

TEST REPORT

No. AR19-0034267-02

performed in accordance with
INDUSTRY CANADA
Spectrum Management and Telecommunications Radio Standards Specification
RSS-247:2017
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

PRODUCT	Bluetooth Low Energy module on evaluation board STEVAL
MODEL(s) TESTED	BLUENRG-M0A
FCC ID	8976C-BNRGM0AL
TRADE MARK(s)	STMICROELECTRONICS

APPLICANT	STMicroelectronics - Via Olivetti, 2 I-20864 Agrate Brianza (MB)
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Tested by	Robertino Torri <i>[Laboratory technician]</i>	
Approved by	Giovanni Di Turi <i>[Laboratory manager]</i>	

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2019-02-22	First edition Digital signed - AR19-0034267-02_TR_RSS 247 - STM - BLUENRG-M0A & M0L
Rev. 1	2019-03-14	Insert correction factor in table at pag. 16 and 18, insert instrument for AC power line emission at pag. 37 Digital signed - AR19-0034267-02_TR_RSS 247 - STM - BLUENRG-M0A & M0L

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.

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1. GENERAL DATA

SAMPLE		
Samples received on	2018-12-17	(Item(s) sampled and sent by applicant)
IMQ reference samples	BEM	93653
Samples tested No.	1	
Object under analysis recognition	Not carried out Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
Date of acceptance of test item	2018-12-17	
TEST LOCATION		
Testing dates	2019-01-14 ÷ 2019-01-21	
Testing laboratory.	IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano	
Testing site	Via Quintiliano, 43 – I-20138 Milano	
ISED Canada test site registration number	8839A-2	
ENVIRONMENTAL CONDITIONING		
Parameter	Measured	
Ambient Temperature	24.0 ÷ 25.0 °C	
Relative Humidity	46 ÷ 58 %	
Atmospheric Pressure	1005 ÷ 1007 mbar	
The laboratory is monitored by a continuous environmental conditions measurements system. Temperature, humidity and pressure data are recorded on a weekly basis and stored in local archive.		
REMARKS		
Throughout this report a point is used as the decimal separator. The ability or reliability of this product to perform its intended function in a particular application has not been investigated. IMQ declines any responsibility derived from missing or wrong information provided aside by the applicant.		

2. REFERENCE DOCUMENT

	DOCUMENT	DATE	TITLE
<input checked="" type="checkbox"/>	RSS-GEN	2018 Issue 5	General Requirements for Compliance of Radio Apparatus
<input checked="" type="checkbox"/>	RSS-247	2017 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
<input checked="" type="checkbox"/>	ANSI C63.4	2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
<input checked="" type="checkbox"/>	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices

3. EQUIPMENT UNDER TEST (EUT) DETAILS

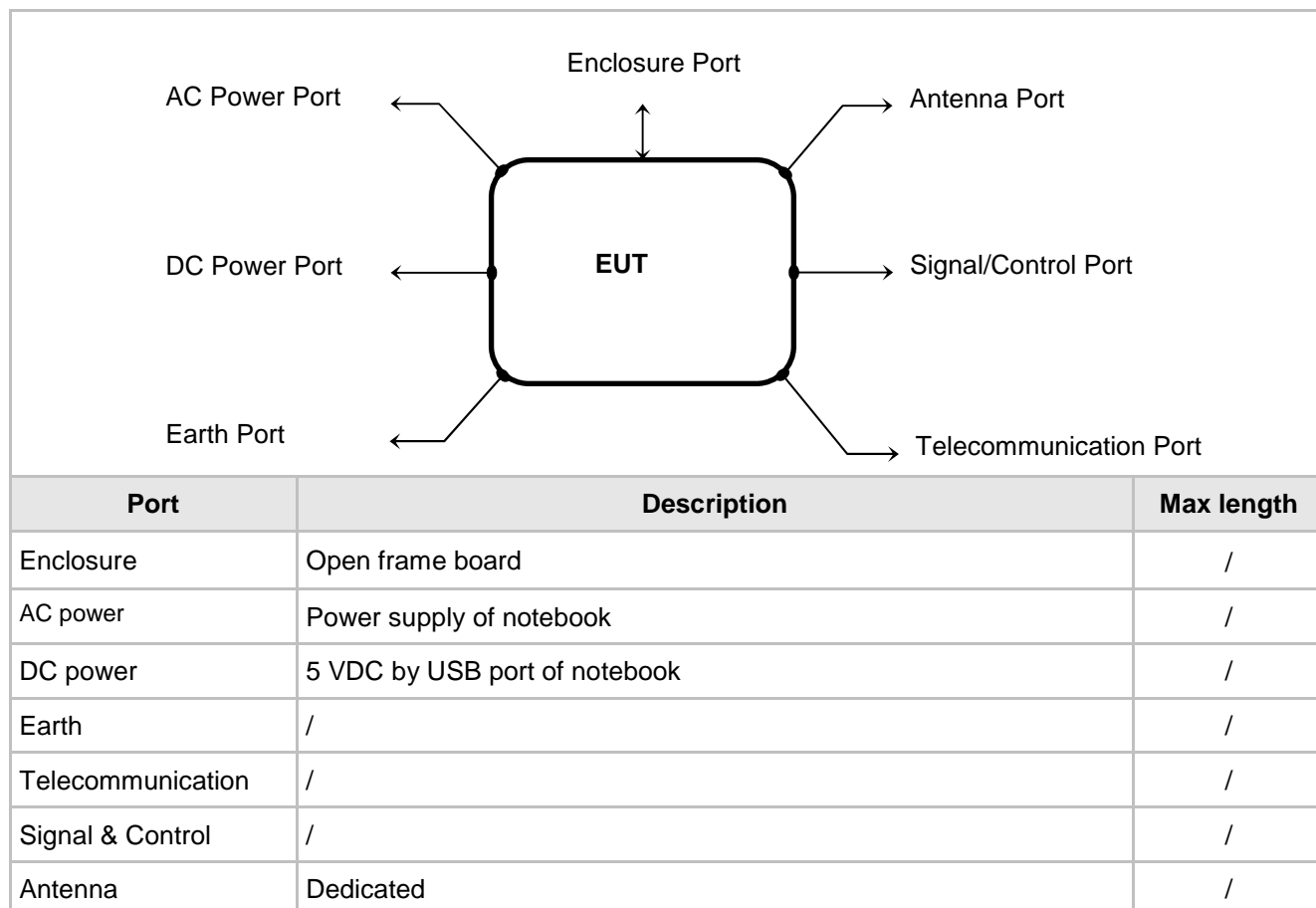
GENERAL DATA

MODEL (basic)	Description
BLUENRG-M0A	Kit composed by: M0A : Bluetooth Low Energy module STEVAL : Evaluation board dongle
VARIANTS (derived)	Description
BLUENRG-M0L	Kit composed by: M0L: Bluetooth Low Energy module (depopulated) STEVAL : Evaluation board dongle
FCC ID	8976C-BNRGM0AL
Manufacturer	STMicroelectronics - Via Olivetti, 2 - I-20864 Agrate Brianza (MB)
Type of equipment	DTS - Digital transmission equipment (Bluetooth® Low Energy module)
Operating frequency	2400 ÷ 2483.5 MHz
Max RF radiated power	100.54 dBμV/m @3m
Modulation	GFSK
Channel	40 channel, 2MHz spaced from 2402 to 2480MHz
Antenna	2450AT18A100E of JOHANSON TECHNOLOGY / +0.5 dBi max peak
Remarks	None

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1 (lower)	2402	2	2404	3	2406	4	2408
5	2410	6	2412	7	2414	8	2416
9	2418	10	2420	11	2422	12	2424
13	2426	14	2428	15	2430	16	2432
17	2434	18	2436	19	2438	20(middle)	2440
21	2442	22	2444	23	2446	24	2448
25	2450	26	2452	27	2454	28	2456
29	2458	30	2460	31	2462	32	2464
33	2466	34	2468	35	2470	36	2472
37	2474	38	2476	39	2478	40(higher)	2480

4. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

EUT PORTS



STATE OF THE EUT DURING TESTS

Ref.	Mode	Description
#1	Operating	<p>The EUT is installed on dedicated USB evaluation board R16-STEVAL-IDB003V1M (USB supplied).</p> <p>The EUT is in continuously transmitting with duty cycle close to 100%.</p>

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
PC with dedicated software for RF transmission management	/	/
Evaluation board	STM	R16-STEVAL-IDB003V1M

ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
Bluetooth Low Energy module	1	STMICROELECTRONICS	M0A
Evaluation dongle board	1	STMICROELECTRONICS	R16-STEVAL-IDB003V1M

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EUT TECHNICAL DOCUMENTATION

Document	Reference
/	/

5. METHODS OF MEASUREMENT

All compliance measurements have been carried out using the procedures described in RSS-Gen, RSS-247 and the standard ANSI C63.4-2014, ANSI C63.10-2013.

Additional test requirements have been adopted according to the reference Section indicated in the § 6 of this test report.

FREQUENCY RANGE INVESTIGATED

Radiated emission tests: from 9 kHz to tenth harmonic of fundamental.

6. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object meets the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

REF. of RSS	TITLE	RESULT
RSS-Gen § 6.8	Transmitter Antenna requirements	PASS
RSS-Gen § 8.8	AC Power line Conducted Emission	PASS
RSS-Gen §§ 7.3 & 8.9	Radiated Transmitter Emission	PASS
RSS 247 - § 5.1 (1)	-20dB Bandwidth	N.A.
RSS 247 - § 5.1 (2)	Carrier frequency separation	N.A.
RSS 247 - § 5.1 (4)	Number of hopping channel	N.A.
RSS 247 - § 5.1 (4)	Average time of occupancy	N.A.
RSS-Gen § 6.7 RSS 247 - § 5.2 (1)	6dB and 99% Bandwidth	PASS
RSS 247 - § 5.2 (2)	Power Spectral Density	PASS
RSS 247 - § 5.4 (2)	Transmitter output power and E.I.R.P requirements	PASS
RSS 247 - § 5.5	Unwanted Emissions	PASS

7. TEST RESULTS

7.1 ANTENNA REQUIREMENTS

TEST REQUIREMENT

The applicant for equipment certification, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operated with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (E.I.R.P.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed used the highest antenna of each combination of license-exempt transmitter and antenna types, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall e stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

this radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

Testing dates

2019-01-21

Antenna specifications

N° of authorized antenna types

/

Antenna type

Dedicated on PCB

Maximum total gain

+0.5 dBi max peak

External power amplifiers

Not present

TEST RESULT

The EUT meets the requirements of section 6.8 of RSS-GEN

7.2 POWER LINE CONDUCTED EMISSION

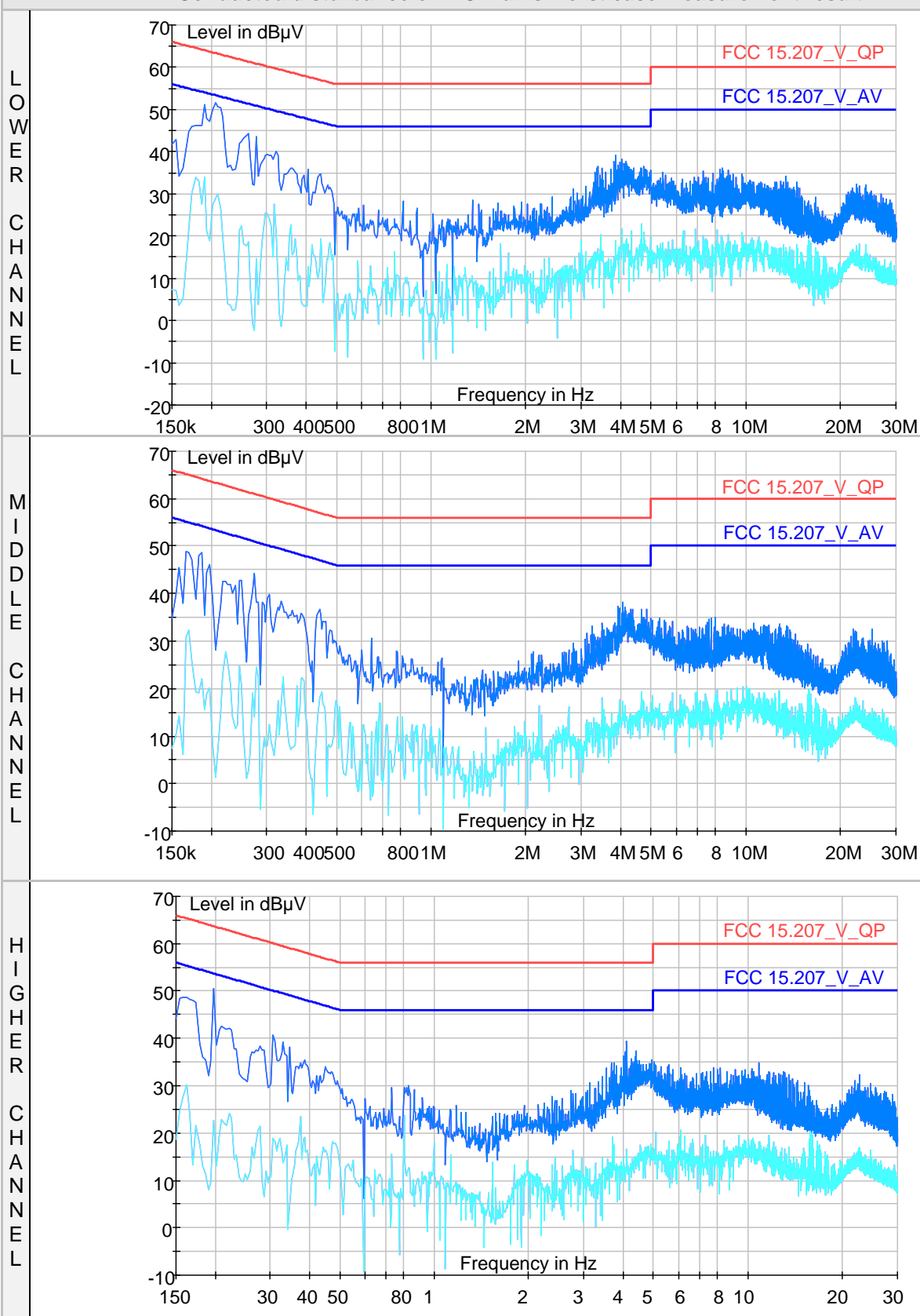
TEST REQUIREMENT	
Test setup	ANSI C63.4
Test facility	Shielded chamber
Frequency range	150 kHz – 30 MHz
IF bandwidth	9 kHz
EMC class	B
EUT operating condition	#1
Testing dates	2019-01-21

LIMITS		
Band of operations	Quasi-Peak (dBμV)	Average Limit (dBμV)
0.15 ÷ 0.5	66 ÷ 56	56 ÷ 46
0.5 ÷ 5	56	46
5 ÷ 30	60	50

TEST RESULT
The EUT meets the requirements of sections RSS-Gen 8.8

TEST PROCEDURE
<ol style="list-style-type: none"> 1) The EUT was placed on a wooden table of size, 80 cm by 80 cm, raised 80 cm in which is located 40 cm away from the vertical wall the shielded room. 2) Each EUT power cord input cord was individually connected through a 50Ω/50μH LISN to the input power source. 3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement. 4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz. 5) The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 10 kHz during the measurements. 6) The measurements with Quasi-Peak detector are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).

Conducted disturbance on AC mains worst case measurement result



7.3 6dB AND 99% BANDWIDTH

TEST REQUIREMENT	
Spectrum analyzer settings	
Span	Wide enough to capture the peak level of the emission
Resolution bandwidth (RBW)	100 kHz
Video bandwidth (VBW)	300 kHz
Sweep time (SWT)	AUTO
Detector function	Peak
Trace	max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2019-01-21

TEST PROCEDURE
<p>The emission bandwidth at 6dB is measured according to clause 5.2(1) of RSS-247 and is defined as the total spectrum the power of which is higher than peak power minus 6 dB.</p> <p>Also the 99% bandwidth is measured according to clause 6.7 of RSS-Gen.</p>

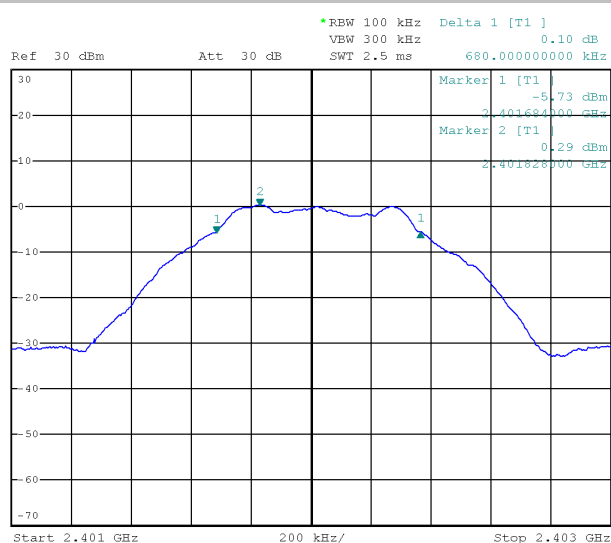
LIMITS
≥ 500 kHz

TEST RESULT
The EUT meets the requirements of sections 5.2(1) of RSS-247.

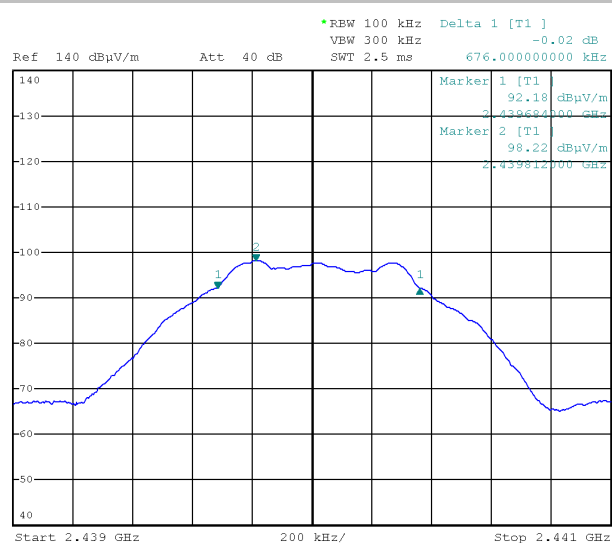
6dB BANDWIDTH MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	Channel Bandwidth (MHz)	Plot (No.)
01	2402	0.680	1
20	2440	0.676	2
40	2480	0.704	3

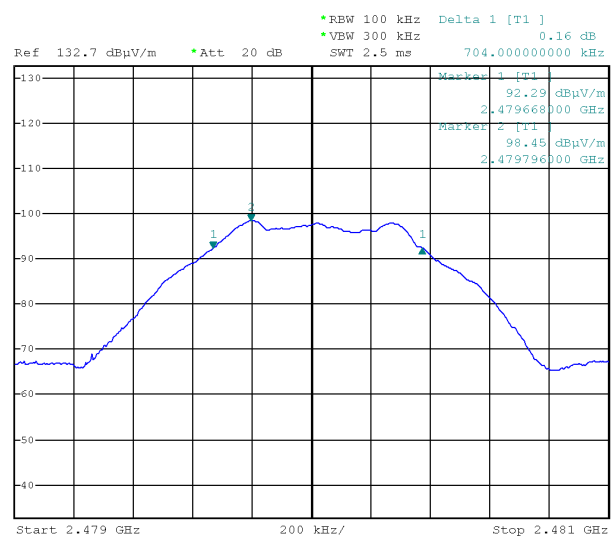
Plot 1



Plot 2



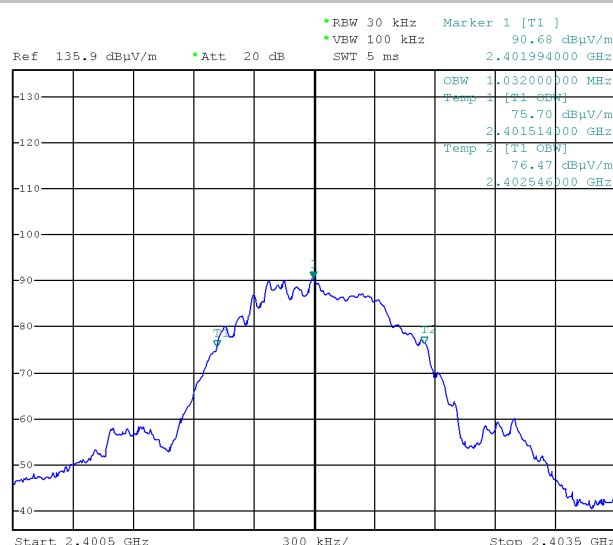
Plot 3



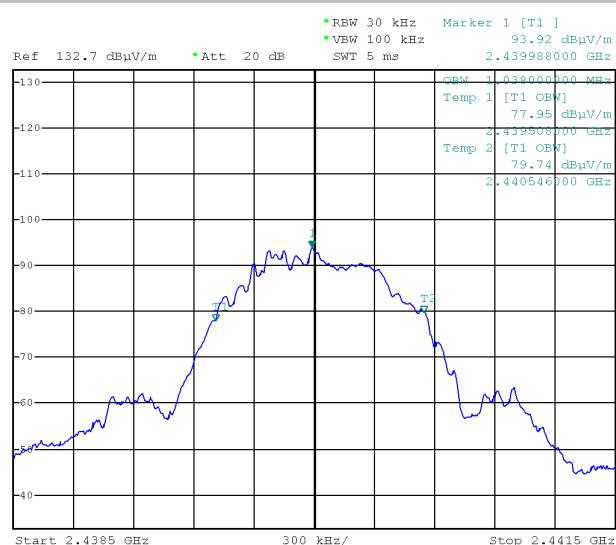
99% BANDWIDTH MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	99% Bandwidth (MHz)	Plot (No.)
01	2402	1.032	1
20	2440	1.038	2
40	2480	1.038	3

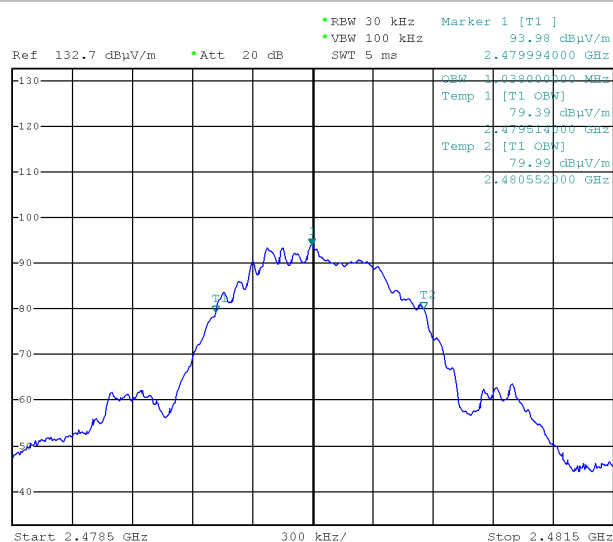
Plot 1



Plot 2



Plot 3



7.4 TRANSMITTER POWER SPECTRAL DENSITY

TEST REQUIREMENT	
Spectrum analyzer settings	
Span	1.5 MHz
Resolution bandwidth (RBW)	3 kHz
Video bandwidth (VBW)	10 kHz
Sweep time (SWT)	500 s
Detector function	Peak
Trace	Max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2019-01-21

TEST PROCEDURE
After trace stabilisation the marker shall be set on the signal peak. The indicated level is the power spectral density.

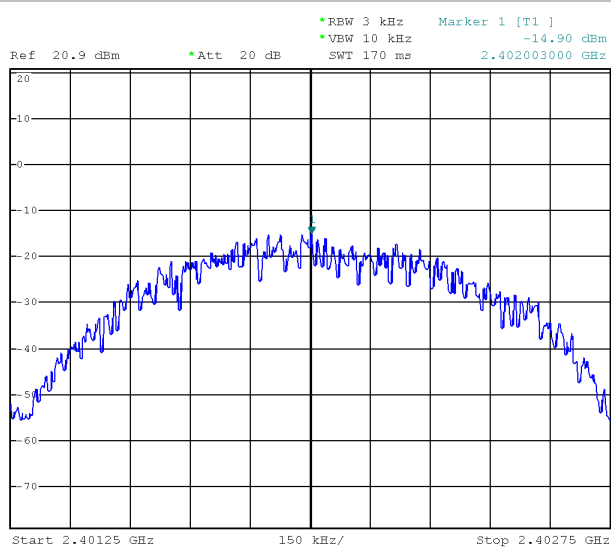
LIMITS
+8 dBm

TEST RESULT
The EUT meets the requirements of sections 5.2(2) of RSS-247.

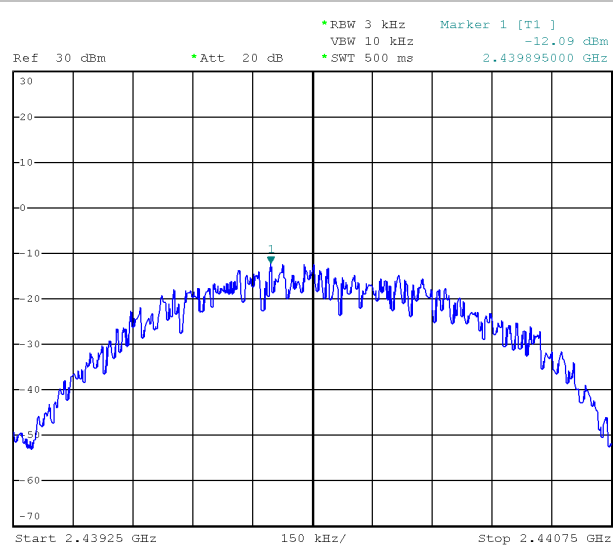
MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	Reading Power (dBm)	Correction Factor (dB)	Correcting reading (dBm)	Limit (dBm)	Plot (No.)
01	2402	-22.22	7.32	-14.90	8	1
20	2440	-18.94	6.85	-12.09	8	2
40	2480	-18.86	7.09	-11.77	8	3

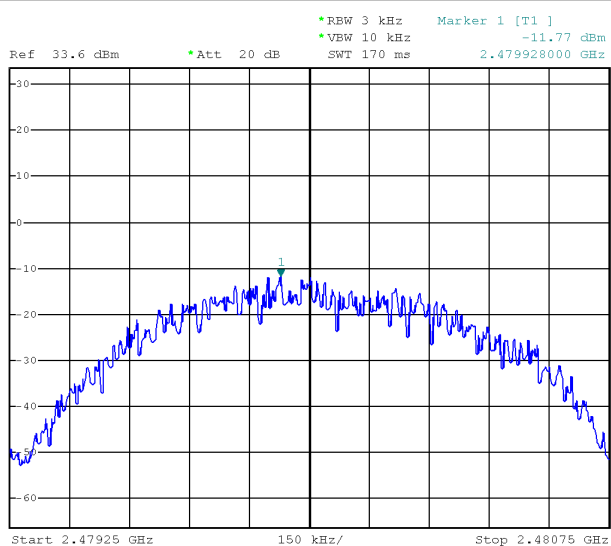
Plot 1



Plot 2



Plot 3



7.5 TRANSMITTER OUTPUT POWER AND E.I.R.P REQUIREMENTS

TEST REQUIREMENT	
Spectrum analyzer settings	
Span	Wide enough to capture the peak level of the emission
Resolution bandwidth (RBW)	10 MHz
Video bandwidth (VBW)	10 MHz
Sweep time (SWT)	2,5 ms
Detector function	Peak
Trace	max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2019-01-16

TEST PROCEDURE
Conducted measurements:
The transmitter output was connected to the spectrum analyzer through a temporary RF 50Ω connector type SMA.
Radiated measurements:
As the EUT is supplied with a dedicated antenna, the effective radiated power is measured in a 3 m anechoic chamber with the substitution antenna method

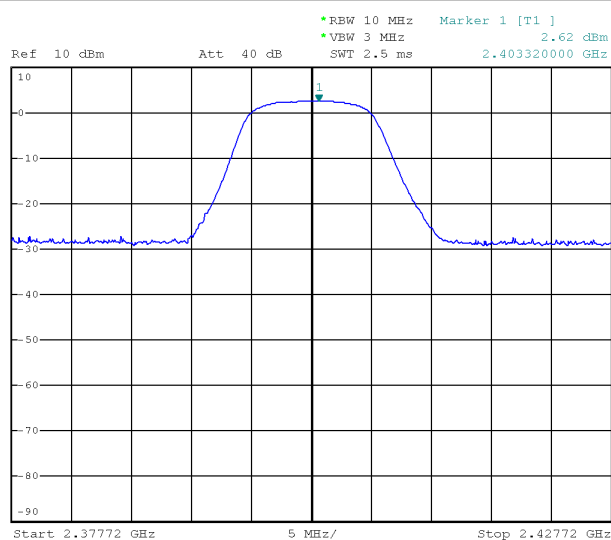
LIMITS
1 Watt (30dBm)

TEST RESULT
The EUT meets the requirements of sections 5 of RSS-247.

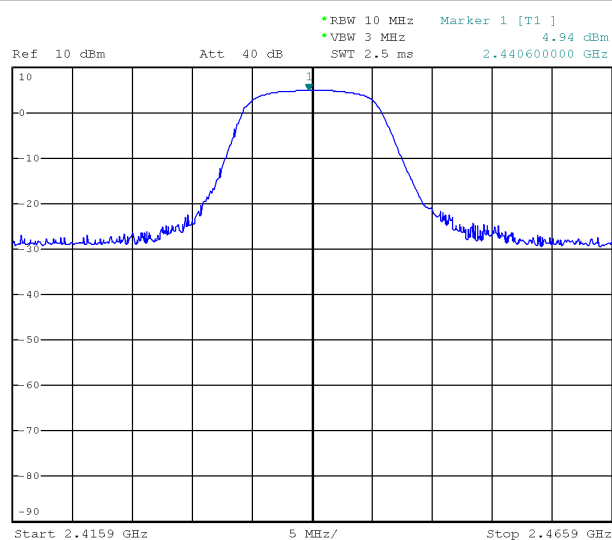
RADIATED MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	Reading Power (dBm)	Correction Factor (dB)	Correcting reading (dBm)	Output Power (mW)	Plot (No.)
01	2402	-4.70	7.32	2.62	1.828	1
20	2440	-1.91	6.85	4.94	3.119	2
40	2480	-1.78	7.09	5.31	3.396	3

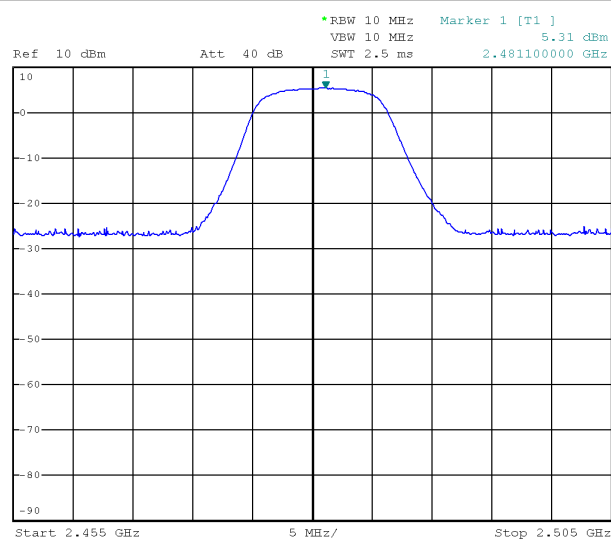
Plot 1



Plot 2



Plot 3



7.6 UNWANTED EMISSIONS

TEST REQUIREMENT	
Spectrum analyzer settings	
Span	Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation
Resolution bandwidth (RBW)	1 MHz (100 kHz band-edge)
Video bandwidth (VBW)	1 MHz (100 kHz band-edge)
Sweep time (SWT)	Auto
Detector function	Peak
Trace	Max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2019-01-21

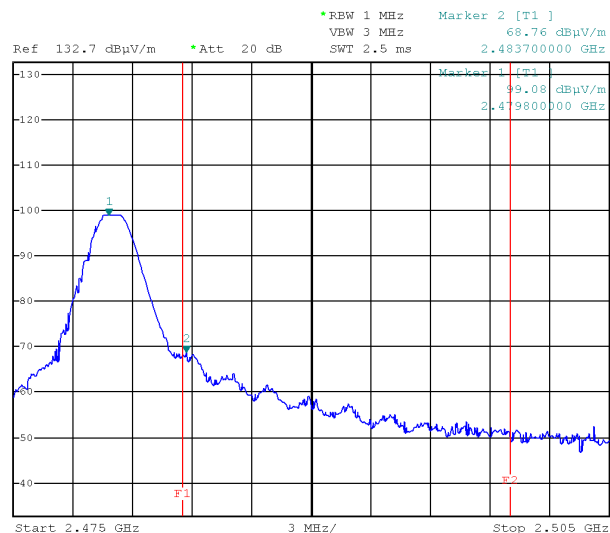
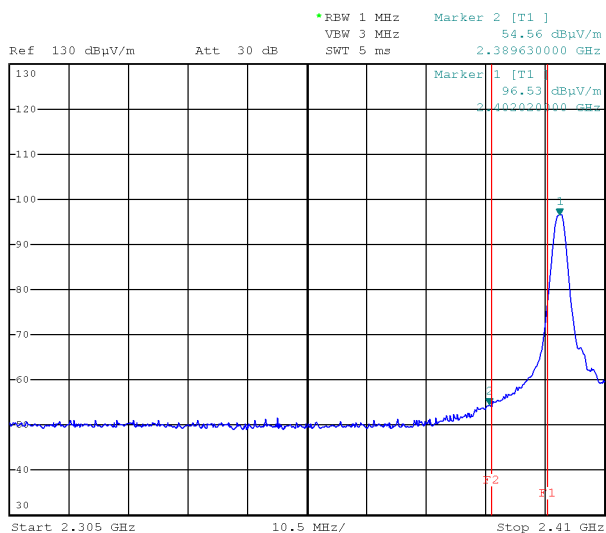
TEST PROCEDURE
<p>Only for measuring emissions up to 2 MHz removed from the band-edge the "delta" technique for Radiated emissions was used.</p> <p>Delta technique: The transmitter output was connected to the spectrum analyzer through a test fixture (radio frequency coupling device associated with the dedicated antenna of the equipment under test)</p> <p>Once the trace is stabilized, by the marker the emission at the band edge (or on the highest modulation product outside of the band, if this level is greater than that at the band edge) was set.</p> <p>The "n" by the marker-delta function and the marker-to-peak function the peak of the in-band emission was selected. The marker-delta value displayed was compared with the limit specified in this Section</p>

LIMITS
-20 dB below peak output power

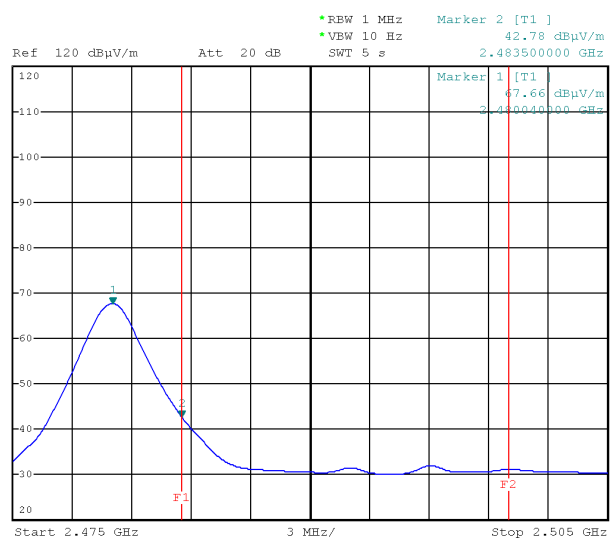
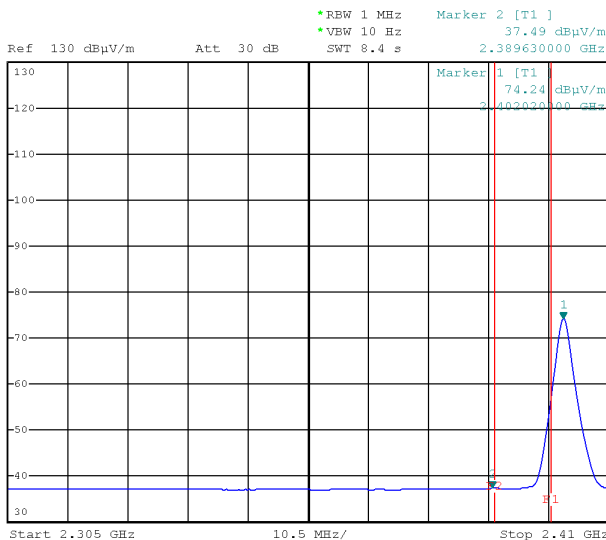
TEST RESULT
<p>The EUT meets the requirements of sections 5 of RSS-247.</p> <p>All out of band spurious emissions are more 20 dB below the in band power of the fundamental.</p>

MEASUREMENTS RESULTS

Band-edge compliance (Peak)



Band-edge compliance (Average)



Spurious Emission in restricted band near 2400-2483.5 MHz

Detector	Frequency	Reading value	Antenna Factor	Cable Loss	Pre-Amp. Gain	Correcting reading	PK Limit	PK Limit	Margin
	(GHz)	(dBμV)	(dB@3m)	(dB)	(dB)	(dBμV/m)	(μV/m)	(dBμV/m)	
PEAK	2.38963	49.47	27.3	5.18	-37.57	54.56	5000	74	18.03
	2.48370	63.77	27.4	5.18	-37.57	68.76	5000	74	5.01
AVERAGE	2.38963	32.40	27.3	5.18	-37.57	37.49	500	54	11.09
	2.48350	37.79	27.4	5.18	-37.57	42.78	500	54	5.01

7.7 OUT-OF-BAND EMISSIONS

TEST REQUIREMENT

Spectrum analyzer settings

Span	/
Resolution bandwidth (RBW)	100 kHz
Video bandwidth (VBW)	300 kHz
Sweep time (SWT)	as necessary to capture the entire dwell time
Detector function	Peak
Trace	Max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2019-01-21

TEST PROCEDURE

The measure has been executed with the lowest transmit channel, the highest transmit channel and one located somewhere in the middle of the band.

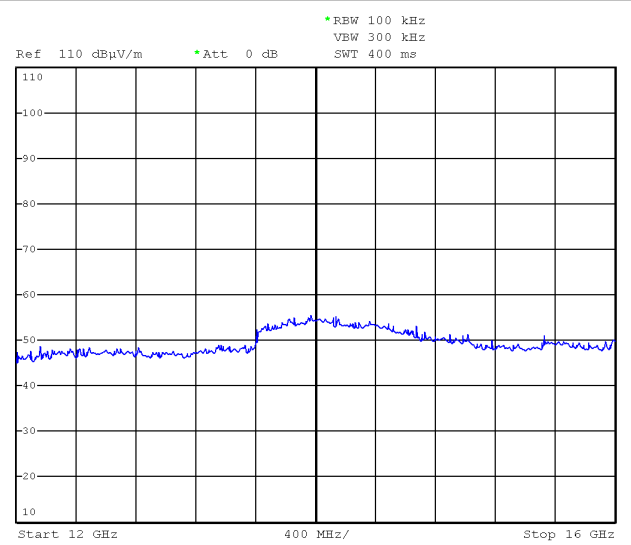
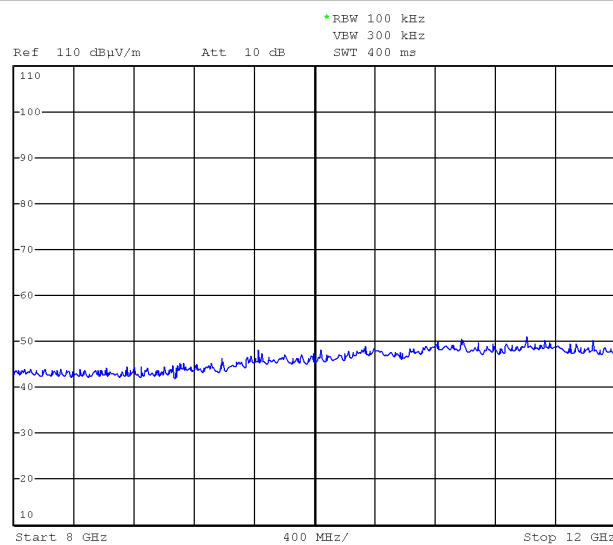
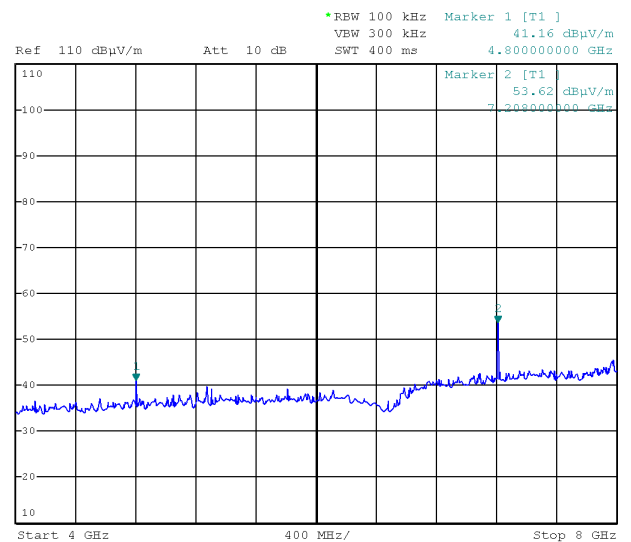
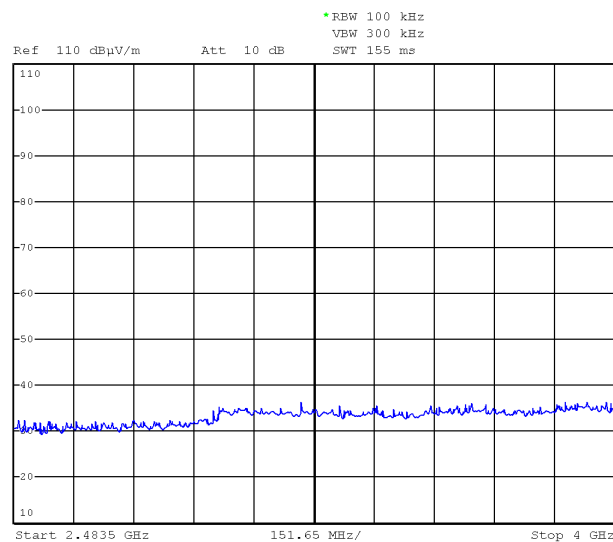
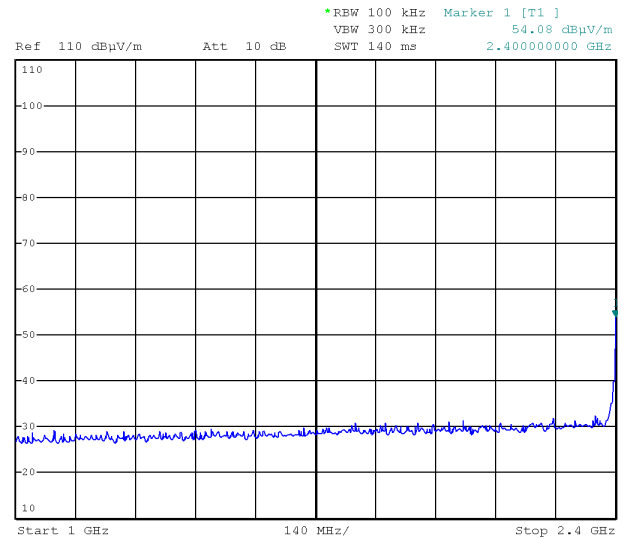
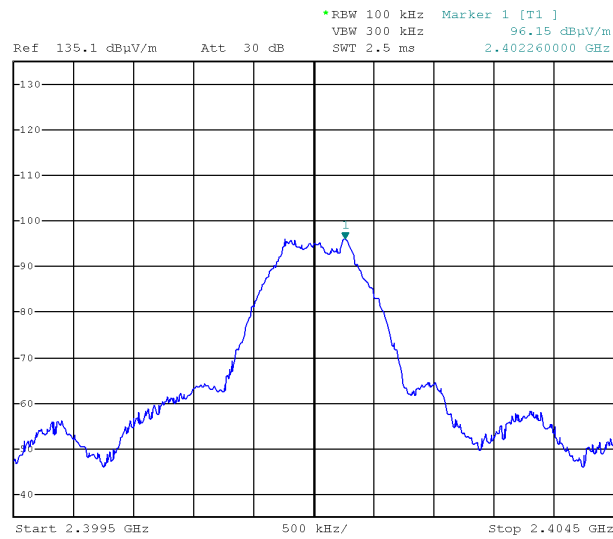
LIMITS

-20 dB below peak output power

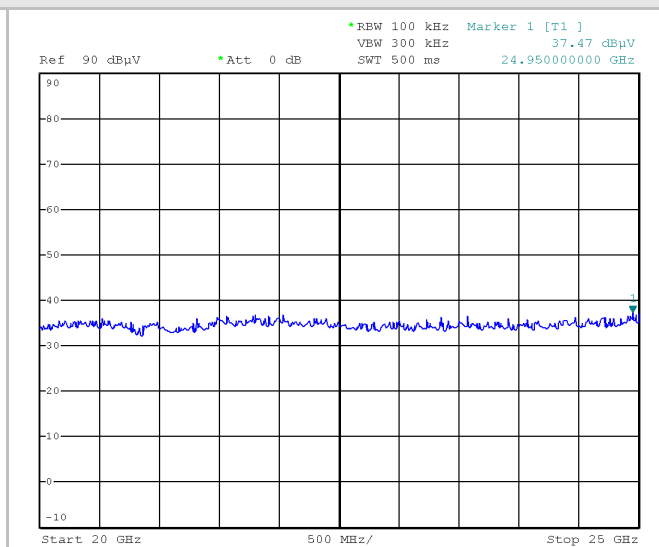
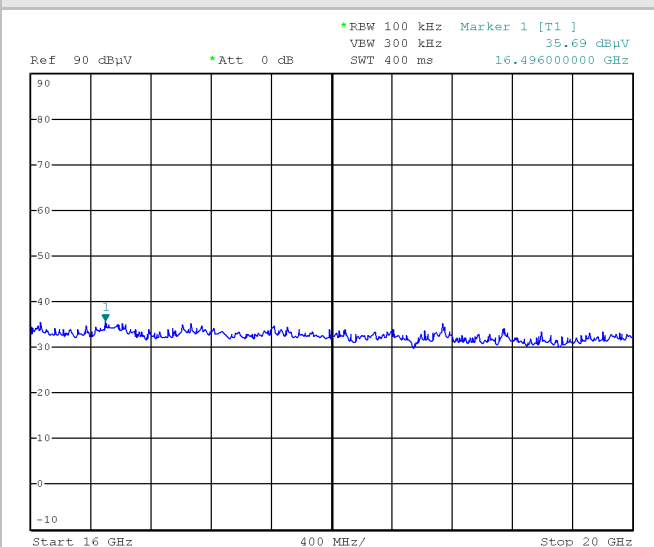
TEST RESULT

The EUT meets the requirements of sections 5 of RSS-247.
All out of band spurious emissions are more 20 dB below the in band power of the fundamental.
No significant spurious emissions above 18GHz.

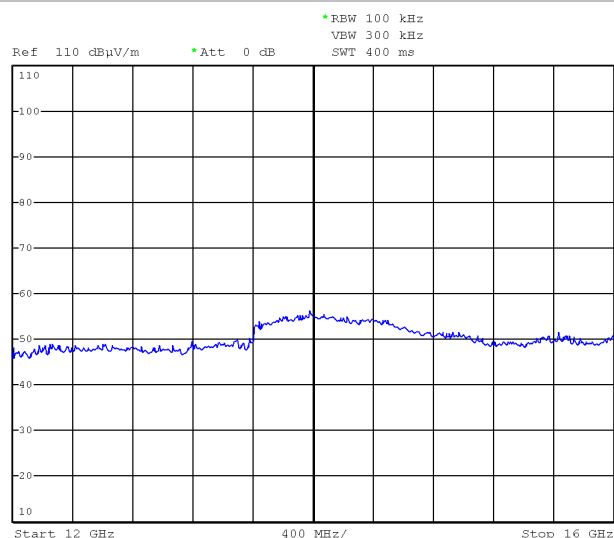
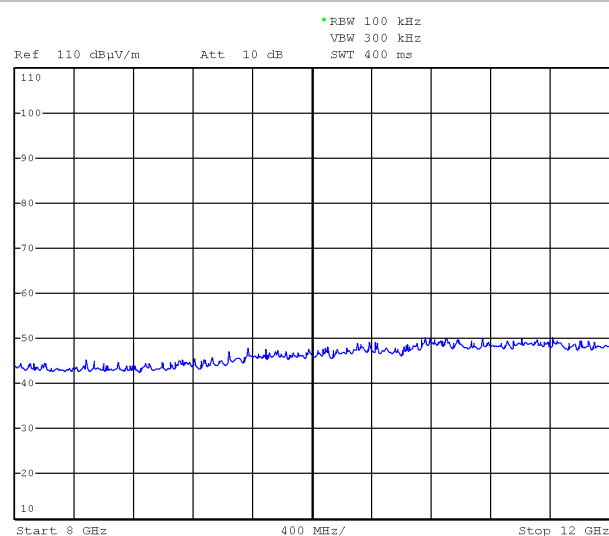
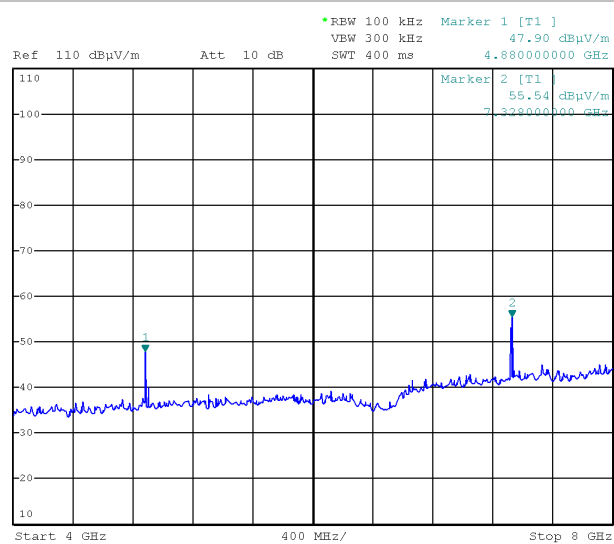
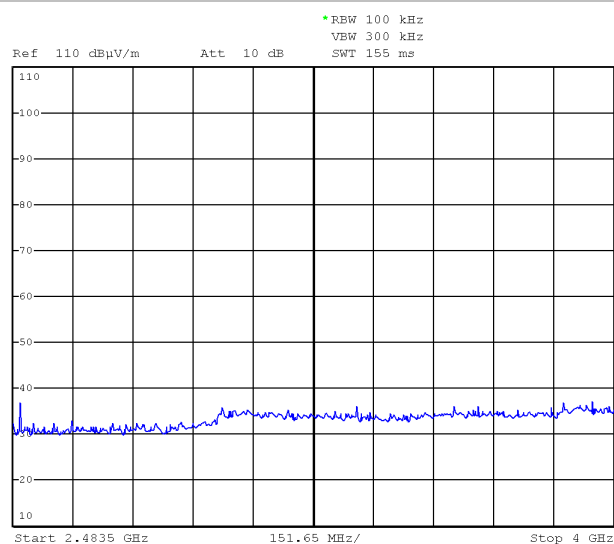
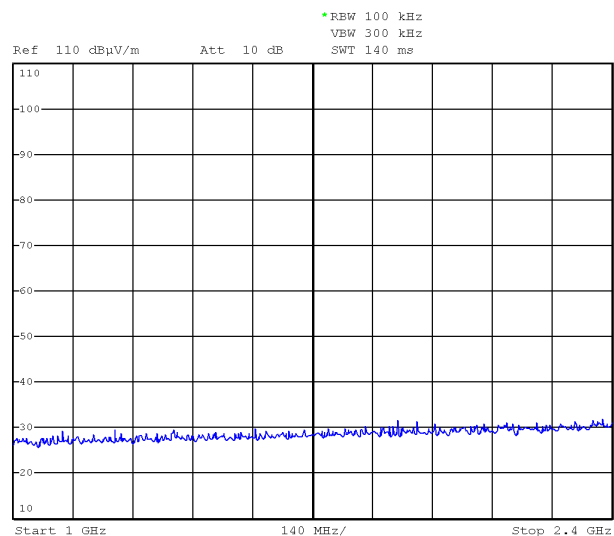
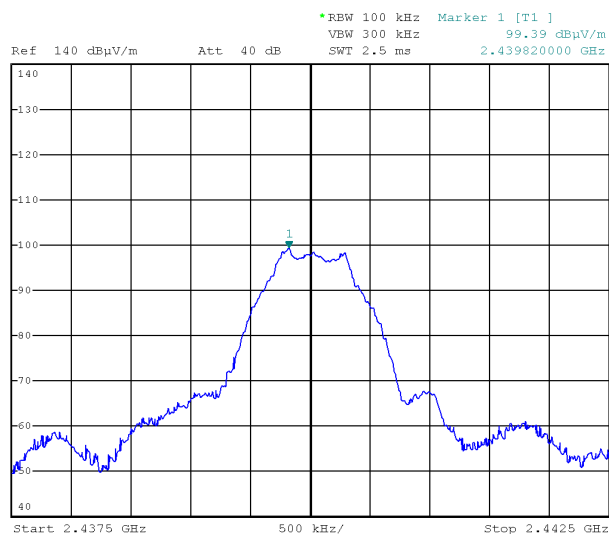
MEASUREMENTS RESULTS - Channel lower



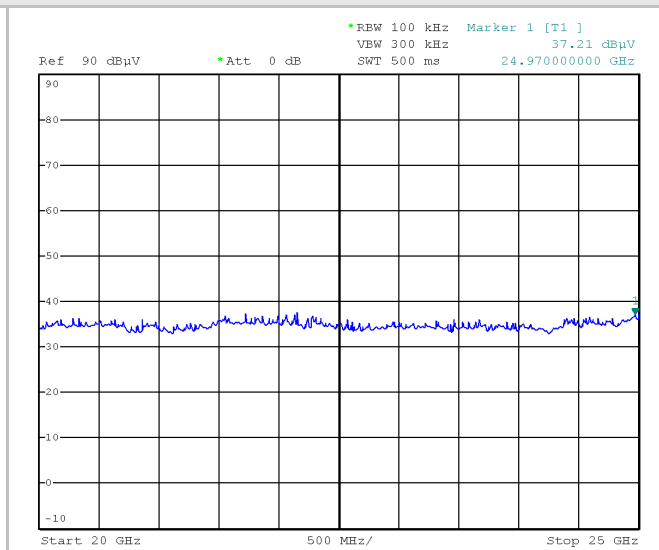
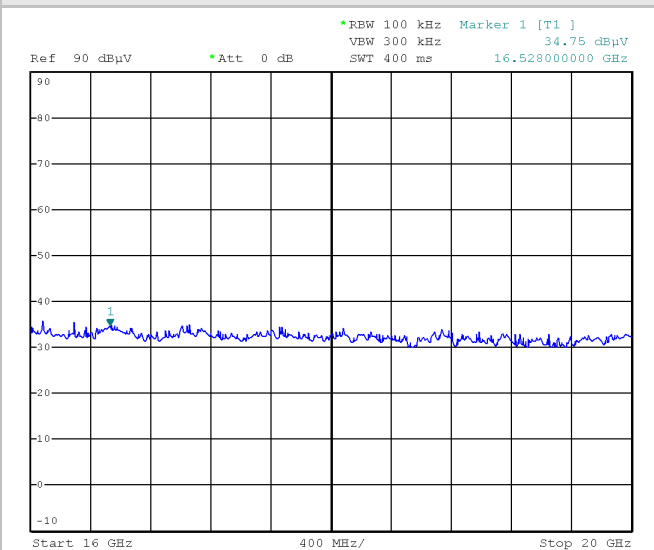
MEASUREMENTS RESULTS - Channel lower



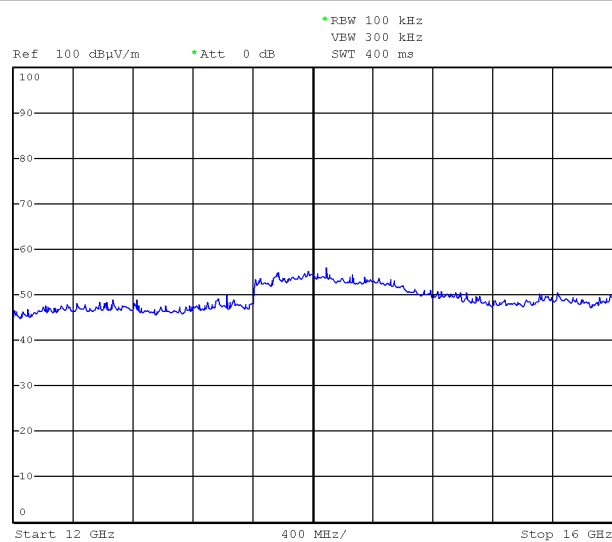
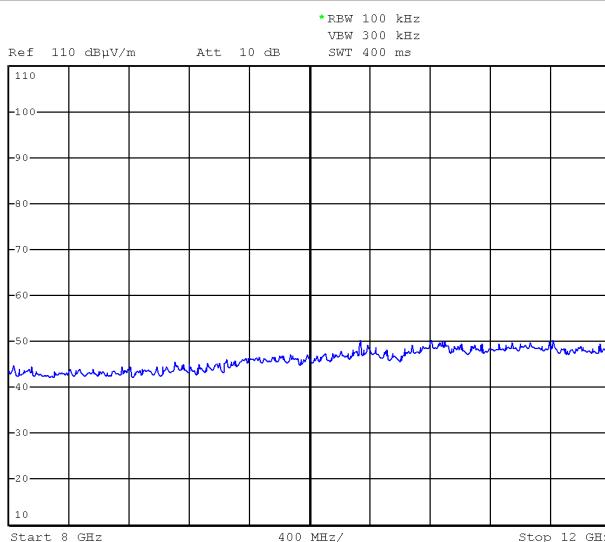
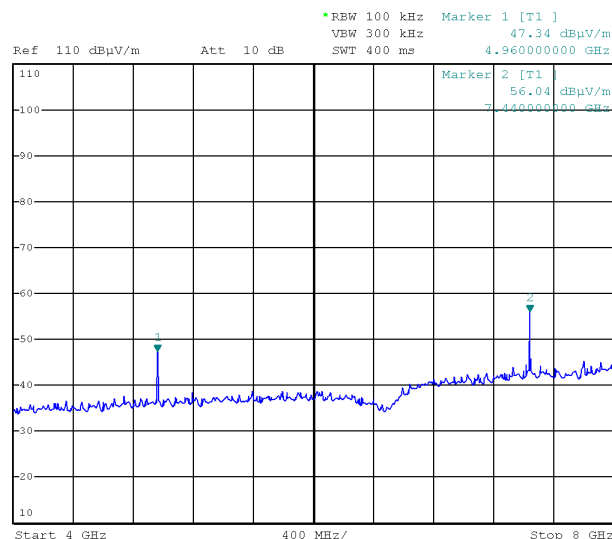
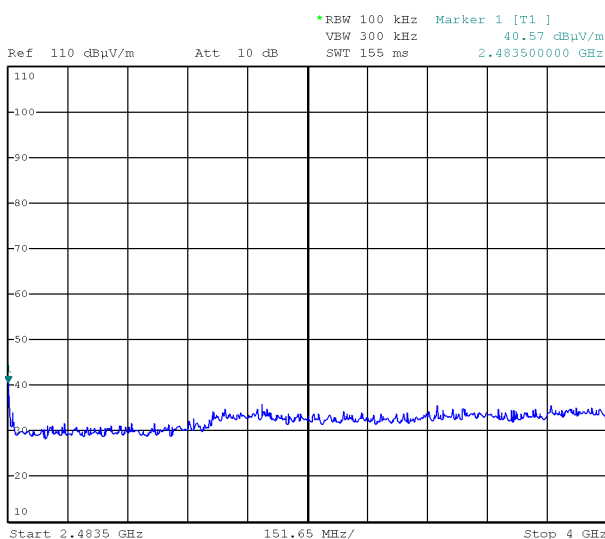
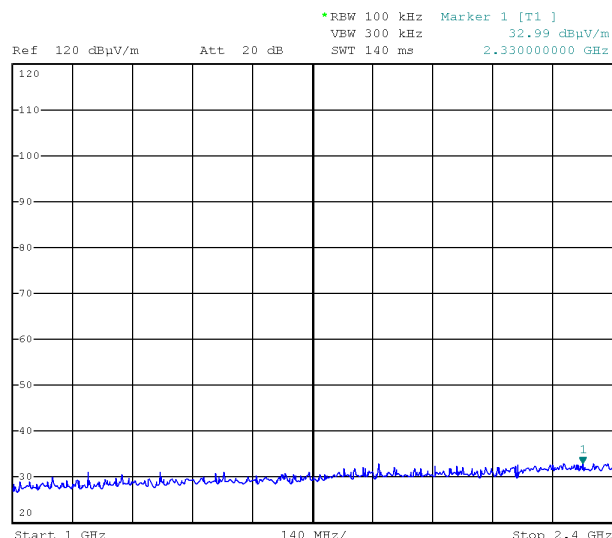
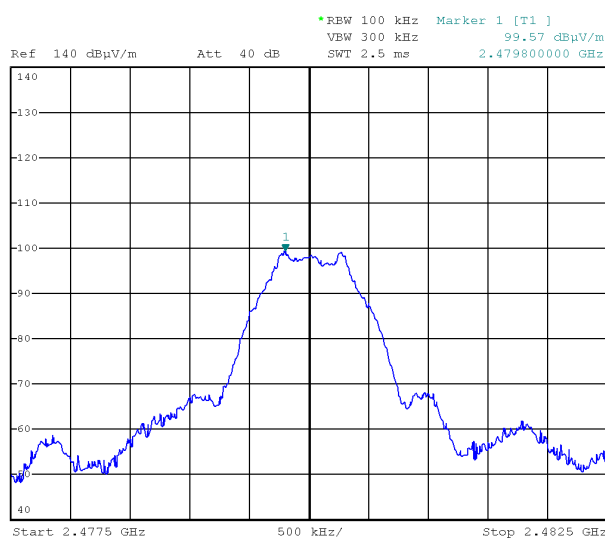
MEASUREMENTS RESULTS - Channel middle



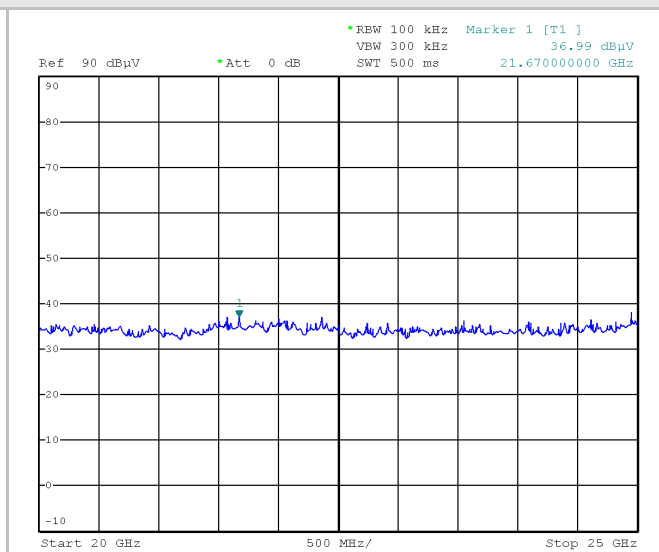
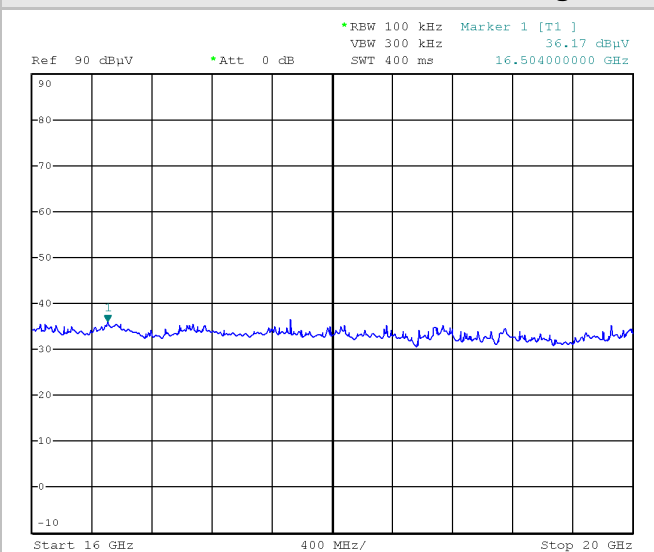
MEASUREMENTS RESULTS - Channel middle



MEASUREMENTS RESULTS - Channel higher



MEASUREMENTS RESULTS - Channel higher



7.8 RADIATED DISTURBANCES

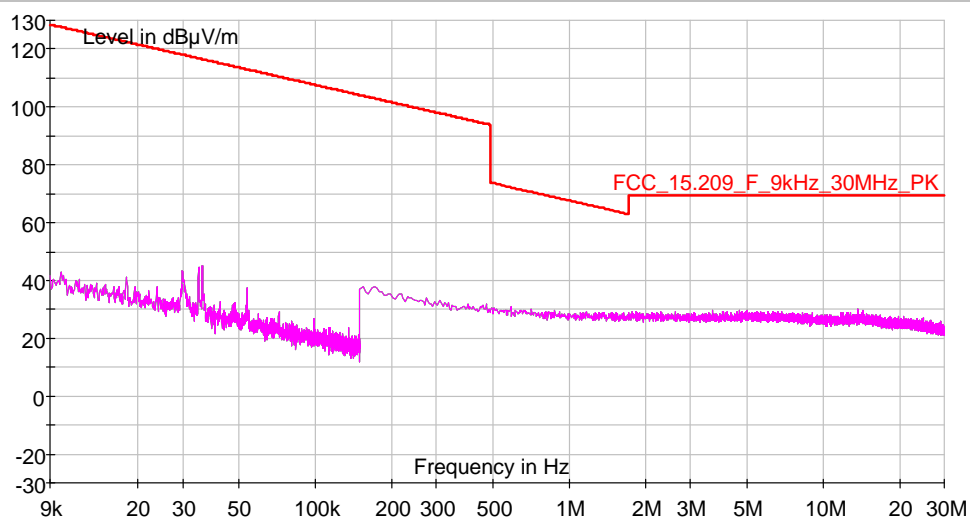
TEST REQUIREMENT	
Test setup	ANSI C63.4
Test facility	Semi-anechoic chamber
Test distance	3 meters
Frequency range	9 kHz to tenth harmonic of fundamental
IF bandwidth (below 30 MHz)	9 kHz
IF bandwidth (below 1,000 MHz)	120 kHz
IF bandwidth (above 1,000 MHz)	1 MHz
EMC class	B
EUT operating condition	#1
Remark	Where the measurement distance was specified to be 30 or 300 meters, a correction factor was applied in order to permit measurement to be performed at a separation distance. The applied formula for limits at 3 meter is: Extrapolation (dB) = $40\log(300\text{meter} / 3\text{meter}) = +80\text{db}$ Extrapolation (dB) = $40\log(30\text{meter} / 3\text{meter}) = +40\text{db}$
Testing dates	2019-01-14 ÷ 2019-01-16

LIMITS		
Band of operations	Peak (dB μ V/m)	Average Limit (dB μ V/m)
Restricted bands (RSS-Gen 7.2.2 table 3)	74	54
Other frequency	74 or Fundamental -20dB (which is greater) (according to RSS-Gen 7.3, 8.9, 8.10 and RSS 247 § 5.5)	54 or Fundamental -20dB (which is greater) (according to RSS-Gen 7.3, 8.9, 8.10 and RSS 247 § 5.5)

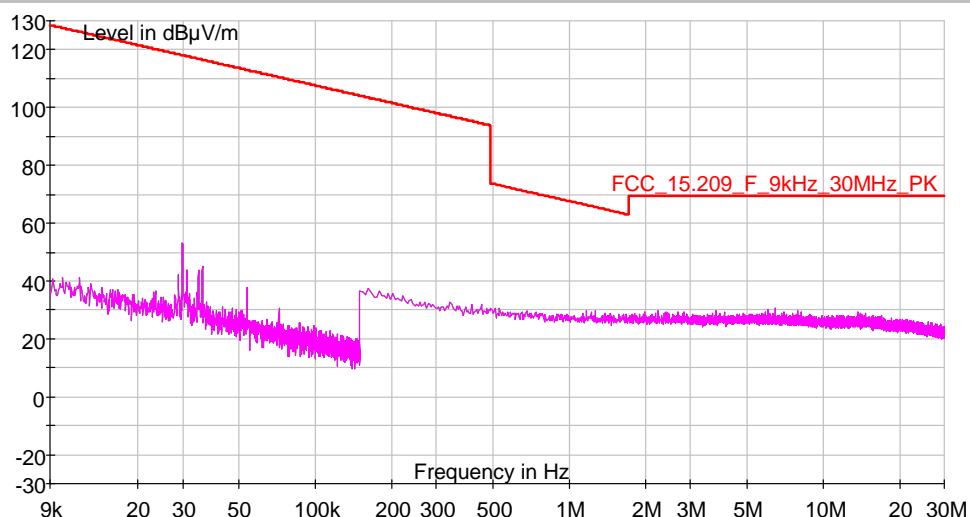
TEST PROCEDURE	
1)	The EUT was placed on turntable which is 0.8 m above the ground plane
2)	The turntable shall rotate from 0° to 360° degrees to determine the position of maximum emission level.
3)	The EUT is positioned 3 m away from the receiving antenna which varied from 1 to 4 m to find the highest emission.
4)	The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 100 kHz below 1000 MHz and 1 MHz above 1000 MHz.
5)	The receiving antenna was positioned in both horizontal and vertical polarization.
6)	The measurements with Quasi-Peak detector, below 1000 MHz are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).

Worst case measurement result 9 kHz+30 MHz

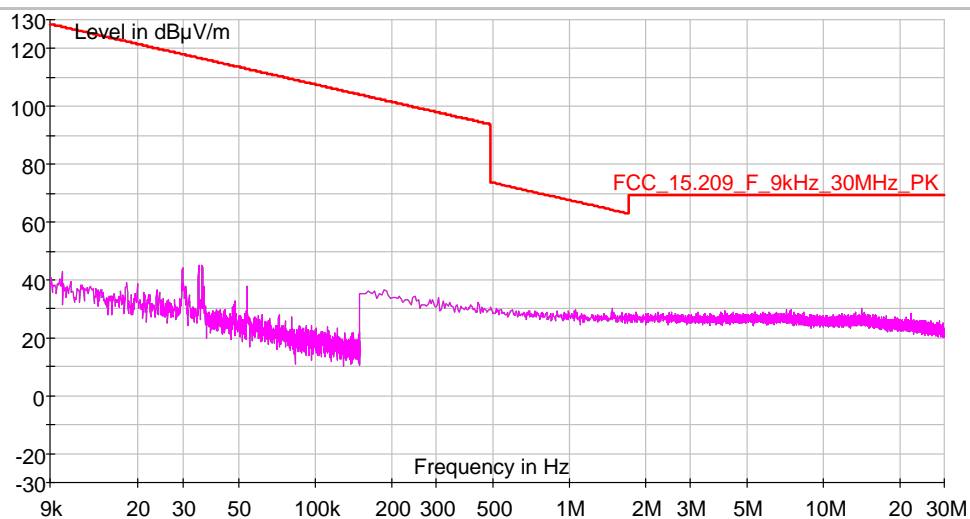
LOWER CHANNEL



MIDDLE CHANNEL

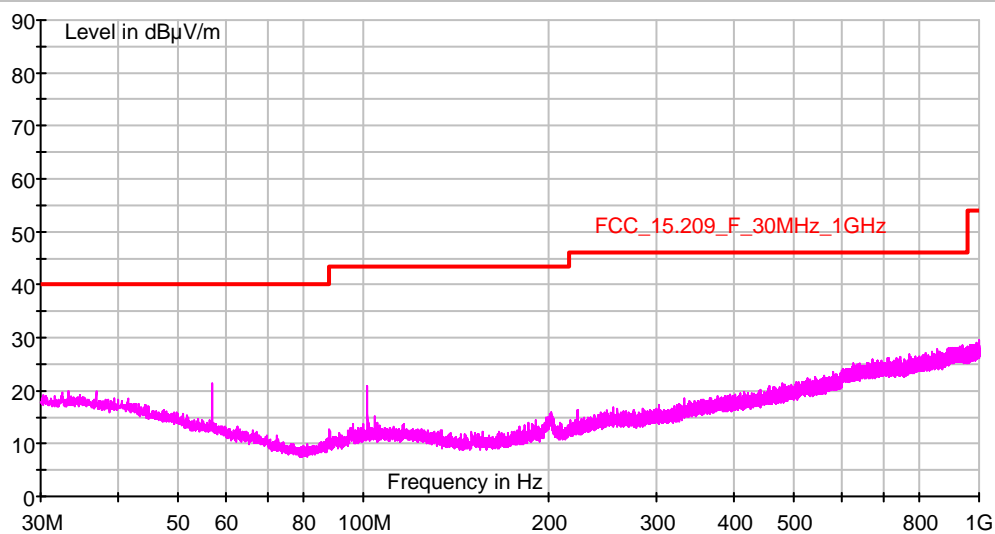


HIGHER CHANNEL

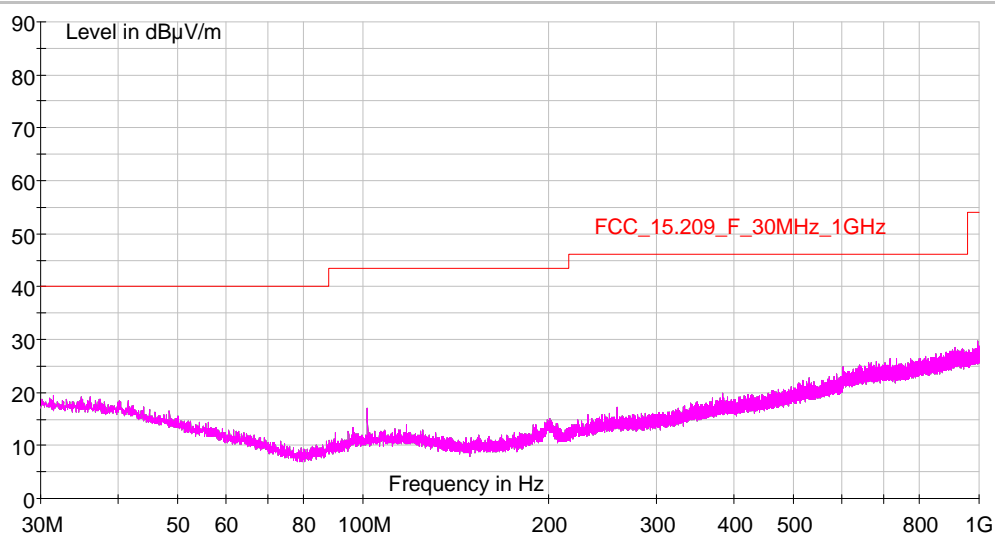


Worst case measurement result 30+1,000 MHz

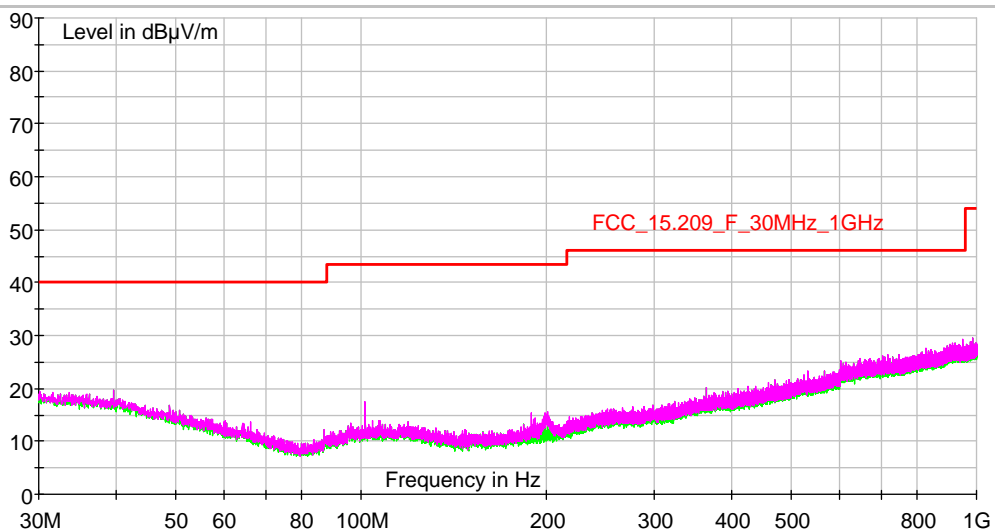
LOWER CHANNEL



MIDDLE CHANNEL

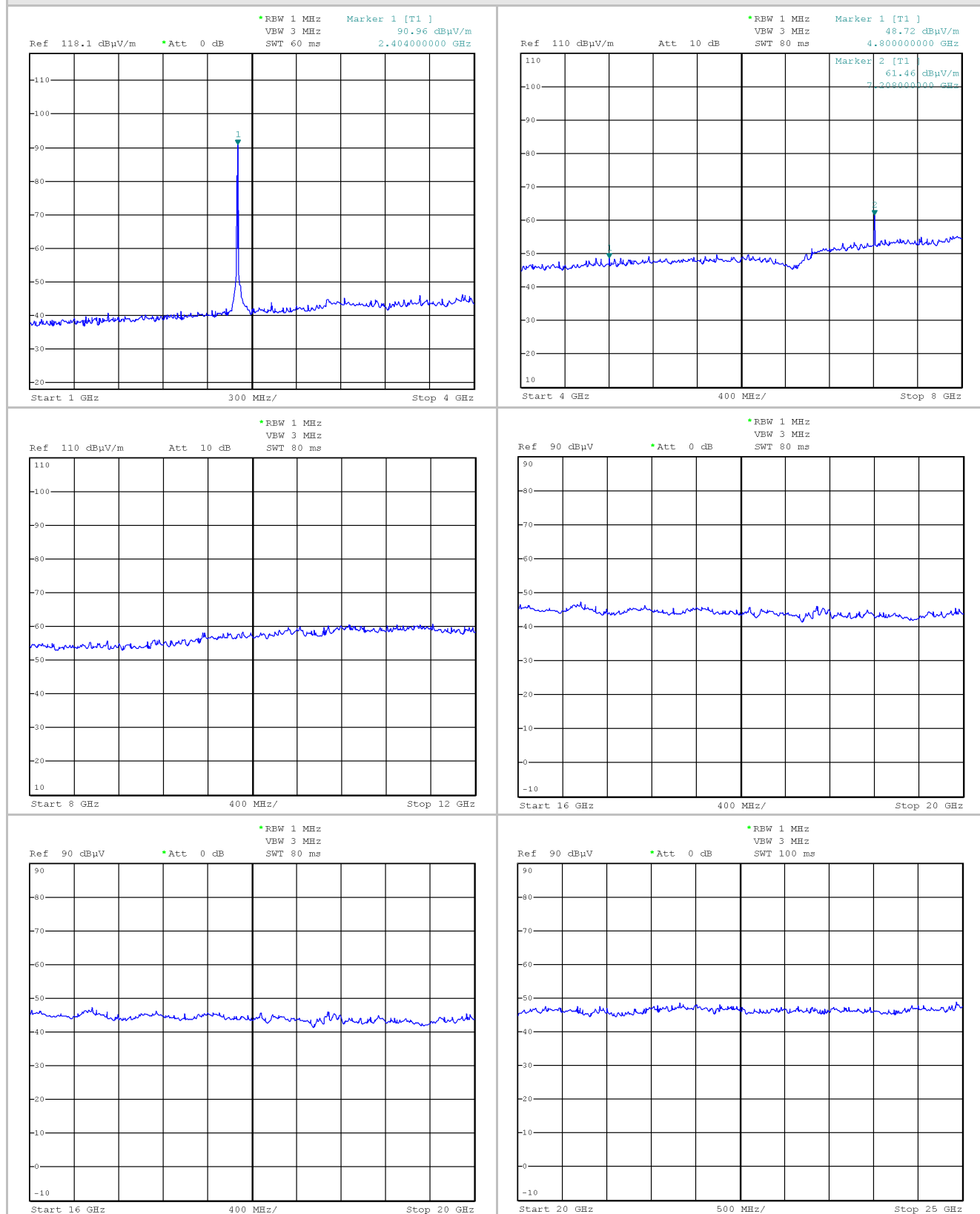


HIGHER CHANNEL

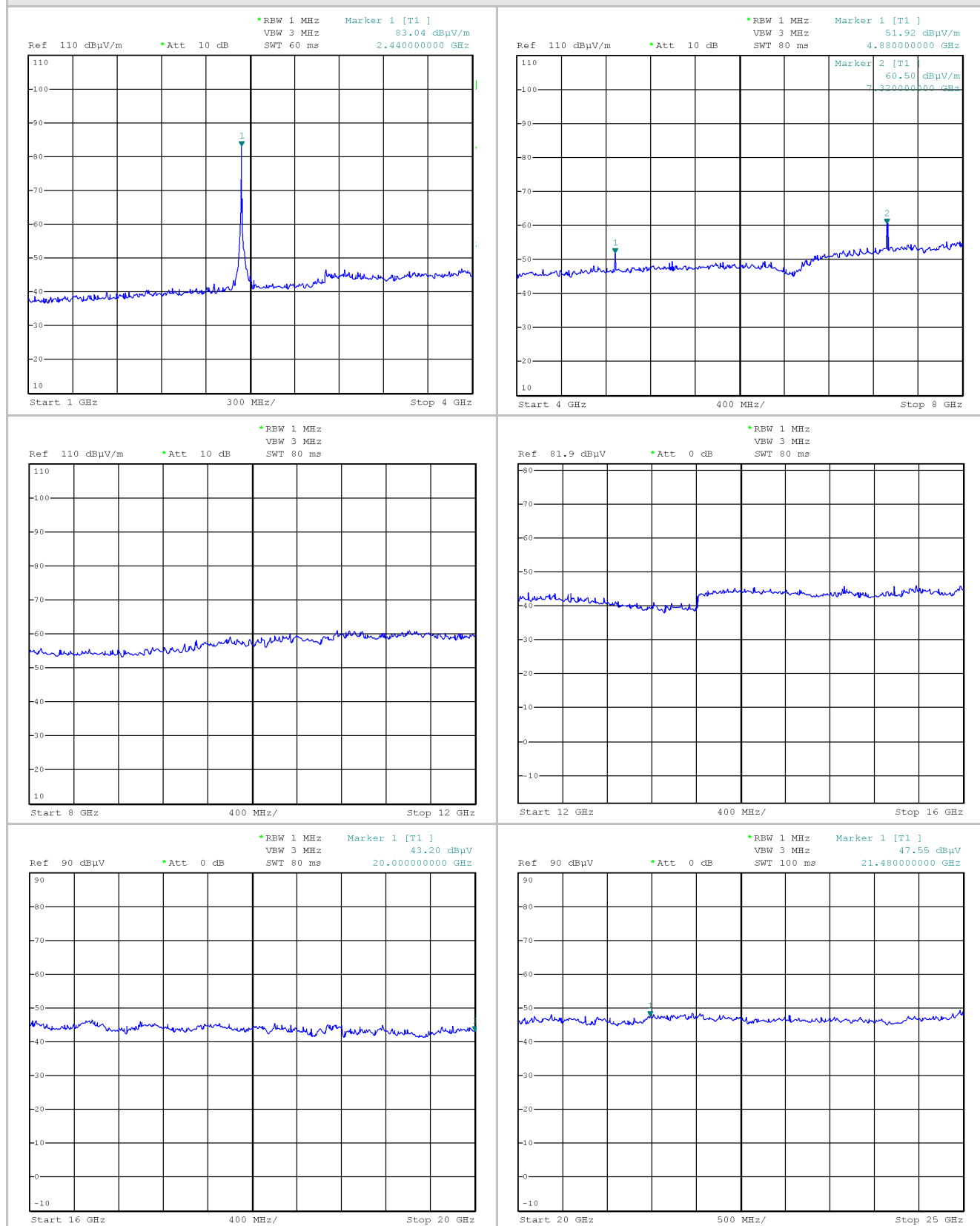


Worst case measurement result >1,000 MHz (Peak)

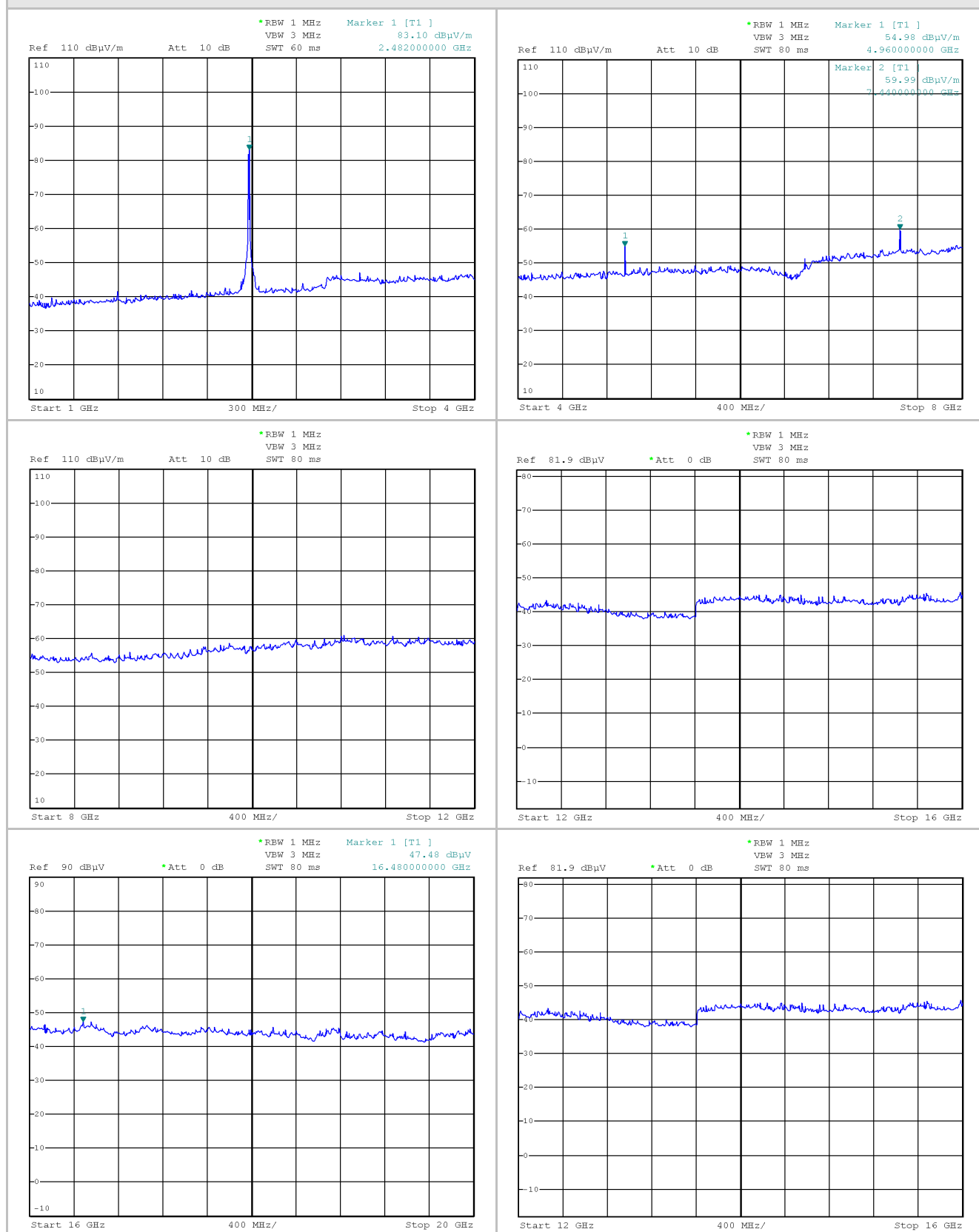
LOWER channel



MIDDLE channel

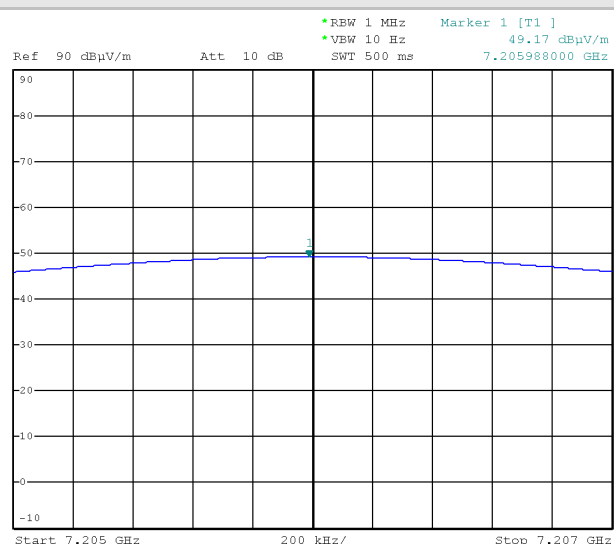
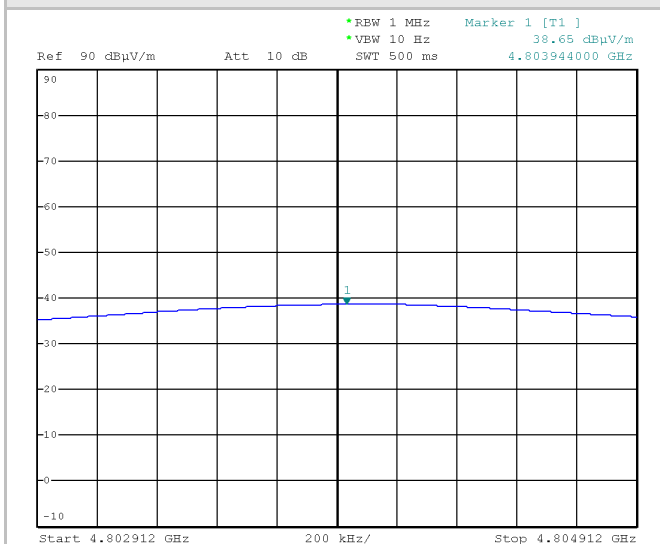


HIGHER channel

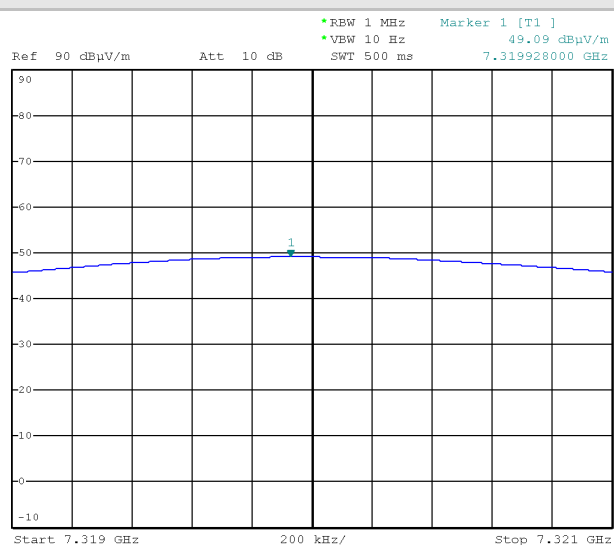
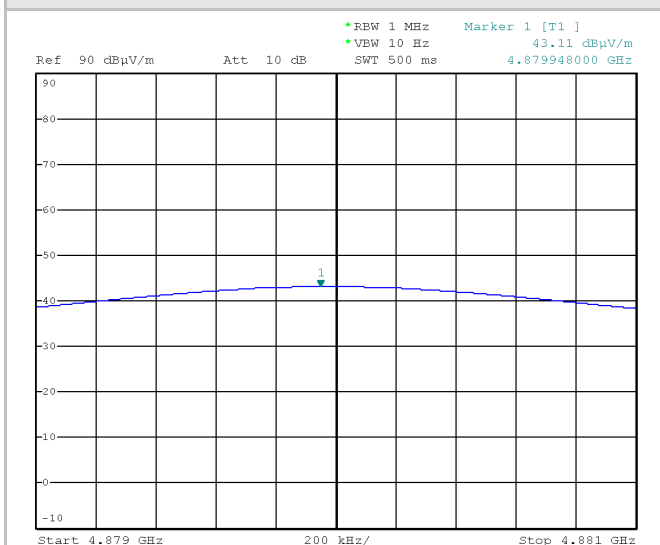


Worst case measurement result >1,000 MHz (Average)

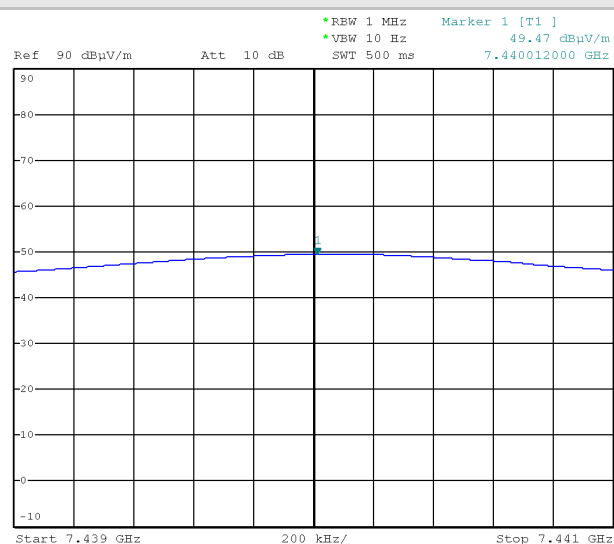
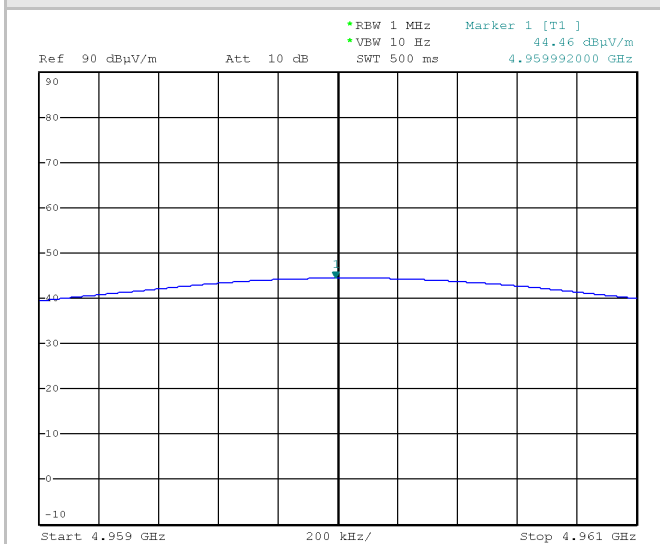
LOWER channel



MIDDLE channel



HIGHER channel



Tabular worst case measurement result >1,000 MHz (PK & AV)

PEAK RESULT (RBW=1MHz; VBW=3MHz)								
Frequency (MHz)	Reading value (dBμV)	Antenna Factor (dB@3m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Correct reading (dBμV/m)	PK Limit (AV + 20dB)		Margin
						(μV/m)	(dBμV/m)	(dB)
2402 (lower channel)	85.87	27.3	5.18	-37.57	90.96	---	---	
4804	50.35	31.3	7.31	-36.98	48.72	5000	74	25.28
7206	69.55	36	9.09	-37	61.46	5000	74	12.54
f>7206	No significant values were found					5000	74	---
2440 (middle channel)	77.95	27.3	5.18	-37.57	83.04	---	---	
4880	53.81	31.45	7.34	-36.9	51.92	5000	74	22.08
7320	68.8	36.15	9.15	-37	60.5	5000	74	13.5
f>7320	No significant values were found					5000	74	---
2480 (higher channel)	78.11	27.4	5.18	-37.57	83.1	---	---	
4960	56.92	31.5	7.34	-36.9	54.98	5000	74	19.02
7440	68.91	36.4	9.42	-36.9	59.99	5000	74	14.01
f>7440	No significant values were found					5000	74	---

AVERAGE RESULT (RBW=1MHz; VBW=10Hz)								
Frequency (MHz)	Reading value (dBμV)	Antenna Factor (dB@3m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Correct reading (dBμV/m)	AV Limit		Margin
						(μV/m)	(dBμV/m)	(dB)
2402 (lower channel)	---	---	---	---	---	---	---	---
4804	40.28	31.3	7.31	-36.98	38.65	500	54	15.35
7206	57.26	36	9.09	-37	49.17	500	54	4.83
f>7206	No significant values were found (see also above plots)					500	54	---
2440 (middle channel)	---	---	---	---	---	---	---	---
4880	45	31.45	7.34	-36.9	43.11	500	54	10.89
7320	57.39	36.15	9.15	-37	49.09	500	54	4.91
f>7320	No significant values were found (see also above plots)					500	54	---
2480 (higher channel)	---	---	---	---	---	---	---	---
4960	46.4	31.5	7.34	-36.9	44.46	500	54	9.54
7440	58.39	36.4	9.42	-36.9	49.47	500	54	4.53
f>7440	No significant values were found (see also above plots)					500	54	---

See below the measurements plots.

8. TESTS UNCERTAINTY

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001 and IO-LAB-004. and requirement of NIST Technical Note 1297 and NIS 81: 1994 "The Treatment of Uncertainty in EMC Measurements"

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025.

Internal Procedure PG-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

Methods/Standard	Parameter	Expanded Uncertainty	Unit	Confidence level
Continuous disturbance	QP detector 9 – 150 kHz	2.47	dB	95%
	QP detector 150 k – 30 MHz	2.61	dB	95%
	QP detector using Voltage Probe	2.45	dB	95%
	QP detector using ISN	3.15	dB	95%
	QP detector using Current Probe	2.15	dB	95%
Radiated disturbance	QP detector (30 MHz - 100 MHz) H polarization	4.33	dB	95%
	QP detector (30 MHz - 100 MHz) V polarization	4.22	dB	95%
	QP detector (100 MHz - 200 MHz) H polarization	3.40	dB	95%
	QP detector (100 MHz - 200 MHz) V polarization	4.76	dB	95%
	QP detector (200 MHz - 1000 MHz) H polarization	3.91	dB	95%
	QP detector (200 MHz - 1000 MHz) V polarization	3.82	dB	95%
	P detector 1 - 6 GHz	4.77	dB	95%
	P detector 6 - 18 GHz	5.14	dB	95%
	P detector 18 - 26 GHz	4.95	dB	95%
	P detector 26 - 40 GHz	5.20	dB	95%

9. LIST OF MEASURING EQUIPMENT AND CALIBRATION INFORMATION

IMQ Serial Number	Instrument	Manufacturer	Type	Last Cal.	Cal. Period.	Calibration Company
P01709	Shielded semi-anechoic chamber	SIDT	/	03-17	24	IMQ
P02486	Turntable controller unit	FRANKONIA	FCTAM01	/	/	/
P02488	Mast antenna	FRANKONIA	FAM4	/	/	/
S02385	Log antenna	ARA	LPB-2513	06-17	36	NPL
S03463	Horn Antenna	SCHWARZBECK	BBHA 9120D	07-17	36	NPL
S02508	Loop Antenna	ROHDE & SCHWARZ	HFH2-Z2	08-18	24	SEIBERSDORF
S03629	Spectrum Analyzer	Rohde & Schwarz	FSP40	08-18	12	ROHDE & SCHWARZ
S03542	Preamplifier	Hewlett Packard	HP 8449B	03-18	12	IMQ
S04355	EMI receiver	Rohde & Schwarz	ESCI 3	10-18	12	I.N.R.I.M.
S02122	Two-line V-network	Rohde & Schwarz	ESH3-Z5	04-18	12	IMQ
W-00199/E	Software	ROHDE & SCHWARZ	EMC32 Ver. 6.30	/	/	/
H-00165	PC	/	/	/	/	/

END OF TEST REPORT