

# INSIGHT SIP

WHO ARE WE

WHAT DO WE DO

WHY US

- Overview
- LTE and Telephony
- Antenna Design & Antenna-in-Package
- Custom SIP
- Bluetooth Low Energy
- Summary

## ✚ Established in 2005

- ✓ Founded by actual CEO and CTO
- ✓ Core team from National Semiconductor

## ✚ Product Lines

- ✓ Full Turn-key design services and creative packaging solutions
- ✓ Standard modules for wireless electronic industry

## ✚ Experts in RF System-in-Package (SiP) and Antenna-in-Package (AiP)

- ✓ Fabless company
- ✓ Design & industrialization expertise
- ✓ Design team : cross-cultural resources of PhD/MSc experts

## ✚ Locations

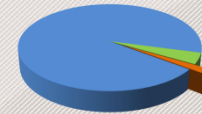
- ✓ Europe – HQ and Technical team in Sophia-Antipolis (France) ●
- ✓ North America – Subsidiary in Denver (USA) since 2008 ●
- ✓ Asia – Sales office in Tokyo (Japan) since 2008 ●
- ✓ Global network of distributors ●



- Manufacturing with multiple established partners
  - Amkor
  - ASE
  - AT&S
  - Barry Ind
  - Kyocera
  - Tong Hsing

## Break by Application Volumes

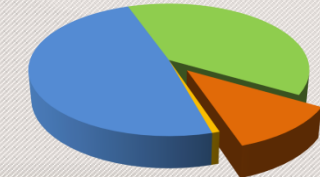
2014



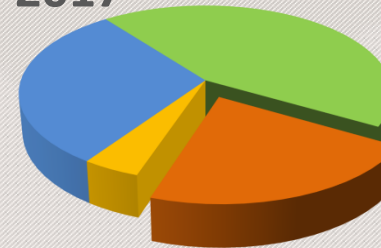
2015



2016

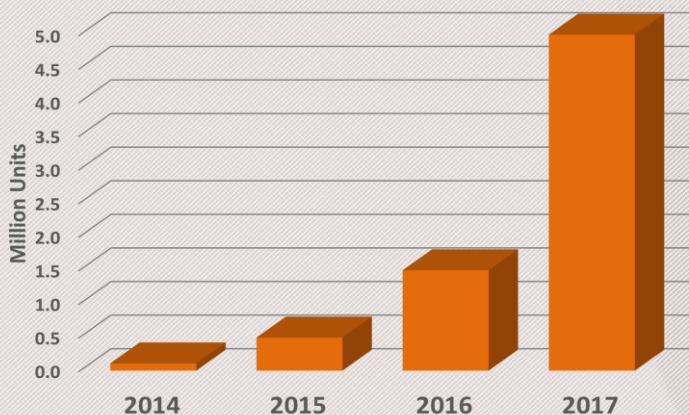


2017



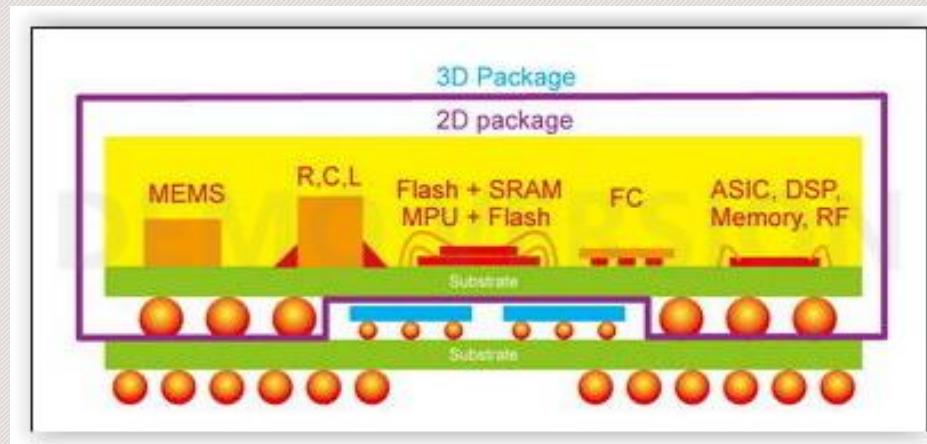
Low Energy Connectivity   
 Connectivity   
 4G/5G Front End & Radio   
 Secure Connectivity   
 (Internal and licensed production)

## Modules Shipment



## Quality standards in production

- ✓ ISO9000 standards and several other equivalent certifications
- ✓ OHSAS18001 – Health and Safety management
- ✓ ISO13485 – Medical requirements
- ✓ AS9100 – Aerospace requirements
- ✓ QS9000 – Automotive requirements

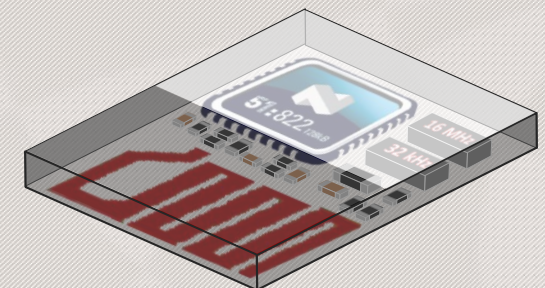


## + Complete 3D RF System Including

- ✓ Multiple Semiconductors Dies, Systems-on-Chip (SOC), Analog Functions, Digital & RF Functions, Passive Functions, Clocking, Power Management, Interface to Application on PCB
- ✓ Made of Heterogeneous Technologies – CMOS, RF-CMOS, GaAs, SiGe, Quartz, Advanced Packaging Techniques, 3D packaging, IPD, Passive SMD, Organo-Metallic Substrates, Multilayer Ceramic Substrates, ...

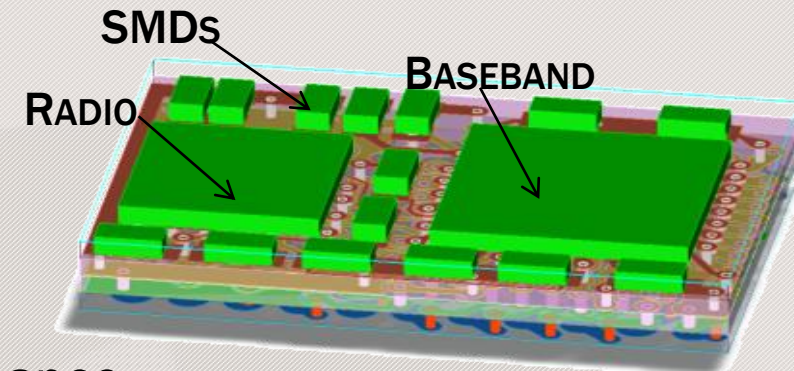
## + Benefits of SiP

- ✓ More Function in Less Space
- ✓ Optimized Cost and Reduced Design Cycles



## Core Competence

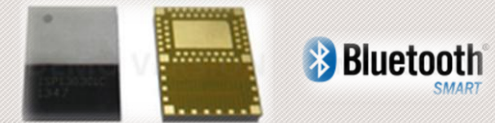
- ✓ Any Wireless Connectivity to Fit Any Device Space
- ✓ System-in-Package (SiP) Or Module Design Approach
- ✓ Highly Integrated Antenna Design Expertise
- ✓ Unique Methods to Estimate Package Size and Performance
- ✓ Multiple Technologies : BT, FR4, LTCC, HTCC, Thick Film, PCB, IPD,...
- ✓ Multiple Assembly Methods: SMT, Wirebond, Flipchip, Embedded Dies...
- ✓ Track Record of Delivering Smallest Solutions



## Technical Successes

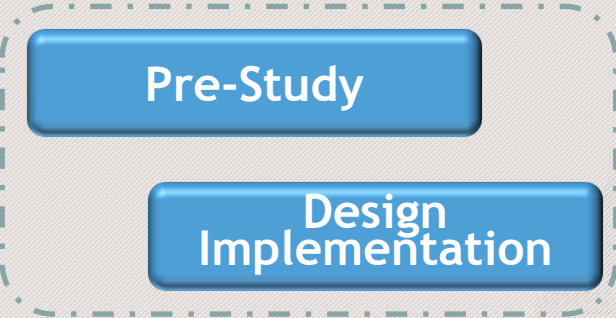
Cellular 2G/3G/4G/LTE/5G, 60GHz, ANT, Bluetooth®, Bluetooth Smart®, GPS/GNSS, ISM, NFC, RFID, TransferJet, UWB, WHDI™, WiFi, Zigbee®, ....

**Benefits To Our Customers:  
Smaller, Faster, Lower Cost**



**DESIGN TO DELIVERY**

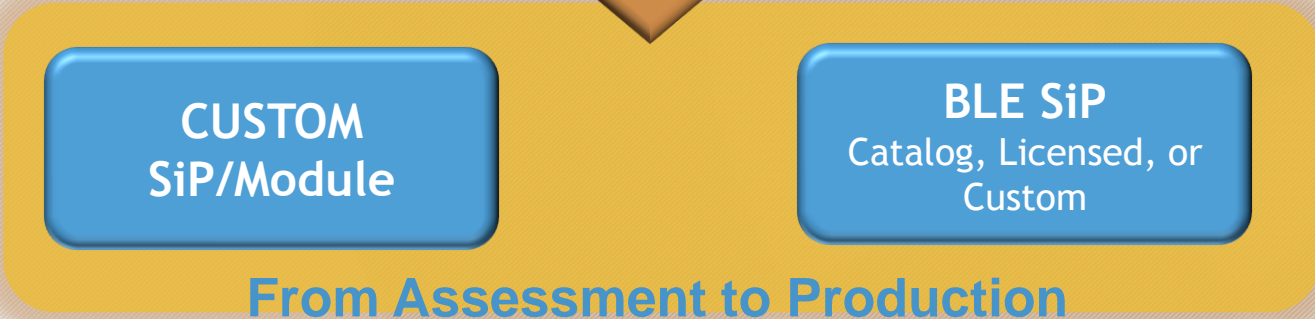
**BLE MODULE**



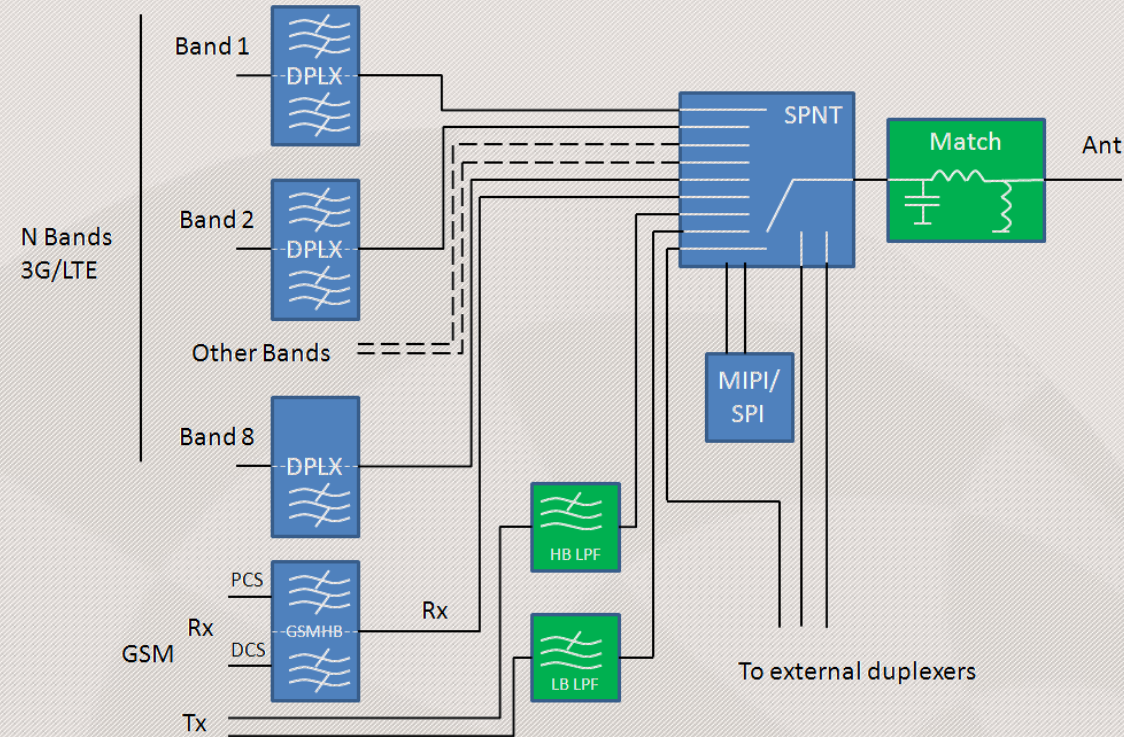
**Design In-house**

**Module Maker I/F**

**Manufacturing with Established Partners**  
Amkor, ASE, AT&S, Barry Ind, Kyocera, SPIL, Tong Hsing, ...



- ✚ 3G/LTE duplexers
  - ✓ SAW or BAW
  - ✓ LTCC and SMT matching
- ✚ Legacy GSM filtering
  - ✓ Rx filters (SAW)
  - ✓ Tx Low Pass Filters (LTCC)
- ✚ Multi-throw switch
  - ✓ 12 or more throws
  - ✓ MIPI or SPI interface
  - ✓ Silicon on sapphire
  - ✓ Low loss and high intermodulation



- ✚ Small size
  - ✓ 4 x 5 x 1 mm for 4 dplx
  - ✓ High Isolation (ca 55 dB)
- ✚ LTCC Technology



## + 5 Band GSM/W-CDMA Module

- ✓ RF SiP based on Silicon IPD with Laminate Substrate
- ✓ Transceiver
- ✓ Passives on IPD
- ✓ Co-Design with Substrate
- ✓ All Transmit Baluns are moved from PCB to BGA
  - 50% overall PCB Footprint Reduction
  - Reduces BOM
  - Eliminates messy Design Task on PCB



## + Application:

- ✓ Mobile Handsets

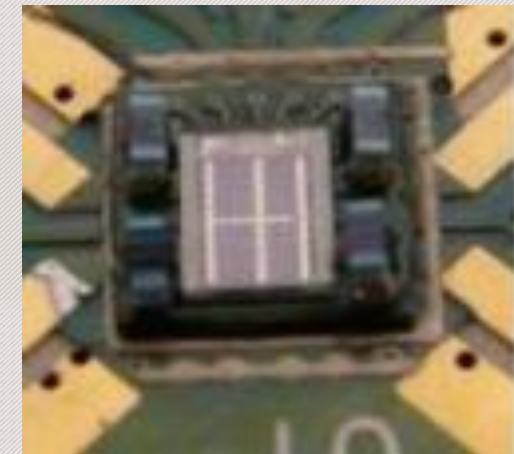


## Antenna Matching Module for Smartphone

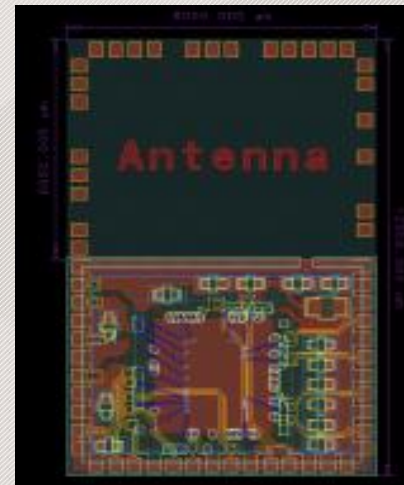
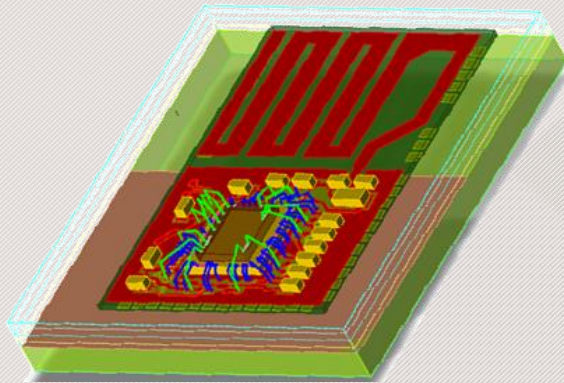
- ✓ Interface between Antenna and RF Front End
- ✓ Improves return loss, thus allows lower power consumption
- ✓ Part of Dynamic tuning system

## Integrated PCB Antenna for M2M Module

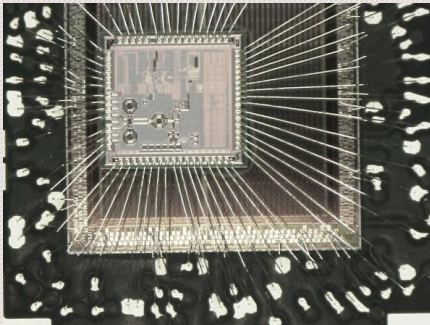
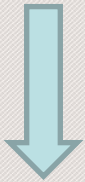
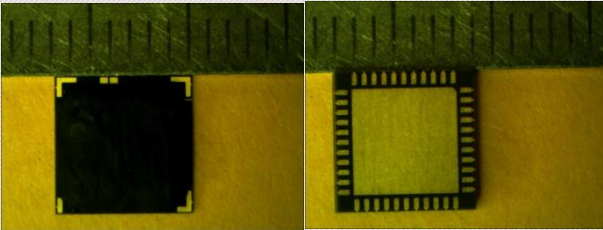
- ✓ Printed Structure
- ✓ Covers 820MHz – 2.2Ghz
- ✓ Extension to cover all LTE bands possible
- ✓ Replaces expensive ceramic/metal antenna



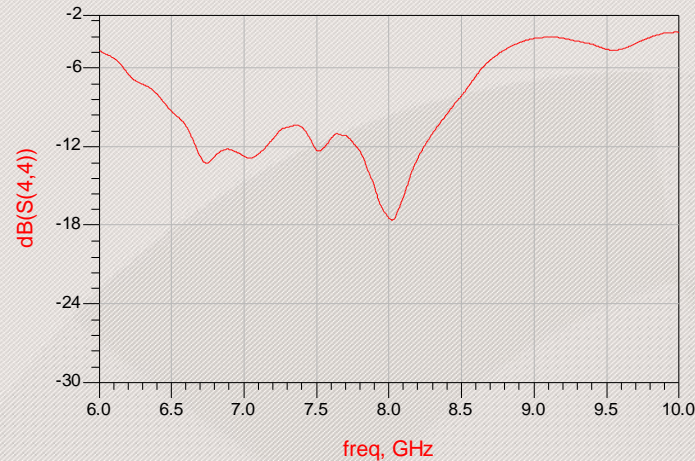
## + Antenna In Package (AiP)



- ✓ 3D stack SiP 8x12x1.5mm:
  - 4 layer substrate
  - MCU bare die
  - 2.4GHz Radio bare die
  - Side 2.4GHz PIFA Antenna
- ✓ Application:
  - Wireless USB



 UWB 7 GHz



7 x 7 mm  
LGA

1.5 mm ht

- ✓ 3D stack SiP 7x7x1.5mm:
  - 4 layer substrate
  - MCU bare die
  - UWB Radio bare die
  - Miniature Patch Antenna
- ✓ BW > 1 GHz at 7.5 GHz
- ✓ Application:
  - High Speed Data Transfer up to 500 Mb/s

✚ Extensive track record of designs covering a wide range of RF cellular standards.... But not only

- ✓ GPS
- ✓ NFC
- ✓ Bluetooth V2.1
- ✓ UWB
- ✓ Multi standard Combo module
- ✓ WiFi 802.11 b/g/n/ac
- ✓ WHDI (Wireless Video)
- ✓ 60GHz
- ✓ IoT
- ✓  $\mu$ SD Card



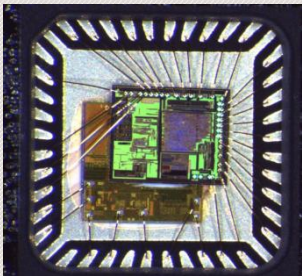
44 x 27 x 5 mm

- ✓ WHDMI Transmit Display Mini Card



7 x 7 x 1.5 mm

- ✓ LTCC WiFi Integrated Filter/Baluns



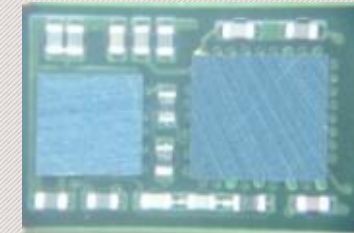
5 x 5 x 0.8 mm

- ✓ 2 die SiP, Secure NFC Contact-less



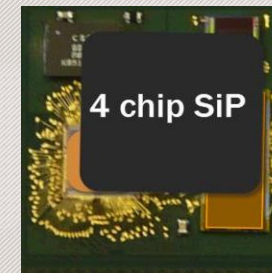
11 x 15 x 1 mm

- ✓ μSD 3D SiP Device, Smart Secure



6 x 4 x 1 mm

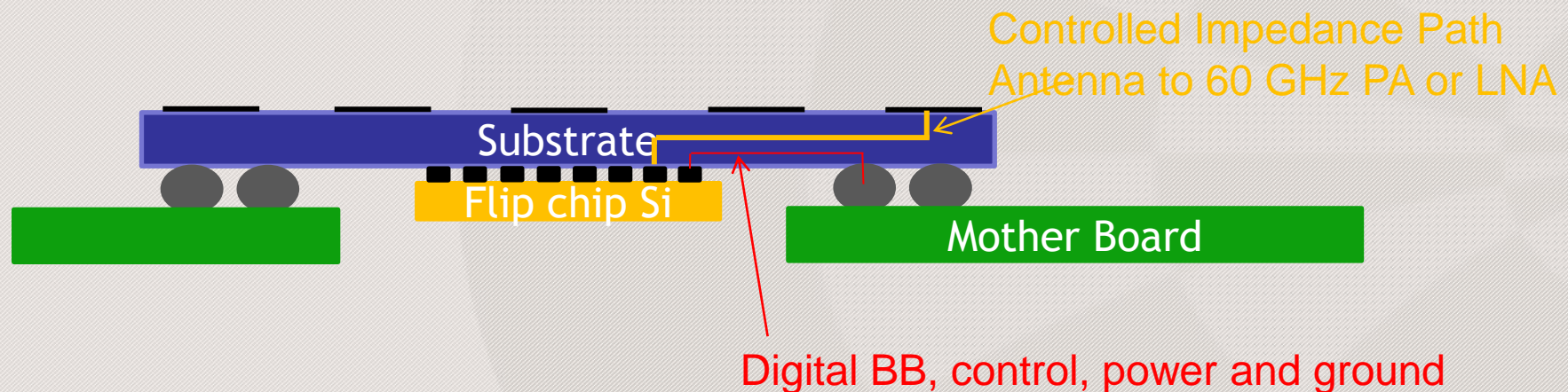
- ✓ GPS Module, Baseband, Radio, SMD



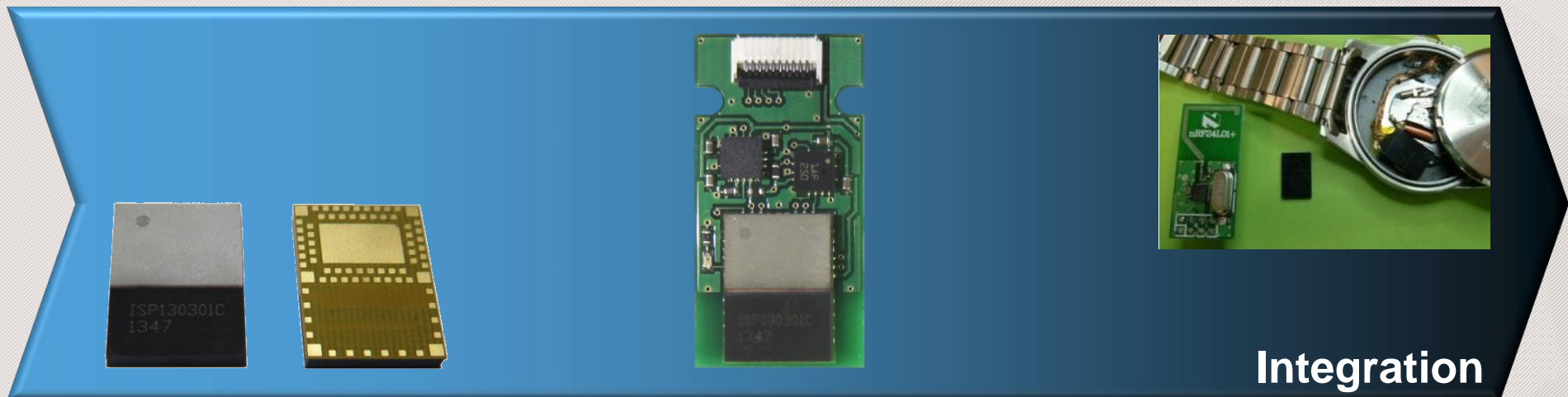
12 x 12 x 1 mm

- ✓ 4 die SiP, BT ASIC Memories

- ✚ 60GHz Antenna
  - ✓ Low Cost Beam forming antenna
  - ✓ Miniature Front-end-Module
- ✚ Applications
  - ✓ In-house High Speed Data
  - ✓ Point to Point Radio Link



- Insight SiP intends to propose a **complete BLE solution offer**



### ✚ **Module solution**

- ✓ Ready to Use BLE Module to be integrated in application circuit
- ✓ Off shelf

### ✚ **Sensor solution**

- ✓ Ready to Use Radio and Hardware circuit with integrated sensor
- ✓ Custom or Off shelf

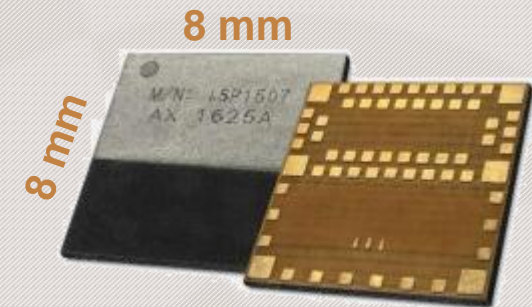
### ✚ **Custom SiP**

- ✓ Radio and Hardware included in a Custom Design SiP
- ✓ Specific form factor



Insight SiP has a wide range of solutions based on existing design framework (eg AiP etc ...) in order to offer extended capabilities in the BLE domain:

- + « Own Brand » ready to use modules
- + Licence of module design to customers
  - ✓ Replacement of chipset with different choice
  - ✓ « Combo » modules (BLE/WiFi, BLE + Sensor)
  - ✓ Different form factor or content
- + Custom BLE integrated into body network device



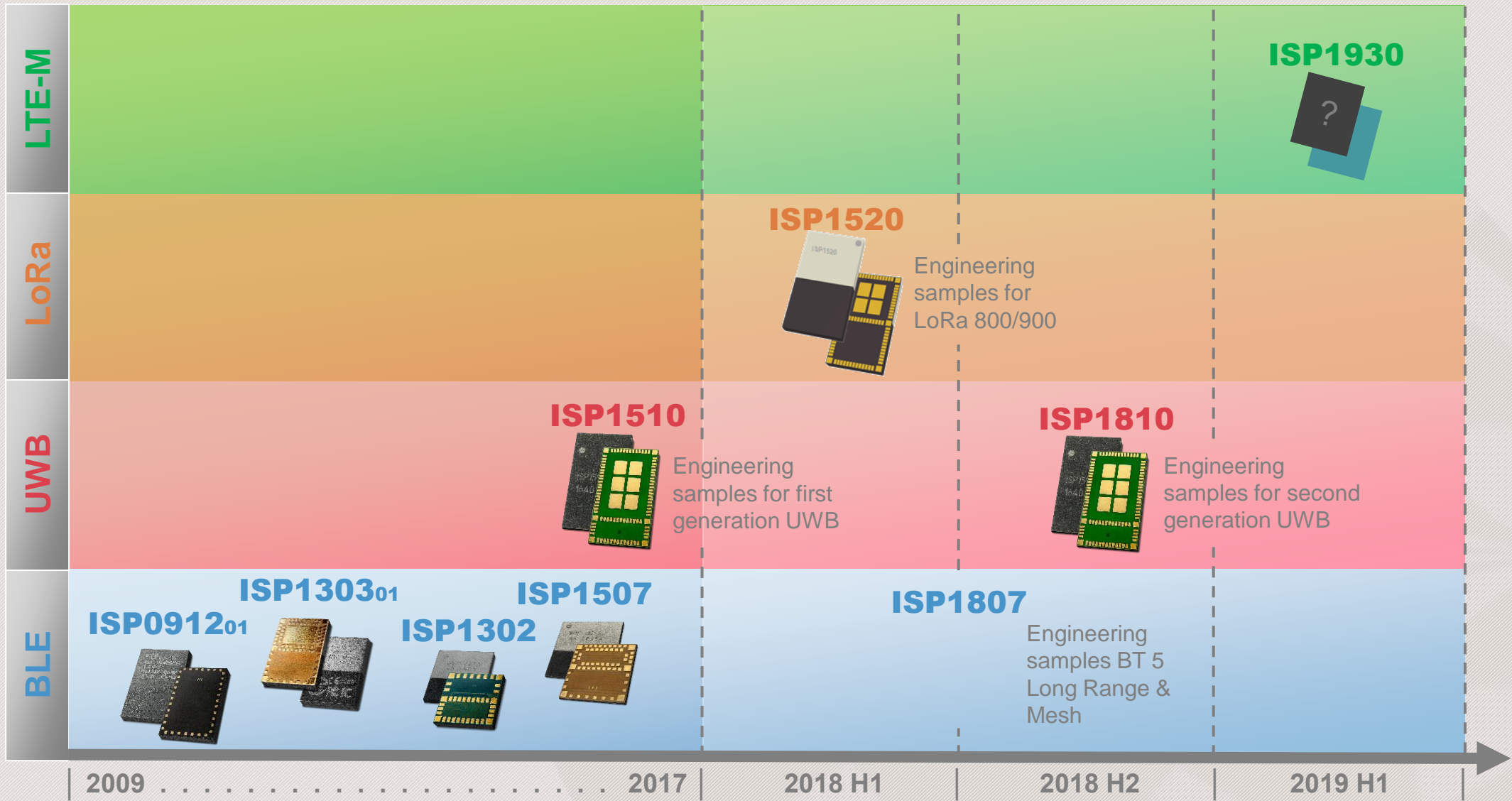
## Values To Our Customers:

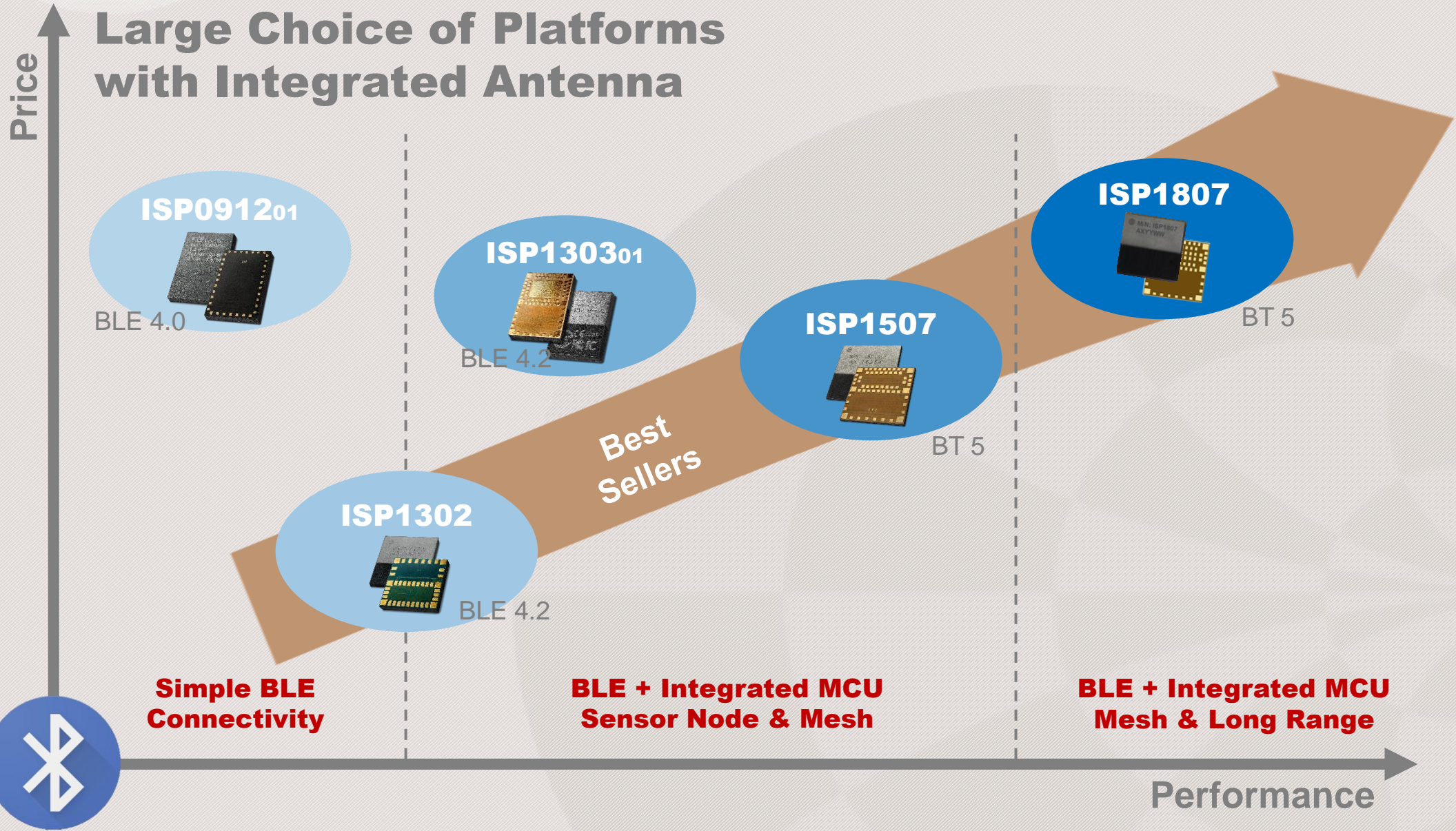
- ✓ Relies on Insight SiP Unique Technology and Expertise
- ✓ Allows to Focus on Embedded Systems (eg SW development) rather than Design Implementation
- ✓ Enables Faster Time-to-Market
- ✓ Provides Faster ROI

# PORTFOLIO EVOLUTION

Available modules 

 The roadmap is subject to chipset availability





- ✚ Long-term partnership with our customers
  - ✓ Assist our customers from design early stage to volume production
  - ✓ Multiple design projects
- ✚ Leader in RF SiP design
- ✚ Extensive design track records
- ✚ Partnership with world class SiP & module manufacturers

Benefits To Our Customers:  
Smaller, Faster, Lower Cost

# THANK YOU

