

FCC LISTED, REGISTRATION
 NUMBER: 720267

Informe de ensayo nº:
 Test report No:

NIE: 50839RRF.002

Test report

USA FCC Part 15.247, 15.209

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 License-
 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	Health tracker
Marca Trademark	Philips health band
Modelo y/o referencia tipo Model and /or type reference	DL7421
Other identification of the product	FCC ID: 2AEFK-DL7421
Final HW version	EB-2 (4222 100 68393)
Final SW version	PTM_100.6.2.0.10861
Características Features	BLE (4.0), PPG heartrate measurement, motion tracking
Solicitante Applicant	PHILIPS CONSUMER LIFESTYLE B.V. High Tech Campus Building HTC 37 – parterre, 5656AE Eindhoven, The Netherlands
Método de ensayo solicitado, norma Test method requested, standard	USA FCC Part 15.247 10-1-15 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, 5725 - 5875 MHz, and 24.0 – 24.25 GHz. USA FCC Part 15.209 10-1-15 Edition: Radiated emission limits; general requirements. Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r05 dated 04/08/2016. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Resultado Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	A. Llamas RF Lab. Manager
Fecha de realización Date of issue	2017-06-08
Formato de informe No. Report template No	FDT08_19

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Competences and guarantees

DEKRA Testing and Certification 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.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification 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 DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification 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.

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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 DEKRA Testing and Certification.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification 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
50839D/002	Health tracker	DL7421	---	2017-02-01

1. Sample S/01 has undergone 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
50839D/004	Health tracker	DL7421	---	2017-02-01

Auxiliary elements used with the sample S/02:

Control N°	Description	Model	Serial N°	Date of reception
50839D/010	USB/UART cable	---	---	2017-02-01
50839D/006	USB charger	EB2	---	2017-02-01

1. Sample S/02 has undergone following test(s).

All conducted tests indicated in appendix A.

Test sample description

The test sample is a health tracker intended to be worn on the wrist and does the following basic measurements:

1. Photoplethysmogram (PPG): LEDs illuminate the skin on the wrist below the device, and a photo diode measures changes in light absorption, caused by volumetric changes in the arteries and arterioles in the subcutaneous tissue.

2. Acceleration: an accelerometer measures movement of the wrist in 3 dimensions.

Biometric and other parameters of the user are set in an app installed on a mobile device (e.g. smartphone or tablet) and sent via the library to the device. The parameters include date of birth, weight, height, gender, etc.

Identification of the client

PHILIPS CONSUMER LIFESTYLE B.V.

Tussendiepen 4, 9206 AD Drachten, The Netherlands

Testing period

The performed test started on 2017-02-02 and finished on 2017-02-09.

The tests have been performed at DEKRA Testing and Certification.

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 kΩ
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 kΩ
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 kΩ
Reference resistance to earth	< 1 Ω

Remarks and comments

1: The tests have been performed by the technical personnel: Pedro Parada.

2: Used instrumentation:

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum analyser Agilent E4440A	2015/10	2017/10
2.	DC power supply R&S NGPE 40/40	2014/11	2017/11

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	2016/11	2019/11
5.	Spectrum analyser Rohde & Schwarz FSW50	2015/12	2017/12
6.	EMI Test Receiver R&S ESU 40	2016/03	2018/03
7.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2016/04	2017/04
8.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-1M	2016/02	2018/02
9.	Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2014/03	2017/03
10.	RF pre-amplifier 18-40 GHz BONN ELEKTRONIK BLMA 1840-1M	2015/12	2017/12

2: Client’s declaration:

As described in the “Usage of samples” section, the tested model used in all the test was DL7421. About other similar models, the manufacturer provided the following “Declaration of identity”:



Philips Consumer Lifestyle

DECLARATION OF IDENTITY

We, PHILIPS CONSUMER LIFESTYLE B.V.
 TUSSENDIEPEN 4, 9206 AD DRACHTEN, THE NETHERLANDS

Declare under our responsibility that the product(s):

Philips DL74xy/zw
(brand name) *(Type version of model)*

Health Band
(product description)

Where xy/zw can change according to table 1

Table 1: Key to product codes

Numeral	Meaning	Range	Value
x	Region	1	EU
		2	US
		3	China
		4	APAC
y	Color	0-9	Indicates color (e.g. black is 1)
z	Size	1	Small
		2	Large
w	Country of destination	0-9	Country identifier within a region

Example: health band for EU - Germany, size large, color black is DL7411/21.

Following parts/characteristics are identical (checked checkboxes)

- Electrical Used components / materials Chemical
- Mechanical Labelling Regulatory requirements Software (or n/a)
- Intended Use Manufacturing process

Description of the differences:

- Material/chemical; related to the change in Masterbatch used to color the TPU material of the strap and spray paint to color the side panel of the device.
- Manufacturing process; related to the change in strap size and masterbatch/spray paint color used.

Eindhoven, 25 April 2017

W. Pehnings, Safety, Compliance & Regulatory Manager



Testing verdicts

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

1. Bluetooth Low Energy

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		

Appendix A – Test result “Bluetooth Low Energy”

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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 5.0 \text{ Vdc}$$

Type of power supply = DC voltage from Battery.

Type of antenna = Integral antenna

Declared antenna gain = 0.5 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

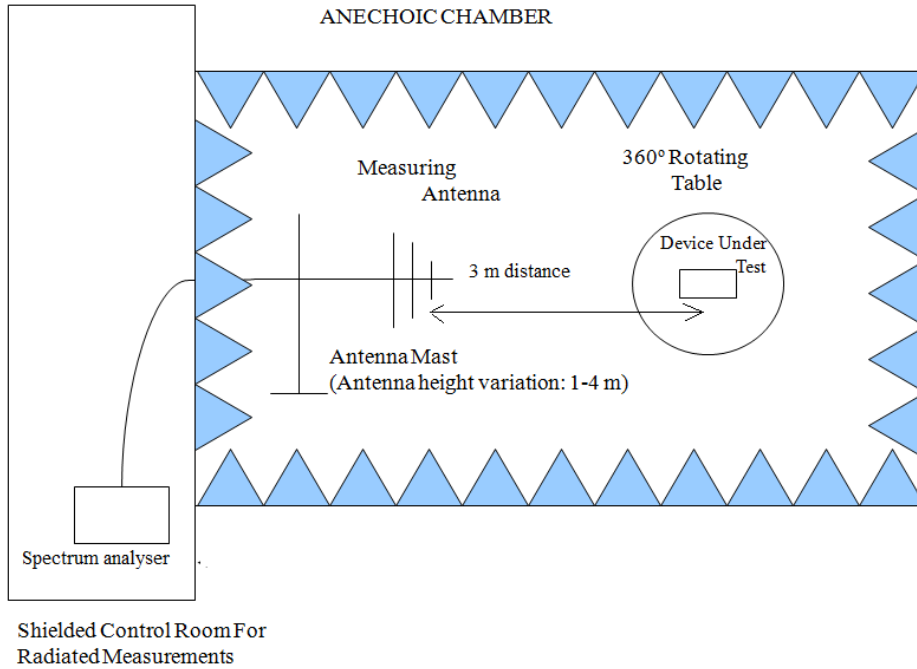
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40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

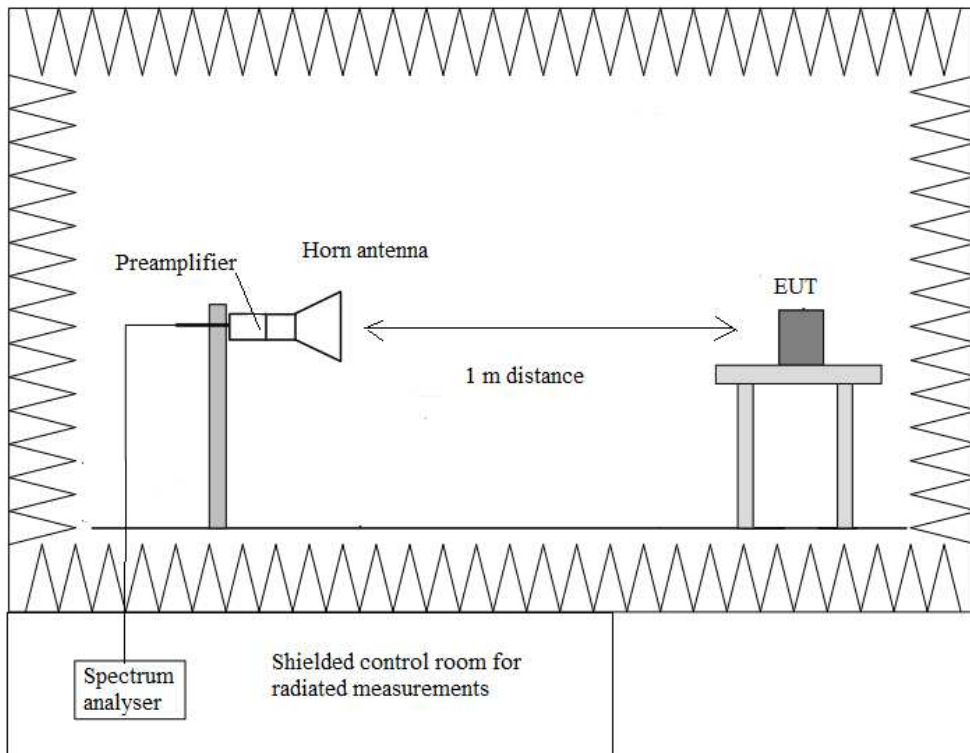
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

Radiated measurements setup $f < 1$ GHz



Radiated measurements setup $f > 1$ GHz



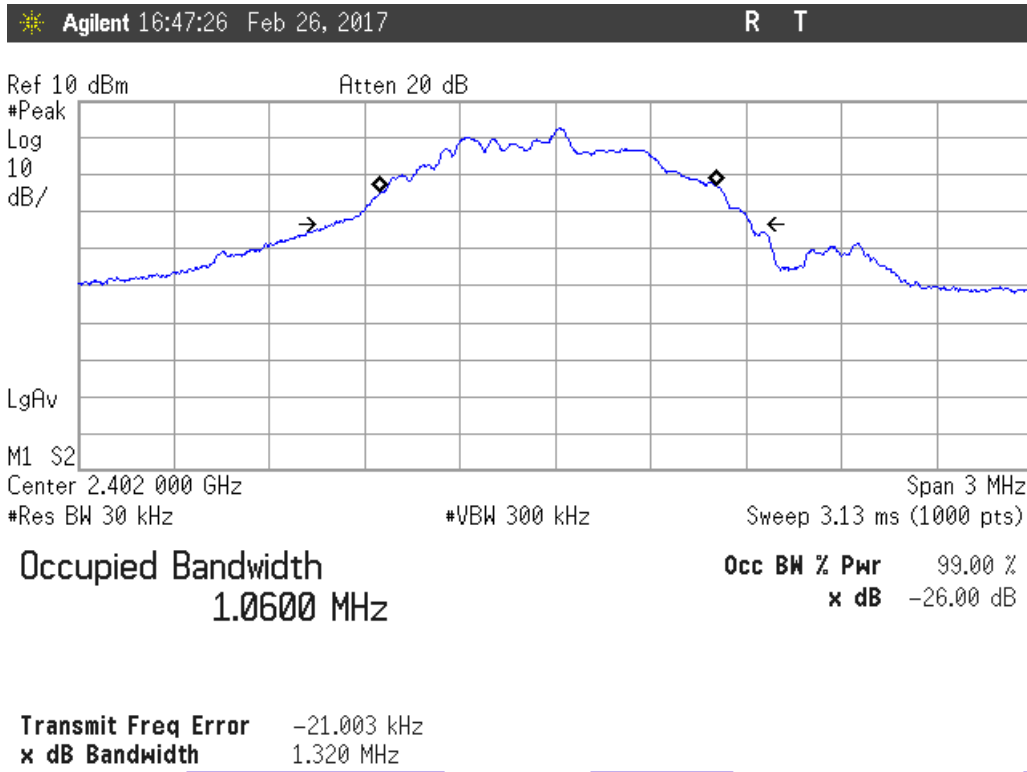
Occupied Bandwidth

RESULTS

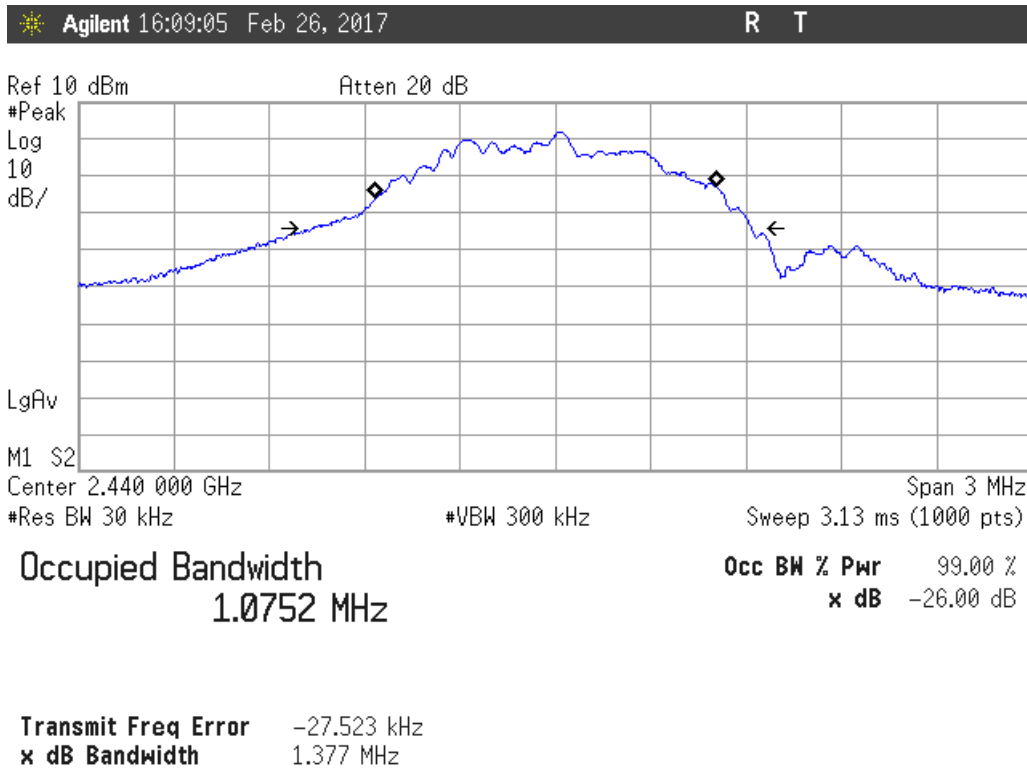
(see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
99% bandwidth (MHz)	1.060	1.075	1.107
-26 dBc bandwidth (MHz)	1.320	1.377	1.451
Measurement uncertainty (kHz)	<±5.00		

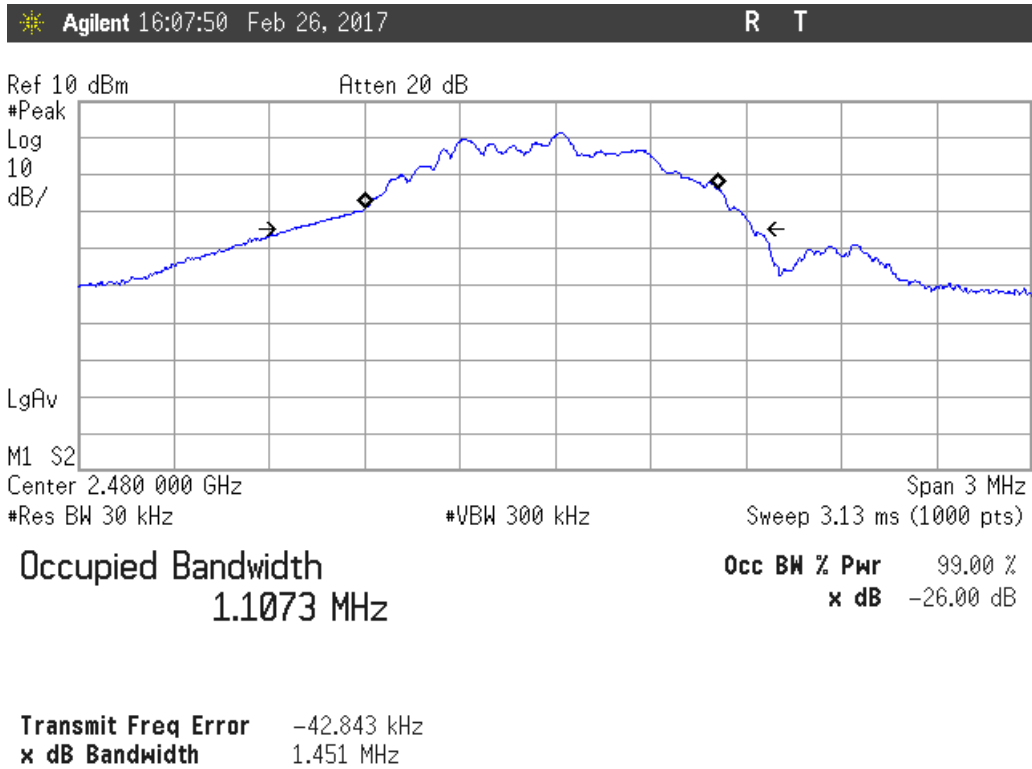
Lowest Channel



Middle Channel



Highest channel



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

SPECIFICATION

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

RESULTS

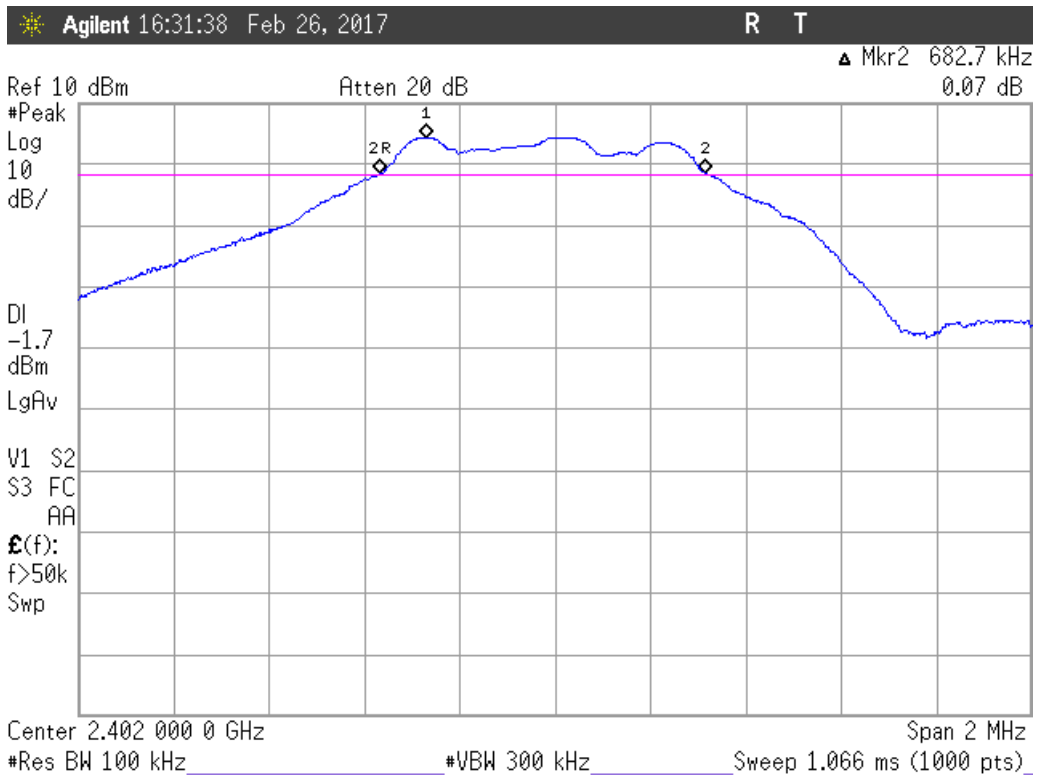
6 dB Bandwidth (see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
6 dB Spectrum bandwidth (kHz)	682.7	708.7	722.7
Measurement uncertainty (kHz)	<±11.00		

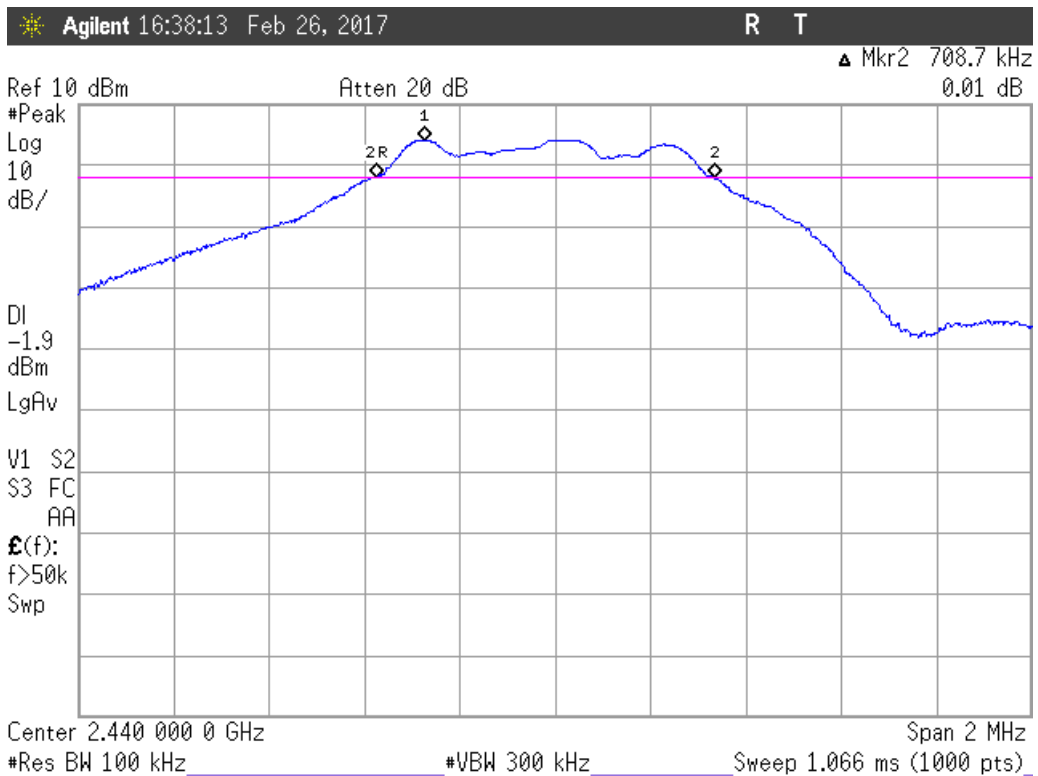
Verdict: PASS

6 dB BANDWIDTH.

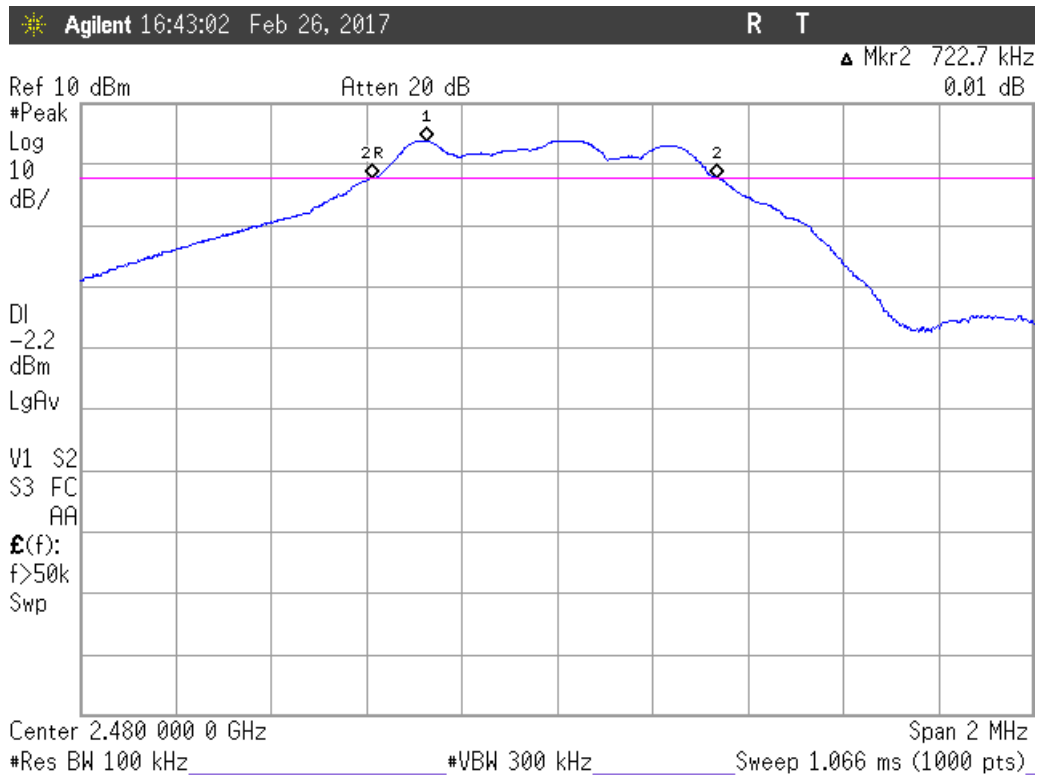
Lowest Channel



Middle Channel



Highest Channel



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 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 v03r05 dated 04/08/2016.

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: 0.5 dBi.

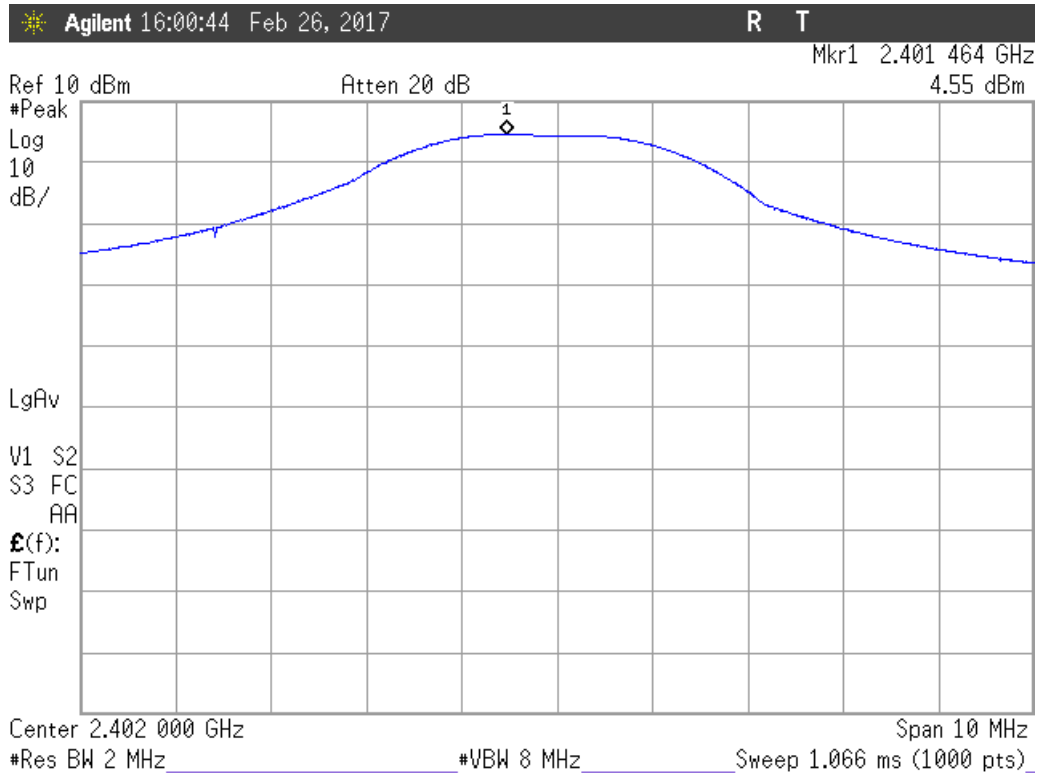
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	4.55	4.32	3.99
Maximum EIRP power (dBm)	5.05	4.82	4.49
Measurement uncertainty (dB)	<±0.78		

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.

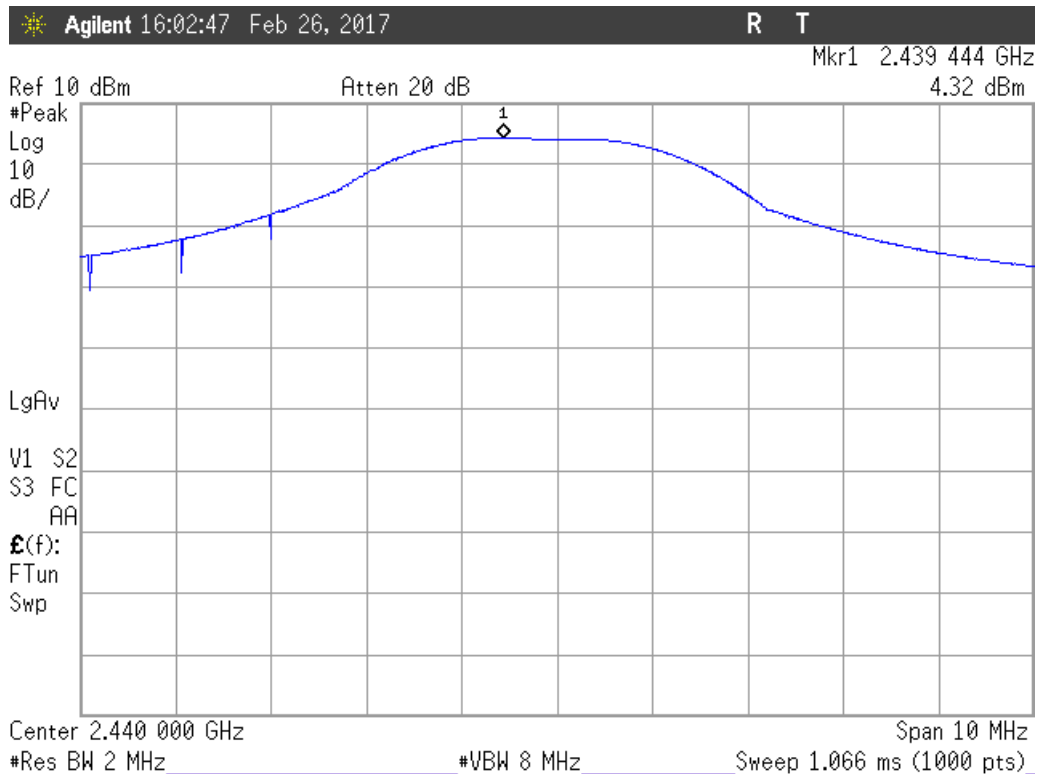
Verdict: PASS

CONDUCTED PEAK POWER.

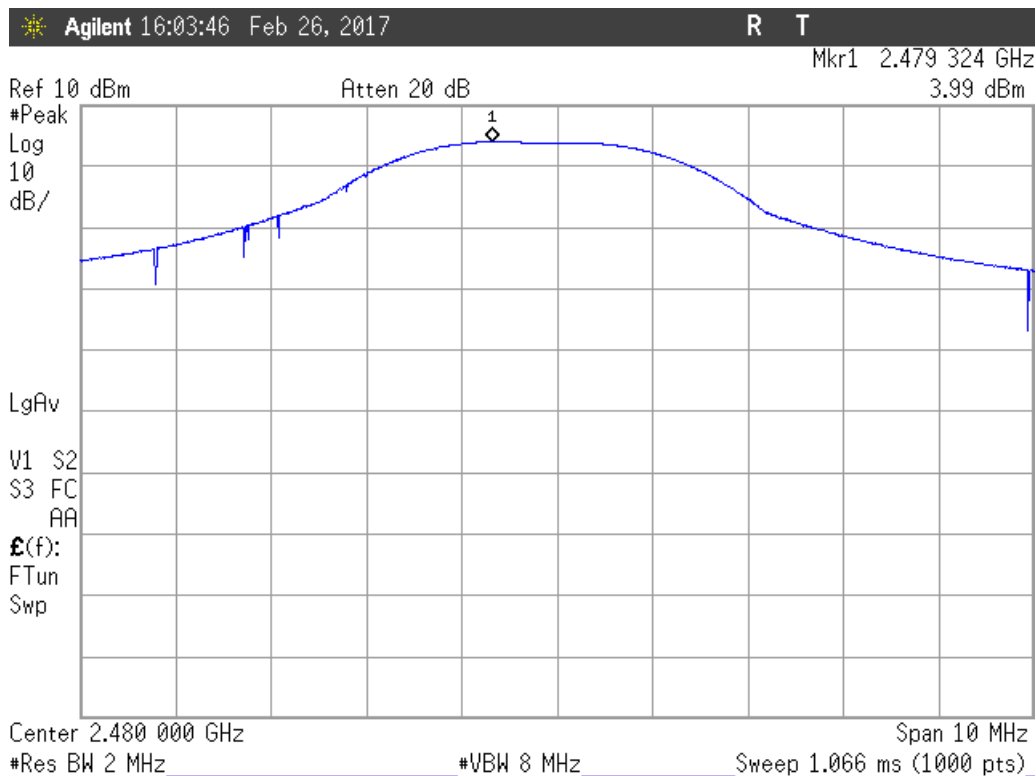
Lowest frequency



Middle frequency



Highest frequency



Section 15.247 Subclause (d). 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)	4.34	4.11	3.81
Measurement uncertainty (dB)	<±0.78		

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.

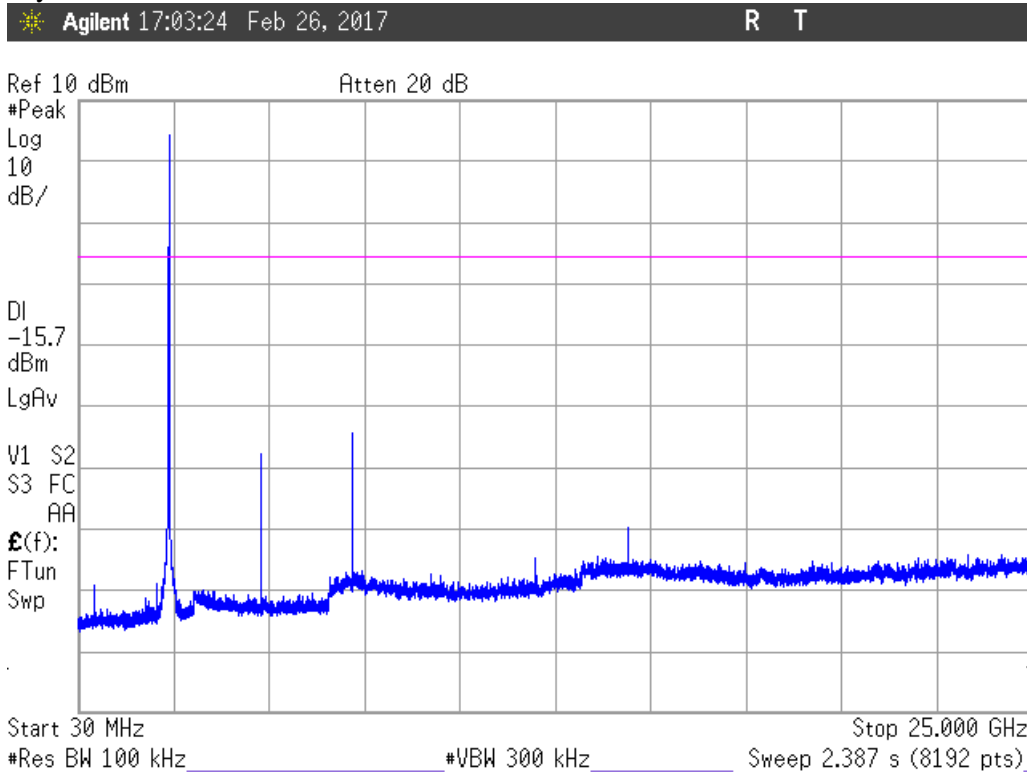
Highest frequency 2480 MHz:

All peaks are more than 20 dB below the limit.

Measurement uncertainty (dB): < 2.03

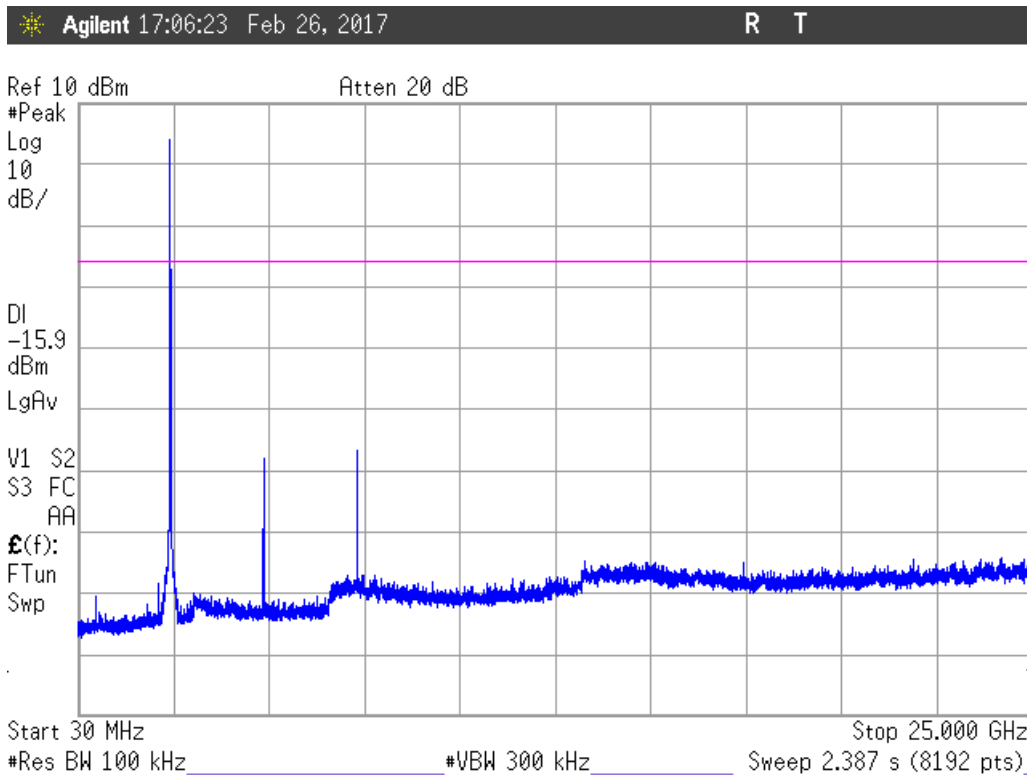
Verdict: PASS

Lowest frequency



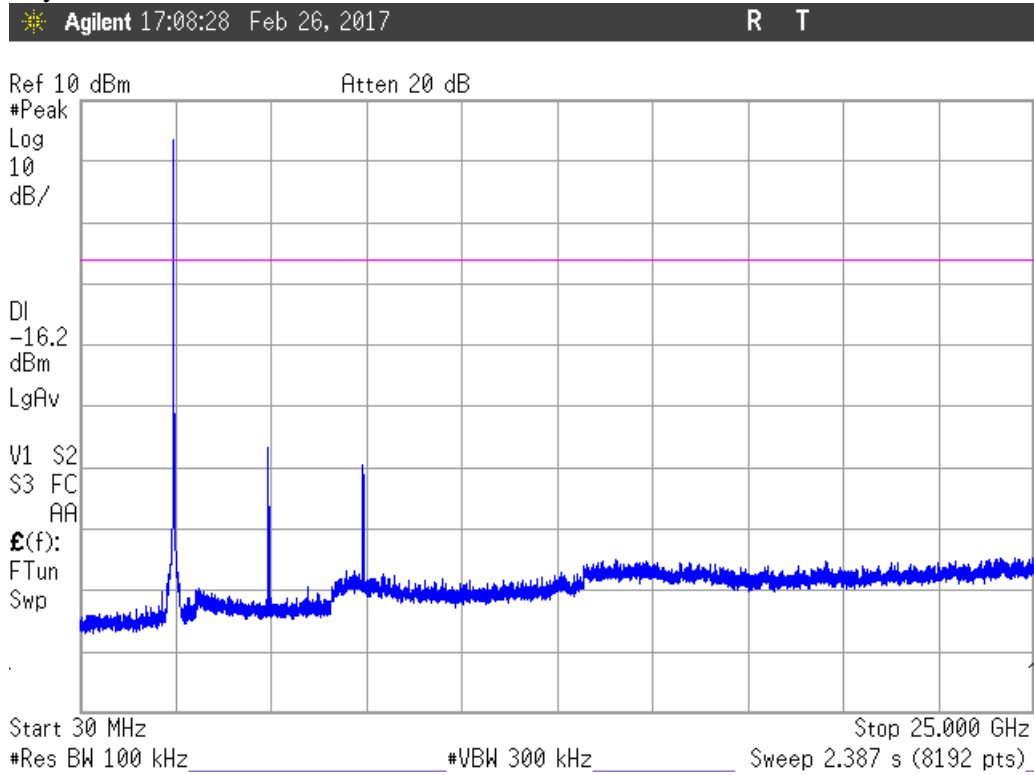
Note: The peak shown in the plot above the limit is the carrier frequency.

Middle frequency



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

Highest frequency



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

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

SPECIFICATION

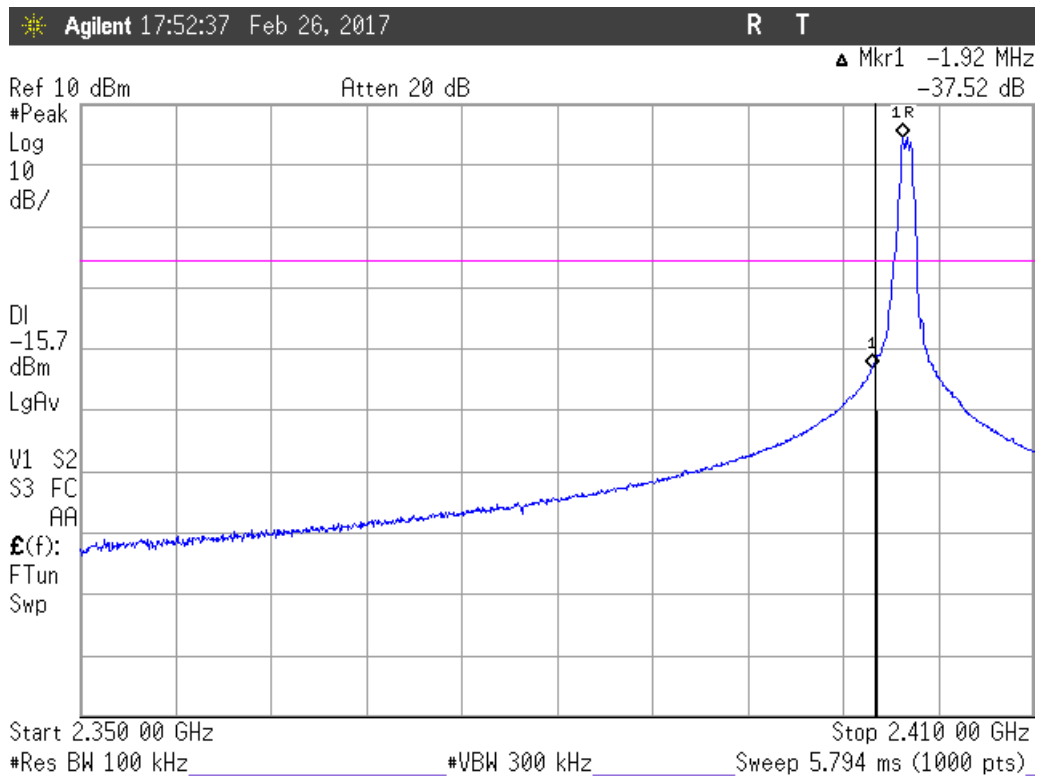
In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of 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:

Note: Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

1. LOW FREQUENCY SECTION. CONDUCTED.

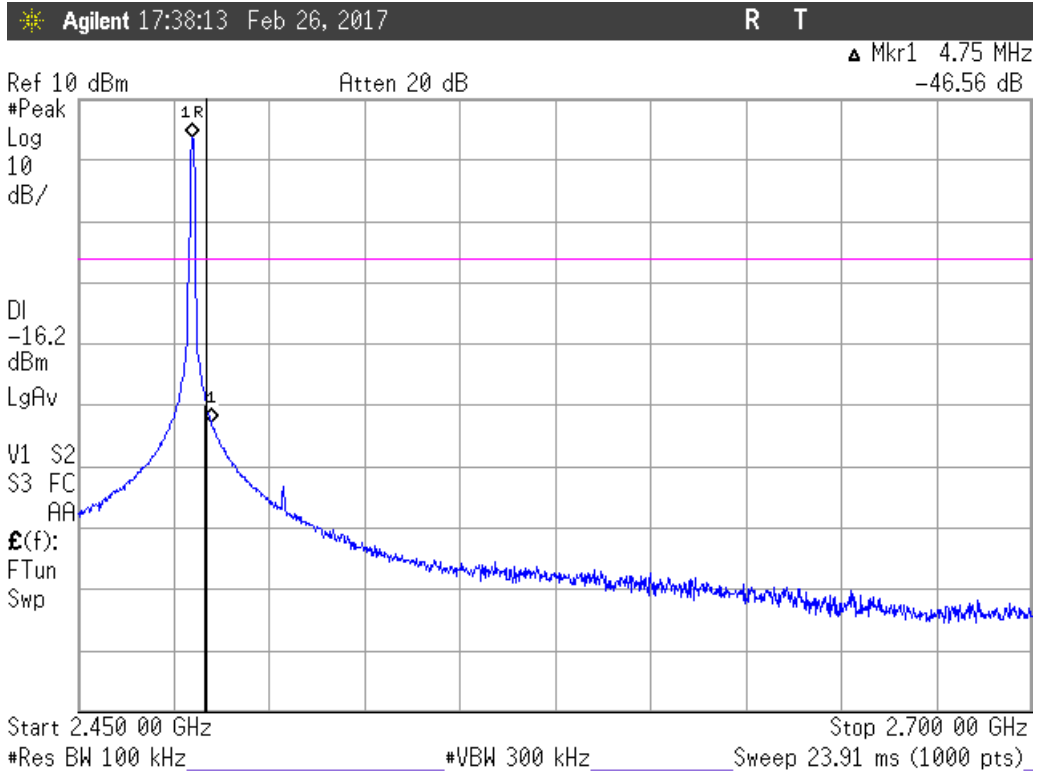
See next plot.



Verdict: PASS

2. HIGH FREQUENCY SECTION. CONDUCTED.

See next plot.



Measurement uncertainty (dB)	< ±2.03
------------------------------	---------

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

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 v03r05 dated 04/08/2016.

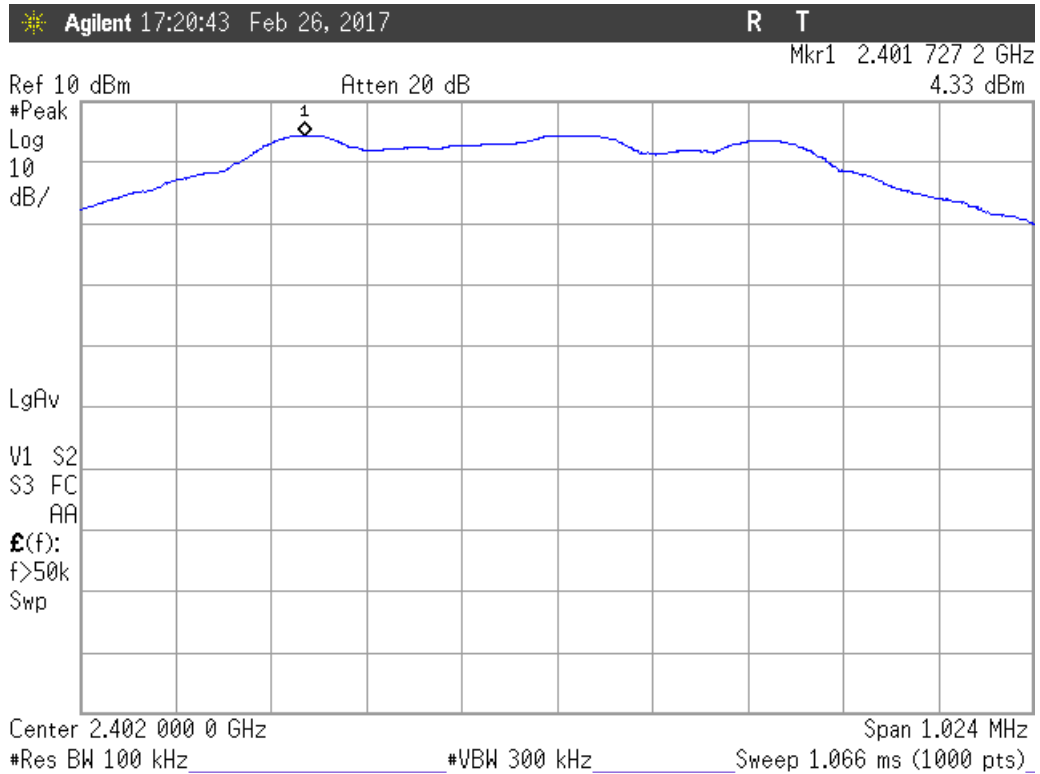
Power spectral density (see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Power spectral density (dBm)	4.33	4.11	3.76
Measurement uncertainty (dB)	<±0.78		

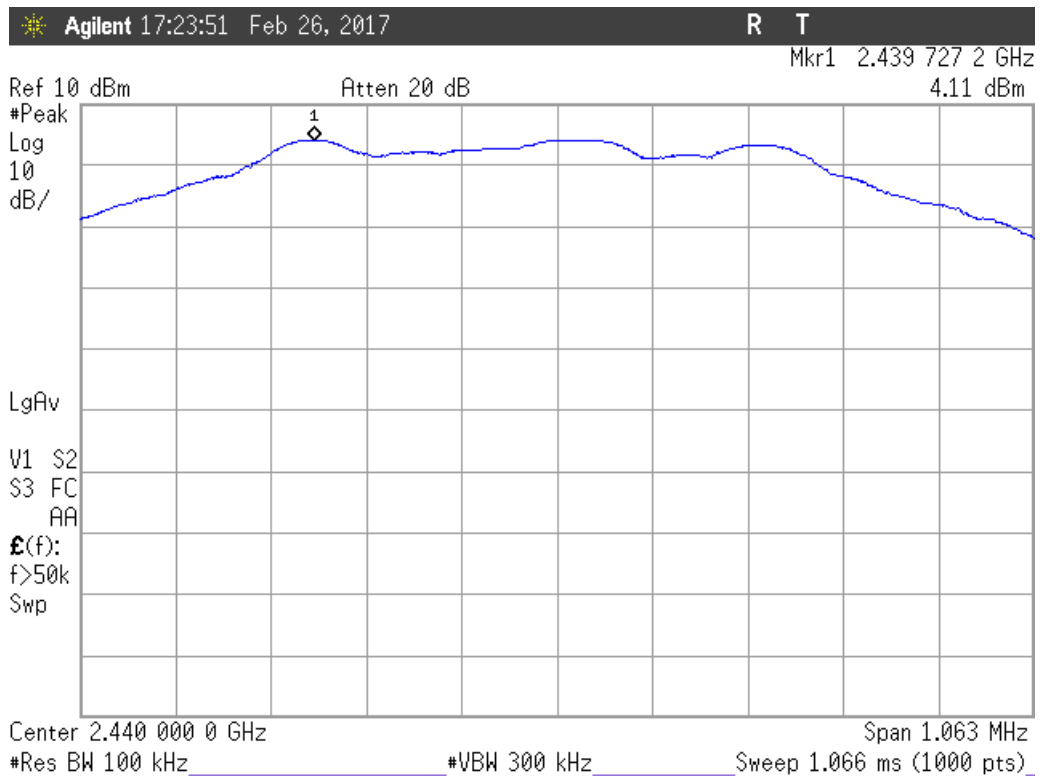
Verdict: PASS

POWER SPECTRAL DENSITY.

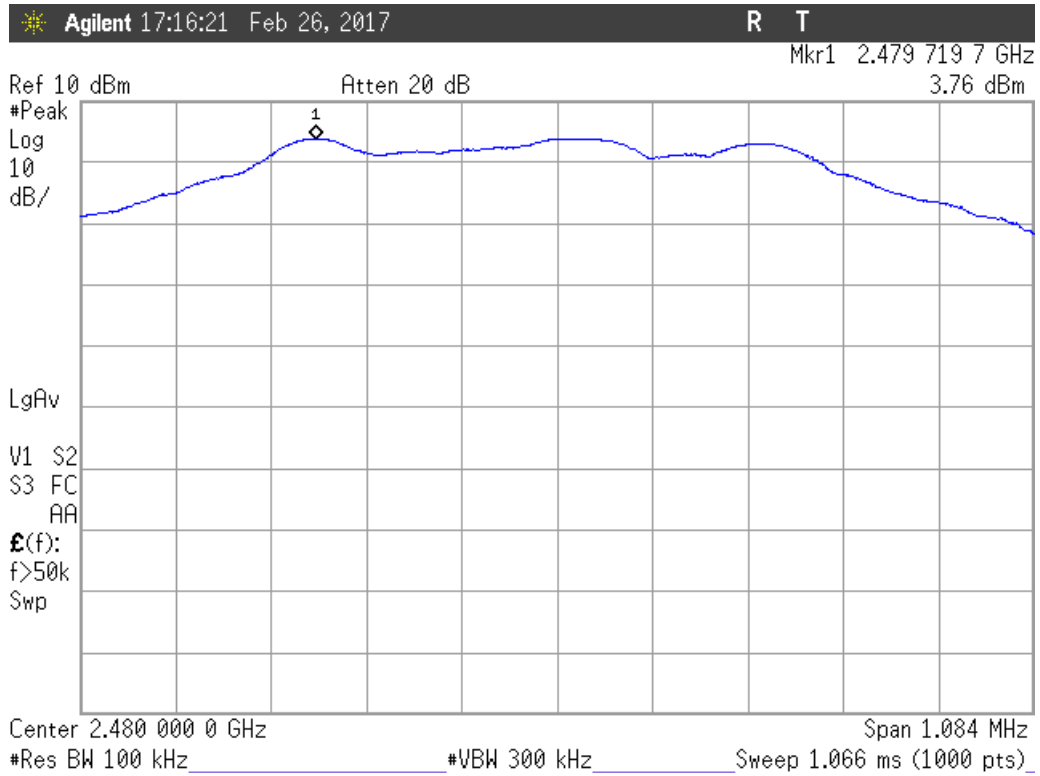
Lowest Channel



Middle Channel



Highest Channel



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 (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
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.

Spurious levels operating (radiated) closest to limit.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
89.4125	V	Quasi-Peak	21.15	± 3.88

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 dB μ V/m at 3 m) are measured with average detector for checking compliance with the average limit.

1. CHANNEL: LOWEST (2402 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
2.38973	V	Peak	58.78	± 4.87
		Average	37.63	± 4.87
2.49563	V	Peak	49.43	± 4.87
4.80375	H	Peak	45.13	± 4.87
7.20675	H	Peak	47.24	± 4.87

2. CHANNEL: MIDDLE (2440 MHz).

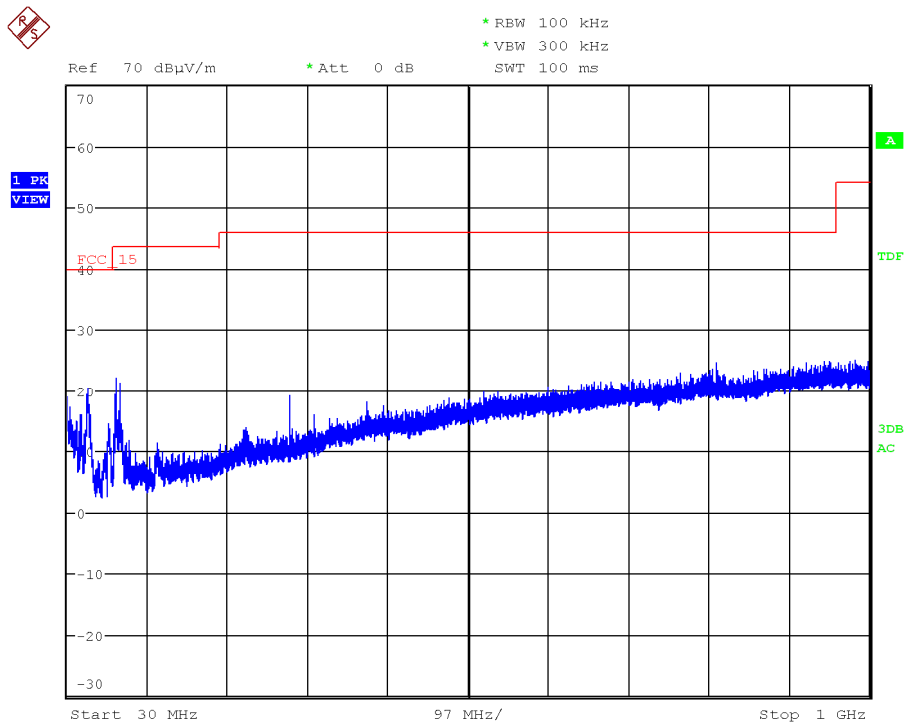
Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
4.87975	H	Peak	45.11	± 4.87
7.31925	H	Peak	48.23	± 4.87

3. CHANNEL: HIGHEST (2480 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
2.48354	V	Peak	70.34	± 4.87
		Average	42.15	± 4.87
4.96025	H	Peak	47.65	± 4.87
7.43975	H	Peak	45.08	± 4.87

Verdict: PASS

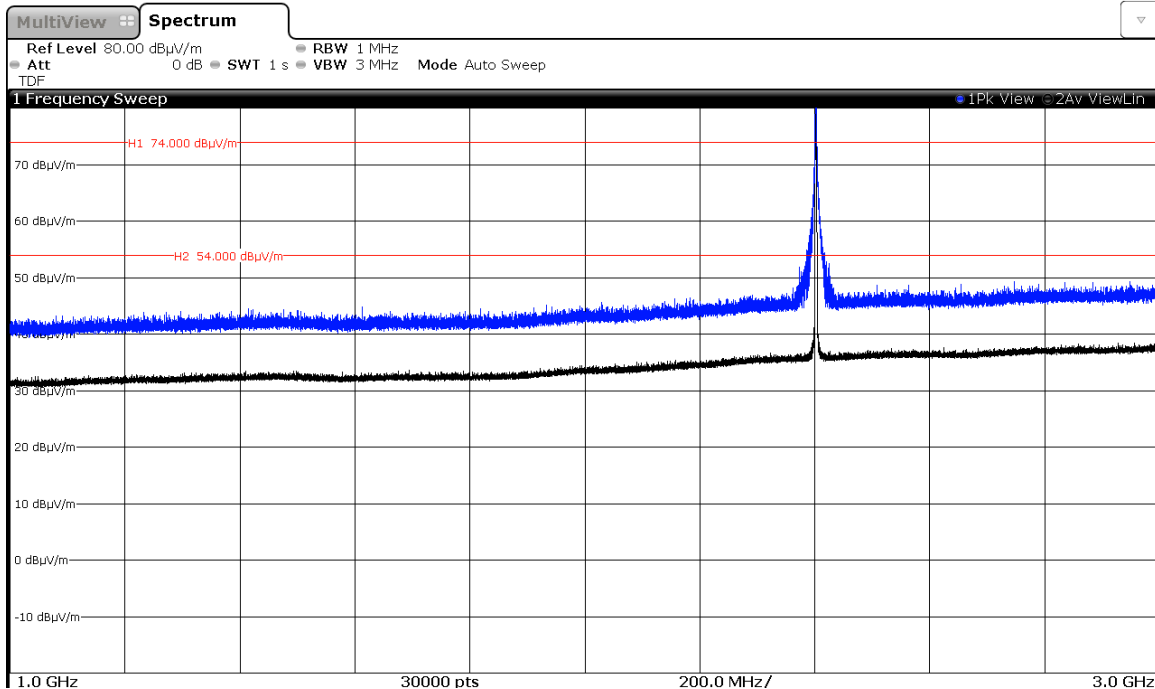
FREQUENCY RANGE 30 MHz-1000 MHz.



(This plot is valid for all three channels).

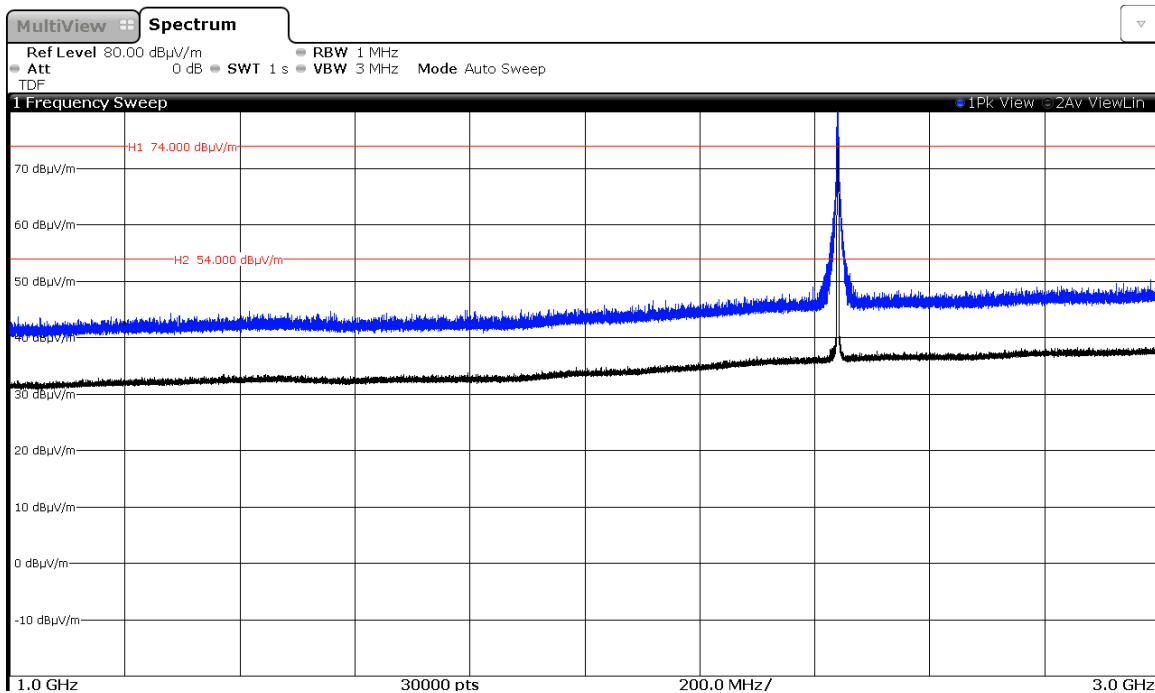
FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: Lowest (2402 MHz).



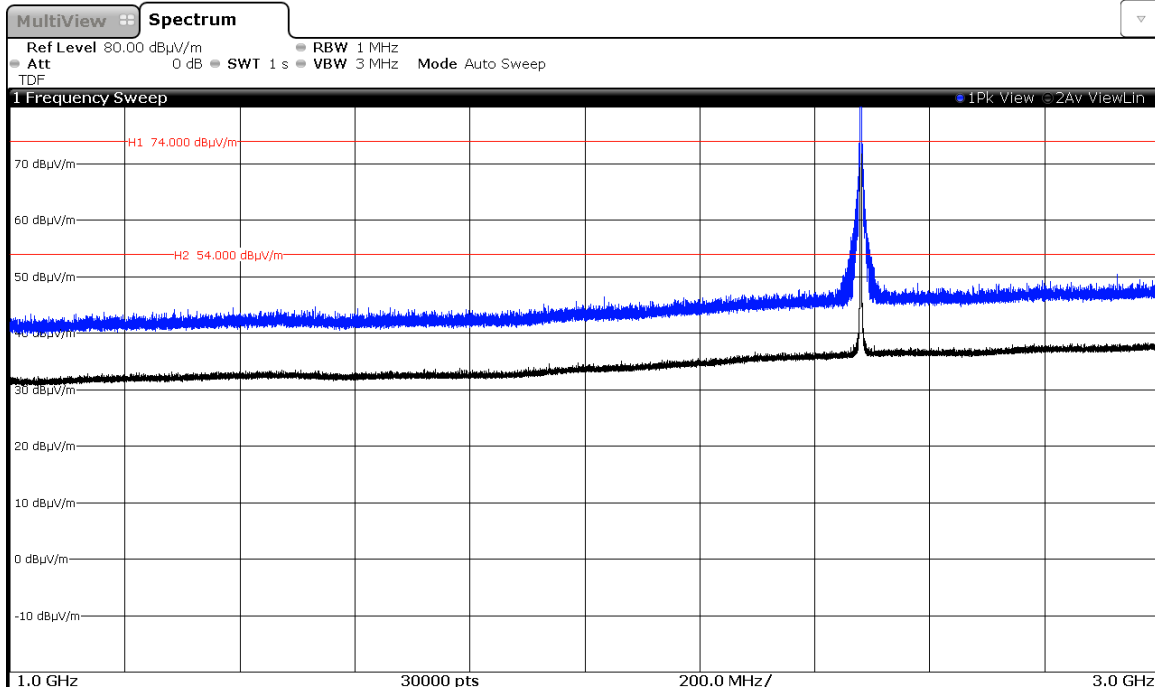
Note: The peak shown in the plot above the limit is the carrier frequency.

CHANNEL: Middle (2440 MHz).



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

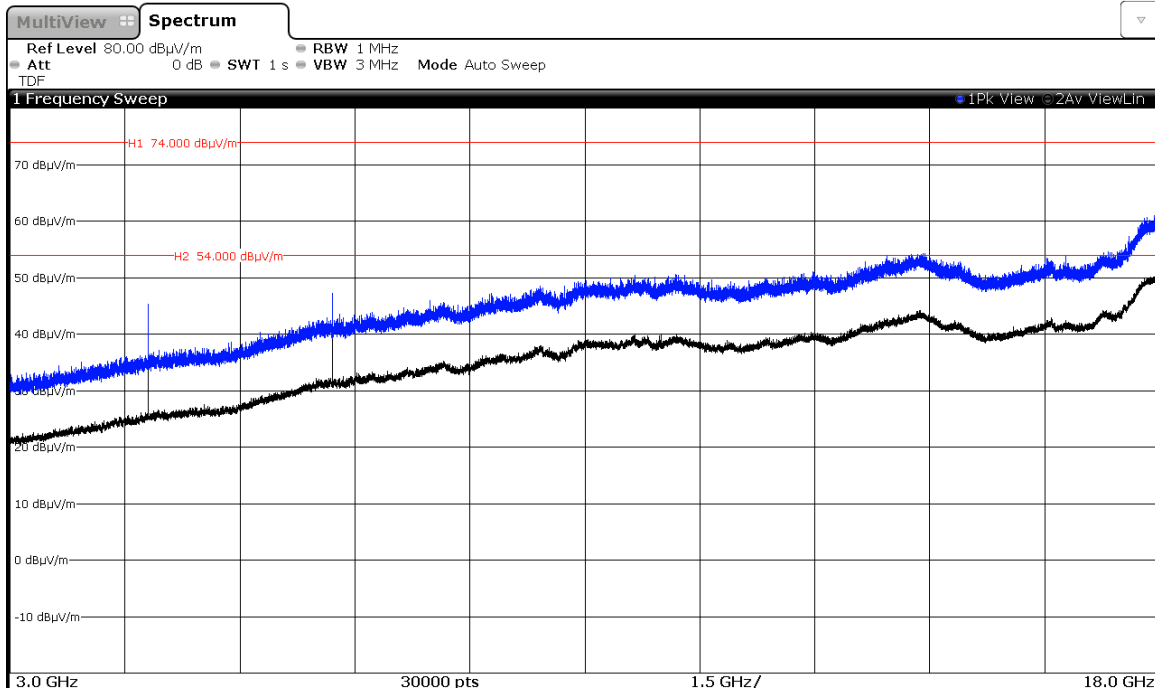
CHANNEL: Highest (2480 MHz).



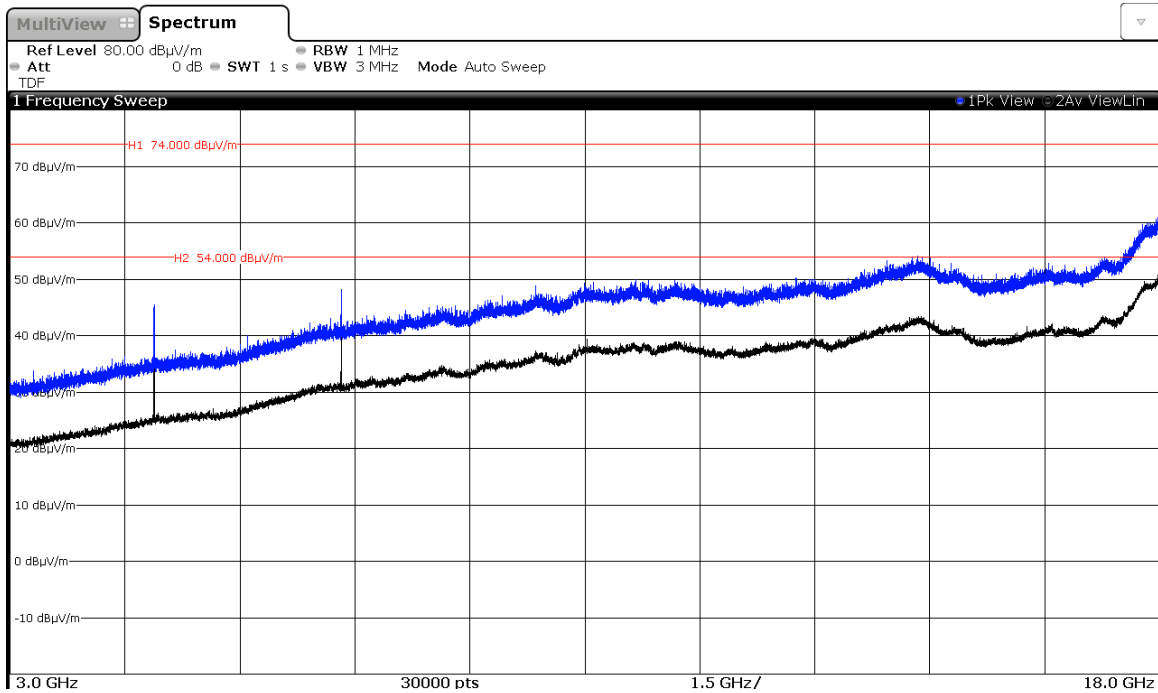
Note: The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 18 GHz.

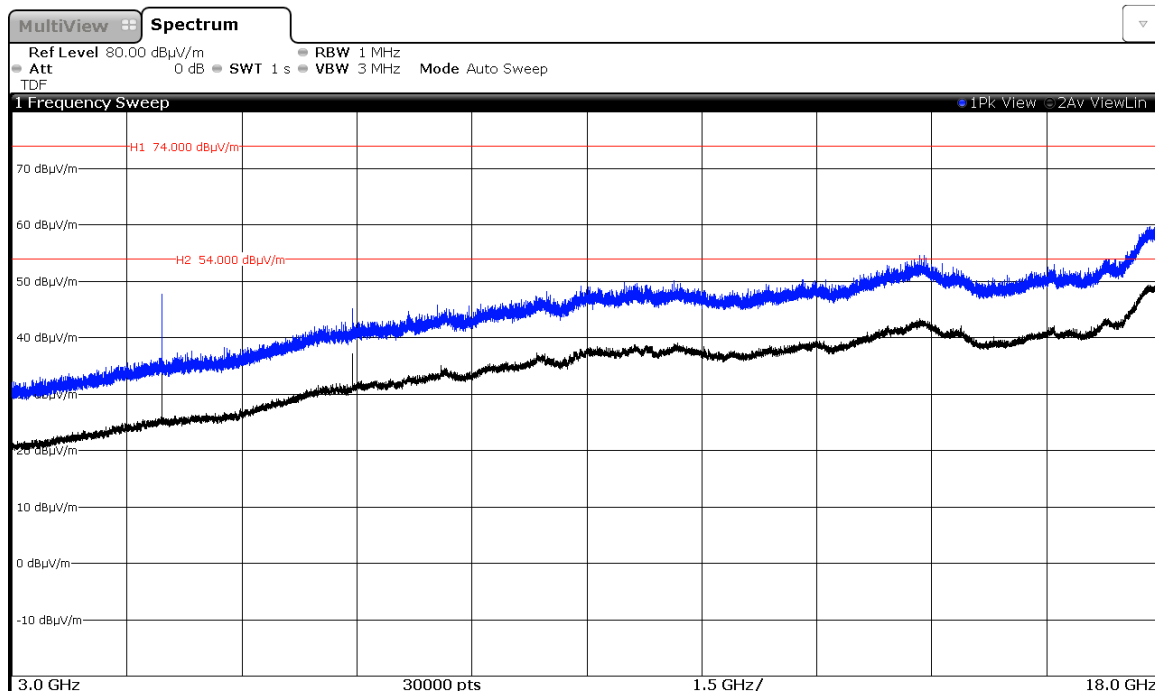
CHANNEL: Lowest (2402 MHz).



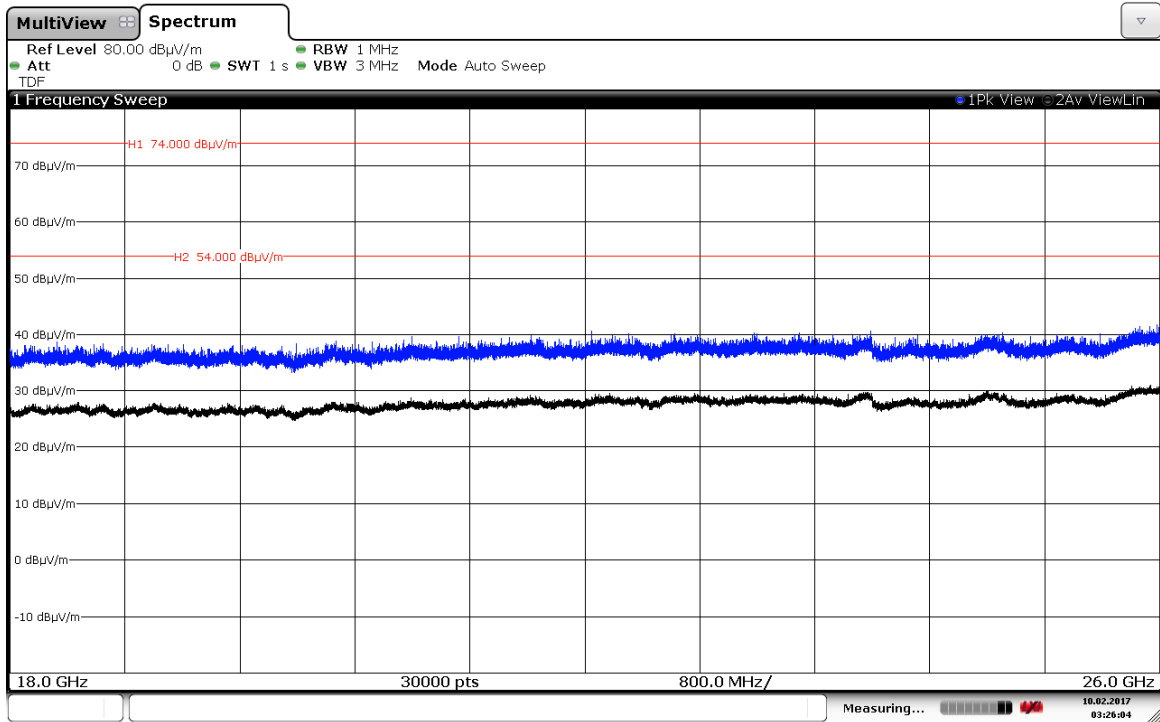
CHANNEL: Middle (2440 MHz).



CHANNEL: Highest (2480 MHz).



FREQUENCY RANGE 18 GHz to 26 GHz.

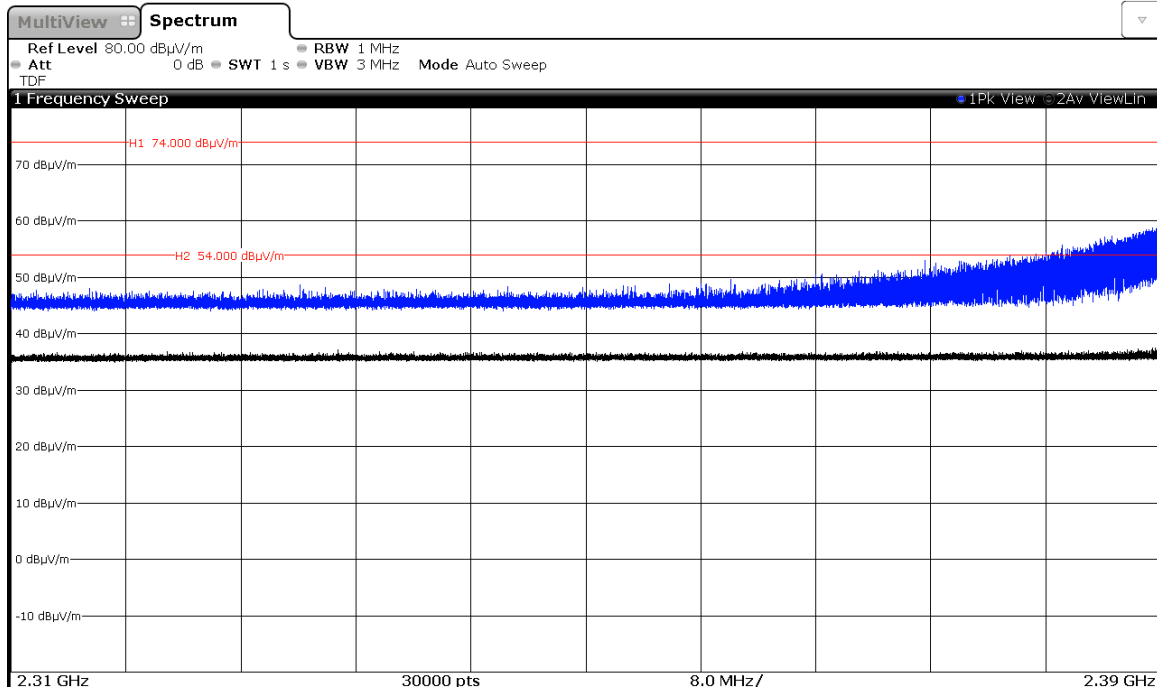


Date: 10.FEB.2017 03:26:05

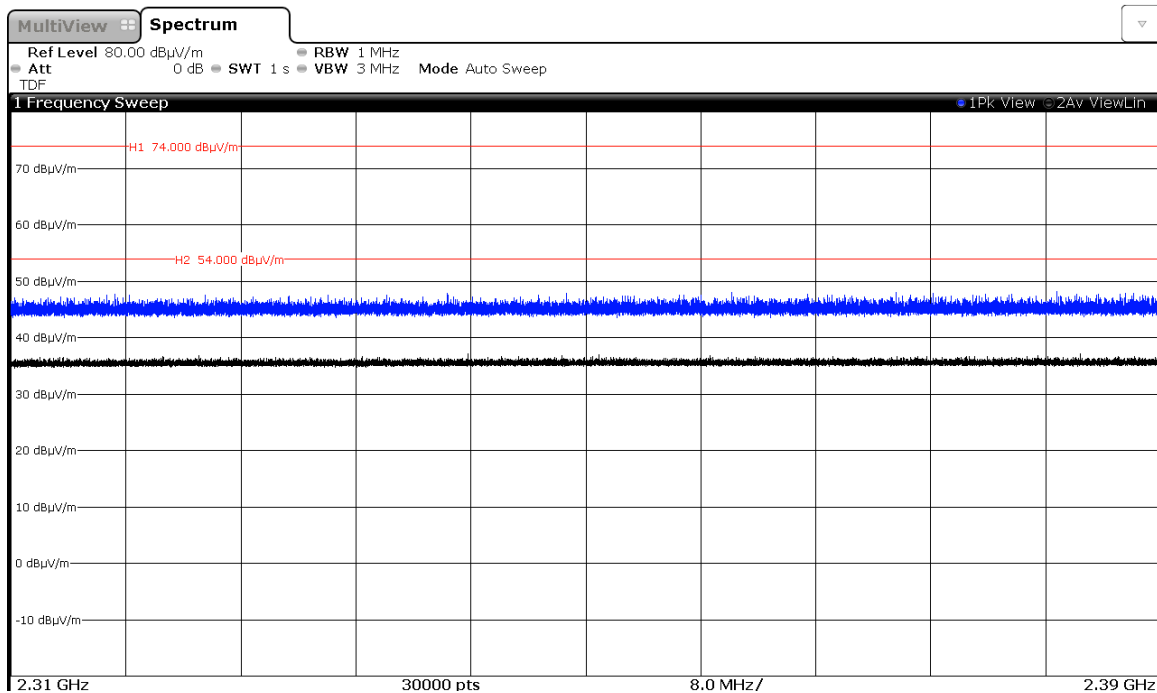
(This plot is valid for all three channels).

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

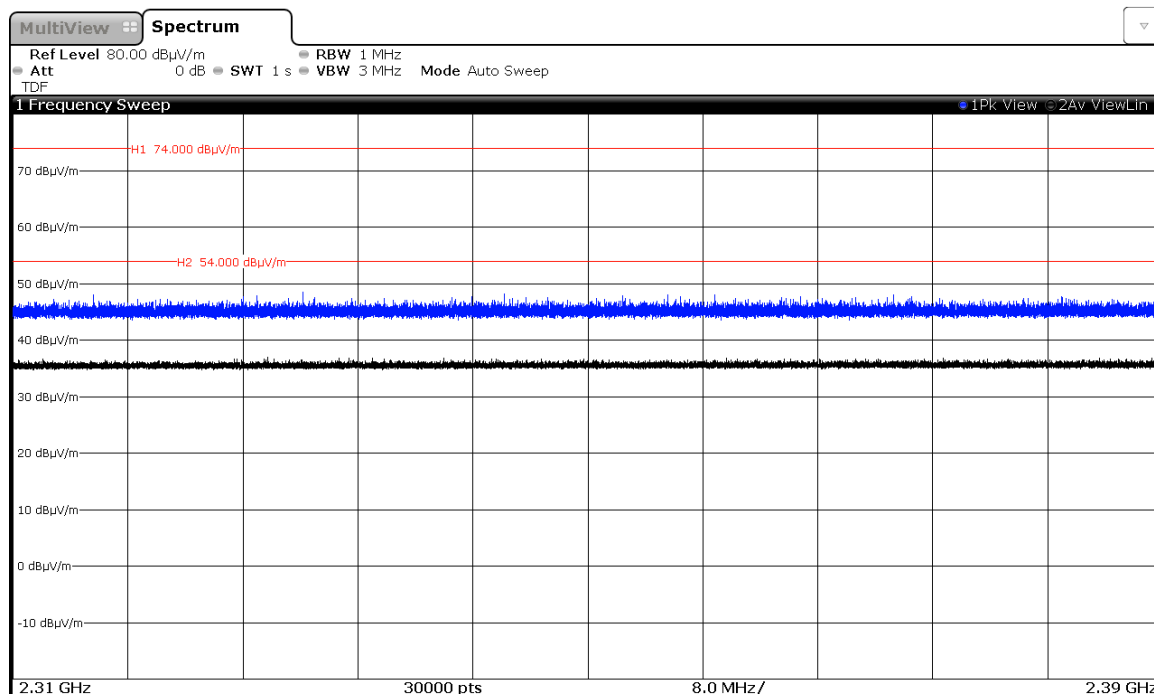
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).

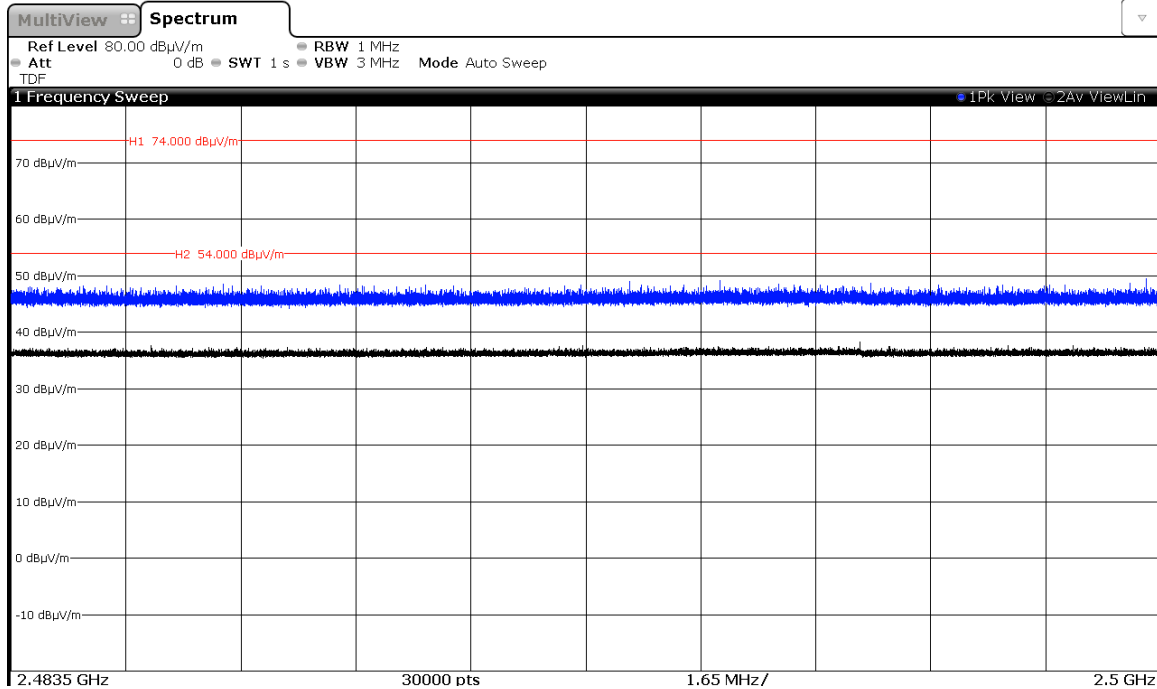


CHANNEL: Highest (2480 MHz).

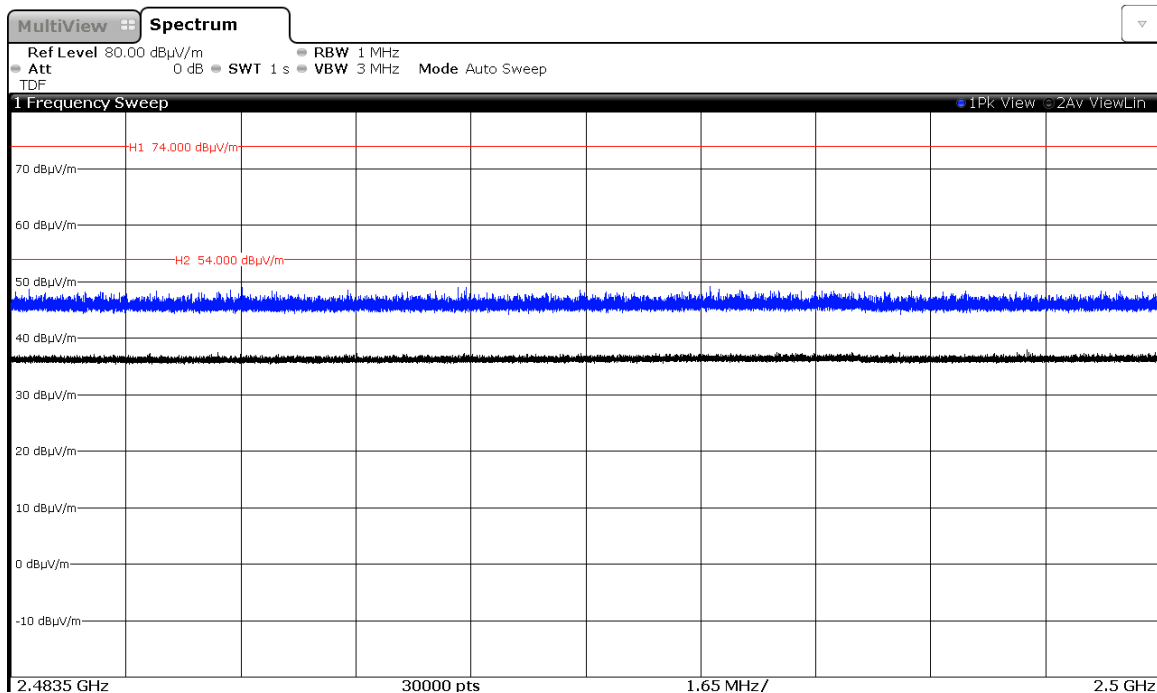


FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND).

CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).



CHANNEL: Highest (2480 MHz).

