

# SAR TEST REPORT



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

<b>EUT Type</b>	Wireless LAN Module
<b>Trade Name</b>	Microsoft
<b>Model Number</b>	2013
<b>Prepared for</b>	Microsoft Corporation One Microsoft Way, Redmond, WA 98052-6399
<b>Standards</b>	USA
<b>FCC ID</b>	IEEE/ANSI C95.1-1992, IEEE 1528-2013 C3K2013
<b>Date of Receipt</b>	Oct. 25, 2021
<b>Date of Test(s)</b>	Oct. 27, 2021 ~ Oct. 28, 2021
<b>Date of Issue</b>	Apr. 18, 2022

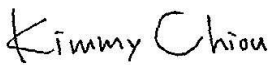

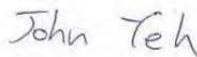
In the configuration tested, the EUT complied with the standards specified above.

## 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.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Ltd. Central RF Lab or testing done by SGS Taiwan Ltd. Central RF Lab in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Ltd. Central RF Lab in writing.

## Signed on behalf of SGS

Clerk / Kimmy Chiou	Engineer / Bond Tsai	Asst. Manager / John Yeh
		

Date: Apr. 18, 2022

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## Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
E5/2021/A0015	Rev.00	Initial creation of document	Dec. 23, 2021	Kimmy Chiou	*
E5/2021/A0015	Rev.01	Modify comment	Apr. 18, 2022	Kimmy Chiou	

**Note:**

1. The mark " \* " is the revised version of the report due to comments submitted by the certification.

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## 0. Guidance applied

The SAR testing method and procedure for this device is in accordance with the following standards:

IEEE/ANSI C95.1-1992

IEEE 1528-2013

KDB248227D01v02r02

KDB865664D01v01r04

KDB865664D02v01r02

KDB447498D01v06

KDB616217D04v01r02

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## Contents

<b>0. Guidance applied .....</b>	<b>3</b>
<b>1. General Information.....</b>	<b>5</b>
1.1 Testing Laboratory.....	5
1.2 Details of Applicant.....	5
1.3 Description of EUT .....	6
1.4 Test Environment .....	22
1.5 Operation Description .....	22
1.6 The SAR Measurement System.....	24
1.7 System Components.....	26
1.8 SAR System Verification .....	28
1.9 Tissue Simulant Fluid for the Frequency Band .....	30
1.10 Evaluation Procedures .....	32
1.11 Probe Calibration Procedures .....	33
1.12 Test Standards and Limits.....	36
<b>2. Summary of Results .....</b>	<b>38</b>
2.1 Decision rules.....	38
2.2 Summary of Results.....	38
2.3 Reporting statements of conformity .....	38
<b>3. Simultaneous Transmission Analysis.....</b>	<b>39</b>
3.1 Estimated SAR calculation .....	40
3.2 SPLSR evaluation and analysis .....	40
<b>4. Instruments List.....</b>	<b>42</b>
<b>5. Measurements.....</b>	<b>43</b>
<b>6. SAR System Performance Verification.....</b>	<b>57</b>
<b>7. Uncertainty Budget.....</b>	<b>62</b>
<b>Appendixes .....</b>	<b>64</b>
E52021A0015 SAR_Appendix A Photographs.....	64
E52021A0015 SAR_Appendix B DAE & Probe Cal. Certificate.....	64
E52021A0015 SAR_Appendix C Phantom Description & Dipole Cal. Certificate .....	64

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# 1. General Information

## 1.1 Testing Laboratory

SGS Taiwan Ltd. Central RF Lab	
1F,A No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road, NeiHu District, Taipei City, 11493, Taiwan.	
FCC Designation Number	TW0029
Tel	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	<a href="http://www.tw.sgs.com/">http://www.tw.sgs.com/</a>

## 1.2 Details of Applicant

Company Name	Microsoft Corporation
Company Address	One Microsoft Way, Redmond, WA 98052-6399 USA

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### 1.3 Description of EUT

#### General Information of Host:

EUT Type	Wireless LAN Module	
Trade Name	Microsoft	
Model Number	2013	
FCC ID	C3K2013	
Host Information	Product Type: Notebook Computer Trade Name: Microsoft Model Name: 2013	
Mode of Operation	<input checked="" type="checkbox"/> WLAN802.11 a/b/g/n/ac/ax(20M/40M/80M/160M) <input checked="" type="checkbox"/> Bluetooth	
Duty Cycle	WLAN802.11 a/b/g/n/ac/ax(20M/40M/80/160M)	Refer to page 21
	Bluetooth	70.7%
TX Frequency Range (MHz)	WLAN802.11 b/g/n/ax(20M)	2412 — 2472
	WLAN802.11 n/ax(40M)	2422 — 2462
	WLAN802.11 a/n/ac/ax(20M) 5.2G	5180 — 5240
	WLAN802.11 n/ac/ax(40M) 5.2G	5190 — 5230
	WLAN802.11 ac/ax(80M) 5.2G	5210
	WLAN802.11 ac/ax(160M) 5.2G	5250
	WLAN802.11 a/n/ac/ax(20M) 5.3G	5260 — 5320
	WLAN802.11 n/ac/ax(40M) 5.3G	5270 — 5310
	WLAN802.11 ac/ax(80M) 5.3G	5290
	WLAN802.11 a/n/ac/ax(20M) 5.6G	5500 — 5720
	WLAN802.11 n/ac/ax(40M) 5.6G	5510 — 5710
	WLAN802.11 ac/ax(80M) 5.6G	5530 — 5690
	WLAN802.11 ac/ax(160M) 5.6G	5570

#### Note:

This report is for host model number 2013 which contains the module whose FCC ID is C3K2013.

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TX Frequency Range (MHz)	WLAN802.11 a/n/ac/ax(20M) 5.8G	5745 — 5825
	WLAN802.11 n/ac/ax(40M) 5.8G	5755 — 5795
	WLAN802.11 ac/ax(80M) 5.8G	5775
	Bluetooth	2402 — 2480
Channel Number (ARFCN)	WLAN802.11 b/g/n/ax(20M)	1 — 13
	WLAN802.11 n/ax(40M)	3 — 11
	WLAN802.11 a/n/ac/ax(20M) 5.2G	36 — 48
	WLAN802.11 n/ac/ax(40M) 5.2G	38 — 46
	WLAN802.11 ac/ax(80M) 5.2G	42
	WLAN802.11 ac/ax(160M) 5.2G	50
	WLAN802.11 a/n/ac/ax(20M) 5.3G	52 — 64
	WLAN802.11 n/ac/ax(40M) 5.3G	54 — 62
	WLAN802.11 ac/ax(80M) 5.3G	58
	WLAN802.11 a/n/ac/ax(20M) 5.6G	100 — 144
	WLAN802.11 n/ac/ax(40M) 5.6G	102 — 142
	WLAN802.11 ac/ax(80M) 5.6G	106 — 138
	WLAN802.11 ac/ax(160M) 5.6G	114
	WLAN802.11 a/n/ac/ax(20M) 5.8G	149 — 165
	WLAN802.11 n/ac/ax(40M) 5.8G	151 — 159
	WLAN802.11 ac/ax(80M) 5.8G	155
Bluetooth	0 — 78	

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Max. SAR (1g) (Unit: W/Kg)					
Antenna	Band	Measured	Reported	Channel	Position
Tx1	WLAN 802.11b	0.64	0.84	10	Bottom Surface
	WLAN 802.11n(40M) 5.2G	0.87	1.17	46	Bottom Surface
	WLAN 802.11n(40M) 5.3G	0.77	1.04	54	Bottom Surface
	WLAN 802.11ac(80M) 5.6G	0.83	1.11	138	Bottom Surface
	WLAN 802.11ac(40M) 5.8G	0.91	1.18	151	Bottom Surface
Tx2	WLAN 802.11b	0.48	0.62	10	Bottom Surface
	Bluetooth(GFSK)	0.03	0.05	78	Bottom Surface
	WLAN 802.11n(40M) 5.2G	0.66	0.87	46	Bottom Surface
	WLAN 802.11n(40M) 5.3G	0.63	0.83	62	Bottom Surface
	WLAN 802.11ac(80M) 5.6G	0.70	0.94	138	Bottom Surface
	WLAN 802.11n(40M) 5.8G	0.84	1.12	159	Bottom Surface

### Antenna Information

Antenna	NB									
	Main(TX1):PIFA					Aux(TX2):Loop				
Frequency	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850
Gain (dBi)	1.95	1.19	1.68	1.33	1.23	1.96	0.94	0.93	2.60	2.09

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**WLAN802.11 a/b/g/n/ax(20M/40M)/ac/ax(20M/40M/80M/160M) conducted power table:**

Band \ Antenna	SISO		MIMO
	Tx1	Tx2	Tx1 + Tx2
WLAN802.11b	V	V	-
WLAN802.11g	V	V	-
WLAN802.11n(20M)	V	V	V
WLAN802.11n(40M)	V	V	V
WLAN802.11ax(20M)	V	V	V
WLAN802.11ax(40M)	V	V	V
WLAN802.11a	V	V	-
WLAN802.11n(20M) 5G	V	V	V
WLAN802.11n(40M) 5G	V	V	V
WLAN802.11ac(20M) 5G	V	V	V
WLAN802.11ac(40M) 5G	V	V	V
WLAN802.11ac(80M) 5G	V	V	V
WLAN802.11ac(160M) 5G	V	V	V
WLAN802.11ax(20M) 5G	V	V	V
WLAN802.11ax(40M) 5G	V	V	V
WLAN802.11ax(80M) 5G	V	V	V
WLAN802.11ax(160M) 5G	V	V	V

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TX1 Main Chain B						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2450 MHz	802.11b	1	2412	1Mbps	19.75	18.61
		2	2417		20.50	19.48
		6	2437		20.50	19.40
		10	2457		20.50	19.49
		11	2462		20.00	18.88
		12	2467		18.00	16.13
		13	2472		17.00	15.09
	802.11g	1	2412	6Mbps	17.50	16.47
		2	2417		19.00	17.95
		6	2437		20.50	19.49
		10	2457		19.25	18.15
		11	2462		15.50	14.38
		12	2467		15.25	13.30
		13	2472		11.50	9.51
	802.11n20-HT0	1	2412	MCS0	17.50	16.36
		2	2417		19.00	17.88
		6	2437		20.50	19.44
		10	2457		19.25	18.25
		11	2462		15.50	14.37
		12	2467		15.25	13.34
		13	2472		11.50	9.56
	802.11ax20-HT0	1	2412	MCS0	17.50	16.39
		2	2417		19.00	17.81
		6	2437		20.50	19.34
		10	2457		19.25	18.20
		11	2462		15.50	14.44
		12	2467		15.25	13.39
		13	2472		11.50	9.55
	802.11n40-HT0	3	2422	MCS0	13.50	12.32
		4	2427		15.00	13.95
		6	2437		16.50	15.49
		8	2447		16.00	14.89
		9	2452		16.00	14.87
		10	2457		12.75	10.82
		11	2462		10.00	8.01
	802.11ax40-HT0	3	2422	MCS0	13.50	12.31
		4	2427		15.00	13.88
		6	2437		16.50	15.48
		8	2447		16.00	14.96
		9	2452		16.00	14.84
		10	2457		12.75	10.91
		11	2462		10.00	8.14

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TX1 Main Chain B						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.15-5.25 GHz	802.11a	36	5180	6Mbps	16.00	14.83
		40	5200		16.00	14.87
		44	5220		16.00	14.92
		48	5240		16.00	14.90
	802.11n20-HT0	36	5180	MCS0	16.00	14.86
		40	5200		16.00	14.94
		44	5220		16.00	14.98
		48	5240		16.00	14.89
	802.11ac20-VHT0	36	5180	MCS0	16.00	14.98
		40	5200		16.00	14.93
		44	5220		16.00	14.98
		48	5240		16.00	14.93
	802.11ax20-HE0	36	5180	MCS0	16.00	14.96
		40	5200		16.00	14.98
		44	5220		16.00	14.91
		48	5240		16.00	14.80
	802.11n40-HT0	38	5190	MCS0	16.00	14.93
		46	5230		16.00	14.90
	802.11ac40-VHT0	38	5190	MCS0	16.00	14.95
		46	5230		16.00	14.91
802.11ax40-HE0	38	5190	MCS0	16.00	14.91	
	46	5230		16.00	14.90	
802.11ac80-VHT0	42	5210	MCS0	16.00	14.97	
802.11ax80-HE0	42	5210	MCS0	16.00	14.99	
802.11ac160-VHT0	50	5250	MCS0	12.75	11.72	
802.11ax160-HE0	50	5250	MCS0	12.75	11.60	

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TX1 Main Chain B						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.25-5.35 GHz	802.11a	52	5260	6Mbps	16.00	14.97
		56	5280		16.00	14.95
		60	5300		16.00	14.97
		64	5320		16.00	14.82
	802.11n20-HT0	52	5260	MCS0	16.00	14.84
		56	5280		16.00	14.86
		60	5300		16.00	14.90
		64	5320		16.00	14.93
	802.11ac20-VHT0	52	5260	MCS0	16.00	14.98
		56	5280		16.00	14.86
		60	5300		16.00	14.94
		64	5320		16.00	14.88
	802.11ax20-HE0	52	5260	MCS0	16.00	14.96
		56	5280		16.00	14.93
		60	5300		16.00	14.90
		64	5320		16.00	14.98
	802.11n40-HT0	54	5270	MCS0	16.00	14.91
		62	5310		16.00	14.95
	802.11ac40-VHT0	54	5270	MCS0	16.00	14.89
		62	5310		16.00	14.94
802.11ax40-HE0	54	5270	MCS0	16.00	14.93	
	62	5310		16.00	14.90	
802.11ac80-VHT0	58	5290	MCS0	15.75	14.58	
802.11ax80-HE0	58	5290	MCS0	15.75	14.67	

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TX1 Main Chain B						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5600 MHz	802.11a	100	5500	6Mbps	15.00	13.95
		120	5600		15.00	13.88
		140	5700		15.00	14.00
		144	5720		15.00	13.85
	802.11n20-HT0	100	5500	MCS0	15.00	13.88
		120	5600		15.00	13.83
		140	5700		15.00	13.98
		144	5720		15.00	13.84
	802.11ac20-VHT0	100	5500	MCS0	15.00	13.83
		120	5600		15.00	13.86
		140	5700		15.00	13.82
		144	5720		15.00	13.86
	802.11ax20-HE0	100	5500	MCS0	15.00	13.83
		120	5600		15.00	13.94
		140	5700		15.00	13.96
		144	5720		15.00	13.97
	802.11n40-HT0	102	5510	MCS0	15.00	13.84
		118	5590		15.00	13.83
		134	5670		15.00	13.93
		142	5710		15.00	13.87
	802.11ac40-VHT0	102	5510	MCS0	15.00	13.96
		118	5590		15.00	13.86
		134	5670		15.00	13.99
		142	5710		15.00	13.96
	802.11ax40-HE0	102	5510	MCS0	15.00	13.85
		118	5590		15.00	13.86
		134	5670		15.00	13.81
		142	5710		15.00	13.97
	802.11ac80-VHT0	106	5530	MCS0	15.00	13.98
		122	5610		15.00	13.89
		138	5690		15.00	13.95
	802.11ax80-HE0	106	5530	MCS0	15.00	13.95
		122	5610		15.00	13.85
		138	5690		15.00	13.85
	802.11ac160-VHT0	114	5570	MCS0	14.50	13.43
	802.11ax160-HE0	114	5570	MCS0	14.50	13.38

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TX1 Main Chain B						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5800 MHz	802.11a	149	5745	6Mbps	16.50	15.43
		157	5785		16.50	15.49
		165	5825		16.50	15.30
	802.11n20-HT0	149	5745	MCS0	16.50	15.45
		157	5785		16.50	15.43
		165	5825		16.50	15.43
	802.11ac20-VHT0	149	5745	MCS0	16.50	15.31
		157	5785		16.50	15.48
		165	5825		16.50	15.48
	802.11ax20-HE0	149	5745	MCS0	16.50	15.46
		157	5785		16.50	15.31
		165	5825		16.50	15.31
	802.11n40-HT0	151	5755	MCS0	16.50	15.31
		159	5795		16.50	15.43
	802.11ac40-VHT0	151	5755	MCS0	16.50	15.57
		159	5795		16.50	15.44
	802.11ax40-HE0	151	5755	MCS0	16.50	15.39
		159	5795		16.50	15.31
802.11ac80-VHT0	155	5775	MCS0	16.50	15.49	
802.11ax80-HE0	155	5775	MCS0	16.50	15.43	

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TX2 Aux Chain A							
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)	
2450 MHz	802.11b	1	2412	1Mbps	20.00	18.93	
		2	2417		21.00	19.92	
		6	2437		21.00	19.95	
		10	2457		21.00	19.98	
		11	2462		20.00	18.87	
		12	2467		18.00	16.05	
	802.11g	13	2472	6Mbps	17.00	15.19	
		1	2412		17.25	16.11	
		2	2417		19.00	17.93	
		6	2437		20.50	19.33	
		10	2457		19.25	18.11	
		11	2462		16.00	14.90	
	802.11n20-HTO	12	2467	MCS0	15.25	13.29	
		13	2472		11.75	9.94	
		1	2412		17.25	16.14	
		2	2417		19.00	17.94	
		6	2437		20.50	19.44	
		10	2457		19.25	18.14	
	802.11ax20-HTO	11	2462	MCS0	16.00	14.91	
		12	2467		15.25	13.34	
		13	2472		11.75	9.82	
		1	2412		17.25	16.05	
		2	2417		19.00	17.91	
		6	2437		20.50	19.32	
	802.11n40-HTO	10	2457	MCS0	19.25	18.15	
		11	2462		16.00	14.83	
		12	2467		15.25	13.42	
		13	2472		11.75	9.81	
		3	2422		MCS0	13.50	12.41
		4	2427			15.00	13.85
	6	2437	16.50	15.34			
	8	2447	16.00	14.94			
	9	2452	15.00	13.96			
	10	2457	12.75	10.76			
	802.11ax40-HTO	11	2462	MCS0	10.50	8.54	
		3	2422		13.50	12.38	
		4	2427		15.00	13.96	
		6	2437		16.50	15.44	
		8	2447		16.00	14.84	
		9	2452		15.00	13.81	
			10	2457	12.75	10.84	
			11	2462	10.50	8.67	

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TX2_Aux_Chain A						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.15-5.25 GHz	802.11a	36	5180	6Mbps	16.50	15.37
		40	5200		16.50	15.46
		44	5220		16.50	15.45
		48	5240		16.50	15.48
	802.11n20-HT0	36	5180	MCS0	16.50	15.39
		40	5200		16.50	15.33
		44	5220		16.50	15.32
		48	5240		16.50	15.50
	802.11ac20-VHT0	36	5180	MCS0	16.50	15.40
		40	5200		16.50	15.35
		44	5220		16.50	15.33
		48	5240		16.50	15.44
	802.11ax20-HE0	36	5180	MCS0	16.50	15.45
		40	5200		16.50	15.43
		44	5220		16.50	15.34
		48	5240		16.50	15.49
	802.11n40-HT0	38	5190	MCS0	16.50	15.46
		46	5230		16.50	15.48
	802.11ac40-VHT0	38	5190	MCS0	16.50	15.44
		46	5230		16.50	15.49
802.11ax40-HE0	38	5190	MCS0	16.50	15.44	
	46	5230		16.50	15.44	
802.11ac80-VHT0	42	5210	MCS0	16.50	15.49	
802.11ax80-HE0	42	5210	MCS0	16.50	15.45	
802.11ac160-VHT0	50	5250	MCS0	12.25	11.07	
802.11ax160-HE0	50	5250	MCS0	12.25	11.19	

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TX2_Aux_Chain A						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.25-5.35 GHz	802.11a	52	5260	6Mbps	16.50	15.40
		56	5280		16.50	15.34
		60	5300		16.50	15.47
		64	5320		16.50	15.40
	802.11n20-HT0	52	5260	MCS0	16.50	15.49
		56	5280		16.50	15.32
		60	5300		16.50	15.47
		64	5320		16.50	15.31
	802.11ac20-VHT0	52	5260	MCS0	16.50	15.37
		56	5280		16.50	15.37
		60	5300		16.50	15.34
		64	5320		16.50	15.45
	802.11ax20-HE0	52	5260	MCS0	16.50	15.46
		56	5280		16.50	15.37
		60	5300		16.50	15.35
		64	5320		16.50	15.44
	802.11n40-HT0	54	5270	MCS0	16.50	15.48
		62	5310		16.50	15.49
	802.11ac40-VHT0	54	5270	MCS0	16.50	15.33
		62	5310		16.50	15.41
802.11ax40-HE0	54	5270	MCS0	16.50	15.45	
	62	5310		16.50	15.50	
802.11ac80-VHT0	58	5290	MCS0	15.75	14.67	
802.11ax80-HE0	58	5290	MCS0	15.75	14.61	

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TX2_Aux_Chain A						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5600 MHz	802.11a	100	5500	6Mbps	16.50	15.34
		120	5600		16.50	15.48
		140	5700		16.50	15.46
		144	5720		16.50	15.47
	802.11n20-HT0	100	5500	MCS0	16.50	15.41
		120	5600		16.50	15.44
		140	5700		16.50	15.44
		144	5720		16.50	15.30
	802.11ac20-VHT0	100	5500	MCS0	16.50	15.45
		120	5600		16.50	15.36
		140	5700		16.50	15.45
		144	5720		16.50	15.30
	802.11ax20-HE0	100	5500	MCS0	16.50	15.31
		120	5600		16.50	15.40
		140	5700		16.50	15.33
		144	5720		16.50	15.42
	802.11n40-HT0	102	5510	MCS0	16.50	15.39
		118	5590		16.50	15.35
		134	5670		16.50	15.46
		142	5710		16.50	15.48
	802.11ac40-VHT0	102	5510	MCS0	16.50	15.31
		118	5590		16.50	15.40
		134	5670		16.50	15.44
		142	5710		16.50	15.46
	802.11ax40-HE0	102	5510	MCS0	16.50	15.38
		118	5590		16.50	15.33
		134	5670		16.50	15.44
		142	5710		16.50	15.45
	802.11ac80-VHT0	106	5530	MCS0	16.50	15.46
		122	5610		16.50	15.42
		138	5690		16.50	15.49
	802.11ax80-HE0	106	5530	MCS0	16.50	15.34
122		5610	16.50		15.45	
138		5690	16.50		15.49	
802.11ac160-VHT0	114	5570	MCS0	14.25	13.22	
802.11ax160-HE0	114	5570	MCS0	14.25	13.11	

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TX2 Aux Chain A						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5800 MHz	802.11a	149	5745	6Mbps	17.50	16.43
		157	5785		17.50	16.36
		165	5825		17.50	16.38
	802.11n20-HT0	149	5745	MCS0	17.50	16.32
		157	5785		17.50	16.33
		165	5825		17.50	16.41
	802.11ac20-VHT0	149	5745	MCS0	17.50	16.42
		157	5785		17.50	16.47
		165	5825		17.50	16.31
	802.11ax20-HE0	149	5745	MCS0	17.50	16.47
		157	5785		17.50	16.41
		165	5825		17.50	16.44
	802.11n40-HT0	151	5755	MCS0	17.50	16.48
		159	5795		17.50	16.44
	802.11ac40-VHT0	151	5755	MCS0	17.50	16.34
		159	5795		17.50	16.47
	802.11ax40-HE0	151	5755	MCS0	17.50	16.37
		159	5795		17.50	16.43
802.11ac80-VHT0	155	5775	MCS0	17.00	16.00	
802.11ax80-HE0	155	5775	MCS0	17.00	15.95	

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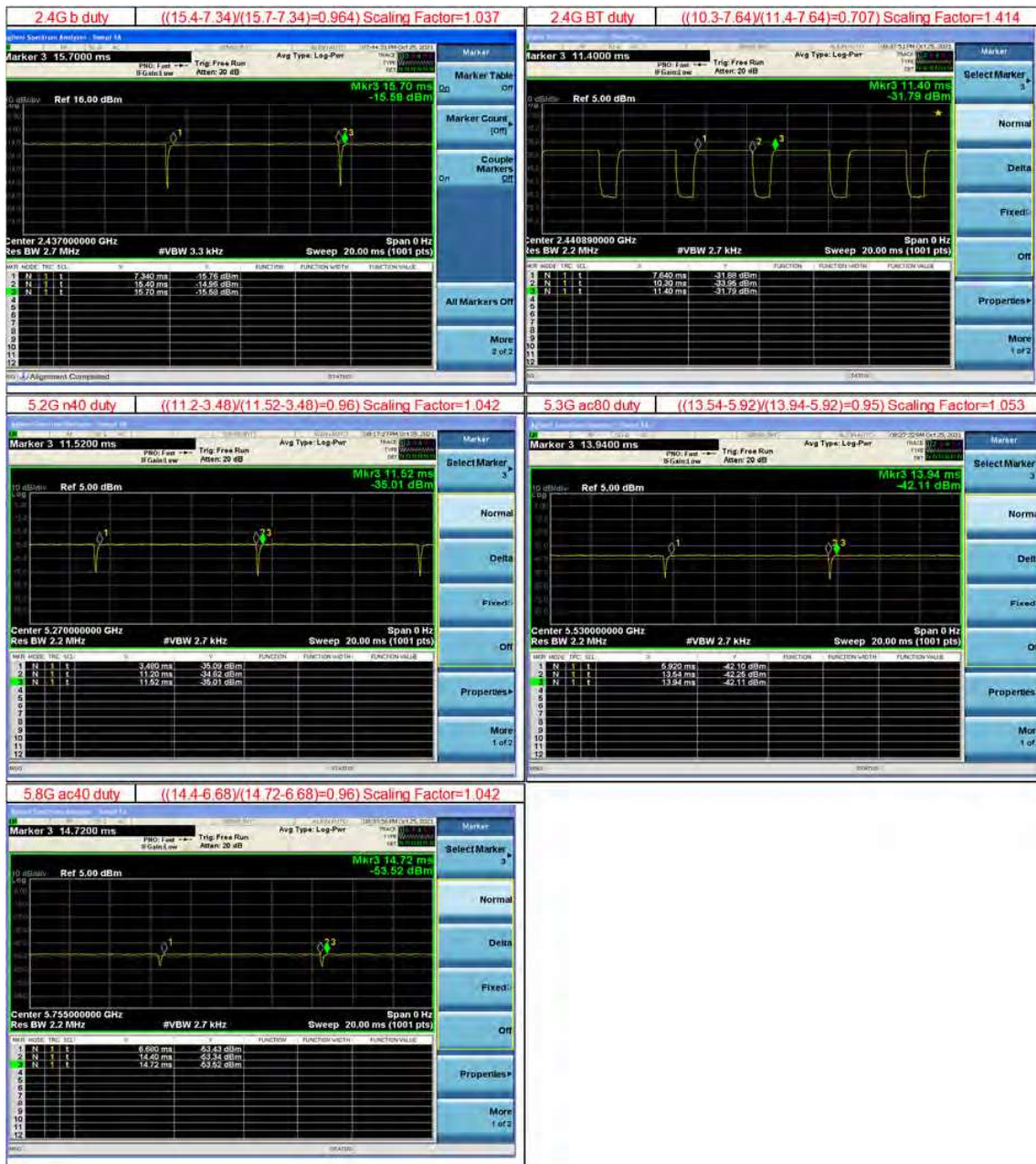
**Bluetooth conducted power table:**

Mode	Channel	Frequency (MHz)	1Mbps		2Mbps		3Mbps	
			Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
BR/EDR	CH 00	2402	10.50	9.92	7.00	6.81	7.00	6.74
	CH 39	2441		9.93		6.82		6.71
	CH 78	2480		9.95		6.93		6.82
Mode	Channel	Frequency (MHz)	GFSK					
			Max. Rated Avg. Power + Max. Tolerance (dBm)		Average Output Power (dBm)			
LE_1M	CH 00	2402	7		5.52			
	CH 19	2440			5.51			
	CH 39	2480			5.58			
Mode	Channel	Frequency (MHz)	GFSK					
			Max. Rated Avg. Power + Max. Tolerance (dBm)		Average Output Power (dBm)			
LE_2M	CH 00	2402	7		5.44			
	CH 19	2440			5.49			
	CH 39	2480			5.57			

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## 1.4 Test Environment

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

## 1.5 Operation Description

Use chipset specific software to control the EUT, and makes it transmit in maximum power. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

### Laptop mode

Keyboard bottom position touch against the flat phantom.

Note:

802.11b DSSS SAR Test Requirements:

1. SAR is measured for 2.4 GHz 802.11b DSSS mode using the highest measured maximum output power channel, when the reported SAR of the highest measured maximum output power channel for the exposure configuration is  $\leq 0.8$  W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2. When the reported SAR is  $> 0.8$  W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel; i.e., all channels require testing.

802.11g/n OFDM SAR Test Exclusion Requirements:

3. SAR is not required for 802.11g/n since the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

Initial Test Configuration:

4. 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.

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5. 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.
6. 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.
7. According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.8$  W/kg, when the transmission band is  $\leq 100$  MHz.
8. 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)

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## 1.6 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation  $SAR = \sigma (|E_i|^2) / \rho$  where  $\sigma$  and  $\rho$  are the conductivity and mass density of the tissue-simulant.

The DASY 5 system for performing compliance tests consists of the following items:

1. A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
2. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage intissue simulating liquid. The probe is equipped with an optical surface detector system.
3. 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.

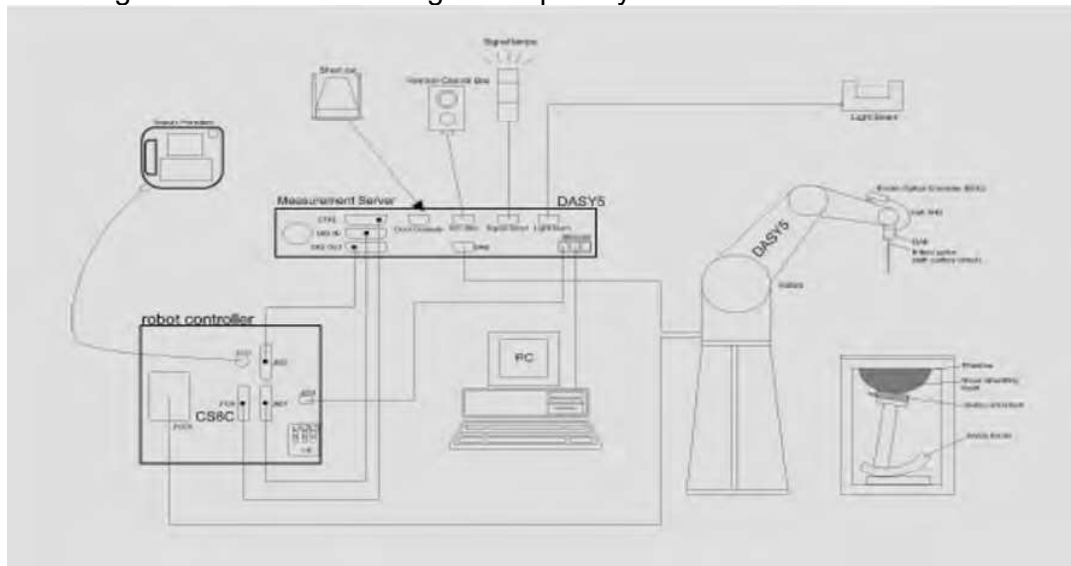


Fig. a The block diagram of SAR system

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4. The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
5. 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.
6. A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
7. A computer operating Windows 7.
8. DASY 5 software.
9. Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
10. Tissue simulating liquid mixed according to the given recipes.
11. Validation dipole kits allowing to validate the proper functioning of the system.

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