C=25°C		28		µA
			T_C=85°C		57		µA
			T_C=125°C		80		µA
Two Volt Reverse Bias Gate-Cathode Leakage Current *See Figure 1.*	I_{GM}	V_{GK}= -2V	T_C=25°C		0.8	2	µA
			T_C=85°C		1.9	4	µA
			T_C=125°C		2.4	6	µA
Gate Trigger Voltage	V_{GT}	V_D= 12V, I_D=1mA	T_C=25°C	450	500		mV
			T_C=85°C	250	350		mV
			T_C=125°C	200	250		mV
Gate Trigger Current	I_{GT}	V_D= 12V, I_D=1mA, $T_C \leq 125°C$				100	µA
Turn-on Delay Time	$t_{d(ON)}$	0.15µF Capacitor Discharge, T_C=25°C, I_{GT}= 500mA, V_{DD}=1200V, L_S=15nH, R_S=0.010Ω=CVR			30	60	nSec
Rate of Change of Current	dI/dt				65		kA/µsec
Capacitor Discharge Event Integral	I^2t				1.38		A^2sec
Peak Anode Current	I_{DM}				3.2		kA

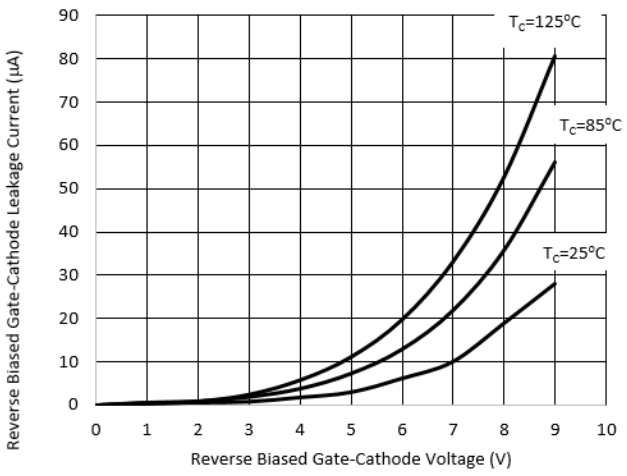


Figure 1. Typical Reverse Biased Gate-Cathode Leakage Characteristic

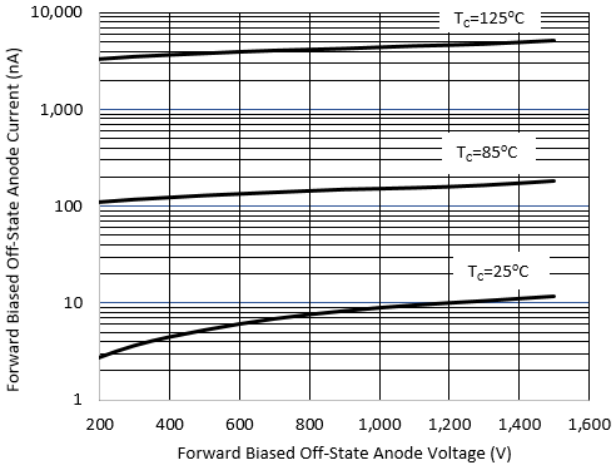


Figure 2. Typical Forward Biased Off-State Anode-Cathode Leakage Characteristic

ESD Sensitivity

The **SP245-01/SP245-01T** have been tested IAW **MIL-STD-883 ESD-HBM (Human Body Model) to +/-2000V (Class 1C).**

The **SP245-01/SP245-01T** have been tested IAW **ANSI/ESDA/JEDEC/JS-002-2014 for ESD-CDM (Charged Device Model) to +/-1500V (Class C5).**

Moisture Sensitivity

The **SP245-01/SP245-01T** have been tested IAW **IPC/JEDEC J-STD-020** and are classified as **MSL Level 5A.**

In accordance with **IPC/JEDEC J-STD-033**, **C-Pak** products are dry-baked then packed in a Moisture Barrier Bag (MBB) containing desiccant and a Humidity Indicator Card (HIC). When the Moisture Barrier Bag is opened or compromised refer to **IPC/JEDEC J-STD-033** for proper HIC interpretation, floor life and storage procedures.

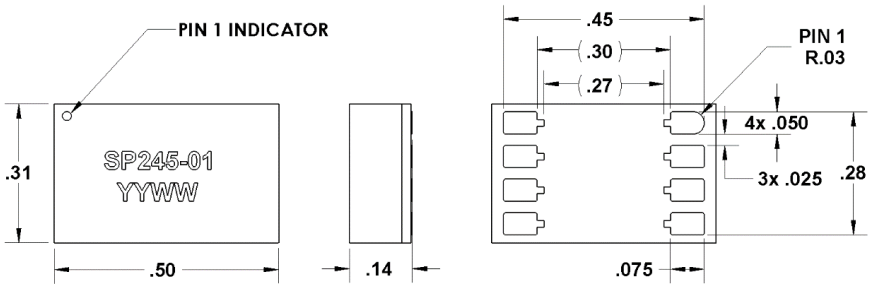
Although **IPC/JEDEC J-STD-033** prescribes specific dry-baking temperatures and times, caution is advised as additional baking of **C-Pak** SMD packages may cause oxidation and/or intermetallic growth of the terminations which may result in solderability problems during board installation. The temperature and time for baking this SMD package should, therefore, be limited with solderability considerations in mind. If available, it is recommended C-Paks be baked in a nitrogen or vacuum oven to limit exposure to oxygen during the baking process.

Solderability

The component pads of the **C-Pak**, *although gold plated*, **are subject to oxidation** of the underlying nickel if handled or stored inappropriately**.** Prolonged exposure to circumstances known to promote nickel oxidation should be avoided; otherwise, solderability of the **C-Pak** will be compromised.

SP245-01T – Prior to final electrical testing, the component pads of the **SP245-01T** are **robotically tinned with 63Sn–37Pb solder**. Thickness and coverage is in accordance with **MIL-PRF-38535**. Please note that PbSn solder is also subject to oxidation growth; however, at a slower rate than the underlying nickel. Conventional handling and storage practices associated with components having 63Sn-37Pb tinned leads may be applied.

Markings and Dimensions



DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS OTHERWISE NOTED:
TWO PLACE DECIMAL +/- 0.010"
THREE PLACE DECIMAL +/- 0.004"

PART NUMBER
SP = SILICON POWER
245 = CHIP TYPE
-01 = PACKAGE TYPE

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

NOTE: The **"T"** in Part Number SP205-01T **WILL NOT** be ink marked on the plastic package of the component itself. The presence of solder on its pads, rather than gold plating, is the only differentiating characteristic between the SP245-01 and the SP245-01T. Shipping trays, Moisture Barrier Bags and other packing labels WILL include the "T" as the final digit of the Part Number.

Ordering Information

The **SP245-01** and **SP245-01T** are priced differently and are subject to different lead times. 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 Tray
SP245-01	Solid State Initiator Firing Switch, C-Pak, Ni/Au pad finish	40
SP245-01T	Solid State Initiator Firing Switch, C-Pak, 63Sn-37Pb pad finish	40

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