

### RF Wafer Probe Test Development

Amkor has been performing RF probe since 2004. Test solutions include Amkor developed and customer provided. For today's multi-die packages such as *Stacked CSP* (S-CSP) or System in Package (SiP), having RF probe to source known tested die (KTD) and known good die (KGD) are critical to overall system yield. Also in today's environment the need has arisen for RF die/RF WLCSF sales where KGD is a must. Our RF probe capabilities are also well positioned for emerging TSV (through silicon via) and 3D package trends.

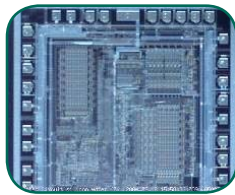
Amkor's experience covers:

- Short beam cantilever cards < 3GHz (suitable for many receivers)
  - GPS, DVB-H, ISDBT, T-DMB
  - Range of CDMA type devices
  - RF screening before assembly
  - Typical tests: Gain, image rejection, signal to noise ratio (SNR), band pass filtering, noise figure, IP2/IP3, phase noise, IQ mismatch, small signal gain
- Membrane cards > 3GHz
  - High precision KGD
  - Impedance matching at device under test (DUT) level
  - Bluetooth WLCSF RF die sales
  - Typical tests: Synthesizer transmit, spectral mask, transmit Tx spurs, magnitude error Tx I/Q phase error, receiver Rx I/Q DC offset, I/Q phase
  - T-DMB & S-DMB Tuner
  - Cellular Transmit
- Pogo pin & vertical RF probe cards < 4GHz – special needs

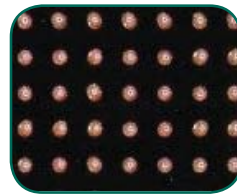
Amkor has experience with RF probe card technologies for multiple topologies / layouts:



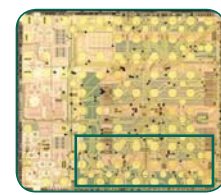
Cu Pillars



In-line Peripheral Pads



Full Array Bumps



Interstitial Pads

Amkor's wafer prober portfolio supports 200 & 300mm, thick and ultra-thin (<150um) wafers, as well as test temperatures from -55 °C to +150 °C. We also offer/support a broad range of industry standard RF ATE equipment and support automation of system level testers as well.

### RF Test Development

In addition to RF probe service, Amkor has broad experience in RF final test including a broad range of industry standard ATE equipment (LTX/Credence, Teradyne, Verigy), our own RFT tester and most recently automation of system level test for 802.11 WiFi and 3G cellular modules (LitePoint, R&S and Agilent). Recent examples of RF test development include:

- Quad site 802.11 WiFi system level test (SiP)
- Complete sCSP / SiP systems ( GPS, DVB-H, T-DMB )
- WCDMA + EDGE (HEDGE) transceiver & power amplifier (PA) modules