

Report No. : TESA2204000049EN Page : 1 of 196

# **RF Exposure report**



The following samples were submitted and identified on behalf of the client as:

Product Type	WIFI6E 802.11AX+BT5.2 adapter card
Trade Name	Intel® Wi-Fi 6E AX211
Model Number	AX211NGW
Company Name	ASUSTeK COMPUTER INC.
Company Address	1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013
FCC ID	MSQAX211NG
Date of EUT Receipt	Apr. 14, 2022
Date of Test(s)	May. 04, 2022 ~ May. 10, 2022
<b>Date of Issue</b> In the configuration tested, the EL	Jun. 23, 2022 JT complied with the standards specified above.

#### Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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#### Signed on behalf of SGS

Clerk / Ruby Ou	PM / Afu Chen	Approved By / John Yeh
Ruby Ou	afr Chen	John Teh
		Date: Jun. 23, 2022

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# **Revision History**

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2204000049EN	Rev.00	Initial creation of document	Jun. 08, 2022	Ruby Ou	*
TESA2204000049EN	Rev.01	Make hotspots clearer (p. 81-84)	Jun. 23, 2022	Ruby Ou	
Note:					
1. The mark " * " is the re	vised version o	f the report due to com	ments submitted	by the certificatio	n.

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## 0. Guidance applied

- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- IEC/IEEE 62209-1528:2020
- SPEAG DASY6 System Handbook
- SPEAG DASY6 Application Note

(Interim Procedure for Device Operation at 6GHz-10GHz)

- IEC TR 63170:2018
- IEC 62479:2010
- FCC KDB 865664 D01 v01r04
- FCC KDB 865664 D02 v01r02
- FCC KDB 447498 D01 v06
- FCC KDB 616217 D04 v01r02
- FCC KDB 248227 D01 v02r02

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# 1. General Information

## 1.1 Testing Laboratory

SGS Taiwan Ltd. Central RF Lab						
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Internet	http://www.tw.sgs.com/					

## 1.2 Details of Applicant

Company Name	ASUSTeK COMPUTER INC.
Company Address	1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan

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## 1.3 Description of EUT

Product Type	WIFI6E 802.11AX+B	T5.2 adapter card				
Trade Name	Intel® Wi-Fi 6E AX211					
Model Number	AX211NGW					
FCC ID	MSQAX211NG					
Host Information		FB, B5402FBA, B5402CB,B5402CBA ically identical, different model names				
Contain Module	Intel / AX211NGW					
Mode of Operation	⊠WLAN802.11 ⊠Bluetooth					
	WLAN802.11	Refer to page 37-41				
Duty Cycle	Bluetooth	74.9%				
	802.11b/g/n/ax	2.4GHz (2400.0 – 2483.5 MHz)				
Supported Radios	802.11a/n/ac/ax         5.2GHz (5150.0 - 5350.0 MHz           5.6GHz (5470.0 - 5725.0 MHz           5.8GHz (5725.0 - 5850.0 MHz					
	Bluetooth 5.2	2.4GHz (2400.0 – 2483.5)				
	802.11ax	6.0GHz (5925.0 – 7125.0 MHz)				

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## <u>High-Tek</u>

Summary of Maximum SAR and Power Density Value								
Mode	Highest SAR1g Body (W/kg)	Highest APD (mW/cm <sup>2</sup> )	Highest PD (mW/cm <sup>2</sup> )					
2.4G WLAN	0.87	N/A	N/A					
5.2G WLAN	0.68	N/A	N/A					
5.3G WLAN	0.64	N/A	N/A					
5.6G WLAN	0.77	N/A	N/A					
5.8G WLAN	0.97	N/A	N/A					
6G WLAN	0.88	0.46	0.44					
Bluetooth(GFSK)	0.75	N/A	N/A					

#### PULSE

Summary of	Summary of Maximum SAR and Power Density Value								
Mode	Highest SAR1g Body (W/kg)	Highest APD (mW/cm <sup>2</sup> )	Highest PD (mW/cm <sup>2</sup> )						
2.4G WLAN	0.91	N/A	N/A						
5.2G WLAN	0.54	N/A	N/A						
5.3G WLAN	0.52	N/A	N/A						
5.6G WLAN	0.68	N/A	N/A						
5.8G WLAN	0.81	N/A	N/A						
6G WLAN	0.72	0.37	0.35						
Bluetooth(GFSK)	0.73	N/A	N/A						

## Antenna Information

Vendor									High	n-tek								
Antenna		WLAN Man(PIFA)								WLAN Aux(PIFA)								
PartNumber	DC33002R600(0ACCN022001N)						DC33002R610(0ACCN022002N)											
Frequency(MHz)	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5925~6425	6425~6525	6525~6875	6875~7125	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5925~6425	6425~6525	6525~6875	6875~7125
Gain (dBi)	1.81	3.16	3.16	3.91	4.21	4.27	3.63	4.17	3.66	2.69	3.13	3.11	4.14	4.22	4.26	3.72	4.19	3.87
WLAN TB mode	-																	
Vendor									High	n-tek								
Antenna					VLAN Man(PIF.									VLAN Aux(PIF/				
PartNumber				DC33002	R600(0ACCN	022001N)							DC33002	R610(0ACCN	022002N)			
Frequency(MHz)	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5925~6425	6425~6525		6875~7125	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5925~6425	6425~6525	6525~6875	6875~7125
								3.32	3.49		3.07	3.20	4.06		3.98			
Gain (dBi)	1.16	3.07	3.20	4.06	4.14	3.98	3.25	3.32	3.49	1.16	3.07	3.20	4.00	4.14	3.98	3.25	3.32	3.49
Gain (dBi) WLAN NB mode	1.16	3.07	3.20	4.06	4.14	3.98	3.25	3.32			3.07	3.20	4.00	4.14	3.98	3.25	3.32	3.49
WLAN NB mode Vendor	1.16	3.07	3.20				3.25	3.32	3.49 PUI		3.07	3.20				3.25	3.32	3.49
WLAN NB mode	1.16	3.07	3.20	v	4.14 VLAN Man(PIF) 002R500 (TZ2	A)	3.25	3.32			3.07	3.20	v	4.14 VLAN Aux(PIFA 002R510 (TZ2	N	3.25	3.32	3.49
WLAN NB mode Vendor Antenna	1.16		3.20	v	VLAN Man(PIF) 002R500 (TZ2	A)	3.25		PUI	LSE	5150~5250	5250~5350	v	VLAN Aux(PIF/ 002R510 (TZ2	<b>N</b> 381E)	6425~6525		3.49 6875~7125
WLAN NB mode Vendor Antenna Part Number				DC33	VLAN Man(PIF) 002R500 (TZ2	<b>A)</b> (381D)			PUI	LSE			DC33	VLAN Aux(PIF/ 002R510 (TZ2	<b>N</b> 381E)			
WLAN NB mode Vendor Antenna Part Number Frequency(MHz)	2400~2500	5150~5250	5250~5350	DC33 5470~5725	VLAN Man(PIF 002R500 (TZ2 5725~5850	A) 381D) 5925~6425	6425~6525	6525~6875	PUI 6875~7125	-SE 2400~2500	5150~5250	5250~5350	DC33 5470~5725	VLAN Aux(PIFA 002R510 (TZ2 5725~5850	<b>y</b> 381E) 5925~6425	6425~6525	6525~6875	6875~7125
WLAN NB mode Vendor Antenna Part Number Frequency(MHz) Gain (dBi)	2400~2500	5150~5250	5250~5350	DC33 5470~5725	VLAN Man(PIF 002R500 (TZ2 5725~5850	A) 381D) 5925~6425	6425~6525	6525~6875	PUI 6875~7125	2400~2500 1.07	5150~5250	5250~5350	DC33 5470~5725	VLAN Aux(PIFA 002R510 (TZ2 5725~5850	<b>y</b> 381E) 5925~6425	6425~6525	6525~6875	6875~7125
WLAN NB mode Vendor Antenna Part Number Frequency(MHz) Gain (dBi) WLAN TB mode_ Vendor Antenna	2400~2500	5150~5250	5250~5350	V DC33 5470~5725 3.70	VLAN Man(PIF 002R500 (TZZ 5725~5850 3.77 VLAN Man(PIF.	A) 381D) 5925~6425 4.09 A)	6425~6525	6525~6875	PUI 6875~7125 3.22	2400~2500 1.07	5150~5250	5250~5350	U DC33 5470-5725 3.7	VLAN Aux(PIF/ 002R510 (T22 5725~5850 3.77 VLAN Aux(PIF/	N) 381E) 5925~6425 4.09	6425~6525	6525~6875	6875~7125
WLAN NB mode Vendor Anterna Part Number Frequency(MHz) Gain (dBi) WLAN TB mode_ Vendor Anterna Part Number	2400~2500	5150-5250 2.81	5250~5350 2.81	DC33 5470-5725 3.70	VLAN Man(PIF 002R500 (TZ2 5725-5850 3.77 VLAN Man(PIF 002R500 (TZ2	A) 381D) 5925~6425 4.09 A) 381D)	6425~6525 2.63	6525~6875 3.46	PUI 6875-7125 3.22 PUI	_SE 2400-2500 1.07 _SE	5150~5250 2.81	5250~5350 2.81	UC33 5470-5725 3.7 UC33	VLAN Aux(PIFA 002R510 (TZ2 5725-5850 3.77 VLAN Aux(PIFA 002R510 (TZ2	₩ 381E) 5925~6425 4.09 ₩ 381E)	6425~6525 2.63	6525~6875 3.46	6875~7125 3.22
WLAN NB mode Vendor Antenna Part Number Frequency(MHz) Gain (dBi) WLAN TB mode_ Vendor Antenna	2400~2500	5150~5250 2.81	5250~5350	V DC33 5470~5725 3.70	VLAN Man(PIF 002R500 (TZZ 5725~5850 3.77 VLAN Man(PIF.	A) 381D) 5925~6425 4.09 A) 381D)	6425~6525	6525~6875	PUI 6875-7125 3.22 PUI	_SE 2400-2500 1.07 _SE	5150~5250	5250~5350	UC33 5470-5725 3.7 UC33	VLAN Aux(PIF/ 002R510 (T22 5725~5850 3.77 VLAN Aux(PIF/	N) 381E) 5925~6425 4.09	6425~6525	6525~6875 3.46	6875~7125

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### WLAN conducted power table:

#### Notebook mode

WLAN Main								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)		
		1	2412		16.00	15.96		
		6	2437		16.00	15.98		
	802.11b	11	2462	1Mbps	16.00	15.99		
		12	2467		16.00			
		13	2472		16.00			
		1	2412		16.00			
	802.11g	6	2437	6Mbps	16.00			
		11	2462		16.00			
		1	2412	MCS0	16.00			
2.45GHz	802.11n20-HT0	6	2437		16.00			
2.400112		11	2462		16.00	Not		
		1	2412		16.00	required		
	802.11ax20-HE0	6	2437	MCS0	16.00	required		
		11	2462		16.00			
		3	2422		15.50			
	802.11n40-HT0	6	2437	MCS0	16.00			
		9	2452		15.50			
		3	2422		15.50			
	802.11ax40-HE0	6	2437	MCS0	16.00			
		9	2452		16.00			

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WLAN Main									
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		36	5180		14.50				
	802.11a	40	5200	GMbba	14.50				
	002.118	44	5220	6Mbps	14.50				
		48	5240		14.50				
		36	5180		14.50				
	802.11n20-HT0	40	5200	MCS0	14.50				
	002.11120-010	44	5220	MC30	14.50				
		48	5240		14.50				
		36	5180	MCS0	14.50	Not			
	802.11ax20-HE0	40	5200		14.50	required			
5.15-5.25 GHz	002.11ax20-11L0	44	5220	10030	14.50				
		48	5240		14.50				
	802.11n40-HT0	38	5190	MCS0	14.50				
	002.11140-1110	46	5230	10030	14.50				
	802.11ax40-HE0	38	5190	MCS0	14.50				
	002.11ax40-nE0	46	5230	MC30	14.50				
	802.11ac80-VHT0	42	5210	MCS0	14.50				
	802.11ax80-HE0	42	5210	MCS0	14.50				
	802.11ac160-VHT0	50	5250	MCS0	14.50	14.49			
	802.11ax160-HE0	50	5250	MCS0	14.50	Not required			

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		WLA	N Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260		14.50	
	802.11a	56	5280	6Mbps	14.50	
	002.11a	60	5300	ownps	14.50	
		64	5320		14.50	
	802.11n20-HT0	52	5260		14.50	Not
		56	5280	MCS0	14.50	
		60	5300	10030	14.50	
		64	5320		14.50	
		52	5260		14.50	required
5.25-5.35 GHz	802.11ax20-HE0	56	5280	MCS0	14.50	
	002.11ax20-FIEU	60	5300	IVIC30	14.50	
		64	5320		14.50	
	802.11n40-HT0	54	5270	MCS0	14.50	
	002.11140-010	62	5310	IVICSU	14.50	
	802.11ax40-HE0	54	5270	MCSO	14.50	
	002.11ax40-nE0	62	5310	MCS0	14.50	
	802.11ac80-VHT0	58	5290	MCS0	14.50	14.49
	802.11ax80-HE0	58	5290	MCS0	14.50	Not required

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		WLA	N Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		15.00	
	802.11a	120	5600	GMbba	15.00	
	802.11a	140	5700	6Mbps	15.00	
		144	5720		15.00	
		100	5500		15.00	
	000 11p00 UT0	120	5600	MCS0	15.00	
	802.11n20-HT0	140	5700	MCSU	15.00	
		144	5720		15.00	
		100	5500		15.00	
	802.11ax20-HE0	120	5600	MCS0	15.00	Not
	002.114720-1120	140	5700	MCSU	15.00	required
		144	5720		15.00	
		102	5510	MCS0	15.00	
	802.11n40-HT0	118	5590		15.00	
5.6GHz	002.11140-010	134	5670		15.00	
		142	5710		15.00	
		102	5510		15.00	
	802.11ax40-HE0	118	5590	MCS0	15.00	
	002.11ax40-ne0	134	5670	10030	15.00	
		142	5710		15.00	
		106	5530		15.00	14.95
	802.11ac80-VHT0	122	5610	MCS0	15.00	14.93
		138	5690		15.00	14.98
		106	5530		15.00	Not
-	802.11ax80-HE0	122	5610	MCS0	15.00	
		138	5690	1	15.00	required
	802.11ac160-VHT0	114	5570	MCS0	15.00	14.98
	802.11ax160-HE0	114	5570	MCS0	15.00	Not required

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	WLAN Main									
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)				
		149	5745		16.50					
	802.11a	157	5785	6Mbps	16.50	Not required				
		165	5825		16.50					
	802.11n20-HT0	149	5745	MCS0	16.50					
		157	5785		16.50					
		165	5825		16.50					
		149	5745		16.50					
5.8GHz	802.11ax20-HE0	157	5785	MCS0	16.50					
5.00112		165	5825		16.50					
	802.11n40-HT0	151	5755	MCS0	16.50					
	002.11140-1110	159	5795	10030	16.50					
	802.11ax40-HE0	151	5755	MCS0	16.50					
	002.11ax40-nE0	159	5795	IVIC30	16.50					
	802.11ac80-VHT0	155	5775	MCS0	16.50	16.48				
	802.11ax80-HE0	155	5775	MCS0	16.50	Not required				

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WLAN Aux									
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		1	2412		15.50	15.48			
		6	2437	-	15.50	15.44			
	802.11b	11	2462	1Mbps	15.50	15.46			
		12	2467		15.50				
		13	2472		15.50				
	802.11g	1	2412	6Mbps	15.50				
		6	2437		15.50				
		11	2462		15.50				
		1	2412		15.50				
2.45GHz	802.11n20-HT0	6	2437	MCS0	15.50				
2.40GHZ		11	2462		15.50	Not			
		1	2412		15.50	required			
	802.11ax20-HE0	6	2437	MCS0	15.50	required			
		11	2462		15.50	1			
		3	2422		15.50				
	802.11n40-HT0	6	2437	MCS0	15.50				
		9	2452	1	15.50				
		3	2422		15.50				
	802.11ax40-HE0	6	2437	MCS0	15.50				
		9	2452		15.50				

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		WL	AN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180		17.50	
	802.11a	40	5200	GMbpa	17.50	
	002.11a	44	5220	6Mbps	17.50	
		48	5240		17.50	
	802.11n20-HT0	36	5180		17.50	
		40	5200	MCS0	17.50	Not required
		44	5220		17.50	
		48	5240		17.50	
		36	5180	MCS0	17.50	
	802.11ax20-HE0	40	5200		17.50	
5.15-5.25 GHz	002.11a20-11L0	44	5220	MC30	17.50	
		48	5240		17.50	
	802.11n40-HT0	38	5190	MCS0	17.50	
	002.11140-0110	46	5230	MC30	17.50	
	802.11ax40-HE0	38	5190	MCS0	17.50	
	002.118X40-FIE0	46	5230	MC30	17.50	1
	802.11ac80-VHT0	42	5210	MCS0	17.50	16.87
	802.11ax80-HE0	42	5210	MCS0	17.50	
	802.11ac160-VHT0	50	5250	MCS0	15.50	Not
	802.11ax160-HE0	50	5250	MCS0	15.50	required

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WLAN Aux								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)		
		52	5260		17.50			
	802.11a	56	5280	6Mbps	17.50			
	002.11a	60	5300	ownps	17.50			
		64	5320		17.50			
	802.11n20-HT0	52	5260		17.50	Not required		
		56	5280	MCS0	17.50			
		60	5300	10000	17.50			
		64	5320		17.50			
		52	5260		17.50			
5.25-5.35 GHz	802.11ax20-HE0	56	5280	MCS0	17.50			
	002.11ax20-FIE0	60	5300	WC30	17.50			
		64	5320		17.50			
	802.11n40-HT0	54	5270	MCS0	17.50			
	002.11140-010	62	5310	WC30	17.50			
	802.11ax40-HE0	54	5270	MCS0	17.50			
	002.11ax40-nE0	62	5310	IVIC30	17.50			
	802.11ac80-VHT0	58	5290	MCS0	17.50	17.47		
	802.11ax80-HE0	58	5290	MCS0	17.50	Not required		

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		WL	AN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		17.25	
	802.11a	120	5600	GMbpa	17.25	
	802.11a	140	5700	6Mbps	17.25	
		144	5720		17.25	
		100	5500		17.25	
	000 44-00 1170	120	5600	MOOD	17.25	
	802.11n20-HT0	140	5700	MCS0	17.25	
		144	5720		17.25	
		100	5500		17.25	
	802.11ax20-HE0	120	5600	MCSO	17.25	Not
		140	5700	MCS0	17.25	required
		144	5720		17.25	
		102	5510	MCS0	17.25	
	802.11n40-HT0	118	5590		17.25	
5.6GHz	0U2.1114U-H1U	134	5670		17.25	
		142	5710		17.25	
		102	5510		17.25	
	802.11ax40-HE0	118	5590	MCS0	17.25	
	802.11ax40-HE0	134	5670	MCSU	17.25	
		142	5710		17.25	
		106	5530		17.25	17.23
	802.11ac80-VHT0	122	5610	MCS0	17.25	17.17
		138	5690		17.25	17.24
		106	5530		17.25	Not
-	802.11ax80-HE0	122	5610	MCS0	17.25	
		138	5690		17.25	
	802.11ac160-VHT0	114	5570	MCS0	15.75	required
	802.11ax160-HE0	114	5570	MCS0	15.75	

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		WL	AN Aux			
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		17.50	
	802.11a	157	5785	6Mbps	17.50	- Not required
		165	5825		17.50	
		149	5745		17.50	
	802.11n20-HT0	157	5785	MCS0	17.50	
		165	5825		17.50	
		149	5745		17.50	
5.8GHz	802.11ax20-HE0	157	5785	MCS0	17.50	
5.0GHZ		165	5825		17.50	
	802.11n40-HT0	151	5755	MCS0	17.50	
	002.11140-0110	159	5795	MC30	17.50	1
	802.11ax40-HE0	151	5755	MCS0	17.50	
	002.11aX40-HE0	159	5795	10030	17.50	
	802.11ac80-VHT0	155	5775	MCS0	17.50	17.48
	802.11ax80-HE0	155	5775	MCS0	17.50	Not required

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#### Tablet mode

WLAN Main									
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		1	2412		12.50	12.45			
		6	2437		12.50	12.48			
	802.11b	11	2462	1Mbps	12.50	12.46			
		12	2467		12.50				
		13	2472		12.50	- - - - Not			
	802.11g	1	2412		12.50				
		6	2437	6Mbps	12.50				
		11	2462		12.50				
		1	2412		12.50				
2.45GHz	802.11n20-HT0	6	2437	MCS0	12.50				
2.456HZ		11	2462		12.50				
		1	2412		12.50	required			
	802.11ax20-HE0	6	2437	MCS0	12.50	required			
		11	2462		12.50	1			
		3	2422		12.50				
	802.11n40-HT0	6	2437	MCS0	12.50				
		9	2452		12.50				
		3	2422	MCS0	12.50				
	802.11ax40-HE0	6	2437		12.50				
		9	2452		12.50				

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		WLA	N Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180		10.00	
	802.11a	40	5200	GMbbb	10.00	
	002.11a	44	5220	6Mbps	10.00	
		48	5240		10.00	
		36	5180		10.00	
	802.11n20-HT0	40	5200	MCS0	10.00	Not required
		44	5220		10.00	
		48	5240		10.00	
		36	5180	MCS0	10.00	
	802.11ax20-HE0	40	5200		10.00	
5.15-5.25 GHz	002.110.20-1120	44	5220	10030	10.00	
		48	5240		10.00	
	802.11n40-HT0	38	5190	MCS0	10.00	
	002.11140-0110	46	5230	WC30	10.00	
	802.11ax40-HE0	38	5190	MCS0	10.00	
	002.11ax40-11L0	46	5230	WC30	10.00	
	802.11ac80-VHT0	42	5210	MCS0	10.00	
-	802.11ax80-HE0	42	5210	MCS0	10.00	
	802.11ac160-VHT0	50	5250	MCS0	10.00	9.99
	802.11ax160-HE0	50	5250	MCS0	10.00	Not required

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		WLA	N Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260		10.00	
	802.11a	56	5280	6Mbps	10.00	
	002.11a	60	5300	ownps	10.00	
		64	5320		10.00	
	802.11n20-HT0	52	5260		10.00	Not
		56	5280	MCS0	10.00	
		60	5300	10030	10.00	
		64	5320		10.00	
		52	5260		10.00	required
5.25-5.35 GHz	802.11ax20-HE0	56	5280	MCS0	10.00	
	002.11ax20-FEU	60	5300	WC30	10.00	
		64	5320		10.00	
	802.11n40-HT0	54	5270	MCS0	10.00	
	002.11140-010	62	5310	WC30	10.00	
	802.11ax40-HE0	54	5270	MCSO	10.00	
	002.11ax40-nE0	62	5310	MCS0	10.00	
	802.11ac80-VHT0	58	5290	MCS0	10.00	9.98
	802.11ax80-HE0	58	5290	MCS0	10.00	Not required

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		WLA	N Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		9.50	
	802.11a	120	5600	GMbba	9.50	
	802.11a	140	5700	6Mbps	9.50	
		144	5720		9.50	
		100	5500		9.50	
	900 11p00 UT0	120	5600	MCS0	9.50	
	802.11n20-HT0	140	5700	MCSU	9.50	
		144	5720		9.50	
		100	5500		9.50	
	802.11ax20-HE0	120	5600	MCS0	9.50	Not
	002.114720-1120	140	5700	MCSU	9.50	required
		144	5720		9.50	
		102	5510	MCS0	9.50	
	802.11n40-HT0	118	5590		9.50	
5.6GHz	0UZ.11140-F110	134	5670		9.50	
		142	5710		9.50	
		102	5510		9.50	
	802.11ax40-HE0	118	5590	MCS0	9.50	
	002.11ax40-nE0	134	5670	INICSU	9.50	
		142	5710		9.50	
		106	5530		9.50	9.47
	802.11ac80-VHT0	122	5610	MCS0	9.50	9.44
		138	5690		9.50	9.49
		106	5530		9.50	Not
-	802.11ax80-HE0	122	5610	MCS0	9.50	
		138	5690		9.50	required
	802.11ac160-VHT0	114	5570	MCS0	9.50	9.49
	802.11ax160-HE0	114	5570	MCS0	9.50	Not required

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		WLA	N Main			
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		9.00	
	802.11a	157	5785	6Mbps	9.00	Not required
		165	5825		9.00	
	802.11n20-HT0	149	5745	MCS0	9.00	
		157	5785		9.00	
		165	5825		9.00	
		149	5745		9.00	
5.8GHz	802.11ax20-HE0	157	5785	MCS0	9.00	
5.00112		165	5825		9.00	
	802.11n40-HT0	151	5755	MCS0	9.00	
	002.11140-1110	159	5795	WC30	9.00	
	802.11ax40-HE0	151	5755	MCS0	9.00	
	002.11aX40-HEU	159	5795	10030	9.00	
	802.11ac80-VHT0	155	5775	MCS0	9.00	8.99
	802.11ax80-HE0	155	5775	MCS0	9.00	Not required

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		WL	AN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		1	2412		12.50	12.46
		6	2437		12.50	12.48
	802.11b	11	2462	1Mbps	12.50	12.46
		12	2467		12.50	
		13	2472		12.50	
	802.11g	1	2412		12.50	
		6	2437	6Mbps	12.50	
		11	2462		12.50	
		1	2412		12.50	
2.45GHz	802.11n20-HT0	6	2437	MCS0	12.50	
2.45012		11	2462		12.50	Not
		1	2412		12.50	required
	802.11ax20-HE0	6	2437	MCS0	12.50	required
		11	2462		12.50	
		3	2422		12.50	
	802.11n40-HT0	6	2437	MCS0	12.50	
		9	2452		12.50	
		3	2422		12.50	
	802.11ax40-HE0	6	2437	MCS0	12.50	
		9	2452		12.50	

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		WL	AN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180		10.50	
	802.11a	40	5200	6Mbps	10.50	
	002.118	44	5220	Ownps	10.50	
		48	5240		10.50	
		36	5180		10.50	
	802.11n20-HT0	40	5200	MCS0	10.50	Not required
		44	5220	MICCO	10.50	
		48	5240		10.50	
		36	5180	MCS0	10.50	
	802.11ax20-HE0	40	5200		10.50	
5.15-5.25 GHz	002.114720-1120	44	5220	101030	10.50	
		48	5240		10.50	
	802.11n40-HT0	38	5190	MCS0	10.50	
	002.11140-1110	46	5230	MCGO	10.50	
	802.11ax40-HE0	38	5190	MCS0	10.50	
	002.11ax40-11L0	46	5230	MC30	10.50	
	802.11ac80-VHT0	42	5210	MCS0	10.50	
	802.11ax80-HE0	42	5210	MCS0	10.50	
	802.11ac160-VHT0	50	5250	MCS0	10.50	10.48
	802.11ax160-HE0	50	5250	MCS0	10.50	Not required

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		WL	AN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260		10.50	
	802.11a	56	5280	6Mbps	10.50	
	002.11a	60	5300	olvibps	10.50	
		64	5320		10.50	
		52	5260		10.50	Not required
	802.11n20-HT0	56	5280	MCS0	10.50	
	002.11120-1110	60	5300		10.50	
		64	5320		10.50	
		52	5260		10.50	
5.25-5.35 GHz	802.11ax20-HE0	56	5280	MCS0	10.50	
	002.11ax20-ne0	60	5300	10030	10.50	
		64	5320		10.50	
	802.11n40-HT0	54	5270	MCS0	10.50	
	002.11140-0110	62	5310	10030	10.50	
	802.11ax40-HE0	54	5270	MCS0	10.50	
	002.11ax40-FEU	62	5310	MC30	10.50	
	802.11ac80-VHT0	58	5290	MCS0	10.50	10.49
	802.11ax80-HE0	58	5290	MCS0	10.50	Not required

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		WL	AN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		9.50	
	802.11a	120	5600	6Mbps	9.50	
	002.118	140	5700		9.50	
		144	5720		9.50	
		100	5500		9.50	
	802.11n20-HT0	120	5600	MCS0	9.50	
	802.11n20-HT0 -	140	5700		9.50	
		144	5720		9.50	
		100	5500		9.50	
		120	5600	MCS0	9.50	Not
		140	5700		9.50	required
		144	5720		9.50	
		102	5510	MCS0	9.50	
	802.11n40-HT0	118	5590		9.50	
5.6GHz	002.11140-010	134	5670		9.50	
		142	5710		9.50	
		102	5510		9.50	
	802.11ax40-HE0	118	5590	MCS0	9.50	
	002.11ax40-ne0	134	5670	MCSU	9.50	
		142	5710	1	9.50	
		106	5530		9.50	9.47
	802.11ac80-VHT0	122	5610	MCS0	9.50	9.44
		138	5690		9.50	9.49
		106	5530		9.50	Not
	802.11ax80-HE0	122	5610	MCS0	9.50	
		138	5690	]	9.50	required
	802.11ac160-VHT0	114	5570	MCS0	9.50	9.49
	802.11ax160-HE0	114	5570	MCS0	9.50	Not required

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		WL	AN Aux			
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		8.50	
	802.11a	157	5785	6Mbps	8.50	Not required
		165	5825		8.50	
		149	5745		8.50	
	802.11n20-HT0	157	5785	MCS0	8.50	
		165	5825		8.50	
		149	5745		8.50	
5.8GHz	802.11ax20-HE0	157	5785	MCS0	8.50	
5.00112		165	5825		8.50	
	802.11n40-HT0	151	5755	MCS0	8.50	
	002.11140-0110	159	5795	10030	8.50	
	802.11ax40-HE0	151	5755	MCS0	8.50	
	002.11aX40-HE0	159	5795	1000	8.50	
	802.11ac80-VHT0	155	5775	MCS0	8.50	8.48
	802.11ax80-HE0	155	5775	MCS0	8.50	Not required

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#### WIFI 6E power:

#### Notebook mode

	WLAN Main								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		1	5955		5.00				
	802.11ax20-HE0	45	6175	MCS0	5.00	Not required			
		93	6415		5.00				
	802.11ax40-HE0	3	5965	MCS0	8.25				
		43	6165		8.25				
U-NII-5		91	6405		8.25				
6.2GHz		7	5985		10.75				
	802.11ax80-HE0	39	6145	MCS0	10.75				
		87	6385		10.75	1			
		15	6025	MCS0	13.50	12.86			
	802.11ax160-HE0	47	6185		13.50	12.83			
		79	6345		13.50	12.48			

	WLAN Main								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
	802.11ax20-HE0	97	6435	MCS0	5.00	Not required			
		105	6475		5.00				
		113	6515		5.00				
U-NII-6	802.11ax40-HE0	99	6445	MCS0	8.25				
6.5GHz	002.118X40-HEU	107	6485	101030	8.25				
		103	6465	MCSO	10.75				
	802.11ax80-HE0	119	6545	MCS0	10.75				
	802.11ax160-HE0	111	6505	MCS0	13.50	13.11			

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		1	WLAN Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		117	6535		4.25	
	802.11ax20-HE0	149	6695	MCS0	4.25	Not required
		181	6855		4.25	
		115	6525		8.25	
U-NII-7	802.11ax40-HE0	147	6685	MCS0	7.50	
6.7GHz		179	6845		7.50	
0.7 GHZ		135	6625		10.00	
	802.11ax80-HE0	151	6705	MCS0	10.00	
		167	6785		10.00	
	802.11ax160-HE0	143	6665	MCS0	12.75	12.72
		175	6825	10000	12.75	12.65

	WLAN Main									
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)				
	802.11ax20-HE0	185	6875		4.25					
		209	6995	MCS0	4.25					
		233	7115		-1.00					
U-NII-8	802.11ax40-HE0	187	6885	MCS0	7.50	Not				
0-111-0 7.0GHz	002.11ax40-HEU	227	7085	101030	7.50	required				
7.0GHZ		183	6865		10.00					
	802.11ax80-HE0	199	6945	MCS0	10.00					
		215	7025		10.00					
	802.11ax160-HE0	207	6985	MCS0	12.75	12.69				

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	WLAN Aux								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		1	5955		5.00				
	802.11ax20-HE0	45	6175	MCS0	5.00	Not required			
		93	6415		5.00				
		3	5965		8.25				
	802.11ax40-HE0	43	6165	MCS0	8.25				
U-NII-5		91	6405		8.25				
6.2GHz		7	5985		10.75				
	802.11ax80-HE0	39	6145	MCS0	10.75				
		87	6385		10.75				
		15	6025	MCS0	13.50	12.97			
	802.11ax160-HE0	47	6185		13.50	12.95			
		79	6345		13.50	12.74			

	WLAN Aux								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
	802.11ax20-HE0	97	6435	MCS0	5.00	Not required			
		105	6475		5.00				
		113	6515		5.00				
U-NII-6	802.11ax40-HE0	99	6445	MCS0	8.25				
6.5GHz	002.11ax40-11E0	107	6485	10030	8.25				
	802.11ax80-HE0	103	6465	MCS0	10.75				
		119	6545		10.75				
	802.11ax160-HE0	111	6505	MCS0	13.50	13.11			

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	WLAN Aux										
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)					
		117	6535		4.25						
	802.11ax20-HE0	149	6695	MCS0	4.25	Not required					
		181	6855		4.25						
		115	6525		8.25						
U-NII-7	802.11ax40-HE0	147	6685	MCS0	7.50						
6.7GHz		179	6845		7.50						
0.7 GHZ		135	6625		10.00						
	802.11ax80-HE0	151	6705	MCS0	10.00						
		167	6785		10.00						
	802.11ax160-HE0	143	6665	MCS0	12.75	12.49					
		175	6825	10000	12.75	12.47					

	WLAN Aux										
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)					
		185	6875		4.25						
	802.11ax20-HE0	209	6995	MCS0	4.25						
		233	7115		-1.00						
U-NII-8	802.11ax40-HE0	187	6885	MCS0	7.50	Not					
0-1011-0 7.0GHz	002.11ax40-11E0	227	7085	10030	7.50	required					
1.0002		183	6865		10.00						
	802.11ax80-HE0	199	6945	MCS0	10.00	]					
		215	7025		10.00						
	802.11ax160-HE0	207	6985	MCS0	12.75	12.74					

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#### Tablet mode

WLAN Main									
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		1	5955		5.00				
	802.11ax20-HE0	45	6175	MCS0	5.00	Not required			
		93	6415		5.00				
	802.11ax40-HE0	3	5965	MCS0	8.25				
		43	6165		8.25				
U-NII-5		91	6405		8.25				
6.2GHz		7	5985		9.00				
	802.11ax80-HE0	39	6145	MCS0	9.00				
		87	6385		9.00				
		15	6025	MCS0	9.00	8.92			
	802.11ax160-HE0	47	6185		9.00	8.97			
		79	6345		9.00	8.98			

WLAN Main										
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)				
		97	6435		5.00	Not required				
	802.11ax20-HE0	105	6475	MCS0	5.00					
		113	6515		5.00					
U-NII-6	802.11ax40-HE0	99	6445	MCS0	8.25					
6.5GHz	002.11ax40-ne0	107	6485	IVIC30	8.25					
		103	6465	MOOD	9.00					
	802.11ax80-HE0	119	6545	MCS0	9.00					
	802.11ax160-HE0	111	6505	MCS0	9.00	8.99				

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		1	WLAN Main			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		117	6535		4.25	
	802.11ax20-HE0	149	6695	MCS0	4.25	Not required
		181	6855		4.25	
		115	6525		8.25	
U-NII-7	802.11ax40-HE0	147	6685	MCS0	7.50	
6.7GHz		179	6845		7.50	
0.7 GHZ		135	6625		9.00	
	802.11ax80-HE0	151	6705	MCS0	9.00	
		167	6785		9.00	
	802.11ax160-HE0	143	6665	MCS0	9.00	8.98
	002.11ax100-11E0	175	6825	10000	9.00	8.97

	WLAN Main										
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)					
		185	6875		4.25	Not required					
	802.11ax20-HE0	209	6995	MCS0	4.25						
		233	7115		-1.00						
	802.11ax40-HE0	187	6885	MCS0	7.50						
U-NII-8	002.11ax40-HE0	227	7085	WC30	7.50						
7.0GHz	183         6865           802.11ax80-HE0         199         6945         MCS0           215         7025         MCS0		9.00	8.95							
		199	6945	MCS0	8.50	8.46					
		215	7025		8.50	8.44					
	802.11ax160-HE0	207	6985	MCS0	8.50	Not required					

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	WLAN Aux										
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)					
		1	5955		5.00						
	802.11ax20-HE0	45	6175	MCS0	5.00	Not required					
		93	6415		5.00						
	802.11ax40-HE0	3	5965	MCS0	8.25						
		43	6165		8.25						
U-NII-5		91	6405		8.25						
6.2GHz		7	5985		9.00						
	802.11ax80-HE0	39	6145	MCS0	9.00						
		87	6385		9.00						
		15	6025	MCS0	9.00	8.97					
	802.11ax160-HE0	47	6185		9.00	8.99					
		79	6345		9.00	8.98					

	WLAN Aux										
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)					
		97	6435		5.00	Not required					
	802.11ax20-HE0	105	6475	MCS0	5.00						
		113	6515		5.00						
U-NII-6	802.11ax40-HE0	99	6445	MCS0	8.25						
6.5GHz	6.5GHz   602.118x40-HE0	107	6485	IVIC30	8.25						
[	802.11ax80-HE0	103	6465	MCS0	9.00						
	002.118X00-HEU	119	6545		9.00						
	802.11ax160-HE0	111	6505	MCS0	9.00	8.98					

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			WLAN Aux			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		117	6535		4.25	
	802.11ax20-HE0	149	6695	MCS0	4.25	Not required
		181	6855		4.25	
		115	6525		8.25	
U-NII-7	802.11ax40-HE0	147	6685	MCS0	7.50	
6.7GHz		179	6845		7.50	
0.7 GHZ		135	6625		9.00	
	802.11ax80-HE0	151	6705	MCS0	9.00	
		167	6785		9.00	
	802.11ax160-HE0	143	6665	MCS0	9.00	8.99
	002.11ax100-11E0	175	6825	10030	9.00	8.97

	WLAN Aux										
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)					
	802.11ax20-HE0	185	6875		4.25						
		209	6995	MCS0	4.25	Not required					
		233	7115		-1.00						
	802.11ax40-HE0	187	6885	MCS0	7.50						
U-NII-8	002.11ax40-nE0	227	7085	101030	7.50						
7.0GHz	802.11ax80-HE0	183	6865		9.00	8.97					
		199	6945	MCS0	8.50	8.44					
		215	7025		8.50	8.46					
	802.11ax160-HE0	207	6985	MCS0	8.50	Not required					

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#### Bluetooth conducted power table:

			- 1M	1Mbps		bps	3Mbps	
Mode	Channel	Frequency (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	(dBm)	Max. Rated Avg. Power + Max. Tolerance (dBm)	(dBm)	Max. Rated Avg. Power + Max. Tolerance (dBm)	(dBm)
	CH 00	2402		9.02		6.94		6.92
<b>BR/EDR</b>	CH 39	2441	11.00	9.11	7.00	6.92	7.00	6.91
	CH 78	2480		9.21		6.98		6.96

Mode	Channel	Frequency	GFSK			
Mode	Channer	(MHz)	Max. Rated Avg.Power + Max. Tolerance (dBm)	Average Output Power (dBm)		
	CH 00	2402		6.79		
BLE_1M	CH 19	2440	7	6.88		
	CH 39	2480		6.98		
Mode	Channel	Frequency	GFSK			
Mode	Channer	(MHz)	Max. Rated Avg.Power + Max. Tolerance (dBm)	Average Output Power (dBm)		
	CH 00	2402		6.45		
BLE_2M	CH 19	2440	7	6.75		
—	CH 39	2480		6.85		

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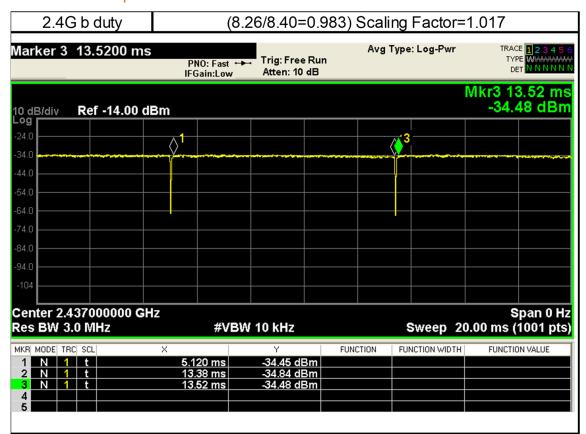
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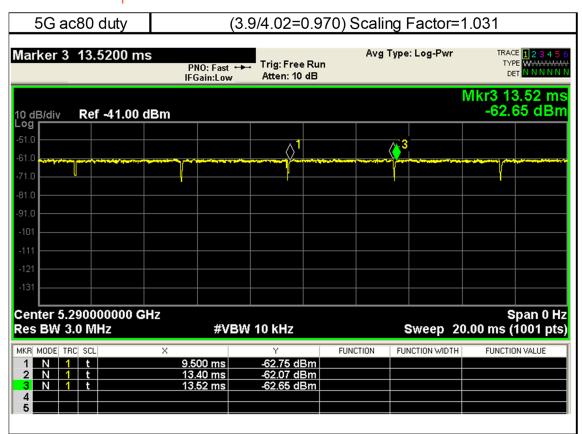
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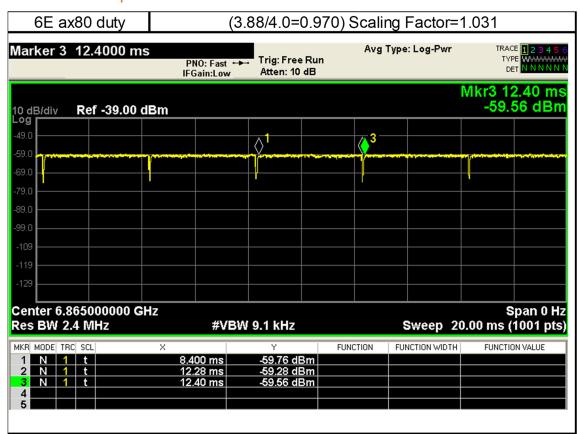


5G ac160 duty (3.92/4.04=0.970) Scaling Factor=1.031							
	Trig: Free Run Atten: 10 dB		Type: Log-Pwr	TRACE 2345 TYPE DET NNNNN			
dBm			N	/kr3 11.64 m -56.55 dBr			
		<b>3</b>					
	W 10 kHz		Sweep 20.	Span 0 H .00 ms (1001 pt			
×	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE			
7.600 ms 11.52 ms 11.64 ms	-56.99 dBm -56.63 dBm -56.55 dBm						
	ns PNO: Fast IFGain:Low dBm dBm GHz #VB X 7.600 ms 11.52 ms	ns PNO: Fast $\rightarrow$ IFGain:Low Trig: Free Run Atten: 10 dB OdBm	Avg PN0: Fast Avg Avg Atten: 10 dB dBm dBm dBm dBm dBm dBm dBm d	Avg Type: Log-Pwr Trig: Free Run Atten: 10 dB Atten: 10			

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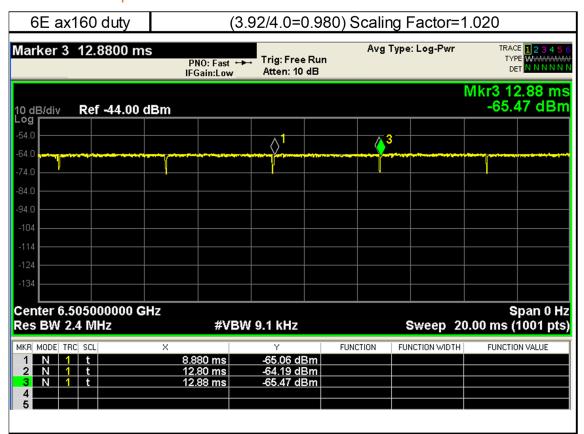




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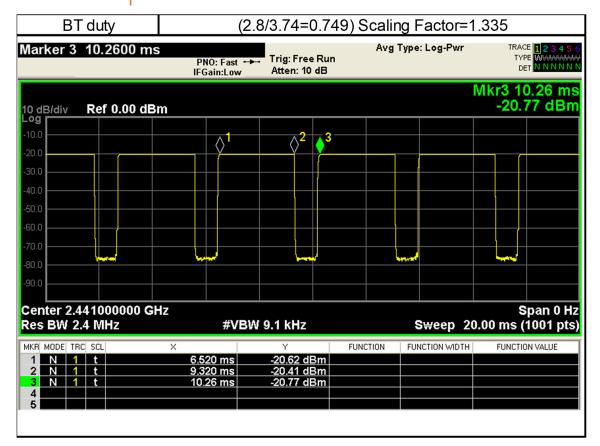
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### **1.4 Test Environment**

Ambient Temperature: 22±2° C Tissue Simulating Liquid: 22±2° C

# **1.5 Operation Description**

- 1. An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band.
- 2. SAR is measured using the highest measured maximum output power channel. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is  $\leq$  1.2 W/kg or all required channels are tested.
- 3. Since the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for subsequent test configuration.
- 4. Per 201904 TCBC workshops, general principles of FCC KDB Publication 248227 D01 can be applied to determine the SAR Initial Test Configurations and test reduction for 802.11ax SAR testing.
- 5. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing. For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands
- 6. According to KDB865664 D01, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is  $\geq 0.8$  W/kg. repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is  $\geq$  1.45 W/kg (~10% from the 1-g SAR limit)
- 7. WIFI 6E of the device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.
- 8. Per October 2020 & April 2021 TCB Workshop Interim procedures and FCC guidance, start instead with a minimum of 5 test channels across the full band, then adapt and apply conducted power and SAR test reduction procedures of KDB Pub. 248227 v02r02.
- 9. WIFI 6E SAR is measured by using 6-7GHz parameters per IEC/IEEE62209-1528:2020 and report also estimated absorbed PD (for reference purposes only, not specifically for compliance).

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- 10. For the highest SAR test configurations also measure incident PD (total) using mmW near-field probe and total-field/power-density reconstruction method.
- 11. The PD test was performed with a 2 mm separation between probe sensor and EUT surface.
- 12. According to October 2020 TCB Workshop Interim procedures, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.67 dB (85%) was used to determine the psPD measurement scaling factor.

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# 1.6 Operating modes validation by power measurement

The device is a convertible laptop computer with predefined single fixed power to each device modes.

For the operating modes validation, the measured conducted output power is monitored qualitatively to identify the triggering characteristics and recorded quantitatively.

Device Mode	Lid Open Angle description Lid Close → Laptop → Tablet	Lid Open Angle description Tablet $\rightarrow$ Laptop $\rightarrow$ Lid Close	Mode Reported to OS for WLAN	
Lid Close	0° ≤ Lid angle <12.5 ° (GMR Sensor Trigger)	0° ≤ Lid angle <12.5 ° (GMR Sensor Trigger)	Standby	
Laptop	12.5° ≤ Lid angle < 200° (G-Sensor Trigger)	12.5° ≤ Lid angle < 160° (G-Sensor Trigger)	Notebook	
Tablet	200° ≤ Lid angle ≤ 360° (G-Sensor Trigger)	160° ≤ Lid angle ≤ 360° (G-Sensor Trigger)	Non-notebook	

#### 1.6.1 Results and conclusion

The measured output power versus lid angle is tabulated in the following table based on the guidance from 2019-11 TCB workshop, and the triggering verification complies with the device mode / power level declared by the manufacturer.

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Antenna	Operation mode	Lid angle	802.11b	802.11ac(80M) 5.2G	802.11ac(80M) 5.3G	802.11ac(80M) 5.6G	802.11ac(80M) 5.8G	U-NII-5 802.11ax(160M)	U-NII-6 802.11ax(160M)	U-NII-7 802.11ax(160M)	U-NII-8 802.11ax(160M)
	Lid close	0°	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Lid close	10°	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Laptop	20° 15°	15.90 15.90	14.45 14.45	14.45 14.45	14.91 14.89	16.48 16.41	12.76 12.79	13.07 13.08	12.62	12.63 12.69
		10°	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Lid close	11°	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		12° 13°	n/a 15.93	n/a 14.48	n/a 14.46	n/a 14.98	n/a 16.43	n/a 12.79	n/a 13.07	n/a 12.68	n/a 12.65
		14°	15.93	14.46	14.46	14.89	16.42	12.85	13.02	12.64	12.66
		15°	15.90	14.45	14.43	14.92	16.40	12.76	13.08	12.66	12.60
		16° 17°	15.91 15.98	14.44 14.39	14.46 14.40	14.89 14.91	16.44 16.38	12.81 12.80	13.09 13.03	12.65 12.70	12.69 12.60
		18°	15.92	14.44	14.45	14.93	16.39	12.00	13.10	12.65	12.64
		19°	15.98	14.45	14.41	14.92	16.48	12.86	13.09	12.70	12.61
		20° 30°	15.93 15.90	14.41	14.47	14.89 14.96	16.44 16.48	12.84 12.78	13.03 13.11	12.65	12.59 12.69
		40°	15.96	14.40	14.44	14.90	16.44	12.80	13.06	12.64	12.60
		50°	15.95	14.47	14.45	14.94	16.46	12.84	13.04	12.66	12.68
	Laptop	60° 70°	15.97	14.47 14.43	14.44 14.49	14.88 14.92	16.39 16.42	12.78 12.83	13.07 13.04	12.70 12.64	12.59 12.65
	Laptop	80°	15.97	14.49	14.42	14.97	16.41	12.86	13.03	12.65	12.68
		90°	15.89	14.47	14.48	14.92	16.45	12.80	13.02	12.69	12.63
		100° 110°	15.90 15.91	14.48 14.45	14.44	14.88 14.91	16.43 16.42	12.79 12.83	13.02 13.06	12.70 12.70	12.66 12.65
		120°	15.99	14.47	14.48	14.88	16.41	12.82	13.11	12.66	12.68
		130°	15.89	14.44	14.42	14.96	16.46	12.78	13.03	12.68	12.67
		140° 150°	15.89 15.90	14.39 14.46	14.46 14.43	14.91 14.93	16.38 16.41	12.81 12.77	13.08 13.05	12.68 12.70	12.60 12.65
		160°	15.94	14.40	14.43	14.92	16.39	12.84	13.11	12.68	12.62
		170°	15.98	14.48	14.39	14.93	16.45	12.86	13.07	12.70	12.59
		180° 190°	15.97 15.92	14.47 14.44	14.47 14.45	14.96 14.93	16.43 16.39	12.83 12.81	13.11 13.01	12.62 12.63	12.68 12.61
	Table	200°	12.41	9.97	9.94	9.44	8.98	8.90	8.91	8.98	8.95
		195°	15.97	14.43	14.41	14.91	16.40	12.81	13.09	12.66	12.67
	Laptop	196° 197°	15.94	14.41	14.44 14.39	14.92 14.92	16.47 16.48	12.85 12.80	13.11 13.03	12.62	12.67 12.65
	Laptop	197°	15.99	14.47	14.39	14.92	16.48	12.80	13.03	12.64	12.65
	L	199°	15.97	14.43	14.49	14.88	16.40	12.79	13.08	12.67	12.59
		200° 201°	12.48	9.94 9.99	9.92 9.95	9.47	8.92 8.92	8.90 8.92	8.93 8.91	8.95 8.94	8.92 8.95
		202°	12.41	9.92	9.92	9.48	8.98	8.94	8.92	8.95	8.93
		203°	12.46	9.91	9.96	9.42	8.97	8.89	8.89	8.98	8.85
		204° 205°	12.41 12.40	9.92 9.97	9.90 9.97	9.42 9.48	8.94 8.98	8.95 8.93	8.89 8.97	8.96 8.97	8.89 8.94
		206°	12.43	9.92	9.91	9.41	8.94	8.93	8.99	8.91	8.87
		207°	12.41	9.97	9.95	9.41	8.96	8.90	8.98	8.98	8.94
		208° 209°	12.47	9.91	9.89	9.39	8.92	8.89 8.91	8.95	8.96	8.89
		210°	12.39	9.94	9.88	9.39	8.92	8.93	8.95	8.89	8.93
		220° 230°	12.44	9.91 9.90	9.94	9.42 9.45	8.90	8.98	8.97	8.92 8.93	8.88
	Table	230°	12.48	9.90	9.96 9.93	9.45	8.90 8.96	8.90 8.88	8.90 8.98	8.93	8.95 8.95
		250°	12.39	9.95	9.89	9.49	8.89	8.92	8.91	8.97	8.85
		260° 270°	12.41	9.92 9.95	9.88 9.88	9.45 9.44	8.97 8.96	8.88 8.96	8.90 8.95	8.90 8.89	8.91 8.95
		280°	12.41	9.96	9.90	9.43	8.90	8.98	8.93	8.95	8.94
		290°	12.48	9.94	9.92	9.48	8.97	8.88	8.95	8.97	8.85
		300° 310°	12.46 12.38	9.91 9.92	9.98 9.98	9.42 9.39	8.95 8.96	8.96 8.97	8.96 8.89	8.92 8.97	8.90 8.95
Main		320°	12.38	9.92	9.93	9.46	8.95	8.92	8.97	8.96	8.89
		330°	12.44	9.96	9.96	9.41	8.92	8.93	8.96	8.89	8.92
		340° 350°	12.46	9.97	9.97 9.92	9.49	8.97	8.94 8.89	8.94	8.88	8.89 8.86
		360°	12.38	9.94	9.93	9.47	8.91	8.88	8.91	8.89	8.89
		350° 340°	12.41	9.89	9.93 9.98	9.44 9.44	8.94 8.90	8.91 8.93	8.95 8.92	8.97 8.97	8.91 8.88
		340 330°	12.46	9.99	9.98	9.44	8.93	8.95	8.93	8.92	8.91
		320°	12.38	9.93	9.98	9.44	8.93	8.94	8.94	8.89	8.87
		310° 300°	12.47 12.41	9.98	9.92	9.45 9.49	8.91 8.90	8.90 8.96	8.95 8.98	8.90	8.86 8.89
		290°	12.41	9.96	9.89	9.48	8.96	8.97	8.89	8.97	8.95
		280°	12.48	9.90	9.93	9.41	8.95	8.95	8.94	8.98	8.93
		270° 260°	12.48	9.90	9.96	9.46 9.42	8.89	8.96	8.90	8.88	8.94 8.92
	Table	250°	12.39	9.93	9.89	9.41	8.95	8.88	8.95	8.92	8.85
		240°	12.39	9.97	9.96	9.43	8.98	8.95	8.89	8.92	8.87
		230° 220°	12.45 12.47	9.97 9.90	9.98 9.96	9.42 9.47	8.95 8.95	8.89 8.89	8.93 8.95	8.96 8.89	8.86 8.88
	1	210°	12.41	9.89	9.88	9.44	8.91	8.95	8.89	8.98	8.88
		200°	12.38	9.90 9.94	9.96 9.94	9.49	8.91	8.88	8.91 8.90	8.91	8.87 8.94
		190° 180°	12.40 12.48	9.94	9.94 9.92	9.41 9.41	8.94	8.90 8.91	8.90	8.92 8.88	8.94
		170°	12.45	9.91	9.94	9.41	8.96	8.98	8.89	8.88	8.88
	l	160°	12.45	9.96	9.89	9.46	8.94	8.93	8.98	8.90	8.94
	Laptop	150° 155°	15.96 15.91	14.41 14.48	14.48 14.42	14.96 14.89	16.38 16.40	12.82 12.83	13.10 13.03	12.66 12.72	12.67 12.64
	Table	160°	12.40	9.98	9.88	9.39	8.95	8.93	8.93	8.90	8.86
		159°	15.89	14.42	14.49	14.90	16.38	12.82	13.10	12.67	12.63
		158° 157°	15.95 15.91	14.44 14.47	14.47 14.41	14.95 14.91	16.45 16.46	12.82 12.80	13.04 13.07	12.68 12.65	12.63 12.64
		156°	15.91	14.47	14.40	14.91	16.38	12.80	13.07	12.65	12.63
		155°	15.95	14.47	14.45	14.97	16.39	12.83	13.05	12.71	12.67
		154°	15.98	14.49 14.47	14.47 14.49	14.90 14.96	16.47 16.48	12.82	13.09 13.05	12.64	12.64
		153° 152°	15.90 15.90	14.47	14.49	14.96 14.88	16.48	12.82 12.86	13.05	12.67 12.70	12.68 12.66
		151°	15.89	14.43	14.40	14.92	16.44	12.85	13.06	12.70	12.66
	1	150°	15.91	14.44	14.46	14.89	16.39	12.81	13.10	12.67	12.66
	Laptop	140° 130°	15.91 15.91	14.46 14.43	14.40 14.43	14.94 14.91	16.38 16.38	12.84 12.76	13.07 13.04	12.69 12.64	12.65 12.65
		120°	15.93	14.49	14.44	14.98	16.46	12.80	13.11	12.65	12.60
		110°	15.99	14.49	14.40	14.93	16.47	12.76	13.10	12.62	12.62
		100° 90°	15.95	14.39	14.41 14.45	14.88 14.92	16.44 16.38	12.77	13.04 13.04	12.63	12.60 12.67
		80°	15.89	14.42	14.40	14.93	16.48	12.86	13.11	12.65	12.67
		70° 60°	15.89 15.90	14.46	14.49	14.90	16.46 16.42	12.76	13.02	12.72 12.65	12.64
		60° 50°	15.90	14.42 14.43	14.41 14.43	14.89 14.91	16.42	12.86 12.84	13.05 13.11	12.69	12.64 12.68
		40°	15.91	14.47	14.43	14.97	16.43	12.83	13.01	12.68	12.59
		30° 20°	15.96 15.93	14.48 14.49	14.43 14.47	14.98 14.88	16.39 16.39	12.79 12.76	13.02 13.03	12.68	12.65 12.66
	Lid close	20° 10°	15.93 n/a	14.49 n/a	14.47 n/a	14.88 n/a	16.39 n/a	12.76 n/a	13.03 n/a	12.67 n/a	12.66 n/a
		15°	15.94	14.45	14.44	14.90	16.40	12.82	13.02	12.63	12.62
	Laptop	14°	15.89	14.39	14.40	14.97	16.43	12.80	13.03	12.68	12.66
I		13° 12°	15.91 n/a	14.42 n/a	14.43 n/a	14.95 n/a	16.39 n/a	12.85 n/a	13.02 n/a	12.70 n/a	12.68 n/a
1	Lid close	11°	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		10° 0°	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
n		v	1//4		140	180				.va	a

#### Operating mode validation by power measurement

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Antenna	Operation mode	Lid angle	802.11b	802.11ac(80M) 5.2G	802.11ac(80M) 5.3G	802.11ac(80M) 5.6G	802.11ac(80M) 5.8G	U-NII-5 802.11ax(160M)	U-NII-6802.11ax(160M)	U-NII-7802.11ax(160M)	U-NII-8802.11ax(160M)
Antenna	Lid close	0°	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10° 20°	n/a 15.48	n/a 16.79	n/a 17.40	n/a 17.23	n/a 17.47	n/a 12.96	n/a 13.01	n/a 12.43	n/a 12.74
	Laptop	15°	15.42	16.77	17.45	17.15	17.45	12.94	13.05	12.44	12.67
	Lid close	10° 11°	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
		12° 13°	n/a 15.44	n/a 16.78	n/a 17.40	n/a 17.24	n/a 17.41	n/a 12.95	n/a 13.07	n/a 12.47	n/a 12.68
		14°	15.47	16.85	17.43	17.21	17.40	12.95	13.02	12.43	12.69
		15° 16°	15.47 15.48	16.80 16.83	17.37 17.39	17.18 17.17	17.44 17.45	12.91 12.97	13.07 13.08	12.47 12.43	12.69 12.73
		17° 18°	15.48 15.39	16.80 16.80	17.43 17.45	17.16 17.16	17.40 17.44	12.90 12.96	13.10 13.05	12.42 12.45	12.72 12.64
		19°	15.40	16.77	17.45	17.22	17.40	12.88	13.06	12.42	12.69
		20° 30°	15.47 15.44	16.83	17.38 17.45	17.17 17.18	17.47	12.91 12.96	13.08	12.48 12.41	12.71 12.74
		40° 50°	15.42 15.42	16.84 16.81	17.45 17.41	17.23 17.20	17.44 17.46	12.92	13.04 13.11	12.46 12.48	12.70 12.64
		60°	15.48	16.85	17.45	17.23	17.41	12.97	13.11	12.49	12.67
	Laptop	70° 80°	15.39 15.48	16.84 16.85	17.46 17.41	17.22 17.20	17.44 17.47	12.96 12.97	13.06 13.07	12.42 12.42	12.73 12.71
		90° 100°	15.42 15.46	16.83 16.81	17.40 17.43	17.22 17.22	17.40 17.38	12.95 12.90	13.10 13.01	12.44 12.42	12.67 12.70
		110°	15.48	16.87	17.37	17.18	17.44	12.95	13.01	12.42	12.71
		120° 130°	15.45 15.44	16.83 16.82	17.42 17.42	17.22 17.23	17.43 17.38	12.94 12.90	13.05	12.40 12.48	12.73 12.64
		140° 150°	15.48 15.44	16.77 16.85	17.41 17.45	17.18 17.21	17.38 17.44	12.97 12.89	13.09 13.08	12.40 12.42	12.73 12.69
		160°	15.42	16.84	17.42	17.19	17.44	12.95	13.04	12.39	12.64
		170° 180°	15.43 15.42	16.85	17.46 17.37	17.16 17.18	17.44	12.96 12.96	13.03 13.02	12.45 12.44	12.70 12.68
	Table	190° 200°	15.38 12.41	16.82 10.39	17.38 10.42	17.14	17.41 8.48	12.91	13.01	12.42	12.68
		195°	15.48	16.81	17.37	17.23	17.44	12.88	13.07	12.39	12.67
	Laptop	196° 197°	15.41 15.48	16.80 16.79	17.41 17.44	17.16 17.17	17.48 17.41	12.95 12.91	13.09 13.02	12.39 12.46	12.74 12.67
		198° 199°	15.48 15.48	16.87 16.84	17.37 17.43	17.22 17.23	17.47 17.47	12.93 12.88	13.08 13.11	12.45 12.45	12.73 12.72
		200° 201°	12.38	10.38	10.41	9.42	8.41	8.91	8.91	8.91	8.89
		202°	12.43	10.46	10.44	9.45	8.42	8.99	8.92	8.98	8.96
		203° 204°	12.39 12.38	10.46	10.45 10.48	9.43 9.47	8.45 8.46	8.90 8.99	8.94 8.97	8.91 8.99	8.97 8.87
		205°	12.38	10.44	10.43	9.39	8.48	8.92	8.89	8.91	8.93
		206° 207°	12.43 12.38	10.43 10.46	10.45 10.41	9.39 9.47	8.47 8.48	8.95 8.99	8.95	8.98 8.92	8.87 8.96
		208° 209°	12.38 12.42	10.48	10.39 10.47	9.42 9.44	8.41 8.41	8.97 8.92	8.95 8.97	8.90 8.95	8.90 8.88
		210° 220°	12.39 12.43	10.38 10.40	10.48 10.43	9.44 9.43	8.42 8.46	8.94 8.96	8.91 8.94	8.90 8.94	8.97 8.94
	Table	230°	12.44	10.43	10.43	9.45	8.38	8.93	8.96	8.91	8.94
	Table	240° 250°	12.45 12.48	10.48	10.42	9.45 9.42	8.43 8.46	8.94 8.92	8.98 8.98	8.89 8.98	8.87 8.87
		260°	12.47	10.39	10.43	9.42	8.47	8.97	8.88	8.92	8.89
		270° 280°	12.41 12.47	10.39 10.46	10.45 10.40	9.41 9.40	8.41 8.40	8.98 8.93	8.98 8.95	8.98 8.90	8.87 8.95
		290° 300°	12.38 12.45	10.41	10.44	9.41 9.49	8.46 8.45	8.95 8.90	8.88	8.99 8.93	8.88 8.92
		310° 320°	12.39 12.42	10.43 10.41	10.40 10.48	9.44 9.45	8.38 8.43	8.94 8.92	8.91 8.92	8.97 8.94	8.87 8.89
Aux		330°	12.41	10.43	10.40	9.43	8.45	8.94	8.94	8.96	8.93
		340° 350°	12.38 12.41	10.44 10.46	10.39 10.47	9.46 9.39	8.39 8.45	8.89 8.97	8.89 8.92	8.96 8.93	8.89 8.89
		360° 350°	12.38 12.42	10.47 10.45	10.42 10.48	9.48 9.45	8.43 8.38	8.91 8.89	8.95 8.89	8.91 8.94	8.93 8.92
		340°	12.44	10.43	10.44	9.42	8.44	8.96	8.94	8.92	8.87
		330° 320°	12.38 12.43	10.39 10.39	10.48 10.45	9.47 9.39	8.40 8.44	8.99 8.90	8.98 8.90	8.96 8.95	8.95 8.90
		310° 300°	12.48 12.48	10.42	10.47 10.41	9.43 9.46	8.46 8.39	8.93 8.89	8.97	8.97 8.94	8.94 8.88
		290° 280°	12.41 12.44	10.41 10.40	10.49 10.43	9.40 9.41	8.47 8.45	8.91 8.91	8.95 8.90	8.93 8.95	8.88 8.91
		270°	12.47	10.41	10.45	9.46	8.40	8.99	8.97	8.98	8.91
	Table	260° 250°	12.46 12.39	10.42	10.43	9.44 9.48	8.47 8.45	8.99 8.98	8.89 8.88	8.91 8.94	8.96 8.92
		240° 230°	12.44 12.42	10.45	10.41 10.46	9.43 9.41	8.43 8.44	8.98 8.95	8.92 8.94	8.99 8.93	8.96 8.91
		220°	12.48	10.46	10.44	9.42	8.39	8.96	8.88	8.94	8.96
		210° 200°	12.39 12.45	10.46 10.38	10.41 10.41	9.49 9.49	8.47 8.48	8.99 8.99	8.90 8.92	8.97 8.89	8.87 8.90
		190° 180°	12.38 12.47	10.40 10.47	10.39 10.43	9.47 9.47	8.48 8.42	8.93 8.90	8.95 8.91	8.95 8.91	8.89 8.92
		170°	12.42	10.40	10.45	9.44	8.46	8.93	8.91	8.97	8.91
	1	160°	12.46	10.41	10.47	9.43	8.39		8.98	8.91	8.92
	1 - 1	150°	15.38	16.77	17.41	17.14	17.46	8.94 12.92	13.08	12.49	12.67
	Laptop	150° 155°	15.47	16.87	17.43	17.19	17.46 17.38	12.92 12.92	13.10	12.44	12.65
	Laptop Table	150°	15.47 12.41 15.44				17.46 17.38 8.41 17.40	12.92	13.10 8.93 13.09	12.44 8.96 12.42	
		150° 155° 160° 159° 158°	15.47 12.41 15.44 15.42	16.87 10.44 16.77 16.79	17.43 10.39 17.44 17.39	17.19 9.44 17.20 17.23	17.46 17.38 8.41 17.40 17.41	12.92 12.92 8.89 12.90 12.87	13.10 8.93 13.09 13.05	12.44 8.96 12.42 12.49	12.65 8.96 12.69 12.65
		150° 155° 160° 159° 158° 157° 156°	15.47 12.41 15.44 15.42 15.38 15.44	16.87 10.44 16.77 16.79 16.79 16.77	17.43 10.39 17.44 17.39 17.40 17.41	17.19 9.44 17.20 17.23 17.14 17.21	17.46 17.38 8.41 17.40 17.41 17.45 17.45	12.92 12.92 8.89 12.90 12.87 12.89 12.93	13.10 8.93 13.09 13.05 13.11 13.09	12.44 8.96 12.42 12.49 12.47 12.47 12.40	12.65 8.96 12.69 12.65 12.65 12.65 12.68
		150° 155° 160° 159° 158° 157°	15.47 12.41 15.44 15.42 15.38	16.87 10.44 16.77 16.79 16.79	17.43 10.39 17.44 17.39 17.40	17.19 9.44 17.20 17.23 17.14	17.46 17.38 8.41 17.40 17.41 17.45	12.92 12.92 8.89 12.90 12.87 12.89	13.10 8.93 13.09 13.05 13.11	12.44 8.96 12.42 12.49 12.47	12.65 8.96 12.69 12.65 12.65
		150° 155° 160° 159° 158° 157° 156° 155° 155° 154° 153°	15.47 12.41 15.44 15.42 15.38 15.44 15.38 15.44 15.38 15.42 15.45	16.87 10.44 16.77 16.79 16.79 16.77 16.83 16.83 16.83	17.43 10.39 17.44 17.39 17.40 17.41 17.45 17.43 17.38	17.19 9.44 17.20 17.23 17.14 17.21 17.21 17.19 17.19	17.46 17.38 8.41 17.40 17.41 17.45 17.46 17.39 17.45 17.39	12.92 8.89 12.90 12.87 12.89 12.93 12.93 12.94 12.97 12.92	13.10 8.93 13.09 13.05 13.11 13.09 13.03 13.11 13.10	12.44 8.96 12.42 12.49 12.47 12.40 12.49 12.48 12.43	12.65 8.96 12.69 12.65 12.65 12.65 12.71 12.71 12.72 12.74
		150° 155° 160° 159° 158° 157° 158° 155° 155° 154° 153° 152° 151°	15.47 12.41 15.44 15.42 15.38 15.44 15.38 15.42 15.45 15.42 15.45 15.44 15.40	16.87 10.44 16.77 16.79 16.79 16.77 16.83 16.83 16.83 16.80 16.86 16.84	17.43 10.39 17.44 17.39 17.40 17.41 17.45 17.43 17.43 17.43 17.47 17.46	17.19 9.44 17.20 17.23 17.14 17.21 17.21 17.19 17.14 17.18 17.14	17.46 17.38 8.41 17.40 17.41 17.45 17.45 17.45 17.39 17.45 17.39 17.45 17.39 17.42 17.42 17.40	12.92 12.92 8.89 12.90 12.87 12.89 12.93 12.94 12.97 12.97 12.92 12.88 12.87	13.10 8.93 13.09 13.05 13.11 13.09 13.03 13.11 13.10 13.04 13.04	12.44 8.96 12.42 12.49 12.47 12.40 12.49 12.48 12.43 12.39 12.39	12.65 8.96 12.69 12.65 12.65 12.65 12.65 12.71 12.72 12.74 12.74 12.68 12.71
		150° 155° 160° 159° 158° 157° 156° 155° 154° 153° 154° 153° 152° 151° 150°	15.47 12.41 15.44 15.42 15.38 15.44 15.38 15.44 15.45 15.45 15.45 15.45 15.40 15.43	16.87 10.44 16.79 16.79 16.79 16.77 16.83 16.83 16.83 16.80 16.86 16.84 16.84 16.78	17.43 10.39 17.44 17.30 17.41 17.45 17.43 17.43 17.38 17.47 17.46 17.38	17.19 9.44 17.20 17.23 17.14 17.21 17.21 17.21 17.19 17.14 17.18	17.46 17.38 8.41 17.40 17.41 17.45 17.46 17.39 17.45 17.39 17.42 17.40 17.42 17.45	12.92 12.92 8.89 12.90 12.87 12.83 12.93 12.93 12.94 12.97 12.92 12.88 12.87 12.87 12.87 12.87 12.82	13.10 8.93 13.09 13.05 13.01 13.09 13.03 13.03 13.03 13.11 13.10 13.04 13.04 13.05	12.44 8.96 12.42 12.49 12.47 12.40 12.49 12.48 12.48 12.43 12.39 12.39	12.65 8.96 12.69 12.65 12.65 12.68 12.71 12.72 12.74 12.74 12.74 12.74 12.64
		150° 155° 156° 158° 158° 155° 155° 154° 155° 154° 155° 154° 155° 151° 150° 140°	15.47 12.41 15.44 15.38 15.44 15.38 15.44 15.45 15.42 15.45 15.45 15.45 15.40 15.43 15.43	16.87 10.44 16.77 16.79 16.79 16.83 16.83 16.83 16.83 16.84 16.84 16.78 16.84 16.78	17.43 10.39 17.44 17.39 17.40 17.41 17.45 17.43 17.45 17.43 17.45 17.45 17.47 17.46 17.38 17.47 17.39	17.19 9.44 17.20 17.23 17.14 17.21 17.21 17.21 17.14 17.14 17.14 17.14 17.18 17.18 17.16	17.46 17.33 8.41 17.40 17.41 17.45 17.46 17.39 17.45 17.39 17.42 17.40 17.45 17.46 17.45 17.46 17.45 17.46 17.43	12.92 12.92 8.89 12.87 12.87 12.283 12.24 12.24 12.297 12.92 12.88 12.87 12.92 12.88 12.87 12.92 12.87 12.90	13.10 8.93 13.09 13.05 13.05 13.11 13.00 13.11 13.10 13.04 13.04 13.04 13.06 13.06 13.10	12.44 8.96 12.42 12.49 12.47 12.40 12.49 12.48 12.43 12.39 12.39 12.39 12.39 12.42 12.45	12.65 8.96 12.69 12.65 12.65 12.68 12.71 12.72 12.74 12.74 12.74 12.68 12.71 12.68 12.71
	Table	150° 155° 160° 159° 158° 155° 155° 155° 155° 154° 153° 152° 151° 152° 151° 150°	15.47 12.41 15.44 15.38 15.38 15.44 15.38 15.42 15.45 15.44 15.44 15.43	16.87 10.44 16.77 16.79 16.79 16.83 16.83 16.83 16.84 16.84 16.84 16.84 16.84	17.43 10.39 17.44 17.39 17.40 17.41 17.45 17.43 17.43 17.43 17.47 17.48 17.747 17.88 17.747	17.19 9.44 17.20 17.23 17.14 17.21 17.14 17.19 17.14 17.18 17.18 17.18 17.18 17.18	17.46 17.38 8.41 17.40 17.41 17.45 17.46 17.39 17.45 17.45 17.45 17.45 17.42 17.40 17.45 17.40	12.92 12.92 8.89 12.90 12.87 12.93 12.93 12.94 12.97 12.92 12.92 12.88 12.88 12.87 12.92 12.87	13.10 8.93 13.09 13.05 13.11 13.03 13.11 13.03 13.11 13.10 13.04 13.04 13.04 13.05 13.06	12.44 8.96 12.42 12.49 12.47 12.49 12.48 12.43 12.39 12.39 12.39 12.39 12.39 12.42	12.65 8.96 12.69 12.65 12.65 12.65 12.71 12.72 12.74 12.74 12.68 12.71 12.68 12.71 12.68 12.71 12.64 12.65 12.70 12.71
	Table	150° 155° 159° 159° 158° 158° 158° 158° 158° 158° 158° 158	15.47 12.41 15.44 15.42 15.42 15.44 15.44 15.45 15.45 15.45 15.44 15.43 15.43 15.43 15.43 15.43 15.44 15.44	16.87 10.44 16.77 16.79 16.79 16.87 16.83 16.83 16.80 16.84 16.84 16.84 16.84 16.84 16.84 16.84 16.84 16.85 16.84 16.87 16.85 16.87	17.43 10.39 17.44 17.39 17.40 17.45 17.45 17.45 17.45 17.45 17.46 17.38 17.47 17.46 17.39 17.47 17.40 17.40 17.40 17.40 17.40	17.19 9.44 17.20 17.23 17.14 17.21 17.21 17.21 17.21 17.14 17.14 17.14 17.16 17.16 17.16 17.18 17.17 17.18	17.46 17.38 8.41 17.40 17.41 17.45 17.46 17.46 17.46 17.46 17.46 17.45 17.46 17.40 17.42 17.40 17.45 17.43 17.43 17.43 17.47 17.43	12.92 12.92 8.89 12.90 12.87 12.88 12.93 12.94 12.97 12.92 12.92 12.88 12.87 12.92 12.87 12.90 12.90 12.90	13.10 8.93 13.05 13.05 13.05 13.05 13.05 13.05 13.06 13.01 13.04 13.04 13.06 13.06 13.06 13.06 13.07 13.07 13.04 13.07	12.44 8.96 12.42 12.49 12.49 12.49 12.49 12.48 12.48 12.30 12.30 12.30 12.30 12.42 12.45 12.45 12.39	12.65 8.96 12.69 12.65 12.65 12.65 12.68 12.71 12.72 12.74 12.74 12.68 12.71 12.65 12.70 12.71 12.72 12.70
	Table	150° 155° 155° 158° 158° 158° 158° 158° 158	15.47 12.41 15.44 15.42 15.38 15.44 15.39 15.44 15.44 15.44 15.45 15.45 15.43 15.43 15.43 15.43 15.43 15.43 15.44 15.44 15.44 15.44 15.44 15.44 15.44 15.42 15.40	16.87 10.44 16.77 16.79 16.79 16.83 16.83 16.83 16.83 16.84 16.84 16.84 16.84 16.84 16.84 16.84 16.87 16.85 16.87 16.85 16.79 16.85	17.43 10.39 17.44 17.39 17.40 17.41 17.43 17.43 17.43 17.43 17.43 17.44 17.38 17.44 17.38 17.44 17.39 17.44 17.40 17.40 17.40 17.40	17.19 9.44 17.20 17.20 17.21 17.21 17.21 17.21 17.19 17.14 17.18 17.14 17.18 17.16 17.16 17.16 17.18 17.17 17.18 17.17 17.18 17.17 17.18 17.17 17.18	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.45           17.45           17.45           17.46           17.47           17.46           17.47           17.46           17.47           17.46           17.47           17.47           17.47           17.47           17.47           17.47           17.47           17.47           17.47           17.47           17.47           17.47           17.42           17.41	12.92 12.92 8.89 12.90 12.87 12.89 12.93 12.94 12.94 12.97 12.92 12.87 12.92 12.87 12.92 12.87 12.90 12.90 12.90 12.90 12.90 12.91 12.97	13.10 8.83 13.06 13.05 13.05 13.11 13.00 13.03 13.04 13.04 13.04 13.04 13.04 13.04 13.06 13.06 13.07 13.04 13.10 13.10 13.10	12.44 8.96 12.42 12.43 12.44 12.40 12.40 12.40 12.40 12.43 12.39 12.39 12.39 12.42 12.45 12.45 12.39 12.39 12.44	12.66 8.96 12.69 12.66 12.66 12.66 12.71 12.72 12.74 12.74 12.74 12.74 12.65 12.71 12.70 12.77 12.77 12.77 12.70 12.70 12.70 12.75
	Table	150° 155° 155° 159° 159° 157° 155° 155° 155° 155° 155° 155° 155	15.47           12.41           15.44           15.42           15.38           15.44           15.45           15.46           15.46           15.47           15.48           15.49           15.40           15.43           15.43           15.43           15.43           15.44           15.44           15.43           15.44           15.43           15.44           15.44           15.43           15.44           15.44           15.44           15.44           15.44           15.45           15.46           15.47           15.48           15.49           15.40           15.41	16.87 10.44 16.77 16.79 16.79 16.77 16.83 16.83 16.83 16.84 16.85 16.84 16.78 16.84 16.78 16.85 16.85 16.85 16.85 16.85 16.85 16.85 16.85 16.82 16.82	17.43 10.39 17.44 17.39 17.40 17.40 17.41 17.45 17.43 17.45 17.47 17.43 17.47 17.48 17.47 17.49 17.47 17.49 17.40	17.19 9.44 17.20 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.18 17.17 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.46           17.45           17.46           17.47           17.46           17.47           17.46           17.47           17.45           17.45           17.47           17.43           17.47           17.43           17.42           17.43           17.43           17.43           17.43	12.92 12.92 8.89 12.87 12.87 12.88 12.94 12.94 12.97 12.92 12.88 12.97 12.92 12.88 12.92 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.91	13.10 8.83 13.06 13.06 13.06 13.07 13.01 13.01 13.00 13.04 13.04 13.04 13.06 13.06 13.06 13.06 13.07 13.04 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.10 13.04 13.10 13.04 13.10 13.04 13.07	12.44 8.66 12.42 12.42 12.49 12.49 12.49 12.40 12.40 12.40 12.43 12.39 12.39 12.39 12.39 12.39 12.42 12.45 12.45 12.39 12.39 12.45 12.45 12.39 12.43 12.43 12.44 12.44 12.44 12.43 12.44 12.44 12.43 12.44 12.44 12.45 12.39 12.45 12.39 12.45 12.39 12.45 12.45 12.45 12.45 12.39 12.45 12.	12.66 8.99 12.69 12.65 12.65 12.65 12.65 12.68 12.71 12.72 12.74 12.74 12.68 12.71 12.74 12.68 12.70 1
	Table	150° 155° 155° 159° 159° 157° 155° 155° 155° 155° 155° 155° 155	$\begin{array}{r} 15.47\\ 12.41\\ 15.44\\ 15.42\\ 15.38\\ 15.48\\ 15.48\\ 15.48\\ 15.46\\ 15.46\\ 15.46\\ 15.40\\ 15.43\\ 15.43\\ 15.43\\ 15.44\\ 15.44\\ 15.44\\ 15.44\\ 15.44\\ 15.44\\ 15.38\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.34\\ 15.44\\ 15.44\\ 15.34\\ 15.44\\ 15$	16.87           10.44           16.79           16.79           16.79           16.71           16.83           16.83           16.84           16.75           16.85           16.86           16.87           16.86           16.87           16.86           16.87           16.87           16.85           16.85           16.85           16.85           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.82           16.79	17.43 10.39 17.44 17.39 17.40 17.40 17.41 17.45 17.43 17.43 17.43 17.43 17.47 17.43 17.47 17.43 17.47 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.41 17.40 17.43 17.41 17.40	17.19 9.44 17.20 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.18 17.17 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.17 17.18	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.45           17.46           17.47           17.48           17.49           17.45           17.46           17.47           17.45           17.45           17.45           17.47           17.43           17.47           17.43           17.42           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.48	12.92 12.92 8.89 12.87 12.87 12.88 12.94 12.94 12.92 12.92 12.88 12.92 12.88 12.92 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.91	13.10 8.83 13.09 13.06 13.05 13.11 13.10 13.09 13.11 13.10 13.04 13.04 13.05 13.04 13.05 13.04 13.05 13.10 13.04 13.10 13.04 13.10 13.04 13.10 13.04 13.10 13.04 13.07 13.08 13.07 13.08	12.44 8.66 12.42 12.42 12.49 12.49 12.49 12.40 12.40 12.48 12.39 12.39 12.39 12.39 12.39 12.39 12.42 12.45 12.45 12.23 12.45 12.23 12.44 12.44 12.44 12.44 12.44 12.41	12.66 8.99 12.69 12.65 12.65 12.65 12.265 12.271 12.72 12.74 12.74 12.74 12.28 12.271 12.274 12.284 12.270 12.70 1
	Table	150°           155°           150°           159°           159°           157°           157°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           150°           150°           100°           90°           80°           70°           60°           50°           40°           30°	15.47           12.41           15.44           15.42           15.38           15.34           15.34           15.44           15.45           15.46           15.47           15.48           15.49           15.40           15.41           15.43           15.44           15.44           15.44           15.44           15.45           15.46           15.47           15.48           15.44           15.44           15.39           15.44           15.34           15.34	16.87 10.44 16.77 16.79 16.79 16.77 16.83 16.83 16.83 16.84 16.85 16.84 16.78 16.84 16.78 16.85 16.85 16.85 16.85 16.85 16.79 16.79 16.77 16.87	17.43 10.39 17.44 17.39 17.40 17.40 17.41 17.45 17.43 17.43 17.43 17.44 17.38 17.47 17.43 17.47 17.49 17.40 17.40 17.40 17.40 17.40 17.43 17.41 17.40 17.43 17.41 17.43 17.43	17.19 9.44 17.20 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.45           17.45           17.46           17.47           17.45           17.46           17.47           17.46           17.47           17.43           17.43           17.47           17.43           17.42           17.43           17.42           17.43           17.43           17.43           17.44           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.43           17.48           17.38	12.92 12.92 8.89 12.87 12.87 12.88 12.94 12.94 12.92 12.92 12.88 12.92 12.88 12.92 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.91 12.87 12.87 12.87 12.91	13.10 8.83 13.09 13.06 13.06 13.11 13.01 13.09 13.11 13.04 13.04 13.06 13.06 13.06 13.07 13.04 13.07 13.04 13.04 13.04 13.04 13.04 13.07 13.06 13.11 13.04 13.07 13.06 13.06 13.07 13.06 13.07 13.06 13.06 13.06 13.06 13.07 13.06 13.	12.44 8.66 12.42 12.42 12.49 12.49 12.49 12.49 12.49 12.48 12.39 12.39 12.39 12.39 12.39 12.42 12.45 12.45 12.39 12.45 12.39 12.45 12.39 12.45 12.39 12.45 12.	12.66 8.99 12.69 12.69 12.265 12.271 12.71 12.74 12.74 12.74 12.74 12.74 12.76 12.74 12.76 12.74 12.76 12.70
	Table Laptop	150°           155°           160°           159°           159°           159°           157°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           151°           150°           100°           90°           90°           80°           70°           60°           50°           40°           30°           20°	$\begin{array}{r} 15.47\\ 12.41\\ 15.44\\ 15.42\\ 15.38\\ 15.38\\ 15.44\\ 15.38\\ 15.42\\ 15.44\\ 15.42\\ 15.45\\ 15.44\\ 15.43\\ 15.43\\ 15.43\\ 15.43\\ 15.44\\ 15.43\\ 15.44\\ 15.44\\ 15.44\\ 15.38\\ 15.44\\ 15.38\\ 15.44\\ 15.39\\ 15.44\\ 15.38\\ 15.44\\ 15.39\\ 15.44\\ 15.38\\ 15.38\\ 15$	16.87           10.44           16.79           16.79           16.79           16.83           16.83           16.84           16.84           16.84           16.87           16.84           16.87           16.83           16.84           16.82           16.83           16.84           16.87           16.82           16.79           16.80           16.79           16.71           16.81	17.43 10.39 17.44 17.39 17.40 17.40 17.43 17.43 17.43 17.43 17.43 17.44 17.38 17.44 17.38 17.44 17.46 17.40 17.40 17.40 17.40 17.42 17.43 17.41 17.43 17.44 17.43 17.44 17.43 17.44 17.43 17.44	17.19           9.44           17.20           17.23           17.24           17.21           17.21           17.21           17.21           17.21           17.21           17.16           17.18           17.16           17.16           17.17           17.18           17.18           17.18           17.18           17.23           17.20           17.18           17.20           17.20           17.20	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.45           17.45           17.46           17.47           17.48           17.49           17.40           17.45           17.46           17.47           17.48           17.49           17.47           17.47           17.48           17.38           17.48           17.38           17.38           17.48           17.38           17.48           17.39	12.92 12.92 8.89 12.90 12.87 12.88 12.93 12.94 12.94 12.94 12.92 12.92 12.92 12.97 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.97 12.88 12.97 12.88 12.91 12.95 12.91 12.95	13.10 8.83 13.09 13.05 13.05 13.01 13.03 13.03 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.05 13.06 13.07 13.04 13.11 13.04 13.10 13.04 13.07 13.08	12.44           8.96           12.42           12.49           12.49           12.40           12.41           12.43           12.43           12.39           12.39           12.42           12.43           12.45           12.39           12.42           12.43           12.45           12.45           12.41           12.41           12.45	12.65 8.96 12.69 12.66 12.66 12.66 12.71 12.72 12.74 12.74 12.74 12.74 12.74 12.74 12.74 12.65 12.71 12.70 12.77 12.70 12.73 12.75 12.73 12.75 1
	Table Laptop Lid close	150°           155°           160°           159°           159°           157°           155°           155°           155°           155°           155°           155°           155°           155°           151°           152°           151°           151°           150°           100°           100°           90°           80°           70°           60°           50°           40°           30°           20°           10°           15°	15.47           12.41           15.44           15.42           15.38           15.44           15.42           15.43           15.44           15.45           15.46           15.47           15.48           15.43           15.43           15.43           15.43           15.43           15.43           15.43           15.44           15.43           15.44           15.44           15.43           15.44           15.44           15.43           15.44           15.38           15.44           15.39           15.44           15.39           15.44           15.39           15.44           15.38           15.43           15.44           15.38           15.43           15.44           15.38           15.43           15.44           15.45	16.87           10.44           16.79           16.79           16.79           16.83           16.83           16.84           16.84           16.84           16.84           16.84           16.84           16.85           16.84           16.85           16.84           16.85           16.87           16.82           16.87           16.82           16.87           16.80           16.81           16.82           16.83           16.84           16.84           16.82           16.83           16.84           16.84           16.84           16.84           n'a           16.84           16.84	17.43 10.39 17.44 17.39 17.40 17.40 17.43 17.43 17.43 17.43 17.43 17.44 17.38 17.47 17.46 17.46 17.40 17.40 17.40 17.40 17.40 17.43 17.41 17.46 17.43 17.46 17.46 17.46 17.40	17.19 9.44 17.20 17.23 17.34 17.24 17.21 17.34 17.34 17.34 17.34 17.34 17.34 17.34 17.34 17.34 17.34 17.36 17.36 17.36 17.36 17.36 17.30 17.31 17.30 17.30 17.31 17.30 17.31 17.30 17.31 17.30 17.31 17.30 17.21 17.31 17.31 17.31 17.31 17.31 17.31 17.31 17.31 17.30 17.31 1	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.46           17.39           17.45           17.46           17.47           17.49           17.40           17.47           17.48           17.49           17.49           17.47           17.47           17.48           17.39           17.48           17.38           17.48           17.39           17.48           17.39           17.48           17.39           17.48           17.49           17.40           17.40           17.41	12.92 12.92 8.89 12.90 12.87 12.89 12.93 12.94 12.94 12.94 12.92 12.94 12.97 12.92 12.87 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.97 12.97 12.97 12.97 12.97 12.97 12.97 12.99	13.10 8.83 13.09 13.05 13.05 13.01 13.03 13.03 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.05 13.06 13.07 13.04 13.07 13.04 13.07 13.06 13.07 13.06 13.07 n/a 13.03	12.44 8.96 12.42 12.42 12.49 12.49 12.49 12.49 12.49 12.49 12.49 12.49 12.23 12.23 12.39 12.24 12.45 12.45 12.44 12.44 12.44 12.44 12.44 12.45 n/a 12.45	12.65 8.99 12.69 12.69 12.66 12.66 12.71 12.72 12.74 12.74 12.74 12.74 12.74 12.74 12.75 12.77 12.77 12.77 12.77 12.76 12.77 12.76 12.77 12.73 12.65 12.77 12.76 12.77 12.78 12.70 12.77 12.78
	Table Laptop	150°           155°           155°           156°           157°           157°           157°           155°           155°           155°           155°           155°           155°           151°           152°           151°           150°           100°           100°           90°           80°           70°           60°           50°           40°           30°           20°           10°           15°           14'	15.47           12.41           15.44           15.42           15.38           15.34           15.34           15.34           15.44           15.45           15.46           15.47           15.48           15.49           15.41           15.43           15.44           15.44           15.44           15.44           15.44           15.45           15.44           15.45           15.44           15.44           15.44           15.44           15.44           15.44           15.44           15.45           15.46           15.47           15.48           15.48           15.40	16.87           10.44           16.77           16.79           16.79           16.71           16.83           16.83           16.83           16.84           16.85           16.86           16.86           16.87           16.87           16.87           16.87           16.87           16.87           16.84           16.87           16.84           16.84           16.85	17.43 10.39 17.44 17.49 17.40 17.40 17.40 17.41 17.45 17.43 17.43 17.43 17.44 17.43 17.47 17.43 17.40 17.40 17.40 17.43 17.44 17.44 17.44 17.43 17.44 17.43 17.44 17.43 17.44 17.43 17.44 17.45	17.19 9.44 17.20 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.20 17.21 17.20 17.20 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.20 17.21 17.20 17.20 17.21 17.20 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.	17.46           17.38           8.41           17.40           17.41           17.45           17.45           17.46           17.47           17.48           17.49           17.45           17.46           17.47           17.42           17.43           17.44           17.43           17.47           17.43           17.47           17.43           17.44           17.45           17.48           17.39           17.48           17.39           17.40           17.41	12.92 12.92 8.89 12.87 12.87 12.89 12.94 12.94 12.94 12.92 12.88 12.92 12.88 12.92 12.88 12.92 12.90 12.90 12.90 12.90 12.90 12.90 12.91 12.97 12.97 12.97 12.95 12.91 12.91 12.91 12.91 12.91	13.10 3.80 13.00 13.00 13.00 13.11 13.01 13.00 13.01 13.04 13.04 13.06 13.04 13.06 13.06 13.10 13.06 13.10 13.06 13.10 13.04 13.07 13.06 13.06 13.07 13.06 13.06 13.06 13.07 13.06 13.06 13.06 13.06 13.06 13.06 13.06 13.06 13.07 13.06 13.06 13.06 13.06 13.06 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.06 13.07 13.06 13.	12.44 8.66 12.42 12.42 12.49 12.49 12.49 12.49 12.49 12.49 12.48 12.39 12.39 12.39 12.39 12.42 12.45 12.45 12.39 12.45 12.45 12.44 12.44 12.44 12.44 12.44 12.45 12.	12.05 8.99 12.09 12.09 12.05 1
	Table Laptop Lid close Laptop	150°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           155°           151°           151°           151°           150°           100°           100°           80°           70°           60°           50°           40°           30°           20°           10°           15°           14'           13°           12°	15.47           12.41           15.44           15.42           15.38           15.34           15.34           15.34           15.44           15.45           15.46           15.47           15.48           15.49           15.40           15.43           15.43           15.44           15.43           15.44           15.44           15.45           15.46           15.47           15.48           15.44           15.44           15.44           15.44           15.44           15.44           15.45           15.46           15.47           15.48           15.49           15.40           15.40           15.40	16.87           10.44           16.79           16.79           16.79           16.71           16.83           16.83           16.84           16.85           16.86           16.86           16.87           16.87           16.85           16.87           16.87           16.87           16.87           16.84           16.85           16.87           16.85           16.85           16.85           16.85           16.85           16.85           16.85           16.85           16.85           16.85           16.81           174	17.43 10.39 17.44 17.49 17.40 17.40 17.41 17.45 17.43 17.43 17.43 17.43 17.43 17.44 17.43 17.47 17.43 17.40 17.40 17.40 17.44 17.44 17.43 17.44 17.43 17.44 17.43 17.44 17.43 17.44 17.43 17.44 17.43 17.46 17.46 17.46 17.46 17.46 17.46 17.46 17.46 17.47 17.46 17.46 17.46 17.46 17.46 17.46 17.46 17.46 17.46 17.47 17.46	17.19 9.44 17.20 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.18 17.20 17.20 17.21 17.20 17.21 17.21 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.20 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.20 17.21 17.21 17.20 17.21 17.20 17.21 17.20 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21 17.21	$\begin{array}{c} 17.46\\ 17.38\\ 8.41\\ 17.40\\ 17.41\\ 17.45\\ 17.45\\ 17.45\\ 17.59\\ 17.45\\ 17.45\\ 17.42\\ 17.42\\ 17.42\\ 17.42\\ 17.42\\ 17.45\\ 17.45\\ 17.45\\ 17.45\\ 17.47\\ 17.47\\ 17.43\\ 17.42\\ 17.43\\ 17.45\\ 17.46\\ 17.48\\ 17.48\\ 17.48\\ 17.48\\ 17.48\\ 17.48\\ 17.48\\ 17.48\\ 17.41\\ 17.$	12.92 12.92 8.89 12.87 12.87 12.89 12.93 12.94 12.94 12.92 12.88 12.92 12.88 12.92 12.88 12.92 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.91 12.97 12.97 12.97 12.97 12.97 12.97 12.97 12.91 12.93 12.93 12.93	13.10           8.83           13.09           13.06           13.11           13.09           13.11           13.09           13.11           13.09           13.11           13.09           13.11           13.01           13.04           13.05           13.06           13.07           13.04           13.07           13.04           13.07           13.06           13.07           13.08           13.09           13.00           13.01           13.02           13.03           13.04           13.05           13.05           13.03           13.05           13.05           13.05           13.01	12.44 8.66 12.42 12.42 12.47 12.49 12.49 12.49 12.49 12.49 12.48 12.39 12.39 12.39 12.39 12.42 12.45 12.39 12.45 12.39 12.45 12.45 12.44 12.44 12.44 12.44 12.45 12.	12.05 8.99 12.09 12.09 12.265 12.271 12.71 12.74 12.74 12.74 12.76 12.74 12.76 12.76 12.76 12.76 12.76 12.70
	Table Laptop Lid close	150° 155° 160° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 155° 157° 150° 100°	15.47           12.41           15.44           15.42           15.38           15.44           15.42           15.43           15.44           15.45           15.46           15.47           15.48           15.44           15.43           15.43           15.43           15.43           15.43           15.43           15.43           15.43           15.44           15.43           15.44           15.43           15.44           15.43           15.44           15.38           15.44           15.39           15.44           15.39           15.48           15.48           15.40           15.40	16.87           10.44           16.79           16.79           16.79           16.83           16.83           16.84           16.84           16.84           16.84           16.84           16.85           16.84           16.84           16.85           16.86           16.87           16.82           16.84           16.85           16.70           16.80           16.81	17.43 10.39 17.44 17.39 17.40 17.40 17.45 17.43 17.43 17.43 17.43 17.44 17.38 17.47 17.46 17.46 17.40 17.40 17.40 17.40 17.40 17.43 17.40 17.43 17.46 17.43 17.46 17.43 17.46 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.40 17.41 17.40 17.41 17.40 17.41 17.40 17.41 17.40 17.41 17.40 17.41 17.40	17.19           9.44           17.20           17.23           17.24           17.21           17.21           17.16           17.18           17.16           17.16           17.16           17.16           17.17           17.18           17.16           17.17           17.18           17.19           17.19           17.10           17.10           17.18           17.20           17.20           n/a           17.20           n/a           17.21           17.21	17.46           17.38           8.41           17.40           17.41           17.45           17.46           17.45           17.47           17.49           17.49           17.49           17.49           17.49           17.40           17.42           17.43           17.44           17.47           17.47           17.48           17.43           17.43           17.43           17.44           17.39           17.43           17.43           17.44           17.39           17.48           17.39           17.48           17.39           17.40           17.41           17.41           17.41           17.41	12.92 12.92 8.89 12.90 12.87 12.88 12.93 12.94 12.94 12.94 12.92 12.92 12.97 12.92 12.87 12.90 12.90 12.90 12.90 12.90 12.90 12.90 12.97 12.97 12.88 12.97 12.97 12.98 12.91 12.95	13.10 8.83 13.06 13.05 13.05 13.11 13.00 13.03 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.04 13.05 13.06 13.07 13.04 13.07 13.04 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.04 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.06 13.07 13.06 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.06 13.07 13.06 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.06 13.07 13.05 13.07 13.05 13.55 13.	$\begin{array}{c} 12.44\\ 8.96\\ 12.42\\ 12.42\\ 12.49\\ 12.49\\ 12.49\\ 12.49\\ 12.40\\ 12.40\\ 12.40\\ 12.40\\ 12.40\\ 12.20\\ 12.20\\ 12.20\\ 12.20\\ 12.20\\ 12.20\\ 12.42\\ 12.45\\ 12.45\\ 12.45\\ 12.44\\ 12.47\\ 12.47\\ 12.47\\ 12.46\\ 12.45\\ 12.$	12.66 8.99 12.69 12.69 12.66 12.66 12.66 12.71 12.72 12.72 12.74 12.68 12.71 12.74 12.66 12.71 12.70 12.73 12.65 12.77 12.73 12.65 12.77 12.73 12.65 12.77 12.73 12.65 12.77 12.73 12.65 12.77 12.73 12.65 12.72 nla 12.72 nla 12.73 12.65 12.73 12.73 12.75 12.73 12.75

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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#### **1.7 EUT Testing Position**

For laptop PC, according to KDB 616217 D04, SAR evaluation is required for the bottom surface of the keyboard. This EUT was tested in the base of EUT directly against the flat phantom. The required minimum test separation distance for incorporating transmitters and antennas into laptop computer display is determined with the display screen opened at an angle of 90° to the keyboard compartment.

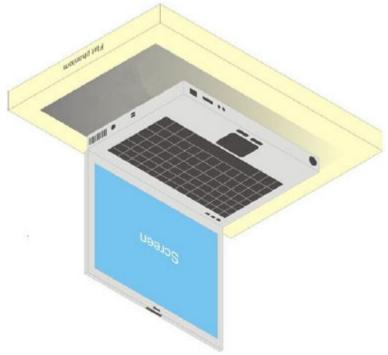


Illustration for Laptop Setup

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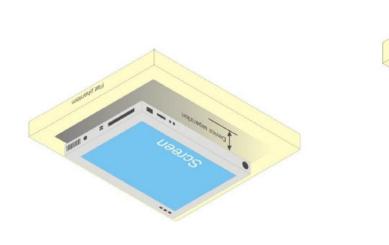
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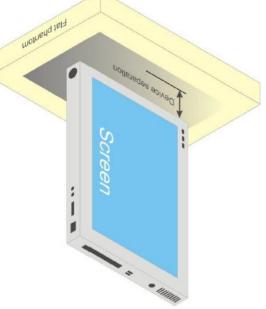
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For full-size tablet, according to KDB 616217 D04, SAR evaluation is required for back surface and edges of the devices. The back surface and edges of the tablet are tested with the tablet touching the phantom. Exposures from antennas through the front surface of the display section of a tablet are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.





**Illustration for Tablet Setup** 

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## **1.8 Evaluation Procedures**

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- 1. The extraction of the measured data (grid and values) from the Zoom Scan.
- 2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
- 3. The generation of a high-resolution mesh within the measured volume.
- 4. The interpolation of all measured values from the measurement grid to the high-resolution grid.
- 5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface.
- 6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within -2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans.

The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is

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the moved around until the highest averaged SAR is found.

If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

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## **1.9 Probe Calibration Procedures**

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

# 1.9.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field ( E ) and the temperature gradient (  $\delta T / \delta t$  ) in the liquid.

$$SAR = C \frac{\delta T}{\delta t}$$

Whereby  $\sigma$  is the conductivity,  $\rho$  the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

1. The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept

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small.

- 2. The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- 3. The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for  $\rho$ ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- 4. Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about ±10% (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is ±5% (RSS) when the same liquid is used for the calibration and for actual measurements and ±7-9% (RSS) when not, which is in good agreement with the estimates given in [2].

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# 1.9.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

- 1. The setup must enable accurate determination of the incident power.
- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- 3. Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

## References

- (1) N. Kuster, Q. Balzano, and J.C. Lin, Eds., Mobile Communications Safety, Chapman & Hall, London, 1997.
- (2) K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", IEEE Transactions on Microwave Theory and Techniques, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.
- (3) K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", IEEE Transactions on Instrumentation and Measurements, vol. 47, no. 2, pp. 432{438, Apr. 1998.

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# 1.10 SAR System Description and Setup

The DASY system used for performing compliance tests consists of the following items:

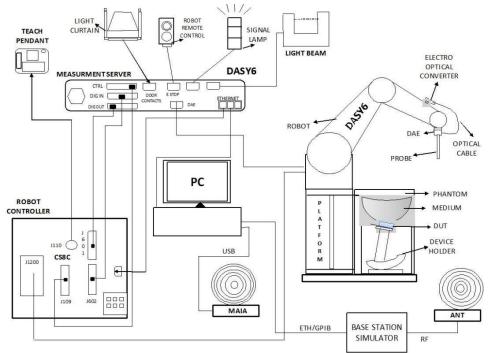


Fig. a A block diagram of the SAR measurement system

• A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).

• An isotropic Field probe optimized and calibrated for the targeted measurement.

- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to

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the measurement server.

The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.

- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Windows 10 and the DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.

The phantom, the device holder and other accessories according to the targeted measurement.

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#### 1.10.1 Power density measurement system

#### **DASY6** system

Power density measurements for mmWave frequencies were performed using SPEAG DASY6 with cDASY6 5G module. The DASY6 included a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom cover.

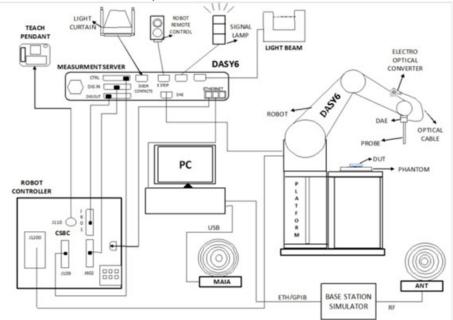


Fig-2.1 SPEAG DASY6 system

#### EUmmWVx probe

The EUmmWVx probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse. The design entails two small 0.8mm dipole sensors mechanically protected by high-density foam, printed on both sides of a 0.9mm wide and 0.12mm thick glass substrate. The body of the probe is specifically constructed to minimize distortion by the scattered fields. The probe consist of two sensors with different angles (1 and 2) arranged in the same plane in the probe axis. Three or more measurements of the two sensors are taken for different probe rotational angles to derive the amplitude and polarization information. The probe design allows measurements at distances as small as 2mm from the sensors to the surface of the device under test (DUT). The typical sensor to probe tip distance is 1.5 mm. The exact distance is calibrated.

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	Two dipoles optimally arranged to obtain pseudo-vector information.Minimum 3 measurements/ point, 120° rotated around probe axis. Sensors (0.8mm length) printed on glass substrate protected by high density foam.Low perturbation of the measured field. Requires positioner which can do accurate probe rotation.
Frequency Range	750 MHz – 110 GHz
Dynamic Range	< 20 V/m – 10,000 V/m with PRE-10 (min <
	50 V/m - 3000 V/m)
Position Precision	< 0.2 mm (DASY6)
Dimensions	Overall length: 337 mm (tip: 20 mm)
	Tip diameter: encapsulation 8 mm
	(internal sensor < 1mm)
	Distance from probe tip to dipole centers:
	< 2 mm. Sensor displacement to probe's
	calibration point: < 0.3 mm
Applications	E-field measurements of 5G devices and
	other mm-wave transmitters operating
	above 10GHz in < 2 mm distance from
	device (free-space).Power density, H-field
	and far-field analysis using total field
	reconstruction (cDASY6 5G module
sensor 1,5mm calibrated	required)
Compatibility	cDASY6 + 5G-Module SW1.0 and higher

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