Triple band frequency tunable polarization insensitive metamaterial absorber for WLAN and 5G applications	
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Abstract: A triple band metamaterial absorber (MMA) has been demonstrated in this paper that is developed on an FR4 substrate targeting WLAN and 5G frequencies. The resonating patch contains three modified concentric copper rings having overall unit cell dimensions of 0.16λ0 × 0.16λ0 × 0.0128λ0, where the wavelength, λ0 is for 2.4 GHz. The MMA exhibits 99.3%, 95.68%, and 99.5% peak absorption at 2.4, 3.5, and 5.85 GHz, respectively. Length variation of inwardly extended metallic stubs attached to the innermost ring provides frequency tuning flexibility for peak absorption within 5.67 GHz–5.98 GHz. The absorption process of the MMA is analyzed through the distribution of surface current. The MMA exhibits incident and polarization angle insensitive behaviour up to 60° for both TE and TM modes with near zero polarization conversion ratio. The resonance characteristics are justified through equivalent circuit modelling with validation by Advanced Design software (ADS). The measured absorption indicates a close resemblance with the simulation. Moreover, a good effective medium ratio of 6.25 shows the compactness of MMA. Due to its compact structure, incident, and polarization angle insensitivity, and near unity absorption at application-specific frequencies, this perfect MMA can be suitable for WLAN and 5G applications, especially for microwave shielding and sensing.