

Multisine Channel Optimization for RF-to-DC Performance Characterization

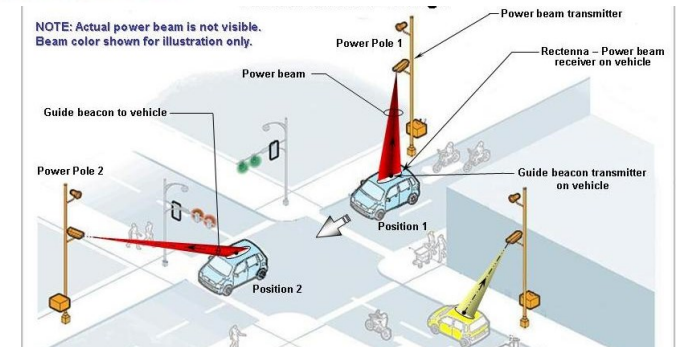
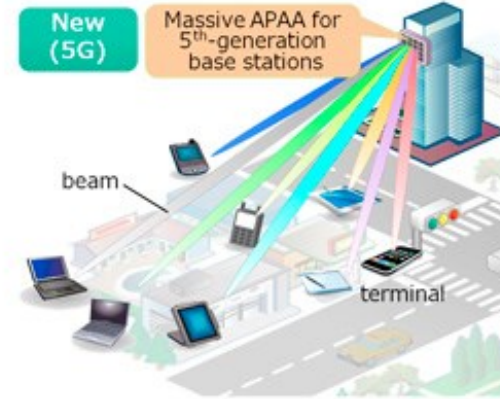
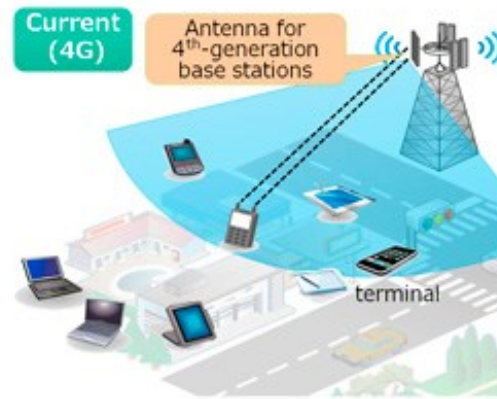
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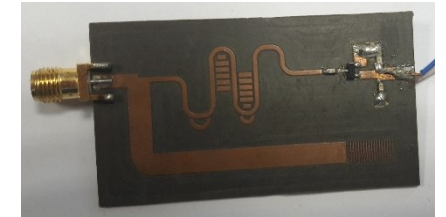
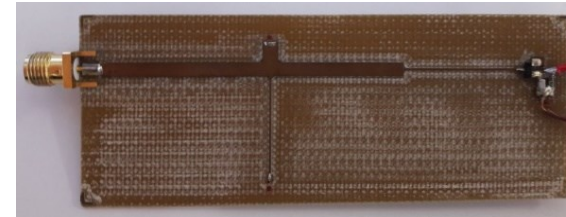
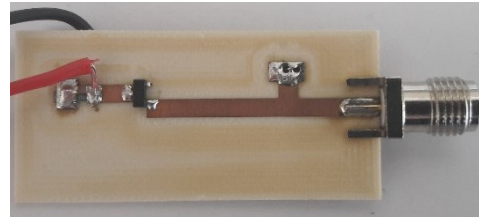
- Motivation
- Goals
- System Setup
- Application
- Work in Progress
- Conclusion

- 5G
- Smart Cities
- Communications
- Wireless Power Transmission
- RF-to-DC Converters

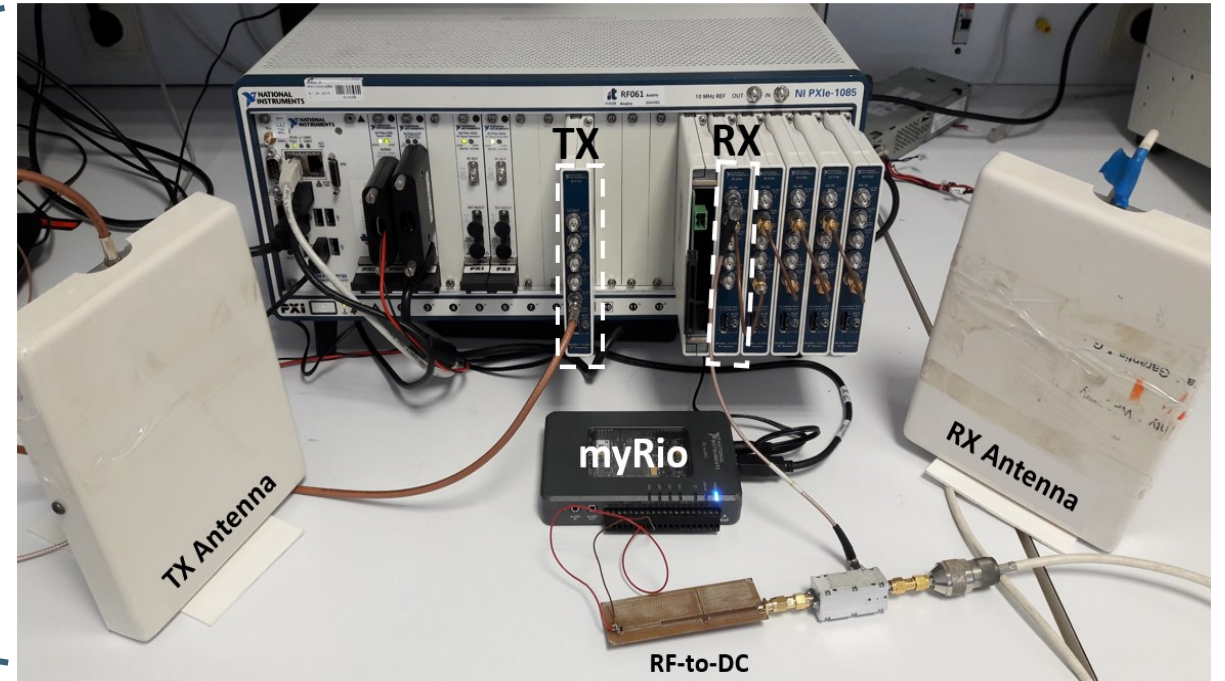
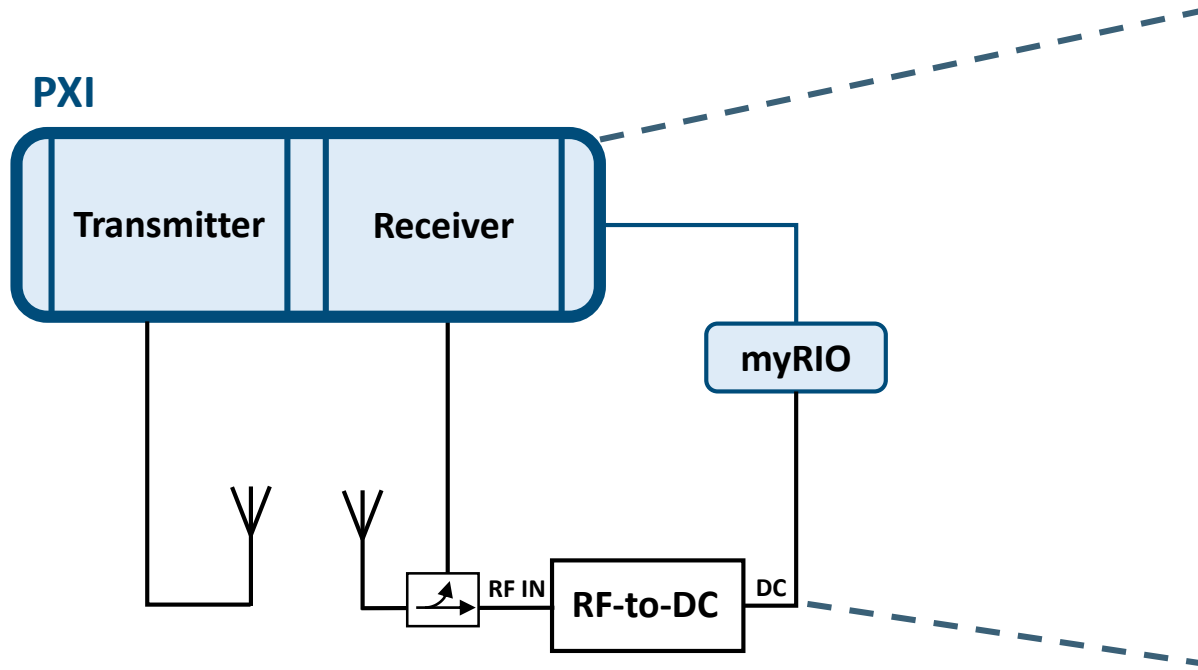


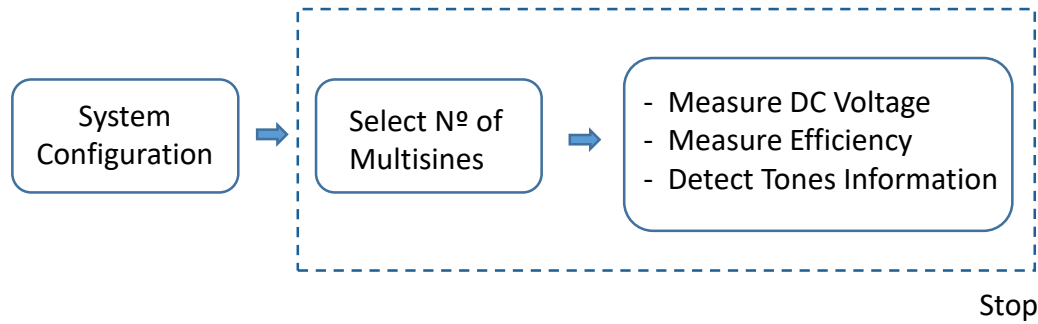
Goals

- Build a LabVIEW application to characterize RF-to-DC converters
- Real Time Multisines generation instead of a classic CWs
- Obtain the DC voltage
- Obtain Efficiency
- Understand the impact of Multisines in RF-to-DC converter
- Vary the distance between TX and RX antennas to study the impact on RF-to-DC converter



System Setup



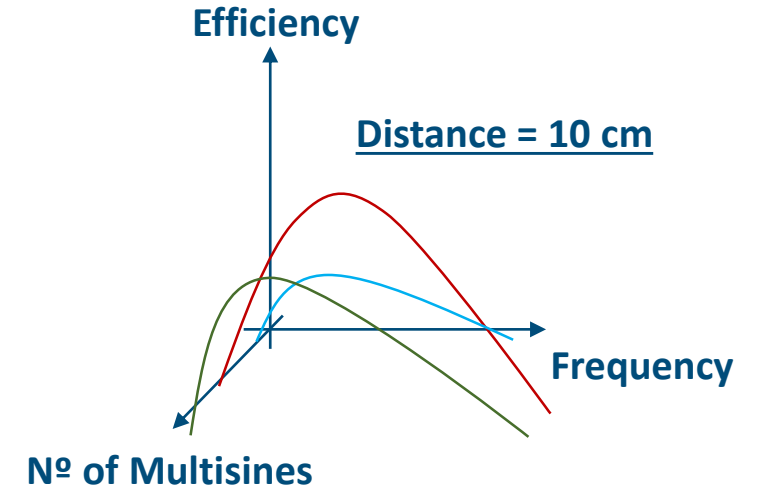


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The software interface is divided into several sections:

- TX Configuration:** TX Device: PXIISlot9; Frequency: 932MHz; Power: 0dBm; Sample Rate: 250MS/s.
- RX Configuration:** RX Device: PXIISlot14; Power: 0dBm; Frequency: 932MHz.
- Power Spectrums:** Two plots showing Power (dBm) vs Frequency (Hz). The TX plot shows a cluster of tones between -10MHz and 10MHz. The RX plot shows a similar cluster of tones.
- Multi Tones Configuration:** Uniform? (checked); Arbitrary Spacing (selected); Number of Tones: 8; Frequency Between Tones (Hz): 1M; Number of Samples: 2.5k; Initial Phase (degrees): 0.00; Power Level per Tone (dBm): -20.0.
- Results:** R: 30k; DC Voltage: 600m; Efficiency: 4.2%.
- Multiple Tone Information:** A table with 11 rows, all showing 0.00000 for detected frequency, amplitude, and phase.
- Stop:** A red button to end the measurement.

- Designing an RF-to-DC with a specific bandwidth to apply Multisines
- Measure RF-to-DC
- Get the Multisines information on RX side



Upgrades to the system:

- Sweep Frequency
- Sweep Power
- Sweep Multisines



Full Performance Characterization !!!

- A characterization system to optimize the performance of RD-to-DC converters using Multisines was purposed.
- Using this approach it is possible to study the distance relation between TX and RX antennas and the impact on the device performance.
- The Multisines impact (uniform and arbitrary spacing tones configuration) on RF-to-DC converters can be tested in Real Time.
- RF-to-DC converters in 5G creates the need of test and measure these WPT devices, which can be done with this characterization system.

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