

**FCC LISTED, REGISTRATION
NUMBER: 905266**

**IC LISTED REGISTRATION NUMBER
IC 4621**

**CENTRO DE TECNOLOGÍA DE
LAS COMUNICACIONES, S.A.**

Parque Tecnológico de Andalucía,
c/Severo Ochoa nº 2

29590 Campanillas/ Málaga/ España
Tel. 952 61 91 00 - Fax 952 61 91 13

MÁLAGA, C.I.F. A29 507 456

Registro Mercantil Tomo 1169 Libro 82 Folio
133 Hoja MA3729

TEST REPORT

REFERENCE STANDARD:

USA FCC Part 15.247, 15.207 and 15.109

NIE: 28057RET.101

Approved by
(name / position & signature): A. Llamas / RF Lab. Manager

Elaboration date: 23/09/2008

Identification of item tested: 802.11 b/gWiFi Module

Trademark: TELIT

Model and/or type reference: WE865 – DUAL

Serial number: ---

Other identification of the product: FCC ID: RI7WE865D / IC: 5131A-WE865D
Prototypes #221, #229, #233 and #235

Features: Operating frequency in the 2412-2472 MHz frequency range, 3.8 V_{DC}
supplied by external power supply.

Description: 802.11 b/g WiFi module

Applicant: Telit Communication S.P.A.

Address.....: Via Stazione di Prosecco 5/B / Sgonico (Trieste), 34010 / ITALY

CIF/NIF/Passport: 03711600266

Contact person: Gian Marco Melosu

Telephone / Fax.....: +39 040 4192 111 / +39 040 4192 237

e-mail:: Gianmarco.Melosu@telit.com

Test samples supplier: Same as applicant

Address.....: ---

CIF/NIF/Passport: ---

Contact person:.....: ---

Telephone / Fax.....: ---

e-mail:: ---

Manufacturer: Same as applicant

Address.....: ---

CIF/NIF/Passport: ---

Telephone / Fax.....: ---

Test method requested	See Standard
Standard	USA FCC Part 15.247: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz. USA FCC part 15.207: Conducted limits. USA FCC Part 15.109: Radiated emission limits, general requirements.
Test procedure	PEET034: Medidas radioeléctricas a equipos de radio de espectro ensanchado en la banda de 2,4 GHz. PEEM001: Medida de la tensión perturbadora en bornes de alimentación según EN 55022.
Non-standardized test method	N/A
Used instrumentation	1. Semianechoic Absorber Lined Chamber IR 11. BS. 2. Control Chamber IR 12.BC. 3. Antenna mast EM 1072 NMT. 4. Rotating table EM 1084-4. ON. 5. Multi device controller ETS 2090. 6. Hybrid Bilog antenna Sunol Sciences Corporation JB6. 7. Antenna tripod EMCO 11968C. 8. Double-ridge Guide Horn antenna 1-18 GHz HP 11966E. 9. Double-ridge Guide Horn antenna 18-40 GHz Agilent 119665J. 10. RF pre-amplifier Miteq JS4-12002600-30-5A. 11. RF pre-amplifier Miteq AFS5-04001300-15-10P-6. 12. Spectrum analyzer R&S ESIB 26. 13. Spectrum analyzer Agilent PSA E4440A. 14. RF pre-amplifier Schaffner CPA 9231. 15. DC power supply R&S NGPE 40/40. 16. Power meter R & S NRVD. 17. Power sensor R & S NRV-Z51. 18. Transient limiter. HP 11947A. 19. Line Impedance Stabilization Network (L.I.S.N.) R&S. ESH2-Z5.
Report template No.	FDT08_09
IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of Centro de Tecnología de las Comunicaciones, S.A. (AT4 wireless).	

INDEX

Competences and guarantees	4
General conditions	4
Uncertainty	4
Usage of samples.....	5
Testing period	5
Environmental conditions	6
Summary	7
Remarks and comments	7
Testing verdicts	7
APPENDIX A: Test result	8
APPENDIX B: Photographs	53

Competences and guarantees

Centro de Tecnología de las Comunicaciones (AT4 wireless), S.A. is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 905266.

Centro de Tecnología de las Comunicaciones (AT4 wireless), S.A. is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document:

PODT000: : Procedimiento para el cálculo de incertidumbres de medida

FEM12_07: Formato de cálculo de incertidumbre a aplicar en la medida de la tensión perturbadora en bornes de alimentación según EN 55022.

Usage of samples

Samples undergoing test have been selected by: **the client**.

Sample M/01 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
28057//02	WiFi module	WE865 – DUAL	Prototipo #221	10/09/2008

Sample M/02 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
28057//04	WiFi module	WE865 – DUAL	Prototipo #233	10/09/2008
28057/07	Communications board	DEV-PC-1504C	178428	10/09/2008

Sample S/01 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
28057/03	WiFi module	WE865-DUAL	Prototype #229	10/09/2008

Sample S/22 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
28057/05	WiFi module	WE865-DUAL	Prototype #235	10/09/2008

The sample S/22 is a new WIFI module with a 2300µF capacitor added to the power supply input.

1. Sample M/01 has undergone following test(s).
Radiated tests indicated in appendix A.
2. Sample M/02 has undergone following test(s).
All tests indicated in appendix A, except radiated tests.
3. Samples S/01 and S/22 has undergone the next test(s):
Continuous conducted emission, power leads in appendix A

Testing period

The performed test started on 2008-09-10 and finished on 2008-09-11.

The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 24 °C Max. = 25 °C
Relative humidity	Min. = 65 % Max. = 65 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 24 °C Max. = 25 °C
Relative humidity	Min. = 65 % Max. = 65 %
Air pressure	Min. = 1019 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ± 4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements the following limits were not exceeded during the test:

Temperature	Min. = 23 °C Max. = 24 °C
Relative humidity	Min. = 58 % Max. = 60 %
Air pressure	Min. = 1019 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 0,5 Ω

Summary

Considering the results of the performed test according to standard USA FCC Parts 15.247, 15.109 and 15.207, the item under test is **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

None.

Testing verdicts

Not applicable: NA

Pass.....: P

Fail: F

Not measured.....: NM

FCC PART 15 PARAGRAPH		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2).	6 dB Bandwidth		P		
Section 15.247 Subclause (b).	Maximum output power and antenna gain		P		
Section 15.247 Subclause (d).	Emission limitations conducted (Transmitter)		P		
Section 15.247 Subclause (d).	Band-edge emissions compliance (Transmitter)		P		
Section 15.247 Subclause (e).	Power spectral density		P		
Section 15.247 Subclause (d).	Emission limitations radiated (Transmitter)		P		
Section 15.109.	Receiver spurious radiation		P		
Section 15.207.	Conducted limits		P		

APPENDIX A: Test result

INDEX

TEST CONDITIONS	10
Section 15.247 Subclause (a) (2). 6 dB Bandwidth.....	11
Section 15.247 Subclause (b). Maximum output power and antenna gain	15
Section 15.247 Subclause (d). Emission limitations conducted (Transmitter)	18
Section 15.247 Subclause (d). Band-edge emissions compliance (Transmitter)	22
Section 15.247 Subclause (e). Power spectral density.....	25
Section 15.247 Subclause (d). Emission limitations radiated (Transmitter)	29
Section 15.109. Receiver spurious radiation	42
Continuous conducted emission on power leads	47

TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3.8 \text{ Vdc}$$

Type of power supply = DC voltage from external power supply.

Type of antenna = Integral antenna.

Declared Gain for antenna = 3 dBi

Operating Temperature Range (°C):

$$T_n = -20^{\circ}\text{C to } +55^{\circ}\text{C}$$

TEST FREQUENCIES:

Lowest channel: 2412 MHz

Middle channel: 2437 MHz

Highest channel: 2462 MHz

The test set-up was made in accordance to the general provisions of ANSI C63.4: 2003.

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyzer using low loss RF cables with sma type connectors. The reading in the spectrum analyzer is corrected taking into account the cable loss.

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

Section 15.247 Subclause (a) (2). 6 dB Bandwidth

SPECIFICATION

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

1. DSSS modulation

Preliminary tests were done with the equipment operating with DSSS modulation mode at 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps and the worst case was for 1 Mbps bit rate. Results shown below correspond to 1 Mbps.

6 dB Bandwidth (see next plots).

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
6 dB Spectrum bandwidth (MHz)	10.17	10.17	10.17
Measurement uncertainty (kHz)	±89		

2. OFDM modulation

Preliminary tests were done with the equipment operating with OFDM modulation mode at 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps and the worst case was for 6 Mbps bit rate. Results shown below correspond to 6 Mbps.

6 dB Bandwidth (see next plots).

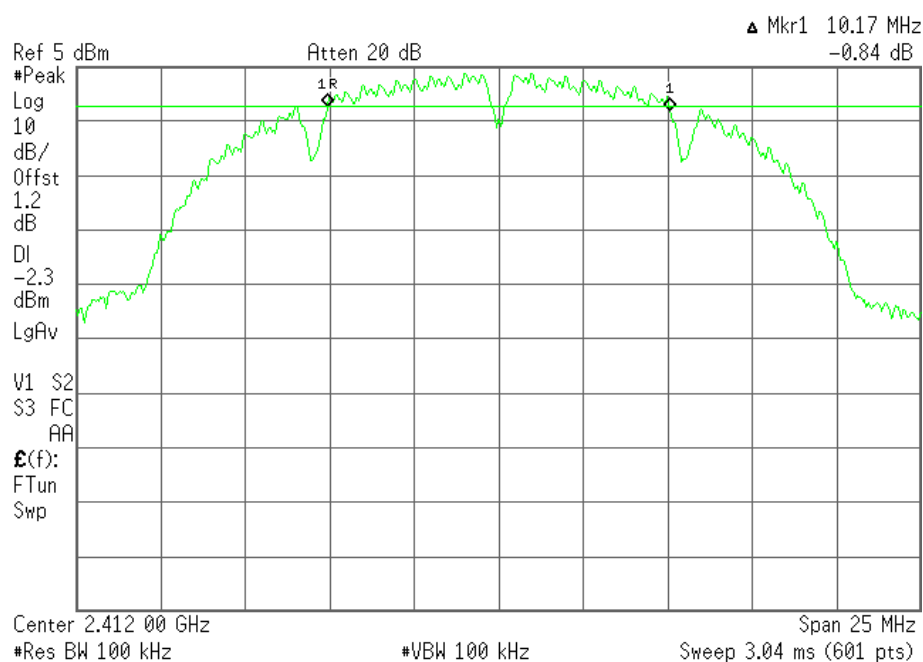
	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
6 dB Spectrum bandwidth (MHz)	17.17	16.42	17.08
Measurement uncertainty (kHz)	±89		

Verdict: PASS

1. DSSS modulation

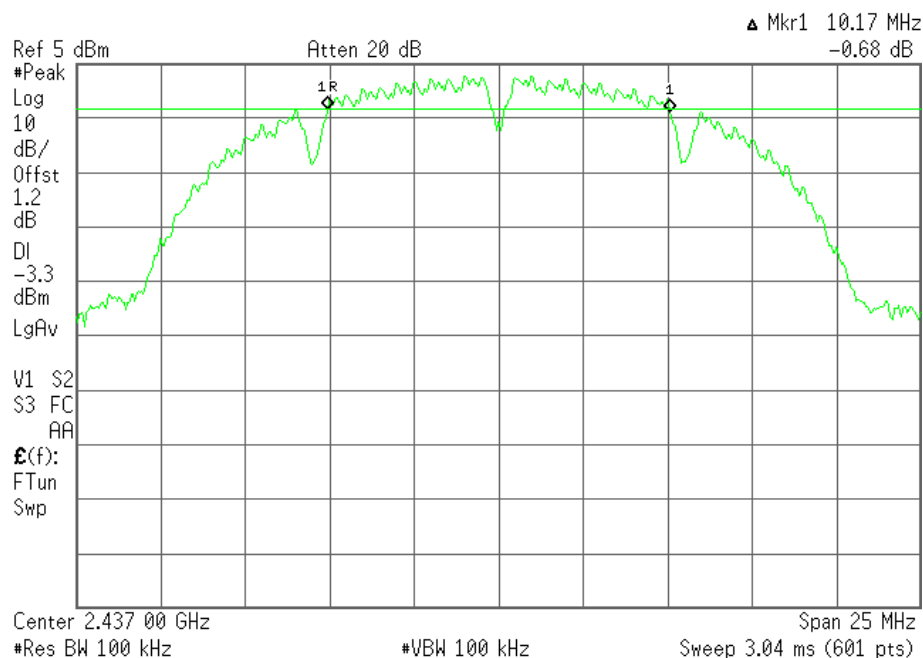
6 dB BANDWIDTH.

Lowest Channel: 2412 MHz.



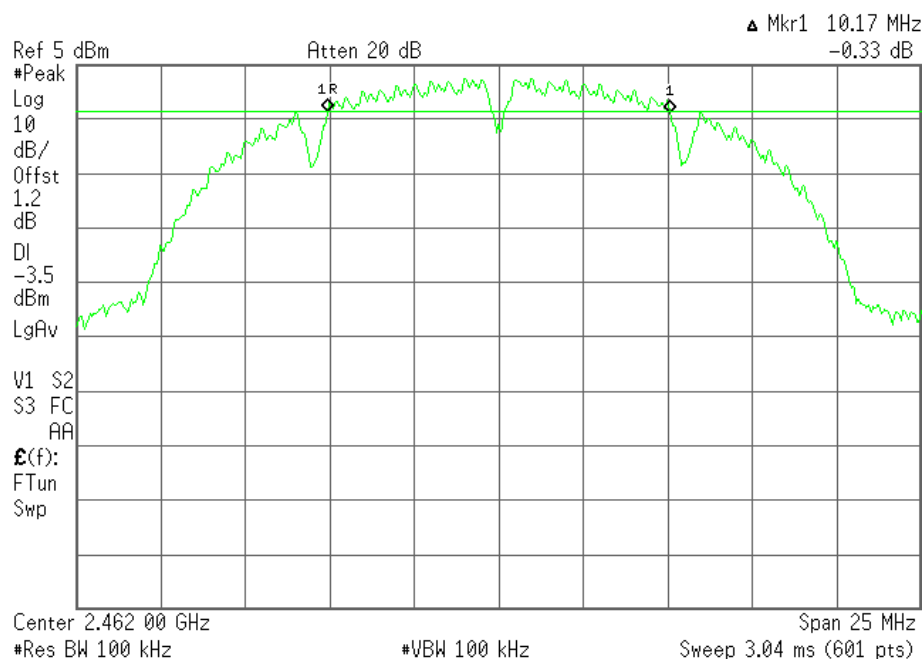
6 dB BANDWIDTH.

Middle Channel: 2437 MHz.



6 dB BANDWIDTH.

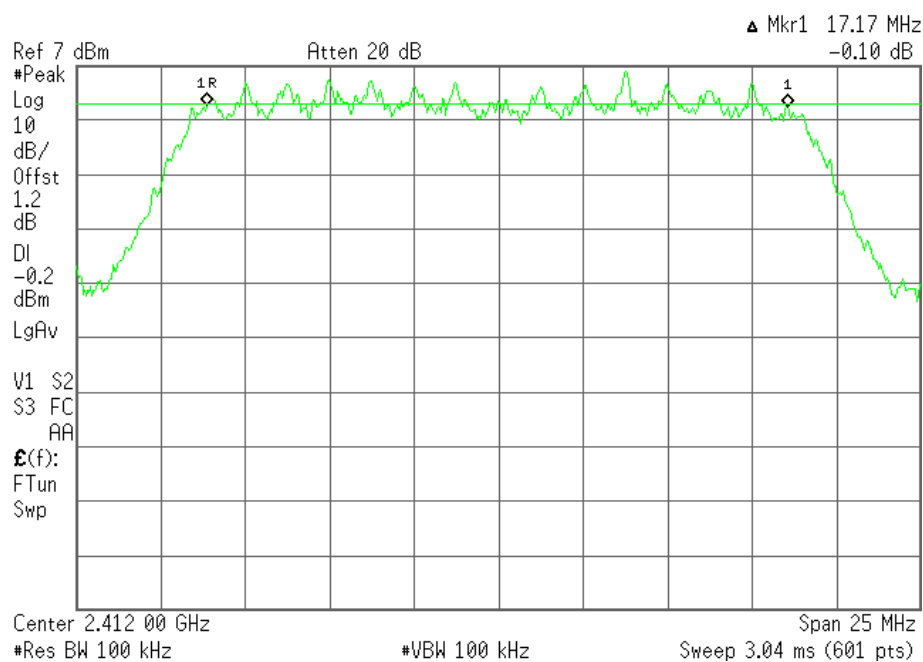
Highest Channel: 2462 MHz.



2. OFDM modulation

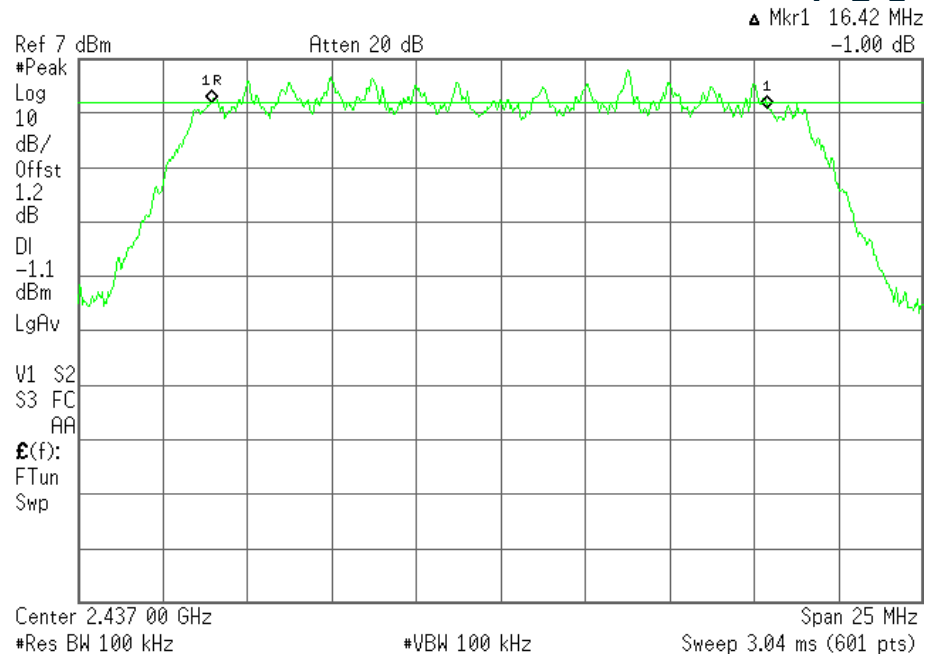
6 dB BANDWIDTH.

Lowest Channel: 2412 MHz.



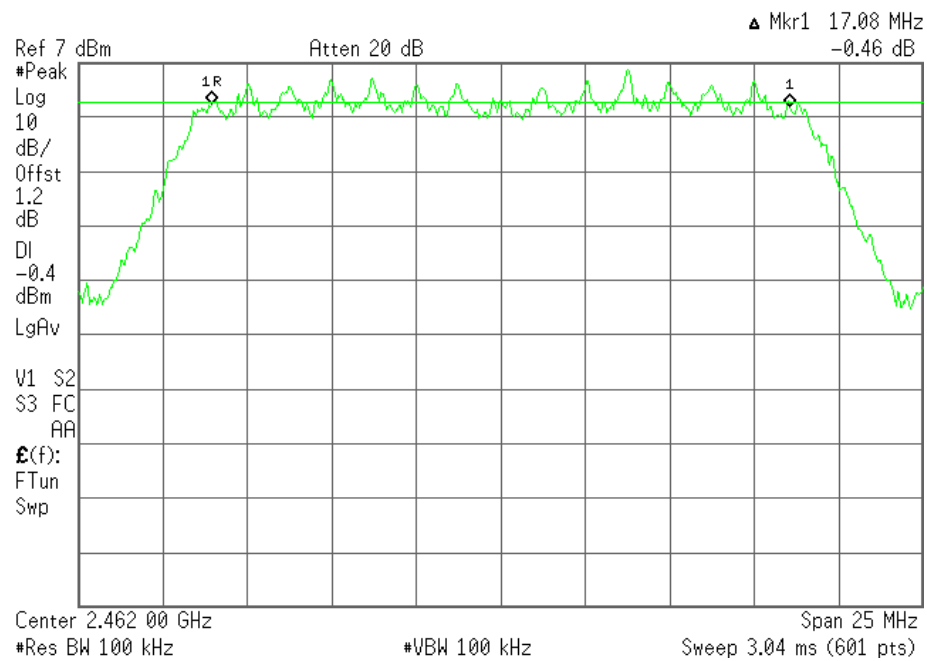
6 dB BANDWIDTH.

Middle Channel: 2437 MHz.



6 dB BANDWIDTH.

Highest Channel: 2462 MHz.



Section 15.247 Subclause (b). Maximum output power and antenna gain

SPECIFICATION

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

RESULTS

The maximum power is averaged across all symbols in the signaling alphabet, using an average power meter, when the transmitter is operating at its maximum power control level and the average does not include any time intervals during which the transmitter is off (duty cycle = 1) or is transmitting at a reduced power level.

1. DSSS modulation

MAXIMUM OUTPUT POWER (CONDUCTED).

Preliminary tests were done with the equipment operating with DSSS modulation mode at 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps and the worst case was for 1 Mbps bit rate. Results shown below correspond to 1 Mbps.

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum power (dBm)	14.52	14.11	14.00
Measurement uncertainty (dB)	±1.5		

The declared antenna gain for this device is 3 dBi, therefore the maximum theoretical radiated power (EIRP) in the three measurement channels for this device is 17.52 dBm 56.49 mW.

The actual maximum radiated power (EIRP) was measured for the lowest, middle and highest frequency.

MAXIMUM OUTPUT POWER (RADIATED).

Preliminary tests were done with the equipment operating with DSSS modulation mode at 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps and the worst case was for 1 Mbps bit rate. Results shown below correspond to 1 Mbps.

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Correction Factor (dB)	35.0	35.1	35.2
Maximum EIRP power (dBm)	9.04	6.94	6.26
Measurement uncertainty (dB)	± 4.0		

Declared antenna gain: 3 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

2. OFDM modulation

MAXIMUM OUTPUT POWER (CONDUCTED).

Preliminary tests were done with the equipment operating with OFDM modulation mode at 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps, and the worst case was for 6 Mbps bit rate. Results shown below correspond to 6 Mbps.

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum power (dBm)	13.30	12.51	13.05
Measurement uncertainty (dB)	± 1.5		

The declared antenna gain for this device is 3 dBi, therefore the maximum theoretical radiated power (EIRP) in the three measurement channels for this device is 16.30 dBm 42.68 mW.

The actual maximum radiated power (EIRP) was measured for the lowest, middle and highest frequency.

MAXIMUM OUTPUT POWER (RADIATED).

Preliminary tests were done with the equipment operating with OFDM modulation mode at 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps, and the worst case was for 6 Mbps bit rate. Results shown below correspond to 6 Mbps.

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Correction Factor (dB)	35.0	35.1	35.2
Maximum EIRP power (dBm)	8.22	7.32	7.98
Measurement uncertainty (dB)	±4.0		

Declared antenna gain: 3 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Verdict: PASS

Section 15.247 Subclause (d). Emission limitations conducted (Transmitter)

SPECIFICATION

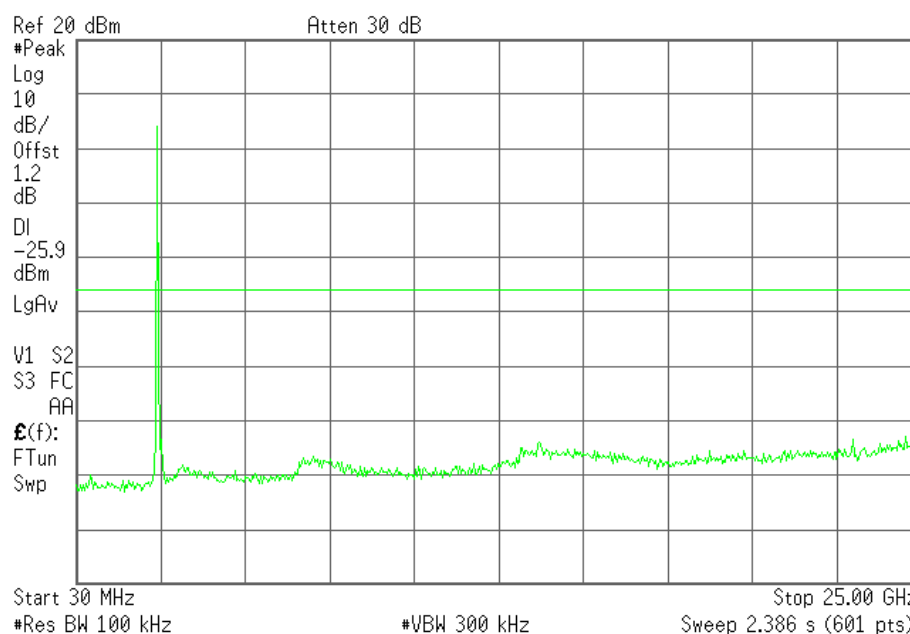
In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

RESULTS:

1. DSSS modulation

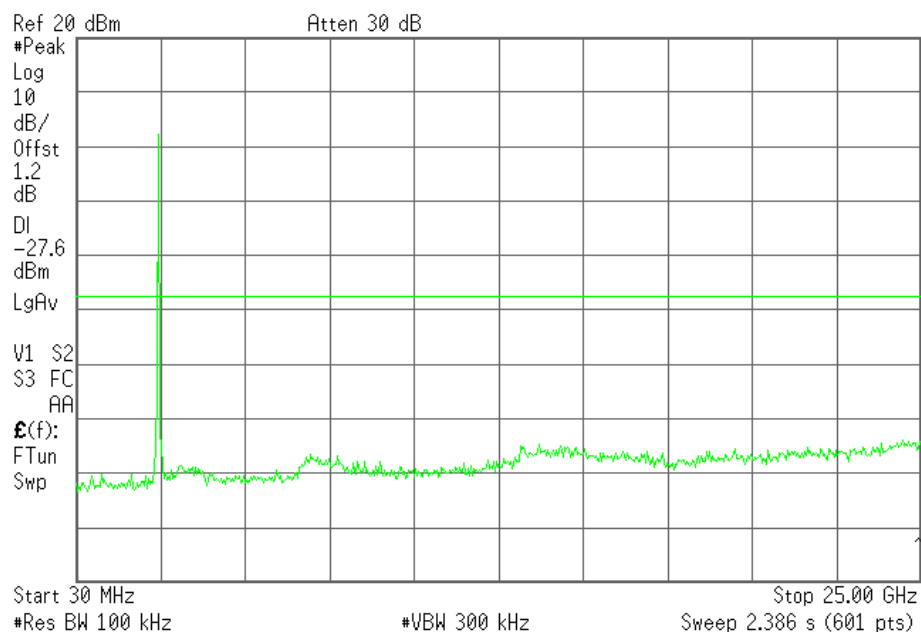
No spurious signals were detected in all the range for all modulation modes selected.

Lowest Channel: 2412 MHz.



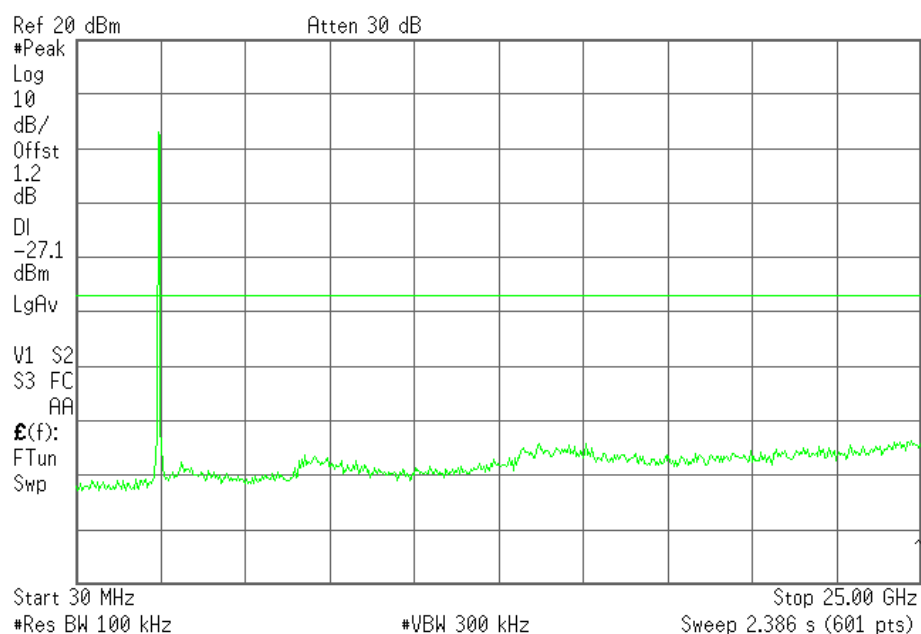
Note: The peak above the limit is the carrier frequency.

Middle Channel: 2437 MHz.



Note: The peak above the limit is the carrier frequency.

Highest Channel: 2462 MHz.

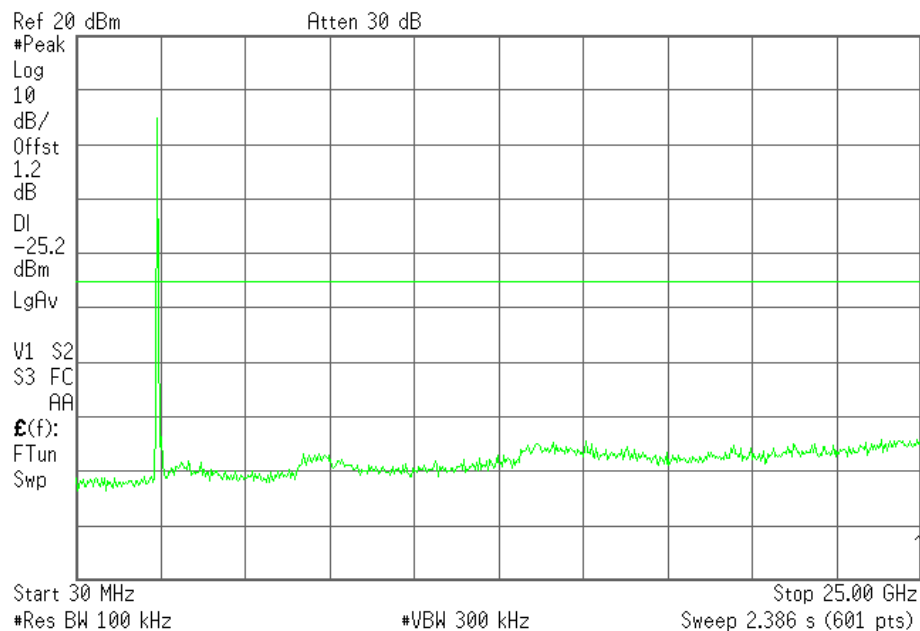


Note: The peak above the limit is the carrier frequency.

2. OFDM Modulation

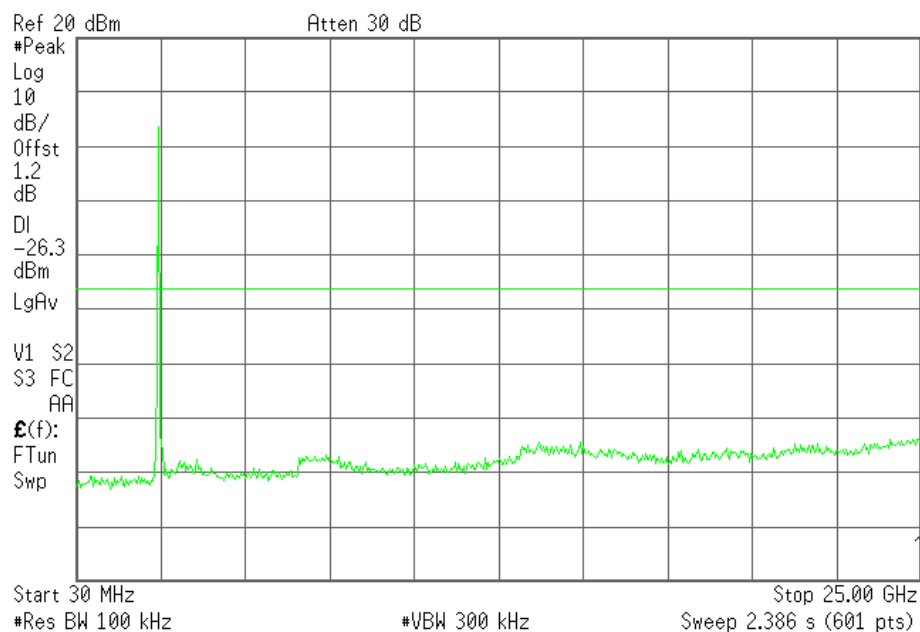
No spurious signals were detected in all the range for all modulation modes selected.

Lowest Channel: 2412 MHz.



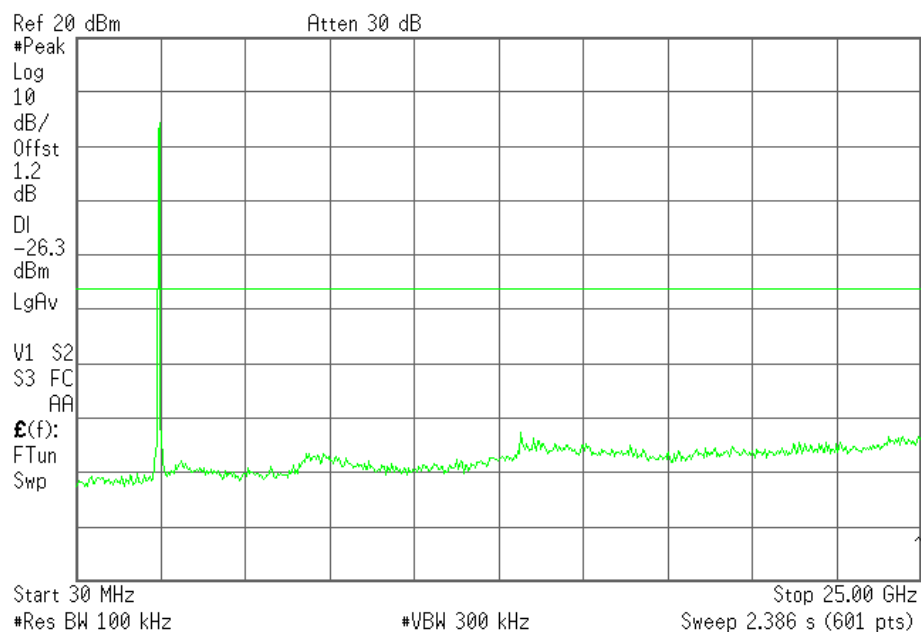
Note: The peak above the limit is the carrier frequency.

Middle Channel: 2437 MHz.



Note: The peak above the limit is the carrier frequency.

Highest Channel: 2462 MHz.



Note: The peak above the limit is the carrier frequency.

Verdict: PASS

Section 15.247 Subclause (d). Band-edge emissions compliance (Transmitter)

SPECIFICATION

Emissions outside the frequency band in which the intentional radiator is operating shall be at least 30dB below the highest level of the desired power.

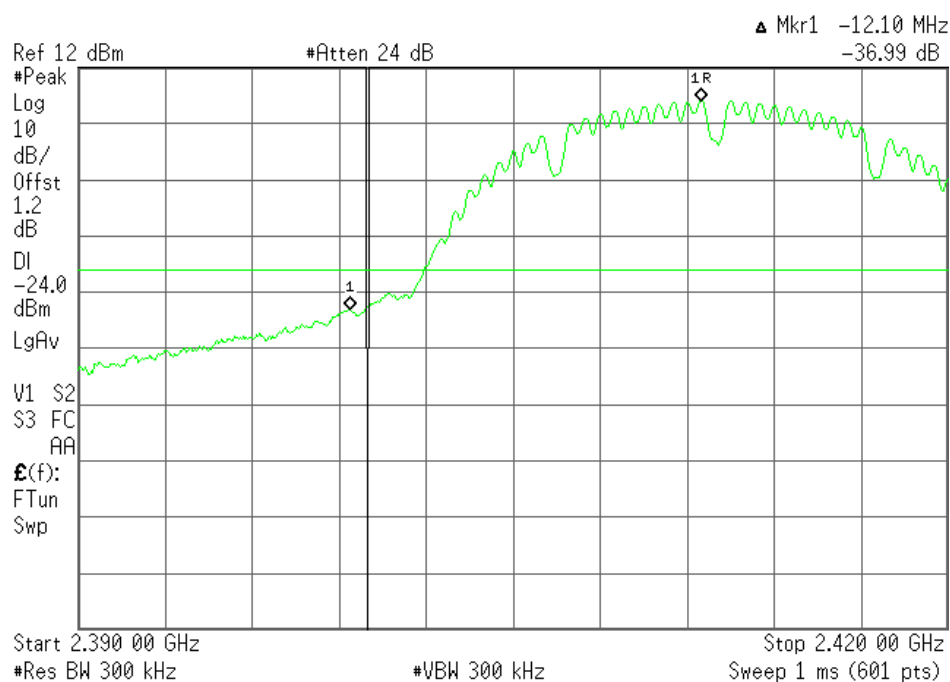
RESULTS:

1. DSSS Modulation

Preliminary tests were done with the equipment operating with DSSS modulation mode at 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps and the worst case was for 1 Mbps bit rate. Results shown below correspond to 1 Mbps.

1. LOW FREQUENCY SECTION 2412 MHz. CONDUCTED.

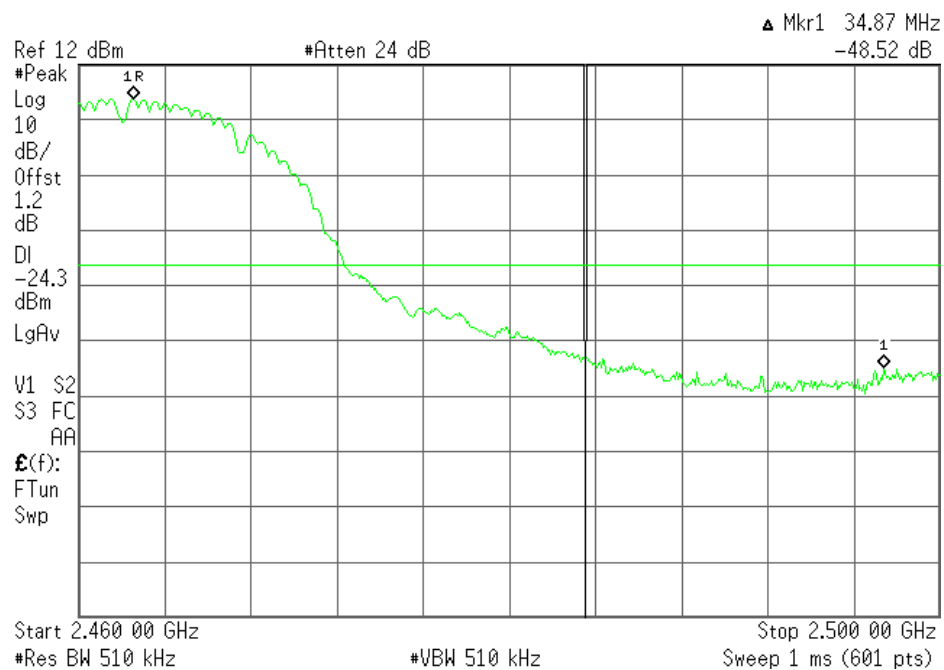
See next plot.



Verdict: PASS

2. HIGH FREQUENCY SECTION 2462 MHz. CONDUCTED.

See next plot.



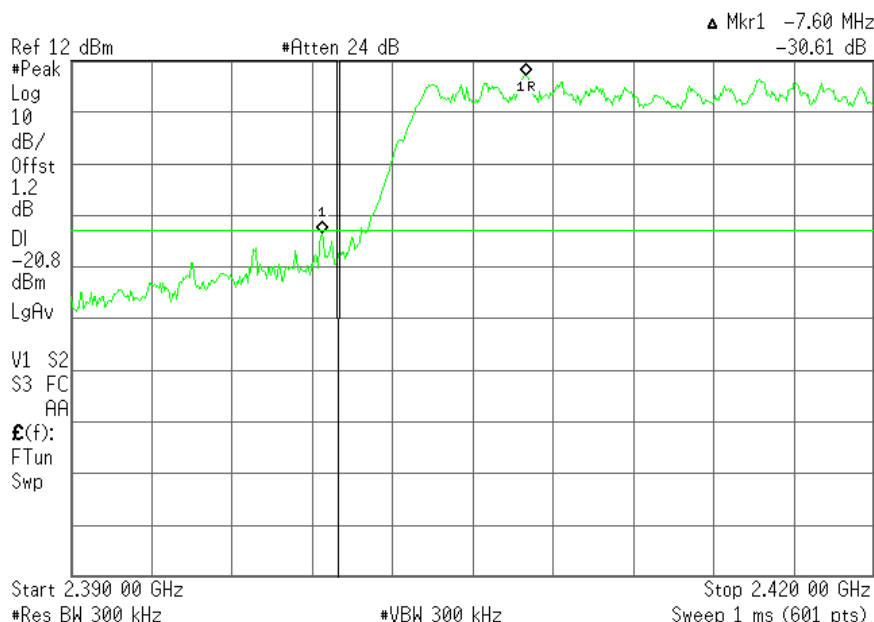
Verdict: PASS

2. OFDM Modulation

Preliminary tests were done with the equipment operating with OFDM modulation mode at 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps, and the worst case was for 6 Mbps bit rate. Results shown below correspond to 6 Mbps.

1. LOW FREQUENCY SECTION 2412 MHz. CONDUCTED.

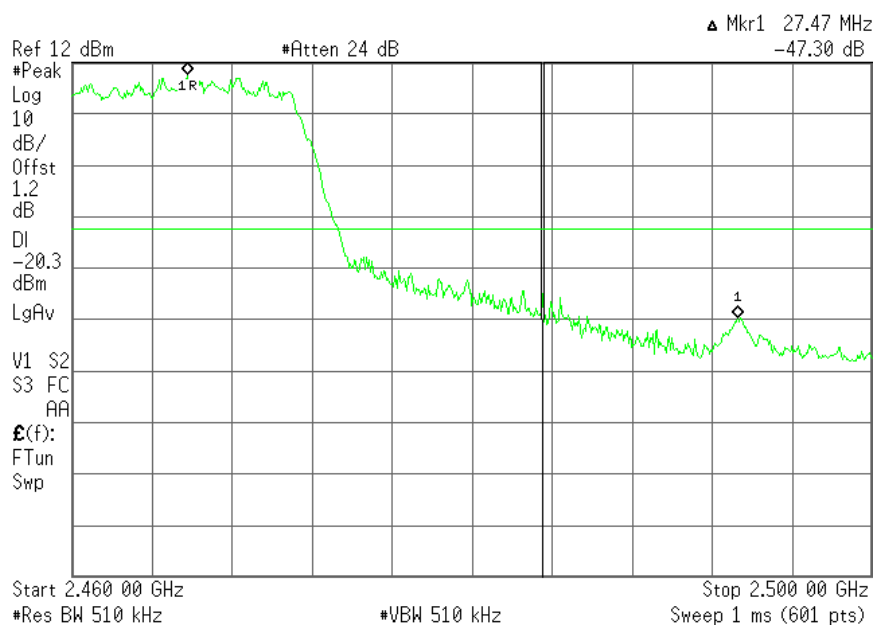
See next plot.



Verdict: PASS

2. HIGH FREQUENCY SECTION 2462 MHz. CONDUCTED.

See next plot.



Verdict: PASS

Section 15.247 Subclause (e). Power spectral density

SPECIFICATION

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.

RESULTS

1. DSSS modulation

Preliminary tests were done with the equipment operating with DSSS modulation mode at 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps and the worst case was for 1 Mbps bit rate. Results shown below correspond to 1 Mbps.

Power spectral density (see next plots).

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Power spectral density (dBm) in 3 kHz bandwidth	-10.23	-10.59	-10.53
Measurement uncertainty (dB)	±1.5		

2. OFDM modulation

Preliminary tests were done with the equipment operating with OFDM modulation mode at 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps, and the worst case was for 6 Mbps bit rate. Results shown below correspond to 6 Mbps.

Power spectral density (see next plots).

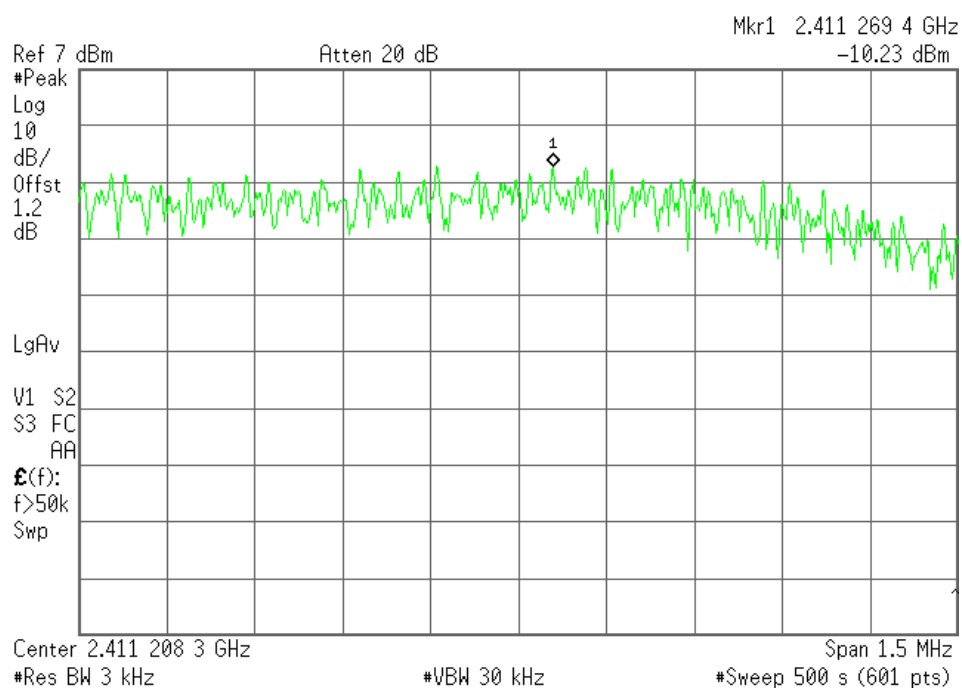
	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Power spectral density (dBm) in 3 kHz bandwidth	-5.78	-5.96	-5.69
Measurement uncertainty (dB)	±1.5		

Verdict: PASS

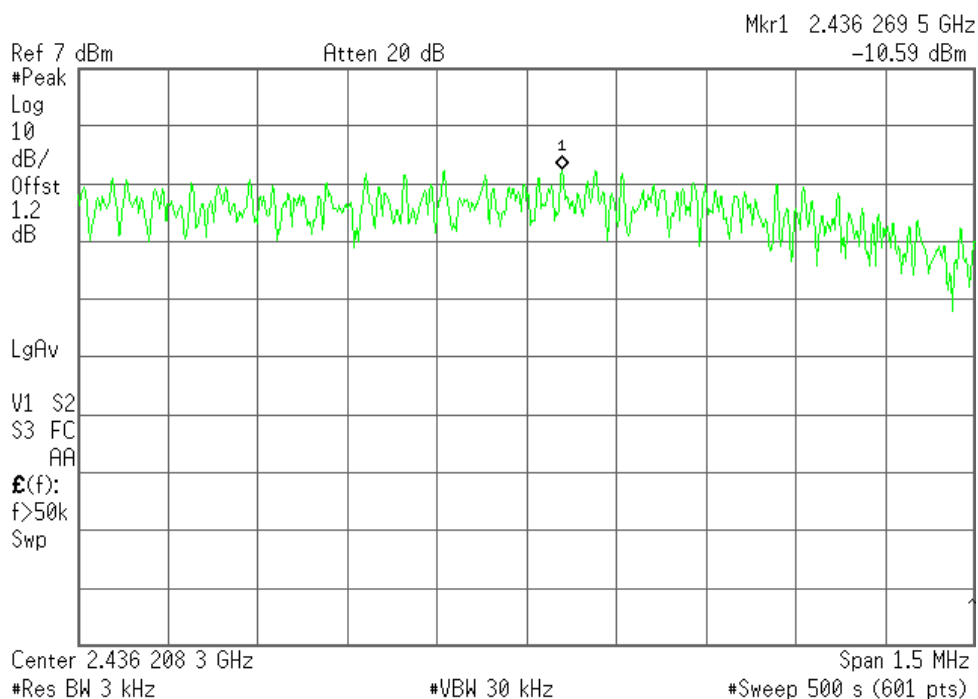
1. DSSS modulation

Power spectral density.

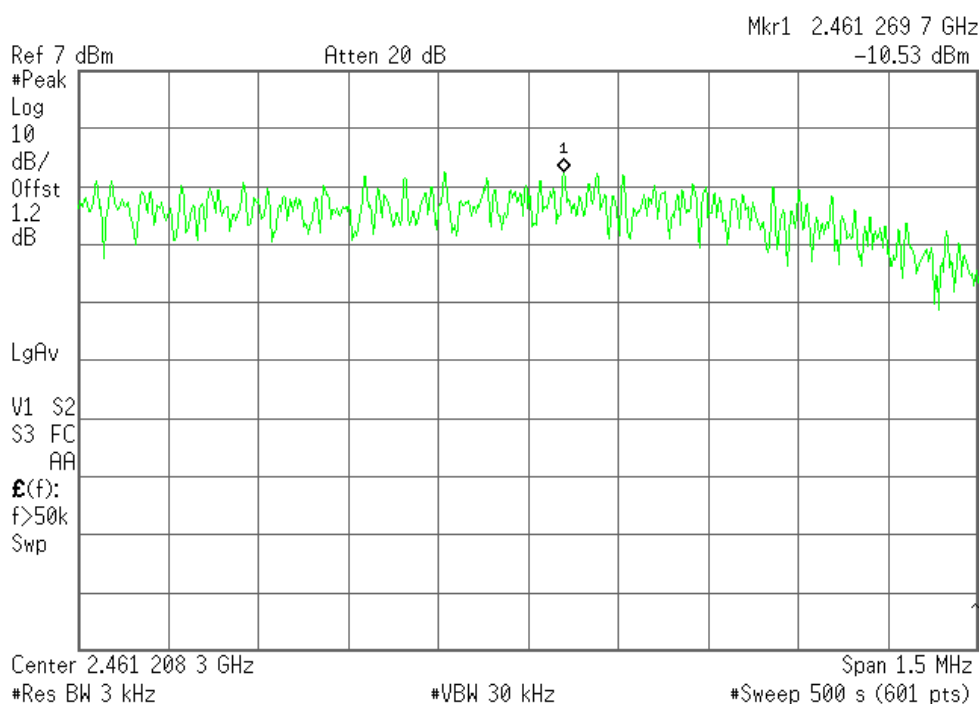
Lowest Channel: 2412 MHz.



Middle Channel: 2437 MHz.



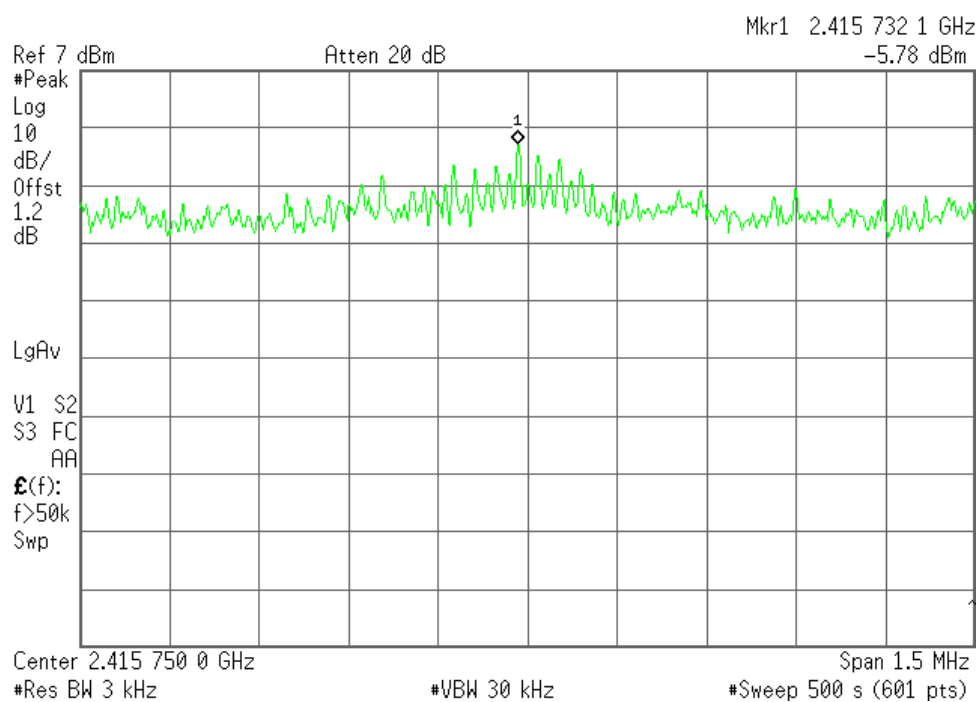
Highest Channel: 2462 MHz.



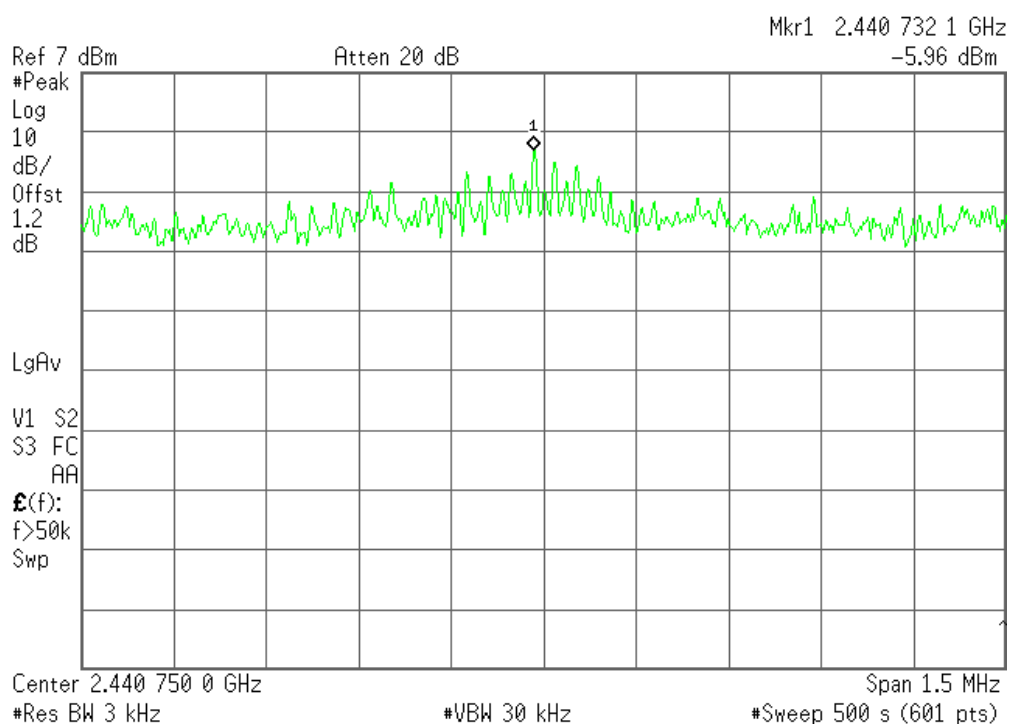
2. OFDM modulation

Power spectral density.

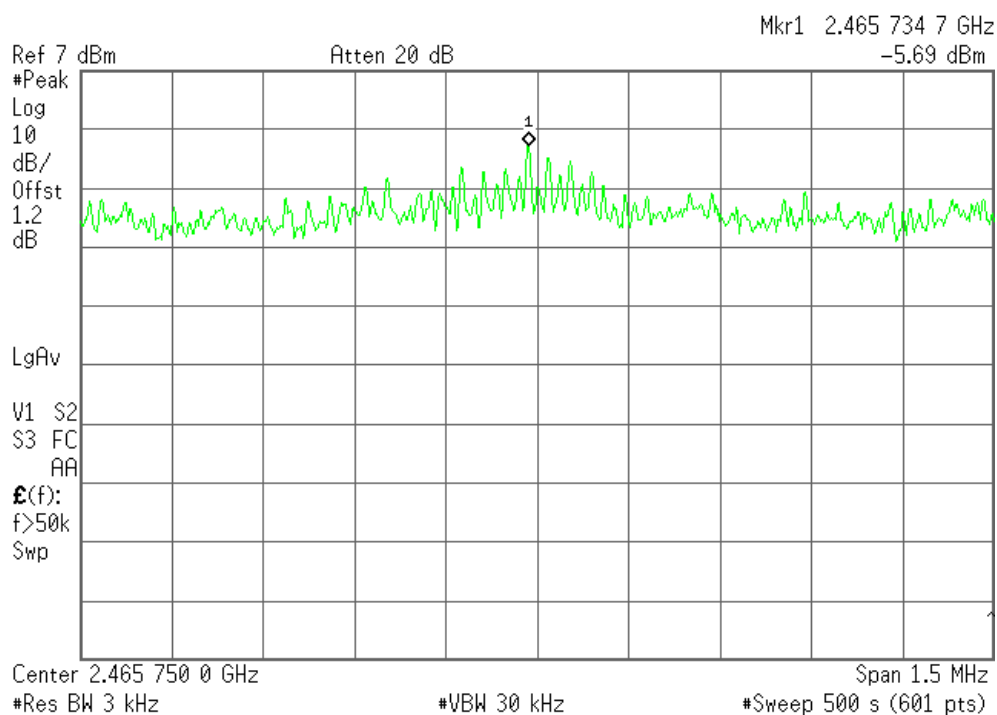
Lowest Channel: 2412 MHz.



Middle Channel: 2437 MHz.



Highest Channel: 2462 MHz.



Section 15.247 Subclause (d). Emission limitations radiated (Transmitter)

SPECIFICATION

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

The equipment transmits continuously in the selected channel so it is not necessary a duty cycle correction factor.

1. DSSS Modulation

Frequency range 30 MHz-1000 MHz.

Note: The spurious emissions below 1 GHz do not depend on either the operating channel or modulation mode selected in the EUT.

Spurious levels operating (radiated) closest to limit.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
262.64529	V	Quasi-peak	29.54	± 3.8
290.06012	V	Quasi-peak	26.73	± 3.8
326.23246	V	Quasi-peak	29.18	± 3.8
368.49699	V	Quasi-peak	29.74	± 3.8

Frequency range 1 GHz-25 GHz

1. CHANNEL: LOWEST (2412 MHz).

No spurious signals were found at the harmonic frequencies and other discrete frequencies in all the range for all modulation modes selected. Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

2. CHANNEL: MIDDLE (2437 MHz).

No spurious signals were found at the harmonic frequencies and other discrete frequencies in all the range for all modulation modes selected. Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

3. CHANNEL: HIGHEST (2462 MHz).

No spurious signals were found at the harmonic frequencies and other discrete frequencies in all the range for all modulation modes selected. Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

2. OFDM Modulation

Frequency range 30 MHz-1000 MHz.

Note: The spurious emissions below 1 GHz do not depend on either the operating channel or modulation mode selected in the EUT.

Spurious levels operating (radiated) closest to limit.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
262.64529	V	Quasi-peak	29.69	± 3.8
290.06012	V	Quasi-peak	27.11	± 3.8
324.32866	V	Quasi-peak	29.43	± 3.8
367.35471	V	Quasi-peak	29.53	± 3.8

Frequency range 1 GHz-25 GHz

1. CHANNEL: LOWEST (2412 MHz).

No spurious signals were found at the harmonic frequencies and other discrete frequencies in all the range for all modulation modes selected. Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

2. CHANNEL: MIDDLE (2437 MHz).

No spurious signals were found at the harmonic frequencies and other discrete frequencies in all the range for all modulation modes selected. Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

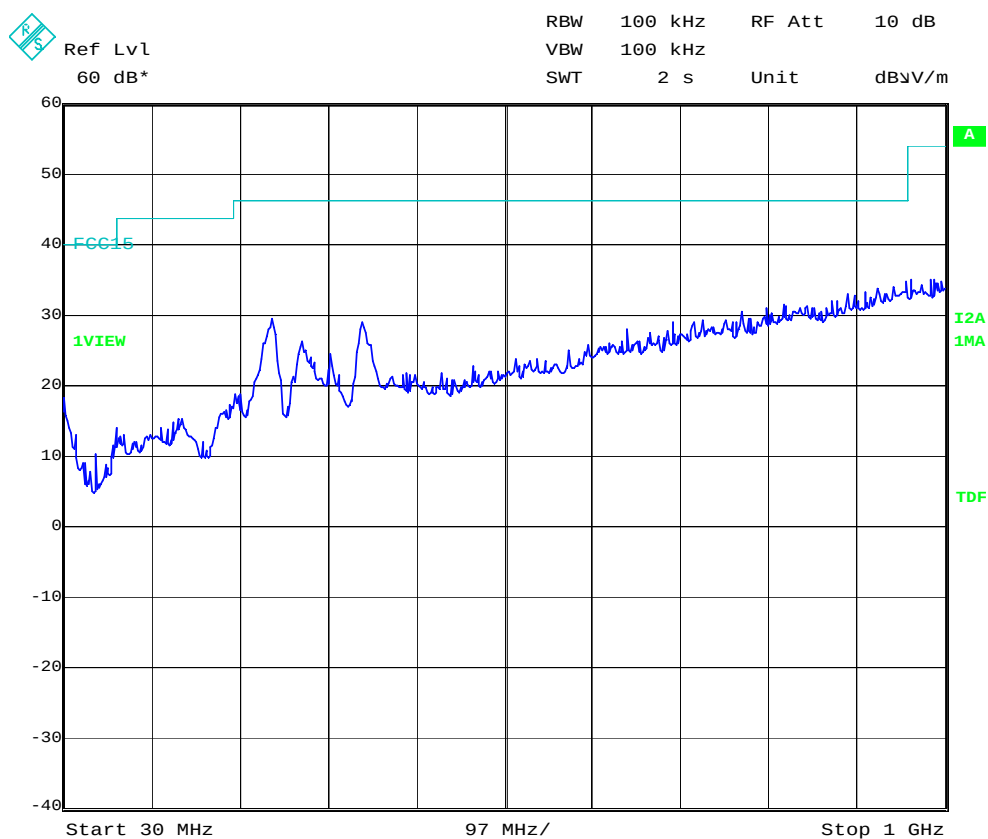
3. CHANNEL: HIGHEST (2462 MHz).

No spurious signals were found at the harmonic frequencies and other discrete frequencies in all the range for all modulation modes selected. Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

Verdict: PASS

1. DSSS modulation

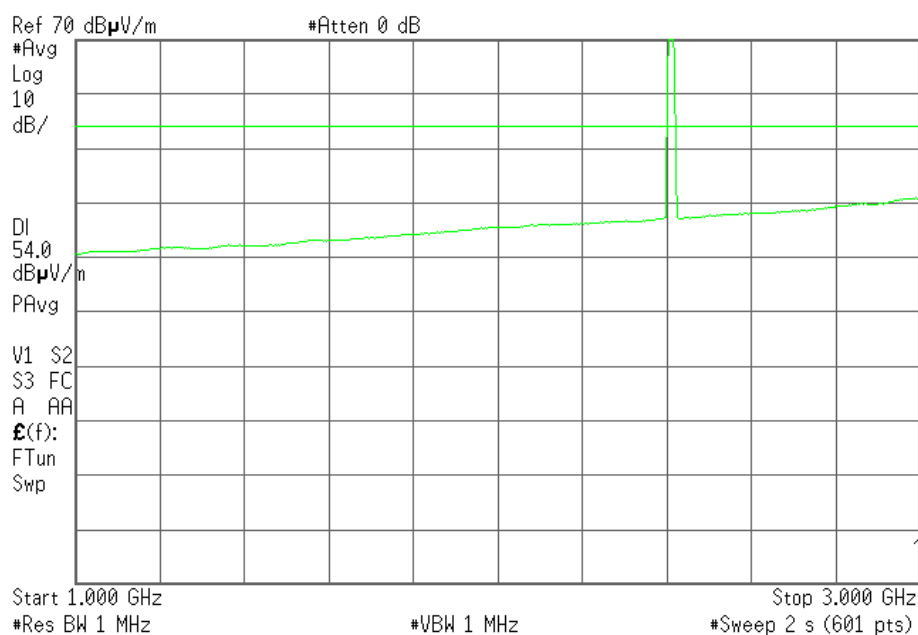
FREQUENCY RANGE 30 MHz-1000 MHz.



This plot is valid for all three channels.

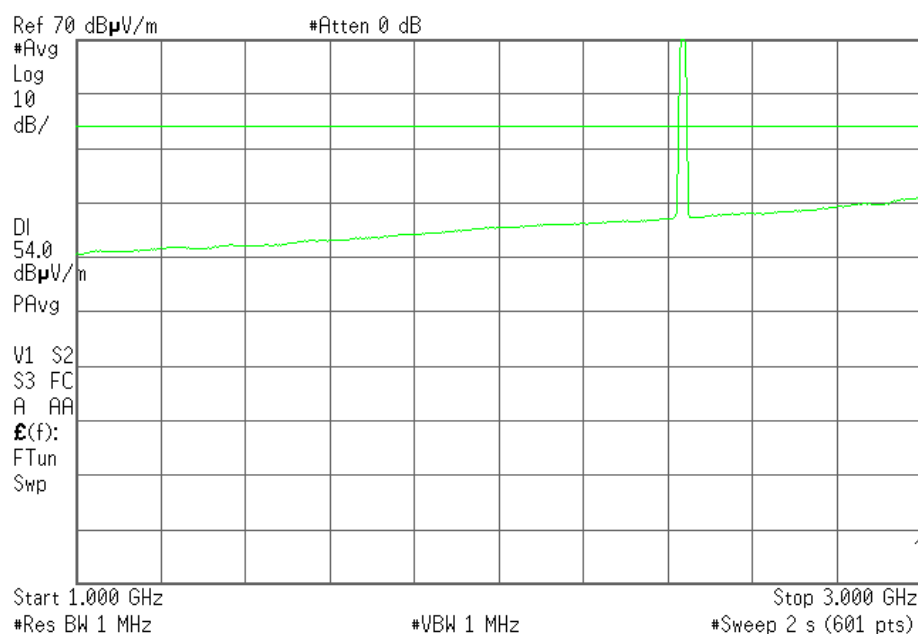
FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: Lowest (2412 MHz).



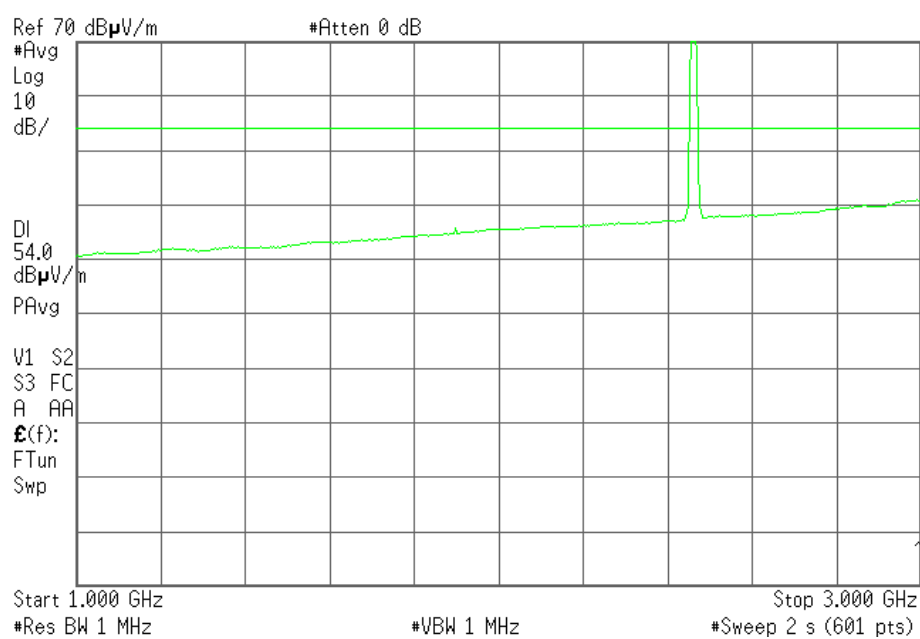
Note: The peak above the limit is the carrier frequency.

CHANNEL: Middle (2437 MHz).



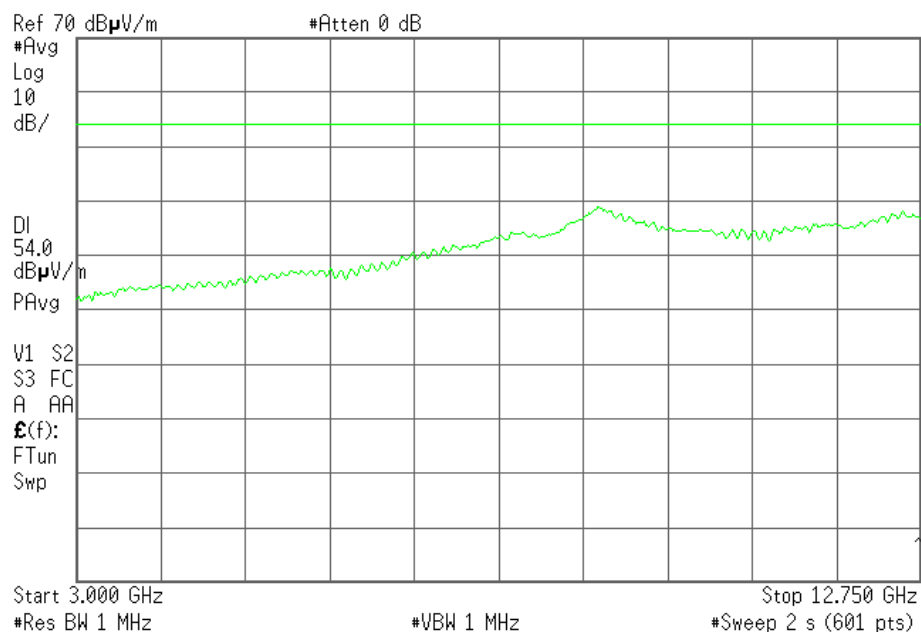
Note: The peak above the limit is the carrier frequency.

CHANNEL: Highest (2462 MHz).



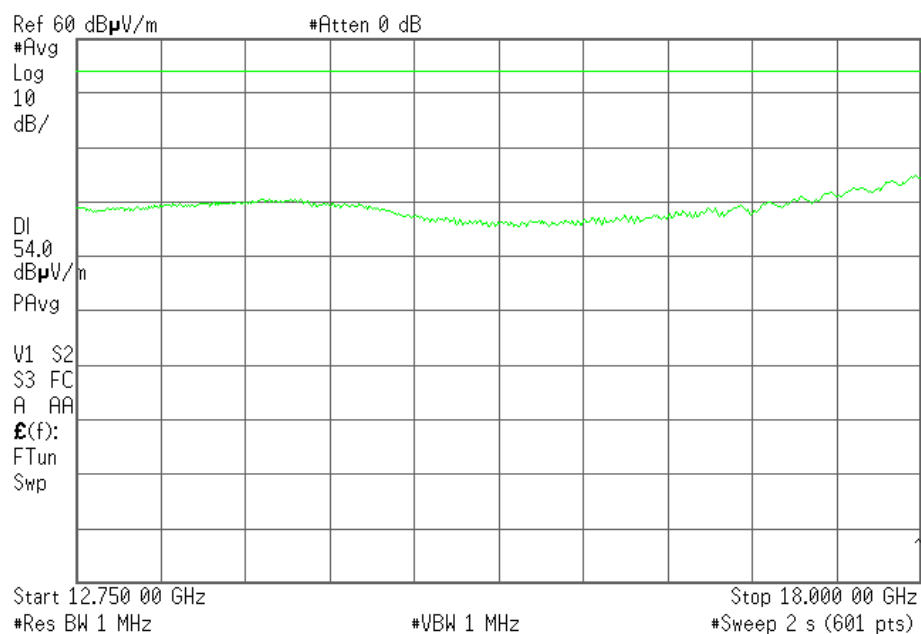
Note: The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 12.75 GHz.



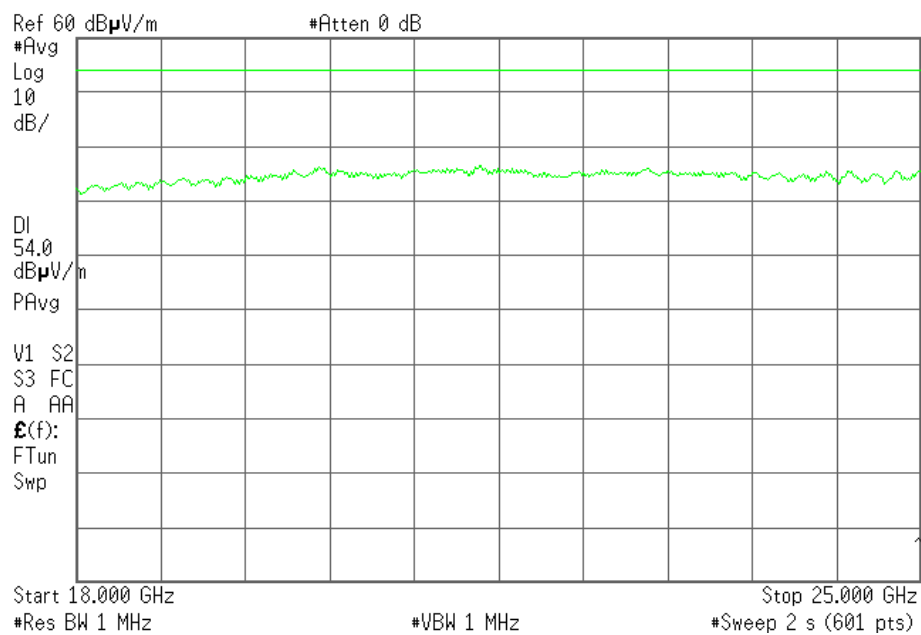
This plot is valid for all three channels

FREQUENCY RANGE 12.75 GHz to 18 GHz.



This plot is valid for all three channels.

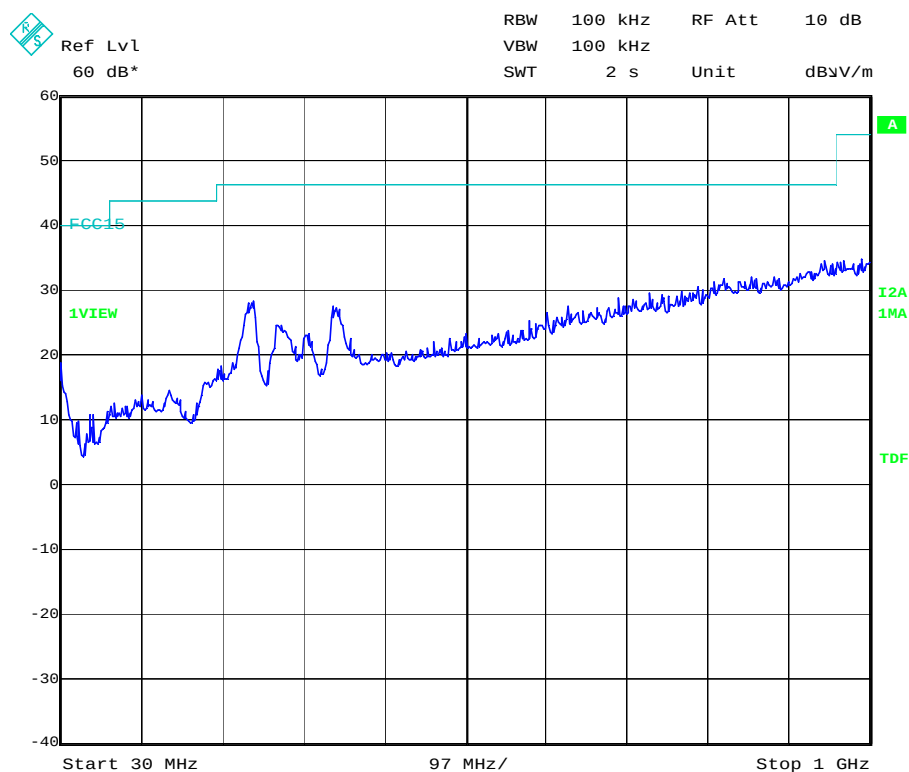
FREQUENCY RANGE 18 GHz to 25 GHz.



This plot is valid for all three channels.

2. OFDM modulation

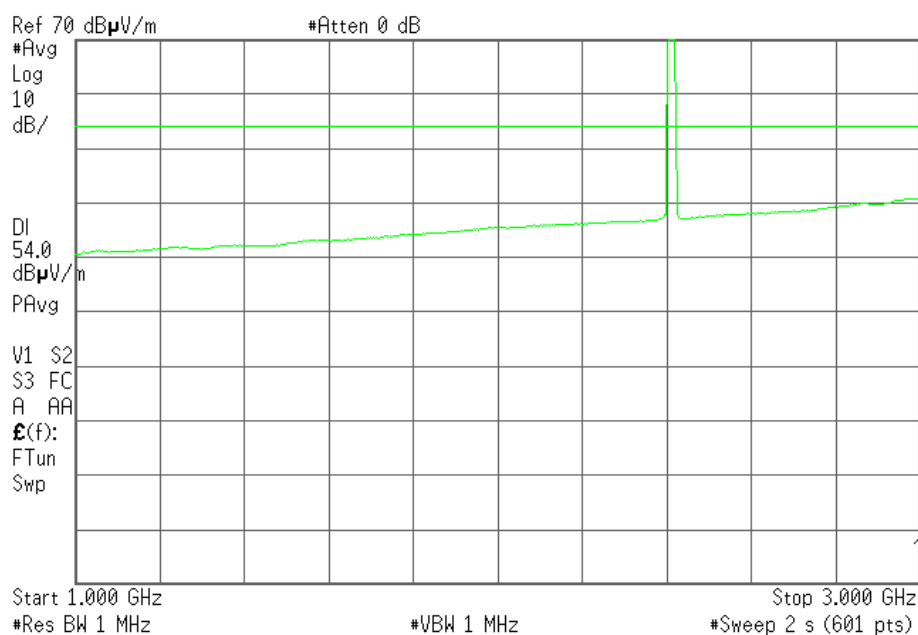
FREQUENCY RANGE 30 MHz-1000 MHz.



This plot is valid for all three channels.

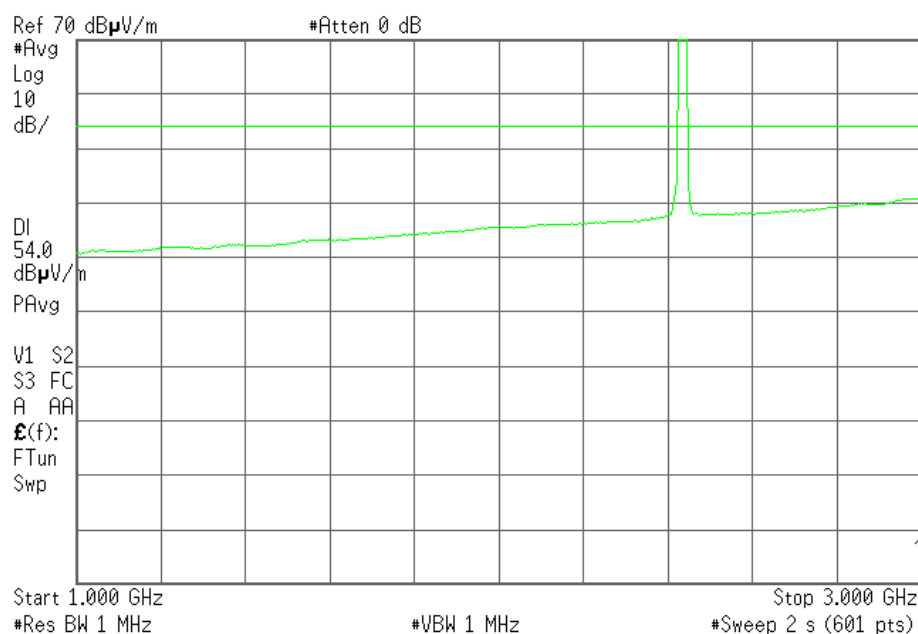
FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: Lowest (2412 MHz).



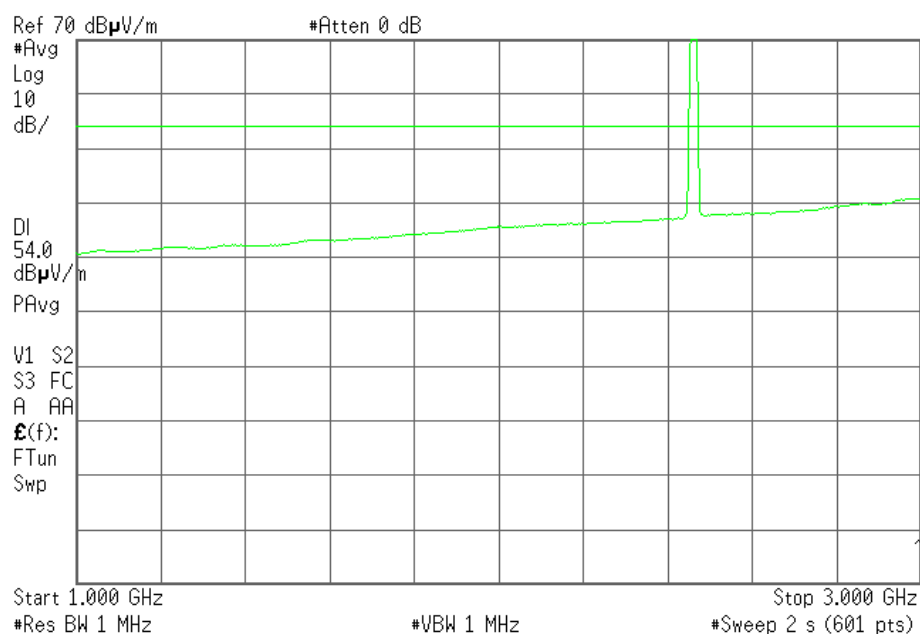
Note: The peak above the limit is the carrier frequency.

CHANNEL: Middle (2437 MHz).



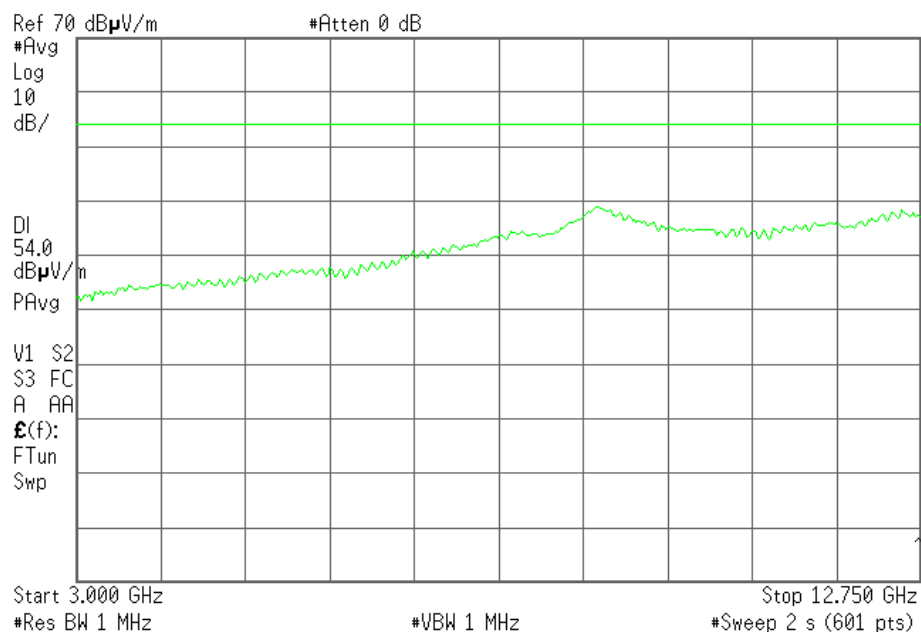
Note: The peak above the limit is the carrier frequency.

CHANNEL: Highest (2462 MHz).



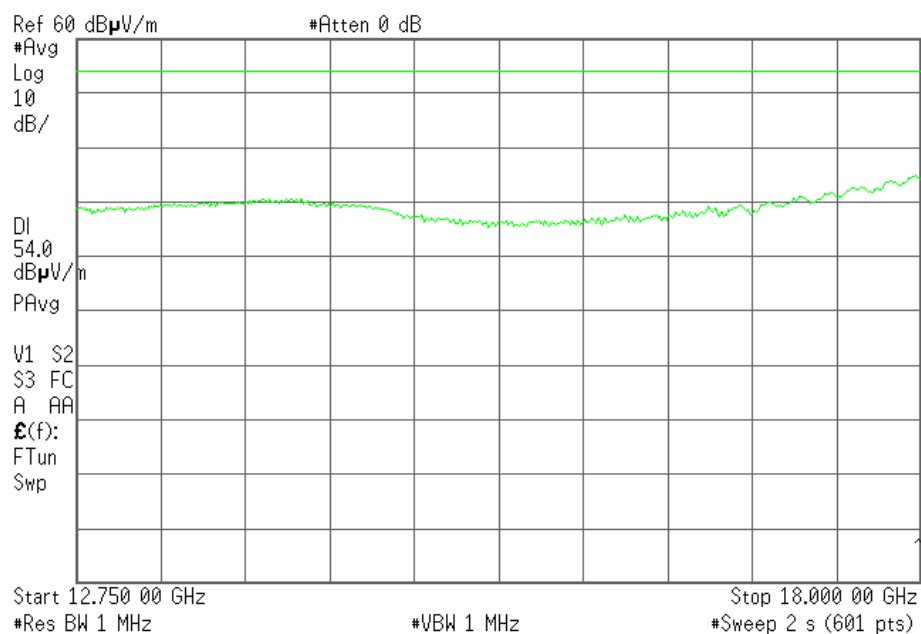
Note: The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 12.75 GHz.



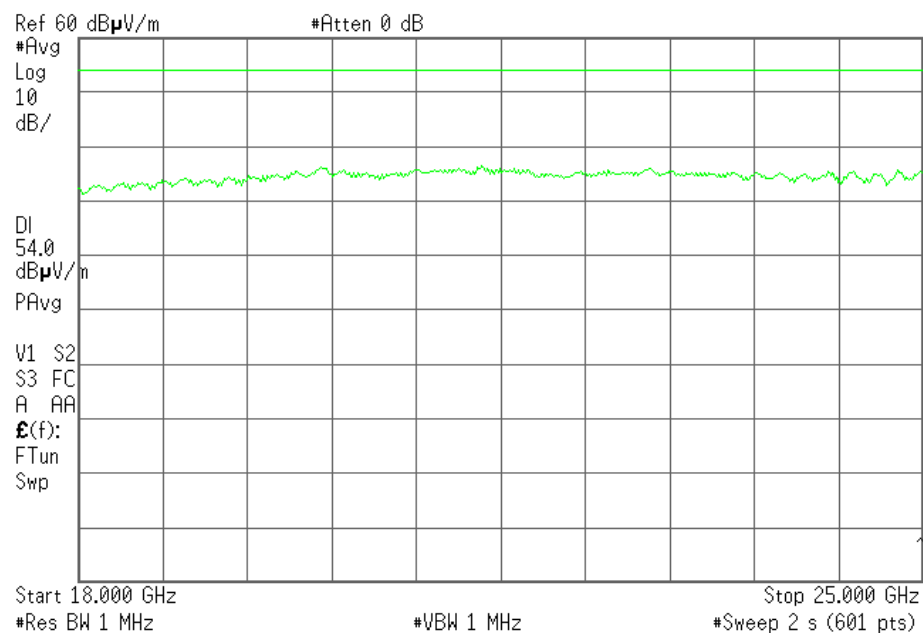
This plot is valid for all three channels

FREQUENCY RANGE 12.75 GHz to 18 GHz.



This plot is valid for all three channels.

FREQUENCY RANGE 18 GHz to 25 GHz.



This plot is valid for all three channels.

Section 15.109. Receiver spurious radiation

SPECIFICATION

The field strength shall not exceed the following values:

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyser. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz-1000 MHz.

Note: The spurious emissions below 1 GHz do not depend on either the receiving channel or the modulation mode selected in the EUT.

Spurious levels operating (radiated) closest to limit.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
262.64529	V	Quasi-peak	30.69	± 3.8
288.91784	V	Quasi-peak	27.97	± 3.8
324.70942	V	Quasi-peak	30.35	± 3.8
361.26253	V	Quasi-peak	31.41	± 3.8

Frequency range 1 GHz-25 GHz.

1. CHANNEL: LOWEST (2402 MHz).

No spurious signals were detected in all the range.

Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

2. CHANNEL: MIDDLE (2441 MHz).

No spurious signals were found in all the range.

Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

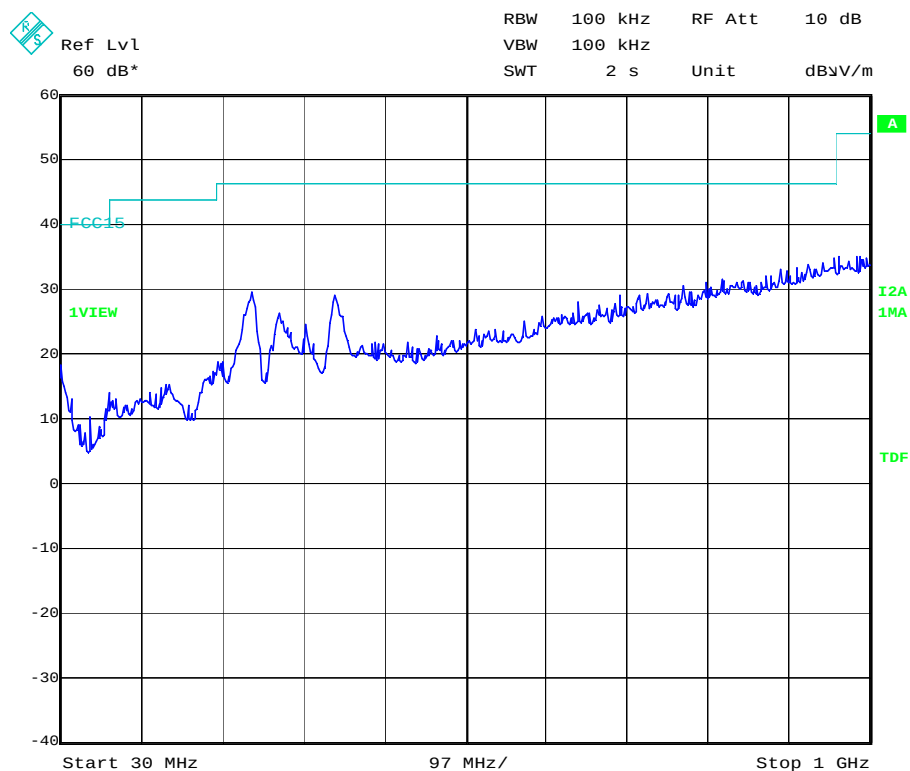
3. CHANNEL: HIGHEST (2480 MHz).

No spurious signals were found in all the range.

Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

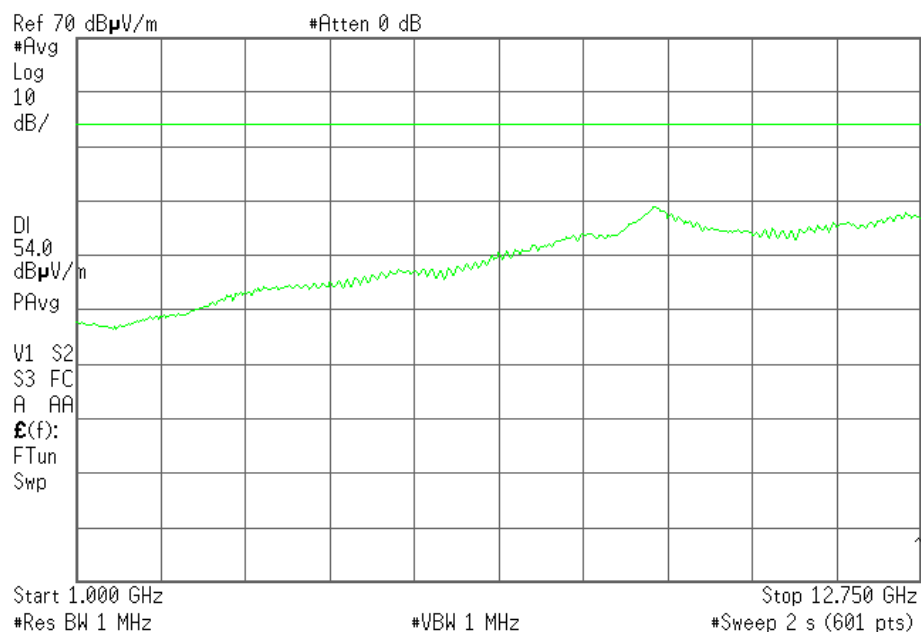
Verdict: PASS.

FREQUENCY RANGE 30 MHz-1000 MHz.



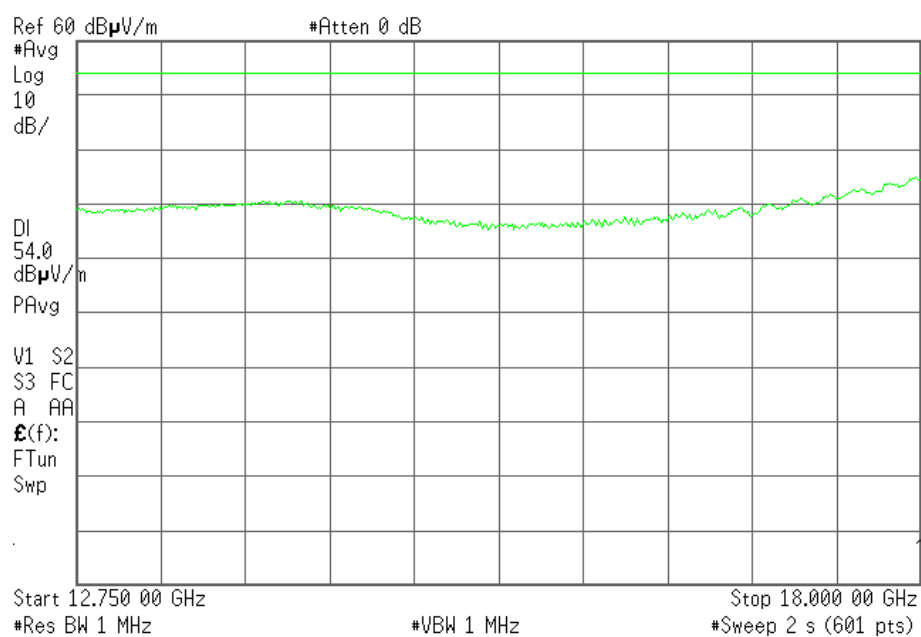
(This plot is valid for all three channels).

FREQUENCY RANGE 1 GHz-12.75 GHz.



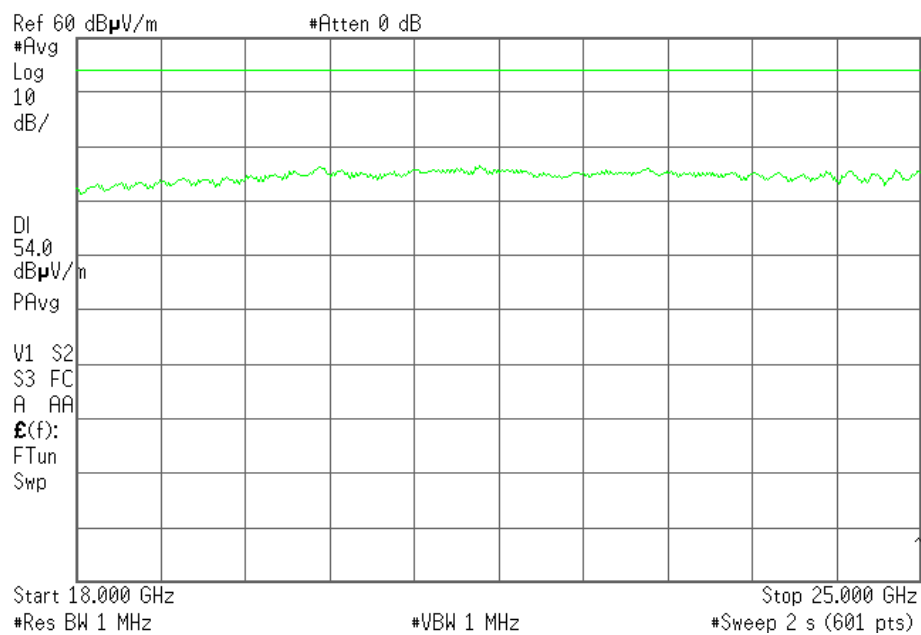
(This plot is valid for all three channels).

FREQUENCY RANGE 12.75 GHz-18 GHz.



(This plot is valid for all three channels).

FREQUENCY RANGE 18 GHz-25 GHz.



(This plot is valid for all three channels).

Continuous conducted emission on power leads

In the following table appears the operation modes used by the samples tested to that it refers the present test report.

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Looking for WIFI network. Power supply 3.8 Vdc.
OM#02	EUT ON. Transmission mode.

LIMITS:	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B.
	Test standard :	EN 55022 (2006)
<u>CLASS B</u> The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B in the frequency range 0,15 to 30 MHz, for Class B equipment was:		
Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

TESTED SAMPLES:	S/22	
TESTED OPERATION MODES:	OM#01 & OM#01	
TEST RESULTS :	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire	

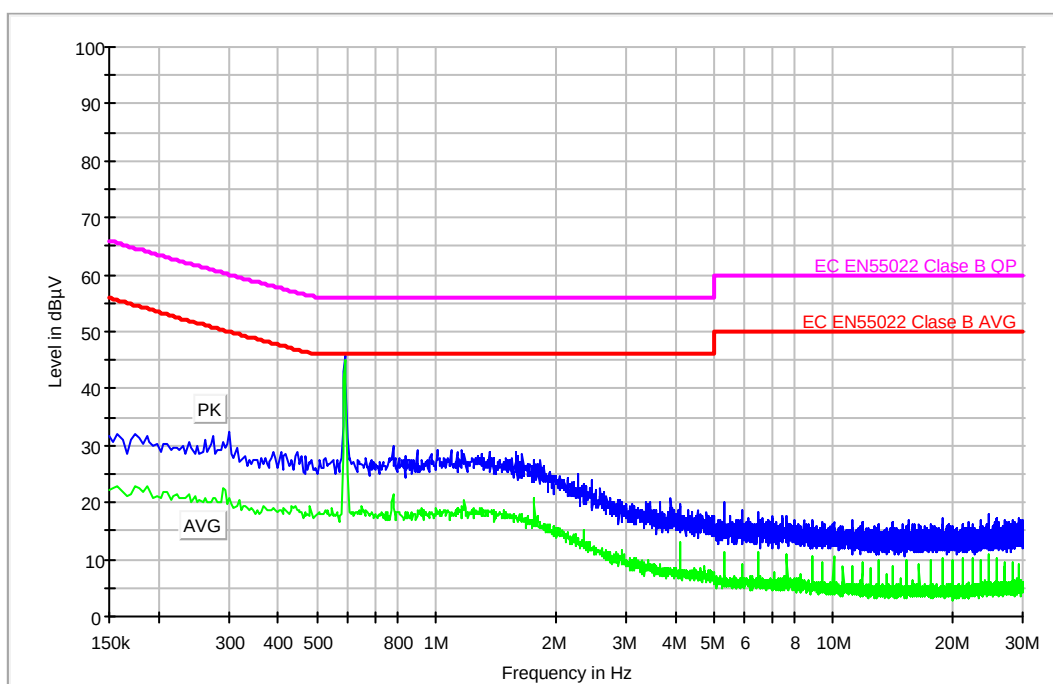
CCmmnnhh	Description	Result
CC2201PO	Positive wire noise	PASS
CC2201NE	Negative wire noise	PASS
CC2202PO	Positive wire noise	PASS
CC2202NE	Negative wire noise	PASS

Continuous Conducted emission : CC2201PO

Detector : Peak / Average / Cuasi-peak

Project: 28057iem.002
 Company: Telit
 Sample: S/22
 Operation mode: OM#01
 Date: 2008-09-11 17:44
 Setup: EMI conducted
 Mode: EUT ON. Reception mode. Positive noise.

EC EMI 55022 Class B ESPI CC



Max Pk-Avg

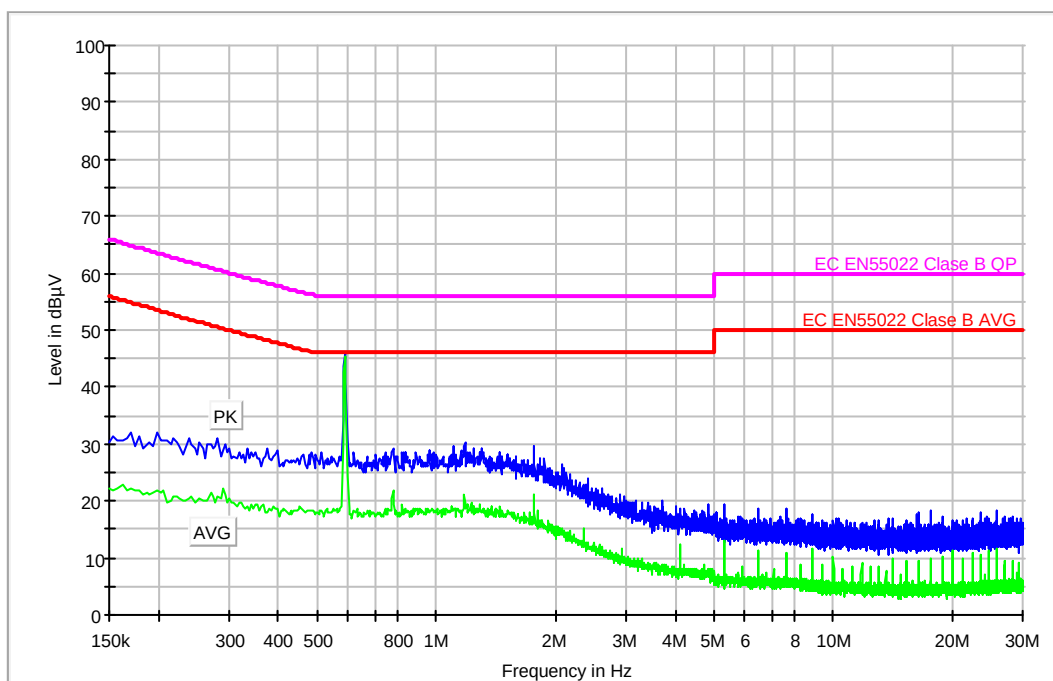
Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.590000	45.8	45.1
24.734000	18.1	10.8

Continuous Conducted emission : CC2201NE

Detector : Peak / Average / Cuasi-peak

Project: 28057iem.002
 Company: Telit
 Sample: S/22
 Operation mode: OM#01
 Date: 2008-09-11 17:41
 Setup: EMI conducted
 Mode: EUT ON. Reception mode. Negative noise.

EC EMI 55022 Class B ESPI CC



Max Pk-Avg

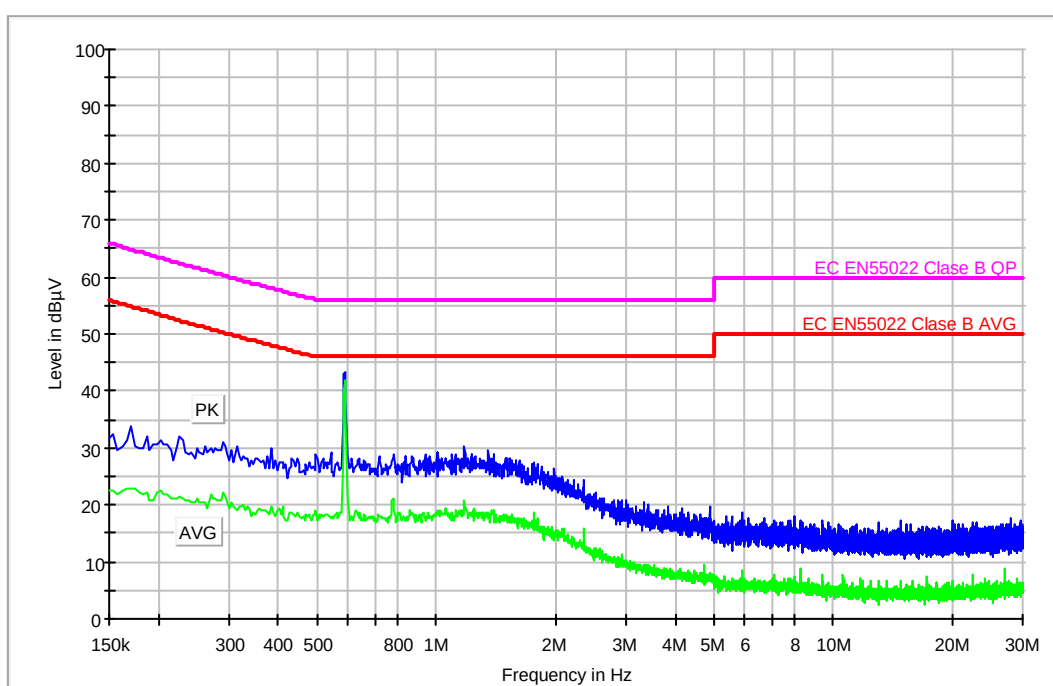
Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.590000	46.0	45.4
25.902000	18.3	11.6
20.014000	16.2	11.4

Continuous Conducted emission : CC2202PO

Detector : Peak / Average / Cuasi-peak

Project: 28057iem.002
 Company: Telit
 Sample: S/22
 Operation mode: MO#02
 Date: 2008-09-11 17:51
 Setup: EMI conducted
 Mode: EUT ON. Transmission mode. Positive noise.

EC EMI 55022 Class B ESPI CC



Max Pk-Avg

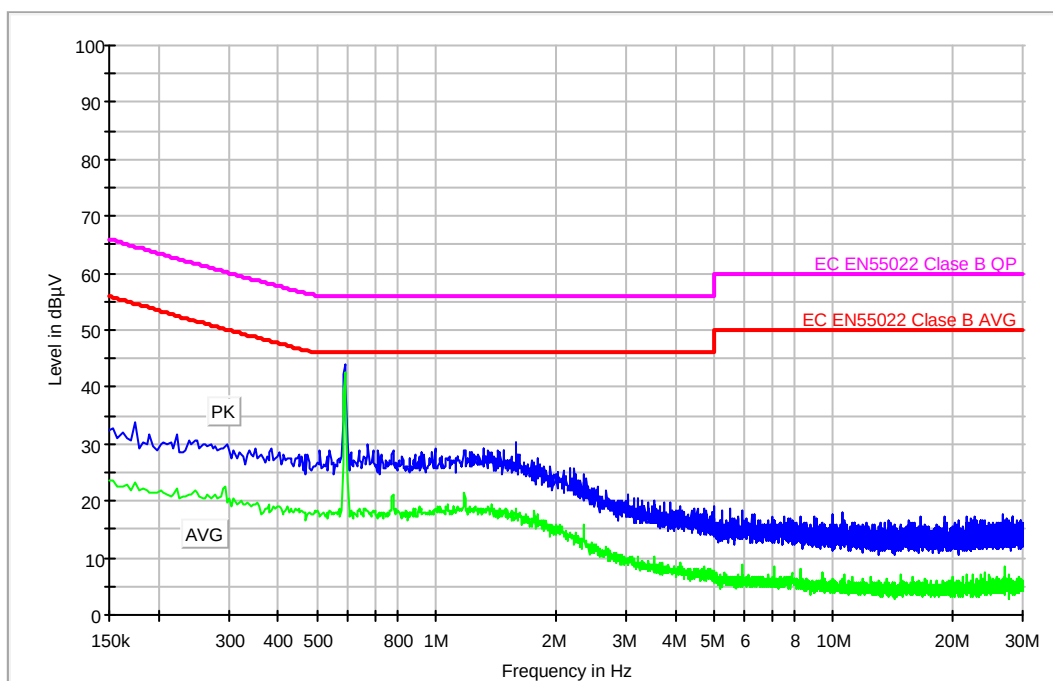
Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.590000	43.3	42.0

Continuous Conducted emission : CC2202NE

Detector : Peak / Average / Cuasi-peak

Project: 28057iem.002
 Company: Telit
 Sample: S/22
 Operation mode: OM#02
 Date: 2008-09-11 17:56
 Setup: EMI conducted
 Mode: EUT ON. Transmission mode. Negative noise.

EC EMI 55022 Class B ESPI CC

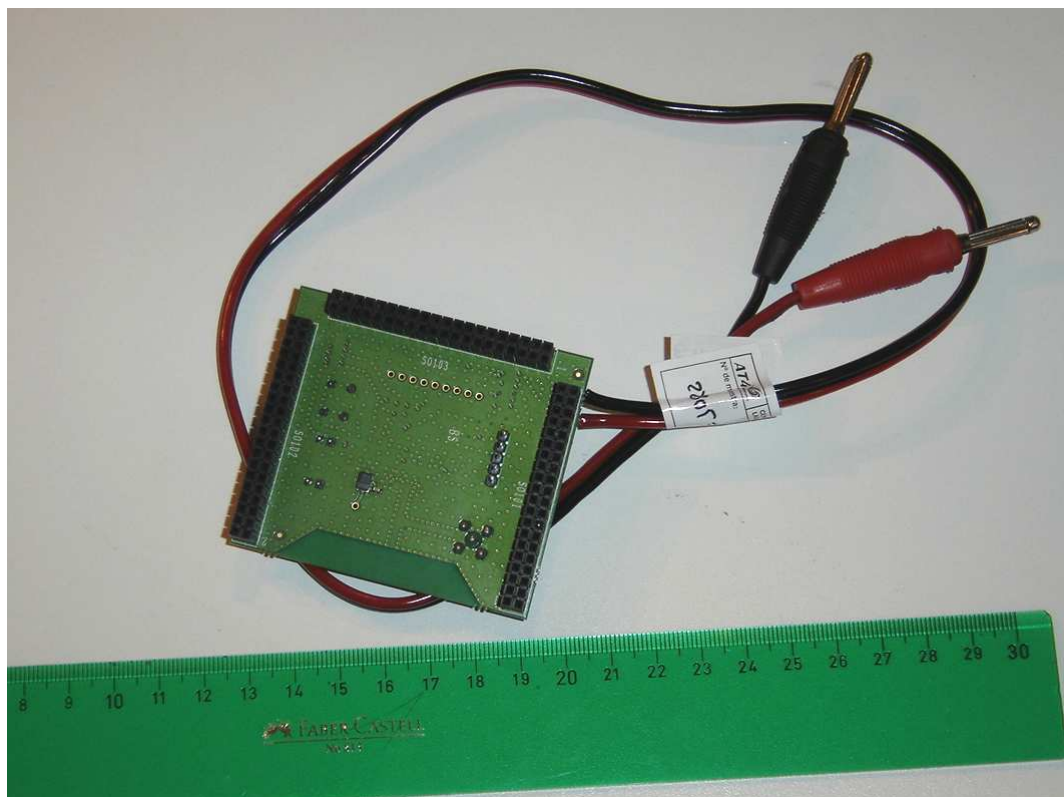
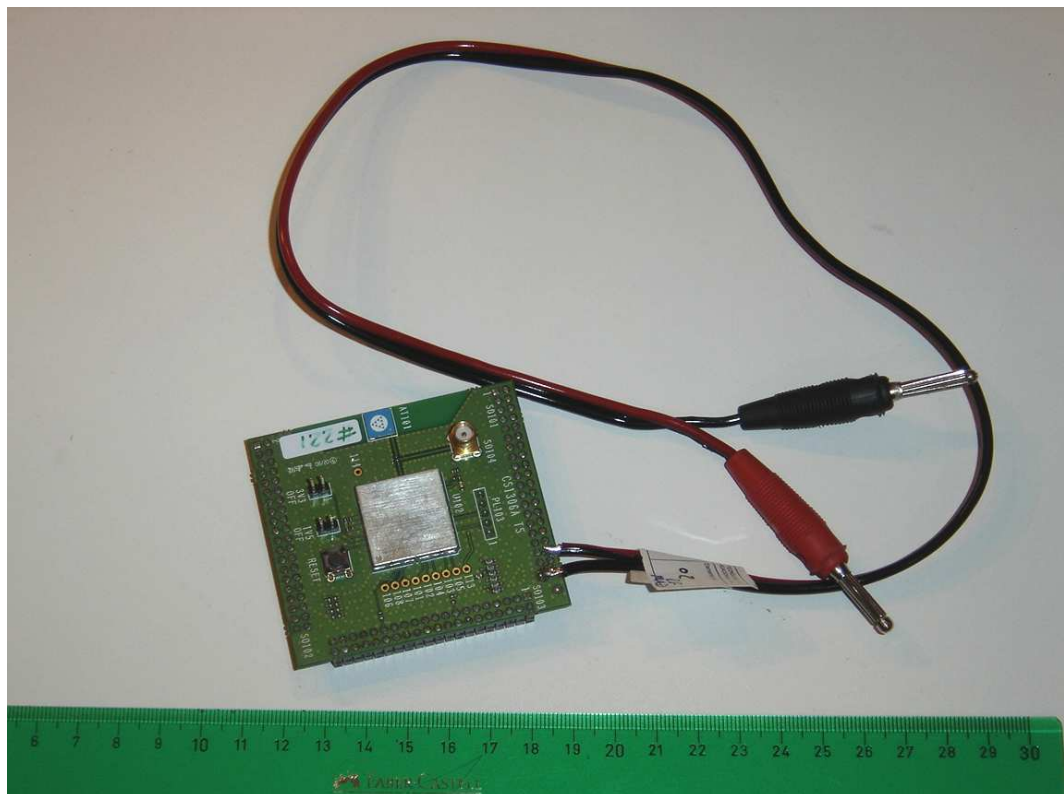


Max Pk-Avg

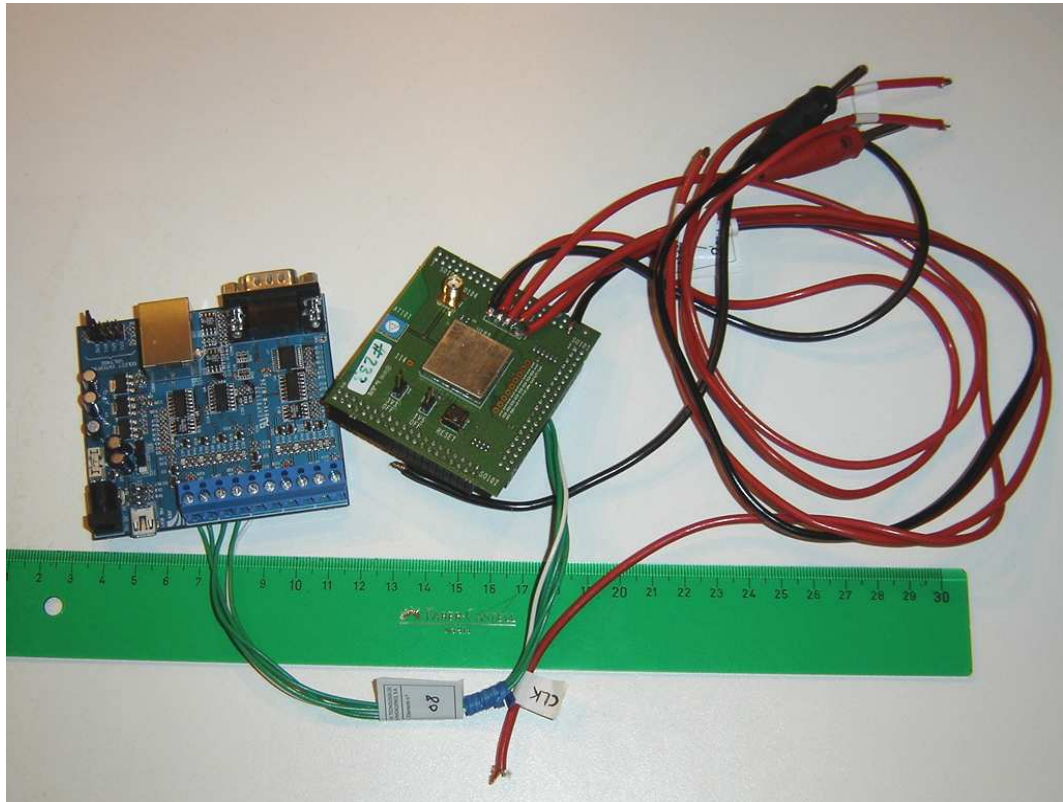
Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.590000	44.1	42.6

APPENDIX B: Photographs

EQUIPMENT FOR RADIATED MEASUREMENTS

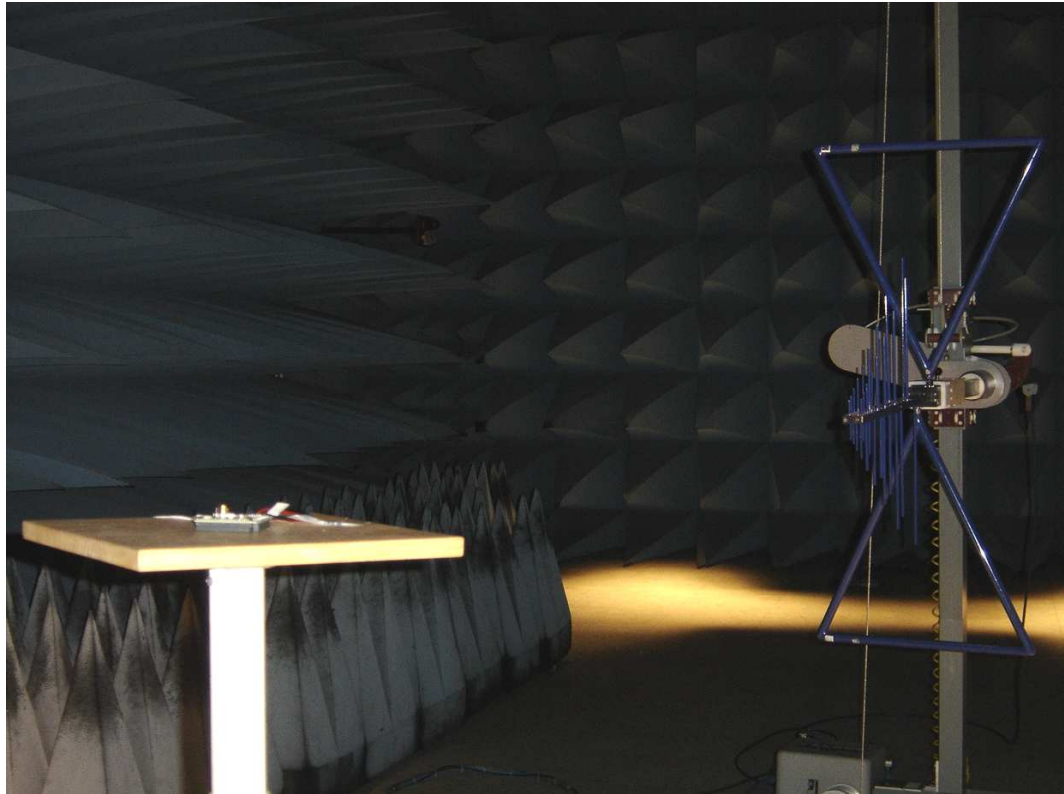


EQUIPMENT FOR CONDUCTED MEASUREMENTS



GENERAL SET-UP FOR RADIATED MEASUREMENTS

TEST SET-UP FOR RADIATED MEASUREMENTS BELOW 1 GHz



TEST SET-UP FOR RADIATED MEASUREMENTS ABOVE 1GHz



GENERAL SET-UP FOR CONDUCTED MEASUREMENTS