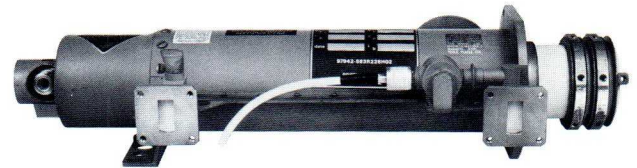


LITTON COUPLED CAVITY TRAVELING WAVE TUBES

Multi-Kilowatt Pulsed
PPM Focused TWTs 2 GHz to 20 GHz



Features

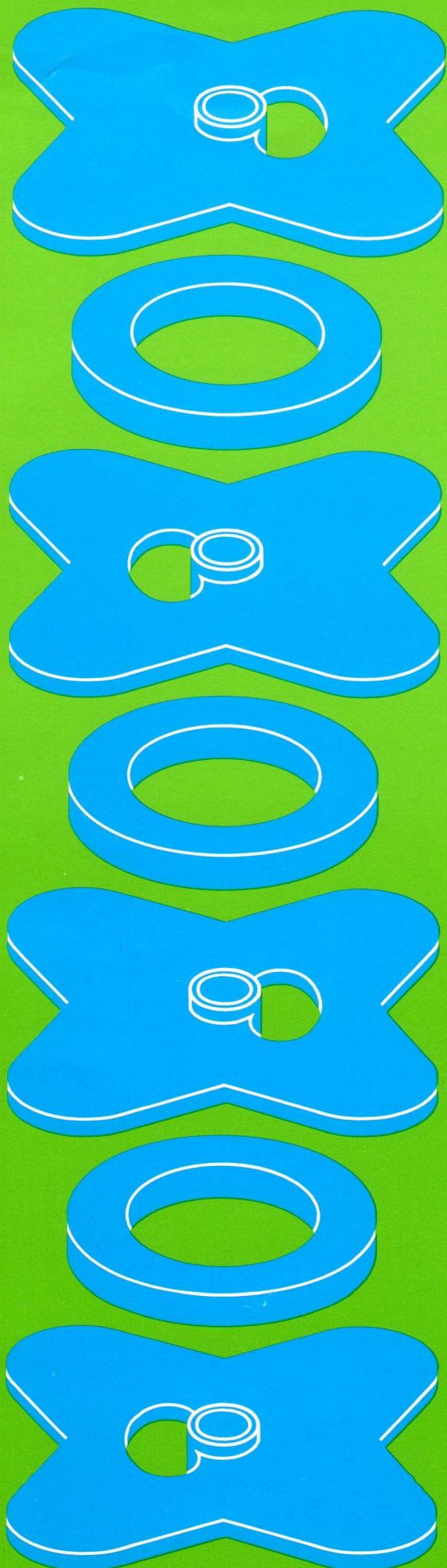
High Average Power

Light Weight

Ruggedness

Excellent Stability

Long Life



Description

Litton Pulsed Coupled Cavity Traveling Wave Tubes produce multi-kilowatts of peak microwave power for radar and ECM applications. The tubes are available in discrete bandwidths from 2 to 50%, at frequencies from 2 to 20 GHz, with pulsed output powers from 1 to 200 kilowatts.

Coupled Cavity Traveling Wave Tubes are rugged, survive the most severe environmental conditions and are the ideal choice for microwave systems requiring high average power and high peak power.

Applications

Specific applications for Litton Coupled Cavity TWTs include use in high resolution radar systems such as airport surveillance, aircraft fire control, air to ground mapping, tracking, etc. They may be employed in threat-oriented ECM systems either as drivers or output tubes. Coupled Cavity Traveling Wave Tubes are used in ground installations and vehicles, on ships, in aircraft and in space.

The Coupled Cavity Circuit

The coupled cavity circuit consists of integral pole pieces and copper spacers forming a series of RF cavities electromagnetically coupled through "kidney" slots. Pole pieces and spacers are brazed together at high temperatures forming a rugged RF circuit. Because of its high thermal conductivity, the circuit is capable of handling high average power. Most modern Coupled Cavity TWTs are PPM (Periodic Permanent Magnet) focused with samarium-cobalt magnets. X or I-Band Coupled Cavity TWTs are capable of producing 1 kilowatt of average microwave power. For higher average powers, the Coupled Cavity TWT may be focused with a wrapped-on solenoid, thereby increasing the average power capability to several kilowatts at X or I-Band.

Many Litton coupled cavity TWTs use the proprietary pill magnet and clover leaf pole piece circuit, in place of the conventional ring magnet and circular pole piece design. This increases the efficiency of the magnetic circuit, while reducing both the weight and the cost.

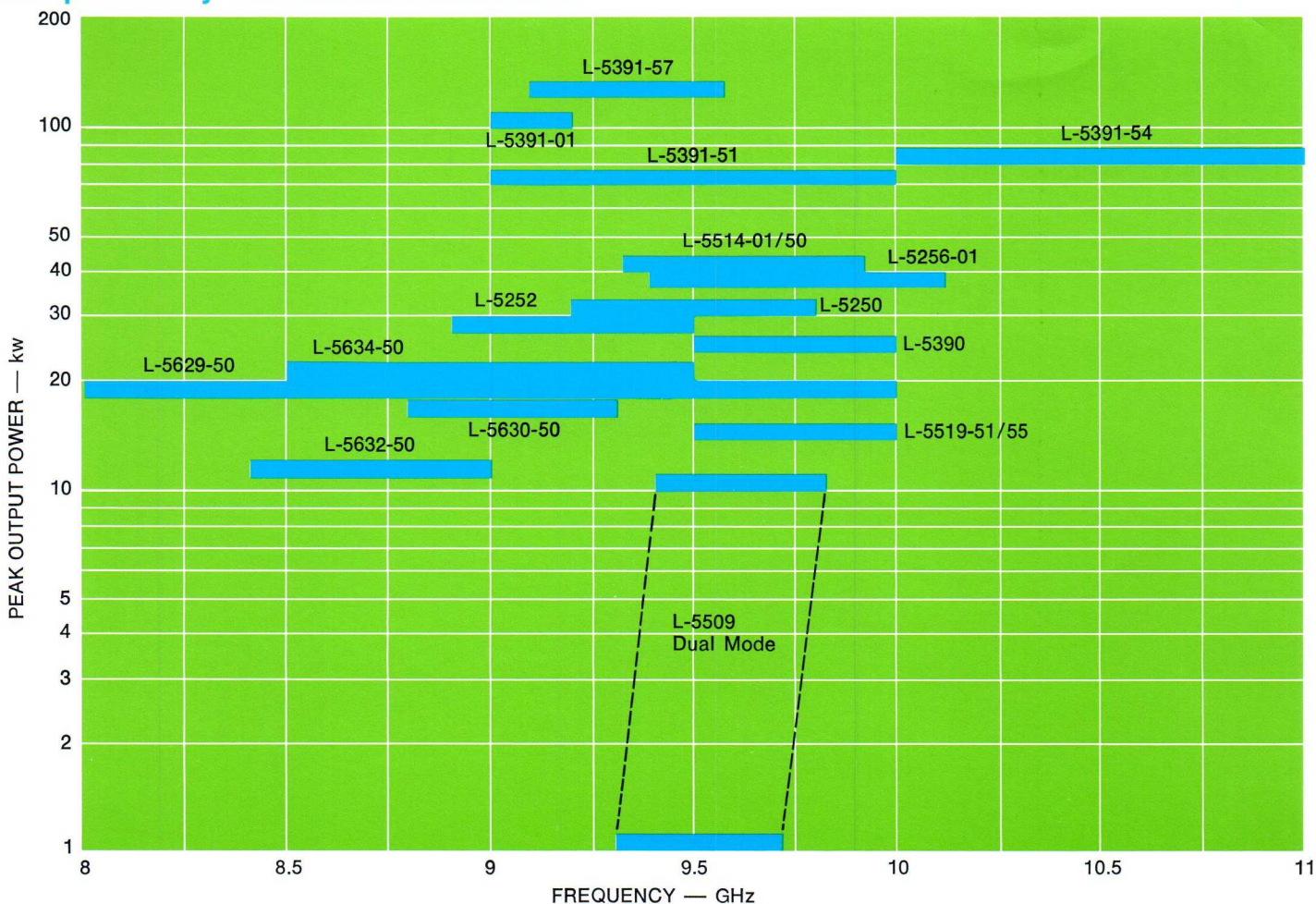
Carefully designed and controlled loss patterns, using both loss buttons and Litton's proprietary "loss segments," give these tubes excellent stability with uniformly high efficiency over wide frequency ranges.

The Electron Gun

Litton provides Coupled Cavity TWTs with either cathode-pulsed or grid-pulsed guns, depending on customer requirements. In all grid-pulsed guns, the control grid is protected by a shadow grid at cathode potential, which minimizes grid current and allows operation at high duty.

All Litton guns use potted heaters for ruggedness and optimum heat transfer from heater to cathode.

Coupled Cavity TWT X-Band Product Line



The cathode is a dispenser type, manufactured at Litton under rigid controls, to give high and uniform emission over a very long life. The longevity has been proved both by independent life tests and by millions of hours of field operation.

Litton has pioneered the 10 dB pulse-up dual mode gun allowing single Coupled Cavity Radar and EW TWTs to operate both CW and pulsed. The Litton dual mode gun approach uses inner and outer coaxial control grids, which provide focusing in either mode equal to that of the best single mode guns.

Typical Performances

The chart on page 3 highlights the minimum peak power/frequency operating ranges of some of Litton's X or I-Band Coupled Cavity TWTs.

Design Capability

Litton's engineering staff is backed by powerful computers and an extensive library of well-developed programs enabling scientists and engineers to compute parameters for new designs and optimize performance prior to cutting metal. This allows each design to be tailored to the customer's exact requirements with minimum time and cost.

Over the years Litton has built a sound library of more

than 150 computer programs covering all aspects of traveling wave tube design.

Litton engineers have at their disposal a computerized beam analyzer which enables them to measure electron beam profiles and trajectories in new designs prior to their use in tubes. The analyzer is also used to solve gun and beam problems that may arise in production.

In recent years Litton's Coupled Cavity TWT group has been first to design and build a 200 W CW TWT for space communication, first to design and test a 10 dB pulse-up dual mode gun, first to supply a 10 dB dual mode radar high power tube, first to design a stable lossy line TWT, first to design and supply a loss segment TWT, and first to use the asymmetric multistage depressed collector.

Manufacturing Capability

From prototype to production, Litton's manufacturing organization maintains discipline and control to ensure product yield and reliability. The organization prides itself on meeting shipping schedules and has demonstrated consistent capability in volume production. Continuous engineering support is maintained through all phases of production to guarantee sound designs, high reliability and performance.

