RF Exposure evaluation for mobile devices

SPB611 module

FCC ID: XO2-SPB611
IC: 8713A-SPB611

Test Report Reference: MDE_HDW_2303_MPE_02

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

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

Administrative Data

Testing Laboratory

Company Name:	7layers GmbH
Address:	Borsigstr. 11 40880 Ratingen Germany

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:	02/04/2024

Applicant Data

Company Name:	H&D Wireless AB
Address:	Färögatan 33, Kista Science Tower 164 51 Kista Sweden
Contact Person:	Mikael Olsson

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	02/04/2024	--	valid
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(responsible for report)
Patrick Lomax

Model: ***SPB620***

FCC ID***:X02-SPB620***
IC***: 8713A- SPB6201***

Standards
OET Bulletin 65 Edition 97-01 August 1997
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/cm²)*
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	*Power density (W/m²)*	*Power density (mW/cm²)*
300 – 6000	$0.02619\ f^{0.6834}$	*mW/cm² = W/m² * 0.1*

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

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.

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

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.

					P		S				
Operational Bands	**Ant**	**Frequency (MHz)**	**Antenna Gain (dBi)**	**Output Power -conducted- (dBm)**	**Output Power -conducted- (mW)**	**IC Limit (mW/cm²)**	**FCC Limit (mW/cm²)**	**Power Density value (mW/cm²)**	**Verdict**	**FCC (Seq / SLim)**	**ISED (Seq / SLim)**
BLE	1	2402	1.3	8.80	7.59	0.5351	1.00	0.0020	Pass	0.0020	0.0038
BLE	2	2402	3.2	8.80	7.59	0.5351	1.00	0.0032	Pass	0.0032	0.0059
Classic BT	1	2402	1.3	6.10	4.07	0.5351	1.00	0.0011	Pass	0.0011	0.0020
Classic BT	2	2402	3.2	6.10	4.07	0.5351	1.00	0.0017	Pass	0.0017	0.0032
Thread	1	2402	1.3	8.90	7.76	0.5351	2.00	0.0021	Pass	0.0010	0.0039
Thread	2	2402	3.2	8.90	7.76	0.5351	3.00	0.0032	Pass	0.0011	0.0060
WLAN 2.4 GHz	1	2412	1.3	14.80	30.20	0.5366	1.00	0.0081	Pass	0.0081	0.0151
WLAN 2.4 GHz	2	2412	3.2	14.80	30.20	0.5366	1.00	0.0126	Pass	0.0126	0.0234
WLAN 5 GHz UNII 1	1	5240	2.3	14.50	28.18	0.9119	1.00	0.0095	Pass	0.0095	0.0104
WLAN 5 GHz UNII 1	2	5240	4.25	14.50	28.18	0.9119	1.00	0.0149	Pass	0.0149	0.0164
WLAN 5 GHz UNII 2A	1	5300	2.3	14.50	28.18	0.9190	1.00	0.0095	Pass	0.0095	0.0104
WLAN 5 GHz UNII 2A	2	5300	4.25	14.50	28.18	0.9190	1.00	0.0149	Pass	0.0149	0.0162
WLAN 5 GHz UNII 2C	1	5580	2.3	15.00	31.62	0.9519	1.00	0.0107	Pass	0.0107	0.0112
WLAN 5 GHz UNII 2C	2	5580	4.25	15.00	31.62	0.9519	1.00	0.0167	Pass	0.0167	0.0176
WLAN 5 GHz UNII 3	1	5825	2.3	19.80	95.50	0.9803	1.00	0.0323	Pass	0.0323	0.0329
WLAN 5 GHz UNII 3	2	5825	4.25	19.80	95.50	0.9803	1.00	0.0506	Pass	0.0506	0.0516

Sum of (S_{eqn} / S_{Limn}) Max BT + Max 2.4 WLAN	0.0157	0.0293
	Passed	
Sum of (S_{eqn} / S_{Limn}) Max BT + Max 5 GHz WLAN	0.0157	0.0293
	Passed	
Sum of (S_{eqn} / S_{Limn}) Max Thread + Max 2.4 WLAN	0.0136	0.0576
	Passed	
Sum of (S_{eqn} / S_{Limn}) Max Thread + Max 5 GHz WLAN	0.0516	0.0576
	Passed	

End of report