

# Small Cell (Femto, Micro, Pico)

Richardson RFPD offers a wide range of products that are ideal for small cell applications, including the newest RF amplifiers, detectors, combiners, couplers, antennas, quad demodulators, and downconverters.

## A Rapidly Expanding Market

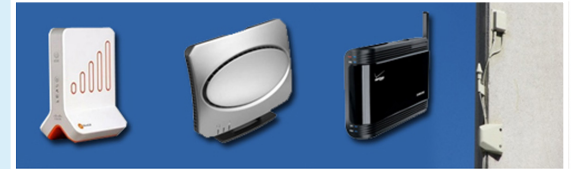
There is a critical need for mobile services that are able to detect the presence of, connect to, and interact with existing networks — both to offload networks as data demands threaten to overwhelm them, and to fill indoor and outdoor coverage gaps.

### Femtocells: Indoor

Residential femtocells typically have power output of about 20mW and cover a house with a small number of users, such as a family. Enterprise femtocells can be as much as 200mW, with the higher power providing a larger range and number of users, such as a small business or apartment building.

### Metrocells & Picocells: Outdoor/Urban

These typically have power output of 1-10W and are used in parks, city centers, tunnels, stadiums, and even mass transit systems.



Though not standardized, small cells may generally be recognized as low power, wireless access points that transmit less than 10W at the antenna.

**JUST RELEASED!**  
Get the Richardson RFPD  
New Product Selector Guide  
for Small Cell. (pdf file)

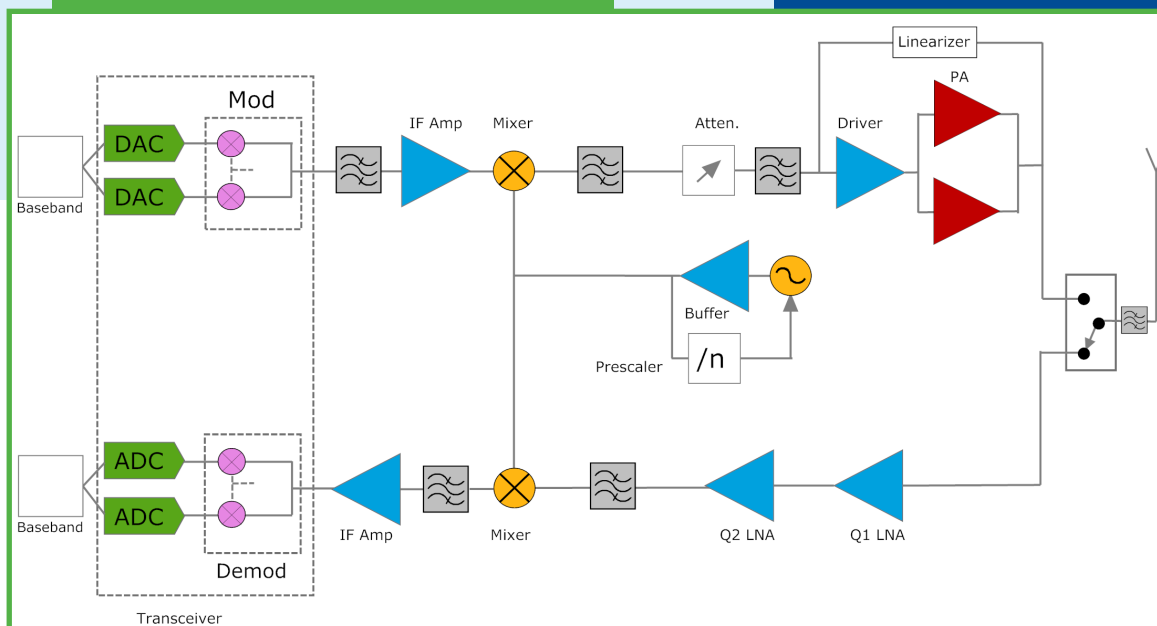


## Small Cell Market Forecast

The non-residential small cell market will grow at a rapid pace over the next five years. In particular, mobile operators and enterprises will deploy millions of small cells for capacity growth, driving cumulative annualized growth of 110% over the next five years, to build up a \$10B market by 2018.

Reference: Mobile Experts, LLC (February 2014)

## Small Cell (Femto, Micro, Pico)



For more on Richardson RFPD's Small Cell products, visit [www.richardsonrfpd.com/small-cell](http://www.richardsonrfpd.com/small-cell)

Your Global Source for  
RF, Wireless & Energy Technologies



## Power Amplifiers

Supplier	Part Number	Frequency Range (MHz)	P1dB (dBm)	Linear Pout (dBm)	Gain (dB)	Supply Voltage (V)
ANADIGICS	AWB7125	860 - 894	-	+24.5	30	4.2
ANADIGICS	AWB7225	860 - 894	-	+27	29.5	4.5
ANADIGICS	AWB7123	1930 - 1990	-	+24.5	31	4.2
ANADIGICS	AWB7223	1930 - 1990	-	+27	29	4.5
ANADIGICS	AWB7127	2110 - 2170	-	+24.5	30	4.2
ANADIGICS	AWB7227	2110 - 2170	-	+27	29	4.5
ANADIGICS	AWB7128	2545 - 2690	-	+24.5	28	4.2
ANADIGICS	AWB7228	2545 - 2690	-	+27	27	4.5
Freescale Semiconductor	MMZ09312BT1	400 - 1000	+30	-	32	5
Freescale Semiconductor	MW7IC915NT1	728 - 960	+42	-	38	28
Freescale Semiconductor	MD8IC925NR1	728 - 960	+44.1	+34	36.4	28
Freescale Semiconductor	MMA20312BT1	1800 - 2200	+30.5	-	26	5
Freescale Semiconductor	MMA20312BVT1	1800 - 2200	+30.5	-	27	3.3
Freescale Semiconductor	MMZ25332BT1	1800 - 2800	+33	-	27	5
Freescale Semiconductor	MD7IC2012	1805 - 2170	+40.8	+31.1	31	28
Freescale Semiconductor	MW7IC2020NT1	1805 - 2170	+43	+33.8	32	28
Freescale Semiconductor	MD7IC2050N	1880 - 2100	+48	-	31	28
Freescale Semiconductor	MMA25312BT1	2300 - 2700	+31	-	26	5
Freescale Semiconductor	MW7IC2725	2500 - 2700	+44	-	29	28
Freescale Semiconductor	MW7IC2750	2500 - 2700	+47	-	26	28
M/A-COM Technology Solutions	MAAP-007885	2300 - 2700	+31	-	30	3.0
Skyworks Solutions	SKY65124-21	1930 - 1990	+33	-	24	5
Skyworks Solutions	SKY65120-21	2110 - 2170	+33	-	24	5
TriQuint Semiconductor	AH420	400 - 2700	+35.7	-	16	5
TriQuint Semiconductor	AH323	700 - 2700	+33	-	27.2	5
TriQuint Semiconductor	AP561	700 - 2900	+39	-	15.8	12
TriQuint Semiconductor	TGA2450-SM	2110 - 2170	+42	-	34	5 / 18

## RF Power Transistors

Supplier	Part Number	Technology	Frequency Range (MHz)	P1dB (dBm)	Linear Pout (dBm)	Gain (dB)	PAE (%)	Supply Voltage (V)
Freescale Semiconductor	MRFG35003N6AT1	GaAs pHEMT	0 - 6000	+34.8	+24.8	10	27	6
Freescale Semiconductor	MRFG35005ANT1	GaAs pHEMT	0 - 6000	+36.5	+26.5	11	26	12
Freescale Semiconductor	MRFG35010ANT1	GaAs pHEMT	0 - 6000	+39.5	+30	10	25	12
Freescale Semiconductor	MRF8P9040N	LDMOS	728 - 960	+46.2	+36	19.1	19.9	28
Freescale Semiconductor	AFT27S006NT1	LDMOS	728 - 2700	-	+28.8	22	20	28
Freescale Semiconductor	AFT27S010NT1	LDMOS	728 - 2700	-	+31	21	22	28
Freescale Semiconductor	MRF8P20100H	LDMOS	1805 - 2025	-	+43	16	44.3	28
Freescale Semiconductor	AFT20S015	LDMOS	1805 - 2700	-	+31.8	18	22	28
Freescale Semiconductor	AFT20P060-4NR3	LDMOS	1805 - 2170	-	+38	19	20	28
Freescale Semiconductor	MRF8P23080H	LDMOS	2300 - 2400	-	+42	15.6	42	28
Freescale Semiconductor	AFT26H050W	LDMOS	2496 - 2690	-	+39.5	14.5	48	28
Freescale Semiconductor	MRF6S27015NR1	LDMOS	2300 - 2700	-	+34.8	14	22	28
Freescale Semiconductor	MRF8P26080H	LDMOS	2500 - 2700	-	+41.5	15	36.9	28

## Driver Amplifiers

Supplier	Part Number	Frequency Range (MHz)	P1dB (dBm)	Gain (dB)	Output IP3 (dBm)	Supply Voltage (V)
Analog Devices	ADL5324	400 - 4000	+29.1	14.6	+43.1	5
M/A-COM Technology Solutions	MAAM-009560	250 - 4000	+28.5	14.3	+40	5
Skyworks Solutions	SKY65162-70	400 - 2700	+29.5	15	+43	5
TriQuint Semiconductor	TQP7M9102	400 - 4000	+27.5	17.8	+43.8	5
TriQuint Semiconductor	TQP7M9103	400 - 4000	+27.5	17.8	+43.8	5

## Low Noise Amplifiers

Supplier	Part Number	Frequency Range (MHz)	Noise Figure (dB)	P1dB (dBm)	Gain (dB)	Input IP3 (dBm)	Supply Voltage (V)
Freescale Semiconductor	MML09211HT1	400 - 1400	0.52	+22	21	+11	5
Freescale Semiconductor	MML09212HT1	400 - 1400	0.52	+22.8	38	+0.5	5
Freescale Semiconductor	MML09231HT1	700 - 1400	0.36	+24.5	17.2	+20.2	5
Freescale Semiconductor	MML20211HT1	1400 - 2800	0.65	+21.3	19	+11	5
Freescale Semiconductor	MML20242HT1	1400 - 2800	0.57	+24	33	+6	5
M/A-COM Technology Solutions	MAAL-007304	500 - 3000	0.7	+7	25.5	-6	3.0 - 5.0
M/A-COM Technology Solutions	MAAMSS0045	1400 - 2000	1.4	+16	14	+15	3.0 - 8.0
M/A-COM Technology Solutions	MAAL-010706	1400 - 4000	0.6	+19	17.5	+17	3
Skyworks Solutions	SKY67151-396	700 - 3800	0.25	+21.5	26	+8.5	5
Skyworks Solutions	SKY67100-369	1200 - 3000	0.71	+18.4	17.6	+16.4	4
Skyworks Solutions	SKY67014-396LF	1500 - 3000	0.95	+16	12	+6	3.3
Skyworks Solutions	SKY67106-369	1500 - 3000	0.65	+24	35	+2.5	5
TriQuint Semiconductor	TQP3M9036	400 - 2000	0.45	+20	19	+15	5
TriQuint Semiconductor	TQP3M9037	1500 - 2700	0.4	+20	20	+15	5

## SPDT Switches

Supplier	Part Number	Frequency Range (MHz)	Insertion Loss (dB)	Isolation (dB)	Max Input Power (dBm)
M/A-COM Technology Solutions	MASW-007072	0 - 3000	0.75	30	+34
M/A-COM Technology Solutions	MASWSS0143	0 - 3000	0.35	22	+36
M/A-COM Technology Solutions	MASWSS0204	0 - 3000	0.3	25	+38
Peregrine Semiconductor	PE42421	10 - 3000	0.35	30	+34
Peregrine Semiconductor	PE42820	30 - 2700	0.4	28	+44.5
Peregrine Semiconductor	PE42821	100 - 2700	0.6	28	+44.5
Peregrine Semiconductor	PE42422	100 - 6000	0.3	35	+32
Skyworks Solutions	SKY13270-92	20 - 2500	0.4	24	+37.8
TriQuint Semiconductor	TQP4M0009	100 - 5000	0.6	54	+33

## RF Detector

Supplier	Part Number	Frequency Range (MHz)	Sensitivity (mV/dBm)	Dynamic Range (dB)	Output Capacitance (pF)	Output Polarity
Analog Devices	ADL5511	0 - 6000	-30	47	10	Positive

## Digital Step Attenuators

Supplier	Part Number	Frequency Range (MHz)	Control Accuracy (bits)	Step Size (dB)	Control Range (dB)	Input IP3 (dBm)
M/A-COM Technology Solutions	MAAD-007082	0 - 2400	6	1	50	+48
Peregrine Semiconductor	PE4302	0 - 4000	6	0.5	31.5	+52
Peregrine Semiconductor	PE4309	0 - 4000	6	0.5	31.5	+52
Peregrine Semiconductor	PE43702	0.009 - 4000	7	0.25	31.75	+57
TriQuint Semiconductor	TQP4M9072	0 - 4000	6	0.5	31.5	+57

## DACs

Supplier	Part Number	Number of Channels	Resolution (bits)	Output Range	Relative Accuracy (LSB)	Differential Nonlinearity (LSB)
Analog Devices	AD5686	4	16	up to 5 V	+/- 1	+/- 1
Analog Devices	AD9122	2	16	8.7 to 31.7 mA	+/- 3.7	+/- 2.1

## ADCs

Supplier	Part Number	Number of Channels	Resolution (bits)	Sample Rate (MSPS)	Output Voltage Range (V)	Interface
Analog Devices	AD9269	2	16	20 to 80	0.05 to 3.29	Serial
Analog Devices	AD9640	2	14	80 to 150	0.05 to 3.29	Serial

## Hybrid Couplers

Supplier	Part Number	Frequency Range (MHz)	Power (W)	Isolation (dB)	Insertion Loss (dB)	Return Loss (dB)	Phase (Degrees)	Footprint
Anaren	X3C07F1-03S	600 - 900	25	26	0.15	25	90	5.1 x 3.1mm
Anaren	C0810J5003AHF	800 - 1000	4	18	0.6	21	90	0805
Anaren	X3C09F1-03S	800 - 1000	25	26	0.15	25	90	5.1 x 3.1mm
Anaren	C1720J5003AHF	1700 - 2000	4	24	0.4	21	90	0805

## Hybrid Couplers (cont.)

Supplier	Part Number	Frequency Range (MHz)	Power (W)	Isolation (dB)	Insertion Loss (dB)	Return Loss (dB)	Phase (Degrees)	Footprint
Anaren	X3C19F1-03S	1700 - 2300	25	26	0.15	25	90	5.1 x 3.1mm
Anaren	C2023J5003AHF	2000 - 2300	4	21	0.4	18	90	0805
Anaren	C2327J5003AHF	2300 - 2700	4	18	0.4	15	90	0805
Anaren	X3C25F1-03S	2300 - 2700	25	26	0.15	25	90	5.1 x 3.1mm

## Directional Couplers

Supplier	Part Number	Frequency Range (MHz)	Power (W)	Coupling (dB)	Directivity (dB)	Insertion Loss (dB)	Return Loss (dB)	Footprint (EIA)
Anaren	DC0710J5010AHF	700 - 1000	2	10	20	0.21	17.5	0805
Anaren	DC0710J5020AHF	700 - 1000	2	20	20	0.22	21	0805
Anaren	X3C09F1-20S	700 - 1000	25	20	25	0.05	25	5.1 x 3.1mm
Anaren	DC1722J5010AHF	1700 - 2200	2	10	17	0.16	19	0805
Anaren	DC1722J5020AHF	1700 - 2200	2	20	21	0.17	22	0805
Anaren	X3C19F1-20S	1700 - 2200	25	20	25	0.05	25	5.1 x 3.1mm
Anaren	DC2337J5010AHF	2300 - 3700	2	10	21	0.21	23	0805
Anaren	DC2337J5020AHF	2300 - 3700	2	20	15	0.14	21	0805

## Doherty Combiners

Supplier	Part Number	Frequency Range (MHz)	Insertion Loss (dB)	Return Loss (dB)	Dimensions (inches)
Anaren	X3DC07E2S	728 - 768	0.15	20	0.56 x 0.20
Anaren	X3DC08E2S	869 - 894	0.15	20	0.56 x 0.20
Anaren	X3DC09E2S	920 - 960	0.15	20	0.56 x 0.20
Anaren	X3DC18E2S	1805 - 1880	0.15	20	0.56 x 0.20
Anaren	X3DC19E2S	1930 - 1990	0.15	20	0.56 x 0.20
Anaren	X3DC21E2S	2110 - 2170	0.15	20	0.56 x 0.20
Anaren	X3DC23P1S	2300 - 2700	0.15	20	0.25 x 0.20

## Doherty Splitters

Supplier	Part Number	Frequency Range (MHz)	Max Input Power (dBm)	Voltage (VDC)	Supply Current (mA)
Freescale Semiconductor	MMDS09254H	700 - 1000	+25	5	12
Freescale Semiconductor	MMDS20254H	1800 - 2200	+25	5	12
Freescale Semiconductor	MMDS25254H	2400 - 2800	+25	5	12

## Circulators &amp; Isolators

Supplier	Part Number	Frequency Range (MHz)	Isolation (dB)	Insertion Loss (dB)	Return Loss (dB)	Footprint (mm)
Skyworks Solutions	SKYFR-000855	1930 - 1995	20	0.3	20	11
Skyworks Solutions	SKYFR-000812	2095 - 2185	20	0.35	20	11
Skyworks Solutions	SKYFR-000709	2110 - 2170	23	0.25	23	15
Skyworks Solutions	SKYFR-000727	2110 - 2170	23	0.3	21	11
Skyworks Solutions	SKYFR-000742	2300 - 2400	23	0.22	23	15
Skyworks Solutions	SKYFR-000788	2490 - 2710	23	0.3	21	15

## PLL

Supplier	Part Number	Frequency Range (MHz)	Divide by	Jitter (ps rms)	EVM (%)	Supply Voltage (V)
Analog Devices	ADF4351	35 - 4400	-1/-2/-4/-8/-16/-32/-64	0.3	0.4	3 - 3.6

## Quadrature Demodulator w/ PLL

Supplier	Part Number	Frequency Range (MHz)	Demod. Conversion Loss (dB)	Input IP3 (dBm)	Input P1dB (dBm)	Phase Accuracy (degrees)	Amplitude Accuracy (dB)
Analog Devices	ADRF6807	700 - 1050	-4.3	+26.7	+12.8	0.5	0.1

## Modulators

Supplier	Part Number	Frequency Range (MHz)	Modulation Pout (dBm)	LO Carrier Suppression (dBc)
Analog Devices	ADL5375	400 - 6000	+10.5	35.5
Analog Devices	ADRF6702	1200 - 2400	+13.1	46.8

## Transceivers

Supplier	Part Number	Frequency Range (MHz)	Noise Figure (dB)	Pout (dBm)	Input IP3 (dBm)	Supply Voltage (V)
Analog Devices	AD9361	70 - 6000	2	+8	-18	3.3
Lime Microsystems	LMS6002DFN	300 - 3800	3.5	+6	-1	3.3