CE Test Report

Equipment	:	**802.11AG Mini Compact Flash Module with antenna connectors**
Model No.	:	**SDC-MSD30AG (please refer to 1.1.1 for more details)**
Brand Name	:	**Laird Technologies**
Applicant	:	**Laird Technologies**
Address	:	**11160 Thompson Ave. / Lenexa, Kansas / 66219 / USA**
Standard	:	**EN 301 893 V1.8.1 (2015-03)**
Received Date	:	**Dec. 25, 2015**
Tested Date	:	**Jan. 19 ~ Jan. 26, 2016**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
ER431802-02AN	Rev. 01	Initial issue	Mar. 14, 2016

Summary of Test Result

Ref. Std. Clause	Test Items	Measured	Result
4.2	Centre Frequencies	Meet the requirement of limit.	Pass
4.3	Nominal Channel Bandwidth and Occupied Channel Bandwidth	Meet the requirement of limit.	Pass
4.4	RF Output Power & Transmit Power Control (TPC)	5.15-5.25GHz: 19.04 dBm 5.25-5.35GHz: 17.70 dBm 5.47-5.725GHz: 17.56 dBm	Pass
4.4	Power Density	Meet the requirement of limit.	Pass
4.5	Transmitter Unwanted Emissions	Meet the requirement of limit.	Pass
4.6	Receiver Spurious Emissions	Meet the requirement of limit.	Pass
4.7	Dynamic Frequency Selection (DFS)	Meet the requirement of limit.	Pass
4.8	Adaptivity (Channel Access Mechanism)	Meet the requirement of limit.	Pass
4.10	Geo-location capability	This test is not required since the device does not support this function	NA

NOTE: The DFS measurement was recorded in Report No.: EY431802-02.

1 General Description

1.1 Information

This report is issued as a supplementary report to the original ICC report no. ER431802AN. The modification is only concerned with updating standard version from V1.7.1 to V1.8.1. Therefore, related test items had been performed and presented in following sections.

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Laird Technologies	SDC-MSD30AG	802.11AG Mini Compact Flash Module with antenna connectors	with carrier board
	SDC-SSD30AG		module only
✦ The above models, model **SDC-MSD30AG** was selected as a representative one for the final test and only its data was recorded in this report.			

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information					
IEEE Std. 802.11	**Frequency Range (MHz)**	**Ch. Freq. (MHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**Data Rate / MCS**
a	5150-5250 5250-5350 5500-5700	5180-5240 5260-5320 5500-5700	36-48 [4] 52-64 [4] 100-140 [11]	1	6-54 Mbps
Note 1: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.					

1.1.3 Antenna Details

Ant. No.	Brand Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)			
				2400~2483.5	**5150~5250**	**5250~5350**	**5470~5725**
1	Cisco Air-Ant 5135	Dipole	RP-TNC plug	-	3.5		
2	Radiall Larsen R380.500.314	Dipole	RP-TNC plug	1.6	5		

1.1.4 EUT Operational Condition

Power Supply Type	3.3Vdc from host		
Operational Voltage	☒ Vnom (230 V)	☒ Vmax (253 V)	☒ Vmin (207 V)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (55°C)	☒ Tmin (-20°C)

1.1.5 Accessories

N/A

1.1.6 Adaptive Equipment

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

1.1.7 Channel List

Frequency band (MHz)			
5150~5350		5500~5700	
802.11 a		802.11 a	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
36	5180	100	5500
40	5200	104	5520
44	5220	108	5540
48	5240	112	5560
52	5260	116	5580
56	5280	132	5660
60	5300	136	5680
64	5320	140	5700

1.1.8 Test Tool and Duty Cycle

Test tool	SRU; Version 3.3.10
Duty Cycle Of Test Signal (%)	100% - IEEE 802.11a
Duty Factor	0 - IEEE 802.11a

1.1.9 Power Setting

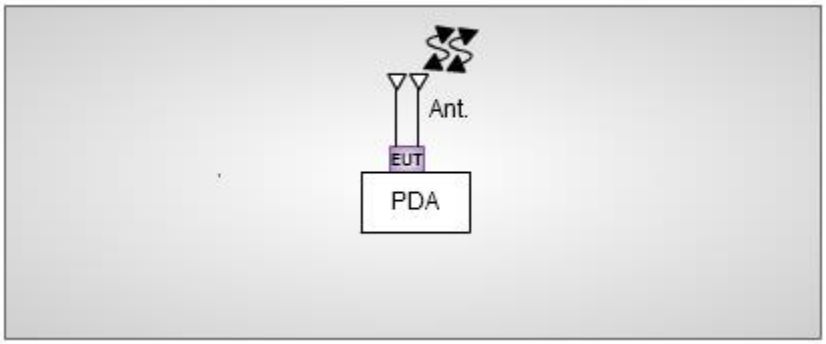
Modulation Mode	**Test Frequency (MHz)**			
	a			
	5180	**5320**	**5500**	**5700**
a	100%	80%	80%	80%

1.2 Local Support Equipment List

Support Equipment List						
No.	**Equipment**	**Brand**	**Model**	**S/N**	**FCC ID**	**Signal cable / Length (m)**
1	PDA	HP	HSTNH-L0 5C-BT	---	DoC	---

1.3 Test Setup Chart

Test Setup Diagram



1.4 Test Equipment and Calibration Data

Test Item	Radiated Emissions				
Test Site	Fully-anechoic chamber 2 / (05CH02-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	Agilent	N9010A	MY52221474	Sep. 08, 2015	Sep. 07, 2016
Bilog Antenna 30-1000MHz	SCHWARZBECK	VULB9168	9168-563	Dec. 29, 2015	Dec. 28, 2016
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	9120D-1205	Jan. 08, 2016	Jan. 07, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Jan. 04, 2016	Jan. 03, 2017
Preamplifier	Agilent	83017A	MY39501310	Dec. 11, 2015	Dec. 10, 2016
Preamplifier 30-1000MHz	EMC	EMC02325	980188	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22622/4	Dec. 04, 2015	Dec. 03, 2016
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22623/4	Dec. 04, 2015	Dec. 03, 2016
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22621/4	Dec. 04, 2015	Dec. 03, 2016
RF cable-4M	HUBER+SUHNER	SUCOFLEX104	MY22579/4	Dec. 04, 2015	Dec. 03, 2016
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-002	Dec. 04, 2015	Dec. 03, 2016
LF cable-3M	EMC	EMC8D-NM-NM-3000	131102	Dec. 04, 2015	Dec. 03, 2016
LF cable-10M	EMC	EMC8D-NM-NM-10000	131101	Dec. 04, 2015	Dec. 03, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101486	Oct. 14, 2015	Oct. 13, 2016
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
DC POWER SOURCE	GW INSTEK	GPC-3060D	EM884797	Oct. 20, 2015	Oct. 19, 2016
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Measurement Software	Agilent	EN RF test	1.1501125	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(DF01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum	R&S	FSV-7	101607	Dec. 10, 2015	Dec. 09, 2016
Spectrum	Keysight	N9010A	MY54510374	May. 18, 2015	May. 17, 2016
RF cable-4M	HUBER+SUHNER	SUCOFLEX_104	MY15686/4	Dec. 17, 2015	Dec. 16, 2016
RF cable-0.5M	HUBER+SUHNER	SUCOFLEX_104	296081/4	Dec. 17, 2015	Dec. 16, 2016
RF cable-0.2M	HUBER+SUHNER	SUCOFLEX_104	329023/4	Dec. 17, 2015	Dec. 16, 2016
RF cable-0.2M	HUBER+SUHNER	SUCOFLEX_104	329021/4	Dec. 17, 2015	Dec. 16, 2016
MXG-B RF Vector Signal Generator	Agilent	N5182B	MY53050081	Mar. 30, 2015	Mar. 29, 2016
Preamplifier	EMC	EMC02325	980146	Oct. 14, 2015	Oct. 13, 2016
Oscilloscope	National Instruments	USB-5133	F651FF	Jun. 15, 2015	Jun. 14, 2016
Measurement Software	Sporton	Sporton_3	1.0.0.22	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Testing Applied Standards

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

EN 301 893 V1.8.1 (2015-03)

1.6 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		
Parameters	**Uncertainty**	**Limit**
Radio Frequency	$\pm 1.4 \times 10^{-9}$	$\pm 1 \times 10^{-5}$
RF power conducted	±0.808 dB	±1,5 dB
RF power radiated	±3.398 dB	±6 dB
Spurious emission, conducted	±2.470 dB	±3 dB
Spurious emission, radiated	±3.398 dB	±6 dB
Humidity	±4.7%	±5 %
Temperature	±0.8 °C	±1 °C
Time	±0.1 %	±10 %

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
RF Conducted	TH01-WS	20°C / 62%	Nic Guan
Radiated Emission	05CH02-WS	19-20°C / 70%	Jack Li
Adaptivity	DF01-WS	24°C / 25%	Ryan Lee

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate
Centre Frequencies	11a	5180 / 5320 / 5500 / 5700	6 Mbps
Occupied Channel Bandwidth			
RF Output Power			
Power Spectral Density			
Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands	11a	5180 / 5700	6 Mbps
Transmitter Unwanted Emissions within the 5 GHz RLAN Band	11a	5180 / 5320 / 5500 / 5700	6 Mbps
Receiver Spurious Emissions	11a	5180 / 5700	6 Mbps
Adaptivity	11a	5180 / 5700	6 Mbps

3 Transmitter Test Results

3.1 Carrier Frequencies

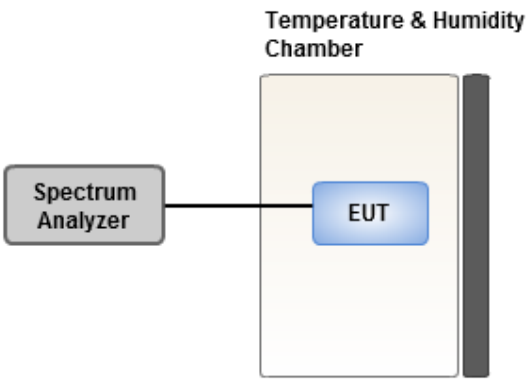
3.1.1 Limit of Carrier Frequencies

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range f_c ± 20 ppm.

3.1.2 Test Procedures

Reference to clause 5.3.2.2 of ETSI EN 301 893 V1.8.1 (2015-03).

3.1.3 Test Setup



3.1.4 Test Result of Carrier Frequencies

Condition	Modulation Mode	Freq. (MHz)	Carrier Centre Frequencies (ppm)		Limit (ppm)
			Freqeuncy (MHz)	Carrier Stability	
$T_{nom}V_{nom}$	802.11a	5180	5180.01010	1.95	20
$T_{min}V_{max}$	802.11a	5180	5180.04180	8.07	20
$T_{min}V_{min}$	802.11a	5180	5180.04180	8.07	20
$T_{max}V_{max}$	802.11a	5180	5180.02320	4.48	20
$T_{max}V_{min}$	802.11a	5180	5180.02320	4.48	20
$T_{nom}V_{nom}$	802.11a	5320	5320.01100	2.07	20
$T_{min}V_{max}$	802.11a	5320	5320.04120	7.74	20
$T_{min}V_{min}$	802.11a	5320	5320.04120	7.74	20
$T_{max}V_{max}$	802.11a	5320	5320.02410	4.53	20
$T_{max}V_{min}$	802.11a	5320	5320.02410	4.53	20
$T_{nom}V_{nom}$	802.11a	5500	5500.01070	1.95	20
$T_{min}V_{max}$	802.11a	5500	5500.04090	7.44	20
$T_{min}V_{min}$	802.11a	5500	5500.04090	7.44	20
$T_{max}V_{max}$	802.11a	5500	5500.02390	4.35	20
$T_{max}V_{min}$	802.11a	5500	5500.02390	4.35	20
$T_{nom}V_{nom}$	802.11a	5700	5700.01090	1.91	20
$T_{min}V_{max}$	802.11a	5700	5700.04080	7.16	20
$T_{min}V_{min}$	802.11a	5700	5700.04080	7.16	20
$T_{max}V_{max}$	802.11a	5700	5700.02460	4.32	20
$T_{max}V_{min}$	802.11a	5700	5700.02460	4.32	20

3.2 Occupied Channel Bandwidth

3.2.1 Limit of Occupied Channel Bandwidth

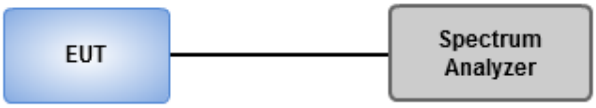
The Nominal Channel Bandwidth shall be at least 5 MHz at all times.

The Occupied Channel Bandwidth shall be between 80 % and 100 % of the declared Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

3.2.2 Test Procedures

Reference to clause 5.3.3.2 of ETSI EN 301 893 V1.8.1 (2015-03).

3.2.3 Test Setup



3.2.4 Test Result of Occupied Channel Bandwidth

Modulation Mode	Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Occupied Channel Bandwidth Limit (MHz)
802.11a	5180	16.44	16-20
802.11a	5320	16.44	16-20
802.11a	5500	16.44	16-20
802.11a	5700	16.44	16-20

3.3 RF Output Power, Transmit Power Control (TPC) and Power density

3.3.1 Limit of RF Output Power, Transmit Power Control (TPC) and Power density

E.I.R.P limits for RF output power and power density at the highest power level

Frequency range (MHz)	Mean e.i.r.p. limit [dBm]		Mean e.i.r.p. density limit [dBm/MHz]	
	With TPC	Without TPC	With TPC	Without TPC
5150 to 5350	23	20 / 23 (see note 1)	10	7 / 10 (see note 2)
5470 to 5725	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)

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

E.I.R.P limits for RF output power at the lowest power level

Frequency range (MHz)	Mean e.i.r.p. [dBm]
5250 to 5350	17
5470 to 5725	24 (see note)

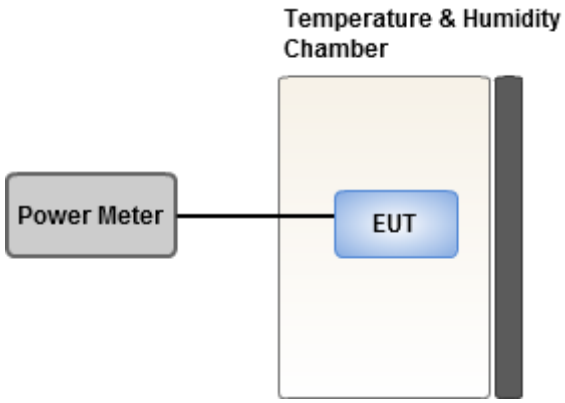
Note: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5250 MHz to 5350 MHz.

3.3.2 Test Procedures

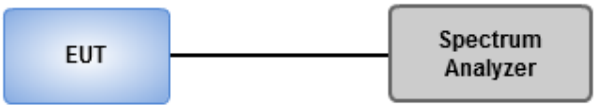
Reference to clause 5.3.4.2 of ETSI EN 301 893 V1.8.1 (2015-03).

3.3.3 Test Setup

For RF Output Power, Transmit Power Control (TPC)



For Power Density



3.3.4 Test Result of RF Output Power at the Highest Power

Maximum Transmit Power (dBm)			
Condition	**Freq. (MHz)**	**802.11a**	**Limit (dBm)**
$T_{nom}V_{nom}$	5180	18.65	23
$T_{min}V_{max}$	5180	19.02	23
$T_{min}V_{min}$	5180	**19.04**	23
$T_{max}V_{max}$	5180	16.85	23
$T_{max}V_{min}$	5180	16.82	23
$T_{nom}V_{nom}$	5320	17.09	23
$T_{min}V_{max}$	5320	17.67	23
$T_{min}V_{min}$	5320	**17.70**	23
$T_{max}V_{max}$	5320	15.40	23
$T_{max}V_{min}$	5320	15.38	23
$T_{nom}V_{nom}$	5500	16.92	23
$T_{min}V_{max}$	5500	17.34	23
$T_{min}V_{min}$	5500	17.36	23
$T_{max}V_{max}$	5500	15.96	23
$T_{max}V_{min}$	5500	15.93	23
$T_{nom}V_{nom}$	5700	16.83	23
$T_{min}V_{max}$	5700	17.53	23
$T_{min}V_{min}$	5700	**17.56**	23
$T_{max}V_{max}$	5700	15.94	23
$T_{max}V_{min}$	5700	15.92	23

3.3.5 Test Result of RF Output Power at the Lowest Power

Maximum Transmit Power (dBm)			
Condition	**Freq. (MHz)**	**802.11a**	**Limit (dBm)**
$T_{nom}V_{nom}$	5320	11.09	17
$T_{min}V_{max}$	5320	11.67	17
$T_{min}V_{min}$	5320	11.70	17
$T_{max}V_{max}$	5320	9.40	17
$T_{max}V_{min}$	5320	9.38	17
$T_{nom}V_{nom}$	5500	10.92	17
$T_{min}V_{max}$	5500	11.34	17
$T_{min}V_{min}$	5500	11.36	17
$T_{max}V_{max}$	5500	9.96	17
$T_{max}V_{min}$	5500	9.93	17
$T_{nom}V_{nom}$	5700	10.83	17
$T_{min}V_{max}$	5700	11.53	17
$T_{min}V_{min}$	5700	11.56	17
$T_{max}V_{max}$	5700	9.94	17
$T_{max}V_{min}$	5700	9.92	17

3.3.6 Test Result of Power Density

Modulation Mode	Freq. (MHz)	Power Density (dBm/1MHz) e.i.r.p.	Limit (dBm/1MHz) e.i.r.p.	Results
802.11a	5180	8.87	10	Pass
802.11a	5320	6.90	10	Pass
802.11a	5500	6.58	10	Pass
802.11a	5700	6.43	10	Pass

3.4 Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands

3.4.1 Limit of Transmitter Unwanted Emissions outside the 5 GHz RLAN Bands

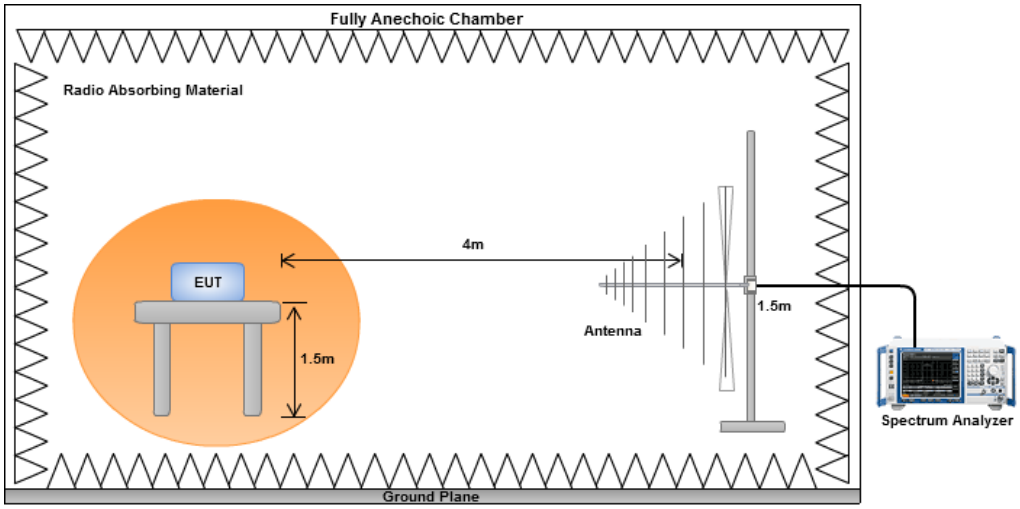
Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 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

3.4.2 Test Procedures

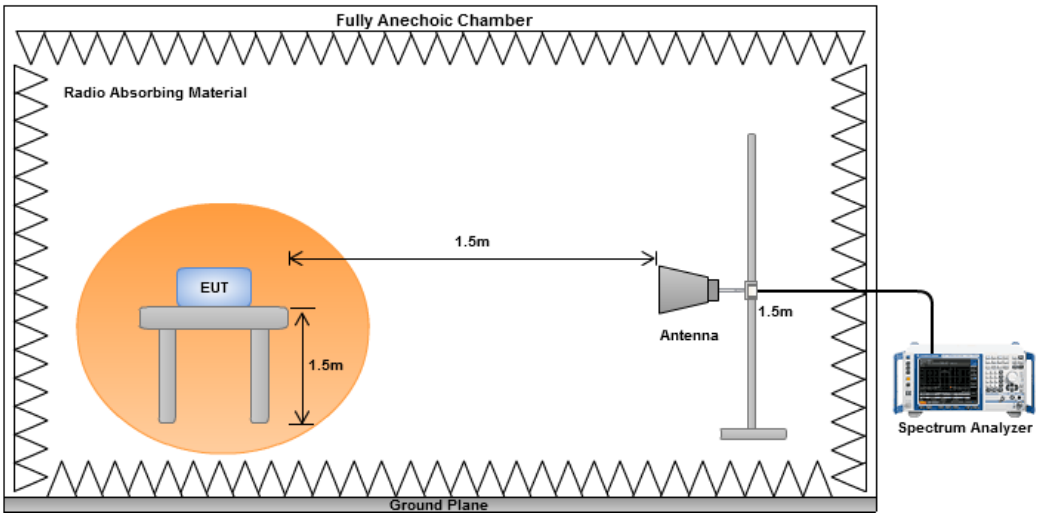
Reference to clause 5.3.5.2 of ETSI EN 301 893 V1.8.1 (2015-03).

3.4.3 Test Setup

Below 1GHz

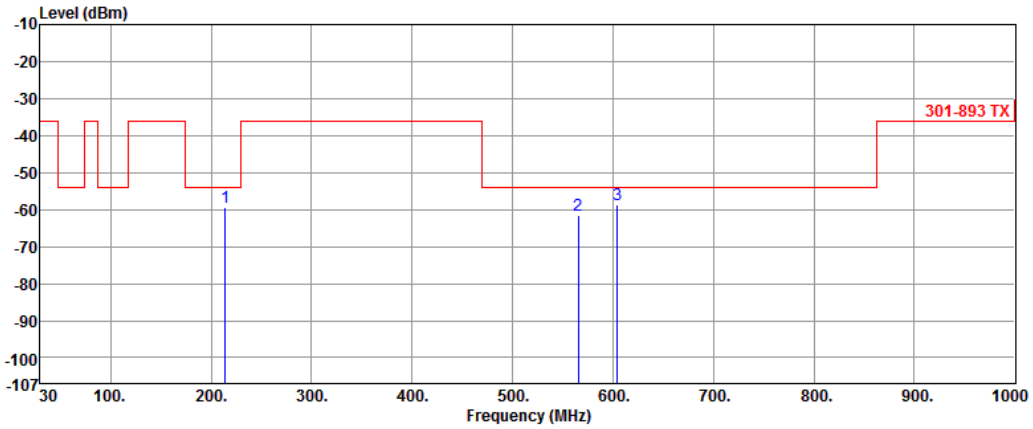


Above 1 GHz



3.4.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

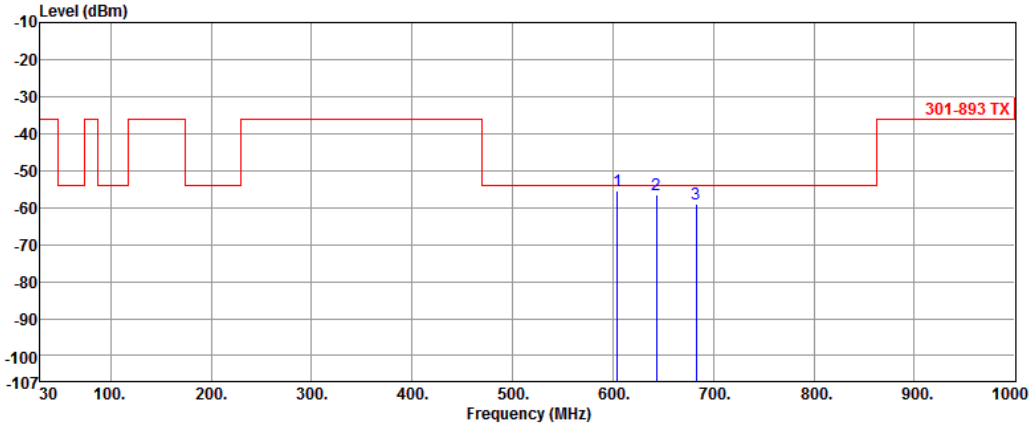
Modulation	11a	**Test Freq. (MHz)**	5180
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	214.30	-59.37	-54.00	-5.37	-4.84	-54.53
2	565.44	-61.44	-54.00	-7.44	4.63	-66.07
3	604.24	-58.78	-54.00	-4.78	6.32	-65.10

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

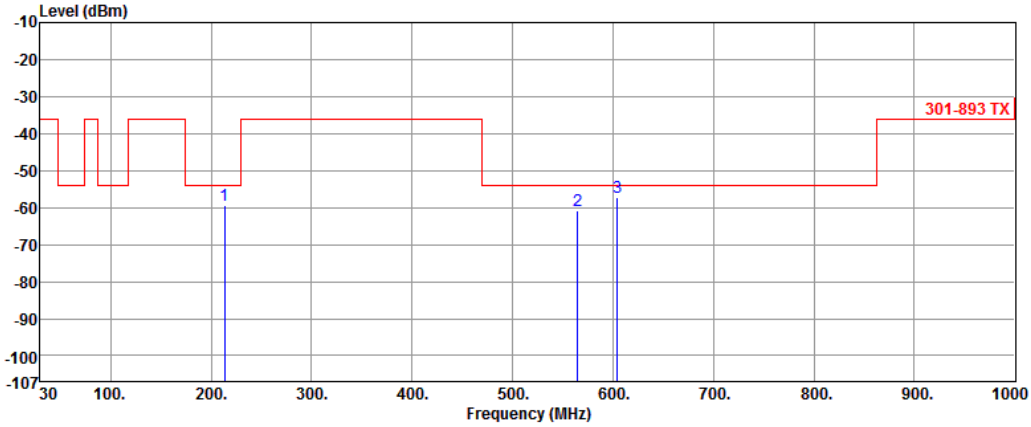
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	604.24	-55.58	-54.00	-1.58	6.31	-61.89
2	643.04	-56.71	-54.00	-2.71	6.21	-62.92
3	682.81	-59.12	-54.00	-5.12	6.49	-65.61

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

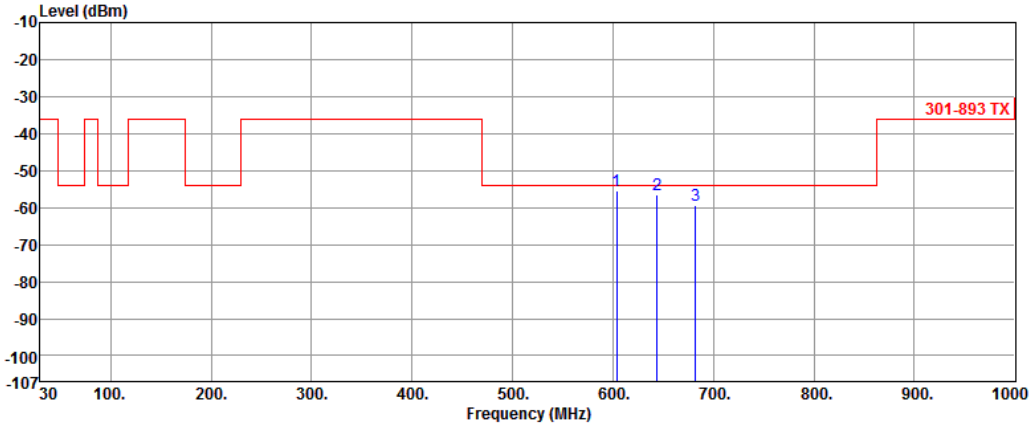
Modulation	11a	Test Freq. (MHz)	5700
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	213.45	-59.52	-54.00	-5.52	-4.84	-54.68
2	564.48	-60.79	-54.00	-6.79	4.59	-65.38
3	604.54	-57.25	-54.00	-3.25	6.34	-63.59

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	11a	Test Freq. (MHz)	5700
Polarization	Vertical		

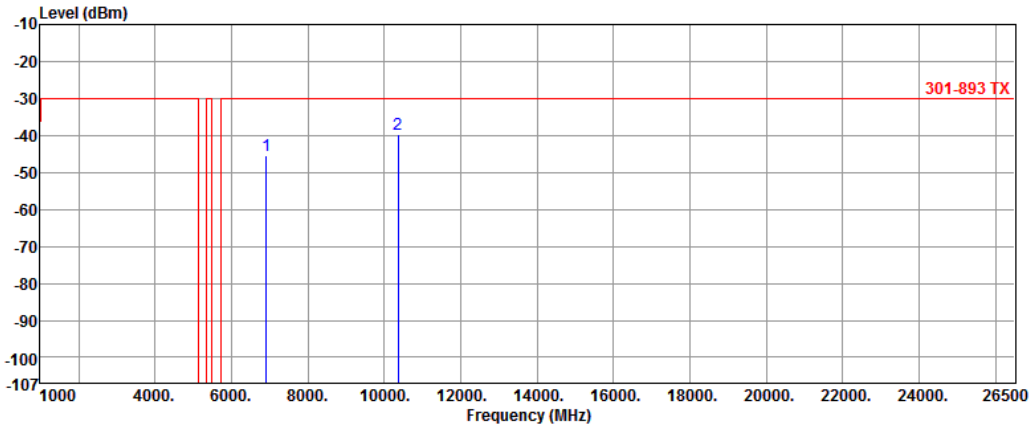


	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	603.45	-55.59	-54.00	-1.59	6.25	-61.84
2	643.84	-56.43	-54.00	-2.43	6.20	-62.63
3	682.48	-59.44	-54.00	-5.44	6.49	-65.93

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

3.4.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

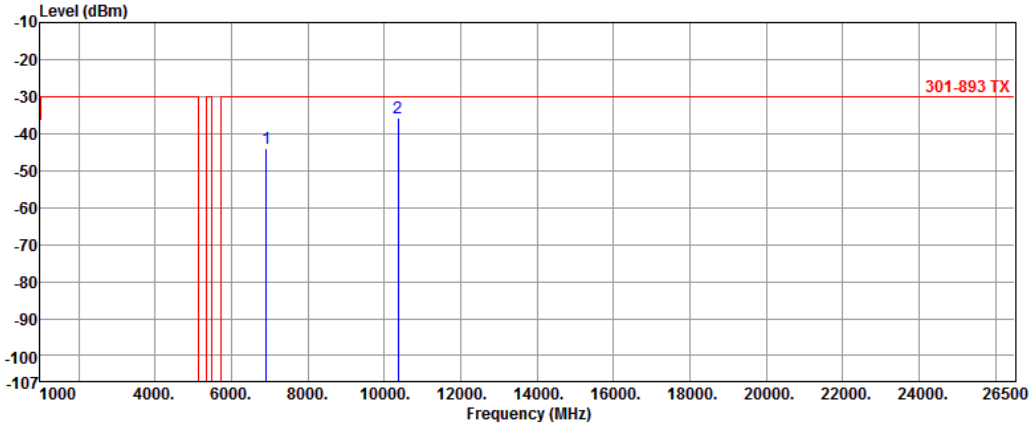
Modulation	11a	**Test Freq. (MHz)**	5180
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	6906.75	-45.29	-30.00	-15.29	13.45	-58.74
2	10352.95	-39.83	-30.00	-9.83	19.08	-58.91

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

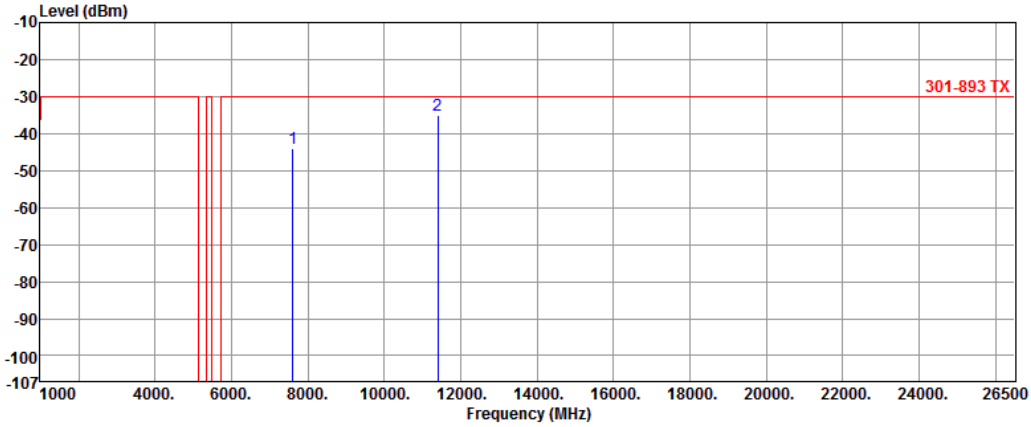
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	6906.54	-44.18	-30.00	-14.18	13.11	-57.29
2	10360.85	-35.62	-30.00	-5.62	19.72	-55.34

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

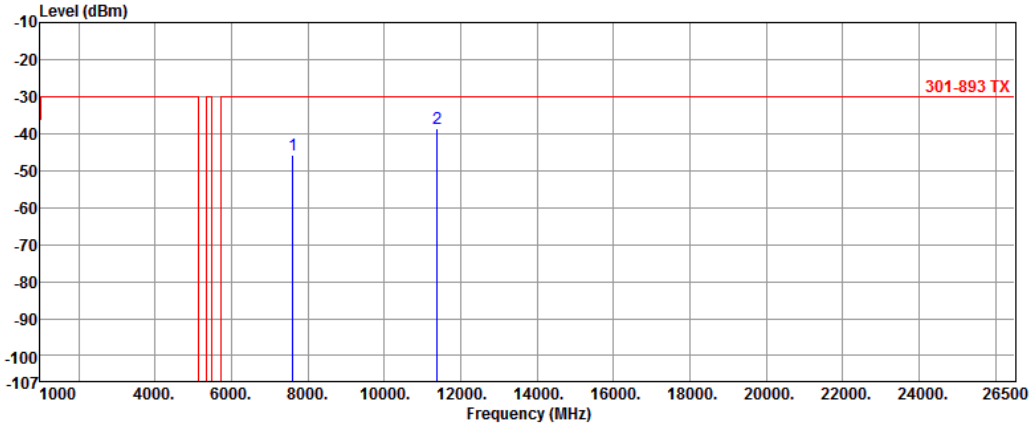
Modulation	11a	Test Freq. (MHz)	5700
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	7600.45	-44.02	-30.00	-14.02	14.73	-58.75
2	11402.85	-35.13	-30.00	-5.13	20.11	-55.24

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	11a	Test Freq. (MHz)	5700
Polarization	Vertical		

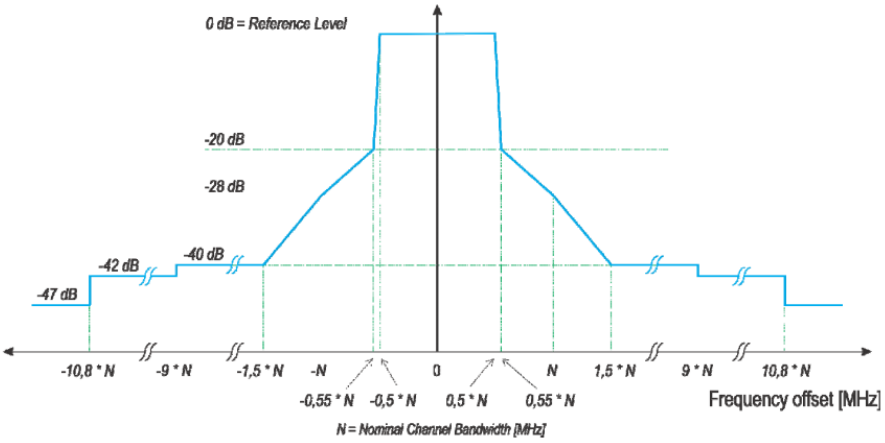


	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	7601.15	-45.64	-30.00	-15.64	14.52	-60.16
2	11375.45	-38.69	-30.00	-8.69	19.85	-58.54

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

3.5 Transmitter Unwanted Emissions within the 5 GHz RLAN Band

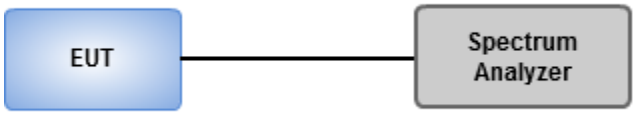
3.5.1 Limit of Transmitter Unwanted Emissions within the 5 GHz RLAN Band



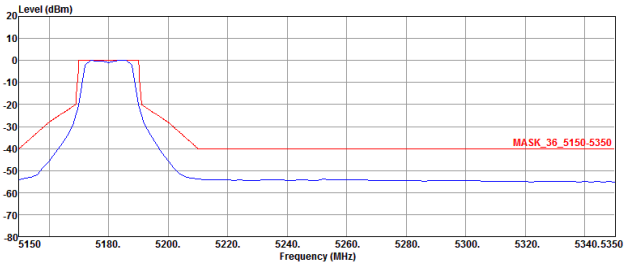
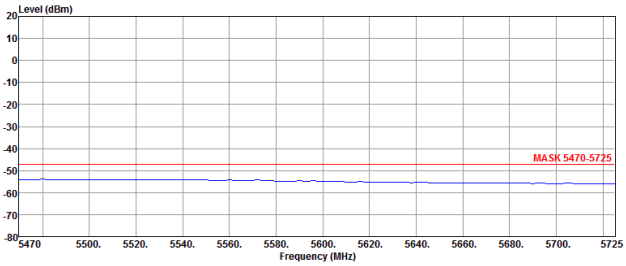
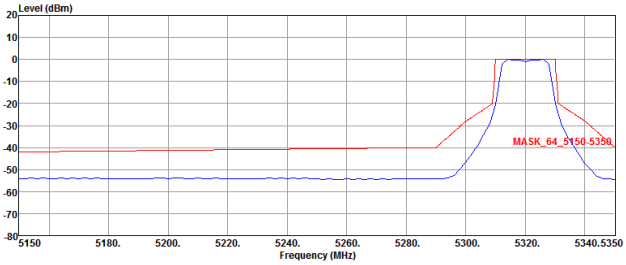
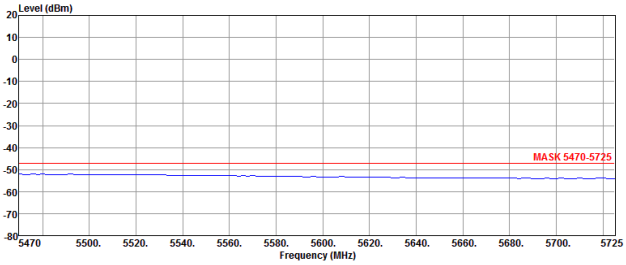
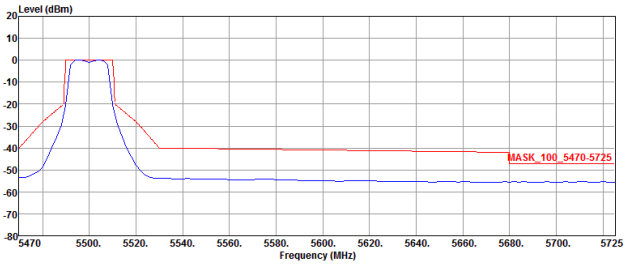
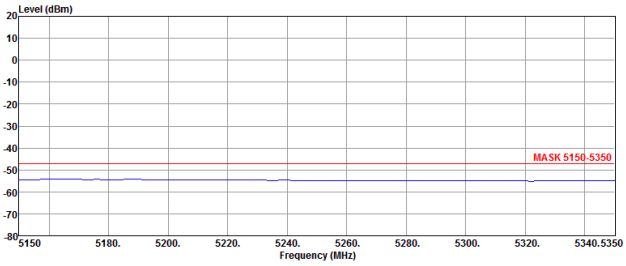
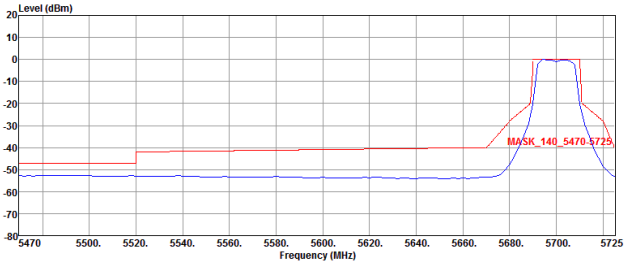
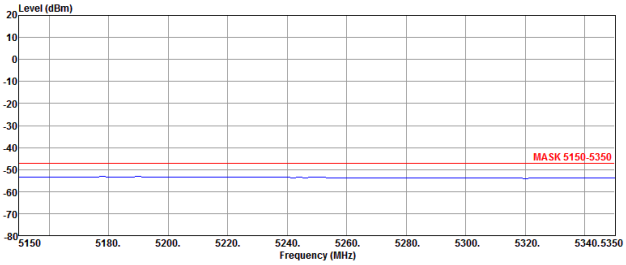
3.5.2 Test Procedures

Reference to clause 5.3.6.2 of ETSI EN 301 893 V1.8.1 (2015-03).

3.5.3 Test Setup



3.5.4 Test Result of Transmitter Unwanted Emissions within the 5 GHz RLAN Band for 802.11a

5180MHz	5180MHz
	
5320MHz	**5320MHz**
	
5500MHz	**5500MHz**
	
5700MHz	**5700MHz**
	

4 Receiver Test Results

4.1 Receiver Spurious Emissions

4.1.1 Limit of Receiver Spurious Emissions

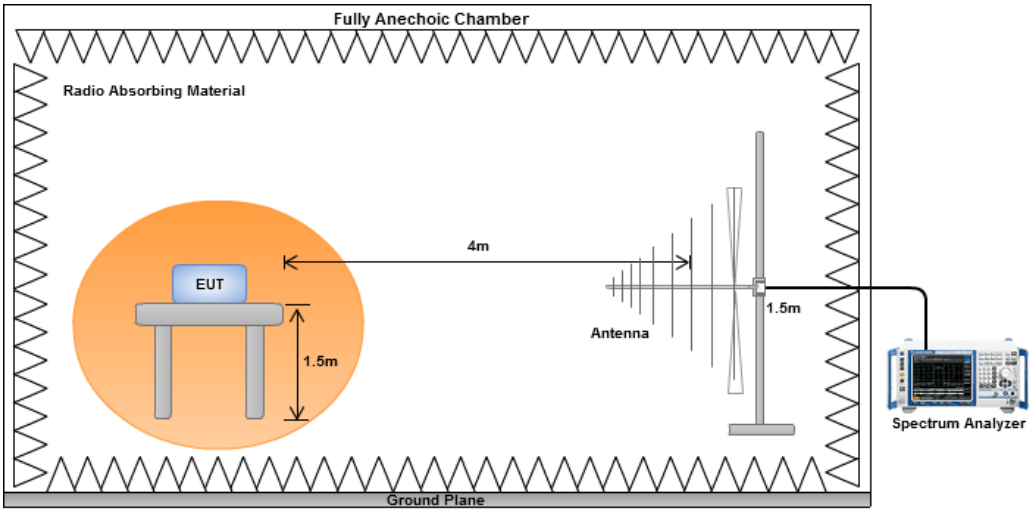
Frequency Range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100kHz
1 GHz to 26 GHz	-47 dBm	1MHz

4.1.2 Test Procedures

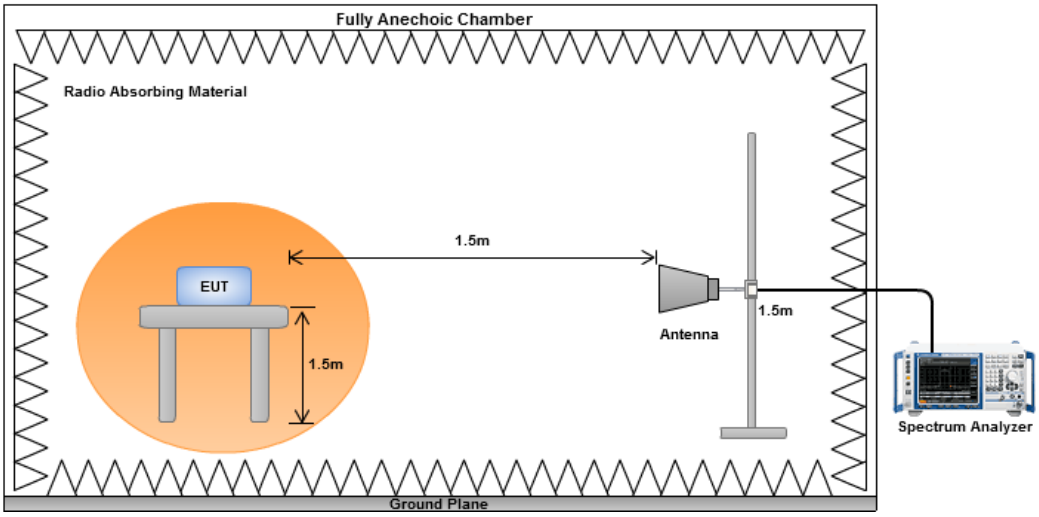
Reference to clause 5.3.7.2 of ETSI EN 301 893 V1.8.1 (2015-03).

4.1.3 Test Setup

Below 1GHz

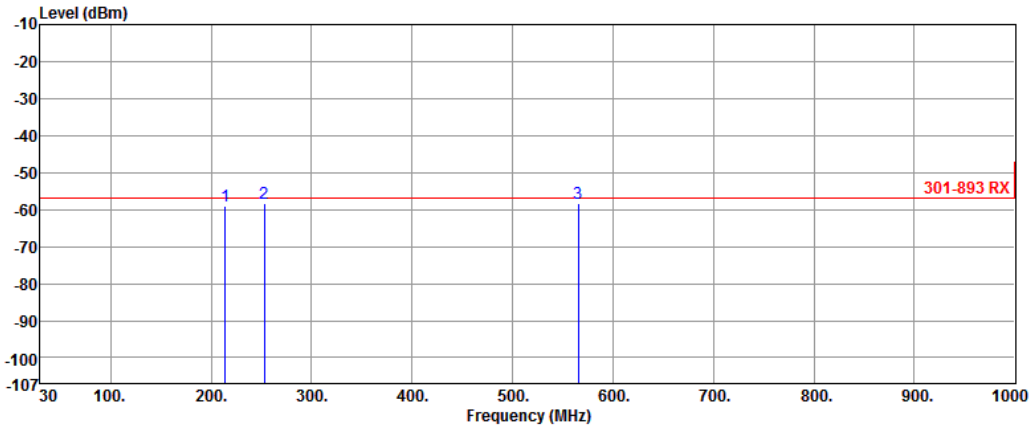


Above 1 GHz



4.1.4 Receiver Spurious Emissions (Below 1GHz)

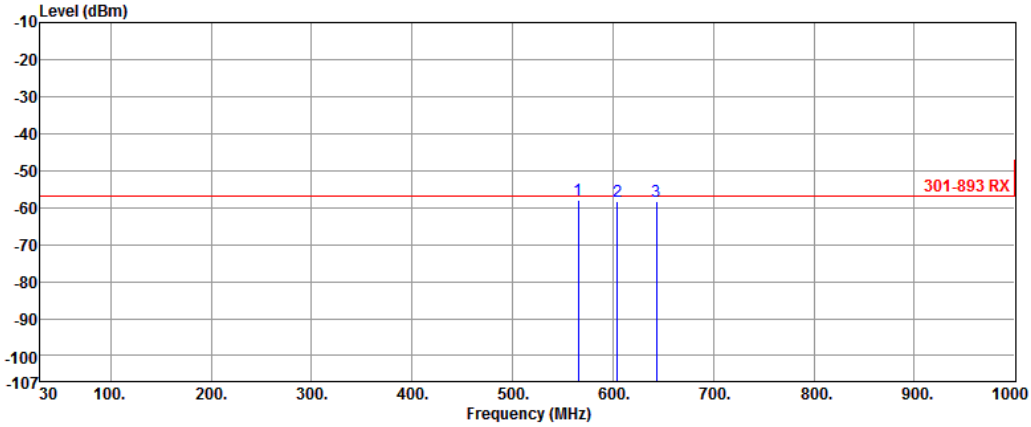
Modulation	11a	**Test Freq. (MHz)**	5180
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	214.30	-58.93	-57.00	-1.93	-4.84	-54.09
2	253.10	-58.45	-57.00	-1.45	-2.07	-56.38
3	565.44	-58.31	-57.00	-1.31	4.63	-62.94

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

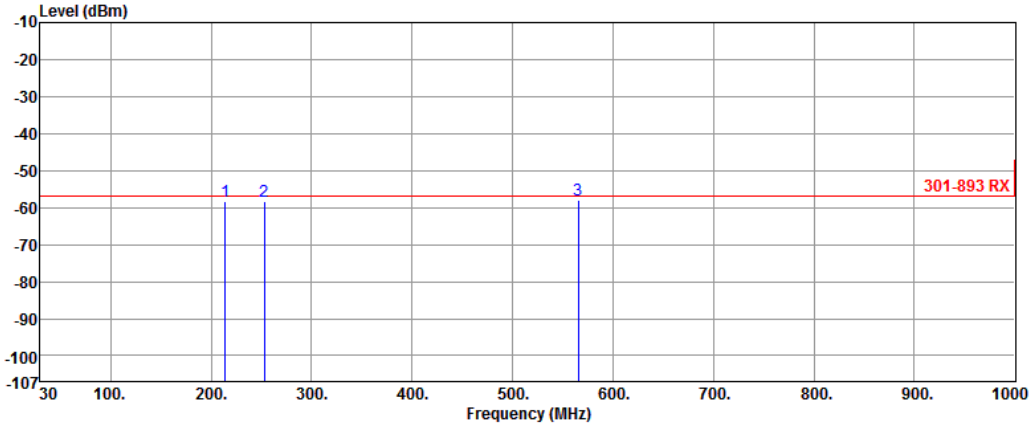
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	565.44	-58.10	-57.00	-1.10	4.54	-62.64
2	604.24	-58.28	-57.00	-1.28	6.31	-64.59
3	643.04	-58.36	-57.00	-1.36	6.21	-64.57

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

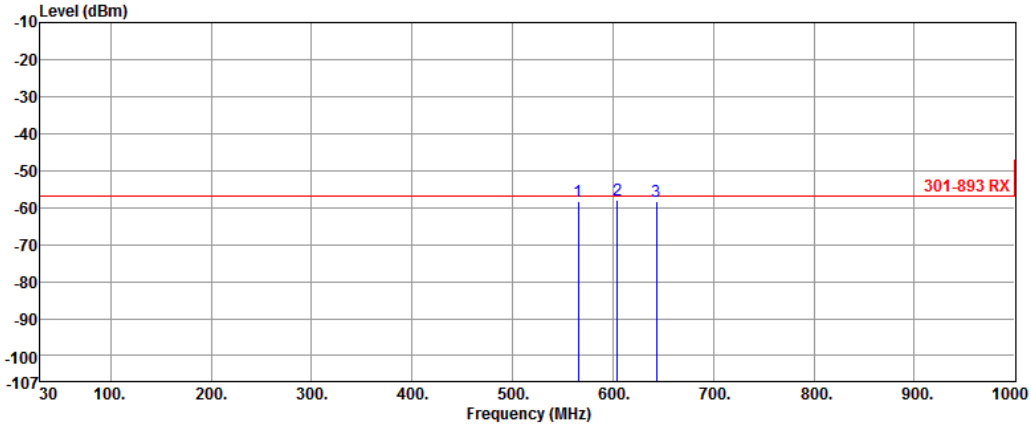
Modulation	11a	Test Freq. (MHz)	5700
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	214.30	-58.34	-57.00	-1.34	-4.84	-53.50
2	253.10	-58.24	-57.00	-1.24	-2.07	-56.17
3	565.44	-58.05	-57.00	-1.05	4.63	-62.68

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	11a	Test Freq. (MHz)	5700
Polarization	Vertical		

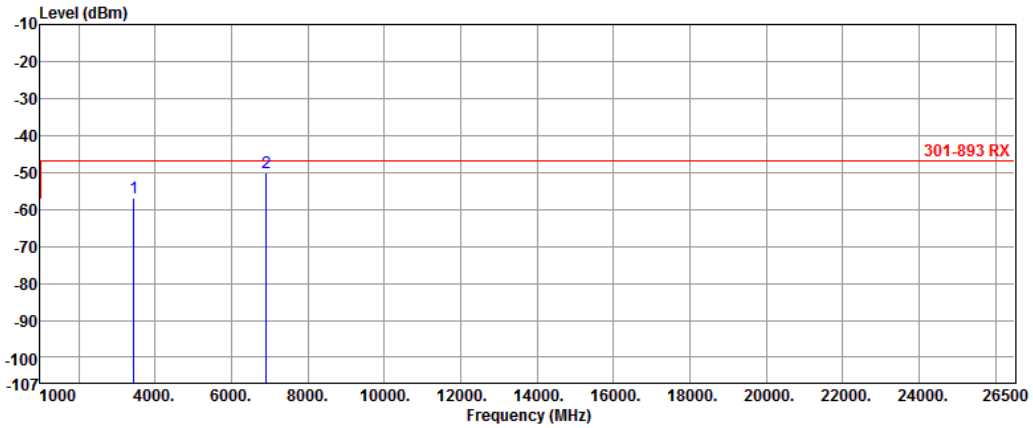


	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	565.44	-58.44	-57.00	-1.44	4.54	-62.98
2	604.24	-58.14	-57.00	-1.14	6.31	-64.45
3	643.04	-58.30	-57.00	-1.30	6.21	-64.51

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

4.1.5 Receiver Spurious Emissions (Above 1GHz)

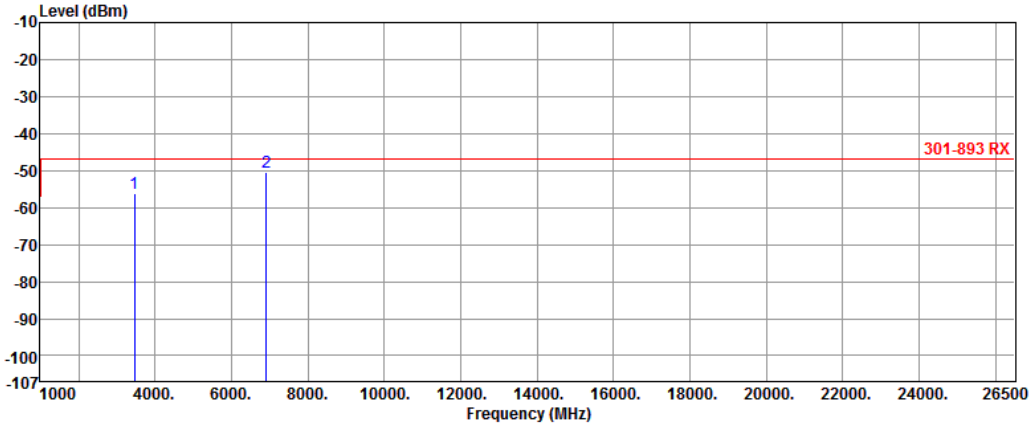
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	3451.31	-56.97	-47.00	-9.97	4.28	-61.25
2	6907.80	-50.26	-47.00	-3.26	13.46	-63.72

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

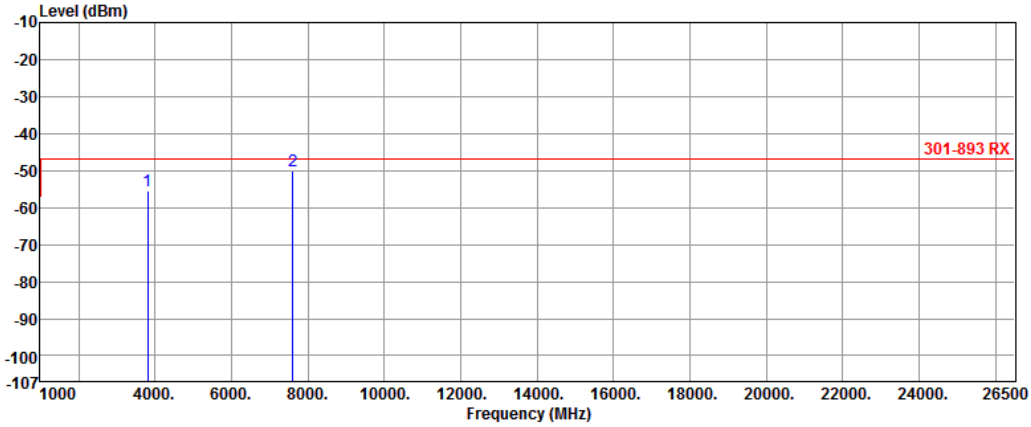
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	3453.39	-56.14	-47.00	-9.14	4.05	-60.19
2	6906.62	-50.39	-47.00	-3.39	13.11	-63.50

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

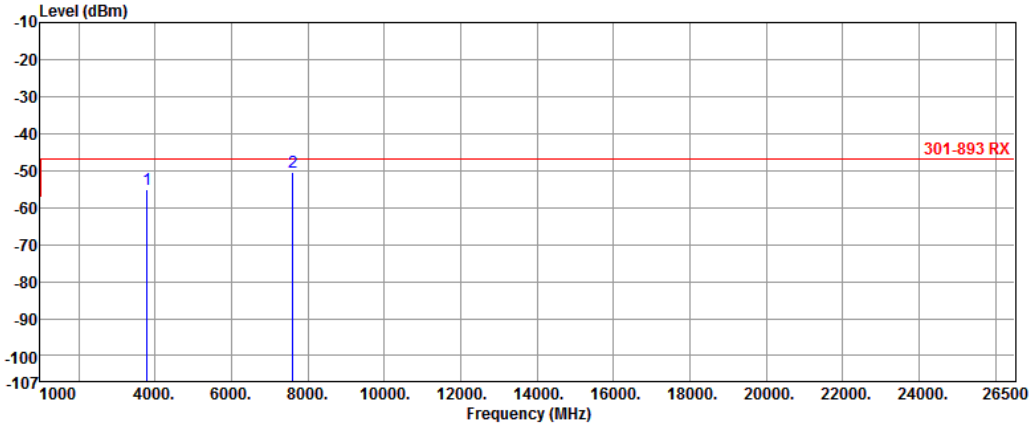
Modulation	11a	Test Freq. (MHz)	5700
Polarization	Horizontal		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	3800.41	-55.61	-47.00	-8.61	6.24	-61.85
2	7599.74	-50.10	-47.00	-3.10	14.73	-64.83

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	11a	Test Freq. (MHz)	5700
Polarization	Vertical		



	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	3799.86	-55.20	-47.00	-8.20	6.11	-61.31
2	7600.20	-50.46	-47.00	-3.46	14.52	-64.98

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

5 Adaptivity Test Results

5.1 Adaptivity

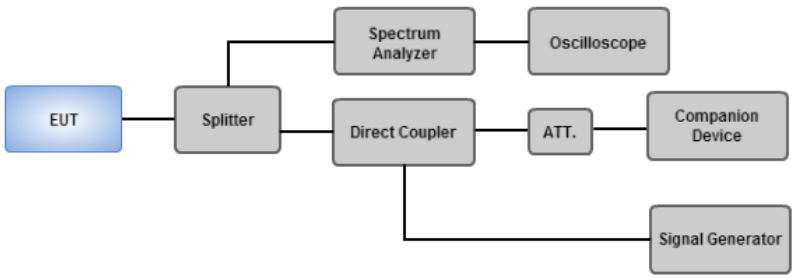
5.1.1 Adaptivity Limit

Adaptivity Limit
☐ LBT based Detect and Avoid (Frame Based Equipment): ◆ Clear Channel Assessment (CCA) time shall be not less than 20 us; ◆ Channel Occupancy Time (COT) shall be in the range 1 ms ~ 10 ms ◆ Minimum Idle Period shall be at least 5 % of Channel Occupancy Time
☒ Load based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using "energy detect", as described in IEEE 802.11™-2012 [8], clause 9, clause 10, clause 18 and clause 20 or as described in IEEE 802.11ac™-2013 [9], clause 8, clause 9, clause 10 and clause 22
☐ LBT based Detect and Avoid (Load Based Equipment): ☐ Option A ◆ Clear Channel Assessment (CCA) time shall be not less than 20 us ◆ Extended CCA(q * observed slots) observed slot: 18us (ECCA time slot)or Busy slot q=16~1024 / N=1~q ◆ Channel Occupancy Time (COT) shall be less than 10 ms ◆ Idle Period is equal to CCA or ECCA ☐ Option B ◆ Clear Channel Assessment (CCA) time shall be not less than 20 us ◆ Extended CCA: N*CCA N:1~q randomly / q=4~32 (q is selected by the manufacturer) ◆ Channel Occupancy Time (COT) (13/32*q)ms ◆ Idle Period is equal to CCA~CCA*N
☒ 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 Test Procedures

Reference to clause 5.3.9.2 of ETSI EN 301 893 V1.8.1 (2015-03).

5.1.3 Test Setup

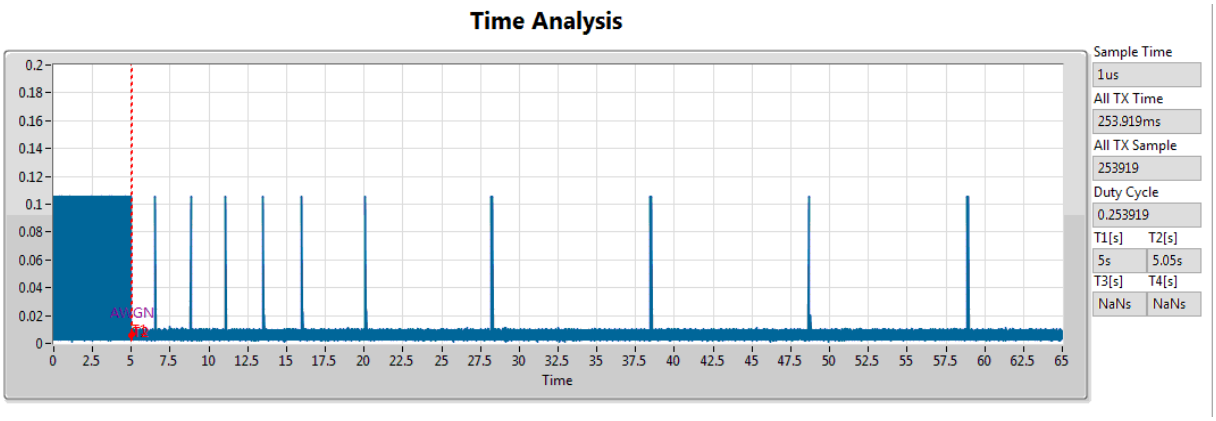


5.1.4 Test Result of Adaptivity and Short Control Signalling Transmissions

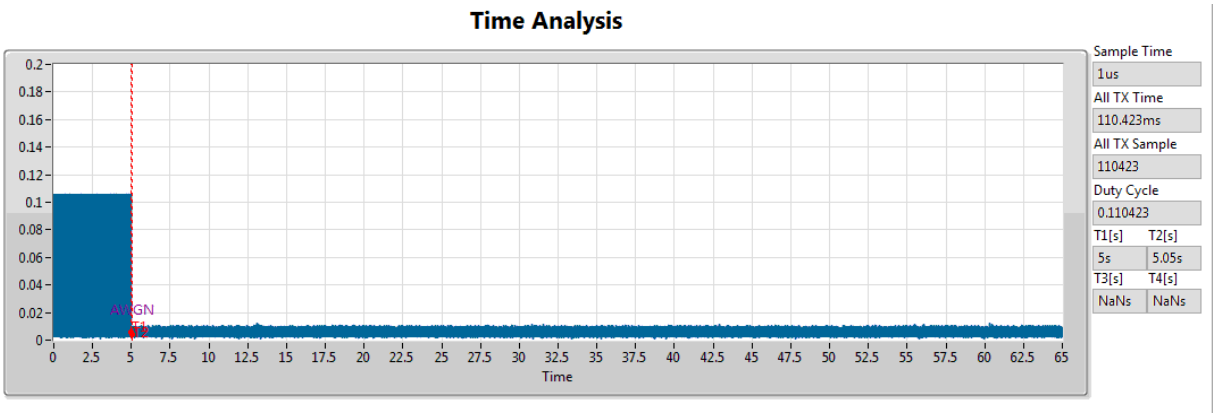
Adaptivity Result					
Adaptivity Detection Threshold Level (dBm)		-63.65			
Modulation Mode	**Freq. (MHz)**	**Short Control Signalling Transmissions (ms)**	**Channel Occupancy Time (ms)**	**Idle Period Time (us)**	**Adaptivity**
802.11a	5180	0.345	0.367	41	Pass
802.11a	5500	0.541	0.254	29	Pass
Limit		< 2.5 ms	-	> 20us	N/A

Adaptivity Result Plots

802.11a - 5180MHz

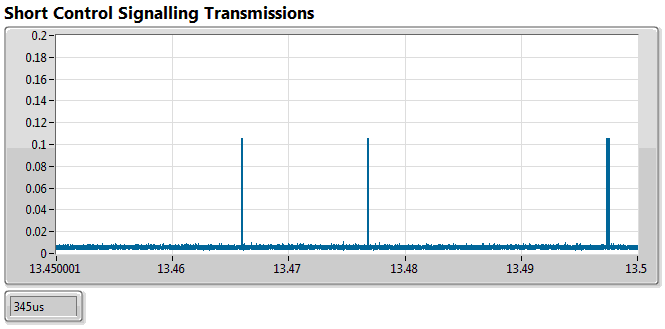


802.11a - 5500MHz

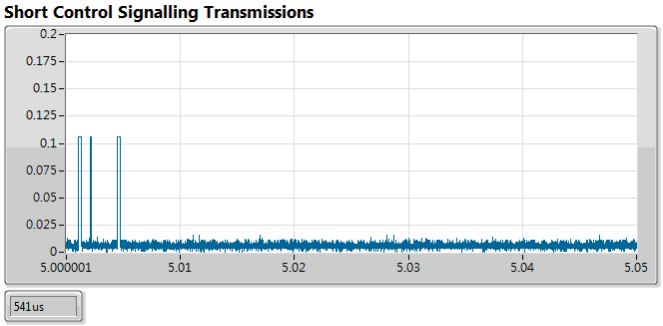


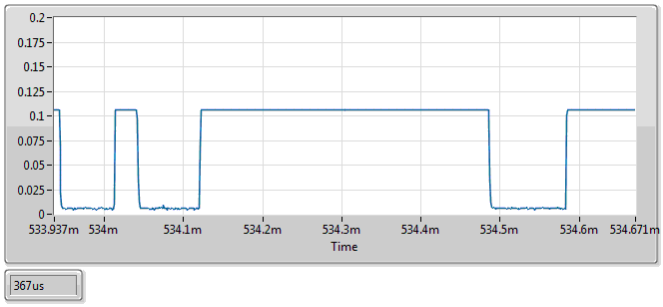
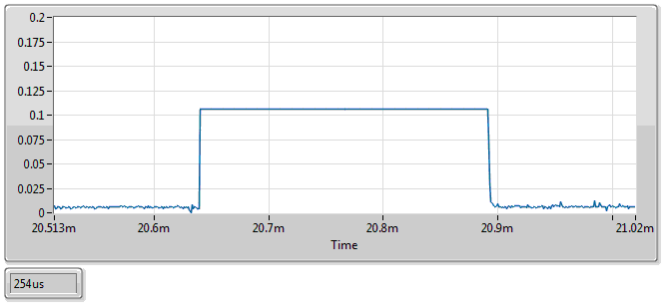
Short Control Signalling Transmissions Plots

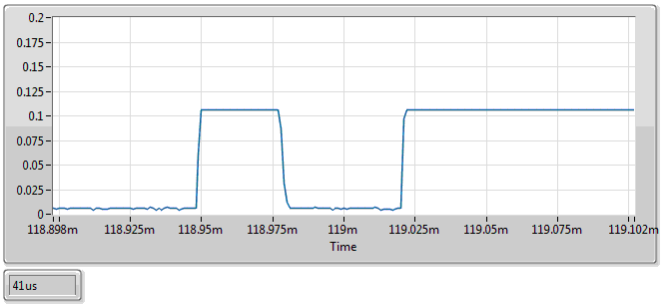
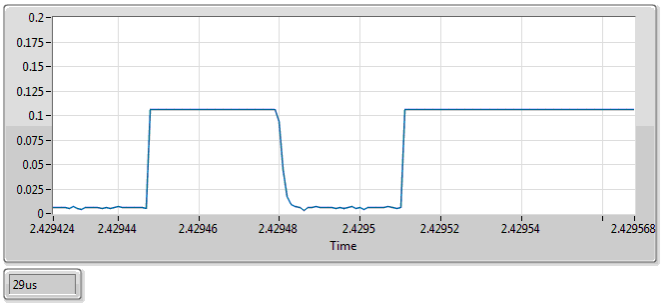
802.11a - 5180MHz



802.11a - 5500MHz

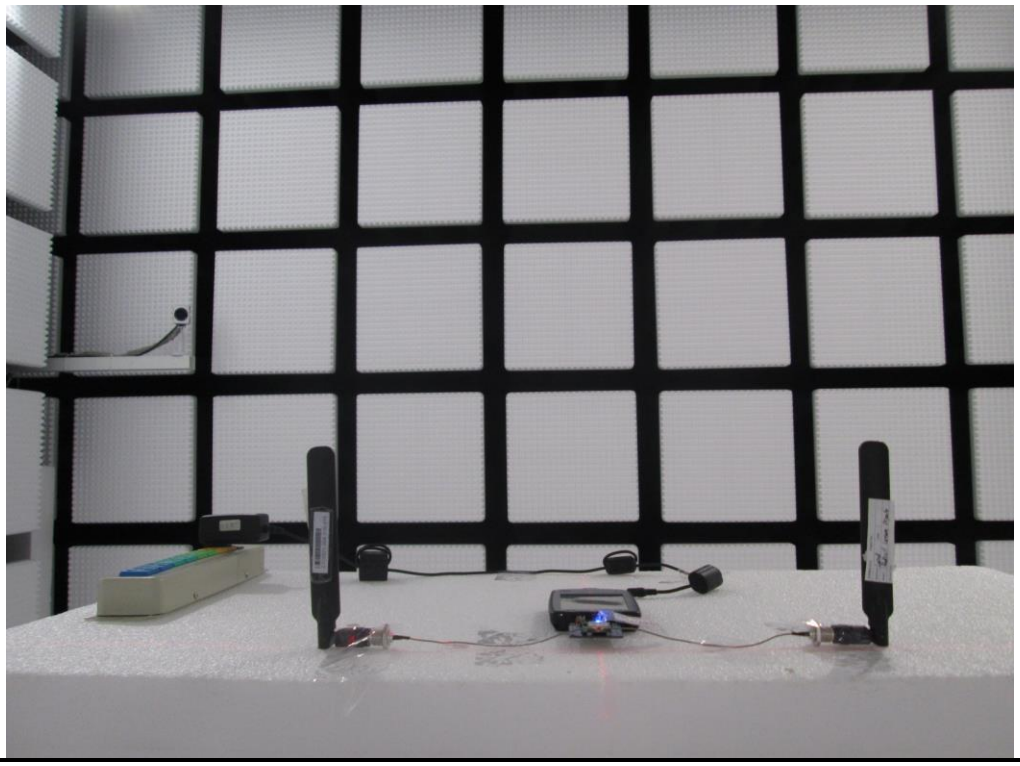


Channel Occupancy Time
802.11a - 5180MHz
Max On Time 
802.11a - 5550MHz
Max On Time 

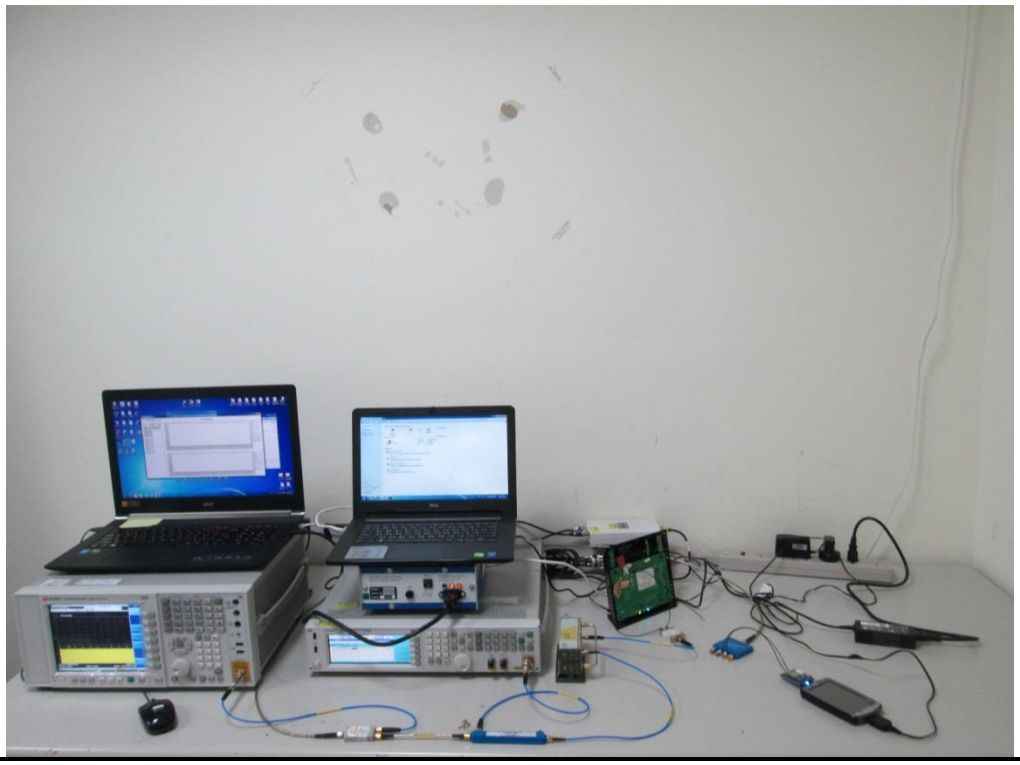
Idle Period Time
802.11a - 5180MHz
Min Off Time 
802.11a - 5550MHz
Min Off Time 

6 Photographs of the Test Configuration

Spurious Emission Test



Adaptivity, Receiver Blocking and Short Control Signalling Transmissions Test



7 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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