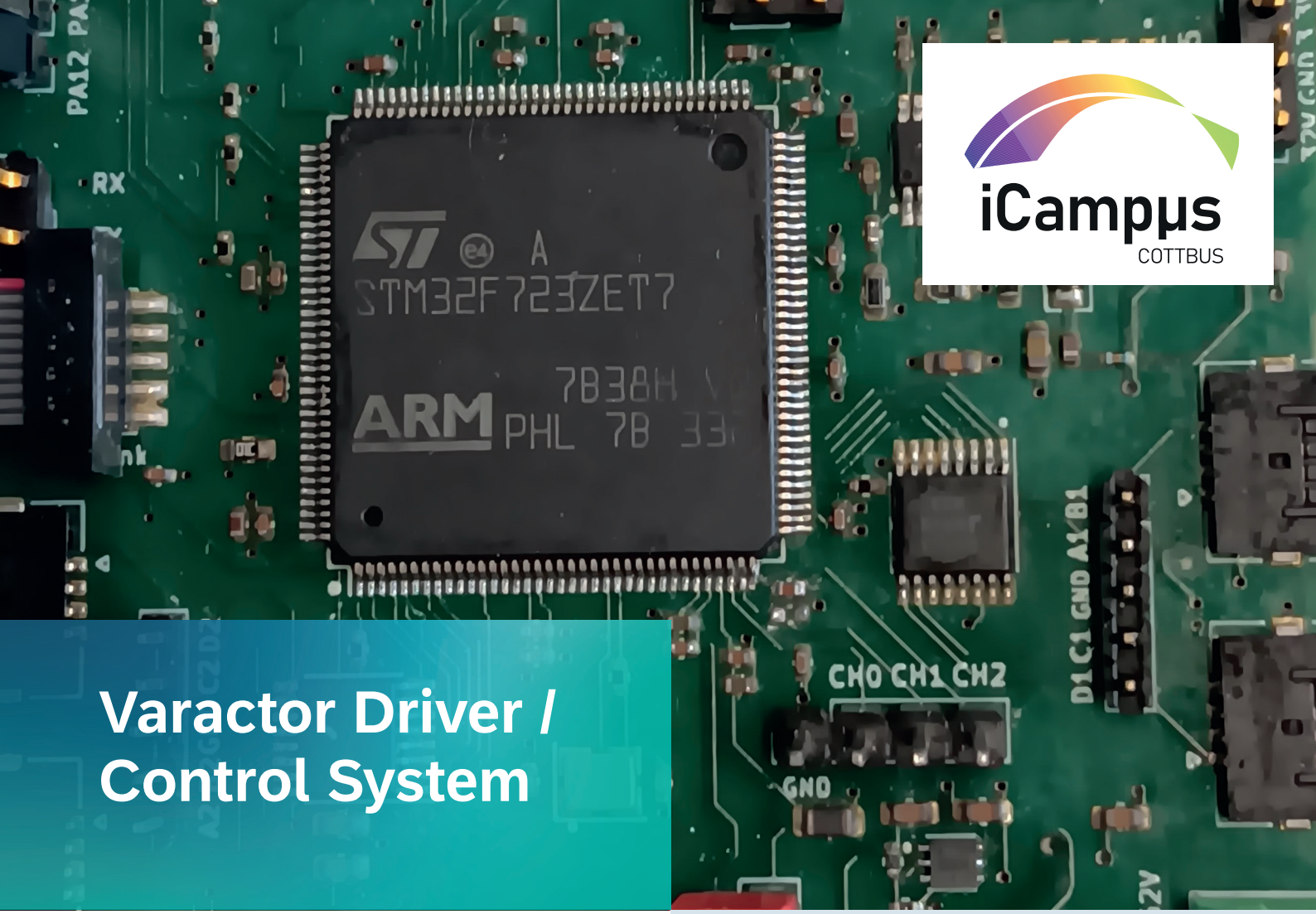


iCampµs
COTTBUS

Varactor Driver / Control System

Market Need

Impedance tuners, phase array antennas, VCOs, tunable filters, and generally adaptive and cognitive RF systems rely on variable capacitors—be it MEMS, diode, BST, or MOS powered varactors—and therefore require accurate voltage bias sources that are precise, compact, software configurable, and easily embedded or adapted to systems on PCB.

Our Solution

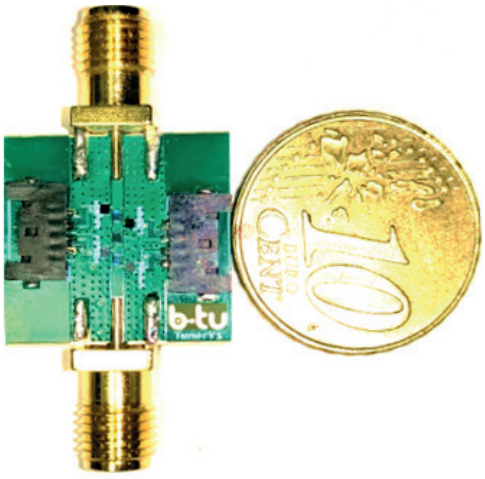
The Varactor Driver System integrates an 8 channel low to high voltage DAC (0–60 V) with three dedicated feedback control ADC channels, all orchestrated by an STM microcontroller. A high speed USB interface exposes SCPI style commands, allowing Python™ or MATLAB® scripts to reprogram bias voltages with 10–20 µs settling time. Once configured, the MCU can enter a 1.8 V ultra low power mode while the on board DAC latches maintain the output indefinitely.

Key Benefits

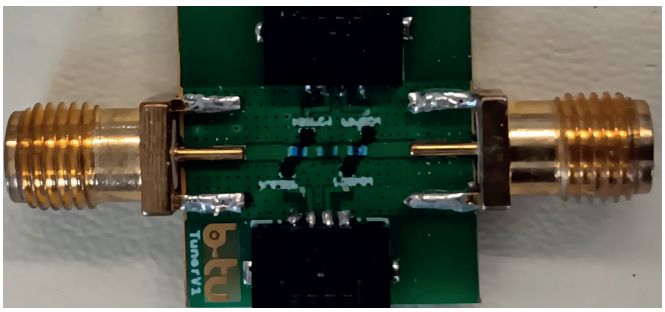
- High precision – ≤ 7 mV error @ 30 V, ≤ 14 mV @ 60 V
- True USB powered – 0–30 V from the 5 V rail; 60 V via optional DC jack[1]
- Eight independent channels – up to 2 mA each
- Fast reconfiguration – ≤ 20 µs voltage settling (full scale step)
- Real time monitoring – three ADC channels enable closed loop control
- Scriptable & OS agnostic – appears as a virtual COM port; ready made Python/MATLAB drivers
- On board µSD card – store bias scripts, lookup tables, and logs
- System on PCB ready – 70 mm × 55 mm, four layer FR 4[2]

Application Fields

- VCOs and tunable resonators
- Adaptive filters
- Impedance matching networks
- RF switches
- Phase shifters
- Cognitive / adaptive radios (5G, IoT)
- Impedance tuners



Low-Cost, Compact, Wide Coverage 0.7-1.5 GHz Varactor-based Impedance Tuner

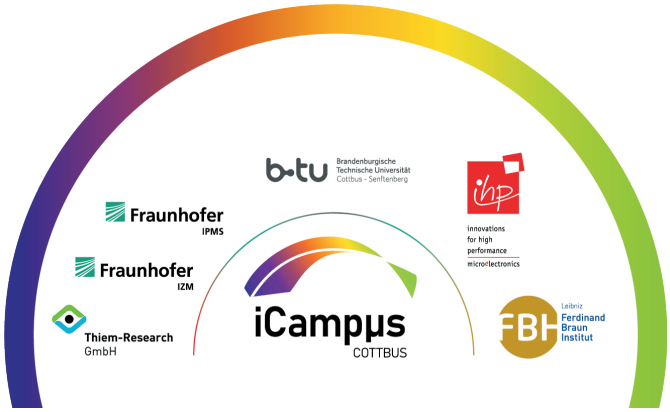


Application-Specific Impedance Tuner used to Improves Sensitivity of Diode Detector

Technical Parameters

Parameter	Units	Min.	Typ	Max.	Notes/Conditions
Output voltage (30 V mode)	V	0	—	30	USB only supply
Output voltage (60 V mode)	V	0	—	60	ext. 60 V DC input[1]
Absolute accuracy	mV	±3.7	±7.3	±14.7	30 V / 60 V ranges
Resolution	bits	—	12	—	1.5 LSB max @ 60 V
Output current (per ch.)	mA	—	1	2	Programmable limit
Ripple / noise	mVrms	1	3	7	10 Hz–1 MHz
Settling time (full scale step)	µs	5	15	30	High swing transitions
SD card throughput	MB/s	3	5	20	x1: 5 MB/s, x4: 15 MB/s
ADC conversion time	µs	0.55	2.54	18.2	per sample
Bias control interface	—	—	USB HS	—	via SPI 16 MHz to DAC
PCB footprint[2]	mm	—	70 × 55	—	4 layer FR 4
MCU standby current	µA	—	30	—	1.8 V sleep mode

[1] Next generation revision eliminates the external 60 V supply; full USB only 0–60 V.
[2] The PCB can be custom integrated into any RF system. A low power MCU (e.g., STM32L4 series) may replace the STM32F7, and unnecessary peripherals can be removed to further shrink the board size.



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