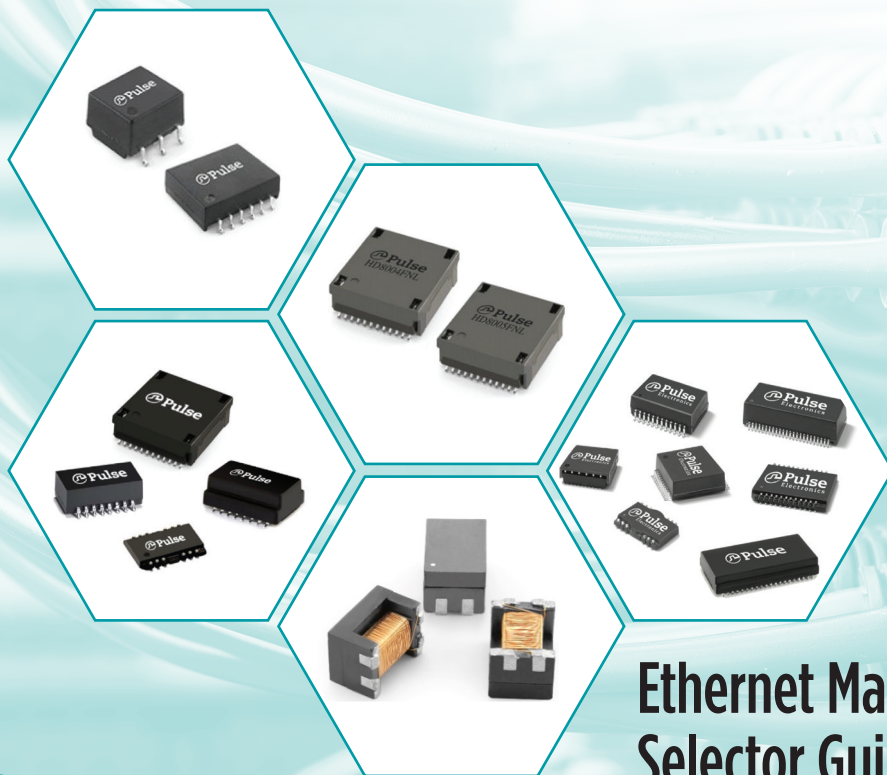


# Pulse

Electronics  
NETWORKING



## Ethernet Magnetics Selector Guide

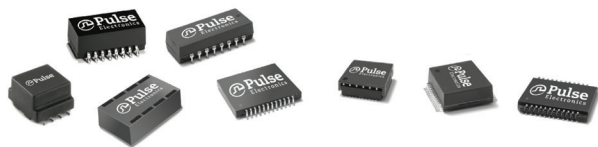
# About Our Ethernet Magnetics

100Base-TX | 1000Base-T | 2.5GBase-T | 5GBase-T | 10GBase-T

Pulse's Ethernet transformers are RoHS compliant and qualified at major PHY suppliers. 100/1000/2.5G/5G/10GBASE-T Ethernet transformer modules are optimized for all major LAN transceivers. All modules provide electrical circuit isolation that meets IEEE 802.3, while maintaining signal integrity needed for the most demanding applications.

## Features and Benefits:

- IEEE 802.3 Compliant to 10G
- High Isolation up to 6kV
- Higher Reliability (Carrier Class & AEC-Q200)
- Single, Dual, Quad Packages
- SMT & BGA Options
- Extended Temperature -40°C to +85°C
- 4P PoE++ Capable up to 140W max.



## 100Base-TX

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	POE RATING
H0068ANL	SINGLE	PCMCIA	2.08	12.70	9.65	100BASE-TX	0 TO 70	NON-PoE
H1102NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	0 TO 70	NON-PoE
H1112NL	SINGLE	SMT	4.88	14.81	14.73	100BASE-TX	0 TO 70	NON-PoE
H1164NL	QUAD	SMT	5.84	28.58	16.00	100BASE-TX	0 TO 70	NON-PoE
H1197NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	0 TO 70	NON-PoE
H12 60NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	0 TO 70	NON-PoE
H1270NL	DUAL	SMT	3.68	13.08	14.99	100BASE-TX	0 TO 70	NON-PoE
H1302NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	0 TO 70	NON-PoE
H2009NL	DUAL	SMT	6.12	13.16	18.67	100BASE-TX	0 TO 70	PoE 15W
H2017NL	QUAD	SMT	7.24	28.45	16.00	100BASE-TX	0 TO 70	PoE 15W
H2019NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	0 TO 70	PoE 15W
H2260NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	0 TO 70	PoE 15W
HX0068ANL	SINGLE	PCMCIA	2.08	12.70	9.65	100BASE-TX	-40 TO +85	NON-PoE
HX1098NL	SINGLE	SMT	4.01	12.70	9.65	100BASE-TX	-40 TO +85	PoE 15W
HX1112QNL	SINGLE	SMT	4.88	14.73	14.73	100BASE-TX	-40 TO +85	NON-PoE
HX1148NL	SINGLE	SMT	5.84	25.45	12.70	100BASE-TX	-40 TO +85	NON-PoE
HX1188NL	SINGLE	SMT	5.97	12.70	7.11	100BASE-TX	-40 TO +85	NON-PoE
HX1198NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	-40 TO +85	NON-PoE
HX1224CNL	SINGLE	SMT	6.22	13.64	14.99	100BASE-TX	-40 TO +85	PoE 15W
HX1234NL	QUAD	SMT	5.84	28.58	16.00	100BASE-TX	-40 TO +85	NON-PoE
HX1260NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	-40 TO +85	NON-PoE
HX1294NL	DUAL	SMT	5.87	13.67	18.87	100BASE-TX	-40 TO +85	NON-PoE
HX1305NL	DUAL	SMT	6.12	13.16	18.67	100BASE-TX	-40 TO +85	NON-PoE
HX1344NL	QUAD	SMT	5.72	28.45	16.00	100BASE-TX	-40 TO +85	NON-PoE
HX2019NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	-40 TO +85	PoE 15W
HX2260NL	SINGLE	SMT	5.97	12.70	9.40	100BASE-TX	-40 TO +85	PoE 15W
HX2305NL	DUAL	SMT	6.12	13.16	18.67	100BASE-TX	-40 TO +85	PoE 15W
HX2326NL	SINGLE	SMT	5.99	12.70	9.65	100BASE-TX	-40 TO +85	PoE+ 30W

## 1000Base-TX

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	PoE RATING
H5004ENL	SINGLE	SMT	5.72	17.53	16.00	1000BASE-T	0 TO 70	NON-PoE
H5007ENL	SINGLE	SMT	5.72	17.53	16.00	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5008NL	SINGLE	SMT	5.87	13.67	18.87	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5014NL	DUAL	SMT	7.24	27.81	15.37	1000BASE-T	0 TO 70	NON-PoE
H5015NL	SINGLE	SMT	4.57	17.65	15.75	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5020NL	DUAL	SMT	8.33	27.94	10.92	1000BASE-T	0 TO 70	NON-PoE
H5062NL	SINGLE	SMT	5.72	17.53	16.00	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5077NL	SINGLE	SMT	4.83	14.22	12.95	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5079NL	SINGLE	PCMCIA	2.54	19.94	14.73	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5084NL	SINGLE	SMT	4.14	15.24	10.29	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5120NL	SINGLE	PCMCIA	2.08	16.51	9.65	1000BASE-T	0 TO 70	NON-PoE
H5149NL	SINGLE	PCMCIA	3.20	17.78	10.41	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5200NL	DUAL	BGA BUMP GRID ARRA	11.18	14.73	17.27	1000BASE-T	0 TO 70	4PAIR PoE 30W
H5400NL	QUAD	BGA BUMP GRID ARRA	11.18	28.45	17.27	1000BASE-T	0 TO 70	4PAIR PoE 30W
H6062NL	SINGLE	SMT	5.72	17.53	15.99	1000BASE-T	0 TO 70	4PAIR PoE 30W
H6080NL	DUAL	SMT	7.24	27.81	15.37	1000BASE-T	0 TO 70	4PAIR PoE 30W
H6096NL	SINGLE	SMT	6.60	18.16	16.00	1000BASE-T	0 TO 70	4PAIR PoE 75W
H6101NL	DUAL	SMT	7.24	27.81	15.24	1000BASE-T	0 TO 70	4PAIR PoE 60W
H6200NL	DUAL	BGA BUMP GRID ARRA	11.18	14.73	17.27	1000BASE-T	0 TO 70	4PAIR PoE 60W
H6400NL	QUAD	BGA BUMP GRID ARRA	11.18	28.45	17.27	1000BASE-T	0 TO 70	4PAIR PoE 60W
HX5004ENL	SINGLE	SMT	5.72	17.53	16.00	1000BASE-T	-40 TO +85	NON-PoE
HX5008NL	SINGLE	SMT	6.12	13.16	18.67	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5014NL	DUAL	SMT	7.24	27.81	15.37	1000BASE-T	-40 TO +85	NON-PoE
HX5020NL	DUAL	SMT	8.33	27.94	10.92	1000BASE-T	-40 TO +85	NON-PoE
HX5062NL	SINGLE	SMT	5.72	17.53	16.00	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5084NL	SINGLE	SMT	4.14	15.24	10.29	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5120NL	SINGLE	PCMCIA	2.08	16.51	9.65	1000BASE-T	-40 TO +85	NON-PoE
HX5149NL	SINGLE	PCMCIA	3.20	17.78	10.41	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5181NL	SINGLE	SMT	6.35	13.84	15.37	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5200NL	DUAL	BGA BUMP GRID ARRA	11.18	14.73	17.27	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5224CNL	SINGLE	SMT	9.77	18.50	15.94	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5400NL	QUAD	BGA BUMP GRID ARRA	11.18	28.45	17.27	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX5610NL	SINGLE	BGA BUMP GRID ARRA	11.18	7.87	17.27	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX6062NL	SINGLE	SMT	5.72	17.53	16.00	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX6080NL	DUAL	SMT	7.24	27.81	15.37	1000BASE-T	-40 TO +85	4PAIR PoE 30W
HX6096NL	SINGLE	SMT	6.60	18.16	16.00	1000BASE-T	-40 TO +85	4PAIR PoE 75W
HX6098NL	SINGLE	SMT	6.60	18.16	16.00	1000BASE-T	-40 TO +85	4PAIR PoE 120W
HX6101NL	DUAL	SMT	7.24	27.81	15.37	1000BASE-T	-40 TO +85	4PAIR PoE 60W

## 2.5GBase-T

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	PoE RATING
HU4006NL	SINGLE	SMT	5.72	13.72	15.24	2.5GBASE-T	0 TO 70	4PAIR PoE 60W
HU4009NL	SINGLE	SMT	6.60	18.16	16.01	2.5GBASE-T	0 TO 70	4PAIR PoE 60W
HU4102NL	DUAL	SMT	8.33	27.94	10.92	2.5GBASE-T	0 TO 70	NON-PoE
HU4103NL	DUAL	SMT	8.33	27.94	10.92	2.5GBASE-T	0 TO 70	4PAIR PoE 60W
HU4108NL	SINGLE	SMT	8.63	15.24	10.93	2.5GBASE-T	0 TO 70	4PAIR PoE 60W

## 5GBase-T

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	PoE RATING
H5G1002NL	SINGLE	SMT	6.60	18.16	16.01	5GBASE-T	0 TO 70	4PAIR PoE 60W

## 10GBase-T

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	PoE RATING
H7008FNL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	0 TO 70	NON-PoE
H7008NL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	0 TO 70	NON-PoE
H7018FNL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	0 TO 70	NON-PoE
H7019FNL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	0 TO 70	NON-PoE
H7028FNL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	0 TO 70	NON-PoE
H7029FNL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	0 TO 70	NON-PoE
H7137FNL	SINGLE	SMT	7.24	17.73	14.86	10GBASE-T	0 TO 70	NON-PoE
H7800NL	SINGLE	SMT	2.54	19.40	14.73	10GBASE-T	0 TO 70	NON-PoE
HX7028NL	SINGLE	SMT	5.72	13.72	15.24	10GBASE-T	-40 TO +85	NON-PoE
HX7137NL	SINGLE	SMT	7.24	17.73	15.24	10GBASE-T	-40 TO +85	NON-PoE

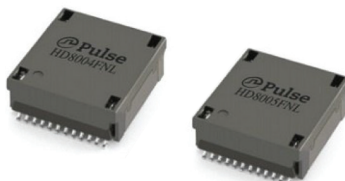


# HDBaseT Transformers

Pulse HDBaseT transformers are designed to provide common mode noise reduction for improved EMI performance and support power over HDBaseT (PoH) applications of up to 140W. The HDBaseT technology enables 5Play feature set, which includes ultra high definition 4K video, audio, 100BASE-TX Ethernet, various control signals, and up to 100W of power, on a single 100m/328ft CAT5e/6 cable.

## Features and Benefits:

- Qualified for Valens chipsets
- Supports Power Over HDBaseT up to 140W
- Suitable for a variety of HDBaseT applications
- High volume production
- Industry standard footprint



## HDBaseT Applications

- Blu-ray, DVD, Recorders
- Displays
- Digital Set Top Box
- PC's Projectors
- A/V Recievers
- Game Consoles
- HDMI repeaters, Splitters, Switches

HDBase-T								
MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	PoE RATING
HD8004FNL	SINGLE	SMT	5.72	13.72	15.24	HDBASE-T	0 TO 70	4PAIR PoE 60W
HD8005FNL	SINGLE	SMT	5.72	13.72	15.24	HDBASE-T	0 TO 70	4PAIRPoE 100W
HD8006FNL	SINGLE	SMT	7.87	17.73	15.88	HDBASE-T	0 TO 70	4PAIR PoE 140W
HD8008NL	SINGLE	SMT	5.72	13.72	15.24	HDBASE-T	0 TO 70	4PAIR PoE 30W
HDX8004NL	SINGLE	SMT	5.72	13.72	15.24	HDBASE-T	-40 TO +85	4PAIR PoE 60W
HDX8005NL	SINGLE	SMT	5.72	13.72	15.24	HDBASE-T	-40 TO +85	4PAIR PoE 100W
HDX8006NL	SINGLE	SMT	6.60	18.16	16.00	HDBASE-T	-40 TO +85	4PAIR PoE 140W
HDX8008NL	SINGLE	SMT	5.72	13.72	15.24	HDBASE-T	-40 TO +85	4PAIR PoE 60W

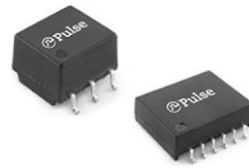
# About Our BMS Transformers

In large battery pack applications with daisy chain connections, the number of cells connected in series is very high, and the large voltage differences demand component-to-component isolation. The serial communication links between boards need to be isolated by transformer coupling circuits instead of capacitor coupling.

Pulse Electronics Networking BU offers a full line of isolation transformers, and common mode chokes for small to large battery pack systems for serial port safety isolation and EMI noise suppression.

We help designers create battery management systems for higher energy-efficiency modern cars such as EVs, HEVs, and PHEVs. All our battery management parts meet AEC-Q200 requirements for automotive applications.

Our team created the BMS transformers to meet the standards of sophisticated BMS systems. We designed isolation transformers, and common mode chokes to isolate multiple high-energy cells to increase safety and function.



BMS Isolation transformers and common mode chokes

## Key Features and Benefits:

- Supports BMS safety isolation and EMI noise suppression
- Supports serial Daisy Chain isoSPI, SPI and other signal isolation
- Meets AEC-Q200 requirements for automotive application
- Operating temperature: -40C up to +125C
- Multiple options for working voltages and voltage isolation
- Functional, Basic, and reinforced insulation available.

## Applications:

- Electric Vehicle
- Energy Storage Systems
- Data Center UPS
- Solar energy storage
- Green – Renewable
- Marine

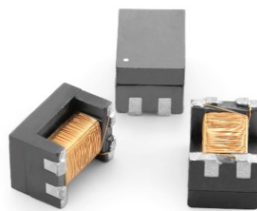
## BMS Parts

MATERIAL	NUMBER OF CHANNELS	ISOLATION VOLTAGE	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	TEMPERATURE	WORKING VOLTAGE	INSULATION
HM1236NL	1	3200 VDC	SMT	4.06	8.64	10.92	-40 TO +125	600	FUNCTIONAL
HM1237NL	2	2500 VRMS	SMT	5.72	11.56	9.53	-40 TO +125	600	FUNCTIONAL
HM1238NL	1	4300 VDC	SMT	4.25	8.38	10.50	-40 TO +150	1000	FUNCTIONAL
HM2100NL	2	4300 VDC	SMT	3.45	14.70	11.65	-40 TO +125	1000	FUNCTIONAL
HM2101NL	1	4300 VDC	SMT	5.72	7.62	9.40	-40 TO +125	1000	FUNCTIONAL
HM2102NL	2	4300 VDC	SMT	5.00	14.81	14.73	-40 TO +125	1600	FUNCTIONAL
HM2103NL	1	4300 VDC	SMT	5.72	7.62	9.40	-40 TO +125	1000	FUNCTIONAL
HM2106NL	1	4300 VDC	SMT	5.75	8.50	16.84	-40 TO +125	1000	FUNCTIONAL
HM2108NL	1	4300 VDC	SMT	5.75	8.50	16.84	-40 TO +125	1000	FUNCTIONAL
HM2112ZNL	2	4300 VDC	SMT	3.45	14.70	15.43	-40 TO +125	1000	FUNCTIONAL
HM2113ZNL	1	4300 VDC	SMT	3.45	0.90	14.53	-40 TO +125	1000	FUNCTIONAL
HMU2128NL	1	4300 VDC	SMT	6.85	8.89	10.03	-40 TO +125	1000	REINFORCED
HMU2102NL	2	4300 VDC	SMT	4.88	14.81	14.70	-40 TO +125	1000	FUNCTIONAL
HMU2103NL	1	4300 VDC	SMT	5.72	7.62	9.27	-40 TO +125	1000	FUNCTIONAL

# Automotive Communications

## Pulse Electronics 100Base-T1 Automotive | Ethernet Common Mode Choke

Pulse releases the AE2002 100Base-T1 common mode choke for automotive Ethernet applications. In addition to the 100Base-T1 Pulse is in process of releasing the 1000Base-T1 AE5002 and the 100Base-T1 Power over Data Lines (PoDL) AE3003/AE3005/AE3006. Pulse's parts are designed to operate from -40C up to +125C, have high reliability, high volume manufacturing, long term manufacturing support, and meet AEC-Q200 requirements.



AE-Series CMC



HM-Series Ethernet Transformers

### Features and Benefits:

- Designed to meet IEEE 802.3bw
- Qualified at Marvell, Broadcom, Intel
- Meets AEC-Q200 requirements
- IATF 16949:2016 certification for 100Base-T1, 1000Base-T1, and PoDL parts in-process
- Operating Temp. from -40C up to +125C
- PPAP Capable

### Applications:

- Infotainment
- Advanced Driver Assist Systems (ADAS)
- Body Control
- Camera/Radar
- Gateways
- Backbone Diagnostics

### AE Auto Chokes

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	CHOKE OCL MH	PoDL RATING
AE2002	SINGLE	SMT	2.8	4.5	3.2	100BASE-T1	-40 TO +125	0.16	NON-PoDL
AE5002	SINGLE	SMT	2.8	4.5	3.2	1000BASE-T1	-40 TO +125	0.12	NON-PoDL

### HM Series Auto

MATERIAL	NUMBER OF PORTS	PACKAGE	PACKAGE HEIGHT (MM)	PACKAGE LENGTH (MM)	PACKAGE WIDTH (MM)	SPEED	TEMPERATURE	PoE RATING
HM0068ANL	SINGLE	PCMCIA	2.083	12.7	9.652	100BASE-TX	-40 TO +105	NON-PoE
HM1188NL	SINGLE	SMT	5.969	12.7	7.11	100BASE-TX	-40 TO +105	NON-PoE
HM1190NL	SINGLE	SMT	5.99	12.7	9.09	100BASE-TX	-40 TO +125	NON-PoE
HM1225NL	SINGLE	SMT	5.969	12.7	9.398	100BASE-TX	-40 TO +85	NON-PoE
HM1331NL	SINGLE	SMT	7.62	15.24	12.7	100BASE-TX	-40 TO +85	NON-PoE
HM5149NL	SINGLE	PCMCIA	3.2	17.78	10.414	1000BASE-T	-40 TO +125	4PAIR PoE 30W



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