Test Report

47 CFR FCC Part 15 subpart C Par. 15.225
Intentional Radiators

Report reference no. ..... :	28111852 005	Firmato da:Roberto Radice Data: 07/01/2019 06:50:25
FCC Designation Number ..... :	IT0008	
FCC Test Firm Registration # ..... :	804595	
Tested by (name + signature)……:	Roberto Radice \ Tester	
Approved by (name + signature)……:	Giovanni Molteni \ TM	Firmato da:Giovanni Molteni Data: 07/01/2019 07:13:08
Date of issue ..... :	January 07, 2019	
Total number of pages ..... :	29 Pages	
Testing Laboratory ..... :	TÜV Rheinland Italia S.r.l.	
Address ..... :	Via Mattei 3 - 20010 - Pogliano Milanese (MI) – Italy	
Applicant's name ..... :	B Medical System S.a.r.l.	
Address ..... :	17, Op der Hei - L-9809 Hosingen - Luxembourg	
Test item description ..... :	Touch display with NFC card reader and Bluetooth communication for data export	
Trade Mark ..... :	Premium HMI	
Manufacturer ..... :	B Medical System S.a.r.l.	
Model/Type reference ..... :	MR17-HMI-A	
Ratings ..... :	Input: 12V DC Power / 2.6 Ampere	
FCC ID ..... :	2AMU2-MR17-HMI-A	
Sample ..... :		
Samples received on ..... :	30/07/2018	
TUV reference samples ..... :	180486 (sampled by the customer)	
Samples tested n. ..... :	1	
Testing ..... :		
Start Date: ..... :	01/08/2018	
End Date: ..... :	03/08/2018	

SUMMARY

RELEASE CONTROL RECORD		
Test report Number	**Reason of change**	**Date of Issue**
28111852 002	Original release	2018-08-31
28111852 005	Removed photographic documentation; modified RF exposure test distance evalution.	2019-01-07

1. Reference Standards

Standard	Description
FCC Part 15 (Subpart C)	§15.225 Operation within the band 13.110 – 14.010 MHz.
FCC Part 15 (Subpart C)	§15.207 Conducted Limits
FCC Part 15 (Subpart C)	§15.209 Radiated emission limits; general requirements
FCC Part 15 (Subpart C)	§15.203 Antenna Requirement
ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices

2. Summary of testing

§ 15.203	Antenna Requirements	PASS
§ 15.207 (a)	Power Line Conducted Emission	PASS
§ 15.215 (a) (b) (c)	Additional provisions to the general radiated emission limitations	PASS
§ 15.215 (c)	20 dB Bandwidth	PASS
§ 15.225 (a)	Field strength in band 13,553-13,567MHz	PASS
§ 15.225 (b)	Field strength in band 13,410-13,553 MHz and 13,567-13,710 MHz	PASS
§ 15.225 (c)	Field strength in band 13,110-13,410 MHz and 13,710-14,010 MHz	PASS
§ 15.225 (d) § 15.209 (a) (f)	Field strength outside of the 13,110-14,010 MHz band	PASS
§ 15.225 (e)	Frequency tolerance of the carrier signal	PASS
§ 15.225 (f)	Radio frequency powered tags	N.A.[1]
§ 47CFR 1.1307(b)(1)	RF humane exposure	PASS

N.A.[1]	No powered tag.

Possible test case verdicts:	
- test case does not apply to the test object ....:	N/A
- test object does meet the requirement .....:	PASS
- test object does not meet the requirement ....:	FAIL

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

3. General product information

MR17-HMI-A is a touch display with NFC card reader and Bluetooth for data export (from HMI to another device) used in Blood bank refrigerators, Plasma contact shock freezers, platelet agitators, distribution freezers.

4. General Chipset information

NFC Chip PN5120A0HN1/C2 (NXP).

DESCRIPTION

PN512 is the most broadly adopted NFC frontend - powering more than 10 billion NFC transactions per year. It is a highly integrated NFC frontend for contactless communication at 13.56 MHz. This NFC frontend utilizes an outstanding modulation and demodulation concept completely integrated for different kinds of contactless communication methods and protocols at 13.56 MHz.
The PN512 NFC frontend supports 4 different operating modes

- Reader/Writer mode supporting ISO/IEC 14443A/MIFARE and FeliCa scheme
- Reader/Writer mode supporting ISO/IEC 14443B
- Card Operation mode supporting ISO/IEC 14443A/MIFARE and FeliCa scheme
- NFCIP-1 mode

Enabled in Reader/Writer mode for ISO/IEC 14443A/MIFARE, the PN512's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO/IEC 14443A/ MIFARE cards and transponders without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO/IEC 14443A/MIFARE compatible cards and transponders. The digital part handles the complete ISO/IEC 14443A framing and error detection (Parity and CRC).
Enabled in Reader/Writer mode for FeliCa, the PN512 NFC frontend supports the FeliCa communication scheme. The receiver part provides a robust and efficient implementation of the demodulation and decoding circuitry for FeliCa coded signals. The digital part handles the FeliCa framing and error detection like CRC. The PN512 supports contactless communication using FeliCa Higher transfer speeds up to 424 kbit/s in both directions.
The PN512 supports all layers of the ISO/IEC 14443B reader/writer communication scheme, given correct implementation of additional components, like oscillator, power supply, coil etc. and provided that standardized protocols, e.g. like ISO/IEC 14443-4 and/or ISO/IEC 14443B anticollision are correctly implemented.
In Card Operation mode, the PN512 NFC frontend is able to answer to a reader/writer command either according to the FeliCa or ISO/IEC 14443A/MIFARE card interface scheme. The PN512 generates the digital load modulated signals and in addition with an external circuit the answer can be sent back to the reader/writer. A complete card functionality is only possible in combination with a secure IC using the S^2C interface.

5. General Antennas information

PCB antenna designed according AN1445.

6. Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Touch display with NFC card reader and Bluetooth communication for data export	B Medical System S.a.r.l.	MR17-HMI-A	---
AE	Power supply unit	Alpha Elettronica	BD212	Input: AC Mains 100÷240V 50/60Hz Output: 12 V dc – Used only for Conducted emission test
AE	System Power supply unit	Hewlett Packard	6038A	0-60V dc; 0-10 Ampere 200W – Used for radiated emission test and climatic chamber test

Note:

* Use :

EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
SIM - Simulator (Not Subjected to Test)

No other Auxiliary/Associated Equipment was connected/installed on the EUT

7. Input/Output Ports

CONNECTIONS

Port		Description	Connection	Cable lenght
1	Enclosure	Non conductive surface	Closed by metallic screws	---
2	AC Power Port	AC	Port not present	---
3	DC Power Port	DC	Input 12Vdc 2.6A (n° 2 wires)	<1mt

*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
WN = Wired Network

8. Power Interface

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	12 V dc	---	---	---	---	---

9. EUT Operation Modes	
Operation mode	**Description**
#1	Continuous Modulated RF Transmission at 13,56MHz at max power.

10. EUT Configuration Modes		
Description		
Touch display connected to DC power supply at 12V dc; continuous transmission at 13,56MHz		
Par.	test	EUT Operation Modes
§ 15.203	Antenna Requirements	#1
§ 15.207 (a)	Power Line Conducted Emission	#1
§ 15.215 (a) (b) (c)	Additional provisions to the general radiated emission limitations	#1
§ 15.215 (c)	20 dB Bandwidth	#1
§ 15.225 (a)	Field strength in band 13,553-13,567MHz	#1
§ 15.225 (b)	Field strength in band 13,410-13,553 MHz and 13,567-13,710 MHz	#1
§ 15.225 (c)	Field strength in band 13,110-13,410 MHz and 13,710-14,010 MHz	#1
§ 15.225 (d) § 15.209 (a) (f)	Field strength outside of the 13,110-14,010 MHz band	#1
§ 15.225 (e)	Frequency tolerance of the carrier signal	#1
§ 47CFR 1.1307(b)(1)	RF humane exposure	#1

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

11. Test Conditions and Results

11.1 TEST: Antenna requirements			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C	
	Relative Humidity (%)	56%	
	Air pressure (hPa)	1020	
—	Power Supply / Frequency	Application Point	
Fully configured sample tested at the power line frequency	12 Vdc	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.203		

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

Antenna specifications	
N° of authorized antenna types	1
Antenna type	PCB antenna designed according AN1445.
Maximum total gain	/
External power amplifiers	Not present

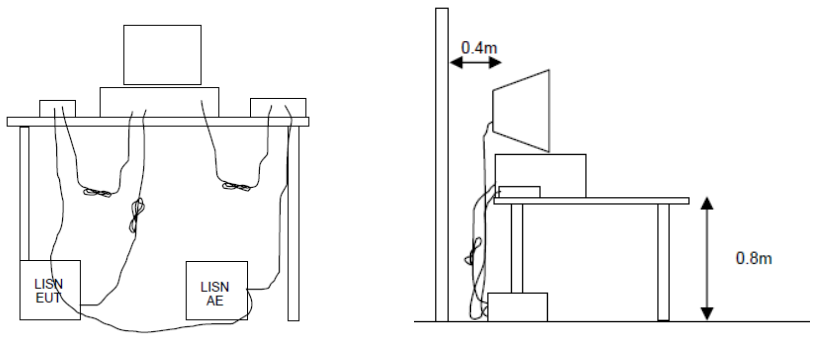
11.2 TEST: AC Power Conducted Emission			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C	
	Relative Humidity (%)	56%	
	Air pressure (hPa)	1020	
—	Power Supply / Frequency	Application Point	
Fully configured sample tested at the power line frequency	115V ~ 60Hz (via AC/DC adapter)	AC Mains	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.207		

Frequency (MHz)	Quasi-peak (dBuV)	Average (dBuV)	Result
0.15-0.5	66 to 56	56 to 46	PASS
0.5-5	56	46	PASS
5-30	60	50	PASS

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Further information to test setup

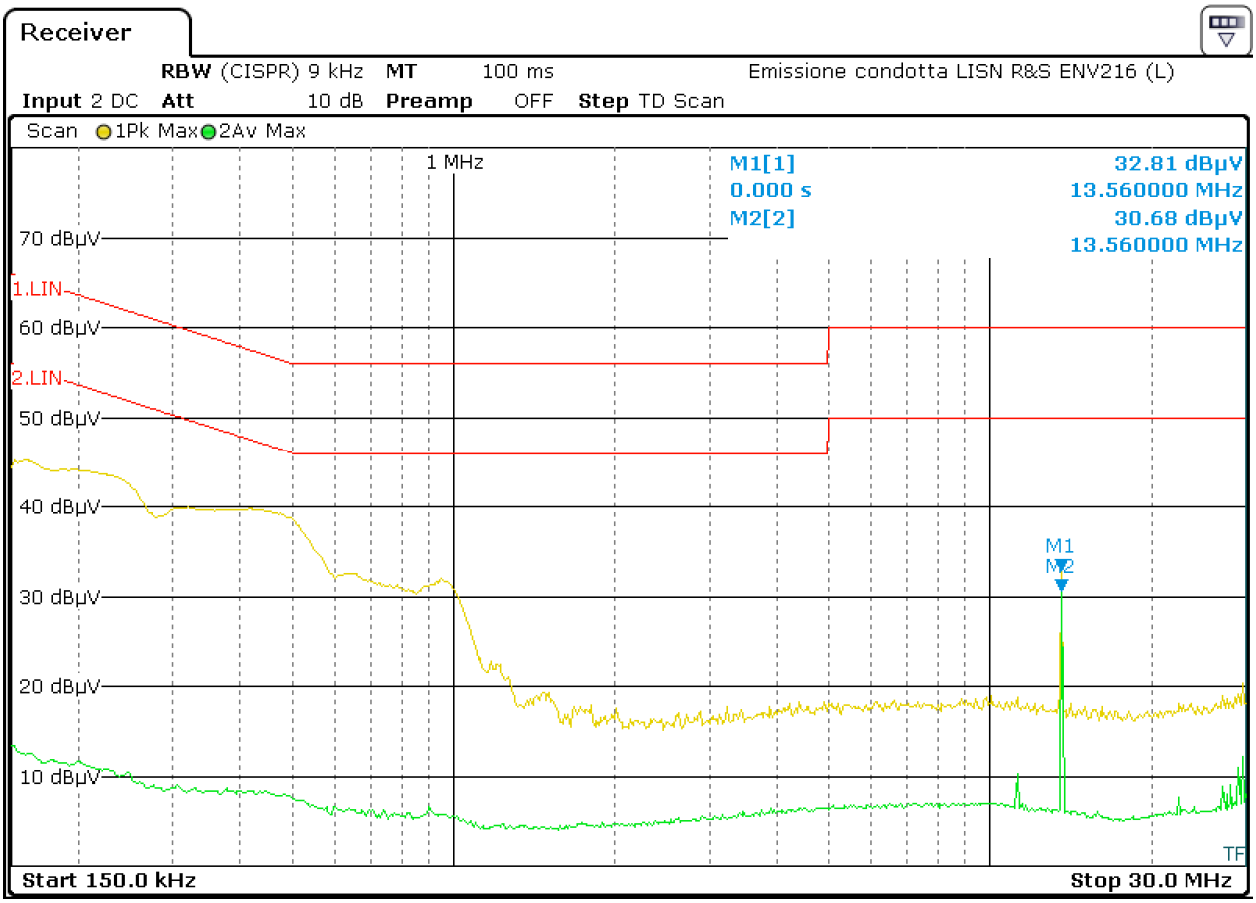


Test Equipment Used					
Description	Manufacturer	Model	TUV Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESR	87020864	12/2017	12/2018
Two line V-Network	R&S	ENV216	87020993	01/2018	01/2020
Stabilized Power Supply	Elettrotest	TPS T 30K60S	87020490	09/2015	09/2018

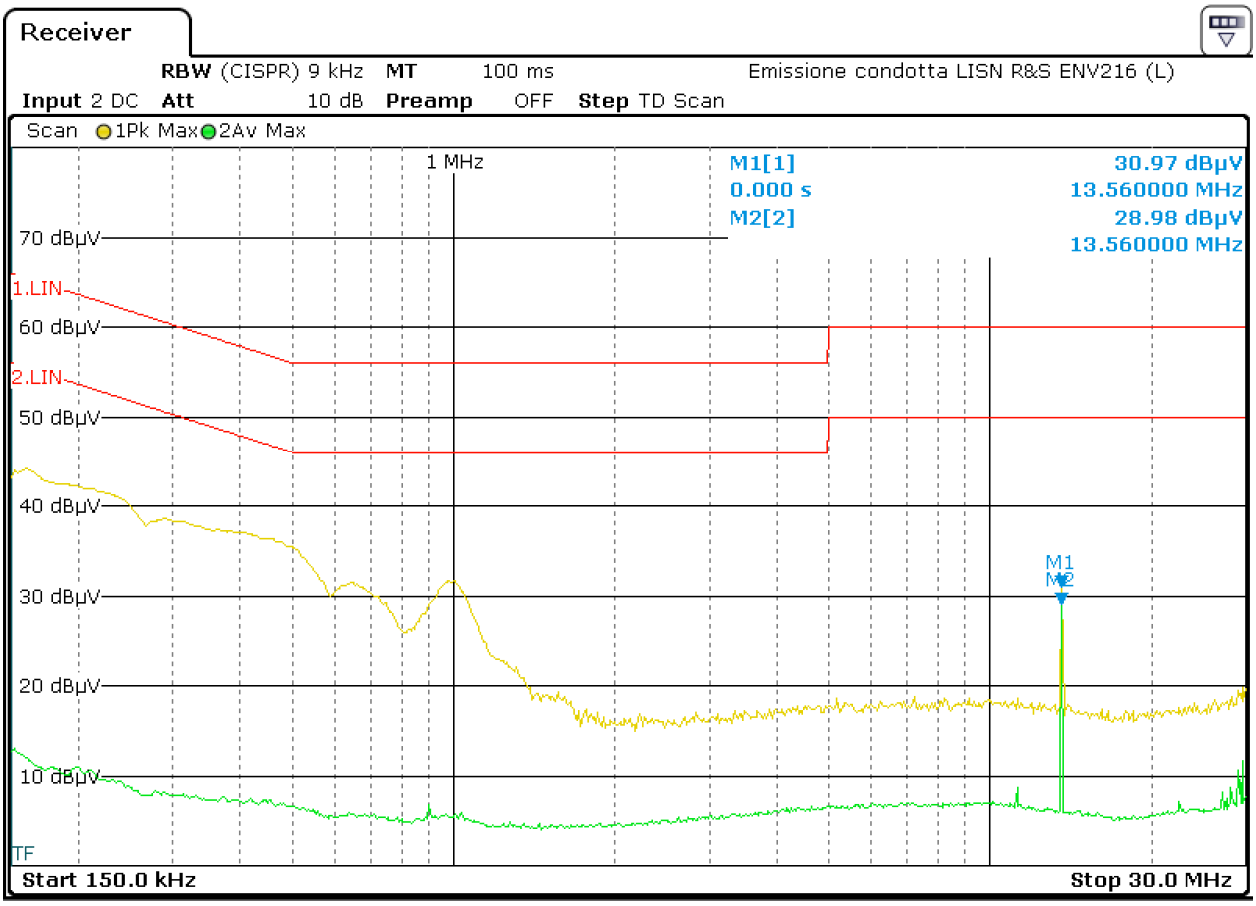
Graphical representation of Mains Terminal Disturbance Voltage Measurement

Operation Mode: #1

Phase



Graphical representation of Mains Terminal Disturbance Voltage Measurement
Operation Mode: #1
Neutral



11.3 TEST: Radiated Emission			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C	
	Relative Humidity (%)	54%	
	Air pressure (hPa)	1020	
—	Power Supply / Frequency	Application Point	
Fully configured sample tested at the power line frequency	12 Vdc	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.205; §15.209; §15.225		

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

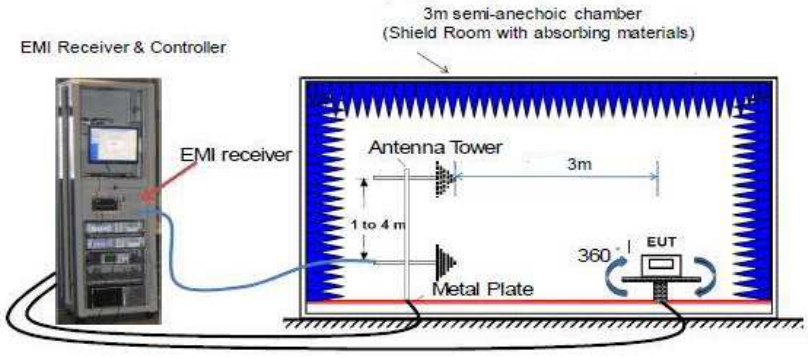
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

Remark: In accordance with part 15.31 (f) (2), where the measurement distance was specified to be 30 or 300 meters, a correction factor was applied in order to permit measurement to be performed at a separation distance. The applied formula for limits at 3 meter is:Extrapolation (dB) = 40log (300meter / 3meter) = +80db Extrapolation (dB) = 40log (30meter / 3meter) = +40db

Further information to test setup.

For frequencies above 1GHz, the anechoic material is also placed on the metallic floor between EUT and Antenna



Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	10/2016	10/2018
EMI Test Receiver	R&S	ESW44	87020967	06/2018	06/2019
Loop Antenna	EMCO	6512	87020465	02/2017	02/2020
Antenna BiConiLog	ETS Lindgren	3124E-PA	87020457	04/2017	04/2020

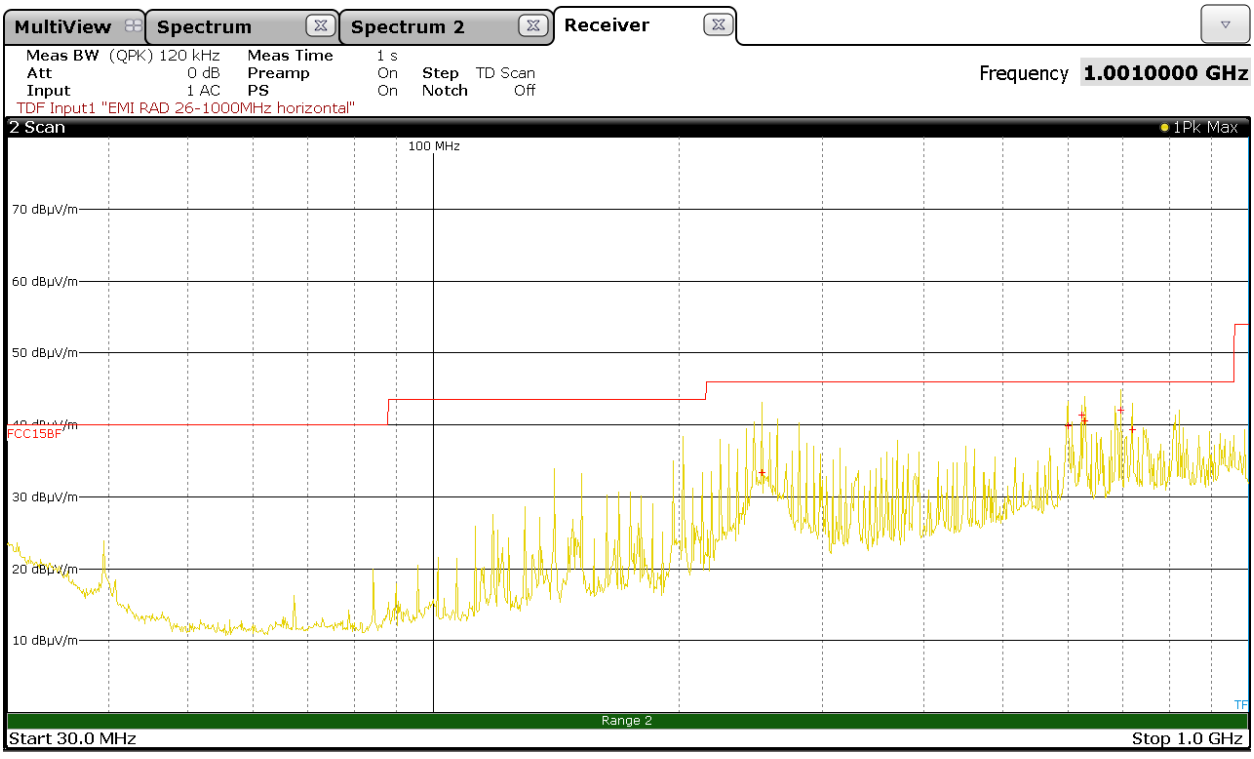
Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 9kHz – 30MHz

level measured at 3m distance.

Graphical representation of Radiated Emission Measurement
Operation Mode: (#1)
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical

QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
202,50	24,67	10,68	1,72	Not present	**37,07**
895,02	14,96	23,66	3,61	Not present	**42,23**
900,00	16,68	23,66	3,61	Not present	**43,95**
922,14	12,98	24,92	3,61	Not present	**41,51**

Graphical representation of Radiated Emission Measurement
Operation Mode: (#1)
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal



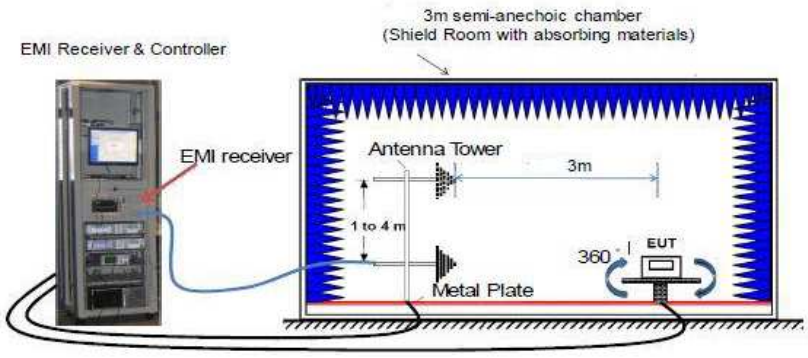
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
253,11	18,69	12,74	1,88	Not present	**33,31**
600,00	15,51	21,36	2,94	Not present	**39,81**
623,79	15,86	22,40	3,06	Not present	**41,32**
630,00	14,83	22,59	3,06	Not present	**40,48**
697,50	15,65	23,22	3,17	Not present	**42,04**
720,00	12,98	23,02	3,30	Not present	**39,30**

11.4 TEST: Field strength in band 13,110-14,010 MHz			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C	
	Relative Humidity (%)	54%	
	Air pressure (hPa)	1020	
—	Power Supply / Frequency	Application Point	
Fully configured sample tested at the power line frequency	12 Vdc	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.225 (A); §15.225 (B); §15.225 (C)		

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

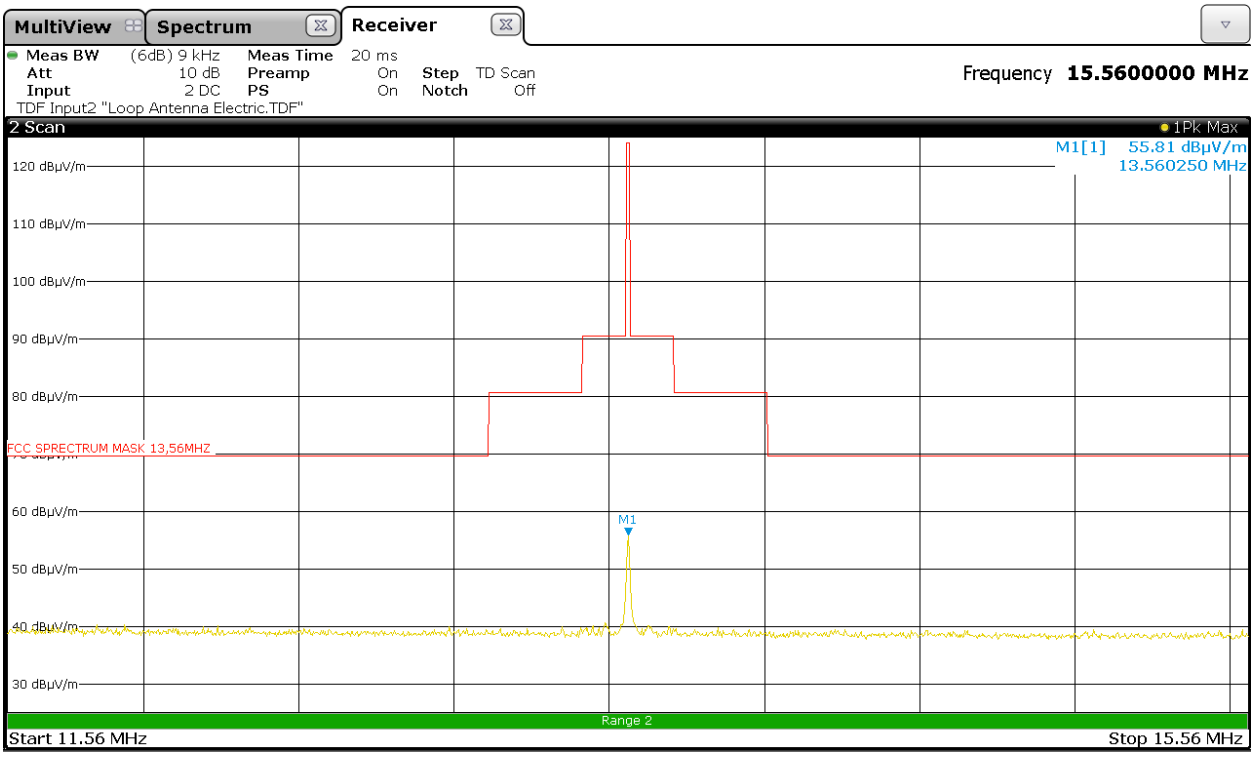
Remark: In accordance with part 15.31 (f) (2), where the measurement distance was specified to be 30 or 300 meters, a correction factor was applied in order to permit measurement to be performed at a separation distance. The applied formula for limits at 3 meter is:Extrapolation (dB) = 40log (300meter / 3meter) = +80db Extrapolation (dB) = 40log (30meter / 3meter) = +40db

Further information to test setup.



Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	10/2016	10/2018
EMI Test Receiver	R&S	ESW44	87020967	06/2018	06/2019
Loop Antenna	EMCO	6512	87020465	02/2017	02/2020

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 13,110-14,010 MHz

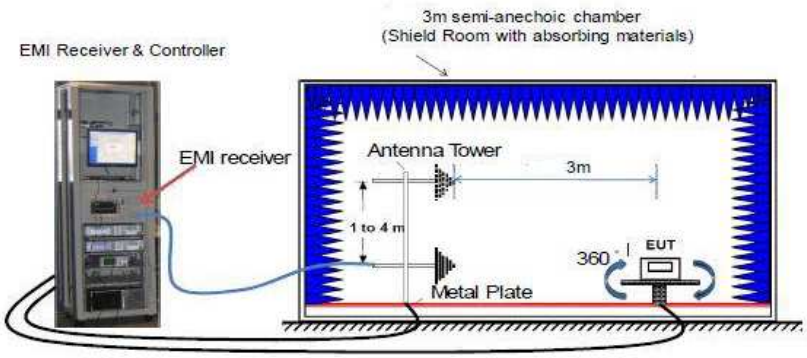


Field strength emission level			
Frequency	**13,560MHz**	**Max level measured**	**55,81dBuV/m***
***level measured at 3m distance.**			

11.5 TEST: 20dB Bandwidth			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C	
	Relative Humidity (%)	48%	
	Air pressure (hPa)	1020	
—	Frequency	Application Point	
Fully configured sample tested at the power line frequency	12 Vdc	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§ 15.215 (C)		

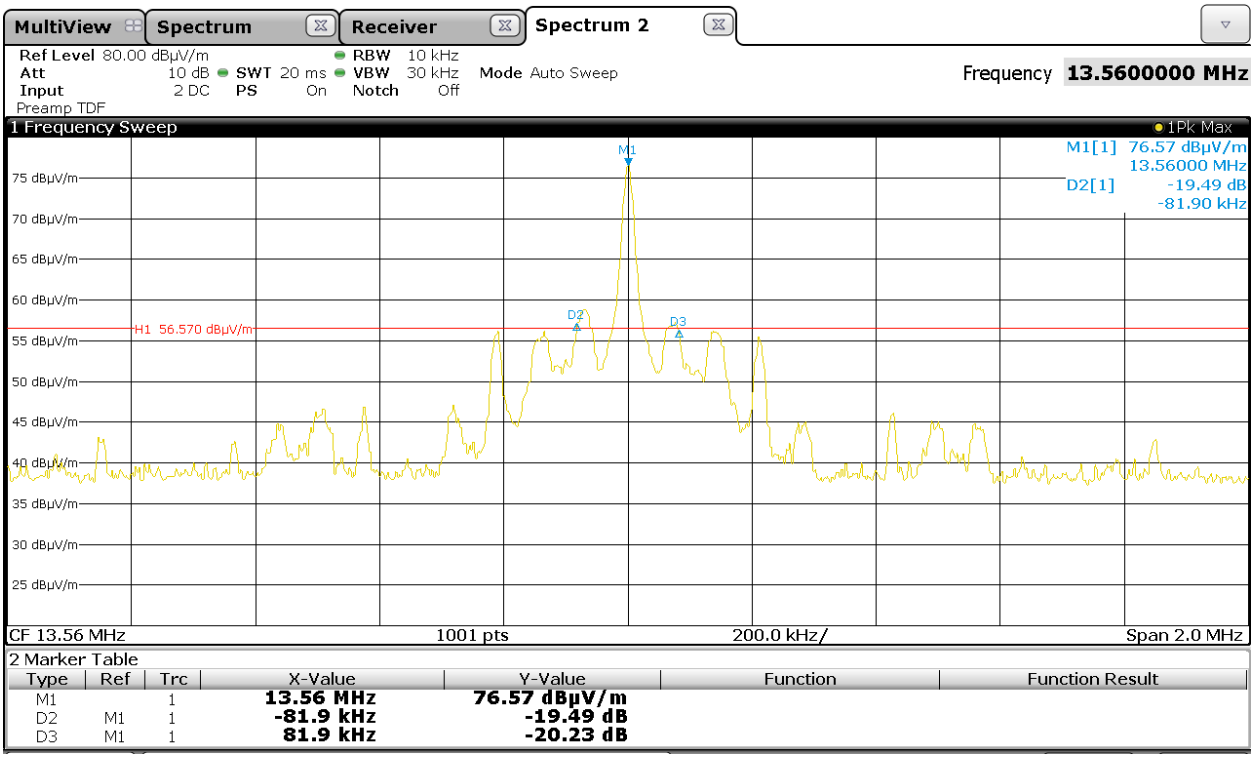
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Further information to test setup.



Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESW44	87020967	06/2018	06/2019

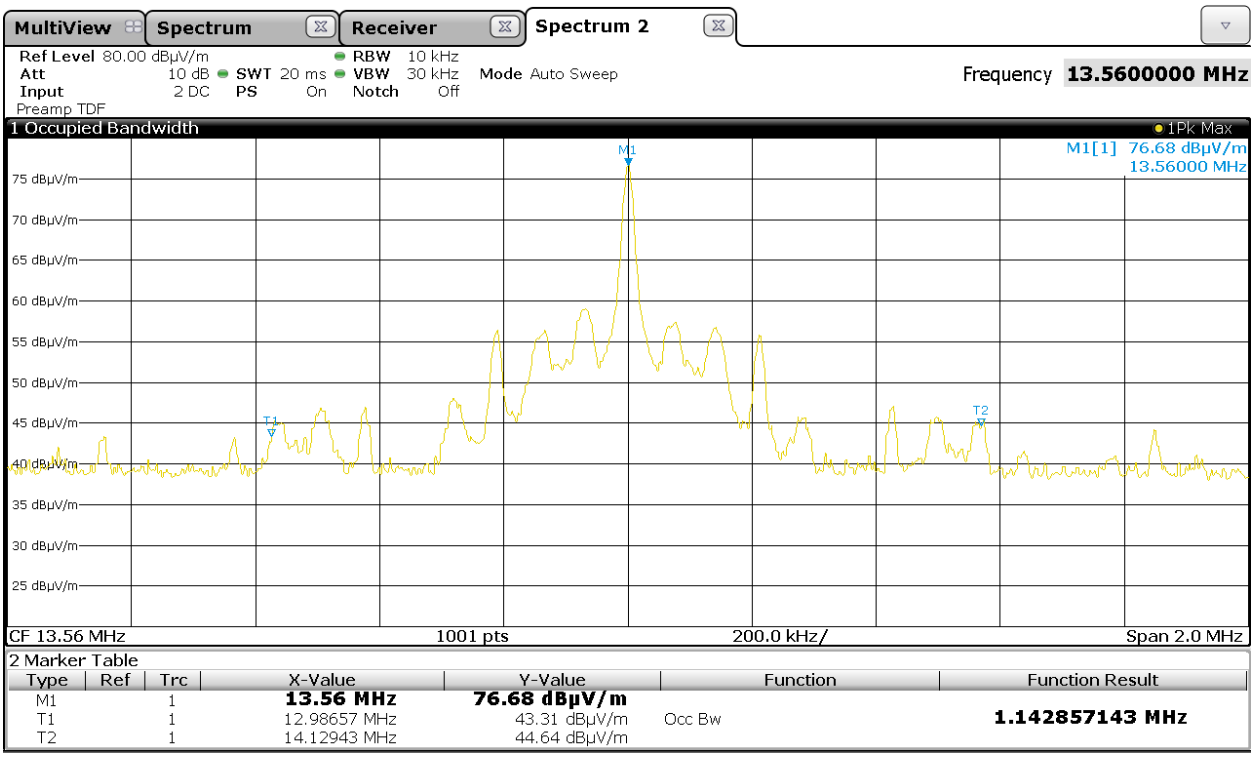
Graphical representation of 20dB Bandwidth
Operation Mode: #1
Plot n°1



Channel (No.)	Frequency (MHz)	Channel Bandwidth at -20dB (kHz)	Plot (No.)
1	13,56	163,80	1

Bandwidth at -20dB (Fmin and Fmax)			
Fmin	13,4781 MHz	Fmax	13,6419 MHz

Graphical representation of 99% Bandwidth
Operation Mode: #1
Plot n°2



Channel (No.)	Frequency (MHz)	Channel Bandwidth at 99% (kHz)	Plot (No.)
1	13,56	1142,85	2

Bandwidth at 99% (Fmin and Fmax)			
Fmin	12,98657 MHz	Fmax	14,12943 MHz

11.6 TEST: Frequency tolerance of the carrier signal			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22,5°C	
	Relative Humidity (%)	51%	
	Air pressure (hPa)	1020	
—	Frequency	Application Point	
Fully configured sample tested at the power line frequency	12Vdc	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§ 15.225 (E)		
The frequency tolerance of the carrier signal shall be maintained within +0.01% of the operating frequency over a temperature variation of -20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.			

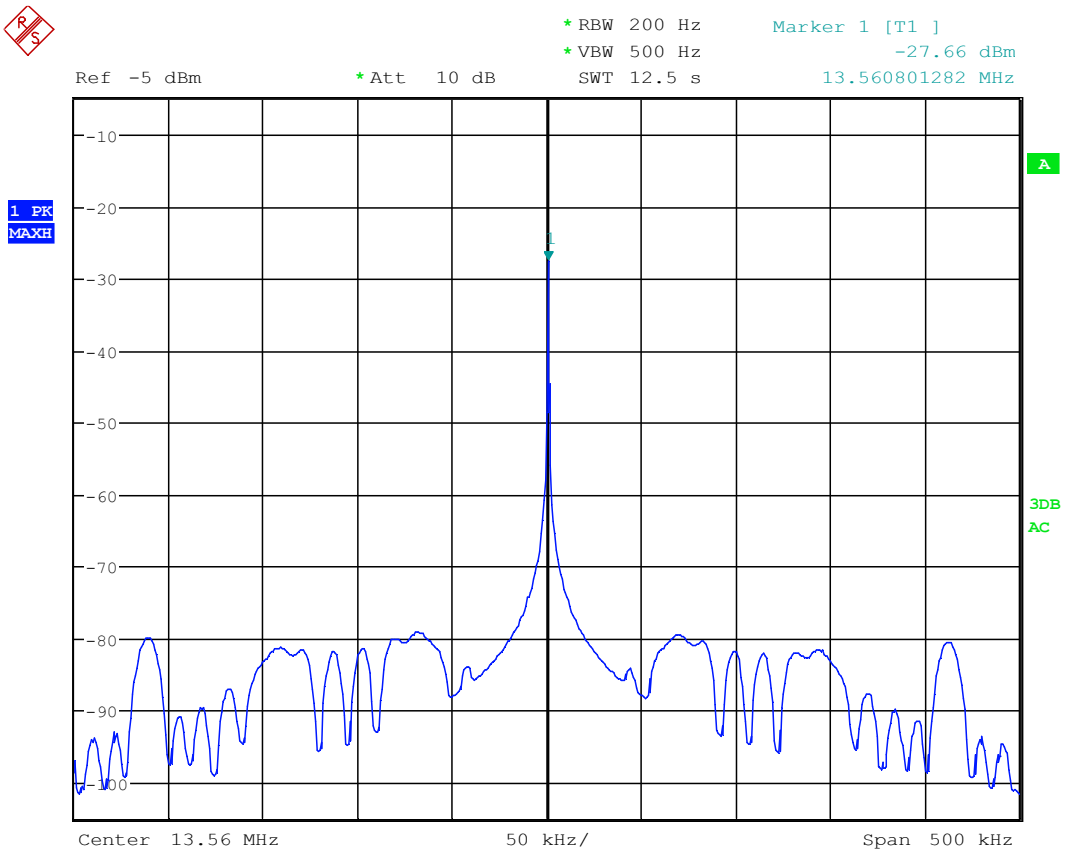
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
Climatic chamber	WEISS	SB22/300/40	87020044	10/2017	10/2018
EMI Test Receiver	R&S	ESU40	87020455	05/2018	05/2019

Frequency stability
Operation Mode: #1

Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Frequency Delta (ppm)
25	12	13,560801282	0
25	10,2	13,560801282	0
25	13,8	13,560801282	0

Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Frequency Delta (ppm)
-20	12	13,560801282	0
-10	12	13,560801282	0
0	12	13,560801282	0
+10	12	13,560801282	0
+20	12	13,560801282	0
+30	12	13,560801282	0
+40	12	13,560801282	0
+50	12	13,560801282	0

Start graphic (at 12V +25°C)



11.7 TEST: Additional provisions to the general radiated emission limitations.			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C	
	Relative Humidity (%)	37%	
	Air pressure (hPa)	1020	
—	Frequency	Application Point	
Fully configured sample tested at the power line frequency	12V dc	---------	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.215 (A) (B) (C)		

(A) The regulations in §§ 15.217-15.257 provide alternatives to the general radiated emission limits for intentional radiators operating in specified frequency bands. Unless otherwise stated, there are no restrictions as to the types of operation permitted under these sections.	
(B) In most cases, unwanted emissions outside of the frequency bands shown in these alternative provisions must be attenuated to the emission limits shown in Section 15.209. In no case shall the level of the unwanted emissions from an intentional radiator operating under these additional provisions exceed the field strength of the fundamental emission.	VERDICT PASS
(C) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least	VERDICT PASS

11.8 TEST: RF Exposure Requirements			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	---	
	Relative Humidity (%)	---	
	Air pressure (hPa)	1020	
—	Frequency	Application Point	
Fully configured sample tested at the power line frequency	12V dc	---	
Equipment mode:	Operation mode	#1	
FCC Standard	§ 1.1310 (1) (B)		
Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines § 1.1310, table (1) (b)			
EUT classification (fixed, mobile or portable devices)	Fixed equipment used in Uncontrolled Exposure environment		
Limits Freq. 13,56 MHz	According to 447498 D01 General RF Exposure Guidance v06 (See table below)		

Appendix C

SAR Test Exclusion Thresholds for < 100 MHz and < 200 mm

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

Operation Mode: #1						
CH	Frequency	Radiated Output Power	Radiated Output Power EIRP*	Radiated Output Power EIRP	Min. test separation Distance (r)	Limit (mW)
	(MHz)	(dBuV/m)	(dBm)	(mW)	(mm)	
1	13,56	55,81	-39,42	0,0001142	<50	459**
VERDICT						
The EUT Radiated Power density at evaluation distance is WHITIN THE LIMIT at the distance < 50mm.						
* according to formula EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) – 104.77						
**Linear interpolation.						

END OF TEST REPORT