# Part-0 Power Density Characterization Report

| | | |
|---|---|---|
| **Report No.** | : | **PFBFLF-WTW-P21010278** |
| **Applicant** | : | **ASUSTeK COMPUTER INC.** |
| **Address** | : | **1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan** |
| **Product** | : | **EXP21 Smartphone** |
| **FCC ID** | : | **MSQI007D** |
| **Brand** | : | **ASUS** |
| **Model No.** | : | **ASUS_I007D** |
| **Sample Received Date** | : | **Jan. 12, 2021** |
| **Lab Address** | : | **No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan** |
| **Test Location** | : | **No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City, Taiwan** |

**CERTIFICATION:** The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch–Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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**Approved By :** Roy Wu / Senior Manager

**FCC Accredited No.: TW0003**

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# Release Control Record

| Report No. | Reason for Change | Date Issued |
|---|---|---|
| PFBFLF-WTW-P21010278 | Initial release | Apr. 01, 2021 |
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# 1. Description of Equipment Under Test

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|---|---|
| **EUT Type** | EXP21 Smartphone |
| **FCC ID** | MSQI007D |
| **Brand Name** | ASUS |
| **Model Name** | ASUS_I007D |
| **Tx Frequency Bands (Unit: MHz)** | GSM850 : 824.2 ~ 848.8<br>GSM1900 : 1850.2 ~ 1909.8<br>WCDMA Band II : 1852.4 ~ 1907.6<br>WCDMA Band IV : 1712.4 ~ 1752.6<br>WCDMA Band V : 826.4 ~ 846.6<br>CDMA BC0 : 824.7 ~ 848.31<br>CDMA BC1 : 1851.25 ~ 1908.75<br>CDMA BC10 : 817.9 ~ 823.1<br>LTE Band 2 : 1850.7 ~ 1909.3<br>LTE Band 4 : 1710.7 ~ 1754.3<br>LTE Band 5 : 824.7 ~ 848.3<br>LTE Band 7 : 2502.5 ~ 2567.5<br>LTE Band 12 : 699.7 ~ 715.3<br>LTE Band 13 : 779.5 ~ 784.5<br>LTE Band 14 : 790.5 ~ 795.5<br>LTE Band 17 : 706.5 ~ 713.5<br>LTE Band 25 : 1850.7 ~ 1914.3<br>LTE Band 26 : 814.7 ~ 848.3<br>LTE Band 30 : 2307.5 ~ 2312.5<br>LTE Band 38 : 2572.5 ~ 2617.5<br>LTE Band 40 : 2302.5 ~ 2397.5<br>LTE Band 41 : 2498.5 ~ 2687.5<br>LTE Band 42 : 3552.5 ~ 3597.5<br>LTE Band 43 : 3652.5 ~ 3672.5<br>LTE Band 48 : 3552.5 ~ 3697.5<br>LTE Band 66 : 1710.7 ~ 1779.3<br>LTE Band 71 : 665.5 ~ 695.5<br>5G NR n2 : 1852.5 ~ 1907.5<br>5G NR n5 : 826.5 ~ 846.5<br>5G NR n7 : 2502.5 ~ 2567.5<br>5G NR n12 : 701.5 ~ 713.5<br>5G NR n14 : 790.5 ~ 795.5<br>5G NR n25 : 1852.5 ~ 1912.5<br>5G NR n26 : 816.5 ~ 846.5<br>5G NR n30 : 2307.5 ~ 2312.5<br>5G NR n38 : 2572.5 ~ 2617.5<br>5G NR n41 : 2506.02 ~ 2679.99<br>5G NR n66 : 1712.5 ~ 1777.5<br>5G NR n71 : 665.5 ~ 695.5<br>5G NR n77 : 3710.01 ~ 3969.99<br>5G NR n78 : 3305 ~ 3795<br>5G NR n258 : 24250 ~ 27500<br>5G NR n260 : 37000 ~ 40000<br>5G NR n261 : 27500 ~ 28350<br>WLAN : 2412 ~ 2462, 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5720, 5745 ~ 5825, 5925 ~ 6425, 6425 ~ 6525, 6525 ~ 6875, 6875 ~ 7125<br>Bluetooth : 2402 ~ 2480 |

**Note:**

1. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

**Time-Averaging for Power Density**

This device is enabled with Qualcomm Smart Transmit algorithm to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from 2G/3G/LTE/5G NR WWAN is in compliance with FCC requirements. This Part-0 report shows power density characterization of WWAN radios for 5G NR FR2 mm-Wave. The characterization is achieved by determining *input.power.limit* for 5G NR FR2 mm-Wave that corresponds to the exposure design targets after accounting for all device design related uncertainties. The power density characterization is denoted as PD Char in this report.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part-1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time-varying) transmission scenario for WWAN technologies are reported in Part-2 report.

**Nomenclature for Part-0 Report**

| Technology | Term | Description |
|---|---|---|
| 5G NR FR2 mm-Wave | *Input.power.limit* | Power level at antenna element for each beam that corresponds to the exposure design target (*PD_design_target*) |
| | *PD_design_target* | Target power density level < FCC PD limit after accounting for all device design related uncertainties |
| | *⊿min* | Housing material influence |
| | *PD Char* | Table containing *input.power.limit* for all beams and bands |

# 2. Power Density Characterization

## 2.1. Exposure Scenarios in Power Density Evaluation

At frequency > 6 GHz, the total peak spatial averaged power density (psPD) is required to be assessed for all antenna configurations (beams) from all mm-Wave antenna modules installed inside the device. This device has 3 patch antenna arrays (Ant 0, Ant 1 and Ant 2).

As showed in Figure-2.1, the surfaces near-by each mm-Wave antenna module for power density characterization are identified and listed in Table 2-1.

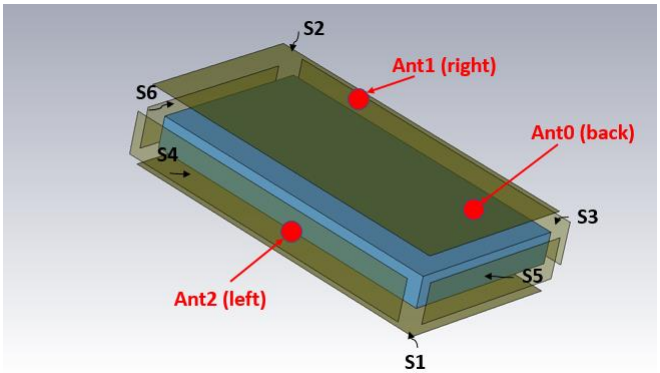


**Figure-2.1 Location of mm-Wave antenna modules of the DUT**

| Band | Antenna | Front | Back | Right | Left | Top | Bottom |
|---|---|---|---|---|---|---|---|
| 5G NR n258 | Ant 0 Patch | No | **Yes** | **Yes** | **Yes** | **Yes** | No |
| | Ant 1 Patch | **Yes** | **Yes** | **Yes** | No | No | **Yes** |
| | Ant 2 Patch | **Yes** | **Yes** | No | **Yes** | **Yes** | No |
| 5G NR n260 | Ant 0 Patch | No | **Yes** | **Yes** | **Yes** | **Yes** | No |
| | Ant 1 Patch | **Yes** | **Yes** | **Yes** | No | No | **Yes** |
| | Ant 2 Patch | **Yes** | **Yes** | No | **Yes** | **Yes** | No |
| 5G NR n261 | Ant 0 Patch | No | **Yes** | **Yes** | **Yes** | **Yes** | No |
| | Ant 1 Patch | **Yes** | **Yes** | **Yes** | No | No | **Yes** |
| | Ant 2 Patch | **Yes** | **Yes** | No | **Yes** | **Yes** | No |

**Table-2.1 Evaluation surfaces of mm-Wave antenna modules looking from front of the DUT**

Particular DUT edges were not required to be evaluated for power density if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB 941225 D06 v02r01 section III and KDB 648474 D04 v01r03. The distances between the transmit antennas and the edges of the device are included in the filing. Per FCC guidance, additional edges with negligible psPD results could be excluded from testing towards $\Delta min$ calculations.

## 2.2. Power Density Characterization Overview

The parameters used in power density characterization：

1. The DUT supports total 132 beams for n261 and 144 beams for n258 and n260, where 88 and 96 beams are single beams (SISO), and 44 and 48 are beam pairs (MIMO) where 2 single beams are excited at the same time.
2. ***PD_design_target*** : The design target for PD compliance as defined in the summary report. It should be less than FCC PD limit to account for all device design related uncertainties.
3. ***input.power.limit*** : For a PD characterized wireless device, the input power level at antenna port(s) for each beam corresponding to *PD_design_target*.
4. ***PD Char*** : The table that contains *input.power.limit* fed to antenna port(s) for all supported beams.

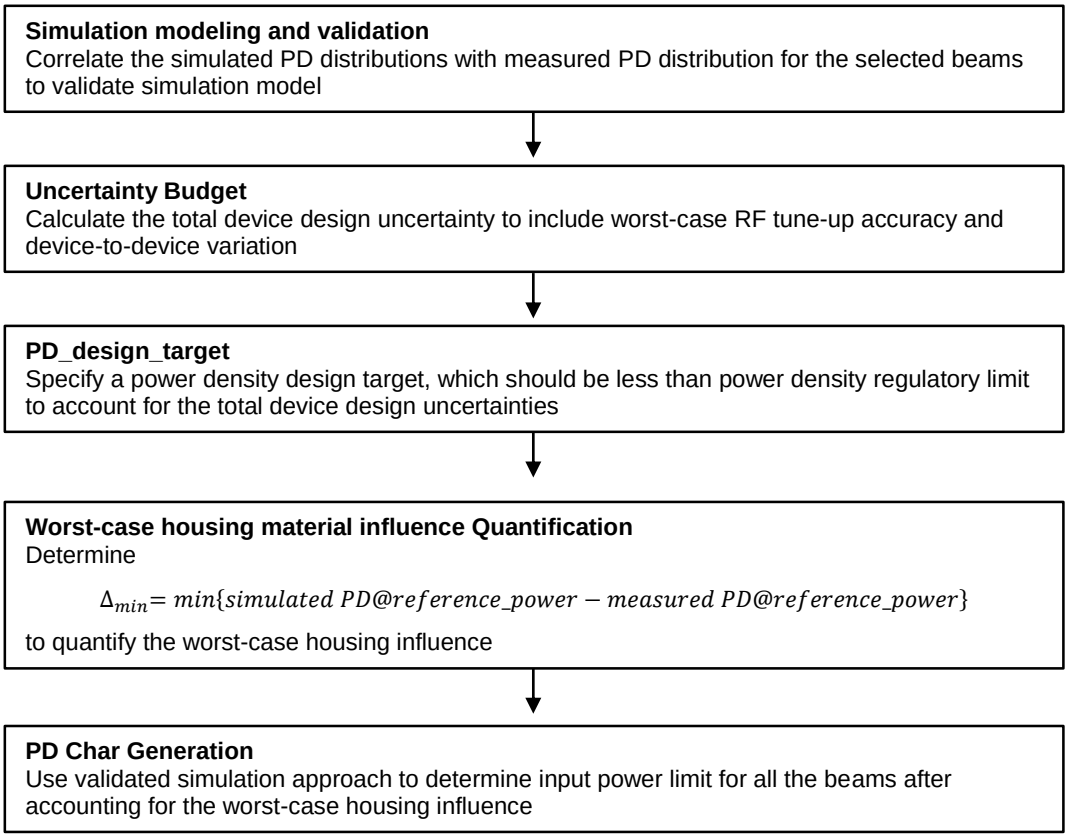


**Figure-2.2 Flow chart for power density characterization**

## 2.3. Codebook for All Supported Beams

All the beams that the DUT supports are specified in the pre-defined codebook. The codebook for this device is specified as below.

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 258 | 0 | PATCH | 4 | 132 | 1 |
| 258 | 0 | PATCH | 5 | 133 | 1 |
| 258 | 0 | PATCH | 12 | 140 | 2 |
| 258 | 0 | PATCH | 13 | 141 | 2 |
| 258 | 0 | PATCH | 14 | 142 | 2 |
| 258 | 0 | PATCH | 19 | 147 | 2 |
| 258 | 0 | PATCH | 20 | 148 | 2 |
| 258 | 0 | PATCH | 31 | 159 | 4 |
| 258 | 0 | PATCH | 32 | 160 | 4 |
| 258 | 0 | PATCH | 33 | 161 | 4 |
| 258 | 0 | PATCH | 34 | 162 | 4 |
| 258 | 0 | PATCH | 35 | 163 | 4 |
| 258 | 0 | PATCH | 44 | 172 | 4 |
| 258 | 0 | PATCH | 45 | 173 | 4 |
| 258 | 0 | PATCH | 46 | 174 | 4 |
| 258 | 0 | PATCH | 47 | 175 | 4 |
| 258 | 0 | PATCH | 132 | 4 | 1 |
| 258 | 0 | PATCH | 133 | 5 | 1 |
| 258 | 0 | PATCH | 140 | 12 | 2 |
| 258 | 0 | PATCH | 141 | 13 | 2 |
| 258 | 0 | PATCH | 142 | 14 | 2 |
| 258 | 0 | PATCH | 147 | 19 | 2 |
| 258 | 0 | PATCH | 148 | 20 | 2 |
| 258 | 0 | PATCH | 159 | 31 | 4 |
| 258 | 0 | PATCH | 160 | 32 | 4 |
| 258 | 0 | PATCH | 161 | 33 | 4 |
| 258 | 0 | PATCH | 162 | 34 | 4 |
| 258 | 0 | PATCH | 163 | 35 | 4 |
| 258 | 0 | PATCH | 172 | 44 | 4 |
| 258 | 0 | PATCH | 173 | 45 | 4 |
| 258 | 0 | PATCH | 174 | 46 | 4 |
| 258 | 0 | PATCH | 175 | 47 | 4 |

**Table-2.5 Codebook for 5G NR n258 Ant-0**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 258 | 1 | PATCH | 2 | 130 | 1 |
| 258 | 1 | PATCH | 3 | 131 | 1 |
| 258 | 1 | PATCH | 9 | 137 | 2 |
| 258 | 1 | PATCH | 10 | 138 | 2 |
| 258 | 1 | PATCH | 11 | 139 | 2 |
| 258 | 1 | PATCH | 17 | 145 | 2 |
| 258 | 1 | PATCH | 18 | 146 | 2 |
| 258 | 1 | PATCH | 26 | 154 | 4 |
| 258 | 1 | PATCH | 27 | 155 | 4 |
| 258 | 1 | PATCH | 28 | 156 | 4 |
| 258 | 1 | PATCH | 29 | 157 | 4 |
| 258 | 1 | PATCH | 30 | 158 | 4 |
| 258 | 1 | PATCH | 40 | 168 | 4 |
| 258 | 1 | PATCH | 41 | 169 | 4 |
| 258 | 1 | PATCH | 42 | 170 | 4 |
| 258 | 1 | PATCH | 43 | 171 | 4 |
| 258 | 1 | PATCH | 130 | 2 | 1 |
| 258 | 1 | PATCH | 131 | 3 | 1 |
| 258 | 1 | PATCH | 137 | 9 | 2 |
| 258 | 1 | PATCH | 138 | 10 | 2 |
| 258 | 1 | PATCH | 139 | 11 | 2 |
| 258 | 1 | PATCH | 145 | 17 | 2 |
| 258 | 1 | PATCH | 146 | 18 | 2 |
| 258 | 1 | PATCH | 154 | 26 | 4 |
| 258 | 1 | PATCH | 155 | 27 | 4 |
| 258 | 1 | PATCH | 156 | 28 | 4 |
| 258 | 1 | PATCH | 157 | 29 | 4 |
| 258 | 1 | PATCH | 158 | 30 | 4 |
| 258 | 1 | PATCH | 168 | 40 | 4 |
| 258 | 1 | PATCH | 169 | 41 | 4 |
| 258 | 1 | PATCH | 170 | 42 | 4 |
| 258 | 1 | PATCH | 171 | 43 | 4 |

**Table-2.6 Codebook for 5G NR n258 Ant-1**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 258 | 2 | PATCH | 0 | 128 | 1 |
| 258 | 2 | PATCH | 1 | 129 | 1 |
| 258 | 2 | PATCH | 6 | 134 | 2 |
| 258 | 2 | PATCH | 7 | 135 | 2 |
| 258 | 2 | PATCH | 8 | 136 | 2 |
| 258 | 2 | PATCH | 15 | 143 | 2 |
| 258 | 2 | PATCH | 16 | 144 | 2 |
| 258 | 2 | PATCH | 21 | 149 | 4 |
| 258 | 2 | PATCH | 22 | 150 | 4 |
| 258 | 2 | PATCH | 23 | 151 | 4 |
| 258 | 2 | PATCH | 24 | 152 | 4 |
| 258 | 2 | PATCH | 25 | 153 | 4 |
| 258 | 2 | PATCH | 36 | 164 | 4 |
| 258 | 2 | PATCH | 37 | 165 | 4 |
| 258 | 2 | PATCH | 38 | 166 | 4 |
| 258 | 2 | PATCH | 39 | 167 | 4 |
| 258 | 2 | PATCH | 128 | 0 | 1 |
| 258 | 2 | PATCH | 129 | 1 | 1 |
| 258 | 2 | PATCH | 134 | 6 | 2 |
| 258 | 2 | PATCH | 135 | 7 | 2 |
| 258 | 2 | PATCH | 136 | 8 | 2 |
| 258 | 2 | PATCH | 143 | 15 | 2 |
| 258 | 2 | PATCH | 144 | 16 | 2 |
| 258 | 2 | PATCH | 149 | 21 | 4 |
| 258 | 2 | PATCH | 150 | 22 | 4 |
| 258 | 2 | PATCH | 151 | 23 | 4 |
| 258 | 2 | PATCH | 152 | 24 | 4 |
| 258 | 2 | PATCH | 153 | 25 | 4 |
| 258 | 2 | PATCH | 164 | 36 | 4 |
| 258 | 2 | PATCH | 165 | 37 | 4 |
| 258 | 2 | PATCH | 166 | 38 | 4 |
| 258 | 2 | PATCH | 167 | 39 | 4 |

**Table-2.7 Codebook for 5G NR n258 Ant-2**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 260 | 0 | PATCH | 4 | 132 | 1 |
| 260 | 0 | PATCH | 5 | 133 | 1 |
| 260 | 0 | PATCH | 12 | 140 | 2 |
| 260 | 0 | PATCH | 13 | 141 | 2 |
| 260 | 0 | PATCH | 14 | 142 | 2 |
| 260 | 0 | PATCH | 19 | 147 | 2 |
| 260 | 0 | PATCH | 20 | 148 | 2 |
| 260 | 0 | PATCH | 31 | 159 | 4 |
| 260 | 0 | PATCH | 32 | 160 | 4 |
| 260 | 0 | PATCH | 33 | 161 | 4 |
| 260 | 0 | PATCH | 34 | 162 | 4 |
| 260 | 0 | PATCH | 35 | 163 | 4 |
| 260 | 0 | PATCH | 44 | 172 | 4 |
| 260 | 0 | PATCH | 45 | 173 | 4 |
| 260 | 0 | PATCH | 46 | 174 | 4 |
| 260 | 0 | PATCH | 47 | 175 | 4 |
| 260 | 0 | PATCH | 132 | 4 | 1 |
| 260 | 0 | PATCH | 133 | 5 | 1 |
| 260 | 0 | PATCH | 140 | 12 | 2 |
| 260 | 0 | PATCH | 141 | 13 | 2 |
| 260 | 0 | PATCH | 142 | 14 | 2 |
| 260 | 0 | PATCH | 147 | 19 | 2 |
| 260 | 0 | PATCH | 148 | 20 | 2 |
| 260 | 0 | PATCH | 159 | 31 | 4 |
| 260 | 0 | PATCH | 160 | 32 | 4 |
| 260 | 0 | PATCH | 161 | 33 | 4 |
| 260 | 0 | PATCH | 162 | 34 | 4 |
| 260 | 0 | PATCH | 163 | 35 | 4 |
| 260 | 0 | PATCH | 172 | 44 | 4 |
| 260 | 0 | PATCH | 173 | 45 | 4 |
| 260 | 0 | PATCH | 174 | 46 | 4 |
| 260 | 0 | PATCH | 175 | 47 | 4 |

**Table-2.8 Codebook for 5G NR n260 Ant-0**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 260 | 1 | PATCH | 2 | 130 | 1 |
| 260 | 1 | PATCH | 3 | 131 | 1 |
| 260 | 1 | PATCH | 9 | 137 | 2 |
| 260 | 1 | PATCH | 10 | 138 | 2 |
| 260 | 1 | PATCH | 11 | 139 | 2 |
| 260 | 1 | PATCH | 17 | 145 | 2 |
| 260 | 1 | PATCH | 18 | 146 | 2 |
| 260 | 1 | PATCH | 26 | 154 | 4 |
| 260 | 1 | PATCH | 27 | 155 | 4 |
| 260 | 1 | PATCH | 28 | 156 | 4 |
| 260 | 1 | PATCH | 29 | 157 | 4 |
| 260 | 1 | PATCH | 30 | 158 | 4 |
| 260 | 1 | PATCH | 40 | 168 | 4 |
| 260 | 1 | PATCH | 41 | 169 | 4 |
| 260 | 1 | PATCH | 42 | 170 | 4 |
| 260 | 1 | PATCH | 43 | 171 | 4 |
| 260 | 1 | PATCH | 130 | 2 | 1 |
| 260 | 1 | PATCH | 131 | 3 | 1 |
| 260 | 1 | PATCH | 137 | 9 | 2 |
| 260 | 1 | PATCH | 138 | 10 | 2 |
| 260 | 1 | PATCH | 139 | 11 | 2 |
| 260 | 1 | PATCH | 145 | 17 | 2 |
| 260 | 1 | PATCH | 146 | 18 | 2 |
| 260 | 1 | PATCH | 154 | 26 | 4 |
| 260 | 1 | PATCH | 155 | 27 | 4 |
| 260 | 1 | PATCH | 156 | 28 | 4 |
| 260 | 1 | PATCH | 157 | 29 | 4 |
| 260 | 1 | PATCH | 158 | 30 | 4 |
| 260 | 1 | PATCH | 168 | 40 | 4 |
| 260 | 1 | PATCH | 169 | 41 | 4 |
| 260 | 1 | PATCH | 170 | 42 | 4 |
| 260 | 1 | PATCH | 171 | 43 | 4 |

**Table-2.9 Codebook for 5G NR n260 Ant-1**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 260 | 2 | PATCH | 0 | 128 | 1 |
| 260 | 2 | PATCH | 1 | 129 | 1 |
| 260 | 2 | PATCH | 6 | 134 | 2 |
| 260 | 2 | PATCH | 7 | 135 | 2 |
| 260 | 2 | PATCH | 8 | 136 | 2 |
| 260 | 2 | PATCH | 15 | 143 | 2 |
| 260 | 2 | PATCH | 16 | 144 | 2 |
| 260 | 2 | PATCH | 21 | 149 | 4 |
| 260 | 2 | PATCH | 22 | 150 | 4 |
| 260 | 2 | PATCH | 23 | 151 | 4 |
| 260 | 2 | PATCH | 24 | 152 | 4 |
| 260 | 2 | PATCH | 25 | 153 | 4 |
| 260 | 2 | PATCH | 36 | 164 | 4 |
| 260 | 2 | PATCH | 37 | 165 | 4 |
| 260 | 2 | PATCH | 38 | 166 | 4 |
| 260 | 2 | PATCH | 39 | 167 | 4 |
| 260 | 2 | PATCH | 128 | 0 | 1 |
| 260 | 2 | PATCH | 129 | 1 | 1 |
| 260 | 2 | PATCH | 134 | 6 | 2 |
| 260 | 2 | PATCH | 135 | 7 | 2 |
| 260 | 2 | PATCH | 136 | 8 | 2 |
| 260 | 2 | PATCH | 143 | 15 | 2 |
| 260 | 2 | PATCH | 144 | 16 | 2 |
| 260 | 2 | PATCH | 149 | 21 | 4 |
| 260 | 2 | PATCH | 150 | 22 | 4 |
| 260 | 2 | PATCH | 151 | 23 | 4 |
| 260 | 2 | PATCH | 152 | 24 | 4 |
| 260 | 2 | PATCH | 153 | 25 | 4 |
| 260 | 2 | PATCH | 164 | 36 | 4 |
| 260 | 2 | PATCH | 165 | 37 | 4 |
| 260 | 2 | PATCH | 166 | 38 | 4 |
| 260 | 2 | PATCH | 167 | 39 | 4 |

**Table-2.10 Codebook for 5G NR n260 Ant-2**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 261 | 0 | PATCH | 4 | 132 | 1 |
| 261 | 0 | PATCH | 5 | 133 | 1 |
| 261 | 0 | PATCH | 12 | 140 | 2 |
| 261 | 0 | PATCH | 13 | 141 | 2 |
| 261 | 0 | PATCH | 14 | 142 | 2 |
| 261 | 0 | PATCH | 19 | 147 | 2 |
| 261 | 0 | PATCH | 20 | 148 | 2 |
| 261 | 0 | PATCH | 29 | 157 | 4 |
| 261 | 0 | PATCH | 30 | 158 | 4 |
| 261 | 0 | PATCH | 31 | 159 | 4 |
| 261 | 0 | PATCH | 32 | 160 | 4 |
| 261 | 0 | PATCH | 33 | 161 | 4 |
| 261 | 0 | PATCH | 40 | 168 | 4 |
| 261 | 0 | PATCH | 41 | 169 | 4 |
| 261 | 0 | PATCH | 42 | 170 | 4 |
| 261 | 0 | PATCH | 43 | 171 | 4 |
| 261 | 0 | PATCH | 132 | 4 | 1 |
| 261 | 0 | PATCH | 133 | 5 | 1 |
| 261 | 0 | PATCH | 140 | 12 | 2 |
| 261 | 0 | PATCH | 141 | 13 | 2 |
| 261 | 0 | PATCH | 142 | 14 | 2 |
| 261 | 0 | PATCH | 147 | 19 | 2 |
| 261 | 0 | PATCH | 148 | 20 | 2 |
| 261 | 0 | PATCH | 157 | 29 | 4 |
| 261 | 0 | PATCH | 158 | 30 | 4 |
| 261 | 0 | PATCH | 159 | 31 | 4 |
| 261 | 0 | PATCH | 160 | 32 | 4 |
| 261 | 0 | PATCH | 161 | 33 | 4 |
| 261 | 0 | PATCH | 168 | 40 | 4 |
| 261 | 0 | PATCH | 169 | 41 | 4 |
| 261 | 0 | PATCH | 170 | 42 | 4 |
| 261 | 0 | PATCH | 171 | 43 | 4 |

**Table-2.11 Codebook for 5G NR n261 Ant-0**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 261 | 1 | PATCH | 2 | 130 | 1 |
| 261 | 1 | PATCH | 3 | 131 | 1 |
| 261 | 1 | PATCH | 9 | 137 | 2 |
| 261 | 1 | PATCH | 10 | 138 | 2 |
| 261 | 1 | PATCH | 11 | 139 | 2 |
| 261 | 1 | PATCH | 17 | 145 | 2 |
| 261 | 1 | PATCH | 18 | 146 | 2 |
| 261 | 1 | PATCH | 25 | 153 | 4 |
| 261 | 1 | PATCH | 26 | 154 | 4 |
| 261 | 1 | PATCH | 27 | 155 | 4 |
| 261 | 1 | PATCH | 28 | 156 | 4 |
| 261 | 1 | PATCH | 37 | 165 | 4 |
| 261 | 1 | PATCH | 38 | 166 | 4 |
| 261 | 1 | PATCH | 39 | 167 | 4 |
| 261 | 1 | PATCH | 130 | 2 | 1 |
| 261 | 1 | PATCH | 131 | 3 | 1 |
| 261 | 1 | PATCH | 137 | 9 | 2 |
| 261 | 1 | PATCH | 138 | 10 | 2 |
| 261 | 1 | PATCH | 139 | 11 | 2 |
| 261 | 1 | PATCH | 145 | 17 | 2 |
| 261 | 1 | PATCH | 146 | 18 | 2 |
| 261 | 1 | PATCH | 153 | 25 | 4 |
| 261 | 1 | PATCH | 154 | 26 | 4 |
| 261 | 1 | PATCH | 155 | 27 | 4 |
| 261 | 1 | PATCH | 156 | 28 | 4 |
| 261 | 1 | PATCH | 165 | 37 | 4 |
| 261 | 1 | PATCH | 166 | 38 | 4 |
| 261 | 1 | PATCH | 167 | 39 | 4 |

**Table-2.12 Codebook for 5G NR n261 Ant-1**

| Band | Module | Antenna Type | Beam ID | Paired With | Feed no. |
|---|---|---|---|---|---|
| 261 | 2 | PATCH | 0 | 128 | 1 |
| 261 | 2 | PATCH | 1 | 129 | 1 |
| 261 | 2 | PATCH | 6 | 134 | 2 |
| 261 | 2 | PATCH | 7 | 135 | 2 |
| 261 | 2 | PATCH | 8 | 136 | 2 |
| 261 | 2 | PATCH | 15 | 143 | 2 |
| 261 | 2 | PATCH | 16 | 144 | 2 |
| 261 | 2 | PATCH | 21 | 149 | 4 |
| 261 | 2 | PATCH | 22 | 150 | 4 |
| 261 | 2 | PATCH | 23 | 151 | 4 |
| 261 | 2 | PATCH | 24 | 152 | 4 |
| 261 | 2 | PATCH | 34 | 162 | 4 |
| 261 | 2 | PATCH | 35 | 163 | 4 |
| 261 | 2 | PATCH | 36 | 164 | 4 |
| 261 | 2 | PATCH | 128 | 0 | 1 |
| 261 | 2 | PATCH | 129 | 1 | 1 |
| 261 | 2 | PATCH | 134 | 6 | 2 |
| 261 | 2 | PATCH | 135 | 7 | 2 |
| 261 | 2 | PATCH | 136 | 8 | 2 |
| 261 | 2 | PATCH | 143 | 15 | 2 |
| 261 | 2 | PATCH | 144 | 16 | 2 |
| 261 | 2 | PATCH | 149 | 21 | 4 |
| 261 | 2 | PATCH | 150 | 22 | 4 |
| 261 | 2 | PATCH | 151 | 23 | 4 |
| 261 | 2 | PATCH | 152 | 24 | 4 |
| 261 | 2 | PATCH | 162 | 34 | 4 |
| 261 | 2 | PATCH | 163 | 35 | 4 |
| 261 | 2 | PATCH | 164 | 36 | 4 |

**Table-2.13 Codebook for 5G NR n261 Ant-2**

## 2.4. Simulation and Modeling Validation

Power density simulations of all beams and surfaces were performed by the manufacturer. Details of these simulations and modeling validation can be found in the Power Density Simulation Report. Tablet below includes a summary of the validation results to support worst-case housing influence quantification in power density characterization for this model.

With an input power of 6 dBm, power density measurements are conducted for two single beams per antenna module on worst-surface(s). Power density measurements are performed at mid channel of each mm-Wave band and with CW modulation. All measured power density values are listed in table below along with corresponding simulated power density values for the same configuration.

Power density value will be used to determine worst-case housing influence for conservative assessment.

| Band | Antenna Module | Ant Group | Beam ID | Surface | Simulated PD ($W/m^2$) | Measured PD ($W/m^2$) | Delta = Sim. - Mea. (dB) |
|---|---|---|---|---|---|---|---|
| n258 | 0 | Vertical (AG0) | 47 | Back Side | 16.24 | 7.39 | 3.42 |
| | | Horizontal (AG1) | 175 | Back Side | 18.09 | 9.17 | **2.95** |
| | 1 | Vertical (AG0) | 28 | Right Side | 15.33 | 9.97 | **1.87** |
| | | Horizontal (AG1) | 170 | Right Side | 13.45 | 7.39 | 2.60 |
| | 2 | Vertical (AG0) | 37 | Left Side | 14.49 | 9.78 | **1.71** |
| | | Horizontal (AG1) | 165 | Left Side | 14.03 | 8.02 | 2.43 |
| n260 | 0 | Vertical (AG0) | 32 | Back Side | 3.12 | 3.17 | -0.07 |
| | | Horizontal (AG1) | 161 | Back Side | 2.42 | 3.97 | **-2.15** |
| | 1 | Vertical (AG0) | 30 | Right Side | 6.02 | 7.59 | **-1.01** |
| | | Horizontal (AG1) | 154 | Right Side | 8.01 | 6.97 | 0.60 |
| | 2 | Vertical (AG0) | 22 | Left Side | 3.46 | 7.36 | -3.28 |
| | | Horizontal (AG1) | 153 | Left Side | 3.04 | 7.32 | **-3.82** |
| n261 | 0 | Vertical (AG0) | 42 | Back Side | 12.44 | 6.32 | **2.94** |
| | | Horizontal (AG1) | 157 | Back Side | 8.64 | 3.61 | 3.79 |
| | 1 | Vertical (AG0) | 38 | Right Side | 10.82 | 6.61 | 2.14 |
| | | Horizontal (AG1) | 166 | Right Side | 9.29 | 7.27 | **1.06** |
| | 2 | Vertical (AG0) | 22 | Left Side | 6.72 | 7.34 | **-0.38** |
| | | Horizontal (AG1) | 163 | Left Side | 8.89 | 8.42 | 0.24 |

## 2.5. *PD_design_target*

The *PD_design_target* is determined by ensuring that it is less than FCC PD limit after accounting for total device designed related uncertainties specified by the manufacturer. The total uncertainties for this device is 2.1 dB. To account for total uncertainty, *PD_design_target* is determined as below.

$$PD\_design\_target < PD_{regulatory\ limit} \times 10^{\frac{-Total\ Uncertainty}{10}}$$

For power density, the $PD_{regulatory\ limit}$ is 1.0 mW/cm$^2$, and the *PD_design_target* is 0.6 mW/cm$^2$.

## 2.6. Worst-case Housing Influence Determination

For non-metal material, the material property cannot be accurately characterized at mm-Wave frequencies to date. The estimated material property for the device housing is used in the simulation model, which could influence the accuracy in simulation for power density amplitude quantification. Since the housing influence on power density could vary from surface to surface where the EM field propagates through, the most underestimated surface is used to quantify the worst-case housing influence for conservative assessment.

Since the mm-Wave antenna modules are placed at different location as shown in the operational description only material/housing surrounded has impact on EM field propagation, in turn impact on power density. Furthermore, depending on the type of antenna array, i.e., dipole antenna array or patch antenna array, the nature of EM field propagation in the near field is different. Therefore, the worst-case housing influence is determined per antenna module and per antenna type.

For this DUT, the below procedure was used to determine worst-case housing influence, $\Delta_{min}$:

1. Based on PD simulation, for each module and antenna type, determine one or more worst-surface(s) that has highest 4 cm$^2$ PD for all the single beams per antenna module and per antenna type in the mid channel of each band.
2. For identified worst surface(s) per antenna module and per antenna type group,
   a. First determine $\Delta_{min}$ based on identified worst surface(s), and derive *input.power.limit*
   b. Then prove all other near-by surface(s), i.e., non-selected surface(s), is not required for housing material loss quantification (in other words, these non-evaluated surfaces have no influence on the determined *input.power.limit*) by:
      i. Re-scale all simulated 4 cm$^2$ PD values to *input.power.limit* to identify the worst-PD beam per each non-evaluated surface.
      ii. Measure 4 cm$^2$ PD at *input.power.limit* on identified worst-PD beam per each non-evaluated surface.
      iii. Demonstrate all measured 4 cm$^2$ PD values are below *PD_design_target*.
3. If any of the above surface(s) in step (2.b.iii) have measured 4 cm$^2$ PD $\geqq$ *PD_design_target*, then those surfaces must be included in the $\Delta_{min}$ determination in step (2.a), and re-evaluate *input.power.limit* with these added surfaces.

Following above procedure, based on Table 3-1 ~ Table 3-4 in PD simulation report, the worst-surface(s) having highest 4 $cm^2$ PD for all the single beams per each antenna type and each antenna module group in the mid channel are identified as:

a. for Antenna 0 patch : Back (S2)
b. for Antenna 1 patch : Right (S3)
c. for Antenna 2 patch : Left (S4)

Thus, when comparing a simulated 4 $cm^2$-averaged PD and measured 4 $cm^2$-averaged PD for the identified worst surface(s), the worst error introduced for each antenna type and each antenna module group when using the estimated material property in the simulation is highlighted in bold numbers in below. Thus, the worst-case housing influence, denoted as $\Delta_{min}$ = Sim. PD – Meas. PD, is determined as:

| Band | Antenna Module | $\Delta min$ (dB) |
|---|---|---|
| n258 | 0 | **2.95** |
| | 1 | **1.87** |
| | 2 | **1.71** |
| n260 | 0 | **-2.15** |
| | 1 | **-1.01** |
| | 2 | **-3.82** |
| n261 | 0 | **2.94** |
| | 1 | **1.06** |
| | 2 | **-0.38** |

The $\Delta_{min}$ represents the worst case where RF exposure is underestimated the most in simulation when using the estimated material property for glass/plastics of the housing. For conservative assessment, the $\Delta_{min}$ is used as the worst-case factor and applied to all the beams in the corresponding beam group to determine input power limits in power density characterization for compliance.

The detail *input.power.limit* derivation is described in section 3.3. Simulated 4 $cm^2$ PD values in Table 3-1 ~ Table 3-4 in Power Density Simulation Report are scaled to *input.power.limit* and are listed in Table-3.2 ~ Table-3.13 for all single beams for all identified surfaces, when assuming the simulation is performed with correct housing influence.

Determine the worst beam for each of non-selected surface(s), i.e.,

a. for n258 Ant-0 patch : Right & Top
b. for n258 Ant-1 patch : Back
c. for n258 Ant-2 patch : Back
d. for n260 Ant-0 patch : Top
e. for n260 Ant-1 patch : Front & Back
f. for n260 Ant-2 patch : Front & Back
g. for n261 Ant-0 patch : Right & Top
h. for n261 Ant-1 patch : Back
i. for n261 Ant-2 patch : Front & Back

Then perform PD measurement for all determined worst-case beams, highlighted in orange in Table-2.14 ~ Table-2.25, on the corresponding surface. Measurement is performed in the min channel of each band with CW modulation. The evaluation distance is at 2 mm.

The test result in Table-2.26 shows that the all measured 4 $cm^2$ PD values are less than *PD_design_target* of 0.6 $mW/cm^2$, thus, the non-selected surfaces have no influence on the determined $\Delta_{min}$ and *input.power.limit* in section 3.3.

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 0 | | 4 | 0.66 | 4.69 | 0.22 | 0.29 | 0.90 | 0.02 |
| 0 | | 5 | 0.36 | 4.65 | 0.13 | 0.33 | 0.64 | 0.01 |
| 0 | | 12 | 0.45 | 5.73 | 0.27 | 0.67 | 0.89 | 0.01 |
| 0 | | 13 | 0.29 | 5.72 | 0.03 | 0.69 | 0.26 | 0.01 |
| 0 | | 14 | 0.55 | 4.04 | 0.08 | 0.12 | 0.84 | 0.02 |
| 0 | | 19 | 0.39 | 5.47 | 0.24 | 0.59 | 0.79 | 0.01 |
| 0 | | 20 | 0.37 | 5.70 | 0.09 | 0.18 | 0.35 | 0.01 |
| 0 | | 31 | 0.33 | 4.34 | 0.15 | 1.22 | 0.85 | 0.01 |
| 0 | | 32 | 0.29 | 5.59 | 0.07 | 1.12 | 0.52 | 0.02 |
| 0 | | 33 | 0.37 | 4.46 | 0.11 | 0.30 | 0.47 | 0.02 |
| 0 | | 34 | 0.35 | 4.90 | 0.09 | 0.16 | 0.55 | 0.02 |
| 0 | | 35 | 0.35 | 5.73 | 0.12 | 0.13 | 0.64 | 0.01 |
| 0 | | 44 | 0.31 | 4.87 | 0.11 | 1.22 | 0.70 | 0.01 |
| 0 | | 45 | 0.37 | 5.55 | 0.09 | 0.80 | 0.46 | 0.02 |
| 0 | | 46 | 0.36 | 4.34 | 0.09 | 0.18 | 0.50 | 0.02 |
| 0 | | 47 | 0.33 | 5.66 | 0.10 | 0.16 | 0.58 | 0.02 |
| 0 | 132 | | 0.24 | 5.56 | 0.24 | 0.20 | 1.54 | 0.00 |
| 0 | 133 | | 0.26 | 5.38 | 0.23 | 0.28 | 1.56 | 0.00 |
| 0 | 140 | | 0.43 | 5.30 | 0.48 | 0.54 | 1.51 | 0.01 |
| 0 | 141 | | 0.33 | 5.33 | 0.06 | 0.19 | 1.79 | 0.01 |
| 0 | 142 | | 0.26 | 5.62 | 0.28 | 0.21 | 2.23 | 0.00 |
| 0 | 147 | | 0.35 | 5.07 | 0.22 | 0.32 | 1.73 | 0.01 |
| 0 | 148 | | 0.26 | 5.69 | 0.10 | 0.06 | 1.95 | 0.01 |
| 0 | 159 | | 0.36 | 5.04 | 0.42 | 1.33 | 1.61 | 0.00 |
| 0 | 160 | | 0.41 | 5.73 | 0.07 | 0.57 | 2.18 | 0.00 |
| 0 | 161 | | 0.49 | 5.71 | 0.06 | 0.08 | 2.33 | 0.00 |
| 0 | 162 | | 0.31 | 5.54 | 0.05 | 0.05 | 2.32 | 0.00 |
| 0 | 163 | | 0.32 | 5.73 | 0.34 | 0.09 | 2.55 | 0.00 |
| 0 | 172 | | 0.35 | 5.30 | 0.15 | 1.02 | 1.81 | 0.00 |
| 0 | 173 | | 0.47 | 5.72 | 0.09 | 0.32 | 2.33 | 0.01 |
| 0 | 174 | | 0.46 | 5.71 | 0.03 | 0.08 | 2.35 | 0.00 |
| 0 | 175 | | 0.26 | 5.58 | 0.21 | 0.07 | 2.32 | 0.00 |

**Table-2.17 n258/mid channel, Ant-0 simulated 4 $cm^2$ PD at *PD_design_target* (if simulation performed with correct housing material properties) $\Delta min$**

| Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | 2.01 | 2.03 | 0.04 | 5.44 | 0.02 | 0.06 |
| 1 | | 3 | 1.94 | 2.32 | 0.03 | 5.73 | 0.03 | 0.10 |
| 1 | | 9 | 1.83 | 1.50 | 0.07 | 5.61 | 0.06 | 0.17 |
| 1 | | 10 | 2.23 | 2.83 | 0.01 | 5.74 | 0.00 | 0.02 |
| 1 | | 11 | 1.62 | 2.00 | 0.03 | 5.73 | 0.04 | 0.41 |
| 1 | | 17 | 2.16 | 2.50 | 0.03 | 5.73 | 0.03 | 0.06 |
| 1 | | 18 | 2.13 | 2.51 | 0.02 | 5.73 | 0.02 | 0.07 |
| 1 | | 26 | 1.49 | 2.02 | 0.08 | 4.58 | 0.06 | 0.20 |
| 1 | | 27 | 2.14 | 3.17 | 0.02 | 5.73 | 0.01 | 0.04 |
| 1 | | 28 | 2.04 | 3.03 | 0.01 | 5.72 | 0.00 | 0.02 |
| 1 | | 29 | 2.09 | 2.54 | 0.03 | 5.72 | 0.02 | 0.33 |
| 1 | | 30 | 1.59 | 2.18 | 0.06 | 4.51 | 0.09 | 0.62 |
| 1 | | 40 | 2.21 | 2.95 | 0.03 | 5.73 | 0.01 | 0.04 |
| 1 | | 41 | 2.14 | 3.18 | 0.02 | 5.74 | 0.00 | 0.02 |
| 1 | | 42 | 2.04 | 2.90 | 0.02 | 5.73 | 0.01 | 0.07 |
| 1 | | 43 | 1.70 | 1.87 | 0.04 | 4.94 | 0.07 | 0.58 |
| 1 | 130 | | 0.52 | 3.57 | 0.04 | 5.73 | 0.05 | 0.20 |
| 1 | 131 | | 0.61 | 3.25 | 0.01 | 5.36 | 0.03 | 0.07 |
| 1 | 137 | | 0.76 | 3.88 | 0.03 | 5.73 | 0.05 | 0.16 |
| 1 | 138 | | 0.73 | 4.12 | 0.02 | 5.74 | 0.01 | 0.06 |
| 1 | 139 | | 0.75 | 3.70 | 0.05 | 5.66 | 0.10 | 0.30 |
| 1 | 145 | | 0.75 | 4.02 | 0.02 | 5.73 | 0.02 | 0.07 |
| 1 | 146 | | 0.70 | 4.12 | 0.04 | 5.72 | 0.07 | 0.22 |
| 1 | 154 | | 1.02 | 4.22 | 0.03 | 5.73 | 0.05 | 0.25 |
| 1 | 155 | | 0.90 | 3.82 | 0.03 | 5.49 | 0.01 | 0.04 |
| 1 | 156 | | 0.98 | 3.97 | 0.02 | 5.73 | 0.01 | 0.03 |
| 1 | 157 | | 0.91 | 4.12 | 0.03 | 5.74 | 0.04 | 0.09 |
| 1 | 158 | | 1.11 | 3.73 | 0.04 | 5.72 | 0.13 | 0.38 |
| 1 | 168 | | 0.95 | 4.03 | 0.02 | 5.72 | 0.00 | 0.05 |
| 1 | 169 | | 0.93 | 3.72 | 0.03 | 5.47 | 0.01 | 0.03 |
| 1 | 170 | | 0.93 | 4.11 | 0.02 | 5.72 | 0.01 | 0.03 |
| 1 | 171 | | 0.98 | 3.92 | 0.03 | 5.73 | 0.09 | 0.22 |

**Table-2.18 n258/mid channel, Ant-1 simulated 4 cm² PD at *PD_design_target* (if simulation performed with correct housing material properties) *⊿min***

| Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 2 | | 0 | 1.78 | 2.45 | 5.58 | 0.05 | 0.16 | 0.03 |
| 2 | | 1 | 2.02 | 2.48 | 5.31 | 0.02 | 0.14 | 0.03 |
| 2 | | 6 | 2.03 | 1.82 | 5.74 | 0.04 | 0.20 | 0.08 |
| 2 | | 7 | 2.39 | 2.59 | 5.73 | 0.03 | 0.06 | 0.01 |
| 2 | | 8 | 1.52 | 2.93 | 5.00 | 0.04 | 0.35 | 0.06 |
| 2 | | 15 | 2.50 | 2.28 | 5.74 | 0.03 | 0.05 | 0.02 |
| 2 | | 16 | 1.69 | 2.49 | 5.73 | 0.04 | 0.25 | 0.09 |
| 2 | | 21 | 1.80 | 3.21 | 4.26 | 0.05 | 0.40 | 0.13 |
| 2 | | 22 | 2.23 | 2.53 | 5.42 | 0.02 | 0.05 | 0.00 |
| 2 | | 23 | 2.34 | 2.42 | 5.44 | 0.03 | 0.02 | 0.01 |
| 2 | | 24 | 2.15 | 3.27 | 5.73 | 0.03 | 0.11 | 0.03 |
| 2 | | 25 | 1.62 | 4.13 | 5.19 | 0.06 | 0.49 | 0.13 |
| 2 | | 36 | 2.06 | 2.42 | 5.08 | 0.04 | 0.15 | 0.03 |
| 2 | | 37 | 2.49 | 2.48 | 5.61 | 0.03 | 0.01 | 0.01 |
| 2 | | 38 | 2.39 | 2.82 | 5.73 | 0.03 | 0.03 | 0.02 |
| 2 | | 39 | 1.43 | 4.06 | 5.48 | 0.05 | 0.39 | 0.08 |
| 2 | 128 | | 0.78 | 3.09 | 5.36 | 0.04 | 0.06 | 0.03 |
| 2 | 129 | | 0.74 | 2.96 | 5.13 | 0.03 | 0.07 | 0.03 |
| 2 | 134 | | 0.79 | 3.76 | 5.64 | 0.07 | 0.11 | 0.06 |
| 2 | 135 | | 0.91 | 3.87 | 5.73 | 0.03 | 0.04 | 0.01 |
| 2 | 136 | | 0.77 | 3.61 | 5.64 | 0.07 | 0.11 | 0.06 |
| 2 | 143 | | 0.83 | 3.88 | 5.73 | 0.05 | 0.07 | 0.03 |
| 2 | 144 | | 0.86 | 3.72 | 5.74 | 0.06 | 0.12 | 0.05 |
| 2 | 149 | | 1.30 | 3.74 | 5.71 | 0.07 | 0.29 | 0.15 |
| 2 | 150 | | 1.07 | 4.00 | 5.73 | 0.04 | 0.01 | 0.01 |
| 2 | 151 | | 1.06 | 3.79 | 5.72 | 0.05 | 0.02 | 0.00 |
| 2 | 152 | | 1.04 | 3.97 | 5.73 | 0.04 | 0.09 | 0.00 |
| 2 | 153 | | 1.17 | 3.12 | 5.26 | 0.10 | 0.28 | 0.15 |
| 2 | 164 | | 1.18 | 3.97 | 5.65 | 0.03 | 0.17 | 0.08 |
| 2 | 165 | | 1.06 | 3.83 | 5.73 | 0.04 | 0.02 | 0.01 |
| 2 | 166 | | 1.09 | 3.84 | 5.73 | 0.05 | 0.01 | 0.02 |
| 2 | 167 | | 1.12 | 3.62 | 5.66 | 0.08 | 0.27 | 0.07 |

**Table-2.19 n258/mid channel, Ant-2 simulated 4 cm² PD at *PD_design_target* (if simulation performed with correct housing material properties) *⊿min***

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 0 | | 4 | 0.16 | 4.03 | 0.41 | 0.45 | 1.10 | 0.00 |
| 0 | | 5 | 0.16 | 4.83 | 0.48 | 0.97 | 1.29 | 0.00 |
| 0 | | 12 | 0.19 | 5.74 | 0.12 | 0.94 | 1.45 | 0.00 |
| 0 | | 13 | 0.21 | 5.35 | 0.61 | 1.03 | 1.75 | 0.00 |
| 0 | | 14 | 0.06 | 1.65 | 0.21 | 0.27 | 0.48 | 0.00 |
| 0 | | 19 | 0.13 | 5.75 | 0.26 | 0.91 | 1.58 | 0.00 |
| 0 | | 20 | 0.09 | 2.17 | 0.17 | 0.27 | 0.57 | 0.00 |
| 0 | | 31 | 0.12 | 3.10 | 0.21 | 0.60 | 1.00 | 0.01 |
| 0 | | 32 | 0.16 | 5.03 | 0.37 | 0.82 | 1.74 | 0.02 |
| 0 | | 33 | 0.13 | 3.99 | 0.36 | 0.66 | 1.03 | 0.00 |
| 0 | | 34 | 0.20 | 3.01 | 0.26 | 0.42 | 1.06 | 0.01 |
| 0 | | 35 | 0.13 | 3.08 | 0.27 | 0.69 | 1.11 | 0.01 |
| 0 | | 44 | 0.17 | 3.72 | 0.40 | 0.49 | 1.39 | 0.00 |
| 0 | | 45 | 0.14 | 3.54 | 0.52 | 0.68 | 1.08 | 0.02 |
| 0 | | 46 | 0.17 | 3.42 | 0.30 | 0.82 | 1.21 | 0.01 |
| 0 | | 47 | 0.19 | 2.99 | 0.19 | 0.44 | 0.96 | 0.01 |
| 0 | 132 | | 0.14 | 5.07 | 0.25 | 0.18 | 1.14 | 0.00 |
| 0 | 133 | | 0.18 | 5.64 | 0.18 | 0.55 | 1.09 | 0.00 |
| 0 | 140 | | 0.12 | 4.63 | 0.30 | 0.30 | 1.04 | 0.00 |
| 0 | 141 | | 0.18 | 3.88 | 0.22 | 0.44 | 0.98 | 0.00 |
| 0 | 142 | | 0.12 | 4.60 | 0.29 | 0.38 | 1.01 | 0.00 |
| 0 | 147 | | 0.12 | 4.91 | 0.30 | 0.18 | 1.18 | 0.00 |
| 0 | 148 | | 0.11 | 4.76 | 0.32 | 0.43 | 0.83 | 0.00 |
| 0 | 159 | | 0.13 | 4.22 | 0.32 | 0.55 | 0.99 | 0.00 |
| 0 | 160 | | 0.17 | 4.07 | 0.34 | 0.54 | 1.12 | 0.00 |
| 0 | 161 | | 0.19 | 5.73 | 0.26 | 0.57 | 1.54 | 0.00 |
| 0 | 162 | | 0.12 | 4.71 | 0.33 | 0.57 | 0.94 | 0.00 |
| 0 | 163 | | 0.13 | 4.26 | 0.31 | 0.57 | 0.94 | 0.00 |
| 0 | 172 | | 0.12 | 4.38 | 0.21 | 0.77 | 1.00 | 0.00 |
| 0 | 173 | | 0.20 | 4.67 | 0.35 | 0.52 | 1.20 | 0.00 |
| 0 | 174 | | 0.15 | 5.20 | 0.32 | 0.54 | 1.27 | 0.00 |
| 0 | 175 | | 0.13 | 4.43 | 0.30 | 0.63 | 1.00 | 0.00 |

**Table-2.20 n260/mid channel, Ant-0 simulated 4 cm² PD at *PD_design_target* (if simulation performed with correct housing material properties) *Δmin***

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | 0.85 | 0.95 | 0.02 | 2.81 | 0.02 | 0.04 |
| 1 | | 3 | 0.68 | 0.76 | 0.02 | 2.62 | 0.02 | 0.06 |
| 1 | | 9 | 1.08 | 1.21 | 0.02 | 3.69 | 0.02 | 0.07 |
| 1 | | 10 | 0.99 | 0.97 | 0.02 | 2.89 | 0.02 | 0.04 |
| 1 | | 11 | 0.57 | 0.93 | 0.01 | 2.70 | 0.02 | 0.02 |
| 1 | | 17 | 0.67 | 0.87 | 0.02 | 2.52 | 0.02 | 0.03 |
| 1 | | 18 | 0.81 | 0.88 | 0.01 | 2.50 | 0.01 | 0.03 |
| 1 | | 26 | 1.02 | 1.23 | 0.01 | 3.21 | 0.01 | 0.08 |
| 1 | | 27 | 1.08 | 1.27 | 0.02 | 3.50 | 0.07 | 0.03 |
| 1 | | 28 | 2.33 | 1.38 | 0.05 | 4.75 | 0.01 | 0.05 |
| 1 | | 29 | 1.20 | 1.28 | 0.02 | 3.33 | 0.01 | 0.09 |
| 1 | | 30 | 0.79 | 1.39 | 0.01 | 3.36 | 0.04 | 0.03 |
| 1 | | 40 | 0.86 | 1.22 | 0.01 | 3.19 | 0.02 | 0.05 |
| 1 | | 41 | 2.31 | 1.43 | 0.05 | 4.68 | 0.03 | 0.02 |
| 1 | | 42 | 1.72 | 1.32 | 0.04 | 3.84 | 0.02 | 0.10 |
| 1 | | 43 | 0.90 | 1.22 | 0.01 | 3.18 | 0.01 | 0.06 |
| 1 | 130 | | 0.57 | 2.41 | 0.00 | 4.18 | 0.00 | 0.07 |
| 1 | 131 | | 0.93 | 3.04 | 0.04 | 5.50 | 0.02 | 0.04 |
| 1 | 137 | | 0.53 | 2.32 | 0.02 | 4.65 | 0.04 | 0.03 |
| 1 | 138 | | 0.63 | 2.75 | 0.02 | 4.79 | 0.02 | 0.03 |
| 1 | 139 | | 0.58 | 2.46 | 0.03 | 4.72 | 0.04 | 0.02 |
| 1 | 145 | | 0.66 | 2.74 | 0.03 | 4.83 | 0.03 | 0.01 |
| 1 | 146 | | 0.49 | 2.40 | 0.02 | 4.61 | 0.03 | 0.03 |
| 1 | 154 | | 0.83 | 2.90 | 0.03 | 4.92 | 0.02 | 0.06 |
| 1 | 155 | | 0.81 | 2.79 | 0.04 | 5.20 | 0.05 | 0.04 |
| 1 | 156 | | 0.71 | 2.41 | 0.04 | 4.96 | 0.01 | 0.02 |
| 1 | 157 | | 0.76 | 2.54 | 0.04 | 4.56 | 0.04 | 0.04 |
| 1 | 158 | | 0.88 | 3.03 | 0.04 | 5.15 | 0.01 | 0.07 |
| 1 | 168 | | 0.83 | 2.93 | 0.03 | 4.97 | 0.01 | 0.07 |
| 1 | 169 | | 0.61 | 2.53 | 0.04 | 5.21 | 0.04 | 0.04 |
| 1 | 170 | | 0.72 | 2.40 | 0.04 | 4.53 | 0.02 | 0.02 |
| 1 | 171 | | 0.79 | 2.93 | 0.03 | 4.89 | 0.03 | 0.08 |

**Table-2.21 n260/mid channel, Ant-1 simulated 4 cm² PD at *PD_design_target* (if simulation performed with correct housing material properties) *Δmin***

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 2 | | 0 | 0.83 | 0.80 | 2.53 | 0.00 | 0.03 | 0.03 |
| 2 | | 1 | 0.70 | 0.85 | 2.87 | 0.02 | 0.06 | 0.02 |
| 2 | | 6 | 0.65 | 0.69 | 2.09 | 0.02 | 0.04 | 0.02 |
| 2 | | 7 | 1.01 | 0.86 | 2.70 | 0.00 | 0.07 | 0.04 |
| 2 | | 8 | 0.39 | 0.71 | 2.31 | 0.02 | 0.04 | 0.02 |
| 2 | | 15 | 0.77 | 0.80 | 2.57 | 0.00 | 0.06 | 0.03 |
| 2 | | 16 | 0.76 | 0.86 | 2.58 | 0.02 | 0.02 | 0.02 |
| 2 | | 21 | 0.52 | 0.67 | 2.09 | 0.02 | 0.01 | 0.02 |
| 2 | | 22 | 0.55 | 0.99 | 2.62 | 0.01 | 0.09 | 0.01 |
| 2 | | 23 | 0.87 | 0.76 | 2.47 | 0.02 | 0.11 | 0.01 |
| 2 | | 24 | 0.52 | 0.65 | 2.07 | 0.02 | 0.01 | 0.02 |
| 2 | | 25 | 0.51 | 0.71 | 2.16 | 0.02 | 0.03 | 0.02 |
| 2 | | 36 | 0.51 | 0.71 | 2.16 | 0.02 | 0.03 | 0.02 |
| 2 | | 37 | 0.67 | 0.94 | 2.65 | 0.01 | 0.10 | 0.01 |
| 2 | | 38 | 0.79 | 0.78 | 1.99 | 0.02 | 0.04 | 0.03 |
| 2 | | 39 | 0.48 | 0.64 | 2.05 | 0.02 | 0.01 | 0.02 |
| 2 | 128 | | 0.57 | 1.55 | 2.98 | 0.00 | 0.04 | 0.00 |
| 2 | 129 | | 0.50 | 1.68 | 2.73 | 0.04 | 0.02 | 0.00 |
| 2 | 134 | | 0.29 | 0.96 | 1.99 | 0.01 | 0.01 | 0.01 |
| 2 | 135 | | 0.33 | 1.04 | 1.79 | 0.01 | 0.01 | 0.00 |
| 2 | 136 | | 0.28 | 0.97 | 1.99 | 0.01 | 0.01 | 0.01 |
| 2 | 143 | | 0.32 | 1.07 | 1.84 | 0.01 | 0.01 | 0.00 |
| 2 | 144 | | 0.32 | 0.98 | 1.95 | 0.01 | 0.01 | 0.01 |
| 2 | 149 | | 0.47 | 1.45 | 2.54 | 0.02 | 0.02 | 0.01 |
| 2 | 150 | | 0.40 | 1.31 | 2.33 | 0.02 | 0.01 | 0.01 |
| 2 | 151 | | 0.41 | 1.36 | 2.32 | 0.02 | 0.02 | 0.01 |
| 2 | 152 | | 0.40 | 1.28 | 2.21 | 0.03 | 0.02 | 0.01 |
| 2 | 153 | | 0.46 | 1.38 | 2.51 | 0.02 | 0.01 | 0.01 |
| 2 | 164 | | 0.43 | 1.29 | 2.41 | 0.02 | 0.01 | 0.01 |
| 2 | 165 | | 0.40 | 1.35 | 2.37 | 0.03 | 0.01 | 0.01 |
| 2 | 166 | | 0.40 | 1.27 | 2.17 | 0.03 | 0.01 | 0.01 |
| 2 | 167 | | 0.39 | 1.42 | 2.39 | 0.03 | 0.02 | 0.01 |

**Table-2.22 n260/mid channel, Ant-2 simulated 4 cm² PD at *PD_design_target* (if simulation performed with correct housing material properties) *Δmin***

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 0 | | 4 | 0.04 | 5.73 | 0.22 | 0.31 | 0.37 | 0.01 |
| 0 | | 5 | 0.08 | 5.13 | 0.15 | 0.58 | 0.56 | 0.01 |
| 0 | | 12 | 0.19 | 5.04 | 0.30 | 1.56 | 0.58 | 0.01 |
| 0 | | 13 | 0.12 | 5.20 | 0.07 | 0.47 | 0.59 | 0.02 |
| 0 | | 14 | 0.04 | 5.73 | 0.22 | 0.31 | 0.36 | 0.01 |
| 0 | | 19 | 0.04 | 5.73 | 0.22 | 0.30 | 0.39 | 0.01 |
| 0 | | 20 | 0.07 | 5.69 | 0.24 | 0.56 | 0.64 | 0.01 |
| 0 | | 29 | 0.14 | 4.82 | 0.53 | 1.61 | 0.54 | 0.01 |
| 0 | | 30 | 0.04 | 5.32 | 0.21 | 1.17 | 0.38 | 0.01 |
| 0 | | 31 | 0.10 | 5.35 | 0.05 | 0.34 | 0.57 | 0.03 |
| 0 | | 32 | 0.08 | 5.68 | 0.16 | 0.49 | 0.57 | 0.01 |
| 0 | | 33 | 0.22 | 5.67 | 0.30 | 1.26 | 0.79 | 0.01 |
| 0 | | 40 | 0.07 | 5.11 | 0.35 | 1.33 | 0.43 | 0.01 |
| 0 | | 41 | 0.08 | 5.40 | 0.05 | 0.79 | 0.50 | 0.02 |
| 0 | | 42 | 0.08 | 5.47 | 0.08 | 0.16 | 0.55 | 0.03 |
| 0 | | 43 | 0.16 | 5.70 | 0.24 | 0.89 | 0.70 | 0.01 |
| 0 | 132 | | 0.00 | 4.28 | 0.00 | 0.36 | 1.07 | 0.00 |
| 0 | 133 | | 0.11 | 5.71 | 0.10 | 0.49 | 1.72 | 0.00 |
| 0 | 140 | | 0.07 | 5.39 | 0.16 | 0.20 | 1.23 | 0.00 |
| 0 | 141 | | 0.10 | 5.39 | 0.12 | 0.10 | 1.43 | 0.00 |
| 0 | 142 | | 0.10 | 5.59 | 0.11 | 0.64 | 1.58 | 0.00 |
| 0 | 147 | | 0.08 | 5.35 | 0.12 | 0.10 | 1.34 | 0.00 |
| 0 | 148 | | 0.11 | 5.42 | 0.16 | 0.18 | 1.42 | 0.00 |
| 0 | 157 | | 0.19 | 5.39 | 0.17 | 0.31 | 1.94 | 0.01 |
| 0 | 158 | | 0.12 | 5.72 | 0.27 | 0.86 | 1.77 | 0.01 |
| 0 | 159 | | 0.22 | 5.58 | 0.15 | 1.29 | 1.70 | 0.01 |
| 0 | 160 | | 0.10 | 5.72 | 0.24 | 0.79 | 1.96 | 0.01 |
| 0 | 161 | | 0.09 | 5.60 | 0.14 | 0.70 | 1.73 | 0.01 |
| 0 | 168 | | 0.16 | 5.57 | 0.23 | 0.40 | 1.65 | 0.01 |
| 0 | 169 | | 0.21 | 5.62 | 0.24 | 1.25 | 1.87 | 0.01 |
| 0 | 170 | | 0.18 | 5.70 | 0.19 | 1.02 | 1.51 | 0.01 |
| 0 | 171 | | 0.09 | 5.58 | 0.18 | 0.76 | 1.87 | 0.01 |

**Table-2.23 n261/mid channel, Ant-0 simulated 4 cm² PD at *PD_design_target* (if simulation performed with correct housing material properties) *Δmin***

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | 1.79 | 1.76 | 0.03 | 5.78 | 0.03 | 0.07 |
| 1 | | 3 | 1.91 | 1.64 | 0.06 | 5.69 | 0.02 | 0.06 |
| 1 | | 9 | 1.79 | 1.71 | 0.03 | 5.86 | 0.05 | 0.12 |
| 1 | | 10 | 2.27 | 2.43 | 0.03 | 5.52 | 0.00 | 0.03 |
| 1 | | 11 | 1.61 | 1.51 | 0.06 | 5.65 | 0.06 | 0.16 |
| 1 | | 17 | 2.23 | 2.06 | 0.05 | 5.67 | 0.01 | 0.04 |
| 1 | | 18 | 1.79 | 1.76 | 0.03 | 5.78 | 0.03 | 0.07 |
| 1 | | 25 | 1.76 | 1.87 | 0.02 | 5.85 | 0.07 | 0.18 |
| 1 | | 26 | 2.14 | 2.02 | 0.03 | 5.62 | 0.01 | 0.05 |
| 1 | | 27 | 2.32 | 2.29 | 0.06 | 5.51 | 0.01 | 0.02 |
| 1 | | 28 | 1.88 | 1.88 | 0.09 | 5.48 | 0.05 | 0.11 |
| 1 | | 37 | 1.98 | 1.95 | 0.03 | 5.75 | 0.02 | 0.11 |
| 1 | | 38 | 2.31 | 2.44 | 0.05 | 5.59 | 0.01 | 0.01 |
| 1 | | 39 | 2.13 | 2.07 | 0.09 | 5.40 | 0.02 | 0.05 |
| 1 | 130 | | 0.69 | 3.34 | 0.05 | 5.86 | 0.03 | 0.06 |
| 1 | 131 | | 0.71 | 3.27 | 0.02 | 5.70 | 0.02 | 0.07 |
| 1 | 137 | | 0.78 | 3.77 | 0.07 | 5.72 | 0.01 | 0.06 |
| 1 | 138 | | 0.74 | 3.84 | 0.04 | 5.76 | 0.04 | 0.07 |
| 1 | 139 | | 0.66 | 2.89 | 0.06 | 5.63 | 0.08 | 0.15 |
| 1 | 145 | | 0.78 | 3.98 | 0.05 | 5.79 | 0.02 | 0.03 |
| 1 | 146 | | 0.71 | 3.27 | 0.02 | 5.70 | 0.02 | 0.07 |
| 1 | 153 | | 0.82 | 3.94 | 0.04 | 5.55 | 0.02 | 0.09 |
| 1 | 154 | | 0.90 | 4.00 | 0.05 | 5.80 | 0.03 | 0.05 |
| 1 | 155 | | 0.95 | 3.98 | 0.04 | 5.81 | 0.02 | 0.04 |
| 1 | 156 | | 0.91 | 3.60 | 0.06 | 5.87 | 0.08 | 0.21 |
| 1 | 165 | | 0.83 | 3.96 | 0.05 | 5.53 | 0.01 | 0.07 |
| 1 | 166 | | 0.97 | 4.01 | 0.03 | 5.86 | 0.03 | 0.03 |
| 1 | 167 | | 0.91 | 3.90 | 0.05 | 5.85 | 0.04 | 0.12 |

**Table-2.24 n261/mid channel, Ant-1 simulated 4 cm$^2$ PD at *PD_design_target* (if simulation performed with correct housing material properties) $\Delta$*min***

| Antenna Module | Beam ID 2 | Beam ID 1 | Front | Back | Left | Right | Top | Bottom |
|---|---|---|---|---|---|---|---|---|
| 2 | | 0 | 1.66 | 1.66 | 4.79 | 0.00 | 0.00 | 0.00 |
| 2 | | 1 | 1.78 | 1.54 | 5.52 | 0.02 | 0.09 | 0.03 |
| 2 | | 6 | 1.63 | 1.98 | 5.68 | 0.03 | 0.16 | 0.05 |
| 2 | | 7 | 1.99 | 1.85 | 5.42 | 0.02 | 0.07 | 0.03 |
| 2 | | 8 | 2.30 | 1.57 | 5.73 | 0.04 | 0.06 | 0.04 |
| 2 | | 15 | 2.06 | 1.76 | 5.31 | 0.02 | 0.05 | 0.02 |
| 2 | | 16 | 1.58 | 1.67 | 5.60 | 0.03 | 0.10 | 0.03 |
| 2 | | 21 | 1.52 | 1.95 | 5.54 | 0.03 | 0.15 | 0.05 |
| 2 | | 22 | 2.66 | 1.92 | 5.53 | 0.02 | 0.02 | 0.01 |
| 2 | | 23 | 2.41 | 2.15 | 5.50 | 0.03 | 0.02 | 0.02 |
| 2 | | 24 | 1.79 | 2.19 | 5.62 | 0.03 | 0.09 | 0.04 |
| 2 | | 34 | 2.21 | 1.94 | 5.47 | 0.03 | 0.07 | 0.03 |
| 2 | | 35 | 2.66 | 1.97 | 5.52 | 0.03 | 0.02 | 0.01 |
| 2 | | 36 | 2.14 | 2.27 | 5.55 | 0.03 | 0.04 | 0.03 |
| 2 | 128 | | 0.61 | 3.23 | 5.47 | 0.04 | 0.06 | 0.04 |
| 2 | 129 | | 0.77 | 3.05 | 5.74 | 0.03 | 0.08 | 0.03 |
| 2 | 134 | | 0.96 | 2.98 | 5.65 | 0.03 | 0.15 | 0.06 |
| 2 | 135 | | 0.95 | 3.68 | 5.60 | 0.03 | 0.04 | 0.03 |
| 2 | 136 | | 0.70 | 2.94 | 5.49 | 0.03 | 0.06 | 0.03 |
| 2 | 143 | | 0.90 | 3.72 | 5.63 | 0.02 | 0.03 | 0.01 |
| 2 | 144 | | 0.83 | 3.09 | 5.72 | 0.04 | 0.09 | 0.07 |
| 2 | 149 | | 0.91 | 3.40 | 5.49 | 0.03 | 0.14 | 0.05 |
| 2 | 150 | | 1.08 | 3.86 | 5.72 | 0.03 | 0.01 | 0.01 |
| 2 | 151 | | 1.01 | 3.73 | 5.62 | 0.04 | 0.03 | 0.03 |
| 2 | 152 | | 0.95 | 3.34 | 5.68 | 0.05 | 0.15 | 0.11 |
| 2 | 162 | | 1.02 | 3.65 | 5.57 | 0.03 | 0.05 | 0.01 |
| 2 | 163 | | 1.07 | 3.86 | 5.73 | 0.03 | 0.01 | 0.02 |
| 2 | 164 | | 0.96 | 3.63 | 5.70 | 0.04 | 0.08 | 0.06 |

**Table-2.25 n261/mid channel, Ant-2 simulated 4 cm$^2$ PD at *PD_design_target* (if simulation performed with correct housing material properties) $\Delta$*min***

| Band | Antenna | Beam ID | Surface | Tested Power Level (dBm) | input.power.limit (dBm) | Measured 4 cm$^2$ PD (mW/cm$^2$) |
|---|---|---|---|---|---|---|
| n258 | 0 | 44 | Right | 1.8 | 1.77 | 0.049 |
| n258 | 0 | 163 | Top | 1.3 | 1.21 | 0.144 |
| n258 | 1 | 41 | Back | 2.0 | 2.00 | 0.185 |
| n258 | 1 | 154 | Back | 3.1 | 3.10 | 0.170 |
| n258 | 2 | 25 | Back | 4.1 | 4.02 | 0.131 |
| n258 | 2 | 150 | Back | 2.2 | 2.15 | 0.192 |
| n260 | 0 | 13 | Top | 11.6 | 11.52 | 0.231 |
| n260 | 0 | 161 | Top | 9.8 | 9.74 | 0.525 |
| n260 | 1 | 28 | Front | 6.0 | 5.97 | 0.470 |
| n260 | 1 | 131 | Back | 8.7 | 8.63 | 0.245 |
| n260 | 2 | 7 | Front | 11.8 | 11.74 | 0.504 |
| n260 | 2 | 129 | Back | 9.4 | 9.33 | 0.263 |
| n261 | 0 | 29 | Right | 4.4 | 4.33 | 0.069 |
| n261 | 0 | 160 | Top | 5.5 | 5.41 | 0.128 |
| n261 | 1 | 38 | Back | 3.2 | 3.13 | 0.101 |
| n261 | 1 | 166 | Back | 4.0 | 4.00 | 0.392 |
| n261 | 2 | 35 | Front | 5.4 | 5.39 | 0.313 |
| n261 | 2 | 150 | Back | 4.2 | 4.14 | 0.334 |

**Table-2.26 4 cm$^2$ PD of the selected beams measured on the corresponding surfaces that are not selected for $\Delta$*min* determination**

# 3. PD Characterization of the DUT

## 3.1. Scaling Factor for Single Beams

To determine the input power limit at each antenna port, perform simulation at low, mid and high channel for each mm-Wave band supported, with a given input power per active port ($P_{ref}$):

1. Obtain $PD_{surface}$ value (the worst PD among all identified surfaces of the DUT) at all three channels for all single beams specified in the codebook.
2. Derive a scaling factor at low, mid and high channel, $s(i)_{low\ or\ mid\ or\ high}$, by:

$$S(i)_{low\ or\ mid\ or\ high} = \frac{PD\ design\ target}{sim.PD_{surface}(i)}, i \in single\ beams \quad (1)$$

3. Determine the worst-case scaling factor, $s(i)$, among low, mid and high channels:

$$S(i) = min\{s_{low}(i), s_{mid}(i), s_{high}(i)\}, i \in single\ beams \quad (2)$$

and this scaling factor applies to the input power at each antenna port.

For 2nd generation of Smart Transmit, "Qualcomm MG Script" prints the $sim.power_{limit}$ for all three channels, denoted as $sim.power_{limit\_}L$, $sim.power_{limit\_}M$, and $sim.power_{limit\_}H$. The $sim.power_{limit}$ is determined by:

$$sim.power_{limit} = min\{sim.power_{limit\_}L, sim.power_{limit\_}M, sim.power_{limit\_}H\}$$

## 3.2. Scaling Factor for Beam Pairs

The relative phase between beam pair is not controlled in the DUT and could vary from run to run. Therefore, for beam pair, based on the simulation results, the worst-case scaling factor needs to be determined mathematically to ensure the compliance.

The worst-case power density for MIMO operations was found by sweeping the relative phase for all possible angles to ensure a conservative assessment. The power density simulation report contains the worst-case power density for each surface after sweeping through all relative phases between beams.

Once the power density was determined for the worst-case ∅, the scaling factor was obtained by the below equation for low, mid and high channels:

$$S(i)_{low\ or\ mid\ or\ high} = \frac{PD\ design\ target}{total\ PD(\phi(i)_{worst-case})}, i \in beam\ pairs \quad (3)$$

The $total\ PD(\varnothing_{worst\text{-}case})$ varies with channel and beam pair, the lowest scaling factor among all three channels, $s(i)$, is determined for the beam pair i:

$$S(i) = min\{s_{low}(i), s_{mid}(i), s_{high}(i)\}, i \in beam\ pairs \quad (4)$$

For 2nd generation of Smart Transmit, "Qualcomm MG Script" prints the *sim.power*$_{limit}$ for all three channels, denoted as *sim.power*$_{limit}$*_L*, *sim.power*$_{limit}$*_M*, and *sim.power*$_{limit}$*_H*. The sim.power$_{limit}$ is determined by:

$$sim.power_{limit} = min\{sim.power_{limit}\_L, sim.power_{limit}\_M, sim.power_{limit}\_H\}$$

## 3.3. *input.power.limit* Calculation

The power density specifies the limit of input power at antenna port that corresponds to *PD_design_target* for all the beams.

Ideally, if there is no uncertainty associated with hardware design, the input power limit, denoted as *input.power.limit(i)*, for beam I can be obtained after accounting for the housing influence ($\Delta_{min}$) determined in table 8, given by:

$$input.power.limit(i) = sim.power_{limit} + 10 * log(s(i)) + \Delta_{min}, i \in all\ beams \quad (5)$$

Where 6 dBm is the input power used in simulation; *s(i)* is the scaling factor obtained from Eq. (2) or Eq. (4) from beam I; $\Delta_{min}$ is the worst-case housing influence factor (determined in table 10) from beam i.

If simulation overestimates the housing influence, then $\Delta_{min}$ (= simulated PD – measured PD) is negative, which means that the measured PD would be higher than the simulated PD. The input power to antenna elements determined via simulation must be decreased for compliance.

Similarly, if simulation underestimates the loss, then $\Delta_{min}$ is positive (measured PD would be lower than the simulated value). Input power to antenna elements determined via simulation can be increased and still be PD compliant.

In reality the hardware design has uncertainty which must be properly considered. The device design related uncertainty is embedded in the process of $\Delta_{min}$ determination. Since the device uncertainty is already accounted for in *PD_design_target*, it needs to be removed to avoid double counting this uncertainty.

Thus, Equation 5 is modified to:
If -TxAGC uncertainty < $\Delta_{min}$ < TxAGC uncertainty,

$$input.power.limit(i) = sim.power_{limit}(i), i \in all\ beams \quad (6)$$

else if $\Delta_{min}$ < -TxAGC uncertainty,

$$input.power.limit(i) = sim.power_{limit}(i) + (\Delta_{min} + TxAGC\ uncertainty), i \in all\ beams \quad (7)$$

else if $\Delta_{min}$ > TxAGC uncertainty,

$$input.power.limit(i) = sim.power_{limit}(i) + (\Delta_{min} - TxAGC\ uncertainty), i \in all\ beams \quad (8)$$

Following above logic, the *input.power.limit* for this DUT can be calculated using Equations (6), (7), and (8), i.e.,

| Band | Antenna | *⊿min* (dB) | TxAGC Uncertainty (dB) | *input.power.limit* (dBm) | Notes |
|---|---|---|---|---|---|
| n258 | 0 (Patch) | 2.95 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + 2.45 | Using Eq.8 |
| | 1 (Patch) | 1.87 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + 1.37 | Using Eq.8 |
| | 2 (Patch) | 1.71 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + 1.21 | Using Eq.8 |
| n260 | 0 (Patch) | -2.15 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + -1.65 | Using Eq.7 |
| | 1 (Patch) | -1.01 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + -0.51 | Using Eq.7 |
| | 2 (Patch) | -3.82 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + -3.32 | Using Eq.7 |
| n261 | 0 (Patch) | 2.94 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + 2.44 | Using Eq.8 |
| | 1 (Patch) | 1.06 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ + 0.56 | Using Eq.8 |
| | 2 (Patch) | -0.38 | 0.5 | input.power.limit(i) = $sim.power_{limit}$ | Using Eq.6 |

**Table-3.1 *input.power.limit* Calculation**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n258 | 0 | | 4 | 12.3 |
| n258 | 0 | | 5 | 10.0 |
| n258 | 0 | | 12 | 9.1 |
| n258 | 0 | | 13 | 6.3 |
| n258 | 0 | | 14 | 7.5 |
| n258 | 0 | | 19 | 8.7 |
| n258 | 0 | | 20 | 6.4 |
| n258 | 0 | | 31 | 4.5 |
| n258 | 0 | | 32 | 4.1 |
| n258 | 0 | | 33 | 4.3 |
| n258 | 0 | | 34 | 3.8 |
| n258 | 0 | | 35 | 4.0 |
| n258 | 0 | | 44 | 4.2 |
| n258 | 0 | | 45 | 4.3 |
| n258 | 0 | | 46 | 3.9 |
| n258 | 0 | | 47 | 3.9 |
| n258 | 0 | | 132 | 10.0 |
| n258 | 0 | | 133 | 9.5 |
| n258 | 0 | | 140 | 7.6 |
| n258 | 0 | | 141 | 6.1 |
| n258 | 0 | | 142 | 6.9 |
| n258 | 0 | | 147 | 6.6 |
| n258 | 0 | | 148 | 6.3 |
| n258 | 0 | | 159 | 5.0 |
| n258 | 0 | | 160 | 4.0 |
| n258 | 0 | | 161 | 3.9 |
| n258 | 0 | | 162 | 3.6 |
| n258 | 0 | | 163 | 3.7 |
| n258 | 0 | | 172 | 4.3 |
| n258 | 0 | | 173 | 3.9 |
| n258 | 0 | | 174 | 3.8 |
| n258 | 0 | | 175 | 3.2 |
| n258 | 0 | 132 | 4 | 7.9 |
| n258 | 0 | 133 | 5 | 6.9 |
| n258 | 0 | 140 | 12 | 4.9 |
| n258 | 0 | 141 | 13 | 4.1 |
| n258 | 0 | 142 | 14 | 3.9 |
| n258 | 0 | 147 | 19 | 4.2 |
| n258 | 0 | 148 | 20 | 3.9 |
| n258 | 0 | 159 | 31 | 1.3 |
| n258 | 0 | 160 | 32 | 1.2 |
| n258 | 0 | 161 | 33 | 1.5 |
| n258 | 0 | 162 | 34 | 0.9 |
| n258 | 0 | 163 | 35 | 0.7 |
| n258 | 0 | 172 | 44 | 1.0 |
| n258 | 0 | 173 | 45 | 1.5 |
| n258 | 0 | 174 | 46 | 1.3 |
| n258 | 0 | 175 | 47 | 0.5 |

**Table-3.5 *input.power.limit* for 5G NR n258 Ant-0**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n258 | 1 | | 2 | 10.6 |
| n258 | 1 | | 3 | 8.9 |
| n258 | 1 | | 9 | 7.8 |
| n258 | 1 | | 10 | 6.0 |
| n258 | 1 | | 11 | 7.4 |
| n258 | 1 | | 17 | 7.0 |
| n258 | 1 | | 18 | 6.3 |
| n258 | 1 | | 26 | 4.8 |
| n258 | 1 | | 27 | 3.4 |
| n258 | 1 | | 28 | 3.1 |
| n258 | 1 | | 29 | 4.7 |
| n258 | 1 | | 30 | 5.3 |
| n258 | 1 | | 40 | 4.0 |
| n258 | 1 | | 41 | 3.4 |
| n258 | 1 | | 42 | 3.4 |
| n258 | 1 | | 43 | 5.1 |
| n258 | 1 | | 130 | 9.9 |
| n258 | 1 | | 131 | 9.0 |
| n258 | 1 | | 137 | 6.9 |
| n258 | 1 | | 138 | 6.1 |
| n258 | 1 | | 139 | 7.5 |
| n258 | 1 | | 145 | 6.3 |
| n258 | 1 | | 146 | 6.9 |
| n258 | 1 | | 154 | 4.5 |
| n258 | 1 | | 155 | 3.6 |
| n258 | 1 | | 156 | 3.7 |
| n258 | 1 | | 157 | 3.7 |
| n258 | 1 | | 158 | 4.6 |
| n258 | 1 | | 168 | 3.8 |
| n258 | 1 | | 169 | 3.7 |
| n258 | 1 | | 170 | 3.7 |
| n258 | 1 | | 171 | 3.9 |
| n258 | 1 | 130 | 2 | 6.2 |
| n258 | 1 | 131 | 3 | 5.9 |
| n258 | 1 | 137 | 9 | 3.9 |
| n258 | 1 | 138 | 10 | 2.7 |
| n258 | 1 | 139 | 11 | 4.8 |
| n258 | 1 | 145 | 17 | 3.1 |
| n258 | 1 | 146 | 18 | 3.0 |
| n258 | 1 | 154 | 26 | 0.9 |
| n258 | 1 | 155 | 27 | 0.1 |
| n258 | 1 | 156 | 28 | 0.2 |
| n258 | 1 | 157 | 29 | 0.5 |
| n258 | 1 | 158 | 30 | 1.0 |
| n258 | 1 | 168 | 40 | 0.4 |
| n258 | 1 | 169 | 41 | 0.3 |
| n258 | 1 | 170 | 42 | 0.0 |
| n258 | 1 | 171 | 43 | 0.9 |

**Table-3.6 *input.power.limit* for 5G NR n258 Ant-1**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n258 | 2 | | 0 | 9.2 |
| n258 | 2 | | 1 | 9.2 |
| n258 | 2 | | 6 | 7.4 |
| n258 | 2 | | 7 | 7.0 |
| n258 | 2 | | 8 | 7.3 |
| n258 | 2 | | 15 | 6.9 |
| n258 | 2 | | 16 | 7.7 |
| n258 | 2 | | 21 | 4.8 |
| n258 | 2 | | 22 | 3.5 |
| n258 | 2 | | 23 | 3.1 |
| n258 | 2 | | 24 | 4.4 |
| n258 | 2 | | 25 | 5.2 |
| n258 | 2 | | 36 | 4.7 |
| n258 | 2 | | 37 | 3.1 |
| n258 | 2 | | 38 | 3.5 |
| n258 | 2 | | 39 | 5.3 |
| n258 | 2 | | 128 | 8.8 |
| n258 | 2 | | 129 | 9.5 |
| n258 | 2 | | 134 | 6.7 |
| n258 | 2 | | 135 | 5.7 |
| n258 | 2 | | 136 | 6.8 |
| n258 | 2 | | 143 | 6.0 |
| n258 | 2 | | 144 | 6.4 |
| n258 | 2 | | 149 | 4.7 |
| n258 | 2 | | 150 | 3.4 |
| n258 | 2 | | 151 | 3.4 |
| n258 | 2 | | 152 | 3.5 |
| n258 | 2 | | 153 | 5.2 |
| n258 | 2 | | 164 | 3.9 |
| n258 | 2 | | 165 | 3.3 |
| n258 | 2 | | 166 | 3.4 |
| n258 | 2 | | 167 | 4.6 |
| n258 | 2 | 128 | 0 | 5.7 |
| n258 | 2 | 129 | 1 | 6.1 |
| n258 | 2 | 134 | 6 | 3.5 |
| n258 | 2 | 135 | 7 | 3.0 |
| n258 | 2 | 136 | 8 | 3.5 |
| n258 | 2 | 143 | 15 | 2.9 |
| n258 | 2 | 144 | 16 | 3.3 |
| n258 | 2 | 149 | 21 | 0.4 |
| n258 | 2 | 150 | 22 | 0.0 |
| n258 | 2 | 151 | 23 | 0.1 |
| n258 | 2 | 152 | 24 | 0.2 |
| n258 | 2 | 153 | 25 | 0.8 |
| n258 | 2 | 164 | 36 | 0.3 |
| n258 | 2 | 165 | 37 | -0.1 |
| n258 | 2 | 166 | 38 | 0.1 |
| n258 | 2 | 167 | 39 | 0.7 |

**Table-3.7 *input.power.limit* for 5G NR n258 Ant-2**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n260 | 0 | | 4 | 10.5 |
| n260 | 0 | | 5 | 16.4 |
| n260 | 0 | | 12 | 8.2 |
| n260 | 0 | | 13 | 9.9 |
| n260 | 0 | | 14 | 9.1 |
| n260 | 0 | | 19 | 8.5 |
| n260 | 0 | | 20 | 6.1 |
| n260 | 0 | | 31 | 4.8 |
| n260 | 0 | | 32 | 6.4 |
| n260 | 0 | | 33 | 6.3 |
| n260 | 0 | | 34 | 5.1 |
| n260 | 0 | | 35 | 5.0 |
| n260 | 0 | | 44 | 5.5 |
| n260 | 0 | | 45 | 6.4 |
| n260 | 0 | | 46 | 5.3 |
| n260 | 0 | | 47 | 5.2 |
| n260 | 0 | | 132 | 9.9 |
| n260 | 0 | | 133 | 17.0 |
| n260 | 0 | | 140 | 9.1 |
| n260 | 0 | | 141 | 10.0 |
| n260 | 0 | | 142 | 9.0 |
| n260 | 0 | | 147 | 9.1 |
| n260 | 0 | | 148 | 8.6 |
| n260 | 0 | | 159 | 7.6 |
| n260 | 0 | | 160 | 7.7 |
| n260 | 0 | | 161 | 8.1 |
| n260 | 0 | | 162 | 7.4 |
| n260 | 0 | | 163 | 7.6 |
| n260 | 0 | | 172 | 7.5 |
| n260 | 0 | | 173 | 7.7 |
| n260 | 0 | | 174 | 7.7 |
| n260 | 0 | | 175 | 7.7 |
| n260 | 0 | 132 | 4 | 6.7 |
| n260 | 0 | 133 | 5 | 12.4 |
| n260 | 0 | 140 | 12 | 6.8 |
| n260 | 0 | 141 | 13 | 6.4 |
| n260 | 0 | 142 | 14 | 5.6 |
| n260 | 0 | 147 | 19 | 6.7 |
| n260 | 0 | 148 | 20 | 3.7 |
| n260 | 0 | 159 | 31 | 2.6 |
| n260 | 0 | 160 | 32 | 3.6 |
| n260 | 0 | 161 | 33 | 3.7 |
| n260 | 0 | 162 | 34 | 2.8 |
| n260 | 0 | 163 | 35 | 2.8 |
| n260 | 0 | 172 | 44 | 2.8 |
| n260 | 0 | 173 | 45 | 3.5 |
| n260 | 0 | 174 | 46 | 3.0 |
| n260 | 0 | 175 | 47 | 2.9 |

**Table-3.8 *input.power.limit* for 5G NR n260 Ant-0**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n260 | 1 | | 2 | 8.2 |
| n260 | 1 | | 3 | 8.3 |
| n260 | 1 | | 9 | 4.9 |
| n260 | 1 | | 10 | 8.4 |
| n260 | 1 | | 11 | 4.6 |
| n260 | 1 | | 17 | 7.4 |
| n260 | 1 | | 18 | 7.2 |
| n260 | 1 | | 26 | 3.2 |
| n260 | 1 | | 27 | 3.9 |
| n260 | 1 | | 28 | 5.5 |
| n260 | 1 | | 29 | 3.7 |
| n260 | 1 | | 30 | 3.0 |
| n260 | 1 | | 40 | 2.8 |
| n260 | 1 | | 41 | 5.6 |
| n260 | 1 | | 42 | 4.6 |
| n260 | 1 | | 43 | 2.9 |
| n260 | 1 | | 130 | 14.0 |
| n260 | 1 | | 131 | 8.1 |
| n260 | 1 | | 137 | 5.5 |
| n260 | 1 | | 138 | 5.3 |
| n260 | 1 | | 139 | 5.4 |
| n260 | 1 | | 145 | 5.2 |
| n260 | 1 | | 146 | 5.5 |
| n260 | 1 | | 154 | 3.4 |
| n260 | 1 | | 155 | 4.3 |
| n260 | 1 | | 156 | 3.5 |
| n260 | 1 | | 157 | 3.2 |
| n260 | 1 | | 158 | 4.0 |
| n260 | 1 | | 168 | 3.8 |
| n260 | 1 | | 169 | 4.1 |
| n260 | 1 | | 170 | 3.1 |
| n260 | 1 | | 171 | 3.7 |
| n260 | 1 | 130 | 2 | 6.5 |
| n260 | 1 | 131 | 3 | 4.6 |
| n260 | 1 | 137 | 9 | 3.2 |
| n260 | 1 | 138 | 10 | 2.9 |
| n260 | 1 | 139 | 11 | 2.1 |
| n260 | 1 | 145 | 17 | 2.9 |
| n260 | 1 | 146 | 18 | 2.8 |
| n260 | 1 | 154 | 26 | -0.1 |
| n260 | 1 | 155 | 27 | 0.4 |
| n260 | 1 | 156 | 28 | 1.2 |
| n260 | 1 | 157 | 29 | 0.1 |
| n260 | 1 | 158 | 30 | 0.1 |
| n260 | 1 | 168 | 40 | -0.1 |
| n260 | 1 | 169 | 41 | 1.0 |
| n260 | 1 | 170 | 42 | 0.5 |
| n260 | 1 | 171 | 43 | -0.1 |

**Table-3.9 *input.power.limit* for 5G NR n260 Ant-1**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n260 | 2 | | 0 | 8.1 |
| n260 | 2 | | 1 | 5.6 |
| n260 | 2 | | 6 | 2.8 |
| n260 | 2 | | 7 | 8.4 |
| n260 | 2 | | 8 | 1.9 |
| n260 | 2 | | 15 | 7.8 |
| n260 | 2 | | 16 | 3.1 |
| n260 | 2 | | 21 | 1.2 |
| n260 | 2 | | 22 | 1.5 |
| n260 | 2 | | 23 | 2.6 |
| n260 | 2 | | 24 | 1.5 |
| n260 | 2 | | 25 | 0.8 |
| n260 | 2 | | 36 | 0.8 |
| n260 | 2 | | 37 | 2.1 |
| n260 | 2 | | 38 | 2.5 |
| n260 | 2 | | 39 | 1.0 |
| n260 | 2 | | 128 | 8.8 |
| n260 | 2 | | 129 | 6.0 |
| n260 | 2 | | 134 | 3.5 |
| n260 | 2 | | 135 | 2.8 |
| n260 | 2 | | 136 | 3.5 |
| n260 | 2 | | 143 | 3.3 |
| n260 | 2 | | 144 | 3.1 |
| n260 | 2 | | 149 | 1.9 |
| n260 | 2 | | 150 | 1.9 |
| n260 | 2 | | 151 | 1.9 |
| n260 | 2 | | 152 | 2.3 |
| n260 | 2 | | 153 | 1.8 |
| n260 | 2 | | 164 | 1.8 |
| n260 | 2 | | 165 | 1.9 |
| n260 | 2 | | 166 | 2.2 |
| n260 | 2 | | 167 | 2.2 |
| n260 | 2 | 128 | 0 | 4.7 |
| n260 | 2 | 129 | 1 | 2.5 |
| n260 | 2 | 134 | 6 | 0.3 |
| n260 | 2 | 135 | 7 | 1.0 |
| n260 | 2 | 136 | 8 | 0.7 |
| n260 | 2 | 143 | 15 | 1.1 |
| n260 | 2 | 144 | 16 | 0.6 |
| n260 | 2 | 149 | 21 | -1.2 |
| n260 | 2 | 150 | 22 | -1.0 |
| n260 | 2 | 151 | 23 | 0.1 |
| n260 | 2 | 152 | 24 | -1.6 |
| n260 | 2 | 153 | 25 | -1.5 |
| n260 | 2 | 164 | 36 | -1.4 |
| n260 | 2 | 165 | 37 | -0.6 |
| n260 | 2 | 166 | 38 | -0.5 |
| n260 | 2 | 167 | 39 | -1.5 |

**Table-3.10 *input.power.limit* for 5G NR n260 Ant-2**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n261 | 0 | | 4 | 9.5 |
| n261 | 0 | | 5 | 9.8 |
| n261 | 0 | | 12 | 8.5 |
| n261 | 0 | | 13 | 6.8 |
| n261 | 0 | | 14 | 9.5 |
| n261 | 0 | | 19 | 9.5 |
| n261 | 0 | | 20 | 7.1 |
| n261 | 0 | | 29 | 6.8 |
| n261 | 0 | | 30 | 5.2 |
| n261 | 0 | | 31 | 5.0 |
| n261 | 0 | | 32 | 5.2 |
| n261 | 0 | | 33 | 6.5 |
| n261 | 0 | | 40 | 5.9 |
| n261 | 0 | | 41 | 4.9 |
| n261 | 0 | | 42 | 4.9 |
| n261 | 0 | | 43 | 5.9 |
| n261 | 0 | | 132 | 24.0 |
| n261 | 0 | | 133 | 10.5 |
| n261 | 0 | | 140 | 11.1 |
| n261 | 0 | | 141 | 10.6 |
| n261 | 0 | | 142 | 10.6 |
| n261 | 0 | | 147 | 10.7 |
| n261 | 0 | | 148 | 10.9 |
| n261 | 0 | | 157 | 6.4 |
| n261 | 0 | | 158 | 7.5 |
| n261 | 0 | | 159 | 7.6 |
| n261 | 0 | | 160 | 7.9 |
| n261 | 0 | | 161 | 7.0 |
| n261 | 0 | | 168 | 6.6 |
| n261 | 0 | | 169 | 7.8 |
| n261 | 0 | | 170 | 7.5 |
| n261 | 0 | | 171 | 7.4 |
| n261 | 0 | 132 | 4 | 9.1 |
| n261 | 0 | 133 | 5 | 7.0 |
| n261 | 0 | 140 | 12 | 7.6 |
| n261 | 0 | 141 | 13 | 6.2 |
| n261 | 0 | 142 | 14 | 7.3 |
| n261 | 0 | 147 | 19 | 7.3 |
| n261 | 0 | 148 | 20 | 5.9 |
| n261 | 0 | 157 | 29 | 3.9 |
| n261 | 0 | 158 | 30 | 3.3 |
| n261 | 0 | 159 | 31 | 3.1 |
| n261 | 0 | 160 | 32 | 3.2 |
| n261 | 0 | 161 | 33 | 3.5 |
| n261 | 0 | 168 | 40 | 3.7 |
| n261 | 0 | 169 | 41 | 1.3 |
| n261 | 0 | 170 | 42 | 3.1 |
| n261 | 0 | 171 | 43 | 3.3 |

**Table-3.11 *input.power.limit* for 5G NR n261 Ant-0**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n261 | 1 | | 2 | 8.8 |
| n261 | 1 | | 3 | 9.5 |
| n261 | 1 | | 9 | 6.5 |
| n261 | 1 | | 10 | 5.6 |
| n261 | 1 | | 11 | 7.4 |
| n261 | 1 | | 17 | 6.0 |
| n261 | 1 | | 18 | 8.8 |
| n261 | 1 | | 25 | 5.3 |
| n261 | 1 | | 26 | 4.2 |
| n261 | 1 | | 27 | 3.8 |
| n261 | 1 | | 28 | 5.6 |
| n261 | 1 | | 37 | 4.7 |
| n261 | 1 | | 38 | 3.7 |
| n261 | 1 | | 39 | 4.6 |
| n261 | 1 | | 130 | 8.3 |
| n261 | 1 | | 131 | 9.3 |
| n261 | 1 | | 137 | 6.6 |
| n261 | 1 | | 138 | 6.4 |
| n261 | 1 | | 139 | 7.3 |
| n261 | 1 | | 145 | 6.4 |
| n261 | 1 | | 146 | 9.3 |
| n261 | 1 | | 153 | 5.2 |
| n261 | 1 | | 154 | 4.7 |
| n261 | 1 | | 155 | 4.6 |
| n261 | 1 | | 156 | 5.6 |
| n261 | 1 | | 165 | 4.8 |
| n261 | 1 | | 166 | 4.0 |
| n261 | 1 | | 167 | 4.8 |
| n261 | 1 | 130 | 2 | 5.3 |
| n261 | 1 | 131 | 3 | 6.0 |
| n261 | 1 | 137 | 9 | 3.4 |
| n261 | 1 | 138 | 10 | 2.8 |
| n261 | 1 | 139 | 11 | 4.8 |
| n261 | 1 | 145 | 17 | 3.4 |
| n261 | 1 | 146 | 18 | 6.0 |
| n261 | 1 | 153 | 25 | 1.8 |
| n261 | 1 | 154 | 26 | 1.3 |
| n261 | 1 | 155 | 27 | 0.9 |
| n261 | 1 | 156 | 28 | 2.4 |
| n261 | 1 | 165 | 37 | 1.8 |
| n261 | 1 | 166 | 38 | 0.9 |
| n261 | 1 | 167 | 39 | 1.4 |

**Table-3.12 *input.power.limit* for 5G NR n261 Ant-1**

| Band | Antenna Module | Paired With ID (For Beam Pair) | Beam ID | *input.power.limit* (dBm) |
|---|---|---|---|---|
| n261 | 2 | | 0 | 18.7 |
| n261 | 2 | | 1 | 8.4 |
| n261 | 2 | | 6 | 6.3 |
| n261 | 2 | | 7 | 8.2 |
| n261 | 2 | | 8 | 9.3 |
| n261 | 2 | | 15 | 7.8 |
| n261 | 2 | | 16 | 8.4 |
| n261 | 2 | | 21 | 6.0 |
| n261 | 2 | | 22 | 4.3 |
| n261 | 2 | | 23 | 5.8 |
| n261 | 2 | | 24 | 6.4 |
| n261 | 2 | | 34 | 5.6 |
| n261 | 2 | | 35 | 5.4 |
| n261 | 2 | | 36 | 6.2 |
| n261 | 2 | | 128 | 8.7 |
| n261 | 2 | | 129 | 7.9 |
| n261 | 2 | | 134 | 6.5 |
| n261 | 2 | | 135 | 5.4 |
| n261 | 2 | | 136 | 10.5 |
| n261 | 2 | | 143 | 5.2 |
| n261 | 2 | | 144 | 5.9 |
| n261 | 2 | | 149 | 4.4 |
| n261 | 2 | | 150 | 4.1 |
| n261 | 2 | | 151 | 4.2 |
| n261 | 2 | | 152 | 5.6 |
| n261 | 2 | | 162 | 4.3 |
| n261 | 2 | | 163 | 4.0 |
| n261 | 2 | | 164 | 5.0 |
| n261 | 2 | 128 | 0 | 7.8 |
| n261 | 2 | 129 | 1 | 4.8 |
| n261 | 2 | 134 | 6 | 2.5 |
| n261 | 2 | 135 | 7 | 3.1 |
| n261 | 2 | 136 | 8 | 6.5 |
| n261 | 2 | 143 | 15 | 3.0 |
| n261 | 2 | 144 | 16 | 3.6 |
| n261 | 2 | 149 | 21 | 1.3 |
| n261 | 2 | 150 | 22 | 1.4 |
| n261 | 2 | 151 | 23 | 1.4 |
| n261 | 2 | 152 | 24 | 2.1 |
| n261 | 2 | 162 | 34 | 1.6 |
| n261 | 2 | 163 | 35 | 1.4 |
| n261 | 2 | 164 | 36 | 2.0 |

**Table-3.13 *input.power.limit* for 5G NR n261 Ant-2**

# 4. Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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