August 1972

B72-10518

NASA TECH BRIEF

NASA Headquarters

A Voltage-Tunable Three-Terminal Gunn Device

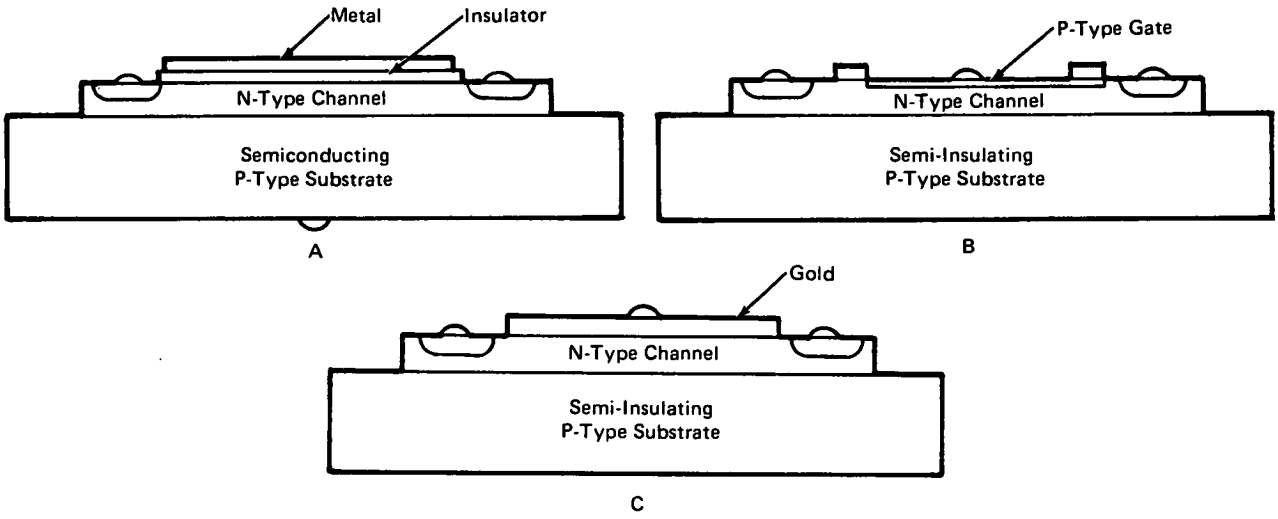

Figure 1.

The problem:

Standard two-terminal Gunn oscillators require electrical or mechanical tuning of a resonant cavity to modulate the frequency of oscillation. In general, these cavities are bulky.

The solution:

A voltage tunable three-terminal Gunn Device has been developed which does not require a bulky resonant cavity and which allows the oscillation frequency to be rapidly tuned with simple circuitry.

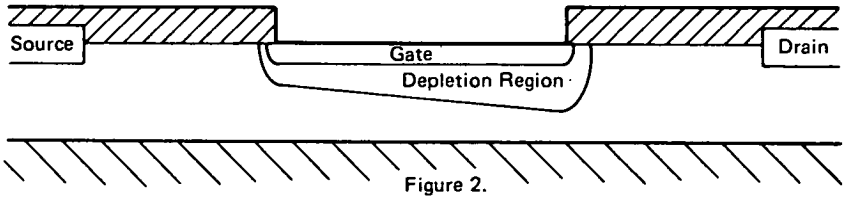

Figure 2.

How it's done:

The newly developed Gunn oscillator, shown in Figure 2, is a three-terminal device which consists of a piece of gallium arsenide (GaAs) with the source, drain, and gate contacts. The oscillations occur because of domain formation and propagation through a thin epitaxial layer of GaAs, which has been deposited on a layer of semi-insulating GaAs. The Gunn domains propagate in a direction parallel to the substrate. The gate contact can be a metal-insulator-semiconductor sandwich, a reverse biased p-n junction, or a Schottky barrier junction, as shown in the Figure 1 sections (a), (b), and (c), respectively.

(continued overleaf)

Notes:

1. This study used a Schottky barrier junction. The constructed device was operated at 460 MHz and proved suitable as an oscillator in the 0.1- to 10- GHz range.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   NASA Headquarters
   Code KT
   Washington, D.C. 20546
   Reference: TSP72-10518

Patent status:

No patent action is contemplated by NASA.

Source: R. J. Schwartz and J. J. Nahas of
Division of Sponsored Programs,
Purdue University
under contract to
NASA Headquarters
(HQN-10783)