Rosenberger

IEEE 802.3 PPoDL
Wire gauges
for automotive applications

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Automotive wire gauges
Outline

- Application for 802.3bp
- Alternative scenarios
- Conclusion

Automotive wire gauges
Application with 802.3bp

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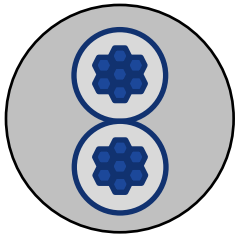
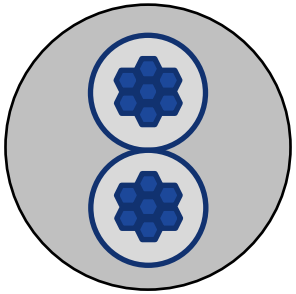
- Unshielded Twisted Pair
- Conductors stranded
- Jacket needed for balance and environmental protection
- Using quality plastic materials (e.g. no PVC)
- AWG 26 sufficient to meet the insertion loss baseline proposal
- Reference channel length:15 m
- Cable DC resistance: 0.14 Ω / m at 20°C
- Loop resistance 15 x 2 x 0.14 Ω / m => **4.2 Ω** at 20°C
- Power handling of connector contact typical 3 A



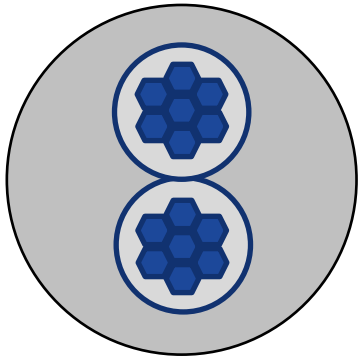
2 x 0.14 mm^2

AWG 26



2 x 0.22 mm^2

AWG 24



2 x 0.35 mm^2

AWG 22

Automotive wire gauges
Application with 802.3bp optional link segment

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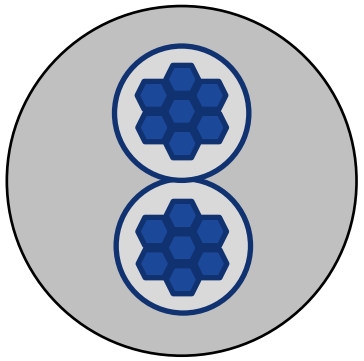
- (Un)shielded Twisted Pair
- Reference channel length:40 m
- Conductors stranded or solid
- IL baseline calculation based on AWG 22
- Cable DC resistance (solid conductor): 0.0553 Ω / m at 20°C
- Loop resistance 40 x 2 x 0.0553 Ω / m => **4.43 Ω** at 20°C



2 x 0.35 mm^2

AWG 22

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Alternative scenarios

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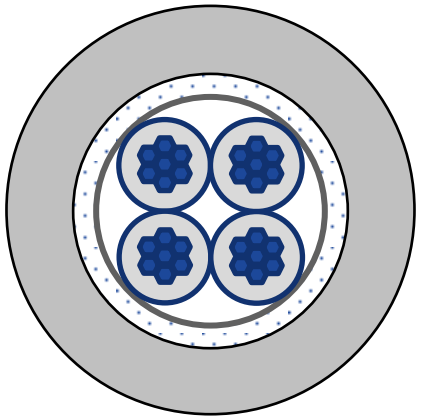
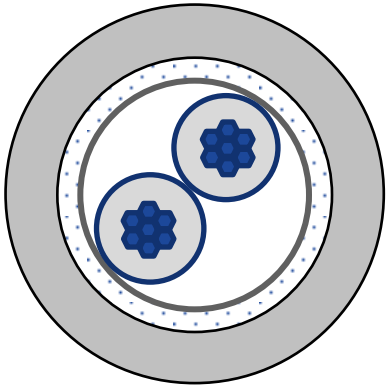
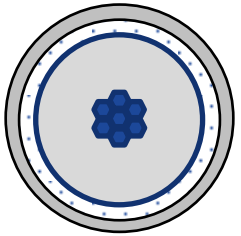
- Fall-back scenarios to shielded (e.g. because of EMC)
- Shielded Twisted Quad (no PPoDL needed) or Twisted Pair (often AWG 26)
- Coaxial cables (often AWG 26, e.g. RG-174, up to AWG 30)
- DC resistance of 15 m reference channel identical to unshielded (**4.2 Ω** at 20°C)
- Shield may be used as DC return pass to lower resistance



4 x 0.14 mm²
AWG 26
STQuad



2 x 0.14 mm²
AWG 26
STP



1 x 0.14 mm²
AWG 26
Coax

PPoDL DC wire resistance calculations should be based

- AWG 26 for the 15 m reference channel
- AWG 22 for the 40 m optional link segment