



Q2 2023

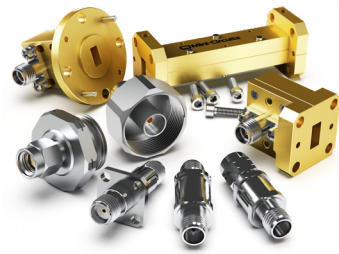
# New Releases

 Mini-Circuits®

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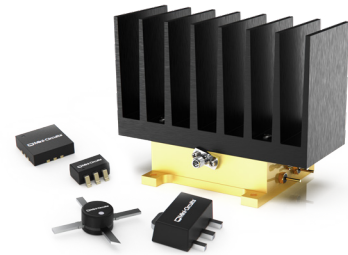
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# Adapters



Model Number	Conn. 1	Conn. 2	F Low (GHz)	F High (GHz)	VSWR (:1) Typ.
10F-10F+	1.0mm-Female	1.0mm-Female	DC	110	1.07
10F-10M+	1.0mm-Female	1.0mm-Male	DC	110	1.10
10M-10M+	1.0mm-Male	1.0mm-Male	DC	110	1.06
10F-185F+	1.0mm-Female	1.85mm-Female	DC	67	1.10
10F-185M+	1.0mm-Female	1.85mm-Male	DC	67	1.09
10M-185F+	1.0mm-Male	1.85mm-Female	DC	67	1.08
10M-185M+	1.0mm-Male	1.85mm-Male	DC	67	1.06
KF-SF50+	1.85mm-Female	SMA-Female	DC	18	1.06

# Amplifiers



## High-Frequency Amplifiers

Model Number	Freq. Range (MHz)	Gain (dB)	NF (dB)	P1dB (dBm)	OIP3 (dBm)	Voltage (V)	DC Current (mA)	Connector Type	Heat Sink
ZVA-50953GX+	50000-95000	28	-	17	-	10	370	1.0mm	No
ZVA-50953G+	50000-95000	28	-	17	-	10	370	1.0mm	Yes
ZVA-5803X+	500-80000	17	5	10	23	10	130	1.0mm	No
ZVA-24443G1X+	24000-43500	45	1.7	20	27	15	160	2.92mm	No
ZVA-24443G1+	24000-43500	45	1.7	20	27	15	160	2.92mm	Yes
ZVA-02443HPX+	2000-43500	37	5	17	25	15	280	2.92mm	No
ZVA-02443HP+	2000-43500	37	5	17	25	15	280	2.92mm	Yes

## Low Noise Amplifiers

Model Number	Freq. Range (MHz)	Gain (dB)	NF (dB)	P1dB (dBm)	OIP3 (dBm)	Voltage (V)	DC Current (mA)	Connector Type	Heat Sink
ZX60-14LN-S+	50-10000	22	1.5	21	32	6	72	SMA	No
ZX60-83MP-S+	400-8000	20	3.2	27	40	8	144	SMA	No

## MMIC Amplifiers

Model Number	Freq. Range (MHz)	Gain (dB)	NF (dB)	P1dB (dBm)	OIP3 (dBm)	Voltage (V)	DC Current (mA)
PMA3-15453+	15000-45000	17	3.2	17	25	5	128
PMA3-24323LN+	24000-32000	17	2.8	17	24	5	128
AVA-0233LN+	2000-30000	17	2.2	13.5	25.7	5	65
AVA-2183+	2000-20000	16.4	5.2	19.3	24.7	4	210
AVA-5R183+	500-18000	14.4	3.4	16.8	27.9	5	85
AVA-183MP+	50-18000	16.5	1.8	23.8	31.1	8	160
PMA2-252LNA+	1500-2500	17.6	0.8	17.8	30	4	57
PMA2-162LNA+	700-1600	22.7	0.5	20	30	4	55

## High Power Amplifiers

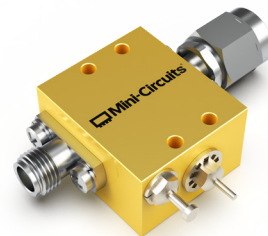
Model Number	Freq. Range (MHz)	Gain (dB)	NF (dB)	P1dB (dBm)	OIP3 (dBm)	Voltage (V)	DC Current (mA)	Connector Type	Heat Sink
ZHL-10M4G21W0+	10-4200	37	6	32	44	28	800	SMA	Yes
ZHL-10M4G21W0X+	10-4200	37	6	32	44	28	800	SMA	No
ZHL-50W-GAN+	20-500	43.5	7	48	55	28	7400	SMA	Yes
ZHL-50W-GANX+	20-500	43.5	7	48	55	28	7100	SMA	No

## Attenuators



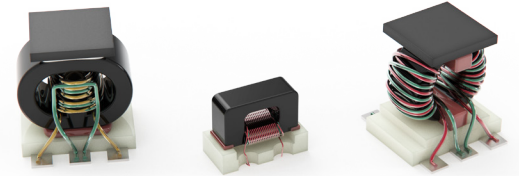
Model Number	Freq. Range (MHz)	Attenuation (dB)	Flatness (dB)	VSWR (:1)	Input Power Max. (W)	Connector Type
BW-20N250W+	DC-8000	20	0.5	1.14	250	N
BW-30N250W+	DC-8000	30	0.4	1.11	250	N
BW-40N250W+	DC-8000	40	0.7	1.1	250	N

## Bias Tees



Model Number	Freq. Range (MHz)	Input Current (mA) Max.	RF Power Max. (dBm)	Insertion Loss (dB)	DC Port Isolation (dB)	VSWR (:1)	Connector Type
ZBT-K44-FT+	10 to 40000	20	30	0.5	1.14	250	2.92mm

# Couplers



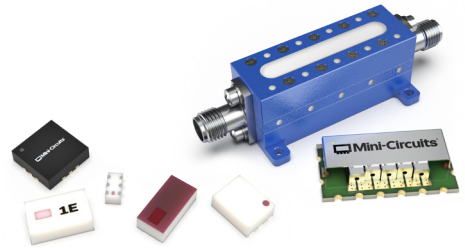
Model Number	Impedance ( $\Omega$ )	Freq. Range (MHz)	Coupling (dB)	Mainline Loss (dB)	Directivity (dB)	VSWR (:1)	Power Input Max. (W)	Type	Construction
RDC-20-232-75X+	75	5-2350	20	0.65	20	1.2	1	Directional	Transformer

# DC Blocks



Model Number	Freq. Range (MHz)	Insertion Loss (dB)	Return Loss (dB)	Connector Type
BLK-18W-N+	10-18000	0.24	25.7	N-Type

# Filters



## Cavity Band Pass Filters

Model Number	Passband (MHz)	Stopband F3 (MHz)	Rejection @ F3 (dB)	Stopband F4 (MHz)	Rejection @ F4 (dB)	Connector Type
ZVBP-K22R5G+	22000-23000	DC - 21400	25	23600 - 40000	23	2.92mm
ZVBP-16R3G-S+	15900-16700	DC - 14700	58	17400 - 28000	39	SMA
ZVBP-3R25G-S+	3000-3500	DC - 2850	16	3650 - 7800	16	SMA
ZVBP-3100A-S+	3020-3180	DC - 2960	39	3198 - 6500	39	SMA

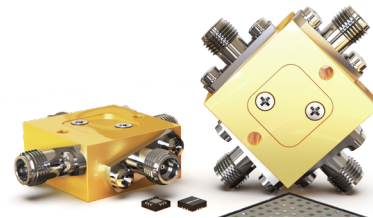
## LTCC Low Pass Filters

Model Number	Passband F1 (MHz)	Passband F2 (MHz)	Stopband F3 (MHz)	Rejection @ F3 (dB)	Stopband F4 (MHz)	Rejection @ F4 (dB)	DC Current (mA)	Connector Type	Heat Sink
LFCV-2202+	DC	22000	29800-42000	40	42000-51000	25	72	SMA	No
LFCV-2002+	DC	20000	25800-40000	36	40000-50000	25	144	SMA	No
LFCG-2275+	DC-2275	2700	3300-7000	45	7000-10000	25	72	SMA	No

## LTCC High Pass Filters

Model Number	Passband F1 (MHz)	Passband F2 (MHz)	Stopband F3 (MHz)	Rejection @ F3 (dB)	Stopband F4 (MHz)	Rejection @ F4 (dB)	Case Style
HFCN-2502+	25000	57000	100-10400	20.9	10500-19200	17.2	1206
HFCV-2002+	19600	47000	100-8000	21.9	8100-15000	17.8	1210
HFCU-1382+	14300-29000	13500	DC-8000	53	8000-10800	32	1812
HFCG-3250+	3650-16500	3250	DC-2000	44	2000-2500	39	0805
HFCG-2500+	2700-14500	2500	DC-1550	48	1550-1950	30	0805
HFCG-1780+	1980-11000	1780	DC-1100	50	1100-1400	33	0805
HFCG-1630+	1850-11000	1630	DC-1000	49	1000-1300	33	0805
HFCG-1230+	1400-8000	1230	DC-850	44	850-1000	32	0805

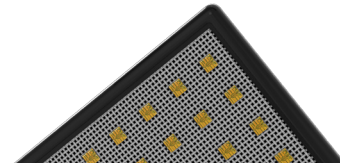
## Mixers



## High Power Amplifiers

Model Number	interface	RF/LO Freq. Range (MHz)	IF Freq. Range (MHz)	LO Power (dBm)	Conv. Loss (dB)	L-R Iso. (dB)	L-I Iso. (dB)	IIP3 (dBm)	IP1dB (dBm)
ZMIQ-653H-E+	Connector	18000-65000	DC-20000	18	14	42	33	25	10
SMIQ-653H-D+	Die	18000-65000	DC-20000	18	10.9	47	32	26	10
SMIQ-6243H+	SMT	6000-24000	DC-6000	18	8.6	41	43	25	10

## Multipliers



Model Number	Interface	Multiply Factor [X]	Input Freq. Range (MHz)	Output Freq. Range (MHz)	RF Input Power Range (dBm)	Conv. Loss (dB)	F1 Fundamental Suppression Below F[X] (dBc)	F[X-1] Suppression Below F[X] (dBc)	F[X+1] Suppression Below F[X] (dBc)
CY3-64-D+	Die	3	10000-20000	30000-60000	12-19	21	30	33	42

## Splitter/Combiners



Model Number	Connector Type	No. of Ways	Freq. Range (MHz)	Isolation (dB)	Insertion Loss (dB)	Phase Unbalance (deg)	Amplitude Unbalance (dB)	Power Input (W) as Splitter, Max.	DC Pass?	Technology
ZC3PD-E18673+	1.85mm	3	18000-67000	36	1.8	6	0.4	12	Yes	Stripline

# Terminations



Model Number	Connector Type	Impedance ( $\Omega$ )	Freq. Range (MHz)	Input Power (W), Max.	VSWR (:1)
TERM-250W-83N+	N-Male	50	DC-8000	36	1.09

# Test Solutions



## Signal Distribution

Model Number	No. of Channels	Freq. Range (MHz)	Input Power Max. (W)	Housing	Connector Type
ZT-16HPS-63W-S	16	700-6000	100	19" x 2U Rack	SMA/N
ZT-20HPS-63-S+	20	2500-6000	100	19" x 2U Rack	SMA/N

## Switching Systems

Model Number	Switch Configuration	Switch Technology	Freq. Range (MHz)	Housing	Connector Type	Control Interface
USB-1SP4T-A673+	1 x SP4T	Solid State	100-67000	Compact Module (5.22 x 0.98 x 0.86")	1.85mm	USB/Dynamic Daisy Chain
ZTM-4SP8T-26	4 x SP8T	Electromechanical	DC-26500	19", 3U Rack Mount Chassis	SMA	USB/Ethernet
RCM-3SP4T-18	3 x SP4T	Electromechanical	DC-18000	Benchtop Module (8.25 x 8.25 x 4.25")	SMA	USB/Ethernet
RCM-6SPDT-18	6 x SPDT	Electromechanical	DC-18000	Benchtop Module (8.25 x 8.25 x 4.25")	SMA	USB/Ethernet
ZTS-1SP80T-63H	1 x SP80T	Solid State	10-6000 MHz	19", 2U Rack Mount Chassis	SMA	USB/Ethernet

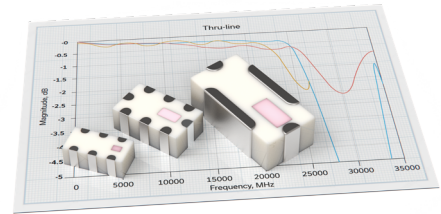
## Programmable Attenuators

Model Number	Connector Type	Freq Range (MHz)	Attenuation Range (dB)	Step Size (dB)	Attenuation Accuracy (dB)	Input Power (dBm), Max.	IP3 (dB)	Control Interface
RCDAT-44G-63	2.92mm	100-43500	0-63	0.5	1.0	28	50	USB & Ethernet

## Mounting Kits

Model Number	Description
RKT-RC4DAT	19"(W) x 3U(H) rack mounting kit for 8 x RC4DAT-6G-Series programmable attenuators
RKT-RC4DAT-2	19"(W) x 1U(H) rack mounting kit for 2 x RC4DAT-8G-95 programmable attenuators

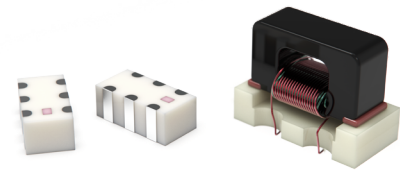
# Thru lines



## LTCC Thru Lines

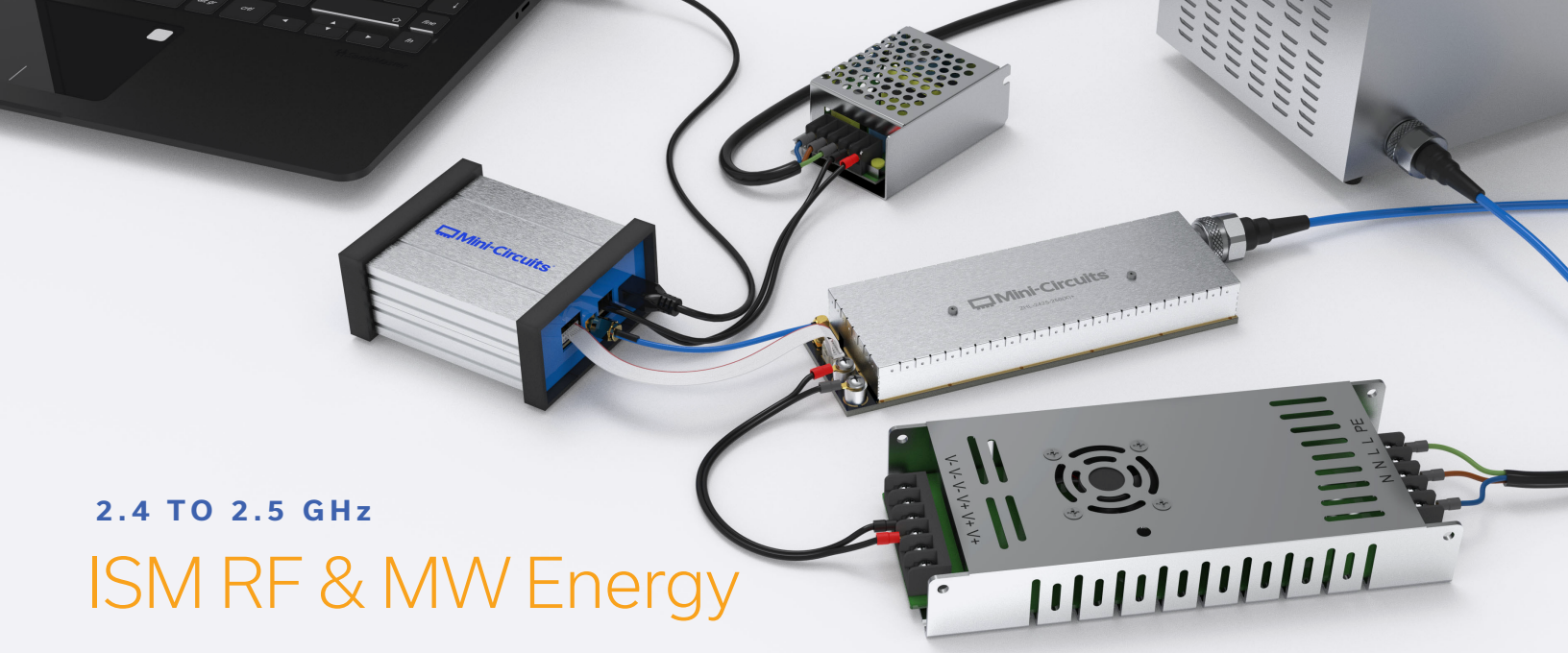
Model Number	Frequency Range (MHz)	Insertion Loss (dB)	Return Loss (dB)	technology	impedance
TPCG-183+	DC-18000	0.5	10	LTCC	50
TPCW-233+	DC-23000	0.5		LTCC	50

# Transformers



Model Number	Single-Ended to Single-Ended	Single-Ended to Balanced	Balanced to Balanced	Center Tap	DC Isolation	Frequency Range (MHz)	impedance ( $\Omega$ )	Impedance Ratio	interface	Technology	config
TCW1-133+	N	Y	N	N	Y	8000-13000	50	1	SMT	LTCC	J
TCW2-133+	N	Y	N	N	Y	7000-13000	50	2	SMT	LTCC	J
TTC1-682W+	N	Y	N	N	N	800-6800	50	1	SMT	CORE & WIRE	G





2.4 TO 2.5 GHz

# ISM RF & MW Energy

## Signal Generator/Controller

ISC-2425-25+

- Output power from -30 to +25 dBm in 0.1 dB steps
- Frequency selection with 1 kHz steps from 2400 to 2500 MHz
- Closed loop and feed forward RF power control modes
- Standalone or multi-channel operation (in either coherent or incoherent modes)
- User-friendly GUI and full API included



## 300W SSPA

ZHL-2425-250X+

- 300W saturated output power typ.
- Supports CW & pulsed signals
- 42 dB gain
- 60% efficiency
- Built-in monitoring and protection for temperature, current, forward and reflected power
- User friendly I2C control interface



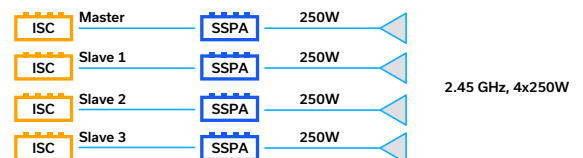
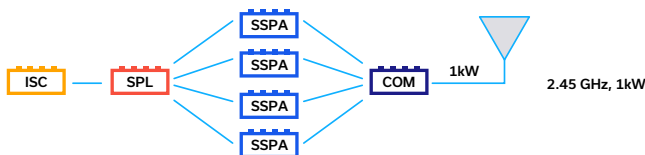
## 1.2 kW 4-Way Combiner

COM-2G42G51K0+

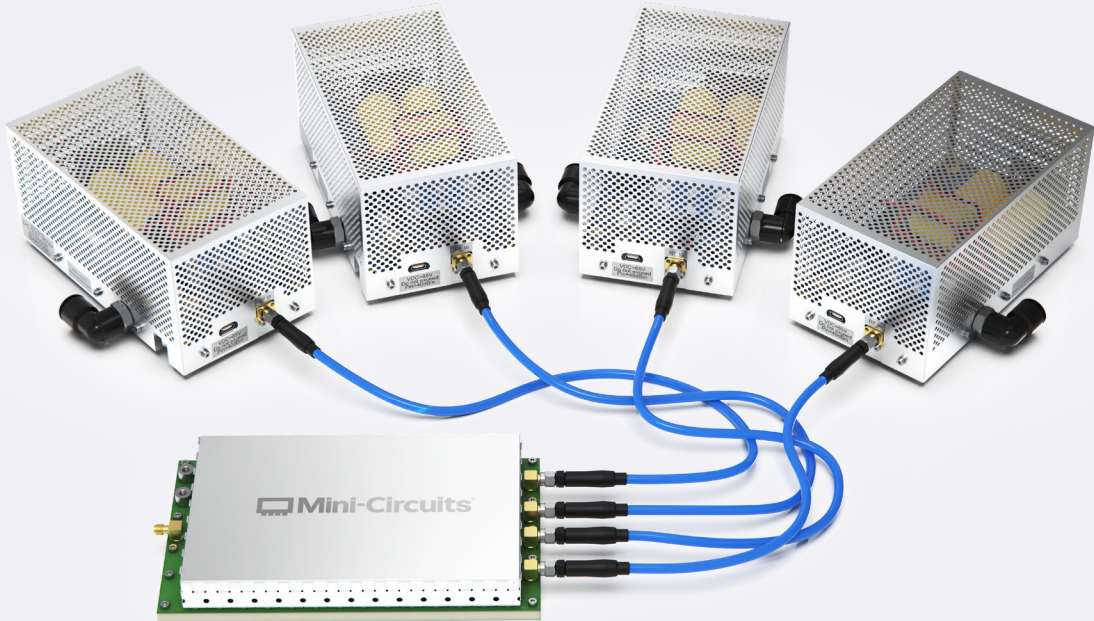
- 2.4 to 2.4 GHz frequency range
- Patented design achieves 1.2 kW power handling (sum port)
- 0.1 dB insertion loss
- 0.15 dB amplitude unbalance
- 1° phase unbalance
- N-type female to 7/16 DIN female connectors
- Allows multiple configurations of amplifier and signal controller up for up to 1 kW output power



### Example Configurations:



Fully Integrated 1kW Rack Mount Solution  
Coming Soon!

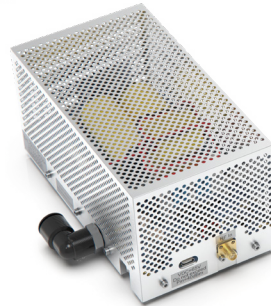


## 27 MHz Solutions

### 1.7 kW Power Amplifier

**RFE-24M30M1K7X+**

- 1.7kW output power
- CW & pulsed signals
- 26 dB gain
- 80% efficiency
- Built-in temperature & current monitoring
- Built-in emergency switch off
- Water cooled



### 4-Channel Driver

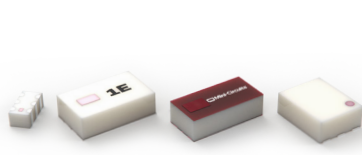
**RFE-24M30M075X+**

- One input, four 19W outputs
- CW & pulsed signals
- 16 dB gain at P3dB
- 55% efficiency
- Integrated harmonic suppression
- Built-in temperature & current monitoring
- Built-in emergency switch off



# Components for the Entire Signal Chain

DC to mmWave



DC TO 50 GHz

## LTCC Passives

World-Leading Design

LTCC devices are fabricated with capacitors, inductors and distributed structures embedded in multi-layered ceramic substrate and sintered into a single monolithic component. Our design team has the most advanced knowledge of LTCC technology in the industry building on 20+ years of R&D and multiple active patents.

- World's broadest portfolio
- 750+ in-stock models
- Custom designs
- Packages as small as 0202

### Product lines:

Couplers, filters, power splitters, thru-lines, transformers/baluns



DC TO 65 GHz

## MMICs

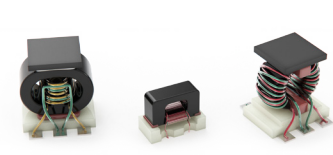
Designed & Packaged in House

MMICs are integrated circuits fabricated from semiconductor substrates, sold in surface-mount packages or as bare die for chip-and-wire assembly. Mini-Circuits MMICs utilize pHEMT, HBT and IPD fabrication processes on gallium arsenide (GaAs), designed and packaged in our own facilities.

- 700+ models in stock and growing
- Industry-leading quality
- All models available in SMT and bare die format

### Product lines:

Amplifiers, attenuators, bias tees, couplers, equalizers, reflectionless filters, mixers, multipliers, power splitters, switches, transformers/baluns



DC TO 20 GHz

## Core & Wire

50+ Years of Quality

Core and wire designs consist of twisted, wire-coupled structures wound around toroidal ferrite cores utilizing inductive coupling between conductors to achieve a desired function. Mini-Circuits performs all wire twisting, winding and welding in house with tight process control to ensure the highest quality and repeatability.

- Thousands of models
- Outstanding repeatability
- Footprints as small as 0.15 x 0.15"
- TopHat® feature for more accurate pick-and-place

### Product lines:

Couplers, filters, power splitters, transformers/baluns

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