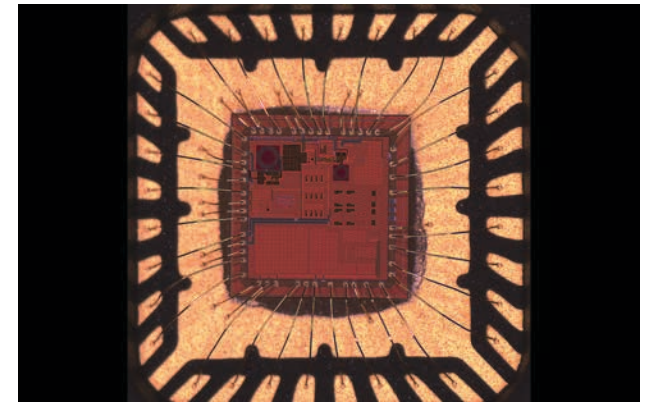


Global Navigation Receiver Chip (Dhruva) Development



Problem Statement: Location services have become an essential part of everyone's life, particularly for navigation using mobile phones. The popular location service is the Global Positioning System (GPS) is owned by the United States of America. However, access to GPS is not always guaranteed. This prompted the Government of India to develop its indigenous satellite navigation system, NAVIC. However, none of the mobile manufacturers has incorporated NAVIC as a mainstream choice of a positioning system yet. Currently, there is no single unified solution that can receive all bands of NAVIC and various other Global Navigation Satellite Systems. This motivated researchers at IIT Bombay to develop NAVIC capable RF receiver called Dhruva.

Uniqueness of the Solution: Dhruva is the first indigenously designed compact reconfigurable navigation receiver chip to work for all navigation frequency bands of NavIC (L5 & S), GPS (L1 & L2),

Galileo, and BeiDou. The receiver is fully integrated with no external components, making it suitable for easy integration into SoCs for large-scale deployment in commercial applications. Dhruva consists of novel RF/Analog circuits to avoid external balun, matching network components. The on-chip PLL frequency synthesiser generates a wide range of desired reference RF frequencies. The IC is fabricated in 65 nm CMOS technology. The receiver occupies an active die area of only 1.96 mm². With the achieved specifications, the IC can be readily used for commercial navigation applications (mobile phones, vehicle tracking, etc.) using NavIC (IRNSS), GPS, Galileo, and BeiDou.

Current Status of Technology: ISRO and MeitY have reviewed and measured IC results in detail during review meetings expressing complete satisfaction. Currently, the design team is working towards an advanced version of Dhruva with additional features and smaller size.

Societal Impact: It is suitable for easy integration into the System on a Chip for large-scale deployment in commercial applications such as vehicle tracking, marine vessel tracking, rail/road/water transportation monitoring, and other navigation applications.

Patent(s): Nil

Relevant Industries: Mobile Telecommunications, IT.

Faculty: Prof. Rajesh Harishchandra Zele, Electrical Engineering.