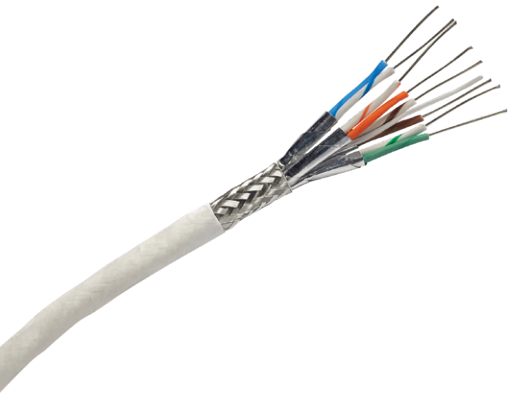
GORE® Ethernet Cables (Cat5e/6A/8)



For standard Ethernet Cat5e, Cat6A and Cat8 protocols, Gore's 4-pair cables are engineered for the increasing data and video demands of modern avionics and vectronics digital networks (Table 1). They meet, some versions even exceed, stringent electrical requirements for cables operating in extreme environments. Our cables have been selected for many airborne and defense program updates, including Future Vertical Lift (FVL) and Advanced Air Mobility (AAM). Examples include the UH-60, F-16, C-130, KC-135, and Abrams Main Battle Tank.

The Cat6A version delivers excellent signal integrity with sufficient margin for high-speed data and video transmission up to 10G BASE-T at lengths up to 80 m (262 ft). This award-winning version is also approved to SAE AS6070 and VG95218-31 standards and on the Qualified Products List (QPL).

We also offer a Cat8 version that meets faster speeds beyond 10G BASE-T to help you adapt now and be ready for the foreseeable future without having to transition to an entirely different cabling solution. This version reliably transfers data and video up to 40G BASE-T at lengths up to 22 m (72 ft) without compromising system robustness or adding weight.

Typical Applications

- Avionics/vectronics digital networks
- Cabin/flight management & mission systems
- Data storage
- Ethernet backbone
- HD streaming camera/video systems
- Radio/radar/communications systems
- Tactical links

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Standards Compliance

- ABD0031 (AITM 2.0005); BSS7230; FAR Part 25, Appendix F, Part I: Flammability
- ABD0031 (AITM 3.0005); BSS7239: Toxicity
- ABD0031 (AITM 3.0008B); BSS7238; FAR Part 25, Appendix F, Part V: Smoke Density
- ANSI/NEMA WC 27500: Environmental Testing, Jacket and Marking
- ANSI/TIA 568.2-D: Balanced Twisted Pair Telecommunications Cabling and Components
- ARINC 664 P2-3: Aircraft Data Networks Ethernet Physical and Data Link Layer 10BASE-T, 100BASE-TX, and 100BASE-FX (RCN9235-24, RCN9241-24, RCN9235-26)
- IEEE 802.3: Ethernet 10G BASE-T (Cat5e/6A versions)
- IEEE 802.3bq: Ethernet 40G BASE-T (Cat8 version)
- SAE AS4373™: Test Methods for Insulated Electric Wire (Contact Gore for available data)
- SAE AS6070™/5 & /6: 10G BASE-T (100 Ohms); QPL (RCN9034-24, RCN9047-26)
- STANAG 4754: NATO Generic Vehicle Architecture (NGVA) for Land Systems (GSC-01-85237-VG, GSC-01-85238-VG, GSC-01-83134-VG)
- VG95218-31: Performance Requirements (GSC-01-85237-VG, GSC-01-85238-VG, GSC-01-83134-VG)

GORE® Ethernet Cables (Cat5e/6A/8)

Table 1: Cable Properties

Electrical

Property	Value Cat5e/6A (10G BASE-T)	Value Cat8 (40G BASE-T)
Signal Transmission Speed Gb/s	Up to 10	Up to 40
Standard Impedance Ohms	100 ± 10	100 +10/-5
Typical Operating Voltage V	< 15	< 15
Nominal Velocity of Propagation %	80	80
Nominal Time Delay ns/m (ns/ft)	4.10 (1.25)	4.17 (1.27)
Capacitance pF/m (pF/ft)	42.6 (13.0)	41.0 (12.5)
Minimum Near-End Crosstalk (NEXT) dB		
10 MHz	59.2	—
100 MHz	52.3	45.3
500 MHz	42.2	34.8
1000 MHz	—	30.3
2000 MHz	—	25.8
Shielding Effectiveness dB	> 55	> 55
Dielectric Withstanding Voltage Vrms		
Conductor-to-Conductor	1500	1500
Conductor-to-Shield	1000	1000

Mechanical / Environmental

Property	Value Cat5e/6A (10G BASE-T)	Value Cat8 (40G BASE-T)
Jacket Material	Engineered Fluoropolymer or PU Halogen-Free[a]	Engineered Fluoropolymer
Jacket Color	EF: White (Laser Markable) PU: Black[a]	White (Laser Markable)
Conductor	Silver-Plated Copper or SPC Alloy	
Conductor Color-Coding	Solid Blue & White/Blue Stripe, Solid Orange & White/Orange Stripe, Solid Green & White/Green Stripe, Solid Brown & White/Brown Stripe	
Dielectric Material	Expanded PTFE/PTFE	
Temperature Range °C	-65 to +200	

a. Based on Gore's part numbers, GSC-01-85237-VG, GSC-01-85238-VG, and GSC-01-83134-VG for military vehicle systems.

Meet Size, Weight & Routing Constraints

GORE® Ethernet Cables with a 4-pair design feature a high-density construction with generally 24% smaller diameters, making them 25% lighter than alternative designs (Figures 1 and 2). We have proven that our unique design typically saves as much as 1.93 kg per 100 m (13 lb per 1000 ft) of weight in aircraft and combat vehicles compared to alternative cables.

To meet higher frequencies, replacing 4 leading alternative Cat6A cables with a single Gore Cat8 cable at 22 m (72 ft) could save installed weight up to 82 kg/km (180 lb/1000 ft). These reduced cable diameters also allow for greater flexibility and a tighter bend radius making routing easier and faster for maintainers.

Figure 1: High-Density Construction

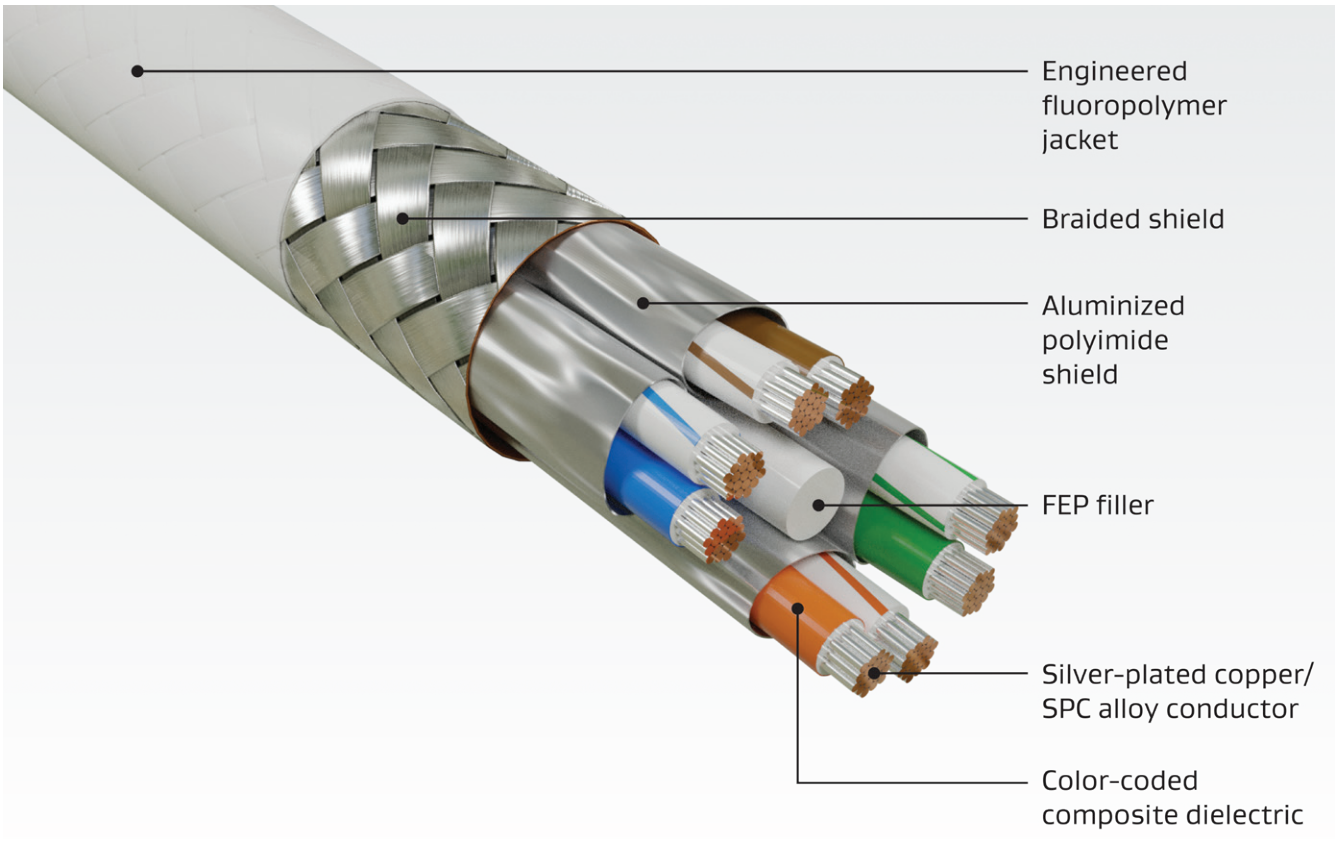
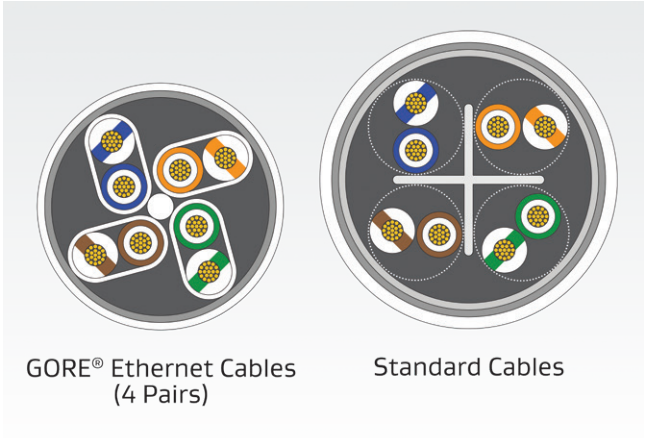


Figure 2: Reduced Diameter



GORE® Ethernet Cables (Cat5e/6A/8)

Improved Electrical Performance

Gore compared its Cat6A version with leading alternative cables. The improved performance of GORE® Ethernet Cables directly translates to more reliable data transmission with a vastly better insertion loss-to-crosstalk ratio (Figure 3). Results indicated that this version provided additional margin to overcome installation issues and operational challenges. Similarly, results showed that our unique 4-pair design could reduce crosstalk right out of the box by more than 10 dB at 500 MHz compared to leading alternative cables (Figure 4).

Figure 3: Insertion Loss-to-Crosstalk Ratio Comparison

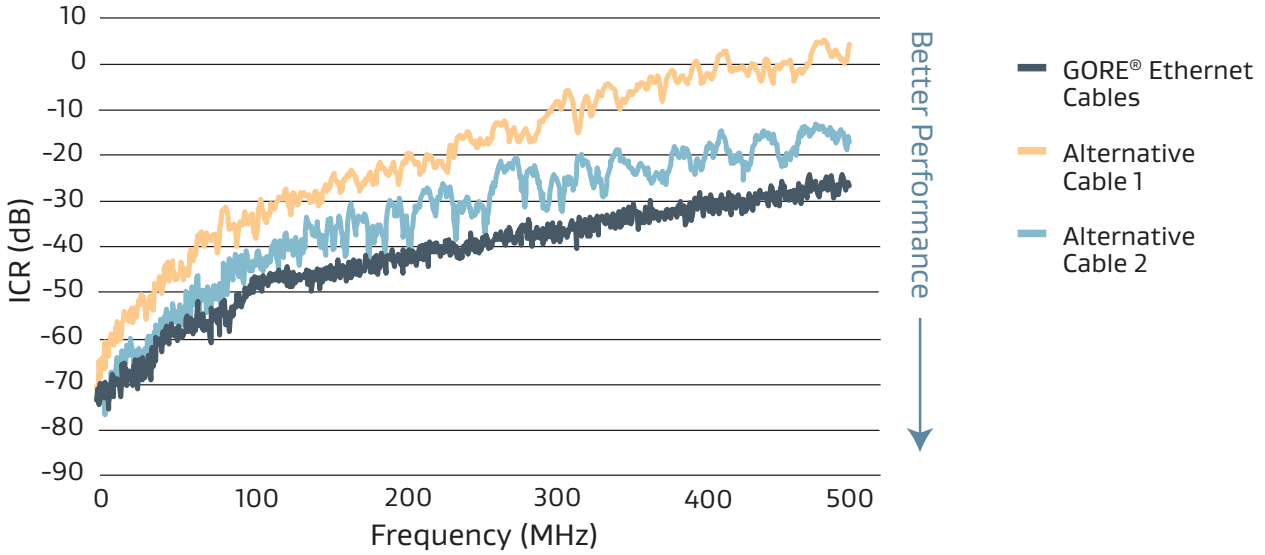
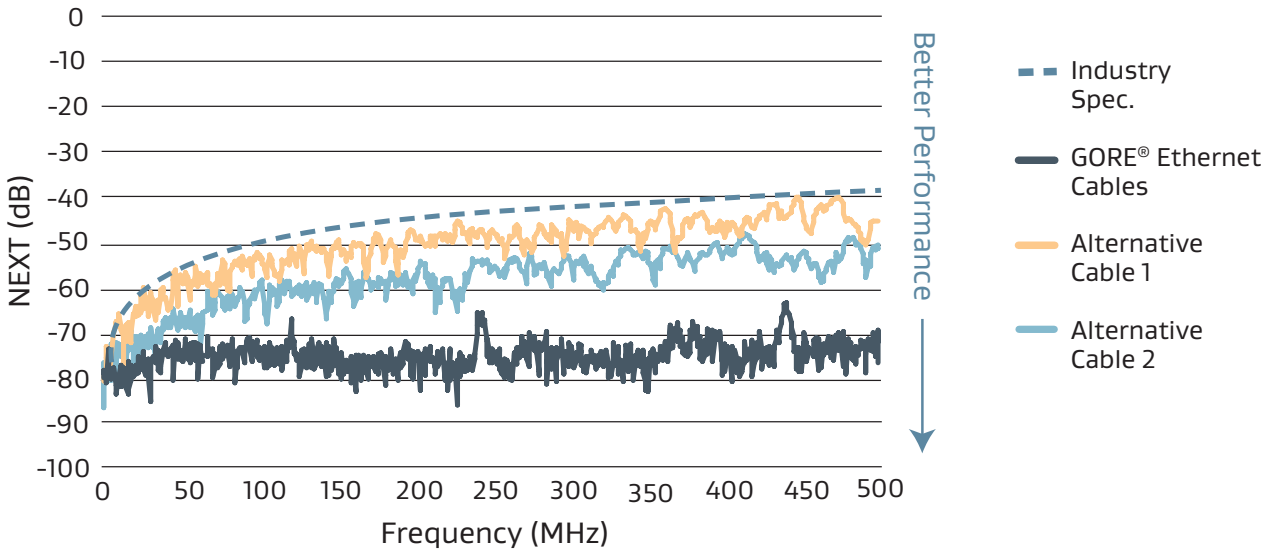
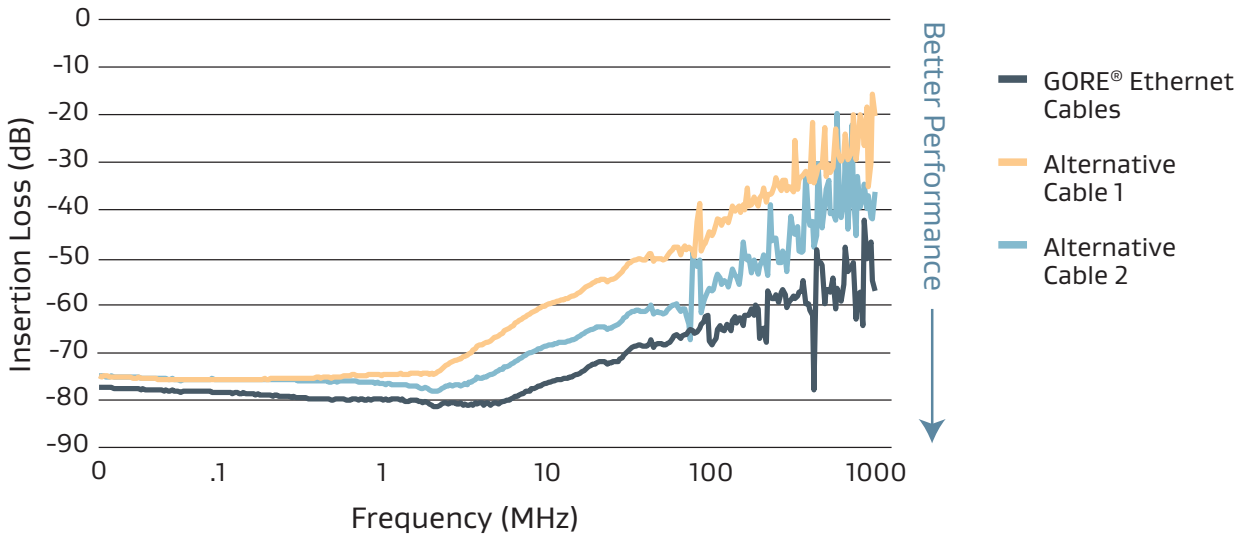


Figure 4: Crosstalk Comparison



Results also showed that Gore's Cat6A cable improves signal integrity and reduces RF interference by as much as 20 dB at higher frequencies among multiple electronic systems (Figure 5). Proof that Gore's innovative 4-pair cable design provides better noise immunity and less EMI emissions compared to leading alternative cables.

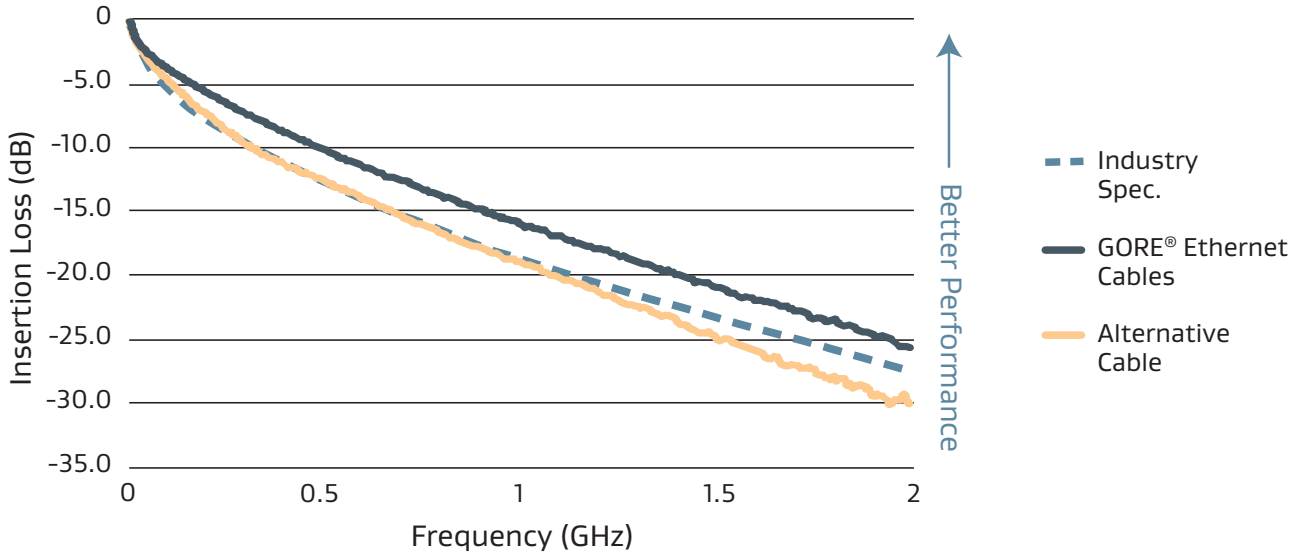
Figure 5: Shielding Effectiveness Comparison



Signal Integrity at Higher Frequencies

To meet Cat8 protocol, we compared our Ethernet 4-pair cable design with a leading alternative cable design. Results proved that our cable continued to deliver reliable signal integrity with lower insertion loss right out of the box up to 2000 MHz (Figure 6). In contrast, the leading alternative cable failed to meet the specification for Cat8 protocol at higher frequencies.

Figure 6: Insertion Loss Comparison



GORE® Ethernet Cables (Cat5e/6A/8)

Cable Preparation

Laser stripping is the ideal method to prep GORE® Ethernet Cables. Alternatively, Gore recommends using thermal or sharp mechanical strippers. Also, a unique method is to make a short, horizontal slit in the jacket material, peel it back to allow for contact termination and return the jacket to its original position for a neat closure (Figure 7).

Figure 7: Peel-Back Method

Connector-Cable Compatibility

Gore also evaluated the electrical characteristics of its Cat6A cable terminated with leading high-speed aerospace and defense connector systems to assist designers in selecting the best option for a specific application (Table 2). Testing connector-cable compatibility during the initial design process ensures interconnects will perform reliably in specific applications.

Visit **gore.com/ethernet-cat6a-cable-connectors** to download Gore's best practices for terminating the Cat6A version of GORE® Ethernet Cables with leading connector systems and related performance data.

Table 2: Ethernet Cat6A Interconnect Options

Gore's part numbers RCN8966-24 and RCN8966-26 include a unique inverted dielectric for termination with selected high-speed aerospace and defense connector systems — including Amphenol®, Glenair®, Platinum Tools®, and Sentinel®. For other connector systems not listed in the table, contact a Gore representative.

	Gore Part Number					
Connector System	**GSC-01-85237-VG**	**RCN8966-24**	**RCN9034-24**	**RCN8966-26**	**RCN9047-26**	**RCN9034-28**
Amphenol® Octonet		●		●		
Amphenol® Oval Contact System (OCS13-53)	●	●	●	●	●	●
Amphenol® µ-Com	●	●	●	●	●	●
Amphenol® Socapex OctoMax 1G26				●	●	●
Bel Stewart SS-39200 Series		●		●		
Carlisle Octax® M38999 (Size 11)	●	●	●	●	●	●
Carlisle Octax®	●	●	●	●	●	●
Glenair® El Ochito®				●	●	●
Glenair® El Ochito® Type 1	●					
Glenair® Octobyte™ (Series ITH Connector)	●					
HARTING RJ Industrial® 10G RJ45 (Part Number 09451511560)	●	●	●	●	●	●
ITT Cannon OctoGig™		●	●	●	●	●
LEMO® 2B Series	●	●	●	●	●	●
ODU AMC® Break-Away (Part Numbers S12YAR-PD8XJG0-0000 / A12YAR-PD8XJG0-0000)		●	●	●	●	●
ODU AMC® High-Density (Part Numbers A10WAM-PD8XBE0-0000 / C10WAM-PD8XBE0-0000)		●	●	●	●	●
Omnetics Micro 360® Cat6a					●	
Platinum Tools® EZ-RJ45® 106193		●		●		
Sentinel® 111S08080095HA4		●				
Sentinel® 111S08080095LA4				●		
TE Connectivity® CeeLok FAS-T®		●		●		●
TE Connectivity® CeeLok FAS-X®	●	●	●	●	●	●

Proven Installed Performance

Gore designed a simulator to evaluate the effects of severe bending on high-speed data cables while being routed through an airframe (Figure 8). The simulator has various mandrels in fixed positions that replicate minimum bend radius conditions for repeatability. The simulator also includes two cable cleats to hold tension.

Testing characteristics such as return loss and crosstalk after routing through the simulator verifies whether a cable can withstand the complex challenges of installation that can degrade signal integrity. Gore routed a 2-m (6.5-ft) cable through the simulator for 4 cycles and measured the electrical performance of its Cat6A version and alternative cables.

Results showed that Gore's Cat6A cable maintained a sufficient margin below the specification limit for return loss compared to the alternative cables (Figure 9). Gore's cable provided consistent impedance control at higher frequencies after routing, indicating reliable high data rate transfer at 10 Gb/s. Similarly, Gore's Cat6A cable maintained a consistent margin of 20 dB, providing lower crosstalk after routing, while the alternative cables showed a slight change in the margin (Figure 10).

Gore's testing proved that GORE® Ethernet Cables deliver exceptional performance after installation, reduce maintenance and downtime, and lower total costs over time.

Watch videos of Gore engineers demonstrating the durability and routability of our Ethernet Cat6A cables and download related white papers at **gore.com/cable-routing-simulators.**

Figure 8: Cable Routing Simulator

Figure 9: Return Loss Comparison after Routing

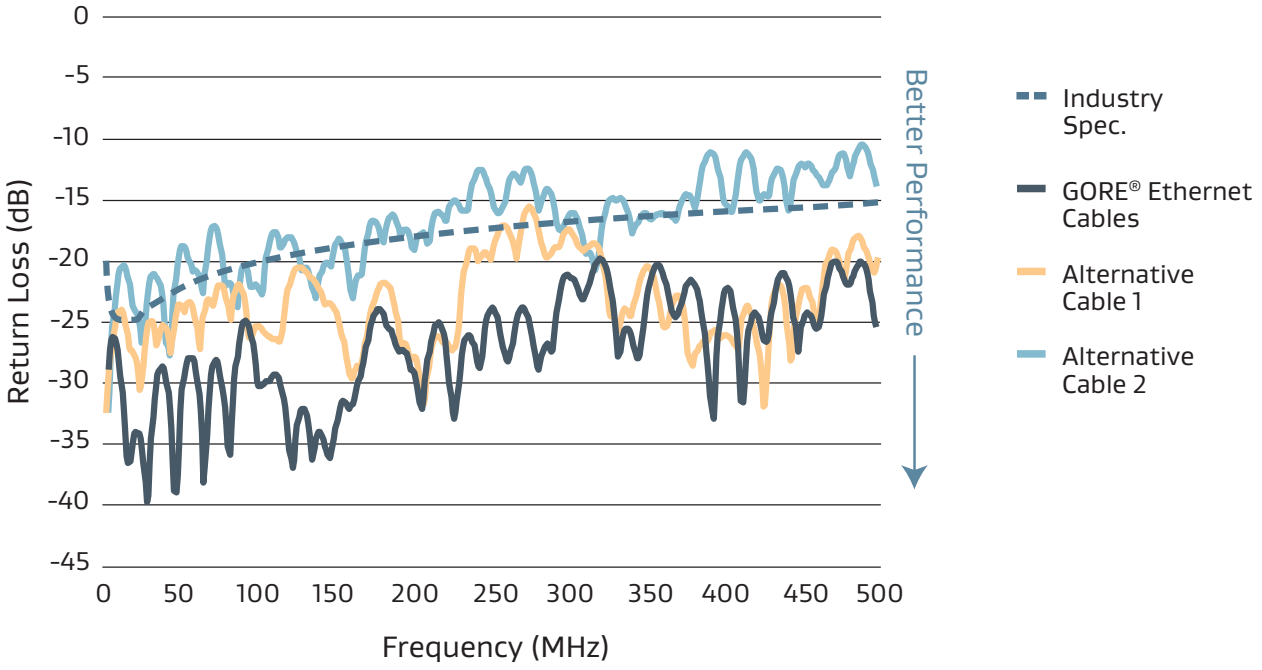
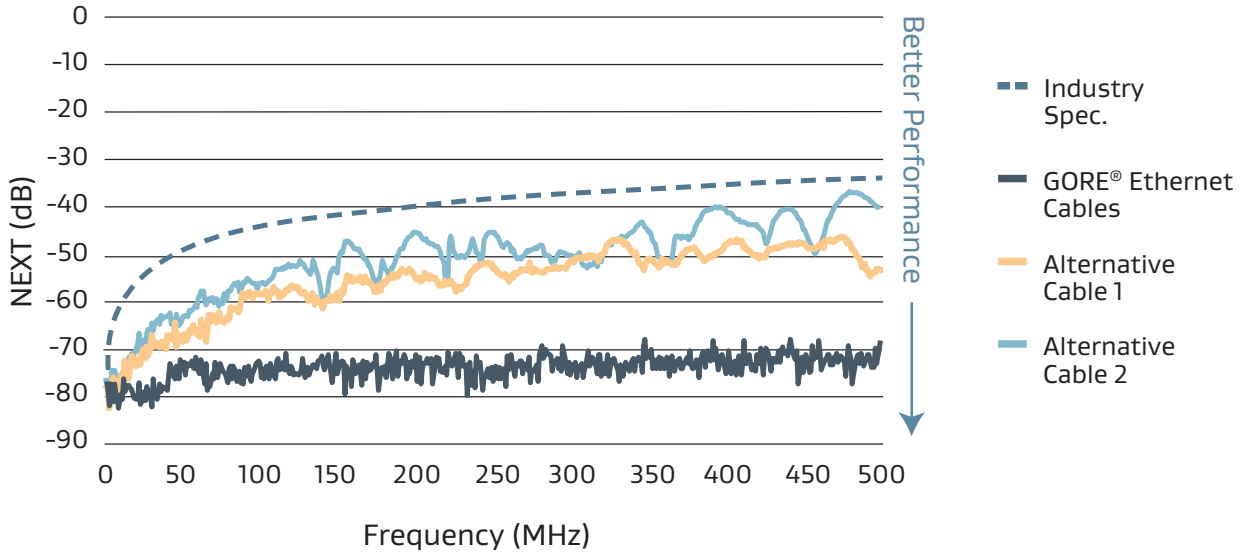


Figure 10: Crosstalk Comparison after Routing



GORE® Ethernet Cables (Cat5e/6A/8)

Samples & Ordering Information

The 4-pair version of GORE® Ethernet Cables are available in standard sizes (Table 3). Insertion loss values are based on the maximum recommended use length. To place an order, contact an authorized distributor for in-stock availability at **gore.com/cable-distributors.** To view our full inventory and order complimentary samples of selected products for prototyping and evaluation in your application, visit **gore.com/hsdc-sample-inventory-air-defense.**

For more information or to discuss specific characteristic limits and application needs – including other impedance options, contact a Gore representative today at **gore.com/aerospace-defense-contact.**

Gore's 4-pair Ethernet cables have been selected for many airborne and defense program updates such as the F-16.

Table 3: Cable Characteristics

Insertion loss values are based on the maximum recommended use length. Also, Gore's Cat6A part numbers RCN9034-24 and RCN9047-26 are approved to SAE AS6070 standards supporting AS50881 EWIS (electrical wiring interconnection systems) specifications. They are also on the Qualified Products List (QPL).

Cat8

Gore Part Number	Conductor	AWG Size (Stranding)	Max Outer Diameter mm (in)	Min Bend Radius mm (in)	Nom Weight kg/km (lb/1000 ft)	Maximum Insertion Loss dB/22 m (72.2 ft)				
						250 MHz	500 MHz	1000 MHz	1500 MHz	2000 MHz
RCN9241	Silver-Plated Copper	24 (19/36)	6.6 (0.26)	13.2 (0.52)	59.5 (40.0)	8.9	12.8	18.6	23.2	27.2
						dB/20 m (65.5 ft)				
RCN9235-24	SPC Alloy	24 (19/36)	6.6 (0.26)	13.2 (0.52)	59.5 (40.0)	8.9	12.8	18.6	23.2	27.2
						dB/18 m (59 ft)				
RCN9235-26	SPC Alloy	26 (19/38)	5.6 (0.22)	11.2 (0.44)	44.65 (30.0)	8.9	12.8	18.6	23.2	27.2

Cat6A

Gore Part Number	AWG Size (Stranding)	Maximum Outer Diameter mm (in)	Minimum Bend Radius mm (in)	Nominal Weight kg/km (lb/1000 ft)	Typical Insertion Loss dB/30 m (100 ft)		
					100 MHz	200 MHz	500 MHz
GSC-01-85237-VG	24 (19/36)	9.0 (0.35)	45.0 (1.77)	94.0 (63.1)	5.6	8.1	14.1
GSC-01-85238-VG	24 (19/36)	9.0 (0.35)	45.0 (1.77)	67.0 (45.0)	5.6	8.1	14.1
RCN8966-24	24 (19/36)	6.9 (0.27)	13.7 (0.54)	67.0 (45.0)	5.6	8.1	14.1
RCN9034-24	24 (19/36)	6.6 (0.26)	13.2 (0.52)	62.5 (42.0)	5.6	8.1	14.1
RCN8966-26	26 (19/38)	5.8 (0.23)	11.6 (0.46)	52.1 (35.0)	6.9	9.9	17.0
RCN9047-26	26 (19/38)	5.6 (0.22)	10.2 (0.44)	47.6 (32.0)	6.9	9.9	17.0
GSC-01-83134-VG	27 (07/34)	6.6 (0.26)	33.0 (1.29)	65.0 (43.7)	10.4	15.2	24.8
RCN9034-28	28 (19/40)	4.6 (0.18)	8.9 (0.35)	37.2 (25.0)	8.8	12.6	21.5

Cat5e

Gore Part Number	AWG Size (Stranding)	Maximum Outer Diameter mm (in)	Minimum Bend Radius mm (in)	Nominal Weight kg/km (lb/1000 ft)	Typical Insertion Loss dB/30 m (100 ft)	
					10 MHz	100 MHz
GSC-01-83471-00	24 (19/36)	6.3 (0.25)	30.0 (1.18)	56.0 (37.0)	2.3	8.1
GSC-01-83472-00	26 (19/38)	4.9 (0.19)	20.0 (0.79)	49.0 (32.9)	2.8	10.0

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