

### General Description

SY205211AMC is a bi-directional, low-capacitance electrostatic discharge (ESD) and surge protector designed to provide ESD protection for high-speed data interfaces. SY205211AMC is designed to protect against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), ( $\pm 30\text{kV}$  air,  $\pm 30\text{kV}$  contact discharge), IEC 61000-4-5 (surge) (25A, 8/20 $\mu\text{s}$ ).

The combined features of ultra-low capacitance and high ESD robustness make SY205211AMC ideal for applications where arrays are not practical. The low clamping voltage of the SY205211AMC guarantees a minimum stress on the protected IC.

The SY205211AMC is available in a compact SOD-323 package.

### Features

- Transient Protection for High-Speed Data Lines
  - IEC61000-4-2 (ESD)  $\pm 30\text{kV}$  (Air)  $\pm 30\text{kV}$  (Contact)
  - IEC61000-4-5 (Surge) 25A (8/20 $\mu\text{s}$ )
- Low Leakage Current: 0.01 $\mu\text{A}$  @  $V_{\text{RWM}}$  (Typical)
- Working Voltages: 3.3V
- Ultra-Low Capacitance: 0.6pF (Typical)
- Low Clamping Voltage

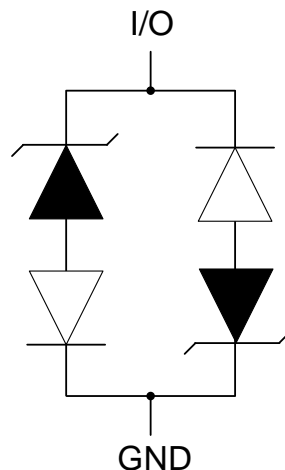
### Applications

- Ethernet - 10/100/1000 Base-T
- Desktops, Servers, and Notebooks
- Mobile Phones
- Portable Instruments
- Analog Inputs
- USB Interface

### Mechanical Characteristics

- SOD-323 Package
- Marking: Device Code, Date Code
- Packaging: Tape and Reel

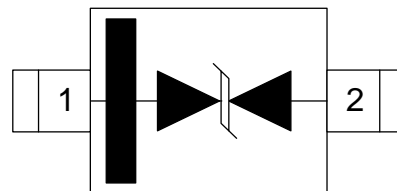
### Circuit Diagram



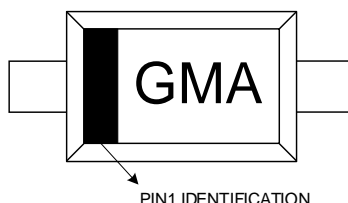
## Ordering Information

Part Number	Package Type	Top Mark
SY205211AMC	SOD-323 RoHS Compliant and Halogen Free	GMA

## Pinout (Top View)



## Marking Codes



**Note 1:** “G” is device code, fixed.

**Note 2:** “MA” is date code.

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
Maximum Peak Pulse Current (8/20 $\mu$ s)	$I_{PP}$		25	A
Maximum Peak Pulse Power (8/20 $\mu$ s)	$P_{PK}$		155	W
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	-30	30	kV
ESD per IEC 61000-4-2 (Contact)				
Operating Temperature	$T_{OPT}$	-40	+125	$^{\circ}$ C
Storage Temperature	$T_{STG}$	-55	+150	$^{\circ}$ C

Electrical Characteristics $T_A = 25^{\circ}$ C						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Nominal Reverse Working Voltage	$V_{RWM}$		-3.3		3.3	V
Reverse Leakage Current @ $V_{RWM}$	$I_R$	$V_{RWM} = 3.3V, T_A = 25^{\circ}$ C Between I/O and GND		0.01	0.1	$\mu$ A
Reverse Breakdown Voltage @ $I_T$	$V_{t1}$	$I_T = 1mA$ Between I/O and GND	3.7			V
Clamping Voltage @ $I_{PP}$	$V_C$ (1)	$I_{PP} = 1A, t_p = 8/20\mu$ s Between I/O and GND		8.0		V
Clamping Voltage @ $I_{PP}$	$V_C$ (1)	$I_{PP} = 25A, t_p = 8/20\mu$ s Between I/O and GND		13.0		V
Clamping Voltage @ $I_{PP}$	$V_C$ (1)	$I_{PP} = 16A, t_p = 10/100ns$ Between I/O and GND		9.0		V
Dynamic Resistance	$R_{DYN}$ (1,2)	$t_p = 10/100ns$ Between I/O and GND		0.25		$\Omega$
Parasitic Capacitance	$C_{ESD}$ (1)	$V_R = 3.3V, f = 1MHz$ Between I/O and GND		0.6		pF

**Note 1:** The device is not guaranteed to function outside its operating conditions.

**Note 2:**  $R_{DYN}$  calculated based on  $I_{PP}=8A$  to  $I_{PP}=16A, t_p = 10/100ns$ .

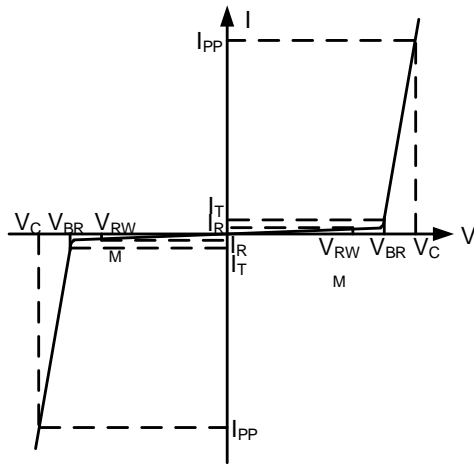
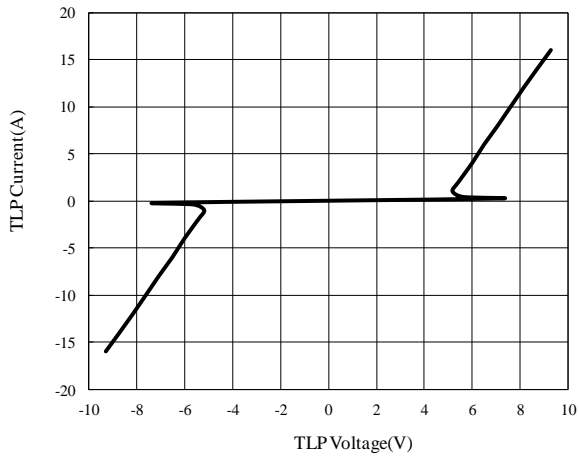


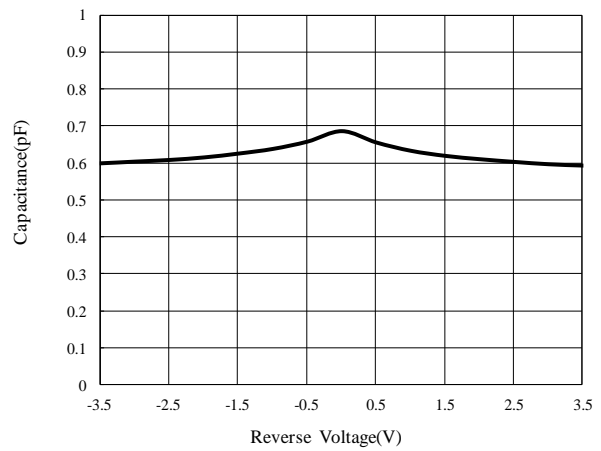
Figure 1. Bi-Directional TVS

## Typical Characteristics

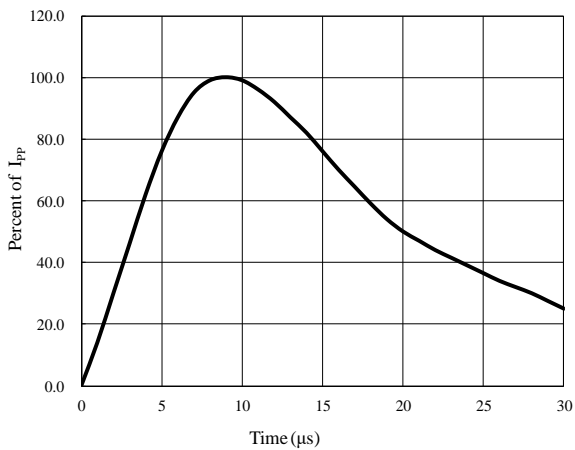
### TLP Testing of I/O to GND



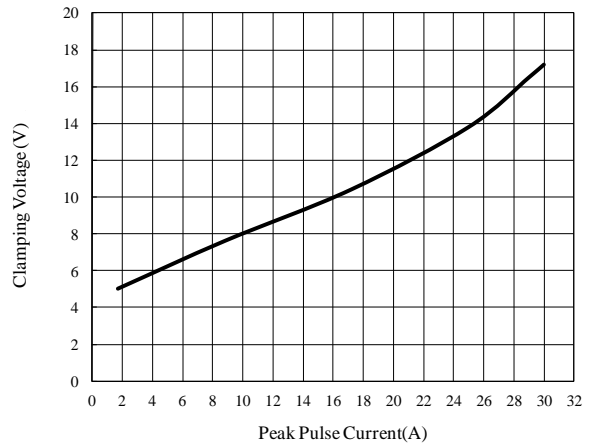
### Capacitance vs. Voltage of I/O to GND



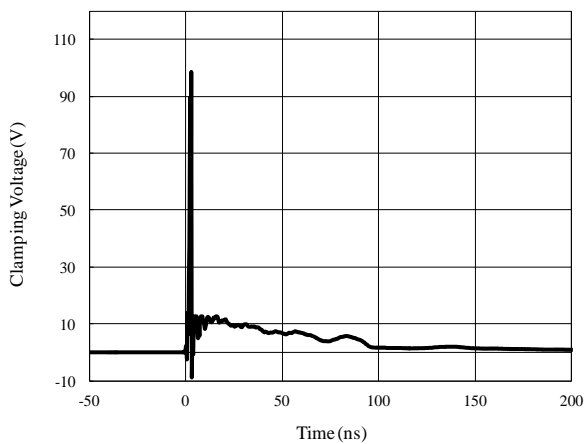
### Pulse Waveform



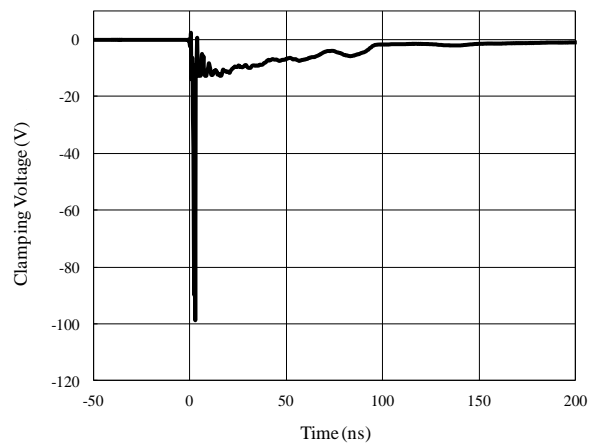
### Clamping Voltage vs. Peak Pulse Current (8/20µs)



### ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)

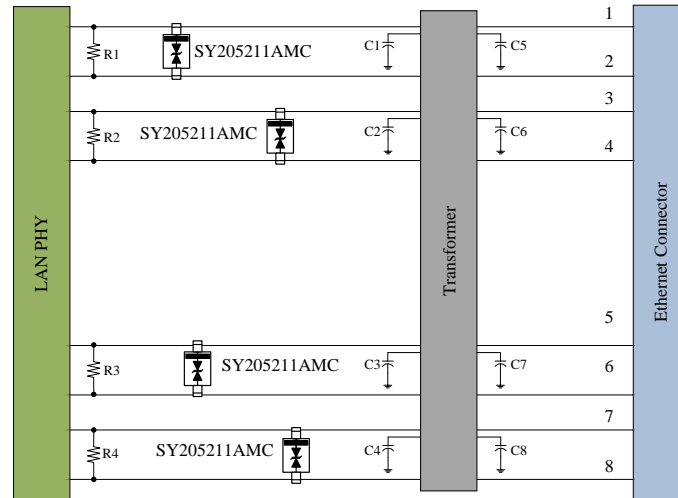


### ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



## Application Information

### Ethernet ESD Protection



**Figure 2. Typical ESD Protection for USB 2.0**

In a typical Ethernet system, each interface port contains a twisted line pair through which differential signals flow. These wires are susceptible to damage caused by transient events including ESD, electrical fast transient (EFT), and lightning strikes. Placing a SY205211AMC device after each transformer can protect against transient damage.

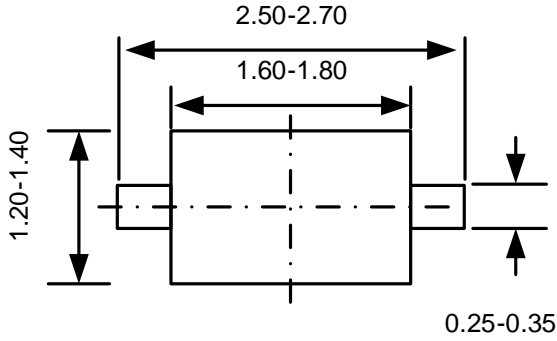
For example, RX- and RX+ are connected to Pin1 and Pin2 respectively. When there is a transient from RX- to RX+, the transient current will be discharged from Pin1 to Pin2 with low impedance. If the transient occurs from RX+ to RX-, the discharged transient current will flow from Pin2 to Pin1. Using SY205211AMC can protect against system damage.

## PCB Layout Guidelines

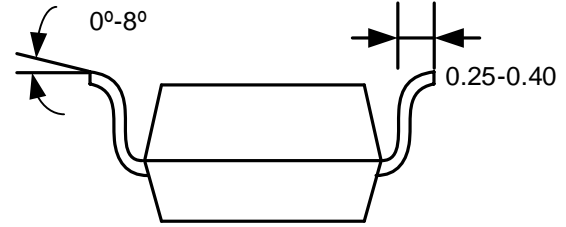
For optimum ESD protection and circuit performance, the following PCB layout guidelines are recommended:

- Place SY205211AMC as close to the connector or terminal ports as possible.
- The distance between the SY205211AMC ground pin and the GND reference path should be as short as possible.
- Use a large via to connect the SY205211AMC pins to the ground.
- Avoid running signals near board edges.
- The SY205211AMC should be placed near the protected lines.

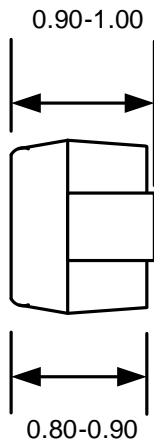
## SOD-323 Package Outline



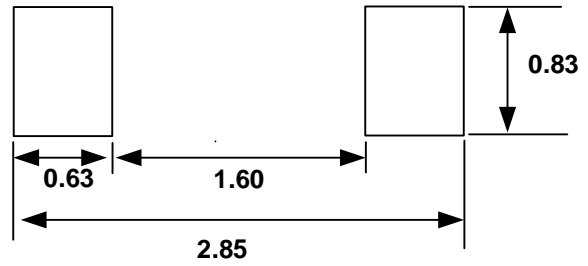
**Top View**



**Side View**



**Side View**

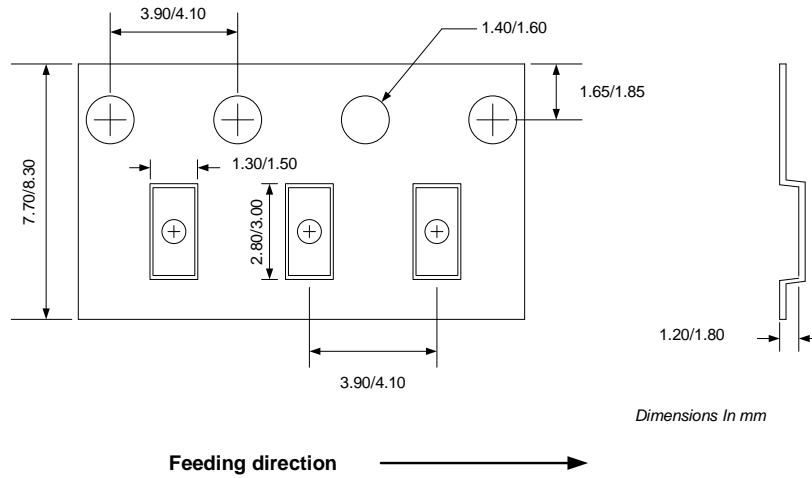


**Recommended PCB Layout  
(Reference only)**

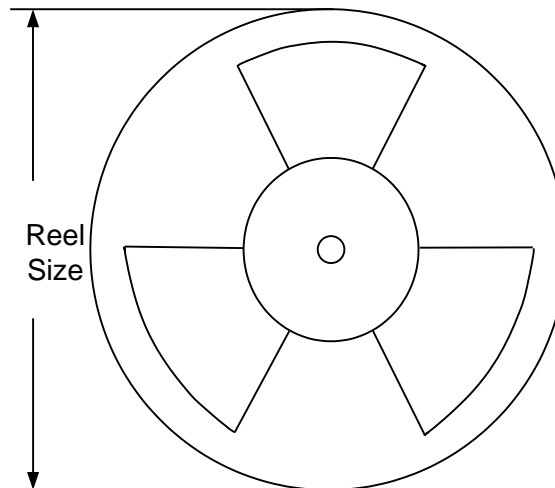
**Note:** All dimensions are in millimeters and exclude mold flash and metal burr.

## Tape and Reel Specification

### SOD-323 Taping Orientation



### Carrier Tape & Reel Specification for Packages



Package Types	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel (pcs)
SOD-323	8	4	7"	3000



## Revision History

The revision history provided is for informational purpose only and is believed to be accurate, however, not warranted. Please make sure that you have the latest revision.

Revision Number	Revision Date	Description	Pages changed
0.9	05/10/2016	Initial Release	
1.0	05/10/2017	Production Release	

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