

60GHz CPW-Fed Dielectric-Resonator-Above-Patch (DRAP) Antenna Using Micromachining Technology

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As the demands of high data rates are increased, the 60GHz band is of much interest since this is the band in which a massive amount of spectral space (5GHz) has been allocated worldwide for dense wireless local communications. Recently, the broadband dielectric resonator antennas (DRA) have been proposed as low profile and efficient antenna elements. But, in the 60GHz band, it is difficult to fabricate DRA because of experimental errors due to its small-size. Especially, the alignment between dielectric-resonator and feed-structure become very important.

We present 60GHz wide-band dielectric-resonator-above-patch (DRAP) antenna using micromachining technology. Although DR and patch are designed at the same resonant frequency, in actual operation, this frequency splits into upper and lower frequencies by coupling the DR to patch using a slot in the patch. The bandwidth of the proposed antenna is wider than 20%. The performance of this antenna will be compared with that of DR antenna, and will be shown the availability in the applications using a thick substrate with high dielectric constant such as GaAs.

Patch is supported by 10 μ m-height posts using micromachining technology. Recently 10 μ m-air-up passive components are used for low loss and reduction of spaced size. In the proposed antenna, DR operates as a radiating element while 10 μ m-air-up patch doesn't operate as an antenna but as a resonator only because of high Q. And, using solder-ball-bumping and flip-chip-bonding, DR is exactly aligned with CPW-feed structure in spite of its small-size (0.9mm*0.9mm). When fabricated, align key is etched appropriately.

Moreover, 60GHz antenna measurement system is set up in order to measure the proposed antenna, which is integrated in MMICs.

In the presentation, we will show the details of the abovementioned design/fabrication process. And, simulated and measured results of the proposed antenna will also be shown and discussed.

