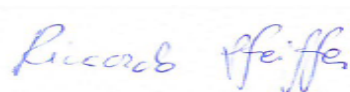


RAPPORTO DI PROVA

TEST REPORT

Rif. / Ref. n.	FCCTR_179296-2_NovoNordisk	Data Emissione /Issue Date:	19/07/2021	Pagine / Pages:	63
Scopo delle prove Test object	Prove di tipo in accordo alla Norma Type test according to standard 47 CFR FCC part 15.247; RSS-GEN Issue 5; RSS 247 Issue 2				
Richiedente Applicant	Novo Nordisk A/S Novo Allé 1 Bagsværd 2880 - Denmark				
Marchio commerciale Trade mark	DIALOG				
Fabbricante Manufacturer	Novo Nordisk A/S				
Prodotto Product	Add-on for Insulin Pen-Injector				
Modello testato Testing model	DV samples (project Revival)				
FCC ID IC ID	2AYMR-DD01 26991-DD01				
Data ricevimento campioni Date of test samples receipt	15/02/2021				
Campioni verificati No. of tested samples	2 – Sampled by the manufacturer				
Data verifiche Testing date	From 17/02/2021 to 29/03/2021				
Sito di prova Testing site	PRSLAB S.r.l. Unipersonale - Via Campagna 92 - 22020 Faloppio - Como - Italy				
Conformity Assessment Body Identifier (CABID)	5347A				
Esito dei test Test results	CONFORME / COMPLIANT				
Verifiche effettuate da Verifications carried out by	Daniele AOSANI Tecnico laboratorio Test Engineer				
Approvato Approved by	Riccardo PFEIFFER Responsabile laboratori Laboratory manager				

I risultati delle prove riportati nel presente rapporto di prova si riferiscono solo ai campioni esaminati.

The test results reported in this test report shall refer only to the samples tested.

Il campione è stato fornito dal cliente ed i risultati si riferiscono al campione così come ricevuto

The sample has been provided by the customer and the results apply to the sample as received

Questo Report non può essere riprodotto in modo parziale, salvo espressa autorizzazione scritta da parte del Laboratorio

This report may not be partially reproduced, except with the prior written permission of the issuing Laboratory

CONTENUTO

TABLE OF CONTENTS

0. RELEASE CONTROL RECORD	3
1. DECISION RULE	3
2. INFORMATION PROVIDED BY CUSTOMER.....	3
3. GENERAL REMARKS	3
4. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT).....	4
4.1 EUT Identification	4
4.2 Bluetooth module technical data	5
4.2.1 Channel List Bluetooth Low Energy	5
4.3 Ports identification identification	6
4.4 Modifications incorporated in E.U.T.....	6
4.5 Auxiliary equipment.....	6
5. OPERATING MODES AND TEST CONDITIONS.....	7
6. REFERENCE STANDARDS	8
7. UNITS OF MEASUREMENTS	8
8. SUMMARY OF TEST RESULTS.....	9
9. MEASUREMENT UNCERTAINTY	10
10. LIST OF INSTRUMENTS USED	10

0. RELEASE CONTROL RECORD

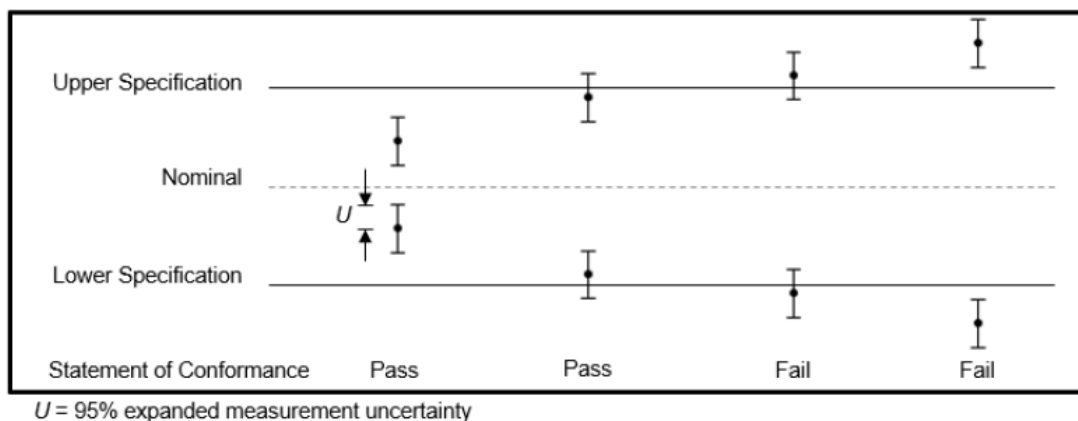
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_179296_0_NovoNordisk	Original release	14/05/2021
FCCTR_179296_1_NovoNordisk	Add maximum point in graphs	28/06/2021
FCCTR_179296_2_NovoNordisk	Add point and table on page 54	19/07/2021

This document is valid in last revision that deletes and replaces the previous one

1. DECISION RULE

PRS LAB specifies that, if the decision rules of conformity of the test results are not indicated in detail in the standard/s object of tests, it takes as a decision rule for the declaration of conformity the simple binary system ($w = 0$) stated in the ILAC-G8-09:2019 document.

The decision rule is applicable for all parts of standard



Statements of conformity are reported as:

- Pass: the measured value is below the acceptance limit, $AL=TL$.
- Fail: the measured value is above the acceptance limit, $AL=TL$.

Definitions

- Guard Band (w): interval between a tolerance limit and a corresponding acceptance limit where length $w=|TL-AL|$.
- Tolerance Limit (TL) (Specification Limit): specified upper or lower bound of permissible values of a property.
- Acceptance Limit (AL): specified upper or lower bound of permissible measured quantity values.

2. INFORMATION PROVIDED BY CUSTOMER

- Customer own protocol:
NND020428-801 Revival Design Verification ESD EMC RF and Airborne Equipment Tests Protocol, Rev. A

3. GENERAL REMARKS

- None

4. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

4.1 EUT Identification

DESCRIPTION	Add-on for Insulin Pen-Injector
MODEL NAME	DV samples (project Revival)
FCC ID	2AYMR-DD01
IC ID	26991-DD01
SERIAL NO.	0769 1631 – Used only for Frequency Stability test
PRSLAB INTERNAL REFERENCE	BC 44/2021 1/20 BC 44/2021 11/20
TRADEMARK	
MANUFACTURER	Novo Nordisk A/S
COUNTRY OF MANUFACTURER	Denmark
SINGLE UNIT OR SYSTEM	Single
POWER SOURCE	Internal lithium battery, Coincell CR1632
SUPPLY VOLTAGE	3V 
MAX POWER or MAX ABSORBED CURRENT	11mA
HVIN	DD01
SW VERSION (MAIN and BLE)	FW: CSS_FCC_TEST_00.09.14
OPERATING TEMPERATURE	+5°C ~ +40°C
DIMENSIONS	See photography documentation
EUT STANDING	On insulin pen

4.2 Bluetooth module technical data

CHIP MANUFACTURER	
CHIP TYPE	QN9083
FREQUENCY BAND	2400 – 2483.5MHz
NUMBER OF CHANNELS	40
CHANNEL BANDWIDTH	2MHz
CHANNEL SEPARATION	2MHz
TRANSFER RATE	1Mbps
SENSITIVITY	-94dBm
TYPE OF MODULATION	GFSK
ANTENNA	Chip antenna
ANTENNA GAIN	1dBi
ANTENNA TYPE	2450AT07A0100
ANTENNA MANUFACTURER	

4.2.1 Channel List Bluetooth Low Energy

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

4.3 Ports identification identification

	PORT	DESCRIPTION	CONNECTION	NOTES
☒	Enclosure	Plastic	Snap	---
☐	AC Power input	Port not present	---	---
☐	DC Power input	Internal battery	---	---
☐	Signal/Control port	Port not present	---	---
☐	Telecomm. Port	Port not present	---	---
☐	Antenna Port	Internal	---	---

Note:

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

4.4 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test:

- None

4.5 Auxiliary equipment

- Laboratory laptop to set BLE channels.
- Auxiliary injection pen with SN U100-41554.

5. OPERATING MODES AND TEST CONDITIONS

In the following table there are the operating conditions adopted during tests identified by an indicator (#) at which has been referred the item "Operating condition of the equipment under test"

OPERATING CONDITION	DESCRIPTION
#1	Continuous transmission, modulated carrier, on channel 0
#2	Continuous transmission, modulated carrier, on channel 19
#3	Continuous transmission, modulated carrier, on channel 39

NOTE: Only in the Frequency Stability test was used the sample with SN 1631.

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

Special Hardware Used: None

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

6. REFERENCE STANDARDS

REFERENCE STANDARD	DESCRIPTION
Cfr 47 part 15 subpart C par. 15.247	Radio Frequency Devices – Intentional Radiators Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
KDB 558074 D01	Guidance for performing Compliance measurements on Digital Transmission Systems (DTS) Operating under §15.247
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices
Title 47 Part 1 Subpart I § 1.1310	Procedures Implementing the National Environmental Policy Act of 1969. Radiofrequency radiation exposure limits.
Title 47 Part 2 Subpart J § 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.
KDB 447498	RF Exposure procedures and equipment authorization policies for mobile and portable devices
ANSI C63.4:2014	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
ICES 003 Issue 6	Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement

7. UNITS OF MEASUREMENTS

Conducted EMI Data is in dBμV; dB referenced to one microvolt

Radiated EMI Data is in dBμV/m; dB/m referenced to one microvolt per meter

Sample Calculation:

RFS = Radiated Field Strength,
FSM = Field Strength Measured,
A.F. = Receive antenna factor,
Gain = amplification gains and/or cable losses.

$RFS (dB\mu V/m @ 3m) = FSM (dB\mu V) + A.F. (dB/m) - Gain (dB)$

8. SUMMARY OF TEST RESULTS

EUT PORT	DESCRIPTION OF PHENOMENA	BASIC STANDARD	OPERATING CONDITION	RESULTS
Antenna port	Antenna requirement	FCC Part 15 §15.203	---	Compliant
		RSS-247		
	Maximum Peak Output Power	FCC Part 15 §15.247 (b) (3)	#1, #2, #3	Within the limits
		RSS-247		
	6 dB Bandwidth	FCC Part 15 §15.247 (a) (2)	#1, #2, #3	Within the limits
		RSS-247		
	Power Spectral Density	FCC Part 15 §15.247 €	#1, #2, #3	Within the limits
		RSS-247		
	Band-Edge	FCC Part 15 § 15.247 (d)	#1, #3	Within the limits
		RSS-247		
	RF radiated Spurious Emissions at the Transmitter Antenna Terminal	FCC Part 15 § 15.247 (d)	#1, #2, #3	Within the limits
		RSS-247		
	Frequency Stability	RSS-Gen	#1, #2, #3	Compliant

Note: FCC classifies Bluetooth LE as a system using digital modulation techniques.

9. MEASUREMENT UNCERTAINTY

PARAMETER	EXPANDED UNCERTAINTY
All Emissions Radiated	$\pm 3,41$ dB
Temperature	$\pm 1,09$ °C
Humidity	$\pm 2,64$ %
DC Voltage	$\pm 0,06$ V
Uncertainty confidence level: = 95% (k=2)	

10. LIST OF INSTRUMENTS USED

Instrument	Manufacturer	Model	Serial n°	Calibrated on	Due to
MXE Emi Receiver	Keysight	N9038A	MY57290150	06/2020	06/2021
Loop antenna	Rohde & Schwarz	HFH 2-Z2	841801/012	03/2020	03/2023
Bi-Log antenna	Chase	CBL6111C	2717	03/2019	03/2022
Horn antenna	Electro Metrics	EM-6961	100437	10/2020	10/2023
Horn antenna + Low Noise Preamplifier	Bonn Elektronik	BLMA 1840-1A	262WL80452	03/2019	03/2021
Power sensor	Keysight	U2022XA + U2032A	MY57030003	06/2020	06/2022
High pass filter	Waineright	WHK 2,8/15G	1	03/2020	03/2021
Semi-Anechoic Chamber	Siemens	B83117-D6019- T232	003-005-134/94C	02/2021	02/2022
Software EMC	Rohde & Schwarz	EMC32-E	V 8.40.0	N.A.	

11. TEST RESULTS

ANTENNA REQUIREMENTS	12
MAXIMUM PEAK OUTPUT POWER.....	13
6dB CHANNEL BANDWIDTH	16
BAND-EDGE.....	20
POWER SPECTRAL DENSITY.....	23
RF RADIATED SPURIOUS EMISSIONS AT THE TRANSMITTER ANTENNA TERMINAL	26
RADIATED EMISSION 9kHz ÷ 10th Harmonic.....	31
TRANSMITTER FREQUENCY STABILITY.....	61

TEST 1.	ANTENNA REQUIREMENTS
REFERENCE DOCUMENT	According to §15.203 / 15.204 An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sec. 15.211, Sec. 15.213, Sec. 15.217, Sec. 15.219, or Sec. 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Sec. 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded

Antenna Requirements
The EUT has an integrated Chip antenna
RESULT: COMPLIANT

TEST 2.	MAXIMUM PEAK OUTPUT POWER
REFERENCE DOCUMENT	According to §15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
CUSTOMER TEST ID	DDVT37 DDVT60

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Semi-anechoic chamber Radio test area
• TEST METHOD	KDB 558074 D01 par. 9.1.1 Maximum peak conducted output power KDB 558074 D01 sec 3 par. 2
• TEST EQUIPMENT USED FOR TEST	MXE Emi Receiver Keysight mod. N9038A Horn antenna Electro Metrics mod. EM-6961 Power sensor Keysight mod. U2022XA + U2032A
• TEST PERFORMED BY	Daniele Aosani
• TESTED PORT	Antenna

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

OPERATING CONDITION :#1, #2, #3
--

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER

Resolution bandwidth	RBW $\geq$ DTS bandwidth
Video bandwidth	VBW $\geq$ 3 x RBW
Span	span $\geq$ 3 x RBW
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

TEST DESCRIPTION

Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously - rotating, remotely - controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency.

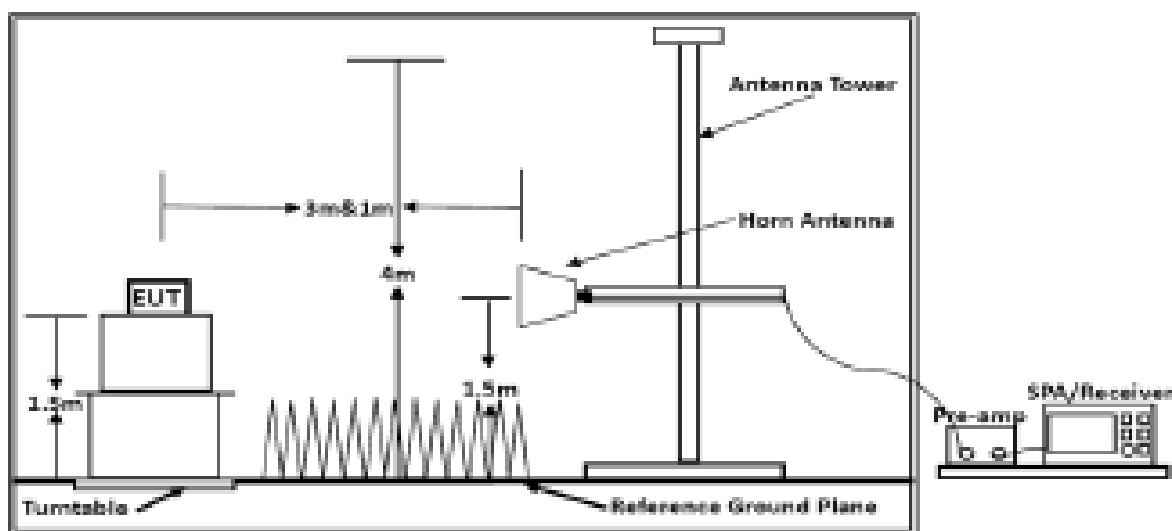
The EUT is placed at test table.

For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m

Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m~4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3m.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

TEST SETUP BLOCK DIAGRAM



Above 1GHz

Channel	Frequency (MHz)	EIRP (dBm)	Antenna Gain	Max Conducted Output power	Limit (dBm)	Result
0	2402	-3.20	+1	-4.20	30	WITHIN THE LIMITS
19	2440	-2.30	+1	-3.30		
39	2480	-2.70	+1	-3.70		
Note: ---						

TEST 3.	6dB CHANNEL BANDWIDTH 99% BW
REFERENCE DOCUMENT	According to §15,247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483,5 MHz, and 5725-5850 MHz bands, The minimum 6 dB bandwidth shall be at least 500 kHz.
CUSTOMER TEST ID	DDVT38 DDVT61 DDVT66

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TEST METHOD	KDB 558074 D01 par. 8.2 DTS Bandwidth Option 2
• TYPE OF MEASUREMENT	Radiated
• TEST EQUIPMENT USED FOR TEST	MXE Emi Receiver Keysight mod. N9038
• TEST PERFORMED BY	Daniele Aosani
• TESTED PORT	Antenna

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

OPERATING CONDITION :#1, #2, #3

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER – 6dB Bandwidth

Resolution bandwidth	100kHz
Video bandwidth	300kHz
Span	5MHz
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

MEASUREMENT PARAMETER – Occupied Bandwidth

Resolution bandwidth	30kHz
Video bandwidth	100kHz
Span	5MHz
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

TEST DESCRIPTION

Allow the trace to stabilize.

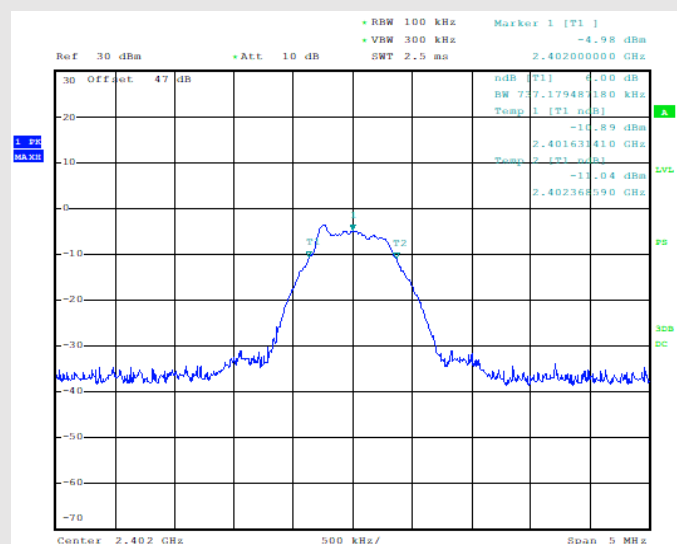
Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Measurement Result

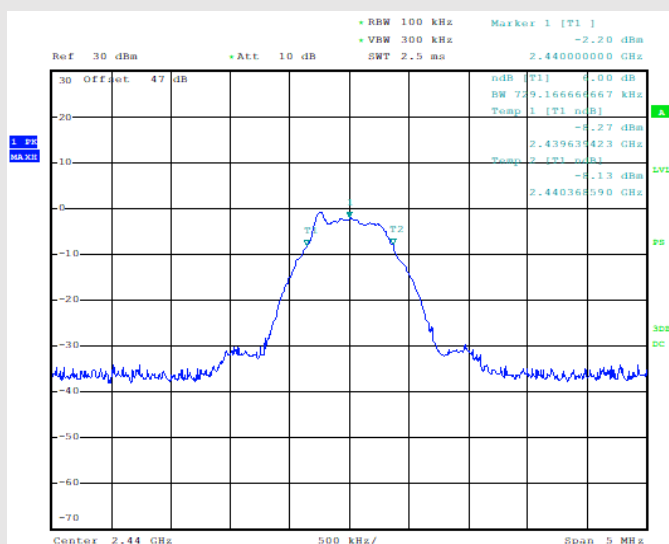
Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Occupied Bandwidth (kHz)	Verdict
0	2402	737.18	1074	Within the limits
19	2440	729.17	1034	
39	2480	745.19	1042	

6dB Bandwidth

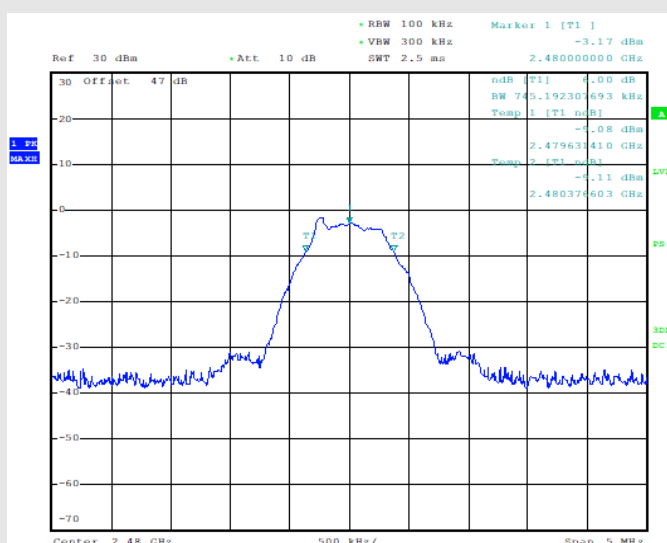
Channel 0



Channel 19

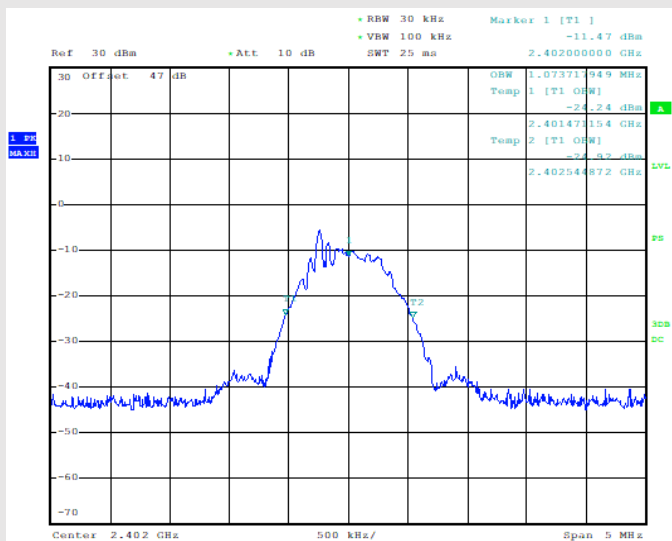


Channel 39

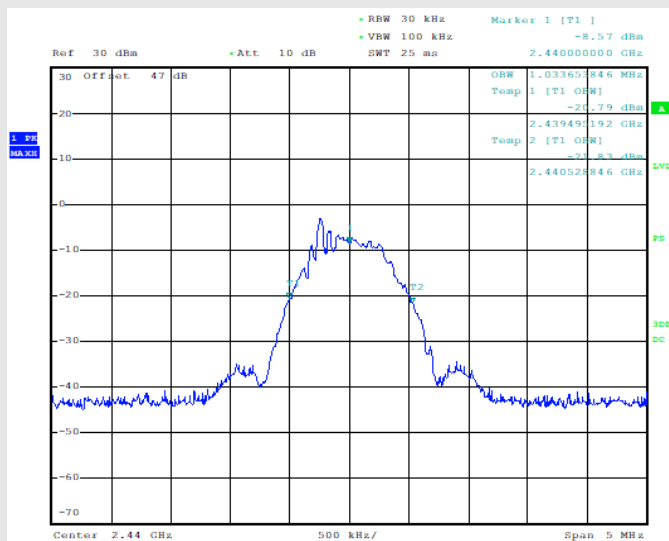


Occupied Bandwidth

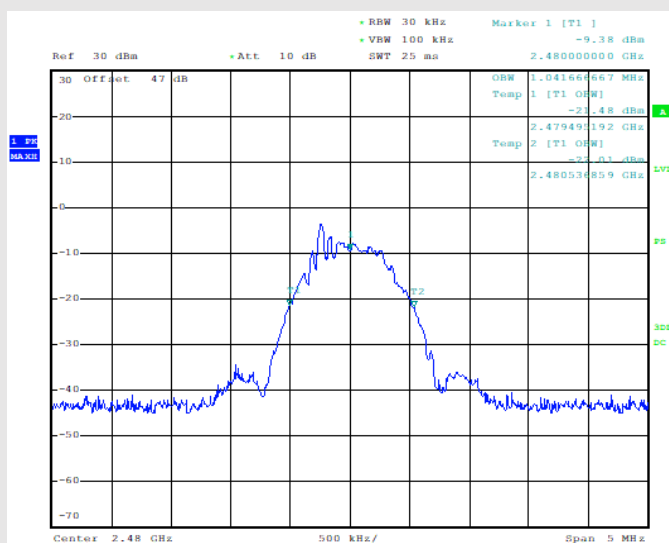
Channel 0



Channel 19



Channel 39



TEST 4.	BAND-EDGE
REFERENCE DOCUMENT	According to §15,247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits, If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB, Attenuation below the general limits specified in Sec, 15,209(a) is not required, In addition, radiated emissions which fall in the restricted bands, as defined in Sec, 15,205(a), must also comply with the radiated emission limits specified in Sec, 15,209(a) (see Sec, 15,205(c)),
CUSTOMER TEST ID	DDVT39 DDVT64

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TEST METHOD	ANSI C63.10:2013
• TYPE OF MEASUREMENT	Radiated
• TEST EQUIPMENT USED FOR TEST	Stabilized Power Supply Spitzenberger+Spies mod. PAS5000 MXE Emi Receiver Keysight mod. N9038
• TEST PERFORMED BY	Daniele Aosani
• TESTED PORT	Anetanna

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

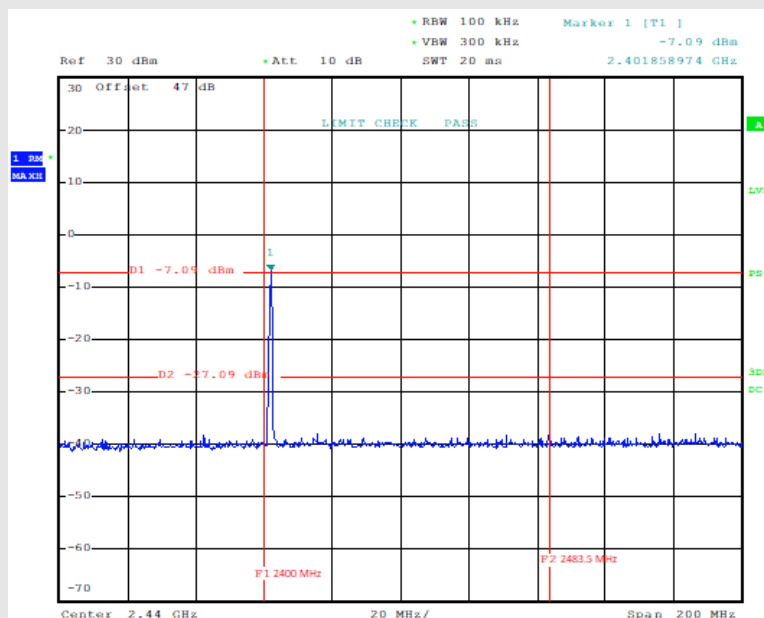
OPERATING CONDITION :#1, #3

RESULT: WITHIN THE LIMITS

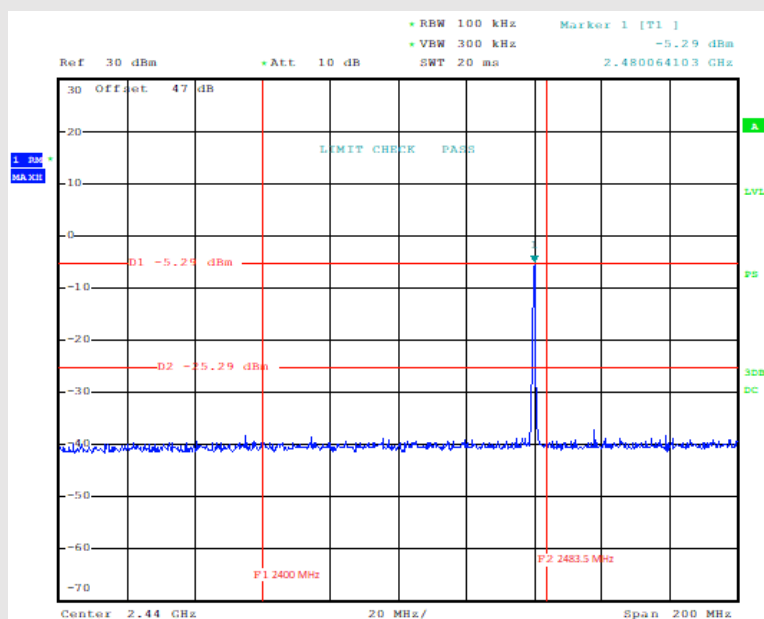
MEASUREMENT PARAMETER	
Resolution bandwidth	100kHz
Video bandwidth	300kHz
Span	200MHz
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

MEASUREMENT RESULT

LOWER BAND-EDGE CH 0



UPPER BAND-EDGE CH 39



TEST 5.	POWER SPECTRAL DENSITY
REFERENCE DOCUMENT	According to §15,247) (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission, This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section, The same method of determining the conducted output power shall be used to determine the power spectral density
CUSTOMER TEST ID	DDVT40 DDVT62

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TEST METHOD	KDB 558074 D01 par. 10.2 Method PKPSD (peak PSD)
• TYPE OF MEASUREMENT	Radiated
• TEST EQUIPMENT USED FOR TEST	MXE Emi Receiver Keysight mod. N9038
• TEST PERFORMED BY	Daniele Aosani
• TESTED PORT	Antenna

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

OPERATING CONDITION :#1, #2, #3
--

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER

Resolution bandwidth	100kHz
Video bandwidth	300kHz
Span	2MHz
Sweep time	Auto couple
Detector	RMS
Trace-Mode	Max. hold

TEST DESCRIPTION

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz or 100kHz if a RMS detector was used) and repeat

Measurement Result

Channel	Frequency (MHz)	PSD (dBm/100kHz)	Limit (dBm/100kHz)	Margin (dB)	Result
0	2402	-3.63	8	11.63	WITHIN THE LIMITS
19	2440	-0.96	8	8.96	
39	2480	-1.37	8	9.37	
Incertezza di misura / Measurement Uncertainty: ±1dB					

TEST 6.	RF RADIATED SPURIOUS EMISSIONS AT THE TRANSMITTER ANTENNA TERMINAL
REFERENCE DOCUMENT	According to §15,247) d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 Db below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 Db instead of 20 Db. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).
CUSTOMER TEST ID	DDVT42 DDVT63

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TYPE OF MEASUREMENT	Radiated
• TEST METHOD	KDB 558074 D01 par. 11.0
• TEST EQUIPMENT USED FOR TEST	MXE Emi Receiver Keysight mod. N9038A
• TEST PERFORMED BY	Daniele Aosani
• TESTED PORTO	Antenna

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

OPERATING CONDITION :#1, #2, #3

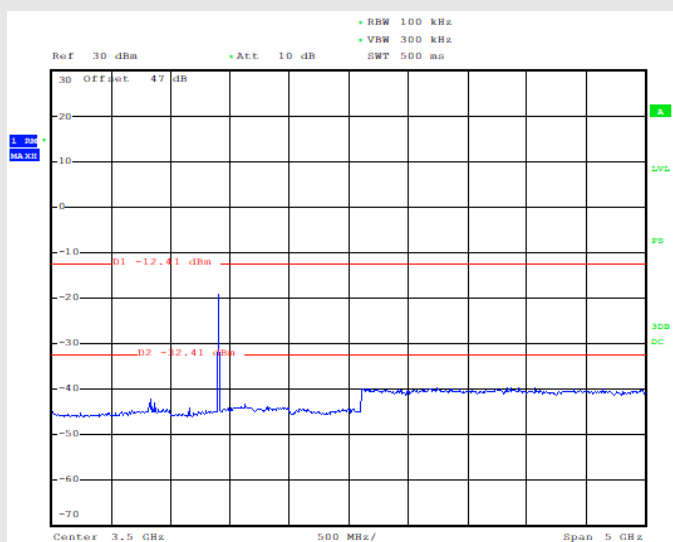
RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER	
Resolution bandwidth	100kHz
Video bandwidth	300kHz
Span	See plots below
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

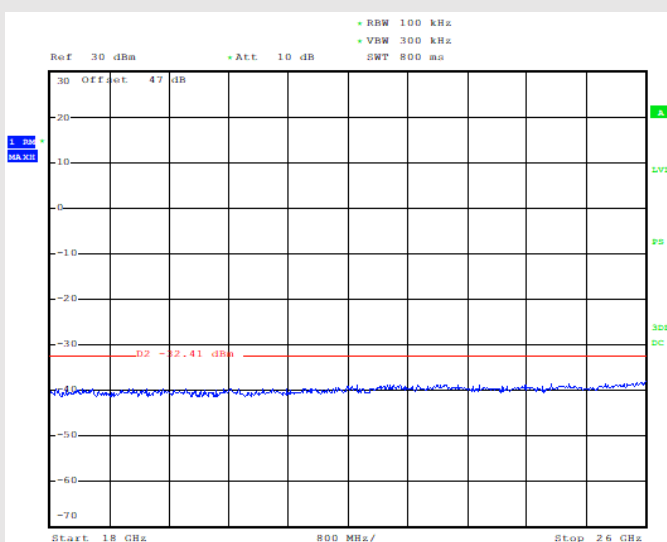
MEASUREMENT RESULTS

Channel 0 – Frequency 2402MHz

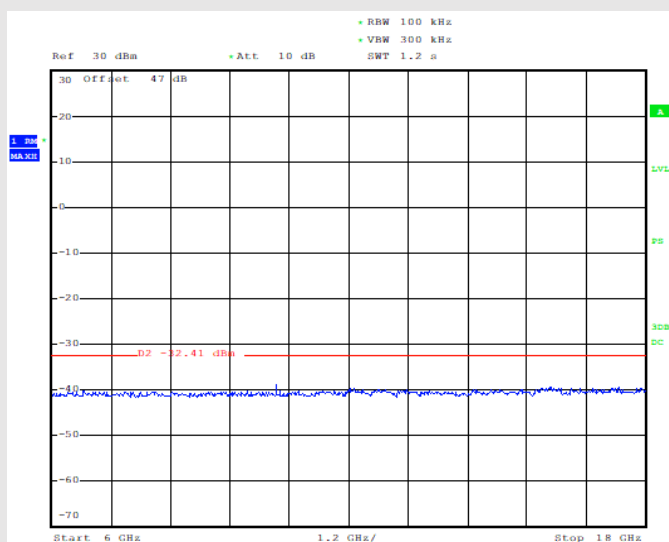
Frequency range: 1GHz – 6GHz



Frequency range: 6GHz – 18GHz



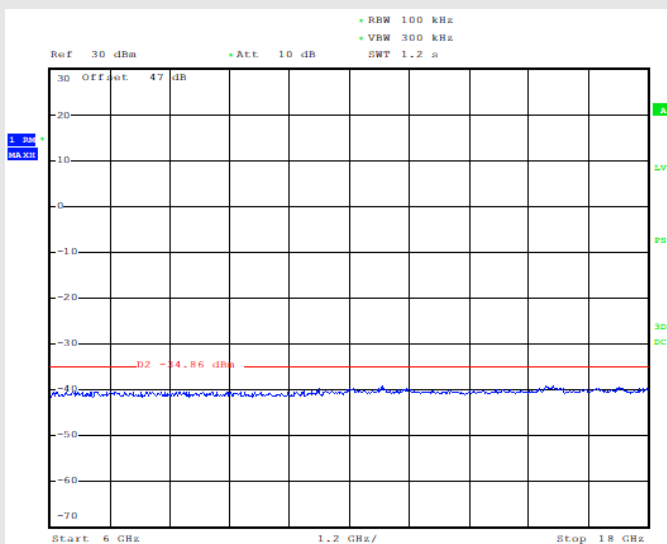
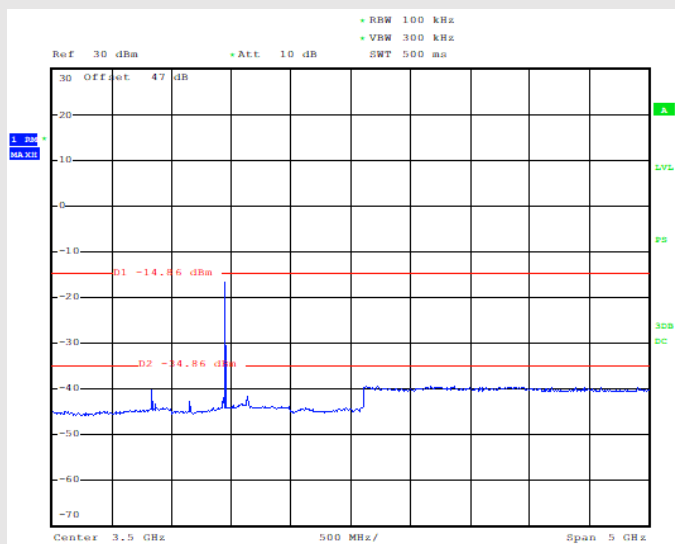
Frequency range: 18GHz – 26GHz



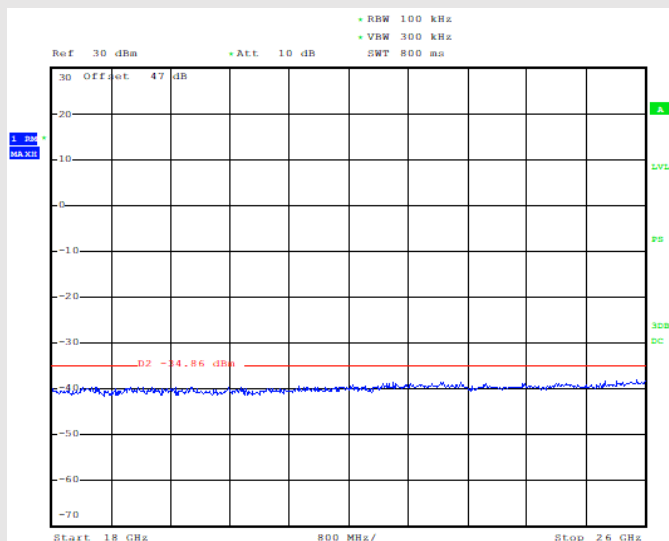
Channel 19 – Frequency 2440MHz

Frequency range: 1GHz – 6GHz

Frequency range: 6GHz – 18GHz



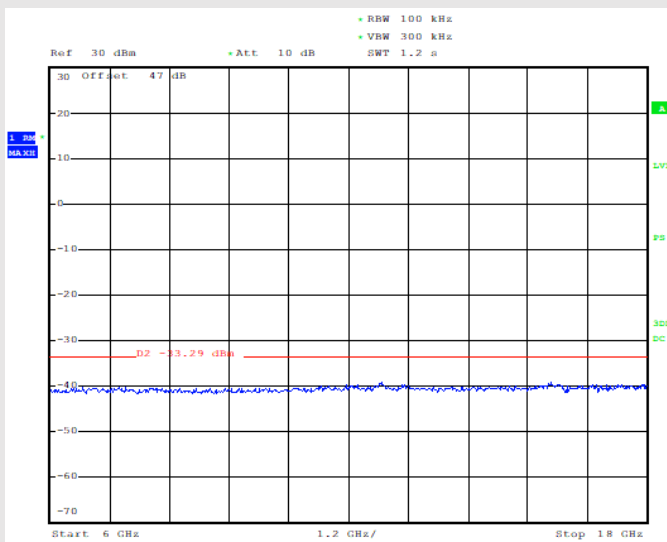
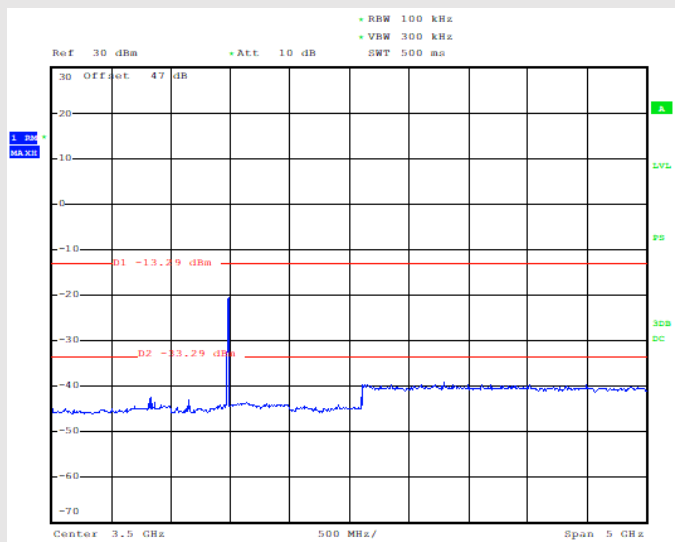
Frequency range: 18GHz – 26GHz



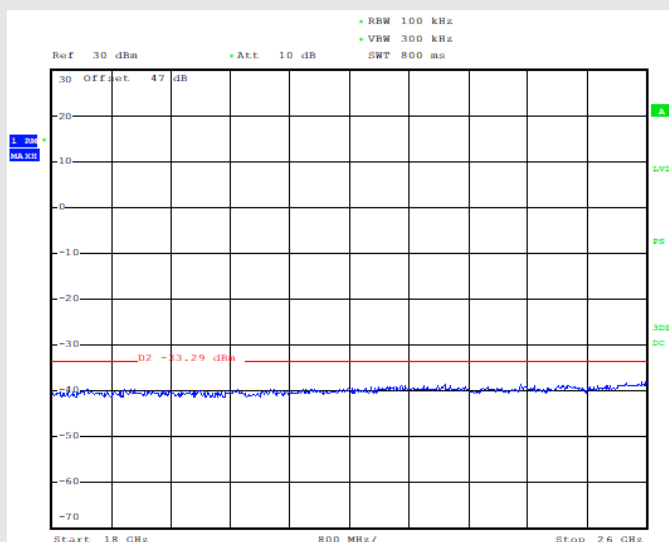
Channel 39 – Frequency 2480MHz

Frequency range: 1GHz – 6GHz

Frequency range: 6GHz – 18GHz



Frequency range: 18GHz – 26GHz



TEST 7.	RADIATED EMISSION 9kHz ÷ 10th HARMONIC
REFERENCE DOCUMENT	According to §15,247) d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 Db below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 Db instead of 20 Db. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).
CUSTOMER TEST ID	DDVT41 DDVT65

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Semi-anechoic chamber with measure distance at 3 meters
• TYPE OF MEASUREMENT	Radiated
• TEST EQUIPMENT USED FOR TEST	MXE Emi Receiver Keysight mod. N9038 Loop Antenna Rohde & Schwarz mod. HFH 2-Z2 Bi-log antenna Chase mod. CBL6111C Horn antenna Electro Metrics mod. EM-6961 Horn antenna + Low Noise Preamplifier Bonn Elektronik mod. BLMA 1840-1 ^a High pass filter Wainwright mod. WHK 2.8/15G SW Rohde & Schwarz EMC32-E
• TEST PERFORMED BY	Daniele Aosani
• UNCERTAINTY OF MEASURE:	Level of confidence = 95% (k=2) Expanded uncertainty 9kHz – 30MHz = 4,24 dB Expanded uncertainty 30MHz – 1GHz = 5,86 dB Expanded uncertainty 1GHz – 18GHz = 5,3 dB Expanded uncertainty 18GHz – 26GHz = 5,82 dB

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

OPERATING CONDITION :#1, #2, #3

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER 9kHz – 30MHz

Resolution bandwidth:	200Hz
Video bandwidth:	1kHz
Span:	See plots below
Sweep time	Auto couple
Detector:	Peak
Trace-Mode:	Max. hold

MEASUREMENT PARAMETER 30MHz – 1GHz

Resolution bandwidth:	100kHz
Video bandwidth:	300kHz
Span:	See plots below
Sweep time	Auto couple
Detector:	Peak
Trace-Mode:	Max. hold

MEASUREMENT PARAMETER 1GHz - 10GHz

Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Span:	See plots below
Sweep time	Auto couple
Detector:	Peak
Trace-Mode:	Max. hold

TEST DESCRIPTION

Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously - rotating, remotely - controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency.

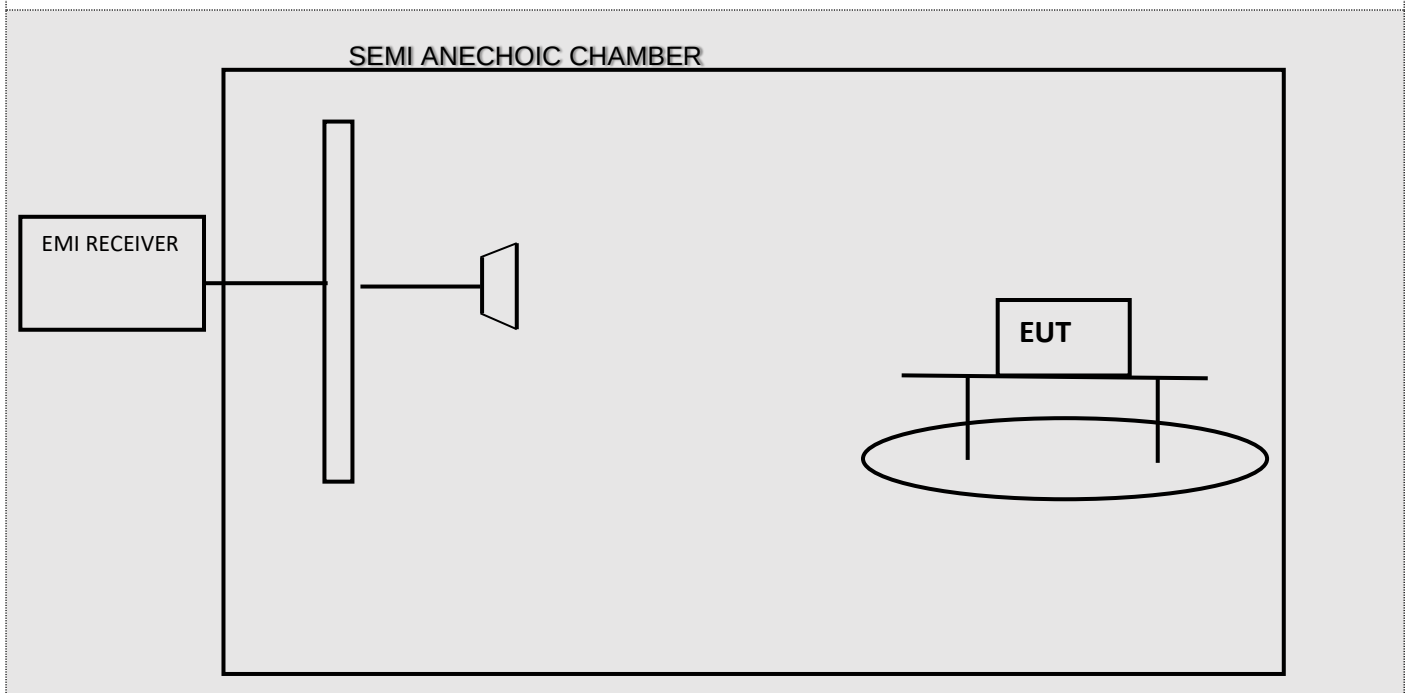
The EUT is placed at test table.

For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m

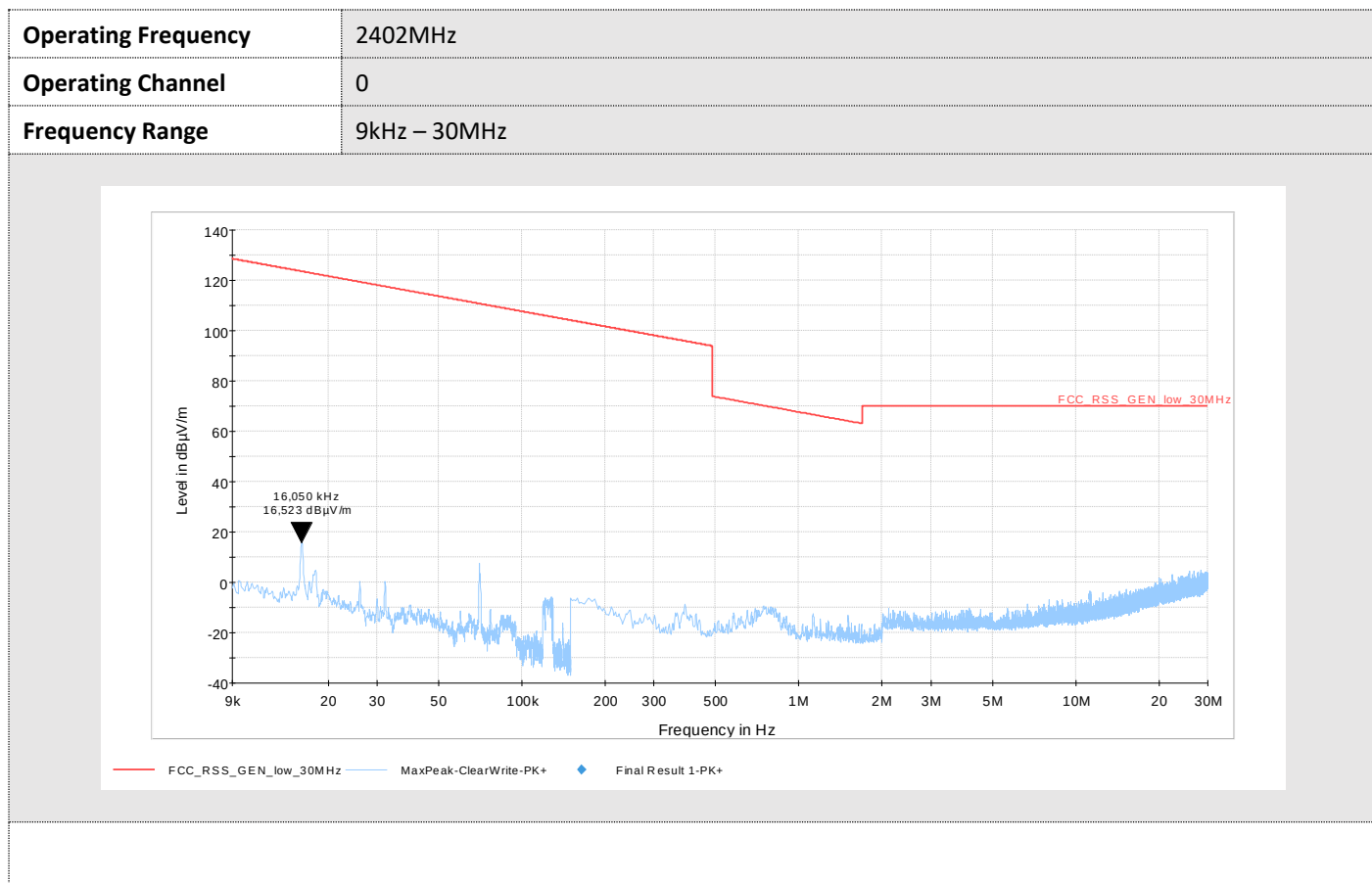
Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m~4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3m.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

TEST SETUP BLOCK DIAGRAM

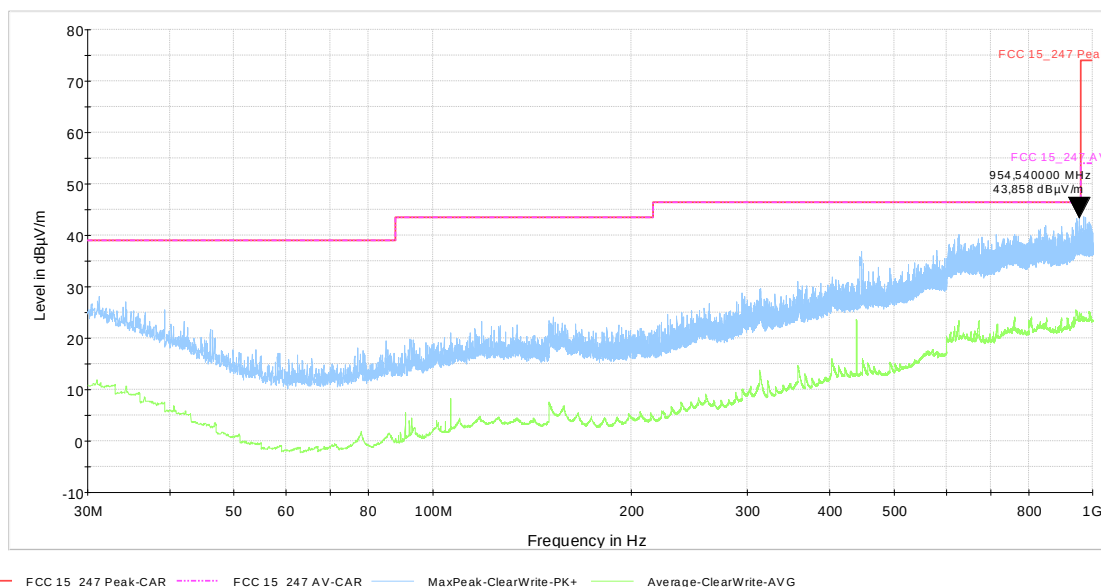


MEASUREMENT RESULT



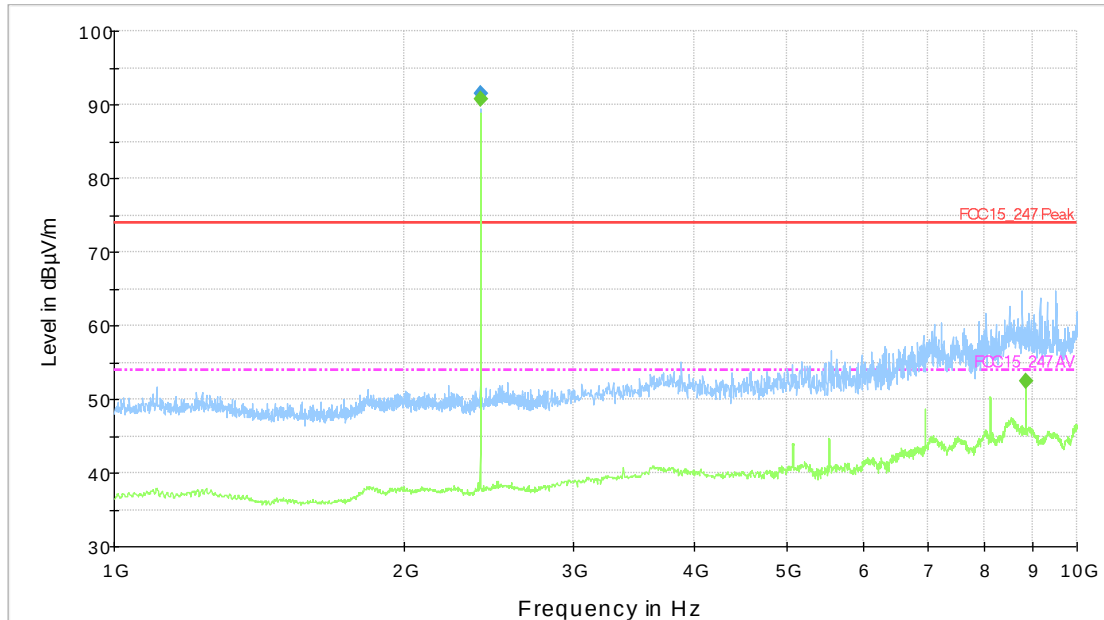
Frequency Range 30MHz – 1GHz

Polarization Vertical



Frequency Range 1GHz – 10GHz

Polarization Vertical



— FCC15_247 Peak-CAR — FCC15_247 AV-CAR — Preview Result 1-PK+
— Preview Result 2-AVG ◆ Final Result 1-PK+ ◆ Final Result 2-AVG

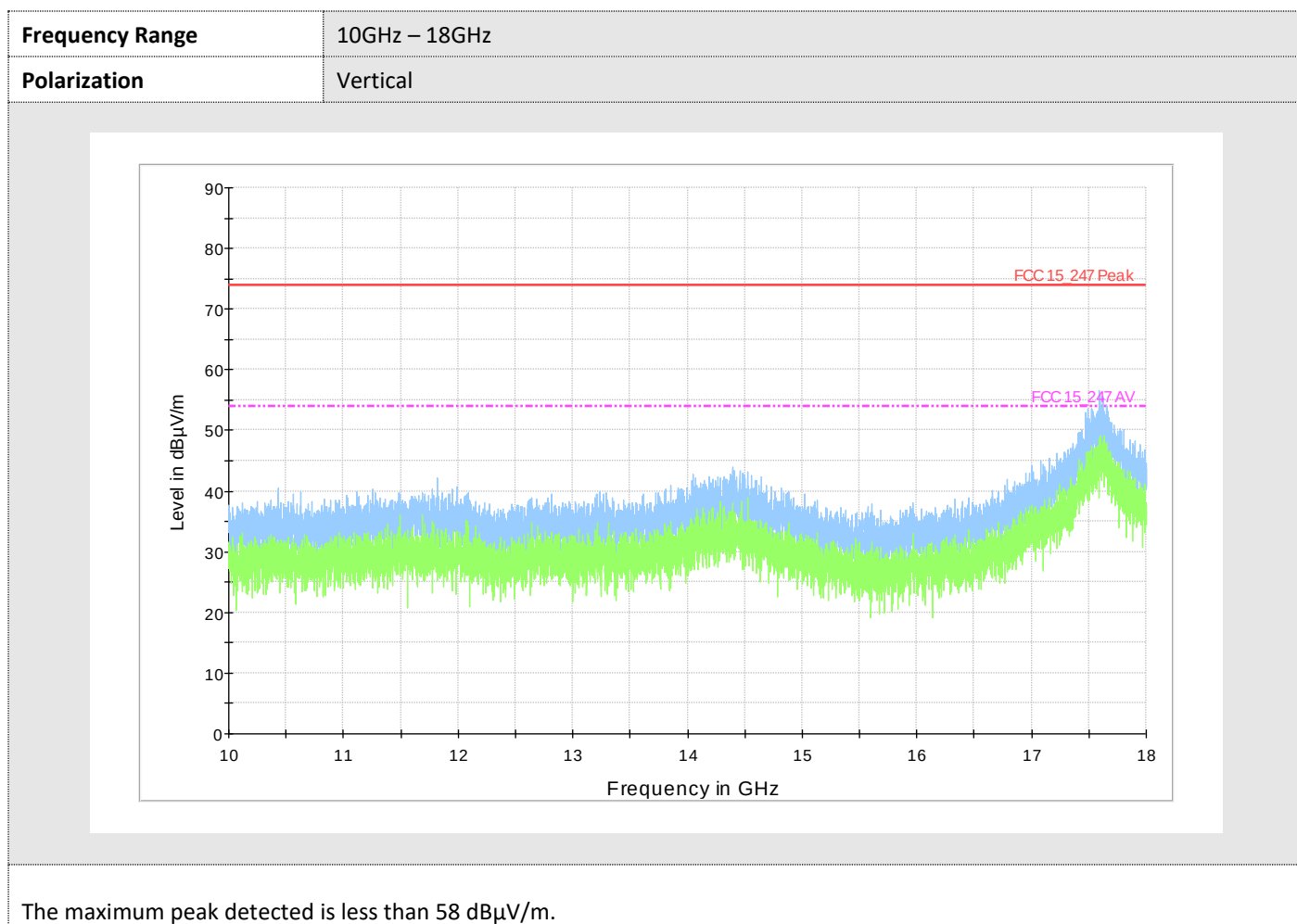
Final Result Peak

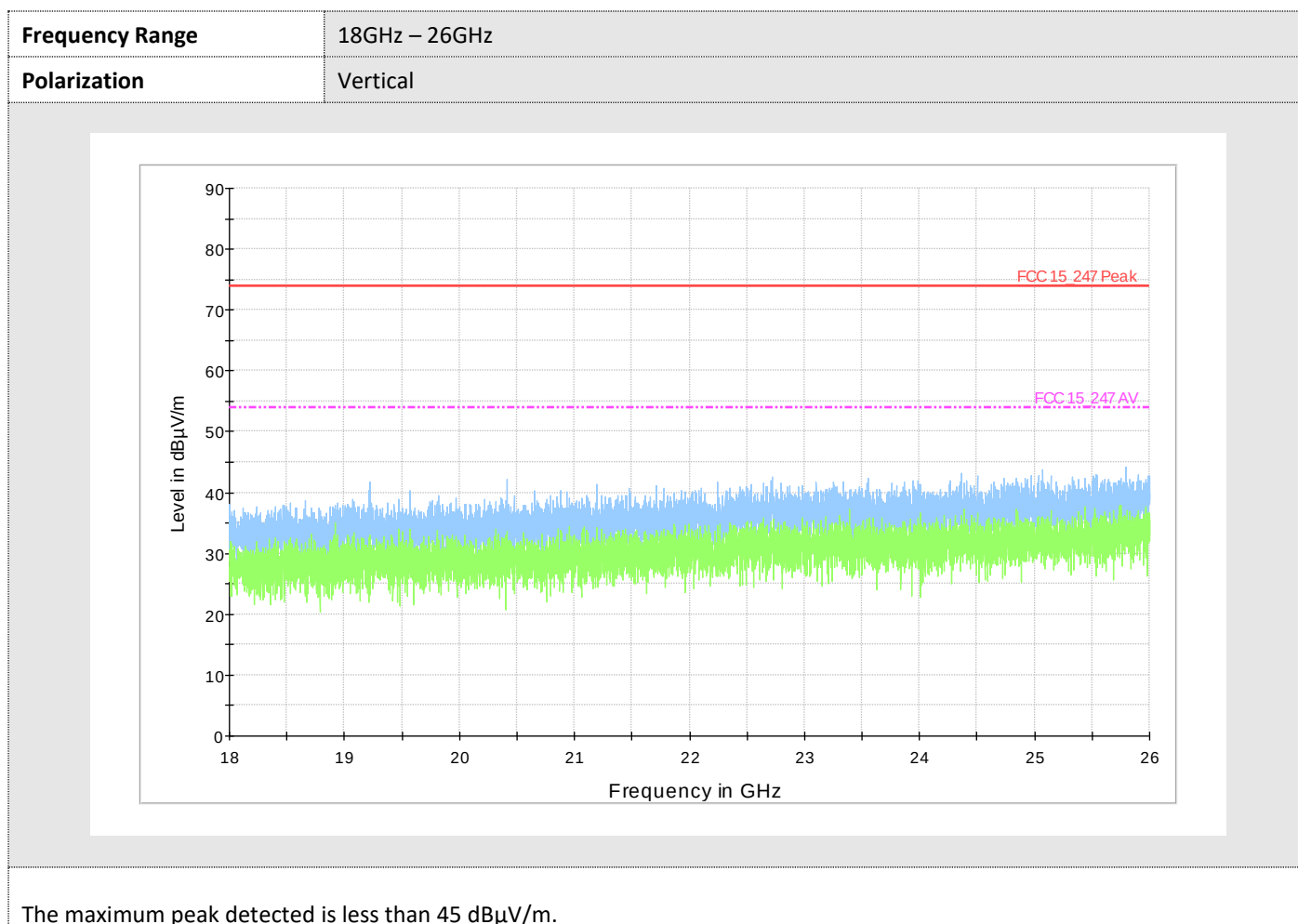
Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2402.000000	91.5	321.6	-8.0	-17.50	74.00

Final Result Average

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2402.000000	90.8	316.6	-8.0	-36.80	54.00
8855.000000	52.5	316.0	0.0	1.50	54.00

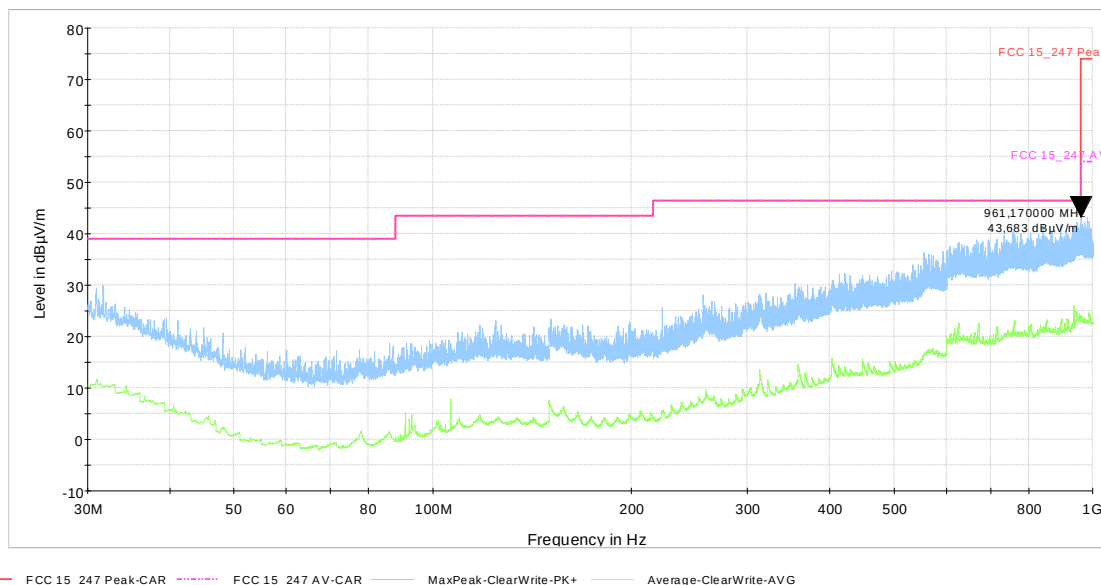
NOTE: Peak out of limits is due to the BLE carrier, this frequency falls in Exclusion Band and is not evaluated in this test.





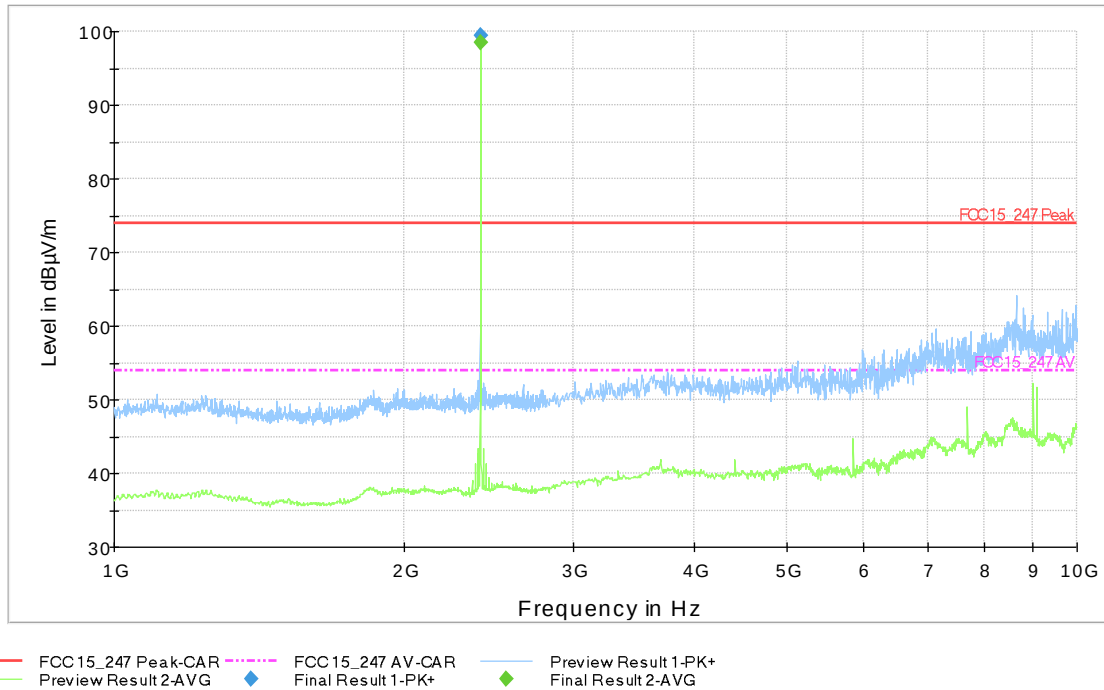
Frequency Range 30MHz – 1GHz

Polarization Horizontal



Frequency Range 1GHz – 10GHz

Polarization Horizontal



Final Result Peak

Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
2402.000000	99.4	106.9	87.0	-25.40	74.00

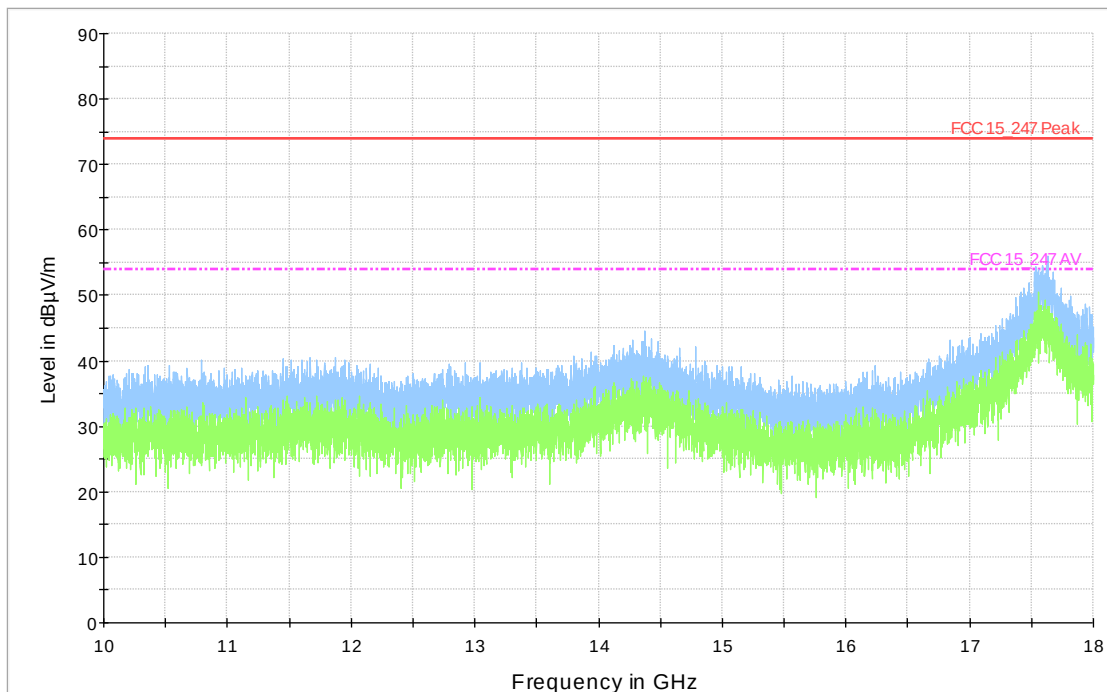
Final Result Average

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
2402.000000	98.6	106.9	85.0	-44.60	54.00

NOTE: Peak out of limits is due to the BLE carrier, this frequency falls in Exclusion Band and is not evaluated in this test.

Frequency Range 10GHz – 18GHz

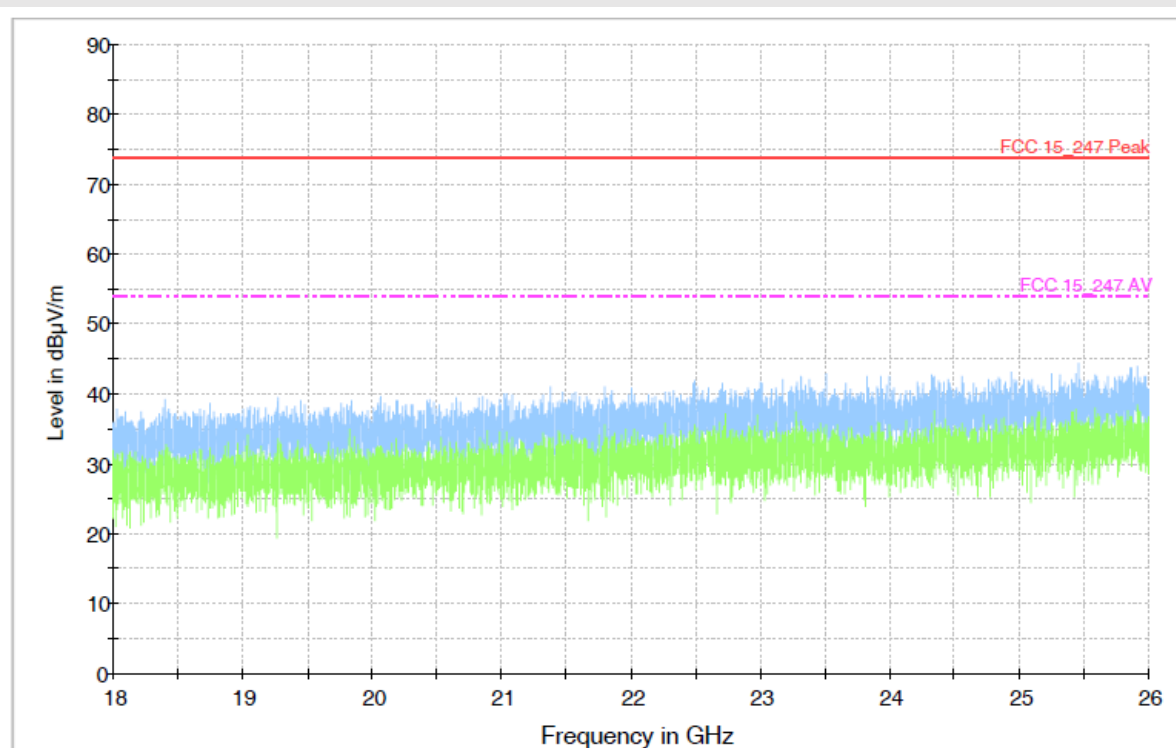
Polarization Horizontal



The maximum peak detected is less than 58 dBμV/m.

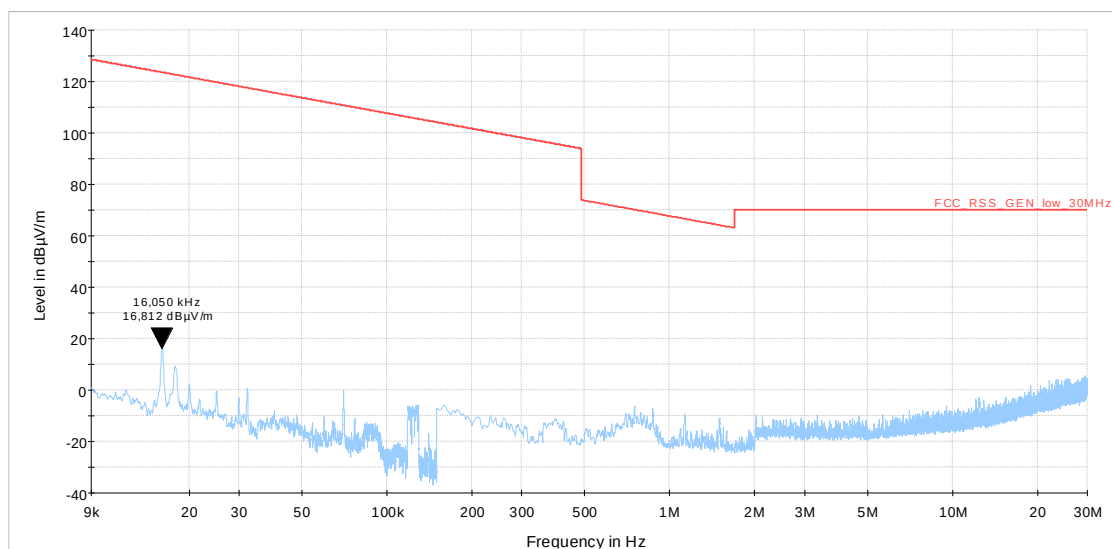
Frequency Range 18GHz – 26GHz

Polarization Horizontal



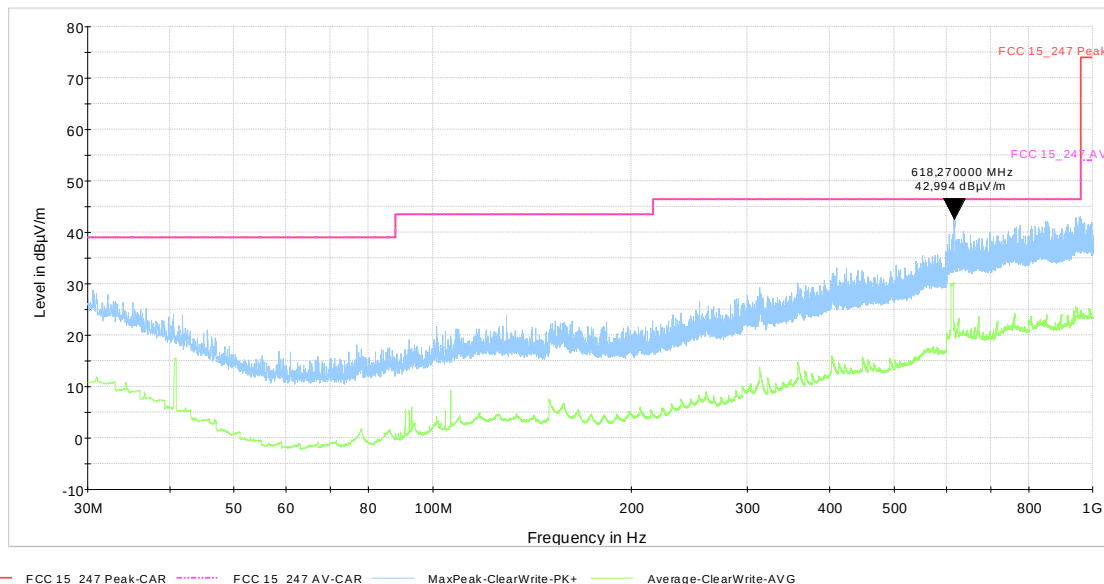
The maximum peak detected is less than 45 dBμV/m.

Operating Frequency	2440MHz
Operating Channel	19
Frequency Range	9kHz – 30MHz

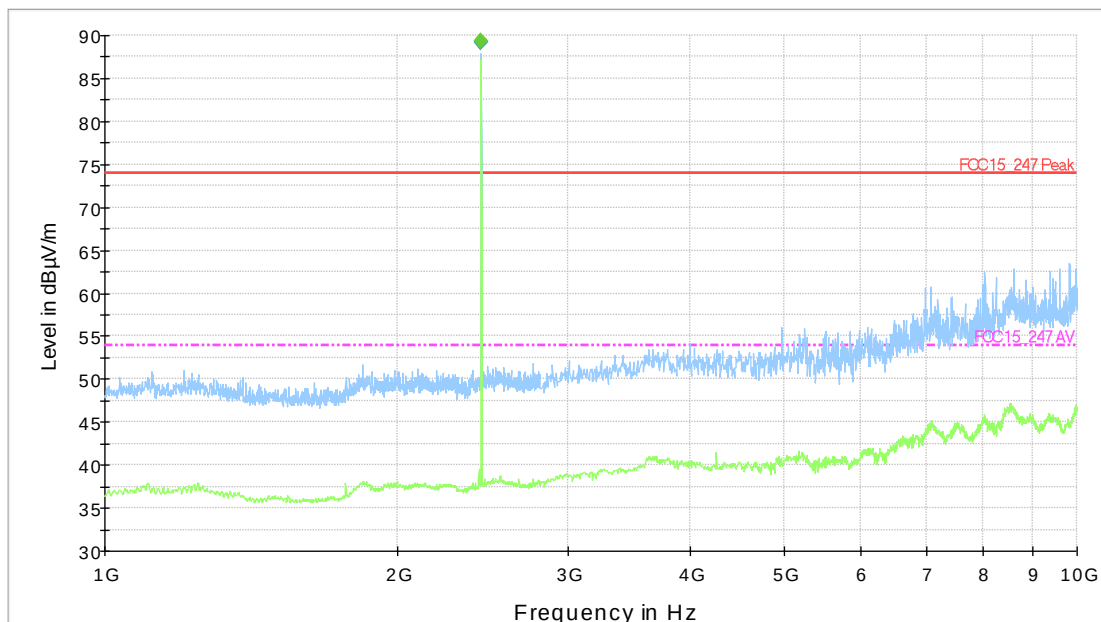


Frequency Range 30MHz – 1GHz

Polarization Vertical



Frequency Range	1GHz – 10GHz
Polarization	Vertical



— FCC15_247 Peak-CAR - - - FCC15_247 AV-CAR — Preview Result 1-PK+
— Preview Result 2-AVG ◆ Final Result 1-PK+ ◆ Final Result 2-AVG

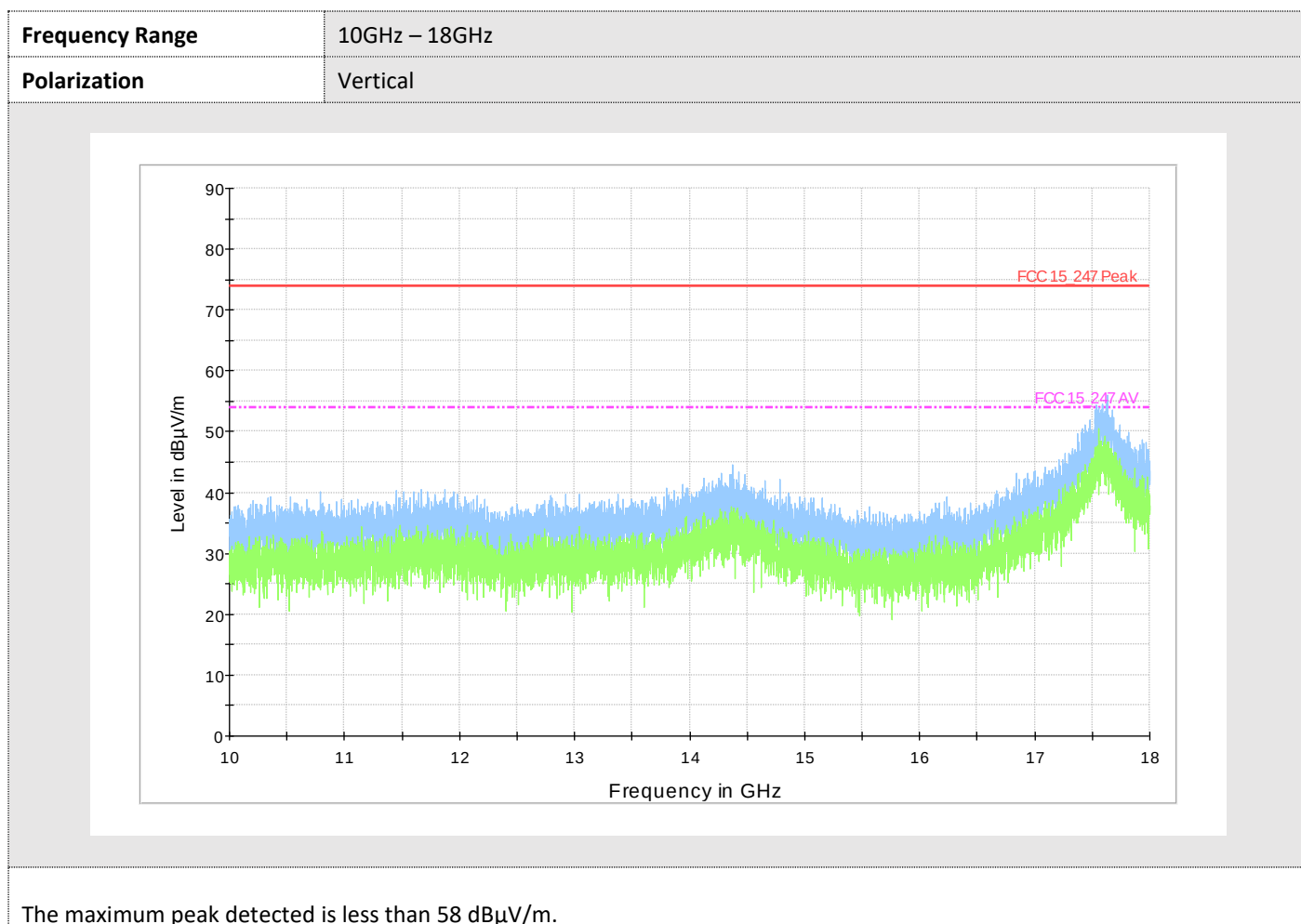
Final Result Peak

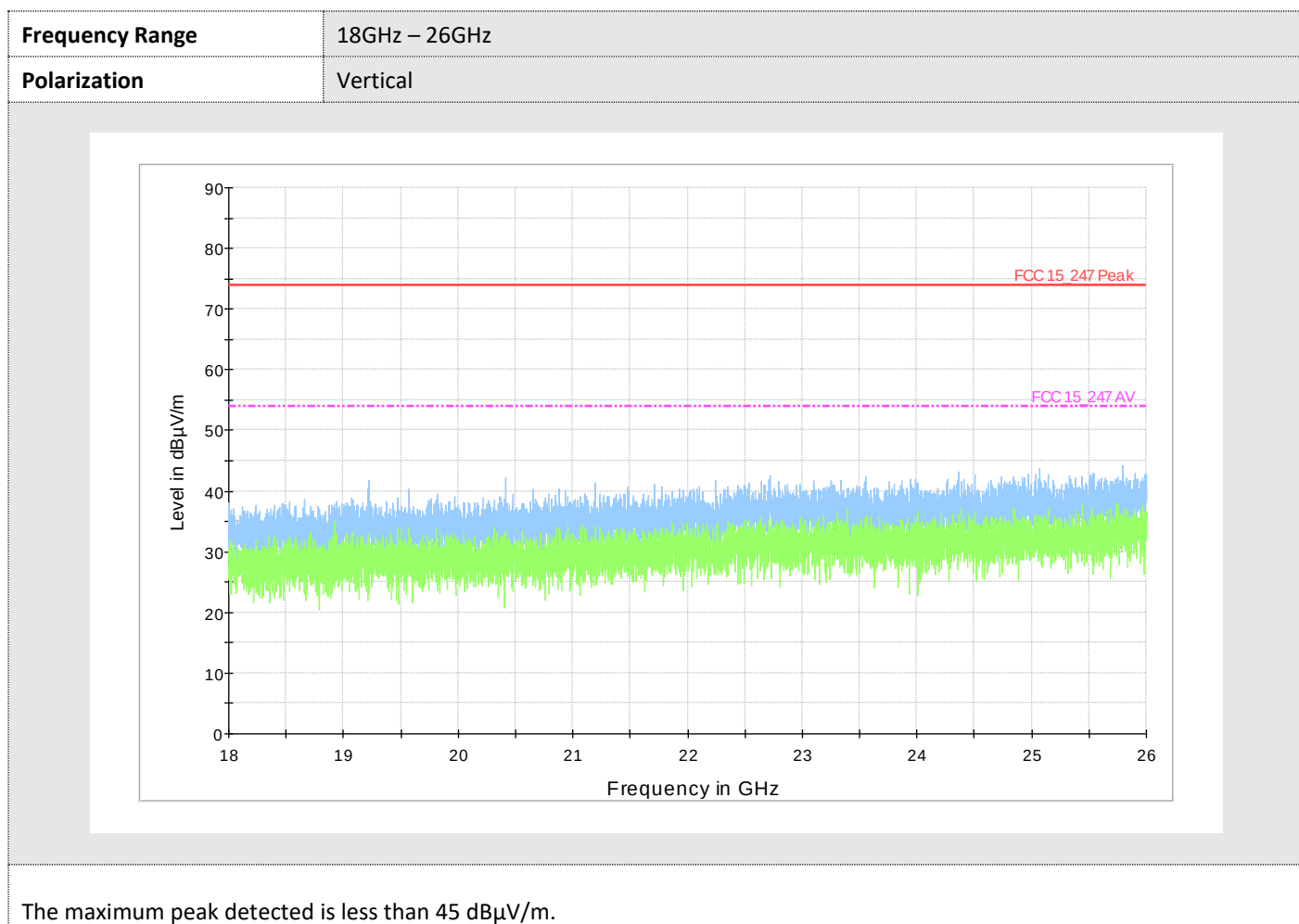
Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
2440.000000	89.3	325.5	-5.0	-15.30	74.00

Final Result Average

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
2440.000000	89.3	298.5	-4.0	-35.30	54.00

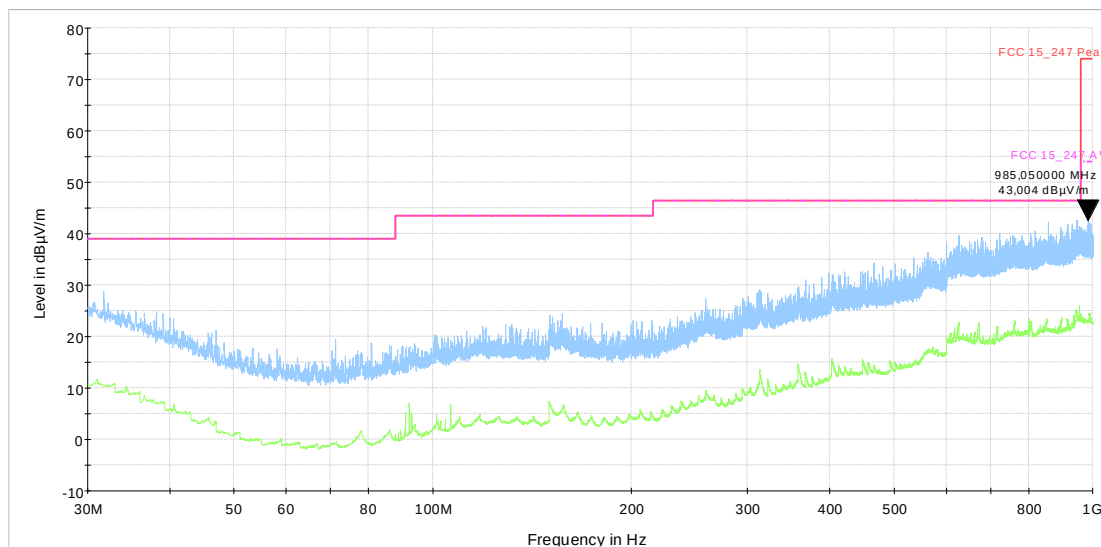
NOTE: Peak out of limits is due to the BLE carrier, this frequency falls in Exclusion Band and is not evaluated in this test.



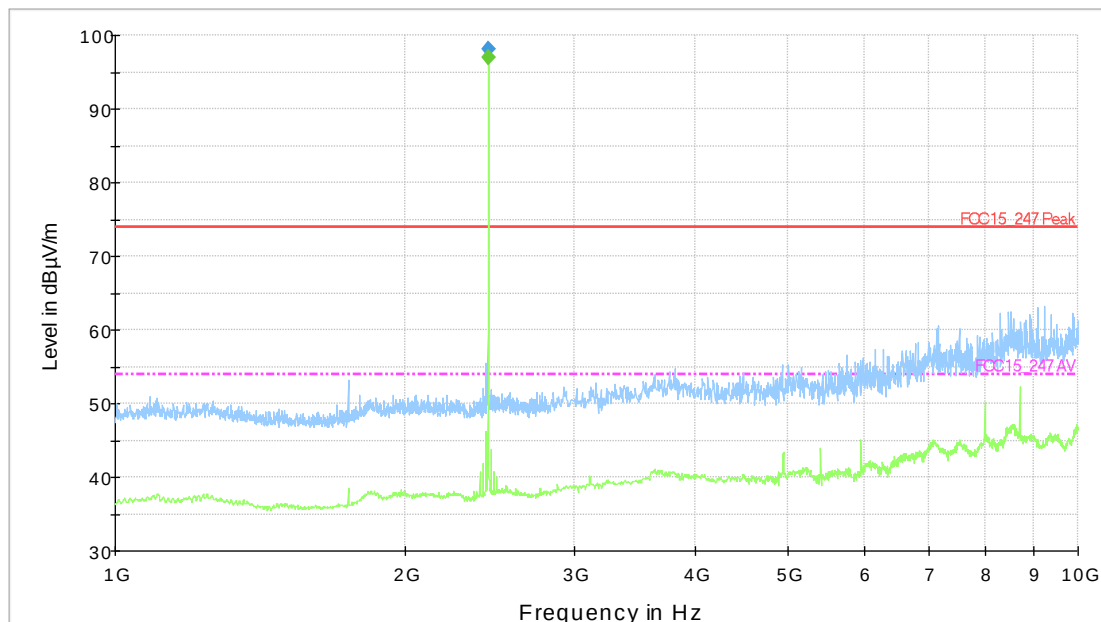


Frequency Range 30MHz – 1GHz

Polarization Horizontal



Frequency Range	1GHz – 10GHz
Polarization	Horizontal



— FCC15_247 Peak-CAR — FCC15_247 AV-CAR — Preview Result 1-PK+
— Preview Result 2-AVG ◆ Final Result 1-PK+ ◆ Final Result 2-AVG

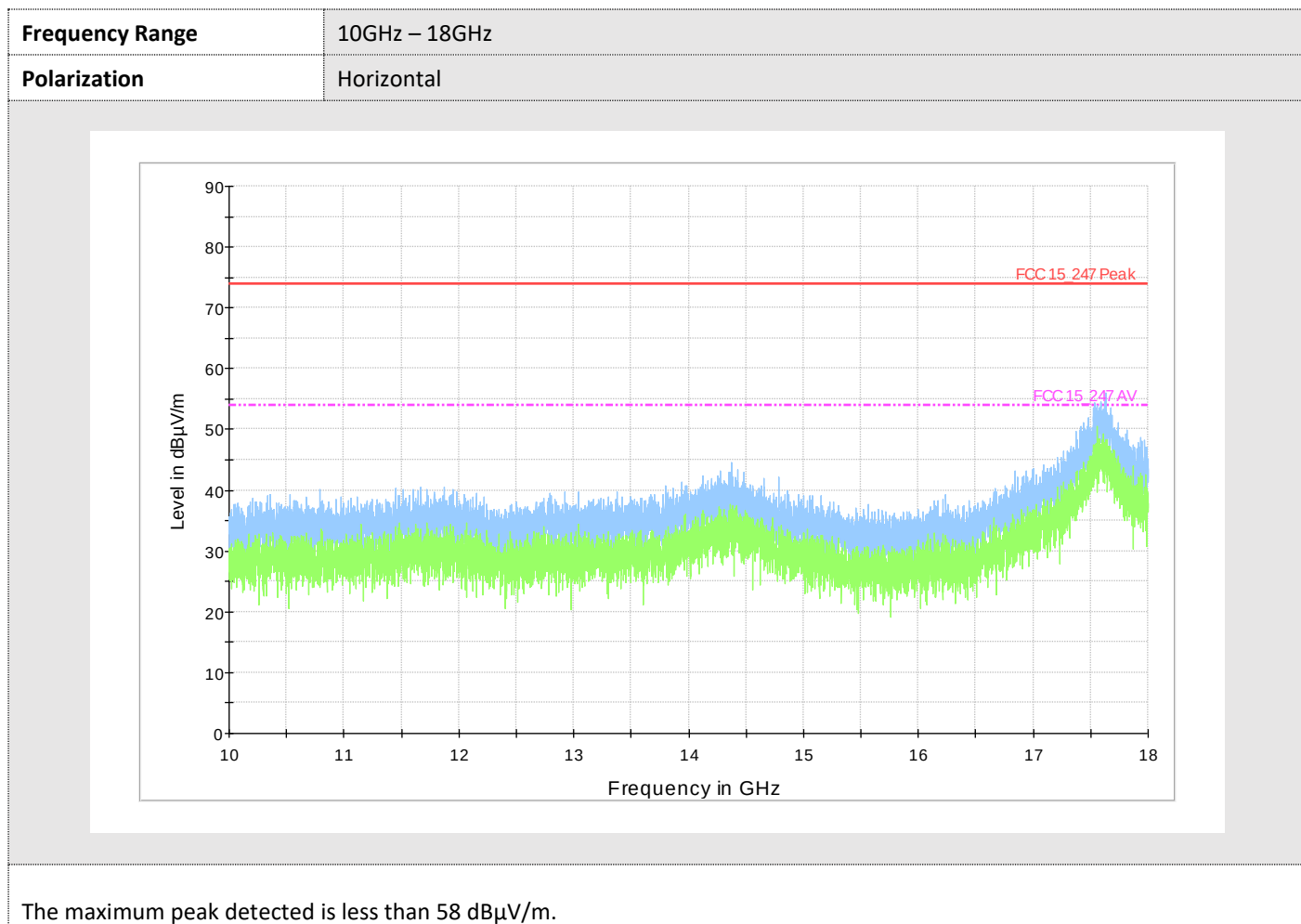
Final Result Peak

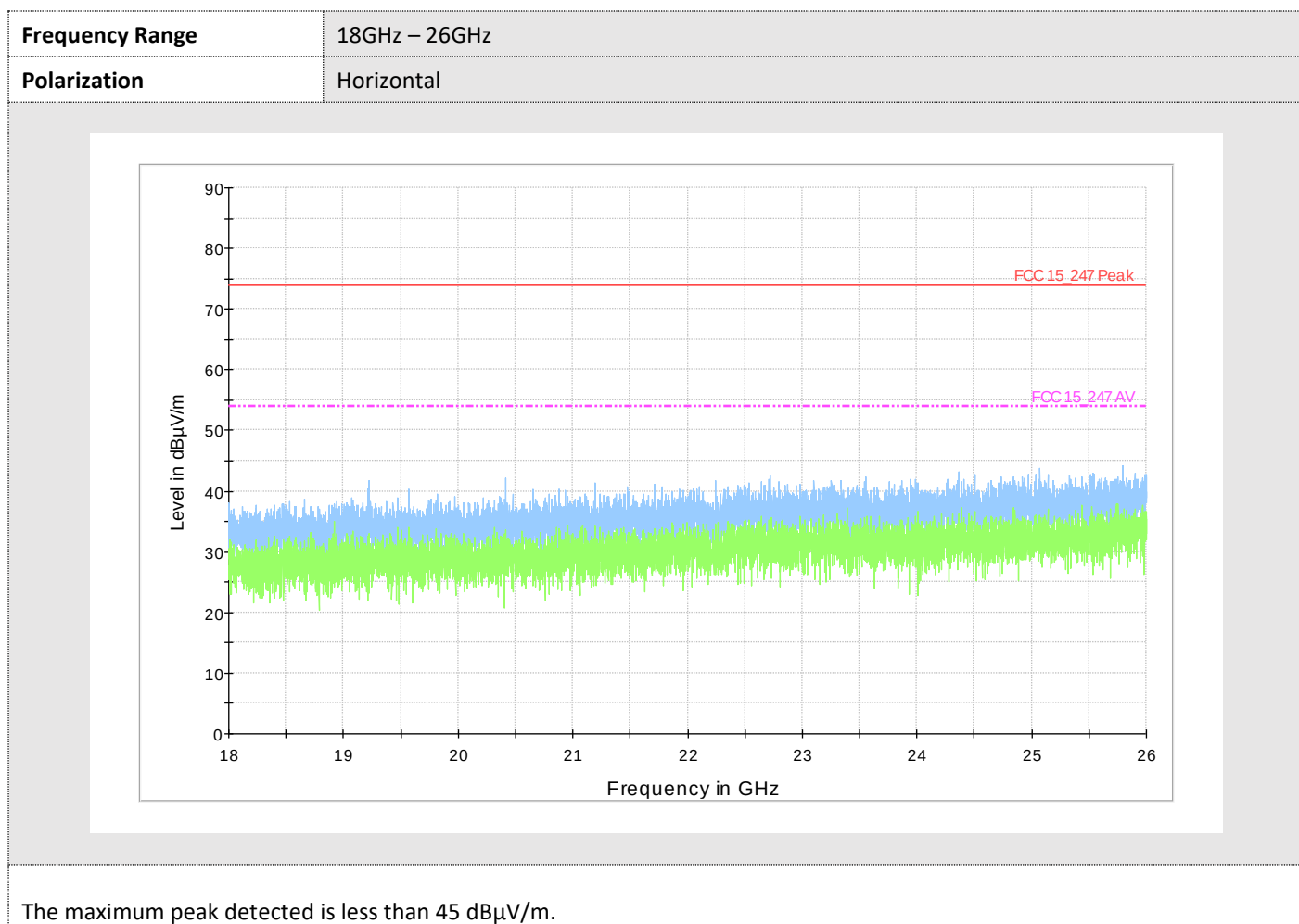
Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2440.000000	98.1	149.9	277.0	-24.10	74.00

Final Result Average

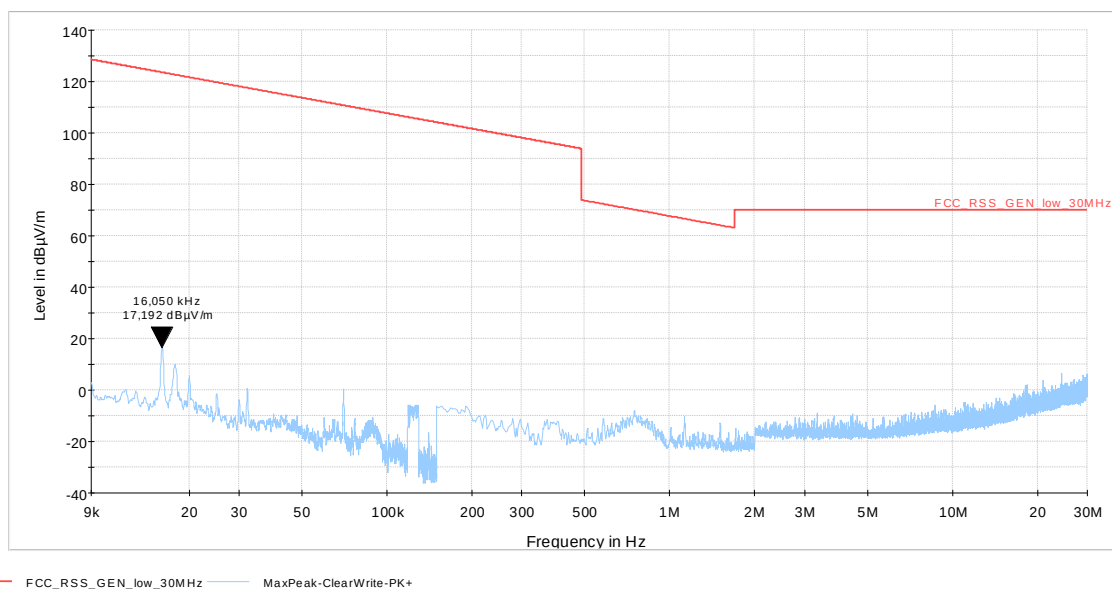
Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2440.000000	96.9	151.6	277.0	-42.90	54.00

NOTE: Peak out of limits is due to the BLE carrier, this frequency falls in Exclusion Band and is not evaluated in this test.



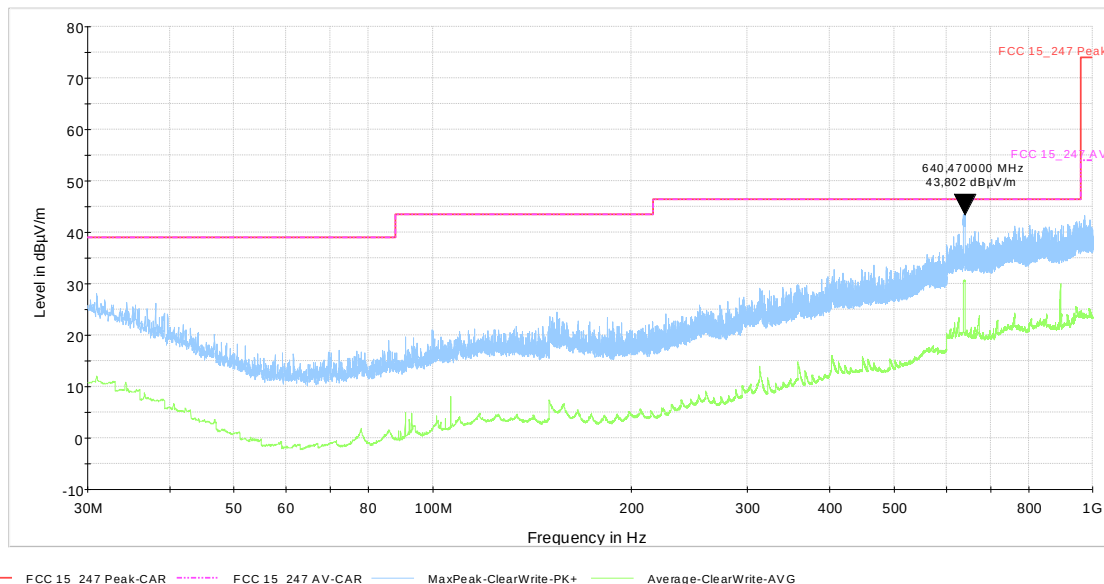


Operating Frequency	2480MHz
Operating Channel	39
Frequency Range	9kHz – 30MHz



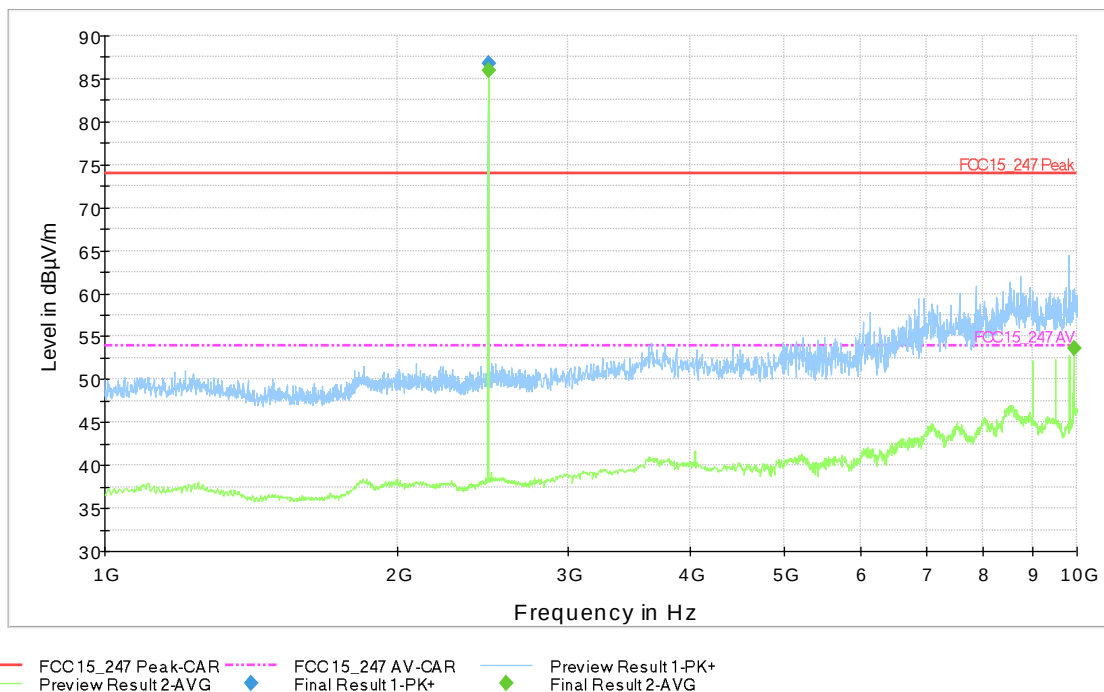
Frequency Range 30MHz – 1GHz

Polarization Vertical



Frequency Range 1GHz – 10GHz

Polarization Vertical



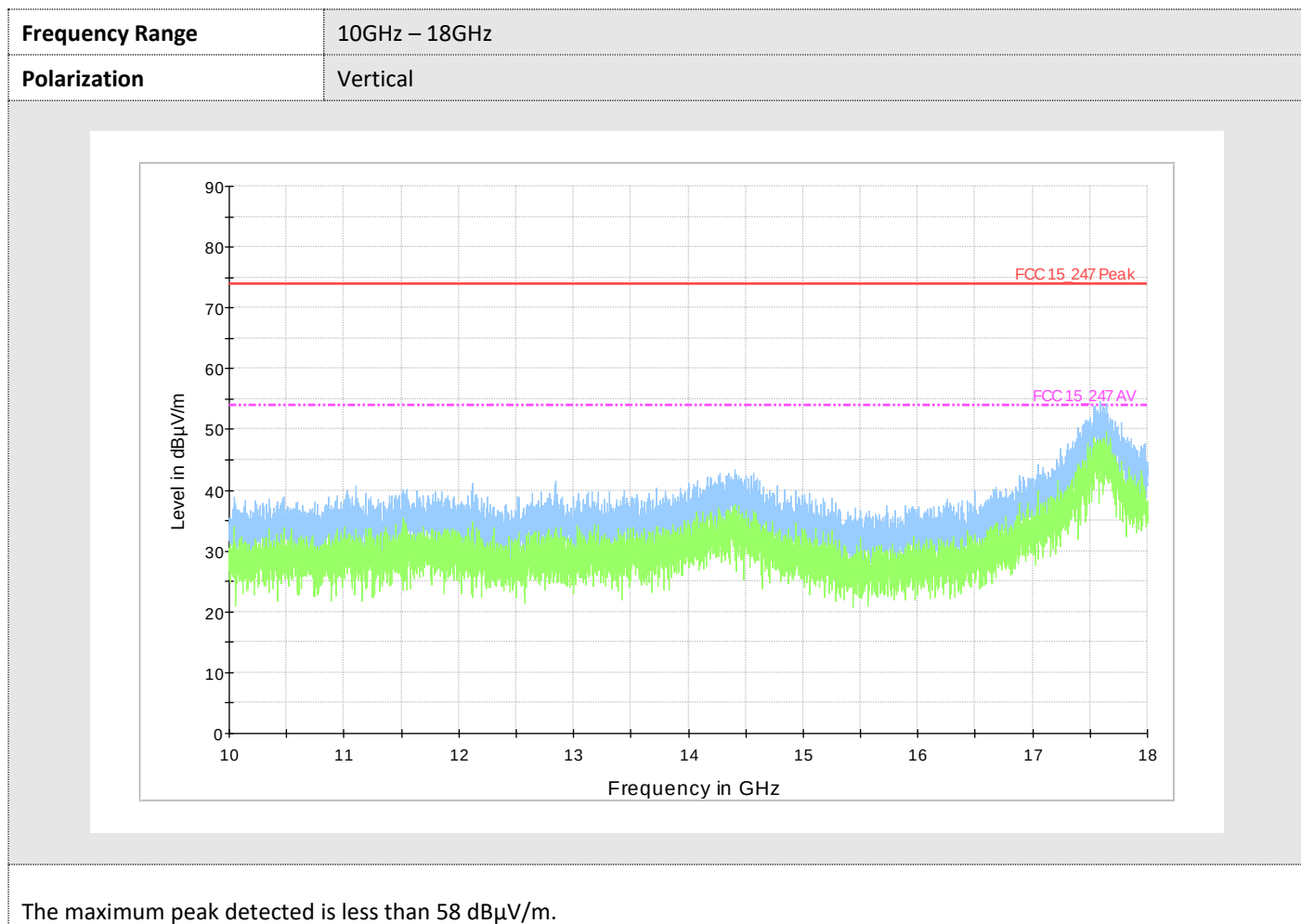
Final Result Peak

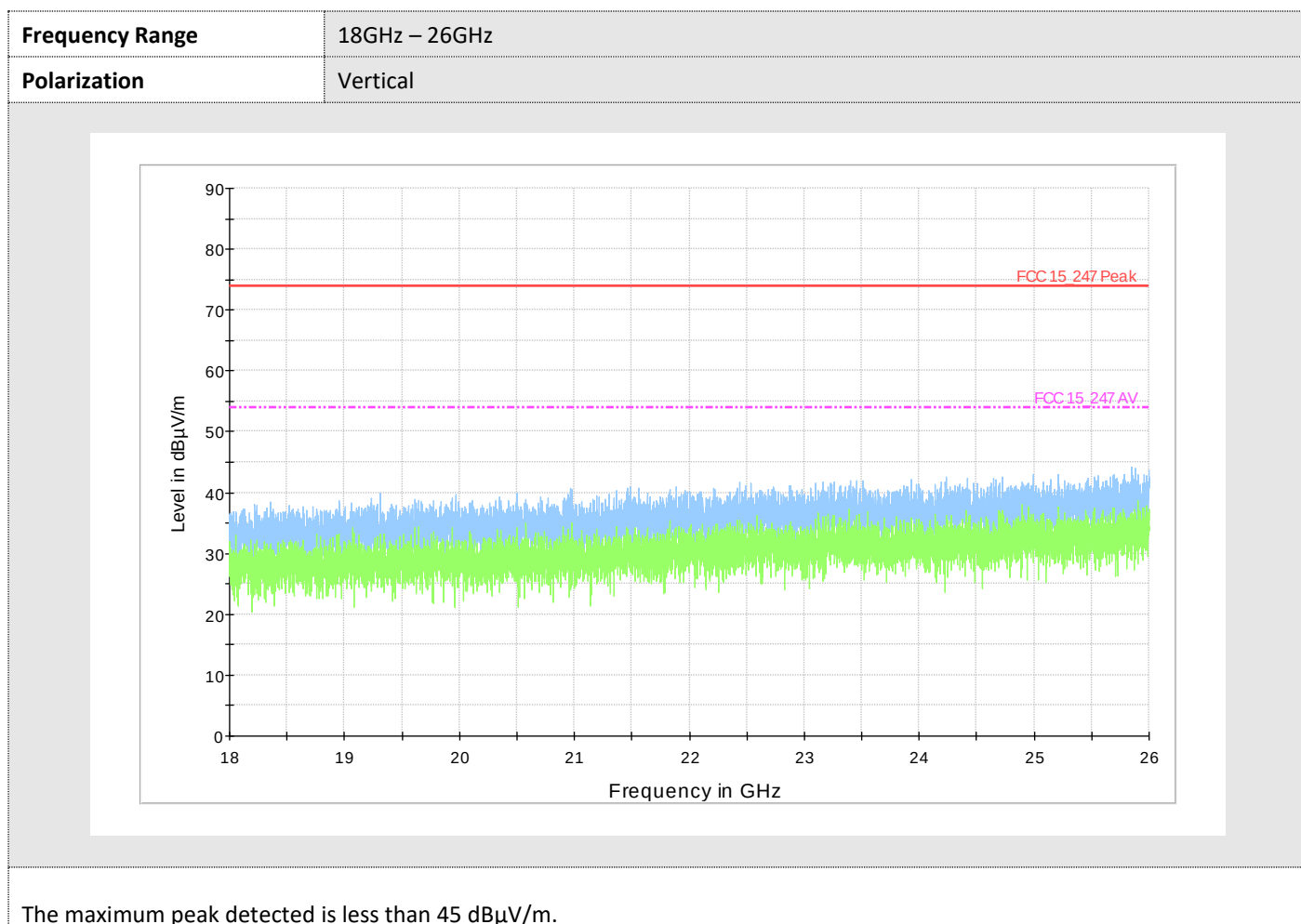
Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	86.7	254.6	-5.0	-12.70	74.00

Final Result Average

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	86.0	197.7	7.0	-32.00	54.00
9945.000000	53.6	197.0	0.0	0.40	54.00

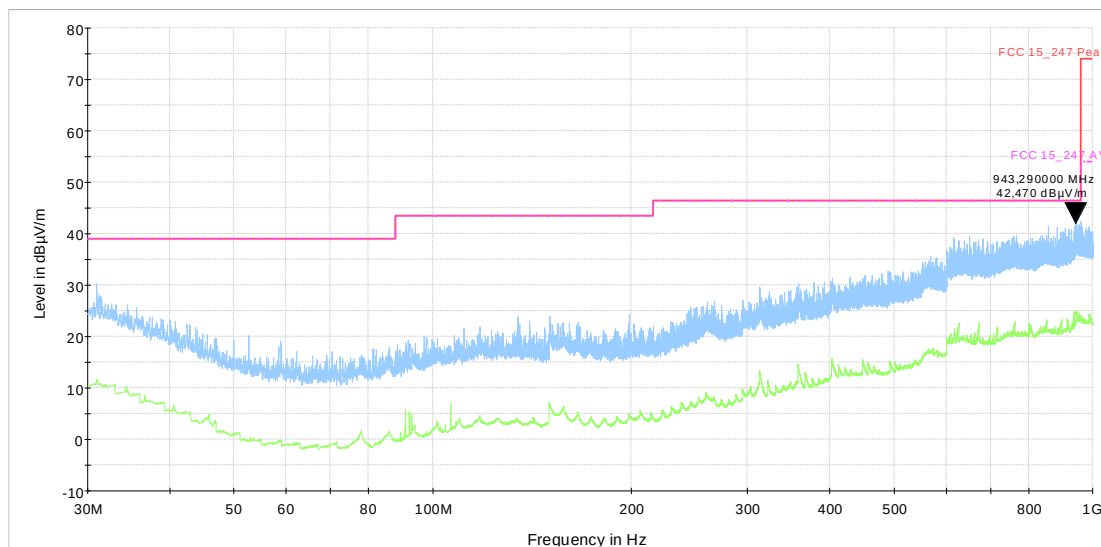
NOTE: Peak out of limits is due to the BLE carrier, this frequency falls in Exclusion Band and is not evaluated in this test.





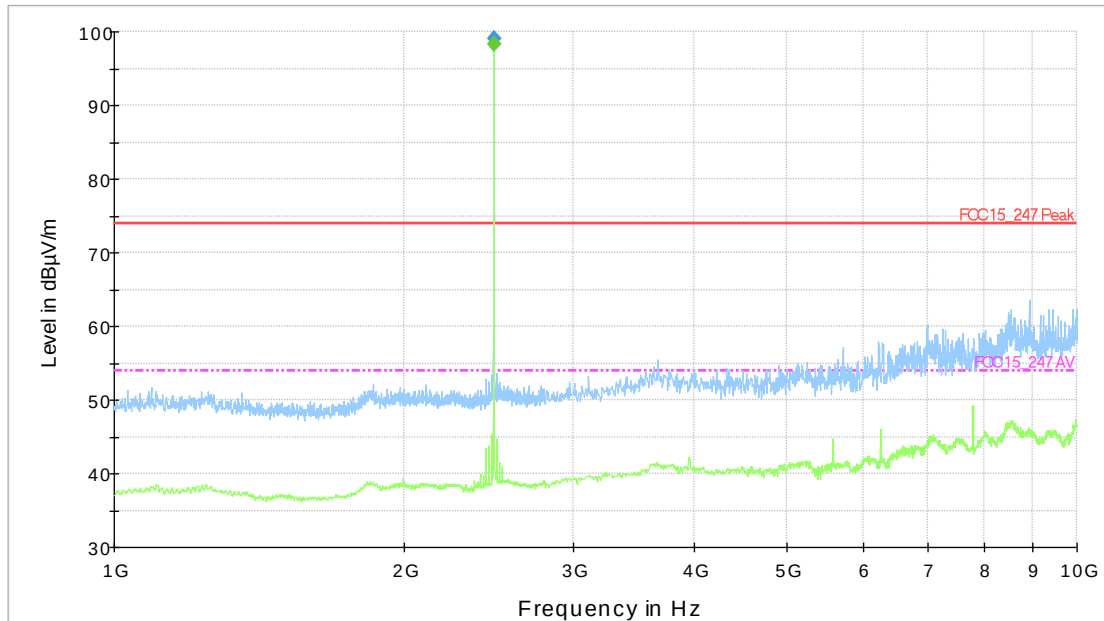
Frequency Range 30MHz – 1GHz

Polarization Horizontal



Frequency Range 1GHz – 10GHz

Polarization Horizontal



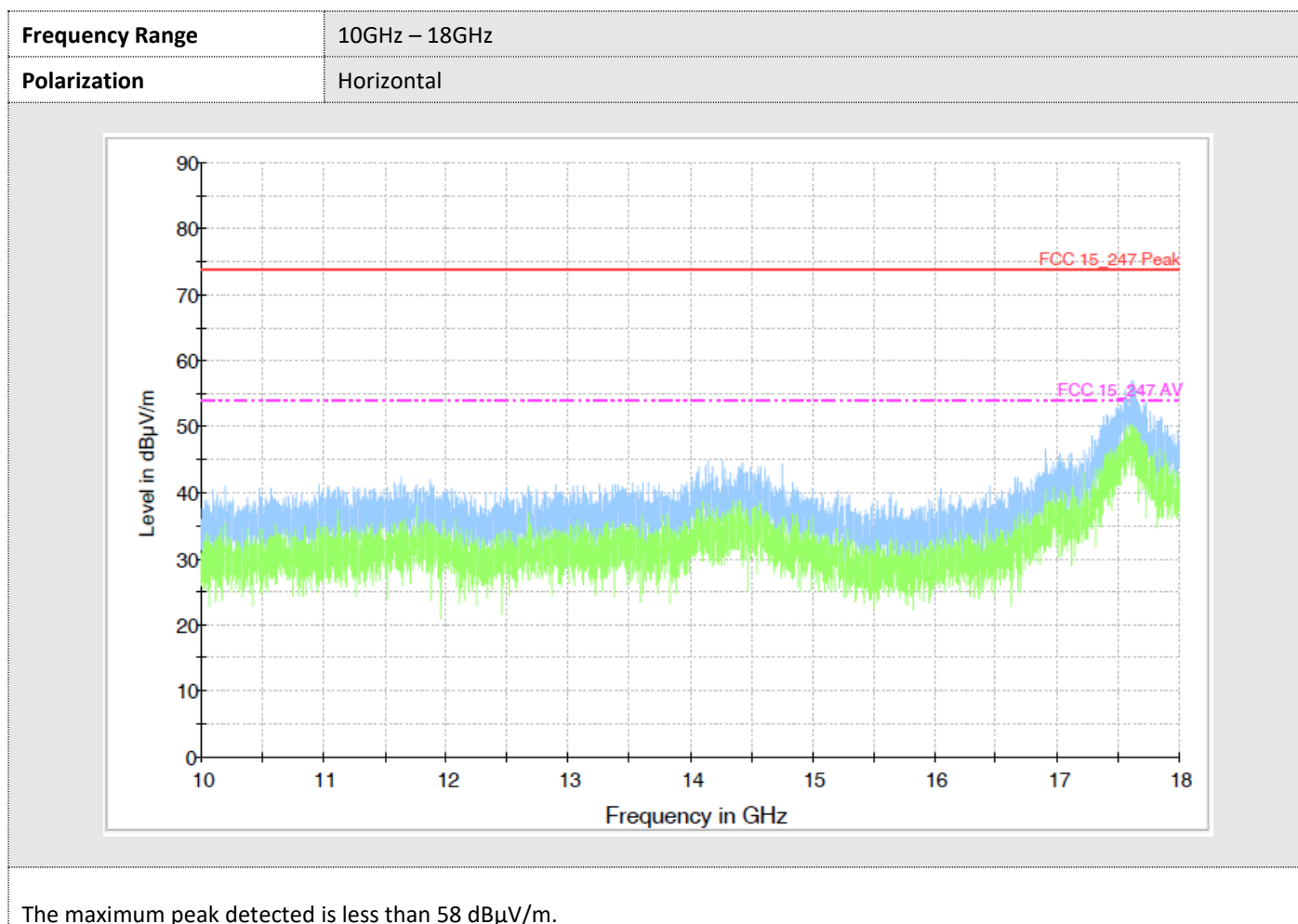
Final Result Peak

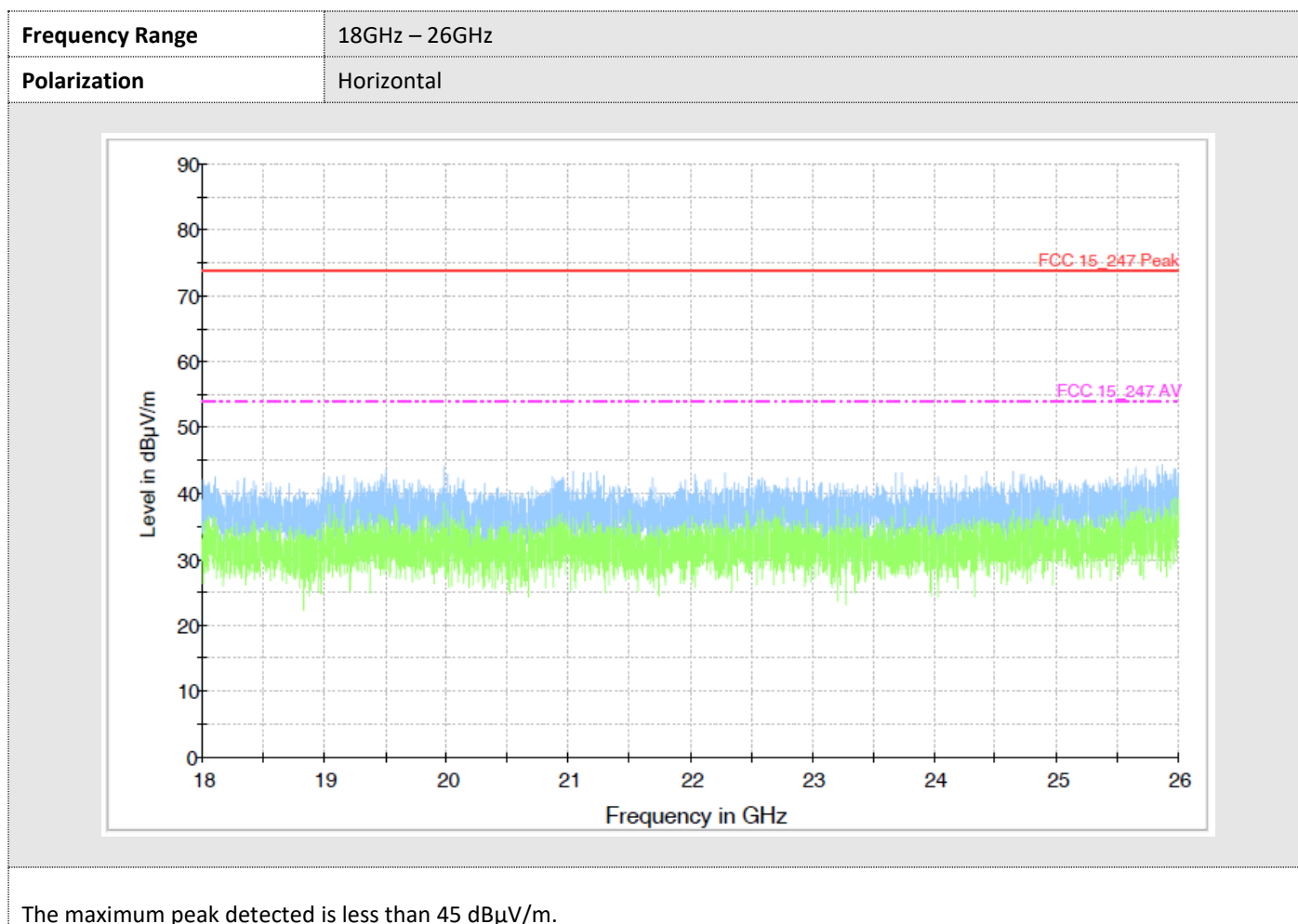
Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	99.0	106.9	84.0	-25.00	74.00

Final Result Average

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	98.2	106.8	85.0	-44.20	54.00

NOTE: Peak out of limits is due to the BLE carrier, this frequency falls in Exclusion Band and is not evaluated in this test.





TEST 8.	TRANSMITTER FREQUENCY STABILITY
REFERENCE DOCUMENT	RSS-GEN
CUSTOMER TEST ID	DDVT67

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TEST METHOD	RSS-GEN
• TEST EQUIPMENT USED FOR TEST	MXE Emi Receiver Keysight mod. N9038
• TEST PERFORMED BY	Daniele Aosani
• TESTED PORT	Antenna

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

OPERATING CONDITION: #1, #2, #3
--

RESULT: COMPLIANT

MEASUREMENT RESULTS

Channel	Voltage (V)	Temperature (°C)	Frequency (MHz)	Variation at the reference value (MHz)	Maximum variation (MHz)	Result
0	3	+23	2401.904	---	±1	COMPLIANT
		+5	2401.920	+0.016		
		+40	2401.896	-0.008		
	2	+23	2401.904	0		
19	3	+23	2439.904	---	±1	COMPLIANT
		+5	2439.904	0		
		+40	2439.896	-0.008		
	2	+23	2439.904	0		
39	3	+23	2479.896	---	±1	COMPLIANT
		+5	2479.904	+0.008		
		+40	2479.888	-0.008		
	2	+23	2479.912	+0.016		

END OF TEST REPORT