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Terahertz Dual-Band Dipole Antenna with Novel Small Flat Quartz-Copper Reflector

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Abstract: In this paper, we have proposed a Terahertz dual-band dipole antenna with a novel small flat quartz-copper reflector. The dimensions of reflector, which is located at a 80 μm distance from antenna, are $300 \times 160 \times 45 \mu\text{m}$. The antenna supports maximum gain of 12.4 dB at 5.2 THz frequency with two main resonant frequencies at 2.58 and 5.33 THz. Also, the proposed Terahertz antenna is used as an array element in linear and planar sets of elements, which are evaluated by using array method. An array Terahertz antenna, which has maximum gain of 18.7 dB at 5.2 THz, is proposed.

Keywords: Dipole Antenna, Terahertz Antenna, Array Antenna, Dual-Band, Reflector, Quartz.

1. Introduction

The frequency range between microwave and infrared is called sub-millimeter or Terahertz band that is generally defined as 0.1 to 10 THz. High transferring rate of data in order of Gbps (Gbits/s) is possible at Terahertz frequency range which is suitable for using in wireless communication systems [1-2]. Also, Terahertz band is more secure than of that at microwave frequency range because of its high directivity in wireless communication systems [3-4]. In this frequency range, the antenna size is small and can be useful to provide

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