

SpaceNXT™ Q Series

Space Qualified Coaxial Cable Assemblies



Smiths Interconnect's SpaceNXT™ product portfolio provides customers with a combination of highly reliable technology and lower cost of ownership that enables operators to overcome potential market entry barriers while enjoying the benefits of an established technology partner.

The SpaceNXT™ Q series is part of Smiths Interconnect's overarching initiative entailing the creation of an entire range of higher reliability products for next generation space applications that are readily available to the market.

All products have gone through extensive qualification testing in order to validate today's rigorous application requirements per customer and industry. Q series assemblies are made with low loss ePTFE insulation, and constructed with materials which meet the outgassing requirements of NASA/ESA when tested per ASTM E595. The outer jackets use an ETFE material for maximum radiation resistance. 105Q, 190Q, and 200Q product models are specifically designed for space flight applications on LEO, MEO, and GEO satellites and offered with standardized testing sequences, reducing delivery times and overall cost of ownership.

SpaceNXT™ Q series, specifically designed and tested for next generation commercial space applications.

Features and Benefits

- Up to 40 GHz
- 100% Flight Test Data
- Low Loss Dielectric Material to Provide Low Attenuation
- Superior Shielding Effectiveness
- Direct Solder Sleeves to Outer Braids for Superior Reliability
- Vented Connector Designs Where Needed
- Stainless Steel Connectors or BeCu Connectors
- Phased Matched Pairs and Sets Available (standard tolerance is +/- one degree per GHz or +/-2.8 picoseconds)

Applications:

- Satellite Communication & Navigation
- Military, Commercial and Scientific Programs
- GEO/MEO/LEO and Small Satellites
- Manned Space Flight

Technical Characteristics

Electrical

| | 105Q | 190Q | 200Q |
|---|----------------|------------|---------------|
| Frequency, Max (GHz) | 40 | 32 | 18 |
| Impedance, nominal (Ω) | 50 | 50 | 50 |
| Velocity of Propagation (%) | 70 | 80 | 80 |
| Shielding Effectiveness, 18 GHz (dB/ft) | > -110dB | > -90dB | > -90dB |
| Capacitance (pF/ft) | 30 | 25 | 25 |
| Delay (ns/ft), (ns/meter) | 1.45, 4.761024 | 1.27, 4.17 | 1.3, 4.268504 |
| Attenuation k1 (db/100ft) @ 23 deg C | 0.576 | 0.28 | 0.222 |
| Attenuation k2 (db/100ft) @ 23 deg C | 0.00099 | 0.000179 | 0.000175 |

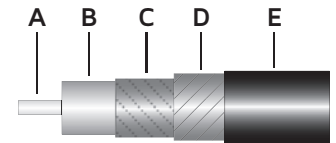
Attenuation (Typical) at any Frequency = k1 x SqRt (FMHz) + k2 x (FMHz)

Mechanical & Environmental

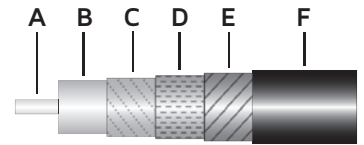
| | 105Q | 190Q | 200Q |
|----------------------------------|-----------------|-----------------|-----------------|
| Weight (lbs/100ft), (Kg/100m) | 1.28, 1.90 | 3.30, 4.96 | 4.40, 6.61 |
| Temperature Range (°C) | -55°C to +150°C | -55°C to +150°C | -65°C to +150°C |
| Minimum Bend Radius (inch), (mm) | 0.625, 15.87 | 0.95, 24.13 | 1.00, 25.40 |

Construction

| | A | B | C | D | E | F |
|----------------------------|---|-------------|----------------|----------------|----------------|----------------|
| Inner Conductor (inch) | A | Solid SCCS | Solid SC | Solid SC | Solid SC | Solid SC |
| Dielectric (inch) | B | Solid PTFE | Tape Wrap PTFE | Tape Wrap PTFE | Tape Wrap PTFE | Tape Wrap PTFE |
| First Outer Shield (inch) | C | SPC Spiral | Flat Braid SPC | Flat Braid SPC | Flat Braid SPC | Flat Braid SPC |
| Second Outer Shield (inch) | D | SPC Round | Metalized Tape | Metalized Tape | Metalized Tape | Metalized Tape |
| Third Outer Shield (inch) | E | - | Round Braid SC | Round Braid SC | Round Braid SC | Round Braid SC |
| Jacket (inch O.D.) | F | 0.105, ETFE | 0.190, ETFE | 0.190, ETFE | 0.200, ETFE | 0.200, ETFE |



SpaceNXT™ 105Q



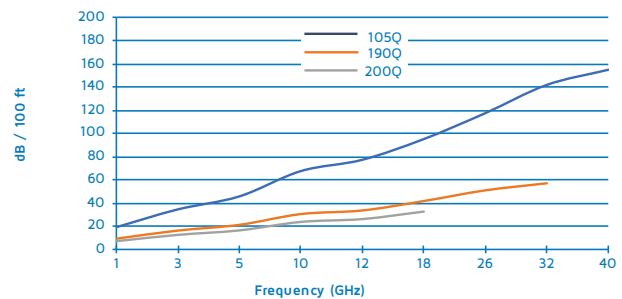
SpaceNXT™ 190Q and 200Q

Attenuation (dB/100ft)

| GHz | 105Q | 190Q | 200Q |
|-----|--------|------|------|
| 1 | 19.2 | 9.4 | 7.2 |
| 3 | 34.5 | 16.4 | 12.7 |
| 5 | 45.7 | 21.4 | 16.6 |
| 10 | 67.5 | 30.8 | 24.0 |
| 12 | 74.22 | 33.9 | 26.4 |
| 18 | 95.1 | 42.1 | 33.0 |
| 26 | 117.43 | 51.4 | |
| 32 | 133.37 | 57.6 | |
| 40 | 154.8 | | |

Typical Cable Loss at +25° C & Sea Level

Attenuation vs Frequency

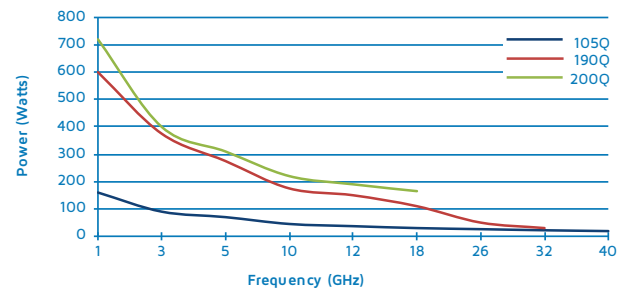


Average Power Rating (Watts)

| GHz | 105Q | 190Q | 200Q |
|-----|------|------|------|
| 1 | 160 | 600 | 720 |
| 3 | 90 | 375 | 400 |
| 5 | 70 | 275 | 310 |
| 10 | 45 | 175 | 220 |
| 12 | 37 | 150 | 190 |
| 18 | 30 | 110 | 165 |
| 26 | 26 | 50 | |
| 32 | 22 | 30 | |
| 40 | 19 | | |

Typical Cable Loss at +25° C & Sea Level

Average Power Rating



Technical Characteristics

| Cable Code | Connector Code | Series | Gender | Type | C-Nut Style ¹ | Body Material ² | Body Finish ³ | Loss per GHz | Frequency Max GHz |
|------------------|----------------|--------|--------|----------|--------------------------|----------------------------|--------------------------|--------------|-------------------|
| 105Q | KFS | 2.9mm | Female | Straight | N/A | SS | P | 0.015 | 40 |
| 105Q | KMS | 2.9mm | Male | Straight | H | SS | P | 0.01 | 40 |
| 105Q | SFS | SMA | Female | Straight | N/A | SS | P | 0.015 | 18 |
| 105Q | SMPFS | SMP | Female | Straight | N/A | Be | G | 0.01 | 40 |
| 200Q | TMS | TNC | Male | Straight | H | SS | P | 0.01 | 18 |
| 200Q | NMS | Type-N | Male | Straight | H | SS | P | 0.01 | 18 |
| 105Q, 190Q, 200Q | SMS | SMA | Male | Straight | H | SS | P | 0.01 | 18 |
| 190Q | KMR | 2.9mm | Male | R/A | H | SS | P | 0.02 | 32 |
| 190Q, 200Q | SMR | SMA | Male | R/A | H | SS | P | 0.02 | 18 |
| 190Q | KMS | 2.9mm | Male | Straight | H | SS | P | 0.01 | 32 |
| 200Q | KMS | 2.9mm | Male | Straight | H | SS | P | 0.01 | 18 |
| 200Q | TMR | TNC | Male | R/A | H | SS | P | 0.02 | 18 |

¹C-nut Style: H= Hex, K=Knurled, HK= Hex Nut & Knurled

²Body Materials: B=Brass, SS=Stainless Steel, Be= Beryllium Copper

³Body Finish: N= Nickel, S=Silver, G=Gold, P= Passivated, T= Tri-metal

Sex of connector is determined by center pin

| Cable Code | Option Code | Option Description | Option Details |
|----------------------|-------------|--------------------|--------------------------------|
| 105Q 190Q 200Q | +/-2.8ps | Phase Match | Standard Tolerance of +/-2.8ps |

*for phase matched assemblies (+/-2.8ps) is required to be added to the end of standard part number

example: NMS-200Q-120.0-NMS +/-2.8ps

Custom Options:

The above connectors and options represent the most common types used. Smiths Interconnect offers a wide range of cables, connectors and options.

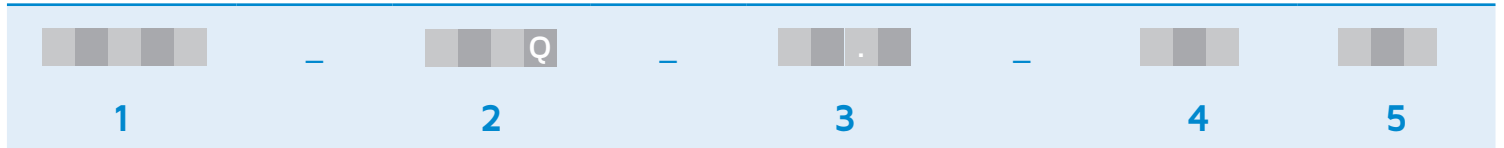
If you do not see an option you require please consult the sales department.

Qualification Summary

| Test Plan | Description | |
|---------------------------------|--|-------------------------|
| TP-9229 | Internal Test Procedure for Phase Over Temperature Requirements | |
| Products Tested | QTY | Testing Sequence |
| KMS-105Q-48.0-KMS +/-2.8ps | 4 | 1,2 |
| KMS-190Q-48.0-KMS +/-2.8ps | 4 | 1,2 |
| SMS-200Q-48.0-SMS +/-2.8ps | 4 | 1,2 |
| Testing Sequence 1 | Requirements | Results |
| Phase Match Assemblies | +/-2.8ps | Pass |
| VSWR and Insertion Loss | Per Cable Specifications | Pass |
| Phase Over Temperature | Characterization Test | Recorded |
| VSWR and Insertion Loss | Per Cable Specifications | Pass |
| Testing Sequence 2 | Requirements | Results |
| Phase Tracking Over Temperature | Measure and Record Results | Recorded |
| TP-9140 | Internal Test Qualification Procedure for Space Flight Cables | |
| Products Tested | QTY | Testing Sequence |
| SMS-200Q-12.0-SMS | 7 | 2 |
| SMS-105Q-12.0-SMS | 5 | 2 |
| SSMS-060Q-12.0-SSMS | 5 | 2 |
| SMS-200Q-39.4-SMS | 4 | 3 |
| TMS-200Q-39.4-TMS | 4 | 3 |
| Cable 200Q | 4 ft. | 1 |
| Cable 190Q | 1 ft. | 1 |
| Testing Sequence 1 | Requirements | Results |
| Group A Inspection Tests | Per MIL-DTL-17H | Pass |
| Group B Inspection Tests | Per MIL-DTL-17H | Pass |
| Testing Sequence 2 | Requirements | Results |
| Insertion Loss (pre-Radiation) | Per Cable Specifications | Pass |
| Radiation Dosage | Cables Exposed to Various Levels of Radiation | Recorded |
| Insertion Loss (post-radiation) | Measure and Record Delta to Original Results | Recorded |
| Testing Sequence 3 | Requirements | Results |
| DWV | Mil-STD-202 Method 301 | Recorded |
| Radiation Dosage | Measure and Record Results | Recorded |
| Random and Sine Vibration | MIL-STD-202 Method 214A Conditions IIG, Swept Sine, 5-100Hz, 2 oct/min | Recorded |
| Thermal Cycles | 100X Thermal Cycles | Recorded |
| Shielding Effectiveness | Measure and Record Results | Recorded |
| CW Power | Measure and Record Results | Recorded |
| Connector Retention | Measure and Record Results | Recorded |
| X-ray | MIL-STD 202 Method 209 | Recorded |
| DPA | Verification of Mechanical Integrity | Recorded |
| VSWR and Insertion Loss | Recorded Between Each Step Above | Pass |

Summary: Cable and connectors individually all passed industry requirements outlined in MIL standards for group A and B tests. Cable assemblies, after going through testing sequences, eventually passed. One noted exception was SMA male connectors which saw increased VSWR after tests performed in sequence 3 testing per TP-9140. Cause of failures was identified during DPA.

How To Order



1 Connector #1

K F S 2.9mm Female Straight

K M R 2.9mm Male R/A

K M S 2.9mm Male Straight

N M S Type N Male Straight

S F S SMA Female Straight

S M P F S SMP Female Straight

S M R SMA Male R/A

S M S SMA Male Straight

T M R TNC Male R/A

T M S TNC Male Straight

2 Cable *(fixed)*

1 0 5 SpaceNXT™ 105Q

1 9 0 SpaceNXT™ 190Q

2 0 0 SpaceNXT™ 200Q

3 Length *(inches)*

3 6 . 0 Example: 36 in.

4 Connector #2

S M S SMA Male Straight

N M S Type N Male Straight

K M S 2.9 mm Male Straight

5 Assembly Option

+/- 2.8 ps +/-2.8ps Phase Matched Electrical Length

None

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