Small Cell and Indoor Cables for 5G

TIMES MICROWAVE SYSTEMS
AN AMPHENOL COMPANY

5G Small Cell and DAS Cables

CONTENTS

5G is a network of networks, with a high level of interconnectivity impacting all kinds of telecom infrastructure. This revolutionary technology requires expanding and upgrading existing network infrastructure.

To deploy 5G, the next generation of mobile network architectures that promises increasing speeds and lower latency, the network must be densified. Densification implies more cell sites in more locations and getting the signal closer to the users. This means significantly more small cells and DAS.

Small Cells and DAS

In Small cells and DAS networks, RF performance, low PIM and good shielding must be maintained to meet the industry goals for 5G performance. In many cases, these systems must be retrofitted in the available space, which may require component densification and ease of installation.

CABLE	SIZE	FLEXIBILITY	SHIELDING	RATING
TFT-5G-402	0.16	Ultra	Superior	Indoor Plenum
TFT-5G-401	0.265	Ultra	Superior	Indoor Plenum
SPP-250	0.250	Good	Excellent	Indoor Plenum
SPP-375	0.375	Good	Excellent	Indoor Plenum
SPP-500	0.500	Good	Excellent	Indoor Plenum
SPO-250	0.250	Good	Excellent	Outdoor
SPO-375	0.375	Good	Excellent	Outdoor
SPO-500	0.500	Good	Excellent	Outdoor
SPF-250	0.250	Good	Excellent	Indoor Riser
SPF-375	0.375	Good	Excellent	Indoor Riser
SPF-500	0.500	Good	Excellent	Indoor Riser
LPA	0.500	Average	Excellent	Indoor Plenum

TFT - 5G

- -160 dBc PIM for optimal system performance
- UL listed, type CMP (plenum), UL file # E-170516
- Extremely flexible
- Durable FEP outer jacket
- For indoor and outdoor use

Specifications

	Units	402	401
Diameter	in (mm)	0.160 (4.06)	0.265 (6.73)
Center Conductor	in (mm)	0.037 (0.94)	0.064 (1.63)
Dielectric	in (mm)	0.113 (2.87)	0.208 (5.28)
Sheild	in (mm)	0.123 (3.12)	0.218 (5.54)
Outer Braid	in (mm)	0.138 (3.51)	0.240 (6.10)
Minimum Bend Radius	in (mm)	0.50 (12.7)	0.75 (19.05)
Weight	lb/1000 ft (kg/1000 m)	31.0 (46.1)	78.0 (116.1)
Velocity of Propagation	%	76	72
Capacitance	pF/ft (pF/m)	26.7 (87.6)	28.2 (92.5)
Shielding	dB	>80	>80

CENTER CONDUCTOR
Bare Copper

DIELECTRIC
Expanded PTFE

SHIELD
Tin Plated Flat Braid

OUTER BRAID
Tin Plated Copper Braid

JACKET
Blue FEP

Ω Impedance 50 Ohms

Op Temp -67 to 302°F -55 to 150°C

Attenuation - db/100ft (dB/100m)

	402	401
450	8.24 (27.0)	5.43 (17.8)
600	9.63 (31.6)	6.43 (21.1)
900	12.03 (39.4)	8.21 (26.9)
1900	18.24 (59.8)	13.09 (42.9)
2100	19.30 (63.3)	13.96 (45.8)
2500	21.32 (69.9)	15.63 (51.2)
3500	25.86 (84.8)	19.51 (64.0)
4900	31.44 (103.1)	24.49 (80.3)
5800	34.72 (113.9)	27.50 (90.2)

Frequency in MHz

Maximum Power - (W)

	402	401
450	541	1266
600	463	1071
900	371	845
1900	245	535
2100	232	502
2500	210	450
3500	205	363
4900	143	291
5800	129	260

Frequency in MHz

How to order

TFT402 -CODE CODE- 10.0 F

- Connector A
Connector B -
Length / 3 dig
F = feet
M = meters
I = inches

USE CODES FROM THE CHART BELOW.

Code	Description
10M	1.0/2.3 mini DIN Male
225F	2.2/5 Female (jack)
225M	2.2/5 Male (plug)
41F	4.1/9.5 mini DIN Female
41M	4.1/9.5 mini DIN Male
43F	4.3/10 Female (jack)
43FB	4.3/10 Female (jack) bulkhead
43M	4.3/10 Male (plug)
43MR	4.3/10 Male (plug) right angle
43MS	4.3/10 Male (plug) snap-on
DF	7/16 Female (jack)
DFP	7/16-Female (jack) panel mount
DM	7/16-Male (plug)
DMR	7/16-Male (plug) right angle
NF	N-Female (jack)
NFB	N-Female (jack) bulkhead
NM	N-Male (plug)
NMR	N-Male (plug) right angle
NXFB	Nex10 Female (jack) bulkhead
NXM	Nex10 Male (plug)
NXMR	Nex10 Male (plug) right angle
QM	QMA-Male (plug)
QMR	QMA-Male (plug) right angle
SM	SMA-Male (plug)
SMR	SMA-Male (plug) right angle

How to order

TFT401 - CODE CODE - 10.0 F

- Connector A
Connector B -
Length / 3 dig
F = feet
M = meters
I = inches

USE CODES FROM THE CHART BELOW.

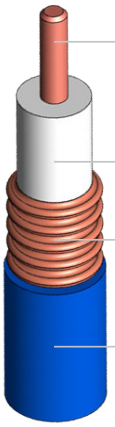
Code	Description	Weather Boot - WPB (Y/N) See page 13 for details
225M	2.2/5 Male (plug)	N
41F	4.1/9.5 mini DIN Female	N
41MR	4.1/9.5 mini DIN Male right angle	Y
43F	4.3/10 Female (jack)	N
43FB	4.3/10 Female (jack) bulkhead	N
43M	4.3/10 Male (plug)	Y
43MR	4.3/10 Male (plug) right angle	Y
43MS	4.3/10 Male (plug) snap-on	Y
DF	7/16 DIN female (jack)	N
DM	7/16 DIN Male (plug)	Y
DMR	7/16 DIN Male (plug) right angle	Y
NFB	N-Female (jack) bulkhead	N
NF	N-Female (jack)	N
NM	N-Male (plug)	Y
NMR	N-Male (plug) right angle	Y
NXFB	Nex10 Female (jack) bulkhead	N
NXM	Nex10 Male (plug)	Y
NXMS	Nex10 Male (plug) snap-on	Y
NXMR	Nex10 Male (plug) right angle	N
QM	QMA-Male (plug)	N
QMR	QMA-Male (plug) right angle	N
SM	SMA-Male (plug)	N
SMR	SMA-Male (plug) right angle	N

SPP - Cable

- -160 dBc PIM for optimal system performance
- UL listed, type CMP (plenum), UL file # E-170516
- Durable FEP outer jacket
- Indoor plenum

Specifications

	Units	250	375	500
Diameter	in (mm)	0.280 (7.11)	0.402 (10.21)	0.496 (12.60)
Center Conductor	in (mm)	0.068 (1.73)	0.108 (2.74)	0.136 (3.45)
Dielectric	in (mm)	0.190 (4.83)	0.285 (7.24)	0.370 (9.40)
Outer Conductor	in (mm)	0.256 (6.50)	0.378 (9.60)	0.472 (11.99)
Min Bend Radius	in (mm)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)
Weight	lb/1000 ft (kg/1000 m)	66.0 (98.2)	115.0 (171.1)	200.0 (297.6)
Velocity of Propagation	%	76	76	76
Capacitance	pF/ft (pF/m)	26.7 (87.6)	26.7 (87.6)	26.7 (87.6)
Shielding	dB	>100	>100	>100



CENTER CONDUCTOR
250 Solid Bare Copper
375 Bare Copper Clad Alum.
500 Bare Copper Clad Alum.

DIELECTRIC
Expanded PTFE

OUTER CONDUCTOR
Corrugated Copper Tube

JACKET
Blue FEP

Ω Impedance 50 Ohms

Op Temp -67 to 392°F -55 to 200°C

Attenuation - db/100ft (dB/100m)

	250	375	500
450	4.16 (13.65)	2.65 (8.69)	2.12 (6.96)
600	4.82 (15.81)	3.07 (10.07)	2.46 (8.07)
900	5.93 (19.46)	3.78 (12.40)	3.03 (9.94)
1900	8.71 (28.58)	5.59 (18.34)	4.50 (14.76)
2100	9.17 (30.09)	5.90 (19.36)	4.75 (15.58)
2500	10.04 (32.94)	6.46 (21.20)	5.21 (17.09)
3500	11.96 (39.24)	7.73 (25.36)	6.26 (20.54)
4900	14.27 (46.82)	9.27 (30.41)	7.52 (24.67)
5800	15.60 (51.18)	10.16 (33.33)	8.26 (27.10)

Frequency in MHz

Maximum Power - (W)

	250	375	500
450	2223	4220	5858
600	1924	3647	5057
900	1565	2960	4092
1900	1068	2012	2774
2100	1015	1910	2631
2500	928	1744	2402
3500	780	1462	2008
4900	655	1224	1675
5800	600	1118	1531

Frequency in MHz

How to order

SPP250 - CODE CODE - 10.0 F

Cable Size	- Connector A	Connector B -	Length / 3 dig	F = feet M = meters I = inches

USE CODES FROM THE CHART BELOW.

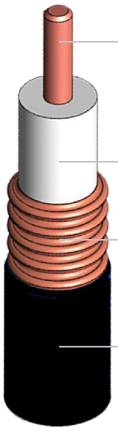
Code	Description	Weather Boot - WPB (Y/N) See page 13 for details
225M	2.2/5 Male (plug)	N
41M	4.1/9.5 mini DIN Male	N
41MR	4.1/9.5 mini DIN Male right angle	Y
43F	4.3/10 Female (jack)	N
43FB	4.3/10 Female (jack) bulkhead	N
43M	4.3/10 Male (plug)	Y
43MR	4.3/10 Male (plug) right angle	Y
43MS	4.3/10 Male (plug) Snap-on	Y
DF	7/16 DIN female (jack)	N
DM	7/16 DIN Male (plug)	Y
DMR	7/16 DIN Male (plug) right angle	Y
NFB	N-Female (jack) bulkhead	N
NF	N-Female (jack)	N
NM	N-Male (plug)	Y
NMR	N-Male (plug) right angle	Y
NXFB	Nex10 Female (jack) bulkhead	N
NXM	Nex10 Male (plug)	Y
NXMS	Nex10 Male (plug) Snap-on	Y
NXMR	Nex10 Male (plug) right angle	N
QM	QMA-Male (plug)	N
QMR	QMA-Male (plug) right angle	N
SM	SMA-Male (plug)	N
SMR	SMA-Male (plug) right angle	N

SPO - Cable

- -160 dBc PIM for optimal system performance
- Corrugated copper outer conductor
- Durable black polyethylene outer jacket
- Outdoor

Specifications

	Units	250	375	500
Diameter	in (mm)	0.303 (7.70)	0.435 (11.05)	0.545 (13.84)
Center Conductor	in (mm)	0.075 (1.91)	0.110 (2.79)	0.142 (3.61)
Dielectric	in (mm)	0.177 (4.50)	0.272 (6.91)	0.354 (8.99)
Outer Conductor	in (mm)	0.252 (6.40)	0.378 (9.60)	0.476 (12.09)
Min Bend Radius	in (mm)	1.250 (31.75)	1.750 (44.45)	2.250 (57.15)
Weight	lb/1000 ft (kg/1000 m)	51.0 (75.9)	100.0 (148.8)	135.0 (200.9)
Velocity of Propagation	%	83	83	83
Capacitance	pF/ft (pF/m)	24.5 (80.4)	24.5 (80.4)	24.5 (80.4)
Shielding	dB	>100	>100	>100



CENTER CONDUCTOR
250 Bare Copper
375 Bare Copper Clad Alum
500 Bare Copper Clad Alum

DIELECTRIC
Foamed PE

OUTER CONDUCTOR
Corrugated Copper Tube

JACKET
Black PE

Impedance 50 Ohms

Op Temp -40 to 185°F -40 to 85°C

Attenuation - db/100ft (dB/100m)

	250	375	500
450	4.07 (13.35)	2.85 (9.35)	2.30 (7.55)
600	4.75 (15.58)	3.34 (10.96)	2.70 (8.86)
900	5.91 (19.39)	4.18 (13.71)	3.40 (11.16)
1900	8.92 (29.27)	6.42 (21.06)	5.27 (17.29)
2100	9.44 (30.97)	6.80 (22.31)	5.60 (18.37)
2500	10.41 (34.16)	7.54 (24.74)	6.23 (20.44)
3500	12.63 (41.44)	9.23 (30.28)	7.68 (25.20)
4900	15.37 (50.43)	11.36 (37.27)	9.52 (31.24)
5800	16.99 (55.74)	12.62 (41.41)	10.63 (34.88)

Frequency in MHz

Maximum Power - (W)

	250	375	500
450	580	1140	1636
600	497	975	1396
900	400	781	1108
1900	266	511	719
2100	251	482	677
2500	228	436	610
3500	188	357	496
4900	155	291	401
5800	140	262	360

Frequency in MHz

How to order

SPO250 -CODE CODE- 10.0 F

Cable Size | - Connector A | Connector B - | Length / 3 dig | F = feet M = meters I = inches

USE CODES FROM THE CHART BELOW.

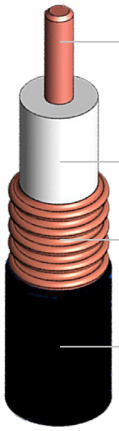
Code	Description	Weather Boot - WPB (Y/N) See page 13 for details
225M	2.2/5 Male (plug)	N
41F	4.1/9.5 mini DIN Female	N
41M	4.1/9.5 mini DIN Male	Y
43F	4.3/10 Female (jack)	N
43FB	4.3/10 Female (jack) bulkhead	N
43M	4.3/10 Male (plug)	Y
43MR	4.3/10 Male (plug) right angle	Y
43MS	4.3/10 Male (plug) Snap-on	Y
DF	7/16 DIN Female (jack)	N
DM	7/16 DIN Male (plug)	Y
DMR	7/16 DIN Male (plug) right angle	Y
NFB	N-Female (jack) bulkhead	N
NF	N-Female (jack)	N
NM	N-Male (plug)	Y
NMR	N-Male (plug) right angle	Y
NXFB	Nex10 Female (jack)bulkhead	N
NXM	Nex10 Male (plug)	Y
NXMS	Nex10 Male (plug) Snap-on	Y
NXMR	Nex10 Male (plug) right angle	N
QM	QMA-Male (plug)	N
QMR	QMA-Male (plug) right angle	N
SM	SMA-Male (plug)	N
SMR	SMA-Male (plug) right angle	N

SPF - Cable

- -160 dBc PIM for optimal system performance
- UL listed, type CMR (riser), UL file # E-170516
- Durable fire retardant, low smoke polyolefin outer jacket
- Indoor riser

Specifications

	Units	250	375	500
Diameter	in (mm)	0.303 (7.70)	0.435 (11.05)	0.545 (13.84)
Center Conductor	in (mm)	0.075 (1.91)	0.110 (2.79)	0.142 (3.61)
Dielectric	in (mm)	0.177 (4.50)	0.272 (6.91)	0.354 (8.99)
Outer Conductor	in (mm)	0.252 (6.40)	0.378 (9.60)	0.476 (12.09)
Min Bend Radius	in (mm)	1.250 (31.75)	1.750 (44.45)	2.250 (57.15)
Weight	lb/1000 ft (kg/1000 m)	51.0 (75.9)	100.0 (148.8)	135.0 (200.9)
Velocity of Propagation	%	83	83	83
Capacitance	pF/ft (pF/m)	24.5 (80.4)	24.5 (80.4)	24.5 (80.4)
Shielding	dB	>100	>100	>100



CENTER CONDUCTOR
250 Bare Copper
375 Bare Copper Clad Alum
500 Bare Copper Clad Alum

DIELECTRIC
Foamed PE

OUTER CONDUCTOR
Corrugated Copper Tube

JACKET
Black FRPE

Ω Impedance 50 Ohms

Op Temp -40 to 185°F -40 to 85°C

Attenuation - db/100ft (dB/100m)

	250	375	500
450	4.07 (13.35)	2.85 (9.35)	2.30 (7.55)
600	4.75 (15.58)	3.34 (10.96)	2.70 (8.86)
900	5.91 (19.39)	4.18 (13.71)	3.40 (11.16)
1900	8.92 (29.27)	6.42 (21.06)	5.27 (17.29)
2100	9.44 (30.97)	6.80 (22.31)	5.60 (18.37)
2500	10.41 (34.16)	7.54 (24.74)	6.23 (20.44)
3500	12.63 (41.44)	9.23 (30.28)	7.68 (25.20)
4900	15.37 (50.43)	11.36 (37.27)	9.52 (31.24)
5800	16.99 (55.74)	12.62 (41.41)	10.63 (34.88)

Frequency in MHz

Maximum Power - (W)

	250	375	500
450	580	1140	1636
600	497	975	1396
900	400	781	1108
1900	266	511	719
2100	251	482	677
2500	228	436	610
3500	188	357	496
4900	155	291	401
5800	140	262	360

Frequency in MHz

How to order

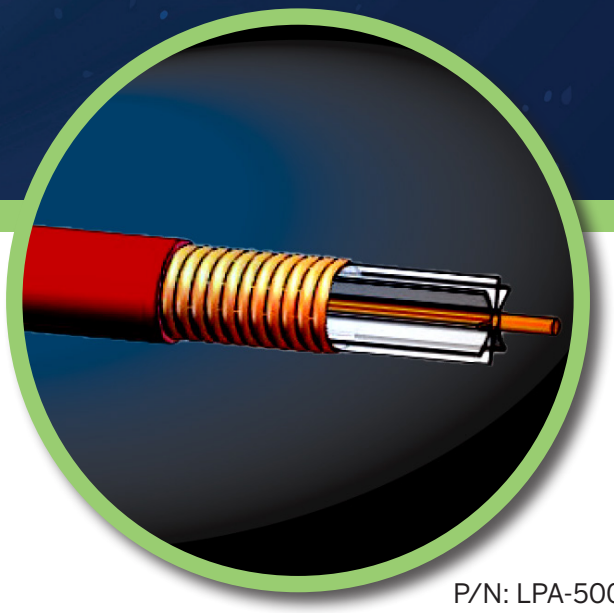
SPF250 -CODE CODE- 10.0 F

Cable Size | - Connector A | Connector B - | Length / 3 dig | F = feet M = meters I = inches

USE CODES FROM THE CHART BELOW.

Code	Description	Weather Boot - WPB (Y/N) See page 13 for details
225M	2.2/5 Male(plug)	N
41M	4.1/9.5 mini DIN Male	N
41MR	4.1/9.5 mini DIN Male right angle	Y
43F	4.3/10 Female (jack)	N
43FB	4.3/10 Female (jack) bulkhead	N
43M	4.3/10 Male (plug)	Y
43MR	4.3/10 Male (plug) right angle	Y
43MS	4.3/10 Male (plug) Snap-on	Y
DF	7/16 DIN female (jack)	N
DM	7/16 DIN Male (plug)	Y
DMR	7/16 DIN Male (plug) right angle	Y
NFB	N-Female (jack) bulkhead	N
NF	N-Female (jack)	N
NM	N-Male (plug)	Y
NMR	N-Male (plug) right angle	Y
NXFB	Nex10 Female(jack)bulkhead	N
NXM	Nex10 Male(plug)	Y
NXMS	Nex10 Male(plug) snap-on	Y
NXMR	Nex10 Male(plug) right angle	N
QM	QMA-Male (plug)	N
QMR	QMA-Male (plug)right angle	N
SM	SMA-Male (plug)	N
SMR	SMA-Male (plug) right angle	N

LPA 1/2” Plenum

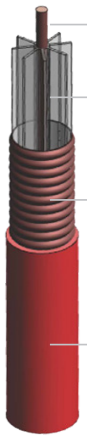


P/N: LPA-500

- Listed type CMP plenum cable
- Low loss indoor plenum feeder cable
- Excellent shielding effectiveness
- Outstanding intermodulation performance
- Indoor plenum

Specifications

	Units	250
Diameter	in (mm)	0.620 (15.75)
Center Conductor	in (mm)	0.189 (4.80)
Dielectric	in (mm)	0.469 (11.9)
Outer Conductor	in (mm)	0.539 (13.6)
Min Bend Radius	in (mm)	5.0 (127)
Weight	lb/1000 ft (kg/1000 m)	163.3 (243.0)
Velocity of Propagation	%	86
Capacitance	pF/ft (pF/m)	23.6 (77.4)
Shielding	dB	>100



CENTER CONDUCTOR
Copper Clad Aluminum

DIELECTRIC AIR SPACED
Polyethylene

OUTER CONDUCTOR
Corrugated Copper

JACKET
Red FR-PVC

Ω Impedance 50 Ohms

Op Temp 14 to 167°F -10 to 75°C

Attenuation - db/100ft (dB/100m)

450	1.73 (5.68)
600	2.03 (6.66)
900	2.56 (8.40)
1900	3.97 (13.03)
2100	4.22 (13.85)
2500	4.70 (15.42)
3500	5.80 (19.03)
4900	7.19 (23.59)
5800	8.03 (26.35)

Frequency in MHz

Maximum Power - (W)

450	2366
600	2013
900	1606
1900	1037
2100	978
2500	879
3500	715
4900	578
5800	518

Frequency in MHz

LPA Connectors and Installation Tools

ST-LPA-500 Installation Tool

All in one prep tool for the LPA-500-LLPL. Can be used by hand or drill mounted. Part Number: ST-LPA-500.

FT-540 Flaring Tool

Used for flaring the outer sheath once the back nut has been installed on the cable. Part number: FT-540.

Available Connectors

Stock Code	Interface	Part Number
3190 - 6344	N-Male	EZ-LP500-NMC-LP
3190 - 6857	N-Male-RA	EZ-LP500-NMC-RA-LP
3190 - 6346	4.3-10 Male	EZ-LP500-4310MC-LP
3190 - 6350	7-16M	EZ-LP-500-716MC-LP
3190 - 6799	N-Female	EZ-LP-500-NFC-LP

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