EMCC™
DR. RAŠEK

TEST REPORT # EMCC-101094B, 2013-12-10

EQUIPMENT UNDER TEST:

Trade Name:	Radar Sensor
Type:	UMRR-0A0903-1F0902-030602
Serial No:	#0x00023395; #0x00023396; #0x00023399; #0x00022DB5
Equipment Category:	Field Disturbance Sensor
Manufacturer:	s.m.s. smart microwave sensors GmbH
Address:	In den Waashainen 1 38108 Braunschweig Germany
Client:	s.m.s. smart microwave sensors GmbH
Address:	In den Waashainen 1 38108 Braunschweig Germany
Name for contact purposes:	Ralph Mende
Phone:	+49 531 39023 0
Fax:	+49 531 39023 599
Email:	ralph.mende@smartmicro.de

RELEVANT STANDARD: 47 CFR Part 15 C

MEASUREMENT PROCEDURE USED:

☒ ANSI C63.4-2009 ☐ ANSI C63.10-2009 ☐ Other

TEST REPORT PREPARED BY:

Zakaria Khalek
EMCCons DR. RAŠEK GmbH & Co. KG
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TEST PERSONNEL:

Z. Khal

Zakaria Khalek

HEAD OF GROUP:

W. Doering

Wolfgang Doering

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1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance to the FCC regulations for Subpart C - Intentional Radiators.

1.2 Limits and Reservations

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Test results relate only to the items tested in the configuration as recorded. This test report shall not be reproduced except in full without the written permission of EMCCons DR. RAŠEK GmbH & Co. KG.

1.3 Test Location

Company Name:	EMCCons DR. RAŠEK GmbH & Co. KG
Accreditation No.:	D-PL-12067-01-01
Address:	Moggast, Boelwiese 8 91320 Ebermannstadt Germany
Test Laboratory:	EMCCons DR. RAŠEK GmbH & Co. KG Test Laboratory IV located at Stoernhofer Berg 15, 91364 Unterleinleiter, Germany. The 3 m & 10 m semi-anechoic chamber site has been fully described in a report submitted to the FCC, and accepted under Registration Number 878769.
Name for contact purposes:	Zakaria Khalek
Phone:	+49 9194 9016
Fax:	+49 9194 8125
E-Mail:	z.khalek@emcc.de

1.4 Manufacturer

Company Name:	s.m.s. smart microwave sensors GmbH
Street:	In den Waashainen 1
City:	38108 Braunschweig
Country:	Germany

1.5 Client

Company Name: s.m.s. smart microwave sensors GmbH
Street: In den Waashainen 1
City: 38108 Braunschweig
Country: Germany

Name for contact purposes: Ralph Mende
Phone: +49 531 39023 0
Fax: +49 531 39023 599
E-Mail: ralph.mende@smartmicro.de

1.6 Dates and Test Location

The s.m.s. smart microwave sensors GmbH Radar Sensor type UMRR-0A0903-1F0902-030602 was tested at EMCCons DR. RAŠEK GmbH & Co. KG test laboratory in Unterleinleiter in CW 34-45/2013.

1.7 Climatic Conditions

Date	Temperature	Relative Humidity	Air Pressure
2013-08-22	23 °C	33 %	954 hPa
2013-10-08	21 °C	45 %	981 hPa
2013-10-09	22 °C	47 %	977 hPa
2013-10-10	22 °C	48 %	962 hPa
2013-10-11	22 °C	46 %	969 hPa
2013-10-14	21 °C	47 %	975 hPa
2013-10-15	21 °C	51 %	966 hPa
2013-10-28	22 °C	51 %	961 hPa
2013-10-31	22 °C	39 %	981 hPa
2013-11-06	21 °C	43 %	960 hPa

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Trade Name:	Radar Sensor
Type:	UMRR-0A0903-1F0902-030602
Serial Number:	#0x00023395; #0x00023396; #0x00023399; #0x00022DB5
Software Version:	T000-12, Revision 7153 ; T000-12, Revision 7154
Equipment Category:	Field Disturbance Sensor
Application:	Radar Automotive Purpose
Power:	12 VDC
Frequency operating range:	24.05 -24.25 GHz
Interface ports:	None
Variants:	None
Remarks:	None

2.2 EUT Peripherals

AC/DC adapter type Voltcraft USPS-1000 was used during AC line conducted emissions measurements.
No specific AC/DC adapter provided by the customer.

2.3 Mode of Operation During Testing

During the tests, the EUT was set to transmit at a fixed frequency in CW mode, by software following customer´s instructions.
Measurements with video averaging performed on EUT operating with normal modulation at fixed frequency.
For further information, please refer to customer.

2.4 Modifications Required for Compliance

None.

3 TEST RESULTS SUMMARY

Summary of Test Results for the following EUT:

Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602

Requirement	CFR Section	Report Section	Test Result
AC Line Conducted Emissions	15.207	4	Pass
Radiated Emissions	15.249 / 15.209	5	Pass

The client has made the determination that EUT Condition, Characterization and Mode of Operation are representative of production units and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedure ANSI C63.4 - 2003 and all applicable Public Notices received prior to the date of testing. All emissions from the device were found to be within the limits outlined in this report.
The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

Test Personnel: Zakaria Khalek
Issuance Date: 2013-12-10

4 POWER LINE CONDUCTED EMISSIONS TEST

Test Requirement: FCC 47 CFR, Part 15C
Test Procedure: ANSI C63.4-2009

4.1 Regulation

(a) 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

*Decreases with the logarithm of the frequency.

4.2 Test Equipment

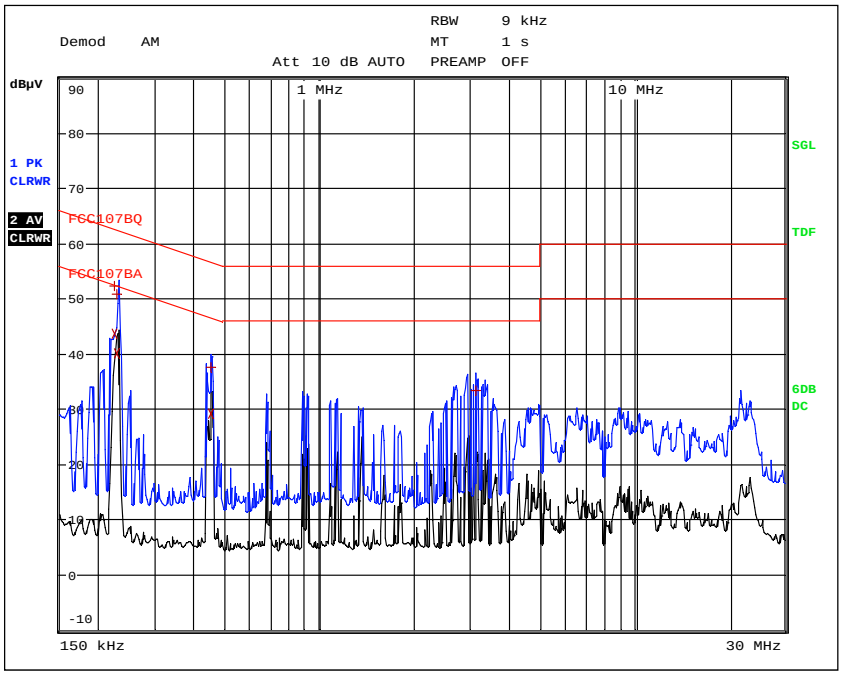
Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
EMI Test Receiver	Rohde & Schwarz / ESU	3846	2013-07	2014-07
V-LISN 50 Ω//(50 μH + 5 Ω)	Rohde & Schwarz / ESH2-Z5	1901	2011-10	2013-10
Protector Limiter	Rohde & Schwarz / ESH3-Z2	719	2013-01	2015-01
AC Power Source	Calif. Ins./ 3001TCA	35	n.a	n.a
Multimeter	Agilent / U1241B	3880	2012-02	2014-02

4.3 Test Procedures

The EUT was placed on a wooden table of nominal size 1 m by 1.5 m, raised 80 cm above the reference groundplane. The vertical conducting wall of the screened room was located 40 cm to the rear of the EUT.
The excess length of the power cord of the ac adapter to the EUT was folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
LISN housing, measuring instrument case, reference ground plane and the vertical conducting wall of the screened room was bonded together.

4.4 Test Results

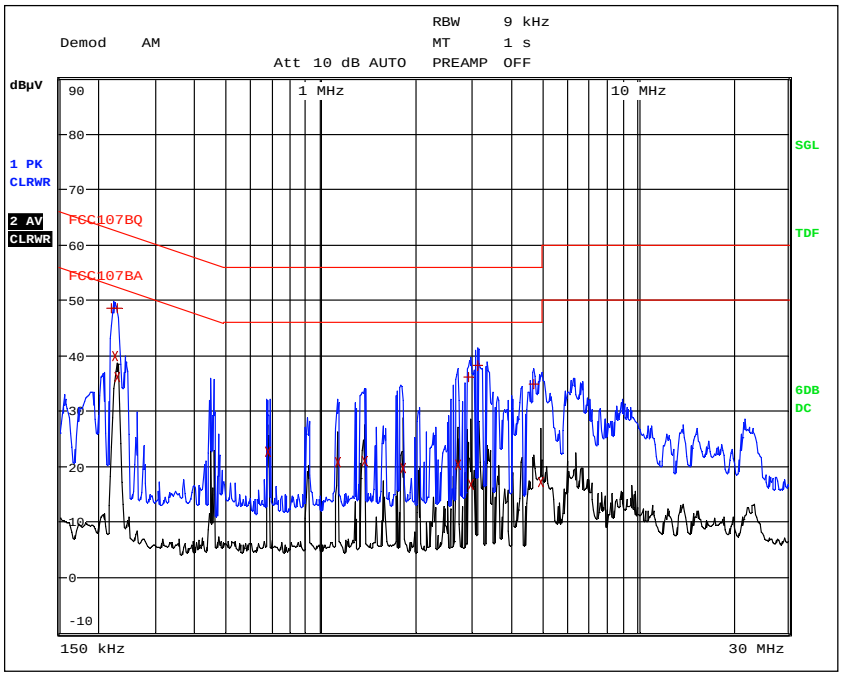
EUT operating at low channel.



Plot 1: Test on Line L

Final measurement results

Freq [MHz]	Result [dBµV]	Margin [dB]	Detector
0.225	52.3	10.3	Cispr QP
0.225	43.6	9.0	Cispr AV
0.230	50.8	11.7	Cispr QP
0.230	40.1	12.3	Cispr AV
0.450	37.6	19.3	Cispr QP
0.455	29.2	17.6	Cispr AV
3.125	33.5	22.5	Cispr QP



Plot 2: Test on Line N

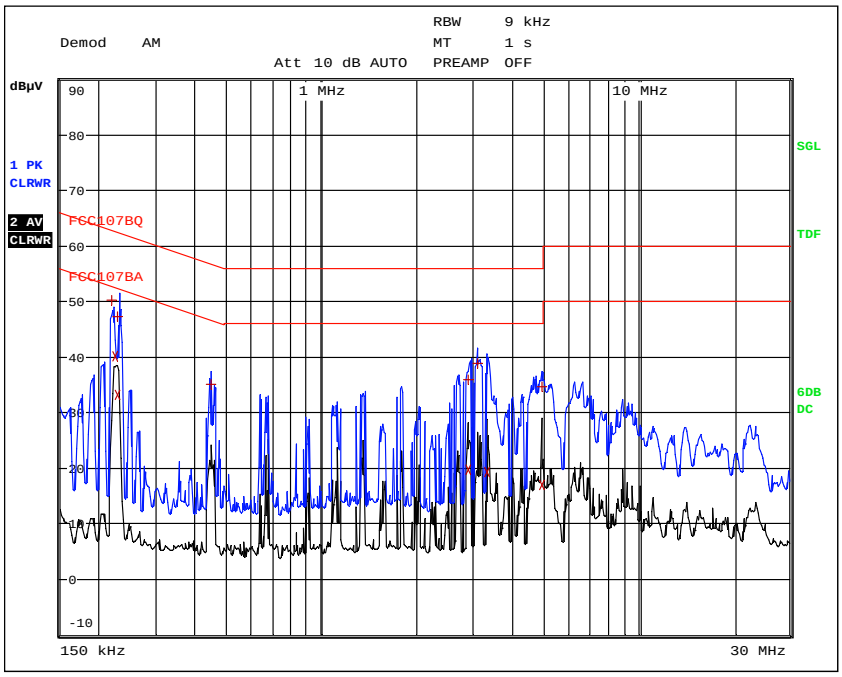
Final measurement results

Freq [MHz]	Result [dBµV]	Margin [dB]	Detector
0.220	48.4	14.4	Cispr QP
0.225	39.9	12.7	Cispr AV
0.230	48.5	14.0	Cispr QP
0.230	36.1	16.4	Cispr AV
0.675	22.6	23.4	Cispr AV
1.130	20.8	25.2	Cispr AV
1.365	21.0	25.0	Cispr AV
1.815	19.6	26.4	Cispr AV
2.705	20.4	25.6	Cispr AV
2.915	36.2	19.8	Cispr QP
2.980	16.8	29.2	Cispr AV
3.125	38.2	17.8	Cispr QP
4.725	34.8	21.2	Cispr QP
4.965	17.2	28.8	Cispr AV

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00023395
Software Version: T000-12, Revision 7153

Test Personnel: Zakaria Khalek
Test Date: 2013-08-22
The EUT meets the requirements of this section.

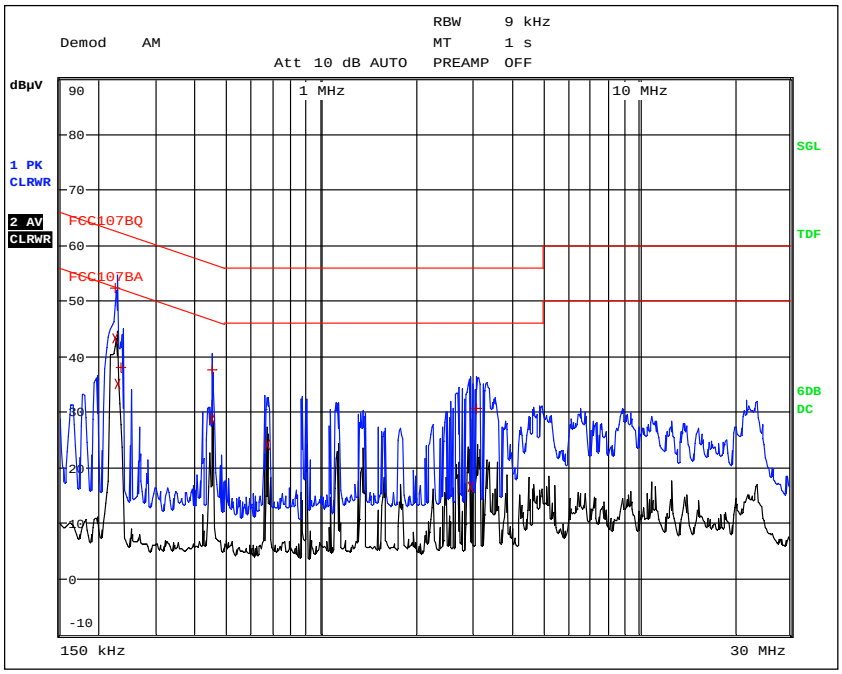
EUT operating at middle channel.



Plot 3: Test on Line L

Final measurement results

Freq [MHz]	Result [dBµV]	Margin [dB]	Detector
0.220	50.1	12.7	Cispr QP
0.225	40.0	12.6	Cispr AV
0.230	47.3	15.2	Cispr QP
0.230	33.2	19.3	Cispr AV
0.445	35.0	22.0	Cispr QP
2.910	35.9	20.1	Cispr QP
2.910	19.7	26.3	Cispr AV
3.115	38.8	17.2	Cispr QP
3.325	19.2	26.8	Cispr AV
4.955	34.6	21.4	Cispr QP
4.960	17.0	29.0	Cispr AV



Plot 4: Test on Line N

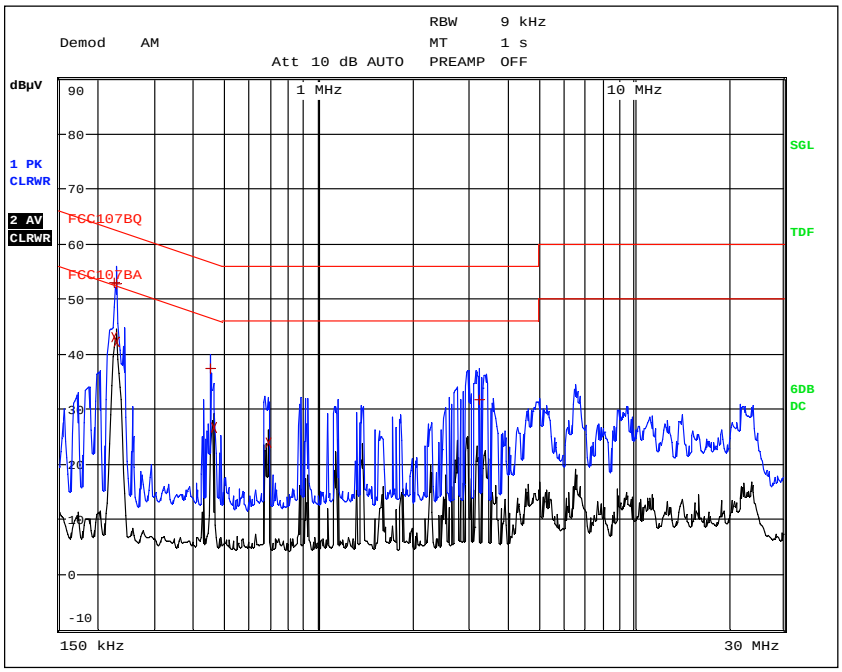
Final measurement results

Freq [MHz]	Result [dBµV]	Margin [dB]	Detector
0.225	52.3	10.3	Cispr QP
0.225	43.3	9.3	Cispr AV
0.230	35.0	17.4	Cispr AV
0.235	38.1	24.2	Cispr QP
0.450	37.7	19.2	Cispr QP
0.450	28.7	18.2	Cispr AV
0.670	24.2	21.8	Cispr AV
2.945	16.5	29.5	Cispr AV
3.065	30.7	25.3	Cispr QP

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00023396
Software Version: T000-12, Revision 7153

Test Personnel: Zakaria Khalek
Test Date: 2013-08-22
The EUT meets the requirements of this section.

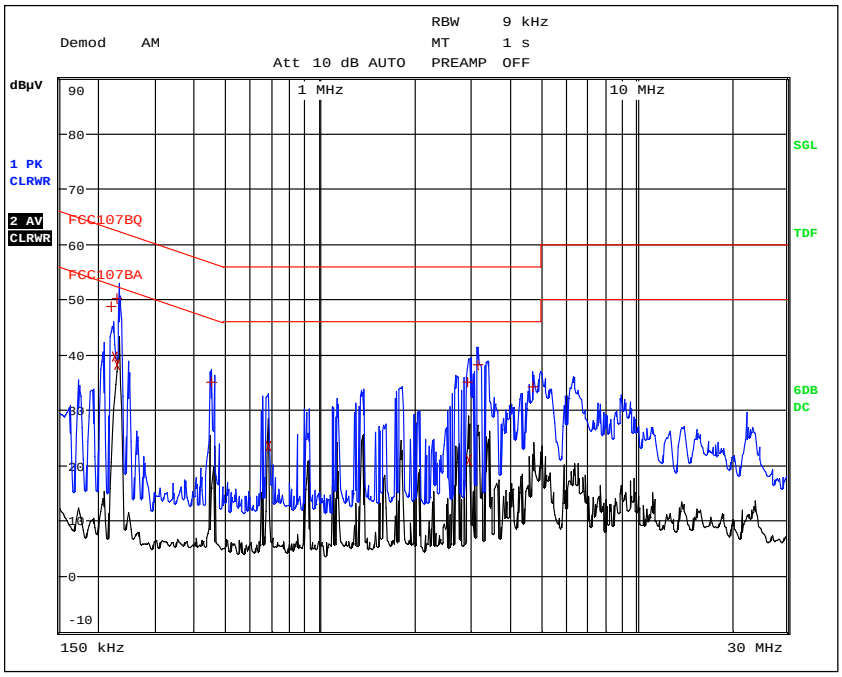
EUT operating at high channel.



Plot 5: Test on Line L

Final measurement results

Freq [MHz]	Result [dBµV]	Margin [dB]	Detector
0.220	48.7	14.1	Cispr QP
0.225	39.8	12.9	Cispr AV
0.230	50.2	12.2	Cispr QP
0.230	38.2	14.2	Cispr AV
0.450	35.2	21.7	Cispr QP
0.680	23.4	22.6	Cispr AV
2.915	35.1	20.9	Cispr QP
2.960	21.0	25.0	Cispr AV
3.145	38.3	17.7	Cispr QP
4.720	34.1	21.9	Cispr QP



Plot 6: Test on Line N

Final measurement results

Freq [MHz]	Result [dBµV]	Margin [dB]	Detector
0.225	52.9	9.8	Cispr QP
0.225	43.1	9.5	Cispr AV
0.230	52.6	9.8	Cispr QP
0.230	42.2	10.2	Cispr AV
0.450	37.5	19.4	Cispr QP
0.460	26.7	19.9	Cispr AV
0.685	23.8	22.2	Cispr AV
3.240	31.7	24.3	Cispr QP

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00023399
Software Version: T000-12, Revision 7153

Test Personnel: Zakaria Khalek
Test Date: 2013-08-22
The EUT meets the requirements of this section.

5 RADIATED EMISSIONS

Test Requirement: FCC 47 CFR Part 15C
Test Procedure: ANSI C63.4-2009

5.1 Regulation

Section 15.33 Frequency range of radiated measurements:
(a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:
(2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

Section 15.35 Measurement detector functions and bandwidths.
The conducted and radiated emission limits shown in this part are based on the following, unless otherwise specified elsewhere in this part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.
Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.
(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

Section 15.249 Radiated emission limits.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	**Field strength of fundamental (millivolts/meter)**	**Field strength of harmonics (microvolts/meter)**
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.
(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Section 15.209 Radiated emission limits.

(a) 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 of emission (MHz)	Field strength (microvolts/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

(b) In the emission table above, the tighter limit applies at the band edges.

5.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
AC Power Source			n.a	n.a
Multimeter	Agilent / U1241B	3880	2012-02	2014-02
Biconilog. Antenna	EMCO / 3143	898	2013-05	2015-05
EMI Test Receiver	Rohde & Schwarz / ESS	303	2013-02	2014-02
EMI Test Receiver	Rohde & Schwarz / FSU	3831	2013-07	2014-07
Double Ridged Guide Ant.	Schwarzbeck / BBHA9120D	3235	2012-11	2014-11
Standard Gain Horn Ant.	Mid Century / MC 20/31B	1300	n.a	n.a
Standard Gain Horn Ant.	Electrof./Tho / WG23-25	2584	n.a	n.a
Standard Gain Horn Ant.	Mid Century / MC 22/31B	1229	n.a	n.a
Waveguide Mixer	Rohde & Schwarz / FS-Z75/WM782V	1548	n.a	n.a
Waveguide Mixer	Rohde & Schwarz / FS-Z110/WM782W	1546	n.a	n.a
Semi-Flex-Cable	Insulated Wire / KPS-1501-354-KPS	1296	2013-09	2014-09
50 GHz Cable, 2.4 mm	Insulated Wire / 2PS-1401-400-2PS	3969	2012-10	2013-10
HF-Cable	Insulated Wire / NPS-2801N-787-NPS	4389	2013-05	2014-05

5.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1 meter wide nonconductive table that is placed above the groundplane. Ceiling or wall-mounted devices also is positioned on a tabletop for testing purposes. Floor standing equipment is placed either directly on the groundplane or on insulating material if normally placed on a nonconducting floor. The EUT is connected to its associated peripherals, with any excess I/O cabling bundled to approximately 1 meter.
With the EUT operating in "worst case" mode, emissions from the unit are maximized by adjusting the polarization and height of the receive antenna and rotating of the EUT on the turntable.

Worst case emissions are listed under chapter: test results.

Radiated Emissions Test Characteristics	
Frequency range	30 MHz – 1,000 MHz
Test distance	3 m
Test instrumentation resolution bandwidth	120 kHz
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

Radiated Emissions Test Characteristics	
Frequency range	1 GHz – 50 GHz
Test distance	1 m
Test instrumentation resolution bandwidth	1 MHz
Receive antenna scan height	1.5 m
Receive antenna polarization	Vertical/Horizontal

Radiated Emissions Test Characteristics	
Frequency range	50 GHz – 100 GHz
Test distance	0.5 m
Test instrumentation resolution bandwidth	1 MHz
Receive antenna scan height	1 m
Receive antenna polarization	Vertical/Horizontal

5.4 Calculation of Field Strength Limits

Section 15.31(f)(1)
When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

E.g. radiated spurious emissions field strength limits for the band above 960 MHz:

µV/m at 3 meters = 500
500 µV/m corresponds with 54.0 dBµV/m at 3 meters.
49.5 dBµV/m corresponds with 63.5 dBµV/m at 1 meter.

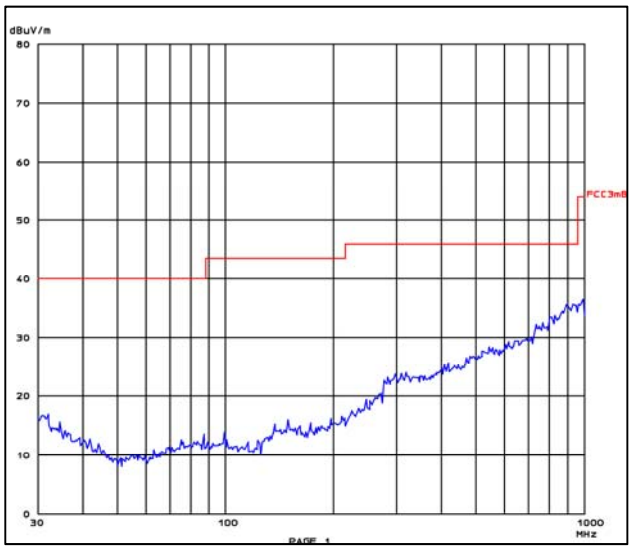
5.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF
where
FS = Field Strength in dBµV/m
RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB

Assume a receiver reading of 23.5 dBµV is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dBµV/m. The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
FS = 23.5 + 7.4 + 1.1 = 32 [dBµV/m]
Level in µV/m = Common Antilogarithm (32/20) = 39.8

5.6 Test Results Low Channel

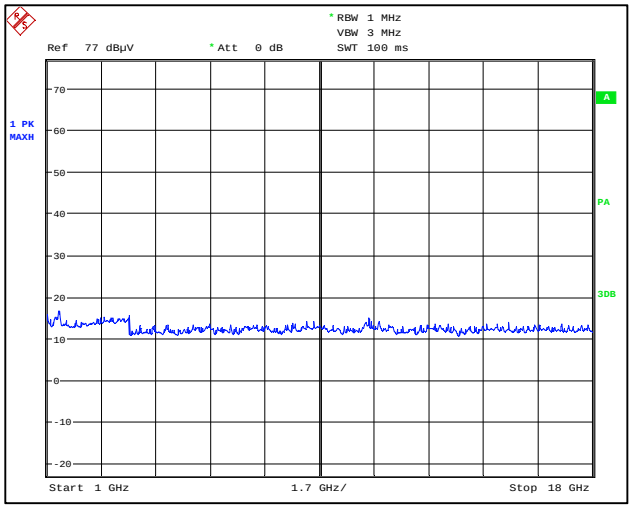


Plot 7: Tests at low channel 30 MHz-1 GHz

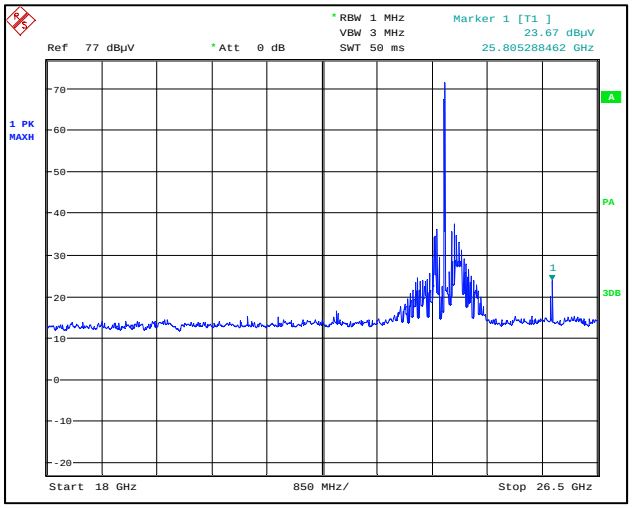
Remarks:
Prescan emission measurements performed using peak detector (limit is based on QP detector).
No emission detected, therefore no measurement with QP detector done.
Prescan emission measurements performed using the test receiver's transducer factor setting capability, i.e. the field strength value measured directly without the necessity of additional correction factors.

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00023395
Software Version: T000-12, Revision 7153

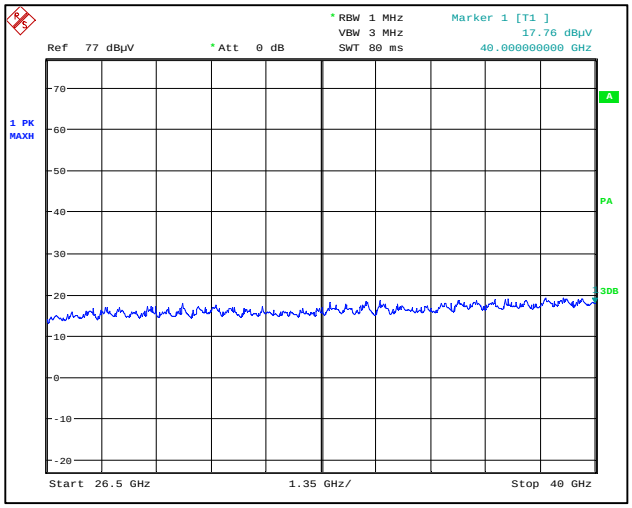
Test Personnel: Zakaria Khalek
Test Date: 2013-08-22
The EUT meets the requirements of this section.



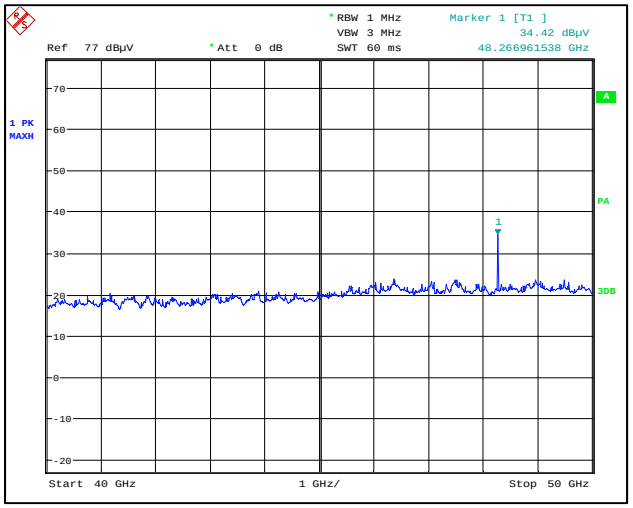
Plot 8: Tests at low channel 1 GHz-18 GHz



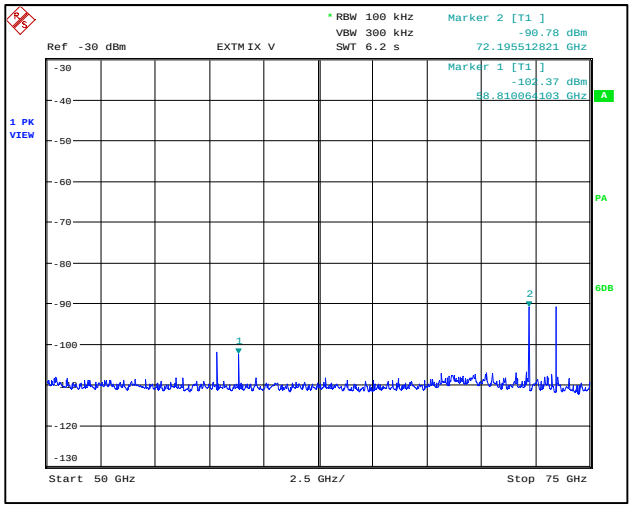
Plot 9: Tests at low channel 18 GHz-26.5 GHz



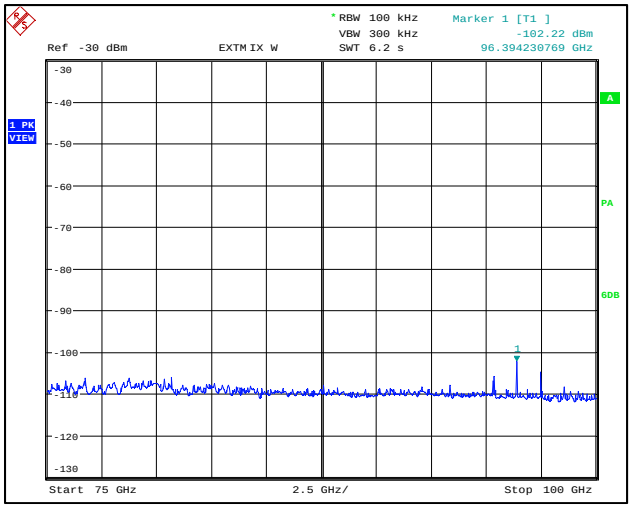
Plot 10: Tests at low channel 26.5 GHz-40 GHz



Plot 11: Tests at low channel 40 GHz-50 GHz



Plot 12: Tests at low channel 50 GHz-75 GHz



Plot 13: Tests at low channel 75 GHz-100 GHz

Remarks:
Prescan emission measurements performed using peak detector (limit is based on AV detector).

In case, max emission are below AV limit, no measurement with average detector performed.
In the frequency range 50 GHz to 100 GHz, all peaks found in the spectrum were investigated and found to be ambient external mixer products.

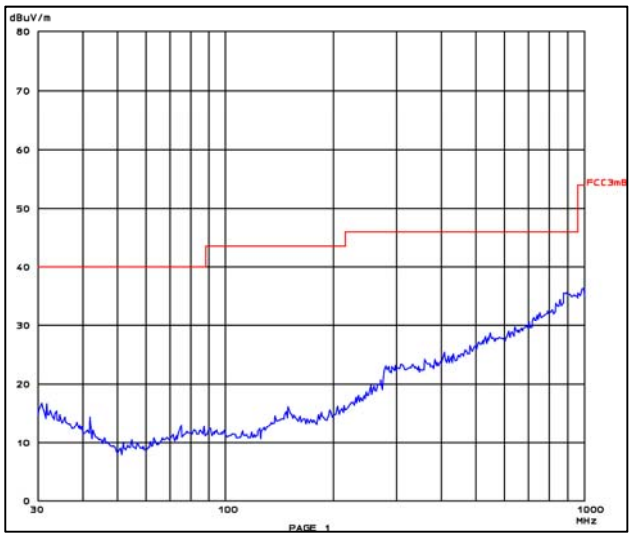
Final measurement table

Frequency [MHz]	RBW [kHz]	VBW [kHz]	Reading [dBµV]	AF + CF [dB]	Distance Correction [dB]	Result [dBµV/m]	Limit dBµV/m	Margin dB
24133	1000	3000	70.0	41.1	-9.5	101.6	128.0	26.4
25663	1000	3000	27	41.6	-9.5	59.1	74.0	14.9
25663	1000	0.01	21.6	41.6	-9.5	53.7	54.0	0.3
48000	1000	3000	37.9	42.9	-9.5	71.2	88.0	16.8
48000	1000	0.01	25.8	42.9	-9.5	59.1	68.0	8.9

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00022DB5
Software Version: T000-12, Revision 7154

Test Personnel: Zakaria Khalek
Test Date: 2013-10-10; 2013-10-11; 2013-10-15; 2013-10-28; 2013-10-31
The EUT meets the requirements of this section.

5.7 Test Results Middle Channel

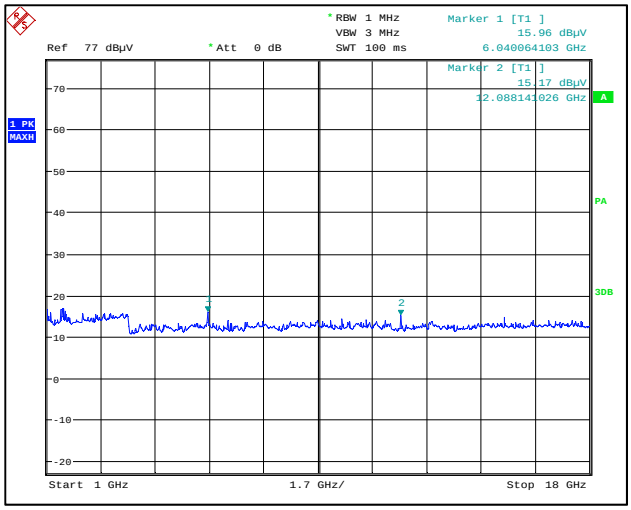


Plot 14: Tests at middle channel 30 MHz-1 GHz

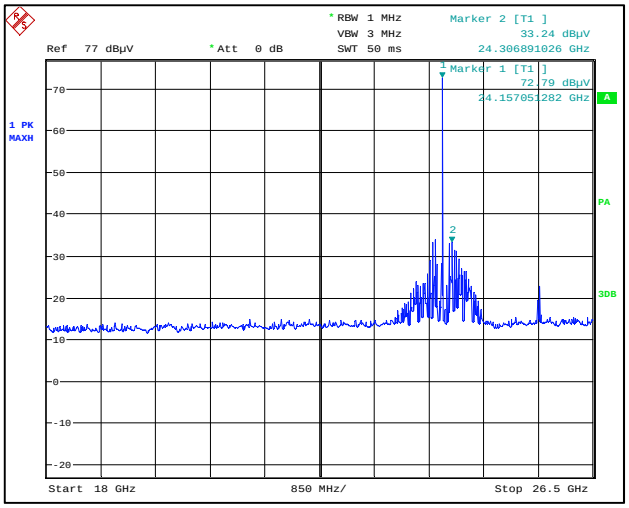
Remarks:
Prescan emission measurements performed using peak detector (limit is based on QP detector).
No emission detected, therefore no measurement with QP detector done.
Prescan emission measurements performed using the test receiver's transducer factor setting capability, i.e. the field strength value measured directly without the necessity of additional correction factors.

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00023396
Software Version: T000-12, Revision 7153

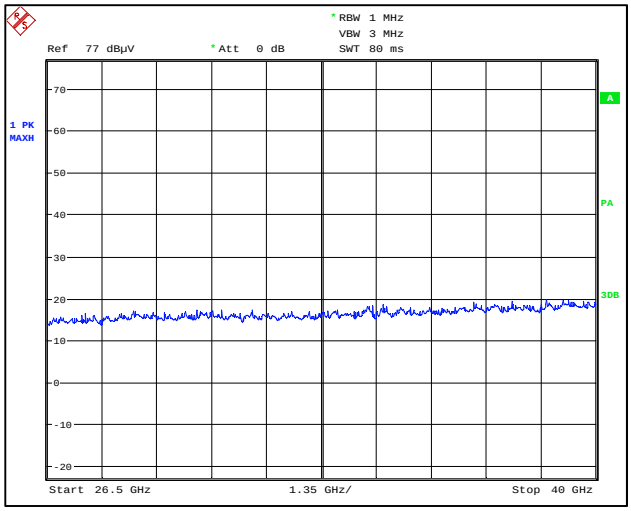
Test Personnel: Zakaria Khalek
Test Date: 2013-08-22
The EUT meets the requirements of this section.



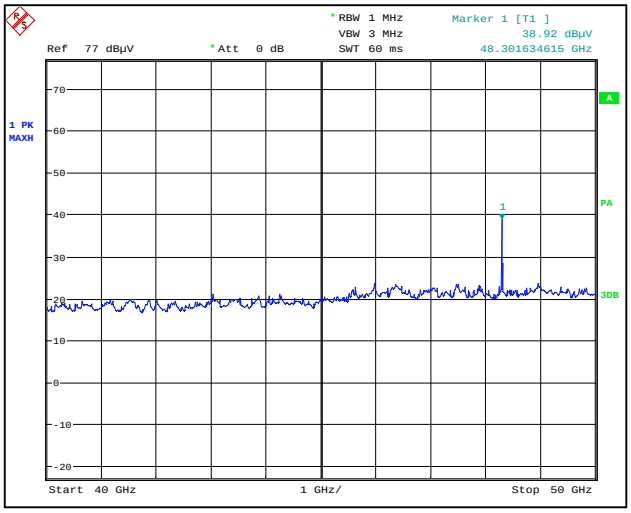
Plot 15: Tests at middle channel 1 GHz-18 GHz



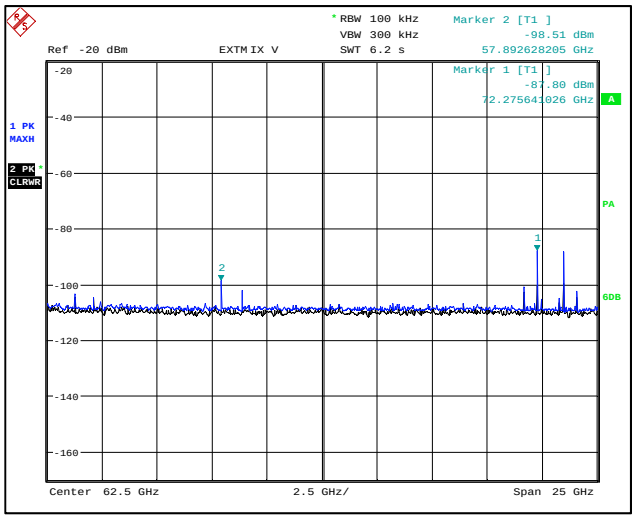
Plot 16: Tests at middle channel 18 GHz-26.5 GHz



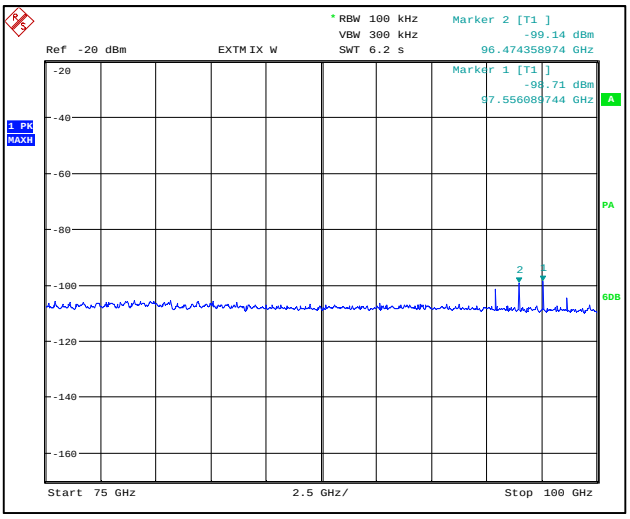
Plot 17: Tests at middle channel 26.5 GHz-40 GHz



Plot 18: Tests at middle channel 40 GHz-50 GHz



Plot 19: Tests at middle channel 50 GHz-75 GHz



Plot 20: Tests at middle channel 75 GHz-100 GHz

Remarks:
Prescan emission measurements performed using peak detector (limit is based on AV detector).
In case, max emissions are below AV limit, no measurement with average detector performed.
In the frequency range 50 GHz to 100 GHz, all peaks found in the spectrum were investigated and found to be ambient external mixer products.

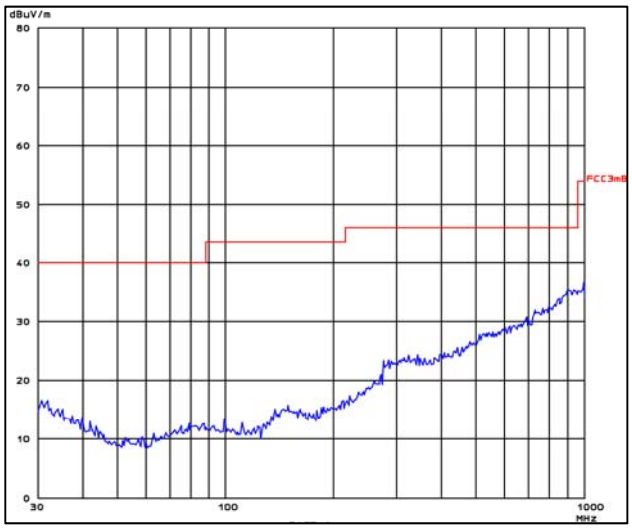
Final measurement table

Frequency [MHz]	RBW [kHz]	VBW [kHz]	Reading [dBµV]	AF + CF [dB]	Distance Correction [dB]	Result [dBµV/m]	Limit dBµV/m	Margin dB
24150	1000	3000	73.8	41.1	-9.5	105.4	128.0	22.5
48000	1000	3000	40.8	42.9	-9.5	74.2	88.0	13.8
48000	1000	0.01	25.6	42.9	-9.5	58.9	68.0	9.1

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00022DB5
Software Version: T000-12, Revision 7154

Test Personnel: Zakaria Khalek
Test Date: 2013-10-08; 2013-10-09; 2013-10-10; 2013-10-28; 2013-11-06
The EUT meets the requirements of this section.

5.8 Test Results High Channel

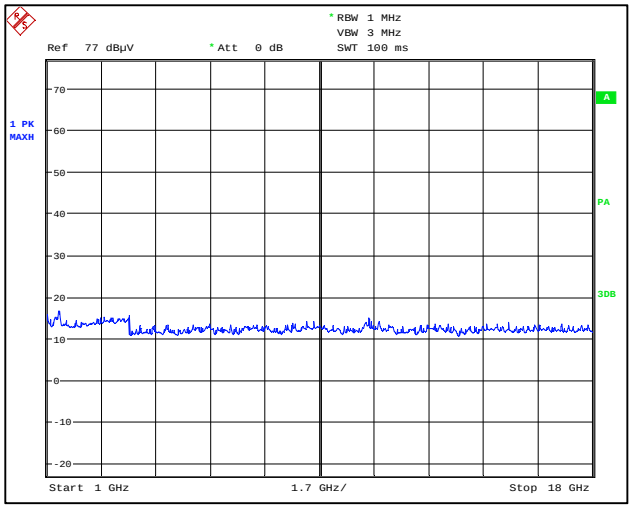


Plot 21: Tests at high channel 30 MHz -1 GHz

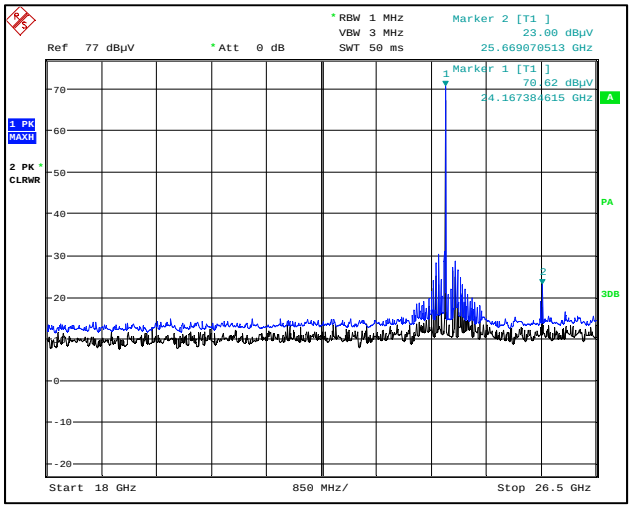
Remarks:
Prescan emission measurements performed using peak detector (limit is based on QP detector).
No emission detected, therefore no measurement with QP detector done.
Prescan emission measurements performed using the test receiver's transducer factor setting capability, i.e. the field strength value measured directly without the necessity of additional correction factors.

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00023399
Software Version: T000-12, Revision 7153

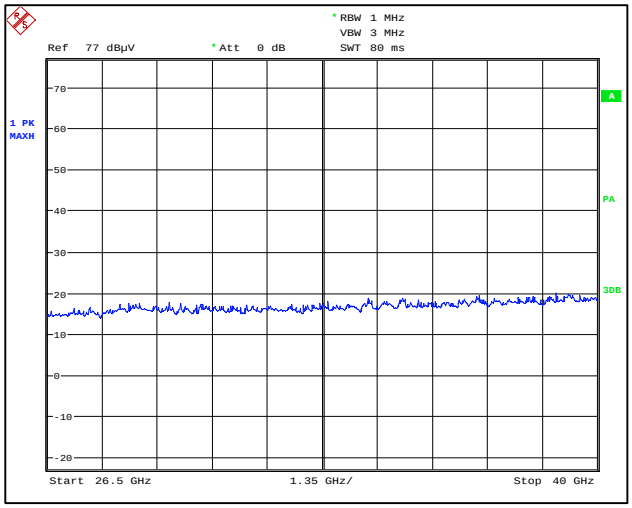
Test Personnel: Zakaria Khalek
Test Date: 2013-08-22
The EUT meets the requirements of this section.



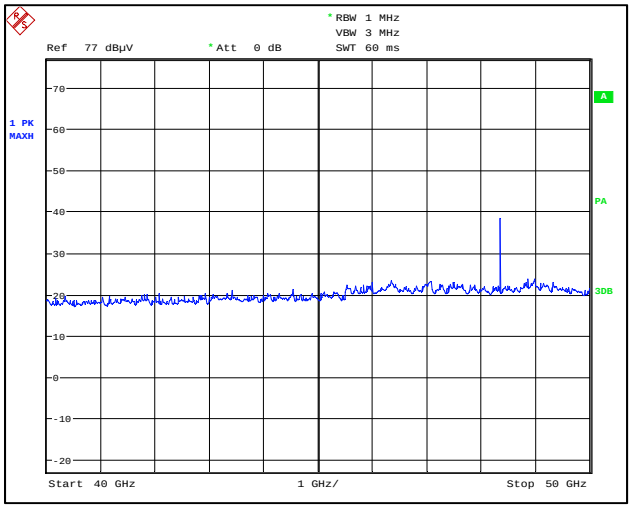
Plot 22: Tests at high channel 1 GHz -18 GHz



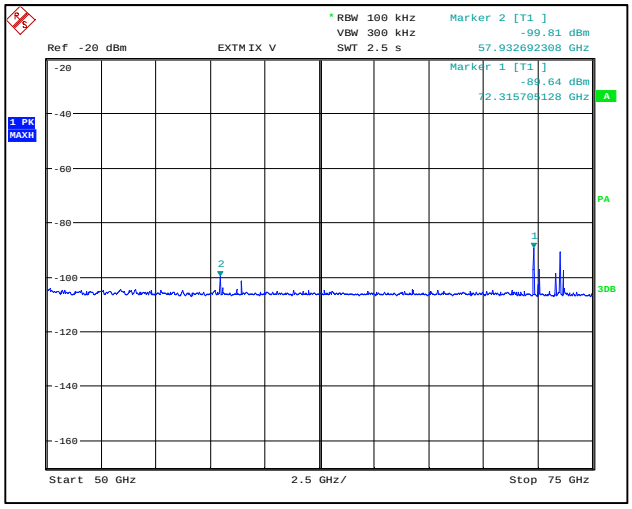
Plot 23: Tests at high channel 18 GHz -26.5 GHz



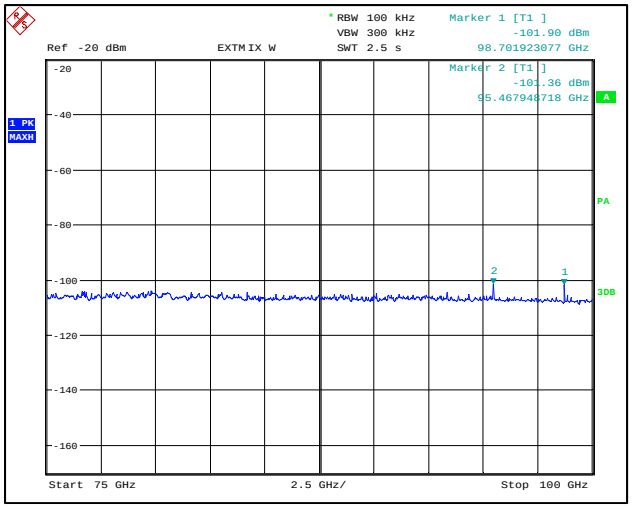
Plot 24: Tests at high channel 26.5 GHz -40 GHz



Plot 25: Tests at high channel 40 GHz -50 GHz



Plot 26: Tests at high channel 50 GHz -75 GHz



Plot 27: Tests at high channel 75 GHz -100 GHz

Remarks:
Prescan emission measurements performed using peak detector (limit is based on AV detector).

In case, max emissions are below AV limit, no measurement with average detector performed.
In the frequency range 50 GHz to 100 GHz, all peaks found in the spectrum were investigated and found to be ambient external mixer products.

Tests performed on the following EUT
Manufacturer: s.m.s. smart microwave sensors GmbH
Device: Radar Sensor
Model No.: UMRR-0A0903-1F0902-030602
Serial No.: #0x00022DB5
Software Version: T000-12, Revision 7154

Final measurement table

Frequency [MHz]	RBW [kHz]	VBW [kHz]	Reading [dBµV]	AF + CF [dB]	Distance Correction [dB]	Result [dBµV/m]	Limit dBµV/m	Margin dB
24167	1000	3000	70.9	41.1	-9.5	102.5	128.0	25.5
25664	1000	3000	24.2	41.6	-9.5	56.3	74.0	17.7
25664	1000	0.01	20.5	41.6	-9.5	52.6	54.0	1.4
48000	1000	3000	38.2	42.9	-9.5	71.6	88.0	16.4
48000	1000	0.01	12.3	42.9	-9.5	45.6	68.0	22.4

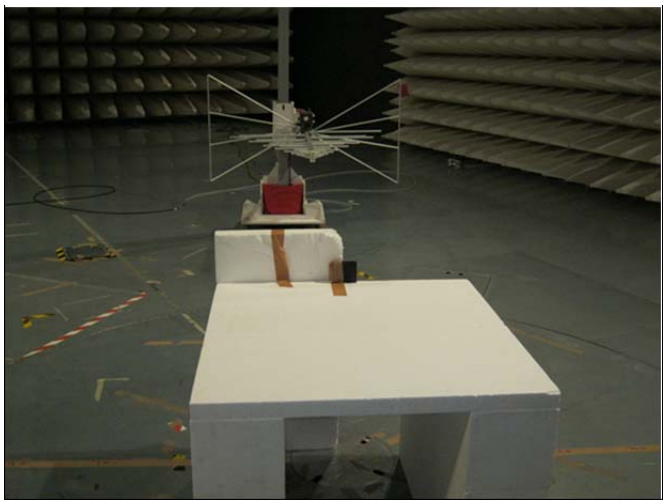
Test Personnel: Zakaria Khalek
Test Date: 2013-10-14; 2013-10-15; 2013-10-28; 2013-11-06
The EUT meets the requirements of this section.

6 MISCELLANEOUS COMMENTS AND NOTES

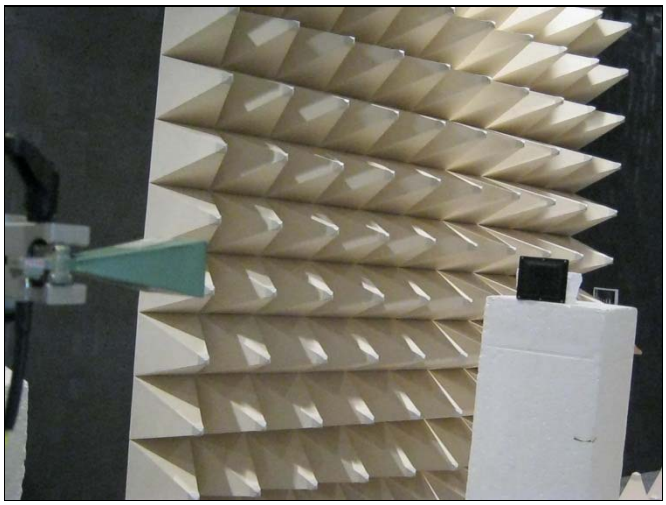
None.

7 PHOTOGRAPHS OF TEST SETUP


Conducted emissions on AC mains

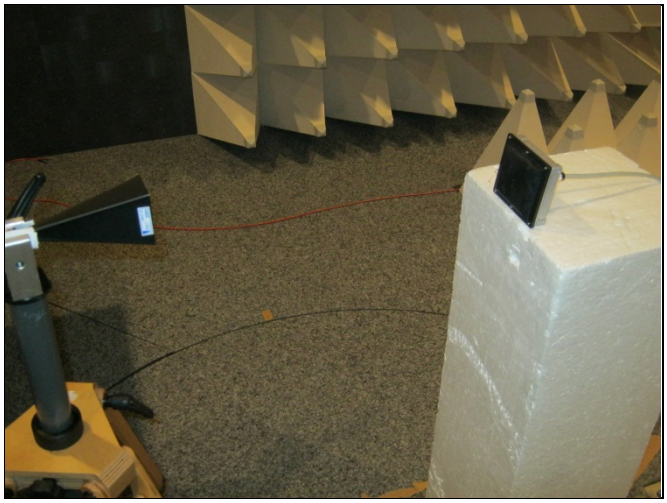

Radiated emissions below 1 GHz


Radiated emissions 1 - 18 GHz

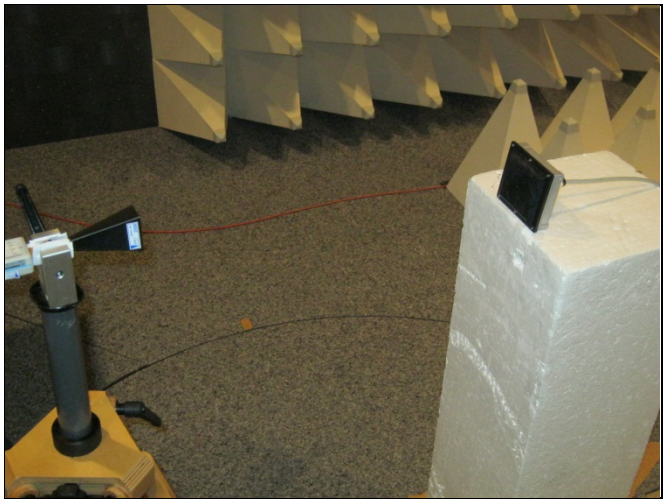

Radiated emissions 18 -26.5 GHz


Radiated emissions 26.5 - 40 GHz


Radiated emissions 40 - 50 GHz



Radiated emissions 50 - 75 GHz



Radiated emissions 75 - 100 GHz

8 PHOTOGRAPHS OF EUT; EXTERNAL VIEWS

Front view

Rear view

Labelling

AC/DC adapter