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We have demonstrated the generation and radiation of an ultra-wideband (UWB) radiation using a high T_C superconductor (HTS) laser triggering fast opening switch, a transmission line pulse forming network, and conical monopole transmitting and receiving antennas. The HTS serves as almost ideal opening switch. It has zero on-resistance, and when triggered by a picosecond laser pulse, is converted to the high resistance off-state on a picosecond time scale. A Ti-based HTS is employed in a current charged transmission line (CCTL) as shown in Fig. 1(a) to generate a square pulse. When used to drive a short conical monopole (CMA) transmitting antenna and received by a short CMA a set of pulses approximating the third derivative of the pulse is received as shown in Fig. 1 (b).

A single step function is sometimes more desirable than a square pulse for practical application. A single step function was generated and drove to radiate using H-type coplanar microstrip line or a T-type coplanar wave guide $YBa_2Cu_3O_{7-x}$ HTS device as shown in Fig. 2.

The superconductor devices were refrigerated by liquid nitrogen and dc biased with a 75 mA current. A diode pump YLF laser was employed to generated a 5 mJ, 125 ps (FWHM), 500 Hz pulse train. When triggered by the laser pulses, a train of electrical pulses was generated as monitored by a Tektronix sampling oscilloscope 11802. These pulses have a rise time limited by laser and a fall time of ~ 100 ns.

The fast rising edge of the electrical pulse behaves like a single step functions as shown in Fig. 3(a). These step function was fed into a CMA transmitting and receiving system. The received pulse which was viewed by the same sampling oscilloscope is shown in Fig. 3(b).

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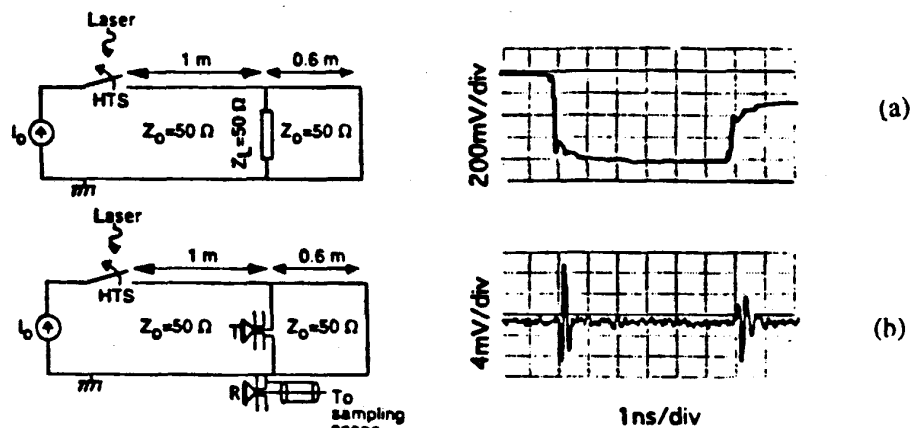


Fig. 1 (a) the generation of a square pulse and (b) the radiation associated with (a).

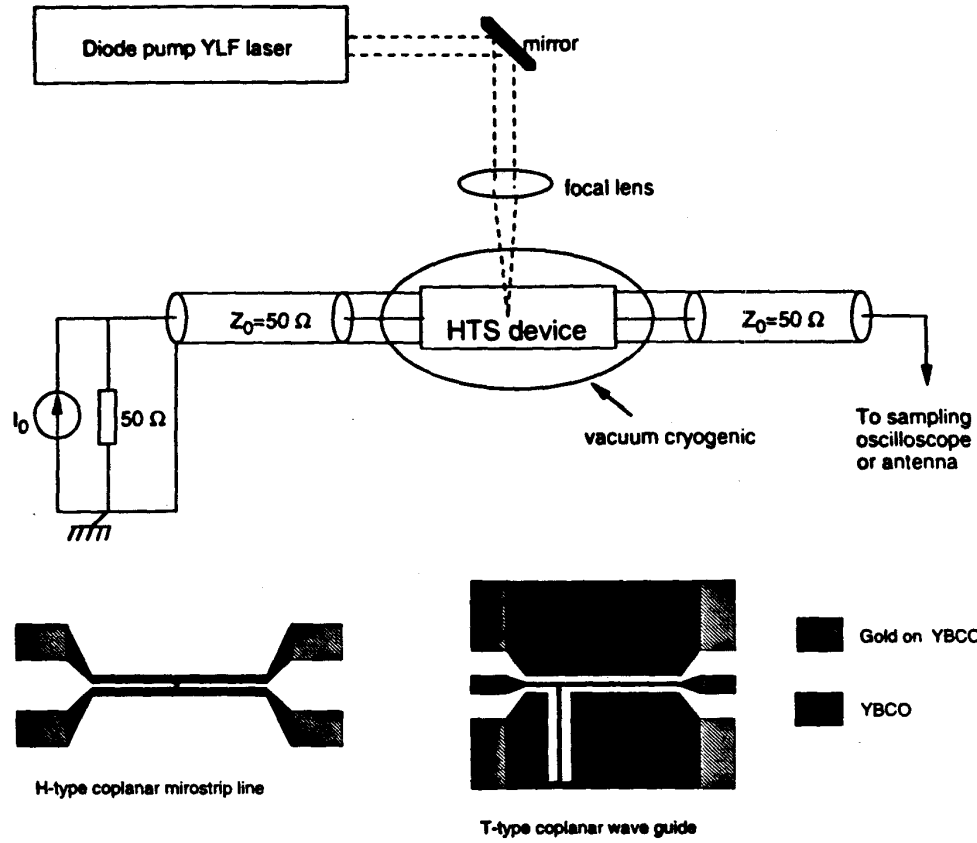


Fig. 2 Experimental setup for generating a single step function and the radiation associated with it.

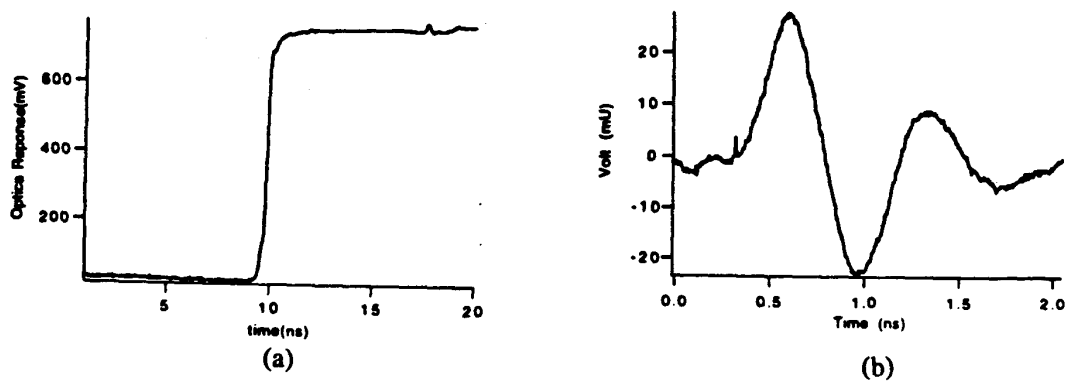


Fig. 3(a) The generated single step function and (b) the radiation associated with (a).