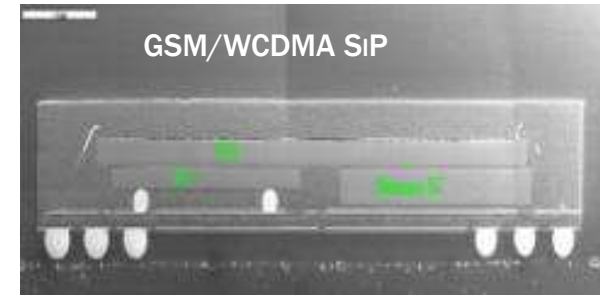


INSIGHT SIP

DESIGN EXAMPLES

CORE COMPETENCIES

- ANY WIRELESS CONNECTIVITY TO FIT ANY DEVICE SPACE
- SYSTEM-IN-PACKAGE (SIP) DESIGN APPROACH
- HIGHLY INTEGRATED ANTENNA DESIGN EXPERTISE
- OPTIMIZATION SIZE/COST/TIME TO MARKET
- 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...



TECHNICAL SUCCESSES

3G, 60 GHZ, ANT, BLE, BLUETOOTH[®], GSM/W-CDMA, GPS, ISM, LTE, NFC, RFID, UMTS, UWB, WHDI[™], WIFI, WLAN, ZIGBEE[®] ...

READY-TO-USE RF MODULES / ANTENNA DESIGN IPs

DESIGN IN-HOUSE



PRODUCTION WITH MODULE
MAKER / ASSEMBLY PARTNER

2.4 GHZ MODULES (PROPRIETARY,
BLUETOOTH LOW ENERGY, ...), ...

HD VIDEO (WHDI), ...

DESIGN SERVICES

FEASIBILITY STUDY



DETAILED DESIGN



TEST AND DEBUG

SYSTEM-IN-PACKAGE

COMBINATION MODULES

ANTENNA-IN-PACKAGE

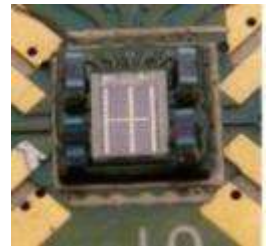
THE STANDARD SiP DESIGN APPROACH

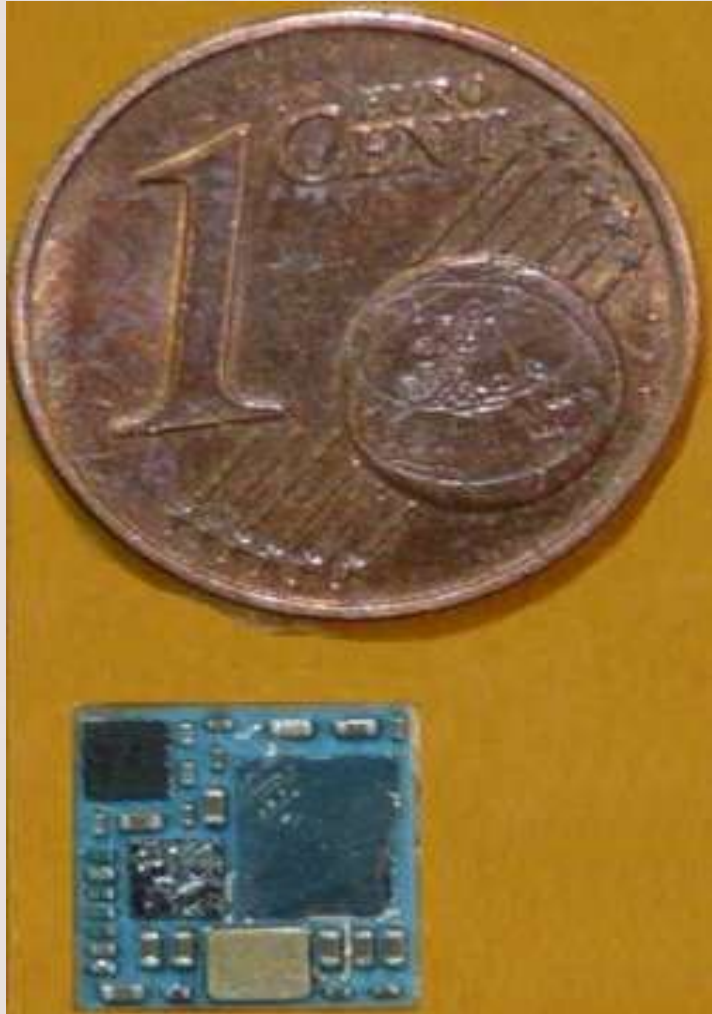
- BASED ON TRIAL AND ERROR → TIME CONSUMING AND UNCERTAIN
- BASED ON CLASSICAL LAY-OUT METHODOLOGY COMING FROM LOW END PCB DESIGNS
→ NOT USABLE FOR COMPLEX RF SiP DESIGN
- “MOST SiP DESIGNS ARE JUST SMALL SURFACE MOUNT ASSEMBLIES USING CHIP AND WIRE FOR ICs AND CONVENTIONAL PASSIVES”
(DR LEONARD SCHAPPER - UNIVERSITY OF ARKANSAS – IEEE WORKSHOP COMO, JAN. 2007)

INSIGHT SiP USES A UNIQUE DESIGN METHODOLOGY

FROM A REFERENCE DESIGN TO A HIGHLY INTEGRATED CUSTOM (RF) MODULE:

- SUBSTRATE DESIGN WITH COUPLING/MATCHING ANALYSES
- MANUFACTURING AND SUPPLY CHAIN SUPERVISION
- DEBUG AND CHARACTERIZATION CAPABILITIES





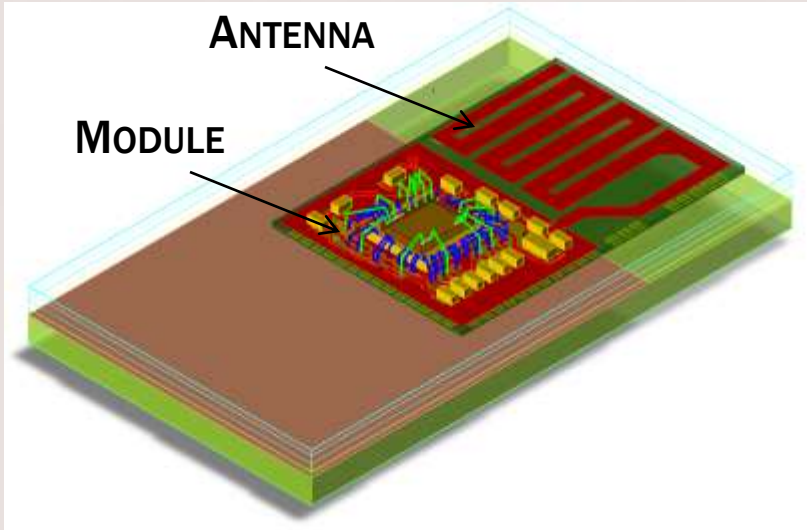
RF SiP BASED ON LTCC SUBSTRATE

- CMOS BASEBAND
- GAAS ANTENNA SWITCH
- PASSIVES EMBEDDED IN SUBSTRATE
- QUARTZ CLOCK
- SIGE TRANSCEIVER
- 7X7 MM²

APPLICATIONS

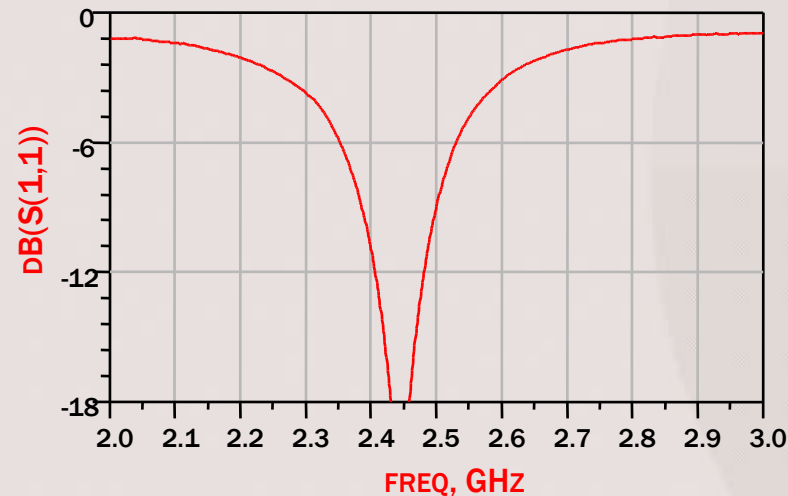
- CELLULAR PHONE
- DIGITAL CAMERA





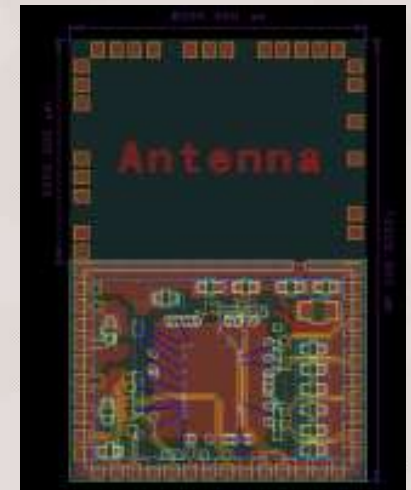
RF SiP BASED ON LAMINATE SUBSTRATE

- MCU & RF TRANSCEIVER
- EMBEDDED ANTENNA
- 8x12 MM² QFN



APPLICATION:

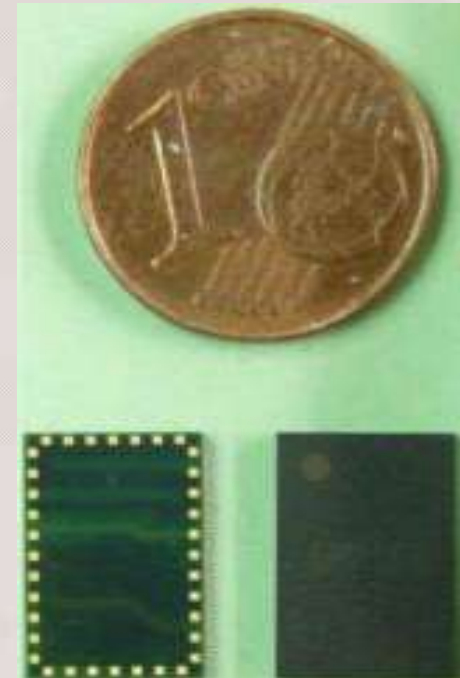
- WIRELESS USB



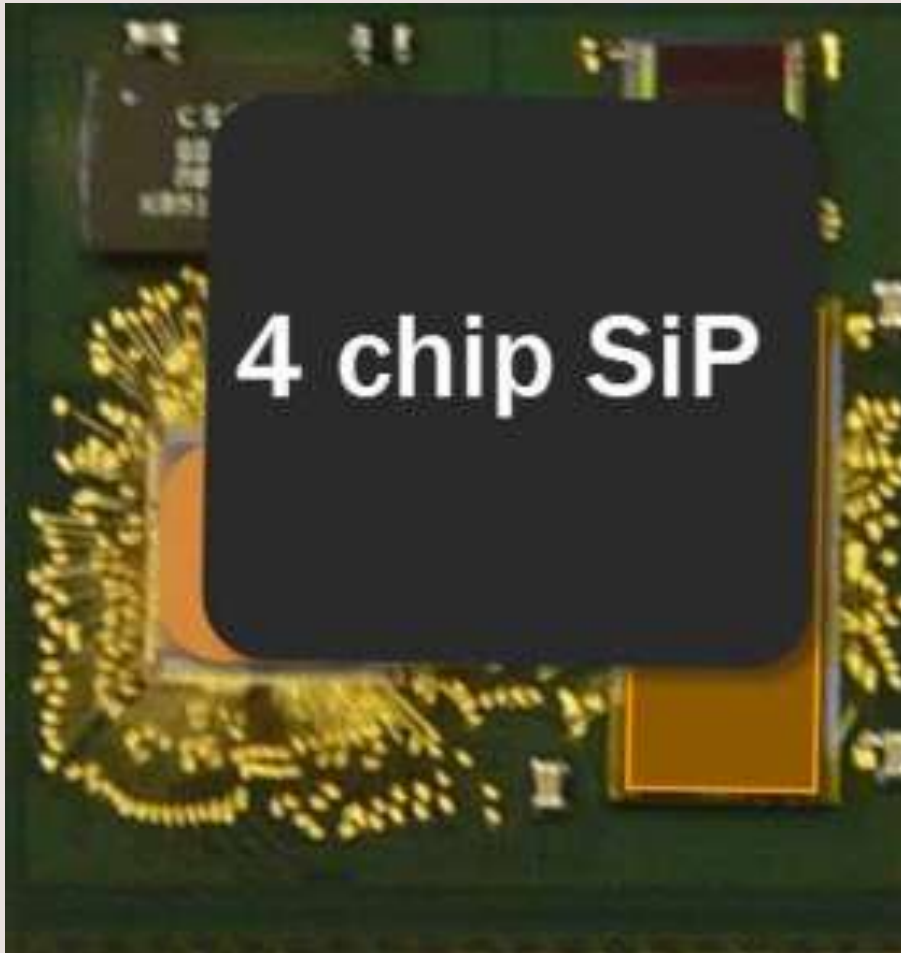
2.45 GHz AiP

BLE MODULE ISP091201X

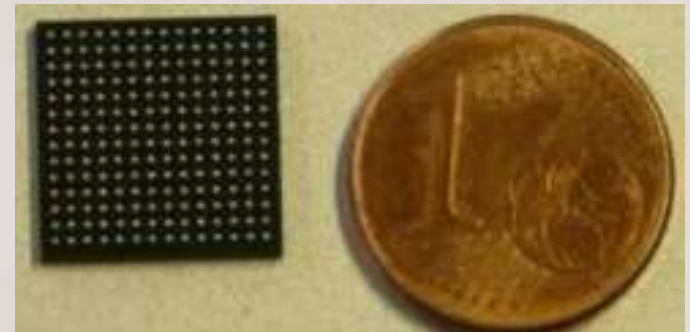
- SINGLE MODE BLUETOOTH[®] LOW ENERGY V4.0 SLAVE
- INCLUDES TRANSCEIVER, BASEBAND AND SOFTWARE STACK
- ULTRA LOW POWER CONSUMPTION
- SINGLE 1.9 TO 3.6 V SUPPLY
- TEMPERATURE -40°C TO 85°C
- FULLY INTEGRATED RF MATCHING AND ANTENNA
- 12MM X 8MM X 1.5MM
- BASED ON NORDIC SEMICONDUCTOR NRF800X FAMILY

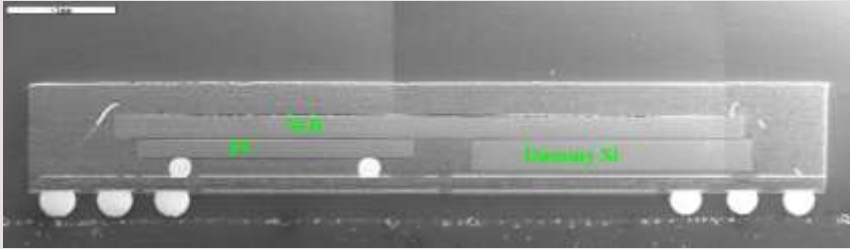


BLUETOOTH/AUDIO - 4 CHIP SiP



- 12 x 12 MM
- 2 MEMORIES
- 1 RF IC
- 1 DIGITAL & ANALOG ASIC
- 3 WIREBONDED CHIPS
- 1 FLIP-CHIP DEVICE





MOLD CAP

WB ACTIVE DIE

FC PASSIVE DIE = IPD

DUMMY (STAND-OFF)

SUBSTRATE

FC BUMPS

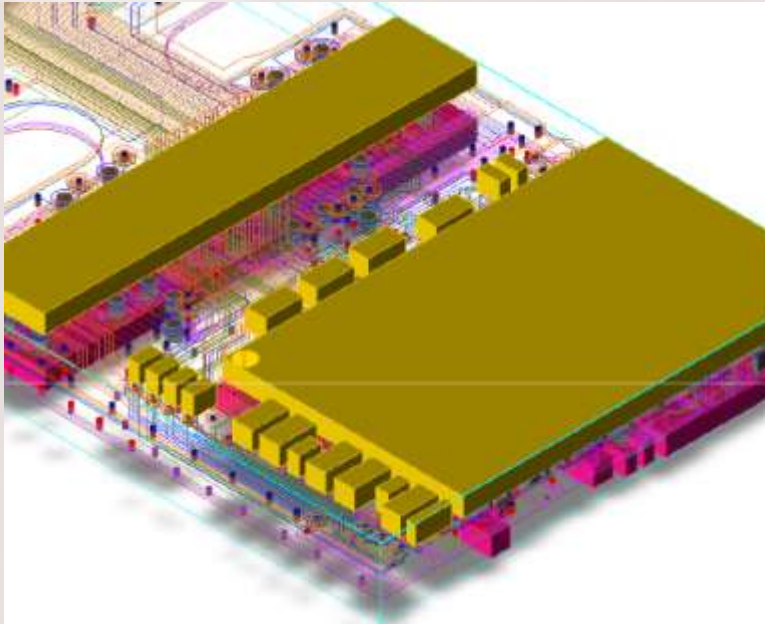
SOLDER BALLS

RF SiP BASED ON SILICON IPD WITH LAMINATE SUBSTRATE

- TRANSCEIVER
- PASSIVES ON IPD
- CO-DESIGN WITH SUBSTRATE

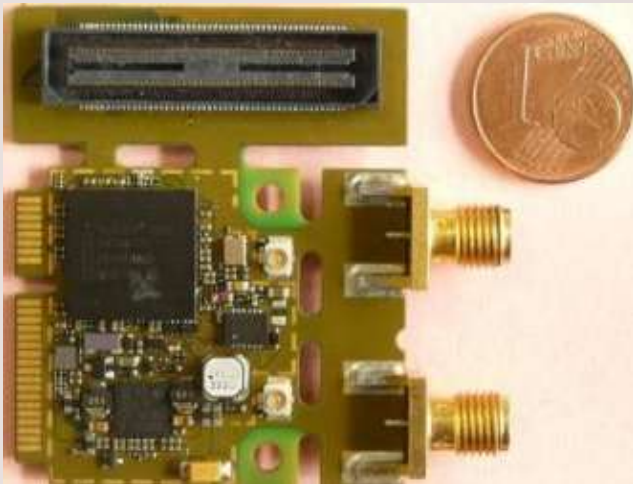
APPLICATION:

- MOBILE HANDSETS



COMPLEX RF MODULE

- 7 BAND MODEM
- MEMORY
- POWER MANAGEMENT
- TRANSCEIVER W/ DIVERSITY
- POWER AMPLIFIERS
- FRONT ENDS



APPLICATION

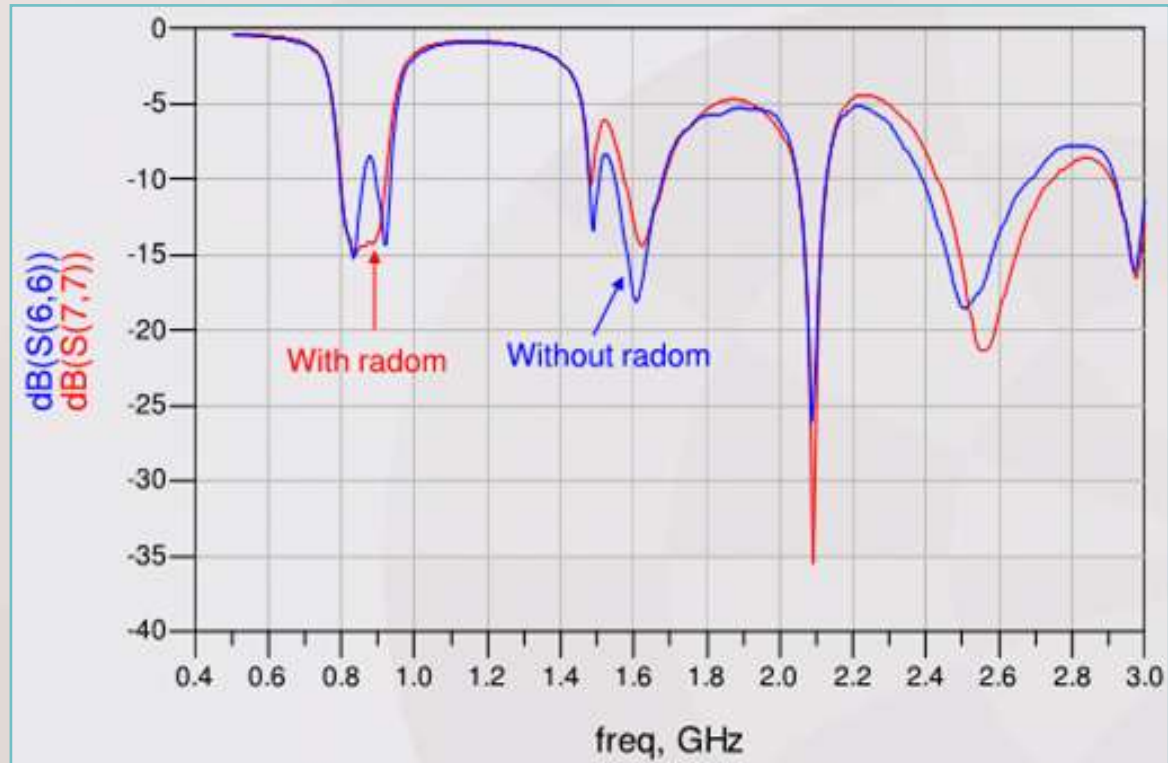
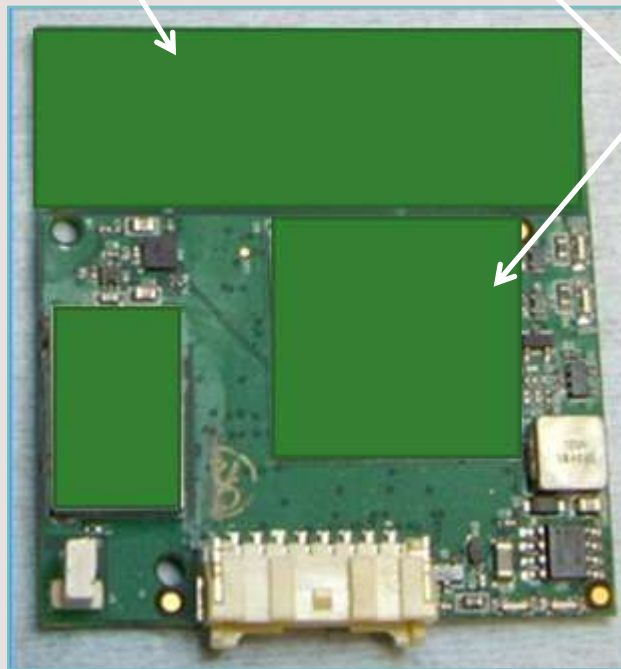
- MOBILE INTERNET DEVICES
- ULTRA MOBILE PC

QUAD BAND GSM INTEGRATED ANTENNA MODULE

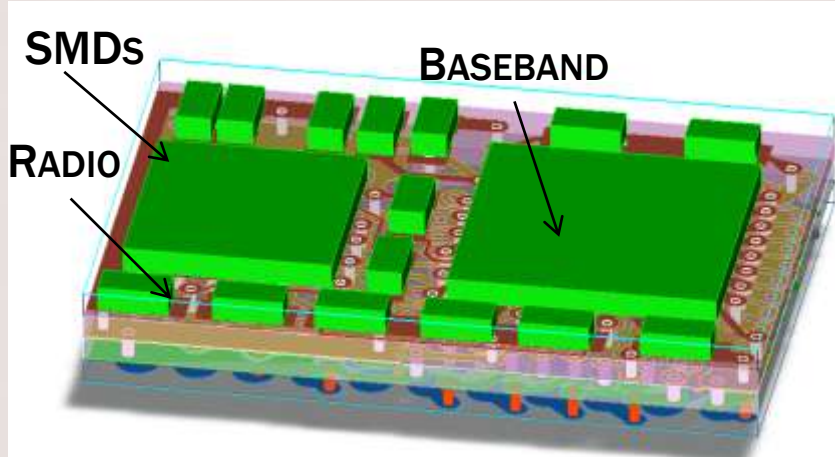
GSM MODULE

ANTENNA

RETURN LOSS MEASUREMENT WITH AND WITHOUT PLASTIC CASE (RANDOM)

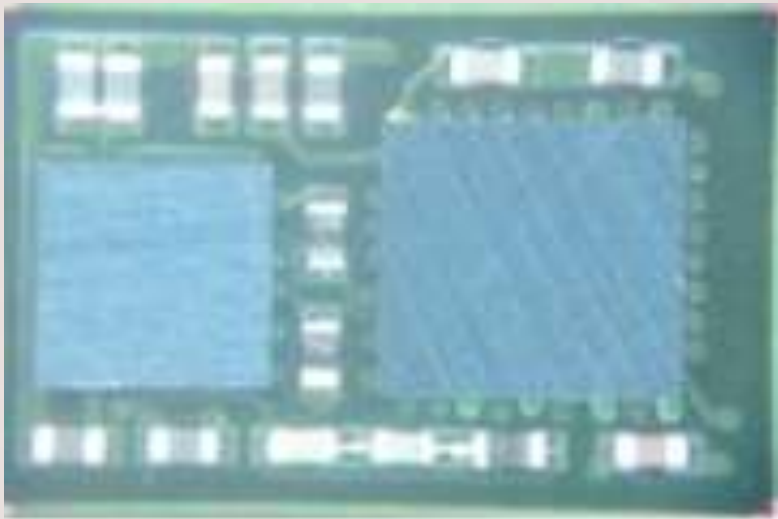


APPLICATION: M2M



RF SiP BASED ON LAMINATE SUBSTRATE

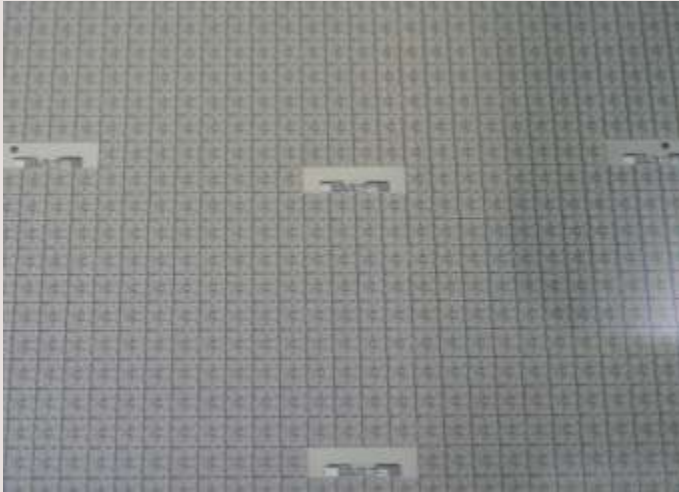
BASEBAND, TRANSCEIVER, SMDs
6x4 mm² HIGH COUNT VFBGA PACKAGE



APPLICATION

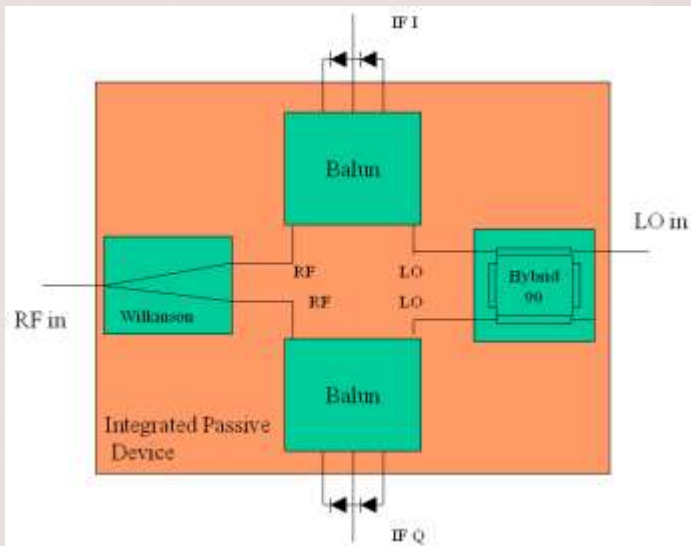
CELLULAR PHONE

ISM IQ MIXER



SILICON BASED IPD

- PASSIVES ON IPD
- CO-DESIGN WITH SUBSTRATE
- 3.5 MM² X 4.5 MM² IPD



APPLICATION:

- TELEMETERING

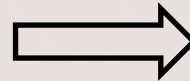
NEXT GENERATION OF LTE FRONT END MODULES

- RADIO CHIPS
 - ST ERICSSON
 - LIME SEMICONDUCTOR
- APPLICATIONS
 - SMART PHONES
 - LTE PICO-CELLS
 - M2M

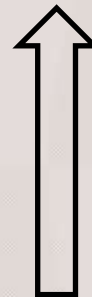
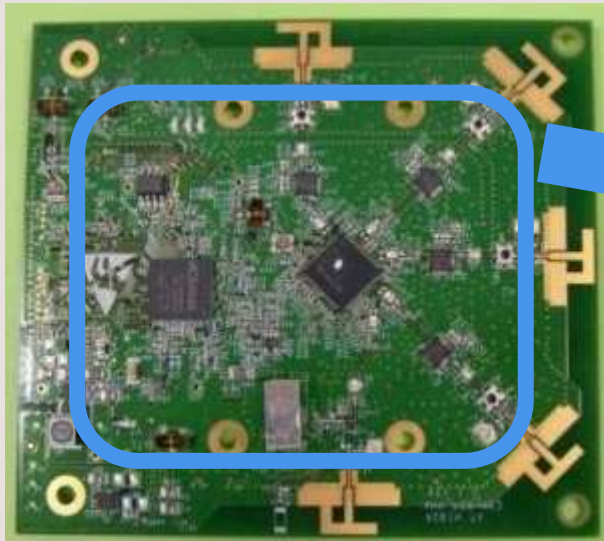


5GHZ WHDI™ MODULES

WHDI RECEIVER MODULE - ISP100903



- 47 X 41 X 4.5MM (WITHOUT HDMI CONNECTOR)
- 65 X 41 X 7.5MM (WITH HDMI CONNECTOR)



WHDI TRANSMITTER DISPLAY MINI CARD - ISP091204

- 44.4 X 26.8 X 5 MM

MINIATURE WIRELESS SENSORS

- EMBEDDING
 - BLE RADIO
 - MICROCONTROLLER
 - SENSORS
 - POWER
- OVERALL SIZE – 1 INCH – IE COIN CELL DIA
- APPLICATIONS
 - BODY NETWORK
 - MINIATURE M2M DEVICES

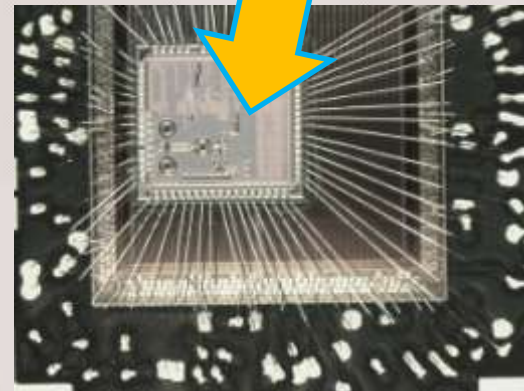
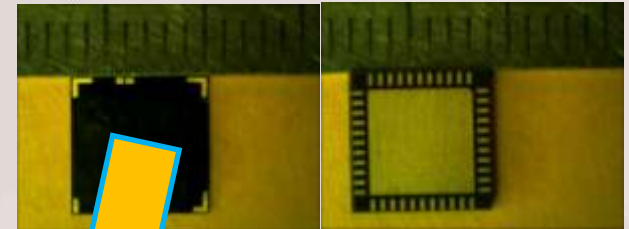


ULTRA SLIM SiP

- **DESIGN SUCCESS**
 - GPS MODULE – OVERALL THICKNESS \ll 0.8MM
- **ADVANCE PROGRAM**
 - OTHER STANDARDS

UWB AIP

- ADVANCE R&D PROGRAM
 - CONFIDENTIAL
- APPLICATIONS
 - CELL PHONE
 - ULTRA-FAST DATA TRANSFER
 - WIMEDIA



60 GHz MODULE

- **ADVANCE R&D PROGRAM**
 - **CONFIDENTIAL**
- **APPLICATIONS**
 - **ULTRA-FAST DATA TRANSFER**
 - **HD VIDEO**
 - **CELL PHONE**

DESIGN HOUSE WITH A UNIQUE EXPERTISE IN:

- **RF SiP (UP TO 60 GHz AND MORE)**
- **ANTENNA DESIGN AND INTEGRATION**
- **CELLULAR AND WIRELESS COMMUNICATION SYSTEMS:**
3G, 60GHz, ANT, BLE, BLUETOOTH[®], GSM/W-CDMA, GPS, ISM, LTE, NFC, RFID, UMTS, UWB, WHDI[™], WiFi, WLAN, ZIGBEE ...

WE DELIVER ON THE PROMISE OF SiP:

- **MORE FUNCTION IN LESS SPACE,**
- **OPTIMIZED COST AND REDUCED DESIGN CYCLES.**

THANK YOU

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Tel : +33 (0) 607 771 474 / +33 (0) 678 559 519