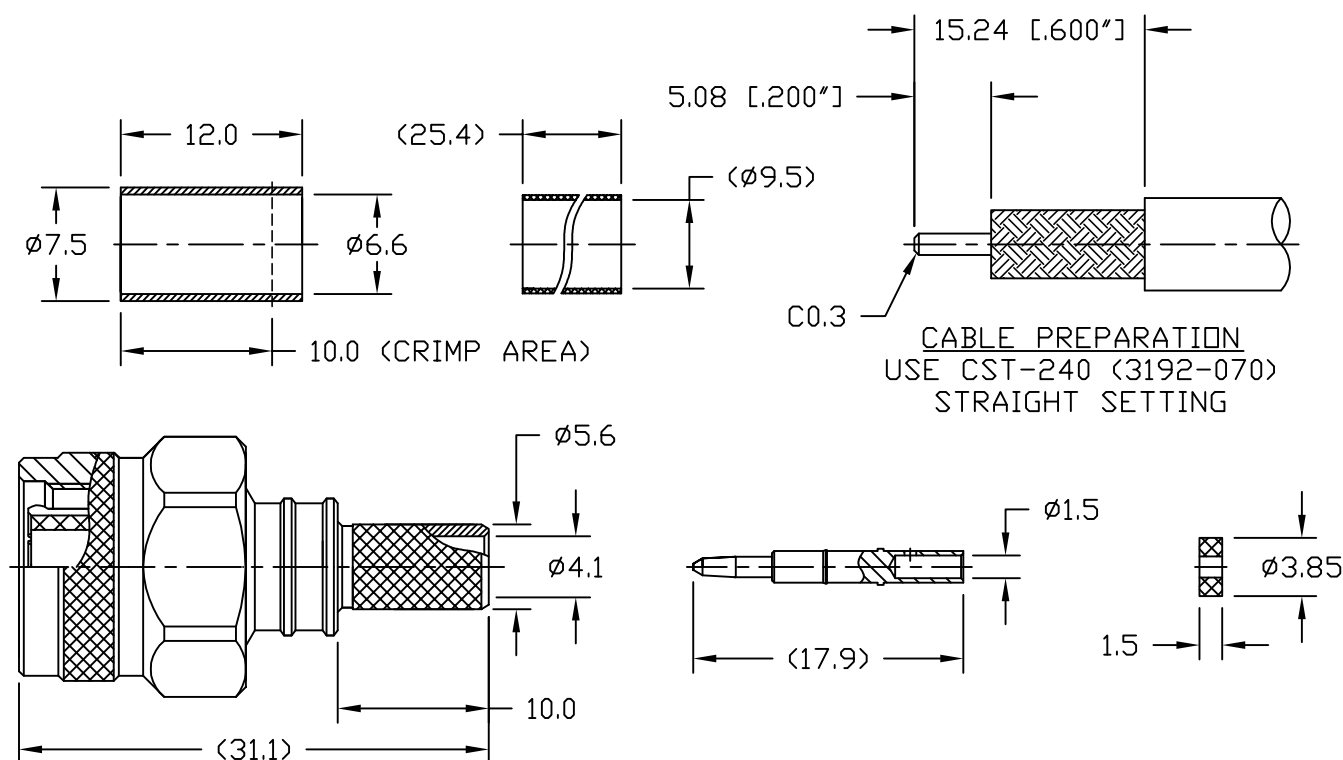


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SYM	REVISION DESCRIPTION	DFTM	DATE	APPD	DATE
A	RELEASED FOR PRODUCTION	<i>D. J. H.</i>	9/12/12	<i>J. D. B.</i>	9/21/12



NOTES:

1. CONTACT PIN IS SOLDERED.
2. CRIMP THE FERRULE TO .255" HEX.

ALL PARTS SATISFIED ROHS REQUIREMENTS

MATERIALS AND PLATING		UNIT: MICRO-INCHES
BODY	BRASS C3604	ALBALOY 80u"/COPPER
CONTACT PIN	BRASS C3604	GOLD 50u"/COPPER
INSULATOR	TEFLON MIL-P-19468	NATURAL
FERRULE	BRASS	ALBALOY 80u"/COPPER

MECHANICAL CHARACTERISTICS	
Force to engage and disengage	N/A
Center contact retention force	6 lbs
Coupling recommend torque	4-6 in-lbs
Coupling nut retention force	100 lbs
Durability	≥ 500 cycles

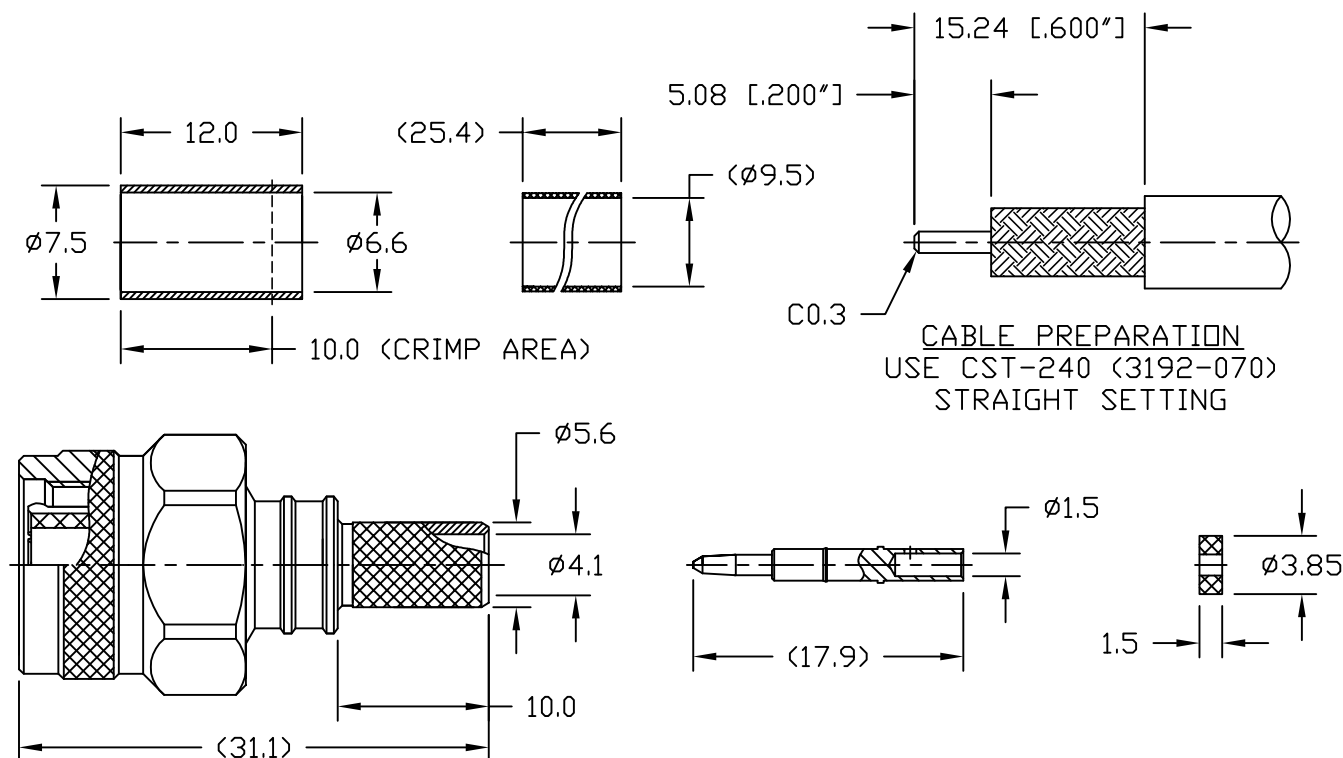
ELECTRICAL CHARACTERISTICS	
Impedance	50 Ω
Voltage rating	500V(rms)
Frequency range	0~6GHz
Dielectric withstanding voltage	1000V
Contact resistance	Center contact $\leq 2.0m\Omega$
	Outer contact $\leq 0.2m\Omega$
Insulation resistance	$\geq 5000M\Omega$
Insertion loss	According to the cable
RF- leakage	N/A
VSWR	1.3MAX@0-6GHz

ENVIRONMENTAL CHARACTERISTICS	
Temperature range	-65°C- +165°C
Vibration	MIL-STD-202, Method 204, Cond. B
Shock	MIL-STD-202, Method 213, Cond. I
Corrosion	MIL-STD-202, Method 101, Cond. B

MATERIAL:		UNLESS OTHERWISE SPECIFIED			DFTM. D. J. H.		TIMES MICROWAVE SYSTEMS	
USED ON: 0-2		ALL DIMENSIONS ARE IN mm MACHINED SURFACES FINISH 1.6 RMS MAX. REMOVE ALL BURRS 0.15X45° MAX. BREAK MACHINE CORNERS 0.15X45° MAX. FILLET R. TOLERANCES ON DECIMALS . X ± 0.3 . XX ± 0.2 ANGLES ± 1/2° FRACTIONS ± N/A			DATE 9/12/12		TC-240-TM-X "TNC" MALE FOR LMR-240 CABLE SOLDER/CRIMP/NO BRAID TRIM	
					CHKD. J. D. B.			
					DATE 9/21/12			
					APPD. J. D. B.			
SCALE: N/A	DWG. SIZE: A	DO NOT SCALE DRAWING	CODE IDENT	68999	DATE 9/21/12	SHIT 1 of 1	SD3190-2797	REV A

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SYM	REVISION DESCRIPTION	DFTM	DATE	APPD	DATE
A	RELEASED FOR PRODUCTION	D. J. H.	9/12/12	J. D. B.	9/21/12



CABLE PREPARATION
USE CST-240 (3192-070)
STRAIGHT SETTING

NOTES:

- CONTACT PIN IS SOLDERED.
- CRIMP THE FERRULE TO .255" HEX.

ALL PARTS SATISFIED ROHS REQUIREMENTS

MATERIALS AND PLATING		UNIT: MICRO-INCHES
BODY	BRASS C3604	ALBALOY 80u"/COPPER
CONTACT PIN	BRASS C3604	GOLD 50u"/COPPER
INSULATOR	TEFLON MIL-P-19468	NATURAL
FERRULE	BRASS	ALBALOY 80u"/COPPER

MECHANICAL CHARACTERISTICS	
Force to engage and disengage	N/A
Center contact retention force	6 lbs
Coupling recommend torque	4-6 in-lbs
Coupling nut retention force	100 lbs
Durability	≥ 500 cycles

ELECTRICAL CHARACTERISTICS	
Impedance	50 Ω
Voltage rating	500V(rms)
Frequency range	0~6GHz
Dielectric withstanding voltage	1000V
Contact resistance	Center contact ≤ 2.0mΩ Outer contact ≤ 0.2mΩ
Insulation resistance	≥ 5000MΩ
Insertion loss	According to the cable
RF-leakage	N/A
VSWR	1.3MAX@0-6GHz

ENVIRONMENTAL CHARACTERISTICS	
Temperature range	-65°C - +165°C
Vibration	MIL-STD-202, Method 204, Cond. B
Shock	MIL-STD-202, Method 213, Cond. I
Corrosion	MIL-STD-202, Method 101, Cond. B

MATL:	UNLESS OTHERWISE SPECIFIED	DFTM: D. J. H.	TIMES MICROWAVE SYSTEMS	
USED ON: 0-2	ALL DIMENSIONS ARE IN mm MACHINED SURFACES FINISH 1.6 RMS MAX. REMOVE ALL BURRS 0.15X45° MAX. BREAK MACHINE CORNERS 0.15X45° MAX. FILLET R. TOLERANCES ON DECIMALS .X ± 0.3 .XX ± 0.2 ANGLES ± 1/2° FRACTIONS ± N/A	DATE 9/12/12	TC-240-TM-X	
		CHKD: J. D. B.		
SCALE: N/A	DO NOT SCALE DRAWING	DATE 9/21/12	"TNC" MALE FOR LMR-240 CABLE SOLDER/CRIMP/NO BRAID TRIM	
		APPD: J. D. B.		
DWG. SIZE: A	CODE IDENT: 68999	DATE 9/21/12	SH: 1 of 1	SD3190-2797 REV: 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)

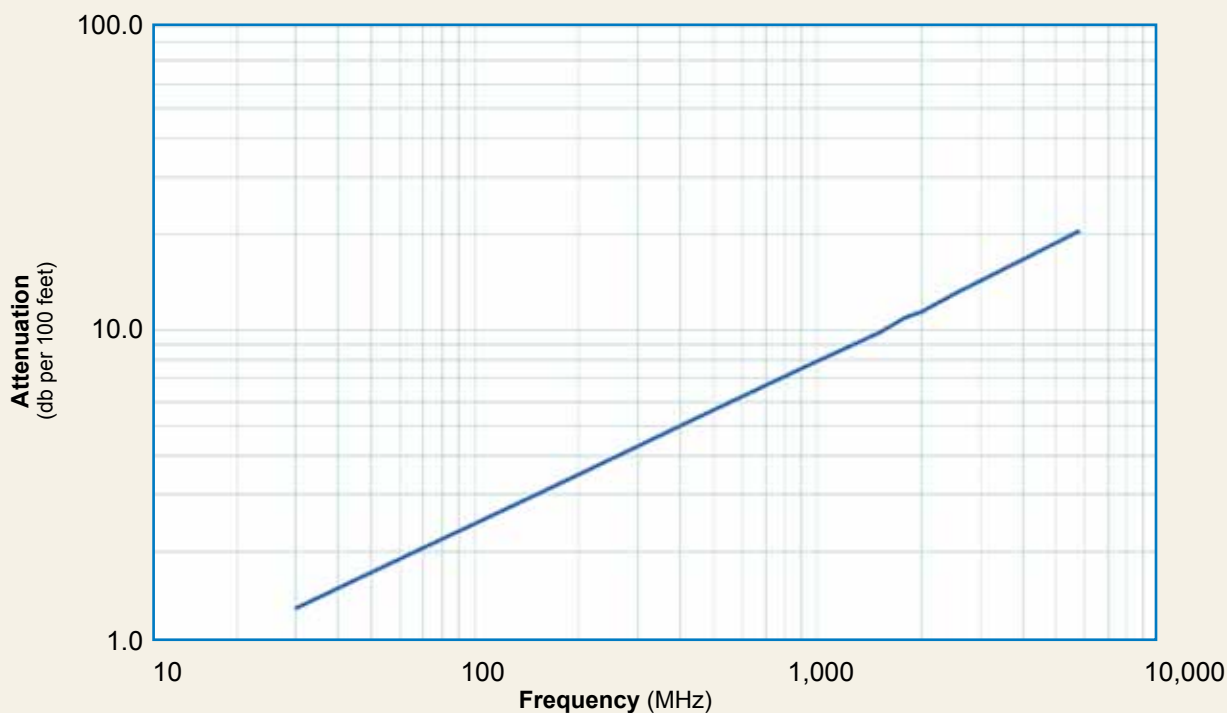
Environmental Specifications

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
Debur 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