

High-Power RF Source Development

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Compact, reliable high-power radio frequency (RF) sources are under development by DIEHL-BGT-Defence for potential RF weapon (RFW) applications. Typical development projects include the DS350 high-power laboratory source for electromagnetic effects testing and the DS110 range of compact sources.

The DS350 laboratory system has been shown to produce field strengths more than 300 kV/m at 1 m range, and operating in the lower VHF-region with radiated pulse energy of 30J. The system was not optimized for compact volume, rather as a reliable, modular laboratory testing system. One useful feature of this system is the convenience with which different antennas can be connected, allowing maximum flexibility during either effects testing or antenna development. A brief description of the system, together with simulated and measured radiated field data will be presented.

The DS110 range of compact autonomous sources is available either integrated into small suitcases or in cylindrical geometry. Radiated field measurements will be presented to show that field strengths of approximately 100-160 kV/m at 1 m range are obtainable with an upper VHF damped sinusoidal pulse with some nanosecond pulse length. The peak radiated field can be doubled with optimized specific reflector constructions. Of particular interest for testing applications is the DS110B tunable source with a tunable centre frequency range covering the VHF band. A new long-pulse version of the DS110B known as the DS110B-LP has been tested which is specifically intended for test applications. The antenna is DC-charged to up to 100 kV, and can produce pulse lengths in excess of 10 cycles with excellent pulse repeatability. Both, the frequency and duration of this pulse can be varied. A lower frequency version of the DS110 antenna will also be discussed to show that both, frequency and bandwidth of the DS110 sources can be selected according to specific requirements, so that there is the possibility to optimize these sources for efficient coupling into targets.

The DS110A3 3-antenna high-power array has been shown to produce stable pulses more than 600 kV/m. The advantages of this system are not only higher field on target, but also enhanced directivity which prevents radiation in undesired directions. The DS110A3 has been integrated into a small trailer to allow the evaluation of mobile RFW scenarios.