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GHz and THz properties of graphene and graphene patch antennas DAVID CAREY, MOJTABA DASHTI, University of Surrey — The distinctive band structure of graphene allows for both inter- and intra-band contributions to sheet conductivity at different energy and frequency scales. Here we report the variation of 2D sheet conductivity and related electronic properties of single layer graphene in the GHz to THz regime. We identify the different contributions to conduction of both the real and imaginary part of the 2D sheet conductivity as function of temperature, chemical potential and scattering time within the random-phase approximation. With knowledge of the high frequency variation of the 2D sheet conductivity, a circular microstrip graphene patch antenna with a central frequency of 2 THz has been designed. We report the factors that control the antenna frequency, bandwidth as well as the voltage standing wave ratio, radiation efficiency, and the radiation pattern of both the electric and magnetic field components. Comparison with a similar copper patch antenna demonstrates the advantages of using graphene. The prospects for graphene based antennas operating in the THz part of the spectrum are also discussed.

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