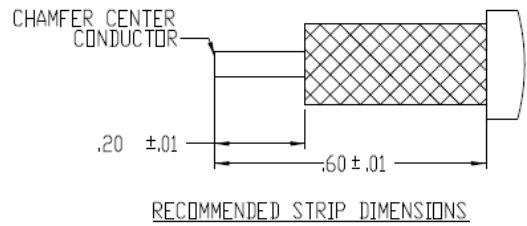
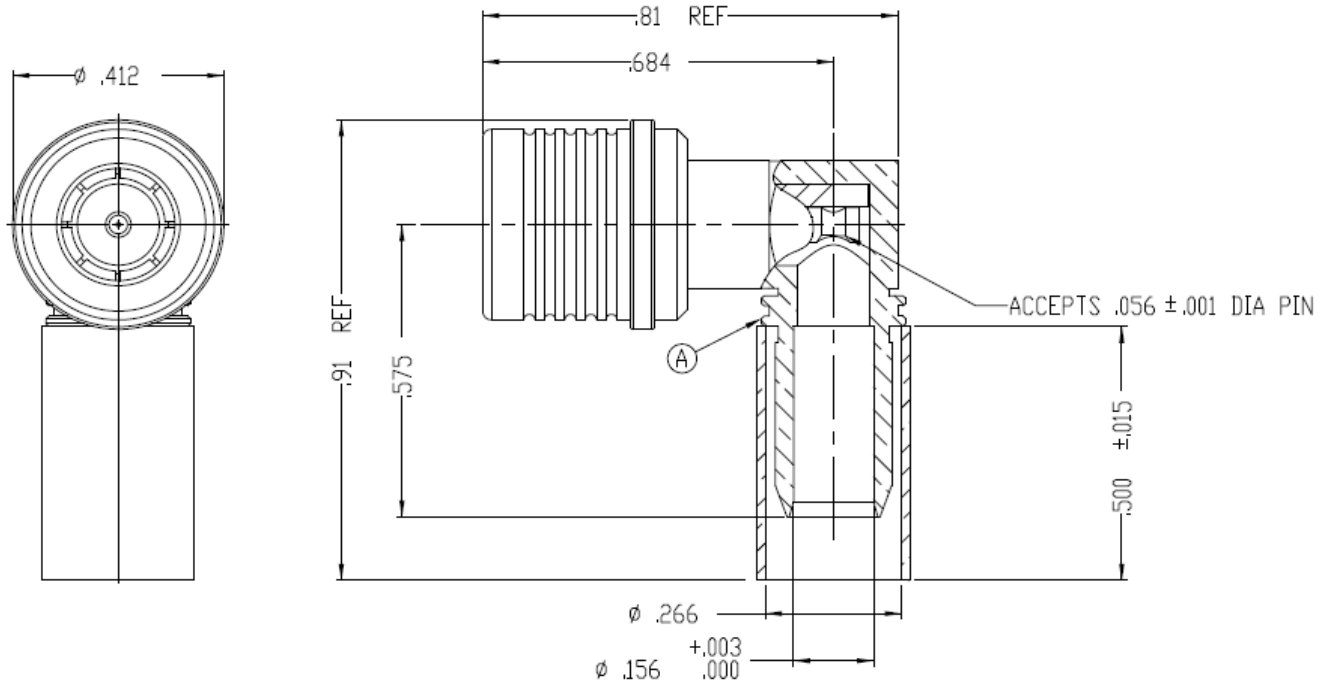


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| SYM | REVISION DESCRIPTION | DFTM | DATE | APPD | DATE |
|-----|-------------------------|---------|--------|----------|---------|
| A | RELEASED FOR PRODUCTION | N. N. N | 9/4/13 | J. D. B. | 9/10/13 |



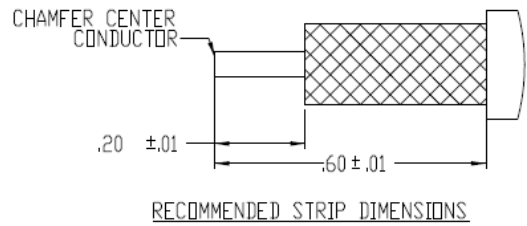
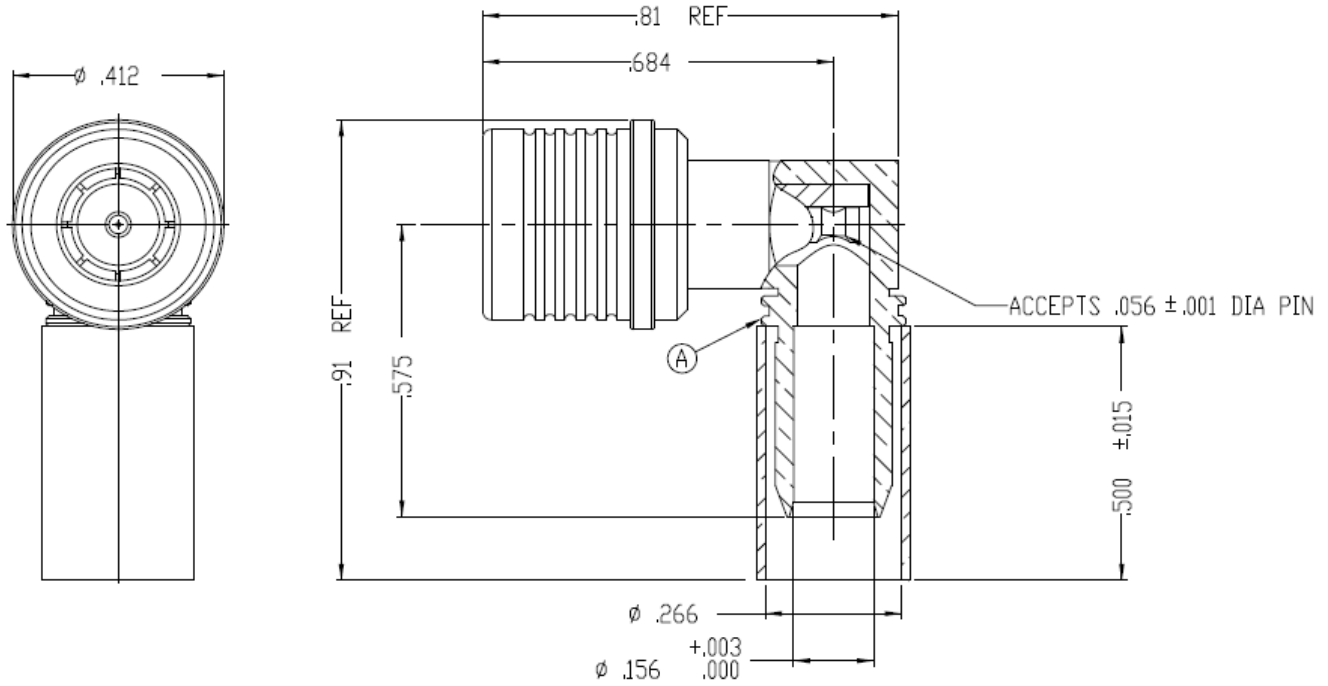
NOTES:

- ASSEMBLED CONNECTOR INTERFACE IS DESIGNED TO MATE WITH STANDARD QMA JACK.
- MATERIAL:**
 BODY, COUPLING SLEEVE - BRASS PER ASTM B16, C36000 ALLOY, TEMPER H02
 INSULATOR - TEFLON PER ASTM D1710, TYPE 1, GRADE 1, CLASS A
 SHRINK SLEEVE - HEAT SHRINKABLE ATUM PER MIL-I-23053/4 (NOT SHOWN)
 CRIMP SLEEVE - D.H.P. COPPER CDA, ALLOY #122, TEMPER HARD
 CONTACT - BERYLLIUM COPPER PER ASTM B196, C17300 ALLOY, CONDITION HT
 CONTACT FINGER - PHOSPHOR BRONZE PER ASTM B139, C54400 ALLOY, TEMPER HD
- FINISH:**
 CONTACT & FINGER - GOLD PLATE PER ASTM B488
 CRIMP SLEEVE - SULFAMATE NICKEL PER MIL-P-27418
 ALL OTHER METAL PARTS - ALBALOY PLATE PER DELTA SPEC. 111197

| | | | | | |
|-------------|--|----------------------|----------------|--|--|
| MATL: | UNLESS OTHERWISE SPECIFIED | | DFTM. N. N. N | TIMES MICROWAVE SYSTEMS | |
| | ALL DIMENSIONS ARE IN INCHES MACHINED SURFACES FINISH 63 RMS MAX. REMOVE ALL BURRS .004 MAX. BREAK MACHINE CORNERS .005 MAX. FILLET R. TOLERANCES ON DECIMALS .XX ± .01 .XXX ± .005 ANGLES ± 1° FRACTIONS ± 1/64 | | DATE 9/4/13 | | |
| USED ON: B | | | CHKD. J. D. B. | EZ-240-QM-RA-X CONNECTOR ASSEMBLY 90° QMAM for LMR-240 | |
| | | | DATE 9/10/13 | | |
| SCALE: NONE | DWG. SIZE A | DO NOT SCALE DRAWING | APPD. J. D. B. | 1 of 1 SD3190-2895 A | |
| | | | DATE 9/10/13 | | |
| | | CODE IDENT 68999 | | | |

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| SYM | REVISION DESCRIPTION | DFTM | DATE | APPD | DATE |
|-----|-------------------------|---------|--------|----------|---------|
| A | RELEASED FOR PRODUCTION | N. N. N | 9/4/13 | J. D. B. | 9/10/13 |



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 CONTACT - BERYLLIUM COPPER PER ASTM B196, C17300 ALLOY, CONDITION HT
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| | | | | | |
|-------------|--|-------------------|----------------|--|--------------------------|
| MATL: | UNLESS OTHERWISE SPECIFIED | | DFTM. N. N. N | TIMES MICROWAVE SYSTEMS | |
| | ALL DIMENSIONS ARE IN INCHES MACHINED SURFACES FINISH 63 RMS MAX. REMOVE ALL BURRS .004 MAX. BREAK MACHINE CORNERS .005 MAX. FILLET R. TOLERANCES ON DECIMALS .XX ±.01 .XXX ±.005 ANGLES ± 1° FRACTIONS ± 1/64 | | DATE 9/4/13 | | |
| USED ON: B | DO NOT SCALE DRAWING | | CHKD. J. D. B. | EZ-240-QM-RA-X CONNECTOR ASSEMBLY 90° QMAM for LMR-240 | |
| | | | DATE 9/10/13 | | |
| SCALE: NONE | DWG. SIZE: A | CODE IDENT: 68999 | APPD. J. D. B. | DATE 9/10/13 | 1 of 1 SD3190-2895 A |

LMR[®]-240 Flexible Low Loss Communications Coax

Ideal for...

- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs (e.g. WLL, GPS, LMR, Mobile Antennas)
- 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.

• **LMR[®]-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-240 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-240. 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-240 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-240 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-240 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-240 | Outdoor | PE | Black | 54021 | |
| LMR-240-DB | Outdoor/Watertight | PE | Black | 54090 | |
| LMR-240-FR | Indoor/Outdoor Riser | CMR FRPE | Black | 54029 | |
| LMR-240-FR-PVC | Indoor/Outdoor Riser | CMR FRPVC | Black | 54214 | |
| LMR-240-PVC | General Purpose | PVC | Black | 54140 | |
| LMR-240-PVC-W | General Purpose | PVC | White | 54202 | |
| LMR-240-MA | Indoor & Mobile Antenna | PVC | Black | 54046 | |

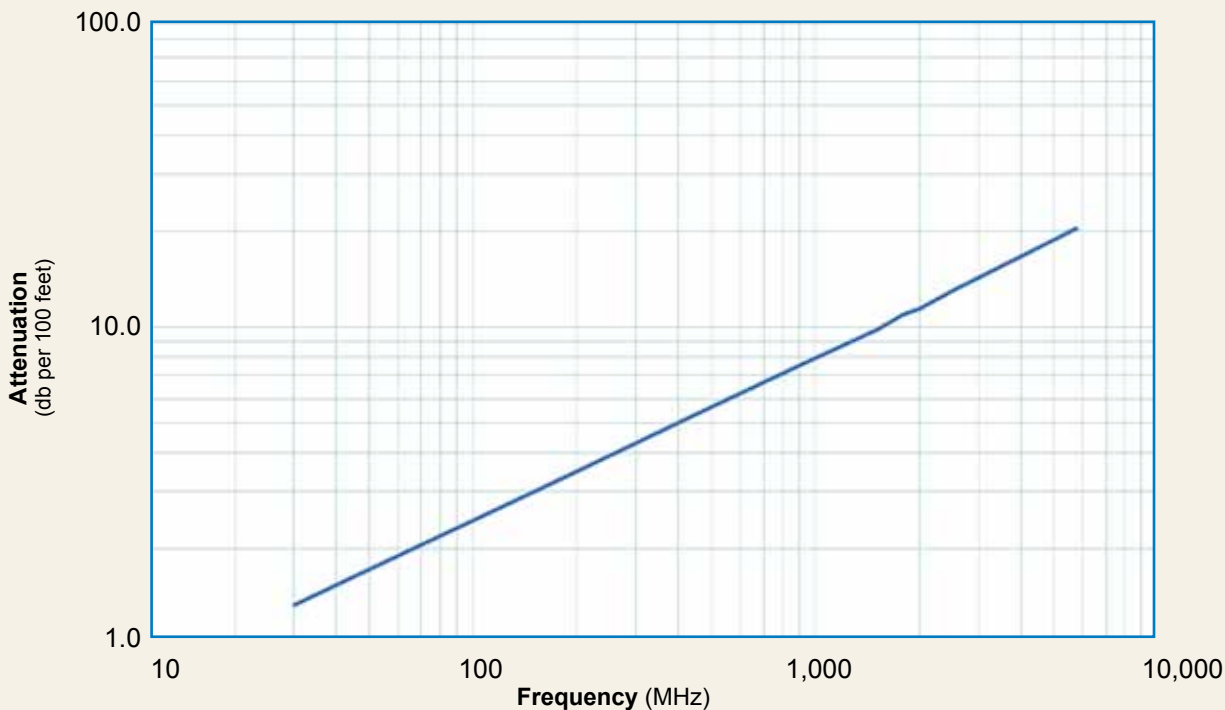
| Construction Specifications | | | |
|-----------------------------|-------------------|-------|--------|
| Description | Material | In. | (mm) |
| Inner Conductor | Solid BC | 0.056 | (1.42) |
| Dielectric | Foam PE | 0.150 | (3.81) |
| Outer Conductor | Aluminum Tape | 0.155 | (3.94) |
| Overall Braid | Tinned Copper | 0.178 | (4.52) |
| Jacket | (see table above) | 0.240 | (6.10) |

| Mechanical Specifications | | | |
|---------------------------|----------------|-------|----------|
| Performance Property | Units | US | (metric) |
| Bend Radius: installation | in. (mm) | 0.75 | (19.1) |
| Bend Radius: repeated | in. (mm) | 2.5 | (63.5) |
| Bending Moment | ft-lb (N-m) | 0.25 | (0.34) |
| Weight | lb/ft (kg/m) | 0.034 | (0.05) |
| Tensile Strength | lb (kg) | 80 | (36.3) |
| Flat Plate Crush | lb/in. (kg/mm) | 20 | (0.36) |

| 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 | % | 84 | |
| Dielectric Constant | NA | 1.42 | |
| Time Delay | nS/ft (nS/m) | 1.21 | (3.97) |
| Impedance | ohms | 50 | |
| Capacitance | pF/ft (pF/m) | 24.2 | (79.4) |
| Inductance | uH/ft (uH/m) | 0.060 | (0.20) |
| Shielding Effectiveness | dB | >90 | |
| DC Resistance | | | |
| Inner Conductor | ohms/1000ft (/km) | 3.2 | (10.5) |
| Outer Conductor | ohms/1000ft (/km) | 3.89 | (12.8) |
| Voltage Withstand | Volts DC | | 1500 |
| Jacket Spark | Volts RMS | | 5000 |
| Peak Power | kW | | 5.6 |

Attenuation vs. Frequency (typical)



| Frequency (MHz) | 30 | 50 | 150 | 220 | 450 | 900 | 1500 | 1800 | 2000 | 2500 | 5800 |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Attenuation dB/100 ft | 1.3 | 1.7 | 3.0 | 3.7 | 5.3 | 7.6 | 9.9 | 10.9 | 11.5 | 12.9 | 20.4 |
| Attenuation dB/100 m | 4.4 | 5.7 | 9.9 | 12.0 | 17.3 | 24.8 | 32.4 | 35.6 | 37.7 | 42.4 | 66.8 |
| Avg. Power kW | 1.49 | 1.15 | 0.66 | 0.54 | 0.38 | 0.26 | 0.20 | 0.18 | 0.17 | 0.15 | 0.10 |

Calculate Attenuation =

$(0.242080) \cdot \sqrt{\text{FMHz}} + (0.000330) \cdot \text{FMHz}$ (interactive calculator available at 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[®]-240 Flexible Low Loss Communications Coax

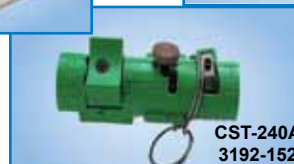


| Connectors | | | | | | | | | | | | |
|-------------------|------------------|-------------------|------------|-----------------------|--------------|----------------------|----------------------|----------------------|----------------|---------------|---------------|--|
| Interface | Description | Part Number | Stock Code | VSWR** Freq. (GHz) | Coupling Nut | Inner Contact Attach | Outer Contact Attach | Finish* Body /Pin | Length in (mm) | Width in (mm) | Weight lb (g) | |
| 1. F Male | Straight Plug | TC-240-FM-X | 3190-2891 | <1.25:1 (2.5) | Knurl | Solder | Crimp | N/G | 1.1 (28) | 0.45 (11.4) | 0.014 (6.4) | |
| 2. N Male | Straight Plug | EZ-240-NMH-X | 3190-2893 | <1.25:1 (2.5) | Hex/Knurl | Spring Finger | Crimp | A/G | 1.5 (38.1) | 0.78 (19.8) | 0.086 (39.0) | |
| 3. N Male | Right Angle | TC-240-NMH-RA-D | 3190-2426 | <1.35:1 (6) | Hex/Knurl | Solder | Crimp | A/G | 1.2 (32.4) | 1.22 (31.0) | 0.091 (41.7) | |
| 4. N Male | Straight Plug | TC-240-NMH-X | 3190-2887 | <1.25:1 (2.5) | Hex/Knurl | Solder | Crimp | N/S | 1.5 (38) | 0.75 (19.1) | 0.086 (39.0) | |
| 5. N Male | Straight Plug | TC-240-NMC | 3190-244 | <1.25:1 (2.5) | Knurl | Solder | Clamp | S/G | 1.5 (38) | 0.75 (19.1) | 0.082 (37.2) | |
| 6. 1.0/2.3 DIN | Straight Plug | EZ-240-1023M | 3190-2512 | <1.35:1 (2.5) | knurl | Spring Finger | Crimp | N/G | 1.1 (228.5) | 0.33 (8.5) | 0.014 (6.63) | |
| 7. N Female | Bulkhead Jack | TC-240-NF-BH-X | 3190-2888 | <1.25:1 (2.5) | NA | Solder | Crimp | A/G | 1.7 (44) | 0.88 (22.2) | 0.115 (52.2) | |
| 8. N Female | Panel Mount | TC-240-NF-PM-X | 3190-2889* | <1.25:1 (6) | NA | Solder | Crimp | A/G | 1.7 (44) | 0.88 (22.2) | 0.115 (52.2) | |
| 9. BNC Male | Straight Plug | TC-240-BMC | 3190-242 | <1.25:1 (2.5) | Knurl | Solder | Clamp | S/G | 1.7 (43) | 0.56 (14.2) | 0.040 (18.1) | |
| 10. BNC Male | Straight Plug | TC-240-BM-X | 3190-2890 | <1.25:1 (2.5) | Knurl | Solder | Crimp | A/G | 1.3 (34) | 0.58 (14.7) | 0.043 (19.5) | |
| 11. BNC Male | Straight Plug | TC-240-BM-RA-D | 3190-2869 | <1.25:1 (2) | Knurl | Solder | Crimp | A/G | 1.0 (25.1) | 0.57 (14.5) | 0.115 (52.0) | |
| 12. TNC Male | Straight Plug | EZ-240-TM-X | 3190-2725 | <1.25:1 (2.5) | Knurl | Spring Finger | Crimp | N/G | 1.4 (34.3) | 0.59 (15.0) | 0.043 (19.5) | |
| 13. TNC Male | Straight Plug | TC-240-TM-X | 3190-2797 | <1.25:1 (2.5) | Knurl | Solder | Crimp | N/G | 1.7 (43) | 0.59 (15.0) | 0.043 (19.5) | |
| 14. TNC Male | Reverse Polarity | EZ-240-TM-RP-X | 3190-2892 | <1.25:1 (6) | Knurl | Spring Finger | Crimp | A/G | 1.4 (36) | 0.59 (15.0) | 0.043 (19.5) | |
| 15. TNC Male | Right Angle | TC-240-TM-RA-D | 3190-2798 | <1.25:1 (6) | Hex | Solder | Crimp | A/G | 1.0 (25.1) | 0.62 (15.7) | 0.115 (52.0) | |
| 16. QMA Male | Straight Plug | EZ-240-QM-X | 3190-2894 | <1.25:1 (6) | Knurl | Spring Finger | Crimp | N/G | 1.2 (30.0) | 0.41 (10.5) | 0.014 (6.35) | |
| 17. QMA Male | Right Angle | EZ-240-QM-RA-X | 3190-2895 | <1.25:1 (<6) | Knurl | Spring Finger | Crimp | N/G | 0.8 (20.3) | 0.65 (16.5) | 0.019 (8.62) | |
| 18. SMA Male | Straight Plug | EZ-240-SM-X | 3190-2897 | <1.25:1 (6) | Hex | Spring Finger | Crimp | N/G | 1.0 (25.4) | 0.32 (8.1) | 0.016 (7.26) | |
| 19. SMA Male | Straight Plug | TC-240-SM-SS-X | 3190-2898* | <1.25:1 (10) | Hex | Solder | Crimp | SS/G | 1.0 (25) | 0.32 (8.1) | 0.016 (7.3) | |
| 20. SMA Male | Right Angle | TC-240-SM-RA-SS-X | 3190-2900* | <1.35:1 (6) | Hex | Solder | Crimp | SS/G | 0.8 (20) | 0.65 (16.5) | 0.019 (8.6) | |
| 21. SMA Male | Right Angle | EZ-240-SM-RA-X | 3190-2899 | <1.25:1 (6) | Hex | Spring Finger | Crimp | A/G | 0.9 (22.8) | 0.31 (7.9) | 0.019 (8.6) | |
| 22. SMA Male | Reverse Polarity | TC-240-SM-RP | 3190-326 | <1.25:1 (2.5) | Hex | Solder | Crimp | SS/G | 1.0 (25) | 0.32 (8.1) | 0.016 (7.3) | |
| 23. SMA Female | Bulkhead Jack | TC-240-SF-SS-BH-X | 3190-2896* | <1.25:1 (2.5) | NA | Solder | Crimp | SS/G | 1.1 (29) | 0.31 (7.9) | 0.019 (8.6) | |
| 24. Mini-UHF | Straight Plug | TC-240-MUHF | 3190-445 | <1.25:1 (2.5) | Knurl | Solder | Crimp | N/G | 1.1 (28) | 0.45 (11.4) | 0.014 (6.4) | |
| 25. 7/16 Din Male | Straight Plug | TC-240-716M | 3190-2982 | <1.35:1 (3) | Hex | Spring Finger | Crimp | A/S | 2.0 (50.5) | 1.26 (32.0) | 0.186 (84.4) | |
| 26. 7/16 Din Male | Right Angle | TC-240-716M-RA-D | 3190-2983 | <1.35:1 (3) | Hex | Solder | Crimp | A/S | 1.4 (34.3) | 1.60 (40.6) | 0.239 (108.5) | |
| 27. TNC Female | Straight Jack | EZ-240-TF | 3190-2552 | <1.35:1 (6) | NA | Spring Finger | Crimp | N/G | 1.1 (27.0) | 0.45 (11.4) | 0.035 (15.9) | |



Hardware Accessories

| Type | Part Number | Stock Code | Description |
|------------|-------------|------------|----------------------------|
| Ground Kit | GK-S240TT | GK-S240TT | 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 |
| Strip Tool | CST-240A | 3192-152 | Prep tool for LMR-240 connectors |
| Deburr Tool | DBT-U | 3192-001 | Removes center conductor rough edges |
| Cutting Tool | CCT-01 | 3190-1544 | Cable end flush cut tool |
| Replacement Blade | RB-01 | 3190-1609 | Replacement blade for cutting tool |
| Replacement Blade Kit | RB-CST | 3192-086 | Replacement blade kit for all CST strip tools |