

Assessment report No:
NIE: 51982RAN.002A1

Assessment report (Modification 1) RF EXPOSURE REPORT ACCORDING TO FCC 47 CFR Part 2.1091 ISED RSS -102 Issue 5:2015

Identification of item tested.....:	WE866A1-P
Trademark	Telit
Model and /or type reference	WE866A1-P
Other identification of the product	FCC ID : RI7WE866A1P
Final HW version	HW 0
Features	802.11 b/g/n Wifi module
Manufacturer.....:	TELIT COMMUNICATIONS Via Stazione di Prosecco 5/B 34010 Sgonico, Trieste-Italy
Test method requested, standard.....:	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices. ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager
Date of issue	2018-04-16
Report template No.....:	FAN24_01

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Competences and guarantees

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Assessment Report apply only to the particular item under test established in this document.

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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Identification of the client

TELIT COMMUNICATIONS

Via Stazione di Prosecco 5/B

34010 Sgonico, Trieste-Italy

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 51982RAN.002 related with the same samples, in the next clauses and sub-clauses:

Clauses / Sub-clauses	Modification	Justification
General description of the device under evaluation	Updated device's E.I.R.P. values	Information updated.
Appendix A – FCC RF Exposure FCC MPE Evaluation Results	Updated device's E.I.R.P. values	Information updated.
Appendix B – ISED RF Exposure ISED MPE Evaluation Results	Updated device's E.I.R.P. values	Information updated.

This modification test report cancels and replaces the test report 51982RAN.002.

General description of the device under evaluation

The device under evaluation consists on a Telit WE866A1-P WIFI module which will be installed into host devices that will be used at a distance greater than 20 cm from the user.

The evaluation distance used for this assessment has been 20 cm.

As stated into DEKRA test report num. 51982RRF.002 the maximum output power, antenna gain and maximum E.I.R.P values for each Wi-Fi mode are:

Frequency Range (MHz)	Technology	Channel/ Frequency (MHz)	Maximum RF output power (dBm)	Maximum Antenna gain (dBi)	Maximum E.I.R.P (dBm)
2412-2462	Wifi 802.11 b	1 / 2412	13.65	+2.2	15.85
		6 / 2437	14.18	+2.2	16.38
		11 / 2462	14.34	+2.2	16.54
	Wifi 802.11 g	1 / 2412	19.37	+2.2	21.57
		6 / 2437	20.20	+2.2	22.40
		11 / 2462	19.45	+2.2	21.65
	Wifi 802.11 n20	1 / 2412	19.38	+2.2	21.58
		6 / 2437	19.82	+2.2	22.02
		11 / 2462	19.44	+2.2	21.64

Table 1: Output power, antenna gain and maximum E.I.R.P values

Assessment summary

Radiofrequency radiation exposure limits			
FCC 47 CFR § 2.1091 & ISED RSS-102 Issue 5 (2015-03)			
Band (MHz)	Technology	Band	VERDICT (Pass/Fail)
2450	Wifi 802.11 b/g/n	ISM	Pass

Table 2: Assessment summary

Appendix A – FCC RF Exposure

FCC RF Exposure evaluation for mobile devices

Devices operating in standalone mobile device exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be at least 20 cm and fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile device exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When a device qualifies for the categorical exclusion provision of § 2.1091(c), the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to §1.1310 Radiofrequency radiation exposure limits, paragraph (e), the limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields are:

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) 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			1/300	6
1,500–100,000			5	6
(B) 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			1/1500	30
1,500–100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

FCC MPE Evaluation Results

In order to perform the assessment, the following equations have been used for the calculations:

$$\text{Power density: } S[mW/cm^2] = \frac{P_{\max}[mW]}{4\pi R[cm]^2}$$

$$\text{Minimum compliance distance: } R_{\min}[m] = \sqrt{\frac{P_{\max}[mW]}{4\pi S[mW/cm^2]}}$$

$$\text{Maximum gain to meet the MPE limit: } G_{\max}[dBi] = (10 * \log[S[mW/cm^2] * 4\pi R[m]^2] - P_{\max}[dBm])$$

S = power density

P_{\max} = power input to the antenna

R = distance to the center of radiation of the antenna (evaluation distance)

R_{\min} = distance to the center of radiation of the antenna

G_{\max} = power gain of the antenna in the direction of interest relative to an isotropic radiator

Assessment 1- Wi-Fi 802.11 g

Maximum output power (dBm):	20.20
Maximum Antenna gain (dBi):	2.2
Maximum E.I.R.P. (dBm):	22.40
Maximum E.I.R.P. (mW):	173.78
Minimum use distance (cm):	0.20
Worst Case Frequency (MHz):	2437
General public - Power density limit (mW/cm ²):	1

Power density at minimum use distance:

Power density (mW/cm ²):	0.03
Verdict for general public:	PASS

The power density level for this transmission mode is below general public and controlled exposure power density limits.

Minimum compliance distance for this technology:

Minimum distance for general public (cm):	3.72
Verdict for general public:	PASS

The minimum use distance is larger than general public and controlled exposure minimum compliance distances.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	16.81
Power density using max antenna gain (mW/cm ²):	0.99

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

Appendix B – ISED RF Exposure

ISED RF Exposure evaluation for mobile devices

According to RSS-102 Issue 5, Paragraph “4. Exposure Limits”, Industry of Canada has adopted the RF field strength limits established in Health Canada’s RF exposure guideline, Safety code 6:

**Table 4: RF Field Strength Limits for Devices Used by the General Public
(Uncontrolled Environment)**

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ⁻²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}
Note: <i>f</i> is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

ISED MPE Evaluation Results

In order to perform the assessment, the following equations have been used for the calculations:

$$\text{Power density: } S[W/m^2] = \frac{P_{\max}[W]}{4\pi R[m]^2}$$

$$\text{Minimum compliance distance: } R_{\min}[m] = \sqrt{\frac{P_{\max}[W]}{4\pi S[W/m^2]}}$$

$$\text{Maximum gain to meet the RSS -102 limit: } G_{\max}[dBi] = (10 * \log[S[W/m^2] * 4\pi R[m]^2) + 30 - P_{\max}[dBm]$$

S = power density

P_{\max} = power input to the antenna

R = distance to the center of radiation of the antenna (evaluation distance)

R_{\min} = distance to the center of radiation of the antenna

G_{\max} = power gain of the antenna in the direction of interest relative to an isotropic radiator

Assessment 1- Wi-Fi 802.11 g

Maximum output power (dBm):	20.20
Maximum antenna gain (dBi):	2.2
Maximum E.I.R.P (dBm):	22.40
Maximum E.I.R.P (mW):	173.78
Minimum use distance (cm):	0.20
Worst Case Frequency (MHz):	2437
General public - Power density limit (W/m2):	5.40

Power density at minimum use distance:

Power density (W/m2):	0.35
Verdict for general public:	PASS

The power density level for this transmission mode is below general public and controlled exposure power density limits.

Minimum compliance distance for this technology:

Minimum distance for general public (cm):	5.06
Verdict for general public:	PASS

The minimum use distance is larger than general public and controlled exposure minimum compliance distances.

Maximum gain to meet the RSS -102 limits:

Maximum antenna gain to meet reference level (dBi):	14.13
Power density using max antenna gain (W/m ²):	5.39

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.