Prüfbericht-Nr.: *Test Report No.:*	60242897-003	**Auftrags-Nr.:** *Order No.:* 23870157	Seite 1 von 6 *Page 1 of 6*
Kunden Referenz-Nr.: Client Reference No.:	-	**Auftragsdatum** *Order date:*	2019-02-26
Auftraggeber: *Client:*	3M Company 410 E. Fillmore Ave, St. Paul, MN, 55144-1000 USA	Pär Rundqvist par.rundqvist@mmm.com +46370694200	
Prüfgegenstand: *Test item:*	WS Protac Xpi		
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	Model: MT15H7AWS6-111 FCC ID: Y9ZMT15H7WS6		
Auftrags-Inhalt: *Order content:*	RF Exposure Evaluation		
Prüfgrundlage: *Test specification:*	FCC 47 CFR §2.1091 KDB 447498 D01 v06		
Wareneingangsdatum: *Date of 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 results:*	See detail in report		

Geprüft von *Tested by:*	Niall Forrester Technical Expert	**Kontrolliert von** *Reviewed by:*	Per Isacsson Lab Manager
2020-01-16	N. Forrester	2020-01-16	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
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Sontiges /
Other:

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.
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Revisions
Revisions

Revision Revision	**Datum** Date	**Anmerkung** Remark	**Verfasser** Author
001	2019-05-06	First Release	Niall Forrester
002	2019-08-28	FCC ID updated and EMC- and radio-equivalents variants added in section 1.1	Niall Forrester
003	2020-01-16	Updated limits to reflect 18 mm distance and updated max output power	Niall Forrester

Note: Latest revision report will replace all previous reports

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APPENDIX A: Diagram showing separation distance

PRODUCT INFORMATION

1.1 Equipment under Test (EUT) description

Model name:	WS Protac Xpi
Manufacturer:	3M Svenska AB
Model number:	MT15H7AWS6-111
FCC ID:	Y9ZMT15H7WS6
Description:	Bluetooth hearing protector

Product variants

Below listed product variants are declared identical from a radio implementation point of view by the manufacturer and therefore also covered by this report.

Article no.	Article description	Attachment	Connection to ext radio
MT15H7AWS6	WS PROTAC XPI HEADBAND	Headband	No
MT15H7BWS6-111	WS PROTAC XPI, FLEX CON, W B-band	Neckband	Yes
MT15H7P3EWS6	WS6 PROTAC XPI, HELMET ATTACHMENT	Helmet	No
MT15H7P3EWS6-111	WS6 PROTAC XPI W HELMET ATT.	Helmet	Yes

1.2 Wireless Technologies and Frequency Bands supported by the DUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed
Bluetooth	2.4 GHz	2400 MHz – 2483.5 MHz	YES

1.3 Conducted Power and Antenna Gain

Technology	Band	Maximum Conducted Output power (dBm)
Bluetooth	2.4 GHz	7.12

Maximum Power are based on details supplied by the device manufacturer and include tune-up tolerances.

EVALUATION

1.4 Summary

Based on the thresholds listed in KDB 447498 D01 v06, SAR evaluation is not required for the device model MT15H7AWS6-111 / FCC ID: Y9ZMT15H7WS6

1.5 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:

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

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

where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation31
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

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.

1.6 Detailed Calculations

In order to determine if SAR testing could be excluded, the following calculation was performed and the result compared to the limits listed in KDB 447498 D01 section 4.3.1

The device is designed to be worn on the head of the user. The transmitting antenna is mounted on a printed circuit board set inside one of the ear-cups. The distance from the edge of the ear-cup (where it would come into contact with the wearer) to the nearest part of the PCB is 18.1mm, as shown in the diagram in Appendix A and allowing for the additional reduction of 5mm due to compression of the soft cup part. The distance from the outside of the ear cup to the antenna is larger than this.

Rounding to the nearest millimeter gives a separation distance of 18 mm

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

Technology	Band	Frequency* (GHz)	Min test Distance (mm)**	Max Conducted Power (dBm)	Max Conducted Power*** (mW)	Threshold Value	Limit
Bluetooth	2.4 GHz	2.4835	18	7.12	5	0.4	3.0

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

** Distance is rounded to nearest mm

**Max Conducted Power (mw) is rounded to nearest mW