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47CFR §2.1093 - NEAR-FIELD INCIDENT POWER DENSITY PART 0 TEST REPORT

FCC ID:	**PY7-46195Y**
Device Type:	Portable Device
Report Issue Date:	February 6, 2024

Sony Corporation.
1-7-1 Konan Minato-ku
Tokyo, 108-0075, Japan

Certification

Steve Liu
President

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1. Exposure Scenarios for PD Evaluation

At frequencies > 6 GHz, PD is required to be assessed for all beams from all mmW antenna modules installed inside the device. See table below for surfaces required for evaluation for this device based on the figure below.

Table 1-1

Evaluation Surfaces for PD Characterization

Antenna/ Module	Back	Front	Top	Bottom	Right	Left
0	Yes	Yes	No	Yes	No	Yes
1	Yes	Yes	Yes	No	Yes	No

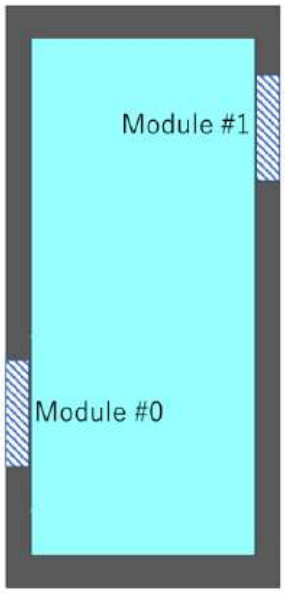

Figure 1-1
Location of mmW antenna modules

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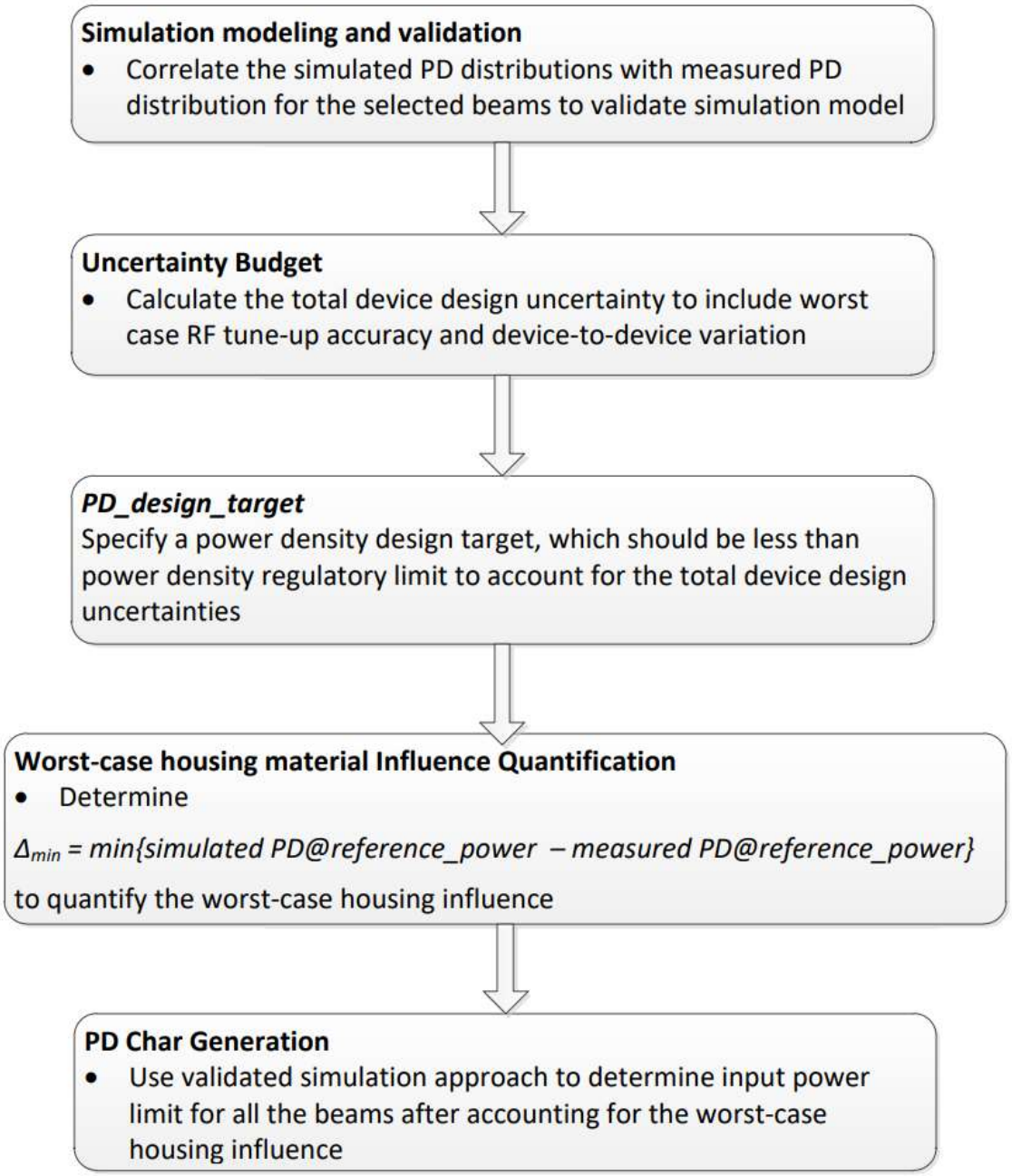
2. Power Density Characterization Method



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3. Codebook

Table 3-1
5G NR n258/n261/n260 Antenna Module 0

Antenna Module	Antenna Type	Beam ID	Feed No	Paired BID
0	PATCH	1	1	129
0	PATCH	3	1	131
0	PATCH	5	1	133
0	PATCH	7	1	135
0	PATCH	9	1	137
0	PATCH	14	2	142
0	PATCH	15	2	143
0	PATCH	16	2	144
0	PATCH	17	2	145
0	PATCH	21	2	149
0	PATCH	22	2	150
0	PATCH	23	2	151
0	PATCH	29	5	157
0	PATCH	30	5	158
0	PATCH	31	5	159
0	PATCH	32	5	160
0	PATCH	33	5	161
0	PATCH	38	5	166
0	PATCH	39	5	167
0	PATCH	40	5	168
0	PATCH	41	5	169
0	PATCH	129	1	1
0	PATCH	131	1	3
0	PATCH	133	1	5
0	PATCH	135	1	7
0	PATCH	137	1	9
0	PATCH	142	2	14
0	PATCH	143	2	15
0	PATCH	144	2	16
0	PATCH	145	2	17
0	PATCH	149	2	21
0	PATCH	150	2	22
0	PATCH	151	2	23
0	PATCH	157	5	29
0	PATCH	158	5	30
0	PATCH	159	5	31
0	PATCH	160	5	32
0	PATCH	161	5	33
0	PATCH	166	5	38
0	PATCH	167	5	39
0	PATCH	168	5	40
0	PATCH	169	5	41

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Table 3-2
5G NR n258/n261/n260 Antenna Module 1

Antenna Module	Antenna Type	Beam ID	Feed No	Paired BID
1	PATCH	0	1	128
1	PATCH	2	1	130
1	PATCH	4	1	132
1	PATCH	6	1	134
1	PATCH	8	1	136
1	PATCH	10	2	138
1	PATCH	11	2	139
1	PATCH	12	2	140
1	PATCH	13	2	141
1	PATCH	18	2	146
1	PATCH	19	2	147
1	PATCH	20	2	148
1	PATCH	24	5	152
1	PATCH	25	5	153
1	PATCH	26	5	154
1	PATCH	27	5	155
1	PATCH	28	5	156
1	PATCH	34	5	162
1	PATCH	35	5	163
1	PATCH	36	5	164
1	PATCH	37	5	165
1	PATCH	128	1	0
1	PATCH	130	1	2
1	PATCH	132	1	4
1	PATCH	134	1	6
1	PATCH	136	1	8
1	PATCH	138	2	10
1	PATCH	139	2	11
1	PATCH	140	2	12
1	PATCH	141	2	13
1	PATCH	146	2	18
1	PATCH	147	2	19
1	PATCH	148	2	20
1	PATCH	152	5	24
1	PATCH	153	5	25
1	PATCH	154	5	26
1	PATCH	155	5	27
1	PATCH	156	5	28
1	PATCH	162	5	34
1	PATCH	163	5	35
1	PATCH	164	5	36
1	PATCH	165	5	37

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4. Simulation and Modeling Validation

Power density simulation was performed for all surfaces and all supported beams. See power density simulation report for more details about the simulation and modeling validations.

Power density measurements at 6dBm were performed for each band and antenna module on the worst case surface(s) using mid channel and CW signal. See table below for the measured power density results and the corresponding simulated power density value. These results are used to determine worst-case housing influence during power density characterization.

Table 4-1
psPD Results for Worst Case Surface(s) for Delta Min

Band	Channel	Antenna Module	Surface	Beam ID	Power (dBm)	Sim. 4cm^2 psPD (W/m^2)	Meas. 4cm^2 psPD (W/m^2)	ΔSim-Meas (dB)
n258	Mid	0	Left	29	60	20.91	11.40	2.63
			Front	29		7.53	4.77	1.98
			Left	161		14.55	7.28	3.01
			Front	167		4.53	4.12	0.41
		1	Right	26		18.71	15.30	0.87
			Front	26		6.77	4.31	1.96
			Right	164		16.82	12.20	1.39
			Front	153		6.50	3.00	3.36
n261	Mid	0	Left	38	60	22.35	14.70	1.82
			Front	32		8.13	4.42	2.65
			Left	160		24.05	15.90	1.80
			Front	159		8.83	4.16	3.27
		1	Right	27		21.06	16.50	1.06
			Front	35		9.15	5.57	2.16
			Right	163		21.32	15.60	1.36
			Front	163		9.45	4.93	2.83
n260	Mid	0	Left	29	60	17.74	10.90	2.12
			Front	29		7.16	3.27	3.40
			Left	157		18.78	11.40	2.17
			Front	157		7.63	4.49	2.30
		1	Right	28		16.54	12.00	1.39
			Front	27		6.34	3.44	2.66
			Right	156		18.87	11.90	2.00
			Front	156		8.95	5.37	2.22

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5. PD_Design_Target

$$PD\_design\_target < PD\_regulatory\_limit \times 10^{\frac{-Tota\ \ Uncertainty}{10}}$$

PD_Design_Target (W/m^2)	6.31
PD_Regulatory_Limit (W/m^2)	10
Design Related Total Uncertainty (dB)	2.0

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6. Worst-Case Housing Influence Determination

For non-metal material, the material property cannot be accurately characterized at mmW frequencies. The estimated material property for the device housing is used in the simulation model, which could impact the accuracy in simulation for PD amplitude quantification. Since the housing influence on PD 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 mmW antenna modules are placed at different locations, only surrounding material/housing has impact on EM field propagation and in turn 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 procedure to determine worst-case housing influence, denoted as Δmin:

1. Based on PD simulation, determine one or more worst-surface(s) that contains all the highest 4cm2-averaged PD for each of the 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 Δmin based on identified worst surface(s) in Step 1, and then follow the procedures used to derive input.power.limit corresponding to PD_design_target for all the beams.
    b. Then prove all other surface(s) near-by the mmW module, i.e., surface(s) not selected in Step 1, 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. Scale the simulated 4cm2-averaged PD values for all single beams to correspond to their sim.powerlimit, and identify the worst-PD beam per each non-selected surface.
        ii. Measure 4cm2-averaged PD at input.power.limit for the identified worst-PD beam at each non-selected surface.
        iii. Demonstrate all measured 4cm2-averaged PD values are below PD_design_target.
3. If any of the above surface(s) in Step (2.b.iii) have measured 4cm2-averaged PD ≥ PD_design_target, then those surfaces must be included in the Δmin determination in Step (2.a), and follow the procedures used to derive input.power.limit to re-evaluate input.power.limit with these added surfaces.

In addition to determining housing influence per antenna module and per antenna type, worst-case housing influence should also be performed per polarization of the antenna. To do so, above Steps 1-3 should be further divided based on polarization as well, by measuring multiple beams for a given polarization. In the below analysis in this document, worst-case material property was determined per antenna type (i.e., by taking the worst value out of both polarizations).

When comparing a simulated 4cm2-avgeraged PD and measured 4cm2-avgeraged PD for the worst case surface(s), the worst errors introduced when using the estimated material property in the simulation per module and per antenna type (worst out of both polarizations) is denoted as Δmin (= minimum of (sim. 4cm2-avg. PD – meas. 4cm2-avg. PD) for the same antenna type of each module), shown in table below.

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Table 6-1
Delta min

Band	Antenna Module	Δmin (dB)
n258	0	0.41
n258	1	0.87
n261	0	1.80
n261	1	1.06
n260	0	2.12
n260	1	1.39

Δmin represents the worst case where RF exposure is underestimated the most by simulation upon using the estimated material property for glass/plastics of the housing. For conservative assessment, the Δmin is used as the worst-case correction and applied to each corresponding beam group to determine power limits in PD char for compliance.

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7. PD Char

7.1. Calculations for Single Beams

To determine the input power limit at each antenna port, simulation was performed at low, mid, and high channel for each mmW band supported, with 6 dBm input power per active port. 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 was obtained. Scaling factors at all three channels were determined according to the below equation:

(1) $$s(i)_{low\_or\_mid\_or\_high} = \frac{PD\_design\_target}{sim.PD_{surface}(i)}, i = 1,2, \dots M$$

The worst case scaling factor among all three channels, which will be applied to the input power at each antenna port, was determined according to the below equation:

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

7.2. Calculations for Beam Pairs

According to the manufacturer, the relative phase between beam pairs is not controlled by the chipset and varies from run to run. Therefore, for each beam pair, the worst-case scaling factor is determined mathematically to ensure compliance.

The worst case PD for beam pairs was determined by sweeping the relative phase for all possible angles to ensure a conservative assessment. The simulation report contains the worst case power density for each surface after sweeping through all relative phases between beams. The scaling factor was then determined according to the below equation:

(3) $$s(i)_{low\_or\_mid\_or\_high} = \frac{PD\_design\_target}{total\ PD\ (\emptyset(i)_{worst\ case})}, i \in beam\ pairs$$

The $\emptyset_{worst\_case}$ varies with channel and beam pair, thus the lowest scaling factor among all three channels, s(i), is determined for the beam pair i according to the below equation:

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

7.3. Calculations for Input.Power.Limit

Ideally, if there is no uncertainty associated with hardware, after accounting for the housing influence (Δmin), input power limit, $input.power.limit(i)$, for beam i can be obtained according to the equation below, (where $sim.power_{limit}$ is generated from "Qualcomm MG Script"):

(5) $$input.power.limit(i) = sim.power_{limit}(i) + \Delta_{min}, i = 1,2, \dots, N$$

If simulation overestimates the housing influence, then Δ_{min} (= minimum {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.

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Similarly, if simulation underestimates loss, then Δ_{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 in equation (1). The TxAGC uncertainty at reference power level is embedded in the process of Δmin determination and should be removed to avoid double counting this uncertainty, thus, equation (5) is modified to:

If -TxAGC uncertainty < Δ min < TxAGC uncertainty:

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

else if Δ min < -TxAGC uncertainty:

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

else if Δ min > TxAGC uncertainty:

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

Table 7-1
Calculation of Input.power.limit

Band	Antenna Module	Δmin (dB)	TxAGC (dB)	Input.power.limit (dBm)	Equation
n258	0	0.41	0.63	Input.power.limit = sim.power.limit	6
n258	1	0.87	0.63	Input.power.limit = sim.power.limit + 0.87 - 0.63	8
n261	0	1.80	0.63	Input.power.limit = sim.power.limit + 1.8 - 0.63	8
n261	1	1.06	0.63	Input.power.limit = sim.power.limit + 1.06 - 0.63	8
n260	0	2.12	0.63	Input.power.limit = sim.power.limit + 2.12 - 0.63	8
n260	1	1.39	0.63	Input.power.limit = sim.power.limit + 1.39 - 0.63	8

OEM has applied permanent backoff to the initially calculated input.power.limits. Final input.power.limits are included in the EFS of the DUT.

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Table 7-2
Antenna Module 0 – Permanent Backoff applied to calculated input.power.limit

Beam ID	Paired Beam ID	n258 (dB)	n261 (dB)	n260 (dB)
1	N/A	0.50	0.90	0.40
3	N/A	1.40	0.50	0.60
5	N/A	0.80	0.70	0.60
7	N/A	1.30	0.70	0.60
9	N/A	2.20	0.90	0.60
14	N/A	0.80	0.50	1.10
15	N/A	0.60	1.90	0.70
16	N/A	1.90	1.10	0.10
17	N/A	0.70	0.10	0.10
21	N/A	1.90	0.90	0.40
22	N/A	0.70	2.60	0.80
23	N/A	1.70	0.10	0.10
29	N/A	0.10	0.70	1.20
30	N/A	1.80	1.20	1.10
31	N/A	1.90	1.50	0.80
32	N/A	1.10	1.20	0.40
33	N/A	1.80	0.10	0.90
38	N/A	2.40	1.00	0.80
39	N/A	1.70	1.50	1.10
40	N/A	1.90	1.70	1.20
41	N/A	2.40	0.90	0.10
129	N/A	0.20	1.30	0.60
131	N/A	0.10	0.70	0.60
133	N/A	1.90	0.30	0.60
135	N/A	2.10	0.30	0.50
137	N/A	5.70	0.60	0.30
142	N/A	0.20	1.40	1.20
143	N/A	1.30	1.90	1.20
144	N/A	2.20	1.10	0.10
145	N/A	0.10	0.90	0.10
149	N/A	0.30	0.70	0.40
150	N/A	0.50	1.50	0.30
151	N/A	3.40	0.80	0.10
157	N/A	2.20	0.60	1.20
158	N/A	2.00	1.50	1.20
159	N/A	2.50	1.20	1.00
160	N/A	1.60	1.00	0.40
161	N/A	1.00	0.80	0.80
166	N/A	2.30	1.00	0.60
167	N/A	2.00	1.30	1.10
168	N/A	2.50	1.10	1.20
169	N/A	2.30	0.80	0.10
1	129	0.20	1.30	0.60
3	131	0.20	0.40	0.70
5	133	0.10	0.20	0.70
7	135	0.20	0.20	0.70
9	137	2.50	0.70	0.60
14	142	0.10	1.00	1.20
15	143	0.40	1.90	1.00
16	144	0.50	1.50	0.40
17	145	0.90	0.30	0.10
21	149	1.20	0.80	0.50
22	150	0.60	2.20	0.60
23	151	2.10	0.20	0.30
29	157	0.20	0.70	1.30
30	158	1.40	1.90	1.20
31	159	1.70	1.80	1.00
32	160	0.30	1.10	0.40
33	161	1.30	0.50	1.10
38	166	1.10	1.30	0.90
39	167	1.80	1.90	1.20
40	168	1.90	1.50	1.30
41	169	2.30	0.70	0.50

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Table 7-3
Antenna Module 1 – Permanent Backoff applied to calculated input.power.limit

Beam ID	Paired Beam ID	n258 (dB)	n261 (dB)	n260 (dB)
0	N/A	1.00	0.30	0.10
2	N/A	1.10	0.40	0.10
4	N/A	0.70	0.20	0.10
6	N/A	0.50	0.10	0.10
8	N/A	0.10	0.10	0.10
10	N/A	1.30	0.30	0.10
11	N/A	1.10	0.60	0.10
12	N/A	1.00	0.10	0.10
13	N/A	0.90	0.30	0.10
18	N/A	0.20	0.60	0.10
19	N/A	0.70	0.40	0.10
20	N/A	0.90	0.10	0.10
24	N/A	1.20	0.30	0.10
25	N/A	1.20	0.50	0.10
26	N/A	0.40	0.40	0.10
27	N/A	0.80	0.30	0.10
28	N/A	0.60	0.10	0.10
34	N/A	1.00	0.40	0.10
35	N/A	0.70	0.40	0.10
36	N/A	0.50	0.30	0.10
37	N/A	0.70	0.10	0.10
128	N/A	1.60	0.20	0.10
130	N/A	1.20	0.30	0.10
132	N/A	0.70	0.10	0.10
134	N/A	0.90	0.10	0.10
136	N/A	1.20	0.10	0.10
138	N/A	0.90	0.10	0.10
139	N/A	1.20	0.20	0.10
140	N/A	0.80	0.30	0.10
141	N/A	2.50	1.00	0.10
146	N/A	1.00	0.10	0.10
147	N/A	1.10	0.80	0.10
148	N/A	1.10	0.10	0.10
152	N/A	1.40	0.10	0.10
153	N/A	1.10	0.10	0.10
154	N/A	1.40	0.60	0.10
155	N/A	0.90	1.10	0.10
156	N/A	2.40	0.10	0.10
162	N/A	1.00	0.10	0.10
163	N/A	1.30	0.30	0.10
164	N/A	1.00	1.00	0.10
165	N/A	1.30	0.10	0.10
0	128	1.10	0.10	0.10
2	130	0.10	0.10	0.10
4	132	0.50	0.10	0.10
6	134	0.90	0.10	0.10
8	136	0.10	0.10	0.10
10	138	1.70	0.20	0.10
11	139	0.70	0.20	0.10
12	140	0.90	0.10	0.10
13	141	0.20	0.10	0.10
18	146	0.70	0.30	0.10
19	147	0.80	0.60	0.10
20	148	0.80	0.10	0.10
24	152	0.40	0.10	0.10
25	153	0.50	0.10	0.10
26	154	0.60	0.40	0.10
27	155	0.20	0.20	0.10
28	156	1.10	0.10	0.10
34	162	0.80	0.10	0.10
35	163	0.70	0.10	0.10
36	164	0.40	0.60	0.10
37	165	0.40	0.10	0.10

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Table 7-4
Antenna Module 0 – final input.power.limit

Beam ID	Paired Beam ID	n258 (dBm)	n261 (dBm)	n260 (dBm)
1	N/A	6.9	9.0	9.7
3	N/A	7.6	8.9	9.1
5	N/A	7.4	8.1	8.2
7	N/A	7.3	8.1	8.6
9	N/A	7.9	8.6	8.8
14	N/A	5.3	6.0	6.1
15	N/A	4.1	4.7	5.8
16	N/A	4.3	6.1	6.8
17	N/A	5.9	7.1	6.7
21	N/A	3.7	4.6	5.7
22	N/A	3.8	4.5	5.6
23	N/A	3.5	6.8	6.7
29	N/A	0.3	2.4	1.7
30	N/A	-0.5	0.7	2.2
31	N/A	0.2	0.8	2.6
32	N/A	1.6	1.1	3.0
33	N/A	2.4	5.4	2.9
38	N/A	-0.2	0.5	2.8
39	N/A	0.0	0.6	2.3
40	N/A	0.2	0.9	2.0
41	N/A	0.9	1.6	3.3
129	N/A	7.7	8.7	9.6
131	N/A	7.9	8.7	8.7
133	N/A	7.3	8.5	7.9
135	N/A	7.4	8.4	8.4
137	N/A	7.7	8.3	8.9
142	N/A	5.0	6.5	5.6
143	N/A	3.3	4.4	4.8
144	N/A	3.7	4.7	6.8
145	N/A	5.3	5.0	6.8
149	N/A	4.7	5.0	5.2
150	N/A	4.1	4.4	5.4
151	N/A	3.9	5.4	6.8
157	N/A	2.1	1.9	1.4
158	N/A	0.2	0.9	1.8
159	N/A	0.1	0.6	2.4
160	N/A	1.4	0.2	3.1
161	N/A	0.9	2.7	2.5
166	N/A	0.6	1.2	2.6
167	N/A	0.0	0.9	1.9
168	N/A	-0.4	0.3	1.5
169	N/A	-0.4	0.9	3.2
1	129	3.7	4.6	5.9
3	131	3.7	5.4	5.3
5	133	3.8	5.1	4.6
7	135	3.9	5.1	5.1
9	137	4.5	5.2	5.2
14	142	1.6	3.2	2.3
15	143	0.7	0.5	1.8
16	144	0.4	1.3	2.7
17	145	3.0	2.8	3.2
21	149	2.0	1.3	2.1
22	150	0.1	0.6	2.2
23	151	0.7	2.3	2.8
29	157	-2.1	-1.7	-1.9
30	158	-3.9	-3.0	-1.2
31	159	-3.1	-3.0	-1.0
32	160	-1.5	-3.0	-0.8
33	161	-2.2	0.4	-1.6
38	166	-3.1	-2.8	-1.3
39	167	-3.8	-3.0	-1.8
40	168	-3.6	-2.7	-1.8
41	169	-3.4	-2.3	-0.8

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Table 7-5
Antenna Module 1 – final input.power.limit

Beam ID	Paired Beam ID	n258 (dBm)	n261 (dBm)	n260 (dBm)
0	N/A	8.4	8.7	8.3
2	N/A	7.7	8.0	8.6
4	N/A	7.6	7.9	8.4
6	N/A	8.2	8.4	9.1
8	N/A	8.2	9.2	9.6
10	N/A	6.5	5.9	5.9
11	N/A	4.4	4.1	6.1
12	N/A	4.0	5.4	5.8
13	N/A	6.5	5.6	6.6
18	N/A	5.5	4.8	5.8
19	N/A	4.1	4.2	5.5
20	N/A	5.1	4.7	5.4
24	N/A	4.4	2.9	2.7
25	N/A	0.6	0.8	2.7
26	N/A	0.5	0.7	2.9
27	N/A	0.5	0.7	2.9
28	N/A	1.5	1.6	2.3
34	N/A	0.8	1.1	2.6
35	N/A	0.3	0.8	3.0
36	N/A	0.5	0.8	2.8
37	N/A	0.7	1.1	2.4
128	N/A	8.5	8.7	8.6
130	N/A	8.2	8.5	8.2
132	N/A	7.9	8.2	7.7
134	N/A	8.0	8.3	8.4
136	N/A	8.8	8.9	9.6
138	N/A	6.1	6.2	6.0
139	N/A	4.2	4.5	5.1
140	N/A	5.1	4.8	5.1
141	N/A	7.1	6.5	6.1
146	N/A	4.3	5.2	5.2
147	N/A	4.3	4.6	5.7
148	N/A	5.0	5.8	4.9
152	N/A	1.1	1.9	2.6
153	N/A	0.5	1.1	2.0
154	N/A	0.4	0.8	2.4
155	N/A	0.8	0.9	2.0
156	N/A	2.8	2.9	1.8
162	N/A	0.9	1.3	2.5
163	N/A	0.4	0.7	2.1
164	N/A	0.6	0.8	2.7
165	N/A	1.8	1.8	2.5
0	128	4.5	4.8	4.9
2	130	4.4	4.9	5.0
4	132	3.9	4.3	4.6
6	134	4.2	4.5	5.2
8	136	5.0	5.5	5.8
10	138	3.0	2.6	2.5
11	139	1.1	1.6	3.7
12	140	2.0	1.6	1.9
13	141	3.1	2.7	2.9
18	146	2.1	1.8	2.4
19	147	1.4	1.2	1.6
20	148	1.5	1.7	1.8
24	152	-1.7	-1.6	-1.4
25	153	-2.6	-2.2	-1.3
26	154	-2.6	-2.3	-1.1
27	155	-2.5	-2.2	-1.0
28	156	-2.0	-1.8	-1.3
34	162	-2.7	-2.1	-1.1
35	163	-2.6	-2.3	-1.0
36	164	-2.6	-2.4	-1.2
37	165	-2.3	-2.2	-1.5

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8. Non-Selected Surfaces

During the procedure to determine Δmin, to ensure that conditions described in Step (2.b.iii) are met, first, scale the simulated 4cm2-averaged PD values for all single beams and at mid channel to their corresponding sim.power.limit. Then, determine the worst beam as highlighted in tables below for each of non-selected applicable surface(s).

Note some of the non-selected surfaces are not adjacent to a specific antenna module, thus, they are excluded in the corresponding PD assessment. In Step (2.b.iii), the PD measurement is performed at the corresponding input.power.limit at the mid channel of each band using FTM mode with CW modulation on the highlighted beams/surfaces in the tables below.

Table 8-1
NR n258 mid.ch Antenna Module 0

Module	Beam ID	4cm^2 PD [W/m^2] at 2mm adjusted to correspond to PD_Design_Target if simulation was performed with correct housing properties)					
		Front	Rear	Left	Right	Top	Bottom
0	**1**	1.77	0.39	5.67	0.03	0.01	0.03
	3	1.68	0.66	6.07	0.08	0.02	0.06
	5	1.37	0.29	5.45	0.02	0.03	0.07
	7	1.37	0.22	5.20	0.02	0.02	0.11
	9	0.95	0.36	5.56	0.03	0.03	0.21
	14	1.51	0.51	6.01	0.04	0.04	0.08
	15	1.89	0.68	5.77	0.04	0.01	0.04
	16	1.05	0.35	5.29	0.01	0.01	0.16
	17	1.50	0.35	5.63	0.02	0.02	0.20
	21	1.18	0.32	5.18	0.01	0.03	0.05
	22	1.91	0.63	5.67	0.04	0.00	0.02
	23	1.74	0.57	5.65	0.03	0.01	0.04
	29	2.09	0.44	5.80	0.02	0.06	0.03
	30	1.92	0.70	5.47	0.03	0.00	0.03
	31	1.69	0.61	5.53	0.04	0.01	0.06
	32	1.47	0.54	5.41	0.04	0.02	0.14
	33	1.20	0.54	5.54	0.06	0.03	0.26
	38	1.85	0.59	5.57	0.02	0.01	0.05
	39	1.74	0.69	5.55	0.03	0.00	0.03
	40	1.47	0.69	5.19	0.03	0.01	0.06
	41	1.82	0.48	5.57	0.03	0.02	0.13
	129	1.12	0.53	5.19	0.05	0.02	0.06
	131	1.49	0.39	5.73	0.02	0.02	0.11
	133	1.55	0.78	6.16	0.06	0.02	0.06
	135	1.99	0.48	6.17	0.11	0.02	0.14
	137	1.68	0.34	4.42	0.06	0.00	0.22
	142	1.30	0.56	5.50	0.03	0.03	0.04
	143	1.69	0.61	5.86	0.04	0.00	0.07
	144	1.68	0.74	5.91	0.09	0.01	0.08
	145	1.42	0.51	5.56	0.05	0.02	0.17
	149	1.26	0.56	5.45	0.02	0.02	0.03
	150	1.23	0.52	5.31	0.02	0.01	0.02
	151	1.75	0.57	5.47	0.12	0.01	0.07
	157	1.52	0.62	5.77	0.12	0.08	0.18
	158	1.70	0.77	5.64	0.04	0.01	0.05
	159	1.79	0.93	5.92	0.12	0.01	0.02
	160	1.52	0.78	5.62	0.07	0.03	0.04
	161	1.69	0.61	5.66	0.06	0.01	0.18
	166	1.64	0.79	5.78	0.05	0.01	0.09
	167	1.80	0.72	5.60	0.08	0.01	0.02
	168	1.79	0.88	5.43	0.07	0.00	0.05
	169	1.69	0.83	5.60	0.06	0.01	0.11

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Table 8-2
NR n258 mid.ch Antenna Module 1

Module	Beam ID	4cm^2 PD [W/m^2] at 2mm adjusted to correspond to PD_Design_Target if simulation was performed with correct housing properties)					
		Front	Rear	Left	Right	Top	Bottom
1	**0**	1.27	0.71	0.06	5.54	0.39	0.00
	2	1.17	0.57	0.02	5.70	0.16	0.02
	4	1.26	0.42	0.02	5.70	0.13	0.02
	6	1.64	0.27	0.04	5.36	0.11	0.02
	8	2.04	0.28	0.03	5.57	0.11	0.00
	10	1.11	0.48	0.06	5.41	0.63	0.03
	11	1.25	0.63	0.04	5.81	0.26	0.01
	12	1.40	0.59	0.02	5.69	0.08	0.02
	13	1.59	0.59	0.03	5.28	0.38	0.04
	18	2.27	0.30	0.04	5.73	0.13	0.00
	19	1.81	0.40	0.02	5.65	0.07	0.01
	20	1.55	0.59	0.03	5.47	0.16	0.03
	24	1.16	0.70	0.07	6.01	0.66	0.01
	25	1.65	0.79	0.03	5.64	0.12	0.00
	26	2.00	0.58	0.03	5.53	0.05	0.00
	27	1.94	0.64	0.02	5.48	0.06	0.00
	28	1.95	0.35	0.02	5.43	0.17	0.05
	34	1.53	0.56	0.04	5.62	0.24	0.00
	35	1.94	0.62	0.03	5.67	0.06	0.00
	36	2.01	0.63	0.03	5.49	0.05	0.00
	37	1.79	0.49	0.02	5.51	0.06	0.01
	128	2.19	0.46	0.02	5.50	0.41	0.00
	130	2.02	0.27	0.02	6.17	0.21	0.02
	132	2.10	0.38	0.05	5.96	0.12	0.00
	134	1.24	0.42	0.02	5.50	0.18	0.02
	136	1.19	1.50	0.05	4.93	0.15	0.00
	138	1.39	0.99	0.04	5.46	0.29	0.01
	139	2.33	0.41	0.04	6.17	0.09	0.00
	140	1.21	0.99	0.05	5.12	0.10	0.01
	141	1.92	0.79	0.04	5.85	0.60	0.04
	146	2.40	0.34	0.03	5.94	0.27	0.01
	147	2.46	0.32	0.03	6.11	0.16	0.00
	148	1.69	0.45	0.03	5.57	0.10	0.01
	152	2.59	0.58	0.04	5.97	0.54	0.00
	153	2.27	0.62	0.02	5.68	0.10	0.01
	154	2.10	0.55	0.04	5.78	0.07	0.01
	155	1.91	0.58	0.06	5.75	0.05	0.00
	156	1.21	1.29	0.06	5.77	0.34	0.05
	162	2.25	0.64	0.03	5.86	0.33	0.00
	163	2.25	0.67	0.04	5.78	0.08	0.01
	164	1.91	0.55	0.04	5.79	0.11	0.00
	165	2.05	0.57	0.05	5.66	0.10	0.01

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Table 8-3
NR n261 mid.ch Antenna Module 0

Module	Beam ID	4cm^2 PD [W/m^2] at 2mm adjusted to correspond to PD_Design_Target if simulation was performed with correct housing properties)					
		Front	Rear	Left	Right	Top	Bottom
0	**1**	1.53	0.51	5.87	0.04	0.00	0.06
	3	1.75	0.37	6.16	0.05	0.02	0.15
	5	1.64	0.37	6.17	0.01	0.01	0.09
	7	1.65	0.32	5.97	0.01	0.01	0.10
	9	1.55	0.33	5.61	0.02	0.00	0.12
	14	1.53	0.61	6.17	0.03	0.02	0.11
	15	2.34	0.35	6.12	0.05	0.01	0.03
	16	2.11	0.55	6.07	0.06	0.01	0.14
	17	1.19	0.44	5.36	0.03	0.02	0.21
	21	1.86	0.48	6.15	0.02	0.01	0.01
	22	2.36	0.36	6.12	0.07	0.01	0.06
	23	1.27	0.59	6.01	0.04	0.01	0.19
	29	1.48	0.61	6.05	0.03	0.03	0.07
	30	2.34	0.66	6.04	0.02	0.00	0.02
	31	2.55	0.60	6.06	0.05	0.00	0.03
	32	2.66	0.75	6.17	0.03	0.00	0.09
	33	0.99	1.17	6.13	0.12	0.06	0.30
	38	1.89	0.69	6.13	0.02	0.01	0.01
	39	2.56	0.66	6.17	0.03	0.00	0.02
	40	2.69	0.65	6.10	0.05	0.00	0.04
	41	2.31	0.68	5.98	0.02	0.00	0.25
	129	1.61	0.37	6.02	0.06	0.02	0.08
	131	1.69	0.39	6.17	0.03	0.00	0.10
	133	1.76	0.29	6.14	0.03	0.01	0.10
	135	1.58	0.36	6.17	0.01	0.01	0.09
	137	1.90	0.28	5.96	0.01	0.01	0.07
	142	1.90	0.55	6.18	0.11	0.01	0.12
	143	2.10	0.39	6.03	0.05	0.01	0.03
	144	1.93	0.39	6.16	0.01	0.00	0.07
	145	1.77	0.51	6.07	0.01	0.01	0.15
	149	2.27	0.33	6.12	0.02	0.02	0.02
	150	2.03	0.37	6.13	0.02	0.00	0.05
	151	1.74	0.46	6.18	0.02	0.01	0.11
	157	2.20	0.65	6.15	0.04	0.02	0.05
	158	2.73	0.65	6.04	0.04	0.00	0.02
	159	2.60	0.67	6.17	0.02	0.00	0.01
	160	1.95	0.75	6.17	0.02	0.00	0.11
	161	1.50	0.64	6.17	0.03	0.01	0.36
	166	2.57	0.65	6.16	0.03	0.01	0.02
	167	2.71	0.63	6.12	0.03	0.00	0.02
	168	2.34	0.66	6.15	0.01	0.00	0.03
	169	1.60	0.76	6.17	0.01	0.00	0.28

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Table 8-4
NR n261 mid.ch Antenna Module 1

Module	Beam ID	4cm^2 PD [W/m^2] at 2mm adjusted to correspond to PD_Design_Target if simulation was performed with correct housing properties)					
		Front	Rear	Left	Right	Top	Bottom
1	**0**	1.86	0.35	0.02	6.04	0.20	0.02
	2	2.12	0.35	0.02	5.99	0.11	0.00
	4	1.61	0.43	0.01	6.05	0.09	0.01
	6	1.92	0.29	0.02	6.04	0.15	0.00
	8	1.84	0.40	0.02	5.42	0.08	0.02
	10	2.13	0.46	0.02	5.88	0.24	0.01
	11	2.36	0.41	0.01	6.02	0.09	0.00
	12	2.18	0.43	0.02	5.78	0.03	0.01
	13	2.02	0.42	0.02	5.91	0.04	0.02
	18	2.38	0.48	0.02	5.93	0.18	0.00
	19	2.19	0.45	0.01	6.09	0.07	0.01
	20	2.04	0.48	0.01	6.17	0.04	0.01
	24	2.30	0.44	0.01	5.88	0.65	0.01
	25	2.82	0.63	0.03	6.11	0.06	0.00
	26	2.71	0.76	0.02	6.15	0.04	0.00
	27	2.25	0.84	0.01	6.12	0.02	0.00
	28	1.66	0.68	0.01	6.16	0.06	0.03
	34	2.64	0.57	0.02	6.04	0.32	0.00
	35	2.79	0.69	0.02	6.14	0.06	0.00
	36	2.55	0.79	0.01	6.14	0.01	0.00
	37	2.02	0.78	0.01	6.15	0.02	0.01
	128	2.07	0.45	0.02	5.97	0.20	0.00
	130	1.84	0.33	0.02	5.75	0.28	0.00
	132	2.12	0.25	0.02	6.06	0.24	0.00
	134	1.72	0.49	0.02	6.04	0.14	0.00
	136	1.68	0.42	0.02	5.58	0.13	0.00
	138	1.86	0.53	0.02	5.92	0.30	0.00
	139	2.12	0.53	0.01	6.17	0.07	0.00
	140	2.10	0.56	0.01	6.13	0.04	0.00
	141	2.29	0.38	0.01	5.69	0.21	0.03
	146	2.08	0.51	0.02	6.09	0.19	0.00
	147	2.71	0.36	0.02	6.01	0.13	0.00
	148	2.00	0.59	0.02	5.96	0.08	0.01
	152	1.58	0.57	0.02	6.14	0.82	0.00
	153	2.68	0.86	0.02	6.16	0.05	0.00
	154	2.80	0.72	0.02	6.17	0.03	0.00
	155	2.74	0.79	0.03	6.04	0.03	0.00
	156	2.36	0.46	0.01	5.96	0.11	0.02
	162	2.29	0.63	0.01	5.97	0.31	0.00
	163	2.73	0.82	0.02	6.16	0.03	0.00
	164	2.82	0.77	0.02	5.94	0.03	0.00
	165	2.48	0.56	0.02	5.94	0.04	0.01

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Table 8-5
NR n260 mid.ch Antenna Module 0

Module	Beam ID	4cm^2 PD [W/m^2] at 2mm adjusted to correspond to PD_Design_Target if simulation was performed with correct housing properties)					
		Front	Rear	Left	Right	Top	Bottom
0	**1**	1.46	0.30	5.71	0.02	0.02	0.04
	3	1.60	0.40	6.03	0.00	0.02	0.05
	5	1.43	0.42	6.00	0.00	0.01	0.07
	7	1.74	0.36	6.03	0.00	0.01	0.07
	9	1.52	0.38	5.86	0.02	0.02	0.08
	14	2.42	0.48	6.14	0.01	0.01	0.01
	15	1.50	0.51	6.17	0.01	0.02	0.05
	16	1.12	0.25	5.76	0.01	0.02	0.09
	17	0.90	0.33	5.70	0.01	0.02	0.09
	21	1.09	0.32	5.74	0.01	0.01	0.10
	22	1.67	0.47	5.88	0.01	0.02	0.09
	23	0.99	0.28	5.72	0.01	0.02	0.09
	29	2.49	0.80	6.17	0.01	0.00	0.01
	30	2.71	0.60	6.14	0.02	0.00	0.02
	31	1.97	0.49	5.41	0.02	0.02	0.06
	32	1.67	0.49	5.67	0.01	0.04	0.26
	33	1.03	0.90	6.16	0.01	0.01	0.13
	38	1.11	0.66	6.17	0.01	0.03	0.25
	39	1.52	0.86	6.05	0.01	0.00	0.05
	40	2.31	0.76	6.16	0.01	0.01	0.03
	41	1.36	0.37	5.83	0.01	0.05	0.32
	129	1.81	0.32	6.17	0.00	0.02	0.04
	131	1.62	0.42	6.17	0.02	0.02	0.06
	133	1.51	0.42	5.99	0.01	0.01	0.06
	135	1.49	0.46	6.06	0.00	0.01	0.07
	137	1.48	0.36	6.18	0.02	0.02	0.12
	142	2.21	0.59	6.16	0.01	0.01	0.02
	143	2.12	0.69	6.17	0.01	0.00	0.03
	144	1.20	0.48	6.16	0.01	0.02	0.09
	145	1.41	0.40	6.17	0.01	0.02	0.09
	149	1.08	0.37	5.55	0.01	0.01	0.10
	150	1.56	0.59	6.04	0.01	0.01	0.08
	151	1.20	0.48	6.16	0.01	0.02	0.09
	157	2.50	0.86	6.16	0.01	0.00	0.02
	158	1.79	1.11	6.16	0.00	0.01	0.04
	159	1.49	1.04	6.16	0.01	0.02	0.10
	160	1.61	0.61	6.17	0.02	0.05	0.25
	161	1.94	0.63	5.96	0.01	0.01	0.11
	166	1.56	0.66	5.85	0.02	0.02	0.26
	167	2.23	0.62	5.57	0.01	0.01	0.04
	168	2.54	0.79	6.16	0.01	0.00	0.03
	169	1.23	0.48	6.03	0.02	0.05	0.34

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Table 8-6
NR n260 mid.ch Antenna Module 1

Module	Beam ID	4cm^2 PD [W/m^2] at 2mm adjusted to correspond to PD_Design_Target if simulation was performed with correct housing properties)					
		Front	Rear	Left	Right	Top	Bottom
1	**0**	1.56	0.28	0.03	5.72	0.28	0.01
	2	1.67	0.42	0.03	5.76	0.14	0.02
	4	1.59	0.50	0.02	5.96	0.12	0.02
	6	1.84	0.35	0.00	6.16	0.14	0.00
	8	1.62	0.28	0.00	5.93	0.14	0.00
	10	1.13	0.19	0.01	5.57	0.23	0.02
	11	1.41	0.21	0.01	5.69	0.24	0.01
	12	2.18	0.50	0.02	5.68	0.18	0.01
	13	2.54	0.52	0.01	5.96	0.03	0.00
	18	2.20	0.58	0.01	6.17	0.07	0.01
	19	1.42	0.50	0.04	5.99	0.29	0.01
	20	1.24	0.35	0.04	5.83	0.37	0.02
	24	1.68	0.43	0.03	5.36	0.38	0.01
	25	1.86	0.34	0.01	5.83	0.71	0.05
	26	2.28	0.64	0.03	5.79	0.20	0.00
	27	2.71	0.77	0.02	6.17	0.07	0.00
	28	2.34	1.09	0.03	6.17	0.06	0.00
	34	2.27	0.88	0.02	6.01	0.09	0.00
	35	2.05	0.55	0.02	5.79	0.54	0.03
	36	2.38	0.43	0.02	5.72	0.20	0.01
	37	1.30	0.33	0.02	5.49	0.57	0.02
	128	1.35	0.27	0.02	5.52	0.33	0.02
	130	1.73	0.27	0.01	5.69	0.16	0.01
	132	1.91	0.31	0.01	6.17	0.18	0.01
	134	1.59	0.37	0.01	5.64	0.15	0.01
	136	1.84	0.32	0.02	6.08	0.12	0.02
	138	1.64	0.24	0.02	5.72	0.21	0.02
	139	1.05	0.28	0.01	5.18	0.43	0.01
	140	2.27	0.44	0.01	6.14	0.14	0.01
	141	2.40	0.61	0.02	5.91	0.04	0.01
	146	2.39	0.49	0.01	6.04	0.06	0.00
	147	1.70	0.34	0.02	5.38	0.22	0.01
	148	1.13	0.22	0.01	5.83	0.30	0.01
	152	1.84	0.45	0.01	5.13	0.25	0.01
	153	1.31	0.26	0.01	5.35	0.64	0.02
	154	2.23	0.60	0.02	5.24	0.11	0.01
	155	2.81	0.65	0.02	5.95	0.07	0.00
	156	2.92	0.81	0.02	6.16	0.05	0.01
	162	2.62	0.82	0.02	6.02	0.10	0.00
	163	1.91	0.44	0.01	5.87	0.74	0.03
	164	2.29	0.67	0.01	5.66	0.34	0.01
	165	1.63	0.41	0.01	5.26	0.42	0.01

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The PD test results below show that all measured 4cm2-averaged PD values are less than PD_design_target and meets condition in Step (2.b.iii). Thus, performing Step (3) is not needed, i.e., the non-selected adjacent surfaces have no influence on input.power.limit.

Table 8-7
psPD Results of the Selected Beams Measured on the Non-Selected Surfaces for Δ min Determination

Band	Antenna Module	Surface	Beam ID	input.power.limit (dBm)	Tested Power Level (dBm)	Meas. 4cm2 psPD (W/m2)
n258	0	Back	159	0.1	2.6	1.140
n258	0	Bottom	33	2.4	4.2	0.286
n258	1	Back	136	8.8	10.0	0.448
n258	1	Top	24	4.4	5.6	0.145
n261	0	Back	33	5.4	5.5	0.707
n261	0	Bottom	161	2.7	3.5	0.376
n261	1	Back	153	1.1	1.2	0.628
n261	1	Top	152	1.9	2.0	0.108
n260	0	Back	158	1.8	3.0	0.511
n260	0	Bottom	169	3.2	3.3	0.265
n260	1	Back	28	2.3	2.4	0.495
n260	1	Top	163	2.1	2.2	0.578