

RF Exposure Evaluation

performed in accordance with

**Federal Communications Commission 47 CFR Part 15, Subpart F
Technical Requirements for Ground Penetrating Radar Systems
SAR Test Exclusion per KDB 447498 D01 v06**

**Industry Canada RSS 220, Issue 1, March 2009
Industry Canada RSS-102, Issue 5, March 2015**

PRODUCT	Ground penetrating radar
MODEL(s) TESTED	CTHRUE
TRADE MARK(s)	IDS GeoRadar S.r.l.
FCC ID	UFW-CTHRUE
IC ID	8991A-CTHRUE
Contains FCC ID	RYK-261ACNBT

APPLICANT	IDS GeoRadar S.r.l. Via E. Calabresi, 24 – I-56121 PISA
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Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2018-03-01	First edition

SAR Test Exclusion for UWB transmitter

Requirement	Portable devices are subject to radio frequency radiation exposure requirements as explained in FCC KDB 447498 D01 General RF Exposure Guidance v06, dated October 23, 2015. RSS-102, Issue 5, March 2015
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Evaluation of Exemption Limit (separation distance 100 mm)

For a 1-g SAR, the test exclusion result must be ≤ 3.0 and ≤ 7.5 for 10-g extremity SAR. The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by the following formula:

$$\text{SAR Test Exclusion} = \frac{P_{\text{MAX}}}{d_{\text{MIN}}} \times \sqrt{f_{(\text{GHz})}}$$

P_{MAX} (mW): Maximum power of channel, including tune-up tolerance

d_{MIN} (mm): Minimum test separation distance, mm (≤ 50 mm)

$f_{(\text{GHz})}$: is the RF channel transmit frequency in GHz (>100 MHz and <6 GHz)

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

The values 3.0 and 7.5 are referred to as numeric thresholds below

Per KDB 447498 Appendix A SAR Exclusion Threshold at 50 mm is:

- 122 mW at 1500 MHz.

Extremity SAR is 2.5 times this value or 305mW at 1500MHz.

The manufacturer's mechanical drawing shows the distance of the EUT's antenna to the handle is 110 mm (see at page 4).

Per KDB 447498 Appendix B the approximate power exclusion at 100mm is:

- 622 mW at 1500 MHz.

$$\text{SAR Test Exclusion} = P((\text{numeric threshold}) + (100 - 50 \text{ mm})) \times (f(\text{MHz}) / 150)$$

Per IC RSS-102, Section 2.5.1 Table 1 devices operating at a separation distance ≥ 50 mm shall be:

- at or below 301 mW at 1500 MHz.

Max. Frequency (MHz)	Max. level measured at 3m. distance (dB μ V/m)	Max. measured e.i.r.p. (mW)	FCC threshold for exclusion (mW)	IC threshold for exclusion (mW)
1440.10	47.45	1.7×10^{-5}	622	301

SAR Test Exclusion for 802.11b/g/n WiFi Module transmitter

Requirement	Portable devices are subject to radio frequency radiation exposure requirements as explained in FCC KDB 447498 D01 General RF Exposure Guidance v06, dated October 23, 2015. RSS-102, Issue 5, March 2015
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Evaluation of Exemption Limit (separation distance 100 mm)

Contained module (FCC ID: RYK-261ACNBT) is used only for WiFi. The BT is not used in this application. The two frequencies 2.4GHz and 5.2 GHz can not transmit simultaneously.

For a 1-g SAR, the test exclusion result must be ≤ 3.0 and ≤ 7.5 for 10-g extremity SAR.

The application of this device involve the extremity SAR. 10-g exemption limit for distance =50 mm is given by the following formula:

$$P_{thres\ 50mm} = \frac{7,5 * 50mm}{\sqrt{f[GHz]}}$$

Using the formula at 4.3.1 b) 2):

$$P_{thres>50mm} = P_{thres\ 50mm} + [(d - 50mm) * 10]$$

d (mm) is the minimum separation distance during intended use of the device.

$f_{(GHz)}$: is the RF channel transmit frequency in GHz (>100 MHz and <6 GHz)

For KDB 447498 SAR Exclusion Threshold at 50 mm (10-g) are:

- 239 mW at 2462 MHz;
- 164 mW at 5240 MHz.

The manufacturer's mechanical drawing shows the distance between embedded WiFi module and users: 100 mm (see at page 5).

For KDB 447498 SAR Exclusion Threshold at distance of 100 mm (10-g) are:

- 739 mW at 2462 MHz;
- 664 mW at 5240 MHz.

Per ISED Canada RSS-102, Section 2.5.1 Table 1 devices operating at a separation distance ≥ 50 mm shall be:

- at or below 309 mW at 2450 MHz;
- at or below 106 mW. at 5800 MHz

For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5:

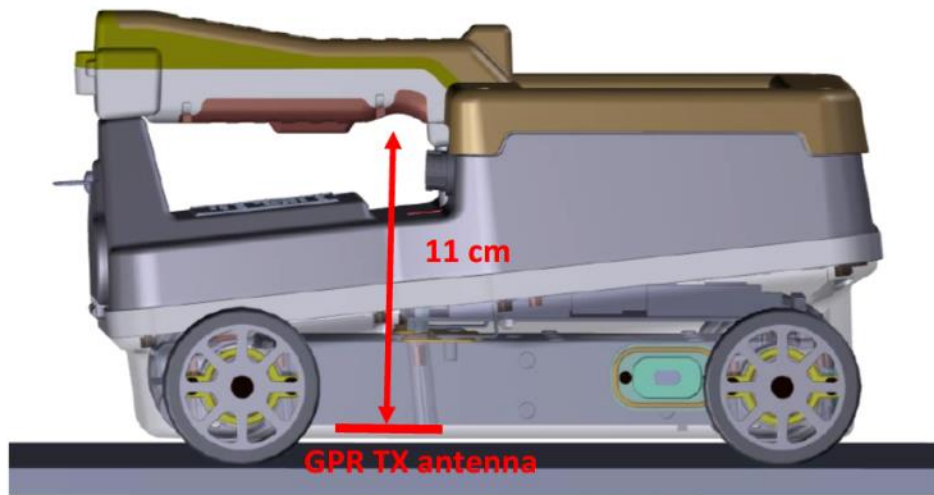
- at or below 772 mW at 2450 MHz;
- at or below 265 mW. at 5800 MHz

For high frequencies (>1900 MHz), the exemption limits are derived from a third order polynomial fit. See threshold limit in the table below):

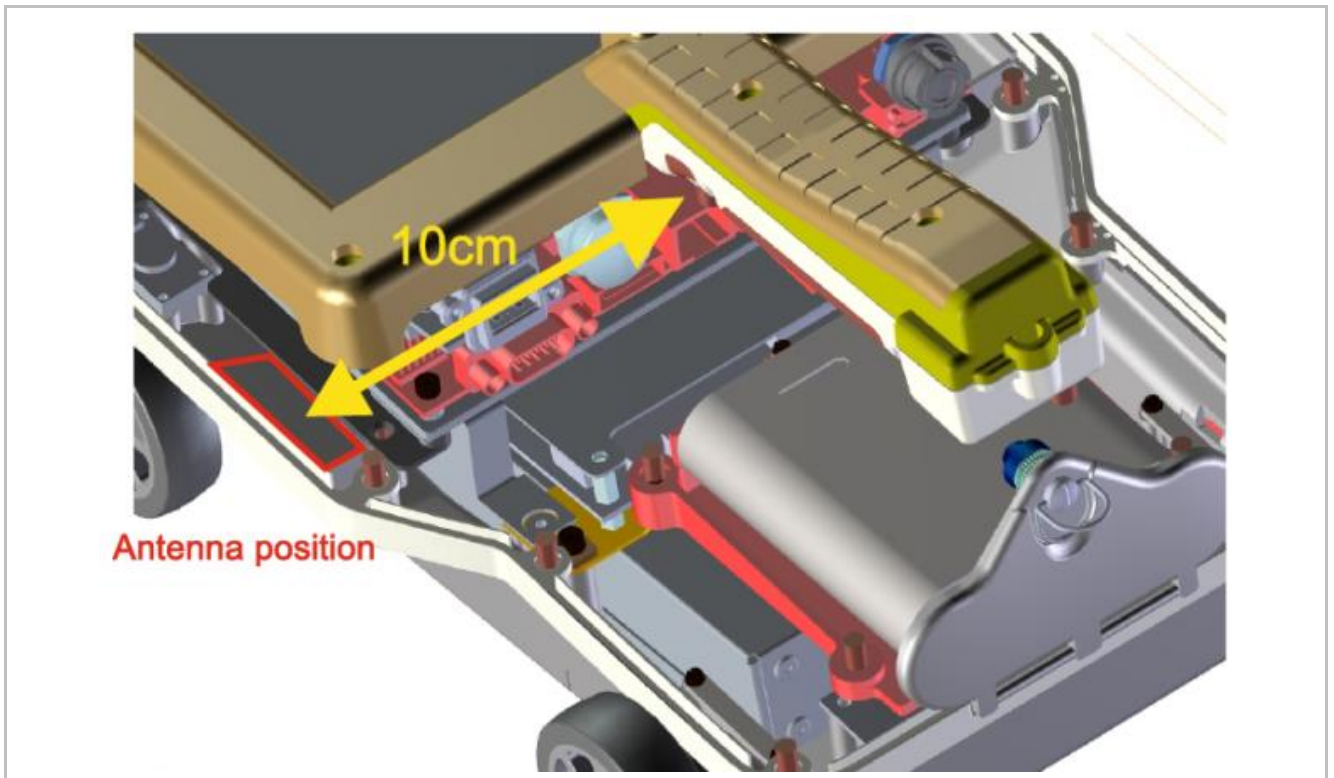
Frequency (MHz)	Max power of the WiFi Module shown in the original grant		Max Antenna gain (dBi)	Max level		FCC threshold exclusion for 10-g limit (mW)	ISED threshold exclusion for limb-worn device (mW)
	(mW)	(dBm)		(dBm)	(mW)		
2412-2462	334.326	25.24	2.27	27.51	563.64	739	772
5180-5240	78.14	18.93	4.9	23.83	241.55	664	265

MANUFACTURER'S MECHANICAL DRAWING

UWB antenna position



WiFi antenna position



TEST RESULT

SAR evaluation is not required because the output power value is less than exemption limit at separation distance of 100 mm.