

Prüfbericht-Nr.: Test report no.:	60440993-001	Auftrags-Nr.: Order no.:	23870481 030	Seite 1 von 7 Page 1 of 7
Kunden-Referenz-Nr.: Client reference no.:	2311184	Auftragsdatum: Order date:	2020.12.09	
Auftraggeber: Client:	Wittra Sweden AB			
Prüfgegenstand: Test item:	Wireless Asset Tag			
Bezeichnung / Typ-Nr.: Identification / Type no.:	Mesh Router 1.0 US / FCC ID:2AYHX00349			
Auftrags-Inhalt: Order content:	RF Exposure Evaluation			
Prüfgrundlage: Test specification:	FCC 47 CFR 2.1093 KDB 447498 D01 v06			
Wareneingangsdatum: Date of sample receipt:	N/A			
Prüfmuster-Nr.: Test sample no.:	N/A			
Prüfzeitraum: Testing period:	N/A -			
Ort der Prüfung: Place of testing:	Lund, Sweden			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Sweden			
Prüfergebnis*: Test result*:	Siehe Sonstiges / See Other			
überprüft von: reviewed by:	genehmigt von: authorized by:			
Datum: 2021.04.16 Date:	Datum: 2021.04.16 Date:			
Stellung / Position:	Senior Technical Expert	Stellung / Position:	Lab Manager	
Sonstiges / Other:	See details below			
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 F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
5 = mangelhaft N/T = nicht getestet 5 = poor N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.</i>				

V05

Revision History60440993-00160440993-001

Revision	Date	Remarks	Author
001	2021.04.16	First release	Niall Forrester
Note: Latest revision report will replace all previous reports			
This report based on RF Exposure FCC 47CR 2-1093 Template version 1.0			

Statement of Compliance

Evaluation was performed based on FCC 47 CFR 2.1093 and KDB 447498 D01 v06, based on the “General SAR test exclusion guidance”.

The calculations below show that the Mesh Router 1.0 US / FCC ID:2AYHX00349 device fulfils the requirements for exclusion of SAR testing.

Table of Contents

1. GENERAL INFORMATION	3
1.1 Test Site	3
1.2 Client Information	3
2. PRODUCT INFORMATION	4
2.1 General Description	4
2.2 Device Usage and Evaluation Distance	4
2.3 Wireless Technologies and Bands Supported by the EUT	4
2.4 Simultaneous Transmission Configurations	4
2.5 Conducted Power and Antenna Gain	4
3. TEST METHODS	5
3.1 Test Standards	5
3.2 Additional references	5
3.3 Limits	6
4. EVALUATION DETAILS	7
4.1 SAR Exclusion Evaluation for Each Band and Technology	7

1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	TÜV Rheinland Sweden AB
Address:	Mobilvägen 10
	223 62 Lund
	Sweden
Swedac Registration Number:	10325
FCC Test Firm Registration Number:	517458
ISED Test Site Registration Number:	24753

1.2 Client Information

Company Name:	Wittra Sweden AB
Address:	Rosenlundsgatan 40 0TR
	118 53 Stockholm
	Sweden
Contact Person:	Warwick Taws
Contact e-Mail / Telephone	wat@wittra.se

2. PRODUCT INFORMATION

2.1 General Description

Model name:	Sensor TAG 1.0 US
Manufacturer:	TT Electronics PLC
Model number / Marketing name:	Mesh Router 1.0 US
FCC ID:	2AYHX00349
Description:	Wireless Asset Tag
Ancillary Equipment:	N/A

2.2 Device Usage and Evaluation Distance

“The device is intended to be mounted on a material asset for the purpose of condition monitoring or location monitoring in industrial environments (therefore it would normally be placed on a portable or moveable industrial asset). In a worst-case scenario, a device could be mounted on the waist belt of a human to monitor their location or movement during work hours (although this is not an intended scenario).”

The device has been evaluated for exclusion of SAR testing based on the “body” requirements at a distance of 0mm

2.3 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed
IEEE 802.15.4g	902-928 MHz	902.0 MHz - 928.0 MHz	YES
Bluetooth LE	2.4 GHz	2400.0 MHz - 2483.5 MHz	YES

2.4 Simultaneous Transmission Configurations

The device supports NO simultaneous transmission configurations. The Bluetooth Low Energy and IEEE 802.15.4 “Sub-GHz” transmitters cannot be transmit at the same time

2.5 Conducted Power and Antenna Gain

Technology	Band	Max. Conducted Output Power (dBm)	Max. Time-Averaged Output Power (dBm)*	Antenna Gain (dBi)
IEEE 802.15.4g	902-928 MHz	9.30	9.30	-4.71
Bluetooth LE	2.4 GHz	1.51	1.51	1.40

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
47 CFR 2.1093	-	Radiofrequency radiation exposure evaluation: portable devices.

□

3.2 Additional references

Standard	Version	Description
KDB 447498 D01	v06	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices

3.3 Limits

Extract from KDB 447498 D01 v06 General RF Exposure Guidance

4.3. General SAR test exclusion guidance

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.²⁸ The minimum test separation distance defined in 4.1 f) is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified, typically in the SAR measurement or SAR analysis report, by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, according to the required published RF exposure

KDB procedures. When no other RF exposure testing or reporting are required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops and tablets, etc.²⁹

- a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$\left[\frac{(\text{max. power of channel including tune - up tolerance, mw})}{(\text{min. test separation, mm})} \right] \times \sqrt{f} \text{ (GHz)} \leq 3.0 \text{ for 1g SAR}$$

$$\left[\frac{(\text{max. power of channel including tune - up tolerance, mw})}{(\text{min. test separation, mm})} \right] \times \sqrt{f} \text{ (GHz)} \leq 7.5 \text{ for 10g extremity SAR}$$

where

- f(GHz) is the RF channel transmit frequency in 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...

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

4. EVALUATION DETAILS

4.1 SAR Exclusion Evaluation for Each Band and Technology

The threshold value for each band/technology is calculated based on the following equation:

$$\left[\frac{(\text{max. power of channel including tune - up tolerance, mw})}{(\text{min. test separation, mm})} \right] \times \sqrt{f} \text{ (GHz)}$$

Technology	Band	Freq* (MHz)	Minimum** Separation (mm)	Max Power (dBm)	Max*** Power (mW)	Threshold Value (Num)	Limit (Num)
IEEE 802.15.4g	902-928 MHz	928	5	9.30	9	1.7	3.0
Bluetooth LE	2.4 GHz	2483.5	5	1.51	1	0.3	3.0

* The highest frequency in each band has been chosen, to give the most conservative limit

** Distance is rounded to nearest mm. For distances less than 5mm, a value of 5mm is used

*** Max conducted power (mW) is rounded to the nearest mW