

Prüfbericht - Nr.:		ULR-TC568819300000032F 001		Seite 1 von 48 Page 1 of 48	
<i>Test Report No.:</i>					
Auftraggeber: <i>Client:</i>	ABMRC LLC 239 FAIRCHILD ST DANIEL ISLAND SOUTH CAROLINA USA - 29492 Ph: +1 843 830 2233				
Gegenstand der Prüfung: <i>Test item:</i>	BiWaze Cough				
Bezeichnung: <i>Identification:</i>	DVM-007	Serien-Nr.: <i>Serial No.</i>	2037351818-1395		
Wareneingangs-Nr.: <i>Receipt No.:</i>	166148550	Eingangsdatum: <i>Date of receipt:</i>	27.06.2019		
Prüfört: <i>Testing location:</i>	Refer Page 5 of 48 for Test site details				
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C 15.247 ANSI C63.10 2013				
Prüfergebnis: <i>Test Result:</i>	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). The test items passed the test specification(s).				
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland (India) Pvt. Ltd. 27/B, 2nd Cross Road, Electronic City Phase1, Bangalore – 560 100, India FCC Test Site Registration No.: 496599				
geprüft / tested by:		kontrolliert / reviewed by:			
27.06.2019	Pramod Sharma R Engineer	26.07.2019	Mahammadgouse Kaladagi Senior Engineer		
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:		On receipt equipment was in good condition. FCC ID:2ATX9-1395			
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	
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. <i>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.</i>					

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

Seite 2 von 48
Page 2 of 48

TEST SUMMARY

Test Item	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
Conducted Spurious Emissions	15.247 (a)(1)	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 the procedure mentioned in ANSI C63.10-2013.

Table of Contents

1	GENERAL REMARKS	4
1.1	Complimentary Materials	4
2	TEST SITES	5
2.1	Testing Facilities.....	5
2.2	List of Test and Measurement Instruments.....	5
3	GENERAL PRODUCT INFORMATION.....	6
3.1	Product Function and Intended Use.....	6
3.2	Ratings and System Details	6
3.3	Measurement Uncertainty:	7
4	TEST SET-UP AND OPERATION MODE.....	8
4.1	Principle of Configuration Selection	8
4.2	Test Operation and Test Software	8
4.3	Special Accessories and Auxiliary Equipment	8
4.4	Countermeasures to achieve EMC Compliance	8
4.5	Test modes – data rates and modulations	8
4.6	List of frequencies	9
5	TEST METHODOLOGY	10
5.1	Radiated Emission Test	10
5.1.1	Test Setup Configuration	10
6	Test Results	12
6.1	Maximum conducted output power	12
6.2	20 dB Bandwidth	18
6.3	Number of Hopping Channels.....	24
6.4	Carrier Frequency Separation.....	25
6.5	Time of Occupancy (Dwell Time)	26
6.6	Band- edge Compliance of RF Conducted Emissions.....	29
6.7	Conducted Spurious Emissions	33
6.8	Restricted bands of Emissions & Restricted Bands of Operation.....	36
6.9	Conducted Spurious Emission Test on AC Power Line.....	45
7	LIST OF TABLES.....	48

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) Pvt.Ltd.,
27/B, 2nd Cross,
ElectronicCityPhase1
Bangalore – 560 100,
India

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
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	Calibration Due Date	Periodicity	Used for Test Items
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	28-03-2020	Yearly	Antenna - Port Measurements
EMI Test Receiver	Rohde & Schwarz	ESW 44	101733	19-09-2019	Yearly	Radiated Spurious Emission
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	11-10-2019	Yearly	
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	
Semi Anechoic Chamber	Frankonia	-	-	-	-	
Fully Anechoic Chamber	Albatross	-	-	-	-	
EMI Receiver	Rohde & Schwarz	ESR7	101133	16-01-2020	Yearly	AC Power line conducted emission
LISN	Rohde & Schwarz	ENV 216	100022	18-10-2019	Yearly	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	09-08-2019	Yearly	

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

The BiWaze Cough device helps to clear bronchopulmonary secretions from the respiratory system. The device applies positive airway pressure to expand the lungs and suddenly shifting to negative pressure to pull the air out of lungs. This rapid shift in pressure during different phases replicates a cough.

This device is designed for use on patients unable to cough or clear secretions effectively due to reduced peak cough expiratory flow, resulting from high spinal cord injuries, neuromuscular deficits or severe fatigue associated with intrinsic lung disease. It may be used either with a facemask, mouthpiece, or an adapter to a patient's endotracheal tube or tracheostomy tube. For use in hospital, institutional setting, or in home. For use on adult patients and pediatric patients 3 years old and up.

3.2 Ratings and System Details

Table 2: Ratings and System Details

Operating Frequency Range	2400MHz – 2483.5MHz	
Radio Protocol	Bluetooth	
No. of Channel	79	
Channel Spacing	1MHz	
Modulation	GFSK, pi/4-DQPSK,8-DPSK	
Data rate	1Mbps, 2Mbps, 3Mbps	
Number of antennas	1	
Antenna Gain & Type	Chip Antenna (2dBi)	
Supply Voltage to Product	Mains 100 to 230 V - AC MCB Voltage : 24 Volts Battery Voltage : 25.9 Volts UIB Voltage (Wi-Fi/BT/BLE Module) : 5 Volts	
Dimensions	275 mm L x 237.5 mm W x 94.5 mm H	
Environmental conditions	Storeage Conditions: Temparature:-20°C to 60 °C Relative Humidity: 15 to 95% (non-condensing)	Operational Conditions: Temparature : 5°C to 35°C Relative Humidi:15 to 95% (non-condensing)

3.3 Measurement Uncertainty:

Table 3: 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	1 GHz to 6 GHz	±5.18 dB
	6 GHz to 18 GHz	±5.48 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

BT/BLE module Firmware version (TlInit_11.8.32.bts) : 11.8.32
Wifi module Firmware version (wl18xx-fw-4.bin) : 8.9.0.0.76
Main Control Board Firmware version : 1.1.5
User Interface Board Software version : 1.2.3.1
Test Hardware : HW Version – MCB – 3.1
 PMB – 3.2
 UIB – 3.0
 Sensor Board – 1.1
 Switch Board – 1.2

4.3 Special Accessories and Auxiliary Equipment

- None

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 Test modes – data rates and modulations

For the antenna port measurement and Radiated spurious emissions, the tests were performed for worst cases and same are reported in the test report.

4.6 List of 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 4: List of Bluetooth center Frequencies

Note:

TUV Sample Identification number : A000947997-001 (Conducted and Radiated Sample)

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 measurement 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.

5.1.1 Test Setup Configuration

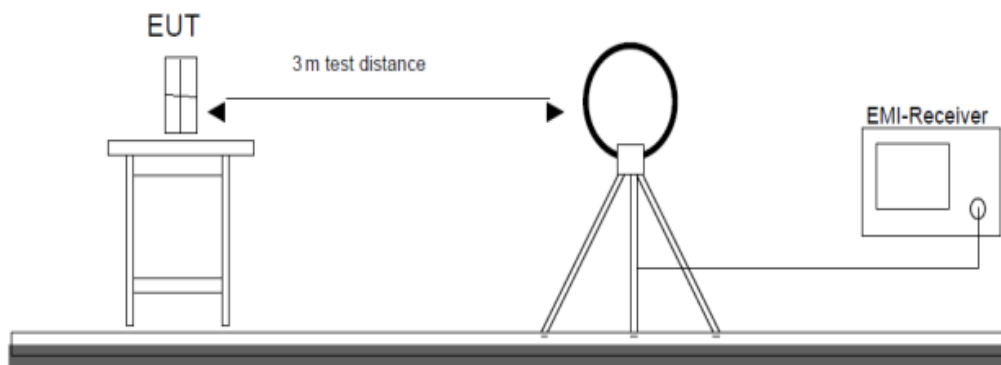


Figure 1: Frequency Range 9 kHz- 30 MHz

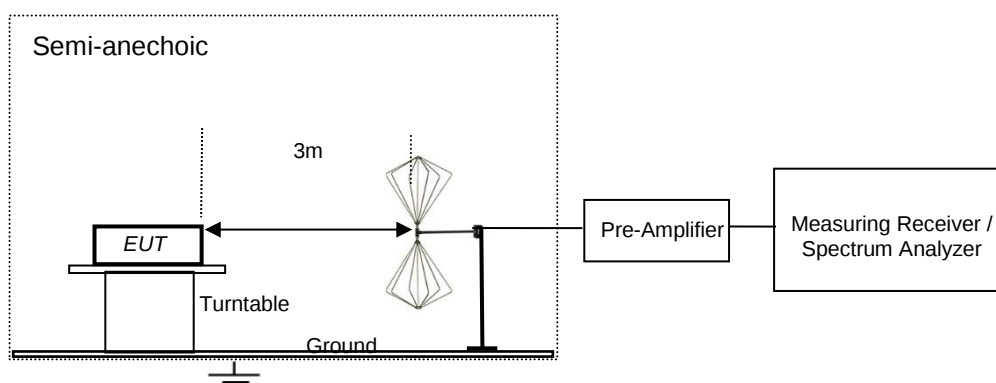


Figure 2: Frequency Range 30 MHz – 200 MHz

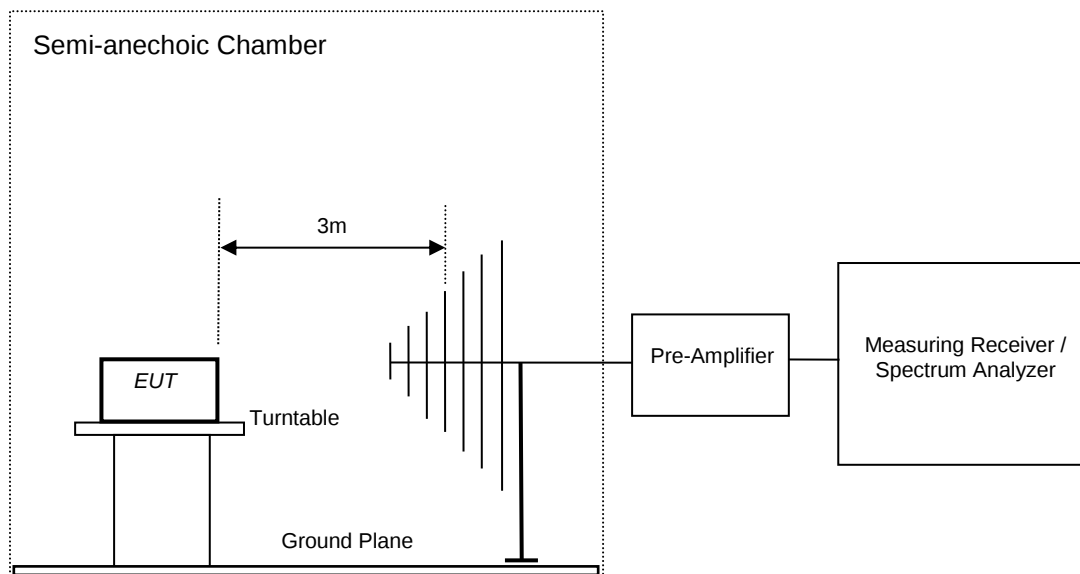


Figure 3: Frequency Range 200 MHz - 1GHz

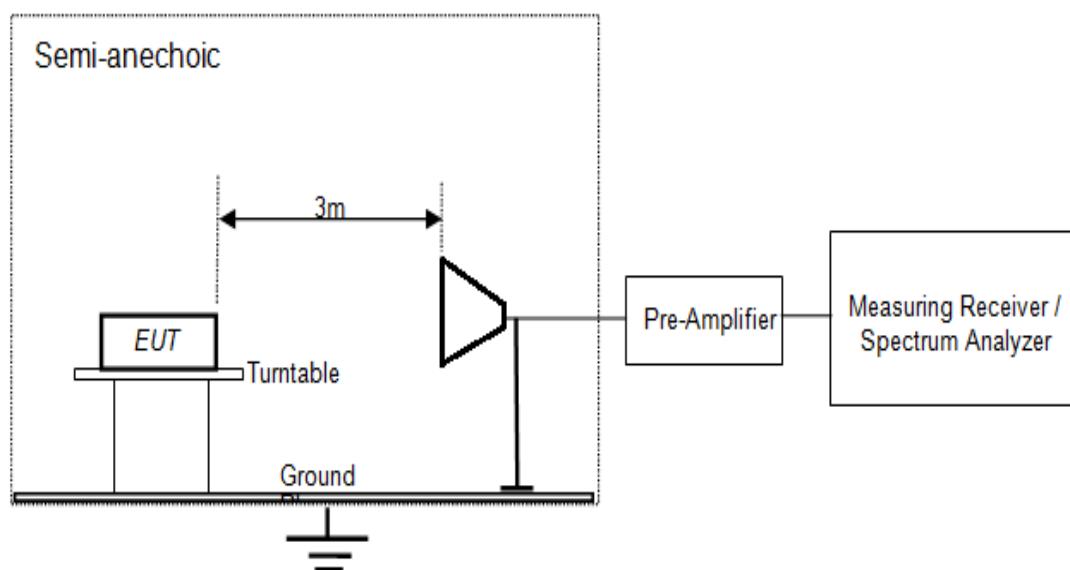


Figure 4: Frequency Range above 1 GHz

6 Test Results

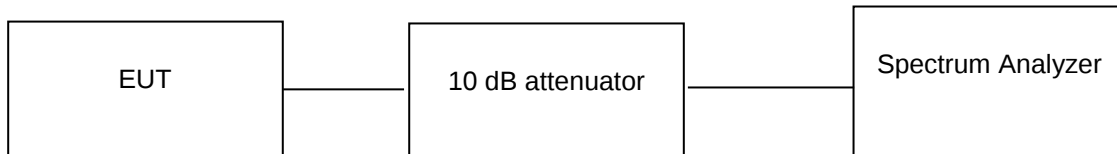
6.1 Maximum conducted output power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (b)(3)
Measurement Bandwidth	3 MHz
Detector	Peak
Requirement	≤ 1 W (30 dBm)

Test Method:



Test results:

10 dB attenuator + 0.5 Cable loss = 10.5 dB offset is considered in below result

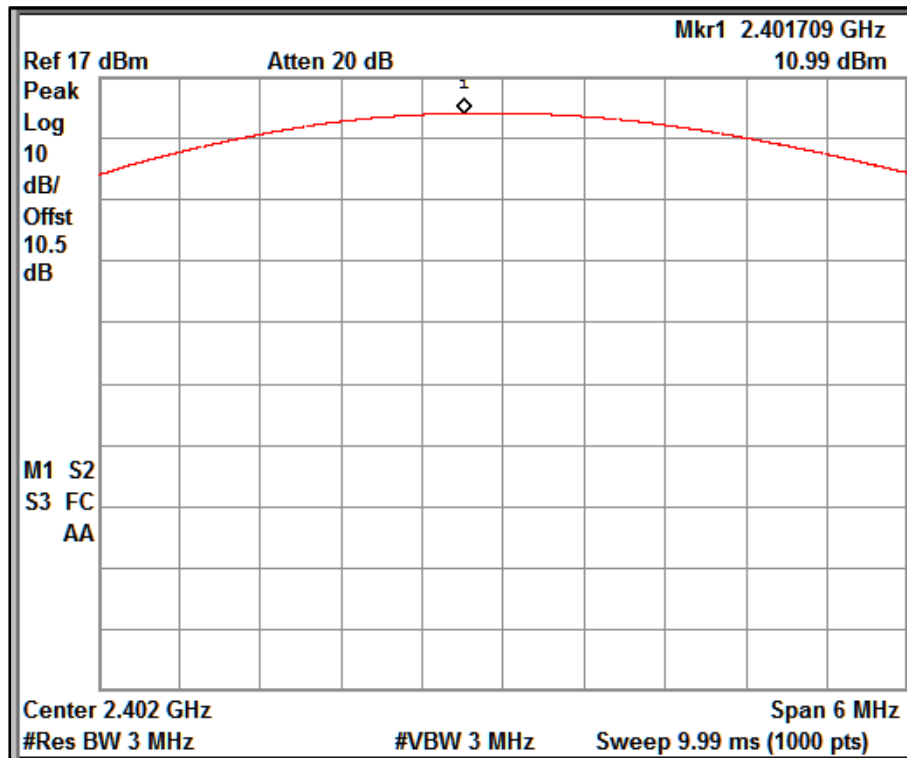
Table 5: Maximum peak conducted output power verified Test Results

Data Rate (Mbps)	Channel Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)	Limit (dBm)
1	2402	10.99	30
	2441	10.68	30
	2480	10.48	30
2	2402	9.01	20.96
	2441	8.50	20.96
	2480	8.06	20.96
3	2402	9.40	20.96
	2441	8.90	20.96
	2480	8.45	20.96

Prüfbericht - Nr.:
Test Report No.:

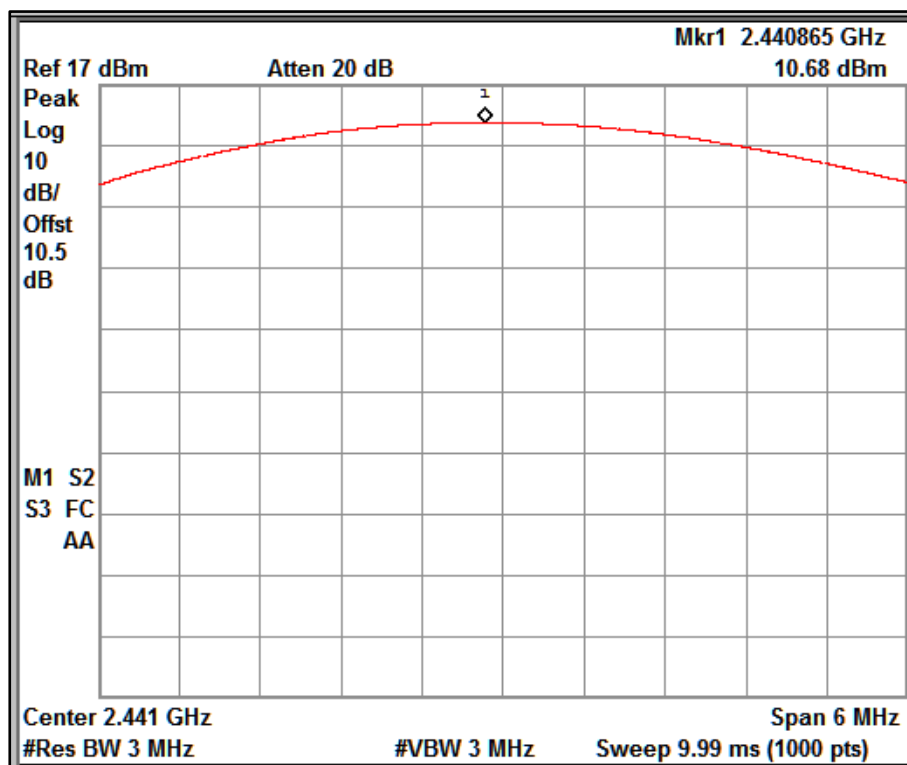
ULR-TC568819300000032F 001

Seite 13 von 48
Page 13 of 48



Channel Frequency: 2402MHz

Dat rate:1Mbps



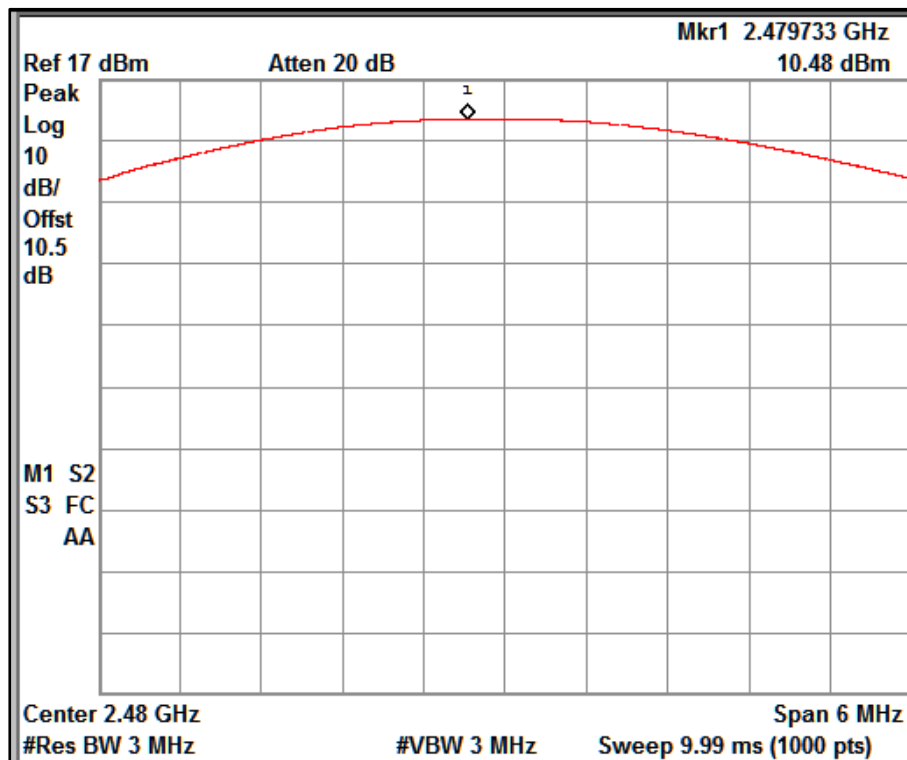
Channel Frequency: 2441MHz

Dat rate:1Mbps

Prüfbericht - Nr.:
Test Report No.:

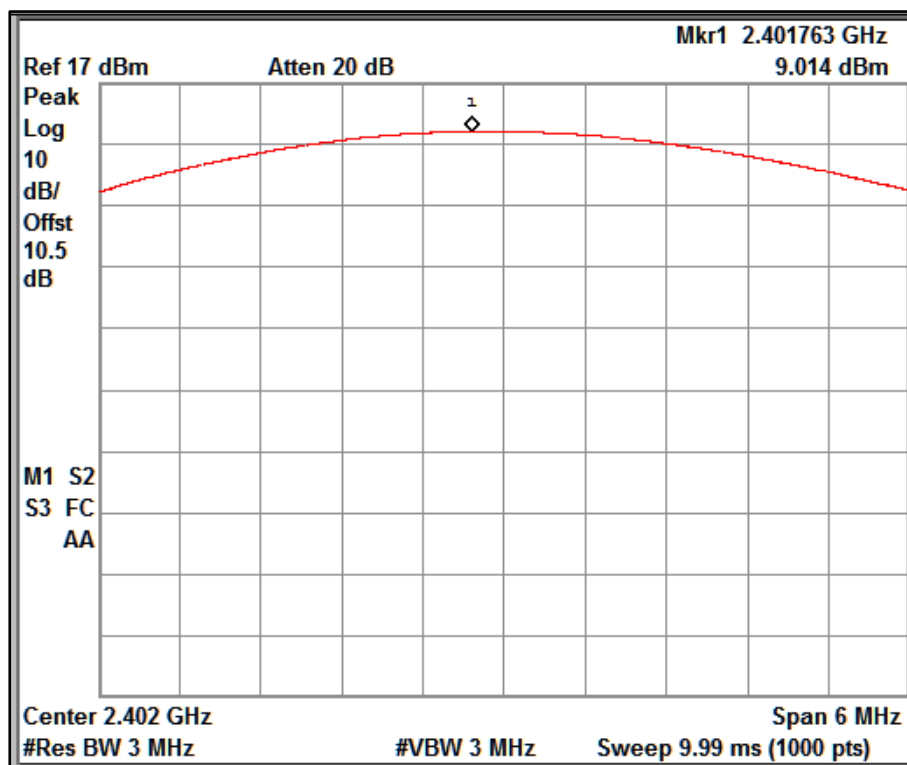
ULR-TC568819300000032F 001

Seite 14 von 48
Page 14 of 48



Channel Frequency: 2480MHz

Dat rate:1Mbps



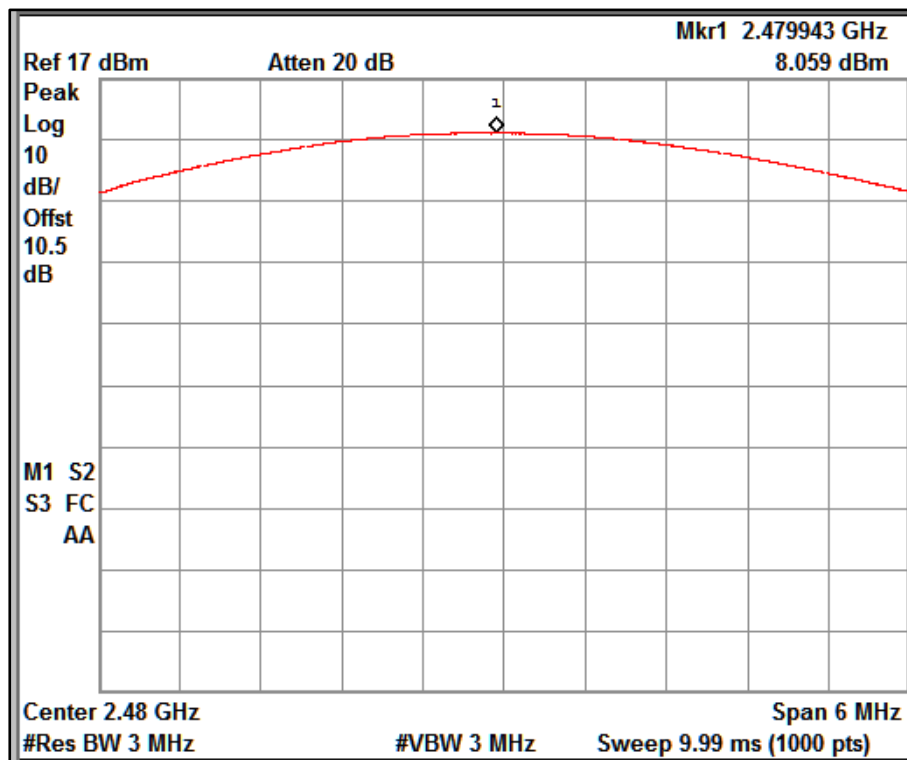
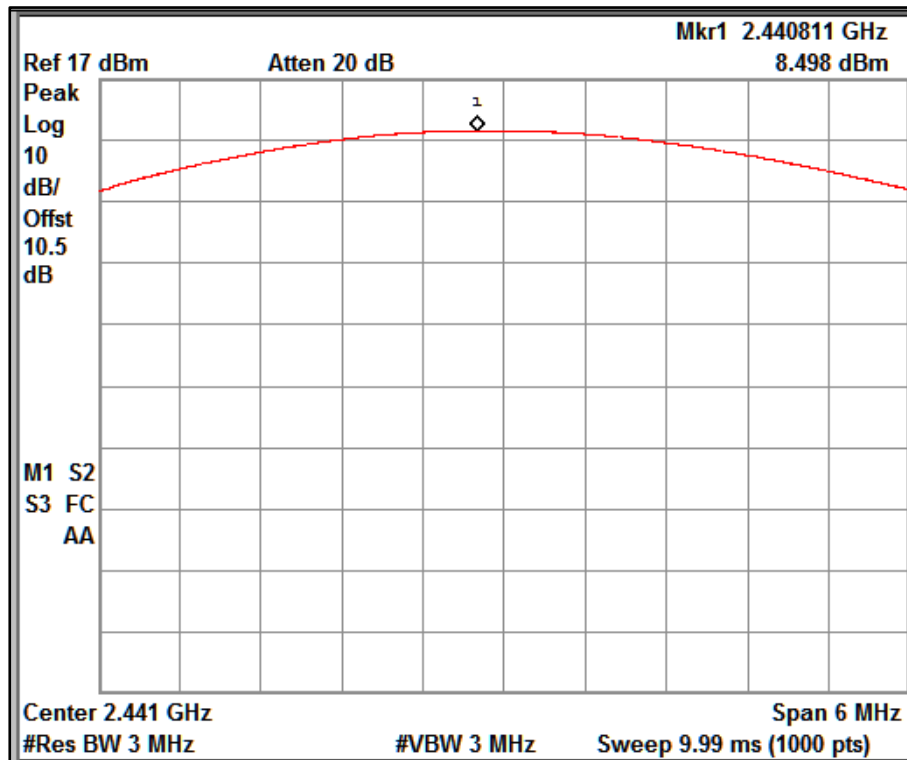
Channel Frequency: 2402MHz

Dat rate:2Mbps

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

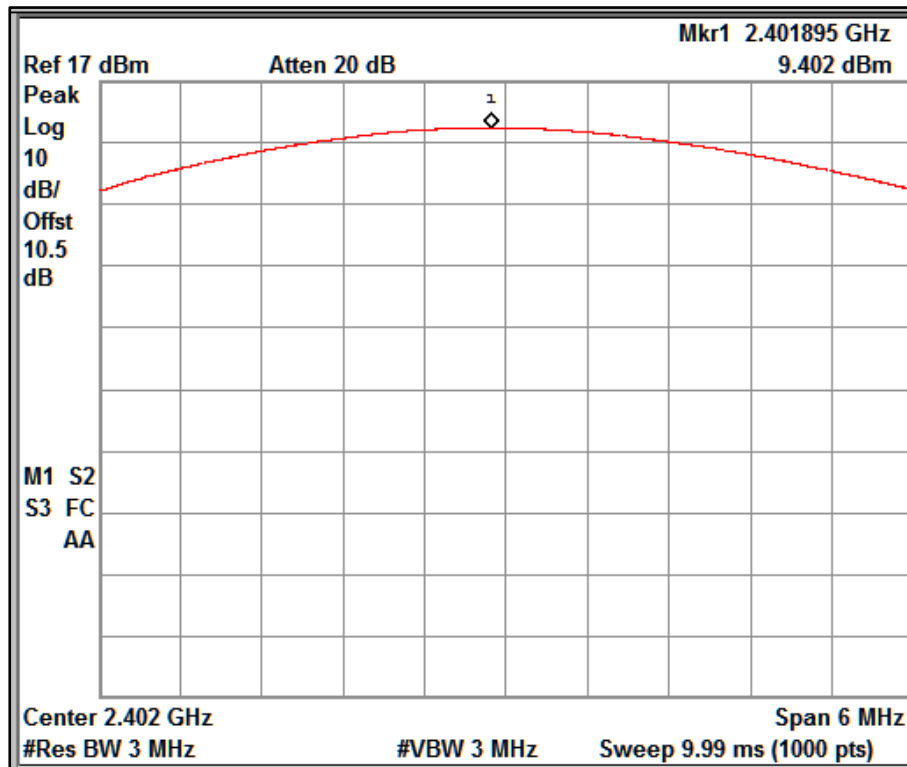
Seite 15 von 48
Page 15 of 48



Prüfbericht - Nr.:
Test Report No.:

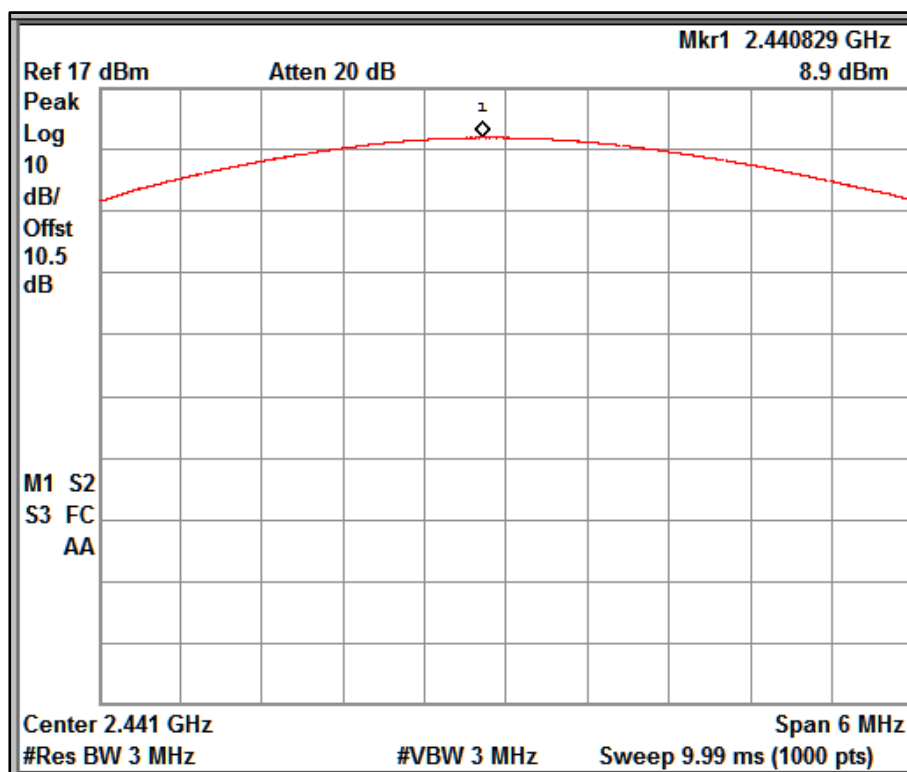
ULR-TC568819300000032F 001

Seite 16 von 48
Page 16 of 48



Channel Frequency: 2402MHz

Dat rate:3Mbps



Channel Frequency: 2441MHz

Dat rate:3Mbps

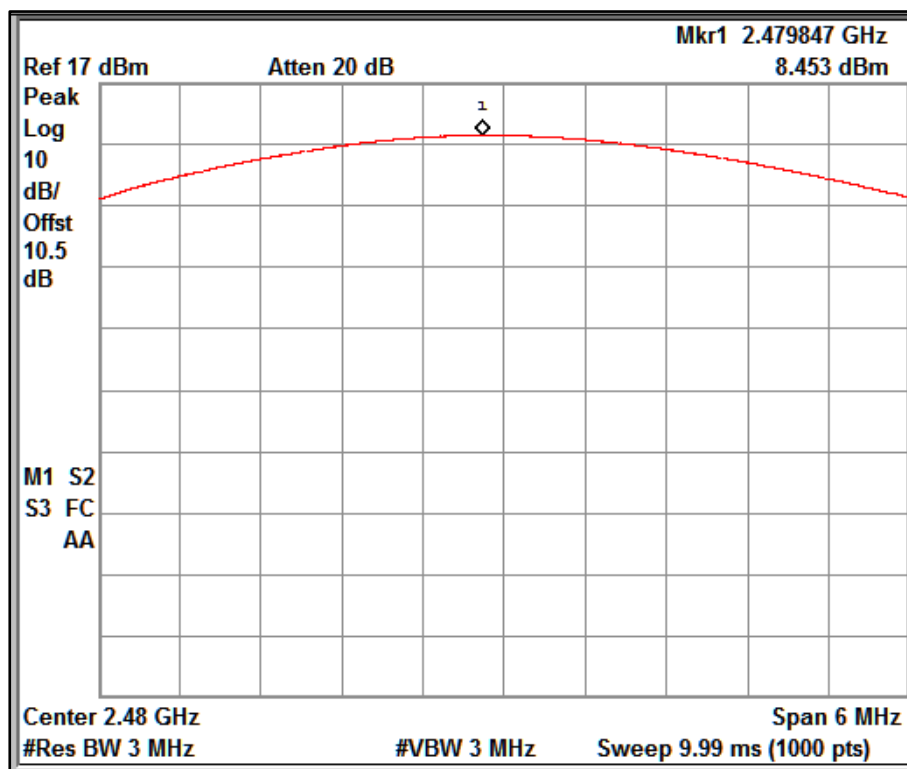
Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 17 von 48

Page 17 of 48



Channel Frequency: 2480MHz

Dat rate:3Mbps

6.2 20 dB Bandwidth

Result

Pass

Test Specification

FCC part 15 Subpart C Section 15.247 (a)(1)

Detector

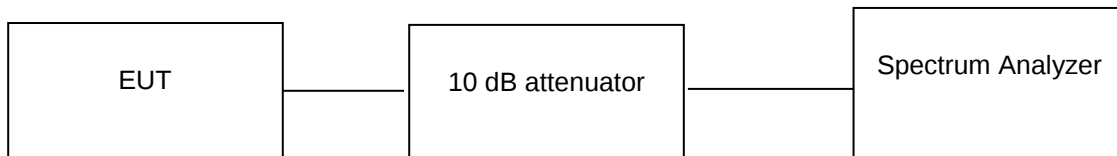
Peak

Port of testing

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.



Test results:

10 dB attenuator + 0.5 Cable loss = 10.5 dB offset is considered in below result

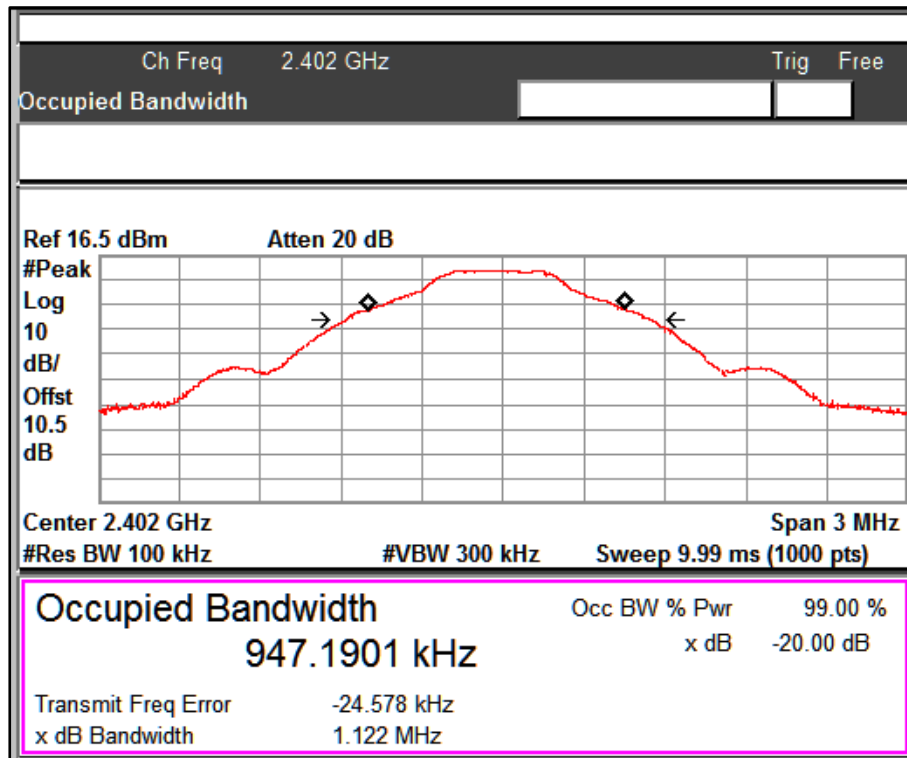
Table 6: 20dB Bandwidth and Occupied Bandwidth Test Results

Data Rate (Mbps)	Channel Frequency (MHz)	20dB Bandwidth (MHz)	99% OBW (MHz)
1	2402	1.222	947.19
	2441	1.125	945.47
	2480	1.123	946.49
2	2402	1.440	1.240
	2441	1.438	1.244
	2480	1.440	1.249
3	2402	1.440	1.254
	2441	1.444	1.256
	2480	1.444	1.259

Prüfbericht - Nr.:
Test Report No.:

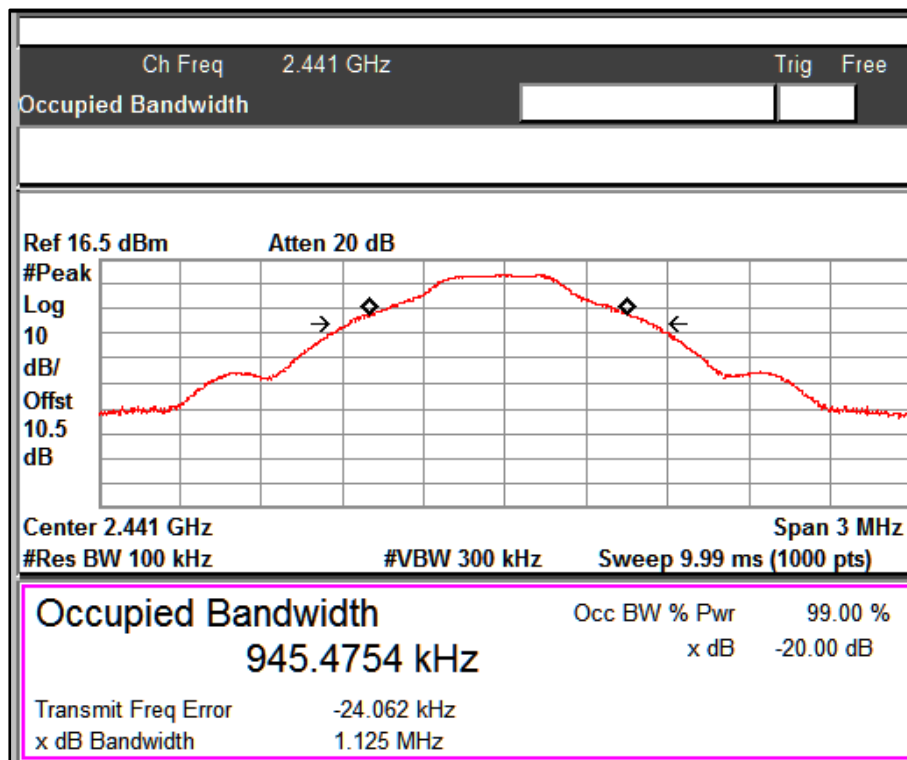
ULR-TC568819300000032F 001

Seite 19 von 48
Page 19 of 48



Channel Frequency: 2402MHz

Dat rate:1Mbps



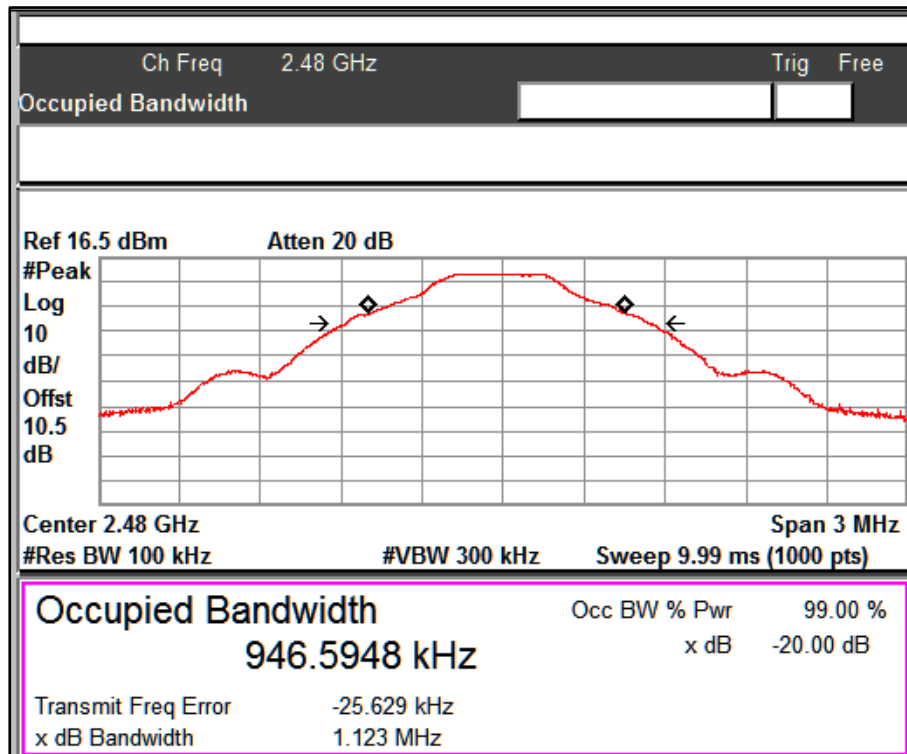
Channel Frequency: 2441MHz

Dat rate:1Mbps

Prüfbericht - Nr.:
Test Report No.:

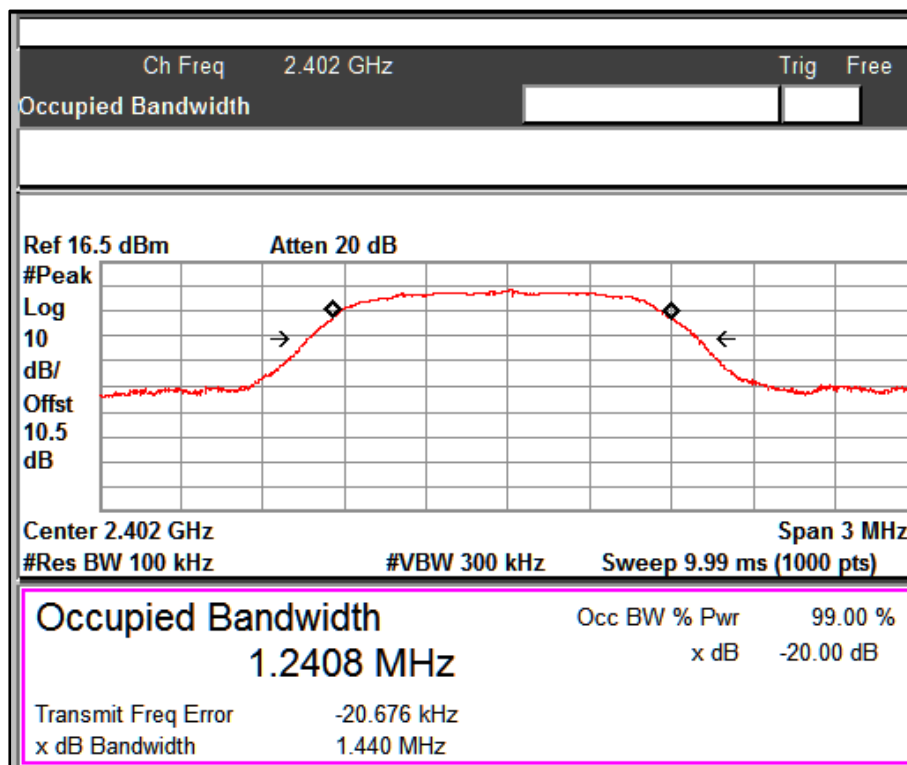
ULR-TC568819300000032F 001

Seite 20 von 48
Page 20 of 48



Channel Frequency: 2480MHz

Dat rate:1Mbps



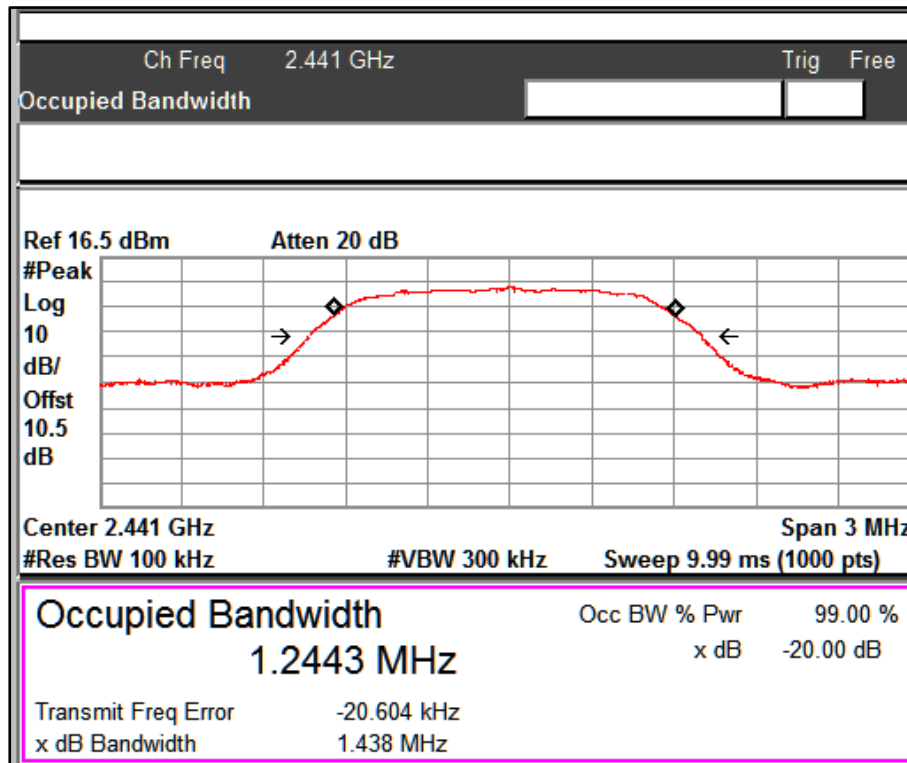
Channel Frequency: 2402MHz

Dat rate:2Mbps

Prüfbericht - Nr.:
Test Report No.:

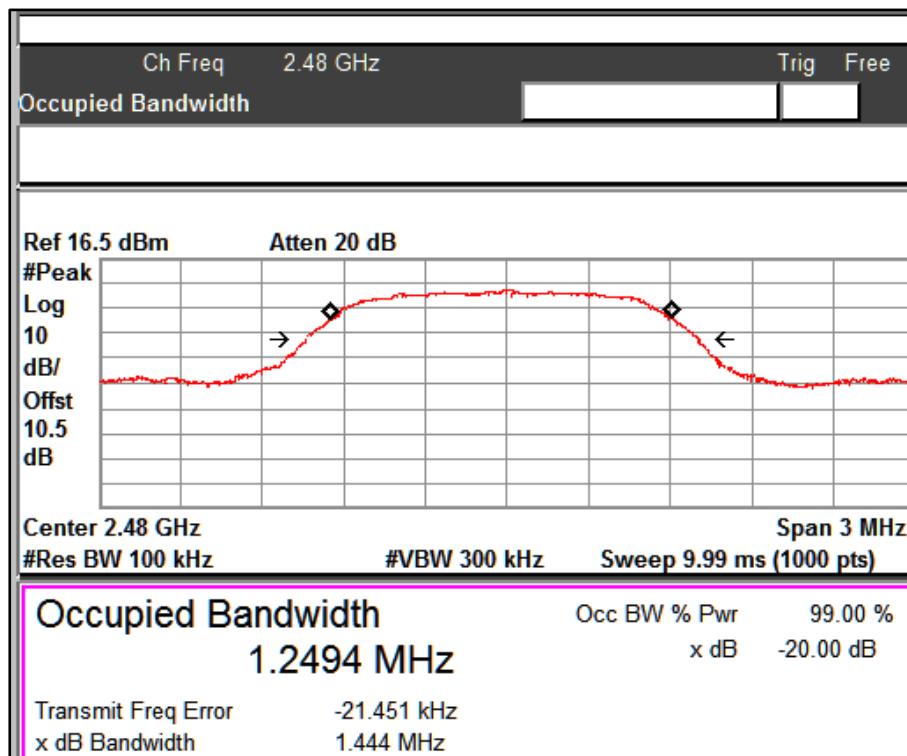
ULR-TC568819300000032F 001

Seite 21 von 48
Page 21 of 48



Channel Frequency: 2441MHz

Dat rate:2Mbps



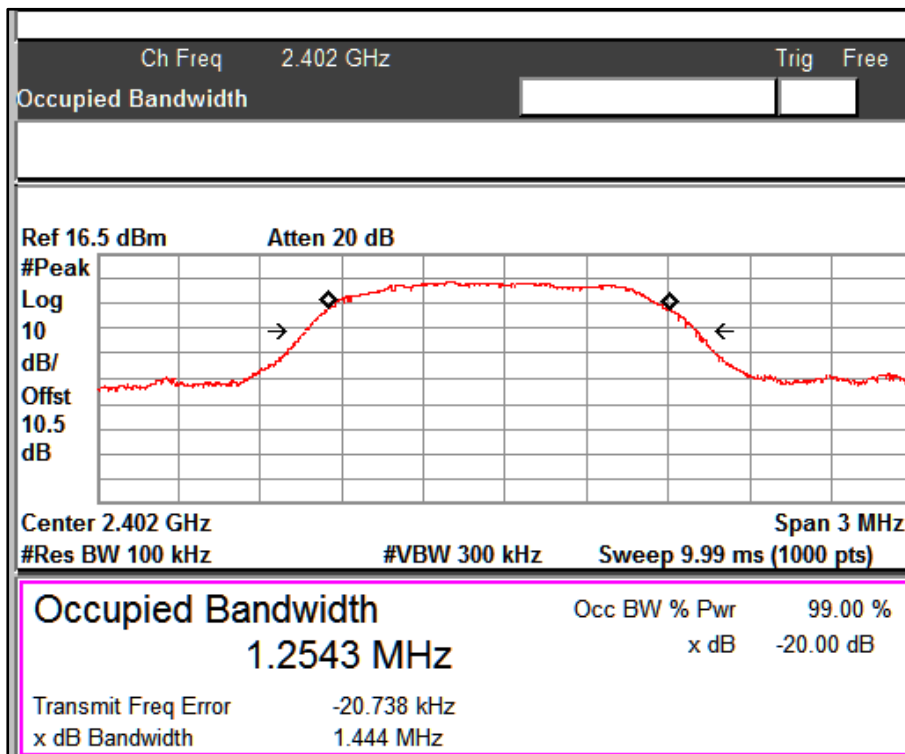
Channel Frequency: 2480MHz

Dat rate:2Mbps

Prüfbericht - Nr.:
Test Report No.:

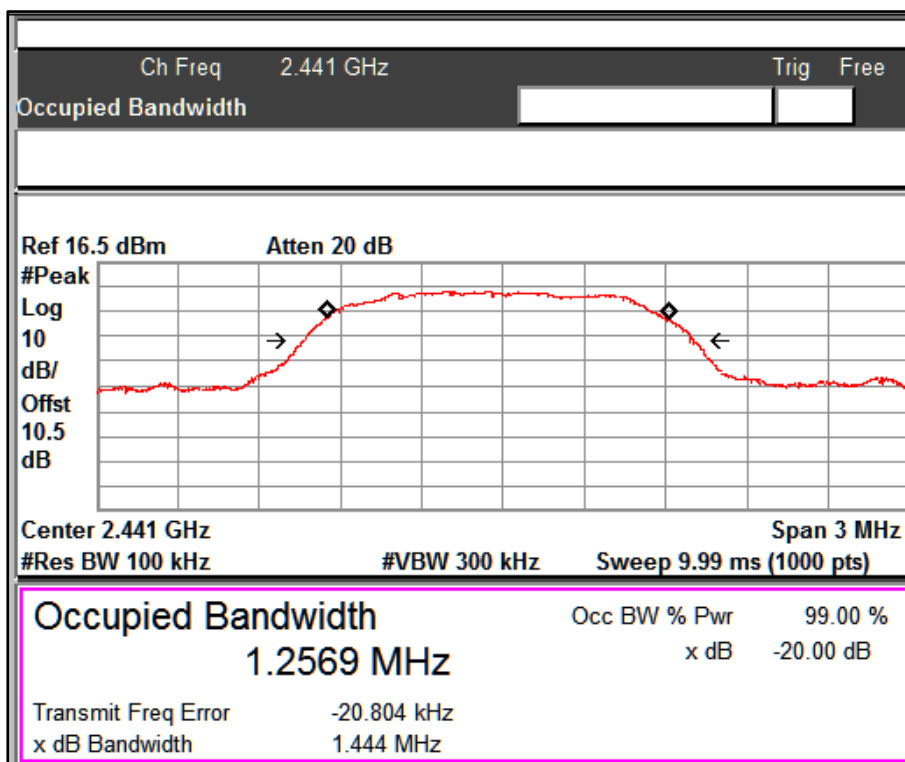
ULR-TC568819300000032F 001

Seite 22 von 48
Page 22 of 48



Channel Frequency: 2402MHz

Dat rate:3Mbps



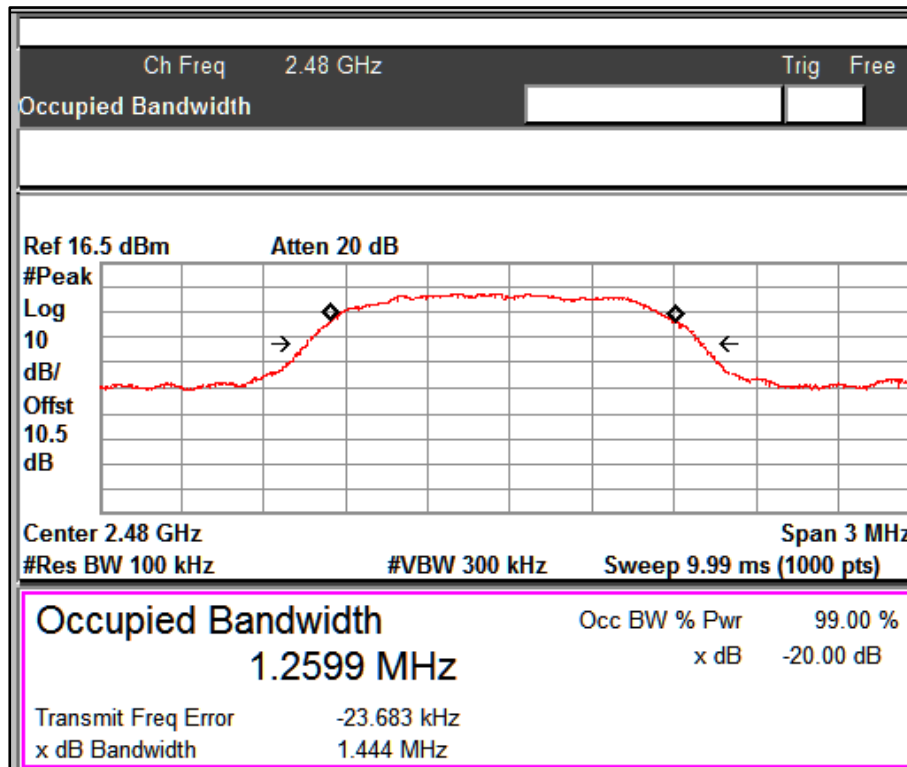
Channel Frequency: 2441MHz

Dat rate:3Mbps

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

Seite 23 von 48
Page 23 of 48



Channel Frequency: 2480MHz

Dat rate:3Mbps

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

Seite 24 von 48
Page 24 of 48

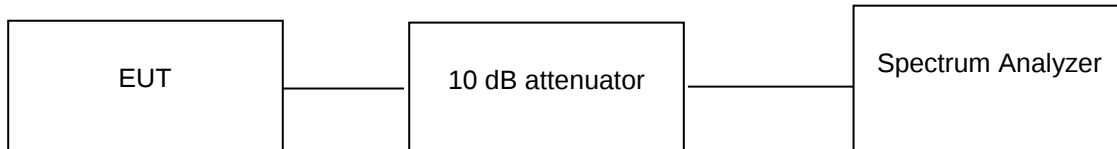
6.3 Number of Hopping Channels

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

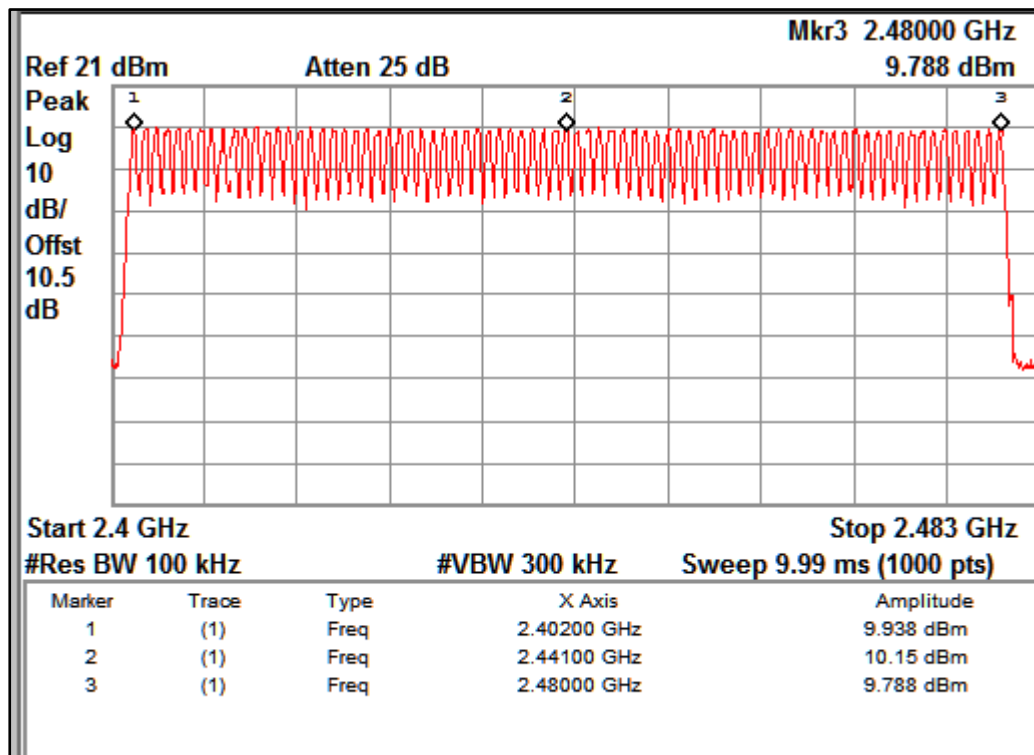
Test Method:



Note: 10 dB attenuator + 0.5 Cable loss = 10.5 dB offset is considered in below result

Test results:

Table 7: Number of Hopping Channels



Total Number of hopping channels = 79

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

Seite 25 von 48
Page 25 of 48

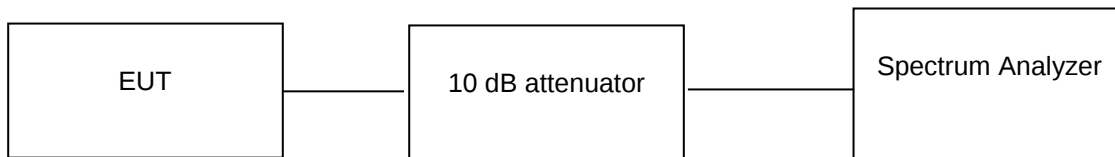
6.4 Carrier Frequency Separation

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

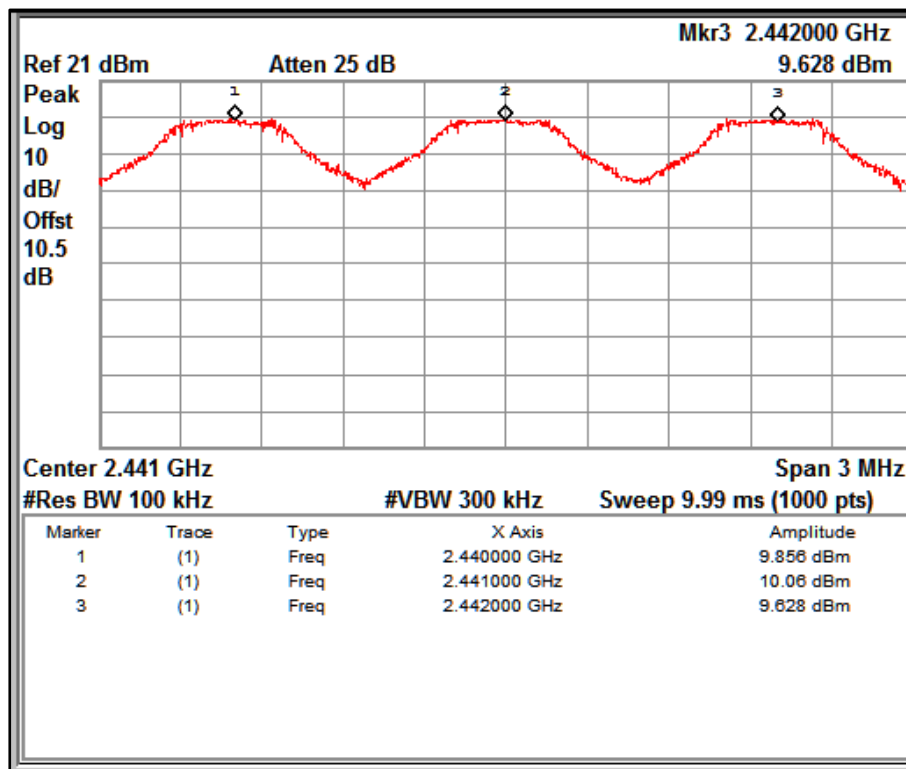
Test Method:



10 dB attenuator + 0.5 Cable loss = 10.5 dB offset is considered in below result

Test results:

Table 8: Carrier Frequency Separation



Channel Separation: 1MHz

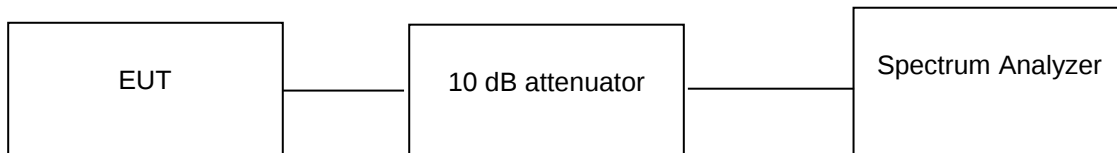
6.5 Time of Occupancy (Dwell Time)

Result

Pass

Test Specification	FCC Part 15 Subpart C Section 15.247 (a) (1)
Detector Function	Peak
Port of testing	Antenna port
Requirement	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:



Test Result:

Table 9: Dwell Time results

Time slot		Time Slot (s)
DH	Measurement Value (sec)	
DH5	0.00290	0.25493
2DH5	0.00152	0.16213
3DH5	0.00107	0.11413

Measurement Method

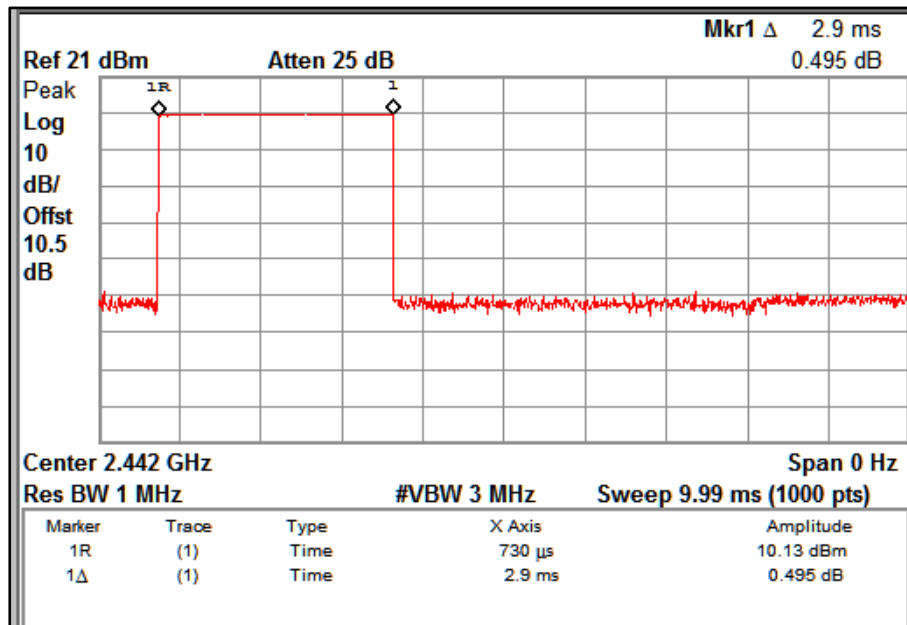
Period Time = 0.4(sec)*79 (hopping channel) = 31.6 s

DH Time slot = Measurement value (Sec)*(1600/ (6*79))*Period time

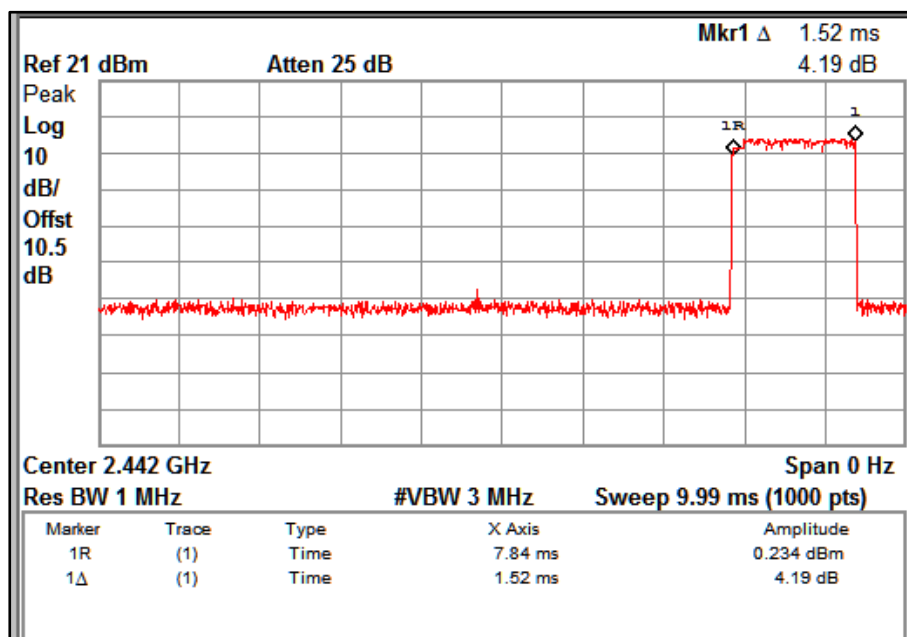
DH5=0.00290*3.3755*31.6=0.254 s

2DH5=0.00152*3.3755*31.6=0.162 s

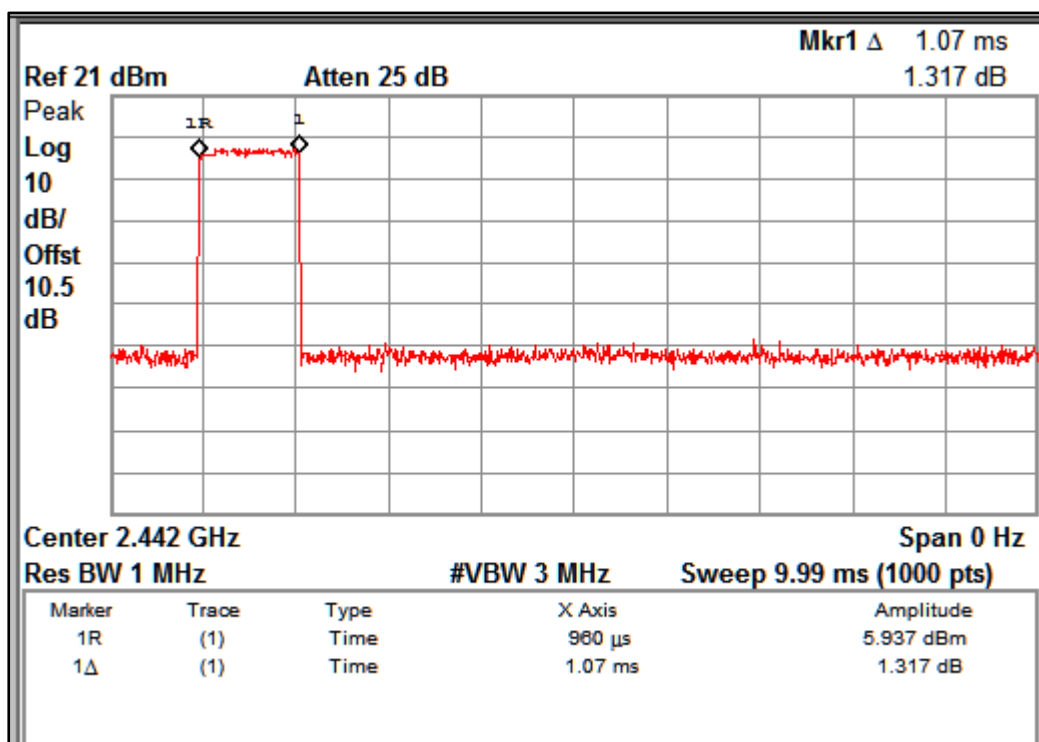
3DH5=0.00107*3.3755*31.6=0.114 s



DH5



2DH5



3DH5

6.6 Band- edge Compliance of RF Conducted Emissions

Result

Pass

Test Specification
Detector Function
Port of testing
Requirement

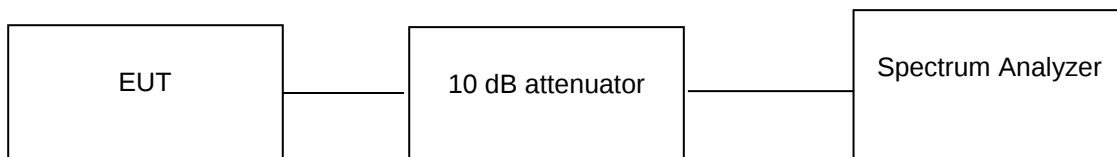
FCC Part 15 Subpart C Section 15.247 (a) (1)

Peak

Antenna port

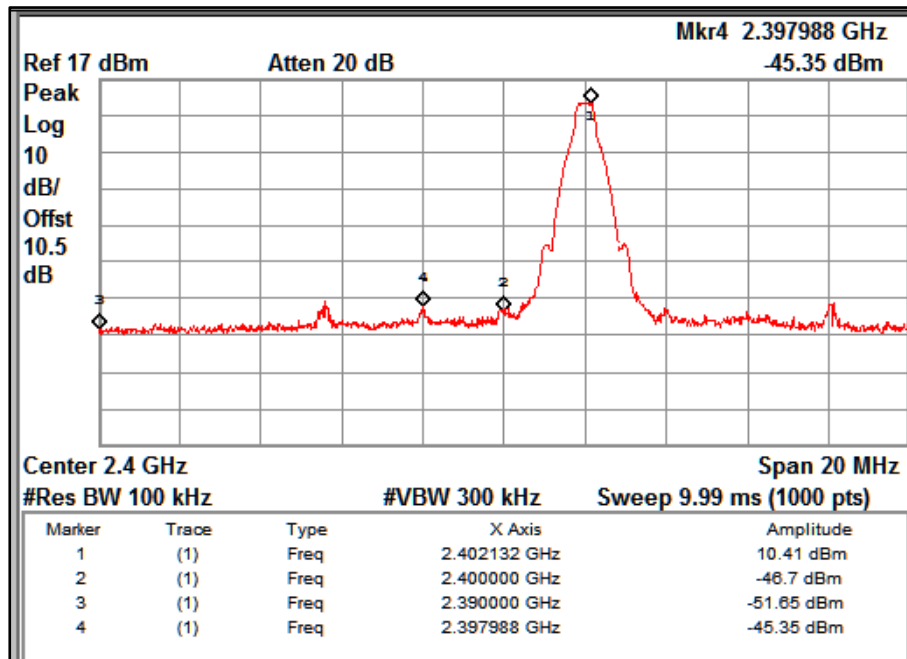
In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the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



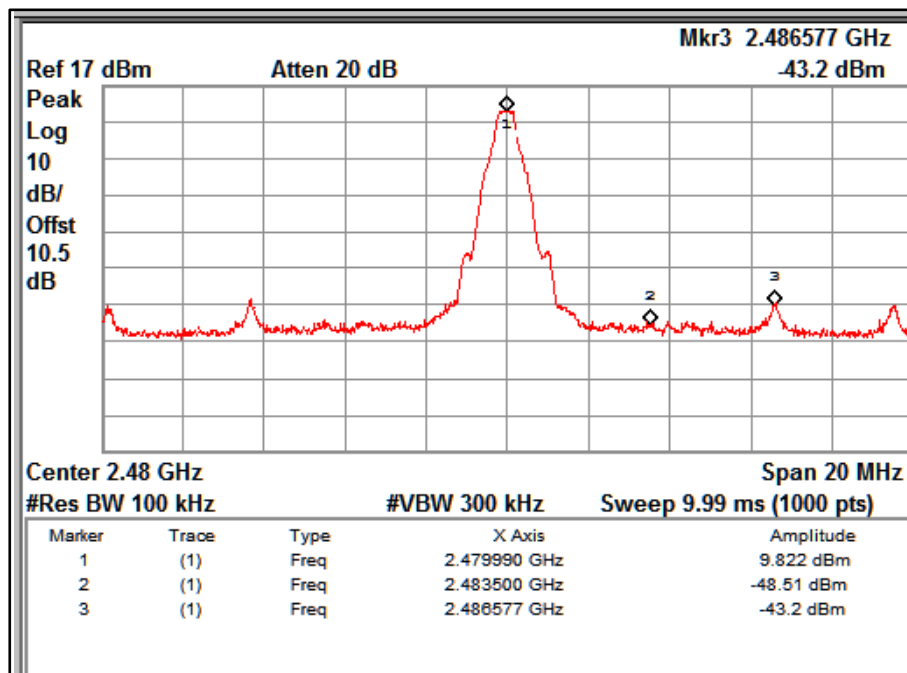
Test Result:

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	-45.35	10.41	55.76	20
	2480	2483.5	-48.51	9.82	58.33	20
2	2402	2400	-46.2	5.21	51.41	20
	2480	2483.5	-47.74	3.91	51.65	20
3	2402	2400	-46.00	5.07	51.07	20
	2480	2483.5	-46.54	3.84	50.38	20



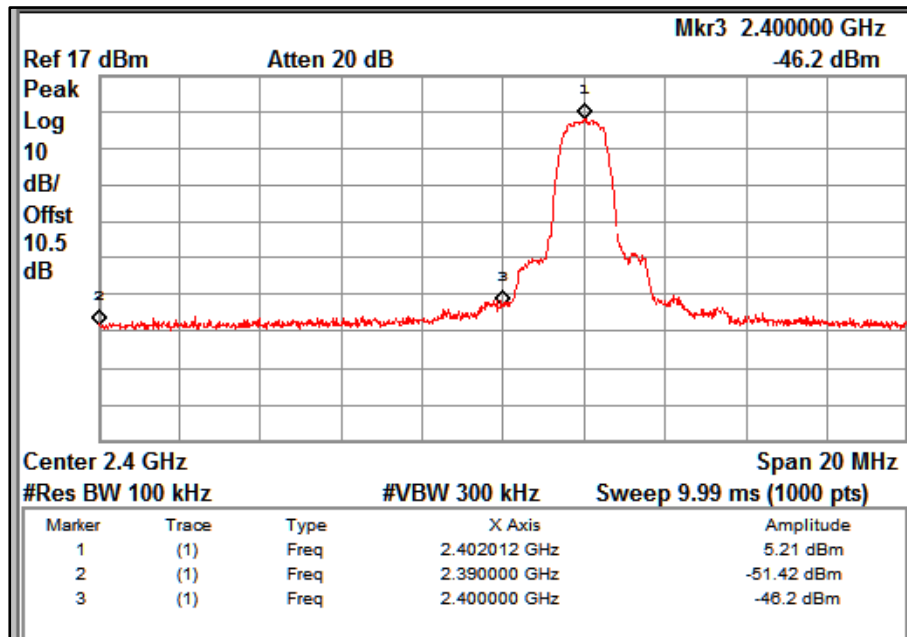
Channel Frequency: 2402MHz

Data rate: 1Mbps



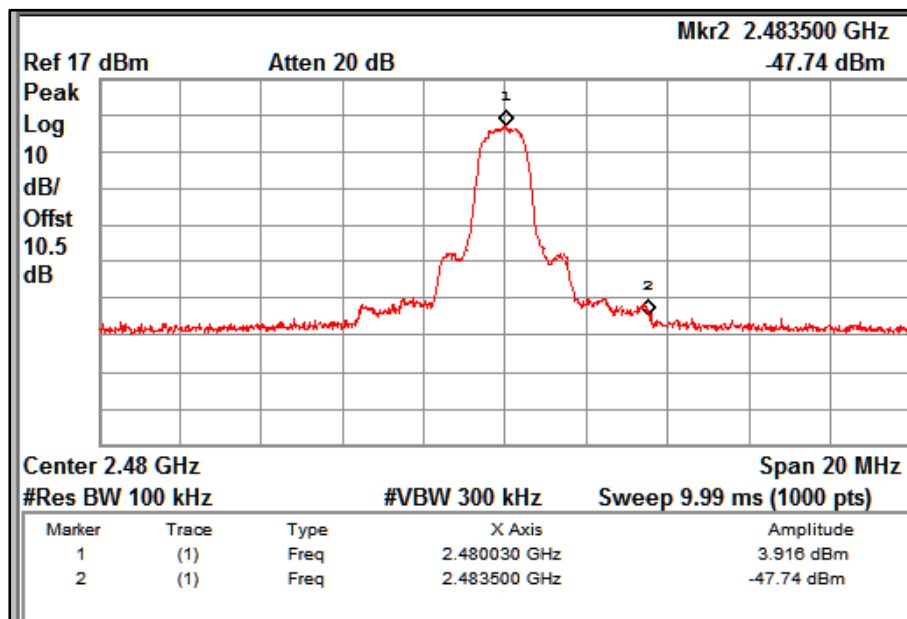
Channel Frequency: 2480MHz

Data rate: 1Mbps



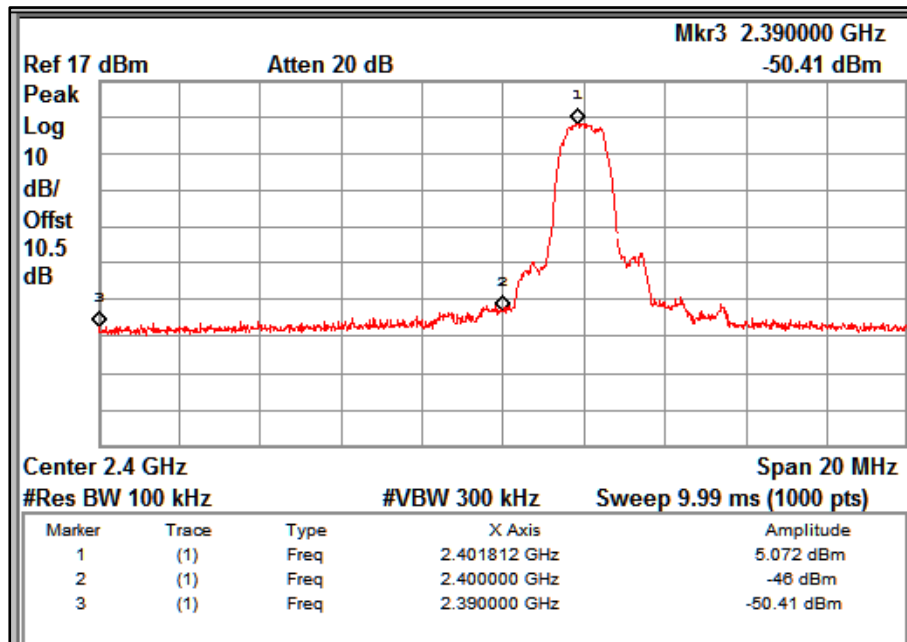
Channel Frequency: 2402MHz

Data rate: 2Mbps



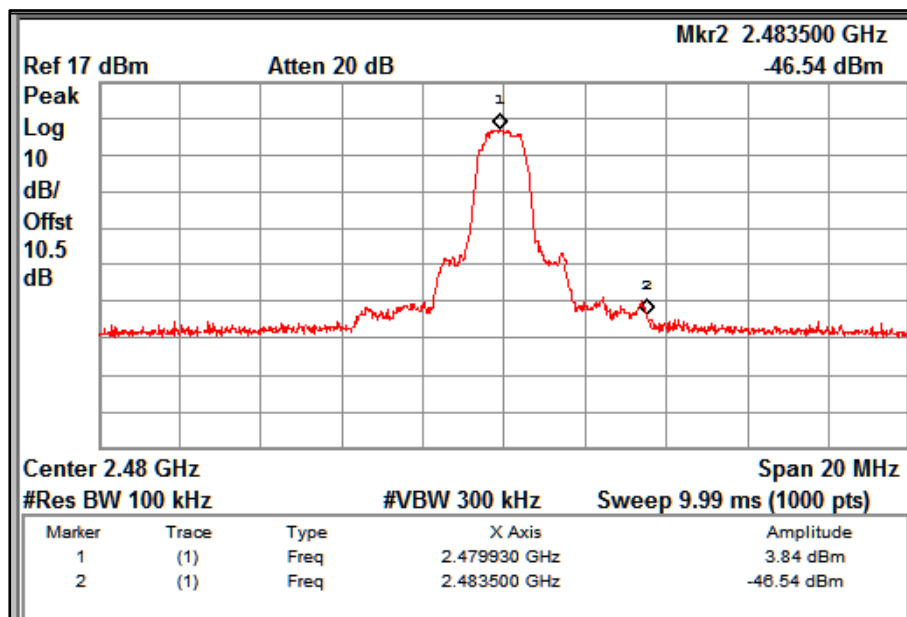
Channel Frequency: 2480MHz

Data rate: 2Mbps



Channel Frequency: 2402MHz

Data rate: 3Mbps

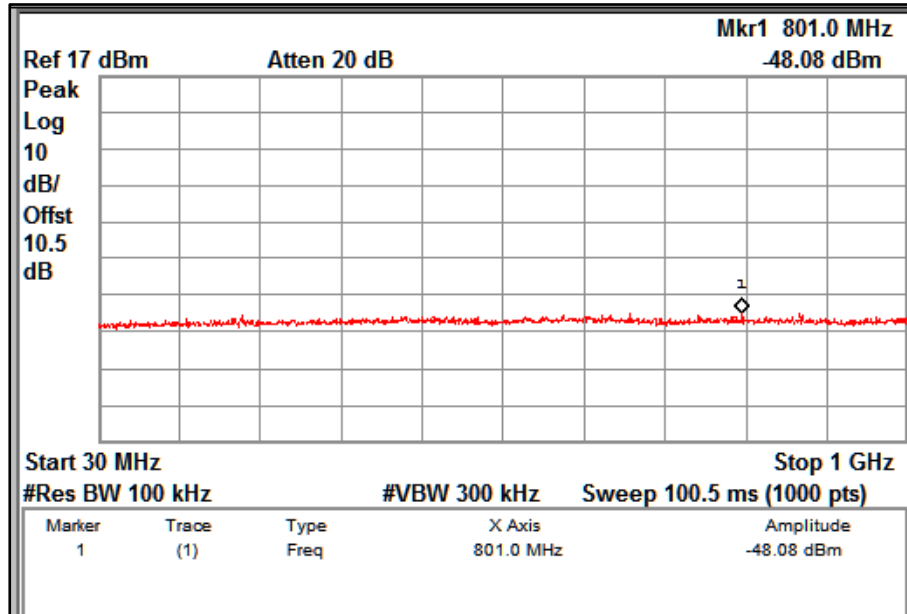


Channel Frequency: 2480MHz

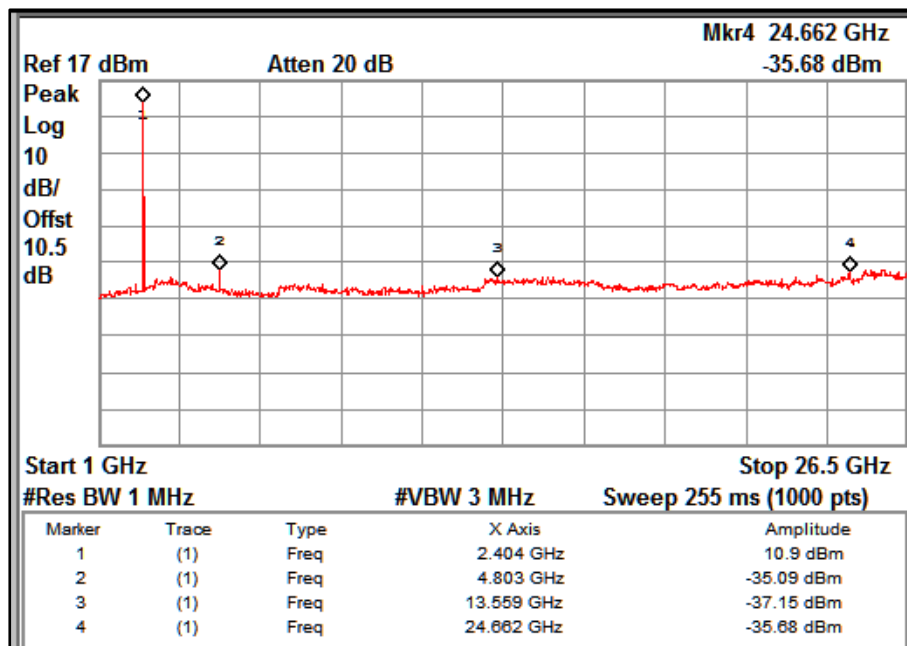
Data rate: 3Mbps

6.7 Conducted Spurious Emissions

Data rate: 1Mbps



Frequency range: 30 MHz – 1 GHz



Frequency range: 1 GHz – 26.5 GHz

Prüfbericht - Nr.:

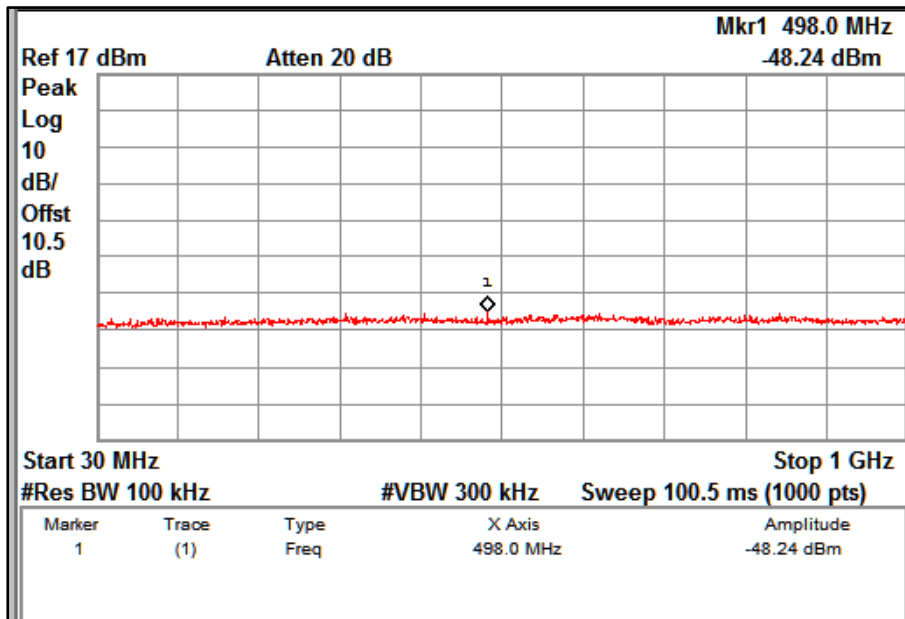
Test Report No.:

ULR-TC568819300000032F 001

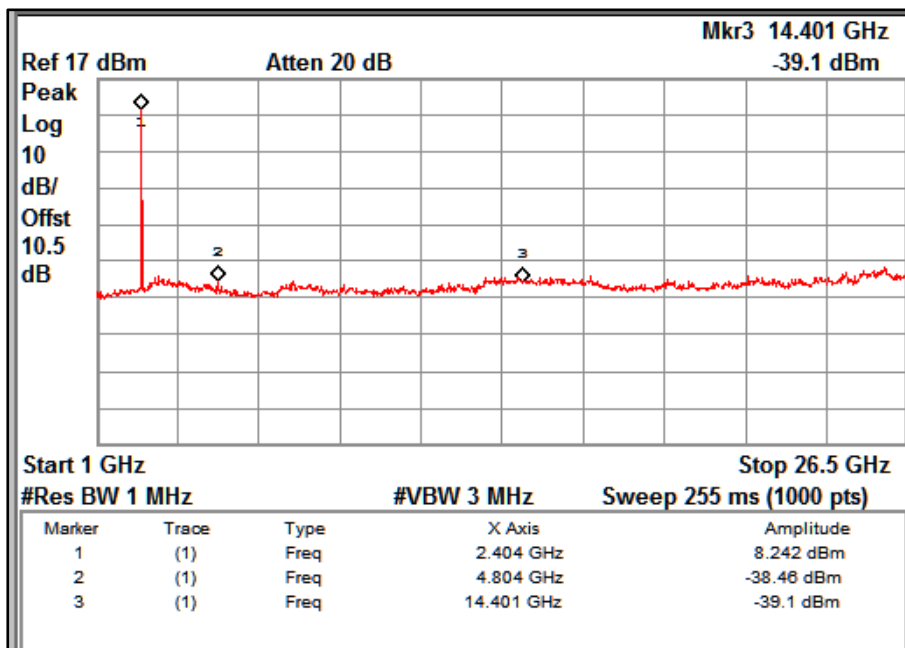
Seite 34 von 48

Page 34 of 48

Data rate: 2Mbps

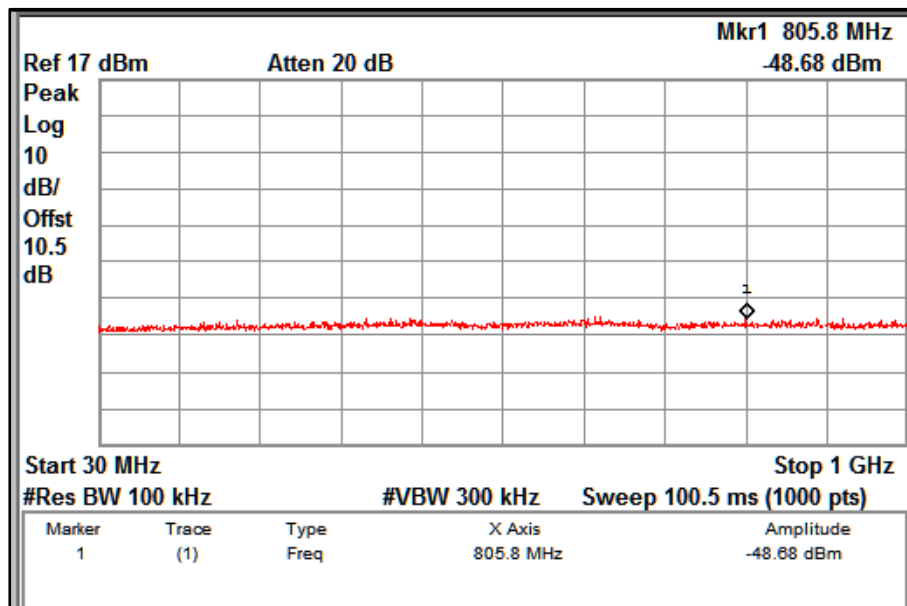


Frequency range: 30 MHz – 1 GHz

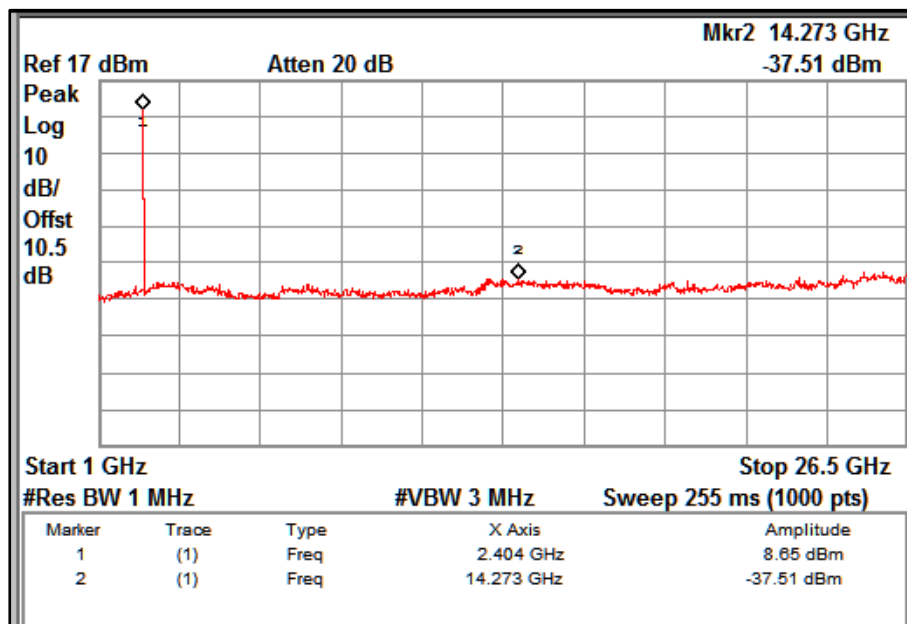


Frequency range: 1 GHz – 26.5 GHz

Data rate: 3Mbps



Frequency range: 30 MHz – 1 GHz



Frequency range: 1 GHz – 26.5 GHz

6.8 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 < 1GHz 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 10: 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 : 110 V AC, 60Hz
Battery: 25.9 V

Environmental conditions:

Temperature: +23.5 °C RH: 54 %

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

Seite 37 von 48
Page 37 of 48

Test results:

Charging Mode:

No emissions found in frequency range 9 kHz to 30 MHz.

Test results for frequency range 30MHz – 200MHz

Polarization	Frequency (MHz)	Measured Emission level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Vertical	42.189	26.22	40	-13.78
	42.886	37.78	40	-2.22
	43.846	23.54	40	-16.46
	80.779	34.19	40	-5.81
	82.164	33.51	40	-6.49
Horizontal	77.812	28.43	40	-11.57
	81.297	33.81	40	-6.19

Test results for frequency range 200MHz – 1GHz

Polarization	Frequency (MHz)	Measured Emission level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Vertical	416.00	39.81	46	-6.19
	479.97	37.26	46	-8.74
	960.00	36.79	46	-9.21
Horizontal	416.00	40.63	46	-5.37
	448.00	42.25	46	-3.75
	896.00	40.25	46	-5.75

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 38 von 48

Page 38 of 48

Discharging Mode:

No emissions found in frequency range 9 kHz to 200 MHz.

Test results for frequency range 200MHz – 1GHz

Polarization	Frequency (MHz)	Measured Emission level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	416	37.50	46	-8.50
	480	37.28	46	-8.72
	896	37.57	46	-8.43
	960	35.65	46	-10.35
Horizontal	448	41.44	46	-4.56
	896	41.25	46	-4.75

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 39 von 48

Page 39 of 48

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

Data rate: 1Mbps

Channel Frequency (MHz)	Frequency (MHz)	Polarization	Emission (dBμV/m)	Limit (dBm)	Margin (dB)
2402	2402(Pk)	Vertical	96.13	*	-
	2402(Av)		96.01	*	-
	2390(Pk)		38.14	74	-35.86
	2390(Av)		26.45	54	-27.55
	4804(Pk)		44.89	74	-29.11
	4804(Av)		38	54	-16.00
	7206(Pk)		48.23	74	-25.77
	7206(Av)		37.81	54	-16.19
	2402(Pk)	Horizontal	92.51	*	-
	2402(Av)		92.4	*	-
	2390(Pk)		37.95	74	-36.05
	2390(Av)		25.27	54	-28.73
	4804(Pk)		43.31	74	-30.69
	4804(Av)		32.87	54	-21.13
	7206(Pk)		49.25	74	-24.75
	7206(Av)		36.1	54	-17.90
2441	2441(Pk)	Vertical	93.91	*	-
	2441(Av)		93.58	*	-
	4882(Pk)		47.43	74	-26.57
	4882(Av)		41.27	54	-12.73
	7323(Pk)		49.64	74	-24.36
	7323(Av)		38.12	54	-15.88
	2441(Pk)	Horizontal	90.06	*	-
	2441(Av)		89.73	*	-
	4882(Pk)		44.4	74	-29.60
	4882(Av)		34.25	54	-19.75
	7323(Pk)		49.64	74	-24.36
	7323(Av)		38.12	54	-15.88

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 40 von 48

Page 40 of 48

Data rate: 1Mbps

Channel Frequency (MHz)	Frequency (MHz)	Polarization	Emission (dBµV/m)	Limit (dBm)	Margin (dB)
2480	2483.5(Pk)	Vertical	41.84	74	-32.16
	2483.5(Av)		30.05	54	-23.95
	2480(Pk)		93	*	-
	2480(Av)		92.67	*	-
	4960(Pk)		47.1	74	-26.90
	4960(Av)		40.01	54	-13.99
	7440(Pk)		50.1	74	-23.90
	7440(Av)		39.45	54	-14.55
	2483.5(Pk)	Horizontal	39.74	74	-34.26
	2483.5(Av)		28.44	54	-25.56
	2480(Pk)		89.59	*	-
	2480(Av)		89.26	*	-
	4960(Pk)		45.56	74	-28.44
	4960(Av)		37.78	54	-16.22
	7440(Pk)		50.37	74	-23.63
	7440(Av)		40.49	54	-13.51

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 41 von 48

Page 41 of 48

Data rate: 2Mbps

Channel Frequency (MHz)	Frequency (MHz)	Polarization	Emission (dBμV/m)	Limit (dBm)	Margin (dB)
2402	2402(Pk)	Vertical	92.68	*	-
	2402(Av)		88.98	*	-
	2390(Pk)		38.79	74	-35.21
	2390(Av)		26.3	54	-27.7
	4804(Pk)		42.61	74	-31.39
	4804(Av)		29.66	54	-24.34
	7206(Pk)		48.16	74	-30.21
	7206(Av)		35.37	54	-24.84
	2402(Pk)	Horizontal	89.02	*	-
	2402(Av)		85.33	*	-
	2390(Pk)		38.42	74	-35.58
	2390(Av)		25.36	54	-28.64
	4804(Pk)		43.79	74	-30.21
	4804(Av)		29.16	54	-24.84
	7206(Pk)		48.73	74	-25.27
	7206(Av)		34.63	54	-19.37
2441	2441(Pk)	Vertical	90.15	*	-
	2441(Av)		86.44	*	-
	4882(Pk)		43.79	74	-30.21
	4882(Av)		29.92	54	-24.08
	7323(Pk)		49.47	74	-24.53
	7323(Av)		35.56	54	-18.44
	2441(Pk)	Horizontal	86.44	*	-
	2441(Av)		82.72	*	-
	4882(Pk)		43.04	74	-30.96
	4882(Av)		29.2	54	-24.8
	7323(Pk)		48.47	74	-25.53
	7323(Av)		35.65	54	-18.35

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 42 von 48

Page 42 of 48

Data rate: 2Mbps

Channel Frequency (MHz)	Frequency (MHz)	Polarization	Emission (dBμV/m)	Limit (dBm)	Margin (dB)
2480	2483.5(Pk)	Vertical	41.31	74	-32.69
	2483.5(Av)		28.33	54	-25.67
	2480(Pk)		90.05	*	-
	2480(Av)		86.51	*	-
	4960(Pk)		43.9	74	-30.10
	4960(Av)		32.6	54	-21.40
	7440(Pk)		48.77	74	-25.23
	7440(Av)		36.12	54	-17.88
	2483.5(Pk)	Horizontal	39.1	74	-34.90
	2483.5(Av)		26.31	54	-27.69
	2480(Pk)		86.7	*	-
	2480(Av)		83.14	*	-
	4960(Pk)		43.71	74	-30.29
	4960(Av)		31.55	54	-22.45
	7440(Pk)		48.85	74	-25.15
	7440(Av)		36.56	54	-17.44

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 43 von 48

Page 43 of 48

Data rate: 3Mbps

Channel Frequency (MHz)	Frequency (MHz)	Polarization	Emission (dBμV/m)	Limit (dBm)	Margin (dB)
2402	2402(Pk)	Vertical	93.04	*	-
	2402(Av)		88.92	*	-
	2390(Pk)		41.21	74	-32.79
	2390(Av)		26.72	54	-27.28
	4804(Pk)		43.35	74	-30.65
	4804(Av)		29.8	54	-24.2
	7206(Pk)		48.26	74	-30.54
	7206(Av)		35.42	54	-24.84
	2402(Pk)	Horizontal	93.17	*	-
	2402(Av)		89.04	*	-
	2390(Pk)		42.44	74	-31.56
	2390(Av)		26.74	54	-27.26
	4804(Pk)		43.46	74	-30.54
	4804(Av)		29.16	54	-24.84
	7206(Pk)		48.44	74	-25.56
	7206(Av)		34.65	54	-19.35
2441	2441(Pk)	Vertical	90.92	*	-
	2441(Av)		86.69	*	-
	4882(Pk)		43.05	74	-30.95
	4882(Av)		29.95	54	-24.05
	7323(Pk)		48.51	74	-25.49
	7323(Av)		35.57	54	-18.43
	2441(Pk)	Horizontal	87.01	*	-
	2441(Av)		82.78	*	-
	4882(Pk)		43.36	74	-30.64
	4882(Av)		29.21	54	-24.79
	7323(Pk)		49.01	74	-24.99
	7323(Av)		35.7	54	-18.3

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000032F 001

Seite 44 von 48

Page 44 of 48

Data rate: 3Mbps

Channel Frequency (MHz)	Frequency (MHz)	Polarization	Emission (dBμV/m)	Limit (dBm)	Margin (dB)
2480	2483.5(Pk)	Vertical	41.06	74	-32.94
	2483.5(Av)		28.28	54	-25.72
	2480(Pk)		90.2	*	-
	2480(Av)		86.34	*	-
	4960(Pk)		43.85	74	-30.15
	4960(Av)		32.42	54	-21.58
	7440(Pk)		48.92	74	-25.08
	7440(Av)		36	54	-18.00
	2483.5(Pk)	Horizontal	39.28	74	-34.72
	2483.5(Av)		26.56	54	-27.44
	2480(Pk)		87.26	*	-
	2480(Av)		83.4	*	-
	4960(Pk)		42.7	74	-31.30
	4960(Av)		31.23	54	-22.77
	7440(Pk)		49.31	74	-24.69
	7440(Av)		36.33	54	-17.67

*- : Fundamental Frequency

Pk:Peak ; Av: Average

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000032F 001

Seite 45 von 48
Page 45 of 48

6.9 Conducted Spurious Emission Test on AC Power Line

Result

Pass

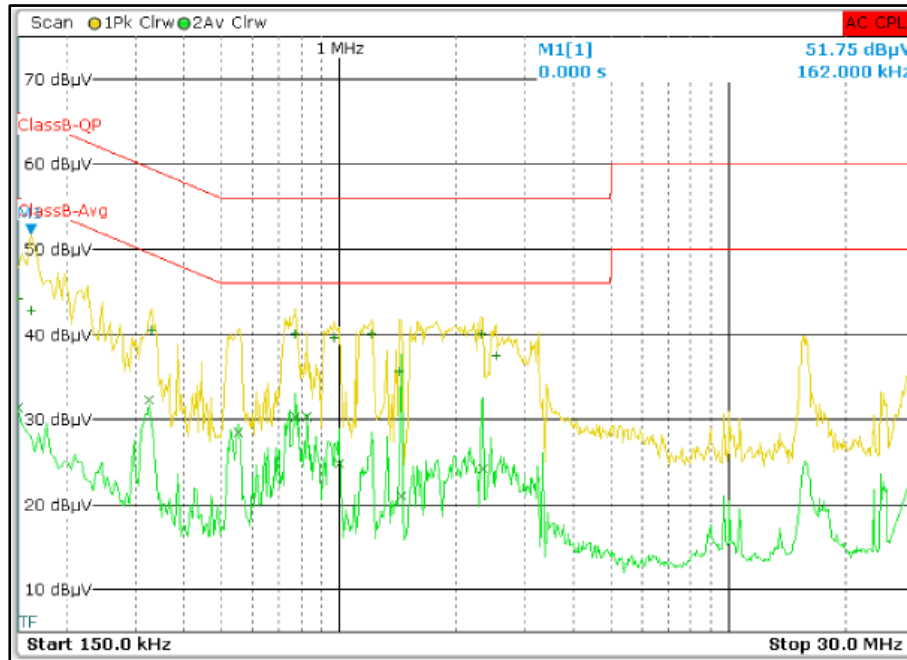
Test Specification : FCC Part 15 Section 15.207
Test Method : ANSI C63.10-2013
Testing Location : Screened room
Measurement Bandwidth : 9kHz
Frequency Range : 150kHz – 30MHz
Supply Voltage : 110VAC,60Hz

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

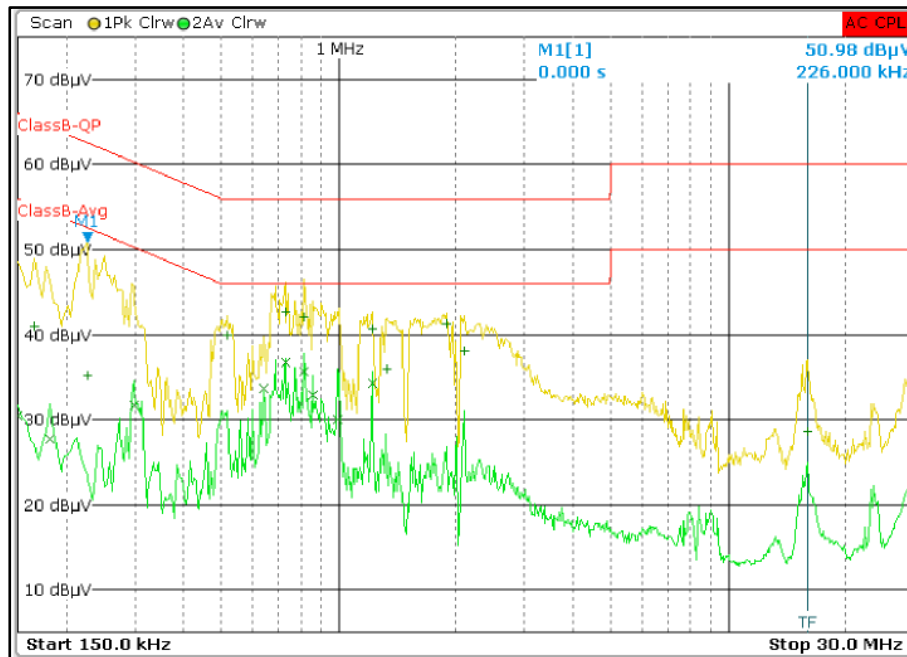
* Decreases with the logarithm of the frequency

Test Result:



Line : Graph

Scan Table							
Scan Start	150.00000000 kHz						
Scan Stop	30.00000000 MHz						
Scan Type	LIN						
Transducer	ENV216-Line						
Detector	Trace 1: Max Peak Trace 2: Average						
Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	4.000 kHz	9.0 kHz	20.0 ms	10.0 dB	30.0 dB	INPUT1
Final Results							
Meas Time	1.0 s						
Margin	6.0 dB						
Peaks	25						
Trace	Frequency	Level (dBμV)	Phase	Detector	Delta Limit/dB		
2	774.00000000 kHz	30.27		Average	-15.73		
2	830.00000000 kHz	30.24		Average	-15.76		
1	2.330000000 MHz	40.11		Quasi Peak	-15.89		
1	774.00000000 kHz	40.06		Quasi Peak	-15.94		
1	1.214000000 MHz	40.06		Quasi Peak	-15.94		
1	974.00000000 kHz	39.65		Quasi Peak	-16.35		
2	326.00000000 kHz	32.30		Average	-17.25		
2	550.00000000 kHz	28.45		Average	-17.55		
1	2.526000000 MHz	37.44		Quasi Peak	-18.56		
1	330.00000000 kHz	40.57		Quasi Peak	-18.88		
1	1.430000000 MHz	35.62		Quasi Peak	-20.38		
2	998.00000000 kHz	24.77		Average	-21.23		
2	2.342000000 MHz	24.28		Average	-21.72		
1	150.00000000 kHz	44.16		Quasi Peak	-21.84		
1	162.00000000 kHz	42.81		Quasi Peak	-22.55		
2	150.00000000 kHz	31.32		Average	-24.68		
2	1.446000000 MHz	21.04		Average	-24.96		



Neutral : Graph

Scan Table							
Scan Start	150.00000000 kHz						
Scan Stop	30.00000000 MHz						
Scan Type	LIN						
Transducer	ENV216-Neutral						
Detector	Trace 1: Max Peak Trace 2: Average						
Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	4.000 kHz	9.0 kHz	20.0 ms	10.0 dB	30.0 dB	INPUT1
Final Results							
Meas Time	1.0 s						
Margin	6.0 dB						
Peaks	25						
Trace	Frequency	Level (dBμV)	Phase	Detector	Delta Limit/dB		
2	730.00000000 kHz	36.69		Average	-9.31		
2	814.00000000 kHz	35.66		Average	-10.34		
2	1.218000000 MHz	34.25		Average	-11.75		
2	642.00000000 kHz	33.68		Average	-12.32		
2	858.00000000 kHz	32.98		Average	-13.02		
1	730.00000000 kHz	42.65		Quasi Peak	-13.35		
1	814.00000000 kHz	42.05		Quasi Peak	-13.95		
1	1.890000000 MHz	41.30		Quasi Peak	-14.70		
1	1.222000000 MHz	40.75		Quasi Peak	-15.25		
2	994.00000000 kHz	30.04		Average	-15.96		
1	518.00000000 kHz	39.89		Quasi Peak	-16.11		
1	2.098000000 MHz	38.03		Quasi Peak	-17.97		
2	298.00000000 kHz	31.66		Average	-18.64		
1	1.326000000 MHz	35.94		Quasi Peak	-20.06		
1	166.00000000 kHz	41.06		Quasi Peak	-24.10		
2	150.00000000 kHz	30.54		Average	-25.46		
2	182.00000000 kHz	27.68		Average	-26.71		
1	226.00000000 kHz	35.27		Quasi Peak	-27.33		
1	15.970000000 MHz	28.58		Quasi Peak	-31.42		

7 LIST OF TABLES

Table 1: List of test and measurement instruments.....	5
Table 2: Ratings and System Details.....	6
Table 3: Measurement Uncertainty.....	7
Table 4: List of Bluetooth center Frequencies	9
Table 5: Maximum peak conducted output power verified Test Results	12
Table 6: 20dB Bandwidth and Occupied Bandwidth Test Results.....	18
Table 7: Number of Hopping Channels.....	24
Table 8: Carrier Frequency Separation.....	25
Table 9: Dwell Time results.....	26
Table 10: Transmitter limits for Radiated emission of Section 15.209.....	36

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