Prüfbericht-Nr.: *Test report no.:*	IN23WDIF 001 IN23FG6K 001 IN23ESPY 001	**Auftrags-Nr.:** *Order no.:*	146742971 0010	Seite 1 von 9 *Page 1 of 9*
Kunden-Referenz-Nr.: *Client reference no.:*	2119359	**Auftragsdatum:** *Order date:*	2022-12-06	
Auftraggeber: *Client:*	1.HONEYWELL INTERNATIONAL INC,Honeywell Safety and Productivity Solutions 9680 OLD BAILES RD, FORT MILL, SC 29707, USA			
Prüfgegenstand: *Test item:*	HWBPM11AX-PRTM	**Product Type**	Wi-Fi BT Module	
Bezeichnung.: *Identification .:*	HWBPM11AX-PRT			
Auftrags-Inhalt: *Order content*:	Maximum Permissible Expsoure			
Prüfgrundlage: *Test specification:*	FCC 1.1310 and RSS 102, Issue 5			
Wareneingangsdatum: *Date of sample receipt:*	2022-12-07			
Prüfmuster-Nr & Serien-Nr.: *Test sample no & serial no.:*	A003385546-022 & A003385546-04 2022120701 & 2022120702			
Prüfzeitraum: *Testing period:*	2022-12-07 - 2023-01-06			
Ort der Prüfung: *Place of testing:*	Wireless laboratory, Bangalore			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (India) Pvt.Ltd., 27/B, 2nd Cross, Electronic City Phase1 Bangalore -560 100, India FCC Test site registration number: 496599 ISED Test site registration number: 3466E-1			
Prüfergebnis*: *Test result*:*	Pass			

geprüft von: *tested by:*	Likhithesh M D	**genehmigt von:** *authorized by:*	Madhu K.N
Datum: *Date:* 2023-01-09		**Ausstellatum:** *Issue date:* 2023-02-08	
Stellung / *Position:*	**Likhithesh M D** **Senior Engineer**	**Stellung** / *Position:*	**Madhu K.N** **Senior Engineer**

Sonstiges / *Other:*	FCC ID: HD5-PM11AX IC: 1693B-PM11AX
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	**Prüfmuster vollständig und unbeschädigt** ***Test item complete and undamaged***

* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
** Legend:*	*1 = very good* *P(ass) = passed a.m. test specification(s)*	*2 = good*	*3 = satisfactory* *F(ail) = failed a.m. test specification(s)*	*4 = sufficient* *N/A = not applicable*	*5 = poor* *N/T = not tested*

1 RF Exposure Report

1.1 RF Exposure Measurement

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS 102, Issue 5, Section 2.5.2 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

1.2 RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b) showed in Table 1. And as per the RSS 102, Issue 5, Section 2.5.2 the MPE limits mentioned in Table 2.

Table 1: Limits for Maximum Permissible Exposure (MPE) as per FCC

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

F or f = Frequency in MHz

Table 2: Limits for Maximum Permissible Exposure (MPE) as per ISED Canada

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)
Limits for Occupational / controlled Exposures			
100-6000	$15.60f^{0.25}$	$0.04138f^{0.25}$	$0.6455f^{0.5}$
Limits for General population / Uncontrolled Exposure			
300-6000	$3.142\ f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$

F or f = Frequency in MHz

1.2.1 Friss Formula

Friss Transmission Formula: Pd = (Pout * G) / (4*pi*r²)

Where
Pd = power density in mW/cm²
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

1.2.2 EUT Operation condition

EUT was enabled to transmit and receive at lowest, middle and highest channels.

1.2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as fixed device.

ANTENNA TYPE: MAF94367 (OMNI DIRECTIONAL ANTENNA)

Test Results

1. **Protocol: BT**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
2.35	1.7179	2440	19.73	1.5	132.7394	0.0453	1	0.54

2. **Protocol: BLE**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
2.35	1.7179	2440	10.26	1.5	14.9968	0.0051	1	0.54

3. **Protocol: Wi-Fi 2.4GHz**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
2.35	1.7179	2437	23.64	1.5	326.5878	0.1116	1	0.54

4. **Protocol: Wi-Fi 5GHz (UNII-1)**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
3.37	2.1727	5240	21.59	1.5	203.7042	0.0880	1	0.91

5. **Protocol: Wi-Fi 5GHz (UNII-2A)**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
3.37	2.1727	5260	20.99	1.5	177.4189	0.0766	1	0.91

6. Protocol: Wi-Fi 5GHz (UNII-2C)

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm^2)	FCC Limit (mW/cm^2)	ISED Limit (mW/cm^2)
3.37	2.1727	5710	20.20	1.5	147.9108	0.0639	1	0.96

7. Protocol: Wi-Fi 5GHz (UNII-3)

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm^2)	FCC Limit (mW/cm^2)	ISED Limit (mW/cm^2)
3.37	2.1727	5745	20.06	1.5	143.2187	0.0619	1	0.97

ANTENNA TYPE: 1001932PT (FLEX/PCB ANTENNA)

Test Results

1. **Protocol: BT**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
2.50	1.7782	2440	19.88	1.5	137.4041	0.0486	1	0.54

2. **Protocol: BLE**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
2.50	1.7782	2440	10.41	1	15.5238	0.0054	1	0.54

3. **Protocol: Wi-Fi 2.4GHz**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
2.50	1.7782	2437	26.70	1	660.6934	0.2337	1	0.54

4. **Protocol: Wi-Fi 5GHz (UNII-1)**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.40	2.7542	5190	30.63	1	1633.0519	0.8948	1	0.90

5. **Protocol: Wi-Fi 5GHz (UNII-2A)**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.40	2.7542	5270	25.24	1	472.0630	0.2586	1	0.91

6. Protocol: Wi-Fi 5GHz (UNII-2C)

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.40	2.7542	5590	23.78	1.5	337.2873	0.1848	1	0.95

7. Protocol: Wi-Fi 5GHz (UNII-3)

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.40	2.7542	5795	26.55	1.5	638.2634	0.3497	1	0.97

ANTENNA TYPE: FPA3020-10 (FLEX/PCB ANTENNA)

Test Results

1. **Protocol: BT**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.23	2.6485	2440	21.61	1.5	204.6444	0.1078	1	0.54

2. **Protocol: BLE**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.23	2.6485	2440	12.14	1.5	23.1206	0.0121	1	0.54

3. **Protocol: Wi-Fi 2.4GHz**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
4.23	2.6485	2437	28.64	1.5	1032.7614	0.5441	1	0.54

4. **Protocol: Wi-Fi 5GHz (UNII-1)**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
5.58	3.6140	5240	27.10	1.5	724.4359	0.5208	1	0.91

5. **Protocol: Wi-Fi 5GHz (UNII-2A)**

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
5.58	3.6140	5270	26.57	1.5	641.2095	0.4610	1	0.91

6. Protocol: Wi-Fi 5GHz (UNII-2C)

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
5.58	3.6140	5590	25.88	1.5	547.0159	0.3933	1	0.95

7. Protocol: Wi-Fi 5GHz (UNII-3)

Antenna Gain (dBi)	Antenna gain in linear scale	Channel Frequency (MHz)	Maximum output power (dBm)	Tune up Value in (dB)	Maximum output power incuding Tune-up value (mW)	Power Density (mW/cm²)	FCC Limit (mW/cm²)	ISED Limit (mW/cm²)
5.58	3.6140	5745	26.12	1.5	578.0960	0.4156	1	0.97

Note:

1. Antenna gain details are taken from the antenna data sheet(2.4/5GHz Flex/PCB Antenna)
2. Manufacturer has declared the tune-up value as ±1.5 dB is considered in MPE calculation.

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