

**TIMES** MICROWAVE SYSTEMS

A Smiths Group plc company

**TCOM-195**  
**Low Loss Low Passive Intermod Coax****Ideal for...**

- -155 dBc Intermodulation Distortion
- Low Loss UHF/Microwave Interconnect
- Wireless Base Station Interconnect
- Flexible for Easy Routing

• **TCOM**® standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than any air-dielectric and corrugated hard-line cables. **TCOM-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. TCOM-FR has a UL/NEC & CSA rating of 'CMR/MPR' and 'FT4' respectively.

**Flexibility** and bendability are hallmarks of the TCOM-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 TCOM-195. Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

**Passive Intermod** is lower than -155 dBc exceed the performance levels for most wireless applications.

**RF Shielding** is 60 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 100 dB (i.e. >200 dB between two adjacent cables).

**Weatherability:** TCOM-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 TCOM-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 TCOM-195 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.



Part Description				Stock
Part No.	Application	Jacket	Color	Code
TCOM-195	Outdoor	PE	Black	55021
TCOM-195-FR	Indoor-Riser CMR	FRPE	Black	55012

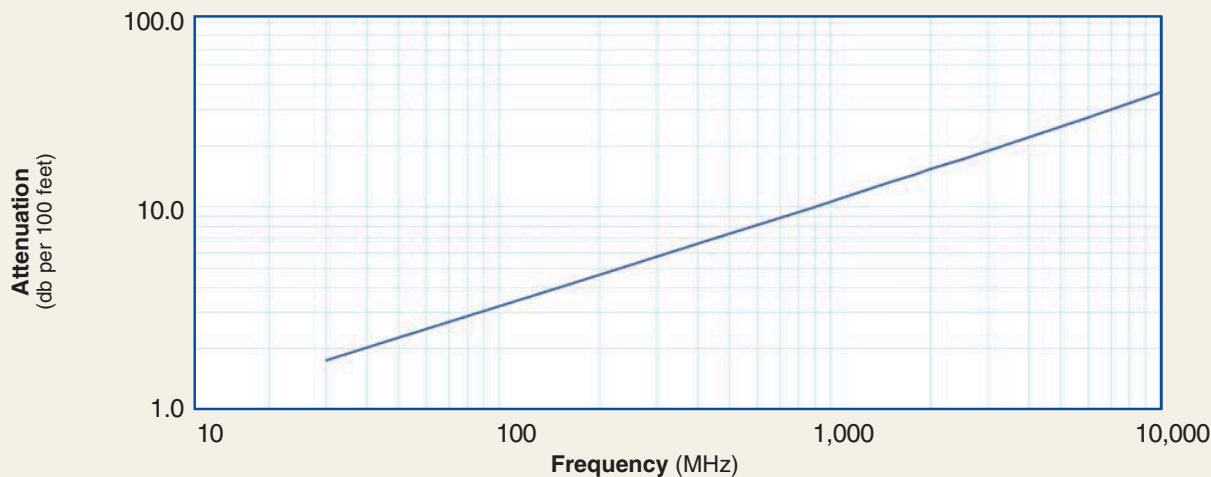
Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BC	0.037	(0.94)
Dielectric	Foam PE	0.110	(2.79)
Outer Conductor	SPC Strip Braid	0.120	(3.05)
Overall Braid	TC Braid over Al tape	0.148	(3.76)
Jacket	(see table above)	0.195	(4.95)

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)	0.035	(0.05)
Tensile Strength	lb (kg)	40	(18.2)
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/+185
Operating Temperature Range	-40/+185	-40/+85

Electrical Specifications			
Performance Property	Units	US	(metric)
Cutoff Frequency	GHz		41
Velocity of Propagation	%		80
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		>100
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	7.6	(24.9)
Outer Conductor	ohms/1000ft (/km)	2.99	(9.8)
Voltage Withstand	Volts DC		1000
Jacket Spark	Volts RMS		3000
Peak Power	kW		2.5
Passive Intermod	dBc		-155

### Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800	10,000
Attenuation dB/100 ft	1.8	2.3	4.0	4.9	7.0	10.1	13.1	14.5	15.3	17.2	27.2	36.8
Attenuation dB/100 m	5.8	7.5	13.1	16.0	23.0	33.0	43.1	47.5	50.2	56.5	89.1	120.7
Avg. Power kW	0.91	0.71	0.40	0.33	0.23	0.16	0.12	0.11	0.10	0.09	0.06	0.04

Calculate Attenuation =  $(0.321011) \cdot \sqrt{FMHz} + (0.000469) \cdot FMHz$  (interactive calculator available at <http://www.timesmicrowave/telecom>)  
 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	3190-224	<1.25:1 (2.5)	Knurl	Solder	Crimp	SG	1.5 (38.1)	0.75 (19.1)	0.073 (33.1)
SMA male	Straight Plug	TC-195-SM	3190-1551	<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	3190-1552	<1.25:1 (2.5)	Knurl	Solder	Crimp	SG	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



## Accessories

Type	Part Number	Stock Code	Description
Crimp Tool	CT-240/200/195/100	3190-667	Crimp tool for LMR-195 connectors
Cutting Tool	CCT-01	3190-1544	Cable and flush cut tool
Replacement Blades	RB-01	3190-1609	Replacement blades for cutting tool

TCOM-200

## TIMES MICROWAVE SYSTEMS

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# TCOM-200 Low Loss Low Passive Intermod Coax

### Ideal for...

- -155 dBc Intermodulation Distortion
- Low Loss UHF/Microwave Interconnect
- Wireless Base Station Interconnect
- Flexible for Easy Routing



• **TCOM**® 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.

**TCOM**®-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. TCOM-FR has a UL/NEC & CSA rating of 'CMR/MPR' and 'FT4' respectively.

**Flexibility** and bendability are hallmarks of the TCOM-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 TCOM-200. Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

**Passive Intermod** is lower than -155 dBc exceed the performance levels for most wireless applications..

**RF Shielding** is 60 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 100 dB (i.e. >200 dB between two adjacent cables).

**Weatherability:** TCOM-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 TCOM-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 TCOM-200 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.

Part Description					Stock
Part No.	Application	Jacket	Color		Code
TCOM-200	Outdoor	PE	Black		55001
TCOM-200-FR	Indoor-Riser	CMR	FRPE	Black	55022

Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BC	0.044	(1.12)
Dielectric	Foam PE	0.116	(2.95)
Outer Conductor	SPC Strip Braid	0.126	(3.20)
Overall Braid	TC Braid over Al tape	0.154	(3.91)
Jacket	(see table above)	0.195	(4.95)

# TIMES MICROWAVE SYSTEMS

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TCOM-200

## 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)	0.040	(0.06)
Tensile Strength	lb (kg)	40	(18.2)
Flat Plate Crush	lb/in. (kg/mm)	15	(0.27)

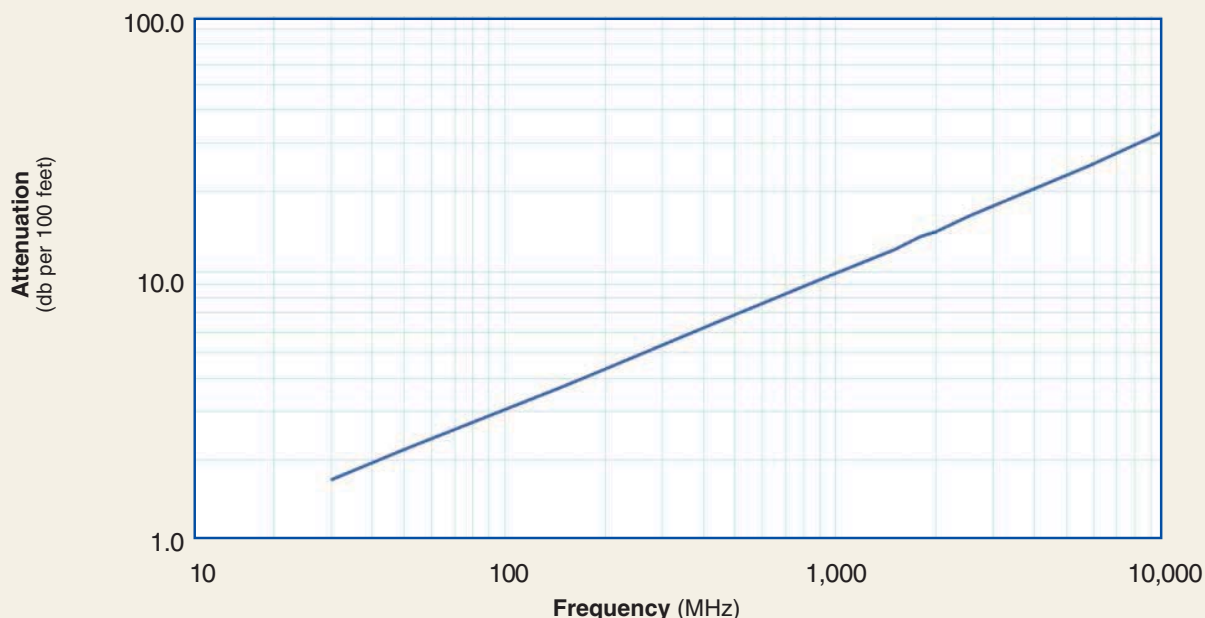
## Environmental Specifications

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

## Electrical Specifications

Performance Property	Units	US	(metric)
Cutoff Frequency	GHz	39	
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	>100	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	5.36	(17.6)
Outer Conductor	ohms/1000ft (/km)	3.27	(10.7)
Voltage Withstand	Volts DC	1000	
Jacket Spark	Volts RMS	3000	
Peak Power	kW	2.5	
Passive Intermod	dBc	-155	

## Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800	10,000
Attenuation dB/100 ft	1.7	2.2	3.8	4.6	6.6	9.4	12.3	13.5	14.2	16.0	25.0	33.7
Attenuation dB/100 m	5.5	7.1	12.4	15.0	21.6	30.9	40.2	44.2	46.7	52.5	82.2	110.5
Avg. Power kW	1.08	0.84	0.48	0.39	0.27	0.19	0.15	0.13	0.13	0.11	0.07	0.05

Calculate Attenuation =  $(0.303670) \cdot \sqrt{FMHz} + (0.000331) \cdot FMHz$  (interactive calculator available at <http://www.timesmicrowave/telecom>)  
 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

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## 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)
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	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	NG	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	NG	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-S200T	GK-S200T	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 200 connectors
Cutting Tool	CCT-01	3190-1544	Cable end flush cut tool
Replacement Blades	RB-01	3190-1609	Replacement blades for cutting tool

## TIMES MICROWAVE SYSTEMS

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# TCOM-240 Low Loss Low Passive Intermod Coax

### Ideal for...

- -155 dBc Intermodulation Distortion
- Low Loss UHF/Microwave Interconnect
- Wireless Base Station Interconnect
- Flexible for Easy Routing



• **TCOM** 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.

**TCOM-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. TCOM-FR has a UL/NEC & CSA rating of 'CMR/MPR' and 'FT4' respectively.

**TCOM-PUR** has a polyurethane outer jacket designed for multiple bending/flexing cycles in rugged tactical applications.

**Flexibility** and bendability are hallmarks of the TCOM-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 TCOM-240. Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

**Passive Intermod** is lower than -155 dBc exceed the performance levels for most wireless applications..

**RF Shielding** is 60 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 100 dB (i.e. >200 dB between two adjacent cables).

**Weatherability:** TCOM-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 TCOM-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 TCOM-240 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.

Part Description				Stock
Part No.	Application	Jacket	Color	Code
TCOM-240	Outdoor	PE	Black	55017
TCOM-240-FR	Indoor-Riser	CMR FRPE	Black	55023

Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BC	0.056	(1.42)
Dielectric	Foam PE	0.150	(3.81)
Outer Conductor	SPC Strip Braid	0.160	(4.06)
Overall Braid	TC Braid over Al tape	0.188	(4.78)
Jacket	(see table above)	0.240	(6.10)

## TIMES MICROWAVE SYSTEMS

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TCOM-240

### 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)	0.045	(0.07)
Tensile Strength	lb (kg)	80	(36.3)
Flat Plate Crush	lb/in. (kg/mm)	20	(0.36)

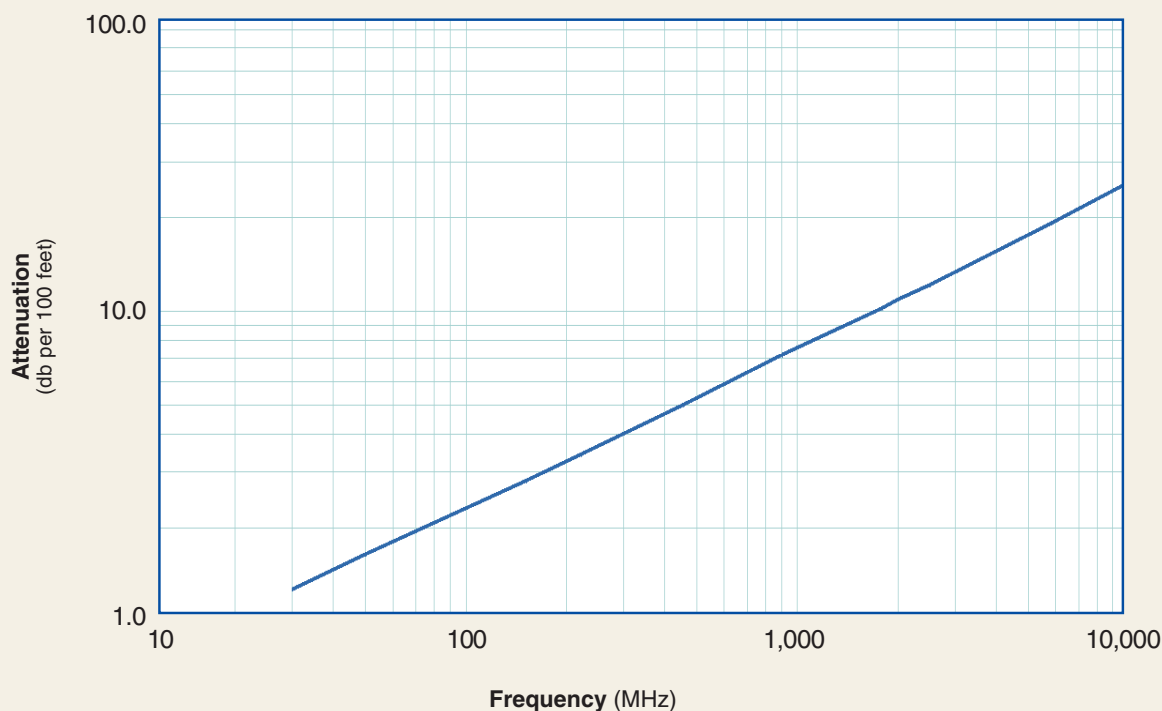
### Environmental Specifications

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

### Electrical Specifications

Performance Property	Units	US	(metric)
Cutoff Frequency	GHz	31	
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	>100	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	3.2	(10.5)
Outer Conductor	ohms/1000ft (/km)	2.62	(8.6)
Voltage Withstand	Volts DC	1500	
Jacket Spark	Volts RMS	5000	
Peak Power	kW	5.6	
Passive Intermod	dBc	-155	

### Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800	10,000
<b>Attenuation dB/100 ft</b>	1.3	1.6	2.9	3.5	5.0	7.2	9.4	10.3	10.9	12.3	19.4	26.2
<b>Attenuation dB/100 m</b>	4.2	5.4	9.4	11.4	16.4	23.5	30.7	33.9	35.8	40.3	63.6	86.0
<b>Avg. Power kW</b>	1.58	1.22	0.70	0.57	0.40	0.28	0.21	0.19	0.18	0.16	0.10	0.07

#### Calculate Attenuation =

$(0.229148) \cdot \sqrt{\text{FMHz}} + (0.000331) \cdot \text{FMHz}$  (interactive calculator available at <http://www.timesmicrowave/telecom>)

#### 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



# TIMES MICROWAVE SYSTEMS

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## TCOM-240 Low Loss Low Passive Intermod 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	Weight (g)
N Male	Straight Plug	EZ-240-NM	3190-1127	<1.25:1 (2.5)	Knurl	Spring Finger	Crimp	NG	1.5 (38.1)	0.78 (19.8)	0.086 (39.0)	
N Male	Straight Plug	TC-240-NMH	3190-382	<1.25:1 (2.5)	Hex	Solder	Crimp	NS	1.5 (38)	0.75 (19.1)	0.086 (39.0)	
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)	
N Male	Right Angle	TC-240-NM-RA(A)	3190-868	<1.35:1 (2.5)	Hex	Solder	Crimp	A/G	1.3 (33)	1.14 (29.1)	0.105 (47.6)	
N Female	Panel Jack	TC-240-NF-BHF(A)	3190-866	<1.25:1 (2.5)	NA	Solder	Crimp	A/G	1.7 (44)	0.88 (22.2)	0.115 (52.2)	
N Female	Bulkhead Jack	TC-240-NF-BH	3190-419	<1.25:1 (2.5)	NA	Solder	Clamp	A/G	1.8 (46)	0.8 8 (22.4)	0.145 (65.8)	
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)	
BNC Male	Straight Plug	TC-240-BM (A)	3190-867	<1.25:1 (2.5)	Knurl	Solder	Crimp	A/G	1.7 (43)	0.5 6 (14.2)	0.043 (19.5)	
TNC Male	Straight Plug	EZ-240-TM	3190-1128	<1.25:1 (2.5)	Knurl	Spring Finger	Crimp	NG	1.4 (34.3)	0.59 (15.0)	0.043 (19.5)	
TNC Male	Straight Plug	TC-240-TM	3190-275	<1.25:1 (2.5)	Knurl	Solder	Crimp	NS	1.7 (43)	0.59 (15.0)	0.043 (19.5)	
TNC Male	Right Angle	TC-240-TM-RA	3190-604	<1.35:1 (2.5)	Knurl	Solder	Crimp	NG	1.3 (33)	0.57 (14.5)	0.055 (24.9)	
TNC Male	Reverse Polarity	EZ-240-TM-RP	3190-970	<1.25:1 (2.5)	Knurl	Spring Finger	Crimp	A/G	1.4 (36)	0.59 (15.0)	0.043 (19.5)	
SMA Male	Straight Plug	TC-240-SM	3190-380	<1.25:1 (10)	Hex	Solder	Crimp	SSG	1.0 (25)	0.32 (8.1)	0.016 (7.3)	
SMA Male	Right Angle	TC-240-SM-RA	3190-381	<1.35:1 (6)	Hex	Solder	Crimp	SSG	0.8 (20)	0.65 (16.5)	0.019 (8.6)	
SMA Male	Reverse Polarity	TC-240-SM-RP	3190-326	<1.25:1 (2.5)	Hex	Solder	Crimp	SSG	1.0 (25)	0.32 (8.1)	0.016 (7.3)	
SMA Female	Bulkhead Jack	TC-240-SF-BH	3190-824	<1.25:1 (2.5)	NA	Solder	Crimp	SSG	1.1 (29)	0.31 (7.9)	0.019 (8.6)	
Mini-UHF	Straight Plug	TC-240-MUHF	3190-445	<1.25:1 (2.5)	Knurl	Solder	Crimp	NG	1.1 (28)	0.45 (11.4)	0.014 (6.4)	

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



GK-S240T

## Hardware Accessories

Type	Part Number	Stock Code	Description
Ground Kit	GK-S240T	GK-S240T	Standard Ground Kit (each)



CT240/200/195/100



CCT-01

## Installation Tools

Type	Part Number	Stock Code	Description
Crimp Tool	CT-240/200/195/100	3190-667	Crimp tool for LMR 240 connectors
Cutting Tool	CCT-01	3190-1544	Cable end flush cut tool
Replacement Blades	RB-01	3190-1609	Replacement blades for cutting tool