Microsoft

Part 0: Power Density Characterization Report
Rev 1.3

for

MODEL NO. 1995
FCC ID: C3K1995

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I. Contents

I. Introduction

Model 1995 uses a Qualcomm modem, transceivers, and two mmWave modules which together enable transmission in the 5G NR mmWave bands (FR2). It also utilizes Qualcomm's Smart Transmit feature, using Gen1 features of that technology, which ensures the time-averaged power for all WWAN radios (2G/3G/4G/5G) remains below compliant levels. This technology requires characterizing the compliant time-averaged power levels for both SAR (for WWAN frequencies under 6 GHz) and Power Density (for 5G FR2 mmWave.)

Each mmWave module employs beamforming technology to steer the transmit beams in desired directions. There are 4 patch antenna elements in each module; the input signals to each element are controlled in phase and amplitude to create the beams. The list of all possible beams the device can use is called the codebook and is defined in the next section.

This report, in conjunction with the Power Density Simulation Report, details the process of characterizing the compliant average input power levels for the mmWave modules operating in the 5G FR2 mmWave bands, for all beams in the device's codebook. All steps of the PD Characterization process shown below are covered.

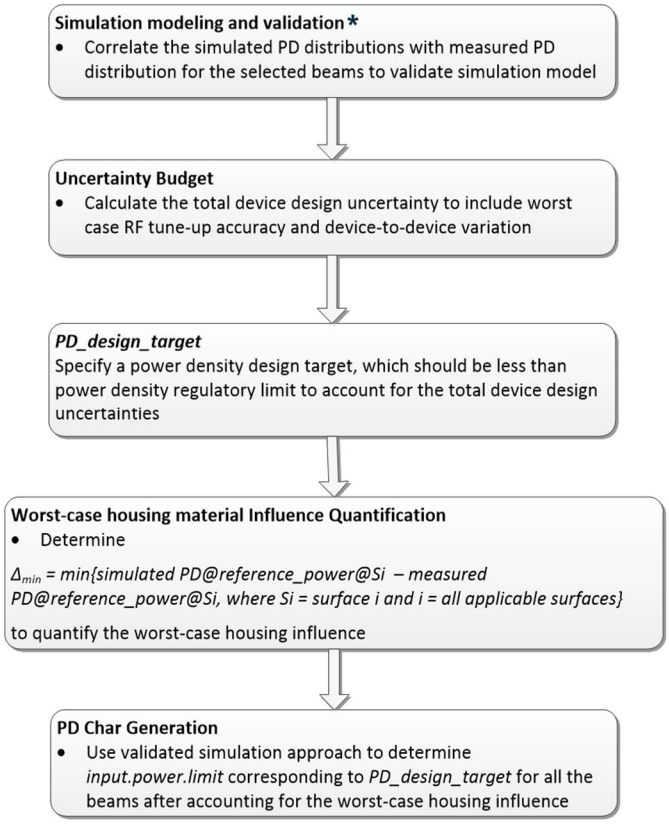


Figure 1. PD Characterization Process

II. Device

A. mmWave Antenna Module Locations

Model 1995 has two mmWave antenna modules, both on the right half of the device. Module 0 faces out of the rear, while module 1 faces out of the front (display) side. The locations of the antennas are shown in Figures 1-3 below for the three device postures which have been evaluated for power density. The surfaces which were chosen for evaluation, as explained in the simulation report, are again summarized in Tables 1-3.

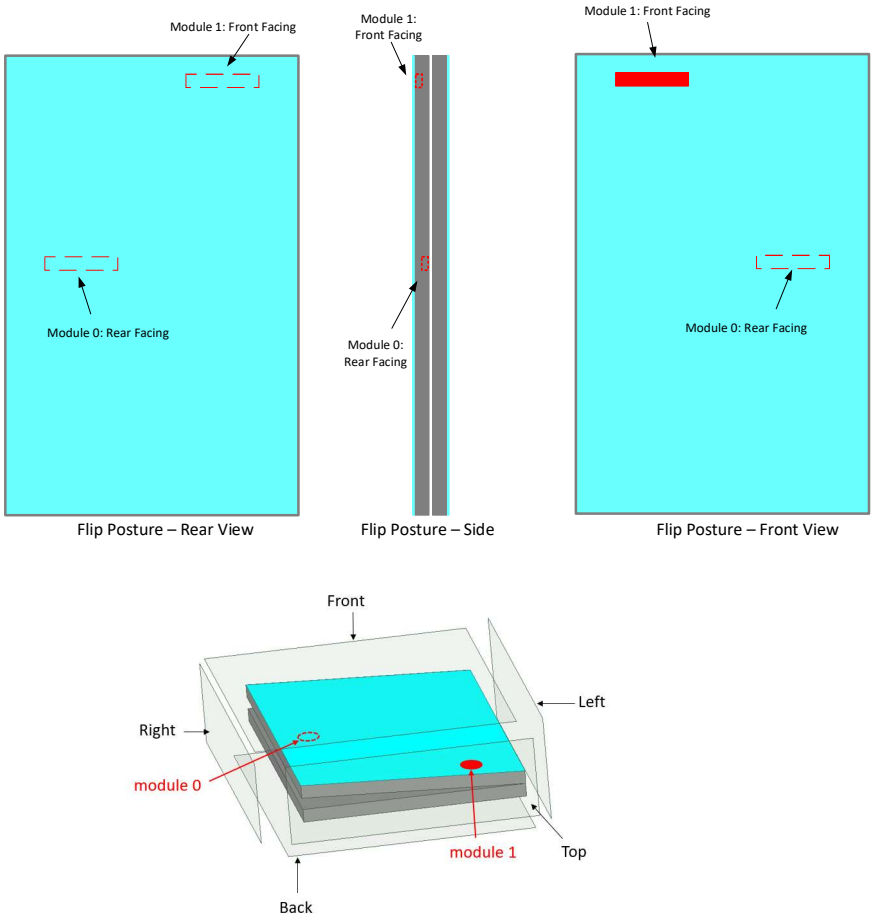
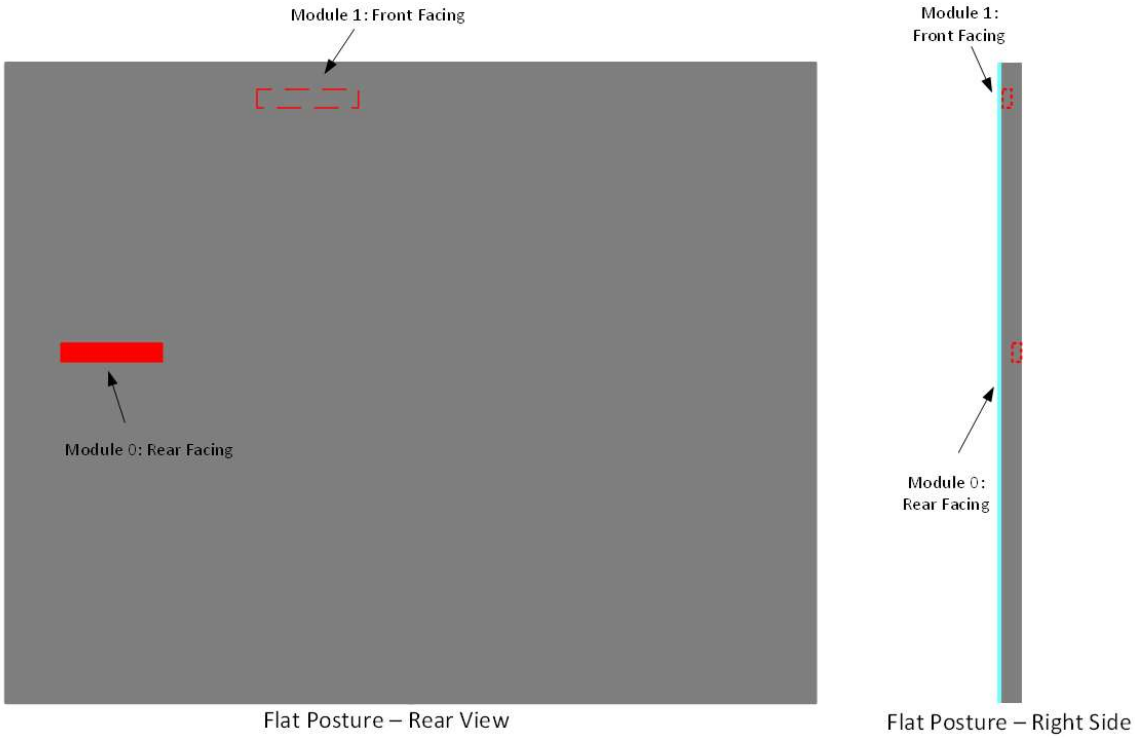


Figure 2. Flip Posture mmWave Antenna Module Locations

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

Table 1. Flip Posture Surfaces Selected for PD Evaluation



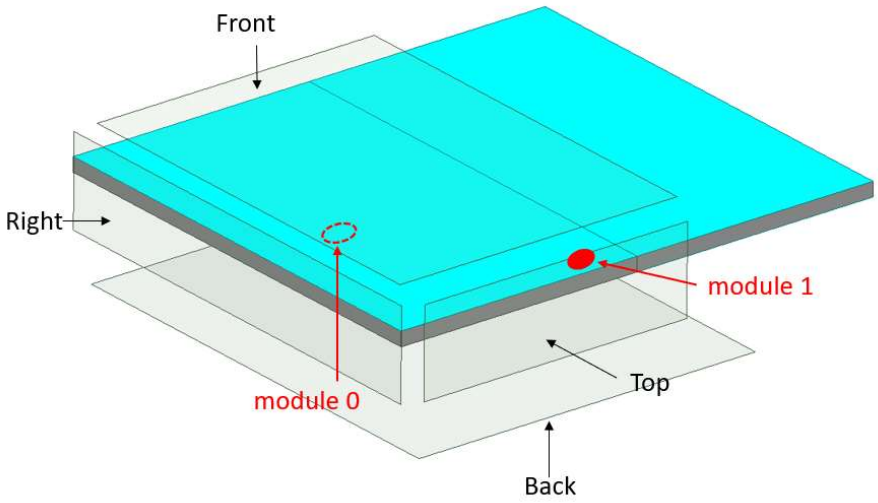


Figure 3. Flat Posture mmWave Antenna Module Locations

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

Table 2. Flat Posture Surfaces Selected for PD Evaluation

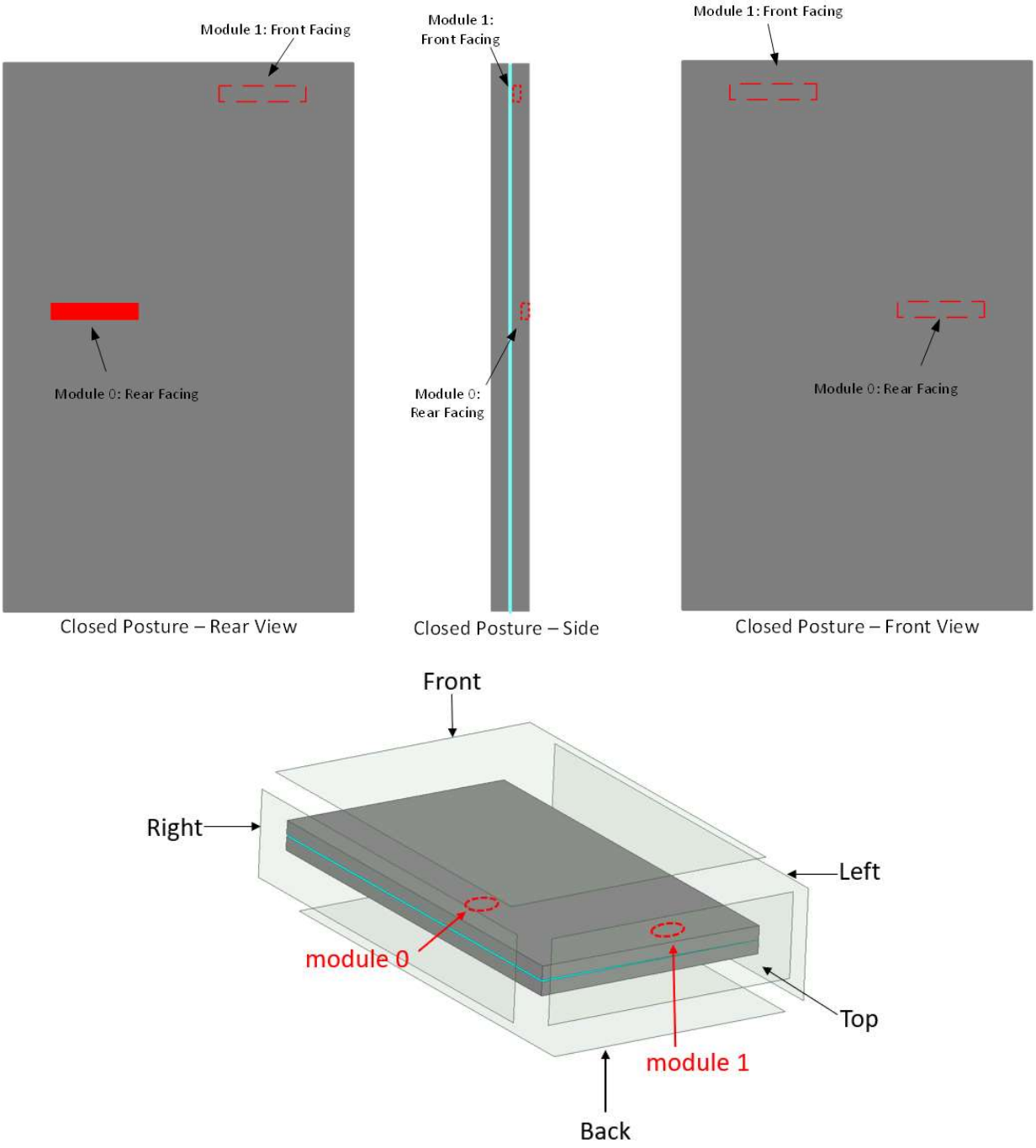


Figure 4. Closed Posture mmWave Antenna Module Locations

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

Table 3. Closed Posture Surfaces Selected for PD Evaluation

B. Device Codebook

The codebook for the device defines the list of vertically and horizontally polarized beams which the device is capable of emitting. All beams shown have been evaluated for compliance.

n261 Codebook Module 0 = Rear-Facing Module 1 = Front-Facing			
Beam ID	Module	# of Active Feeds	Paired With
0	1	1	128
1	1	1	129
2	0	1	130
3	0	1	131
4	1	2	132
5	1	2	133
6	1	2	134
7	0	2	135
8	0	2	136
9	0	2	137
10	1	2	138
11	1	2	139
12	0	2	140
13	0	2	141
14	1	4	142
15	1	4	143
16	1	4	144
17	1	4	145
18	1	4	146
19	0	4	147
20	0	4	148
21	0	4	149
22	0	4	150
23	1	4	151
24	1	4	152
25	1	4	153
26	1	4	154
27	0	4	155
28	0	4	156
29	0	4	157
128	1	1	0
129	1	1	1
130	0	1	2
131	0	1	3
132	1	2	4
133	1	2	5
134	1	2	6
135	0	2	7
136	0	2	8
137	0	2	9
138	1	2	10
139	1	2	11
140	0	2	12
141	0	2	13
142	1	4	14
143	1	4	15
144	1	4	16

n261 Codebook Module 0 = Rear-Facing Module 1 = Front-Facing			
Beam ID	Module	# of Active Feeds	Paired With
145	1	4	17
146	1	4	18
147	0	4	19
148	0	4	20
149	0	4	21
150	0	4	22
151	1	4	23
152	1	4	24
153	1	4	25
154	1	4	26
155	0	4	27
156	0	4	28
157	0	4	29

Table 4. Codebook for Band n261

n260 Codebook Module 0 = Rear-Facing Module 1 = Front-Facing			
Beam ID	Module	# of Active Feeds	Paired With
0	0	1	128
1	1	1	129
2	1	1	130
3	0	1	131
4	0	1	132
5	0	1	133
6	0	1	134
7	1	2	135
8	1	2	136
9	1	2	137
10	0	2	138
11	0	2	139
12	0	2	140
13	1	2	141
14	1	2	142
15	0	2	143
16	0	2	144
17	1	4	145
18	1	4	146
19	1	4	147
20	1	4	148
21	1	4	149
22	0	4	150
23	0	4	151
24	0	4	152
25	0	4	153
26	0	4	154
27	1	4	155
28	1	4	156
29	1	4	157
30	1	4	158
31	0	4	159
32	0	4	160
33	0	4	161
34	0	4	162
128	1	1	0
129	1	1	1
130	1	1	2
131	0	1	3
132	0	1	4
133	0	1	5
134	0	1	6
135	1	2	7
136	1	2	8
137	1	2	9
138	0	2	10
139	0	2	11
140	0	2	12
141	1	2	13
142	1	2	14
143	0	2	15
144	0	2	16
145	1	4	17
146	1	4	18
147	1	4	19

n260 Codebook Module 0 = Rear-Facing Module 1 = Front-Facing			
Beam ID	Module	# of Active Feeds	Paired With
148	1	4	20
149	1	4	21
150	0	4	22
151	0	4	23
152	0	4	24
153	0	4	25
154	0	4	26
155	1	4	27
156	1	4	28
157	1	4	29
158	1	4	30
159	0	4	31
160	0	4	32
161	0	4	33
162	0	4	34

Table 5. Codebook for Band n260

III. Simulation Validation Results

The PD simulation results were validated as explained in the Power Density Simulation Report. The summary of these measurement results is again shown here since the difference between the simulation and measurement results is used as part of the PD characterization process. There is expected to be a difference between the simulation and measurement PD magnitudes due to unknown device housing material properties at mmWave frequencies.

All simulations and measurements were performed with 6 dBm reference input power to the antenna feeds. Simulations were performed at the low, mid, and high channels for each band in the 3 device postures noted previously. Correlation measurements in the lab using the DASY6 system were only performed on the worst device surface for each module / band / posture combination. All simulations and physical measurements are done using CW signals.

Simulations and measurements were performed 2mm from the applicable device surface with one exception. For the back surface and module 0, a bump on the device prevents physical measurements at 2mm from the device surface near module 0. So, module 0 was both measured and simulated at 2mm from the plane defined by this physical bump to get the correlation data and Δ_{min} for the back surface. Simulations were however still also done at 2mm from the back surface itself, and this more conservative simulation data was used for characterizing the PD for module 0 on the back surface.

Band	Posture	Module	Surface	Beam ID	Measured PD (mW/cm^2)	Simulated PD (mW/cm^2)
n261	Flip	0	Right	19	0.104	0.22
n261	Flip	0	Right	156	0.0744	0.19
n261	Flat	0	Back	28	0.658	1.38
n261	Flat	0	Back	148	0.592	1.40
n261	Closed	0	Back	28	0.581	1.52
n261	Closed	0	Back	147	0.4	1.69
n261	Flip	1	Front	16	0.846	1.51
n261	Flip	1	Front	154	0.507	1.72
n261	Flat	1	Front	15	0.821	1.51
n261	Flat	1	Front	132	0.294	1.08
n261	Closed	1	Top	23	0.174	0.60
n261	Closed	1	Top	145	0.179	0.47
n261	Closed	1	Front	24	0.199	0.65
n261	Closed	1	Front	146	0.102	0.69

Table 6. 4 cm^2 Average Power Density Results for Measurements vs. Simulations, Band 261

Band	Posture	Module	Surface	Beam ID	Measured PD (mW/cm^2)	Simulated PD (mW/cm^2)
n260	Flip	0	Right	33	0.0323	0.43
n260	Flip	0	Right	160	0.0311	0.34
n260	Flat	0	Back	33	0.491	1.14
n260	Flat	0	Back	159	0.576	1.00
n260	Closed	0	Back	33	0.471	1.40
n260	Closed	0	Back	161	0.512	1.45
n260	Flip	1	Front	18	0.523	1.42
n260	Flip	1	Front	147	0.55	1.41
n260	Flat	1	Front	27	0.568	1.44
n260	Flat	1	Front	147	0.528	1.38
n260	Closed	1	Top	28	0.346	0.58
n260	Closed	1	Top	145	0.311	0.49
n260	Closed	1	Front	20	0.247	0.50
n260	Closed	1	Front	148	0.222	0.52

Table 7. 4 cm^2 Average Power Density Results for Measurements vs. Simulations, Band 260

IV. PD Design Target

The PD design target is the target PD level that assures compliance after mmWave module power total uncertainty is taken into account. The PD_{design_target} is defined as:

$$PD_{design\_target} < PD_{regulatory\_limit}\ x\ 10^{\frac{-tota\ \ uncertainty}{10}}$$

The total uncertainty budget declared by the module manufacturer for the QTM 525 mmWave module used in this device is 2.1 dB. The regulatory limit for 4 cm^2-averaged PD is 1.0 mW/cm^2. The PD design target is then calculated to be:

$$PD_{design\_target} = 0.617\ mW/cm^2$$

V. Δ_{min} Determination – Housing Influence Characterization

The difference in magnitude between the simulated and measured PD is used to determine the worst-case housing influence since non-metal material properties can't be accurately characterized at mmWave frequencies. Only surfaces which might impact the PD char, the worst-case surfaces with the highest 4cm^2-averaged PD, were used to determine the worst-case housing influence. Δ_{min} represents the worst case where RF exposure is underestimated the most by simulations. Or, in this case where all simulation values exceed the measured values, it represents the case where RF exposure is overestimated the least.

Since the mmWave modules are placed in different locations, each may experience different housing material impacts due to their differing environments. Additionally, when the device posture changes the surrounding material around each module may change further. So, the worst-case housing influence is determined per antenna module, per band, and per posture. Measurements and simulations were performed at the 6 dBm reference power, at the middle channel of each band, for each polarization (H and V), for any surface which might contains the highest PD for a given module / posture. The lowest Δ_{min} determined for a given module + band + posture combination was later used in the PD characterization process for that combination.

In the tables below, the lowest Δ_{min} is highlighted for each module + band + posture combination. This is the value which will be used in the PD char calculations for that module + band + posture as lower values are more conservative.

Δ_{min} – Band n261							
Band	Posture	Module	Surface	Beam ID	Measured PD (mW/cm^2)	Simulated PD (mW/cm^2)	Δ_{min} (dB)
n261	Flip	0	Right	19	0.104	0.22	**3.25**
n261	Flip	0	Right	156	0.0744	0.19	4.07
n261	Flat	0	Back	28	0.658	1.38	**3.21**
n261	Flat	0	Back	148	0.592	1.40	3.73
n261	Closed	0	Back	28	0.581	1.52	**4.17**
n261	Closed	0	Back	147	0.4	1.69	6.25
n261	Flip	1	Front	16	0.846	1.51	**2.51**
n261	Flip	1	Front	154	0.507	1.72	5.30
n261	Flat	1	Front	15	0.821	1.51	**2.65**
n261	Flat	1	Front	132	0.294	1.08	5.15
n261	Closed	1	Top	23	0.174	0.60	5.38
n261	Closed	1	Top	145	0.179	0.47	**4.19**
n261	Closed	1	Front	24	0.199	0.65	5.14
n261	Closed	1	Front	146	0.102	0.69	8.3

Table 8. Δ_{min} Calculated Values for n261 from 6 dBm Reference Power Simulations and Measurements

Δ_{min} – Band n260							
Band	Posture	Module	Surface	Beam ID	Measured PD (mW/cm^2)	Simulated PD (mW/cm^2)	Δ_{min} (dB)
n260	Flip	0	Right	33	0.0323	0.43	11.24
n260	Flip	0	Right	160	0.0311	0.34	**10.38**
n260	Flat	0	Back	33	0.491	1.14	3.65
n260	Flat	0	Back	159	0.576	1.00	**2.39**
n260	Closed	0	Back	33	0.471	1.40	4.73
n260	Closed	0	Back	161	0.512	1.45	**4.52**
n260	Flip	1	Front	18	0.523	1.42	4.34
n260	Flip	1	Front	147	0.55	1.41	**4.05**
n260	Flat	1	Front	27	0.568	1.44	**4.04**
n260	Flat	1	Front	147	0.528	1.38	4.17
n260	Closed	1	Top	28	0.346	0.58	2.24
n260	Closed	1	Top	145	0.311	0.49	**1.97**
n260	Closed	1	Front	20	0.247	0.50	3.06
n260	Closed	1	Front	148	0.222	0.52	3.69

Table 9. Δ_{min} Calculated Values for n260 from 6 dBm Reference Power Simulations and Measurements

VI. PD Characterization Calculations and Results

A. Scaling Factor

The worst-case scaling factors for each module + band + channel + beam were shown in the PD simulation report. Those values are used here in conjunction with Δ_{min} to adjust the 6 dBm reference power level to the compliant levels and thus determine the compliant *input.power.limits.* The scaling factor for a given beam *i* of M possible beams is calculated as:

$$s(i) = \frac{PD\ design\ target}{sim.PDsurface}, i = 1, 2, \dots M$$

Note that for beam pairs, the relative phase between beam pairs is not controlled by the QTM mmWave module. So any relative phase between beam pairs is possible and the worst-case relative phase must be accounted for in the simulations. The relative phase between beam pairs is swept from 0 to 360 degrees in 5 degree increments to find the relative phase resulting in the highest PD. This worst-case phase was used to determine all beam pair PD values, and thus for the *sim.PDsurface* in the equation above.

B. Input Power Limit Calculations from *s(i)* and Δ_{min}

In all cases evaluated here, the simulations underestimate the housing materials losses and Δ_{min} is a positive value. Thus, Δ_{min} can be used to increase the simulated power limits while still maintaining compliance.

The TxAGC uncertainty for the QTM 525 mmWave modules used is 0.5 dB at the 6 dBm reference power according to the module manufacturer. Since every Δ_{min} value used here is greater than 0.5 dB, the following equation is used to calculate all *input.power.limit* values:

$$input.power.limit(i) = P_{ref} + 10 * \log\left(s(i) + (\Delta_{min} - \text{TxAGC uncertainty}\right), \text{i } \epsilon \text{ all beams}$$

Note that interim input power limits are calculated for each posture separately since each posture has different Δ_{min} values associated with it. But since all postures will share the same final input power limits, the lowest of these interim calculated values from each posture is taken as the final power limit for a particular beam.

Tables 10-13 contain the worst-case s(i) values from the simulation report for all postures. The lowest s(i) value amongst the 3 channels in each posture is used to calculate the interim power limit for that posture. The lowest calculated power limit from each posture is then taken as the overall *input.power.limit*.

Module 0 – n261 – *input.power.limit* Determination														
Beam ID	Paired Beam ID	Flip Posture: Δ_{min} = 3.25 dB				Flat Posture: Δ_{min} = 3.21 dB				Closed Posture: Δ_{min} = 4.17 dB				Overall *Input. power. Limit* (dBm)
		s(i) Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flip (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flat (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Closed (dBm)	
2		20.55	10.28	12.33	18.87	1.142	1.186	1.186	9.29	1.163	1.186	1.186	10.33	**9.3**
3		15.41	20.55	20.55	20.63	1.028	1.045	1.142	8.83	1.063	1.063	1.233	9.94	**8.8**
7		4.40	3.85	3.85	14.60	0.582	0.610	0.593	6.36	0.587	0.587	0.599	7.36	**6.4**
8		15.41	8.81	10.28	18.20	0.561	0.582	0.593	6.20	0.566	0.571	0.610	7.20	**6.2**
9		8.81	4.74	5.14	15.51	0.693	0.743	0.701	7.12	0.709	0.743	0.979	8.18	**7.1**
12		5.14	4.74	4.74	15.51	0.571	0.587	0.605	6.28	0.582	0.587	0.599	7.32	**6.3**
13		20.55	12.33	10.28	18.87	0.536	0.571	0.582	6.00	0.541	0.555	0.599	7.00	**6.0**
19		3.85	2.80	2.47	12.68	0.400	0.431	0.464	4.73	0.417	0.428	0.501	5.87	**4.7**
20		6.85	4.74	5.14	15.51	0.395	0.422	0.414	4.68	0.400	0.417	0.411	5.69	**4.7**
21		8.81	8.81	12.33	18.20	0.332	0.350	0.323	3.80	0.339	0.333	0.378	4.89	**3.8**
22		6.17	4.40	4.74	15.18	0.361	0.374	0.406	4.29	0.369	0.376	0.422	5.34	**4.3**
27		4.74	5.61	5.61	15.51	0.434	0.428	0.467	5.02	0.437	0.447	0.474	6.07	**5.0**
28		6.85	4.74	5.14	15.51	0.356	0.371	0.363	4.22	0.369	0.358	0.350	5.11	**4.2**
29		6.17	6.17	5.61	16.24	0.296	0.406	0.428	3.42	0.304	0.400	0.434	4.50	**3.4**
130		20.55	20.55	20.55	21.88	1.082	1.142	1.101	9.05	1.101	1.082	1.121	10.01	**9.1**
131		30.83	61.66	61.66	23.64	1.082	1.142	1.186	9.05	1.101	1.121	1.209	10.09	**9.1**
135		8.81	15.41	15.41	18.20	0.541	0.576	0.593	6.04	0.551	0.561	0.623	7.08	**6.0**
136		15.41	15.41	15.41	20.63	0.685	0.717	0.734	7.07	0.701	0.709	0.717	8.13	**7.1**
137		15.41	15.41	15.41	20.63	0.551	0.587	0.599	6.12	0.561	0.571	0.617	7.16	**6.1**
140		12.33	30.83	20.55	19.66	0.536	0.536	0.518	5.85	0.551	0.518	0.523	6.81	**5.9**
141		6.17	5.14	5.61	15.86	0.571	0.605	0.576	6.28	0.582	0.582	0.610	7.32	**6.3**
147		10.28	12.33	12.33	18.87	0.371	0.344	0.356	4.08	0.376	0.344	0.356	5.04	**4.1**
148		3.43	3.63	4.40	14.10	0.390	0.302	0.398	3.51	0.734	0.296	0.326	4.38	**3.5**
149		4.11	3.63	3.63	14.35	0.486	0.474	0.440	5.14	0.493	0.464	0.440	6.10	**5.2**
150		6.17	4.74	5.61	15.51	0.311	0.341	0.388	3.64	0.316	0.330	0.378	4.67	**3.6**
155		6.17	8.81	7.71	16.65	0.390	0.383	0.343	4.06	0.398	0.339	0.369	4.97	**4.1**
156		4.40	3.25	3.63	13.87	0.358	0.385	0.403	4.25	0.811	0.378	0.398	5.44	**4.3**
157		5.61	6.17	4.74	15.51	0.352	0.393	0.419	4.18	0.361	0.388	0.425	5.25	**4.2**
2	130	5.61	4.11	5.61	14.89	0.447	0.464	0.460	5.21	0.450	0.460	0.453	6.20	**5.2**
3	131	8.81	12.33	12.33	18.20	0.431	0.447	0.450	5.05	0.437	0.453	0.457	6.07	**5.1**
7	135	1.76	1.87	2.28	11.21	0.310	0.328	0.339	3.62	0.319	0.350	0.350	4.71	**3.6**
8	136	6.85	7.71	6.17	16.65	0.267	0.274	0.277	2.98	0.268	0.280	0.277	3.95	**3.0**
9	137	4.40	3.85	2.80	13.22	0.273	0.289	0.302	3.07	0.278	0.301	0.308	4.11	**3.1**
12	140	2.37	2.80	2.68	12.50	0.411	0.419	0.411	4.85	0.417	0.453	0.425	5.87	**4.9**
13	141	3.08	2.28	2.47	12.33	0.275	0.278	0.273	3.07	0.278	0.296	0.288	4.11	**3.1**
19	147	2.28	1.99	1.76	11.21	0.184	0.191	0.195	1.36	0.189	0.195	0.187	2.39	**1.4**
20	148	2.47	2.06	2.37	11.89	0.147	0.155	0.192	0.38	0.149	0.159	0.205	1.40	**0.4**
21	149	2.94	1.99	1.76	11.21	0.219	0.211	0.232	1.95	0.222	0.222	0.240	3.13	**2.0**
22	150	1.76	1.93	1.47	10.42	0.197	0.173	0.178	1.09	0.200	0.230	0.206	2.68	**1.1**
27	155	1.71	2.28	2.80	11.08	0.177	0.186	0.210	1.19	0.180	0.192	0.202	2.22	**1.2**
28	156	2.20	2.37	2.06	11.89	0.134	0.148	0.153	-0.02	0.137	0.154	0.197	1.04	**0.0**
29	157	1.76	1.28	1.50	9.82	0.202	0.231	0.169	0.99	0.207	0.259	0.207	2.83	**1.0**

Table 10. n261 Module 0 Δ_{min} and worst-case s(i) values for all channels in all postures needed for input.power.limit calculations

Module 1 – n261 – *input.power.limit* Determination														
Beam ID	Paired Beam ID	Flip Posture: Δ_{min} = 2.51 dB				Flat Posture: Δ_{min} = 2.65 dB				Closed Posture: Δ_{min} = 4.19 dB				Overall *Input. power. Limit* (dBm)
		s(i) Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flip (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flat (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Closed (dBm)	
0		1.258	1.258	1.285	9.01	1.285	1.312	1.312	9.24	4.743	5.138	5.605	16.45	**9.0**
1		1.101	1.121	1.186	8.43	1.163	1.209	1.233	8.81	3.854	3.854	4.111	15.53	**8.4**
4		0.693	0.709	0.693	6.42	0.693	0.725	0.743	6.56	2.569	2.569	2.803	13.77	**6.4**
5		0.555	0.555	0.576	5.45	0.566	0.571	0.582	5.68	1.504	1.623	1.868	11.44	**5.5**
6		0.685	0.701	0.734	6.37	0.709	0.781	0.781	6.66	2.466	2.466	2.569	13.59	**6.4**
10		0.593	0.587	0.605	5.70	0.593	0.593	0.605	5.88	1.623	1.762	1.989	11.77	**5.7**
11		0.61	0.623	0.649	5.86	0.67	0.701	0.701	6.41	1.814	1.927	2.284	12.26	**5.9**
14		0.587	0.593	0.571	5.58	0.587	0.617	0.593	5.84	1.163	1.142	1.163	10.25	**5.6**
15		0.381	0.381	0.422	3.82	0.371	0.408	0.425	3.84	1.142	1.186	1.258	10.25	**3.8**
16		0.4	0.408	0.408	4.03	0.411	0.419	0.393	4.09	0.963	0.979	1.101	9.51	**4.0**
17		0.493	0.518	0.523	4.94	0.453	0.501	0.527	4.71	1.209	1.285	1.37	10.49	**4.7**
18		0.471	0.489	0.514	4.74	0.501	0.561	0.587	5.15	1.163	1.233	1.34	10.33	**4.7**
23		0.536	0.431	0.478	4.35	0.546	0.464	0.478	4.82	0.963	0.979	1.028	9.51	**4.4**
24		0.376	0.383	0.388	3.76	0.369	0.365	0.381	3.77	0.949	0.949	1.011	9.44	**3.8**
25		0.431	0.444	0.44	4.35	0.408	0.45	0.431	4.26	0.995	1.028	1.101	9.65	**4.3**
26		0.46	0.482	0.514	4.64	0.471	0.536	0.571	4.88	1.163	1.713	1.762	10.33	**4.6**
128		1.285	1.312	1.312	9.10	1.312	1.258	1.312	9.15	4.111	3.854	4.111	15.53	**9.1**
129		1.209	1.233	1.285	8.83	1.258	1.258	1.312	9.15	4.404	4.404	4.743	16.11	**8.8**
132		0.555	0.566	0.593	5.45	0.555	0.571	0.582	5.59	1.762	1.927	2.202	12.13	**5.5**
133		0.781	0.811	0.822	6.94	0.822	0.845	0.856	7.30	3.083	2.936	3.627	14.35	**6.9**
134		0.593	0.61	0.623	5.74	0.61	0.636	0.629	6.00	1.868	1.868	1.927	12.38	**5.7**
138		0.649	0.67	0.678	6.13	0.656	0.663	0.67	6.32	2.284	2.466	2.681	13.26	**6.1**
139		0.663	0.678	0.717	6.23	0.701	0.685	0.709	6.51	1.989	1.868	1.868	12.38	**6.2**
142		0.341	0.298	0.305	2.75	0.335	0.371	0.348	3.40	0.995	1.028	1.082	9.65	**2.8**
143		0.414	0.425	0.437	4.18	0.422	0.467	0.453	4.40	1.101	1.312	1.541	10.09	**4.2**
144		0.434	0.523	0.801	4.38	0.434	0.505	0.845	4.52	1.34	1.504	1.868	10.94	**4.4**
145		0.376	0.406	0.431	3.76	0.4	0.431	0.51	4.17	0.963	1.045	1.186	9.51	**3.8**
146		0.333	0.352	0.361	3.23	0.344	0.369	0.35	3.52	0.92	0.894	0.979	9.18	**3.2**
151		0.385	0.311	0.4	2.94	0.378	0.422	0.393	3.92	1.163	1.285	1.37	10.33	**2.9**
152		0.61	0.636	0.636	5.86	0.605	0.629	0.685	5.97	1.258	1.37	1.581	10.67	**5.9**
153		0.422	0.471	0.518	4.26	0.437	0.501	0.541	4.55	1.163	1.312	1.37	10.33	**4.3**
154		0.352	0.358	0.371	3.48	0.365	0.376	0.437	3.77	0.949	1.011	1.028	9.44	**3.5**
0	128	0.576	0.605	0.593	5.61	0.576	0.693	0.709	5.75	2.202	2.202	2.372	13.10	**5.6**
1	129	0.518	0.541	0.561	5.15	0.518	0.541	0.566	5.29	1.868	1.989	2.126	12.38	**5.2**
4	132	0.356	0.361	0.356	3.52	0.35	0.381	0.358	3.59	1.082	1.142	1.233	10.01	**3.5**
5	133	0.288	0.292	0.296	2.60	0.288	0.294	0.301	2.74	0.92	1.142	1.209	9.31	**2.6**
6	134	0.31	0.321	0.333	2.92	0.325	0.337	0.346	3.27	1.082	1.063	1.063	9.94	**2.9**
10	138	0.273	0.28	0.284	2.37	0.277	0.283	0.291	2.57	0.881	1.028	1.142	9.12	**2.4**
11	139	0.319	0.337	0.371	3.05	0.318	0.341	0.356	3.17	1.163	1.082	1.121	10.01	**3.1**
14	142	0.222	0.228	0.228	1.47	0.215	0.22	0.217	1.47	0.649	0.599	0.605	7.44	**1.5**
15	143	0.202	0.203	0.211	1.06	0.203	0.225	0.222	1.22	0.61	0.649	0.725	7.52	**1.1**
16	144	0.219	0.237	0.242	1.41	0.223	0.225	0.236	1.63	0.617	0.649	0.701	7.57	**1.4**
17	145	0.203	0.213	0.223	1.08	0.228	0.235	0.24	1.73	0.532	0.582	0.599	6.93	**1.1**
18	146	0.197	0.22	0.208	0.95	0.213	0.222	0.227	1.43	0.663	0.642	0.629	7.66	**1.0**
23	151	0.222	0.234	0.235	1.47	0.206	0.231	0.218	1.29	0.546	0.571	0.617	7.04	**1.3**
24	152	0.205	0.212	0.216	1.13	0.214	0.233	0.223	1.45	0.566	0.582	0.656	7.20	**1.1**
25	153	0.209	0.223	0.228	1.21	0.212	0.216	0.228	1.41	0.61	0.623	0.587	7.36	**1.2**
26	154	0.228	0.232	0.229	1.59	0.227	0.242	0.251	1.71	0.617	0.617	0.629	7.57	**1.6**

Table 11. n261 Module 1 Δ_{min} and worst-case s(i) values for all channels in all postures needed for input.power.limit calculations

Module 0 – n260 – *input.power.limit* Determination														
Beam ID	Paired Beam ID	Flip Posture: Δ_{min} = 10.38 dB				Flat Posture: Δ_{min} = 2.39 dB				Closed Posture: Δ_{min} = 4.52 dB				Overall *Input. power. limit*
		s(i) Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flip (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flat (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Closed (dBm)	
3		7.707	6.166	7.707	23.78	1.504	1.209	1.258	8.71	1.504	1.209	1.258	10.84	**8.7**
4		15.415	15.415	20.553	27.76	1.581	1.312	1.258	8.89	1.541	1.312	1.258	11.02	**8.9**
5		8.809	5.138	12.332	22.99	1.468	1.312	1.209	8.71	1.504	1.312	1.233	10.93	**8.7**
6		15.415	10.277	7.707	24.75	1.401	1.121	1.045	8.08	1.434	1.121	1.063	10.29	**8.1**
10		12.332	6.166	8.809	23.78	0.934	0.717	0.656	6.06	0.934	0.717	0.656	8.19	**6.1**
11		2.936	3.245	4.404	20.56	0.693	0.582	0.617	5.54	0.693	0.582	0.623	7.67	**5.5**
12		12.332	8.809	6.851	24.24	0.963	0.709	0.663	6.11	0.963	0.701	0.663	8.24	**6.1**
15		7.707	4.404	5.605	22.32	0.949	0.781	0.636	5.92	0.949	0.771	0.649	8.14	**5.9**
16		5.138	7.707	7.707	22.99	0.894	0.663	0.743	6.11	0.907	0.663	0.734	8.24	**6.1**
22		2.803	2.936	2.803	20.36	0.385	0.44	0.414	3.74	0.447	0.437	0.419	6.24	**3.8**
23		5.138	3.083	3.245	20.77	0.907	0.663	0.566	5.42	0.822	0.663	0.642	8.10	**5.4**
24		1.312	1.623	2.055	17.06	0.411	0.365	0.346	3.28	0.471	0.363	0.346	5.41	**3.3**
25		1.868	2.055	3.083	18.59	0.403	0.343	0.354	3.24	0.417	0.344	0.358	5.39	**3.2**
26		5.605	2.372	3.245	19.63	0.617	0.482	0.457	4.49	0.629	0.482	0.457	6.62	**4.5**
31		3.854	2.681	2.569	19.98	0.582	0.437	0.408	4.00	0.518	0.642	0.406	6.11	**4.0**
32		4.111	2.284	2.936	19.47	0.482	0.425	0.45	4.17	0.486	0.425	0.453	6.30	**4.2**
33		1.868	1.434	2.055	17.45	0.367	0.337	0.343	3.17	0.383	0.337	0.335	5.27	**3.2**
34		3.854	5.138	3.627	21.48	0.501	0.555	0.437	4.29	0.523	0.555	0.434	6.39	**4.3**
131		6.851	7.707	4.743	22.64	1.37	1.186	1.142	8.47	1.37	1.209	1.142	10.60	**8.5**
132		15.415	8.809	15.415	25.33	1.623	1.434	1.34	9.16	1.581	1.434	1.34	11.29	**9.2**
133		12.332	6.851	8.809	24.24	1.434	1.233	1.233	8.80	1.468	1.233	1.233	10.93	**8.8**
134		20.553	20.553	20.553	29.01	1.401	1.186	1.101	8.31	1.468	1.186	1.142	10.60	**8.3**
138		10.277	4.111	3.083	20.77	0.868	0.801	0.623	5.83	0.856	0.801	0.617	7.92	**5.8**
139		4.404	5.605	5.605	22.32	0.894	0.693	0.717	6.30	0.907	0.701	0.623	7.96	**6.3**
140		12.332	6.851	8.809	24.24	0.833	0.701	0.678	6.20	0.833	0.701	0.693	8.43	**6.2**
143		8.809	6.166	5.138	22.99	0.791	0.693	0.61	5.74	0.791	0.685	0.617	7.92	**5.8**
144		8.809	6.166	3.854	21.74	0.963	0.734	0.636	5.92	0.963	0.734	0.649	8.14	**5.9**
150		3.426	2.055	1.623	17.98	0.527	1.101	1.045	5.11	0.532	1.121	0.45	6.55	**5.1**
151		4.111	1.868	1.989	18.59	0.44	0.411	0.388	3.78	0.489	0.411	0.388	5.91	**3.8**
152		1.989	2.284	2.055	18.87	0.486	0.363	0.39	3.49	0.541	0.365	0.398	5.64	**3.5**
153		3.245	2.936	2.936	20.56	0.51	0.369	0.35	3.33	0.532	0.371	0.352	5.49	**3.3**
154		5.138	2.126	2.284	19.16	0.489	0.447	0.398	3.89	0.555	0.447	0.398	6.02	**3.9**
159		3.627	2.681	1.989	18.87	0.532	0.403	0.35	3.33	0.555	0.403	0.356	5.53	**3.3**
160		2.803	1.814	2.466	18.47	0.408	1.101	0.371	3.58	0.419	1.082	0.369	5.69	**3.6**
161		1.666	2.681	2.936	18.10	0.367	0.328	0.381	3.05	0.464	0.333	0.393	5.24	**3.1**
162		7.707	2.466	2.803	19.80	0.636	0.45	0.371	3.58	0.629	0.453	0.378	5.79	**3.6**
3	131	1.927	1.868	1.713	18.22	0.734	0.599	0.587	5.58	0.743	0.629	0.599	7.79	**5.6**
4	132	6.166	5.605	5.138	22.99	0.717	0.593	0.536	5.18	0.725	0.61	0.532	7.28	**5.2**
5	133	3.426	3.245	6.166	20.99	0.717	0.582	0.518	5.03	0.725	0.649	0.523	7.21	**5.0**
6	134	7.707	6.851	4.404	22.32	0.61	0.523	0.527	5.08	0.623	0.532	0.532	7.28	**5.1**
10	138	3.854	1.666	1.34	17.15	0.464	0.388	0.333	3.11	0.489	0.395	0.337	5.30	**3.1**
11	139	1.082	1.504	1.814	16.22	0.369	0.266	0.264	2.11	0.332	0.275	0.266	4.27	**2.1**
12	140	4.404	3.083	3.426	20.77	0.551	0.393	0.369	3.56	0.555	0.385	0.374	5.75	**3.6**
15	143	3.083	2.372	3.083	19.63	0.395	0.313	0.259	2.02	0.398	0.325	0.261	4.19	**2.0**
16	144	2.936	2.569	2.284	19.47	0.447	0.346	0.321	2.96	0.453	0.363	0.326	5.15	**3.0**
22	150	1.34	0.995	0.822	15.03	0.222	0.214	0.201	0.92	0.305	0.227	0.203	3.09	**0.9**
23	151	1.37	0.685	0.771	14.24	0.289	0.209	0.177	0.37	0.383	0.22	0.179	2.55	**0.4**
24	152	0.514	0.605	0.845	12.99	0.189	0.156	0.153	-0.26	0.307	0.163	0.304	2.14	**-0.2**
25	153	1.1	1.47	1.23	16.29	0.178	0.164	0.166	0.04	0.18	0.168	0.161	2.09	**0.1**
26	154	2.28	1.05	1.19	16.09	0.245	0.265	0.208	1.07	0.242	0.248	0.213	3.30	**1.1**
31	159	1.62	0.83	0.91	15.07	0.257	0.193	0.178	0.39	0.261	0.203	0.178	2.52	**0.4**
32	160	1.08	0.59	0.95	13.59	0.207	0.173	0.159	-0.10	0.301	0.179	0.313	2.55	**-0.1**
33	161	0.6	0.92	1.06	13.66	0.177	0.145	0.159	-0.50	0.178	0.152	0.161	1.84	**-0.5**
34	162	2.28	1.16	1.87	16.52	0.299	0.21	0.222	1.11	0.471	0.308	0.227	3.58	**1.1**

Table 12. n260 Module 0 Δ_{min} and worst-case s(i) values for all channels in all postures needed for input.power.limit calculation

Module 1 – n260 – *input.power.limit* Determination														
Beam ID	Paired Beam ID	Flip Posture: Δ_{min} = 4.05 dB				Flat Posture: Δ_{min} = 4.04 dB				Closed Posture: Δ_{min} = 1.97 dB				Overall *Input. power. Limit* (dBm)
		s(i) Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flip (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Flat (dBm)	*s(i)* Low	*s(i)* Mid	*s(i)* High	Pwr. Limit Closed (dBm)	
0		1.927	1.623	1.541	11.43	1.927	1.666	1.581	11.53	5.605	5.605	4.743	14.23	**11.4**
1		2.126	1.868	1.623	11.65	2.202	1.868	1.581	11.53	5.138	5.138	5.138	14.58	**11.5**
2		1.868	1.762	1.541	11.43	1.868	1.666	1.504	11.31	5.138	3.854	5.138	13.33	**11.3**
7		0.963	0.894	0.894	9.06	0.979	0.856	0.881	8.86	2.372	3.083	2.803	11.22	**8.9**
8		1.163	1.101	0.894	9.06	1.163	1.045	0.907	9.12	3.083	2.936	2.284	11.06	**9.1**
9		1.028	0.856	0.868	8.87	1.045	0.822	0.92	8.69	3.854	2.569	3.083	11.57	**8.7**
13		1.028	0.856	0.801	8.59	1.011	0.833	0.791	8.52	3.426	3.245	3.083	12.36	**8.5**
14		1.142	1.101	0.995	9.53	1.209	1.011	0.963	9.38	2.284	1.927	2.372	10.32	**9.4**
17		0.587	0.474	0.518	6.31	0.587	0.471	0.505	6.27	1.434	1.713	1.762	9.04	**6.3**
18		0.523	0.434	0.453	5.92	0.527	0.419	0.414	5.71	1.082	1.186	1.401	7.81	**5.7**
19		0.649	0.587	0.551	6.96	0.781	0.576	0.532	6.80	1.927	1.34	1.34	8.74	**6.8**
20		0.752	0.636	0.566	7.08	0.761	0.629	0.532	6.80	1.37	1.233	1.101	7.89	**6.8**
21		0.67	0.67	0.587	7.24	0.678	0.599	0.582	7.19	1.401	1.233	1.504	8.38	**7.2**
27		0.566	0.44	0.489	5.98	0.561	0.428	0.474	5.85	1.285	1.581	1.623	8.56	**5.9**
28		0.551	0.467	0.444	6.02	0.576	0.464	0.431	5.88	1.101	1.063	1.312	7.74	**5.9**
29		0.649	0.582	0.546	6.92	0.656	0.571	0.532	6.80	1.927	1.312	1.285	8.56	**6.8**
30		0.709	0.678	0.61	7.40	0.717	0.636	0.587	7.23	1.312	1.163	1.312	8.13	**7.2**
128		1.814	1.623	1.37	10.92	1.868	1.623	1.401	11.00	6.851	4.404	3.854	13.33	**10.9**
129		1.868	1.814	1.623	11.65	1.989	1.762	1.666	11.76	7.707	6.166	4.111	13.61	**11.7**
130		1.868	1.623	1.713	11.65	1.814	1.623	1.666	11.64	5.605	4.743	4.743	14.23	**11.6**
135		1.209	1.082	0.894	9.06	1.209	1.063	0.894	9.05	3.083	2.055	1.989	10.46	**9.1**
136		0.949	0.822	0.801	8.59	0.949	0.801	0.822	8.58	2.803	2.681	2.569	11.57	**8.6**
137		1.233	0.979	0.801	8.59	1.258	0.995	0.822	8.69	2.936	2.372	2.126	10.75	**8.6**
141		1.011	0.92	0.822	8.70	1.063	0.894	0.845	8.81	4.111	3.627	2.803	11.95	**8.7**
142		1.045	0.995	0.995	9.53	1.082	1.028	0.979	9.45	2.681	2.466	2.202	10.90	**9.4**
145		0.709	0.636	0.482	6.38	0.752	0.649	0.523	6.73	1.623	1.258	1.163	8.13	**6.4**
146		0.546	0.623	0.551	6.92	0.555	0.623	0.474	6.30	1.581	1.37	1.312	8.65	**6.3**
147		0.536	0.437	0.437	5.95	0.536	0.447	0.447	6.04	1.989	1.434	1.401	8.93	**6.0**
148		0.752	0.693	0.617	7.45	0.725	0.67	0.582	7.19	1.312	1.186	1.101	7.89	**7.2**
149		0.649	0.551	0.457	6.15	0.649	0.546	0.482	6.37	1.541	1.285	1.163	8.13	**6.2**
155		0.656	0.701	0.561	7.04	0.701	0.678	0.551	6.95	1.762	1.434	1.045	7.66	**6.9**
156		0.518	0.45	0.437	5.95	0.518	0.45	0.447	6.04	1.868	1.541	1.623	9.35	**6.0**
157		0.566	0.493	0.471	6.28	0.582	0.482	0.471	6.27	1.581	1.142	1.468	8.05	**6.3**
158		0.717	0.587	0.489	6.44	0.709	0.593	0.514	6.65	1.541	1.285	1.082	7.81	**6.5**
0	128	0.949	0.845	0.67	7.81	0.934	0.752	0.725	8.14	2.936	2.202	1.713	9.81	**7.8**
1	129	0.949	0.894	0.761	8.36	0.949	0.881	0.761	8.35	2.569	2.936	2.126	10.75	**8.4**
2	130	1.011	0.752	0.771	8.31	0.995	0.856	0.791	8.52	1.927	1.762	2.055	9.93	**8.3**
7	135	0.505	0.471	0.434	5.92	0.505	0.457	0.428	5.85	1.142	1.186	1.233	8.05	**5.9**
8	136	0.44	0.398	0.453	5.55	0.44	0.403	0.374	5.27	1.312	1.121	0.92	7.11	**5.3**
9	137	0.582	0.444	0.393	5.49	0.561	0.431	0.385	5.39	1.468	1.163	1.121	7.97	**5.4**
13	141	0.523	0.489	0.447	6.05	0.527	0.486	0.434	5.91	2.055	1.762	1.713	9.81	**5.9**
14	142	0.523	0.514	0.493	6.48	0.532	0.486	0.478	6.33	1.258	0.963	0.979	7.31	**6.3**
17	145	0.301	0.232	0.235	3.20	0.305	0.236	0.236	3.27	0.693	0.678	0.599	5.24	**3.2**
18	146	0.229	0.216	0.206	2.69	0.227	0.203	0.206	2.61	0.518	0.636	0.67	4.61	**2.6**
19	147	0.284	0.266	0.254	3.60	0.298	0.265	0.243	3.40	0.791	0.605	0.678	5.29	**3.4**
20	148	0.363	0.278	0.33	3.99	0.361	0.269	0.247	3.47	0.642	0.636	0.532	4.73	**3.5**
21	149	0.307	0.279	0.218	2.93	0.315	0.243	0.223	3.02	0.605	0.527	0.546	4.69	**2.9**
27	155	0.285	0.264	0.251	3.55	0.279	0.267	0.246	3.45	0.801	0.571	0.546	4.84	**3.4**
28	156	0.213	0.196	0.189	2.31	0.219	0.195	0.189	2.30	0.551	0.546	0.656	4.84	**2.3**
29	157	0.358	0.253	0.227	3.11	0.296	0.253	0.225	3.06	0.771	0.617	0.685	5.37	**3.1**
30	158	0.335	0.302	0.235	3.26	0.339	0.313	0.238	3.31	0.593	0.551	0.576	4.88	**3.3**

Table 13. n260 Module 1 Δ_{min} and worst-case s(i) values for all channels in all postures needed for input.power.limit calculations

C. PD Characterization Tables

An additional 3 dB reduction is made to all *input.power.limits* shown in Tables 10-13 to conservatively ensure TER compliance in simultaneous transmission scenarios with WLAN. These PD Characterization tables show the final input.power.limits after incorporating that additional 3 dB backoff.

PD Char – Module 0 – n261		
Beam1	Beam2	*input.Power.limit* (dBm)
2		**6.3**
3		**5.8**
7		**3.4**
8		**3.2**
9		**4.1**
12		**3.3**
13		**3.0**
19		**1.7**
20		**1.7**
21		**0.8**
22		**1.3**
27		**2.0**
28		**1.2**
29		**0.4**
130		**6.1**
131		**6.1**
135		**3.0**
136		**4.1**
137		**3.1**
140		**2.9**
141		**3.3**
147		**1.1**
148		**0.5**
149		**2.2**
150		**0.6**
155		**1.1**
156		**1.3**
157		**1.2**
2	130	**2.2**
3	131	**2.1**
7	135	**0.6**
8	136	**0.0**
9	137	**0.1**
12	140	**1.9**
13	141	**0.1**
19	147	**-1.6**
20	148	**-2.6**
21	149	**-1.0**
22	150	**-1.9**
27	155	**-1.8**
28	156	**-3.0**
29	157	**-2.0**

Table 14. Module 0 – n261 PD Char Table

PD Char – Module 1 – n261		
Beam1	Beam2	*input.Power.limit* (dBm)
0		**6.0**
1		**5.4**
4		**3.4**
5		**2.5**
6		**3.4**
10		**2.7**
11		**2.9**
14		**2.6**
15		**0.8**
16		**1.0**
17		**1.7**
18		**1.7**
23		**1.4**
24		**0.8**
25		**1.3**
26		**1.6**
128		**6.1**
129		**5.8**
132		**2.5**
133		**3.9**
134		**2.7**
138		**3.1**
139		**3.2**
142		**-0.2**
143		**1.2**
144		**1.4**
145		**0.8**
146		**0.2**
151		**-0.1**
152		**2.9**
153		**1.3**
154		**0.5**
0	128	**2.6**
1	129	**2.2**
4	132	**0.5**
5	133	**-0.4**
6	134	**-0.1**
10	138	**-0.6**
11	139	**0.1**
14	142	**-1.5**
15	143	**-1.9**
16	144	**-1.6**
17	145	**-1.9**
18	146	**-2.0**
23	151	**-1.7**
24	152	**-1.9**
25	153	**-1.8**
26	154	**-1.4**

Table 15. Module 1 – n261 PD Char Table

PD Char – Module 0 – n260		
Beam1	Beam2	*input.Power.limit* (dBm)
3		**5.7**
4		**5.9**
5		**5.7**
6		**5.1**
10		**3.1**
11		**2.5**
12		**3.1**
15		**2.9**
16		**3.1**
22		**0.8**
23		**2.4**
24		**0.3**
25		**0.2**
26		**1.5**
31		**1.0**
32		**1.2**
33		**0.2**
34		**1.3**
131		**5.5**
132		**6.2**
133		**5.8**
134		**5.3**
138		**2.8**
139		**3.3**
140		**3.2**
143		**2.8**
144		**2.9**
150		**2.1**
151		**0.8**
152		**0.5**
153		**0.3**
154		**0.9**
159		**0.3**
160		**0.6**
161		**0.1**
162		**0.6**
3	131	**2.6**
4	132	**2.2**
5	133	**2.0**
6	134	**2.1**
10	138	**0.1**
11	139	**-0.9**
12	140	**0.6**
15	143	**-1.0**
16	144	**0.0**
22	150	**-2.1**
23	151	**-2.6**
24	152	**-3.2**
25	153	**-2.9**
26	154	**-1.9**
31	159	**-2.6**
32	160	**-3.1**
33	161	**-3.5**
34	162	**-1.9**

Table 16. Module 0 – n260 PD Char Table

PD Char – Module 1 – n260		
Beam1	Beam2	*input.Power.limit* (dBm)
0		**8.4**
1		**8.5**
2		**8.3**
7		**5.9**
8		**6.1**
9		**5.7**
13		**5.5**
14		**6.4**
17		**3.3**
18		**2.7**
19		**3.8**
20		**3.8**
21		**4.2**
27		**2.9**
28		**2.9**
29		**3.8**
30		**4.2**
128		**7.9**
129		**8.7**
130		**8.6**
135		**6.1**
136		**5.6**
137		**5.6**
141		**5.7**
142		**6.4**
145		**3.4**
146		**3.3**
147		**3.0**
148		**4.2**
149		**3.2**
155		**3.9**
156		**3.0**
157		**3.3**
158		**3.5**
0	128	**4.8**
1	129	**5.4**
2	130	**5.3**
7	135	**2.9**
8	136	**2.3**
9	137	**2.4**
13	141	**2.9**
14	142	**3.3**
17	145	**0.2**
18	146	**-0.4**
19	147	**0.4**
20	148	**0.5**
21	149	**-0.1**
27	155	**0.4**
28	156	**-0.7**
29	157	**0.1**
30	158	**0.3**

Table 17. Module 1 – n260 PD Char Table

Appendix A: Δ_{min} Validation

To validate that all relevant surfaces were considered in the determination of the Δ_{min} values used for housing material loss quantification, the following procedure was followed:

1. Scale the simulated 4cm^2-averaged PD values for all single beams to correspond to their *sim.power$_{limit}$*, and identify the worst-PD beam per each non-selected surface.

2. Measure 4cm^2-averaged PD at *input.power.limit* for the identified worst-PD beam at each non-selected surface.
3. Demonstrate all measured 4cm^2-averaged PD values are below *PD_design_target*

Note that some simulated surfaces which were not selected for Δ_{min} evaluation were not measured in cases where the results would be obviously low PD which had already been covered by a test on another posture. I.e., the PD from the rear-facing Module 0 was measured for the front surface in the Flat and Flip postures. The PD for the front surface would be obviously lower in the Closed posture when it is blocked by the other side of the device, as is supported by the near-zero simulated PD values.

Since the same *input.power.limit* for each band + beam combination is used across all postures, the *sim.power$_{limit}$* was determined across postures as well. I.e., the *sim.power$_{limit}$* for a given beam + band is determined by the highest simulated PD for that beam from any test case across Flip, Flat, Closed postures. *sim.power$_{limit}$* is calculated as:

$$simpower_{limit}(i)dBm = 10 * \log\big(s(i)\big) + 6\ dBm$$

Tables 18-21 show the simulated PD scaled to the $simpower_{limit}$ for the middle channel for all single beams in each posture. The highlighted values show the worst-case beam for a given posture + surface for which PD has been measured here using the *input.power.limit* value for that beam. These are all surfaces which were not selected for Δ_{min} determination. Measuring the worst simulated beam for these surfaces at the *input.power.limit* and showing that the result is below the PD design target validates that those surfaces were not included in Δ_{min} determination. All results in Tables 22 and 23 are well below the PD design target of 0.617 mW/cm^2.

Module 0 – n261 – Mid Channel – Simulated PD Scaled to *simpower*$_{limit}$														
Beam ID	Paired Beam ID	# of Active Feeds	4cm^2 PD (mW/cm^2) at 2mm											
			Flip Posture				Flat Posture				Closed Posture			
			Front	Back	Right	Top	Front	Back	Right	Top	Front	Back	Right	Top
2		1	0.02	0.01	0.07	N/A	0.01	0.594	0.06	N/A	0.00	0.594	0.06	N/A
3		1	0.03	0.01	0.02	N/A	0.00	0.606	0.02	N/A	0.00	0.596	0.04	N/A
7		2	0.05	0.01	0.09	N/A	0.03	0.588	0.09	N/A	0.01	0.611	0.10	N/A
8		2	0.02	0.01	0.04	N/A	0.01	0.594	0.02	N/A	0.00	0.605	0.02	N/A
9		2	0.06	0.01	0.09	N/A	0.01	0.575	0.09	N/A	0.00	0.575	0.10	N/A
12		2	0.04	0.01	0.07	N/A	0.02	0.599	0.06	N/A	0.01	0.599	0.07	N/A
13		2	0.02	0.01	0.03	N/A	0.02	0.579	0.03	N/A	0.01	0.595	0.03	N/A
19		4	**0.07**	0.02	0.09	N/A	**0.03**	0.573	0.11	N/A	0.00	0.577	0.12	N/A
20		4	0.03	0.01	0.05	N/A	0.01	0.577	0.02	N/A	0.00	0.585	0.02	N/A
21		4	0.02	0.01	0.02	N/A	0.01	0.568	0.02	N/A	0.00	0.597	0.01	N/A
22		4	0.03	0.01	0.05	N/A	0.02	0.595	0.10	N/A	0.01	0.591	0.11	N/A
27		4	0.03	0.01	0.05	N/A	0.01	0.617	0.03	N/A	0.00	0.591	0.07	N/A
28		4	0.04	0.01	0.05	N/A	0.00	0.582	0.01	N/A	0.00	0.603	0.01	N/A
29		4	0.02	0.01	0.03	N/A	0.02	0.451	0.05	N/A	0.00	0.457	0.03	N/A
130		1	0.01	0.01	0.03	N/A	0.01	0.584	0.04	N/A	0.00	0.617	0.05	N/A
131		1	0.01	0.01	0.01	N/A	0.00	0.584	0.02	N/A	0.00	0.595	0.02	N/A
135		2	0.01	0.01	0.02	N/A	0.01	0.579	0.02	N/A	0.00	0.595	0.03	N/A
136		2	0.01	0.01	0.03	N/A	0.01	0.589	0.08	N/A	0.00	0.596	0.06	N/A
137		2	0.01	0.01	0.02	N/A	0.01	0.578	0.03	N/A	0.00	0.595	0.02	N/A
140		2	0.01	0.01	0.01	N/A	0.01	0.596	0.01	N/A	0.00	0.617	0.02	N/A
141		2	0.02	0.01	0.07	N/A	0.03	0.582	0.07	N/A	0.01	0.605	0.07	N/A
147		4	0.01	0.00	0.02	N/A	0.01	0.617	0.01	N/A	0.00	0.617	0.01	N/A
148		4	0.03	0.01	0.05	N/A	0.02	0.605	0.05	N/A	0.00	0.617	0.06	N/A
149		4	0.03	0.01	0.07	N/A	0.02	0.573	**0.15**	N/A	0.00	0.586	**0.16**	N/A
150		4	0.03	0.01	0.04	N/A	0.02	0.564	0.05	N/A	0.00	0.582	0.05	N/A
155		4	0.02	0.02	0.02	N/A	0.00	0.545	0.01	N/A	0.00	0.617	0.01	N/A
156		4	0.03	0.01	0.07	N/A	0.03	0.574	0.08	N/A	0.01	0.584	0.10	N/A
157		4	0.03	0.01	0.04	N/A	0.03	0.553	0.06	N/A	0.01	0.560	0.09	N/A

Table 18. Module 0 – n261 Simulated PD Scaled to simpower$_{limit}$

Module 1 – n261 – Mid Channel – Simulated PD Scaled to *simpower*$_{limit}$													
Beam ID	Paired Beam ID	# of Active Feeds	4cm^2 PD (mW/cm^2) at 2mm										
			Flip Posture				Flat Posture				Closed Posture		
			Front	Back	Left	Top	Front	Back	Left	Top	Front	Back	Left	Top
0		1	0.617	0.00	0.03	0.14	0.591	0.10	N/A	0.10	0.15	0.14	0.01	0.11
1		1	0.606	0.00	0.01	0.07	0.562	0.06	N/A	0.08	0.18	0.09	0.01	0.08
4		2	0.603	0.00	0.03	0.15	0.589	0.12	N/A	0.10	0.17	0.15	0.02	0.12
5		2	0.617	0.00	0.01	0.13	0.600	0.05	N/A	0.09	0.21	0.08	0.01	0.14
6		2	0.603	0.00	0.04	0.09	0.541	0.08	N/A	0.10	0.17	0.11	0.03	0.09
10		2	0.617	0.00	0.01	0.15	0.611	0.06	N/A	0.09	0.21	0.09	0.01	0.11
11		2	0.604	0.00	0.04	0.09	0.537	0.08	N/A	0.10	0.20	0.10	0.02	0.15
14		4	0.594	0.01	0.10	0.15	0.571	0.16	N/A	0.11	0.15	0.27	0.05	0.31
15		4	0.602	0.00	0.04	0.19	0.561	0.06	N/A	0.11	0.17	0.17	0.01	0.19
16		4	0.593	0.00	0.02	0.16	0.577	0.04	N/A	0.07	0.25	0.09	0.02	0.13
17		4	0.540	0.00	0.05	0.15	0.558	0.09	N/A	0.12	0.22	0.14	0.04	0.16
18		4	0.593	0.00	0.11	0.13	0.518	0.14	N/A	0.16	0.24	0.13	**0.07**	0.16
23		4	0.617	0.00	0.06	**0.22**	0.573	0.13	N/A	0.12	0.11	**0.27**	0.03	0.26
24		4	0.587	0.00	0.01	0.15	0.617	0.04	N/A	0.09	0.24	0.12	0.03	0.13
25		4	0.568	0.00	0.02	0.17	0.559	0.05	N/A	0.08	0.25	0.12	0.03	0.15
26		4	0.589	0.00	0.10	0.12	0.529	0.13	N/A	0.15	0.16	0.11	0.06	0.17
128		1	0.591	0.00	0.03	0.18	0.617	0.08	N/A	0.10	0.20	0.10	0.03	0.14
129		1	0.605	0.00	0.04	0.11	0.592	0.05	N/A	0.11	0.17	0.10	0.02	0.12
132		2	0.605	0.00	0.02	0.08	0.600	0.05	N/A	0.07	0.18	0.15	0.01	0.15
133		2	0.593	0.00	0.07	0.12	0.570	0.11	N/A	0.10	0.16	0.13	0.05	0.11
134		2	0.599	0.00	0.01	0.09	0.575	0.07	N/A	0.08	0.20	0.08	0.02	0.09
138		2	0.597	0.00	0.04	0.18	0.604	0.08	N/A	0.10	0.16	0.12	0.03	0.12
139		2	0.603	0.00	0.03	0.14	0.597	0.06	N/A	0.13	0.22	0.07	0.04	0.20
142		4	0.617	0.00	0.01	0.12	0.494	0.03	N/A	0.07	0.18	0.07	0.01	0.12
143		4	0.600	0.00	0.02	0.19	0.546	0.10	N/A	0.09	0.18	0.19	0.02	0.19
144		4	0.512	0.00	**0.18**	0.11	0.530	0.12	N/A	0.13	0.15	0.18	0.06	0.14
145		4	0.571	0.00	0.03	0.17	0.538	0.08	N/A	0.13	0.22	0.13	0.04	0.18
146		4	0.583	0.00	0.02	0.14	0.557	0.05	N/A	0.08	0.23	0.13	0.04	0.11
151		4	0.617	0.00	0.01	0.15	0.455	0.07	N/A	0.08	0.15	0.12	0.01	0.14
152		4	0.586	0.01	0.16	0.22	0.592	**0.21**	N/A	**0.17**	0.20	0.27	0.07	0.25
153		4	0.553	0.00	0.08	0.14	0.519	0.08	N/A	0.14	0.20	0.16	0.05	0.18
154		4	0.606	0.00	0.02	0.16	0.578	0.07	N/A	0.10	0.21	0.13	0.05	0.15

Table 19. Module 1 – n261 Simulated PD Scaled to simpower$_{limit}$

Module 0 – n260 – Mid Channel – Simulated PD Scaled to *simpower*$_{limit}$														
Beam ID	Paired Beam ID	# of Active Feeds	4cm^2 PD (mW/cm^2) at 2mm											
			Flip Posture				Flat Posture				Closed Posture			
			Front	Back	Right	Top	Front	Back	Right	Top	Front	Back	Right	Top
3		1	0.07	0.01	0.12	N/A	0.01	0.617	0.05	N/A	0.00	0.617	0.05	N/A
4		1	0.05	0.01	0.05	N/A	0.03	0.591	0.05	N/A	0.01	0.591	0.05	N/A
5		1	0.10	0.02	0.15	N/A	0.02	0.568	0.05	N/A	0.00	0.568	0.04	N/A
6		1	0.02	0.01	0.06	N/A	0.01	0.575	0.01	N/A	0.00	0.575	0.01	N/A
10		2	0.03	0.01	0.07	N/A	0.03	0.564	0.05	N/A	0.01	0.564	0.05	N/A
11		2	0.06	0.01	0.11	N/A	0.01	0.617	0.03	N/A	0.01	0.617	0.04	N/A
12		2	0.03	0.01	0.05	N/A	0.03	0.577	0.06	N/A	0.01	0.583	0.05	N/A
15		2	0.07	0.01	0.09	N/A	0.03	0.502	0.06	N/A	0.01	0.509	0.06	N/A
16		2	0.04	0.01	0.05	N/A	0.03	0.617	0.05	N/A	0.01	0.617	0.05	N/A
22		4	0.03	0.01	0.08	N/A	0.02	0.540	0.05	N/A	0.00	0.543	0.04	N/A
23		4	**0.11**	0.01	0.11	N/A	0.03	0.526	0.07	N/A	0.01	0.526	0.06	N/A
24		4	0.08	0.01	0.13	N/A	0.02	0.585	0.06	N/A	0.01	0.589	0.06	N/A
25		4	0.08	0.01	0.10	N/A	0.02	0.617	0.04	N/A	0.00	0.613	0.03	N/A
26		4	0.04	0.01	0.12	N/A	0.01	0.585	0.05	N/A	0.00	0.585	0.04	N/A
31		4	0.07	0.02	0.09	N/A	0.03	0.572	0.05	N/A	0.01	0.389	0.04	N/A
32		4	0.08	0.01	0.11	N/A	0.02	0.617	0.06	N/A	0.01	0.617	0.05	N/A
33		4	0.10	0.02	0.14	N/A	0.02	0.613	0.05	N/A	0.00	0.613	0.05	N/A
34		4	0.03	0.01	0.05	N/A	0.01	0.482	0.03	N/A	0.00	0.482	0.03	N/A
131		1	0.06	0.01	0.09	N/A	0.02	0.594	0.05	N/A	0.00	0.582	0.03	N/A
132		1	0.04	0.01	0.09	N/A	0.03	0.576	0.05	N/A	0.00	0.576	0.04	N/A
133		1	0.02	0.02	0.11	N/A	0.01	0.617	0.04	N/A	0.00	0.617	0.04	N/A
134		1	0.02	0.01	0.03	N/A	0.01	0.573	0.02	N/A	0.00	0.573	0.03	N/A
138		2	0.07	0.01	0.09	N/A	0.02	0.475	0.06	N/A	0.01	0.475	0.05	N/A
139		2	0.03	0.02	0.07	N/A	0.01	0.554	0.03	N/A	0.00	0.548	0.02	N/A
140		2	0.03	0.01	0.06	N/A	0.01	0.596	0.02	N/A	0.00	0.596	0.01	N/A
143		2	0.03	0.02	0.06	N/A	0.02	0.543	0.05	N/A	0.01	0.549	0.04	N/A
144		2	0.05	0.02	0.06	N/A	0.03	0.534	0.05	N/A	0.01	0.534	0.04	N/A
150		4	0.04	0.01	0.14	N/A	**0.04**	0.252	0.07	N/A	0.01	0.248	0.06	N/A
151		4	0.05	0.01	0.13	N/A	0.02	0.582	0.03	N/A	0.00	0.582	0.03	N/A
152		4	0.04	0.01	0.10	N/A	0.01	0.617	**0.09**	N/A	0.00	0.613	**0.08**	N/A
153		4	0.02	0.02	0.07	N/A	0.01	0.585	0.02	N/A	0.00	0.582	0.02	N/A
154		4	0.04	0.01	0.12	N/A	0.03	0.549	0.04	N/A	0.01	0.549	0.04	N/A
159		4	0.05	0.01	0.08	N/A	0.02	0.536	0.04	N/A	0.00	0.536	0.03	N/A
160		4	0.05	0.01	0.13	N/A	0.03	0.207	0.05	N/A	0.00	0.210	0.04	N/A
161		4	0.03	0.01	0.08	N/A	0.01	0.617	0.03	N/A	0.00	0.607	0.06	N/A
162		4	0.07	0.01	0.09	N/A	0.01	0.509	0.04	N/A	0.00	0.505	0.04	N/A

Table 20. Module 0 – n260 Simulated PD Scaled to simpower$_{limit}$

Module 1 – n260 – Mid Channel – Simulated PD Scaled to *simpower*$_{limit}$													
Beam ID	Paired Beam ID	# of Active Feeds	4cm^2 PD (mW/cm^2) at 2mm										
			Flip Posture				Flat Posture				Closed Posture		
			Front	Back	Left	Top	Front	Back	Left	Top	Front	Back	Left	Top
0		1	0.586	0.00	0.03	0.17	0.570	0.11	N/A	0.17	0.17	0.11	0.02	0.17
1		1	0.522	0.00	0.03	0.16	0.522	0.11	N/A	0.17	0.19	0.13	0.03	0.17
2		1	0.526	0.00	0.05	0.21	0.556	0.17	N/A	0.21	0.24	0.15	0.03	0.23
7		2	0.591	0.00	0.08	0.17	0.617	0.11	N/A	0.18	0.14	0.13	0.04	0.17
8		2	0.500	0.00	0.06	0.15	0.527	0.03	N/A	0.14	0.19	0.11	0.02	0.18
9		2	0.592	0.00	0.03	0.10	0.617	0.08	N/A	0.14	0.20	0.10	0.02	0.12
13		2	0.569	0.00	0.06	0.13	0.585	0.09	N/A	0.15	0.15	0.09	0.03	0.15
14		2	0.540	0.00	0.07	0.20	0.588	0.16	N/A	0.22	0.31	0.12	0.06	0.18
17		4	0.612	0.00	0.02	0.17	0.617	0.14	N/A	0.16	0.12	0.15	0.03	0.17
18		4	0.588	0.00	0.07	0.20	0.608	0.17	N/A	0.21	0.16	0.16	0.04	0.22
19		4	0.558	0.01	0.04	0.14	0.569	0.12	N/A	0.16	0.24	0.11	0.03	0.13
20		4	0.516	0.01	0.05	0.14	0.521	0.11	N/A	0.14	0.27	0.12	0.05	0.13
21		4	0.535	0.01	0.03	0.18	0.599	**0.17**	N/A	0.20	0.29	0.18	0.03	0.20
27		4	0.599	0.00	0.04	0.18	0.617	0.14	N/A	0.18	0.15	0.15	0.03	0.17
28		4	0.569	0.00	**0.09**	**0.23**	0.573	0.15	N/A	**0.23**	0.18	**0.18**	0.04	0.25
29		4	0.563	0.01	0.04	0.15	0.574	0.12	N/A	0.16	0.25	0.11	0.03	0.13
30		4	0.534	0.01	0.04	0.16	0.570	0.15	N/A	0.18	0.31	0.16	**0.06**	0.16
128		1	0.521	0.00	0.01	0.11	0.521	0.07	N/A	0.12	0.19	0.10	0.01	0.11
129		1	0.552	0.00	0.05	0.08	0.568	0.08	N/A	0.11	0.16	0.08	0.02	0.10
130		1	0.617	0.00	0.05	0.13	0.617	0.10	N/A	0.15	0.21	0.08	0.03	0.13
135		2	0.509	0.00	0.01	0.15	0.518	0.12	N/A	0.14	0.27	0.14	0.01	0.13
136		2	0.601	0.00	0.03	0.15	0.617	0.10	N/A	0.14	0.18	0.12	0.02	0.16
137		2	0.504	0.00	0.05	0.10	0.496	0.08	N/A	0.10	0.21	0.10	0.02	0.11
141		2	0.551	0.00	0.03	0.12	0.567	0.07	N/A	0.12	0.14	0.07	0.02	0.10
142		2	0.607	0.00	0.07	0.12	0.587	0.09	N/A	0.13	0.24	0.11	0.04	0.11
145		4	0.467	0.00	0.04	0.11	0.458	0.10	N/A	0.11	0.24	0.11	0.03	0.24
146		4	0.470	0.00	0.03	0.18	0.470	0.15	N/A	0.19	0.19	0.14	0.02	0.21
147		4	0.617	0.00	0.04	0.14	0.603	0.08	N/A	0.12	0.19	0.10	0.05	0.15
148		4	0.518	0.01	0.05	0.15	0.535	0.15	N/A	0.16	0.30	0.15	0.02	0.27
149		4	0.512	0.00	0.05	0.13	0.516	0.11	N/A	0.12	0.22	0.12	0.02	0.17
155		4	0.484	0.01	0.03	0.14	0.501	0.14	N/A	0.18	0.24	0.12	0.03	0.15
156		4	0.599	0.00	0.05	0.17	0.599	0.09	N/A	0.14	0.14	0.11	0.04	0.17
157		4	0.588	0.00	0.06	0.13	0.602	0.08	N/A	0.12	0.25	0.14	0.04	0.13
158		4	0.514	0.00	0.05	0.13	0.509	0.11	N/A	0.13	0.23	0.12	0.02	0.21

Table 21. Module 1 – n260 Simulated PD Scaled to simpower$_{limit}$

Δ_{min} Validation Measurement Results

Band	Posture	Module	Surface	Beam	Test Power (dBm)	Input.power.limit	Measured PD (mW/cm^2)
n261	Flip	0	Front	19	1.7	1.7	0.01
n261	Flat	0	Right	149	2.2	2.2	0.01
n261	Flat	0	Front	19	1.7	1.7	0.01
n261	Closed	0	Right	149	2.2	2.2	0.01
n261	Flip	1	Top	23	1.4	1.4	0.05
n261	Flip	1	Left	144	1.4	1.4	0.01
n261	Flat	1	Top	152	2.9	2.9	0.03
n261	Flat	1	Back	152	2.9	2.9	0.02
n261	Closed	1	Back	23	1.4	1.4	0.03
n261	Closed	1	Left	18	1.7	1.7	0.01

Table 22. Band n261 Measured PD for Select Surfaces at input.power.limit

Band	Posture	Module	Surface	Beam	Test Power (dBm)	Input.power.limit	Measured PD (mW/cm^2)
n260	Flip	0	Front	23	2.4	2.4	0.01
n260	Flat	0	Right	150	2.1	2.1	0.01
n260	Flat	0	Front	152	0.5	0.5	0.01
n260	Closed	0	Right	152	0.5	0.5	0.01
n260	Flip	1	Top	28	2.9	2.9	0.07
n260	Flip	1	Left	28	2.9	2.9	0.03
n260	Flat	1	Top	28	2.9	2.9	0.07
n260	Flat	1	Back	21	4.2	4.2	0.03
n260	Closed	1	Back	28	2.9	2.9	0.03
n260	Closed	1	Left	30	4.2	4.2	0.04

Table 23. Band n260 Measured PD for Select Surfaces at input.power.limit