Microwave Abstracts

Based on technical merit and timeliness, microwave papers in journals published outside the United States have been selected and compiled below, generally with brief abstracts. Reprints of the papers may be obtained by writing directly to the author or to the source quoted.

—F. G. R. Warren, *Associate Editor for Abstracts*
RCA Limited, Montreal, Canada

Papers from Journals Published in Japan

Compiled by Prof. T. Okoshi, Department of Electrical Engineering, University of Tokyo. Prof. Okoshi points out that, where articles in Trans. IECEJ, *in Japanese, are referenced, these may be available in English translation, with a few months' delay, in* Electronics and Communications in Japan.

1
The Absorbing Wall Utilizing the Combination of Lossy Dielectric Layers and a Magnetic Layer, by Y. Shimizu, K. Suetake, Y. Naito, and K. Wakayama (Tokyo, Institute of Technology, Meguro-ku, Tokyo, Japan 152); *Trans. IECEJ*, vol. 53-B, July 1970, pp. 381–388.

A super-wideband absorbing wall using both lossy dielectric material and lossy magnetic material has been developed. Two types of the wave absorbing walls are reported; one has been designed at 70 MHz and the other at 100 MHz. The thicknesses of the walls are 90.6 cm and 53 cm, respectively.

2
Device Application of Ferromagnetic Semiconductors for Microwave Power and Frequency Measurements, by M. Toda (RCA Research Laboratories, Machida-shi, Tokyo, Japan 194–02); *Trans. IECEJ*, vol. 53-B, July 1970, pp. 397–403.

A sharp increase is observed in the resistance of a ferromagnetic semiconductor (In-doped $HgCr_2Se_4$) under the condition of FMR (ferromagnetic resonance) in a circularly rotating RF magnetic field. Using this effect, a new power-measuring device has been constructed, which makes it possible to measure both incident and reflected power separately. This device can also be used for frequency measurement.

3
A New Method of Measuring Microwave Oscillator Noise (Long-Line Method), by T. Okoshi, S. Hashiguchi (Faculty of Engineering, Tokyo University, Bunkyo-ku, Tokyo, Japan 113), M. Matsumoto (Fujitsu Co., Ltd., Kawasaki-shi, Japan 211), and M. Kotani (Faculty of Engineering, Tokyo University); *Trans. IECEJ*, vol. 53-B, Aug. 1970, pp. 422–427.

A new FM discriminator with relatively high sensitivity has been devised and constructed for noise measurements in solid state microwave oscillators. This discriminator consists of a magic tee and a long transmission line, short-circuited at one end. The sensitivity as an FM discriminator is equivalent to that of a cavity resonator with a Q factor between several thousands and several tens of thousands.

4
Determination of Equivalent Circuit Parameters Describing Noise from a Gunn Oscillator, by S. Hashiguchi and T. Okoshi (Faculty of Engineering, Tokyo University, Bunkyo-ku, Tokyo, Japan 113); *Trans. IECEJ*, vol. 53-B, Aug. 1970, pp. 459–463.

The fluctuation in oscillator output originates from impedance fluctuation in the low-frequency region (baseband noise) and voltage or current fluctuation in the vicinity of the carrier frequency (microwave noise). From newly defined "complex correlation coefficient between AM and FM noises," contributions of the baseband and microwave noises to AM and FM noises are determined.

5
Noise Reduction of Oscillators by Injection Locking, by T. Ota and M. Hata (Research Laboratories, Oki Electric Industry Co., Ltd., Tokyo, Japan 108); *Trans. IECEJ*, vol. 53-B, Sept. 1970, pp. 487–494.

Self-injection locking is proposed for noise reduction. The noise reduction effects of the self-injection locking system and an ordinary (external) injection locking system are analyzed. The effect of injection is represented by the variation of instantaneous load admittance, and the noise component of the oscillator is represented by an equivalent noise admittance.

6
A Small-Size Matched Waveguide-Load with Rubber-Ferrite Sheets, by Y. Suetake, Y. Naito, Y. Shimizu, and S. R. Ramasamy (Faculty of Engineering, Tokyo Institute of Techonlogy, Meguro-ku, Tokyo, Japan 152); *Trans. IECEJ*, vol. 53-B, Sept. 1970, pp. 502–505.

A small-size wideband matched-load for a rectangular waveguide (TE mode) has been constructed by using new "magnetic resistance sheets," each of which is composed of a thin rubber-ferrite sheet backed by a metal plate. The matched load element consists of two such sheets, shaped in the form of the letter "V", which are inserted obliquely into the waveguide. With a load as short as 8 cm, a VSWR less than 1.05 has been attained at frequencies ranging from 3.8 to 4.8 GHz.

7
Experimental Analysis of the Large-amplitude, High-Efficiency Mode, Oscillation of Avalanche Diodes, by H. Yanai, H. Torizuka, N. Yamada, and K. Ohkubo (Faculty of Engineering, Tokyo University, Bunkyo-ku, Tokyo, Japan 113); *Trans. IECEJ*, vol. 53-B, Sept. 1970, pp. 520–528.

A high-efficiency mode of oscillation from an avalanche diode is investigated. The results suggest the presence of a buildup mechanism involving the TRAPATT-mode of oscillation. Voltage and current waveforms at various node-points are observed and analyzed.

8
The Thickness of Electromagnetic Wave Absorbers Utilizing Ferrite, by Y. Naito and E. Fujiwara (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, Japan 152); *Trans. IECEJ*, vol. 53-B, Sept. 1970, pp. 537–545.

This paper deals with the determination of the optimum thickness t_m of ferrite absorbers. A previously reported experiment suggested that t_m ranges from 5 mm to 8 mm regardless of matching frequency. It has recently been found that t_m is closely related to Shonek's value S.

9
A Local Oscillator for Repeater Equipment in the 70 GHz Band, by M. Sugiyama, M. Ando, and T. Watanabe (Central Research Laboratories, Nippon Electric Co., Ltd., Kawasaki-shi, Japan 211); *Trans. IECEJ* (Corresp.), vol. 53-B, Sept. 1970, pp. 506–561.

A varactor-chain local oscillator has been constructed which features high efficiency. The fundamental oscillator is an 11-GHz IMPATT delivering 28 dBm. The overall loss of the doubler-tripler chain delivering 66 GHz local oscillator power is 10.0 dBm.

10
Characteristics of Parallel-Plate Transmission Lines on Silicon-Silicon Dioxide, by H. Hasegawa and H. Yanai (Faculty of Engineering, Tokyo University, Tokyo, Japan 113); *Trans. IECEJ*, vol. 53-B, Oct. 1970, pp. 567–575.

Characteristics of a transmission line on a Si-SiO_2 system to be employed in monolithic IC's are analyzed. The wave exhibits three principal configurations. They are: 1) slow-wave mode; 2) TEM mode in silicon; and 3) skin-effect mode. Mode boundaries, equivalent circuits and field distributions are presented.

11
Design Theory of a Proposed Wideband Lumped-Element Isolator, by Y. Konishi and N. Hoshino (Technical Research Laboratories of Nippon Hoso Kyokai, Setagaya-ku, Tokyo, Japan 157); *Trans. IECEJ*, vol. 53-B, Oct. 1970, pp. 598–606.

Theory and experimental results of a proposed widebanding technique for an isolator are presented. The proposed technique assures a wideband performance for the backward isolation as well as for the insertion loss. An ultra-wideband isolator is constructed and shows 20-dB isolation from 70 MHz to 800 MHz.

12
On the Characteristics of the Varactor Upconverter, by S. Ono and T. Shiino (Research Laboratory of Oki Electric Industrial Co., Ltd., Tokyo, Japan 108); *Trans. IECEJ*, vol. 53-B, Oct. 1970, pp. 621–628.

A new simple method is presented for analyzing the transmission characteristics of a varactor upconverter. The characteristics include the dynamic response, frequency response, and AM–PM conversion. A close agreement is found between the theory and experimental results with a 6-GHz upconverter using varactor VAB-824-A.

13
Wideband IMPATT Oscillator, by Shinoda and M. Yamamoto (Fujitsu Laboratories Ltd., Kawasaki-shi, Japan 211); *Trans. IECEJ* (Corresp.), vol. 53-B Oct. 1970, pp. 630–631.

An IMPATT oscillator tunable over 10.5–12.5-GHz band with a power variation less than 1 dB has been constructed.

14
Variable Operating-Frequency Circulator, by Y. Naito and N. Tanaka (Faculty of Engineering, Tokyo Institute of Technology, Meguro-ku, Tokyo, Japan 152); *Trans. IECEJ*, vol. 53-B Oct. 1970, pp. 631–632.

The center frequency f_0 of a lumped-element circulator is made tunable by using varactors. A circulator tunable over 120–220 MHz has been experimentally realized.

15
A Method of Broadbanding a Circulator, by Y. Naito and N. Tanaka (Faculty of Engineering, Tokyo Institute of Technology, Meguro-ku, Tokyo, Japan 152); *Trans. IECEJ*, vol. 53-B. Oct. 1970, pp. 632–634.

A new broadbanding technique to be applied to a distributed-constant circulator is discussed. A broadbanding from 250 MHz to 750 MHz has been experimentally achieved with a 2.3-GHz circulator.