

RECENT ADVANCES IN MESOBAND MICROWAVE SOURCE TECHNOLOGY

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Recent years have seen the development of several new types of very high power microwave (HPM) sources designed to produce a damped sinewave or damped squarewave signal with a center frequency in the range of 100 MHz to 1 GHz. (W.D. Prather, C.E. Baum, et al, "Survey of Worldwide Wideband High Power Capabilities," *IEEE Trans on EMC, Special Issue on HPEM and IEMI*, **46**, 3, August 2004). When designed to operate at very high voltages, these sources often use the natural oscillations of pulse forming networks or antennas and thus typically ring down in 5-6 oscillations which corresponds to a Q of around 6-10 and a bandwidths of 10-15% (or a band ratio of about 1.1). It is desirable to have longer decay times and correspondingly narrower bandwidths, and our research is pushing us in that direction. Voltages may be as low as 40 kV or in the range exceeding 500 kV.

Such sources do not rely on evacuated electron beam technology, but instead use Marx generators or resonant transformers to drive oscillating pulse forming networks or resonant antennas. As a result, they are typically smaller, lighter weight, and more energy efficient than their narrowband counterparts. Although they don't have the power of narrowband HPM sources, their relative simplicity, size, frequency range, and bandwidth make them attractive for some applications.

Since these sources are designed to couple efficiently to targets of interest, they operate in the frequency band between 100MHz and 1 GHz. However, because of the wavelengths involved, this also creates unique challenges for the antenna designers (C.E. Baum, "More Antennas for the Switched Oscillator," Sensor and Simulation Note 493, August 2004).

This paper reviews some of the latest developments in mesoband source and antennas technology in both the US and Europe. The work was supported in part by the Air Force Office of Scientific Research.