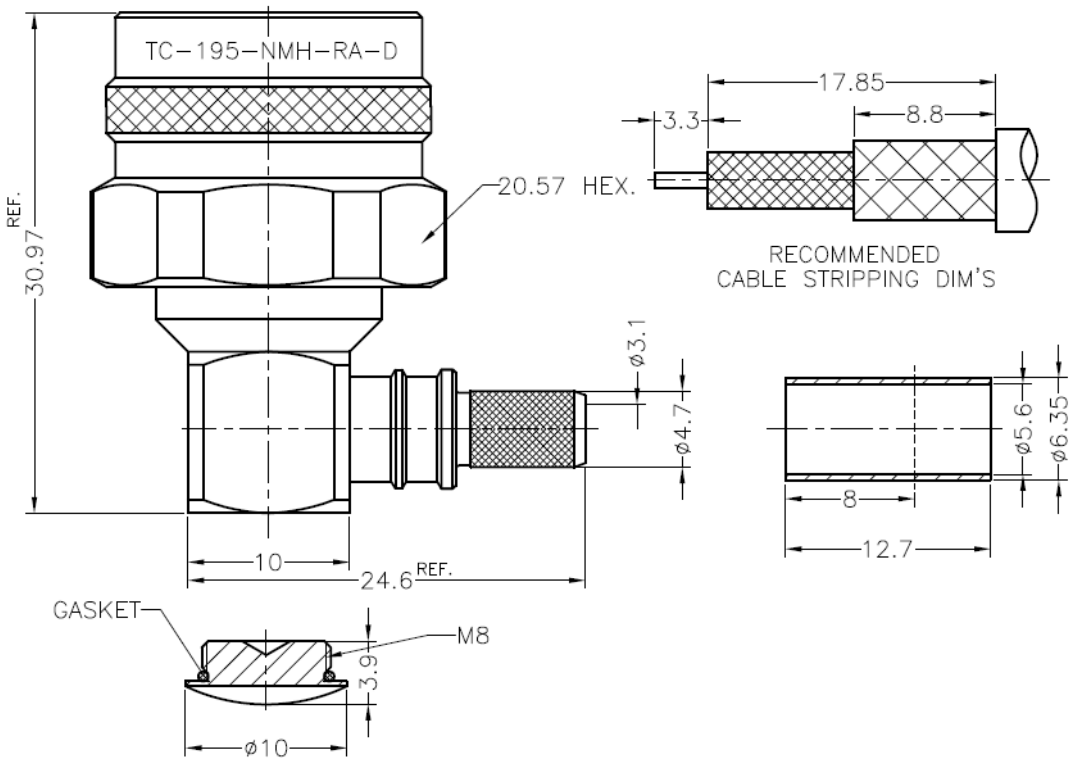
NOTICE OF PROPRIETARY RIGHTS THIS DOCUMENT CONTAINS CONFIDENTIAL TECHNICAL DATA, INCLUDING TRADE SECRETS, PROPRIETARY TO TIMES MICROWAVE SYSTEMS. DISCLOSURE OF THIS DATA IS EXPRESSLY CONDITIONED UPON YOUR ASSENT THAT ITS USE IS LIMITED TO USE WITHIN YOUR COMPANY ONLY. ANY OTHER USE IS STRICTLY PROHIBITED WITHOUT THE PRIOR WRITTEN CONSENT OF TIMES MICROWAVE SYSTEMS.

SYM	REVISION DESCRIPTION	DFTM	DATE	APPD	DATE
A	RELEASED FOR PRODUCTION	D. J. H.	1/13/09	J. D. B.	1/13/09



ALL PARTS SATISFIED ROHS REQUIREMENTS

NOTE:
1. CRIMP THE FERRULE TO .217" HEX.

材料与电镀(MATERIALS AND PLATING)		UNIT: MICRO-INCHES
壳体,主体 BODY,SHELL	黄铜 (BRASS C3604) BRASS C3604	镀三元合金80μ" ALBALOY PLATING THICK 80 MIN.
中心针 CONTACT PIN	黄铜 (BRASS C3604) BRASS C3604	铜底,镀金50μ" GOLD PL. 50/COPPER
绝缘体: INSULATOR	聚四氟乙烯 TEFLON MIL-P-19468	
铜 管: FERRULE	紫铜 COPPER	镀三元合金80μ" ALBALOY PLATING THICK 80 MIN.
密封圈: GASKET	硅橡胶 SILICONE	RED OR BLACK

电气性能(ELECTRICAL CHARACTERISTICS)	
特性阻抗 (Impedance)	50 Ω
工作电压(Voltage rating)	750V(rms)
频率范围 (Frequency range)	0~6GHz
介质耐压(Dielectric withstanding voltage)	1000V
接触电阻 (Contact resistance)	内导体(Center contact): ≤3mΩ
	外导体(Outer contact)≤2m Ω
绝缘电阻 (Insulation resistance)	≥5000MΩ
插入损耗(Insertion loss)	根据电缆特性 (According as the cable)
射频泄漏(RF- leakage)	N/A
电压驻波比(VSWR)	≤1.2 (DC-2GHz) ≤1.3 (DC-6GHz)
三阶互调 (3rd Intermodulation)	---

机 械 特 性 (MECHANICAL CHARACTERISTICS)	
插入力(Force to engage and disengage)	6 lbs MAX.
中心针保持力Center contact retention force	6 lbs MIN.
螺母扭力(Coupling torque)	30 in-lbs MIN.
螺母拉力(Coupling nut retention force)	100 lbs MIN.
机械耐久性(Durability)	≥ 500 cycles

环境参数(ENVIRONMENTAL CHARACTERISTICS)	
工作温度(Temperature range)	-55?- +155?
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
Climatic class	IEC 60068 65/165/21

MATL:

USED ON: 0-1

SCALE: N/A | DWG. SIZE A

UNLESS OTHERWISE SPECIFIED
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 ± 0.2 .XX ± 0.1
ANGLES ± 3° FRACTIONS ± N/A

DO NOT SCALE DRAWING | CODE IDENT 68999

DFTM. D. J. H.
DATE 1/13/09
CHKD. J. D. B.
DATE 1/13/09
APPD. J. D. B.
DATE 1/13/09

TIMES MICROWAVE SYSTEMS

TC-195-NMH-RA-D
90° "N" MALE
FOR LMR-195 CABLE

SHT. 1 of 1 | SD3190-2425 | REV. A

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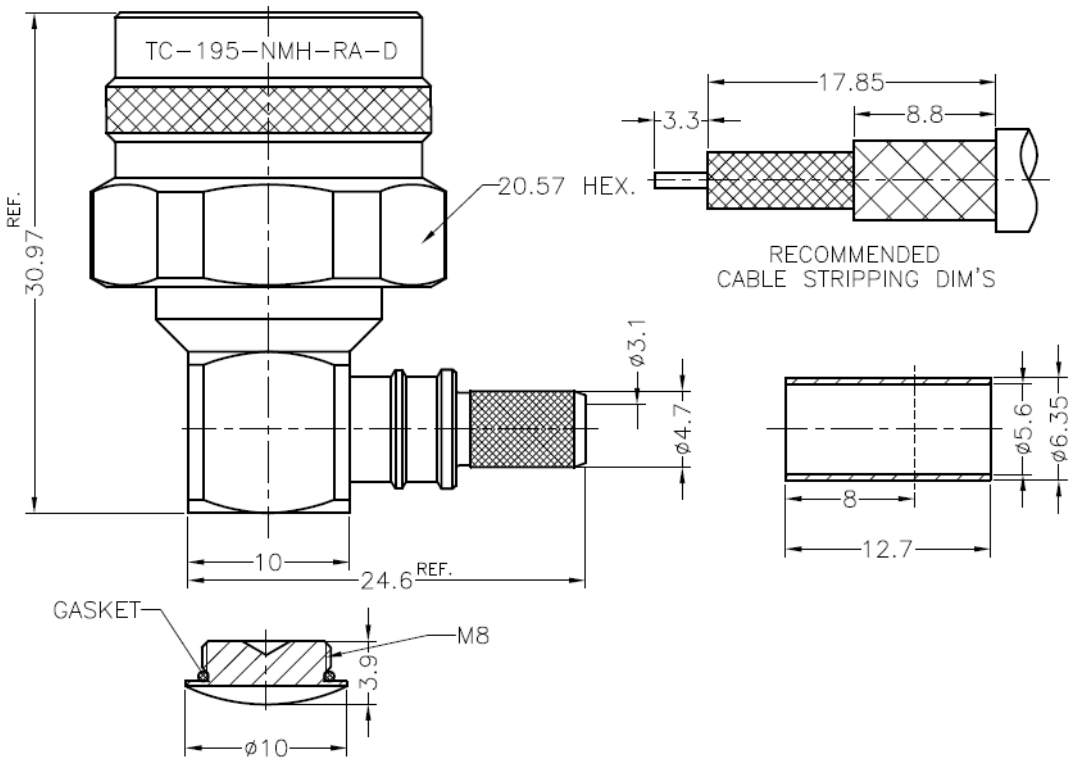

ALL PARTS SATISFIED ROHS REQUIREMENTS

NOTE:
1. CRIMP THE FERRULE TO .217" HEX.

材料与电镀(MATERIALS AND PLATING)		UNIT: MICRO-INCHES
壳体,主体 BODY,SHELL	黄铜 (BRASS C3604) BRASS C3604	镀三元合金80μ" ALBALOY PLATING THICK 80 MIN.
中心针 CONTACT PIN	黄铜 (BRASS C3604) BRASS C3604	铜底,镀金50μ" GOLD PL. 50/COPPER
绝缘体: INSULATOR	聚四氟乙烯 TEFLON MIL-P-19468	
铜 管: FERRULE	紫铜 COPPER	镀三元合金80μ" ALBALOY PLATING THICK 80 MIN.
密封圈: GASKET	硅橡胶 SILICONE	RED OR BLACK

电气性能(ELECTRICAL CHARACTERISTICS)	
特性阻抗 (Impedance)	50 Ω
工作电压(Voltage rating)	750V(rms)
频率范围 (Frequency range)	0~6GHz
介质耐压(Dielectric withstanding voltage)	1000V
接触电阻 (Contact resistance)	内导体(Center contact): ≤3mΩ
	外导体(Outer contact)≤2m Ω
绝缘电阻 (Insulation resistance)	≥5000MΩ
插入损耗(Insertion loss)	根据电缆特性 (According as the cable)
射频泄漏(RF- leakage)	N/A
电压驻波比(VSWR)	≤1.2 (DC-2GHz) ≤1.3 (DC-6GHz)
三阶互调 (3rd Intermodulation)	---

机 械 特 性 (MECHANICAL CHARACTERISTICS)	
插入力(Force to engage and disengage)	6 lbs MAX.
中心针保持力Center contact retention force	6 lbs MIN.
螺母扭力(Coupling torque)	30 in-lbs MIN.
螺母拉力(Coupling nut retention force)	100 lbs MIN.
机械耐久性(Durability)	≥ 500 cycles

环境参数(ENVIRONMENTAL CHARACTERISTICS)	
工作温度(Temperature range)	-55?- +155?
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
Climatic class	IEC 60068 65/165/21

MATL:

USED ON: 0-1

SCALE: N/A | DWG. SIZE A

UNLESS OTHERWISE SPECIFIED
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 ± 0.2 .XX ± 0.1
ANGLES ± 3° FRACTIONS ± N/A

DO NOT SCALE DRAWING | CODE IDENT 68999

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TIMES MICROWAVE SYSTEMS

TC-195-NMH-RA-D
90° "N" MALE
FOR LMR-195 CABLE

SHT. 1 of 1 | SD3190-2425 | REV. A

TIMES MICROWAVE SYSTEMS

LMR®-195
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
- Drop-in replacement for RG-58 and RG-142

• **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-195 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-195. 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-195 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-195 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-195 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-195	Outdoor	PE	Black	54110
LMR-195-DB	Outdoor/Watertight	PE	Black	54113
LMR-195-FR	Indoor/Outdoor Riser CMR	FRPE	Black	54111
LMR-195-FR-W	Indoor/Outdoor Riser CMR	FRPE	White	54158
LMR-195-FR-PVC	Indoor/Outdoor Riser CMR	FRPVC	Black	54105
LMR-195-MA	Mobile Antennas	PVC	Black	54210
LMR-195-PVC	General Purpose	PVC	Black	54215
LMR-195-PVC-W	General Purpose	PVC	White	54199

Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BC	0.037	(0.94)
Dielectric	Foam PE	0.110	(2.79)
Outer Conductor	Aluminum Tape	0.116	(2.95)
Overall Braid	Tinned Copper	0.139	(3.53)
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)	2.0	(50.8)
Bending Moment	ft-lb (N-m)	0.2	(0.27)
Weight	lb/ft (kg/m)	0.021	(0.03)
Tensile Strength	lb (kg)	40	(18.2)
Flat Plate Crush	lb/in. (kg/mm)	15	(0.27)

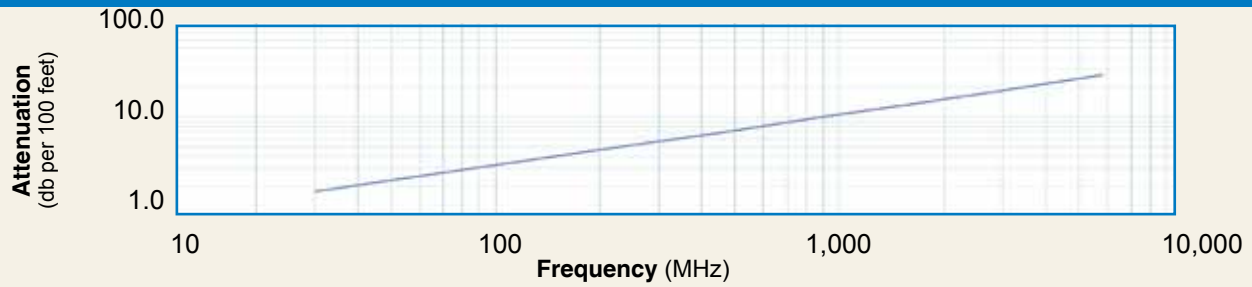
Electrical Specifications

Performance Property	Units	US	(metric)
Velocity of Propagation	%	76	
Dielectric Constant	NA	1.56	
Time Delay	nS/ft (nS/m)	1.27	(4.17)
Impedance	ohms	50	
Capacitance	pF/ft (pF/m)	25.4	(83.3)
Inductance	uH/ft (uH/m)	0.064	(0.21)
Shielding Effectiveness	dB	>90	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	7.6	(24.9)
Outer Conductor	ohms/1000ft (/km)	4.9	(16.1)
Voltage Withstand	Volts DC	1000	
Jacket Spark	Volts RMS	3000	
Peak Power	kW	2.5	

Environmental Specifications

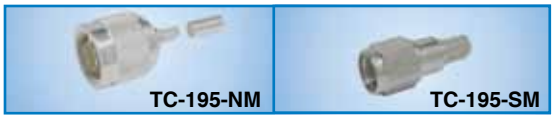
Performance Property	°F	°C
Installation Temperature Range	-40/+185	-40/+85
Storage Temperature Range	-94/+185	-70/+85
Operating Temperature Range	-40/+185	-40/+85

Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800
Attenuation dB/100 ft	2.0	2.5	4.4	5.4	7.8	11.1	14.5	16.0	16.9	19.0	29.9
Attenuation dB/100 m	6.5	8.4	14.6	17.7	25.5	36.5	47.7	52.5	55.4	62.4	98.1
Avg. Power kW	0.89	0.68	0.39	0.32	0.22	0.16	0.12	0.11	0.10	0.09	0.06

Calculate Attenuation = (0.356859) • $\sqrt{FMHz}$ + (0.000470) • 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



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)
N male	Straight Plug	TC-195-NM	3190-1555	<1.25:1 (2.5)	Knurl	Solder	Crimp	S/G	1.5 (38.1)	0.75 (19.1)	0.073 (33.1)
N male	Right Angle	TC-195-NMH-RA-D	3190-2425	<1.35:1 (6)	Hex/Knurl	Solder	Crimp	A/G	1.3 (32.1)	1.19 (30.1)	0.083 (37.5)
SMA male	Straight Plug	TC-195-SM	3190-1553	<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	TC-195-TM	3190-1554	<1.25:1 (2.5)	Knurl	Solder	Crimp	S/G	1.4 (35.6)	0.59 (15.0)	0.045 (20.4)

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

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