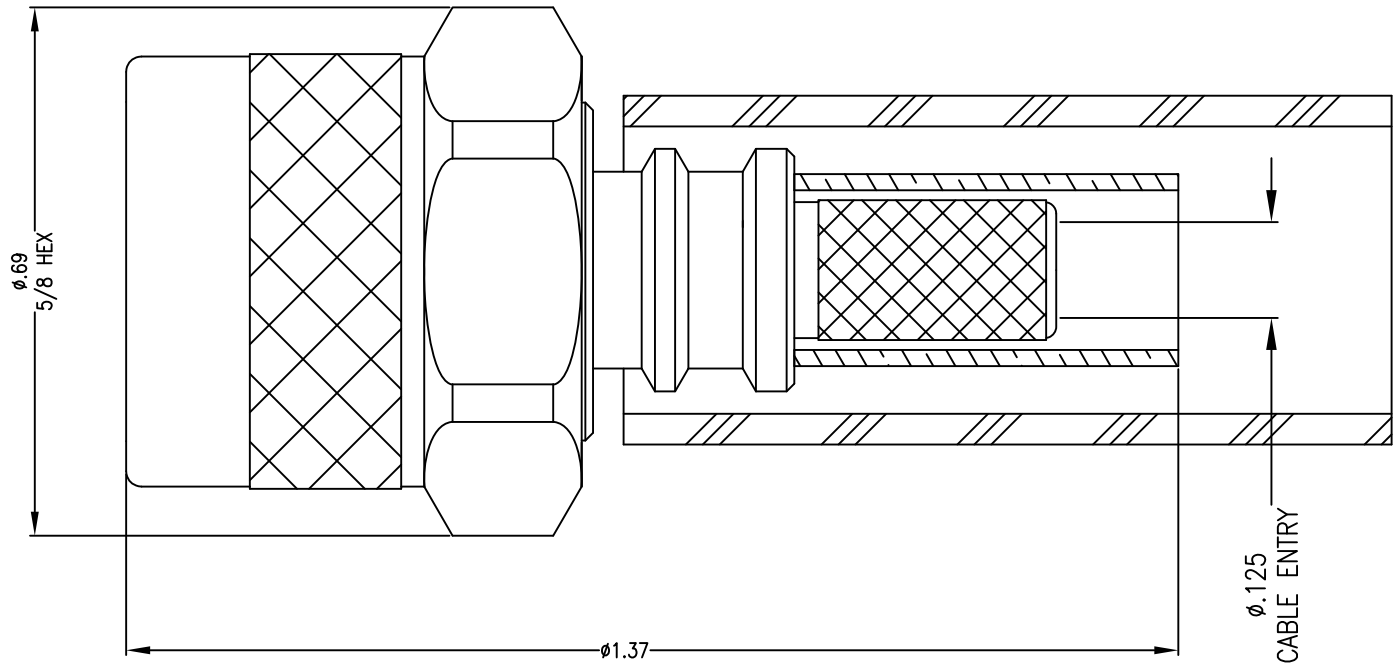


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| SYM | REVISION DESCRIPTION    | DFTM  | DATE   | APPD   | DATE   |
|-----|-------------------------|-------|--------|--------|--------|
| A   | RELEASED FOR PRODUCTION | N.N.N | 6/2/14 | J.D.B. | 6/5/14 |



- 1.0 PERFORMANCE  
 1.1 FREQUENCY RANGE: DC-6 GHz  
 1.2 NOMINAL IMPEDANCE: 50 OHMS  
 1.3 DWV: 500 VRMS @ 60 Hz (SEA LEVEL)  
 1.4 TEMPERATURE RANGE: -65°C TO +165°C

- 2.0 MATERIALS  
 2.1 DIELECTRIC: PTFE  
 2.2 CONTACT: BERYLLIUM COPPER  
 2.3 LOCKING RING: PHOSPHOR BRONZE  
 2.4 CRIMP FERRULE: SOFT COPPER  
 2.5 OTHER METAL PARTS: BRASS  
 2.6 GASKET: SILICONE RUBBER  
 2.7 HEAT SHRINK: POLYOLEFIN THICK WALL

3.0 FINISHES: SEE TABLE

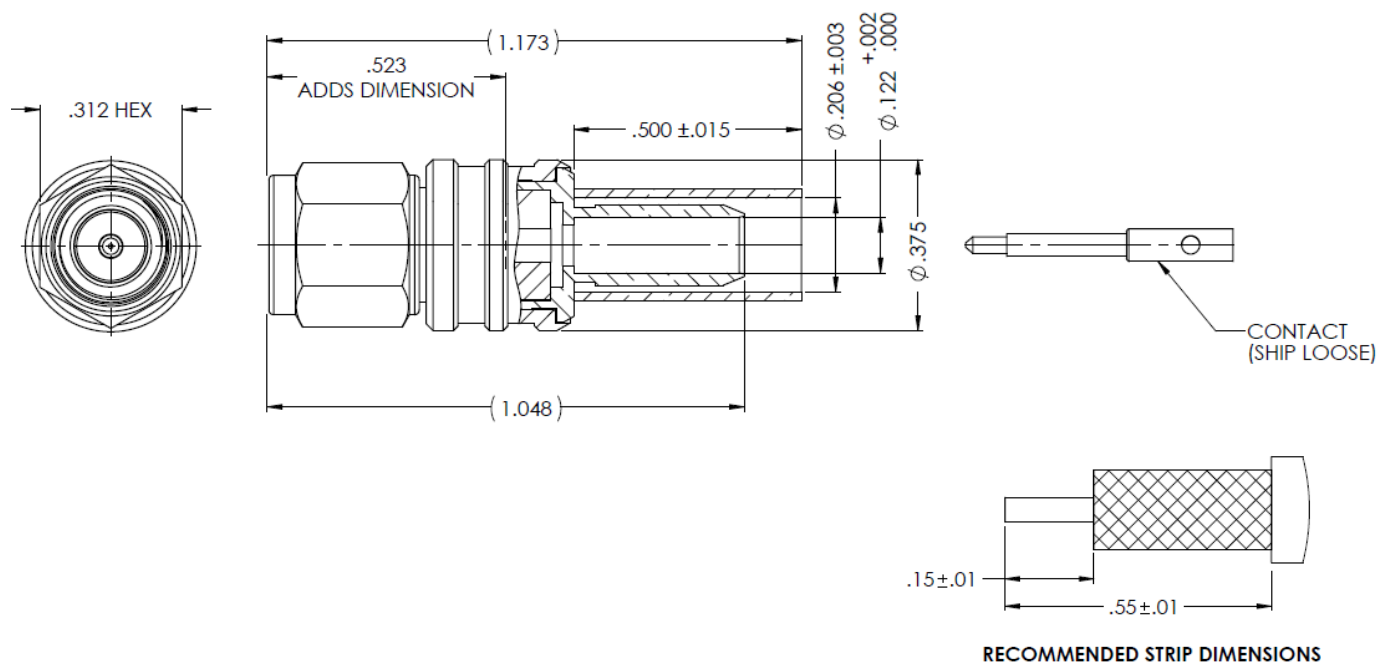
- 4.0 MECHANICAL  
 4.1 INTERFACE PER MIL-STD-348

| BODY    | CONTACT |
|---------|---------|
| ALBALOY | GOLD/NI |

|            |                                                                                                                                                                                                                                                                   |                      |                                                 |             |                              |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------|-------------|------------------------------|
| MATL:      | UNLESS OTHERWISE SPECIFIED<br>ALL DIMENSIONS ARE IN INCHES<br>MACHINED SURFACES FINISH N/A RMS MAX.<br>REMOVE ALL BURRS .005 MAX. BREAK<br>MACHINE CORNERS .005 MAX. FILLET R.<br>TOLERANCES ON DECIMALS<br>.XX ± .03 .XXX ± .005<br>ANGLES ± 1° FRACTIONS ± 1/32 | DFTM. N. N. N        | TIMES MICROWAVE SYSTEMS                         |             |                              |
|            |                                                                                                                                                                                                                                                                   | DATE 6/2/14          | <b>EZ-200-TM-X</b><br>TNCM<br>FOR LMR-200 CABLE |             |                              |
| USED ON: A |                                                                                                                                                                                                                                                                   | CHKD. J. D. B.       |                                                 |             |                              |
|            |                                                                                                                                                                                                                                                                   | DATE 6/5/14          |                                                 |             |                              |
|            |                                                                                                                                                                                                                                                                   | APPD. J. D. B.       |                                                 |             |                              |
| SCALE: N/A | DWG. SIZE A                                                                                                                                                                                                                                                       | DO NOT SCALE DRAWING | CODE IDENT 68999                                | DATE 6/5/14 | SHT 1 of 1 SD3190-2885 REV A |

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| SYM | REVISION DESCRIPTION    | DFTM   | DATE    | APPD   | DATE    |
|-----|-------------------------|--------|---------|--------|---------|
| A   | RELEASED FOR PRODUCTION | N.N.N. | 9/5/13  | J.D.B. | 9/10/13 |
| B   | CHANGED PER CDC #49330  | D.J.H. | 6/19/18 | N.N.N. | 6/19/18 |



#### NOTES:

- ASSEMBLED CONNECTOR INTERFACE IS DESIGNED IN ACCORDANCE WITH MIL-STD-348.
- MATERIAL:
  - BODY, NUT - STAINLESS STEEL PER ASTM 582, S30300 ALLOY, COND. A
  - INSULATOR - TEFLON PER ASTM D1710, TYPE 1, GRADE 1, CLASS A
  - CONTACT & TAIL - BRASS PER ASTM B16, C36000 ALLOY, TEMPER H02
  - GASKET - SILICONE RUBBER PER A-A-59588, 50-75 DUROMETER
  - SHRINK SLEEVE - HEAT SHRINKABLE ATUM PER MIL-I-23053/4 (NOT SHOWN)
  - CRIMP SLEEVE - D.H.P. COPPER CDA, ALLOY #122, TEMPER HARD
  - LOCKING RING - BERYLLIUM COPPER PER ASTM B196, C17300 ALLOY, CONDITION HT
- FINISH:
  - CONTACT - GOLD PLATE PER ASTM B488
  - TAIL - NICKEL PLATE PER AMS-QQ-N-290
  - CRIMP SLEEVE - SULFAMATE NICKEL PER MIL-P-27418
  - ALL OTHER METAL PARTS - PASSIVATE PER SAE-AMS-2700

|             |                                                                                                                                                                                                                                    |                      |                         |              |                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|--------------|--------------------------------|
| MATL:       | UNLESS OTHERWISE SPECIFIED                                                                                                                                                                                                         | DFTM. N. N. N.       | TIMES MICROWAVE SYSTEMS |              |                                |
|             |                                                                                                                                                                                                                                    | DATE 9/5/13          | TC-200-SM-SS-X          |              |                                |
| USED ON: A  | ALL DIMENSIONS ARE IN INCHES<br>MACHINED SURFACES FINISH 63 RMS MAX.<br>REMOVE ALL BURRS .004 MAX. BREAK<br>MACHINE CORNERS .005 MAX. FILLET R.<br>TOLERANCES ON DECIMALS<br>.XX ± .01 .XXX ± .005<br>ANGLES ± 1° FRACTIONS ± 1/64 | CHKD. J. D. B.       | CONNECTOR ASSEMBLY      |              |                                |
|             |                                                                                                                                                                                                                                    | DATE 9/10/13         | SMAM for LMR-200        |              |                                |
| SCALE: NONE | DWG. SIZE A                                                                                                                                                                                                                        | DO NOT SCALE DRAWING | CODE IDENT 68999        | DATE 9/10/13 | SHEET 1 of 1 SD3190-2881 REV B |

## LMR<sup>®</sup>-200 Flexible Low Loss Communications Coax

### Ideal for...

- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs
- Any application (e.g. WLL, GPS, LMR, WLAN, WISP, WiMax, SCADA, Mobile Antennas) requiring an easily routed, low loss RF cable

• **LMR<sup>®</sup>** standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables.

• **LMR<sup>®</sup>-DB** is identical to standard LMR plus has the advantage of being watertight. The addition of waterproofing compound in and around the foil/braid insures continuous reliable service should the jacket be inadvertently damaged during installation or in the future.

• **LMR<sup>®</sup>-FR** is a non-halogen (non-toxic), low smoke, fire retardant cable designed for in-building runs that can be routed anywhere except air handling plenums. LMR-FR is UL/NEC & CSA rated 'CMR' and 'FT4' respectively, meets FAA FAR25 requirements and is MSHA-P for mining applications.

• **LMR<sup>®</sup>-FR-PVC** is a general-purpose indoor cable and has a UL/NEC & CSA rating of 'CMR' and 'FT4' respectively. It is less expensive than LMR-FR, however it emits toxic fumes (HCL) and greater smoke density when burned.

• **LMR<sup>®</sup>-PVC** is designed for low loss general-purpose applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

• **LMR<sup>®</sup>-PVC-W** is a white-jacketed version of LMR-PVC for marine and other applications where color compatibility is desired.

• **LMR<sup>®</sup>-MA** is a flexible cable designed specifically for mobile antenna applications. It has a PVC jacket and un-bonded aluminum tape to facilitate end stripping with automated equipment.

• **Flexibility** and bendability are hallmarks of the LMR-200 cable design. The flexible outer conductor enables the tightest bend radius available for any cable of similar size and performance.

• **Low Loss** is another hallmark feature of LMR-200. Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

• **RF Shielding** is 50 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 90 dB (i.e. >180 dB between two adjacent cables).

• **Weatherability:** LMR-200 cables designed for outdoor exposure incorporate the best materials for UV resistance and have life expectancy in excess of 20 years.

• **Connectors:** A wide variety of connectors are available for LMR-200 cable, including all common interface types, reverse polarity, and a choice of solder or non-solder center pins. Most LMR connectors employ crimp outer attachment using standard hex crimp sizes.

• **Cable Assemblies:** All LMR-200 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.



| Part Description |                      |           |       | Stock |
|------------------|----------------------|-----------|-------|-------|
| Part Number      | Application          | Jacket    | Color | Code  |
| LMR-200          | Outdoor              | PE        | Black | 54022 |
| LMR-200-DB       | Outdoor/Watertight   | PE        | Black | 54089 |
| LMR-200-FR       | Indoor/Outdoor Riser | CMR FRPE  | Black | 54028 |
| LMR-200-FR-PVC   | Indoor/Outdoor Riser | CMR FRPVC | Black | 54125 |
| LMR-200-PVC      | General Purpose      | PVC       | Black | 54216 |
| LMR-200-PVC-W    | General Purpose      | PVC       | White | 54201 |
| LMR-200-MA       | Mobile Antennas      | PVC       | Black | 54045 |

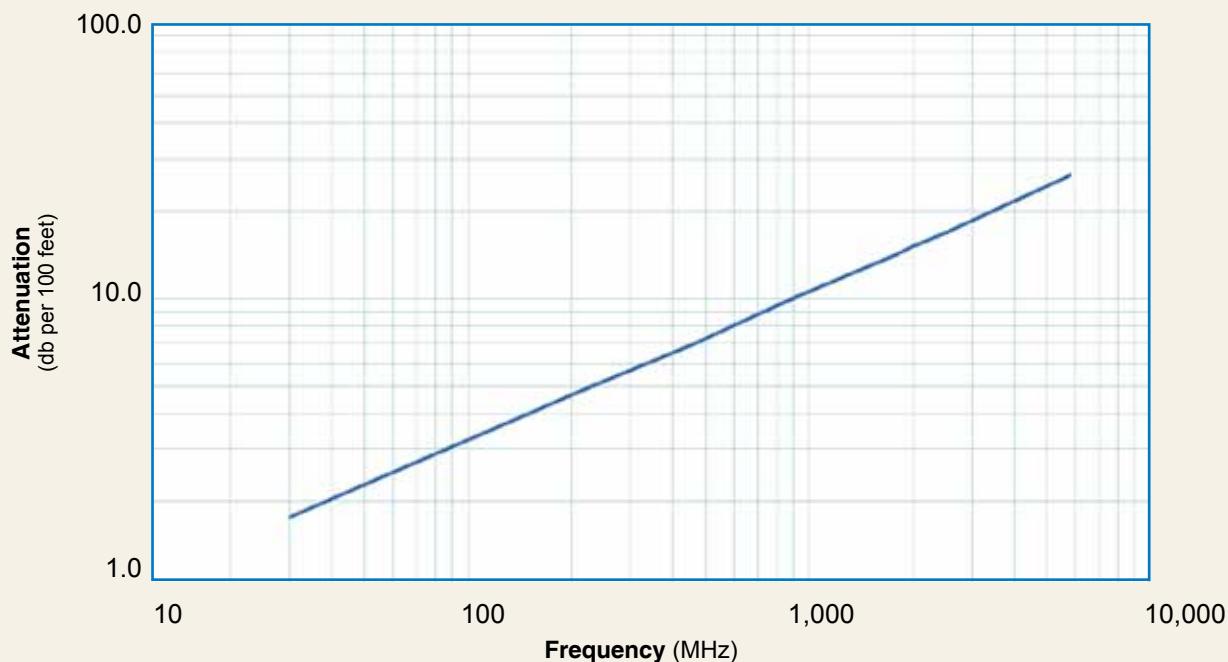
| Construction Specifications |                   |       |        |
|-----------------------------|-------------------|-------|--------|
| Description                 | Material          | In.   | (mm)   |
| Inner Conductor             | Solid BC          | 0.044 | (1.12) |
| Dielectric                  | Foam PE           | 0.116 | (2.95) |
| Outer Conductor             | Aluminum Tape     | 0.121 | (3.07) |
| Overall Braid               | Tinned Copper     | 0.144 | (3.66) |
| Jacket                      | (see table above) | 0.195 | (4.95) |

| Mechanical Specifications |                |       |          |
|---------------------------|----------------|-------|----------|
| Performance Property      | Units          | US    | (metric) |
| Bend Radius: installation | in. (mm)       | 0.5   | (12.7)   |
| Bend Radius: repeated     | in. (mm)       | 2     | (50.8)   |
| Bending Moment            | ft-lb (N-m)    | 0.2   | (0.27)   |
| Weight                    | lb/ft (kg/m)   | 0.022 | (0.03)   |
| Tensile Strength          | lb (kg)        | 40    | (48)     |
| Flat Plate Crush          | lb/in. (kg/mm) | 15    | (0.27)   |

| Environmental Specifications   |          |         |
|--------------------------------|----------|---------|
| Performance Property           | °F       | °C      |
| Installation Temperature Range | -40/+185 | -40/+85 |
| Storage Temperature Range      | -94/+185 | -70/+85 |
| Operating Temperature Range    | -40/+185 | -40/+85 |

| Electrical Specifications |                   |       |          |
|---------------------------|-------------------|-------|----------|
| Performance Property      | Units             | US    | (metric) |
| Velocity of Propagation   | %                 | 83    |          |
| Dielectric Constant       | NA                | 1.45  |          |
| Time Delay                | nS/ft (nS/m)      | 1.22  | (4.02)   |
| Impedance                 | ohms              | 50    |          |
| Capacitance               | pF/ft (pF/m)      | 24.5  | (80.3)   |
| Inductance                | uH/ft (uH/m)      | 0.061 | (0.20)   |
| Shielding Effectiveness   | dB                | >90   |          |
| DC Resistance             |                   |       |          |
| Inner Conductor           | ohms/1000ft (/km) | 5.36  | (17.6)   |
| Outer Conductor           | ohms/1000ft (/km) | 4.9   | (16.1)   |
| Voltage Withstand         | Volts DC          | 1000  |          |
| Jacket Spark              | Volts RMS         | 3000  |          |
| Peak Power                | kW                | 2.5   |          |

### Attenuation vs. Frequency (typical)



| Frequency (MHz)       | 30   | 50   | 150  | 220  | 450  | 900  | 1500 | 1800 | 2000 | 2500 | 5800 |
|-----------------------|------|------|------|------|------|------|------|------|------|------|------|
| Attenuation dB/100 ft | 1.8  | 2.3  | 4.0  | 4.8  | 7.0  | 9.9  | 12.9 | 14.2 | 15.0 | 16.9 | 26.4 |
| Attenuation dB/100 m  | 5.8  | 7.5  | 13.1 | 15.9 | 22.8 | 32.6 | 42.4 | 46.6 | 49.3 | 55.4 | 86.5 |
| Avg. Power kW         | 1.02 | 0.79 | 0.45 | 0.37 | 0.26 | 0.18 | 0.14 | 0.13 | 0.12 | 0.11 | 0.07 |

#### Calculate Attenuation =

$(0.320900) \cdot \sqrt{\text{FMHz}} + (0.000330) \cdot \text{FMHz}$  (interactive calculator available at [http://www.timesmicrowave.com/cable\\_calculators](http://www.timesmicrowave.com/cable_calculators))

#### Attenuation:

VSWR=1.0; Ambient = +25°C (77°F)

#### Power:

VSWR=1.0; Ambient = +40°C; Inner Conductor = 100°C (212°F); Sea Level; dry air; atmospheric pressure; no solar loading

# LMR<sup>®</sup>-200 Flexible Low Loss Communications Coax



## Connectors

| Interface  | Description      | Part Number  | Stock Code | VSWR**<br>Freq. (GHz) | Coupling<br>Nut | Inner<br>Contact<br>Attach | Outer<br>Contact<br>Attach | Finish*<br>Body /Pin | Length<br>in (mm) | Width<br>in (mm) | Weight<br>lb (g) |
|------------|------------------|--------------|------------|-----------------------|-----------------|----------------------------|----------------------------|----------------------|-------------------|------------------|------------------|
| BNC male   | Straight Plug    | TC-200-BM    | 3190-225   | <1.25:1 (2.5)         | Knurl           | Solder                     | Crimp                      | S/G                  | 1.7 (43.2)        | 0.56 (14.2)      | 0.045 (20.4)     |
| Mini-UHF   | Straight Plug    | TC-200-MUHF  | 3190-444   | <1.25:1 (2.5)         | Knurl           | Solder                     | Crimp                      | NG                   | 1.1 (27.9)        | 0.45 (11.4)      | 0.015 (6.8)      |
| N male     | Straight Plug    | EZ-200-NM    | 3190-1475  | <1.25:1 (8)           | Knurl           | Spring Fit                 | Crimp                      | S/G                  | 1.5 (38.1)        | 0.75 (19.1)      | 0.073 (33.1)     |
| N male     | Straight Plug    | EZ-200-NMH-D | 3190-1918  | <1.25:1 (8)           | Hex/Knurl       | Spring Fit                 | Crimp                      | A/G                  | 1.5 (38.1)        | 0.75 (19.1)      | 0.073 (33.1)     |
| N male     | Straight Plug    | TC-200-NM    | 3190-224   | <1.25:1 (2.5)         | Knurl           | Solder                     | Crimp                      | S/G                  | 1.5 (38.1)        | 0.75 (19.1)      | 0.073 (33.1)     |
| N male     | Reverse Polarity | TC-200-NM-RP | 3190-959   | <1.25:1 (2.5)         | Knurl           | Solder                     | Crimp                      | N/G                  | 1.5 (38.1)        | 0.75 (19.1)      | 0.073 (33.1)     |
| SMA male   | Straight Plug    | TC-200-SM    | 3190-612   | <1.25:1 (8)           | Hex             | Solder                     | Crimp                      | SS/G                 | 1.0 (25.4)        | 0.32 (8.1)       | 0.015 (6.8)      |
| SMA male   | Reverse Polarity | TC-200-SM-RP | 3190-327   | <1.25:1 (2.5)         | Hex             | Solder                     | Crimp                      | SS/G                 | 1.0 (25.4)        | 0.32 (8.1)       | 0.015 (6.8)      |
| TNC male   | Straight Plug    | EZ-200-TM    | 3190-1266  | <1.25:1 (2.5)         | Knurl           | Spring Fit                 | Crimp                      | S/G                  | 1.4 (35.6)        | 0.59 (15.0)      | 0.045 (20.4)     |
| TNC male   | Straight Plug    | TC-200-TMC   | 3190-240   | <1.25:1 (2.5)         | Knurl           | Solder                     | Clamp                      | S/G                  | 1.7 (43.2)        | 0.59 (15.0)      | 0.045 (20.4)     |
| TNC male   | Reverse Polarity | EZ-200-TM-RP | 3190-792   | <1.25:1 (2.5)         | Knurl           | Spring Fit                 | Crimp                      | A/G                  | 1.4 (35.6)        | 0.32 (8.1)       | 0.045 (20.4)     |
| TNC female | Straight Jack    | TC-200-TF    | 3190-263   | <1.25:1 (2.5)         | NA              | Solder                     | Crimp                      | N/G                  | 1.3 (33.0)        | 0.57 (14.5)      | 0.033 (15.0)     |
| TNC female | Reverse Polarity | EZ-200-TF-RP | 3190-793   | <1.25:1 (2.5)         | NA              | Spring Fit                 | Crimp                      | A/G                  | 1.3 (33.0)        | 0.57 (14.5)      | 0.033 (15.0)     |

\* Finish metals: N=Nickel, S=Silver, G=Gold, SS=Stainless Steel, A=Alballoy \*\*VSWR spec based on 3 foot cable with a connector pair



## Hardware Accessories

| Type       | Part Number | Stock Code | Description                |
|------------|-------------|------------|----------------------------|
| Ground Kit | GK-S200TT   | GK-S200TT  | Standard Ground Kit (each) |



## Install Tools

| Type              | Part Number        | Stock Code | Description                                         |
|-------------------|--------------------|------------|-----------------------------------------------------|
| Crimp Tool        | CT-240/200/195/100 | 3190-667   | Crimp tool for LMR-100, 195, 200 and 240 connectors |
| Cutting Tool      | CCT-01             | 3190-1544  | Cable end flush cut tool                            |
| Deburr Tool       | DBT-U              | 3192-001   | Removes center conductor rough edges                |
| Replacement Blade | RB-01              | 3190-1609  | Replacement blade for cutting tool                  |