Universal Microwave Components Corporation

- Power Dividers / Combiners
- Directional Couplers
- Hybrid Couplers (90°/180°)
- Pin-Diode Switches
- Pin-Diode Attenuators
- Bias-Tees / DC-Blocks
- Other Custom Made Products

WWW.UMCC111.COM

(2011/2012)
About UMCC

Company:
UMCC is a designer and manufacturer of high performance RF/Microwave components and subsystems. Since its founding almost two decades ago, the company has established and followed a tradition of excellence supplying reliable high quality products into a wide range of industries such as wireless and satellite communications, medical science, surveillance, security, industrial automation, military/defense sector products, space exploration, aviation, biometrics, broadcasting, and similar. UMCC is a privately owned company located in Northern Virginia USA.

Technical / Design Capabilities:
UMCC is a technically-oriented company with specialized engineering capabilities in RF/Microwave hardware design and development. Our team of engineers and technicians have years of hands-on experience in product development. Computer aided design tools are widely applied in different stages of product-design, development, and manufacturing.

Product design starts with an engineering concept to meet a specific product specification. RF/Microwave circuitry is designed along with preliminary engineering calculations. Electrical circuitry and layout is modeled on a computer simulator. The computer model includes real-world physical parameters where tolerances, parts limitations, and manufacturing yields are accounted for. Touchstone simulator is among the software tools frequently used for analysis and optimization of such circuits by our engineers. After each circuit model is fully optimized, a circuit layout is generated along with a mechanical package to house the circuit elements such as connectors, feeds, substrate/PCB, and other parts. Mechanical package design is done with AutoCAD software. Ultimately, a preliminary test prototype is developed and tested. Upon success of the prototype a complete set of documentation is generated. The documentation package includes parts lists, schematics, assembly drawings, CNC machining programs, manufacturing instructions, testing/tuning procedures, test data sheets, outline drawings, marking instructions, etc.

Marketing / Customer Service:
UMCC’s marketing is supported directly by engineers with a complete understanding of our products, associated applications, and design limitations. Our engineers are ready to discuss any technical matter relating to products supported by UMCC. Once technical parameters are discussed and agreed upon, quotations are submitted to the customer for consideration. UMCC is also represented by technical sales representatives covering different territories and many countries around the globe. To find the UMCC representative closest to you, please visit our web site for current listings of UMCC distributors and representatives.
**Production / Process Control:**
Hardware production takes place under complete quality and process control. Each production step from preparing the bill of materials to assembly, testing, screening, and shipping is constantly monitored to assure the consistency, quality, and performance of the products manufactured. Individual units are serialized and fully tested for performance prior to shipment to the customer. Test data and certificates of compliance are provided to the customer at no additional cost. Standard UMCC products are built to the best commercial grade. UMCC guarantees its products to meet and exceed many environmental extremes such as high/low temperature, altitude, vibration, and others. All products offered by UMCC are subjected to routine steps in screening such as temperature shock cycles and 3-axis vibration testing to assure product reliability.

**Warranty / Product Support:**
UMCC warrants its products to be free from defects in material and workmanship. The standard warranty is one year from date of shipment. Any component found to be defective will be repaired or replaced free of charge during this warranty period. Technical support is available from UMCC engineers and product specialists for the entire life span of each and every product. UMCC also maintains an archive of final test data taken on each unit shipped to the customer.

**Here is a summery of UMCC's capabilities:**
- In house product design & development
- Fast custom built prototype development
- In house mechanical design and machining
- In house PCB and microwave circuit etching
- Complete in house assembly and integration
- In house RF/Microwave testing and tuning

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UMCC offers a wide selection of Dividers/Combiners covering frequencies from DC to 20GHz. These dividers are built from narrow bands of one octave to bandwidths as wide as multi decades. Dividers are built for low signals to high powers, 2-way split to N-ways, and many other custom made options to fit your application. Units are available with standard SMA (female) connectors. Other type connectors such as “N” or “BNC” types are offered on limited number of low frequency models.

UMCC’s low frequency dividers (10KHz to about 1GHz range) are of lumped-element construction, where ferrite elements are used in divider circuitry. UMCC’s low frequency dividers do cover a wide frequency band of two to three decades.

UMCC’s high frequency dividers (0.4 to 20GHz range) are of distributed-element construction. Micro-strip transmission lines are etched monolithically on a Teflon base substrate providing impedance transformation and power division or summation functions possible. UMCC’s high frequency dividers are offered from narrow bands of one octave to multi octave bandwidths.

UMCC offers a wide selection of Dividers/Combiners covering frequencies from DC to 20GHz. These dividers are built from narrow bands of one octave to bandwidths as wide as multi decades. Dividers are built for low signals to high powers, 2-way split to N-ways, and many other custom made options to fit your application. Units are available with standard SMA (female) connectors. Other type connectors such as “N” or “BNC” types are offered on limited number of low frequency models.

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UMCC offers a limited series of semi lumped-element dividers covering the frequency range of 20MHz to 3GHz in one band. These series cover a wide frequency bandwidth of two to nearly three decades. Their construction is a combination of lumped-element ferrite components with distributed-element transmission lines.

“Here is a typical specification for a wide band 8-Way Divider/Combiner”

> Model No. ......................... PS-3000-8S
> Operating Frequency:........... 20-3000 MHz
> Insertion Loss: .................... 4.4 dB Max
> Amplitude Balance: ............ ± 0.5 dB Max
> Phase Balance: .................... ± 5º Max
> VSWR: ................................. 1.5:1 Max
> Isolation: ............................ 18 dB Min
> Power Handling: ................. 2W Avg/Cw
> Connectors: ......................... SMA (female)
> Impedance: .......................... 50 Ohms Nominal
> Operating Temperature: ....... -55 ºC to +95 ºC
> Weight: ............................... 5.8oz [164g]
> Grade: ................................. Best Commercial

“Here is a typical specification for a wide band 3-Way Divider/Combiner”

> Model No. ......................... PD-S000-3S
> Operating Frequency:........... 2-18 GHz
> Insertion Loss: .................... 1.9 dB Max
> Amplitude Balance: ............ ± 0.5 dB Max
> Phase Balance: .................... ± 7º Max
> VSWR: ................................. 1.8:1 Max
> Isolation: ............................ 17 dB Min
> Power Handling: ................. 1W Avg/Cw
> Connectors: ......................... SMA (female), Removable
> Impedance: .......................... 50 Ohms Nominal
> Operating Temperature: ....... -55 ºC to +95 ºC
> Weight: ............................... 1.25oz [35.4g]
> Grade: ................................. Best Commercial

Visit UMCC’s web site for complete product information on all Power Divider Series.
UMCC offers a wide selection of unidirectional and bi-directional couplers covering frequencies from 10KHz to 18GHz. These couplers are available from narrow bands to multi decade bandwidths with all coupling levels of 6dB, 10dB, 16dB, 20dB, and 30dB. Units are available with standard SMA (female) connectors. Other type connectors such as “N” or “BNC” types are offered on limited number of low frequency models.

UMCC’s low frequency dividers (10KHz to about 1GHz) are of lumped-element construction, where ferrite elements are used in coupler circuitry. UMCC’s low frequency couplers do cover a wide frequency band of two to three decades.

UMCC’s high frequency couplers (0.5 to 18GHz) are of distributed-element construction. Strip-line transmission lines are etched monolithically on a Teflon base substrate creating impedance transformation and the coupling function. UMCC’s high frequency couplers are offered from narrow bands of one octave to multi octave bandwidths.
UMCC offers a limited series of semi lumped-element couplers covering the frequency range of 20MHz to 2GHz. These series cover a wide frequency bandwidth of two to nearly three decades. Their construction is a combination of lumped-element ferrite components with distributed element transmission lines.

“Here is a typical specification for a wide band **Directional Coupler**”

> Model No. ......................... DC-N000-16S  
> Operating Frequency:............. 6 – 18 GHz  
> Coupling: .......................... 16 ± 1 dB Nominal  
> Coupling Flatness:............... ± 0.75 dB Max  
> Insertion Loss (Total):......... 0.75 dB Max  
> Directivity: ....................... 12 dB Min  
> VSWR: ................................ 1.45:1 Max  
> Power Handling: ................... 30W Cw/Avg, 0.5Kw Peak  
> Connectors: ....................... SMA (female)  
> Impedance: ....................... 50 Ohms Nominal  
> Operating Temperature: ........ -40ºC to +85ºC  
> Weight: .......................... 0.9 oz [25.5 g]  
> Grade: ............................. Best Commercial

“Here is a typical specification for a low frequency wide band **Bi-Directional Coupler**”

> Model No. ......................... BC-003A-20B  
> Operating Frequency:............. 10 KHz – 30 MHz  
> Coupling: .......................... 20 ± 1 dB Nominal  
> Coupling Flatness:............... ± 0.5 dB Max  
> Insertion Loss (Total):......... 2.5 dB Max  
> Directivity: ....................... 20 dB Min  
> VSWR: ................................ 1.15:1 Max  
> Power Handling: ................... 2W Cw/Peak  
> Connectors: ....................... BNC (female)  
> Impedance: ....................... 50 Ohms Nominal  
> Operating Temperature: ........ -40ºC to +85ºC  
> Weight: .......................... 3.2 oz [90.7 g]  
> Grade: ............................. Best Commercial

Visit UMCC’s web site for complete product information on all Coupler series.
Features:

♦ 90° Quadrature / 180° Magic Tee
♦ Frequencies from 30KHz to 18GHz
♦ Excellent phase tracking
♦ Narrow bands to multi octave bands
♦ Lumped Element, or Strip-line Design
♦ Low loss, Low VSWR, High Isolation
♦ Rugged, compact packages

UMCC offers a selection of 90° phase and 180° phase hybrid couplers. These hybrids are available from narrow bands of one octave to multi decade frequency bands from 30KHz to 18GHz. Units are available with standard SMA(female) connectors. Other type connectors such as “N” or “BNC” types are offered on limited number of low frequency models.

UMCC’s low frequency 180° phase hybrids are of lumped-element construction, where ferrite elements and impedance transformers are used in coupler circuitry. UMCC’s low frequency hybrids cover a wide band of two to three decades from 30KHz to 500MHz Range.

UMCC’s high frequency hybrids are of distributed element construction. Strip-line transmission lines are etched monolithically on a Teflon base substrate creating impedance transformation and the coupling function. UMCC’s high frequency hybrids are offered in one octave or two octave bands from 330MHz to 18GHz.
Hybrid Couplers

“Here is a typical specification for a wide band 90° Hybrid Coupler”

> Model No. .................................. HC-K000-QS
> Operating Frequency: ............... 1 – 4 GHz
> Coupling (total): ...................... 3.2 ± 0.6 dB Max
> Frequency Flatness: .................. ± 0.6 dB Max
> Isolation: ............................... 22 dB Min
> VSWR: ................................. 1.25:1 Max
> Phase Error: ........................... ±5° Max
> Power Handling: ...................... 50W Cw/Avg, 3KW Peak
> Connectors: ........................... SMA (female)
> Impedance: ............................. 50 Ohms Nominal
> Operating Temperature: .......... -55°C to +95°C
> Weight: ............................... 2.0 oz [56.7 g]
> Grade: ................................. Best Commercial

“Here is a typical specification for an octave band 180° Hybrid Coupler”

> Model No. ............................... HC-CD00-MS
> Operating Frequency: ............... 1.5 – 3 GHz
> Coupling (total): ...................... 3.4 ± 0.6 dB Max
> Frequency Flatness: .................. ± 0.5 dB Max
> Isolation: ............................... 22 dB Min
> VSWR: ................................. 1.3:1 Max
> Phase Error: ........................... ±9° Max
> Power Handling: ...................... 50W Cw/Avg, 3KW Peak
> Connectors: ........................... SMA (female)
> Impedance: ............................. 50 Ohms Nominal
> Operating Temperature: .......... -55°C to +95°C
> Weight: ............................... 2.8 oz [79.4 g]
> Grade: ................................. Best Commercial

Visit UMCC’s web site for complete product information on all 90° / 180° Hybrid Coupler series.
UMCC offers a wide selection of PIN-Diode switches covering frequencies from 10MHz to 20GHz. UMCC offers these switches in reflective or absorptive configurations. All standard switches are equipped with a high-speed TTL driver. Switches are energized by a pair of positive/negative supply voltages. UMCC’s standard switches are designed for wide frequency bandwidths to work for a range of applications. Units are available with standard SMA (female) connectors.

UMCC switches are available with a variety of options to satisfy many applications. Few of these options are:

- Supply voltages from 5V to 15V on each supply line
- SMA (male) RF connectors
- SMC or SMB connectors for control
- Inverse, toggle, or binary control options
- Internal 50Ω driver control impedance
- Video Suppression Filters on RF lines
- Others
UMCC offers a limited number of High-Power PIN-Diode switches with power levels ranging to about 40W Cw/Avg. These High-Power switches are offered from 50MHz to about 10GHz in narrow octave bands and wider bandwidths.

“Here is a typical specification for a small signal SP16T Absorptive PIN-Diode Switch”

- Model No. ......................... SR-L010-16S
- Operating Frequency:........... 2 – 12.4 GHz
- Insertion Loss: .................... 4.7 dB Max
- Isolation:......................... 55 dB Min
- VSWR (On/Off):............... 1.8:1 Max
- Rise/Fall Time:................... 30 ns Max
- ON/OFF Time:.................... 100 ns Max
- Control Characteristic:........... TTL, One Unit Load
- Operating Power:................ +27 dBm Cw/Avg Max
- Supply Voltage:.................. +5 / -12 Volts
- Control Logic:................. 16 Independent Controls
- Operating Temperature: ........ -55ºC to +95ºC
- Impedance:...................... 50 Ohms Nominal
- ON/OFF Time:.................... 100 ns Max
- Connectors (Supply/Control): : Solder Pins
- Weight: ................................ 9 oz [255 g]
- Grade:.............................. Best Commercial

Visit UMCC’s web site for complete product information on all PIN-Diode Switches.
UMCC offers a wide selection of PIN-Diode variable attenuators covering frequencies from 10MHz to 18GHz. Standard UMCC attenuators are equipped with a linearizer-driver circuitry for attenuation control setting. Control signal is via a voltage or a digital word. Limited number of UMCC attenuators is available without a driver circuitry for direct current controlling.

Linearized attenuators do come with an advance electronic Control circuitry. Controlling circuit has features such as temperature compensation circuitry, onboard supply voltage regulation, and reverse voltage protection circuitry. Linearized attenuators can be custom built with a variety of controlling options. Options such as shallower or steeper attenuation slope functions, a reverse slope attenuation function, or higher/lower attenuation step resolutions are among few options available on these attenuators.
UMCC also offers a limited series of Switched-Bit attenuators for applications where fast speed of attenuation setting time is a critical parameter. These series of Switched-Bit attenuators are available on special order.

“Here is a typical specification for an Octave Band Voltage Controlled PIN-Diode Attenuator”

- Model No. AT-Q000-HV
- Operating Frequency: 6 – 12 GHz
- Insertion Loss (0dB Ref.): 2.5 dB Max
- Attenuation Range: 0 - 60 dB Nominal
- Attenuation Flatness: 0.8 dB Peak-Peak (up to 10 dB)
  1.8 dB Peak-Peak (up to 20 dB)
  3.0 dB Peak-Peak (up to 50 dB)
  3.4 dB Peak-Peak (up to 60 dB)
- VSWR (all settings): 1.6:1 Max
- Control Function: 0-6 V, 10dB/Volt
- Transfer Function Accuracy: ±50% Max (0 – 0.8 dB)
  ±0.4 dB Max (0.8 – 10 dB)
  ±0.5 dB Max (10 – 30 dB)
  ±0.9 dB Max (30 – 50 dB)
  ±1.2 dB Max (50 – 60 dB)
- Settling Time: 500 ns Max, (5μs<PW<0.1s)
- Temperature Coefficient: ±0.025 dB/°C Max
- Power Supply: ±12V to ±15V
- Operating Temperature: -40°C to +85°C
- Impedance: 50 Ohms Nominal

“Here is a typical specification for an Octave Band Digital Controlled PIN-Diode Attenuator”

- Model No. AT-H000-HD
- Operating Frequency: 3 – 6 GHz
- Insertion Loss (0dB Ref.): 1.8 dB Max
- Attenuation Range: 0 - 60 dB Nominal
- Attenuation Flatness: 0.6 dB Peak-Peak (up to 10 dB)
  1.6 dB Peak-Peak (up to 20 dB)
  2.6 dB Peak-Peak (up to 40 dB)
  3.0 dB Peak-Peak (up to 50 dB)
  3.6 dB Peak-Peak (up to 60 dB)
- VSWR (all settings): 1.6:1 Max
- Control Function: 8 Bit Positive Binary TTL
- Transfer Function Accuracy: ±50% Max (0 – 0.8 dB)
  ±0.4 dB Max (0.8 – 10 dB)
  ±0.5 dB Max (10 – 30 dB)
  ±0.9 dB Max (30 – 50 dB)
  ±1.2 dB Max (50 – 60 dB)
- Settling Time: 500 ns Max, (5μs<PW<0.1s)
- Temperature Coefficient: ±0.025 dB/°C Max
- Power Supply: ±12V to ±15V
- Operating Temperature: -40°C to +85°C
- Impedance: 50 Ohms Nominal

Visit UMCC’s web site for complete product information on all PIN-Diode Attenuators.
Features:

♦ Wide selection
♦ Frequencies from 10KHz to 20GHz
♦ Wide RF Frequency Bandwidth
♦ Micro-Strip, or Suspended Substrate Design
♦ Wide Bias Frequency Bandwidth
♦ Low Loss, Low VSWR
♦ Rugged, Compact Packages

UMCC offers a selection of Bias-Tees and DC-Blocks covering frequencies from 10KHz to 20GHz. These products are available with standard SMA or N type connectors.

UMCC’s Bias-Tees and DC-Blocks are designed for a wide band frequency operation to fit many diverse applications. High frequency Bias-Tees and DC-Blocks are built on a suspended substrate to minimize the insertion loss of the RF signal path as best as possible. This is achieved by monolithically etching the series capacitor directly on the main RF signal substrate without any line discontinuity.

UMCC offers a limited number of Bias-Tees and DC-Blocks for high Bias current and high DC blocking voltage applications.
"Here is a typical specification for a wide band Bias-Tee”

> Model No. ......................... BT-5000-MS
> Operating Frequency: ........ 10 MHz – 5 GHz
> Insertion Loss: .................... 0.7 dB Max
> Isolation DC to RF: ......... 40dB Min
> VSWR: .............................. 1.3:1 Max
> RF Power: ......................... 5W Cw/Avg
> Bias Voltage: ...................... 50 V Max
> Bias Current: ...................... 500 mA Max
> Bias DC Resistance: ........... 1Ω Max
> Bias Frequency Bandwidth: .... DC – 3 MHz
> RF & RF+DC Connectors: ..... SMA (female)
> Bias Connector: ................. Solder Pins
> Impedance: ....................... 50 Ohms Nominal
> Operating Temperature: ....... -55ºC to +95ºC
> Grade: ............................... Best Commercial

"Here is a typical specification for a wide band DC-Block”

> Model No. ......................... DB-5000-S
> Operating Frequency: ........ 10 MHz – 5 GHz
> Insertion Loss: .................... 0.25 dB Max
> VSWR: .............................. 1.25:1 Max
> .......................................................... (1.5:1 Max Over 10-20MHz)
> RF Power: ......................... 15W Cw/Avg
> Blocked Voltage: ............... 50 V Max
> RF Connectors: ..................... SMA (female) / SMA (male)
> Impedance: .......................... 50 Ohms Nominal
> Operating Temperature: ....... -55ºC to +95ºC
> Grade: ............................... Best Commercial

Visit UMCC’s web site for complete product information on all Bias-Tee’s and DC-Blocks.