Screen Printed L-band Circularly Polarized Antenna for Textile Platforms

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To support the ever-increasing demand for more communication systems for the soldier, novel antenna systems integrated onto clothing are being investigated in order to maintain free-range of movement without degrading antenna performance. Textile antennas show great promise due to their ease of integration onto the fabric. They also are inherently lightweight as well as flexible relative to conventional antennas. In this paper, we present antennas printed on textiles for body-wearable applications. The antennas are screen printed onto the fabric to provide a smooth integration onto clothing while preserving the original properties of the textiles. These antennas use commercially available functionalized silver screen printable inks that are common for printed electronics applications. Antenna performance characteristics such as input impedance (radiation resistance and imaginary part), gain, axial ratio, VSWR (Voltage Standing Wave Ratio), E-plane and H-plane radiation patterns, and bandwidth are investigated for a L-Band circularly polarized antenna. Results are given for simulations involving antennas on fabric, without a balun, with a balun, and ferrite beads acting as a choke balun. Bandwidth is defined between the VSWR = 2.0 (return loss of -10dB) upper and lower frequencies with the antenna matched to the radiation resistance at the center frequency. Experimental measurements were also obtained in an anechoic chamber and agreed with simulation results for patterns, VSWR, and return loss. This preliminary research shows promise and is leading to conformal antennas on textile-based platforms.

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