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Electric Material Measurement Technology

Technology based on the resonance method, to evaluate with a high resolution of significant digits of up to 4 digits or more, a dielectric loss tangent of 10^{-5} or less, with the specific inductive capacity of electric material in microwave and millimeter wave bands developed. To meet the evaluation of various electric materials, e.g., resonator materials, circuit substrate, liquid/stick electric materials, and the electric material cylinder resonator method, cut off cylindrical waveguide method, cavity resonator method, balance type circular plate resonator method, and TM_{0m0} cavity resonator method were developed.

Tools and specimens were developed for each method. In addition, validation tests as a standard method were carried out with round-robin tests and passed, and thereby they spread as JIS standards and IEC international standards. They contributed to the development of fine ceramics, LTCC materials, and resin substrate materials which boast a high level of global competitiveness. Even today, they are employed as an infrastructure technology to make it possible to carry out the high precision design of communication electric filter circuits and plane circuits.

LTCC: Low Temperature Co-fired Ceramic

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SHF Band Receiver for Satellite Broadcasting

Today we see compact antennas for satellite broadcasting on rooftops and balconies on all houses. It is a common scene. A down-converter which converts SHF (microwave) charged waves from a broadcasting satellite down to an intermediate frequency is imbedded in the antenna. When satellite broadcasting was under development, the microwave circuit was mounted on the plane pattern. To set up the microwave circuit in the waveguide was a quite a unique concept and thanks to this seminal circuit technology, price reduction and low noise of the down converter were realized. Furthermore, the method to directly convert from the FM waves of satellite broadcasting to AM waves the same as terrestrial broadcasting was proposed, and thereby inexpensive receivers for satellite broadcasting were realized. Taking this opportunity, current satellite broadcasting which directly receives radio wave from the satellite at home became widespread.