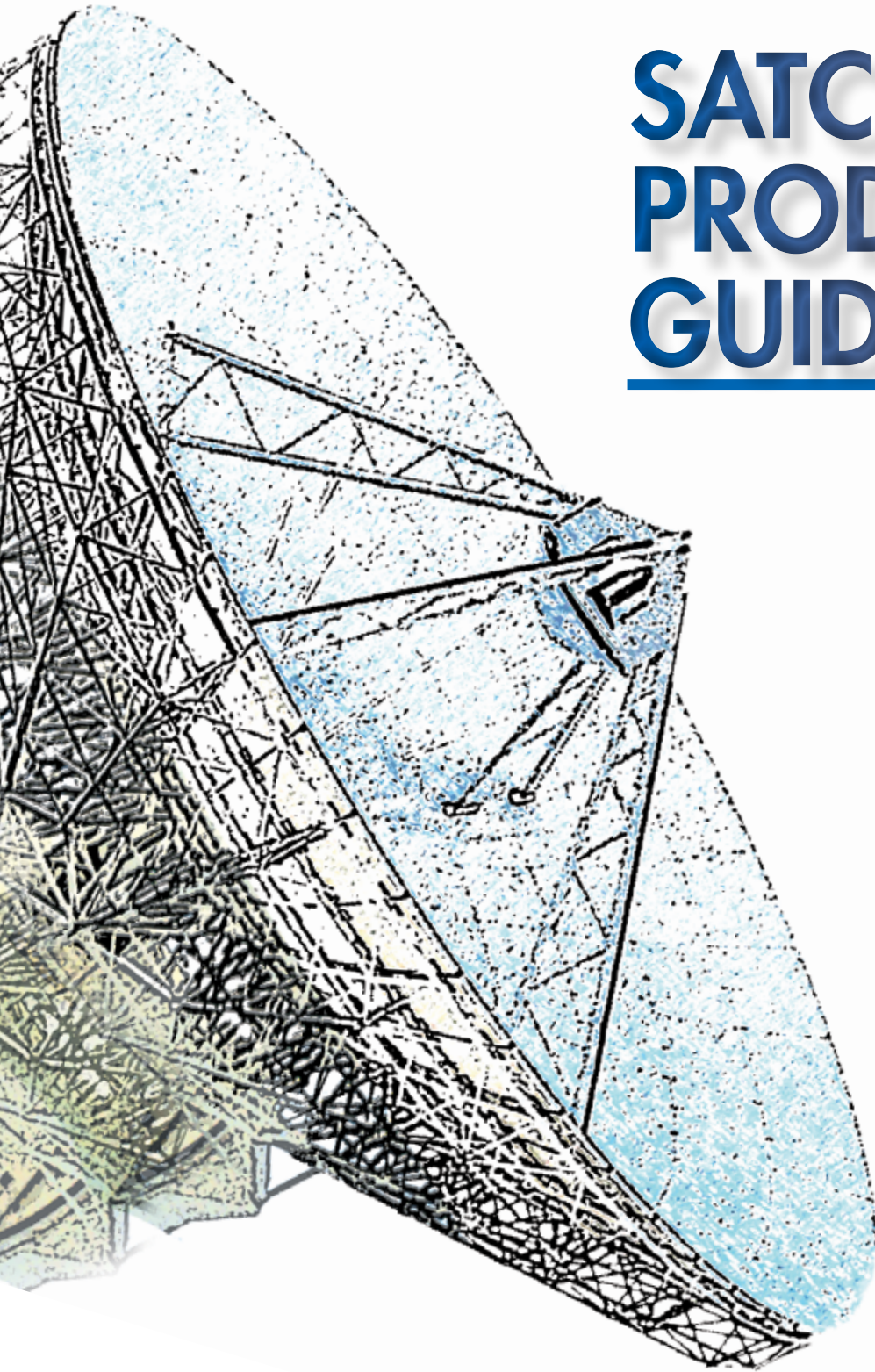


# SATCOM PRODUCT GUIDE

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### ***CUSTOMIZED SMA WRENCHES***

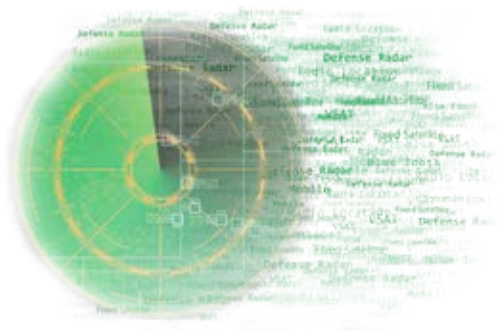
*Easily removes cable connections from tight spots.*

*From \$24.95 ea.*

*Patent Pending*

### ***Custom Modules Upon Request***

*Mini-Circuits engineers will design and build  
to meet any of your custom requirements.*

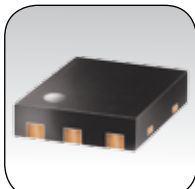


## Attenuators

### DC to 26 GHz

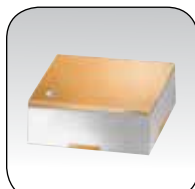


#### Surface Mount Fixed Models



**YAT Series**  
**Precision**  
DC – 18 GHz, 50Ω  
Models from 0 - 30  
Flatness <±1 dB  
P<sub>MAX</sub>, 2W

.079 x .079 x .039"



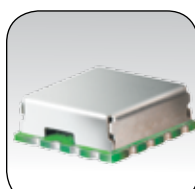
**RCAT Series**  
**Fixed Hermetic LTCC**  
DC – 20 GHz, 50Ω  
Models from 0 to 30 dB  
Flatness <±1 dB  
P<sub>MAX</sub>, 2W

2.25 x 2.25 x 1.1 mm



**HAT Series**  
**Precision, BNC Connector**  
DC – 2000 MHz, 50Ω & 75Ω  
Models from 1 to 30 dB  
Flatness, ±1 dB  
P<sub>MAX</sub>, up to 1W

1.94 x 0.62" diameter



**RVA-2500+**  
**Surface Mount Voltage Variable**  
DC – 2500 MHz, 50Ω & 75Ω  
Attenuation range, 5 – 40 dB  
Power supply, 3 – 5V, 5mA  
Control voltage, 0 – 17V

0.5 x 0.5 x 0.2"

#### Coaxial Fixed Models, 50Ω & 75Ω



**VAT Series**  
**Wideband**  
DC – 6 GHz, 50Ω  
Models from 1 - 30 dB  
Flatness, ±1 dB  
P<sub>MAX</sub>, up to 2W

1.43 x 0.41" diameter



**UNAT Series**  
**Wideband, N-type Connector**  
DC – 6 GHz, 50Ω  
Models from 1 – 30 dB  
Flatness, ±2 dB  
P<sub>MAX</sub>, up to 1W

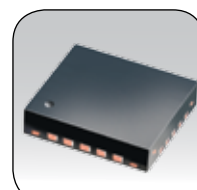
2.11 x .68" diameter



**BW Series**  
**Very Wideband, Precision**  
DC – 26 GHz, 50Ω  
Models from 0 to 40 dB  
Flatness, ±0.5 dB  
P<sub>MAX</sub>, up to 100W

Dimensions Vary

#### Variable Models



**DAT Series**  
**Surface Mount Digital Step**  
DC – 4 GHz, 50Ω & 75Ω  
Attenuation range, 15.5 - 31.5 dB  
Step size, 0.5 dB  
Accuracy, 0.1 dB

0.16 x 0.16 x 0.04"



**ZX76-Series**  
**Coaxial Digital Step**  
DC – 4 GHz, 50Ω  
Attenuation range, up to 31.5 dB  
Step size, 0.5 dB  
Accuracy, 0.1 dB typ.

1.2 x 1.18 x 0.46"



**ZX73-2500+**  
**Coaxial Voltage Variable**  
10 – 2500 MHz, 50Ω  
Attenuation range, 5 – 40 dB  
Power supply, 3 – 5V, 5mA  
Control voltage, 0 – 17V

1.2 x 0.75 x 0.46"





## Amplifiers

DC to 20 GHz

Monolithic Models – GVA Series, InGaP HBT Technology, Unconditionally Stable



0.18 x 0.17 x 0.06"

**GVA-60+**  
*Flat Gain, High IP3*  
0.01 – 5 GHz, 50Ω  
Gain, 18.5 dB  
P1dB, 20 dBm  
IP3, 40 dBm

**GVA-62+**  
*Flat Gain, High IP3*  
0.01 – 6 GHz, 50Ω  
Gain, 15.5  
P1dB, 19 dBm  
IP3, 33.5 dBm

**GVA-63+**  
*Flat Gain, High IP3*  
0.1 – 6 GHz, 50Ω  
Gain, 20.4 dB  
P1dB, 19 dBm  
IP3, 35 dBm

**GVA-81+**  
*Flat Gain, High IP3*  
DC – 6 GHz, 50Ω  
Gain, 10 dB  
P1dB, 18 dBm  
IP3, 41 dBm

**GVA-82+**  
*Flat Gain, High IP3*  
DC – 7 GHz, 50Ω  
Gain, 10 dB  
P1dB, 20 dBm  
IP3, 41 dBm

**GVA-83+**  
*Flat Gain, High IP3*  
DC – 7 GHz, 50Ω  
Gain, 20 dB  
P1dB, 18 dBm  
IP3, 33 dBm

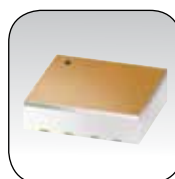
**GVA-84+**  
*Flat Gain, High IP3*  
DC – 7 GHz, 50Ω  
Gain, 24 dB  
P1dB, 20.5 dBm  
IP3, 37 dBm

Monolithic Models – PHEMT Technology, 50Ω & 75Ω



0.236 x 0.192 x 0.35"

**YSF-2151+**  
*Ultra Flat Gain*  
0.9 – 2.5 GHz, 50Ω  
Gain, 20 dB  
P1dB, 20 dBm  
IP3, 35 dBm



0.118 x 0.118 x 0.045"

**CMA Series**  
*Ceramic, Hi-Rel*  
0.01 – 6 GHz, 50Ω  
Gain up to 31.5 dB  
P1dB up to 23.7 dBm  
IP3 up to 39 dBm

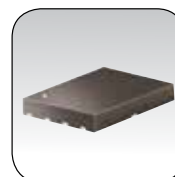


0.18 x 0.17 x 0.06"

**PGA-105+**  
*Flat Gain, Low Noise*  
0.04 – 2.6 GHz, 50Ω  
Gain, 15.2 dB  
P1dB, 20.5 dBm  
IP3, 39.3 dBm

**PGA-106W-75+**  
*Flat Gain, High Dynamic Range*  
0.95 – 2.15 GHz, 75Ω  
Gain, 16.9 dB  
P1dB, 19.5 dBm  
IP3, 35.6 dBm

**PHA-1+**  
*Ultra High Dynamic Range*  
0.05 – 6 GHz, 50Ω  
Gain, 13.5 dB  
P1dB, 22.4 dBm  
IP3, 42 dBm



0.24 x 0.19 x 0.04"

**PHA-11+**  
*Dual Matched for Push-Pull Configuration*  
0.05 – 3 GHz, 50Ω & 75Ω  
Gain, 16 dB  
P1dB, 22 dBm  
IP3, 41 dBm



0.12 x 0.12 x 0.04"

**PMA-545G1+**  
*Ultra Low Noise, 1.0 dB*  
0.4 – 2.2 GHz, 50Ω  
Gain, 31.3 dB  
P1dB, 22 dBm  
IP3, 33.6 dBm

**PMA-5452+**  
*Low Noise, High IP3*  
0.5 – 6 GHz, 50Ω  
Gain, 19 dB  
P1dB, 18.3 dBm  
IP3, 32 dBm



0.12 x 0.12 x 0.04"

**AVA-24+**  
*Wideband, Integrated Matching*  
5 – 20 GHz, 50Ω  
Gain, 12.6 dB  
P1dB, 18 dBm  
IP3, 25.4 dBm

**AVA-183A+**  
*Wideband, Integrated Matching*  
5 – 18 GHz, 50Ω  
Gain, 13.7 dB  
P1dB, 19 dBm  
IP3, 29 dBm



### Amplifiers – Rugged Coaxial Connectorized Models



**ZX60-24+**  
*Wideband,  
Unconditionally Stable*  
5 – 20 GHz, 50Ω  
Gain, 24 dB  
P1dB, 18.0 dBm  
IP3, 26.4 dBm

0.75 x 0.74 x 0.46"

**ZX60-H242+**  
*Ultra High IP3*  
700 – 2400 MHz, 50Ω  
Gain, 14.5 dB  
P1dB, 23 dBm  
IP3, 46 dBm

**ZX60-V62+**  
*Ultra Flat Gain*  
0.05 – 6 GHz, 50Ω  
Gain, 15.4 dB  
P1dB, 19 dBm  
IP3, 33.4 dBm

**ZX60-V63+**  
*High Gain, High IP3*  
0.05 – 6 GHz, 50Ω  
Gain, 20 dB  
P1dB, 17.8 dBm  
IP3, 31.2 dBm



**ZX60-2411BM+**  
*High Linearity*  
800 – 2400 MHz, 50Ω  
Gain, 12 dB  
P1dB, 23 dBm  
IP3, 49 dBm

1.20 x 0.75 x 0.46"



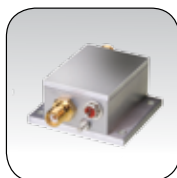
**ZRL-2150+**  
*High IP3, Low Noise*  
950 – 2150 MHz, 50Ω  
Gain, 25 dB  
P1dB, 22 dBm  
IP3, 33 dBm

3.75 x 2.00 x 0.80"



**ZHL-2150-X**  
*L Band, Flat Gain*  
950 – 2150 MHz, 50Ω  
Gain, 29 dB  
P1dB, 10.44 dBm  
IP3, 24.29 dBm

3.75 x 2.00 x 0.86"



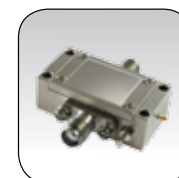
**ZKL-2R5+**  
*Wideband,  
Medium Power*  
10 – 2500 MHz, 50Ω  
Gain, 30 dB  
P1dB, 13 dBm  
IP3, 31 dBm

1.38 x 1.50 x 0.75"



**ZVA-183W+**  
*Super Ultra Wideband*  
0.1 – 18 GHz, 50Ω  
Gain, 27 dB  
P1dB, 27 dBm  
IP3, 36 dBm

4.18 x 3.36 x 3.57"



**ZVA-213+**  
*Super Ultra Wideband*  
0.8 to 21 GHz  
Gain, 26 dB  
P1dB, 24 dBm  
IP3, 33 dBm

4.18 x 3.36 x 3.57"



## Bias-Tees Satellite MuxTee & Bias-Tee/Diplexers

100 kHz to 10 GHz

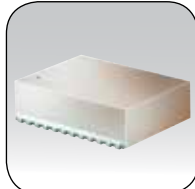


### Surface Mount Models



0.15 x 0.15 x 0.14"

**TCBT Series**  
*Extremely Wideband  
Bias Tee*  
RF / RF + DC / DC  
10 MHz – 10 GHz, 50Ω  
Insertion loss, <1 dB  
Current, up to 200 mA



1.26 x 0.94 x 0.39"

**JEFT Series**  
*Extremely Wideband  
Bias Tee*  
RF / RF + DC / DC  
10 – 4200 MHz, 50Ω  
Insertion loss, 0.6 dB  
Current, 500 mA

### Coaxial Models



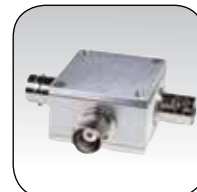
2.19 x 1.25 x 0.94"

**ZFBT-282-1.5A+**  
*Extremely Wideband  
Bias Tee*  
RF / RF + DC / DC  
10 MHz – 2.8 GHz, 50Ω  
Insertion loss, 0.6 dB  
Current, 1.5A



1.25 x 1.25 x 0.75"

**ZFBT-4R2GW+**  
*Wideband Bias Tee*  
RF / RF + DC / DC  
0.1 – 4200 MHz, 50Ω  
Insertion loss, 0.6 dB  
Current, 500 mA



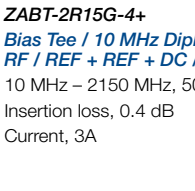
1.25 x 1.25 x 0.75"

**ZFBT-6GW+**  
*Wideband Bias Tee*  
RF / RF + DC / DC  
0.1 – 6000 MHz, 50Ω  
Insertion loss, 0.6 dB  
Current, 500 mA

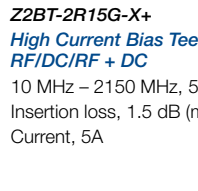


2.00 x 2.00 x 0.75"

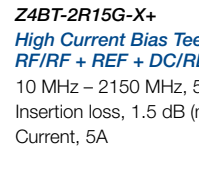
**ZABT-2R15G+**  
*Satellite MuxTee  
Bias Tee / 10 MHz Diplexer*  
RF / RF + REF + DC /  
REF / DC  
10 MHz – 2150 MHz, 50Ω  
Insertion loss, 0.4 dB  
Current, 3A



**ZABT-2R15G-4+**  
*Bias Tee / 10 MHz Diplexer*  
RF / REF + REF + DC / REF  
10 MHz – 2150 MHz, 50Ω  
Insertion loss, 0.4 dB  
Current, 3A



**Z2BT-2R15G-X+**  
*High Current Bias Tee*  
RF/DC/RF + DC  
10 MHz – 2150 MHz, 50Ω  
Insertion loss, 1.5 dB (max.)  
Current, 5A



**Z4BT-2R15G-X+**  
*High Current Bias Tee*  
RF/RF + REF + DC/REF/DC  
10 MHz – 2150 MHz, 50Ω  
Insertion loss, 1.5 dB (max.)  
Current, 5A



## System Interconnect & Test Cables

DC to 40 GHz

Test Cables, Performance Qualified to 20,000 Flexures, 50 $\Omega$  & 75 $\Omega$



**CBL Precision**  
**L, C & Ku Band**  
DC – 18 GHz, 50 $\Omega$   
SMA (M/F), N-Type (M)  
Return Loss, 27 dB

Various Lengths



**APC Armored**  
**L, C & Ku Band**  
DC – 18 GHz, 50 $\Omega$   
N-Type (M) Connectors  
Return Loss, 27 dB

Various Lengths



**FLC Super Flexible**  
**L, C, Ku & K Band**  
DC – 26 GHz  
SMA (M) connectors  
Return Loss, 28.5 dB

Various Lengths



**CBL 75 $\Omega$**   
**L Band**  
DC – 3000 MHz, 75 $\Omega$   
F-Type (M)  
Return loss, 26 dB

Various Lengths



**CBL 75 $\Omega$**   
**L Band**  
DC – 3000 MHz, 75 $\Omega$   
N-type (M)  
Return loss, 26 dB

Various Lengths



**KBL 40 GHz**  
**Phase Stable**  
**L, C, Ku, K & Ka Band**  
DC – 40 GHz, 50 $\Omega$   
2.92mm (M) connectors  
Return Loss, 17 dB  
@ 40 GHz  
Phase 3° typ. @ 40 GHz

Various Lengths



**KBL 40 GHz**  
**Low Loss**  
**L, C, Ku, K & Ka Band**  
DC – 40 GHz, 50 $\Omega$   
2.92mm (M) connectors  
Return Loss, 17 dB  
@ 40GHz  
Insertion Loss, 3.1 dB  
@ 40 GHz / 1M

Various Lengths



**QBL E-Z Lock**  
**L, C & Ku Band**  
DC – 18 GHz, 50 $\Omega$   
SMA (M) or N-Type (M)  
Return Loss, 27 dB

Various Lengths

### System Interconnect Cables

**HAND FLEX™**



Various Lengths

**086 Series**  
0.086" diameter  
**141 Series**  
0.141" diameter  
**L, C & Ku Band**  
DC – 18 GHz, 50 $\Omega$   
SMA (M) or N-Type (M)  
Straight or right-angle



## Directional Couplers

0.1 to 9700 MHz



### Coaxial Models



1.25 x 1.25 x 0.75"

**ZFDC-10-5-S+**  
**10 MHz Pass**  
1 – 2000 MHz, 50Ω  
10 dB coupling  
Directivity, 30 dB  
P<sub>MAX</sub>, 0.5W

**ZFDC-20-3-S+**  
**10 MHz Pass**  
0.2 – 250 MHz, 50Ω  
20 dB coupling  
Directivity, 33 dB  
P<sub>MAX</sub>, 4.0W

**ZFDC-20-4L**  
**10 MHz Pass**  
10 – 1000 MHz, 50Ω  
20 dB coupling  
Directivity, 30 dB  
P<sub>MAX</sub>, 1.0W

**ZFDC-20-50-S+**  
**10 MHz Pass**  
20 – 2000 MHz, 50Ω  
20 dB coupling  
Directivity, 25 dB  
P<sub>MAX</sub>, 1.0W

**ZFDC-20-5-S+**  
**10 MHz Pass**  
0.1 – 2000 MHz, 50Ω  
20 dB coupling  
Directivity, 27 dB  
P<sub>MAX</sub>, 1.0W



0.74 x 0.90 x 0.54"

**ZX30-17-5-S+**  
**10 MHz Pass, All Welded**  
5 – 2000 MHz, 50Ω  
17 dB coupling  
Directivity, 18 dB  
P<sub>MAX</sub>, 1.0W

**ZX30-20-4-S+**  
**10 MHz Pass, All Welded**  
5 – 1000 MHz, 50Ω  
20 dB coupling  
Directivity, 20 dB  
P<sub>MAX</sub>, 1.0W



1.04 x 0.60 x 0.75"

**ZX30-14-972HP+**  
**High Power, DC Pass**  
8300 – 9700 MHz, 50Ω  
14 dB coupling  
Directivity, 7 dB  
P<sub>MAX</sub>, 20W



2.00 x 2.00 x 0.54"

**ZADC-6-2G-5W+**  
**10 MHz / DC Pass**  
800 – 2000 MHz, 50Ω  
6 dB coupling  
Directivity, 22 dB  
P<sub>MAX</sub>, 5.0W



5.93 x 2.24 x 1.00"

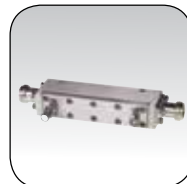
**ZGDC6-362HP+**  
**High Power, DC Pass**  
380 – 3600 MHz, 50Ω  
6 dB coupling  
Directivity, 28 dB  
P<sub>MAX</sub>, 250W

**ZGDC10-362HP+**  
**High Power, DC Pass**  
380 – 3600 MHz, 50Ω  
10 dB coupling  
Directivity, 27 dB  
P<sub>MAX</sub>, 250W



5.58 x 2.50 x 1.00"

**ZGDC20-33HP+**  
**High Power, DC Pass**  
300 – 3000 MHz, 50Ω  
20 dB coupling  
Directivity, 26 dB  
P<sub>MAX</sub>, 250W



3.85 x 1.10 x .80"

**ZGDC35-93HP+**  
**High Power, DC Pass**  
900 – 9000 MHz, 50Ω  
35 dB coupling  
Directivity, 25 dB  
P<sub>MAX</sub>, 20W

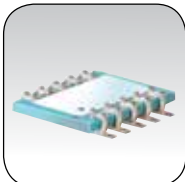




## Bi-Directional Couplers

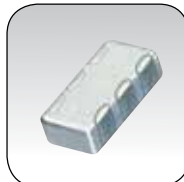
400 to 2525 MHz

### Surface Mount Models, 50Ω & 75Ω



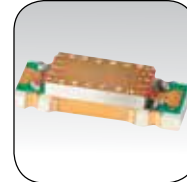
0.30 x 0.30 x 0.07"

**BDCA-10-25+**  
**L Band 10 MHz / DC Pass**  
800 – 2500 MHz, 50Ω  
10 dB coupling  
Directivity, 22 dB  
P<sub>MAX</sub>, 50W



0.13 x 0.06 x 0.04"

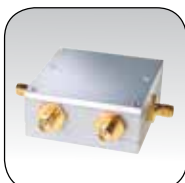
**BDCN-17-25+**  
**Four Port, LTCC,**  
**0.126 x 0.063" DC Pass**  
824 – 2525 MHz, 50Ω  
17 dB coupling  
Directivity, 22 dB  
P<sub>MAX</sub>, 7W



0.70 x 0.32 x 0.13"

**SYBD Series**  
**High Power, DC Pass**  
400 – 6000 MHz, 50Ω  
8 to 30 dB coupling  
Directivity up to 35 dB  
P<sub>MAX</sub>, 100W

### Coaxial Models



2.00 x 2.00 x 0.75"

**ZABDC20-2400+**  
**DC Pass, SMA Connector**  
1500 – 2400 MHz, 50Ω  
20 dB coupling  
Directivity, 25 dB  
P<sub>MAX</sub>, 10W



2.00 x 2.00 x 0.88"

**ZABDC20-25H75+**  
**DC Pass, N-Type Connector**  
700 – 2500 MHz, 75Ω  
20 dB coupling  
Directivity, 25 dB  
P<sub>MAX</sub>, 100W



## Equalizers

950 to 2150 MHz



### Surface Mount Voltage Variable Equalizer



0.39 x 0.39 x 0.15"

#### **VAEQ-2150+**

**L Band, Adjustable Attenuation Slope**

950 – 2150 MHz, 50Ω

VSWR, 1.37

±0.05 dB deviation from linear loss

### Coaxial Slope Equalizers, SMA



1.25 x 1.25 x 0.75"

#### **ZEQ-3-222S+**

**L Band, Attenuation Slope: 3**

950 – 2150 MHz, 50Ω

VSWR, 1.1

±0.4 dB deviation in  
attenuation slope



1.25 x 1.25 x 0.75"

#### **ZEQ-8-222S+**

**L Band, Attenuation Slope: 8**

950 – 2150 MHz, 50Ω

VSWR, 1.1

±0.4 dB deviation in  
attenuation slope

### Coaxial Slope Equalizers, N-Type



1.25 x 1.25 x 0.94"

#### **ZEQ-3-222N+**

**L Band, Attenuation Slope: 3**

950 – 2150 MHz, 50Ω

VSWR, 1.1

±0.4 dB deviation in  
attenuation slope



1.25 x 1.25 x 0.94"

#### **ZEQ-8-222N+**

**L Band, Attenuation Slope: 8**

950 – 2150 MHz, 50Ω

VSWR, 1.1

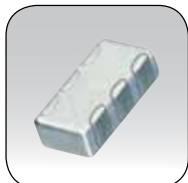
±0.4 dB deviation in  
attenuation slope

## High Pass Filters

### 54 to 5000 MHz

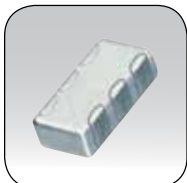


#### Surface Mount Models



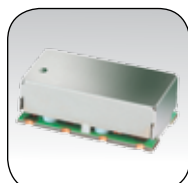
0.13 x 0.06 x 0.04"

**HFCN-1320+**  
**LTCC, 1206 Package**  
1400 – 5000 MHz, 50Ω  
Pass band IL, 1 dB  
Stop band rejection:  
27 dB @ 1060 MHz



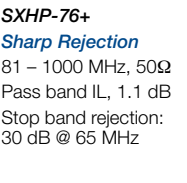
0.13 x 0.06 x 0.04"

**HFCN-740+**  
**LTCC, 1206 Package**  
780 – 2800 MHz, 50Ω  
Pass band IL, 1.1 dB  
Stop band rejection:  
23 dB @ 550 MHz



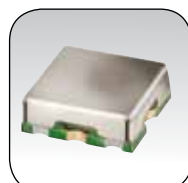
0.74 x 0.44 x 0.27"

**SXHP-48+**  
**Sharp Rejection**  
54 – 1000 MHz, 50Ω  
Pass band IL, 0.6 dB  
Stop band rejection:  
30 dB @ 42 MHz



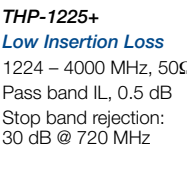
**SXHP-76+**  
**Sharp Rejection**  
81 – 1000 MHz, 50Ω  
Pass band IL, 1.1 dB  
Stop band rejection:  
30 dB @ 65 MHz

**SXHP-108+**  
**Sharp Rejection**  
108 – 1000 MHz, 50Ω  
Pass band IL, 1.0 dB  
Stop band rejection:  
30 dB @ 85 MHz

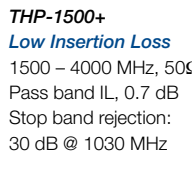


0.25 x 0.25 x 0.10"

**THP-1050+**  
**Low Insertion Loss**  
1050 – 4000 MHz, 50Ω  
Pass band IL, 0.6 dB  
Stop band rejection:  
30 dB @ 620 MHz



**THP-1225+**  
**Low Insertion Loss**  
1224 – 4000 MHz, 50Ω  
Pass band IL, 0.5 dB  
Stop band rejection:  
30 dB @ 720 MHz



**THP-1500+**  
**Low Insertion Loss**  
1500 – 4000 MHz, 50Ω  
Pass band IL, 0.7 dB  
Stop band rejection:  
30 dB @ 1030 MHz

#### Coaxial Models



1.98 x 0.67" diameter

**SHP-900+**  
**Low Insertion Loss**  
910 – 3000 MHz, 50Ω  
Pass band IL, 0.7 dB  
Stop band rejection:  
25 dB @ 660 MHz



1.43 x 0.41" diameter

**VHF-1300+**  
**Sharp Rejection**  
1400 – 5000 MHz, 50Ω  
Pass band IL, 2 dB  
Stop band rejection:  
27 dB @ 930 MHz

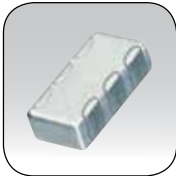


## Low Pass Filters & Diplexers

DC to 4400 MHz



### Surface Mount Low Pass Filters



0.13 x 0.06 x 0.04"

**LFCN-400+**  
**LTCC, 1206 Package**  
DC – 400 MHz, 50Ω  
Pass band IL, 1.0 dB  
Stop band rejection:  
40 dB @ 680 MHz

**LFCN-1400+**  
**LTCC, 1206 Package**  
DC – 1400 MHz, 50Ω  
Pass band IL, 1.0 dB  
Stop band rejection:  
30 dB @ 2100 MHz

**LFCN-1525+**  
**LTCC, 1206 Package**  
DC – 1525 MHz, 50Ω  
Pass band IL, 1.2 dB  
Stop band rejection:  
30 dB @ 2120 MHz

**LFCN-2250+**  
**LTCC, 1206 Package**  
DC – 2200 MHz, 50Ω  
Pass band IL, 1.2 dB  
Stop band rejection:  
30 dB @ 3000 MHz

**LFCN-3800+**  
**LTCC, 1206 Package**  
DC – 3900 MHz, 50Ω  
Pass band IL, 1.5 dB  
Stop band rejection:  
30 dB @ 5700 MHz

**LFCN-4400+**  
**LTCC, 1206 Package**  
DC – 4400 MHz, 50Ω  
Pass band IL, 1.0 dB  
Stop band rejection:  
30 dB @ 6280 MHz

### Coaxial Low Pass Filters



1.98 x 0.67" diameter

**SLP-2400+**  
**Sharp Roll-Off**  
DC – 2200 MHz, 50Ω  
Pass band IL, 0.2 dB  
Stop band rejection:  
30 dB @ 3200 MHz

### Surface Mount Diplexers



0.50 x 0.50 x 0.18"

**RDP-2R15+**  
DC – 20 MHz and  
950 – 2150 MHz, 50Ω  
Low pass IL, 0.5 dB  
High pass IL, 0.6 dB  
Stop band isolation:  
*Low pass*, 30 dB @ 70 MHz  
*High pass*, 32 dB @ 250 MHz



0.87 x 0.80 x 0.25"

**SDP-2R15+**  
DC – 800 MHz and  
1500 – 2150 MHz, 50Ω  
Low pass IL, 0.4  
High pass IL, 0.5  
Stop band isolation:  
*Low pass*, 30 dB @ 1300 MHz  
*High pass*, 29 dB @ 930 MHz

### Coaxial Diplexers



0.74 x 0.90 x 0.54"

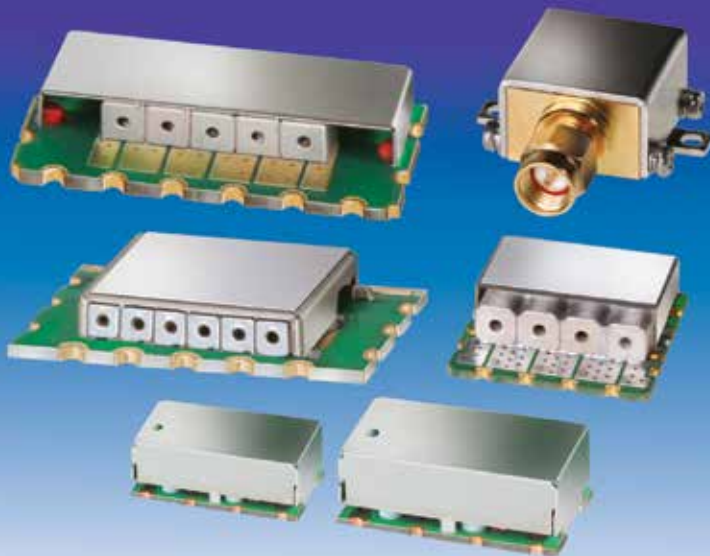
**ZX75-2R15+**  
DC – 20 MHz and  
950 – 2150 MHz, 50Ω  
Low pass IL, 0.4 dB  
High pass IL, 0.5 dB  
Stop band isolation:  
*Low pass*, 30 dB @ 70 MHz  
*High pass*, 30 dB @ 320 MHz



0.74 x 0.90 x 0.54"

**ZDPLX-2150+**  
DC – 10 MHz and  
50 – 2150 MHz, 50Ω  
Low pass IL, 0.5 dB  
High pass IL, 0.9 dB  
Stop band isolation:  
*Low pass*, 31 dB @ 40 MHz  
*High pass*, 33 dB @ 18 MHz

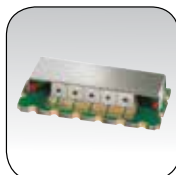




## Band Pass Filters

175 to 2600 MHz

### Surface Mount Models 50Ω & 75Ω



0.55 x 1.04 x 0.18"

#### CBP-2400A+

##### Ceramic Resonator

2200 – 2600 MHz, 50Ω  
Pass band IL, 1.1 dB  
Stop band rejection:  
Lower, 31 dB @ 1780 MHz  
Upper, 31 dB @ 3480 MHz

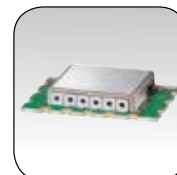


0.75 x 0.75 x 0.21"

#### CBP-B1230C+

##### Ceramic Resonator

1120 – 1340 MHz, 50Ω  
Pass band IL, 0.6 dB  
Stop band rejection:  
Lower, 30 dB @ 910 MHz  
Upper, 30 dB @ 1750 MHz

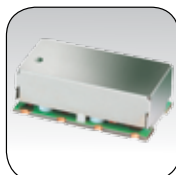


0.434 x 0.638 x 0.105"

#### CBP-1400E+

##### Ceramic Resonator

1320 – 1480 MHz, 50Ω  
Pass band IL, 1.7 dB  
Stop band rejection:  
Lower, 42 dB @ 1150 MHz  
Upper, 31 dB @ 1600 MHz



0.74 x 0.44 x 0.27"

#### SXBP-176+

##### Narrow Band

175 – 177 MHz, 50Ω  
Pass band IL, 3.3 dB  
Stop band rejection:  
Lower, 30 dB @ 155 MHz  
Upper, 31 dB @ 199 MHz

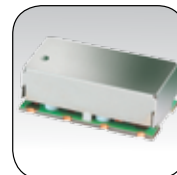


0.74 x 0.44 x 0.27"

#### SXBP-1500+

##### Fast Roll-Off on Upper Band Edge

1350 – 1650 MHz, 50Ω  
Pass band IL, 0.6 dB  
Stop band rejection:  
Lower, 30 dB @ 75 MHz  
Upper, 29 dB @ 2160 MHz

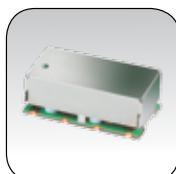


0.74 x 0.44 x 0.27"

#### SXBP-1940+

##### Fast Roll-Off on Upper Band Edge

1710 – 2170 MHz, 50Ω  
Pass band IL, 2.0 dB  
Stop band rejection:  
Lower, 30 dB @ 145 MHz  
Upper, 28 dB @ 2900 MHz

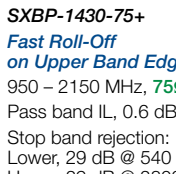


0.74 x 0.44 x 0.19"

#### SXBP-1430+

##### Fast Roll-Off on Upper Band Edge

950 – 2150 MHz, 50Ω  
Pass band IL, 0.6 dB  
Stop band rejection:  
Lower, 28 dB @ 575 MHz  
Upper, 29 dB @ 2800 MHz



#### SXBP-1430-75+

##### Fast Roll-Off on Upper Band Edge

950 – 2150 MHz, 75Ω  
Pass band IL, 0.6 dB  
Stop band rejection:  
Lower, 29 dB @ 540 MHz  
Upper, 29 dB @ 2800 MHz

### Coaxial Models



0.74 x 0.75 x 0.46"

#### ZX75BP-1500+

##### Sharp Roll-Off on Upper Band Edge

1350 – 1650 MHz, 50Ω  
Pass band IL, 0.7 dB  
Stop band rejection:  
Lower, 30 dB @ 85 MHz  
Upper, 29 dB @ 2030 MHz

#### ZX75BP-1940+

##### Sharp Roll-Off on Upper Band Edge

1710 – 2170 MHz, 50Ω  
Pass band IL, 0.7  
Stop band rejection:  
Lower, 30 dB @ 150 MHz  
Upper, 31 dB @ 2800 MHz

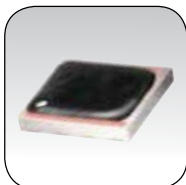


## Frequency Mixers

5 MHz to 20 GHz



### Surface Mount Models



0.20 x 0.18 x 0.09"

#### **SIM-153+**

##### **Level 7, Ceramic**

3.4 – 15 GHz, 50Ω  
50mW RF power  
Conversion loss, 6.8 dB  
L-R isolation, 36 dB

#### **SIM-153LH+**

##### **Level 10, Ceramic**

3.2 – 15 GHz, 50Ω  
50mW RF power  
Conversion loss, 6.1 dB  
L-R isolation, 36 dB

#### **SIM-24MH+**

##### **Level 13, Ceramic**

7.3 – 20 GHz, 50Ω  
250mW RF power  
Conversion loss, 5.7 dB  
L-R isolation, 36 dB

#### **SIM-153MH+**

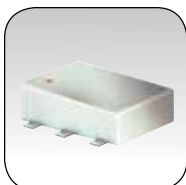
##### **Level 13, Ceramic**

3.2 – 15 GHz, 50Ω  
50mW RF power  
Conversion loss, 6.5 dB  
L-R isolation, 36 dB

#### **SIM-193H+**

##### **Level 17, Ceramic**

7.3 – 19 GHz, 50Ω  
120mW RF power  
Conversion loss, 6.2 dB  
L-R isolation, 33 dB



0.31 x 0.27 x 0.11"

#### **ADE-30W**

##### **Level 7**

300 MHz – 4 GHz, 50Ω  
50mW RF power  
Conversion loss, 6.8 dB  
L-R isolation, 35 dB

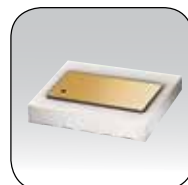


0.50 x 0.50 x 0.16"

#### **LAVI-17VH+**

##### **Level 21**

470 – 1730 MHz, 50Ω  
125 mW RF power  
Conversion loss, 6.8 dB  
L-R isolation, 52 dB



0.30 x 0.25 x 0.06"

#### **MAC series**

##### **Levels 4 – 17**

**Ultra-Rel Hermetic LTCC**  
300 MHz – 12 GHz, 50Ω  
50 – 100mW RF Power  
Conversion loss from 5.8 dB  
L-R isolation as high as 40 dB

### Rugged Coaxial Models, ZX05 Series



0.74 x 0.90 x 0.54"

#### **ZX05-30W-S+**

##### **Level 7**

300 – 4000 MHz, 50Ω  
50mW RF power  
Conversion loss, 6.8 dB  
L-R isolation, 35 dB

#### **ZX05-5-S+**

##### **Level 7**

5 – 1500 MHz, 50Ω  
50mW RF power  
Conversion loss, 6.6 dB  
L-R isolation, 40 dB

#### **ZX05-83-S+**

##### **Level 7**

2300 – 8000 MHz, 50Ω  
50mW RF power  
Conversion loss, 6.0 dB  
L-R isolation, 29 dB

#### **ZX05-42MH-S+**

##### **Level 13**

5 MHz – 4.2 GHz, 50Ω  
200mW RF power  
Conversion loss, 7.5 dB  
L-R isolation, 26 dB



## Limiters

0.2 to 8200 MHz

### Surface Mount Models

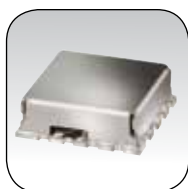


0.50 x 0.50 x 0.18"

#### **RLM-23+**

##### **Low Output Power**

950 – 2050 MHz, 50Ω  
+5 to +30 dBm  
Recovery time, 8 nsec.  
Max  $P_{in}$ , 1.5W  
Output power, 0 dBm  
@ 30 dBm input



0.50 x 0.50 x 0.18"

#### **RLM-23-1WL+**

##### **Low Output Power**

100 – 2500 MHz, 50Ω  
+5 to +30 dBm  
Recovery time, 8 nsec.  
Max  $P_{in}$ , 1.5W  
Output power, 0 dBm  
@ 30 dBm input



0.25 x 0.31 x 0.16"

#### **RLM-63-2W+**

##### **Low Output Power**

30 – 6000 MHz, 50Ω  
+12 to +33 dBm  
Recovery time, 10 nsec.  
Max  $P_{in}$ , 2W  
Output power, 11.5 dBm



0.25 x 0.31 x 0.16"

#### **RLM-33-2W+**

##### **Low Output Power**

0.2 – 3000 MHz, 50Ω  
+12 to +33 dBm  
Recovery time, 22.5 nsec.  
Max  $P_{in}$ , 2.5W  
Output power, 13 dBm

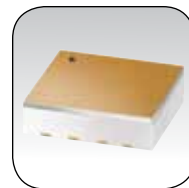


0.25 x 0.31 x 0.16"

#### **RLM-33+**

##### **Low Output Power**

30 – 3000 MHz, 50Ω  
+12 to +30 dBm  
Recovery time, 10 nSec  
Max  $P_{in}$ , 2W  
Output power, 11.5 dBm



0.118 x 0.118 x 0.045"

#### **CLM-83-2W+**

##### **Ceramic, Hermetic, Nitrogen-Filled, Hi-Rel**

30 – 8200 MHz, 50Ω  
+12 to +32 dBm  
Recovery time, 10 nsec.  
Max  $P_{in}$ , 2W  
Output power, 11.5 dBm

### Coaxial Models

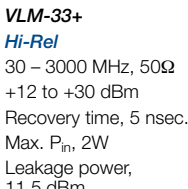


1.43 x 0.41" diameter

#### **VLM-73-1W+**

##### **Hi-Rel**

30 – 7000 MHz, 50Ω  
+12 to +30 dBm  
Recovery time, 5 nsec.  
Max.  $P_{in}$ , 1.5W CW  
Leakage power, 11.5 dBm



#### **VLM-33+**

##### **Hi-Rel**

30 – 3000 MHz, 50Ω  
+12 to +30 dBm  
Recovery time, 5 nsec.  
Max.  $P_{in}$ , 2W  
Leakage power, 11.5 dBm

#### **VLM-63-2W+**

##### **Hi-Rel**

30 – 6000 MHz, 50Ω  
+12 to +33 dBm  
Recovery time, 5 nsec.  
Max.  $P_{in}$ , 2.5W  
Leakage power, 11.5 dBm



1.25 x 1.25 x 0.75"

#### **ZFLM-252-1WL+**

##### **Low Output Power**

100 – 2500 MHz, 50Ω  
+5 to +30 dBm  
Recovery time, 8 nsec.  
Max  $P_{in}$ , 1.5W  
Leakage power, 6 dBm



## 2 Way, 0° and 180° Power Splitters/Combiners

DC to 18 GHz



### Surface Mount 2 Way 0° Models

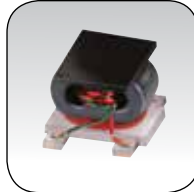


0.118 x 0.118 x 0.035"

#### GP2S1+

0°, L Band

500 – 2500 MHz, 50Ω  
Insertion loss, 0.9 dB  
Amp. unb., 0.02 dB  
Phase unb., 0.9°  
Isolation, 20 dB



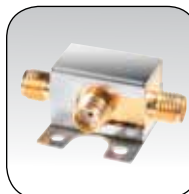
0.16 x 0.15 x 0.16"

#### TCP-2-25+

0°, L Band

200 – 2500 MHz, 50Ω  
Insertion loss, 0.8 dB  
Amp. unb., 0.2 dB  
Phase unb., 1°  
Isolation, 25 dB

### Coaxial 2 Way 0° Models



0.74 x 0.90 x 0.54"

#### ZX10-2-222+

0°, L Band

800 – 2200 MHz, 50Ω  
Insertion loss, 0.8 dB  
Amp. unb., 0.01 dB  
Phase unb., 1°  
Isolation, 24 dB

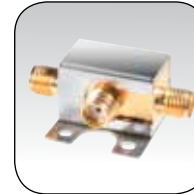


0.74 x 0.90 x 0.54"

#### ZX10-2-42+

0°, S Band

1900 – 4200 MHz, 50Ω  
Insertion loss, 0.2 dB  
Amp. unb., 0.03 dB  
Phase unb., 1°  
Isolation, 23 dB

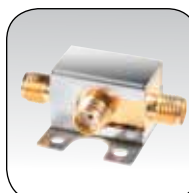


0.74 x 0.90 x 0.54"

#### ZX10-2-71+

0°, C Band

2950 – 7100 MHz, 50Ω  
Insertion loss, 0.25 dB  
Amp. unb., 0.06 dB  
Phase unb., 0.5°  
Isolation, 23 dB



0.74 x 0.90 x 0.54"

#### ZX10-2-98-S+

0°, C Band

4750 – 9800 MHz, 50Ω  
Insertion loss, 0.3 dB  
Amp. unb., 0.1 dB  
Phase unb., 1°  
Isolation, 23 dB

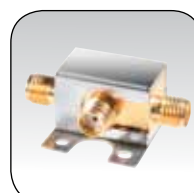


0.74 x 0.90 x 0.54"

#### ZX10R-14-S+

0° Resistive,  
L Band, C Band

DC – 10 GHz, 50Ω  
Insertion loss, 0.7 dB  
Amp. unb., 0.02 dB  
Phase unb., 1°  
Isolation, 6 dB



0.74 x 0.90 x 0.54"

#### ZX10-2-12+

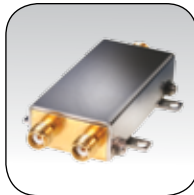
0°, VHF/UHF

2 – 1200 MHz, 50Ω  
Insertion loss, 0.35 dB  
Amp. unb., 0.05 dB  
Phase unb., 1°  
Isolation, 21 dB





### Coaxial 2 Way 0° Models



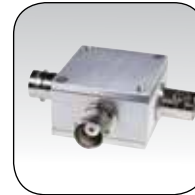
1.90 x 0.96 x 0.46"

**ZX10-2-183+**  
0°, L, C & Ku Band  
1.5 – 18 GHz, 50Ω  
Insertion loss, 0.8 dB  
Amp. unb., 0.1 dB  
Phase unb., 4°  
Isolation, 22 dB



1.25 x 1.25 x 0.75"

**ZFSC-2-1+**  
0°, VHF  
5 – 500 MHz, 50Ω  
Insertion loss, 0.3 dB  
Amp. unb., 0.1 dB  
Phase unb., 1°  
Isolation, 28 dB



1.25 x 1.25 x 0.75"

**ZFSC-2-2500+**  
0°, L Band  
10 – 2500 MHz, 50Ω  
Insertion loss, 0.4 dB  
Amp. unb., 0.1 dB  
Phase unb., 1°  
Isolation, 17 dB



2.0 x 2.0 x 0.75"

**ZAPD-2-272+**  
0°, L Band  
800 – 2700 MHz, 50Ω  
Insertion loss, 0.3 dB  
Amp. unb., 0.05 dB  
Phase unb., 0.7°  
Isolation, 25 dB



2.0 x 2.0 x 0.75"

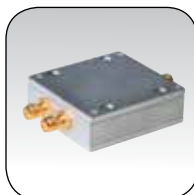
**ZAPD-4+**  
0°, C Band  
2000 – 4200 MHz, 50Ω  
Insertion loss, 0.4 dB  
Amp. unb., 0.1 dB  
Phase unb., 0.5°  
Isolation, 25 dB



1.00 x 0.75 x 0.58"

**ZFRSC-183+**  
0° Resistive, L, C & Ku Band  
DC – 18 GHz, 50Ω  
Insertion loss, 0.7 dB  
Amp. unb., 0.1 dB  
Phase unb., 1°  
Isolation, 6.5 dB

### Coaxial 2 Way 180° Model



4.50 x 2.50 x 0.67"

**ZN2PD2-50+**  
0°, L & C Band  
500 – 5000 MHz, 50Ω  
Insertion loss, 0.8 dB  
Amp. unb., 0.05 dB  
Phase unb., 0.5°  
Isolation, 25 dB



1.25 x 1.25 x 0.75"

**ZY2PDJ-33-1+**  
180°, L Band  
50 – 3000 MHz, 50Ω  
Insertion loss, 2.4 dB  
Amp. unb., 0.3 dB  
Phase unb., 180° ± 4°  
Isolation, 4.23 dB



## 3, 4, 8, 12, 16, and 24 Way, 0° Power Splitters/Combiners

0.25 to 3600 MHz



### Coaxial Models



1.50 x 1.00 x 0.38"

**ZCSC-3-R3+**  
**3 Way, 0°**  
2 – 300 MHz, 50Ω  
Insertion loss, 0.4 dB  
Amp. unb., 0.1 dB  
Phase unb., 1°  
Isolation, 31 dB



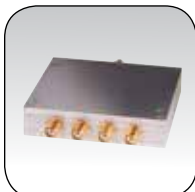
3.50 x 2.13 x 0.88"

**ZB3PD1-222+**  
**3 Way, 0°, L Band**  
500 – 2200 MHz, 50Ω  
Insertion loss, 0.3 dB  
Amp. unb., 0.2 dB  
Phase unb., 111°  
Isolation, 25 dB



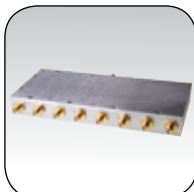
3.50 x 2.13 x 0.88"

**ZB4PD1-2000+**  
**4 Way, 0°, L Band**  
800 – 2000 MHz, 50Ω  
Insertion loss, 0.6 dB  
Amp. unb., 0.1 dB  
Phase unb., 1°  
Isolation, 25 dB



2.75 x 2.80 x 0.63"

**ZN4PD-272+**  
**4 Way, 0°, L Band**  
500 – 2700 MHz, 50Ω  
Insertion loss, 0.9 dB  
Amp. unb., 0.2 dB  
Phase unb., 1.7°  
Isolation, 25 dB



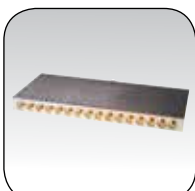
7.06 x 3.13 x 0.88"

**ZB8PD-362+**  
**8 Way, 0°, L Band**  
600 – 3600 MHz, 50Ω  
Insertion loss, 1 dB  
Amp. unb., 0.2 dB  
Phase unb., 4°  
Isolation, 20 dB



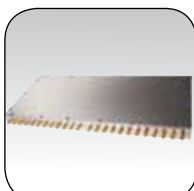
6.69 x 1.60 x 1.50"

**ZFSC-12-1+**  
**12 Way, 0°**  
1 – 200 MHz, 50Ω  
Insertion loss, 1.1 dB  
Amp. unb., 0.2 dB  
Phase unb., 1°  
Isolation, 35 dB



8.50 x 3.95 x 0.75"

**ZC16PD-2185**  
**16 Way, 0°**  
1800 – 2600 MHz, 50Ω  
Insertion loss, 0.5 dB  
Amp. unb., 0.2 dB  
Phase unb., 4°  
Isolation, 30 dB

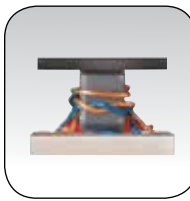


12.75 x 5.50 x 0.88"

**ZC24PD-222+**  
**24 Way, 0°, L Band**  
650 – 2200 MHz, 50Ω  
Insertion loss, 1.8 dB  
Amp. unb., 0.5 dB  
Phase unb., 10°  
Isolation, 25 dB

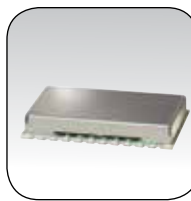


#### Surface Mount Models, 50Ω & 75Ω



0.15 x 0.15 x 0.15"

**SBTC-2-10-75X+**  
**2 Way, 0°**  
 10 – 1000 MHz, **75Ω**  
 Insertion loss, 0.8 dB  
 Amp. unb., 0.15 dB  
 Phase unb., 1°  
 Isolation, 25 dB



1.25 x 1.00 x 0.20"

**SEPS-4-272+**  
**4 Way, 0°, L-Band**  
 690 – 2700 MHz, 50Ω  
 Insertion loss, 1.0 dB  
 Amp. unb., 0.4 dB  
 Phase unb., 4°  
 Isolation, 20 dB



0.50 x 0.38 x 0.25"

**SYPS-2-282-75+**  
**8 Way, 0°, L Band**  
 5 – 2750 MHz, **75Ω**  
 Insertion loss, 0.8 dB  
 Amp. unb., 0.1 dB  
 Phase unb., 0.5°  
 Isolation, 25 dB

#### Coaxial Models, 75Ω



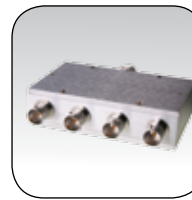
1.25 x 1.25 x 0.75"

**ZFSC-2-1-75+**  
**2 Way, 0°**  
 0.25 – 300 MHz, **75Ω**  
 Insertion loss, 0.4 dB  
 Amp. unb., 0.1 dB  
 Phase unb., 0.2°  
 Isolation, 30 dB



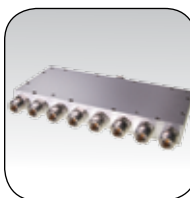
2.00 x 2.00 x 0.75"

**ZAPD-2-22-75+**  
**2 Way, 0°, L Band**  
 910 – 2150 MHz, **75Ω**  
 Insertion loss, 0.2 dB  
 Amp. unb., 0.1 dB  
 Phase unb., 0.5°  
 Isolation, 30 dB



3.50 x 2.13 x 0.88"

**ZB4PD-222-75+**  
**4 Way, 0°, L Band**  
 950 – 2200 MHz, **75Ω**  
 Insertion loss, 0.9 dB  
 Amp. unb., 0.3 dB  
 Phase unb., 2.7°  
 Isolation, 23 dB



7.06 x 3.13 x 0.88"

**ZB8PD-22-75+**  
**8 Way, 0°, L Band**  
 950 – 2200 MHz, **75Ω**  
 Insertion loss, 0.5 dB  
 Amp. unb., 0.1 dB  
 Phase unb., 5°  
 Isolation, 24 dB

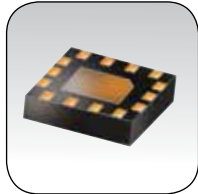


## Switches

DC to 18 GHz

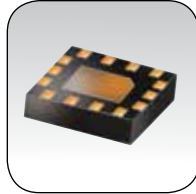


### Surface Mount Models, 50Ω & 75Ω



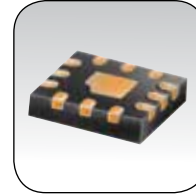
**JSW2-33DR-75+**  
**SPDT, Reflective**  
**Internal Driver**  
 10 – 3000 MHz, 75Ω  
 Insertion loss, 0.46 dB  
 Isolation, 40 dB  
 Rise/fall time, 0.75 μsec

2 x 2 x 0.55 mm



**JSW2-63DR+**  
**SPDT, Reflective**  
**Internal Driver**  
 10 – 6000 MHz, 50Ω  
 Insertion loss, 0.33 dB  
 Isolation, 40 dB  
 Rise/fall time, 0.75 μsec

2 x 2 x 0.55 mm



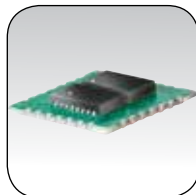
**JSW6-23DR-75+**  
**SP6T, Reflective**  
**Internal Driver**  
 10 – 2000 MHz, 75Ω  
 Insertion loss, 0.8 dB  
 Isolation, 29 dB  
 Rise/fall time, 1 μsec

2 x 2 x 0.55 mm



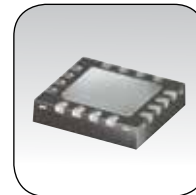
**MSWT-4-20+**  
**50W Transfer**  
 DC – 2 GHz, 50Ω  
 Insertion loss, 1.25 dB  
 Isolation, 26 dB  
 Rise/fall time, 2 nsec

0.25 x 0.21 x 0.08"



**GSAWA-4-30DR+**  
**SP4T, Absorptive**  
 DC – 3 GHz, 50Ω  
 Insertion loss, 2 dB  
 Isolation, 37 dB  
 Rise/fall time, 25 nsec

0.49 x 0.49 x 0.06"



**HSAWA2-30DR+**  
**SPDT, Absorptive**  
**Immune to Latchup**  
 DC – 3 GHz, 50Ω  
 Insertion loss, 0.95 dB  
 Isolation, 50 dB  
 Rise/fall time, 2 msec

0.16 x 0.16 x 0.04"



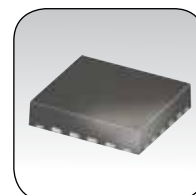
**RSW-2-25P+**  
**SPDT, Reflective**  
 DC – 2500 MHz, 50Ω  
 Insertion loss, 1.1 dB  
 Isolation, 50 dB  
 Rise/fall time, 10 nsec

0.34 x 0.24 x 0.07"



**VSW2-33-10W+**  
**SPDT, Reflective**  
 50 – 3000 MHz, 50Ω  
 Insertion loss, 0.5 dB  
 Isolation, 26 dB  
 Rise/fall time, 150 nsec

0.118 x 0.079 x 0.035"



**VSWA2-63DR+**  
**SPDT, Absorptive**  
**With Internal Driver**  
 500 – 6000 MHz, 50Ω  
 Insertion loss, 1.0 dB  
 Isolation, 65 dB  
 Rise/fall time, 23 nsec

0.157 x 0.157 x 0.35"

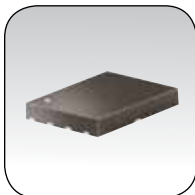




## Synthesizers

### 700 to 3500 MHz

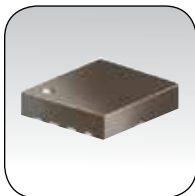
#### Surface Mount Models, Robust Design and Construction



**M3SW-2-50DR+**  
*SPDT, Reflective  
Integral TTL Driver*

**M3SWA-2-50DR+**  
*SPDT, Absorptive  
Integral TTL Driver*  
DC – 4500 MHz, 50Ω  
Insertion loss, 0.7 dB  
Isolation, 60 dB  
Rise/fall time, 5 nsec

0.13 x 0.13 x 0.04"



**SWM-2-50DR+**  
*SPDT, Reflective  
Integral TTL Driver*

**SWMA-2-50DR+**  
*SPDT, Absorptive  
Integral TTL Driver*  
DC – 4500 MHz, 50Ω  
Insertion loss, 0.7 dB  
Isolation, 55 dB  
Rise/fall time, 5 nsec

0.24 x 0.19 x 0.04"

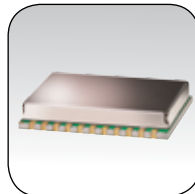
#### Coaxial, Hi-Rel Mechanical Switches



**MSP Series**  
*SPDT, SP4T & Transfer  
100 Million Cycles  
Guaranteed!*

DC – 18 GHz, 50Ω  
Insertion loss, 0.25 dB  
Isolation, 80 dB  
Switching time, 20 msec

Dimensions Vary



**DSN-3019A-119+**  
*Integrated VCO+ PLL*  
1788 – 3019 MHz, 50Ω  
Step size, 100 kHz  
Phase Noise: -83 dBc/Hz  
@ 10 kHz offset

1.00 x 1.25 x 0.20"



**KSN-700A-3C19+**  
*Integrated Microcontroller  
Fixed Frequency*  
700 MHz, 50Ω  
Comparison freq., 5 MHz  
Phase noise: -110 dBc/Hz  
@ 10 kHz offset

0.80 x 0.58 x 0.15"

**KSN-1900A-119+**  
*Integrated VCO+ PLL*  
1830 – 1900 MHz, 50Ω  
Step size, 1000 kHz  
Phase noise: -101 dBc/Hz  
@ 10 kHz offset

**KSN-3500A-119+**  
*Fractional N Synthesizer*  
3000 – 3450 MHz, 50Ω  
Step size, 1000 kHz  
Phase noise: -95 dBc/Hz  
@ 10 kHz offset

**KSN-3310A-119+**  
*Fractional N Synthesizer*  
3210 – 3310 MHz, 50Ω  
Step size, 2500 kHz  
Phase noise: -93 dBc/Hz  
@ 10 kHz offset

**KSN-1470A-1+**  
*Integrated VCO+ PLL*  
930 – 1470 MHz, 50Ω  
Step size, 0.3 Hz  
Phase noise: -83 dBc/Hz  
@ 10 kHz offset

**DSN-3500A-119+**  
*Integrated VCO+ PLL*  
2700 – 3500, MHz 50Ω  
Step size, 1000 kHz  
Phase noise: -83 dBc/Hz  
@ 10 kHz offset

**KSN-860A-119+**  
*Integrated VCO+ PLL*  
856.6 – 858.6 MHz, 50Ω  
Step size, 5 kHz  
Phase noise: -101 dBc/Hz  
@ 10 kHz offset

**KSN-2825A-219+**  
*Fractional N Synthesizer*  
2435 – 2825 MHz, 50Ω  
Step size, 2500 kHz  
Phase noise: -94 dBc/Hz  
@ 10 kHz offset

**KSN-3263A-1**  
*Integrated VCO+ PLL*  
3210 – 3310 MHz, 50Ω  
Step size, 1 MHz  
Phase noise: -95 dBc/Hz  
@ 10 kHz offset

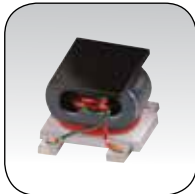


## Transformers

### DC to 3000 MHz

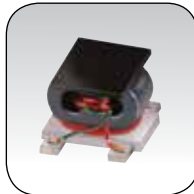


#### Surface Mount Models, 50Ω & 75Ω



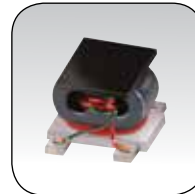
0.15 x 0.15 x 0.16"

**TC1-1-13MX+**  
**Top Hat Feature**  
4.5 – 3000 MHz, 50Ω  
Ω secondary/primary, 1  
Phase unb., 2°  
Insertion loss, 0.9 dB  
Max. input power, 0.25W



0.15 x 0.15 x 0.16"

**TC1.5-1X+**  
**Top Hat Feature**  
0.5 – 2200 MHz, 50Ω  
Ω secondary/primary, 1.5  
Phase unb., 3°  
Insertion loss, 0.6 dB  
Max. input power, 0.25W



0.15 x 0.15 x 0.16"

**TC1.33-282X+**  
**Top Hat Feature**  
5 – 2800 MHz, 50Ω to 75Ω  
Ω secondary/primary, 1.33  
Phase unb., 6°  
Insertion loss, 1.4 dB  
Max. input power, 0.25W



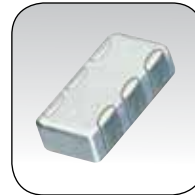
0.15 x 0.15 x 0.15"

**TC1-33-75G2+**  
**Top Hat Feature**  
5 – 3000 MHz, 75Ω  
Ω secondary/primary, 1  
Phase unb., 3°  
Insertion loss, 1.4 dB  
Max. input power, 0.25W



0.20 x 0.20 x 0.20"

**TRS2-252+**  
**Ceramic**  
4 – 2500 MHz, 100Ω to 50Ω  
Ω secondary/primary, 2  
Phase unb., N/A  
Insertion loss, 1.2 dB  
Max. input power, 0.35W



0.08 x 0.05 x 0.03"

**NCS1-222-75+**  
**LTCC Balun**  
950 – 2200 MHz, 75Ω  
Ω secondary/primary, 1  
Phase unb., 5°  
(rel. to 180°)  
Insertion loss, 1.0 dB  
Max. input power, 3W



0.13 x 0.06 x 0.04"

**TCN4-22+**  
**LTCC Balun**  
1200 – 2200 MHz, 50Ω  
Ω secondary/primary, 4  
Phase unb., 10°  
(rel. to 180°)  
Insertion loss, 1 dB  
Max. input power, 5W



1.25 x 1.25 x 0.75"

**SEMP-5075-1+**  
**L Band Matching Pad**  
950 – 2150 MHz  
50Ω to 75Ω  
Phase unb., N/A  
Insertion loss, 0.2 dB  
Max. input power, 0.25W



1.25 x 1.25 x 0.94"

**Z7550-FMSF+**  
**DC Passing**  
DC – 2300 MHz  
50Ω to 75Ω  
Phase unb., N/A  
Insertion loss, 0.5 dB  
Max. input power, 2W

#### Coaxial Models



## Voltage Controlled Oscillators

950 to 4360 MHz

### Surface Mount Models



0.5 x 0.5 x 0.18"

#### **ROS-2150VW+** **L Band**

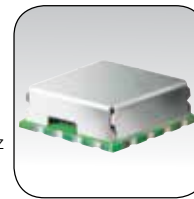
970 – 2150 MHz, 50Ω  
Phase noise: -96 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 30 – 70 MHz  
Power output, +4 dBm



0.5 x 0.5 x 0.18"

#### **ROS-1700-919+** **L Band**

950 – 1620 MHz, 50Ω  
Phase noise: -100 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 10 – 110 MHz  
Power output, +6 dBm



0.5 x 0.5 x 0.18"

#### **ROS-2500W-319+** **L Band**

1000 – 2400 MHz, 50Ω  
Phase noise: -93 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 80 – 95 MHz  
Power output, +3.5 dBm



0.5 x 0.5 x 0.18"

#### **ROS-4403-119+** **C Band**

4260 – 4360 MHz, 50Ω  
Phase noise: -97 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 60 – 80 MHz  
Power output, +4 dBm



0.5 x 0.5 x 0.22"

#### **ROS-3730C+** **L Band**

3575 – 3730 MHz, 50Ω  
Phase noise: -103 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 55 – 70 MHz  
Power output, +2.5 dBm



0.5 x 0.5 x 0.22"

#### **ROS-3044+**

**5V Tuning for PLL ICs**  
2885 – 3044 MHz, 50Ω  
Phase noise: -104 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 64 – 72 MHz  
Power output, +8 dBm

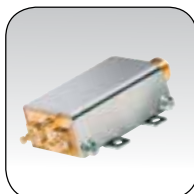


0.5 x 0.5 x 0.10"

#### **ROS-2050-719+** **L Band**

1020 – 1980 MHz, 50Ω  
Phase noise: -99 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 57 – 105 MHz  
Power output, +4 dBm

### Coaxial, Patented Unibody Construction



1.20 x 1.18 x 0.46"

#### **ZX95-3360-S+**

##### **Low Pushing, Low Pulling**

2120 – 3360 MHz, 50Ω  
Phase noise: -95 dBc/Hz  
@ 10 kHz offset  
Linear tuning, 65 – 113 MHz  
Power output, +8.5 dBm



### *Rack Mount Integrated Assemblies*

*DC to 18 GHz*

#### ***Much more than catalog products***

Mini-Circuits has a well-established history of supporting customers with custom integration to achieve highly functional systems and sub-systems. Leveraging our wealth of standard components, our application and systems engineers work directly with customers at the engineering level following our proven framework to accurately define your design requirements up front, ensuring a successful development effort.

The following examples illustrate just some of the capabilities we offer that may be implemented or adapted for use in satcom systems and subsystems.



13 x 19 x 7"

#### ***ZT-100***

##### ***2 x 10 Switch Matrix***

***DC to 8.5 GHz, 50Ω***

With cross bar configuration, this switch matrix can connect the 2 input ports to any 2 of the 10 output ports with the push of a button using the Mini-Circuits GUI (included). This versatile module offers an efficient solution for L, S, and C band signal routing.



10 x 19 x 10.5"

#### ***ZT-101***

##### ***Amplifier with Dual Switched Outputs***

***0.7 to 18 GHz, 50Ω***

Housed in a space-efficient 1U height rack, this module integrates a super ultra wideband, unconditionally stable amplifier with a high isolation absorptive electro-mechanical SPDT switch. The ZT-101 offers the convenience of dual switched outputs for line amplification over L, S, C, X, and Ku bands.



16 x 19 x 3.5"

#### ***ZT-103***

##### ***12 x 3 Switch Matrix***

***DC to 18 GHz, 50Ω***

With 3 high-isolation SP4T electro-mechanical switches independently controlled via Mini-Circuits user-friendly GUI (included), the ZT-103 greatly enhances efficiency where multiple TX and RX signals need to be processed. This unit offers outstanding capability for switching needs in earth station subsystems.





13 x 19 x 7"

#### **ZT-116**

##### ***Antennae Distribution Matrix with Push Button Control***

**600 to 3000 MHz, 50Ω**

Push button control allows users to switch in signal from various antennae to receivers via multiple output channels on the front panel. Additional frequency ranges are available upon request as well as remote control via USB/Ethernet.



10 x 19 x 10.5"

#### **ZT-117**

##### ***Multiple Signal Distribution Box***

**800 to 2000 MHz**

Where multiple splitters or combiners are required to distribute signals, optimizing your system layout is often a challenge for complex configurations. The ZT-117 is designed with 9 six-way splitter/combiners to provide 54 RF channels in neat arrangement allowing easy portability and repeatable configuration. Different splitters and combiners can be used to extend to the frequency range of your choice.



16 x 19 x 3.5"

#### **ZT-122**

##### ***6 Channel RF Signal Distribution Matrix with Push Button Control***

**2 to 18 GHz**

Where a tone needs to be directed to 1 or more outputs simultaneously, the ZT-122 provides an array of 6 momentary push buttons on the front panel for change-on-the-fly situations. Output connector types can be chosen from TNC, SMA and N Type. USB/Ethernet control for remote operation is also available.





### Satellite Antenna H Switch Control Module

**19" Rack Mount Assembly for  
Band Satellite Antenna Rx  
and Tx Path Control**

**10 to 4200 MHz**

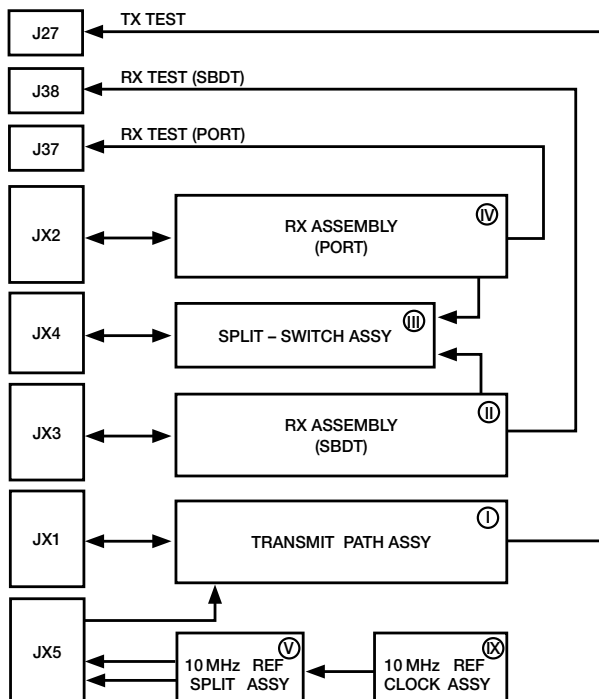


Fig.1: Overall Schematic

Designed specifically to control satellite transmit and receive antennas, the Mini-Circuits H Switch control module is configured with two receive modules and one transmit module. It can also easily be configured for other antenna options. It has a self-contained 10 MHz Rubidium clock with lock detect, operates on 24VDC supply, and comes contained in a 3.5 x 19 x 20" rack mountable case. All RF connections are PDK style multi-connector, and all control lines are D Sub connectors. BNC front panel test ports are available for transmit and receive paths.

## 4 Channel Remote Radio Head (RRH) Tester

**19" Rack Mount Assembly with 40W Tx Power Handling**

**2000 to 3800 MHz**



THE ZT-110 high performance switch matrix is designed to handle 40W of transmit (Tx) power from an RRH and simultaneously work with the receive (Rx) path of another channel. This configuration eliminates the need to turn off the high output power in the Tx path during channel swapping. A built-in isolator provides additional signal isolation between the Tx and Rx paths. Current configuration operates over 2000 – 3800 MHz. Other frequency bands are also available upon request.

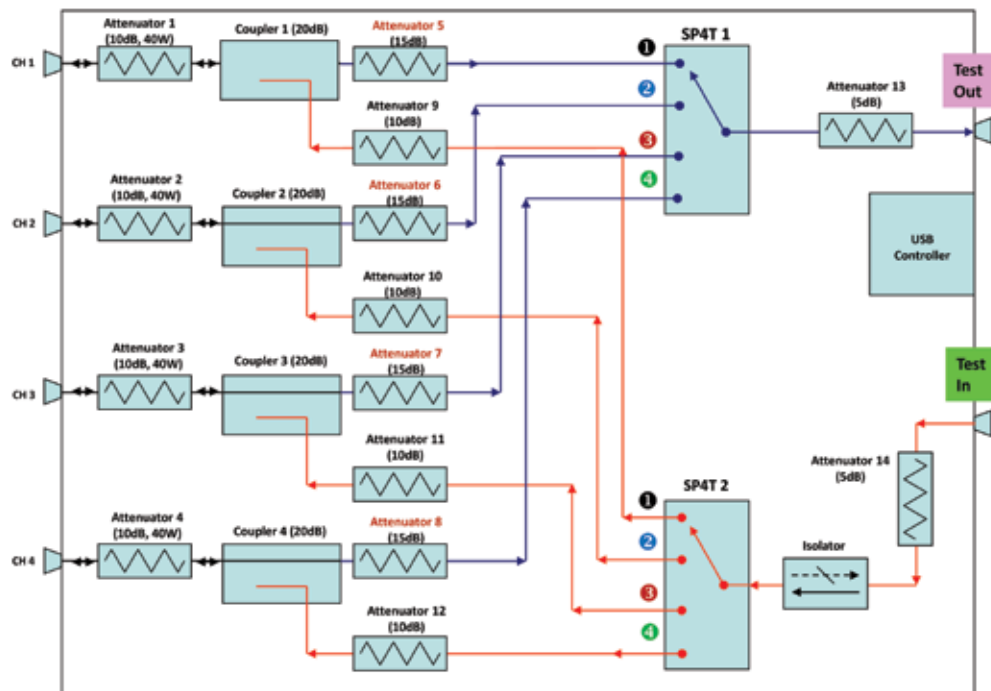


Figure1: ZT-110 Functional Schematic



### J Box L Band Diplexer

**Integrated Assembly with  
2 Rx Paths and 2 Tx Paths**



The Mini-Circuits J Box is an L band diplexer featuring two receive paths and two transmit paths. The receive paths have approximately 30 dB of forward gain, and both are designed with a 2 way power splitter on their inputs to drive multiple modems.

Each of the receive and transmit paths contains a 10 MHz diplexer, which feeds the 10 MHz reference back to the receive and transmit antennas via their respective coaxial cables. The 10 MHz path features an active buffer stage to increase isolation between the receive and transmit paths.

The unit also features a separate 10 MHz monitor port, a compact 6" x 4" x 0.5" case with SMA connectors, and operates from a 24 VDC supply.

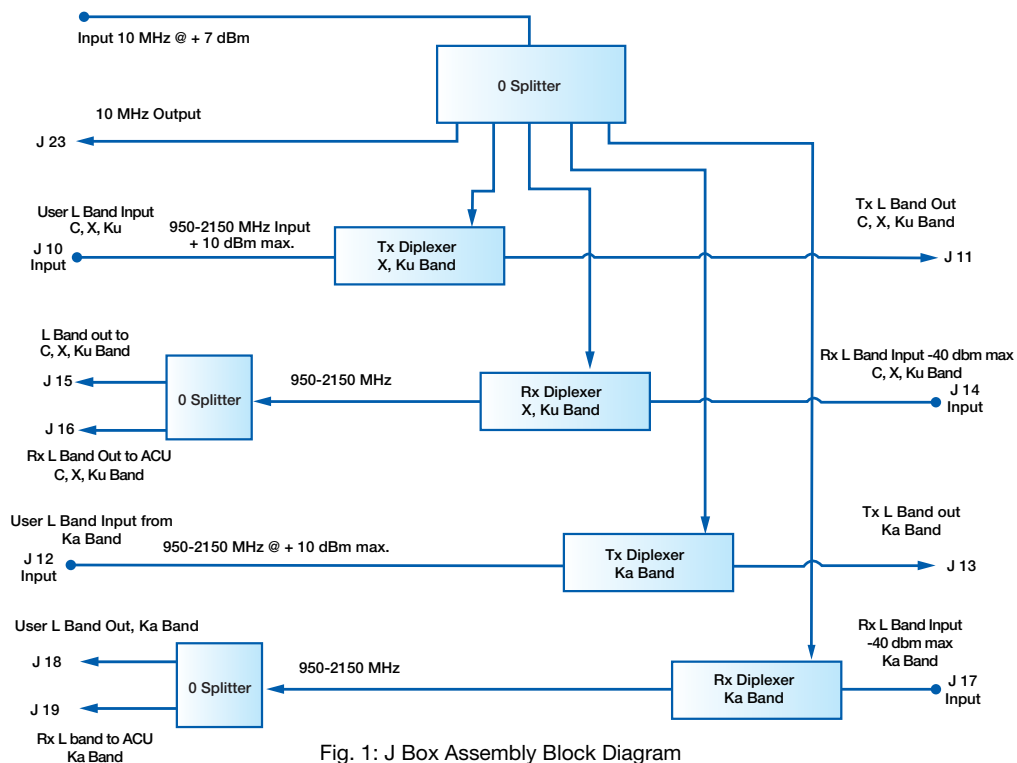


Fig. 1: J Box Assembly Block Diagram



## Active L Band 8 Way Power Splitter

### 19" Rack Mount Assembly



The Mini-Circuits RZ8PD-222DC-X+ is an active L Band 8 way power splitter housed in a 1U high rack mounted assembly. It contains an 8 way splitter, an amplifier, and an internal AC-DC power supply.

This design provides 0 dB insertion loss ( $\pm 0.5$  dB) while still maintaining excellent port-to-port amplitude and phase matching (see figure below). All RF input and output connections are SMA and accessible from the front panel.

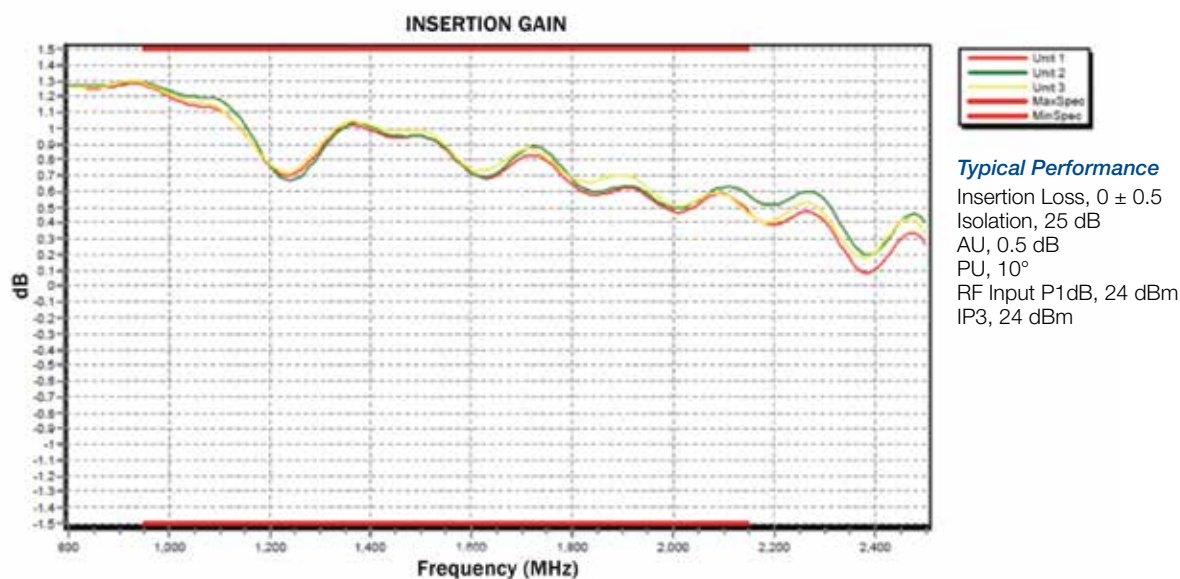


Figure 1: RZ8PD-222DC-X+ Insertion Gain (dB) vs. Frequency (MHz)



## Portable Test Equipment

DC to 18 GHz

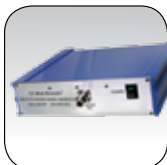
**Signal Generators,  
Switch Matrices, Power Sensors,  
and Programmable Attenuators**



Mini-Circuits offers a unique line of easy-to-configure test equipment providing convenient, cost-effective measurement capability. These units are small and light enough to carry in your laptop case and come standard with our user-friendly GUI control software, all available from stock at prices to fit your budget.

## Synthesized Signal Generators

5 models with a practical range of capabilities to meet your needs.



8.37 x 8.50 x 2.15"

### SSG-4000HP

#### High Output Power

250 – 4000 MHz, 50Ω  
P<sub>out</sub>, -50 to +20 dBm  
Frequency resolution, 5 kHz  
Power resolution, 0.25 dB  
Internal pulse modulation, triggered or continuous  
Frequency/power sweeping (up, down, bi-directional)  
USB control



11.00 x 8.50 x 2.15"

### SSG-4000LH

#### Low Harmonics

250 – 4000 MHz, 50Ω  
P<sub>out</sub>, -60 to +10 dBm  
Frequency resolution, 5 kHz  
Power resolution, 0.25 dB  
Internal pulse modulation, triggered or continuous  
Frequency/power sweeping (up, down, bi-directional)  
Harmonics, -66 dBc  
USB control



8.37 x 8.50 x 2.15"

### SSG-6000

#### Expanded Frequency Range

25 – 6000 MHz, 50Ω  
P<sub>out</sub>, -60 to +10 dBm  
Frequency resolution, 3 Hz  
Power resolution, 0.25 dB  
Internal pulse modulation, triggered or continuous  
Frequency/power sweeping (up, down, bi-directional)  
Frequency/power hopping  
USB control

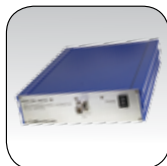


8.37 x 8.50 x 2.15"

### SSG-6000RC

#### Expanded Frequency, USB/Ethernet

250 – 6000 MHz, 50Ω  
P<sub>out</sub>, -60 to +10 dBm  
Frequency resolution, 3 Hz  
Power resolution, 0.25 dB  
Internal pulse modulation, triggered or continuous  
Frequency/power sweeping (up, down, bi-directional)  
Frequency/power hopping  
USB and Ethernet control



11.00 x 8.50 x 2.15"

### SSG-6400HS

#### High Speed, High Capability

0.25 – 6400 MHz, 50Ω  
P<sub>out</sub>, -75 to +10 dBm  
Frequency resolution, 0.01 Hz  
Power resolution, <0.01 dB  
Internal AM, PM, FM, and pulse modulation, triggered or continuous  
Tuning speed, <300μs  
Frequency/power sweeping (up, down, bi-directional)  
Frequency/power hopping  
USB and Ethernet control

### RACK MOUNT OPTION AVAILABLE



## Switch Matrices

Mini-Circuits switch matrices incorporate our patented mechanical switches with ultra-high reliability and extra-long life of 10 years/100 million switch cycles of guaranteed performance.\* This robustness makes them suitable for signal routing and redundancy switching relays in earth station systems where reliability is critical. USB and Ethernet control options are available on all models, and our intuitive GUI control screen allows you to set many different switch configurations for step-by-step control or full automation. Operating voltage may also be modified to fit your application requirements upon request.



Dimension Vary

### USB Control Switch Matrices

Model	# Switches (SPDT)	IL (dB)	VSWR (:1)	Isolation (dB)	RF P <sub>MAX</sub> (W)
USB-1SP4T-A18	1 (SP4T)	0.25	1.2	85	2
USB-1SPDT-A18	1	0.25	1.2	85	10
USB-2SPDT-A18	2	0.25	1.2	85	10
USB-3SPDT-A18	3	0.25	1.2	85	10
USB-4SPDT-A18	4	0.25	1.2	85	10
USB-8SPDT-A18	8	0.25	1.2	85	10

### USB and Ethernet Control Switch Matrices

Model	# Switches (SPDT)	IL (dB)	VSWR (:1)	Isolation (dB)	RF P <sub>MAX</sub> (W)
RC-1SP4T-A18	1 (SP4T)	0.25	1.2	85	2
RC-1SPDT-A18	1	0.25	1.2	85	10
RC-2SPDT-A18	2	0.25	1.2	85	10
RC-3SPDT-A18	3	0.25	1.2	85	10
RC-4SPDT-A18	4	0.25	1.2	85	10
RC-8SPDT-A18	8	0.25	1.2	85	10

\*The mechanical switches within each model are offered with an optional 10 year extended warrantee. Agreement required. See data sheets on our website for terms and conditions.

## Smart Power Sensors, 50Ω & 75Ω

Mini-Circuits smart power sensors are pocket-sized, precision USB HID devices that provide highly accurate measurements of continuous wave (CW) as well as modulated and multi-tone signals. Built-in GUI measurement software enables the user to perform measurements on RF components such as couplers, filters, amplifiers, and more, and displays numerical data and graphs for a full range of data analysis options.



4.89 x 1.74 x 0.95"

Model	Frequency (MHz) and Impedance	Type	Dynamic Range (dBm)	Measurement Speed (ms)
PWR-2.5GHS-75	0.1 – 2500, 75Ω	CW only	-30 to +20	30
PWR-4GHS	0.009 – 4000, 50Ω	CW only	-30 to +20	30
PWR-4RMS	50 – 4000, 50Ω	True RMS	-35 to +20	30
PWR-6GHS	1 – 6000, 50Ω	CW only	-30 to +20	30
PWR-8GHS	1 – 8000, 50Ω	CW only	-30 to +20	30
PWR-8FS	2 – 8000, 50Ω	CW only	-30 to +20	10

## Programmable Attenuators

Mini-Circuits' USB and Ethernet controlled programmable attenuators provide precise level control for a wide range of field, test, and integration applications. They come housed in a pocket-sized, shielded metal case. Our unique design maintains linear attenuation change per dB over the entire range of attenuation settings.



2.0 x 3.0 x 0.6"

### RUDAT-6000 Series

#### Programmable, USB Controlled

1 MHz to 6 GHz, 50Ω  
Max. attenuation, 30, 60, or 90 dB  
Step size, 0.25 dB  
Accuracy:  
±0.3 dB @ 10 dB attenuation  
±1.7 dB @ 90 dB attenuation



2.5 x 3.0 x 0.85"

### RCDAT-6000 Series

#### Programmable USB & Ethernet Controlled

1 MHz to 6 GHz, 50Ω  
Max. Attenuation, 30, 60, or 90 dB  
Step size, 0.25 dB  
Accuracy:  
±0.3 dB @ 10 dB attenuation  
±1.7 dB @ 90 dB attenuation



# SATCOM PRODUCT GUIDE

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