

Quad band dual polarized low profile antenna for Multiband Active Radar Calibrator

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Salient Features:

- Wideband & high gain antenna covering L band to X band frequencies.
- Single aperture catering all the operating band frequencies (L/S/C/X).
- Compact & low profile antenna for portable Active Radar Calibrator (ARC).
- High radar cross-section (RCS) with small physical size.
- Controlled radiation pattern at all the frequency bands.

International scenario & State of the art:

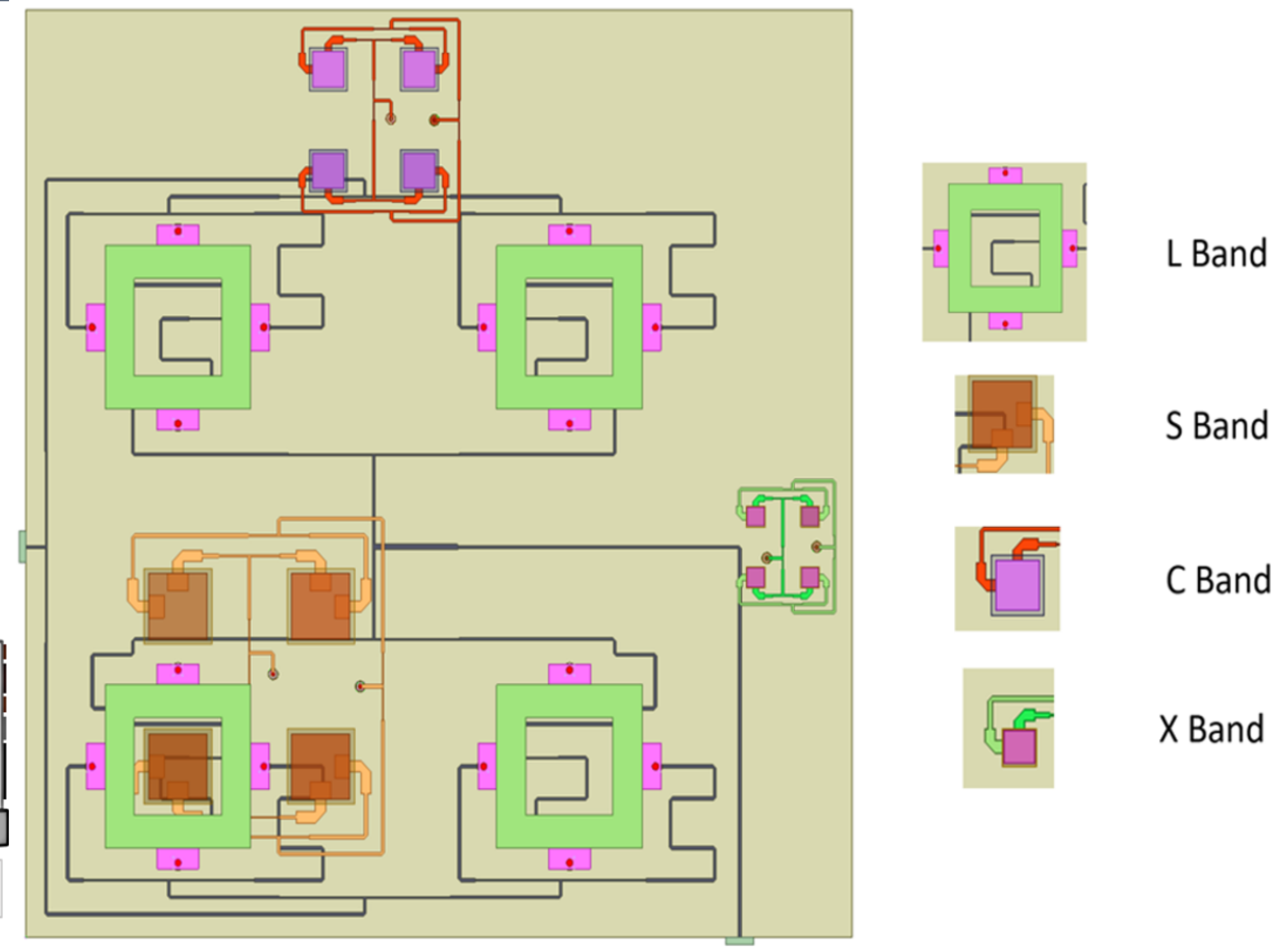
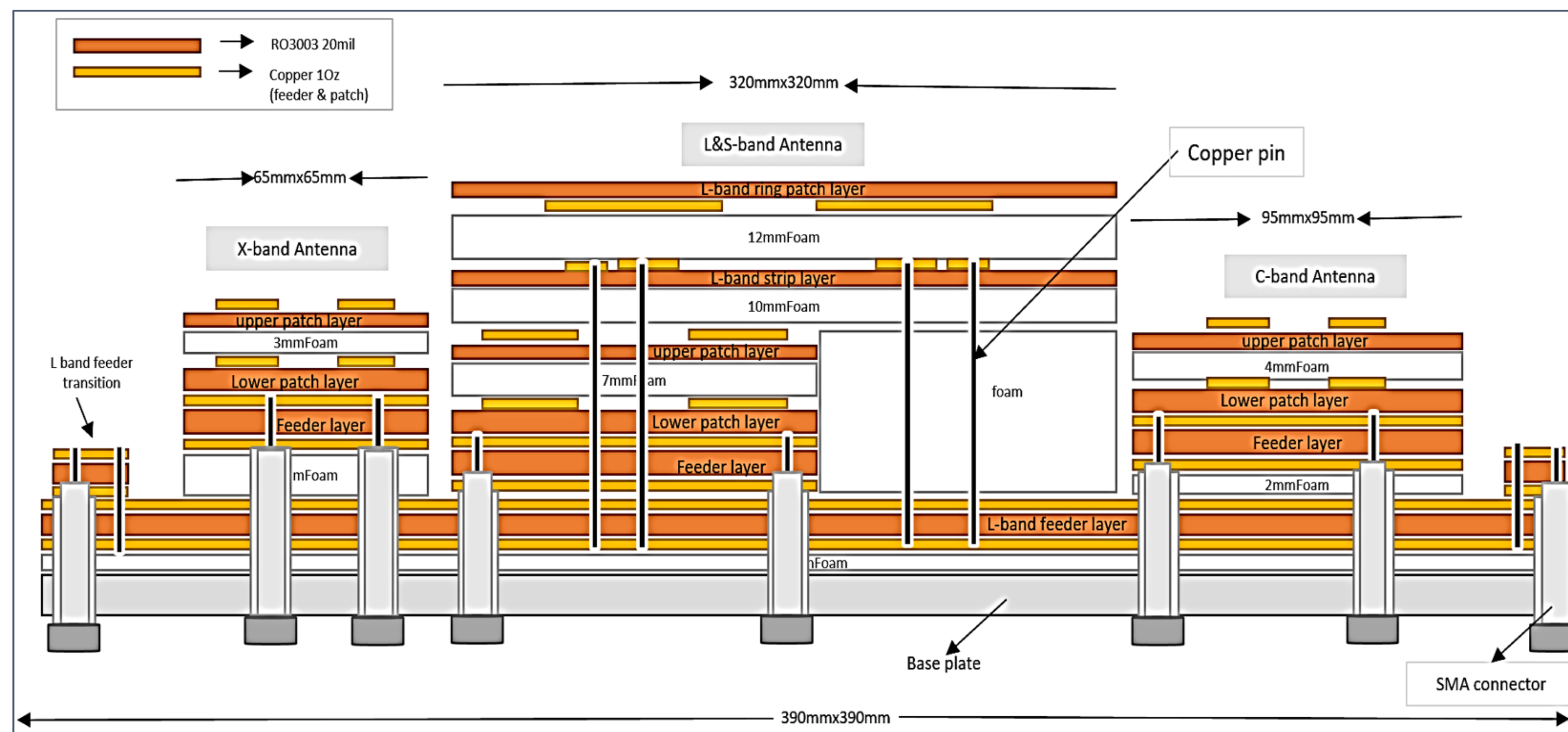
- Different antenna for different band ARC.
- Two Shared aperture Horns at L, C and X, Ka band by Chinese ARC.
- Quad ridge horn antenna.

Antenna Configuration & Specifications:

- Designed wideband capacitive strip probe fed square ring microstrip patch element for L-band & proximity fed stacked patch element for S, C & X band.
- Quad band ARC Antenna comprises of
 - S-Band antenna sharing one element with L-Band antenna ring element .
 - C-band and X-band antennas are placed at the top side and right side of the L-band antenna aperture.
- All the four band antenna are sharing a common aperture of size $0.4m^2$

Parameters	Specification
Frequency	1GHz to 10GHz
Bandwidth	±50MHz@L-Band ±50MHz@ L-Band ±175MHz@ L-Band ±375MHz@ L-Band
Peak Gain	6dBi @1.25 GHz 11dBi @3.2GHz 12dBi @5.4 GHz 13dBi @9.6 GHz
3-dB Beamwidth	>25° in both E&H plane
Polarization	Dual Linear Polarization at each band
Cross Polarization	Better than 23dB
Port to port isolation	Better than 23dB
Tx-Rx antenna Isolation	Better than 50dB
Weight	1.5 Kg maximum

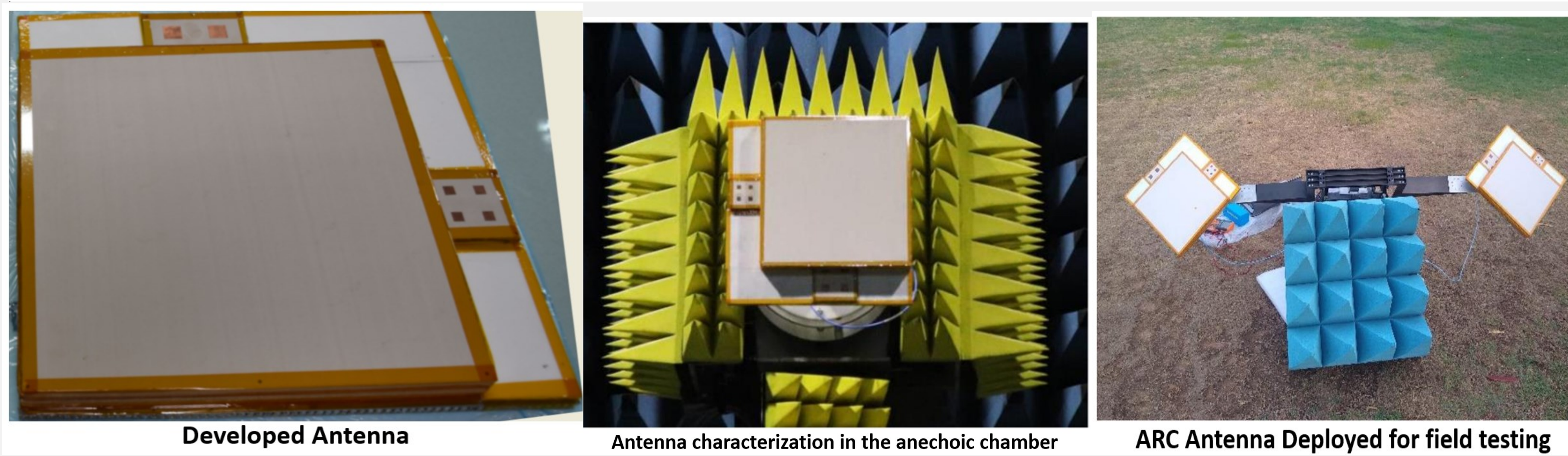
Antenna Layer Stack-up & Layout



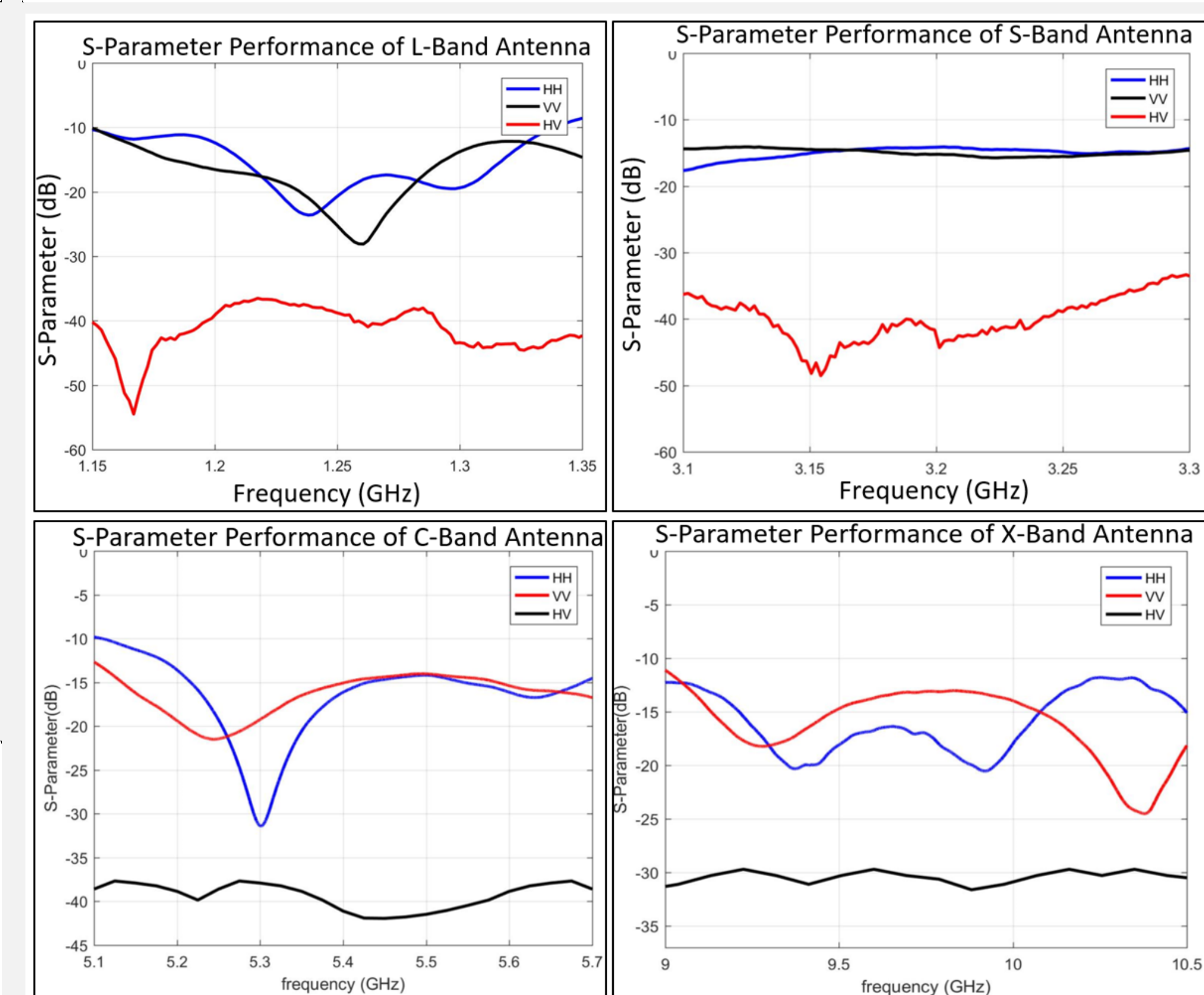
Quad band ARC Antenna Layer Stack-up

Quad band ARC Antenna Layout

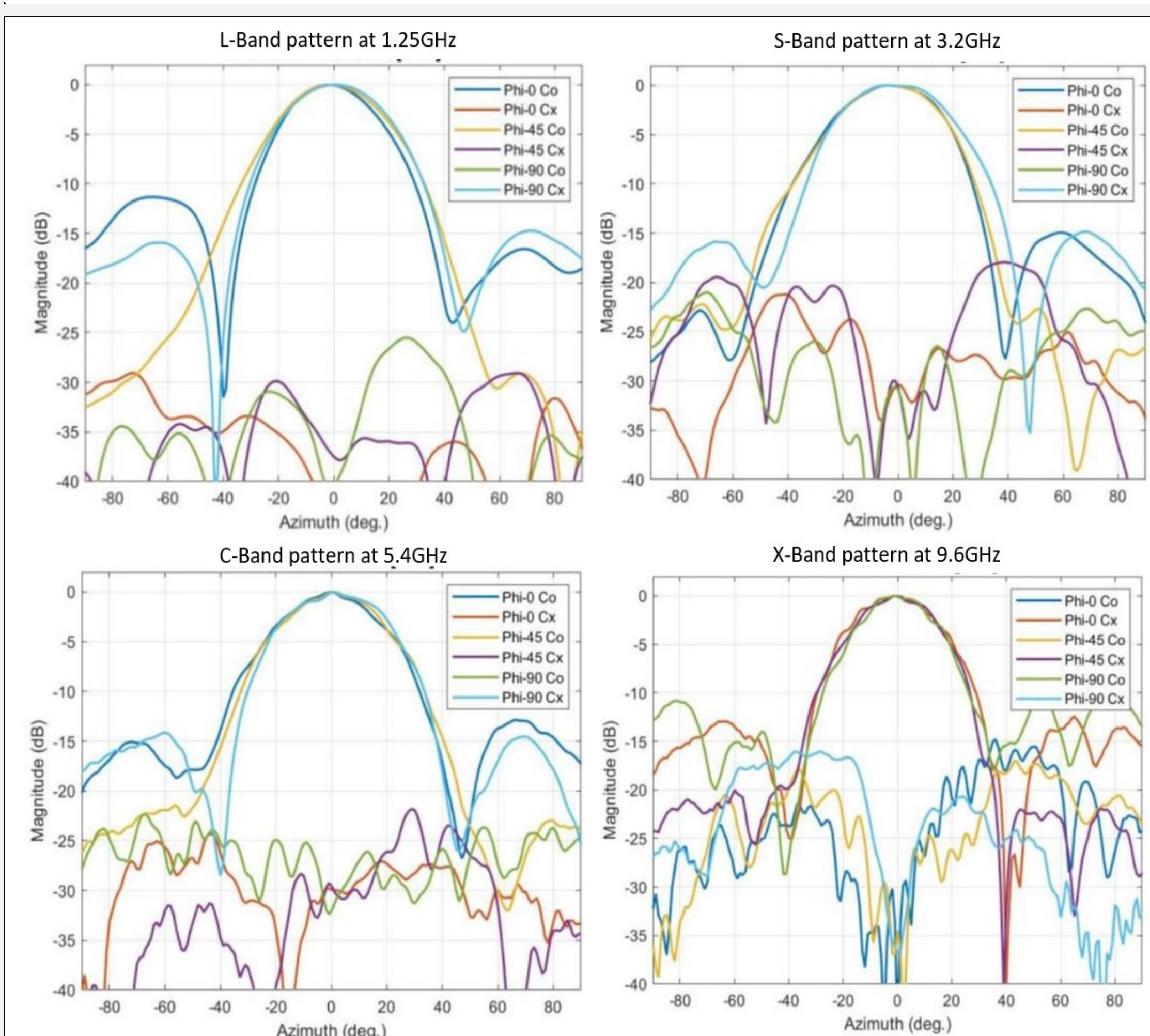
Antenna Development, Characterization & Field Testing



S-Parameter Performance of Antenna



Radiation Pattern Performance



Conclusion

- Compact, low profile wideband shared aperture antenna operating from L to X band frequencies.
- Impedance bandwidth of the antenna is better than 11% for 10dB return loss at all the operating frequency band.
- Measured gain of antenna better than 12dBi at all the operating band frequencies.
- Inter-band isolation is better than 25dB.
- This antenna is a compact solution for portable multiband ARC to achieve very high radar cross section (RCS) with small physical size as compared to its counterpart corner reflector.
- Developed antenna is used in ARC system during the calibration campaign of ISRO's EOS-4 C- Band SAR satellite over Ahmedabad region.

Tx-Rx Antenna Isolation Performance

