



High Performance Microwave Sources



SPINNAKER
MICROWAVE, INC.

Spinnaker Microwave has combined analog and direct frequency synthesis, frequency conversion and arbitrary wave generation.

Specific market applications of our products include:

- EW, SIGINT, COMINT Jammers, Radar and Other Defense applications
- Air/Sea/Ground-Based Communication Systems
- Telecom Infrastructure
- Test Equipment and Industrial Control

Founded in 1992, Spinnaker Microwave Inc. has established itself as an innovative designer and low cost manufacturer of precision microwave sources including Frequency Synthesizers, Frequency converters, Waveform Generators, Frequency Multipliers, and Custom Microwave Assemblies in the 10 MHz to 40 GHz spectrum. Our products are designed to provide solutions to the most difficult requirements facing today's systems engineers within the defense, telecommunications, industrial, and security electronics markets.

Frequency Synthesizers

SMS Ultra-Compact Octave, Fast Switching Synthesizer to 26 GHz

Spinnaker Microwave's SMS synthesizer offers tremendous bandwidth and frequency capabilities in a rugged, compact housing measuring only 1.9" x 1.9" x 0.45". These units provide octave frequency coverage up to 26 GHz, with step size down to 200 kHz. Standard tuning speed is <math><500\mu\text{s}</math>. Harmonics and spurious are -15 dBc and -60 dBc respectively. A micro D-25 connector allows user option of parallel, serial, or BCD control.

SMS-B Compact Multi-Octave, Fast Switching Synthesizer to 40 GHz

The SMS-B synthesizer was designed to provide systems engineers a reliable, fast tuning, multi-octave microwave source with the smallest possible footprint (2.96" x 3.05" x 0.74") and lightest weight. It covers the entire 1-20 GHz frequency range with option up to 40 GHz. Standard units have a single SMA output. Standard tuning speed is <math><250\mu\text{s}</math>. Harmonics and spurious are -15 dBc and -60 dBc respectively. The design utilizes the latest MMIC components including VCO's, Multipliers, and Amplifiers to shrink size, eliminate hand tuning, and minimize parts count.

SMS-D Low Phase Noise, Multi-Octave, Fast Switching Synthesizer to 40 GHz

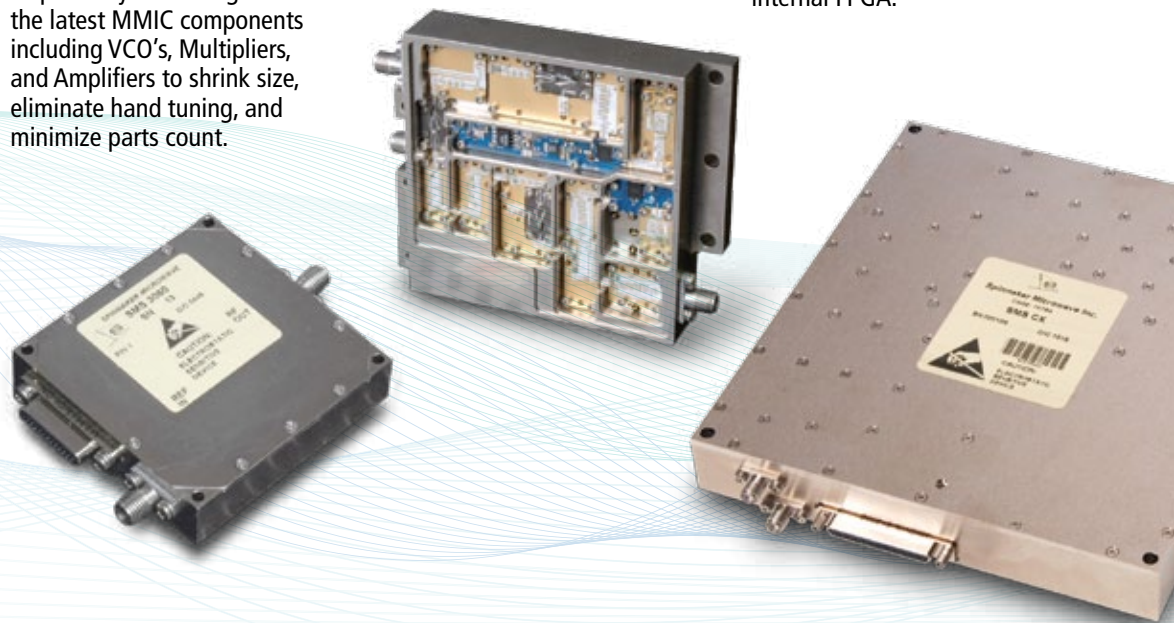
The SMS-D synthesizer is a miniature 'multi-loop' microwave source designed to offer the best phase noise (-110 dBc/Hz, 10 kHz offset @ 12 GHz) and switching speed (<math><50\mu\text{s}</math>). By using a 'double-then-mix-down' topology, the overall PLL 'N' count is kept below 40 for frequencies up through 13 GHz without sacrificing frequency resolution. Careful selection of frequency plan yields spurious performance of better than -70 dBc.

The SMS-DA Ultra-Fast, Multi-Octave Synthesizer with DDS Capability to 40 GHz

The SMS-DA Direct Frequency Synthesizer offers sub 500 ns tuning speed, multi-octave bandwidth, and a small footprint for the most demanding Radar and EW applications. Frequency translators and multipliers then expand the base signal to cover the spectrum required by the customer. A Direct Digital Synthesizer (DDS) provides fine frequency resolution, and can be 'phase corrected' to provide phase coherent operation over some bands. Programming complexity is minimized by an internal FPGA.

Synthesizer Features

- .01 - 40 GHz Frequency Coverage
- Switching Speed to <math><500\text{ ns}</math>
- Output Power up to +30 dBm
- Fundamental, Divided, Multiplied Outputs
- Compact Design
- Military and Commercial Applications
- Extended Operating Temperature: -55°C to +100°
- Internal reference, with a customer defined external reference option.



Arbitrary Waveform/Direct Digital Synthesis Modules

Spinnaker Microwave's new line of Digital Signal Generation Products are made to take advantage of new high speed Digital-to-Analog (DAC) IC's to provide RF signals with unmatched speed and modulation capabilities. With seamless integration to high performance FPGA's, these products give systems designers the ultimate flexibility in RF signal generation. These modular, flexible and expandable architectures are the perfect core for Radar, Simulation, and DRFM requirements.

- 100MHz to 26 GHz RF Outputs
- Sampled signals at up to 4 GSPS
- Up to 8 Mbits user configurable waveform memory
- Multi-Octave Bandwidths
- Down to 50 ns Tuning Speed
- Low Phase Noise
- Integrated Frequency Conversion Plans

Frequency Converters/Receivers

Spinnaker Microwave provides custom designed RF Front ends for Microwave Tuners and Receivers. Our high performance units provide small package size, fast LO tuning, and superior dynamic range, with built in RF and IF attenuators, internal/external selectable reference, and selectable IF bandwidths. Our modular designs can be easily modified for your specific requirements. Many configurations and frequency bands can incorporate the same proven architectures.

- 0.1 to 40GHz RF Inputs
- Selectable IF's with up to 2 GHz Output Bandwidth
- Preselect Filtering, IF digital Attenuation
- Lowest Noise Figures, Highest Dynamic Ranges
- Sub 1 μ s LO Tuning
- Low Integrated Phase Noise
- Multi-channel Configurations

Broadband Converters/Exciters

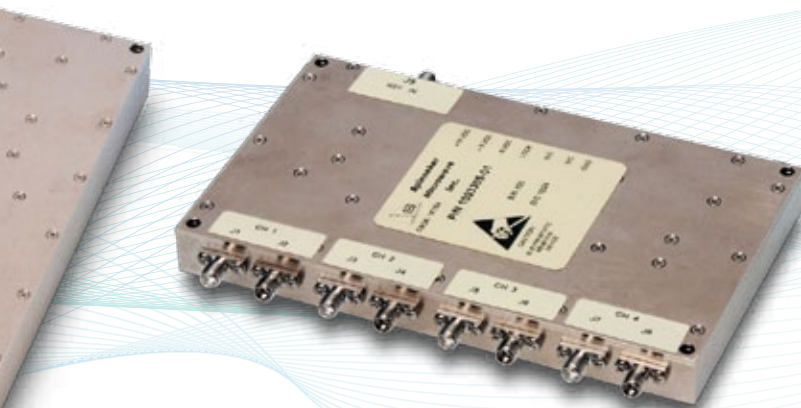
Spinnaker Microwave's SMS-ACX RF Converter/Exciter is capable of up-converting an IF signal with arbitrary phase, frequency, and amplitude and quickly placing it at an output frequency ranging from 10 MHz to 14 GHz. The IF signal can have up to 1 GHz of modulation bandwidth that can be generated internally via a DDS / DAC or externally received. The SMS-ACX RF Converter/Exciter provides complex arbitrary waveforms or linear FM chirp signals for DRFM, test instrumentation, or module embedded applications.

- 10 MHz – 40 GHz Output Frequency
- Up to 1 GHz Modulation Bandwidth
- Down to 1 Hz Step Size
- Fast 100 μ s Switching Speed
- Low Phase Noise Option: -110 dBc/Hz @ 10 kHz offset
- Compact Size: 4.70" x 4.65" x 1.68"

Frequency Multiplier Assemblies

Spinnaker Microwave Frequency Multiplier Products generate microwave frequencies on up to 4 outputs based on multiplying an internal / external reference signal in the VHF range. This unit is used to increase the frequency characteristic of a high performance OXCO between 50 MHz and 500 MHz with minimal phase noise and spurious degradation. A rugged machined housing ensures compliance to most MIL-STD testing/screening procedures.

- 100 MHz up to 26 GHz RF Output
- Multiple Output Configurations
- Internal or External Reference OXCO's
- Internal 'Low Noise' Voltage Regulation
- Fast Multi-Channel Output Switching, < 25 ns
- Lowest Phase Noise, 20 log N +3 dB
- Compact, Rugged Housings



Voltage Control Oscillators (VCOs):

With over 25-years of design experience, Spinnaker Microwave has established itself as the industry leader in hybrid VCO design. Covering 1.0 to 20 GHz frequency range, we offer VCOs in both the industry-standard surface-mount TO-8 package and a hermetically sealed, connectorized packages. Spinnaker Microwave offers design engineers signal sources with unmatched bandwidths, phase noise, tuning linearity and post tuning drift performance. Buffered outputs and hermetic seal are standard on most units.

- 1.0 to 20.0 GHz Frequency Coverage
- Octave Bandwidths
- Output Power up to +18.0 dBm
- Low Tune Voltage Range
- Excellent Tuning Linearity
- Low Post Tuning Drift
- Extended Operating Temperature: -55°C to +100°C
- Custom Packaging Available

Special/Custom Assemblies:

For over 15 years, Spinnaker Microwave has been assisting system engineers develop and manufacture custom microwave modules from 100 MHz to over 40 GHz. Our existing library of proven designs allows us to create fast prototypes and thus shorter design cycles. Take advantage of Spinnaker Microwave's technical knowledge and manufacturing experience to aide in the development of your next program.

- Frequency Converters with Integrated LOs
- Custom Frequency Synthesizers and VCO's
- Hybrid and MMIC Based Switch Arrays
- Mixed Signal Control Devices
- Filter-Amplifier Modules
- VME-type and 19" Rack Mount Subassemblies



Spinnaker Microwave's Strength You Can Count On

At Spinnaker Microwave, our specialty is working with customers who have unique requirements that are not addressed by off the shelf signal source devices. Through years of experience, our engineering staff has developed an uncommon sense of technical understanding and working with the concerns of the customer to produce custom designs that meet specific program requirements..

All products available can be designed, manufactured and screened based on appropriate military standards, including MIL-STD-883 and MIL-PERF-38534. Spinnaker Microwave's hybrid manufacturing facility uses the latest MMIC die components to achieve the best possible performance in the smallest possible package; this capability combined with in-house automated test systems gives Spinnaker Microwave complete control over the final product.

- Continuous innovation using the state of the art components
- Experienced engineering staff working one-on-one with our customers
- Short Engineering design cycles to minimize time to Production
- Low Overhead = Low Product Development Costs
- Design philosophy to support ease of manufacturing
- Strong relationships with local manufacturing and testing facilities for high-volume production
- Designed, manufactured and tested in the U.S.A.
- ISO9001:2000 Certified

At Spinnaker Microwave, our products are designed with one thing in mind - your specifications. We pride ourselves on delivering quality signal sources custom tailored to your unique application.

Contact Spinnaker Microwave today for the high performance microwave sources you can count on.



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