SPE Technology Days

Available PHYs and Switches

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Agenda

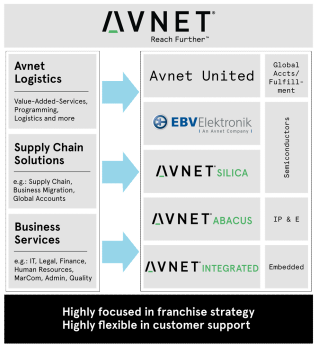
- EBV Elektronik – short introduction
- Industrial USE Cases Analysis
- Broadcom & i-NOVATIVE
- Microchip
- NXP
- ON Semiconductor
- Toshiba
- Avnet Abacus – passive component

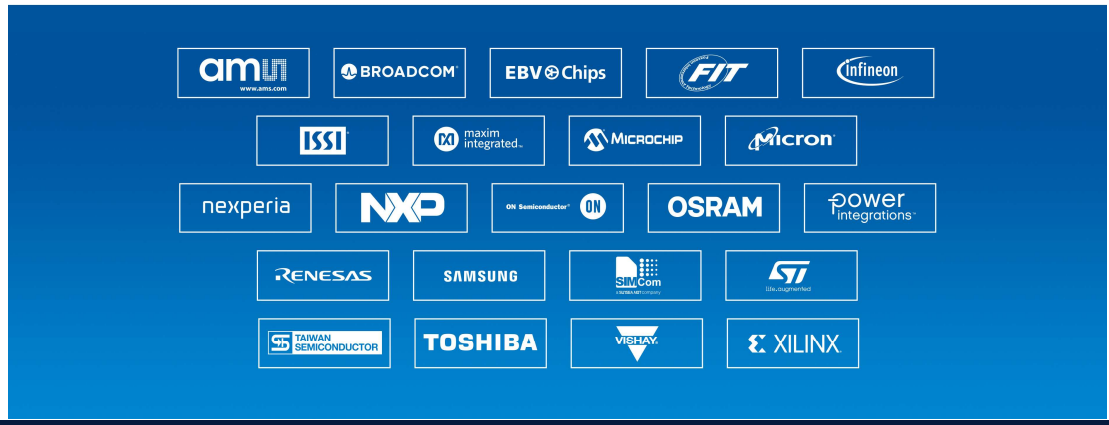
EBV Elektronik – short introduction

- Specialized Semiconductor Distributor
- Founded 1969
- Full Solution Provider
- Part of Avnet EMEA
- EBV Franchises – get connected with the best
- EBV is the Technical Specialist
- EBV Segments - Engage Early in Design Chain
- EBVchips Program

www.ebv.com

Sales: **€ 1,681 Billion**
(Billings in CY19)
Employees: **1,012**
Inventory: **€ 370 M**
Locations: **60+** in 29 countries
Suppliers: **22**





Industrial USE Cases Analysis

EBV Elektronik
I An Avnet Company I

- Automotive Body Shop segment in factory -> 15m x 15m
- Serial Machines -> 15m x 5m
- Switch cabinet -> 3m x 2m
- Robot -> 5m x 1m

- **>80% of industrial production machines or cells are not larger then 15x15m**

History of BroadR-Reach to SPE

- Broadcom is the inventor of the BroadR-Reach standard
  https://en.wikipedia.org/wiki/BroadR-Reach
- OPEN (One-Pair Ether-Net) Alliance Special Interest Group (SIG) in 2011
  https://www.opensig.org/
- IEEE 802.3

Broadcom SPE Phy Overview

BCM89811

Features

- Automotive-qualified low-power design reduces power consumption up to 30 percent
- On-chip integrated low-pass filters lower emissions (meets EMC requirements)
- Integrated internal regulators provide on-chip power and eliminate the need for external regulators
- Exceeds automotive specifications for noise cancellation and transmission jitter
- Delivers 100 Mb/s over single, unshielded twisted-pair wiring, delivering up to an 80 percent reduction in connectivity cost and 30 percent reduction in cabling weight

BCM8988x

Features

- Fully compliant with IEEE 802.3bp 1000BASE-T1 and IEEE 802.3bw 100BASE-T1
- Highly integrated including on-chip LPF, single-voltage rail
- Low-power consumption and support for different low-power modes
- Meets stringent Automotive EMC requirements over UTP
- BroadR-Secure™ capable
- AECQ-100 Qualified
- Fast link-up time suitable for time-sensitive applications
- PHY timestamp for IEEE1588 / 802.1AS
- Supports SGMII MAC interface

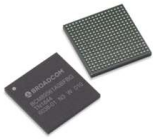
Broadcom SPE Switch Overview

BCM895xx

Automotive Ethernet Switch with Integrated BroadR-Reach® 100BASE-T1 PHYs

Features

•Fully featured Automotive Ethernet switch with integrated 100BASE-T1 and 100-TX PHYs
•Line rate packet filtering for advanced security
•IEEE AVB protocol stack (IEEE 802.1AS Time Synchronization and IEEE 802.1Qat SRP)
•Fast configuration startup for Automotive applications



BCM8956x

Auomtotive Ethernet Switch with Integrated BroadR-Reach® 100/1000 BASE-T1 PHYs

Features

•Layer 2+ gigabit switch with built-in IEEE Compliant 100BASE-T1, 1000BASE-T1 PHYs and 100-TX PHYs
•Integrated PCIe connectivity providing high-bandwidth connectivity to the host processor
•Advanced multilevel security features
•Layer 3 flow accelerator offloading host processor from compute intensive routing operations
•AVB & TSN support with ARM Cortex M7 programmability
•IEEE AVB protocol stack (IEEE 802.1AS Time Synchronization and IEEE 802.1Qat SRP)

Auto-Link-SPE Family

More information at: https://i-novative.de/

Auto-Link-SPE-*M* 100MBit/s

- BCM89811 PHY
- 802.3bw
- 802.3u

Auto-Link-SPE-*G* 1GBit/s

- BCM89881 PHY
- 802.3bp, 802.3bw
- 802.3ab, 802.3u

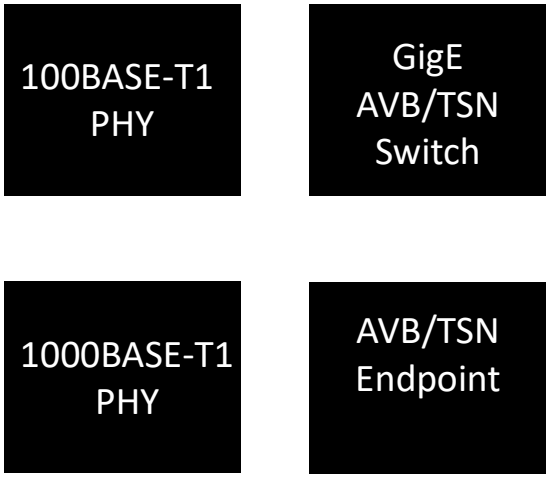
xBASE-T1	100BASE-T1 ←→ 100BASE-TX	1000BASE-T1 ←→ 1000BASE-T 100BASE-T1 ←→ 100BASE-TX
SPE	Proprietary Auto-Role-Config	Auto-Negotiation & Proprietary Auto-Role-Config
MPE	802.3 Auto-Negotiation	
DIP-Switch Config	M/S, Auto-Role	M/S, Auto-Role, Auto-Negotiation, Speed
Signal Quality & Cable Diag	via Host Software	
Power	DC 4.5V – 28V & USB	DC 5V – 28V & USB
Cable	802.3bw: spec 15m TP (more possible)	802.3bp: Link Type-A 15m TP

Microchip market expertise and commitment

+

- Proven, valued supplier to both industrial and automotive markets
  - 46% of Microchip overall revenue
- Delivered first industrial and automotive grade ethernet devices to market
- Comprehensive Ethernet portfolio; PHYs, Switches, Bridges, Controllers, SoC
- ‘No End of Life’ policy

Differentiating SPE solutions

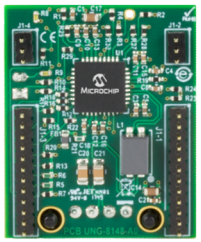


www.microchip.com/wwwproducts/en/LAN8770

- Flexible and scalable system solutions
- Extended cable reach
- Smallest packages
- Lowest power, wake/sleep
- Security support
- Functional Safety Ready
- Ambient temperatures up to 125°C
- Comprehensive software & Tool support

PHY and Switch evaluation platforms

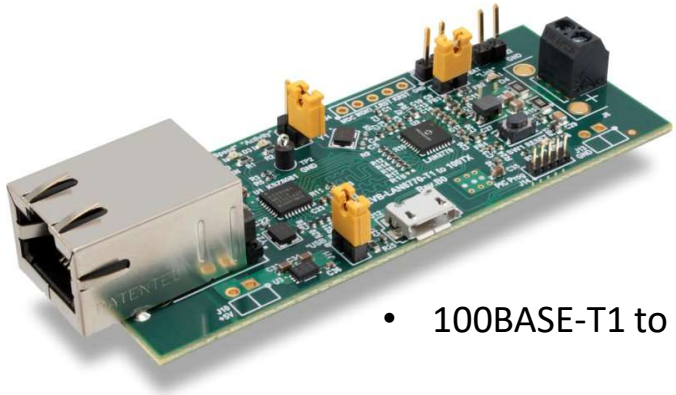
Modular MCU / MPU + SPE



- 100BASE-T1 PHY and Switch daughter cards

- Xplained SAMV7x MCU board
- AVB/TSN End Point board
- SAMA5 MPU board

Media Converters

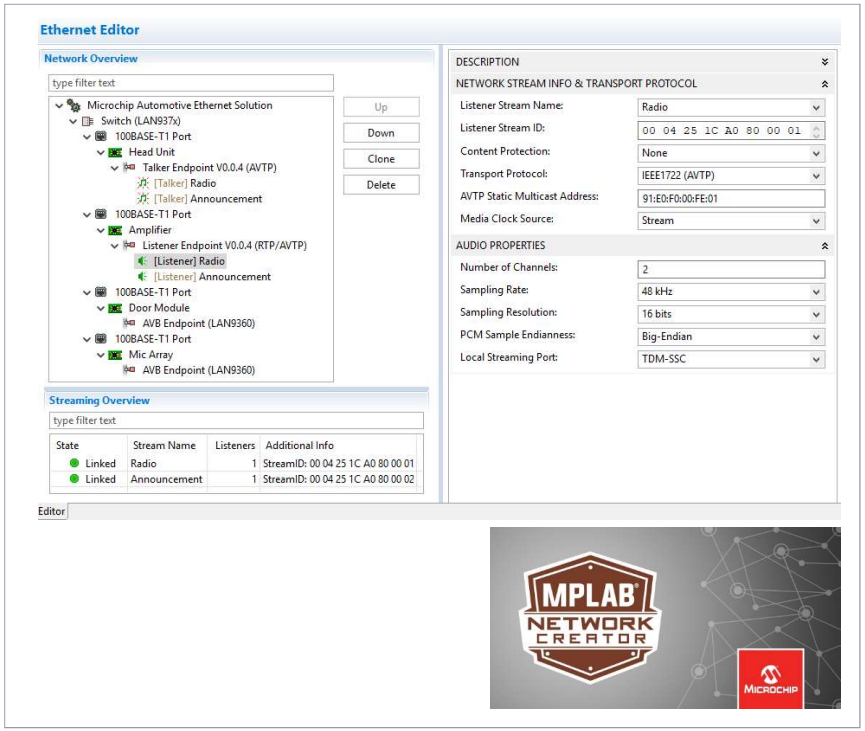


- 100BASE-T1 to 100BASE-TX

www.microchip.com/wwwproducts/en/LAN8770

Software and Tools

- Switch configuration



- **Software drivers**
  - Linux (mainline kernel)
  - Autosar, FreeRTOS

NXP Automotive Ethernet – PHY & Switch Portfolio Overview

TJA1100
Single 100BT1 PHY

OPEN TC10, Reduced BoM

TJA1101/2
Single/Dual 100BT1 PHY

SJA1105P/Q/R/S
5 port digital Switch

- Int. PHYs
- Int. uC
- TSN
- Security
- Safety

SJA1110
10 Port integr. ETH Switch

Samples NOW
(selected customers only)

	TJA1100	TJA1101/2
Ethernet	1 x 100BT1	1 or 2 x 100BT1
Interfaces	MII, RMII	MII/RMII
Functional Safety		ASIL A
WakeUp	proprietary	OPEN TC-10 / ISO21111
Package	HVQFN36	HVQFN36 / HVQFN56 TQFP48 (TJA1101 only)
System Solution	-	S32K1

	SJA1105x	SJA1110x
Ports	5	10
Integrated PHYs	-	6 x 100BT1
Integrated uC	No	ARM M7
Functional Safety	ASIL A	ASIL B
Other Features	AVB HW Spec. 1x TSN feature in T/Q/S variants	AVB HW Spec. 4x TSN features OPEN TC-10 / ISO21111 Deep Packet Inspection
System Solution	-	S32G+VR5510

PHY: Tools

OM14500/TJA1101 & OM14500/TJA1102
Customer Evaluation Board

https://www.nxp.com/part/OM14500#/

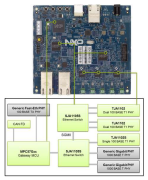
The board is not a reference design for production purposes
Production ready layout examples are available on request

Switch: Tools

SJA1105Q-EVB Evaluation Board

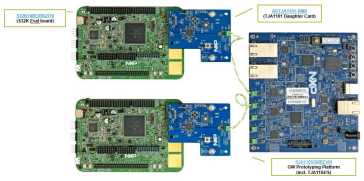
WWW.NXP.com/SJA1105Q-EVB

SJA1105SMBEVM - GATEWAY PROTOTYPING PLATFORM



WWW.NXP.com/AutomotiveEthernet

OPEN ALLIANCE TC-10 (ISO21111) Sleep and Wake up forwarding DEVKIT



MPC-LS Evaluation Board for Vehicle Networking Processing

WWW.nxp.com/MPC-LS-VNP-EVB

MPC5748G Secure Ethernet Gateway reference design

WWW.nxp.com/MPC5748G-GW-RDB

MPC-LS Vehicle Network Processing reference design

WWW.nxp.com/MPC-LS-VNP-RDB

Software Overview

	Low-Level Drivers	Linux Drivers	AUTOSAR Drivers	AVB Software
TJA1101	use TJA1102 LLD	Available	Available	n.a.
TJA1102/ TJA1102S	Available	Available	Available	n.a.
SJA1105P/Q/R/S	Available	Available	Available	Available
Comments	**Free**	**Free**	**Licensed**	**Licensed**

Free Software is provided without warranty, “as is”

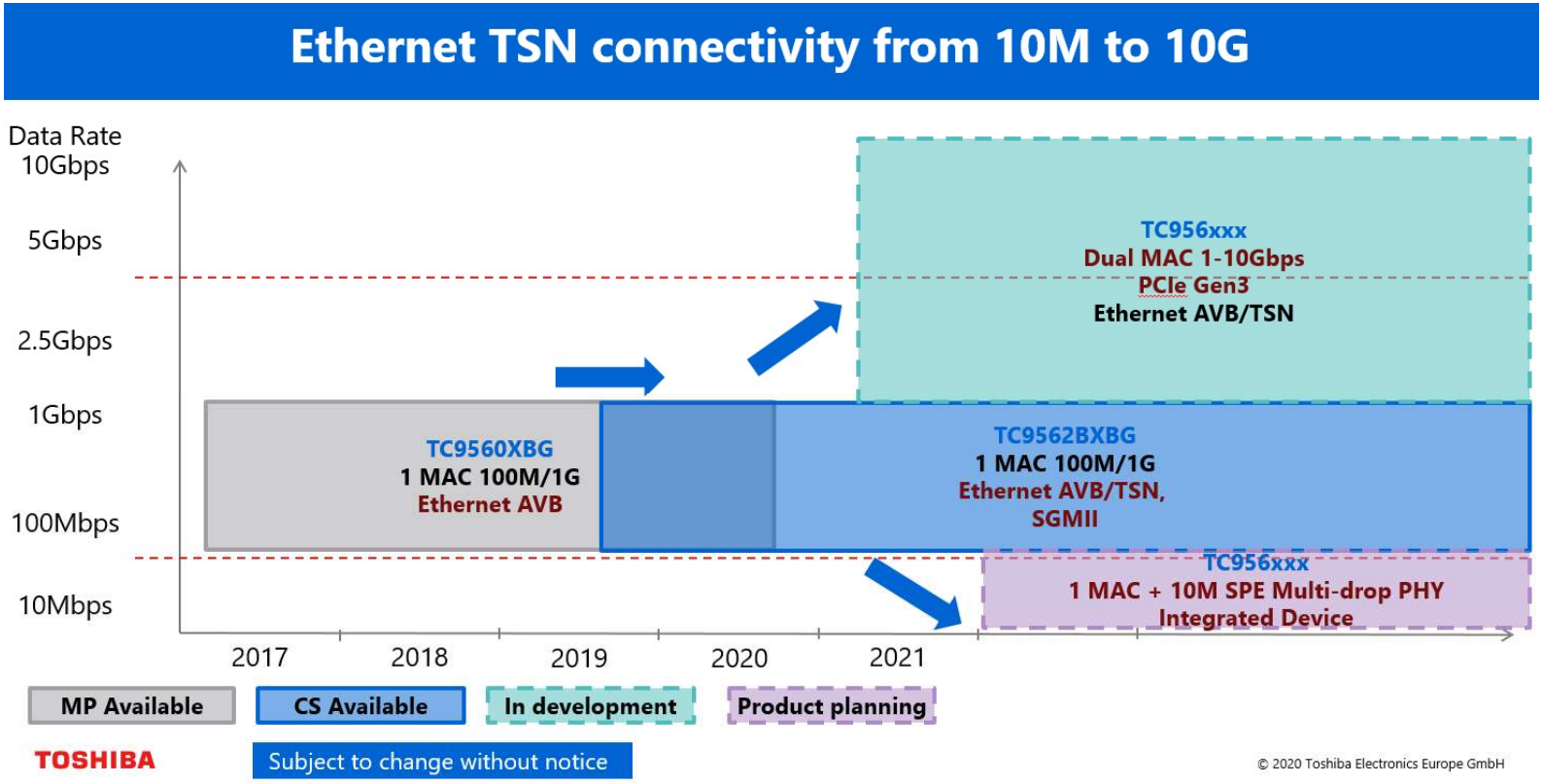
ON Semiconductor
10Base-T1S Ethernet

- Expanding Portfolio with New **Best in Class Industrial Ethernet Solutions**
- Examples of **upcoming devices** for **10Base-T1S**, now in development

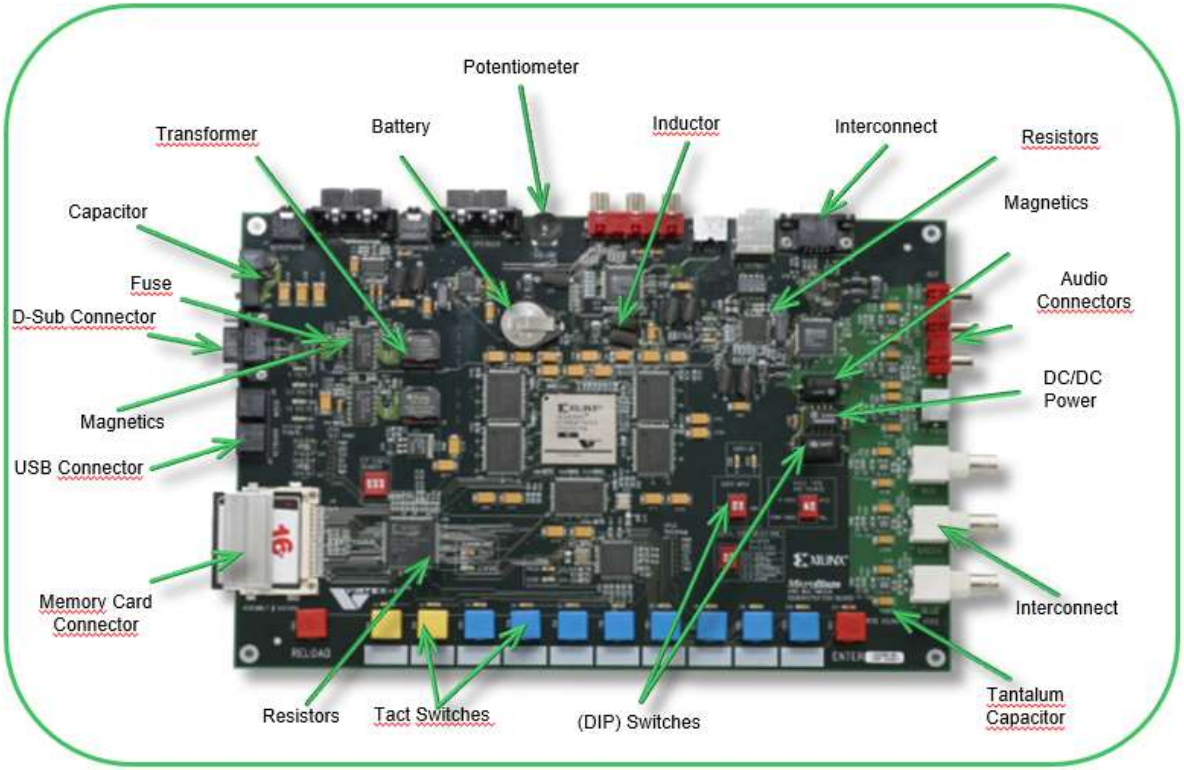
DEVICE	NCN26000	NCN26010
COMM. STANDARD	10Base-T1S	10Base-T1S
OSI LAYER	PHY	PHY, MAC
INTERFACE	MII	SPI
PACKAGE	QFN36 – 6x6 TQFP48 – 7x7	QFN24 – 5x5

TC956x Series – Ethernet TSN Network Interface Controllers Roadmap

TOSHIBA EBV Elektronik | An Avnet Company |



Introduction to Avnet Abacus



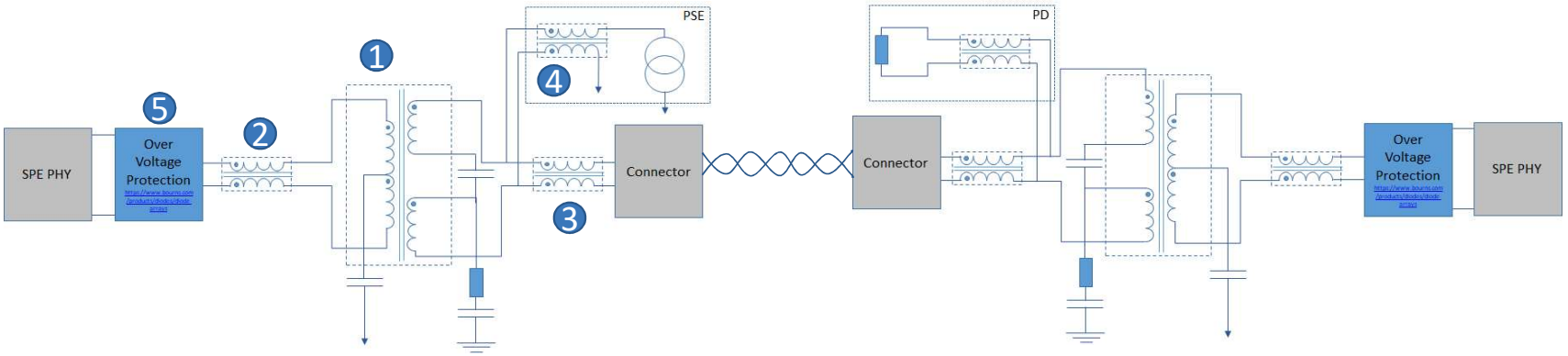
- EMEA distributor, complimentary to EBV
- Focused on non-semiconductor components
- Broad linecard, industry leading franchises
- Engineers and sales offices across EMEA, providing local and pan-European design and commercial support

Key technologies:

- Interconnect
- Passive
- Electromechanical
- Batteries
- Power conversion
- Sensors
- RF & wireless

Passiv

Bourns Portfolio for Single Pair Ethernet Applications



Part	Part Type & Function	BOURNS available	Suitable Products / Product Families	Part Picture
1	Discrete Chip LAN Transformer	✓	SM4532xx Discrete Transformer Series	
2	Chip Side Common Mode Choke	✓	SRF3216 & SRF2012 Series	
3	Line Side Common Mode Choke	✓	SRF6545A Series	
4	Dual Differential Mode Choke	✓	SRF1260 Series	
5	TVS Diode Array OV Protection	✓	CDDFN6-3312P	

*Parts shown are a potential suggestions for Single Pair Ethernet Applications. The suitability and performance of each individual part needs to be verified by customer.

avnet-abacus.eu