

Prüfbericht – Produkte
Test Report - Products

Prüfbericht-Nr.: Test report no.:	ULR-TC568822300000060F	Auftrags-Nr.: Order no.:	146696276 0010	Seite 1 von 36 Page 1 of 36	
Kunden-Referenz-Nr.: Client reference no.:	2133653	Auftragsdatum: Order date:	2022.07.01		
Auftraggeber: Client:	Grayshift LLC, 931 Monroe Dr NE, Suite A102-340, Atlanta Georgia United States, Phone: (833) 472-9539, Fax: (404) 420-2797				
Prüfgegenstand: Test item:	GrayKey	Serien-Nr.: Serial No.:	Engineering Sample		
Bezeichnung: Identification.:	GK.02				
Auftrags-Inhalt: Order content:	Testing and issue of Test Report With Grant Certificate				
Prüfgrundlage: Test specification:	FCC Part 15 Subpart C 15.247, 15.207, 15.205 & 15.209 RSS247 Issue2 & RSS GEN Issue5				
Wareneingangsdatum: Date of sample receipt:	2022.07.05				
Prüfmuster-Nr & Test sample no &	A003294326-001 & A003294326-002				
Prüfzeitraum: Testing period:	2022.07.06 - 2022.07.11				
Ort der Prüfung: Place of testing:	Wireless laboratory, Bangalore				
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (India) Pvt.Ltd., 27/B, 2nd Cross, Electronic City Phase1 Bangalore -560 100, India FCC Test site registration number: 496599 ISED Test site registration number: 3466E-1				
Prüfergebnis*: Test result*:	Pass				
geprüft von: tested by:	genehmigt von: authorized by:				
Datum: Date: 2022.07.18	Ausstellatum: Issue date: 2022.08.29				
Stellung / Position:	M.V.Naveen Kumar Engineer	Stellung / Position:	Madhu K.N Senior Engineer		
Sonstiges / Other:	FCC ID: 2AV7EGK02 IC : 26020-GK02				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = N/T = nicht
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not
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 only 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 test mark.					

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 2 von 36
Page 2 of 36

TEST SUMMARY

Test Item	Applicable Standard		Result
	FCC	ISED	
Maximum conducted (average) output power	FCC 15.247(b)(3)	RSS 247 Issue 2, Section 5.4 (d)	Pass
Maximum Power Spectral Density	FCC 15.247(e)	RSS 247 Issue 2, Section 5.2 (b)	*N/T
DTS Bandwidth	FCC 15.247(a)(2)	RSS 247 Issue 2, Section 5.2 (a)	*N/T
Emissions in non-restricted frequency bands	FCC 15.247(d)	RSS 247 Issue 2, Section 5.5	*N/T
Spurious Radiated Emissions and Restricted Bands of Operation	FCC 15.209 / FCC 15.205	RSS-Gen Issue 5, Section 8.9 /8.10	Pass
Conducted Emissions on A.C Power Lines	FCC 15.207	RSS-Gen Issue 5, Section 8.8	Pass
Antenna requirement	FCC 15.203	NA	Pass

Note:

NA: Not Applicable

*N/T: Not tested – These test cases are not tested, the product uses certified RF module

Sterling-LWB5+802.11b/g/n/ac module with Bluetooth 5.0 from **Laird Connectivity.**, with

FCC ID: SQG-LWB5PLUS & IC : 3147A-LWB5PLUS. Issued by the **International Certification Corp.**

Product Category: Electronics Testing

Test Discipline: EMC Test Facility

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 3 von 36
Page 3 of 36

REVISION HISTORY OF THIS REPORT

Report Number	Version	Description	Issue date
ULR-TC568822300000060F	01	Initial issue of report	2022.08.29

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 4 von 36
Page 4 of 36

Table of Contents

1	GENERAL REMARKS	5
1.1	Attachments	5
2	TEST SITES	6
2.1	Testing Facilities.....	6
2.2	List of Test and Measurement Instruments.....	6
3	GENERAL PRODUCT INFORMATION.....	8
3.1	Product Function and Intended Use.....	8
3.2	Ratings and System Details of Equipment under Test	8
3.3	Measurement Uncertainty:	9
4	TEST SET-UP AND OPERATION MODE.....	10
4.1	Principle of Configuration Selection	10
4.2	UUT Operation and Software	10
4.3	Special Accessories and Auxiliary Equipment	10
4.4	Simultaneous Transmission	10
4.5	Countermeasures to achieve EMC Compliance	10
4.6	List of frequencies	10
4.7	Report references.....	11
5	Operational Description	12
6	TEST METHODOLOGY	13
6.1	Conducted Spurious Emission Test on AC Power Line.....	13
6.1.1	Test Setup Configuration	13
6.2	Radiated Emission Test	14
6.2.1	Test Setup Configuration	14
7	TEST RESULTS FOR Wi-Fi.....	16
7.1	Maximum Average Conducted Output Power.....	16
7.2	Spurious Radiated Emissions & Restricted Bands of Operation	22
7.3	Conducted Spurious Emission Test on AC Power Line.....	33
8	LIST OF TABLES.....	36
9	LIST OF FIGURES	36
10	Power level used for testing	36

1 GENERAL REMARKS

1.1 Attachments

All attachments are part of this test report and are issued in separate document

1. TEST SETUP PHOTOS
- 2: EUT EXTERNAL PHOTOS
- 3: EUT INTERNAL PHOTOS
- 4: FCC LABEL AND LABEL LOCATION
- 5: BLOCK DIAGRAM
- 6: SPECIFICATION OF EUT
- 7: SCHEMATIC DIAGRAM
- 8: BILL OF MATERIAL
- 9: USER MANUAL
- 10: MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 6 von 36
Page 6 of 36

2 TEST SITES

2.1 Testing Facilities

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

2. TUV Rheinland (India) Pvt.Ltd.,
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.
India

Radiated Measurement site type :
Fully anechoic chamber (used for above 1 GHz
measurements)

Radiated Measurement site type :
Semi anechoic chamber (used for below 1 GHz
measurements)

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	Test Facility
EMI Receiver	Rohde & Schwarz	ESW 44	101732	4.73 SP5	19.08.2022	Yearly	Radiated Spurious Emission
EMI Receiver	Rohde & Schwarz	ESW 44	101733	1.72SP1	12.02.2023	Yearly	
Active loop antenna	Frankonia	LAX-18	LAX-10-800	-	31.01.2023	Yearly	
Balloon and Biconical Antenna	Schwarzbeck	VHBB-9124 / BBA-9106	1028	-	03.02.2023	Yearly	
Log - Periodical Antenna	Schwarzbeck	VUSLP-9111B	9111B-111	-	04.02.2023	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1944	-	03.09.2022	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-0904	-	06.09.2022	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	-	
Fully Anechoic Chamber	Albatross	-	-	-	-	-	Antenna-Port Conducted test
Spectrum Analyser	Agilent Technologies	E4407B	US41192 772	A.14.06	15.12.2022	Yearly	
EMI Receiver	Rohde & Schwarz	ESR7	101133	3.48 SP3	14.07.2022	Yearly	Conducted AC Power line Test
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	-	29.07.2022	Yearly	
LISN	Rohde & Schwarz	ENV216	100022	-	07.10.2022	Yearly	

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568822300000060F

Seite 7 von 36

Page 7 of 36

Table 2: Instrument application Software versions

SL. No.	Test Type	Application software	Version
1	Radiated spurious emission measurement in 10mtr-SAC	BAT EMC	3.20.0.17
2	Radiated spurious emission measurement in 3mtr-FAC	EMC 32	10.60.00

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Grayshift's GrayKey solution delivers robust access and extraction capabilities for locked and encrypted mobile devices. GrayKey supports lawful, same-day access to the latest iOS and Android devices, typically extracting and accessing multiple data types, to expedite critical investigations.

3.2 Ratings and System Details of Equipment under Test

Table 3: Ratings and System Details as declared by Client*

Radio Protocol		Wi-Fi
Operating Frequency Range		2412MHz to 2462MHz
No. of Channels		11 (Refer Table 5)
Channel Spacing		5MHz
Transmitting Power Level		Refer clause 10
Maximum Measured Power(dBm)		16.70dBm (g-mode 6Mbps 2437MHz)
Modulation		DSSS and OFDM
Number of antennas		1
Antenna Gain		1dBi
Antenna Type		Chip Antenna
Supply Voltage to Product		110VAC 60Hz through Adapter & 3.7V of Li-Po Battery
Environmental conditions	Storage	0° C to 55° C
	Operating	0° C to 55° C
EUT Dimension(L x W x H) in mm		200 x 135 x 60 mm

***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. Refer the products user manual for more details.

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 9 von 36
Page 9 of 36

Note: Product **GrayKey** has multiple protocols. All the supported wireless protocols and their respective test results are issued in separate test reports, refer clause 4.7 Report references

3.3 Measurement Uncertainty:

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

Table 4: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 5 \%$
RF output power, conducted	$\pm 1.5 \text{ dB}$
Power Spectral Density, conducted	$\pm 3 \text{ dB}$
Unwanted Emissions, conducted	$\pm 3 \text{ dB}$
All emissions, radiated	$\pm 6 \text{ dB}$
Temperature	$\pm 3 \text{ }^{\circ}\text{C}$
Supply Voltages	$\pm 3 \%$
Time	$\pm 5 \%$

Note: The Listed Measurement Uncertainties are the worst-case uncertainty, for the respective test cases. Above Table is for reporting purpose only and not used in determining Final Pass/Fail verdict.

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle on low, mid and high channels

4.2 UUT Operation and Software

Hardware Version : 2.0

Software version : 1.4.0

4.3 Special Accessories and Auxiliary Equipment

Model Name	Model Number	Power Adapter Ratings
FSP	FSP045-D3MR3	AC Input : 100V-240V ~,1.2A,50-60Hz DC Output: 5.0V/9.0V/12.0V/15.0V—3.0A 20.0V—2.25A of 45W
Li-Po Battery	-	3.7V, 5000mAH

4.4 Simultaneous Transmission

This product doesn't Support Simultaneous operation

4.5 Countermeasures to achieve EMC Compliance

- None

4.6 List of frequencies

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2412 – 2462	1	2412
	2	2417
	3	2422
	4	2427
	5	2432
	6	2437
	7	2442
	8	2447
	9	2452
	10	2457
	11	2462

Table 5: List of Wi-Fi center Frequencies

Channel used for Wi-Fi 2.4GHz testing

Protocol: WLAN 802.11b

Channel Low : 2412 MHz
Channel Mid : 2437 MHz
Channel High : 2462 MHz

Protocol: WLAN 802.11g

Channel Low : 2412 MHz
Channel Mid : 2437 MHz
Channel High : 2462 MHz

Protocol: WLAN 802.11n_20MHz

Channel Low : 2412 MHz
Channel Mid : 2437 MHz
Channel High : 2462 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 11 von 36
Page 11 of 36

Protocol: WLAN 802.11n-40MHz

Channel Low : 2422 MHz
Channel Mid : 2437 MHz
Channel High : 2452 MHz

Note:

TUV Sample Identification number : A003294326-001 – Radiated test Sample
A003294326-002 – Conducted test Sample

4.7 Report references

Note: Product **GrayKey** has multiple protocols. All the supported wireless protocols and their respective test results are issued in separate test reports, following table lists the report numbers.

Radio Protocol	Report Number
RF test report for Wi-Fi (2.4GHz) – (This report)	ULR-TC568822300000060F
RF test report for Wi-Fi (5GHz)	ULR-TC568822300000061F

Prüfbericht - Nr.:

ULR-TC568822300000060F

Test Report No.:

Seite 12 von 36

Page 12 of 36

5 Operational Description

The Grakey solution is required to network and licence configured first as descried in the user manual. After that the end device need to be connected with Graykey for access and extraction purpose. Here Graykey will perform BFU and AFU extractions and generate full extraction report.

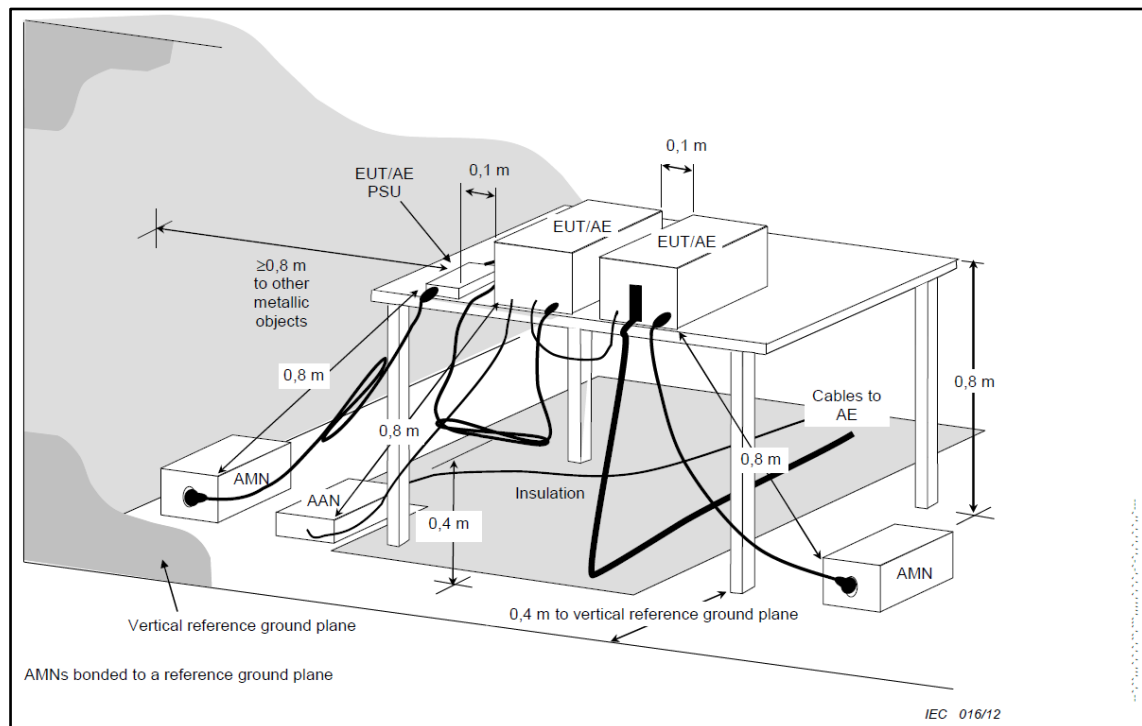
6 TEST METHODOLOGY

6.1 Conducted Spurious Emission Test on AC Power Line

Measured levels of ac power-line conducted emission across the 50Ω LISN port (to which the EUT is connected). All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer.

The device is placed on the test table, raised 80cm above the reference ground plane. The vertical conducting plane is located 40cm to the rear of the device. AC Conducted emission measurement is made over frequency range from 150kHz to 30MHz, this measurement was performed with EUT powered by 2 methods and both methods are tested individually, one with an AC adaptor with 110V AC 60Hz supply and second with Wireless charger with supply 110V AC 60Hz.

6.1.1 Test Setup Configuration



6.2 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

6.2.1 Test Setup Configuration

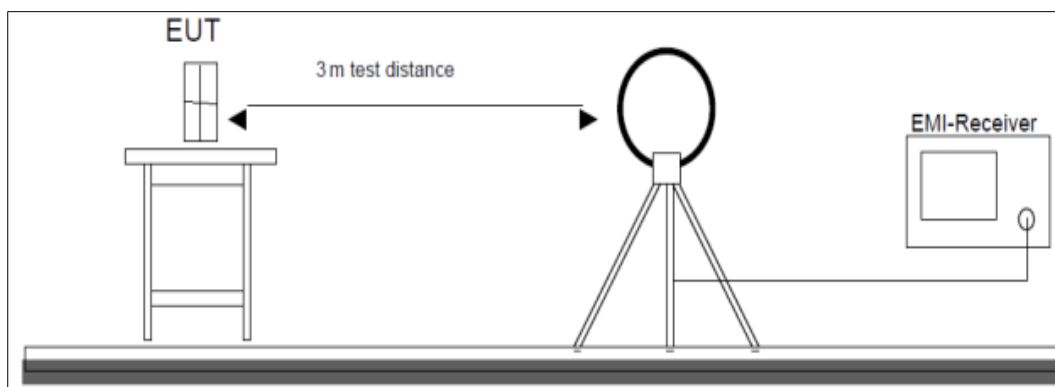


Figure 1: Frequency Range 9 kHz- 30 MHz

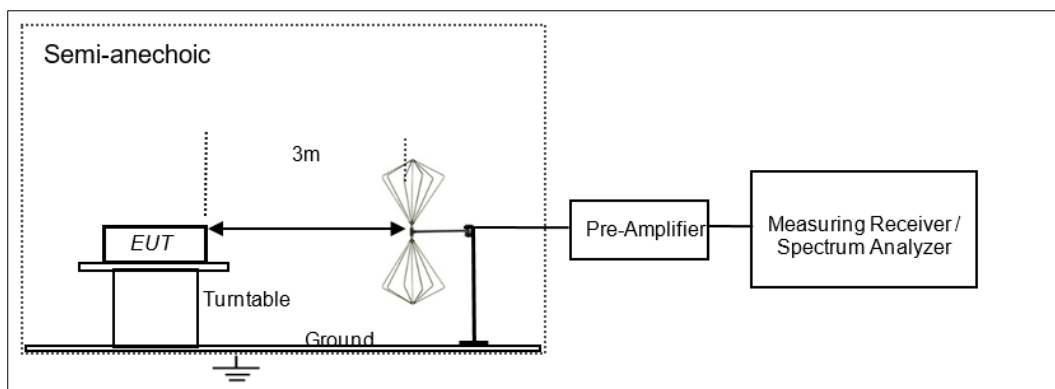


Figure 2: Frequency Range 30 MHz – 200 MHz

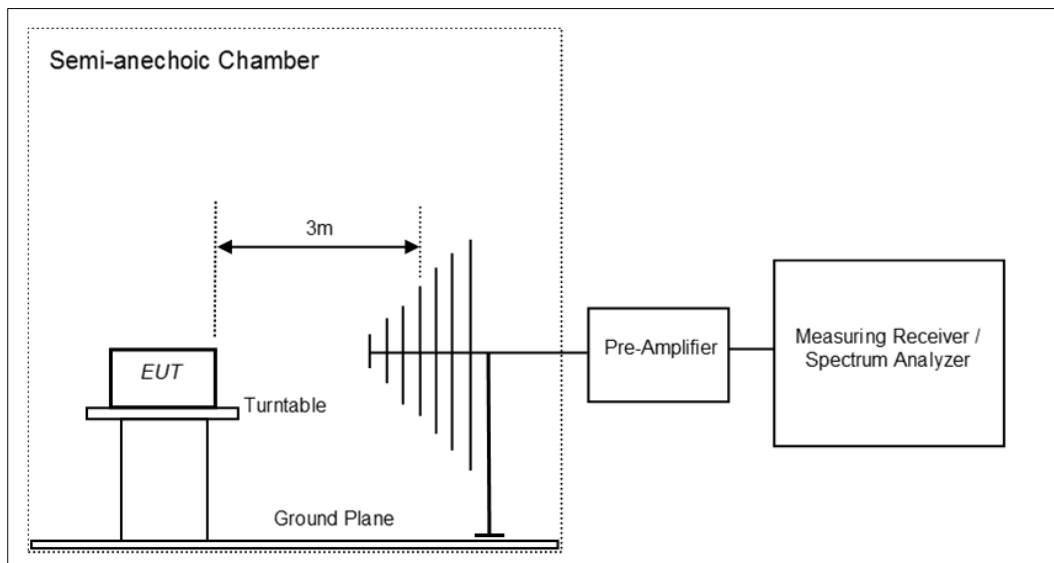


Figure 3: Frequency Range 200 MHz - 1GHz

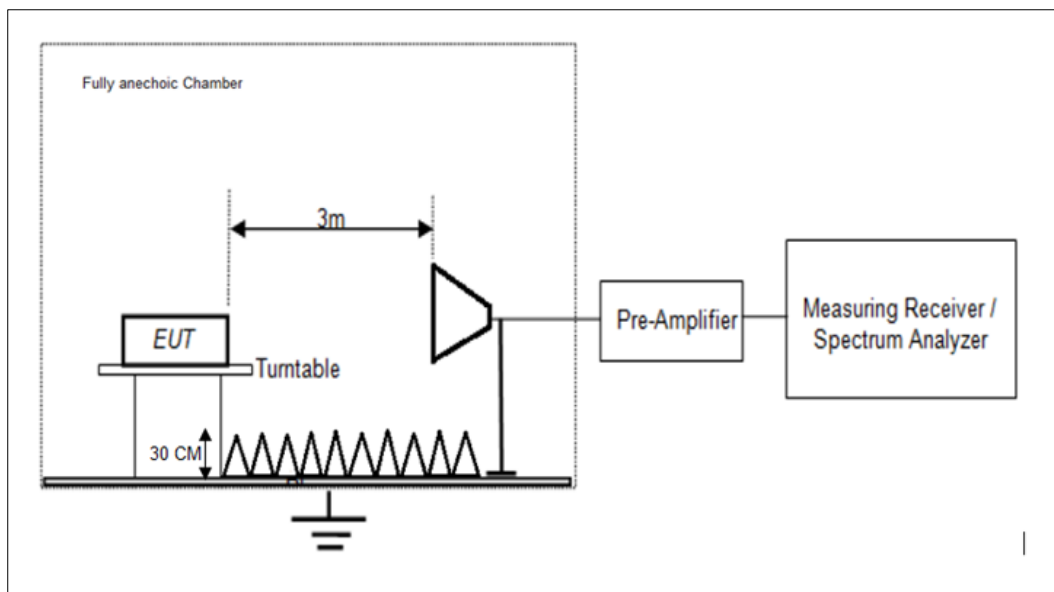


Figure 4: Frequency Range above 1 GHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 16 von 36
Page 16 of 36

7 TEST RESULTS FOR Wi-Fi

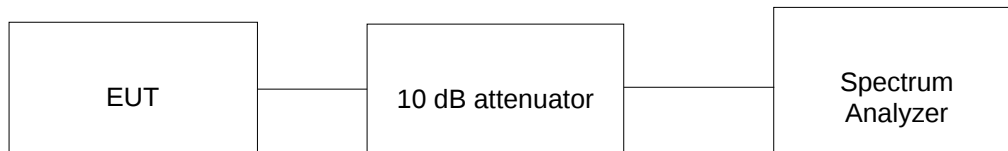
7.1 Maximum Average Conducted Output Power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (b)(3)/ RSS 247 Issue 2, Section 5.4 (d)
Test Method	Subclause 11.9.2.2.4 of ANSI C63.10
Measurement Bandwidth	300kHz/1MHz
Detector	Average sample detector mode
Port of testing	Antenna port
Requirement	Power ≤ 1 W (30 dBm) for FCC e.i.r.p ≤ 4 W (36 dBm) for ISED

Test Method



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.9 °C Voltage = 110VAC 60Hz through Adapter Relative humidity: 62%

KDB Guidelines applied:

Measurements were made as per section 8.3.2.2 in KDB 558074.00 D01 15.247 Measurement Guidance v05r02.

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 17 von 36
Page 17 of 36

Test results:

Note:

1. All the losses are included during measurement and final values are mentioned in the test report.
2. Total Average Output power (dBm) = Measured Average power (dBm) + Attenuator factor (10dB) + Cable loss (0.6dB)
3. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is 1 dBi

Mode	BW	Data rate	Channel frequency (MHz)	Duty cycle (%)	Duty cycle correction factor (dB)	Measured Average Power (dBm)	Measured Final Average power (dBm)	Final e.i.r.p (dBm)	FCC Limit (dBm)	ISED Limit (dBm)
b	20MHz	1Mbps	2412	99.47	0.04	14.48	14.52	15.52	30.00	36.00
			2437	99.47	0.04	15.47	15.51	16.51	30.00	36.00
			2462	99.47	0.04	13.94	13.98	14.98	30.00	36.00
g		6Mbps	2412	97.62	0.13	11.15	11.28	12.28	30.00	36.00
			2437	97.62	0.13	15.57	15.70	16.70	30.00	36.00
			2462	97.62	0.13	13.14	13.27	14.27	30.00	36.00
n		MCS0	2412	97.44	0.11	10.64	10.75	11.75	30.00	36.00
			2437	97.44	0.11	13.47	13.58	14.58	30.00	36.00
			2462	97.44	0.11	11.32	11.43	12.43	30.00	36.00
n	40MHz	MCS0	2422	93.75	0.28	6.42	6.70	7.70	30.00	36.00
			2437	93.75	0.28	8.68	8.96	9.96	30.00	36.00
			2452	93.75	0.28	7.68	7.96	8.96	30.00	36.00

***Note:** Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

Duty cycle correction Factor is considered in Final Average Power

Measured e.i.r.p(dBm): Measured Final Average power + Antenna Gain

Prüfbericht - Nr.:
Test Report No.:

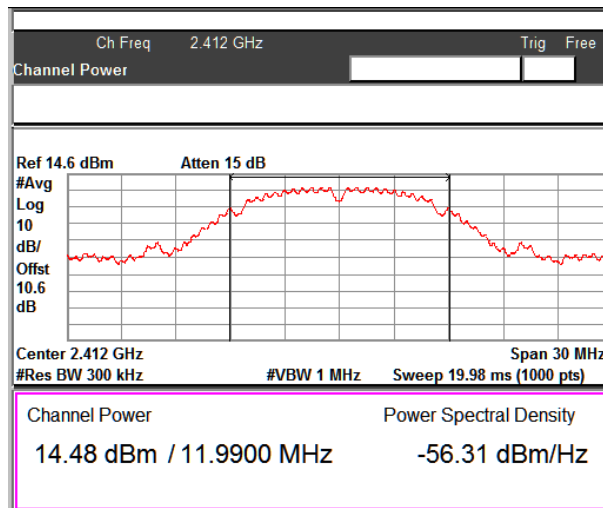
ULR-TC568822300000060F

Seite 18 von 36
Page 18 of 36

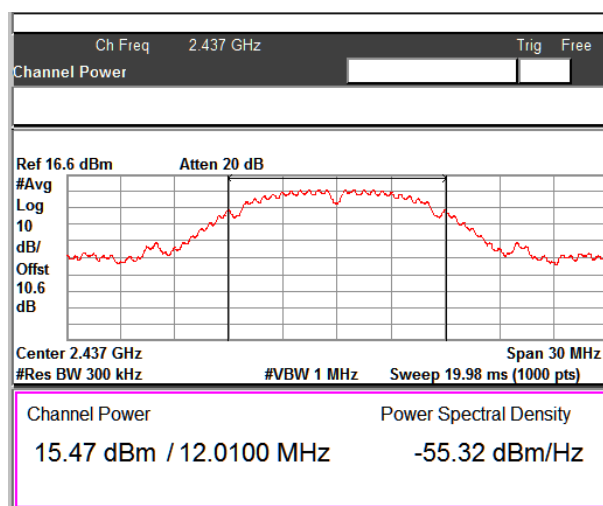
Test Plots:

Mode: 802.11b

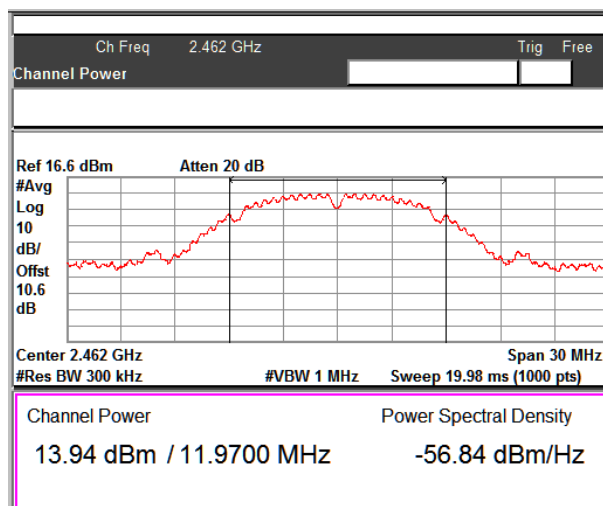
Data rate: 1Mbps



Channel frequency: 2412MHz



Channel frequency: 2437MHz



Channel frequency: 2462MHz

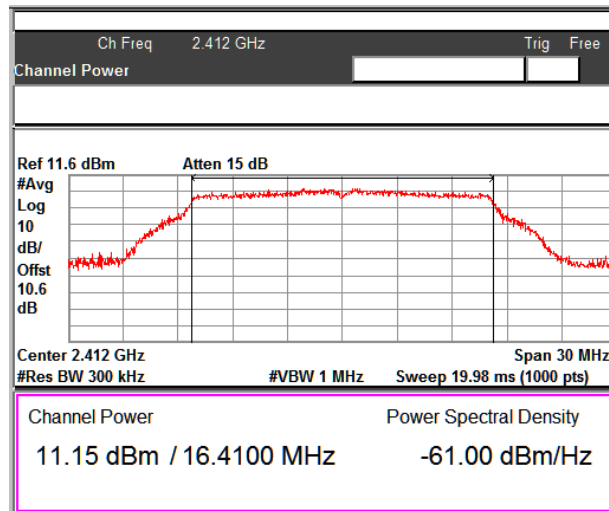
Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

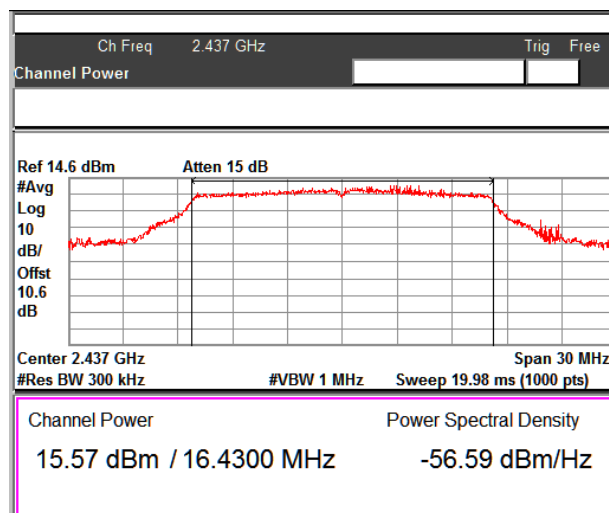
Seite 19 von 36
Page 19 of 36

Mode: 802.11g

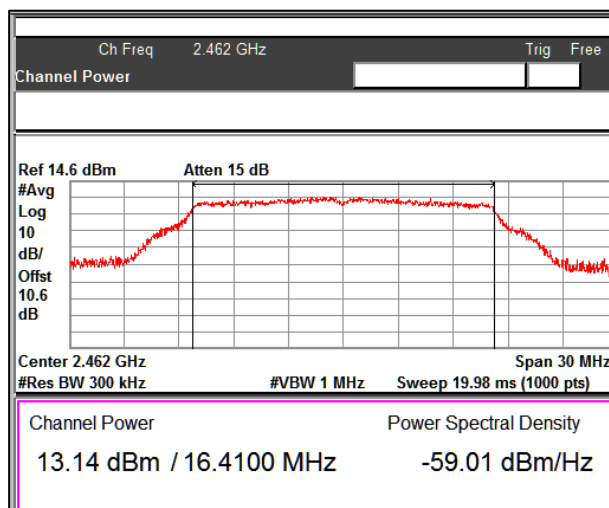
Data rate: 6Mbps



Channel frequency: 2412MHz



Channel frequency: 2437MHz



Channel frequency: 2462MHz

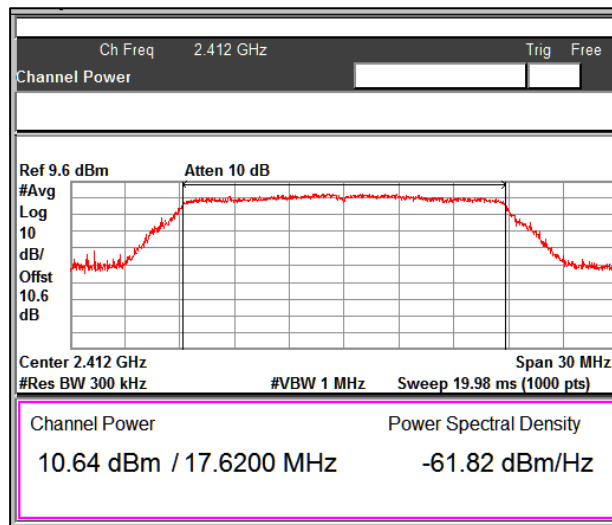
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Test Report No.:

ULR-TC568822300000060F

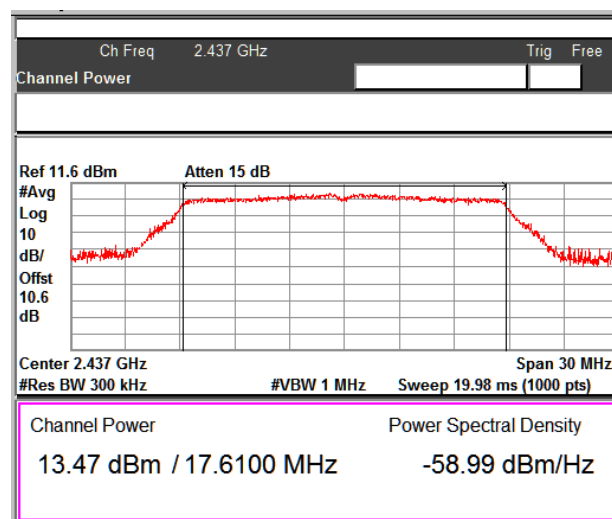
Seite 20 von 36
Page 20 of 36

Mode :802.11n-20MHz

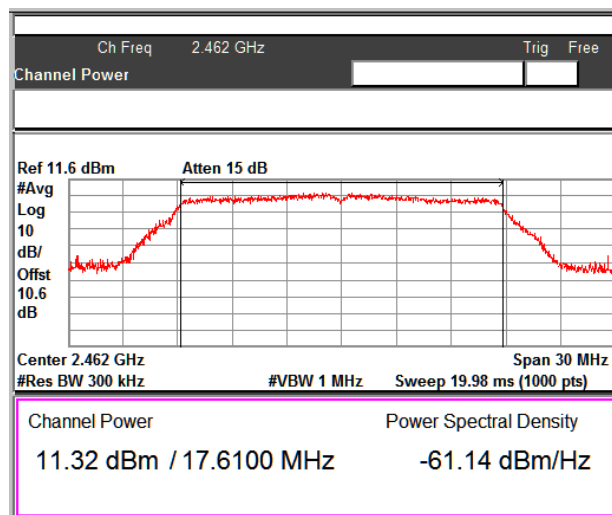
Data rate: MCS0



Channel frequency: 2412MHz



Channel frequency: 2437MHz



Channel frequency: 2462MHz

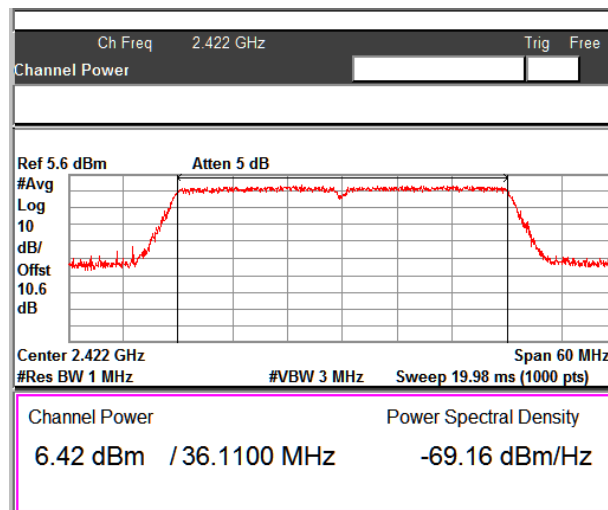
Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

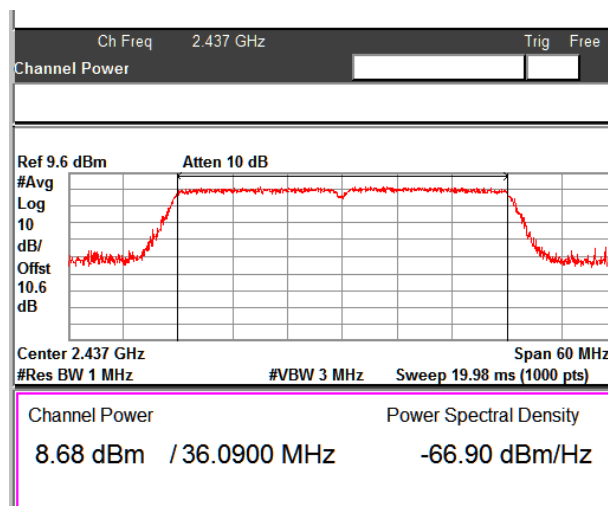
Seite 21 von 36
Page 21 of 36

Mode: 802.11n-40MHz

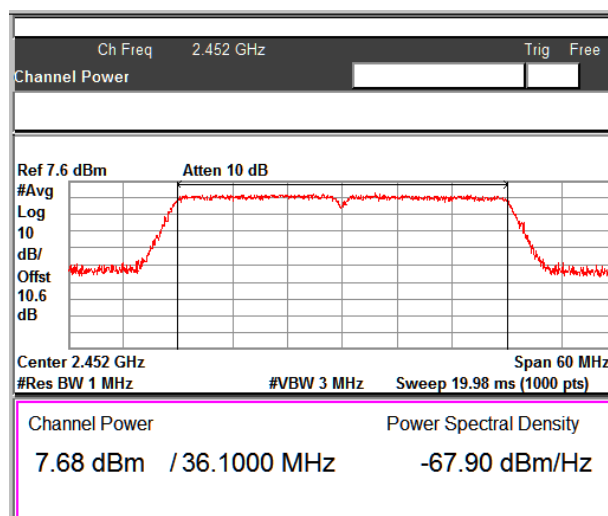
Data rate: MCS0



Channel frequency: 2422MHz



Channel frequency: 2437MHz



Channel frequency: 2452MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 22 von 36
Page 22 of 36

7.2 Spurious Radiated Emissions & Restricted Bands of Operation

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (d) / (15.209 & 15.205)/ RSS-Gen Issue 5, Section 8.9 /8.10
Test Method	ANSI C63.10.2013
Measurement Location	Semi Anechoic Chamber 30MHz - 1 GHz Fully Anechoic Chamber 1 GHz - 40GHz
Measurement Bandwidth	100 kHz for frequency range < 1GHz 1 MHz for Frequency range >1GHz
Detector	Refer remarks below
Measuring Distance	3 m
Requirement	As per the limits mentioned in the below table
Test setup	Refer Clause 6 TEST METHODOLOGY

Table 6: Transmitter limits for Radiated emission

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	54.00	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 69.54.00 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:

Temperature (Norm) = + 22.9 °C Voltage = 110VAC 60Hz through Adapter & 3.7V of Li-Po Battery
Relative humidity = 62 %

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 23 von 36
Page 23 of 36

Test results:

Note: All the losses are included during measurement and final values are mentioned in the test report. Refer Clause 7 TEST METHODOLOGY for more details

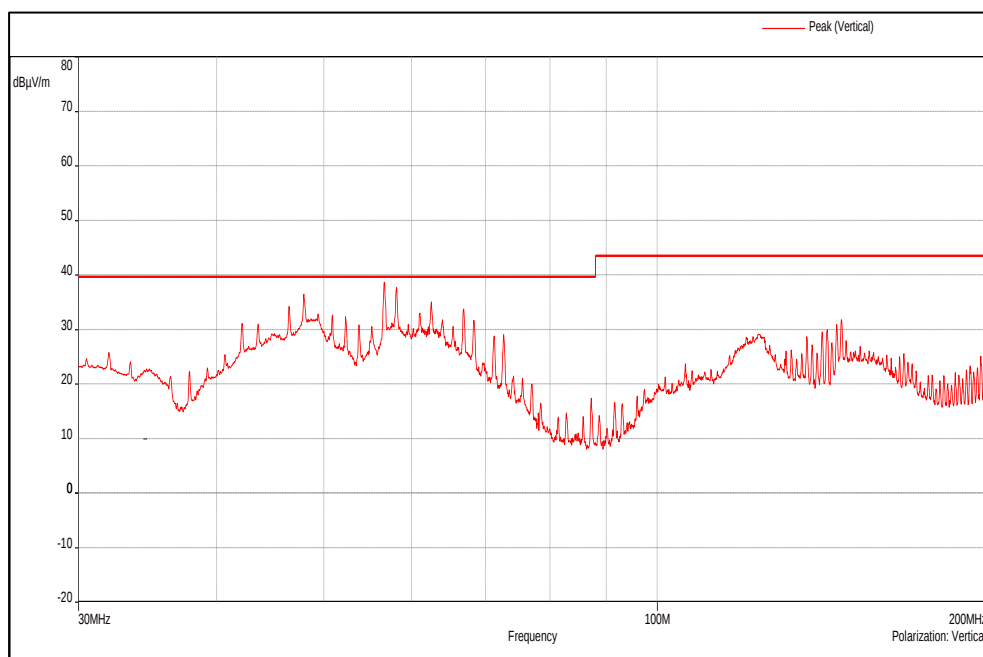
Test results for frequency range 9kHz – 30MHz

No emissions found in frequency range 9 kHz to 30 MHz, and measured levels are below 20dB from the limit line, hence not reported

Test results for frequency range 30MHz – 1GHz

Mode of Configuration	Antenna Polarization	Measured Frequency (MHz)	Measured Emission (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
g-mode 6Mbps@2437MHz	Vertical	47.994(Qp)	32.76	40.00	-7.24
		56.676(Qp)	27.75	40.00	-12.25
		58.152(Qp)	29.13	40.00	-10.87
		261.59(Pk)	33.60	46.00	-12.40
		332.78(Pk)	36.20	46.00	-9.80
		500.00(Pk)	35.80	46.00	-10.20
		599.99(Pk)	32.80	46.00	-13.20
	Horizontal	47.97(Pk)	22.10	40.00	-17.90
		56.70(Pk)	28.30	40.00	-11.70
		66.87(Pk)	25.00	40.00	-15.00
		146.67(Pk)	31.40	43.50	-12.10
		344.42(Pk)	40.00	46.00	-6.00
		400.01(Pk)	37.30	46.00	-8.70
		500.00(Pk)	39.00	46.00	-7.00
		599.99(Pk)	33.90	46.00	-12.10
		800.00(Pk)	34.50	46.00	-11.50

Note: Testing performed both the modes with Adapter & Battery for reporting mentioned only Adapter mode condition



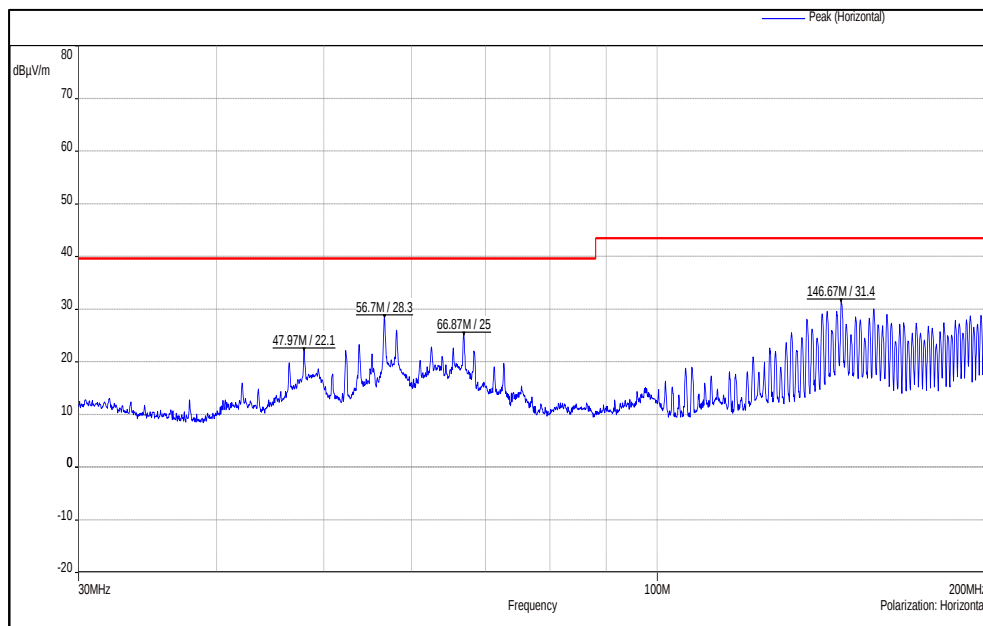
Channel Frequency 30MHz – 200MHz

Polarization Vertical

Prüfbericht - Nr.:
Test Report No.:

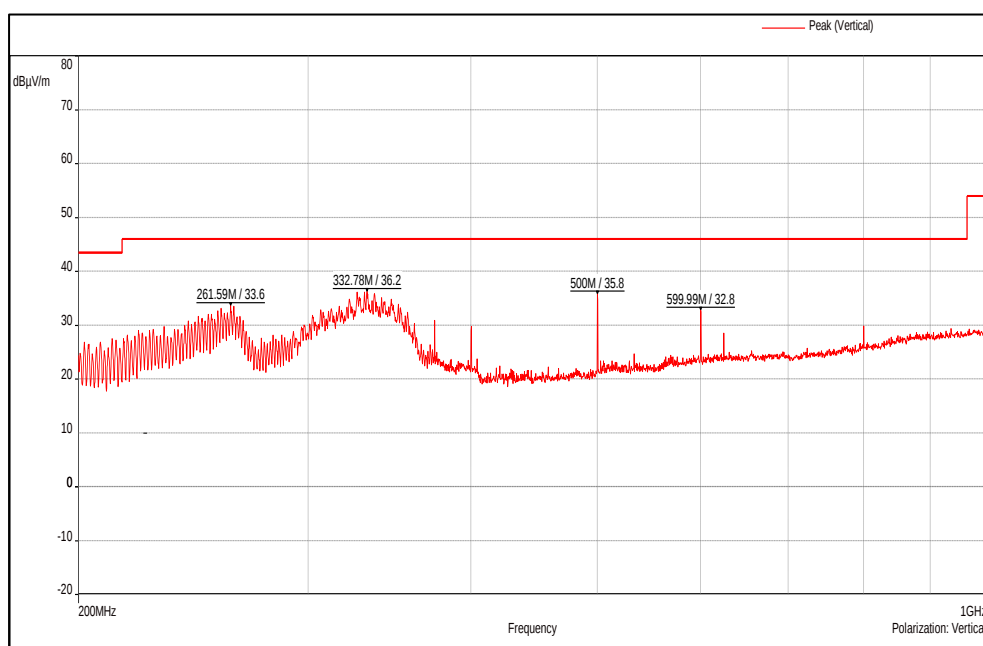
ULR-TC568822300000060F

Seite 24 von 36
Page 24 of 36



Channel Frequency 30MHz – 200MHz

Polarization Horizontal



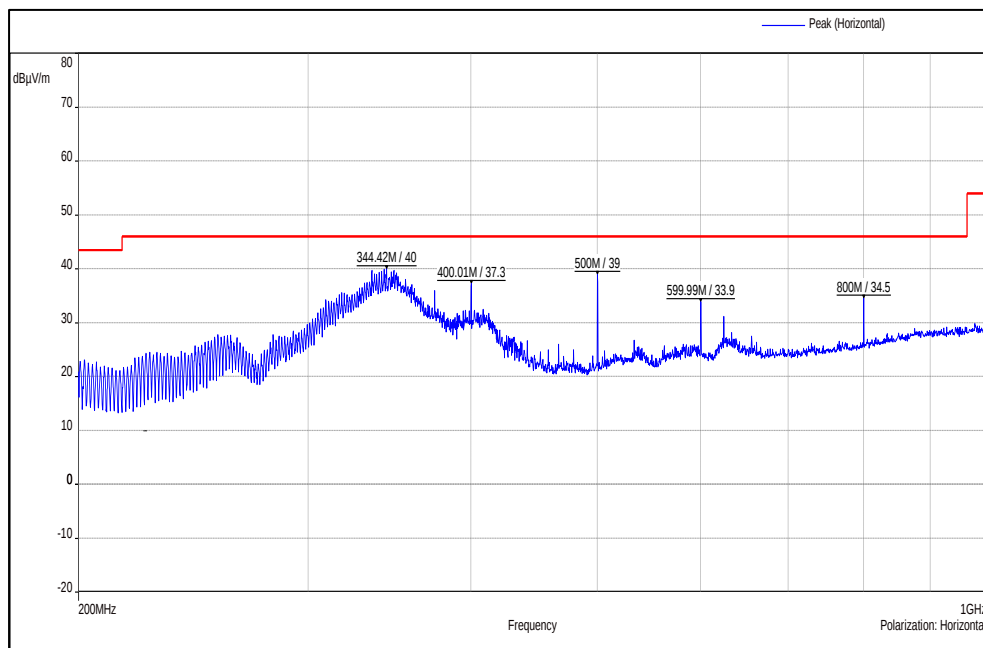
Channel Frequency 200MHz – 1GHz

Polarization Vertical

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 25 von 36
Page 25 of 36



Channel Frequency 200MHz – 1GHz

Polarization Horizontal

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 26 von 36
Page 26 of 36

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

Modulation: 802.11b

Data Rate: 1Mbps

Data Rate	Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	2412	2412(Pk)	Vertical	97.73	-	-
		2412(Av)		95.17	-	-
		2390(Pk)		48.04	74*	-25.96
		2390(Av)		31.41	54*	-22.59
		4824(Pk)		45.50	74	-28.50
		4824(Av)		39.18	54	-14.82
		7236(Pk)		46.00	74	-28.00
		7236(Av)		34.66	54	-19.34
		2412(Pk)	Horizontal	97.29	-	-
		2412(Av)		94.71	-	-
		2390(Pk)		46.77	74*	-27.23
		2390(Av)		30.34	54*	-23.66
		4824(Pk)		40.82	74	-33.18
		4824(Av)		29.11	54	-24.89
		7236(Pk)		47.74	74	-26.26
		7236(Av)		34.78	54	-19.22
	2437	2437(Pk)	Vertical	99.39	-	-
		2437(Av)		96.87	-	-
		4874(Pk)		48.51	74	-25.49
		4874(Av)		44.39	54	-9.61
		7311(Pk)		47.05	74	-26.95
		7311(Av)		34.56	54	-19.44
		2437(Pk)	Horizontal	98.78	-	-
		2437(Av)		96.24	-	-
		4874(Pk)		47.03	74	-26.97
		4874(Av)		41.54	54	-12.46
		7311(Pk)		46.89	74	-27.11
		7311(Av)		34.55	54	-19.45
	2462	2462(Pk)	Vertical	99.93	-	-
		2462(Av)		97.58	-	-
		2483.5(Pk)		52.15	74*	-21.85
		2483.5(Av)		32.91	54*	-21.09
		4924(Pk)		45.46	74	-28.54
		4924(Av)		39.75	54	-14.25
		7386(Pk)		47.04	74	-26.96
		7386(Av)		34.79	54	-19.21
		2462(Pk)	Horizontal	98.59	-	-
		2462(Av)		95.91	-	-
		2483.5(Pk)		51.46	74*	-22.54
		2483.5(Av)		32.86	54*	-21.14
		4924(Pk)		43.48	74	-30.52
		4924(Av)		36.26	54	-17.74
		7386(Pk)		47.26	74	-26.74
		7386(Av)		34.48	54	-19.52

*: Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 27 von 36
Page 27 of 36

Modulation: 802.11g
Data Rate: 6Mbps

Data Rate	Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
6	2412	2412(Pk)	Vertical	96.91	-	-
		2412(Av)		87.86	-	-
		2390(Pk)		57.33	74*	-16.67
		2390(Av)		33.51	54*	-20.49
		4824(Pk)		45.03	74	-28.97
		4824(Av)		38.70	54	-15.30
		7236(Pk)		47.31	74	-26.69
		7236(Av)		34.60	54	-19.40
		2412(Pk)	Horizontal	94.29	-	-
		2412(Av)		85.37	-	-
		2390(Pk)		55.22	74*	-18.78
		2390(Av)		32.36	54*	-21.64
		4824(Pk)		42.12	74	-31.88
		4824(Av)		34.12	54	-19.88
		7236(Pk)		46.94	74	-27.06
		7236(Av)		34.84	54	-19.16
	2437	2437(Pk)	Vertical	103.57	-	-
		2437(Av)		94.67	-	-
		4874(Pk)		47.04	74	-26.96
		4874(Av))		42.14	54	-11.86
		7311(Pk)		47.76	74	-26.24
		7311(Av))		34.67	54	-19.33
		2437(Pk)	Horizontal	99.99	-	-
		2437(Av)		91.22	-	-
		4874(Pk)		41.12	74	-32.88
		4874(Av))		29.64	54	-24.36
		7311(Pk)		46.79	74	-27.21
		7311(Av))		34.63	54	-19.37
	2462	2462(Pk)	Vertical	101.69	-	-
		2462(Av)		92.89	-	-
		2483.5(Pk)		62.72	74*	-11.28
		2483.5(Av)		43.13	54*	-10.87
		4924(Pk)		41.89	74	-32.11
		4924(Av)		30.02	54	-23.98
		7386(Pk)		46.71	74	-27.29
		7386(Av)		34.81	54	-19.19
		2462(Pk)	Horizontal	100.64	-	-
		2462(Av)		91.75	-	-
		2483.5(Pk)		63.07	74*	-10.93
		2483.5(Av)		42.84	54*	-11.16
		4924(Pk)		41.80	74	-32.20
		4924(Av)		30.33	54	-23.67
		7386(Pk)		47.18	74	-26.82
		7386(Av)		34.46	54	-19.54

*→ Indicate restricted band of operation §15.205
Pk: Peak Detector; Av: Average Detector

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 28 von 36
Page 28 of 36

Modulation: 802.11n_HT20
Data Rate: MCS0

Data Rate	Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
MCS0	2412	2412(Pk)	Vertical	95.46	-	-
		2412(Av)		86.47	-	-
		2390(Pk)		56.52	74*	-17.48
		2390(Av)		32.66	54*	-21.34
		4824(Pk)		45.19	74	-28.81
		4824(Av)		38.02	54	-15.98
		7236(Pk)		46.90	74	-27.10
		7236(Av)		34.67	54	-19.33
		2412(Pk)	Horizontal	96.02	-	-
		2412(Av)		86.09	-	-
		2390(Pk)		58.23	74*	-15.77
		2390(Av)		32.47	54*	-21.53
		4824(Pk)		41.58	74	-32.42
		4824(Av)		29.07	54	-24.93
		7236(Pk)		46.90	74	-27.10
		7236(Av)		34.77	54	-19.23
	2437	2437(Pk)	Vertical	100.35	-	-
		2437(Av)		90.79	-	-
		4874(Pk)		41.17	74	-32.83
		4874(Av))		29.29	54	-24.71
		7311(Pk)		46.13	74	-27.87
		7311(Av))		34.58	54	-19.42
		2437(Pk)	Horizontal	100.06	-	-
		2437(Av)		90.10	-	-
		4874(Pk)		41.56	74	-32.44
		4874(Av))		29.28	54	-24.72
		7311(Pk)		46.45	74	-27.55
		7311(Av))		34.55	54	-19.45
	2462	2462(Pk)	Vertical	100.01	-	-
		2462(Av)		90.81	-	-
		2483.5(Pk)		64.37	74*	-9.63
		2483.5(Av)		38.26	54*	-15.74
		4924(Pk)		41.09	74	-32.91
		4924(Av)		28.96	54	-25.04
		7386(Pk)		46.63	74	-27.37
		7386(Av)		35.21	54	-18.79
		2462(Pk)	Horizontal	99.72	-	-
		2462(Av)		89.85	-	-
		2483.5(PK)		64.63	74*	-9.37
		2483.5(Av)		37.23	54*	-16.77
		4924(Pk)		41.04	74	-32.96
		4924(Av)		29.11	54	-24.89
		7386(Pk)		45.88	74	-28.12
		7386(Av)		34.40	54	-19.60

*→ Indicate restricted band of operation §15.205
Pk: Peak Detector; Av: Average Detector

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 29 von 36
Page 29 of 36

Mode: 802.11n-40MHz

Data rate: MCS0

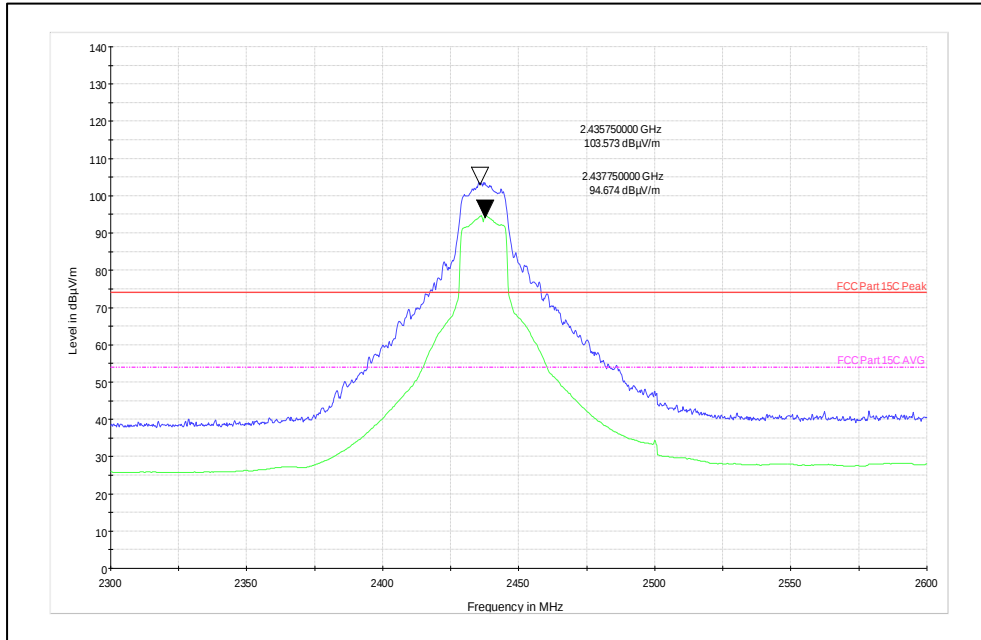
Data Rate	Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	2422	2422(Pk)	Vertical	90.78	-	-
		2422(Av)		79.76	-	-
		2390(Pk)		44.75	74*	-29.25
		2390(Av)		28.96	54*	-25.04
		4824(Pk)		42.66	74	-31.34
		4824(Av)		29.07	54	-24.93
		7236(Pk)		46.46	74	-27.54
		7236(Av)		34.52	54	-19.48
		2412(Pk)	Horizontal	89.81	-	-
		2412(Av)		78.60	-	-
		2390(Pk)		44.74	74*	-29.26
		2390(Av)		29.09	54*	-24.91
		4824(Pk)		47.34	74	-26.66
		4824(Av)		42.98	54	-11.02
		7236(Pk)		46.49	74	-27.51
		7236(Av)		34.52	54	-19.48
	2437	2437(Pk)	Vertical	94.95	-	-
		2437(Av)		83.73	-	-
		4874(Pk)		44.49	74	-29.51
		4874(Av)		37.41	54	-16.59
		7311(Pk)		48.16	74	-25.84
		7311(Av)		34.64	54	-19.36
		2437(Pk)	Horizontal	92.62	-	-
		2437(Av)		81.78	-	-
		4874(Pk)		47.60	74	-26.40
		4874(Av)		43.43	54	-10.57
		7311(Pk)		47.19	74	-26.81
		7311(Av)		34.63	54	-19.37
	2452	2462(Pk)	Vertical	93.55	-	-
		2462(Av)		82.71	-	-
		2483.5(Pk)		57.22	74*	-16.78
		2483.5(Av)		34.73	54*	-19.27
		4904(Pk)		46.41	74	-27.59
		4904(Av)		40.9	54	-13.1
		7356(Pk)		46.60	74	-27.40
		7356(Av)		34.29	54	-19.71
		2462(Pk)	Horizontal	91.97	-	-
		2462(Av)		81.32	-	-
		2483.5(Pk)		58.20	74*	-15.80
		2483.5(Av)		35.19	54*	-18.81
		4904(Pk)		47.26	74	-26.74
		4904(Av)		42.69	54	-11.31
		7356(Pk)		46.29	74	-27.71
		7356(Av)		34.28	54	-19.72

*→ Indicate restricted band of operation §15.205
Pk: Peak Detector; Av: Average Detector

Test Plots:

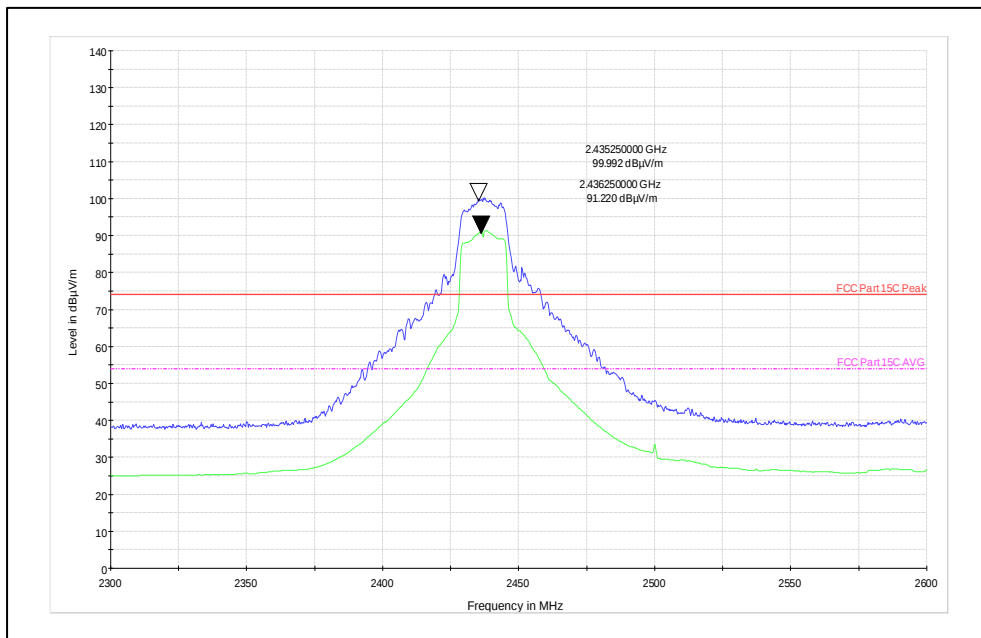
Mode 802.11g

Data rate: 6Mbps



Channel Frequency: 2437MHz

Polarization: Vertical



Channel Frequency: 2462MHz

Polarization: Horizontal

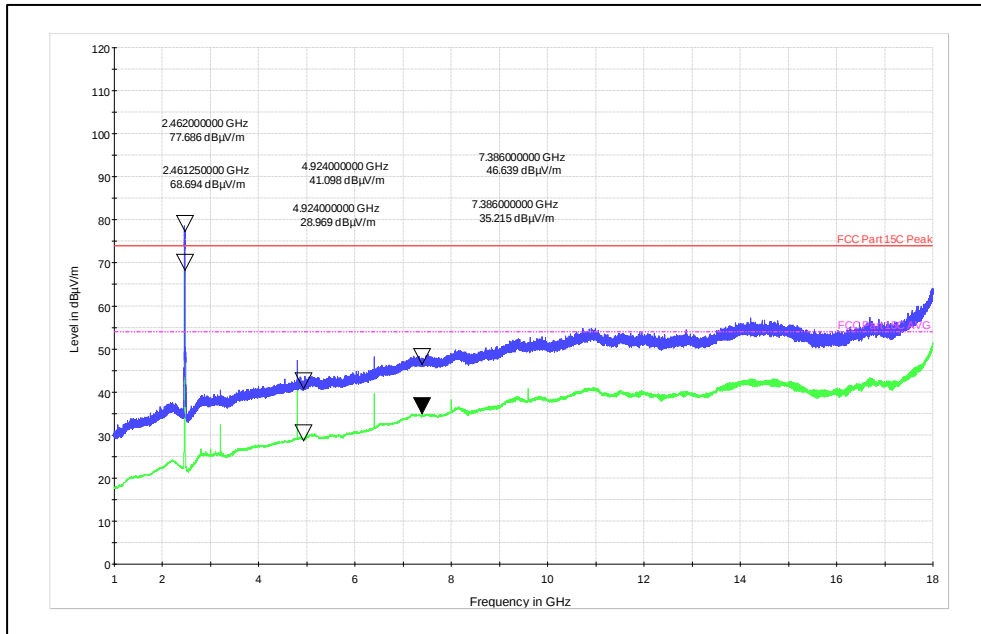
Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 31 von 36
Page 31 of 36

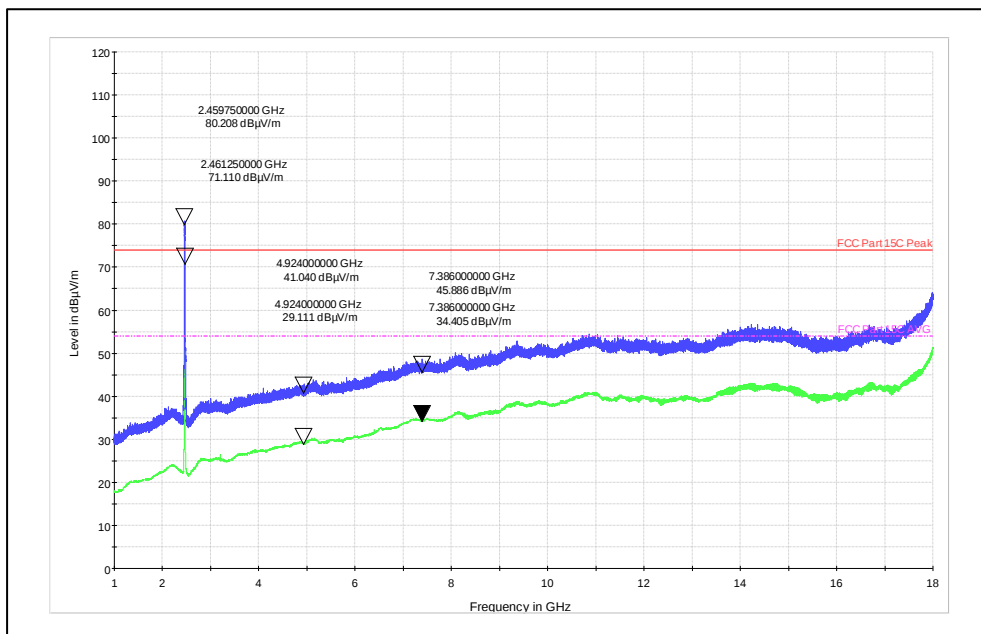
Mode 802.11n-20MHz

Data rate: MCS0



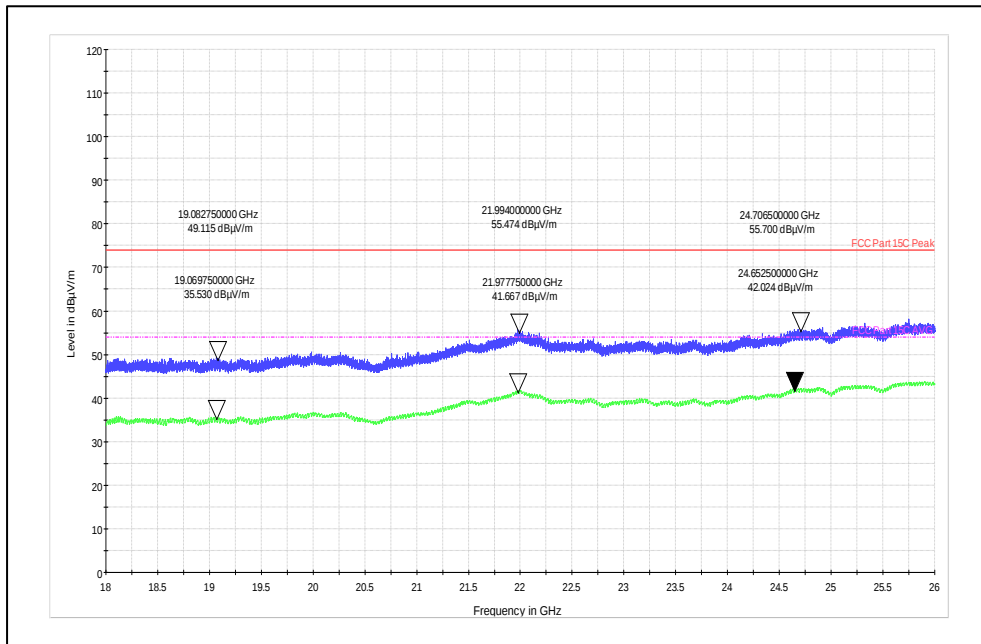
Frequency range: 1GHz to 18GHz

Polarization: Vertical



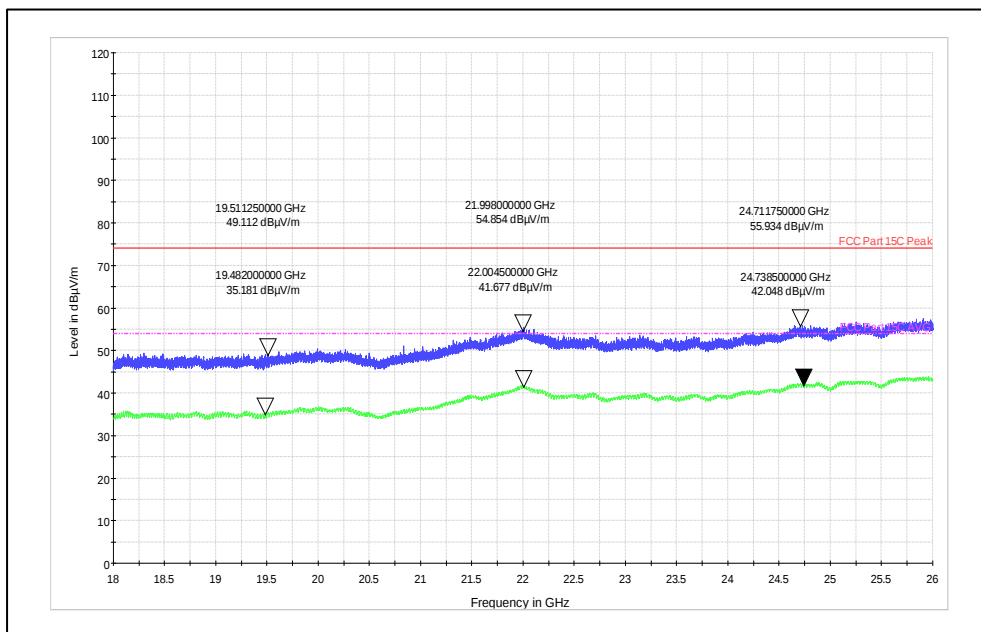
Frequency range: 1GHz to 18GHz

Polarization: Horizontal



Frequency range: 18GHz to 26GHz

Polarization: Vertical



Frequency range: 18GHz to 26GHz

Polarization: Horizontal

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 33 von 36
Page 33 of 36

7.3 Conducted Spurious Emission Test on AC Power Line

Result

Pass

Test Specification : FCC Part 15 Section 15.207 / RSS Gen Issue 5 Section 8.8
Test Method : ANSI C 63.10-2013
Testing Location : Screened room
Measurement Bandwidth : 9kHz
Frequency Range : 150kHz – 30MHz
Supply Voltage : 110VAC,60Hz
Test Method : Refer TEST METHODOLOGY

Limits of section 15.207

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak (dBµV)	Average (dBµV)
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 Conditions:

Normal Temperature = +24°C Voltage (V norm) = 110VAC 60Hz through Adapter Relative Humidity = 64%

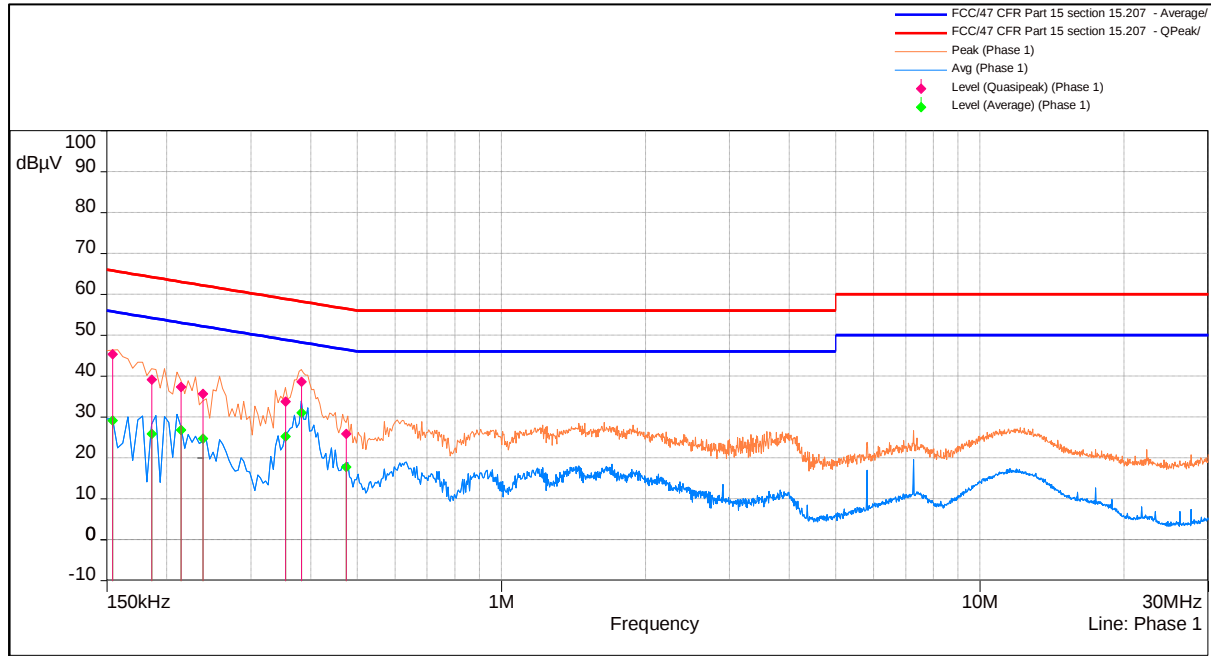
Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 34 von 36
Page 34 of 36

Test result:

Power: 110V 60Hz_LINE



Line Graph

Quasipeak:-

Frequency (MHz)	Correction (dB)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.3829	19.58	38.59	58.24	-19.65	Pass
0.15225	19.57	45.34	65.78	-20.44	Pass
0.35465	19.58	33.83	58.87	-25.04	Pass
0.18795	19.57	39.17	64.21	-25.05	Pass
0.21425	19.56	37.42	63.05	-25.63	Pass
0.2373	19.56	35.65	62.17	-26.52	Pass
0.47575	19.61	25.9	56.44	-30.55	Pass

Average:-

Frequency (MHz)	Correction (dB)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.3829	19.58	31.01	48.24	-17.22	Pass
0.35465	19.58	25.28	48.87	-23.59	Pass
0.21425	19.56	26.88	53.05	-26.17	Pass
0.15225	19.57	29.16	55.78	-26.63	Pass
0.2373	19.56	24.77	52.17	-27.4	Pass
0.18795	19.57	25.91	54.21	-28.31	Pass
0.47575	19.61	17.82	46.44	-28.62	Pass

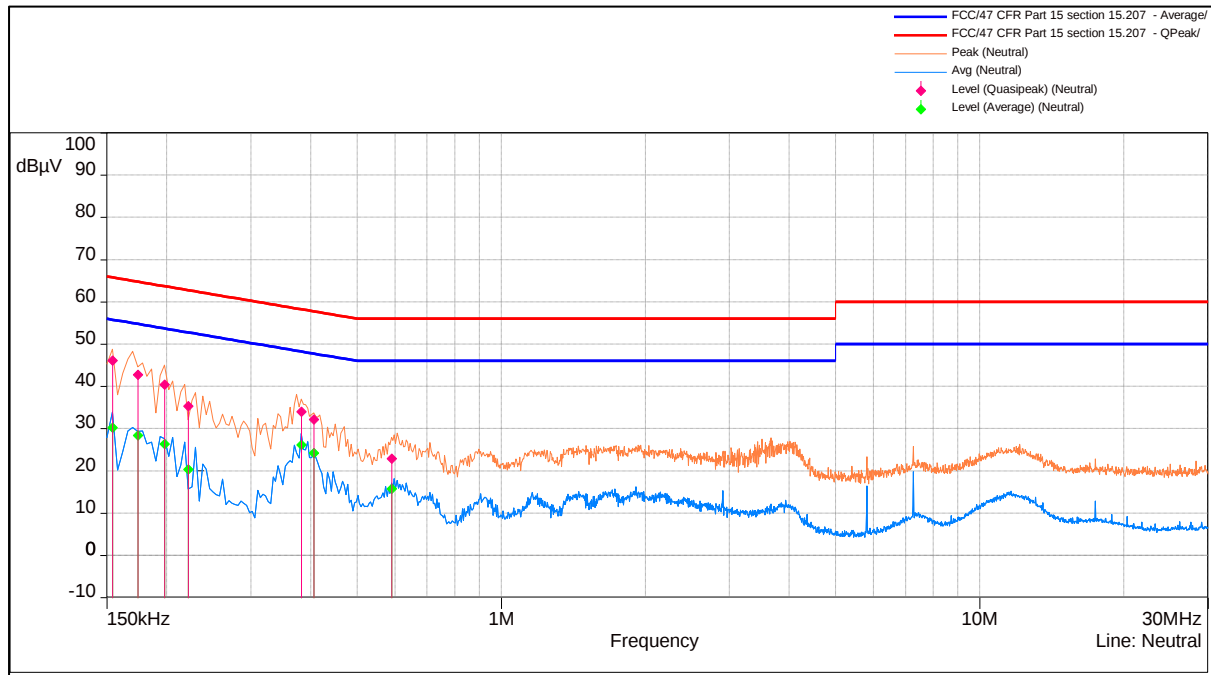
Line Table

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568822300000060F

Seite 35 von 36
Page 35 of 36

Power: 110VAC/60Hz_NEUTRAL



Neutral Graph

Quasipeak:-

Frequency (MHz)	Correction (dB)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.1536	19.55	46.14	65.78	-19.65	Pass
0.17595	19.55	42.82	64.77	-21.95	Pass
0.1964	19.55	40.44	63.69	-23.25	Pass
0.38345	19.59	33.96	58.24	-24.27	Pass
0.4072	19.6	32.19	57.73	-25.54	Pass
0.22315	19.55	35.3	62.74	-27.44	Pass
0.58935	19.64	22.92	56	-33.08	Pass

Average:-

Frequency (MHz)	Correction (dB)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.38345	19.59	26.22	48.24	-22.02	Pass
0.4072	19.6	24.22	47.73	-23.51	Pass
0.1536	19.55	30.28	55.78	-25.51	Pass
0.17595	19.55	28.45	54.77	-26.31	Pass
0.1964	19.55	26.35	53.69	-27.35	Pass
0.58935	19.64	15.82	46	-30.18	Pass
0.22315	19.55	20.32	52.74	-32.42	Pass

Neutral Table

8 LIST OF TABLES

Table 1: List of test and measurement instruments	6
Table 2: Instrument application Software versions	7
Table 3: Ratings and System Details as declared by Client*	8
Table 4: Measurement Uncertainty	9
Table 5: List of Wi-Fi center Frequencies	10
Table 6: Transmitter limits for Radiated emission	22

9 LIST OF FIGURES

Figure 1: Frequency Range 9 kHz- 30 MHz	14
Figure 2: Frequency Range 30 MHz – 200 MHz	14
Figure 3: Frequency Range 200 MHz - 1GHz	15
Figure 4: Frequency Range above 1 GHz	15

10 Power level used for testing

Wi-Fi 2.4GHz

802.11b _1Mbps	
Channel Frequency (MHz)	Power level
2412	17
2437	17
2462	17
802.11g _6Mbps	
Channel Frequency (MHz)	Power level
2412	17
2437	17
2462	17
802.11n-20MHz_MCS0	
Channel Frequency (MHz)	Power level
2412	17
2437	17
2462	17

802.11n-40MHz_MCS0	
Channel Frequency (MHz)	Power level
2422	17
2437	17
2452	17

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