

TEST REPORT

Test Report Reference: F091187E4

Equipment under Test: TSU25

FCC ID: IXLTSU25UDL250

IC: 1893B-TSU25UDL250

Serial Number: 0000000115

Applicant: deister electronic GmbH

Manufacturer: deister electronic GmbH

**Test Laboratory
(CAB)
accredited by
Deutsche Gesellschaft für Akkreditierung mbH (DGA)
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. DGA-PL-105/99-22,
FCC Test site registration number 90877
and
Industry Canada Test site registration IC3469A-1 and
FCC Test site registration number 90877**

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1 IDENTIFICATION

1.1 APPLICANT

Name:	deister electronic GmbH
Address:	Hermann-Bahlsen-Straße 11 – 13 30890 Barsinghausen
Country:	Germany
Name for contact purposes:	Mr. Stefan Eichler
Tel:	+49 51 05 516-129
Fax:	+49 51 05 516-266
e-mail address:	eichler@deister-gmbh.de

1.2 MANUFACTURER

Name:	deister electronic GmbH
Address:	Hermann-Bahlsen-Straße 11 – 13 30890 Barsinghausen
Country:	Germany
Name for contact purposes:	Mr. Stefan Eichler
Tel:	+49 51 05 516-129
Fax:	+49 51 05 516-266
e-mail address:	eichler@deister-gmbh.de

1.3 DATES

Date of receipt of test sample:	13 Novmeber 2009
Start of test:	16 November 2009
End of test:	9 December 2009


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1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
D-32825 Blomberg Phone: **+49 (0) 52 35 / 95 00-0**
Germany Fax: **+49 (0) 52 35 / 95 00-10**

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Test engineer: Thomas KÜHN
Name



Signature

9 December 2009

Date

Test report checked: Bernd STEINER
Name



Signature

9 December 2009

Date

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Tel. 0 52 35 / 95 00-0
Fax 0 52 35 / 95 00-10

Stamp

1.5 RESERVATION

This test report is only valid in its original form.

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The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT REFERENCE.

1.6 NORMATIVE REFERENCES

- [1] **ANSI C63.4-2003** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- [2] **FCC CFR 47 Part 15 (October 2008)** Radio Frequency Devices
- [3] **FCC Public Notice DA 00-705 (March 2000)**
- [4] **RSS-210 Issue 7 (June 2007)** Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
- [5] **RSS-Gen Issue 2 (June 2007)** General Requirements and Information for the Certification of Radiocommunication Equipment

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results are presented in the following.

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2 TECHNICAL DATA OF EQUIPMENT

Channel 1	902.750 MHz	Channel 25	914.750 MHz
Channel 50	927.250 MHz	-	-

Type / model designation: *	TSU25					
Type of equipment: *	UHF RFID reader					
FCC ID: *	IXLTSU25UDL250					
IC: *	1893B-TSU25UDL250					
Rated RF output power: *	33 dBm (ERP)					
Antenna type: *	Integral					
Antenna gain: *	5.0 dBd					
Antenna connector: *	None (no external antenna connectable)					
Adaptive frequency agility: *	Yes					
Modulation: *	FHSS (GFSK)					
Operation frequency range: *	902.750 to 927.25 MHz					
Number of channels: *	50 (with 500 kHz spacing)					
Supply Voltage: *	U _{nom} =	16.0 V DC	U _{min} =	12.0 V DC *	U _{max} =	24.0 V DC *
Temperature range: *	-20 °C to +50 °C					
Hard- / Software Version: *	1.02 / 1.23					
Lowest internal frequency: *	18.4320 MHz					

* declared by the applicant.

Identification	Connector		Length *
	EUT	Ancillary	
Power / RS485	4-pin M12-connector	-	2.0 m
I/O	4-pin M12-connector	-	1.5 m
-	-	-	-

*: Length during the test if no other specified.

2.1 PERIPHERY DEVICES

The following equipment was used as control unit and ancillary equipment:

- A personal computer with a terminal-software was used, connected to the EUT via the RS485 bus, for setting the equipment into the necessary operation mode. During the measurements the personal computer was connected to the RS485 bus.
- An AC / DC adaptor type FW 3288 was used to power the EUT during conducted emission measurement on the power supply line.

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3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

All tests were carried out with an unmodified sample with integral antenna.

During the all tests the TSU25 was powered by an external 16.0 V DC power supply, for measurements under extreme conditions EUT with 12.0 V DC to 24 V DC.

The operation mode could be chosen with the help of a laptop computer with a test-software, communicates with the EUT via the RS485 bus. The tested sample was equipped with an Ethernet connector. As declared by the manufacturer, this port will by not implemented during mass production.

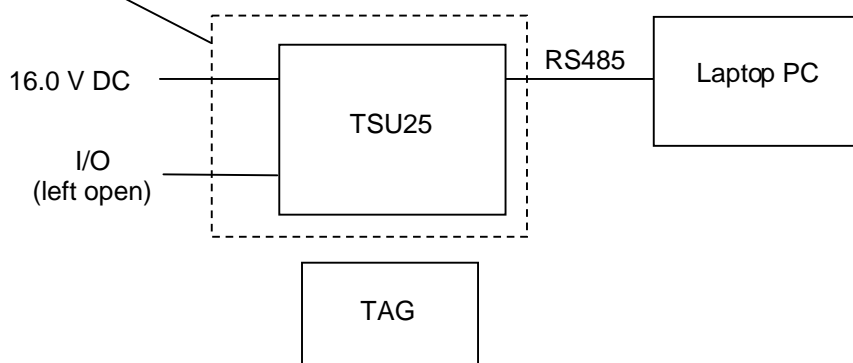
The spurious emissions were measured as effective radiated power (radiated by the cabinet and the antenna), because the EUT is not equipped with an external antenna connector and will be used with the internal antennas only.

As additional pre-tests have shown, the maximum emissions were radiated with horizontal polarisation of the EUT's antenna. Therefore all measurements were carried out with horizontal polarisation of the EUT.

The following operation modes were used during the tests:

Operation mode	Description of the operation mode
1	Transmit on 902.750 MHz (channel 1)
2	Transmit on 914.750 MHz (channel 25)
3	Transmit on 927.250 MHz (channel 50)
4	Transmit on all channels (normal hopping mode)

Physical boundary of the EUT



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4 LIST OF MEASUREMENTS

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS 210, Issue 7 [4] or RSS-Gen, Issue 2 [5]	Status	Refer page
20 dB bandwidth	General	15.247 (a) (1)	A8.1 (b) [4]	Passed	8 et seq.
Carrier frequency separation	General	15.247 (a) (1)	A8.1 (b) [4]	Passed	11 et seq.
Number of hopping channels	902 – 928	15.247 (a) (1) (iii)	A8.1 (d) [4]	Passed	14 et seq.
Dwell time	902 – 928	15.247 (a) (1) (iii)	A8.1 (d) [4]	Passed	16 et seq.
Maximum peak output power	902 – 928	15.247 (b) (1)	A8.4 (2) [4]	Passed	19 et seq.
Radiated emissions (transmitter)	0.009 - 10,000	15.205 (a) 15.209 (a)	A8.5 [4] 2.6 [4]	Passed	22 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.2 [5]	Passed	45 et seq.
Radiated emissions (receiver)	0.009 - 5,000	15.109 (a)	6 [5] 2.6 [4]	*1	-

*1: Not carried out, because the colocated transmitter of the EUT is permanently in operation.

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5 TEST RESULTS

5.1 20 dB BANDWIDTH

5.1.1 METHOD OF MEASUREMENT (20 dB BANDWIDTH)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be disabled, the transmitter shall work with its maximum data rate.

The following spectrum analyser settings shall be used:

- Span: App. 2 to 3 times the 20 dB bandwidth, centred on the actual hopping channel.
- Resolution bandwidth: $\geq 1\%$ of the 20 dB bandwidth.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency lines shall be set on the intersection points between the second display line and the measured curve.

The measurement will be performed at the upper and lower end and the middle of the assigned frequency band.

Test set-up:

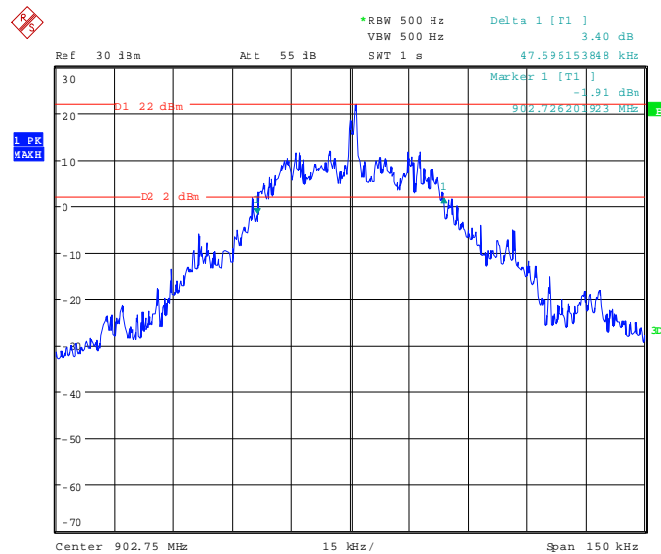


TEST REPORT REFERENCE: F091187E4

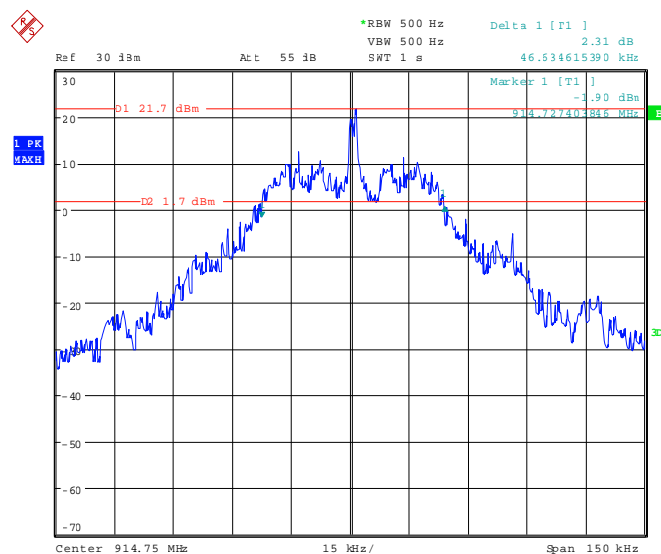
5.1.2 TEST RESULTS (20 dB BANDWIDTH)

Ambient temperature	21 °C	Relative humidity	38 %
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91187_98.wmf: 20 dB bandwidth at the lower end of the assigned frequency band (operation mode 1):

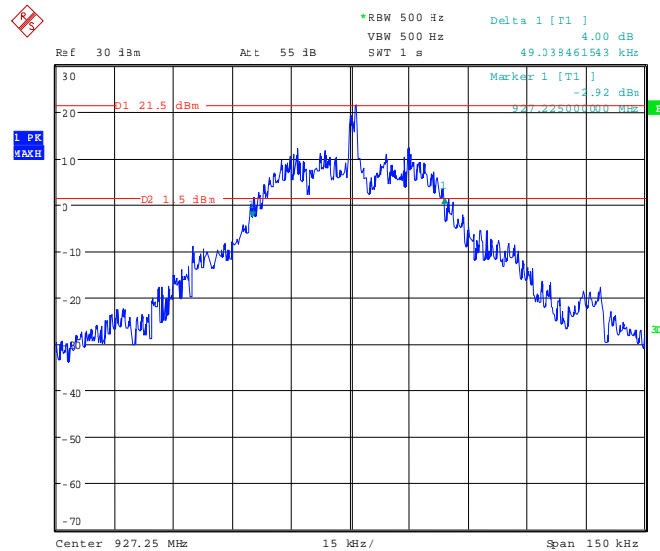


91187_100.wmf: 20 dB bandwidth at the middle of the assigned frequency band (operation mode 2):



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91187_99.wmf: 20 dB bandwidth at the upper end of the assigned frequency band (operation mode 3):



Operation mode 1, 2, 3		
Channel number	Channel frequency [MHz]	20 dB bandwidth [kHz]
1	902.750	47.596
25	914.750	46.634
50	927.250	49.038
Measurement uncertainty		+0.66 dB / -0.72 dB

TEST EQUIPMENT USED FOR THE TEST:

30

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5.2 CARRIER FREQUENCY SEPARATION

5.2.1 METHOD OF MEASUREMENT (CARRIER FREQUENCY SEPARATION)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

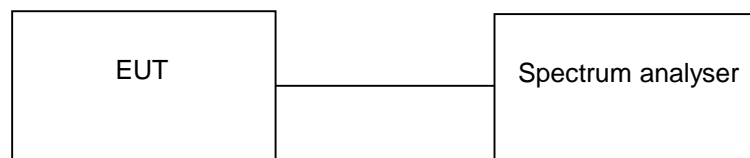
The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peaks of two adjacent channels.
- Resolution bandwidth: ≥ 1 % of the span.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker and the delta marker function will be used to determine the separation between the peaks of two adjacent channel signals.

The measurement will be performed at the upper and lower end and the middle of the assigned frequency band.

Test set-up:

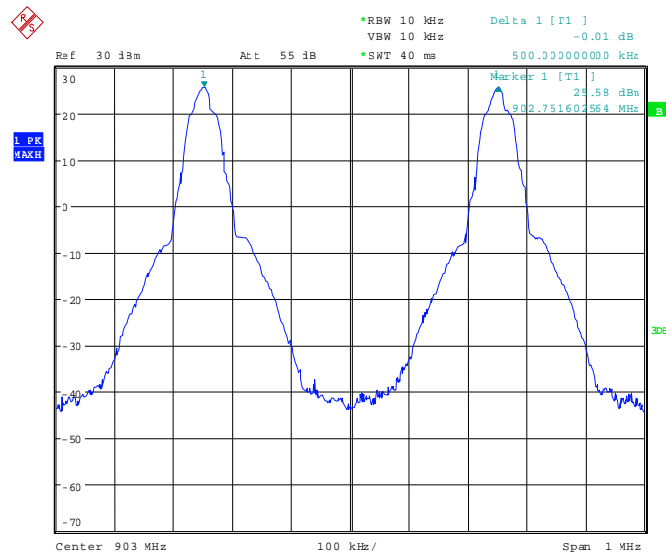


TEST REPORT REFERENCE: F091187E4

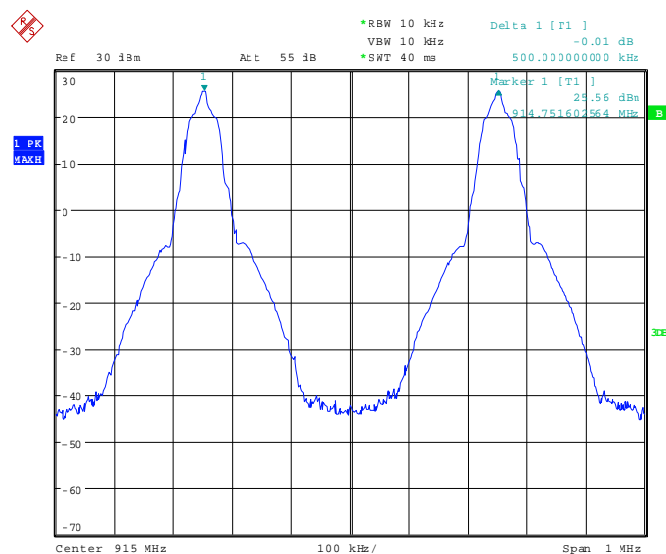
5.2.2 TEST RESULTS (CARRIER FREQUENCY SEPARATION)

Ambient temperature	21 °C	Relative humidity	38 %
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91187_101.wmf: Channel separation at the lower end of the assigned frequency band (operation mode 1):

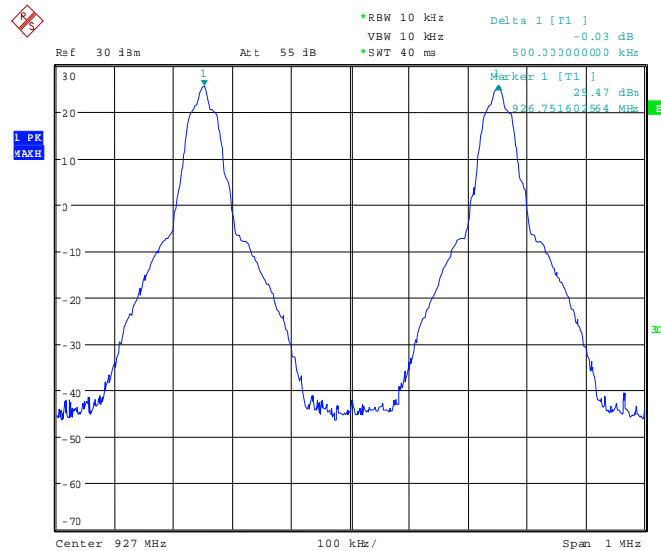


91187_102.wmf: Channel separation at the middle of the assigned frequency band (operation mode 2):



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91187_103.wmf: Channel separation at the upper end of the assigned frequency band (operation mode 3):



Operation mode 1, 2, 3			
Channel number	Channel frequency [MHz]	Channel separation [kHz]	Minimum limit [kHz]
1	902.750	500.000	250.000
25	914.750	500.000	250.000
50	927.250	500.000	250.000
Measurement uncertainty			$<10^{-7}$

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
30

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5.3 NUMBER OF HOPPING FREQUENCIES

5.3.1 METHOD OF MEASUREMENT (NUMBER OF HOPPING FREQUENCIES)

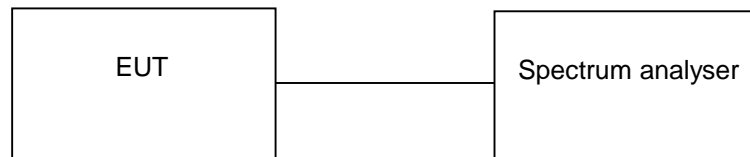
The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

The following spectrum analyser settings shall be used:

- Span: Equal to the assigned frequency band.
- Resolution bandwidth: ≥ 1 % of the span.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

After trace stabilisation the number of hopping channels could be counted. It might be possible to divide the span into some sub ranges in order to clearly show all hopping frequencies.

Test set-up:

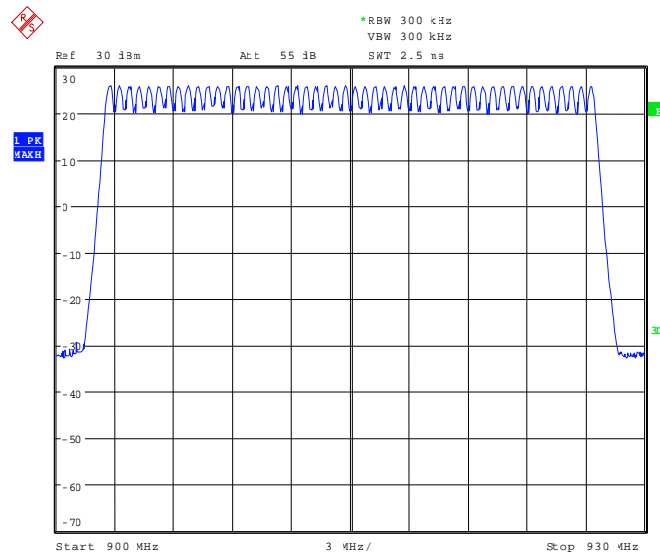


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5.3.2 TEST RESULTS (NUMBER OF HOPPING FREQUENCIES)

Ambient temperature	21 °C	Relative humidity	38 %
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91187_104.wmf: Number of hopping channels (operation mode 4):



Operation mode 4	
Number of hopping channels	Limit
50	At least 50

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
30

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5.4 DWELL TIME

5.4.1 METHOD OF MEASUREMENT (DWELL TIME)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

The following spectrum analyser settings shall be used:

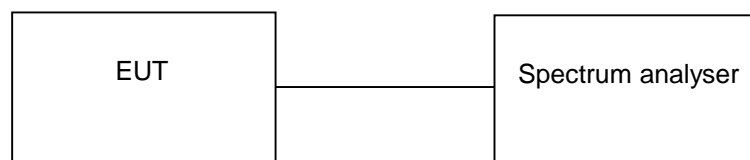
- Span: Zero, centred on a hopping channel.
- Resolution bandwidth: 1 MHz.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: As necessary to capture the entire dwell time per hopping channel.
- Detector function: peak.
- Trace mode: Max hold.

The marker and delta marker function of the spectrum analyser will be used to determine the dwell time.

The measurement will be performed at the upper and lower end and the middle of the assigned frequency band.

If the EUT is possible to operate with different mode of operation (data rates, modulation formats etc.) the test will be repeated with every different operation mode of the EUT.

Test set-up:



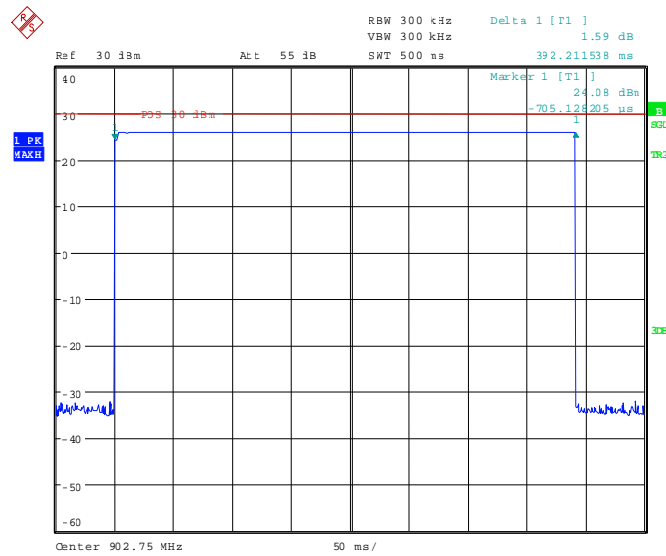
TEST REPORT REFERENCE: F091187E4

5.4.2 TEST RESULTS (DWELL TIME)

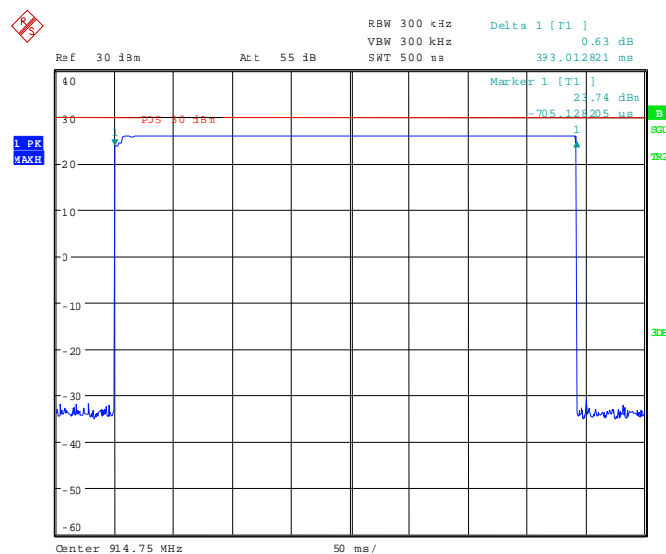
Ambient temperature	21 °C
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Relative humidity	38 %
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91187_105.wmf: Dwell time at the lower end of the assigned frequency band (operation mode 1):

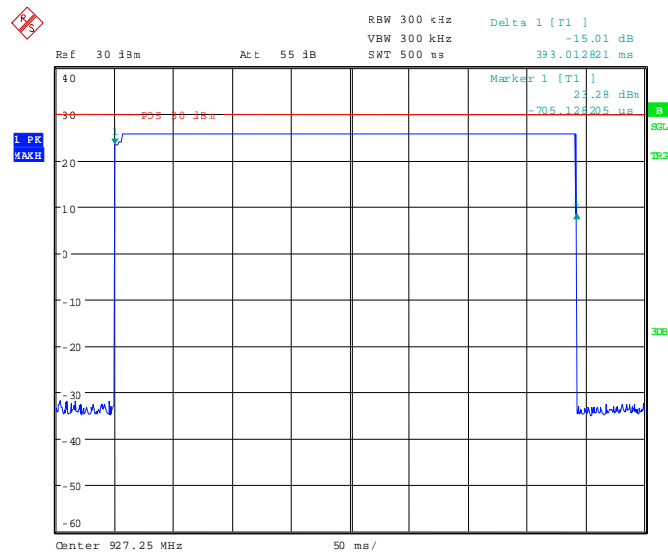


91187_106.wmf: Dwell time at the middle of the assigned frequency band (operation mode 2):



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91187_107.wmf: Dwell time at the upper end of the assigned frequency band (operation mode 3):



The dwell time is calculated with the following formula:

$$\text{Dwell time} = t_{\text{pulse}} \times n_{\text{hops}} / \text{number of hopping channels} \times 20 \text{ s}$$

Where:

t_{pulse} is the measured pulse time (pls. refer the plots of the spectrum analyser above) [s],
 n_{hops} is the number of hops per second in the actual operating mode of the transmitter [1/s].

The hopping rate of the system is 2.5 hops per second and the system uses 50 channels. For this reason one time slot has a length of 400 ms.

Operation mode 1, 2, 3				
Channel number	Channel frequency [MHz]	t_{pulse} [ms]	Dwell time [ms]	Limit [ms]
1	902.750	392.212	392.212	400
25	914.750	393.013	393.013	400
50	927.250	393.013	393.013	400
Measurement uncertainty			<10 ⁻⁷	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
30

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5.5 MAXIMUM PEAK OUTPUT POWER

5.5.1 METHOD OF MEASUREMENT (MAXIMUM PEAK OUTPUT POWER)

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be disabled.

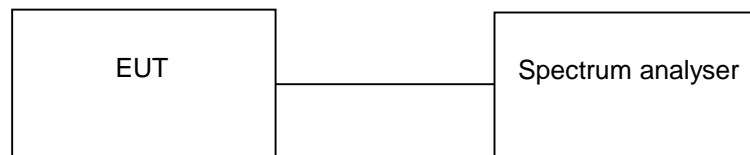
The following spectrum analyser settings shall be used:

- Span: Approx. 5 times the 20 dB bandwidth, centred on a hopping channel.
- Resolution bandwidth: > the 20 dB bandwidth of the emission being measured.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The indicated level is the peak output power, which has to be corrected with the value of the cable loss and an external attenuation (if necessary).

The measurement will be performed at the upper and lower end and the middle of the assigned frequency band.

Test set-up:

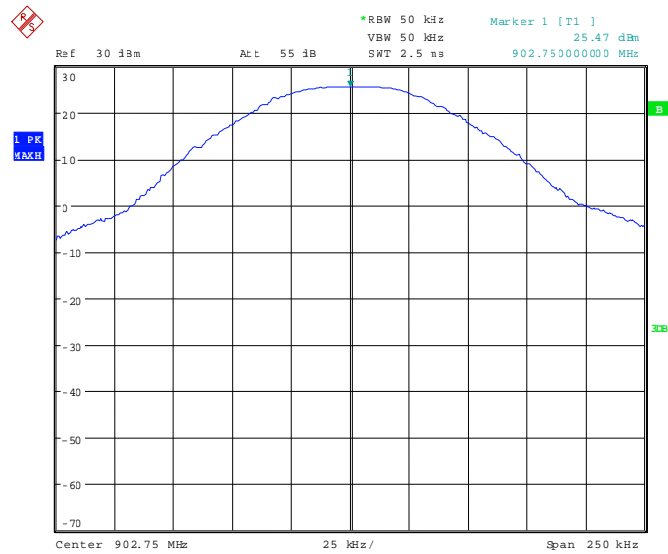


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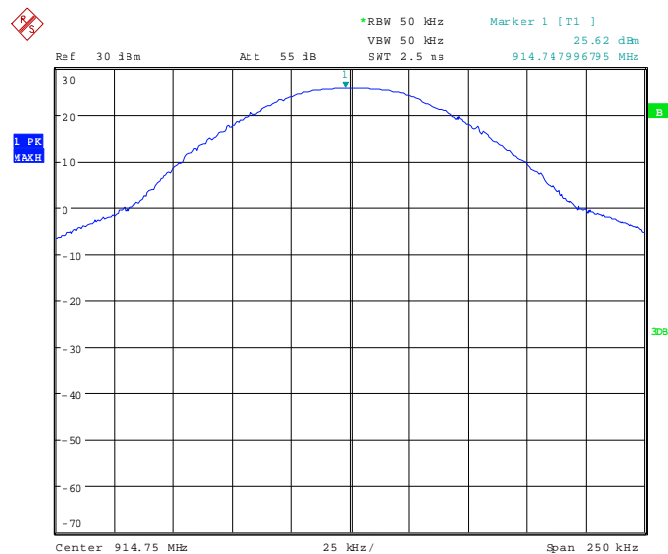
5.5.2 TEST RESULTS (MAXIMUM PEAK OUTPUT POWER)

Ambient temperature	21 °C	Relative humidity	38 %
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91187_108.wmf: Maximum peak output power at the lower end of the assigned frequency band (operation mode 1):

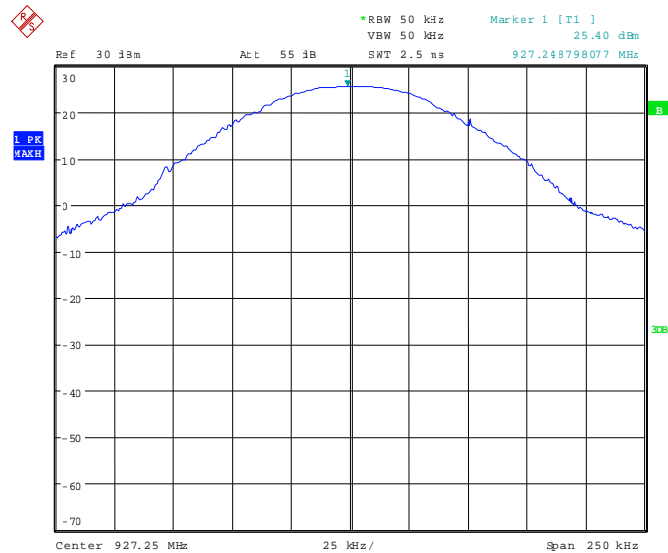


91187_109.wmf: Maximum peak output power at the middle of the assigned frequency band (operation mode 2):



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91187_110.wmf: Maximum peak output power at the upper end of the assigned frequency band
(operation mode 3):



Operation mode 1, 2, 3				
Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]	Antenna gain [dBi]	Peak power limit [dBm]
1	902.750	25.5	7.15	28.8
25	914.750	25.6	7.15	28.8
50	927.250	25.4	7.15	28.8
Measurement uncertainty			+0.66 dB / -0.72 dB	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

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5.6 RADIATED EMISSIONS

5.6.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 30 MHz to 1 GHz.
- A final measurement carried out on an open area test site with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 110 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the upper and lower end and middle of the assigned frequency band.

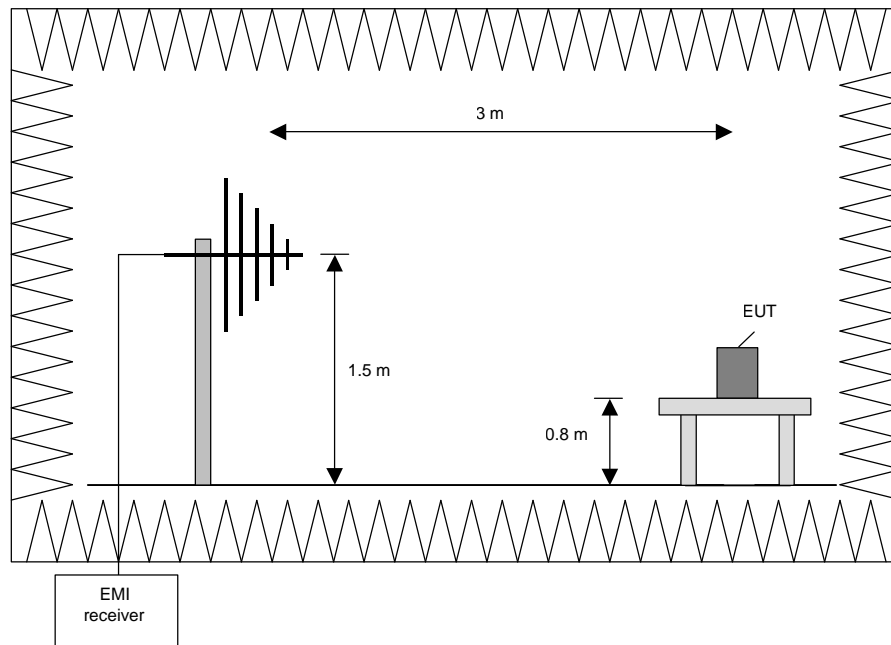
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



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Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

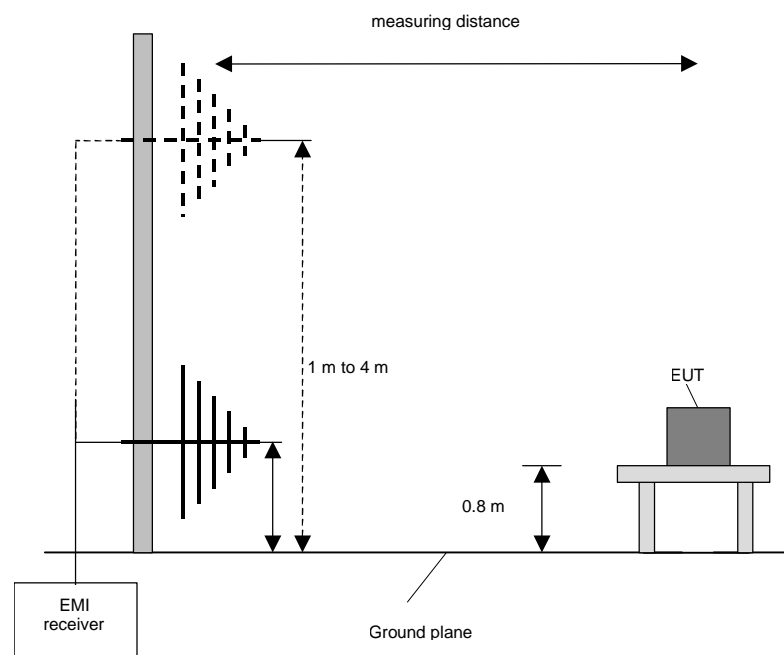
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



TEST REPORT REFERENCE: F091187E4

Procedure final measurement:

The following procedure will be used:

- 1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
- 2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
- 3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
- 4) Repeat 1) to 3) for the other orthogonal antenna polarization.
- 5) Move the antenna and the turntable to the position where the maximum value is detected.
- 6) Measure while moving the antenna slowly +/- 1 m.
- 7) Set the antenna to the position where the maximum value is found.
- 8) Measure while moving the turntable +/- 45 °.
- 9) Set the turntable to the azimuth where the maximum value is found.
- 10) Measure with Final detector (QP and AV) and note the value.
- 11) Repeat 5) to 10) for each frequency.
- 12) Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 110 GHz)

This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

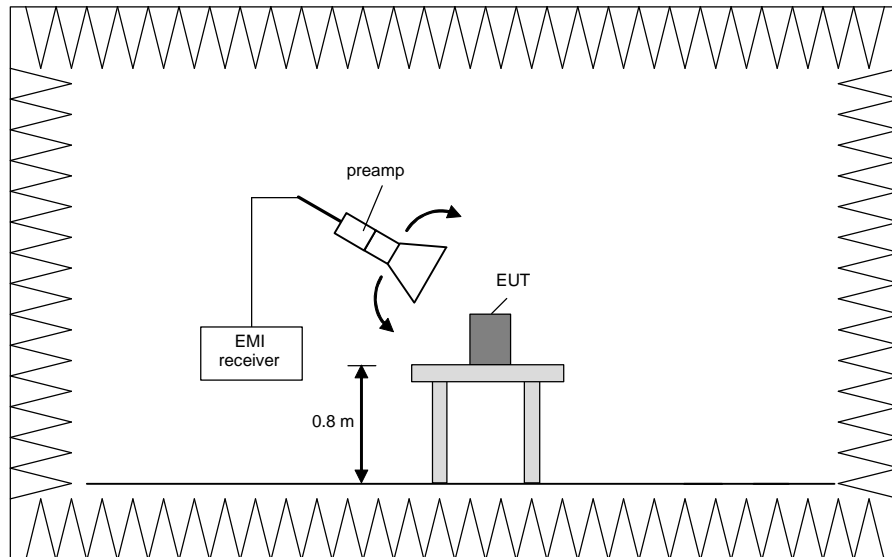
Preliminary measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz

TEST REPORT REFERENCE: F091187E4



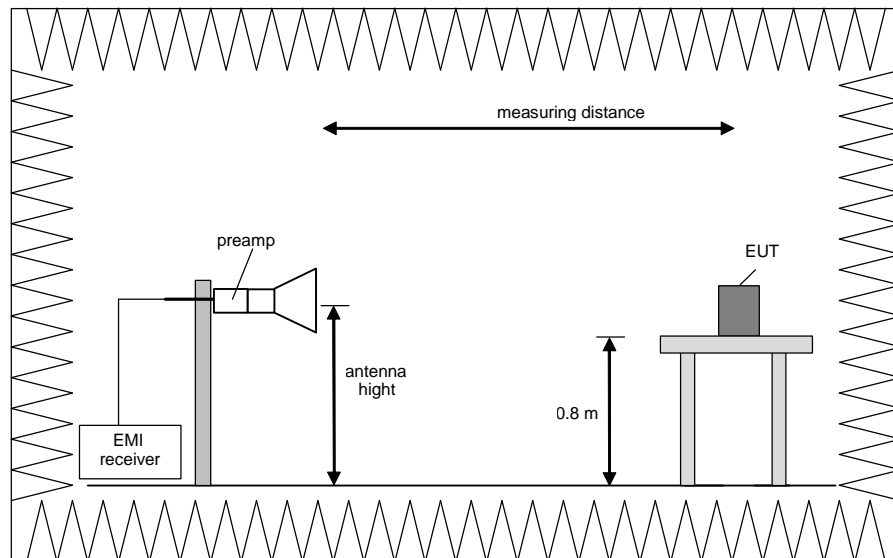
Final measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz

TEST REPORT REFERENCE: F091187E4



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 GHz.

The following procedure will be used:

- 1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
- 2) Change the antenna polarisation and repeat 1) with vertical polarisation.
- 3) Make a hardcopy of the spectrum.
- 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 5) Change the analyser mode to Clear / Write and found the cone of emission.
- 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
- 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
- 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

Step 1) to 6) are defined as preliminary measurement.

TEST REPORT REFERENCE: F091187E4

5.6.2 TEST RESULTS (RADIATED EMISSIONS)

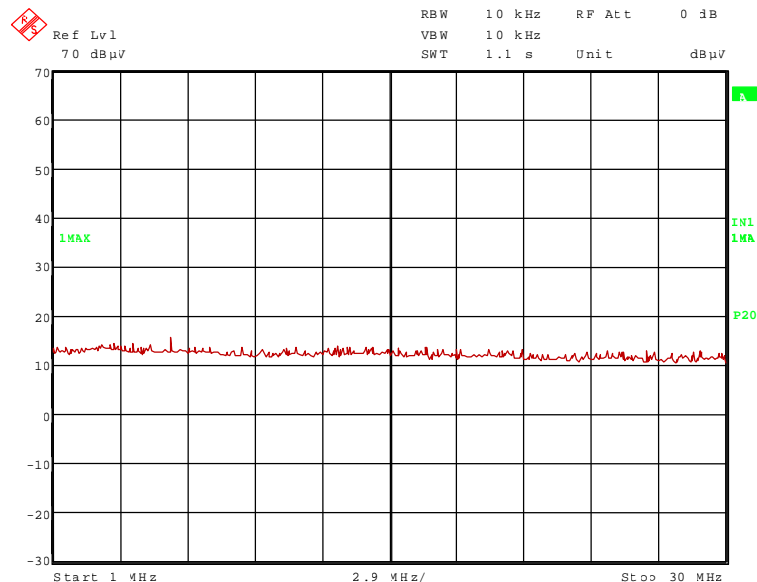
5.6.2.1 PRELIMINARY MEASUREMENT (9 kHz to 1 GHz)

Ambient temperature	20 °C	Relative humidity	45 %
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- Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
- Cable guide: The cables of the EUT were running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.
- Test record: All results are shown in the following.
- Supply voltage: During all measurements the EUT was supplied with 16.0 V DC.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

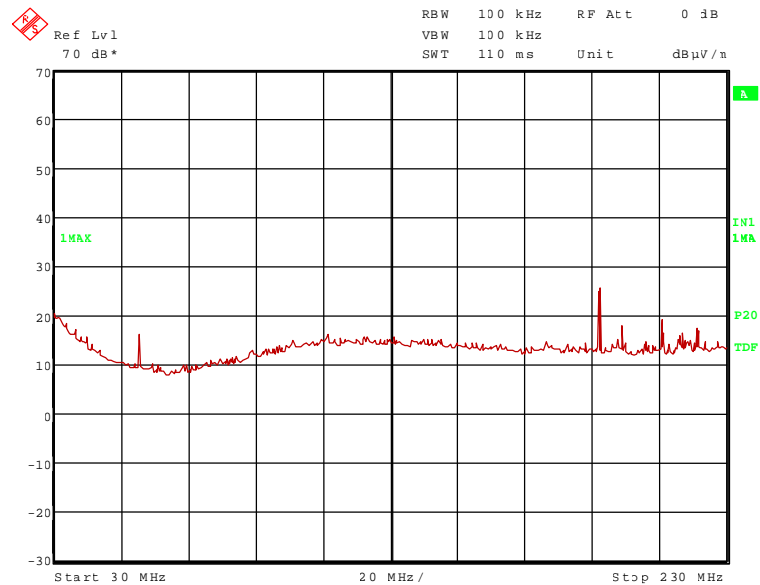
91187_88.wmf: Spurious emissions from 1 MHz to 30 MHz (operation mode 1):



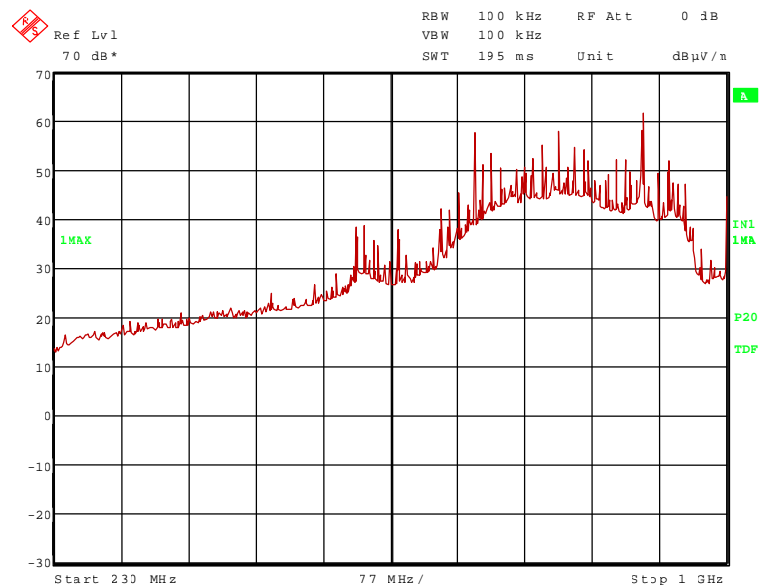
No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

TEST REPORT REFERENCE: F091187E4

91187_67.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 1):



91187_66.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 1, carrier notched):



The following frequencies were found outside the restricted bands during the preliminary radiated emission test:
 55.297 MHz, 192.000 MHz, 576.000 MHz, 710.750 MHz, 788.250 MHz, 806.750 MHz, 901.750 MHz,
 902.750 MHz and 903.750 MHz.

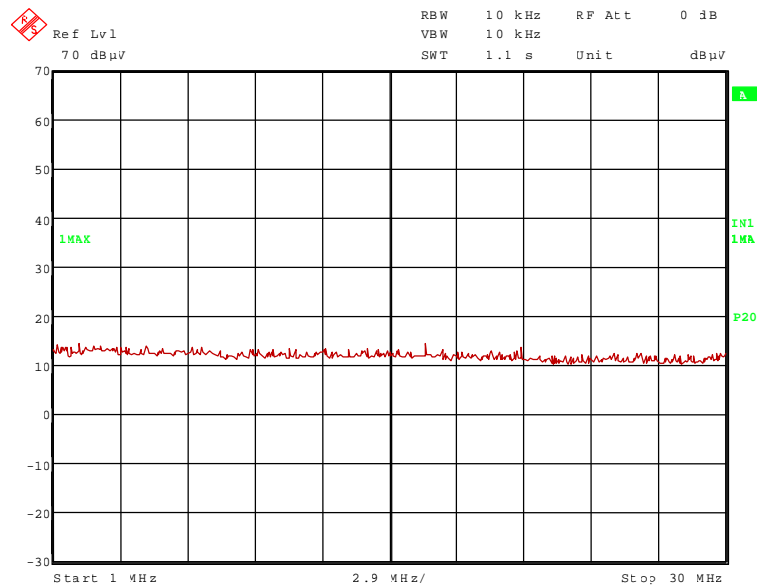
The following frequencies were found inside the restricted bands during the preliminary radiated emission test:
 960.000 MHz and 998.750 MHz.

These frequencies have to be measured on the open area test site. The result is presented in the following.

TEST REPORT REFERENCE: F091187E4

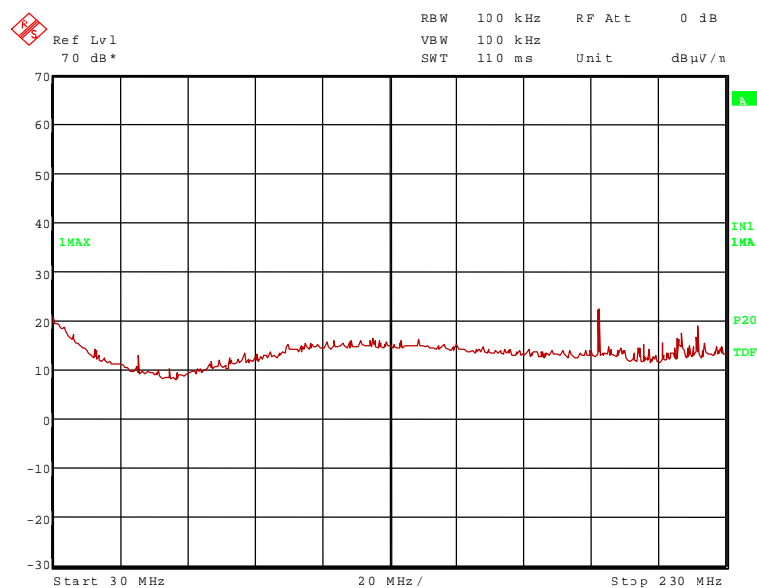
Transmitter operates at the middle of the assigned frequency band (operation mode 2)

91187_85.wmf: Spurious emissions from 1 MHz to 30 MHz (operation mode 2):



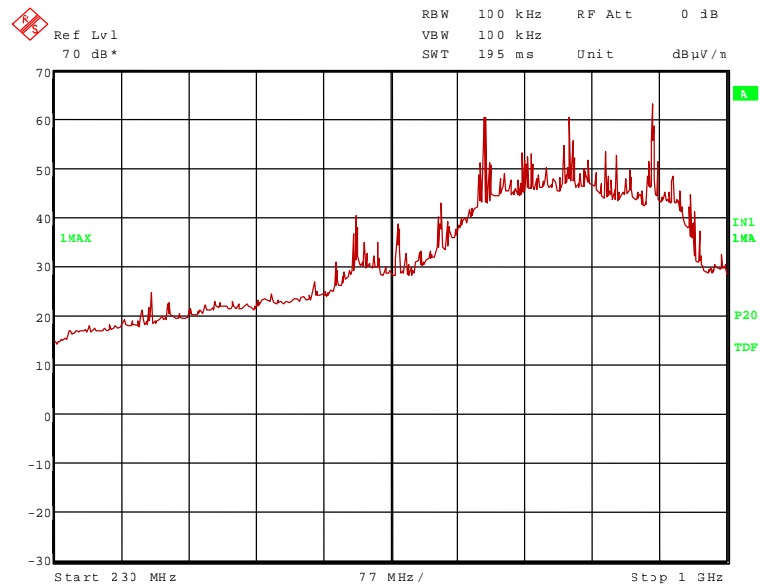
No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

91187_73.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 2):



TEST REPORT REFERENCE: F091187E4

91187_72.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 2, carrier notched):



The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

55.297 MHz, 192.000 MHz, 576.000 MHz, 624.000 MHz, 672.750 MHz, 722.750 MHz, 818.750 MHz,
913.750 MHz, 914.750 MHz, 915.750 MHz, 938.750 MHz and 957.250 MHz.

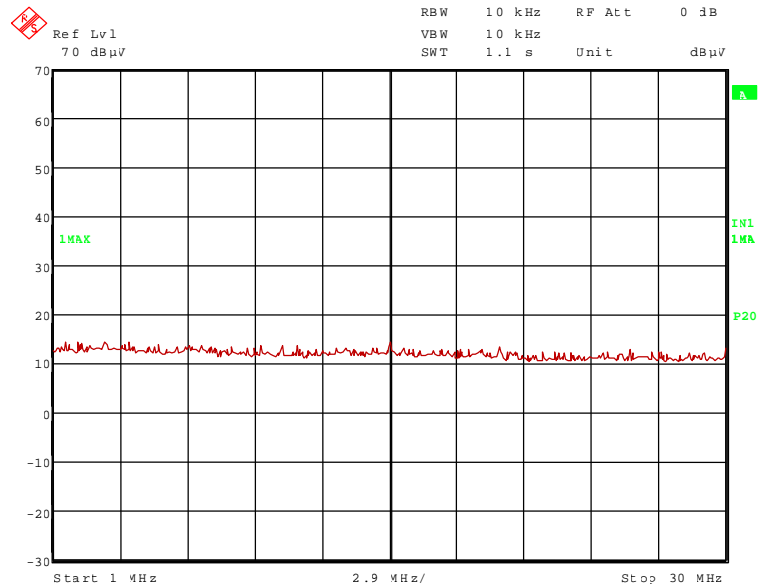
No frequencies were found inside the restricted bands during the preliminary radiated emission test:

These frequencies have to be measured on the open area test site. The result is presented in the following.

TEST REPORT REFERENCE: F091187E4

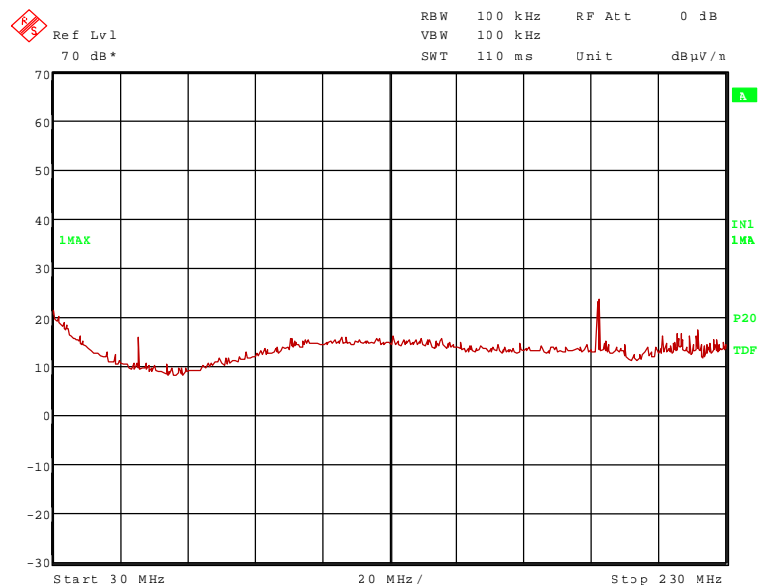
Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

91187_84.wmf: Spurious emissions from 1 MHz to 30 MHz (operation mode 3):



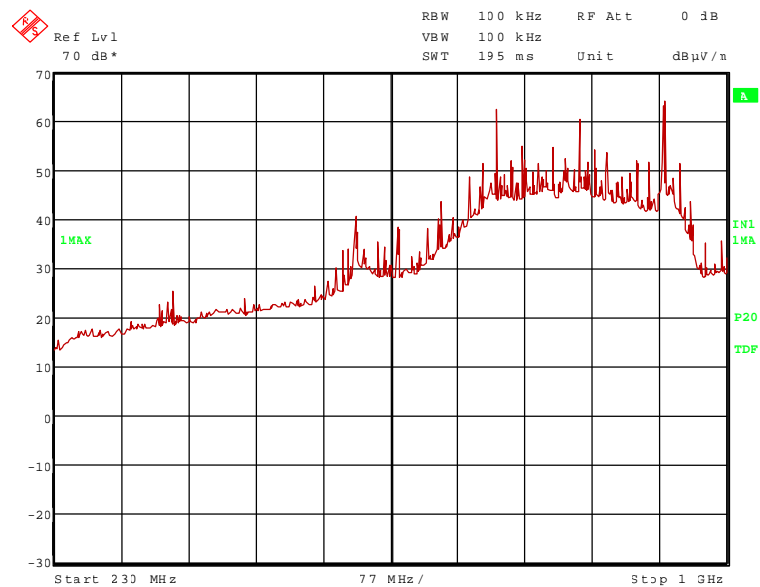
No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

91187_71.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 3):



TEST REPORT REFERENCE: F091187E4

91187_70.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 3, carrier notched):



The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

55.297 MHz, 192.000 MHz, 576.000 MHz, 720.778 MHz, 735.250 MHz, 831.250 MHz, 926.250 MHz, 927.250 MHz, 928.250 MHz, 944.750 MHz and 957.750 MHz.

No frequencies were found inside the restricted bands during the preliminary radiated emission test:

These frequencies have to be measured on the open area test site. The result is presented in the following.

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 35, 43, 55, 83

TEST REPORT REFERENCE: F091187E4

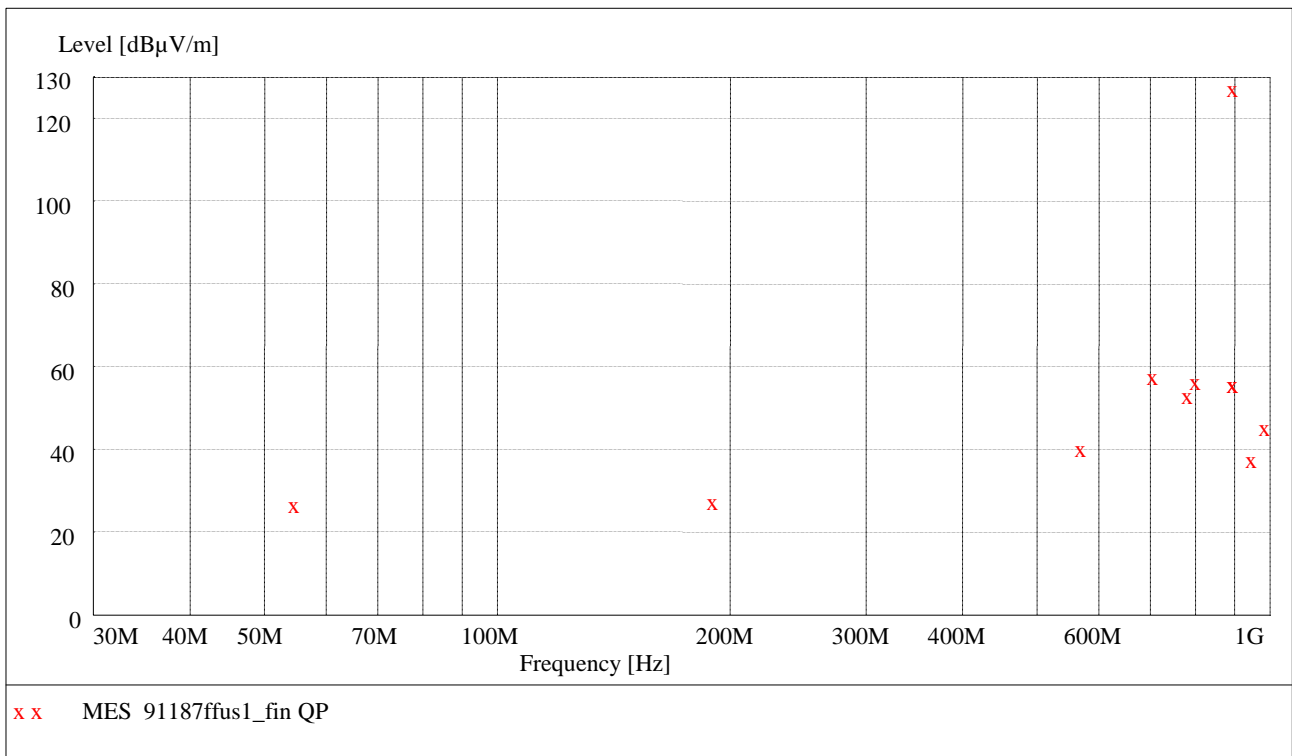
5.6.2.2 FINAL RADIATED EMISSION TEST (30 MHz to 1 GHz)

Ambient temperature	20 °C	Relative humidity	42 %
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- Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
- Cable guide: The cables of the EUT were running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.
- Test record: All results are shown in the following.
- Supply voltage: During all measurements the EUT was supplied with 16.0 V DC.
- Test results: The test results were calculated with the following formula:

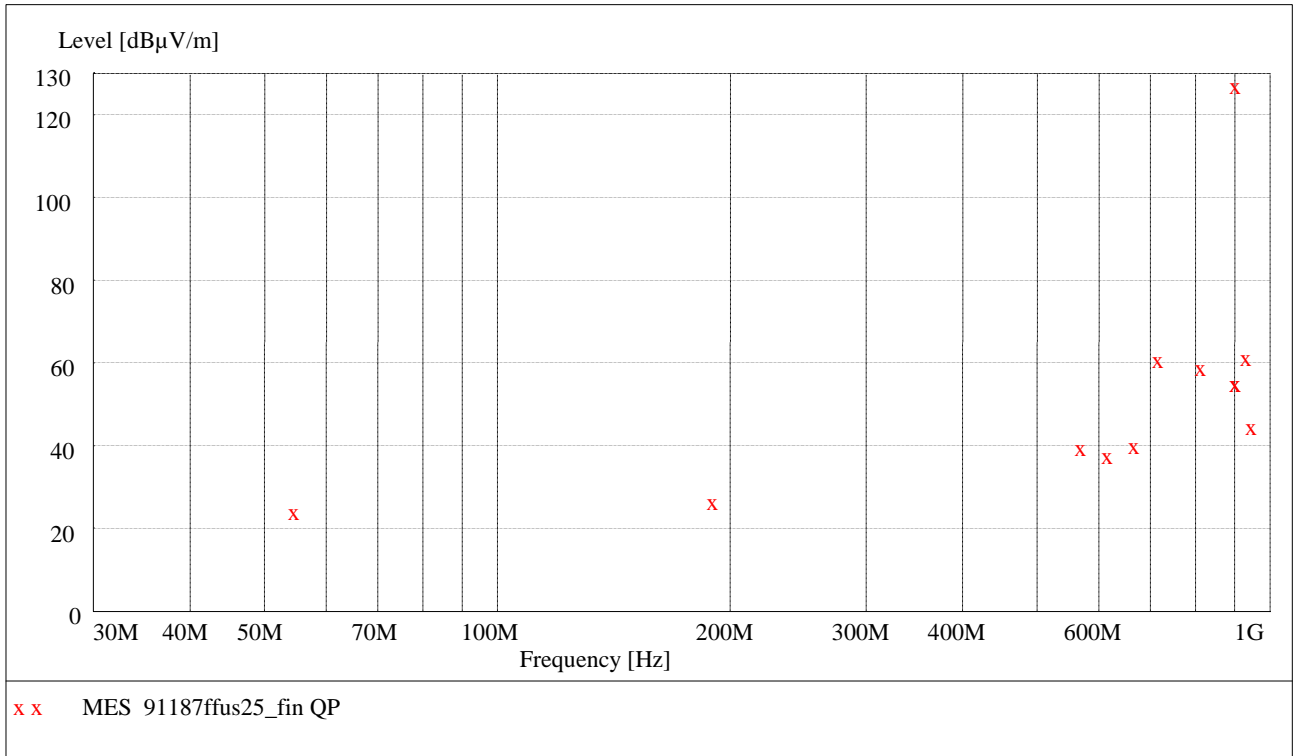
$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with an x are the measured results of the standard final measurement on the open area test site.

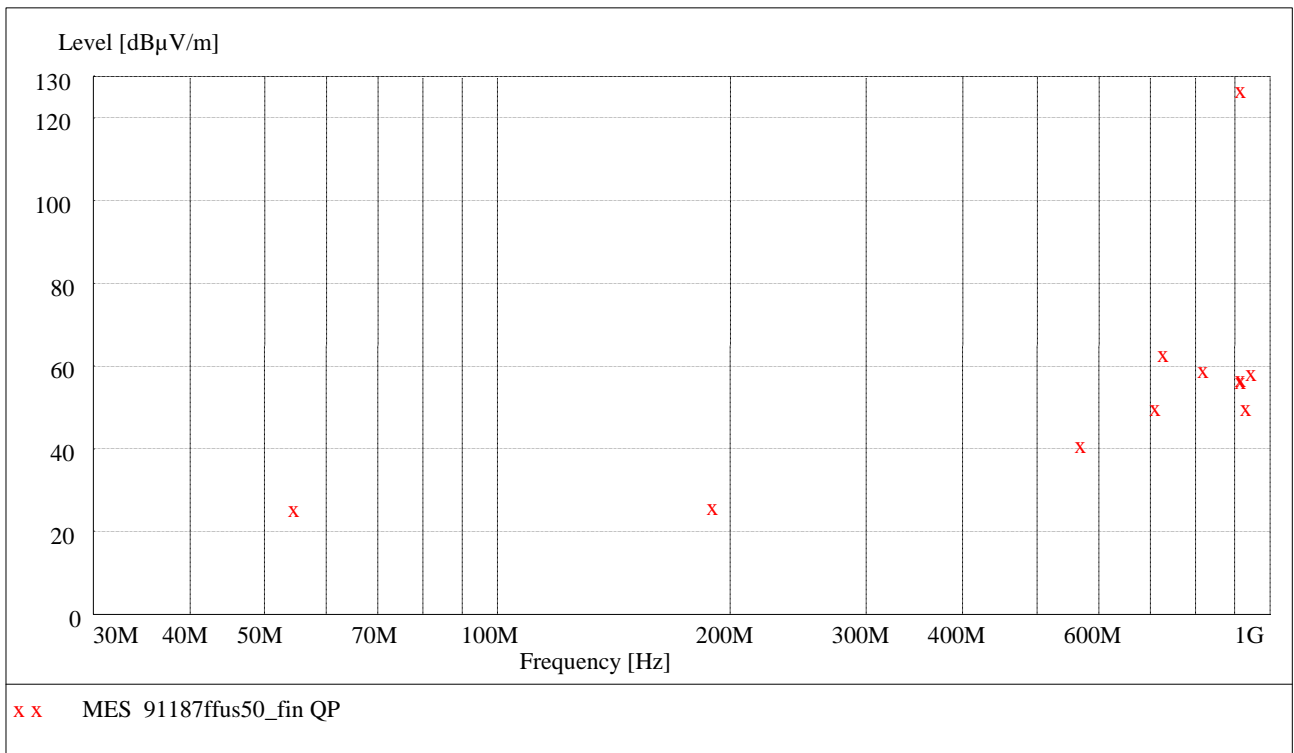


Data record name: 91187ffus1 (operation mode 1)

TEST REPORT REFERENCE: F091187E4



Data record name: 91187ffus (operation mode 2)



Data record name: 91187ffus50 (operation mode 3)

TEST REPORT REFERENCE: F091187E4

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

The measurement time with the quasi-peak measuring detector is 1 second.

Result measured with the quasipeak detector (operation mode 1):

(This value is marked in the diagram 91187ffus1 by an x)

Spurious emissions outside the restricted bands									
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
55.297	27.5	108.0	80.5	19.8	6.9	0.8	210.0	135.0	Vert.
192.000	28.7	108.0	79.3	18.2	9.0	1.5	109.0	314.0	Hor.
576.000	41.0	108.0	67.0	19.0	19.2	2.8	208.0	351.0	Hor.
710.750	58.5	108.0	49.5	35.0	20.5	3.0	156.0	0.0	Hor.
788.250	54.4	108.0	53.6	29.8	21.4	3.2	141.0	1.0	Hor.
806.750	57.1	108.0	50.9	32.5	21.4	3.2	219.0	359.0	Hor.
901.750	56.6	108.0	51.4	30.7	22.4	3.5	178.0	359.0	Hor.
902.750	128.0	-	carrier	102.1	22.5	3.4	175.0	359.0	Hor.
903.750	56.6	108.0	51.4	30.7	22.5	3.4	177.0	359.0	Hor.
Spurious emissions inside the restricted bands									
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
960.000	38.7	46.0	7.3	11.4	23.8	3.5	111.0	344.0	Hor.
998.750	46.2	54.0	7.8	19.0	23.7	3.5	154.0	19.0	Hor.
Measurement uncertainty				+2.2 dB / -3.6 dB					

TEST REPORT REFERENCE: F091187E4

Result measured with the quasipeak detector (operation mode 2):
(This value is marked in the diagram 91187ffus25 by an x)

Spurious emissions outside the restricted bands									
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
55.297	24.9	107.9	83.0	17.2	6.9	0.8	100.0	222.0	Vert.
192.000	27.5	107.9	80.4	17.0	9.0	1.5	100.0	311.0	Hor.
576.000	40.8	107.9	67.1	18.8	19.2	2.8	206.0	347.0	Hor.
624.000	38.9	107.9	69.0	16.4	19.7	2.8	104.0	351.0	Hor.
672.750	41.0	107.9	66.9	18.3	19.8	2.9	107.0	353.0	Hor.
722.750	61.9	107.9	46.0	37.7	21.2	3.0	157.0	1.0	Hor.
818.750	59.8	107.9	48.1	34.7	21.9	3.2	214.0	359.0	Hor.
913.750	55.7	107.9	52.2	29.5	22.8	3.4	175.0	359.0	Hor.
914.750	127.9	-	carrier	101.7	22.8	3.4	175.0	359.0	Hor.
915.750	55.8	107.9	52.1	29.5	22.9	3.4	175.0	359.0	Hor.
938.750	62.2	107.9	45.7	35.0	23.8	3.4	110.0	359.0	Hor.
957.250	45.5	107.9	62.4	18.2	23.8	3.5	109.0	339.0	Hor.
Spurious emissions inside the restricted bands									
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
Measurement uncertainty				+2.2 dB / -3.6 dB					

TEST REPORT REFERENCE: F091187E4

Result measured with the quasipeak detector (operation mode 3):
(This value is marked in the diagram 91187ffus50 by an x)

Spurious emissions outside the restricted bands									
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
55.297	26.7	108.0	81.3	19.0	6.9	0.8	202.0	46.0	Vert.
192.000	26.9	108.0	81.1	16.4	9.0	1.5	107.0	311.0	Hor.
576.000	41.8	108.0	66.2	19.8	19.2	2.8	208.0	348.0	Hor.
720.778	51.1	108.0	56.9	27.0	21.1	3.0	155.0	0.0	Hor.
735.250	64.1	108.0	43.9	39.3	21.7	3.1	156.0	1.0	Hor.
831.250	59.8	108.0	48.2	34.1	22.5	3.2	209.0	359.0	Hor.
926.250	57.3	108.0	50.7	30.5	23.4	3.4	175.0	359.0	Hor.
927.250	128.0	-	carrier	101.2	23.4	3.4	115.0	350.0	Hor.
928.250	57.9	108.0	50.1	31.1	23.4	3.4	118.0	359.0	Hor.
944.750	51.2	108.0	56.8	24.0	23.8	3.4	110.0	359.0	Hor.
957.750	59.2	108.0	48.8	31.9	23.8	3.5	112.0	355.0	Hor.
Spurious emissions inside the restricted bands									
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
14 – 20, 83

TEST REPORT REFERENCE: F091187E4

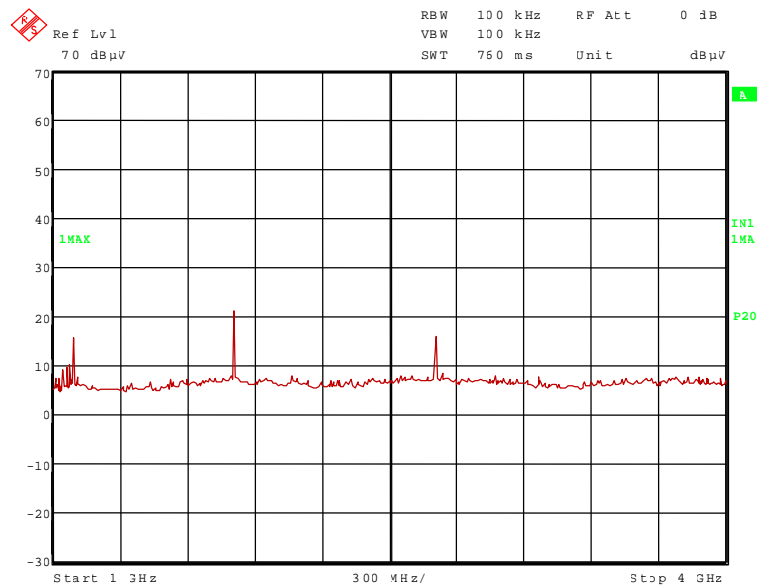
5.6.2.3 PRELIMINARY MEASUREMENT (1 GHz to 10 GHz)

Ambient temperature	20 °C	Relative humidity	43 %
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- Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
- Cable guide: The cable of the EUT is running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.
- Test record: All results are shown in the following.
- Supply voltage: During all measurements the EUT was supplied with 16.0 V DC via the carrier board.

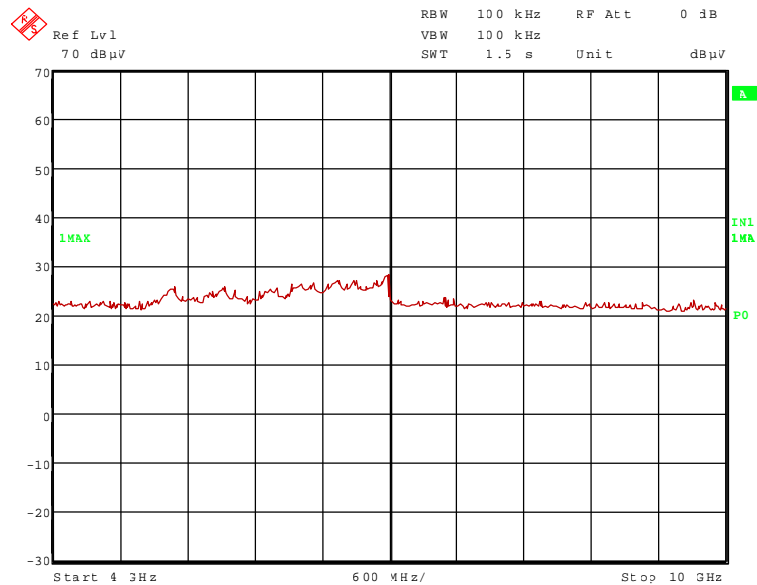
Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

91187_75.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 1):



TEST REPORT REFERENCE: F091187E4

91187_81.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 1):



The following frequency was found outside the restricted bands during the preliminary radiated emission test:
1805.500 MHz.

The following frequencies were found inside the restricted bands during the preliminary radiated emission test:
1094.750 MHz and 2708.250 MHz

These frequencies have to be measured in a final measurement. The results were presented in the following.

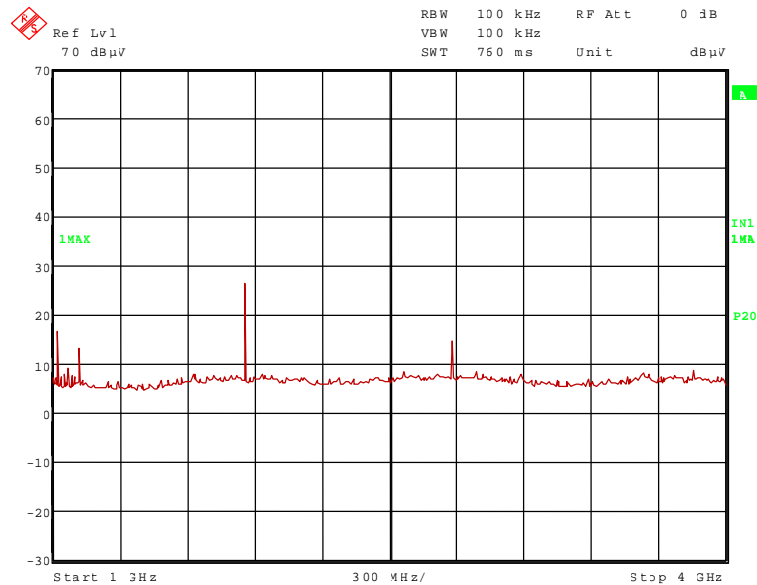
TEST EQUIPMENT USED FOR THE TEST:

29, 31 –34, 36, 44, 49, 73

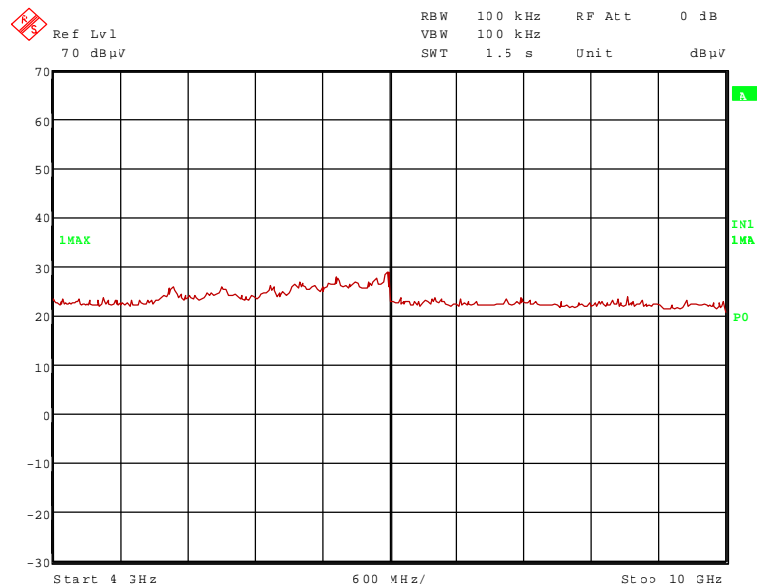
TEST REPORT REFERENCE: F091187E4

Transmitter operates on the upper end of the assigned frequency (operation mode 3)

91187_76.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 3):



91187_83.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 3):



The following frequency was found outside the restricted bands during the preliminary radiated emission test:
1854.500 MHz.

The following frequencies were found inside the restricted bands during the preliminary radiated emission test:
1023.250 MHz, 1119.250 MHz and 2781.750 MHz.

These frequencies have to be measured in a final measurement. The results were presented in the following.

TEST REPORT REFERENCE: F091187E4

5.6.2.4 FINAL MEASUREMENT (1 GHz to 10 GHz)

Ambient temperature	20 °C	Relative humidity	43 %
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- Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
- Cable guide: The cable of the EUT is running vertically to the false floor. For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.
- Test record: All results are shown in the following.
- Supply voltage: During all measurements the EUT was supplied with 16.0 V DC by the carrier board.
- Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency MHz	Corr. value dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
1094.750	47.6	74.0	26.4	20.7	24.4	0.0	2.5	150	Hor.	Yes
1805.500	54.6	108.0	53.4	24.7	26.9	0.0	3.0	150	Hor.	No
2708.250	54.7	74.0	19.3	21.0	29.7	0.0	4.0	150	Hor.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency MHz	Corr. value dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamplifier dB	Cable loss dB	Height cm	Pol.	Restr. Band
1094.750	39.5	54.0	14.5	12.6	24.4	0.0	2.5	150	Hor.	Yes
1805.500	49.7	108.0	58.3	19.8	26.9	0.0	3.0	150	Hor.	No
2708.250	47.4	54.0	6.6	13.7	29.7	0.0	4.0	150	Hor.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

TEST REPORT REFERENCE: F091187E4

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency MHz	Corr. value dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1010.750	48.5	74.0	25.5	21.9	24.2	0.0	2.4	150	Hor.	Yes
1106.750	47.0	74.0	27.0	20.0	24.5	0.0	2.5	150	Hor.	Yes
1829.500	53.9	107.9	54.0	23.6	27.0	0.0	3.3	150	Hor.	No
2744.250	54.1	74.0	19.9	20.1	29.9	0.0	4.1	150	Hor.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency MHz	Corr. value dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1010.750	42.4	54.0	11.6	15.8	24.2	0.0	2.4	150	Hor.	Yes
1106.750	39.3	54.0	14.7	12.3	24.5	0.0	2.5	150	Hor.	Yes
1829.500	48.5	107.9	59.4	18.2	27.0	0.0	3.3	150	Hor.	No
2744.250	45.8	54.0	8.2	11.8	29.9	0.0	4.1	150	Hor.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

TEST REPORT REFERENCE: F091187E4

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency MHz	Corr. value dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1023.250	48.1	74.0	25.9	21.4	24.3	0.0	2.4	150	Hor.	Yes
1119.250	47.0	74.0	27.0	20.0	24.5	0.0	2.5	150	Hor.	Yes
1854.500	59.3	108.0	48.7	28.6	27.1	0.0	3.6	150	Hor.	No
2781.750	54.6	74.0	19.4	20.5	30.0	0.0	4.1	150	Hor.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

Result measured with the average detector:

Frequency MHz	Corr. value dB μ V/m	Limit dB μ V/m	Margin dB	Readings dB μ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1023.250	41.9	54.0	12.1	15.2	24.3	0.0	2.4	150	Hor.	Yes
1119.250	38.0	54.0	16.0	11.0	24.5	0.0	2.5	150	Hor.	Yes
1854.500	56.0	108.0	52.0	25.3	27.1	0.0	3.6	150	Hor.	No
2781.750	46.9	54.0	7.1	12.8	30.0	0.0	4.1	150	Hor.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 –34, 36, 44, 49, 73

TEST REPORT REFERENCE: F091187E4

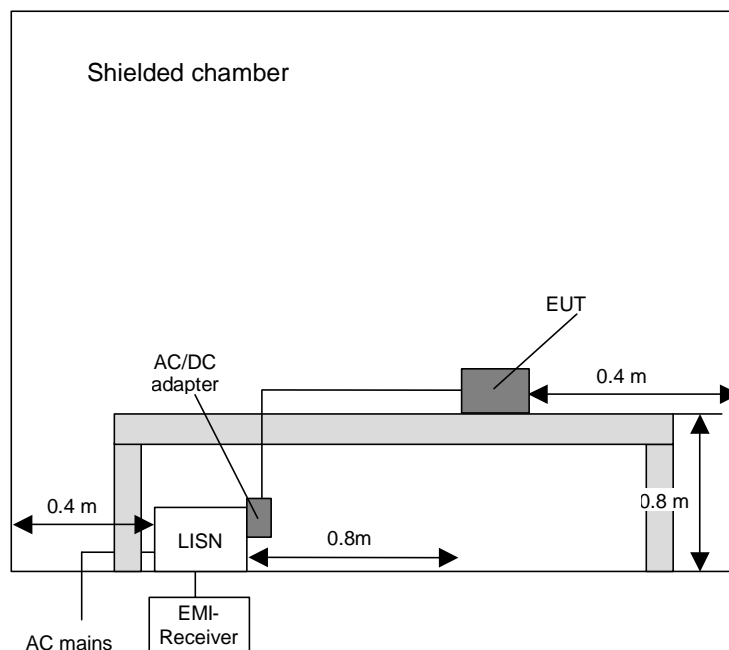
5.7 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

5.7.1 METHOD OF MEASUREMENT

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriate limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



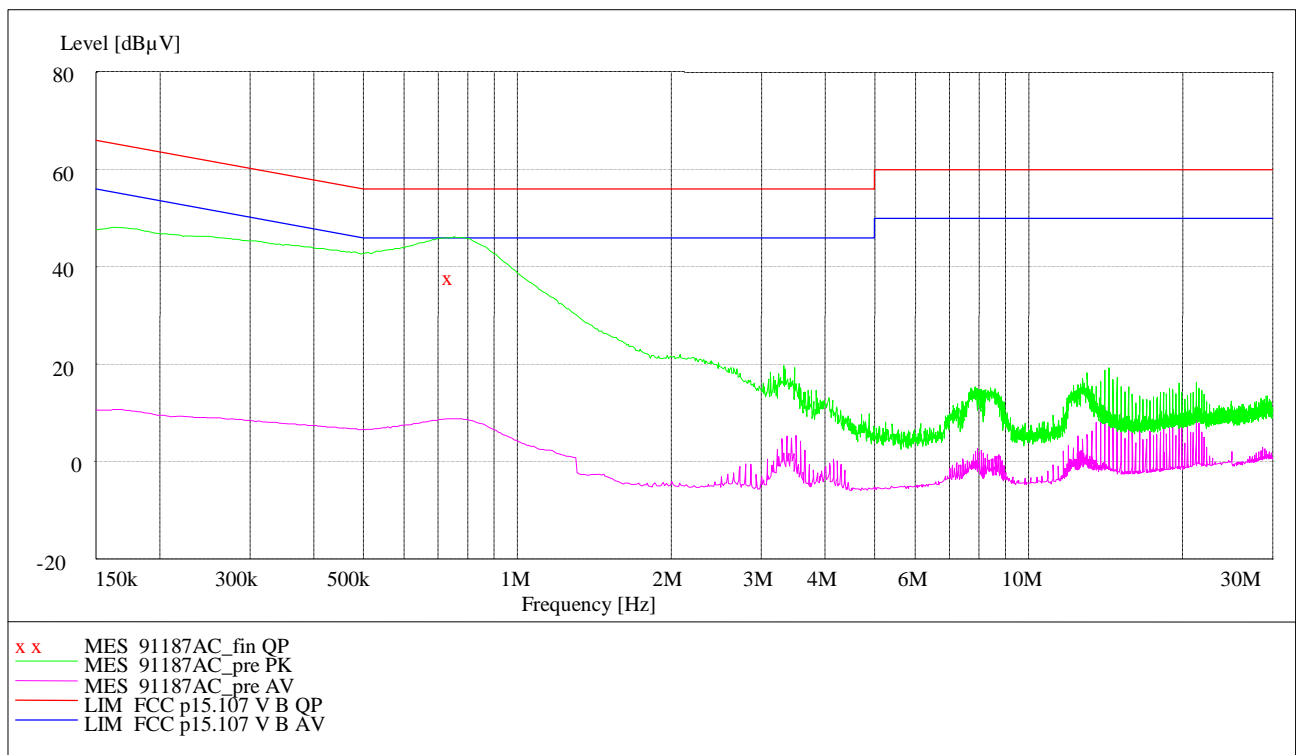
TEST REPORT REFERENCE: F091187E4

5.7.2 TEST RESULTS (CONDUCTED EMISSIONS ON POWER SUPPLY LINES)

Ambient temperature	20 °C	Relative humidity	50 %
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- Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m.
- Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
- Test record: The EUT operates in operation mode 4. All results are shown in the following.
- Supply voltage: During the measurement the EUT was supplied 12.0 V DC by an AC / DC adaptor type FW 3288, which was supplied by 115 V AC / 60 Hz.

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by an x and the average measured points by an +.



Data record name: 91187AC

TEST REPORT REFERENCE: F091187E4

Result measured with the quasipeak detector:

(These values are marked in the diagram by an x)

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.744000	38.7	0.2	56.0	17.3	L1	FLO
Measurement uncertainty				+3.6 dB / -4.5 dB		

Data record name: 91187AC_fin

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

1 – 4, 20

TEST REPORT REFERENCE: F091187E4

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

TEST REPORT REFERENCE: F091187E4

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M47	-	Albatross Projects	B83117-C6439-T262 -	480662	Weekly verification (system cal.)	
2	EMI Receiver	ESCS 30	Rohde & Schwarz	834489/011	580007	02/27/2008	02/2010
3	LISN	ESH2-Z5	Rohde & Schwarz	879675/037	580006	06/14/2009	06/2010
4	High pass filter	HR 0.13- 5ENN	FSY Microwave Inc.	DC 0109 SN 002	480340	Weekly verification (system cal.)	
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESIB7	Rohde & Schwarz	100304	480521	02/26/2008	02/2010
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 A	Chase	1643	480147	08/01/2007	08/2012
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
30	Spectrum analyser	FSU	Rohde & Schwarz	200125	480956	02/04/2009	02/2011
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/25/2008	02/2010
32	Controller	MCU	Maturo	MCU/043/971107	480832	-	-
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	-
34	Antenna support	AS615P	Deisel	615/310	480187	-	-
35	Antenna	CBL6112 B	Chase	2688	480328	10/11/2005	10/2010
36	Antenna	3115 A	EMCO	9609-4918	480183	04/11/2008	11/2013
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141	Weekly verification (system cal.)	
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142	Weekly verification (system cal.)	
46	RF-cable 1m	KPS-1533- 400-KPS	Insulated Wire	-	480301	Six month verification (system cal.)	
49	Preamplifier	JS3- 00101200- 23-5A	Miteq	681851	480337	Six month verification (system cal.)	
55	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	02/19/2008	02/2013
73	High Pass Filter	WHJS1000C 11/60EF	Wainwright Instruments GmbH	1	480413	Six month verification (system cal.)	
83	Tuneable Notch Filter	WRCA800/90 0-0.2/40- 6EEK	Wainwright Instruments GmbH	15	480414	Six month verification (system cal.)	

TEST REPORT REFERENCE: F091187E4

7 LIST OF ANNEXES

ANNEX A	PHOTOGRAPHS OF THE TEST SET-UPS:	6 pages
	TSU25, test set-up fully anechoic chamber	91187_17.jpg
	TSU25, test setup fully anechoic chamber	91187_23.jpg
	TSU25, test setup fully anechoic chamber	91187_16.jpg
	TSU25, test setup fully anechoic chamber	91187_18.jpg
	TSU25, test setup open area test site	91187_8.jpg
	TSU25, test setup shielded chamber	91187_10.jpg
ANNEX B	INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	10 pages
	TSU25, internal top view	91187_d.jpg
	TSU25, internal bottom view	91187_c.jpg
	TSU25, main PCB, top view	91187_k.jpg
	TSU25, main PCB, bottom view	91187_l.jpg
	TSU25, antenna switch PCB, top view	91187_e.jpg
	TSU25, antenna switch PCB, bottom view	91187_f.jpg
	TSU25, rf-PCB (housing removed), top view	91187_n.jpg
	TSU25, rf-PCB (housing removed), bottom view	91187_m.jpg
	TSU25, LED-PCB, top view	91187_g.jpg
	TSU25, LED-PCB, bottom view	91187_h.jpg
ANNEX C	EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	2 pages
	TSU25, 3-D view 1	91187_a.jpg
	TSU25, 3-D view 2	91187_b.jpg