



**EUROFINS PRODUCT SERVICE GMBH**



**Testing Cert #1983.01**

# **TEST - REPORT**

**2.4GHz FHSS Transceiver WIT2450**

**FCC RULES PARTS 15.247  
IC RADIO STANDARDS RSS-210 Issue 7**

**FCC ID: RFD-CS-B  
IC: 3177A-CSB**

**Field controller  
CS15**

**Test report no.: G0M20908-2509-C-2**



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# 1 General information

## 1.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Product Service GmbH is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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### Operator:

25.09.2009

W. Treffke



Date

Eurofins-Lab.

Name

Signature

### Technical responsibility for area of testing:

25.09.2009

T. Jahn



Date

Eurofins-Lab

Name

Signature

## 1.2 Testing laboratory

### 1.2.1 Location

EUROFINS PRODUCT SERVICE GMBH  
Storkower Straße 38c  
D-15526 Reichenwalde b. Berlin  
Germany  
Telephone : +49 33631 888 00  
Telefax : +49 33631 888 660

### 1.2.2 Details of accreditation status

**DAR ACCREDITED TESTING LABORATORY**  
DAR-REGISTRATION NUMBER: DAT-P-268/08

**RECOGNIZED NOTIFIED BODY EMC**  
REGISTRATION NUMBER: BNetzA-bS EMV-07/61

**RECOGNIZED NOTIFIED BODY R&TTE**  
REGISTRATION NUMBER: BNetzA-bS-02/51-53

**FCC FILED TEST LABORATORY**  
REG.-No. 96970

**A2LA ACCREDITED TESTING LABORATORY**  
CERTIFICATE No. 1983.01

**BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)**  
ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

**INDUSTRY CANADA FILED TEST LABORATORY**  
REG. No. IC 3470

## 1.3 Details of approval holder

Name	: Leica Geosystems AG
Street	: Heinrich Wild Strasse 1
Town	: CH-9435 Heerbrugg
Country	: Switzerland
Telephone	: +41 71 727 3764
Contact	: Herr Silvan Stucki
E-Mail	: Silvan.Stucki@Leica-Geosystems.com

## 1.4 Application details

Date of receipt of application : 18.08.2009  
Date of receipt of test item : 18.08.2009  
Date of test : 31.08.2009 - 01.09.2009

## 1.5 Test item

Description of test item : Field controller  
Type identification : CS15  
Serial number : without  
Photos : See annex A.

## Technical data

Frequency range : 2400 - 2483.5MHz  
Tested frequencies : F<sub>1</sub> 2401MHz  
                                  F<sub>2</sub> 2437MHz  
                                  F<sub>3</sub> 2474MHz  
  
Antenna : integral  
Antenna gain : 2dBi  
Power supply : 7.4VDC(battery)  
Modulation : FHSS

Classification :

Fixed Device	<input type="checkbox"/>
Mobile Device (Human Body distance > 20 cm)	<input checked="" type="checkbox"/>
Portable Device (Human Body distance < 20 cm)	<input type="checkbox"/>

**Manufacturer:**  
(if applicable)

Name : Leica Geosystems AG  
Street : Heinrich Wild Strasse 1  
Town : CH-9435 Heerbrugg  
Country : Switzerland

Additional information: The test item has three radios with three antennas inside. All radios were tested separately with one radio active and the other radios deactivated.

The manufacturer declares that the device Field controller CS15 uses the Bluetooth wireless module model PAN1310 of the company Panasonic, the frequency hopping transceiver module WIT2450 of the company Cirronet and the OWLAN211g module from connectBlue AB. Therefore a shortened test plan was created in confirmation with the manufacturer. The test results for the wireless lan radio are given in the test report G0M20908-2509-C-1 and for the Bluetooth in the test report G0M20908-2509-P-15.

## 1.6 Test standards

Technical standard: FCC Parts: 15.247  
IC Standards: RSS 210 Issue 7

## 2 Technical test

### 2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

or

The deviations as specified in 2.5 were ascertained in the course of the tests performed.

### 2.2 Test environment

Temperature : 24°C  
Relative humidity content : 20 ... 75 %  
Air pressure : 86 ... 103 kPa  
Details of power supply : 7.4VDC(battery)

### 2.3 Test equipment utilized

No.	Test equipment	Type	Manufacturer
ETS 0012	Biconical Antenna	HK 116	R & S
ETS 0013	LPD Antenna	HL 223	R & S
ETS 0015	Log Periodical Antenna	HL 025	R & S
ETS 0018	Horn antenna	BBHA 9120 D	Schwarzbeck
ETS 0253	Spectrum Analyzer	FSIQ 26	R & S
ETS 0271	Spectrum Analyzer	FSEK 30	R & S
ETS 0288	Artificial mains	ESH2-Z5	R & S
ETS 0086	Anechoic chamber	AC 1	Frankonia
ETS 0474	EMI Test Receiver	ESCS 30	R&S



## 2.4 General test procedure

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI STANDARD C63.4-2003 5.2 using a 50  $\mu$ H LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The resolution bandwidth of the spectrum analyzer was 100 kHz for measurements below 1 GHz and RBW 1 MHz was used above 1 GHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

**FORMULA OF CONVERSION FACTORS for Field strength:** The Field Strength at 3 m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB $\mu$ V) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

Freq. (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dB $\mu$ V + 10.36 dB + 6 dB = 36.36 dB $\mu$ V/m @ 3 m

**ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES:** The UUT was placed on a table 80 cm high and with dimensions of 1 m by 1.5 m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to at least 10<sup>th</sup> harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings. Measurements were made by Eurofins Product Service GmbH at the registered open field test site located at Storkower Str. 38c, 15526 Reichenwalde, Germany.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1 m to 4 m. The antenna was placed in both the horizontal and vertical planes.

### RF Exposure Compliance Requirements

According to FCC OET Bulletin 65 Edition 97-01 Supplement C and RSS-102 § 2.5, this spread spectrum transmitter is categorically excluded from routine environmental evaluation because of the low power level, where there is a high likelihood of compliance with RF exposure standards.

The antenna used for this transceiver must not be co-located or operating in conjunction with any other antenna or transmitter.

### ANTENNA & GROUND:

This unit uses internal antenna.

## 2.5 Test results

 1<sup>st</sup> test

 test after modification

 production test

SECT.	TEST CASE	FCC 47CFR PART	IC RSS-	Required	Test passed	Test failed
3.	<i>TRANSMITTER PARAMETERS</i>					
	RF power output conducted	15.247 (b)	210 A8.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	RF power output radiated (EIRP)	15.247 (b)	210 A8.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.1	20dB bandwidth, Occupied bandwidth	15.247 (a)(1)	210 A8.1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Time of occupancy (dwell time)	15.247 (a)(1)	210 A8.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Number of hopping channels	15.247 (a)(1)	210 A8.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Carrier frequency separation	15.247 (a)(1)	210 A8.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Spurious emission conducted	15.247 (d)	210 A8.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Spurious emission radiated	15.247 (d)	210 A8.5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Band-edge compliance	15.247 (d)	210 A8.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	AC power line conducted emissions	15.207	Gen 7.2.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<i>RECEIVER PARAMETERS</i>					
4.1	Radiated emissions	15.107	Gen 7.2.3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### 3 Transmitter parameters

#### 3.1 Occupied Bandwidth (99%) – RSS Gen

Test conditions	Frequency 1 2401 MHz	Frequency 2 2437MHz	Frequency 3 247 MHz
	kHz	kHz	kHz
$T_{nom} = 24^{\circ}\text{C}$ $V_{nom} = 7.4\text{VDC}$	631	651	701
Measurement uncertainty	< 10 Hz		

**Test equipment:** ETS 0271

## 3.2 Spurious emission radiated

### Reference

<b>FCC</b>	CFR part 15.247(d), 15.205, 15.209, 15.35
<b>IC</b>	RSS-210 A8.5, RSS-210 2.7

### Method of measurement

According to 47 CFR 15, Part 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### Calculation of Limit:

All results are updated by an automatic measuring system in accordance to point 2.3

### GFSK

Limit = max. reading (because peak detector is used)  
114.69 dB $\mu$ V/m

Limit = Max. reading - 20 dB (because average detector is used)  
114.69 dB $\mu$ V/m - 20 dB = 94.69 dB $\mu$ V/m

**Limits for restricted bands**

<b>FCC &amp; IC</b>	20 dB below peak output power, emissions which fall in the restricted bands (15.205(a)) / (RSS-210 2.7) must comply the following limits: Frequencies below 1GHz:		
	Frequency of emission	Field strength	Field strength
	[MHz]	[ $\mu$ V / m]	[dB $\mu$ V / m]
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
For frequencies above 1 GHz (Avg measurements): 54.0 dB $\mu$ V / m For frequencies above 1 GHz (Pk measurements): Limit + 20 dB = 54.0 dB $\mu$ V / m + 20 dB = 74 dB $\mu$ V / m			

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results.

The peak and average spurious emission plots was measured with the average limits. In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

If in the column's correction factor states a value then the max. Field strength in the same row is corrected by a value gained from the "Marker-Delta-Method" or the „Duty-Cycle Correction Factor“.

**15.35 (c) Duty cycle correction average value**

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.

Duty cycle correction = 20 log (dwell time / 100 ms or less)

**DA 00-705 Duty cycle correction peak value**

The analyzer setting was as following:

Frequency range	RES bandwidth		Video bandwidth	
	Pk	Avg	Pk	Avg
f < 1GHz	100 kHz	100 kHz	10 Hz	10 Hz
f > 1GHz	1 MHz	1 MHz	10 Hz	10 Hz

Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20 log (dwell time / 100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## Test results

### Summary table with radiated data of the test plots GFSK

Used Ch.	Frequency Marker [GHz]	Polarization	$\Delta$ corrections dB	Max. Field Strength [dB $\mu$ V/m]	Compliance Limit [dB $\mu$ V/m]	Detector	BW [MHz]	Margin [dB]
low	4802	h		58.21	74	P	1	-15.8
low	4802	h		46.93	54	AV	1	-7.07
low	4802	v		55.3	74	P	1	-18.7
low	4802	v		47.9	54	AV	1	-6.1

All other not noted test plots do not contain significant test results in relation to the limits.

See attached diagrams in Annex.

**Test equipment:** ETS 0012, ETS 0013, ETS 0015, ETS 0018, ETS 0271, ETS 0253, ETS 0086

## 4 Receiver parameters

### 4.1 Radiated emissions

#### Reference

<b>FCC</b>	Part 15.109
<b>IC</b>	RSS-Gen 7.2.3

#### Method of measurement

The compliance of the EUT Receiver with the Limits of spurious emissions was performed according to the radiated measurement method.

The spectrum analyzer RBW was set to 100 kHz for measurements below 100 kHz and 1.0 MHz above 1.0 GHz. The measurement results are evaluated according to the procedure described in section 2.4 of this test report.

#### Limits

<b>FCC &amp; IC</b>	20 dB below peak output power, emissions which fall in the restricted bands (15.205(a)) / (RSS-210 2.7) must comply the following limits: Frequencies below 1GHz:		
	Frequency of emission	Field strength	Field strength
	[MHz]	[ $\mu\text{V} / \text{m}$ ]	[dB $\mu\text{V} / \text{m}$ ]
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
For frequencies above 1 GHz (Avg measurements): 54.0 dB $\mu\text{V} / \text{m}$ For frequencies above 1 GHz (Pk measurements): Limit + 20 dB = 54.0 dB $\mu\text{V} / \text{m}$ + 20 dB = 74 dB $\mu\text{V} / \text{m}$			

#### Test Results

Device Frequency	Frequency marker indication [MHz]	Antenna polarization	Worst case emission level [ $\mu\text{V}/\text{m}$ ]	Compliance limit [ $\mu\text{V}/\text{M}$ ]	Results [ $\mu\text{V}/\text{M}$ ]
2441 MHz	178,878	V	43,55	150	<u>-106,45</u>
	198,297	H	43,80	150	<u>-106,20</u>
	259,319	V	36,90	200	<u>-163,10</u>
	259,319	H	30,34	200	<u>-169,66</u>
	3910,000	V	185,99	500	<u>-314,01</u>
	7984,000	H	333,04	500	<u>-166,96</u>
	7848,000	V	336,12	500	<u>-163,88</u>
	178,878	H	43,55	150	<u>-106,45</u>

Comment: See attached diagrams.

**Test equipment:** ETS 0014, ETS 0294, ETS 0295, ETS 0310, ETS 0416, ETS 0484

Test Report No.: G0M20908-2509-C-2

## Annex

<b>A</b>	<b>Pictures</b>	<b>17</b>
<b>B</b>	<b>Transmitter spurious emission</b>	<b>20</b>
<b>C</b>	<b>Receiver spurious emission</b>	<b>42</b>



## **Annex B**

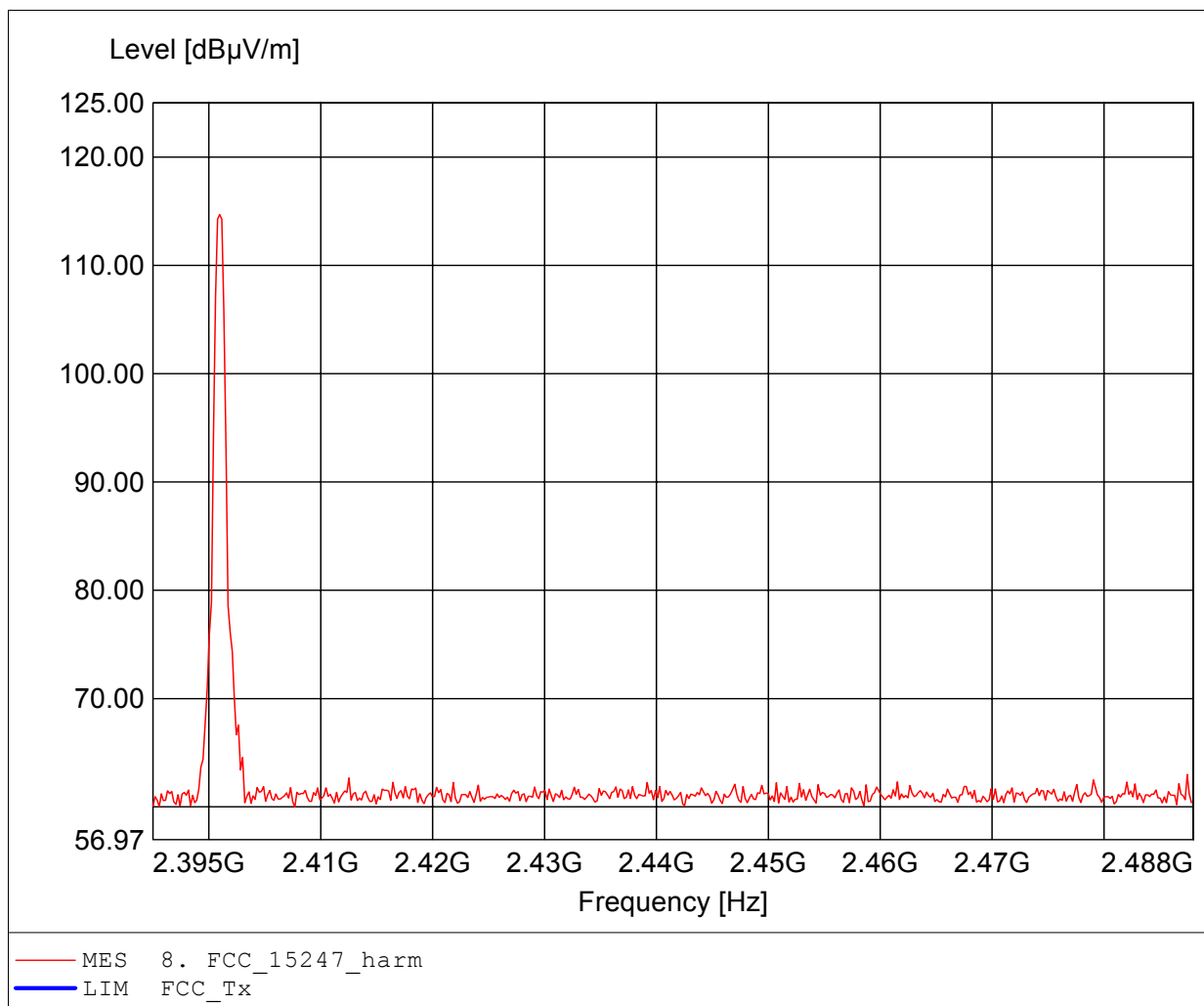
### **Transmitter Spurious Emissions**

This section contains only plots for frequency spans that contain spurious emissions. All missing frequency ranges or plots does not contain any spurious emissions.

**Carrier power (Field Strength)**

**FCC RULES PART 15, SUBPART C**

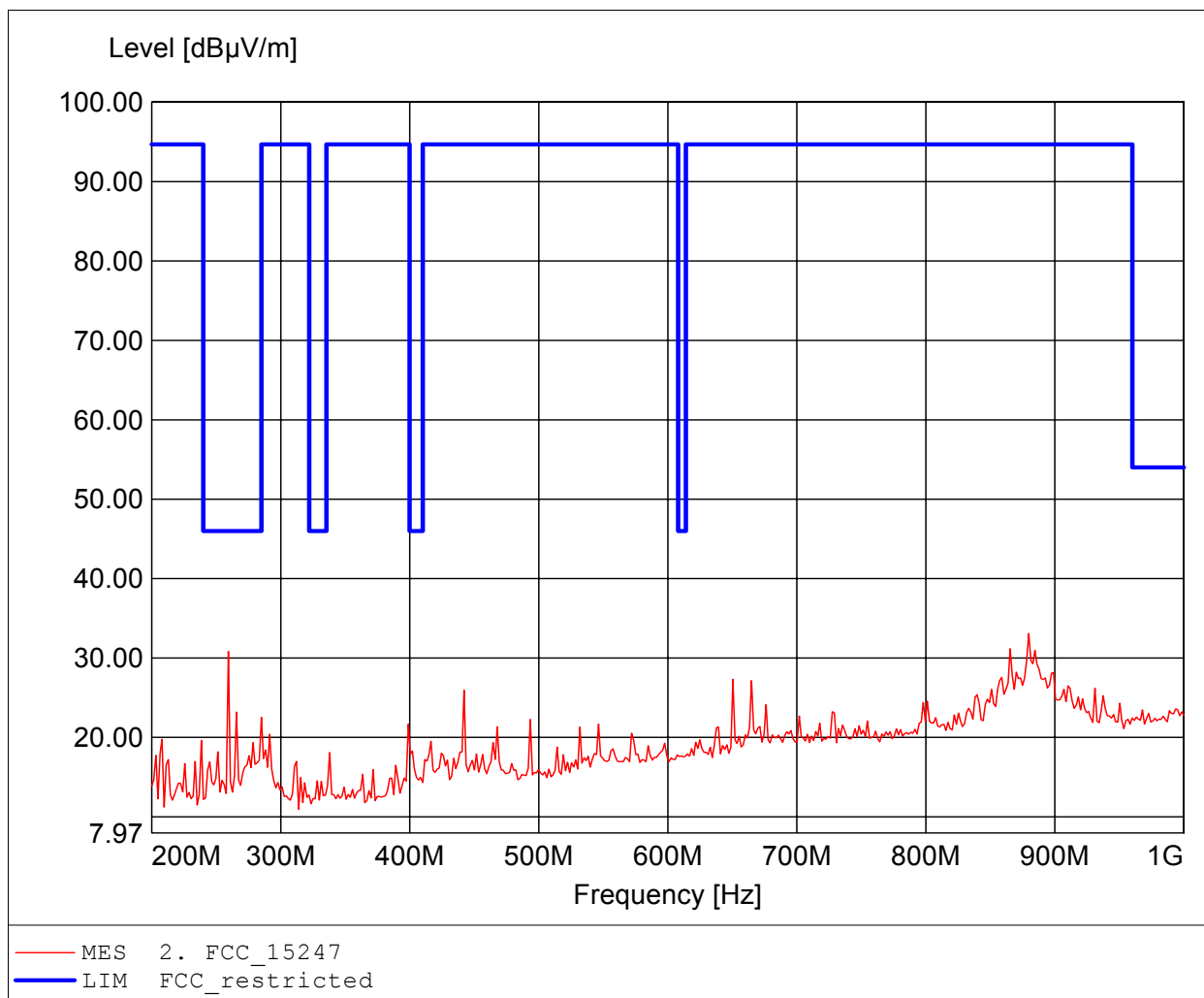
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: BBHA9120D  
Comment 2: Freq: 2.401GHz, Emax: 114.69dBµV/m, RBW: 100kHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

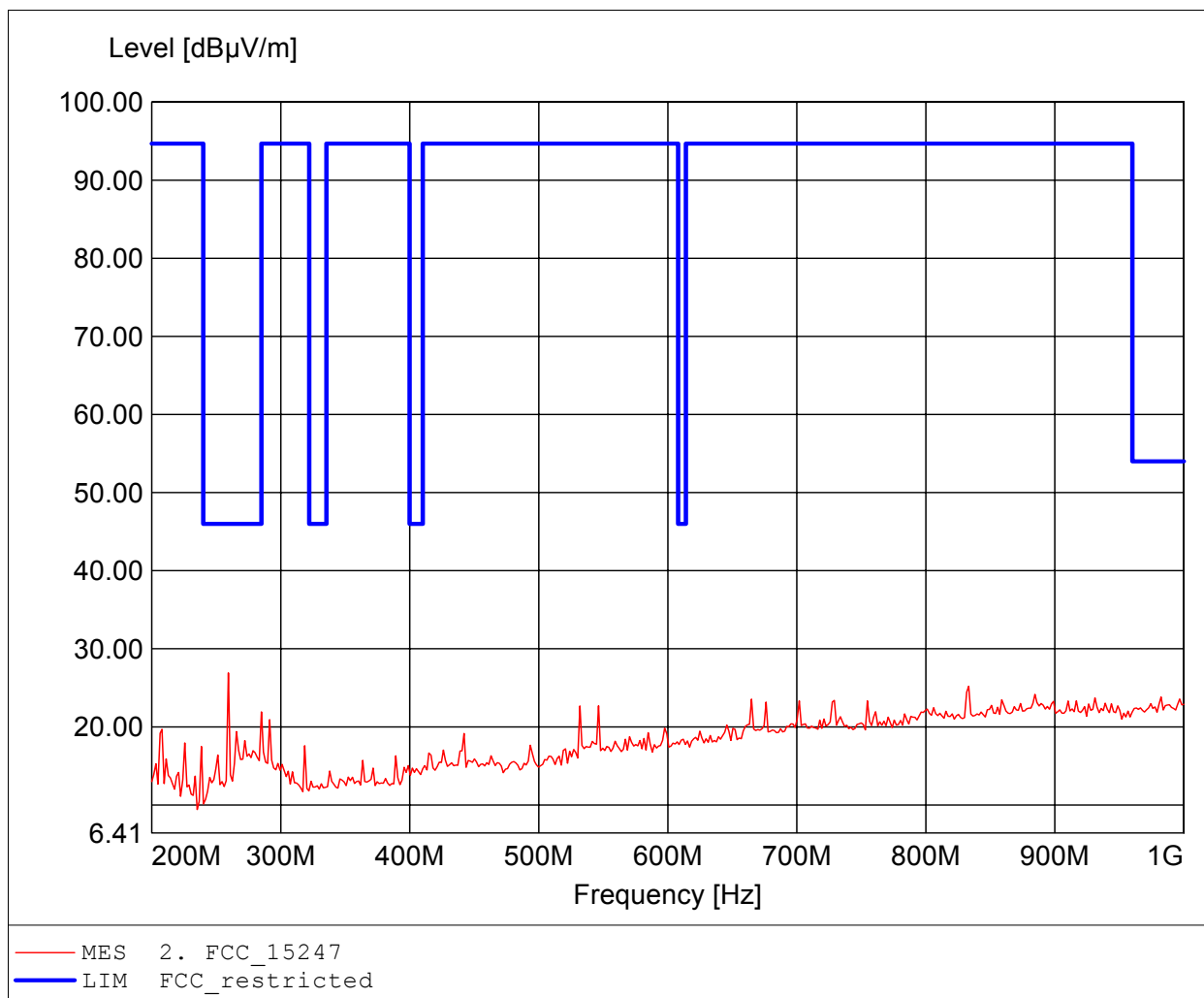
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: HL 223, amplif.  
Comment 2: Freq: 879.760MHz, Emax: 33.09dBµV/m, RBW: 100kHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

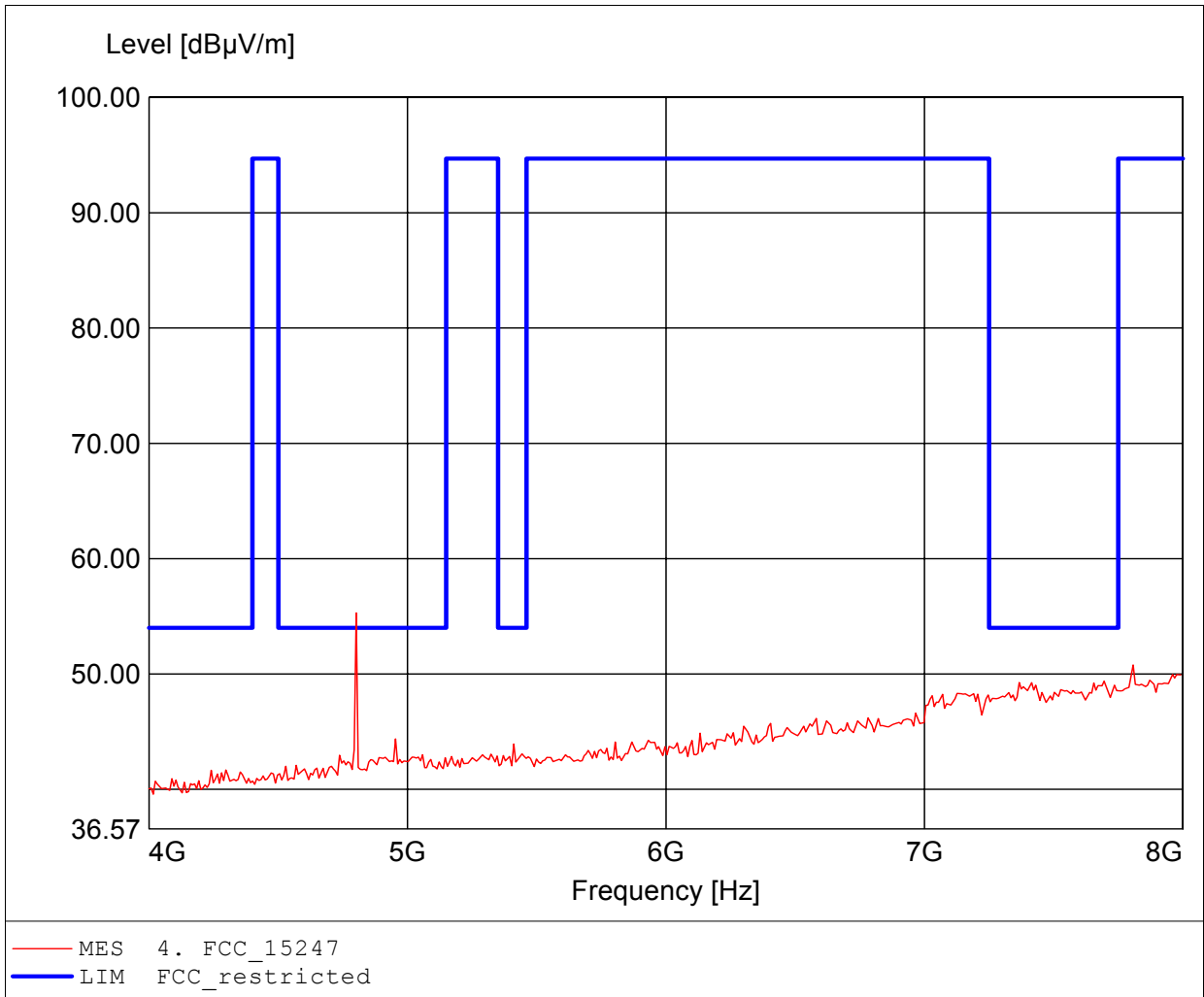
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: HL 223, amplif.  
Comment 2: Freq: 259.319MHz, Emax: 26.91dBµV/m, RBW: 100kHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

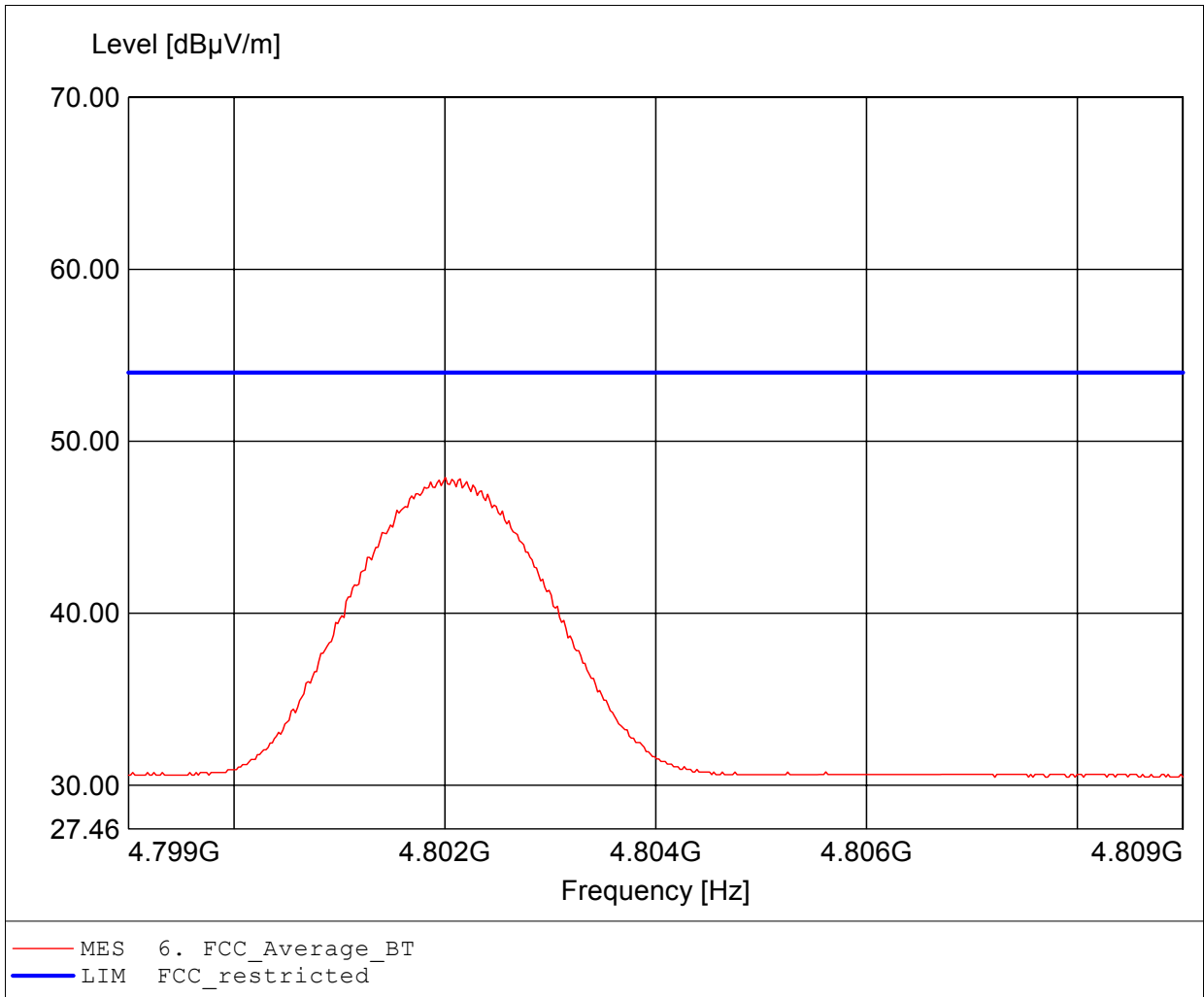
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 4.802GHz, Emax: 55.30dBµV/m, RBW: 1MHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

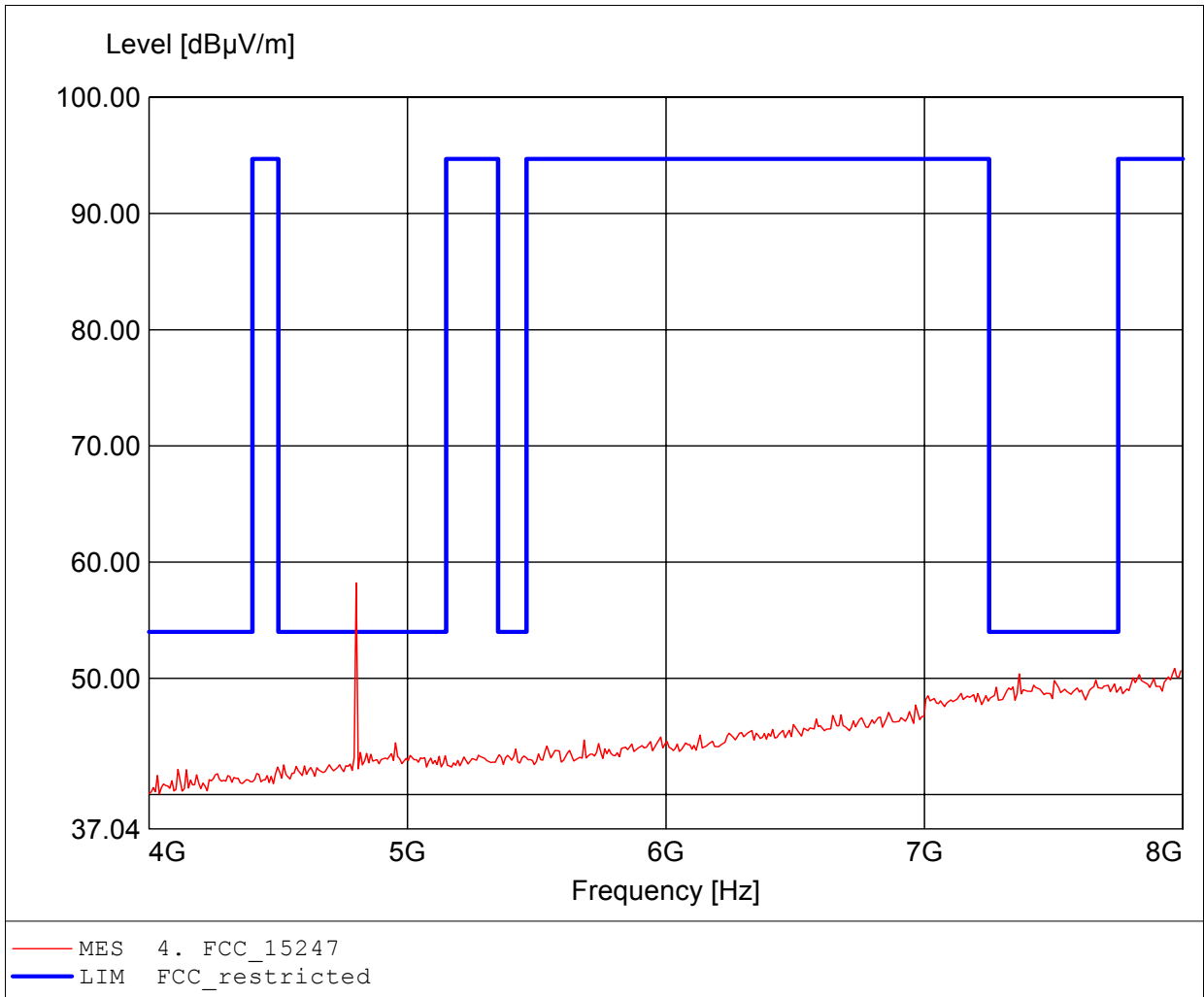
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, average detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 4.802GHz, Emax: 47.90dBuV/m, RBW: 1MHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

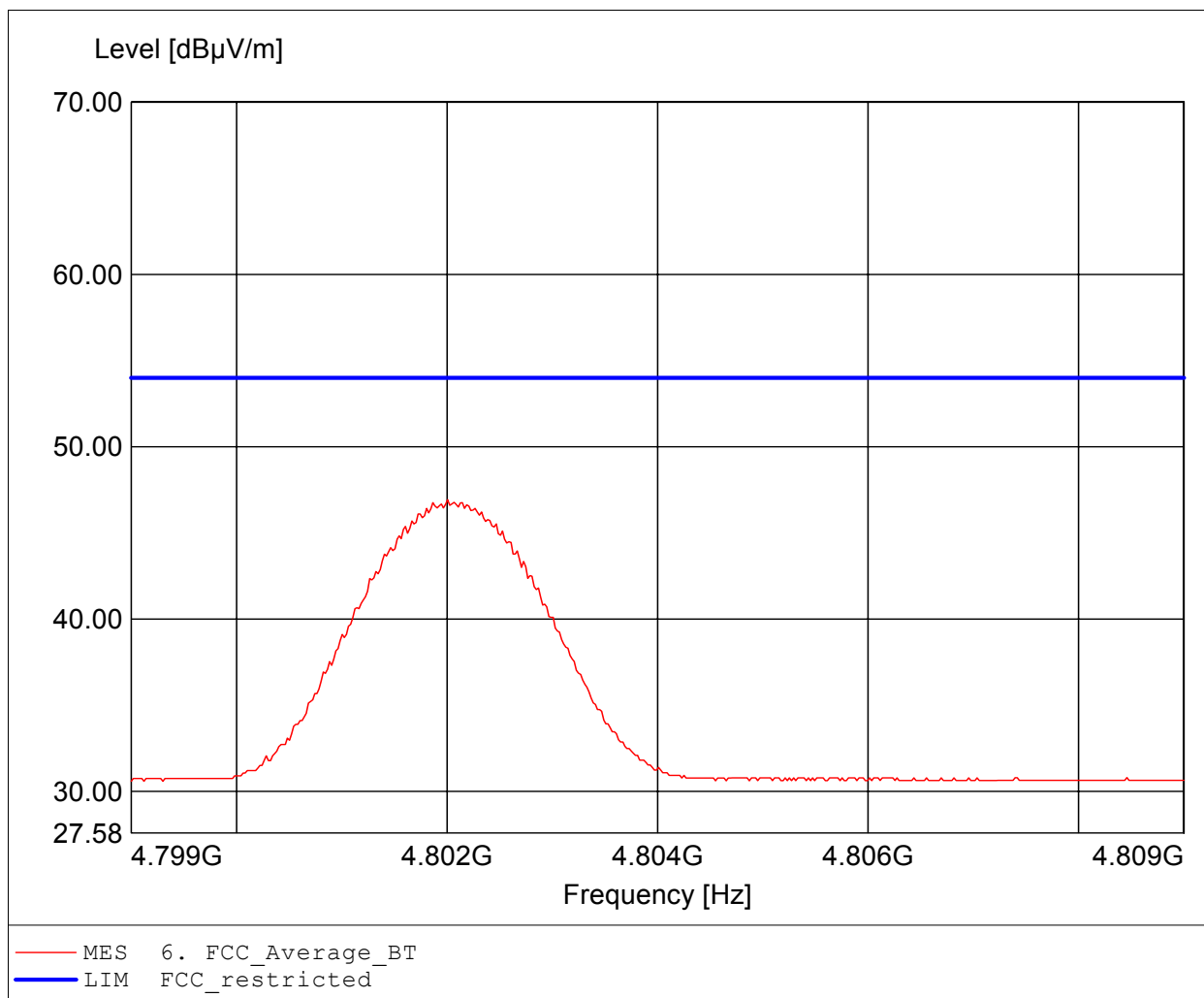
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 4.802GHz, Emax: 58.21dBuV/m, RBW: 1MHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, average detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 4.802GHz, Emax: 46.93dBuV/m, RBW: 1MHz

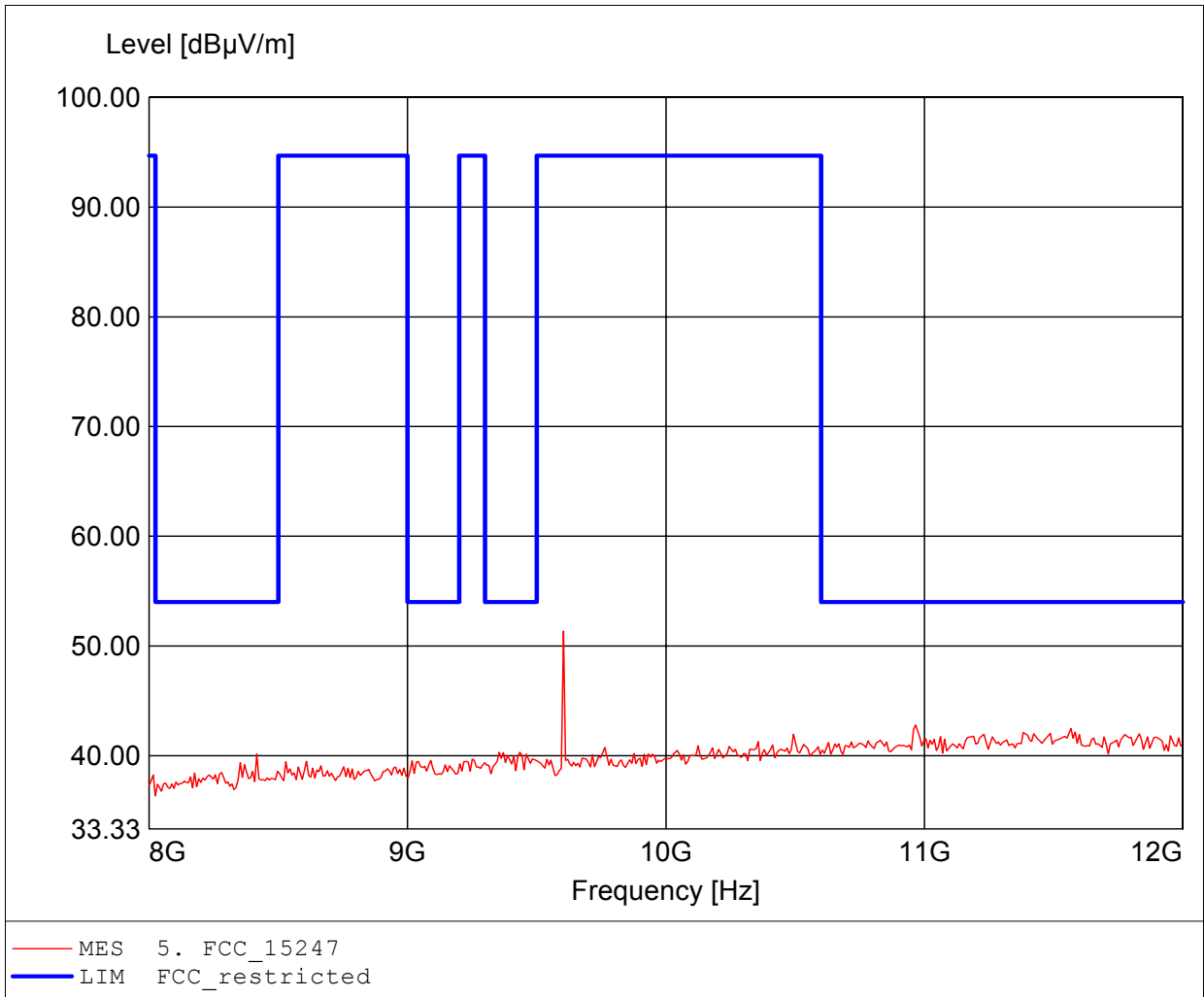




**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

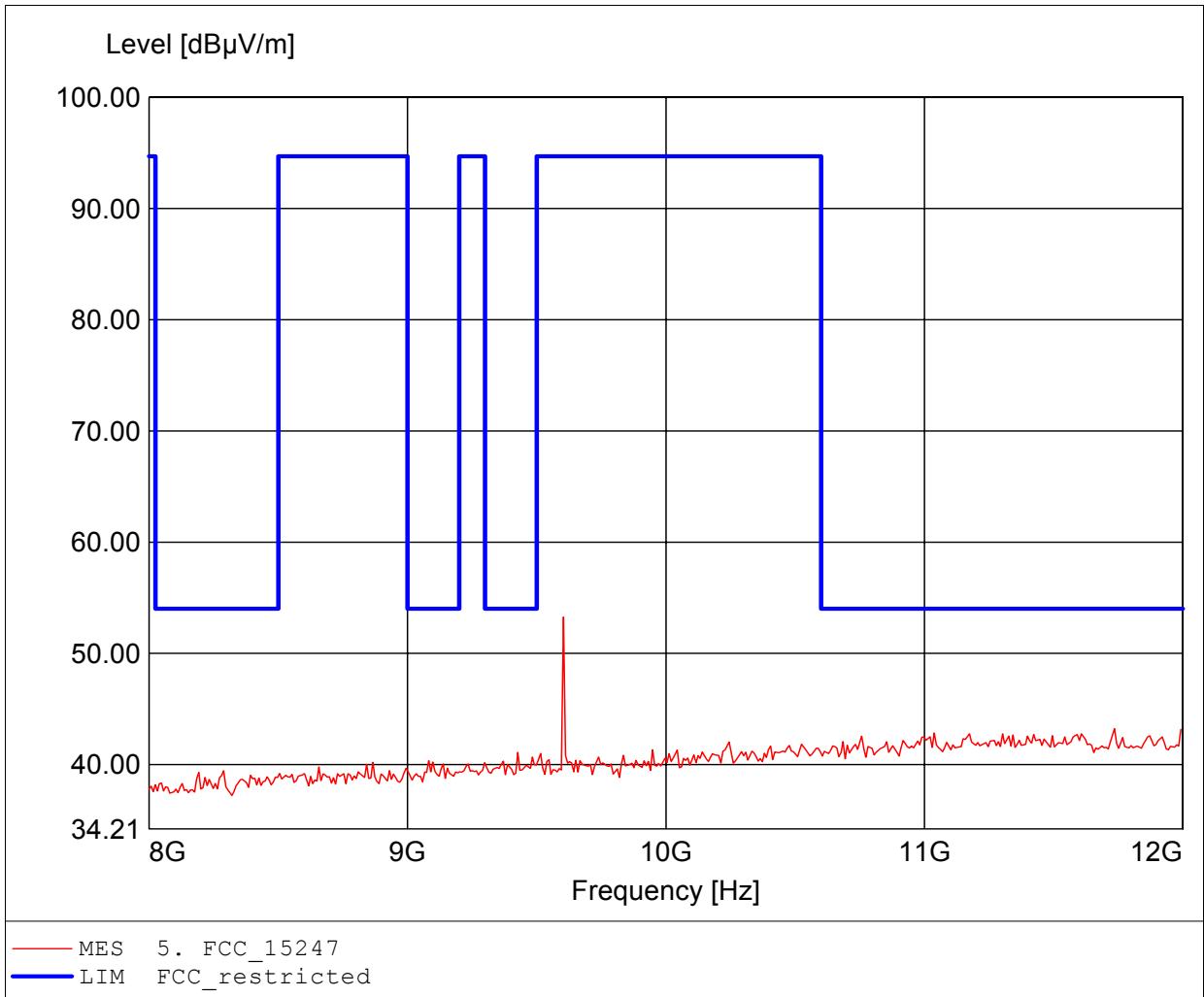
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 9.603GHz, Emax: 51.35dBµV/m, RBW: 1MHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

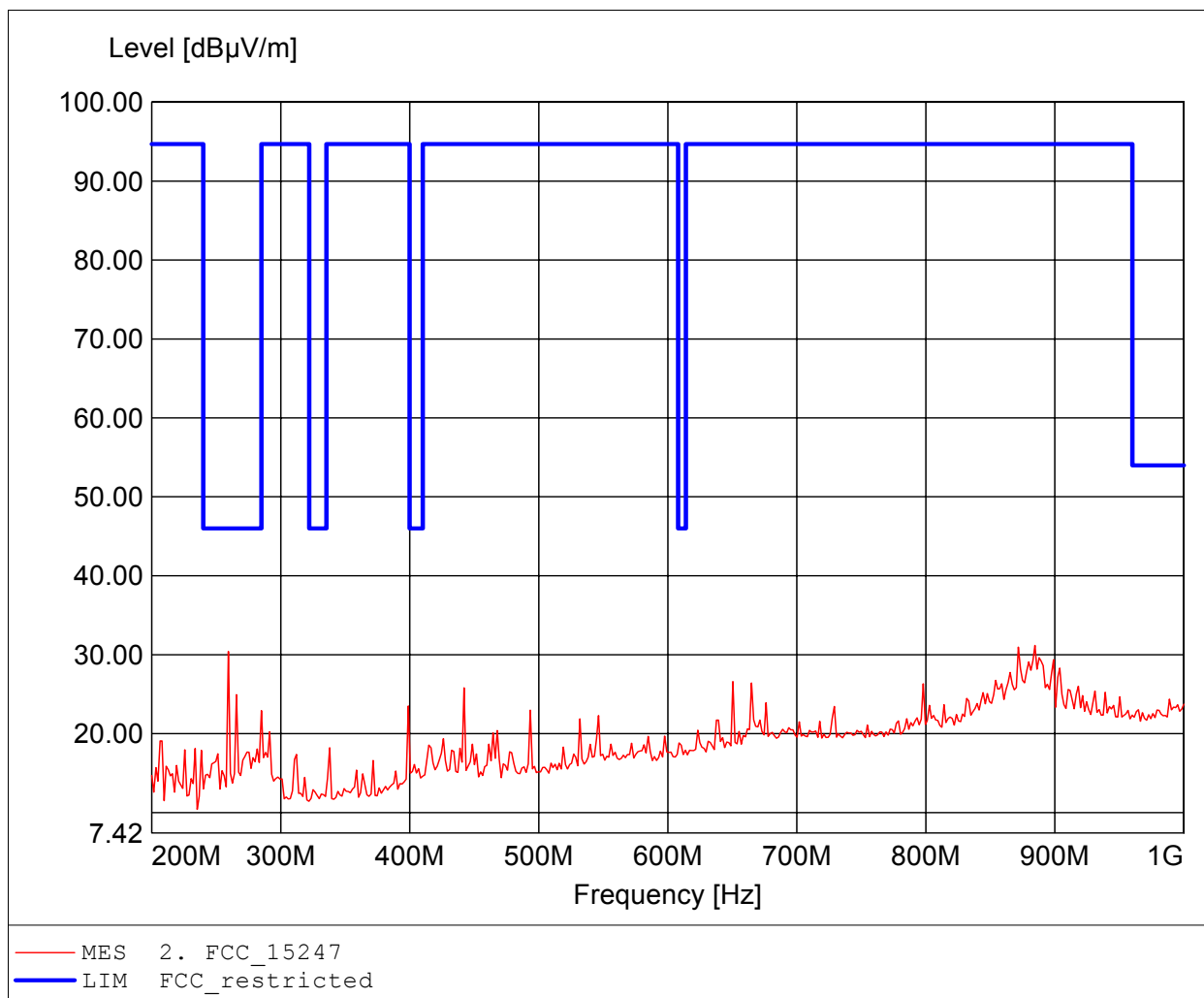
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 9.603GHz, Emax: 53.25dBµV/m, RBW: 1MHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

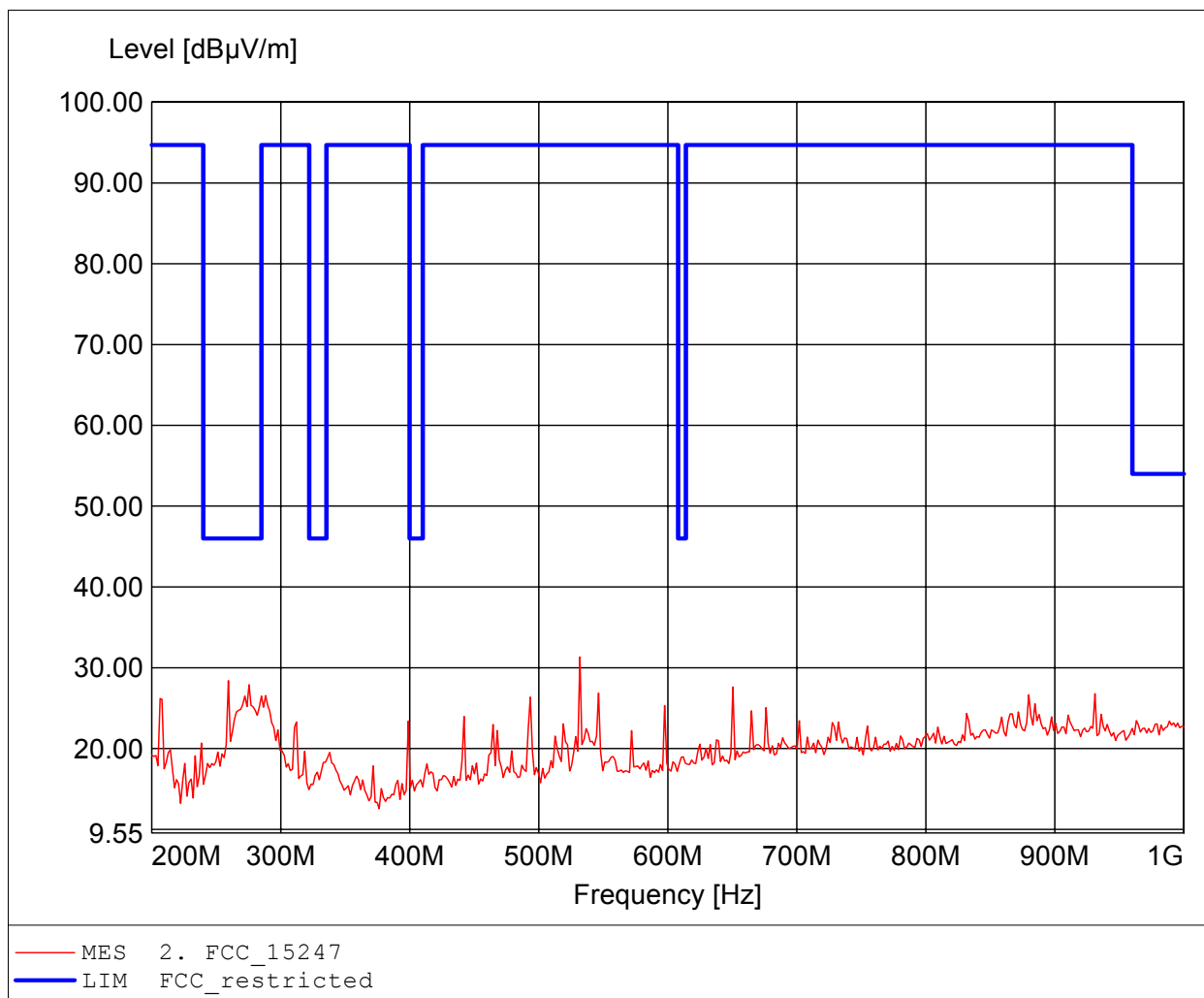
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: HL 223, amplif.  
Comment 2: Freq: 884.569MHz, Emax: 31.18dBµV/m, RBW: 100kHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

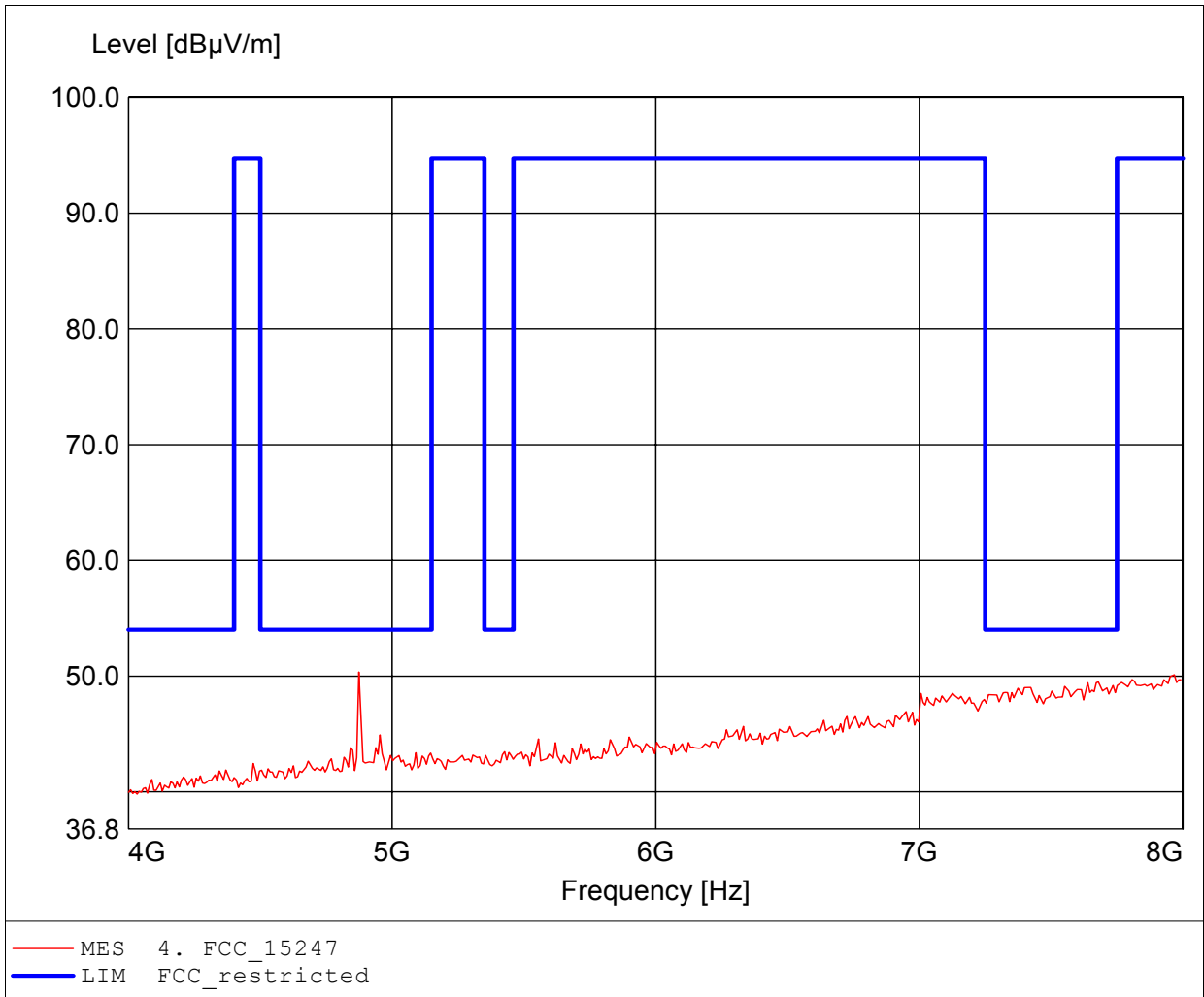
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: HL 223, amplif.  
Comment 2: Freq: 531.864MHz, Emax: 31.34dBµV/m, RBW: 100kHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

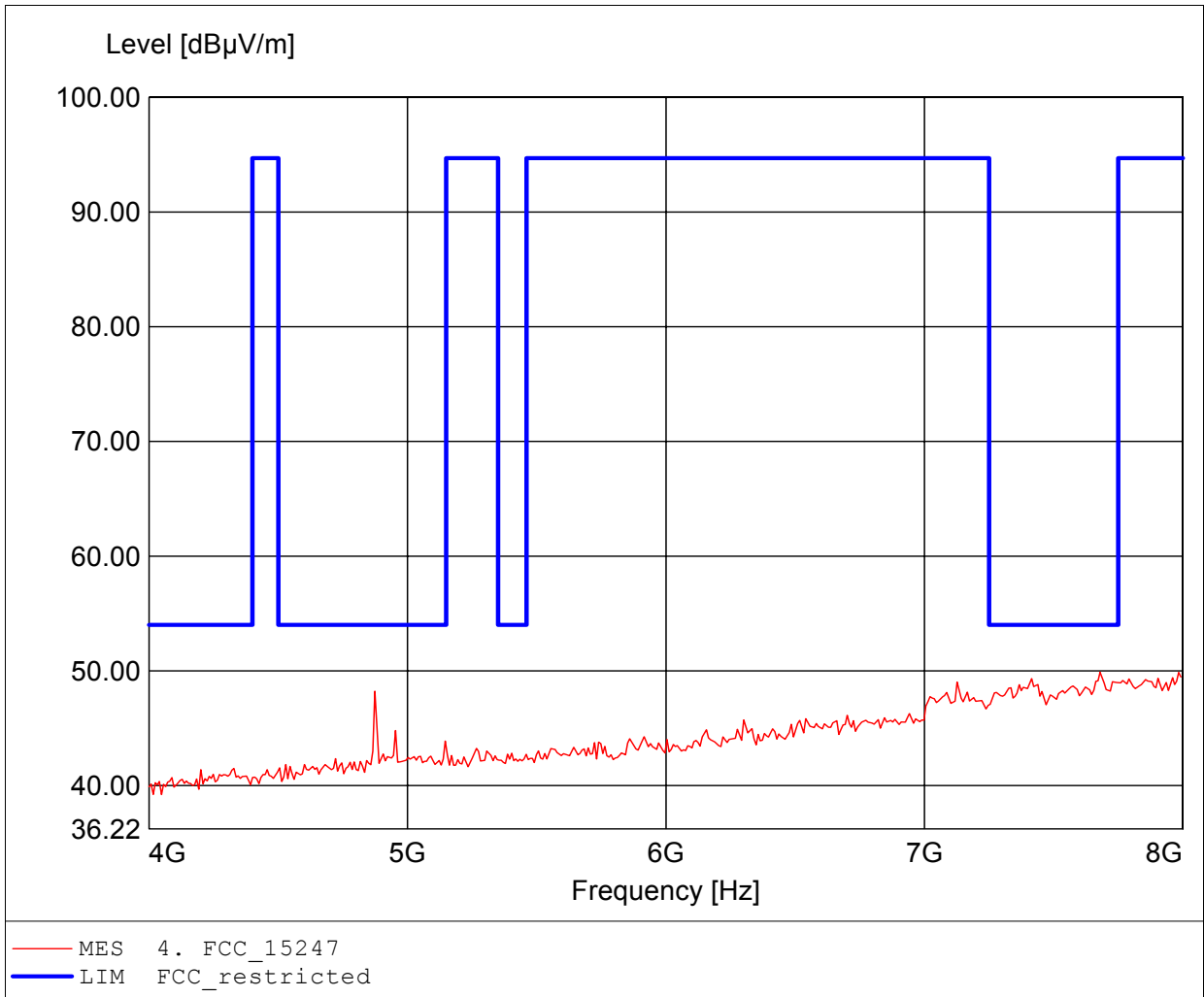
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 4.874GHz, Emax: 50.36dBµV/m, RBW: 1MHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

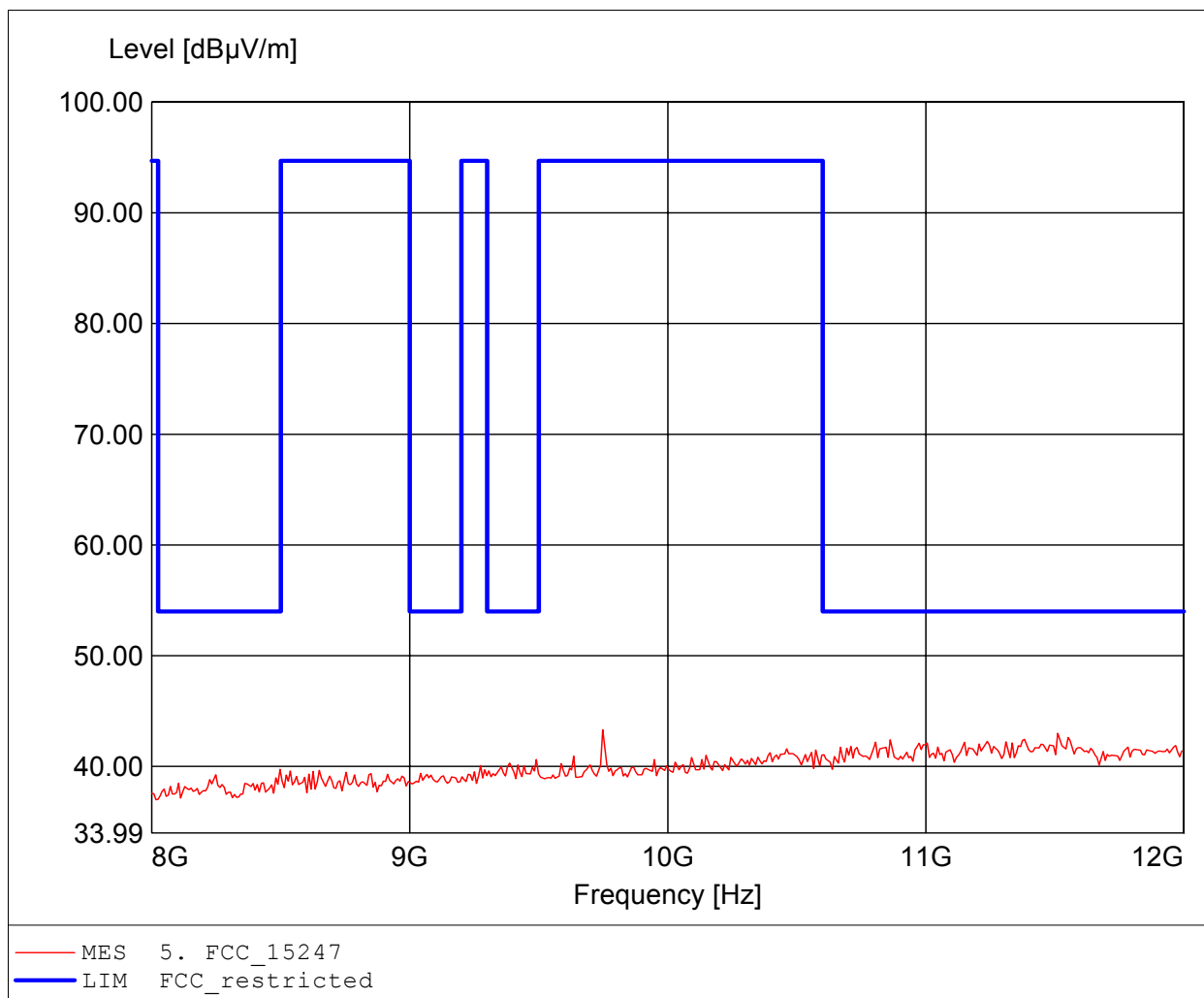
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 7.679GHz, Emax: 49.87dBuV/m, RBW: 1MHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

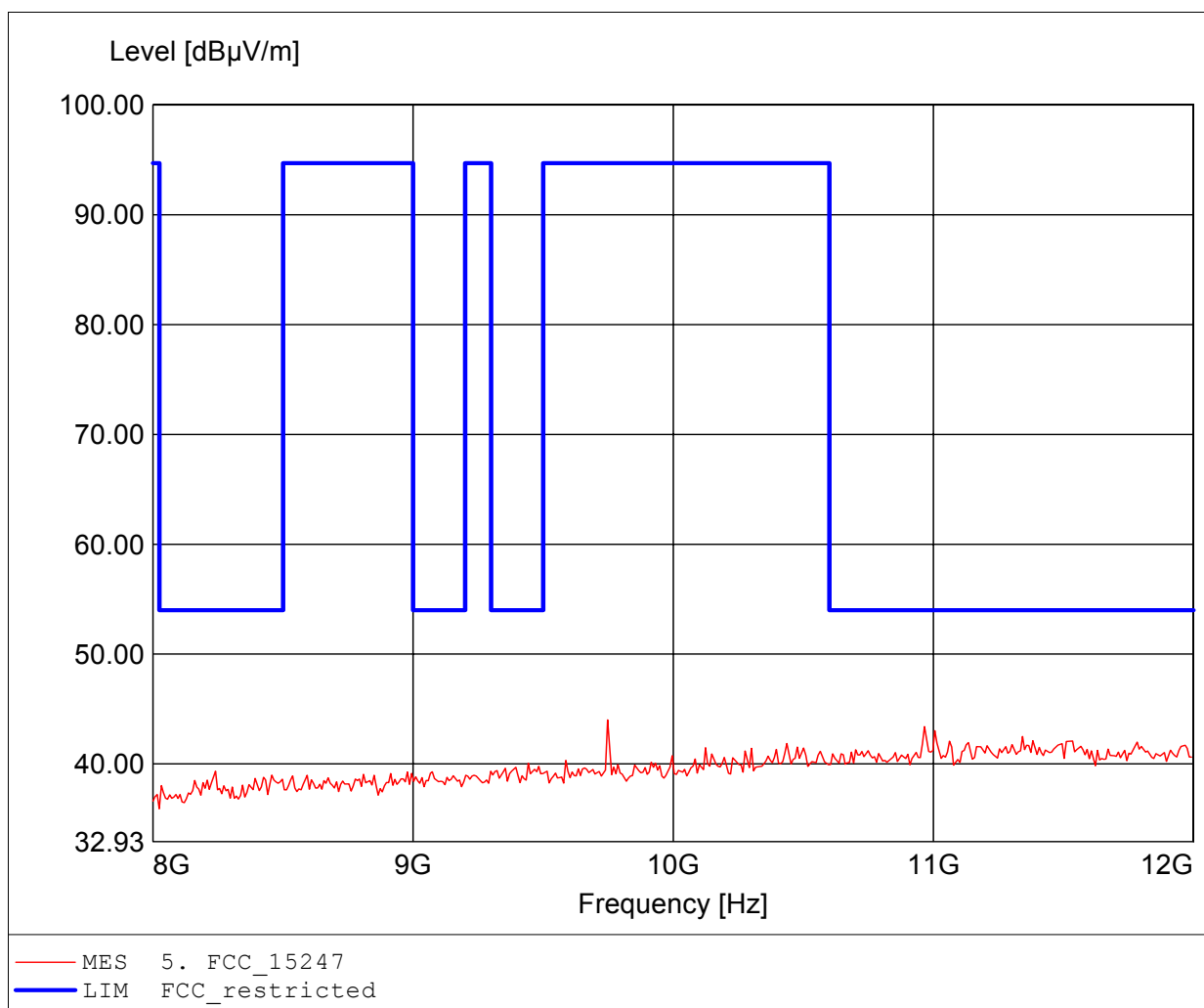
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 9.747GHz, Emax: 43.32dBμV/m, RBW: 1MHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 9.747GHz, Emax: 44.01dBµV/m, RBW: 1MHz

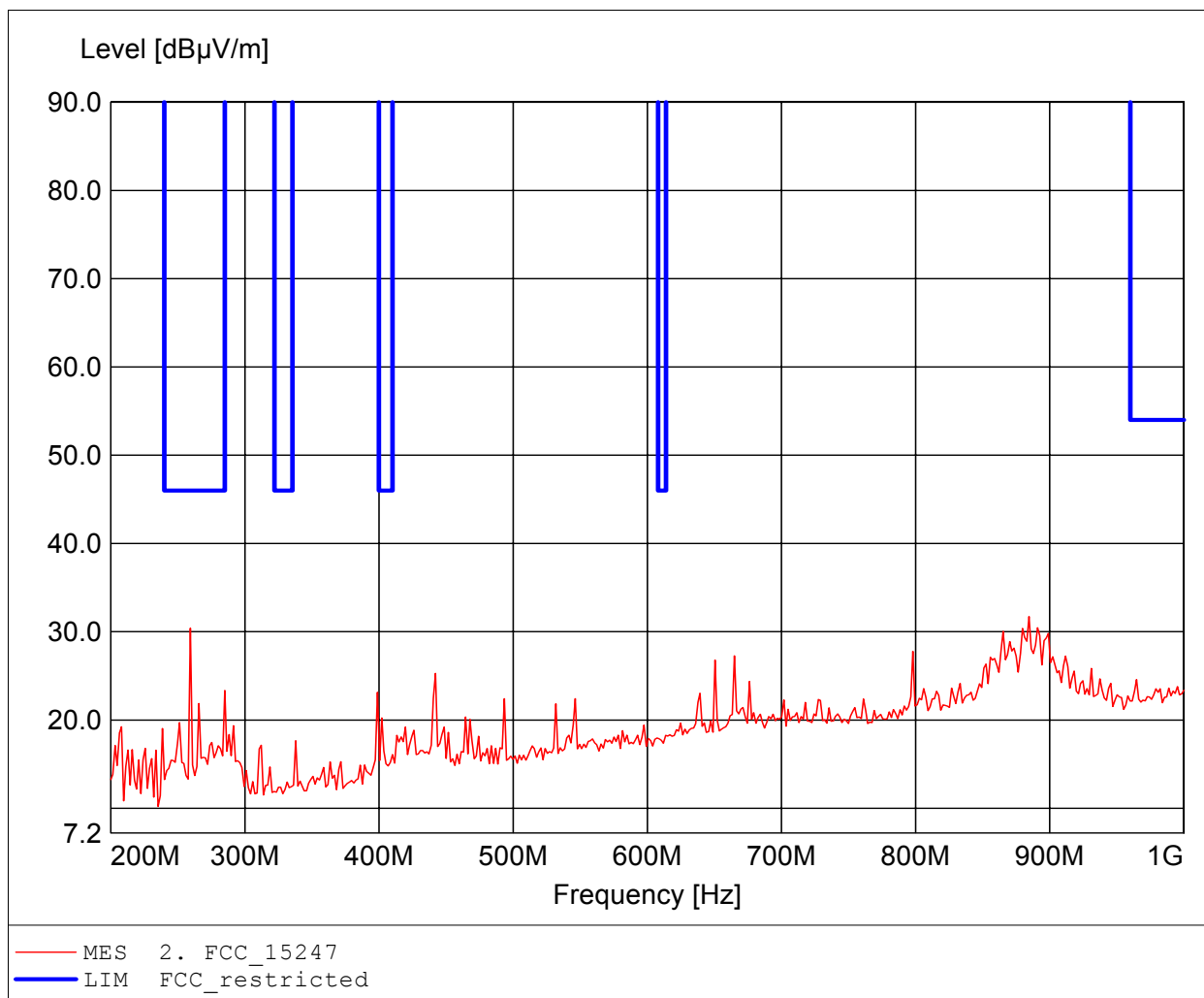




# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

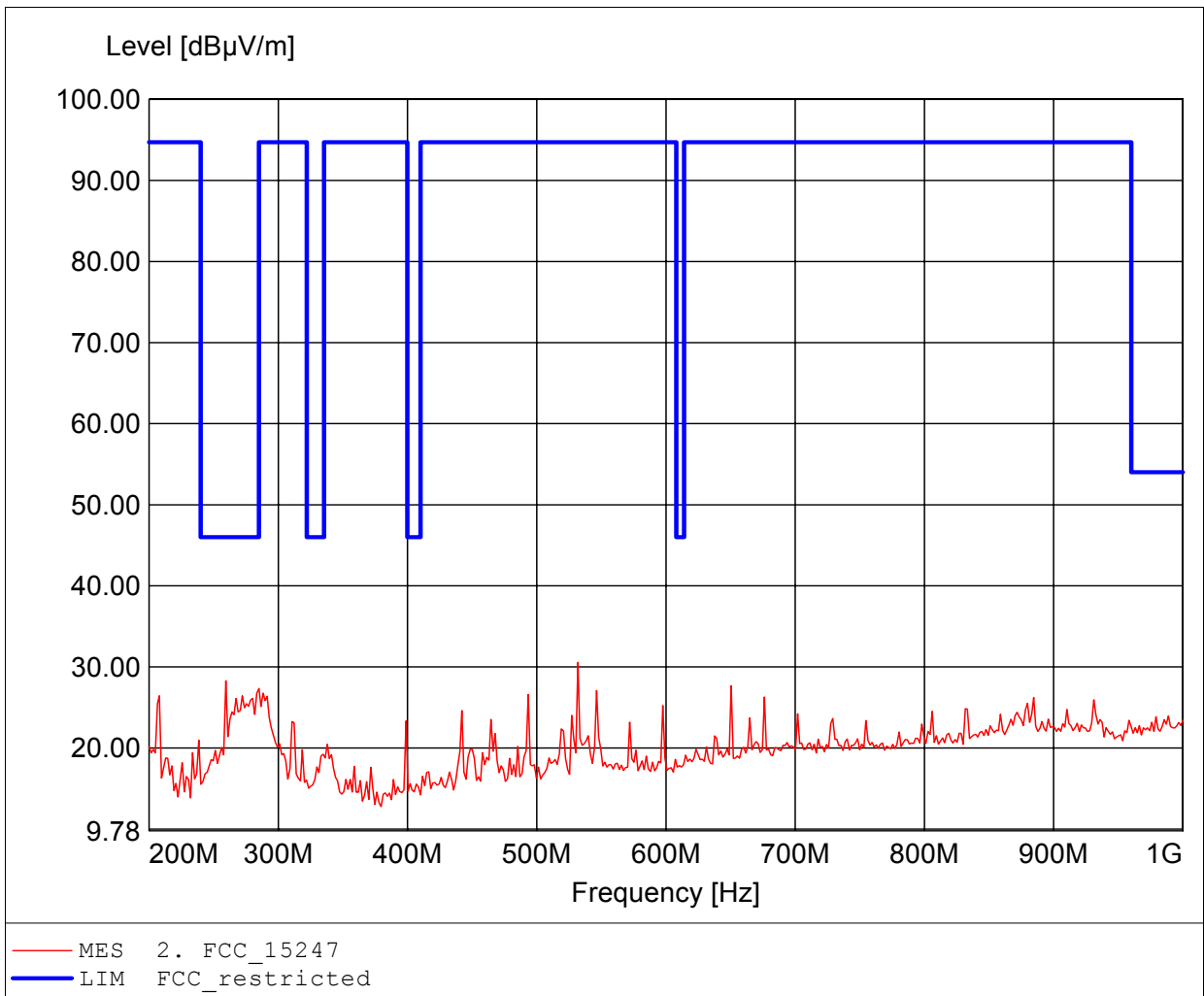
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: low  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: HL 223, amplif.  
Comment 2: Freq: 884.569MHz, Emax: 31.72dBµV/m, RBW: 100kHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

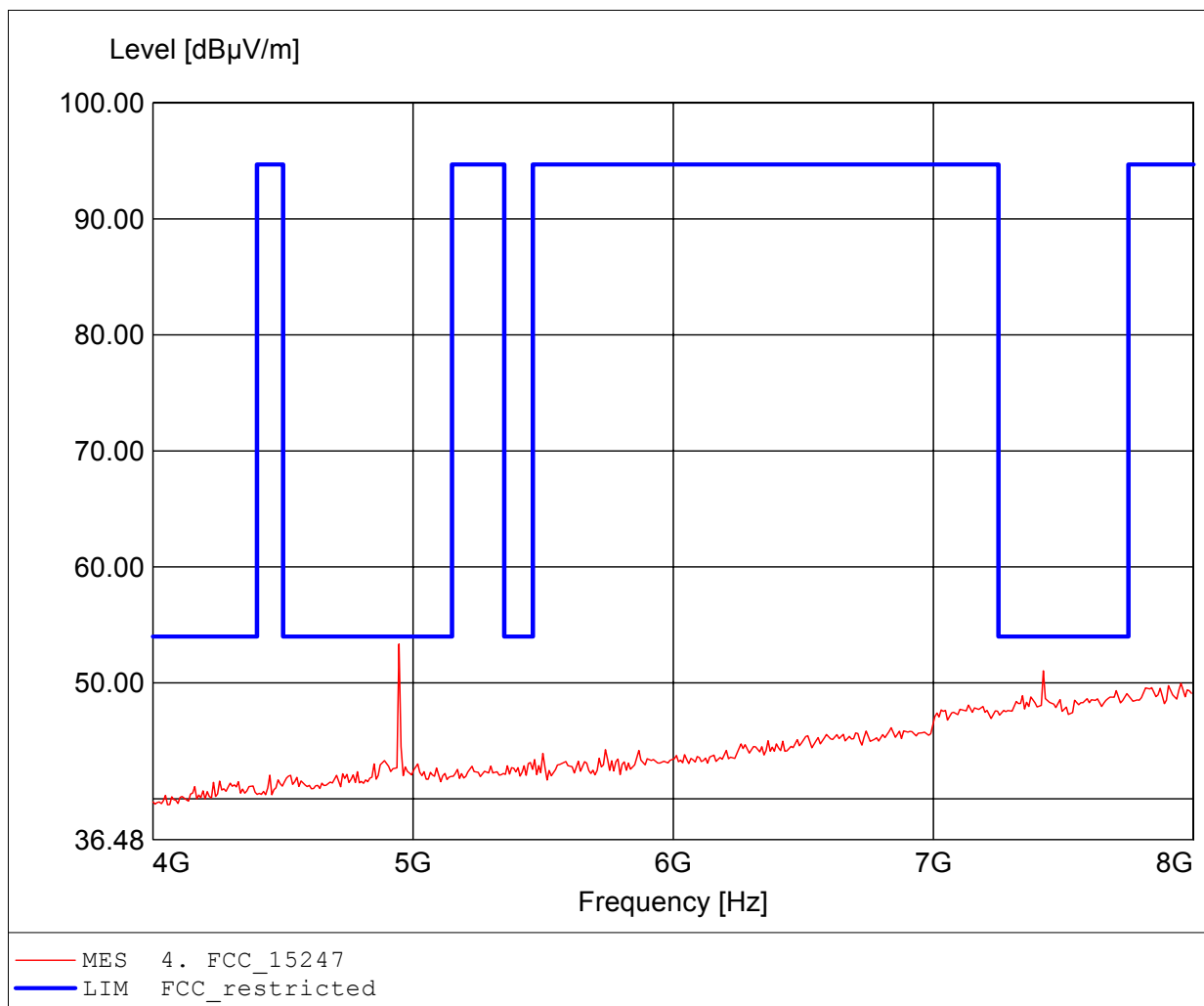
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: high  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247  
Comment 1: Dist.: 3m, Ant.: HL 223, amplif.  
Comment 2: Freq: 531.864MHz, Emax: 30.55dBµV/m, RBW: 100kHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

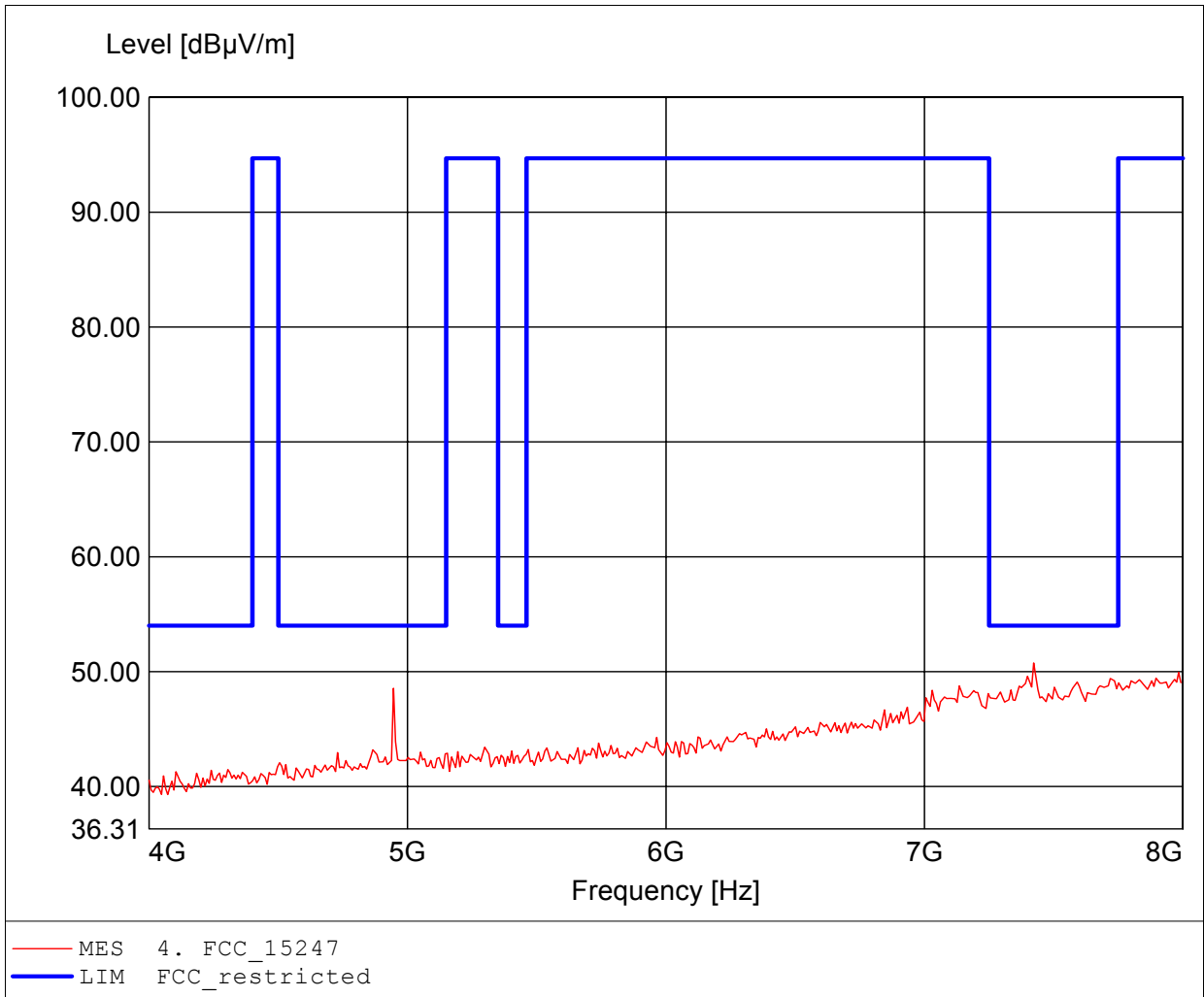
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: high  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 4.946GHz, Emax: 53.34dBuV/m, RBW: 1MHz



**Spurious emissions Field Strength**

**FCC RULES PART 15, SUBPART C**

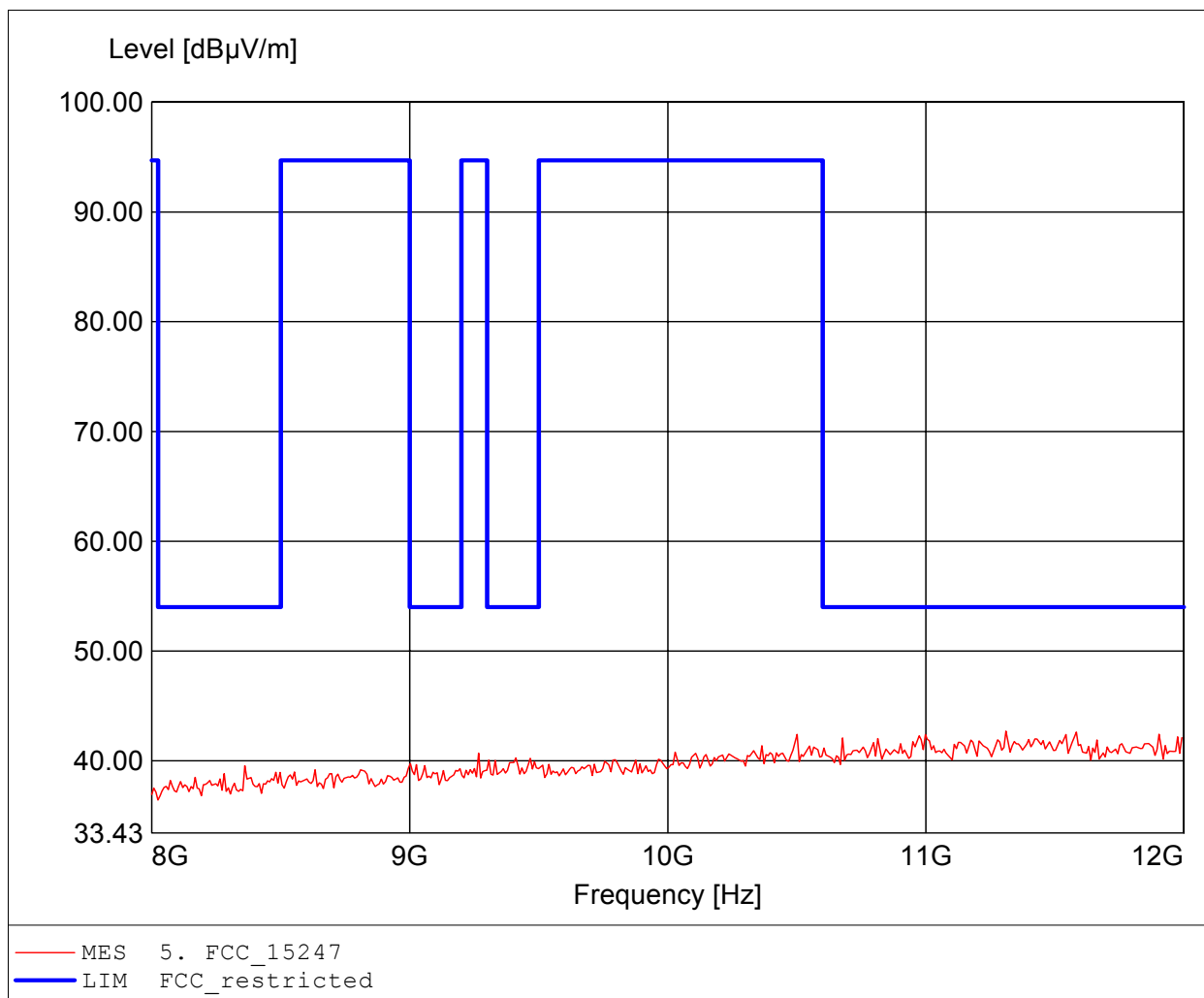
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: high  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 7.423GHz, Emax: 50.76dBuV/m, RBW: 1MHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

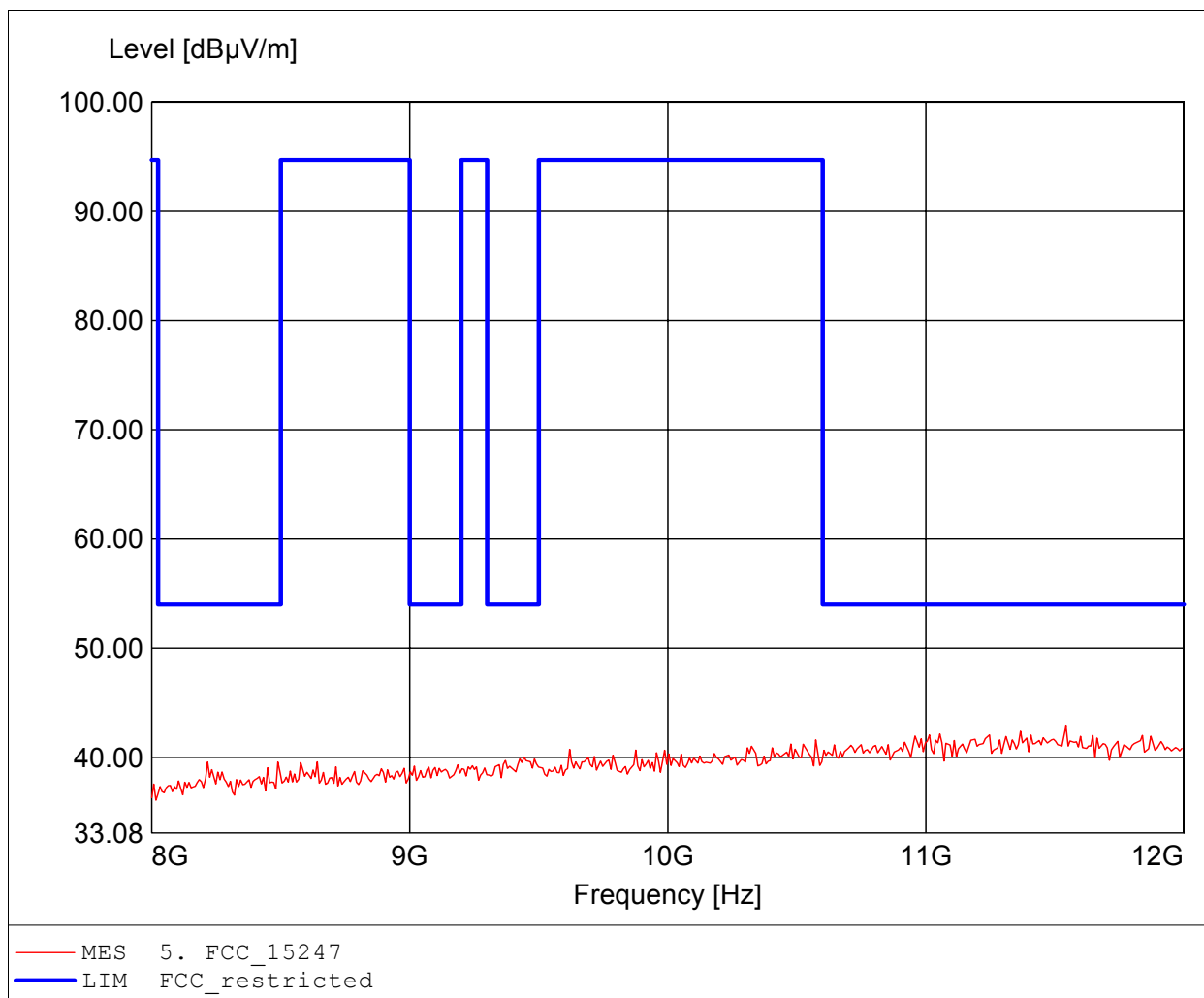
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: high  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 11.311GHz, Emax: 42.70dBµV/m, RBW: 1MHz



# Spurious emissions Field Strength

## FCC RULES PART 15, SUBPART C

Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio) G0M20908-2509  
Model: CS10 / GFSK / Ch.: high  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: according to §15.247, peak detector  
Comment 1: Dist.: 3m, Ant.: BBHA9120D, ampl.+HP.  
Comment 2: Freq: 11.543GHz, Emax: 42.87dBµV/m, RBW: 1MHz



## **Annex C**

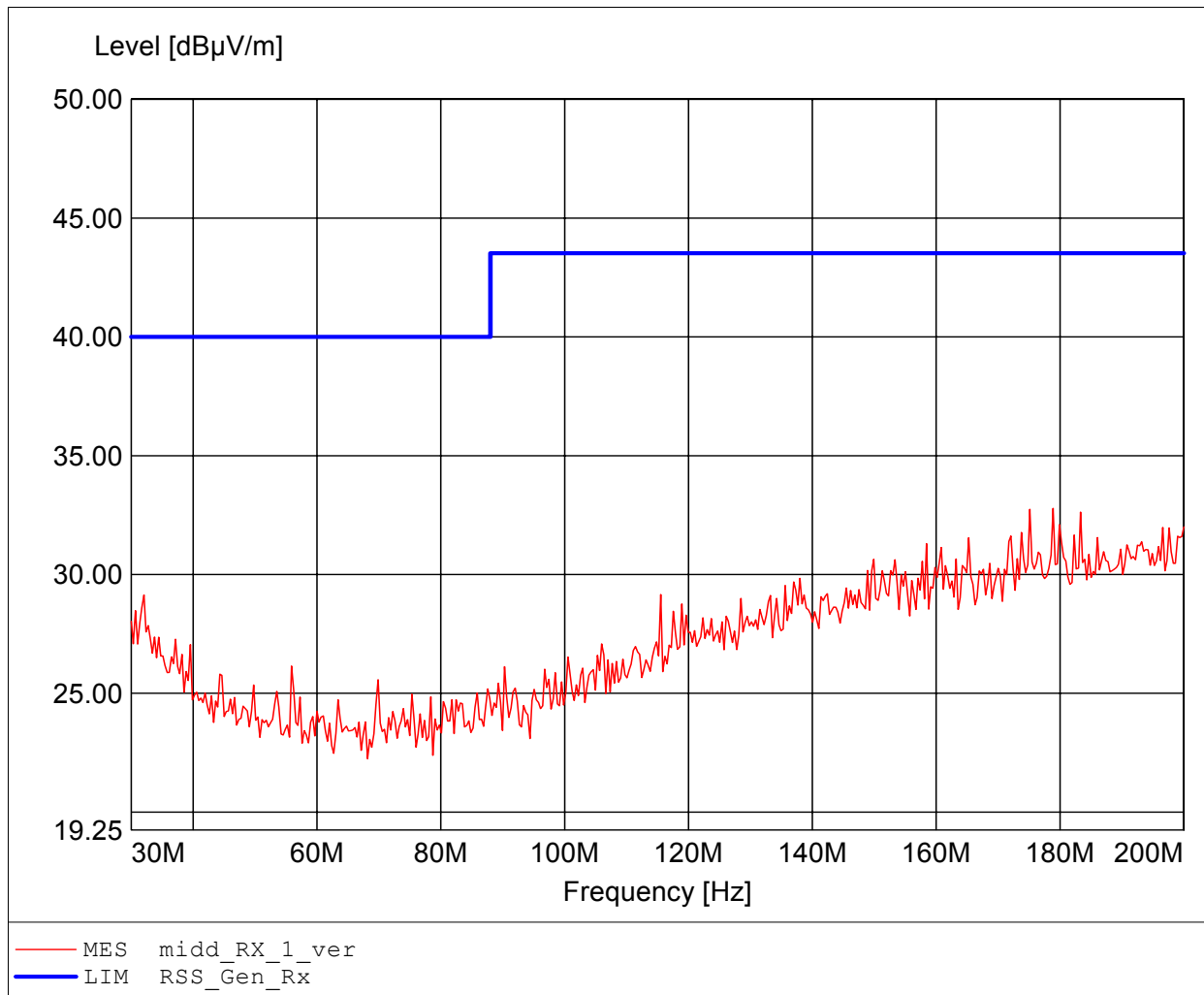
### **Receiver Spurious Emissions**

This section contains only plots for frequency spans that contain spurious emissions. All missing frequency ranges or plots does not contain any spurious emissions.

# Field Strength under normal conditions

## Standards Industry Canada, RSS-GEN

Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HK 116  
Comment 2: Freq:178.878MHz Emax:32.78dBuV/m RBW: 100 kHz

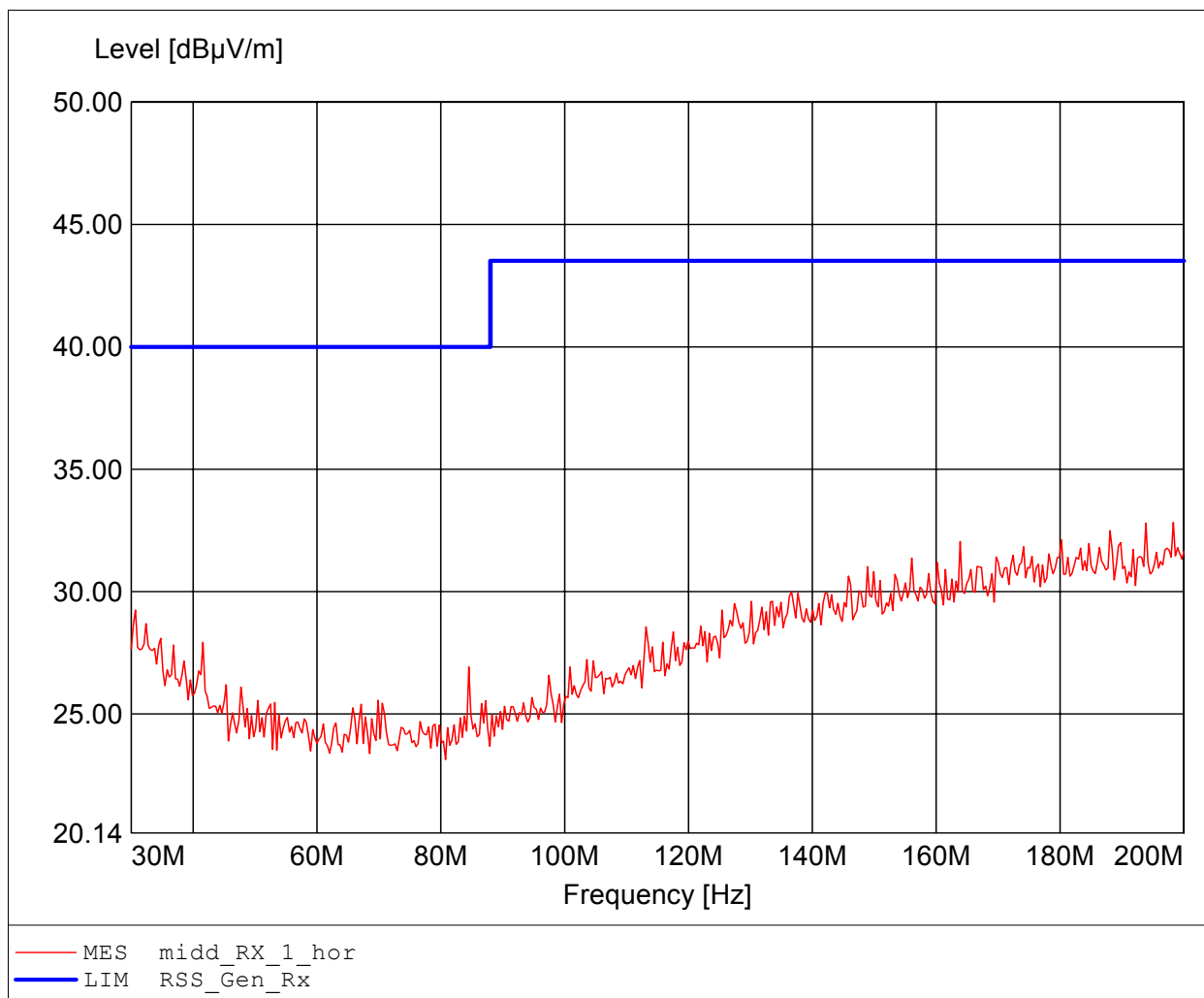




**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

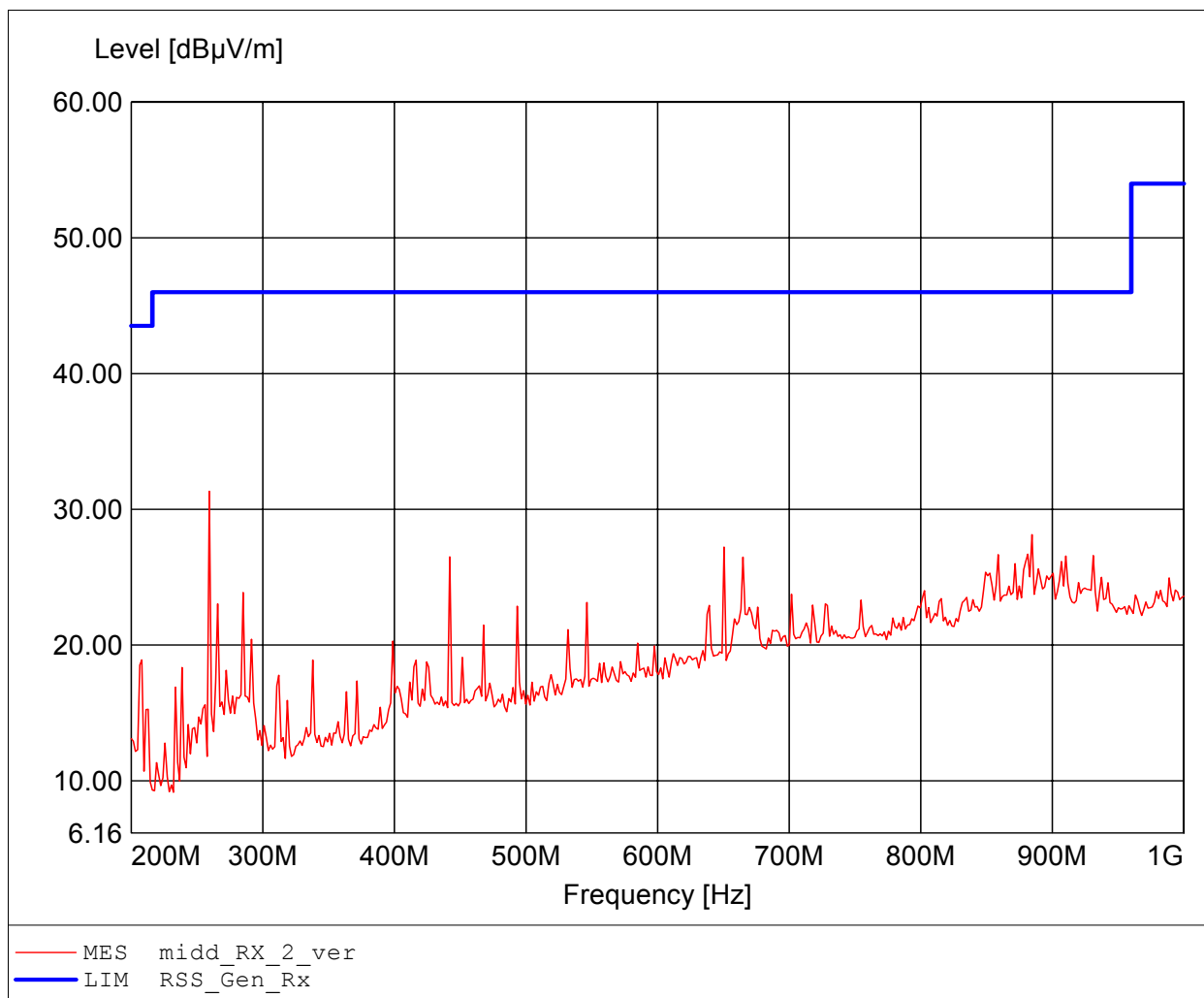
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HK 116  
Comment 2: Freq:198.297MHz Emax:32.83dBuV/m RBW: 100 kHz



**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

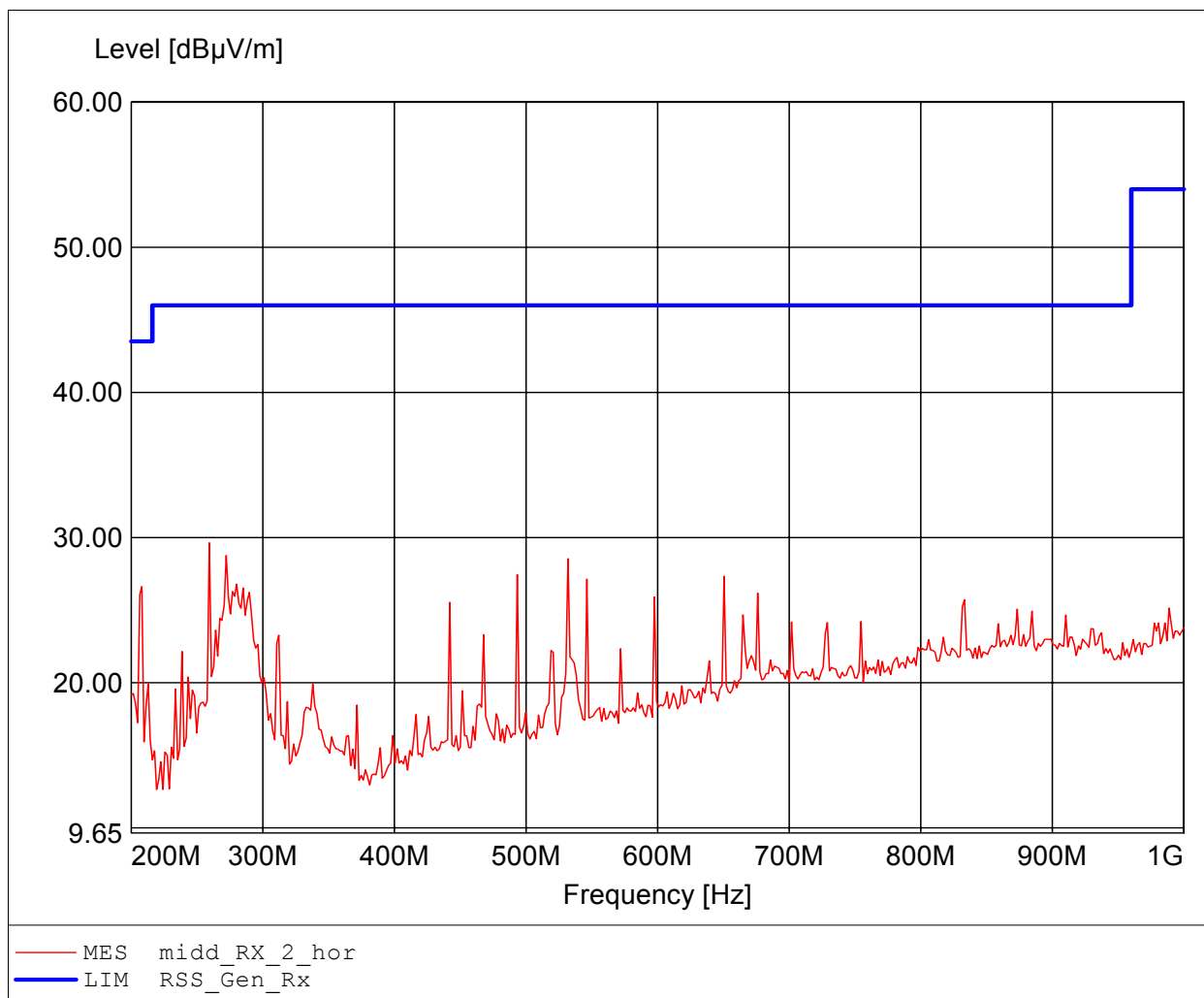
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL 223, ampl.  
Comment 2: Freq:259.319MHz Emax:31.34dBuV/m RBW: 100 kHz



**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

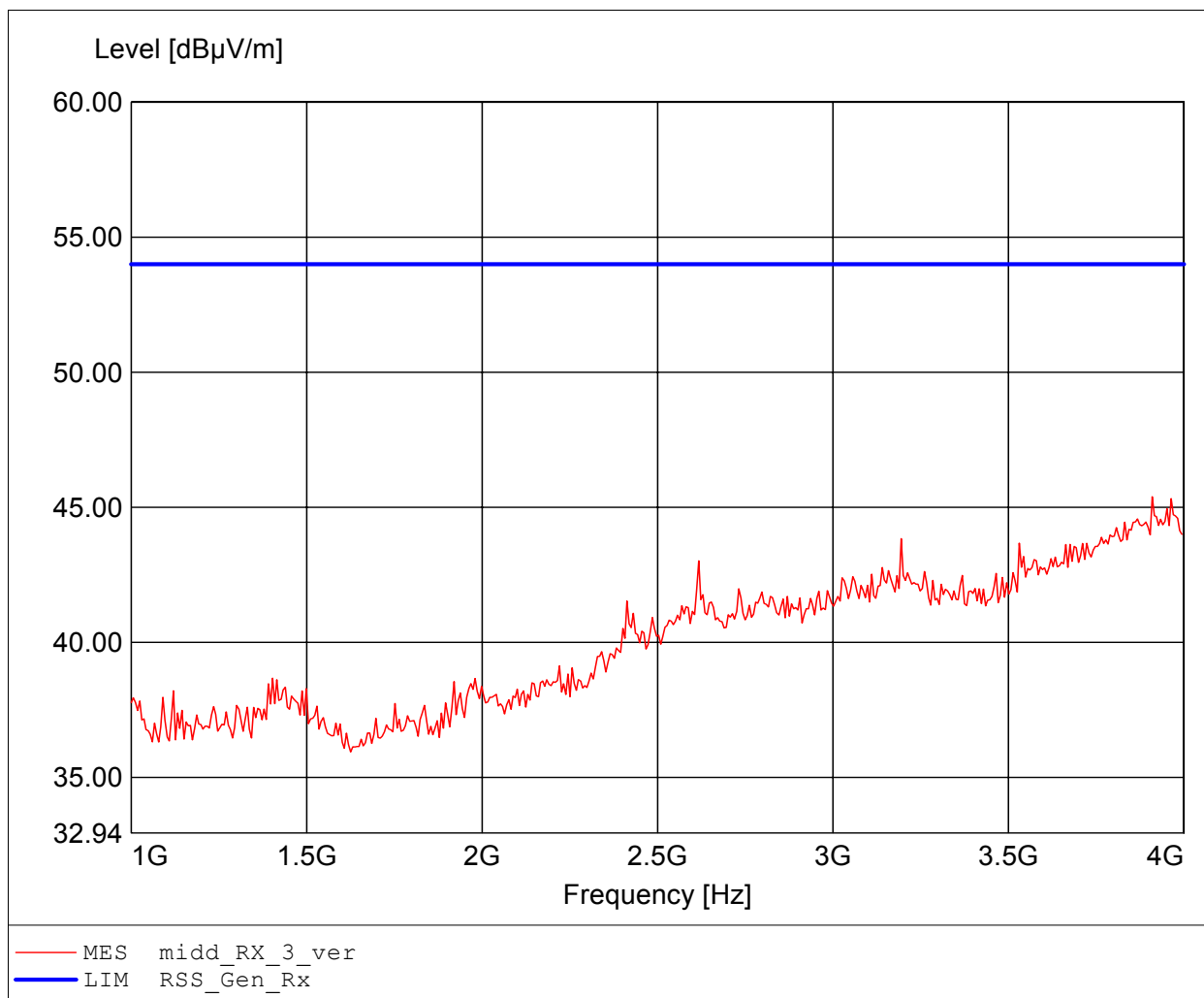
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL 223, ampl.  
Comment 2: Freq:259.319MHz Emax:29.64dBuV/m RBW: 100 kHz



**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

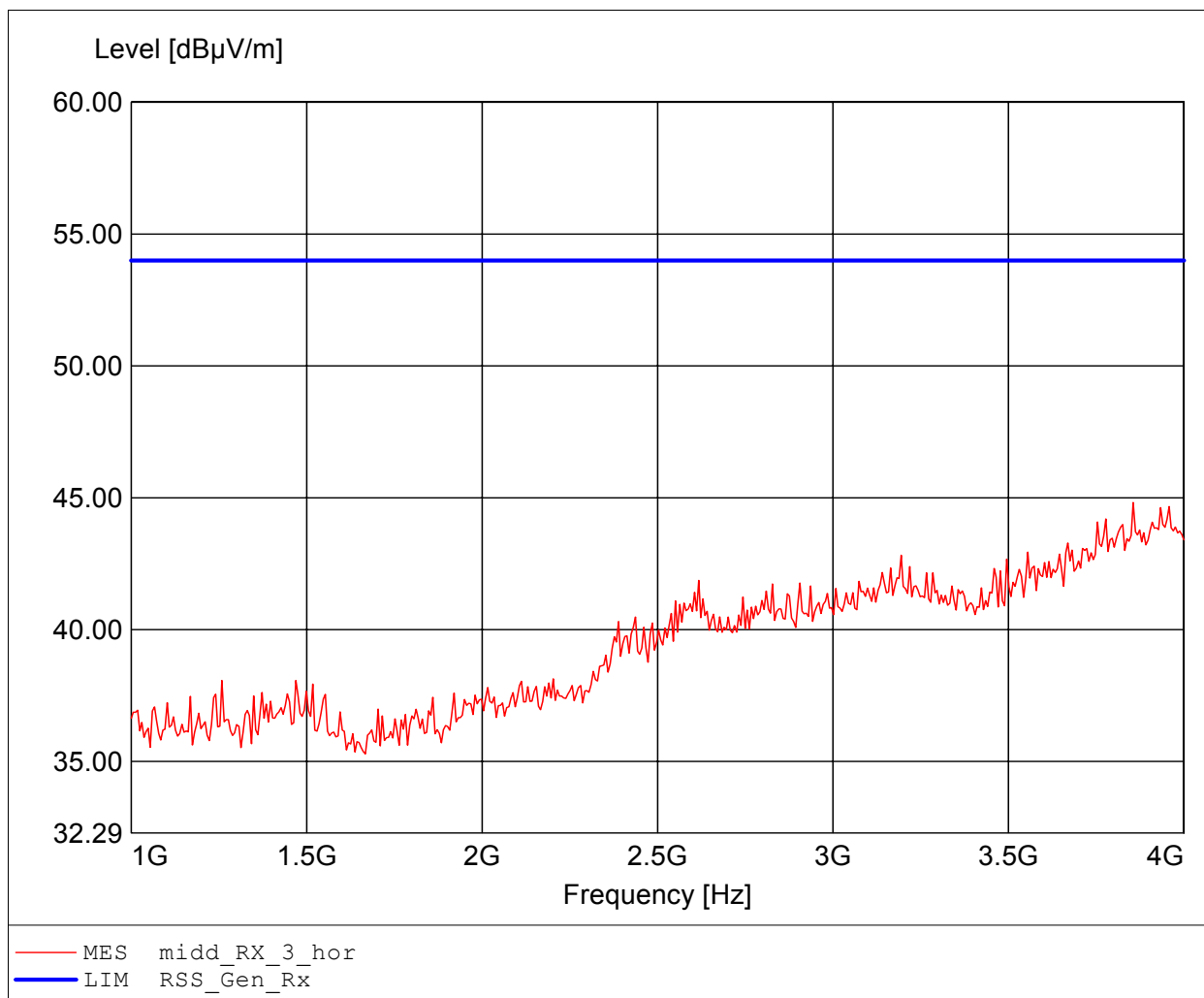
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL025, ampl.  
Comment 2: Freq:3.910GHz Emax:45.39dBµV/m RBW: 1 MHz



**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

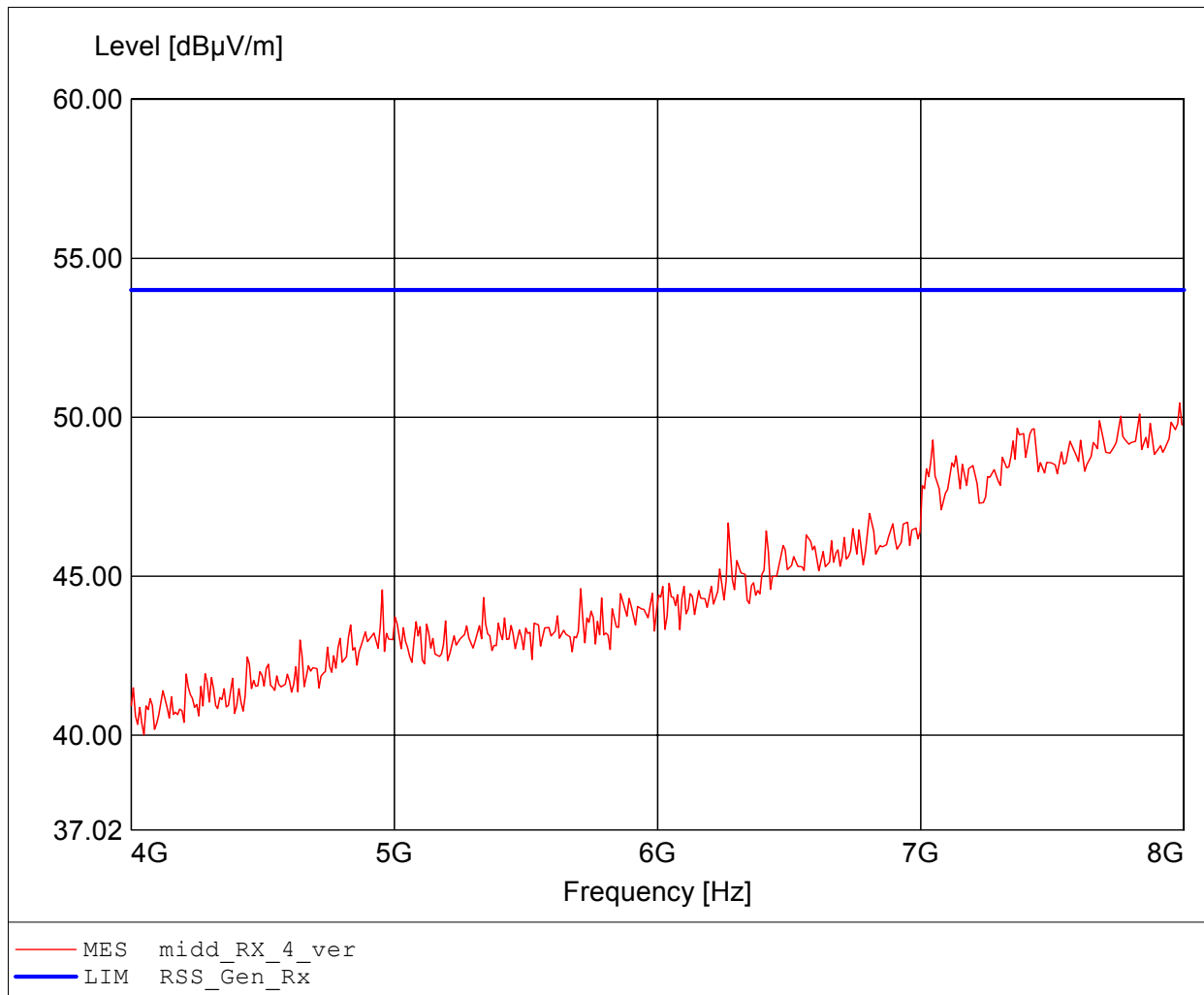
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL025, ampl.  
Comment 2: Freq:3.856GHz Emax:44.82dBuV/m RBW: 1 MHz



# Field Strength under normal conditions

## Standards Industry Canada, RSS-GEN

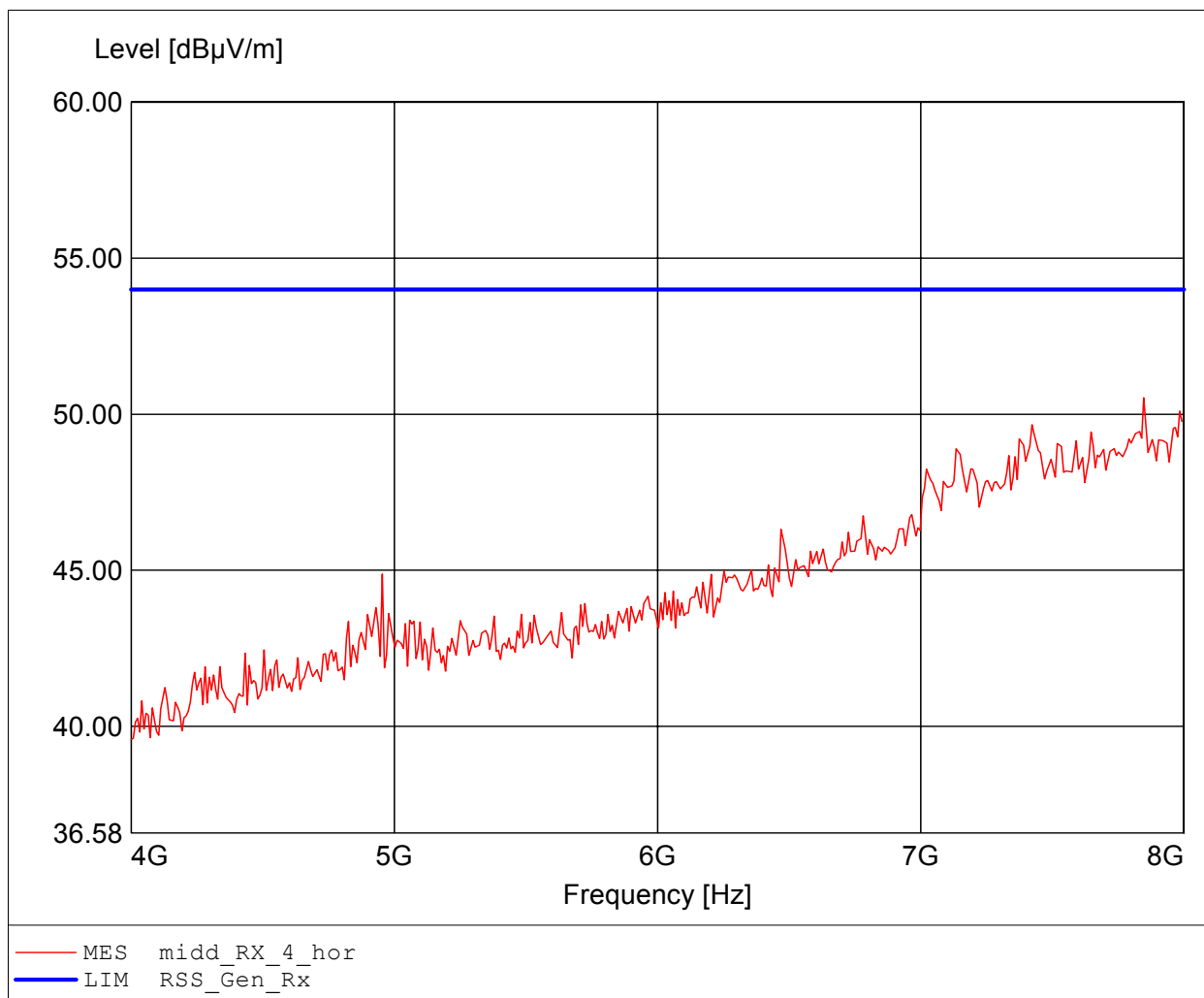
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL025, ampl.  
Comment 2: Freq:7.984GHz Emax:50.45dBµV/m RBW: 1 MHz



**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

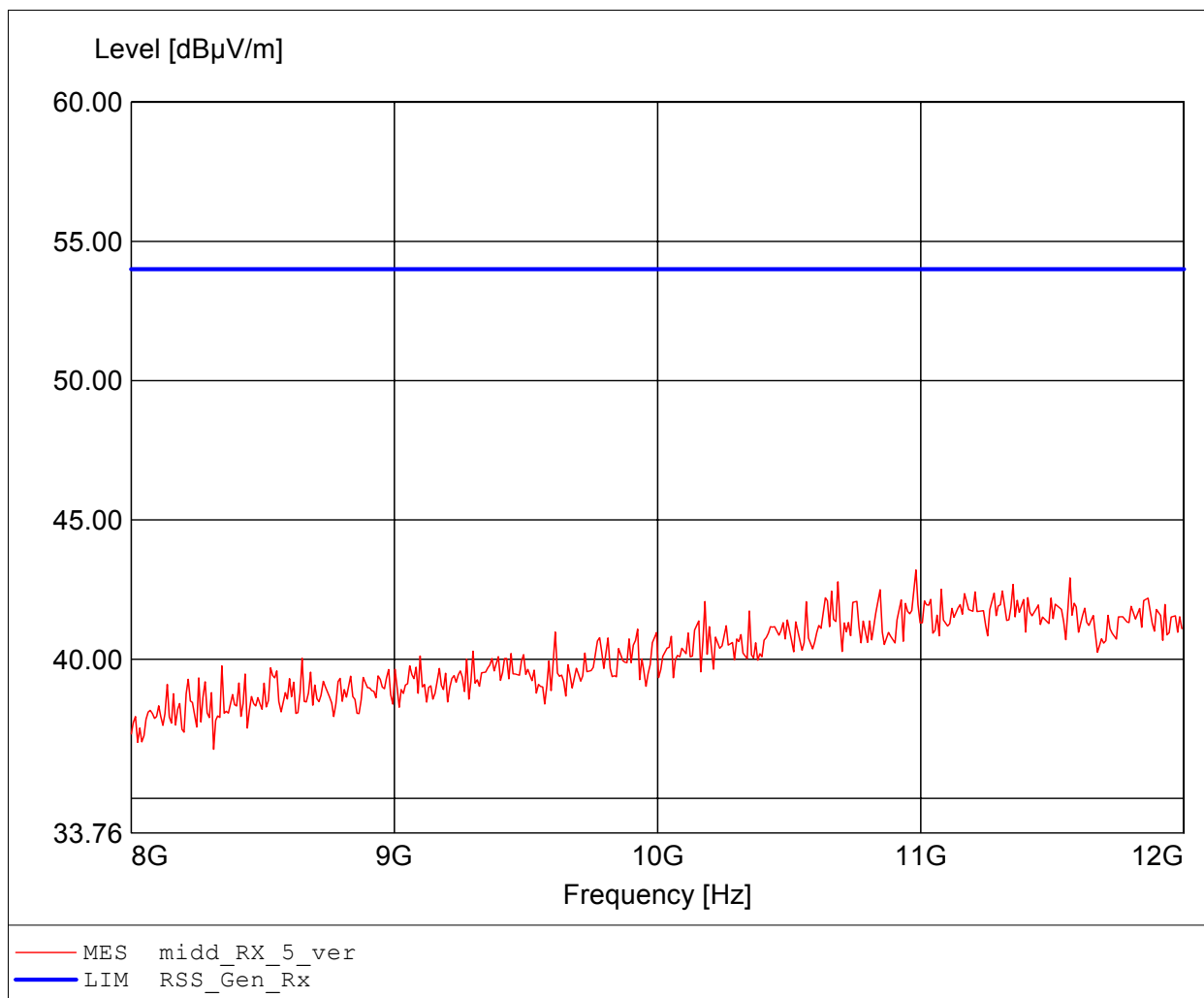
Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL025, ampl.  
Comment 2: Freq:7.848GHz Emax:50.53dBuV/m RBW: 1 MHz



**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL025, ampl.  
Comment 2: Freq:10.982GHz Emax:43.20dBµV/m RBW: 1 MHz





**Field Strength under normal conditions**

**Standards Industry Canada, RSS-GEN**

Approval Holder: Leica Geosystems AG  
EUT: Tornado 1 (WIT2450 FHSS radio)  
Model: CS10 / Rx / Ch.: middle  
Test Site / Operator: Eurofins Product Service GmbH / Mr. Treffke  
Test Condition: 24°C / Unom: 7.4 VDC (230V AC: AC/DC adaptor); (n.pos.30°  
Test Specification: Freq. / CH: midd  
Comment 1: Dist.: 3m, Ant.: HL025, ampl.  
Comment 2: Freq:11.142GHz Emax:43.23dBµV/m RBW: 1 MHz

