Appendix F. SAR and Power Density Test Results

SAR and Power Density Results for Body Exposure Condition.

Note:

1. SAR testing for WLAN was performed on the maximum power mode.
2. The “N/A” means there is no SAR value, or the SAR is too low to be measured.
3. Per Apr. 2021 TCB Workshop U-NII 6-7G interim procedures, the incident power density was performed with the highest SAR configuration on U-NII 6-7G bands and measured results were scaled by factor 1.554 to reported power density when measurement uncertainty exceeds 30%.

SAR Test Record - Test Result (Body)

System & Position										SAR							
Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	RB	offset	Ant Status	Data Rate	Duty Cycle	Drift Power	Maximum Tune-up (dBm)	Conducted Power (dBm)	Scaling Factor	Duty Factor	SAR 1g	Scaled 1g SAR
1850	2.4G WLAN	802.11b	Bottom	0	1	-	-	Ant 1 (Aux)	1Mbps	98.9	-0.02	17.0	16.99	1.00	1.01	0.461	0.467
1851	2.4G WLAN	802.11b	Bottom	0	12	-	-	Ant 2 (Main)	1Mbps	98.9	-0.01	17.0	16.99	1.00	1.01	0.525	**0.533**
1852	2.4G WLAN	802.11ax	Bottom	0	6	-	-	Ant 1+2	MCS0	97.8	-0.01	14.5	14.48	1.00	1.02	0.199	0.204
2000	5.3G WLAN	802.11ax80	Bottom	0	58	-	-	Ant 1 (Aux)	MCS0	97.9	0.00	15.5	15.49	1.00	1.02	0.759	0.777
2001	5.3G WLAN	802.11ax80	Bottom	0	58	-	-	Ant 2 (Main)	MCS0	97.9	-0.19	15.5	15.49	1.00	1.02	0.929	**0.951**
2002	5.3G WLAN	802.11ax80	Bottom	0	58	-	-	Ant 1+2	MCS0	97.9	0.02	13.0	12.99	1.00	1.02	0.266	0.272
2003	5.3G WLAN_Repeat	802.11ax80	Bottom	0	58	-	-	Ant 2 (Main)	MCS0	97.9	-0.13	15.5	15.49	1.00	1.02	0.920	0.942
2200	5.6G WLAN	802.11ax160	Bottom	0	114	-	-	Ant 1 (Aux)	MCS0	98.5	-0.01	14.0	13.98	1.00	1.02	0.740	**0.754**
2201	5.6G WLAN	802.11ax160	Bottom	0	114	-	-	Ant 2 (Main)	MCS0	98.5	-0.05	14.0	13.98	1.00	1.02	0.536	0.546
2202	5.6G WLAN	802.11ax160	Bottom	0	114	-	-	Ant 1+2	MCS0	98.5	-0.11	11.5	11.49	1.00	1.02	0.218	0.222
2300	5.8G WLAN	802.11ax80	Bottom	0	155	-	-	Ant 1 (Aux)	MCS0	97.9	-0.03	14.0	13.96	1.01	1.02	0.788	**0.813**
2301	5.8G WLAN	802.11ax80	Bottom	0	155	-	-	Ant 2 (Main)	MCS0	97.9	0.00	14.0	13.96	1.01	1.02	0.623	0.642
2302	5.8G WLAN	802.11ax80	Bottom	0	155	-	-	Ant 1+2	MCS0	97.9	-0.12	11.5	11.46	1.01	1.02	0.217	0.223
2450	Bluetooth	BR/EDR	Bottom	0	78	-	-	Ant 1 (Aux)	DH5	76.9	-0.13	10.5	10.32	1.04	1.30	0.102	**0.138**
2451	Bluetooth	BR/EDR	Bottom	0	0	-	-	Ant 1 (Aux)	DH5	76.9	0.06	10.5	9.96	1.13	1.30	0.062	0.091
2452	Bluetooth	BR/EDR	Bottom	0	39	-	-	Ant 1 (Aux)	DH5	76.9	0.01	10.5	10.15	1.08	1.30	0.087	0.123

SAR and APD Test Record - Test Result (Body)

System & Position								SAR								APD	
Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	RB	Ant Status	Duty Cycle	Drift Power	Maximum Tune-up (dBm)	Conducted Power (dBm)	Scaling Factor	Duty Factor	SAR 1g	Scaled 1g SAR	APD W/㎡ (4c㎡)	Scaled APD W/㎡ (4c㎡)
2600	6E WLAN	802.11ax_HE160	Bottom	0	15	SU	Ant 1 (Aux)	98.88	-0.02	10.00	9.95	1.01	1.01	0.411	0.420	2.820	2.885
2601	6E WLAN	802.11ax_HE160	Bottom	0	111	SU	Ant 2 (Main)	98.88	-0.14	10.00	9.98	1.01	1.01	0.278	0.283	1.980	2.012
2602	6E WLAN	802.11ax_HE160	Bottom	0	15	SU	Ant 1+2	98.88	-0.15	7.50	7.48	1.00	1.01	0.104	0.106	0.769	0.781
2603	6E WLAN	802.11ax_HE160	Bottom	0	47	SU	Ant 1 (Aux)	98.88	0.05	10.00	9.94	1.01	1.01	0.356	0.365	2.410	2.471
2604	6E WLAN	802.11ax_HE160	Bottom	0	79	SU	Ant 1 (Aux)	98.88	-0.06	10.00	9.82	1.04	1.01	0.393	0.414	2.550	2.688
2605	6E WLAN	802.11ax_HE160	Bottom	0	111	SU	Ant 1 (Aux)	98.88	-0.06	10.00	9.94	1.01	1.01	0.371	0.380	2.460	2.522
2606	6E WLAN	802.11ax_HE160	Bottom	0	143	SU	Ant 1 (Aux)	98.88	0.15	9.75	9.72	1.01	1.01	0.395	0.402	2.730	2.780
2607	6E WLAN	802.11ax_HE160	Bottom	0	175	SU	Ant 1 (Aux)	98.88	0.08	9.75	9.75	1.00	1.01	0.439	**0.444**	3.010	**3.044**
2608	6E WLAN	802.11ax_HE160	Bottom	0	207	SU	Ant 1 (Aux)	98.88	0.14	9.75	9.74	1.00	1.01	0.337	0.342	2.580	2.615

Power Density Test Record - Test Result (Body)

System & Position								iPD											
Plot No.	Band	Mode	Test Position	Separation Distance (mm)	Channel	Ant Status	Data Rate	Duty Cycle (%)	Averaging Area (cm^2)	Grid Step	Drift Power	iPD (W/m^2)	Scaling Factor	Duty Factor	Scaling Factor for Measurement Uncertainty	Normal psPD (W/m^2)	Scaled Normal psPD W/m^2	Total psPD W/m^2	Scaled Total psPD W/m^2
2800	6E WLAN	802.11ax_HE160	Bottom	≤2	15	Ant 1 (Aux)	MCS0	98.88	4	0.0502	-0.09	7.66	1.01	1.01	1.554	1.48	**2.35**	4.66	**7.387**
2801	6E WLAN	802.11ax_HE160	Bottom	≤2	79	Ant 1 (Aux)	MCS0	98.88	4	0.0529	0.14	12.3	1.03	1.01	1.554	1.10	1.78	4.03	6.515
2802	6E WLAN	802.11ax_HE160	Bottom	≤2	111	Ant 1 (Aux)	MCS0	98.88	4	0.0542	0.19	12.3	1.01	1.01	1.554	1.13	1.79	2.66	4.217
2803	6E WLAN	802.11ax_HE160	Bottom	≤2	143	Ant 1 (Aux)	MCS0	98.88	4	0.0555	-0.02	13.9	1.01	1.01	1.554	1.32	2.09	2.56	4.058
2804	6E WLAN	802.11ax_HE160	Bottom	≤2	175	Ant 1 (Aux)	MCS0	98.88	4	0.0569	0.14	11.6	1.00	1.01	1.554	1.07	1.68	2.92	4.583

Appendix G. SAR Measurement Variability

SAR repeated measurement are shown as below.

Repeated SAR							
Plot	Band	Mode	Test Position	CH	Original Measured SAR-1g (W/kg)	1st Repeated SAR-1g (W/kg)	L/S Ratio
2003	WLAN 5.3G	802.11ax80	Bottom	58	0.929	0.920	1.01

Appendix H. Analysis of Simultaneous Transmission

The analysis of simultaneous transmission SAR are shown as below.

<Possibilities of Simultaneous Transmission>
The simultaneous transmission possibilities for this device are listed as below.

Simultaneous TX Combination	Capable Transmit Configurations	Body Exposure Condition
A	WLAN2.4G Ant 2 + BT Ant 1	Yes
B	WLAN5G Ant 1 + BT Ant 1	Yes
C	WLAN5G Ant 2 + BT Ant 1	Yes
D	WLAN5G Ant (1+2) + BT Ant 1	Yes
E	WLAN6G Ant 1 + BT Ant 1	Yes
F	WLAN6G Ant 2 + BT Ant 1	Yes
G	WLAN6G Ant (1+2) + BT Ant 1	Yes

Simultaneous Transmission SAR Evaluation									
Position	Test Gap (cm)	1	2	3	4	5	6	7	8
		WLAN 2.4GHz Ant 2	Max WLAN 5GHz Ant 1	Max WLAN 5GHz Ant 2	Max WLAN 5GHz Ant 1+2	Max WLAN 6GHz Ant 1	Max WLAN 6GHz Ant 2	Max WLAN 6GHz Ant 1+2	Max BT Ant 1
Bottom	0	0.533	0.813	0.951	0.272	0.444	0.283	0.106	0.155

Simultaneous Transmission SAR Evaluation						
A(1+8)	B(2+8)	C(3+8)	D(4+8)	E(5+8)	F(6+8)	G(7+8)
Summing result 1g SAR W/kg	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg	Summing result 1g SAR W/kg
0.688	0.968	**1.106**	0.427	0.599	0.438	0.261

Notes
1. The WLAN 2.4G and WLAN 5G cannot transmit simultaneously.

Appendix I. SAR to Peak Location Separation Ratio Analysis

Since sum of simultaneous transmission SAR is less than the SAR limit for Body SAR1g 1.6 W/kg.
There is no requirement for SAR to Peak Location Separation Ratio Analysis.

Appendix J. Total Exposure Ratio Analysis

According to the FCC guidance in Oct. 2022 TCB workshop and IEC TR 63170, the total exposure ratio calculated by taking ratio of maximum reported SAR divided by SAR limit and adding it to maximum measured power density divided by power density limit. Numerical sum of the ratios should be less than 1.

Position	Max Wlan 6GHz 4cm^2 (W/m^2)	Max BT Ant 1g SAR W/kg	Total Exposure Ratio
Bottom	**7.387**	**0.160**	**0.84**

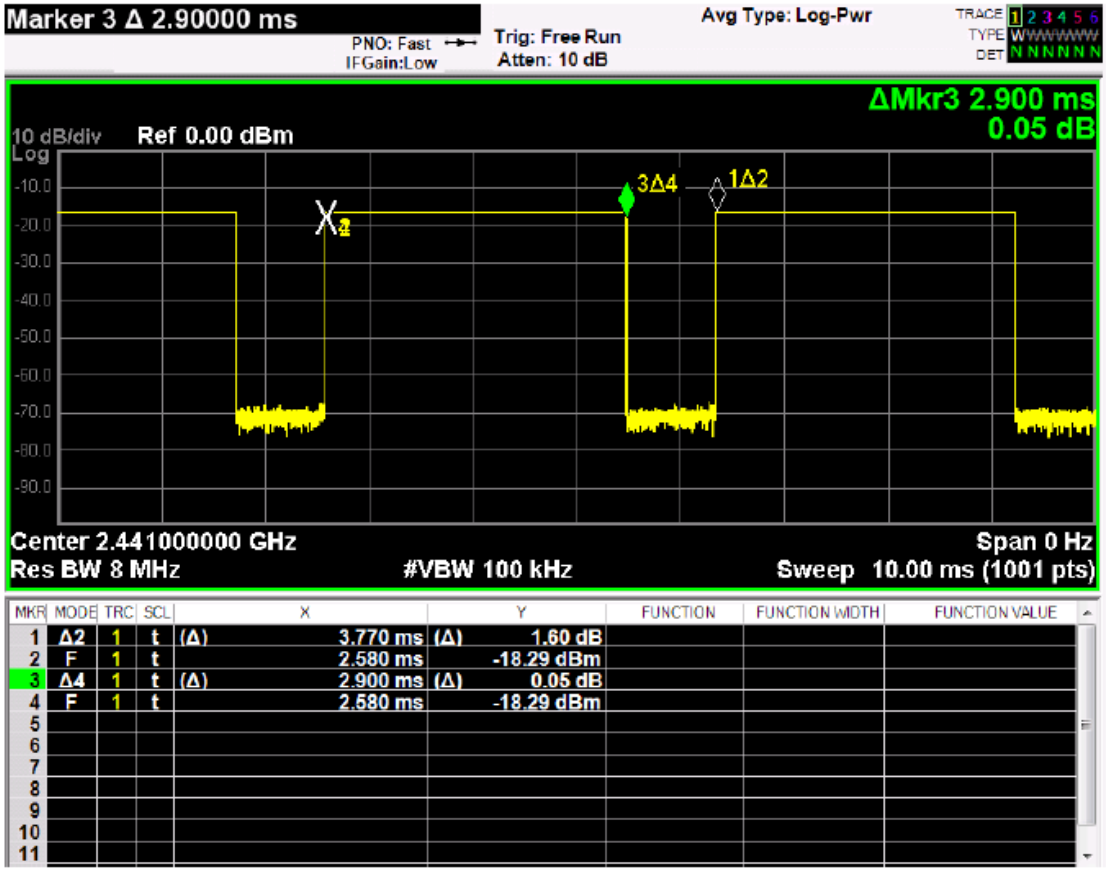
Appendix K. Considerations Related to Bluetooth for Setup and Testing

This device has installed Bluetooth engineering testing software which can provide continuous transmitting RF signal. During Bluetooth SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

The Bluetooth call box has been used during SAR measurement and the EUT was set to DH5 mode at the maximum output power. Its duty factor was calculated as below and the measured SAR for Bluetooth would be scaled to the 100% transmission duty factor to determine compliance.

The duty factor of Bluetooth signal are shown as below.

<Time-domain Plot for Bluetooth transmission signal>



Time-domain plot for Bluetooth transmission signal

The duty factor of Bluetooth signal has BEN calculated as following.

Duty Cycle (%) = (uptime / total time) * 100 = (2.900 / 3.770) * 100 = 76.92 %

Duty Factor = total time / uptime = 1.30