SPORTON LAB.

Project No : ER232843-18AC

VERIFICATION OF COMPLIANCE

Equipment : **802.11abgn, USB Dongle**
Model No. : **WUBR-508N**
Applicant : **SparkLAN Communications, Inc.**
8F., No. 257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan

SPORTON LAB.

I HEREBY **DECLARE THAT :**

The following technical requirements and test specifications are relevant to the presumption of conformity under the **RED Directive 2014/53/EU.**
The equipment was **Passed** the test performed according to
EN 300 328 V2.1.1 (2016-11)
The test was carried out on **Apr. 27, 2017** at **SPORTON INTERNATIONAL INC.** LAB.

Phoenix Chen
Assistant Manager

CE Test Report

Equipment	:	**802.11abgn, USB Dongle**
Brand Name	:	**SparkLAN**
Model No.	:	**WUBR-508N**
Standard	:	**EN 300 328 V2.1.1 (2016-11)**
Operating Band	:	**2400 MHz – 2483.5 MHz**
Applicant **Manufacturer**		**SparkLAN Communications, Inc.** 8F., No. 257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan

The product sample received on May. 26, 2015 and completely tested on Apr. 27, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in EN 300 328 V2.1.1 (2016-11) and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Phoenix Chen
SPORTON INTERNATIONAL INC.

Testing Laboratory
1190

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Summary of Test Result

Requirements and Conformance Test Specifications					
Report Clause	**Ref. Std. Clause**	**Description**	**Limit**	**Result**	**Remark**
3.1	4.3.2.2	RF Output Power	20 dBm	Complied	-
3.2	4.3.2.3	Power Density	10 dBm/MHz	Complied	-
-	4.3.2.4	Duty cycle, Tx-sequence, Tx-gap	EN 300 328 C4.3.2.4.3	Complied	-
-	4.3.2.5	Medium Utilization (MU) Factor	MU < 10%	Complied	-
3.3	4.3.2.7	Occupied Channel Bandwidth	20 dBm	Complied	-
3.4	4.3.2.8	Transmitter unwanted emissions in the OOB domain	EN 300 328 Figure 3	Complied	-
3.5	4.3.2.9	Transmitter unwanted emissions in the spurious domain	EN 300 328 Table 4	Complied	-
4.1	4.3.2.10	Receiver spurious emissions	EN 300 328 Table 5	Complied	-
5.1	4.3.2.6	Adaptivity	EN 300 328 Clause 4.3.2.6.2 & 4.3.2.6.3	Complied	-
6.1	4.3.2.11	Receiver Blocking	EN 300 328 Clause 4.3.2.11.4	Complied	-
1.1.8	4.3.2.12	Geo-location capability	EN 300 328 Clause 4.3.2.12.2	N/A	-

Revision History

Report No.	Version	Description	Issued Date
ER232843-18AC	Rev. 01	Initial issue of report	Jun. 05, 2017

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11**	**Ch. Frequency (MHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**EIRP - Output Power (dBm)**
2400-2483.5	b	2412-2472	1-13 [13]	1	19.52
2400-2483.5	g	2412-2472	1-13 [13]	1	19.71
2400-2483.5	n (HT20)	2412-2472	1-13 [13]	2	19.77
2400-2483.5	n (HT40)	2422-2462	3-11 [9]	2	19.92
Note 1: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation. Note 2: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.					

1.1.2 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
	☒ Temporary RF connector provided
	☐ No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.

Antenna General Information			
No.	**Ant. Cat.**	**Ant. Type**	**Gain (dBi)**
1-2	Integral	Printed	3.79
Remark: 1. In modulation mode 11b and 11g, this EUT supports diversity. EUT was pre-tested Antenna Port 1 and Antenna Port 2 for single chain, and the worst case was Antenna Port 1. Therefore only the test data (Port 1) was recorded in this report. 2. In modulation mode 11n, this EUT only supports 2TX.			

1.1.3 Type of EUT

Operational Condition							
EUT Power Type	From DC Source						
Software / Firmware Version for Adaptivity & Receiver Blocking	5.1.19.0						
Type of EUT							
☒	Stand-alone						
☐	Combined (EUT where the radio part is fully integrated within another device)						
	Combined Equipment - Brand Name / Model No.:	…					
☐	Plug-in radio (EUT intended for a variety of host systems)						
	Host System - Brand Name / Model No.:	…					
☐	Other:						
Operational Voltage	☒	Vnom (5 V)	☒	Vmax (5.25 V)	☒	Vmin (4.75 V)	
Operational Temperature	☒	Tnom (20°C)	☒	Tmax (50°C)	☒	Tmin (0°C)	

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☐ Operated normally mode for worst duty cycle	
☒ Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	**Power Duty Factor [dB] – (10 log 1/x)**
☒ 100.00% - IEEE 802.11b	0.00
☒ 100.00% - IEEE 802.11g	0.00
☒ 100.00% - IEEE 802.11n (HT20)	0.00
☒ 100.00% - IEEE 802.11n (HT40)	0.00

1.1.5 Medium Access Protocol

Medium Access Protocol		
Medium Access Protocol:	☒	IEEE Std. 802.11-2007
	☒	IEEE Std. 802.11n-2009
	☐	IEEE Std. 802.15.4-2006
	☐	IEEE Std. 802.15.1-2005
	☐	Other:
A medium access protocol has been implemented by the equipment. With mechanism designed to facilitate spectrum sharing with other devices in a wireless network. The equipment implements an adequate spectrum sharing mechanism and users will be equal access wireless network.		

1.1.6 Table for Existing Change

This product is an extension of original one reported under Sporton project number: ER232843-12AC

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Update standard to 300 328 V2.1.1(2016-11)	1. RSE limit was modified 2. Receiver Blocking was evaluated

1.1.7 Adaptive Equipment

Adaptive Equipment		
☐	non-Adaptive Equipment	
☒	Adaptive Equipment without the possibility to switch to a non-adaptive mode:	
	☒	The equipment has implemented an LBT based DAA mechanism:
		☐ The equipment is Frame Based equipment
		☒ The equipment is Load Based equipment
		☐ The equipment can switch dynamically between Frame Based and Load Based equipment
	☐	The equipment has implemented an non-LBT based DAA mechanism
	☐	The equipment can operate in more than one adaptive mode
☐	Adaptive Equipment which can also operate in a non-adaptive mode	

1.1.8 Geo-location capability supported by the equipment

Geo-location capability supported by the equipment		
☐	Yes	
	☐	The geographical location determined by the equipment as defined in EN 300 328, clause 4.3.2.12.3 is not accessible to the user.
☒	No	

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- EN 300 328 V2.1.1 (2016-11)

1.3 Testing Location Information

Testing Location					
☒ HWA YA	ADD :	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)			
	TEL :	886-3-327-3456	FAX :	886-3-327-0973	
☐ JHUBEI	ADD :	No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)			
	TEL :	886-3-656-9065	FAX :	886-3-656-9085	

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Candy	23.4°C / 58.7%	01/Oct/2015
Radiated Emission	05CH01-HY	Jerry	24.5°C / 65%	02/Oct/2015
Adaptivity Site	DFS01-HY	Ben	25°C / 60%	20/Apr/2016
Receiver Blocking	DFS01-HY	Dexter	23.2°C / 61%	27/Apr/2017

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission	1.3 dB	Confidence levels of 95%
Emission Bandwidth	$5.8*10^{-7}$ MHz	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	2.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	2.5 dB	Confidence levels of 95%

Parameter	Uncertainty
RF frequency	$\pm 5.8x10^{-7}$ MHz
Power Spectral Density, conducted	±2.6dB
Supply voltages	±2.9%
RF power conducted	±1.2dB
RF power radiated	±2.5dB
Spurious emissions, radiated	±3.3dB
Humidity	±2.4%
Temperature	±0.33°C
Time	±1.44%
95% confidence level using a coverage factor of k=2	

2 Test Configuration of EUT

2.1 The Worse Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Modulation Mode	**Transmit Chains (N_{TX})**	**Data Rate / MCS**	**Worst Data Rate / MCS**
11b	1	1-11 Mbps	1 Mbps
11g	1	6-54 Mbps	6 Mbps
HT20	2	MCS 8-15	MCS 8
HT40	2	MCS 8-15	MCS 8

2.2 The Worse Case Power Setting Parameter

The Worst Case Power Setting Parameter (2400-2483.5MHz band)							
Test Software/Version	RT5x7x QA _V1.0.5.9						
Modulation Mode	**N_{TX}**	**Test Frequency (MHz)**					
		NCB: 20MHz			**NCB: 40MHz**		
		2412	**2442**	**2472**	**2422**	**2442**	**2462**
11b	1	0C	0C	0C	-	-	-
11g	1	12	12	12	-	-	-
HT20	2	0C,0A	0C,0A	0C,0C	-	-	-
HT40	2	-	-	-	0C,0B	0C,0B	0C,0C

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power, Power Density, Occupied Channel Bandwidth Transmitter unwanted emissions in the OOB domain
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11b, 11g, HT20, HT40

The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Unwanted Emissions in The Spurious Domain, Receiver Spurious Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
User Position	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes.		
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.		
Operating Mode	Operating Mode Description		
1	Transmit / Receive		
Modulation Mode	11b, 11g, HT20, HT40		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			
Worst Planes of EUT	V		

The Worst Case Mode for Following Conformance Tests	
Test Items	Adaptivity
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests	
Test Items	Receiver Blocking
Test Condition	Conducted measurement at a receiver chain

2.4 Support Equipment

Support Equipment - RF Conducted			
No.	**Equipment**	**Brand Name**	**Model Name**
1	Notebook	DELL	E5540
2	Adapter	DELL	LA65NM130

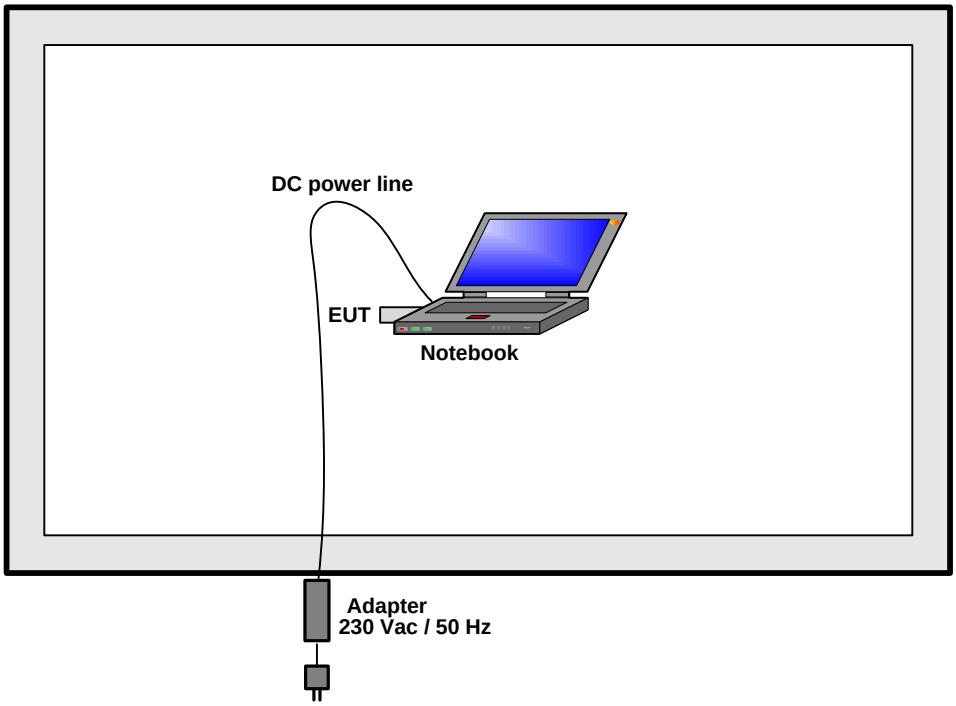
Support Equipment - Radiated Emission			
No.	**Equipment**	**Brand Name**	**Model Name**
1	Notebook	DELL	E5540
2	Adapter	DELL	DA90E3-00

Support Equipment – Adaptivity			
No.	**Equipment**	**Brand Name**	**Model Name**
1	AP (Master)	Inteno	CG300
2	NoteBook	DELL	Latitude E5510
3	Adapter	DELL	DA65NM111-00
4	NoteBook	DELL	Latitude E5530
5	Adapter	DELL	DA65NM111-00
6	NoteBook	DELL	Latitude E5560
7	Adapter	DELL	LA65NM130

Support Equipment – Receiver Blocking			
No.	**Equipment**	**Brand Name**	**Model Name**
1	NoteBook	DELL	Latitude E5550
2	Adapter for NB	DELL	FA90PSO-00
3	Shielding Box	EMEC	EM-SHB-650550300-M

2.5 Test Setup Diagram

Test Setup Diagram - Radiated Test



3 Transmitter Test Result

3.1 RF Output Power

3.1.1 RF Output Power Limit

RF Output Power Limit
☒ Mean equivalent isotropic radiated power (e.i.r.p.) ≤ 20 dBm

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
☒ Refer as EN 300 328, clause 5.4.2.2.1 for conducted measurement.

Step 1: Use a fast power sensor suitable for 2,4 GHz and capable of 1 MS/s.
Use the following settings:
- Sample speed 1 MS/s or faster.
- The samples must represent the power of the signal.
- Measurement duration: For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.

NOTE 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2: For conducted measurements on devices with multiple transmit chains:
- Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
- Trigger the power sensors so that they start sampling at the same time.
  Make sure the time difference between the samples of all sensors is less than half the time between the samples of all sensors is less than 500 ns.
- For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.

Step 3: Find the start and stop times of each burst in the stored measurement samples.
NOTE 2: The start and stop times are defined as the points where the power is at least 30 dB the RMS burst power calculated in step 4.

Step 4: Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

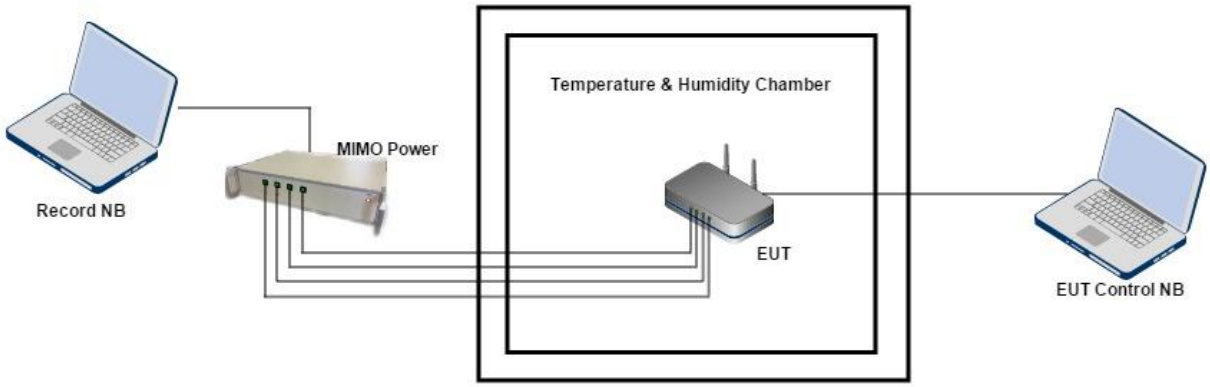
with 'k' being the total number of samples and 'n' the actual sample number

Step 5: The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6: Add the (stated) antenna assembly gain "G" in dBi of the individual antenna. If applicable, add the additional beamforming gain "Y" in dB. If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used. The RF Output Power (P) shall be calculated using the formula below: P = A + G + Y. This value, which shall comply with the limit given in clauses 4.3.2.2.3, shall be recorded in the test report.
☐ Refer as EN 300 328, clause 5.4.2.2.2 for radiated measurement.

3.1.4 Test Setup

RF Output Power



Test conditions:
The measurements for RF output power shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.

3.1.5 Maximum Antenna Gain

Maximum Antenna Gain Result					
Transmit Chains No.		1	2	-	-
Maximum Gain (dBi)-G		3.79	3.79	-	-
Modulation Mode	**G+Y (dBi)**	**N_{TX}**	**N_{SS} (Min.)**	**STBC**	**Beamforming Gain (dB)-Y**
11b	3.79	1	1	-	-
11g	3.79	1	1	-	-
HT20	3.79	2	2	-	-
HT40	3.79	2	2	-	-

3.1.6 Test Result of RF Output Power

Test Date: Oct. 01, 2015		RF Output Power Result				
Max. Gain (dBi)		3.79		RF Output Power (dBm)		
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	Port 1 (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
TnomVnom	11b	1	2412	14.62	18.41	20
TminVnom	11b	1	2412	15.69	19.48	20
TmaxVnom	11b	1	2412	13.14	16.93	20
TnomVnom	11b	1	2442	14.63	18.42	20
TminVnom	11b	1	2442	15.73	19.52	20
TmaxVnom	11b	1	2442	12.87	16.66	20
TnomVnom	11b	1	2472	14.26	18.05	20
TminVnom	11b	1	2472	15.47	19.26	20
TmaxVnom	11b	1	2472	12.49	16.28	20
Result				Complied		

Test Date: Oct. 01, 2015		RF Output Power Result				
Max. Gain (dBi)		3.79		RF Output Power (dBm)		
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	Port 1 (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
TnomVnom	11g	1	2412	14.46	18.25	20
TminVnom	11g	1	2412	15.74	19.53	20
TmaxVnom	11g	1	2412	12.52	16.31	20
TnomVnom	11g	1	2442	14.76	18.55	20
TminVnom	11g	1	2442	15.92	19.71	20
TmaxVnom	11g	1	2442	12.66	16.45	20
TnomVnom	11g	1	2472	14.59	18.38	20
TminVnom	11g	1	2472	15.90	19.69	20
TmaxVnom	11g	1	2472	12.50	16.29	20
Result				Complied		

Test Date: Oct. 01, 2015		RF Output Power Result						
Max. Gain (dBi)		3.79		RF Output Power (dBm)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	Port 1 (dBm)	Port 2 (dBm)	Sum (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
TnomVnom	HT20	2	2412	12.04	11.78	14.92	18.71	20
TminVnom	HT20	2	2412	12.84	12.69	15.78	19.57	20
TmaxVnom	HT20	2	2412	9.41	9.10	12.27	16.06	20
TnomVnom	HT20	2	2442	11.80	10.84	14.36	18.15	20
TminVnom	HT20	2	2442	13.18	12.25	15.75	19.54	20
TmaxVnom	HT20	2	2442	9.38	8.37	11.92	15.71	20
TnomVnom	HT20	2	2472	11.71	11.66	14.70	18.49	20
TminVnom	HT20	2	2472	13.01	12.93	15.98	19.77	20
TmaxVnom	HT20	2	2472	9.27	9.15	12.22	16.01	20
Result				Complied				

Test Date: Oct. 01, 2015		RF Output Power Result						
Max. Gain (dBi)		3.79		RF Output Power (dBm)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	Port 1 (dBm)	Port 2 (dBm)	Sum (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
TnomVnom	HT40	2	2422	11.62	11.68	14.66	18.45	20
TminVnom	HT40	2	2422	12.79	12.85	15.83	19.62	20
TmaxVnom	HT40	2	2422	9.34	9.28	12.32	16.11	20
TnomVnom	HT40	2	2442	11.61	11.19	14.41	18.20	20
TminVnom	HT40	2	2442	13.00	12.58	15.80	19.59	20
TmaxVnom	HT40	2	2442	9.44	8.85	12.16	15.95	20
TnomVnom	HT40	2	2462	12.00	12.08	15.05	18.84	20
TminVnom	HT40	2	2462	13.06	13.18	16.13	19.92	20
TmaxVnom	HT40	2	2462	8.99	9.04	12.02	15.81	20
Result				Complied				

3.2 Power Density

3.2.1 Power Density Limit

Power Spectral Density Limit
☒ Mean equivalent isotropic radiated power (e.i.r.p.) density ≤ 10 dBm/MHz

3.2.2 Measuring Instruments

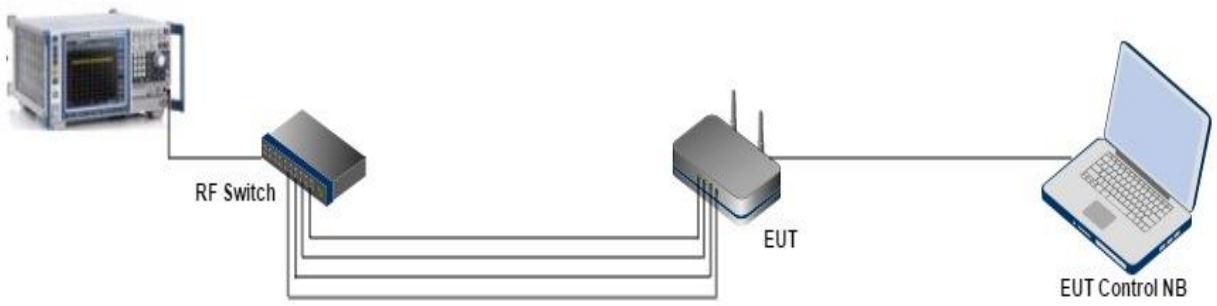
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method		
☒ Power spectral density shall be measured using one of the options below.		
	☒ Option 1: For equipment with continuous and non-continuous transmissions. Refer as EN 300 328, clause 5.4.3.2.1.	
	☐ Option 2: For equipment with continuous transmission capability or for equipment operating (or with the capability to operate) with a constant duty cycle (e.g. Frame Based equipment). Refer as EN 300 328, clause 5.4.3.2.1.	
☒ Refer as EN 300 328, clause 5.4.3.2.1 for conducted measurement.		
	☒ Option 1:	
	Step 1:	Connect the UUT to the spectrum analyzer and use the following settings: - Start & Stop Frequency: 2400 MHz ~ 2483.5MHz - Resolution BW: 10 kHz - Video BW: 30 kHz - Sweep Points: > 8 350 - Detector Mode: RMS - Trace Mode: Max Hold - Sweep time: For non-continuous transmissions: 2 x Channel Occupancy Time x number of sweep points For continuous transmissions: 10s; the sweep time may be increased further until a value where the sweep time has no impact on the RMS value of the signal For non-continuous signals, wait for the trace to stabilize.
	Step 2:	For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point (frequency domain), add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.
	Step 3:	Add up the values for power for all the samples in the file using the formula below. $P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$ with 'k' being the total number of samples and 'n' the actual sample number
	Step 4:	Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used: $C_{Corr} = P_{Sum} - P_{e.i.r.p.}$ $P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$ with 'n' being the actual sample number

	Step 5:	Starting from the first sample $P_{Samplecorr}(n)$ (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.
	Step 6:	Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 5 (i.e. sample #2 to #101).
	Step 7:	Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.
	☐ Option 2:	
	Step 1:	Connect the UUT to the spectrum analyser and use the following settings: - Centre Frequency: The centre frequency of the channel under test - RBW: 1 MHz - VBW: 3 MHz - Frequency Span: 2 × Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel) - Detector Mode: Peak - Trace Mode: Max Hold
	Step 2:	When the trace is complete, find the peak value of the power envelope and record the frequency.
	Step 3:	Make the following changes to the settings of the spectrum analyser: - Centre Frequency: Equal to the frequency recorded in step 2 - Frequency Span: 3 MHz - RBW: 1 MHz - VBW: 3 MHz - Sweep Time: 1 minute - Detector Mode: RMS - Trace Mode: Max Hold
	Step 4:	When the trace is complete, the trace shall be captured using the "Hold" or "View" option on the spectrum analyser. Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as the highest mean power (power spectral density) D in a 1 MHz band. Alternatively, where a spectrum analyser is equipped with a function to measure power spectral density, this function may be used to display the power spectral density D in dBm / MHz. In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the power spectral density of each transmit chain shall be measured separately to calculate the total power spectral density (value D in dBm / MHz) for the UUT.
	Step 5:	The maximum Power Spectral Density (PSD) e.i.r.p. is calculated from the above measured power spectral density D, the observed Duty Cycle (DC) (see clause 5.4.2.2.1.3, step 4), the applicable antenna assembly gain G in dBi and if applicable the beamforming gain Y in dB, according to the formula below. This value shall be recorded in the test report. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used. PSD = D + G + Y + 10 × log (1 / DC) (dBm / MHz)
☐	Refer as EN 300 328, clause 5.4.3.2.2 for radiated measurement.	

3.2.4 Test Setup

Power Spectral Density
 Test conditions: These measurements shall only be performed at normal test conditions.

3.2.5 Test Result of Power Density

Test Date: Oct. 01, 2015			Maximum e.i.r.p. Spectral Density Result			
Modulation Mode	N_{TX}	Freq. (MHz)	PD (dBm/MHz)	Max. Gain (dBi)	EIRP PD (dBm/MHz)	EIRP Limit (dBm/MHz)
11b	1	2412	5.01	3.79	8.80	10
11b	1	2442	5.06	3.79	8.85	10
11b	1	2472	4.61	3.79	8.40	10
11g	1	2412	3.25	3.79	7.04	10
11g	1	2442	3.50	3.79	7.29	10
11g	1	2472	3.25	3.79	7.04	10
HT20	2	2412	3.38	3.79	7.17	10
HT20	2	2442	2.66	3.79	6.45	10
HT20	2	2472	3.16	3.79	6.95	10
HT40	2	2422	-0.19	3.79	3.60	10
HT40	2	2442	-0.14	3.79	3.65	10
HT40	2	2462	0.33	3.79	4.12	10
Result			Complied			

3.3 Occupied Channel Bandwidth

3.3.1 Occupied Channel Bandwidth Limit

Occupied Channel Bandwidth Limit
Type of Frequency Hopping Equipment:
☐ Occupied Channel Bandwidth for each hopping frequency fall completely within 2.4 GHz – 2.4835 GHz.
☐ For non-adaptive equipment with e.i.r.p greater than 10 dBm, Occupied Channel Bandwidth ≤ 5 MHz.
Type of Equipment Using Wide Band Modulations Other than FHSS:
☒ Occupied Channel Bandwidth fall completely within 2.4 GHz – 2.4835 GHz.
☐ For non-adaptive equipment with e.i.r.p greater than 10 dBm, Occupied Channel Bandwidth ≤ 20 MHz.

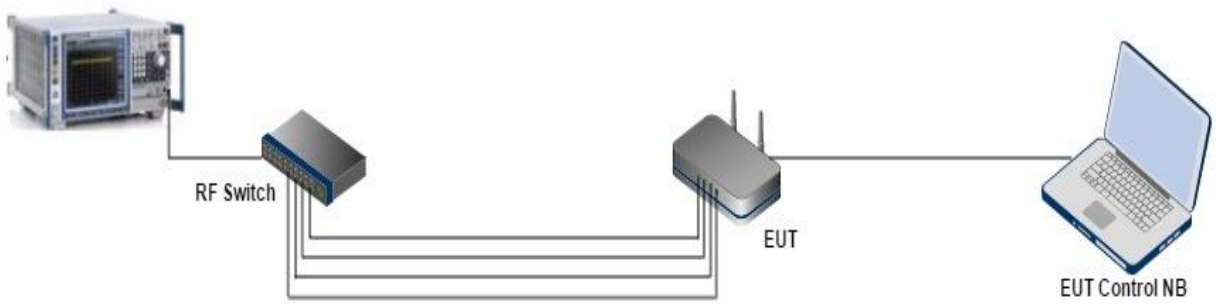
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method
☒ Refer as EN 300 328, clause 5.4.7.2.1 for conducted measurement.
Step 1: Connect the UUT to the spectrum analyzer and use the following settings: - Centre Frequency : The centre frequency of the channel under test. - Resolution BW : ~ 1 % of the span without going below 1 %. - Video BW : 3 × RBW. - Frequency Span : 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel) - Detector Mode : RMS. - Trace Mode : Max Hold. - Sweep Time : 1s. Step 2: Wait until the trace is completed. Find the peak value of the trace and place the analyzer marker on this peak. Step 3: Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT ,This value shall be recorded. NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyzer to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
☐ Refer as EN 300 328, clause 5.4.7.2.2 for radiated measurement.

3.3.4 Test Setup

Emission Bandwidth

Test conditions: These measurements shall only be performed at normal test conditions. In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs).

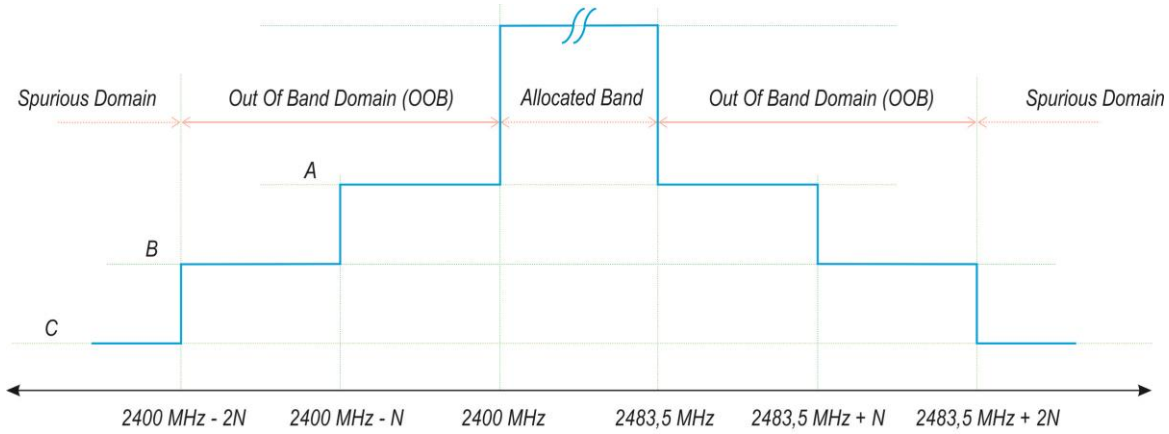
3.3.5 Test Result of Occupied Channel Bandwidth

Test Date: Oct. 01, 2015		Occupied Channel Bandwidth Result			
Modulation Mode	Frequency (MHz)	99% Bandwidth (MHz)	F_L at 99% BW (MHz)	F_H at 99% BW (MHz)	6dB Bandwidth (MHz)
11b	2412	14.47	2404.72400	2419.19600	12.08
11b	2472	14.21	2464.78400	2478.99700	11.08
11g	2412	16.37	2403.82400	2420.19600	16.38
11g	2472	16.35	2463.82400	2480.17600	16.40
HT20	2412	17.46	2403.26400	2420.73000	17.54
HT20	2472	17.41	2463.28400	2480.69600	17.18
HT40	2422	36.03	2403.98400	2440.01600	36.35
HT40	2462	36.00	2443.98400	2479.99100	36.30
Limit		**N/A**	**2400**	**2483.5**	**N/A**
Result		**Complied**			

3.4 Transmitter Unwanted Emissions in the Out-of-band Domain

3.4.1 Transmitter Unwanted Emissions in the Out-of-band Domain Limit

Transmit Mask Limit



A: -10 dBm/MHz
B: -20 dBm/MHz
C: Spuriois Domain limits

N = max(1, Occupied Channel Bandwidth) [MHz]

3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method
☒ The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
☒ Refer as EN 300 328, clause 5.4.8.2.1 for conducted measurement.
Step 1: Connect the UUT to the spectrum analyzer and use the following settings: - Centre Frequency : 2 484 MHz - Span : 0 Hz - Resolution BW : 1 MHz - Filter mode : Channel filter - Video BW : 3MHz - Detector Mode : RMS - Trace Mode : Clear / Write - Sweep Mode : Continuous - Sweep Points : Sweep Time [s] / (1 µs) or 5 000 whichever is greater - Trigger Mode : Video trigger - Sweep Time : > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power. NOTE 1: In case video triggering is not possible, an external trigger source may be used.

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)
- Adjust the trigger level to select the transmissions with the highest power level.
- For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
- Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)
- Change the centre frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)
- Change the centre frequency of the analyzer to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)
- Change the centre frequency of the analyzer to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

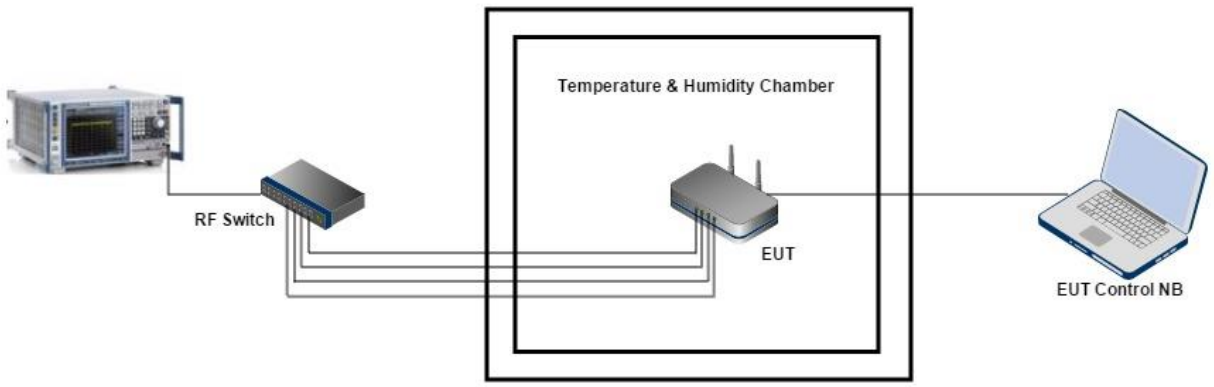
Step 6:
- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:
  - •Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
  - •Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

☐ Refer as EN 300 328, clause 5.4.8.2.2 for radiated measurement.

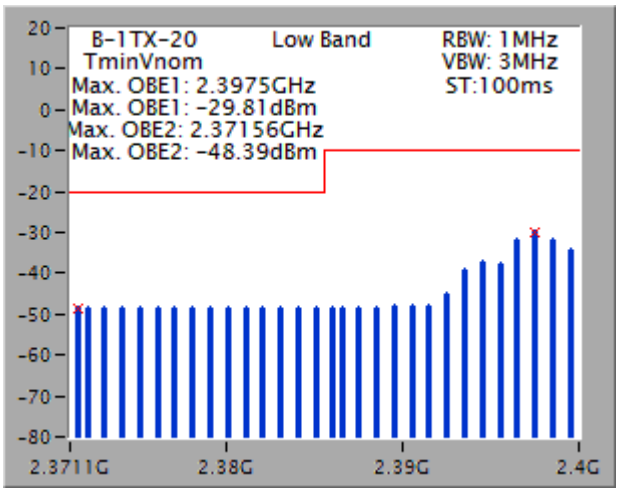
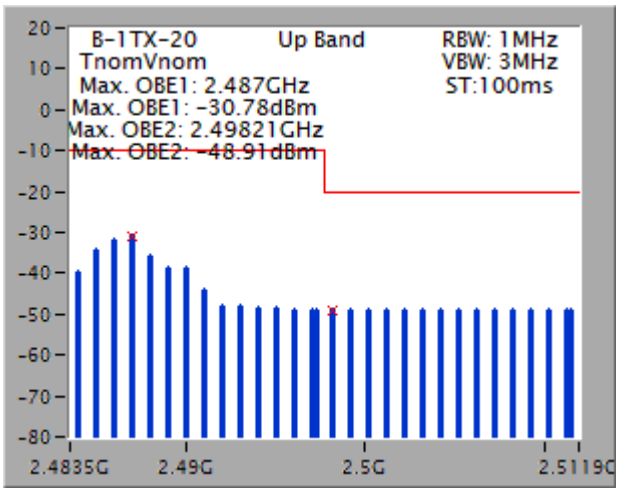
3.4.4 Test Setup

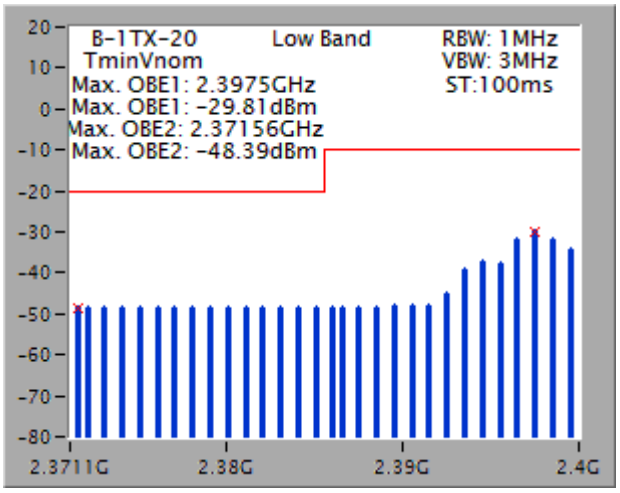
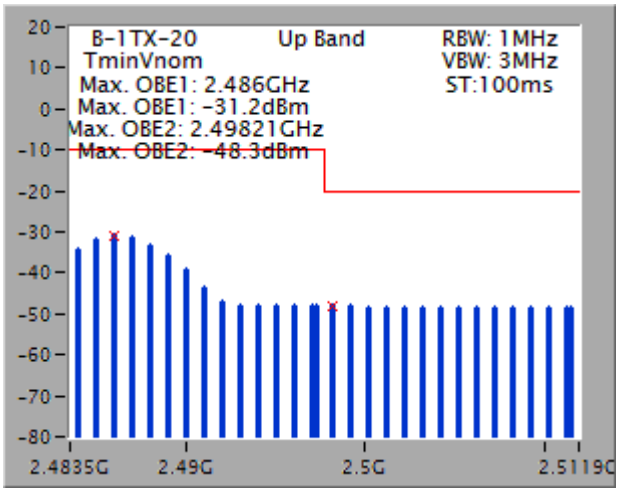
Transmitter Unwanted Emissions in the Out-of-band Domain

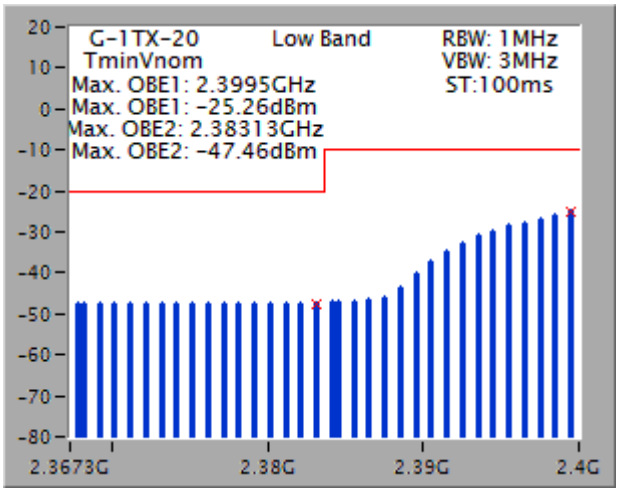
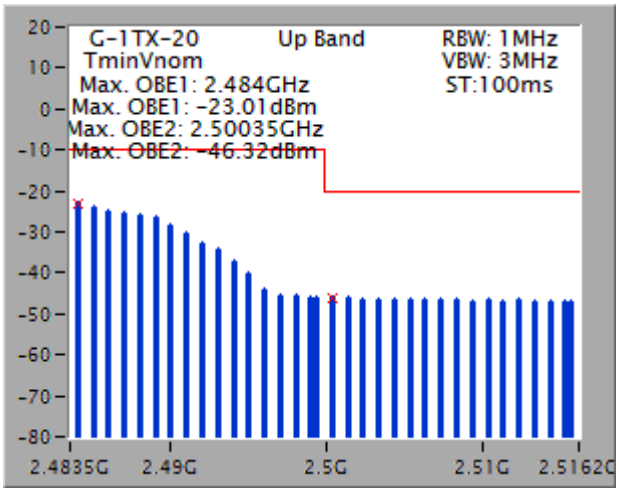


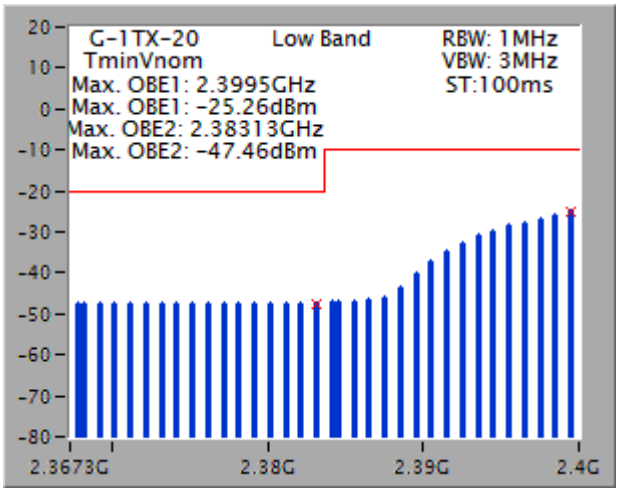
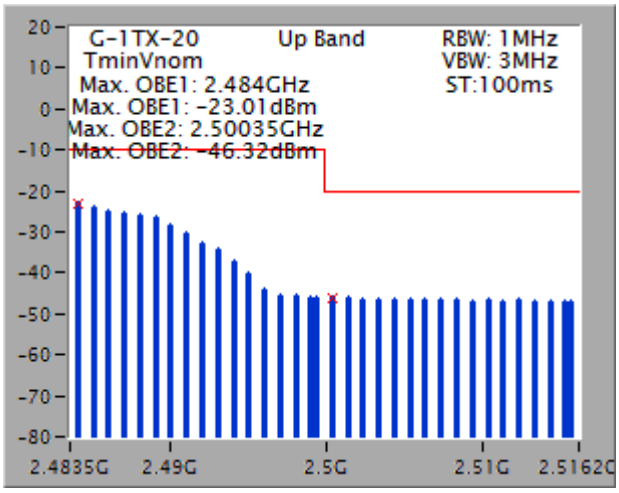
Test conditions:
These measurements have to be performed at normal environmental conditions.

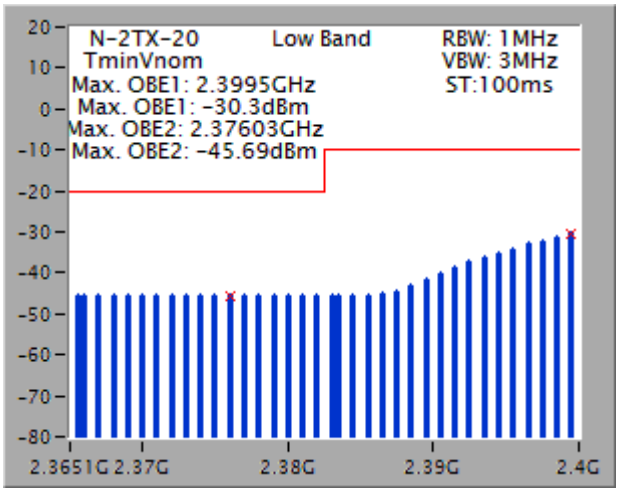
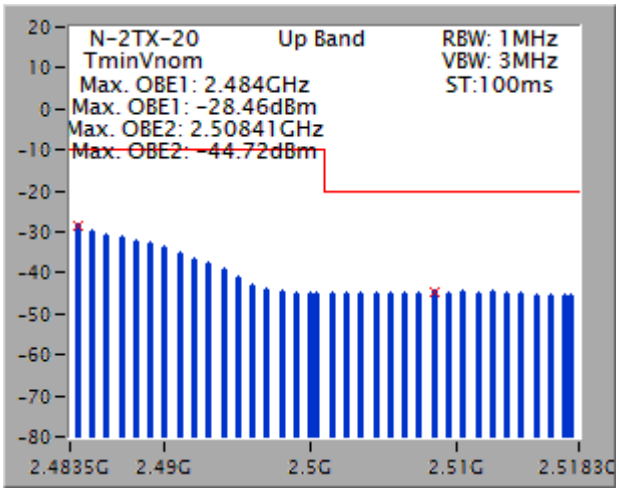
3.4.5 Test Result of Transmitter Unwanted Emissions in the Out-of-band Domain

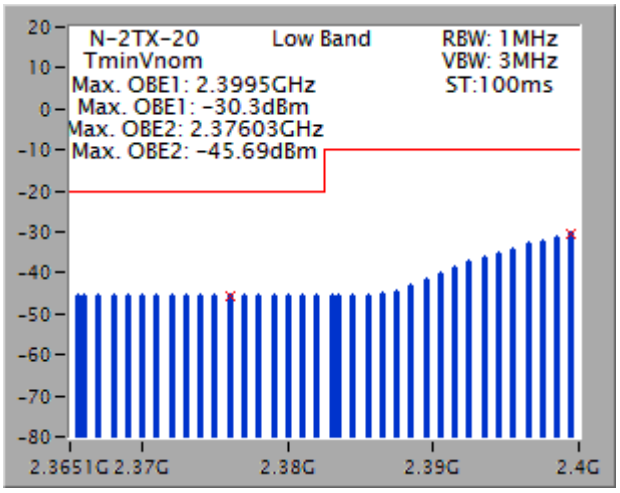
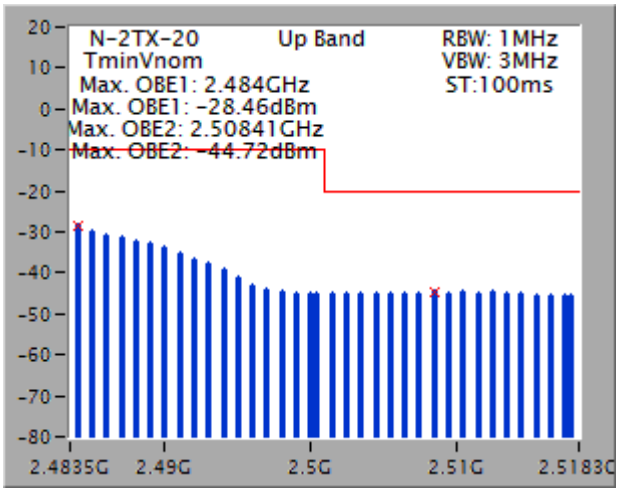
Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	11b	1	2412	2397.5	-34.94	-10
TminVnom	11b	1	2412	2397.5	-29.81	-10
TmaxVnom	11b	1	2412	2397.5	-36.25	-10
TnomVnom	11b	1	2472	2487.0	-30.78	-10
TminVnom	11b	1	2472	2486.0	-31.20	-10
TmaxVnom	11b	1	2472	2486.0	-38.05	-10
Low Band				Up Band		
						
Result				Complied		

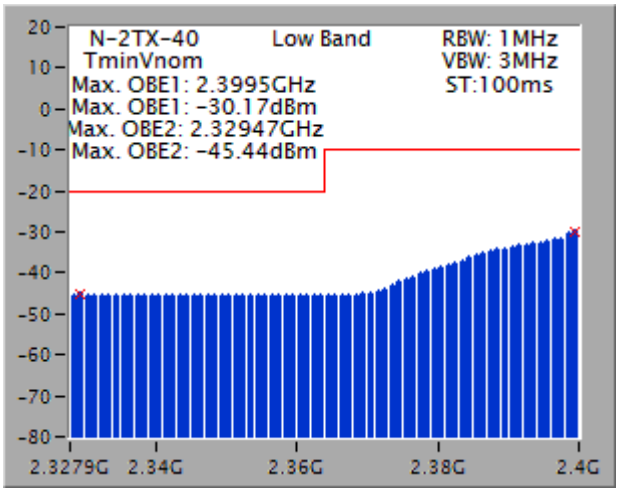
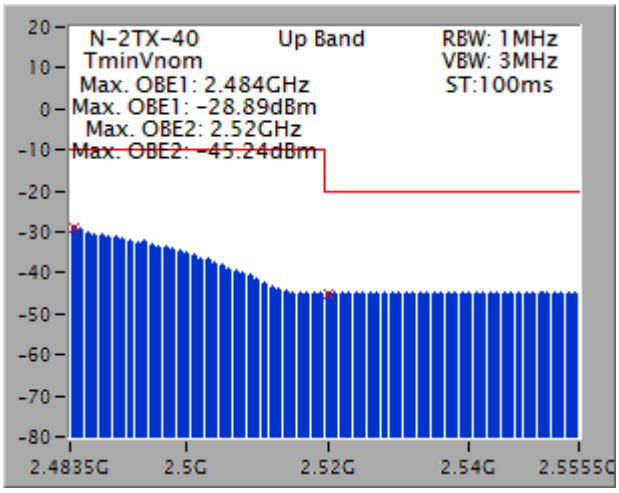
Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	11b	1	2412	2372.03	-49.06	-20
TminVnom	11b	1	2412	2371.56	-48.39	-20
TmaxVnom	11b	1	2412	2373.03	-49.01	-20
TnomVnom	11b	1	2472	2498.21	-48.91	-20
TminVnom	11b	1	2472	2498.21	-48.30	-20
TmaxVnom	11b	1	2472	2498.21	-48.92	-20
Low Band				Up Band		
						
Result				Complied		

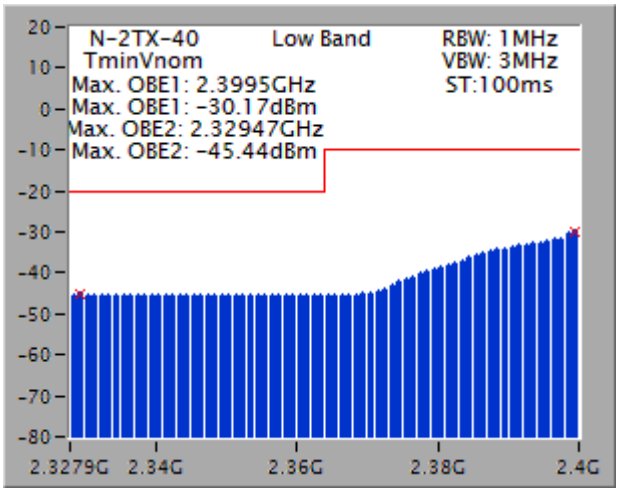
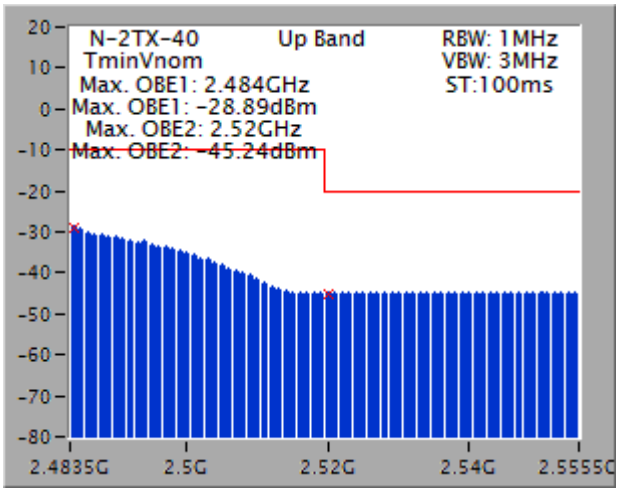
Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	11g	1	2412	2399.5	-27.97	-10
TminVnom	11g	1	2412	2399.5	-25.26	-10
TmaxVnom	11g	1	2412	2399.5	-31.93	-10
TnomVnom	11g	1	2472	2484.0	-24.95	-10
TminVnom	11g	1	2472	2484.0	-23.01	-10
TmaxVnom	11g	1	2472	2484.0	-30.50	-10
Low Band				Up Band		
						
Result				Complied		

Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	11g	1	2412	2376.13	-47.94	-20
TminVnom	11g	1	2412	2383.13	-47.46	-20
TmaxVnom	11g	1	2412	2376.13	-48.57	-20
TnomVnom	11g	1	2472	2508.35	-46.88	-20
TminVnom	11g	1	2472	2500.35	-46.32	-20
TmaxVnom	11g	1	2472	2508.35	-47.64	-20
Low Band				Up Band		
						
Result				Complied		

Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	HT20	2	2412	2399.5	-33.05	-10
TminVnom	HT20	2	2412	2399.5	-30.30	-10
TmaxVnom	HT20	2	2412	2399.5	-36.89	-10
TnomVnom	HT20	2	2472	2484.0	-31.20	-10
TminVnom	HT20	2	2472	2484.0	-28.46	-10
TmaxVnom	HT20	2	2472	2484.0	-35.00	-10
Low Band				Up Band		
						
Result				Complied		

Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	HT20	2	2412	2376.03	-45.95	-20
TminVnom	HT20	2	2412	2376.03	-45.69	-20
TmaxVnom	HT20	2	2412	2370.03	-46.39	-20
TnomVnom	HT20	2	2472	2508.41	-45.03	-20
TminVnom	HT20	2	2472	2508.41	-44.72	-20
TmaxVnom	HT20	2	2472	2508.41	-45.41	-20
Low Band				Up Band		
						
Result				Complied		

Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	HT40	2	2422	2398.5	-33.24	-10
TminVnom	HT40	2	2422	2399.5	-30.17	-10
TmaxVnom	HT40	2	2422	2398.5	-37.02	-10
TnomVnom	HT40	2	2462	2484.0	-31.68	-10
TminVnom	HT40	2	2462	2484.0	-28.89	-10
TmaxVnom	HT40	2	2462	2484.0	-35.75	-10
Low Band				Up Band		
						
Result				Complied		

Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Oct. 01, 2015		OOB Emissions (dBm/MHz)				
Condition	Modulation Mode	N_{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	HT40	2	2422	2328.44	-45.76	-20
TminVnom	HT40	2	2422	2329.47	-45.44	-20
TmaxVnom	HT40	2	2422	2335.47	-46.20	-20
TnomVnom	HT40	2	2462	2520.00	-45.69	-20
TminVnom	HT40	2	2462	2520.00	-45.24	-20
TmaxVnom	HT40	2	2462	2520.00	-46.24	-20
Low Band				Up Band		
						
Result				Complied		

3.5 Transmitter Unwanted Emissions in the Spurious Domain

3.5.1 Transmitter Unwanted Emissions in the Spurious Domain Limit

Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz
Note 1: spurious domain ≤ (2400 MHz – 2N) and spurious domain ≥ (2483.5 MHz + 2N); N = MAX (1, Occupied Channel Bandwidth) MHz		

3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method
☐ Refer as EN 300 328, clause 5.4.9.2.1 for conducted measurement. Conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☒ Refer as EN 300 328, clause 5.4.9.2.2 for radiated measurement.

Pre-scan: The test procedure below shall be used to identify potential unwanted emissions of the UUT.

Step 1: The sensitivity of the spectrum analyzer should be such that the noise floor is at least 12 dB below the limits given in tables 4 or 12.

Step 2: The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyzer settings :
- Resolution bandwidth : 100 kHz
- Video bandwidth : 300 kHz
- Detector mode : Peak
- Filter type : 3 dB (Gaussian)
- Trace Mode : Max Hold
- Sweep Points : ≥ 19 400

NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
- Sweep time:
  - •For non-continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT.
  - •For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in tables 4 or 12.

Step 3: The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyzer settings:
- Resolution bandwidth : 1 MHz
- Video bandwidth : 3 MHz
- Filter type : 3 dB (Gaussian)
- Detector mode : Peak
- Trace Mode : Max Hold
- Sweep Points : ≥ 23 500

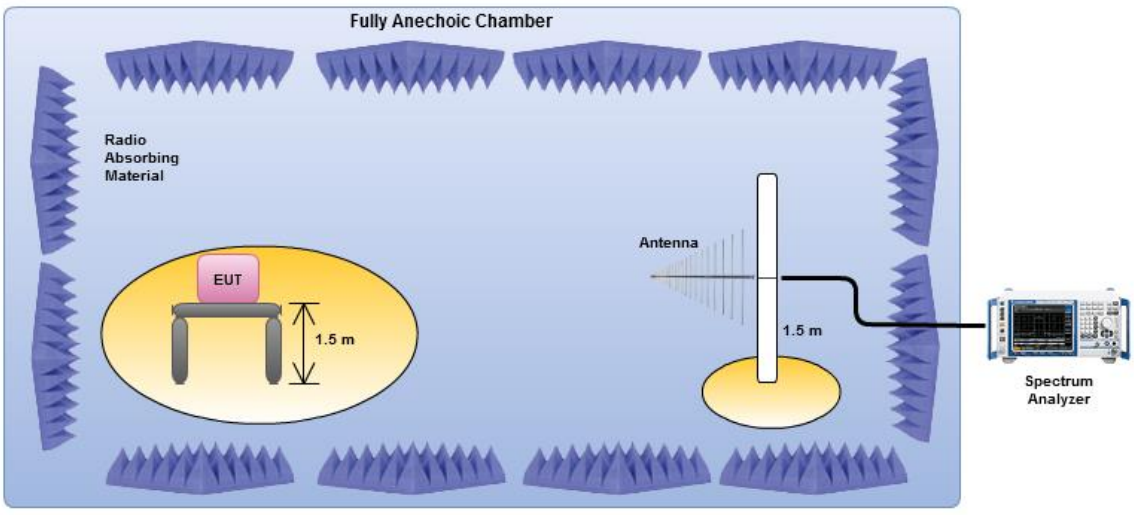
NOTE 2: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
- Sweep time:
  - •For non-continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.
  - •For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences.

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in tables 4 or 12.
Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3.

Step 4:	In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active transmit chains).
Measurement of the emissions identified during the pre-scan	
Step 1:	The level of the emissions shall be measured using the following spectrum analyzer settings: - Measurement Mode : Time Domain Power - Centre Frequency : Frequency of emission identified during the pre-scan - Resolution Bandwidth : 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) - Video Bandwidth : 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) - Frequency Span : Zero Span - Sweep mode : Single Sweep - Sweep time : >120 % of the duration of the longest burst detected during the measurement of the RF Output Power - Sweep points : Sweep time [µs] / (1 µs) with a maximum of 30 000 - Trigger : Video (burst signals) or Manual (continuous signals) - Detector : RMS
Step 2:	Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.
Step 3:	In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (Ach). Sum the measured power (within the observed window) for each of the active transmit chains.
Step 4:	The value defined in step 3 shall be compared to the limits defined in tables 4 or 12.

3.5.4 Test Setup

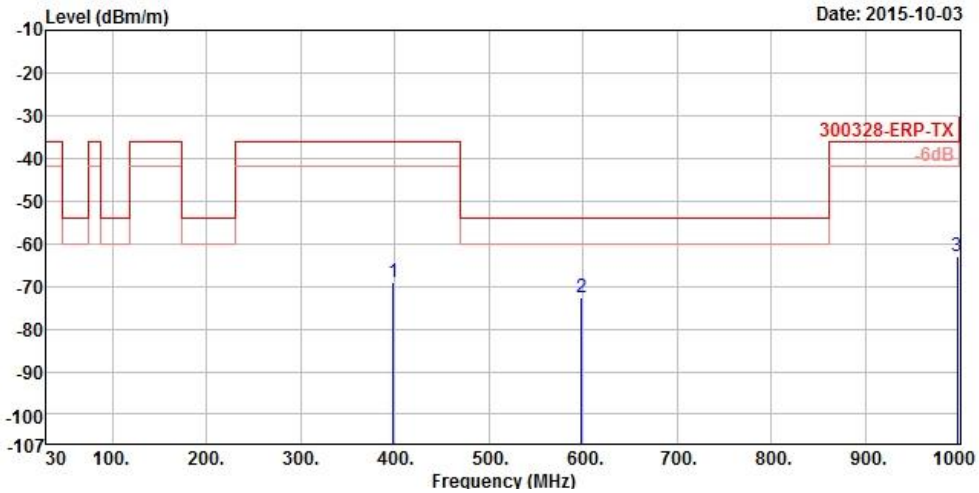
Transmitter Unwanted Emissions in the Spurious Domain



Test conditions:
These measurements shall only be performed at normal test conditions.
A measuring distance of at least 3 m shall be used for measurements at frequencies up to 1 GHz. For frequencies above 1 GHz, any suitable measuring far field distance may be used, depending on the test system noise floor for detecting spurious emission signals. The equipment size (excluding the antenna) shall be less than 20 % of the measuring distance. The height of the equipment or of the substitution antenna shall be 1.5 m.

3.5.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)

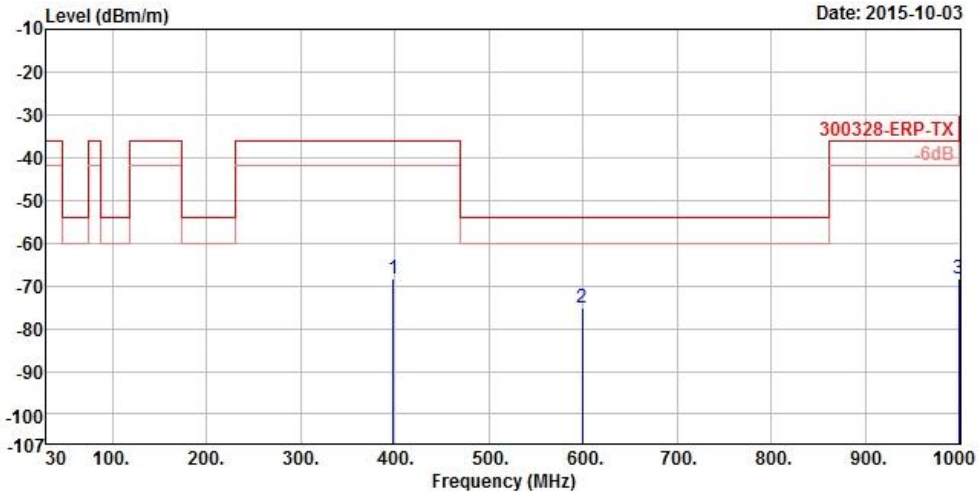
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Modulation Mode	HT20	**Polarization**	V
Operating Mode	1	**Operating Function**	Transmit



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	398.600	-68.92	-32.92	-36.00	-71.98	3.06
2	598.420	-72.62	-18.62	-54.00	-76.60	3.98
3	997.090	-62.83	-26.83	-36.00	-71.86	9.03

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Modulation Mode	HT20	**Polarization**	H
Operating Mode	1	**Operating Function**	Transmit

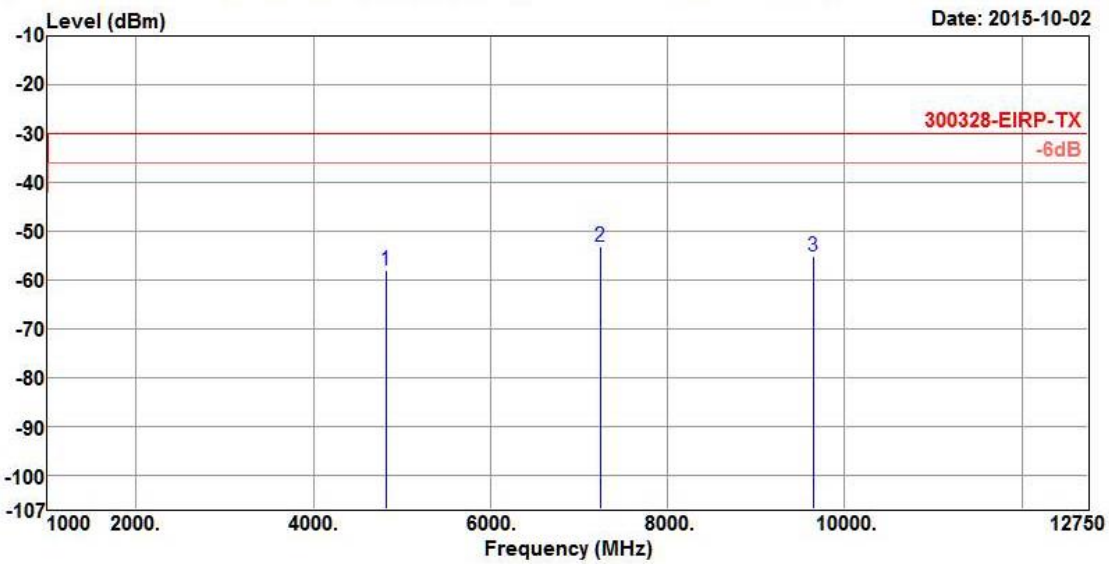


	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	398.600	-68.34	-32.34	-36.00	-71.93	3.59
2	599.390	-75.00	-21.00	-54.00	-78.69	3.69
3	999.030	-68.22	-32.22	-36.00	-77.63	9.41

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)

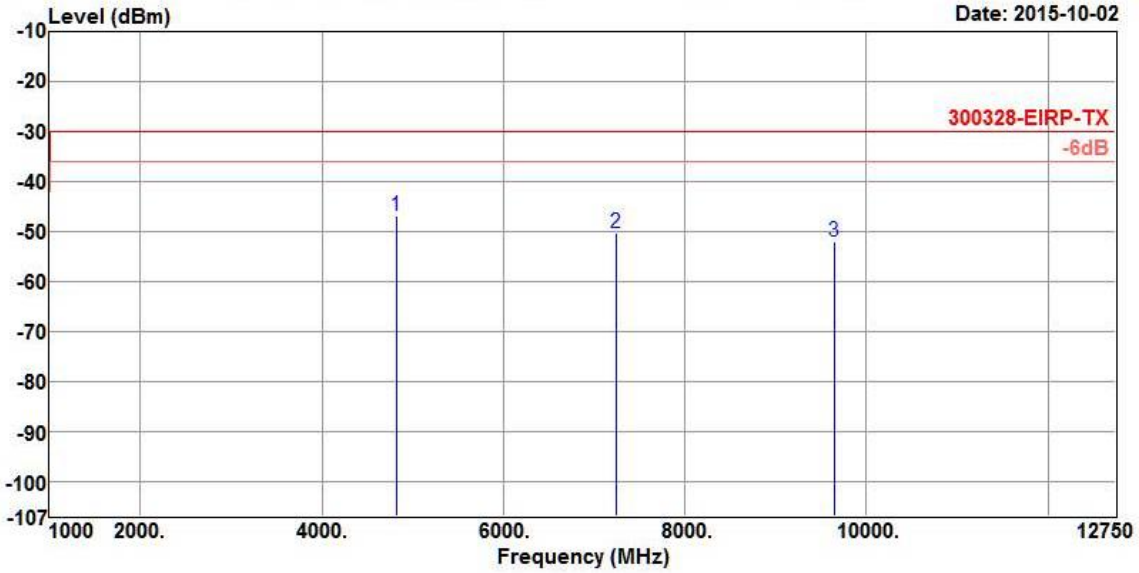
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-58.15	-28.15	-30.00	-53.08	-5.07
2	7236.000	-53.33	-23.33	-30.00	-53.04	-0.29
3	9648.000	-55.29	-25.29	-30.00	-53.42	-1.87

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

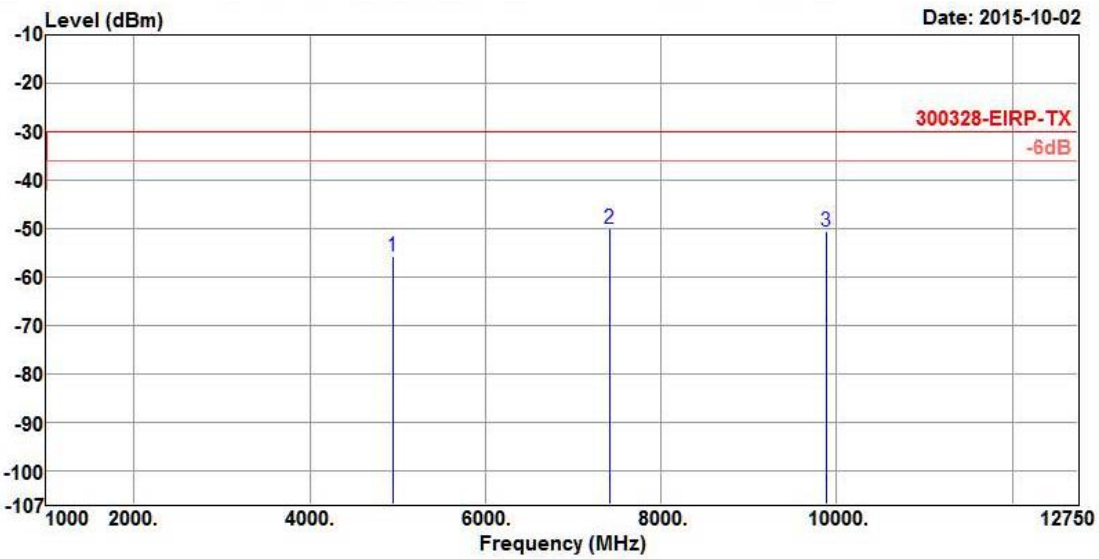
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-46.82	-16.82	-30.00	-42.53	-4.29
2	7236.000	-50.41	-20.41	-30.00	-52.49	2.08
3	9648.000	-51.91	-21.91	-30.00	-53.98	2.07

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

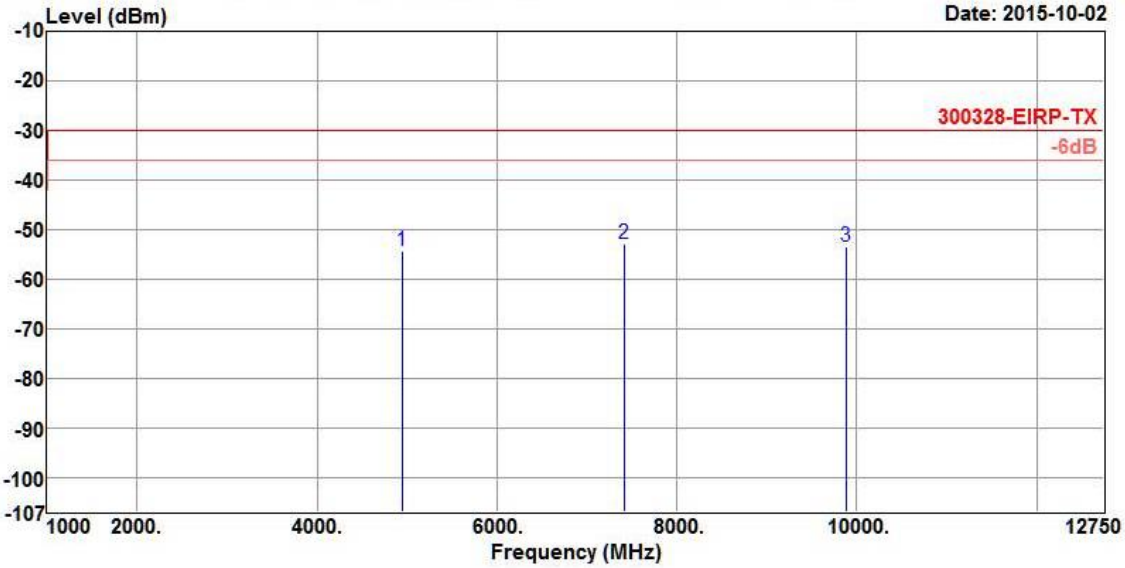
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2472
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4944.000	-55.84	-25.84	-30.00	-51.77	-4.07
2	7416.000	-50.10	-20.10	-30.00	-51.58	1.48
3	9888.000	-50.64	-20.64	-30.00	-53.03	2.39

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

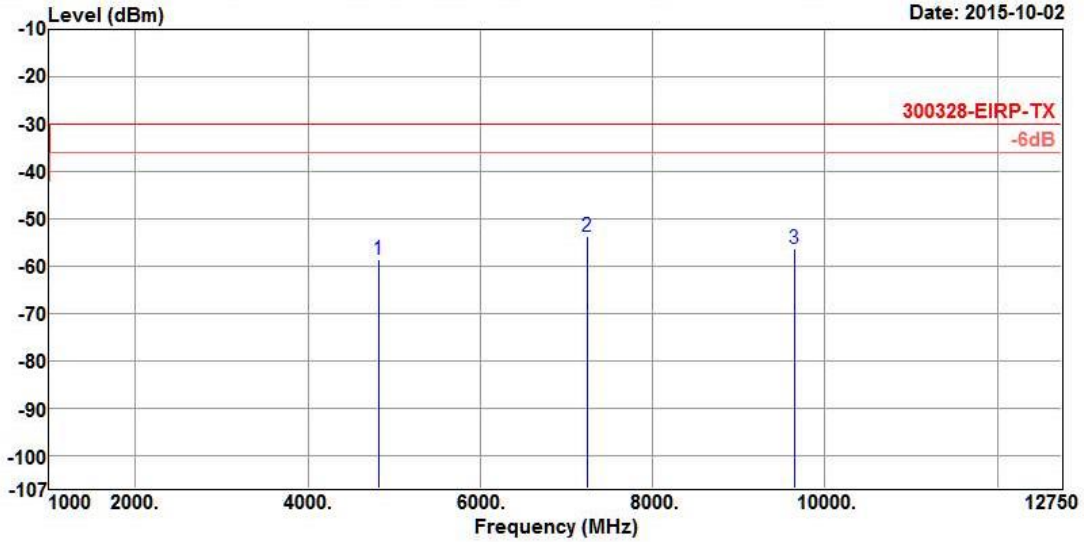
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2472
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4944.000	-54.27	-24.27	-30.00	-49.33	-4.94
2	7416.000	-52.93	-22.93	-30.00	-52.72	-0.21
3	9888.000	-53.40	-23.40	-30.00	-52.93	-0.47

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

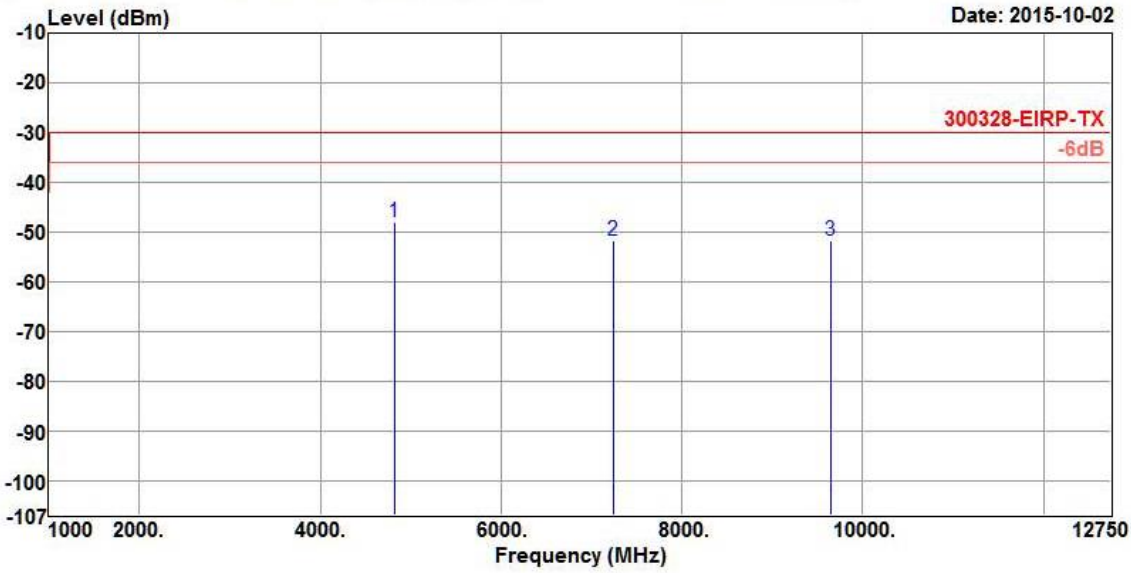
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-58.49	-28.49	-30.00	-53.42	-5.07
2	7236.000	-53.69	-23.69	-30.00	-53.40	-0.29
3	9648.000	-56.25	-26.25	-30.00	-54.38	-1.87

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

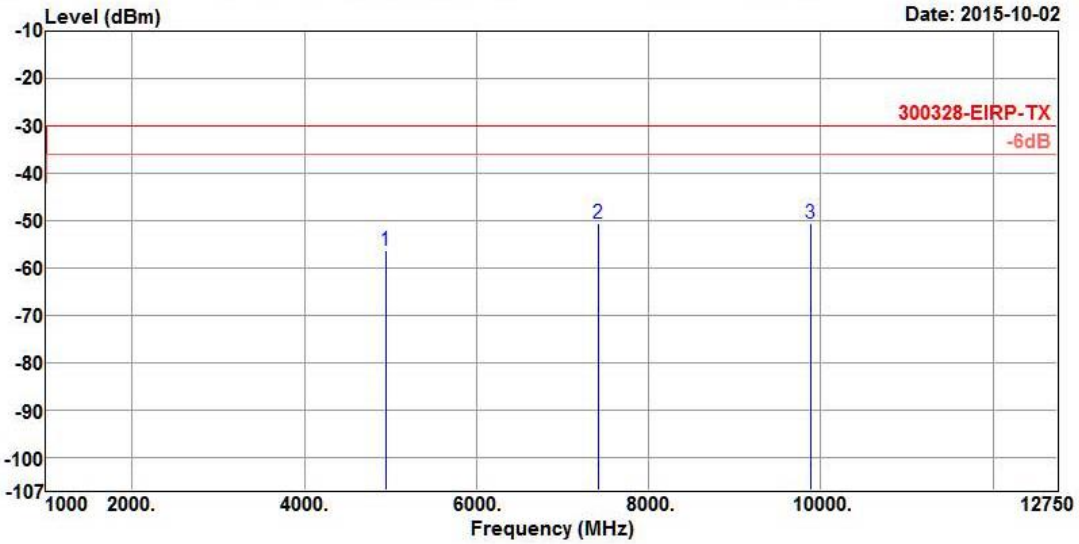
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-48.11	-18.11	-30.00	-43.82	-4.29
2	7236.000	-51.68	-21.68	-30.00	-53.76	2.08
3	9648.000	-51.79	-21.79	-30.00	-53.86	2.07

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

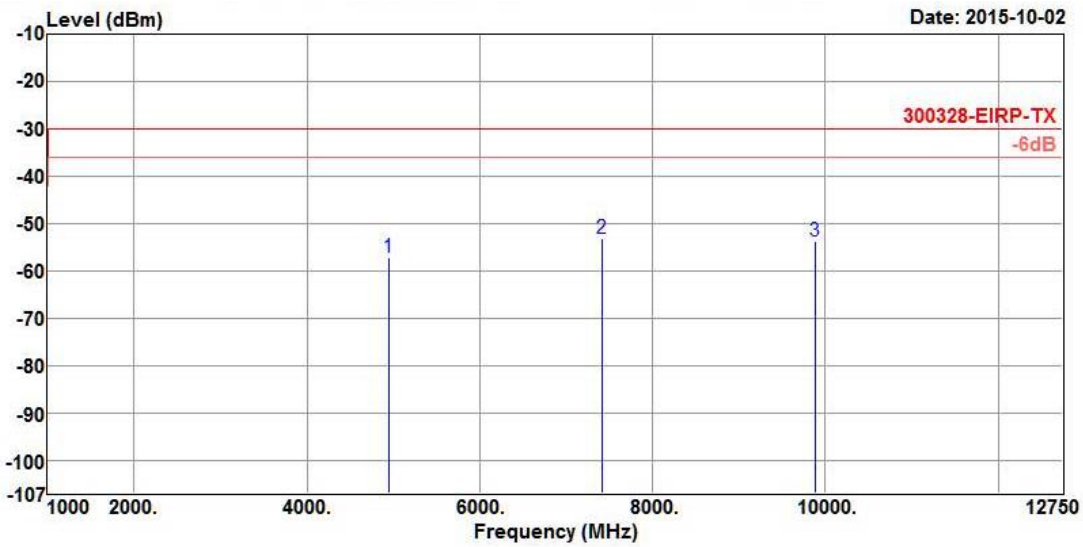
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2472
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4944.000	-56.26	-26.26	-30.00	-52.19	-4.07
2	7416.750	-50.61	-20.61	-30.00	-52.09	1.48
3	9888.000	-50.64	-20.64	-30.00	-53.03	2.39

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

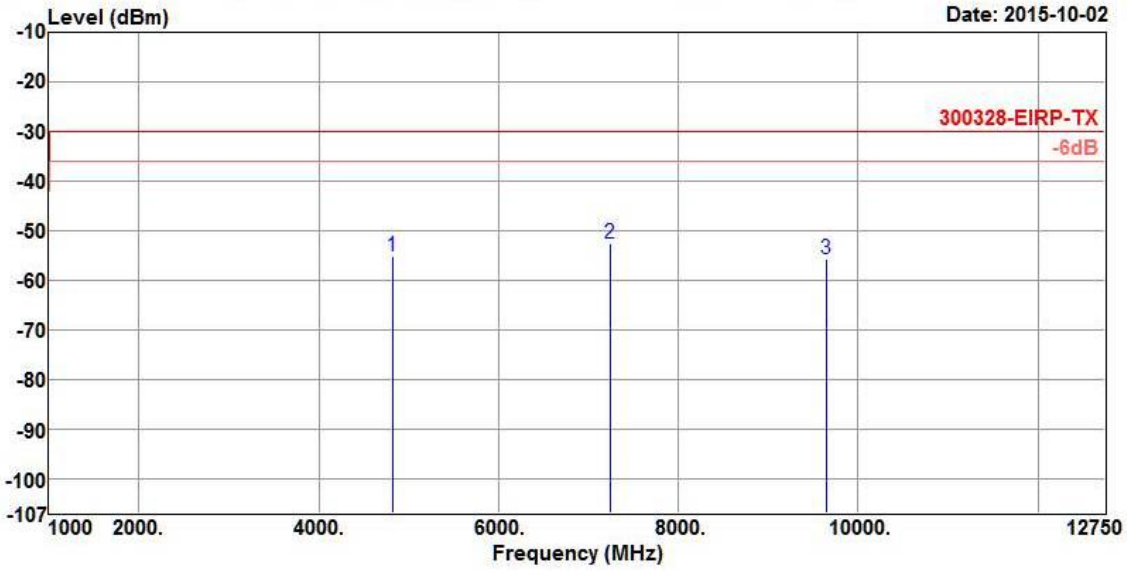
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2472
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4944.000	-57.31	-27.31	-30.00	-52.37	-4.94
2	7416.750	-53.26	-23.26	-30.00	-53.05	-0.21
3	9888.000	-53.67	-23.67	-30.00	-53.20	-0.47

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

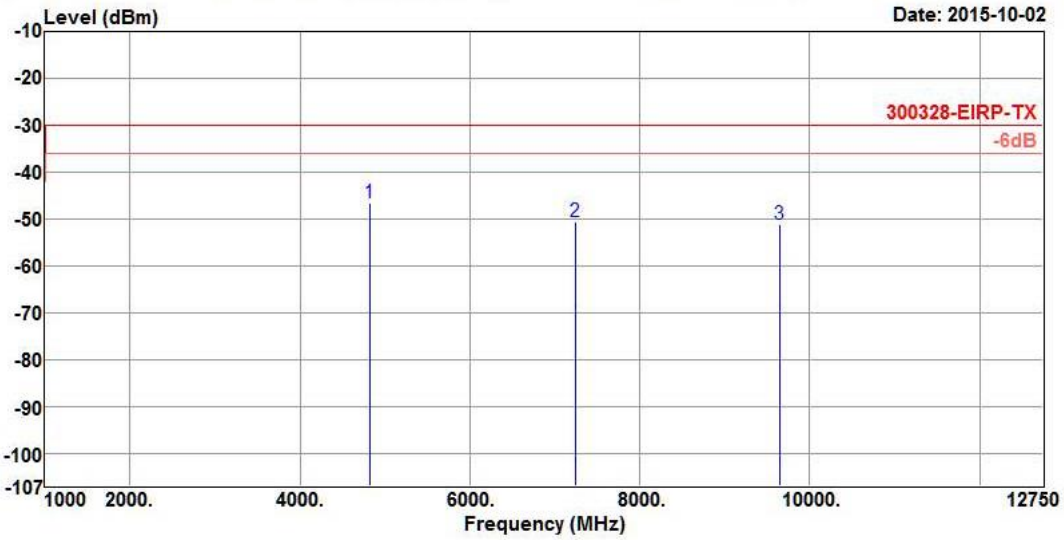
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2412
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-55.29	-25.29	-30.00	-50.22	-5.07
2	7236.000	-52.72	-22.72	-30.00	-52.43	-0.29
3	9648.000	-55.65	-25.65	-30.00	-53.78	-1.87

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

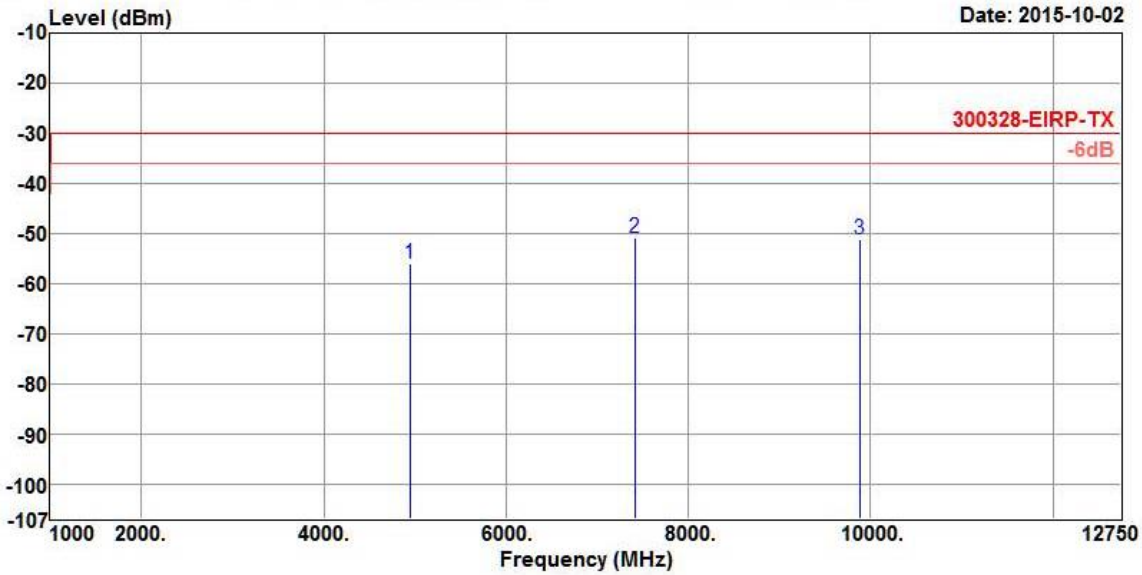
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2412
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-46.60	-16.60	-30.00	-42.31	-4.29
2	7236.000	-50.69	-20.69	-30.00	-52.77	2.08
3	9648.000	-51.20	-21.20	-30.00	-53.27	2.07

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

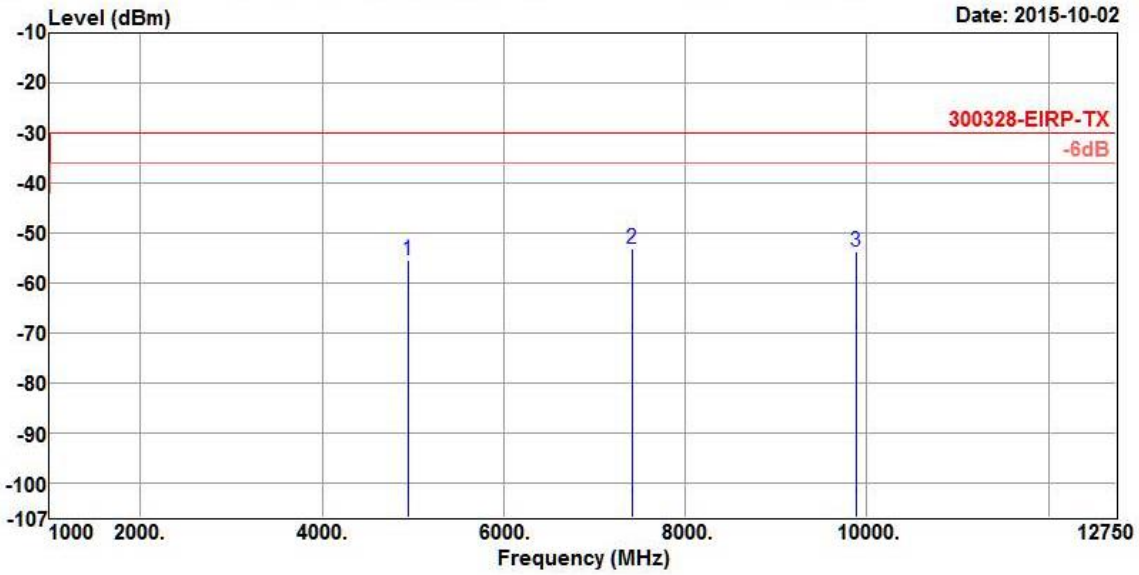
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2472
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4944.000	-56.11	-26.11	-30.00	-52.04	-4.07
2	7416.000	-50.93	-20.93	-30.00	-52.41	1.48
3	9888.000	-51.11	-21.11	-30.00	-53.50	2.39

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

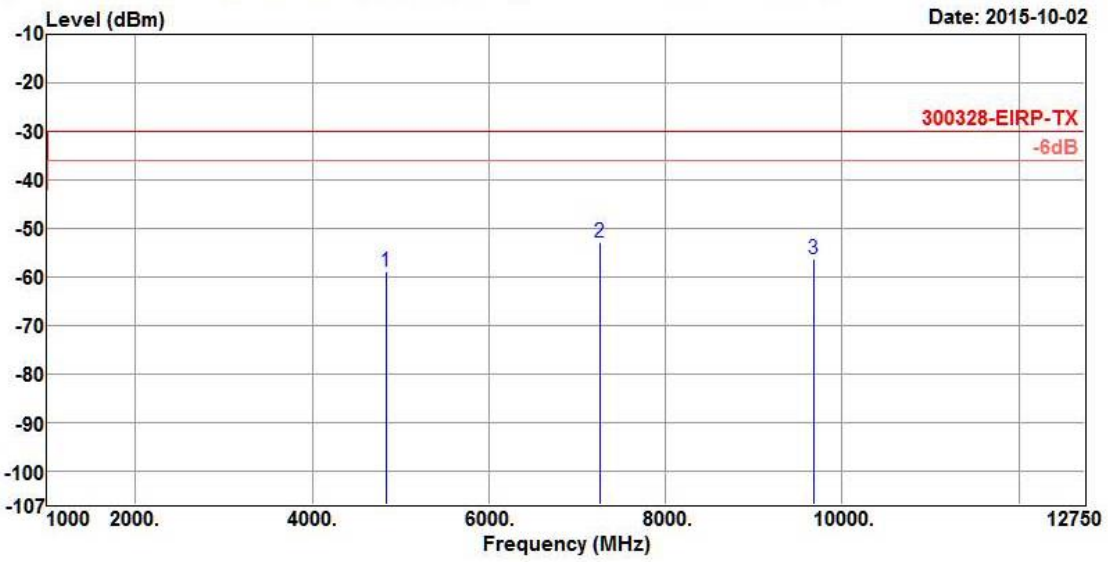
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2472
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4944.000	-55.45	-25.45	-30.00	-50.51	-4.94
2	7416.000	-53.10	-23.10	-30.00	-52.89	-0.21
3	9888.000	-53.70	-23.70	-30.00	-53.23	-0.47

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

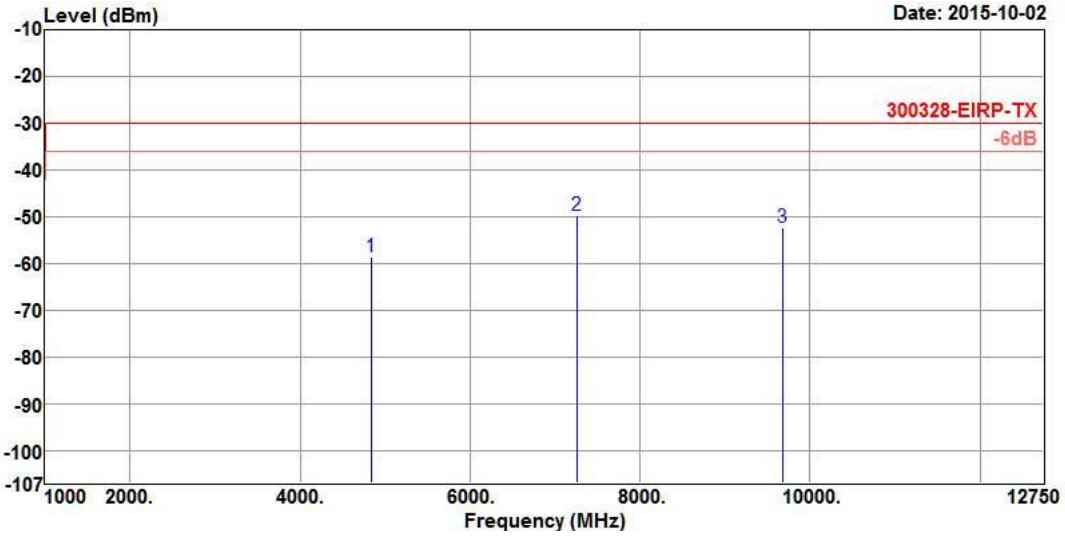
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2422
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4844.000	-58.86	-28.86	-30.00	-53.80	-5.06
2	7266.000	-52.98	-22.98	-30.00	-52.70	-0.28
3	9688.000	-56.42	-26.42	-30.00	-54.75	-1.67

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

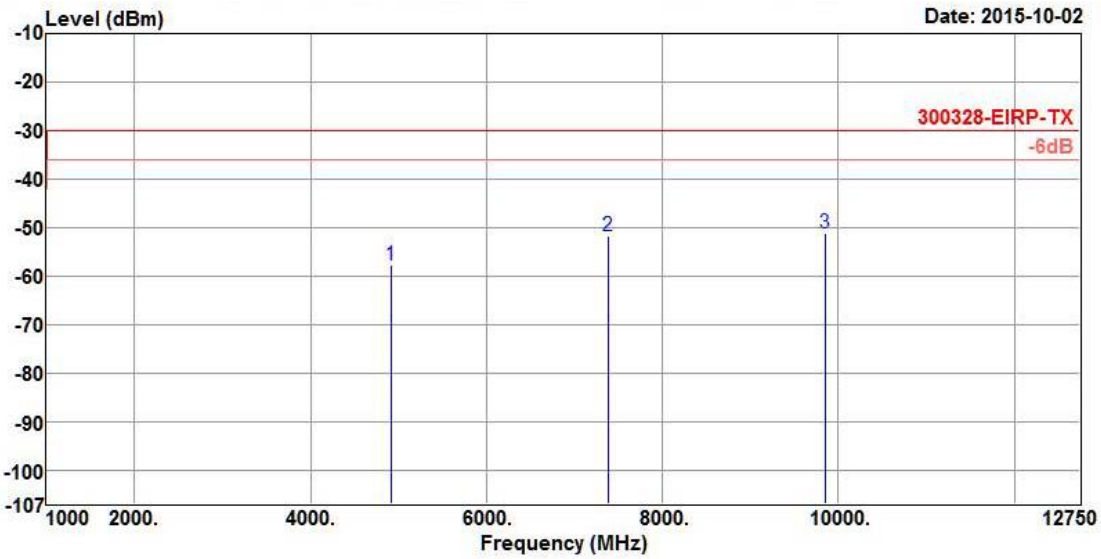
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2422
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4844.000	-58.56	-28.56	-30.00	-54.30	-4.26
2	7266.000	-49.79	-19.79	-30.00	-51.75	1.96
3	9688.000	-52.39	-22.39	-30.00	-54.51	2.12

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

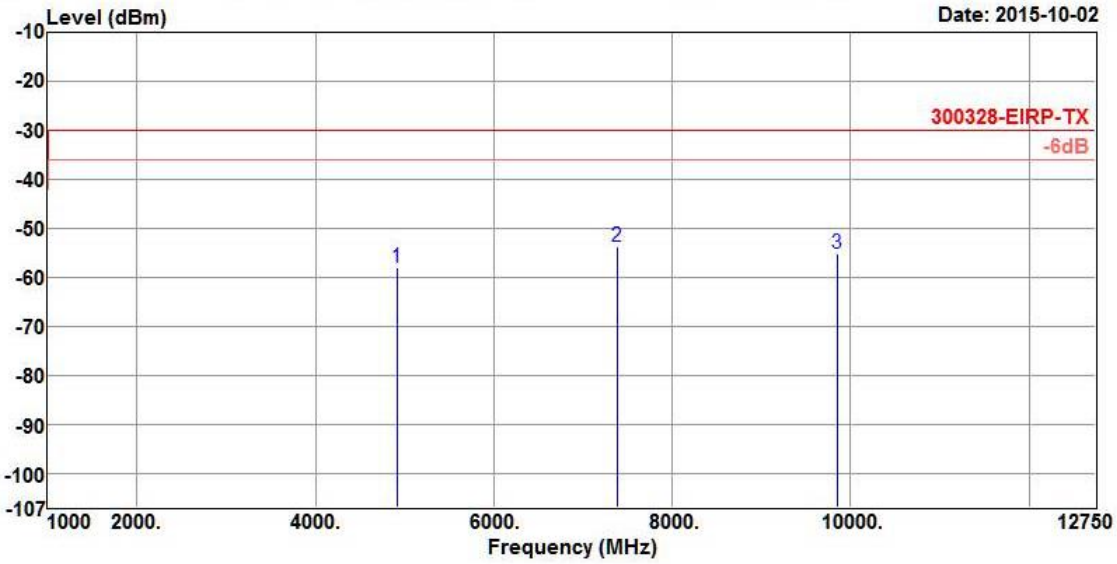
Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2462
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4924.000	-57.71	-27.71	-30.00	-53.61	-4.10
2	7386.000	-51.72	-21.72	-30.00	-53.27	1.55
3	9848.000	-51.10	-21.10	-30.00	-53.42	2.32

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2462
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4924.000	-58.00	-28.00	-30.00	-53.04	-4.96
2	7386.000	-53.77	-23.77	-30.00	-53.56	-0.21
3	9848.000	-55.11	-25.11	-30.00	-54.34	-0.77

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

4 Receiver Test Result

4.1 Receiver Spurious Emissions

4.1.1 Receiver Spurious Emissions Limit

Frequency Range	Maximum Power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

4.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

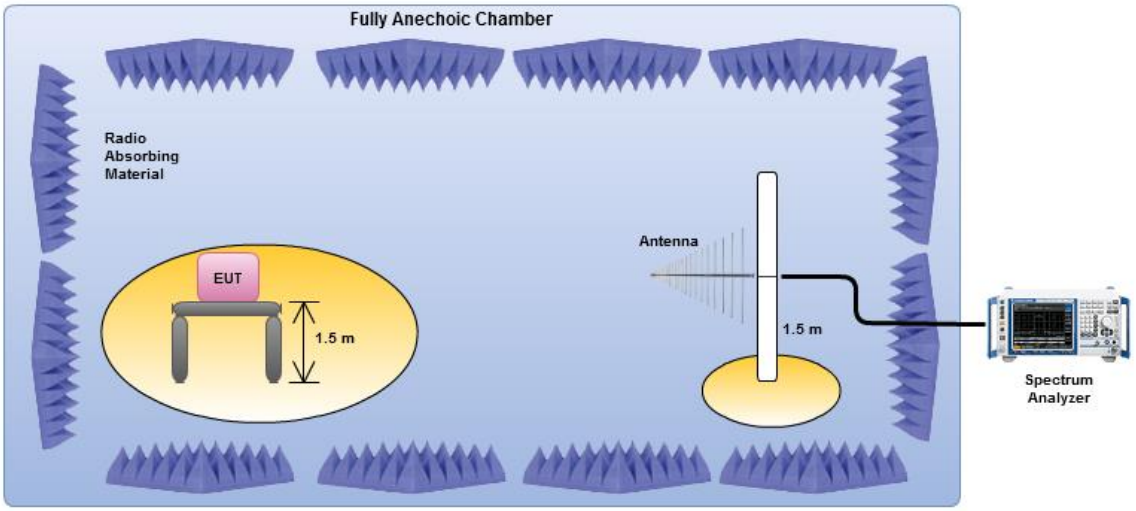
4.1.3 Test Procedures

Test Method
☐ Refer as EN 300 328, clause 5.4.10.2.1 for conducted measurement. Conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☒ Refer as EN 300 328, clause 5.4.10.2.2 for radiated measurement.
Pre-scan: The test procedure below shall be used to identify potential unwanted emissions of the UUT. Step 1: The sensitivity of the spectrum analyzer should be such that the noise floor is at least 12 dB below the limits given in tables 5 or 13. Step 2: The emissions over the range 30 MHz to 1 000 MHz shall be identified. Spectrum analyzer settings : - Resolution bandwidth : 100 kHz - Video bandwidth : 300 kHz - Filter type : 3 dB (Gaussian) - Detector mode : Peak - Trace Mode : Max Hold - Sweep Points : ≥ 19 400 NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented. - Sweep time : Auto Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in tables 5 or 13.

Step 3:	The emissions over the range 1 GHz to 12,75 GHz shall be identified. Spectrum analyzer settings: - Resolution bandwidth : 1 MHz - Video bandwidth : 3 MHz - Filter type : 3 dB (Gaussian) - Detector mode : Peak - Trace Mode : Max Hold - Sweep Points : ≥ 23 500 NOTE 2: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented. - Sweep time: Auto Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in tables 5 or 13. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.10.2.1.3.
Step 4:	In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active transmit chains).
	Measurement of the emissions identified during the pre-scan
Step 1:	The level of the emissions shall be measured using the following spectrum analyzer settings: - Measurement Mode : Time Domain Power - Centre Frequency : Frequency of emission identified during the pre-scan - Resolution Bandwidth : 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) - Video Bandwidth : 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) - Frequency Span : Zero Span - Sweep mode : Single Sweep - Sweep time : 30 ms - Sweep Point : ≥ 30 000 - Trigger : Video (for burst signals) or Manual (for continuous signals) - Detector : RMS
Step 2:	Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to the start and stop times of the sweep.
Step 3:	In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), step 2 needs to be repeated for each of the active receive chains (Ach). Sum the measured power (within the observed window) for each of the active receive chains
Step 4:	The value defined in step 3 shall be compared to the limits defined in tables 5 and 13.

4.1.4 Test Setup

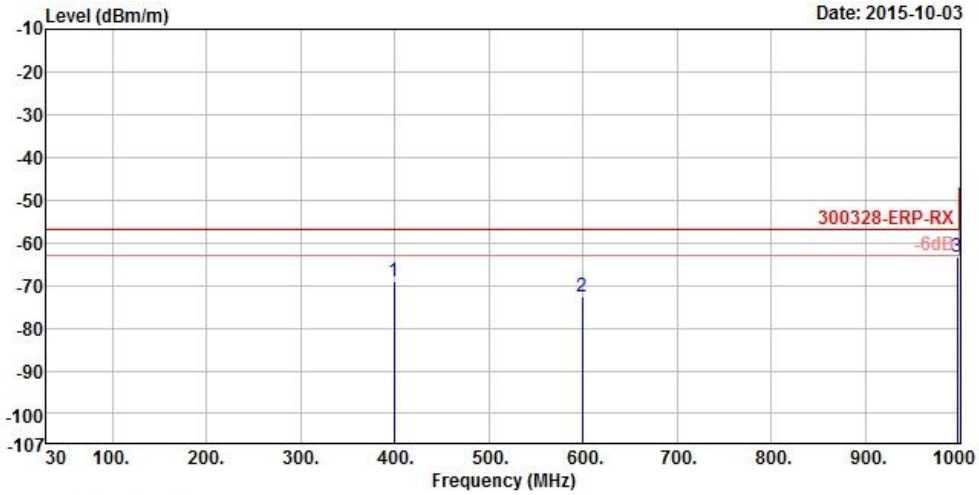
Receiver Spurious Emissions



Test conditions:
These measurements shall only be performed at normal test conditions.
A measuring distance of at least 3 m shall be used for measurements at frequencies up to 1 GHz. For frequencies above 1 GHz, any suitable measuring far field distance may be used, depending on the test system noise floor for detecting spurious emission signals. The equipment size (excluding the antenna) shall be less than 20 % of the measuring distance. The height of the equipment or of the substitution antenna shall be 1.5 m.

4.1.5 Receiver Radiated Spurious Emissions (Below 1GHz)

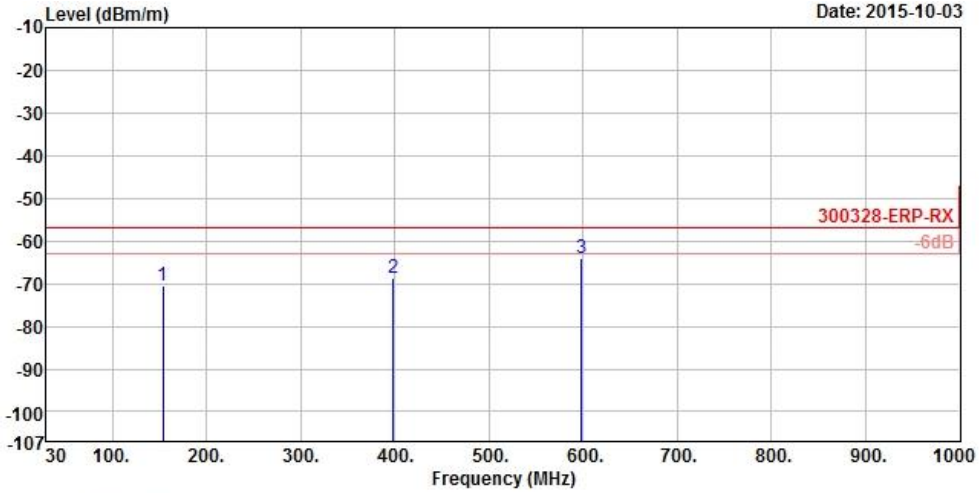
Receiver Radiated Spurious Emissions (Below 1GHz)			
Operating Function	Receive	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	399.570	-69.13	-12.13	-57.00	-72.24	3.11
2	599.390	-72.46	-15.46	-57.00	-76.46	4.00
3	997.090	-63.40	-6.40	-57.00	-72.43	9.03

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Receiver Radiated Spurious Emissions (Below 1GHz)			
Operating Function	Receive	**Polarization**	H

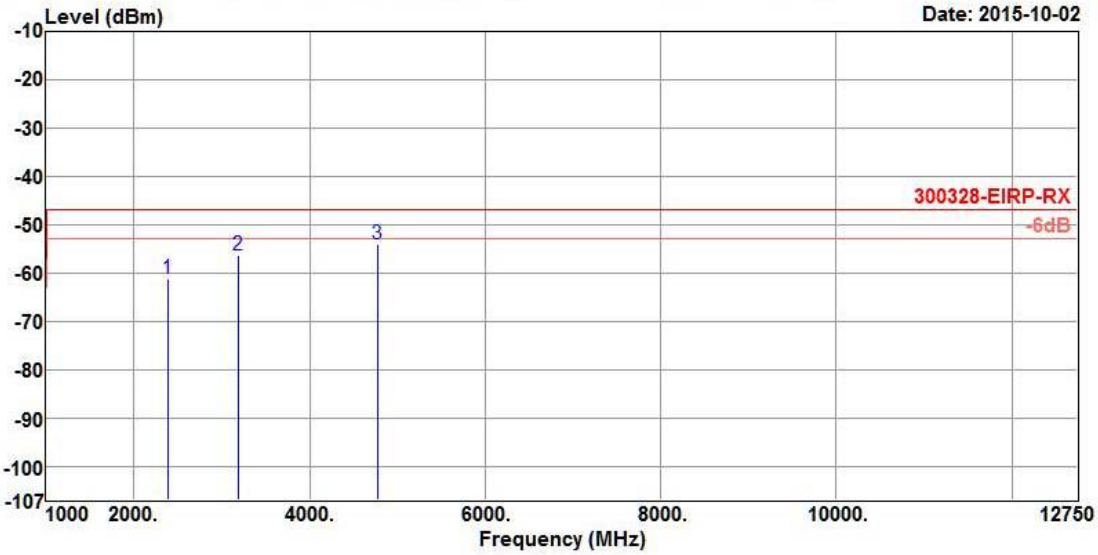


	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	154.160	-70.39	-13.39	-57.00	-65.76	-4.63
2	398.600	-68.82	-11.82	-57.00	-72.41	3.59
3	598.420	-63.97	-6.97	-57.00	-67.65	3.68

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

4.1.6 Receiver Radiated Spurious Emissions (Above 1GHz)

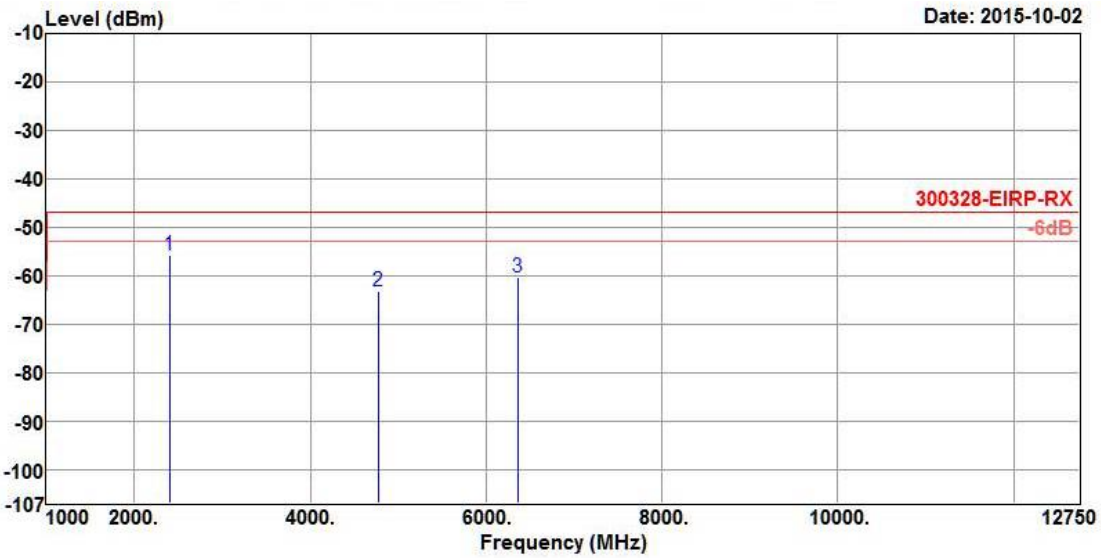
Receiver Radiated Spurious Emissions (Above 1GHz)			
Operating Function	Receive	**Test Freq. (MHz)**	2412
Polarization	V		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	2386.500	-61.24	-14.24	-47.00	-51.83	-9.41
2	3185.500	-56.30	-9.30	-47.00	-47.52	-8.78
3	4783.500	-53.98	-6.98	-47.00	-48.86	-5.12

Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

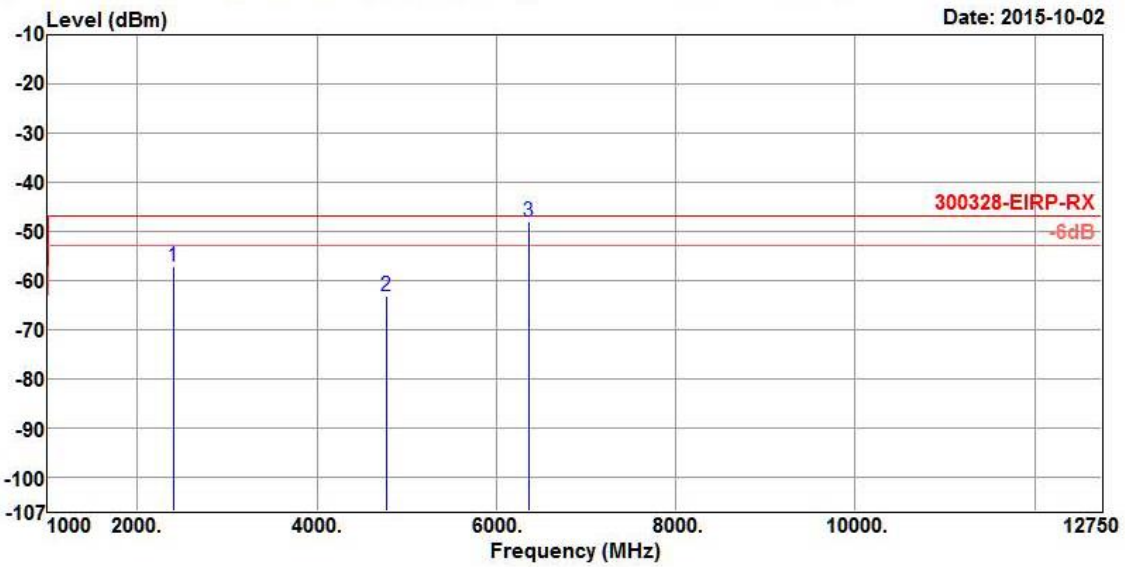
Receiver Radiated Spurious Emissions (Above 1GHz)			
Operating Function	Receive	**Test Freq. (MHz)**	2412
Polarization	H		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	2398.250	-55.71	-8.71	-47.00	-45.81	-9.90
2	4783.500	-63.22	-16.22	-47.00	-58.86	-4.36
3	6369.750	-60.30	-13.30	-47.00	-59.69	-0.61

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

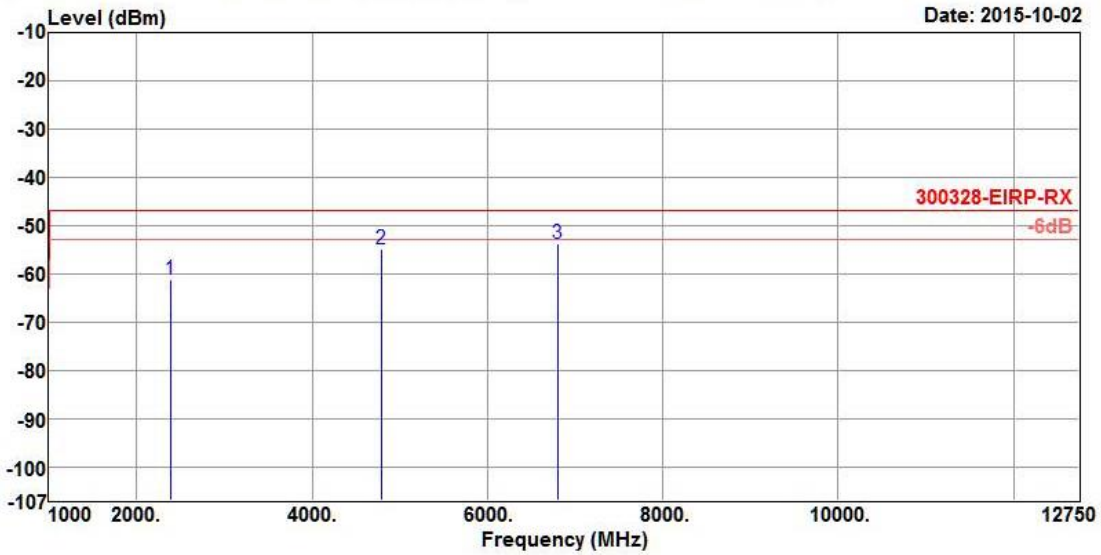
Receiver Radiated Spurious Emissions (Above 1GHz)			
Operating Function	Receive	**Test Freq. (MHz)**	2472
Polarization	V		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	2398.250	-57.23	-10.23	-47.00	-47.33	-9.90
2	4783.500	-63.19	-16.19	-47.00	-58.83	-4.36
3	6369.750	-47.96	-0.96	-47.00	-47.35	-0.61

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Receiver Radiated Spurious Emissions (Above 1GHz)			
Operating Function	Receive	**Test Freq. (MHz)**	2472
Polarization	H		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	2386.500	-61.09	-14.09	-47.00	-51.68	-9.41
2	4795.250	-54.90	-7.90	-47.00	-49.78	-5.12
3	6804.500	-53.82	-6.82	-47.00	-52.42	-1.40

Note 1: “>6dB” means spurious emission levels that exceed the level of 6 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

5 Adaptivity Test Result

5.1 Adaptivity

5.1.1 Adaptivity Limit

Adaptivity Limit
☒ Only for adaptive systems and RF Output Power > 10 dBm
☐ Non-LBT based Detect and Avoid: ◆ Minimum remain unavailable = 1sec; ◆ Minimum Idle Period time = 100us; ◆ Maximum COT = 40ms ◆ i.e. COT [40ms] + Idle Period [2ms - 5% of COT]; N x [COT+Idle]; ◆ TL = -70 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
☐ LBT based Detect and Avoid (Frame Based Equipment): ◆ Minimum Clear Channel Assessment (CCA) time > 18 us; ◆ Maximum COT = 1 ms to 10 ms ◆ Minimum of Idle period Time > 5% of COT ◆ e.g. CCA [120us] + COT [10ms] + Idle Period [0.5ms - 5% of COT]; ◆ TL = -70 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
☒ LBT based Detect and Avoid (Load Based Equipment with spectrum sharing mechanism IEEE Std.): ◆ LBT based spectrum sharing mechanism may implement IEEE 802.11™-2012 [i.3] clause 9, clause 10, clause 16, clause 17, clause 19 and clause 20, or in IEEE 802.15.4™-2011 [i.4], clause 4, clause 5 and clause 8 TL = -70 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
☒ LBT based Detect and Avoid (Load Based Equipment): ◆ Minimum Clear Channel Assessment (CCA) time >18 us; ◆ Maximum COT ≤ 13ms; ◆ Minimum of Idle period Time >18 us; TL = -70 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
☒ Short Control Signaling Transmissions: ◆ Short Control Signaling Transmissions shall have a maximum duty cycle of 10 % within an observation period of 50 ms.

Unwanted Signal Parameters				
Equipment Type	**Wanted Signal Mean Power from Companion Device**	**Unwanted Signal Frequency (MHz)**	**Unwanted Signal Mean power (dBm)**	**Type of Interfering Signal**
LBT	sufficient to maintain the link (see note 2)	2395 or 2488,5 (see note 1)	-35 (see note 3)	CW
Non-LBT	-30 dBm			
Note 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. Note 2: A typical value which can be used in most cases is -50 dBm/MHz. Note 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.				

5.1.2 Measuring Instruments

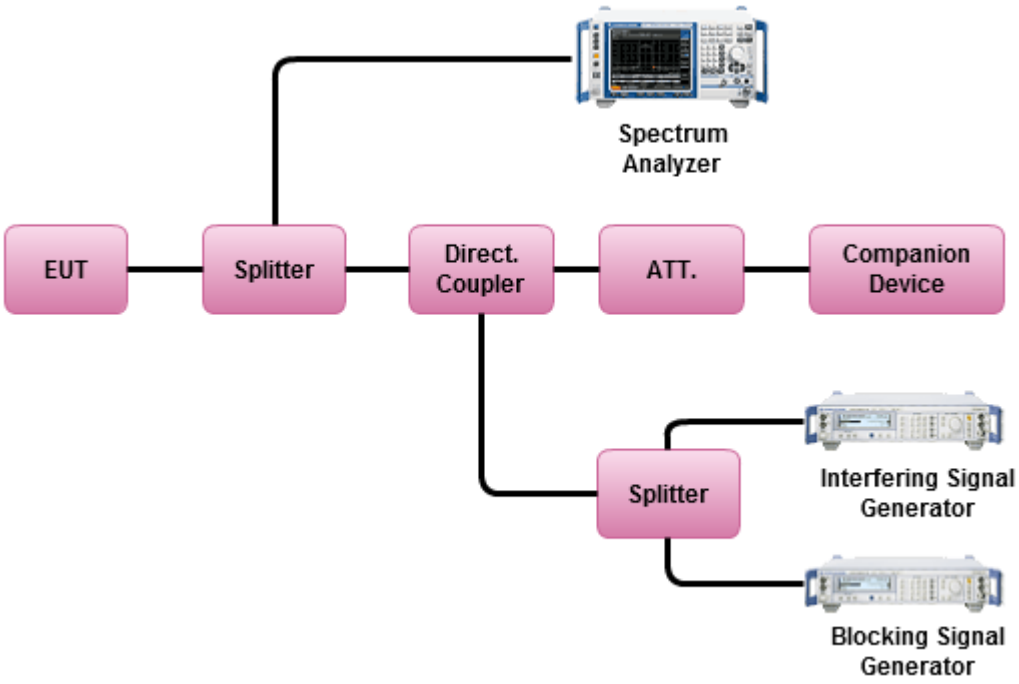
Refer a test equipment and calibration data table in this test report.

5.1.3 Test Procedures

Test Method	
☒	Refer as EN 300 328, clause 5.4.6.2.1 for conducted measurement.
	☒ For conducted measurements on devices with multiple transmit chains and receive chains. The power splitter/combiner shall be used to combine all the transmit/receive chains (antenna outputs) into a single test point. The insertion loss of the power splitter/combiner shall be taken into account.
☐	Refer as EN 300 328, clause 5.4.6.2.2 for radiated measurement.

5.1.4 Test Setup

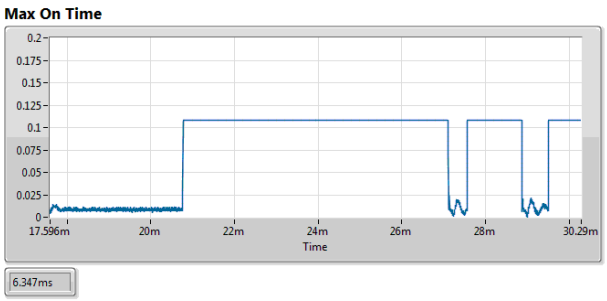
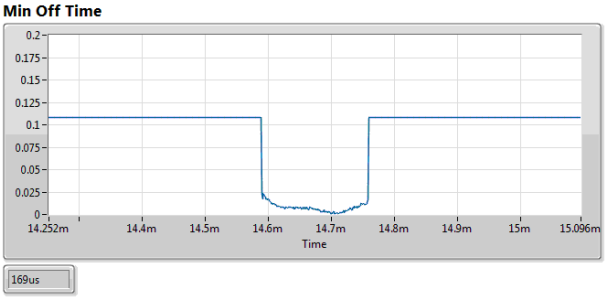
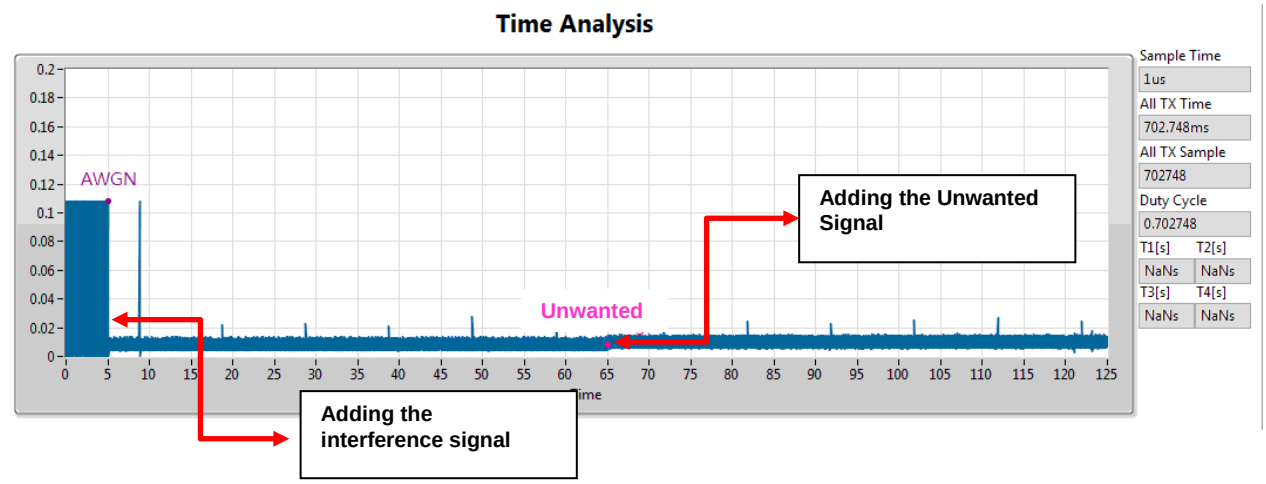
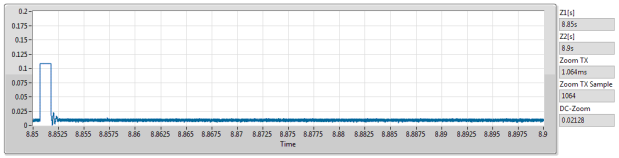
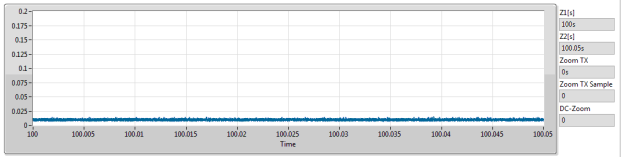
Adaptivity and Unwanted Signal – Conducted Method



5.1.5 Test Result of Adaptivity and Unwanted Signal

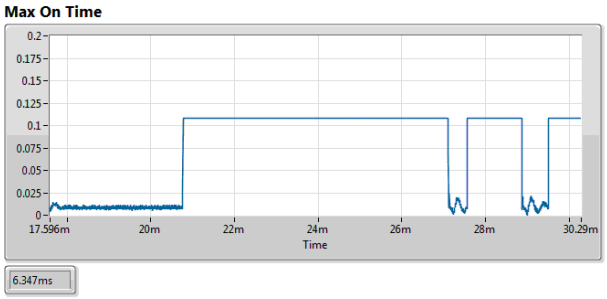
Adaptivity & Unwanted Signal Result.							
Detection Threshold Level (dBm)		(-70 dBm/MHz + 20 - Pout e.i.r.p.)= -70 + 20 - 19.92 + 3.79 = -66.13 dBm					
Modulation Mode	Freq. (MHz)	Channel Occupancy Time (ms)	Idle Period Time (ms)	Short Control Signalling Transmissions (ms)			
				Adaptivity		Adaptivity & Unwanted Signa	
				Bin	Time (ms)	Bin	Time (ms)
11b	2412	6.347	0.169	1064	1.064	0	0
11b	2472	12.499	0.388	1314	1.314	0	0
11g	2412	3.606	0.061	262	0.262	0	0
11g	2472	9.542	0.076	60	0.060	0	0
HT20	2412	4.789	0.053	0	0	0	0
HT20	2472	9.542	0.066	40	0.040	0	0
HT40	2422	1.759	0.043	307	0.307	22	0.022
HT40	2462	3.470	0.042	1590	1.590	498	0.498
Limit		N/A	N/A	5 ms in 50 ms period		5 ms in 50 ms period	
Result		Complied					
Channel Occupancy Time and Idle Period Time follow as IEEE 802.11™-2012 and IEEE 802.15.4™-2011 specification without restirction.							

5.1.6 Test Result of Adaptivity Time Plots

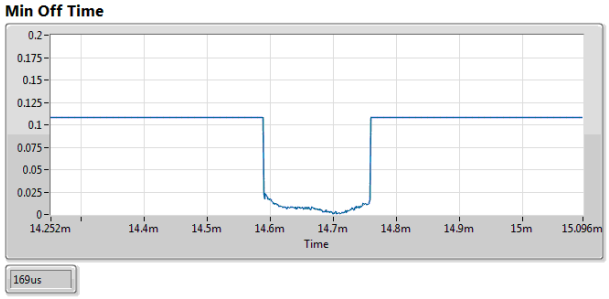
Adaptivity & Unwanted Signal Result Time Plots	
11b – 2412MHz - Channel Occupancy Time	**11b – 2412MHz - Idle Period Time**
	
11b – 2412MHz - Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 120s	
	
11b – 2412MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms	**11b – 2412MHz - Worst Unwanted Signal Short Control Signaling Transmissions - 50ms**
	

Adaptivity & Unwanted Signal Result Time Plots

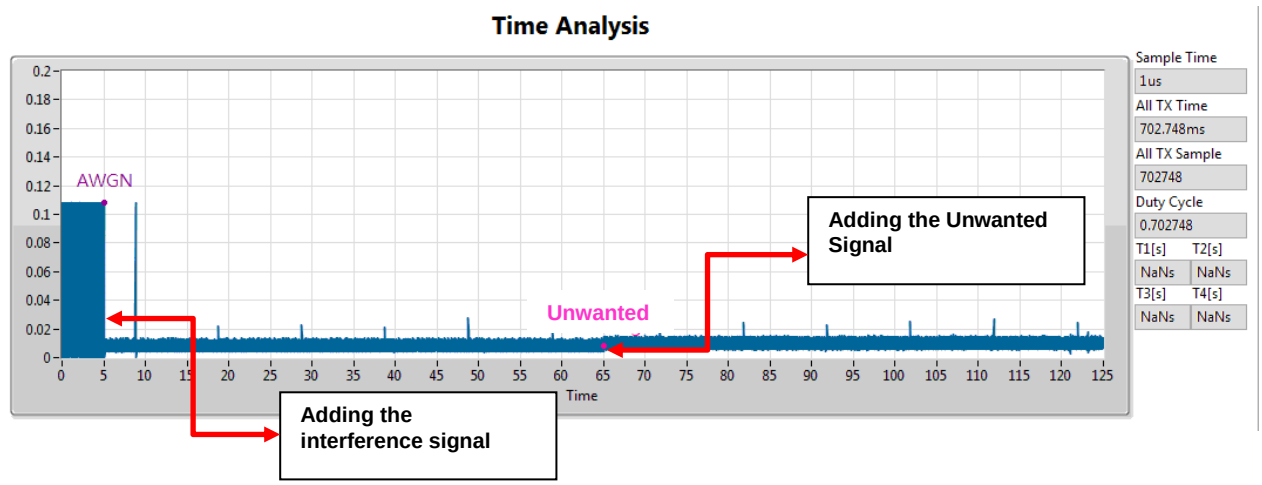
11b – 2472MHz - Channel Occupancy Time



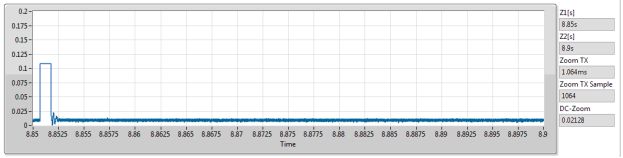
11b – 2472MHz - Idle Period Time



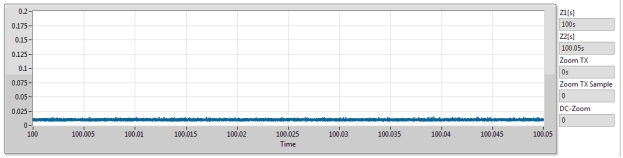
11b – 2472MHz - Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 120s



11b – 2472MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms

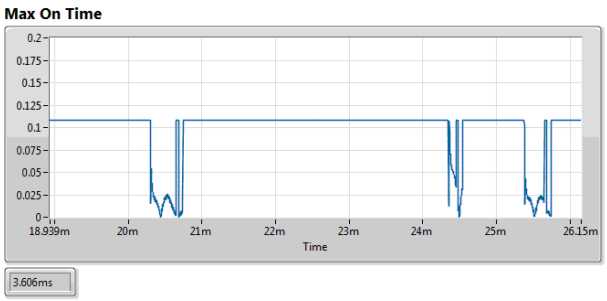


11b – 2472MHz - Worst Adaptivity & Receiver Blocking Short Control Signaling Transmissions - 50ms

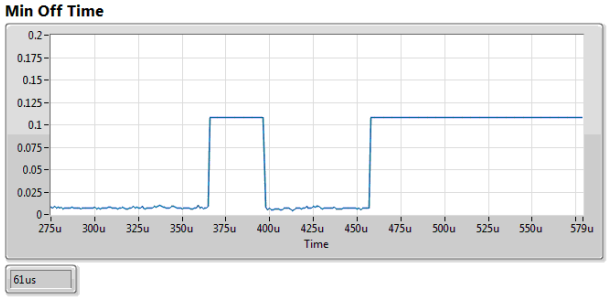


Adaptivity & Unwanted Signal Result Time Plots

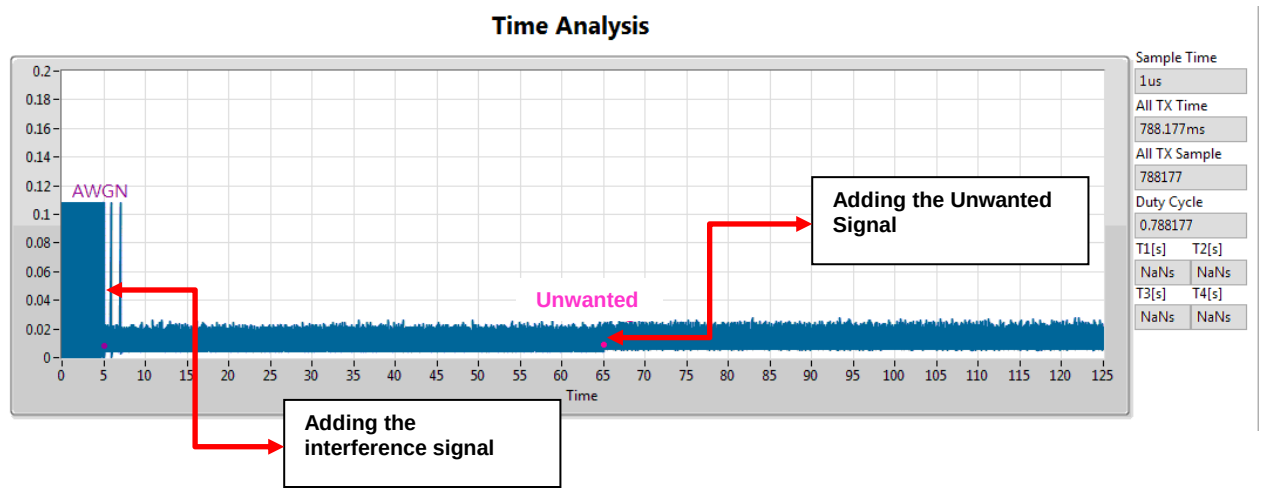
11g – 2412MHz - Channel Occupancy Time



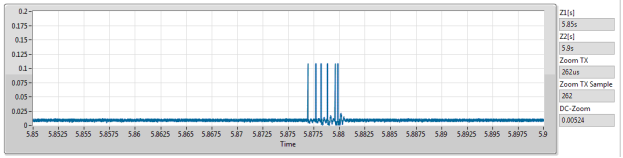
11g – 2412MHz - Idle Period Time



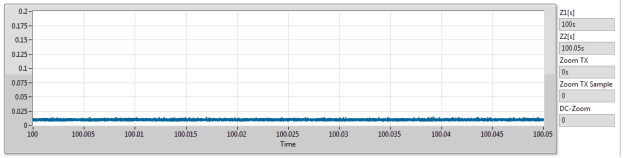
11g – 2412MHz - Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 120s



11g – 2412MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms

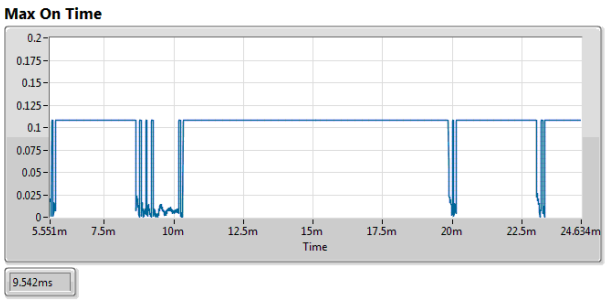


11g – 2412MHz - Worst Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 50ms

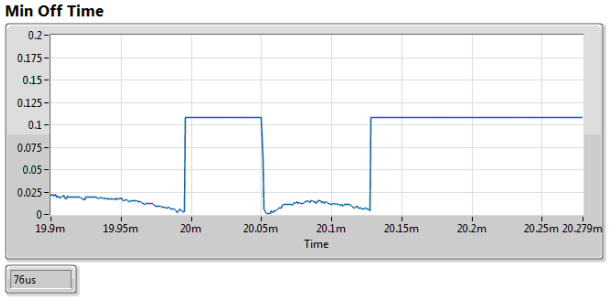


Adaptivity & Unwanted Signal Result Time Plots

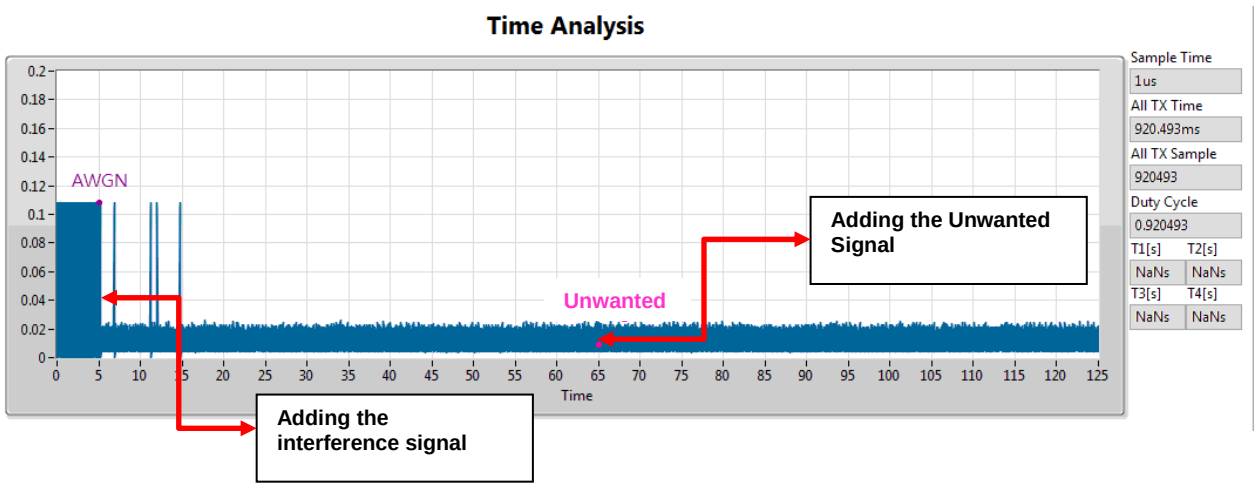
11g – 2472MHz - Channel Occupancy Time



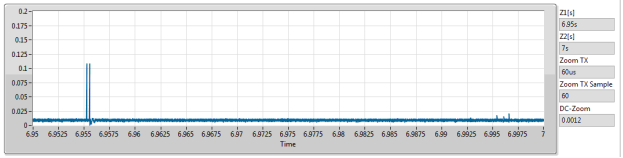
11g – 2472MHz - Idle Period Time



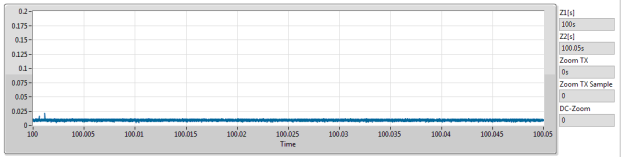
11g – 2472MHz - Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 120s



11g – 2472MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms

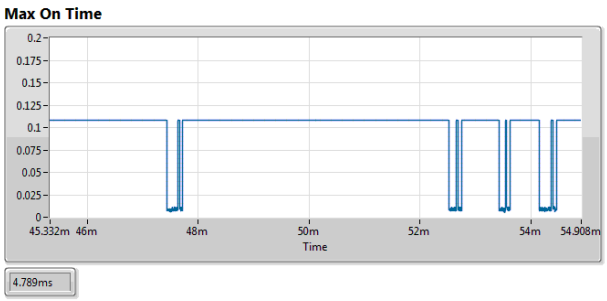


11g – 2472MHz – Worst Unwanted Signal Short Control Signaling Transmissions - 50ms

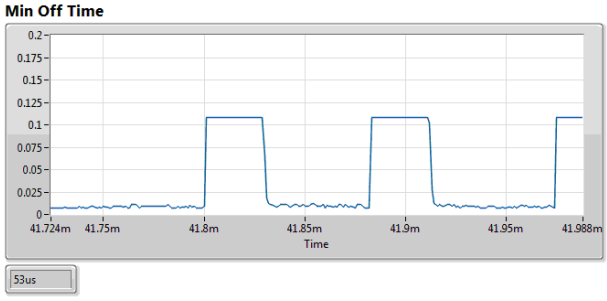


Adaptivity & Unwanted Signal Result Time Plots

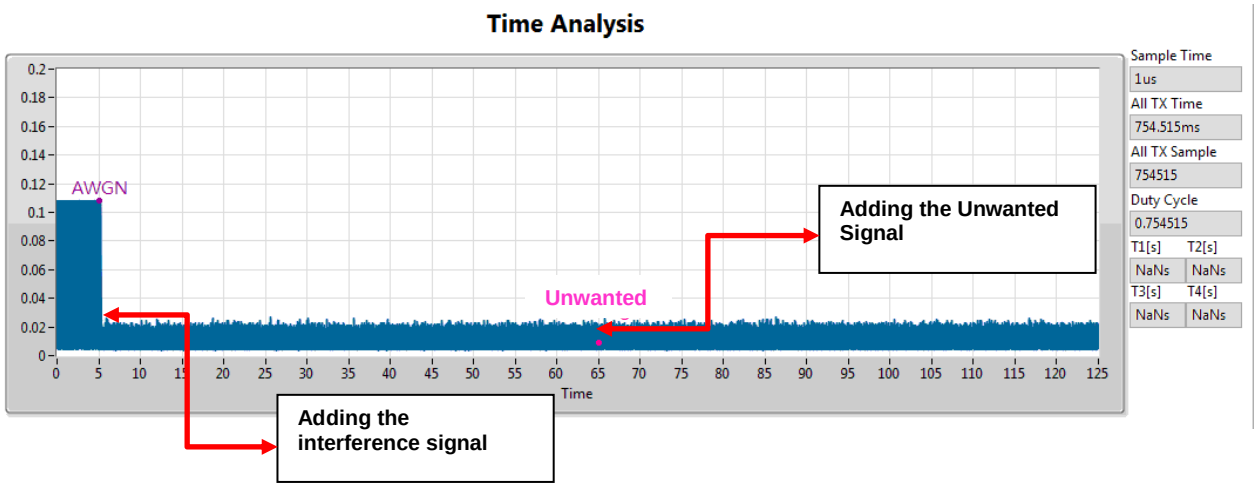
HT20 – 2412MHz - Channel Occupancy Time



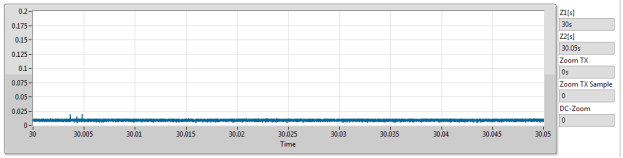
HT20 – 2412MHz - Idle Period Time



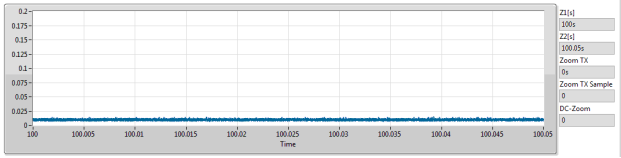
HT20 – 2412MHz - Adaptivity &Unwanted Signal Short Control Signaling Transmissions - 120s



HT20 – 2412MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms

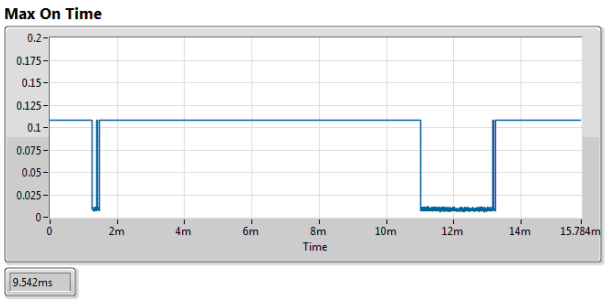


HT20 – 2412MHz – Worst Adaptivity &Unwanted Signal Short Control Signaling Transmissions - 50ms

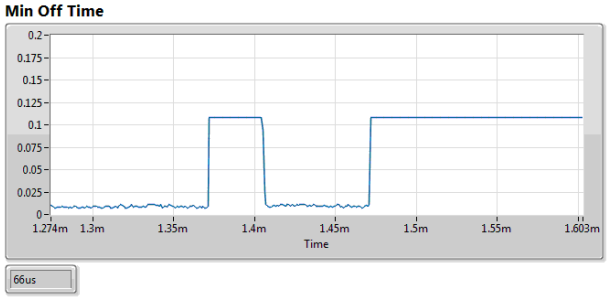


Adaptivity & Unwanted Signal Result Time Plots

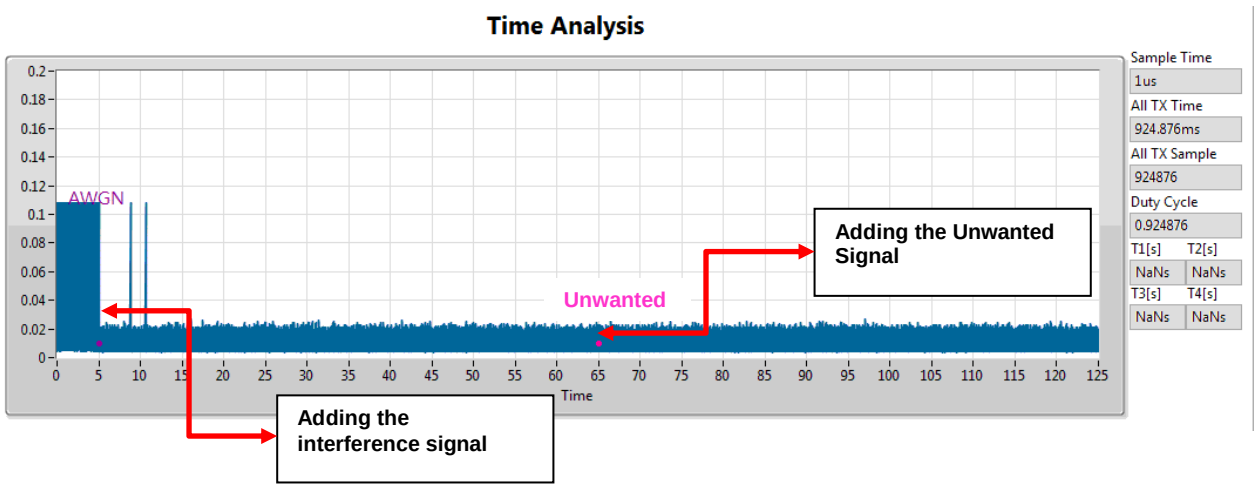
HT20 – 2472MHz - Channel Occupancy Time



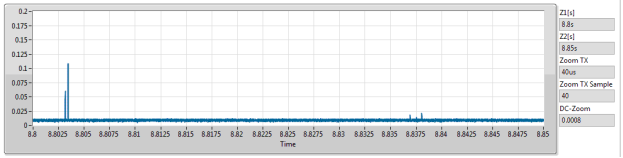
HT20 – 2472MHz - Idle Period Time



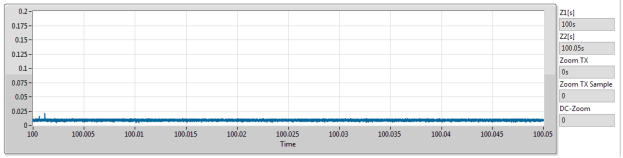
HT20 – 2472MHz - Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 120s



HT20 – 2472MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms

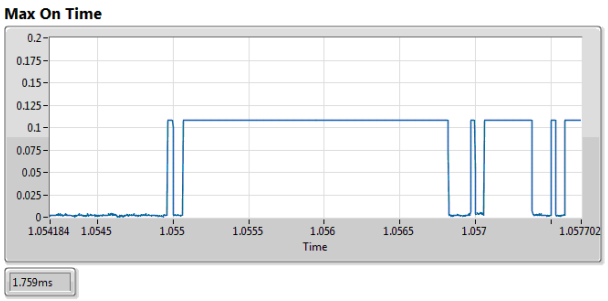


HT20 – 2472MHz - Worst Unwanted Signal Short Control Signaling Transmissions - 50ms

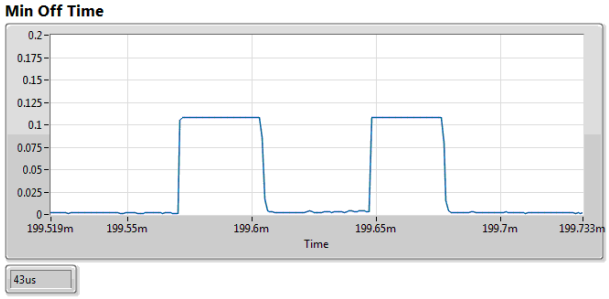


Adaptivity & Unwanted Signal Result Time Plots

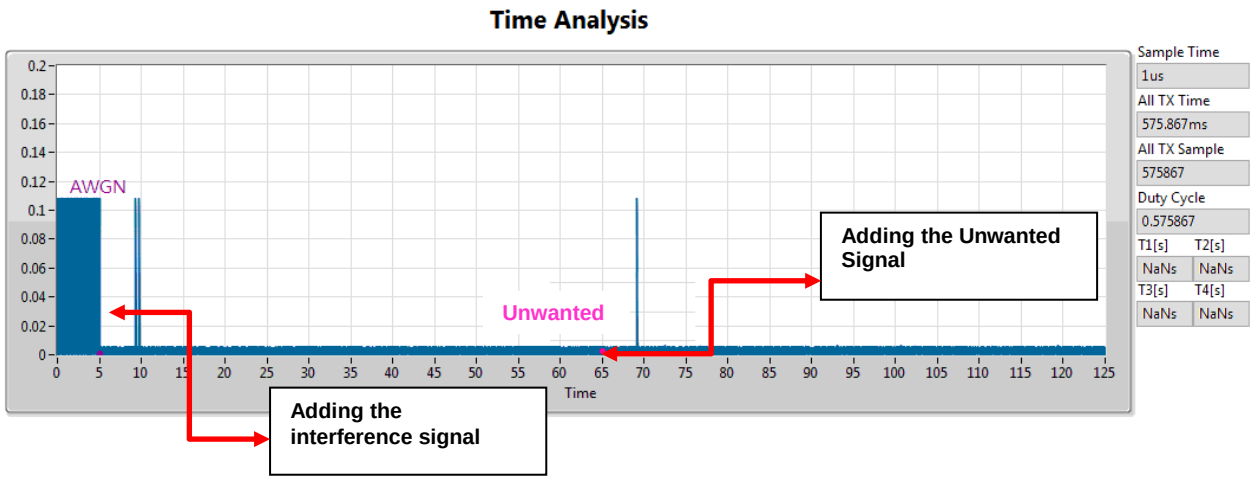
HT40 – 2422MHz - Channel Occupancy Time



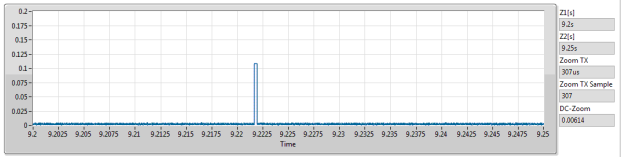
HT40 – 2422MHz - Idle Period Time



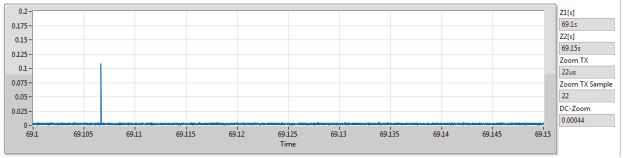
HT40 – 2422MHz - Adaptivity &Unwanted Signal Short Control Signaling Transmissions - 120s



HT40 – 2422MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms

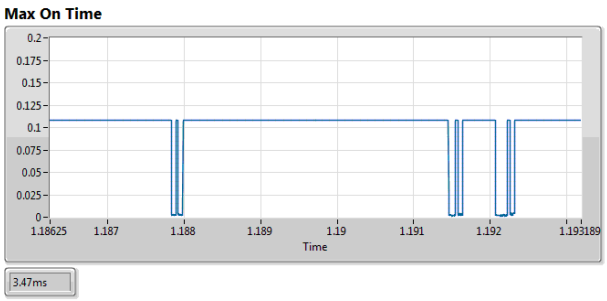


HT40 – 2422MHz – Worst Unwanted Signal Short Control Signaling Transmissions - 50ms

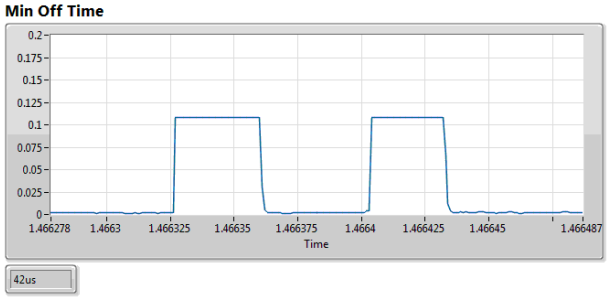


Adaptivity & Unwanted Signal Result Time Plots

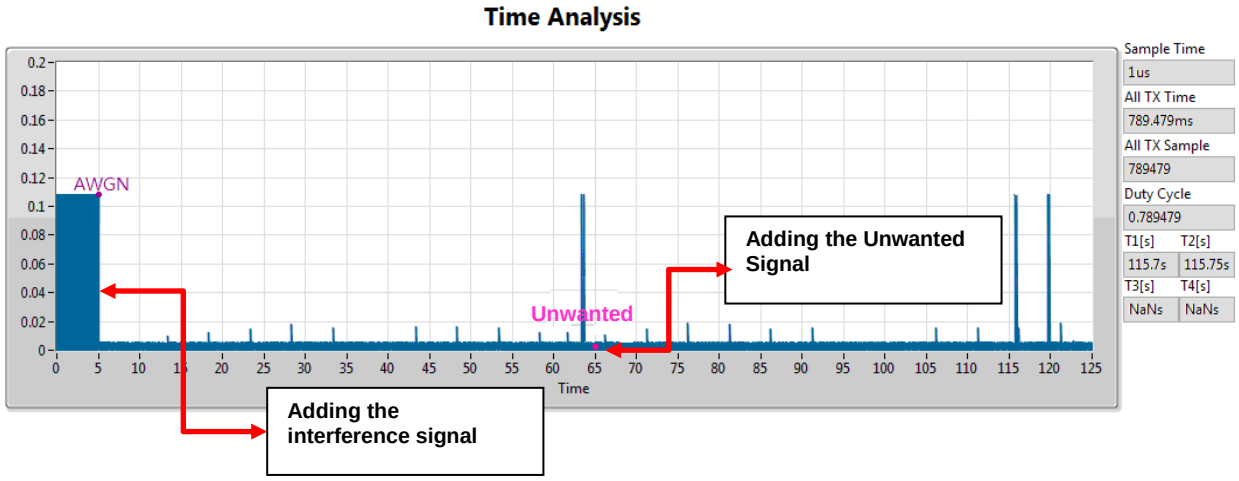
HT40 – 2462MHz - Channel Occupancy Time



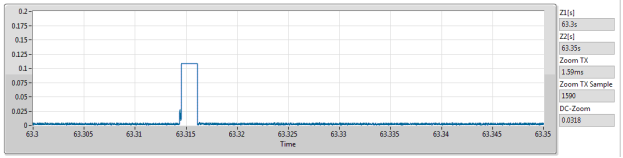
HT40 – 2462MHz - Idle Period Time



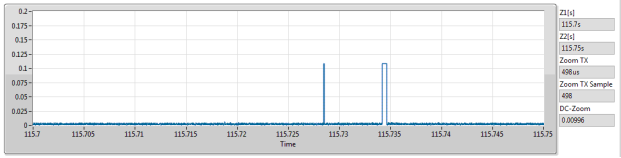
HT40 – 2462MHz - Adaptivity & Unwanted Signal Short Control Signaling Transmissions - 120s



HT40 – 2462MHz - Worst Adaptivity Short Control Signaling Transmissions - 50ms



HT40 – 2462MHz – Worst Unwanted Signal Short Control Signaling Transmissions - 50ms



6 Receiver Blocking Test Result

6.1 Receiver Blocking

6.1.1 Receiver Blocking Limit

Receiver Blocking Limit	
☒	Receiver Category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.
☐	Receiver Category 2: Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.
☐	Receiver Category 3: Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

Table 1: Receiver Blocking Parameters for Raceiver Category 1 Equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P min + 6 dB	2 380 2 503,5	-53	CW
P min + 6 dB	2 300 2 330 2 360	-47	CW
P min + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW

NOTE 1: Pmin is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Table 2: Receiver Blocking Parameters for Raceiver Category 2 Equipment			
Wanted signal mean power from companion device (dBm)	**Blocking signal frequency (MHz)**	**Blocking signal power (dBm) (see note 2)**	**Type of blocking signal**
P min + 6 dB	2 380 2 503,5	-57	CW
P min + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 3: Receiver Blocking Parameters for Raceiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm)	**Blocking signal frequency (MHz)**	**Blocking signal power (dBm) (see note 2)**	**Type of blocking signal**
P min + 12 dB	2 380 2 503,5	-57	CW
P min + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

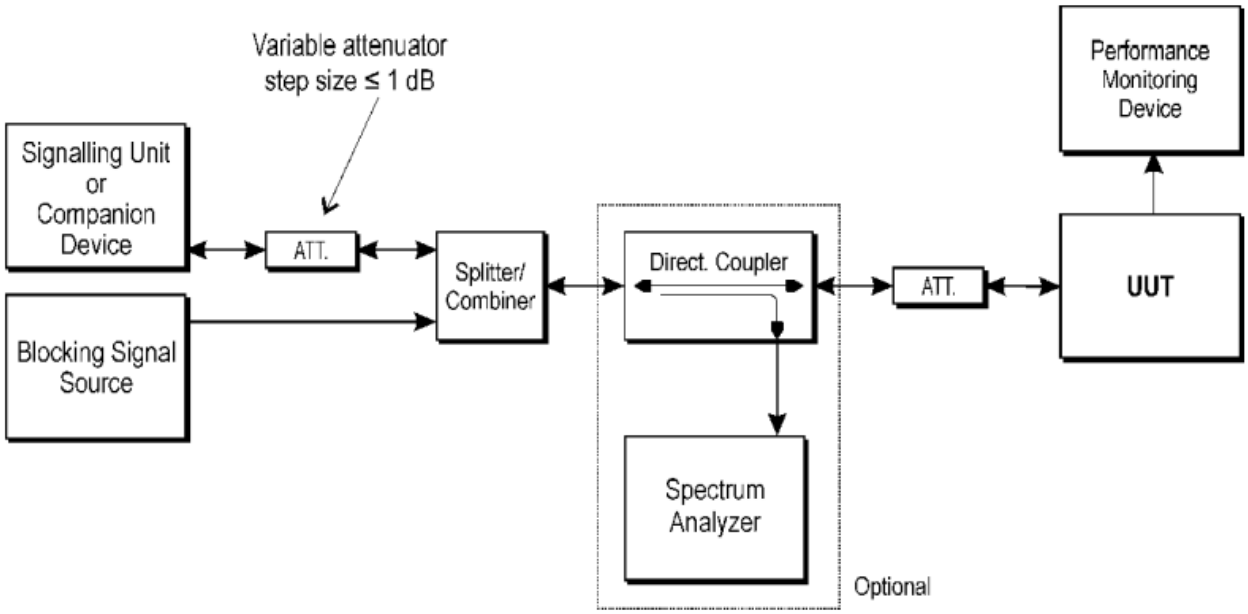
6.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

6.1.3 Test Procedures

Test Method	
☒ Refer as EN 300 328, clause 5.4.11.2.1 for conducted measurement.	
	☒ For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated. For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.
	Step 1 The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.
	Step 2 With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The variable attenuator is set to a value that achieves the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 with a resolution of at least 1 dB. The resulting level for the wanted signal at the input of the UUT is P_{min}. The signal level is increased by the value provided in the table corresponding to the receiver category and type of equipment.
	Step 3 The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.
	Step 4 Repeat step 3 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment. For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.
☐ Refer as EN 300 328, clause 5.4.11.2.2 for radiated measurement.	

6.1.4 Test Setup



6.1.5 Test Result of Receiver Blocking

Receiver Blocking Result						
P_{min}(dBm)	-87.5					
Modulation Mode	**Operation Frequency (MHz)**	**Wanted Signal Mean Power from Companion Device (dBm) P_{min} + 6 dB**	**Receiver Blocking Power (dBm)**	**Blocking Signal Frequency (MHz)**	**Type of Blocking Signal**	**Test Result**
802.11b	2412	-81.5	-49.21	2380, 2503.5	CW	Pass
	2412	-81.5	-43.21	2300, 2330, 2360	CW	Pass
	2412	-81.5	-43.21	2523.5, 2553.5, 2583.5, 2613.5, 2643.5, 2673.5	CW	Pass
Limit	PER(Packet Error Rate) ≦ 10%					
Result	**Complied**					

Receiver Blocking Result						
P_{min}(dBm)	-86.6					
Modulation Mode	**Operation Frequency (MHz)**	**Wanted Signal Mean Power from Companion Device (dBm) P_{min} + 6 dB**	**Receiver Blocking Power (dBm)**	**Blocking Signal Frequency (MHz)**	**Type of Blocking Signal**	**Test Result**
802.11b	2472	-80.6	-49.21	2380, 2503.5	CW	Pass
	2472	-80.6	-43.21	2300, 2330, 2360	CW	Pass
	2472	-80.6	-43.21	2523.5, 2553.5, 2583.5, 2613.5, 2643.5, 2673.5	CW	Pass
Limit	PER(Packet Error Rate) ≦ 10%					
Result	**Complied**					

Receiver Blocking Result						
P_{min}(dBm)	-92.5					
Modulation Mode	**Operation Frequency (MHz)**	**Wanted Signal Mean Power from Companion Device (dBm) P_{min} + 6 dB**	**Receiver Blocking Power (dBm)**	**Blocking Signal Frequency (MHz)**	**Type of Blocking Signal**	**Test Result**
802.11g	2412	-86.5	-49.21	2380, 2503.5	CW	Pass
	2412	-86.5	-43.21	2300, 2330, 2360	CW	Pass
	2412	-86.5	-43.21	2523.5, 2553.5, 2583.5, 2613.5, 2643.5, 2673.5	CW	Pass
Limit	PER(Packet Error Rate) ≦ 10%					
Result	**Complied**					

Receiver Blocking Result						
P_{min}(dBm)	-92.6					
Modulation Mode	**Operation Frequency (MHz)**	**Wanted Signal Mean Power from Companion Device (dBm) P_{min} + 6 dB**	**Receiver Blocking Power (dBm)**	**Blocking Signal Frequency (MHz)**	**Type of Blocking Signal**	**Test Result**
802.11g	2472	-86.6	-49.21	2380, 2503.5	CW	Pass
	2472	-86.6	-43.21	2300, 2330, 2360	CW	Pass
	2472	-86.6	-43.21	2523.5, 2553.5, 2583.5, 2613.5, 2643.5, 2673.5	CW	Pass
Limit	PER(Packet Error Rate) ≦ 10%					
Result	**Complied**					

7 Test Equipment and Calibration Data

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	06/May/2015	05/May/2016
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100℃	07/Apr/2015	06/Apr/2016
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	28/Jul/2015	27/Jul/2016
4 Port switch	CEI	P4R-720120	TH01	1GHz~26.5GHz	01/Jul/2015	30/Jun/2016
Power Meter	Agilent	U2021XA	MY54320011	50MHz~18GHz	17/Aug/2015	16/Aug/2016
Power Meter	Agilent	U2021XA	MY54320013	50MHz~18GHz	17/Aug/2015	16/Aug/2016

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101514	10Hz ~ 40GHz	16/Sep/2015	15/Sep/2016
Amplifier	Agilent	8447D	2944A11146	0.1M ~ 1.3G	16/Sep/2015	15/Sep/2016
Amplifier	EMCI	EMC051845BE	980241	1GHz ~ 18GHz	09/Mar/2015	08/Mar/2016
Bilog Antenna	SCHAFFNER	CBL6111C	2737	25MHz ~ 1GHz	18/Sep/2015	17/Sep/2016
Horn Antenna	COM-POWER	AH-118	10094	1GHz ~ 18GHz	21/May/2015	20/May/2016

Instrument for Adaptivity

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Signal generator	Agilent	E4438C	MY49072778	250kHz-6GHz	03/Oct/2014	02/Oct/2015
Vector Signal Generator	Keysight	N5171B	MY53051240	9KHz ~ 6GHz	18/Jun/2015	17/Jun/2016
Spectrum Analyzer	Keysight	N9010A	MY55150165	9KHz~7GHz	22/Jun/2015	21/Jun/2016
USB Scope	NATIONAL INSTRRUMENTS	USB-5133	F4D0D4	100MHz	25/Aug/2015	24/Aug/2016
Amplifier	EMCI	EMC9135	980232	10KHz ~ 1000MHz	27/Jan/2015	26/Jan/2016

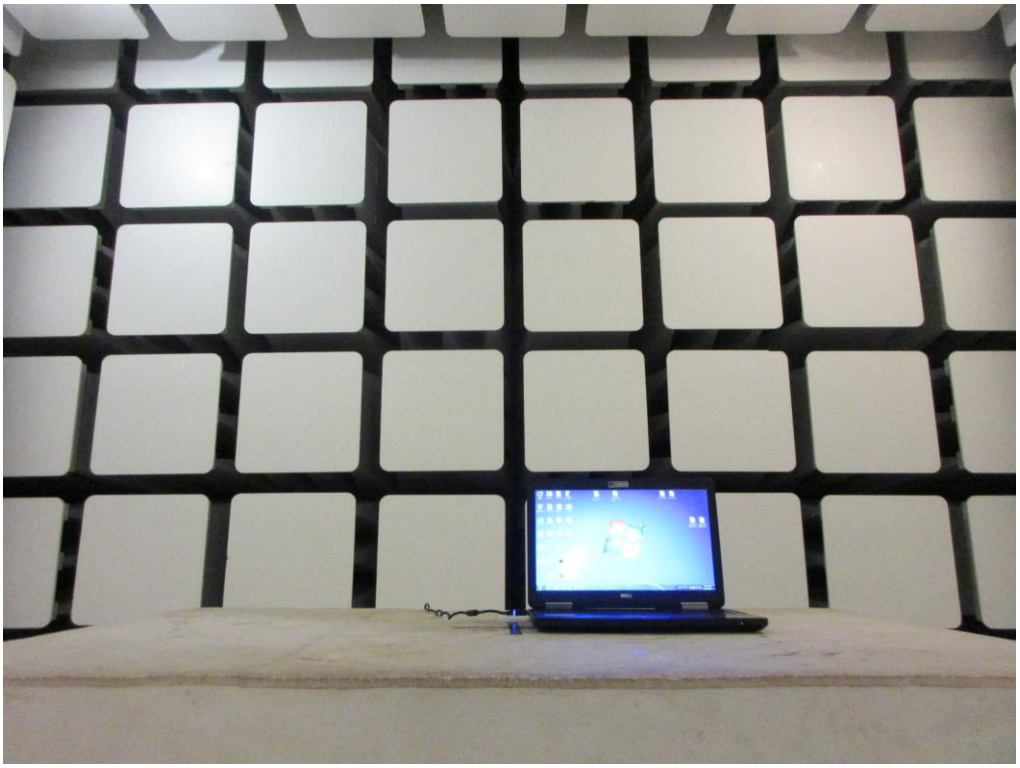
Instrument for Receiver Blocking

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSP7	100644	9kHz ~ 7GHz	Nov/08/2016	Nov/07/2017
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Jan/12/2017	Jan/11/2018
Wireless connectivity tester	R&S	CMW270	100855	70 MHz ~ 6 GHz	Nov/17/2016	Nov/16/2017
RF cable 0.5m	MTJ Cooperation	000000-MT26A-50	D5105	1 GHz ~ 40 GHz	Nov/02/2016	Nov/01/2017
RF cable 0.5m	MTJ Cooperation	000000-MT26A-50	D5106	1 GHz ~ 40 GHz	Nov/02/2016	Nov/01/2017
RF cable 0.5m	MTJ Cooperation	000000-MT26A-50	D5107	1 GHz ~ 40 GHz	Nov/02/2016	Nov/01/2017
RF cable 2m	MTJ Cooperation	000000-MT18A-200	D5100	1 GHz ~ 40 GHz	Nov/02/2016	Nov/01/2017

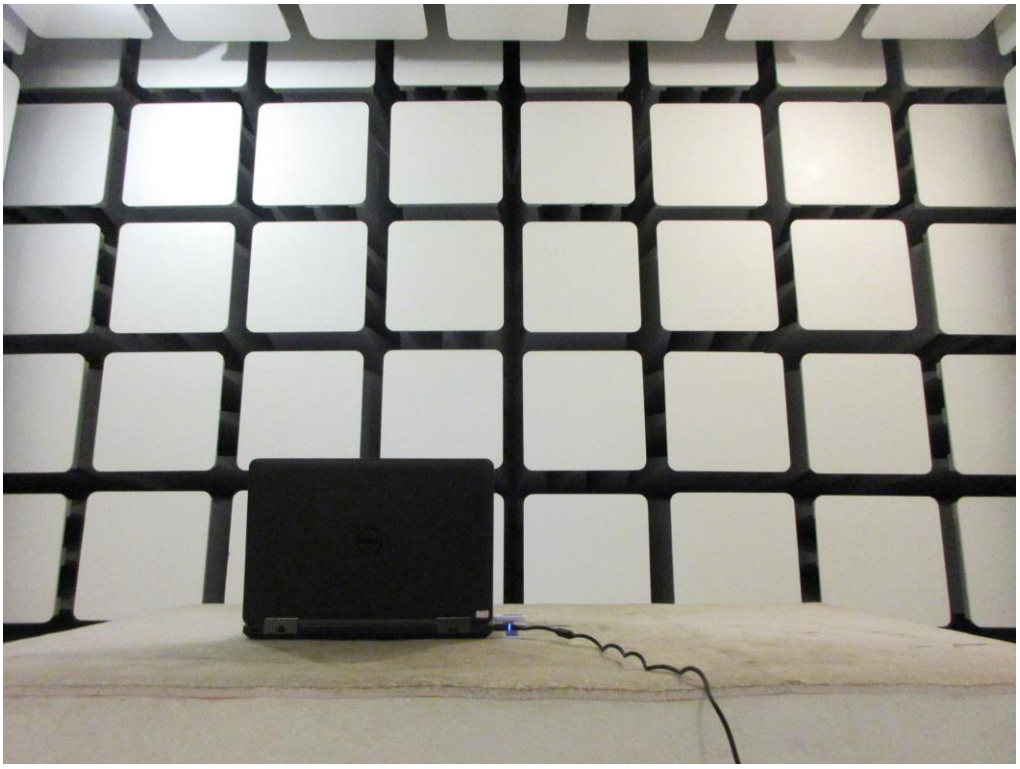
Appendix A. Test Photos

1. Photographs of Radiated Emissions Test Configuration

Front view

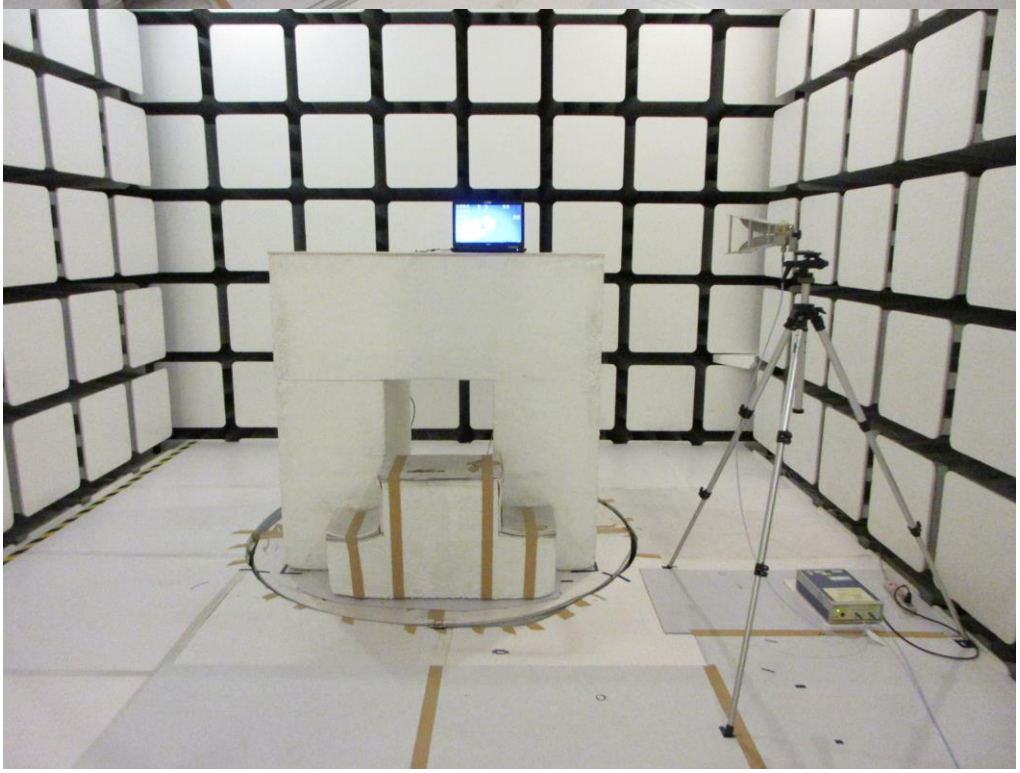


Rear view



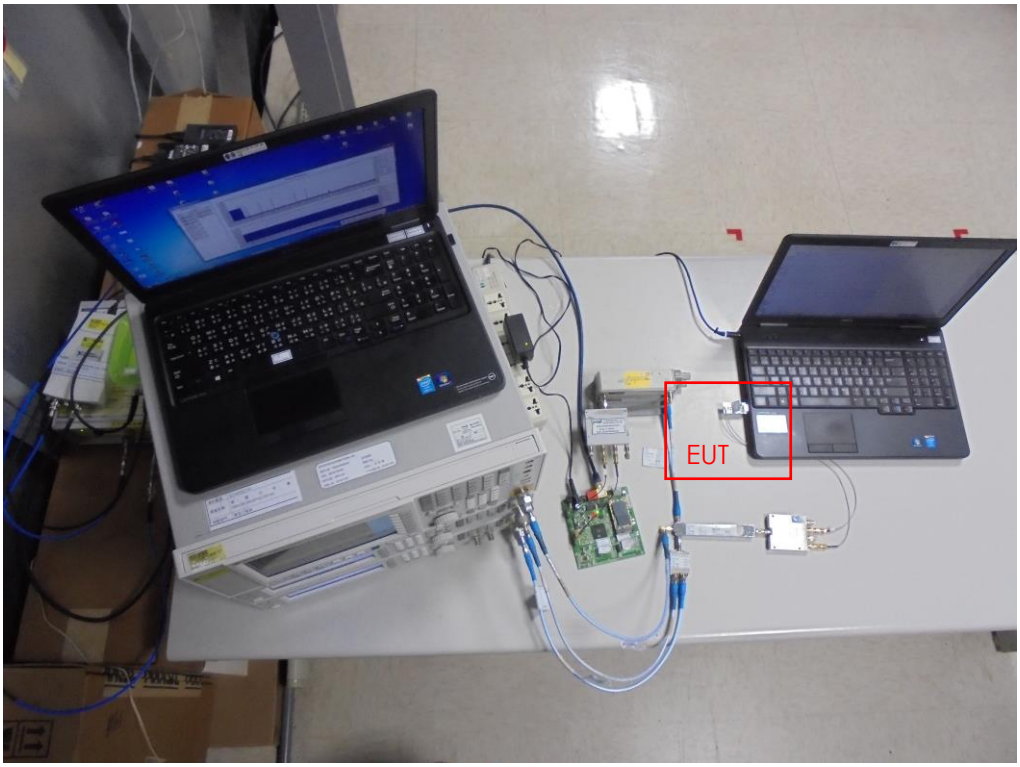
Below 1GHz

Above 1GHz



EUT took a close view

2. Photographs of Adaptivity Test Configuration



3. Photographs of Receiver Blocking Test Configuration