

## Description

The SMXXC is a bi-directional TVS diode array, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting sensitive semiconductor components from damage. The SMXXC complies with the IEC 61000-4-2 (ESD) with  $\pm 30\text{kV}$  air and  $\pm 30\text{kV}$  contact discharge. It is assembled into a lead-free SOT-23 package. It is designed to protect components which are connected to data and transmission lines from voltage surges.

## Features

- 300W peak pulse power (8/20 $\mu\text{s}$ )
- Protects two bi-directional lines
- Ultra low leakage: nA level
- Operating voltage: 3.3V, 5V, 12V, 15V, 24V, 32V, 36V
- Low clamping voltage
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge:  $\pm 30\text{kV}$
    - Contact discharge:  $\pm 30\text{kV}$
- RoHS Compliant

## Mechanical Characteristics

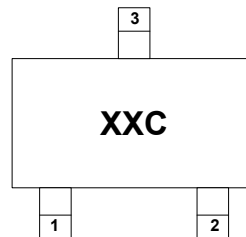
- Package: SOT-23
- Lead Finish: Matte Tin
- Case Material: "Green" Molding Compound.
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

- Cellular Handsets and Accessories
- Notebooks and Handhelds
- Portable Instrumentation
- Set Top Box
- Industrial Controls
- Server and Desktop PC

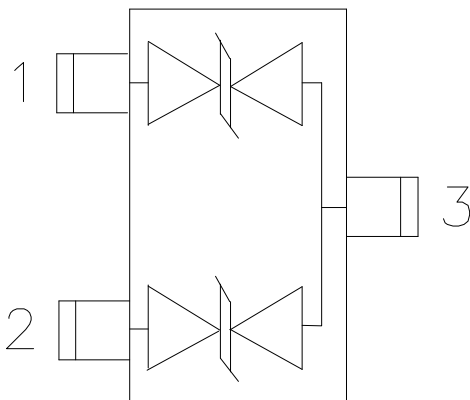
## Marking Information

XXC = Device Marking



Part Number	Marking
SM33C	33C
SM05C	05C
SM12C	12C
SM15C	15C
SM24C	24M
SM32C	32C
SM36C	36C

## Dimensions and Pin Configuration



Circuit and Pin Schematic

## Ordering Information

Part Number	Packaging	Reel Size
SMXXC	3000/Tape & Reel	7 inch

**Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$  unless otherwise specified)**

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 $\mu\text{s}$ )	Ppk	300	W
ESD per IEC 61000-4-2 (Air)	VESD	$\pm 30$	kV
ESD per IEC 61000-4-2 (Contact)		$\pm 30$	
Operating Temperature Range	TJ	-55 to +125	$^\circ\text{C}$
Storage Temperature Range	Tstg	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics ( $T_A=25^\circ\text{C}$  unless otherwise specified)**

<b>SM33C</b>						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			3.3	V	
Breakdown Voltage	VBR	3.8			V	IT = 1mA
Reverse Leakage Current	IR			1.0	$\mu\text{A}$	VRWM = 3.3V
Clamping Voltage	VC			6	V	I <sub>PP</sub> = 1A (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	VC			12	V	I <sub>PP</sub> = 25A (8 x 20 $\mu\text{s}$ pulse)
Peak Pulse Current	I <sub>PP</sub>			25	A	t <sub>p</sub> = 8/20 $\mu\text{s}$
Junction Capacitance	CJ			100	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

<b>SM05C</b>						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			5	V	
Breakdown Voltage	VBR	6			V	IT = 1mA
Reverse Leakage Current	IR			1.0	$\mu\text{A}$	VRWM = 5V
Clamping Voltage	VC			8	V	I <sub>PP</sub> = 1A (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	VC			15	V	I <sub>PP</sub> = 20A (8 x 20 $\mu\text{s}$ pulse)
Peak Pulse Current	I <sub>PP</sub>			20	A	t <sub>p</sub> = 8/20 $\mu\text{s}$
Junction Capacitance	CJ			80	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

<b>SM12C</b>						
<b>Parameter</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>	<b>Test Condition</b>
Reverse Working Voltage	VRWM			12	V	
Breakdown Voltage	VBR	13.3			V	IT = 1mA
Reverse Leakage Current	IR			0.5	μA	VRWM = 12V
Clamping Voltage	VC			18	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			25	V	I <sub>PP</sub> = 12A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			12	A	t <sub>p</sub> = 8/20μs
Junction Capacitance	C <sub>J</sub>			50	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

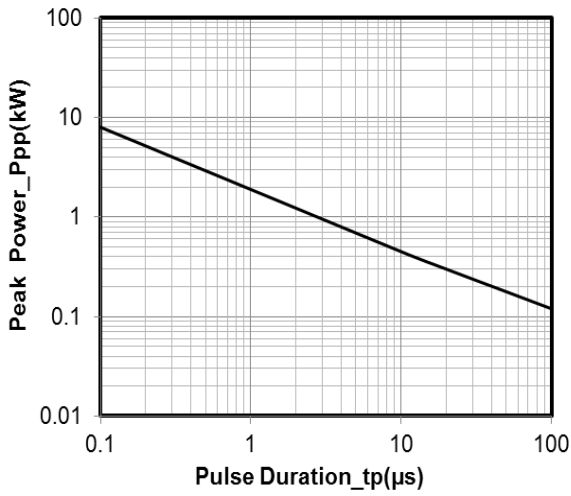
<b>SM15C</b>						
<b>Parameter</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>	<b>Test Condition</b>
Reverse Working Voltage	VRWM			15	V	
Breakdown Voltage	VBR	16.7			V	IT = 1mA
Reverse Leakage Current	IR			0.5	μA	VRWM = 15V
Clamping Voltage	VC			20	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			37.5	V	I <sub>PP</sub> = 8A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			8	A	t <sub>p</sub> = 8/20μs
Junction Capacitance	C <sub>J</sub>			40	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

<b>SM24C</b>						
<b>Parameter</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>	<b>Test Condition</b>
Reverse Working Voltage	VRWM			24	V	
Breakdown Voltage	VBR	27			V	IT = 1mA
Reverse Leakage Current	IR			0.2	μA	VRWM = 24V
Clamping Voltage	VC			40	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			60	V	I <sub>PP</sub> = 5A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			5	A	t <sub>p</sub> = 8/20μs
Junction Capacitance	C <sub>J</sub>		15	30	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

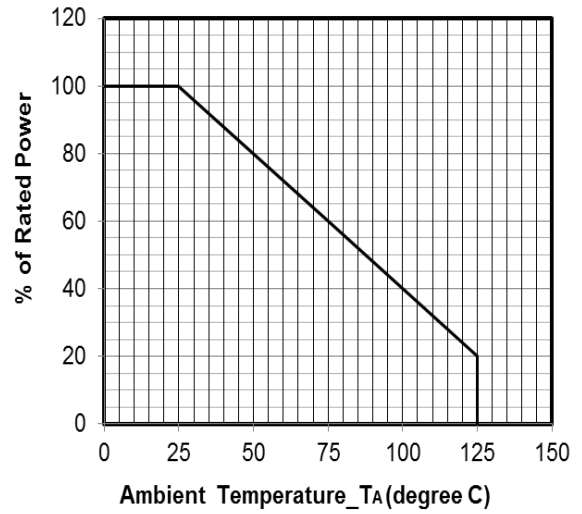
<b>SM32C</b>						
<b>Parameter</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>	<b>Test Condition</b>
Reverse Working Voltage	VRWM			32	V	
Breakdown Voltage	VBR	35.6			V	IT = 1mA
Reverse Leakage Current	IR			0.2	μA	VRWM = 36V
Clamping Voltage	VC			45	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			67	V	I <sub>PP</sub> = 4.5A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			4	A	t <sub>p</sub> = 8/20μs
Junction Capacitance	C <sub>J</sub>		15	25	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

<b>SM36C</b>						
<b>Parameter</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>	<b>Test Condition</b>
Reverse Working Voltage	VRWM			36	V	
Breakdown Voltage	VBR	38			V	IT = 1mA
Reverse Leakage Current	IR			0.2	μA	VRWM = 36V
Clamping Voltage	VC			50	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			75	V	I <sub>PP</sub> = 4A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			4	A	t <sub>p</sub> = 8/20μs
Junction Capacitance	C <sub>J</sub>		12	20	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3

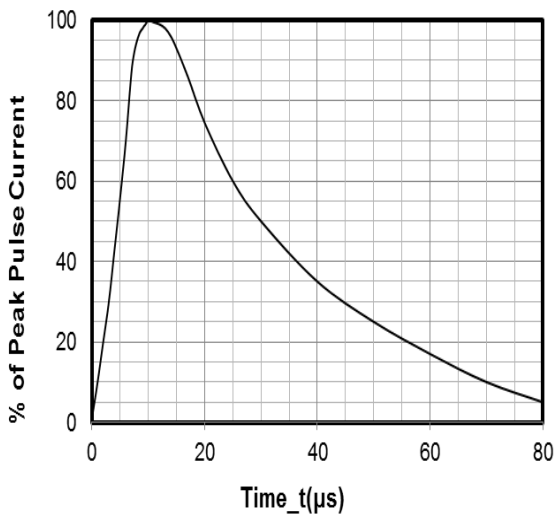
**Typical Performance Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise Specified)**



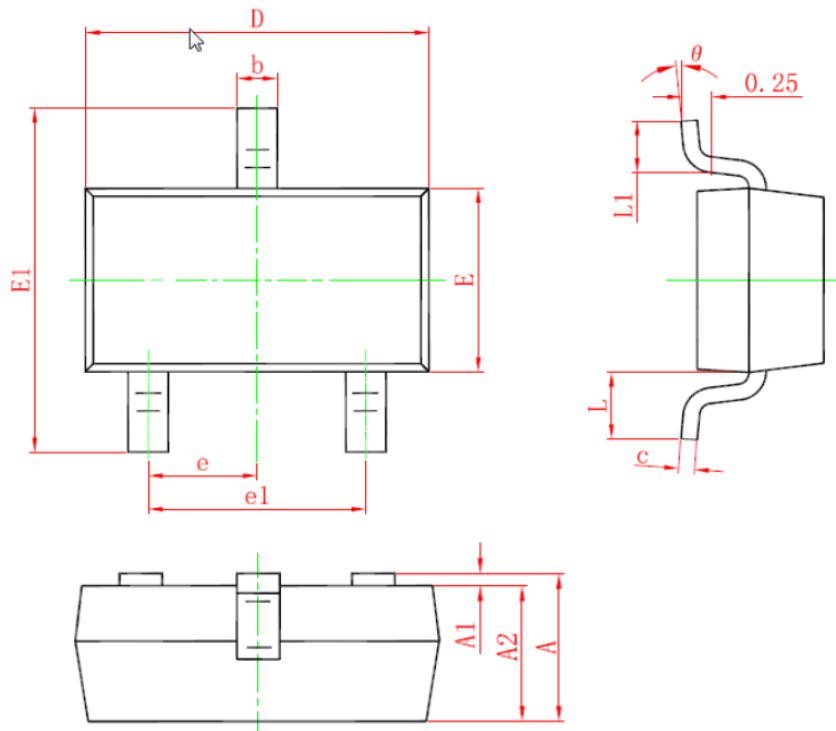
**Peak Pulse Power vs. Pulse Time**



**Power Derating Curve**

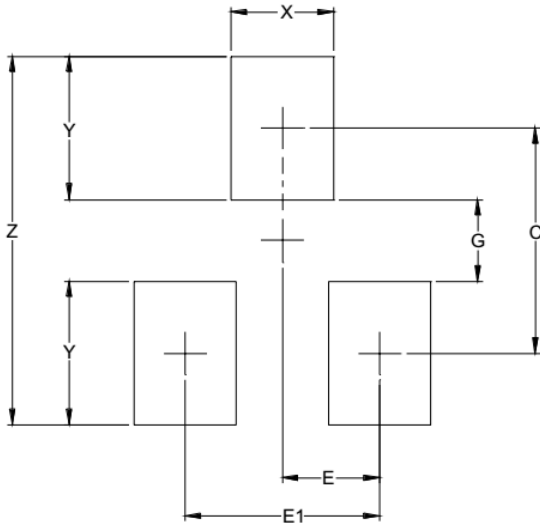


**8 X 20μs Pulse Waveform**

**SOT-23 Package Outline Drawing**


SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	--	1.15	0.035	--	0.045
A1	0.00	--	0.10	0.000	--	0.004
A2	0.90	--	1.05	0.035	--	0.041
b	0.30	--	0.50	0.012	--	0.020
c	0.08	--	0.15	0.003	--	0.006
D	2.80	--	3.00	0.110	--	0.118
E	1.20	--	1.40	0.047	--	0.055
E1	2.25	--	2.25	0.089		0.100
e	0.95TYP			0.037TYP		
e1	1.80	--	2.00	0.071	--	0.079
L	0.55REF			0.022REF		
L1	0.30	--	0.50	0.012	--	0.020
$\theta$	0°	--	8°	0°	--	8°

### Suggested Land Pattern



SYM	DIMENSIONS	
	INCHES	MILLIMETERS
C	.087	2.20
E	.037	0.95
E1	.075	1.90
G	.031	0.80
X	.039	1.00
Y	.055	1.40
Z	.141	3.60

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