

*RADITEK inc*

- Welcome

# *RADITEK inc*

- RADITEK was founded in 1993
- Founders:
- Malcolm Lee (President and CTO)
- Peter Corbett (COO)
- Manufacturing Telecom and Wireless
  - Passive Components
  - Active Sub Assemblies
  - Systems for Satcom, Terrestrial Microwave

# *RADITEK inc*



- PASSIVE COMPONENTS
- Isolators and Circulators
  - High power coax, Lumped Element, Stripline drop-in, microstrip and waveguide to 90GHz.
- Splitters, Combiners and Couplers
  - Coax, multi way, couplers, high power etc
- Filters
  - Compline, SAW, waveguide, duplexers etc



# *RADITEK continues...*

## ACTIVE ASSEMBLIES

Oscillators: DROs, Phase locked DROs

- Crystal: OCXOs, VCXOs, VCTCXOs etc
  - Synthesizers, VCOs etc
  - YIG oscillators to >20GHz
- 
- Subsystems
    - Amplifiers, Converters...

# *RADITEK TELECOM GROUP*

- TELECOM SYSTEMS
- Satellite communications Bands:
  - L,S.C.X, Ku, Ka
  - Point to Point / SCPC, SCPC/DAMA, Mesh
  - State of the Art Modems
  - Antenna: Transportable, Fixed Including motorized to 9M, Vehicle Mount , IOTM





# *RADITEK TELECOM GROUP*

- Point to Point Radios,
  - **Standard, licensed bands 7 GHz to 60GHz**
  - **RadLink: Standard Licensed and non licensed bands, 300MHz -6GHz**
- **WiMax Point to Multipoint 3.8, 5.8...**
  - **Low cost, last mile, highly competitive**
- **WiFi Mesh**

# Contents..

- **Section 1 Isolators and Circulators**
- **Section 2 Oscillators (DRO, PLDRO)**
- **Section 3 Filters (Cavity, Comblines etc)**
- **Section 4 Broadband couplers and splitters**
- **Section 5 Amplifiers**
- **Section 6 YIG Products (broadband filters and oscillators)**
- **Section 7 Satellite communications**
  - **Point to Point Radio products**

# ISOLATORS & CIRCULATORS

Section 1

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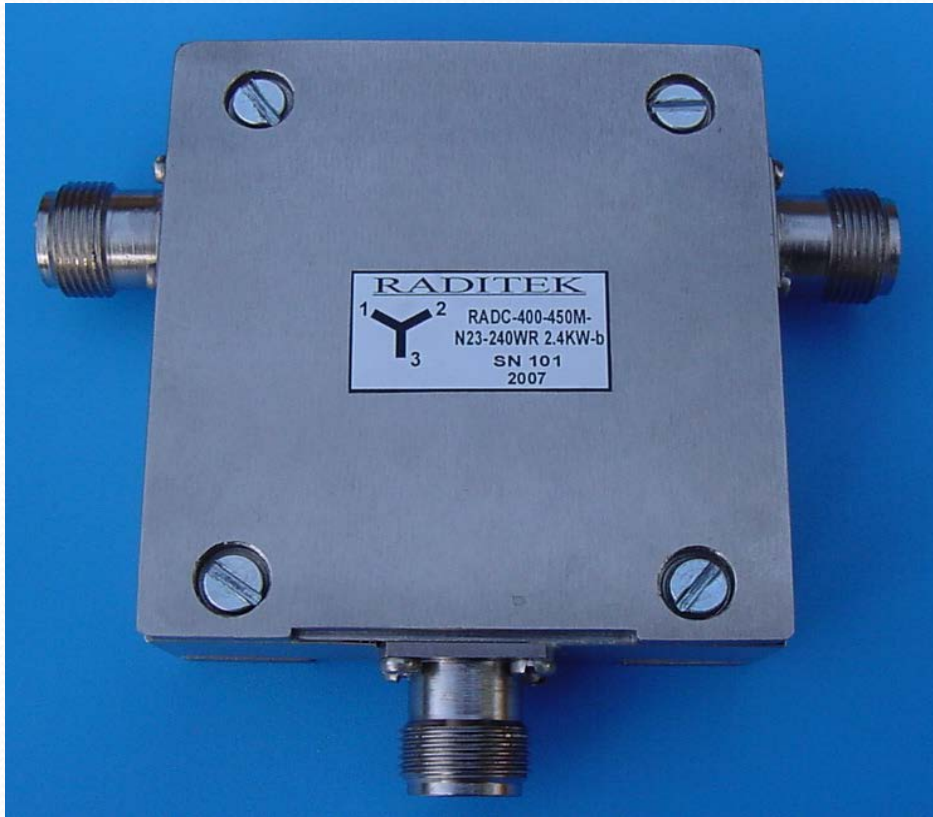
# *Isolator & Circulator products:*

- **Stripline drop-in-**
  - “ss” model, Samarium Cobalt side magnets to 3.8GHz
    - Medium IMD, to 200W power
  - “TT” model, Samarium Cobalt top magnets
  - ‘TW’ model, new high volume, low cost
- **Coaxial (connectorised to mm wave)**
  - SMA, N, K connectors >20GHz
- **RLEI (miniature, SMT, lumped element)**
  - 5mm, 7mm many Cell bands standard frequencies
- **Waveguide to mm wave (to >100GHz) frequencies**

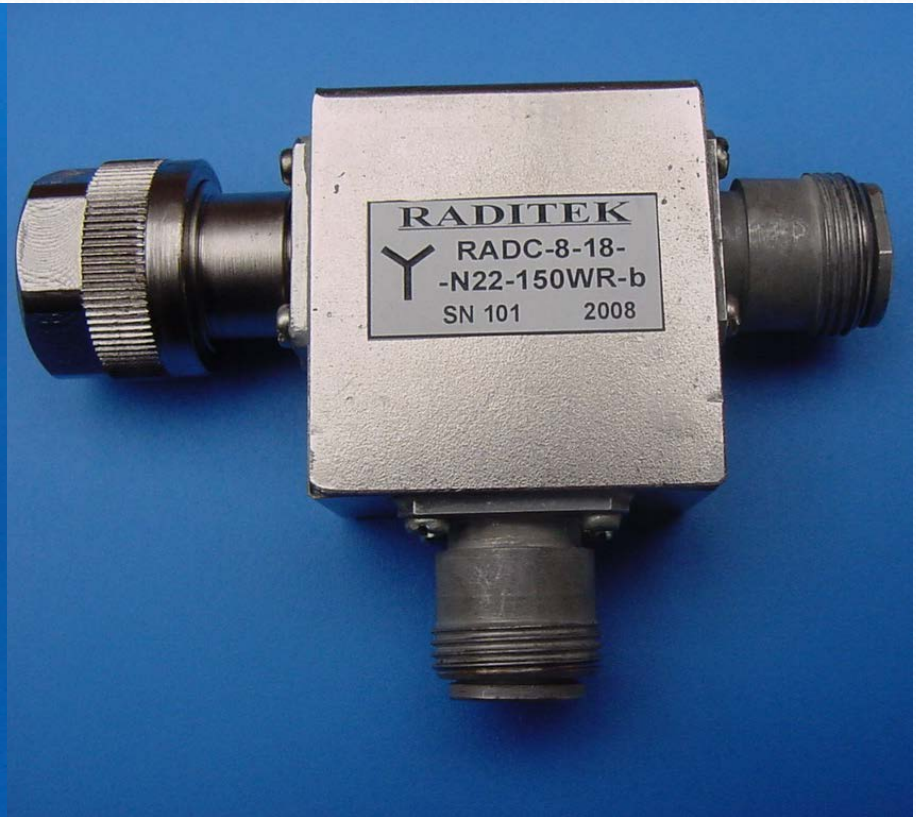


# Why RADITEK?

Probably the widest range of high performance isolator and circulator products,  
In the world....COAXIAL Examples....To MW pulsed power!



400-450MHz Band High Power 2.4KW



8 to 18GHz high power (150W)



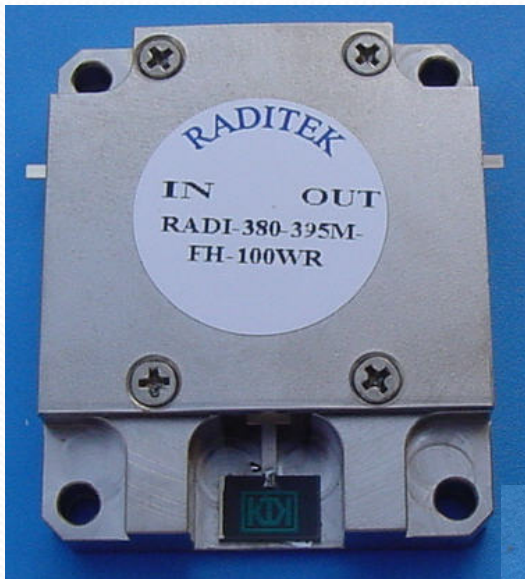
# *High power circulators...*



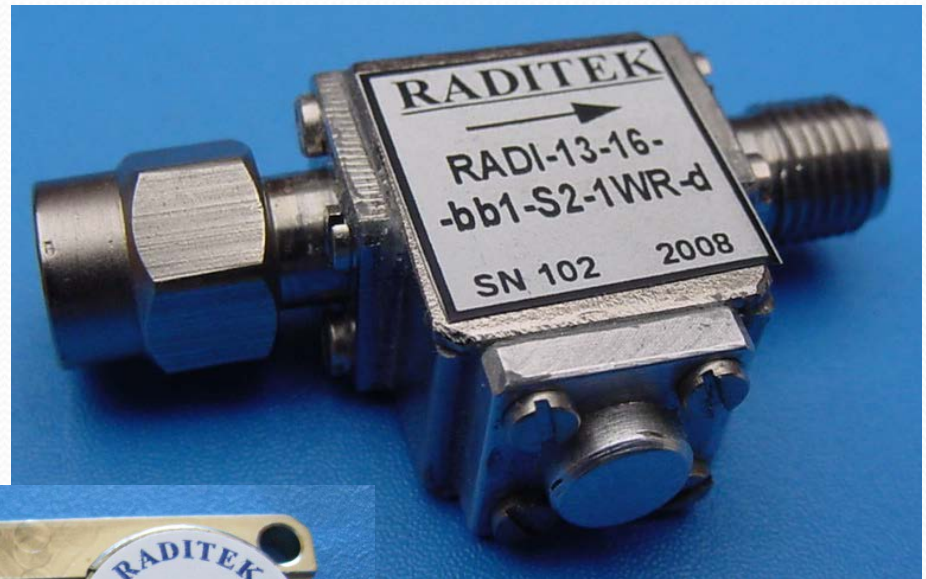
225-400MHz, 400W



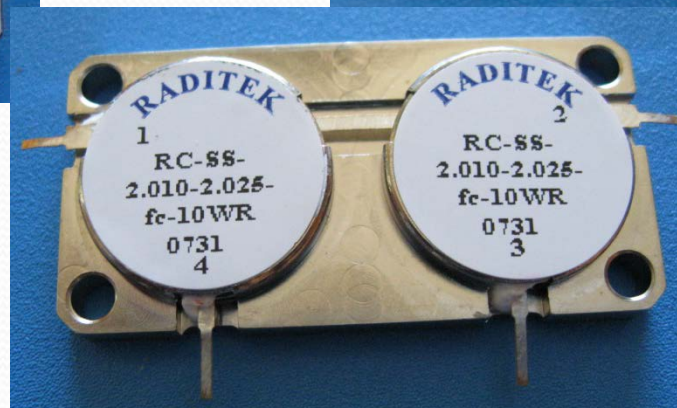
# *Winning isolator products...*



World's top selling  
350MHz (available in  
250-500MHz band)  
Drop-in



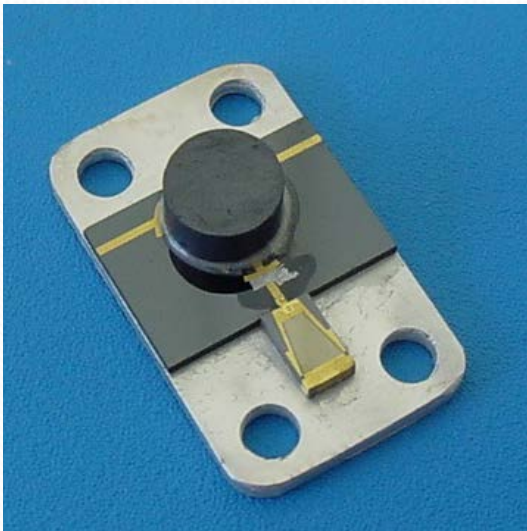
13-16GHz coaxial



Dual TD-SCDMA isolator

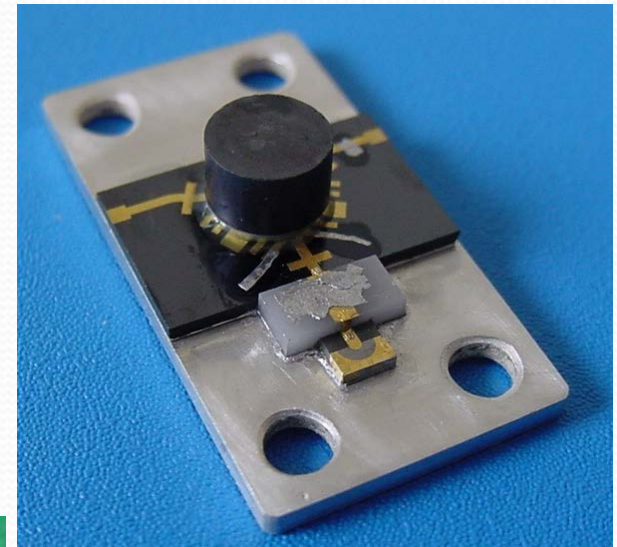
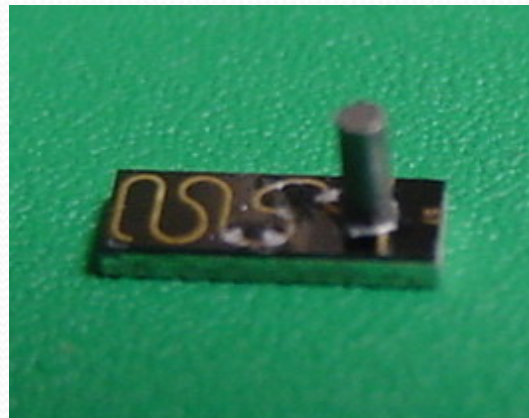


# Microstrips:



Isolators and circulators  
from 3 GHz to >80GHz

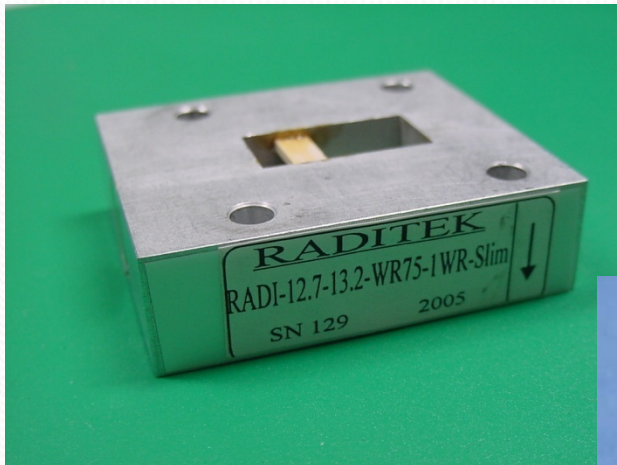
77GHz Microstrip  
(below)



Polished ferrite:  
Thin film Gold over copper  
Metallization  
For Gold wire, ribbon or  
Solderable tabs

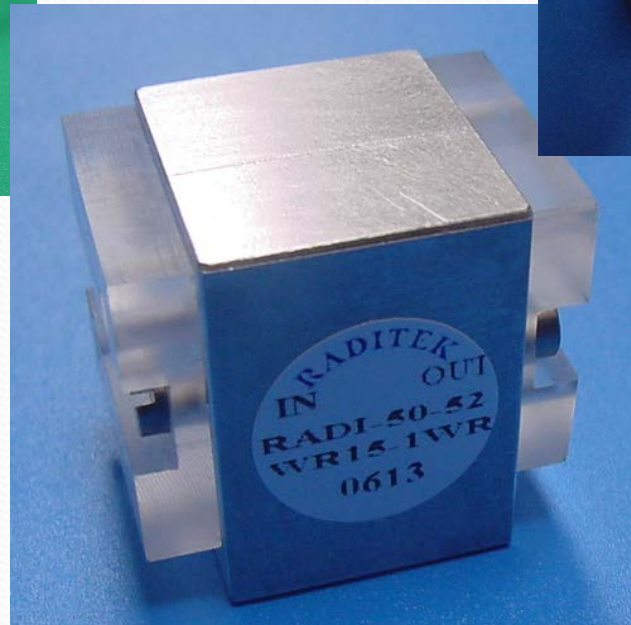


# Waveguide...



12.7-13.2GHz  
WR75  
Low profile  
isolator

50-52GHz  
1W isolator



7.25-7.75GHz  
Circulator





# *Stripline models*

GSM band with 30dB attenuator load



869-894MHz isolator  
10W load



2.4-2.7GHz circulator

# Oscillators

Section 2

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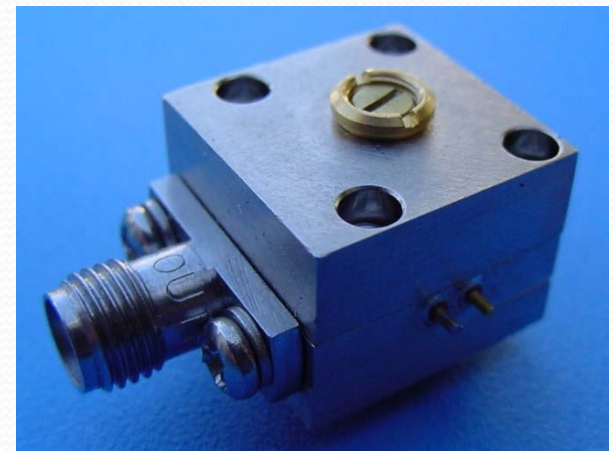
# *Oscillators..*

- **Phase locked sources to >46GHz**
  - (INTERNAL OR EXTERNAL REFERENCE)
  - **Phase locked/synthesized DROs (Dielectric Resonant Oscillators)**
  - **Phase locked CROs (Coaxial Resonant Oscillators)**
  - **Synthesizers**
    - Fixed frequency to >26GHz, PLO replacement
    - Variable frequency programmable (3 wire series) to >26GHz
- **Crystal Oscillators**
  - **OCXO (High stability Ovenized Crystal oscillators)**
  - **TCXO (Temperature compensated Crystal oscillators)**



# *DROs..*

Models in the 4-40GHz band shown  
Lower band CROs also available.

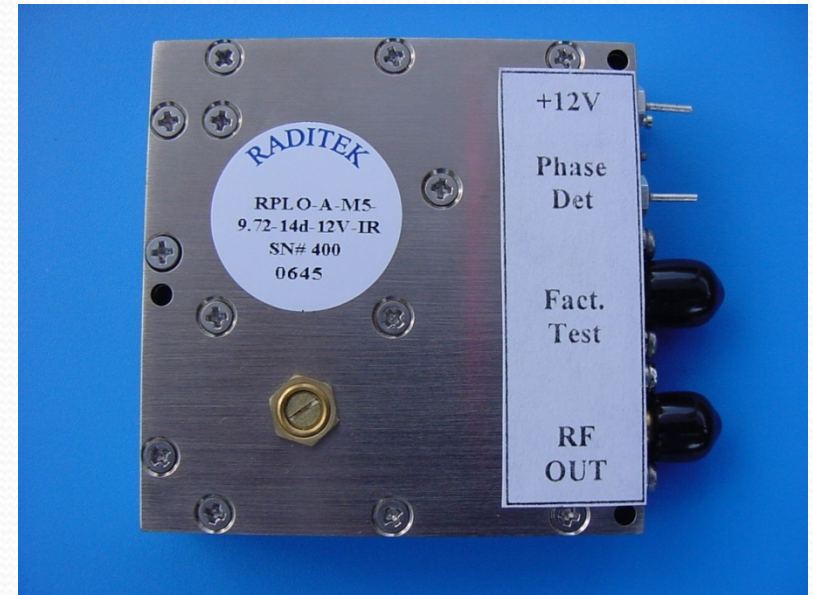




# *Phase Locked DROs...*



External reference model  
16GHz example

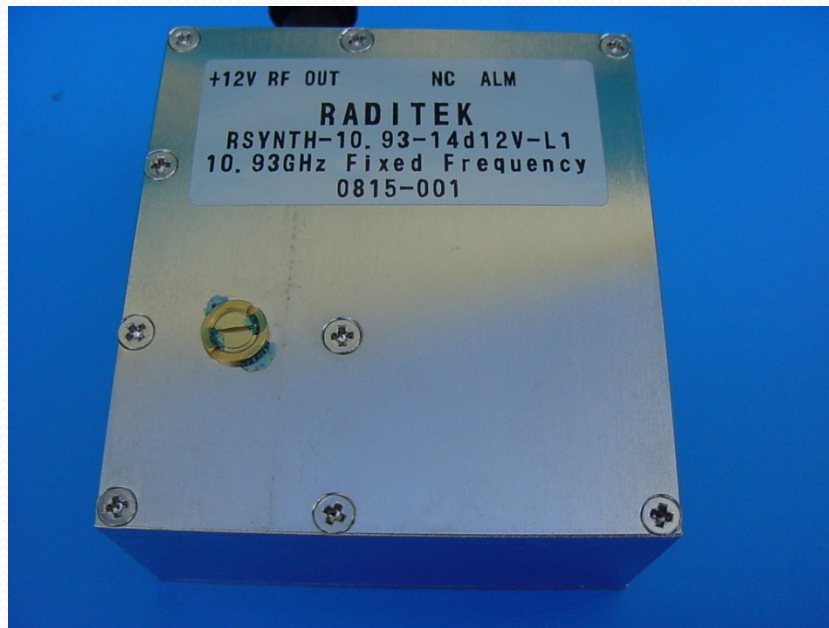


Internal reference model  
9.72 GHz example

Standard and custom form factors



# *Superb Synthesizers...*

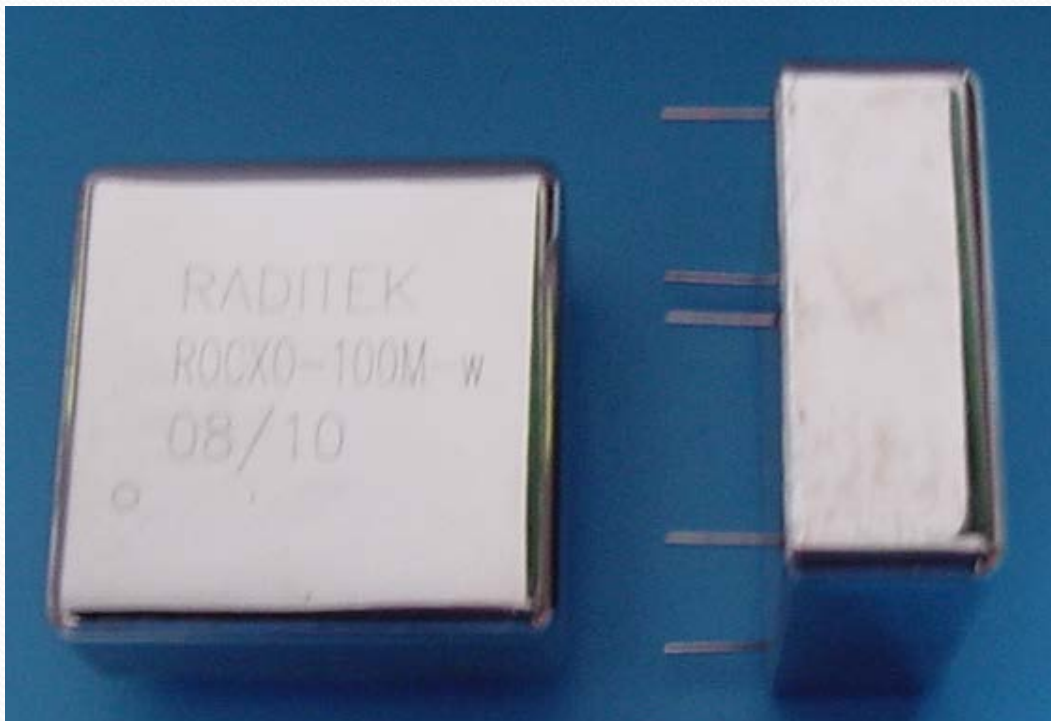


Fixed frequency, 10.93GHz unit shown. **NOTE:** Output frequency does not need to be a harmonic of the reference, unlike other's PLDROs etc.  
Also serial bus programmable version to ~26GHz



# *Crystal Oscillators..*

100MHz OCXO (Ovenized crystal oscillator)



8MHz VCTCXO  
Voltage controlled,  
Temperature compensated  
Crystal Oscillator

# Filters

Section 3

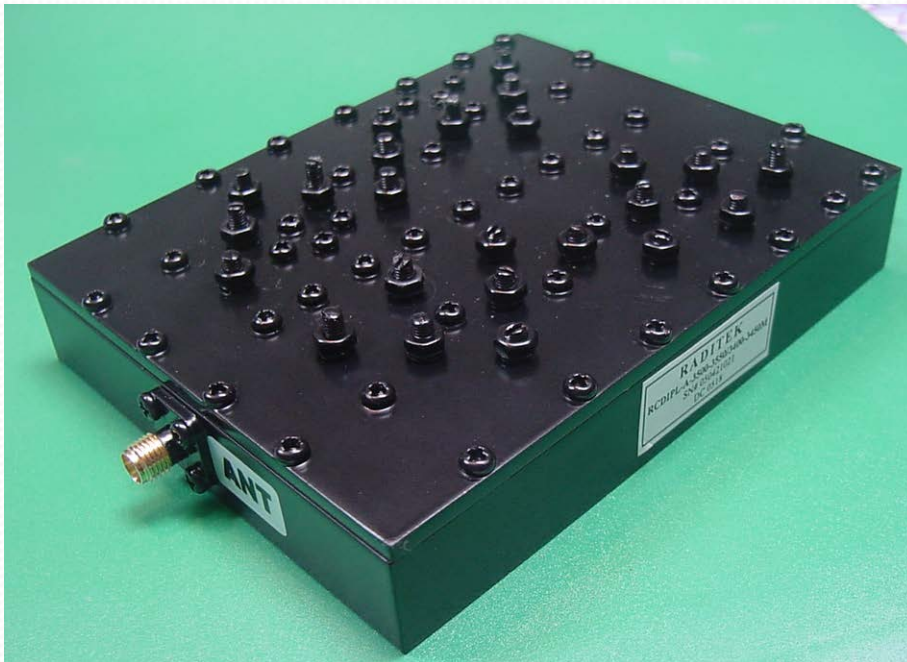
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# *Filters..*

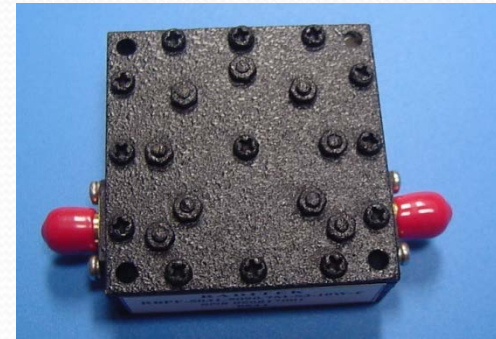
- High Q, Comblines
  - Includes diplexers
  - Dielectric loaded (for smaller size)
- High Q, Cavity filters
  - Includes diplexers
  - Dielectric loaded (for smaller size)
- Ceramic filters and diplexers
- SAW (limited to **standard frequencies** only, in small quantity, specials in high volume only)



# *Cavity filters* (high performance)



3.5GHz high Q diplexer



5GHz Band pass filter

# Broadband couplers & Combiner/splitters

Section 4

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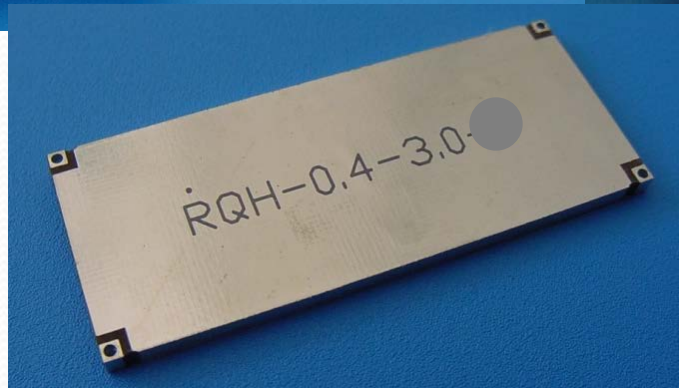


# *Broadband Couplers..*

- Various coupling factors (1->30dB)
- Quadrature Hybrids (3dB-0° -90°)
- Low and High power (100W)
- Octave and multi octave bandwidths
  - Coaxial (connectorized)
    - SMA, N connector etc.

# *Broadband couplers..*

1-18GHz coupler



Stripline drop-in broad band Quad hybrid (0.4-3GHz)



30dB coupler, 1-2 GHz, 50W coax



# Amplifiers

Section 5

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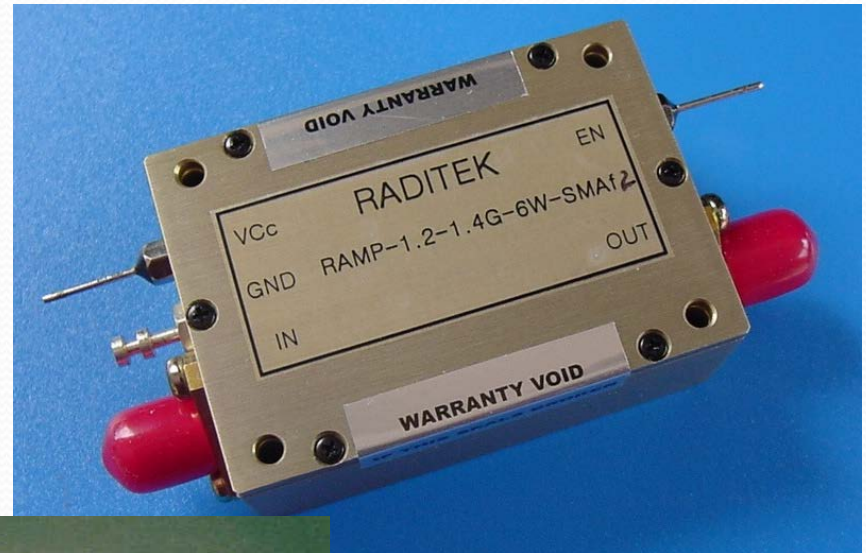
# *Amplifiers..*

- Custom amplifier “bricks” and 19” rack mount..
  - To 40 GHz
  - Minimum order quantity (MOQ) is 5 or 10 (typically)
  - LDMOS, GaN, SiGe, HBT technologies etc.
  - Specializing in high linearity (Power) amplifiers
    - WiMax, TD-SCDMA, GSM, WCDMA etc
    - Multi-channel
  - TWTAs based CW and Pulsed amplifiers to Mwatts!
    - (Quote is SUBJECT TO U.S. approval, “WHERE USED/END USER STATEMENT” and any other restrictions.)



# Amplifiers

950-960MHz, 40W



1.2-1.4GHz, 6W

# Amplifier 81-86 GHz, 71-76GHz





# RADITEK

**RF POWER!**

## TELECOM

**GaN and LDMOS POWER**



**250 Watt/ 625 Watt/  
1250 Watt**

**Perfect for high Crest factor modulation: ATSC television and OFDM-Data services. Also, Hybrid AM/FM/digital broadcast and low-power local data transmission such as WiMAX, IPTV and MediaFLO.**

Description	Frequency Bandwidth	Power Levels Up to
Broadband Modules	10 KHz - 8 GHz	600 Watt
Broadband Systems	10 KHz - 8 GHz	2000 Watt
General Communication Modules	0.1 MHz - 4.2 GHz	800 Watt
General Communication Systems	0.1 MHz - 4.2 GHz	2500 Watt
Matched Band Modules *	2 GHz - 18 GHz	300 Watt
Matched Band Systems *	2 GHz - 18 GHz	1000 Watt
Personal Communication Modules	Cell, GSM, PCS, iDEN, WIMAX, WLL	Various
Personal Communication Systems	Cell, GSM, PCS, iDEN, WIMAX, WLL	Various

**3100 – 3500 MHz  
1300 Watts  
Pulse**

- ▣ Solid-state Class AB
- ▣ Broadband
- ▣ Suitable for Pulse apps.
- ▣ Built-in control, monitoring & protection
- ▣ 50 ohm
- ▣ High reliability and ruggedness
- ▣ Isolator output protection






**RADITEK inc**  
**(408) 266-7404**  
[www.raditek.com](http://www.raditek.com)

**500 – 2500 MHz  
100 Watts**

Suitable for broadband mobile jamming and band specific high power linear applications in the P/L/E frequency bands.



	250 Watt	625 Watt	1250 Watt
			
Model	RADI- F1-F2-250W-G-28V	F1-F2-625W-G-28V	F1-F2-1250W-G-28V
Frequency Response	UHF Band	UHF Band	UHF Band
Power Output (average peak power)	250 Watts	625 Watts	1,250 Watts
Gain Adjustability	3 dB	3 dB	3 dB

# ***IFF Power amplifier, 1030MHz 4KW peak power. Ground based Interrogator***





# YIG Products

Section 6

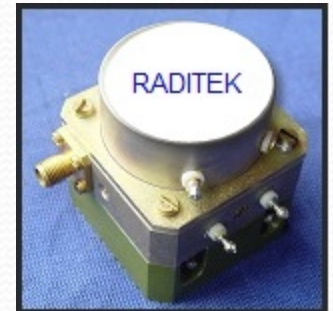
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# YIG Products..

- **Advanced YIG FILTERS**

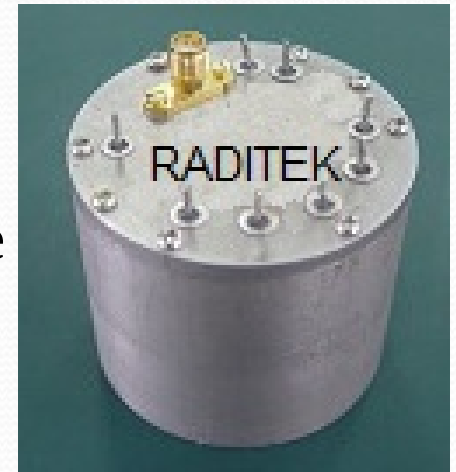
- 0.5~1 GHz, 1~2 GHz, 2~4GHz, 2-6GHz, 4~8 GHz, 8~12 GHz, 12~18 GHz, 18~26 GHz, and 26.5~ 40GHz
- **Band Pass, or Band stop available**
- *Ultra wideband available, e.g. **200MHz** min at 2GHz!*
  - *(Everyone else struggles to meet **100MHz** at 2 GHz!!!!!!)*
- Special, custom models in reasonable volume
- Analog voltage driver available
- Digital driver available





# *YIG Products..*

- **Advanced Ultra broad-band YIG Oscillators**
  - 2 to 8GHz, 2 to 10 GHz, 4 to 18 GHz,
  - 2 to 18 GHz, and 2 to 20 GHz... specials to >30GHz!
  - Single and dual out puts (<18 GHz)
  - 10dBm typical outputs (<18 GHz)
  - Custom models in reasonable volume
  - Analog voltage driver available
  - 12 bit Digital driver
    - Microcontroller based, look up table temperature compensated



Section 9

# TELECOM SYSTEMS

## SATCOM

### RF, Modems, Antenna

### Point to Point Radio



# Radlink Product Lines – Lower Frequencies

- Licensed Radios:
  - Available:
    - Mobile Data System 300-750MHz, 1W
    - Bridge Radio 3.3, 3.5GHz (wi-max) , 200mW
    - 4.9 GHz Home Security (USA) Band
- License Free Radios (ISM Band) (p2p mesh) :
  - 600 MHz 5 Watts
  - 900MHz available:
    - Mobile Data System 1W OFDM
  - 2.4GHz (wi-fi p2p) available:
    - Bridge Radio 100mW, 802.11b
    - Bridge Radio 500mW, 802.11b
    - Bridge Radio 1W, 802.11b
    - Bridge Radio 2W, 802.11b
    - Hotspot Radio 200mW 802.11g/b (ofsm)
  - 5GHz (wi-fi p2p) available:
    - Bridge Radio 100mW & 200mW, 802.11a/b/g w/Ext. antenna, TDD
    - Bridge Radio EIRP=46dBm 802.11a/b/g w/Integral antenna, TDD
    - Bridge Radio EIRP=32dBm 802.11a/b/g w/EXT & INT antenna, TDD
    - Bridge Radio High Speed (130 Mbps aggregate) FDD

# Satellite Products Converters



- **UP/Down Converters: Up to 4 independent converters per rack unit**
- **Hot swap, redundant power supplies**
- **L, C, X, Ku and new Ka band**



# Satellite Products BUCs



- **C, X, Ku and new Ka band**
- **Example: 50W Ku Band GaN BUC**
- **Lightest and smallest in the industry**
- **1+1 and High Powers (indoor and outdoor)**

# **Dream and Super Dream (DamaREAdy Modem)**

## **DAMA (Demand Assigned Multiple Access)**

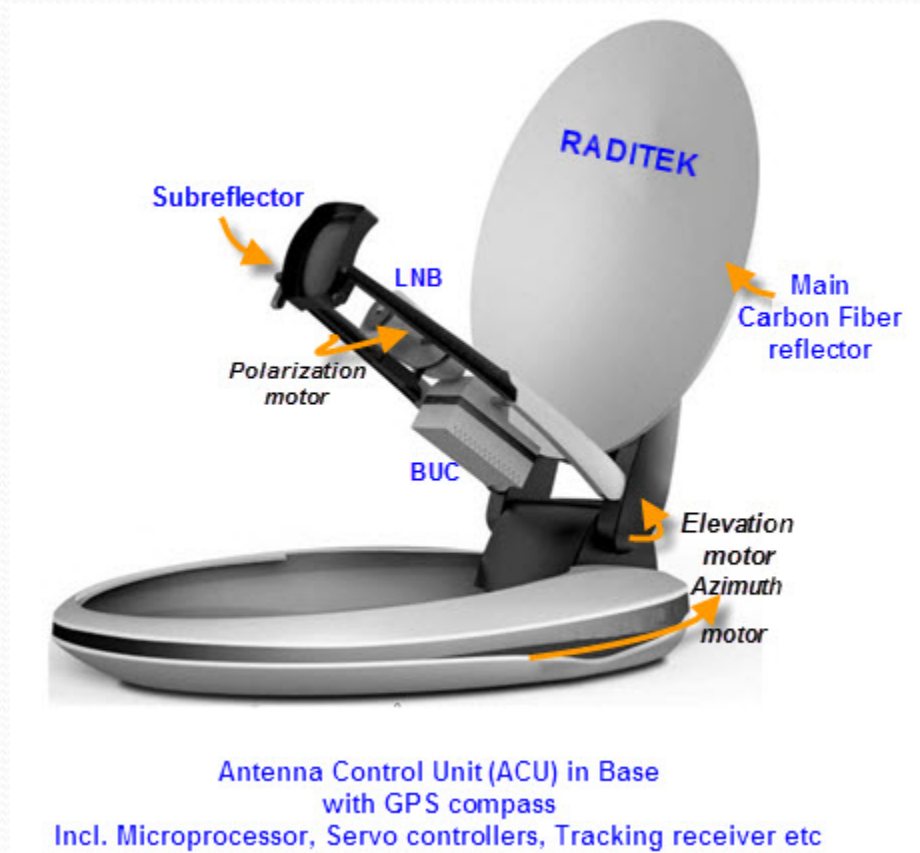
## **BOD (Adaptive Bandwidth on Demand)**



- ALL IP based ROUTER SCPC modem, which is always SINGLE HOP. Can be used as either:***
- 1.A Stand alone SCPC, Point to Point modem or***
  - 2.A remote “TDM” based modem function used in a DREAM Super Hub modem network or***
  - 3.A super (satellite) efficient DAMA (Demand Assigned Multiple Access) based SCPC modem ABOD)***
    - Multiple STAR or MESH networks***
    - Central network status display, spectrum analyzer display etc***



# Satellite Products VMA



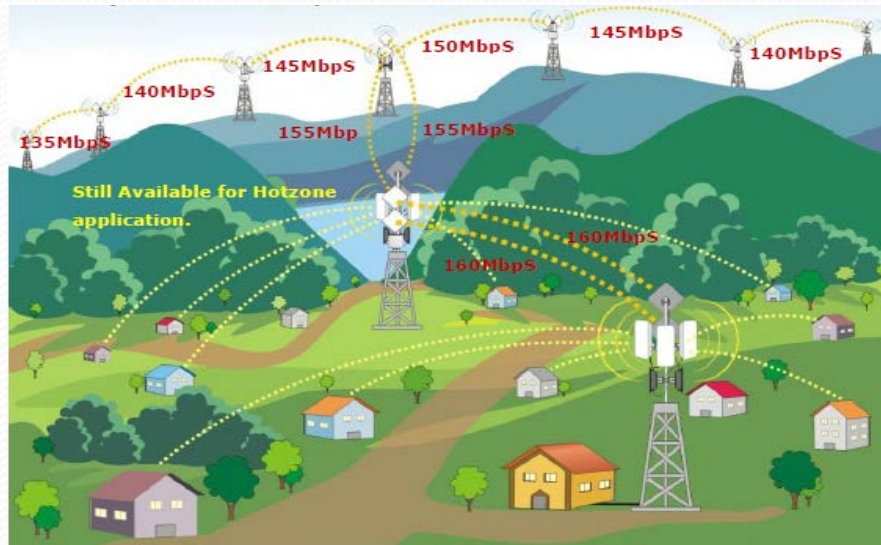
# IOTM antenna Ku, Ka



- **Linear or circular polarization available**
- **Compatible with RADITEK DREAM modems, BUCs and LNBs**
- **Cold start acquisition <3min,**
- **<100ms re-acquisition after signal loss/block**
- **Rescan <20s**
- **High Power, low profile BUC (eg 40W) available**

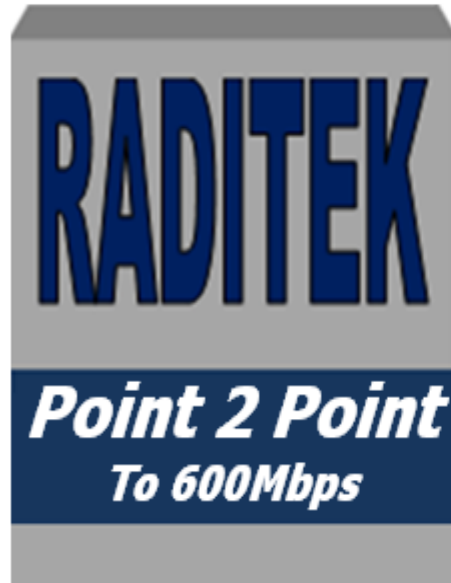


# Wi-Fi. Metro-fifi RADLINK 2000



- 802.11 a/b/g/n MIMO NLOS/OFDM Radio
- Integrated Multi-Radios (to 3 per node)
- Fast Data Switching Technology
- Real Aggregate TCP rate  $\geq 320\text{Mbps}$  for 4x4 & 6x6 MIMO Base Station
- High Efficiency in Multi-hops Repeating
  - Low Throughput data drop, eg 100 Mbps @ 10 hops
  - Multi-hop latency increased, eg  $\leq 15\text{ ms}$  with 10 hops
- Operate in 2.4GHz / 5GHz ISM Band
- **Create the best, fastest, lowest latency WIFI village/town/city.**

# Licensed band Point to Point.



## Point to Point licensed band, all outdoor, Link RP2P-IPODU-"FREQ"\*-a9

### Feature and Benefits

- Licensed Frequency Bands
- 300/600Mbps Ethernet (IP only)
- Very Low Latency
- Adaptive Modulation for optimal availability
- Jumbo Frame support to 9720 Bytes
- Built-in Link Monitor
- Power over Ethernet (PoE)
- Low Power Consumption
- Wide Operating Temperature Range
- SNMP Network Management
- Up to 100 meter between PoE and ODU
- Smallest profile



Total outdoor radio with Common antenna waveguide port

PoE with Cover removed

6-38 GHz

300+ Mbps

LOS

FD

PoE

PTP

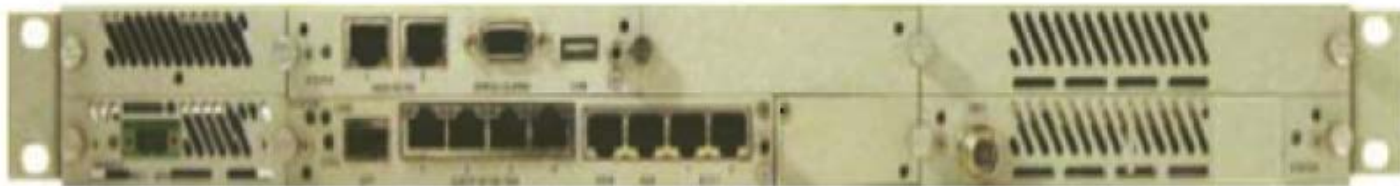




*Covers most licensed bands..*

RADIO (ODU)									
Frequency		7 GHz	8 GHz 1	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	38 GHz
Band (GHz)		7.1-7.9	7.72-8.5	10.7-11.7	12.7-12.3	14.5-15.4	17.7-19.7	22.0-23.6	37.0-40.0
T-R Space (MHz)		154/161/ 196/245	119/126/151/ 266/311.32/6 14	490/530	266	420/490 728	1010/1092.5	1008/1200 1232	700, 1260
T-T Space (MHz)	ETSI	7, 14, 28, 56	7, 14, 28, 56	7, 14, 28, 56	7, 14, 28, 56	7, 14, 28, 56	7, 14, 28, 56	7, 14, 28, 56	7, 14, 28, 56
	FCC	30, 40, 50	30, 40, 50	30, 40, 50	30, 40, 50	30, 40, 50	30, 40, 50	30, 40, 50	30, 40, 50
Xmit Power (dBm)QPSK		27	27	26	26	20	25.5	24	23
Xmit Power (dBm)16/32QAM		22.5	22.5	21.5	21.5	21.5	21.5	20.5	20
Xmit Pwr (dBm) 64/128QAM		16.5	16.5	15.5	15.5	15.5	15.5	14.5	16
Receiver Threshold 10-6 BER (dBm)	QPSK	-84	-84	-84	-84	-84	-84	-84	-84
	16/32 QAM	-72	-72	-72	-72	-72	-72	-72	-72
	64/128 QAM	-69/-65	-69/-65	-69/-65	-69/-65	-69/-65	-69/-65	-69/-65	-69/-65
Modulation		QCPK, 16QAM, 32QAM, 64QAM, 128QAM - User Selectable							

# *Point to Point Radio*





If we are not already there....

Please tell us how we can be your most favored supplier, partner ?

If you didn't see the product you were looking for, still ask us, we may be developing something similar as a special!  
Contact your representative...

*please visit us often at:*

*[www.raditek.com](http://www.raditek.com)*