RF EXPOSURE REPORT
(Part 0: SAR and PD Char Evaluation)

No. 24T04Z100387-001

For

TCL Communication Ltd.

Mobile Hot Spot

Model Name: MW513U

With

Hardware Version: 06

Software Version: MW513U_ZZ_02.00_06

FCC ID: 2ACCJB183

Issued Date: 2024-03-05

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

REPORT HISTORY

Report Number	Revision	Issue Date	Description
24T04Z100387-001	Rev.0	2024-03-05	Initial creation of test report

TABLE OF CONTENT

1 Introduction

The FCC RF exposure limit is defined based on time-averaged RF exposure. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter sto ensure the product in compliance with FCC RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 6GHz) and power density (transmit frequency > 6GHz), to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance to the regulation requirement.

This report describes the procedures for the SAR char and PD char generation, and the parameters obtained from SAR and PD characterization (refer to as SAR char and PD char) will be used as input for Smart Transmit. Both SAR char and PD char will be entered via the Embedded File System (EFS) to enable the Smart Transmit Feature.

Terminologies in this Report

Term	Description
P_{limit}	The time-averaged RF power which corresponds to SAR_design_target.
P_{max}	Maximum target power level
SAR_design_target:	The design target for SAR compliance. It should be less than regulatory power density limit to account for all device design related uncertainties.
SAR Char	P_{limit} for all the technologies/bands for all applicable DSI
PD_design_target:	The design target for PD compliance. It should be less than regulatory power density limit to account for all device design related uncertainties.
Input.power.limit	For a PD characterized wireless device, the input power level at antenna port(s) for each beam corresponding to PD_design_targe.
PD Char	The table that contains input.power.limit fed to antenna port(s) for all supported beams.

2 Equipment Under Test (EUT) Overview

Description:	Mobile Hot Spot	
Model name:	MW513U	
Operating mode(s):	LTE Band1/2/3/4/5/7/12/13/20/28/46/48/66 5G NR n2/5/48/66/77/n257/n260/261 Wi-Fi(2.4G), Wi-Fi(5G), Wi-Fi(6G)	
Tested Tx Frequency:	1850.7 – 1909.3 MHz (LTE Band 2)	
	824.7 – 848.3 MHz (LTE Band 5)	
	2500 – 2570 MHz (LTE Band 7)	
	699.7 – 715.3 MHz (LTE Band 12)	
	779.5 – 784.5 MHz (LTE Band 13)	
	3550 – 3700 MHz (LTE Band 48)	
	1710.7 –1779.3 MHz (LTE Band 66)	
	2412 – 2462 MHz (WLAN 2.4G)	
	5150 – 5250 MHz	WLAN 5G
	5250 – 5350 MHz	
	5500 – 5720 MHz	
	5745 – 5825 MHz	
	5925 – 6425 MHz	WLAN 6G
	6425 – 6525 MHz	
	6525 – 6875 MHz	
	6875 – 7125 MHz	
	1850 – 1910 MHz(n2)	
	824 – 849 MHz(n5)	
	1710 – 1780 MHz (n66)	
	3450 – 3550 MHz (n77L)	
	3700 – 3980 MHz (n77H)	
	37000– 40000 MHz (n260)	
	27500– 28350 MHz (n257/261)	
Test device Production information:	Production unit	
Device type:	Portable device	
Antenna type:	Integrated antenna	

3 SAR Characterization

3.1 DSI and SAR Determination

This device uses different Device State Index (DSI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the smartphone, the worst-case SAR is further grouped and determined for each or combined exposure scenario

DSI and Corresponding Exposure Scenarios

Exposure conditions	DSI	SAR design target W/kg(1g)	Remark
without wifi	0/1	1.2	/
with wifi	0/1	0.78	/

Total uncertainty	DSI	
	0	1
	1	1

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR\_design\_target < SAR_{regulatory\_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

3.2 SAR Char Table

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating. P_{limit} is calculated by linearly scaling with the measured SAR at the P_{part0} to correspond to the SAR_design_target. When P_{limit} < P_{max}, P_{part0} was used as P_{limit} in the Smart Transmit EFS. When P_{limit} >P_{max} and P_{part0}=P_{max}, calculated Pmax was used in the Smart Transmit EFS. All reported SAR obtained from the P_{part0} SAR tests was less than SAR_Design_target+ device uncertainty.

<P_{limit} for supported technologies and bands (P_{limit} in EFS file)>

Band	Antenna	Plimit				Pmax
		DSI0		DSI1		
		without wifi	with wifi	without wifi	with wifi	
LTE_B2	1	23	23	23	21	23
LTE_B2	3	23	23	23	21	23
LTE_B4	1	23	23	22.5	20.5	23
LTE_B5	1	23	23	23	23	23
LTE_B7	1	23	23	22.5	20.5	23
LTE_B12	4	23	23	23	23	23
LTE_B13	0	23	23	23	23	23
LTE_B48	5	22	22	22	22	22
LTE_B66	1	23.5	23.5	22.5	20.5	23.5
LTE_B66	3	23.5	23.5	22.5	20.5	23.5
NR5G_N2	1	23	22	22	20	23
NR5G_N2	3	23	23	23	22	23
NR5G_N5	1	23	23	23	23	23
NR5G_N48	5	22	22	22	22	22
NR5G_N66	1	23.5	23.5	22.5	20.5	23.5
NR5G_N66	3	23.5	23.5	22.5	21	23.5
NR5G_N78	5	25	23	22	20	26
NR5G_N78	7	24	22.5	22	20.5	24
NR5G_N77	5	25	23	22	20	26
NR5G_N77	7	24	22.5	22	20.5	24

*P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} + 1dB uncertainty.

**All P_{limit} power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD & NR TDD).

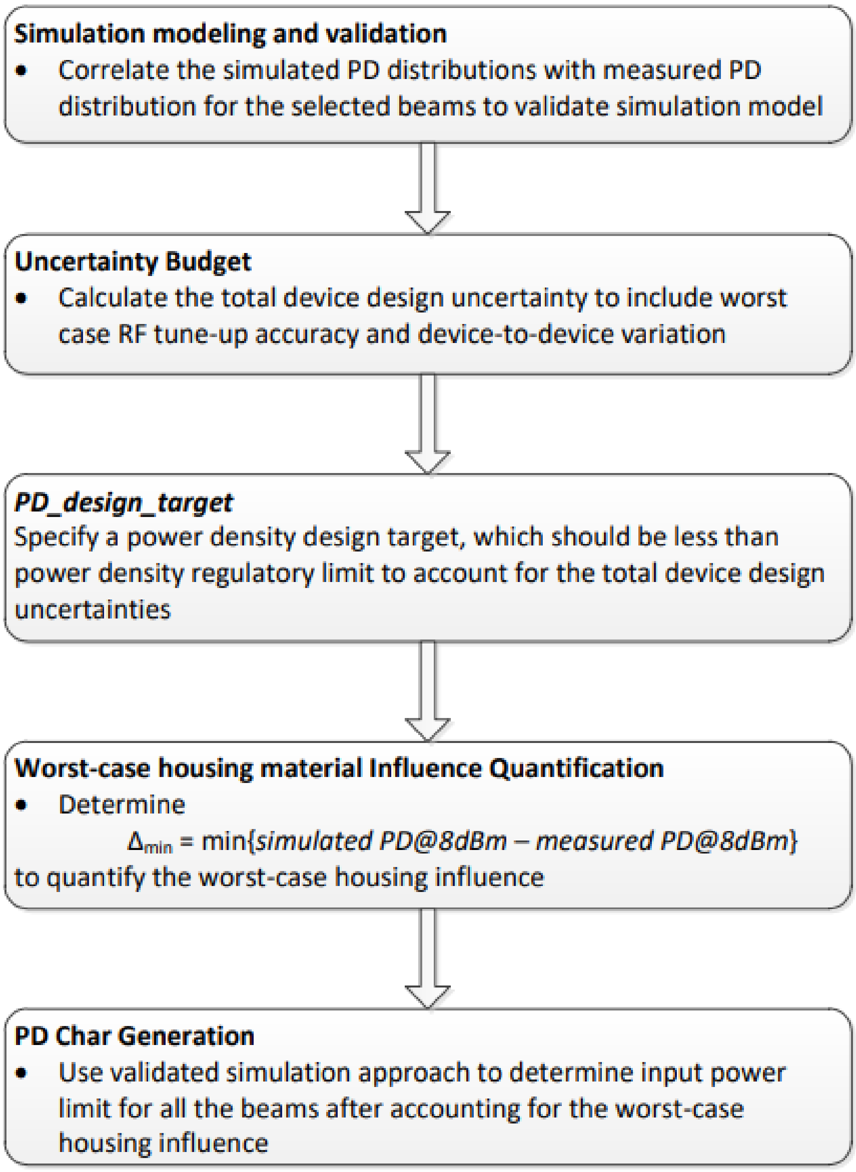
The max allowed output power is the P_{limit} + 1dB device uncertainty, and if P_{limit} is higher than P_{max}, the device output power will be P_{max} instead.

4 Power Density Characterization

The device with 5G mmW NR typically supports many beams and contains multiple mmW antenna arrays installed at different locations to achieve good coverage in the field. The power density (PD) measurement is a time-consuming test, and it is not practical to measure the power density for all the beams on all the surfaces of the device, thus a hybrid approach using electromagnetic (EM) simulation in combination with measurement is recommended for PD char generation.

4.1 PD Char Table

The mmW device supports total N beams, where M out of N are single beams and the rest of (N-M) are beam pairs (where 2 single beams are excited at the same time).
The following figure outlines the PD char process.



4.2 Codebook for all beams

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

Band	Beam_ID		Module	Ant_Type	Num. of feed
260		1	0	PATCH	1
260		3	0	PATCH	1
260		5	0	PATCH	1
260		7	0	PATCH	1
260		9	0	PATCH	1
260		14	0	PATCH	2
260		15	0	PATCH	2
260		16	0	PATCH	2
260		17	0	PATCH	2
260		21	0	PATCH	2
260		22	0	PATCH	2
260		23	0	PATCH	2
260		29	0	PATCH	5
260		30	0	PATCH	5
260		31	0	PATCH	5
260		32	0	PATCH	5
260		33	0	PATCH	5
260		38	0	PATCH	5
260		39	0	PATCH	5
260		40	0	PATCH	5
260		41	0	PATCH	5
260		129	0	PATCH	1
260		131	0	PATCH	1
260		133	0	PATCH	1
260		135	0	PATCH	1
260		137	0	PATCH	1
260		142	0	PATCH	2
260		143	0	PATCH	2
260		144	0	PATCH	2
260		145	0	PATCH	2
260		149	0	PATCH	2
260		150	0	PATCH	2
260		151	0	PATCH	2
260		157	0	PATCH	5
260		158	0	PATCH	5
260		159	0	PATCH	5
260		160	0	PATCH	5
260		161	0	PATCH	5
260		166	0	PATCH	5
260		167	0	PATCH	5
260		168	0	PATCH	5
260		169	0	PATCH	5
260	129	1	0	PATCH	2
260	131	3	0	PATCH	2
260	133	5	0	PATCH	2
260	135	7	0	PATCH	2
260	137	9	0	PATCH	2
260	142	14	0	PATCH	4
260	143	15	0	PATCH	4
260	144	16	0	PATCH	4
260	145	17	0	PATCH	4
260	149	21	0	PATCH	4
260	150	22	0	PATCH	4
260	151	23	0	PATCH	4
260	157	29	0	PATCH	10
260	158	30	0	PATCH	10
260	159	31	0	PATCH	10
260	160	32	0	PATCH	10
260	161	33	0	PATCH	10
260	166	38	0	PATCH	10
260	167	39	0	PATCH	10
260	168	40	0	PATCH	10
260	169	41	0	PATCH	10

Band	Beam_ID		Module	Ant_Type	Num. of feed
260		0	1	PATCH	1
260		2	1	PATCH	1
260		4	1	PATCH	1
260		6	1	PATCH	1
260		8	1	PATCH	1
260		10	1	PATCH	2
260		11	1	PATCH	2
260		12	1	PATCH	2
260		13	1	PATCH	2
260		18	1	PATCH	2
260		19	1	PATCH	2
260		20	1	PATCH	2
260		24	1	PATCH	5
260		25	1	PATCH	5
260		26	1	PATCH	5
260		27	1	PATCH	5
260		28	1	PATCH	5
260		34	1	PATCH	5
260		35	1	PATCH	5
260		36	1	PATCH	5
260		37	1	PATCH	5
260		128	1	PATCH	1
260		130	1	PATCH	1
260		132	1	PATCH	1
260		134	1	PATCH	1
260		136	1	PATCH	1
260		138	1	PATCH	2
260		139	1	PATCH	2
260		140	1	PATCH	2
260		141	1	PATCH	2
260		146	1	PATCH	2
260		147	1	PATCH	2
260		148	1	PATCH	2
260		152	1	PATCH	5
260		153	1	PATCH	5
260		154	1	PATCH	5
260		155	1	PATCH	5
260		156	1	PATCH	5
260		162	1	PATCH	5
260		163	1	PATCH	5
260		164	1	PATCH	5
260		165	1	PATCH	5
260	128	0	1	PATCH	2
260	130	2	1	PATCH	2
260	132	4	1	PATCH	2
260	134	6	1	PATCH	2
260	136	8	1	PATCH	2
260	138	10	1	PATCH	4
260	139	11	1	PATCH	4
260	140	12	1	PATCH	4
260	141	13	1	PATCH	4
260	146	18	1	PATCH	4
260	147	19	1	PATCH	4
260	148	20	1	PATCH	4
260	152	24	1	PATCH	10
260	153	25	1	PATCH	10
260	154	26	1	PATCH	10
260	155	27	1	PATCH	10
260	156	28	1	PATCH	10
260	162	34	1	PATCH	10
260	163	35	1	PATCH	10
260	164	36	1	PATCH	10
260	165	37	1	PATCH	10

Band	Beam_ID		Module	Ant_Type	Num. of feed
261		1	0	PATCH	1
261		3	0	PATCH	1
261		5	0	PATCH	1
261		7	0	PATCH	1
261		9	0	PATCH	1
261		14	0	PATCH	2
261		15	0	PATCH	2
261		16	0	PATCH	2
261		17	0	PATCH	2
261		21	0	PATCH	2
261		22	0	PATCH	2
261		23	0	PATCH	2
261		29	0	PATCH	5
261		30	0	PATCH	5
261		31	0	PATCH	5
261		32	0	PATCH	5
261		33	0	PATCH	5
261		38	0	PATCH	5
261		39	0	PATCH	5
261		40	0	PATCH	5
261		41	0	PATCH	5
261		129	0	PATCH	1
261		131	0	PATCH	1
261		133	0	PATCH	1
261		135	0	PATCH	1
261		137	0	PATCH	1
261		142	0	PATCH	2
261		143	0	PATCH	2
261		144	0	PATCH	2
261		145	0	PATCH	2
261		149	0	PATCH	2
261		150	0	PATCH	2
261		151	0	PATCH	2
261		157	0	PATCH	5
261		158	0	PATCH	5
261		159	0	PATCH	5
261		160	0	PATCH	5
261		161	0	PATCH	5
261		166	0	PATCH	5
261		167	0	PATCH	5
261		168	0	PATCH	5
261		169	0	PATCH	5
261	129	1	0	PATCH	2
261	131	3	0	PATCH	2
261	133	5	0	PATCH	2
261	135	7	0	PATCH	2
261	137	9	0	PATCH	2
261	142	14	0	PATCH	4
261	143	15	0	PATCH	4
261	144	16	0	PATCH	4
261	145	17	0	PATCH	4
261	149	21	0	PATCH	4
261	150	22	0	PATCH	4
261	151	23	0	PATCH	4
261	157	29	0	PATCH	10
261	158	30	0	PATCH	10
261	159	31	0	PATCH	10
261	160	32	0	PATCH	10
261	161	33	0	PATCH	10
261	166	38	0	PATCH	10
261	167	39	0	PATCH	10
261	168	40	0	PATCH	10
261	169	41	0	PATCH	10

Band	Beam_ID		Module	Ant_Type	Num. of feed
261		0	1	PATCH	1
261		2	1	PATCH	1
261		4	1	PATCH	1
261		6	1	PATCH	1
261		8	1	PATCH	1
261		10	1	PATCH	2
261		11	1	PATCH	2
261		12	1	PATCH	2
261		13	1	PATCH	2
261		18	1	PATCH	2
261		19	1	PATCH	2
261		20	1	PATCH	2
261		24	1	PATCH	5
261		25	1	PATCH	5
261		26	1	PATCH	5
261		27	1	PATCH	5
261		28	1	PATCH	5
261		34	1	PATCH	5
261		35	1	PATCH	5
261		36	1	PATCH	5
261		37	1	PATCH	5
261		128	1	PATCH	1
261		130	1	PATCH	1
261		132	1	PATCH	1
261		134	1	PATCH	1
261		136	1	PATCH	1
261		138	1	PATCH	2
261		139	1	PATCH	2
261		140	1	PATCH	2
261		141	1	PATCH	2
261		146	1	PATCH	2
261		147	1	PATCH	2
261		148	1	PATCH	2
261		152	1	PATCH	5
261		153	1	PATCH	5
261		154	1	PATCH	5
261		155	1	PATCH	5
261		156	1	PATCH	5
261		162	1	PATCH	5
261		163	1	PATCH	5
261		164	1	PATCH	5
261		165	1	PATCH	5
261	128	0	1	PATCH	2
261	130	2	1	PATCH	2
261	132	4	1	PATCH	2
261	134	6	1	PATCH	2
261	136	8	1	PATCH	2
261	138	10	1	PATCH	4
261	139	11	1	PATCH	4
261	140	12	1	PATCH	4
261	141	13	1	PATCH	4
261	146	18	1	PATCH	4
261	147	19	1	PATCH	4
261	148	20	1	PATCH	4
261	152	24	1	PATCH	10
261	153	25	1	PATCH	10
261	154	26	1	PATCH	10
261	155	27	1	PATCH	10
261	156	28	1	PATCH	10
261	162	34	1	PATCH	10
261	163	35	1	PATCH	10
261	164	36	1	PATCH	10
261	165	37	1	PATCH	10

4.3 PD design target determination

To account for total uncertainty, PD_design_target should meet the criteria:

$$PD\_design\_target < PD_{regulatory\_limit} \times 10^{\frac{-totaluncertainty}{10}}$$

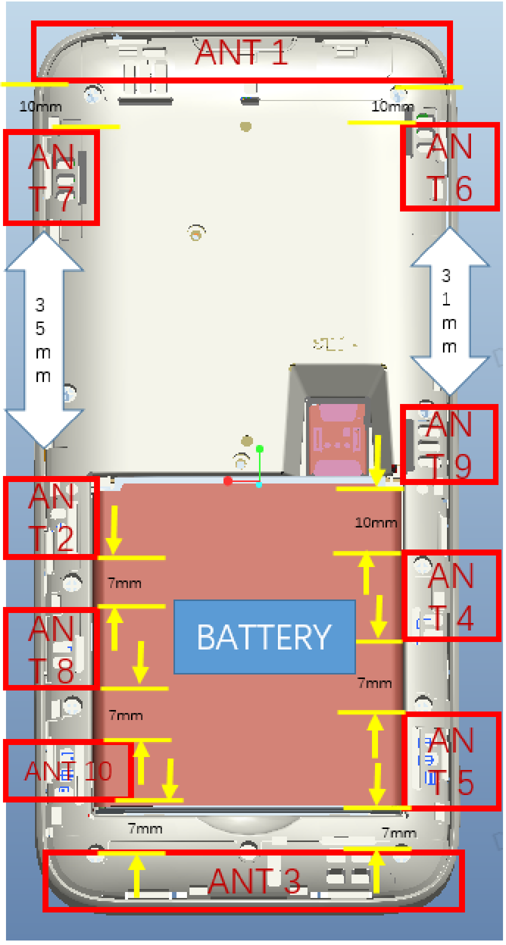
For this EUT, the PD design target and the uncertainty value are listed below

N260	PD_desigh_target	Antenna Module	W/m2
		0/1	6

N261	PD_desigh_target	Antenna Module	W/m2
		0/1	6

Item	Uncertainty db (k=2)
Total Uncertainty	2

4.4 Exposure positions for PD evaluation



Evaluation surfaces

	Front	Back	Left from Front View	Right from Front View	Top	Bottom
QTM#0	O	O	O	O	O	O
QTM#1	O	O	O	O	O	O

Note:

1. Referring to the PD simulation report for the reason of selecting surfaces/edges.
2. The exposure positions selection is based on the all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge.

4.5 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. A summary of the validation results to support worst-case housing influence quantification in power density characterization for this model can be seen below.

With an input power of 6 dBm for n261 band and 6 dBm for n260 band, PD measurements are conducted for at least one single beam per antenna type and per antenna module on worst-surface(s). PD measurements are performed at mid channel of each mmW band and with CW modulation. All measured PD values are listed below along with corresponding simulated PD values for the same configuration. Beams are chosen based on worst case simulation value of mid channel only.

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

Band	Beam ID		Antenna		Selected Surface	4cm^2 psPD(W/m^2)	
			Moudule	Type		Meas. PD	Sim. PD
n260	30		QTM0	PATCH	Front	4.15	16.18
n260	40		QTM0	PATCH	Left	3.2	14.15
n260		159	QTM0	PATCH	Front	4.18	15.48
n260		159	QTM0	PATCH	Left	5.89	13.46
n260	25		QTM1	PATCH	Front	3.28	14.25
n260	35		QTM1	PATCH	Top	1.89	6.76
n260		154	QTM1	PATCH	Front	3.67	14.6
n260		163	QTM1	PATCH	Top	1.60	7.62

Band	Beam ID		Antenna		Selected Surface	4cm^2 psPD(W/m^2)	
			Moudule	Type		Meas. PD	Sim. PD
n261	32		QTM0	PATCH	Front	4.57	18.5
n261	41		QTM0	PATCH	Left	4.14	12.81
n261		157	QTM0	PATCH	Front	7.12	19.5
n261		157	QTM0	PATCH	Left	4.26	13.91
n261	27		QTM1	PATCH	Front	3.49	15.63
n261	26		QTM1	PATCH	Top	2.06	5.24
n261		153	QTM1	PATCH	Front	4.13	18.37
n261		153	QTM1	PATCH	Top	2.09	7.17

4.6 Worst-case housing Influence Determination:△min

For non-metal material, the material property cannot be accurately characterized at mmW 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 PD amplitude quantification. Since the housing influence on PD could vary from surface to surface where the EM field propagated 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.

1. Based on PD simulation, for each module and antenna type, determine one or more worst-surface(s) that has highest 4cm^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 △min based on identified worst surface(s), and derive input.power.linit
   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) bu:
      i. re-scale all simulated 4cm^{2}PD values to *input.power.limit* to identify the worst-PD beam per each non-evaluated surface
      ii. Measure 4cm^{2}PD at *input.power.limit* on identified worst-PD beam per each non-evaluated surface
      iii. Demonstrate all measured 4cm^{2}PD values are below *PD_design_target*
3. If any of the above surface(s) in Step (2.b.iii) have measured 4cm^2 PD ≥ PD_design_target, then those surfaces must e included in the △min determination in Setp (2.a), and re-evaluate input.power.limit with these added surfaces.

Therefore, when comparing a simulated 4cm2 averaged PD and measured 4cm2 averaged PD for the above identified surfaces, 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 highlighted in bolded numbers in section4.5. thus, the worst-case housing influence, denoted as △min (= minimum of (sim.PD –MEAS.pd) for the same antenna type of each module), is determined as:

Band	Antenna Module	Polariaztion	Delta Min
n260	0	AG0	5.91
		AG1	3.59
	1	AG0	5.53
		AG1	6.00

Band	Antenna Module	Polariaztion	Delta Min
n261	0	AG0	4.91
		AG1	4.38
	1	AG0	4.05
		AG1	5.35

△min 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 △min is used as the worst case correction and applied to each corresponding beam group to determine power limits in PD char for compliance. To ensure that condition described in Step (2.b.iii) is met, apply the correct input.power.limit to derive the PD simulated results for all beams, and select the worst beams (yellow highlighted in the PD table) for each of non-selected applicable surface(s).

The PD test results for non-selected surfaces are less the PD_design_target, and meets condition in step (2.b.iii), thus performing step (3) is not needed.

Simulated 4cm^2 averaged PD at input.power.limit

Determine the worst beam for each of non-selected surface(s)

Band	Beam ID	Polarization	Antenna		Front	Back	Left	Right	Top
			Moudule	Type					
n260	1	AG0	QTM0	PATCH	6.000	0.497	5.166	0.036	0.124
n260	3	AG0	QTM0	PATCH	5.394	0.505	4.606	0.040	0.283
n260	5	AG0	QTM0	PATCH	5.767	0.167	4.417	0.067	0.067
n260	7	AG0	QTM0	PATCH	6.000	0.255	4.657	0.034	0.051
n260	9	AG0	QTM0	PATCH	5.716	0.316	4.295	0.047	0.063
n260	14	AG0	QTM0	PATCH	4.746	0.383	4.411	0.057	0.191
n260	15	AG0	QTM0	PATCH	5.870	0.246	4.560	0.022	0.058
n260	16	AG0	QTM0	PATCH	5.833	0.466	5.402	0.044	0.026
n260	17	AG0	QTM0	PATCH	6.000	0.252	3.802	0.045	0.117
n260	21	AG0	QTM0	PATCH	6.000	0.211	3.977	0.047	0.094
n260	22	AG0	QTM0	PATCH	5.819	0.264	4.943	0.030	0.038
n260	23	AG0	QTM0	PATCH	5.979	0.581	5.461	0.042	0.412
n260	29	AG0	QTM0	PATCH	6.000	0.354	4.423	0.084	0.167
n260	30	AG0	QTM0	PATCH	6.000	0.211	4.101	0.033	0.126
n260	31	AG0	QTM0	PATCH	5.641	0.295	4.892	0.043	0.071
n260	32	AG0	QTM0	PATCH	5.496	0.449	5.469	0.054	0.163
n260	33	AG0	QTM0	PATCH	6.000	0.614	5.491	0.111	0.359
n260	38	AG0	QTM0	PATCH	5.722	0.218	3.701	0.034	0.162
n260	39	AG0	QTM0	PATCH	5.928	0.242	4.562	0.042	0.132
n260	40	AG0	QTM0	PATCH	5.375	0.410	5.231	0.059	0.041
n260	41	AG0	QTM0	PATCH	5.366	0.554	5.419	0.081	0.328
n260	129	AG1	QTM0	PATCH	5.691	0.223	4.418	0.017	0.069
n260	131	AG1	QTM0	PATCH	5.839	0.179	4.143	0.018	0.268
n260	133	AG1	QTM0	PATCH	5.683	0.598	4.575	0.053	0.158
n260	135	AG1	QTM0	PATCH	5.720	0.617	5.084	0.037	0.075
n260	137	AG1	QTM0	PATCH	5.799	0.584	4.742	0.073	0.091
n260	142	AG1	QTM0	PATCH	5.755	0.827	4.755	0.061	0.245
n260	143	AG1	QTM0	PATCH	5.599	0.643	5.097	0.050	0.109
n260	144	AG1	QTM0	PATCH	5.553	0.429	4.630	0.084	0.028
n260	145	AG1	QTM0	PATCH	6.000	0.160	3.744	0.027	0.259
n260	149	AG1	QTM0	PATCH	5.520	0.884	5.276	0.066	0.188
n260	150	AG1	QTM0	PATCH	5.403	0.494	4.739	0.077	0.051
n260	151	AG1	QTM0	PATCH	6.000	0.527	4.730	0.093	0.062
n260	157	AG1	QTM0	PATCH	5.557	0.820	4.172	0.067	0.559
n260	158	AG1	QTM0	PATCH	5.067	0.810	5.431	0.082	0.259
n260	159	AG1	QTM0	PATCH	5.486	0.330	4.770	0.067	0.057
n260	160	AG1	QTM0	PATCH	5.755	0.249	4.129	0.062	0.179
n260	161	AG1	QTM0	PATCH	5.831	0.663	4.444	0.048	0.283
n260	166	AG1	QTM0	PATCH	4.815	0.910	5.090	0.090	0.295
n260	167	AG1	QTM0	PATCH	5.472	0.536	5.257	0.072	0.118
n260	168	AG1	QTM0	PATCH	5.051	0.208	4.087	0.043	0.072
n260	169	AG1	QTM0	PATCH	5.804	0.477	3.694	0.058	0.371

Band	Beam ID	Polarization	Antenna		Front	Back	Left	Right	Top
			Moudule	Type					
n260	0		QTM1	PATCH	6.000	0.264	0.141	1.003	2.323
n260	2		QTM1	PATCH	6.000	0.353	0.110	0.728	2.294
n260	4		QTM1	PATCH	5.342	0.299	0.140	0.399	1.814
n260	6		QTM1	PATCH	6.000	0.322	0.391	0.230	2.483
n260	8		QTM1	PATCH	5.183	0.259	0.359	0.159	1.854
n260	10		QTM1	PATCH	5.756	0.212	0.615	0.223	1.749
n260	11		QTM1	PATCH	6.000	0.291	0.068	0.428	2.748
n260	12		QTM1	PATCH	5.962	0.382	0.713	0.280	2.051
n260	13		QTM1	PATCH	5.955	0.462	0.214	1.376	2.244
n260	18		QTM1	PATCH	6.000	0.363	0.104	0.889	2.659
n260	19		QTM1	PATCH	6.000	0.318	0.103	0.853	2.825
n260	20		QTM1	PATCH	5.396	0.496	0.151	0.874	2.460
n260	24		QTM1	PATCH	6.000	0.612	0.343	1.154	2.957
n260	25		QTM1	PATCH	6.000	0.337	0.122	0.303	2.429
n260	26		QTM1	PATCH	5.617	0.409	0.124	0.456	2.930
n260	27		QTM1	PATCH	6.000	0.536	0.536	1.222	2.769
n260	28		QTM1	PATCH	5.857	0.514	0.508	1.210	2.408
n260	34		QTM1	PATCH	6.000	0.495	0.245	0.982	2.855
n260	35		QTM1	PATCH	6.000	0.411	0.086	0.317	2.895
n260	36		QTM1	PATCH	5.799	0.668	0.910	1.812	2.626
n260	37		QTM1	PATCH	5.770	0.428	0.521	1.024	2.345
n260	128		QTM1	PATCH	5.607	0.308	0.085	1.470	1.624
n260	130		QTM1	PATCH	6.000	0.460	0.063	1.129	2.362
n260	132		QTM1	PATCH	6.000	0.392	0.078	0.431	2.451
n260	134		QTM1	PATCH	5.161	0.473	0.452	0.280	1.957
n260	136		QTM1	PATCH	5.583	0.533	0.232	0.185	2.641
n260	138		QTM1	PATCH	6.000	0.386	0.087	2.248	1.514
n260	139		QTM1	PATCH	5.494	0.636	0.172	0.140	2.984
n260	140		QTM1	PATCH	6.000	0.303	0.089	1.774	1.516
n260	141		QTM1	PATCH	5.923	0.425	0.103	1.545	1.880
n260	146		QTM1	PATCH	5.824	0.553	0.071	1.882	2.788
n260	147		QTM1	PATCH	5.922	0.262	0.078	1.125	1.953
n260	148		QTM1	PATCH	5.244	0.695	0.366	0.512	2.829
n260	152		QTM1	PATCH	5.519	0.645	0.430	1.941	1.631
n260	153		QTM1	PATCH	5.830	0.767	0.263	0.870	3.554
n260	154		QTM1	PATCH	6.000	0.485	0.090	0.514	2.610
n260	155		QTM1	PATCH	5.935	0.437	0.157	1.793	1.923
n260	156		QTM1	PATCH	5.466	0.501	0.128	1.965	2.699
n260	162		QTM1	PATCH	5.412	1.239	0.302	2.415	3.507
n260	163		QTM1	PATCH	5.665	0.562	0.083	0.310	3.151
n260	164		QTM1	PATCH	6.000	0.366	0.209	1.146	2.187
n260	165		QTM1	PATCH	6.000	0.459	0.310	1.378	2.105

Band	Beam ID	Polarization	Antenna		Front	Back	Left	Right	Top
			Moudule	Type					
n261	1	AG0	QTM0	PATCH	5.943	0.170	4.107	0.057	0.151
n261	3	AG0	QTM0	PATCH	5.931	0.189	3.120	0.034	0.137
n261	5	AG0	QTM0	PATCH	6.000	0.132	3.577	0.038	0.151
n261	7	AG0	QTM0	PATCH	5.963	0.183	4.018	0.055	0.147
n261	9	AG0	QTM0	PATCH	5.853	0.147	3.798	0.055	0.128
n261	14	AG0	QTM0	PATCH	5.957	0.208	4.216	0.078	0.078
n261	15	AG0	QTM0	PATCH	5.948	0.130	3.931	0.043	0.026
n261	16	AG0	QTM0	PATCH	5.900	0.154	4.121	0.073	0.218
n261	17	AG0	QTM0	PATCH	5.585	0.392	3.877	0.058	0.312
n261	21	AG0	QTM0	PATCH	5.941	0.170	3.824	0.051	0.042
n261	22	AG0	QTM0	PATCH	5.947	0.166	4.117	0.070	0.149
n261	23	AG0	QTM0	PATCH	5.892	0.276	3.714	0.069	0.286
n261	29	AG0	QTM0	PATCH	5.908	0.226	3.853	0.062	0.044
n261	30	AG0	QTM0	PATCH	6.000	0.177	4.307	0.106	0.025
n261	31	AG0	QTM0	PATCH	6.000	0.183	4.403	0.084	0.077
n261	32	AG0	QTM0	PATCH	5.870	0.152	3.893	0.067	0.200
n261	33	AG0	QTM0	PATCH	5.552	0.254	4.418	0.057	0.573
n261	38	AG0	QTM0	PATCH	5.997	0.197	4.272	0.105	0.017
n261	39	AG0	QTM0	PATCH	5.923	0.169	4.310	0.084	0.015
n261	40	AG0	QTM0	PATCH	5.989	0.199	4.216	0.074	0.035
n261	41	AG0	QTM0	PATCH	5.770	0.142	4.037	0.041	0.504
n261	129	AG1	QTM0	PATCH	6.000	0.290	4.676	0.062	0.166
n261	131	AG1	QTM0	PATCH	5.836	0.185	4.233	0.041	0.164
n261	133	AG1	QTM0	PATCH	5.909	0.218	3.218	0.055	0.255
n261	135	AG1	QTM0	PATCH	5.827	0.268	3.354	0.047	0.173
n261	137	AG1	QTM0	PATCH	5.857	0.175	3.438	0.064	0.111
n261	142	AG1	QTM0	PATCH	5.903	0.194	4.585	0.068	0.116
n261	143	AG1	QTM0	PATCH	5.810	0.316	4.726	0.054	0.027
n261	144	AG1	QTM0	PATCH	6.000	0.329	4.792	0.058	0.184
n261	145	AG1	QTM0	PATCH	5.816	0.264	4.310	0.057	0.299
n261	149	AG1	QTM0	PATCH	6.000	0.267	4.714	0.067	0.048
n261	150	AG1	QTM0	PATCH	5.890	0.150	3.921	0.047	0.094
n261	151	AG1	QTM0	PATCH	5.878	0.277	4.472	0.066	0.288
n261	157	AG1	QTM0	PATCH	5.783	0.122	4.126	0.071	0.021
n261	158	AG1	QTM0	PATCH	5.986	0.170	4.204	0.109	0.014
n261	159	AG1	QTM0	PATCH	5.996	0.218	4.534	0.106	0.025
n261	160	AG1	QTM0	PATCH	5.896	0.324	4.163	0.051	0.287
n261	161	AG1	QTM0	PATCH	5.955	0.401	3.696	0.054	0.483
n261	166	AG1	QTM0	PATCH	5.937	0.119	3.980	0.089	0.020
n261	167	AG1	QTM0	PATCH	6.000	0.176	4.433	0.116	0.022
n261	168	AG1	QTM0	PATCH	5.990	0.251	4.376	0.073	0.063
n261	169	AG1	QTM0	PATCH	5.922	0.363	3.877	0.044	0.381

Band	Beam ID	Polarization	Antenna		Front	Back	Left	Right	Top
			Moudule	Type					
n261	0		QTM1	PATCH	5.832	0.185	0.134	0.790	0.992
n261	2		QTM1	PATCH	6.000	0.144	0.323	0.557	0.862
n261	4		QTM1	PATCH	5.895	0.192	0.227	0.419	1.029
n261	6		QTM1	PATCH	5.862	0.433	0.118	0.413	1.731
n261	8		QTM1	PATCH	5.521	0.274	0.205	0.388	1.779
n261	10		QTM1	PATCH	6.000	0.305	0.269	0.464	1.796
n261	11		QTM1	PATCH	5.863	0.220	0.174	0.274	1.290
n261	12		QTM1	PATCH	5.965	0.184	0.114	0.808	1.379
n261	13		QTM1	PATCH	6.000	0.266	0.290	0.555	1.726
n261	18		QTM1	PATCH	5.958	0.202	0.320	0.135	1.363
n261	19		QTM1	PATCH	5.967	0.166	0.041	0.432	1.353
n261	20		QTM1	PATCH	5.672	0.318	0.109	0.498	1.821
n261	24		QTM1	PATCH	6.000	0.340	0.631	0.383	1.951
n261	25		QTM1	PATCH	5.988	0.319	0.229	0.261	1.842
n261	26		QTM1	PATCH	5.893	0.405	0.031	0.126	2.001
n261	27		QTM1	PATCH	5.966	0.290	0.103	1.637	1.962
n261	28		QTM1	PATCH	5.922	0.260	0.374	1.445	1.154
n261	34		QTM1	PATCH	5.929	0.315	0.555	0.403	2.038
n261	35		QTM1	PATCH	5.843	0.355	0.058	0.264	1.953
n261	36		QTM1	PATCH	5.854	0.349	0.049	0.683	1.886
n261	37		QTM1	PATCH	5.887	0.211	0.235	1.668	1.654
n261	128		QTM1	PATCH	5.826	0.251	0.096	0.849	1.080
n261	130		QTM1	PATCH	5.682	0.224	0.131	0.486	1.346
n261	132		QTM1	PATCH	5.889	0.149	0.186	0.464	1.226
n261	134		QTM1	PATCH	6.000	0.236	0.135	0.674	1.163
n261	136		QTM1	PATCH	5.956	0.262	0.218	0.371	1.855
n261	138		QTM1	PATCH	5.788	0.297	0.201	0.668	1.495
n261	139		QTM1	PATCH	5.764	0.259	0.091	0.183	1.609
n261	140		QTM1	PATCH	5.980	0.299	0.070	0.967	1.575
n261	141		QTM1	PATCH	5.877	0.177	0.341	0.900	1.691
n261	146		QTM1	PATCH	5.933	0.326	0.326	0.384	1.901
n261	147		QTM1	PATCH	6.000	0.303	0.088	0.586	1.759
n261	148		QTM1	PATCH	5.828	0.197	0.184	1.389	1.242
n261	152		QTM1	PATCH	6.000	0.166	0.490	0.754	1.379
n261	153		QTM1	PATCH	5.955	0.382	0.169	0.146	2.324
n261	154		QTM1	PATCH	5.996	0.361	0.058	0.184	2.092
n261	155		QTM1	PATCH	5.784	0.232	0.130	1.913	1.844
n261	156		QTM1	PATCH	5.591	0.208	0.440	1.566	2.226
n261	162		QTM1	PATCH	6.000	0.257	0.298	0.318	2.110
n261	163		QTM1	PATCH	5.850	0.483	0.045	0.191	2.158
n261	164		QTM1	PATCH	5.923	0.270	0.080	0.884	1.981
n261	165		QTM1	PATCH	5.796	0.185	0.146	1.710	1.725

4cm2 average PD for the selected beams on non-selected surfaces for △min determination

Band	Beam ID		Antenna		Selected Surface	Input power limit	Measured results
			Moudule	Type			4cm² psPD (W/m²)
n260		166	QTM0	PATCH	Back	5.95	0.293
	33				Right	9.43	0.042
		157			Top	6.79	0.649
		162	QTM1	PATCH	Back	10.26	0.139
	36				Left	9.96	0.171
		162			Right	10.26	0.314

Band	Beam ID		Antenna		Selected Surface	Input power limit	Measured results
			Moudule	Type			4cm² psPD (W/m²)
n261		161	QTM0	PATCH	Back	5.90	0.354
		167			Right	5.48	0.049
	33				Top	6.06	0.544
		163	QTM1	PATCH	Back	6.45	0.313
	24				Left	5.81	0.473
		155			Right	6.82	1.03

4.7 PD Char

4.7.1 Scaling Factor 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 for n261 and 6 dBm input power per active port for n260 band:

1. Obtained $PD_{surface}$ value (the worst PD among all identified surfaces of the DUT) at all three channels for all single beams specified in the codebook.
2. Derived 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. Determined the worst-case scaling factor, $\boldsymbol{s(i)}$, among low, mid and high channels:

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

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

4.7.2 Scaling Factor for Beams Pairs

Per the manufacturer, the relative phase between beam pair is not controlled in the chipset design and could vary from run to run. Therefore, for each beam pair, based on the simulation results, the worst-case scaling factor was determined mathematically to ensure the compliance. The worst-case PD 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:

$$s(i)_{low\_or\_mid\_or\_high} = \frac{PD\ design\ target}{total\ PD\ (\emptyset(i)_{worstcase})}, i \in beam\ pairs \quad (3)$$

The $total\ PD\ (\emptyset_{worstcase})$ varies with channel and beam pair, the lowest scaling factor among all three channels, $s(i)$, is determined for the beam pair *i*:

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

4.7.3 Input.Power.Limit calculations

The PD Char 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 (△min), given by:

- For n260 and n261

$$input.power.limit(i) = 6\ dBm + 10 * \log(s(i)) + \Delta_{min},\ i \in all\ beams \qquad (5)$$

Where 6dBm is the input power used in simulation for n261 and n260, respectively; s(i) is the scaling factor obtained from Eq. (2) or Eq. (4) for beam i; △min is the worst-case housing influence factor for beam i.

If simulation overestimates the housing influence, then △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, the loss, then △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 △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 < Δ_{min} < TxAGC uncertainty,

$$input.power.limit(i) = 6\ dBm + 10 * \log\big(s(i)\big),\ i \in all\ beams, \text{for n260 and n261} \quad (6)$$

else if Δ_{min} < -TxAGC uncertainty,

$$input.power.limit(i) = 6\ dBm + 10 * \log\big(s(i)\big) + \ (\Delta_{min} + \text{TxAGC uncertainty}),$$
$$i \in all\ beams, \text{for n260 and n261} \quad (7)$$

else if Δ_{min} > TxAGC uncertainty,

$$input.power.limit(i) = 6\ dBm + 10 * \log\big(s(i)\big) + (\Delta_{min} - \text{TxAGC uncertainty}),$$
$$i \in all\ beams, \text{for n260 and n261} \quad (8)$$

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

Band	Antenna Module	Polariaztion	Delta Min	TxAGC uncertainty (dB)	Input power limit(db)
n260	0	AG0	5.91	0.63	Input power limit(i)=6dbm+10*log(s(i))+5.28
		AG1	3.59	0.63	Input power limit(i)=6dbm+10*log(s(i))+2.96
	1	AG0	5.53	0.63	Input power limit(i)=6dbm+10*log(s(i))+4.90
		AG1	6.00	0.63	Input power limit(i)=6dbm+10*log(s(i))+5.37

Band	Antenna Module	Polariaztion	Delta Min	TxAGC uncertainty (dB)	Input power limit(db)
n261	0	AG0	4.91	0.63	Input power limit(i)=6dbm+10*log(s(i))+4.28
		AG1	4.38	0.63	Input power limit(i)=6dbm+10*log(s(i))+3.75
	1	AG0	4.05	0.63	Input power limit(i)=6dbm+10*log(s(i))+3.42
		AG1	5.35	0.63	Input power limit(i)=6dbm+10*log(s(i))+4.72

5G NR n260 Antenna 0 input.power.limit

Band	Beam ID		Antenna		Input Power Limit
			Moudule	Type	6+10log(S(i))+Delta min
n260	1		QTM0	PATCH	13.77
n260	3		QTM0	PATCH	14.33
n260	5		QTM0	PATCH	13.50
n260	7		QTM0	PATCH	13.58
n260	9		QTM0	PATCH	13.26
n260	14		QTM0	PATCH	11.09
n260	15		QTM0	PATCH	9.88
n260	16		QTM0	PATCH	10.72
n260	17		QTM0	PATCH	10.83
n260	21		QTM0	PATCH	10.21
n260	22		QTM0	PATCH	10.06
n260	23		QTM0	PATCH	11.52
n260	29		QTM0	PATCH	8.19
n260	30		QTM0	PATCH	6.97
n260	31		QTM0	PATCH	6.78
n260	32		QTM0	PATCH	7.85
n260	33		QTM0	PATCH	9.43
n260	38		QTM0	PATCH	7.03
n260	39		QTM0	PATCH	7.06
n260	40		QTM0	PATCH	6.96
n260	41		QTM0	PATCH	8.58
n260		129	QTM0	PATCH	11.31
n260		131	QTM0	PATCH	11.48
n260		133	QTM0	PATCH	11.41
n260		135	QTM0	PATCH	11.68
n260		137	QTM0	PATCH	11.57
n260		142	QTM0	PATCH	9.05
n260		143	QTM0	PATCH	8.18
n260		144	QTM0	PATCH	8.65
n260		145	QTM0	PATCH	8.46
n260		149	QTM0	PATCH	8.69
n260		150	QTM0	PATCH	8.27
n260		151	QTM0	PATCH	9.10
n260		157	QTM0	PATCH	6.79
n260		158	QTM0	PATCH	5.54
n260		159	QTM0	PATCH	4.45
n260		160	QTM0	PATCH	5.15
n260		161	QTM0	PATCH	6.76
n260		166	QTM0	PATCH	5.95
n260		167	QTM0	PATCH	5.21
n260		168	QTM0	PATCH	4.50
n260		169	QTM0	PATCH	6.20
n260	1	129	QTM0	PATCH	8.18
n260	3	131	QTM0	PATCH	7.80
n260	5	133	QTM0	PATCH	7.67
n260	7	135	QTM0	PATCH	8.19
n260	9	137	QTM0	PATCH	7.77
n260	14	142	QTM0	PATCH	5.61
n260	15	143	QTM0	PATCH	4.49
n260	16	144	QTM0	PATCH	4.94
n260	17	145	QTM0	PATCH	7.40
n260	21	149	QTM0	PATCH	4.11
n260	22	150	QTM0	PATCH	4.75
n260	23	151	QTM0	PATCH	7.32
n260	29	157	QTM0	PATCH	2.14
n260	30	158	QTM0	PATCH	1.97
n260	31	159	QTM0	PATCH	1.19
n260	32	160	QTM0	PATCH	1.73
n260	33	161	QTM0	PATCH	2.77
n260	38	166	QTM0	PATCH	1.86
n260	39	167	QTM0	PATCH	1.64
n260	40	168	QTM0	PATCH	1.43
n260	41	169	QTM0	PATCH	2.61

5G NR n260 Antenna 1 input.power.limit

Band	Beam ID		Antenna		Input Power Limit
			Moudule	Type	6+10log(S(i))+Delta min
n260	0		QTM1	PATCH	13.36
n260	2		QTM1	PATCH	14.34
n260	4		QTM1	PATCH	13.90
n260	6		QTM1	PATCH	14.52
n260	8		QTM1	PATCH	13.90
n260	10		QTM1	PATCH	11.16
n260	11		QTM1	PATCH	10.23
n260	12		QTM1	PATCH	11.96
n260	13		QTM1	PATCH	11.43
n260	18		QTM1	PATCH	10.27
n260	19		QTM1	PATCH	11.02
n260	20		QTM1	PATCH	11.24
n260	24		QTM1	PATCH	8.20
n260	25		QTM1	PATCH	7.15
n260	26		QTM1	PATCH	8.05
n260	27		QTM1	PATCH	8.85
n260	28		QTM1	PATCH	9.04
n260	34		QTM1	PATCH	7.48
n260	35		QTM1	PATCH	7.22
n260	36		QTM1	PATCH	9.96
n260	37		QTM1	PATCH	8.83
n260		128	QTM1	PATCH	13.70
n260		130	QTM1	PATCH	14.57
n260		132	QTM1	PATCH	14.29
n260		134	QTM1	PATCH	14.69
n260		136	QTM1	PATCH	15.02
n260		138	QTM1	PATCH	11.21
n260		139	QTM1	PATCH	11.69
n260		140	QTM1	PATCH	10.87
n260		141	QTM1	PATCH	12.46
n260		146	QTM1	PATCH	12.07
n260		147	QTM1	PATCH	10.77
n260		148	QTM1	PATCH	12.23
n260		152	QTM1	PATCH	9.38
n260		153	QTM1	PATCH	8.49
n260		154	QTM1	PATCH	7.50
n260		155	QTM1	PATCH	8.69
n260		156	QTM1	PATCH	8.82
n260		162	QTM1	PATCH	10.26
n260		163	QTM1	PATCH	7.53
n260		164	QTM1	PATCH	8.55
n260		165	QTM1	PATCH	9.12
n260	0	128	QTM1	PATCH	10.11
n260	2	130	QTM1	PATCH	10.71
n260	4	132	QTM1	PATCH	10.57
n260	6	134	QTM1	PATCH	11.30
n260	8	136	QTM1	PATCH	10.88
n260	10	138	QTM1	PATCH	10.25
n260	11	139	QTM1	PATCH	8.68
n260	12	140	QTM1	PATCH	9.69
n260	13	141	QTM1	PATCH	7.39
n260	18	146	QTM1	PATCH	6.70
n260	19	147	QTM1	PATCH	6.98
n260	20	148	QTM1	PATCH	7.77
n260	24	152	QTM1	PATCH	4.96
n260	25	153	QTM1	PATCH	3.67
n260	26	154	QTM1	PATCH	3.93
n260	27	155	QTM1	PATCH	4.34
n260	28	156	QTM1	PATCH	4.80
n260	34	162	QTM1	PATCH	4.28
n260	35	163	QTM1	PATCH	3.32
n260	36	164	QTM1	PATCH	4.75
n260	37	165	QTM1	PATCH	5.36

5G NR n261 Antenna 0 input.power.limit

Band	Beam ID		Antenna		Input Power Limit
			Moudule	Type	6+10log(S(i))+Delta min
n261	1		QTM0	PATCH	13.05
n261	3		QTM0	PATCH	12.62
n261	5		QTM0	PATCH	13.05
n261	7		QTM0	PATCH	12.91
n261	9		QTM0	PATCH	12.91
n261	14		QTM0	PATCH	9.65
n261	15		QTM0	PATCH	9.65
n261	16		QTM0	PATCH	9.85
n261	17		QTM0	PATCH	10.90
n261	21		QTM0	PATCH	9.57
n261	22		QTM0	PATCH	9.70
n261	23		QTM0	PATCH	10.21
n261	29		QTM0	PATCH	5.61
n261	30		QTM0	PATCH	5.76
n261	31		QTM0	PATCH	5.91
n261	32		QTM0	PATCH	5.29
n261	33		QTM0	PATCH	6.06
n261	38		QTM0	PATCH	5.59
n261	39		QTM0	PATCH	5.92
n261	40		QTM0	PATCH	5.77
n261	41		QTM0	PATCH	5.26
n261		129	QTM0	PATCH	12.90
n261		131	QTM0	PATCH	12.87
n261		133	QTM0	PATCH	12.34
n261		135	QTM0	PATCH	11.72
n261		137	QTM0	PATCH	11.76
n261		142	QTM0	PATCH	9.61
n261		143	QTM0	PATCH	9.31
n261		144	QTM0	PATCH	9.60
n261		145	QTM0	PATCH	10.35
n261		149	QTM0	PATCH	9.53
n261		150	QTM0	PATCH	8.71
n261		151	QTM0	PATCH	10.19
n261		157	QTM0	PATCH	4.47
n261		158	QTM0	PATCH	5.33
n261		159	QTM0	PATCH	5.35
n261		160	QTM0	PATCH	5.02
n261		161	QTM0	PATCH	5.90
n261		166	QTM0	PATCH	4.92
n261		167	QTM0	PATCH	5.48
n261		168	QTM0	PATCH	5.18
n261		169	QTM0	PATCH	5.43
n261	1	129	QTM0	PATCH	8.51
n261	3	131	QTM0	PATCH	8.94
n261	5	133	QTM0	PATCH	9.02
n261	7	135	QTM0	PATCH	8.74
n261	9	137	QTM0	PATCH	8.73
n261	14	142	QTM0	PATCH	6.79
n261	15	143	QTM0	PATCH	5.16
n261	16	144	QTM0	PATCH	5.53
n261	17	145	QTM0	PATCH	7.93
n261	21	149	QTM0	PATCH	5.17
n261	22	150	QTM0	PATCH	5.43
n261	23	151	QTM0	PATCH	6.28
n261	29	157	QTM0	PATCH	1.03
n261	30	158	QTM0	PATCH	1.62
n261	31	159	QTM0	PATCH	1.66
n261	32	160	QTM0	PATCH	1.06
n261	33	161	QTM0	PATCH	1.92
n261	38	166	QTM0	PATCH	1.31
n261	39	167	QTM0	PATCH	1.76
n261	40	168	QTM0	PATCH	1.39
n261	41	169	QTM0	PATCH	1.23

5G NR n261 Antenna 1 input.power.limit

Band	Beam ID		Antenna		Input Power Limit
			Moudule	Type	6+10log(S(i))+Delta min
n261	0		QTM1	PATCH	11.68
n261	2		QTM1	PATCH	11.97
n261	4		QTM1	PATCH	11.84
n261	6		QTM1	PATCH	12.36
n261	8		QTM1	PATCH	13.01
n261	10		QTM1	PATCH	10.30
n261	11		QTM1	PATCH	9.04
n261	12		QTM1	PATCH	8.86
n261	13		QTM1	PATCH	10.24
n261	18		QTM1	PATCH	8.68
n261	19		QTM1	PATCH	8.61
n261	20		QTM1	PATCH	9.40
n261	24		QTM1	PATCH	5.81
n261	25		QTM1	PATCH	5.54
n261	26		QTM1	PATCH	5.24
n261	27		QTM1	PATCH	5.24
n261	28		QTM1	PATCH	6.58
n261	34		QTM1	PATCH	5.66
n261	35		QTM1	PATCH	5.58
n261	36		QTM1	PATCH	5.16
n261	37		QTM1	PATCH	6.14
n261		128	QTM1	PATCH	13.58
n261		130	QTM1	PATCH	13.44
n261		132	QTM1	PATCH	13.41
n261		134	QTM1	PATCH	12.99
n261		136	QTM1	PATCH	14.11
n261		138	QTM1	PATCH	10.98
n261		139	QTM1	PATCH	9.55
n261		140	QTM1	PATCH	10.71
n261		141	QTM1	PATCH	12.07
n261		146	QTM1	PATCH	10.55
n261		147	QTM1	PATCH	10.62
n261		148	QTM1	PATCH	11.62
n261		152	QTM1	PATCH	7.25
n261		153	QTM1	PATCH	5.83
n261		154	QTM1	PATCH	6.57
n261		155	QTM1	PATCH	6.82
n261		156	QTM1	PATCH	8.71
n261		162	QTM1	PATCH	6.07
n261		163	QTM1	PATCH	6.45
n261		164	QTM1	PATCH	6.35
n261		165	QTM1	PATCH	7.59
n261	0	128	QTM1	PATCH	8.73
n261	2	130	QTM1	PATCH	8.80
n261	4	132	QTM1	PATCH	8.71
n261	6	134	QTM1	PATCH	8.82
n261	8	136	QTM1	PATCH	8.64
n261	10	138	QTM1	PATCH	7.20
n261	11	139	QTM1	PATCH	5.38
n261	12	140	QTM1	PATCH	5.96
n261	13	141	QTM1	PATCH	7.26
n261	18	146	QTM1	PATCH	5.97
n261	19	147	QTM1	PATCH	5.85
n261	20	148	QTM1	PATCH	7.04
n261	24	152	QTM1	PATCH	1.48
n261	25	153	QTM1	PATCH	1.73
n261	26	154	QTM1	PATCH	1.83
n261	27	155	QTM1	PATCH	1.96
n261	28	156	QTM1	PATCH	2.93
n261	34	162	QTM1	PATCH	1.86
n261	35	163	QTM1	PATCH	2.04
n261	36	164	QTM1	PATCH	1.70
n261	37	165	QTM1	PATCH	2.32

5 Measurement Uncertainty

The budget is valid for evaluation distance ＞λ/2π. For specific tests and configurations, the uncertainty can be considered smaller.

Error Description		Unc. Value (±dB)	Prob. Dist.	Div.	(C_i)	Std.Unc. (±dB)	(V_i) V_{eff}
Uncertainty terms dependent on the measurement system							
CAL	Calibration	0.49	N	1	1	0.49	∞
FRS	Frequency response	0.20	R	$\sqrt{3}$	1	0.12	∞
ISO	Isotropy	0.50	R	$\sqrt{3}$	1	0.29	∞
LIN	Linearity	0.20	R	$\sqrt{3}$	1	0.12	∞
PPO	Probe positioning offset	0.30	R	$\sqrt{3}$	1	0.17	∞
PPR	Probe positioning repeatability	0.04	R	$\sqrt{3}$	1	0.02	∞
APN	Amplitude and phase noise	0.04	R	$\sqrt{3}$	1	0.02	∞
DAQ	Data acquisition	0.03	N	1	1	0.03	∞
REC	Field reconstruction	0.60	R	$\sqrt{3}$	1	0.35	∞
SAV	Spatial averaging	0.10	R	$\sqrt{3}$	1	0.06	∞
SDL	System detection limit	0.04	R	$\sqrt{3}$	1	0.02	∞
Uncertainty terms dependent on the DUT and environmental factors							
MOD	Modulation response	0.40	R	$\sqrt{3}$	1	0.23	∞
DH	Device holder influence	0.10	R	$\sqrt{3}$	1	0.06	∞
AC	RF ambient conditions	0.04	R	$\sqrt{3}$	1	0.02	∞
AR	Ambient reflections	0.04	R	$\sqrt{3}$	1	0.02	∞
DRI	Drift of the DUT	0.02	R	$\sqrt{3}$	1	0.01	∞
Combined Standard Uncertainty						0.76	∞
Expanded Standard Uncertainty (95%)						1.52	