4.7 BARITT and Comparison

Module:4 Microwave Sources

Course: BECE305L – Antenna and Microwave Engineering

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CHENNAI

Module:4 Microwave Sources 5 hours

- Microwave frequencies and applications, Microwave Tubes: TWT, Klystron amplifier, Reflex, Klystron & Magnetron. Semiconductor Devices: Gunn diode, Tunnel diode, IMPATT – TRAPATT - BARITT diodes, PIN Diode.

11.1 BARITT Diodes

- Formed by forward biased $p-n$ junction with $p-n-p$ or $p-n$-metal or $p-n-i-p$ or $metal-n-metal$.
- **Minority charge carriers are injected into drift region**

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- **Positive half cycle** – Total voltage produces sharp pulse of minority carrier current in drift region
- **During drift time** – constant external current (energy) to resonator from dc bias. This maintains continuous oscillations.

11.1 BARITT Diodes

- Low power (mW)
- Low efficiency
- Less noisy
- Application: local oscillator at microwave frequencies (4-8GHz)

12 Comparison

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Operating	1-100GHz	0.5-100GHz	1-10GHz	4-8GHz

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Noise figure	-	High 30dB	High 60dB	Less noisy than IMPATT (<15dB)

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Basic semiconductor ss	GaAs, InP	Si, Ge, GaAs or InP	Si	Si/metal
Harmonics	-	Less	Strong	Less

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Harmonics	-	Less	Strong	Less
Size	Small	Small	Small	Small
Ruggedness	Yes	Yes	Yes	Yes