Universal Coherent Modulator Sub-Assembly

G.T. MICROWAVE, INC.
The Leading Edge in Technology
Universal Coherent Modulator Sub-Assembly

Applications:
- PDOA, TDOA and ADOA
- Simulation Applications
- Microwave/Digital Communications
- Phase Array Antenna Calibrations

Capabilities:
- 360° and 120 dB Dynamic Range
- Up to .5 Watt Output Power
- Capabilities up to 16 Bit Resolution
- Custom Variations
- Frequency Ranges From 400 MHz to 24 GHz
- Desktop Simulation Compatibility
- Back Plane Mountable
- ISO 9001: 2000 Quality Management System

This Universal Coherent Modulator Sub-Assembly has state-of-the-art technology, cutting edge engineering and the latest manufacturing procedures to provide the high level of sophistication needed in military ECM applications that require coverage from 2-18 GHz. The Model SA-69-BD’s modularity provides each user with exactly what they need for their particular application.

There is nothing in the marketplace that even comes close to providing the control of signal phase and amplitude that this unit does... truly eons ahead of competition.

Other Products:
- Switches
- Attenuators
- Phase Shifters
- Vector Modulators
- Custom Sub-Assemblies
Harness the Power...

UCMS SCHEMATIC

www.gtmicrowave.com
ELECTRICAL SPECIFICATIONS

Universal Coherent Modulator Sub-Assembly

Part Number: SA-69-XX
Frequency Range: 2.0 – 18.0 GHz
Input Power: +20 dB Max
Overall Gain: +22 dB Max
Amp. Flatness vs Freq.: ±4.0 dBm @ Insertion Loss
Output 1 dB Compression: +14 dBm Min
Video Filtering: 5 m V Max @ 100 MHz BW
Harmonics: -60 dBc Min @ +14 dBm output
AM Sidebands: -65 dBc to 50 MHz without analog I&Q control
Noise Figure: 17 dB Typ
V.S.W.R.: 2.1:1 Max
Operating Temp. Range: Maintain @ constant +45 deg C
Storage Temp. Range: 0 to +70 deg C

I & Q Vector Modulator Specifications:

Dynamic Range: 15 dB Min
Resolution & Accuracy @ any CW Frequency: 0.10 Degree & 0.06 dB
Isolation: 19 dB Min
Phase Flatness vs. Frequency: ±22 degrees
Amplitude Variation vs Phase Shift:
Digital Control Logic: 2x, 12 BITS (I & Q), TTL Compatible
Control Input Slope: Linear with output voltage
Switching Speed: 500 nSec Max
Analog Control: 2x (I & Q), -1 to +1 VDC Typ
Control Input Slope: Non – Linear
Switching Speed: 50 nSec Max

Attenuator Specifications:

Dynamic Range: 105 dB Min
Resolution & Accuracy @ any CW Frequency: 0.03 dB
Attenuation Flatness Vs Frequency: ±4.5 dB to 60 dB
Control Logic: 12 BITS, TTL Compatible
Switching Speed: 1.0 uSec Max

Absorptive Pulse Modulator Specifications:

Isolation: 80 dB Min
Control Logic: TTL Compatible
Switching Speed: 10 nSec RF, 10nSec TTL Delay
25 nSec Total Max

4 Band Switch Filter Bank Specifications:

(1) Pass Band: 2.0 – 3.5 GHz
Rejection: 55 dB from 4.0 – 7.0 GHz
40 dB from 7.0 – 18.0 GHz
24 dB/octave on low end skirt

(2) Pass Band: 3.5 – 6.0 GHz
Rejection: 55 dB from 7.0 – 12.0 GHz
40 dB from 12.0 – 18.0 GHz
24 dB/octave on low end skirt

(3) Pass Band: 6.0 – 10.4 GHz
Rejection: 55 dB from 12.0 – 18.0 GHz
24 dB/octave on low end skirt

(4) Pass Band: 10.4 – 18 GHz
Rejection: 24 dB/octave on low end skirt
45 dB @ 7.4 GHz

Guard Band: 25 MHz
Input Switch: SP4T, Reflective
Isolation: 60 dB Min
Output Switch: SP5T, Reflective with terminated park state
Isolation: 20 dB Min
Switching Speed: 300 nSec Max
Control Logic: 5 Bits TTL Compatible

Temperature Compensation:
The unit shall be temperature compensated such that for a fixed input power level, the variation of output power as a function of temperature shall be less than ±0.05 dB/degrees C. The unit shall also be compensated such that the variation of phase as a function of temperature shall be less than ±0.2 degrees/degrees C, differentially measured between units.
Universal Modulator
Spans 2 To 18 GHz

This compact assembly blends switches, bandpass filters, a digital attenuator, and a digitally controlled I/Q modulator for accurate control of signal phase and amplitude.

Vector modulators provide the control of signal phase and amplitude needed for information transfer in complex communications systems. For wideband military applications requiring full coverage of the 2-to-18-GHz range, there may be no better vector-modulator solution than the model SA-69-BD universal coherent modulator subassembly from G.T. Microwave, Inc. (Randolph, NJ). It combines several stages of amplification, a high-speed vector modulator, wide-dynamic-range attenuation, and a digitally controlled switched-filter bank to provide modulated signals from 2 to 18 GHz with good amplitude and phase accuracy.

The model SA-69-BD universal coherent modulator subassembly accepts maximum input levels to +20 dBm. Signals are processed through an I/Q vector modulator with separate 12-b digital control of phase and amplitude. The phase flatness versus frequency (from 2 to 18 GHz) is at least ±0.2 deg., while the amplitude flatness versus frequency is at least ±3.5 dB. The modulator achieves at least 18-dB isolation between ports and boasts 500-ns switching speed.

From the vector modulator, signals are amplified and then passed through a wideband 2-to-18-GHz attenuator with 80-dB dynamic range and 0.08-dB attenuation resolution. The 10-b digital attenuator, which also features 500-ns switching speed, achieves ±4.5-dB attenuation flatness across the full frequency range. Output signals from the attenuator are amplified and then switched among four bandpass filters. The filters pass bands of 2.0 to 3.5 GHz, 3.5 to 6.0 GHz, 6.0 to 10.4 GHz, and 10.4 to 18.0 GHz with out-of-band rejection as good as 55 dB. A switch at the output of the filters selects the band of interest. The switching speed for the input switch is 200 ns, while the switching speed for the output switch is 300 ns, or a worst-case total of 500 ns.

Overall, the modulator assembly offers ±20-deg. phase flatness versus frequency. It features 22-dB gain from 2 to 18 GHz with +14-dBm minimum output power at 1-dB compression. AM sidebands are down -65 dBc to the megahertz of a signal, while overall amplitude flatness is ±3.5 dB. Harmonics are -60 dBc and the overall assembly noise figure is 14 dB. The TTL-compatible SA-69-BD measures 4.25 × 9.0 × 2.0 in. (10.80 × 22.86 × 5.08 cm) with SMA female connectors. G.T. Microwave, Inc., 2 Emery Ave., Randolph, NJ 07869; (973) 361-5700, FAX: (973) 361-5722, e-mail: gtmicrowav@aol.com, Internet: www.GTmicrowave.com.

Send For Our New Catalog
2 Emery Avenue Randolph, NJ 07869 USA
973-361-5700 Fax: 973-361-5722
www.gtmicrowave.com e-mail: gtmicrowav@aol.com