



SPORTON LAB.

Certificate No: ER232843-07AN

CERTIFICATE 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

CERTIFY THAT:

The following technical requirements and test specifications are relevant to the presumption of conformity under article 3.2 of the **R&TTE Directive 1999/5/EC**

The equipment was **Passed** the test performed according to
ETSI EN 301 893 V1.7.1 (2012-06)

The test was carried out on **Oct. 24, 2014** SPORTON INTERNATIONAL INC. LAB.

Vic Hsiao / Supervisor

CE Test Report

Equipment : 802.11abgn, USB module
Brand Name : SparkLAN
Model No. : WUBR-508N
Standard : EN 301 893 V1.7.1 (2012-06)
Operating Band : 5150 MHz – 5250 MHz
5250 MHz – 5350 MHz
5470 MHz – 5725 MHz
Applicant : SparkLAN Communications, Inc.
Manufacturer : 8F., No.257, Sec. 2, Tiding Blvd., Neihu District,
Taipei City 11493, Taiwan
Operate Mode : Slave without radar detection

The product sample received on Sep. 22, 2014 and completely tested on Oct. 24, 2014. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in EN 301 893 V1.7.1 (2012-06) and shown compliance with the applicable technical standards. The equipment under R&TTE Directive 1999/5/EC of article 3.2 harmonized essential for the radio spectrum requirements.

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.

Reviewed by:


Vic Hsiao / Supervisor



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Summary of Test Result

Harmonized Standard Requirements and Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
3.1	4.2	Carrier Frequencies	5.64 ppm	$f_c \pm 20$ ppm	Complied
3.2	4.3	Nominal Channel Bandwidth (NCB) and Occupied Channel Bandwidth (OCB)	NCB[MHz], OCB [MHz] NCB[20]:OCB[17.47] NCB[40]:OCB[35.98]	NCB ≥ 5 MHz OCB = NCB x [80% ~ 100%]	Complied
3.3	4.4	RF Output Power	EIRP [dBm]: 5.15-5.25GHz:22.87dBm 5.25-5.35GHz:19.82dBm 5.47-5.725GHz:19.90dBm	EN 301 893 Table 1	Complied
3.4	4.4	Transmit Power Control (TPC)	5.25-5.35GHz:13.82dBm 5.47-5.725GHz:13.90dBm	EN 301 893 Table 2	Complied
3.5	4.4	Power Density	EIRP PD [dBm/MHz] 5.15-5.25GHz:9.97 5.25-5.35GHz:6.35 5.47-5.725GHz:6.44	EN 301 893 Table 1	Complied
3.6	4.5.1	Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands	[e.i.r.p.]: 15540MHz -33.38 dBm (Margin 3.38dB)	EN 301 893 Table 3	Complied
3.7	4.5.2	Transmitter Unwanted Emissions within the 5 GHz RLAN Bands	Device complies with spectral mask – refer to test data	EN 301 893 Figure 1	Complied
4.1	4.6	Receiver Spurious Emissions	[e.i.r.p.]: 183.26MHz -60.57dBm (Margin 3.57dB)	EN 301 893 Table 4	Complied
5.1	4.9	Adaptivity (Channel Access Mechanism)	COT: 1.42ms Idle: 0.06ms	IEEE 802.11 IEEE 802.11n IEEE 802.11ac	Complied



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 Protocol	Ch. Frequency (MHz)	Channel Number	Number of Transmit Chains (N _{TX})	EIRP - Output Power (dBm)
5150-5250	a	5180-5240	36-48 [4]	1	22.63
5250-5350		5260-5320	52-64 [4]	1	19.52
5470-5725		5500-5700	100-140 [11]	1	19.58
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	22.74
5250-5350		5260-5320	52-64 [4]	2	19.82
5470-5725		5500-5700	100-140 [11]	2	19.90
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	22.87
5250-5350		5270-5310	54-62 [2]	2	19.77
5470-5725		5510-5670	102-134 [5]	2	19.84

Note 1: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

1.1.2 Antenna Information

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

Antenna General Information				
No.	Ant. Cat.	Ant. Type	Model name	Gain (dBi)
1	External	Dipole	GEC6200	5.00
Remark: 1. IEEE802.11A only include 1Tx and EUT was pre-tested Antenna Port 1 and Antenna Port 2 for single chain, the worst case was Antenna Port 1. Therefore only test data (Port 1) was recorded in report. 2. IEEE802.11n only include 2Tx.				

1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	☒ Production ; ☐ Pre-Production ; ☐ Prototype
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ...
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ...
☐	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle		
☐ Operated normally mode for worst duty cycle		
☒ Operated test mode for worst duty cycle		
Test Signal Duty Cycle (x)	N _{TX}	Power Duty Factor [dB] – (10 log 1/x)
☒ 100.00% - IEEE 802.11a	1	0.00
☒ 100.00% - IEEE 802.11n (HT20)	2	0.00
☒ 100.00% - IEEE 802.11n (HT40)	2	0.00

1.1.5 EUT Operational Condition

Supply Voltage	☐ AC mains	☒ DC	
Type of DC Source	☐ Internal DC supply	☒ From system	☐ External DC adapter
Test Voltage	☒ V _{nom} (5 V)	☒ V _{max} (5.25 V)	☒ V _{min} (4.75 V)
Test Climatic	☒ T _{nom} (20°C)	☒ T _{max} (50°C)	☒ T _{min} (0°C)

1.1.6 Adaptive Equipment

Adaptive Equipment	
☐	For total occupied bandwidth ≤ 40 MHz w/o adaptivity function but have medium access protocol facilitate spectrum sharing with other devices in the wireless network.
☒	Adaptive Equipment without the possibility to switch to a non-adaptive mode:
☒	The equipment has implemented an LBT based DAA mechanism:
☐	The equipment is Frame Based equipment
☒	The equipment is Load Based equipment
☐	The equipment can switch dynamically between Frame Based and Load Based equipment
☐	The equipment has implemented an non-LBT based DAA mechanism
☐	The equipment can operate in more than one adaptive mode
☐	Adaptive Equipment which can also operate in a non-adaptive mode

1.1.7 DFS and TPC Information

The DFS Related Operating Mode(s) of the Equipment			
☐ Master			
☐ Slave with radar detection			
☒ Slave without radar detection			
Software / Firmware Version		Ver 3.2.4.0	
Communication Mode		☒ IP Based (Load Based)	☐ Frame Based
IEEE Std. 802.11 Protocol	Frequency Range (MHz)	TPC (Transmit Power Control)	Passive Scan
a / n (HT20)	☒ 5250-5350	Yes	Yes
n (HT40)	☒ 5470-5725	Yes	Yes
	☒ 5600-5650	Yes	Yes

1.2 Support Equipment

Support Equipment - RF Conducted			
No.	Equipment	Brand Name	Model Name
1	Notebook	DELL	E5500

Support Equipment - Radiated Emission			
No.	Equipment	Brand Name	Model Name
1	Notebook	DELL	E5520

Support Equipment – Adaptivity			
No.	Equipment	Brand Name	Model Name
1	AP (Master)	ASUS	RP-AC52
2	Notebook	DELL	E5510
3	Notebook	DELL	E5530

1.3 Testing Applied Standards

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

- ♦ EN 301 893 V1.7.1 (2012-06)

1.4 Testing Location Information

Testing Location			
☒	HWA YA	ADD : No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.	
		TEL : 886-3-327-3456 FAX : 886-3-327-0973	
Test Condition	Test Site No.	Test Engineer	Test Environment
RF Conducted	TH01-HY	Ian	23°C / 65%
Radiated Emission	05CH01-HY	Sam	21°C / 63%
Adaptivity Site	DFS01-HY	Ben	26°C / 62.1%

1.5 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))

Measurement Uncertainty			
Test Item		Uncertainty	Limit
Radio frequency		$\pm 8.7 \times 10^{-7}$	$\pm 1 \times 10^{-5}$
RF output power, conducted		± 0.6 dB	± 1.5 dB
RF power radiated		± 2.6 dB	± 6 dB
Spurious emissions, conducted	30 – 1000 MHz	± 0.5 dB	± 3 dB
	1 – 18 GHz	± 0.7 dB	± 3 dB
	18 – 26 GHz	± 0.8 dB	± 3 dB
Spurious emissions, radiated	30 – 1000 MHz	± 2.3 dB	± 6 dB
	1 – 18 GHz	± 2.6 dB	± 6 dB
	18 – 26 GHz	± 2.9 dB	± 6 dB
Temperature		± 0.8 °C	± 1 °C
Humidity		± 3 %	± 5 %
Time		± 1.4 %	± 10 %

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
11a	1	6-54Mbps	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		
Channel Plan	IEEE Std. 802.11	Test Channel Freq. (MHz)
[lower sub-band]	a, n (HT20)	5180, 5320
[higher sub-band]	a, n (HT20)	5500, 5700
[lower sub-band]	n (HT40)	5190, 5310
[higher sub-band]	n (HT40)	5510, 5670

2.3 The Worse Case Power Setting Parameter

The Worst Case Power Setting Parameter (lower sub-band)					
Test Software Version	RT5x7x QA_V1.0.5.9				
Modulation Mode	N _{TX}	Test Frequency (MHz)			
		NCB: 20MHz		NCB: 40MHz	
		5180	5320	5190	5310
11a	1	14	12	-	-
HT20	2	13,11	12,0E	-	-
HT40	2	-	-	13,11	11,0E

The Worst Case Power Setting Parameter (higher sub-band)					
Test Software Version	RT5x7x QA_V1.0.5.9				
Modulation Mode	N _{TX}	Test Frequency (MHz)			
		NCB: 20MHz		NCB: 40MHz	
		5500	5700	5510	5670
11a	1	12	16	-	-
HT20	2	11,12	16,13	-	-
HT40	2	-	-	11,12	18,17

2.4 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Centre Frequencies
Test Condition	Conducted measurement at transmit chains. 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.
Modulation Mode	Un-modulation

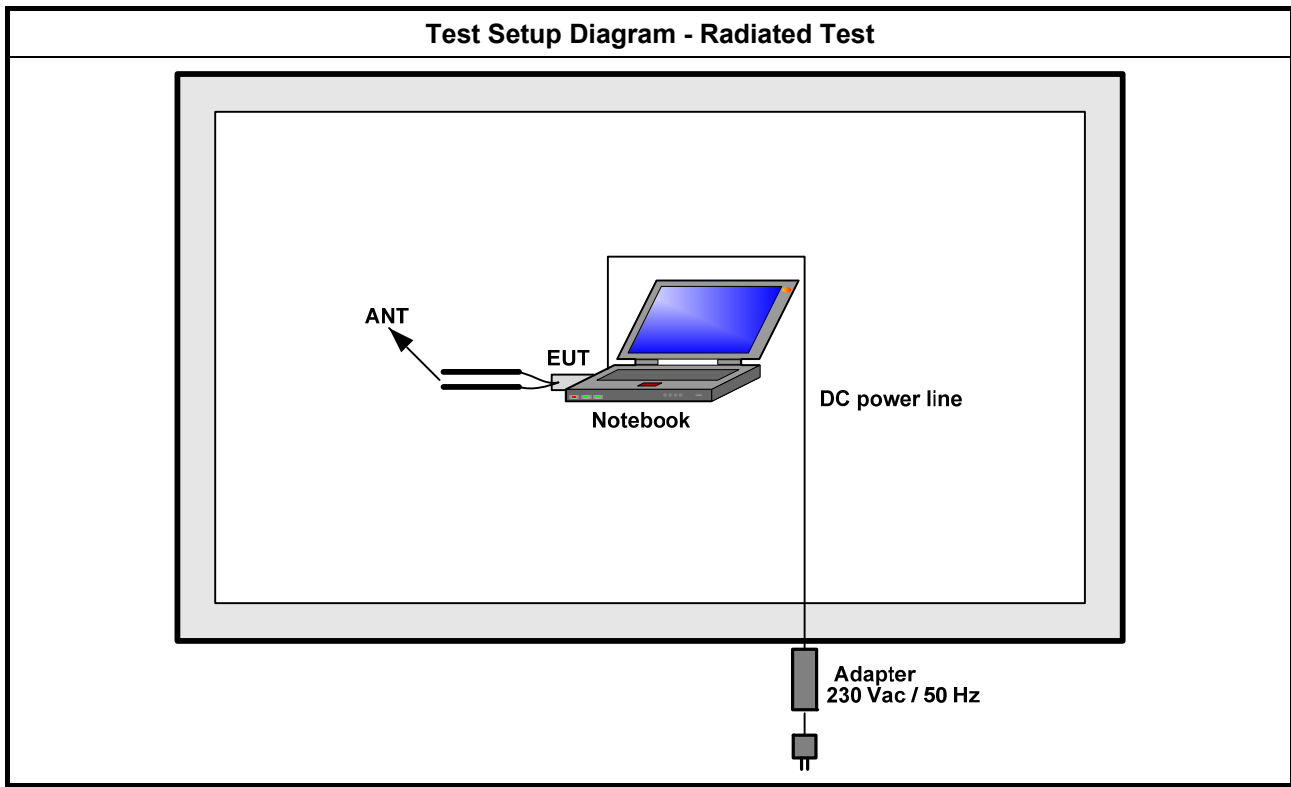
The Worst Case Mode for Following Conformance Tests	
Tests Item	Occupied Channel Bandwidth
Test Condition	Conducted measurement at transmit chains. One channel out of the declared channels for each sub-band. For Occupied Channel Bandwidth, testing has been repeated for every declared nominal channel bandwidth within this sub-band.
Modulation Mode	11a, HT20, HT40

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power, Power Density Transmitter Unwanted Emissions within the 5 GHz RLAN Bands
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11a, HT20, HT40

The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands 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	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. The worst planes is X.		
	☐ 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	11a, HT20, HT40		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			

The Worst Case Mode for Following Conformance Tests	
Tests Item	Adaptivity
Test Condition	Conducted measurement at transmit chains. One channel out of the declared channels for each sub-band. For Adaptivity, testing has been performed using the highest nominal channel bandwidth.
Modulation Mode	HT40

2.5 Test Setup Diagram



3 Transmitter Test Result

3.1 Carrier Frequencies

3.1.1 Carrier Frequencies Limit

Carrier Frequencies Limit
The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range $f_c \pm 20$ ppm.

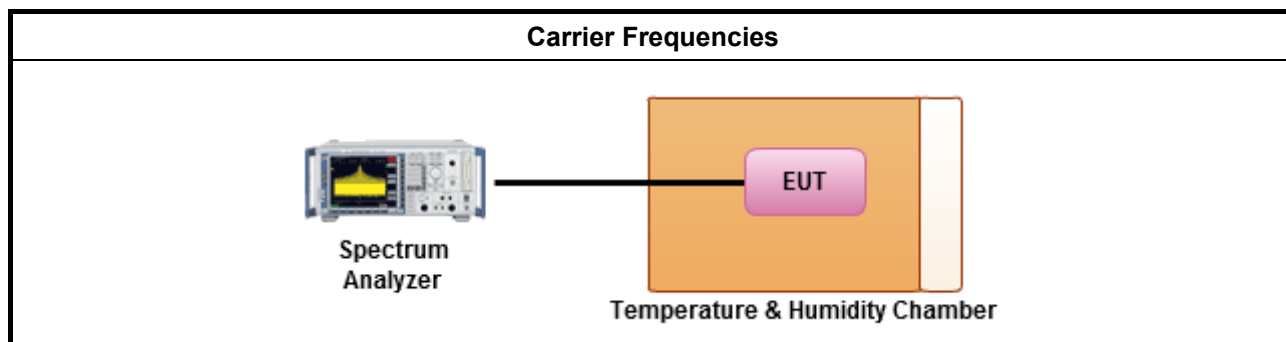
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

Test Method
☒ Refer as EN 301 893, clause 5.1.3 for test channel. 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.
☒ Refer as EN 301 893, clause 5.3.2 for the carrier frequencies shall be measured using one of the options below.
☒ Refer as EN 301 893, clause 5.3.2.2.1.1 for equipment operating without modulation method ☐ Refer as EN 301 893, clause 5.3.2.2.1.2 for equipment operating with modulation method
☒ Refer as EN 301 893, clause 5.3.2.2.1 for conducted measurement.
☐ The EUT supports single transmit chain and measurements performed on this transmit chain. ☒ The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. ☐ Refer as EN 301 893, clause 5.3.2.1 for conducted measurements on smart antenna systems (equipment with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
☐ Refer as EN 301 893, clause 5.3.2.2.2 for radiated measurement.

3.1.4 Test Setup



3.1.5 Test Result of Carrier Frequencies

Test Date	Oct. 20, 2014		Carrier Frequencies Result		
Method			Carrier Stability (ppm)		
Condition	Test Mode	Freq. (MHz)	Frequeuncy (MHz)	Carrier Stability	Carrier Stability Limit
TnomVnom	Un-modulation	5180	5179.98524	-2.85	20
TminVmax	Un-modulation	5180	5180.02848	5.50	20
TminVmin	Un-modulation	5180	5180.02852	5.51	20
TmaxVmax	Un-modulation	5180	5180.02041	3.94	20
TmaxVmin	Un-modulation	5180	5180.01997	3.86	20
TnomVnom	Un-modulation	5500	5499.98611	-2.53	20
TminVmax	Un-modulation	5500	5499.97308	-4.89	20
TminVmin	Un-modulation	5500	5499.96898	-5.64	20
TmaxVmax	Un-modulation	5500	5500.02171	3.95	20
TmaxVmin	Un-modulation	5500	5500.02214	4.03	20
Result			Complied		

3.2 Occupied Channel Bandwidth

3.2.1 Occupied Channel Bandwidth Limit

Nominal Channel Bandwidth and Occupied Channel Bandwidth Limit	
The Occupied Channel Bandwidth (OCB) is the bandwidth containing 99 % of the power of the signal. The Nominal Channel Bandwidth (NCB) shall be at least 5 MHz at all times. And the Occupied Channel Bandwidth shall be between 80 % and 100 % of the declared Nominal Channel Bandwidth.	
Nominal Channel Bandwidth (MHz)	Occupied Channel Bandwidth (MHz)
20	16 – 20
40	32 – 40
80	64 – 80
160	128 – 160

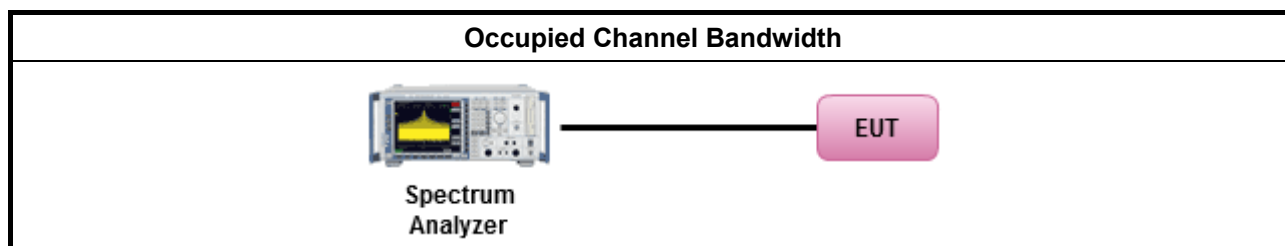
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
☒	Refer as EN 301 893, clause 5.1.3 for test channel. One channel out of the declared channels for each sub-band. For Occupied Channel Bandwidth, testing shall be repeated for every declared nominal channel bandwidth within this sub-band.
☒	Refer as EN 301 893, clause 5.3.3.2.1 for conducted measurement.
☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
☒	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
☒	Refer as EN 301 893, clause 5.3.3.1 for conducted measurements on smart antenna systems (equipment with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
☐	Refer as EN 301 893, clause 5.3.3.2.2 for radiated measurement.

3.2.4 Test Setup



3.2.5 Test Result of Occupied Channel Bandwidth

Test Date	Oct. 20, 2014	Occupied Channel Bandwidth Result		
Modulation Mode	Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Occupied Channel Bandwidth Limit (MHz)
11a	5180	16.39	20	16
11a	5500	16.43	20	16
HT20	5180	17.47	20	16
HT20	5500	17.47	20	16
HT40	5190	35.98	40	32
HT40	5510	35.90	40	32
Result		Complied		

3.3 RF Output Power

3.3.1 RF Output Power Limit

Frequency Range (MHz)	Mean e.i.r.p. Limit (dBm)	
	with TPC	w/o TPC
5150-5350	23	20/23 (note1)
5470-5725	30 (note2)	27 (note2)

Note 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 23 dBm.

Note 2: Slave devices without a Radar Interference Detection function shall comply with limits for band 5250 MHz to 5350 MHz.

Note 3: TPC is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz.

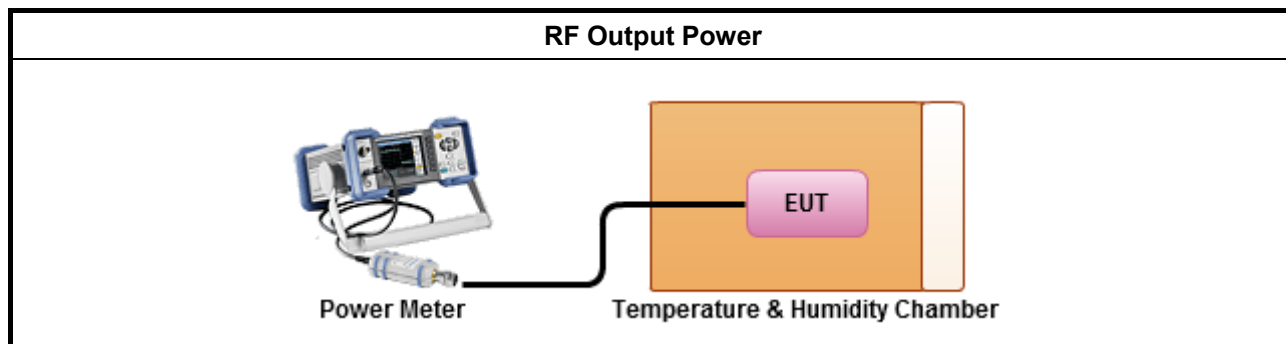
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
☒	The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
☒	The EUT shall be configured to operate at the maximum stated transmitter output power level.
☒	Refer as EN 301 893, clause 5.3.4 for the RF output power shall be measured using below options:
☒	Option 1: 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 301 893, clause 5.3.4.2.1.1.1.
☐	Option 2: For equipment without continuous transmission capability and operating (or with the capability to operate) in only one sub-band. Refer as EN 301 893, clause 5.3.4.2.1.1.2.
☐	Option 3: For equipment without continuous transmission capability and having simultaneous transmissions in both sub-bands. Refer as EN 301 893, clause 5.3.4.2.1.1.3.
☒	Refer as EN 301 893, clause 5.3.4.2.1.1 for conducted measurement.
☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
☒	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
☒	In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the output power of each transmit chain shall be measured separately to calculate the total power (value "A" in dBm) for the EUT.
☒	If multiple transmit chains, EIRP calculation could be following as methods:
☒	$P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + G$ If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used for EIRP.
☐	Refer as EN 301 893, clause 5.3.4.2.2 for radiated measurement.

3.3.4 Test Setup



3.3.5 Maximum Antenna Gain

Maximum Antenna Gain Result					
Transmit Chains No.		1	2	-	-
Maximum Gain (dBi)-G		5.00	5.00	-	-
Modulation Mode	G+Y (dBi)	N _{TX}	N _{SS} (Min.)	STBC	Beamforming Gain (dB)-Y
11a	5.00	1	1	-	-
HT20	5.00	2	2	-	-
HT40	5.00	2	2	-	-

3.3.6 Test Result of RF Output Power at the Highest Power - P_H

Test Date	Oct. 20, 2014		RF Output Power at the Highest Power - P _H Result			
Max. Gain (dBi)			5.00	RF Output Power (dBm)		
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	EIRP Power	EIRP Limit
TnomVnom	11a	1	5180	15.15	20.15	23.0
TminVmax	11a	1	5180	17.63	22.63	23.0
TminVmin	11a	1	5180	17.51	22.51	23.0
TmaxVmax	11a	1	5180	13.77	18.77	23.0
TmaxVmin	11a	1	5180	13.69	18.69	23.0
TnomVnom	11a	1	5320	12.14	17.14	23.0
TminVmax	11a	1	5320	14.52	19.52	23.0
TminVmin	11a	1	5320	14.43	19.43	23.0
TmaxVmax	11a	1	5320	9.45	14.45	23.0
TmaxVmin	11a	1	5320	9.36	14.36	23.0
TnomVnom	11a	1	5500	12.45	17.45	23.0
TminVmax	11a	1	5500	14.52	19.52	23.0
TminVmin	11a	1	5500	14.40	19.40	23.0
TmaxVmax	11a	1	5500	9.24	14.24	23.0
TmaxVmin	11a	1	5500	9.11	14.11	23.0
TnomVnom	11a	1	5700	12.63	17.63	23.0
TminVmax	11a	1	5700	14.58	19.58	23.0
TminVmin	11a	1	5700	14.47	19.47	23.0
TmaxVmax	11a	1	5700	9.46	14.46	23.0
TmaxVmin	11a	1	5700	9.35	14.35	23.0
Result				Complied		

Test Date	Oct. 20, 2014		RF Output Power at the Highest Power - P _H Result					
Max. Gain (dBi)			5.00	RF Output Power (dBm)				
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum chain	EIRP Power	EIRP Limit
TnomVnom	HT20	2	5180	12.87	11.88	15.41	20.41	23.0
TminVmax	HT20	2	5180	14.71	14.74	17.74	22.74	23.0
TminVmin	HT20	2	5180	14.57	14.62	17.61	22.61	23.0
TmaxVmax	HT20	2	5180	9.28	8.87	12.09	17.09	23.0
TmaxVmin	HT20	2	5180	9.15	8.65	11.92	16.92	23.0
TnomVnom	HT20	2	5320	9.87	9.68	12.79	17.79	23.0
TminVmax	HT20	2	5320	11.93	11.69	14.82	19.82	23.0
TminVmin	HT20	2	5320	11.84	11.62	14.74	19.74	23.0
TmaxVmax	HT20	2	5320	5.70	5.46	8.59	13.59	23.0
TmaxVmin	HT20	2	5320	5.46	5.28	8.38	13.38	23.0
TnomVnom	HT20	2	5500	9.57	9.63	12.61	17.61	23.0
TminVmax	HT20	2	5500	11.69	11.75	14.73	19.73	23.0
TminVmin	HT20	2	5500	11.53	11.64	14.60	19.60	23.0
TmaxVmax	HT20	2	5500	5.55	5.36	8.47	13.47	23.0
TmaxVmin	HT20	2	5500	5.42	5.17	8.31	13.31	23.0
TnomVnom	HT20	2	5700	9.34	9.86	12.62	17.62	23.0
TminVmax	HT20	2	5700	11.90	11.88	14.90	19.90	23.0
TminVmin	HT20	2	5700	11.77	11.80	14.80	19.80	23.0
TmaxVmax	HT20	2	5700	4.83	5.85	8.38	13.38	23.0
TmaxVmin	HT20	2	5700	4.58	5.57	8.11	13.11	23.0
Result				Complied				

Test Date		Oct. 20, 2014		RF Output Power at the Highest Power - P _H Result				
Max. Gain (dBi)			5.00	RF Output Power (dBm)				
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum chain	EIRP Power	EIRP Limit
TnomVnom	HT40	2	5190	11.86	11.74	14.81	19.81	23.0
TminVmax	HT40	2	5190	14.88	14.83	17.87	22.87	23.0
TminVmin	HT40	2	5190	14.72	14.69	17.72	22.72	23.0
TmaxVmax	HT40	2	5190	7.34	7.72	10.54	15.54	23.0
TmaxVmin	HT40	2	5190	7.20	7.56	10.39	15.39	23.0
TnomVnom	HT40	2	5310	9.11	9.71	12.43	17.43	23.0
TminVmax	HT40	2	5310	11.73	11.78	14.77	19.77	23.0
TminVmin	HT40	2	5310	11.67	11.69	14.69	19.69	23.0
TmaxVmax	HT40	2	5310	4.93	5.02	7.99	12.99	23.0
TmaxVmin	HT40	2	5310	4.65	4.97	7.82	12.82	23.0
TnomVnom	HT40	2	5510	8.96	9.51	12.25	17.25	23.0
TminVmax	HT40	2	5510	11.65	11.77	14.72	19.72	23.0
TminVmin	HT40	2	5510	11.58	11.52	14.56	19.56	23.0
TmaxVmax	HT40	2	5510	5.19	5.06	8.14	13.14	23.0
TmaxVmin	HT40	2	5510	4.97	4.79	7.89	12.89	23.0
TnomVnom	HT40	2	5670	8.98	9.31	12.16	17.16	23.0
TminVmax	HT40	2	5670	11.89	11.77	14.84	19.84	23.0
TminVmin	HT40	2	5670	11.76	11.65	14.72	19.72	23.0
TmaxVmax	HT40	2	5670	5.02	5.01	8.03	13.03	23.0
TmaxVmin	HT40	2	5670	4.80	4.85	7.84	12.84	23.0
Result				Complied				

3.4 Transmit Power Control (TPC)

3.4.1 Transmit Power Control (TPC) Limit

Mean e.i.r.p. Limits for RF Output Power at the Lowest Power Level	
Frequency Range	Mean e.i.r.p.
5250 MHz to 5350 MHz	17 dBm
5470 MHz to 5725 MHz	24 dBm (see note1)
Note 1: For Slave devices without a Radar Interference Detection function the mean e.i.r.p. shall be less than 17 dBm. TPC is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz	

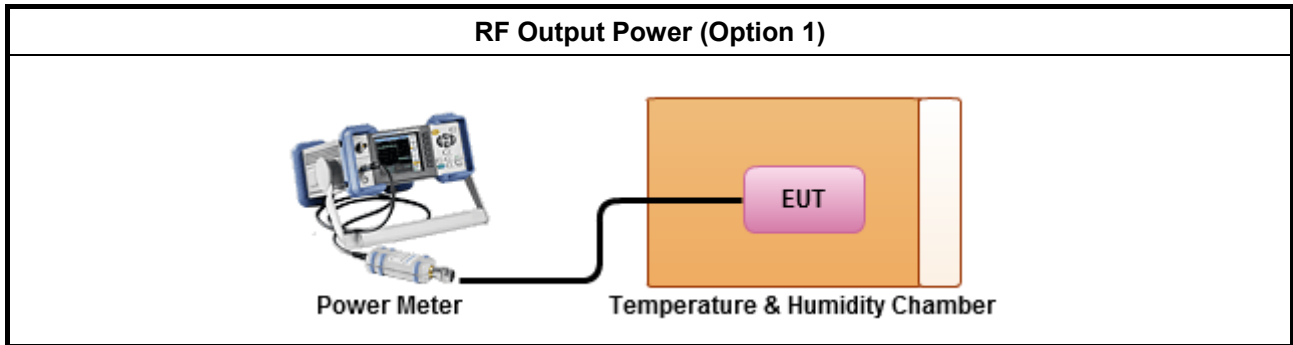
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method	
☒	The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
☒	The EUT shall be configured to operate at the lowest stated transmitter output power level.
☒	Refer as EN 301 893, clause 5.1.3 for test channel. 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.
☒	Refer as EN 301 893, clause 5.3.4 for the RF output power shall be measured using below options:
☒	Option 1: 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 301 893, clause 5.3.4.2.1.2.1.
☐	Option 2: For equipment without continuous transmission capability and operating (or with the capability to operate) in only one sub-band. Refer as EN 301 893, clause 5.3.4.2.1.2.2.
☐	Option 3: For equipment without continuous transmission capability and having simultaneous transmissions in both sub-bands. Refer as EN 301 893, clause 5.3.4.2.1.2.3.
☒	Refer as EN 301 893, clause 5.3.4.2.1.2 for conducted measurement.
☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
☒	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
☒	In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the output power of each transmit chain shall be measured separately to calculate the total power (value "A" in dBm) for the EUT.
☒	If multiple transmit chains, EIRP calculation could be following as methods:
☒	$P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + G$ If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used for EIRP.
☐	Refer as EN 301 893, clause 5.3.4.2.2 for radiated measurement.

3.4.4 Test Setup



3.4.5 Test Result of RF Output Power at the Lowest Power - P_L

RF Output Power at the Lowest Power - P_L Result					
Max. Gain (dBi)			5.00	RF Output Power (dBm)	
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	TPC EIRP Power	EIRP Limit
TnomVnom	11a	1	5320	11.14	17.0
TminVmax	11a	1	5320	13.52	17.0
TminVmin	11a	1	5320	13.43	17.0
TmaxVmax	11a	1	5320	8.45	17.0
TmaxVmin	11a	1	5320	8.36	17.0
TnomVnom	HT20	2	5320	11.79	17.0
TminVmax	HT20	2	5320	13.82	17.0
TminVmin	HT20	2	5320	13.74	17.0
TmaxVmax	HT20	2	5320	7.59	17.0
TmaxVmin	HT20	2	5320	7.38	17.0
TnomVnom	HT40	2	5310	11.43	17.0
TminVmax	HT40	2	5310	13.77	17.0
TminVmin	HT40	2	5310	13.69	17.0
TmaxVmax	HT40	2	5310	6.99	17.0
TmaxVmin	HT40	2	5310	6.82	17.0
Result			Complied		

3.4.6 Test Result of RF Output Power at the Lowest Power – P_H

RF Output Power at the Lowest Power – P _H Result					
Max. Gain (dBi)			5.00	RF Output Power (dBm)	
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	TPC EIRP Power	EIRP Limit
TnomVnom	11a	1	5500	11.45	17.0
TminVmax	11a	1	5500	13.52	17.0
TminVmin	11a	1	5500	13.40	17.0
TmaxVmax	11a	1	5500	8.24	17.0
TmaxVmin	11a	1	5500	8.11	17.0
TnomVnom	11a	1	5700	11.63	17.0
TminVmax	11a	1	5700	13.58	17.0
TminVmin	11a	1	5700	13.47	17.0
TmaxVmax	11a	1	5700	8.46	17.0
TmaxVmin	11a	1	5700	8.35	17.0
Result			Complied		

RF Output Power at the Lowest Power – P _H Result					
Max. Gain (dBi)			5.00	RF Output Power (dBm)	
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	TPC EIRP Power	EIRP Limit
TnomVnom	HT20	2	5500	11.61	17.0
TminVmax	HT20	2	5500	13.73	17.0
TminVmin	HT20	2	5500	13.60	17.0
TmaxVmax	HT20	2	5500	7.47	17.0
TmaxVmin	HT20	2	5500	7.31	17.0
TnomVnom	HT20	2	5700	11.62	17.0
TminVmax	HT20	2	5700	13.90	17.0
TminVmin	HT20	2	5700	13.80	17.0
TmaxVmax	HT20	2	5700	7.38	17.0
TmaxVmin	HT20	2	5700	7.11	17.0
Result			Complied		

RF Output Power at the Lowest Power – P _H Result					
Max. Gain (dBi)			5.00	RF Output Power (dBm)	
Condition	Modulation Mode	N _{TX}	Freq. (MHz)	TPC EIRP Power	EIRP Limit
TnomVnom	HT40	2	5510	11.25	17.0
TminVmax	HT40	2	5510	13.72	17.0
TminVmin	HT40	2	5510	13.56	17.0
TmaxVmax	HT40	2	5510	7.14	17.0
TmaxVmin	HT40	2	5510	6.89	17.0
TnomVnom	HT40	2	5670	11.16	17.0
TminVmax	HT40	2	5670	13.84	17.0
TminVmin	HT40	2	5670	13.72	17.0
TmaxVmax	HT40	2	5670	7.03	17.0
TmaxVmin	HT40	2	5670	6.84	17.0
Result				Complied	

3.5 Power Density

3.5.1 Power Density Limit

Frequency Range (MHz)	Mean e.i.r.p. Density Limit (dBm/MHz)	
	with TPC	w/o TPC
5150-5350	10	7/10 (note1)
5470-5725	17 (note2)	14 (note2)
Note 1: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 10 dBm/MHz. Note 2: Slave devices without a Radar Interference Detection function shall comply with limits for band 5250 MHz to 5350 MHz.		

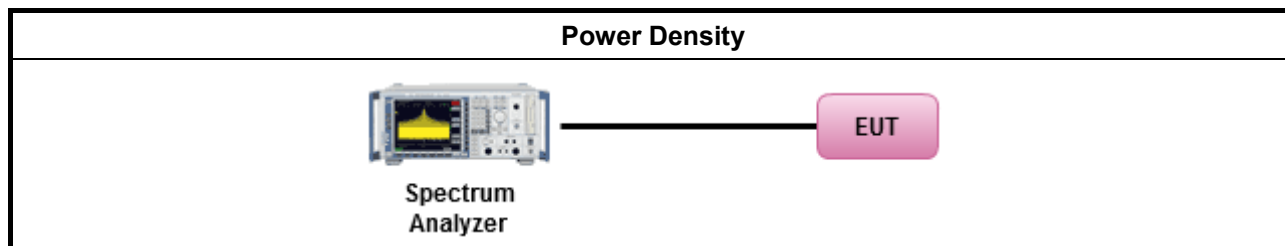
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
☒	The measurements shall be performed at normal environmental conditions.
☒	The EUT shall be configured to operate at the maximum stated transmitter output power level.
☒	Power density shall be measured using one of the options below.
☒	Option 1: 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 301 893, clause 5.3.4.2.1.3.1.
☐	Option 2: For equipment without continuous transmission capability and without the capability to transmit with a constant duty cycle. Refer as EN 301 893, clause 5.3.4.2.1.3.2.
☒	Refer as EN 301 893, clause 5.3.4.2.1 for conducted measurement.
☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
☒	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
☒	The EUT supports multiple transmit chains using options given below:
☐	Option 1: Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N _{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace. The new data trace samples added 1 MHz segment and found the highest value of each 1 MHz segments.
☒	Option 2: Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Sum the power of all ports for each individual sample and calculate the total power (value "D" in dBm/MHz) for the EUT.
☒	If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used for EIRP PSD.
☐	Refer as EN 301 893, clause 5.3.4.2.2 for radiated measurement.

3.5.4 Test Setup



3.5.5 Test Result of Power Density

Test Date	Oct. 20, 2014		Power Density Result			
Modulation Mode	N _{TX}	Freq. (MHz)	PD (dBm/MHz)	Max. Gain (dBi)	EIRP PD (dBm/MHz)	EIRP Limit (dBm/MHz)
11a	1	5180	4.97	5.00	9.97	10
11a	1	5320	1.35	5.00	6.35	10
11a	1	5500	1.44	5.00	6.44	10
11a	1	5700	1.01	5.00	6.01	10
HT20	2	5180	1.03	5.00	6.03	10
HT20	2	5320	-2.06	5.00	2.94	10
HT20	2	5500	1.06	5.00	6.06	10
HT20	2	5700	1.36	5.00	6.36	10
HT40	2	5190	1.06	5.00	6.06	10
HT40	2	5310	1.36	5.00	6.36	10
HT40	2	5510	-2.11	5.00	2.89	10
HT40	2	5670	-1.73	5.00	3.27	10
Result			Complied			

3.6 Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands

3.6.1 Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands Limit

Frequency Range	Maximum Power e.r.p. (≤ 1 GHz) ; e.i.r.p. (> 1 GHz)	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 5,15 GHz	-30 dBm	1 MHz
5,35 GHz to 5,47 GHz	-30 dBm	1 MHz
5,725 GHz to 26 GHz	-30 dBm	1 MHz

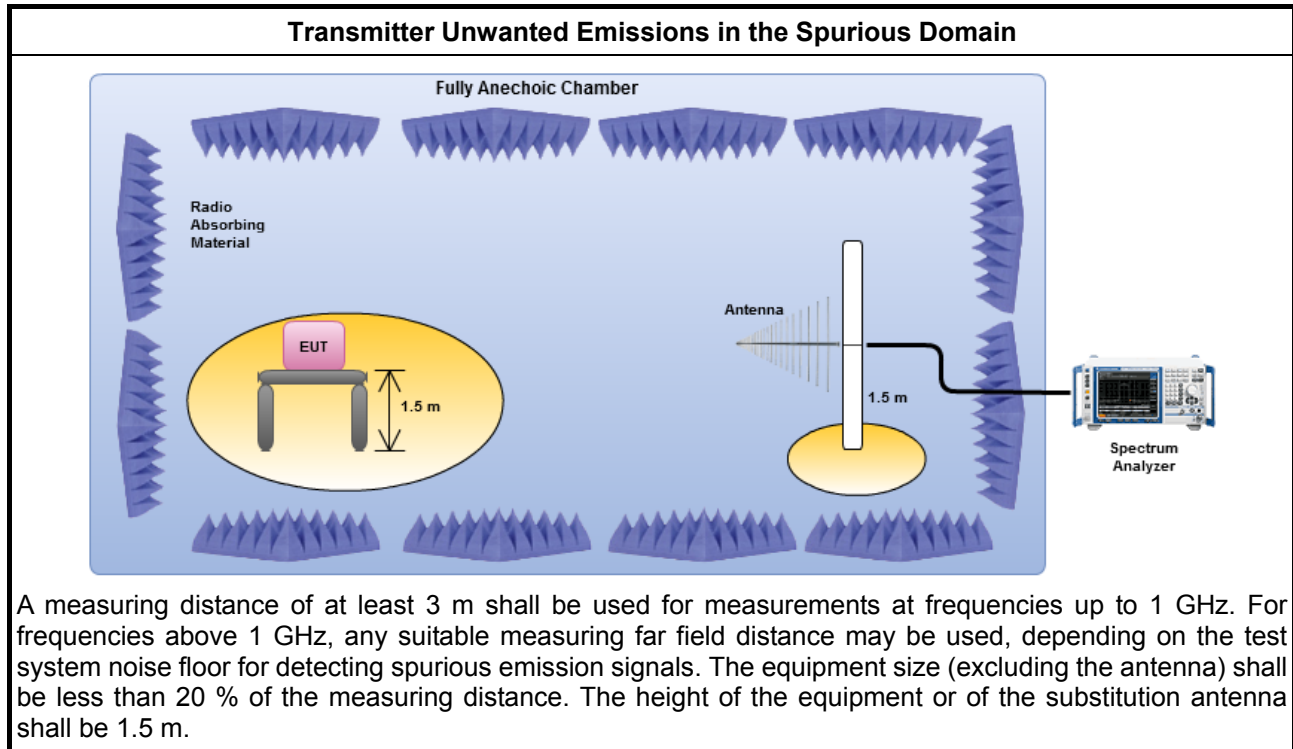
3.6.2 Measuring Instruments

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

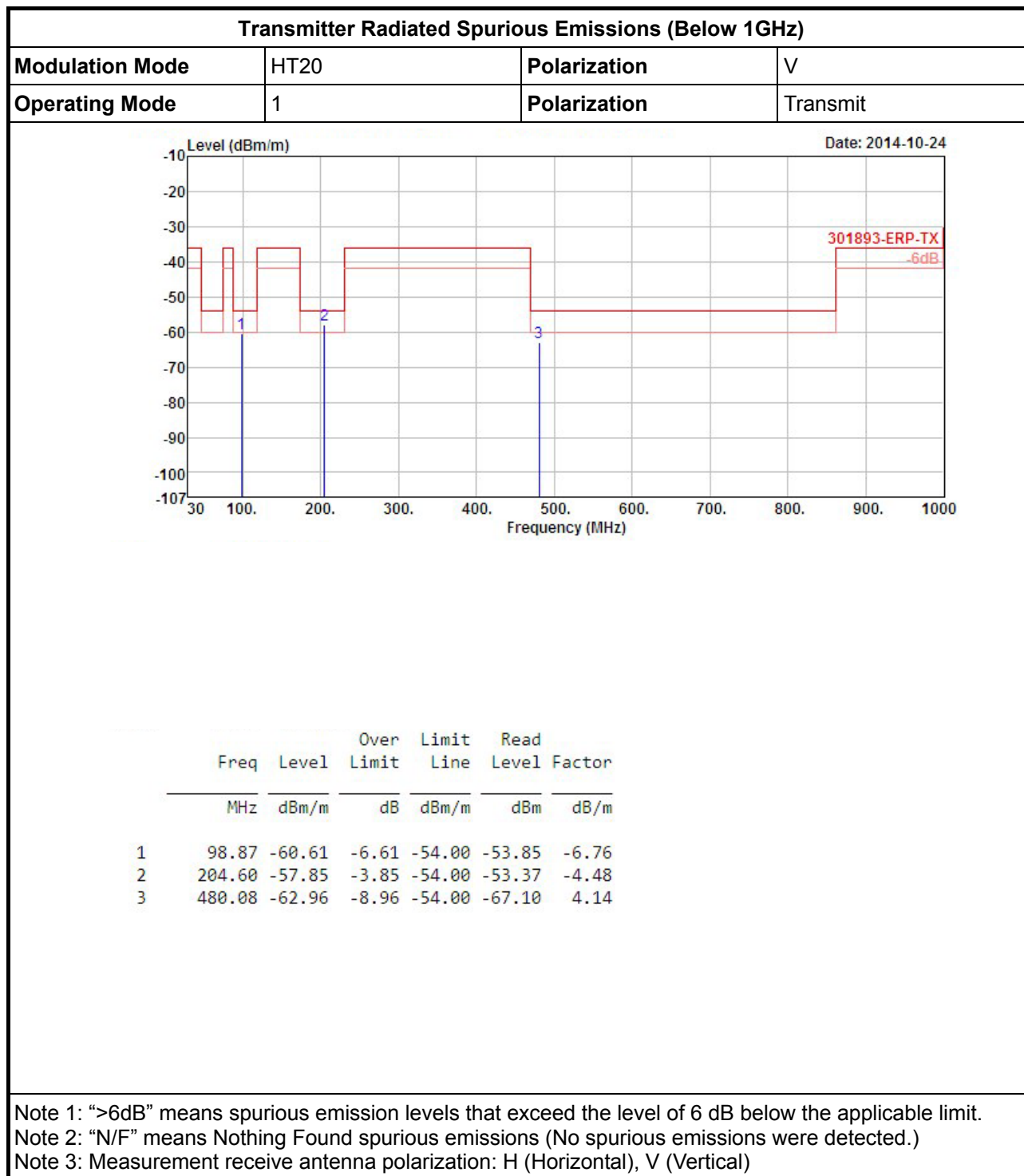
3.6.3 Test Procedures

Test Method	
☒	Refer as EN 301 893, clause 5.1.3 for test channel. 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.
☐	Refer as EN 301 893, clause 5.3.5.2.1 for conducted measurement. Conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
☐	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
☐	The EUT supports multiple transmit chains using options given below:
☐	Option 1: The trace data for each transmit chain has to be individually recorded and each transmit chain trace data shall be added and compared with the transmitter spurious emissions limit.
☐	Option 2: the results for each of the transmit chains shall be individually compared with the transmitter spurious emissions limit. After that these limits have been reduced with $10 \times \log_{10}(A_{ch})$. (Number of active transmit chains).
☒	Refer as EN 301 893, clause 5.3.5.2.2 for radiated measurement.

3.6.4 Test Setup

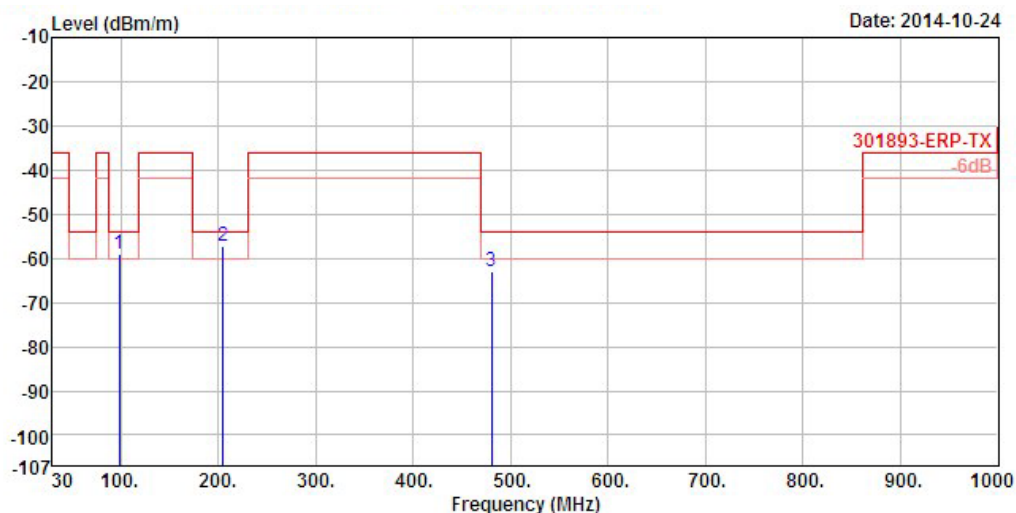


3.6.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)



Transmitter Radiated Spurious Emissions (Below 1GHz)

Modulation Mode	HT20	Polarization	H
Operating Mode	1	Operating Function	Transmit



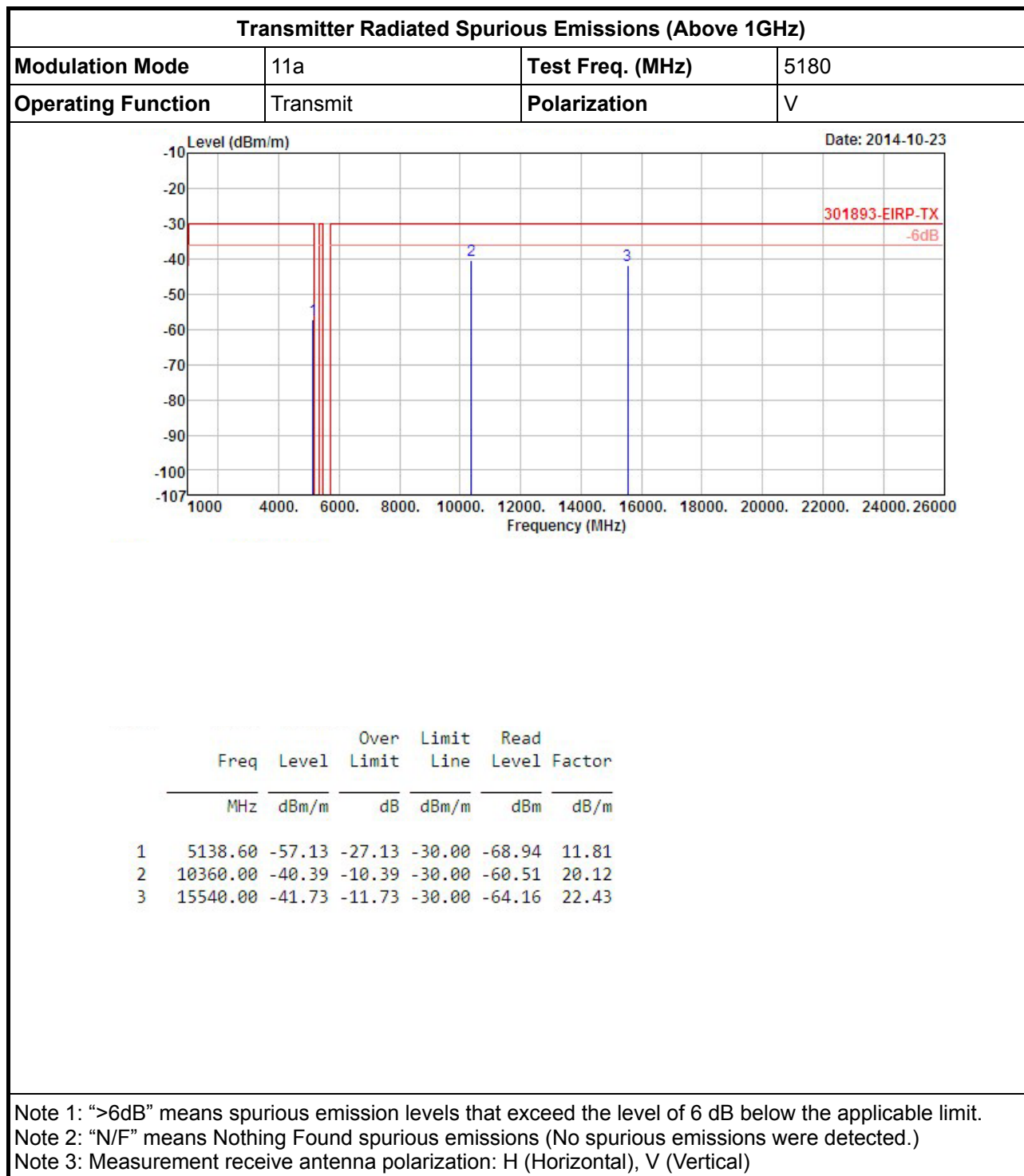
	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	98.87	-59.12	-5.12	-54.00	-53.62	-5.50
2	204.60	-57.41	-3.41	-54.00	-53.15	-4.26
3	480.08	-63.08	-9.08	-54.00	-66.94	3.86

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.)

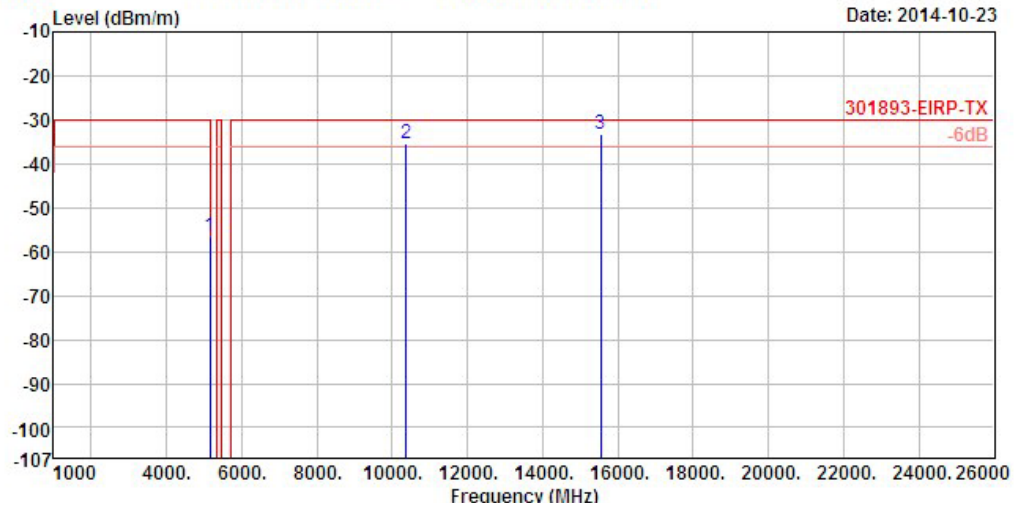
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.6.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)



Transmitter Radiated Spurious Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5180
Operating Function	Transmit	Polarization	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	5148.30	-56.62	-26.62	-30.00	-68.87	12.25
2	10360.00	-35.36	-5.36	-30.00	-54.06	18.70
3	15540.00	-33.38	-3.38	-30.00	-57.46	24.08

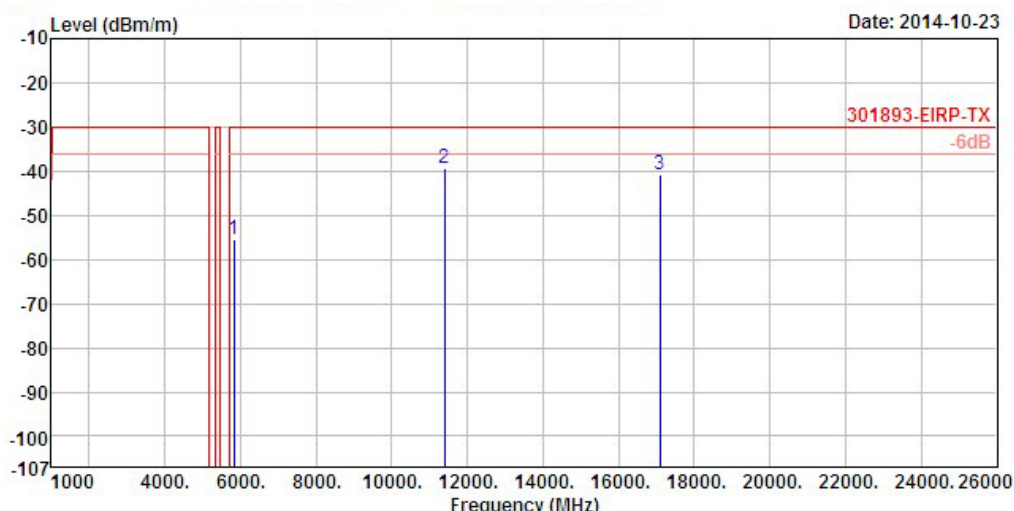
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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	11a	Test Freq. (MHz)	5700
Operating Function	Transmit	Polarization	V

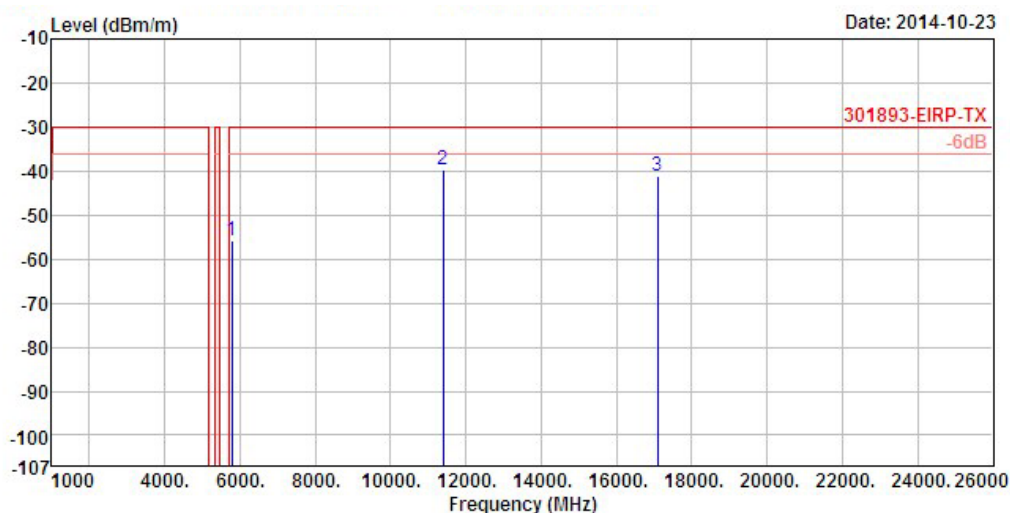


	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	5817.60	-55.56	-25.56	-30.00	-69.01	13.45
2	11400.00	-39.35	-9.35	-30.00	-60.99	21.64
3	17100.00	-40.68	-10.68	-30.00	-67.94	27.26

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	11a	Test Freq. (MHz)	5700
Operating Function	Transmit	Polarization	H

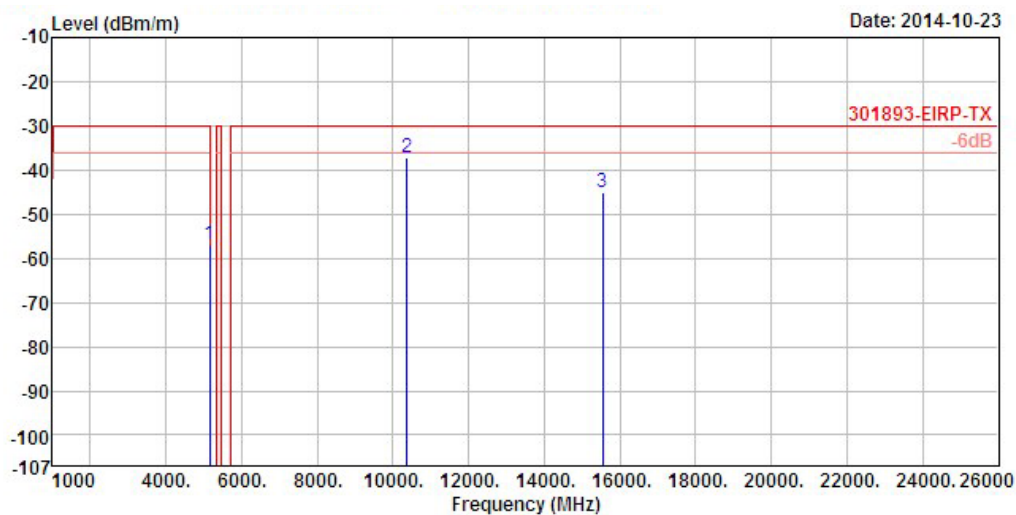


	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	5780.40	-55.87	-25.87	-30.00	-69.06	13.19
2	11400.00	-39.86	-9.86	-30.00	-59.66	19.80
3	17100.00	-41.03	-11.03	-30.00	-69.00	27.97

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)	5180
Operating Function	Transmit	Polarization	V

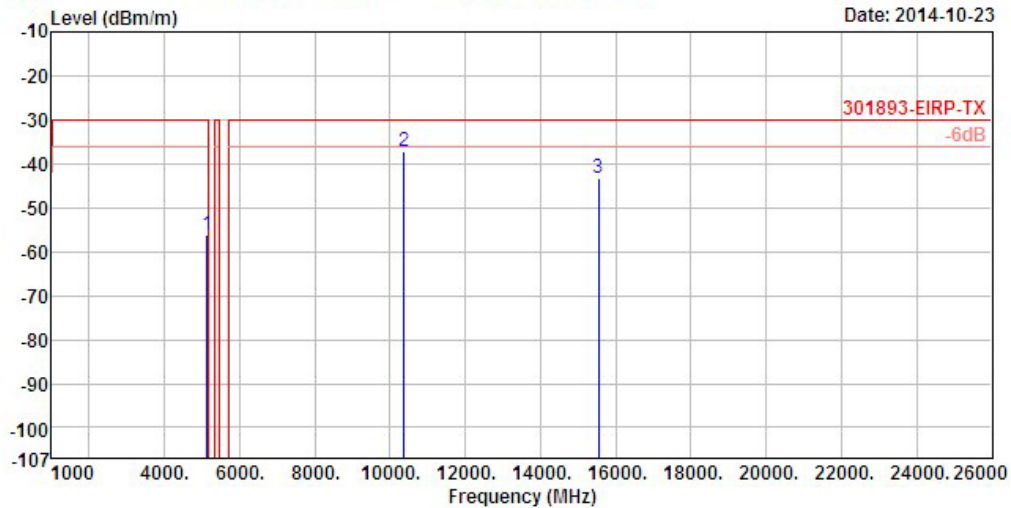


	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	5149.10	-57.02	-27.02	-30.00	-68.88	11.86
2	10360.00	-37.34	-7.34	-30.00	-57.46	20.12
3	15540.00	-45.04	-15.04	-30.00	-67.47	22.43

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)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5180
Operating Function	Transmit	Polarization	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	5128.40	-56.22	-26.22	-30.00	-68.45	12.23
2	10360.00	-37.21	-7.21	-30.00	-55.91	18.70
3	15540.00	-43.31	-13.31	-30.00	-67.39	24.08

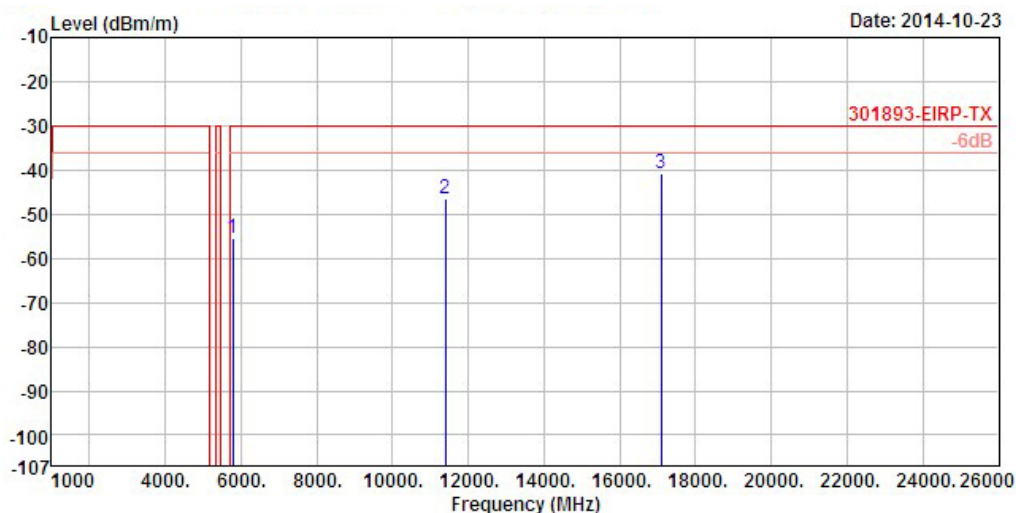
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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)	5700
Operating Function	Transmit	Polarization	V



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	5785.30	-55.57	-25.57	-30.00	-68.95	13.38
2	11400.00	-46.62	-16.62	-30.00	-68.26	21.64
3	17100.00	-40.74	-10.74	-30.00	-68.00	27.26

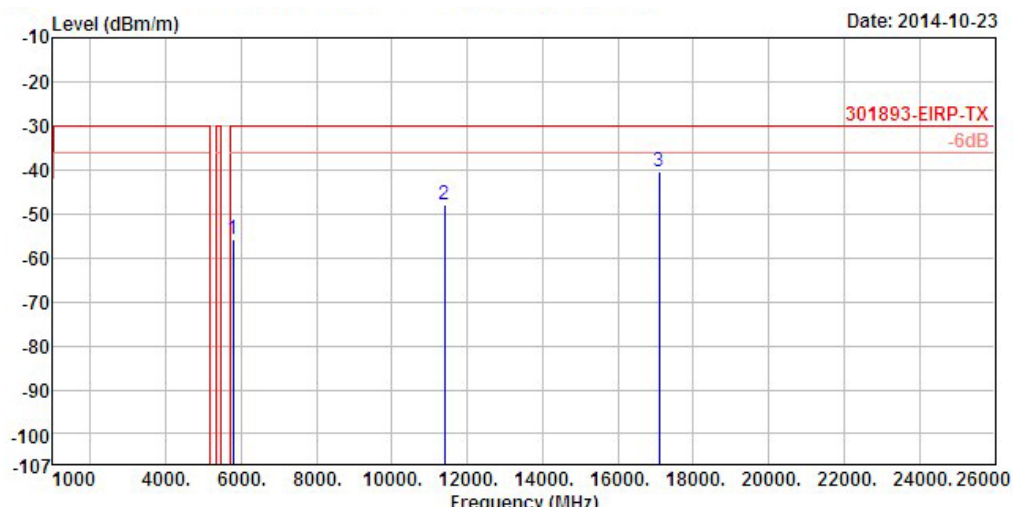
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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)	5700
Operating Function	Transmit	Polarization	H

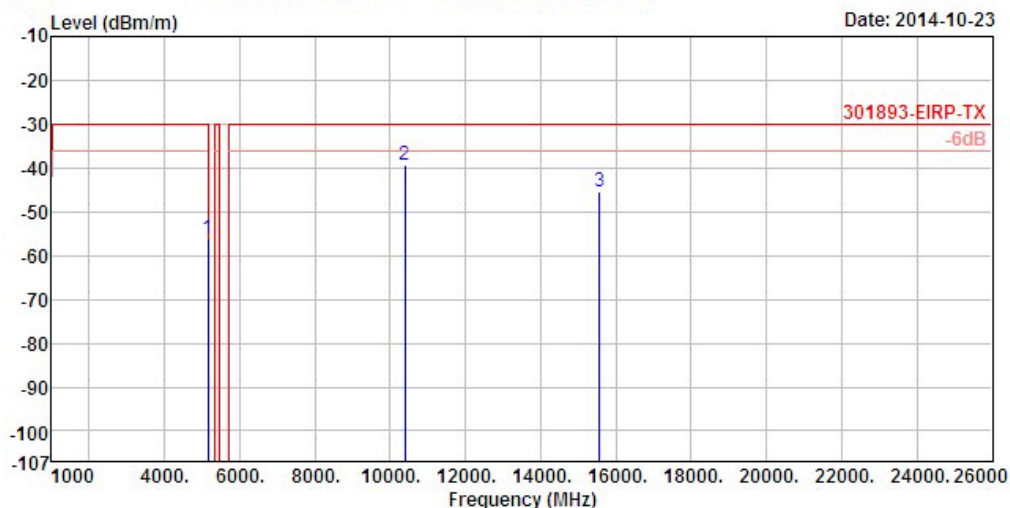


	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dBm
1	5777.90	-55.71	-25.71	-30.00	-68.90	13.19
2	11400.00	-47.94	-17.94	-30.00	-67.74	19.80
3	17100.00	-40.30	-10.30	-30.00	-68.27	27.97

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)	5190
Operating Function	Transmit	Polarization	V



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	5149.80	-56.19	-26.19	-30.00	-68.05	11.86
2	10380.00	-39.48	-9.48	-30.00	-59.63	20.15
3	15570.00	-45.27	-15.27	-30.00	-67.71	22.44

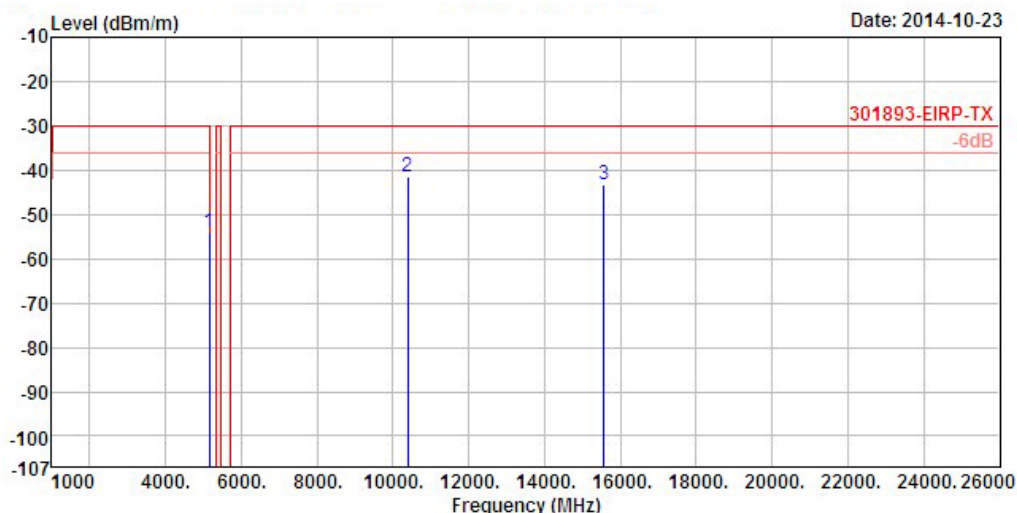
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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)	5190
Operating Function	Transmit	Polarization	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	5149.40	-54.10	-24.10	-30.00	-66.35	12.25
2	10380.00	-41.57	-11.57	-30.00	-60.27	18.70
3	15570.00	-43.36	-13.36	-30.00	-67.42	24.06

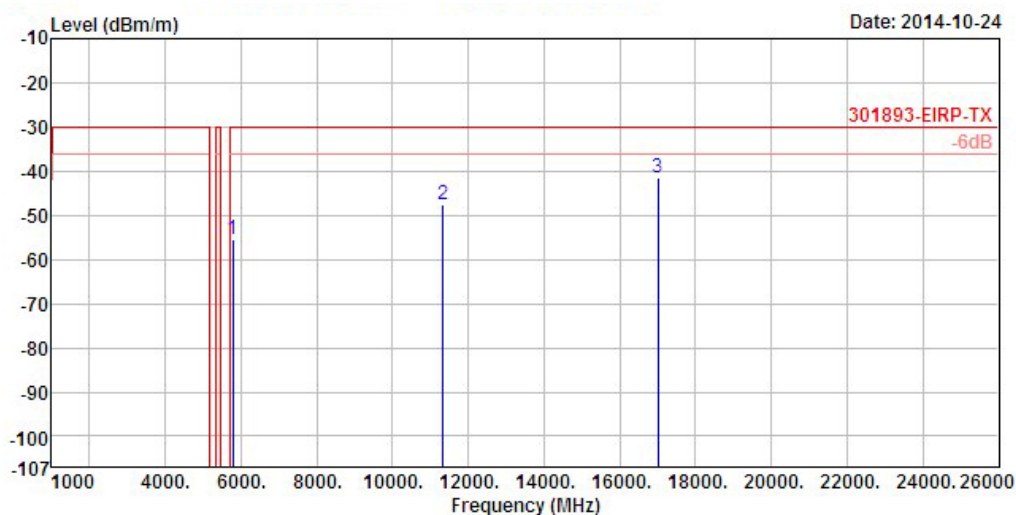
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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)	5670
Operating Function	Transmit	Polarization	V



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	5781.50	-55.49	-25.49	-30.00	-68.87	13.38
2	11340.00	-47.64	-17.64	-30.00	-68.93	21.29
3	17010.00	-41.60	-11.60	-30.00	-68.53	26.93

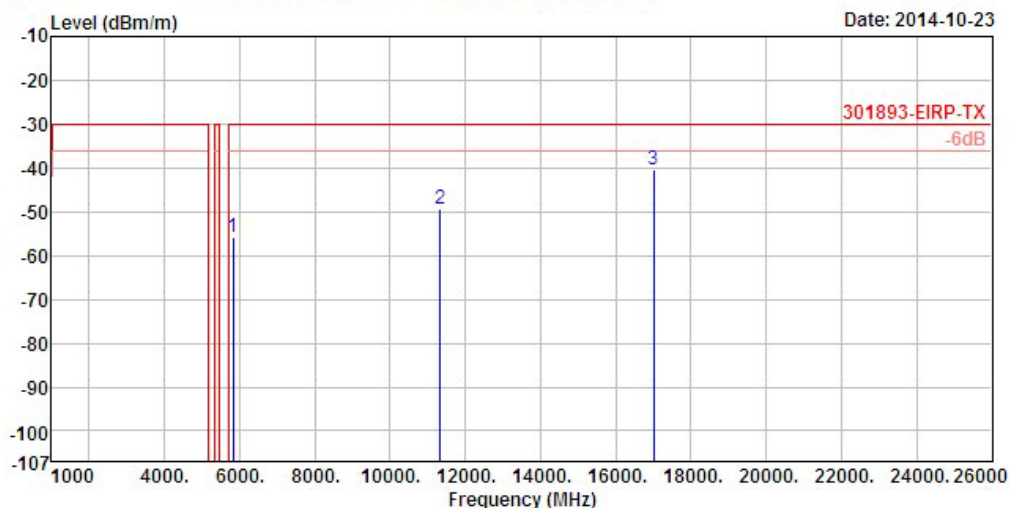
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

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)	5670
Operating Function	Transmit	Polarization	H



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	5818.00	-55.76	-25.76	-30.00	-68.99	13.23
2	11340.00	-49.45	-19.45	-30.00	-69.09	19.64
3	17010.00	-40.52	-10.52	-30.00	-68.19	27.67

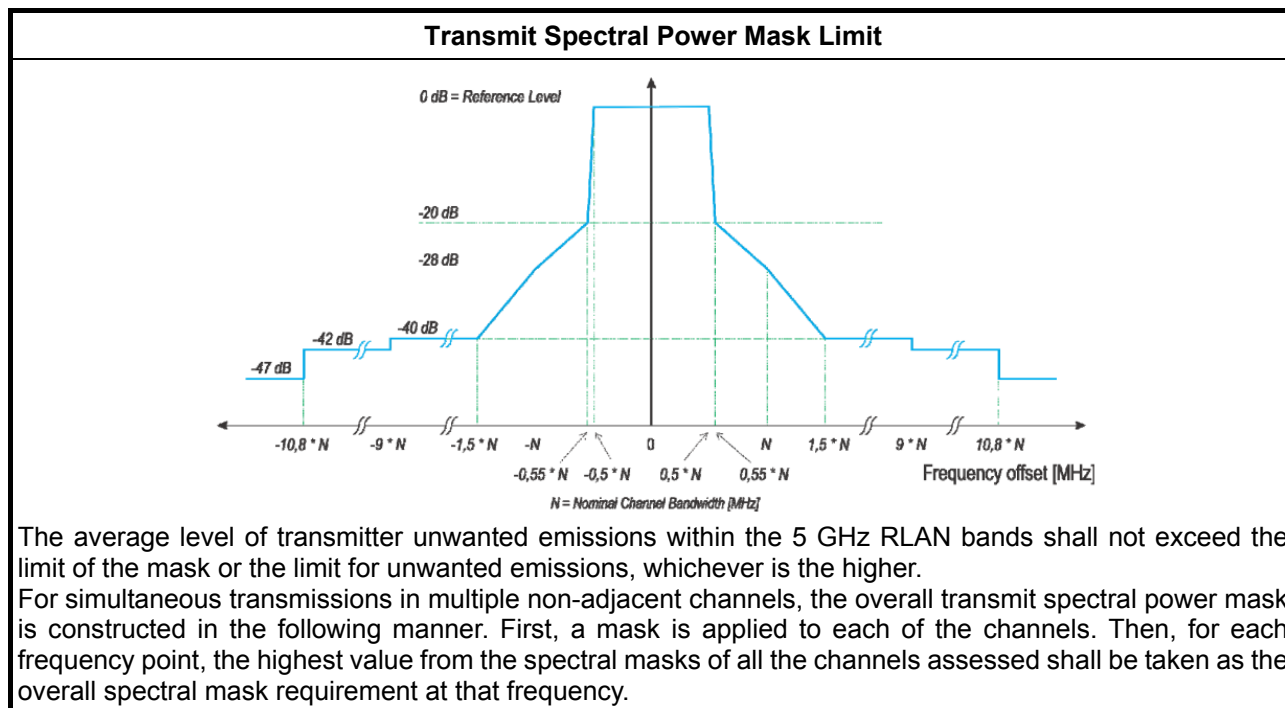
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

3.7 Transmitter Unwanted Emissions within the 5 GHz RLAN Band

3.7.1 Transmitter Unwanted Emissions within the 5 GHz RLAN Band Limit



3.7.2 Measuring Instruments

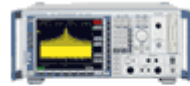
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method	
☒	The measurements shall be performed at both normal environmental conditions.
☒	Refer as EN 301 893, clause 5.3.6 for the transmit spectral power mask shall be measured using one of the options below:
☒	Option 1: For equipment with continuous transmission capability (duty cycle equal to 100 %)
☐	Option 2: For equipment without continuous transmission capability (duty cycle $\leq$ 100 %)
☒	Refer as EN 301 893, clause 5.3.6.2.1 for conducted measurement.
☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
☒	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
☒	Refer as EN 301 893, clause 5.3.6.1 for conducted measurements on smart antenna systems (equipment with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
☐	Refer as EN 301 893, clause 5.3.6.2.2 for radiated measurement.

3.7.4 Test Setup

Transmitter Unwanted Emissions within the 5 GHz RLAN Band

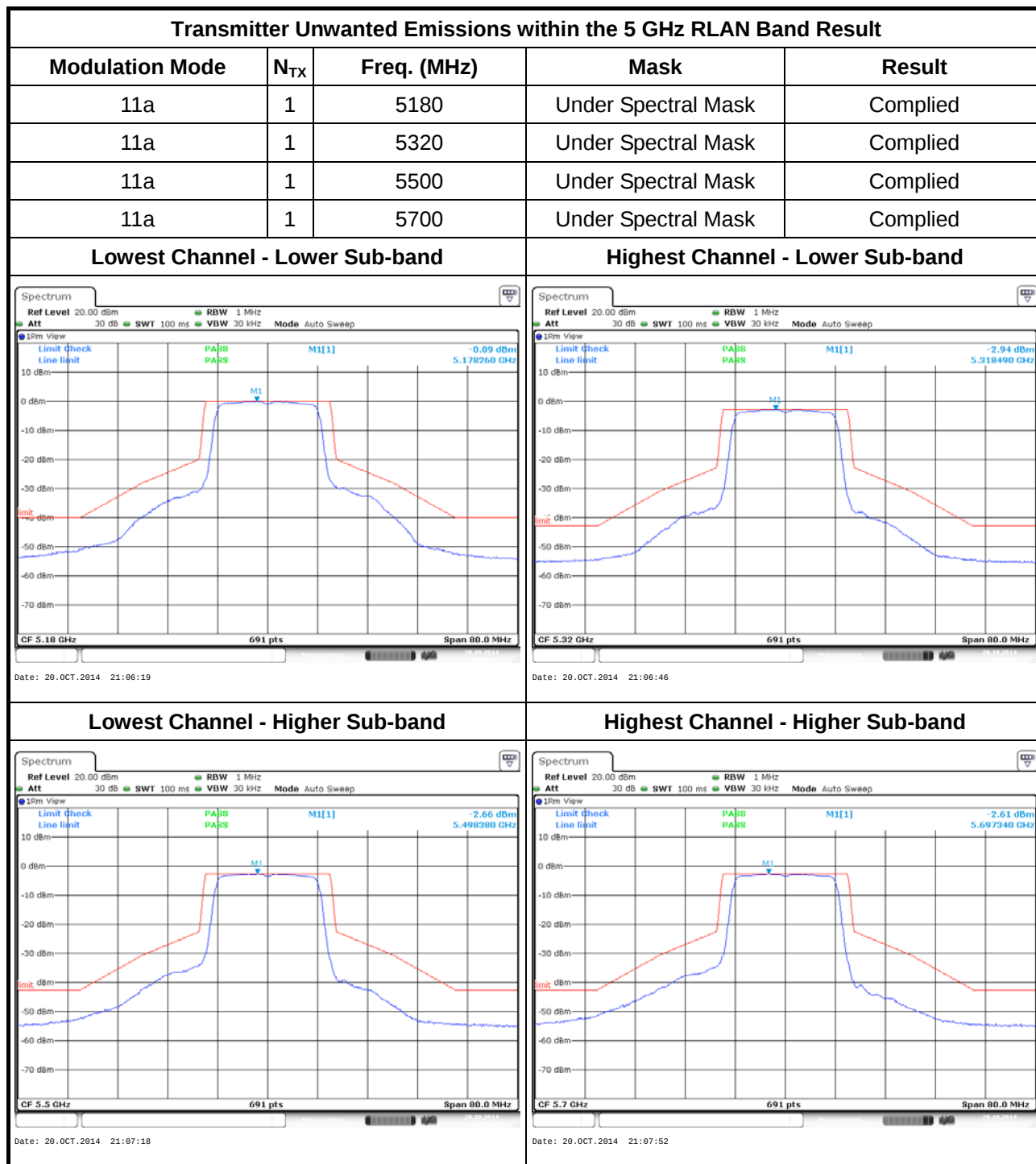


Spectrum
Analyzer



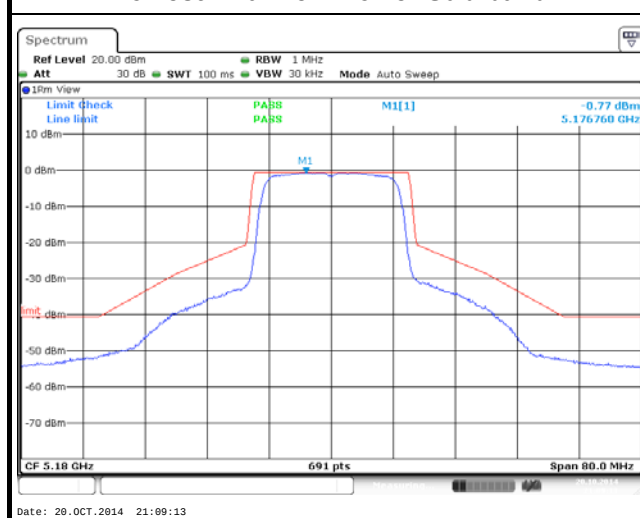
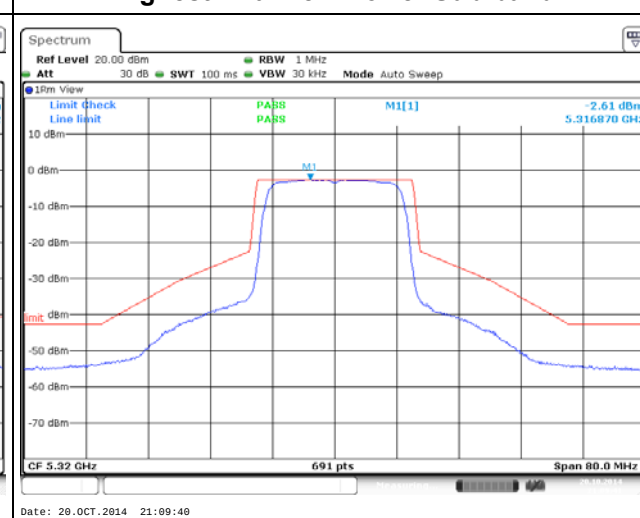
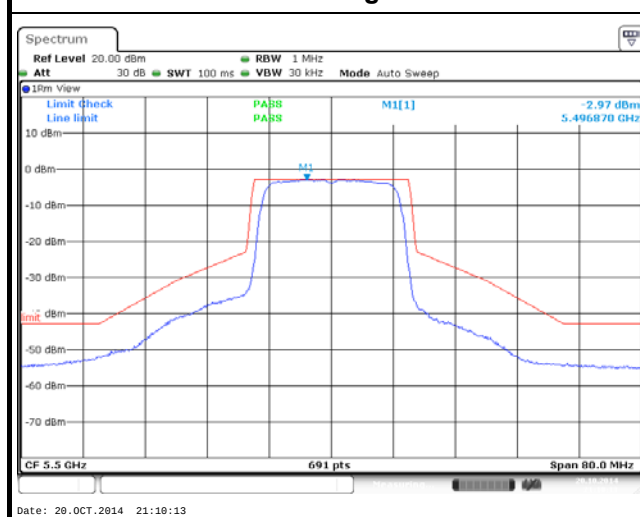
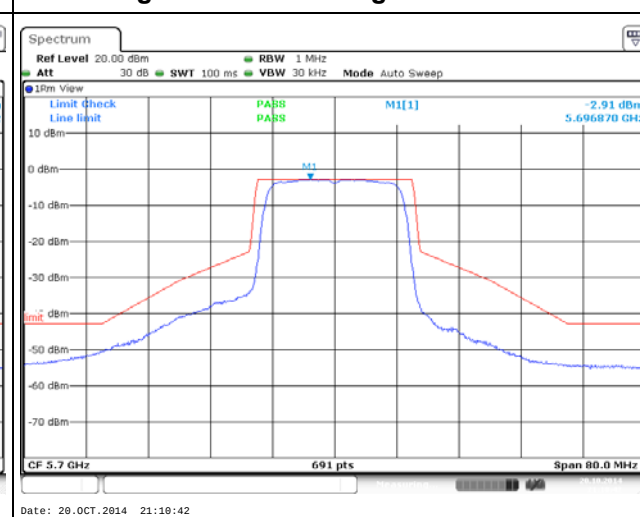
EUT

3.7.5 Test Result of Transmitter Unwanted Emissions within the 5 GHz RLAN Band



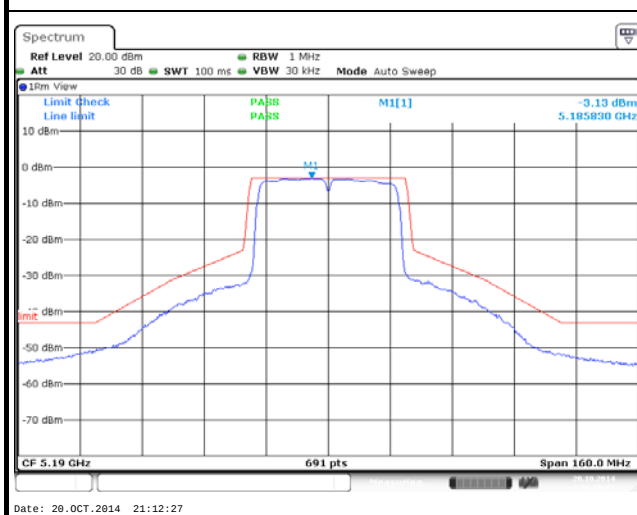
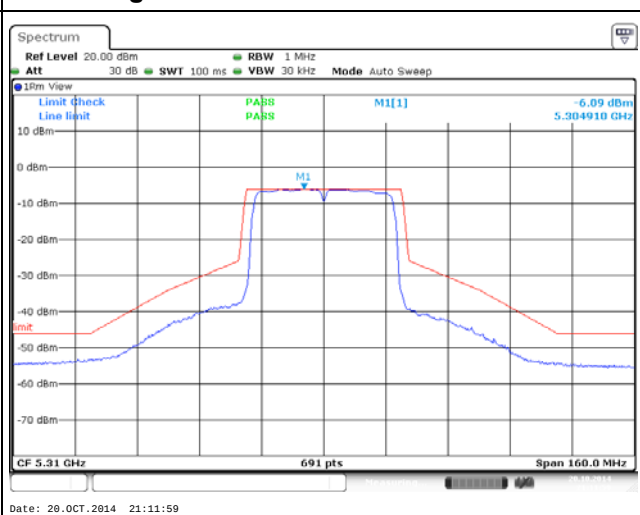
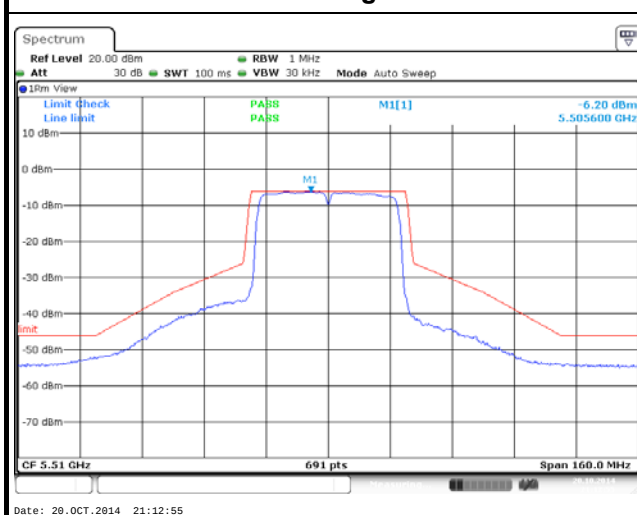
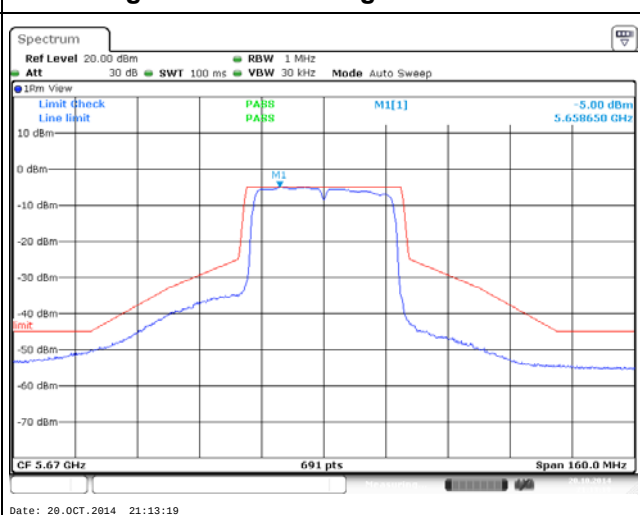
Transmitter Unwanted Emissions within the 5 GHz RLAN Band Result

Modulation Mode	N _{TX}	Freq. (MHz)	Mask	Result
HT20	2	5180	Under Spectral Mask	Complied
HT20	2	5320	Under Spectral Mask	Complied
HT20	2	5500	Under Spectral Mask	Complied
HT20	2	5700	Under Spectral Mask	Complied

Lowest Channel - Lower Sub-band

Highest Channel - Lower Sub-band

Lowest Channel - Higher Sub-band

Highest Channel - Higher Sub-band


Transmitter Unwanted Emissions within the 5 GHz RLAN Band Result

Modulation Mode	N _{TX}	Freq. (MHz)	Mask	Result
HT40	2	5190	Under Spectral Mask	Complied
HT40	2	5310	Under Spectral Mask	Complied
HT40	2	5510	Under Spectral Mask	Complied
HT40	2	5670	Under Spectral Mask	Complied

Lowest Channel - Lower Sub-band

Highest Channel - Lower Sub-band

Lowest Channel - Higher Sub-band

Highest Channel - Higher Sub-band


4 Receiver Test Result

4.1 Receiver Spurious Emissions

4.1.1 Receiver Spurious Emissions Limit

Frequency Range	Maximum Power e.r.p. (≤ 1 GHz) ; e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26 GHz	-47 dBm	1 MHz

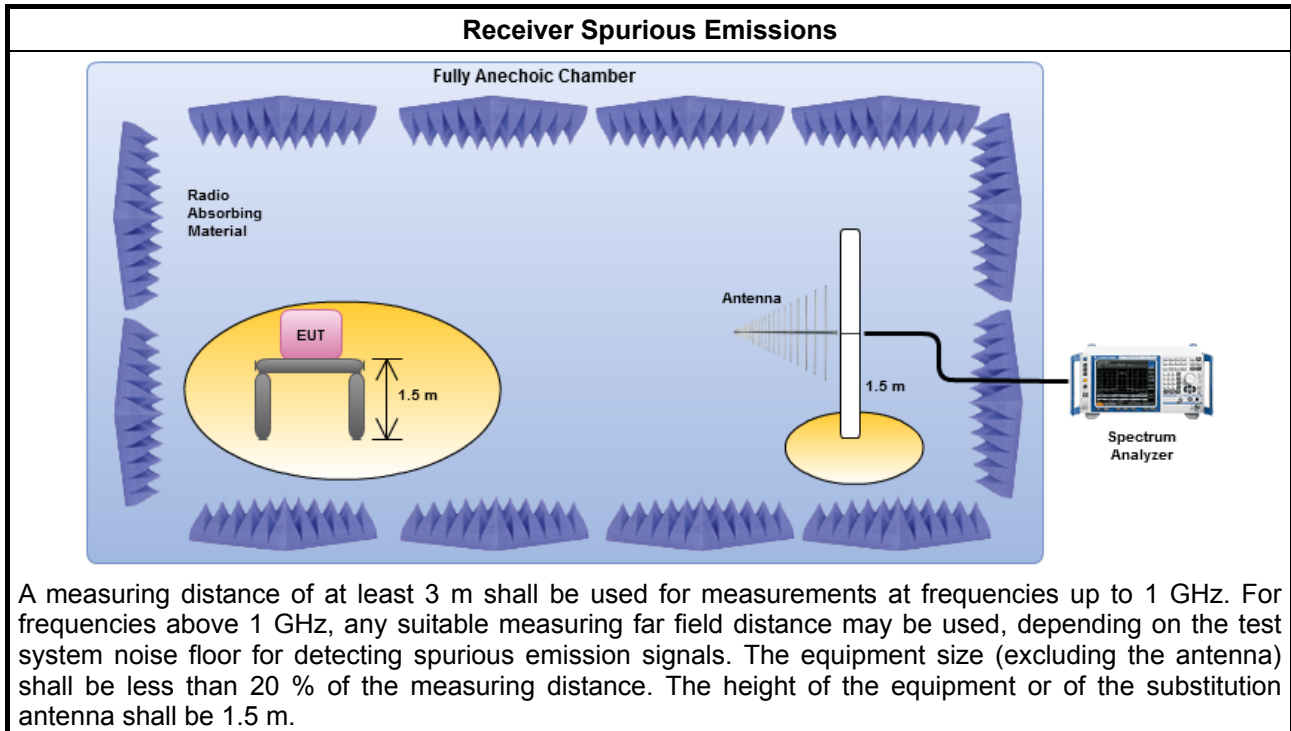
4.1.2 Measuring Instruments

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

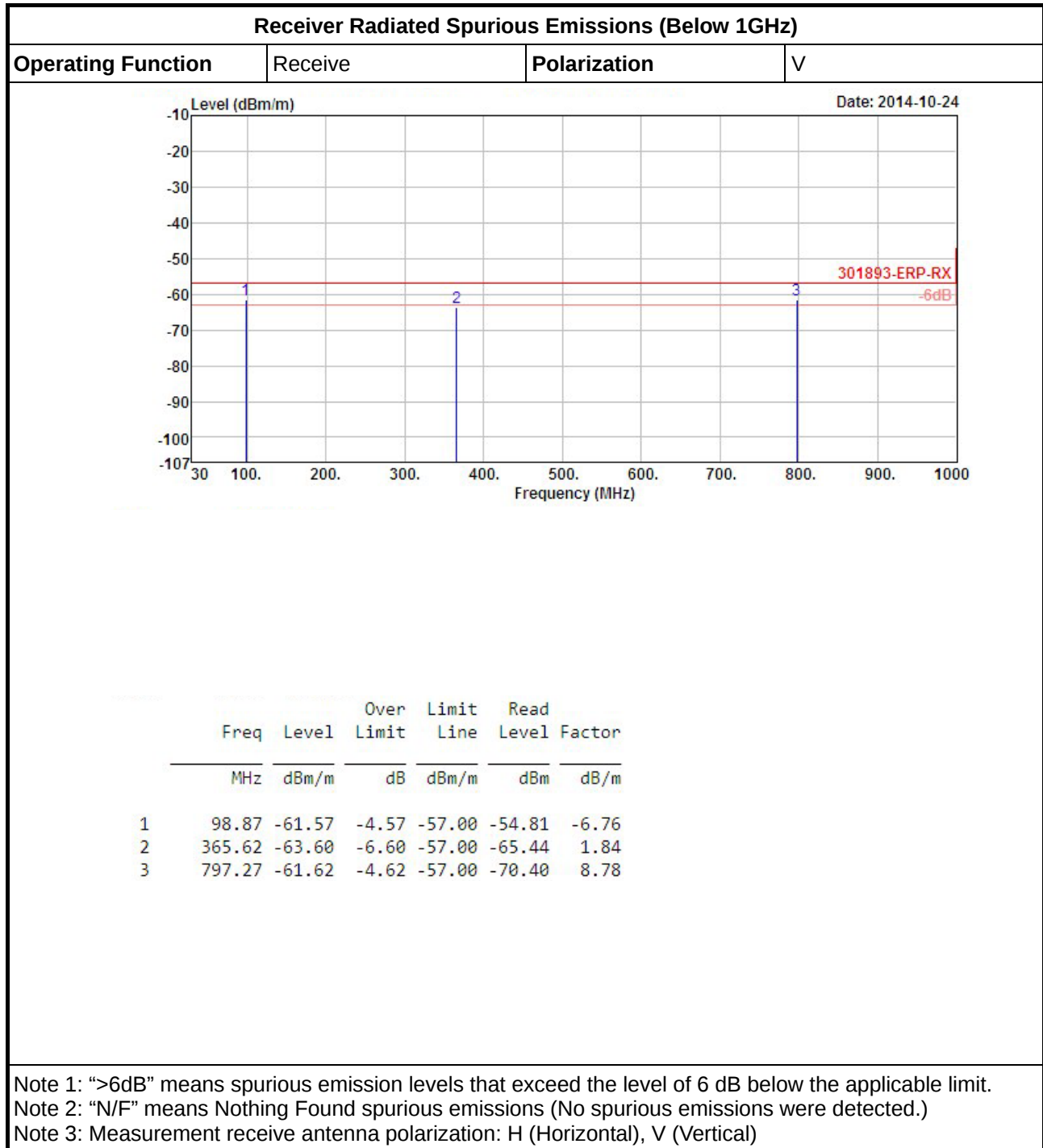
4.1.3 Test Procedures

Test Method	
☒	Refer as EN 301 893, clause 5.1.3 for test channel. 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.
☐	Refer as EN 301 893, clause 5.3.7.2.1 for conducted measurement. Conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☐	The EUT supports single receive chain and measurements performed on this receive chain.
☐	The EUT supports diversity receiving and the results on receive chain port 1 is the worst case.
☐	The EUT supports multiple receive chains using options given below:
☐	Option 1: The trace data for each receive chain has to be individually recorded and each receive chain trace data shall be added and compared with the receiver spurious emissions limit.
☐	Option 2: the results for each of the receive chains shall be individually compared with the receiver spurious emissions limit. After that these limits have been reduced with $10 \times \log_{10}(A_{ch})$. (Number of active receive chains).
☐	Option 3: A power splitter/combiner shall be used to combine all the receive chains (antenna outputs) into a single test point. The insertion loss of the power splitter/combiner shall be taken into account.
☒	Refer as EN 301 893, clause 5.3.7.2.2 for radiated measurement.

4.1.4 Test Setup



4.1.5 Receiver Radiated Spurious Emissions (Below 1GHz)

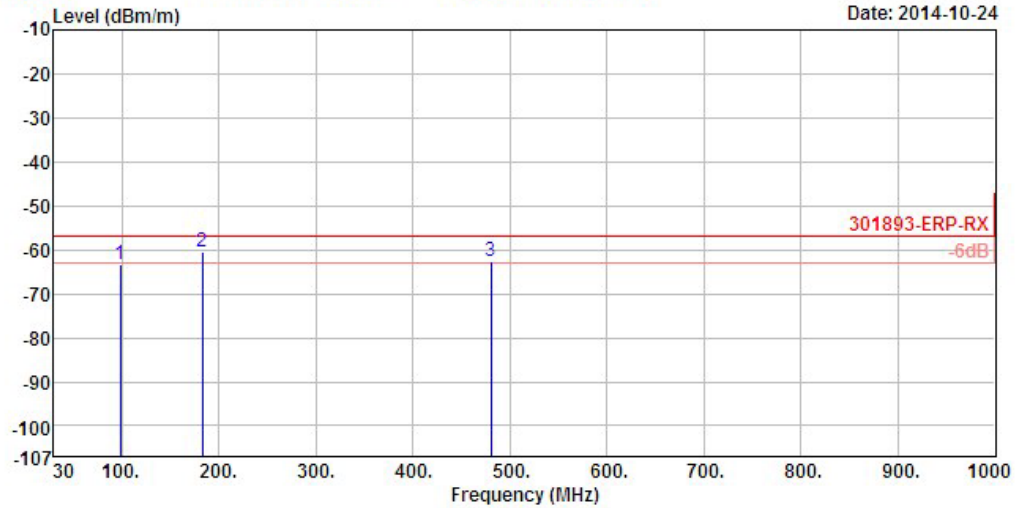


Receiver Radiated Spurious Emissions (Below 1GHz)
Operating Function

Receive

Polarization

H

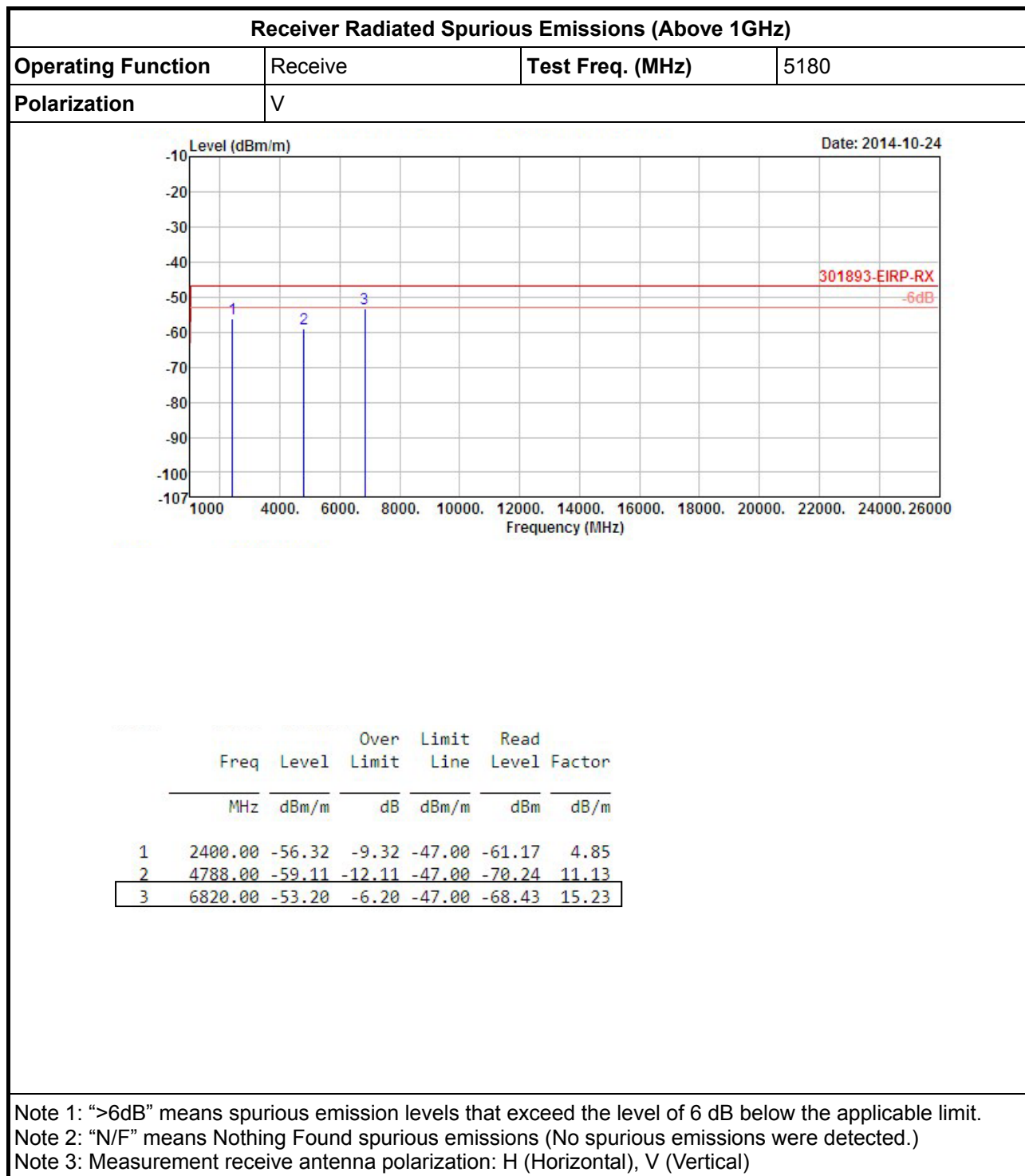


	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	98.87	-63.40	-6.40	-57.00	-57.90	-5.50
2	183.26	-60.57	-3.57	-57.00	-55.91	-4.66
3	480.08	-62.49	-5.49	-57.00	-66.35	3.86

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

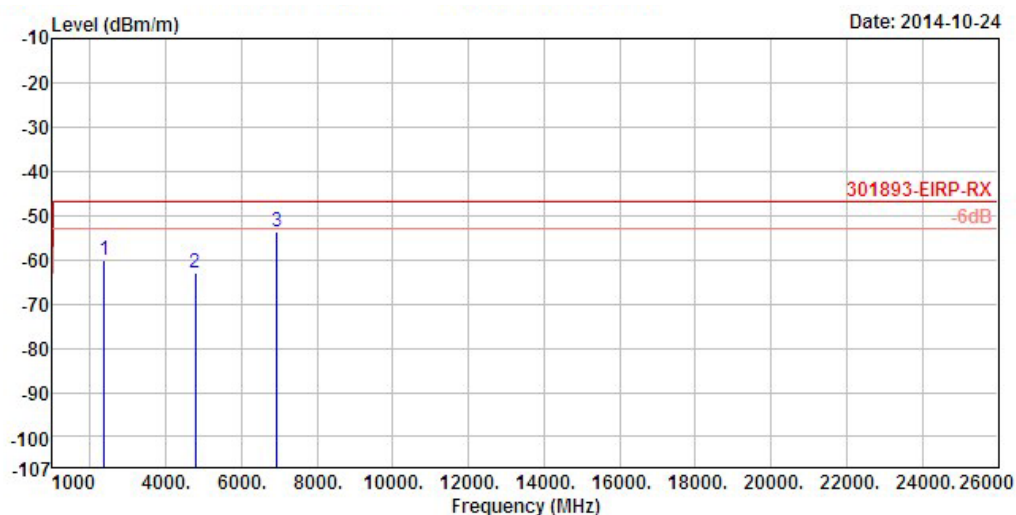
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

4.1.6 Receiver Radiated Spurious Emissions (Above 1GHz)


Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5180
Polarization	H		



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	2374.00	-60.28	-13.28	-47.00	-65.81	5.53
2	4780.00	-62.96	-15.96	-47.00	-74.63	11.67
3	6930.00	-53.53	-6.53	-47.00	-68.17	14.64

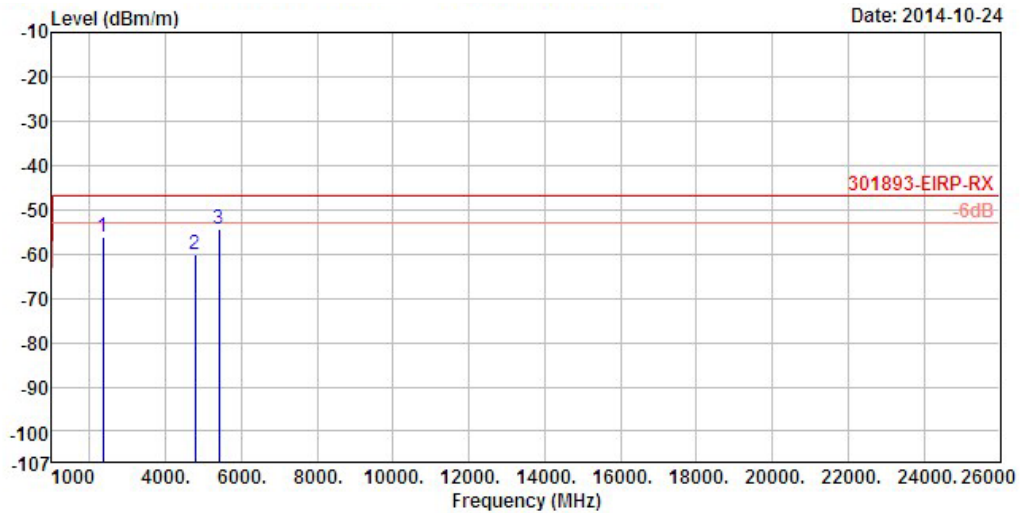
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5700
Polarization	V		



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	2350.00	-56.26	-9.26	-47.00	-61.16	4.90
2	4782.00	-60.11	-13.11	-47.00	-71.21	11.10
3	5406.00	-54.52	-7.52	-47.00	-67.07	12.55

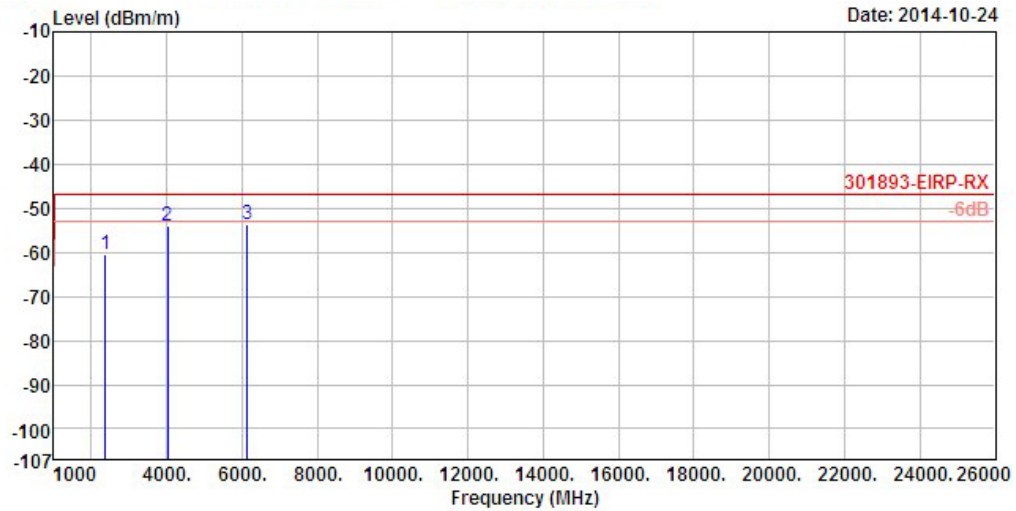
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5700
Polarization	H		



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	2366.00	-60.36	-13.36	-47.00	-65.83	5.47
2	4028.00	-54.06	-7.06	-47.00	-65.25	11.19
3	6134.00	-53.70	-6.70	-47.00	-67.35	13.65

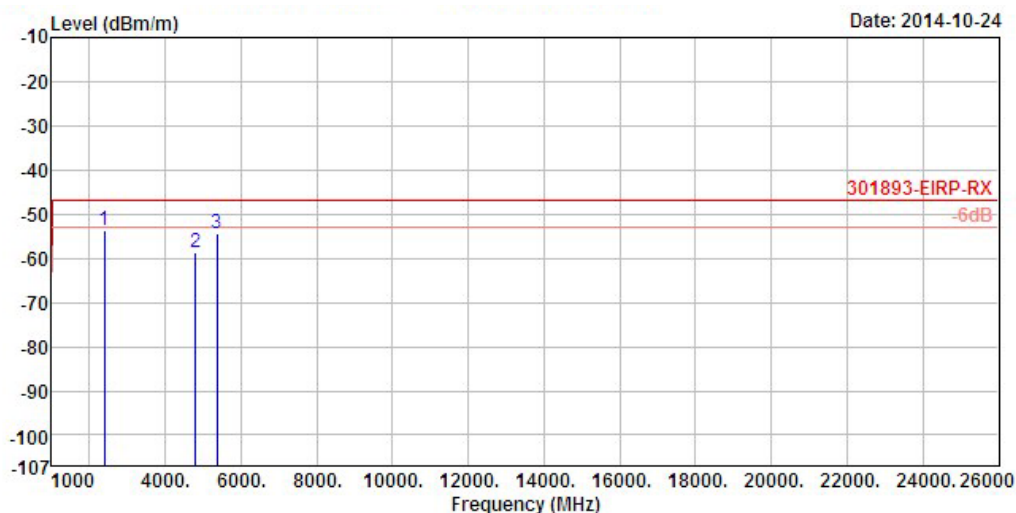
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5190
Polarization	V		

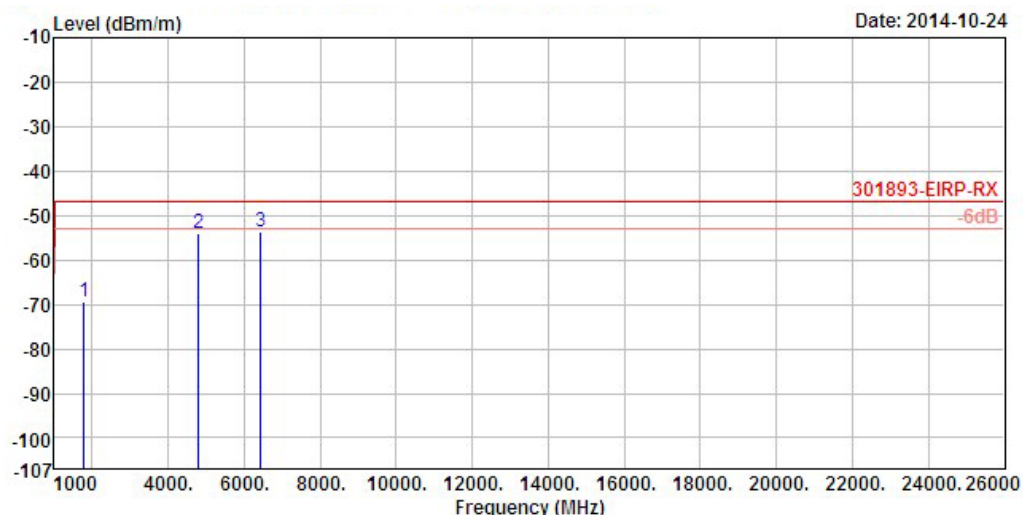


	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	2392.00	-53.49	-6.49	-47.00	-58.34	4.85
2	4792.00	-58.55	-11.55	-47.00	-69.68	11.13
3	5356.00	-54.28	-7.28	-47.00	-66.68	12.40

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

Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5190
Polarization	H		



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	1772.00	-69.42	-22.42	-47.00	-71.29	1.87
2	4792.00	-53.87	-6.87	-47.00	-65.58	11.71
3	6424.00	-53.58	-6.58	-47.00	-67.59	14.01

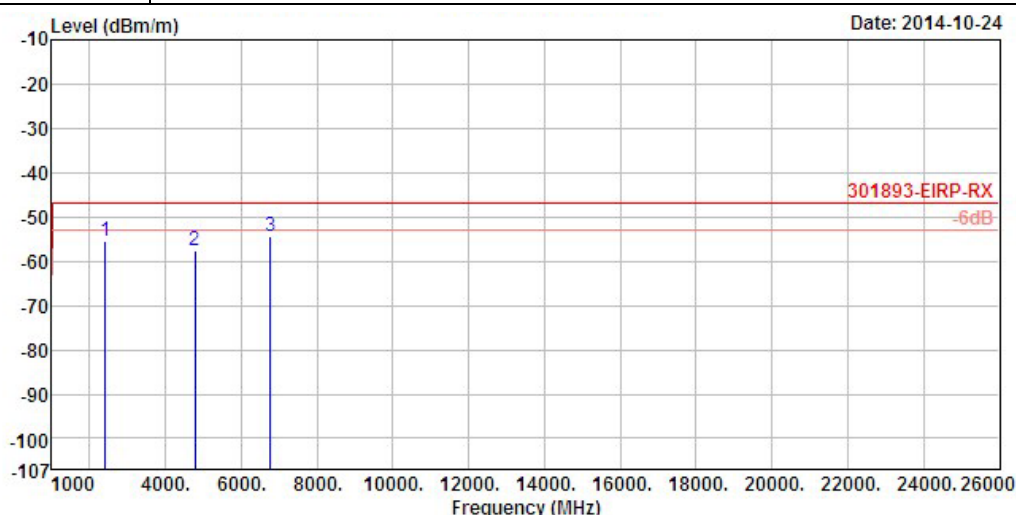
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5670
Polarization	V		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm/m	dB	dBm/m	dBm	dB/m
1	2418.00	-55.34	-8.34	-47.00	-60.17	4.83
2	4786.00	-57.63	-10.63	-47.00	-68.75	11.12
3	6762.00	-54.25	-7.25	-47.00	-69.41	15.16

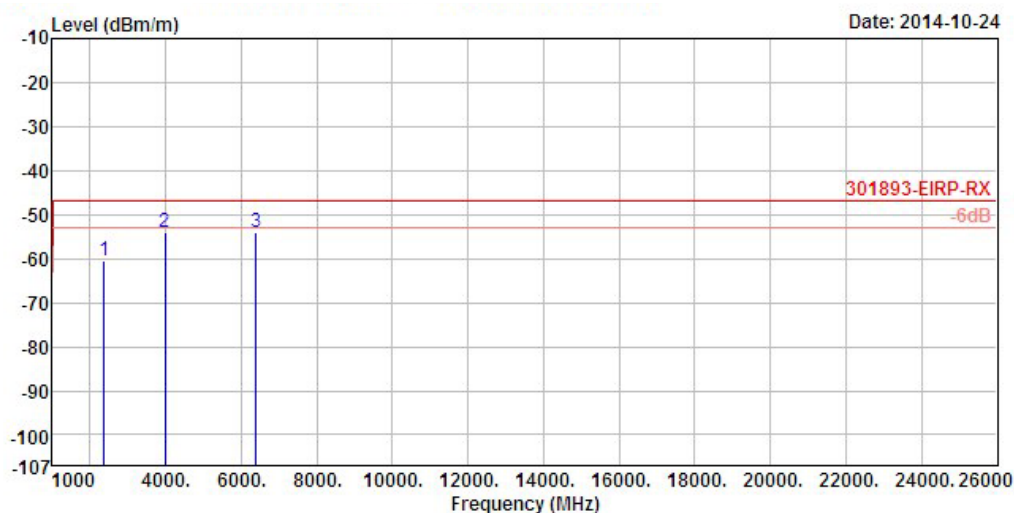
Note 1: ">6dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

Receiver Radiated Spurious Emissions (Above 1GHz)

Operating Function	Receive	Test Freq. (MHz)	5670
Polarization	H		



	Freq	Level	Over	Limit	Read	
	MHz	dBm/m	Limit	Line	Level	Factor
			dB	dBm/m	dBm	dB/m
1	2374.00	-60.58	-13.58	-47.00	-66.11	5.53
2	3988.00	-54.01	-7.01	-47.00	-65.19	11.18
3	6398.00	-54.12	-7.12	-47.00	-68.11	13.99

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	
☐	LBT based Detect and Avoid (Frame Based Equipment): • minimum Clear Channel Assessment (CCA) time = 20 us; • CCA declared by the supplier • COT = 1 ms to 10 ms • Idle Period = 5% of COT • e.g. CCA [120us] + COT [10ms] + Idle Period [0.5ms - 5% of COT]; • detection threshold level = -73 dBm/MHz + 23 - Pout e.i.r.p. (Pout in dBm);
☒	LBT based Detect and Avoid (Load Based Equipment with spectrum sharing mechanism IEEE Std.): • LBT based spectrum sharing mechanism may implement IEEE Std. 802.11-2007 clauses 15, 17, 18 or 19, in IEEE Std. 802.11n-2009, clause 20 or in IEEE Std. 802.15.4-2006,
☐	LBT based Detect and Avoid (Load Based Equipment): • minimum Clear Channel Assessment (CCA) time = 20 us; • $COT \leq (13 / 32) \times q$ ms; $q=[4..32]$; 1.625ms – 13ms; • R = number of clear idle slots are randomly [1..q]. Every time an Extended CCA is required and the R value stored in a counter. Extended CCA = R x CCA • i.e. for channel occupied then R = 4 idle slots; COT [1.625ms; q=4]; idle slots [1] - Extended CCA [60us, R=3]; • detection threshold level = -73 dBm/MHz + 23 - Pout e.i.r.p. (Pout in dBm);
☒	Short Control Signalling Transmissions: • Short Control Signalling Transmissions shall have a maximum duty cycle of 5 % within an observation period of 50 ms.

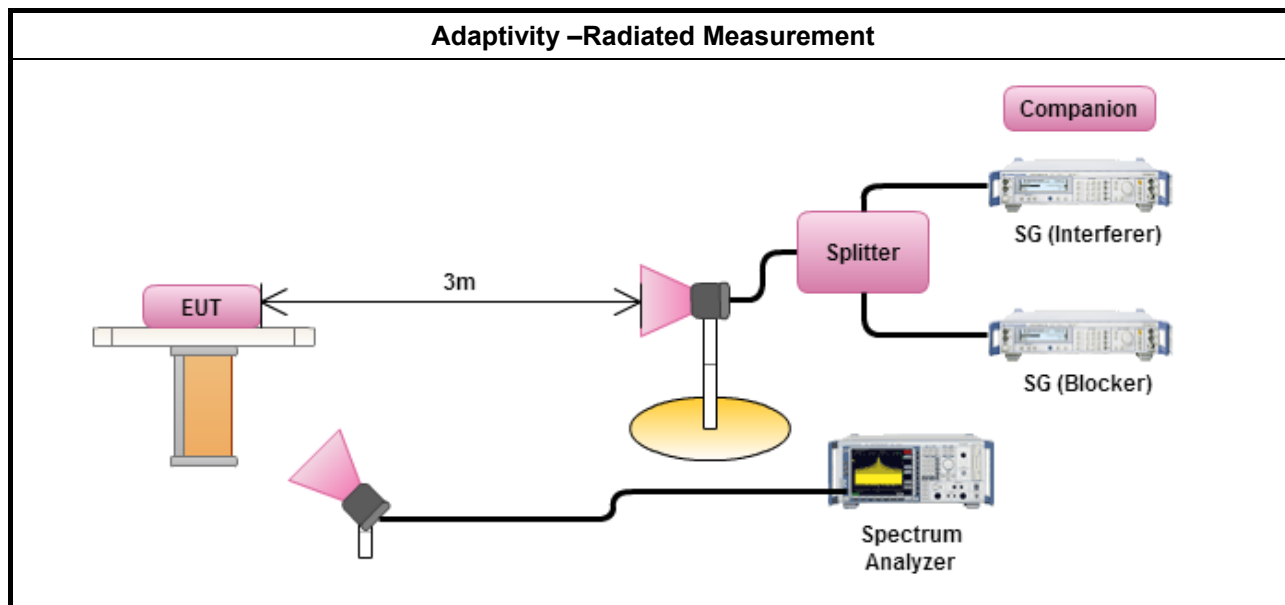
5.1.2 Measuring Instruments

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

5.1.3 Test Procedures

Test Method	
☒	Refer as EN 301 893, clause 5.1.3 for test channel. One channel out of the declared channels for each sub-band. For Adaptivity, testing shall be performed using the highest nominal channel bandwidth.
☐	Refer as EN 301 893, clause 5.3.9.2.1 for conducted measurement.
☐	The EUT supports single receive chain and measurements performed on this receive chain.
☐	For conducted measurements on devices with multiple transmit chains and receive chains. The power splitter/combiner shall be used to combine all the transmit/receive chains (antenna outputs) into a single test point. The insertion loss of the power splitter/combiner shall be taken into account.
☒	Refer as EN 301 893, clause 5.3.9.2.2 for radiated measurement.

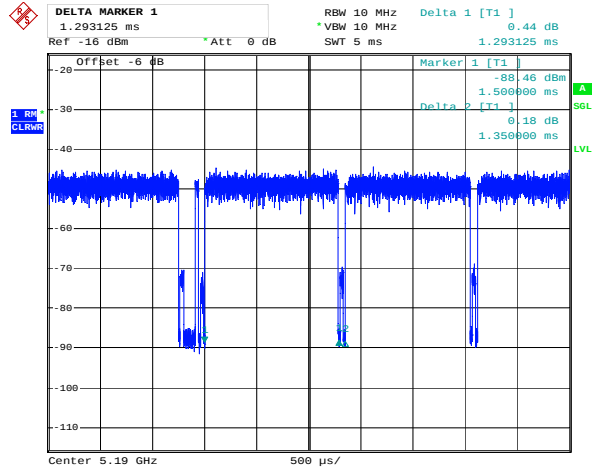
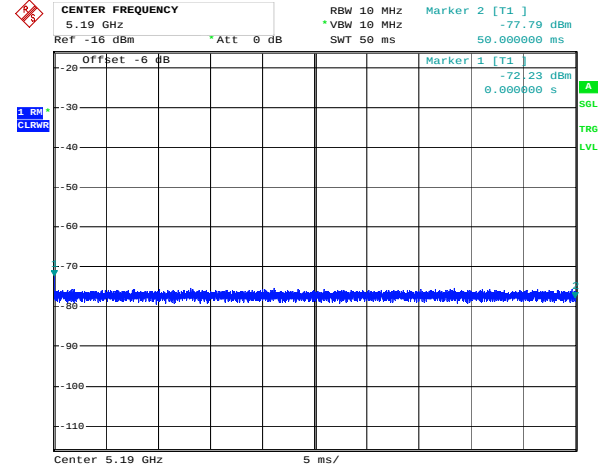
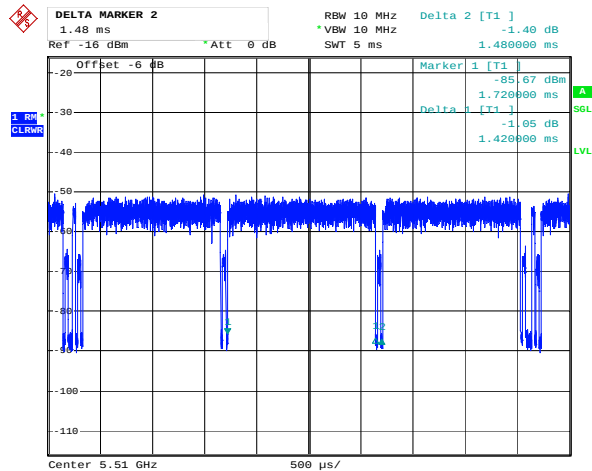
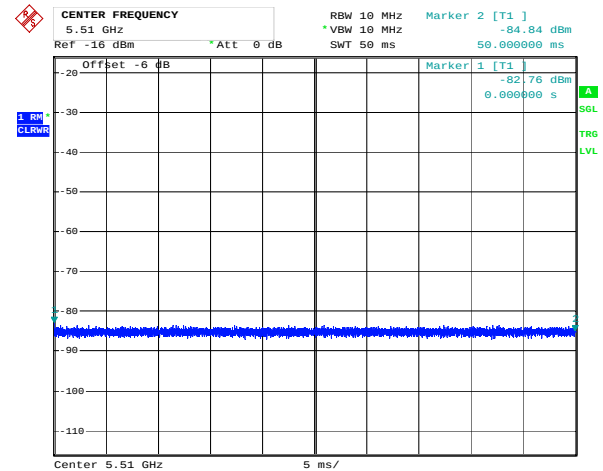
5.1.4 Test Setup



5.1.5 Test Result of Adaptivity

Adaptivity Result					
Detection Threshold Level (dBm)		-73			
Modulation Mode	Freq. (MHz)	Channel Occupancy Time (ms)	Idle Period Time (ms)	Short Control Signalling Transmissions (ms)	
				Bin	Time (ms)
HT40	5190	1.293125	0.056875	0	0
HT40	5510	1.420000	0.060000	0	0
Limit		N/A	N/A	2.5 ms in 50ms period	
Result		Complied			
Note 1: Channel Occupancy Time and Idle Period Time follow as IEEE Std. 802.11-2007 and IEEE 802.11n-2009 specification without restrinction.					

Adaptivity Result Time Plots

F1 - Channel Occupancy Time/ Idle Period

F1 - Short Control Signalling Transmissions

F3 - Channel Occupancy Time/ Idle Period

F3 - Short Control Signalling Transmissions


Note : In the plots of Short Control Signalling Transmissions, inject the interference signal to the EUT at the beginning.

6 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101013	9kHz ~ 40GHz	Jan. 25, 2014	RF Conducted
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100℃	Nov. 20, 2013	RF Conducted
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 31, 2014	RF Conducted
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	Jan. 28, 2014	RF Conducted
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Jan. 28, 2014	RF Conducted
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	30MHz ~ 26.5GHz	Dec. 02, 2013	RF Conducted
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345679/4	30MHz ~ 26.5GHz	Dec. 02, 2013	RF Conducted

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101514	10Hz ~ 40GHz	Jun. 13, 2014	Radiation
Amplifier	Agilent	8447D	2944A11146	10kHz ~ 1.3GHz	Jul. 15, 2014	Radiation
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	Mar. 27, 2014	Radiation
Bilog Antenna	SCHAFFNER	CBL6111C	2737	25MHz ~ 2GHz	Sep. 20, 2014	Radiation
Horn Antenna	ETS	3115	6744	1GHz ~ 18GHz	May 05, 2014	Radiation
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170221	15GHz ~ 40GHz	Jan. 22, 2014	Radiation
RF Cable-R03m	Jye Bao	RG142	CB031	25MHz ~ 1GHz	Oct. 03, 2014	Radiation
RF Cable-10m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	1GHz ~ 26.5GHz	Oct. 03, 2014	Radiation
Turn Table	Chaintek Instruments	3000	MF780208275	0 ~ 360 degree	N/A	Radiation
Antenna Mast	HD	100	HD1000203311	1 ~ 4 m	N/A	Radiation

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP7	100645	9kHz ~ 7GHz	Apr. 17, 2014	Adaptivity
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Nov. 12, 2013	Adaptivity
Horn Antenna	COM-POWER	AH-118	10091	1GHz ~ 18GHz	Jun. 28, 2014	Adaptivity
Horn Antenna	COM-POWER	AH-118	10094	1GHz ~ 18GHz	Apr. 21, 2014	Adaptivity
RF Cable-3m	HUBER+SUHNER	SUCOFLEX_104	302338	1GHz ~ 26.5GHz	Dec. 03, 2013	Adaptivity
RF Cable-8m	HUBER+SUHNER	SUCOFLEX_104	MY17172/4	0.05GHz ~ 26.5GHz	Dec. 03, 2013	Adaptivity
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_103	53804/3	1GHz ~ 33GHz	Dec. 03, 2013	Adaptivity
RF Power Divider	Worken	0120A002201801O	11012007220	2 Way	Dec. 03, 2013	Adaptivity

Note: Calibration Interval of instruments listed above is one year.



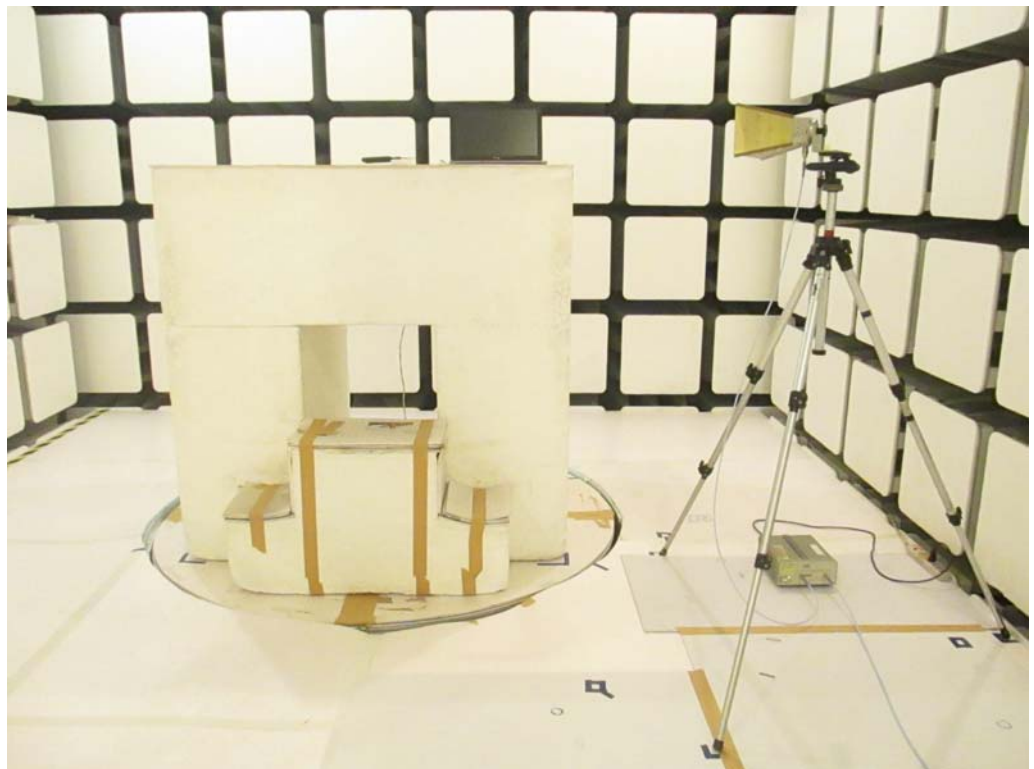
Appendix A. Test Photos

1 Photographs of Radiated Emissions Test Configuration

BILOG ANTENNA



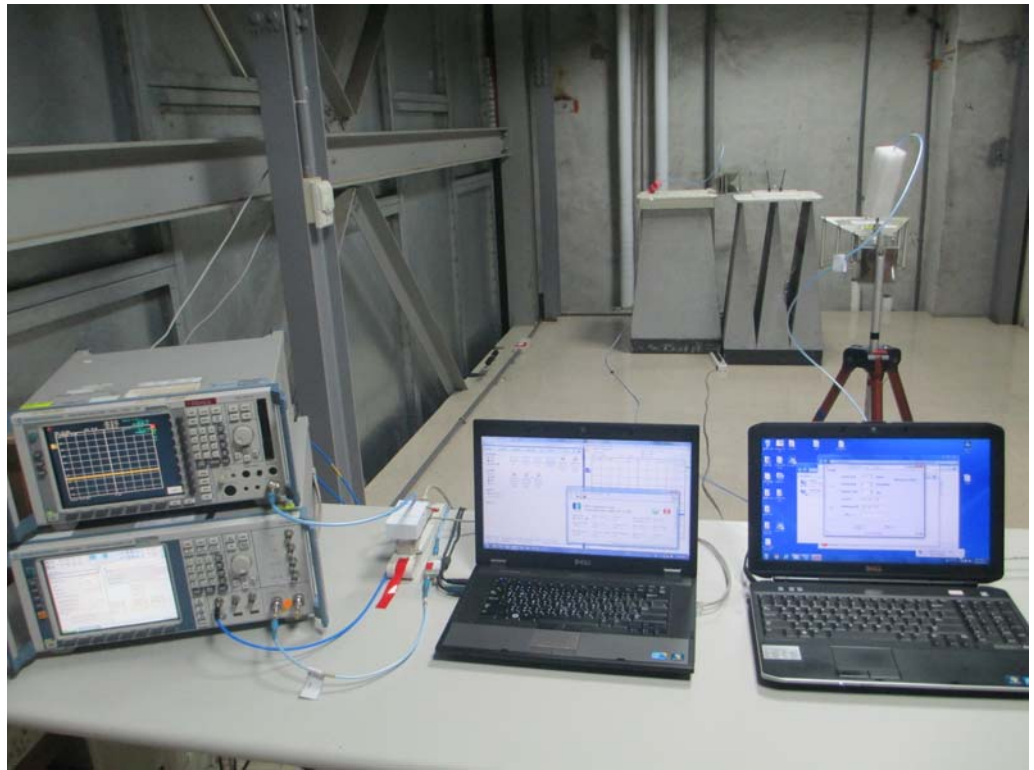
HORN ANTENNA



EUT take a close-up



2 Photographs of Adaptivity Test Configuration



APPENDIX B. Photographs of EUT

