

VISORS: XLINX Satellite Communication System



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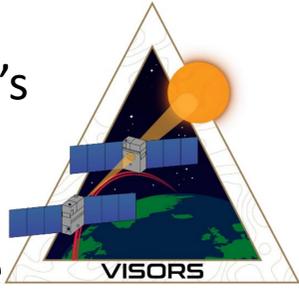
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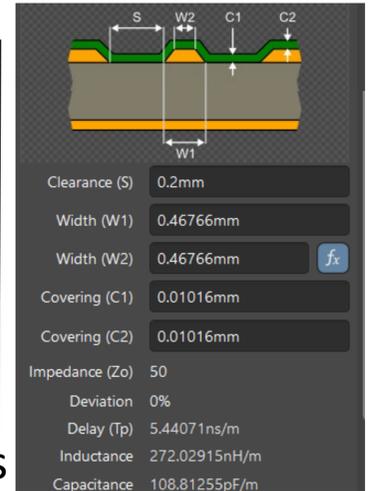
Introduction

- Data collection on the sun's corona energization using an extreme ultraviolet detector and photon sieve
- The Virtual Super-resolution Optics with Reconfigurable Swarms (VISORS) system is a telescope distributed across two cube satellites
- VISORS can be implemented in other systems to obtain high resolution photographs for phenomics applications



PCB Stackup

	Material	Thickness
RF Signal		0.0175 mm
Dielectric 1	RO 4450B	0.304 mm
Ground plane 1	FR4	0.21 mm
Core	RO 4350B	0.254 mm
Ground plane 2	FR4	0.21 mm
Dielectric 2	RO 4450B	0.304 mm
Control Signal		0.018 mm



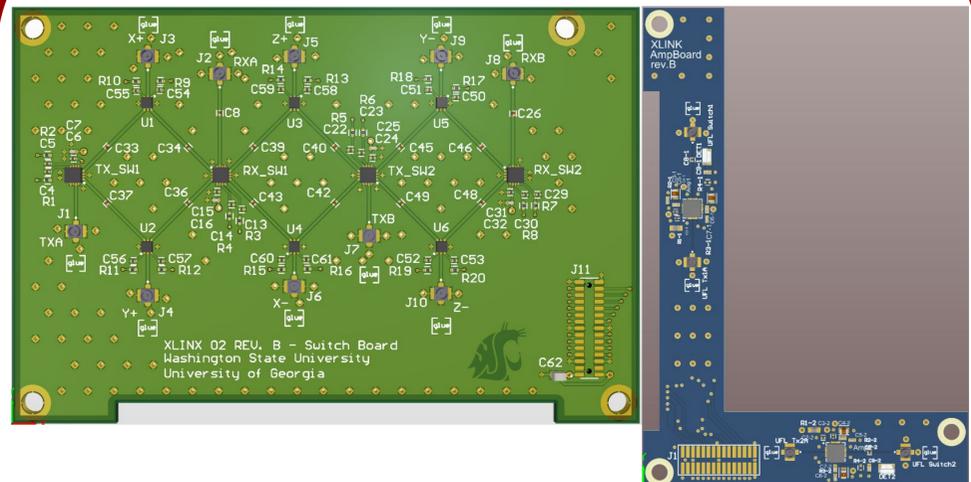
- Separating signal layers with ground planes reduces crosstalk [1]
- Dielectric material chosen to ensure minimal insertion loss

[1] Sierra Circuits. "High-Speed PCB Design Guide." Sierra Circuits, 2020.

XLINX Overview

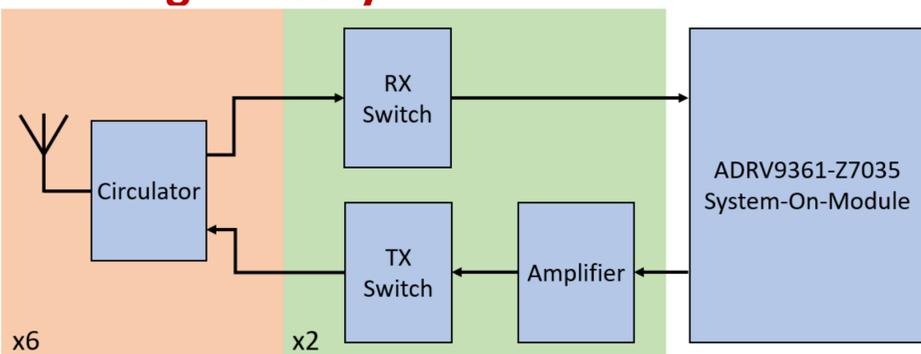
- Six antennas mounted on each satellite
- Antenna configuration ensures spherical full-coverage communication capability
- A switch board, amplifier, and control unit (System-On-Module) will be housed within each satellite

Final PCB Design



- All PCB design preformed in Altium Designer
- Components selected to withstand radiation and high frequencies
- Via stitching performed to enhance signal integrity
- Switch board signal attenuation: -1.85 dB

Design Theory



- Desired operation frequency: 5.8GHz
- Amplifier gain: 30dB
- Transmission range: 2m – 10km
- High frequency requires signal tracks to be treated as transmission lines
- Trace lengths between RF components are tuned to prevent reflections

Conclusion

- The theory and design of RF PCBs has been studied throughout the program
- VISORS can provide higher resolution photos for phenomics research when compared to traditional telescopes
- Distributed telescopes can provide higher resolution photographs in a smaller footprint

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