

## Integrated Antenna Characteristics

### ST60A3H1 Built-in Integrated Antenna

ST60A3H1 chip designed and manufactured by STMicroelectronics. ST60A3H1 embeds an aperture coupled patch single antenna, with dual polarization and 45° tilt, which allows the use of the same device for both sides of the link. The ST60A3H1 modulation is ASK. It operates in Half-Duplex mode and features a weak back-radiation on the PCB.

Nevertheless, particular care must be taken for the PCB implementation. This is especially the case for the ST60A3H1 grounding on the board, as the antenna radiated performance can vary for different PCB implementations.

The antenna is embedded in the chip package which is a VFBGA (very thin profile fine pitch ball grid array) AiP (antenna-in-package) 2.9 mm x 4.1 mm x0.8 mm, 23 balls, 0.4 mm pitch. The antenna position and size are shown in figure 1. The antenna size is 0.885\*0.885mm.

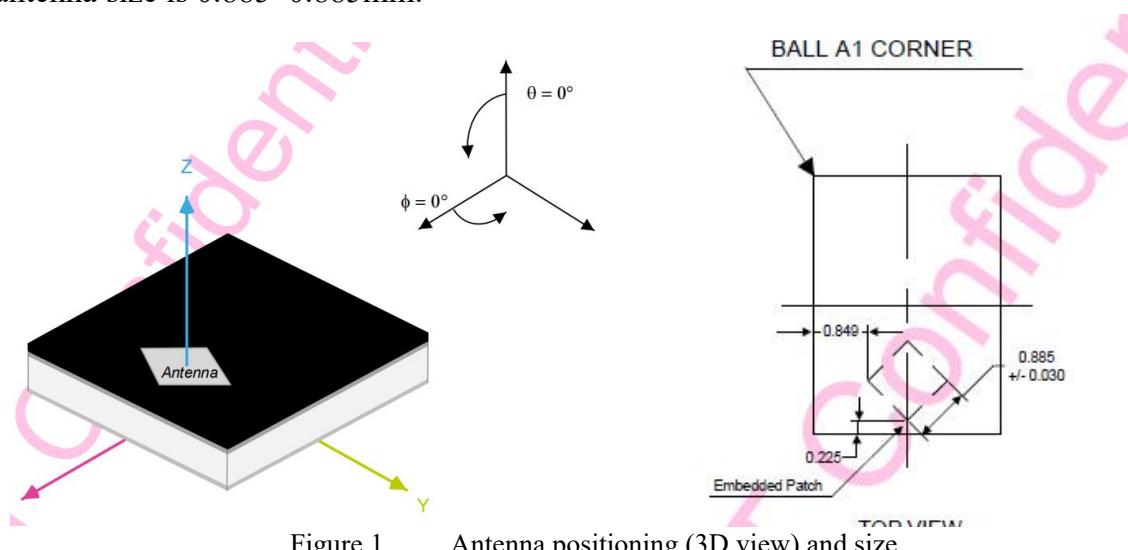


Figure 1. Antenna positioning (3D view) and size

The antenna's directivity is along the Z axis, with an aperture opening that accommodates +/- 2 mm alignment, considering an operating range of 30 mm. Both 180° relative orientations are supported as shown in Figure 2.



Figure 2. Board outlook of SKL5010

The integrated antenna broadside radiation pattern is described in Figure 3.

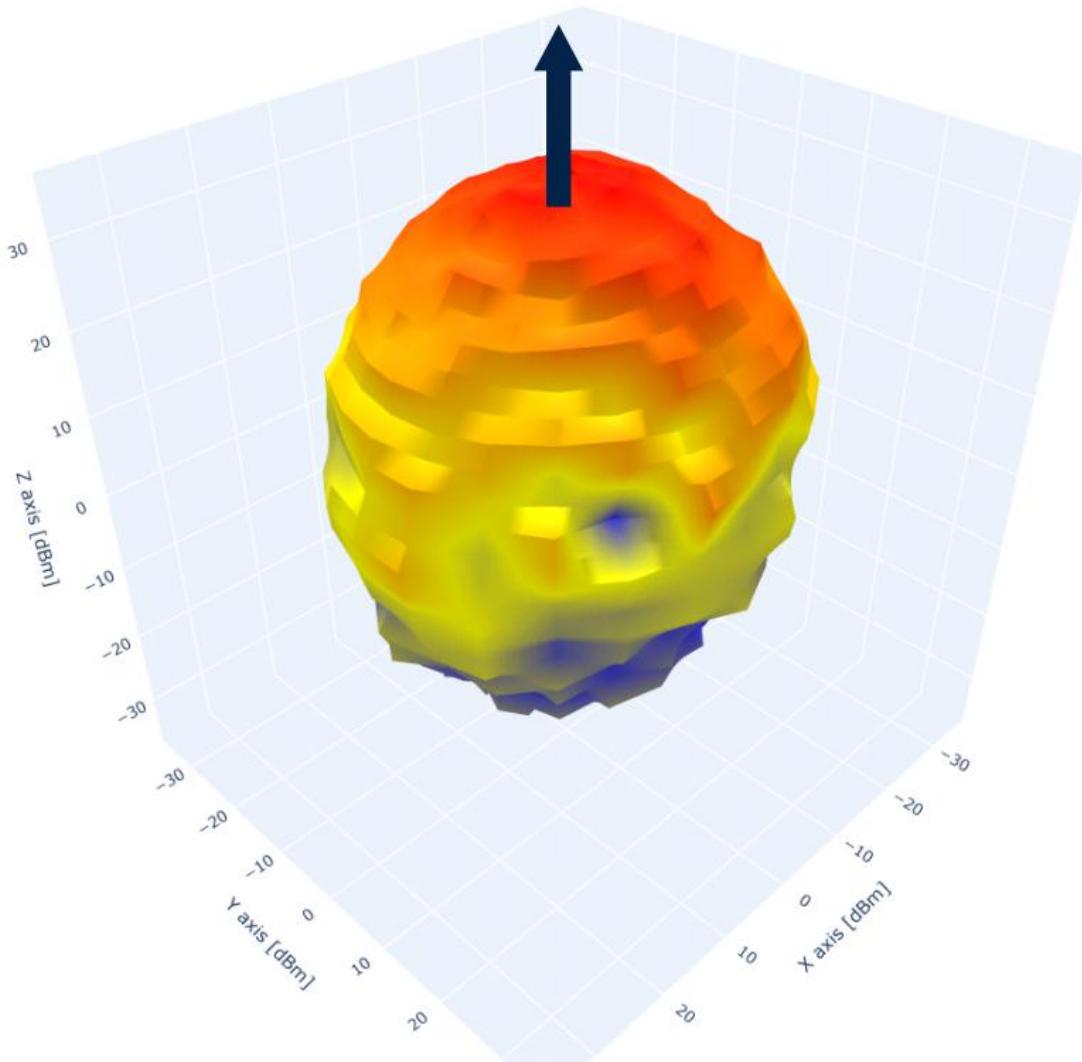


Figure 3. EIRP - measured 3D radiation pattern

Table 1. Antenna-in-package key specification

Parameter	Value
Model number	LP AIP antenna
Center frequency	60.5 GHz
Frequency band	57 - 64 GHz
Polarization	Dual polarization, linear
Antenna number	Single antenna
Tx gain	4 dBi peak
Rx gain	4 dBi peak
3 dB aperture	E-Plane: +/- 55° H-Plane: +/- 45°
PCB immunity	10 dB minimum front to back ratio
XY offset	+/- 2 mm

1. They can vary with PCB implementation.
2. Far-field gain established when the distance between antennas is at least 15 mm.
3. LP AIP antenna: LP for linear polarized, AIP for Antenna in package
4. Name and Address of antenna manufacturer: STMicroelectronics - 12, rue Jules Horowitz - BP217 38019 Grenoble Cedex | France