SAR Assessment Report

DUT Information	
Manufacturer	CeoTronics
Model Name	CT-DECT Multi M7
FCC ID	contains FCC ID L52CT-M7CEO1 and L52CT-BT32I
DUT Type	DECT mobile communication device
Intended Use	☒ < 20 cm distance to human body ☐ > 20 cm distance to human body ☐ ☐ next to the ear ☒ body-worn ☐ limb-worn ☐ hand-held ☐ front-of-face ☐ body supported ☐ clothing-integrated

Prepared by	
Testing Laboratory	IMST GmbH, Test Center Carl-Friedrich-Gauß-Str. 2 – 4 47475 Kamp-Lintfort Germany

Accreditation	
Laboratory Accreditation	The Test Center facility 'Dosimetric Test Lab' within IMST GmbH is accredited by the German National 'Deutsche Akkreditierungsstelle GmbH (DAkkS)' for testing according to the scope as listed in the accreditation certificate: D-PL-12139-01-01. The German Bundesnetzagentur (BNetzA) recognizes IMST GmbH as CAB-EMC on the basis of the Council Decision of 22. June 1998 concerning the conclusion of the MRA between the European Community and the United States of America (1999/178/EC) in accordance with § 4 of the Recognition Ordinance of 11. January 2016. The recognition is valid until 20. July 2021 under the registration number: BNetzA-CAB-16/21-14.

Prepared for	
Applicant / Manufacturer	CeoTronics AG Adam-Opel Str. 6 63322 Rödermark Germany

Test Specification	
Applied Standard / Rule	FCC CFR 47 § 2.1093;
Exposure Category	☒ general public / uncontrolled ☐ occupational / controlled
Test Result	☒ PASS ☐ FAIL

Report Information	
Data Stored	6200801
Issue Date	March 16, 2021
Revision Date	-
Revision Number*	-
	***A new revision replaces all previous revisions and thus, become invalid herewith.**
Remarks	This report relates only to the item(s) evaluated. This report shall not be reproduced, except in its entirety, without the prior written approval of IMST GmbH. The results and statements contained in this report reflect the evaluation for the certain model described above. The manufacturer is responsible for ensuring that all production devices meet the intent of the requirements described in this report.

Table of Contents

1 Subject of Investigation 3

1.1 Technical Data of DUT 3

1.2 Picture of DUT 4

1.3 Test Specification / Normative References 4

1.4 Attestation of Assessment Results 4

2 Exposure Criteria and Limits 5

2.1 SAR Limits 5

2.2 Device Categories 5

2.3 RF Exposure Categories 5

3 RF Exposure Assessment 6

3.1 SAR Exemption Assessment according to FCC Requirements 6

3.2 Assessment Results 7

3.3 Simultaneous Transmission Consideration 7

4 Statement of Compliance 8

5 Quality Assurance 8

6 Revision History 9

1 Subject of Investigation

The CT-DECT Multi M7 from CeoTronics is a portable communication device operating in DECT and Bluetooth standards with three integrated antennas. Two DECT antennas are working in diversity mode and one BT antenna is capable of working in simultaneous transmission in combination with DECT. The device is intended to be used as a body-worn device by trained personnel only and can be set to different software profiles (PP or FP) enabling to connect to a CT-DECT network supporting up to four communication transmissions simultaneously.

1.1 Technical Data of DUT

Product Specifications		
Manufacturer	CeoTronics	
Model Name	CT-DECT Multi M7	
Integrated Transmitter	CeoTronics CT-DECT Modul M7	Silicon Labs WT32i-A
FCC ID	L52CT-M7CEO1	L52CT-BT32I
Operation Mode	DECT	Bluetooth
Frequency Range	1921.536 – 1928.448 MHz	2402 - 2480 MHz
Maximum Duty Cycle	PP profile: 3.73 % FP profile: 14.92 %	100 %
Maximum Output Power (tune-up limit)	PP profile: 3.9 mW (5.9 dBm) FP profile: 15.6 mW (11.9 dBm)	6.3 mW (8.0 dBm)
Antenna Type	2x integrated (PIFA)	1x integrated (SMD)
Power Supply	Li-Po battery pack or 3x AAA NiMH cells	
Used Accessory	belt clip	
DUT Stage	☒ production unit ☐ identical prototype	
Notes: PP = portable part software profile; FP = fixed part software profile		

Table 1: Product specifications.

1.2 Picture of DUT

Fig. 1: Picture of the DUT.

1.3 Test Specification / Normative References

The tests documented in this report were performed according to the rules and standards described below.

Test Specifications		
Test Standard / Rule	**Description**	**Issue Date**
☒ FCC CFR 47 § 2.1093	Code of Federal Regulations; Title 47. Radiofrequency radiation exposure evaluation: Portable Devices.	October 01, 2010
☒ FCC CFR 47 § 1.1310	Code of Federal Regulations; Title 47. Radiofrequency radiation exposure limits	October 01, 2010
Product KDB		
☒ KDB 447498 D01 v06	General RF Exposure Guidance	October 23, 2015
☒ KDB 865664 D02 v01r01	Exposure Reporting	October 23, 2015

1.4 Attestation of Assessment Results

Highest Reported SAR [W/kg]					
Exposure Configuration	**Equipment Class**		**Σ SAR_{1g}**	**Limit SAR_{1g}**	**Verdict**
	PCT	**DSS**			
Standalone TX	0.4	0.4	-	1.6	PASS
Simultaneous TX	0.4	0.4	0.8	1.6	PASS
Notes: All SAR assessment results are shown in chapter 3.3 on page 7.					

2 Exposure Criteria and Limits

2.1 SAR Limits

Human Exposure Limits				
Condition	**Uncontrolled Environment** (General Population)		**Controlled Environment** (Occupational)	
	SAR Limit [W/kg]	**Mass Avg.**	**SAR Limit [W/kg]**	**Mass Avg.**
SAR averaged over the whole body mass	0.08	whole body	0.4	whole body
Peak spatially-averaged SAR for the head, neck & trunk	1.6	1g of tissue*	8.0	1g of tissue*
Peak spatially-averaged SAR in the limbs	4.0	10g of tissue*	20.0	10g of tissue*
Note: *Defined as a tissue volume in the shape of a cube				

Table 2: SAR limits specified in IEEE Standard C95.1-2005.

In this report the comparison between the exposure limits and the measured data is made using the spatial peak SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

2.2 Device Categories

Three different categories of devices are defined and shown in table 3.

Fixed Transmitter
Fixed transmitter is defined as a device physically secured at one location and is not able to be easily moved to another location. *Intended use: ≥ 20 cm separation distance to human body*
Mobile Device
A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. *Intended use: ≥ 20 cm separation distance to human body*
Portable Device
A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. *Intended use: < 20 cm separation distance to human body*

Table 3: Device categories.

2.3 RF Exposure Categories

General Public / Uncontrolled Exposure
General population comprises individuals of all ages and of varying health status, and may include particularly susceptible groups or individuals. In many cases, members of the public are unaware of their exposure to electromagnetic fields. Moreover, individual members of the public cannot reasonably be expected to take precautions to minimize or avoid exposure.
Occupational / Controlled Exposure
The occupationally exposed population consists of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions.

Table 4: RF exposure categories.

3 RF Exposure Assessment

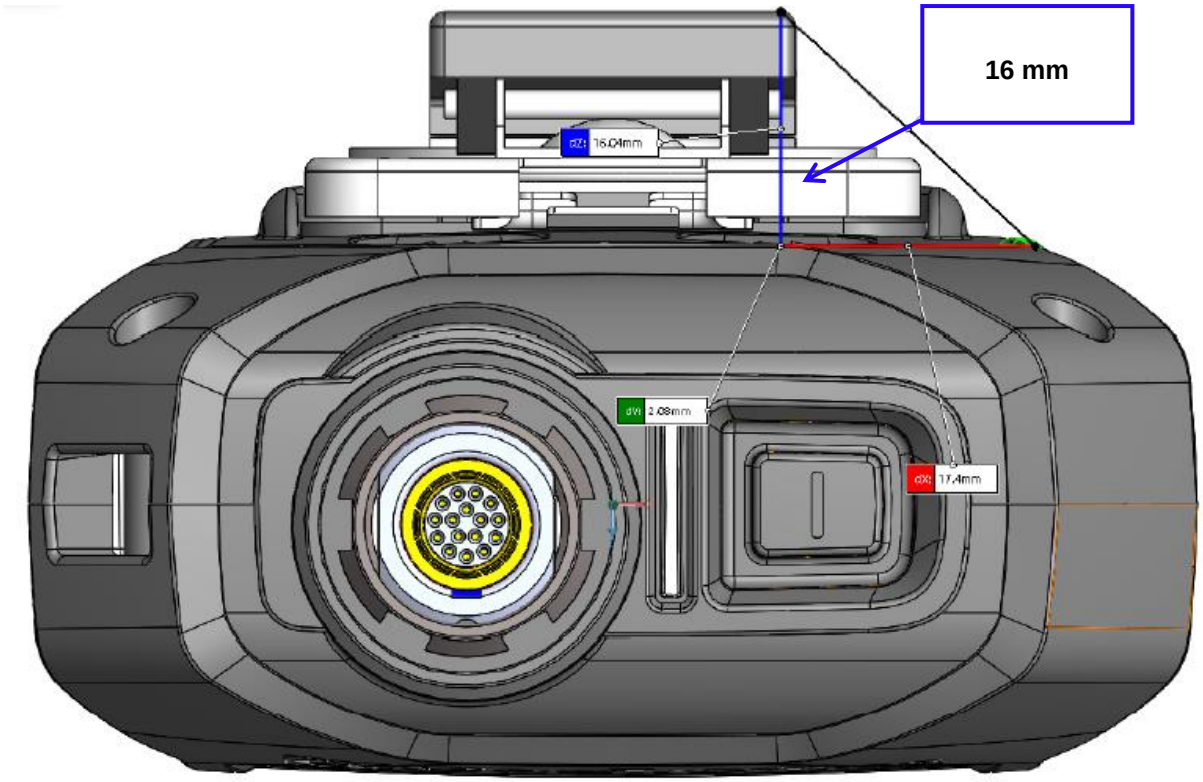

Fig. 2: Sketch of the DUT showing the minimum distance in the body-worn configuration.

The sketch in Fig. 2 shows the minimum separation distance between the device and human body in body-worn configuration. Therefore, the distance of 16 mm is applied to determine SAR test exclusion as considered in the following assessment.

3.1 SAR Exemption Assessment according to FCC Requirements

For standalone SAR exclusion consideration, when SAR exclusion threshold requirement in KDB 447498 D01 v06 is satisfied, standalone SAR evaluation by measurement or numerical simulation is not required. Therefore, in the frequency range between 100 MHz to 6 GHz and test separation distance below 50mm, SAR test exclusion threshold is determined as follows.

Calculation Formula for Standalone Transmission SAR	
100 MHz to 6GHz at test separation distances ≤ 50 mm	
$\frac{max.\,power\ of\ channel\ incl.\ tune-up\ tolerance\,[mW]}{min.\ test\ separation\ distance\,[mm]} * \sqrt{f\,(GHz)} \le \begin{cases} 3.0 & 1g \quad (head/body) \\ 7.5 & 10g \quad (extremities) \end{cases}$	
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
Note/s: When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.	

Table 5: Assessment relations for standalone transmission SAR.

When the standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas the standalone SAR must be estimated according to the following in order to determine simultaneous transmission SAR test exclusion.

Calculation Formula for Simultaneous Transmission SAR	
100 MHz to 6GHz at test separation distances ≤ 50 mm	
$\frac{max.\,power\,of\,channel\,incl.\,tune-up\,tolerance\,[mW]}{min.\,test\,separation\,distance\,[mm]} * \sqrt{\frac{f\,(GHz)}{X}}\,[\frac{W}{kg}]$	
Where:	X = 7.5 for 1g SAR and X = 18.75 for 10g SAR 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
Note/s: When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.	

Table 6: Assessment relations for simultaneous transmission SAR.

3.2 Assessment Results

Standalone SAR Test Exclusion Consideration FCC												
Mode	**Freq.**	**Distance**	**Output Power (peak)**		**Maximum Duty Cycle**	**Output Power (average)**		**Threshold Comparison Value**	**Exclusion Threshold SAR 1g**	**SAR Testing Exclusion**	**Estimated SAR Values**	**SAR Testing Required**
	[MHz]	**[mm]**	**[dBm]**	**[mW]**	**[%]**	**[dBm]**	**[mW]**					
DECT (PP)	1925	16	20.2	104.71	3.73	5.92	3.91	0.3	≤ 3.0	YES	0.4	NO
DECT (FP)	1925	16	20.2	104.71	14.92	11.94	15.62	1.4	≤ 3.0	YES	0.4	NO
BT	2440	16	8.0	6.31	100.00	8.00	6.31	0.6	≤ 3.0	YES	0.4	NO
Notes: PP = portable part software profile; FP = fixed part software profile												

Table 7: SAR test exclusion consideration for the applicable transmitter according to KDB 447498.

3.3 Simultaneous Transmission Consideration

Simultaneous Transmission Capabilities of DUT		
DECT ANT1	**DECT ANT2**	**Bluetooth ANT3**
V	X	V
X	V	V
Notes: Simultaneous Transmission can be performed only in combination of Ant 1 + Ant 3, or Ant 2 + Ant 3.		

Table 8: Simultaneous transmission capabilities.

For the following simultaneous transmission analysis the estimated worst case SAR results shown in Table 7 are taken to introduce the highest reported SAR results.

Highest Reported SAR for Simultaneous Transmission [W/kg]				
Exposure Configuration	**DECT**	**BT**	**Σ SAR_{1g}**	**Limit SAR_{1g}**
Simultaneous TX	0.4	0.4	0.8	1.6
Notes: According to simultaneous transmission capabilities shown in Table 8.				

Table 9: Estimated worst case SAR for simultaneous transmission scenario.

4 Statement of Compliance

The maximum transmitting output power of the CT-DECT Multi M7 is below the exclusion threshold of FCC requirements as shown in Table 7. Furthermore, the estimated SAR results of simultaneous transmission consideration are below the given limits shown in Table 9. Therefore, the DUT is in compliance with the given limits and is exempted from further SAR assessment.

Prepared by: ..... Reviewed by: .....

Alexander Rahn
Test Engineer

Dessislava Patrishkova
Quality Assurance

5 Quality Assurance

The responsible test engineer states that all the measurements and evaluations have been performed under the guidelines of the valid quality assurance plan according to DIN EN ISO IEC 17025-2017.

6 Revision History

Revision History				
Revision	**Description of Revision**	**Date**	**Revised Page**	**Revised By**
/	Initial Release	March 16, 2021	-	-
-		-		

END OF ASSESSMENT REPORT