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Invention of mesh-emitter transistors for the UHF band (Fujitsu Limited)

~ Discrete Semiconductor/Others ~

When a bipolar transistor is operated at a high frequency and high current density, current crowds at the emitter peripheral portion close to the base electrode and only the emitter peripheral portion performs transistor operation (This is called base cut-off). For this reason, it is desirable to keep the emitter perimeter as large as possible within the collector area. Fujitsu's Fukuta devised a mesh-emitter transistor (MET) that arranged the emitter diffusion layer region in a lattice shape, and Fujitsu developed and commercialized a high-output transistor with 30W output at 1 GHz.

On the occasion of the Tokyo Olympic Games in 1964, TV spread nationwide. UHF satellite transmitters were installed nationwide to eliminate areas with viewing difficulty, and this device was adopted to an all transistor type UHF 10W TV transmitter. (Rated 10W, saturation output 30W)

In the paper published in 1973, it stated that about 10,000 METs were adopted to the equipment by this year, which indicates the scale of this application field at that time.

The mesh emitter transistor was developed further, and in 1983, a transistor with the capacity of 100 W output at 900 MHZ was developed.

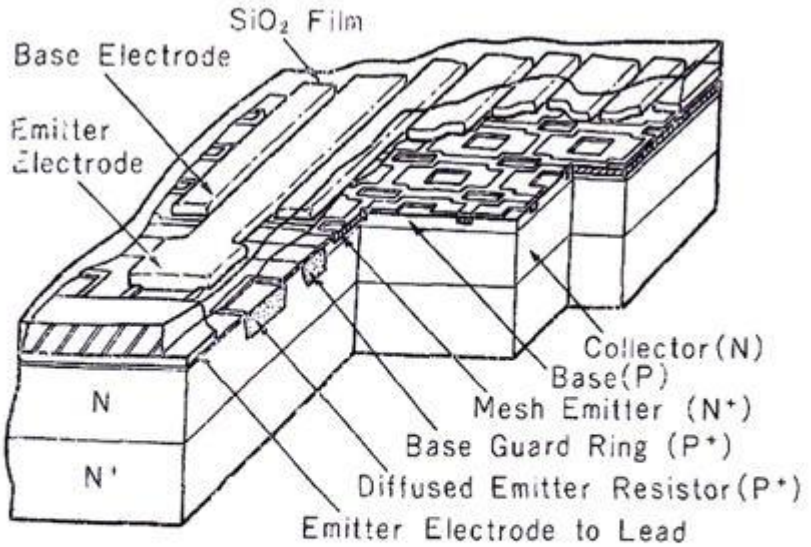

図8　高信頼METの断面図
Fig.8-A cross sectional diagram of a highly reliable MET.

Fig.1: Schematic cross-sectional view of the mesh emitter transistor

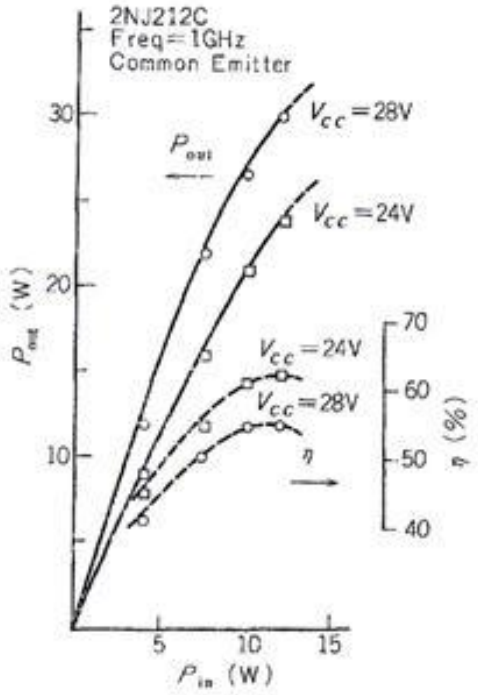

図9　高信頼MET 2NJ212Cの入出力コレクタ効率特性
Fig.9–Typical power output and collector efficiency vs. power input of highly reliable MET 2NJ212C.

Fig.2: I/O characteristics of mesh emitter transistor

References:

(1) M. Fukuta, H. Kisaki, and S. Maekawa、“Mesh emitter transistor” Proc. IEEE, 56, P. 742 (April 1968)

(2) K. Ishii, H. Yamawaki, S. Kashiwagi, & E. Yamashita, “A 900 MHz 100W CW Mesh Emitter Type Transistor with P.H.S. Structure” IEDM Digest of Tech. Papers, pp.225-227, (Dec. 1983)

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