

Automotive Ethernet ESD Protection

Nexperia offers the first true OPEN Alliance compliant ESD Protection with outstanding signal integrity

To take the next step in automotive connectivity and electrification, high-speed and high-bandwidth Automotive Ethernet is required. Industry leaders collaborate within the OPEN Alliance SIG to encourage Ethernet adoption in cars. But with more advanced electrical designs, discrete ESD Protection is becoming ever more essential.

Nexperia is the first in offering a fully compliant 100/1000BASE-T1 OPEN Alliance Ethernet ESD Protection with improved diode capacitance of 1.2 pF (max), ensuring outstanding signal integrity.

Key Features

- › Fully 100/1000BASE-T1 OPEN Alliance compliant
- › Low capacitance down to < 1.2 pF
- › ESD protection up to 30 kV (IEC 61000-4-2, contact)
- › ESD robustness 15 kV at 1000 discharges
- › High trigger voltage: $V_{t1} = 100 \text{ V min}$
- › Available in various package options
- › AEC-Q101 qualified / automotive grade

Key Applications

- ESD protection for in-vehicle network lines
- In-automotive environments
- › OPEN Alliance 100/1000BASE-T1 Ethernet



More information
www.nexperia.com/ESD-protection/automotive-ethernet

Available package options:



DFN1006D-2
1.0 x 0.6 x 0.37



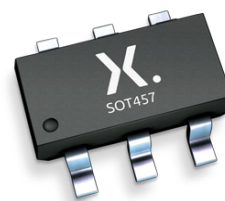
DFN1006(BD)-2
1.0 x 0.6 x 0.48



SOT23
2.9 x 1.3 x 1.0



SOT143B
2.9 x 1.3 x 1.0



SOT457
2.9 x 1.5 x 1.0

Main Application	Number of protected lines	$V_{RWM} (V)$	$V_{trigger} min (V)$	ESD rating max (kV) (1)	$C_{line} typ (pF)$	$C_{line} max (pF)$	$I_{PPM} max (\mu A)$	Configuration	Type	Package	Size (mm)
100BASE-T1 1000BASE-T1	1	24	100	30	1.5	1.8	2.3		PESD1ETH1GLS-Q	DFN1006BD-2 (SOD882BD)	1.0 x 0.6 x 0.48
					0.9	1.2	2.3		PESD1ETH1GXS-Q		
	100BASE-T1	2	-	-	-	-	-		PESD2ETH1G-T	SOT23	2.9 x 1.3 x 1.0
							PESD2ETH1GXT-Q				
							PESD2ETH100-T				
10/100/1000 Mbit/s ESD Protection at the PHY	2	5	-	8	-	-	-		PESD2ETH-X	SOT143B	2.9 x 1.3 x 1.0
			-	12	1.8	-	-		PESD2ETH-AX		
			-	8	1.3	1.5	-		PESD2ETH-D	SOT457	.9 x 1.5 x 1.0
	-	12	2	2.3	-	PESD2ETH-AD					
	1	5.5	-	10	0.4	0.55	2.5		PESD5V0F1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
							PESD5V0F1BLD		DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37	

OPEN Alliance and ESD protection placement

The OPEN Alliance (One-Pair Ether-Net) Special Interest Group (SIG) is a non-profit alliance of mainly automotive industry and technology providers collaborating to encourage wide scale adoption of Ethernet-based networks as the standard in automotive networking applications. One key goal is to enable the deployment of the existing IEEE 100BASE-T1 / 1000BASE-T1 physical layer specifications with complementing specifications for conformance and interoperability.

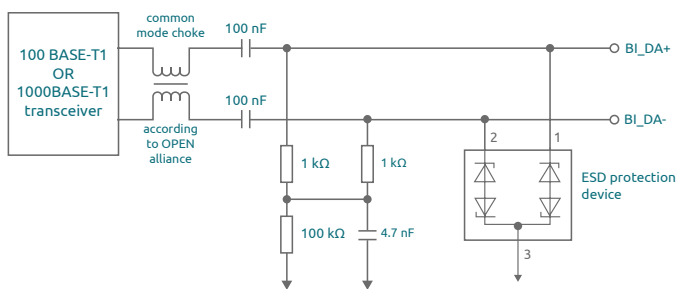


Figure 2: Arrangement of ESD suppression device within the 100/1000BASE-T1 MDI interface, OPEN Alliance SIG (2020) SPDT in Power Amplifier Application

Moreover, the OPEN Alliance member companies work together to further complete the eco-system with requirement and test specifications for harnesses, switches, ECUs and additional functionalities.

Discrete ESD protection devices take a crucial role when it comes to system level robustness and new requirements needs to be considered. In previous automotive Ethernet implementations, PHY vendors recommended to put a discrete ESD protection device between the CMC and the PHY, if required. When taking a closer look on the arrangement of ESD protection devices within 100BASE-T1 MDI network proposed by OPEN Alliance, a major change can be seen.

When there is either no ESD protection or it is located at the PHY, then the power of ESD strikes would pass the CM termination, DC Block and CMC. If the ESD protection device is placed right at the connector, it not only protects the PHY but also the common-mode choke (CMC) and the passives. At this position, the power of ESD strikes can immediately be directed to ground however this change in topology requires a completely different ESD protection.

© 2022 Nexperia B.V.

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Date of release:
February 2022

