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MPE Calculation

Project No: C5814
Date: 14th October 2021

Product details:

Product name	T2 terminal
Company name	Mitrefinch Ltd
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Company Reg. No. 6048589
VAT Reg. No. GB 887 1276 83

Reference: C5814

MPE Calculation for Mitrefinch Ltd

WiFi FCC requirement :

This report contains calculation of maximum Possible Exposure for the T2 terminal.

Required distance to the user is assumed to be 20 cm

Mobile devices are defined by the FCC as transmitters designed to be used in other than fixed locations and generally to be used in such a way that a separation distance of 20cm is normally maintained between radiating structures and the body of the user or nearby persons.

These devices are normally evaluated for exposure potential with relation to the MPE limit.

As the 20cm separation may not be achievable under normal operating conditions, an RF exposure calculation is used to demonstrate the minimum distance required to be less than the power density limit, as required under FCC rules.

FCC rule part:47CFR2.1091(3)

Power density (S) relates to Equivalent Isotropic Radiated power (EIRP) according to the following:

$$S = \frac{EIRP}{4\pi R}$$

Where,

R is the distance to the centre of radiation of the antenna (cm)

Rearranging,

$$R = \sqrt{\frac{EIRP}{S4\pi}}$$

The output power of the WiFi module was = 126.3 mW

The distance R is calculated as:

Frequency (MHz)	**Maximum EIRP (mW)**	**Power density limit (S) (mW/cm^2) 47CFR1.1310 Table 1**	**Distance (R) cm required to be less than 5 (mW/cm^2)**
2463.0	126.3	5.0	1.4

Conclusion:

The product was shown to be compliant at a distance of 1.4cm with the 20cm power density limit, therefore mat the requirements at 20cm.

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WiFi ISED Requirement

RSS Standard:

RSS-102 Issue 5 Posted on Industry Canada website: March 19, 2015

Clause:2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation

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 then, in Watts,

$$1.31 \times 10^{-2} \, f^{0.6834}$$

adjusted for tune-up tolerance), where f is in MHz

Calculation of e.i.r.p.:
Peak conducted power was measured, see Test Report 14098TR1.

Evaluation

frequency (MHz)*	Modulation Scheme	Measured Power (W)	Limit (W)
2411	CCK	0.0657	2.68
2411	OFDM	0.1165	2.68
2432	CCK	0.0676	2.7
2432	OFDM	0.12	2.7
2463	CCK	0.0698	2.72
2463	OFDM	0.1263	2.72

Highest measurement using a peak detector.

Conclusion
The apparatus meets the exclusion requirements for RF exposure.

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RFID FCC and ISED

For both the FCC and ISED requirements the output signal 15 13.56MHz was **>20dB below the spurious emission limit (see figure 1 below).** Formal MPE calculation was not done since the emission was completely within the spurious domain.

The data was measured at 3m and extrapolated to the specified measurement distance of 30m:

For measurements in the band 0.490MHz to 30MHz the specified measurement distance is 30m. The distance correction will be:

Correction = 40*log (3/30) = -40dB

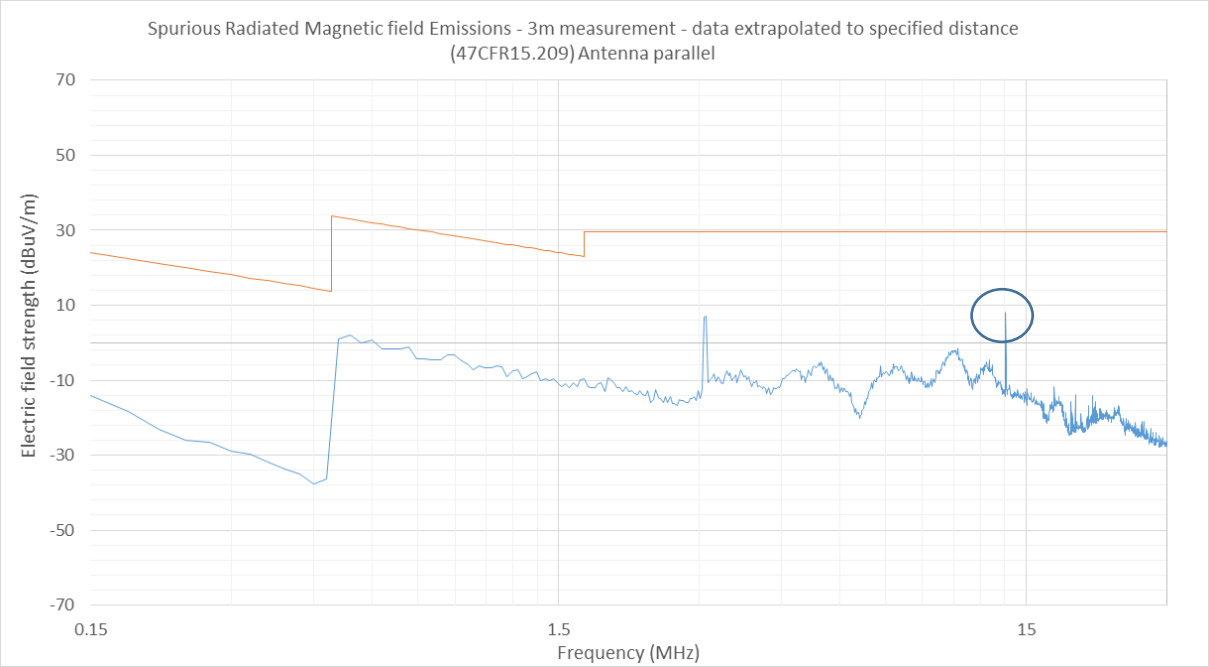

Figure 1 Spurious emissions profile (peak detection) compared to the spurious emission limit at 30m. The i13.56MHz signal is circled.

Simultaneous Transmission WiFi and RFID

Since the RFID output field strength at13.56MHz and was below the spurious emission limit, the evaluation of interaction with 2.4GHz WiFi is that interaction is not possible.

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