

Prüfbericht-Nr.: Test Report No.: 60263491-003		Auftrags-Nr.: Order No.: 23870191		Seite 1 von 7 Page 1 of 7	
Kunden Referenz-Nr.: Client Reference No.: -		Auftragsdatum Order date: 2019-05-28			
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Prüfgegenstand: Test item: Smart Connect Mini					
Bezeichnung / Typ-Nr.: Identification / Type No.: 300110 FCC ID: 2A0FP-300110					
Auftrags-Inhalt: Order content: RF Exposure Evaluation					
Prüfgrundlage: Test specification: FCC 47 CFR §2.1091 IEEE Std. C95.1:2005					
Wareneingangsdatum: Date of receipt: N/A					
Prüfmuster-Nr.: Test sample No.: N/A					
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Prüfergebnis: Test results: See detail in report					
Geprüft von Tested by: Håkan Sjöberg Technical Expert 2020-01-21		Kontrolliert von Reviewed by: Per Isacsson Lab Manager 2020-01-21			
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position	Unterschrift Signature
Sontiges / Other:					
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Revisions Revisions			
Revision Revision	Datum Date	Anmerkung Remark	Verfasser Author
001	2019-07-23	First Release	Niall Forrester
002	2019-12-19	Updated power levels and calculations	Niall Forrester
003	2020-01-21	Removed support for LTE NB-IoT	Håkan Sjöberg

Note: Latest revision report will replace all previous reports

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PRODUCT INFORMATION

1.1 Equipment under Test (EUT) description

Model name:	Smart Connect Mini
Manufacturer:	Anticimex Innovation Center A/S
Model number:	300110
FCC ID:	2AOFP-300110
Description:	Cellular and sub-GHz gateway for the smart Connect system

1.2 Wireless Technologies and Frequency Bands supported by the DUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed
GSM (GPRS)	850	824.2 MHz – 848.8 MHz	YES
GSM (GPRS)	900	880.2 MHz – 914.8 MHz	NO
GSM (GPRS)	1800	1710.2 MHz – 1784.8 MHz	NO
GSM (GPRS)	1900	1850.2 MHz – 1909.8 MHz	YES
LTE CAT-M1	B1	1920 MHz – 1980 MHz	NO
LTE CAT-M1	B2	1850 MHz – 1910 MHz	YES
LTE CAT-M1	B3	1710 MHz – 1785 MHz	NO
LTE CAT-M1	B4	1710 MHz – 1755 MHz	YES
LTE CAT-M1	B5	824 MHz – 849 MHz	YES
LTE CAT-M1	B8	880 MHz – 915 MHz	NO
LTE CAT-M1	B12	699 MHz – 716 MHz	YES
LTE CAT-M1	B13	777 MHz – 787 MHz	YES
LTE CAT-M1	B20	832 MHz – 862 MHz	NO
LTE CAT-M1	B28	703 MHz – 748 MHz	NO
'Sub GHz' Proprietary	868.3 MHz	868.3 MHz	NO
'Sub GHz' Proprietary	917-926 MHz	917 MHz – 926 MHz	YES

1.3 Conducted Power and Antenna Gain

Technology	Band	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)
GSM (GPRS)	850	32.5	-1.9
GSM (GPRS)	1900	29.5	1.3
LTE CAT-M1	B2	25.7	1.0
LTE CAT-M1	B4	25.7	0.9
LTE CAT-M1	B5	25.7	-1.9
LTE CAT-M1	B12	25.7	1.4
LTE CAT-M1	B13	25.7	-1.6
'Sub GHz' Proprietary	917-926 MHz	14.0	1.3

Maximum Power and Antenna Gain are based on details supplied by the device manufacturer.

EVALUATION

1.4 Summary

At 20cm, the device is compliant with the "General Population / Uncontrolled" requirements set out in FCC 47 CFR §1.1310 Table 1 (B) for all supported combinations of wireless technologies.

1.5 Limits

47 CFR § 1.1310 - Radiofrequency radiation exposure limits

Table 1B
Limits for Maximum Permissible Exposure (MPE)
(Limits for general Population / Uncontrolled Exposure)

Frequency Range (MHz)	Electric Field strength (V/m)	Magnetic Field strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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 - 1500	-	-	f/1500	30
1500 - 10000	-	-	1.0	30

Notes:

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

1.6 Stand-alone Calculations

The Power Density at 20cm separation distance has been calculated for each of the transmitter technologies supported by the device according to a re-arrangement of the Friis formula, as below:

$$S = \frac{P * G}{4\pi * r^2}$$

Where:

- “S” is power density in mW/cm²
- “P” is maximum avg. conducted power (incl. tolerances) in mW according to data from the manufacturer
- “G” is the peak antenna gain (numerical) according to data from the manufacturer
- “r” is the separation distance (20 cm)

Power Density (S) at 20cm Distance for Each Transmitter

Technology	Band	Frequency (MHz)*	Power (dBm)	P (mW)	Gain (dBi)	G (Numerical)	r (cm)	S (mW/cm ²)	Limit** (mW/cm ²)
GSM (GPRS)	850	824.2	32.5	1778.28	-1.9	0.65	20	0.23	0.55
GSM (GPRS)	1900	1850.2	29.5	891.25	1.3	1.35	20	0.24	1.00
LTE CAT-M1	B2	1850	25.7	371.54	1.0	1.26	20	0.09	1.00
LTE CAT-M1	B4	1710	25.7	371.54	0.9	1.23	20	0.09	1.00
LTE CAT-M1	B5	824	25.7	371.54	-1.9	0.65	20	0.05	0.55
LTE CAT-M1	B12	699	25.7	371.54	1.4	1.38	20	0.10	0.47
LTE CAT-M1	B13	777	25.7	371.54	-1.6	0.69	20	0.05	0.52
‘Sub GHz’ Proprietary	917-926 MHz	917	14.0	25.12	1.3	1.35	20	0.01	0.61

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

**The limits listed are from FCC 47 CFR §1.1310 Table 1 (B): “Limits for General Population/Uncontrolled”

From 300MHz to 1500MHz, the limit is $f/1500$ mW/cm² where “f” is the frequency in MHz

From 1500MHz to 100000MHz, the limit is 1.0 mW/cm²

1.7 Simultaneous Transmission Calculations

The device can transmit on cellular and proprietary Sub-GHz bands simultaneously, but only one cellular (i.e. one GSM or one LTE band) and one sub-GHz band can be active at any time. All relevant combinations of transmitters have been evaluated at 20cm distance below, using the following equation, rearranged from IEEE Std. C95.1:2005 Annex D.2:

$$\sum_{i=1}^n \left(\frac{S_i}{S_{L,i}} \right) = \text{"Evaluation Result"}$$

Where:

- S_i is the power density for transmitter 'i'
- $S_{L,i}$ is the power density MPE limit from Table 1(B) of 47 CFR § 1.1310

If the evaluation result is ≤ 1 , the device is compliant with the limits even for the simultaneous transmission configuration.

Evaluation of Compliance at 20cm for Supported Combinations of Transmitters

Technology 1	Band 1	Technology 2	Band 2	S_1 (mW/cm ²)	$S_{L,1}$ (mW/cm ²)	S_2 (mW/cm ²)	$S_{L,2}$ (mW/cm ²)	Evaluation Result	Result
GSM (GPRS)	850	'Sub GHz' Proprietary	917-926 MHz	0.23	0.55	0.01	0.61	0.427	OK
GSM (GPRS)	1900	'Sub GHz' Proprietary	917-926 MHz	0.24	1.00	0.01	0.61	0.250	OK
LTE CAT-M1	B2	'Sub GHz' Proprietary	917-926 MHz	0.09	1.00	0.01	0.61	0.104	OK
LTE CAT-M1	B4	'Sub GHz' Proprietary	917-926 MHz	0.09	1.00	0.01	0.61	0.102	OK
LTE CAT-M1	B5	'Sub GHz' Proprietary	917-926 MHz	0.05	0.55	0.01	0.61	0.098	OK
LTE CAT-M1	B12	'Sub GHz' Proprietary	917-926 MHz	0.10	0.47	0.01	0.61	0.230	OK
LTE CAT-M1	B13	'Sub GHz' Proprietary	917-926 MHz	0.05	0.52	0.01	0.61	0.110	OK