

Prüfbericht - Nr.: **ULR-TC568819300000086F** **Seite 1 von 61**
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Test Report No.:

Auftraggeber: **Honeywell**
Client:
12, Clintonville Rd, Northford, CT,
USA 06472; +1 203 4847161

Gegenstand der Prüfung: **GLSS Gateway**
Test item:

Bezeichnung: **CGW-MB** **Serien-Nr.:** **850020000300129B70045**
Identification: *Serial No.*

Wareneingangs-Nr.: **166211445** **Eingangsdatum:** **04.12.2019**
Receipt No.: *Date of receipt:*

Prüfort: **Refer Page 5 of 61 for Test site details**
Testing location:

Prüfgrundlage: **FCC Part 15 Subpart C 15.247, 15.209, 15.207**
Test specification: **ANSI C63.10 2013**

Prüfergebnis: **Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).**
Test Result: **The test items passed the test specification(s).**

Prüflaboratorium: **TÜV Rheinland (India) Pvt. Ltd.**
Testing Laboratory:
27/B, 2nd Cross Road,
Electronic City Phase1,
Bangalore – 560 100, India
FCC Test Site Registration No.: 496599

geprüft / tested by:			kontrolliert / reviewed by:		
09.09.2019	Raviraj Kamati Engineer		24.10.2019	Raghavendra Katti Assistant Manager	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>

Sonstiges / Other Aspects: **FCC ID:PV3CGWMB**

Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations: P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested
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Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

TEST SUMMARY

Test Item	FCC Clause	Result
Maximum Conducted Output Power	15.247 (b) (3)	Pass
20 dB Bandwidth	15.247 (a) (1)	Pass
Carrier Frequency Separation	15.247 (a) (1)	Pass
Number of Hopping channels	15.247 (a) (1)(III)	Pass
Time of Occupancy (Dwell Time)	15.247 (a) (1)(III)	Pass
Emissions in non – restricted band	15.247 (d)	Pass
Radiated spurious emissions and emissions in Restricted bands of operation	15.247 (d) / (15.209 & 15.205)	Pass
Conducted emission on A.C power lines	15.207	Pass

Product Category: Electronics Testing
Test Discipline: EMC Test Facility

Note: Measurements were performed as per procedure mentioned in ANSI C63.10-2013.

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1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report. This applies especially to the following appendix:

- 1: Test Setup Photo**
- 2: EUT External Photo**
- 3: EUT Internal Photo**
- 4: FCC Label and Label Location**
- 5: Block Diagram**
- 6: Specification of EUT**
- 7: Schematic Diagrams**
- 8: Bill of Material**
- 9: User Manual**
- 10: Maximum Permissible Exposure Information**

2 TEST SITES

2.1 Testing Facilities

TÜV Rheinland (India) Private Limited.
27/B, 2nd Cross,
Electronic City Phase1
Bangalore – 560 100,
India

TUV Rheinland (India) Private Limited.
108 , Beside ISBR Business School,
Electronic City Phase1
Bangalore - 560 100.
India

2.2 List of Test and Measurement Instruments

Table 1: List of test and measurement instruments

Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Used for Test Items
USB Wideband Power Sensor	AIMIL Ltd	55006	10231	-	22-12-2019	Yearly	Antenna - Port Measurements
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	A.14.06	28-03-2020	Yearly	
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	4.43 SP3	11-10-2020	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	-	15-01-2020	Yearly	
Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	9124-656	-	16-01-2020	Yearly	
Log-Periodic Antenna	Schwarzbeck	FMZB 1519 B	1519B-00111	-	16-01-2020	Yearly	
Broadband Horn Antenna	Frankonia	BBHA 9120 D	9120D-1944	-	16-01-2020	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-0904	-	21-01-2020	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	-	
Fully Anechoic Chamber	Albatross	-	-	-	-	-	
EMI Receiver	Rohde & Schwarz	ESR7	101133	V7.0-4-62-2	16-01-2020	Yearly	AC Power line conducted emission
LISN	Rohde & Schwarz	ENV 216	100022	-	05-09-2020	Yearly	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	-	01-08-2020	Yearly	

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Table 2: Instrument application Software versions

SL. No.	Test Type	Application software	Version
1	Radiated spurious emission measurement	EMC 32	10.50.00

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Gateway Connect is an embedded and intelligent gateway for connected buildings. It enables system maintenance providers as well as end users to remotely manage connected fire detection systems. The gateway also supports them to ensure compliance.

Operational description: The gateway acts as a portal among fire alarm panels, and peripheral devices. The gateway connection with the fire alarm panel enables reading the inventory and transmitting the data. The connection with Cloud facilities remotely monitoring and managing the fire detection systems.

3.2 Ratings and System Details declared by client*

Table 3: Ratings and System Details

Radio Protocol	WLAN (2.4GHz)	BLE	BLUETOOTH	WLAN (5GHz)
Operating Frequency Range	2412MHz – 2462MHz	2402MHz – 2480MHz		5150MHz to 5250MHz 5250MHz to 5350MHz 5470MHz to 5725MHz
No. of Channel and Supporting Bandwidth	11 Channels , 20MHz	40	79	Only 20MHz
Channel Spacing	5MHz	2MHz	1MHz	10MHz
Modulation	802.11b: CCK and DSSS 802.11g: OFDM 802.11n: OFDM	GFSK	GFSK, pi/4-DQPSK, 8-DPSK	802.11a: OFDM 802.11n: OFDM
Number of antennas	2	1	1	2
Antenna Gain & Type	3dBi & Printed F Antenna			6.5 dBi & Printed F Antenna
Supply Voltage to Product	24V DC			
Dimensions	200mm x 70mm x 255mm			
Environmental conditions (Operating and Storage)	-10°C to +60° C			

Note: The product does not support simultaneous transmission. Conducted output power measured with respect to each protocol with single transmission chain.

***Disclaimer:** The information/data is supplied by the client and the same is considered to arrive at the final value. Any changes made apart from the specified specification, can directly impact on the tests results.

Table 4: Report No. References

SL. No.	RF Protocol / Frequency Bands	Report No.
1	WLAN (2.4GHz) and BLUETOOTH LOW ENERGY	ULR-TC568819300000085F
2	BLUETOOTH	ULR-TC568819300000086F
3	WLAN (5GHz)	ULR-TC568819300000087F

3.3 Measurement Uncertainty:

Table 5: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
SAC, radiated measurement	±6 dB
FAC, radiated measurement	±6 dB
Temperature	±3 °C
Supply Voltages	±3 %
Time	±5 %

Note: The listed uncertainties are the worst case uncertainty for the entire range of measurements and are for the reporting purpose only and are not used in determining the PASS/FAIL of the results.

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle transmission on low, mid and high channel.

4.2 Test Operation and Test Software

Test Software and Hardware Name : FW 2.0, PC Utility 1.4
Software version : 2.1.7.0
Hardware name : CCM-BM28
Hardware version : RevA

4.3 Test modes – data rates and modulations

For an antenna port measurement and radiated spurious emissions, the tests were performed for both antennas and worst test results are reported in this test report.

4.4 Special Accessories and Auxiliary Equipment

- Test laptop and USB cable

4.5 Countermeasures to achieve EMC Compliance

- None

4.6 List of frequencies

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2400 - 2483.5	1	2412
	2	2417
	3	2422
	4	2427
	5	2432
	6	2437
	7	2437
	8	2447
	9	2452
	10	2457
	11	2462

Table 6: List of Wi-Fi center Frequencies

Frequency Band	Channel No.	Frequency (MHz)
5150–5350 MHz	36	5180
	48	5240
	64	5320
5470-5725 MHz	100	5500
	140	5700

Table 7: 5GHz WLAN -20MHz Bandwidth Channels List

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2400 – 2483.5	0	2402
	1	2404
	2	2406
	3	2408
	:	:
	:	:
	18	2438
	19	2440
	20	2437
	:	:
	:	:
	36	2474
	37	2476
	38	2478
	39	2480

Table 8: List of BLE center Frequencies

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2400 – 2483.5 BT(BDR+EDR)	0	2402
	1	2403
	2	2404
	3	2405
	:	:
	:	:
	:	:
	37	2439
	38	2440
	39	2441
	40	2442
	:	:
	:	:
	:	:
	74	2476
	75	2477
	:	:
	:	:
	78	2480

Table 9: List of Bluetooth center Frequencies

5 TEST METHODOLOGY

5.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and mesurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

Note: Field Strength = Measured Value + Antenna Factor + Cable Loss – Pre-Amplifier Gain

5.1.1 Test Setup Configuration

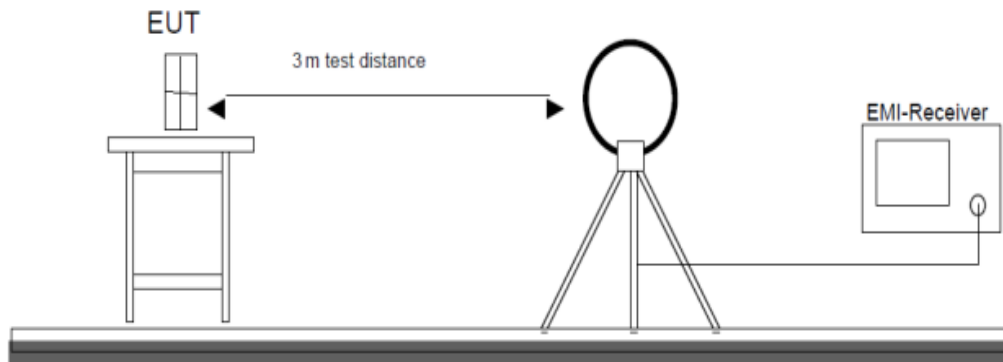


Figure 1: Frequency Range 9 kHz- 30 MHz

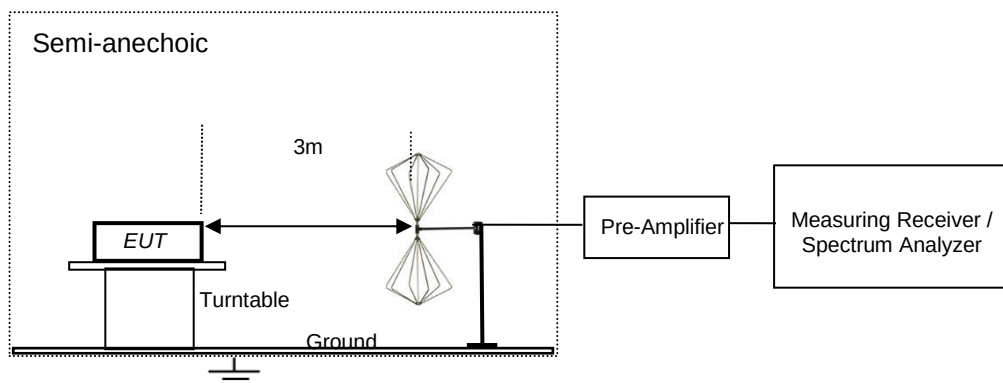


Figure 2: Frequency Range 30 MHz – 200 MHz

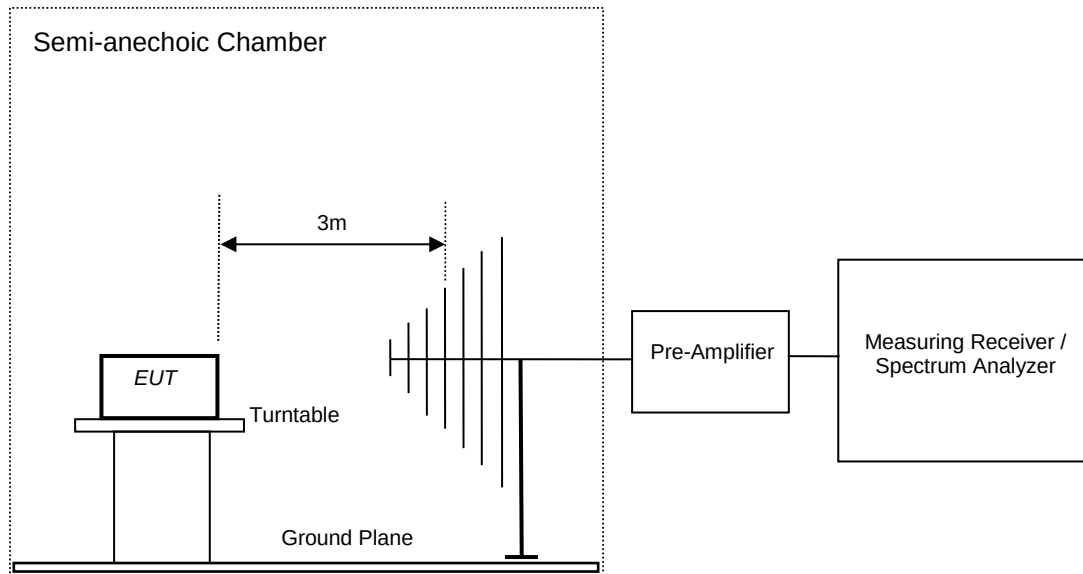


Figure 3: Frequency Range 200 MHz - 1GHz

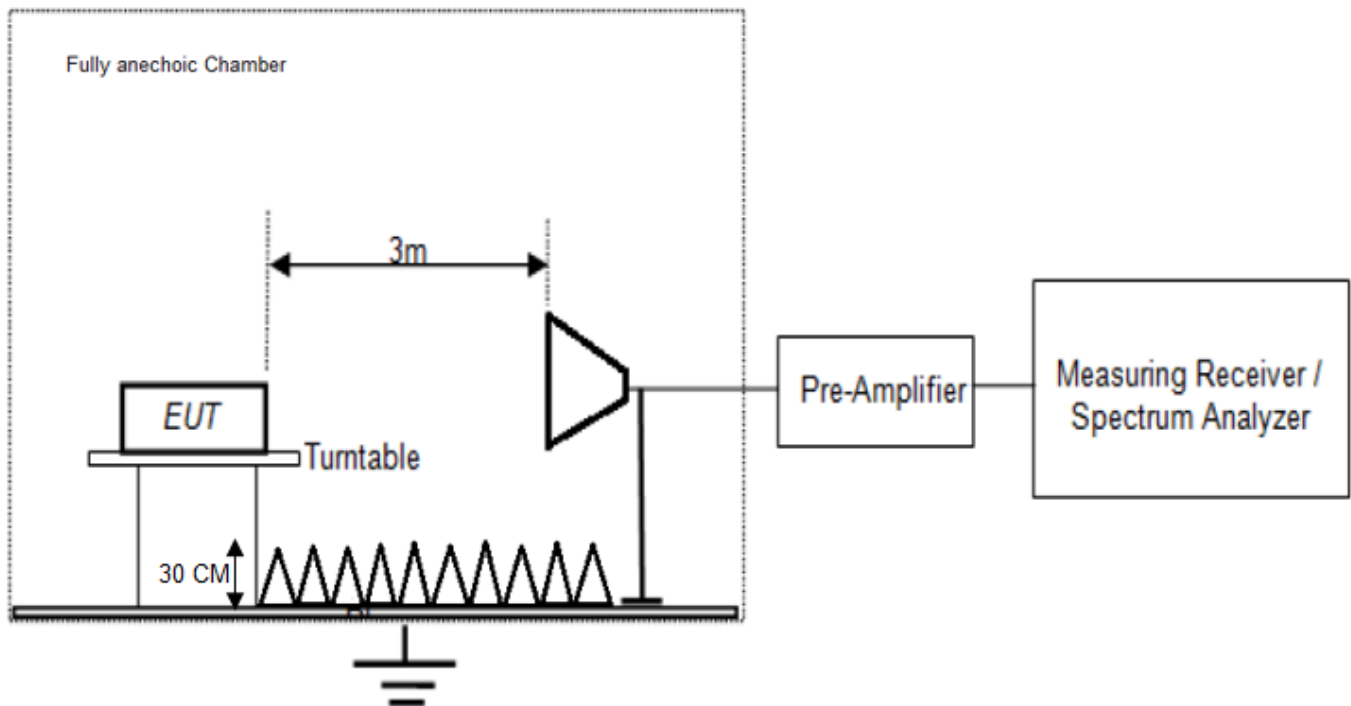


Figure 4: Frequency Range 1GHz – 26GHz

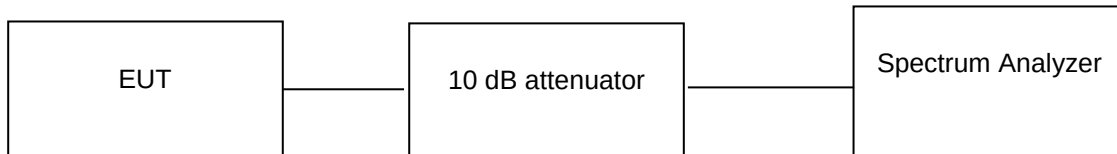
6 TEST RESULTS FOR BT

6.1 Maximum Peak Conducted Output Power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (b)(1)
Measurement Bandwidth	3 MHz
Detector	Peak



Environmental conditions:

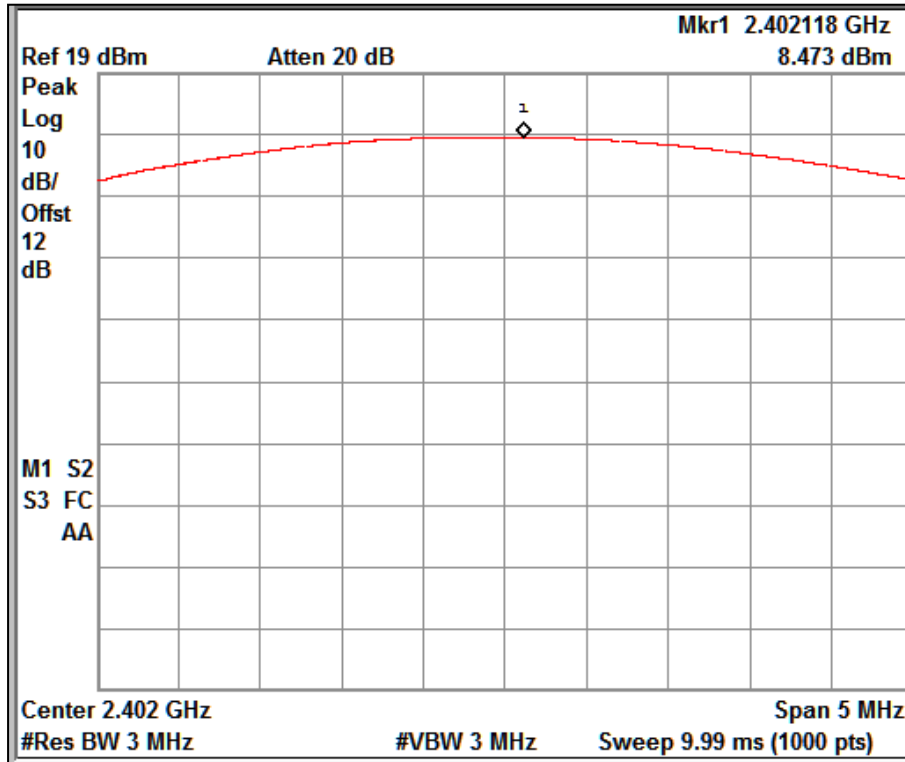
Temperature: +23.5 °C RH: 61.7 %

Test results:

10 dB attenuator + 2 dB Cable loss = 12 dB offset is considered in below results.

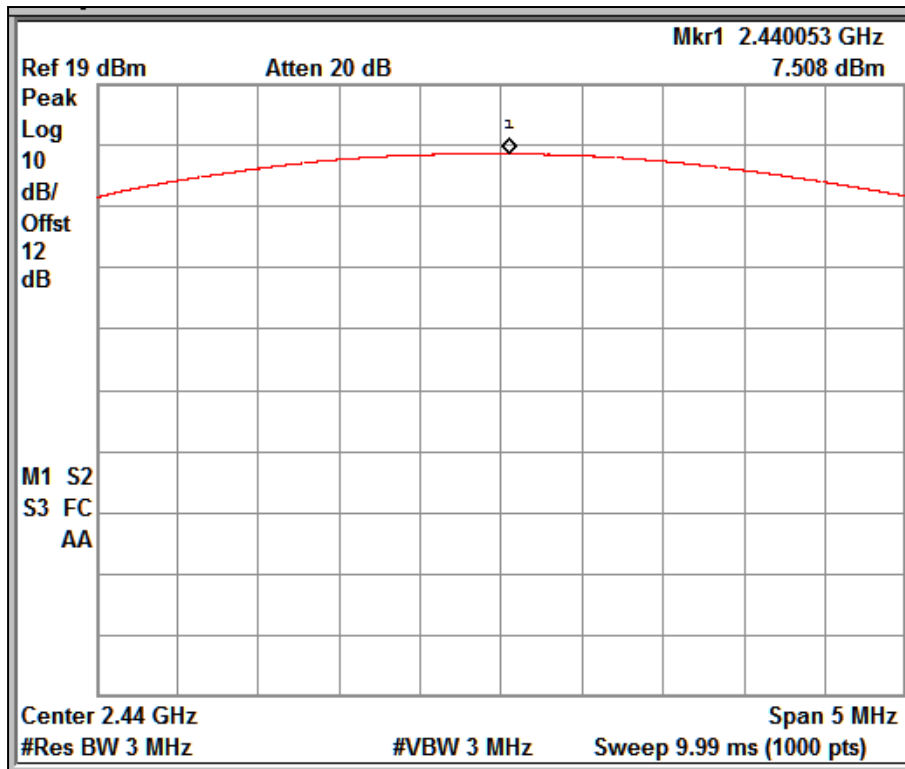
Table 10: Maximum peak conducted output power verified Test Results

Data Rate (Mbps)	Channel Frequency (MHz)	Measured Power (dBm)	Limit (dBm)
1	2402	8.473	30.00
	2440	7.508	30.00
	2480	6.549	30.00
2	2402	9.461	20.96
	2440	8.117	20.96
	2480	7.368	20.96
3	2402	9.676	20.96
	2440	8.492	20.96
	2480	7.778	20.96



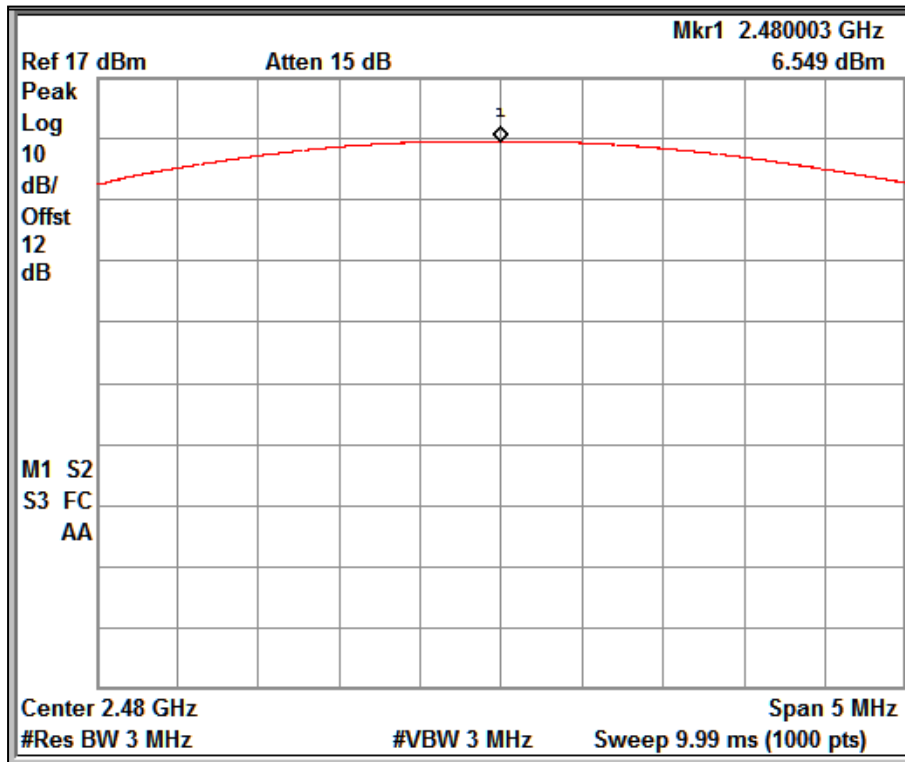
Channel Frequency: 2402MHz

Data rate: 1Mbps



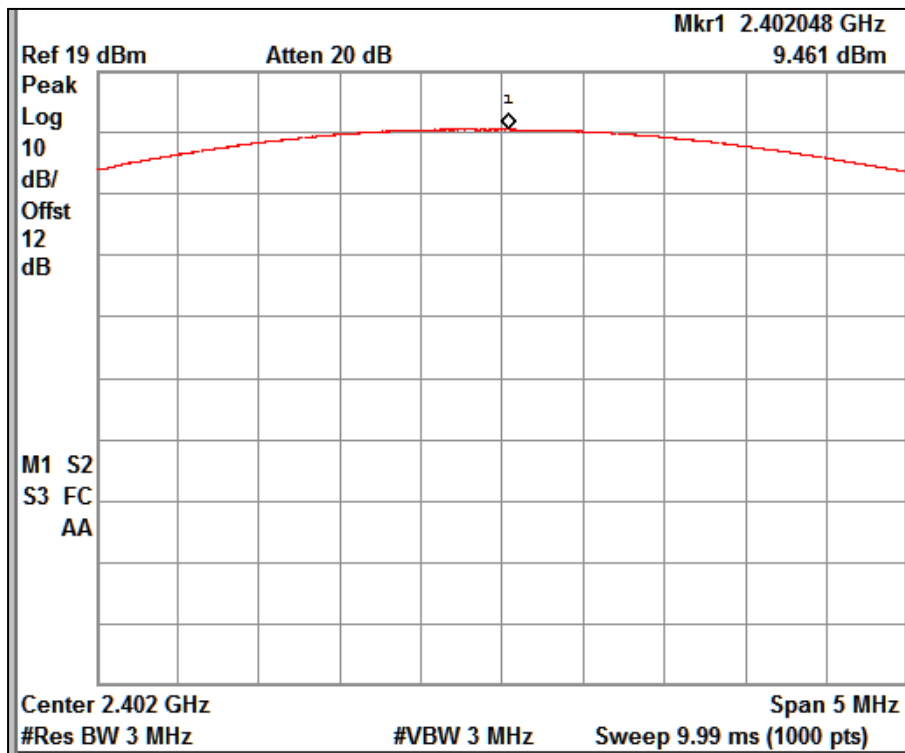
Channel Frequency: 2440MHz

Data rate: 1Mbps



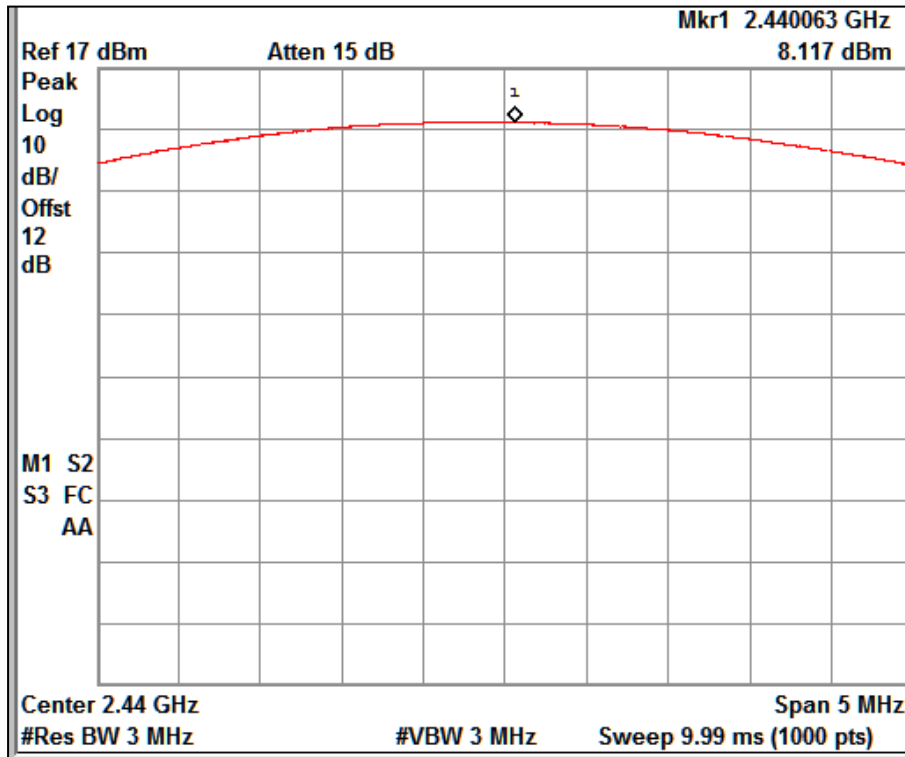
Channel Frequency: 2480MHz

Data rate: 1Mbps



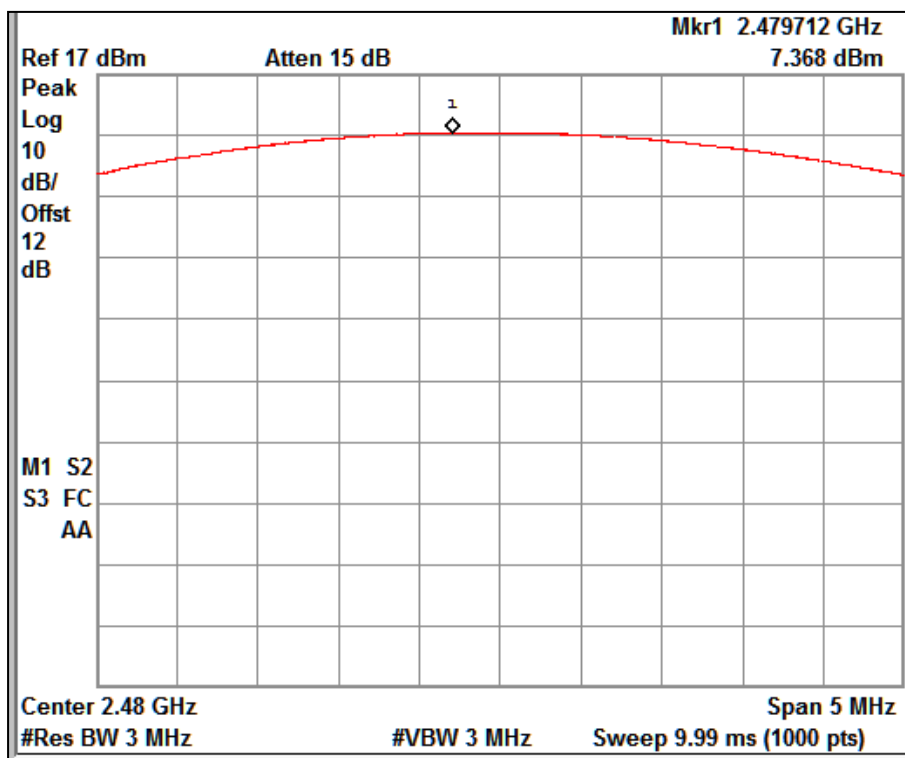
Channel Frequency: 2402MHz

Data rate: 2Mbps



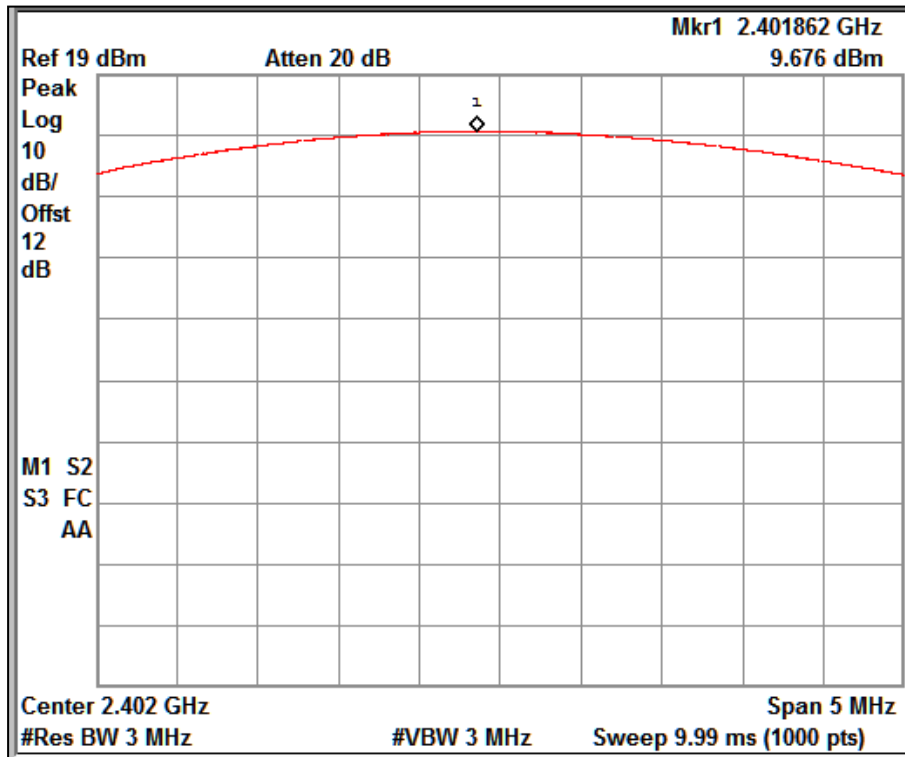
Channel Frequency: 2440MHz

Data rate: 2Mbps



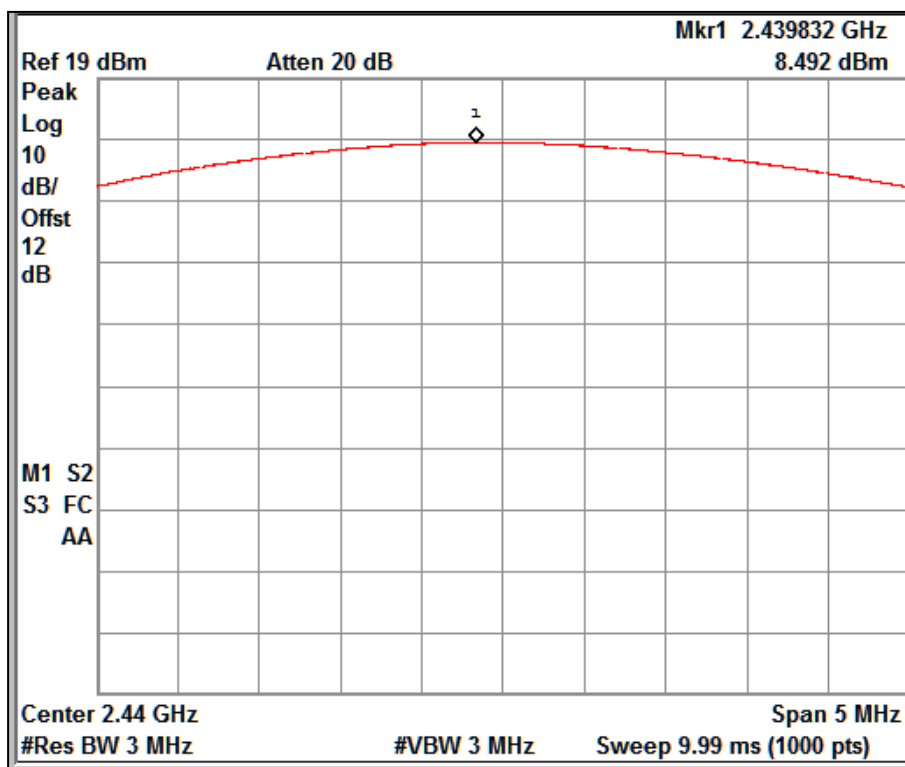
Channel Frequency: 2480MHz

Data rate: 2Mbps



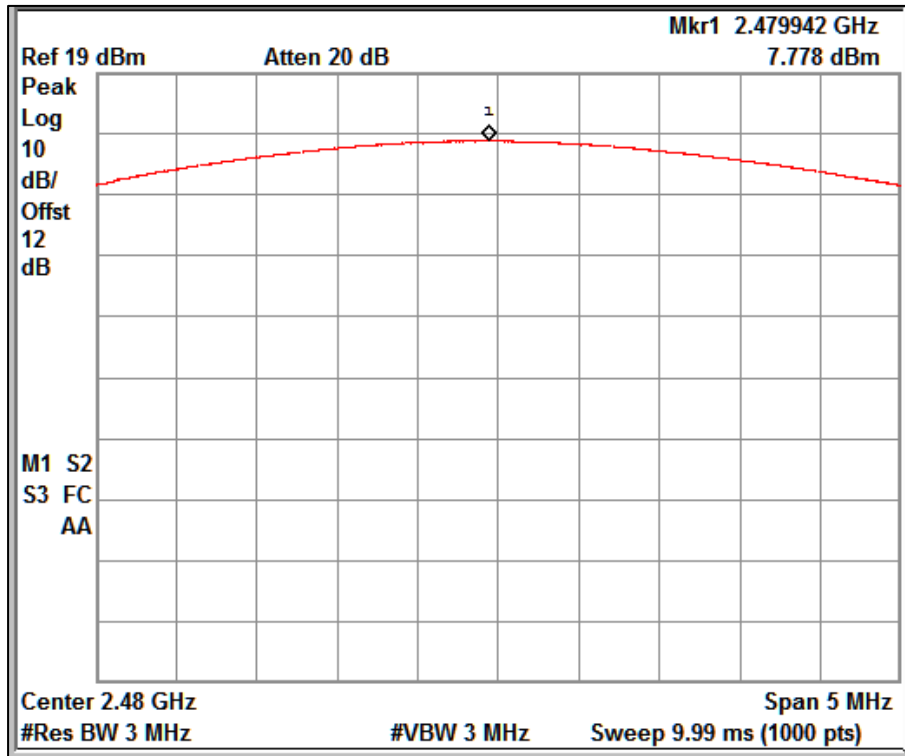
Channel Frequency: 2402MHz

Data rate: 3Mbps



Channel Frequency: 2440MHz

Data rate: 3Mbps



Channel Frequency: 2480MHz

Data rate: 3Mbps

6.2 20 dB Bandwidth

Result

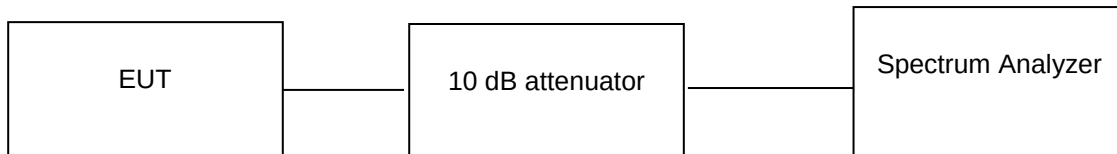
Pass

Test Specification
Detector
Port of testing

FCC part 15 Subpart C Section 15.247 (a)(1)
Peak
Antenna Port

Requirement

The bandwidth of frequency hopping channel is the 20 dB emission bandwidth , measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near-term distribution of frequencies appears random , with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long-term distribution appears evenly distributed.



Environmental conditions:

Temperature: +23.5 °C

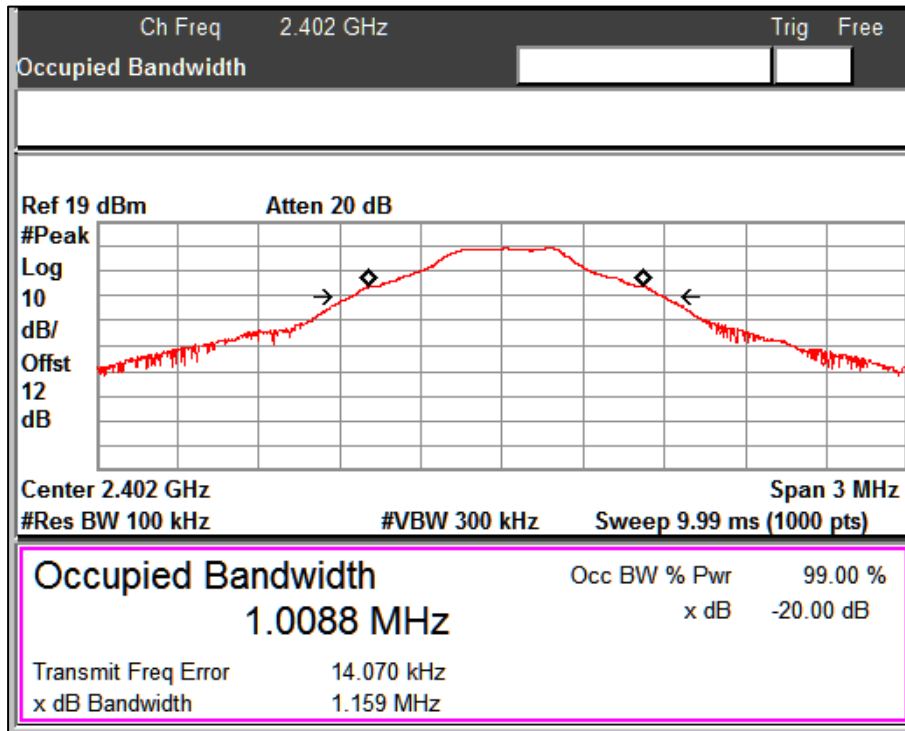
RH: 61.7 %

Test results:

10 dB attenuator + 2 dB Cable loss = 12 dB offset is considered in below result

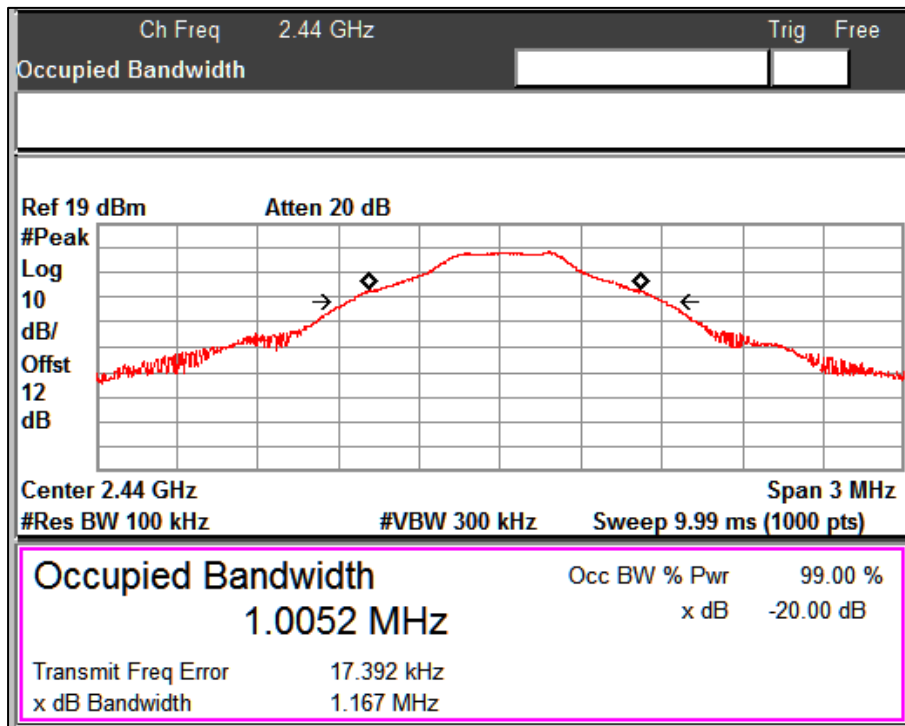
Table 11: 20dB Bandwidth and Occupied Bandwidth Test Results

Data Rate (Mbps)	Channel Frequency (MHz)	20dB Bandwidth (MHz)	99% OBW (MHz)
1	2402	1.159	1.0088
	2440	1.167	1.0052
	2480	1.16	1.0021
2	2402	1.468	1.2949
	2440	1.461	1.2794
	2480	1.458	1.2729
3	2402	1.462	1.2976
	2440	1.453	1.2836
	2480	1.451	1.2795



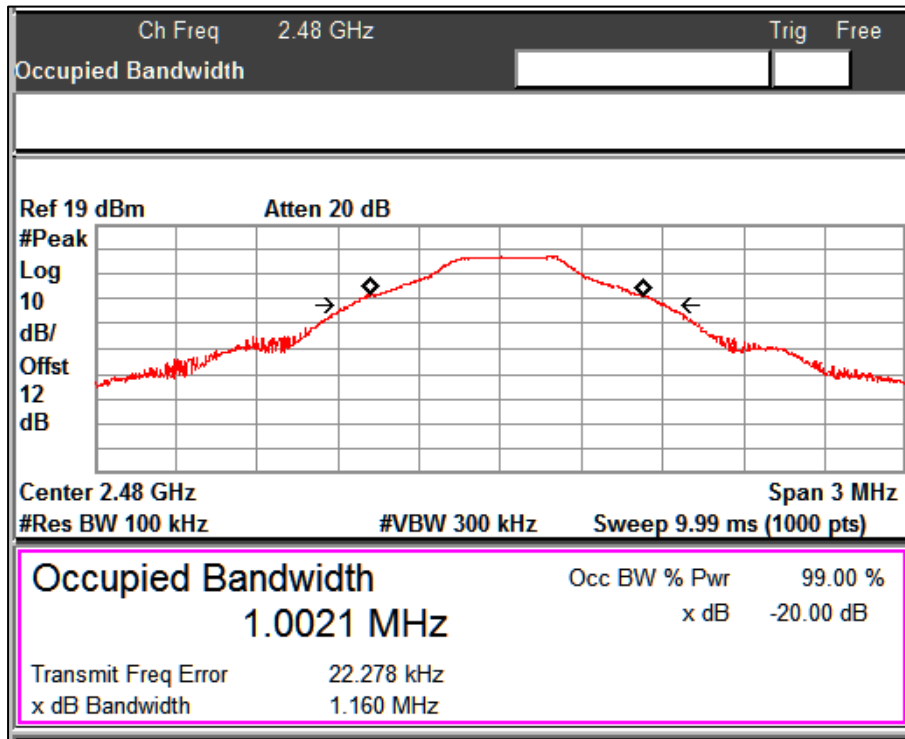
Channel Frequency: 2402MHz

Data rate: 1Mbps



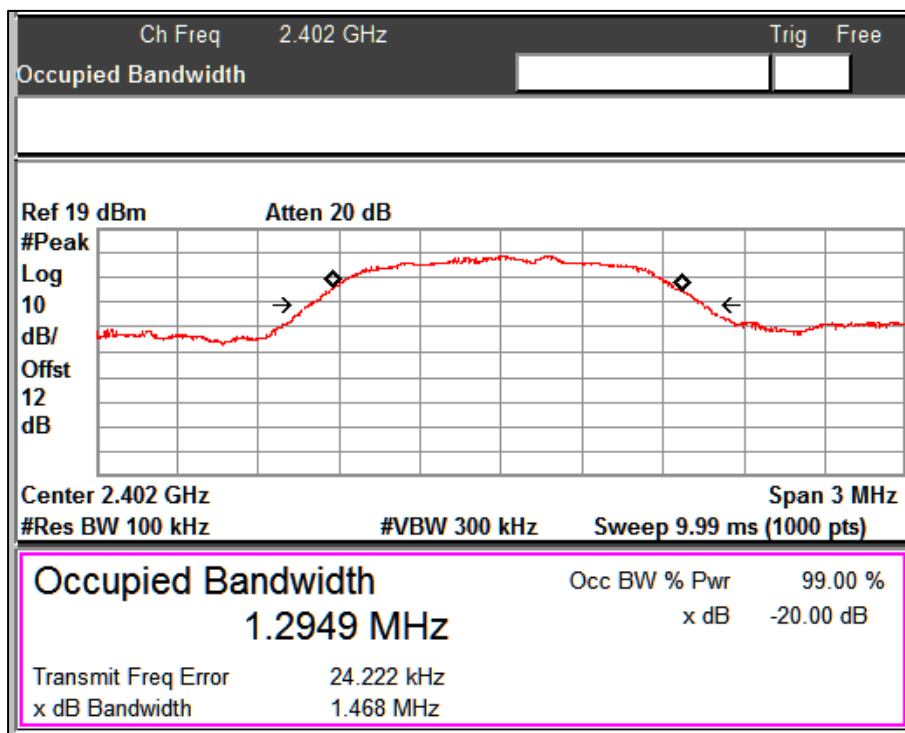
Channel Frequency: 2440MHz

Data rate: 1Mbps



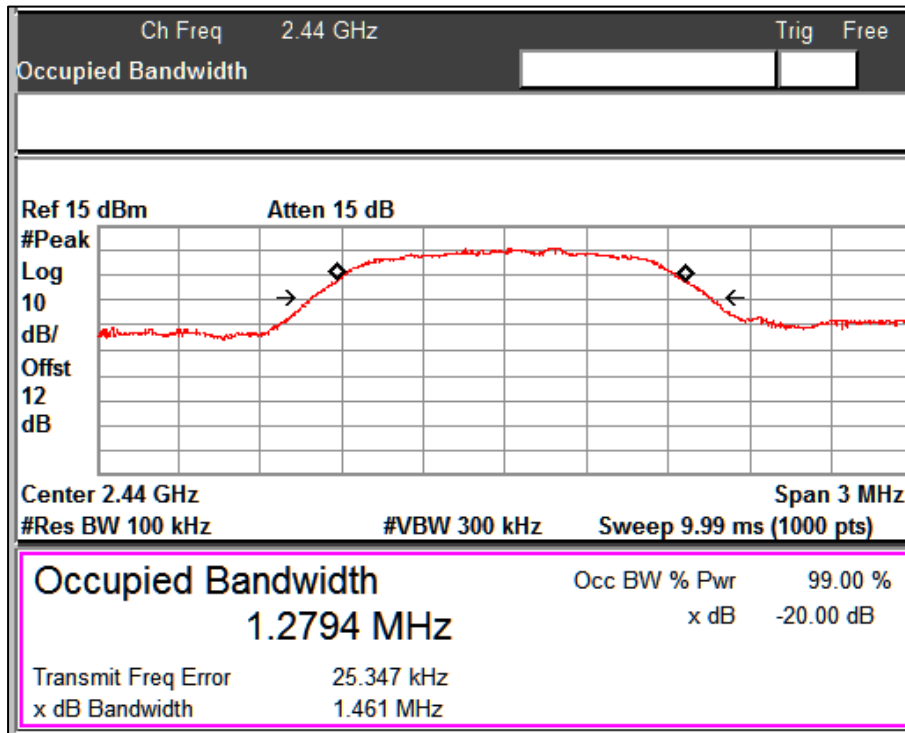
Channel Frequency: 2480MHz

Data rate: 1Mbps



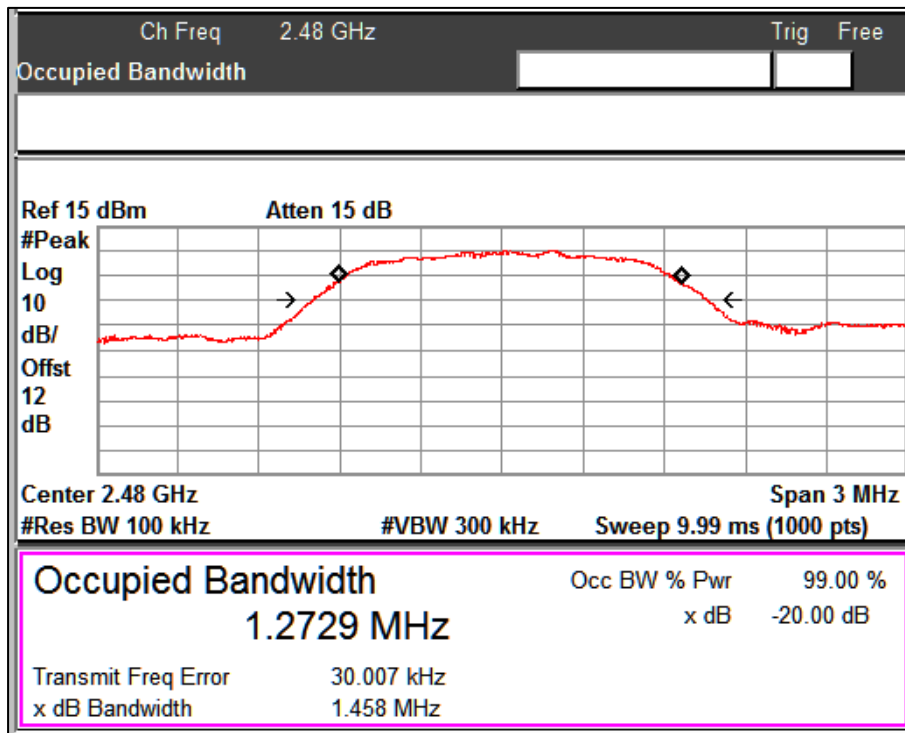
Channel Frequency: 2402MHz

Data rate: 2Mbps



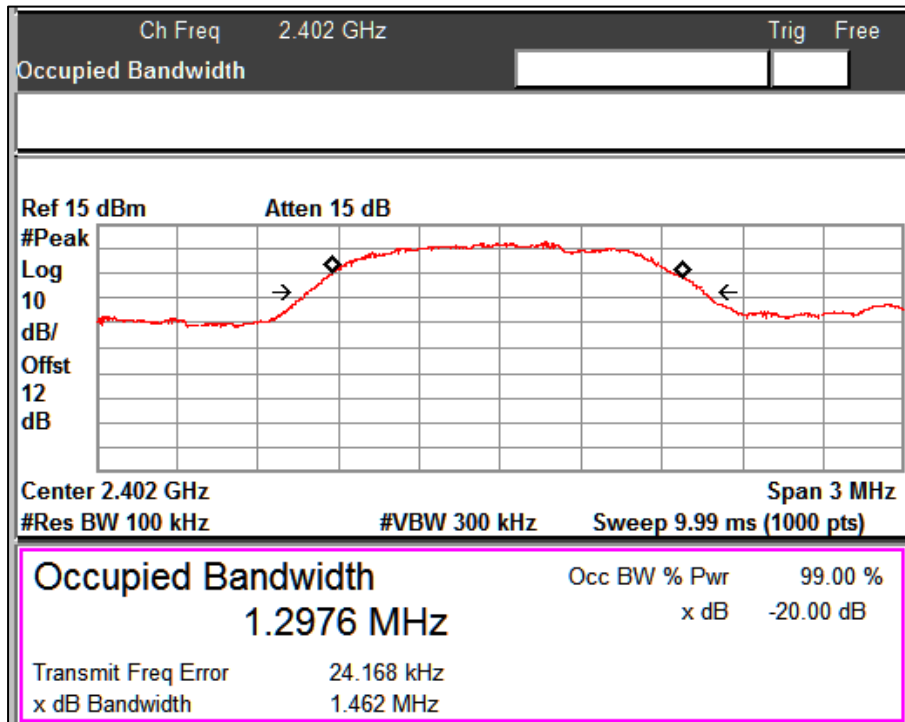
Channel Frequency: 2440MHz

Data rate: 2Mbps



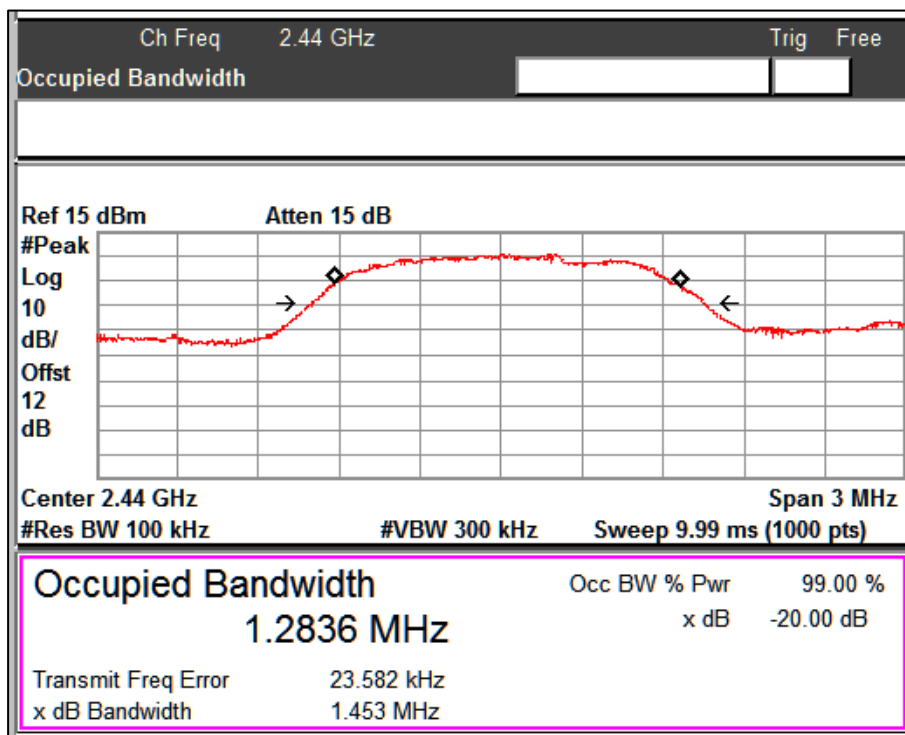
Channel Frequency: 2480MHz

Data rate: 2Mbps



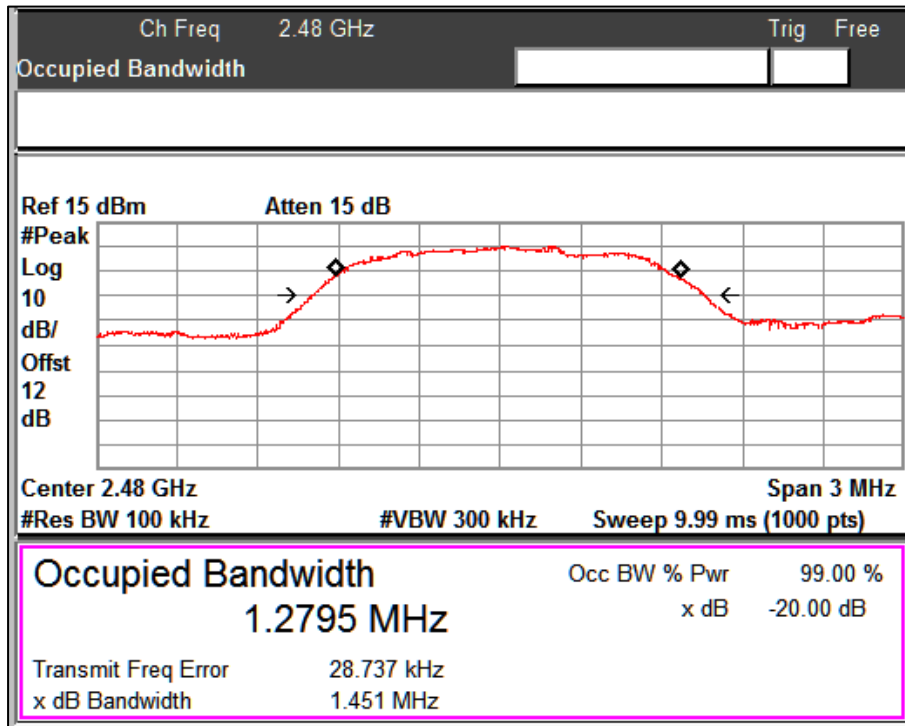
Channel Frequency: 2402MHz

Data rate: 3Mbps



Channel Frequency: 2440MHz

Data rate: 3Mbps



Channel Frequency: 2480MHz

Data rate: 3Mbps

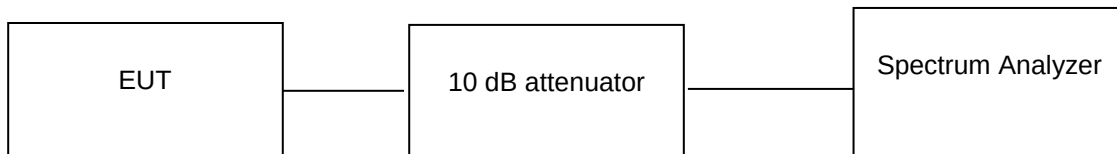
6.3 Number of Hopping Channels

Result

Pass

Test Specification	FCC Part 15 Subpart C Section 15.247 (a) (1)
Detector Function	Peak
Port of testing	Antenna port
Requirement	Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels

Test Method:



Environmental conditions:

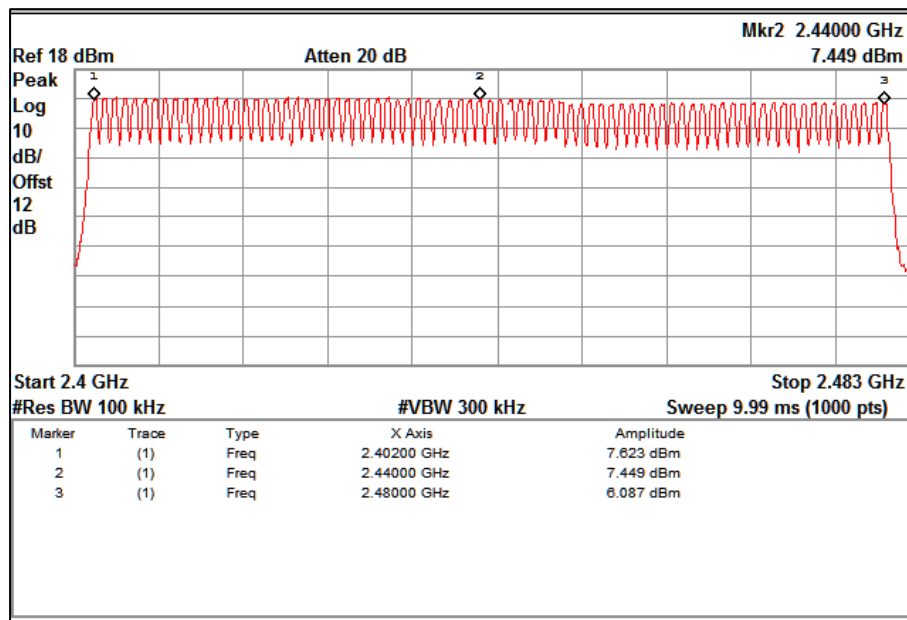
Temperature: +23.5 °C

RH: 61.7 %

Test results:

10 dB attenuator + 2 dB Cable loss = 12 dB offset is considered in below result

Table 12: Number of Hopping Channels



Total Number of hopping channels = 79

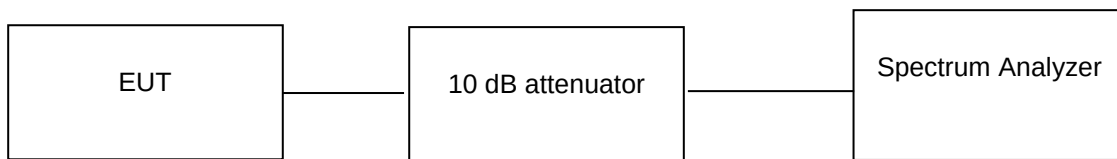
6.4 Carrier Frequency Separation

Result

Pass

Test Specification	FCC Part 15 Subpart C Section 15.247 (a) (1)
Detector Function	Peak
Port of testing	Antenna port
Requirement	Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater

Test Method:



Test results:

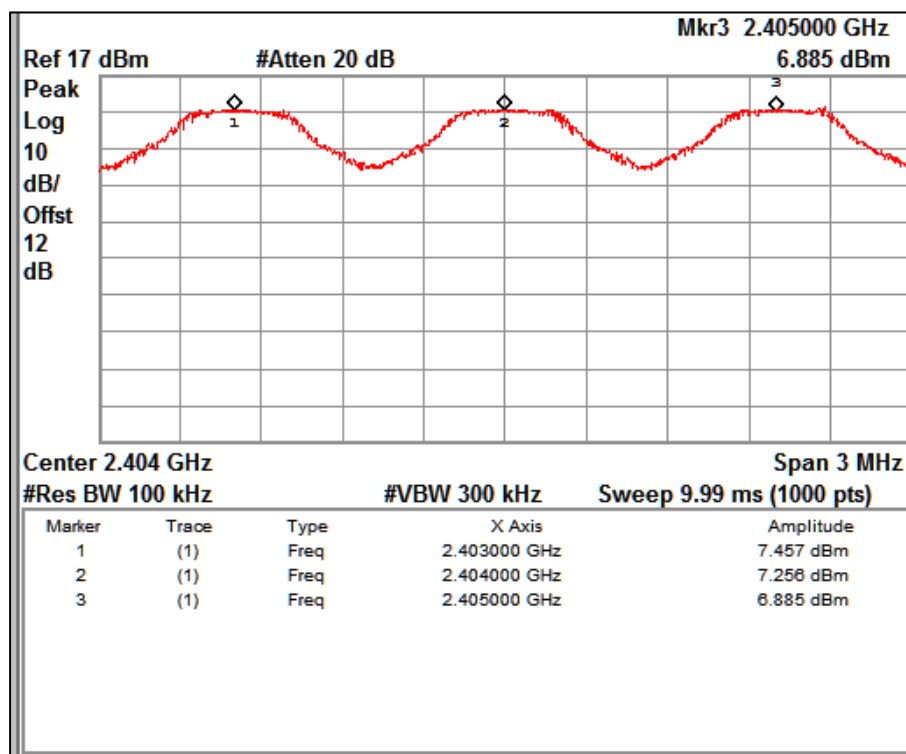
10 dB attenuator + 2 dB Cable loss = 12 dB offset is considered in below result

Environmental conditions:

Temperature: +23.5 °C

RH: 61.7 %

Table 13: Carrier Frequency Separation



Channel Separation: 1MHz

6.5 Time of Occupancy (Dwell Time)

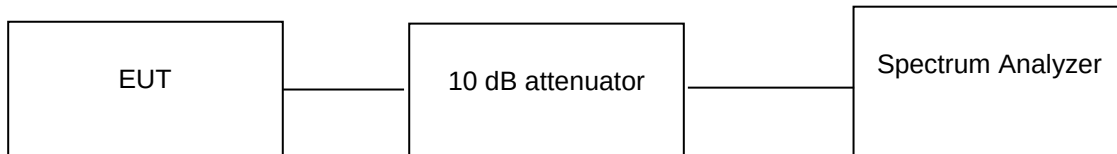
Result

Pass

Test Specification
Detector Function
Port of testing
Requirement

FCC Part 15 Subpart C Section 15.247 (a) (1)
Peak
Antenna port
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

Test Method:



Environmental conditions:

Temperature: +23.5 °C

RH: 61.7 %

Test Results:

Time slot		Time Slot (s)
DH	Measurement Value (sec)	
DH5	0.00288	0.307
2DH5	0.00288	0.307
3DH5	0.00288	0.307

Measurement Method:

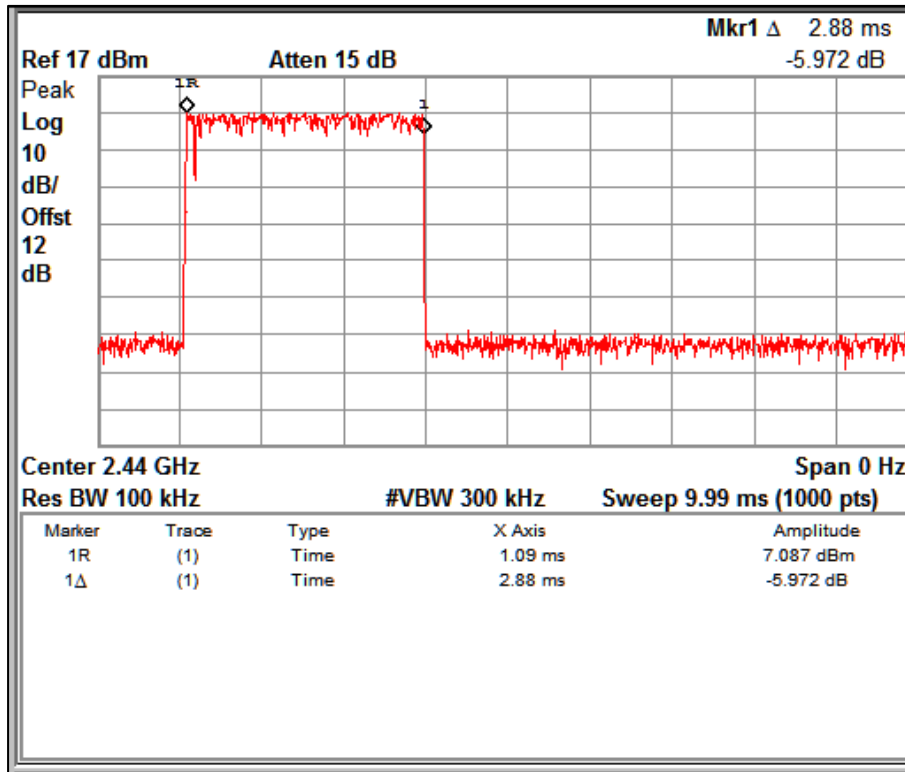
Period Time: $0.4(\text{Sec}) \times 79(\text{Hopping Channels}) = 31.6\text{Sec}$

DH Time slot = Measurement value (Sec) $\times (1600 / (6 \times 79)) \times \text{Period time}$

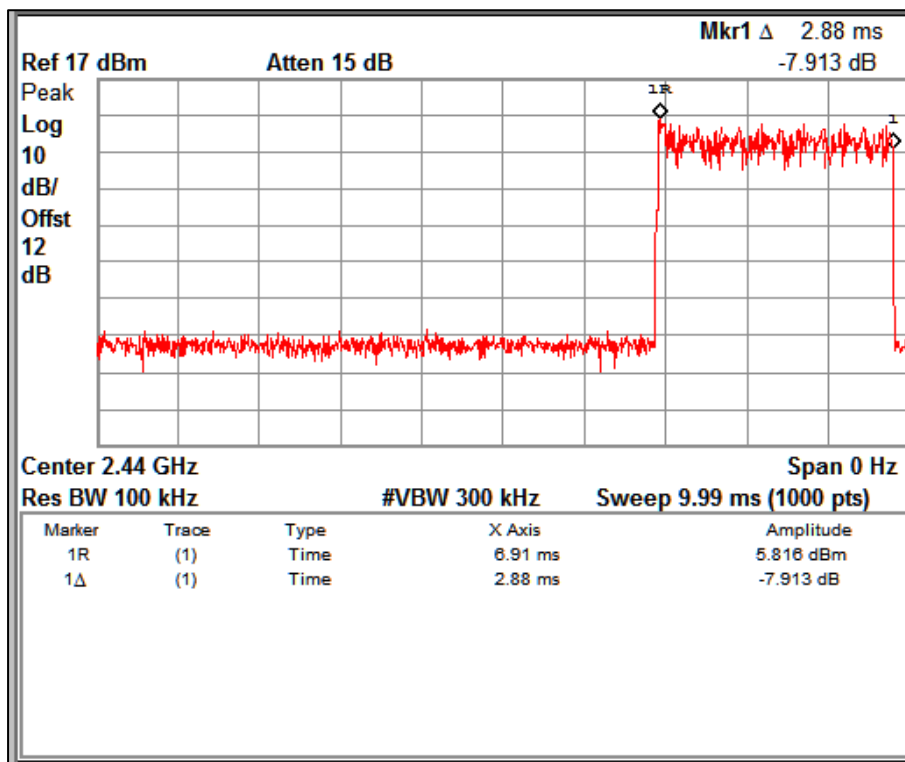
$\text{DH5} = 0.00288 \times 3.3755 \times 31.6 = 0.307\text{s}$

$2\text{DH5} = 0.00288 \times 3.3755 \times 31.6 = 0.307\text{s}$

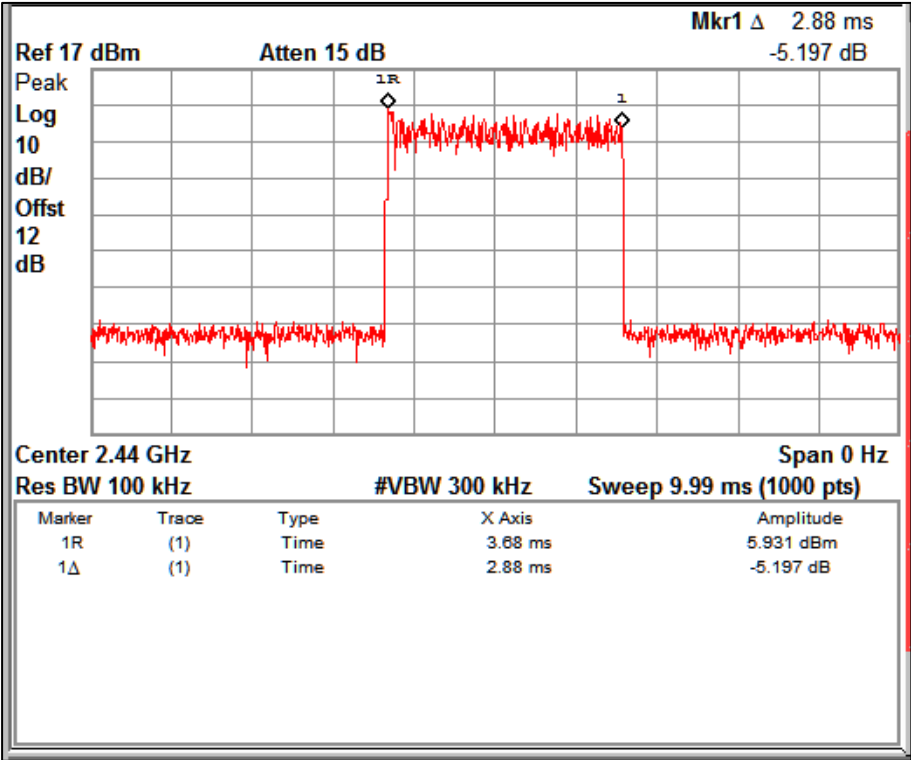
$3\text{DH5} = 0.00288 \times 3.3755 \times 31.6 = 0.307\text{s}$



DH5



2DH5



3DH5

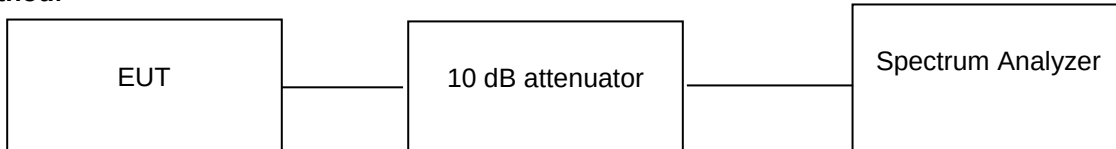
6.6 Band- edge Compliance and Conducted Spurious Emissions

Result

Pass

Test Specification	FCC Part 15 Subpart C Section 15.247 (a) (1)
Detector Function	Peak
Port of testing	Antenna port
Requirement	In any 100kHz 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 20dB below that in the 100kHz 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.

Test Method:



Environmental conditions:

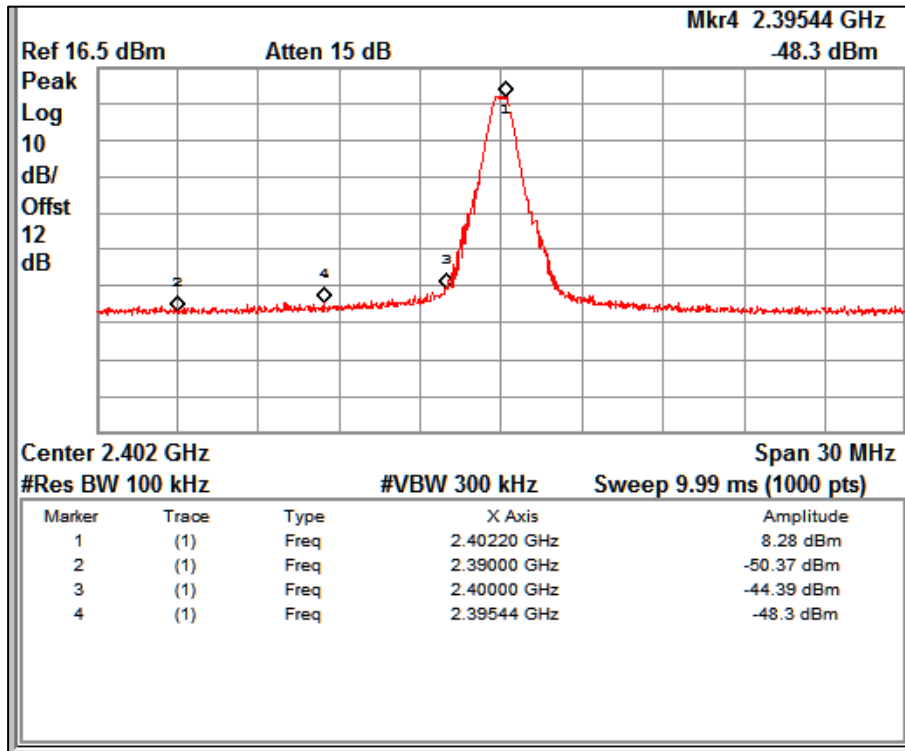
Temperature: +23.5 °C

RH: 61.7 %

Test Result:

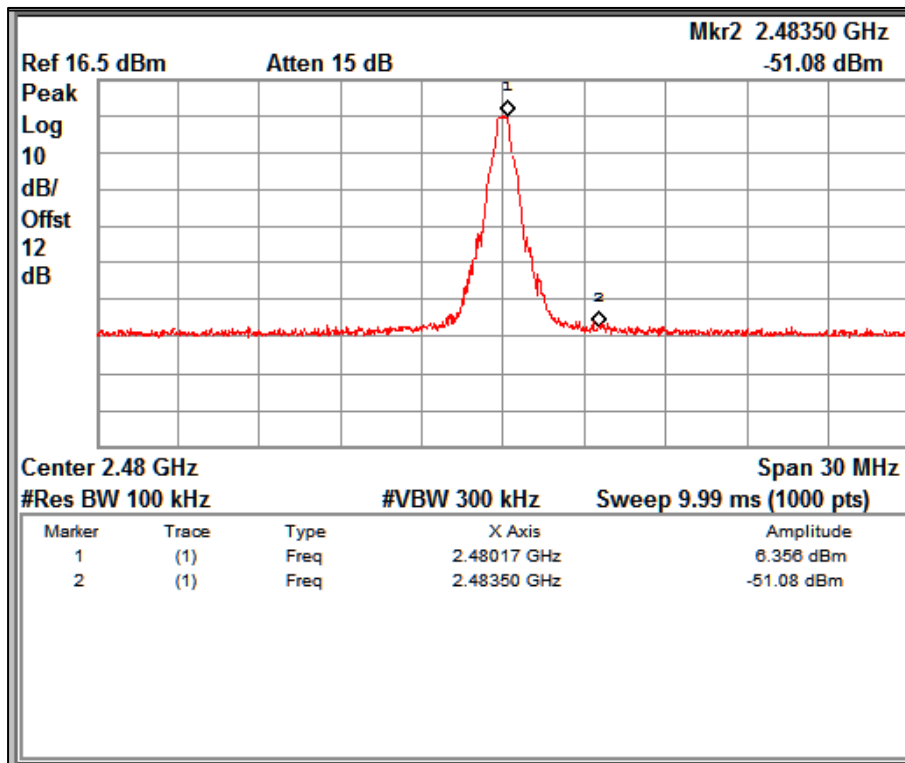
10 dB attenuator + 2 dB Cable loss = 12 dB offset is considered in below result

Data Rate (Mbps)	Channel Frequency (MHz)	Value at the Band Edge		Reference Value B (dBm)	Band Edge Value A~B (dBc)	Limit (dBc)
		Frequency (MHz)	Value A (dBm)			
1	2402	2400	-44.39	8.137	-52.527	20
	2480	2483.5	-51.08	6.582	-57.662	20
2	2402	2400	-38.50	7.469	-45.969	20
	2480	2483.5	-47.06	5.209	-52.269	20
3	2402	2400	-37.52	7.555	-45.075	20
	2480	2483.5	-44.46	5.369	-49.829	20



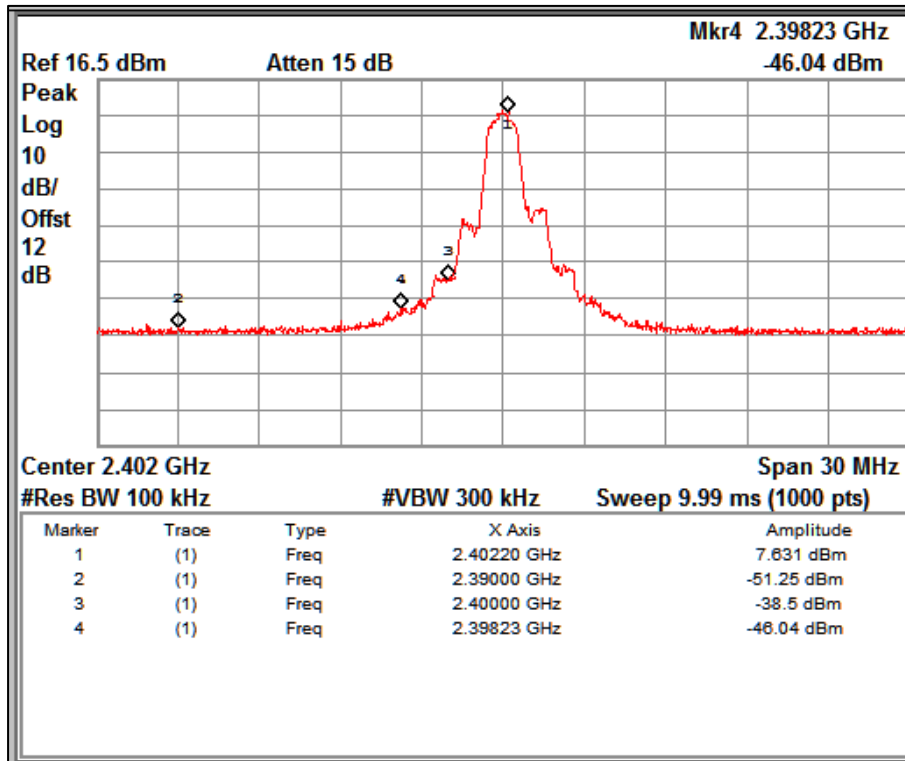
Channel Frequency: 2402MHz

Data rate: 1Mbps



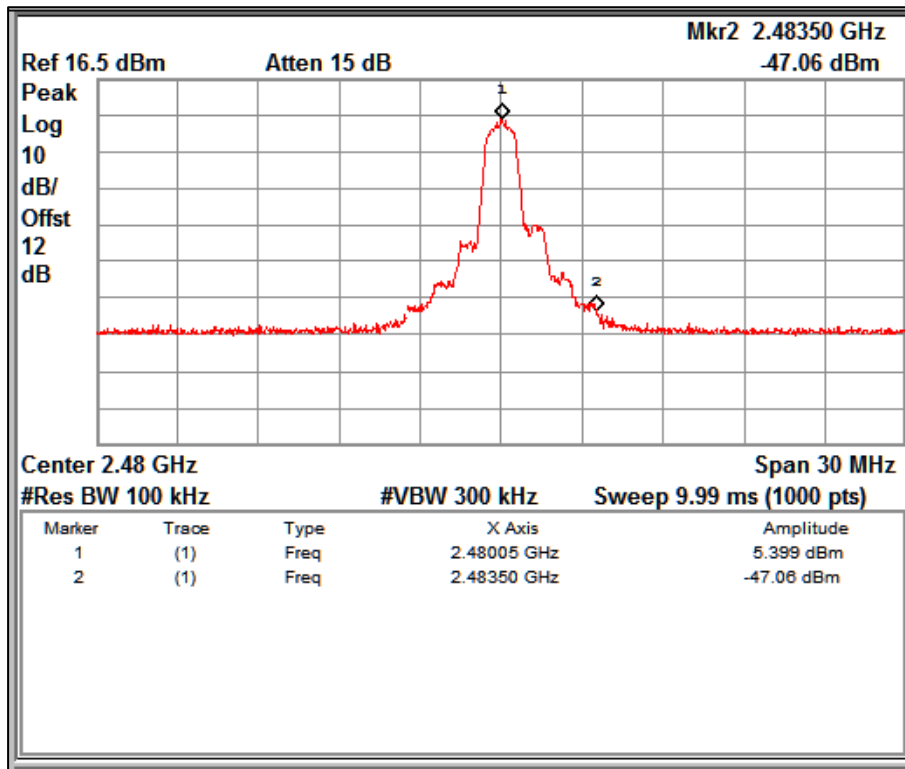
Channel Frequency: 2480MHz

Data rate: 1Mbps



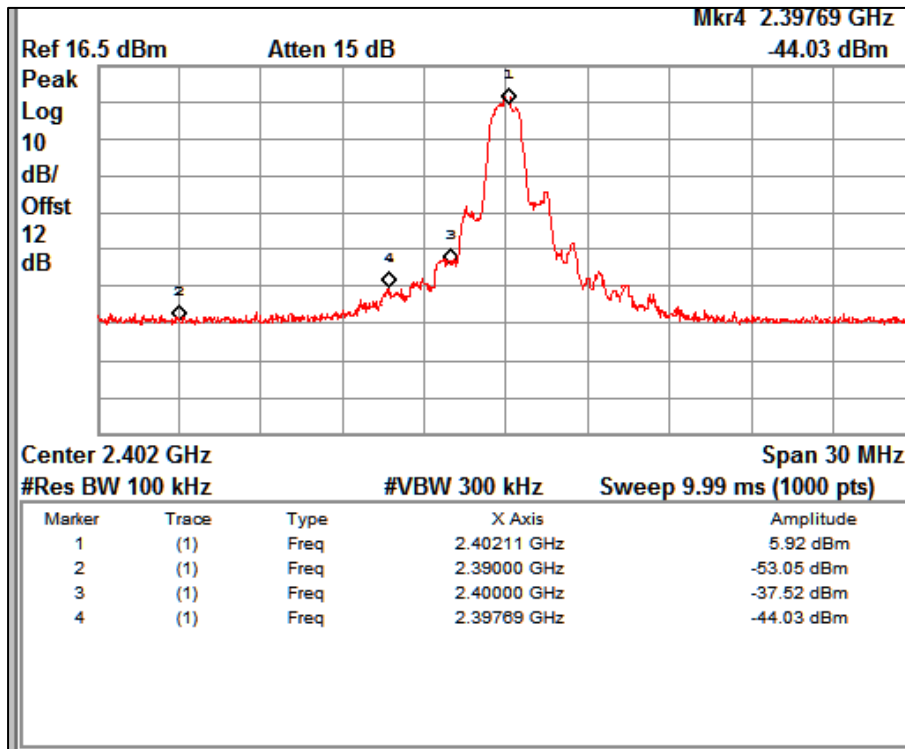
Channel Frequency: 2402MHz

Data rate: 2Mbps



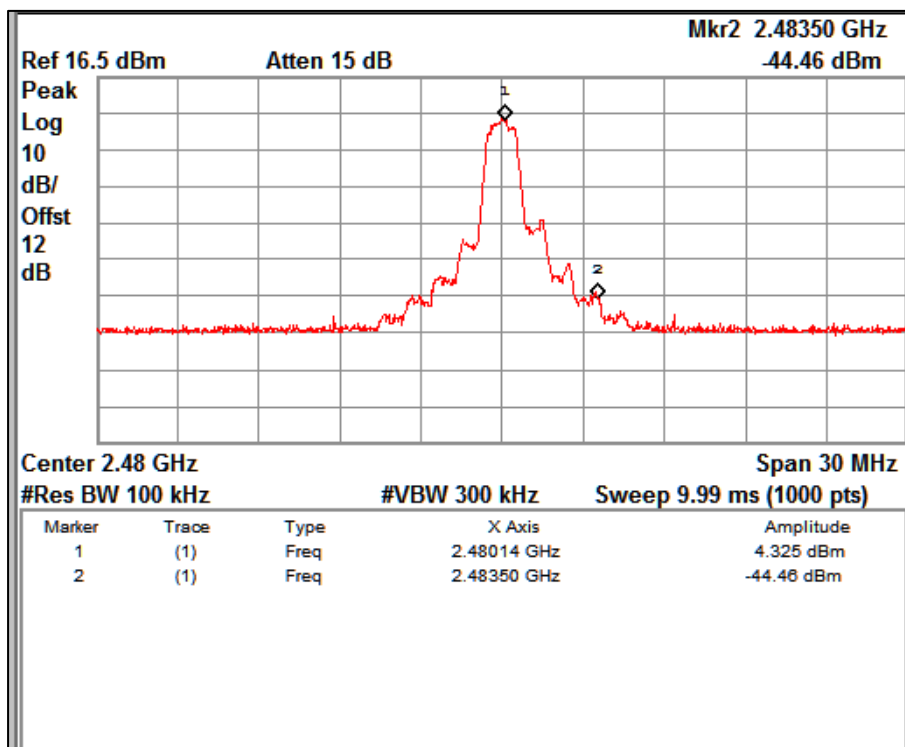
Channel Frequency: 2480MHz

Data rate: 2Mbps



Channel Frequency: 2402MHz

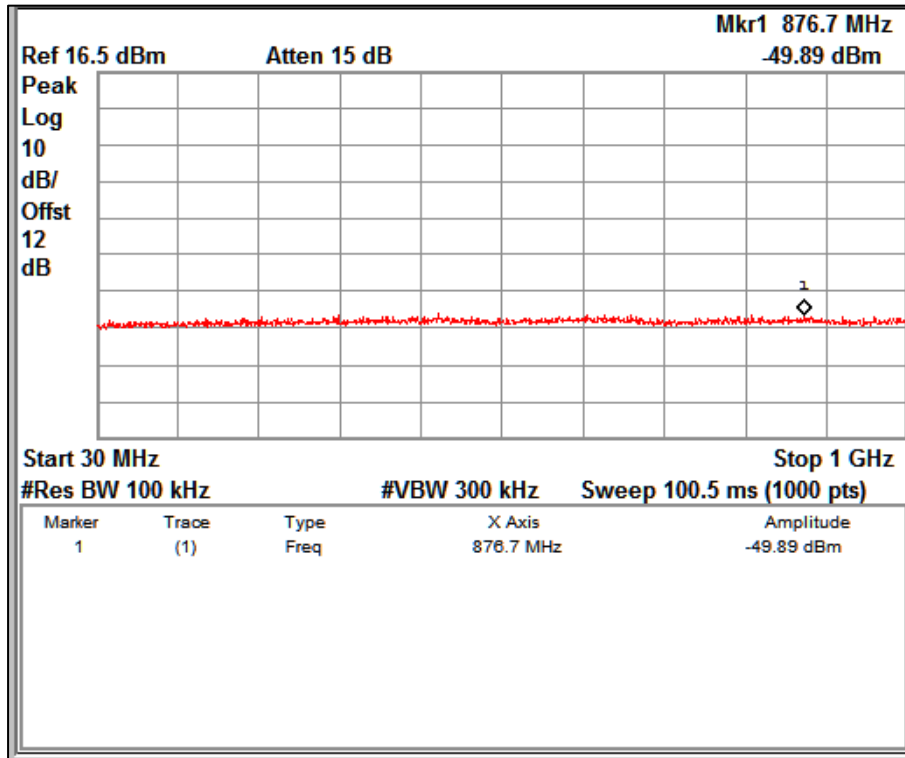
Data rate: 3Mbps



Channel Frequency: 2480MHz

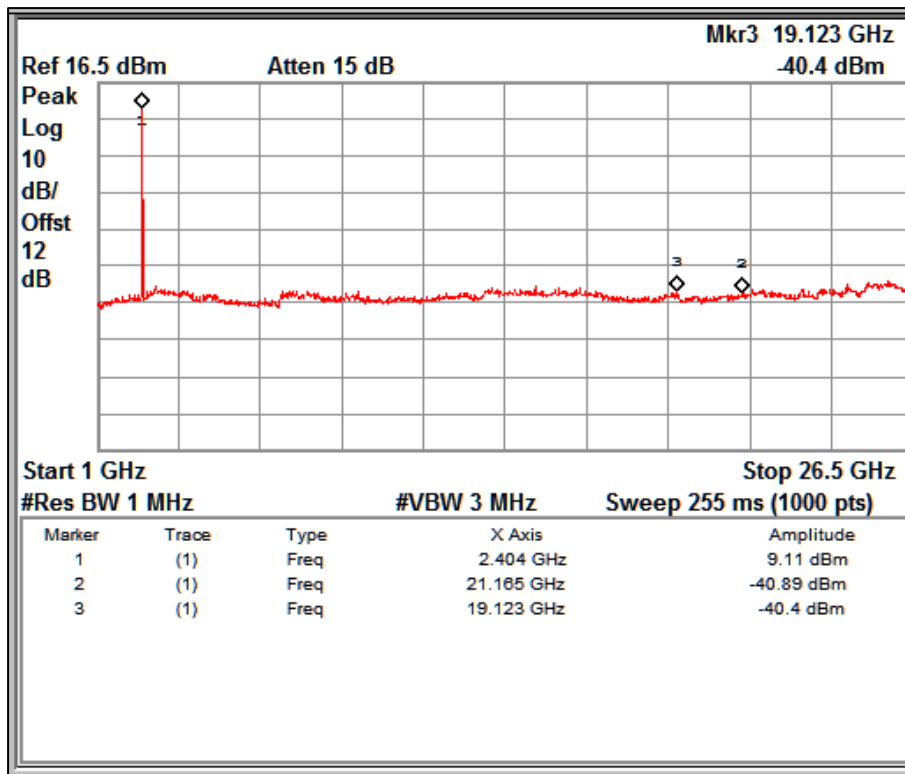
Data rate: 3Mbps

Conducted Spurious Emissions



Channel Frequency: 2402MHz

Frequency range: 30MHz-1GHz



Channel Frequency: 2402MHz

Frequency range: 1GHz-26.5GHz

6.7 Restricted bands of Emissions & Restricted Bands of Operation

Result

Pass

Test Specification	FCC part 15 Subpart C Section 15.247 (d) / (15.209 & 15.205)
Test Method	ANSI C 63.10 – 2013
Measurement Location	Semi Anechoic Chamber < 1 GHz Fully Anechoic Chamber > 1 GHz
Measuring Distance	3 m
Detector	QP for frequency below 1 GHz, average for frequency above 1 GHz
Requirement	As per the limits mentioned in the below table

Table 14: Transmitter limits for Radiated emission of Section 15.209

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a 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.

Test Conditions:

Supply Voltage to product: 110V AC, 60Hz

Supply Voltage to the Module: 24 VDC

Environmental conditions:

Temperature: +23.5 °C

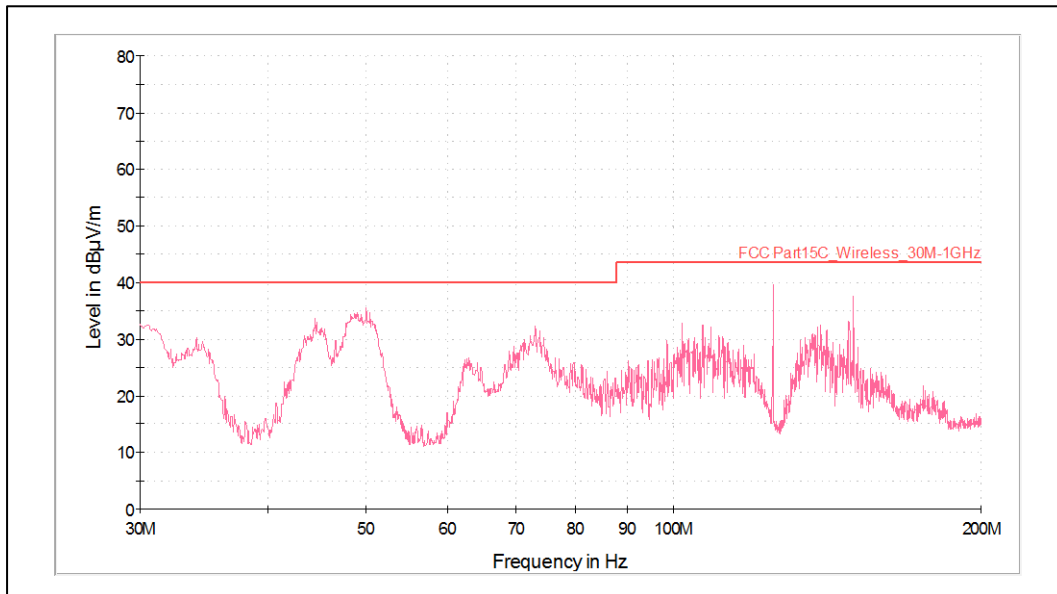
RH: 61.7 %

Test results:

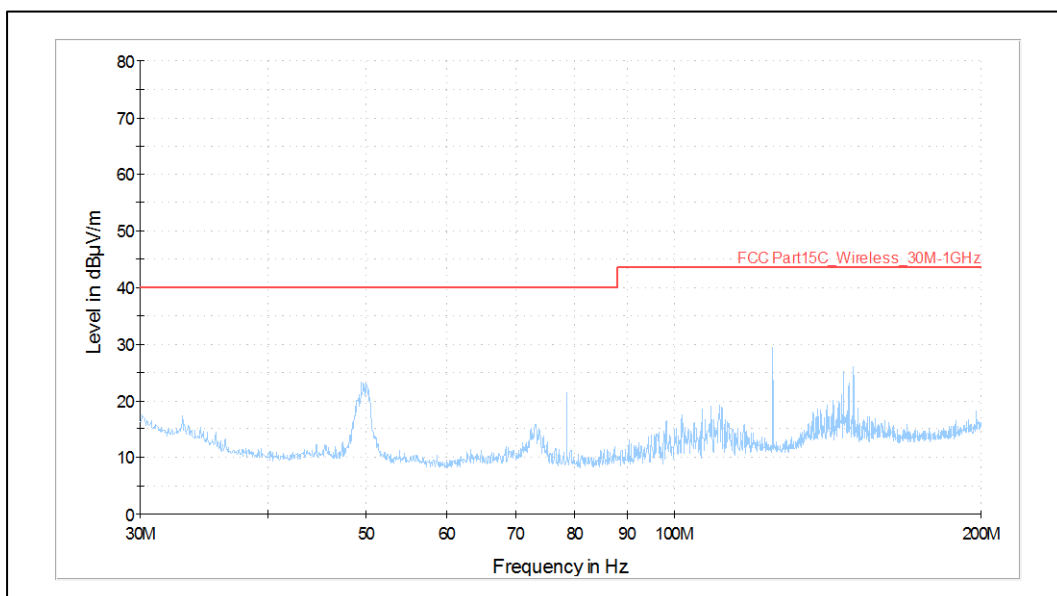
No emissions found in frequency 9 kHz to 30 MHz

Power Mode: RS232:

Frequency range : 30MHz – 200MHz



Polarization: Vertical



Polarization: Horizontal

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000086F

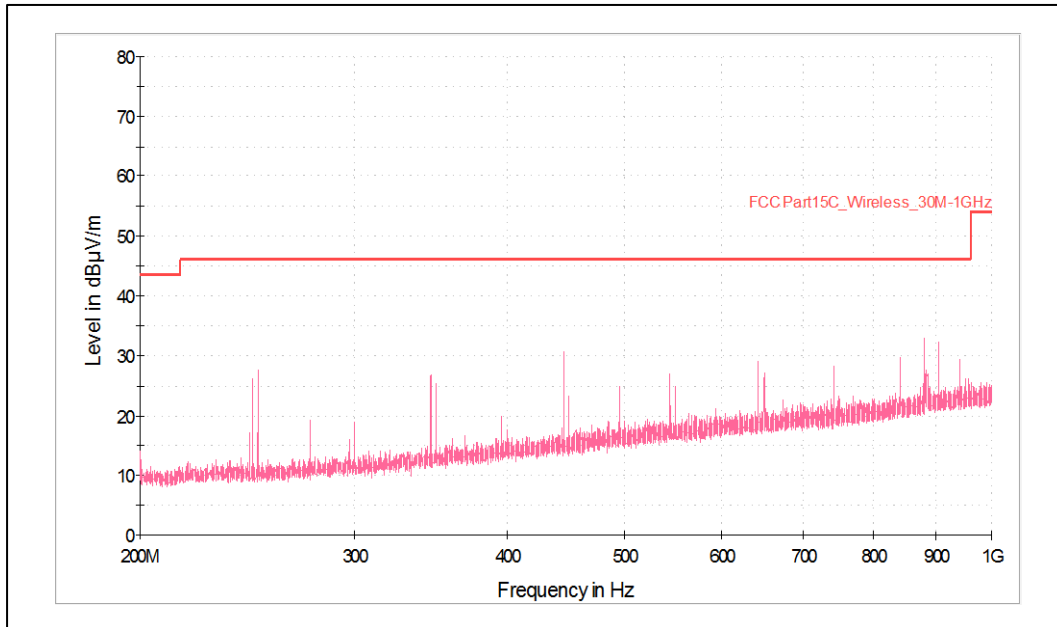
Seite 37 von 61

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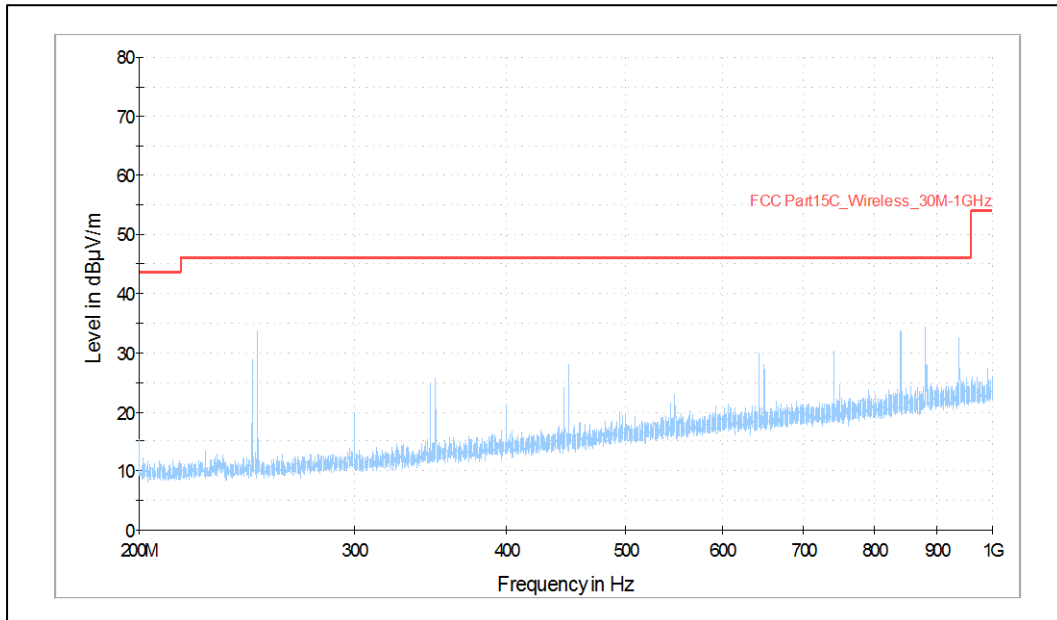
Test results:

Polarization	Measured Frequency (MHz)	Quasi Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Vertical	30.60	29.50	40.00	7.57
Vertical	49.97	31.36	40.00	4.43
Vertical	73.16	29.22	40.00	7.83
Horizontal	78.51	4.62	40.00	18.38
Horizontal	124.95	27.07	43.50	14.86
Vertical	125.01	38.36	43.50	3.72
Vertical	149.97	35.88	43.50	5.93

Frequency range : 200MHz – 1GHz



Polarization: Vertical



Polarization: Horizontal

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000086F

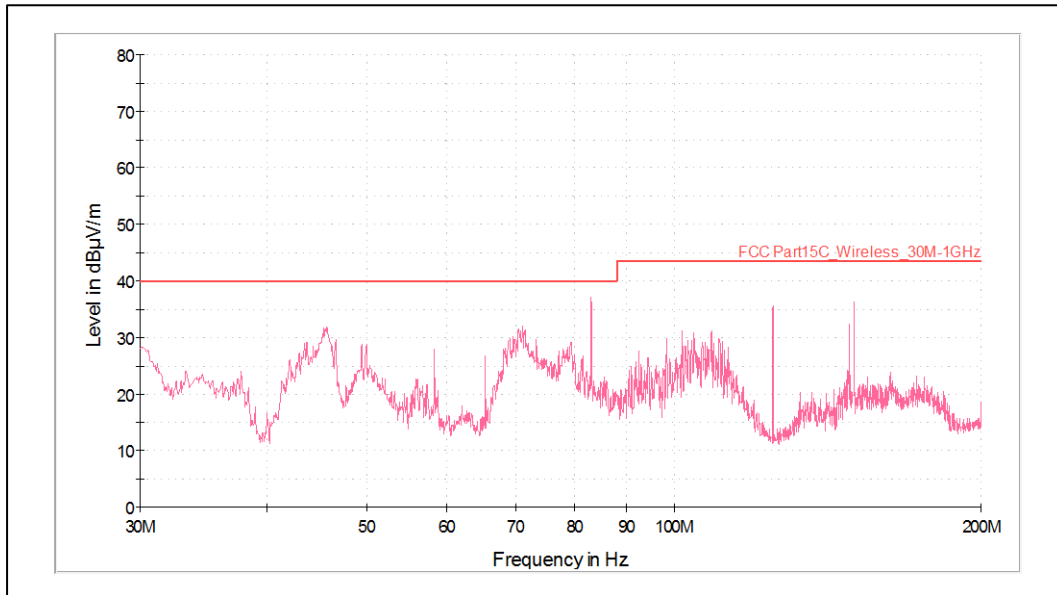
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Test result :

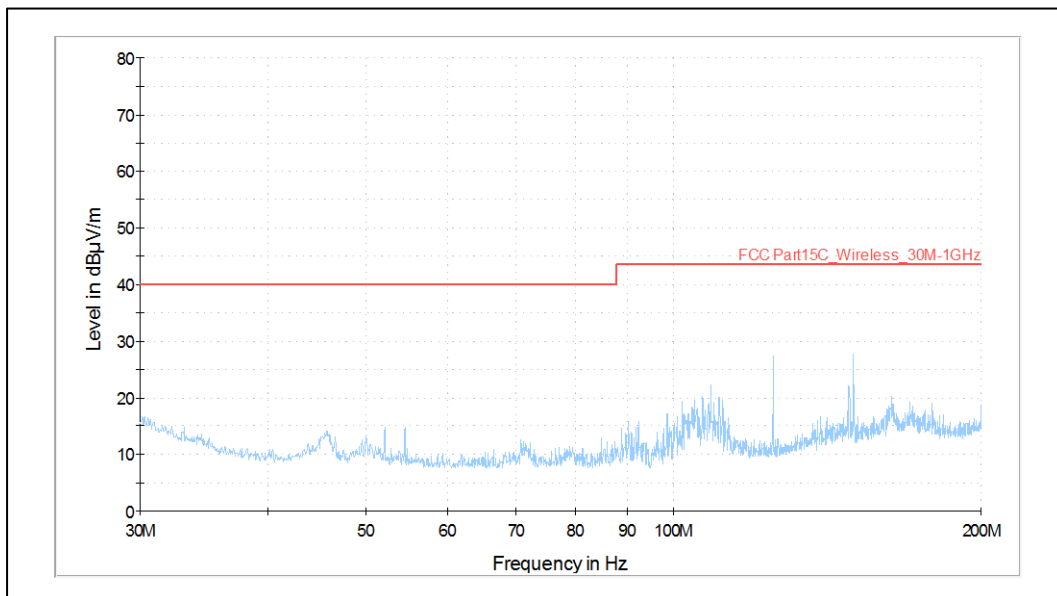
Polarization	Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Horizontal	250.00	33.73	46.00	12.27
Vertical	445.50	27.44	46.00	18.56
Horizontal	841.50	33.83	46.00	12.17
Horizontal	880.60	32.13	46.00	13.87
Vertical	903.55	19.21	46.00	26.79
Horizontal	940.50	30.00	46.00	16.00

Power Mode: 24V DC Supply

Frequency range: 30MHz – 200MHz



Polarization: Vertical



Polarization: Horizontal

Prüfbericht - Nr.:
Test Report No.:

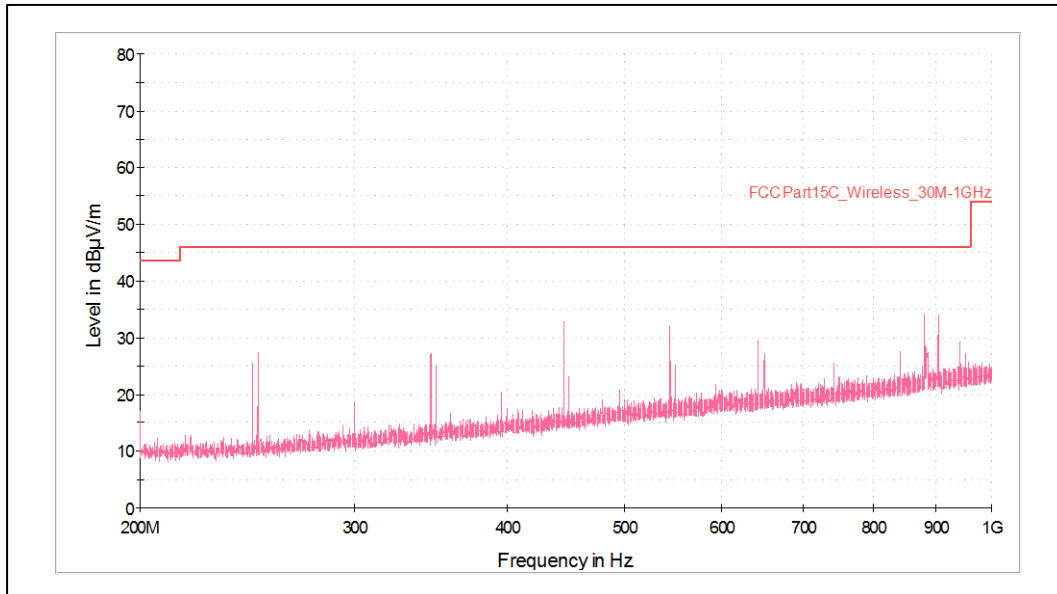
ULR-TC568819300000086F

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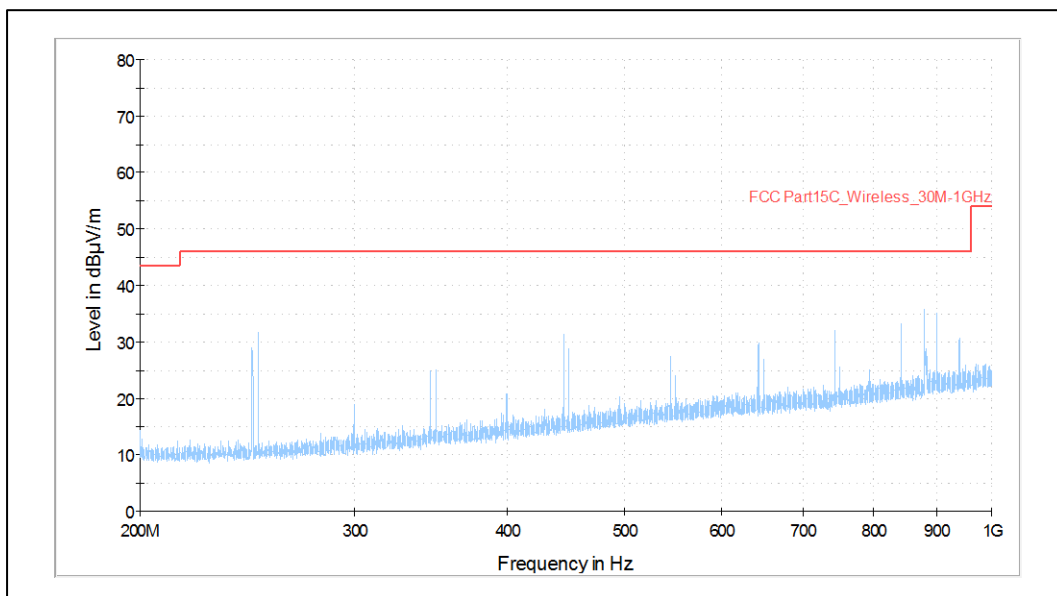
Test results :

Polarization	Measured Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	45.42	24.92	40.00	15.08
Vertical	83.12	17.21	40.00	22.79
Horizontal	124.95	24.11	43.50	19.39
Vertical	125.01	33.59	43.50	9.91
Vertical	148.51	30.58	43.50	12.92
Horizontal	149.97	25.48	43.50	18.02
Vertical	150.03	33.28	43.50	10.22

Frequency range : 200MHz – 1GHz



Polarization: Vertical



Polarization: Horizontal

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000086F

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Test results :

Polarization	Measured Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	247.45	21.48	46.00	24.52
Horizontal	247.50	28.56	46.00	17.44
Vertical	249.95	19.44	46.00	26.56
Horizontal	250.00	32.22	46.00	13.78
Horizontal	880.60	32.81	46.00	13.19

Test results for the frequencies in the range 1 GHz to 26.5 GHz.

Data Rate: 1 Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Polarization	Measured Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2402	2390(Pk)	Vertical	46.47	74	-27.53
	2390(Av)		32.03	54	-21.97
	2402(Pk)		103.34	*	-
	2402(Av)		92.66	*	-
	4804(Pk)		45.02	74	-28.98
	4804(Av)		29.45	54	-24.55
	7206(Pk)		No Harmonics Found		
	7206(Av)				
	2390(Pk)	Horizontal	42.22	74	-31.78
	2390(Av)		28.41	54	-25.59
	2402(Pk)		101.88	*	-
	2402(Av)		91.21	*	-
	4804(Pk)		42.29	74	-31.71
	4804(Av)		28.60	54	-25.40
	7206(Pk)		No Harmonics Found		
	7206(Av)				
2440	2440(Pk)	Vertical	102.21	*	-
	2440(Av)		91.55	*	-
	4880(Pk)		42.60	74	-31.40
	4880(Av)		30.30	54	-23.70
	7320(Pk)		No Harmonics Found		
	7320(Av)				
	2440(Pk)	Horizontal	101.52	*	-
	2440(Av)		90.86	*	-
	4880(Pk)		44.25	74	-29.75
	4880(Av)		31.74	54	-22.26
	7320(Pk)		No Harmonics Found		
	7320(Av)				
2480	2480(Pk)	Vertical	100.67	*	-
	2480(Av)		89.98	*	-
	2483.5(Pk)		50.22	74	-23.78
	2483.5(Av)		36.80	54	-17.20
	4960(Pk)		45.30	74	-28.70
	4960(Av)		32.85	54	-21.15
	7440(Pk)		No Harmonics Found		
	7440(Av)				
	2480(Pk)	Horizontal	101.20	*	-
	2480(Av)		90.53	*	-
	2483.5(Pk)		50.13	74	-23.87
	2483.5(Av)		36.86	54	-17.14
	4960(Pk)		43.68	74	-30.32
	4960(Av)		31.12	54	-22.88
	7440(Pk)		No Harmonics Found		
	7440(Av)				

Data Rate: 2 Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Polarization	Measured Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2402	2390(Pk)	Vertical	44.72	74	-29.28
	2390(Av)		31.99	54	-22.01
	2402(Pk)		104.07	*	-
	2402(Av)		91.54	*	-
	4804(Pk)		43.04	74	-30.96
	4804(Av)		29.68	54	-24.32
	7206(Pk)	Horizontal	No Harmonics Found		
	7206(Av)				
	2390(Pk)		44.01	74	-29.99
	2390(Av)		31.90	54	-22.10
	2402(Pk)		102.58	*	-
	2402(Av)		90.20	*	-
	4804(Pk)		41.98	74	-32.02
	4804(Av)		28.60	54	-25.40
	7206(Pk)		No Harmonics Found		
	7206(Av)				
2440	2440(Pk)	Vertical	102.50	*	-
	2440(Av)		89.72	*	-
	4880(Pk)		44.06	74	-29.94
	4880(Av)		30.15	54	-23.85
	7320(Pk)	Horizontal	No Harmonics Found		
	7320(Av)				
	2440(Pk)		101.82	*	-
	2440(Av)		89.04	*	-
	4880(Pk)		42.35	74	-31.65
	4880(Av)		28.60	54	-25.4
	7320(Pk)		No Harmonics Found		
	7320(Av)				
2480	2480(Pk)	Vertical	101.31	*	-
	2480(Av)		88.51	*	-
	2483.5(Pk)		58.31	74	-15.69
	2483.5(Av)		38.21	54	-15.79
	4960(Pk)		42.58	74	-31.42
	4960(Av)		29.67	54	-24.33
	7440(Pk)	Horizontal	No Harmonics Found		
	7440(Av)				
	2480(Pk)		101.85	*	-
	2480(Av)		88.48	*	-
	2483.5(Pk)		59.05	74	-14.95
	2483.5(Av)		38.40	54	-15.60
	4960(Pk)		44.19	74	-29.81
	4960(Av)		31.30	54	-22.70
	7440(Pk)		No Harmonics Found		
	7440(Av)				

Data Rate: 3 Mbps

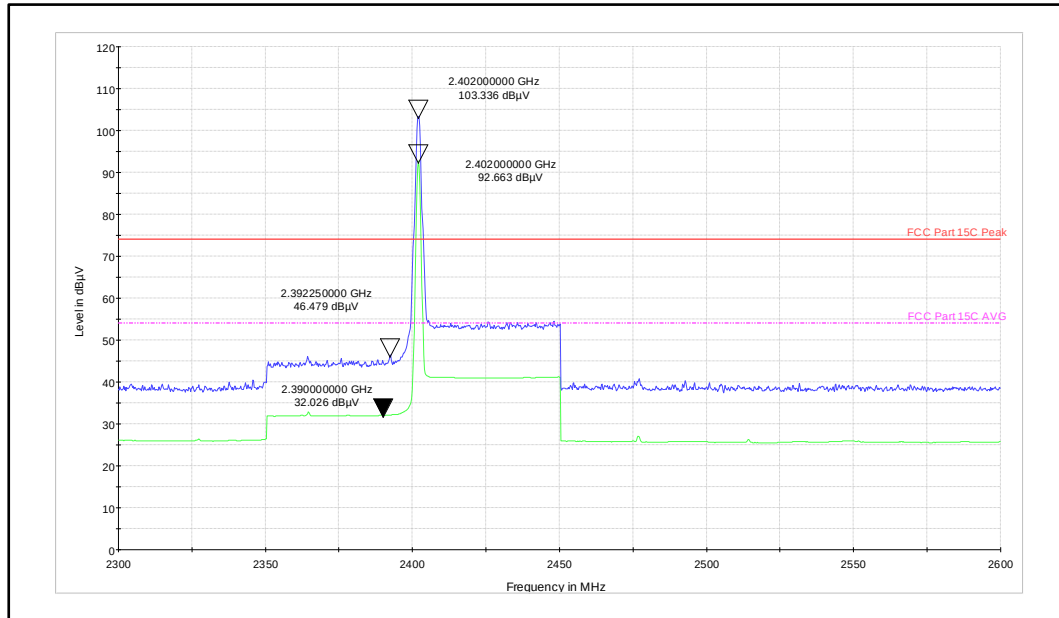
Channel Frequency (MHz)	Measured Frequency (MHz)	Polarization	Measured Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2402	2390(Pk)	Vertical	44.20	74	-29.80
	2390(Av)		32.00	54	-22.00
	2402(Pk)		103.64	*	-
	2402(Av)		90.97	*	-
	4804(Pk)		45.30	74	-28.70
	4804(Av)		30.84	54	-23.16
	7206(Pk)		No Harmonics Found		
	7206(Av)				
	2390(Pk)	Horizontal	44.58	74	-29.42
	2390(Av)		32.00	54	-22.00
	2402(Pk)		103.85	*	-
	2402(Av)		91.43	*	-
	4804(Pk)		42.31	74	-31.69
	4804(Av)		29.86	54	-24.14
	7206(Pk)		No Harmonics Found		
	7206(Av)				
2440	2440(Pk)	Vertical	102.68	*	-
	2440(Av)		90.09	*	-
	4880(Pk)		44.99	74	-29.01
	4880(Av)		31.08	54	-22.92
	7320(Pk)	Horizontal	No Harmonics Found		
	7320(Av)				
	2440(Pk)		101.90	*	-
	2440(Av)		88.95	*	-
	4880(Pk)		42.33	74	-31.67
	4880(Av)		29.03	54	-24.97
	7320(Pk)		No Harmonics Found		
	7320(Av)				
2480	2480(Pk)	Vertical	101.36	*	-
	2480(Av)		88.36	*	-
	2483.5(Pk)		59.73	74	-14.27
	2483.5(Av)		38.56	54	-15.44
	4960(Pk)		43.88	74	-30.12
	4960(Av)		31.19	54	-22.81
	7440(Pk)		No Harmonics Found		
	7440(Av)				
	2480(Pk)	Horizontal	101.35	*	-
	2480(Av)		88.35	*	-
	2483.5(Pk)		59.72	74	-14.28
	2483.5(Av)		38.55	54	-15.45
	4960(Pk)		44.40	74	-29.60
	4960(Av)		31.22	54	-22.78
	7440(Pk)		No Harmonics Found		
	7440(Av)				

*: Fundamental Frequency

Pk: Peak Detector; Av: Average Detector

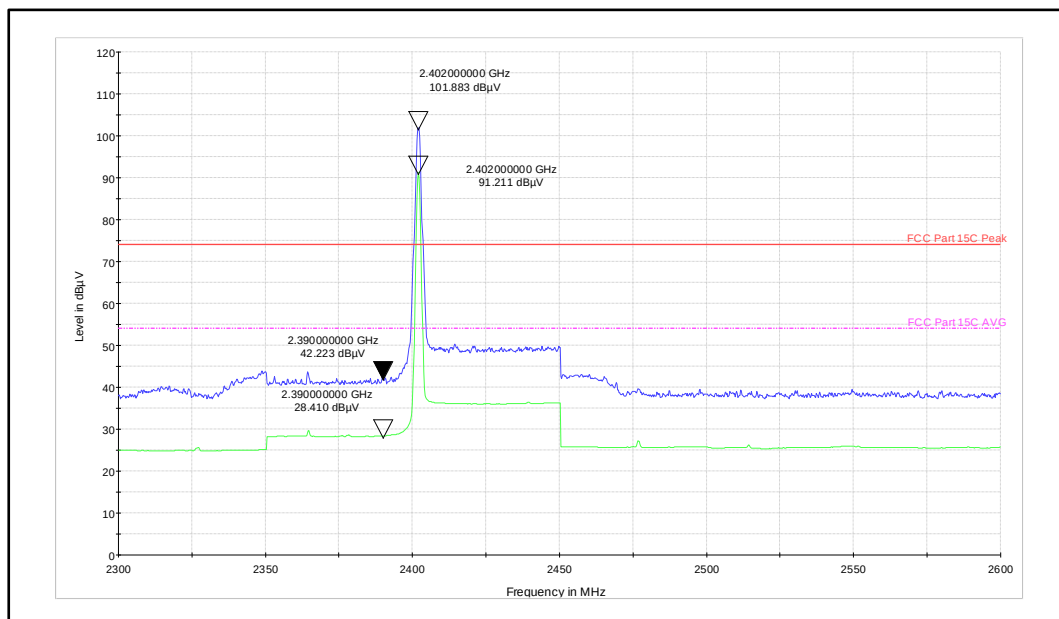
Worst case Plots:

Data rate: 1Mbps



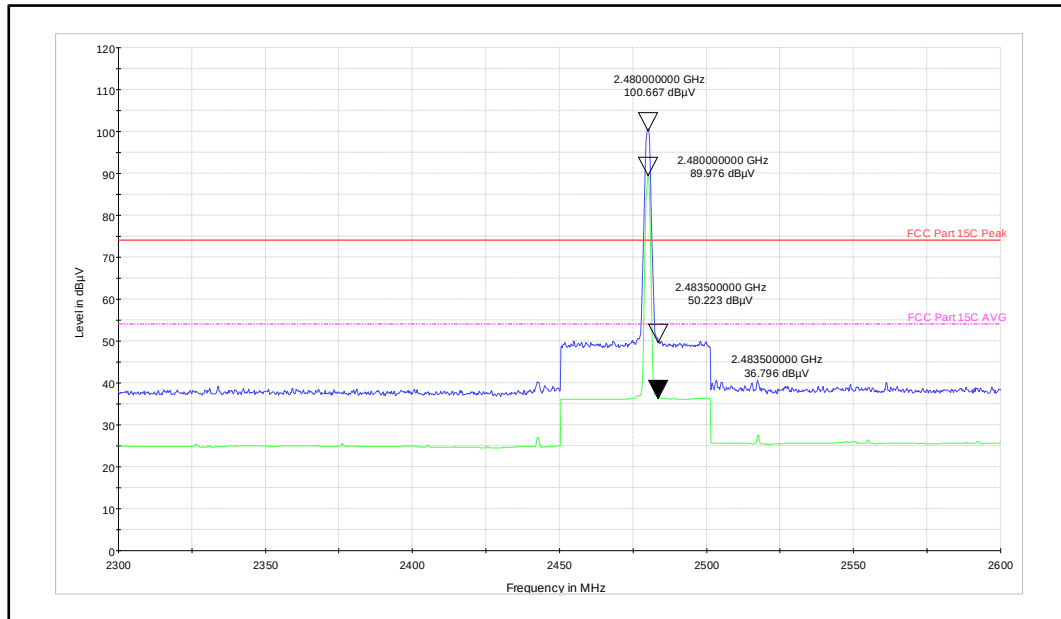
Channel Frequency: 2402MHz

Polarization: Vertical



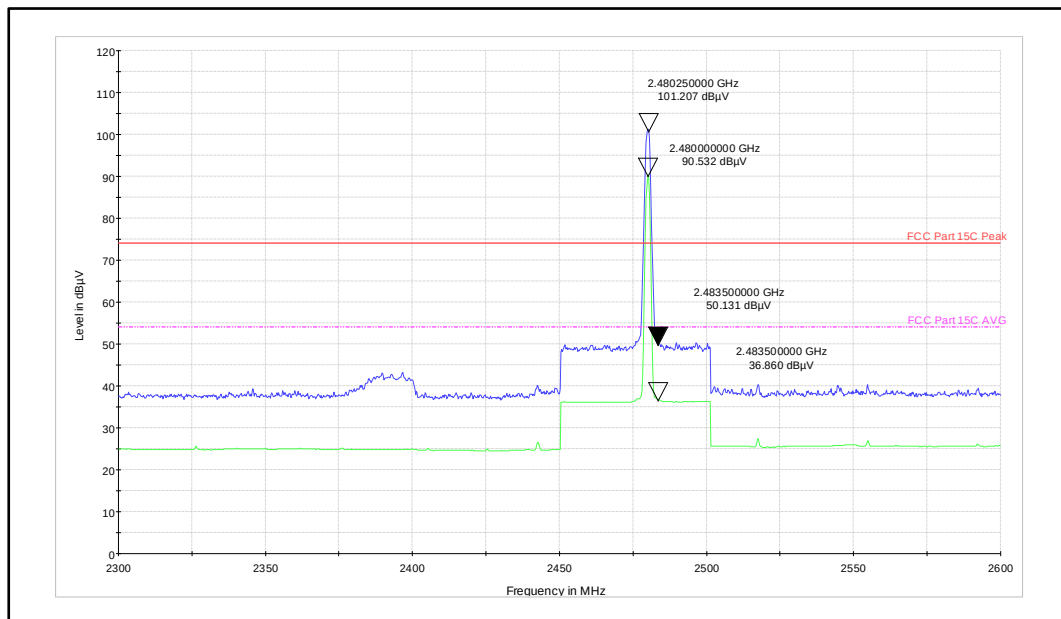
Channel Frequency: 2402MHz

Polarization: Horizontal



Channel Frequency: 2480MHz

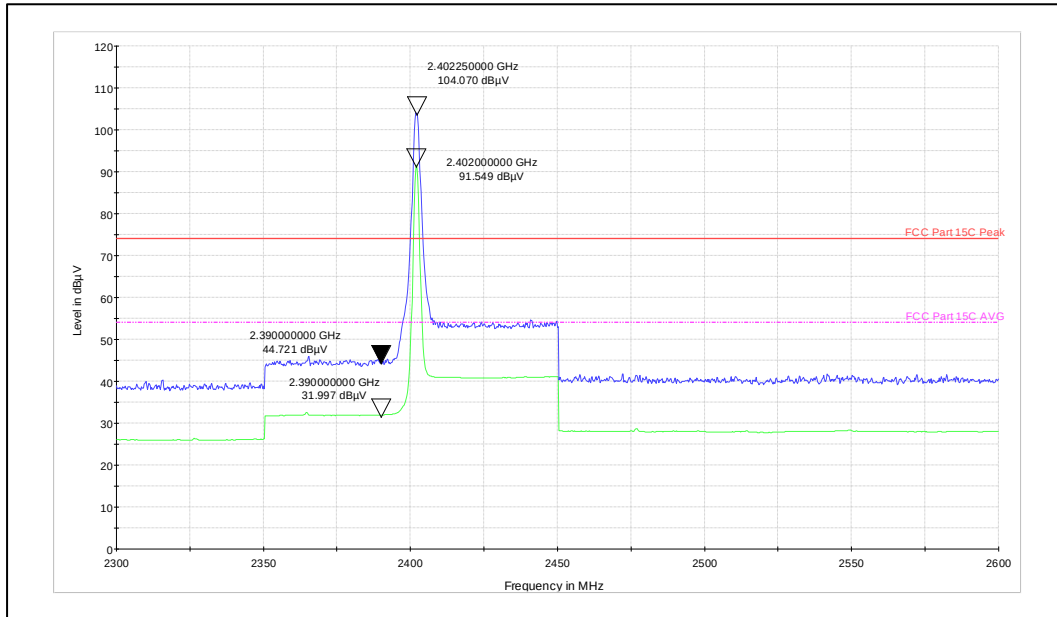
Polarization: Vertical



Channel Frequency: 2480MHz

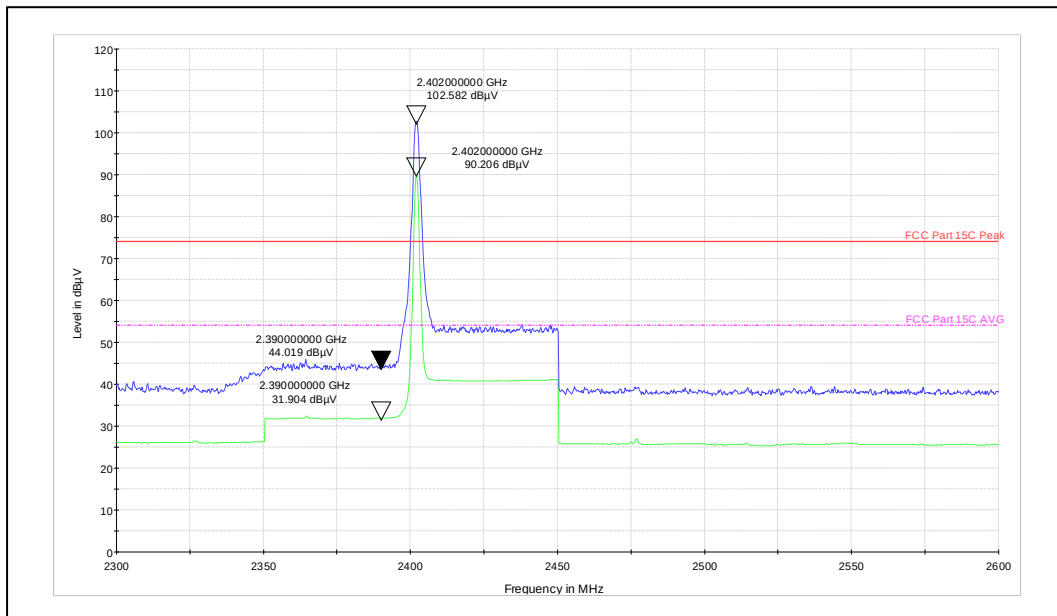
Polarization: Horizontal

Data rate: 2Mbps



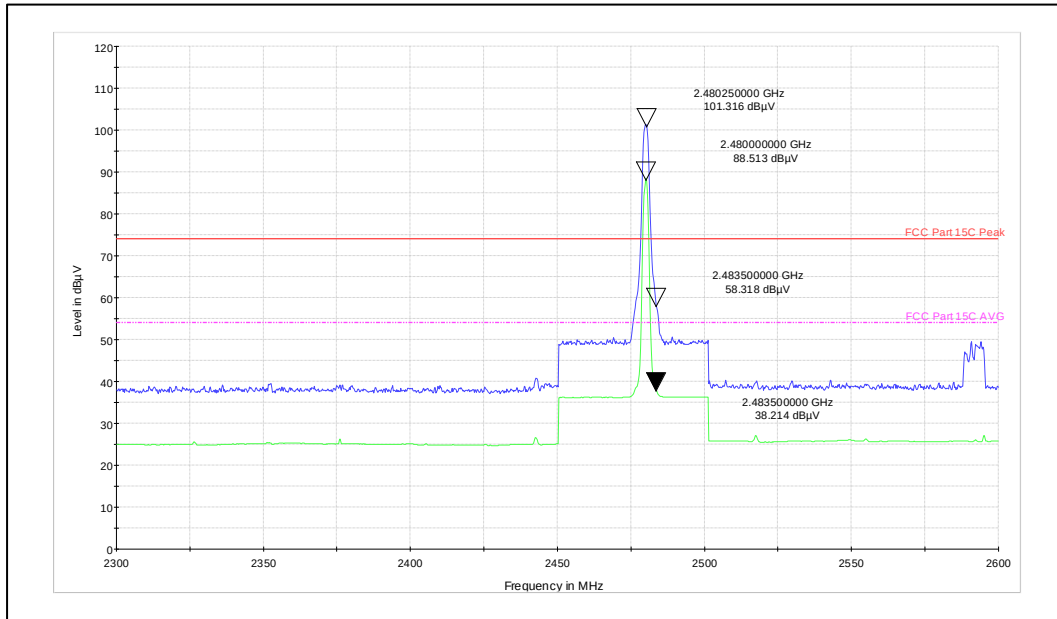
Channel Frequency: 2402MHz

Polarization: Vertical



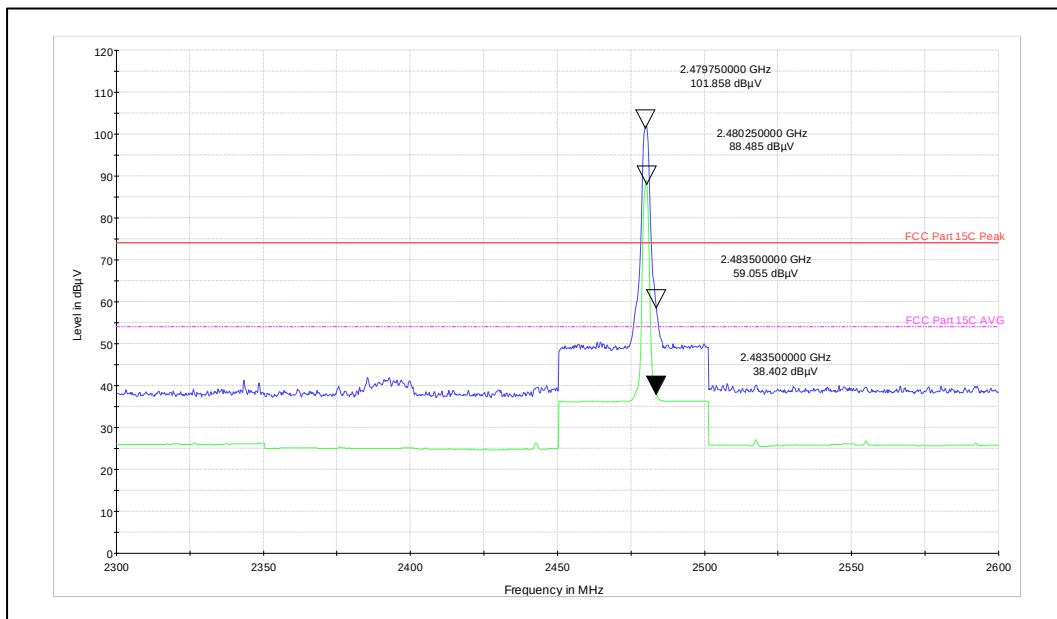
Channel Frequency: 2402MHz

Polarization: Horizontal



Channel Frequency: 2480MHz

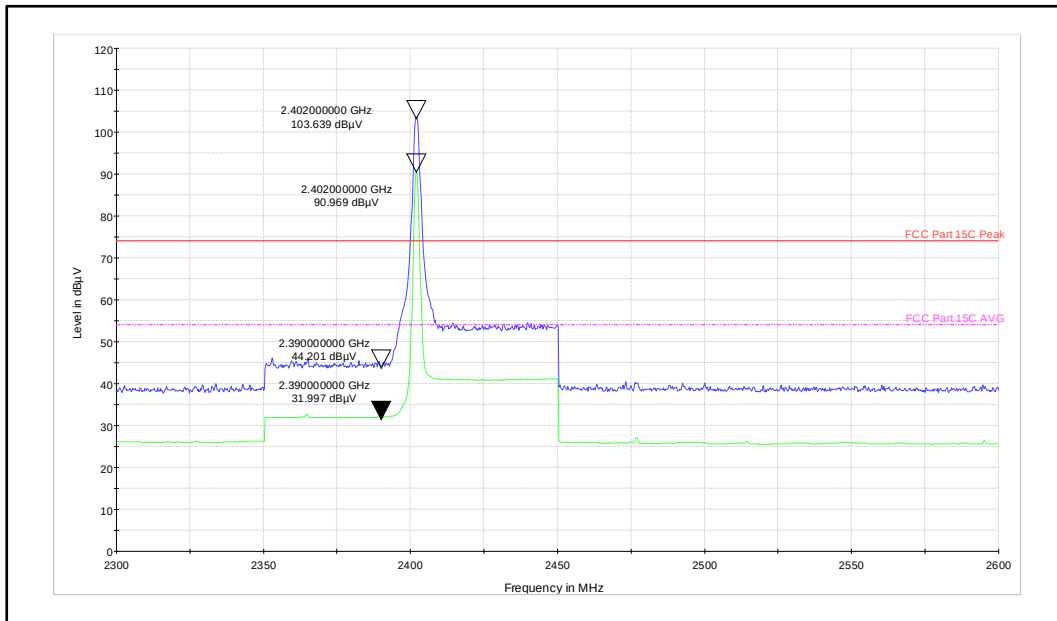
Polarization: Vertical



Channel Frequency: 2480MHz

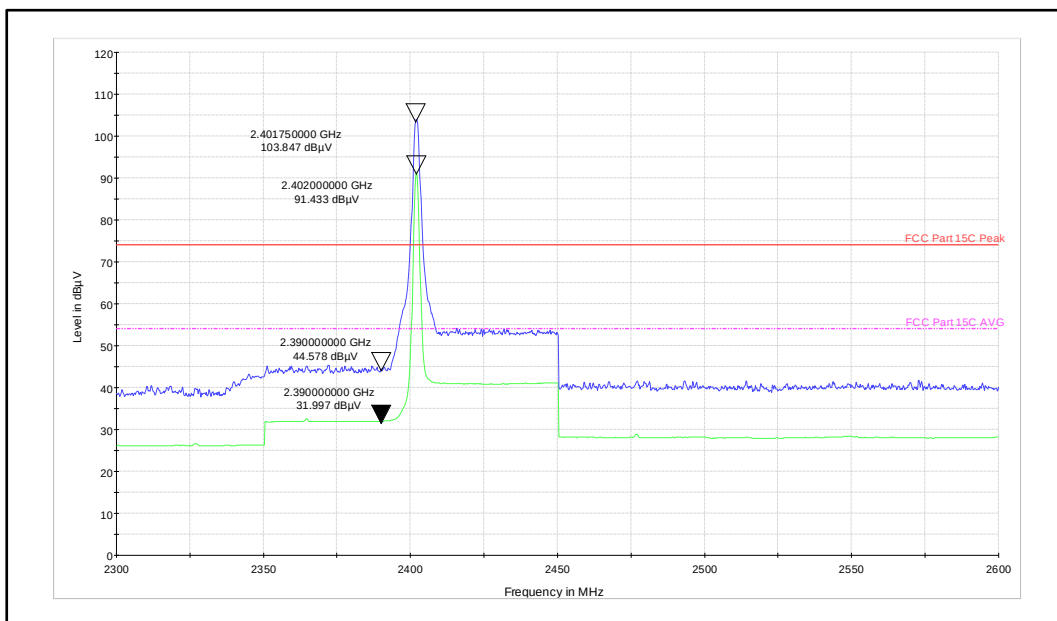
Polarization: Horizontal

Data rate: 3Mbps



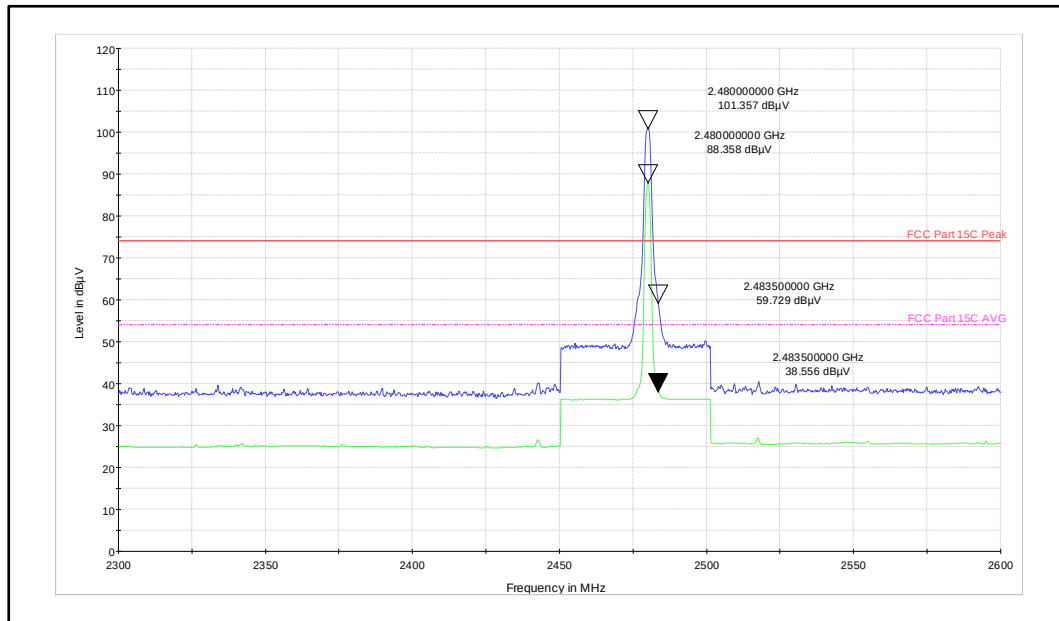
Channel Frequency: 2402MHz

Polarization: Vertical



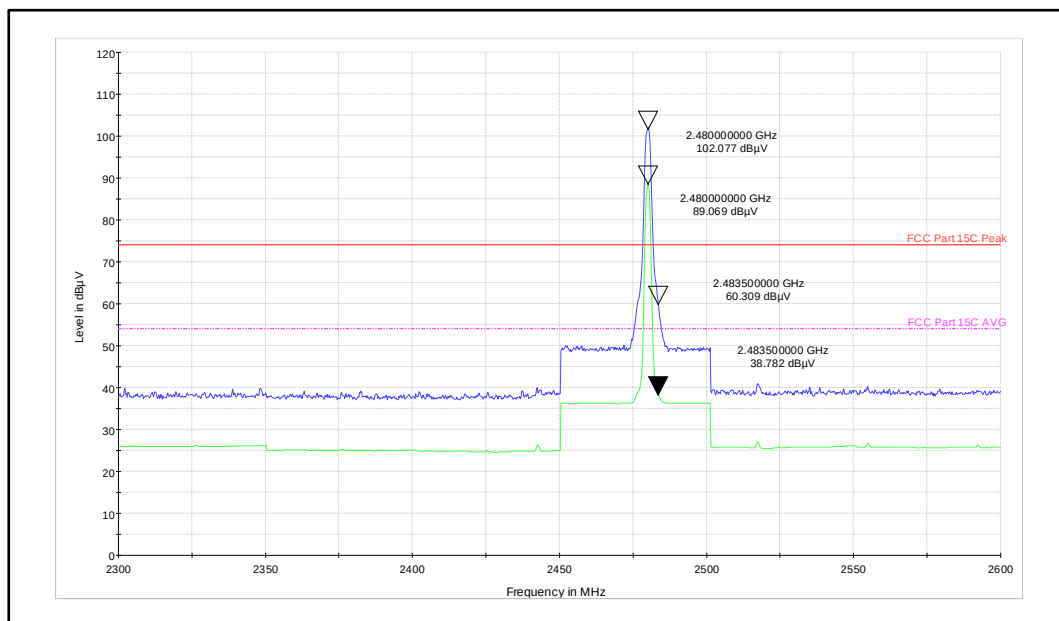
Channel Frequency: 2402MHz

Polarization: Horizontal



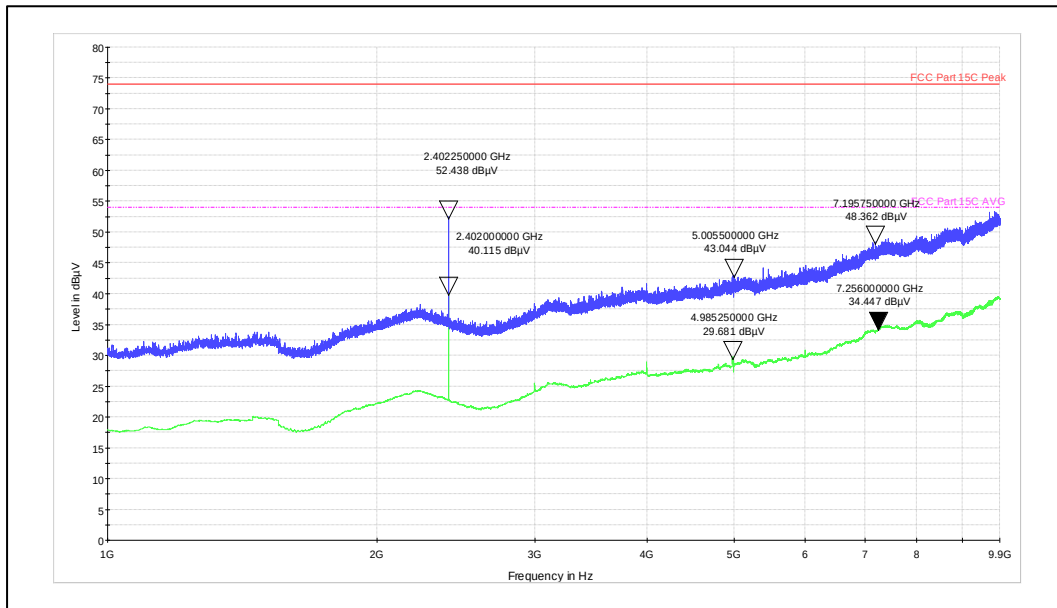
Channel Frequency: 2480MHz

Polarization: Vertical



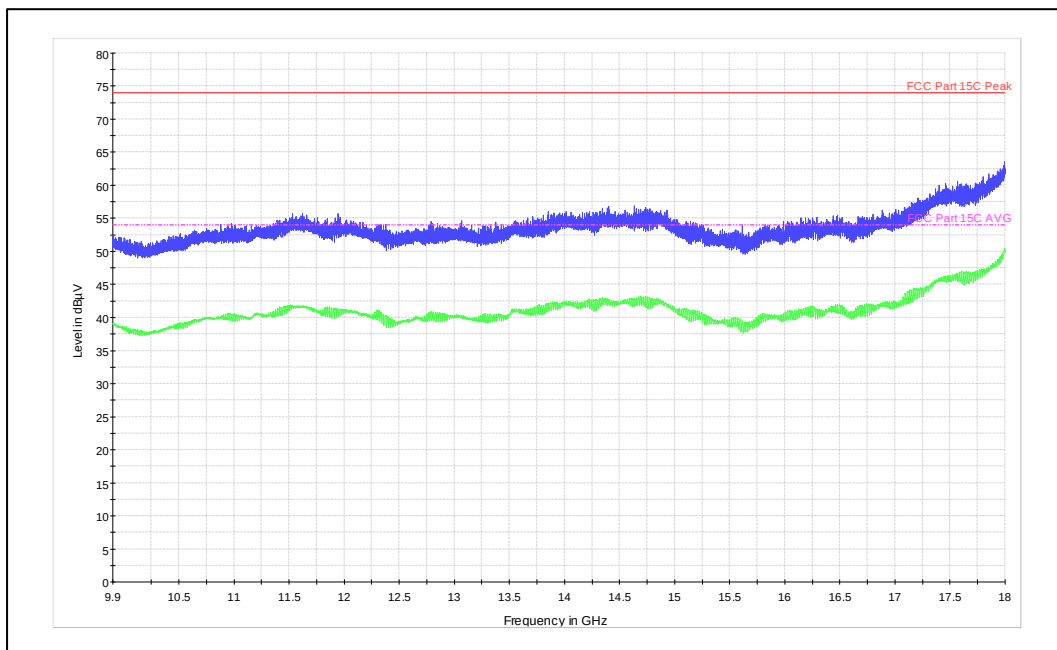
Channel Frequency: 2480MHz

Polarization: Horizontal



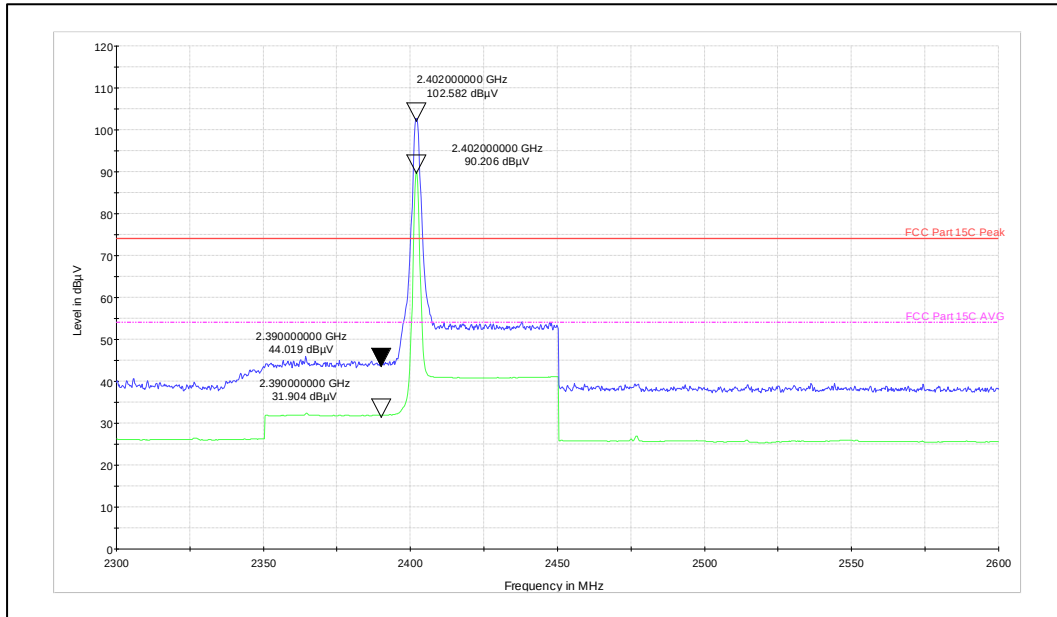
Frequency Range: 1-9.9GHz

Polarization: Vertical



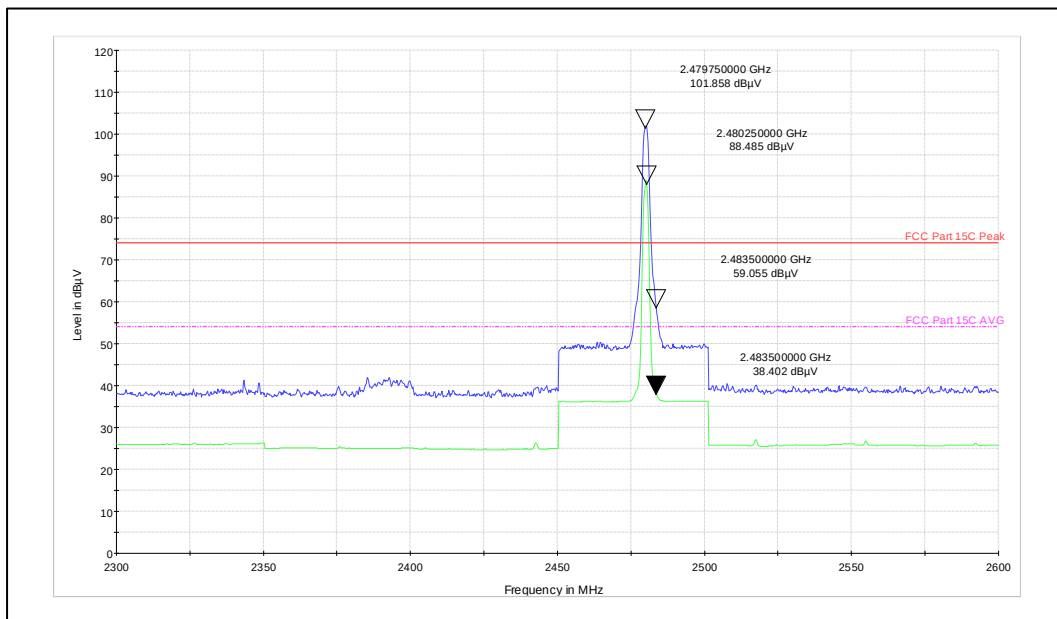
Frequency Range: 9.9-18GHz

Polarization: Vertical



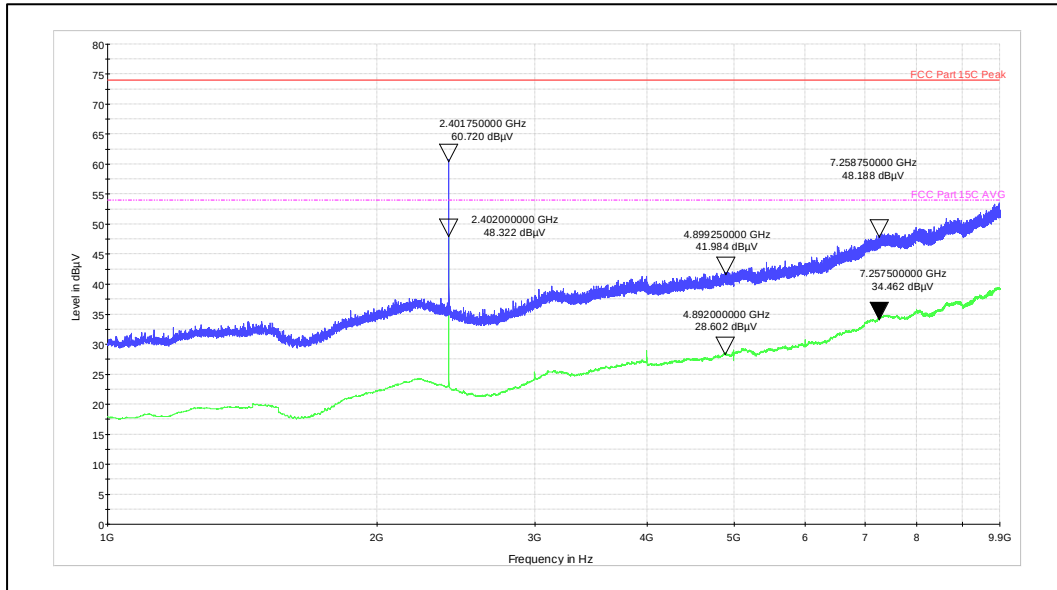
Channel Frequency: 2402MHz

Polarization: Horizontal



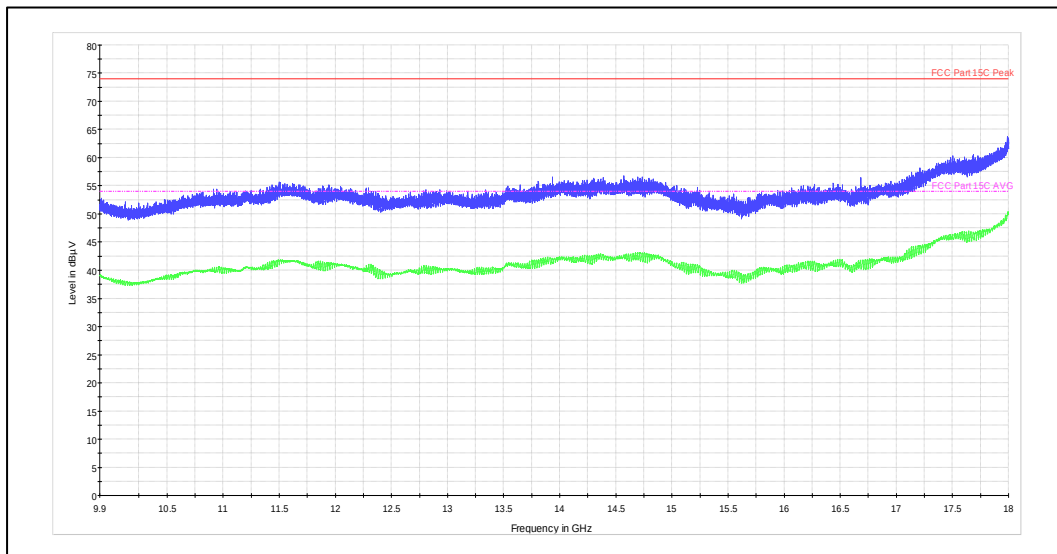
Channel Frequency: 2480MHz

Polarization: Horizontal



Frequency Range: 1-9.9GHz

Polarization: Horizontal



Frequency Range: 9.9-18GHz

Polarization: Horizontal

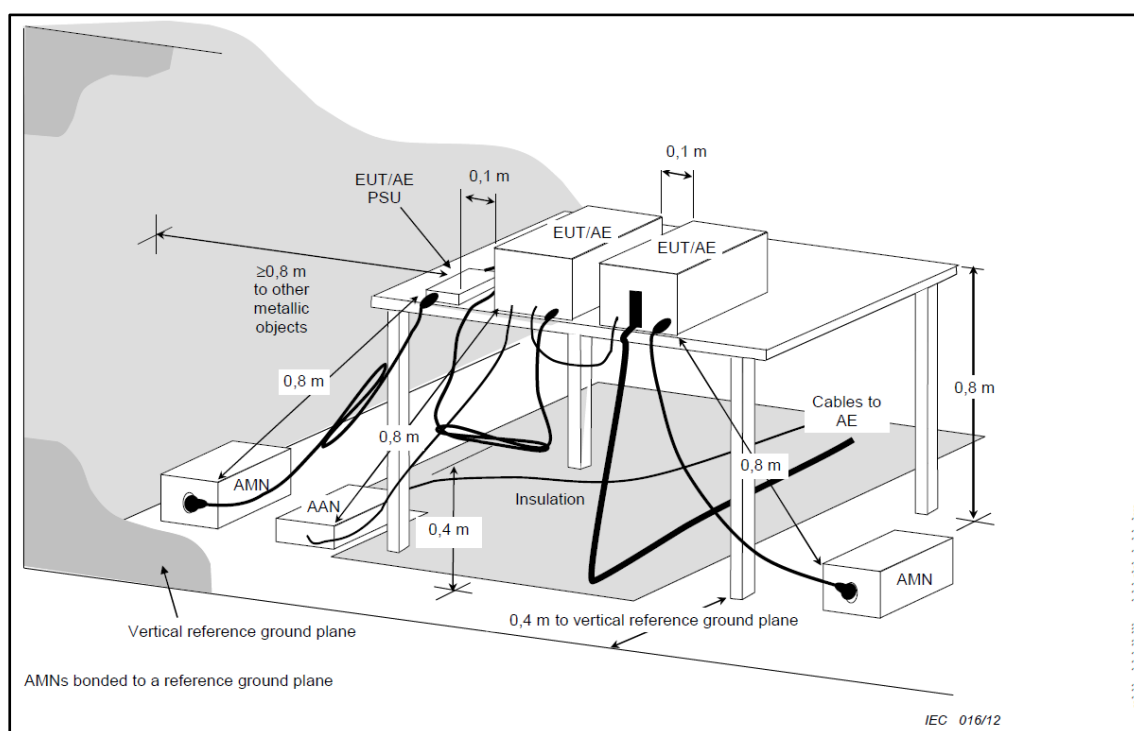
7 Conducted Spurious Emission Test on AC Power Line

Result

Pass

Test Specification	: FCC Part 15 Section 15.207
Test Method	: ANSI C 63.10-2013
Testing Location	: Screened room
Measurement Bandwidth	: 9kHz
Frequency Range	: 150kHz – 30MHz
Supply Voltage	: 110VAC,60Hz

Test setup



Limits of section 15.207

Frequency of emission (MHz)	QP Limit (dBµV)	AV Limit (dBµV/m)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency

Prüfbericht - Nr.:

Test Report No.:

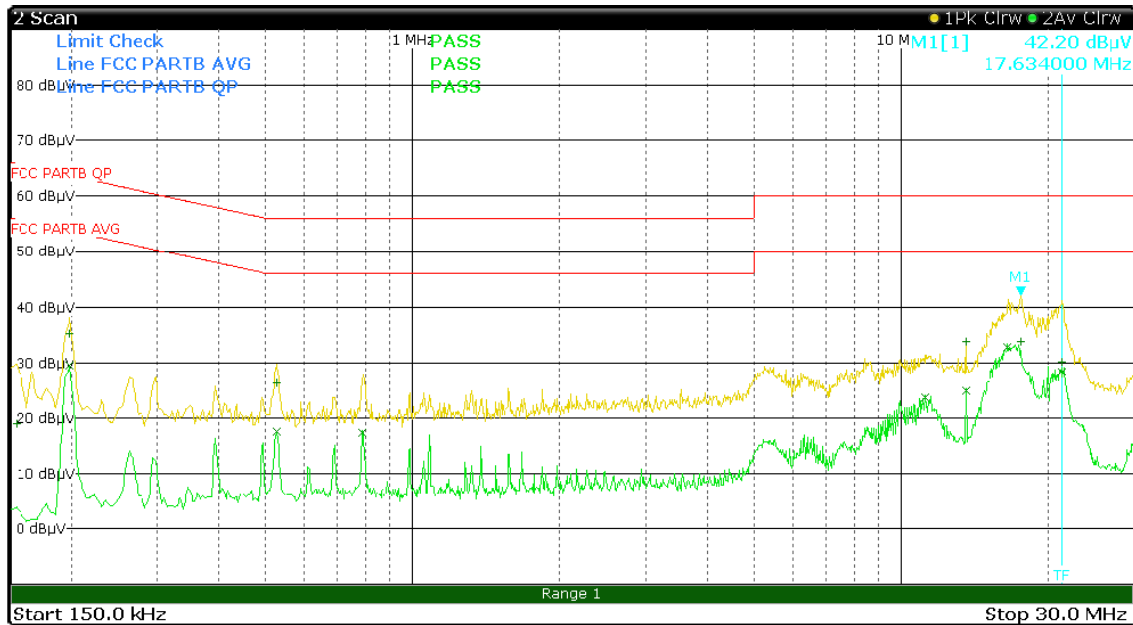
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Test result:

Power Mode: RS232



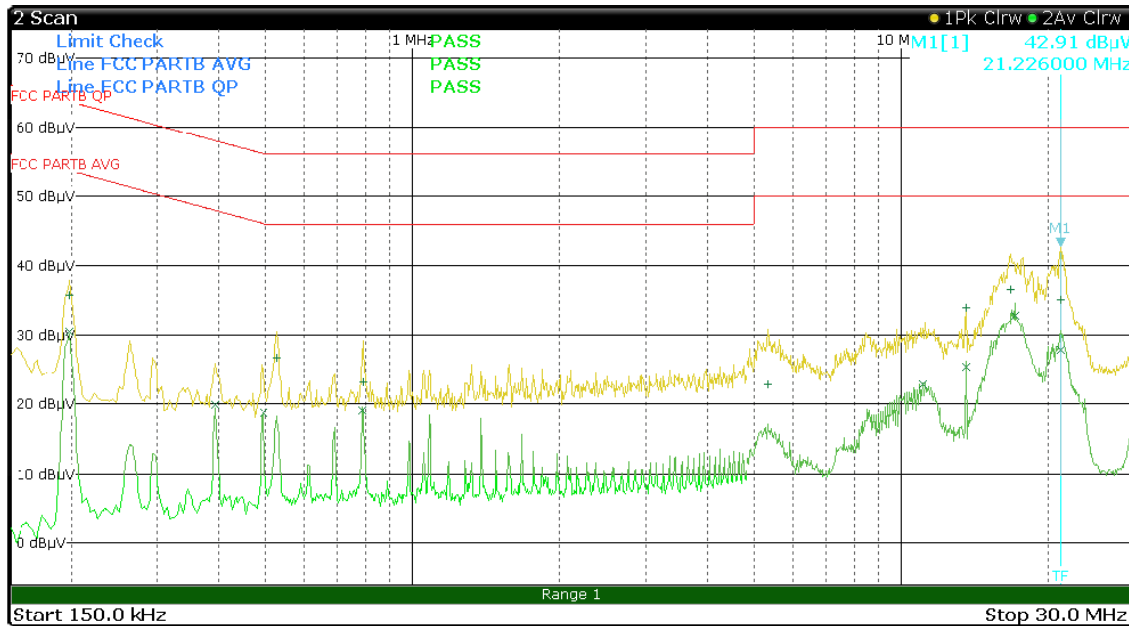
Graph: Line

Trace	Frequency	Level	Delta Limit
2	16526000,000000 Hz	32,830000 dBμV	-17,170000 dBμV
2	21282000,000000 Hz	28,320000 dBμV	-21,680000 dBμV
2	198000,000000 Hz	29,530000 dBμV	-24,164036 dBμV
2	13558000,000000 Hz	24,770000 dBμV	-25,230000 dBμV
1	13562000,000000 Hz	33,770000 dBμV	-26,230000 dBμV
1	17634000,000000 Hz	33,740000 dBμV	-26,260000 dBμV
2	11186000,000000 Hz	23,610000 dBμV	-26,390000 dBμV
2	526000,000000 Hz	17,560000 dBμV	-28,440000 dBμV
1	198000,000000 Hz	35,120000 dBμV	-28,574036 dBμV
2	786000,000000 Hz	17,300000 dBμV	-28,700000 dBμV
1	526000,000000 Hz	26,290000 dBμV	-29,710000 dBμV
1	21354000,000000 Hz	30,190000 dBμV	-29,810000 dBμV
1	154000,000000 Hz	18,990000 dBμV	-46,791413 dBμV

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Graph: Neutral

Trace	Frequency	Level	Delta Limit
2	17118000,000000 Hz	32,760000 dBμV	-17,240000 dBμV
2	21226000,000000 Hz	27,950000 dBμV	-22,050000 dBμV
2	198000,000000 Hz	30,450000 dBμV	-23,244036 dBμV
1	16818000,000000 Hz	36,500000 dBμV	-23,500000 dBμV
2	13562000,000000 Hz	25,370000 dBμV	-24,630000 dBμV
1	21226000,000000 Hz	35,000000 dBμV	-25,000000 dBμV
1	13562000,000000 Hz	33,990000 dBμV	-26,010000 dBμV
2	786000,000000 Hz	19,100000 dBμV	-26,900000 dBμV
2	11086000,000000 Hz	22,900000 dBμV	-27,100000 dBμV
2	494000,000000 Hz	18,750000 dBμV	-27,350273 dBμV
1	198000,000000 Hz	35,660000 dBμV	-28,034036 dBμV
2	394000,000000 Hz	19,900000 dBμV	-28,078925 dBμV
1	526000,000000 Hz	26,700000 dBμV	-29,300000 dBμV
1	790000,000000 Hz	23,230000 dBμV	-32,770000 dBμV
1	5330000,000000 Hz	22,870000 dBμV	-37,130000 dBμV

Prüfbericht - Nr.:

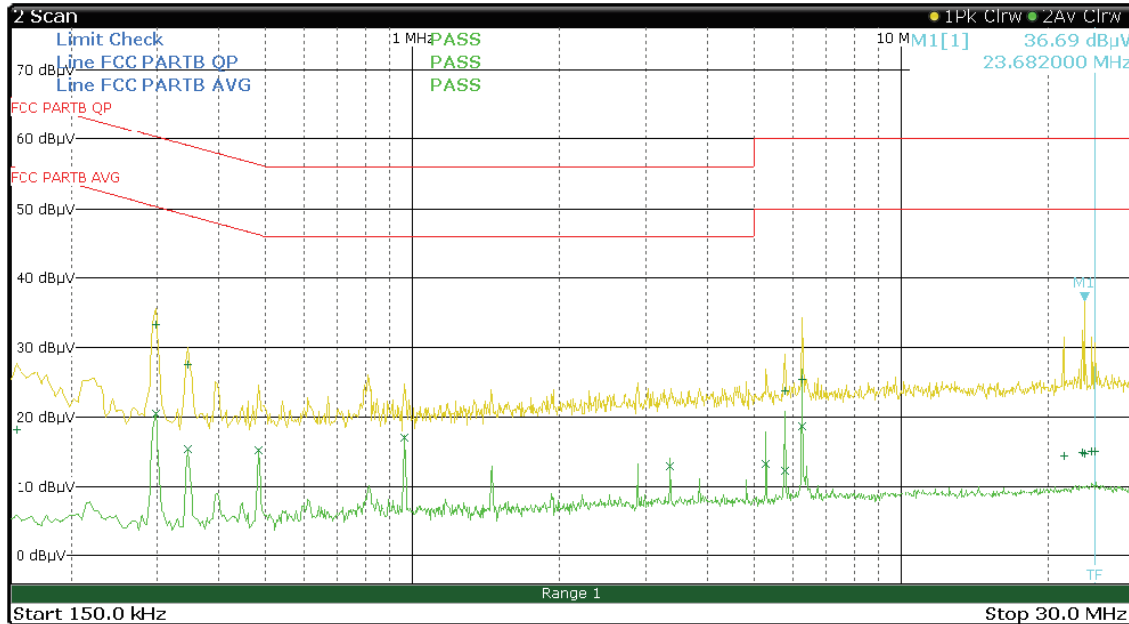
Test Report No.:

ULR-TC568819300000086F

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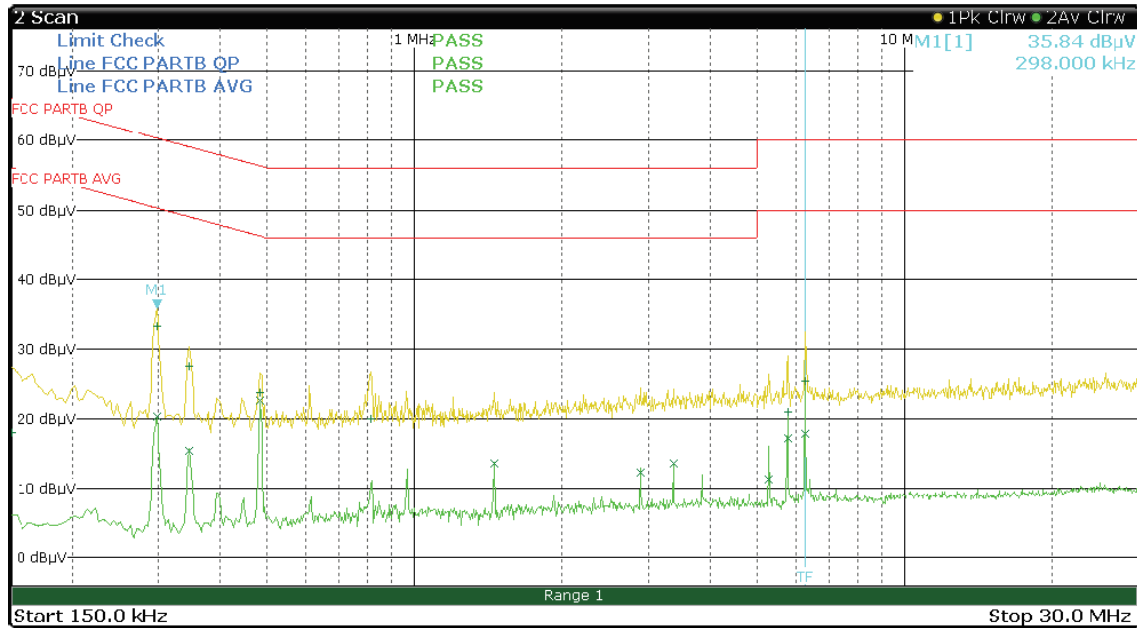
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Power Mode: 24V DC



Graph: Line

Trace	Frequency	Level	Delta Limit
1	298000,000000 Hz	33,380000 dBμV	-26,918391 dBμV
2	962000,000000 Hz	16,950000 dBμV	-29,050000 dBμV
2	298000,000000 Hz	20,470000 dBμV	-29,828391 dBμV
2	482000,000000 Hz	15,210000 dBμV	-31,094525 dBμV
2	6286000,000000 Hz	18,700000 dBμV	-31,300000 dBμV
1	346000,000000 Hz	27,630000 dBμV	-31,427954 dBμV
2	3370000,000000 Hz	12,890000 dBμV	-33,110000 dBμV
2	348000,000000 Hz	15,430000 dBμV	-33,627954 dBμV
1	6278000,000000 Hz	25,320000 dBμV	-34,680000 dBμV
1	5778000,000000 Hz	23,770000 dBμV	-36,230000 dBμV
2	5298000,000000 Hz	13,280000 dBμV	-36,720000 dBμV
2	5782000,000000 Hz	12,350000 dBμV	-37,650000 dBμV
1	24958000,000000 Hz	15,030000 dBμV	-44,970000 dBμV
1	24562000,000000 Hz	15,020000 dBμV	-44,980000 dBμV
1	23438000,000000 Hz	14,850000 dBμV	-45,150000 dBμV
1	23682000,000000 Hz	14,740000 dBμV	-45,260000 dBμV
1	21534000,000000 Hz	14,480000 dBμV	-45,520000 dBμV
1	154000,000000 Hz	18,110000 dBμV	-47,671413 dBμV



Graph: Neutral

Trace	Frequency	Level	Delta Limit
2	482000,000000 Hz	22,480000 dBμV	-23,824525 dBμV
1	298000,000000 Hz	33,260000 dBμV	-27,038391 dBμV
2	298000,000000 Hz	20,310000 dBμV	-29,988391 dBμV
1	348000,000000 Hz	27,590000 dBμV	-31,467954 dBμV
2	625800,000000 Hz	17,840000 dBμV	-32,160000 dBμV
2	1446000,000000 Hz	13,670000 dBμV	-32,330000 dBμV
2	3374000,000000 Hz	13,620000 dBμV	-32,380000 dBμV
1	482000,000000 Hz	23,760000 dBμV	-32,544525 dBμV
2	5778000,000000 Hz	17,140000 dBμV	-32,860000 dBμV
2	348000,000000 Hz	15,440000 dBμV	-33,617954 dBμV
2	2894000,000000 Hz	12,280000 dBμV	-33,720000 dBμV
1	6254000,000000 Hz	25,360000 dBμV	-34,640000 dBμV
1	810000,000000 Hz	19,940000 dBμV	-36,060000 dBμV
2	5294000,000000 Hz	11,300000 dBμV	-38,700000 dBμV
1	5798000,000000 Hz	20,880000 dBμV	-39,120000 dBμV
1	150000,000000 Hz	17,940000 dBμV	-48,060000 dBμV

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Power ratings: Maximum power had been set during testing.

***** END OF TEST REPORT *****