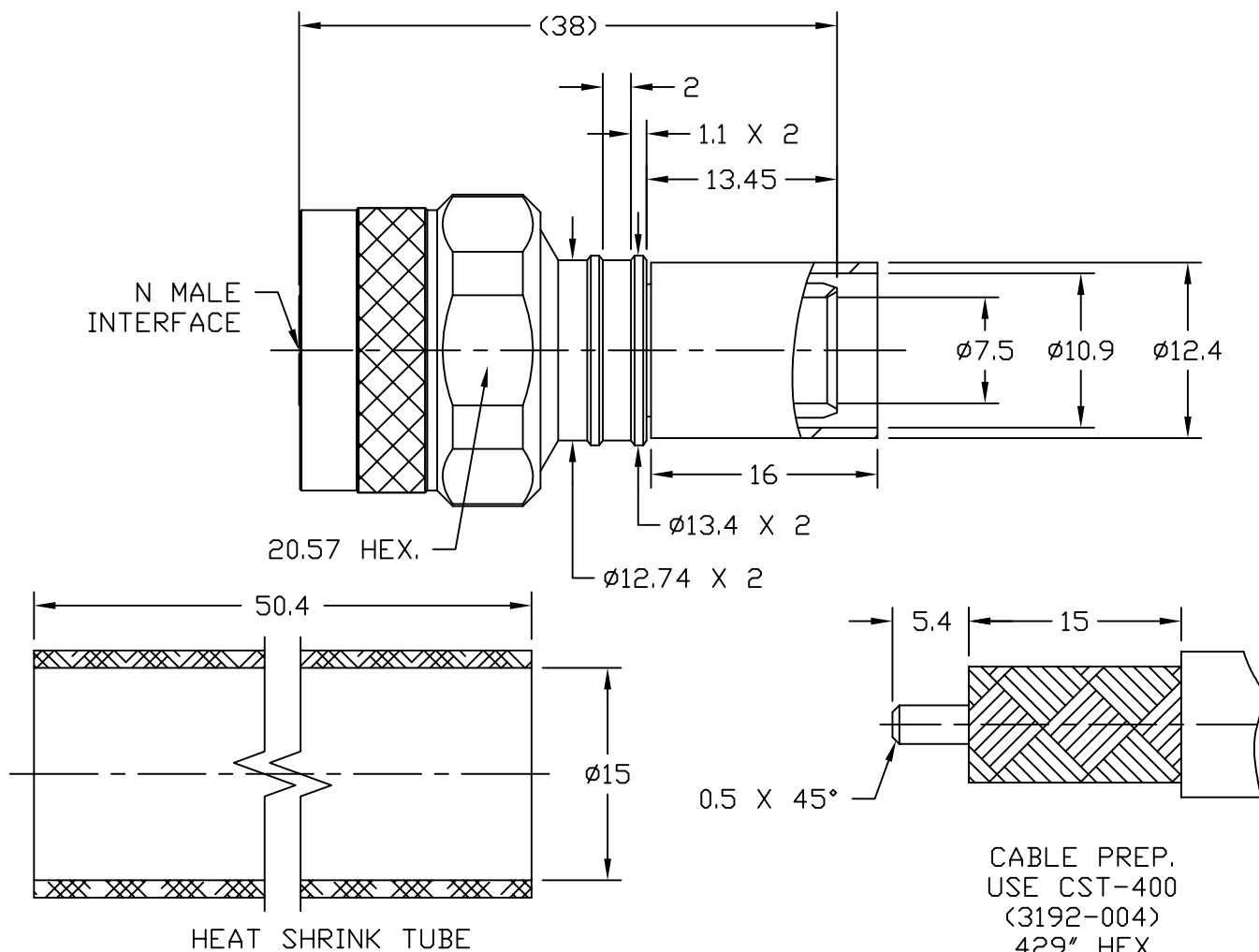


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| SYM | REVISION DESCRIPTION    | DFTM     | DATE    | APPD     | DATE    |
|-----|-------------------------|----------|---------|----------|---------|
| A   | RELEASED FOR PRODUCTION | D. J. H. | 6/13/11 | J. D. B. | 6/27/11 |
| B   | CHANGED PER CDC #33920  | D. J. H. | 8/12/11 | J. D. B. | 8/15/11 |



**Reference standard**  
I. Electric Performance

Impedance( $\Omega$ ):  
Frequency Range:  
VSWR:  
Insert Loss: (dB)  
Insulation resistance (M $\Omega$ )  
Work voltage (V)  
Conductor resistance (m $\Omega$ )

IEC60169-16

50  
DC-6GHz  
 $\leq 1.25$   
 $\leq 0.05$   
 $> 5000$   
1500  
outer conductor  $< 0.2$   
inner conductor  $< 0.8$

II. Mechanical Performance

Nut torque  
(Nut) Whorl pull  
Tensile force(cable-connect)  
Torsion(cable-connect)

25N.m  
1000N  
400N  
2N.m

III. Material and plating:

**Component**

inner conductor  
outer conductor  
tube  
nut  
gasket  
insulator

**Material**

Brass  
Brass  
Copper  
Brass  
Silicone rubber  
PTFE

**Plating**

Au50 micro inches over nickel 100 over copper  
copper tin-zinc 100-150 micro inches  
copper tin-zinc 100-150 micro inches  
copper tin-zinc 100-150 micro inches

IV. Environment

Temp.range  
Weather standard  
Thermal shock  
Vibration  
Shock  
Waterproofing standard IP67

-55°C~+155°C

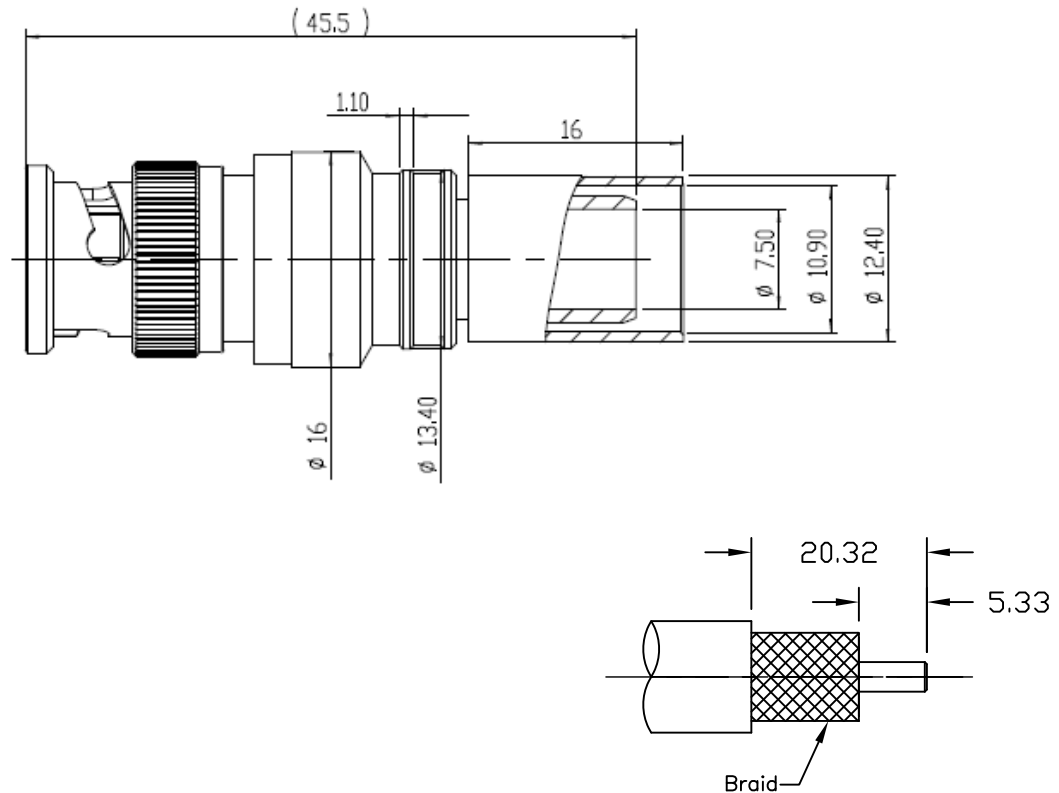
IEC 60068 55 / 155/ 56  
US MIL-STD 202,Meth.107,Cond.B  
US MIL-STD 202,Meth.204,Cond.B  
US MIL-STD 202,Meth.213,Cond.I

V. Assembly: inner conductor installed and outer conductor crimped

|            |                                                                                                                                                                                                                                                  |                |                                                                             |                      |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------|----------------------|
| MATL:      | UNLESS OTHERWISE SPECIFIED                                                                                                                                                                                                                       | DFTM. D. J. H. | TIMES MICROWAVE SYSTEMS                                                     |                      |
|            |                                                                                                                                                                                                                                                  | DATE 6/13/11   |                                                                             |                      |
| USED ON: 0 | ALL DIMENSIONS ARE IN mm<br>MACHINED SURFACES FINISH N/A RMS MAX.<br>REMOVE ALL BURRS N/A MAX. BREAK<br>MACHINE CORNERS N/A MAX. FILLET R.<br>TOLERANCES ON DECIMALS<br>.XX $\pm$ N/A .XXX $\pm$ N/A<br>ANGLES $\pm 1^\circ$ FRACTIONS $\pm$ N/A | CHKD. J. D. B. | <b>EZ-400-NMH-X</b><br>"N" MALE FOR LMR-400 CABLE<br>EZ/CRIMP/NO BRAID TRIM |                      |
|            |                                                                                                                                                                                                                                                  | DATE 6/27/11   |                                                                             |                      |
| SCALE: N/A | DWG. SIZE A                                                                                                                                                                                                                                      | APPD. J. D. B. | DATE 6/27/11                                                                | 1 of 1 SD3190-2590 B |

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| SYM | REVISION DESCRIPTION    | DFTM  | DATE   | APPD   | DATE   |
|-----|-------------------------|-------|--------|--------|--------|
| A   | RELEASED FOR PRODUCTION | N.N.N | 8/6/13 | J.D.B. | 8/9/13 |



Reference standard IEC60169-8

**I. Electric Performance**

Nominal Impedance( $\Omega$ ): 50  
Frequency Range: DC-4GHz  
VSWR:  $\leq 1.35$   
Insert Loss:  $\leq 0.1$   
Insulation resistance ( $M\Omega$ ):  $\geq 5000$   
Withstand voltage (V): 1500  
Conductor resistance ( $m\Omega$ ):  
outer conductor  $< 0.4$   
inner conductor  $< 1.5$

**II. Mechanical Performance**

Tensile force(cable-connect) 400N  
Torsion(cable-connect) 2N.m

**III. Material and plating:**

Component  
inner conductor Material Spring copper  
outer conductor Brass  
insulator PTFE  
o-ring Silicone rubber

Plating  
Au 1.27um  
Copper-tin-zinc 2um

**IV. Environment**

Temp.range -55°C~+155°C  
Weather standard IEC 60068 55 / 155/ 56  
Thermal shock US MIL-STD 202,Meth.107,Cond.B  
Vibration US MIL-STD 202,Meth.204,Cond.B  
Shock US MIL-STD 202,Meth.213,Cond.I  
ROHS compliant

V. Assemble: inner conductor installed and outer conductor crimped

|            |                                                                                                                                                                                                                                                |                      |                                           |             |                                 |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------|-------------|---------------------------------|
| MATL:      | UNLESS OTHERWISE SPECIFIED                                                                                                                                                                                                                     | DFTM. N. N. N        | TIMES MICROWAVE SYSTEMS                   |             |                                 |
|            |                                                                                                                                                                                                                                                | DATE 8/6/13          |                                           |             |                                 |
| USED ON: ~ | ALL DIMENSIONS ARE IN mm<br>MACHINED SURFACES FINISH N/A RMS MAX.<br>REMOVE ALL BURRS N/A MAX. BREAK<br>MACHINE CORNERS N/A MAX. FILLET R.<br>TOLERANCES ON DECIMALS<br>. XX $\pm$ N/A . XXX $\pm$ N/A<br>ANGLES $\pm$ N/A FRACTIONS $\pm$ N/A | CHKD. J. D. B.       | <b>EZ-400-BM-X</b><br>BNCM<br>for LMR-400 |             |                                 |
|            |                                                                                                                                                                                                                                                | DATE 8/9/13          |                                           |             |                                 |
| SCALE: N/A | DWG. SIZE A                                                                                                                                                                                                                                    | DO NOT SCALE DRAWING | CODE IDENT 68999                          | DATE 8/9/13 | SH T 1 of 1 SD3190-2852 R E V A |

# LMR®-400 Flexible Low Loss Communications Coax

## Ideal for...

- Drop-in replacement for RG-8/9913 Air-Dielectric type Cable
- 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®** 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®-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®-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®-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®-PVC** is designed for low loss general-purpose applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

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

• **Flexibility** and bendability are hallmarks of the LMR-400 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-400.

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-400 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-400 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-400 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-400          | Outdoor              | PE        | Black |  | 54001 |
| LMR-400-DB       | Outdoor/Watertight   | PE        | Black |  | 54091 |
| LMR-400-FR       | Indoor/Outdoor Riser | CMR FRPE  | Black |  | 54030 |
| LMR-400-FR-PVC   | Indoor/Outdoor Riser | CMR FRPVC | Black |  | 54073 |
| LMR-400-PVC      | General Purpose      | PVC       | Black |  | 54218 |
| LMR-400-PVC-W    | General Purpose      | PVC       | White |  | 54204 |

| Construction Specifications |                   |       |         |
|-----------------------------|-------------------|-------|---------|
| Description                 | Material          | In.   | (mm)    |
| Inner Conductor             | Solid BCCAI       | 0.108 | (2.74)  |
| Dielectric                  | Foam PE           | 0.285 | (7.24)  |
| Outer Conductor             | Aluminum Tape     | 0.291 | (7.39)  |
| Overall Braid               | Tinned Copper     | 0.320 | (8.13)  |
| Jacket                      | (see table above) | 0.405 | (10.29) |

# LMR®-400 Flexible Low Loss Communications Coax



## Connectors

|                 |                  |                   |            |                       |                 |               | Inner   | Outer   | Finish* |            |             |               |  |        |  |
|-----------------|------------------|-------------------|------------|-----------------------|-----------------|---------------|---------|---------|---------|------------|-------------|---------------|--|--------|--|
| Interface       | Description      | Part Number       | Stock Code | VSWR**<br>Freq. (GHz) | Coupling<br>Nut | Contact       | Contact | Contact | Body    | Length     |             | Width         |  | Weight |  |
|                 |                  |                   |            |                       |                 | Attach        | Attach  | Attach  | /Pin    | in (mm)    |             | in (mm)       |  | lb(g)  |  |
| 7-16 DIN Female | Straight Jack    | TC-400-716-FC     | 3190-376   | <1.25:1 (2.5)         | NA              | Solder        | Clamp   | S/S     | S/S     | 1.6 (41)   | 1.13 (28.7) | 0.281 (127.5) |  |        |  |
| 7-16 DIN Male   | Straight Plug    | EZ-400-716M-X     | 3190-2524  | <1.25:1 (6)           | Hex             | Spring Finger | Crimp   | A/G     | A/G     | 1.6 (39.5) | 1.38 (35)   | 0.277 (126.0) |  |        |  |
| 7-16 DIN Male   | Straight Plug    | TC-400-716-MC     | 3190-279   | <1.25:1 (2.5)         | Hex             | Solder        | Clamp   | S/S     | S/S     | 1.4 (36)   | 1.40 (35.6) | 0.268 (121.6) |  |        |  |
| 7-16 DIN Male   | Right Angle      | TC-400-716MC-RA   | 3190-1671  | <1.25:1 (<3)          | Hex             | Solder        | Clamp   | A/S     | A/S     | 2.4 (61.5) | 1.88 (47.8) | 0.35 (159)    |  |        |  |
| 7-16DIN Male    | Right Angle      | EZ-400-716M-RA-X  | 3190-2545  | <1.35:1 (6)           | Hex             | Spring Finger | Crimp   | A/G     | A/G     | 1.6 (41.7) | 1.75 (44.3) | 0.374 (0.17)  |  |        |  |
| BNC Male        | Straight Plug    | TC-400-BM         | 3190-318   | <1.25:1 (2.5)         | Knurl           | Solder        | Crimp   | N/S     | N/S     | 1.7 (43)   | 0.56 (14.2) | 0.063 (28.6)  |  |        |  |
| HN Male         | Straight Plug    | TC-400-HNM        | 3190-923   | <1.25:1 (<1)          | Knurl           | Solder        | Clamp   | S/G     | S/G     | 2.3 (59.2) | 0.88 (22.4) | 0.25 (113.4)  |  |        |  |
| HN Male         | Right Angle      | TC-400-HNM-RA     | 3190-2541  | <1.25:1 (2.5)         | Hex             | Solder        | Crimp   | A/G     | A/G     | 1.6 (41.4) | 1.56 (39.6) | 0.198 (90.0)  |  |        |  |
| QDS Male        | Straight Plug    | TC-400-QDSM       | 3190-620   | <1.25:1 (<3)          | Knurl           | Solder        | Clamp   | A/G     | A/G     | 1.8 (46.6) | 1.00 (25.4) | 0.25 (113.4)  |  |        |  |
| Mini-UHF        | Straight Plug    | TC-400-MUHF       | 3190-520   | <1.25:1 (2.5)         | Knurl           | Solder        | Crimp   | N/G     | N/G     | 1.1 (28)   | 0.50 (12.7) | 0.020 (9.1)   |  |        |  |
| N Female        | Straight Jack    | TC-400-NFC        | 3190-299   | <1.25:1 (2.5)         | NA              | Solder        | Clamp   | N/S     | N/S     | 1.6 (41)   | 0.75 (19.1) | 0.119 (54.0)  |  |        |  |
|                 | Straight Jack    | EZ-400-NF         | 3190-956   | <1.25:1 (2.5)         | NA              | Spring Finger | Crimp   | N/G     | N/G     | 1.8 (45)   | 0.66 (16.8) | 0.105 (47.6)  |  |        |  |
|                 | Straight Jack    | TC-400-NF         | 3190-2255  | <1.25:1 (2.5)         | NA              | Solder        | Crimp   | N/G     | N/G     | 1.8 (45)   | 0.66 (16.8) | 0.105 (47.6)  |  |        |  |
|                 | Bulkhead Jack    | EZ-400-NF-BH      | 3190-518*  | <1.25:1 (2.5)         | NA              | Spring Finger | Crimp   | N/G     | N/G     | 1.8 (46)   | 0.88 (22.4) | 0.102 (46.3)  |  |        |  |
|                 | Bulkhead Jack    | TC-400-NFC-BH (A) | 3190-872   | <1.25:1 (2.5)         | NA              | Solder        | Clamp   | A/G     | A/G     | 1.8 (46)   | 0.88 (22.4) | 0.145 (65.8)  |  |        |  |
| N Male          | Straight Plug    | SC-400-NM         | 3190-1454  | <1.25:1 (2.5)         | Knurl           | Solder        | Crimp   | N/G     | N/G     | 1.5 (38)   | 0.75 (19.1) | 0.090 (40.8)  |  |        |  |
|                 | Straight Plug    | TC-400-NMC        | 3190-277   | <1.25:1 (2.5)         | Knurl           | Solder        | Clamp   | N/G     | N/G     | 1.5 (38)   | 0.70 (17.8) | 0.121 (54.9)  |  |        |  |
|                 | Straight Plug    | EZ-400-NMC-2      | 3190-2640  | <1.25:1 (2.5)         | Hex/Knurl       | Spring Finger | Crimp   | N/G     | N/G     | 1.5 (38)   | 0.75 (19.1) | 0.121 (54.9)  |  |        |  |
|                 | Straight Plug    | EZ-400-NMH-X      | 3190-2590  | <1.25:1 (10)          | Hex/Knurl       | Spring Finger | Crimp   | A/G     | A/G     | 1.5 (38)   | 0.89 (22.6) | 0.103 (46.8)  |  |        |  |
|                 | Straight Plug    | TC-400-NMH-X      | 3190-2626  | <1.25:1 (10)          | Hex/Knurl       | Solder        | Crimp   | A/G     | A/G     | 1.5 (38)   | 0.89 (22.6) | 0.113 (51.3)  |  |        |  |
|                 | Straight Plug    | EZ-400-NMK        | 3190-661   | <1.25:1 (10)          | Knurl           | Spring Finger | Crimp   | S/G     | S/G     | 1.5 (38)   | 0.75 (22.6) | 0.113 (51.3)  |  |        |  |
|                 | Right Angle      | EZ-400-NMH-RA-X   | 3190-2638  | <1.35:1 (6)           | Hex/Knurl       | Spring Finger | Crimp   | A/G     | A/G     | 1.87 (47)  | 1.42 (36.0) | 0.177 (80.2)  |  |        |  |
|                 | Right Angle      | TC-400-NMH-RA-D   | 3190-2293* | <1.35:1 (6)           | Hex/Knurl       | Solder        | Crimp   | A/G     | A/G     | 1.8 (46)   | 1.25 (31.8) | 0.130 (59.0)  |  |        |  |
|                 | Right Angle      | TC-400-NMC-RA (A) | 3190-870   | <1.35:1 (2.5)         | Hex             | Solder        | Clamp   | A/G     | A/G     | 1.8 (46)   | 1.25 (31.8) | 0.150 (68.0)  |  |        |  |
|                 | Reverse Polarity | TC-400-NM-RP      | 3190-960   | <1.25:1 (2.5)         | Knurl           | Solder        | Crimp   | N/G     | N/G     | 1.5 (38)   | 0.75 (19.1) | 0.090 (40.8)  |  |        |  |
| SMA Male        | Straight Plug    | TC-400-SM         | 3190-439   | <1.25:1 (8)           | Hex             | Solder        | Crimp   | N/G     | N/G     | 1.2 (29)   | 0.50 (12.7) | 0.032 (14.5)  |  |        |  |
| TNC Female      | Reverse Polarity | TC-400-TF-RP      | 3190-1063  | <1.25:1 (2.5)         | NA              | Solder        | Crimp   | N/G     | N/G     | 1.8 (46)   | 0.55 (14.0) | 0.074 (33.6)  |  |        |  |
|                 | Reverse Polarity | EZ-400-TF-RP      | 3190-795   | <1.25:1 (2.5)         | NA              | Spring Finger | Crimp   | A/G     | A/G     | 1.8 (46)   | 0.55 (14.0) | 0.074 (33.6)  |  |        |  |
| TNC Male        | Straight Plug    | TC-400-TM-X       | 3190-2532  | <1.25:1 (6)           | Hex/Knurl       | Solder        | Crimp   | A/G     | A/G     | 1.9 (48)   | 0.67 (17.5) | 0.075 (34.3)  |  |        |  |
|                 | Straight Plug    | EZ-400-TM-X       | 3190-2533  | <1.25:1 (6)           | Hex/Knurl       | Spring Finger | Crimp   | A/G     | A/G     | 1.9 (48)   | 0.67 (17.5) | 0.075 (34.3)  |  |        |  |
|                 | Right Angle      | TC-400-TM-RA      | 3190-442*  | <1.35:1 (2.5)         | Knurl           | Solder        | Crimp   | N/G     | N/G     | 1.7 (43)   | 0.59 (15.0) | 0.085 (38.6)  |  |        |  |
|                 | Reverse Polarity | TC-400-TM-RP      | 3190-1062  | <1.25:1 (2.5)         | Knurl           | Solder        | Crimp   | N/G     | N/G     | 1.7 (43)   | 0.59 (15.0) | 0.074 (33.6)  |  |        |  |
|                 | Reverse Polarity | EZ-400-TM-RP      | 3190-794   | <1.25:1 (2.5)         | Knurl           | Spring Finger | Crimp   | A/G     | A/G     | 1.7 (43)   | 0.59 (15.0) | 0.074 (33.6)  |  |        |  |