

TEST REPORT

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Report Number : SZ1230414-19311E-RF-22F

Test Standard (s)

ETSI EN 301 893 V2.1.1 (2017-05)

Sample Description

Product Type: Smartphone
Model No.: KINGKONG STAR
Multiple Model(s) No.: N/A
Trade Mark: CUBOT
Date Received: 2023/04/14
Report Date: 2023/05/24

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Approved By:

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Note: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk "*". Customer model name, addresses, names, trademarks etc. are not considered data.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ1230414-19311E-RF-22F	Original Report	2023-05-24

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	5150-5250MHz
Mode	802.11a/n20/n40/ac20/ac40
Maximum EIRP	15.28dBm
Modulation Technique	OFDM
Antenna Specification*	1.04 dBi(It is provided by the manufacturer)
Voltage Range	DC3.87V from rechargeable Li-ion battery or DC 5/9/12V from adapter
Sample serial number	2408-1 (RF Conducted Test) 2408-2 (RF Radiated Test) (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Normal/Extreme Condition	N.V.: Nominal Voltage: 3.87V _{DC} L.T.: Low Temperature -10°C N.T.: Normal Temperature +25°C H.T.: High Temperature +55°C Note: the extreme test condition was declared by manufacturer.
Adapter Information	Model:HJ-PD33W-EU Input: AC100-240V~50/60Hz 0.8A Output: DC 5.0V.3.0A 15.0W OR DC9.0V. 3.0A 27.0W OR DC 12.0V.2.75A 33.0W MAX

Objective

This test report is in accordance with ETSI EN 301 893 V2.1.1 (2017-05), 5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine the compliance of EUT with ETSI EN 301 893 V2.1.1 (2017-05).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 893 V2.1.1 (2017-05).

Item	Frequency Range		Expanded Measurement uncertainty
Emissions, Radiated	30MHz~200MHz	Horizontal	4.46dB(k=2, 95% level of confidence)
	30MHz~200MHz	Vertical	4.53dB(k=2, 95% level of confidence)
	200MHz~1000MHz	Horizontal	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz	Vertical	4.76dB(k=2, 95% level of confidence)
	1GHz~6GHz	/	5.02dB(k=2, 95% level of confidence)
	6GHz~18GHz	/	5.11dB(k=2, 95% level of confidence)
	18GHz~40GHz	/	5.50dB(k=2, 95% level of confidence)
Occupied Channel Bandwidth	/		±5%
Radio frequency	/		213.55Hz(k=2, 95% level of confidence)
RF output power, Conducted	/		0.74dB(k=2, 95% level of confidence)
Power Spectral Density, conducted	/		± 3dB
Unwanted Emission, conducted	/		1.75dB(k=2, 95% level of confidence)
Temperature	/		±2℃
Time	/		2.53dB(k=2, 95% level of confidence)

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West), 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

Each test item follows test standards and with no deviation

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system supports 802.11a/n-ht20/n-ht40/ac vht20/ac vht40, the n-ht20/n-ht40 were reduced since the identical parameters with ac vht20/ac vht40.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PSD across all data rates bandwidths, and modulations.

For 802.11a/ac20 mode: channel 36 was tested;

For 802.11ac40 mode: channel 38 was tested;

EUT Exercise Software

Test in the engineering mode. The power level was provided by the manufacturer.

The worst case as below:

Mode	Data rate	Power Level
		Test Channel
802.11a	1Mbps	Default
802.11ac-VHT20	MCS0	Default
802.11ac-VHT40	MCS0	Default

Equipment Modifications

No modifications were made to the EUT.

Special Accessories

No special accessory.

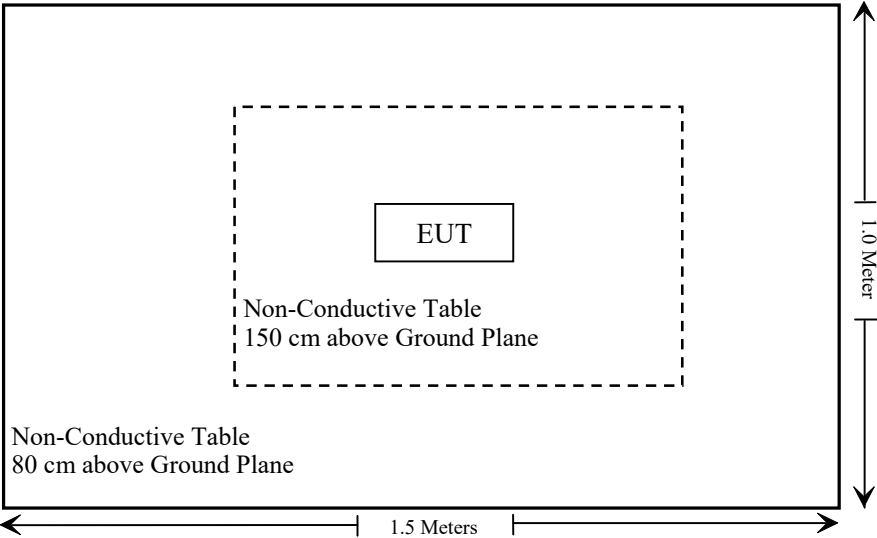
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

ETSI EN 301 893 V2.1.1 (2017-05)	Description of Test	Test Result
§ 4.2.1	Centre Frequencies	Compliant
§ 4.2.2	Nominal Channel Bandwidth and Occupied Channel Bandwidth	Compliant
§ 4.2.3	RF output power	Compliant
§ 4.2.3	Transmit Power Control (TPC)	Not Applicable
§ 4.2.3	Power Density	Compliant
§ 4.2.4.1	Transmitter unwanted emissions outside the 5 GHz RLAN bands	Compliant
§ 4.2.4.2	Transmitter unwanted emissions within the 5 GHz RLAN bands	Compliant
§ 4.2.5	Receiver spurious emissions	Compliant
§ 4.2.6	Dynamic Frequency Selection (DFS)	Not Applicable
§ 4.2.7	Adaptivity (Channel Access Mechanism)	Compliant
§ 4.2.8	Receiver Blocking	Compliant
§ 4.2.9	User Access Restrictions	Compliant*
§ 4.2.10	Geo-location capability	Not Applicable*

Note: Compliant*: Please refer to the product information declared by the manufacturer.

Not Applicable: The EUT only support 5150-5250MHz band.

Not Applicable*: The manufacturer declared that the equipment has no this function.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2022/07/28	2023/07/27
Sonoma instrument	Pre-amplifier	310 N	186238	2022/11/11	2023/11/10
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2020/12/22	2023/12/21
Unknown	Cable	Chamber Cable 1	F-03-EM236	2022/11/11	2023/11/10
Unknown	Cable	Chamber Cable 4	EC-007	2022/11/11	2023/11/10
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2022/07/04	2023/07/03
COM-POWER	Pre-amplifier	PA-122	181919	2022/11/25	2023/11/24
Sunol Sciences	Horn Antenna	3115	9107-3694	2021/01/15	2024/01/14
A.H.System	Horn Antenna	SAS-200/571	135	2021/07/14	2024/07/13
Insulated Wire Inc.	RF Cable	SPS-2503-3150	02222010	2022/11/25	2023/11/24
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2022/11/25	2023/11/24
Agilent	Signal Generator	N5183A	MY51040755	2023/02/08	2024/02/07
SNSD	5G Band Reject filter	BSF5150- 5850MN-0899- 004	5G filter	2023/04/18	2024/04/17
A.H.System	Pre-amplifier	PAM-1840VH	190	2022/08/03	2023/08/02
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2021/10/21	2024/10/20
Electro-Mechanics Co	Horn Antenna	3116	2026	2021/10/21	2024/10/20
RF Conducted Test					
BACL	Temperature & Humidity Chamber	BTH-150-40	30145	2023/02/08	2024/02/07
Tonscend	RF control Unit	JS0806-2	19D8060154	2022/09/15	2023/09/14
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2023/02/08	2024/02/07
Agilent	MXG Vector Signal Generator	N5182B	MY53051503	2022/07/04	2023/07/03
Agilent	Signal Generator	N5183A	MY51040755	2023/02/08	2024/02/07
R&S	Wideband Radio Communication Tester	CMW500	141718	2022/10/12	2023/10/11
Weinschel	Power divider	1515	MY628	2022/11/25	2023/11/24
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2023/2/10	2024/2/9

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

ETSI EN 301 893 V2.1.1 (2017-05) § 4.2.1- CENTRE FREQUENCIES

Definition

The centre frequency is the centre of the channel declared by the manufacturer as part of the declared channel plan(s).

Limits

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

Test Procedure**Test conditions**

These measurements shall be performed under both normal and extreme test conditions (see clause 5.1).

The channels on which the conformance requirements in clause 4.2.1 shall be verified are defined in clause 5.3.2.

The UUT shall be configured to operate at a normal RF Output Power level. In addition, the UUT shall be configured to operate on a single channel.

For a UUT with antenna connector(s) and using dedicated external antenna(s), or for a UUT with integral antenna(s) but with a temporary antenna connector(s) provided, conducted measurements shall be used.

In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) the measurements shall be performed on only one of the active transmit chains.

For a UUT with integral antenna(s) and without a temporary antenna connector(s), radiated measurements shall be used.

Test method**Conducted measurement****1. Equipment operating without modulation**

This test method requires that the UUT can be operated in an unmodulated test mode.

The UUT shall be connected to a suitable frequency measuring device (e.g. a frequency counter or a spectrum analyser) and operated in an unmodulated mode. The result shall be recorded.

2. Equipment operating with modulation

This method is an alternative to the above method in case the UUT cannot be operated in an un-modulated mode.

The UUT shall be connected to spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the UUT.

The peak value of the power envelope shall be measured and noted. The span shall be reduced and the marker moved in a positive frequency increment until the upper, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f1.

The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f2.

The centre frequency is calculated as $(f1 + f2) / 2$.

Radiated measurement

The test set up as described in annex B shall be used with a spectrum analyser of sufficient accuracy attached to the test antenna.

The test procedure is as described under clause 5.4.2.2.1.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Lee on 2023-04-27.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

ETSI EN 301 893 V2.1.1 (2017-05) § 4.2.2- NOMINAL CHANNEL BANDWIDTH AND OCCUPIED CHANNEL BANDWIDTH

Definition

The Nominal Channel Bandwidth is the widest band of frequencies, inclusive of guard bands, assigned to a single channel.

The Occupied Channel Bandwidth is the bandwidth containing 99 % of the power of the signal.

A device is permitted to operate in one or more adjacent or non-adjacent channels simultaneously.

When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

Limits

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.

During an established communication, the device is allowed to operate temporarily with an Occupied Channel Bandwidth below 80 % of its Nominal Channel Bandwidth with a minimum of 4 MHz.

Test Procedure

Test conditions

The conformance requirements in clause 4.2.2 shall be verified only under normal operating conditions, and on those channels and channel bandwidths defined in clause 5.3.2.

The measurements shall be performed using normal operation of the equipment with the test signal applied (see clause 5.3.1.1).

The UUT shall be configured to operate at a typical RF power output level used for normal operation.

When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

For a UUT with antenna connector(s) and using dedicated external antenna(s), or for a UUT with integral antenna(s) but with a temporary antenna connector(s) provided, conducted measurements shall be used. In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs).

For a UUT with integral antenna(s) and without a temporary antenna connector(s), radiated measurements shall be used.

Test method

Conducted measurement

The measurement procedure shall be as follows:

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:
 - Centre Frequency: The centre frequency of the channel under test
 - Resolution Bandwidth: 100 kHz
 - Video Bandwidth: 300 kHz
 - Frequency Span: $2 \times$ Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel)
 - Sweep time: > 1 s; for larger Nominal Bandwidths, the sweep time may be increased until a value where the sweep time has no impact on the RMS value of the signal
 - Detector Mode: RMS
 - Trace Mode: Max Hold

Step 2:

- Wait for the trace to stabilize.

Step 3:

- Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
- Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

The measurement described in step 1 to step 3 above shall be repeated in case of simultaneous transmissions in non-adjacent channels.

Radiated measurement

The test set up as described in annex B and the applicable measurement procedures described in annex C shall be used.

The test procedure is as described under clause 5.4.3.2.1.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Lee on 2023-04-27.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

ETSI EN 301 893 V2.1.1 (2017-05) § 4.2.3 - RF OUTPUT POWER, TRANSMIT POWER CONTROL (WITHOUT TPC) AND POWER DENSITY

Definition

RF Output Power:

The RF Output Power is the mean equivalent isotropically radiated power (e.i.r.p.) during a transmission burst.

Transmit Power Control (TPC):

Transmit Power Control (TPC) is a mechanism to be used by the RLAN device to ensure a mitigation factor of at least 3 dB on the aggregate power from a large number of devices. This requires the RLAN device to have a TPC range from which the lowest value is at least 6 dB below the values for mean e.i.r.p. given in table 2 for devices with TPC.

Power Density:

The Power Density is the mean equivalent isotropically radiated power (e.i.r.p.) density during a transmission burst.

Limits

General

The limits below are applicable to the system as a whole and in any possible configuration. This includes smart antenna systems (devices with multiple transmit chains).

In case of multiple (adjacent or non-adjacent) channels within the same sub-band, the total RF output power of all channels in that sub-band shall not exceed the limits defined below.

In case of multiple, non-adjacent channels operating in separate sub-bands, the total RF output power in each of the sub-bands shall not exceed the limits defined below.

RF output power and power density at the highest power level

TPC is not required for channels whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz.

For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in table 2.

Devices are allowed to operate without TPC. See table 2 for the applicable limits in this case.

Table 2: Mean 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
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	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 5 150 MHz to 5 250 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 5 150 MHz to 5 250 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 5 250 MHz to 5 350 MHz.				

RF output power at the lowest power level of the TPC range

For devices using TPC, the RF output power during a transmission burst when configured to operate at the lowest stated power level of the TPC range shall not exceed the levels given in table 3. For devices without TPC, the limits in table 3 do not apply.

Table 3: Mean e.i.r.p. limits for RF output power at the lowest power level of the TPC range

Frequency range	Mean e.i.r.p. [dBm]
5 250 MHz to 5 350 MHz	17
5 470 MHz to 5 725 MHz	24 (see note)
NOTE: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.	

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.4

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Lee on 2023-04-27.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

ETSI EN 301 893 V2.1.1 (2017-05) 4.2.4.1 - TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5 GHz RLAN BANDS

Definition

Transmitter unwanted emissions outside the 5 GHz RLAN bands are radio frequency emissions outside the 5 GHz RLAN bands defined in clause 3.1.

Limits

The level of transmitter unwanted emissions outside the 5 GHz RLAN bands shall not exceed the limits given in table 4.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

Table 4: Transmitter unwanted emission limits 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

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.5

Test Data

Environmental Conditions

Temperature:	24.5~25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by York Yang on 2023-04-26 for below 1GHz and Zenos Qiao on 2023-04-28 for above 1GHz.

EUT operation mode: Transmitting

Test Result: Compliant.

Please refer to following table.

Radiated Spurious Emission: worst case as below

Frequency	Receiver	TurnTable	Rx Antenna		Substituted			Absolute Level (dBm)	EN 301 893	
(MHz)	Reading (dBμV)	Angle Degree	Height (m)	Polar (H/V)	Substituted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
802.11a, 5180 MHz										
953.3	32.16	165	1.8	H	-64.3	1.36	0.0	-65.66	-36	29.66
953.3	32.01	180	1.0	V	-62.0	1.36	0.0	-63.36	-36	27.36
10360.00	44.15	328	1.2	H	-52.2	2.60	10.50	-44.30	-30	14.30
10360.00	43.89	75	1.0	V	-53.0	2.60	10.50	-45.10	-30	15.10

Note:

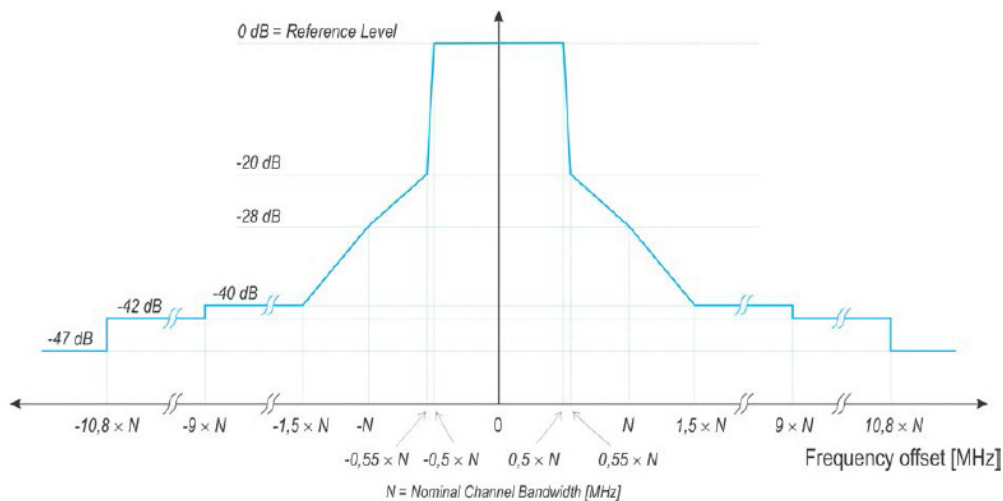
- 1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level
- 3) Below 1G antenna gain unit is dBd, above 1G antenna gain unit is dBi

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.4.2 –TRANSMITTER UNWANTED EMISSIONS WITHIN THE 5 GHZ RLAN BANDS

Definition

Transmitter unwanted emissions within the 5 GHz RLAN bands are radio frequency emissions within the 5 GHz RLAN bands defined in clause 3.1.

Limits



NOTE: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal.

Figure 1: Transmit spectral power mask

The average level of transmitter unwanted emissions within the 5 GHz RLAN bands shall not exceed the limit of the mask provided in figure 1 or the limit for unwanted emissions provided in table 4, whichever is the higher.

The mask is only applicable within the band of operation. Beyond the band edges the requirements of clause 4.2.4.1 apply.

In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

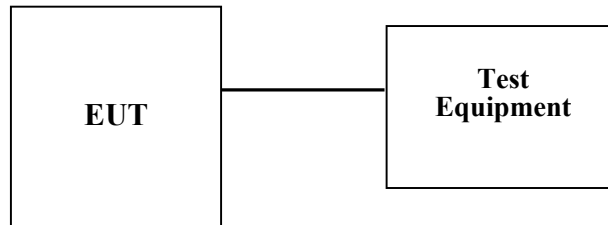
For transmitter unwanted emissions within the 5 GHz RLAN bands, simultaneous transmissions in adjacent channels may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels used simultaneously.

For simultaneous transmissions in multiple non-adjacent channels, the overall transmit spectral power mask is constructed in the following manner. First, a mask as provided in figure 1 is applied to each of the channels. Then, for each frequency point, the highest value from the spectral masks of all the channels assessed shall be taken as the overall spectral mask requirement at that frequency.

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.6.

Test Set up Block diagram



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Lee on 2023-04-27.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

ETSI EN 301 893 V2.1.1 (2017-05) § 4.2.5 – RECEIVER SPURIOUS EMISSIONS

Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

Limits

The spurious emissions of the receiver shall not exceed the limits given in table 5.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

Table 5: Spurious radiated emission limits

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

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.7.

Test Data

Environmental Conditions

Temperature:	24.5~25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by York Yang on 2023-04-26 for below 1GHz and Zenos Qiao on 2023-04-28 for above 1GHz.

Test mode: Receiving

Test Result: Compliant.

Radiated Spurious Emission: *(worst case as below)*

Frequency (MHz)	Receiver Reading (dBμV)	TurnTable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 301 893	
			Height (m)	Polar (H/V)	Substituted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
802.11a mode, 5180 MHz										
957.1	32.96	195	1.1	H	-63.5	1.36	0.0	-64.86	-57	7.86
957.1	31.89	220	2.4	V	-62.2	1.36	0.0	-63.56	-57	6.56
1404.86	41.08	337	1.2	H	-67.2	1.60	7.90	-60.90	-47	13.90
1404.86	41.52	203	1.4	V	-67.0	1.60	7.90	-60.70	-47	13.70

Note:

- 1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level
- 3) Below 1G antenna gain unit is dBd, above 1G antenna gain unit is dBi

ETSI EN 301 893 V2.1.1 (2017-05) § 4.2.7 – ADAPTIVITY (CHANNEL ACCESS MECHANISM)

Definition

Adaptivity is an automatic channel access mechanism by which a device avoids transmissions in a channel in the presence of transmissions from other RLAN devices in that channel.

Adaptivity is not intended to be used as an alternative to DFS to detect radar transmissions, but to detect transmissions from other RLAN devices operating in the band. DFS requirements are covered by clause 4.2.6.

Limit

This requirement applies to all equipment within the scope of the present document.

The present document defines 2 types of Adaptive equipment: Frame Based Equipment and Load Based Equipment.

Whilst the mechanisms described in this clause define conditions under which the equipment may transmit, transmissions are only allowed providing they are not prohibited by any of the DFS requirements in clause 4.2.6.

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.9.

Test Setup Block diagram

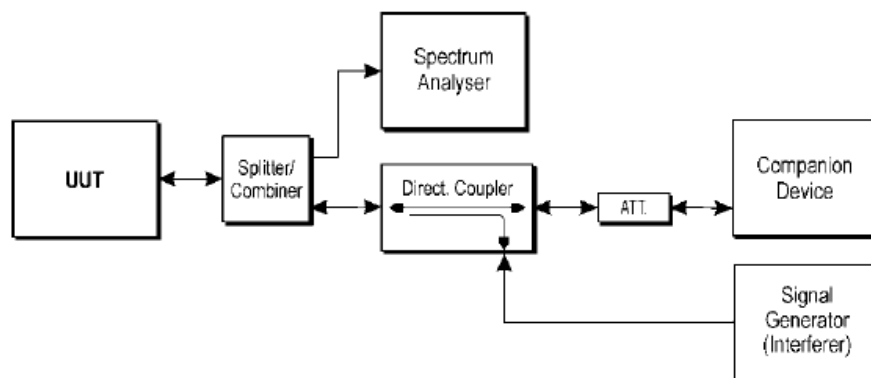


Figure 13: Example Test Set-up for verifying the adaptivity of an equipment

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Lee on 2023-04-27.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

ETSI EN 301 893 V2.1.1 (2017-05) § 4.2.8 –RECEIVER BLOCKING

Definition

Receiver blocking is a measure of the capability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) on frequencies other than those of the operating bands provided in table 1.

Table 1: Service frequency bands

	Service frequency bands
Transmit	5 150 MHz to 5 350 MHz
Receive	5 150 MHz to 5 350 MHz
Transmit	5 470 MHz to 5 725 MHz
Receive	5 470 MHz to 5 725 MHz

Limit

The minimum performance criterion shall be a PER of less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1, item s)).

While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 7.

Table 7: Receiver Blocking parameters

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
P _{min} + 6 dB	5 100	-53	-59	Continuous Wave
P _{min} + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave

NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.

Test Procedure

Conducted measurements

For systems using multiple receive chains only one chain need to be tested. All other receiver inputs shall be terminated.

Figure 14 shows the test set-up which can be used for performing the receiver blocking test. The companion device may require appropriate shielding or may need to be put in a shielded room to prevent it may have a negative impact on the measurement.

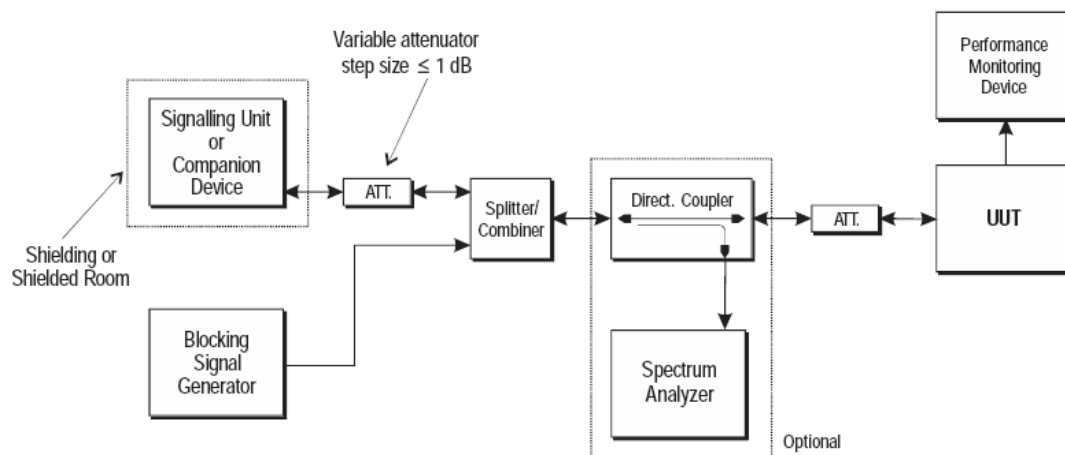


Figure 14: Test Set-up for receiver blocking

The steps below define the procedure to verify the receiver blocking requirement as described in clause 4.2.8.

Step 1:

- The UUT shall be set to the first operating frequency to be tested (see clause 5.3.2).

Step 2:

- The blocking signal generator is set to the first frequency as defined in table 7.

Step 3:

- With the blocking signal generator switched off a communication link is set up between the UUT and the associated companion device using the test setup shown in figure 14. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.2.8.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min} .

- This signal level (P_{min}) is increased by 6 dB resulting in a new level ($P_{min} + 6$ dB) of the wanted signal at the UUT receiver input.

Step 4:

- The level of the blocking signal at the UUT input is set to the level provided in table 7. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.2.8.3 are met.
- If the performance criteria as specified in clause 4.2.8.3 are met, the level of the blocking signal at the UUT may be further increased (e.g. in steps of 1 dB) until the level whereby the performance criteria as specified in clause 4.2.8.3 are no longer met. The highest level at which the performance criteria are met is recorded in the test report.

Step 5:

- Repeat step 4 for each remaining combination of frequency and level as specified in table 7.

Step 6:

- Repeat step 2 to step 5 with the UUT operating at the other operating frequencies at which the blocking test has to be performed. See clause 5.3.2.

Radiated measurements

When performing radiated measurements on equipment with dedicated antennas, measurements shall be repeated for each alternative dedicated antenna.

A test site as described in annex B and applicable measurement procedures as described in annex C shall be used.

The test procedure is further as described under clause 5.4.10.2.1.

The level of the blocking signal at the UUT referred to in step 4 is assumed to be the level in front of the UUT antenna(s). The UUT shall be positioned with its main beam pointing towards the antenna radiating the blocking signal.

The position recorded in clause 5.4.4.2.2 can be used.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Lee on 2023-04-27.

EUT operation mode: Receiving (Worst Case)

Test Result: Compliant. Please refer to the Appendix.

EXHIBIT A - EUT PHOTOGRAPHS

Please refer to the report number is SZ1230414-19311E-EUT.

EXHIBIT B - TEST SETUP PHOTOGRAPHS

Radiated Spurious Emissions Test View (Below 1GHz)



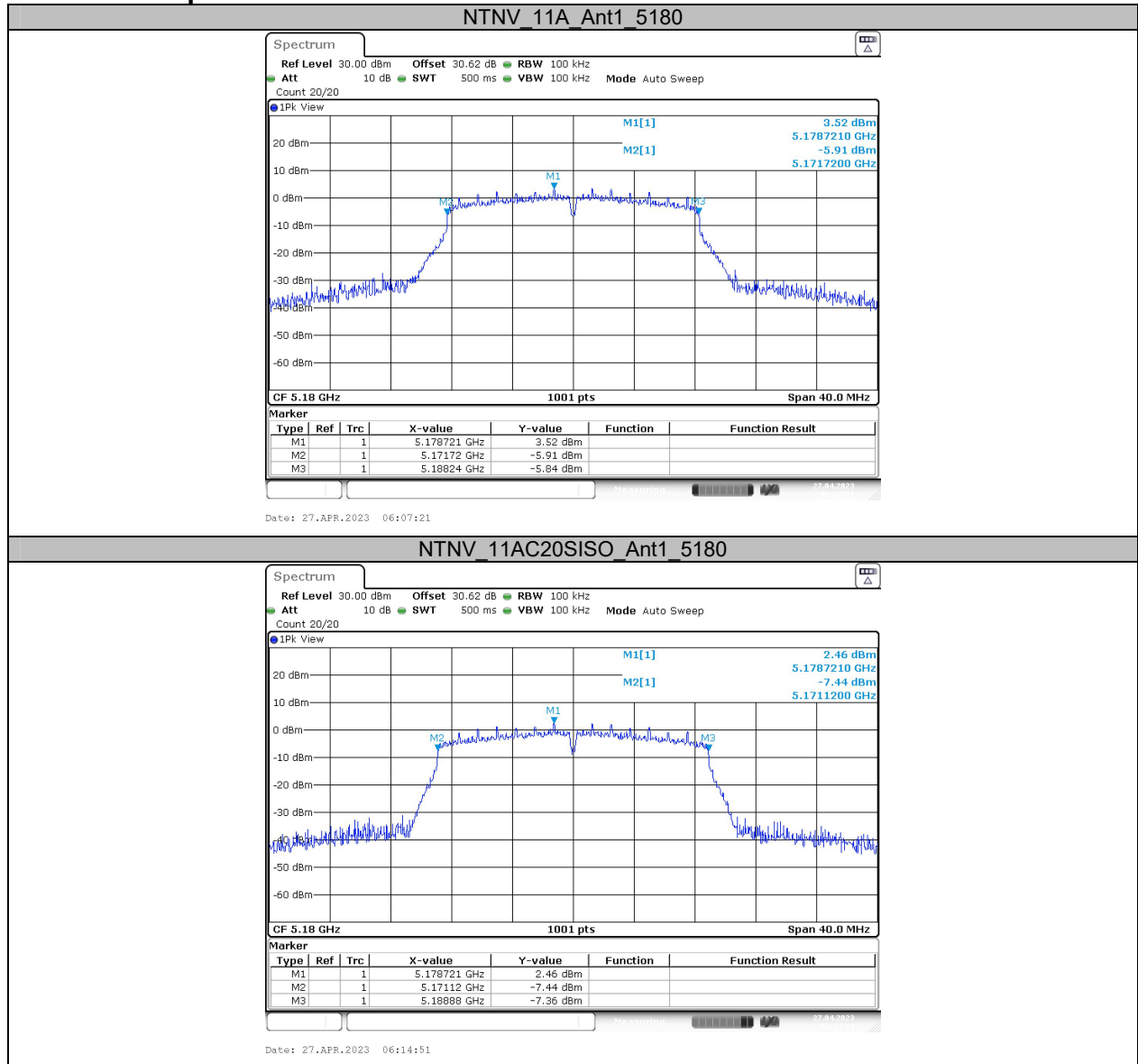
Radiated Spurious Emissions Test View (Above 1GHz)

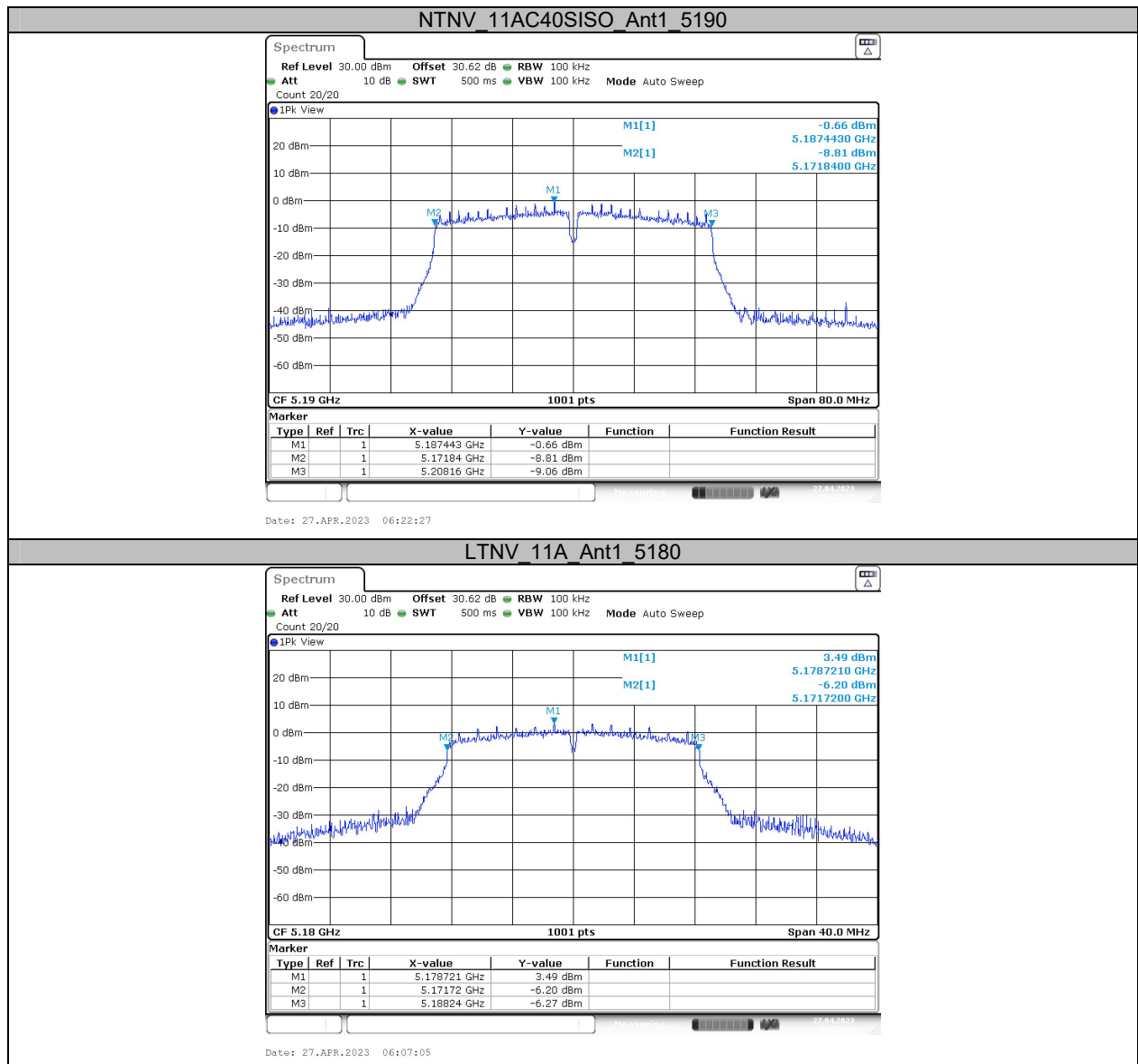


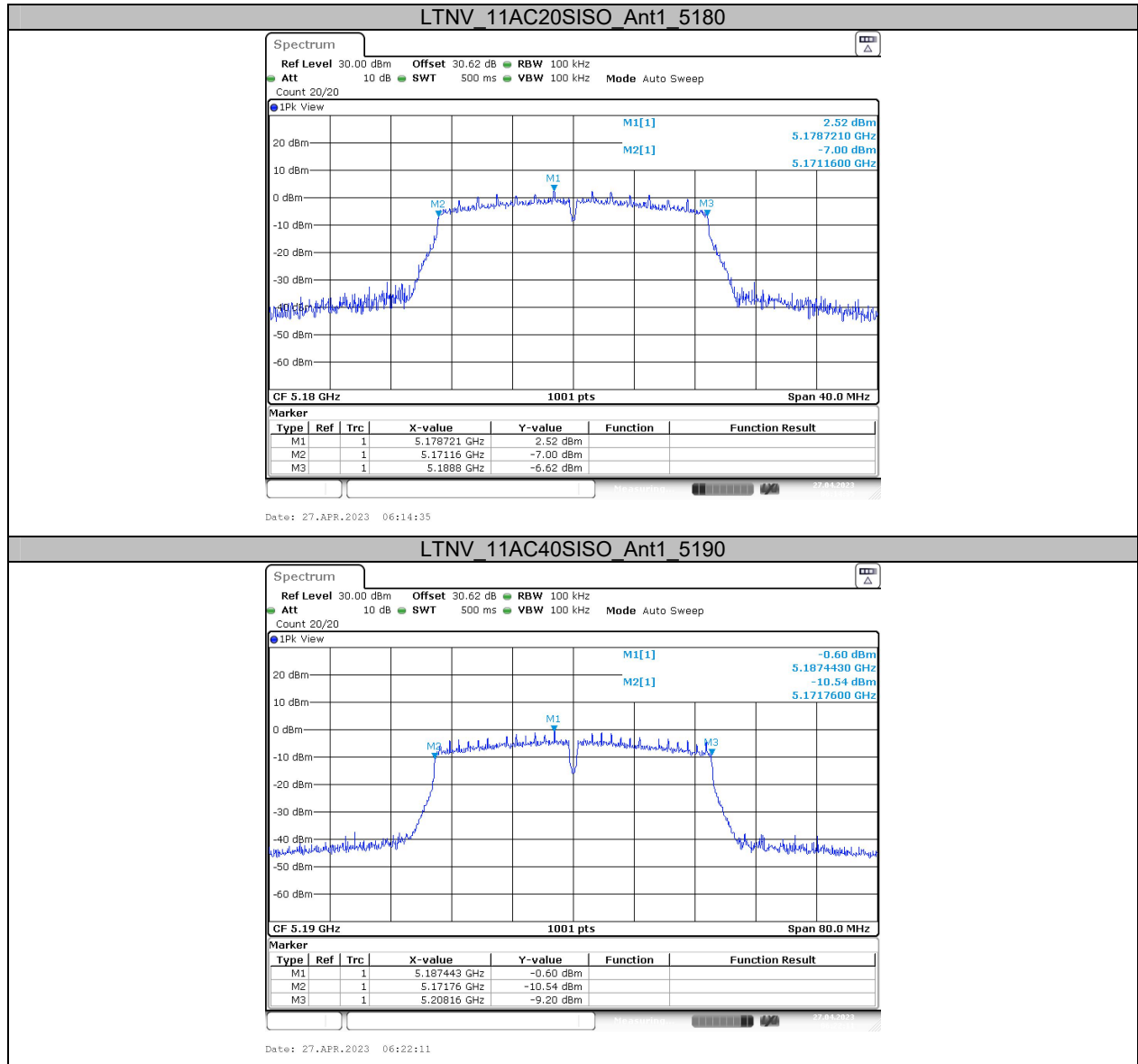
APPENDIX**Appendix A: Carrier frequencies****Test Result**

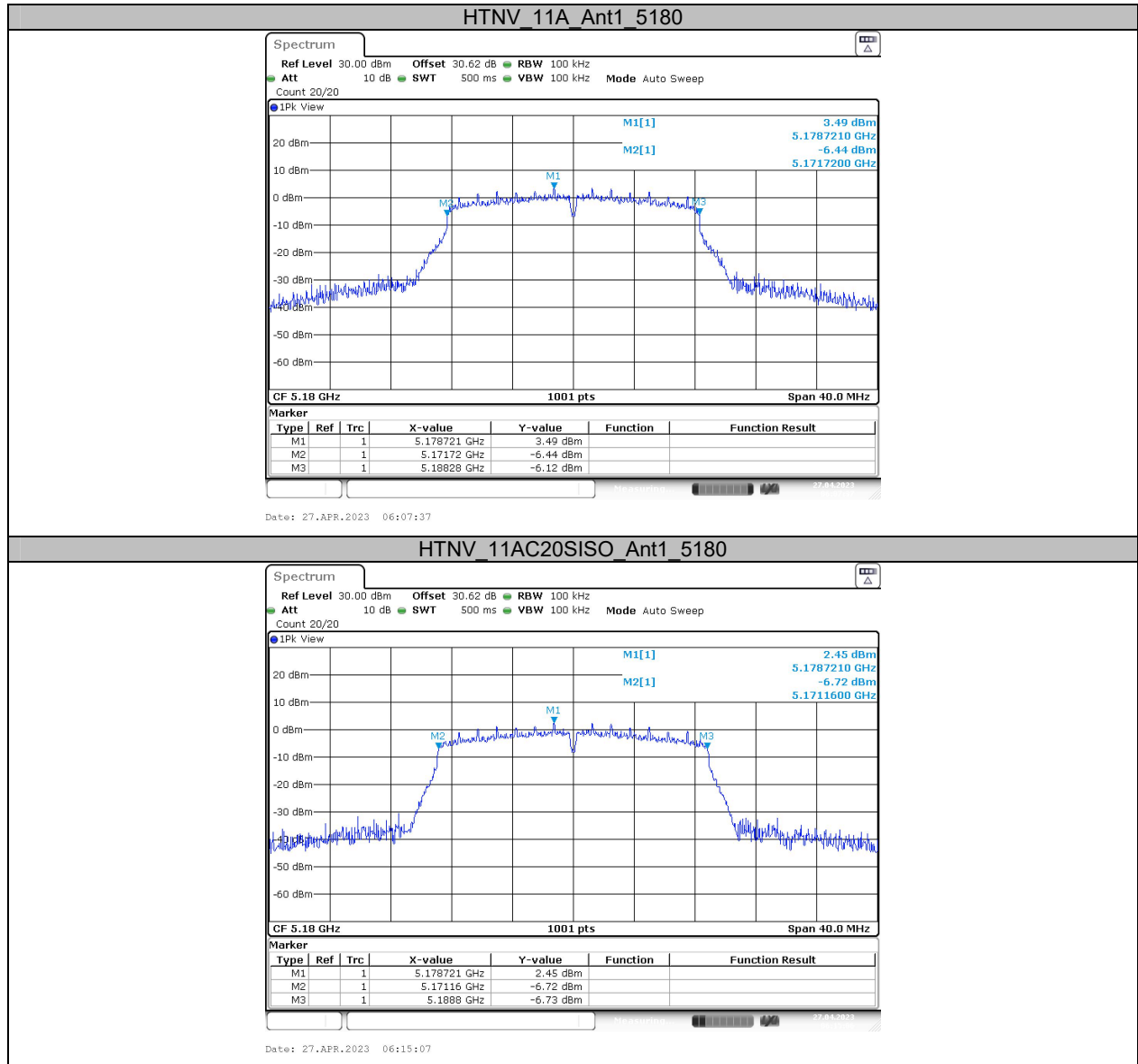
Test Condition	Test Mode	Channel	Result[ppm]	Limit[ppm]	Verdict
NTNV	11A	5180	-3.86100	±20	PASS
	11AC20SISO	5180	0.00000	±20	PASS
	11AC40SISO	5190	0.00000	±20	PASS
LTNV	11A	5180	-3.86100	±20	PASS
	11AC20SISO	5180	-3.86100	±20	PASS
	11AC40SISO	5190	-7.70713	±20	PASS
HTNV	11A	5180	0.00000	±20	PASS
	11AC20SISO	5180	-3.86100	±20	PASS
	11AC40SISO	5190	-7.70713	±20	PASS

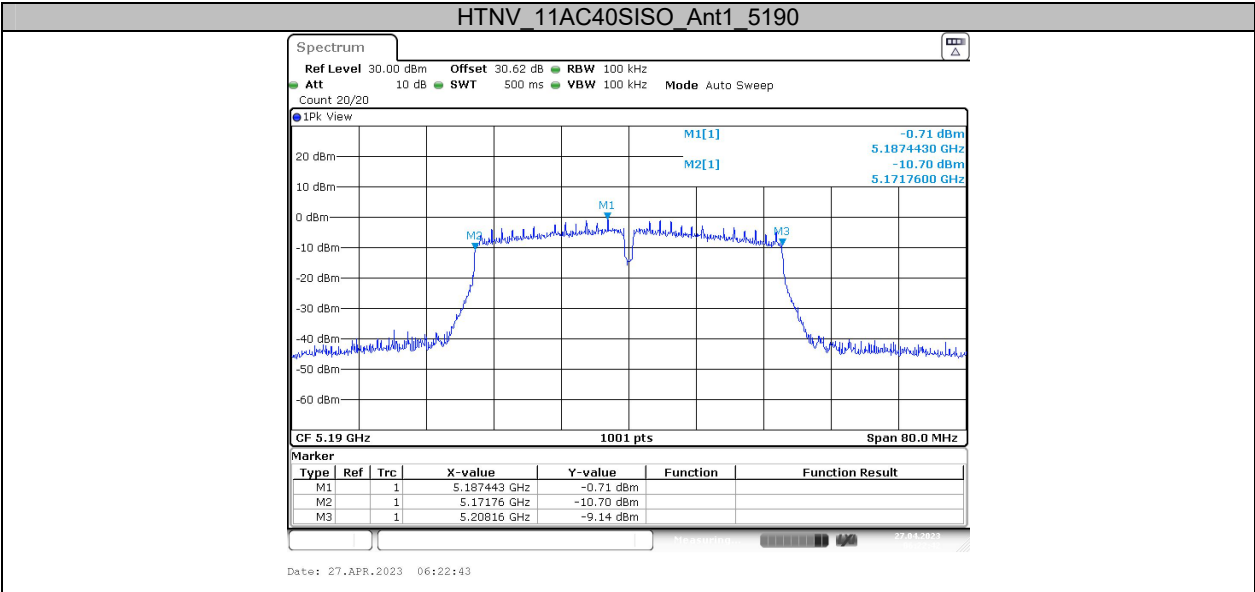
Test Graphs











Appendix B: RF Output Power**Test Result**

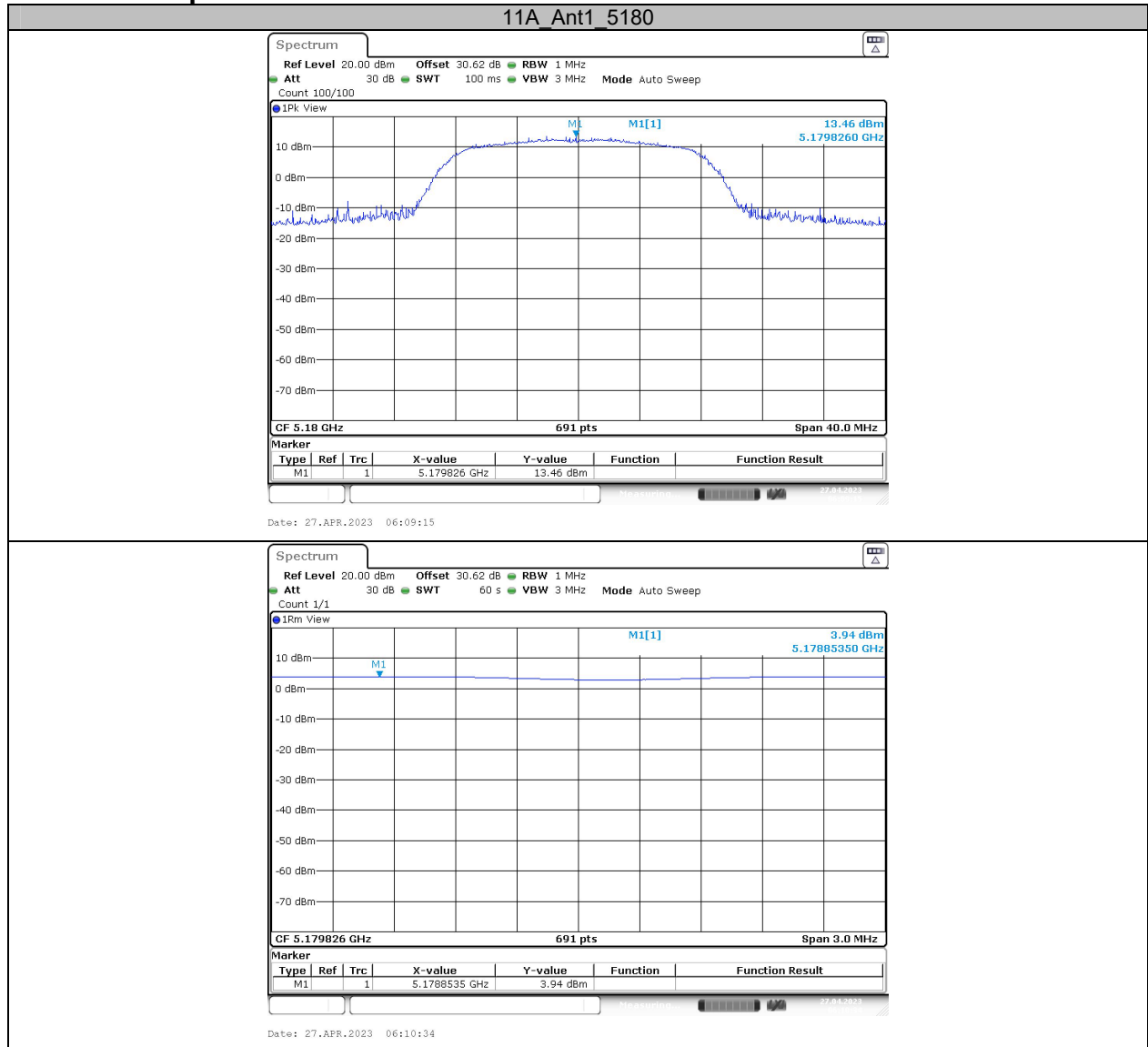
Test Condition	Test Mode	Channel	TPC	Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
NTNV	11A	5180	NA	14.16	15.20	23	PASS
	11AC20SISO	5180	NA	13.08	14.12	23	PASS
	11AC40SISO	5190	NA	12.76	13.80	23	PASS
LTVN	11A	5180	NA	14.17	15.21	23	PASS
	11AC20SISO	5180	NA	13.11	14.15	23	PASS
	11AC40SISO	5190	NA	12.79	13.83	23	PASS
HTNV	11A	5180	NA	14.24	15.28	23	PASS
	11AC20SISO	5180	NA	13.09	14.13	23	PASS
	11AC40SISO	5190	NA	12.76	13.80	23	PASS

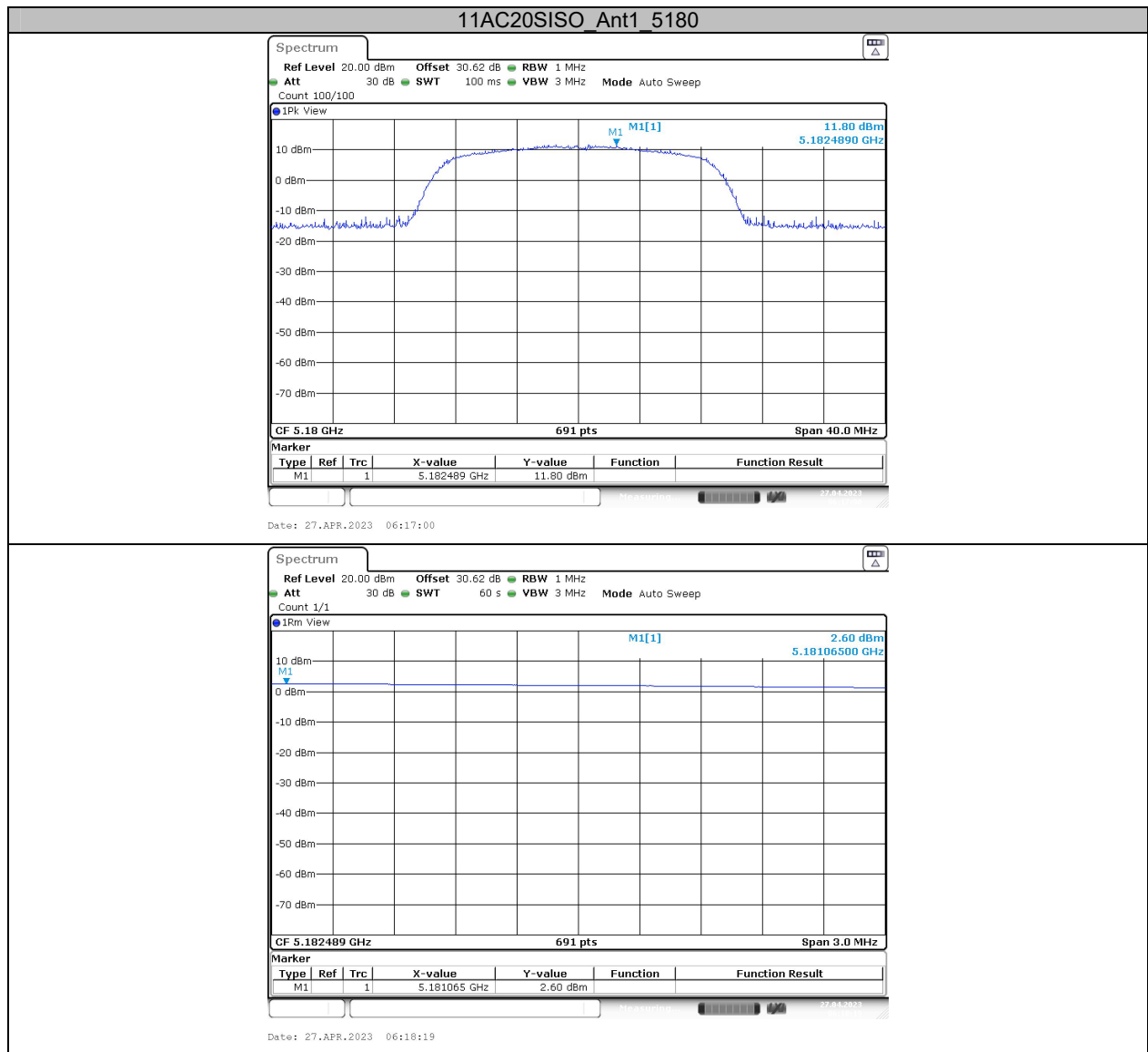
Appendix C: Power Spectral Density**Test Result**

Test Mode	Antenna	Channel	PD [dBm/MHz]	PSD [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	Ant1	5180	3.94	5.10	10	PASS
11AC20SISO	Ant1	5180	2.60	3.77	10	PASS

Note: $PSD = PD + \text{duty cycle factor} + \text{antenna gain}$

Test Graphs

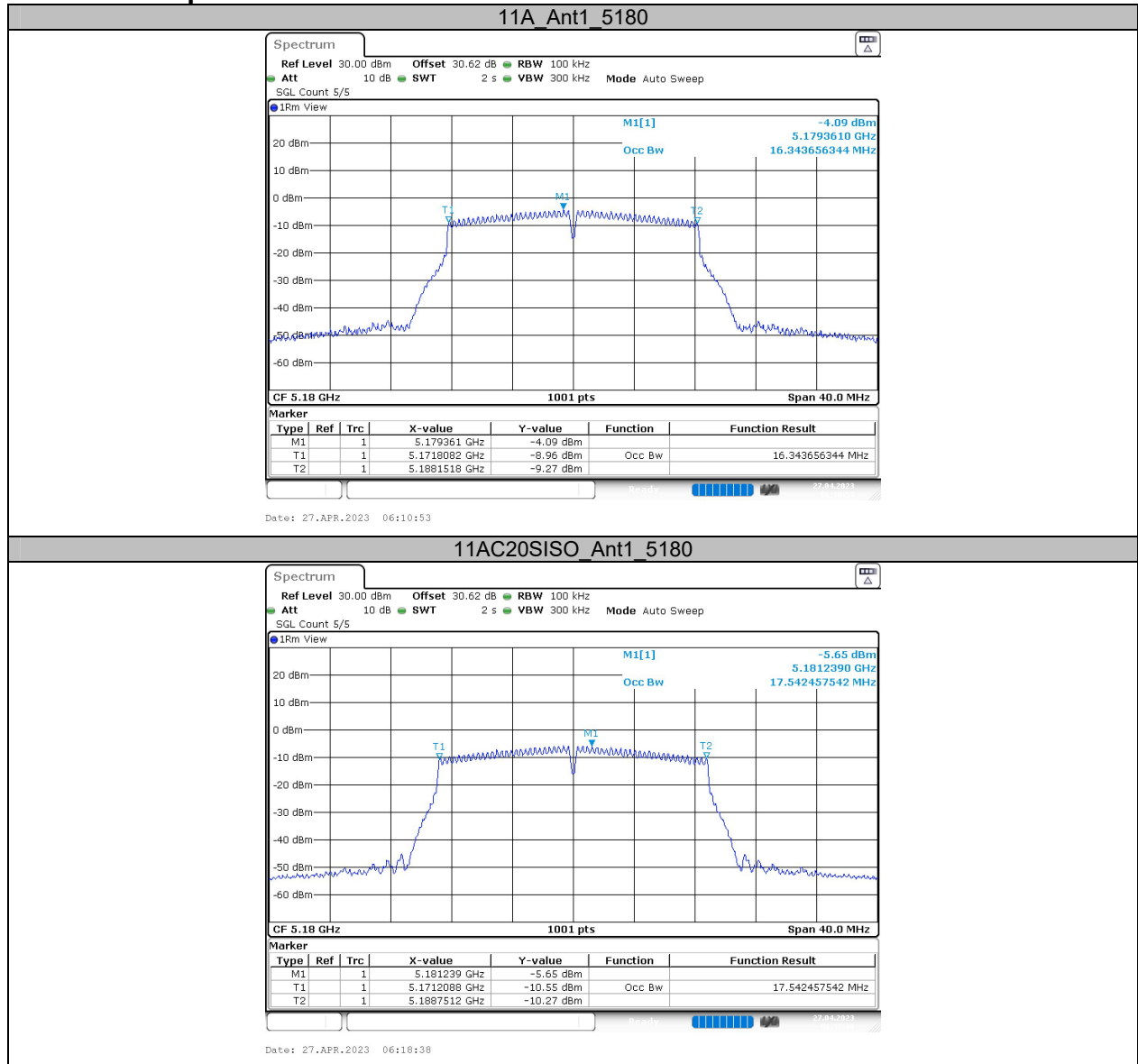


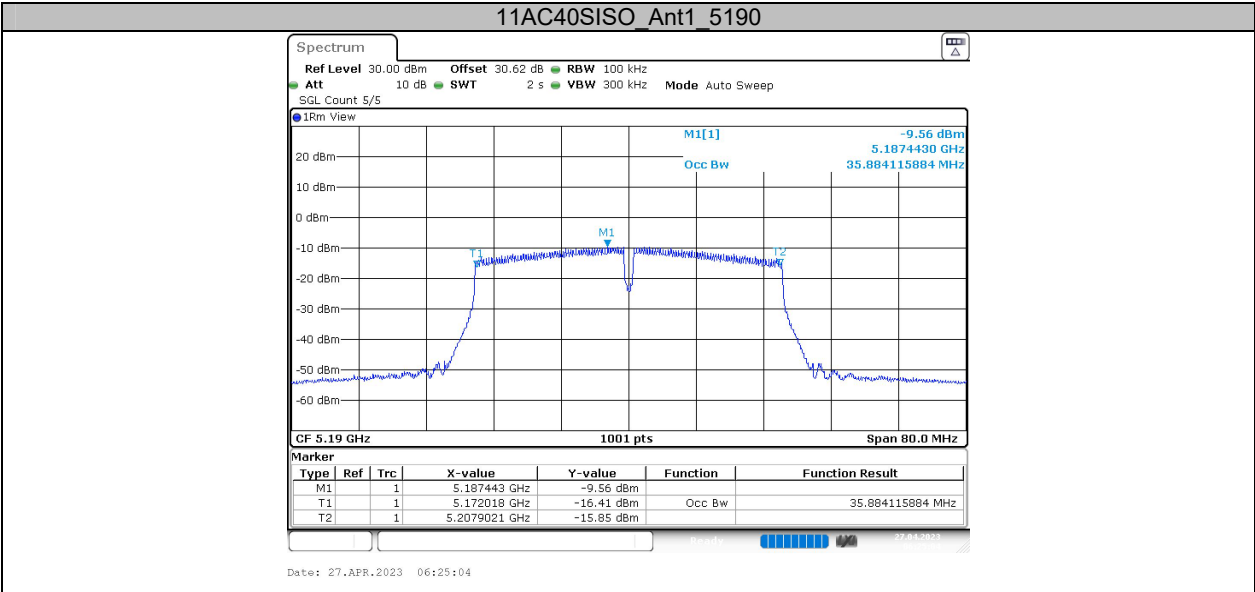


Appendix D: Occupied Channel Bandwidth**Test Result**

Test Mode	Antenna	Channel	OCB[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	16.344	16 to 20	PASS
11AC20SISO	Ant1	5180	17.542	16 to 20	PASS
11AC40SISO	Ant1	5190	35.884	32 to 40	PASS

Test Graphs

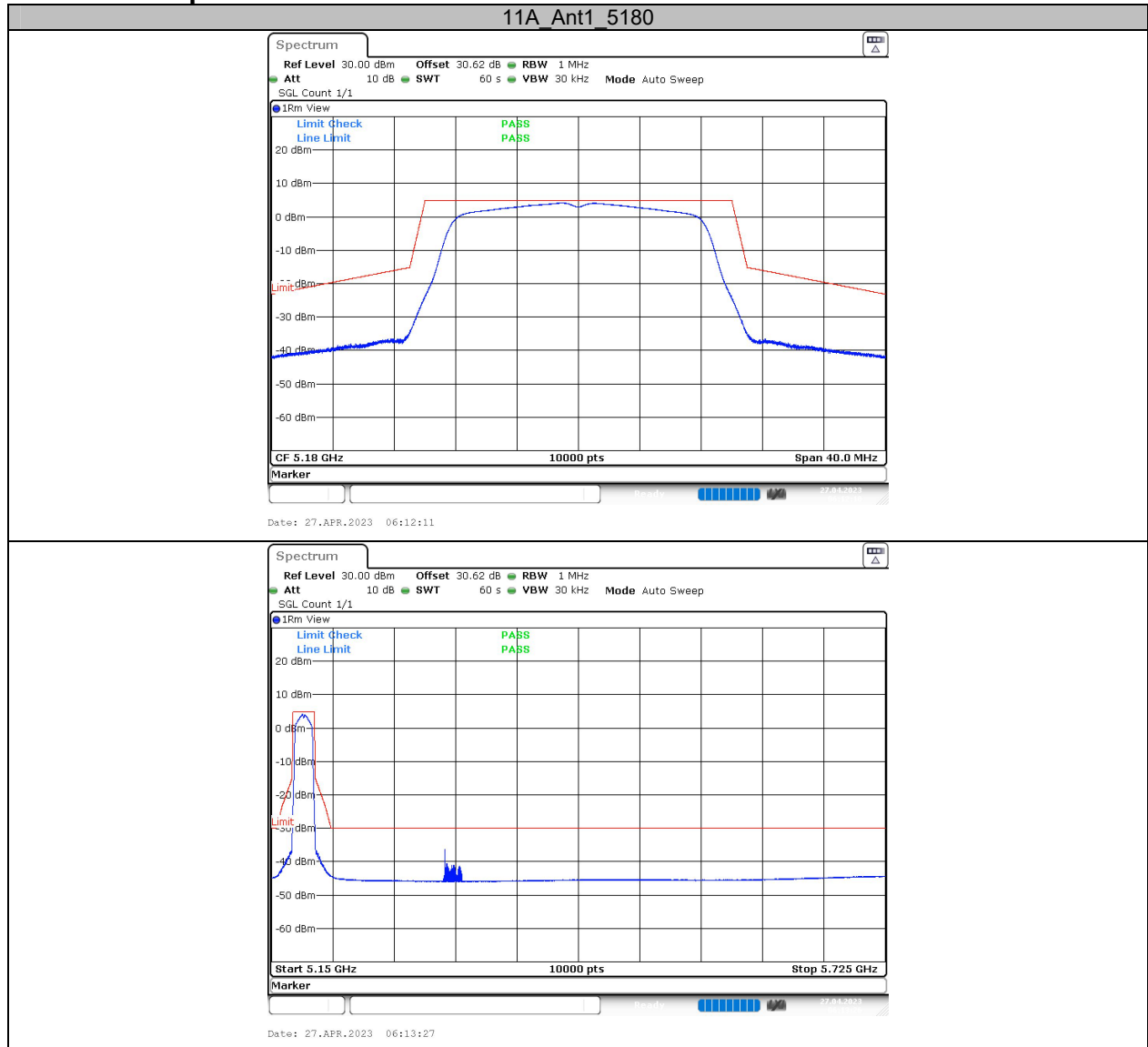


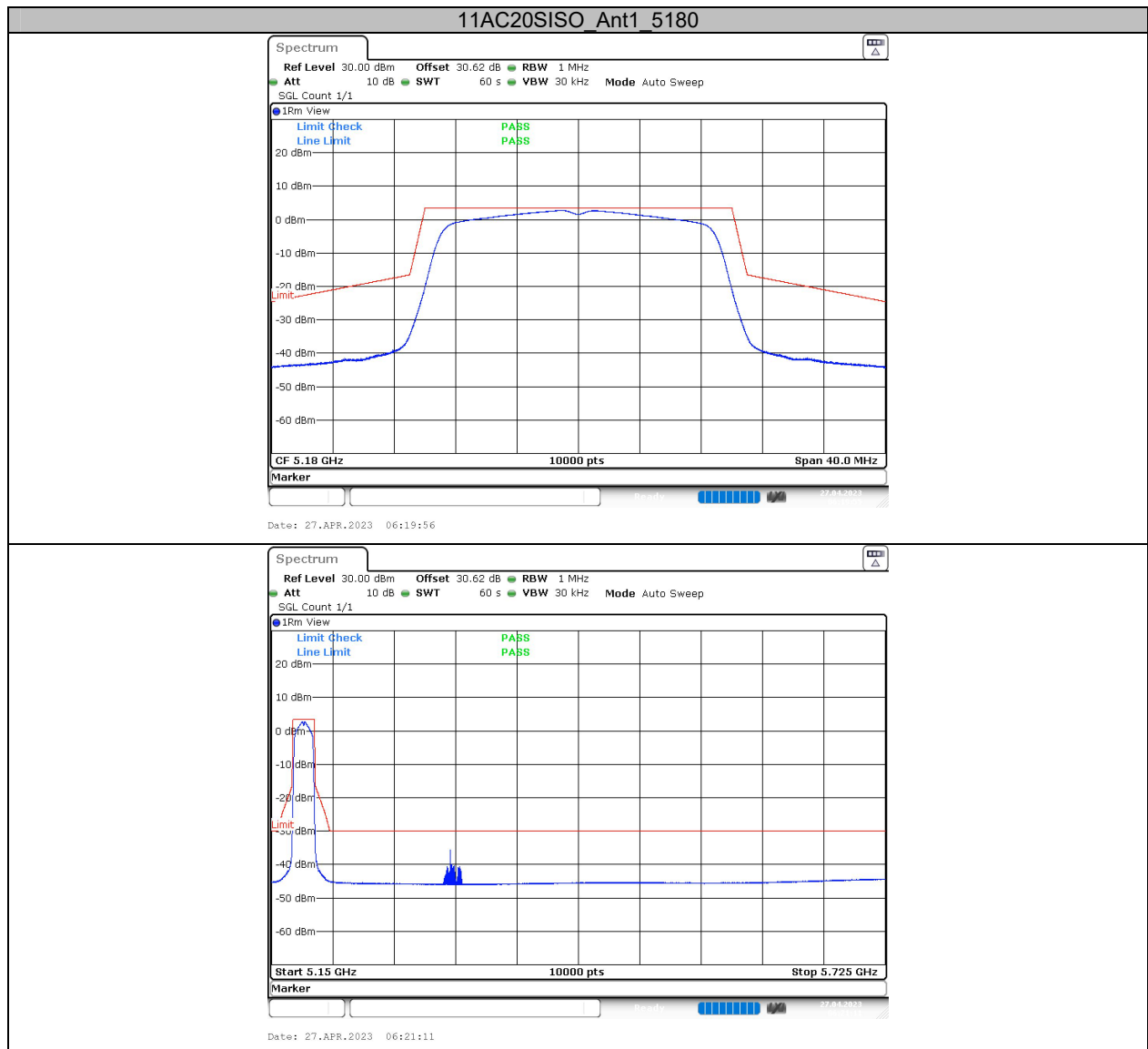


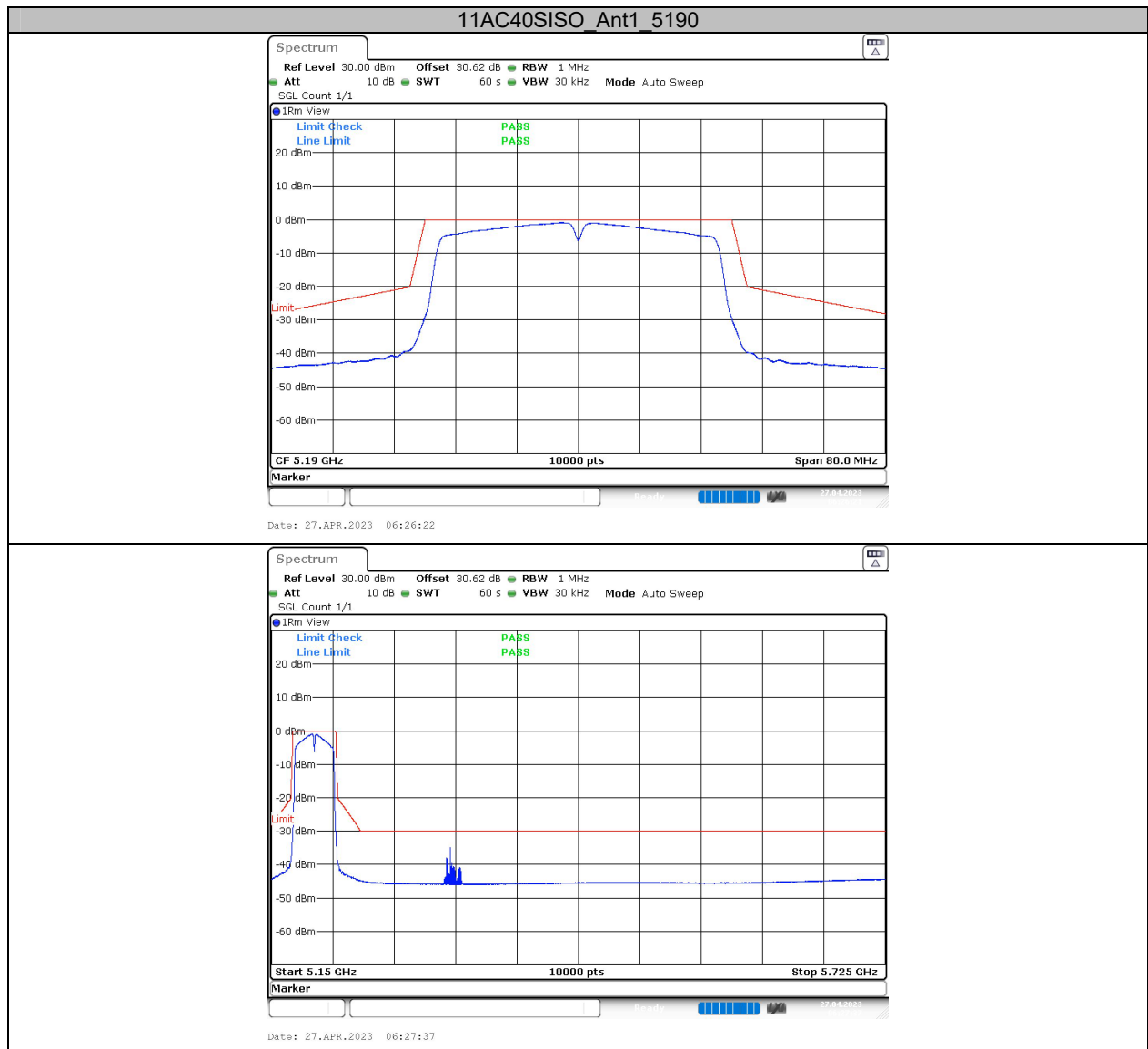
Appendix E: Transmitter unwanted emissions within the 5 GHz RLAN bands**Test Result**

Test Mode	Antenna	Channel	Result [dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	See test graph	See test graph	PASS
11AC20SISO	Ant1	5180	See test graph	See test graph	PASS
11AC40SISO	Ant1	5190	See test graph	See test graph	PASS

Test Graphs





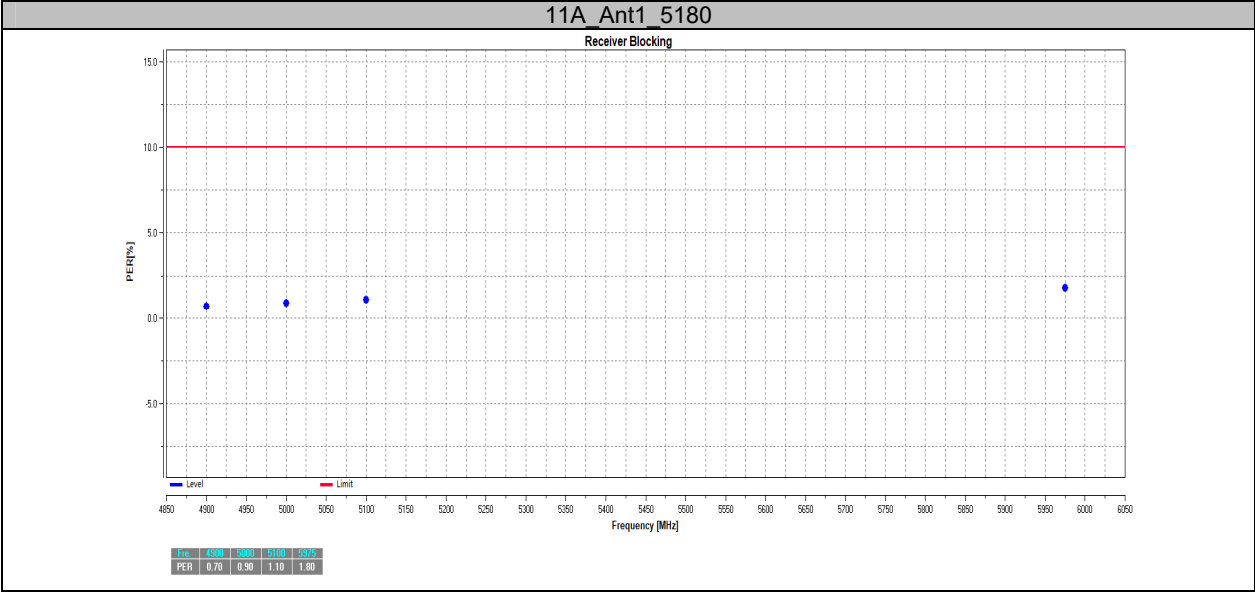


Appendix F: Receiver Blocking

Test Result

Test Mode	Antenna	Channel	Pmin [dBm]	Wanted Signal [dBm]	Freq. [MHz]	CW [dBm]	PER [%]	Limit [%]	Verdict
11A	Ant1	5180	-39.98	-33.98	4900	-53	0.70	≤10	PASS
			-39.98	-33.98	5000	-53	0.90	≤10	PASS
			-39.98	-33.98	5100	-59	1.10	≤10	PASS
			-39.98	-33.98	5975	-53	1.80	≤10	PASS

Test Graphs

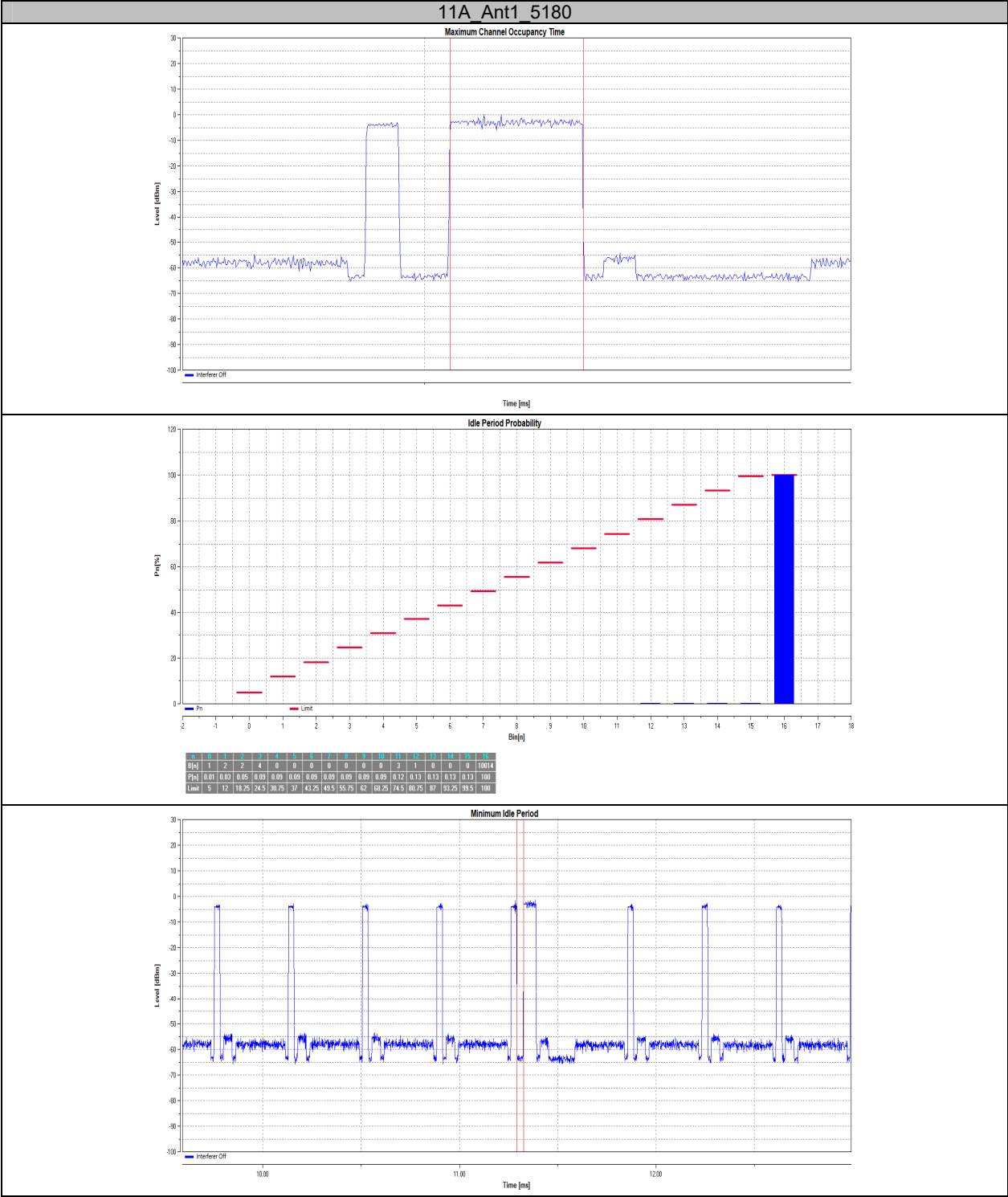


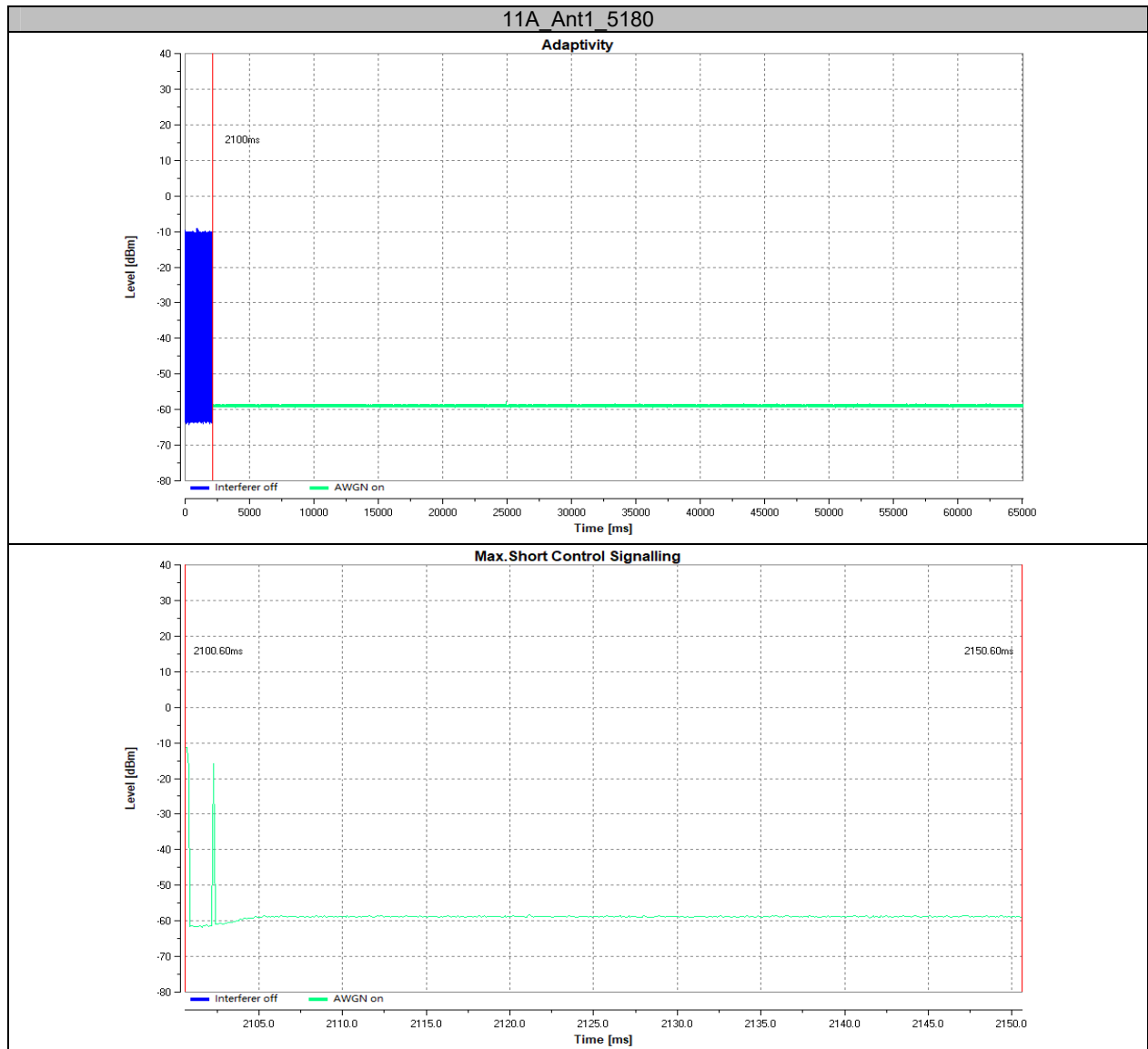
Appendix G: Adaptivity**Test Result**

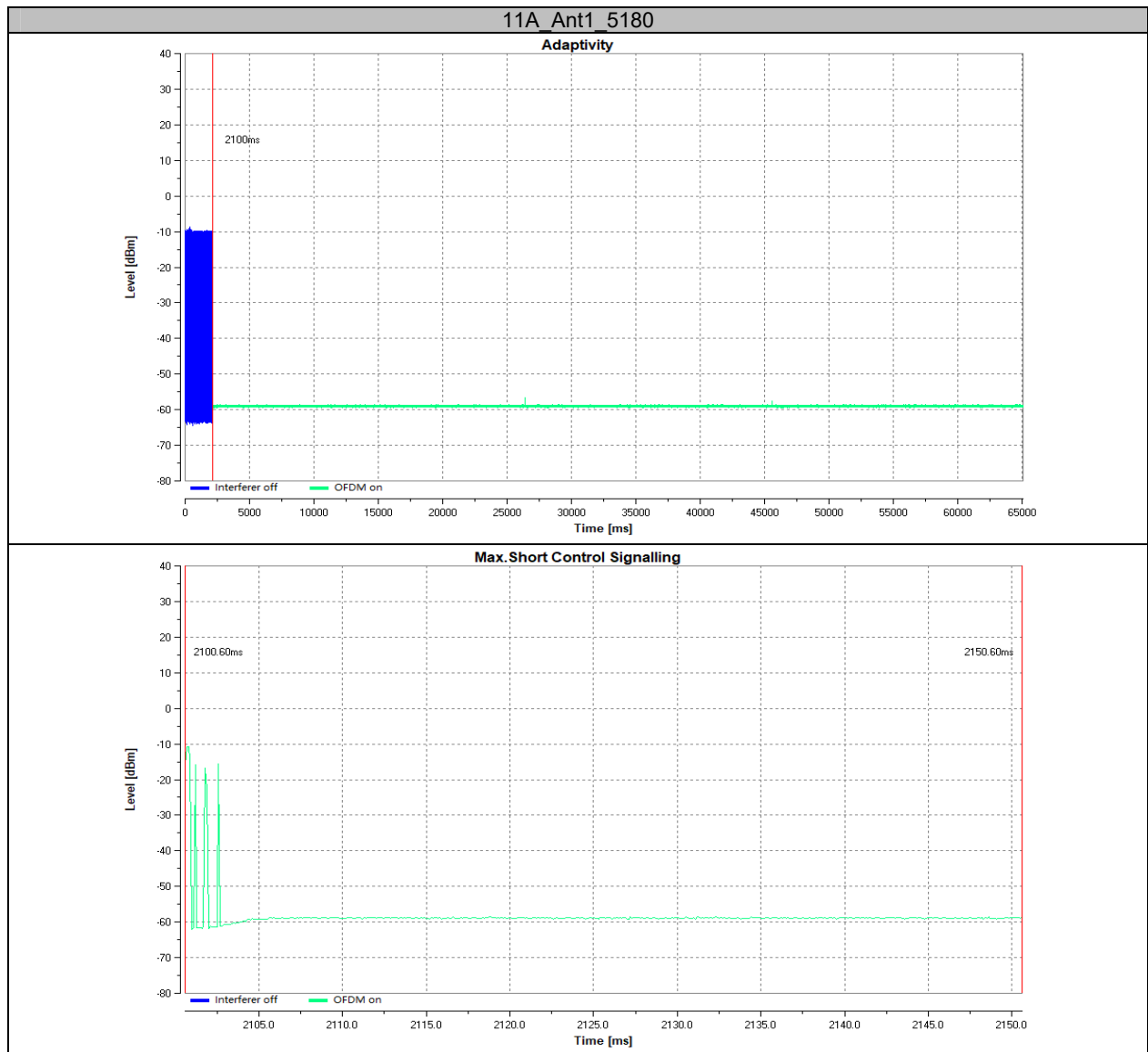
Test Mode	Channel	Priority Class	COT Num [n]	Max. COT [ms]	Limit [ms]	Min.Idle Time[ms]	Limit [ms]	Idle Period probability	Verdict
11A	5180	2	10027	0.117	6.000	0.034	0.027	See the graph	PASS

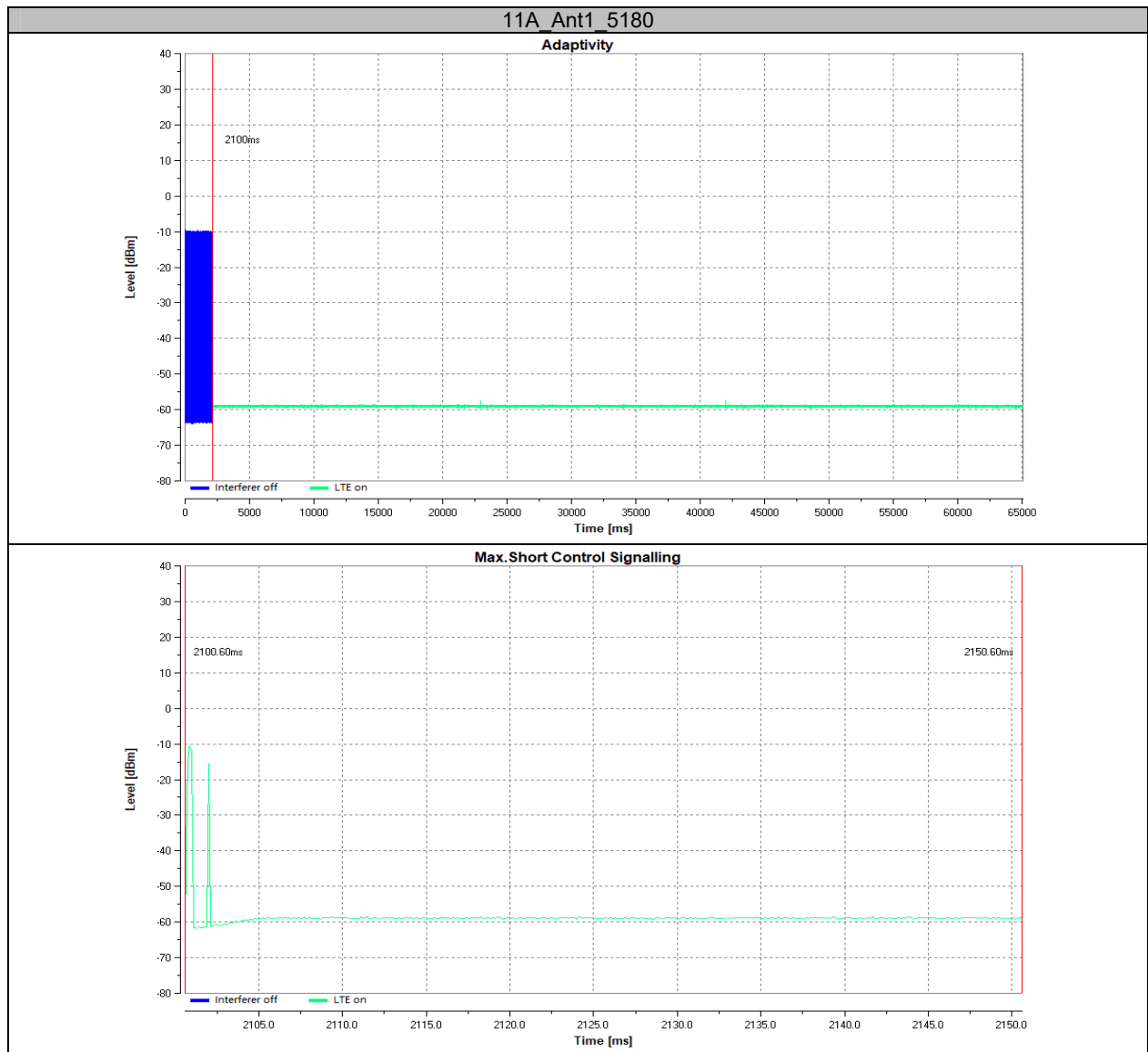
Test Mode	Channel	Interference Type	Add interference Time [ms]	Interference Level [dBm/MHz]	Max. Short Control number [n]	Limit [n]	Max. Short Control Time [ms]	Limit [ms]	Verdict
11A	5180	AWGN	2101	-75.00	2	50	0.40	2.5	PASS
		OFDM	2101	-75.00	4	50	0.80	2.5	PASS
		LTE	2101	-75.00	2	50	0.50	2.5	PASS

Test Graphs









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