



EMI – TEST REPORT

- FCC Part 15.225 -

Type / Model Name : M260SE-HF

Product Description : Handheld Data Terminal (RFID) HF

Applicant : ACD Elektronik GmbH

Address : Engelberg 2

88480 ACHSTETTEN

GERMANY

Manufacturer : ACD Elektronik GmbH

Address : Engelberg 2

88480 ACHSTETTEN

GERMANY

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : T41434-00-00JP

09. November 2016

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results
without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (February, 2016)

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (February, 2016)

Part 15, Subpart C, Section 15.207

Conducted limits

Part 15, Subpart C, Section 15.209

Radiated emission limits, general requirements

Part 15, Subpart C, Section 15.225

Operation within the band 13.110 - 14.010 MHz

RSS-Gen Issue 4, Nov 2014

General Requirements and Information for the Certification of Radio Apparatus

RSS-210 Issue 9, Aug 2016

Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

ANSI C63.10: 2013

Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 Test results

FCC Rule Part	RSS Rule Part	Description	Result
15.207	RSS Gen, 8.8	AC power line conducted emissions	N/A*
15.225	RSS-210, B.6	Field strength of fundamental	passed
15.209	RSS Gen, 8.9	Spurious emissions	passed
15.225	RSS-210, B.6	Frequency tolerance	passed
15.215	RSS-Gen, 6.6	Occupied bandwidth	passed
15.225	RSS-210, B.6	Transmitter spectrum mask	passed

*Device is battery operated

2.2 GENERAL REMARKS:

The EuT was tested together with a TAG supplied by client.

2.3 FINAL ASSESSMENT:

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 23 August 2016

Testing concluded on : 08 September 2016

Checked by:

Issued by:

Klaus Gegenfurtner
Teamleader Radio

Jürgen Pessinger
Radio Team

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT – Detailed photos see attachment A

3.2 Power supply system utilised

Power supply voltage : 7.4 V DC LiPO Battery

3.3 Short description of the equipment under test (EUT)

The EuT is a mobile handheld Data Terminal with an integrated RFID reader, operating at 13.56 MHz. The product is used by trained personal only and is not intended to be used by general public

Number of tested samples: 1
Serial number: 158100001615

EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- Continous tag reading mode at 13.56 MHz

EUT configuration:

The following peripheral devices and interface cables were connected during the measurements:

- TAG	Model : IQC21-50P, Pepperl+Fuchs
- -	Model : -
-	Model :

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	$\pm 3.29 \text{ dB}$
20 dB Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
99% Occupied Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	$\pm 3.53 \text{ dB}$
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	$\pm 3.71 \text{ dB}$
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	$\pm 2.34 \text{ dB}$
Peak conducted output power	Center frequency of EuT	95%	$\pm 3.53 \text{ dB}$
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	$\pm 2.15 \text{ dB}$

4.4 Measurement protocol for FCC and IC

4.4.1 General information

4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

The Open Area test sites are listed Open Sites under the Canadian Test-Sites File-No:

IC 3009A-1 (OATS1)

In compliance with RSS 210 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.3 Details of test procedures

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

5 TEST CONDITIONS AND RESULTS

5.1 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part **CPR 1**.

5.1.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.1.2 Photo documentation of the test set-up



5.1.3 Applicable standard

FCC Part 15, Section 15.225 and RSS-210 B.6

FCC ID: O2FM260SEHF
5.1.4 Test result

a) Result at a measurement distance of 3m

Frequency (MHz)	Level (dB μ V)	Ant. factor (dB 1/m)	Field strength dB(μ V/m)
13.56	40.2	20.0	60.2

b) Result extrapolated to a distance of 30 m

Frequency (MHz)	Level QP@3m (dB μ V)	Ant. factor (dB/m)	Field strength QP@3m dB(μ V/m)	Distance corr. 3m to 30m (dB)	Corrected level QP@30m dB(μ V/m)	Limit QP@30m dB(μ V/m)	Delta (dB)
13.56	40.2	20	60.2	-40	20.2	84	-63.8

Limit according to FCC Part 15, Section 15.225(a) and RSS 210, Annex B.6 (a):

Frequency (MHz)	Field strength of fundamental wave		Measurement distance
	(μ V/m)	dB(μ V/m)	(metres)
13.553 - 13.567	15848	84.0	30

The requirements are **FULFILLED**.

Remarks: The test was performed in all three orthogonal axes. The shown value indicates highest
measured result.

5.2 Spurious emissions

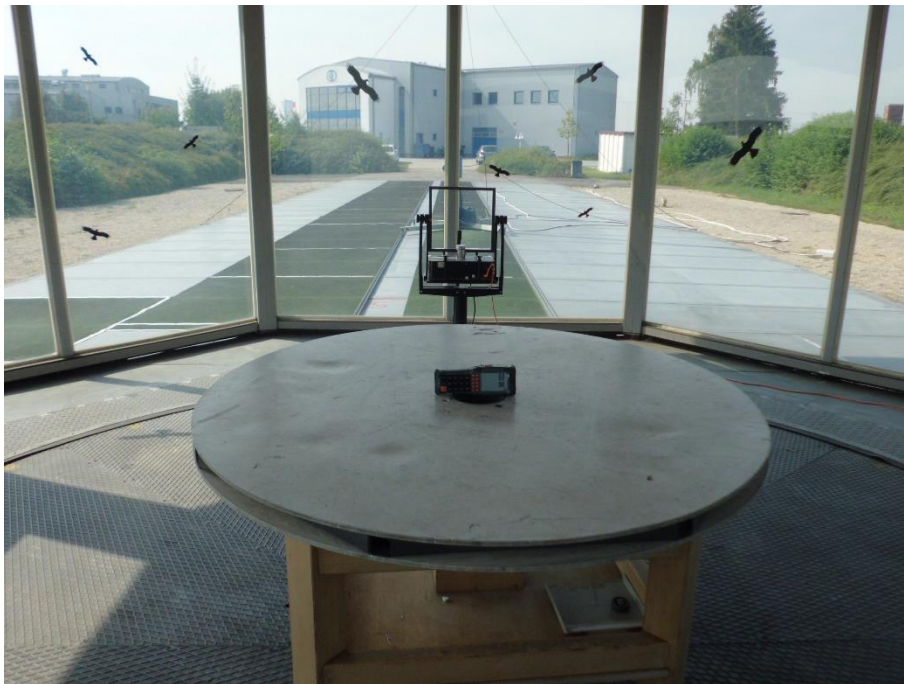
For test instruments and accessories used see section 6 Part **SER 1**, **SER 2**.

5.2.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.2.2 Photo documentation of the test set-up



FCC ID: O2FM260SEHF

5.2.1 Applicable standard

FCC Part 15, Section 15.209 and RSS-Gen 8.9

Instrument settings:

9 kHz – 150 kHz	RBW:	200 Hz
150 kHz - 30 MHz	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz

5.2.2 Test result

Results at a measurement distance of 3m

9 kHz < f < 30 MHz

No unwanted emissions from the EuT could be measured in this frequency range.

30 MHz < f < 1 GHz:

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
40,68	10,8	3,6	14,7	13,5	25,5	17,1	40,0	-14,5
54,24	3,5	-0,2	15,0	14,0	18,5	13,8	40,0	-21,5
56,80	9,4	8,5	14,9	13,9	24,3	22,4	40,0	-15,7
67,80	11,0	4,8	14,2	13,4	25,2	18,2	40,0	-14,8
72,00	16,4	14,7	13,4	12,8	29,8	27,5	40,0	-10,2
81,36	3,5	2,3	10,8	10,6	14,3	12,9	40,0	-25,7
108,48	1,9	0,5	10,4	11,3	12,3	11,8	43,5	-31,2
120,00	18,1	18,5	12,4	12,9	30,5	31,4	43,5	-12,1
149,16	1,8	3,9	13,9	14,7	15,7	18,6	43,5	-24,9
168,00	16,0	19,0	14,1	14,8	30,1	33,8	43,5	-9,7
192,00	13,6	21,4	12,1	12,8	25,7	34,2	43,5	-9,3
216,00	21,7	30,0	12,1	12,6	33,8	42,6	46,0	-3,4
264,00	16,3	19,4	14,7	14,7	31,0	34,1	46,0	-11,9
312,00	20,4	27,2	17,3	16,8	37,7	44,0	46,0	-2,0
336,00	19,6	24,5	18,0	17,6	37,6	42,1	46,0	-3,9
344,50	20,3	23,4	18,2	17,8	38,5	41,2	46,0	-4,8
370,50	20,7	21,2	19,0	18,6	39,7	39,8	46,0	-6,2
384,00	19,9	22,5	19,4	19,1	39,3	41,6	46,0	-4,4
432,00	22,3	21,3	20,7	20,4	43,0	41,7	46,0	-3,0
504,00	20,9	9,4	22,6	22,4	43,5	31,8	46,0	-2,5
576,00	16,8	12,4	24,8	24,6	41,6	37,0	46,0	-4,4
744,00	4,8	11,2	28,1	27,6	32,9	38,8	46,0	-7,2
768,10	4,8	8,4	28,7	28,2	33,5	36,6	46,0	-9,4
888,15	3,9	5,5	30,9	30,5	34,8	36,0	46,0	-10,0
910,00	-0,7	-0,8	31,2	30,8	30,5	30,0	46,0	-15,5

FCC ID: O2FM260SEHF

Limit according to FCC Part 15 Subpart 15.209 and RSS-Gen, Section 8.9:

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	($\mu\text{V/m}$)	dB($\mu\text{V/m}$)	
0.009 - 0.490	2400/F(kHz)	--	300
0.490 - 1.705	24000/F (kHz)	--	30
1.705 - 30.0	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The requirements are **FULFILLED**.

Remarks: The test was performed in all three orthogonal axes. The shown value indicates highest
measured result.

FCC ID: O2FM260SEHF

5.3 Frequency tolerance

For test instruments and accessories used see section 6 Part FE.

5.3.1 Description of the test location

Test location: AREA4 (Climatic Chamber)

5.3.2 Photo documentation of the test set-up



5.3.3 Applicable standard

FCC Part 15, Section 15.225 and RSS-210 B.6

FCC ID: O2FM260SEHF

5.3.4 Test result

Test conditions		Test result
		Frequency (MHz)
$T_{min} (-20)^{\circ}C$	$V_{nom} (7.4 V)$	13.56015
$T (-10)^{\circ}C$	$V_{nom} (7.4 V)$	13.56013
$T (0)^{\circ}C$	$V_{nom} (7.4 V)$	13.56010
$T (10)^{\circ}C$	$V_{nom} (7.4 V)$	13.56008
$T_{nom} (20)^{\circ}C$	$V_{nom} (7.4 V)$	13.56008
$T (30)^{\circ}C$	$V_{nom} (7.4 V)$	13.56007
$T (40)^{\circ}C$	$V_{nom} (7.4 V)$	13.56008
$T_{max} (50)^{\circ}C$	$V_{nom} (7.4 V)$	13.56011
Measurement uncertainty		$\pm 10 \text{ Hz}$

Carrier frequency: $f_c = 13.56 \text{ MHz}$
 Max. tolerance: $\pm 0.01 \text{ \% of } 13.56 \text{ MHz} = \pm 1.356 \text{ kHz}$

Highest frequency measured: $f_h = 13.56015 \text{ MHz}$
 Lowest frequency measured: $f_l = 13.56007 \text{ MHz}$

Max. tolerance measured: $f_h - f_c = 0.14 \text{ kHz} < 1.356 \text{ kHz}$

Limit according to FCC Part 15, Section 15.225 and RSS-210 Issue 9, Annex B.6:
 The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01 \text{ \%}$ of the operating frequency.

The requirements are **FULFILLED**.

Remarks:

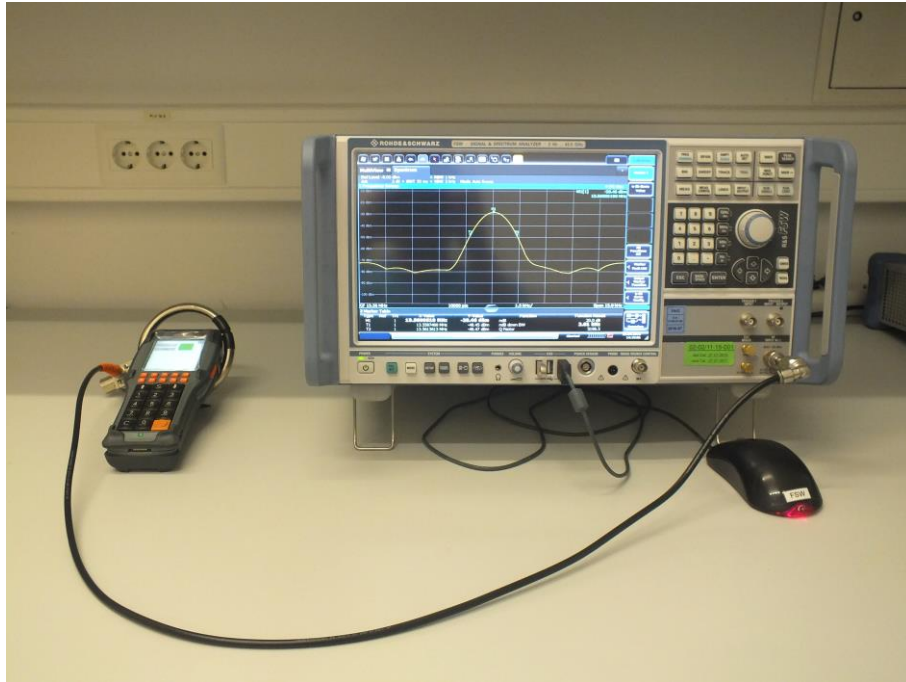
5.4 Occupied Bandwidth

For test instruments and accessories used see section 6 Part MB.

5.4.1 Description of the test location

Test location: AREA 4

5.4.2 Photo documentation of the test set-up



5.4.3 Applicable standard

FCC Part 15, Section 15.215 and RSS-Gen, 6.6

5.4.4 Test result

Measured Bandwidth	result (kHz)	Limit (kHz)
20dB	2,61	--
99%	2,23	--

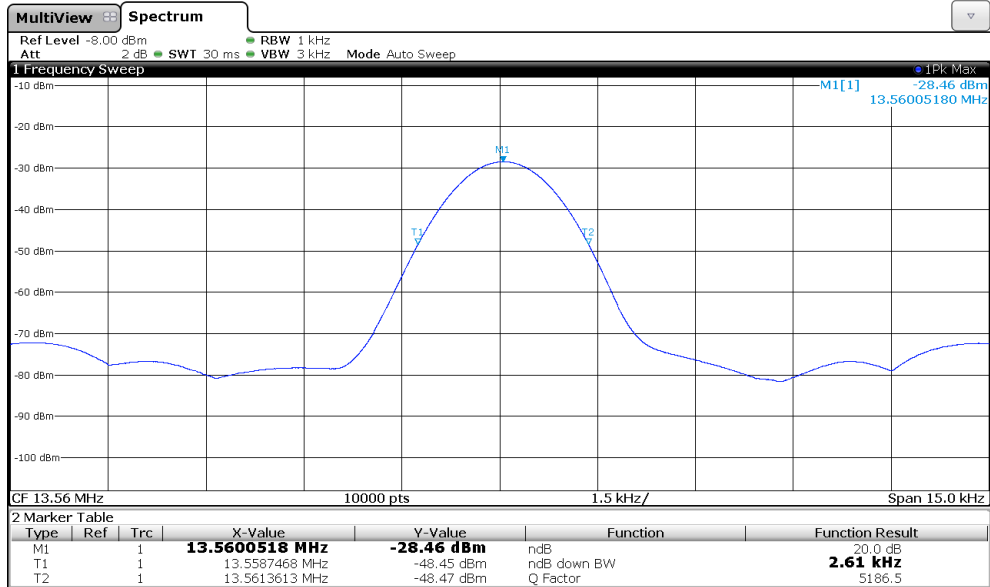
No limit defined.

The requirements are **FULFILLED**.

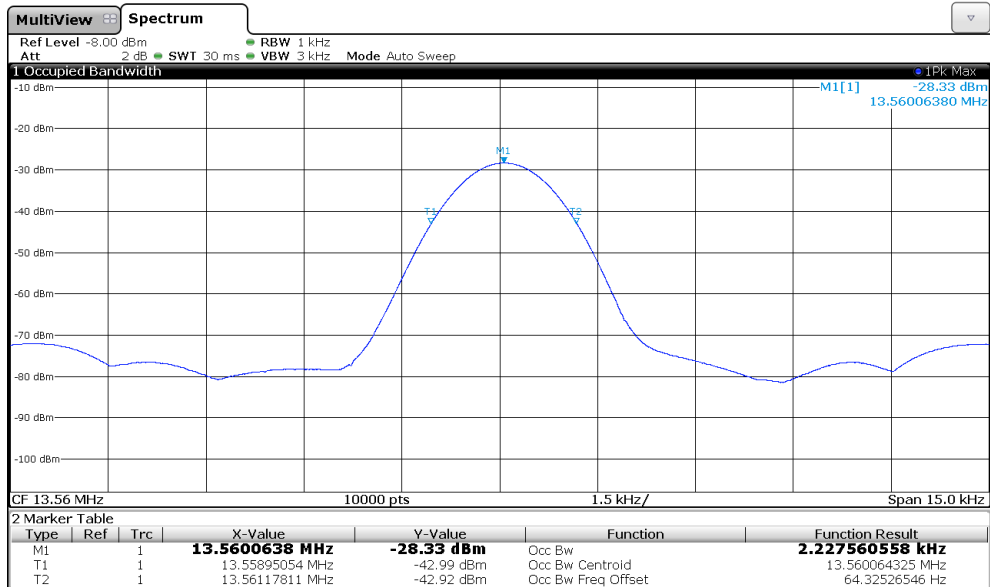
Remarks: For detailed test result please refer to following test protocol.

5.4.5 Test protocol

20 dB bandwidth



OBW 99%



FCC ID: O2FM260SEHF

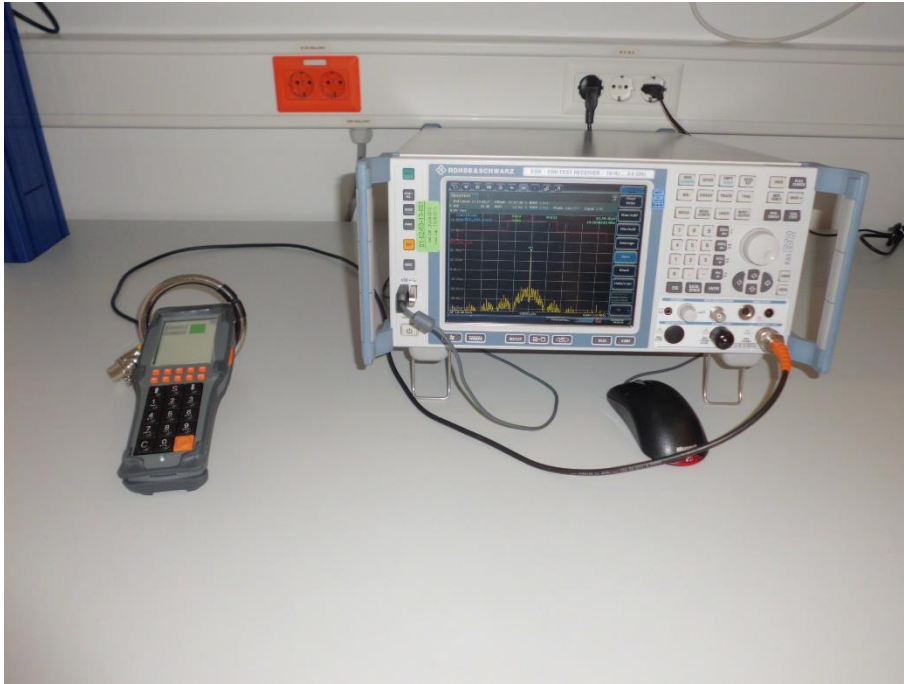
5.5 Transmitter spectrum mask

For test instruments and accessories used see section 6 Part MB.

5.5.1 Description of the test location

Test location: AREA 4

5.5.2 Photo documentation of the test set-up

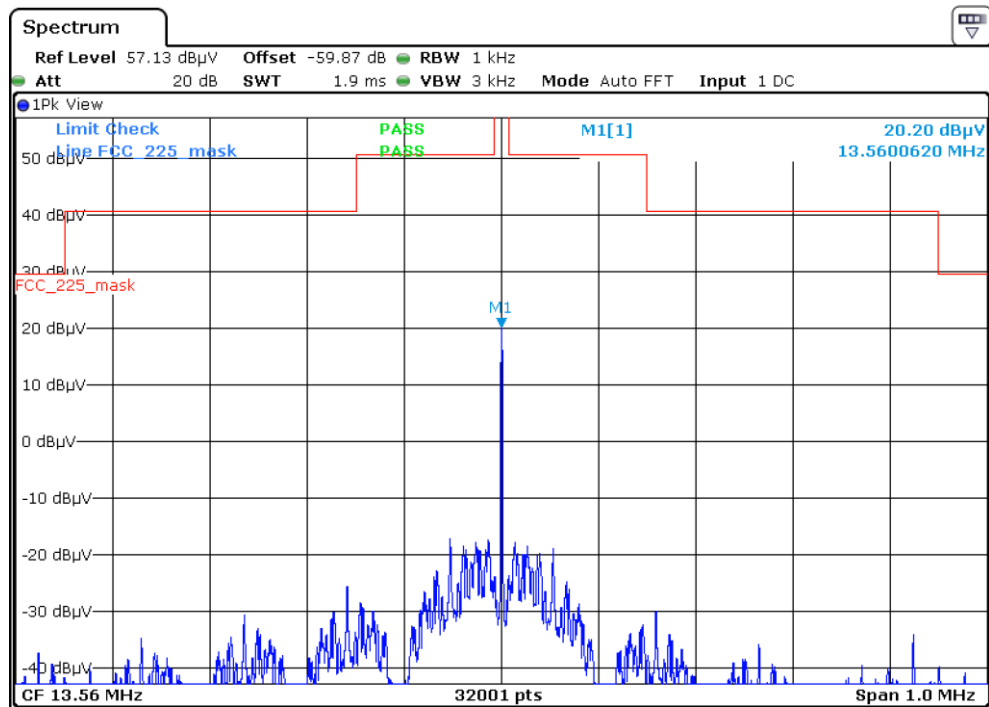


5.5.3 Applicable standard

FCC Part 15, Section 15.225 and RSS-210 B.6

FCC ID: O2FM260SEHF

5.5.4 Test result



Limits according to FCC Part 15C, Section 15.225 and RSS-210, Annex B.6

Frequency band (MHz)	Emission level limit at 30 m (μV/m)	Emission level limit at 30 m (dBμV/m)
13.110 – 13.410	106	40.5
13.410 - 13.553	334	50.5
13.553 - 13.567	15,848	84.0
13.567 – 13.710	334	50.5
13.710 – 14.010	106	40.5
outside of 13.110 – 14.010	30	29.5

The requirements are **FULFILLED**.

Remarks: none

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPR 1	ESR 3	01-02/03-13-001	10/08/2017	10/08/2016		
	FMZB 1516	01-02/24-01-018	21/01/2017	21/01/2016		
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
FE	ESR 7	02-02/03-13-001	15/06/2017	15/06/2016		
	HFRAE 5161 _ 50 kHz-120	02-02/24-11-004				
	WK-340/40	02-02/45-05-001	23/06/2017	23/06/2016		
MB	ESR 3	01-02/03-13-001	10/08/2017	10/08/2016		
	FSW43	02-02/11-15-001	25/07/2017	25/07/2016		
	HFRAE 5161 _ 50 kHz-120	02-02/24-11-004				
SER 1	ESR 3	01-02/03-13-001	10/08/2017	10/08/2016		
	FMZB 1516	01-02/24-01-018	21/01/2017	21/01/2016		
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 2	ESVS 30	02-02/03-05-006	04/07/2017	04/07/2016		
	VULB 9168	02-02/24-05-005	20/04/2017	20/04/2016	01/03/2017	01/09/2016
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				