

### WiFi Module

The WLAN SiP design tasked to Insight SiP designers by a leading WLAN chipset supplier is to meet the challenge of providing WiFi capability in portable devices in which size, power consumption and cost are the key driving factors.

Key design challenges addressed at the SiP level are:

- Embedding high-performance RF functions in the LTCC substrate
- High-density interconnect of base-band die on digital functions
- Coupling mitigation between RF signals and noisy digital and power supply signals.

The module includes a Base-band die, and RF die, an antenna switch, a crystal clock and a number of SMD components mounted on the substrate. Inside the substrate, a filter and 2 baluns are integrated.

The functional specifications requirements are:

- 7x7x1.4mm size,
- full compatibility with IEEE802.11b/g
- and very low power consumption (0.3mW in power save mode)

**Applications:**

- Cellular phone
- Digital camera



The major PDA, Smart Phone and wireless headset players require extremely high nodes in order to produce next generation products incorporating many different RF systems in an ever decreasing physical envelope.

The market for Fixed Mobile Convergence (FMC) phones (Cellular/WLAN) is poised for rapid growth. Potential customers are already excited about the prospect of being able to switch seamlessly between their chosen mobile network and their Wireless LAN. A FMC handset allows you to use one device in the street, office and your home and substantially reduce your phone bill.

Insight SiP engineers started the WiFi module design with an initial feasibility study. This feasibility study led to the choice of a solution based on a System in Package approach, allowing each portion of the system to use the most appropriate technology. Furthermore this study showed the need to use wafer scale flip chip technologies and integrated passive devices to meet the overall size constraints.

The main technologies used are SiGe for the RF transceiver and power amplifier, 0.13um CMOS for the base-band and LTCC for the passive integration, band pass filter, baluns and packaging.

The overall WLAN SiP uses an LTCC substrate together with flip chip and surface mount assembly techniques to produce a single package solution.

The choice of LTCC as opposed to a laminate based SiP was made during the feasibility phase, since it was shown to offer similar costs to the laminate based approach, whilst offering a 30% reduction in size.

As a summary, the RF SiP is based on LTCC substrate:

- CMOS Baseband
- SiGe transceiver
- GaAs antenna switch
- Quartz clock
- Passives embedded in substrate
- 7x7mm<sup>2</sup>

For further information, please contact the Marketing Department:  
Tel : +33 (0)4 9290 7330  
Fax : +33 (0)4 9290 7331  
Email : [contact@insightsip.com](mailto:contact@insightsip.com)  
[www.insightsip.com](http://www.insightsip.com)