

Königswinkel 10  
32825 Blomberg  
Germany  
Phone +49 5235 9500-0  
Fax +49 5235 9500-10

# TEST REPORT

**Test Report Reference: R20353 Edition 2**

**Equipment under Test: METT HHU 76519**

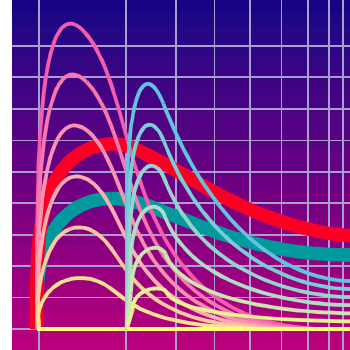
**Serial Number: 00001**

**FCC ID: A92-76519**

**Applicant: Texas Instruments Deutschland GmbH**

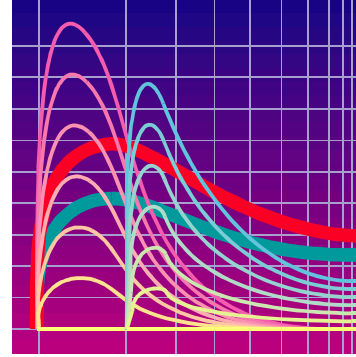
**Manufacturer: Texas Instruments Incorporated**

**Test Laboratory  
(CAB)  
accredited by  
DATech e.V.  
in compliance with DIN EN ISO/IEC 17025  
under the  
Reg. No. TTI-P-G071/94-11  
and listed by  
FCC 31040/SIT1300F2**



TEST REPORT REFERENCE: R20353 Edition 2

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# 1 IDENTIFICATION

## 1.1 APPLICANT

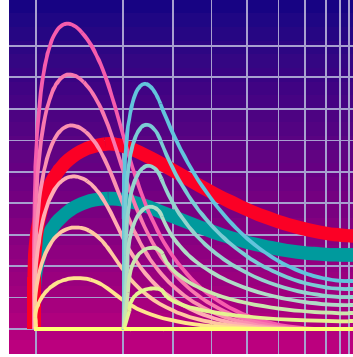
Name:	Texas Instruments Deutschland GmbH
Address:	Kahrstraße 13 45128 Essen
Country:	Germany
Name for contact purposes:	Mr. Bernd Volkwein
Phone:	+49 20 19 99 26 90
Fax:	+49 20 19 78 18 40
Mail address:	b-volkwein@ti.com
Applicant represented during the test by the following person:	Mr. Bernd Volkwein

## 1.2 MANUFACTURER

Name:	Texas Instruments Incorporated
Address:	34 Forrest Street Attleboro, MA 02703
Country:	USA
Name for contact purposes:	-
Phone:	-
Fax:	-
Mail address:	-
Manufacturer represented during the test by the following person:	-

## 1.3 DATES

Date of receipt of test sample:	17 July 2002
Start of test:	02 August 2002
End of test:	08 August 2002



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## 1.4 TEST LABORATORY

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

Test engineer: Thomas KÜHN *T. Kühn* 06 September 2002  
Name

Test report checked by: Bernd STEINER *B. Steiner* 06 September 2002  
Name

**Phoenix TEST-LAB 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.

Any reproduction of its contents without written permission of the accredited test laboratory PHOENIX TEST-LAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TEST-LAB 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 TEST-LAB Logo and the TEST REPORT REFERENCE.

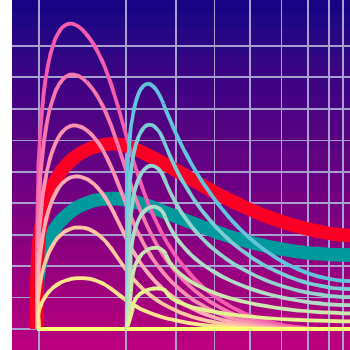
## 1.6 NORMATIVE REFERENCES

[1] **ANSI C63.4-1992** 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 47 CFR Part 15 (July 2002)** Radio Frequency Devices

## 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

### 2.1 DEVICE UNDER TEST

Type of equipment:	Short range inductive identification system
Type designation:	METT HHU 76519
Serial No.:	00001
FCC ID:	A92-76519
Antenna type:	Integrated

**The following external I/O cables were used:**

There are no cables connected to the EUT during the test.

### 2.2 PERIPHERY DEVICES

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

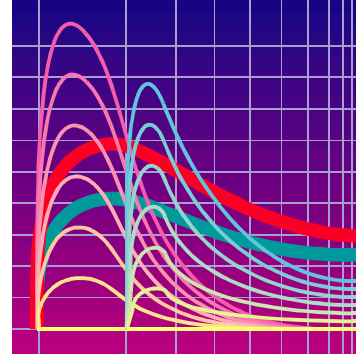
No equipment was used as control unit and ancillary equipment.

### 2.3 LIST OF EMC-RELEVANT MEASURES

The following measures were mounted during the test and were necessary to reach the results, which were documented below:

- The PCB sandwich of the digital board and the analogue board was built in a metal housing. Both parts of this housing are soldered to each other and connected to the system ground.
- The wires to the hand held computer and the internal temperature and pressure sensor were passed thru a ferrite core (742 700 9 from Würth Elektronik).
- All wires to the antennas were passed thru a ferrite core (742 700 7 from Würth Elektronik).

For details refer also the photographs in annex C of this test report.



### 3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

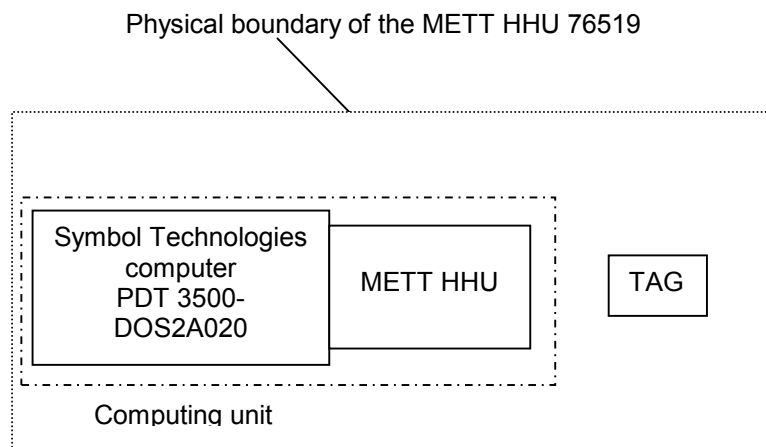
The METT HHU 76519 consists of two parts; one computing unit and a transponder (TAG). The computing unit was added to a computer PDT 3500-DOS2A020 from Symbol Technologies, which was already tested in accordance to FCC 47 CFR Part 15 and is not object of this test report.

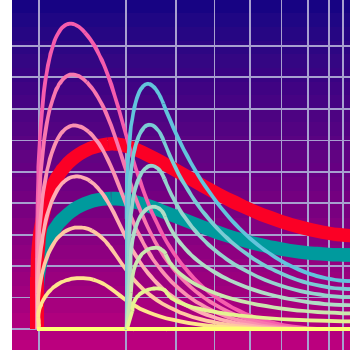
For all measurements the METT HHU 76519 was tested in continuous transmission mode with the presence of a TAG outside the system range.

During all tests the EUT was supplied with 6 V DC by the integrated nickel metal hydride rechargeable battery.

For the whole frequency range a preliminary measurement in a fully anechoic chamber with a measuring distance of 3 m was carried out to determine the frequencies, which were radiated by the EUT. The final measurements on the detected frequencies were carried out on an outdoor test site without ground plane (for the frequency range 9 kHz to 30 MHz) and on an open area test site with ground plane (for the frequency range 30 MHz to 1 GHz).

The physical boundaries of the Equipment Under Test are shown below.



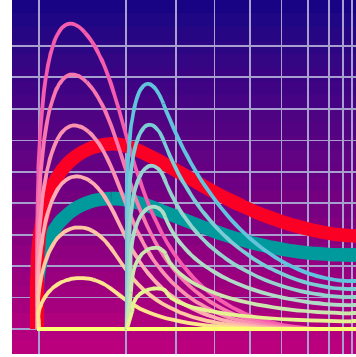


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## 4 LIST OF TEST MODULES

### 4.1 EMISSION

Radiated emissions FCC 47 CFR Part 15 section 15.109 [2], Class B						
No.	Application	Frequency range	Limits (quasi peak)	Reference standard	Remark	Status
1	Unintentional radiator	30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 1000 MHz	40.0 dB $\mu$ V/m at 3 m 43.5 dB $\mu$ V/m at 3 m 46.0 dB $\mu$ V/m at 3 m 54.0 dB $\mu$ V/m at 3 m	ANSI C63.4 (1992);	-	Passed
Radiated emissions FCC 47 CFR Part 15 section 15.209 [2]						
No.	Application	Frequency range	Limits (microvolts/meter)	Reference standard	Remark	Status
2	Intentional radiator	0.009 to 0.49 MHz 0.490 to 1.705 MHz 1.705 to 30.0 MHz 30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 1000 MHz	2400/f(kHz) at 300 m 24000/f(kHz) at 30 m 30 at 30 m 40.0 dB $\mu$ V/m at 3 m 43.5 dB $\mu$ V/m at 3 m 46.0 dB $\mu$ V/m at 3 m 54.0 dB $\mu$ V/m at 3 m	ANSI C63.4 (1992);	-	Passed



## 5 METHOD OF MEASUREMENT

### 5.1 RADIATED EMISSION 9 kHz TO 30 MHz

The radiated emission measurement is divided into two stages.

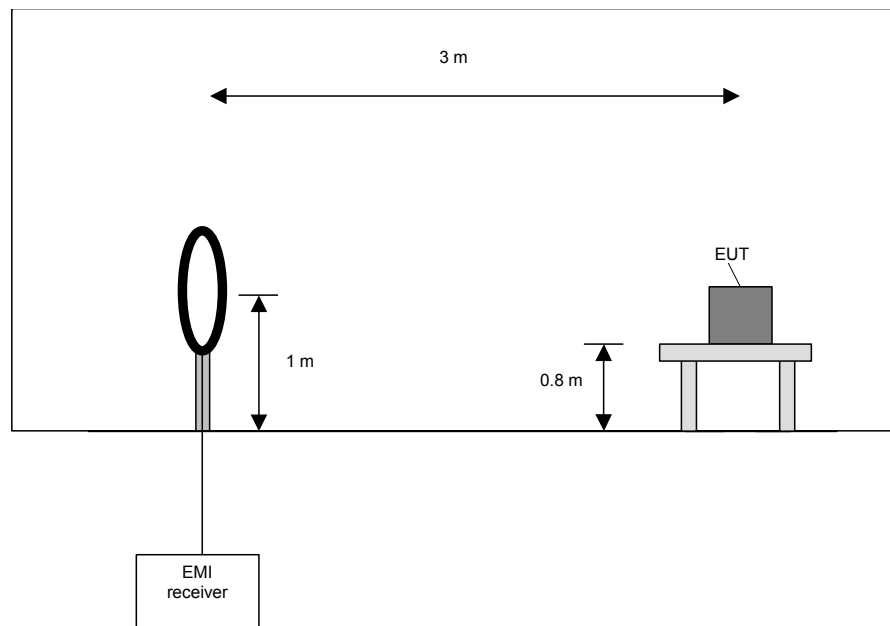
#### Preliminary measurement:

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. 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 C63.4-1992 [1].

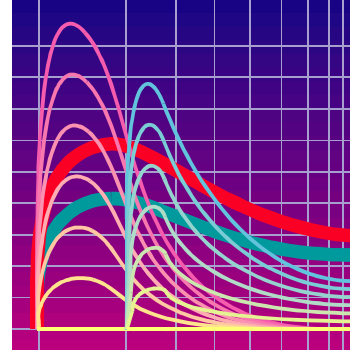
The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 250 kHz	200 Hz
250 kHz to 1 MHz	10 kHz
1 MHz to 30 MHz	100 kHz







Preliminary measurement procedure:

Prescans were performed in the following frequency ranges 9 kHz to 150 kHz and 150 kHz to 30 MHz.

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 frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 6) Repeat steps 1) to 4) with the other orthogonal axes of the EUT if applicable (handheld equipment).
- 7) Rotate the measuring antenna and repeat steps 1) to 5).

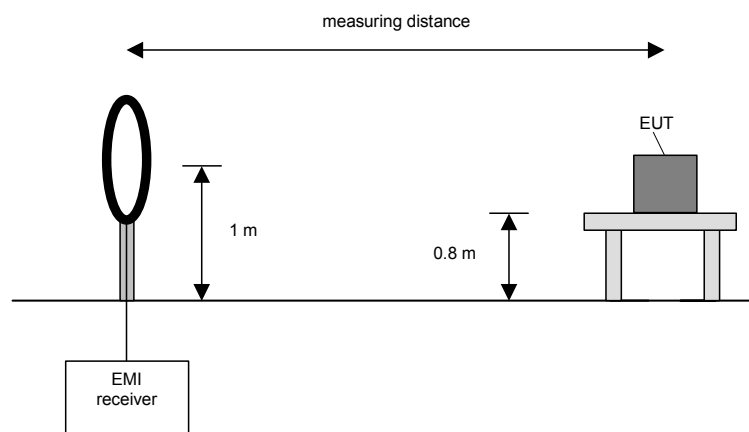
Final measurement:

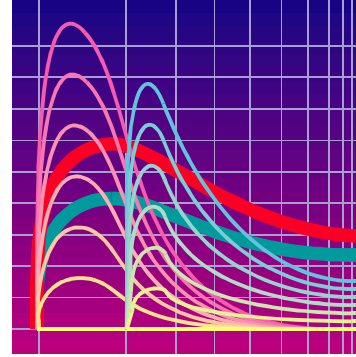
In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the during the preliminary measurement detected frequencies the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

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

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz





Final measurement procedure:

The following procedure will be used:

- 1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
- 2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
- 3) Rotate the measuring antenna to find the maximum and note the value.
- 4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
- 5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT if applicable (handheld equipment).

**5.2 RADIATED EMISSIONS 30 MHz TO 1 GHz**

The radiated emission measurement is divided into two stages.

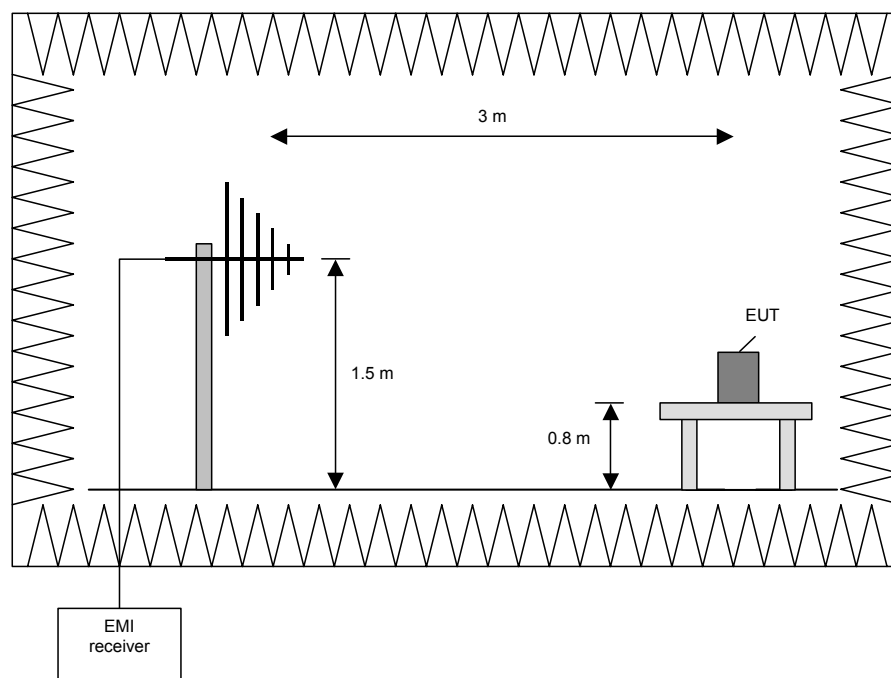
Preliminary measurement:

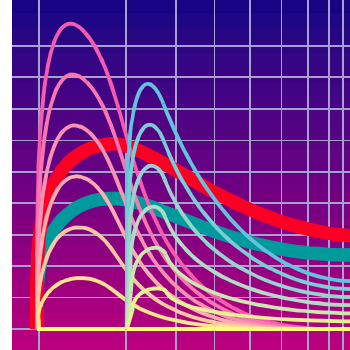
In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-1992 [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 120 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 1 GHz	120 kHz





Procedure preliminary measurement:

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

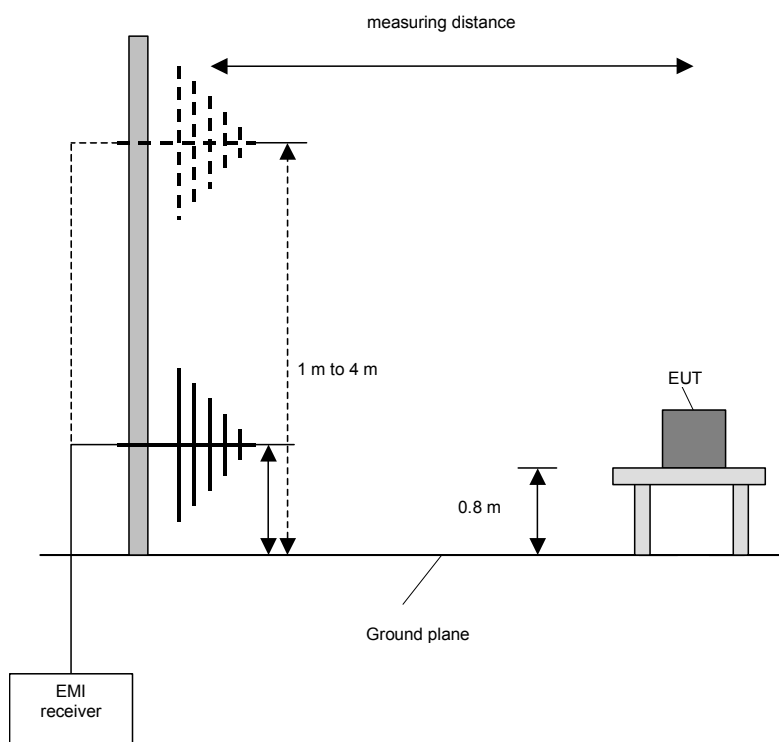
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °
2. Manipulate the system cables within the range to produce the maximum level of emission
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum
5. Measure the frequency of 3 highest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

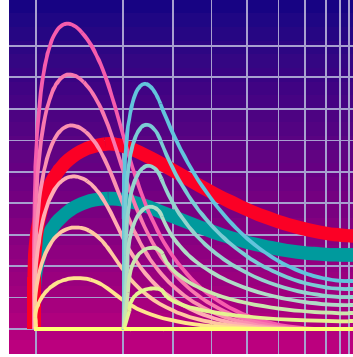
Final Measurement:

In the second stage 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





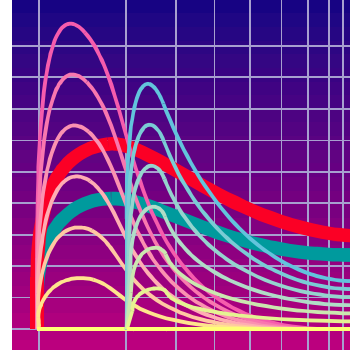
TEST REPORT REFERENCE: R20353 Edition 2

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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 or 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 if handheld equipment



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## 6 TEST RESULTS EMISSION TEST

### 6.1 PRELIMINARY RADIATED EMISSION TEST (9 kHz TO 30 MHz)

Ambient temperature	20 °C	Relative humidity	62 %
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Position of EUT: The EUT was set-up on a wooden table with its lower edge in a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: No cables were connected to the EUT.

Test record: The test was carried out in continuous transmission mode in the presence of a TAG outside the system range. The EUT was rotated in three orthogonal axis, the worst-case results are shown in the following.

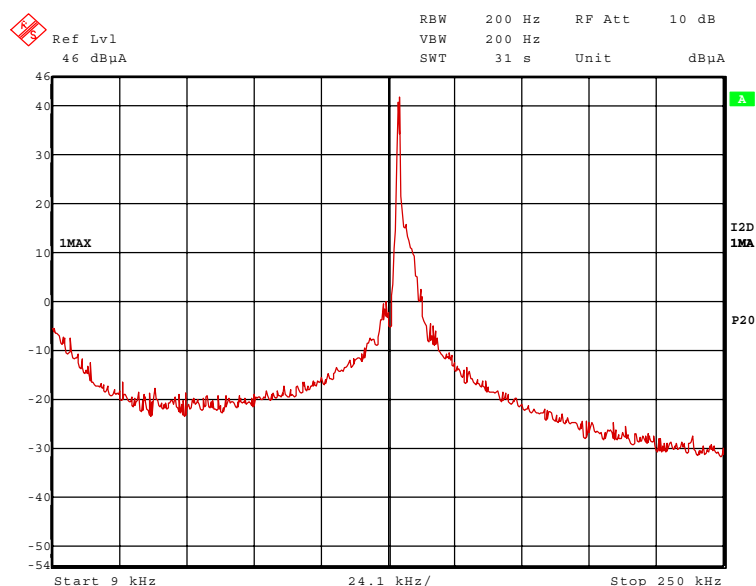
The following significant frequencies were found during the preliminary radiated emission test:

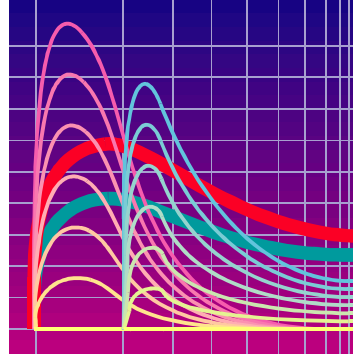
- 133.330 kHz;
- 266.660 kHz;
- 399.990 kHz;
- 533.320 kHz;
- 666.650 kHz.

These frequencies have to be measured on the outdoor test site. The results of this final measurement are shown in subclause 6.3 of this test report.

No frequencies were found inside the restricted bands according to FCC 47 CFR Part 15 section 15.205 [2].

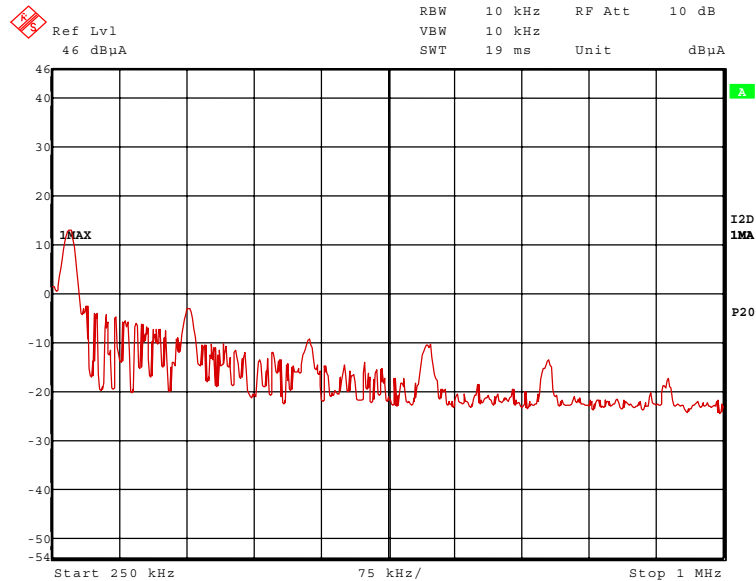
20353\_2.wmf (9 kHz to 250 kHz):



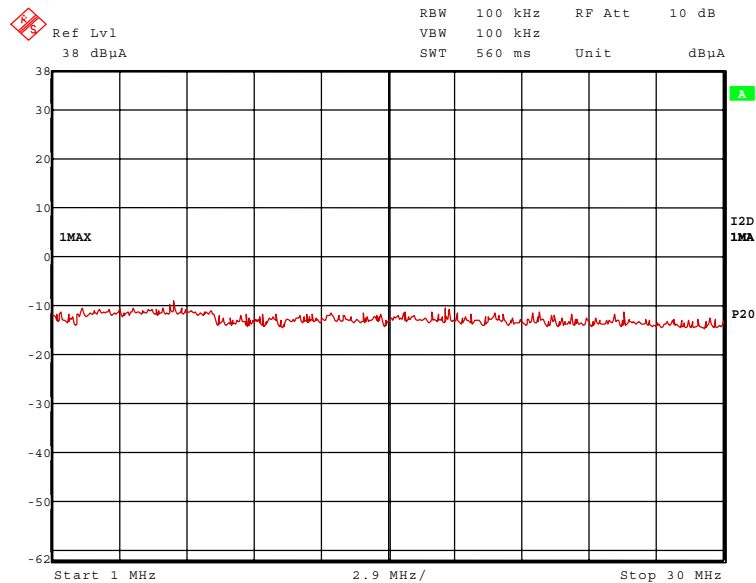


TEST REPORT REFERENCE: R20353 Edition 2

20353\_3.wmf (250 kHz to 1 MHz):

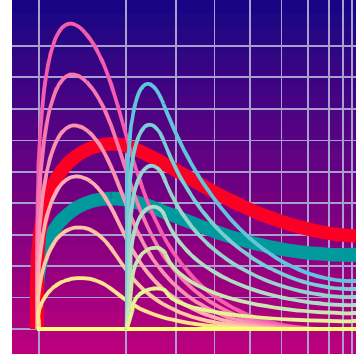


20353\_4.wmf (1 MHz to 30 MHz):



TEST EQUIPMENT USED THE TEST:

29, 31 - 33, 41



TEST REPORT REFERENCE: R20353 Edition 2

## 6.2 PRELIMINARY RADIATED EMISSION TEST (30 MHz TO 1 GHz)

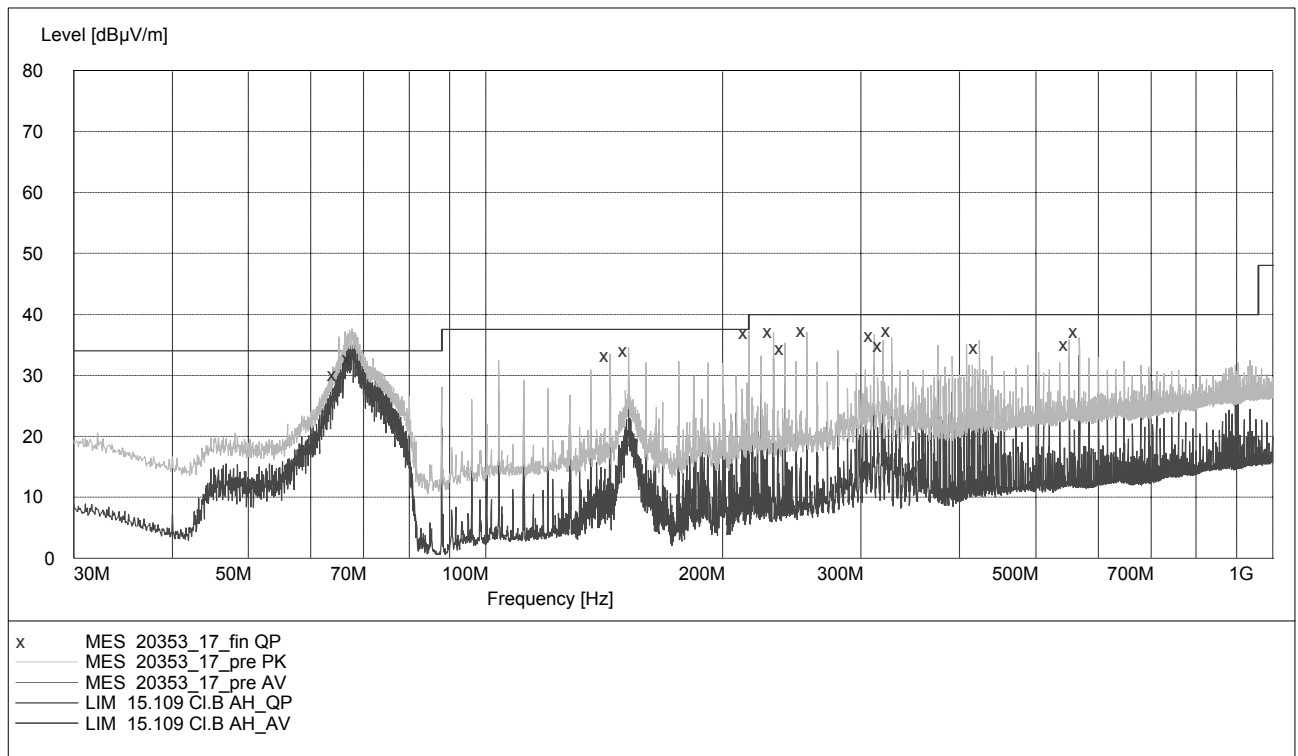
Ambient temperature	21 °C	Relative humidity	67 %
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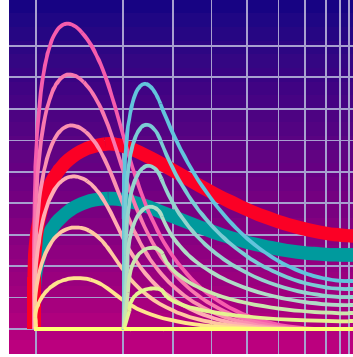
Position of EUT: The EUT was set-up on a wooden table with its lower edge in a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: No cables were connected to the EUT.

Test record: The test was carried out in continuous transmission mode in the presence of a TAG outside the system range. The EUT was rotated in three orthogonal axis, the worst-case results are shown in the following.

20353\_17 (30 MHz to 1 GHz):





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The following significant frequencies were found during the preliminary radiated emission test:

- 64.944 MHz;
- 67.776 MHz;
- 143.988 MHz;
- 151.992 MHz;
- 216.000 MHz;
- 231.984 MHz;
- 239.988 MHz;
- 311.980 MHz;
- 319.906 MHz;
- 423.976 MHz;
- 551.980 MHz;
- 567.976 MHz.

The following frequencies were found inside the restricted bands according to FCC 47 CFR Part 15 section 15.205 [2].

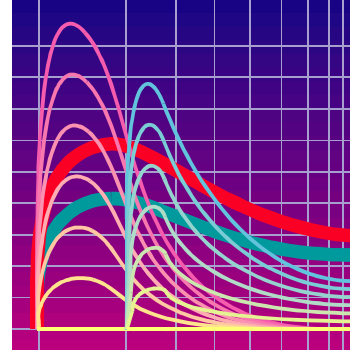
- 255.988 MHz;
- 327.988 MHz.

These frequencies have to be measured on the open area test site. The results of this final measurement are shown in subclause 6.4 of this test report.

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 35, 37, 38
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TEST REPORT REFERENCE: R20353 Edition 2

### 6.3 FINAL RADIATED EMISSION TEST (9 kHz TO 30 MHz)

Ambient temperature	23 °C	Relative humidity	40 %
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Position of EUT: The EUT was set-up on a wooden table with its lower edge in a height of 0.8 m. The distance between EUT and antenna was 3 m, 10 m and 30 m.

Cable guide: No cables were connected to the EUT.

Test record: The test was carried out in continuous transmission mode in the presence of a TAG outside the system range. The EUT was rotated in three orthogonal axis, the worst-case results are shown in the following.

Limits: To calculate the limits according to the used measuring distances, the 40 dB/decade extrapolation method was used.

Supply voltage: During all measurements the EUT was supplied by the internal power supply.

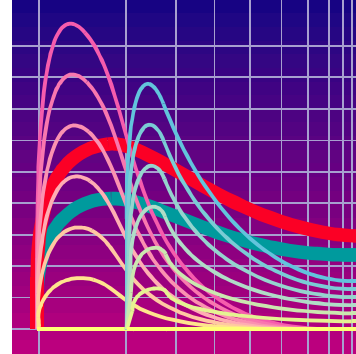
Test results: The test results were calculated with the following formula:

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

#### Measuring results (distance 3 m):

Fundamental frequency						
Frequency kHz	Result dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
133.330	97.7	105.1	7.4	AV	77.7	20.0
Three highest spurious emissions						
Frequency kHz	Result dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
266.660	62.0	99.1	37.1	AV	42.0	20.0
399.990	48.0	95.6	47.6	AV	28.0	20.0
533.320	50.9	113.1	62.2	QP	30.9	20.0
Three highest spurious emissions in restricted bands						
Frequency kHz	Result dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
No emissions inside the restricted bands found						
Other spurious emissions						
Frequency kHz	Result dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
666.650	40.8	111.1	70.3	QP	20.8	20.0

\*: Cable loss included



TEST REPORT REFERENCE: R20353 Edition 2

Measuring results (distance 10 m):

Fundamental frequency				
Frequency kHz	Result dB $\mu$ V/m	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
133.330	65.0	AV	45.0	20.0
Three highest spurious emissions				
Frequency kHz	Result dB $\mu$ V/m	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
266.660	43.4	AV	23.4	20.0
399.990	45.8	AV	25.8	20.0
533.320	46.2	QP	26.2	20.0
Three highest spurious emissions in restricted bands				
Frequency kHz	Result dB $\mu$ V/m	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
No emissions inside the restricted bands found				
Other spurious emissions				
Frequency kHz	Result dB $\mu$ V/m	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
666.650	41.9	QP	21.9	20.0

\*: Cable loss included

Measuring results (distance 30 m):

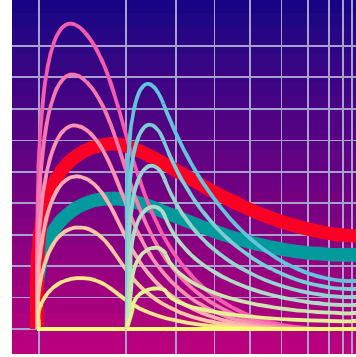
Fundamental frequency						
Frequency kHz	Result dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
133.330	40.0	65.1	25.1	AV	20.0	20.0
No other emissions above the noise floor detectable						

\*: Cable loss included

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

40, 41, 43



TEST REPORT REFERENCE: R20353 Edition 2

#### 6.4 FINAL RADIATED EMISSION TEST (30 MHz TO 1 GHz)

Ambient temperature	24 °C	Relative humidity	42 %
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Position of EUT: The EUT was set-up on a wooden table with its lower edge in a height of 0.8 m. The distance between EUT and antenna was 3 m.

Supply voltage: During all measurements the EUT was supplied by the internal power supply.

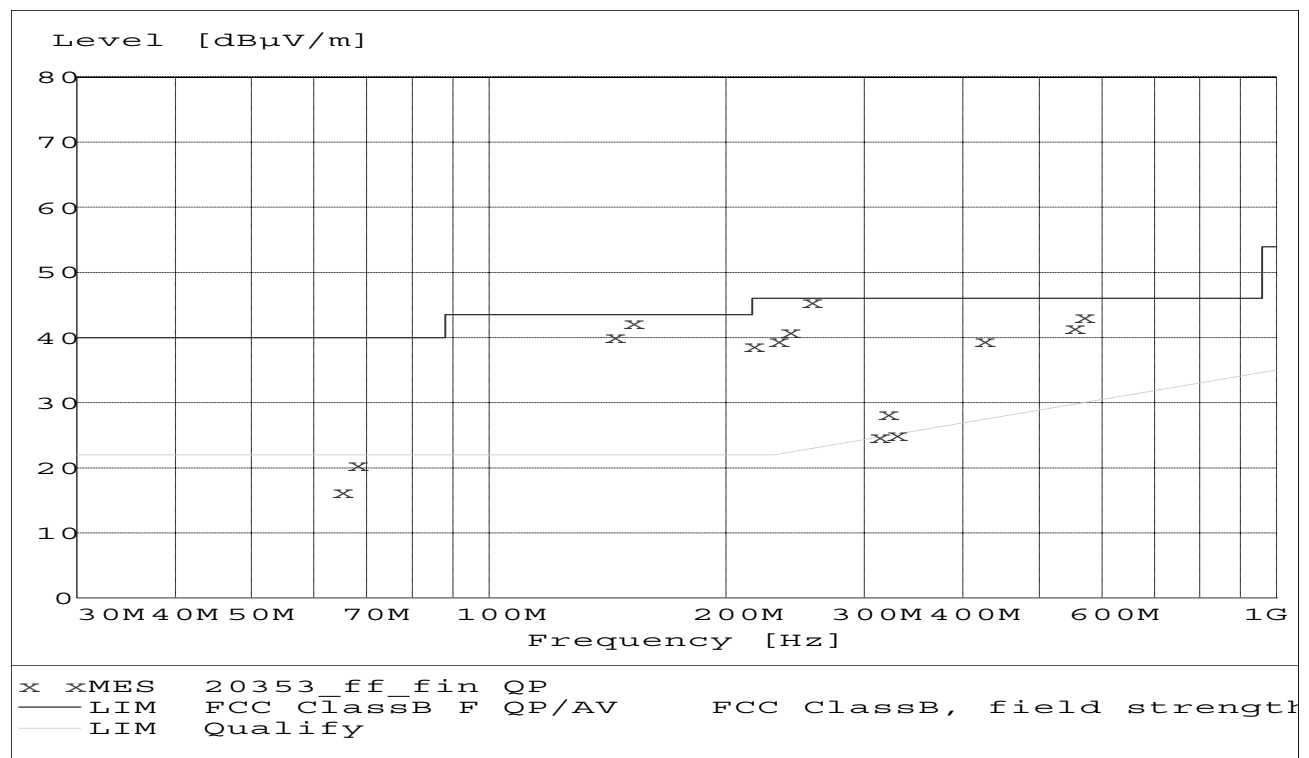
Cable guide: No cables were connected to the EUT.

Test results: The test results were calculated with the following formula:

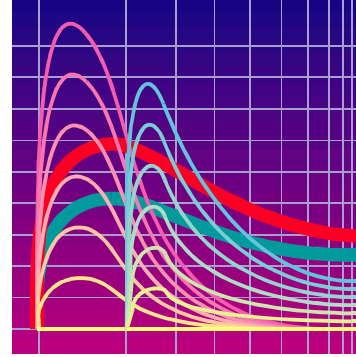
$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

Test record: The test was carried out in continuous transmission mode in the presence of a TAG outside the system range. All results are shown in the following.

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 x are the measured results of the standard final measurement on the open area test site.



Data record name: 20382\_ff



TEST REPORT REFERENCE: R20353 Edition 2

The results of the standard final 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 quasi-peak detector:**

Three highest spurious emissions									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBµV/m	dBµV/m	dB	dBµV	1/m	dB	cm	deg	
143.988000	40.2	43.5	3.3	27.0	11.6	1.6	134.0	352.0	HOR.
151.992000	42.3	43.5	1.2	29.3	11.4	1.6	137.0	82.0	HOR.
567.976000	43.2	46.0	2.8	20.9	19.1	3.2	98.0	152.0	HOR.
Three highest spurious emissions in restricted bands (only two found)									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBµV/m	dBµV/m	dB	dBµV	1/m	dB	cm	deg	
255.988000	45.5	46.0	0.5	31.1	12.3	2.1	100.0	337.0	HOR.
327.988000	25.0	46.0	21.0	9.4	13.2	2.4	325.0	339.0	HOR.
Other spurious emissions									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBµV/m	dBµV/m	dB	dBµV	1/m	dB	cm	deg	
64.944000	16.2	40.0	23.8	9.2	5.9	1.1	328.0	145.0	VERT.
67.776000	20.5	40.0	19.5	13.3	6.1	1.1	390.0	68.0	HOR.
216.000000	38.7	43.5	4.8	27.6	9.2	1.9	101.0	68.0	HOR.
231.984000	39.4	46.0	6.6	27.3	10.1	2.0	101.0	88.0	HOR.
239.988000	40.9	46.0	5.1	28.0	10.9	2.0	101.0	89.0	HOR.
311.980000	24.7	46.0	21.3	9.9	12.5	2.3	272.0	254.0	VERT.
319.906000	28.3	46.0	17.7	13.0	13.0	2.3	215.0	68.0	HOR.
423.976000	39.4	46.0	6.6	21.0	15.7	2.7	138.0	88.0	HOR.
551.980000	41.5	46.0	4.5	21.3	17.1	3.1	361.0	143.0	HOR.

Data record name: 20353\_ff\_fin QP

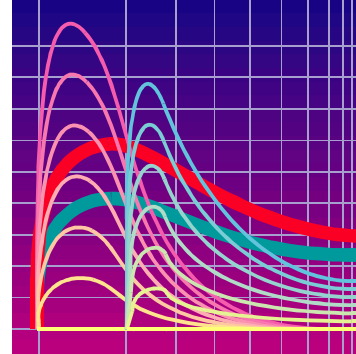
The test results were calculated with the following formula:

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

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

14 – 20



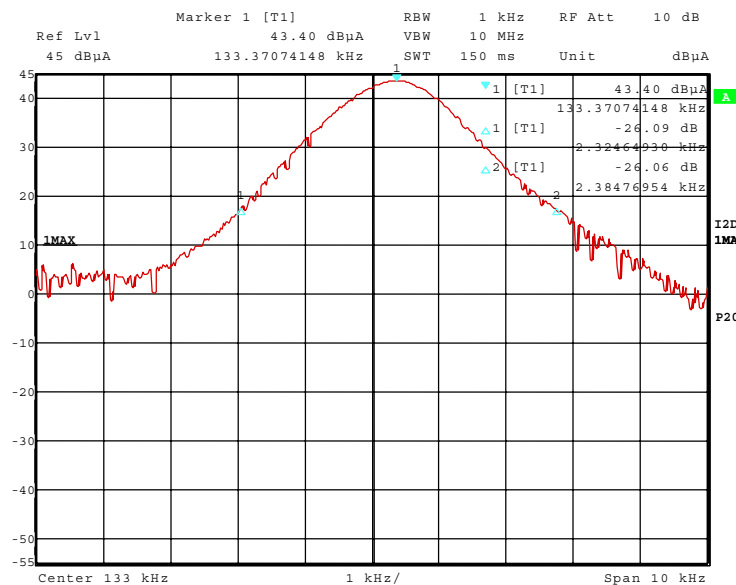
TEST REPORT REFERENCE: R20353 Edition 2

## 6.5 BANDEDGE COMPLIANCE

Ambient temperature	20 °C	Relative humidity	62 %
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- Test set-up:** For this test the test set-up from the preliminary emission measurement test set-up was used.
- Position of EUT:** The EUT was set-up on a wooden table with its lower edge in a height of 0.8 m. The distance between EUT and antenna was 3 m.
- Cable guide:** No cables were connected to the EUT.
- Test record:** The test was carried out in continuous transmission mode in the presence of a TAG outside the system range. The EUT was rotated in three orthogonal axis, the worst-case results are shown in the following.
- Calibration:** The display of the spectrum analyser was calibrated with a signal generator before

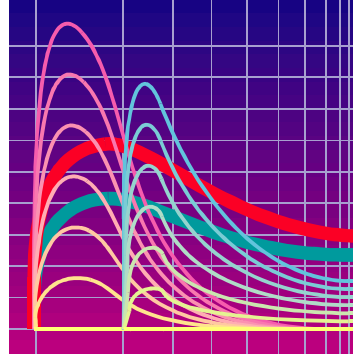
20353bw.wmf



$F_L$	$F_U$	BW ( $F_U - F_L$ )
131.046 kHz	135.756 kHz	4.710 kHz

TEST EQUIPMENT USED THE TEST:

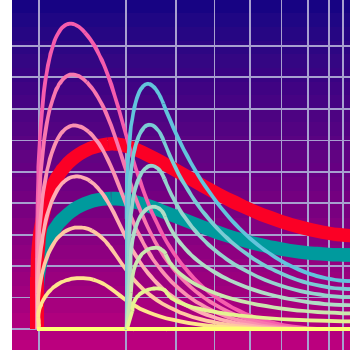
29, 31 - 33, 41, 44
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TEST REPORT REFERENCE: R20353 Edition 2

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## 7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

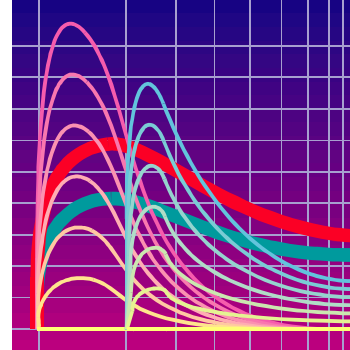


TEST REPORT REFERENCE: R20353 Edition 2

Emission measurement at AC mains and DC in / out ports at M4					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088
2	Measuring receiver	ESAI	Rohde & Schwarz	831953/001 833181/018	480025 480026
3	LISN	NSLK8128	Schwarzbeck	8128155	480058
4	DC-filter	B84266-A21-E13	Siemens	940164525	480099
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M5					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
7	Fully anechoic chamber M5	-	Siemens	B83177-S1-X156	480073
8	Measuring receiver	ESVS30	Rohde & Schwarz	829673/012	480024
9	Controller	HD100	Deisel	100/324	480067
10	Antenna support	MA240	Deisel	228/314	480069
11	Turntable	DS412	Deisel	412/317	480070
12	Antenna	CBL6112C	Chase	2689	480327
13	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M6					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
14	Open area test site	-	Phoenix Test-Lab	-	480085
15	Measuring receiver	ESVS30	Rohde & Schwarz	829673/012	480024
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
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111



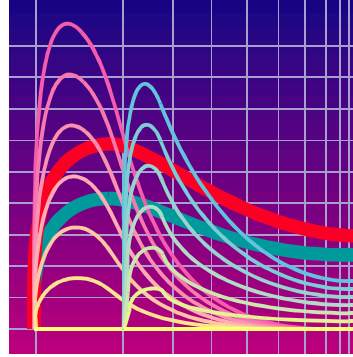
TEST REPORT REFERENCE: R20353 Edition 2

Radiated emission measurement at M8					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
21	Fully anechoic chamber M8	-	Siemens	B83117-E7019-T231	480190
22	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
23	Measuring receiver	ESCS 30	Rohde & Schwarz	828985/014	480270
24	Controller	HD100	Deisel	100/427	480181
25	Turntable	DS420	Deisel	420/435/97	480186
26	Antenna support	AS615P	Deisel	615/310	480187
27	Antenna	CBL6112 A	Chase	2034	480185
28	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M20					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303
30	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355
32	Controller	HD100	Deisel	100/670	480326
33	Turntable	DS420HE	Deisel	420/620/80	480315
34	Antenna support	AS615P	Deisel	615/310	480187
35	Antenna	CBL6112 B	Chase	2688	480328
36	Antenna	3115 A	EMCO	9609-4918	480183
37	RF-cable No. 30	RTK 081	Rosenberger	-	410141
38	EMI Software	ES-K1	Rohde & Schwarz	-	480111
39	RF-cable No. 5	RTK 081	Rosenberger	-	410097

Ancillary equipment used for testing					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
40	Outdoor test site	-	Phoenix Test-Lab	-	480293
41	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059
42	Power supply	TOE 8852	Toellner	51712	480233

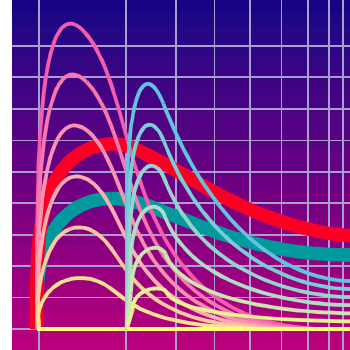




TEST REPORT REFERENCE: R20353 Edition 2

No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
43	EMI test receiver	ESPC	Rohde & Schwarz	843756/006	480150
44	Signal generator	SMHU	Rohde & Schwarz	844170/017	480266
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

All used measurement equipment was calibrated (if necessary). The calibration intervals and the calibration history will be given out on request.



TEST REPORT REFERENCE: R20353 Edition 2

## 8 LIST OF ANNEXES

<b>ANNEX A</b>	<b>PHOTOGRAPHS OF THE TEST SET-UPS:</b>	<b>5 pages</b>
	METT HHU 76519 test set-up preliminary emission test (9 kHz to 30 MHz)	20353_f.jpg
	METT HHU 76519 test set-up preliminary emission test (30 MHz to 1 GHz)	20353_a.jpg
	METT HHU 76519 detail view to test set-up	20353_g.jpg
	METT HHU 76519 test set-up outdoor test site	20353_c.jpg
	METT HHU 76519 test set-up open area test site	20353_i.jpg
<b>ANNEX B</b>	<b>EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:</b>	<b>5 pages</b>
	METT HHU 76519 front view	20353_3.jpg
	METT HHU 76519 rear view	20353_2.jpg
	METT HHU 76519 type plate RF unit	20353_1.jpg
	METT HHU 76519 TAG, top view	20353_11.jpg
	METT HHU 76519 TAG, bottom view	20353_12.jpg
<b>ANNEX C</b>	<b>INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:</b>	<b>7 pages</b>
	METT HHU 76519 internal view RF unit	20353_4.jpg
	METT HHU 76519 shielding of the RF unit, top view	20353_9.jpg
	METT HHU 76519 shielding of the RF unit, bottom view	20353_6.jpg
	METT HHU 76519 RF unit, digital board, top view	20353_8.jpg
	METT HHU 76519 RF unit, digital board, bottom view	20353_7.jpg
	METT HHU 76519 RF unit, analogue board, top view	20353_5.jpg
	METT HHU 76519 RF unit, analogue board, bottom view	20353_10.jpg
<b>ANNEX D</b>	<b>DECLARATION TO THE EMC ARRANGEMENTS</b>	<b>1 page</b>