

VERIFICATION OF COMPLIANCE

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

**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 module
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.



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APPENDIX A. TEST PHOTOS

PHOTOGRAPHS OF EUT v01

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

[illegible]

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	18.95
2400-2483.5	g	2412-2472	1-13 [13]	1	19.12
2400-2483.5	n (HT20)	2412-2472	1-13 [13]	2	19.01
2400-2483.5	n (HT40)	2422-2462	3-11 [9]	2	19.10
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	
<input type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	External antenna (dedicated antennas)
<input type="checkbox"/>	Single power level with corresponding antenna(s).
<input checked="" type="checkbox"/>	Multiple power level and corresponding antenna(s).

Antenna General Information			
No.	Ant. Cat.	Ant. Type	Gain (dBi)
1-2	External	Dipole	3.00
Remark: 1. IEEE802.11b/g only include 1Tx and EUT was pre-tested Antenna Port 1 and Antenna Port 2 for single chain, the worst case was Antenna Port 2. Therefore only test data (Port 2) was recorded in report. 2. IEEE802.11n only include 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					
<input checked="" type="checkbox"/>	Stand-alone				
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)				
	Combined Equipment - Brand Name / Model No.: ...				
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)				
	Host System - Brand Name / Model No.: ...				
<input type="checkbox"/>	Other: ...				
Operational Voltage		<input checked="" type="checkbox"/>	Vnom (5 V)	<input checked="" type="checkbox"/>	Vmax (5.25 V)
Operational Temperature		<input checked="" type="checkbox"/>	Tnom (20°C)	<input checked="" type="checkbox"/>	Tmax (50°C)
		<input checked="" type="checkbox"/>	Vmin (4.75 V)	<input checked="" type="checkbox"/>	Tmin (0°C)

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input type="checkbox"/> Operated normally mode for worst duty cycle	
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11b	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11g	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT20)	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT40)	0.00

1.1.5 Medium Access Protocol

Medium Access Protocol	
Medium Access Protocol:	<input checked="" type="checkbox"/> IEEE Std. 802.11-2007
	<input checked="" type="checkbox"/> IEEE Std. 802.11n-2009
	<input type="checkbox"/> IEEE Std. 802.15.4-2006
	<input type="checkbox"/> IEEE Std. 802.15.1-2005
	<input type="checkbox"/> Other:
<p>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.</p>	

1.1.6 Table for Existing Change

This product is an extension of original one reported under Sporton project number: ER232843-13AC

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	
<input type="checkbox"/>	non-Adaptive Equipment
<input checked="" type="checkbox"/>	Adaptive Equipment without the possibility to switch to a non-adaptive mode:
<input checked="" type="checkbox"/>	The equipment has implemented an LBT based DAA mechanism:
<input type="checkbox"/>	The equipment is Frame Based equipment
<input checked="" type="checkbox"/>	The equipment is Load Based equipment
<input type="checkbox"/>	The equipment can switch dynamically between Frame Based and Load Based equipment
<input type="checkbox"/>	The equipment has implemented an non-LBT based DAA mechanism
<input type="checkbox"/>	The equipment can operate in more than one adaptive mode
<input type="checkbox"/>	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	
<input type="checkbox"/>	Yes
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	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				
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> 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	Ian	22.8°C / 62%	22/Sep/2014
Radiated Emission	05CH01-HY	Monday	21°C / 63%	14/Apr/2012
Adaptivity Site	DFS01-HY	Sam	25.4°C / 60.3%	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	$\pm 5.8 \times 10^{-7}$ MHz
Power Spectral Density, conducted	± 2.6 dB
Supply voltages	± 2.9 %
RF power conducted	± 1.2 dB
RF power radiated	± 2.5 dB
Spurious emissions, radiated	± 3.3 dB
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 Test Channel Frequencies Configuration




Test Channel Frequencies Configuration	
IEEE Std. 802.11	Test Channel Frequencies (MHz)
b, g, n (HT20) n (HT40)	2412-(F1), 2442-(F2), 2472-(F3) 2422-(F4), 2437-(F5), 2462-(F6)

2.3 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	09	0A	0B	-	-	-
11g	1	0F	0F	11	-	-	-
HT20	2	12,0B	11,0B	11,0C	-	-	-
HT40	2	-	-	-	12,0B	11,0C	12,0C

2.4 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 One channel out of the declared channels for each sub-band. In case of more than 1 channel plan has been declared, testing of these specific requirements need only be performed using one of the declared channel plans. 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	<input type="checkbox"/> EUT will be placed in fixed position.		
	<input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions.		
	<input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
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

2.5 Support Equipment

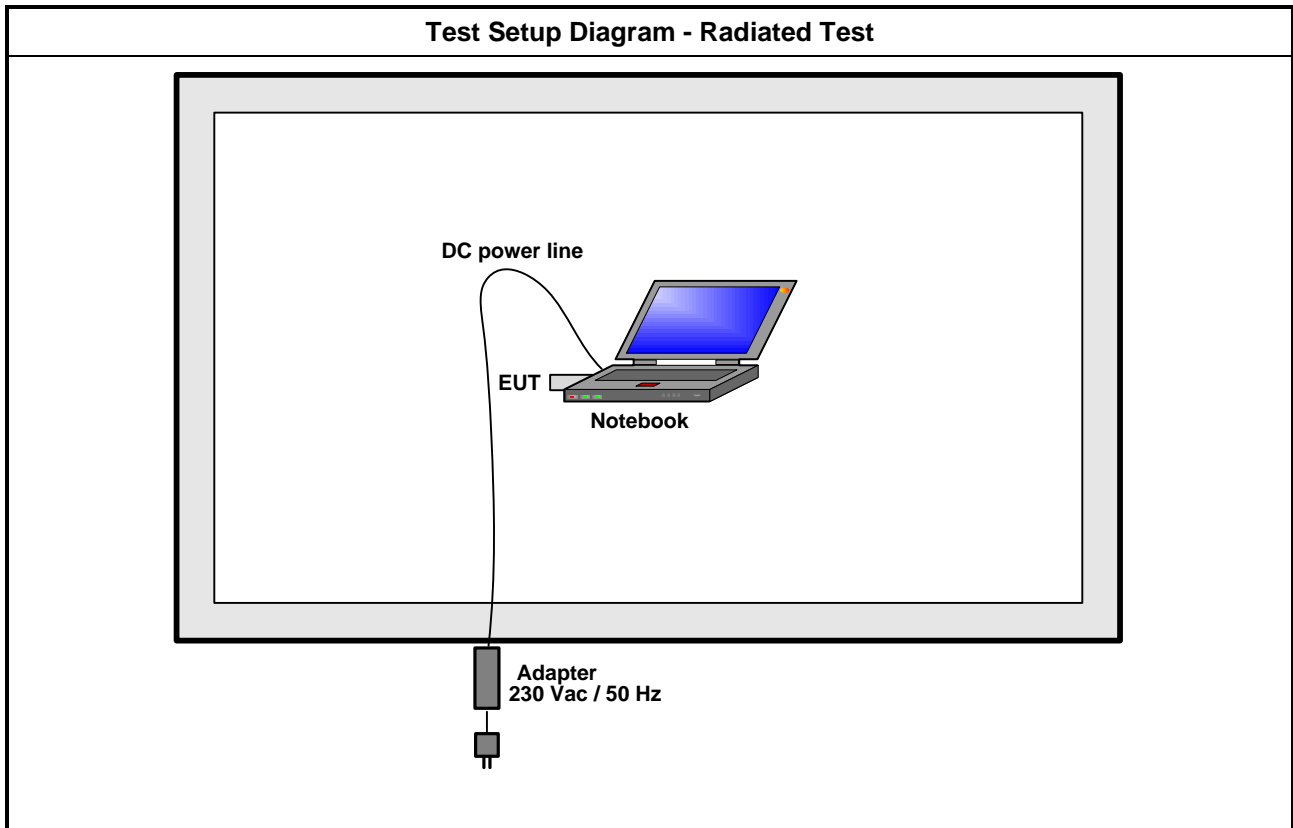
Support Equipment - RF Conducted			
No.	Equipment	Brand Name	Model Name
1	Notebook	DELL	E5540
2	Adapter for NB	DELL	LA65NM130

Support Equipment - Radiated Emission			
No.	Equipment	Brand Name	Model Name
1	Notebook	DELL	E5520
2	Adapter for NB	DELL	HA65NM130

Support Equipment – Adaptivity			
No.	Equipment	Brand Name	Model Name
1	AP (Master)	EDIMAX	CG300
2	NoteBook	DELL	Latitude E5550
3	Adapter for NB	DELL	FA90PSO-00
4	NoteBook	DELL	Latitude E5540
5	Adapter for NB	DELL	DA65NM111-00

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

2.6 Test Setup Diagram



3 Transmitter Test Result

3.1 RF Output Power

3.1.1 RF Output Power Limit

RF Output Power Limit	
<input checked="" type="checkbox"/>	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.

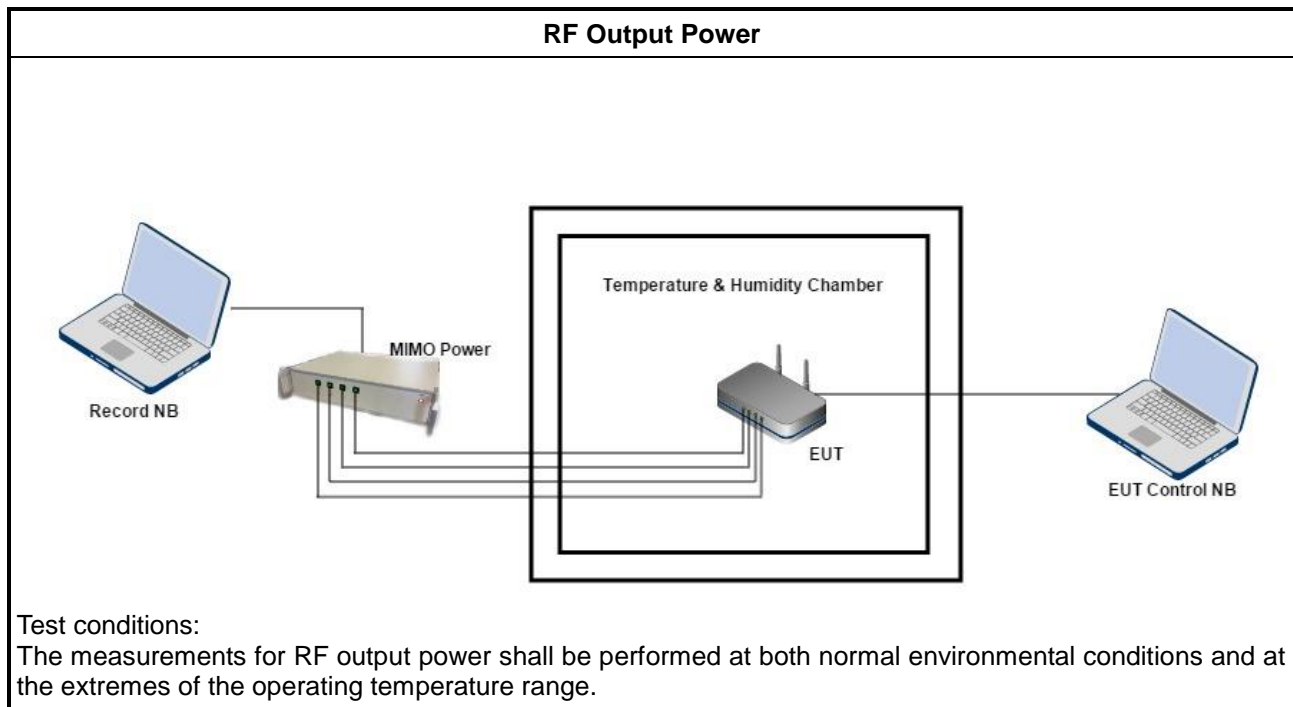
3.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
<input checked="" type="checkbox"/>	Refer as EN 300 328, clause 5.4.2.2.1 for conducted measurement.
<p>Step 1: Use a fast power sensor suitable for 2,4 GHz and capable of 1 MS/s. Use the following settings:</p> <ul style="list-style-type: none"> - 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. <p>NOTE 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.</p> <p>Step 2: For conducted measurements on devices with multiple transmit chains:</p> <ul style="list-style-type: none"> - 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. <p>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.</p> <p>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> $P_{burst} = \frac{1}{k} \sum_{n=1}^k P_{sample}(n)$ <p>with 'k' being the total number of samples and 'n' the actual sample number</p> <p>Step 5: The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.</p>	

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



3.1.5 Maximum Antenna Gain

Maximum Antenna Gain Result					
Transmit Chains No.		1	2	-	-
Maximum Gain (dBi)-G		3.00	3.00	-	-
Modulation Mode	G+Y (dBi)	N _{TX}	N _{SS} (Min.)	STBC	Beamforming Gain (dB)-Y
11b	3.00	1	1	-	-
11g	3.00	1	1	-	-
HT20	3.00	2	2	-	-
HT40	3.00	2	2	-	-

3.1.6 Test Result of RF Output Power

Test Date: Sep. 22, 2014		RF Output Power Result				
Max. Gain (dBi)		3.00		RF Output Power (dBm)		
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	Port 1 (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
TnomVnom	11b	1	2412	14.97	17.97	20
TminVmax	11b	1	2412	15.87	18.87	20
TminVmin	11b	1	2412	15.90	18.90	20
TmaxVmax	11b	1	2412	12.94	15.94	20
TmaxVmin	11b	1	2412	12.94	15.94	20
TnomVnom	11b	1	2442	15.04	18.04	20
TminVmax	11b	1	2442	15.95	18.95	20
TminVmin	11b	1	2442	15.91	18.91	20
TmaxVmax	11b	1	2442	12.87	15.87	20
TmaxVmin	11b	1	2442	12.87	15.87	20
TnomVnom	11b	1	2472	14.70	17.70	20
TminVmax	11b	1	2472	15.71	18.71	20
TminVmin	11b	1	2472	15.72	18.72	20
TmaxVmax	11b	1	2472	12.50	15.50	20
TmaxVmin	11b	1	2472	12.51	15.51	20
Result				Complied		

Test Date: Sep. 22, 2014		RF Output Power Result				
Max. Gain (dBi)		3.00		RF Output Power (dBm)		
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	Port 1 (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
TnomVnom	11g	1	2412	14.59	17.59	20
TminVmax	11g	1	2412	15.95	18.95	20
TminVmin	11g	1	2412	15.91	18.91	20
TmaxVmax	11g	1	2412	12.44	15.44	20
TmaxVmin	11g	1	2412	12.45	15.45	20
TnomVnom	11g	1	2442	14.60	17.60	20
TminVmax	11g	1	2442	15.86	18.86	20
TminVmin	11g	1	2442	15.83	18.83	20
TmaxVmax	11g	1	2442	12.37	15.37	20
TmaxVmin	11g	1	2442	12.34	15.34	20
TnomVnom	11g	1	2472	14.90	17.90	20
TminVmax	11g	1	2472	16.12	19.12	20
TminVmin	11g	1	2472	16.07	19.07	20
TmaxVmax	11g	1	2472	12.63	15.63	20
TmaxVmin	11g	1	2472	12.60	15.60	20
Result				Complied		

Test Date: Sep. 22, 2014		RF Output Power Result						
Max. Gain (dBi)		3.00		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	11.83	11.21	14.54	17.54	20
TminVmax	HT20	2	2412	12.94	12.56	15.76	18.76	20
TminVmin	HT20	2	2412	12.91	12.50	15.72	18.72	20
TmaxVmax	HT20	2	2412	9.92	8.97	12.48	15.48	20
TmaxVmin	HT20	2	2412	9.85	8.89	12.41	15.41	20
TnomVnom	HT20	2	2442	11.76	11.18	14.49	17.49	20
TminVmax	HT20	2	2442	13.02	12.66	15.85	18.85	20
TminVmin	HT20	2	2442	12.97	12.62	15.81	18.81	20
TmaxVmax	HT20	2	2442	9.48	8.55	12.05	15.05	20
TmaxVmin	HT20	2	2442	9.52	8.58	12.09	15.09	20
TnomVnom	HT20	2	2472	11.82	11.61	14.73	17.73	20
TminVmax	HT20	2	2472	13.00	12.99	16.01	19.01	20
TminVmin	HT20	2	2472	12.97	12.92	15.96	18.96	20
TmaxVmax	HT20	2	2472	9.50	9.07	12.30	15.30	20
TmaxVmin	HT20	2	2472	9.48	8.98	12.25	15.25	20
Result				Complied				

Test Date: Sep. 22, 2014		RF Output Power Result						
Max. Gain (dBi)		3.00		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	11.83	11.03	14.46	17.46	20
TminVmax	HT40	2	2422	13.08	12.57	15.84	18.84	20
TminVmin	HT40	2	2422	13.06	12.60	15.85	18.85	20
TmaxVmax	HT40	2	2422	9.69	8.58	12.18	15.18	20
TmaxVmin	HT40	2	2422	9.64	8.50	12.12	15.12	20
TnomVnom	HT40	2	2437	11.97	11.55	14.78	17.78	20
TminVmax	HT40	2	2437	13.30	12.71	16.03	19.03	20
TminVmin	HT40	2	2437	13.28	12.67	16.00	19.00	20
TmaxVmax	HT40	2	2437	9.38	9.49	12.45	15.45	20
TmaxVmin	HT40	2	2437	9.47	9.53	12.51	15.51	20
TnomVnom	HT40	2	2462	11.89	11.44	14.68	17.68	20
TminVmax	HT40	2	2462	12.94	13.17	16.07	19.07	20
TminVmin	HT40	2	2462	12.98	13.19	16.10	19.10	20
TmaxVmax	HT40	2	2462	9.69	8.98	12.36	15.36	20
TmaxVmin	HT40	2	2462	9.69	9.00	12.37	15.37	20
Result				Complied				

3.2 Power Density

3.2.1 Power Density Limit

Power Spectral Density Limit	
<input checked="" type="checkbox"/>	Mean equivalent isotropic radiated power (e.i.r.p.) density ≤ 10 dBm/MHz

3.2.2 Measuring Instruments

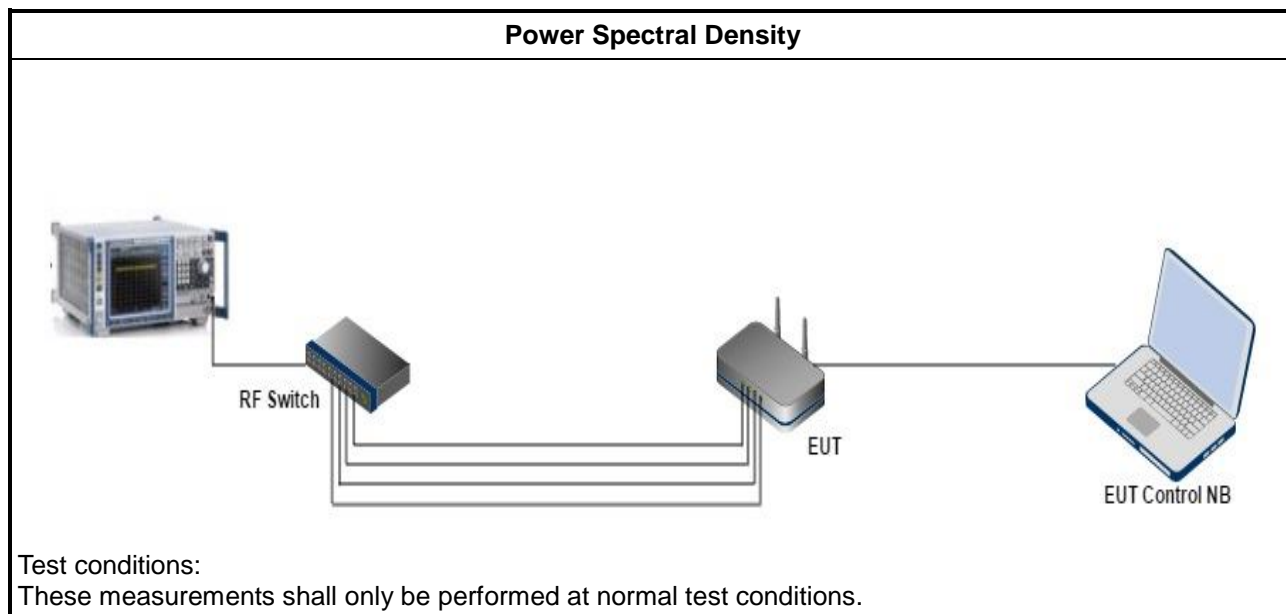
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Power spectral density shall be measured using one of the options below.
<input checked="" type="checkbox"/>	Option 1: For equipment with continuous and non-continuous transmissions. Refer as EN 300 328, clause 5.4.3.2.1.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	Refer as EN 300 328, clause 5.4.3.2.1 for conducted measurement.
<input checked="" type="checkbox"/>	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 $P_{\text{Samplecorr}}(n)$ (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.
<input type="checkbox"/> Option 2:	
Step 1:	Connect the UUT to the spectrum analyser and use the following settings: <ul style="list-style-type: none"> - Centre Frequency: The centre frequency of the channel under test - RBW: 1 MHz - VBW: 3 MHz - Frequency Span: $2 \times$ 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: <ul style="list-style-type: none"> - 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. $\text{PSD} = D + G + Y + 10 \times \log(1 / \text{DC}) \quad (\text{dBm} / \text{MHz})$
<input type="checkbox"/> Refer as EN 300 328, clause 5.4.3.2.2 for radiated measurement.	

3.2.4 Test Setup



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	5.35	3.00	8.35	10
11b	1	2442	5.64	3.00	8.64	10
11b	1	2472	5.24	3.00	8.24	10
11g	1	2412	3.13	3.00	6.13	10
11g	1	2442	3.47	3.00	6.47	10
11g	1	2472	3.73	3.00	6.73	10
HT20	2	2412	2.86	3.00	5.86	10
HT20	2	2442	2.88	3.00	5.88	10
HT20	2	2472	3.05	3.00	6.05	10
HT40	2	2422	-0.21	3.00	2.79	10
HT40	2	2442	0.12	3.00	3.12	10
HT40	2	2462	-0.11	3.00	2.89	10
Result			Complied			

3.3 Occupied Channel Bandwidth

3.3.1 Occupied Channel Bandwidth Limit

Occupied Channel Bandwidth Limit
Type of Frequency Hopping Equipment:
<input type="checkbox"/> Occupied Channel Bandwidth for each hopping frequency fall completely within 2.4 GHz – 2.4835 GHz.
<input type="checkbox"/> For non-adaptive equipment with e.i.r.p greater than 10 dBm, Occupied Channel Bandwidth \leq 5 MHz.
Type of Equipment Using Wide Band Modulations Other than FHSS:
<input checked="" type="checkbox"/> Occupied Channel Bandwidth fall completely within 2.4 GHz – 2.4835 GHz.
<input type="checkbox"/> For non-adaptive equipment with e.i.r.p greater than 10 dBm, Occupied Channel Bandwidth \leq 20 MHz.

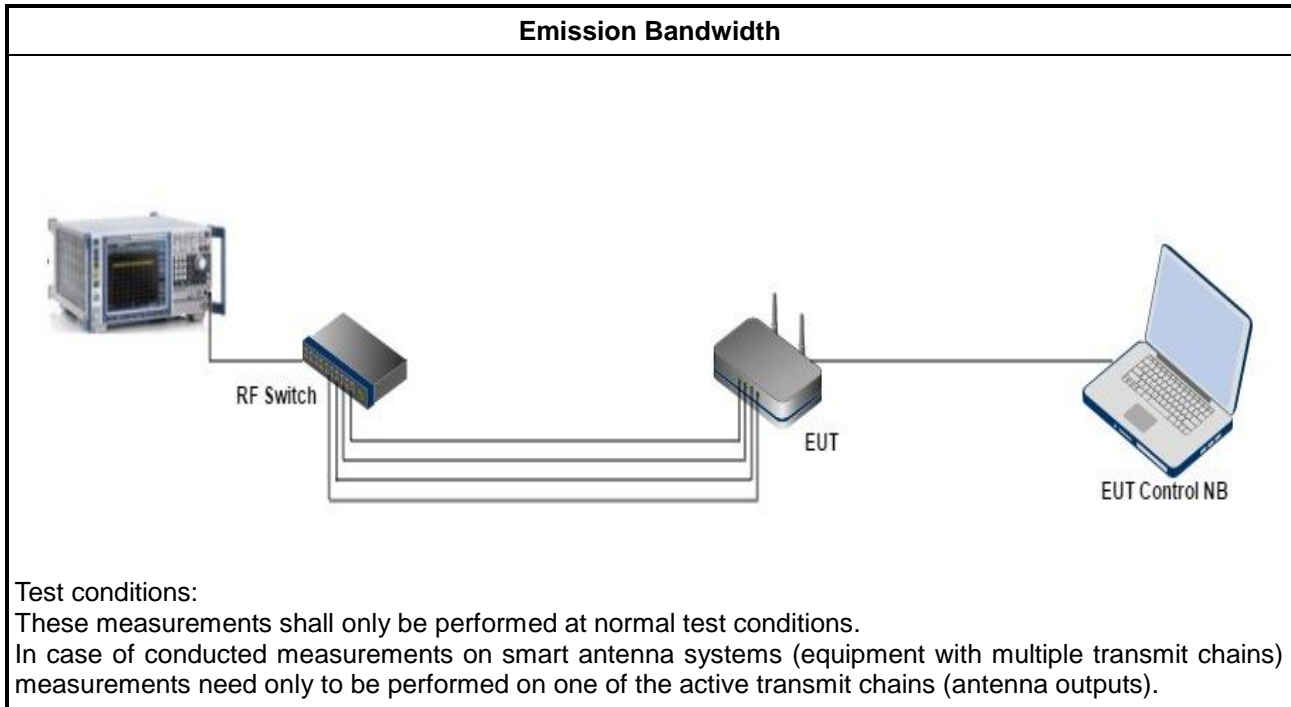
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as EN 300 328, clause 5.4.7.2.1 for conducted measurement.
<p>Step 1: Connect the UUT to the spectrum analyzer and use the following settings:</p> <ul style="list-style-type: none"> - Centre Frequency : The centre frequency of the channel under test. - Resolution BW : \sim 1 % of the span without going below 1 %. - Video BW : $3 \times$ RBW. - Frequency Span : $2 \times$ Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel) - Detector Mode : RMS. - Trace Mode : Max Hold. - Sweep Time : 1s. <p>Step 2: Wait until the trace is completed. Find the peak value of the trace and place the analyzer marker on this peak.</p> <p>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.</p>
<input type="checkbox"/> Refer as EN 300 328, clause 5.4.7.2.2 for radiated measurement.

3.3.4 Test Setup

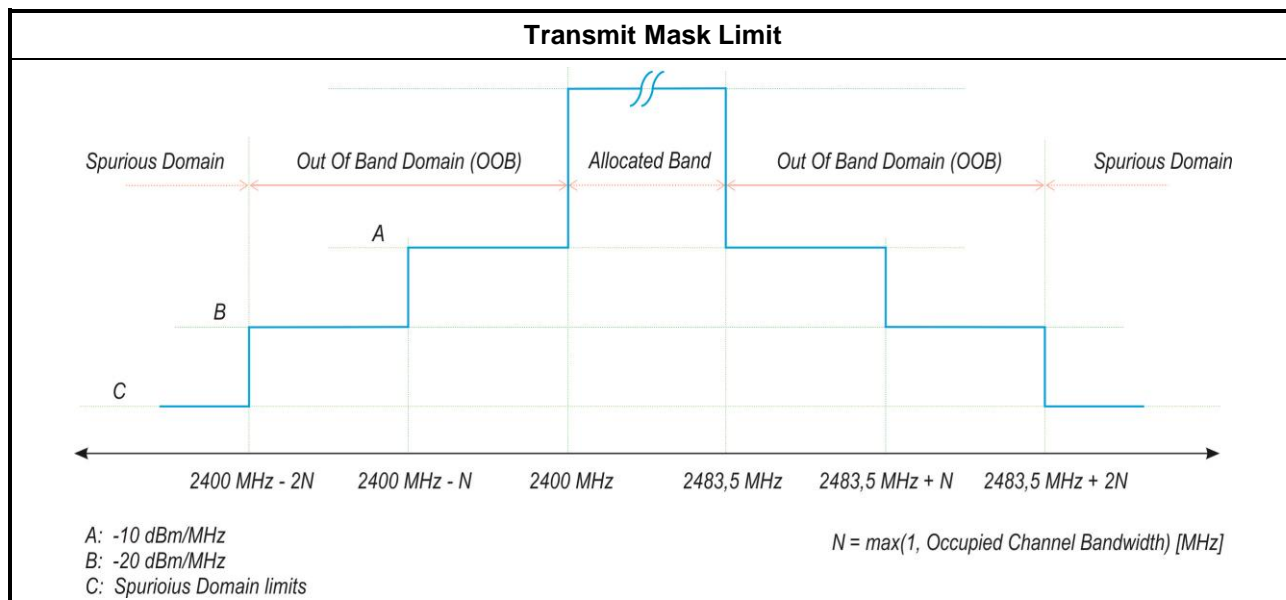


3.3.5 Test Result of Occupied Channel Bandwidth

Test Date: Sep. 22, 2014		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	14.65	2404.68400	2419.33600	10.84
11b	2472	14.67	2464.64400	2479.31600	10.84
11g	2412	16.91	2403.56400	2420.47600	16.88
11g	2472	16.91	2463.54400	2480.45600	16.88
HT20	2412	17.89	2403.06400	2420.95600	17.82
HT20	2472	17.89	2463.04400	2480.93600	17.82
HT40	2422	36.10	2403.96900	2440.07100	36.56
HT40	2462	36.10	2443.92900	2480.03100	36.52
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



3.4.2 Measuring Instruments

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

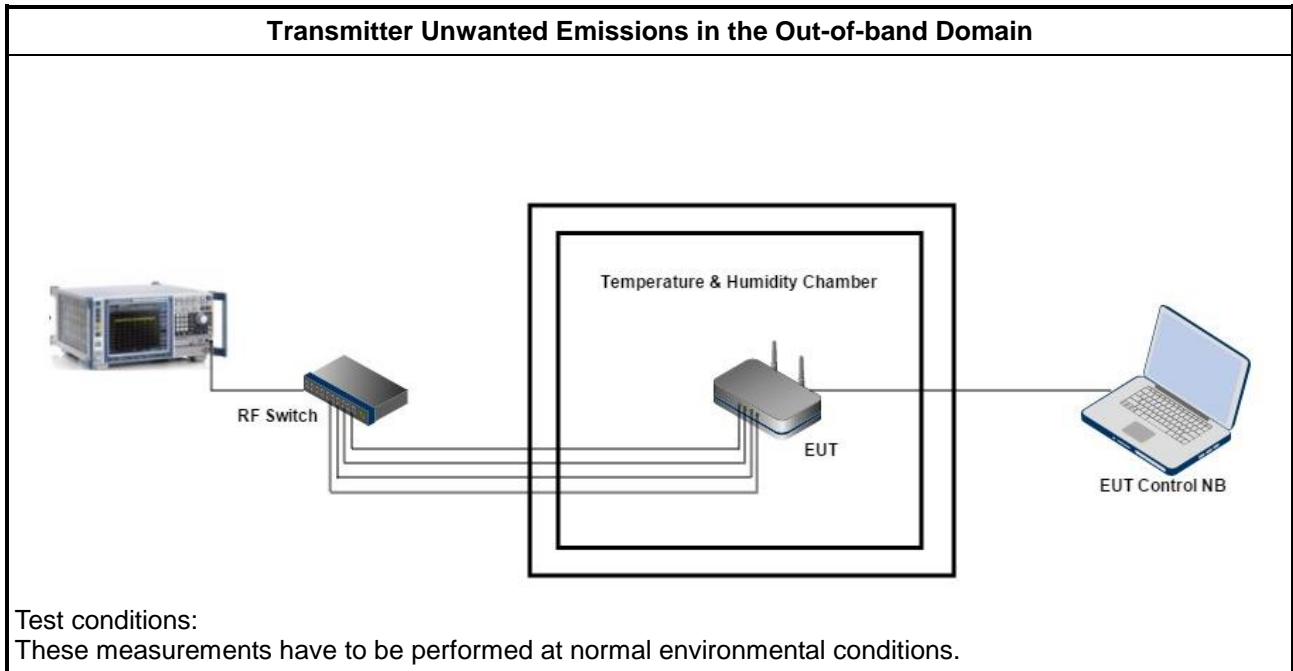
3.4.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
<input checked="" type="checkbox"/>	Refer as EN 300 328, clause 5.4.8.2.1 for conducted measurement.
<p>Step 1: Connect the UUT to the spectrum analyzer and use the following settings:</p> <ul style="list-style-type: none"> - 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. <p>NOTE 1: In case video triggering is not possible, an external trigger source may be used.</p>	

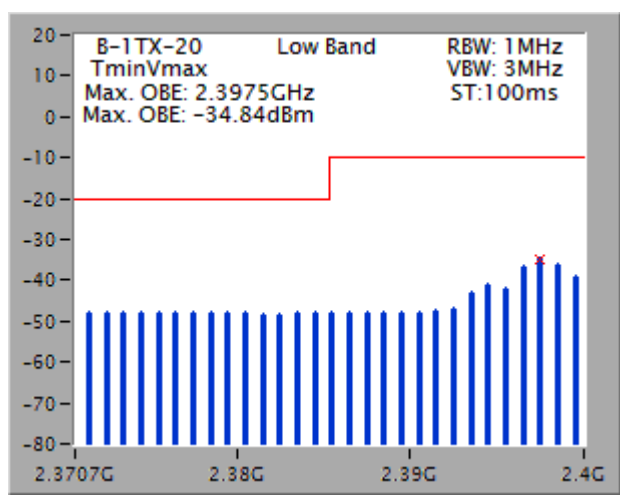
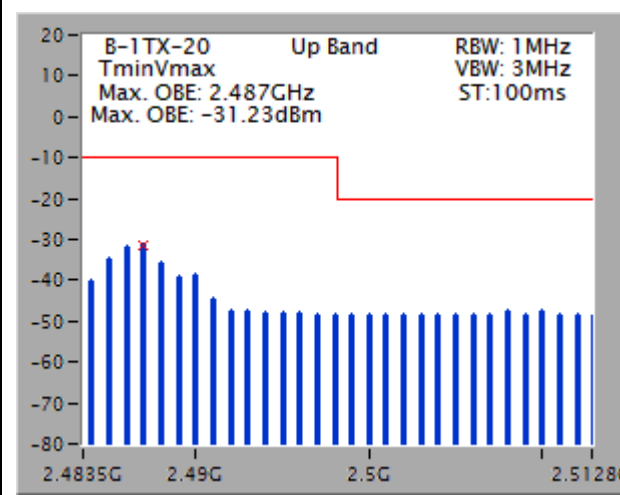
- Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)
- Adjust the trigger level to select the transmissions with the highest power level.
 - For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the 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 $10 \times \log_{10}(A_{ch})$ 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: A_{ch} 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

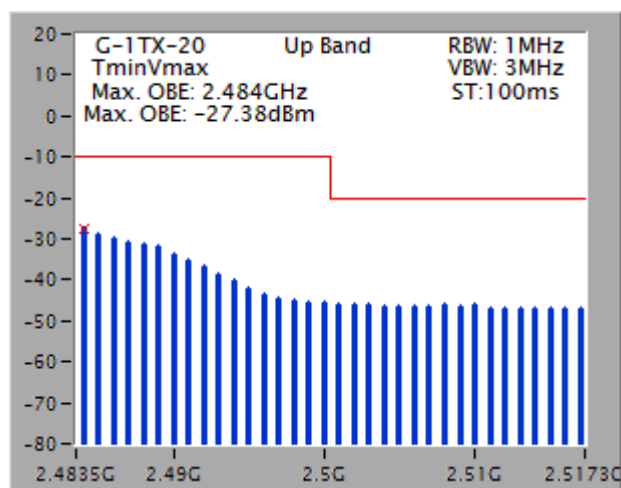
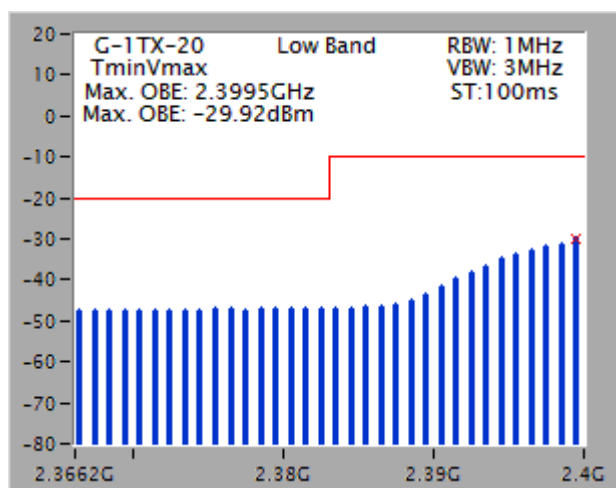


3.4.5 Test Result of Transmitter Unwanted Emissions in the Out-of-band Domain

Transmitter Unwanted Emissions in the Out-of-band Domain Result						
Test Date: Sep. 22, 2014			OOB Emissions (dBm/MHz)			
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	11b	1	2412	2397.5	-36.99	-10
TminVmax	11b	1	2412	2397.5	-34.84	-10
TminVmin	11b	1	2412	2397.5	-34.85	-10
TmaxVmax	11b	1	2412	2397.5	-41.91	-10
TmaxVmin	11b	1	2412	2397.5	-41.90	-10
TnomVnom	11b	1	2472	2487.0	-33.37	-10
TminVmax	11b	1	2472	2487.0	-31.23	-10
TminVmin	11b	1	2472	2487.0	-31.24	-10
TmaxVmax	11b	1	2472	2487.0	-38.15	-10
TmaxVmin	11b	1	2472	2487.0	-38.14	-10
Low Band				Up Band		
						
Result				Complied		

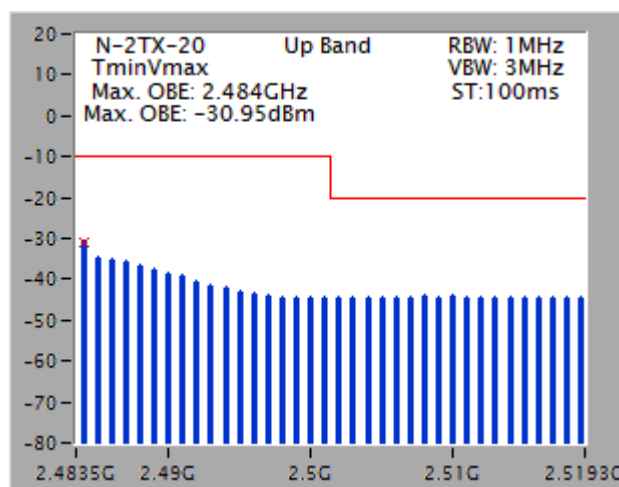
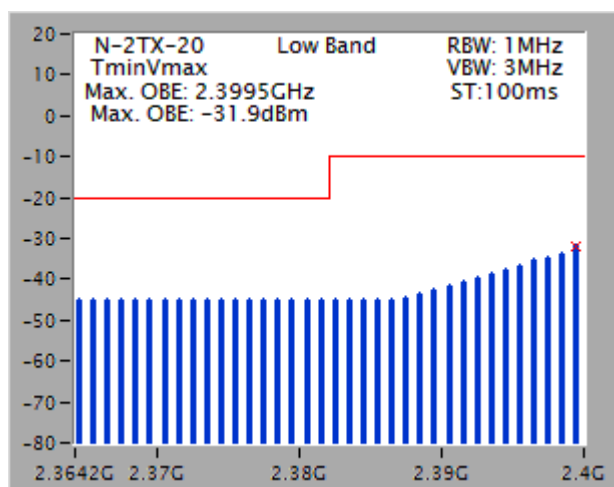
Transmitter Unwanted Emissions in the Out-of-band Domain Result
Test Date: Sep. 22, 2014
OOB Emissions (dBm/MHz)

Condition	Modulation Mode	N _{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	11g	1	2412	2399.5	-32.69	-10
TminVmax	11g	1	2412	2399.5	-29.92	-10
TminVmin	11g	1	2412	2399.5	-29.96	-10
TmaxVmax	11g	1	2412	2399.5	-36.25	-10
TmaxVmin	11g	1	2412	2399.5	-36.28	-10
TnomVnom	11g	1	2472	2484.0	-30.29	-10
TminVmax	11g	1	2472	2484.0	-27.38	-10
TminVmin	11g	1	2472	2484.0	-27.38	-10
TmaxVmax	11g	1	2472	2484.0	-35.34	-10
TmaxVmin	11g	1	2472	2484.0	-35.42	-10

Low Band
Up Band

Result
Complied

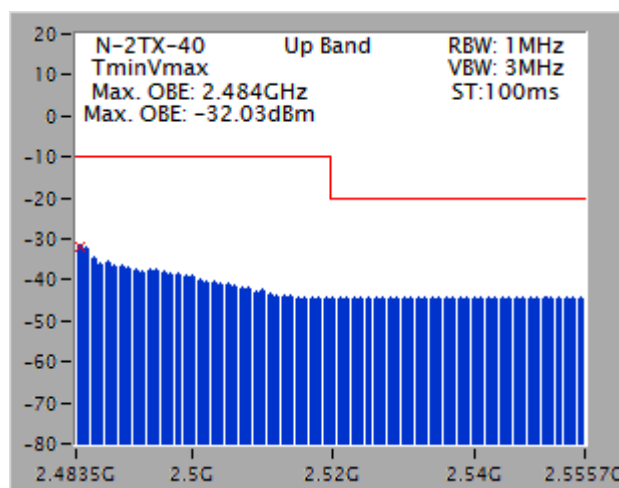
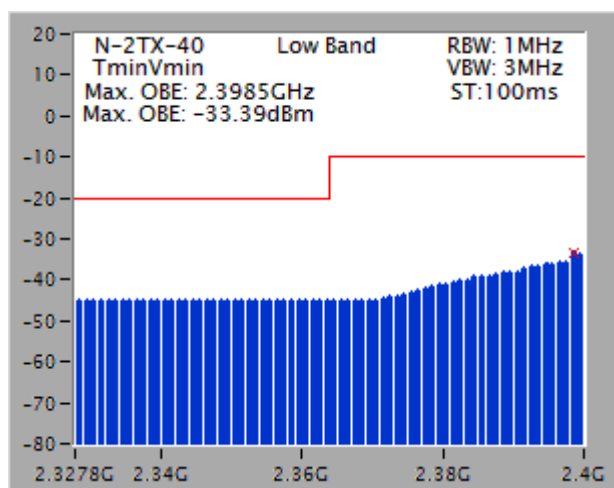
Transmitter Unwanted Emissions in the Out-of-band Domain Result
Test Date: Sep. 22, 2014
OOB Emissions (dBm/MHz)

Condition	Modulation Mode	N _{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	HT20	2	2412	2399.5	-33.92	-10
TminVmax	HT20	2	2412	2399.5	-31.90	-10
TminVmin	HT20	2	2412	2399.5	-31.90	-10
TmaxVmax	HT20	2	2412	2399.5	-37.14	-10
TmaxVmin	HT20	2	2412	2399.5	-37.26	-10
TnomVnom	HT20	2	2472	2484.0	-32.72	-10
TminVmax	HT20	2	2472	2484.0	-30.95	-10
TminVmin	HT20	2	2472	2484.0	-30.95	-10
TmaxVmax	HT20	2	2472	2484.0	-35.83	-10
TmaxVmin	HT20	2	2472	2484.0	-35.89	-10

Low Band
Up Band

Result
Complied

Transmitter Unwanted Emissions in the Out-of-band Domain Result
Test Date: Sep. 22, 2014
OOB Emissions (dBm/MHz)

Condition	Modulation Mode	N _{TX}	Freq. (MHz)	OOB Freq. (MHz)	OOB Emissions	Limit
TnomVnom	HT40	2	2422	2398.5	-35.52	-10
TminVmax	HT40	2	2422	2398.5	-33.42	-10
TminVmin	HT40	2	2422	2398.5	-33.39	-10
TmaxVmax	HT40	2	2422	2398.5	-38.21	-10
TmaxVmin	HT40	2	2422	2398.5	-38.26	-10
TnomVnom	HT40	2	2462	2484.0	-34.08	-10
TminVmax	HT40	2	2462	2484.0	-32.03	-10
TminVmin	HT40	2	2462	2484.0	-32.03	-10
TmaxVmax	HT40	2	2462	2484.0	-36.84	-10
TmaxVmin	HT40	2	2462	2484.0	-36.90	-10

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 $\leq (2400 \text{ MHz} - 2N)$ and spurious domain $\geq (2483.5 \text{ MHz} + 2N)$; 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	
<input type="checkbox"/>	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).
<input checked="" type="checkbox"/>	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:	<p>The emissions over the range 30 MHz to 1 000 MHz shall be identified.</p> <p>Spectrum analyzer settings :</p> <ul style="list-style-type: none"> - Resolution bandwidth : 100 kHz - Video bandwidth : 300 kHz - Detector mode : Peak - Filter type : 3 dB (Gaussian) - Trace Mode : Max Hold - Sweep Points : $\geq 19\,400$ <p>NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.</p> <p>- Sweep time:</p> <ul style="list-style-type: none"> •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. <p>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.</p>
Step 3:	<p>The emissions over the range 1 GHz to 12,75 GHz shall be identified.</p> <p>Spectrum analyzer settings:</p> <ul style="list-style-type: none"> - Resolution bandwidth : 1 MHz - Video bandwidth : 3 MHz - Filter type : 3 dB (Gaussian) - Detector mode : Peak - Trace Mode : Max Hold - Sweep Points : $\geq 23\,500$ <p>NOTE 2: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.</p> <p>- Sweep time:</p> <ul style="list-style-type: none"> •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. <p>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.</p> <p>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.</p>

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 $10 \times \log_{10}(\text{Ach})$ (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

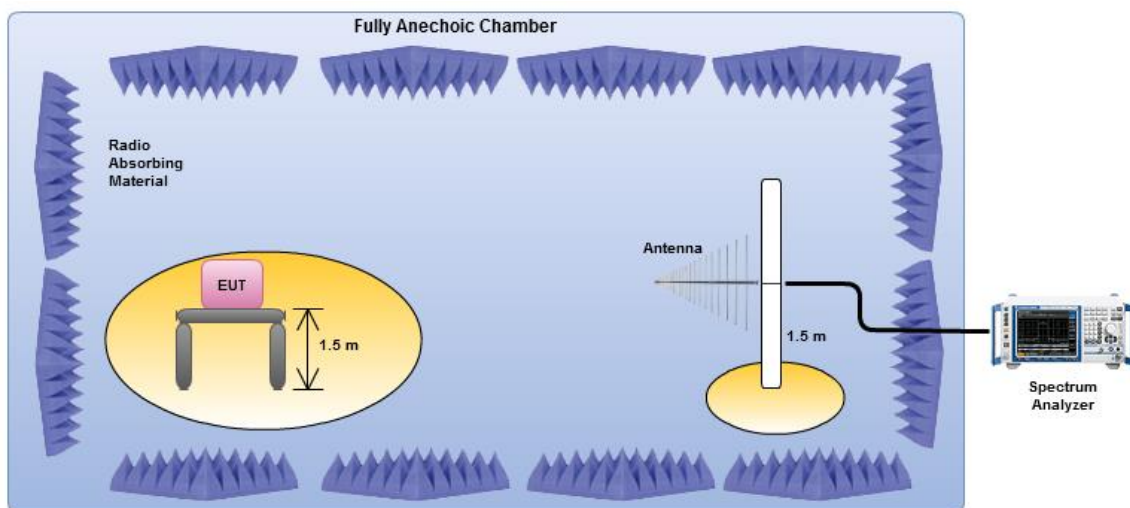
Step 2: Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window.
If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start 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

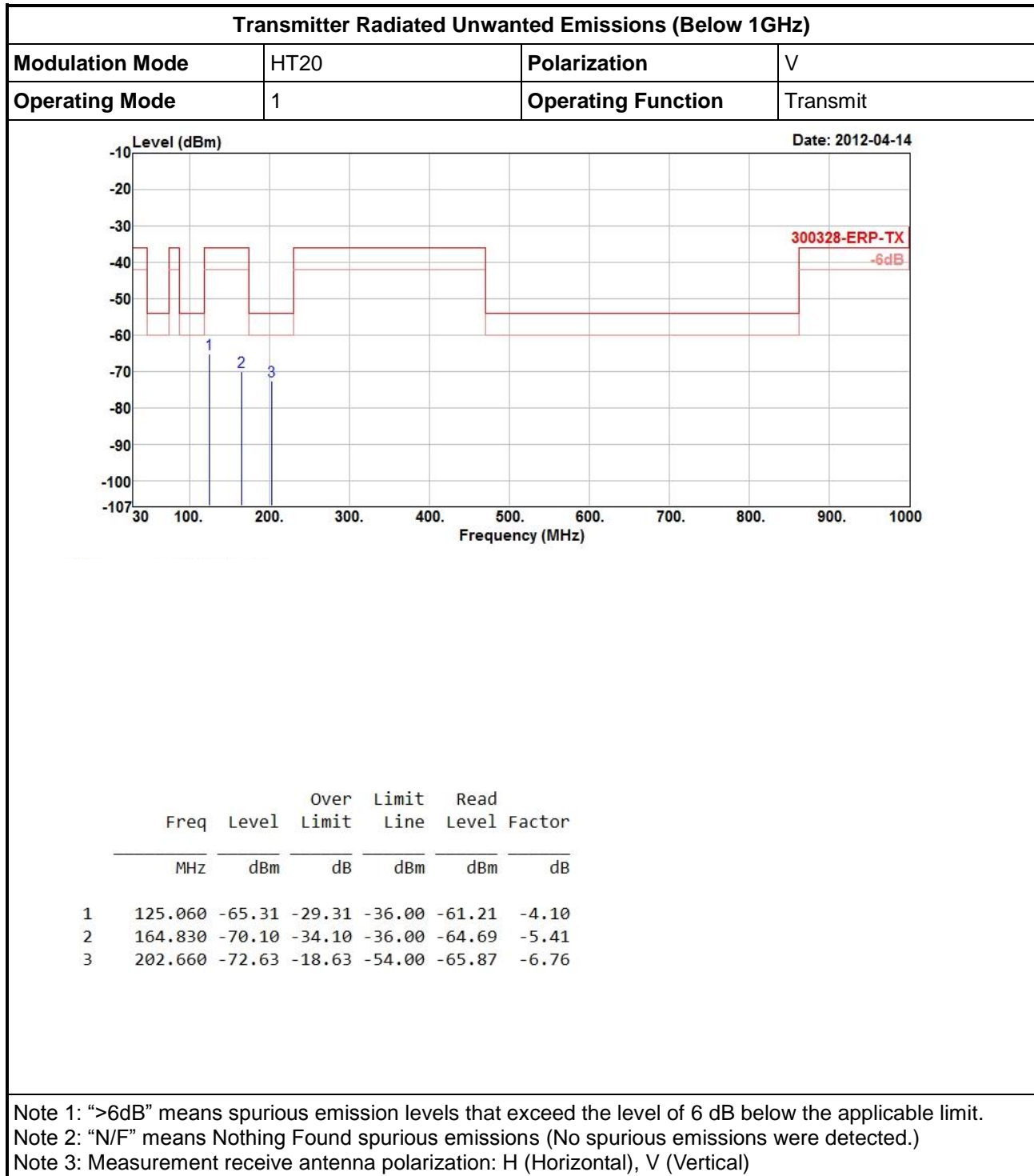


Test conditions:

These measurements shall only be performed at normal test conditions.

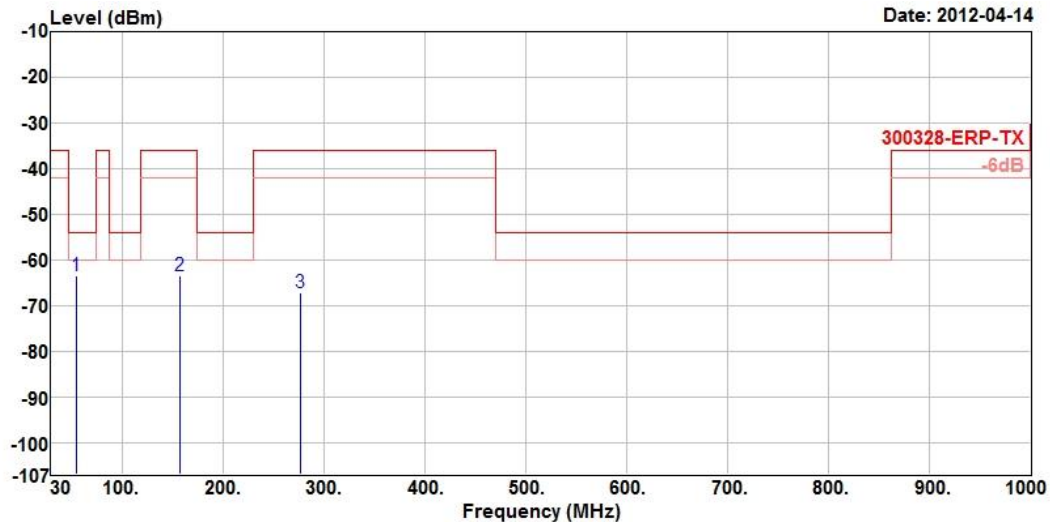
A measuring distance of at least 3 m shall be used for measurements at frequencies up to 1 GHz. For frequencies above 1 GHz, any suitable measuring far field distance may be used, depending on the test system noise floor for detecting spurious emission signals. The equipment size (excluding the antenna) 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	H
Operating Mode	1	Operating Function	Transmit



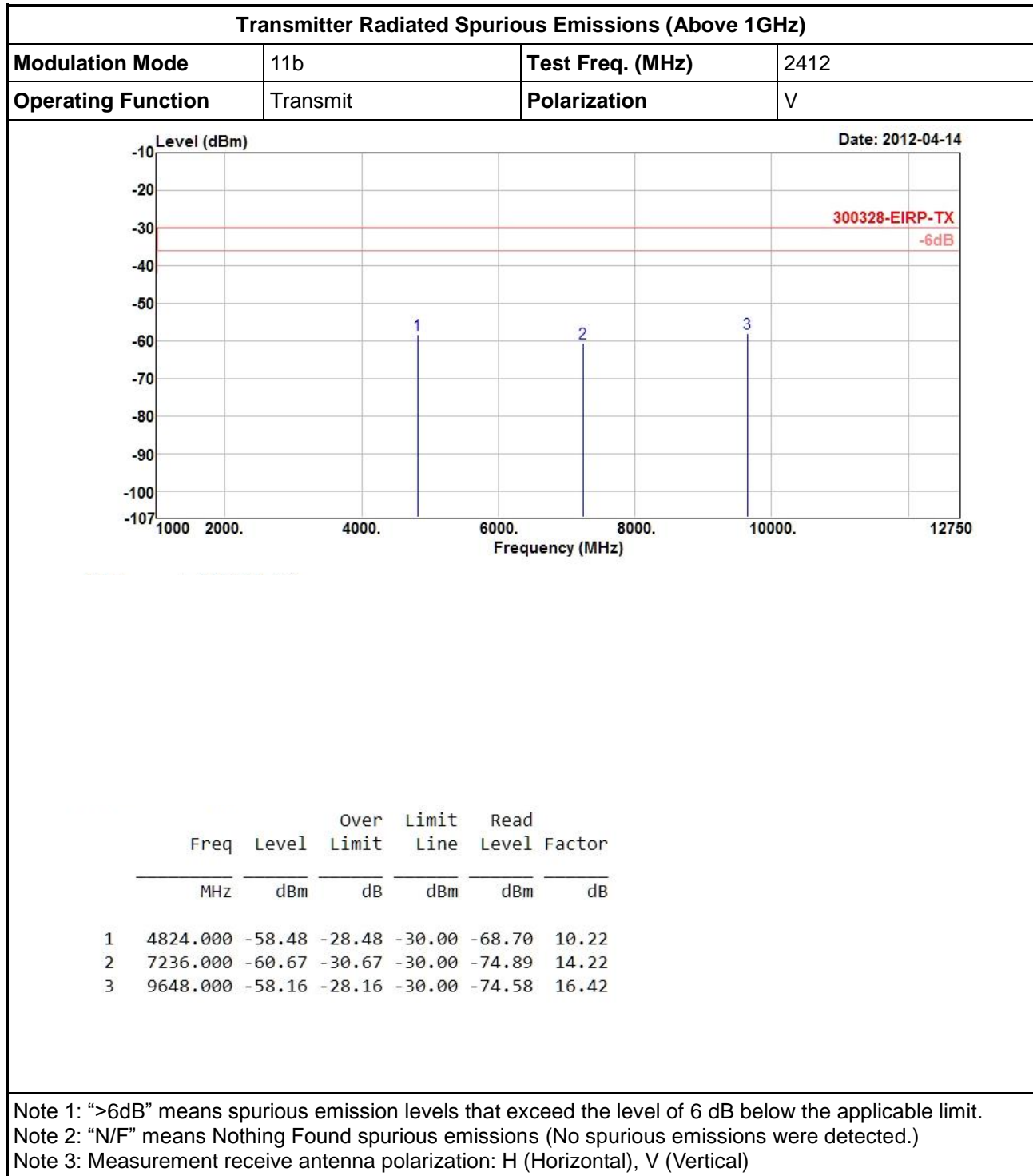
	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	55.220	-63.63	-9.63	-54.00	-60.56	-3.07
2	157.070	-63.43	-27.43	-36.00	-58.98	-4.45
3	277.350	-67.10	-31.10	-36.00	-63.67	-3.43

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.)

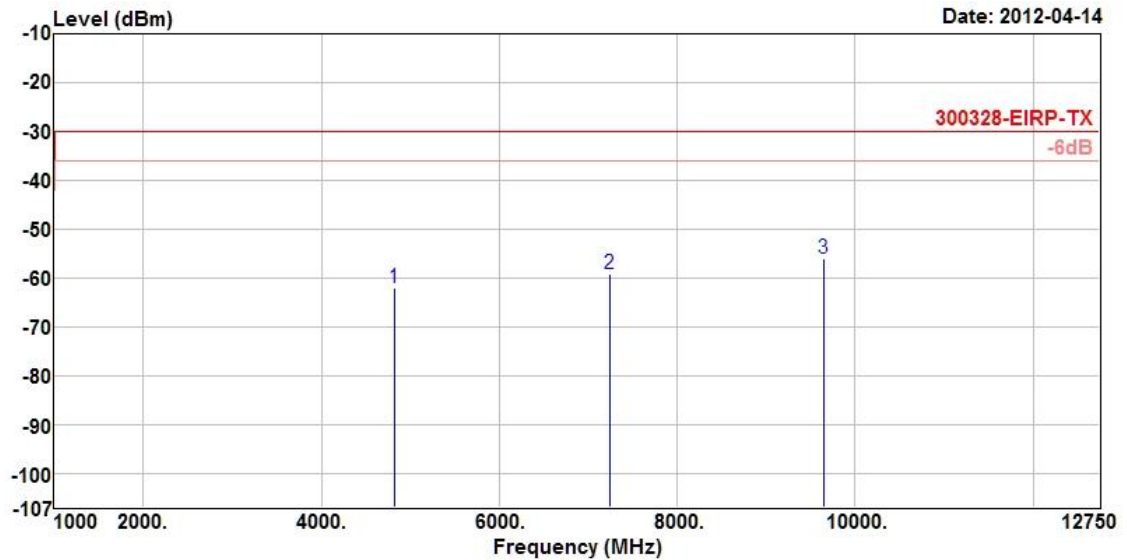
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4824.000	-62.04	-32.04	-30.00	-73.04	11.00
2	7236.000	-59.27	-29.27	-30.00	-74.97	15.70
3	9648.000	-55.93	-25.93	-30.00	-74.08	18.15

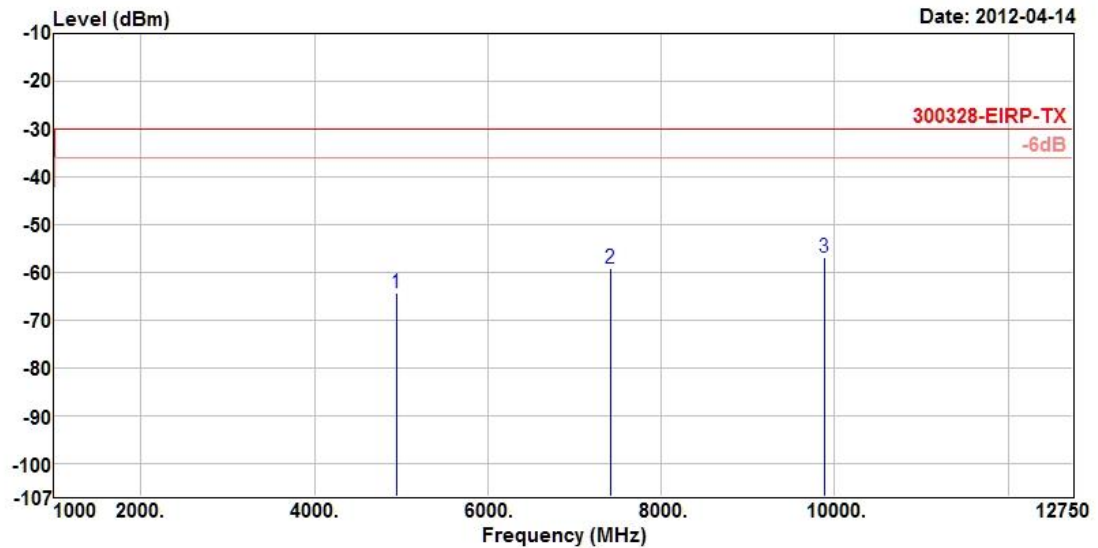
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4944.000	-64.34	-34.34	-30.00	-75.95	11.61
2	7416.000	-59.31	-29.31	-30.00	-75.19	15.88
3	9888.000	-56.94	-26.94	-30.00	-74.09	17.15

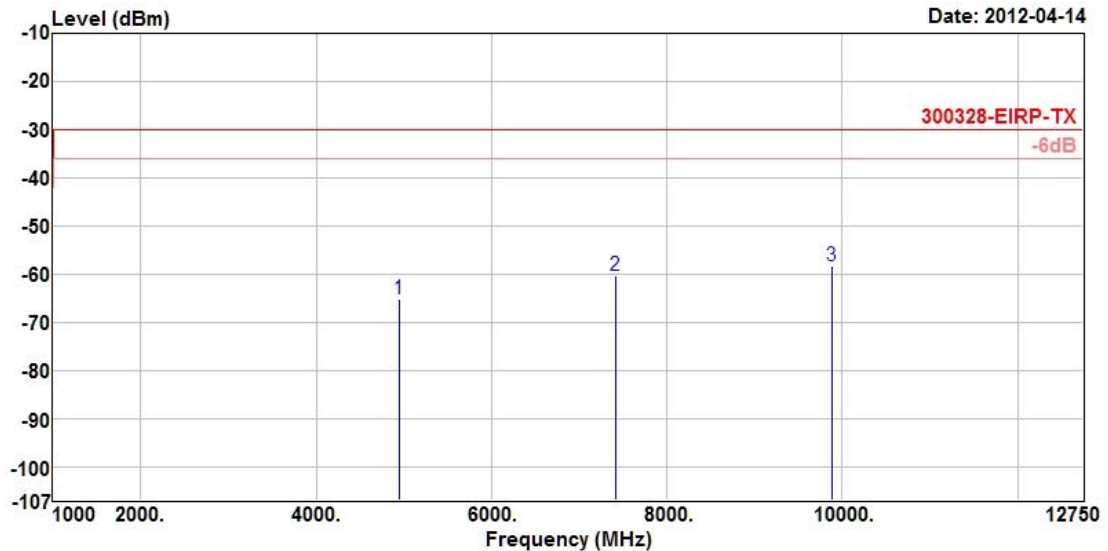
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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

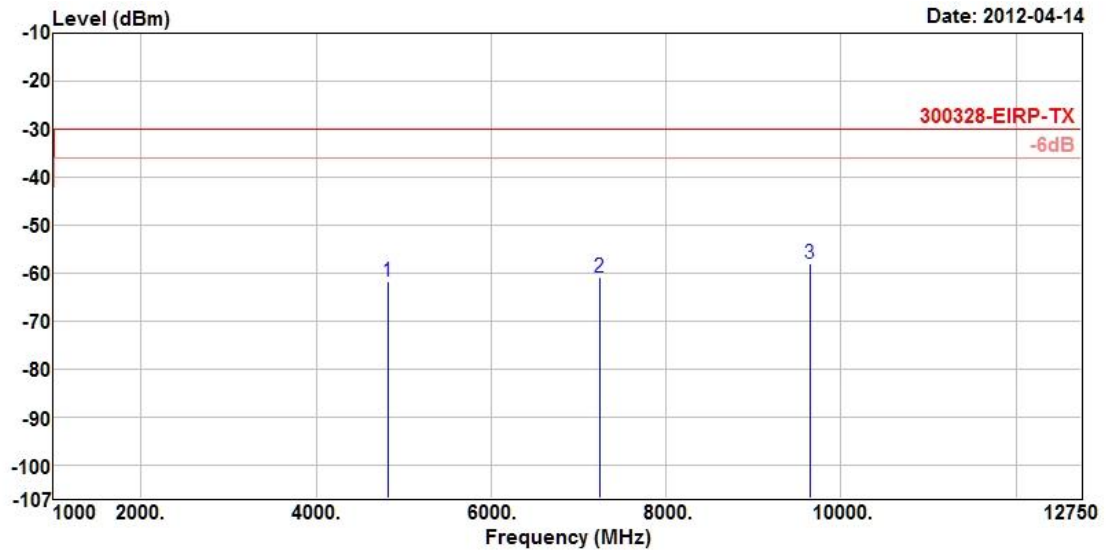


	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4944.000	-65.35	-35.35	-30.00	-76.09	10.74
2	7416.000	-60.25	-30.25	-30.00	-74.90	14.65
3	9888.000	-58.28	-28.28	-30.00	-74.12	15.84

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

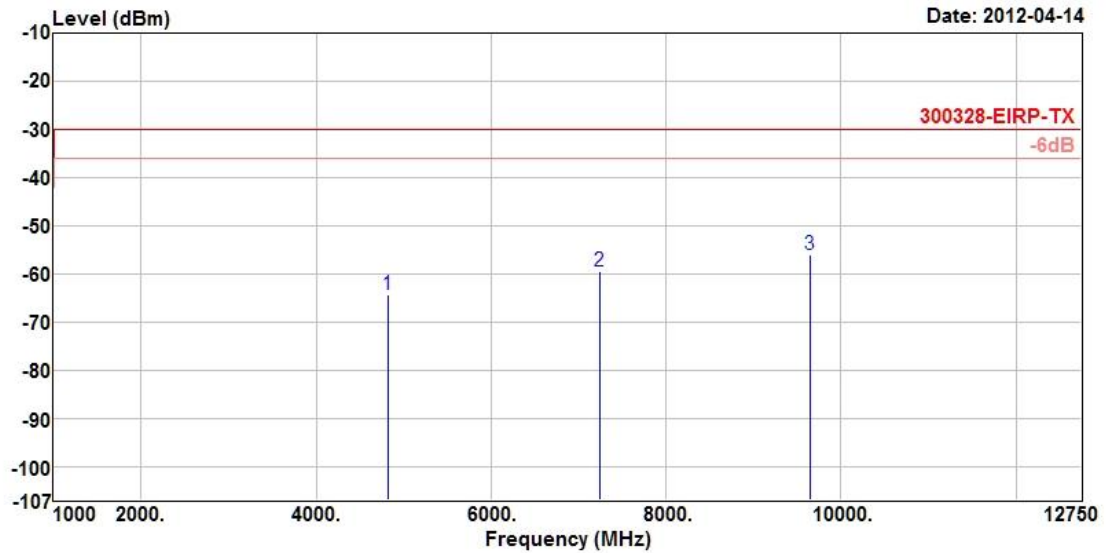


	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4824.000	-61.85	-31.85	-30.00	-72.07	10.22
2	7236.000	-60.81	-30.81	-30.00	-75.03	14.22
3	9648.000	-58.15	-28.15	-30.00	-74.57	16.42

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4824.000	-64.30	-34.30	-30.00	-75.30	11.00
2	7236.000	-59.58	-29.58	-30.00	-75.28	15.70
3	9648.000	-56.18	-26.18	-30.00	-74.33	18.15

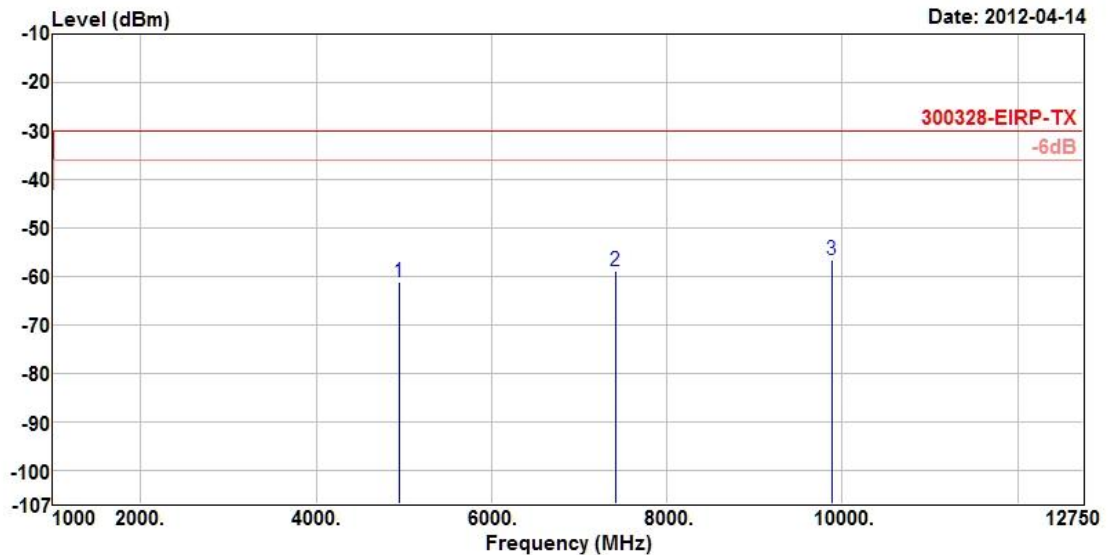
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4944.000	-61.32	-31.32	-30.00	-72.93	11.61
2	7416.000	-58.88	-28.88	-30.00	-74.76	15.88
3	9888.000	-56.75	-26.75	-30.00	-73.90	17.15

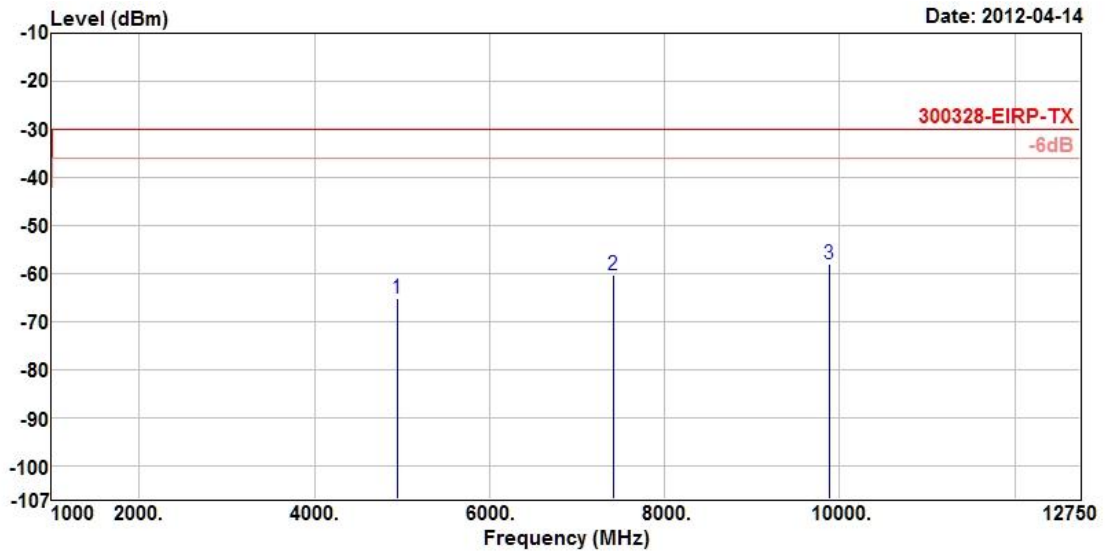
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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

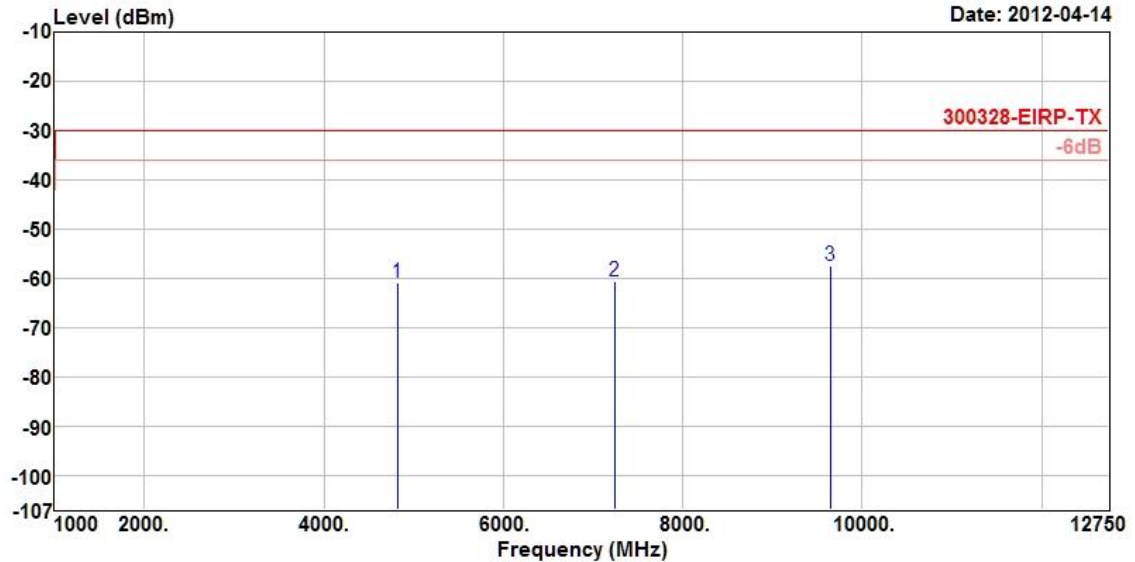


	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4944.000	-65.28	-35.28	-30.00	-76.02	10.74
2	7416.000	-60.48	-30.48	-30.00	-75.13	14.65
3	9888.000	-58.06	-28.06	-30.00	-73.90	15.84

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	4824.000	-60.89	-30.89	-30.00	-71.11	10.22
2	7236.000	-60.60	-30.60	-30.00	-74.82	14.22
3	9648.000	-57.52	-27.52	-30.00	-73.94	16.42

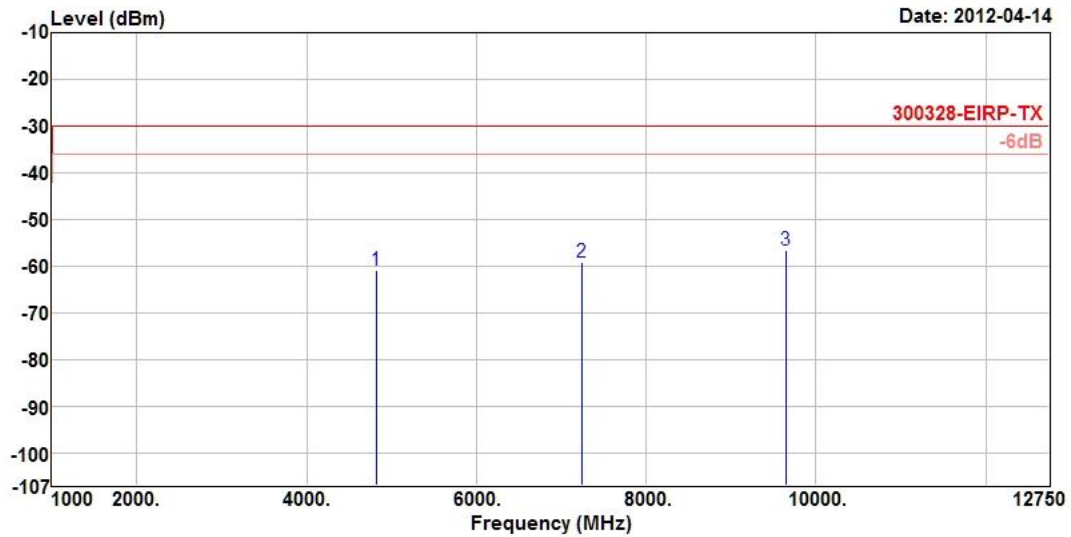
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4824.000	-60.87	-30.87	-30.00	-71.87	11.00
2	7236.000	-59.13	-29.13	-30.00	-74.83	15.70
3	9648.000	-56.61	-26.61	-30.00	-74.76	18.15

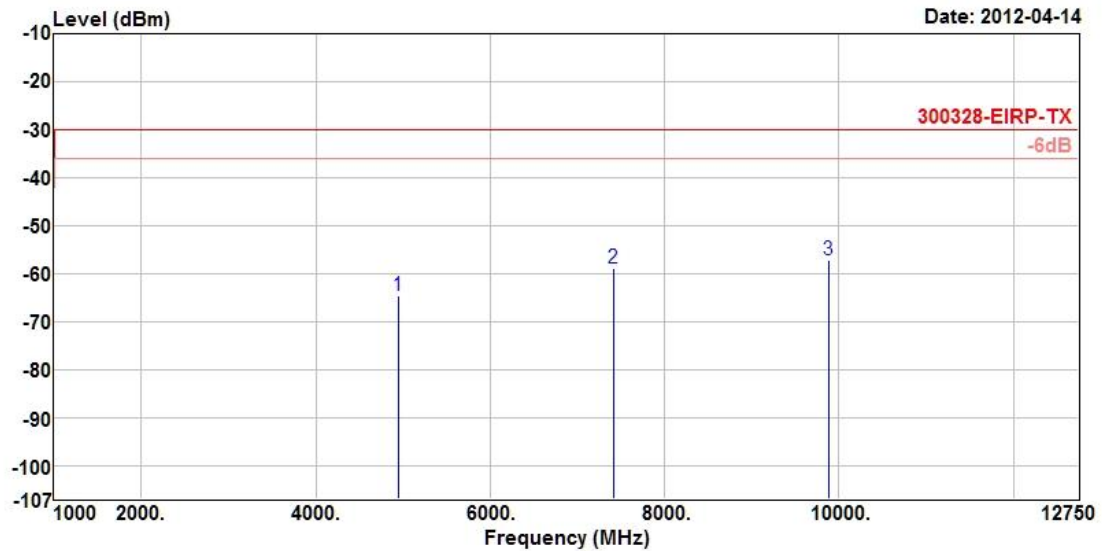
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4944.000	-64.53	-34.53	-30.00	-76.14	11.61
2	7416.000	-59.05	-29.05	-30.00	-74.93	15.88
3	9888.000	-57.22	-27.22	-30.00	-74.37	17.15

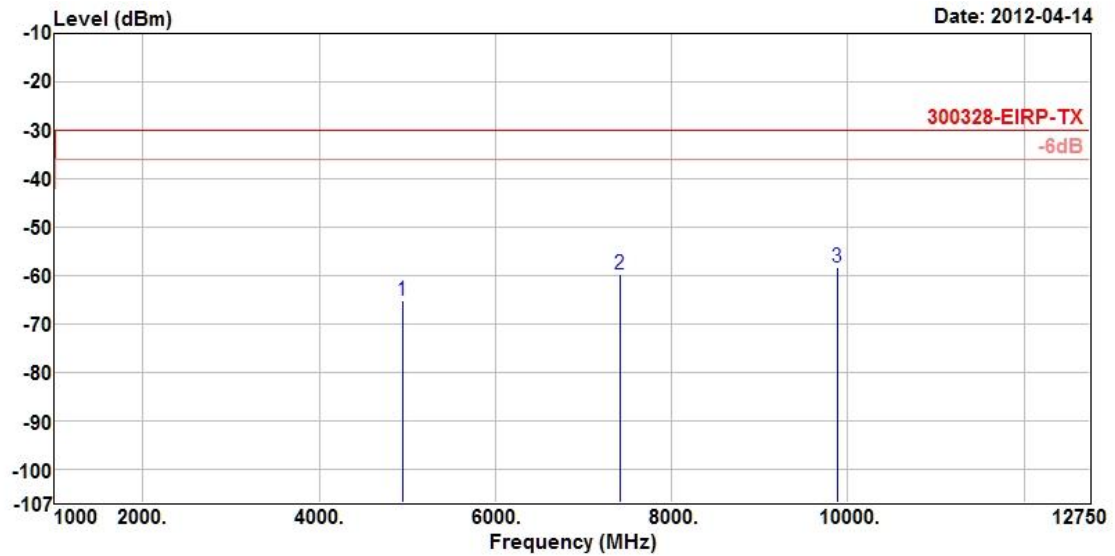
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4944.000	-65.32	-35.32	-30.00	-76.06	10.74
2	7416.000	-59.91	-29.91	-30.00	-74.56	14.65
3	9888.000	-58.39	-28.39	-30.00	-74.23	15.84

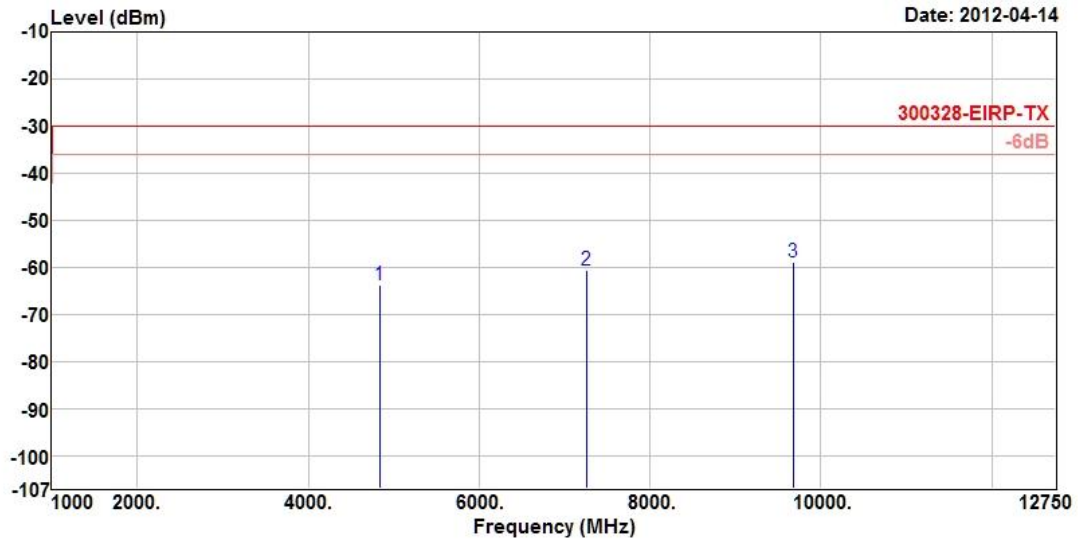
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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

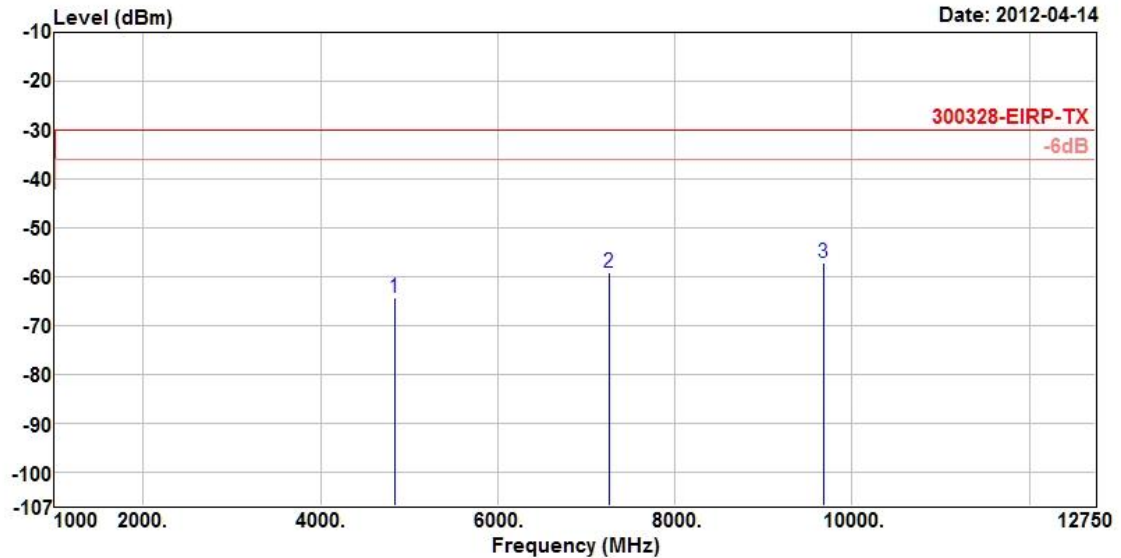


	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
		dBm	dB	dBm	dBm	dB
1	4844.000	-63.76	-33.76	-30.00	-74.08	10.32
2	7266.000	-60.73	-30.73	-30.00	-75.01	14.28
3	9688.000	-58.90	-28.90	-30.00	-75.21	16.31

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4844.000	-64.29	-34.29	-30.00	-75.41	11.12
2	7266.000	-59.12	-29.12	-30.00	-74.85	15.73
3	9688.000	-57.07	-27.07	-30.00	-75.02	17.95

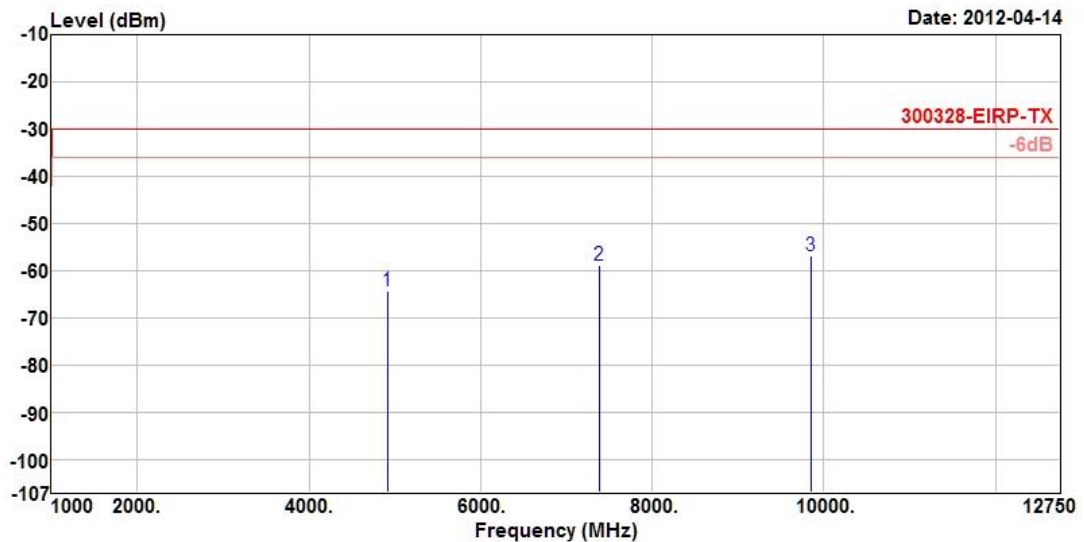
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	4924.000	-64.30	-34.30	-30.00	-75.78	11.48
2	7386.000	-58.83	-28.83	-30.00	-74.66	15.83
3	9848.000	-56.87	-26.87	-30.00	-74.22	17.35

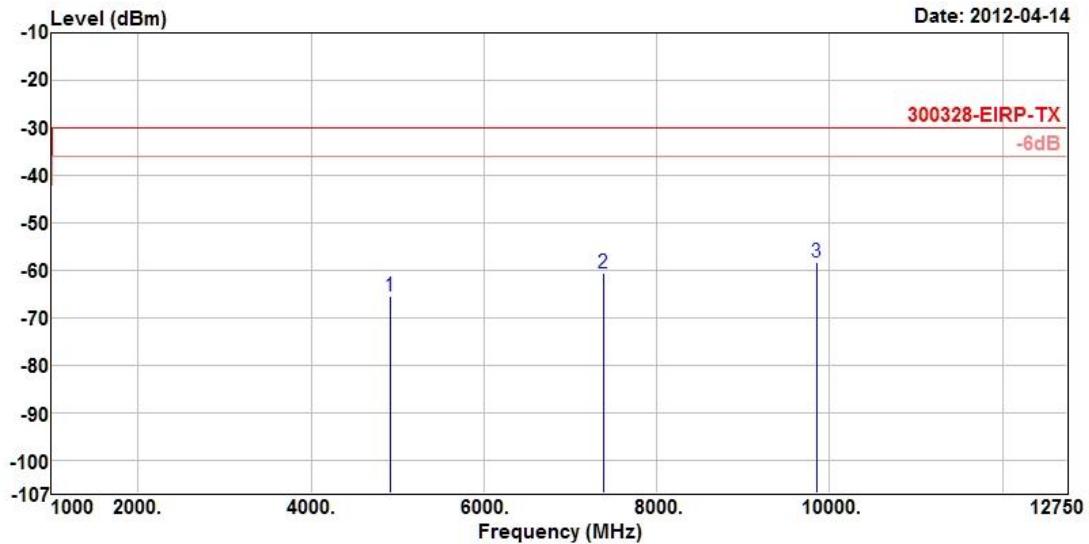
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	-65.50	-35.50	-30.00	-76.14	10.64
2	7386.000	-60.64	-30.64	-30.00	-75.17	14.53
3	9848.000	-58.21	-28.21	-30.00	-74.17	15.96

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

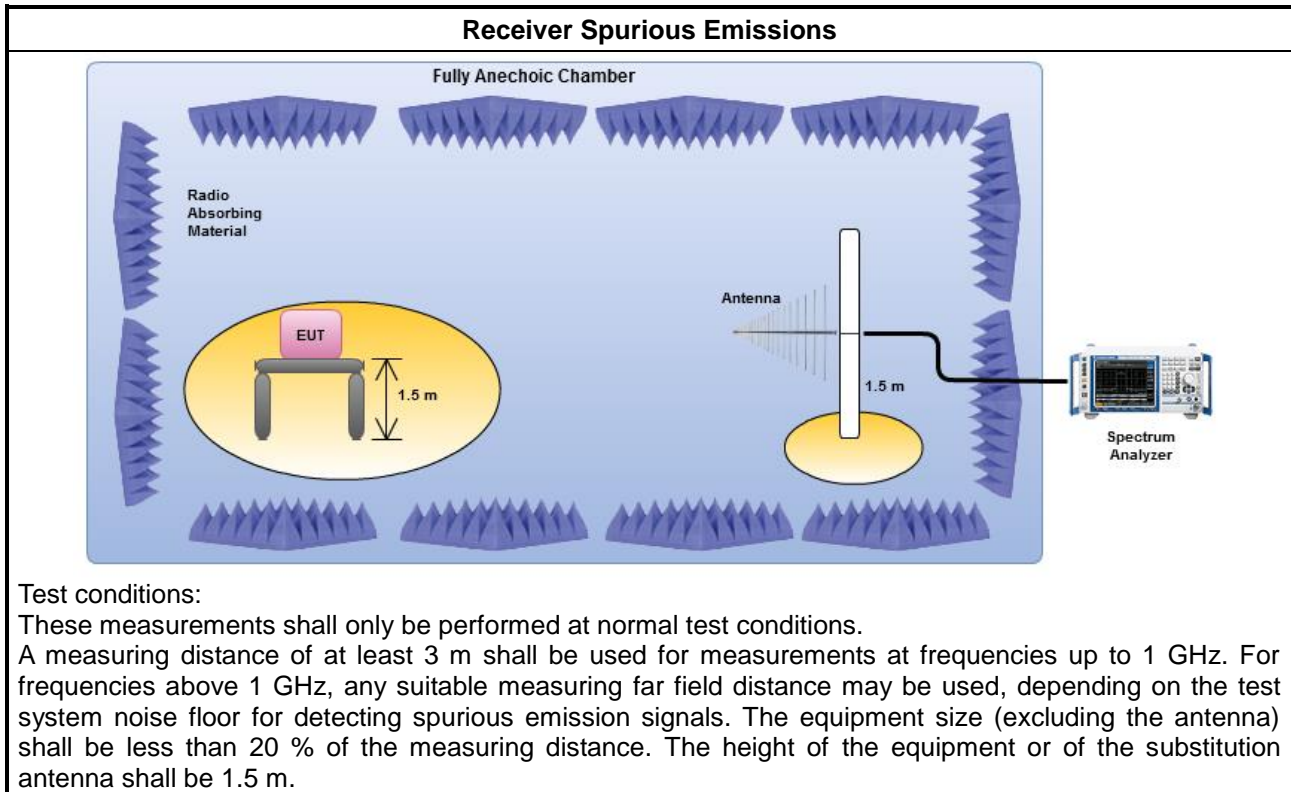
Refer a test equipment and calibration data table in this test report.

4.1.3 Test Procedures

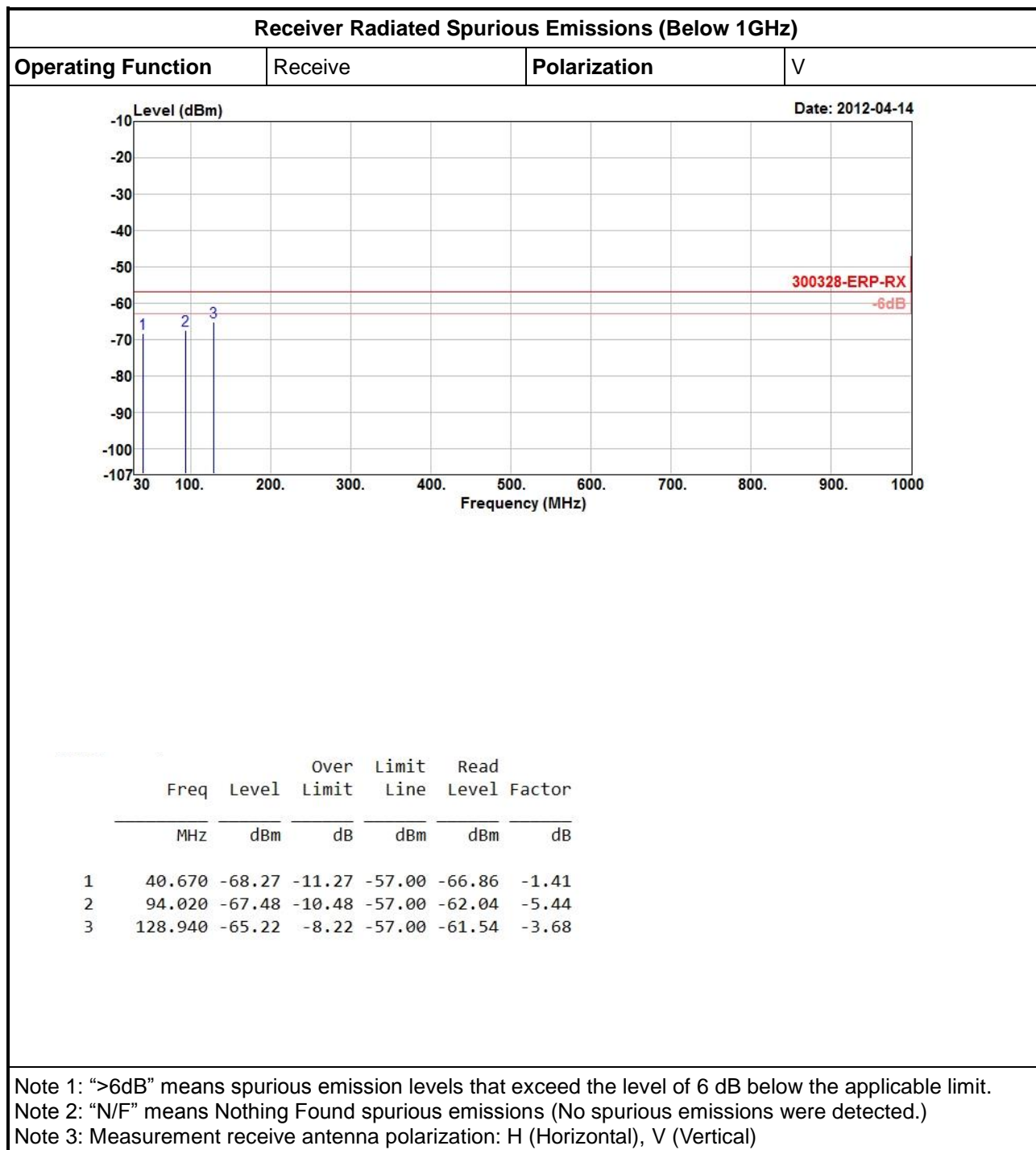
Test Method	
<input type="checkbox"/>	Refer as EN 300 328, clause 5.4.10.2.1 for conducted measurement. Conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
<input checked="" type="checkbox"/>	Refer as EN 300 328, clause 5.4.10.2.2 for radiated measurement.
<p>Pre-scan: The test procedure below shall be used to identify potential unwanted emissions of the UUT.</p> <p>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.</p> <p>Step 2: The emissions over the range 30 MHz to 1 000 MHz shall be identified.</p> <p>Spectrum analyzer settings :</p> <ul style="list-style-type: none"> - Resolution bandwidth : 100 kHz - Video bandwidth : 300 kHz - Filter type : 3 dB (Gaussian) - Detector mode : Peak - Trace Mode : Max Hold - Sweep Points : $\geq 19\,400$ <p>NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.</p> <ul style="list-style-type: none"> - Sweep time : Auto <p>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.</p>	

Step 3:	<p>The emissions over the range 1 GHz to 12,75 GHz shall be identified.</p> <p>Spectrum analyzer settings:</p> <ul style="list-style-type: none"> - Resolution bandwidth : 1 MHz - Video bandwidth : 3 MHz - Filter type : 3 dB (Gaussian) - Detector mode : Peak - Trace Mode : Max Hold - Sweep Points : $\geq 23\,500$ <p>NOTE 2: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.</p> <ul style="list-style-type: none"> - Sweep time: Auto <p>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.</p> <p>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.</p>
Step 4:	<p>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 $10 \times \log_{10}(\text{Ach})$ (number of active transmit chains).</p> <p>Measurement of the emissions identified during the pre-scan</p>
Step 1:	<p>The level of the emissions shall be measured using the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> - 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 : $\geq 30\,000$ - Trigger : Video (for burst signals) or Manual (for continuous signals) - Detector : RMS
Step 2:	<p>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.</p> <p>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.</p>
Step 3:	<p>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</p>
Step 4:	<p>The value defined in step 3 shall be compared to the limits defined in tables 5 and 13.</p>

4.1.4 Test Setup



4.1.5 Receiver Radiated Spurious Emissions (Below 1GHz)

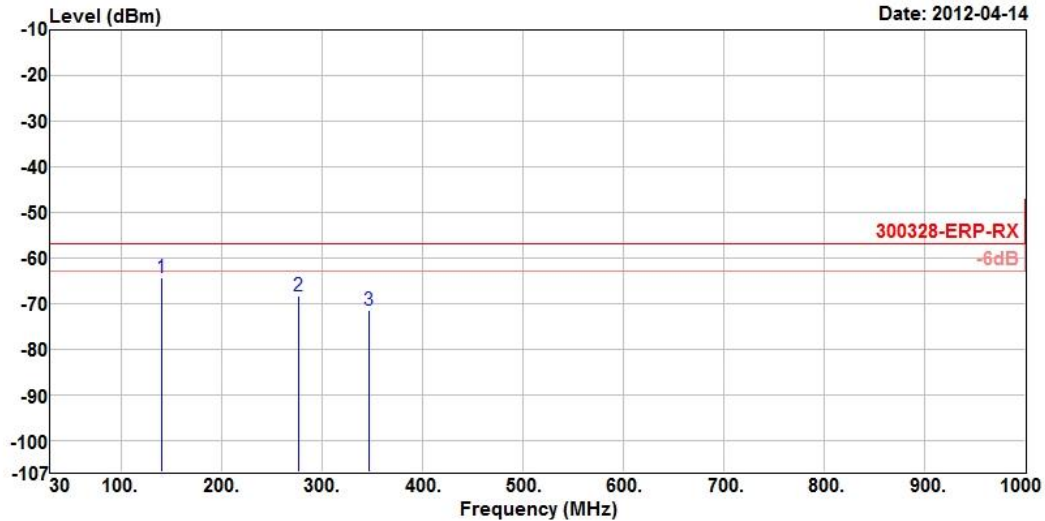


Receiver Radiated Spurious Emissions (Below 1GHz)
Operating Function

Receive

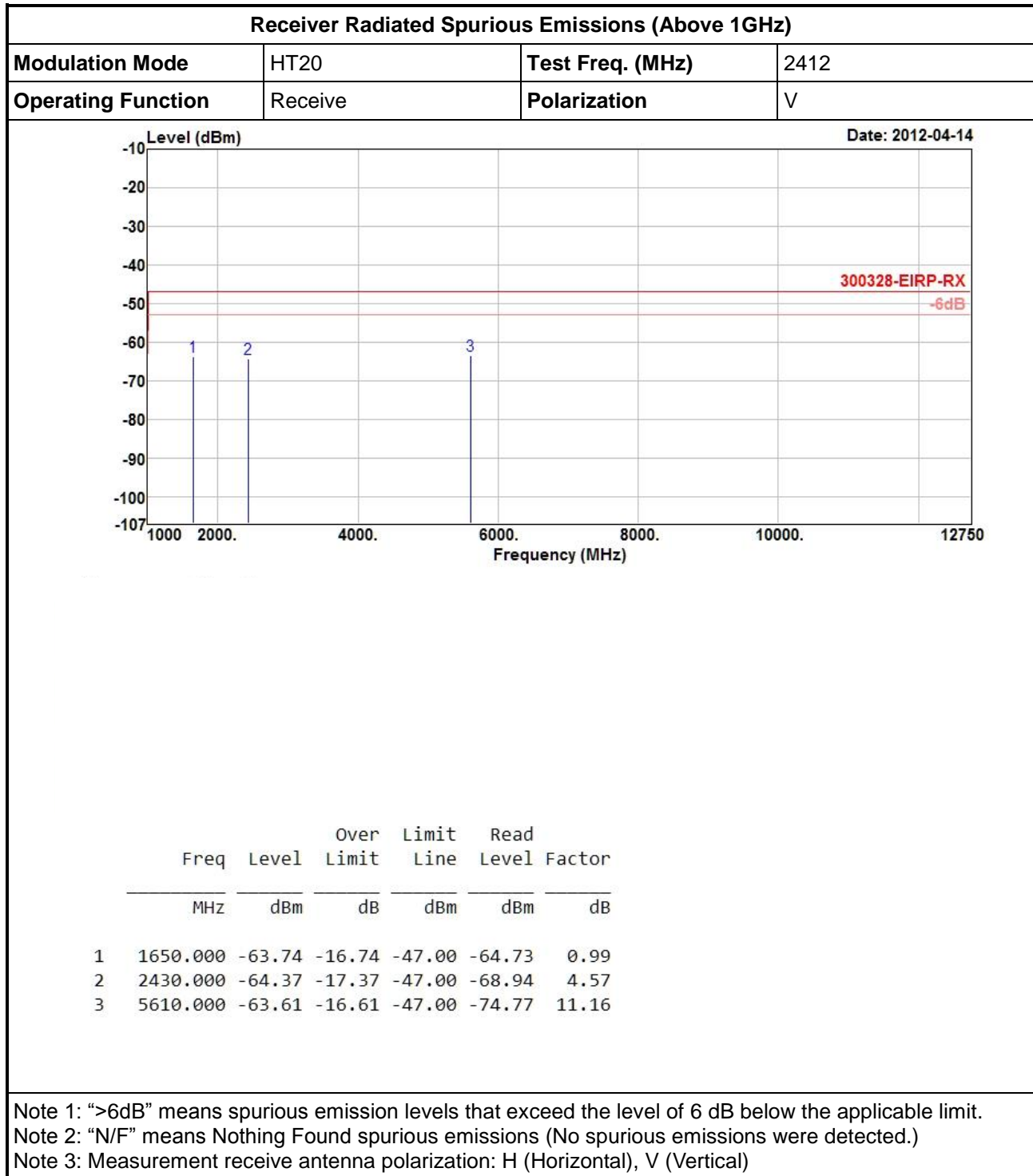
Polarization

H



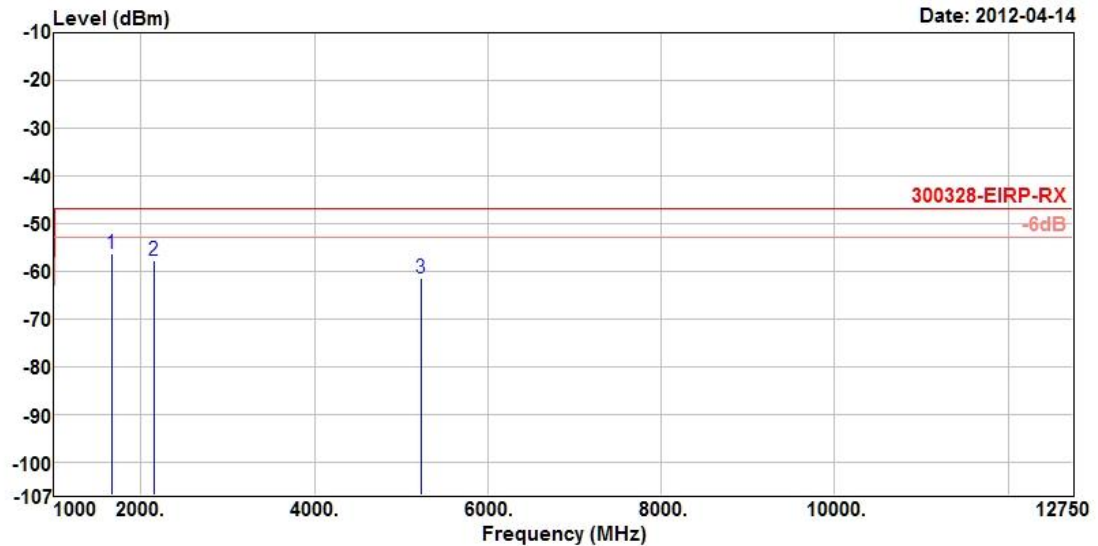
	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	140.580	-64.41	-7.41	-57.00	-61.10	-3.31
2	277.350	-68.32	-11.32	-57.00	-64.89	-3.43
3	347.190	-71.52	-14.52	-57.00	-69.38	-2.14

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)

Modulation Mode	HT20	Test Freq. (MHz)	2412
Operating Function	Receive	Polarization	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	1670.000	-56.42	-9.42	-47.00	-57.50	1.08
2	2150.000	-57.79	-10.79	-47.00	-62.21	4.42
3	5235.000	-61.46	-14.46	-47.00	-73.49	12.03

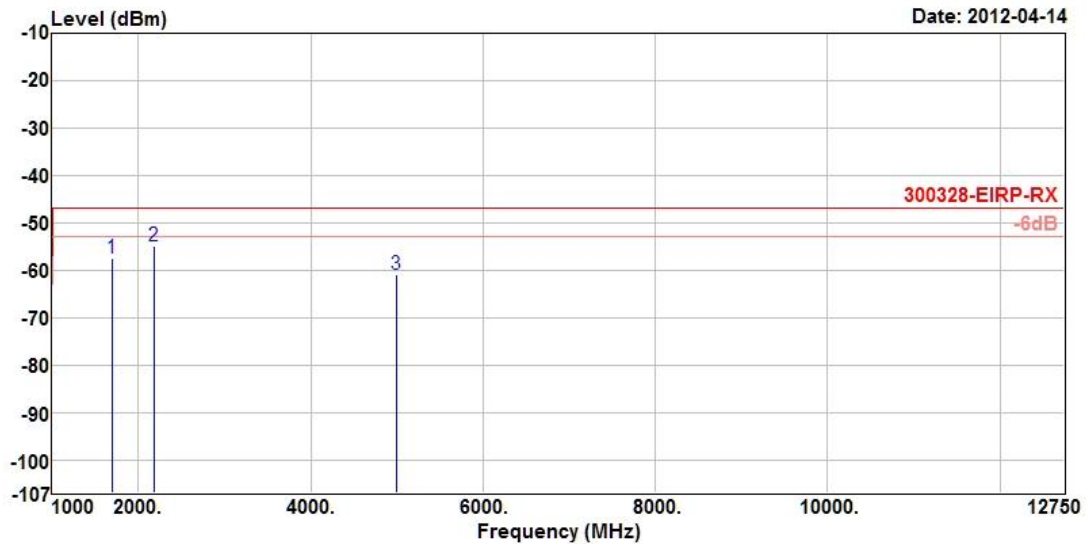
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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 (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	2472
Operating Function	Receive	Polarization	V



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	1695.000	-57.49	-10.49	-47.00	-58.83	1.34
2	2190.000	-55.01	-8.01	-47.00	-59.43	4.42
3	4990.000	-60.96	-13.96	-47.00	-72.69	11.73

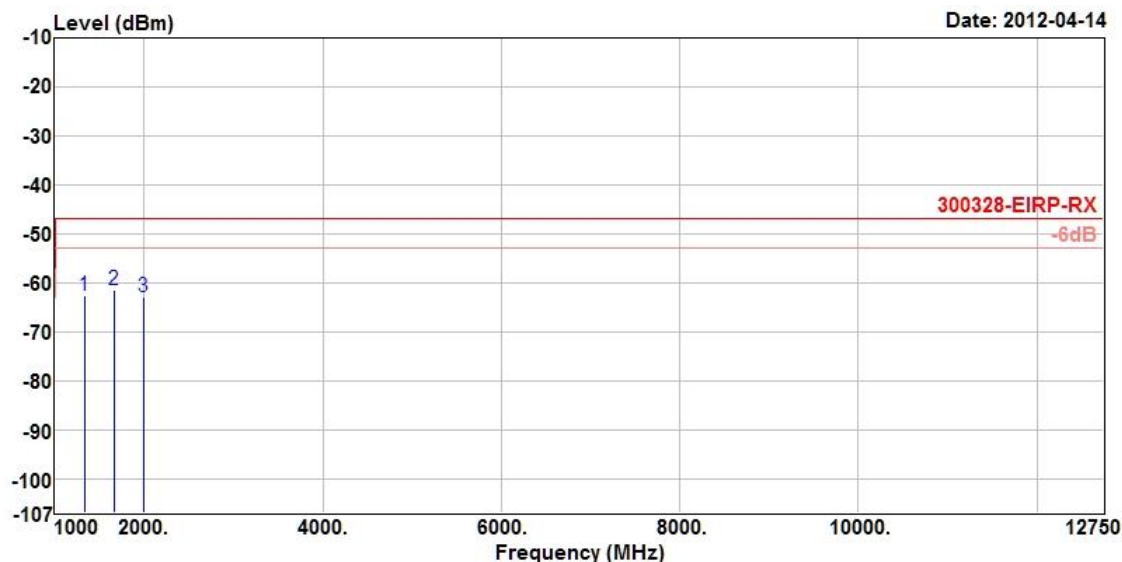
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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)

Modulation Mode	HT20	Test Freq. (MHz)	2472
Operating Function	Receive	Polarization	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor
			dB	dBm	dBm	dB
1	1330.000	-62.64	-15.64	-47.00	-61.44	-1.20
2	1670.000	-61.36	-14.36	-47.00	-62.61	1.25
3	1990.000	-62.86	-15.86	-47.00	-67.52	4.66

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	
<input checked="" type="checkbox"/>	Only for adaptive systems and RF Output Power > 10 dBm
<input type="checkbox"/>	Non-LBT based Detect and Avoid: <ul style="list-style-type: none"> 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 x log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
<input type="checkbox"/>	LBT based Detect and Avoid (Frame Based Equipment): <ul style="list-style-type: none"> 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 x log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
<input checked="" type="checkbox"/>	LBT based Detect and Avoid (Load Based Equipment with spectrum sharing mechanism IEEE Std.): <ul style="list-style-type: none"> 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 x log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
<input checked="" type="checkbox"/>	LBT based Detect and Avoid (Load Based Equipment): <ul style="list-style-type: none"> Minimum Clear Channel Assessment (CCA) time >18 us; Maximum COT ≤ 13ms; Minimum of Idle period Time >18 us; TL = -70 dBm/MHz + 10 x log10 (100 mW / Pout) (Pout in mW e.i.r.p.)
<input checked="" type="checkbox"/>	Short Control Signaling Transmissions: <ul style="list-style-type: none"> 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			
<p>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.</p> <p>Note 2: A typical value which can be used in most cases is -50 dBm/MHz.</p> <p>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.</p>				

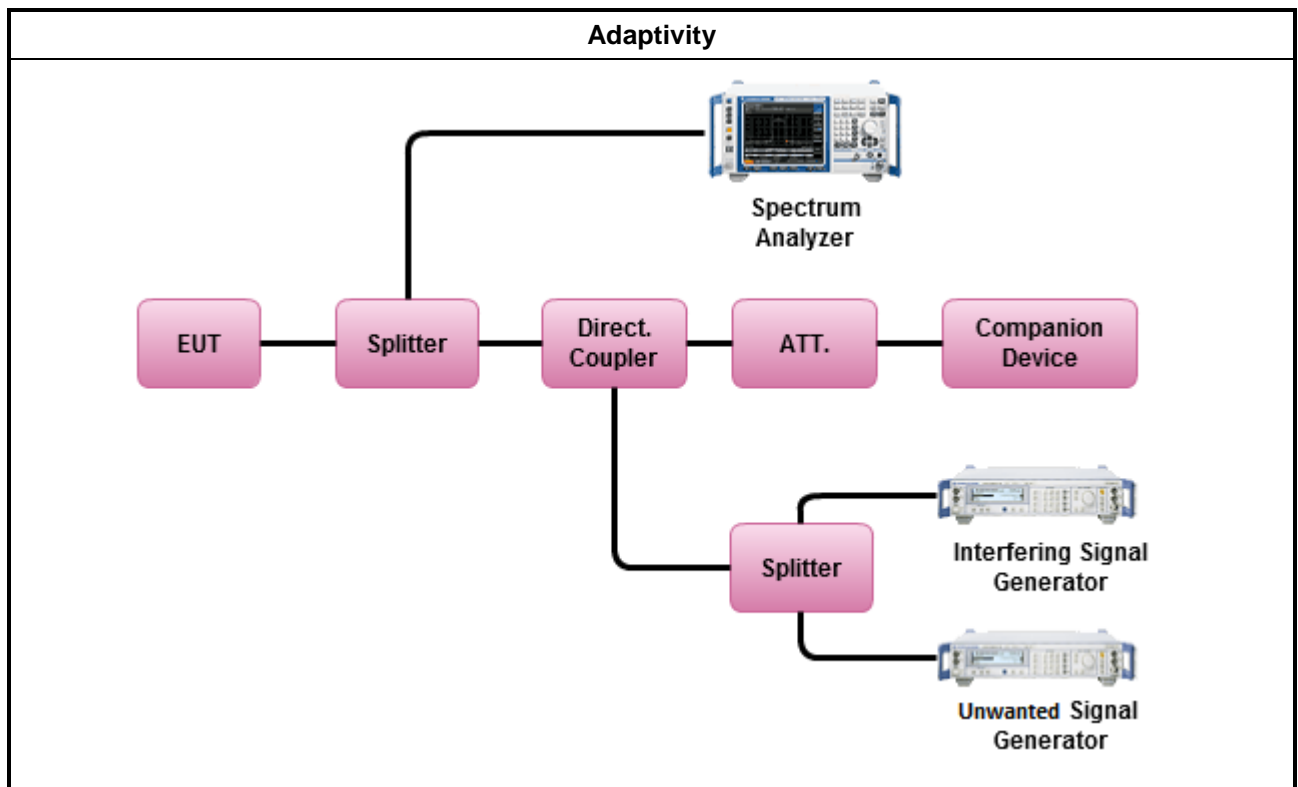
5.1.2 Measuring Instruments

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

5.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as EN 300 328, clause 5.4.6.2.1 for conducted measurement.
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	Refer as EN 300 328, clause 5.4.6.2.2 for radiated measurement.

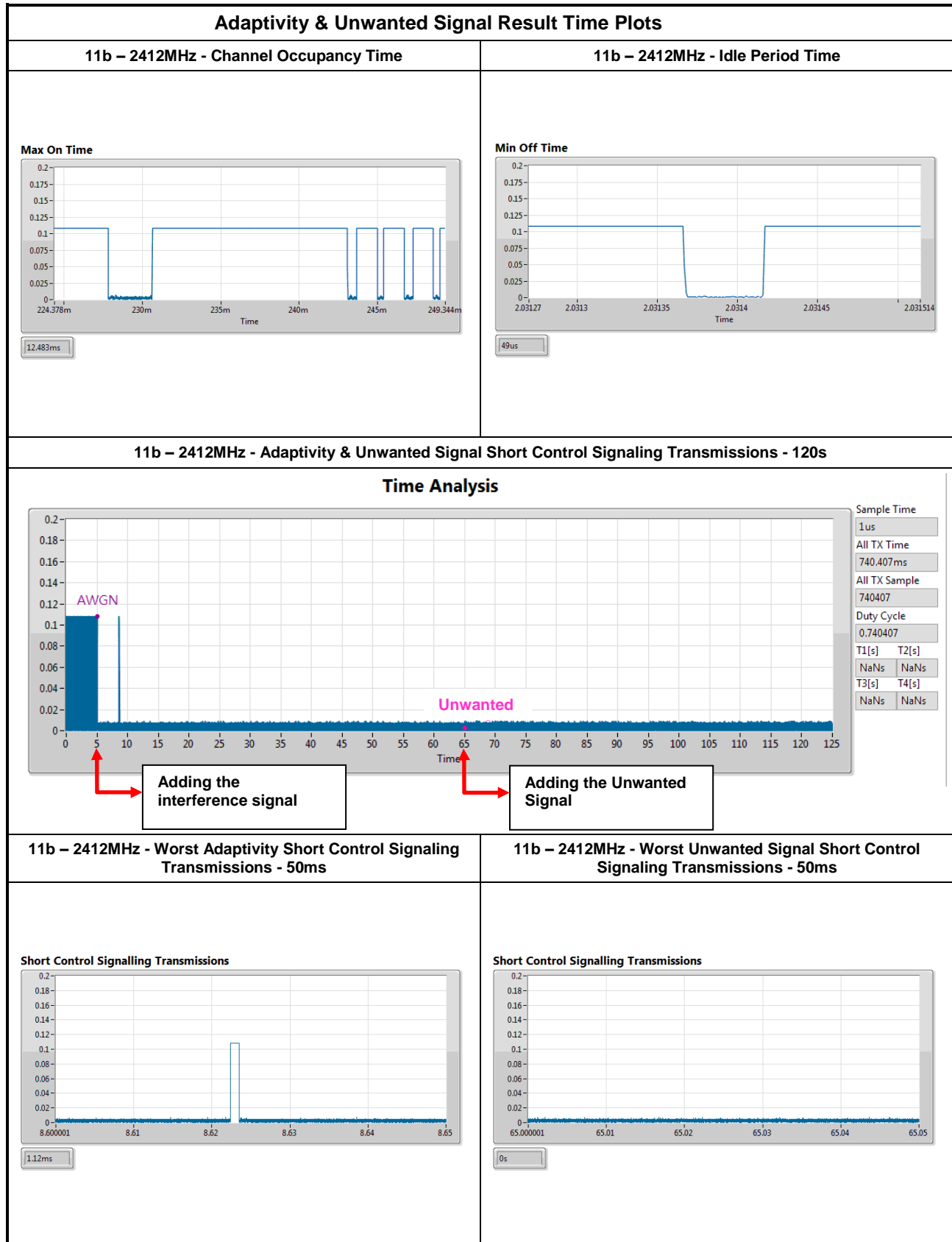
5.1.4 Test Setup

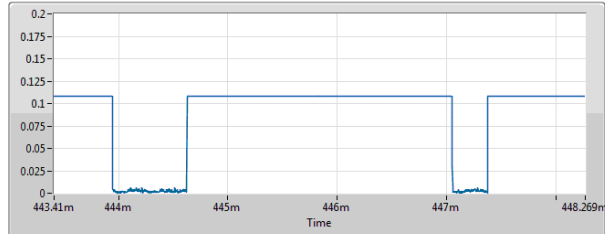


5.1.5 Test Result of Adaptivity and Unwanted Signal

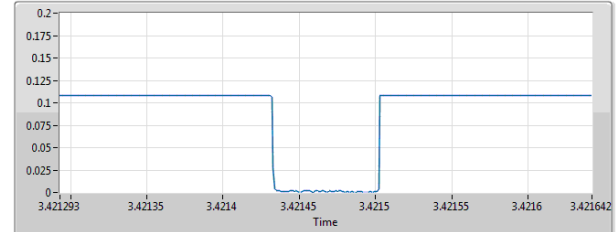
Adaptivity & Unwanted Signal Result.							
Software/Firmware Version		5.1.19.0					
Detection Threshold Level (dBm)		-70					
Modulation Mode	Freq. (MHz)	Channel Occupancy Time (ms)	Idle Period Time (ms)	Short Control Signalling Transmissions (ms)			
				Adaptivity		Adaptivity & Unwanted Signal	
				Bin	Time (ms)	Bin	Time (ms)
11b	2412	12.483	0.049	1120	1.12	0	0
11b	2472	2.43	0.07	1313	1.313	0	0
11g	2412	0.708	0.061	283	0.283	0	0
11g	2472	1.051	0.041	48	0.048	0	0
HT20	2412	2.891	0.062	368	0.368	0	0
HT20	2472	2.89	0.052	389	0.389	0	0
HT40	2422	1.584	0.041	642	0.642	0	0
HT40	2462	1.568	0.041	1620	1.62	56	0.056
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 restrirction.							

5.1.6 Test Result of Adaptivity Time Plots

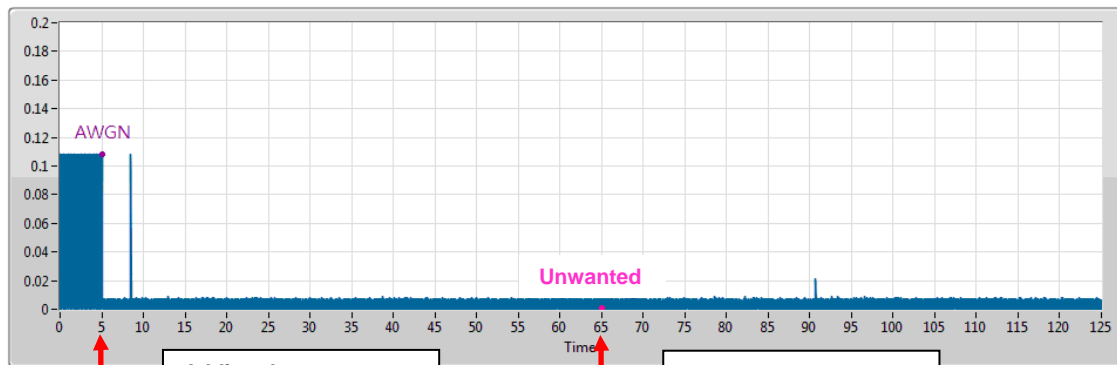


Adaptivity & Unwanted Signal Result Time Plots
11b – 2472MHz - Channel Occupancy Time
Max On Time


2.43ms

11b – 2472MHz - Idle Period Time
Min Off Time


70us

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

Sample Time

1us

All TX Time

729.546ms

All TX Sample

729546

Duty Cycle

0.729546

T1[s] T2[s]

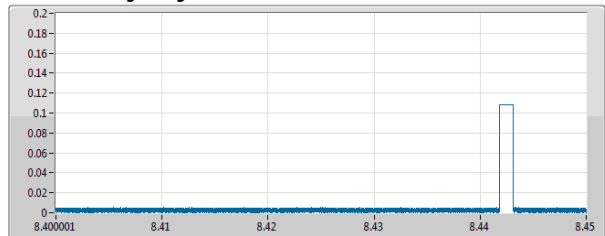
NaNs NaNs

T3[s] T4[s]

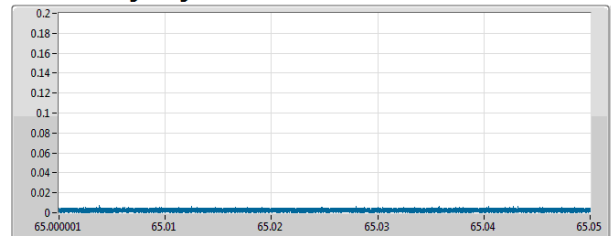
NaNs NaNs

Adding the
interference signal

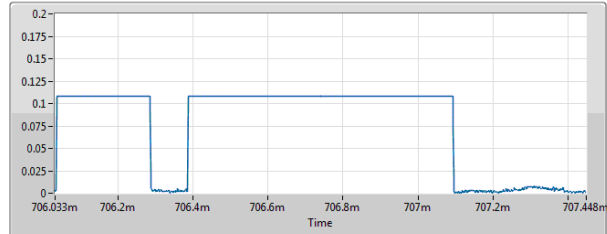
Adding the Unwanted
Signal

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


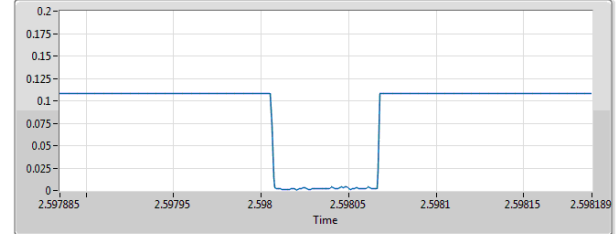
1.313ms

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


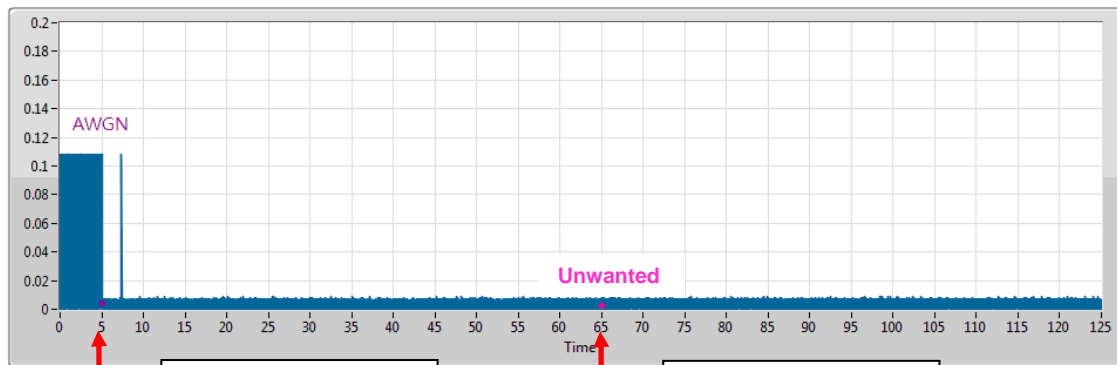
0s

Adaptivity & Unwanted Signal Result Time Plots
11g – 2412MHz - Channel Occupancy Time
Max On Time


708us

11g – 2412MHz - Idle Period Time
Min Off Time


61us

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

Sample Time

1us

All TX Time

621.736ms

All TX Sample

621736

Duty Cycle

0.621736

T1[s] T2[s]

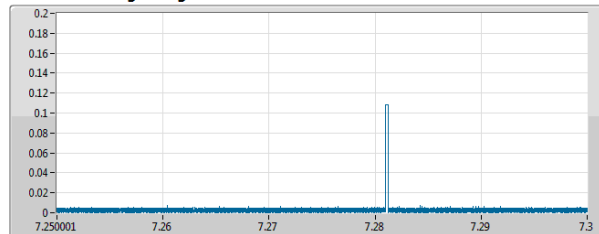
NaNs NaNs

T3[s] T4[s]

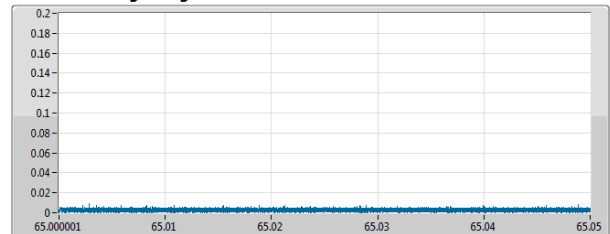
NaNs NaNs

Adding the
interference signal

Adding the Unwanted
Signal

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


283us

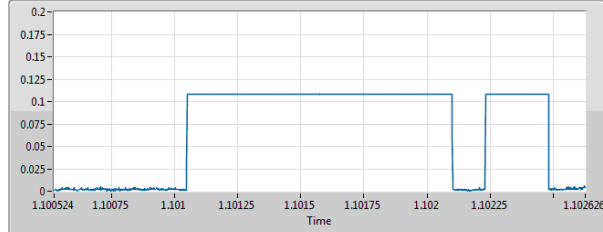
11g – 2412MHz - Worst Unwanted Signal Short Control Signaling Transmissions - 50ms
Short Control Signalling Transmissions


0s

Adaptivity & Unwanted Signal Result Time Plots

11g – 2472MHz - Channel Occupancy Time

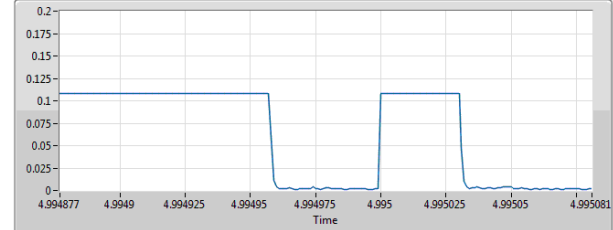
Max On Time



1.051ms

11g – 2472MHz - Idle Period Time

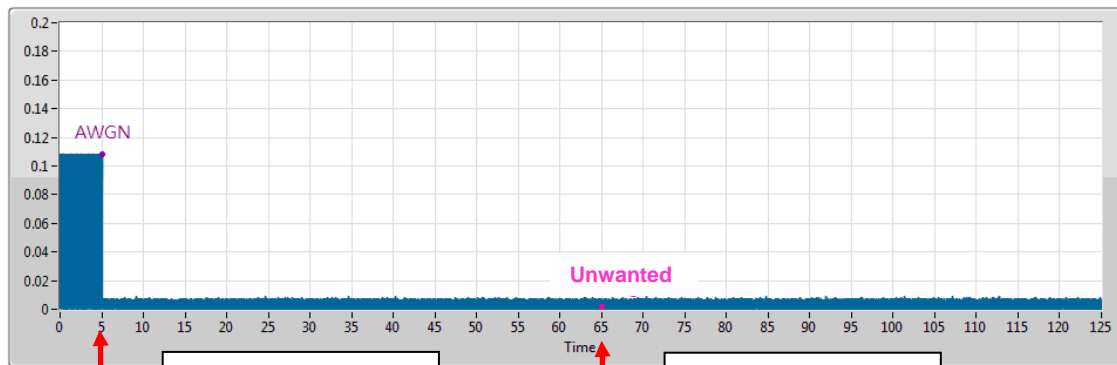
Min Off Time



41us

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

Time Analysis



Sample Time

1us

All TX Time

590.106ms

All TX Sample

590106

Duty Cycle

0.590106

T1[s] T2[s]

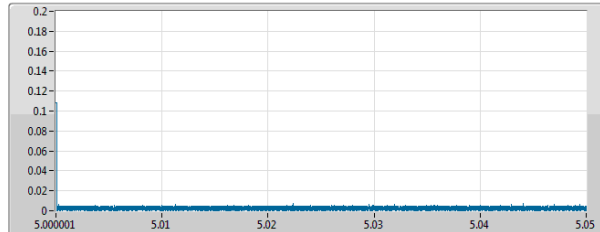
NaNs NaNs

T3[s] T4[s]

NaNs NaNs

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

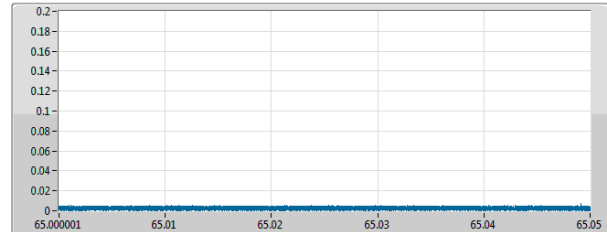
Short Control Signalling Transmissions



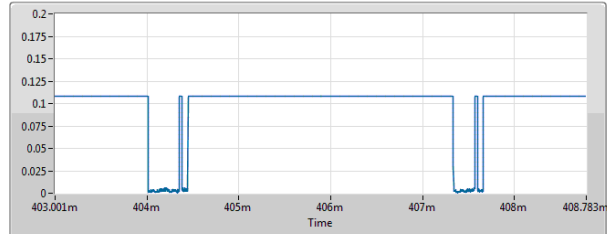
48us

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

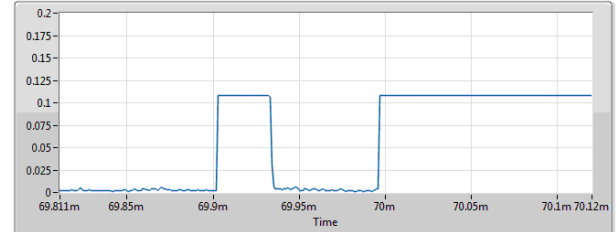
Short Control Signalling Transmissions



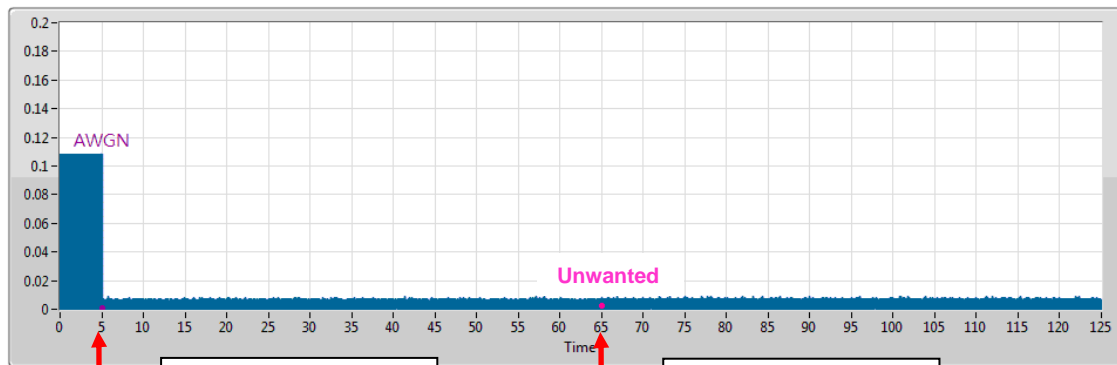
0s

Adaptivity & Unwanted Signal Result Time Plots
HT20 – 2412MHz - Channel Occupancy Time
Max On Time


2.891ms

HT20 – 2412MHz - Idle Period Time
Min Off Time


62us

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

Sample Time

1us

All TX Time

874.223ms

All TX Sample

874223

Duty Cycle

0.874223

T1[s] T2[s]

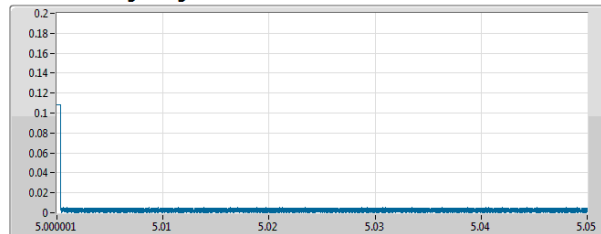
0s 5s

T3[s] T4[s]

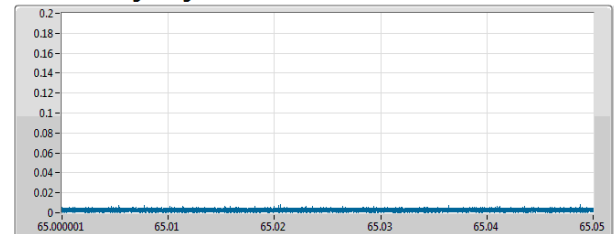
NaNs NaNs

Adding the
interference signal

Adding the Unwanted
Signal

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


368us

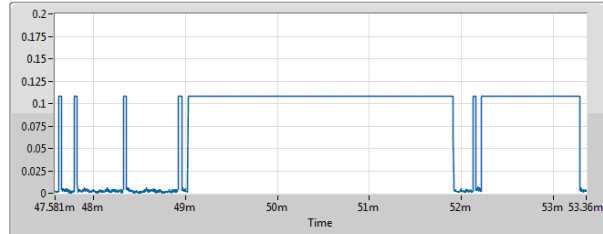
HT20 – 2412MHz - Worst Unwanted Signal Short Control Signaling Transmissions - 50ms
Short Control Signalling Transmissions


0s

Adaptivity & Unwanted Signal Result Time Plots

HT20 – 2472MHz - Channel Occupancy Time

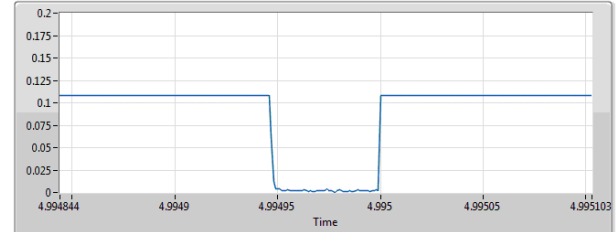
Max On Time



2.89ms

HT20 – 2472MHz - Idle Period Time

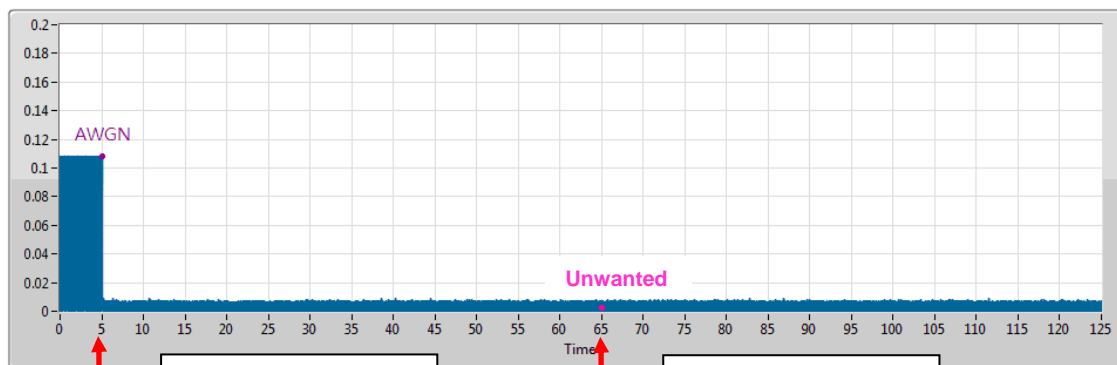
Min Off Time



52us

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

Time Analysis



Sample Time

1us

All TX Time

862.97ms

All TX Sample

862970

Duty Cycle

0.86297

T1[s] T2[s]

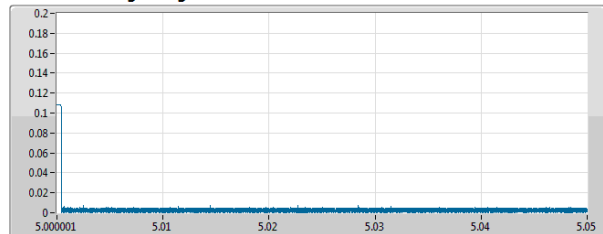
NaNs NaNs

T3[s] T4[s]

NaNs NaNs

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

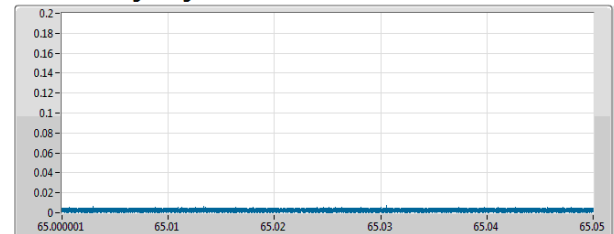
Short Control Signalling Transmissions



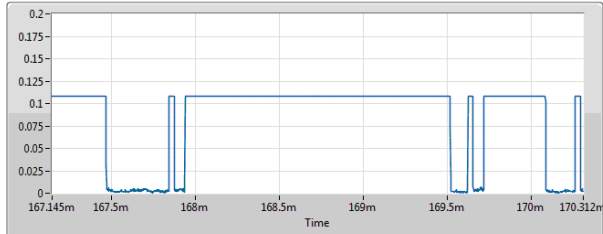
389us

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

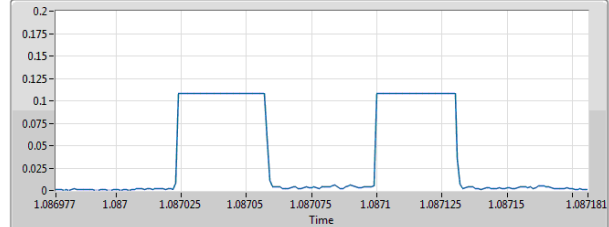
Short Control Signalling Transmissions



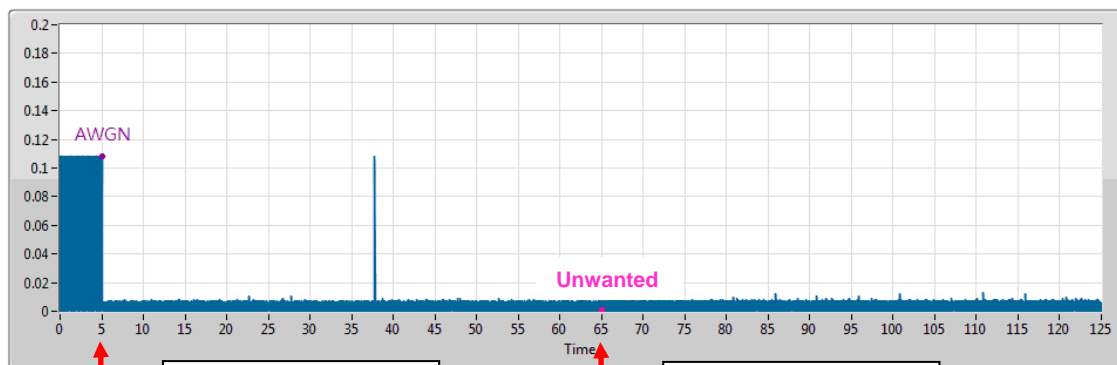
0s

Adaptivity & Unwanted Signal Result Time Plots
HT40 – 2422MHz - Channel Occupancy Time
Max On Time


1.584ms

HT40 – 2422MHz - Idle Period Time
Min Off Time


41us

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

Sample Time

1us

All TX Time

769.855ms

All TX Sample

769855

Duty Cycle

0.769855

T1[s] T2[s]

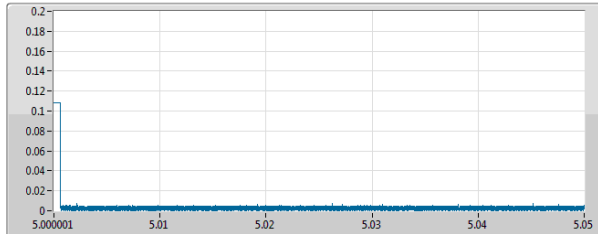
NaNs NaNs

T3[s] T4[s]

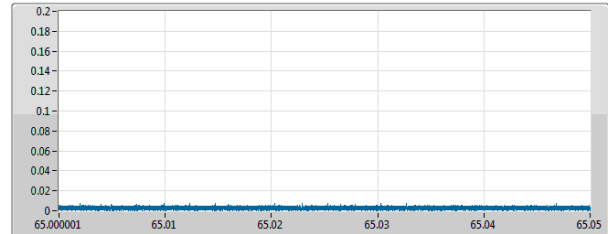
NaNs NaNs

Adding the
interference signal

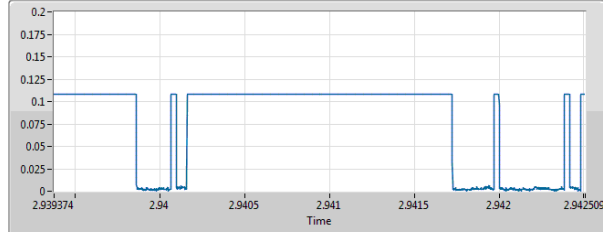
Adding the Unwanted
Signal

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


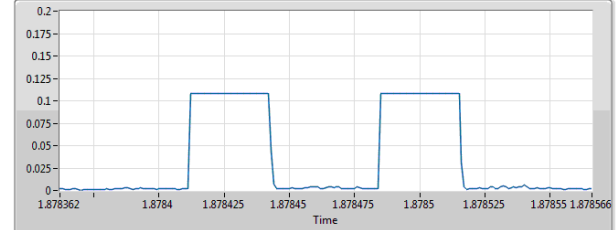
642us

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


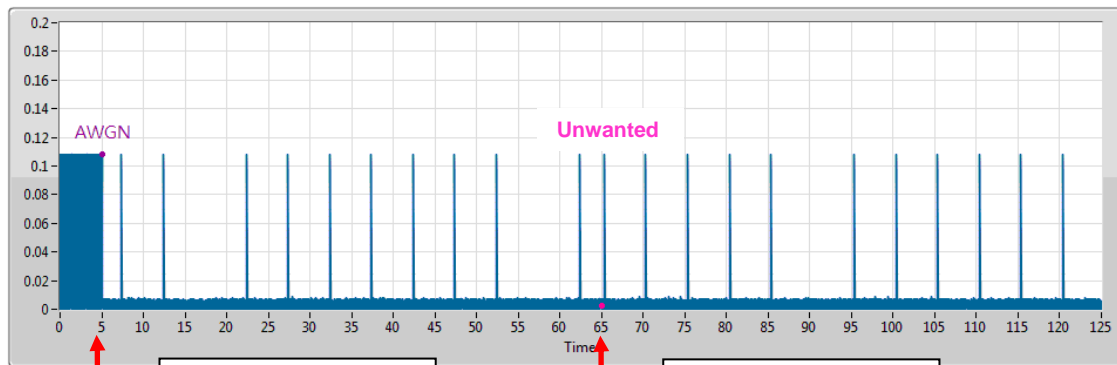
0s

Adaptivity & Unwanted Signal Result Time Plots
HT40 – 2462MHz - Channel Occupancy Time
Max On Time


1.568ms

HT40 – 2462MHz - Idle Period Time
Min Off Time


41us

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

Sample Time

1us

All TX Time

768.503ms

All TX Sample

768503

Duty Cycle

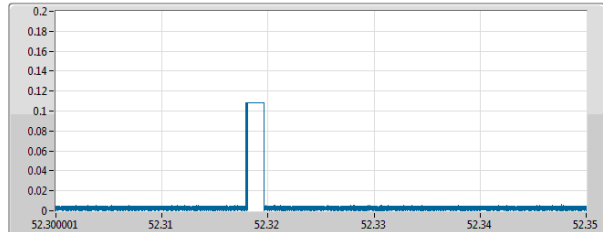
0.768503

T1[s] T2[s]

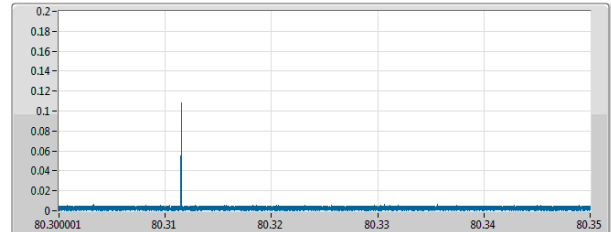
NaNs NaNs

T3[s] T4[s]

NaNs NaNs

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


1.62ms

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


56us

6 Receiver Blocking Test Result

6.1 Receiver Blocking

6.1.1 Receiver Blocking Limit

Receiver Blocking Limit	
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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 Receiver 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: 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 2: Receiver Blocking Parameters for Receiver 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 Receiver 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.

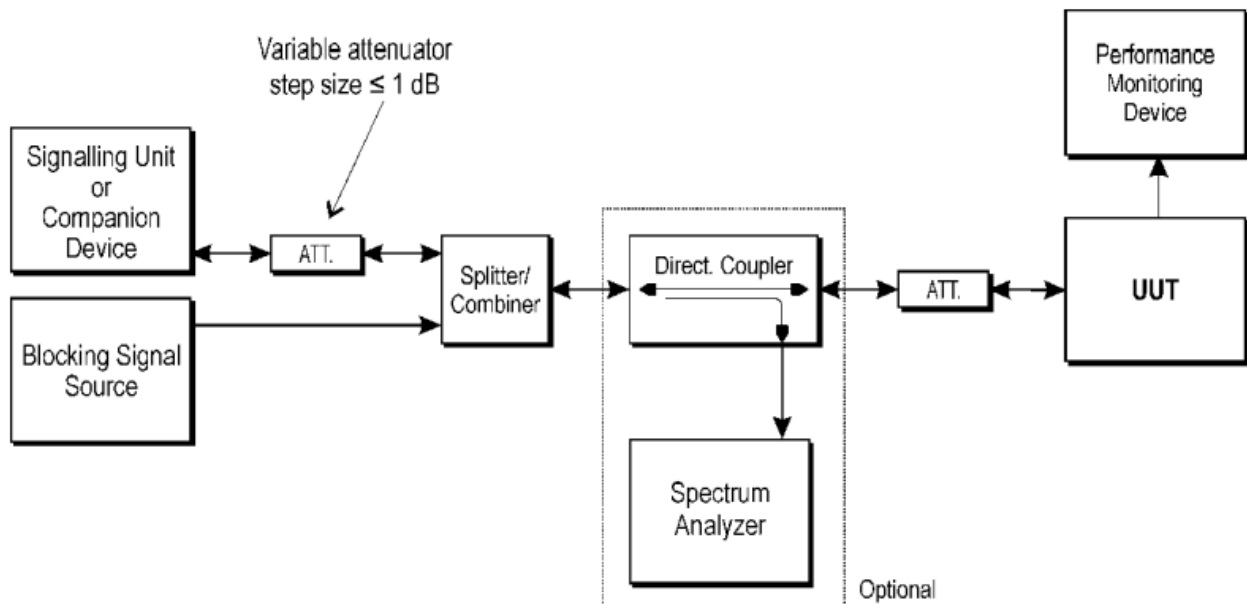
6.1.2 Measuring Instruments

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

6.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as EN 300 328, clause 5.4.11.2.1 for conducted measurement.
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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	-50	2380, 2503.5	CW	Pass
	2412	-81.5	-44	2300, 2330, 2360	CW	Pass
	2412	-81.5	-44	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	-50	2380, 2503.5	CW	Pass
	2472	-80.6	-44	2300, 2330, 2360	CW	Pass
	2472	-80.6	-44	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	-50	2380, 2503.5	CW	Pass
	2412	-86.5	-44	2300, 2330, 2360	CW	Pass
	2412	-86.5	-44	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	-50	2380, 2503.5	CW	Pass
	2472	-86.6	-44	2300, 2330, 2360	CW	Pass
	2472	-86.6	-44	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	101013	9kHz ~ 40GHz	Jan/25/2014	Jan/24/2015
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100°C	Nov/20/2013	Nov/19/2014
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul/31/2014	Jul/30/2015
Power Meter	Agilent	U2021XA	MY53480019	50MHz ~ 18GHz	Feb/23/2014	Feb/22/2015
Power Meter	Agilent	U2021XA	MY53510003	50MHz ~ 18GHz	Feb/23/2014	Feb/22/2015
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_103	10712/4 10709/4	30MHz ~ 26.5GHz	Dec/02/2013	Dec/01/2014

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	Jun/13/2014	Jun/12/2015
Amplifier	Agilent	8447D	2944A11146	10kHz ~ 1.3GHz	Jul/15/2014	Jul/14/2015
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	Mar/27/2014	Mar/26/2015
Bilog Antenna	SCHAFFNER	CBL6111C	2737	25MHz ~ 2GHz	Oct/19/2013	Oct/18/2014
Horn Antenna	COM-POWER	AH-118	10091	1GHz ~ 18GHz	Jan/28/2014	Jan/27/2015
Horn Antenna	ETS	3115	6744	1GHz ~ 18GHz	May/05/2014	May/04/2015
RF Cable-R03m	Jye Bao	RG142	CB031	30MHz ~ 1GHz	Dec/01/2013	Nov/30/2014
RF Cable-10m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	1GHz ~ 26.5GHz	Dec/01/2013	Nov/30/2014
Turn Table	Chaintek Instruments	3000	MF780208275	0 ~ 360 degree	N/A	N/A
Antenna Mast	HD	100	HD1000203311	1 ~ 4 m	N/A	N/A

Instrument for Adaptivity

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	Keysight	N9010A	MY55150165	9KHz~7GHz	03/Nov/2015	02/Nov/2016
Signal Generator	Keysight	N5182B	MY53051912	9KHz ~ 6GHz	13/Oct/2015	12/Oct/2016
Vector Signal Generator	Keysight	N5171B	MY53051240	9KHz ~ 6GHz	02/Nov/2015	01/Nov/2016
Amplifier	EMCI	EMC1150	980270	10KHz~1000MHz	31/Aug/2015	30/Aug/2016
USB Scope	NATIONAL INSTRUMENTS	USB-5133	F4D0D4	100MHz	25/Aug/2015	24/Aug/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

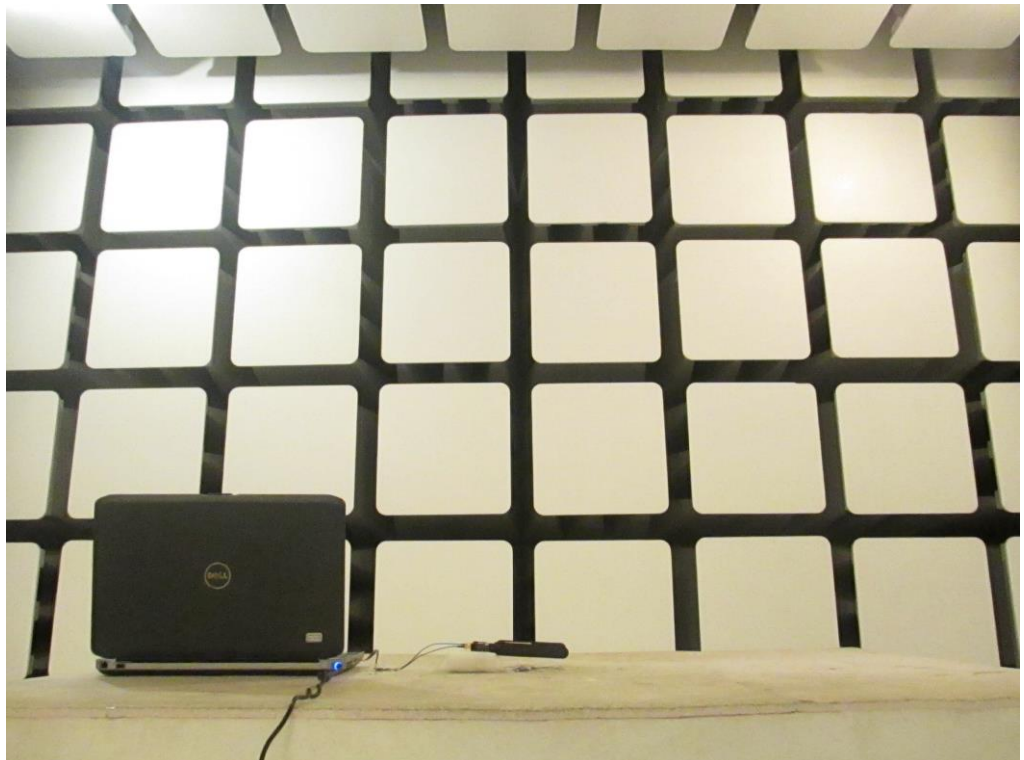
Appendix A. Test Photos

1. Photographs of Radiated Emissions Test Configuration

Front view



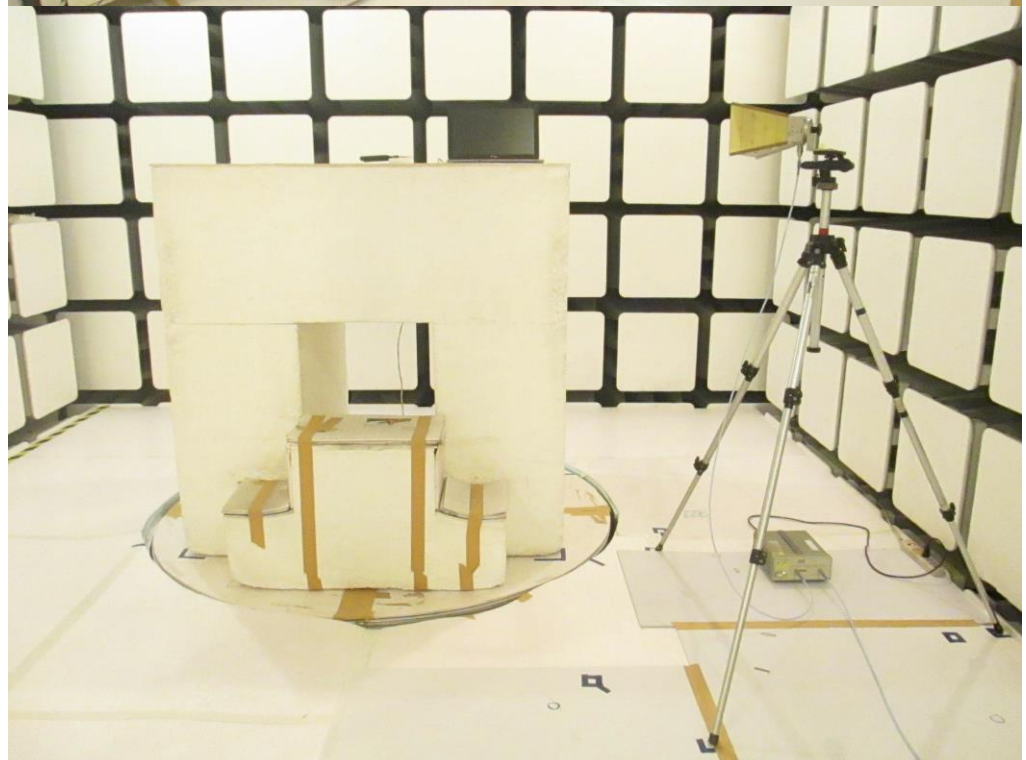
Rear view



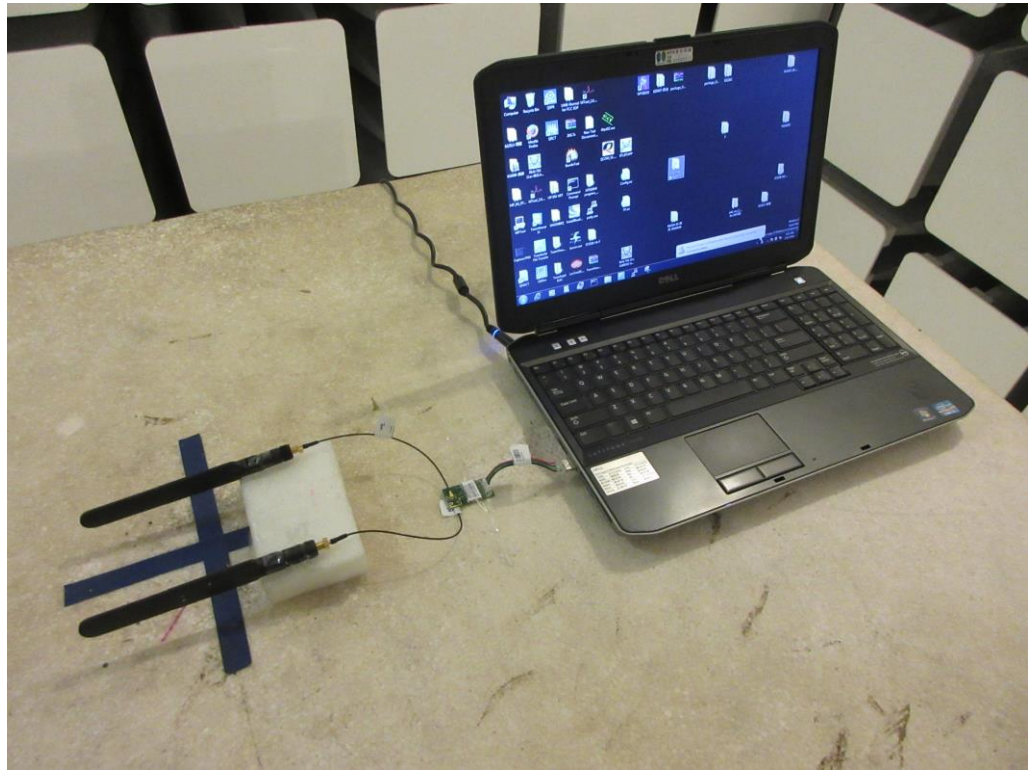
Below 1GHz



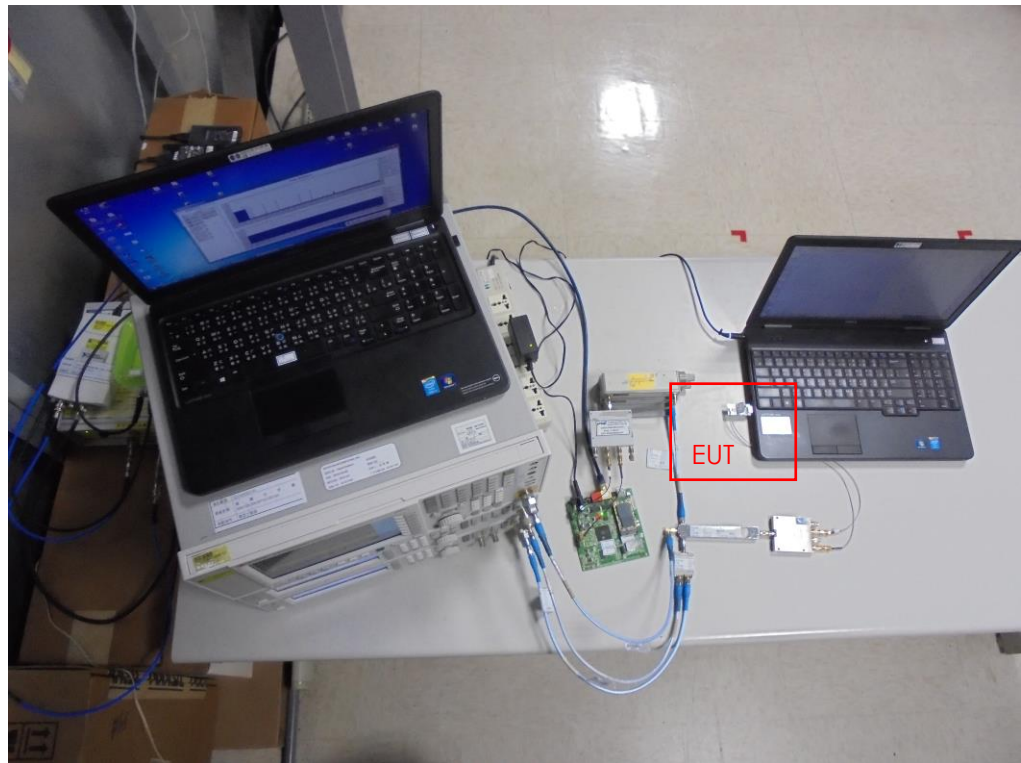
Above 1GHz



EUT Close up photo



2. Photographs of Adaptivity Test Configuration



3. Photographs of Receiver Blocking Test Configuration

