

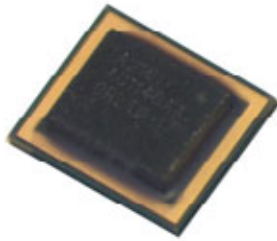
REVERSE COSTING

RF MEMS Antenna Tuner from Wispry

The market for RF MEMS in cell phone finally emerges with the first Wispry antenna tuner in high volume production. RF MEMS switches and varactor are on the verge of being the next very big market for the MEMS industry.

Technology analysis

Ideally suited for front-end tuning applications in portable wireless devices the Wispry component integrates both MEMS capacitor and control IC through a "CMOS First" process. The combined MEMS+CMOS die is wafer level packaged and the die is mounted using flip-chip on a 4.2x3.6x1mm LGA Substrate.

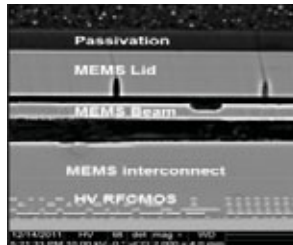


RF MEMS Component
(Courtesy of System Plus Consulting)

Developed by Wispry and manufactured by IBM, RF MEMS elements consist of a network of low-loss inductors combined with Wispry's digitally-tunable MEMS capacitors.



4 Single Capacitors (Courtesy of System Plus Consulting)



MEMS detail (Courtesy of System Plus Consulting)

The manufacturing process starts with an 8" HVC MOS wafer. The MEMS process is divided into three sections: MEMS interconnection, MEMS Beam and MEMS Lid.

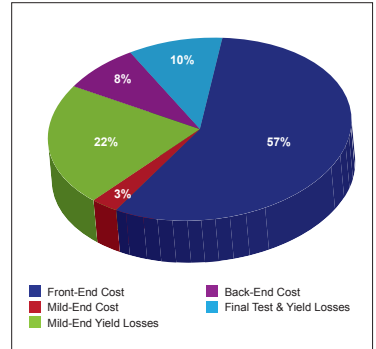
Silicon dioxide is mainly used to manufacture the three sections certainly for its good mechanical properties and its isolation ability.

Cost analysis

The main part of the manufacturing cost is due to the front End with 57% of the total cost.

The HVC MOS Front-End cost is 55% of the total Front-End cost while the MEMS Capacitor cost is only 45%.

The full reverse costing report combining technological analysis of the devices and detailed manufacturing cost is already available.



MEMS Cost Breakdown
(Courtesy of System Plus Consulting)

Recent reverse costing reports

- Invensense MPU6000: MEMS 6 DoF IMU
- Bosch Sensortec BMA250: 3-axes MEMS accelerometer
- Efficient Power Conversion EPC2010: GaN transistor



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