

Dataset for

**Planar array with bidirectional elements for tunnel environments**

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The manuscript contains all information required to reproduce the simulated and measured results that it contains.

**Figure4a.xlsx** Reflection coefficients of the antenna shown in Figure 3 with and without top slots. The x coordinate increases with the first and third column and the y coordinate increases with the second and fourth columns.

**Figure5.xlsx** Figure5a, the reflection coefficient versus the number n of side additional grounded holes, where  $D=2.9$  mm. Figure5b, the reflection coefficients versus different feeding positions, where  $n=3$ . The x coordinate increases with the first column and the y coordinate increases with the second column.

**Figure6.xlsx** Simulated normalized patterns of the bidirectional antenna with infinite ground: (a) yz plane and (b) xy plane.

**Figure7.xlsx** Figure7b, the simulated and measured reflection coefficients. Both the two fabricated antennas have a  $104 \times 104$  mm<sup>2</sup> metallic ground. Figure7c and Figure7d are far-field radiation patterns at 5.8 GHz in yz plane and xy plane, respectively.

**Figure8c.xlsx** Some measured active S parameters. The x coordinate increases with the odd columns and the y coordinate increases with the even columns.

**Figure9.xlsx** Figure9b, S21 versus different distance Dy when the antennas have no decoupling cavities. Figure9c, S21 versus different distance Dy when the antennas have decoupling cavities.

**Figure10.xlsx** Figure10b, S21 versus different distance Dx when the antennas have no decoupling cavities. Figure10c, S21 versus different distance Dx when the antennas have decoupling cavities.

**Figure11.xlsx** Figure10a and Figure10b are the simulated and measured active far-field radiation patterns at 5.8 GHz in the yz plane of each element in the array.

**Figure12.xlsx** Simulated patterns of the array scanning in  $\theta$  directions at 5.8GHz. The theta coordinate increases with the first column and the phi coordinate increases with the second column, the radiation is corresponding to the third column.

**Figure13.xlsx** Simulated patterns of the array scanning in  $\phi$  directions at 5.8GHz. The theta coordinate increases with the first column and the phi coordinate increases with the second column, the radiation is corresponding to the third column.

**Figure14.xlsx** Figure14a and Figure14b are patterns scanning in  $\theta$  directions at 5.8 GHz in the yz plane (E plane) and xy plane, respectively. Figure14c and Figure14d are patterns scanning in  $\phi$  directions at 5.8 GHz in the E planes and

xy plane, respectively.

**Figure15.xlsx** Measured scanning gains of the array at 5.8 GHz. The theta coordinate increases with the first column and the phi coordinate increases with the second column, the gain is corresponding to the third column.

**Figure16.xlsx** Bidirectional radiation patterns of the array. The theta coordinate increases with the first column and the phi coordinate increases with the second column, the radiation is corresponding to the third column.