

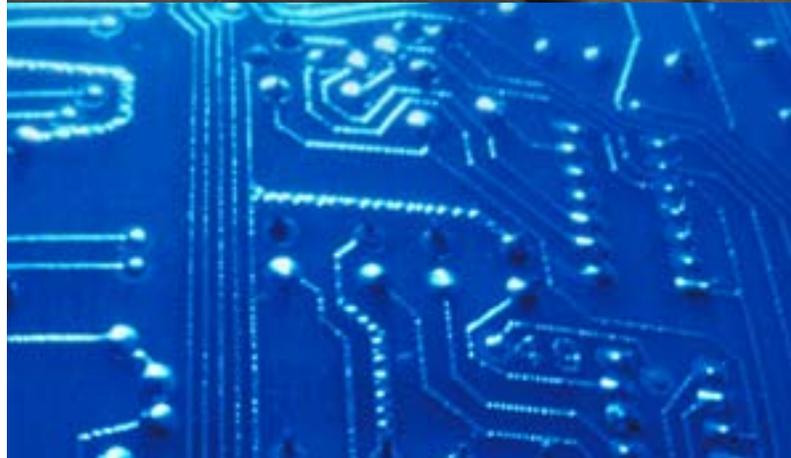


**RF,
Microwave
and
Millimeter
Wave
Integrated
Assemblies**



A Wholly-Owned Subsidiary of Renaissance Electronics Corp.

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12 Lancaster County Road
Harvard, MA 01451



Overview

While renowned in the industry since 1991 for our passive and active components, Renaissance has been a provider of higher order assemblies to fulfill custom application needs in the Military and Commercial market place. Renaissance and its subsidiary, HXI, have provided unique solutions for applications ranging from 70 MHz through 140 GHz.

Renaissance is an AS9100 quality standard certified company and is equipped to handle engineering prototypes to volume production of reliable high performance products. We continually live up to the industry quality standards of reliability that exemplify the Renaissance name.

We are also capable of partnering and manufacturing build-to-print integrated products assuring cost effective solutions.

We have earned a good reputation in the industry as a component supplier, and by using mostly components in the integrated assemblies, Renaissance is cost competitive and passes the savings to our customers. We have the people, technology, equipment, and quality standards to be of full service to your custom needs. So, when you think of integrated assemblies, **THINK OF RENAISSANCE.**



About REC/HXI

Renaissance/HXI is a turnkey solution provider of quality RF, Microwave and Millimeter Wave products.

Design and Technical Capabilities

We provide optimized cost and performance solutions for all RF, Microwave and Millimeter Wave based components, sub-assemblies, integrated assemblies, and sub-systems. We offer design and engineering capabilities and solutions for integrated RF, Microwave and Millimeter Wave hybrid modules and sub-assemblies employing SMT or chip and wire assembly techniques plus an expanded line of best-in-class high quality and high performance mixed-signal sub-system products.

Engineering and Product Development

Our engineering and product development team converts concepts to working solutions. From MEMS based SPDT for ATE application to Millimeter Wave Radar front ends for surveillance applications, the Renaissance/HXI design team can help provide solutions for all levels of integration. Our products are used on majority of the military programs.

Focused Market Applications

The focused markets are Military Radar, Communications and Surveillance.

Applications Engineering Support

We have a design team with expertise in the area of RF, Microwave and Millimeter Wave devices, circuit design, Electronics Engineering and Mechanical Design. We have the necessary software tools required to verify EM interactions and to mechanically package the concept in SolidWorks. For small scale production, we utilize prototyping PCB machines that aid in quick concept verification.

Facilities

World Class design and manufacturing facilities located in Harvard, MA and Haverhill, MA.

Manufacturing Capabilities

The combined manufacturing expertise includes assembly and test work centers supported by fully loaded tool kits and fixtures along with required RF characterization equipment. We cover all topologies including surface mount (wire bond), drop-in, coaxial and waveguide assemblies and sub-assemblies.

Test Capabilities

Our test work centers include PNAs, VNAs, Spectrum Analyzers, IM test sets, High Power Test Sets, Temperature chambers and Thermal Shock chambers to list a few.

Quality Assurance

AS9100 certification with a cleared facility.

RF,

Microwave

and

Millimeter

Wave

Products

RF to Millimeter Wave Sub-System Solutions

REC/HXI supplies Millimeter Wave sub-systems and custom-designed components to support military and commercial systems worldwide. Sub-systems include transceivers for UAV and helicopter landing systems, surveillance receivers, active sensors for medical research and specialized communication links for a wide range of applications. Custom components include variations of many of our catalog products, such as LNAs, power amplifiers and power combiners, frequency multipliers, mixers, switches and isolators.

Variants of existing catalog components are quickly produced and new sub-assembly requirements are addressed comprehensively by the appropriate set of component hardware and system engineers to arrive at the optimum design configuration. A working knowledge of radar and communications systems allows HXI to understand and address the affects of complex problems and subtle component performance and interaction issues. Our broad experience allows us to assume system integration tasks where appropriate, freeing our customers resources for other aspects of product development. The use of SolidWorks as our primary mechanical design tool provides a smooth transition when inserting our products into our customers systems.



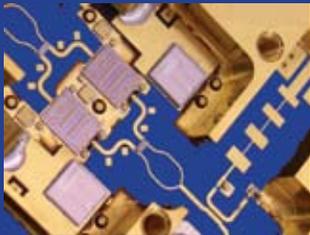
Integrated Switch 18A1NAI

Renaissance Electronics' new 18A1NAI switch matrix is designed for applications that require reverse low level signals to interfere with forward high power going through the through paths. The through path can be stepped in intervals of 1.0 dB up to 120 dB. Various models for different frequency bands are designed with high isolation and directivity. The components are designed for highest performance and reliability. The matrices are 1U in height in a standard 19" rack.



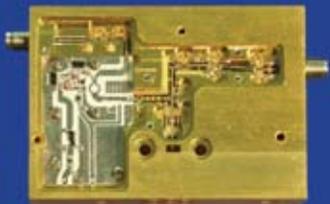
35 GHz Integrated Transceiver

HXI produces two highly integrated transceivers to support the ground-based and flight units for a UAV landing system application. The program has been in production for 5+ years using our parts. The ground-based unit integrates 17 individual Millimeter Wave and IF circuit functions, including one 3.5W Ka-band power amplifier and a SP4T non-reflective switch matrix.

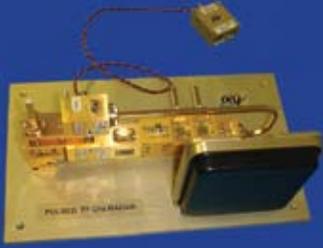


60 GHz Integrated Receiver

The integrated receiver to the left has been used in our Gigalink radios. The receiver is based on individual circuit functions which are also available from our standard component catalog. The receiver design provided us with a reduced size and parts count, two common objectives of integration efforts.



RF to Millimeter Wave Sub-System Solutions



77 GHz Pulsed Radar Prototype for Intelligent Cruise Control Applications

The forward looking radar (FLR) prototype to the left was developed by HXI within a few months and was used by a French car manufacturer as a prototype for a new Intelligent Cruise Control. The prototype used mostly standard catalog components along with a microstrip patch antenna to provide a unit that was mounted in the front of a test vehicle to collect data in preparation of the design of a production unit.



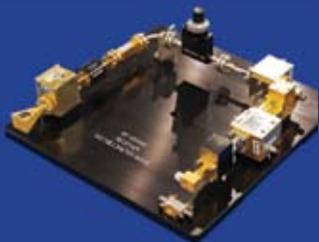
94 GHz Pulsed Radar Prototype

Using our vast library of standard and custom-designed components, we can quickly build prototype front ends for system performance verification. Later, we can optimize parameters and integrate the front end for production. The plate-mounted transceiver assembly to the left was designed and integrated within a few months and actually served as an initial flight unit for a helicopter landing radar. The transceiver was later integrated for a pre-production unit and the size was reduced by a factor of 5.



94 GHz Sub-System for Medical Research

This custom-designed sub-system consisted of many active and passive components at 94, 60 and 35 GHz. The sub-system includes two 94 GHz LNAs and four 94 GHz power amplifiers, as well as a wideband VCO at 60 GHz with extremely fine mechanical tuning control. The sub-system also features interchangeable hardware to support 16 different test configurations.



80 to 100 GHz Receiver Prototype

Recently, HXI produced a number of integrated receivers for use in surveillance activities. In addition to a normal down conversion function, the receivers also offer an optional radiometric mode for higher sensitivity. Frequency coverage and bandwidths were selected based on available semiconductor devices, which were obtained from a wide variety of sources, including commercial foundries, research labs and universities.



FMCW Front Ends

HXI has produced a number of miniature 60 GHz FMCW radar front ends for a variety of distance/dimension measurement applications. Originally developed for use as a railroad crossing safety/warning radar, the front ends have also been used for highly accurate dimension verification during metal ingot fabrication where the high temperature used in the process does not allow the use of other measurement methods.

Base Station Solutions

Fully Integrated Assemblies

- Transceivers and Repeaters: Miniature high performance Tx and Rx modules from 100 MHz to 6 GHz. Microcell/Picocell base stations and RF repeaters for WiMAX and LTE applications.
- DAS Solutions – Components and custom assemblies, embedded antenna arrays for Bluetooth, WiFi, ZigBee, etc., applications.
- Switch Matrices – Covering UHF up to Ka-band, reciprocal and non-reciprocal, blocking/non-blocking and with the reliability to sustain ground or air transport operating conditions.
- MEMS: From SPST, SPDT to 8 x 8 MEMS based matrix to meet reliability and size constraints for battlefield communications, wireless networks and ATE systems and platforms.
- Receiver Multi-Couplers: LNA with n-port division to provide unity gain with ultra low noise figure for satellite communication system applications.

Switch Product Group

Renaissance has successfully designed a DC-18 GHz RF Switching Matrix Unit. This unit will direct RF and Microwave frequency signals from general and special purpose test equipment to the system under test (SUT) as well as RF and Microwave signals from the SUT to the test equipment. In general, the unit is used as an input/output switching matrix for RF transmitted/received signals. Additionally, it provides the capability to monitor its switches operational status continuously by the ATE controller. This matrix consists of terminated electro-mechanical switches, programmable attenuators, couplers, circulators and power dividers to synthesize the RF signals. The layout and choice of components were optimized to achieve lower loss (<4 dB) and highest isolation (>90 dB). The VSWR on all ports were better than 1.5:1. The unit is fully controlled by a GPIB interface and has a built-in initialization and check routine. The matrix is 7U in height, 22" deep and mounts on a standard 19" rack. It weighs about 30 lbs. and has telescopic rails that help in servicing the inside without dismounting from the rack.



Microcell or Repeater for LTE Applications

Our μ TCA based repeaters and macro cells for point-to-point to multi-point deployment supports WiMAX and LTE systems. These Multiple Input Multiple Output (MIMO) and Orthogonal Frequency Division Multiplexing (OFDM) based systems are built on the success and performance of industry leading components.



Base Station Emulator Test System, 18A4NAE, 18A4NAF

Renaissance Electronics has developed Switch Matrices for Base Station Emulators to support a software-based test system to solve capacity and coverage problems. These emulator systems allow companies to conduct unique testing within their labs by allowing switching between multiple systems and equipment. An example is the 18A4NAE GSM system that provides the ability to take any one of the 84 input signals which then can be directed to any one of the five layers, each with seven individual outputs.



Integrated/Multi-Function Assemblies

60 GHz & E-Band Radio Links

In addition to our standard off-the-shelf Gigalink radio links at 60 GHz and E-band (71-76 GHz), we have produced a number of variants for military and government usage. (Standard links operate at a data rate of 1.25 Gbps.) Our E-band links have been used in Iraq and Afghanistan to transport critical reconnaissance video back to command posts for review and action. An analog version of our E-band radio has been used by the Department of Energy as part of a feedback/correction loop in a particle accelerator ring, resulting in a significant increase in collisions at the atomic level.



Multi-Band Combiner

Renaissance Electronics has designed a multi-band combiner for GSM 800/900/1800/1900 & UMTS schemes. This is ideal for in-building distributed antenna systems where different operators require simultaneous coverage without interference.



ADC/DAC Switch Matrix

Renaissance Electronics Corporation has released a new DC to 500 MHz Switch Matrix with two inputs and six outputs. The 18A1NA will support the high level of integration required during qualification testing for digital and analog assemblies operating at microwave frequencies. In addition, the separate analog and digital USB control ports, combined with software, allows for the development of a complete Automatic Test Program (ATP) to verify and measure all possible paths.



Receiver Multi-Coupler

Renaissance Electronics' Receiver Multi-Couplers are designed for next generation commercial wireless applications. With a very low noise figure, the signal-to-noise ratio of the system improves significantly. Redundant power supplies require less system maintenance and lower maintenance cost. This unit has been field tested for facilitating site expansion in a cost effective and timely manner.



Tri-Band Attenuator for DAS

Renaissance Electronics' universal interface panels will provide on-site adjustment of various receive and transmit links to ensure equalized signal strengths thereby reducing interference noise.





Contact Us Today for a Quote!

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Other Renaissance/HXI Products include:

- **Ferrite Isolators and Circulators**
- **Power Dividers and Combiners**
- **Electro-Mechanical Switches**
- **Low Noise and Power Amplifiers**
- **Mixers, Upconverters and Detectors**
- **Frequency Multipliers**
- **PIN Diode-Based Switches and Attenuators**
- **Gunn Oscillators and VCOs**
- **60 GHz and E-Band Radio Links (Gigalink)**
- **Wireless transmission of raw HDTV signals**



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