

COMMUNICATION PRODUCTS

Synthesized Frequency Up- And Downconverters



9800 Series



9900 Series

Single-, Dual-, Tri- and Quad-Band High Performance Outdoor Block Converters



WS Series
Over 30 Ka-Band models available
BW ≥ 1.5 GHz

- Synthesized Converters providing high resolution precise step size
- Single and Multi Frequency Bands:
L, C, X, Ku, K, Ka, & Q Combined Bands
- IF frequency choices of L-band or 70/140 MHz, or custom
- Superior Phase Noise to IESS-308/309 standards
- Low Intermodulation Distortion
- High Gain with Accurate Gain control & flatness
- Remote control using RS422/485 or 10/100Base-T Ethernet options

Single And Multiband Block Converters



(1:1) Redundant BUC System

U.S. Patent #7,510,090

- Up & Downconverters to 60 GHz:
L, C, X, Ku, K, Ka, Q & V-bands
- Multiband versions; Dual, Tri, Quad, & Quint-bands
- Indoor Rack Mount & Outdoor Antenna Mount Models
- Many configurations; 1/3 rack size, full rack, modules, etc.
- Superior Phase Noise to the applicable IESS 308/309 or MIL-STD-188-164A specifications
- Low Intermodulation Distortion
- 10/100Base-T Ethernet & RS422/485 plus additional control options

LNA, LNB, And Redundant Systems



(1:1) Redundant LNB System

- C- through Ka-bands Low Noise Amplifiers Available with Fiber Optic IF outputs
- X- & Ka-bands Low Noise Block Downconverters Available with Fiber Optic IF
- Redundant 1:1 or 1:2, & Dual 1:1 LNB Systems
- Hot swappable LNBs & Power Supplies
- Superior Low Noise Temperature LNA front end
- Remote control using RS422/485 interface
- Meets harsh outdoor environmental conditions



(1:2) Redundant LNB Controller

Test Translators, Beacon Receivers, Amplifier/Slope Equalizers And Satellite Simulators



Outdoor 5 Band Test Translator



Quad Band Outdoor Simulator

- Single & Multiband Test Translators providing accurate system test capability by converting satellite transmit frequency bands to their corresponding receive bands
- Minimum amplitude and delay distortion
- Slope Equalizers for L-band & 70/140 MHz
- Variable amplitude slope & group delay adjustment
- Redundant Slope Equalizer Systems with RS422/485 remote control
- L-band Slope Equalizers suppresses critical 2nd harmonic @ 2 GHz
- Quad-band Outdoor Sat Simulator to MIL-STD-188-164A and IESS Requirements
- Beacon Receiver covers 940 to 2150 MHz & provides precise beacon power measurement



Dual Amplifier/Slope Equalizer



(1:1) Redundant Slope Equalizer

U.S. Patent #7,510,090



Beacon Receiver



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SPACE SAVINGS COMMUNICATION PRODUCTS

1/3 Rack Size, Configurable RF SATCOM Equipment

1RU height cage can hold up to 3 of the following 1/3 rack products:

- Block Upconverters: S, C, X, Ku, or Ka-bands available
- Block Downconverters: S, C, X, Ku, or Ka-bands available
- Redundant Switchover Unit: All bands
- Test Translators: All bands
- Amplifiers: All bands – L- thru Ka-bands available
- Fiber Optic Transmitters & Receivers
 - Complete Links with Redundant Switchover Unit

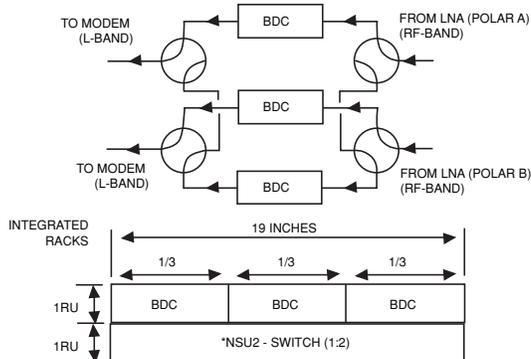
MITEQ's patented space saving units are easily configured to create redundancy systems in 1RU Height.

- Each 1/3 rack unit has its own power supply & controls
- Independent front panel & remote controls
- Automatic 5 or 10 MHz & automatic internal or external reference oscillator selections
- Excellent phase noise & low intermodulation products
- Gain: 30 dB upconverters/ 35 dB downconverters with 30 dB gain control
- LO Frequency & Power Monitors
- 10/100Base-T Ethernet and RS422/RS485 options

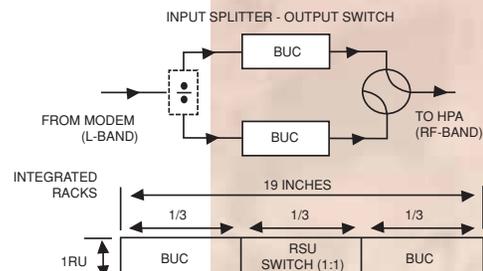
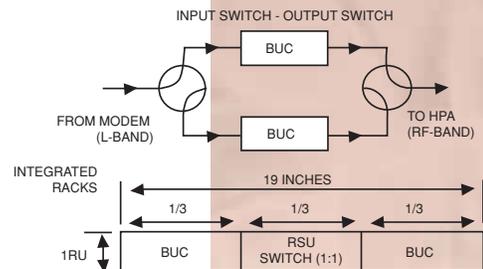


1/3 Rack Size, 1:1 Block Converter Configuration

- L- to RF Block Upconverters: C- thru Ka-Bands
- RF to L- Band Downconverters: C- thru Ka-Bands
- 1:1 Redundant Switchover unit: C- thru Ka-Bands
- 1:2 Redundant Converters: Utilizing full rack NSU2 switch



BUC NSU Switch BUC



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U.S. Patent #7,510,090

SPACE SAVINGS COMMUNICATION PRODUCTS

1/3 Rack Size, Three-Channel Amplifier Configurations

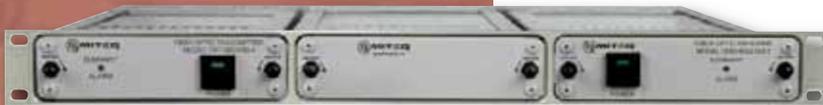


X-Band Amplifier C-Band Amplifier Ka-Band Amplifier

(1:1) Redundant Amplifier System



Amplifier NSU Switch Amplifier



Fiber Optic Transmitter Fiber Optic Receiver

(1:1) Redundant Equalizer System



Equalizer Unit Switchover Unit Equalizer Unit



BUC Test Translator BDC



- Three channels in 1RU package
- 17 models covering L- to Ka-band
- LED current fault alarm & summary alarm
- Optional input/output attenuators
- Optional input/output monitors
- Optional remote attenuation control

1/3 Rack Size, Redundant Amplifier Switchover Configuration

- 1:1 switchover configurations in 1RU package using RSU or NSU2 controller
- 1:2 switchover configurations using NSU2 full rack switch
- 17 amplifier models covering L- to Ka-band
- LED current fault alarm & summary alarm
- Optional input/output attenuators
- Optional input/output monitors
- Optional remote attenuation control

1/3 Rack Size, Fiber Optic Transmit Receive Configurations

- 1/3 Rack Transmitters & Receivers covering from 10 MHz to 14.5 GHz
- 1:1 Redundant Switchover Unit can provide both RF and FO Switching
- High Dynamic Range
- Low Noise Figure

1/3 Rack Size, Equalizer And Switchover Configuration

- Redundant operation with independent gain and slope adjustment
- Multiple IF and L-band coverage
- Gain adjustment range: 20 dB
- Slope adjustment: 6 dB
- Remote control RS485/RS422 with Ethernet option
- 1:2 Redundant Converters: Utilizing full rack NSU2 switch

1/3 Rack Size, Test Translator With Block Converter Configuration

- Test Translators:
 - RFTx band to RFRx band models covering all bands: C, X, Ku, K and Ka
 - RFTx band to L-band models covering all bands: C, X, Ku, K and Ka
- Remote control RS485/RS422 with Ethernet option



FIBER OPTIC COMMUNICATION PRODUCTS

SATCOM Fiber Optic Products

- FO links providing over 60 Km separation from antenna to base
- RF over fiber – full satcom band of S, C, X, Ku, & K
- IF to L-band or 70/140 MHz
- Indoor & outdoor models
- Card cage FO links, multiple receivers & transmitters & cage rack
- S-, C-, X- and Ku-bands Low Noise Amplifiers with Fiber Optic RF outputs
- X- & Ka-bands Low Noise Block Downconverters with FO IF at L-band
- Redundant switchover systems with FO links
- Custom configurations & distribution systems provided



Multiple FO Links-Cage Rack Assembly



DC-Powered L-Band FO Transmitter & Receiver: 60Km separation



AC-Powered HF to Ku-band models Tx/Rx separation 10Km

Ku-Band Integrated LNA With Fiber Optic Transmitter

- Entire Rx Ku-band coverage: 10.75 to 12.75 GHz
- Superior low noise figure and high dynamic range
- Integral FO transmitter with low noise amplifier
- Antenna mount LNA/FO unit operating over harsh environment
- Operational distance over 10 Km
- Redundant LNAs can be provided on antenna mount plate assembly with RF and FO outputs



Ku-band Integrated LNA with Fiber Optic Link



X- and Ka-Band Integrated LNAs With Fiber Optic Transmitter

- X- and Ka-band LNAs with optional integral FO transmitter
- Superior low noise temperature front end
- Can interface with either rack mount cage FO receiver or separate 1/3 Rack mount receiver
- Interstage high rejection filter included
- Custom versions and options available



Ka-band LNB with Fiber Optic Link



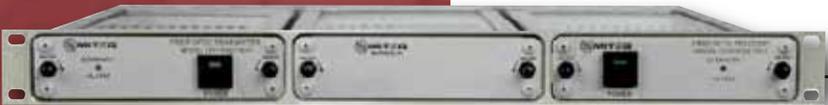
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FIBER OPTIC COMMUNICATION PRODUCTS

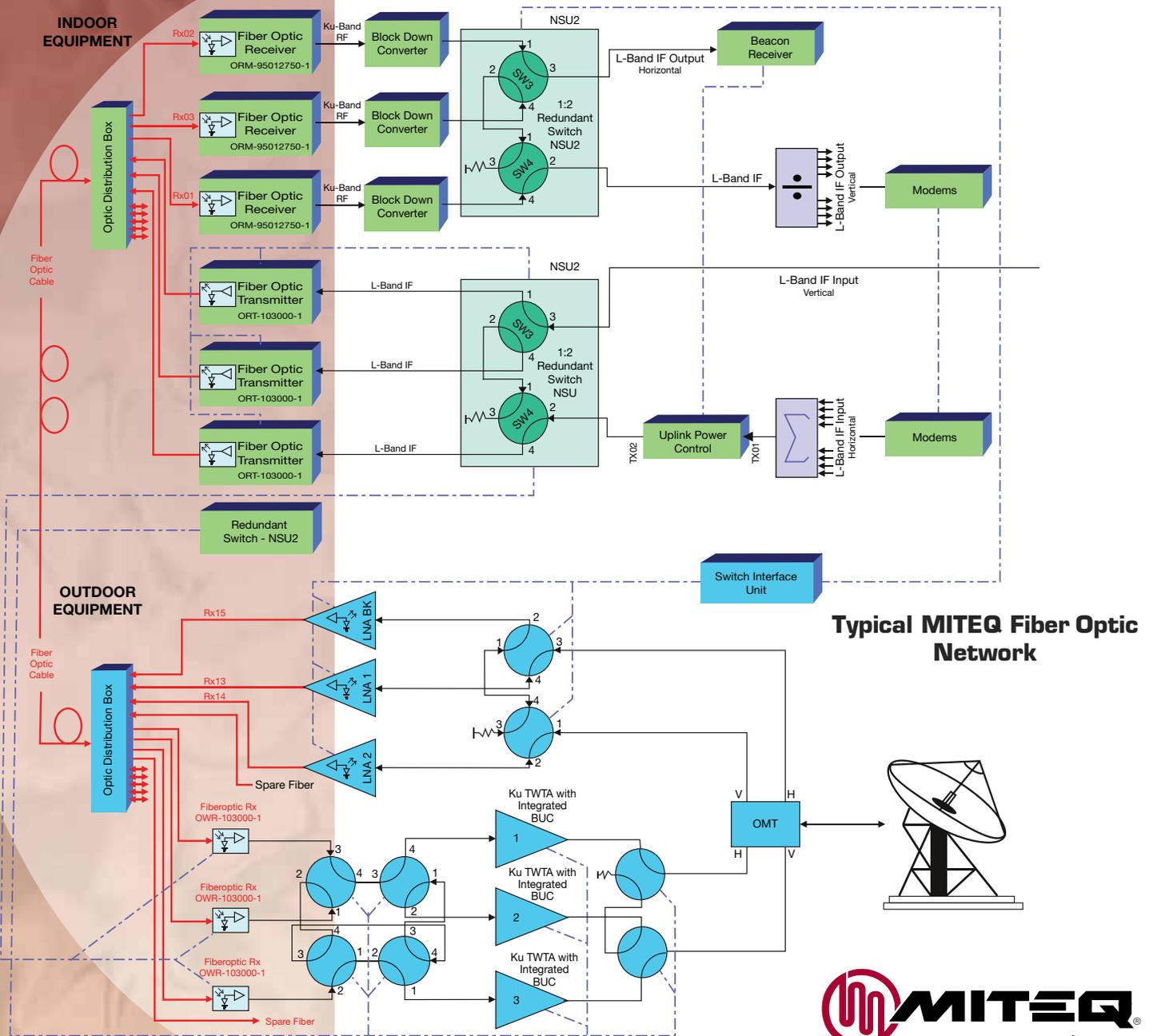
1/3 Rack Size, Fiber Optic Transmit And Receive Configuration

- RF on FO transmitters and receivers covering from 10 MHz to 14.5 GHz
- Redundant FO switchover model provides stand by capability
- Complete RF/FO distribution networks provides integral FO link to BUC
- U.S. Patent #7,510,090



Fiber Optic Transmitter

Fiber Optic Receiver



Typical MITEQ Fiber Optic Network



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COMMUNICATION PRODUCTS

Special & Custom SATCOM Products

- Custom designed SATCOM subassemblies & systems
- Uplink Power Control Systems providing up to 10 transmit channels control
- INMARSAT Products: converters, pilot receivers, translators
- Unique frequency bands & multiple bands from L- to W-band available
- Military & flight qualified converters & transceivers
- Integrated Block Upconverters & Downconverters for use in SSPAs and customer assemblies
- Integrated Fiber Optic Distribution systems with interfaces to all RF equipment
- Superior engineered solutions to customer specifications



Uplink Power Control System

Ultra-Broadband Downconverters

• 0.5 to 40 GHz & 0.5 to 20 GHz

- DC-0.5/20H: 0.5 to 20 GHz
- Adjustable precise 2 Hz minimum step size from .5 to 20 GHz and to 40 GHz with DC20/40H frequency extension module
- Low Phase Noise and Low Intermodulation Distortion
- User-Friendly Local and Remote Control
- Two Simultaneous L- and IF Band Outputs
- 500 MHz minimum L-band instantaneous bandwidth
- Variable Gain, Independently Controlled and High Stability
- Available in both 1RU and 2 RU configurations

- DC-20/40H: 20 to 40 GHz Frequency Extension Module
- Adjustable precise 2 Hz minimum step size over entire band
- Two Simultaneous L- and IF Band Outputs
- Variable Gain, Independently Controlled and High Stability
- Low Phase Noise and Low Intermodulation Distortion
- User-Friendly Local and Remote Control
- Available in Both 1/3 RU and 1 RU configurations
- Additional options available:
 - 8 to 20 GHz downconverter
 - 20 to 26.5 GHz extension module



DC-20/40H
1/3 RU
U.S. Patent #7,510,090



DC-0.5/20H
1 RU



DC-20/40G, 1RU



DC-0.5/20G, 2RU

Ruggedized Outdoor Broadband Downconverter

• 2 to 22 GHz

- 2 to 22 GHz input
- L-band output
- 2 kHz step size, other step sizes available
- Wide IF bandwidth, >1 GHz
- Variable gain
- Low phase noise
- Remote control and monitoring
- Outdoor enclosure



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MITEQ INTEGRATED ASSEMBLIES

MITEQ offers one of the broadest lines of standard catalog items, the bulk of MITEQ's business is in customized components, assemblies, subsystems, systems multifunction assemblies and Integrated Microwave Assemblies designed specifically around the customer's needs. Below are some samples of these products.

SATCOM Element Separator Synthesizer

This SATCOM synthesizer assembly is used by the NASA T.D.R.S ground system.

- SATCOM element separator synthesizer system is comprised of:
 - 10 MITEQ standard VHF fixed block sources
 - Three L-band synthesizers
 - One S-band synthesizer
 - 1 Ku-band synthesizer

The receiver section utilizes MITEQ's Beacon Receiver DSP technology for reference acquisition and tracking.

VME Based Receiver

- S-, C- and X-band dual conversion radar receiver
- Bandwidths up to 1,000 MHz
- Receiver functions:
 - Automatic gain control (AGC) attenuator with analog sampling
 - Channel gain and phase trimmers
 - Peak pulse sampling
 - Three-slot wide VME module
 - Receiver control, BIT and monitoring using VME-64 bus protocol

3-Channel Receiver With Limiter

- RF input frequency: 11 GHz
- IF frequency range: 25 to 50 MHz
- Conversion gain: 28 dB
- Noise figure: 3.3 dB
- Image rejection: 20 dB
- High and low gain selectable

Sub-Harmonic Upconverter And Power Amplifier Module

- RF output range: 36 to 37 GHz
- LO input frequency: 17.5 GHz
- Output 1 dB compression point: +24 dBm
- Conversion gain: 20 dB
- Carrier suppression: 40 dB
- High reliability miniature hermetic MIC construction

Low-Noise Block Converter With Fiber Optic IF Output

- RF input frequency range: 24 to 40 GHz
- IF output frequency range: 2 to 18 GHz
- Instantaneous bandwidth: 16 GHz
- Noise figure: 4 dB typical
- Conversion gain: 50 dB including fiber optic receiver

Switched Output Variable Gain Amplifier

- Frequency range: 11 to 21 GHz
- Output 1 dB compression point: +20 dBm
- Gain: 30 dB
- 4 BIT 15 dB digital gain control
- Four switched selectable outputs
- High reliability miniature hermetic MIC construction

Low-Noise Block Downconverter

- RF input range: 18 to 22 GHz
- Internal LO: 17 GHz
- IF output: 1 to 5 GHz
- Noise figure: 2.9 dB
- Image rejection: 60 dB

SPACEBORNE PRODUCTS

MITEQ has supplied hardware for space-flight missions for over twenty-six years. Our emphasis is predominantly in technically challenging requirements, particularly in the area of:

- Low-noise amplifiers
- High-performance microwave mixers
- Frequency synthesizers
- Oscillators
- Logarithmic amplifiers
- Custom designed assemblies

MITEQ provides a wide spectrum of products and designs by utilizing mature technology delivered on other high-reliability programs.

For additional information, or a list of space programs which MITEQ has supported visit: <http://www.miteq.com/page.php?ID=63&Z=Spaceborne+Products>



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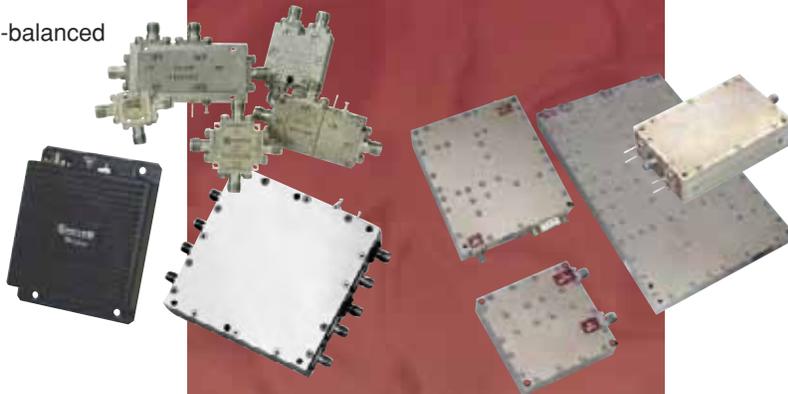
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RF AND MICROWAVE COMPONENTS

Mixers To 60 GHz

- Single-, double-, and triple-balanced
- Image rejection and I/Q
- Single-sideband, BPSK and QPSK modulators
- High dynamic range
- Active and passive frequency multipliers
- Spaceborne mixers
- Low-noise front ends
- Low-noise block downconverters
- Comb generators



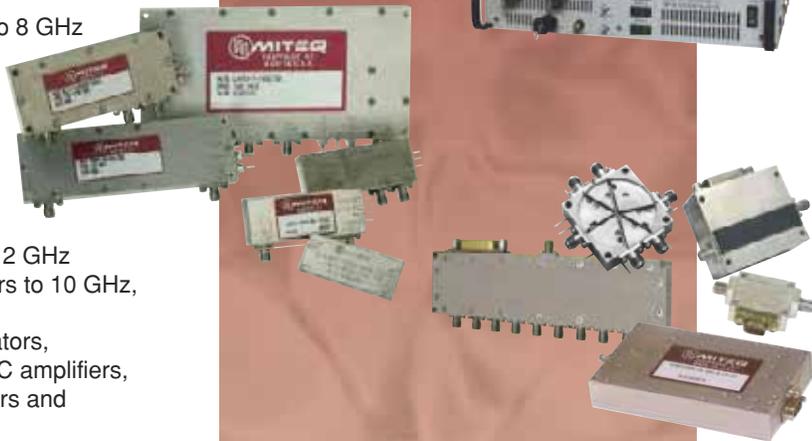
Fiber Optic System Components

- Wideband fiber optic links to 18 GHz
- High gain receivers and transmitters
- Modulator drivers



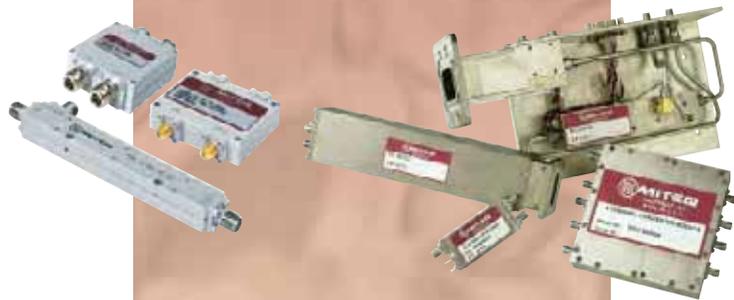
IF And Video Signal Processing

- Logarithmic amplifiers to 8 GHz
- SDLVA and DLVA high speed logarithmic amplifiers
- Digital logarithmic amplifiers
- Constant phase-limiting amplifiers
- AGC/VGC amplifiers to 2 GHz
- Frequency discriminators to 10 GHz, digital discriminators
- High linearity discriminators, low intermodulation AGC amplifiers, communication amplifiers and radar components



Passive Power Components To 2.5 Kilowatts

- Power dividers/combiners
- Directional couplers
- 90 and 180 degree hybrids
- Coaxial terminations
- Custom passive components



Frequency Sources To 60 GHz

- Synthesizers for radar, instrumentation and broadband communications
- Free-running and phase-locked DROs
- Frequency agile phase-locked sources
- Variable frequency phase-locked sources
- Ovenized crystal oscillators
- Spaceborne oscillators and synthesizers

Amplifiers To 75 GHz

- Octave to ultra-broadband
- Power to Ka-band, 20 watts available
- Temperature/slope compensated
- Input protected
- Coaxial, waveguide, surface mount and microstrip
- Pulsed and low-phase noise
- High data-rate (fiber optic) LNAs
- SATCOM LNAs
- Spaceborne
- Custom design

Control Products

- PIN diode and high power switches
- Switch matrices
- Analog and digital PIN attenuators, phase shifters
- Limiters to 100W

Multifunction RF/Microwave Assemblies To 60 GHz

- Remote exciter modules
- Monopulse receivers
- SAR exciter/receiver systems
- Five-channel phase interferometer receiver systems
- Spaceborne components
- Block converters
- Switch filter banks
- Phased array radar subsystems
- RF signal distribution



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