

Produkte
Products

Prüfbericht - Nr.:	ULR-TC568819300000050F 001	Seite 1 von 42
<i>Test Report No.:</i>		<i>Page 1 of 42</i>

Auftraggeber:	Redpine Signals Inc.
<i>Client:</i>	2107N.First Street,
	Suite 680
	San Jose, CA 95131-2019
	U.S.A

Gegenstand der Prüfung:	802.11 a/b/g/n Wi-Fi Module
<i>Test item:</i>	

Bezeichnung:	RS9113DB	Serien-Nr.:	Engineering Sample
<i>Identification:</i>		<i>Serial No.</i>	

Wareneingangs-Nr.:	166153524	Eingangsdatum:	05.07.2019
<i>Receipt No.:</i>		<i>Date of receipt:</i>	

Prüfart:	Refer Page 5 of 42 for test facilities
<i>Testing location:</i>	

Prüfgrundlage:	FCC Part 15 Subpart C 15.247 ANSI C63.10-2013
<i>Test specification:</i>	& RSS 247 Issue 2 and RSS Gen Issue 5

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

Prüflaboratorium:	TÜV Rheinland (India) Pvt. Ltd.
<i>Testing Laboratory:</i>	27/B, 2nd corss, Electronic City Phase 1
	Bangalore – 560 100. India
	FCC Test Site Registration no.: 496599
	ISED Test Site Number.: 346E-1

geprüft / tested by:			kontrolliert / reviewed by:		
08.07.2019	Rajesh M Gowda Engineer		09.08.2019	Raghavendra G Katti Assistant Manager	
Datum	Name/Stellung	Unterschrift	Datum	Name/Stellung	Unterschrift
<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>	<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>

Sonstiges / Other Aspects:	FCC ID:XF6-RS9113DB ; Class 2 Permissive Change
	IC: 8407A-RS9113DB ; Class 2 Permissive Change

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.

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.

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42
Page 42 of 42

TEST SUMMARY

Test item	Clause		Result
	FCC	ISED	
Maximum Conducted Output Power	Section 15.247 (b) (3)	RSS 247 Issue 2 Section 5.4 (d)	Pass
Radiated spurious emissions and emissions in Restricted bands of operation	Section 15.247 (d) / (15.209 & 15.205)	RSS-Gen Issue 5, Section 8.9/8.10	Pass
Conducted emission on A.C power lines	Section 15.207	RSS-Gen Issue 5 section 8.8	Pass

Discipline: Electronics Testing
Group: EMC Test Facility

Note: The module is originally certified for FCC with FCC ID:XF6-RS9113DB, and IC: 8407A-RS9113DB with respect to the changes made originally certified module class 2 permissive change has been applied. Changes made to the originally certified module are listed in the below table.

Application Purpose	Antenna	Wi-Fi (2.4 GHz)
Class II Permissive Change	mFelxPIFA	Tested for 802.11 b/g/n for 20MHz bandwidth only

The original module tested for 802.11 a/b/g/n 20MHz & 40MHz bandwidth along with BT/BLE and ZigBee, with the above-specified FCC ID and IC. In the current module is restricted to use of only in 802.11 a/b/g/n for 20MHz bandwidth only for above specified antenna and results related to same are reported in this test report. Remaining protocols like ZigBee, BT and BLE are disabled and are not enabled for the end user, and is as declared by manufacturer.

To address the test results for the above changes, the original test report numbers for FCC: 19660145 001, 19660145 002, 19660145 003 is been updated to ULR-TC568819300000050F 001

To address the test results for the above changes, the original test report numbers for IC: 19660148 001, 19660148 002, 19660148 003 is been updated to ULR-TC568819300000050F 001

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
3.1	Measurement Uncertainty:	6
4	TEST SET-UP AND OPERATION MODE	7
4.1	Principle of Configuration Selection	7
4.2	Test Operation and Test Software	7
4.3	Special Accessories and Auxiliary Equipment	7
4.4	Countermeasures to achieve EMC Compliance	7
4.5	Test modes – data rates and modulations	7
4.6	List of Frequencies and Frequency bands	7
5	RADIATED TEST METHODOLOGY	8
5.1	Radiated Emission Test	8
5.1.1	Test Setup Configuration	8
6	TEST RESULTS-WI-FI.....	11
6.1	Maximum conducted output power	11
6.2	Restricted bands of Emissions & Restricted Bands of Operation	29
7	CONDUCTED EMISSION TEST ON A.C. POWER LINE.....	39
8	LIST OF TABLES	42
9	LIST OF FIGURES.....	42

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42
Page 42 of 42

1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report.

- 1: Test Setup Photo
- 2: EUT External Photo
- 3: EUT Internal Photo
- 4: Maximum Permissible Exposure Information
- 5: USER MANUAL

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

2 TEST SITES

2.1 Testing Facilities

- 1) TÜV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.
- 2) TÜV Rheinland (India) Private Limited
27/B, 2nd Cross,
Electronic City Phase 1, Bangalore- 560100

2.2 List of Test and Measurement Instruments

Table 1: Test and measurements instrument used

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
Signal Analyzer	Rohde & Schwarz	FSV7	101644	29/12/2019	Yearly	Antenna - Port Measurements
USB Peak power sensor	AIMIL Ltd	55006	10231	22-12-2019	Yearly	
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	11/10/2019	Yearly	
EMI Test Receiver	Rohde & Schwarz	ESW 44	101773	19/09/2019	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 mess-elektronik	VUSLP-9111B	9111B-111	17-01-2020	Yearly	
Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1944	16/01/2020	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	AC Power line conducted emission
EMI Receiver	Rohde & Schwarz	ESR7	101133	16-01-2020	Yearly	
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 RS9113 module integrates a multi-threaded MAC processor with integrated analog peripherals and support for digital peripherals, baseband digital signal processor, analog front-end, crystal oscillator, calibration OTP memory, Dual band RF transceiver, Dual-band high-power amplifiers, baluns, diplexers, diversity switch and Quad-SPI Flash thus providing a fully-integrated solution for embedded wireless applications. The RS9113 based chips and modules leverage and improve upon Redpine's proven low power innovations from Lite-FTM products (RS9110) and provide WLAN 802.11n convergence solution for integration into mobile and M2M communication devices. It can connect to a host processor through SDIO, USB, SPI or UART interfaces.

3.2 Ratings and System Details

Table 2: Ratings and System Details as declared by manufacturer

Operating frequency range	2400 MHz to 2483.5 MHz
Radio Protocol	Wi-Fi
Channel Spacing	5 MHz
Modulation	802.11b: DSSS 802.11g: OFDM 802.11n: OFDM
Number of antennas	1
Antenna type	mFelixPIFA
Antenna gain	1.9 dBi
Supply Voltage to Product	3 to 3.6V DC from the host device
Dimensions	14 x 15 x 2.1 mm
Environmental conditions	-40 to 85 deg c

3.1 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
All emissions, radiated	±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 on Low, Mid and High channels to obtain maximum emissions.

4.2 Test Operation and Test Software

Test Software – PER test software was used to enable the transmission with 100% duty cycle changing channels and data rates on the EUT for the test in the report.

Software version-1.7.2

Hardware version - 6.0

4.3 Special Accessories and Auxiliary Equipment

- Test Laptop was used to configure the device in transmission mode.

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 Test modes – data rates and modulations

For Radiated spurious emissions only the worst case results and are reported in this report.

4.6 List of Frequencies and Frequency bands

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 4: List of Wi-Fi center Frequencies

Note: TUV Sample Identification number : A000952265-001(Radiated & Conducted)

5 RADIATED 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.

5.1.1 Test Setup Configuration

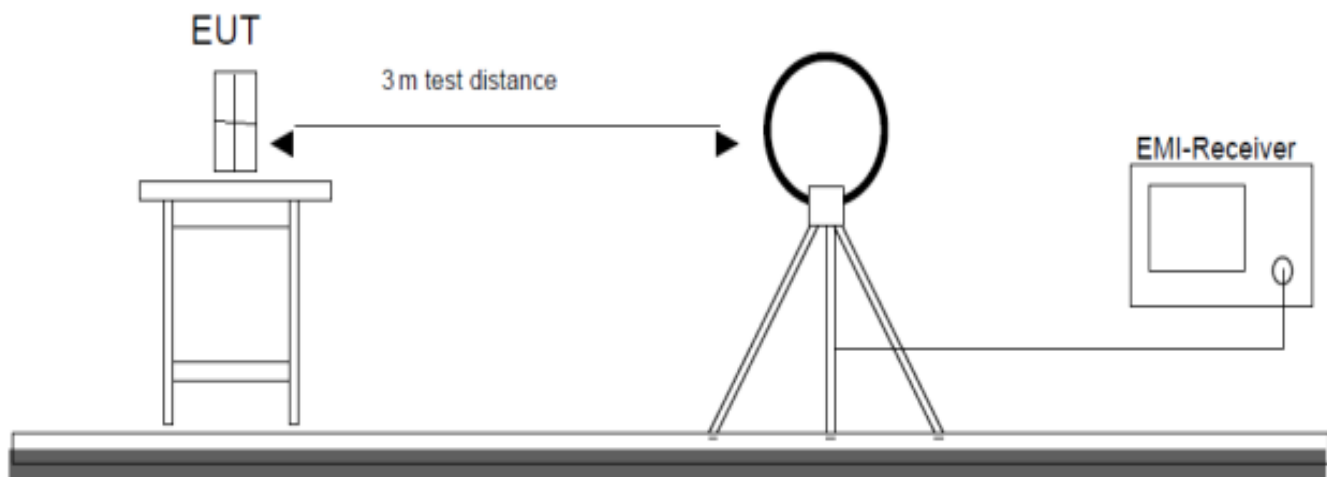


Figure 1: Frequency Range 9 kHz- 30 MHz

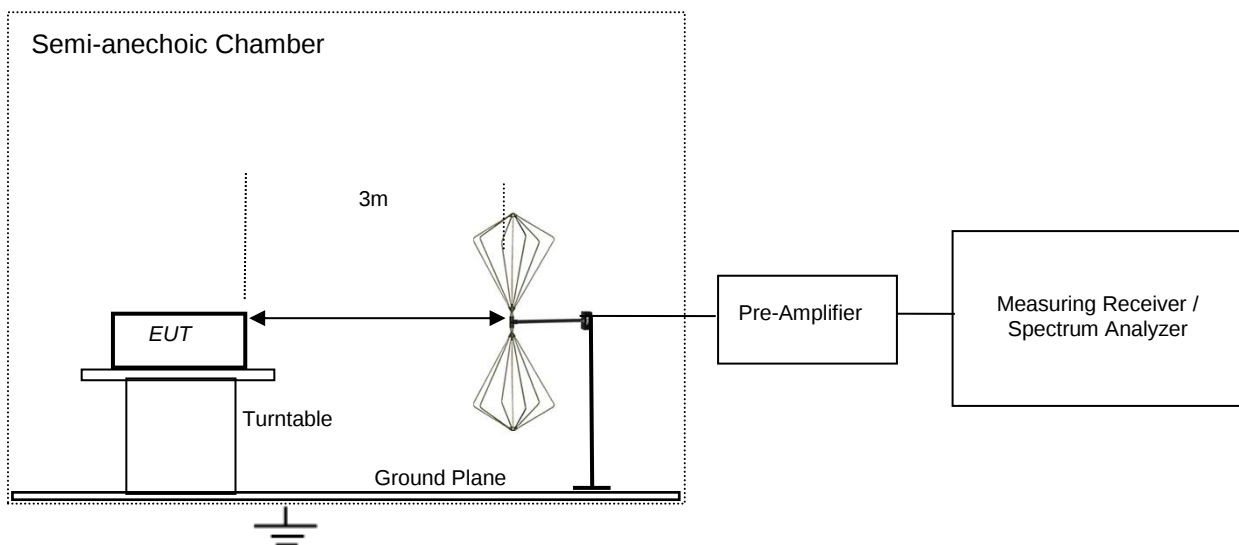


Figure 2: Frequency Range 30 MHz – 200 MHz

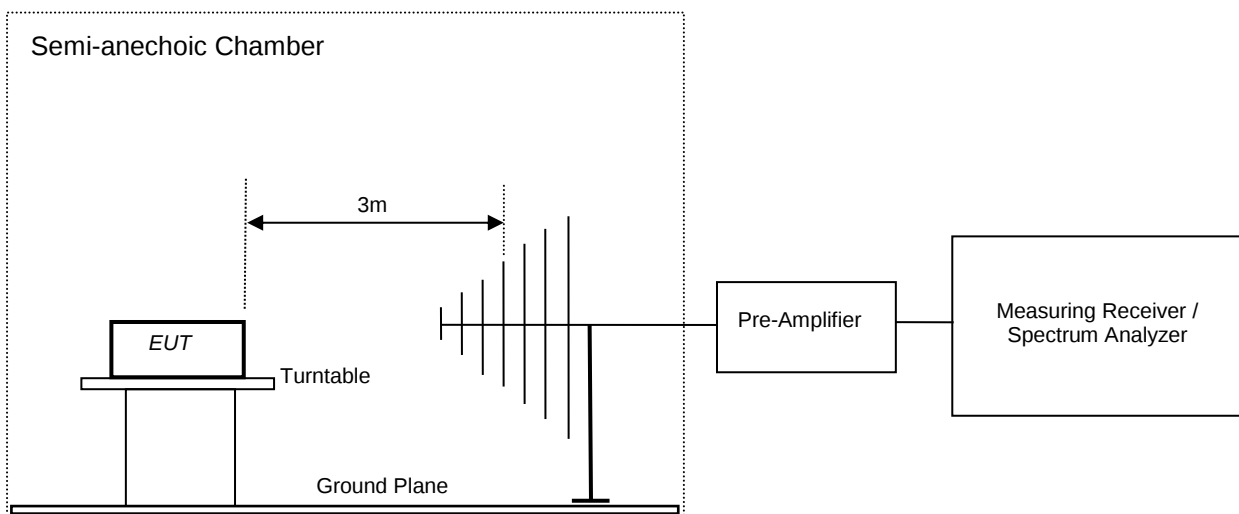


Figure 3: Frequency Range 200 MHz - 1GHz

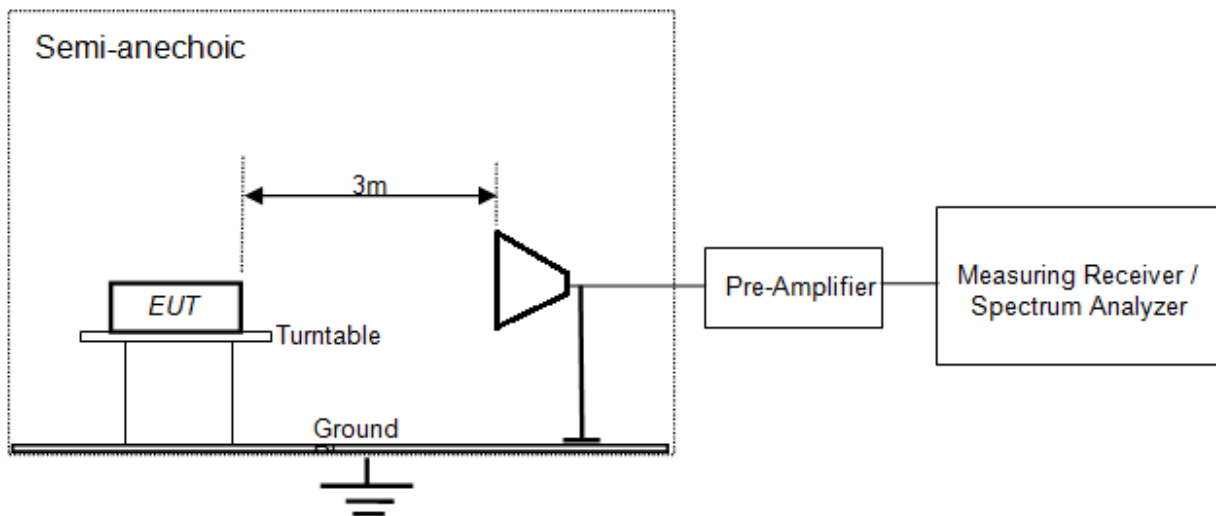


Figure 4: Frequency Range above 1 GHz

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

6 Test Results-Wi-Fi

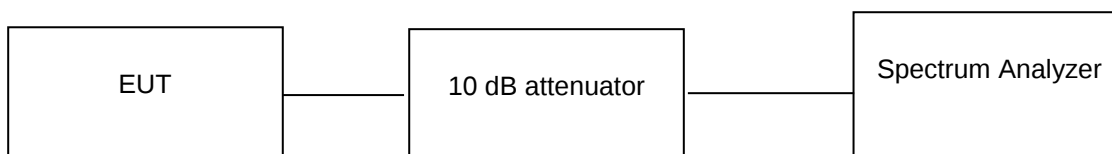
6.1 Maximum conducted output power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (b)(3)
Measurement	1 MHz
Bandwidth	
Detector	Peak
Requirement	$\leq 1 \text{ W (30 dBm)}$

Test Method:



Environmental and Test conditions:

Normal Temperature = 25+ °C

Voltage (V norm) = 230 V AC

RH = 63.2 %

Note:

Measurements were made as per section 8.3.1 in KDB 558074 D01 15.247 Measurement Guidance v05r02

Test results:

10 dB attenuator + 0.9 Cable loss = 10.9 dB offset is considered in below result

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

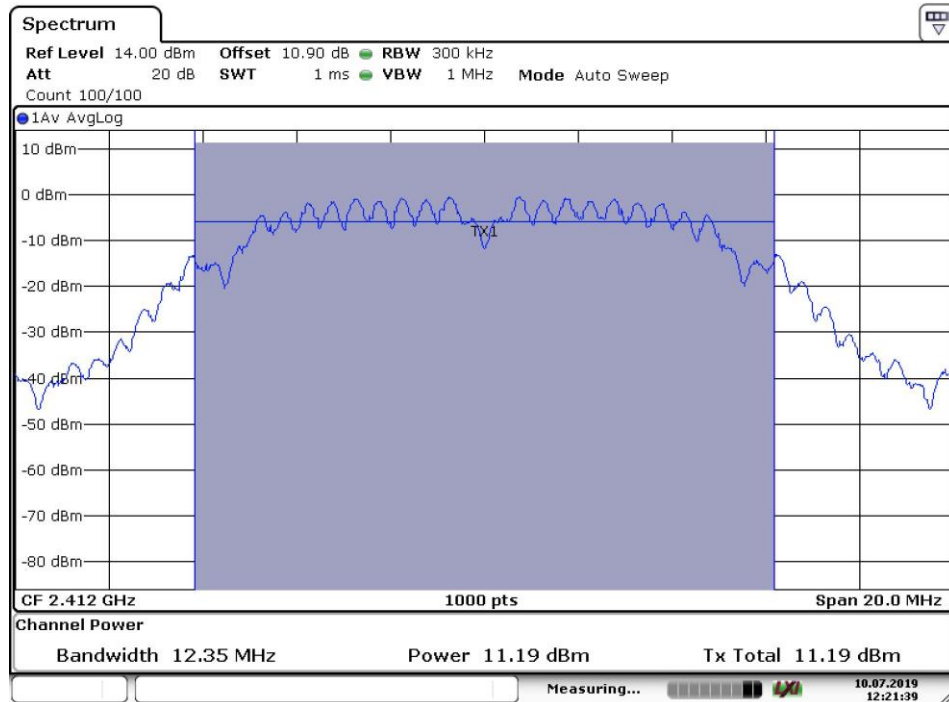
Wi-Fi 2.4GHz

Mode	Data rate (Mbps)	Frequency (MHz)	Power (dBm)	Limit (dBm)
b	1	2412	11.19	30
		2437	15.87	30
		2442	16.13	30
		2462	11.85	30
	11	2412	13.19	30
		2437	16.17	30
		2442	16.37	30
		2462	13.85	30
g	6	2412	7.55	30
		2437	7.93	30
		2442	7.67	30
		2462	8.28	30
	24	2412	7.51	30
		2437	7.95	30
		2442	7.51	30
		2462	8.14	30
	54	2412	7.30	30
		2437	7.61	30
		2442	7.54	30
		2462	7.98	30
n	MCS0	2412	8.23	30
		2437	8.20	30
		2442	8.09	30
		2462	7.44	30
	MCS4	2412	7.64	30
		2437	7.98	30
		2442	7.92	30
		2462	6.95	30
	MCS7	2412	7.61	30
		2437	7.94	30
		2442	7.93	30
		2462	6.93	30

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

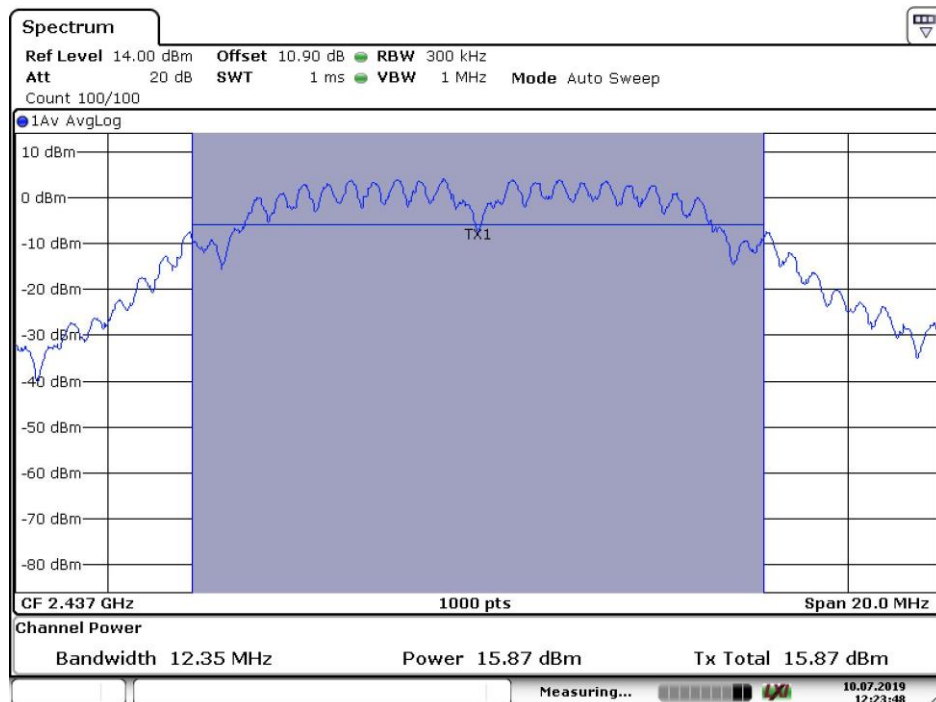
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 12:21:39

Data rate: 1Mbps

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 12:23:48

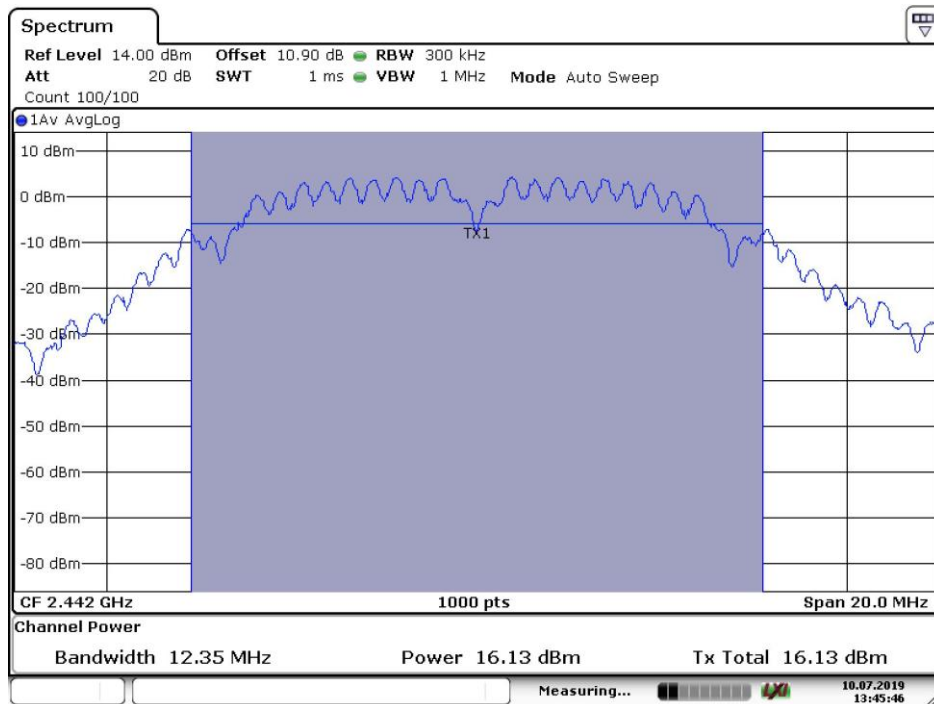
Data rate: 1Mbps

Channel Frequency: 2437 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

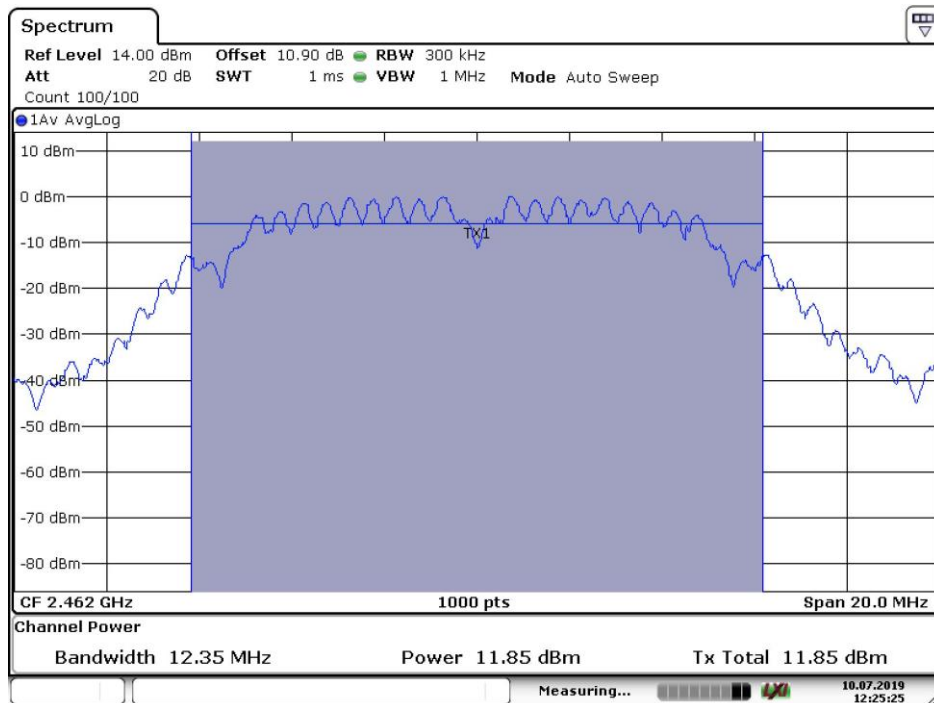
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 13:45:46

Data rate: 1Mbps

Channel Frequency: 2442 MHz



Date: 10.JUL.2019 12:25:25

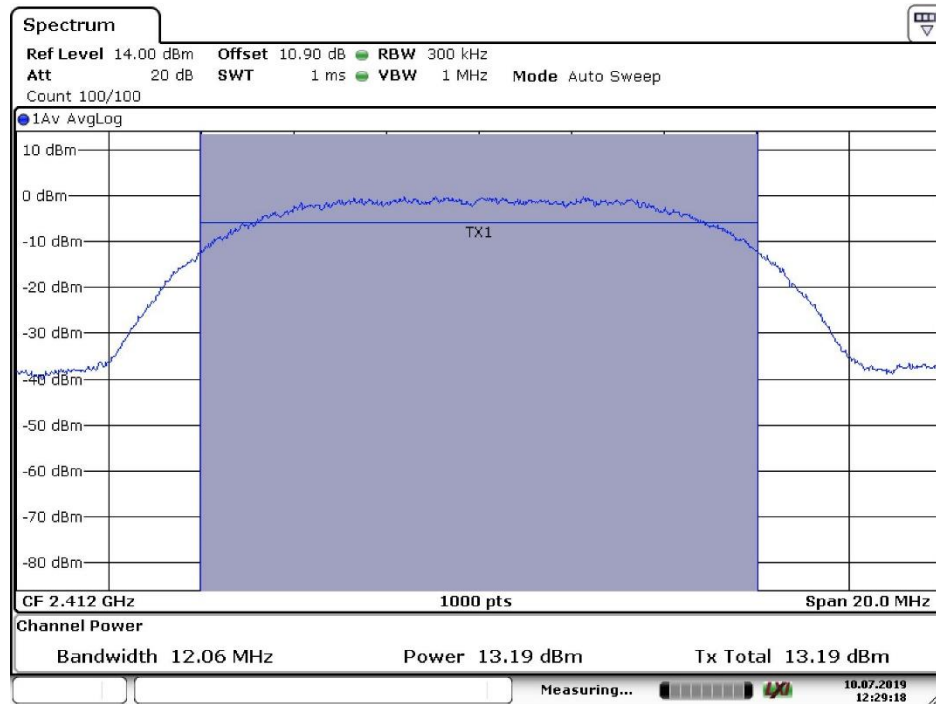
Data rate: 1Mbps

Channel Frequency: 2462 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

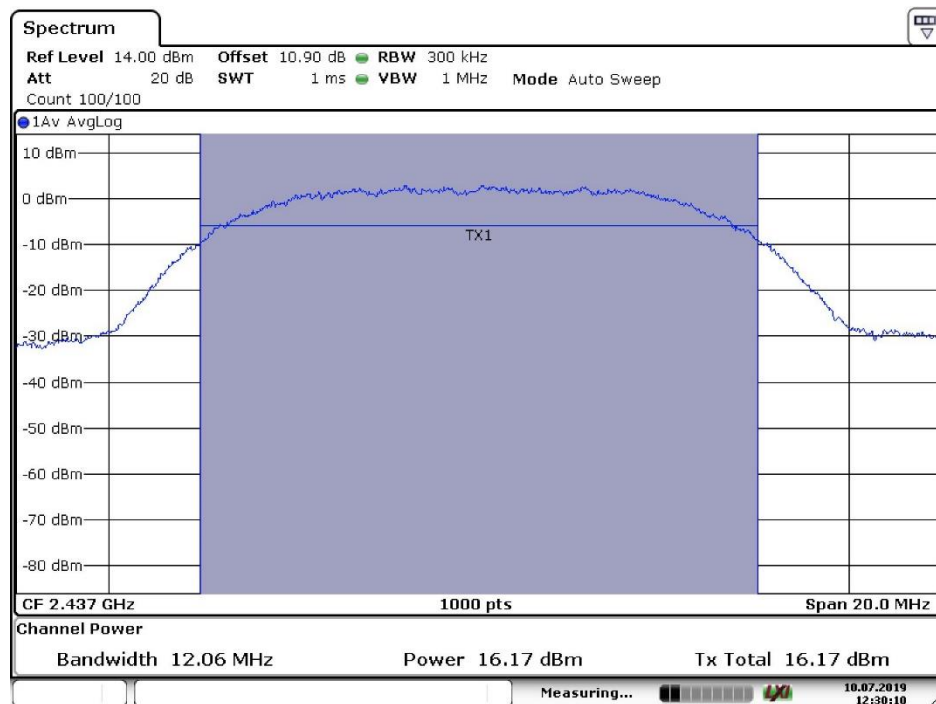
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 12:29:19

Data rate: 11Mbps

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 12:30:10

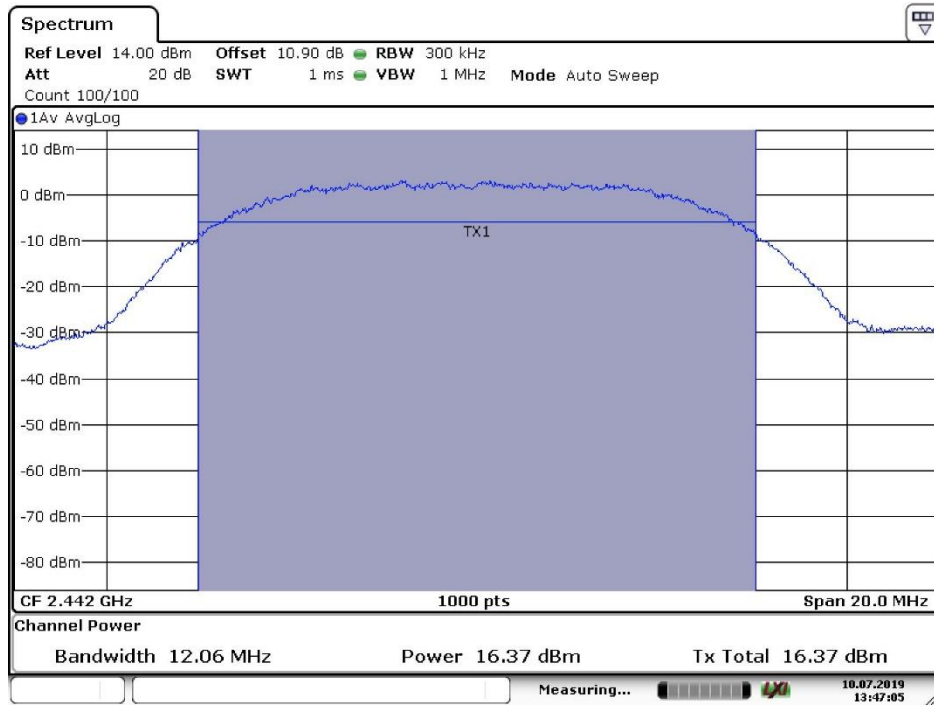
Data rate: 11Mbps

Channel Frequency: 2437 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

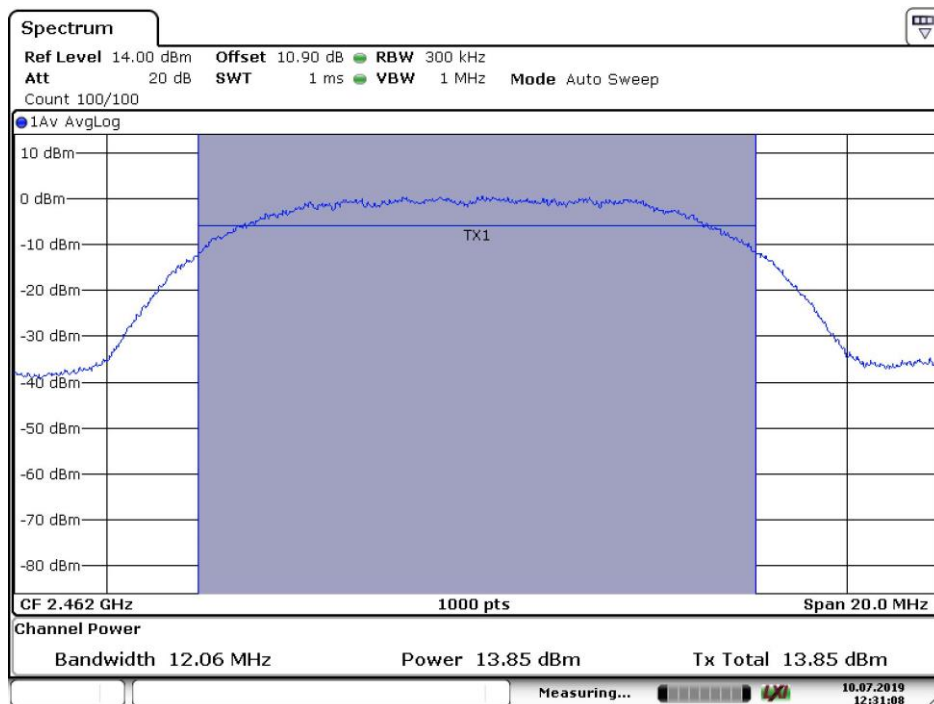
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 13:47:05

Data rate: 11Mbps

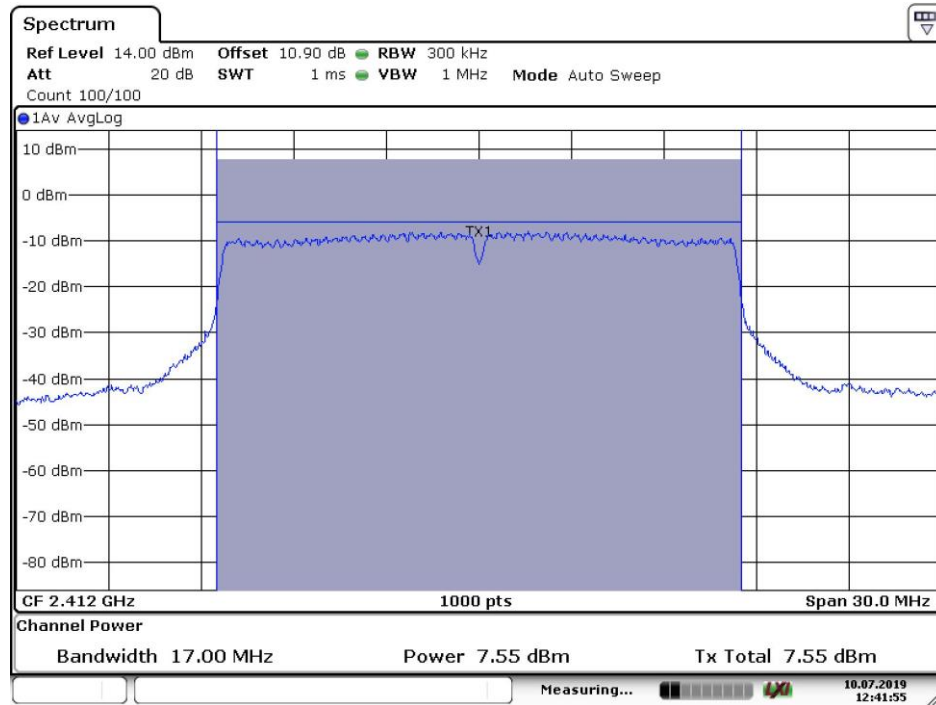
Channel Frequency: 2442 MHz



Date: 10.JUL.2019 12:31:08

Data rate: 11Mbps

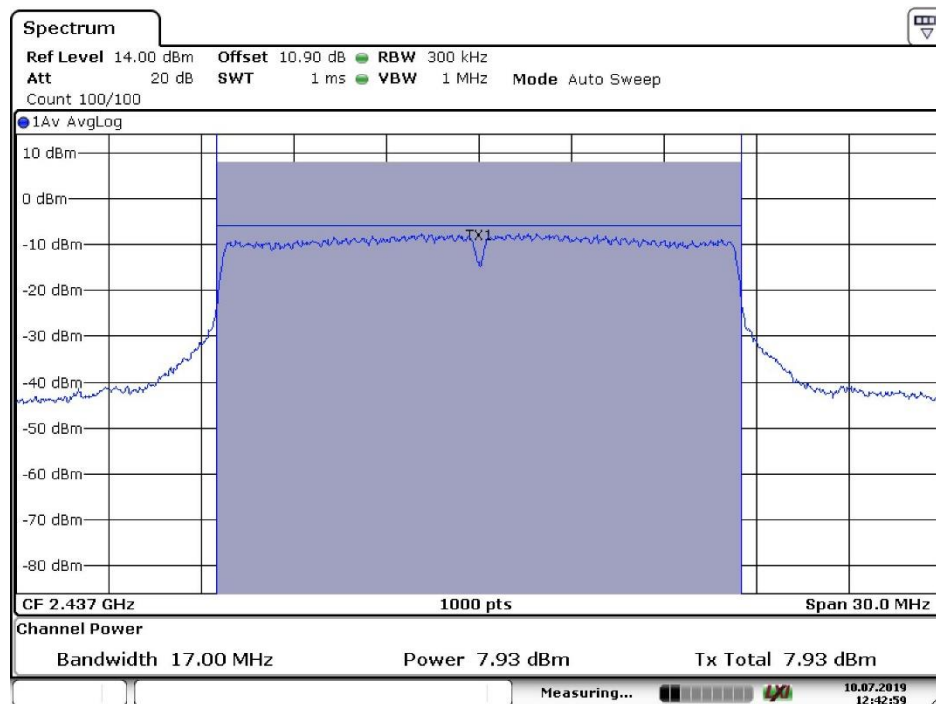
Channel Frequency: 2462 MHz



Date: 10.JUL.2019 12:41:55

Data rate: 6Mbps

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 12:42:59

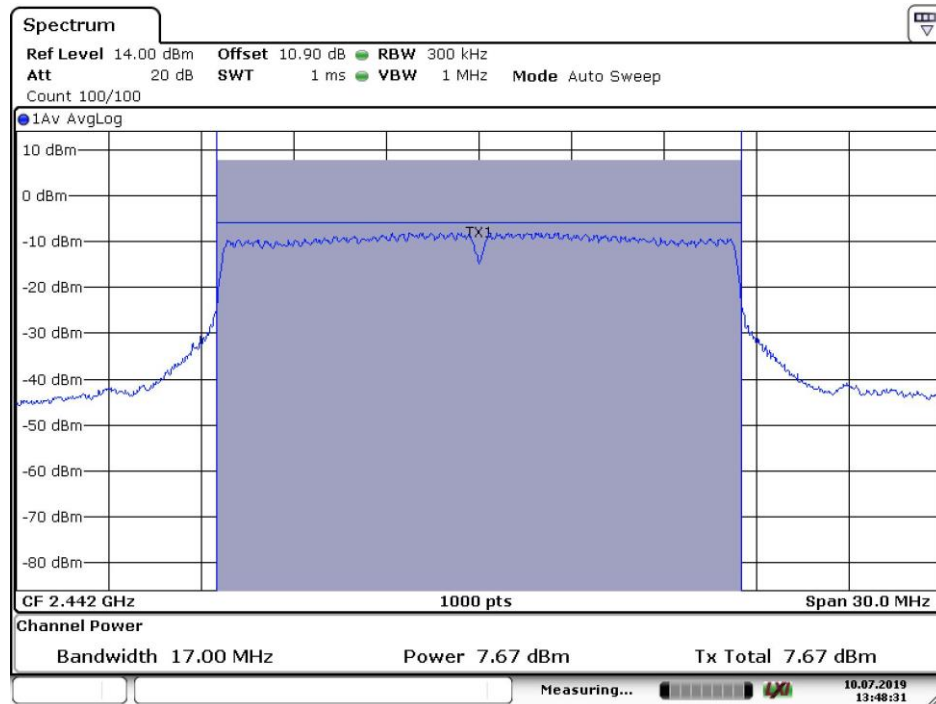
Data rate: 6Mbps

Channel Frequency: 2437 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

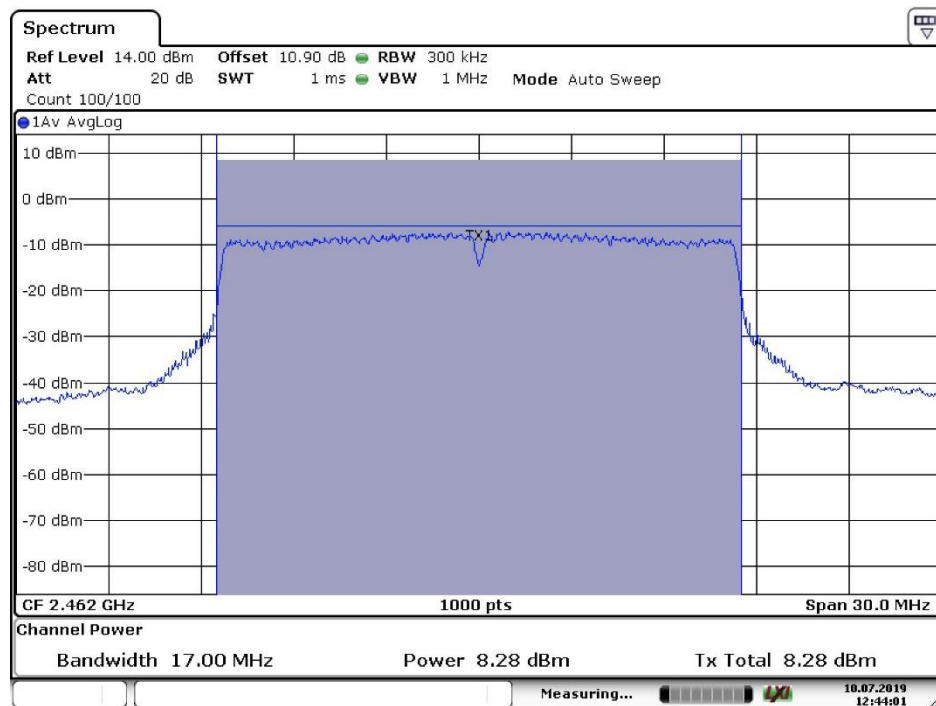
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 13:48:31

Data rate: 6Mbps

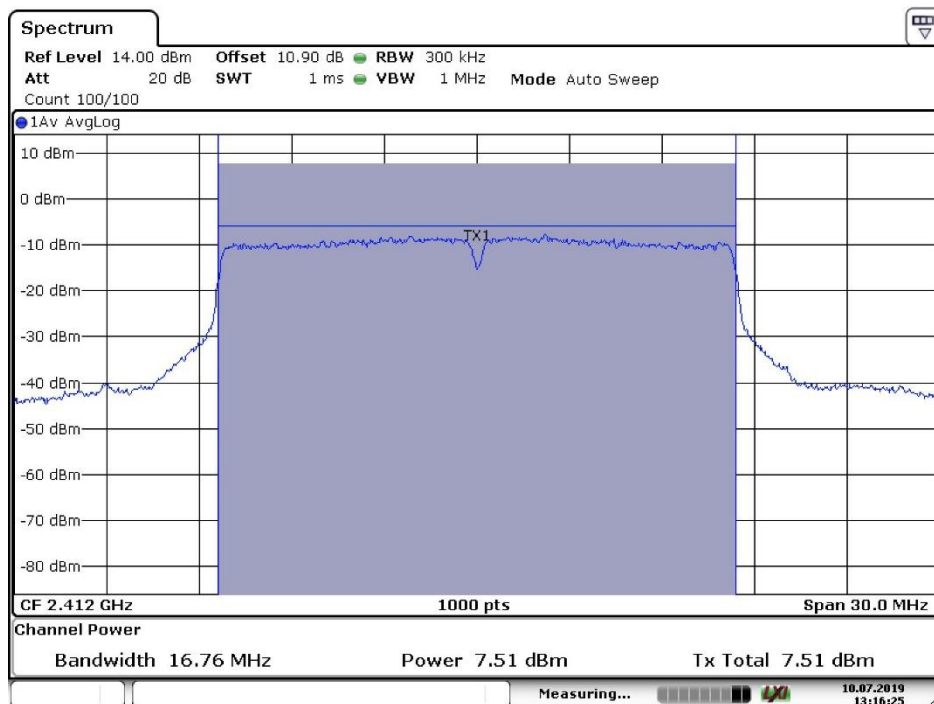
Channel Frequency: 2442 MHz



Date: 10.JUL.2019 12:44:02

Data rate: 6Mbps

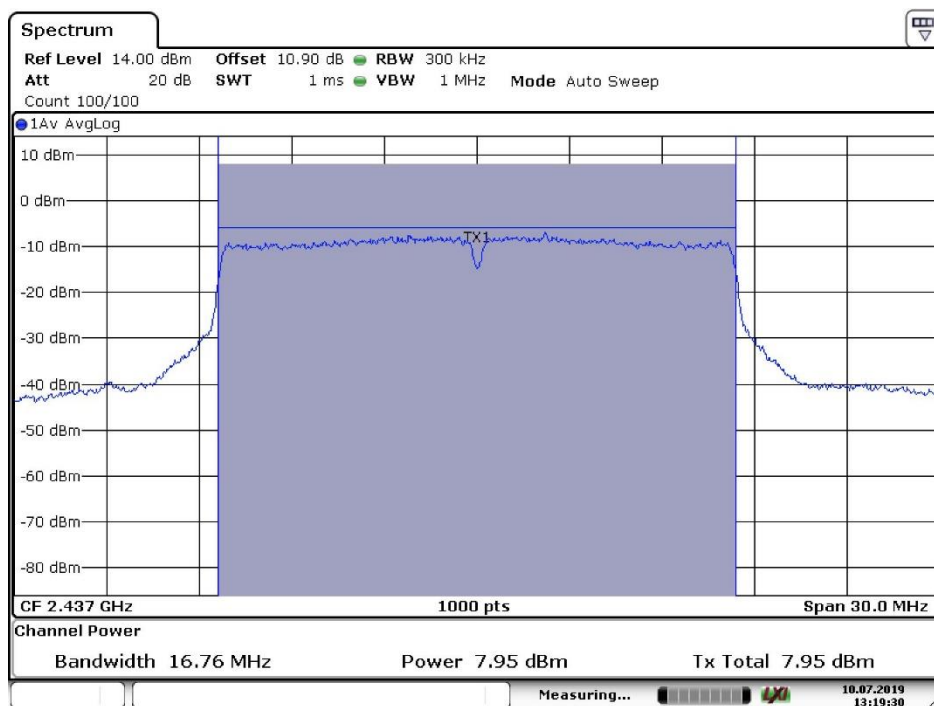
Channel Frequency: 2462 MHz



Date: 10.JUL.2019 13:16:26

Data rate: 24Mbps

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 13:19:30

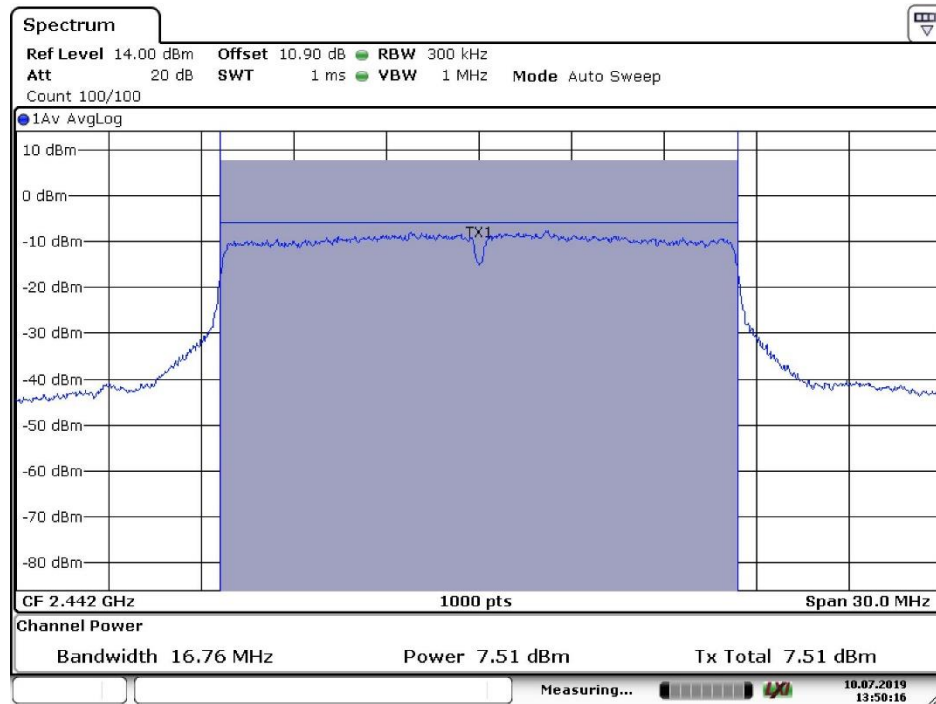
Data rate: 24Mbps

Channel Frequency: 2437 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

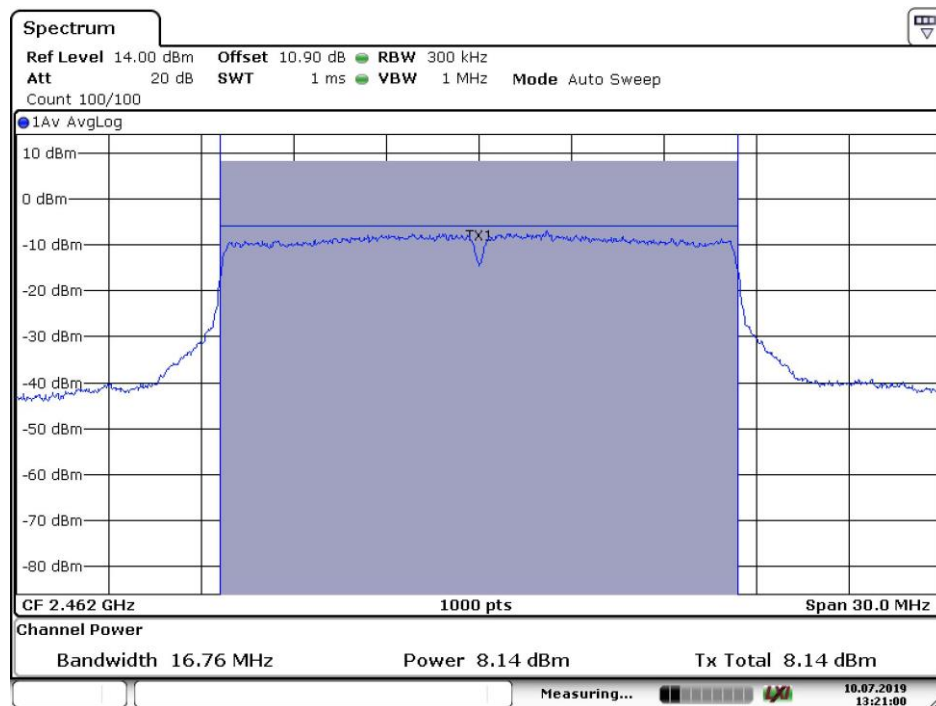
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 13:50:17

Data rate: 24Mbps

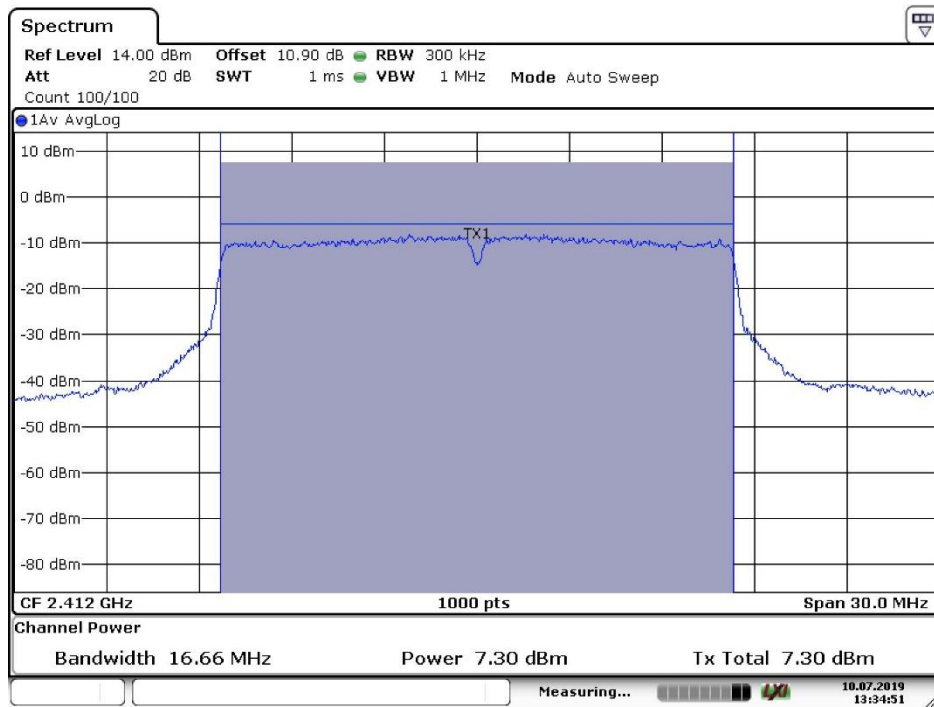
Channel Frequency: 2442 MHz



Date: 10.JUL.2019 13:21:00

Data rate: 24Mbps

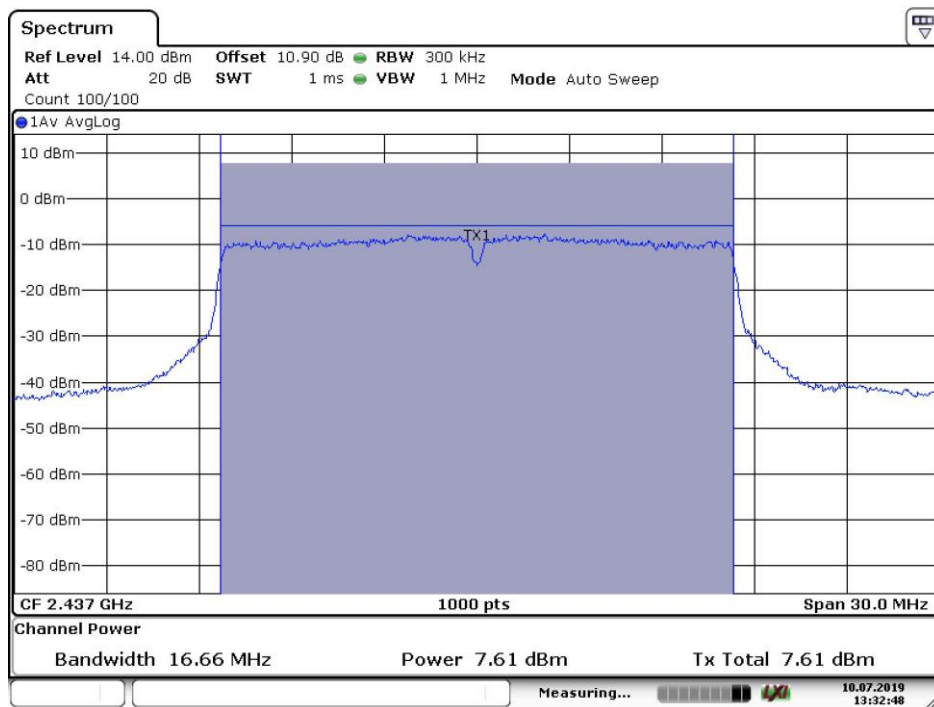
Channel Frequency: 2462 MHz



Date: 10.JUL.2019 13:34:51

Data rate: 54Mbps

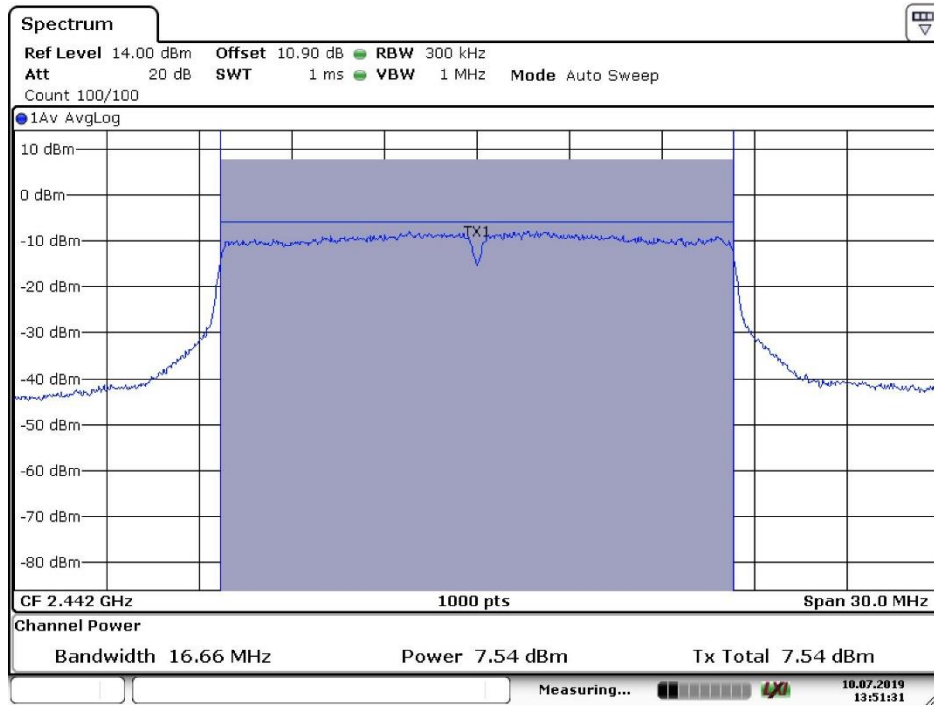
Channel Frequency: 2412 MHz



Date: 10.JUL.2019 13:32:48

Data rate: 54Mbps

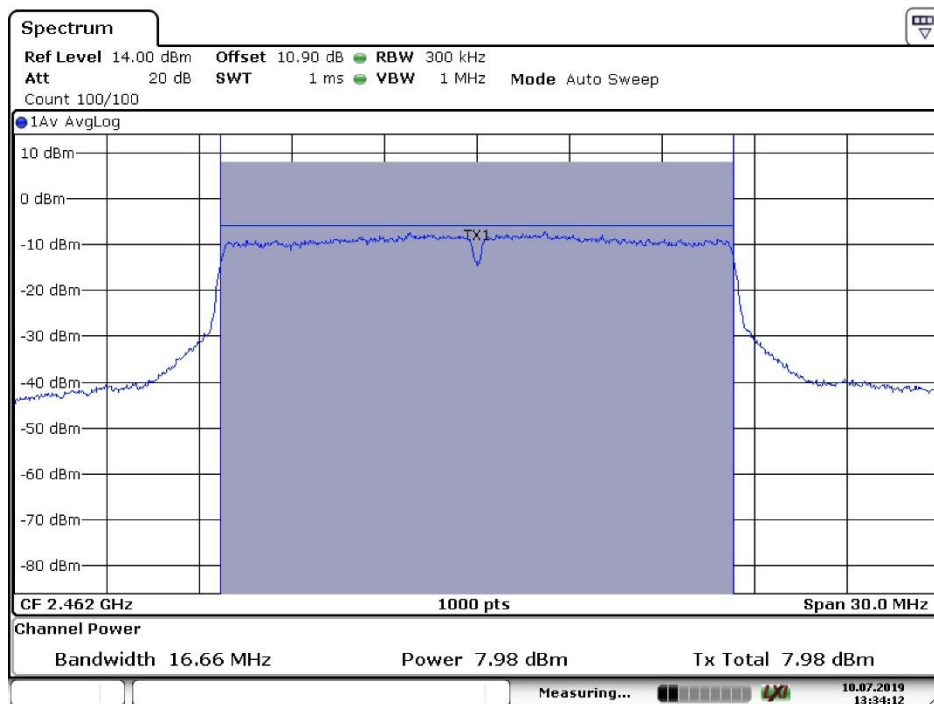
Channel Frequency: 2437 MHz



Date: 10.JUL.2019 13:51:32

Data rate: 54Mbps

Channel Frequency: 2442 MHz



Date: 10.JUL.2019 13:54:12

Data rate: 54Mbps

Channel Frequency: 2462 MHz

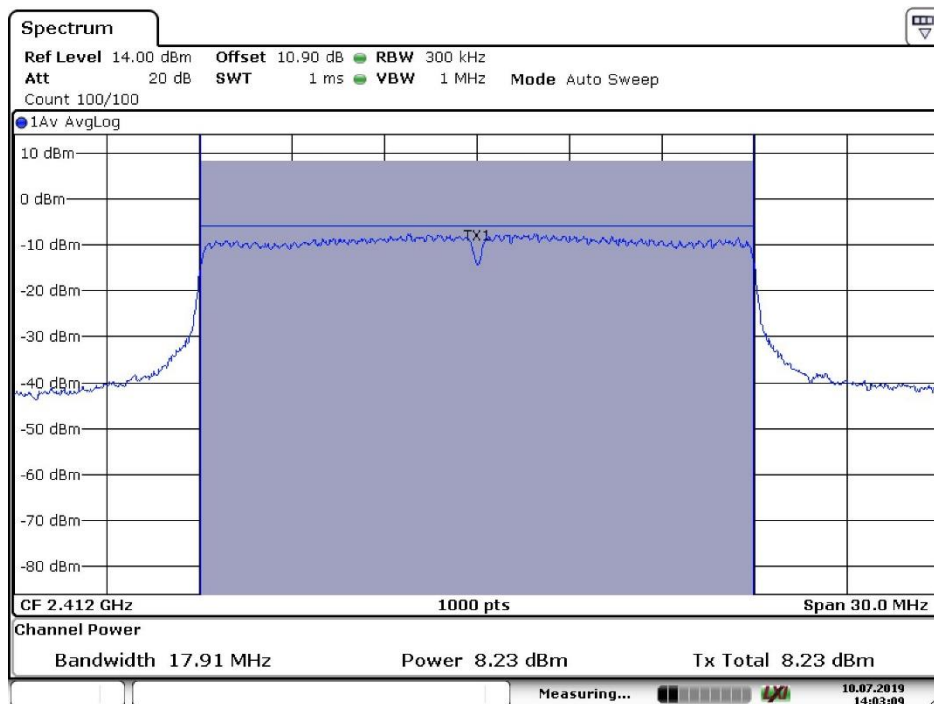
Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

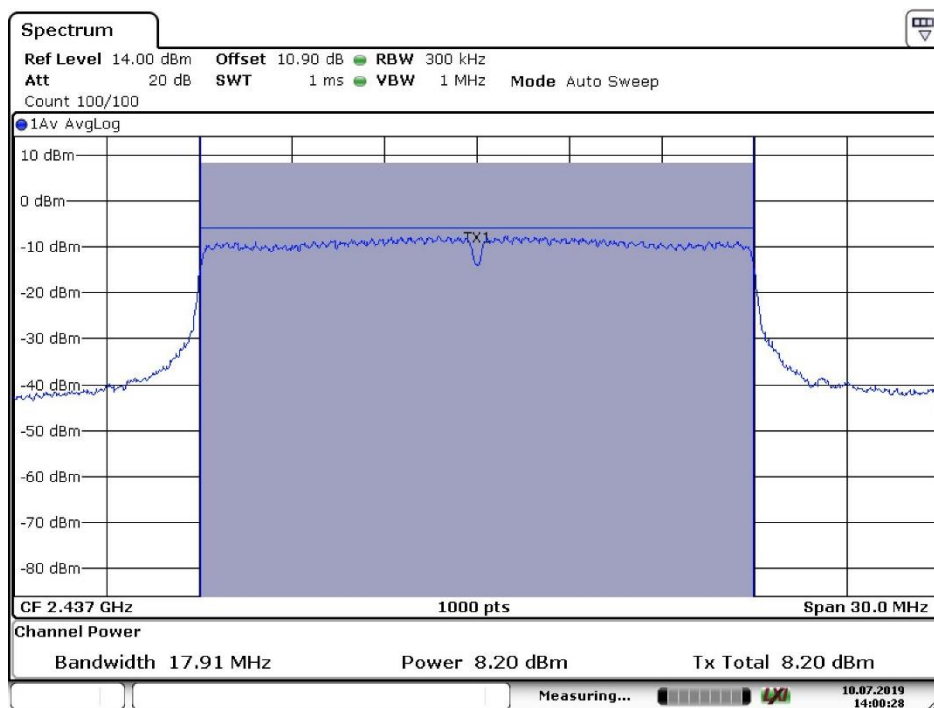
Page 42 of 42



Date: 10.JUL.2019 14:03:09

Data rate: MCS0

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 14:00:28

Data rate: MCS0

Channel Frequency: 2437 MHz

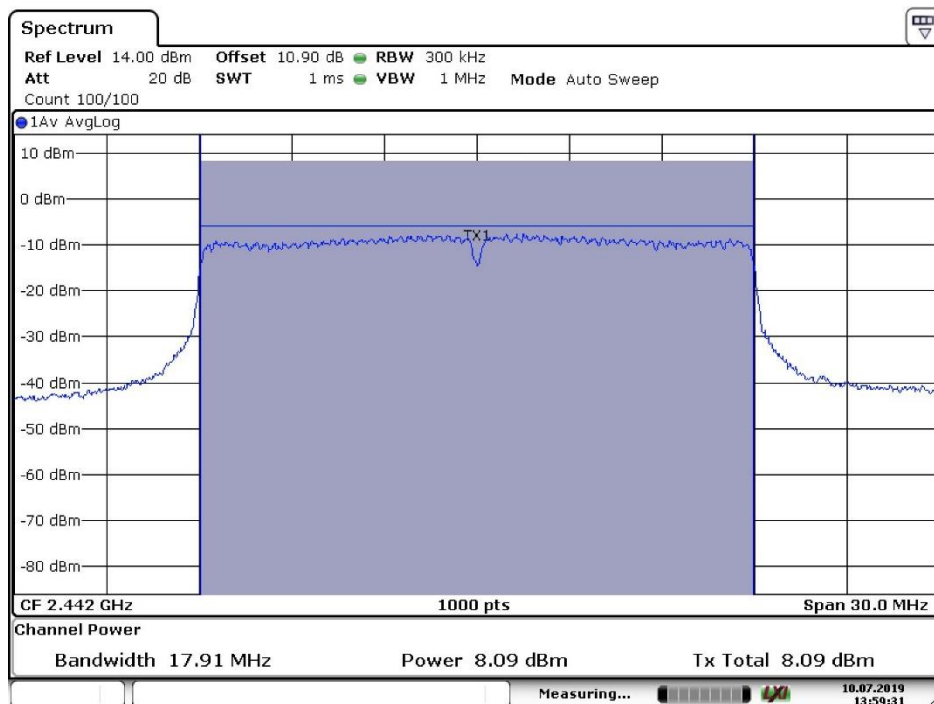
Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

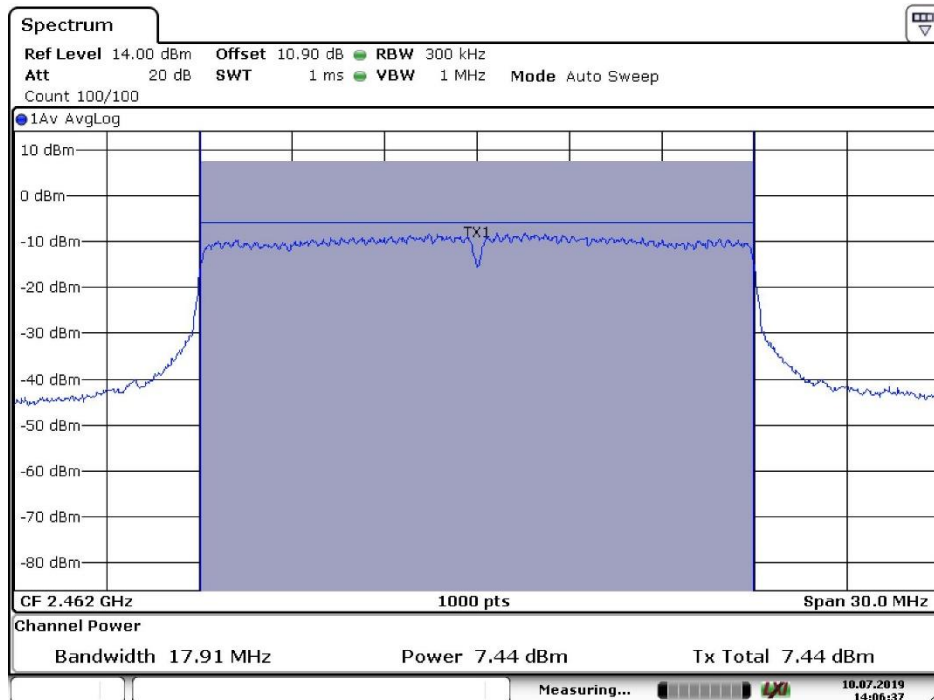
Page 42 of 42



Date: 10.JUL.2019 13:59:32

Data rate: MCS0

Channel Frequency: 2442 MHz



Date: 10.JUL.2019 14:06:37

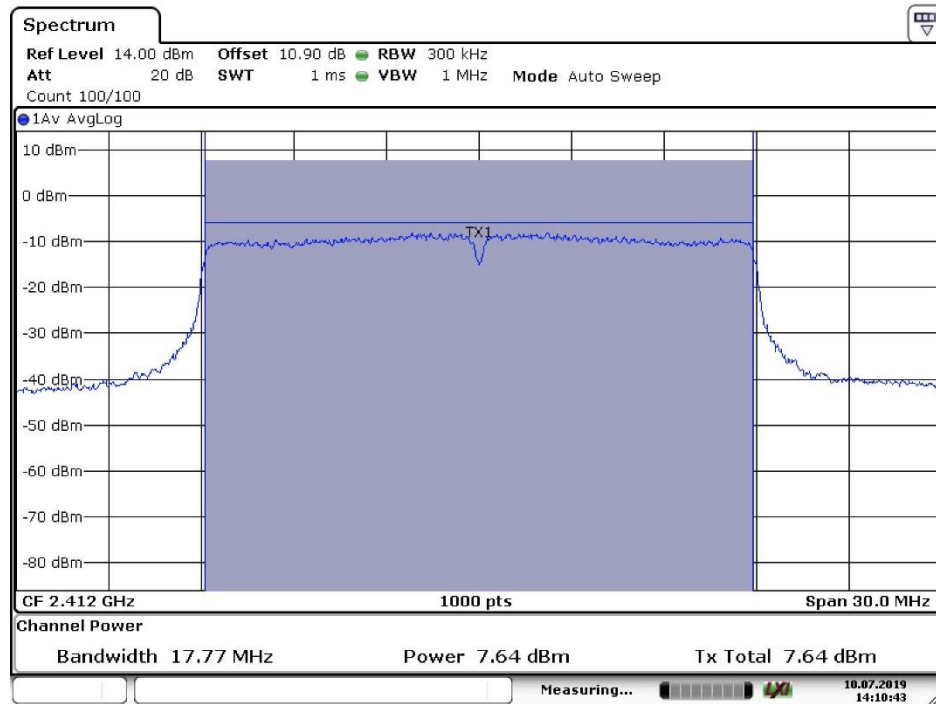
Data rate: MCS0

Channel Frequency: 2462 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

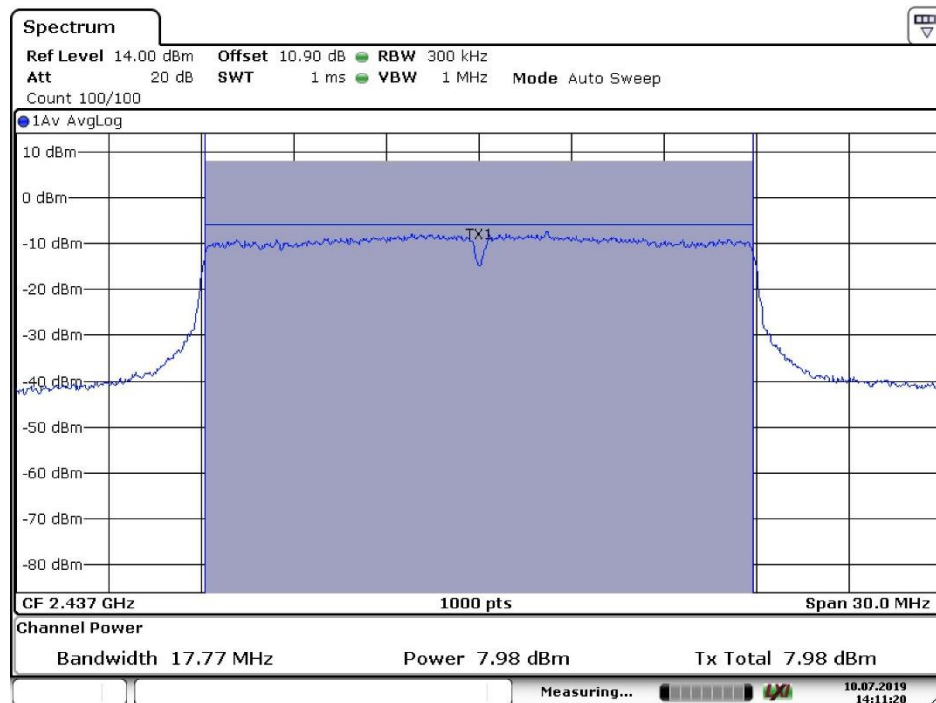
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 14:10:43

Data rate: MCS4

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 14:11:21

Data rate: MCS4

Channel Frequency: 2437 MHz

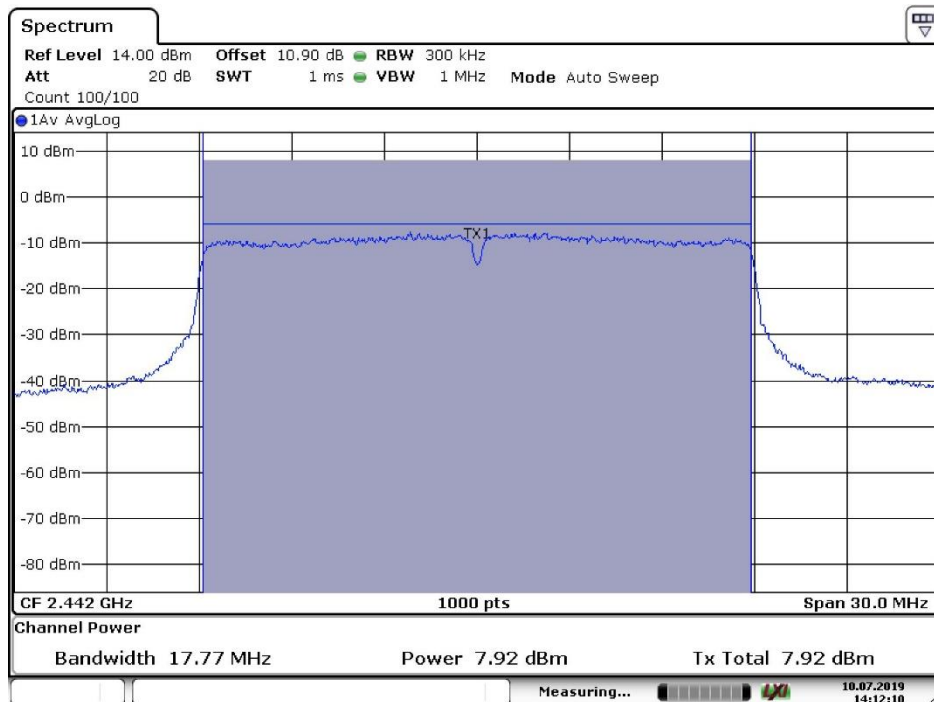
Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

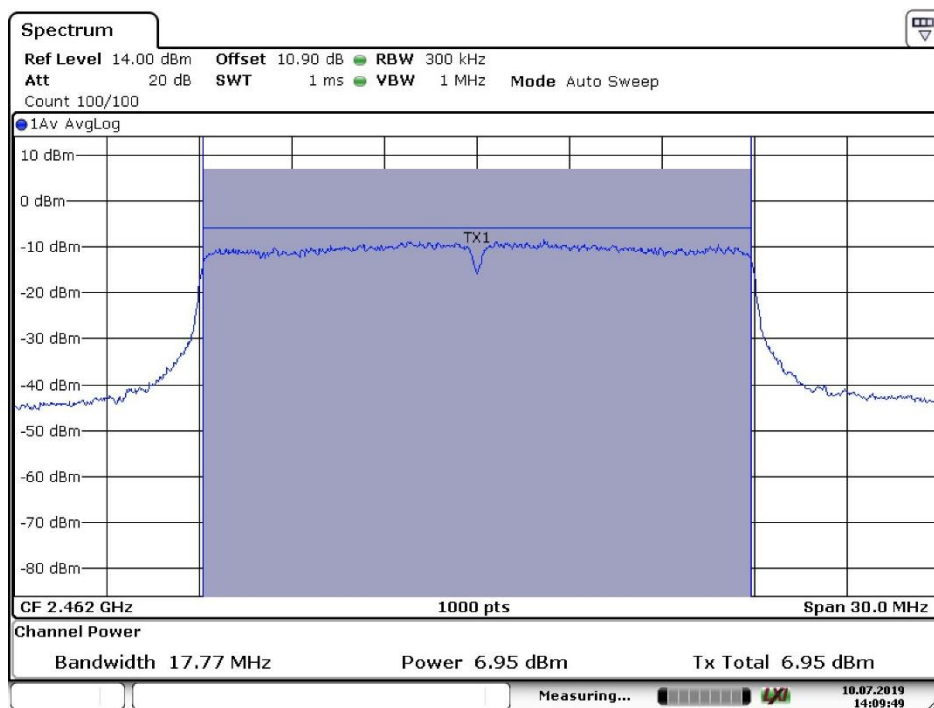
Page 42 of 42



Date: 10.JUL.2019 14:12:10

Data rate: MCS4

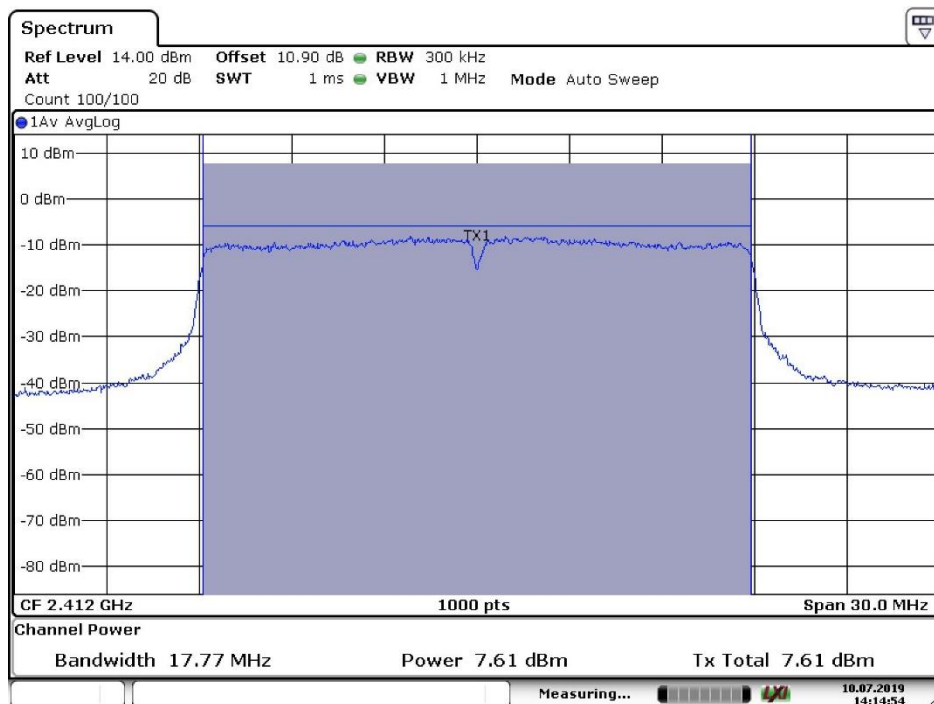
Channel Frequency: 2442 MHz



Date: 10.JUL.2019 14:09:49

Data rate: MCS4

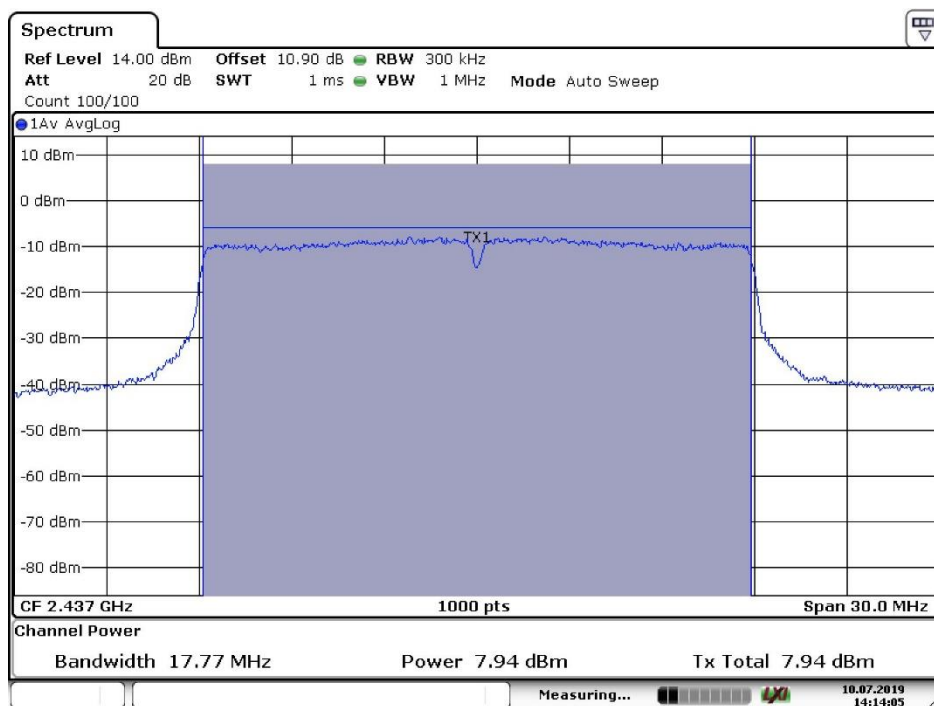
Channel Frequency: 2462 MHz



Date: 10.JUL.2019 14:14:54

Data rate: MCS7

Channel Frequency: 2412 MHz



Date: 10.JUL.2019 14:14:06

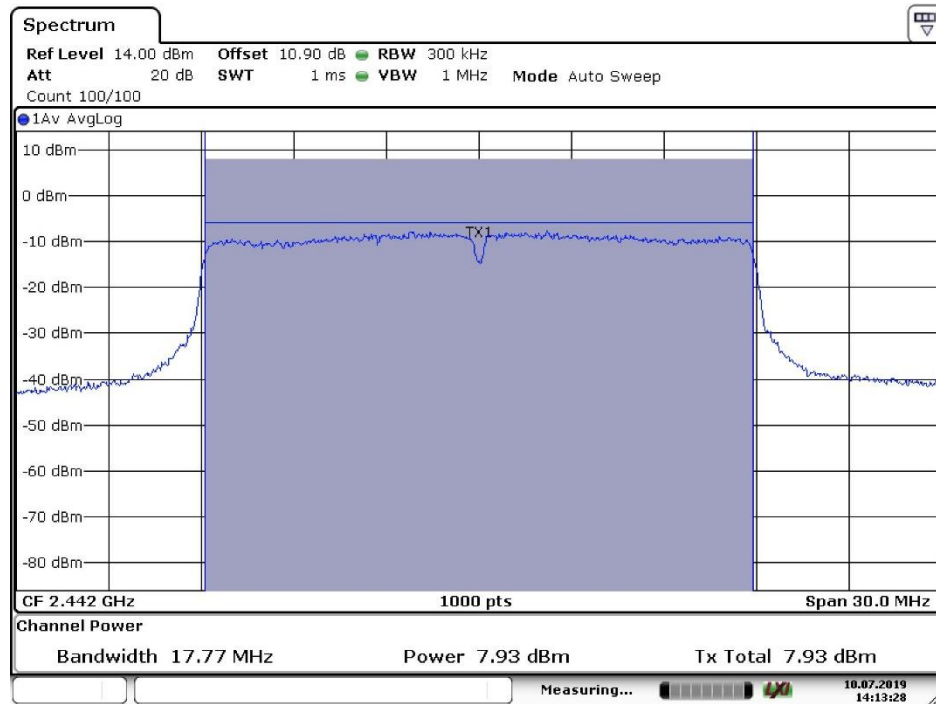
Data rate: MCS7

Channel Frequency: 2437 MHz

Prüfbericht - Nr.:
Test Report No.:

ULR-TC568819300000050F 001

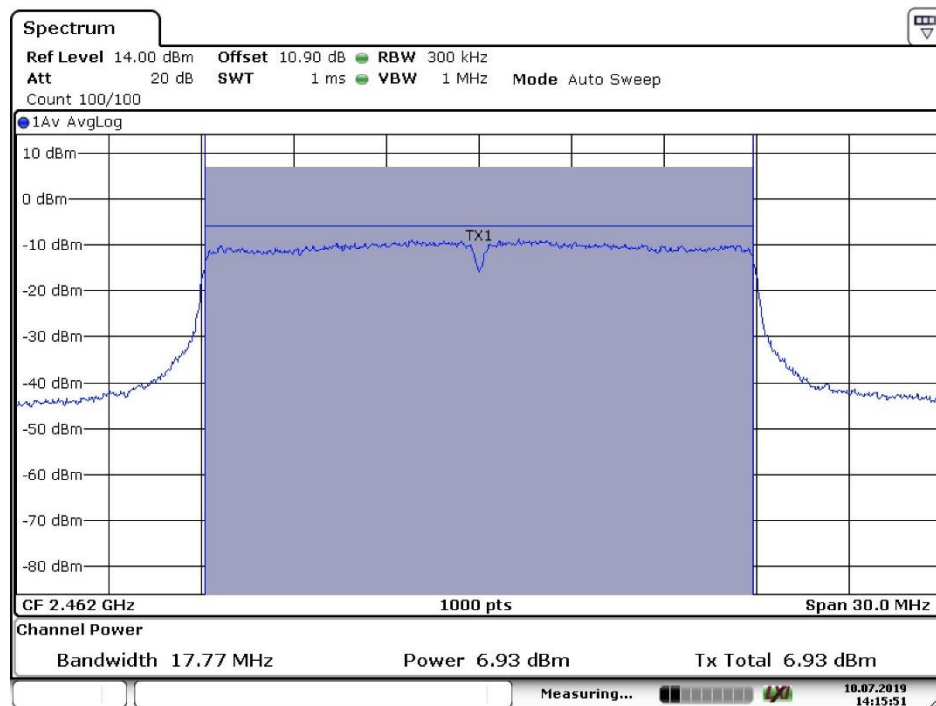
Seite 42 von 42
Page 42 of 42



Date: 10.JUL.2019 14:13:27

Data rate: MCS7

Channel Frequency: 2442 MHz



Date: 10.JUL.2019 14:15:51

Data rate: MCS7

Channel Frequency: 2462MHz

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

6.2 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
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

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 128-93.8, 73.80-62.95, 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 detecto

Test Conditions:

Supply Voltage: 110V AC 60Hz

Environmental conditions:

Temperature: +22°C

RH: 64.6 %

Note:

Measurements were made as per section 8.6 in KDB 558074 D01 15.247 Meas Guidance v05r02

Test results:

No emissions found in frequency 9 kHz to 30 MHz

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Test results for frequencies in the range 30 MHz – 1 GHz

Polarization	Frequency (MHz)	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	34.19	12.38	40	-27.62
	34.91	9.27	40	-30.73
	39.36	6.93	40	-33.07
	79.86	24.96	40	-15.04
	83.95	26.23	40	-13.77
	155.44	28.1	43.5	-15.40
	231.33	24.68	43.5	-18.82
Horizontal	125.34	30.45	43.5	-13.05
	131.39	30.56	43.5	-12.94
	135.42	27.46	43.5	-16.04
	139.43	26.21	43.5	-17.29
	336.37	24.47	46	-21.53
	360.00	25.05	46	-20.95
	385.52	18.05	46	-27.95

Note: Emission level = Received value + Antenna factor + Cable loss – Pre-Amplifier Gain

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

802.11b

Data rate: 1Mbps

Channel	Polarization	Frequency (MHz)	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low	V	2390(Pk)	45.36	74	-28.64
		2390(Av)	35.94	54	-18.06
		2412(Pk)	98.251	*	*
		2412(Av)	94.151	*	*
		4824(Pk)	46.48	74	-27.52
		4824(Av)	41.73	54	-12.27
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	45.45	74	-28.55
		2390(Av)	35.579	54	-18.42
		2412(Pk)	98.39	*	*
		2412(Av)	94.28	*	*
		4824(Pk)	50.09	74	-23.91
		4824(Av)	46.71	54	-7.29
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	101.16	*	*
		2437(Av)	98.44	*	*
		4874(Pk)	52.104	74	-21.89
		4874(Av)	49.449	54	-4.55
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	103.75	*	*
		2437(Av)	101.15	*	*
		4874(Pk)	54.32	74	-19.68
		4874(Av)	52.48	54	-1.52
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	100.98	*	*
		2462(Av)	97.10	*	*
		2483.5(Pk)	50.24	74	-23.75
		2483.5(Av)	42.42	54	-11.57
		4924(Pk)	47.80	74	-26.20
		4924(Av)	42.77	54	-11.23
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	103.05	*	*
		2462(Av)	99.19	*	*
		2483.5(Pk)	50.92	74	-23.07
		2483.5(Av)	43.15	54	-10.84
		4924(Pk)	47.60	74	-26.40
		4924(Av)	50.89	54	-3.11
		7386(Pk)	48.63	74	-25.37
		7386(Av)	34.74	54	-19.26

Note: Low Channel : 2412 MHz,
Mid Channel : 2437 MHz,
High Channel : 2462 MHz.

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Data rate: 11Mbps

Channel	Polarization	Frequency (MHz)	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low	V	2390(Pk)	54.99	74	-19.01
		2390(Av)	42.16	54	-11.84
		2412(Pk)	105.53	*	*
		2412(Av)	97.43	*	*
		4824(Pk)	46.56	74	-27.44
		4824(Av)	33.43	54	-20.57
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	58.06	74	-15.94
		2390(Av)	45.403	54	-8.597
		2412(Pk)	107.53	*	*
		2412(Av)	99.41	*	*
		4824(Pk)	51.22	74	-22.78
		4824(Av)	37.91	54	-16.09
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	108.26	*	*
		2437(Av)	99.91	*	*
		4874(Pk)	51.065	74	-22.935
		4874(Av)	38.246	54	-15.754
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	110.97	*	*
		2437(Av)	102.62	*	*
		4874(Pk)	55.28	74	-18.72
		4874(Av)	42.63	54	-11.37
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	106.31	*	*
		2462(Av)	98.05	*	*
		2483.5(Pk)	56.65	74	-17.35
		2483.5(Av)	44.95	54	-9.05
		4924(Pk)	48.11	74	-25.89
		4924(Av)	34.82	54	-19.18
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	108.36	*	*
		2462(Av)	100.16	*	*
		2483.5(Pk)	56.99	74	-17.01
		2483.5(Av)	45.82	54	-8.18
		4924(Pk)	52.56	74	-21.44
		4924(Av)	39.39	54	-14.61
		7386(Pk)	No Harmonics found		
		7386(Av)			

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

802.11g

Data rate: 6Mbps

Channel	Polarization	Frequency (MHz)	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low	V	2390(Pk)	62.95	74	-11.05
		2390(Av)	40.67	54	-13.33
		2412(Pk)	96.4	*	*
		2412(Av)	86.64	*	*
		4824(Pk)	43.56	74	-30.44
		4824(Av)	30.37	54	-23.63
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	65.03	74	-8.97
		2390(Av)	43	54	-11
		2412(Pk)	98.26	*	*
		2412(Av)	89.31	*	*
		4824(Pk)	45.29	74	-28.71
		4824(Av)	31.77	54	-22.23
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	96.83	*	*
		2437(Av)	87.46	*	*
		4874(Pk)	43.83	74	-30.17
		4874(Av)	30.45	54	-23.55
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	99.132	*	*
		2437(Av)	89.786	*	*
		4874(Pk)	45.19	74	-28.81
		4874(Av)	32.12	54	-21.88
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	96.8	*	*
		2462(Av)	87.4	*	*
		2483.5(Pk)	63.82	74	-10.18
		2483.5(Av)	43.9	54	-10.1
		4924(Pk)	43.07	74	-30.93
		4924(Av)	30.01	54	-23.99
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	100.14	*	*
		2462(Av)	90.9	*	*
		2483.5(Pk)	66.69	74	-7.31
		2483.5(Av)	46.9	54	-7.1
		4924(Pk)	43.26	74	-30.74
		4924(Av)	30.89	54	-23.11
		7386(Pk)	No Harmonics found		
		7386(Av)			

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Data rate: 24Mbps

Channel	Polarization	Frequency (MHz)	Emission level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low	V	2390(Pk)	65.69	74	-8.31
		2390(Av)	45.33	54	-8.67
		2412(Pk)	98.88	*	*
		2412(Av)	89.14	*	*
		4824(Pk)	43.28	74	-30.72
		4824(Av)	30.12	54	-23.88
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	66.49	74	-7.51
		2390(Av)	47.73	54	-6.27
		2412(Pk)	101.83	*	*
		2412(Av)	91.42	*	*
		4824(Pk)	43.26	74	-30.74
		4824(Av)	30.26	54	-23.74
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	99.83	*	*
		2437(Av)	89.37	*	*
		4874(Pk)	43.3	74	-30.7
		4874(Av)	30.25	54	-23.75
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	101.98	*	*
		2437(Av)	91.47	*	*
		4874(Pk)	43.85	74	-30.15
		4874(Av)	31.67	54	-22.33
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	100.41	*	*
		2462(Av)	90.136	*	*
		2483.5(Pk)	67.61	74	-6.39
		2483.5(Av)	48.59	54	-5.41
		4924(Pk)	43	74	-31
		4924(Av)	30.346	54	-23.654
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	101.8	*	*
		2462(Av)	91.84	*	*
		2483.5(Pk)	69.73	74	-4.27
		2483.5(Av)	50.85	54	-3.15
		4924(Pk)	44.26	74	-29.74
		4924(Av)	31.68	54	-22.32
		7386(Pk)	No Harmonics found		
		7386(Av)			

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Data rate: 54Mbps

Channel	Polarization	Frequency (MHz)	Emission level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low	V	2390(Pk)	64.27	74	-9.73
		2390(Av)	45.99	54	-8.01
		2412(Pk)	99.35	*	*
		2412(Av)	89.07	*	*
		4824(Pk)	43.24	74	-30.758
		4824(Av)	28.57	54	-25.43
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	65.95	74	-8.05
		2390(Av)	48.67	54	-5.33
		2412(Pk)	101.68	*	*
		2412(Av)	91.068	*	*
		4824(Pk)	43.119	74	-30.88
		4824(Av)	28.6	54	-25.40
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	99.81	*	*
		2437(Av)	89.42	*	*
		4874(Pk)	42.9	74	-31.1
		4874(Av)	29.8	54	-24.2
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	102.49	*	*
		2437(Av)	92.35	*	*
		4874(Pk)	44.46	74	-29.54
		4874(Av)	31.75	54	-22.25
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	100.65	*	*
		2462(Av)	90.14	*	*
		2483.5(Pk)	68.17	74	-5.83
		2483.5(Av)	48.89	54	-5.11
		4924(Pk)	43.034	74	-30.966
		4924(Av)	30.34	54	-23.66
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	103.23	*	*
		2462(Av)	92.72	*	*
		2483.5(Pk)	70.48	74	-3.52
		2483.5(Av)	51.25	54	-2.75
		4924(Pk)	44.42	74	-29.58
		4924(Av)	31.86	54	-22.14
		7386(Pk)	No Harmonics found		
		7386(Av)			

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

802.11n

Data rate: MCS0

Channel	Polarization	Frequency (MHz)	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low	V	2390(Pk)	70.4	74	-3.6
		2390(Av)	49.73	54	-4.27
		2412(Pk)	98.74	*	*
		2412(Av)	88.75	*	*
		4824(Pk)	42.9	74	-31.1
		4824(Av)	29.82	54	-24.18
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	70.57	74	-3.43
		2390(Av)	51.86	54	-2.14
		2412(Pk)	100.47	*	*
		2412(Av)	90.53	*	*
		4824(Pk)	43.1	74	-30.9
		4824(Av)	30.64	54	-23.36
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	98.72	*	*
		2437(Av)	89.07	*	*
		4874(Pk)	42.75	74	-31.25
		4874(Av)	29.86	54	-24.14
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	102.03	*	*
		2437(Av)	92.33	*	*
		4874(Pk)	44.07	74	-29.93
		4874(Av)	30.84	54	-23.16
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	99.88	*	*
		2462(Av)	90.086	*	*
		2483.5(Pk)	70.41	74	-3.59
		2483.5(Av)	50.81	54	-3.19
		4924(Pk)	44.16	74	-29.84
		4924(Av)	30.03	54	-23.97
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	100.1	*	*
		2462(Av)	90.23	*	*
		2483.5(Pk)	71.29	74	-2.71
		2483.5(Av)	50.87	54	-3.13
		4924(Pk)	43.41	74	-30.59
		4924(Av)	30.99	54	-23.01
		7386(Pk)	No Harmonics found		
		7386(Av)			

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Data rate: MCS4

Channel	Polarization	Frequency (MHz)	Emission level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low	V	2390(Pk)	66.81	74	-7.19
		2390(Av)	50.02	54	-3.98
		2412(Pk)	99.02	*	*
		2412(Av)	88.42	*	*
		4824(Pk)	43.12	74	-30.88
		4824(Av)	29.84	54	-24.16
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	69.79	74	-4.21
		2390(Av)	51.45	54	-2.55
		2412(Pk)	100.44	*	*
		2412(Av)	90	*	*
		4824(Pk)	43.66	74	-30.34
		4824(Av)	30.74	54	-23.26
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	100.09	*	*
		2437(Av)	89.6	*	*
		4874(Pk)	43.21	74	-30.79
		4874(Av)	29.95	54	-24.05
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	102.9	*	*
		2437(Av)	92.45	*	*
		4874(Pk)	43.68	74	-30.32
		4874(Av)	30.9	54	-23.1
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	98.99	*	*
		2462(Av)	88.53	*	*
		2483.5(Pk)	68.49	74	-5.51
		2483.5(Av)	49.95	54	-4.05
		4924(Pk)	43.66	74	-30.34
		4924(Av)	30.13	54	-23.87
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	100.82	*	*
		2462(Av)	90.15	*	*
		2483.5(Pk)	70.37	74	-3.63
		2483.5(Av)	51.83	54	-2.17
		4924(Pk)	44.15	74	-29.85
		4924(Av)	31.06	54	-22.94
		7386(Pk)	No Harmonics found		
		7386(Av)			

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Data rate: MCS7

Channel	Polarization	Frequency (MHz)	Emission level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low	V	2390(Pk)	68.42	74	-5.58
		2390(Av)	50.09	54	-3.91
		2412(Pk)	99.41	*	*
		2412(Av)	88.44	*	*
		4824(Pk)	42.89	74	-31.11
		4824(Av)	29.95	54	-24.05
		7236(Pk)	No Harmonics found		
		7236(Av)			
	H	2390(Pk)	69.88	74	-4.12
		2390(Av)	51.91	54	-2.09
		2412(Pk)	101.39	*	*
		2412(Av)	90.41	*	*
		4824(Pk)	43.77	74	-30.23
		4824(Av)	30.76	54	-23.24
		7236(Pk)	No Harmonics found		
		7236(Av)			
Mid	V	2437(PK)	99.88	*	*
		2437(Av)	89.02	*	*
		4874(Pk)	44.10	74	-29.9
		4874(Av)	30.04	54	-23.96
		7311(Pk)	No Harmonics found		
		7311(Av)			
	H	2437(PK)	101.80	*	*
		2437(Av)	90.96	*	*
		4874(Pk)	43.73	74	-30.27
		4874(Av)	31.16	54	-22.84
		7311(Pk)	No Harmonics found		
		7311(Av)			
High	V	2462(Pk)	99.06	*	*
		2462(Av)	88.25	*	*
		2483.5(Pk)	68.34	74	-5.66
		2483.5(Av)	49.84	54	-4.156
		4924(Pk)	43.19	74	-30.81
		4924(Av)	30.11	54	-23.89
		7386(Pk)	No Harmonics found		
		7386(Av)			
	H	2462(Pk)	102.23	*	*
		2462(Av)	91.37	*	*
		2483.5(Pk)	71.34	74	-2.658
		2483.5(Av)	52.75	54	-1.244
		4924(Pk)	43.79	74	-30.21
		4924(Av)	31.3	54	-22.70
		7386(Pk)	No Harmonics found		
		7386(Av)			

Note:

Pk : Peak Detector

Av: Average Detector

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

7 Conducted Emission Test on A.C. 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

Limit of section 15.207

Frequency of emission	QP Limit	AV Limit
(MHz)	(dBµV)	(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.:

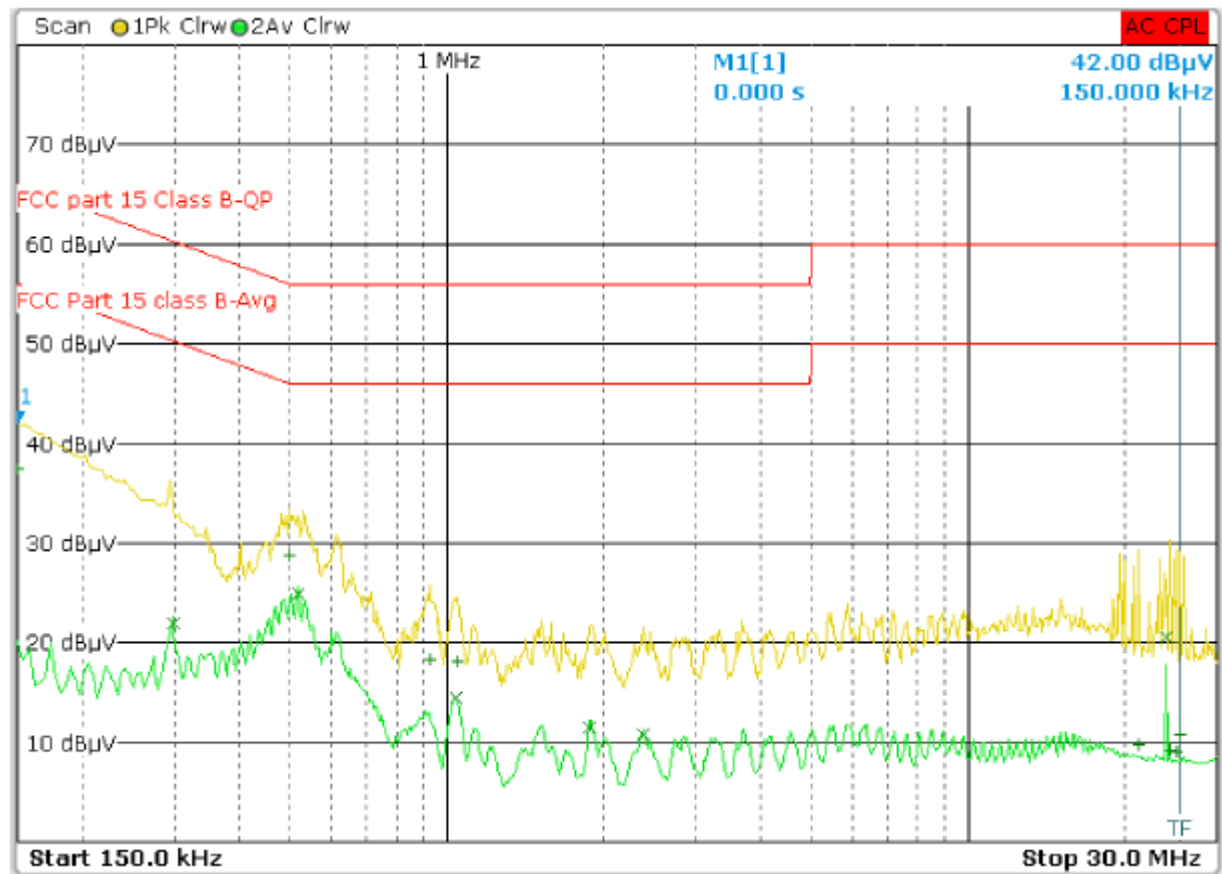
ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Test Result: LINE Graphs and Tables

110v AC , 60Hz



Line Graph

Trace	Frequency	Level (dBμV)	Phase	Detector	Delta Limit/dB
2	518.000000000 kHz	24.85		Average	-21.15
1	498.000000000 kHz	28.82		Quasi Peak	-27.21
2	298.000000000 kHz	22.00		Average	-28.30
1	150.000000000 kHz	37.45		Quasi Peak	-28.55
2	24.026000000 MHz	20.52		Average	-29.48
2	1.038000000 MHz	14.42		Average	-31.58
2	1.882000000 MHz	11.55		Average	-34.45
2	2.382000000 MHz	10.79		Average	-35.21
1	926.000000000 kHz	18.25		Quasi Peak	-37.75
1	1.050000000 MHz	18.14		Quasi Peak	-37.86
1	25.602000000 MHz	10.75		Quasi Peak	-49.25
1	21.186000000 MHz	9.68		Quasi Peak	-50.32
1	24.346000000 MHz	9.20		Quasi Peak	-50.80
1	25.194000000 MHz	9.11		Quasi Peak	-50.89

Line Table

Prüfbericht - Nr.:

Test Report No.:

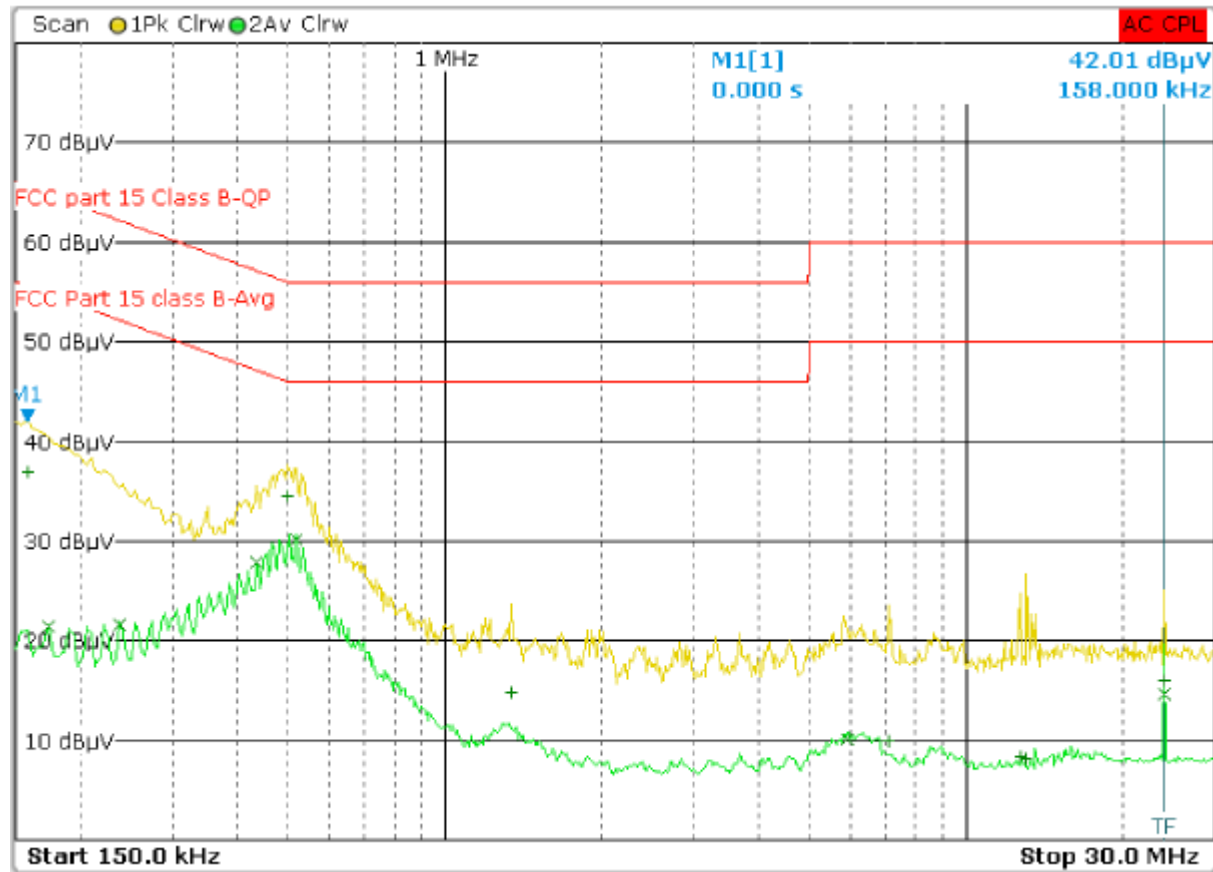
ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

Test Result: Neutral Graphs and Tables

110v AC , 60Hz



Neutral Graph

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	518.000000000 kHz	30.20		Average	-15.80
2	434.000000000 kHz	27.80		Average	-19.38
1	498.000000000 kHz	34.51		Quasi Peak	-21.52
1	158.000000000 kHz	36.99		Quasi Peak	-28.58
2	238.000000000 kHz	21.59		Average	-30.58
2	174.000000000 kHz	21.50		Average	-33.27
2	24.026000000 MHz	14.60		Average	-35.40
2	5.906000000 MHz	10.07		Average	-39.93
1	1.338000000 MHz	14.86		Quasi Peak	-41.14
1	24.026000000 MHz	16.05		Quasi Peak	-43.95
1	7.122000000 MHz	10.01		Quasi Peak	-49.99
1	12.734000000 MHz	8.30		Quasi Peak	-51.70
1	13.066000000 MHz	8.12		Quasi Peak	-51.88

Neutral Table

Prüfbericht - Nr.:

Test Report No.:

ULR-TC568819300000050F 001

Seite 42 von 42

Page 42 of 42

8 LIST OF TABLES

Table 1: Test and measurements instrument used.....	5
Table 2: Ratings and System Details as declared by manufacturer	6
Table 3: Measurement Uncertainty	6
Table 4: List of Wi-Fi center Frequencies	7

9 LIST OF FIGURES

Figure 1: Frequency Range 9 kHz- 30 MHz	8
Figure 2: Frequency Range 30 MHz – 200 MHz	9
Figure 3: Frequency Range 200 MHz - 1GHz	9
Figure 4: Frequency Range above 1 GHz	10

Power Level settings used during the test

Mode	Data rate	Low	Mid	High
b	1	13	18	13
	11	15	18	15
g	6	8	17	8
	24	8	17	8
	54	8	17	8
n	MCS0	8	17	7
	MCS4	8	17	7
	MCS7	8	12	7

Channel low: 2412 MHz

Channel mid: 2437 MHz

Channel low: 2462 MHz

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