2.1.2 Antenna Arrays

The antenna array is composed of antenna elements embedded into the main printed circuit board. The antennas are not replaceable, and no provisions are made to add external antennas.

During typical operation, one or more transmitting (TX) antenna transmit at a time, while multiple receiving (RX) antennas are collecting and recording the received RF signals.

The V60G-INCAR devices utilize printed circuit board antennas designed for the 57-71 GHz range. The peak gain of the antennas typically ranges between 0dBi and 4.5dBi. The power levels are adjusted so as not to exceed the limits on EIRP and on the conducted power at the antenna port, taking into account both antenna gain and the trace loss.

Figure 3: Example of antenna-array on VanGoch_RevA

2.1.3 Antenna and RF Characteristics

A typical antenna and RF characteristics, based on the simulation of a single antenna over a finite ground plane:

Parameter	Value	Comment
Gain	4.5 dBi @ 62 GHz	At 0˚ Elevation, 0˚ Azimuth
Antenna -5dB beamwidth	140 deg. @62.5 GHz (E-plane) 120 deg. @62.5 GHz (H-plane)	
Polarization	Linear	

Table 1: Antenna and RF Characteristics

Antenna's gain simulation note: the VanGoch_RevA_CTPC0 board is produced out of a common PCB material of FR-4 family, such that a 3D EM simulation involves also the losses intrinsic to the PCB material in the transmission line and in the antenna's cavity. To account for the PCB's dielectric-losses and isolate the physical gain of the antenna (accounting for directivity and VSWR, for example) the antenna was simulated within a low-loss stackup (by setting $tan\delta \rightarrow 0$ and zeroing surface-roughness), while keeping the dielectric-coefficient $\epsilon_r = 4.3$ to have similar VSWR, matching and other antenna's properties.

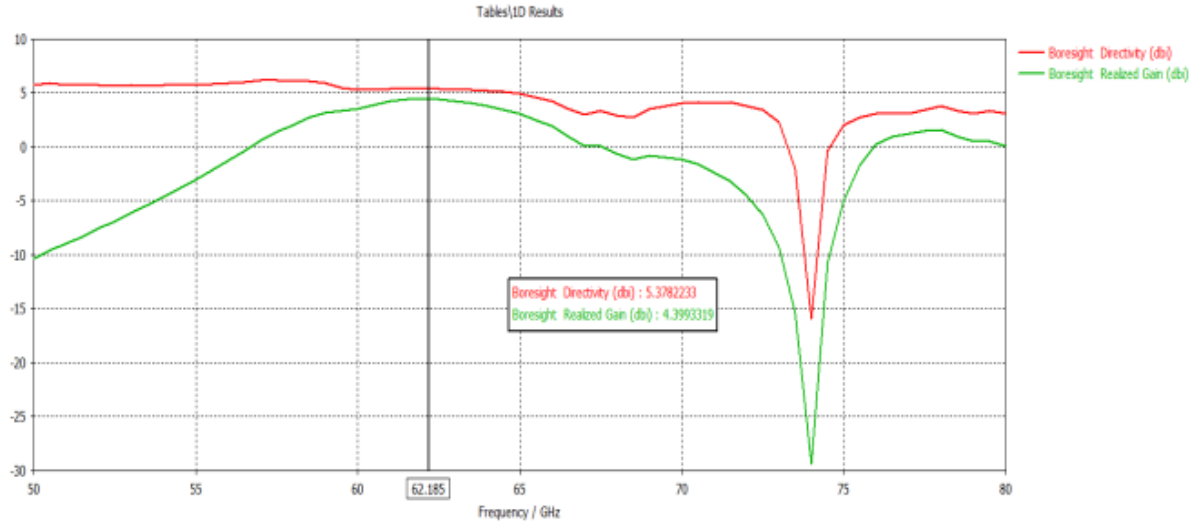

Figure 4: PCB embedded-antenna simulated gain, using CST 3D EM solver, over low-loss substrate

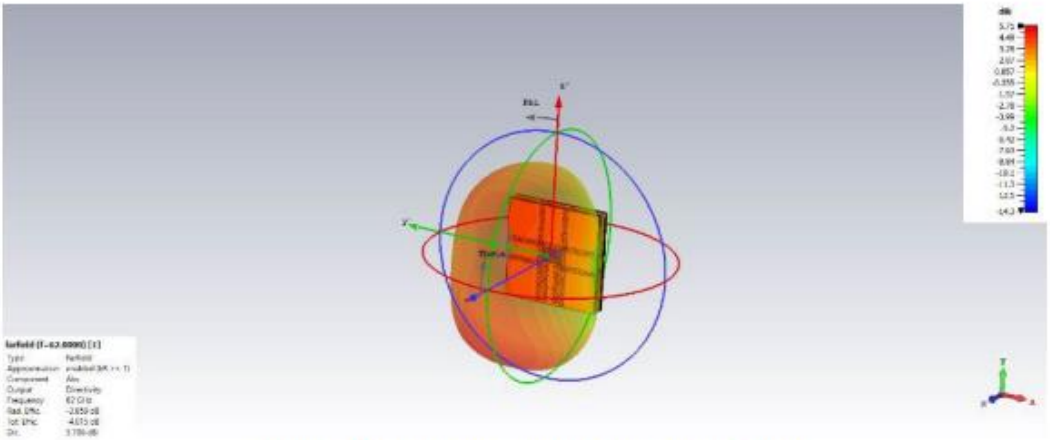

Figure 5: PCB embedded-antenna simulated directivity