

TEST REPORT

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EUT DESCRIPTION USB DONGLE

EUT TRADEMARK EMBIT

EUT MODEL EMB-Z2531PA-USB/xx; EMB-Z2531/xx; EMB-Z2531PA/xx;
EMB-Z2531USB/xx; EMB-Z2531-USB/xx; EMB-Z2531PAUSB/xx;
NETCE001/xx (just different commercial type names)
/xx stands from EUT with integral antenna or EUT with antenna connector

REFERENCE STANDARDS : 47 CFR FCC part 15.247
Part 15.203, part 15.205, part 15.207, part 15.209

TEST REPORT NUMBER FCCTR_111255-1

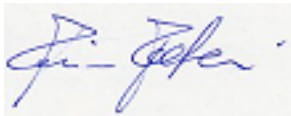
TEST REPORT ISSUE DATE 28/02/2012

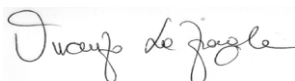
TESTING LABORATORY Prima Ricerca & Sviluppo S.r.l.
Via Campagna, 92 -22020 Faloppio (Co) –Italy

TESTING LOCATION As Above

DATE OF TEST SAMPLE RECEIPT 11/10/2011

DATE OF TEST 11/10/2011 - 17/10/2011

TESTED BY Massimo Maltempi 

APPROVED BY Vincenzo La Fragola 

The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained. Reproduction of this Test Report, should not be reproduced, except in full, without the written authorization of the Laboratory

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0. RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_111255-0	Original Release	28/02/2012
FCCTR_111255-1	Added List of Instruments	05/04/2012
FCCTR_111255-2	Added a new EUT model	17/04/2012
FCCTR_111255-2	Complete revision of antenna list	03/08/2012

1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

Brand name: *EMBIT*
 Manufacturer: EMBIT s.r.l. EMBEDDED & WIRELESS SOLUTION
 Type of Equipment : Digital Modulation Transmitter
 Model name or number : EMB-Z2531PA-USB/xx; EMB-Z2531/xx; EMB-Z2531PA/xx;
 EMB-Z2531USB/xx; EMB-Z2531-USB/xx; EMB-Z2531PAUSB/xx;
 NETCE001/xx (just different commercial type names)
 /xx stands from EUT with integral antenna or EUT with antenna connector
 Serial number : Test Sample
 FCC ID : Z7H-EMBZ2531PAUSB
 Country of manufacturer: ITALY

1.1 Technical data

FCC class: 47 CFR FCC Part 15 Subpart C § 15.247
 Product type: Radio Equipment
 Radio type: Intentional radiators
 Power supply requirements : 2 ÷ 3,6 Vdc powered from USB port
 Frequency range : 2405 – 2480 MHz
 Type Modulation : QPSK
 RF Output Impedance : 50 Ohms
 Channel spacing : 5 MHz
 6 dB bandwidth : 1,75 MHz
 Oscillator Frequencies: 4.8 GHz
 Channels number : 16

	n. channel	Frequency
1	11	2405
2	12	2410
3	13	2415
4	14	2420
5	15	2425
6	16	2430
7	17	2435
8	18	2440
9	19	2445
10	20	2450
11	21	2455
12	22	2460
13	23	2465
14	24	2470
15	25	2475
16 (not used)	26	2480

RF Output Power rating : 120.5 mW (+20.81 dBm) – High Power Setting
 Carrier Frequency: 2405, 2440, and 2480 MHz (Channels # 11, 18, & 26)
 Antenna Connector /Types :

- Integral
- Unique connector (RPSMA / u.FL)

1.2 Associated antenna description

The highest gain antenna from each type of antenna was selected for testing to represent the worst case. The following antennas were selected for testing in this filing:

	NAME	TYPE	CONNECTOR	MAX GAIN
1	EMB-AN24-15PFA	PRINTED PCB ANTENNA – PIFA	-	1.5 dBi

1.3 Ports identification

Port	Description	Maximum length	Connection	Ancillaries / Modules / Support Equipment
1	Enclosure	Electronic card	---	---
2	AC power input/output ports	Port not present	---	Ac/dc adapter for Notebook
3	DC power input/output ports	DC 2 ÷ 3,6 Vdc powered from USB port		Notebook USB port
4	Antenna connector	Present	---	RPSMA/u.FL
5	Signals Ports	USB		None
6	Telec. Port	Port no present	----	None

Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.

1.4 Auxiliary equipment

- Notebook Toshiba, mod Satellite Pro C660
- ac/dc adapter Toshiba part. No. PA3714U-1ACA

2. TEST CONDITIONS

2.1 Operating test modes and test conditions

The equipment has been tested according to the operative conditions described in the user/installation manual provided by the manufacturer and by following reference standards :

Reference Standard:

- 47 CFR FCC Part 15 Subpart C § 15.247
- RSS-210 Issue 7 June 2007 - Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment,

In the following table there are the operating conditions adopted during tests identified by an indicator (#..) at which has been referred the item “Operating condition of the equipment under test” of all technical sheets of the tests (see Section 4)

Operating condition	Description
#1	Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements
#2	EUT in transmission mode with only carrier frequency

Special Test Software: Special software and hardware by the Applicant to operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of the lowest, middle and highest frequencies individually continuously during testing.

Special Hardware Used: None.

Transmitter Test Antenna: The EUT has been tested with the antenna fitted in a manner typical of normal intended use as integral / non-integral antenna equipment as described with the test results.

2.2 Test overview

The appliance is classified as “Intentional radiator” in conformity to FCC Part 15 Subpart C § 15.247.

The application is mainly as generic module for standard data transfer communication application (modem)

3. REFERENCE STANDARD FOR PERFORMED TESTS

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in ANSI C63.4-2003 and 47 CFR FCC Part 15 Subpart C.

4. SUMMARY OF TEST RESULTS

4.1 Emission tests

Port		Phenomena	Basic standard	Operating condition ¹	Result
1	Antenna port	Antenna requirement ¹	FCC Part 15 §15.203	---	Within the limit
2		Maximum Peak Output Power	FCC Part 15 §15.247 (b) (3)	#2	Within the limit
3		6 dB Bandwidth	FCC Part 15 §15.247 (a) (2)	#1	Within the limit
4		Power Spectral Density	FCC Part 15 §15.247 (e)	#1	Within the limit
5		Band-Edge and	FCC Part 15 § 15.247 (d)	#1	Within the limit
6		RF conducted Spurious Emissions at the Transmitter Antenna Terminal	FCC Part 15 § 15.247 (d), 15.209	#2	Within the limit
		RF radiated Spurious Emissions at the Transmitter Antenna Terminal	FCC Part 15 § 15.247 (d), 15.209	#2	Within the limit
7		Restricted Bands	FCC Part 15 § 15.205	#2	Within the limit
8	AC mains Input ports	Conducted Emission	FCC Part 15 § 15 207(a)	#1	Within the limit

Notes: ¹ The EUT complies with the requirement; it employs a unique (non-standard) antenna connector (RPSMA/U.FL/IPX), for all external antennas proposed for use with the EUT and permanently mounted integral antenna.

5. TEST RESULTS

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**TEST
1.**

MAXIMUM PEAK OUTPUT POWER

**REFERENCE
DOCUMENT**

According to §15.247(b) (3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b) (4), The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- TEST SETUP: In according to manufacturer specifications
 - TEST LOCATION: Radio test area
- TEST equipment used for conducted test:
- Spectrum Analyzer Rohde&Schwarz mod. FSP40
 - Variable Power supply
 - Attenuator 10dB mod MCL BW-N10W5+

TEST CONDITIONS:		MEASURED
Ambient temperature :	23°C ± 5°C	24 °C
Ambient humidity :	25 - 75 %rH	45%
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	960 mbar

modulation:	OFF	
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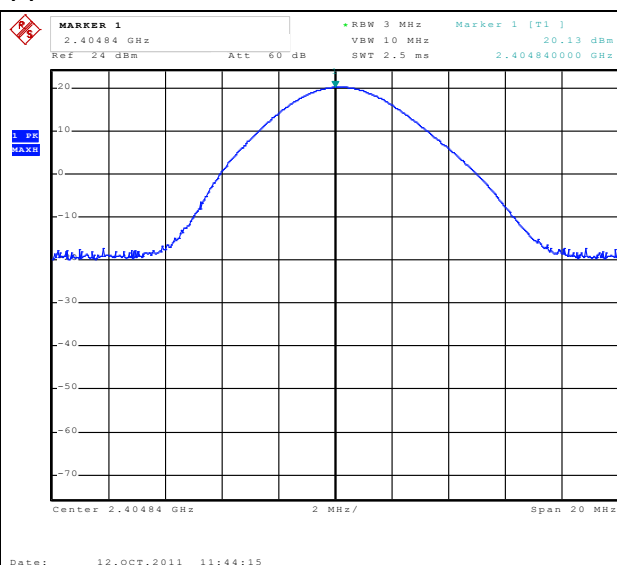
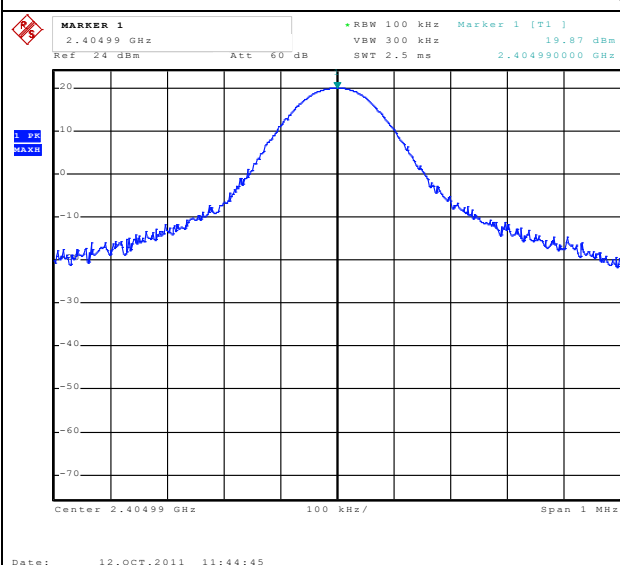
Conducted Measurement Result

channel	frequency	Output Power in dBm	Output Power in mW	Limit dBm	Result
CH 11	2405	20,13	103,0	30	compliant
CH 18	2440	20,81	120,5	30	compliant
CH 26	2480	19,77	94,8	30	compliant

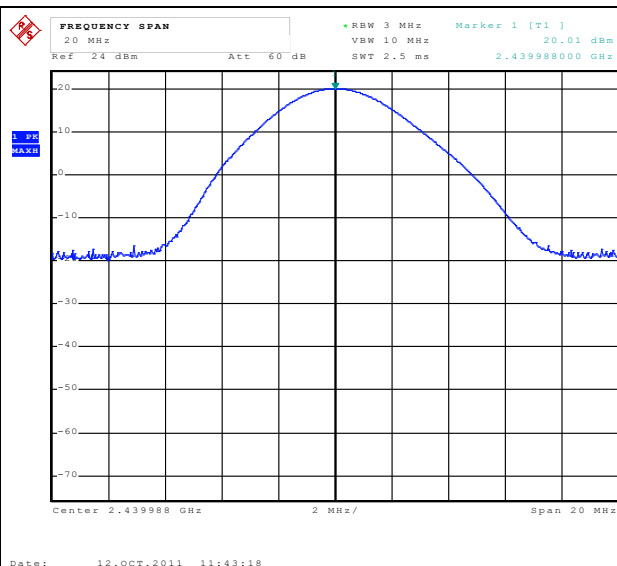
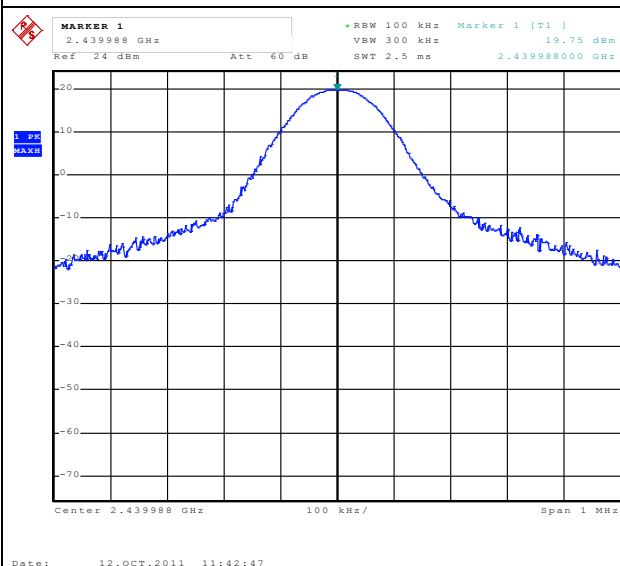
Incertezza di misura / Measurement Uncertainty : ± 3 dB

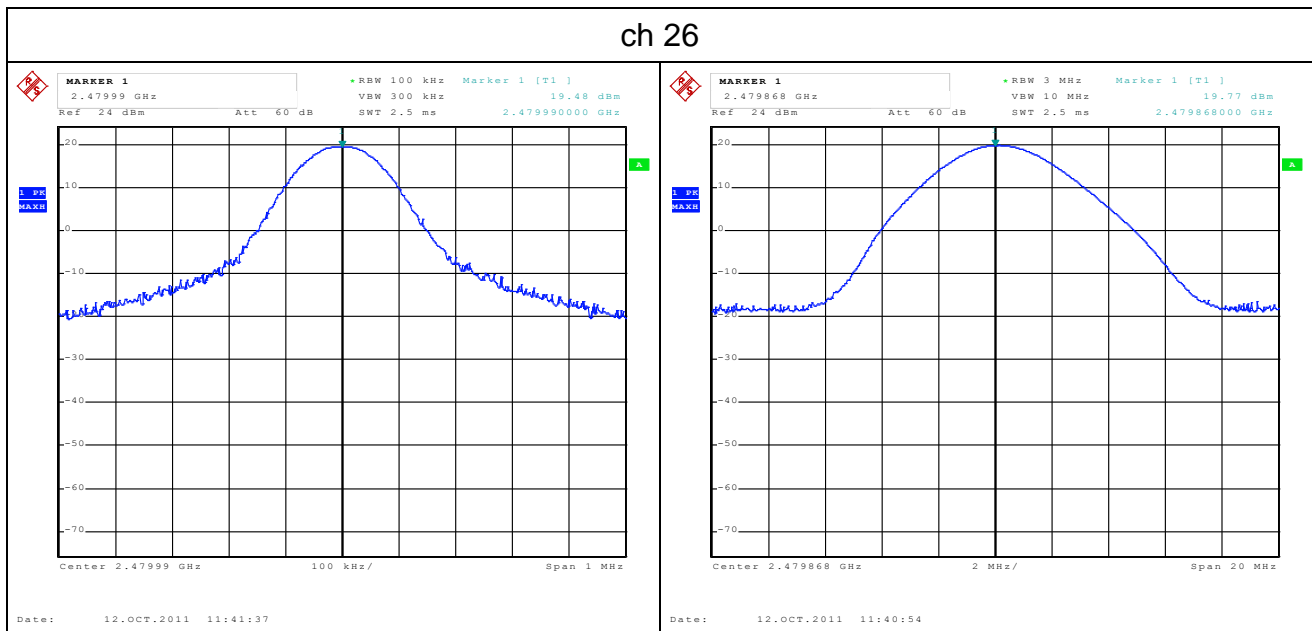
Plots of result

ch 11



ch 18





MAXIMUM PEAK OUTPUT POWER

Note:- The following is type allowed antenna with gain allowed operating channels to comply with FCC 15.247 requirements

TEST
2.

6dB CHANNEL BANDWIDTH

REFERENCE DOCUMENT According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

- **TEST SETUP:** In according to manufacturer specifications
- **TEST LOCATION:** Radio test area
- **TEST EQUIPMENT USED FOR TEST:**
 - Spectrum Analyzer Rohde&Schwarz mod. FSP40
 - Test Fixture Prima Ricerca&Sviluppo
 - Climatic Chamber MAZZALI mod. Climatest

TEST CONDITIONS:			MEASURED
Ambient temperature :	23°C ± 5°C		24 °C
Ambient humidity :	25 - 75 %rH		45%
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	960 mbar

modulation:	ON	
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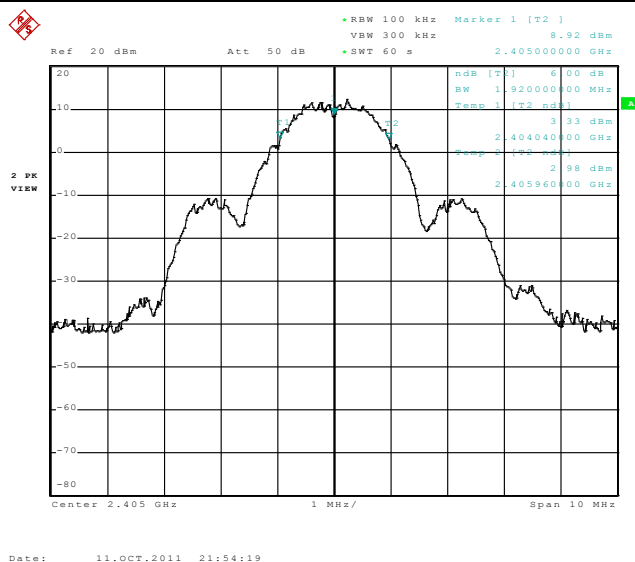
Measurement Result

frequency	Measurement (MHz) 6 dB band	Result	LIMIT
CH 11	1,920	compliant	> 500 kHz
CH 18	1,900	compliant	> 500 kHz
CH 26	1,880	compliant	> 500 kHz

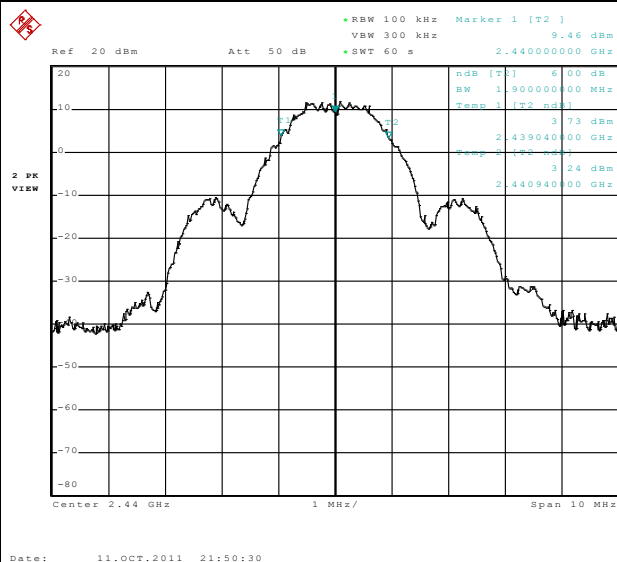
Incertezza di misura / Measurement Uncertainty : ±1 KHz

Plots of result

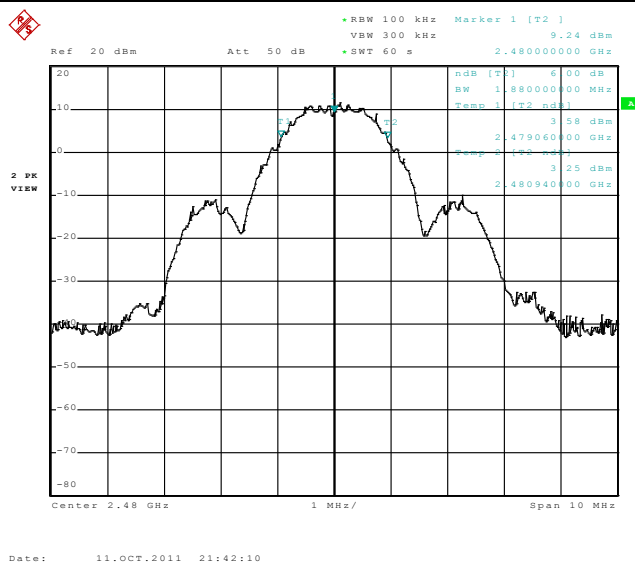
ch 11



ch 18



ch 26



Blank

TEST 3. **99% CHANNEL BANDWIDTH**

REFERENCE *RSS-210*
DOCUMENT

- TEST SETUP: In according to manufacturer specifications
- TEST LOCATION: Radio test area
- TEST EQUIPMENT USED FOR TEST:
 - Spectrum Analyzer Rohde&Schwarz mod. FSP40
 - Test Fixture Prima Ricerca&Sviluppo
 - Climatic Chamber MAZZALI mod. Climatest

TEST CONDITIONS:	MEASURED
Ambient temperature : 23°C ± 5°C	24 °C
Ambient humidity : 25 - 75 %rH	45%
Pressure : 85 - 106 kPa (860 mbar - 1060 mbar)	960 mbar

modulation:	ON	
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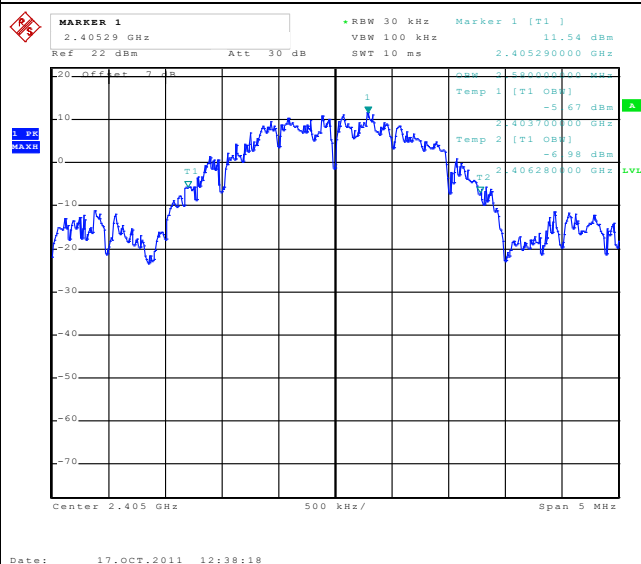
Measurement Result

frequency	Measurement (MHz) 99% Occupied Bandwidth	Result
CH 11	2,580	compliant
CH 18	2,600	compliant
CH 26	2,640	compliant

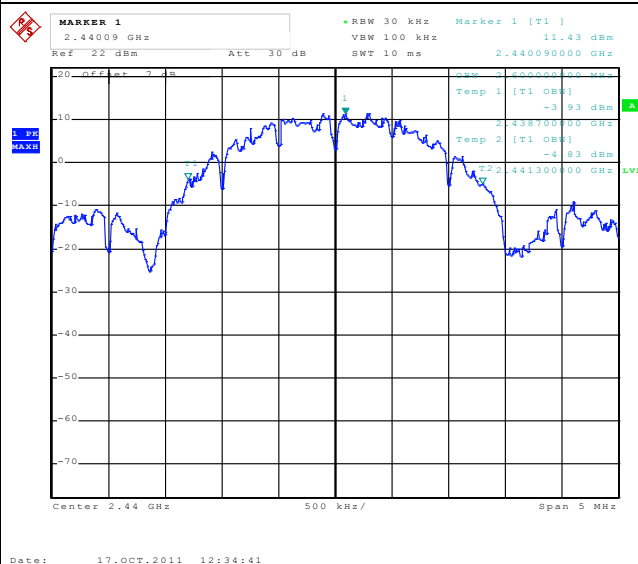
Incertezza di misura / Measurement Uncertainty : ±10 KHz

Plots of result

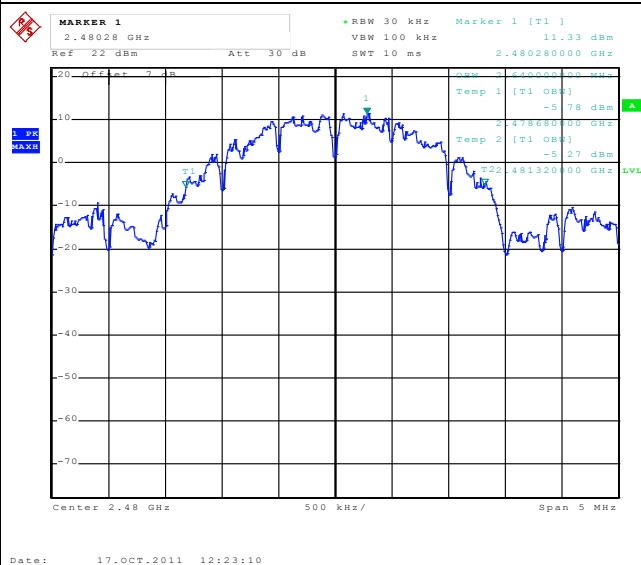
ch 11



ch 18



ch 26



Blank

TEST 4. Band-Edge

REFERENCE DOCUMENT

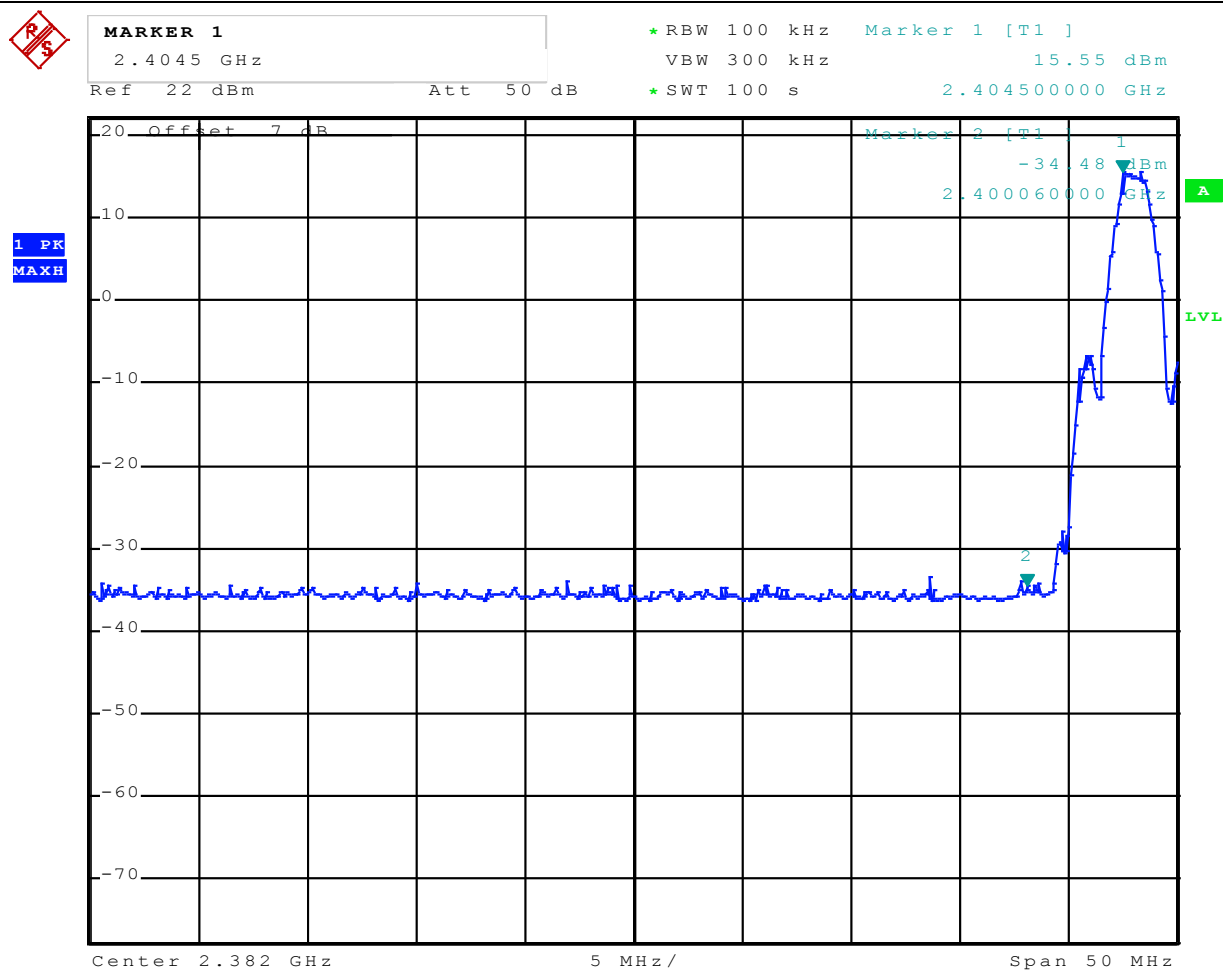
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

- TEST SETUP: In according to manufacturer specifications
- TEST LOCATION: Radio test area
- TEST EQUIPMENT USED FOR TEST:
 - Spectrum Analyzer Rohde&Schwarz mod. FSP40
 - Attenuator 10 dB mod. MCL BW-N10W5+
 - High pass filter Wainwright WHNX 3.5/26.5G-6SS

TEST CONDITIONS:	MEASURED
Ambient temperature : 23°C ± 5°C	24 °C
Ambient humidity : 25 - 75 %rH	45%
Pressure : 85 - 106 kPa (860 mbar - 1060 mbar)	960 mbar
Measurement Result:	Compliant

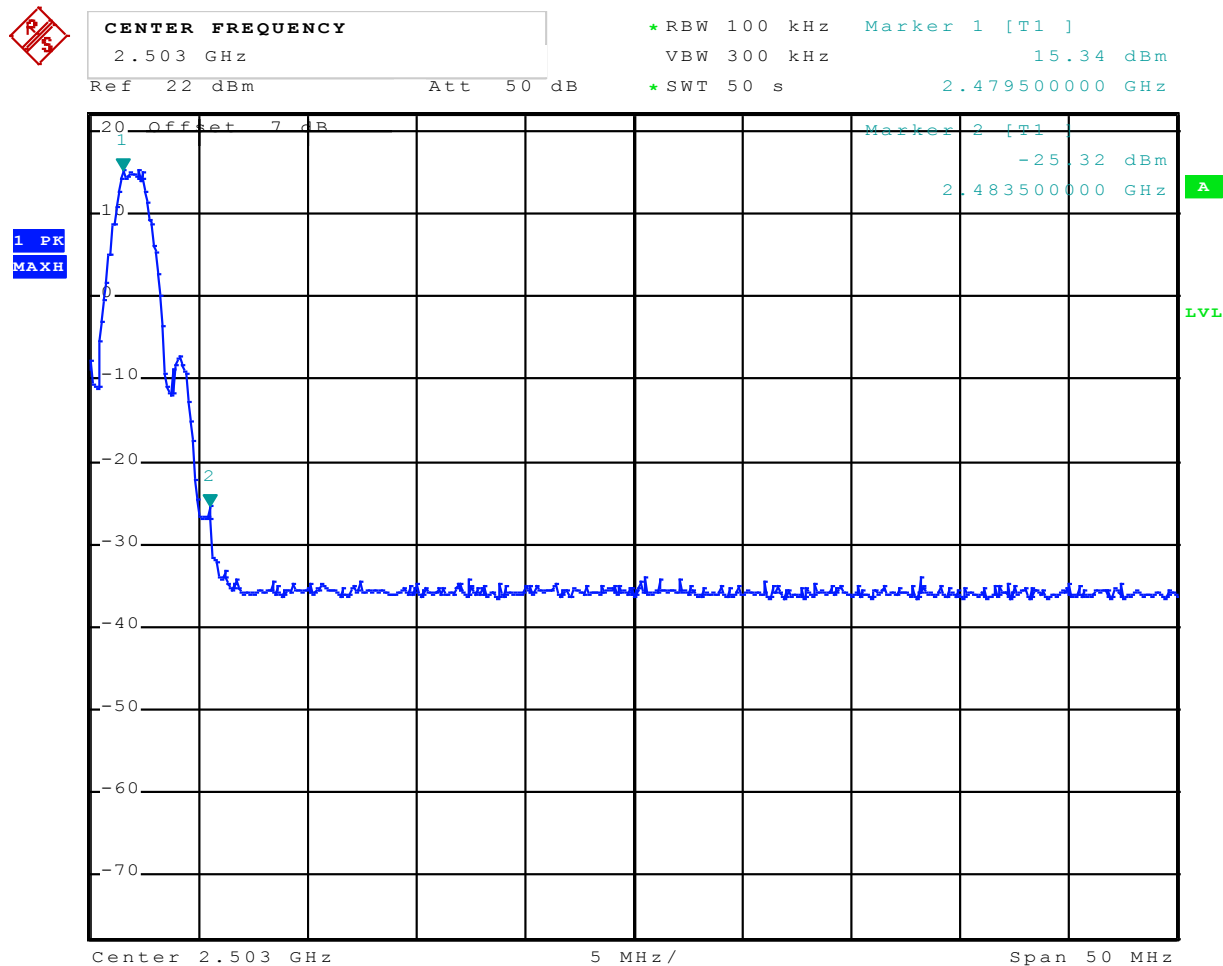
Please refer the following plots.

Plots of 100KHz Band Edge low band (2405 MHz)



Date: 17.OCT.2011 13:16:26

Plots of 100KHz Band Edge highest band (2475 MHz)



Date: 17.OCT.2011 13:24:57

**TEST
5.**

POWER SPECTRAL DENSITY

**REFERENCE
DOCUMENT**

According to §15.247) (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

• **TEST SETUP:**

In according to manufacturer specifications

• **TEST LOCATION:**

Radio test area

TEST equipment used for conducted test:

- Spectrum Analyzer Rohde&Schwarz mod. FSP40
- Variable Power supply
- Attenuator 10dB mod MCL BW-N10W5+

TEST CONDITIONS:			MEASURED
Ambient temperature :	23°C ± 5°C		24 °C
Ambient humidity :	25 - 75 %rH		45%
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	960 mbar

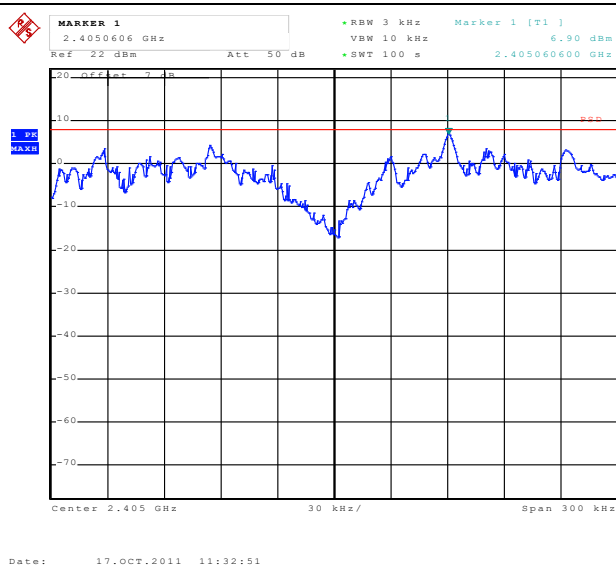
modulation:	ON	
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Conducted Measurement Result

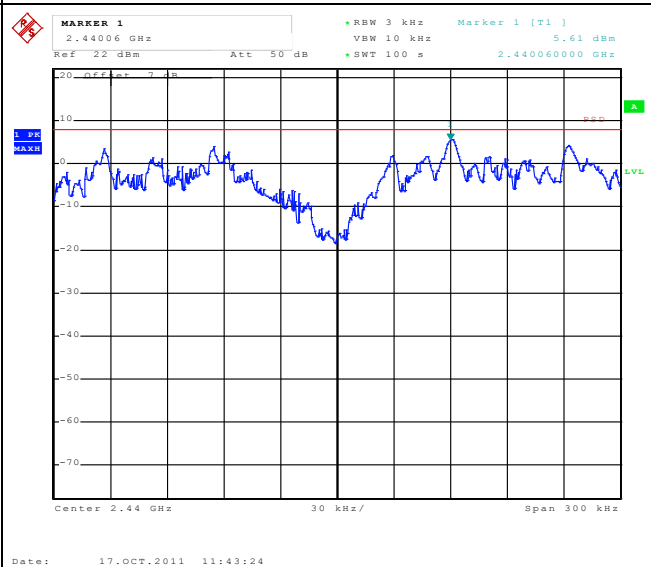
channel	frequency	Power density in 3 kHz BW (dBm)	Limit (dBm)	Margin (dB)	Result
CH 11	2405	6,90	8	-3,10	Compliant
CH 18	2440	5,61	8	-4,39	Compliant
CH 26	2480	5,36	8	-4,64	Compliant
Incertezza di misura / Measurement Uncertainty : ± 1 dB					

Plots of result

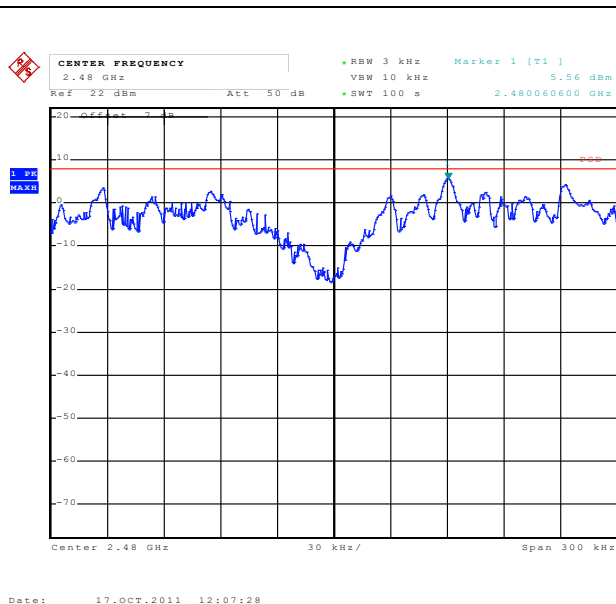
ch 11



ch 18



ch 26



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**TEST
6.**

**RF CONDUCTED SPURIOUS EMISSIONS AT THE
TRANSMITTER ANTENNA TERMINAL**

**REFERENCE
DOCUMENT** FCC 47CFR Part 15

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** Spectrum Analyzer Rohde & Schwarz Mod. FSP 40
Attenuator 10 dB mod. MCL BW-N10W5
High pass filter Wainwright WHNX 3.5/26.5G-6SS
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.209 of reference document
- **UNCERTAINTY OF MEASURE:** Combined uncertainty = ± 1.75 dB
Total uncertainty = (k=2) ± 3.5 dB

TEST CONDITIONS:			MEASURED
Ambient temperature : 15 - 35 °C			23,5 \pm 3 °C
Ambient humidity : 25 - 75 %rH			39 \pm 5 %rH
Pressure : 85 - 106 kPa (860 mbar - 1060 mbar)			950 \pm 50 mbar
Tested	CH11	2405 MHz	
Tested	CH18	2440 MHz	
Tested	CH26	2480 MHz	

OPERATING CONDITION (Rif. Section. 2) : #1

RESULT: WITHIN THE LIMIT

CH 11

Result channel low

Frequency	Measured (dBm)	Average limit dBuV (dBm)	Margin
225,68	36,90	46	9,1
451,37	38,54	46	7,46
1805,275	36,78	54	17,22
2707,975	42,20	54	11,8
3609,100	41,2	54	12,8

**TEST
7.**

RADIATED EMISSION 9 KHZ ÷ 10TH HARMONIC

**REFERENCE
DOCUMENT** FCC 47CFR Part 15

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:**
 - EMI receiver Rohde & Schwarz Mod. ESU 40
 - Spectrum Analyzer Rohde & Schwarz Mod. FSP 40
 - Chase Antenna Mod. CBL 6111 A
 - Antenna Rohde & Schwarz mod. HL50
 - Preamplifier BONN mod BLMA 0118 -1M
 - Preamplifier BONN mod BLMA 1840-1A
 - Tuneable notch filter Wainwright mod. WRCT2200/2500-5/40-10SK
 - High pass filter Wainwright WHNX 3.5/26.5G-6SS
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.209 of reference document
- **UNCERTAINTY OF MEASURE:**
 - Combined uncertainty = ± 1.75 dB
 - Total uncertainty = (k=2) ± 3.5 dB

TEST CONDITIONS:			MEASURED
Ambient temperature : 15 - 35 °C			23,5 \pm 3 °C
Ambient humidity : 25 - 75 %rH			39 \pm 5 %rH
Pressure : 85 - 106 kPa (860 mbar - 1060 mbar)			950 \pm 50 mbar
Tested	CH11	2405 MHz	Worst case
Tested	CH26	2480 MHz	Worst case

OPERATING CONDITION (Rif. Section. 2) : #1

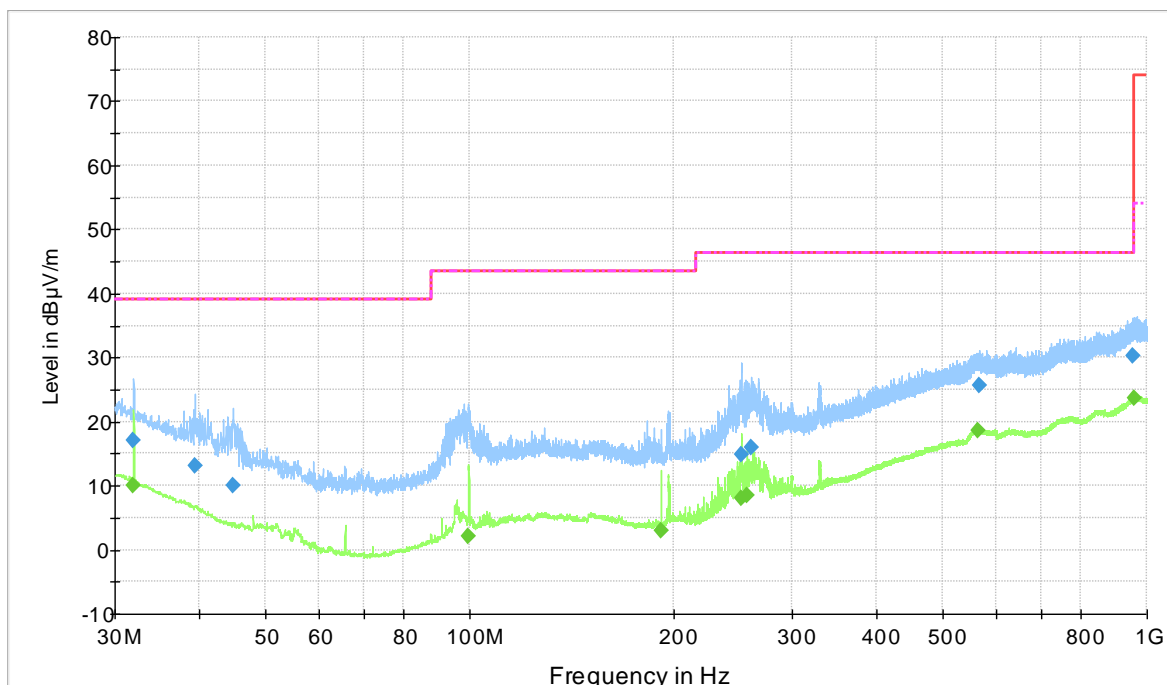
RESULT: WITHIN THE LIMIT



Vertical Polarization

CH18 worst case

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.000000	17.1	1000.0	120.000	175.0	V	201.0	18.5	21.90	39.00
39.360000	13.0	1000.0	120.000	175.0	V	21.0	14.7	26.00	39.00
44.880000	10.0	1000.0	120.000	175.0	V	89.0	11.8	29.00	39.00
252.520000	15.0	1000.0	120.000	175.0	V	111.0	15.0	31.40	46.40
261.080000	15.9	1000.0	120.000	175.0	V	88.0	16.0	30.50	46.40
565.000000	25.7	1000.0	120.000	175.0	V	0.0	23.7	20.70	46.40
955.400000	30.4	1000.0	120.000	175.0	V	98.0	29.5	16.00	46.40

Final Result 2

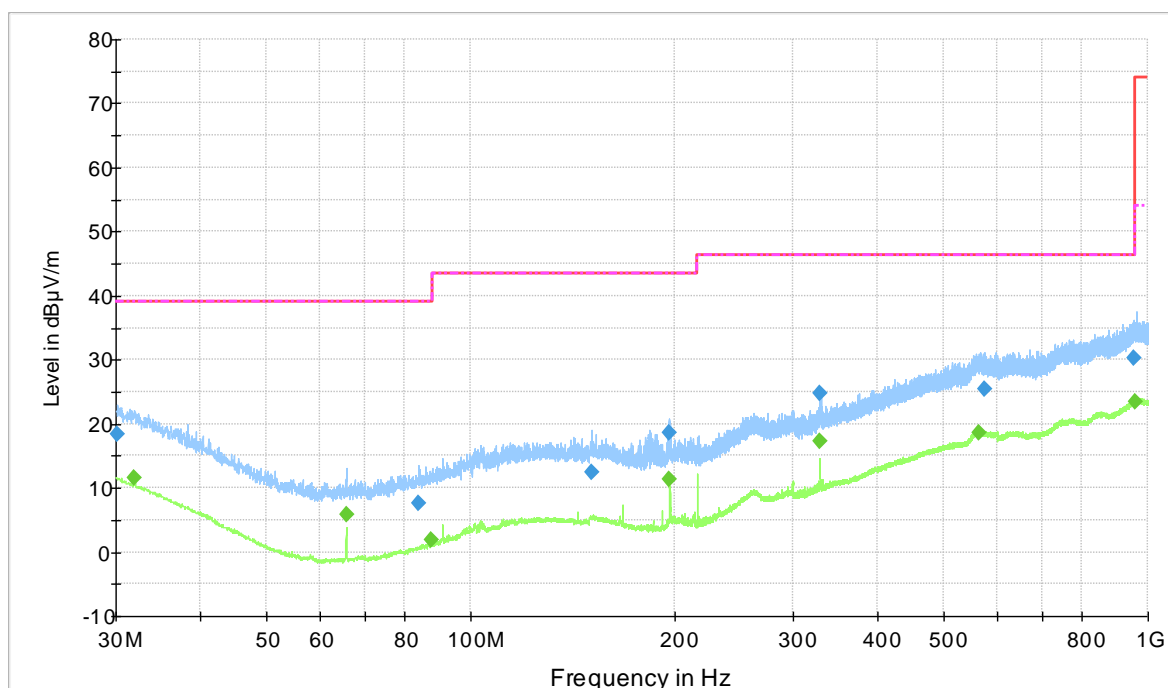
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.000000	10.1	1000.0	120.000	175.0	V	171.0	18.5	28.90	39.00
99.760000	2.1	1000.0	120.000	175.0	V	201.0	11.2	41.40	43.50
192.000000	3.1	1000.0	120.000	175.0	V	201.0	10.4	40.40	43.50
252.360000	8.0	1000.0	120.000	175.0	V	89.0	15.0	38.40	46.40
256.720000	8.6	1000.0	120.000	175.0	V	67.0	15.5	37.80	46.40
564.280000	18.7	1000.0	120.000	175.0	V	182.0	23.8	27.70	46.40
959.640000	23.6	1000.0	120.000	175.0	V	0.0	29.5	22.80	46.40



Horizontal Polarization

CH18 worst case

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.200000	18.4	1000.0	120.000	175.0	H	-14.0	19.6	20.60	39.00
84.000000	7.5	1000.0	120.000	100.0	H	99.0	9.2	31.50	39.00
151.400000	12.3	1000.0	120.000	175.0	H	91.0	12.8	31.20	43.50
196.960000	18.6	1000.0	120.000	175.0	H	91.0	10.7	24.90	43.50
328.200000	24.8	1000.0	120.000	100.0	H	201.0	16.3	21.60	46.40
574.640000	25.3	1000.0	120.000	119.0	H	181.0	23.3	21.10	46.40
952.440000	30.3	1000.0	120.000	130.0	H	201.0	29.4	16.10	46.40

Final Result 2

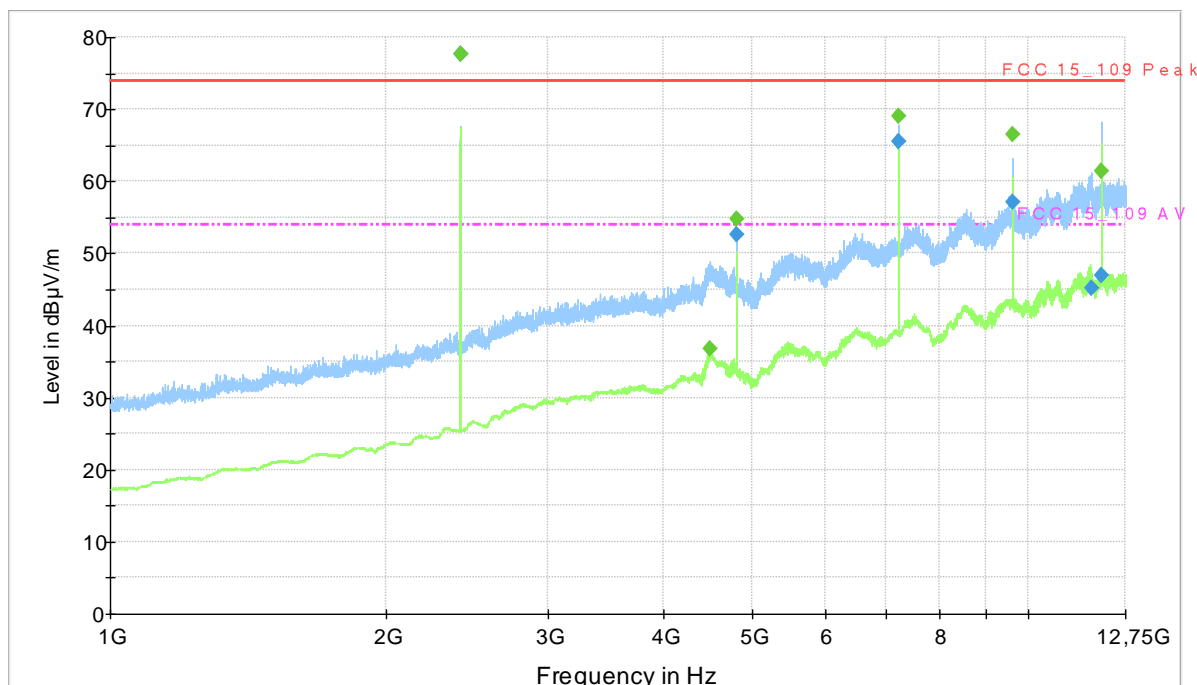
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.000000	11.7	1000.0	120.000	100.0	H	186.0	18.5	27.30	39.00
65.640000	5.8	1000.0	120.000	175.0	H	188.0	6.9	33.20	39.00
87.760000	1.9	1000.0	120.000	175.0	H	188.0	9.8	37.10	39.00
196.960000	11.4	1000.0	120.000	175.0	H	100.0	10.7	32.10	43.50
328.040000	17.3	1000.0	120.000	100.0	H	201.0	16.3	29.10	46.40
562.120000	18.7	1000.0	120.000	175.0	H	0.0	23.7	27.70	46.40
955.960000	23.5	1000.0	120.000	100.0	H	0.0	29.5	22.90	46.40



Vertical Polarization

CH11

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2405.000000	77.6	1000.0	1000.000	175.0	V	201.0	-1.8	-3.60	74.00	
4810.000000	52.6	1000.0	1000.000	151.0	V	96.0	7.0	21.40	74.00	
7215.000000	65.5	1000.0	1000.000	120.0	V	201.0	14.2	8.50	74.00	
9620.000000	57.1	1000.0	1000.000	152.0	V	23.0	20.4	16.90	74.00	
11697.750000	45.1	1000.0	1000.000	100.0	V	66.0	28.6	28.90	74.00	
12025.000000	47.0	1000.0	1000.000	151.0	V	15.0	28.4	27.00	74.00	

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2405.000000	77.7	1000.0	1000.000	175.0	V	202.0	-1.8	-23.70	54.00	
4500.500000	36.8	1000.0	1000.000	175.0	V	23.0	7.7	17.20	54.00	
4810.000000	54.7	1000.0	1000.000	156.0	V	66.0	7.0	-0.70	54.00	
7215.000000	69.0	1000.0	1000.000	100.0	V	201.0	14.2	-15.00	54.00	
9620.000000	66.4	1000.0	1000.000	128.0	V	23.0	20.4	-12.40	54.00	
12025.000000	61.3	1000.0	1000.000	142.0	V	15.0	28.4	-7.30	54.00	



PRIMA

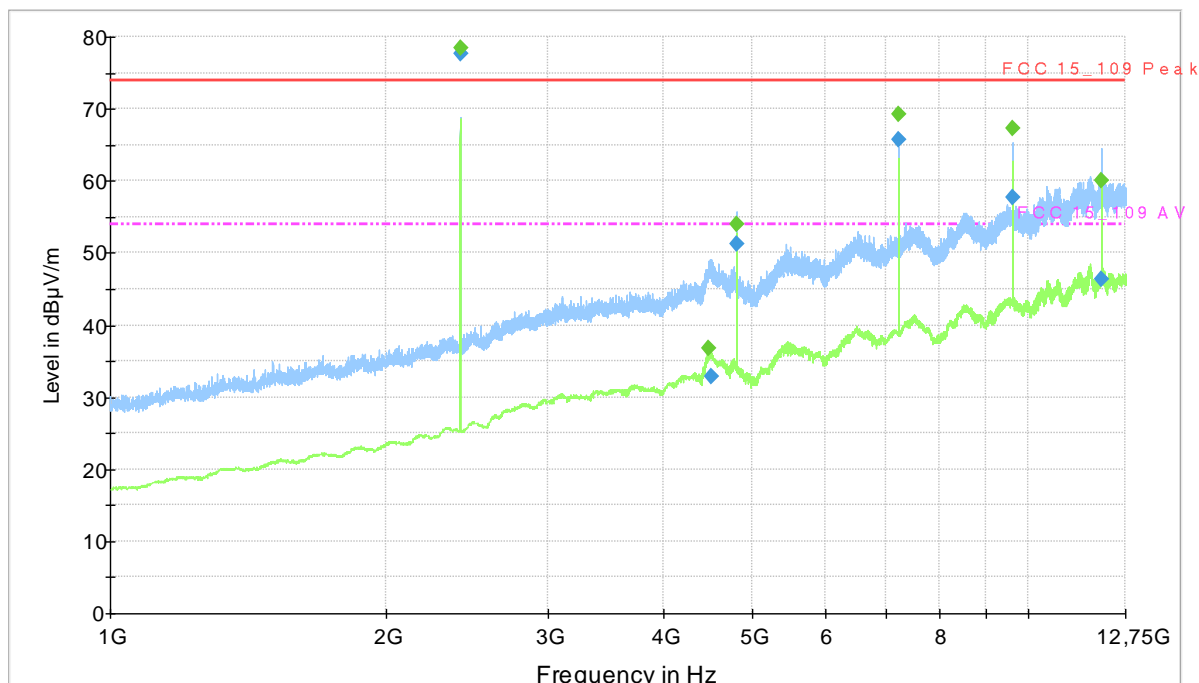
RICERCA & SVILUPPO

Horizontal Polarization

CH11

FCCTR_111255-2

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comm ent
2405.000000	77.7	1000.0	1000.000	175.0	H	201.0	-1.8	-3.70	74.00	
4511.750000	32.9	1000.0	1000.000	175.0	H	111.0	7.7	41.10	74.00	
4810.000000	51.3	1000.0	1000.000	151.0	H	1.0	7.0	22.70	74.00	
7215.000000	65.7	1000.0	1000.000	120.0	H	201.0	14.2	8.30	74.00	
9620.000000	57.8	1000.0	1000.000	152.0	H	23.0	20.4	16.20	74.00	
12024.750000	46.3	1000.0	1000.000	151.0	H	15.0	28.4	27.70	74.00	

Final Result 2

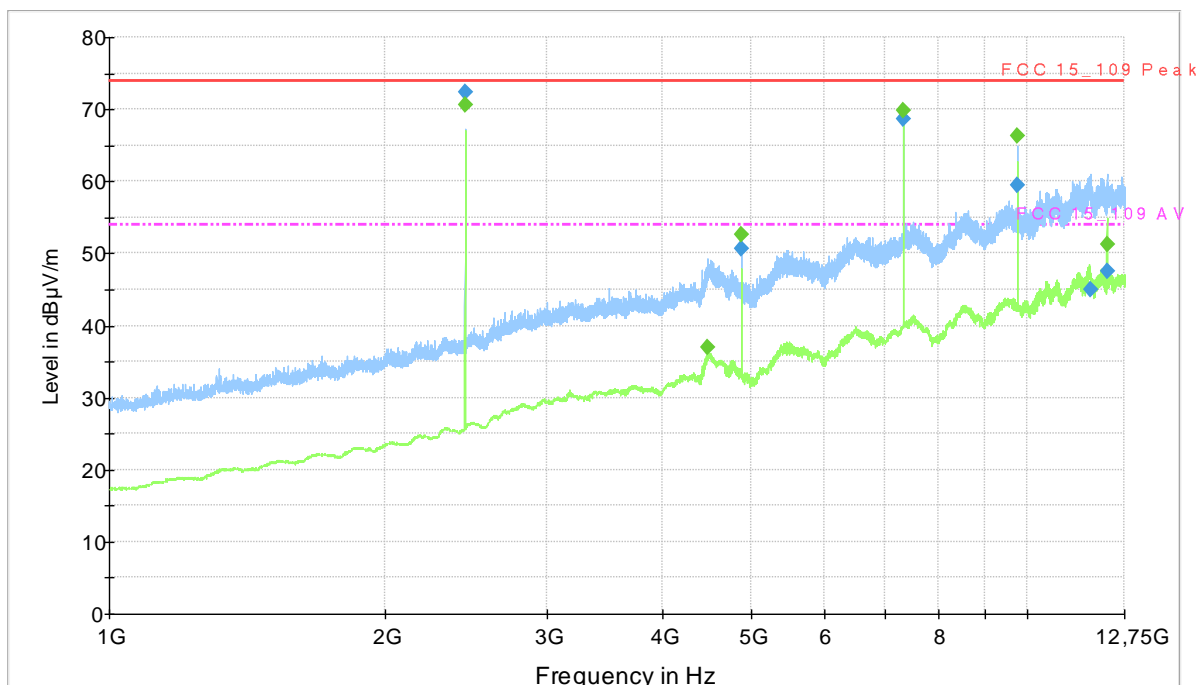
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comm ent
2405.000000	78.4	1000.0	1000.000	175.0	H	201.0	-1.8	-24.40	54.00	
4486.750000	36.7	1000.0	1000.000	175.0	H	23.0	7.6	17.30	54.00	
4810.000000	54.1	1000.0	1000.000	175.0	H	1.0	7.0	-0.10	54.00	
7215.000000	69.3	1000.0	1000.000	100.0	H	201.0	14.2	-15.30	54.00	
9620.000000	67.2	1000.0	1000.000	142.0	H	23.0	20.4	-13.20	54.00	
12025.000000	60.0	1000.0	1000.000	143.0	H	15.0	28.4	-6.00	54.00	



Vertical Polarization

CH18

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2440.000000	72.4	1000.0	1000.000	175.0	V	9.0	-1.5	1.60	74.00	
4880.000000	50.7	1000.0	1000.000	120.0	V	97.0	7.0	23.30	74.00	
7320.000000	68.6	1000.0	1000.000	120.0	V	201.0	14.9	5.40	74.00	
9760.000000	59.5	1000.0	1000.000	134.0	V	23.0	20.4	14.50	74.00	
11698.500000	45.1	1000.0	1000.000	153.0	V	16.0	28.5	28.90	74.00	
12200.000000	47.5	1000.0	1000.000	120.0	V	23.0	27.4	26.50	74.00	

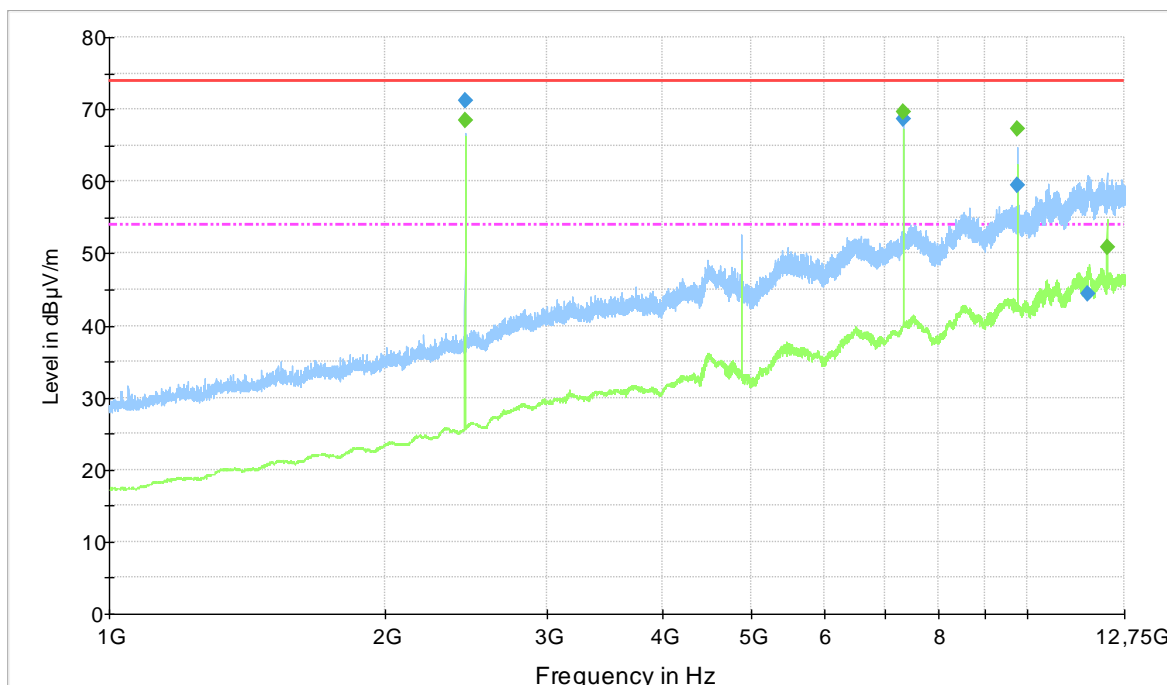
Final Result 2

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2440.000000	70.7	1000.0	1000.000	175.0	V	0.0	-1.5	-16.60	54.00	
4486.750000	36.9	1000.0	1000.000	175.0	V	2.0	7.6	17.10	54.00	
4880.000000	52.6	1000.0	1000.000	175.0	V	81.0	7.0	1.40	54.00	
7320.000000	69.8	1000.0	1000.000	133.0	V	201.0	14.9	-15.80	54.00	
9760.000000	66.3	1000.0	1000.000	133.0	V	23.0	20.4	-12.30	54.00	
12200.000000	51.2	1000.0	1000.000	115.0	V	23.0	27.4	2.80	54.00	

Horizontal Polarization

CH18

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2440.000000	71.2	1000.0	1000.000	175.0	H	16.0	-1.5	2.80	74.00	
7320.000000	68.8	1000.0	1000.000	120.0	H	201.0	14.9	5.20	74.00	
9760.000000	59.4	1000.0	1000.000	134.0	H	23.0	20.4	14.60	74.00	
11614.750000	44.4	1000.0	1000.000	100.0	H	201.0	27.4	29.60	74.00	
12936.000000	46.5	1000.0	1000.000	120.0	H	111.0	30.4	27.50	74.00	
17930.500000	55.5	1000.0	1000.000	175.0	H	-15.0	40.5	18.50	74.00	

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2440.000000	68.4	1000.0	1000.000	175.0	H	0.0	-1.5	-14.40	54.00	
7320.000000	69.6	1000.0	1000.000	133.0	H	201.0	14.9	-15.60	54.00	
9760.000000	67.3	1000.0	1000.000	133.0	H	23.0	20.4	-13.30	54.00	
12200.000000	50.9	1000.0	1000.000	115.0	H	23.0	27.4	3.10	54.00	
14639.750000	59.1	1000.0	1000.000	115.0	H	-14.0	33.9	-5.10	54.00	
17914.750000	56.8	1000.0	1000.000	100.0	H	201.0	40.7	-2.80	54.00	



PRIMA

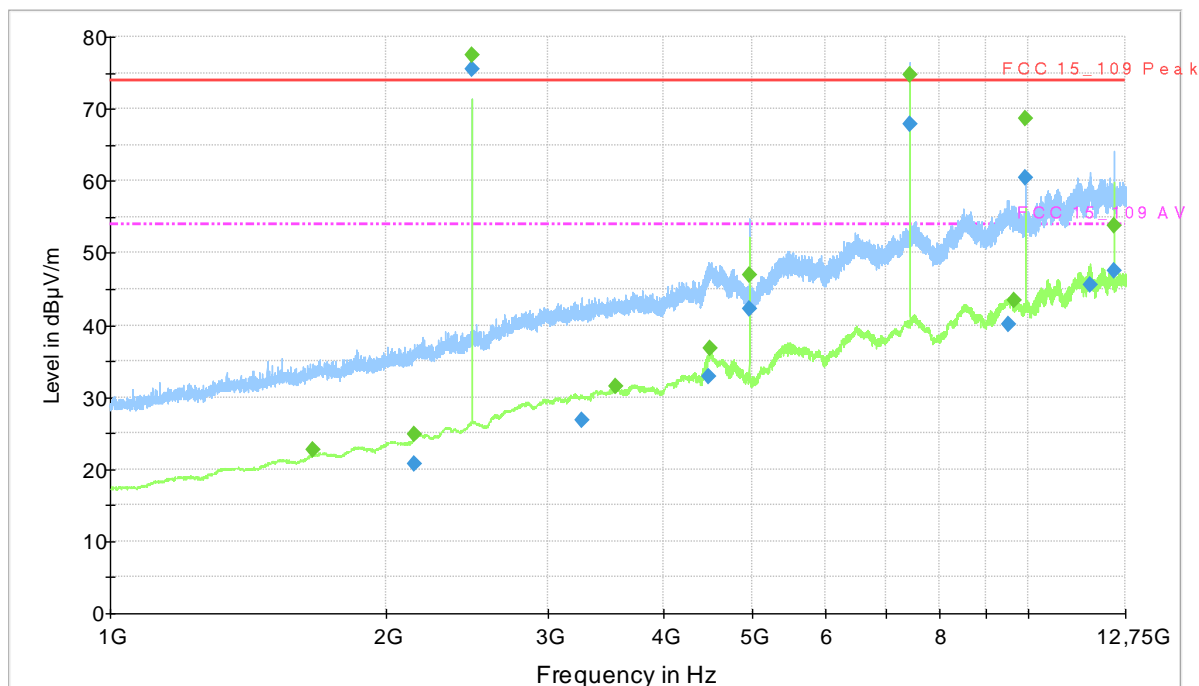
RICERCA & SVILUPPO

vertical polarization

CH26

FCCTR_111255-2

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comm ent
2142.500000	20.8	1000.0	1000.000	100.0	V	201.0	-3.4	53.20	74.00	
2480.000000	75.6	1000.0	1000.000	120.0	V	201.0	-1.3	-1.60	74.00	
3265.500000	26.7	1000.0	1000.000	175.0	V	89.0	2.3	47.30	74.00	
4483.500000	32.8	1000.0	1000.000	152.0	V	201.0	7.5	41.20	74.00	
4960.000000	42.3	1000.0	1000.000	152.0	V	23.0	7.1	31.70	74.00	
7440.000000	67.9	1000.0	1000.000	152.0	V	201.0	15.1	6.10	74.00	
9502.000000	40.1	1000.0	1000.000	100.0	V	1.0	20.1	33.90	74.00	
9920.000000	60.4	1000.0	1000.000	122.0	V	23.0	21.1	13.60	74.00	
11655.500000	45.5	1000.0	1000.000	102.0	V	1.0	28.5	28.50	74.00	
12400.000000	47.5	1000.0	1000.000	143.0	V	-14.0	27.7	26.50	74.00	

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comm ent
1661.000000	22.7	1000.0	1000.000	175.0	V	1.0	-6.3	31.30	54.00	
2144.500000	24.8	1000.0	1000.000	134.0	V	201.0	-3.4	29.20	54.00	
2480.000000	77.5	1000.0	1000.000	115.0	V	201.0	-1.3	-23.50	54.00	
3554.750000	31.5	1000.0	1000.000	133.0	V	-14.0	3.1	22.50	54.00	
4500.250000	36.8	1000.0	1000.000	175.0	V	0.0	7.7	17.20	54.00	
4960.000000	47.0	1000.0	1000.000	143.0	V	23.0	7.1	7.00	54.00	
7440.000000	74.8	1000.0	1000.000	133.0	V	201.0	15.1	-20.80	54.00	
9639.250000	43.3	1000.0	1000.000	115.0	V	112.0	20.3	10.70	54.00	
9920.000000	68.7	1000.0	1000.000	133.0	V	23.0	21.1	-14.70	54.00	
12400.000000	53.8	1000.0	1000.000	100.0	V	23.0	27.7	0.20	54.00	

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PRIMA

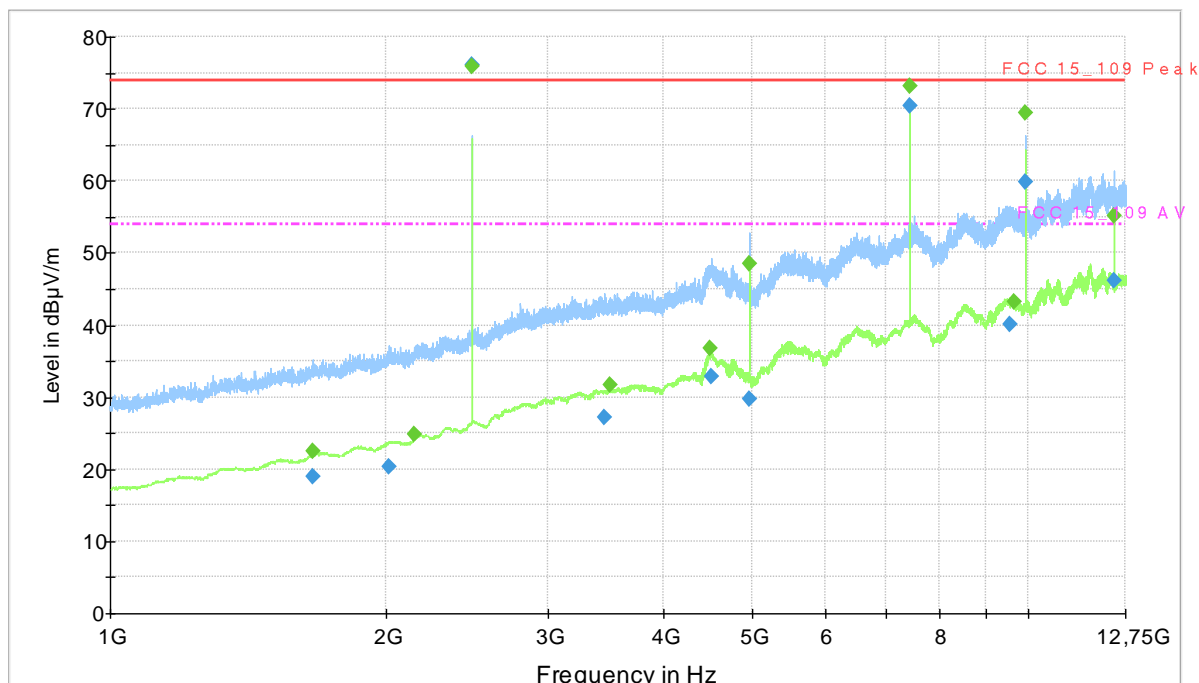
RICERCA & SVILUPPO

horizontal polarization

CH26

FCCTR_111255-2

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comm ent
1661.000000	19.0	1000.0	1000.000	175.0	H	111.0	-6.3	55.00	74.00	
2011.250000	20.3	1000.0	1000.000	175.0	H	89.0	-4.3	53.70	74.00	
2480.000000	76.2	1000.0	1000.000	175.0	H	111.0	-1.3	-2.20	74.00	
3456.750000	27.1	1000.0	1000.000	151.0	H	111.0	3.0	46.90	74.00	
4511.250000	32.9	1000.0	1000.000	149.0	H	1.0	7.7	41.10	74.00	
4959.750000	29.7	1000.0	1000.000	100.0	H	89.0	7.1	44.30	74.00	
7440.000000	70.5	1000.0	1000.000	149.0	H	201.0	15.1	3.50	74.00	
9558.500000	40.0	1000.0	1000.000	175.0	H	67.0	20.5	34.00	74.00	
9920.000000	59.9	1000.0	1000.000	149.0	H	22.0	21.1	14.10	74.00	
12399.750000	46.2	1000.0	1000.000	100.0	H	189.0	27.7	27.80	74.00	

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comm ent
1661.250000	22.5	1000.0	1000.000	175.0	H	160.0	-6.3	31.50	54.00	
2144.750000	24.8	1000.0	1000.000	100.0	H	1.0	-3.4	29.20	54.00	
2480.000000	75.9	1000.0	1000.000	175.0	H	89.0	-1.3	-21.90	54.00	
3501.250000	31.6	1000.0	1000.000	158.0	H	1.0	3.4	22.40	54.00	
4500.250000	36.8	1000.0	1000.000	115.0	H	1.0	7.7	17.20	54.00	
4960.000000	48.5	1000.0	1000.000	100.0	H	89.0	7.1	5.50	54.00	
7440.000000	73.1	1000.0	1000.000	131.0	H	201.0	15.1	-19.10	54.00	
9639.250000	43.2	1000.0	1000.000	175.0	H	111.0	20.3	10.80	54.00	
9920.000000	69.5	1000.0	1000.000	134.0	H	22.0	21.1	-15.50	54.00	
12400.000000	55.1	1000.0	1000.000	100.0	H	189.0	27.7	-1.10	54.00	

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**TEST
8.**

**EMISSION OF MAINS TERMINAL DISTURBANCE
VOLTAGE (CONTINUOUS DISTURBANCE)**

**REFERENCE
DOCUMENT** FCC 47CFR Part 15

- **TEST SETUP:** According to reference standard
- **TEST LOCATION:** Semianechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESU 40
Artificial Network Rohde & Schwarz Mod. ESH3-Z5

- **TESTED PORT:** AC Inverter mains output : Phase and Neutral Line
- **FREQUENCY RANGE:** 0.15 - 30 MHz
- **EMISSION LIMITS:** Section 15.207 of Standard
- **MEASUREMENT UNCERTAINTY:** Total uncertainty (k=2) ± 2.5 dB

TEST CONDITIONS:		MEASURED
Ambient temperature :	15 - 35 °C	24 \pm 3 °C
Ambient humidity :	25 - 75 %rH	38 \pm 5 %rH
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	975 \pm 50 mbar

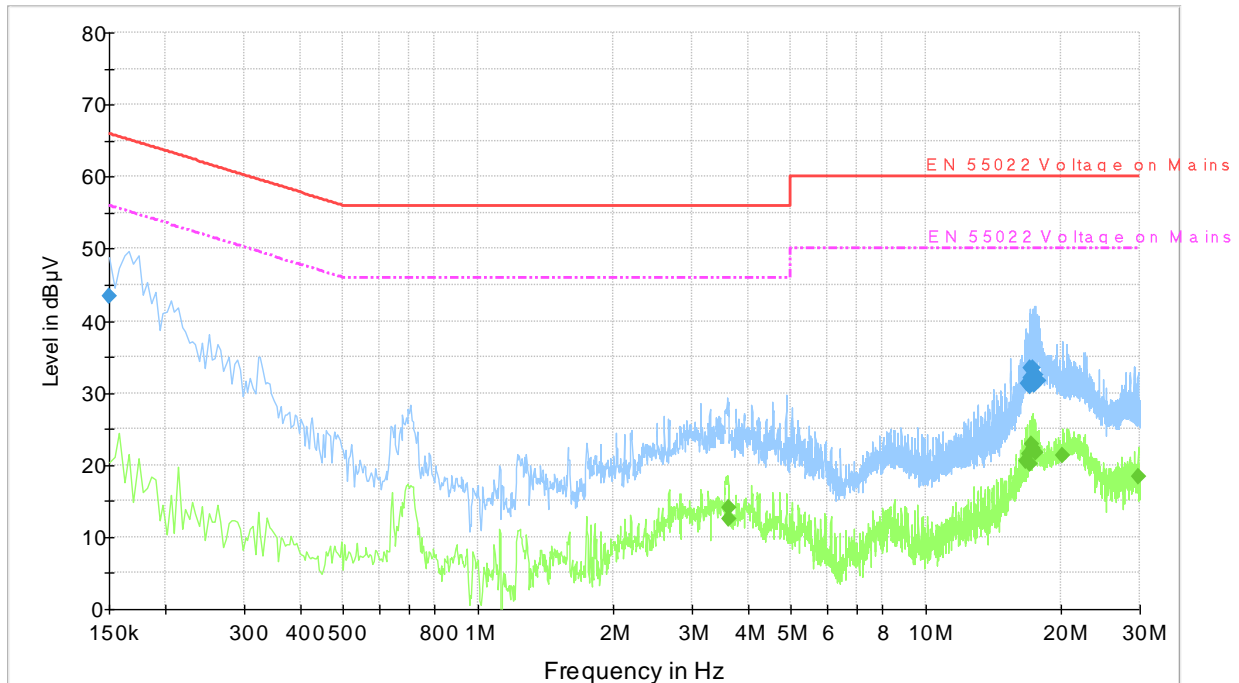
Voltage:	connected to USB port Notebook Toshiba mod. Satellite AC/dc adapter Toshiba part. No. PA3714U-1ACA	110Vac 60Hz
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OPERATING CONDITION (Rif. Section. 2) : #1

RESULT: WITHIN THE LIMIT

Neutral

Voltage_with_2_Line_lisn_OSP



Final Result 1

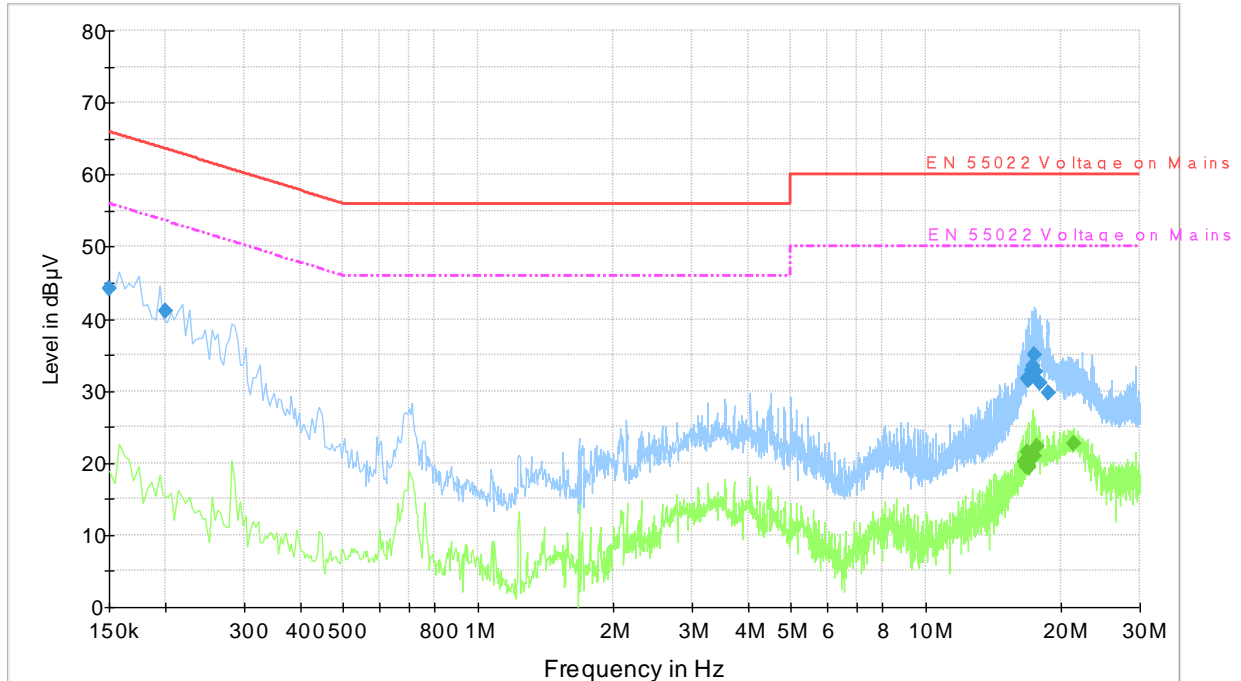
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	43.4	1000.0	9.000	GND	N	10.0	22.6	66.0	
16.792000	31.4	1000.0	9.000	GND	N	11.0	28.6	60.0	
17.068000	33.5	1000.0	9.000	GND	N	11.0	26.5	60.0	
17.076000	32.1	1000.0	9.000	GND	N	11.0	27.9	60.0	
17.088000	30.8	1000.0	9.000	GND	N	11.0	29.2	60.0	
17.276000	33.5	1000.0	9.000	GND	N	11.0	26.5	60.0	
17.388000	31.0	1000.0	9.000	GND	N	11.0	29.0	60.0	
17.504000	32.5	1000.0	9.000	GND	N	11.0	27.5	60.0	
17.616000	31.9	1000.0	9.000	GND	N	11.0	28.1	60.0	
17.840000	31.8	1000.0	9.000	GND	N	11.0	28.2	60.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
3.624000	12.6	1000.0	9.000	GND	N	10.3	33.4	46.0	
3.628000	14.2	1000.0	9.000	GND	N	10.3	31.8	46.0	
16.668000	20.5	1000.0	9.000	GND	N	11.0	29.5	50.0	
16.940000	21.4	1000.0	9.000	GND	N	11.0	28.6	50.0	
17.040000	20.2	1000.0	9.000	GND	N	11.0	29.8	50.0	
17.160000	22.9	1000.0	9.000	GND	N	11.0	27.1	50.0	
17.276000	22.3	1000.0	9.000	GND	N	11.0	27.7	50.0	
17.544000	21.7	1000.0	9.000	GND	N	11.0	28.3	50.0	
20.204000	21.4	1000.0	9.000	GND	N	11.1	28.6	50.0	
29.680000	18.4	1000.0	9.000	GND	N	11.4	31.6	50.0	

Phase

Voltage_with_2_Line_lisn_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	44.2	1000.0	9.000	GND	L1	10.0	21.8	66.0	
0.200000	41.1	1000.0	9.000	GND	L1	10.0	22.5	63.6	
16.832000	31.7	1000.0	9.000	GND	L1	11.3	28.3	60.0	
16.932000	31.4	1000.0	9.000	GND	L1	11.3	28.6	60.0	
17.224000	32.8	1000.0	9.000	GND	L1	11.3	27.2	60.0	
17.332000	33.4	1000.0	9.000	GND	L1	11.3	26.6	60.0	
17.444000	35.1	1000.0	9.000	GND	L1	11.3	24.9	60.0	
17.560000	32.7	1000.0	9.000	GND	L1	11.3	27.3	60.0	
17.992000	31.1	1000.0	9.000	GND	L1	11.3	28.9	60.0	
18.756000	29.8	1000.0	9.000	GND	L1	11.3	30.2	60.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
16.544000	20.1	1000.0	9.000	GND	L1	11.3	29.9	50.0	
16.688000	19.6	1000.0	9.000	GND	L1	11.3	30.4	50.0	
16.812000	21.4	1000.0	9.000	GND	L1	11.3	28.6	50.0	
16.884000	19.5	1000.0	9.000	GND	L1	11.3	30.5	50.0	
16.888000	19.4	1000.0	9.000	GND	L1	11.3	30.6	50.0	
17.128000	20.9	1000.0	9.000	GND	L1	11.3	29.1	50.0	
17.280000	21.2	1000.0	9.000	GND	L1	11.3	28.8	50.0	
17.404000	21.0	1000.0	9.000	GND	L1	11.3	29.0	50.0	
17.676000	22.3	1000.0	9.000	GND	L1	11.3	27.7	50.0	
21.424000	22.7	1000.0	9.000	GND	L1	11.5	27.3	50.0	

**TEST
1**

RECEIVER SPURIUS EMISSION 9 KHZ ÷ 10TH HARMONIC

REFERENCE RSS-GEN Issue 2 § 4.10, § 6, § 7.2.3
DOCUMENT RSS-210 Issue 7 § 2.2

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESU 40
Chase Antenna Mod. CBL 6111 A
Antenna Rohde & Schwarz mod. HL50
Preamplifier BONN mod BLMA 0118 –1M
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.209 of reference document
- **UNCERTAINTY OF MEASURE:** Combined uncertainty = ± 1.75 dB
Total uncertainty = (k=2) ± 3.5 dB

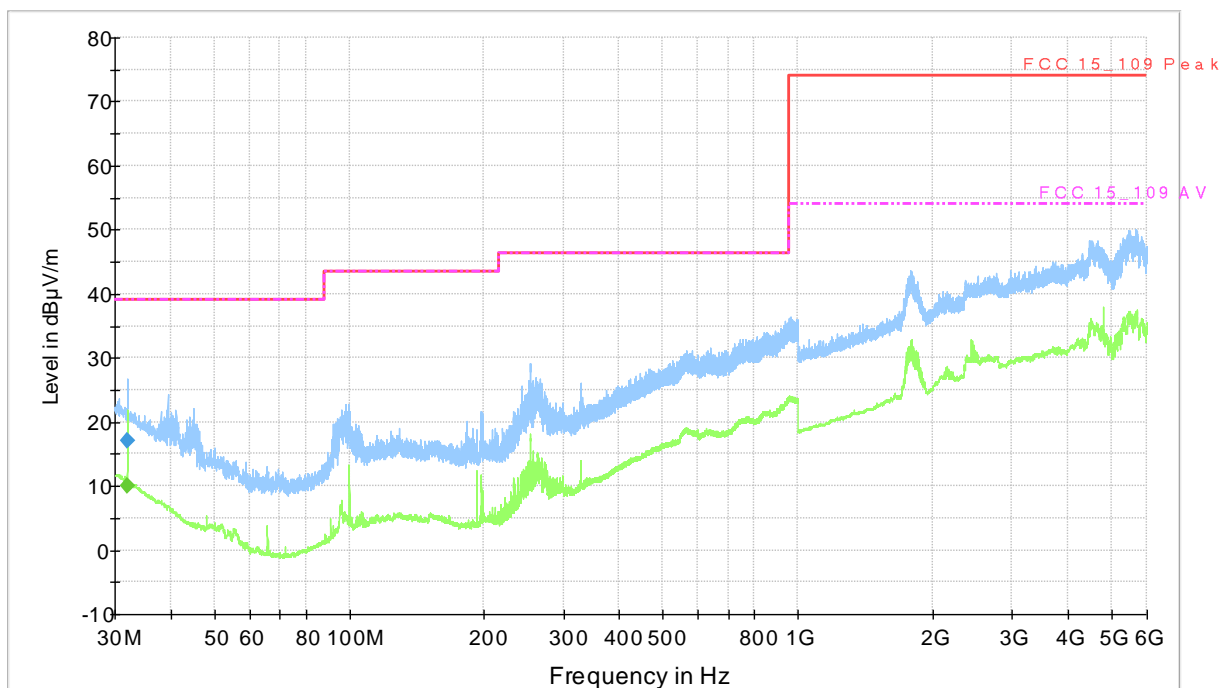
TEST CONDITIONS:		MEASURED
Ambient temperature :	15 - 35 °C	23,5 \pm 3 °C
Ambient humidity :	25 - 75 %rH	39 \pm 5 %rH
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	950 \pm 50 mbar

OPERATING CONDITION (Rif. Section. 2) : #1

RESULT: WITHIN THE LIMIT

vertical polarization

Electric Field Strength FCC_OSP



Final Result 1

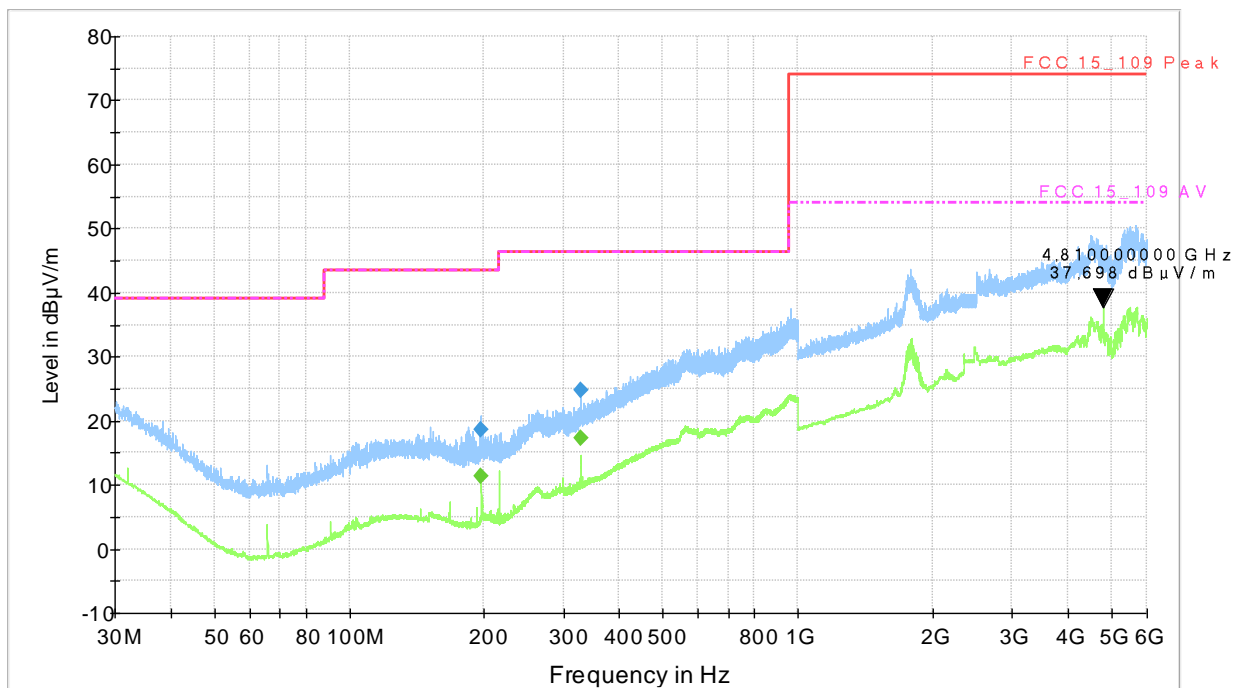
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.000000	17.1	1000.0	120.000	175.0	V	201.0	18.5	21.90	39.00

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.000000	10.1	1000.0	120.000	175.0	V	171.0	18.5	28.90	39.00

Horizontal polarization

Electric Field Strength FCC_OSP



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
196.960000	18.6	1000.0	120.000	175.0	H	91.0	10.7	24.90	43.50
328.200000	24.8	1000.0	120.000	100.0	H	201.0	16.3	21.60	46.40

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
196.960000	11.4	1000.0	120.000	175.0	H	100.0	10.7	32.10	43.50
328.040000	17.3	1000.0	120.000	100.0	H	201.0	16.3	29.10	46.40

6. LIST OF EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL N.	CAL. DUE
EMI TEST RECEIVER 20Hz 40GHz	Rohde & Schwarz	ESU40	100111	AUG.2012
RF SEMI-ANECHOIC CHAMBER (CSSA)	Siemens	B83117- D6019-T232	003-005- 134/94C	AUG.2012
BILOG ANTENNA	Chase	CBL6111C	2717	MAY.2014
LOG PERIODIC ANTENNA BROAD BAND 1-26,5GHz	Rohde & Schwarz	HL050	100437	DEC.2012
ARTIFICIAL MAIN NETWORK	Rohde & Schwarz	ESH2-Z5	830364/015	JUL 2012
ARTIFICIAL MAIN NETWORK	Rohde & Schwarz	ESH3-Z5	838576/009	JUL 2012
POWER SUPPLY	Spitzenberger Spies	EMV D 15000 PAS	UO399	FEB.2014
PROGRAMMABLE POWER SUPPLY	Hewlett Packard	6623A	3448A04501	APR 2012
SPECTRUM ANALYZER	Rohde & Schwarz	FSP	100038	APR 2012
CLIMATIC CHAMBER	Mazzali	CLIMATEST	AZC150HS0000	APR.2012

7. EUT TECHNICAL DOCUMENTATION

7.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	*****
PART LIST	*****

7.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
Operating Manual	*****

7.3 Photographic documentation

PHOTO 1 – E.U.T. IDENTIFICATION

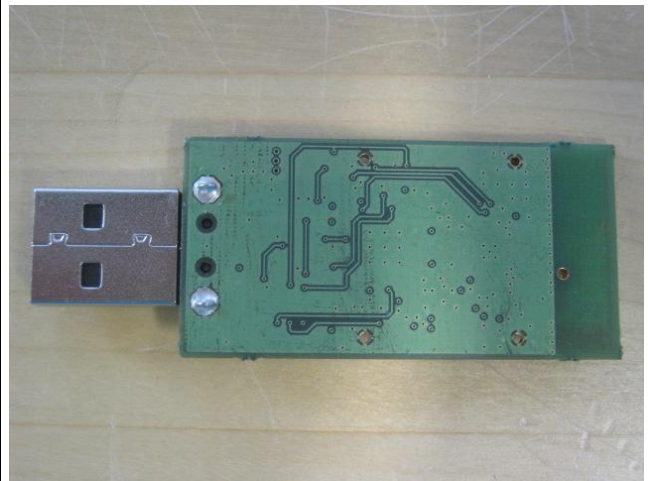


PHOTO 2 – RADIATED SETUP

