PRODUCT BULLETIN

PB: 003

High-speed Ethernet Cables

Thermax Gigabit Ethernet Cable Family

Thermax's Gigabit-10HP™, Gigabit-Plus™ and Gigabit-Flexx™ Ethernet cables meet the high-speed needs of aerospace, defense, military, ground transportation, industrial and RF communications applications. The three cable types also provide distinct, industry-leading performance, size and weight advantages.

- **Gigabit-10HP cables with Bonded-Pairs and X-Web ensure reliable 10 Gigabit performance up to 500 MHz at distances of up to 90m**
- **Gigabit-Plus cables with X-Web provide exceptional 1000 Base-T performance up to 250 MHz at distances of up to 100m**
- **Gigabit-Flexx cables are highly flexible with a bend radius of 0.75in (19.0mm) and provide 1000 Base-T performance up to 100 MHz at distances of up to 80m**

Key Advantages of Thermax Gigabit Ethernet Cable

- The 10 Gb HP Bonded-Pair design provides installation-friendly, superior electrical performance; the Web-X design reduces crosstalk
- Ideal for a range of high-speed Ethernet applications
- Small size and light weight
- Extremely durable
- Exceptional electrical and mechanical performance characteristics

Thermax's Gigabit Ethernet cables are RoHS compliant. They also meet the flammability requirements of FAR 25.853 and the smoke and toxicity requirements of Boeing and Airbus ABD0031.

Electrical Performance Attributes	
Impedance	100 ohms nominal
Time Delay	1.45 nS/ft (4.76 nS/m)
Delay Skew	45 nS/100 m
Vp	70% nominal
DC Resistance (maximum)	**26 AWG:** 4.38 ohms/100ft (14.7ohms/100m) **24 AWG:** 2.76 ohms/100ft (9.02ohms/100m)

Mechanical/Environmental Performance Attributes

		GIGABIT-10HP	GIGABIT-PLUS	GIGABIT-FLEXX
TEMPERATURE RATING		150°C	150°C	200°C
WEIGHT	26 AWG	——	3.5 lbs/100ft (1.59 kg/km)	2.8 lbs/100ft (1.27 kg/km)
	24 AWG	5.0 lbs/100ft (2.27 kg/km)	5.0 lbs/100ft (2.27 kg/km)	3.5 lbs/100ft (1.59 kg/km)
BEND RADIUS (minimum)	26 AWG	——	1.75in/44.5mm	0.75in/19.1mm, dynamic 0.50in/12.7mm, static
	24 AWG	0.50in/12.7mm	2.00in/50.8mm	1.00in/25.4mm, dynamic 0.75in/19.5mm, static
CABLING DISTANCE (maximum)	26 AWG	——	80m (1000 Base-T)	45m (1000 Base-T)
	24 AWG	90m (10G Base-T) 100m (1000 Base-T)	100m (1000 Base-T)	80m (1000 Base-T)

Thermax
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High-speed Ethernet Cables



Thermax Gigabit-10HP Ethernet Cables

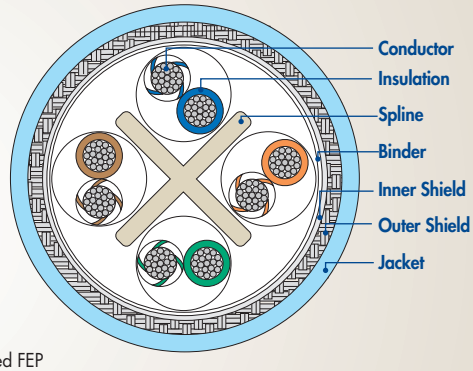
Thermax Gigabit-10HP cables with Bonded-Pairs ensure reliable 10 Gigabit performance up to 500 MHz at distances of up to 90m in the most extreme routing and application environments. The Bonded-Pair design is key to the superior electrical performance and reliability of the cable since the conductor-to-conductor spacing of the pairs is uniformly affixed, with no gaps, throughout the length of the cable. This unique performance-enhancing feature also makes the cables installation friendly, with far less troubleshooting and rework needed than nonbonded-pair cables. *(See illustrations.)* Gigabit-10HP cables also feature an innovative X-Web central spline which positions the wire pairs precisely to reduce crosstalk.

Applications:

- Ethernet Backbone
- High Definition Video
- Avionics
- Cabin Management Systems
- Ground Vehicle Bus

Construction Details

Pairs	Four (4) Bonded-Pairs
Conductor	**24 AWG** stranded (19x36) silver-plated copper alloy 0.0235in/0.60mm diameter
Insulation	Extruded fluoropolymer 0.046in/1.17mm
Spline	X-Web
Binder	Skive PTFE tape
Inner Shield	Aluminum/Mylar 100% coverage
Outer Shield	Round silver-plated copper braid 85% minimum coverage 0.245in/6.22mm diameter
Jacket	Transparent Blue or Black extruded FEP 0.270in/6.86mm diameter



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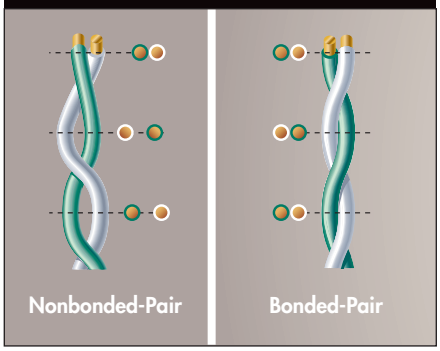
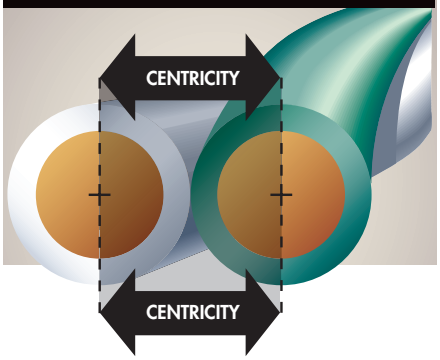
Bonded-Pairs



Nonbonded-pairs (left) have the potential to gap, varying the centricity of the two conductors. Bonded-Pairs (right) do not gap so the physical integrity of the pair is maintained, providing consistently reliable electrical performance.

Bonded-Pair Centricity



In Bonded-Pair cables, the distance between the conductors, or the conductor-to-conductor centricity, remains fixed and stable along the length of the twisted pair, providing consistent electrical performance.

24 AWG Gigabit-10HP Cable - 10 Gigabit (MX10G-24HP)

Electrical Properties (Guarantee vs. Typical)		Frequency (MHz)										
		1	4	8	10	20	100	200	250	300	400	500
Attenuation (dB/100m)	Guarantee	2.4	4.9	7.0	7.8	11.1	26.4	35.2	40.0	43.7	51.2	58.0
	Typical	2.0	4.1	5.5	6.0	8.8	21.0	30.0	32.0	35.0	40.0	48.0
NEXT (dB)	Guarantee	75.3	66.3	61.8	60.3	55.8	45.3	40.8	39.3	38.1	36.3	34.8
	Typical	94.0	90.0	83.0	83.0	76.0	70.0	65.0	63.0	60.0	54.0	51.0
PSNEXT (dB)	Guarantee	73.3	64.3	59.8	58.3	53.8	43.3	38.8	37.3	36.1	34.3	32.8
	Typical	88.0	79.0	78.0	75.0	69.0	62.0	57.0	55.0	48.0	47.0	40.0
ELFEXT (dB)	Guarantee	70.1	58.3	52.6	51.1	44.9	30.8	24.8	23.3	21.5	18.7	16.8
	Typical	98.0	90.0	84.0	82.0	77.0	61.0	57.0	55.0	54.0	50.0	45.0
PS-ELFEXT (dB)	Guarantee	68.2	56.3	50.6	49.1	42.8	28.8	22.8	21.7	19.3	16.7	14.8
	Typical	93.0	83.0	76.0	75.0	70.0	55.0	48.0	47.0	45.0	38.0	40.0
Return Loss (dB)	Guarantee	20.2	23.1	24.5	24.9	25.0	20.1	18.0	17.0	16.8	15.9	15.2
	Typical	28.0	35.0	35.0	43.0	40.0	35.0	35.0	32.0	30.0	29.0	32.0

Connector requirement: 26 AWG must accept 0.036in insulation diameter and 0.180in cable diameter (e.g., standard shielded RJ45)
24 AWG must accept 0.045in insulation diameter (e.g., Sentinel part 106S08080058C34, RJ45)

High-speed Ethernet Cables



Thermax Gigabit-Plus Ethernet Cables

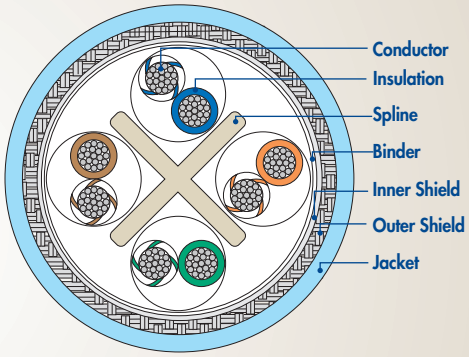
Thermax Gigabit-Plus cables with the innovative X-Web central spline provide exceptional 1000 Base-T performance up to 250 MHz at distances of up to 100m. These 150°C rated, highly durable cables are a perfect match for a wide variety of demanding data applications. The X-Web spline reduces crosstalk and eliminates the need for individual pair shielding. Gigabit-Plus cables are also more durable, smaller in overall size and lighter in weight than comparable cables.

Applications:

- Ethernet Backbone
- Avionics
- In-flight Entertainment Systems
- Cabin Management Systems
- Ground Vehicle Bus

Construction Details

Pairs	Four (4) twisted pairs
Conductor	**26 AWG** stranded (19x38) silver-plated copper alloy 0.0189in/0.48mm diameter **24 AWG** stranded (19x36) silver-plated copper alloy 0.235in/0.60mm diameter
Insulation	Extruded fluoropolymer **26 AWG**: 0.036in/0.91mm diameter **24 AWG**: 0.045in/1.143mm diameter
Spline	X-Web
Binder	Skive PTFE tape
Inner Shield	Aluminum/Mylar, 100% coverage
Outer Shield	Round silver-plated copper braid 85% minimum coverage **26 AWG**: 0.200in/5.08mm diameter **24 AWG**: 0.245in/6.22mm diameter
Jacket	Transparent Blue or Black extruded FEP **26 AWG**: 0.225in/5.72mm diameter **24 AWG**: 0.270in/6.86mm diameter



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Gigabit-Plus Cable - 1000 Base-T (MX10G-24 and MX10G-26)

Electrical Properties (Guarantee vs. Typical)		Frequency (MHz) 1	4	8	10	20	100	200	250
Attenuation (dB/100m)									
26 AWG	Guarantee	2.9	5.9	8.4	9.4	14.0	31.6	42.2	47.6
	Typical	2.4	5.0	7.0	7.7	11.2	26.4	37.2	42.0
24 AWG	Guarantee	2.4	4.9	7.0	7.8	11.1	26.4	35.2	40.0
	Typical	2.0	4.2	5.8	6.4	9.3	22.0	31.0	35.0
NEXT (dB)									
26 AWG	Guarantee	74.3	65.3	60.8	59.3	54.8	44.3	39.8	38.3
	Typical	93.0	80.0	74.0	72.0	71.0	57.0	55.0	53.0
24 AWG	Guarantee	74.3	65.3	60.8	59.3	54.8	44.3	39.8	38.3
	Typical	93.0	80.0	74.0	72.0	71.0	57.0	55.0	53.0
PSNEXT (dB)									
26 AWG	Guarantee	72.3	63.3	58.8	57.3	58.0	42.3	37.8	36.3
	Typical	85.0	73.0	66.0	65.0	64.0	51.0	48.0	46.0
24 AWG	Guarantee	72.3	63.3	58.8	57.3	58.0	42.3	37.8	36.3
	Typical	85.0	73.0	66.0	65.0	64.0	51.0	48.0	46.0
ELFEXT (dB)									
26 AWG	Guarantee	67.8	55.8	49.7	47.8	41.8	27.8	21.8	19.8
	Typical	95.0	83.0	78.0	75.0	71.0	55.0	46.0	36.0
24 AWG	Guarantee	67.8	55.8	49.7	47.8	41.8	27.8	21.8	19.8
	Typical	95.0	83.0	78.0	75.0	71.0	55.0	46.0	36.0
PS-ELFEXT (dB)									
26 AWG	Guarantee	64.8	52.8	46.7	44.8	38.8	24.7	18.8	16.8
	Typical	88.0	79.0	75.0	73.0	67.0	50.0	42.0	38.0
24 AWG	Guarantee	64.8	52.8	46.7	44.8	38.8	24.7	18.8	16.8
	Typical	88.0	79.0	75.0	73.0	67.0	50.0	42.0	38.0
Return Loss (dB)									
26 AWG	Guarantee	20.2	23.1	24.5	24.9	25.0	19.0	16.4	15.6
	Typical	36.0	42.0	35.0	32.0	34.0	34.0	26.0	26.0
24 AWG	Guarantee	20.2	23.1	24.5	24.9	25.0	19.0	16.4	15.6
	Typical	36.0	42.0	35.0	32.0	34.0	34.0	26.0	26.0

Connector requirement: 26 AWG must accept 0.036in insulation diameter and 0.180in cable diameter (e.g., standard shielded RJ45)
24 AWG must accept 0.045in insulation diameter (e.g., Sentinel part 106S08080058C34, RJ45)

High-speed Ethernet Cables



Thermax Gigabit-Flexx Ethernet Cable

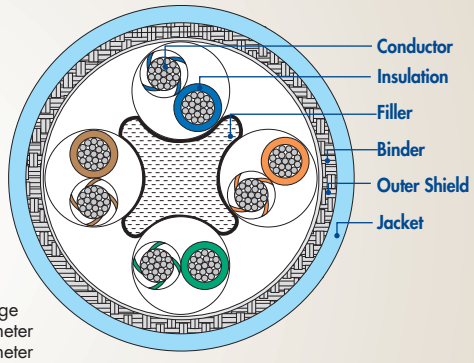
Thermax Gigabit-Flexx cables have a bend radius of 0.75in (19.0mm) which makes them extremely flexible and easy to route in tight spaces. The small cable diameter provides the most efficient use of space. They provide 1000 Base-T performance up to 100 MHz at distances of up to 80m and they are more durable, lighter in weight and smaller in overall size than comparable cables.

Applications:

- In-flight Entertainment Systems (esp. seat-to-seat connections)
- Cabin Management Systems
- Ground Vehicle

Construction Details

Pairs	Four (4) twisted pairs
Conductor	**26 AWG** stranded (19x38) silver-plated copper alloy 0.0189in/0.48mm diameter **24 AWG** stranded (19x36) silver-plated copper alloy 0.0235in/0.60mm diameter
Insulation	Fluoropolymer **26 AWG**: 0.036in/0.91mm diameter **24 AWG**: 0.045in/1.132mm diameter
Binder	Skive PTFE tape
Shield	Round silver-plated copper alloy braid 80% minimum coverage **26 AWG**: 0.180in/4.57mm diameter **24 AWG**: 0.230in/5.84mm diameter
Jacket	White or Black PTFE **26 AWG**: 0.195in/4.9mm diameter **24 AWG**: 0.245in/6.22mm diameter



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Gigabit-Flexx Cable - 1000 Base-T (MX10G-24FLX and MX10G-26FLX)

Electrical Properties (Guarantee vs. Typical)		Frequency (MHz) 1	4	8	10	20	100
Attenuation (dB/100m)							
26 AWG	Guarantee	2.9	5.9	8.4	9.4	14.0	31.6
	Typical	2.7	5.1	8.1	8.4	12.0	28.8
24 AWG	Guarantee	2.4	4.9	7.0	7.8	11.1	26.4
	Typical	2.3	4.3	6.8	7.0	10.0	24.0
NEXT (dB)							
26 AWG	Guarantee	65.3	56.3	51.8	50.3	45.8	35.3
	Typical	90.0	75.0	72.0	68.0	62.0	54.0
24 AWG	Guarantee	65.3	56.3	51.8	50.3	45.8	35.3
	Typical	90.0	75.0	72.0	68.0	62.0	54.0
PSNEXT (dB)							
26 AWG	Guarantee	62.3	35.3	48.8	47.3	42.8	32.3
	Typical	78.0	62.0	60.0	59.0	55.0	45.0
24 AWG	Guarantee	62.3	35.3	48.8	47.3	42.8	32.3
	Typical	78.0	62.0	60.0	59.0	55.0	45.0
ELFEXT (dB)							
26 AWG	Guarantee	63.8	51.7	45.7	43.8	37.7	23.8
	Typical	93.0	80.0	73.0	68.0	62.0	49.0
24 AWG	Guarantee	63.8	51.7	45.7	43.8	37.7	23.8
	Typical	93.0	80.0	73.0	68.0	62.0	49.0
PS-ELFEXT (dB)							
26 AWG	Guarantee	60.8	48.7	42.7	40.8	36.7	20.8
	Typical	80.0	52.0	60.0	57.0	50.0	40.0
24 AWG	Guarantee	60.8	48.7	42.7	40.8	36.7	20.8
	Typical	80.0	52.0	60.0	57.0	50.0	40.0
Return Loss (dB)							
26 AWG	Guarantee	20.0	23.0	24.5	25.0	25.0	19.0
	Typical	32.0	29.0	32.0	31.0	31.0	29.0
24 AWG	Guarantee	20.0	23.0	24.5	25.0	25.0	19.0
	Typical	32.0	29.0	32.0	31.0	31.0	29.0

Connector requirement: 26 AWG must accept 0.036in insulation diameter and 0.180in cable diameter (e.g., standard shielded RJ45)
24 AWG must accept 0.045in insulation diameter (e.g., Sentinel part 106S08080058C34, RJ45)

Pair Color Combinations (All Versions)

Pair No.	Color
1.	White/Blue, Blue
2.	White/Orange, Orange
3.	White/Green, Green
4.	White/Brown, Brown

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Note: These standard specifications have been met with the use of test equipment and procedures developed by Thermax. This product bulletin does not constitute a warranty that the product will meet the above specifications while used in specific applications or attached to specific test equipment.