TES 24 GHz Planar Antenna Array

Description

TES 24 GHz Planar Antenna Array is a planar antenna array for the SHF (1.2 cm) ISM–Band. The 4 × 4 and 8 × 4 array versions of the antenna provide flexibility and adaptability to the chosen application scenario. The antenna array has a return loss better than 12.5 dB and has very linear gain characteristics in the desired operating frequency range of 23.3 GHz to 25.7 GHz. The planar antenna array is well suited not only for conventional automotive radar applications as well as for exciting applications like vital signs sensing (i.e. heartbeat and respiration rate monitoring), micro-motion detection, child presence detection, detection of alive humans and animals in debris, etc.

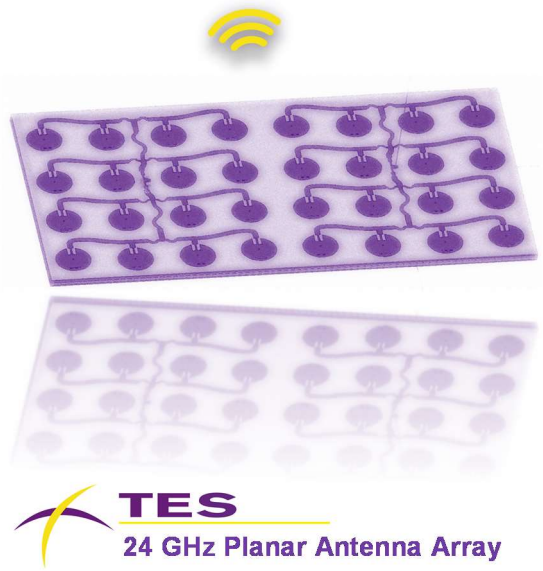

Fig. 1 The 8 × 4 planar antenna array fitted with an RF connector for signal feed-in (left). Two copies of the 8 × 4 planar antenna array (i.e. for transmitter and receiver) used together for a radar application (right).

8 × 4 Planar Antenna Array Specifications

Parameter	Elevation Angle	Azimuth Angle	Units
-3 dB beamwidth	20°	10°	Degrees
-10 dB beamwidth	34°	17°	Degrees

Antenna Pattern Polar Plot (8 × 4 Planar Antenna Array)

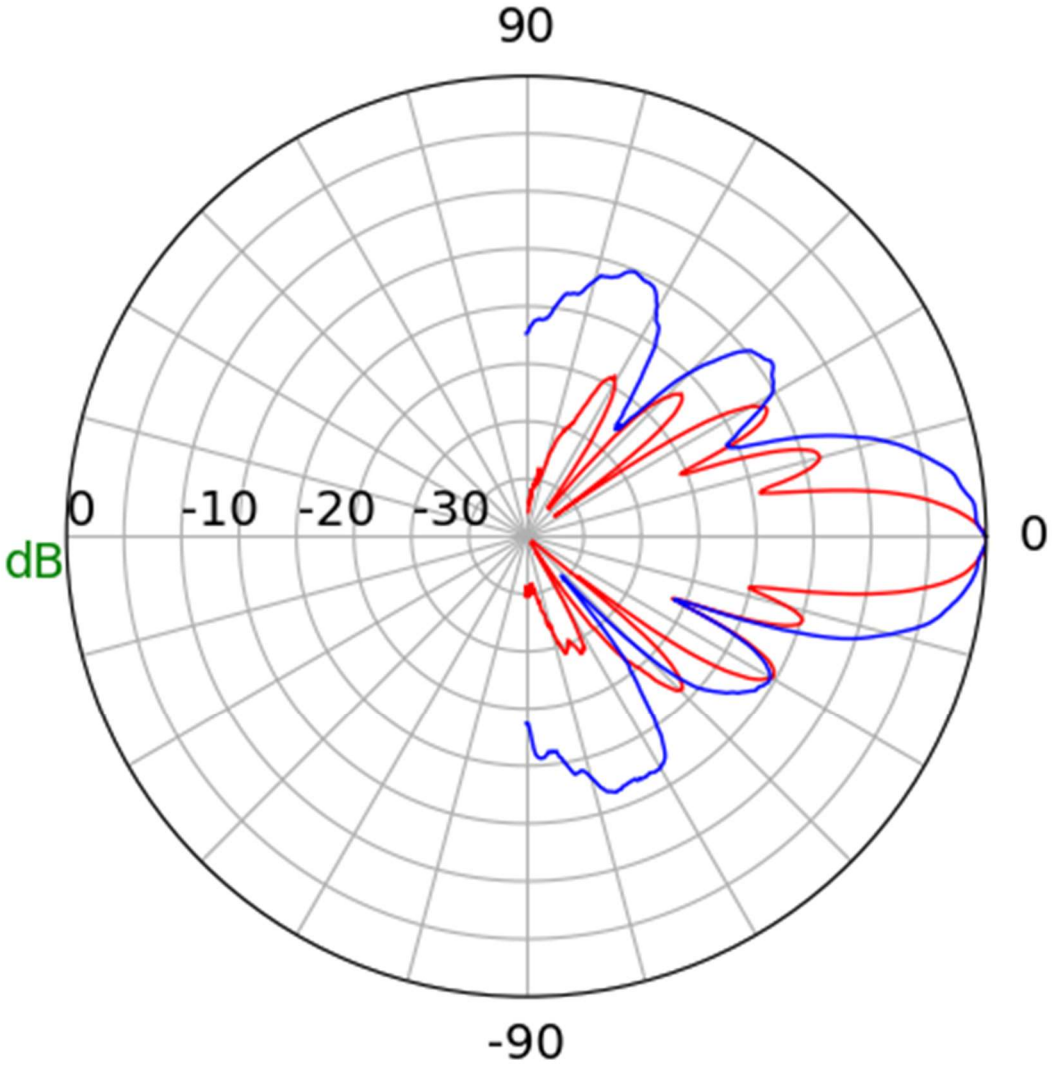

Fig. 2 Measured result of the antenna pattern plotted as a polar plot. The blue plot corresponds to the Elevation pattern whereas the red plot corresponds to the Azimuth pattern of the antenna.

Gain vs. Frequency Plot (8 × 4 Planar Antenna Array)

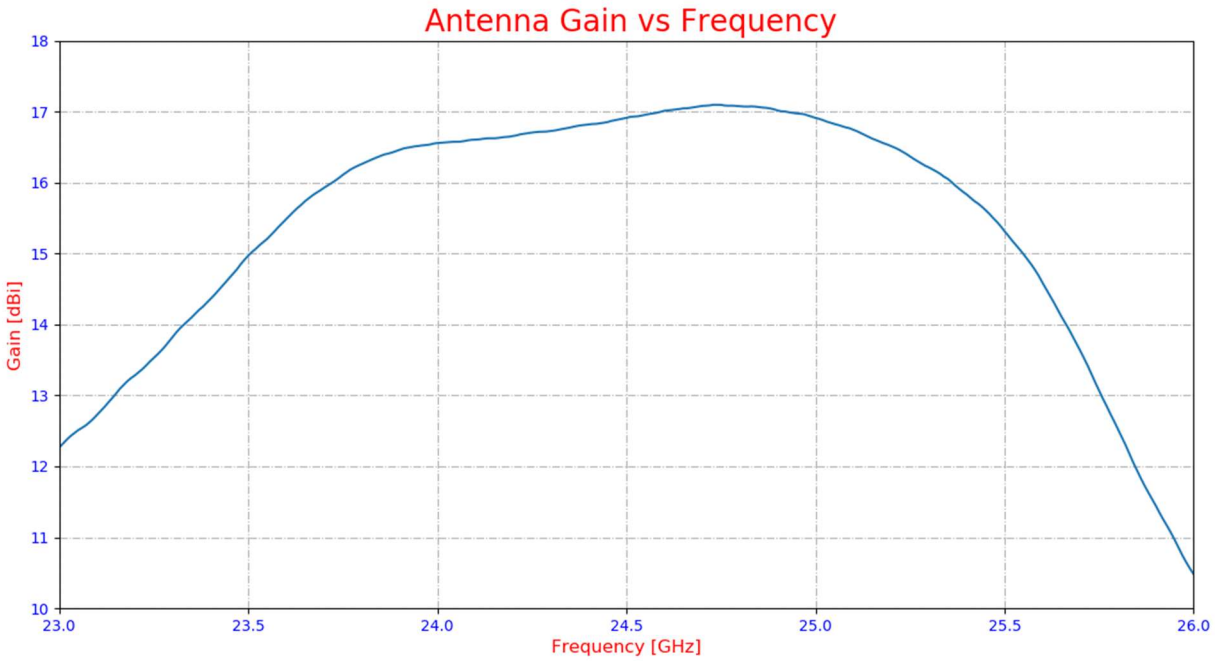

Fig. 3 Measured result of the antenna gain vs. frequency.

Return Loss vs. Frequency Plot (8 × 4 Planar Antenna Array)

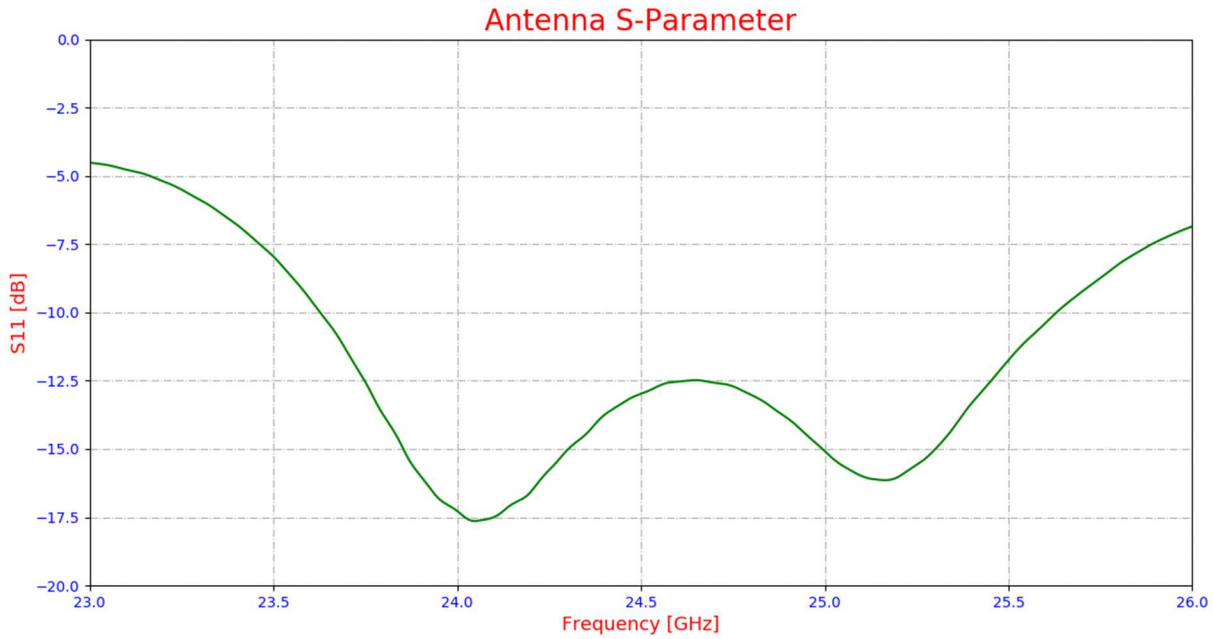

Fig. 4 Measured result of the antenna return loss vs. frequency.

4 × 4 Planar Antenna Array Specifications

Parameter	Elevation Angle	Azimuth Angle	Units
-3 dB beamwidth	10°	10°	Degrees
-10 dB beamwidth	35°	35°	Degrees

Antenna Pattern Polar Plot (4 × 4 Planar Antenna Array)

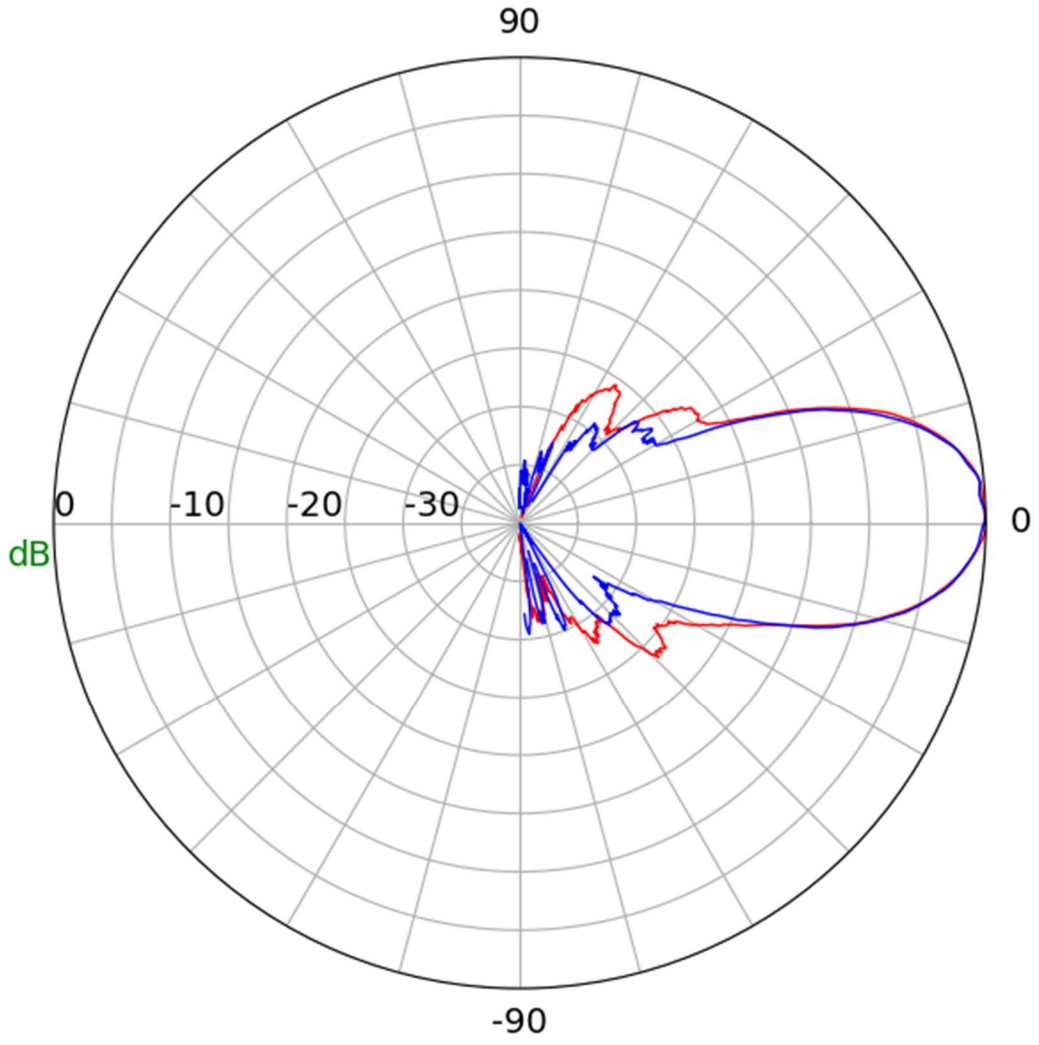

Fig. 5 Measured result of the antenna pattern plotted as a polar plot. The blue plot corresponds to the Elevation pattern whereas the red plot corresponds to the Azimuth pattern of the antenna.

Gain vs. Frequency Plot (4 × 4 Planar Antenna Array)

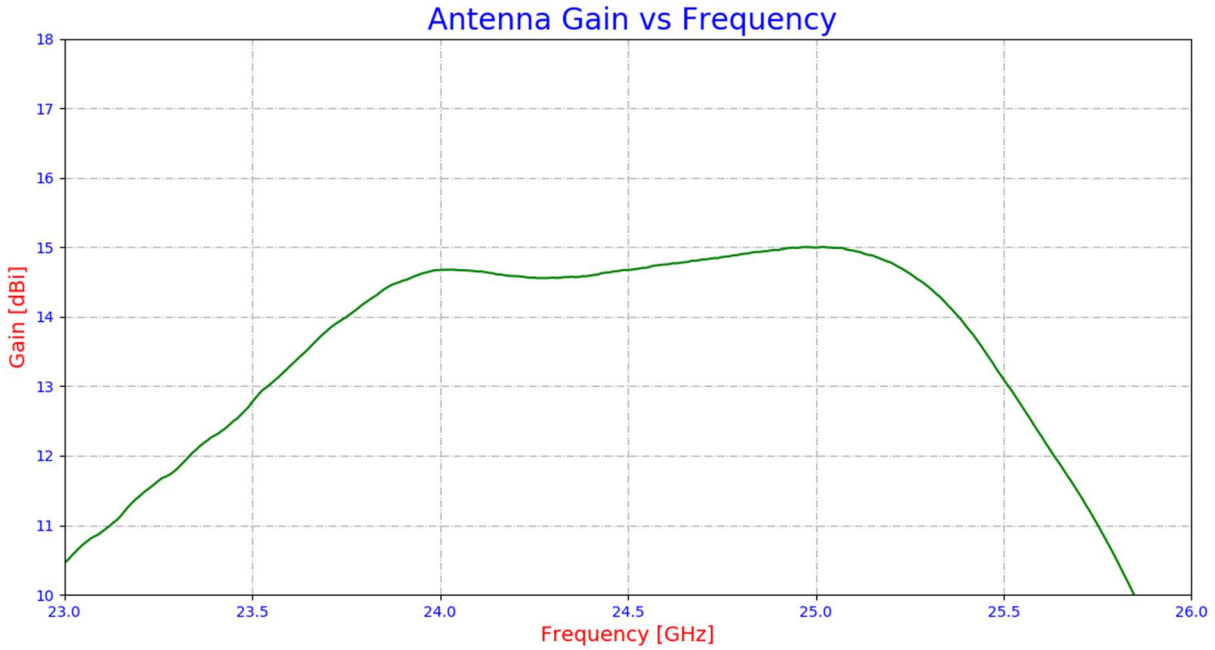

Fig. 6 Measured result of the antenna gain vs. frequency.

Return Loss vs. Frequency Plot (4 × 4 Planar Antenna Array)

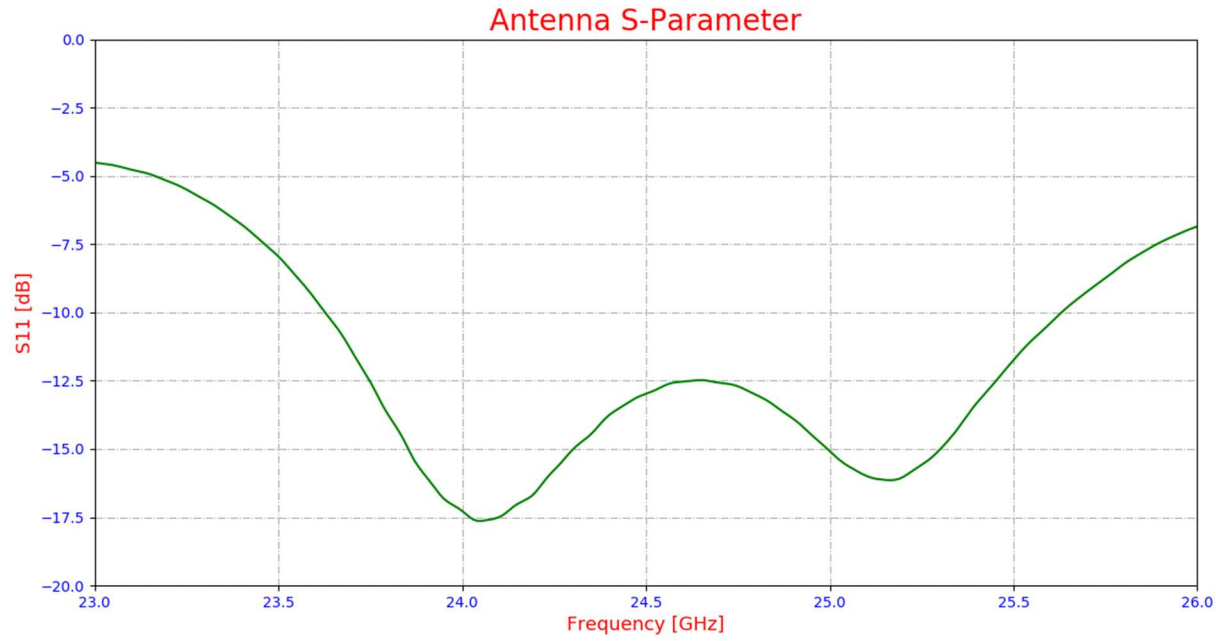

Fig. 7 Measured result of the antenna return loss vs. frequency.

General Specifications

Parameter	Test Conditions/ Comments	Min.	Typ.	Max.	Units
Environment					
Operating temperature			TBD		°C
Storage temperature			TBD		°C
Mechanical Outline					
8 × 4 planar antenna array	Only PCB without any housing		70mm × 35mm × 1.7mm		mm³
4 × 4 planar antenna array	Only PCB without any housing		35mm × 35mm × 1.7mm		mm³

Applications

- Continuous wave (CW) and frequency modulated continuous wave (FMCW) operation

- Micro-motion detection in CW mode
  - Vital function monitoring (i.e. heart-beat and respiration rate)
  - Car seat occupancy recognition or child presence detection
  - Automatic car door or hood opening system
  - Detection of intruders
  - Detection of alive humans and animals underneath the debris following an earthquake/ building collapse, or avalanche

- Accurate distance and velocity measurement using FMCW mode
  - Vehicle speed measurement using a stationary FMCW radar
  - Drone flight control and obstacle avoidance

- Velocity measurement using CW mode

RoHS – Compliance

The TES 24 GHz planar antenna array complies with the European Union directive 2011/65/EU for the restriction of hazardous materials in the manufacture of electronic and electrical equipment.

Disclaimer

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