

FCC LISTED, REGISTRATION
 NUMBER: 720267

Informe de ensayo n°:
 Test report No:

IC LISTED REGISTRATION
 NUMBER IC 4621A-1

NIE: 45639RRF.004

Test report

USA FCC Part 15.247, 15.207, 15.209 CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz,
 and 5725 - 5850 MHz.

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-
 Exempt Local Area Network (LE-LAN) Devices.

General Requirements and Information for the Certification of Radio Apparatus.

Identificación del objeto ensayado.....: Identification of item tested	THINGSEE ONE developer device with 2G, Wi-Fi, Bluetooth LE 4.1 and sensors
Marca Trademark	Thingsee
Modelo y/o referencia tipo Model and /or type reference	TSONE
Other identification of the product	Commercial name: THINGSEE ONE FCC ID: 2AEU3TSONE IC: 20236-TSONE
Final HW version	0404
Final SW version	2015.06.01.1
IMEI TAC	35381605 (SARA 2G modem IMEI TAC)
Características Features	2G/GPRS,WLAN, Bluetooth, set of sensors
Fabricante Manufacturer	THINGSEE OY Yrttpellontie 1D, 90230 Oulu, Finland
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 15.247 10-1-14 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 10-1-14 Edition: Radiated emission limits; general requirements. USA FCC Part 15.207 10-1-14 Edition: Conducted limits. CANADA RSS-247 Issue 1 (May 2015). CANADA RSS-Gen Issue 4 (November 2014). Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r02 dated 05/06/2014. ANSI C63.4-2014: American National Standard for Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz ANSI C63.10-2013: American National Standard for Testing

	Unlicensed Wireless Devices.
Resultado:	IN COMPLIANCE
Summary	
Aprobado por (nombre / cargo y firma)	A. Llamas
Approved by (name / position & signature)	RF Lab. Manager
Fecha de realización	2015-07-09
Date of issue	
Formato de informe No.:	FDT08_16
Report template No	

Index

Competences and guarantees.....	4
General conditions.....	4
Uncertainty	4
Usage of samples.....	4
Test sample description	5
Identification of the client	5
Testing period.....	5
Environmental conditions.....	6
Remarks and comments.....	7
Testing verdicts	8
Appendix A – Test result.....	9
Appendix B – Measuring results for electromagnetic conducted emission.....	40

Competences and guarantees

AT4 wireless 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: 720267.

AT4 wireless 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 4621A-1.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program 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.

The results presented in this Test Report apply only to the particular item under test established in this document.

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 AT4 wireless.

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.

Usage of samples

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

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
45639C/002	ThingseeONE device	TSONE	XNG51760176	2015-06-02

1. Sample S/01 has undergone the following test(s):
All radiated tests indicated in appendix A.

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
45639C/008	ThingseeONE device	TSONE	XNG51760171	2015-06-02

- Sample S/02 has undergone the following test(s):
 All conducted tests indicated in appendix A.

Sample S/03 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
45639C/002	THINGSEE ONE device	TSONE	XNG51760176	2015-06-02
45639C/011	USB cable	---	---	2015-06-16

Auxiliary element used with the sample S/03:

Control N°	Description	Model	Serial N°	Date of reception
N/A	Laptop PC	Lenovo Thinkpad Edge	25453RG	N/A

- Sample S/03 has undergone the following test(s):
 Continuous conducted emission on power leads in appendix B.

Test sample description

THINGSEE ONE is an Internet of Things developer device that enables the fast and efficient development of new Io apps and solutions. The device has wireless connectivity (2G, Wi-Fi, Bluetooth LE 4.1) and a wide set of built-in sensors to track location, speed, movement, orientation, direction, light, temperature and humidity. The sensor set can also be augmented via the device’s free serial interfaces. The battery can last up to a year with a single charge.

Identification of the client

THINGSEE OY

Yrttpellontie 1D, 90230 Oulu, Finland.

Testing period

The performed test started on 2015-06-04 and finished on 2015-06-11.

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. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 1 Ω

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 1 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. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k Ω
Reference resistance to earth	< 1 Ω

Remarks and comments

1: Used instrumentation:

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum Analyzer Agilent E4440A	2014/05	2016/05
2.	DC power supply R&S NGPE 40/40	2014/11	2017/11
3.	Transient Limiter SCHWARZBECK 9561-D002	2014/10	2016/10
4.	Artificial Network SCHWARZBECK NNLK - 8121	2013/06	2015/06

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2014/03	2017/03
3.	Multi Device Controller EMCO 2090	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2013/11	2016/11
5.	Double-ridge Guide Horn antenna 14-40 GHz SCHWARZBECK BBHA 9170	2014/03	2017/03
6.	EMI Test Receiver R&S ESU 26	2013/08	2015/08
7.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
8.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2015/03	2016/03
9.	RF pre-amplifier Miteq AFS5-04001300-15-10P-6.	2014/05	2016/05
10.	RF pre-amplifier Miteq JS4-12002600-30-5A.	2014/05	2016/05

Testing verdicts

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

FCC PART 15 PARAGRAPH / RSS-247		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-247 5.2. (1)	6 dB Bandwidth	P			
Section 15.247 Subclause (b) / RSS-247 5.4. (4)	Maximum output power and antenna gain	P			
Section 15.247 Subclause (d) / RSS-247 5.5	Emission limitations conducted (Transmitter)	P			
Section 15.247 Subclause (d) / RSS-247 5.5. ..	Band-edge emissions compliance (Transmitter)	P			
Section 15.247 Subclause (e) / RSS-247 5.2. (2)	Power spectral density	P			
Section 15.247 Subclause (d) / RSS-247 5.5. ...	Emission limitations radiated (Transmitter)	P			
Section 15.207. Conducted limits		P			

Appendix A – Test result



INDEX

TEST CONDITIONS	11
Occupied Bandwidth	12
Section 15.247 Subclause (a) (2) / RSS-247 5.2. (1). 6 dB Bandwidth	15
Section 15.247 Subclause (b) / RSS-247 5.4. (4). Maximum output power and antenna gain	18
Section 15.247 Subclause (d) / RSS-247 5.5. Emission limitations conducted (Transmitter)	21
Section 15.247 Subclause (d) / RSS-247 5.5. Band-edge emissions compliance (Transmitter)	24
Section 15.247 Subclause (e) / RSS-247 5.2. (2) Power spectral density	26
Section 15.247 Subclause (d) / RSS-247 5.5. Emission limitations radiated (Transmitter)	29

TEST CONDITIONS

Power supply (V):

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

Type of power supply = DC voltage from battery.

Type of antenna = Integral antenna.

Declared Gain for antenna (maximum) = 0.6 dBi

TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2440 MHz

Highest channel: 2480 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is directly connected to the spectrum analyzer.

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.

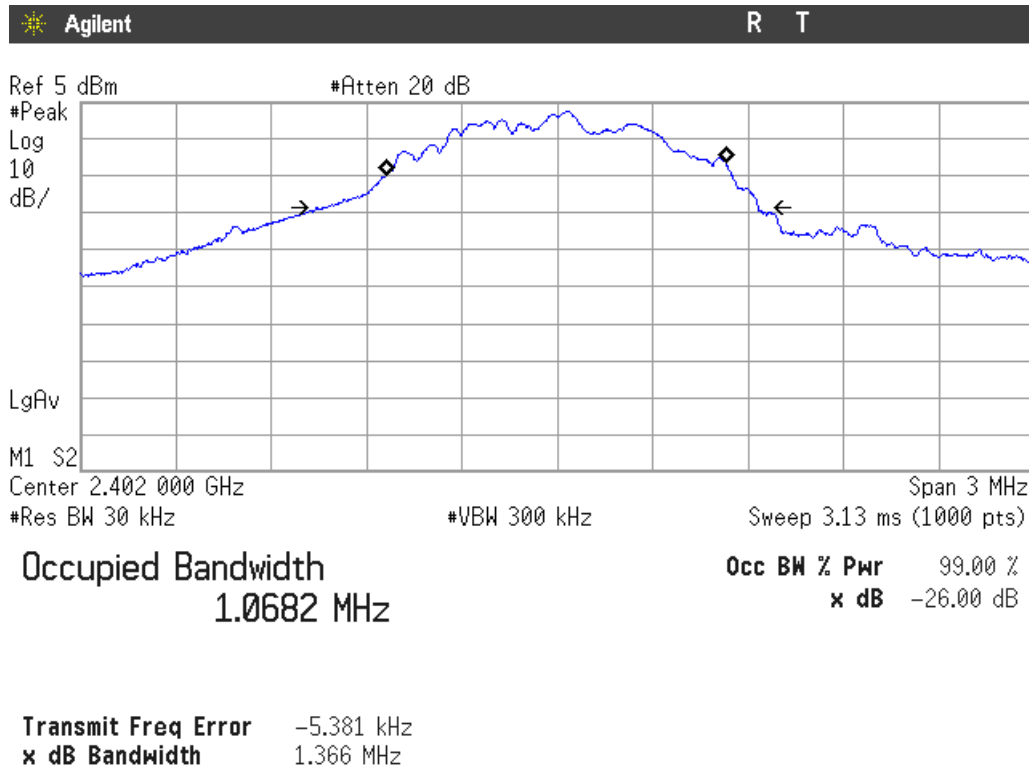
Occupied Bandwidth

RESULTS

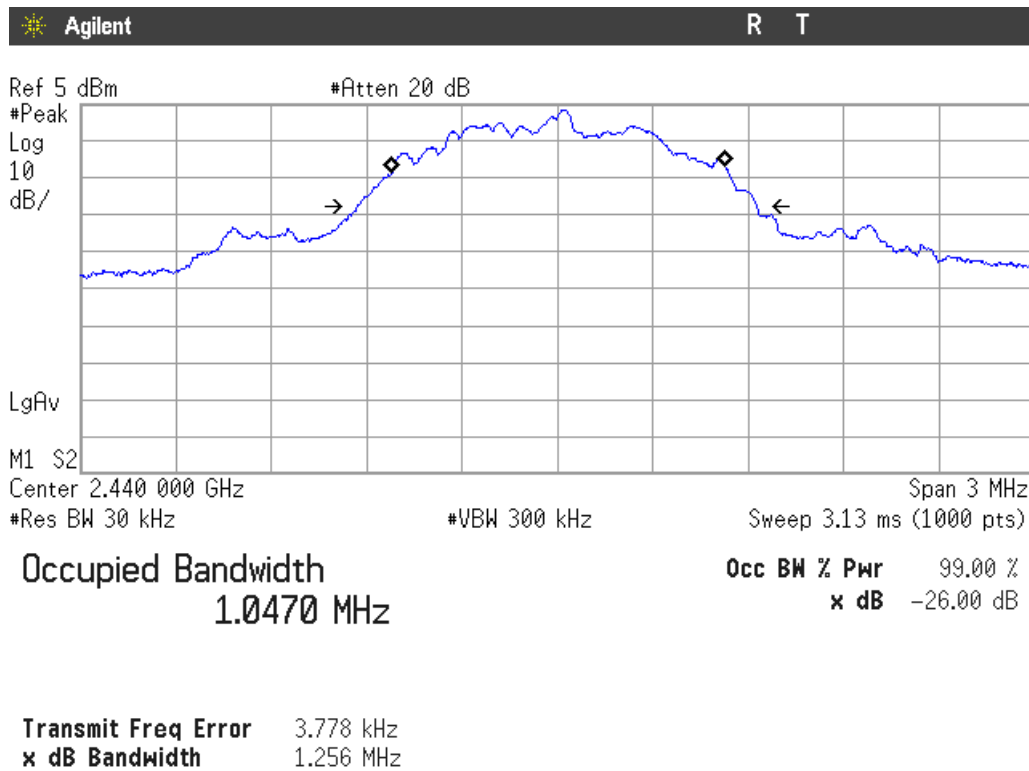
(see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
99% bandwidth (MHz)	1.0682	1.0470	1.0450
-26 dBc bandwidth (MHz)	1.366	1.256	1.246
Measurement uncertainty (kHz)	±7		

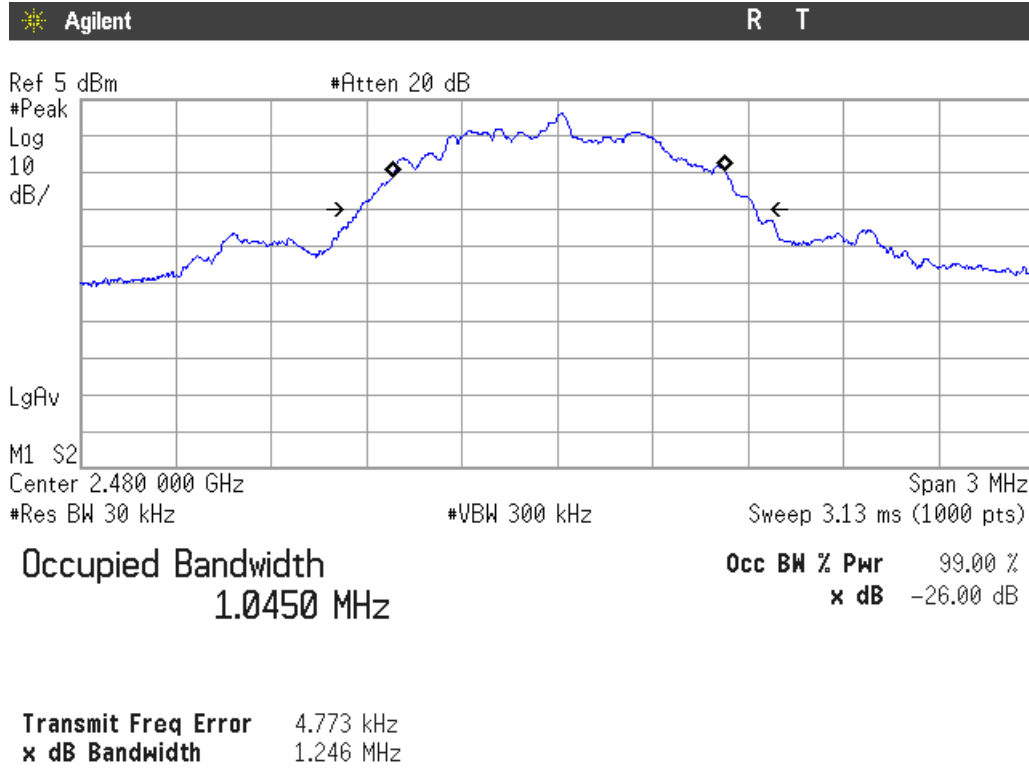
Lowest Channel



Middle Channel



Highest channel



Section 15.247 Subclause (a) (2) / RSS-247 5.2. (1). 6 dB Bandwidth

SPECIFICATION

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

RESULTS

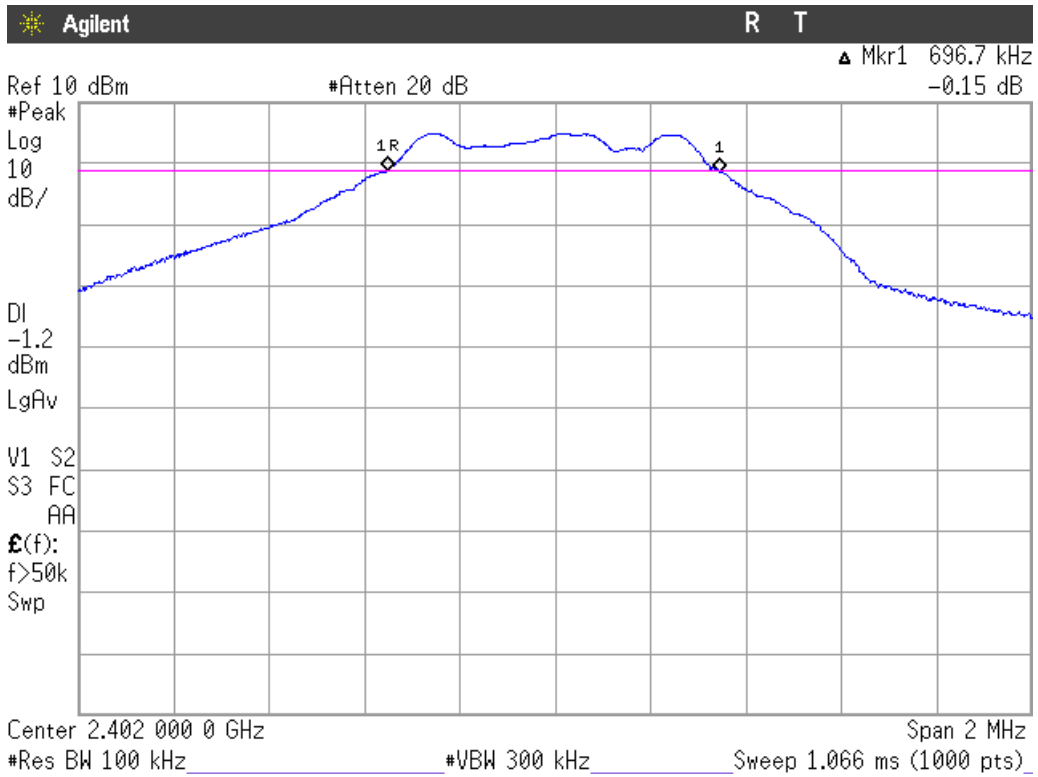
6 dB Bandwidth (see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
6 dB Spectrum bandwidth (kHz)	696.7	700.7	710.7
Measurement uncertainty (kHz)	±7		

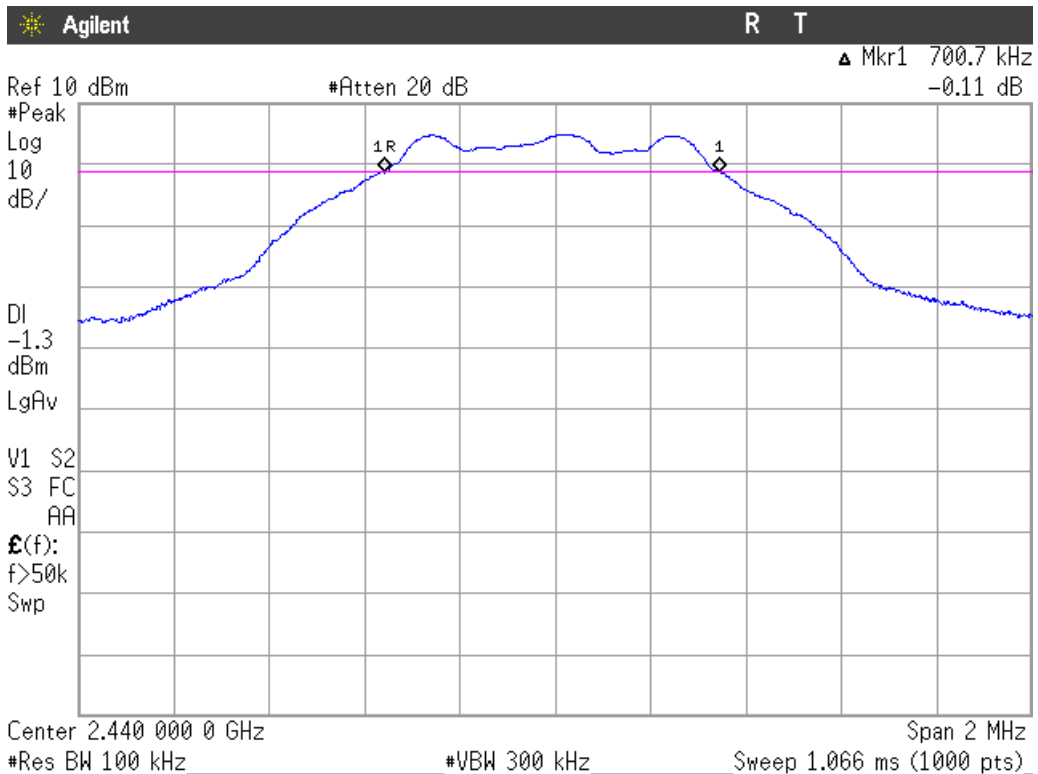
Verdict: PASS

6 dB BANDWIDTH.

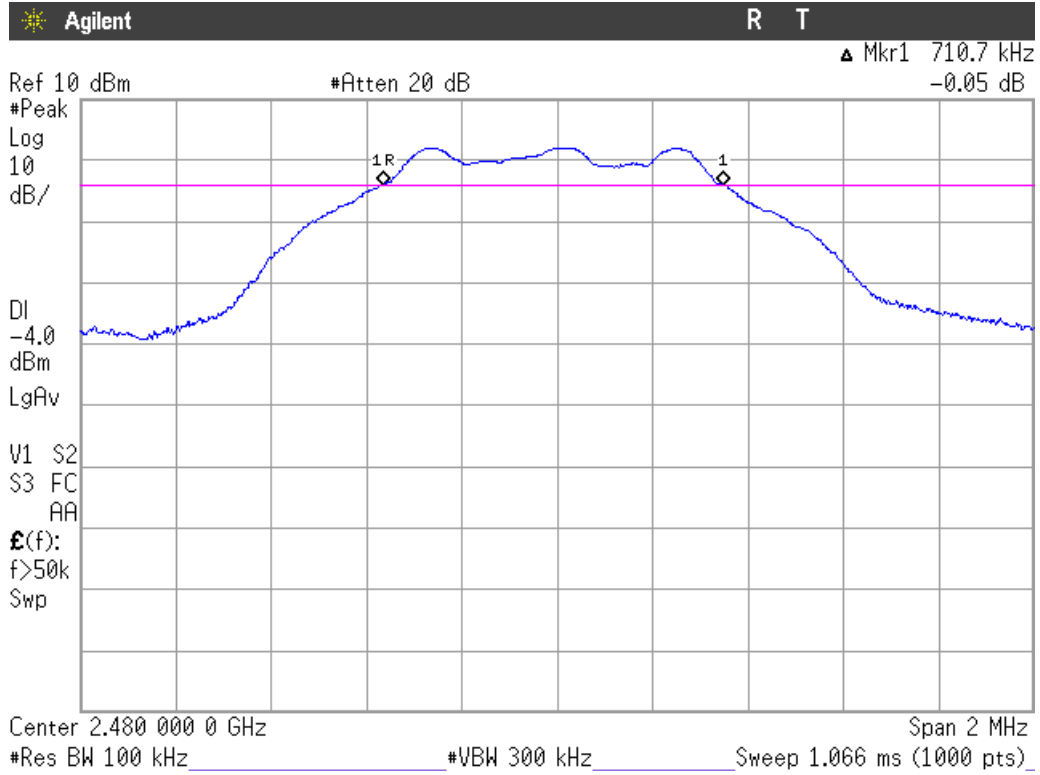
Lowest Channel



Middle Channel



Highest Channel



Section 15.247 Subclause (b) / RSS-247 5.4. (4). Maximum output power and antenna gain

SPECIFICATION

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).
 The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

RESULTS

The maximum peak conducted output power was measured using the method according to point 9.1.1. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r02 dated 05/06/2014.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

MAXIMUM OUTPUT POWER. See next plots.

Maximum declared antenna gain: 0.6 dBi.

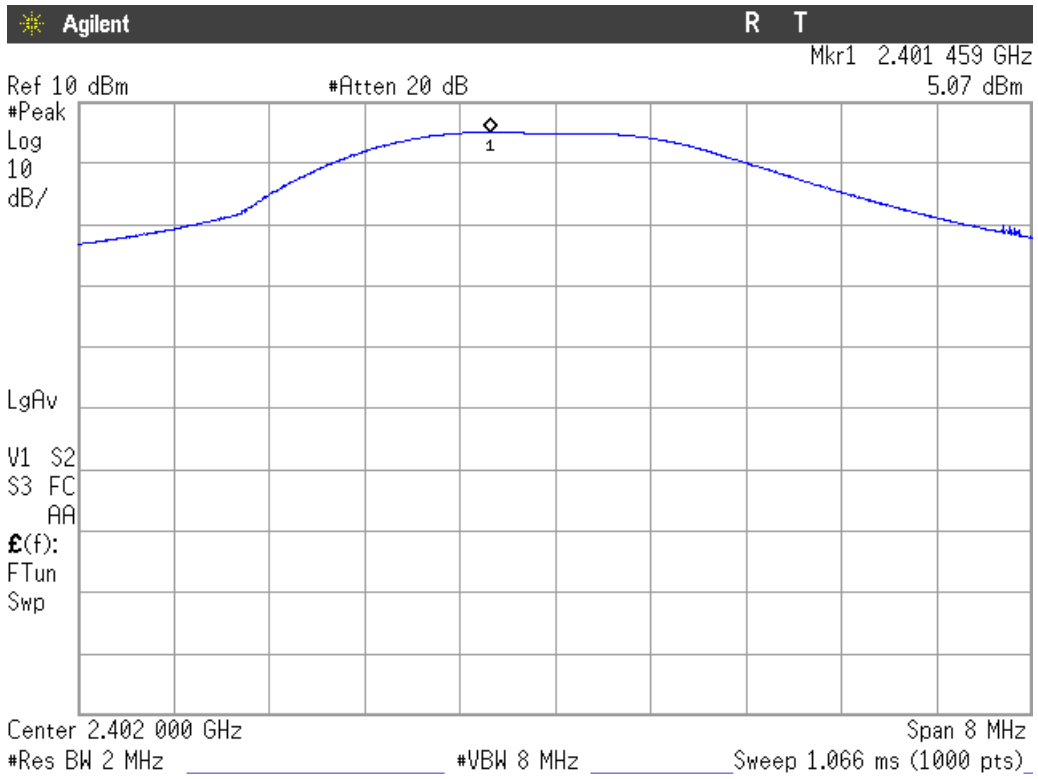
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	5.07	4.99	2.48
Maximum EIRP power (dBm)	5.67	5.59	3.08
Measurement uncertainty (dB)	±1.5		

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.

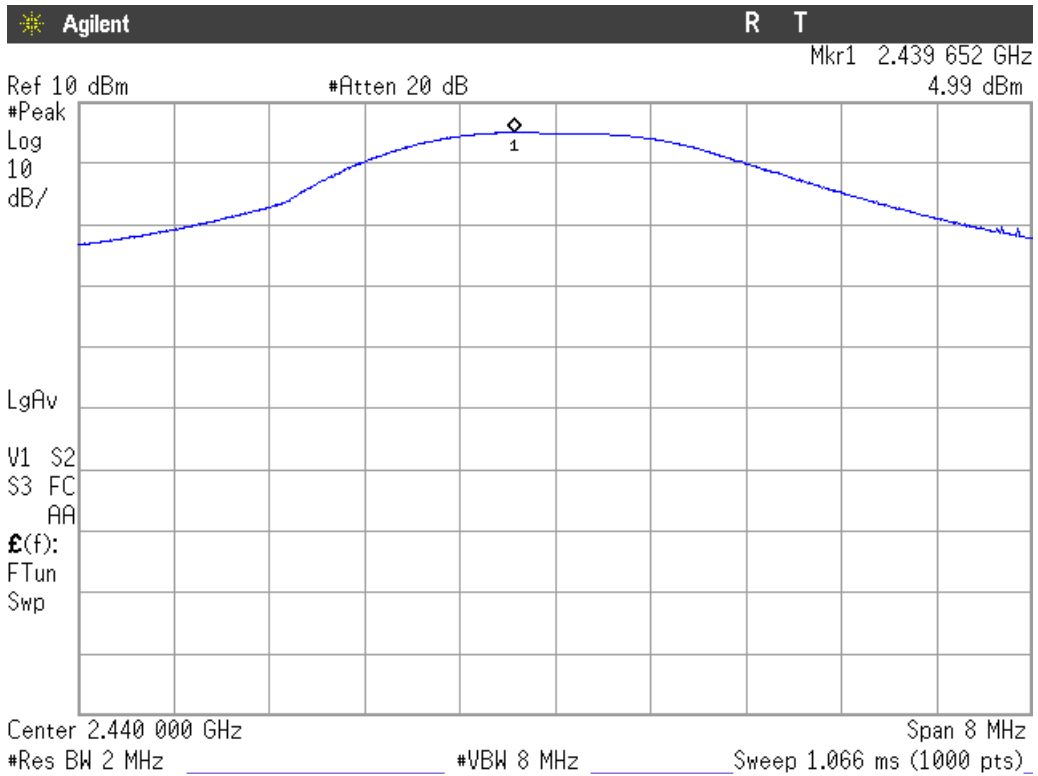
Verdict: PASS

CONDUCTED PEAK POWER.

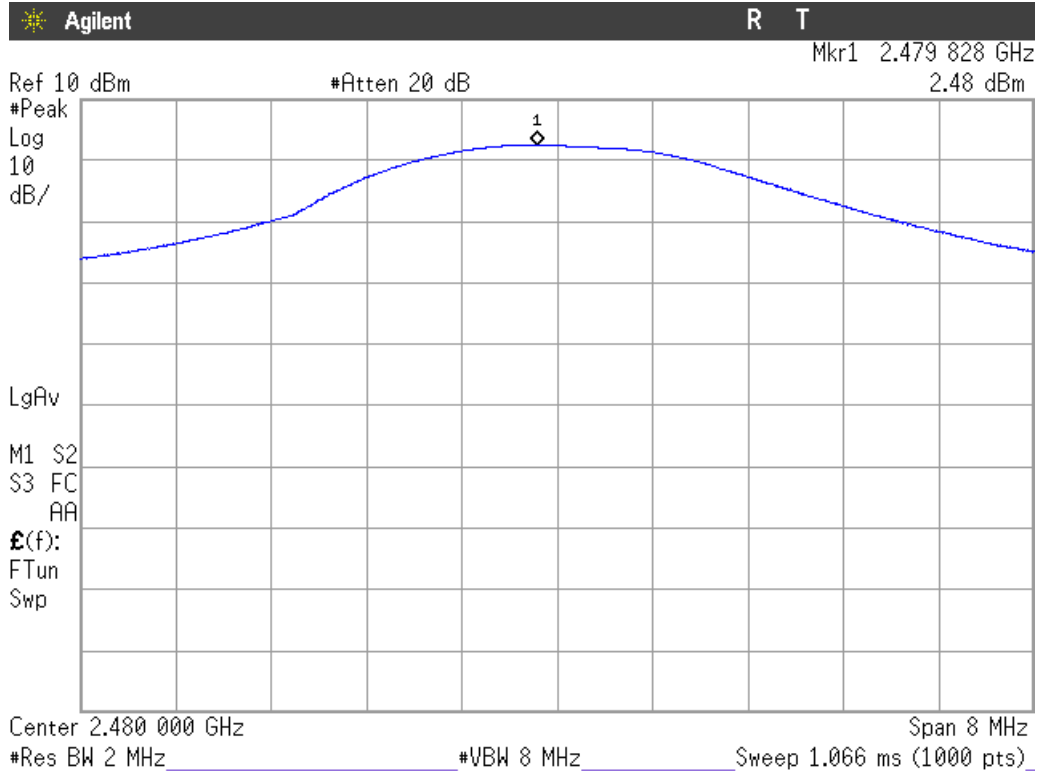
Lowest frequency



Middle frequency



Highest frequency



Section 15.247 Subclause (d) / RSS-247 5.5. 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS:

Reference Level Measurement

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Reference Level Measurement (dBm)	4.80	4.70	2.04
Measurement uncertainty (dB)	±1.5		

Lowest frequency 2402 MHz

All peaks are more than 20 dB below the limit.

Middle frequency 2440 MHz

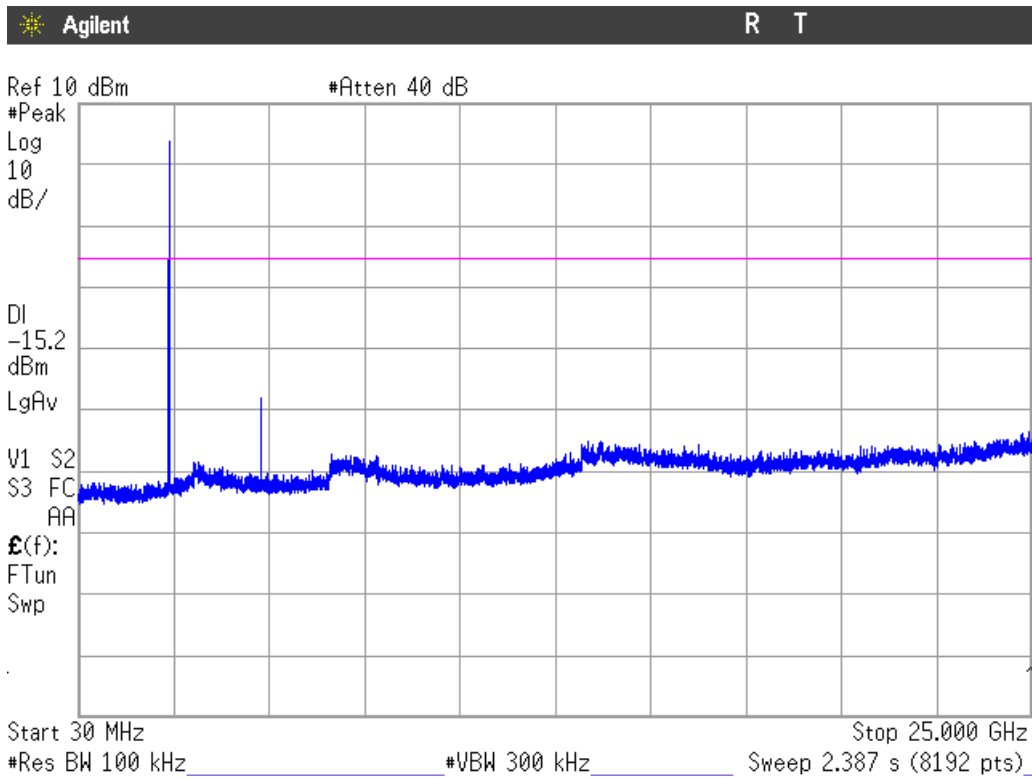
All peaks are more than 20 dB below the limit.

Highest frequency 2480 MHz

All peaks are more than 20 dB below the limit.

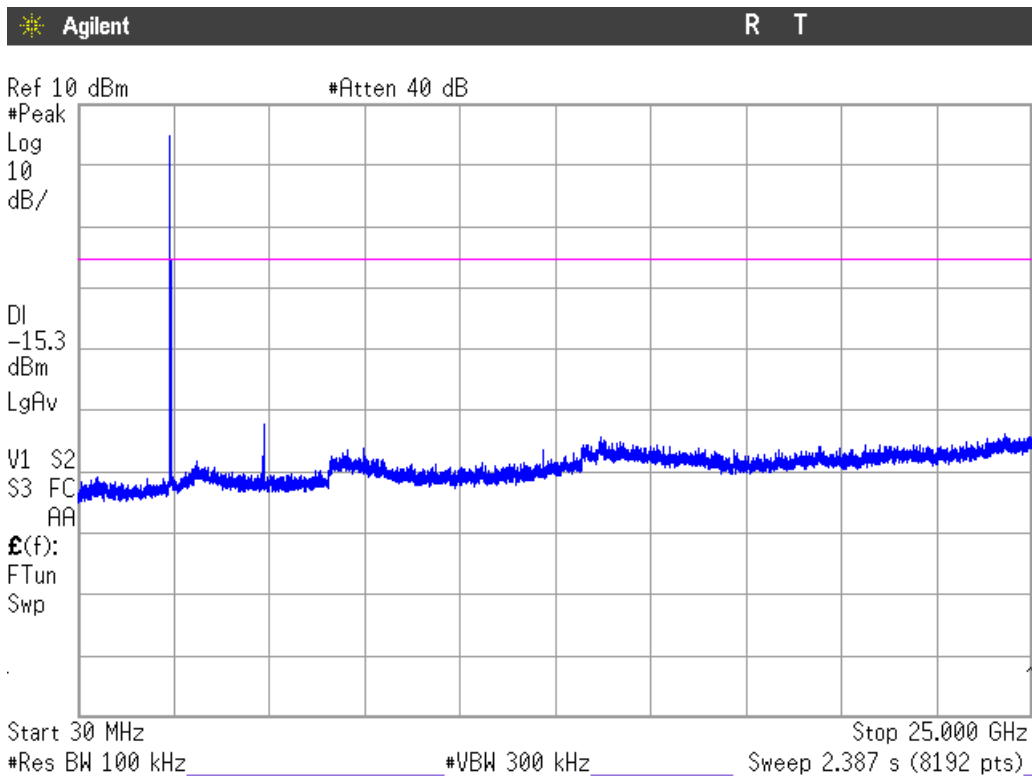
Verdict: PASS

Lowest frequency (2402 MHz)



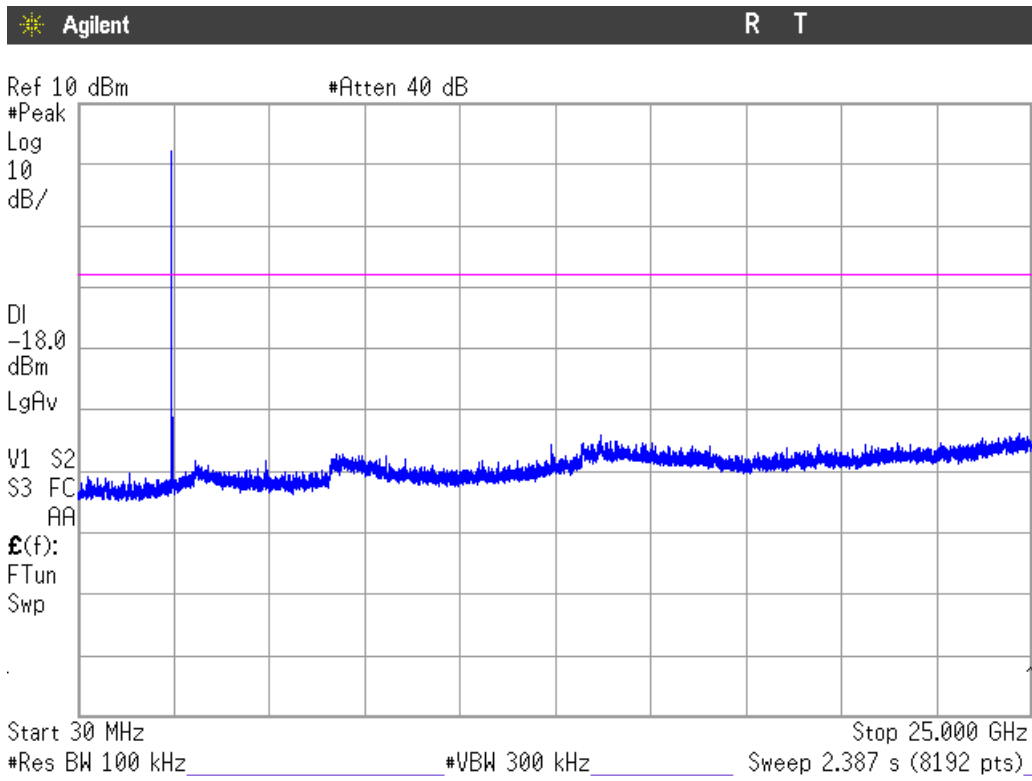
Note: The peak above the limit is the carrier frequency.

Middle frequency (2440 MHz)



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

Highest frequency (2480 MHz)



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

Section 15.247 Subclause (d) / RSS-247 5.5. Band-edge emissions compliance (Transmitter)

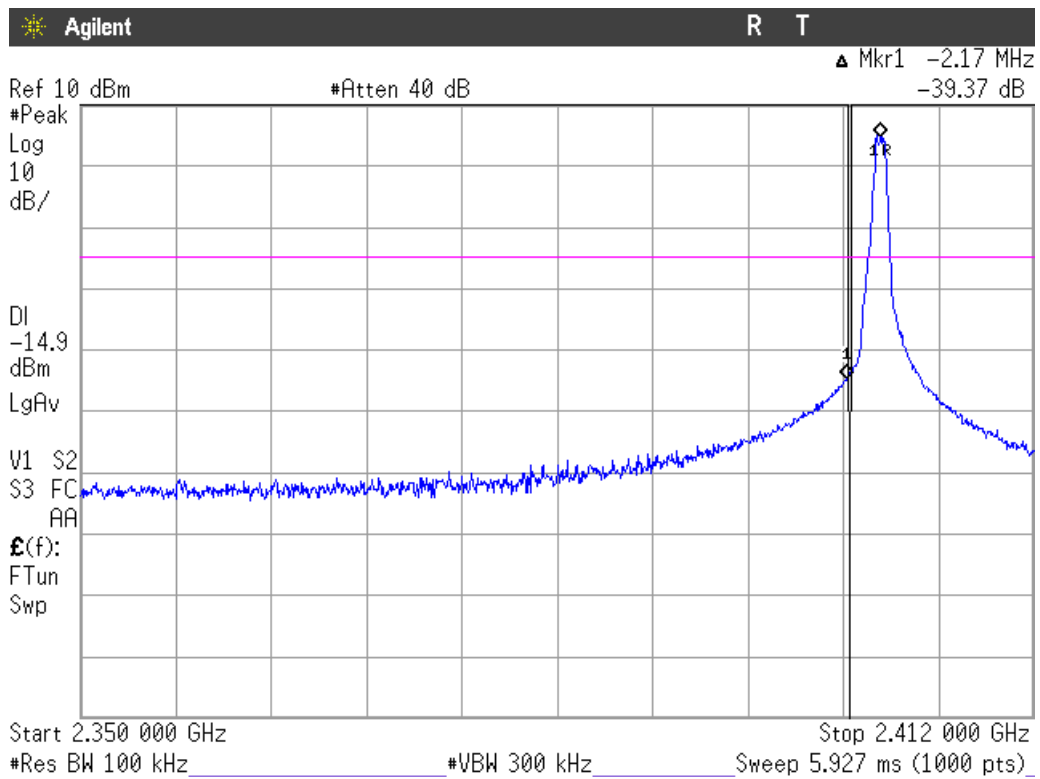
SPECIFICATION

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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS:

1. LOW FREQUENCY SECTION. CONDUCTED.

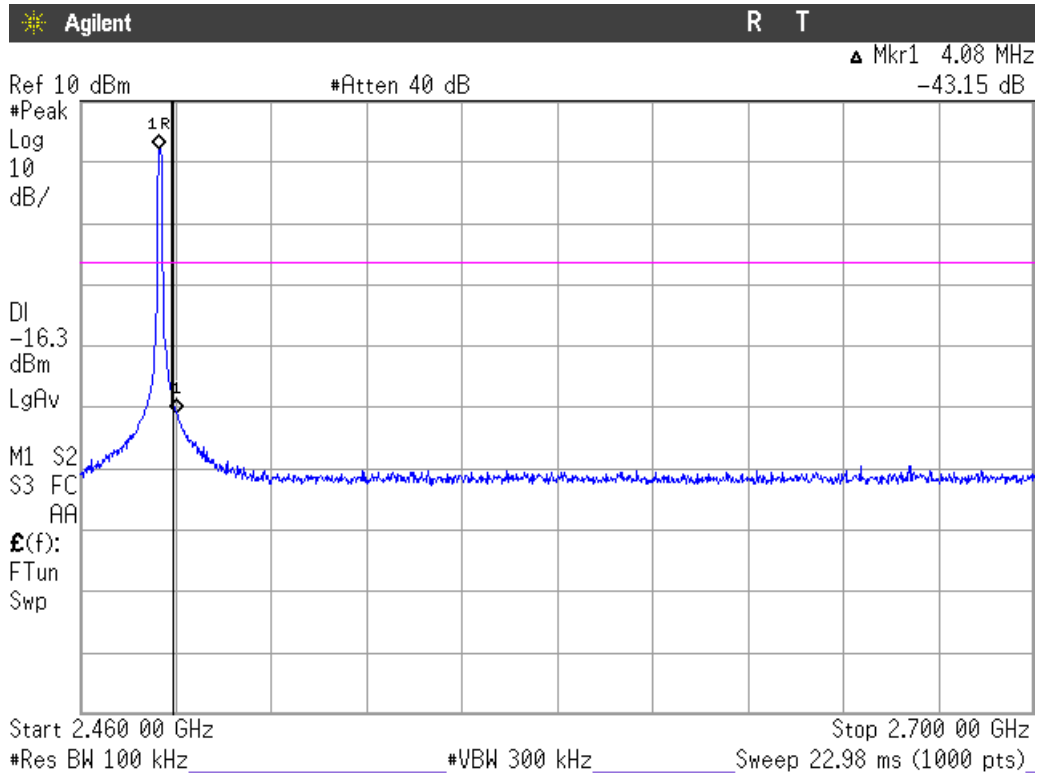
See next plot.



Verdict: PASS

2. HIGH FREQUENCY SECTION. CONDUCTED.

See next plot.



Verdict: PASS

Section 15.247 Subclause (e) / RSS-247 5.2. (2) 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

The maximum power spectral density level in the fundamental emission was measured using the method PKPSD (Peak PSD) according to point 10.2. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r02 dated 05/06/2014.

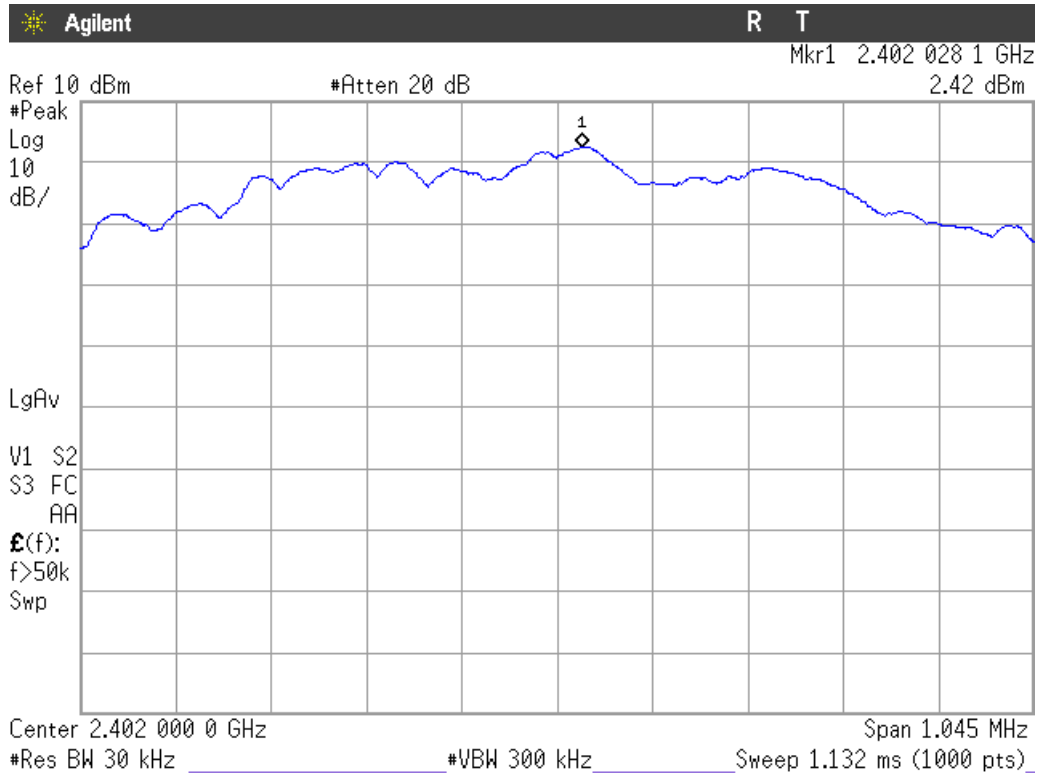
Power spectral density (see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Power spectral density (dBm)	2.42	3.54	1.19
Measurement uncertainty (dB)	±1.5		

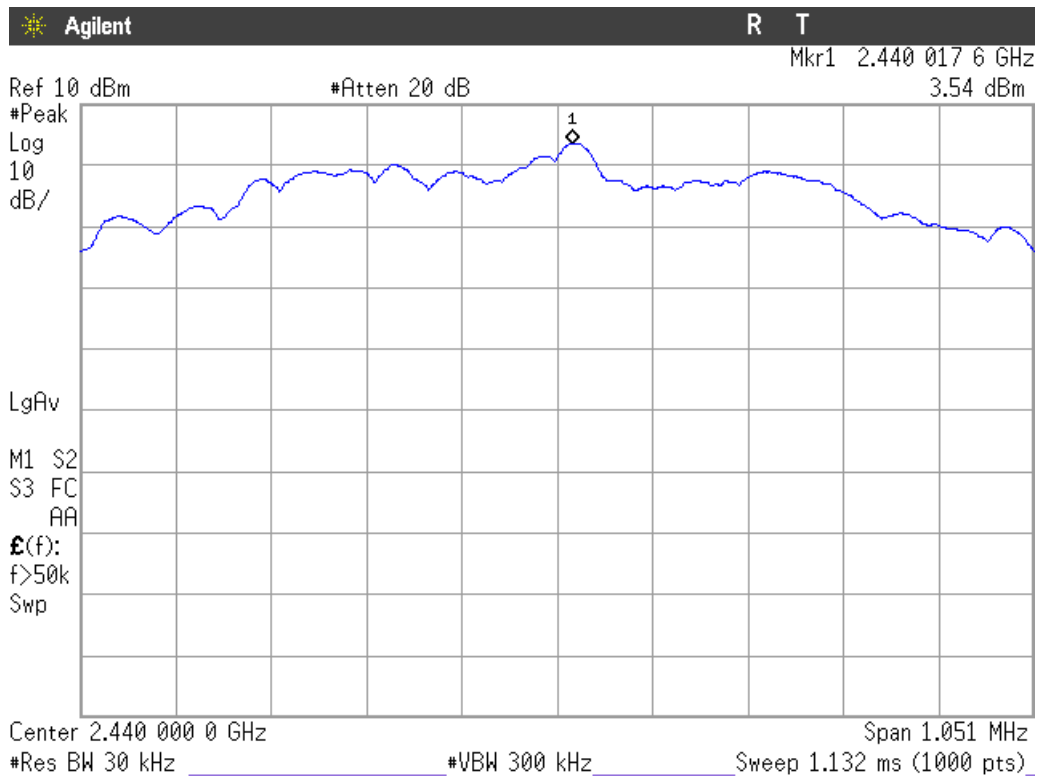
Verdict: PASS

Power spectral density.

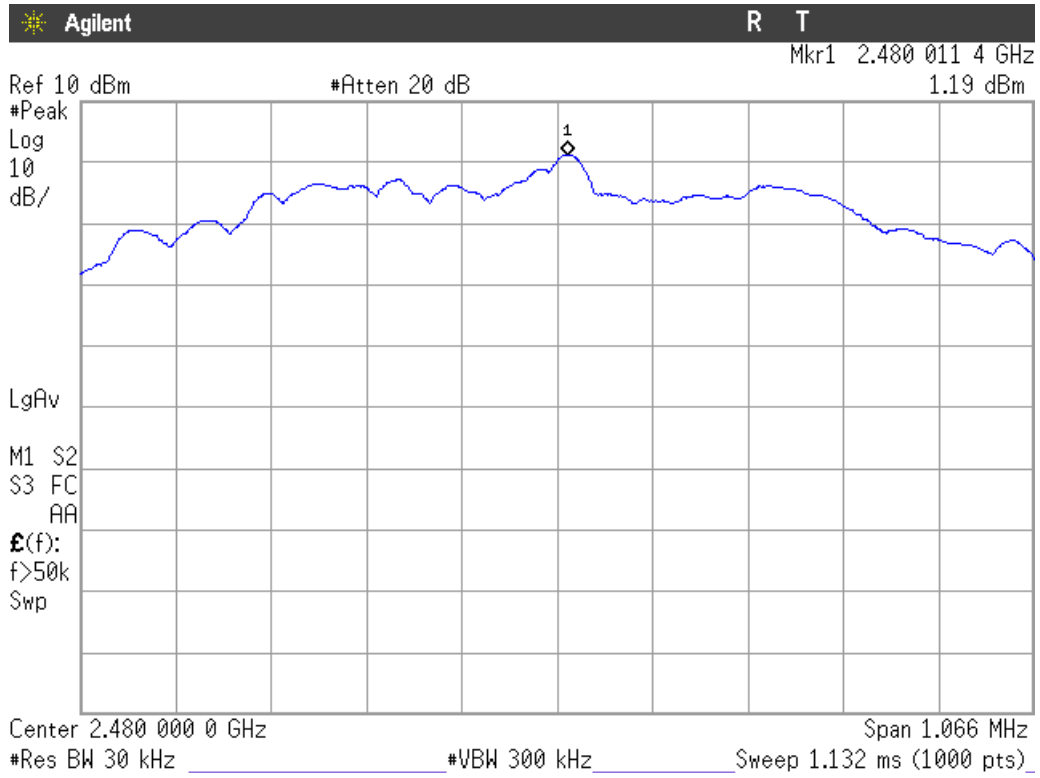
Lowest Channel



Middle Channel



Highest Channel



Section 15.247 Subclause (d) / RSS-247 5.5. 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)) / RSS-Gen 8.9.:

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.

Frequency range 30 MHz-1000 MHz.

The spurious signals detected do not depend on the operating channel.

All peaks are more than 20 dB below the limit.

Frequency range 1 GHz-25 GHz

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

Spurious signals with peak levels above the average limit (54 dBµV/m at 3 m) are measured with RMS detector for checking compliance with the average limit.

1. CHANNEL: LOWEST (2402 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38998	H	Peak	62.62	± 4.00
		RMS	44.51	± 4.00
2.48394	H	Peak	50.69	± 4.00
4.80402	H	Peak	38.65	± 4.00

2. CHANNEL: MIDDLE (2440 MHz).

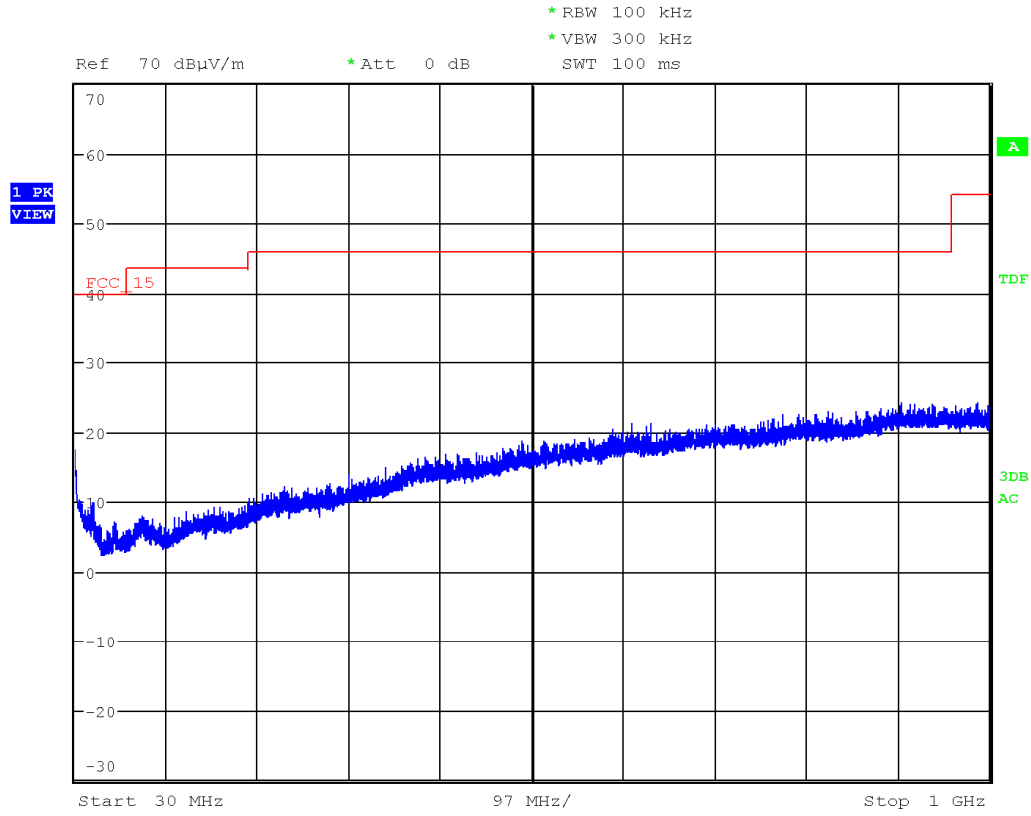
Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38938	H	Peak	51.35	± 4.00
2.48505	V	Peak	53.13	± 4.00
4.88061	H	Peak	38.54	± 4.00

3. CHANNEL: HIGHEST (2480 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38932	H	Peak	48.37	± 4.00
2.48351	V	Peak	73.48	± 4.00
		RMS	50.40	± 4.00
4.96024	H	Peak	36.15	± 4.00

Verdict: PASS

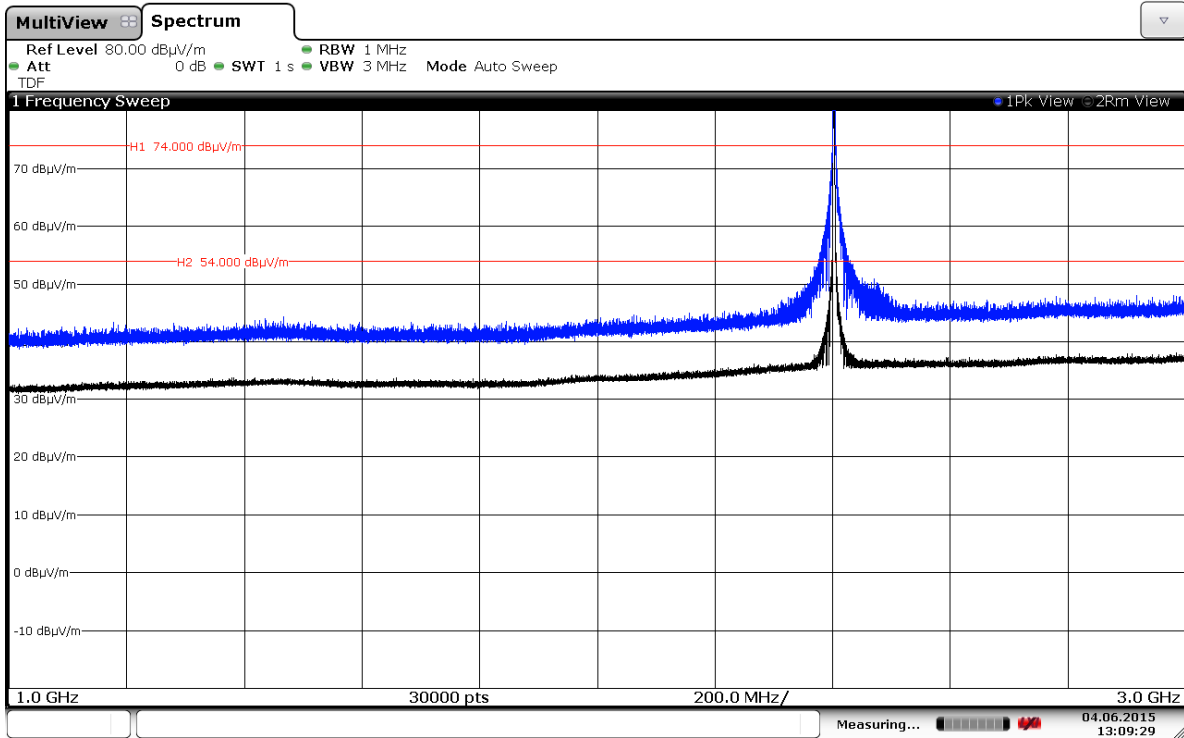
FREQUENCY RANGE 30 MHz-1000 MHz.



Date: 8.JUN.2015 06:07:56

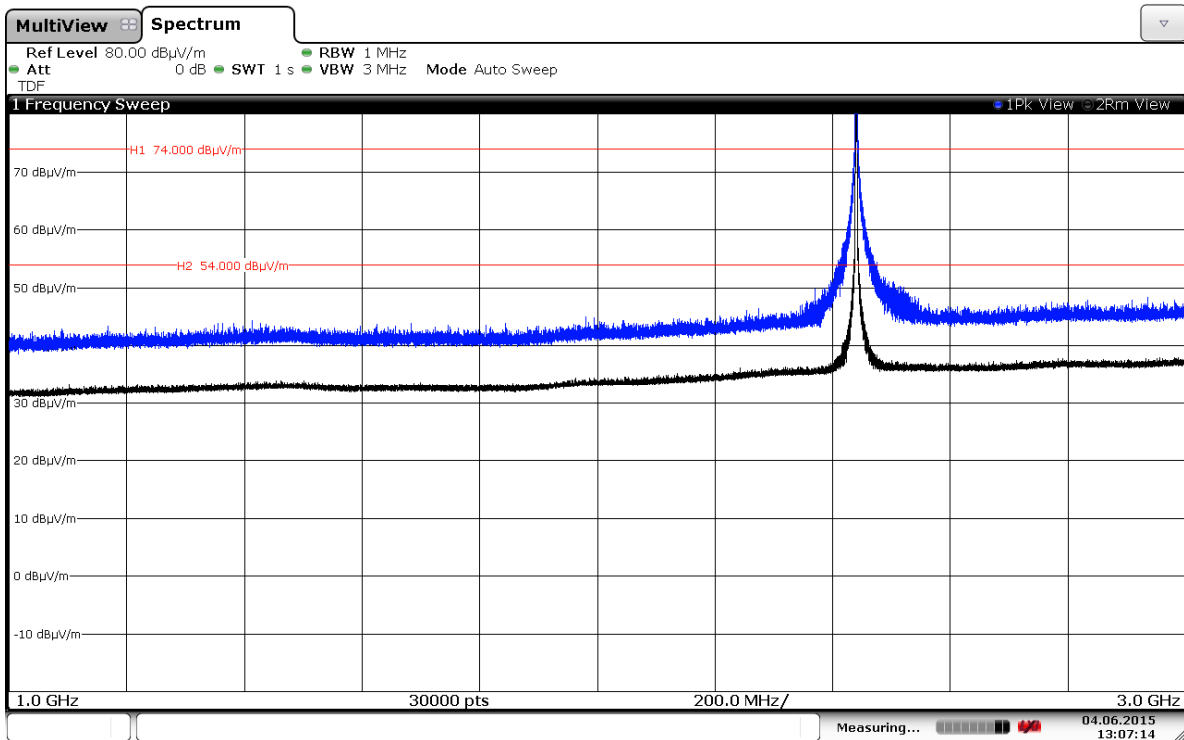
(This plot is valid for all three channels).

FREQUENCY RANGE 1 GHz to 3 GHz.
CHANNEL: Lowest (2402 MHz).



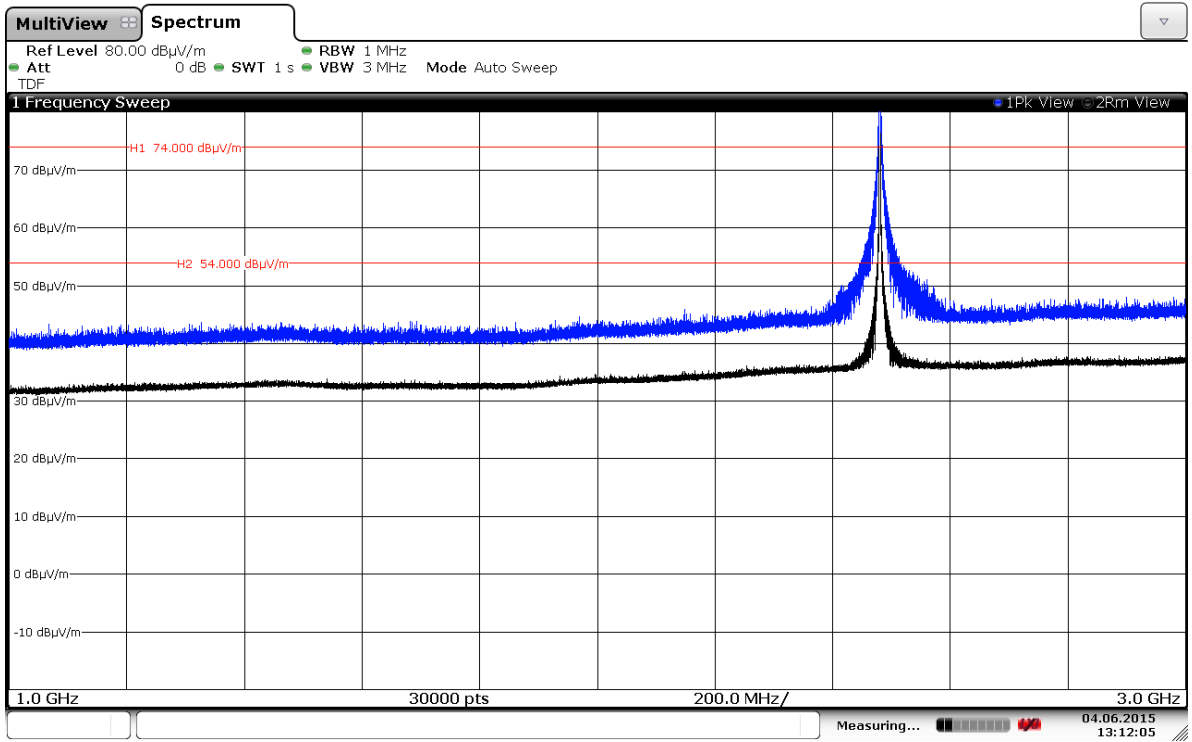
Note: The peak shown in the plot above the limit is the carrier frequency.

CHANNEL: Middle (2440 MHz).



Note: The peak shown in the plot above the limit is the carrier frequency.

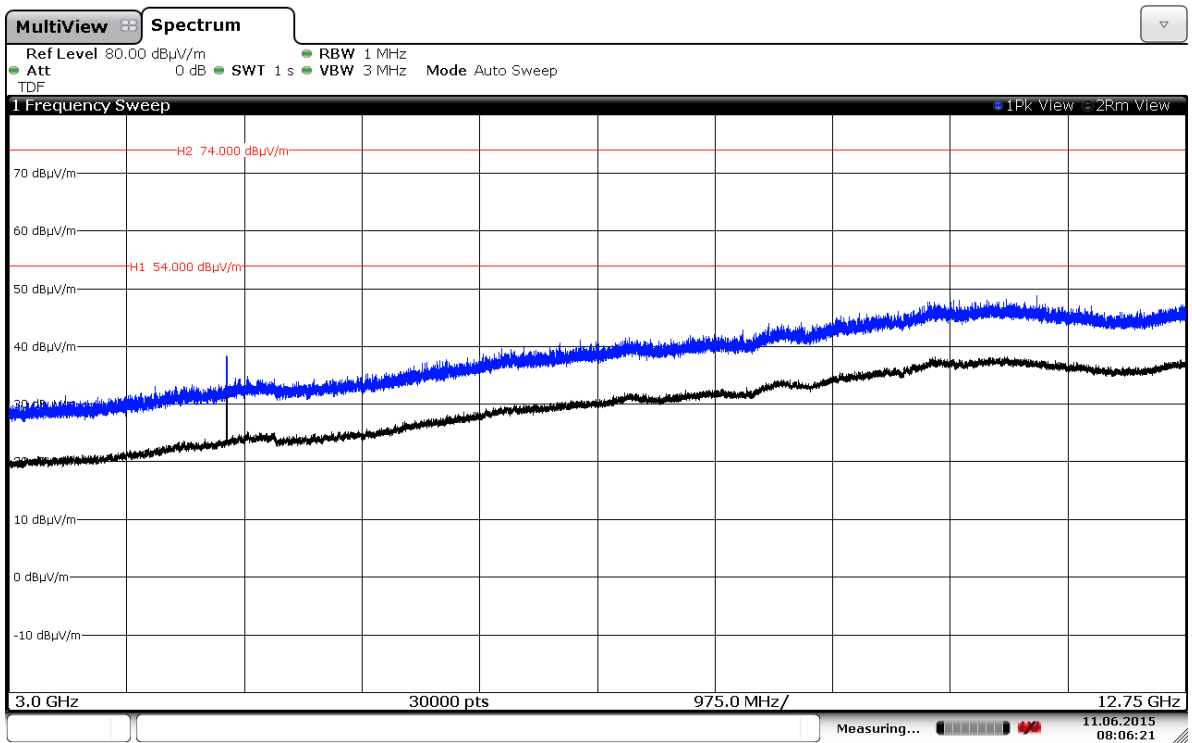
CHANNEL: Highest (2480 MHz).



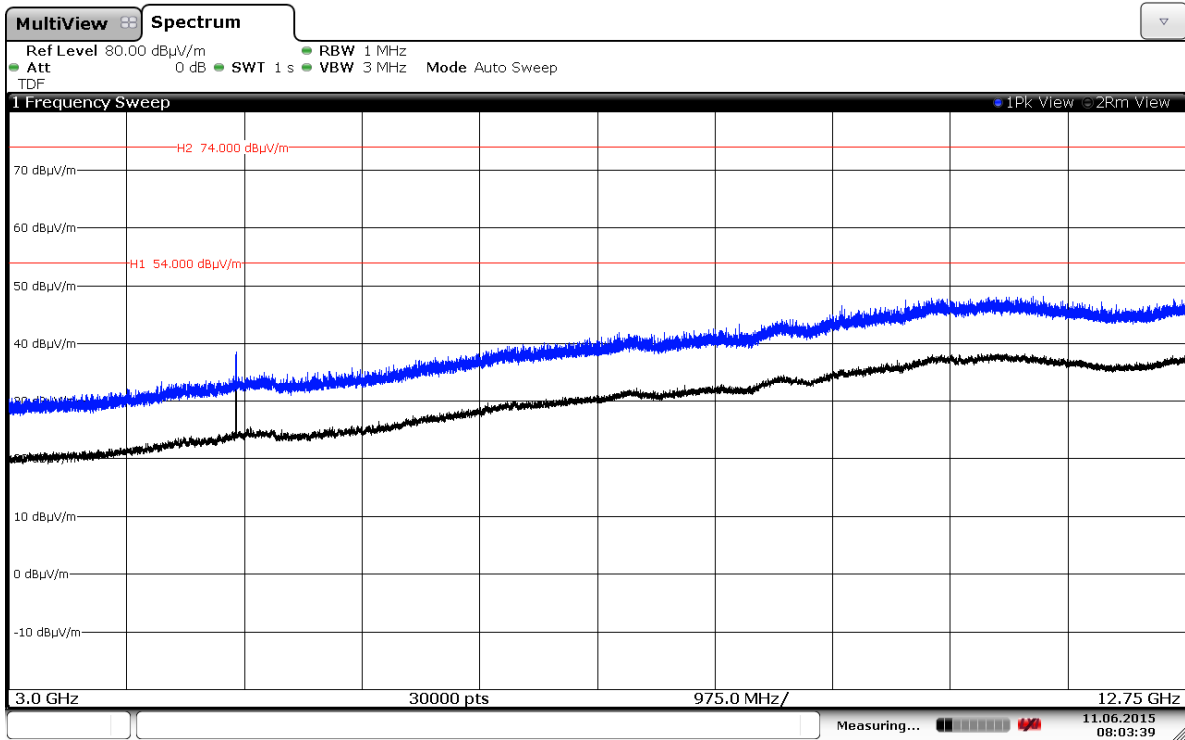
Note: The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 12.75 GHz.

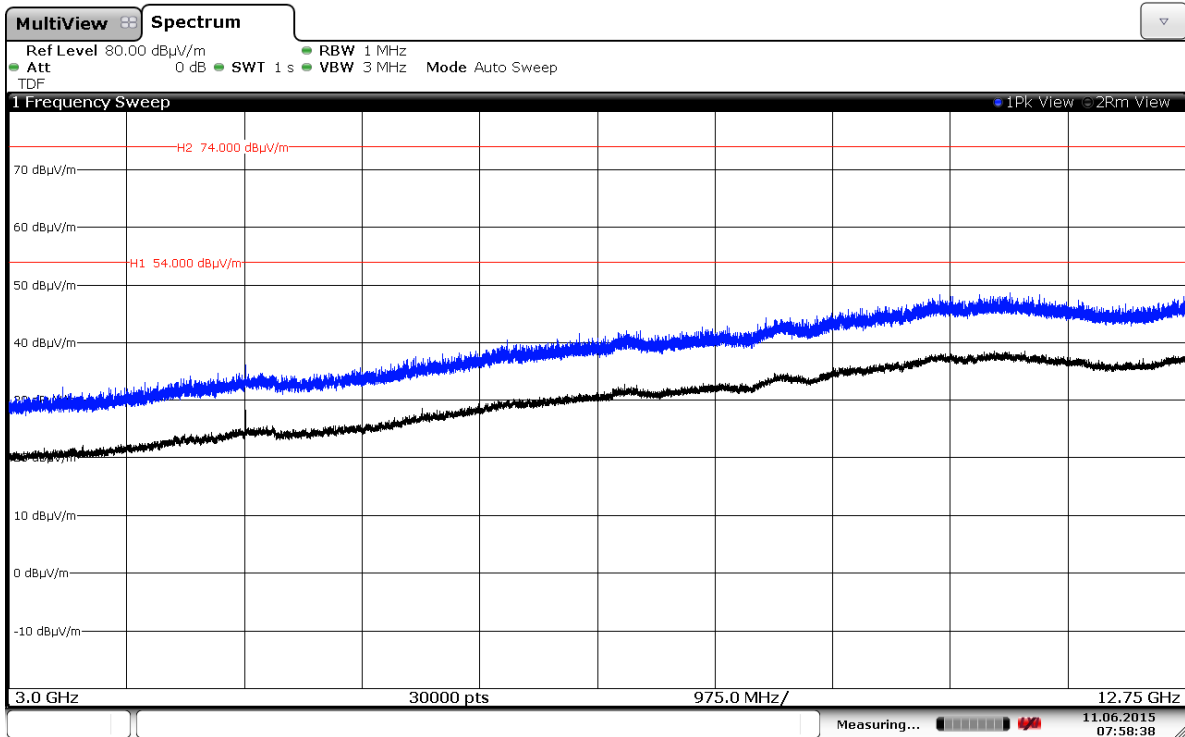
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).

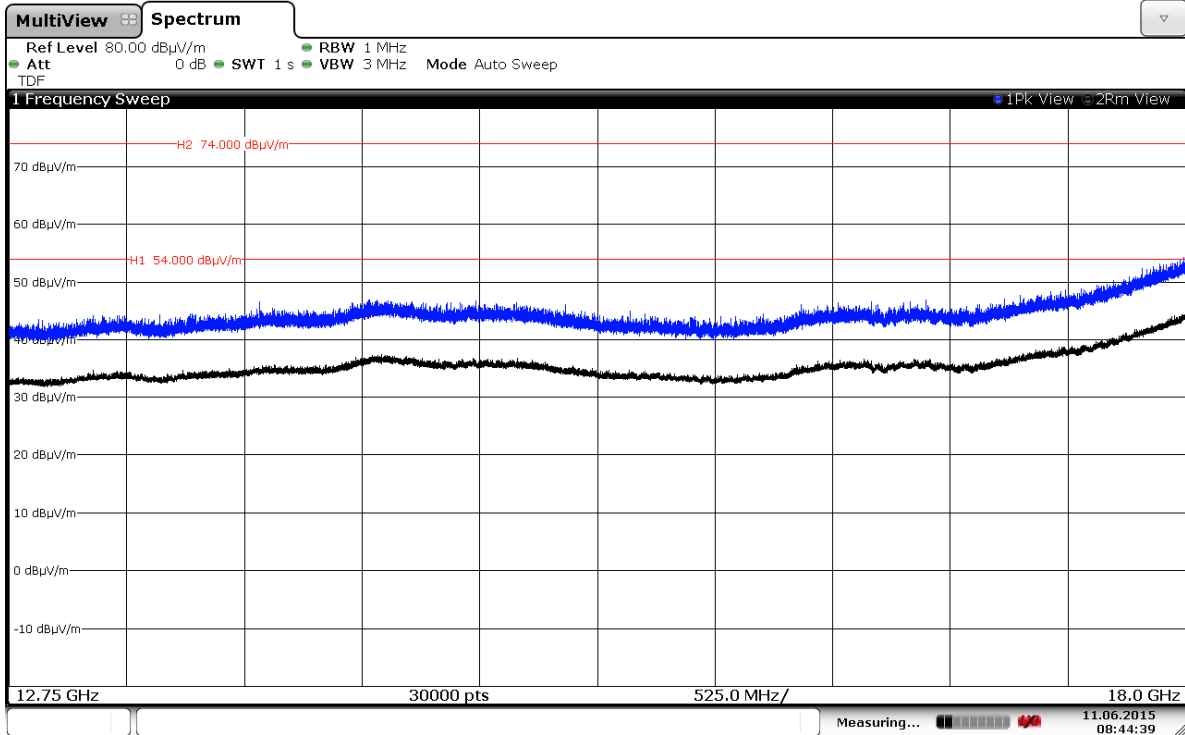


CHANNEL: Highest (2480 MHz).

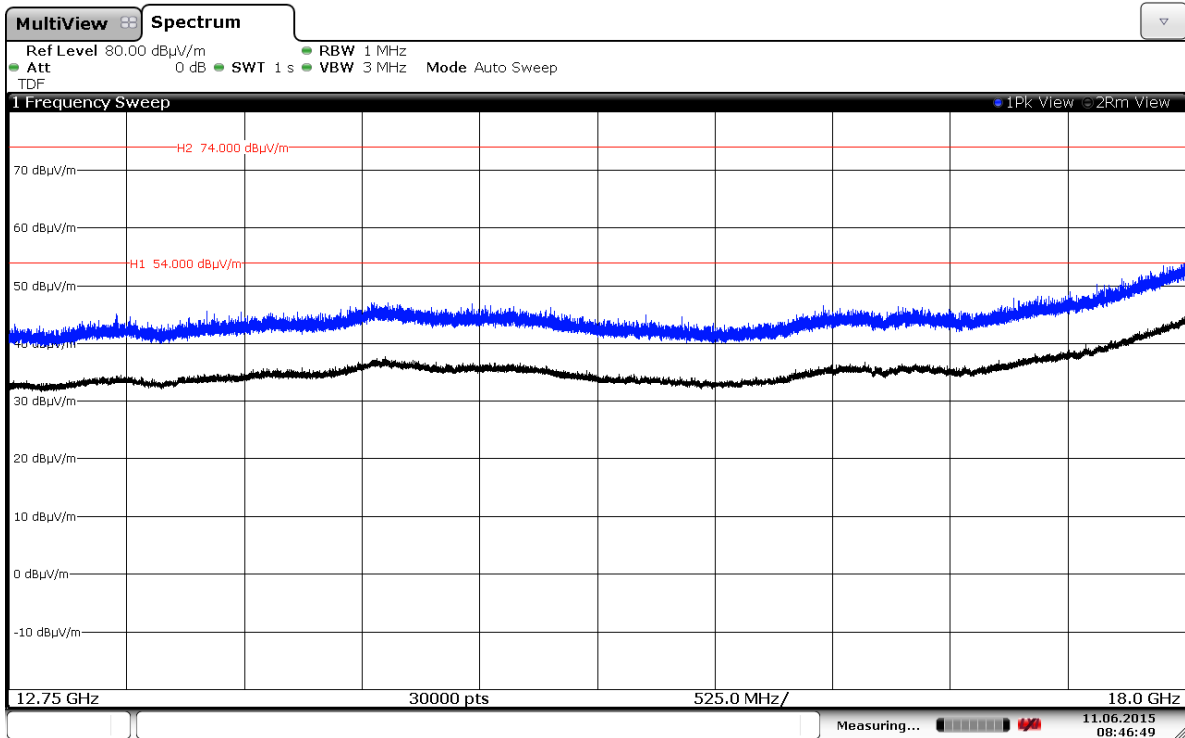


FREQUENCY RANGE 3 GHz to 12.75 GHz.

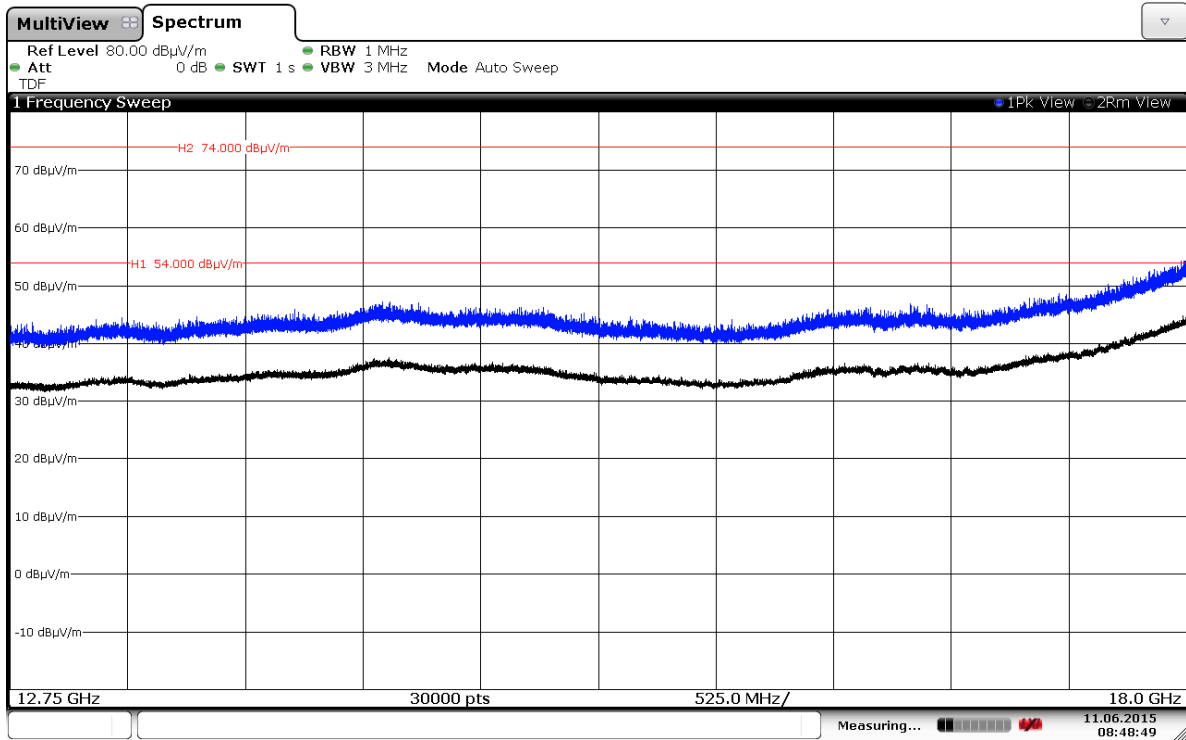
CHANNEL: Lowest (2402 MHz).



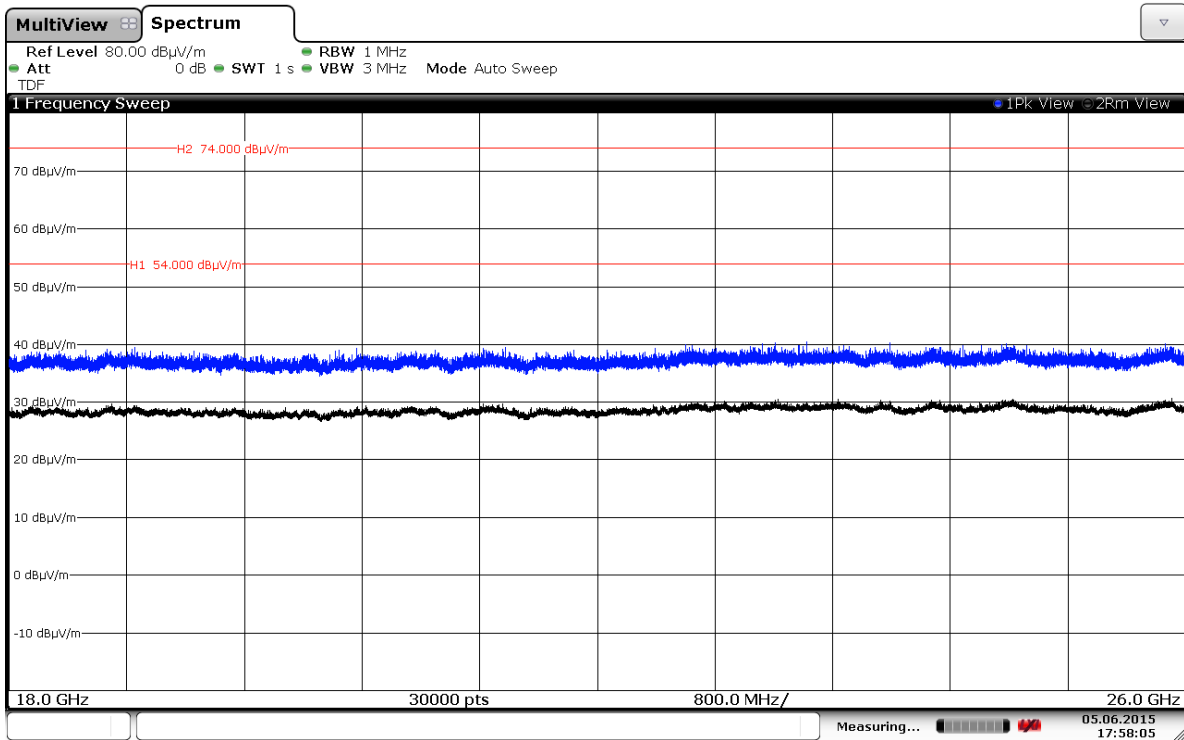
CHANNEL: Middle (2440 MHz).



CHANNEL: Highest (2480 MHz).



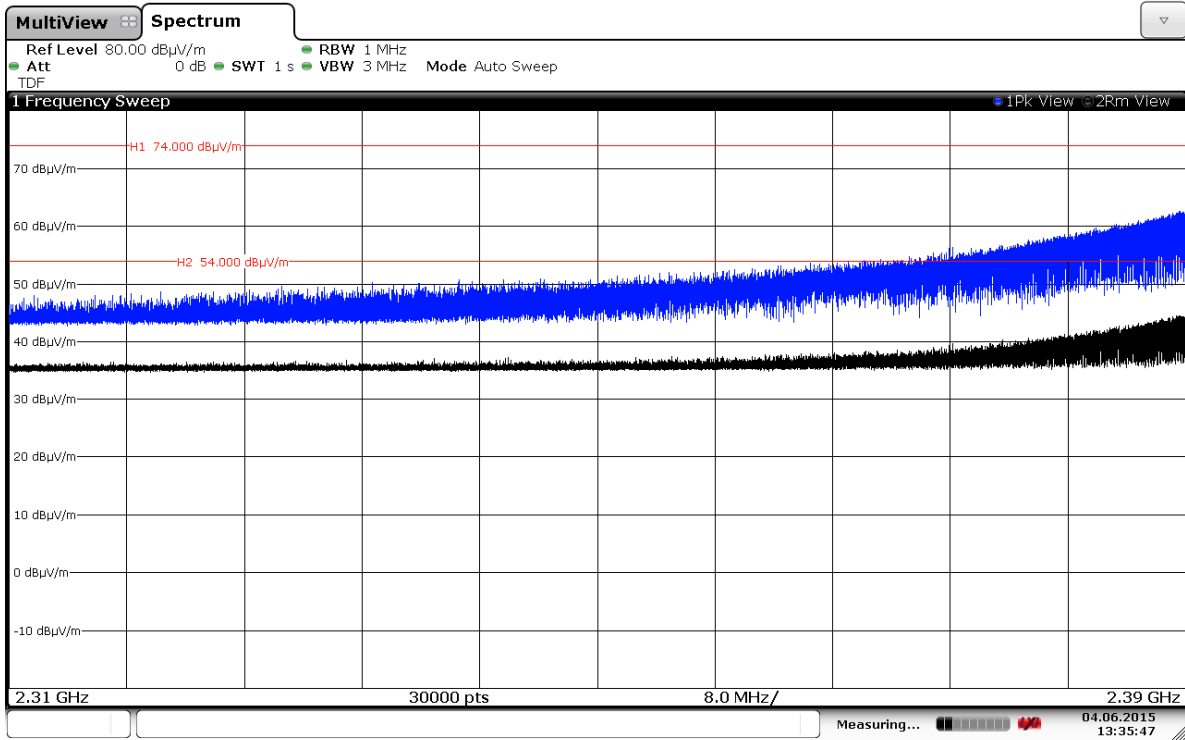
FREQUENCY RANGE 18 GHz to 26 GHz.



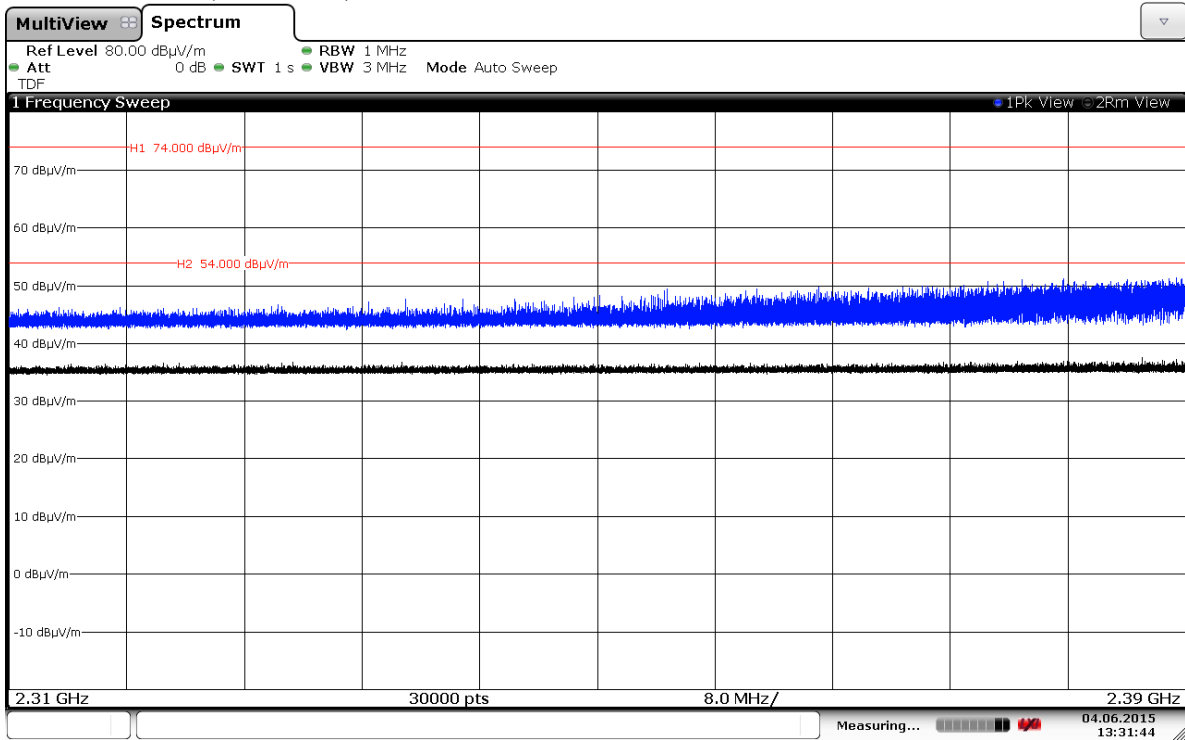
(This plot is valid for all three channels).

FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

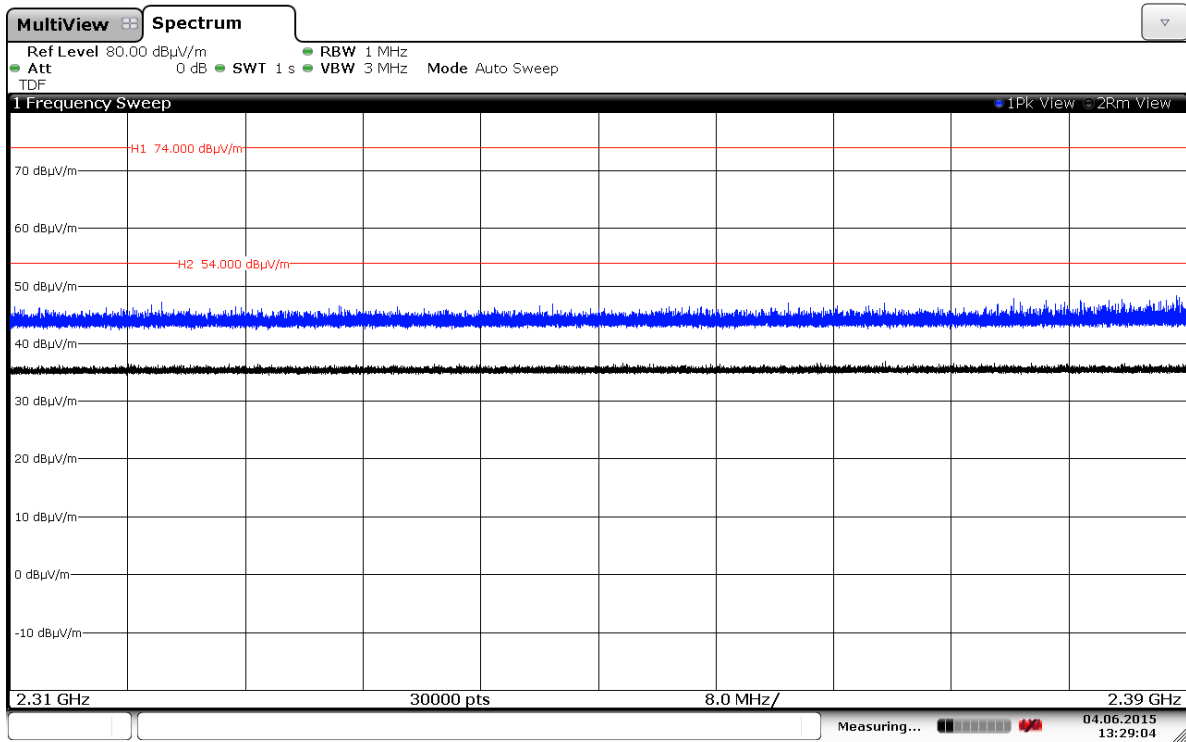
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).

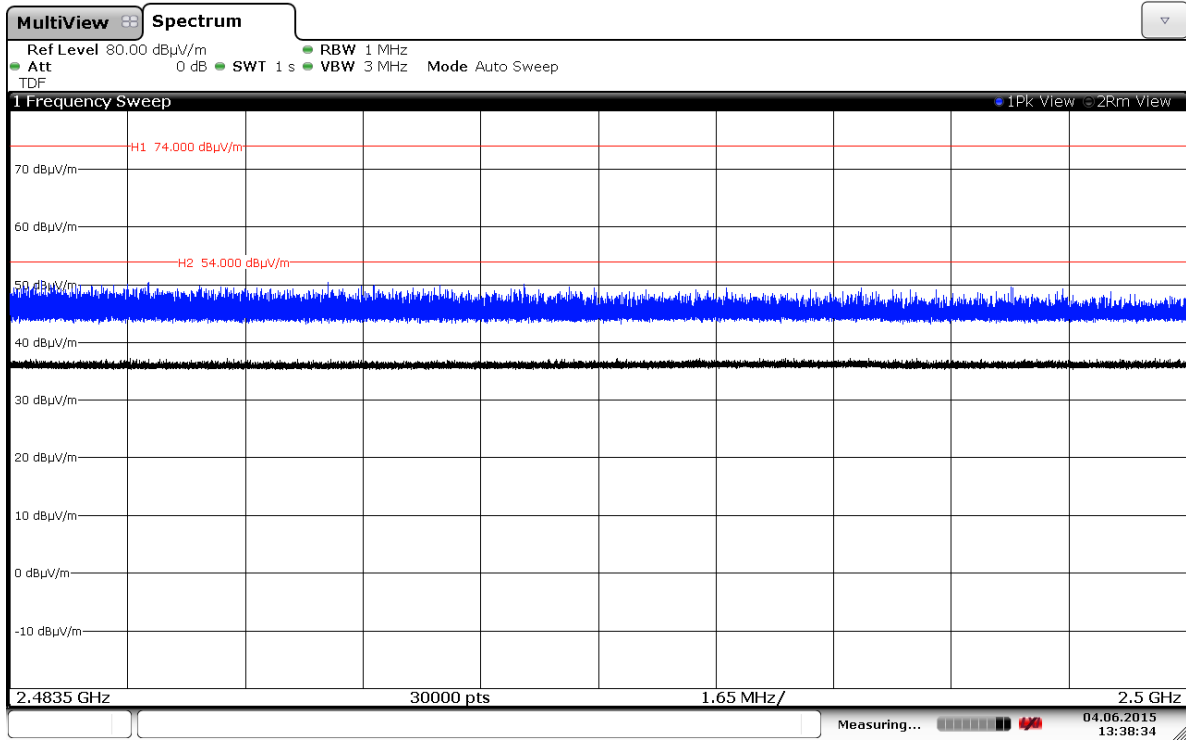


CHANNEL: Highest (2480 MHz).

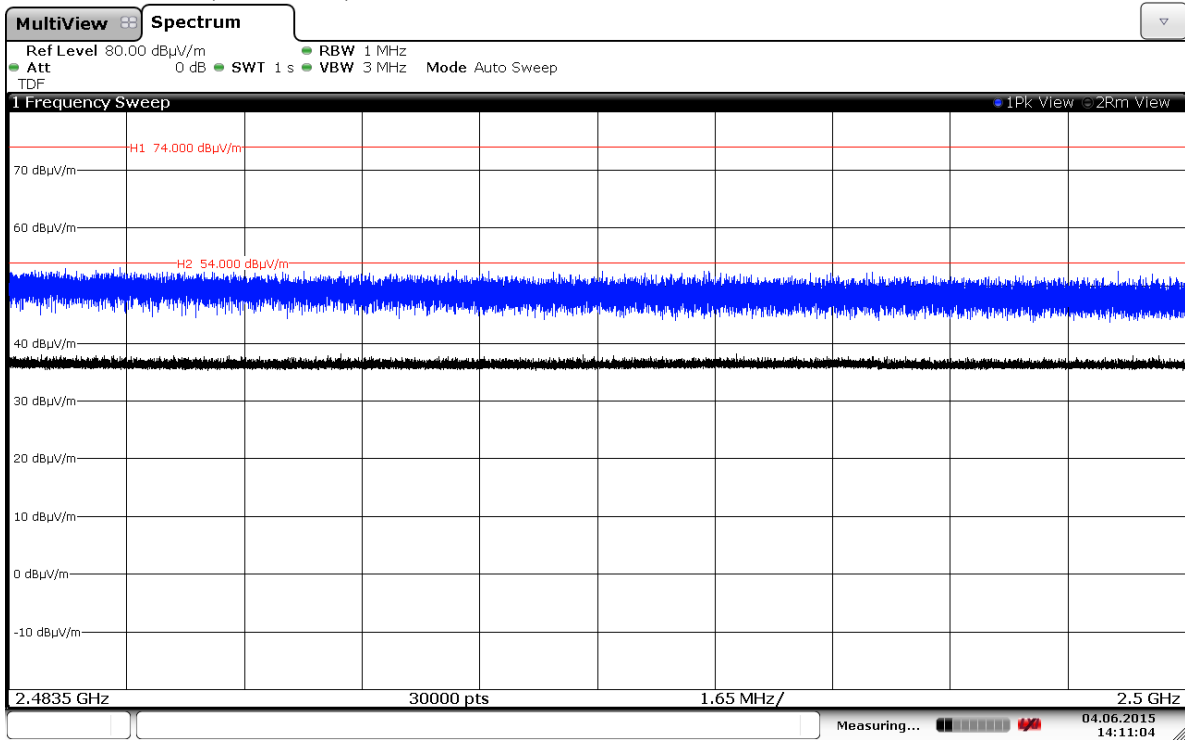


FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

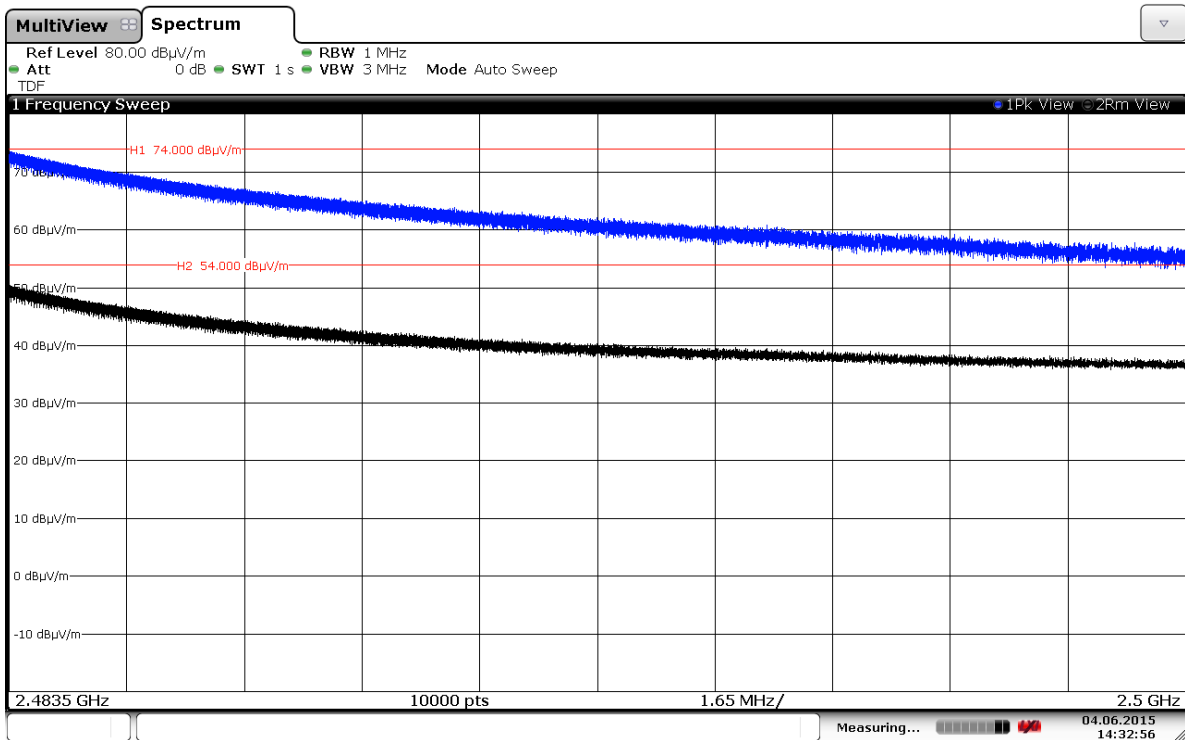
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).



CHANNEL: Highest (2480 MHz).



Appendix B – Measuring results for electromagnetic conducted emission

CONTENT

DESCRIPTION OF THE OPERATION MODES	42
CONTINUOUS CONDUCTED EMISSION ON POWER LEADS	43

DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

The operation modes used by the samples to which the present report refers, are shown in the following table:

OPERATION MODE	DESCRIPTION
OM#02	EUT ON. IDLE 2G 900MHz. (Worst case). IDLE WiFi, Bluetooth Tx. Power supply: 5Vdc by USB Port through a laptop PC.

CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

Product standard:	
Test standard:	

Class B

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 (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency

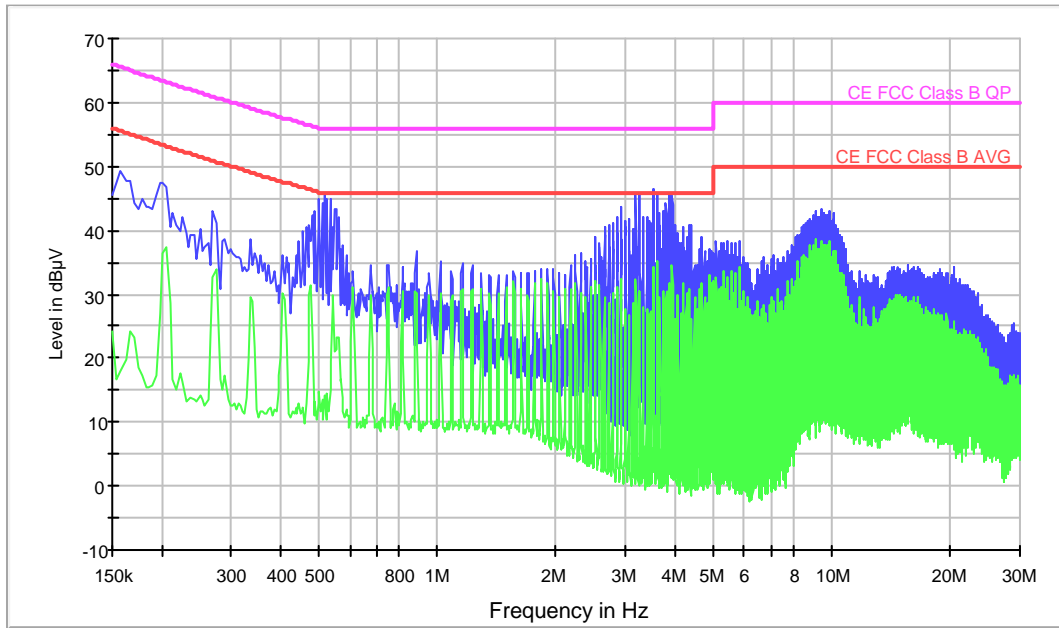
TESTED SAMPLES:	
TESTED OPERATION MODES:	
TEST RESULTS:	

CCmnn	Description	Result
CC01020N	Neutral wire noise.	P
CC0102L1	Phase wire noise.	P

Conducted Emission. CC01020N

Project: 45639REM.003
 Company: THINGSEE (HALTIAN)
 Sample: S/03
 Operation mode: OM#02
 Description: EUT ON. IDLE 2G 900MHz. (Worst case). IDLE WiFi, Bluetooth Tx.
 Power supply: 5Vdc by USB Port through a laptop PC. Neutral wire noise.

EC FCC Class B ESPI CC



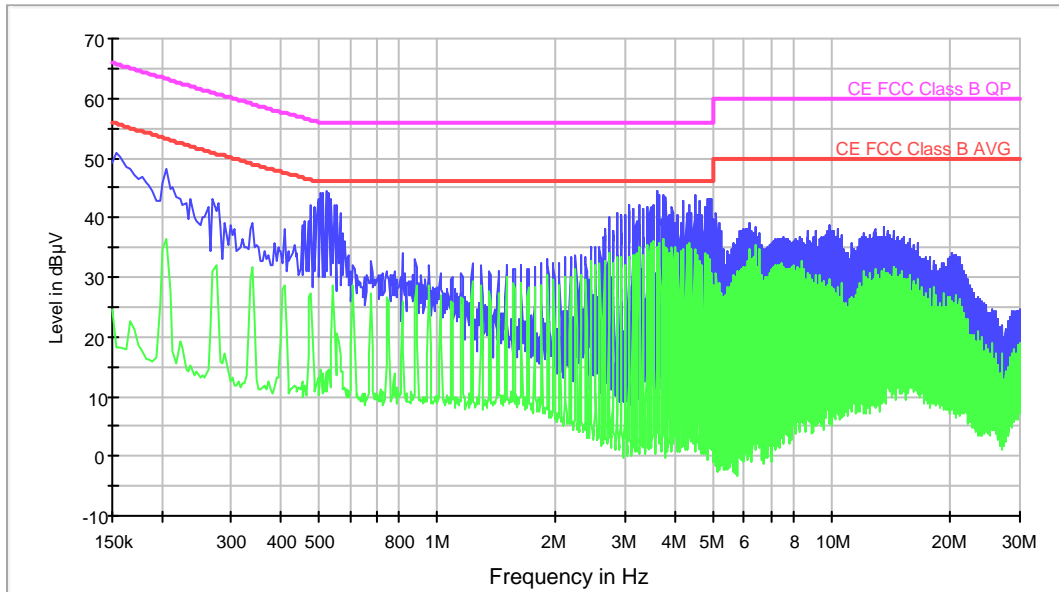
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.158000	49.4	17.8
0.270000	42.9	32.6
0.518000	45.4	14.3
0.886000	36.7	30.3
1.902000	34.1	31.8
3.534000	46.3	34.4
3.874000	45.7	31.7
9.382000	43.4	38.2
10.398000	40.2	34.7
20.322000	34.2	25.7

Conducted Emission. CC0102L1

Project: 45639REM.003
 Company: THINGSEE (HALTIAN)
 Sample: S/03
 Operation mode: OM#02
 Description: EUT ON. IDLE 2G 900MHz. (Worst case). IDLE WiFi, Bluetooth Tx.
 Power supply: 5Vdc by USB Port through a laptop PC. Phase wire noise.

EC FCC Class B ESPI CC



— Peak-Scan — Average-Scan — CE FCC Class B AVG — CE FCC Class B QP

Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.154000	50.8	18.1
0.270000	43.1	31.1
0.522000	44.6	14.1
0.814000	34.1	26.0
2.110000	33.3	29.6
3.262000	42.2	35.0
3.606000	44.3	35.0
6.190000	39.1	33.9
13.598000	38.4	31.5
20.262000	33.9	24.6