

RF Exposure evaluation for mobile devices

SPB620 module

FCC ID: XO2-SPB620

IC: 8713A-SPB620

Test Report Reference: MDE_HDW_2304_MPE_01_rev01

Test Laboratory:

7layers GmbH
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40880 Ratingen
Germany



Deutsche
Akkreditierungsstelle
D-PL-12140-01-01
D-PL-12140-01-02
D-PL-12140-01-03

Note:

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Administrative Data

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Company Name: 7layers GmbH
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The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no: DAKkS D-PL-12140-01-01| -02 | -03
FCC Designation Number: DE0015
FCC Test Firm Registration: 929146
ISED CAB Identifier: DE0007; ISED#: 3699A
Responsible for accreditation scope: Marco Kullik

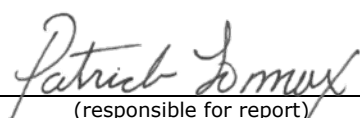
Project Data

Responsible for report: Patrick Lomax
Date of Report: 04/04/2025

Applicant Data

Company Name: H&D Wireless AB
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Report version control			
Version	Release date	Change Description	Version validity
initial	02/04/2024	--	valid
Rev01	04/04/2025	Added additional antennas	valid


(responsible for report)
Patrick Lomax

Model: **SPB620**

FCC ID: **X02-SPB620**

IC: **8713A- SPB6201**

Standards
OET Bulletin 65 Edition 97-01 August 1997
KDB 447498 D01 General RF Exposure Guidance v06
FCC 47 CFR §1.1307
FCC 47 CFR §1.1310
RSS-102 Issue 6 – December 2023

Test limits

As specified in Table 1B of 47 CFR 1.1310 – Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure.

Frequency range (MHz)	Power density (mW/cm ²)
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	Power density (W/m ²)	Power density (mW/cm ²)
300 – 6000	0.02619 f ^{0.6834}	mW/cm ² = W/m ² * 0.1

Equation OET bulletin 65, page 18, edition 97-01: $S = \frac{PQ}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna = 20cm

Co-Location Considerations

The calculation below is used to consider situations in which simultaneous exposure to fields of different frequencies occur. The calculation is performed by the sum of each relative exposure for each equipment according to the following criteria.

$$\sum_{1}^N \frac{S_{eqn}}{S_{Limn}} = \frac{S_{eq1}}{S_{Lim1}} + \frac{S_{eq2}}{S_{Lim2}} + \dots + \frac{S_{eqN}}{S_{LimN}} \leq 1$$

Where:

S_{eq} is the power density of the electromagnetic field at a given distance by a specific transmitter and a defined frequency.

S_{lim} is the MPE limit for the frequency being evaluated.



Operational Bands	Ant	Frequency (MHz)	Antenna Gain (dBi)	Output Power - conducted- (dBm)	P	IC Limit (mW/cm ²)	S	Power Density value (mW/cm ²)	Verdict	FCC (Seq / SLim)	ISED (Seq / SLim)
					Output Power - conducted- (mW)		FCC Limit (mW/cm ²)				
BLE	1	2402	1.3	4.40	2.75	0.5351	1.00	0.0007	Pass	0.0007	0.0014
BLE	2	2402	3.2	4.40	2.75	0.5351	1.00	0.0011	Pass	0.0011	0.0021
BLE	3	2402	3.8	4.40	2.75	0.5351	1.00	0.0013	Pass	0.0013	0.0025
BLE	4	2402	2	4.40	2.75	0.5351	1.00	0.0009	Pass	0.0009	0.0016
BLE	5	2402	4	4.40	2.75	0.5351	1.00	0.0014	Pass	0.0014	0.0026
BLE	6	2402	2.67	4.40	2.75	0.5351	1.00	0.0010	Pass	0.0010	0.0019
BLE	9	2402	2.4	4.40	2.75	0.5351	1.00	0.0010	Pass	0.0010	0.0018
Classic BT	1	2402	1.3	5.30	3.39	0.5351	1.00	0.0009	Pass	0.0009	0.0017
Classic BT	2	2402	3.2	5.30	3.39	0.5351	1.00	0.0014	Pass	0.0014	0.0026
Classic BT	3	2402	3.8	5.30	3.39	0.5351	1.00	0.0016	Pass	0.0016	0.0030
Classic BT	4	2402	2	5.30	3.39	0.5351	1.00	0.0011	Pass	0.0011	0.0020
Classic BT	5	2402	4	5.30	3.39	0.5351	1.00	0.0017	Pass	0.0017	0.0032
Classic BT	6	2402	2.67	5.30	3.39	0.5351	1.00	0.0012	Pass	0.0012	0.0023
Classic BT	9	2402	2.4	5.30	3.39	0.5351	1.00	0.0012	Pass	0.0012	0.0022
WLAN 2.4 GHz	1	2412	1.3	16.00	39.81	0.5366	1.00	0.0107	Pass	0.0107	0.0199
WLAN 2.4 GHz	2	2412	3.2	16.00	39.81	0.5366	1.00	0.0165	Pass	0.0165	0.0308
WLAN 2.4 GHz	4	2412	2	16.00	39.81	0.5366	1.00	0.0126	Pass	0.0126	0.0234
WLAN 2.4 GHz	3	2412	3.8	16.00	39.81	0.5366	1.00	0.0190	Pass	0.0190	0.0354
WLAN 2.4 GHz	5	2412	4	16.00	39.81	0.5366	1.00	0.0199	Pass	0.0199	0.0371
WLAN 2.4 GHz	4	2412	2	16.00	39.81	0.5366	1.00	0.0126	Pass	0.0126	0.0234



WLAN 2.4 GHz	9	2412	2.4	16.00	39.81	0.5366	1.00	0.0138	Pass	0.0138	0.0256
WLAN 5 GHz UNII 1	1	5240	2.3	14.60	28.84	0.9119	1.00	0.0097	Pass	0.0097	0.0107
WLAN 5 GHz UNII 1	2	5240	4.25	14.60	28.84	0.9119	1.00	0.0153	Pass	0.0153	0.0167
WLAN 5 GHz UNII 1	3	5240	5.3	14.60	28.84	0.9119	1.00	0.0194	Pass	0.0194	0.0213
WLAN 5 GHz UNII 1	4	5240	2	14.60	28.84	0.9119	1.00	0.0091	Pass	0.0091	0.0100
WLAN 5 GHz UNII 1	5	5240	7.5	14.60	28.84	0.9119	1.00	0.0323	Pass	0.0323	0.0354
WLAN 5 GHz UNII 1	7	5240	4.59	14.60	28.84	0.9119	1.00	0.0165	Pass	0.0165	0.0181
WLAN 5 GHz UNII 1	8	5240	-3.8	14.60	28.84	0.9119	1.00	0.0024	Pass	0.0024	0.0026
WLAN 5 GHz UNII 2A	1	5300	2.3	14.60	28.84	0.9190	1.00	0.0097	Pass	0.0097	0.0106
WLAN 5 GHz UNII 2A	2	5300	4.25	14.60	28.84	0.9190	1.00	0.0153	Pass	0.0153	0.0166
WLAN 5 GHz UNII 2A	3	5300	5.3	14.60	28.84	0.9190	1.00	0.0194	Pass	0.0194	0.0212
WLAN 5 GHz UNII 2A	4	5300	2	14.60	28.84	0.9190	1.00	0.0091	Pass	0.0091	0.0099
WLAN 5 GHz UNII 2A	5	5300	7.5	14.60	28.84	0.9190	1.00	0.0323	Pass	0.0323	0.0351
WLAN 5 GHz UNII 2A	7	5300	4.59	14.60	28.84	0.9190	1.00	0.0165	Pass	0.0165	0.0180
WLAN 5 GHz UNII 2A	8	5300	-3.8	14.60	28.84	0.9190	1.00	0.0024	Pass	0.0024	0.0026
WLAN 5 GHz UNII 2C	1	5580	2.3	14.10	25.70	0.9519	1.00	0.0087	Pass	0.0087	0.0091
WLAN 5 GHz UNII 2C	2	5580	4.25	14.10	25.70	0.9519	1.00	0.0136	Pass	0.0136	0.0143
WLAN 5 GHz UNII 2C	3	5580	5.3	14.10	25.70	0.9519	1.00	0.0173	Pass	0.0173	0.0182
WLAN 5 GHz UNII 2C	4	5580	2	14.10	25.70	0.9519	1.00	0.0081	Pass	0.0081	0.0085
WLAN 5 GHz UNII 2C	5	5580	7.5	14.10	25.70	0.9519	1.00	0.0288	Pass	0.0288	0.0302
WLAN 5 GHz UNII 2C	7	5580	4.59	14.10	25.70	0.9519	1.00	0.0147	Pass	0.0147	0.0155
WLAN 5 GHz UNII 2C	8	5580	-3.8	14.10	25.70	0.9519	1.00	0.0021	Pass	0.0021	0.0022
WLAN 5 GHz UNII 3	1	5825	2.3	15.30	33.88	0.9803	1.00	0.0114	Pass	0.0114	0.0117
WLAN 5 GHz UNII 3	2	5825	4.25	15.30	33.88	0.9803	1.00	0.0179	Pass	0.0179	0.0183
WLAN 5 GHz UNII 3	3	5825	5.3	15.30	33.88	0.9803	1.00	0.0228	Pass	0.0228	0.0233
WLAN 5 GHz UNII 3	4	5825	2	15.30	33.88	0.9803	1.00	0.0107	Pass	0.0107	0.0109



WLAN 5 GHz UNII 3	5	5825	7.5	15.30	33.88	0.9803	1.00	0.0379	Pass	0.0379	0.0387
WLAN 5 GHz UNII 3	7	5825	4.59	15.30	33.88	0.9803	1.00	0.0194	Pass	0.0194	0.0198
WLAN 5 GHz UNII 3	8	5825	-3.8	15.30	33.88	0.9803	1.00	0.0028	Pass	0.0028	0.0029
Distance to Antenna (R) in cm: 20								Sum of (S _{eqn} / S _{Limn}) Max BT + Max 2.4 WLAN		0.0216	0.0402
										Passed	
								Sum of (S _{eqn} / S _{Limn}) Max BT + Max 5 GHz WLAN		0.0396	0.0418
		Passed									

Distance to Antenna (R) in cm:	20
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Antennas used:

Manufacturer	Model	Type	Ant number	Gains 2.4	Gains 5ghz
Molex	204281-1300	Flex	1	1.3	2.3
Molex	146153-1050	Flex	2	3.2	4.25
Taoglas	GW.59.3153	Dipole RP-SMA	3	3.8	5.3
Laird	01-0012	Dipole RP-SMA	4	2	2
HUBER+SUHNER	1399.17.0040	Omni - directional	5	4	7.5
SEW-EURODRIVE	R-SMA 2,4 GHz	Nahfeldkoppler	6	2.67	-
SEW-EURODRIVE	R-SMA 5 GHz	Nahfeldkoppler	7	-	4.59
SEW-EURODRIVE	Coupler Waveguide R-SMA 5-6 GHz	Waveguide Coupler	8	-	-3.8
SEW-EURODRIVE	Coupler Waveguide R-SMA 2,4 GHz	Waveguide Coupler	9	2.4	-

*****END OF TEST REPORT*****