

Microlab

DAS & Small Cell Applications

GPS Applications

Solutions Guide



www.microlabtech.com

 **Wireless Telecom Group**
Boonton CommAgility Microlab Noisecom



Network Infrastructure Products for Harsh Environments

Microlab's product line for harsh outdoor applications have been designed to protect against corrosive salt fog environments. These products combine state of the art protective coatings, double moisture seals, and limits the use of dissimilar metals to produce a robust outdoor RF component. These products are also adapted with modified 4-hole flanges. Unlike our competitors our 4-hole flange design prevents rotation during assembly avoiding future PIM issues. Available as custom assemblies or passive components.

Microlab Salt-Fog Products:

- ◆ Capable of performing under corrosive salt fog conditions
- ◆ Complies with Telcordia GR-3108-CORE paragraph 6.2 "Salt Fog Exposure" as Class 4 products for 30 Days as defined by ASTM-B117
- ◆ IP68 Ingress Protection Rating for hazardous partial protection and product submission greater than 1 meter
- ◆ Connector Interfaces accepts Popular Weather Protection Boot Systems
- ◆ Connectors designed to withstand excessive installation torque

These components will perform service free even in the worst environmental conditions. In addition the connectors on these products have been redesigned to withstand high torque conditions for trouble free installations.

Hybrid Combiners

Model	Frequency (MHz)	Coupling Value	Ports In:Out	Power/Input (W)	Conn. Type	Ingress	PIM (dBc)
CA-84KD	694-2700	3 dB	2:2	80	7-16	IP68	-161
CA-84KE	694-2700	3 dB	2:2	80	4.3-10	IP68	-161
CM-80KD	694-2700	4.8 dB	3:3	150	7-16	IP68	-161
CM-80KE	694-2700	4.8 dB	3:3	150	4.3-10	IP68	-161
CM-88KD	694-2700	6 dB	4:4	150	7-16	IP68	-161
CM-88KE	694-2700	6 dB	4:4	150	4.3-10	IP68	-161
CT-84KD	698-2700	3 dB	2:1	80	7-16	IP68	-161
CT-84KE	698-2700	3 dB	2:1	80	4.3-10	IP68	-161

Directional Couplers

Model	Frequency (MHz)	Coupling Value	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
CK-15KD	694-3600	15 dB	200	7-16	IP68	-161
CK-15KE	694-3600	15 dB	200	4.3-10	IP68	-161
CK-16KD	694-3600	6 dB	200	7-16	IP68	-161
CK-16KE	694-3600	6 dB	200	4.3-10	IP68	-161
CK-17KD	694-3600	10 dB	200	7-16	IP68	-161
CK-17KE	694-3600	10 dB	200	4.3-10	IP68	-161
CK-18KD	694-3600	20 dB	200	7-16	IP68	-161
CK-18KE	694-3600	20 dB	200	4.3-10	IP68	-161

Low PIM Terminations

Model	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
TK-21KMD	400-2700	10	7-16	IP68	-161
TK-21KME	400-2700	10	4.3-10	IP68	-161
TK-205MD	400-2700	5	4.3-10	IP67*	-161
TK-205ME	400-2700	5	7-16	IP67*	-161
TK-210MD	400-2700	10	4.3-10	IP67*	-161
TK-210ME	400-2700	10	7-16	IP67*	-161

*meets 30 days ASTM B117 Salt Fog Testing when used with weather boot or connector wrap

Reactive Splitters

Model	Frequency (MHz)	Ways	Loss	Power/Input (W)	Conn. Type	Ingress	PIM (dBc)
D2-84KFE	575-2700	2	3 dB	300	4.3-10	IP68	-161
D3-84KFE	575-2700	3	4.8 dB	300	4.3-10	IP68	-161
D4-84KFE	575-2700	4	6 dB	300	4.3-10	IP68	-161

See individual data sheet for complete specification.

Directional Couplers

Model	Frequency (MHz)	Coupling Value	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
CC-05D	575-2700	5 dB	300	7-16	IP67	-161
CC-05E	575-2700	5 dB	300	4.3-10	IP67	-161
CC-06D	575-2700	6 dB	300	7-16	IP67	-161
CC-06E	575-2700	6 dB	300	4.3-10	IP67	-161
CC-07D	575-2700	7 dB	300	7-16	IP67	-161
CC-07E	575-2700	7 dB	300	4.3-10	IP67	-161
CC-08D	575-2700	8 dB	300	7-16	IP67	-161
CC-08E	575-2700	8 dB	300	4.3-10	IP67	-161
CC-10D	575-2700	10 dB	300	7-16	IP67	-161
CC-10E	575-2700	10 dB	300	4.3-10	IP67	-161
CC-13D	575-2700	13 dB	300	7-16	IP67	-161
CC-13E	575-2700	13 dB	300	4.3-10	IP67	-161
CC-15D	575-2700	15 dB	300	7-16	IP67	-161
CC-15E	575-2700	15 dB	300	4.3-10	IP67	-161
CC-20D	575-2700	20 dB	300	7-16	IP67	-161
CC-20E	575-2700	20 dB	300	4.3-10	IP67	-161
CC-30D	575-2700	30 dB	300	7-16	IP67	-161
CC-30E	575-2700	30 dB	300	4.3-10	IP67	-161

Wilkinson Splitters

Model	Frequency (MHz)	Ways	Loss	Power/Input (W)	Conn. Type	Ingress
D2-74FE	575-2700	2	3 dB	50	4.3-10	IP65
D3-74FE	575-2700	3	4.8 dB	50	4.3-10	IP65
D4-74FE	575-2700	4	6 dB	50	4.3-10	IP65

High Power Reactive Splitters

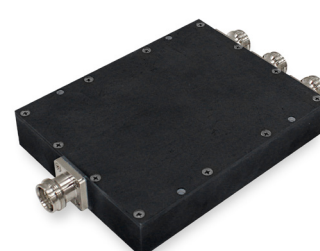
Model	Frequency (MHz)	Ways	Loss	Power/Input (W)	Conn. Type	Ingress	PIM (dBc)
D2-84KFE	575-2700	2	3 dB	300	4.3-10	IP68	-161
D3-84KFE	575-2700	3	4.8 dB	300	4.3-10	IP68	-161
D4-84KFE	575-2700	4	6 dB	300	4.3-10	IP68	-161



CC-06E



D4-84FE



D3-74FE

See individual data sheet for complete specification.

Tappers

Model	Frequency (MHz)	Tapper Value	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
DN-34FD	350-5850	3 dB	500W	7-16	IP67	-161
DN-34FE	350-5850	3 dB	500W	4.3-10	IP67	-161
DN-44FD	350-5850	4.8 dB	500W	7-16	IP67	-161
DN-44FE	350-5850	4.8 dB	500W	4.3-10	IP67	-161
DN-54FD	350-5850	6 dB	500W	7-16	IP67	-161
DN-54FE	350-5850	6 dB	500W	4.3-10	IP67	-161
DN-64FD	350-5850	8 dB	500W	7-16	IP67	-161
DN-64FE	350-5850	8 dB	500W	4.3-10	IP67	-161
DN-74FD	350-5850	10 dB	500W	7-16	IP67	-161
DN-74FE	350-5850	10 dB	500W	4.3-10	IP67	-161
DN-84FD	350-5850	13 dB	500W	7-16	IP67	-161
DN-84FE	350-5850	13 dB	500W	4.3-10	IP67	-161
DN-94FD	350-5850	15 dB	500W	7-16	IP67	-161
DN-94FE	350-5850	15 dB	500W	4.3-10	IP67	-161
DN-04FD	350-5850	20 dB	500W	7-16	IP67	-161
DN-04FE	350-5850	20 dB	500W	4.3-10	IP67	-161
DN-14FD	350-5850	30 dB	500W	7-16	IP67	-161
DN-14FE	350-5850	30 dB	500W	4.3-10	IP67	-161



DN-44FD

See individual data sheet for complete specification.

Diplexers/Multi-Band Combiners

Model	Port #1	Port #2	Port #3	Port #4	Power/ Input (W)	Conn. Type	Ingress	PIM (dBc)
BK-12EP	80-960	1695-2700	--	--	120	4.3-10	IP67	-161
BK-12DP	80-960	1695-2700	--	--	120	7-16	IP67	-161
BK-20EP	694-960	1710-2170	--	--	250	7-16	IP67	-161
BK-20DP	694-960	1710-2170	--	--	250	7-16	IP67	-161
BK-36D	698-806	824-896 1850-2000	1710-1755 2110-2155	--	250	7-16	--	-156
BK-42D	698-960	1695-2180	2300-2600	--	250	7-16	IP67	-161
BK-69D	698-960 1695-2200	2300-2700	--	--	250	7-16	IP67	-161
BK-691D	698-960 1695-2360	2300-2700	--	--	250	7-16	IP67	-161
BK-741D/ BK-741DW*	1850-2000	1695-1780 2110-2180	--	--	250	7-16	IP67	-161
BK-741E/ BK-741EW*	1850-2000	1695-1780 2110-2180	--	--	250	4.3-10	IP67	-161
BK-745E†	1850-1990	1695-1780 2110-2360	--	--	100	4.3-10	IP67	-155
BK-75D	698-793	824-894	--	--	100	7-16	IP67	-153
BK-962D	698-787	817-896	1850-2000	1695-1780 2110-2180	250	7-16	IP67	-161
BK-962E	698-787	817-896	1850-2000	1695-1780 2110-2180	250	4.3-10	IP67	-161

*Twin Model; For additional twin model configurations please contact your Microlab Sales Representative



BK-962E



BK-741D



BK-745E

See individual data sheet for complete specification.

Low PIM Attenuators

Model	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
FZ-03FD	694-2700	80	7-16 (f-f)	--	-161
FZ-06D	694-2700	133	7-16 (m-f)	--	-161
FZ-06E	694-2700	133	4.3-10 (m-f)	--	-161
FZ-10D	694-2700	110	7-16 (m-f)	--	-161
FZ-10E	694-2700	110	4.3-10 (m-f)	--	-161
FZ-15D	694-2700	100	7-16 (m-f)	--	-161
FZ-20D	694-2700	100	7-16 (m-f)	--	-161
FZ-20E	694-2700	100	4.3-10 (m-f)	--	-161
FZ-30D	694-2700	100	7-16 (m-f)	--	-161
FZ-30E	694-2700	100	4.3-10 (m-f)	--	-161
FZ-15E	694-2700	100	4.3-10 (m-f)	--	-161

Low Power Low Pim Attenuators

Model	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBm*)
FY-06D	694-2700	13	7-16 (m-f)	--	-110
FY-06E	694-2700	13	4.3-10 (m-f)	--	-110
FY-10D	694-2700	10	7-16 (m-f)	--	-110
FY-10E	694-2700	10	4.3-10 (m-f)	--	-110
FY-15D	694-2700	10	7-16 (m-f)	--	-110
FY-15E	694-2700	10	4.3-10 (m-f)	--	-110
FY-20D	694-2700	10	7-16 (m-f)	--	-110
FY-20E	694-2700	10	4.3-10 (m-f)	--	-110

*absolute PIM (dBm) specified and test power not to exceed product rating.

Attenuators

Model	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
AS-10D	DC-3000	100	7-16 (m-f)	--	--
AS-15D	DC-3000	100	7-16 (m-f)	--	--
AS-20D	DC-3000	100	7-16 (m-f)	--	--
AS-30D	DC-3000	100	7-16 (m-f)	--	--



FZ-06D



AS-10D



FY Series

See individual data sheet for complete specification.

Low PIM Terminations

Model	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
TK-21KMD	400-2700	10	7-16	IP68	-161
TK-21KME	400-2700	10	4.3-10	IP68	-161
TK-205MD	400-2700	5	4.3-10	IP67*	-161
TK-205ME	400-2700	5	7-16	IP67*	-161
TK-210MD	400-2700	10	4.3-10	IP67*	-161
TK-210ME	400-2700	10	7-16	IP67*	-161
TK-23FD	400-2700	30	7-16 (f)	--	-161
TK-23FE	400-2700	30	4.3-10 (f)	--	-161
TK-23MD	400-2700	30	7-16 (m)	--	-161
TK-23ME	400-2700	30	4.3-10 (m)	--	-161
TK-25FD	400-2700	60	7-16 (f)	IP67	-161
TK-25FE	400-2700	60	4.3-10 (f)	IP67	-161
TK-25MD	400-2700	60	7-16 (m)	IP67	-161
TK-25ME	400-2700	60	4.3-10 (m)	IP67	-161
TK-27FD	400-2700	100	7-16 (f)	IP67	-161
TK-27FE	400-2700	100	4.3-10 (f)	IP67	-161
TK-27MD	400-2700	100	7-16 (m)	IP67	-161
TK-27ME	400-2700	100	4.3-10 (m)	IP67	-161
TK-28FD	300-2700	200	7-16 (f)	--	-161
TK-28MD	300-2700	200	7-16 (m)	--	-161

*meets 30 days ASTM B117 Salt Fog Testing when used with weather boot or connector wrap

Terminations

Model	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
TA-2MHE	DC-3000	2	4.3-10(m)	IP65	--
TA-2MD	DC-3000	2	7-16 (m)	IP67	--
TB-5MD	DC-2700	20	7-16 (m)	--	--
TB-70MD	DC-4000	50	7-16 (m)	--	--
TB-75MD	DC-4000	100	7-16 (m)	--	--
TB-90MD	DC-4000	250	7-16 (m)	--	--



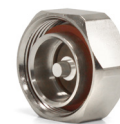
TK-205ME



TK-25FD



TB-5MD



TA-2MD

See individual data sheet for complete specification.

Jumper Cables, Low PIM

Model	Frequency (MHz)	Power Rating (W)	Conn. #1	Conn. #2	Length (m)	PIM (dBc)
JA-10MD	DC-6000	100	7-16(m)	7-16(m)	1	-158
JA-10MX	DC-6000	100	4.3-10(m)	4.3-10(m)	1	-158
JA-10MY	DC-6000	100	4.3-10(m)	7-16(m)	1	-158
JA-10TD	DC-6000	100	7-16(m)	7-16(f)	1	-158
JA-10FD	DC-6000	100	7-16(f)	7-16(f)	1	-158
JA-10TX	DC-6000	100	4.3-10(m)	4.3-10(f)	1	-158
JA-20MX	DC-6000	100	4.3-10(m)	4.3-10(m)	2	-158
JA-20MY	DC-6000	100	4.3-10(m)	7-16(m)	2	-158
JA-20FD	DC-6000	100	7-16(f)	7-16(f)	2	-158
JA-20MD	DC-6000	100	7-16(m)	7-16(m)	2	-158
JA-20TD	DC-6000	100	7-16(m)	7-16(f)	2	-158
JA-20TX	DC-6000	100	4.3-10(m)	4.3-10(f)	2	-158
JA-30FD	DC-6000	100	7-16(f)	7-16(f)	3	-158
JA-30MD	DC-6000	100	7-16(m)	7-16(m)	3	-158
JA-30MX	DC-6000	100	4.3-10(m)	4.3-10(m)	3	-158
JA-30MY	DC-6000	100	4.3-10(m)	7-16(m)	3	-158
JA-30TD	DC-6000	100	7-16(m)	7-16(f)	3	-158
JA-30TX	DC-6000	100	4.3-10(m)	4.3-10(f)	3	-158


JA series

Antennas

Model	Frequency (MHz)	Style	MIMO	Power (W)	Conn Type	Ingress	PIM (dBc)
YA-14NF	698-960 / 1710-3500	flat omni		50	N	--	-140
YA-17NF	380-470 / 698-960 / 1710-6000	omni		60	N	--	-153
YA-18NF	698-960 / 1500-6000	omni		50	N	--	-153
YA-20NF	698-960 / 1700-2700	directional		50	N	--	-140
YA-30NF	698-960 / 1710-2700	low profile omni	Y	50	N	--	-153
YA-31NF	698-960 / 1500-6000	low profile omni	Y	50	N	--	-153



YA-31NF



YA-14NF



YA-30NF

Interface Accessories

Model	Description	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
DCC601-B20	8x16 Splitter Panel	698-2700	50	4.3-10 (f)	--	-154
PP-220FE	2RU Demarcation Panel	DC-4000	100	(20x) 4.3-10 (f-f)	--	-165

DCC Series™ DAS Carrier Conditioner

Model	Description	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
DCC19-19-1DDFSEF3D	Dual Channel 1900 PCS, 15dB atten	1850-1915 / 1930-1995	60	7-16 / 4.3-10	IP64	-153
DCC19-19-1DEFSEF3B	Dual Channel 1900 PCS, 6dB atten	1850-1915 / 1930-1995	5	4.3-10	IP64	-153
DCC19-19-1DEFSEF3E	Dual Channel 1900 PCS, 20dB atten	1850-1915 / 1930-1995	60	4.3-10	IP64	-153
DCC19-1DEFSEF3E	Single Channel 1900 PCS, 20dB atten	1850-1915 / 1930-1995	60	4.3-10	IP64	-153
DCC19-1DEFSEF3E	Single Channel 1900 PCS, 20dB atten	1850-1915 / 1930-1995	60	4.3-10	IP64	-153
DCC21-1DEFSEF3B	Single Channel 2100 AWS1-3, 6dB atten	1695-1780 / 2110-2180	5	4.3-10	IP64	-153
DCC601-B25	Dual Band 2x1, 700 upper C + 2100 AWS1-3	746-757 / 776-787 1695-1780 / 2110-2180	10	7-10/SMA	IP64	-153
DCC601-B42	2x1 2100 AWS1-3, 20dB atten	1695-1780 / 2110-2180	60	4.3-10	IP64	-153
DCC7UC-21-1DEFSEF3B	Dual Channel 700 upper C/2100 AWS1-3, 6dB atten	746-757 / 776-787 1695-1780 / 2110-218	5	4.3-10	IP64	-153
DCC7UC-7UC-1DEFSEF3B	Dual Channel 700 upper C, 6dB atten	746-757 / 776-787	5	4.3-10	IP64	-153
DCC7UC-7UC-1DEFSEF3E	Dual Channel 700 upper C, 20dB atten	746-757 / 776-787	60	4.3-10	IP64	-153

DCC Series Point-of-Interface (POI) / Combiners

Model	Description	Frequency (MHz)	Power Rating (W)	Conn. Type	Ingress	PIM (dBc)
DCC690D	8x4 combiner	698-2700	75	7-16	IP64	-158
DCC690DNW	8x4 combiner	698-2700	75	7-16 / N	IP65	-158
DCC601-B32	2x1 simplex combiner	1900/2100	5		IP64	--
DCC601-B44	Dual 2x1 simplex combiner	694-2700	0.1 (+20dBm)	4.3-10	IP64	--
DCC601-B34	6x2 combiner	698-2700	30/160	7-16	IP64	-150
DCC601-B19	9x2 combiner	1800-2600	60/100	4.3-10	IP64	-153

*absolute PIM (dBm) specified and test power not to exceed product rating.



DCC7UC-21-1DEFSEF3B



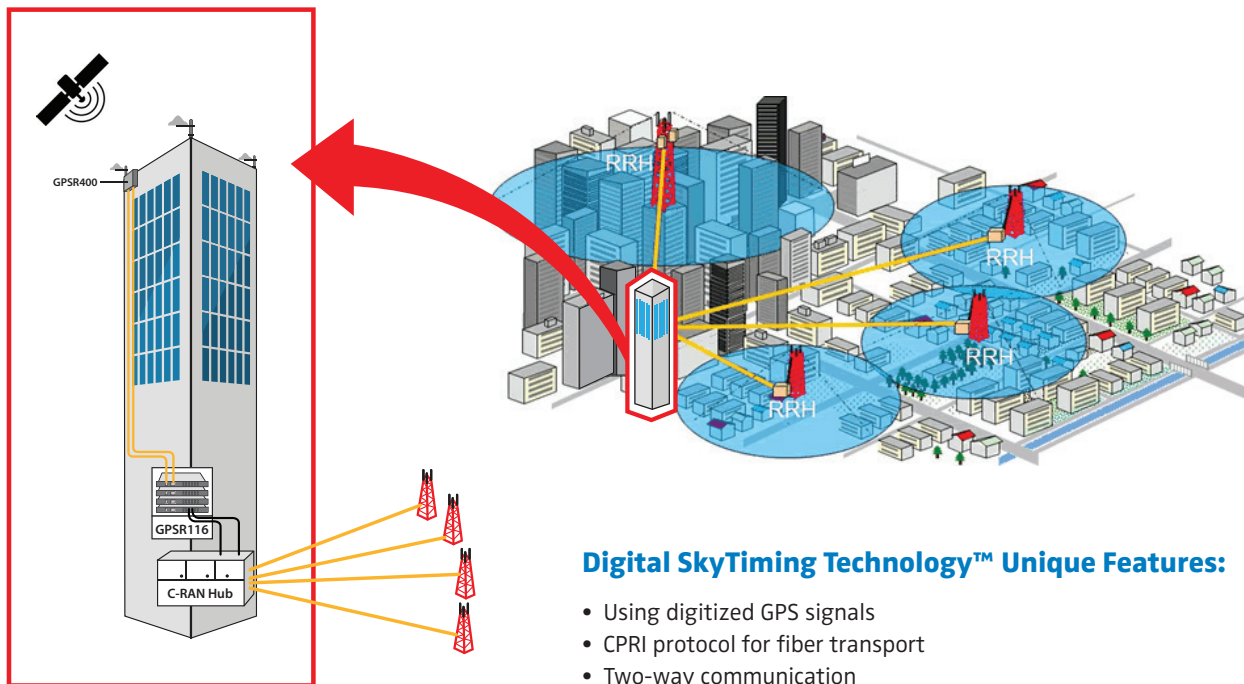
PP-220FE

See individual data sheet for complete specification.

Digital SkyTiming Technology™

Digital SkyTiming Technology™ is a patent-pending technique to transport GPS signals digitally over fiber for wireless network timing applications in C-RAN hubs and Distributed Antenna Systems (DAS). It is used in wireless systems where GPS signals are not readily available (where no skyview exists) close to the basestation or where remote monitoring and advanced alarms are required in the NOC by the carrier.

GPS signals are converted from RF to digital and transported over a fiber optic cable using CPRI protocols. The digital GPS signals are analyzed for number of satellites and their signal quality and monitored for robust network operation. The fiber link is also analyzed for round trip delay times and link quality to support advanced wireless features. The digital signals are then converted back to RF and distributed to the wireless network.



Impact of Digital GPS Signal Repeaters

- Solves network timing distance limitation in C-RAN and DAS systems
- Remote control and monitoring allows system management and reduces network troubleshooting
- Provides accurate timing required for advanced wireless services

Digital Skytiming™ Benefits

- Allows GPS signals to be transmitted up to 10km from antenna to BTS/BBU
- New web-based interface provides remote system control and monitoring over Ethernet
- Monitors antenna status with automatic switch-over
- Redundant fiber optic links monitored with auto switch-over
- Provides communication delay within a 100 nanosecond alignment for LTE and LTE-A
- Reduces temperature sensitivity
- Detects the presence of interference or jamming
- Eliminates signal degradation
- Advanced intelligent SNMP alarms



GPSR400 - Outdoor Remote Unit

- Up to 4 GPS antenna inputs
- Wall-mounted NEMA-4 enclosure
- Redundant fiber optic links
- Loss of signal alarms
- LED system health monitors
- Ethernet local port
- Connects to GPSR116 Indoor Head-End Unit



GPSR116 - Indoor Head-End Unit

- Up to 16 GPS RF outputs
- Redundant fiber optic links
- 1RU rack-mounted controller
- LED system health monitors
- Ethernet local port
- Connects to GPSR400 Outdoor Remote Unit



GPSS216 - GPS RF Signal Splitter

- Up to 16 GPS RF outputs
- 2 GPS antenna inputs
- GPS signal quality monitoring
- Compatible with GPSR116 Indoor Head-End Unit

GPS Repeater

Model	Description
GPSR116	Indoor head-end receiver, 16 RF output
GPSR400	Outdoor GPS signal transmitter, 4 antenna inputs, US version
GPSA001	AC/DC Adapter, 100-240VAC input, 24VDC output
GPSA002	PoE DC/DC adapter, +45-57V DC input, +24VDC output
GPS-FS-KIT	Fiber-Span replacement kit

GPS Lossless Splitter

Model	Description
GPSS216	Lossless GPS signal splitter, 2 RF inputs, 16 RF outputs
GPSS232	Lossless GPS signal splitter, 2 RF inputs, 32 RF outputs

GPS Jumpers

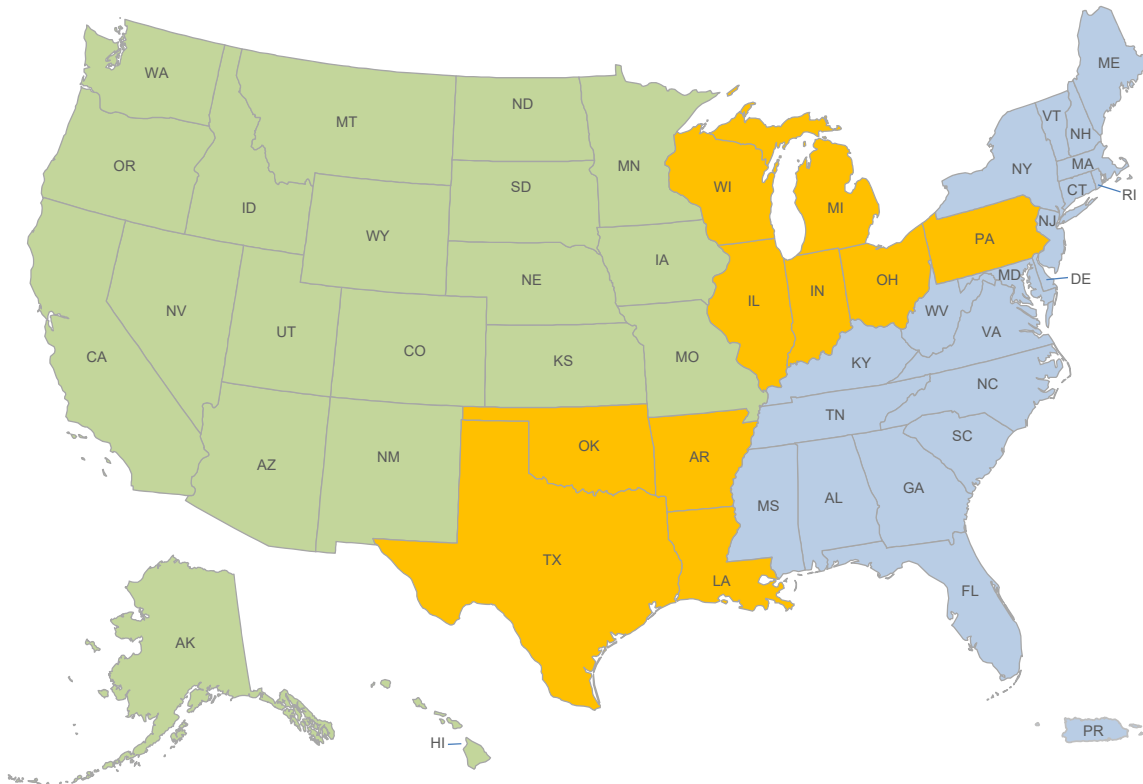
Model	Description
GPSJ-10-NFSM	1.0m, DC-6 GHz, .141, N(f) to SMA(m)
GPSJ-20-NFSM	2.0m, DC-6 GHz, .141, N(f) to SMA(m)
GPSJ-30-NFSM	3.0m, DC-6 GHz, .141, N(f) to SMA(m)
GPSJ-40-NFSM	4.0m, DC-6 GHz, .141, N(f) to SMA(m)
GPSJ-50-NFSM	5.0m, DC-6 GHz, .141, N(f) to SMA(m)
GPSJ-10-SMSM	1.0m, DC-6 GHz, .141, SMA(m) to SMA(m)
GPSJ-20-SMSM	2.0m, DC-6 GHz, .141, SMA(m) to SMA(m)
GPSJ-30-SMSM	3.0m, DC-6 GHz, .141, SMA(m) to SMA(m)
GPSJ-40-SMSM	4.0m, DC-6 GHz, .141, SMA(m) to SMA(m)
GPSJ-50-SMSM	5.0m, DC-6 GHz, .141, SMA(m) to SMA(m)

GPS Repeater (Head End/Remote Units)

Lossless GPS Signal Splitter



See individual data sheet for complete specification.

Regional Sales Managers

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