MPE Evaluation Report: Haytech

Product:	Haytech
FCC ID:	2A3UFQNT2X3
IC:	28052-QNT2X3
HVIN (Hardware Version Identification Number)	QNT-203
PMN (Product Marketing Name)	Haytech
FVIN (Firmware Version Identification Number)	NA
HMN (Host Marketing Name)	NA

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1- Description of Equipment Under Test

EUT Type:	Haytech
FCC ID:	2A3UFQNT2X3
IC:	28052-QNT2X3
HVIN (Hardware Version Identification Number)	QNT-203
PMN (Product Marketing Name)	Haytech
FVIN (Firmware Version Identification Number)	NA
HMN (Host Marketing Name)	NA
Tx Frequency Bands (Unit: MHz)	903-927
Antenna Type	PCB Antenna

Note:

1- For more detailed features description please refers to the manufacturer's specifications or User's Manual.

2- MPE (Maximum Permissible Exposure) Assessment Requirements

a. FCC 47 CFR Part 1.1310 Radiofrequency radiation exposure limits

According to 47 CFR §2.1091, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitting antenna and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 cm separation requirement. The limits to be used for MPE evaluation are specified in §1.1310. All unlicensed personal communications service (PCS) devices and unlicensed NII devices shall be subject to the limits for general population/uncontrolled exposure.

i. FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices

According to 47 CFR §1.1310, the criteria listed in below table shall be used to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f^2)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f^2)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

Notes:

1. f = frequency in MHz
2. 2.Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.
3. General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

b. ISED RSS-102 Issue 5- Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

i. RSS-102 Section 2.5 – Exemption Limits for Routine Evaluation

All transmitters are exempt from routine SAR and RF exposure evaluations provided that they comply with the requirements of sections 2.5.1 or 2.5.2. **If the equipment under test (EUT) meets the requirements of sections 2.5.1 or 2.5.2, applicants are only required to submit a properly signed declaration of compliance (see Annex C)**. The information contained in the RF exposure technical brief may be limited to the value(s) of the maximum output power, the information that demonstrates how the maximum output power of the transmitter was derived and the rationale for the separation distances applied (see Table 1), which must be based on the most conservative exposure condition for the applicable module or host platform test procedure requirements

ii. RSS-102 Section 2.5.2 – Exemption Limits for Routine Evaluation – RF Exposure Evaluation RF Radiation Exposure Limits

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element **is greater than 20 cm**, except when the device operates as follows:
• below 20 MHz 6 and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
• at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 4.49/ƒ0.5 W (adjusted for tune-up tolerance), where ƒ is in MHz;
• at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10-2 ƒ0.6834 W (adjusted for tune-up tolerance), where ƒ is in MHz;
• at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).
In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

3- MPE Assessment Method and Results

a. MPE Assessment Method

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations below. This equation is generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$Power\ Density\ (S) = \frac{\mathrm{PG}}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

Where

S = Power Density, unit in mW/cm
P = Power input to the antenna, unit in mW
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, unit in cm
EIRP = Effective isotropically radiated power

b. MPE Calculation for Standalone Operations

The manufacturer expects that the radiated component of this device will not close to the human body during normal usage and the warning statement was also stated in the user instruction. Since the transmitting antenna will be kept at least 20 cm away from the human body, the MPE level is calculated based on this condition and the result is listed in below table.

Band (MHz)	Max. EIRP (dbm)	Max EIRP (mW)	Calculated Power Density (mW/m^2)	Calculated Power Density (W/m^2)	Calculated Power Density (mW/cm^2)
903	11.53	14.22	28.29	0.0283	0.00283
915	11,77	15.03	29.90	0.0299	0.00299
927	11,88	15.42	30.68	0.0307	0.00307

FCC MPE Limit (mW/cm^2)	FCC Result	FCC Exemp. Fulfilled	ISED Limit (W/m^2)	ISED Result	ISED Exmp. (W)	ISED Exemp. Fulfilled
0,602	**Pass**	Yes	2,728	**Pass**	1,371	Yes
0,610	**Pass**	Yes	2,753	**Pass**	1.384	Yes
0618	**Pass**	Yes	2,778	**Pass**	1.396	Yes

c. MPE Conclusion

FCC: The results do comply with the requirements.

ISED: The results do comply with the requirements.

4- Document Version

Date – Author	Version	Comments
25.07.2022 – Maxime DAUPHIN	V1.0	First Version
09.02.2023 – Nhut Tran	V2.0	Updated FCC ID