Pulse
a YAGEO company

# SIGNAL COMMON MODE CHOKE OVERVIEW (Non-Automotive)

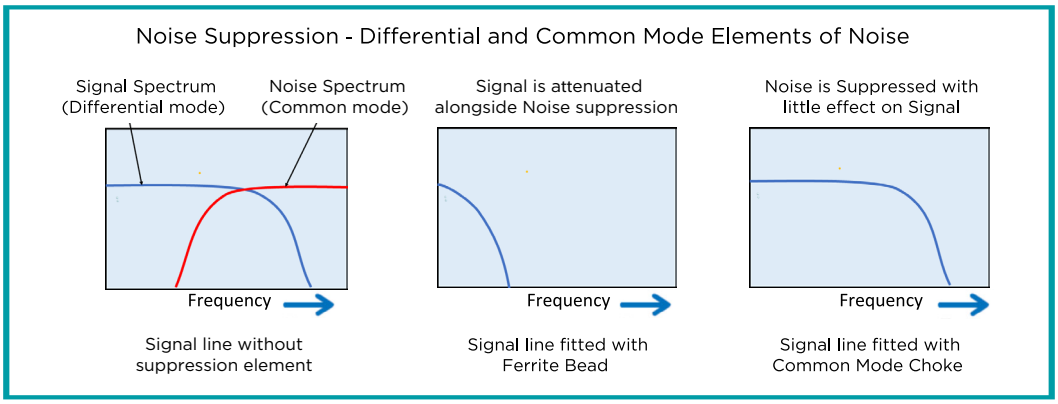
## SURFACE MOUNT AND THROUGH-HOLE SOLUTIONS

Common Mode Signal Chokes, as the name implies, are designed to attenuate and filter common mode noise propagated on a differential signal communication line. The key parameters for a signal line common mode choke are the impedance or attenuation level with frequency, the number of data lines in use 2, 3, 4, 6 and 8 and the size.

Unlike power line chokes, where currents are high, differential data signals are generated from very low voltages and currents; typically 5V(peak to peak) and <200mA. Therefore, nearly all signal line chokes are actually better defined as differential/common mode chokes since the windings are wound bilfilar (side by side) and are in phase. This means that currents flowing through them add, rather than cancel out. That gives risk to potential core saturatation, if excessive currents are applied, so care should be taken in selecting chokes for applications where current may be high, such as power over Ethernet (PoE+), where up to 800mAmps could be seen.

Signal line chokes are often listed by inductance value as this is used as an indication of their effective frequency range; - A high Inductance value will best suppress low frequency noise while a low inductance value will be best for higher frequency ranges. They also provide limited isolation between signal lines. Typically only a few hundred volts - since chokes are not approved for safety Isolation. The isolation level is based on the coating of the wire with typical values ranging form 125Vdc ~ 500Vdc.

Signal line Chokes offer superior noise suppression without affecting to signal quality when compared to ferrite beads or snubbing inductor, The beneficial performance comparison of Signal line chokes is shown below.




Pulse catalog signal common mode chokes are listed on the following pages and are available in SMT and THT topologies. All are based on ferrite toroidal core constructions for currents < 1Amp. The Automotive and ChipChoke product range overview can be found in a separate guide on the web at PulseElectronics.com

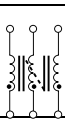
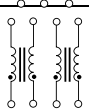
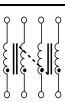
# SIGNAL COMMON MODE CHOKE OVERVIEW (Non-Automotive)

SURFACE MOUNT AND THROUGH-HOLE SOLUTIONS

Pulse a YAGEO company

## PRODUCT OVERVIEW: SIGNAL COMMON MODE CHOKES

| THT Part Number | | Platform Size (Max) L (mm) | W (mm) | H (mm) | Primary Inductance OCL (uH) | Winding Resistance ( DCR MAX) | Winding Schematic | Common Mode Attenuation (represetative) 0.1 MHz | 1.0MHz | 10MHz | 30MHz | 50MHz | 100MHz | 300MHz | 500MHz | 1.0GHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | B2005NL | 12.70 | 10.16 | 12.70 | 9,000 | 1.0Ω |  | | 47dB | | | | 33dB | | | 15dB |
|  | PE-67531NL | 10.16 | 5.08 | 8.89 | 140min | 0.60Ω |  | | 34dB | | | | 47dB | | | 25dB |
|  | PE-65554NL | 15.11 | 12.20 | 7.62 | 24min | 0.30Ω |  | | 21dB | | | | 39dB | | | |
|  | PE-65950NL | 14.17 | 14.17 | 10.16 | 470Ω | 1.0Ω |  | | 51dB | | | | 20dB | | | |

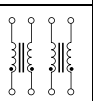
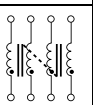
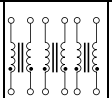
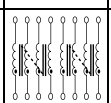
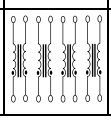
| SMD Part Number | | Platform Size (Max) L (mm) | W (mm) | H (mm) | Primary Inductance OCL (uH) | Winding Resistance ( DCR MAX) | Winding Schematic | Common Mode Attenuation (represetative) 0.1MHz | 1.0MHz | 10MHz | 30MHz | 50MHz | 100MHz | 300MHz | 500MHz | 1.0GHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | B2013NL | 15.11 | 12.20 | 7.62 | 9,000 | 0.30Ω |  | 46dB | 47dB | | 32dB | | 29dB | | | 16dB |
|  | B4003NL | 9.02 | 8.76 | 7.62 | 4,700 | 0.40Ω |  | 42dB | 47dB | | 38dB | | 21dB | | | 17dB |
|  | BX8333NL | 15.11 | 12.20 | 7.62 | 16,000 | 0.30Ω |  | 38dB | 36dB | | 15dB | | 8dB | | | |
|  | BX8333DNL | 15.11 | 12.20 | 7.62 | 33,000 | 0.30Ω |  | 46dB | 22dB | | 12dB | | 6dB | | | |
|  | PE-65855NL | 15.11 | 12.20 | 7.62 | 4,700 | 0.40Ω |  | 41dB | 43dB | | 39dB | | 26dB | | | 12dB |
|  | PE-68264NL | 8.64 | 6.60 | 2.49 | 47min | 0.30Ω |  | | 27dB | | 44dB | | 36dB | | 17dB | |
|  | R0003NL | 8.64 | 6.60 | 2.49 | 20min | 1.00Ω |  | | 14dB | | 27dB | | 30dB | | | 25dB |
|  | PE-65627NL | 9.02 | 8.76 | 5.26 | 24min | 0.40Ω |  | | 21dB | | 36dB | | 36dB | | 20dB | |
|  | PE-65854NL | 9.14 | 8.64 | 2.50 | 47min | 0.25Ω |  | | 19dB | | 36dB | | 29dB | | 6dB | |

# SIGNAL COMMON MODE CHOKE OVERVIEW (Non-Automotive)

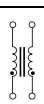
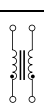
SURFACE MOUNT AND THROUGH-HOLE SOLUTIONS

Pulse a YAGEO company

## PRODUCT OVERVIEW: HIGH FREQUENCY COMMON MODE CHOKES

| Platform Name | | Platform Size (Max) L (mm) | W (mm) | H (mm) | Primary Inductance OCL (uH) | Winding Resistance ( DCR MAX) | Winding Schematic | Common Mode Attenuation (represetative) 0.1MHz | 1MHz | 10MHz | 30MHz | 50MHz | 100MHz | 300MHz | 500MHz | 1.0GHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 23Z104SMNL | 12.20 | 12.20 | 7.62 | 68 | 0.20Ω |  | | 22dB | 28dB | | | 25dB | | 15dB | |
|  | PE-65857NL | 12.07 | 15.24 | 8.64 | 22.5 | 0.22Ω |  | | 20dB | 30dB | | | 34dB | | 13dB | |
|  | PE-67540NL | 12.07 | 15.24 | 8.64 | 100 | 0.60Ω |  | | 33dB | 44dB | | | 44dB | | 29dB | |
|  | T8003NL MSL 4 | 15.11 | 12.20 | 7.62 | 33 | 0.20Ω |  | | 13dB | 32dB | | | 27dB | | 17dB | |
|  | 23Z106SMNL | 11.43 | 9.14 | 5.46 | 68 | 0.20Ω |  | | 22dB | 29dB | | | 29dB | | 19dB | |
|  | 23Z105SMNL | 11 .43 | 9.14 | 5.46 | 68 | 0.20Ω |  | | 24dB | 30dB | | | 24dB | | 11dB | |
|  | PE-69011NL MSL 4 | 12.70 | 9.40 | 5.08 | 36 | 0.35Ω |  | | 24dB | 36dB | | | 29dB | | 11dB | |

## PRODUCT OVERVIEW: 2-WIRE CAN/WAN COMMON MODE CHOKES

| Platform Name | | Platform Size (Max) L (mm) | W (mm) | H (mm) | Primary Inductance OCL (uH) | Winding Resistance ( DCR MAX) | Winding Schematic | Common Mode Impedance (\|Z\| Typ.) (represetative) 0.1MHz | 1MHz | 5MHz | 10MHz | 30MHz | 50MHz | 80MHz | 100MHz | 200MHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | T81119NLT | 8.90 | 6,39 | 4,11 | 15 | 0.16Ω |  | | 180 | | 800 | | 1,700 | | 1,800 | |
|  | TX8111NLT | 15.11 | 12.20 | 7.62 | 51 | 0.20Ω |  | | 400 | | 1,700 | | 3,800 | | 3,400 | |
|  | T8116NLT | 15.11 | 12.20 | 7.62 | 470 | 0.30Ω |  | | 3,000 | | 4500 | | 1,200 | | 500 | |
|  | T8112NLT | 15.11 | 12.20 | 7.62 | 1,000 | 0.30Ω |  | | 3,200 | | 5,200 | | 2,500 | | 1,300 | |
|  | T8113NLT | 15.11 | 12.20 | 7.62 | 2,200 | 0.40Ω |  | | 6,000 | | 8,000 | | 1,800 | | 700 | |
|  | T8114NLT | 15.11 | 12.20 | 7.62 | 4,700 | 0.70Ω |  | | 14,000 | | 2,800 | | 500 | | 240 | |

# SIGNAL COMMON MODE CHOKE OVERVIEW (Non-Automotive)

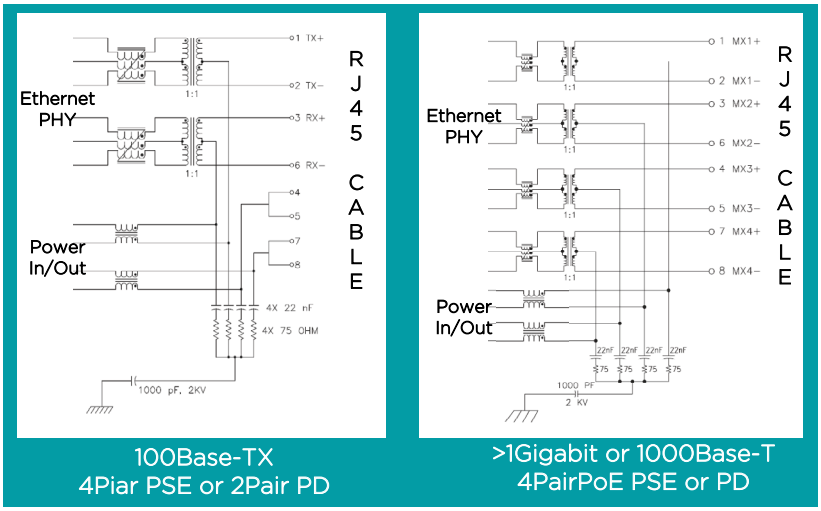
## SURFACE MOUNT AND THROUGH-HOLE SOLUTIONS

Pulse a YAGEO company

### Power over Ethernet (PoE) - DC supply line chokes

PoE Common Mode line chokes are designed to sit across the DC power supply pairings that connect directly to the central taps of the isolation transformers, or to the spare wires, in the case of 100Base-Tx (as shown in the diagram below). The chokes need to suppress CM noise on these DC power lines which may be generated by the switching frequencies of the DC converter used to “inject” or “take-off” the DC power on to the cable via an RJ45 connector.

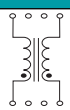
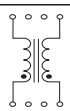
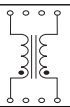
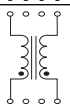
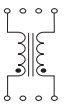
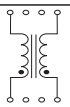
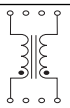
In the generic PoE set-up opposite, each DC power supply - labeled “Power in/out”- is shown connected to the signal transformers central tap. Therefore, the performance of the choke needs, not only to remove unwanted CM noise ,but also not appear to impede, delay or disrupt the transmission of the Ethernet data. Pulse PoE and PoE+ Choke series has been designed and tested to meet the requirements of IEEE802.3 standards at system level for Return and Insertion loss while supporting the load currents of 400mA for PoE (15W/pair) or 800mA for PoE+ (30W/pair).




100Base-TX
4Piar PSE or 2Pair PD

>1Gigabit or 1000Base-T
4PairPoE PSE or PD

The table below shows a small selection of the PoE power Line chokes that are available. The two series for PoE and PoE+ can be found on the website on data sheet H603.A (PoE) and H04.A (PoE+).

| | Platform Name | | Platform Size (Max) L (mm) | W (mm) | H (mm) | Primary Inductance OCL (uH) | Winding Resistance ( DCR MAX) | Winding Schematic | Common Mode Impedance (\|Z\| Typ.) (represetative) 0.01MHz | 0.1MHz | 1.0MHz | 6.0MHz | 10MHz | 30MHz | 60MHz | 100MHz | 300MHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POE |  | H6033NL | 6.22 | 9.27 | 5.50 | 100 | 0.40Ω |  | | 100 | 500 | 2,000 | | 4,900 | | 1,800 | |
| POE |  | H6034NL | 6.22 | 9.27 | 5.50 | 250 | 0.30Ω |  | | 200 | 1,250 | 3,200 | | 2,000 | | 1,000 | |
| POE |  | H6035NL | 6.22 | 9.27 | 5.50 | 500 | 0.60Ω |  | | 350 | 2,700 | 7,000 | | 2,400 | | 800 | |
| POE+ |  | H6502NL | 6.22 | 9.27 | 5.50 | 60 | 0.20Ω |  | | 100 | 300 | 1,100 | | 3,200 | | 1,900 | |
| POE+ |  | H6504NL | 6.22 | 9.27 | 5.50 | 250 | 0.18Ω |  | | 200 | 1,200 | 3,300 | | 2,000 | | 1,000 | |
| POE+ |  | H6506NL | 6.22 | 9.27 | 5.50 | 1,000 | 0.35Ω |  | | 600 | 6,000 | 11,000 | | 2,400 | | 600 | |
| POE+ |  | H6507NL | 12.10 | 15.30 | 8.64 | 20,000 | 1.50Ω |  | 3,000 | 16,500 | | 3,000 | | 1,000 | | 100 | |

# SIGNAL COMMON MODE CHOKE OVERVIEW (Non-Automotive)

SURFACE MOUNT AND THROUGH-HOLE SOLUTIONS

Pulse
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## Wide frquency 2-wire CAN/WAN Solutions

T81xxxNLT, TX8111NLT

- Cost Effective SLIC (8.9x6.3x4.1mm)
- Current Rating: 400mA to 800mA
- Inductance: Low frequency 1.0mH to 2.7mH
  High frequency 15uH to 470uH
- Impedance: Low frequency 3.0~14KΩ @ 1.0MHz
  High frequency 0.80~3KΩ @ 100MHz

## High frequency, 2/3/4-wire LAN Solutions

PE-65xxxNL, R0003NL, PE-65627NL, PE-65854NL

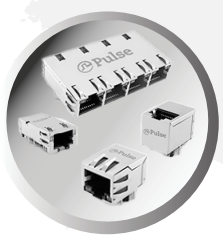
- Cost Effective SLIC - 2 package sizes
  (6.6x8.6x2.5mm and 9.1x8.7x2.5/5.1/7.6mm)
- Current Rating: 300mA
- Inductance: 20uH or 47uH
- Typical Attenuation: > 30dB @100MHz


## Low frequency, High Impedance Solutions

PE-65855NL, BX8333NL/DNL

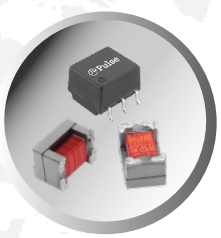
- Cost Effective SMD - (7.6x8.8x6.4/8.6mm)
- Current Rating: 100mA~400mA
- Inductance : 4.7mH or 33mH
- Typical Attenuation : 30dB @10KHz
  40dB @ 100KHz
  30dB @ 1MHz

## Other Great Products from Pulse Electronics



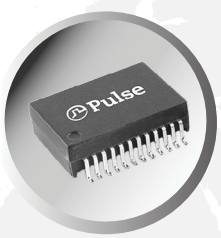
### Integrated Connector Modules (ICMs)

- 100Base-T to 25GBase-T
- PoE, PoE+, 4 Pair PoE
- 1x1, 1xN, 2xN Packaging
- THT, SMT, Pin-in-Paste and Press Fit



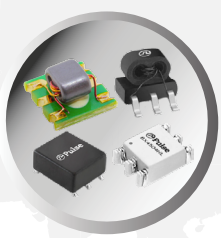
### Automotive Network Magnetics

- BMS Modules & Xfrms Transformers (functional, basic, reinforced insulation)
- Automotive Ethernet (100Base-T to 10GBase-T)
- CMC (100Base-T, CAN)




### Ethernet Transformer & Modules (LAN)

- 100Base-T to 25GBase-T
- PoE, PoE+, 4 Pair PoE
- Single, Dual, Quad, Octal
- THT, SMT, BGA & Pin-in-Paste



### Telecom & Audio Magnetics (WAN)

- PLC Transformers
- ISDN, T1/E1, T3/E3, xDSL & G.Fast
- Multiple Port Options

### Connectors & Cages

- Unfiltered Connectors (RJ45, RJxx, USBx)
- Optical Connectors & Cages (SFP, SFP+, QSFP)
- 1x1, 1xN, 2xN