SY205210DHC

Low Capacitance TVS Protection

General Description

SY205210DHC is a low-capacitance transient voltage suppressor (TVS) array designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 3.0pF, the SY205210DHC is designed to protect against overvoltage and over-current transient events. It complies with IEC 61000-4-2 (ESD) (±30kV air, ±30kV contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50μs), IEC 61000-4-5 (surge) (40A, 8/20μs).

The combined features of low capacitance and high ESD robustness makes SY205210DHC ideal for high-speed data port and high-frequency line (e.g., Gigabit Ethernet ports) applications. The low clamping voltage of the SY205210DHC guarantees a minimum stress on the protected IC. The "flow-through" design minimizes trace inductance and reduces voltage overshoot associated with ESD events.

Each SY205210DHC device can protect two high-speed line pairs. The SY205210DHC is available in a compact DFN3.0×2.0-10 package.

Features

- Transient Protection for High-Speed Data Lines
 - IEC61000-4-2 (ESD) ±30kV (air) ±30kV (contact)
 - IEC61000-4-5 (surge) 40A (8/20µs)
- Package Optimized for High-Speed Lines
- Provides Protection for Two Line Pairs
- Low Capacitance: 3.0pF @ 0V (typical)
- Low Leakage Current: 0.1µA @ V_{RWM} (typical)
- Low Operating and Clamping Voltage

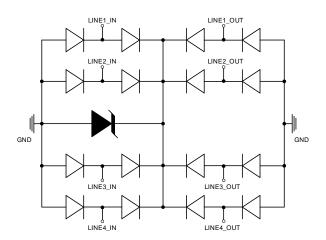
Applications

- 10/100/1000M Ethernet Ports
- WAN/LAN Equipment
- · Desktops, Servers, and Notebooks
- Mobile Phones
- Switching Systems
- Audio/Video Inputs

Mechanical Characteristics

- DFN3.0×2.0-10 Package
- Marking: Device code, Date code
- · Packaging: Tape and Reel

Circuit Diagram

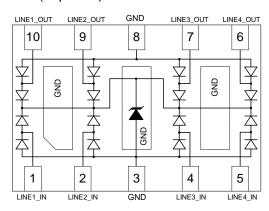




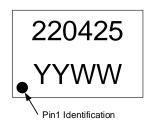
Ordering Information

Part Number	Package Type	Top Mark
SY205210DHC	DFN3.0×2.0-10 RoHS Compliant and Halogen Free	220425YYWW

Pinout (Top View)



Marking Codes



Note 1: "220425" is device code, fixed.

Note 2: "YYWW" is date code.

Absolute Maximum Rating					
Parameter	Symbol	Min	Max	Unit	
Maximum Peak Pulse Current (8/20µs)	I _{PP}		40	Α	
Maximum Peak Pulse Power (8/20µs)	P _{PK}		1000	W	
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	-30	30	kV	
Operating Temperature	Торт	-40	+125	°C	
Storage Temperature	T_{STG}	-55	+150	°C	

Electrical Characteristics T _A = 25°C							
Parameter	Symbol	Test Condition	Min	Тур	Max	Unit	
Nominal Reverse Working Voltage	V_{RWM}				2.5	V	
Reverse Leakage Current @ V _{RWM}	I_R	$V_{RWM} = 2.5V, T = 25^{\circ}C$		0.1	1.0	μΑ	
Reverse Breakdown Voltage @ I _T	V_{BR}	$I_{t1} = 1\mu A$	3.0	3.7	4.5	V	
Forward Voltage @ I _F	V_h	$I_h = 1mA$	3.0		4.0	V	
Clamping Voltage @ IPP	V _C (1)	Any I/O to Ground $I_{PP} = 1A$, $t_p = 8/20\mu s$			4.5	V	
Clamping Voltage @ IPP	Vc (1)	Any I/O to Ground $I_{PP} = 10A$, $t_p = 8/20\mu s$			7.5	V	
Clamping Voltage @ IPP	Vc (1)	Any I/O to Ground $I_{PP} = 25A$, $t_p = 8/20\mu s$			12.0	V	
Clamping Voltage @ IPP	Vc (1)	Line-to-Line/Line-to-GND, two I/O pins connected together on each line.I _{PP} = 40A, t _p = 8/20µs			20.0	V	
Dynamic Resistance	R _{DYN} (1,2)	$t_p = 10/100$ ns From I/O to GND		0.19		Ω	
Parasitic Capacitance	C _{ESD} (1)	Between I/O Pins and Ground V _R = 0V, f = 1MHz		3.0	4.0	pF	
Parasitic Capacitance	C _{ESD} (1)	Between I/O Pins V _R = 0V, f = 1MHz		1.5	2.0	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.

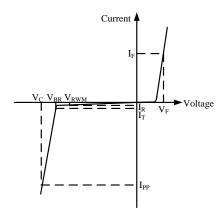
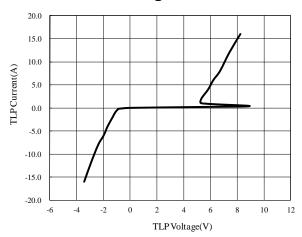


Figure 1. Uni-Directional TVS

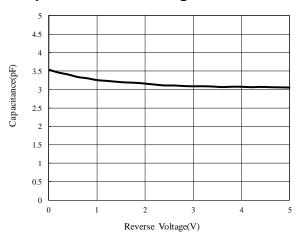


Typical Characteristics

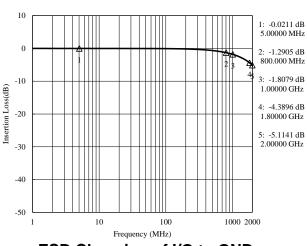
TLP Testing of I/O to GND



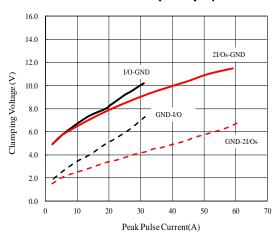
Capacitance vs. Voltage of I/O to GND



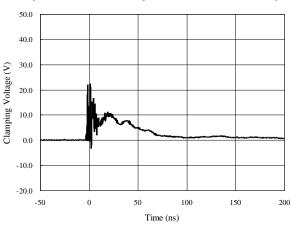
Insertion Loss S21



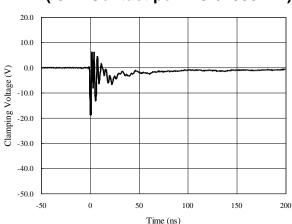
Clamping Voltage vs. Peak Pulse Current (8/20µs)



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

The SY205210DHC is designed to protect equipment from damage caused by transient events including ESD, EFT, and lightning strikes. This device can be connected as shown below to meet the requirements for common-mode and differential-mode protection:

Gigabit Ethernet Protection

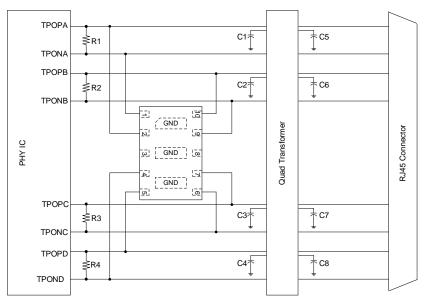


Figure 2. Schematic Diagram for Gigabit Ethernet ESD/Surge Protection using SY205210DHC

Note: Connect Pin3, Pin8 and all GND pins of SY205210DHC to the ground plane.

Gigabit Ethernet Protection (Continued)

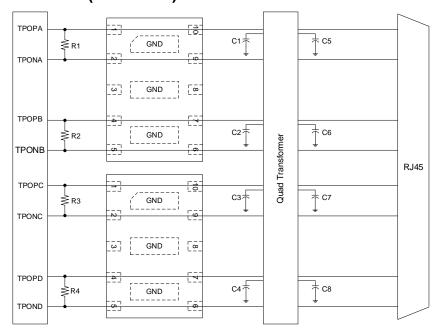
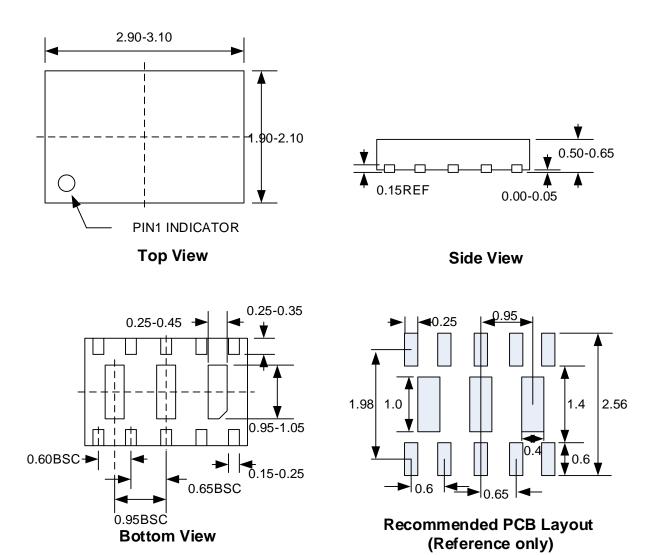


Figure 3. Schematic Diagram for Gigabit Ethernet ESD/Surge Protection using SY205210DHC

Note: Connect Pin3, Pin8 and all GND pins of SY205210DHC to the ground plane.



DFN3.0×2.0-10 Package Outline

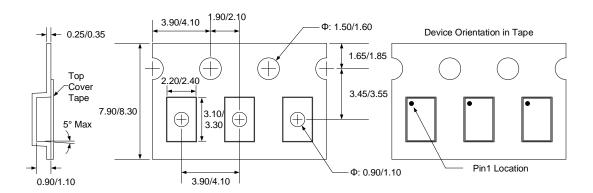


Note: All dimensions are in millimeters and exclude mold flash and metal burr.

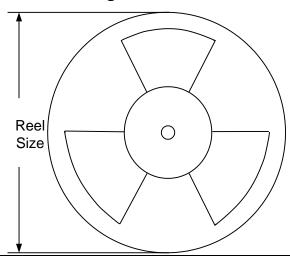


Tape and Reel Specification

DFN3.0×2.0-10 Taping Orientation



Carrier Tape & Reel Specification for Packages



Package Types	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel (pcs)
DFN3.0×2.0-10	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	05/06/2014	Initial Release	
1.0	05/06/2015	Production Release	





IMPORTANT NOTICE

- 1. **Right to make changes.** Silergy and its subsidiaries (hereafter Silergy) reserve the right to change any information published in this document, including but not limited to circuitry, specification and/or product design, manufacturing or descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to Silergy's standard terms and conditions of sale.
- 2. Applications. Application examples that are described herein for any of these products are for illustrative purposes only. Silergy makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Buyers are responsible for the design and operation of their applications and products using Silergy products. Silergy or its subsidiaries assume no liability for any application assistance or designs of customer products. It is customer's sole responsibility to determine whether the Silergy product is suitable and fit for the customer's applications and products planned. To minimize the risks associated with customer's products and applications, customer should provide adequate design and operating safeguards. Customer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Silergy assumes no liability related to any default, damage, costs or problem in the customer's applications or products, or the application or use by customer's third-party buyers. Customer will fully indemnify Silergy, its subsidiaries, and their representatives against any damages arising out of the use of any Silergy components in safety-critical applications. It is also buyers' sole responsibility to warrant and guarantee that any intellectual property rights of a third party are not infringed upon when integrating Silergy products into any application. Silergy assumes no responsibility for any said applications or for any use of any circuitry other than circuitry entirely embodied in a Silergy product.
- 3. **Limited warranty and liability.** Information furnished by Silergy in this document is believed to be accurate and reliable. However, Silergy makes no representation or warranty, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. In no event shall Silergy be liable for any indirect, incidental, punitive, special or consequential damages, including but not limited to lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges, whether or not such damages are based on tort or negligence, warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, Silergy' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Standard Terms and Conditions of Sale of Silergy.
- 4. **Suitability for use.** Customer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of Silergy components in its applications, notwithstanding any applications-related information or support that may be provided by Silergy. Silergy products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Silergy product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Silergy assumes no liability for inclusion and/or use of Silergy products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.
- 5. **Terms and conditions of commercial sale**. Silergy products are sold subject to the standard terms and conditions of commercial sale, as published at http://www.silergy.com/stdterms, unless otherwise agreed in a valid written individual agreement specifically agreed to in writing by an authorized officer of Silergy. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Silergy hereby expressly objects to and denies the application of any customer's general terms and conditions with regard to the purchase of Silergy products by the customer.
- 6. **No offer to sell or license**. Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights. Silergy makes no representation or warranty that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right. Information published by Silergy regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from Silergy under the patents or other intellectual property of Silergy.

For more information, please visit: www.silergy.com

© 2023 Silergy Corp. All Rights Reserved.