

# MILITARY & SPACE SOLUTIONS



Analog, Digital & Mixed-Signal ICs, Modules, Subsystems & Instrumentation

***Standard & Custom Products, DC to 110 GHz***

***High Reliability Screening for Military & Space*** ♦

***Custom Digital, Mixed-Signal &  
MMIC Solutions*** ♦

***Custom MIC Modules & Subsystems*** ♦

***Custom Instrumentation*** ♦

## ***Custom Mission Critical Applications***

Hittite Microwave has a strong reputation for technically innovative, high performance, quality products and provides a wide variety of custom solutions for military and space environments.



- DC - 110 GHz Solutions
- ICs to Instrumentation
- MIL-PRF-38534 / 38535 & MIL-STD-883 Compliant
- ISO 9001:2008 QMS
- AS9100:2009 Certified

Since 1985, Hittite Microwave has offered standard and custom MMIC die, hermetic packaged die, MIC hybrids, subsystems and instrumentation for analog, digital and mixed-signal IC military and space applications. We leverage our IC design capabilities to select the optimum device technologies for these applications. We employ internal resources for engineering, prototyping and production assembly / test. High reliability screening is offered for all products to customer specifications and / or requirements outlined in MIL-PRF-38534/38535.

Every product we design, manufacture and ship is backed by our commitment to total quality. We provide our customers with products that meet or exceed all requirements and function reliably throughout their specified life.

*Contact us Today to Discuss Your Mission Critical MMIC, MIC, Subsystem and Instrumentation Hi-Rel Product Requirements.*

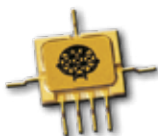
## Military Level Component & Module Qualification Commercial / Industrial Components & Assemblies

Hittite Microwave offers MIL-PRF-38534 Class H & MIL-PRF-38535 Class B screening on die, hermetic, packaged die and hybrid assemblies.



## Space Level Component & Module Qualification

Hittite Microwave offers MIL-PRF-38534 Class K & MIL-PRF-38535 Class S screening on die, hermetic, packaged die and hybrid assemblies.



Hermetic  
SMT Package



Hermetic Modules



FET Channel SEM

## High Reliability Screening & Tests

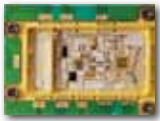
- Wafer Lot Acceptance Test (WLAT)  
Bond Pull & Die Shear  
SEM Inspection  
Metal & Glass Thicknesses Meas.
- Temp Cycle
- Constant Acceleration
- High Temp Burn-In
- Visual Inspection
- Vibration Stress
- Fine & Gross Hermeticity
- Radiographic Inspection
- Particle Impact Noise Detection
- Residual Gas Analysis
- ESD Characterization
- Serialized Test Data
- Qualification Report

Hittite is a major component supplier to hundreds of military radar, ECM/EW, data link and communications programs worldwide.

Hittite is qualified by major spacecraft OEMs worldwide, shipping tens of thousands of space grade components which are currently operational on dozens of commercial, scientific & military spacecraft.

# Hittite Vertically Integrates ICs, Modules & Subsystems to Achieve

## Microwave Integrated Circuits (MIC)

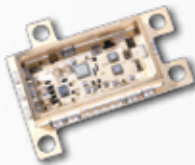
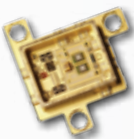


• Local Oscillator



• Downconverter

• Class K Space MICs



• Class B Military MICs

## Standard & Custom Connectorized Modules



• Dielectric Resonator Oscillator (DRO)



• Hermetic MicroSynth™

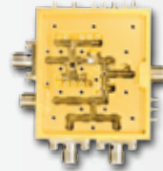


• Ultra Low Phase Noise Amplifiers

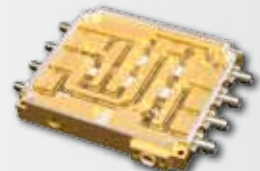


• SP4T Switch

## Multi-Function Modules



• Ka-Band T/R Module



• Millimeterwave Upconverter



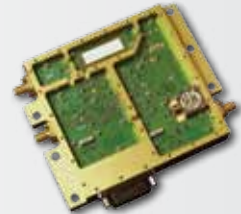
• W-Band Active Multiplier



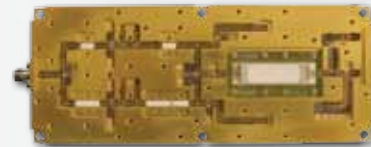
• Wideband Jitter Generator



• Radar Synthesizer



• SATCOM Synthesizer



• Millimeterwave Receiver

## Ceramic Hermetic SMT to 40 GHz



## COTS Ceramic SMT to 43 GHz



## GaAs MESFET



E/D MESFET

- Space Qualified
- Circuits to 40 GHz

## GaAs pHEMT



0.25, 0.15, 0.10 μm pHEMT  
0.5μm E/D pHEMT

- Space Qualified
- Circuits to 110 GHz

## InGaP HBT Analog



Power Process

- Space Qualified
- Circuits to 24 GHz

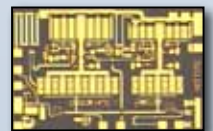
## InGaP HBT Digital



Analog / Digital Integration

- Space Qualified
- Circuits to 38 GHz

## GaN HEMT



High Efficiency Amps & Control Devices

- Space Qualified
- Circuits to 40 GHz

**Hittite has Created an Exemplary Foundation of Advanced**



# Performance Commensurate with Customer Requirements

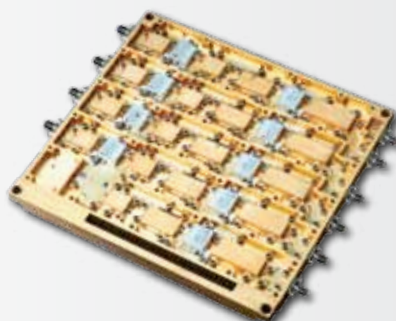
## Integrated Subsystems



- High Performance Wideband Synthesizer



- Microwave Synthesizer

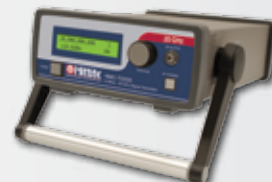


- Mutli-Channel Receiver

## Instrumentation



- HMC-T2100B: 20 GHz  
Portable, Battery Operated  
Synthesized Signal Generator



- HMC-T2220: 20 GHz  
Synthesized Signal Generator



- HMC-T2270: 70 GHz  
Synthesized Signal Generator

## Subsystem Design & Manufacturing Expertise

Hittite has extensive experience in design & manufacturing of high-performance miniature microwave subsystems for demanding high-reliability military and space applications. Hittite applies expertise in system analysis, MMIC & module design, mechanical packaging, automated manufacturing, RF testing, screening and qualification. Since the majority of MMIC chips are Hittite products there are significant benefits in controlling performance, schedule, screening, qualification, packaging, part obsolescence, troubleshooting and design optimization.

## High Speed BGAs

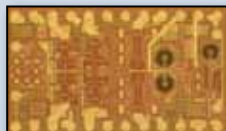


## COTS Plastic SMT to 40 GHz \*



\* Select products are available with 80/20 SnPb lead finish

## SiGe HBT



Analog / Digital Integration

- Linear Amplifiers
- Circuits to 20 GHz

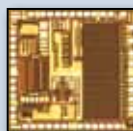
## SiGe BiCMOS



120, 180, 350 nm  
Analog / Digital

- Large Scale Integration
- Circuits to 80 GHz

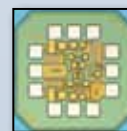
## SILICON CMOS



45 to 180 nm  
Analog / Digital

- Large Scale Integration
- Circuits to 40 GHz

## SOI



Silicon-on-Insulator

- Linear Control Devices
- Wideband Circuits to 8 GHz

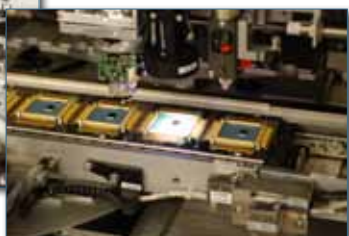
## Semiconductor Technologies for Analog/Digital Applications

## Custom Integrated Circuits

- Semiconductor device to system level knowledge
- Extensive library of proven Analog, Digital & Mixed-Signal ICs and MMICs
- Mechanical and thermal design
- Validated device models
- Specialty products include: Synthesizers, Radar Based Sensors, Tx / Rx Subsystems



**Class 100K Clean Rooms**



**Automated Assembly:  
Substrate & Die Attach**



**Automated Assembly:  
Wirebonding**



**High Volume Test Capacity**

## Facilities, Manufacturing & Test

- ISO 9001:2008 and AS9100:2009 Certified
- Class 100 environment for S-level product
- Automatic hybrid assembly equipment includes; die inspect/pick, die/substrate attach, and wire bond
- IR reflow equipment for PCB based assemblies
- Automated digital product test to 40 Gbps
- Automated RF, microwave and millimeterwave product test to 110 GHz

## Quality Assurance; Reliability & Screening

- Complete environmental test lab
- In-house process qualification, reliability analysis & production screening
- In-house inspection & test of incoming material
- Periodic qualification & monitoring of ISO 9001 sub-contractors
- Full product traceability



**SEM / Physical Analysis**



**Vibration Test Stand**



**Module Burn-In**



**Automated Wafer Inspect  
& Handler**



## MILITARY & SPACE CUSTOM SOLUTIONS TO 110 GHz

### What We Do

Hittite Microwave is an innovative designer and manufacturer of analog, digital and mixed-signal ICs, Modules, Subsystems and Instrumentation for analog, digital, RF, microwave and millimeterwave applications covering DC to 110 GHz. Our products are developed using state-of-the-art GaAs, GaN, InGaP/GaAs, InP, SOI, SiGe, CMOS and BiCMOS semiconductor processes utilizing MESFET, HEMT, pHEMT, mHEMT, HBT and PIN devices.

We design and supply custom ICs, Modules, Subsystems and Instrumentation, combining multiple functions for specific requirements. We select the most appropriate semiconductor and package technologies, uniquely balancing digital and analog integration techniques.

Hittite Microwave is a one-stop solution provider which has the unique ability to provide products that are designed, developed and manufactured in-house from the IC level to the integrated module/subsystem. In doing so, Hittite provides unparalleled value and service to our customers through our ability to control cost, performance, schedule, obsolescence and reliability.

Hittite Microwave is ISO 9001:2008, AS9100:2009 and ANS/ESD S20.20-2007 certified designer and manufacturer. Every component is backed by every Hittite employee and subcontractor's commitment to total quality, thus providing our customers with products that meet or exceed all requirements, are delivered on time and function reliably throughout their useful life.



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