SPORTON LAB.

Project No : ER871326AE

VERIFICATION OF COMPLIANCE

- Equipment : RouterBOARD SXTsq-60ad
  Model Name : RBSXTsq-60ad
  Applicant : Mikrotikls SIA
  Brivibas gatve 214i, Riga, LV-1039 Latvia

SPORTON LAB.

I HEREBY DECLARE THAT :

The equipment was **Passed** the test performed according to Draft EN 305 550 V2.1.0 (2017-10).
The test was carried out on Sep. 05, 2018 at SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory.

TAF
Testing Laboratory
1190

Sam Chen

Sam Chen
SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

CE RADIO TEST REPORT

Equipment	:	**RouterBOARD SXTsq-60ad**
Brand Name	:	**MikroTik**
Model Name	:	**RBSXTsq-60ad**
Applicant	:	**Mikrotikls SIA** **Brivibas gatve 214i, Riga, LV-1039 Latvia**
Manufacturer	:	**MIKROTIKLS SIA** **Brivibas gatve 214i, Riga, LV-1039 Latvia**
Standard	:	**Draft EN 305 550 V2.1.0 (2017-10)**

The product was received on Jul. 13, 2018, and testing was started from Aug. 01, 2018 and completed on Sep. 05, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in Draft EN 305 550 V2.1.0 (2017-10) and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test

Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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Appendix A. Test Photos

Photographs of EUT v01

History of this test report

Report No.	Version	Description	Issued Date
ER871326AE	01	Initial issue of report	Sep. 21, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	4.3.3	RF Output Power	PASS	-
3.2	4.3.4	Spectral Power Density	PASS	-
3.3	4.3.2	Permitted Range of Operating Frequencies	PASS	-
3.4	4.3.5	Unwanted emissions in the out-of-band domain	PASS	-
3.5	4.3.6	Unwanted Emissions in the Spurious Domain	PASS	-
4.1	4.4.2	Receiver Unwanted Emissions	PASS	-
4.2	4.4.3	Receiver interference signal handling	PASS	-

Reviewed by: Sam Chen

Report Producer: Cindy Peng

1 General Description

1.1 Information

1.1.1 The Channel Plan(s)

The Channel Plan(s)	
57 GHz – 64 GHz Band	Channel 1: 58.32 GHz Channel 2: 60.48 GHz Channel 3: 62.64 GHz

1.1.2 Antenna Information

Antenna Information		
☐ Equipment placed on the market without antennas		
☒ Integral antenna		
According to EN 305 550 clause 6.1.2, The integral antenna design used by the equipment and measures to prevent the user from connecting a different antenna.		
Integral antenna gain	12.13 dBi for Channel 1	13.48 dBi for Channel 2
	10.56 dBi for Channel 3	
	☐ Temporary RF connector provided	
	☒ No temporary RF connector provided	
☐ External antenna (dedicated antennas)		
	☐ Single power level with corresponding antenna(s)	
	☐ Multiple power settings and corresponding antenna(s)	

1.1.3 Power Levels

Worst Power Levels for Channel 1		
Applicable power levels	☐ Conducted ☒ EIRP	
Antenna gain	12.13 dBi	
Frequency (GHz)	Highest setting (P_{high}): (dBm)	
	Modulation	AV Power
58.32	MCS1	17.18

Worst Power Levels for Channel 2		
Applicable power levels	☐ Conducted ☒ EIRP	
Antenna gain	13.48 dBi	
Frequency (GHz)	Highest setting (P_{high}): (dBm)	
	Modulation	AV Power
60.48	MCS1	19.99

Worst Power Levels for Channel 3		
Applicable power levels	☐ Conducted ☒ EIRP	
Integral antenna gain	10.56 dBi	
Frequency (GHz)	Highest setting (P_{high}): (dBm)	
	Modulation	AV Power
62.64	MCS1	18.93

1.1.4 User Condition

Intended Operation
☒ Indoor
☒ Outdoor

1.1.5 EUT Information

EUT Information			
EUT Power Type	From adapter with PoE		
Operational Voltage	☒ Vnom (230 Vac)	☒ Vmax (253 Vac)	☒ Vmin (207 Vac)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (50°C)	☒ Tmin (-40°C)

1.2 Additional Information Provided by the Submitter

1.2.1 Modulation

IEEE 802.11ad Modulation Scheme

MCS Index	Modulation	Code rate	Data rate (Mbit/s)
0	π/-2BPSK	1/2	27.5
1	π/-2BPSK	1/2	385
2	π/-2BPSK	1/2	770
3	π/-2BPSK	5/8	962.5
4	π/-2BPSK	3/4	1155
5	π/-2BPSK	13/16	1251.25
6	π/-2QPSK	1/2	1540
7	π/-2QPSK	5/8	1925
8	π/-2QPSK	3/4	2310
9	π/-2QPSK	13/16	2502.5
10	π/2-16QAM	1/2	3080
11	π/2-16QAM	5/8	3850
12	π/2-16QAM	3/4	4620
Channel Bandwidth is 2.16GHz			
Can the transmitter operate un-modulated:	☒ Yes	☐ No	

1.2.2 Duty Cycle

Duty Cycle			Duty Cycle Factor
The transmitter is intended for	58.32 GHz	100.00 %	0.00
	60.48 GHz	100.00 %	0.00
	62.64 GHz	100.00 %	0.00

1.3 Accessories

Accessories					
No.	Equipment Name	Brand Name	Model Name	Rating	Remark
1	Adapter	MLF	MLF-A00122400380 FE0141	INPUT: 100-240V~50/60Hz, 0.4Amax. OUTPUT: 24V, 0.38A	-
2	PoE	MikroTik	RBGPOE	INPUT: 9-48V	Matched with adapter use

1.4 Support Equipment

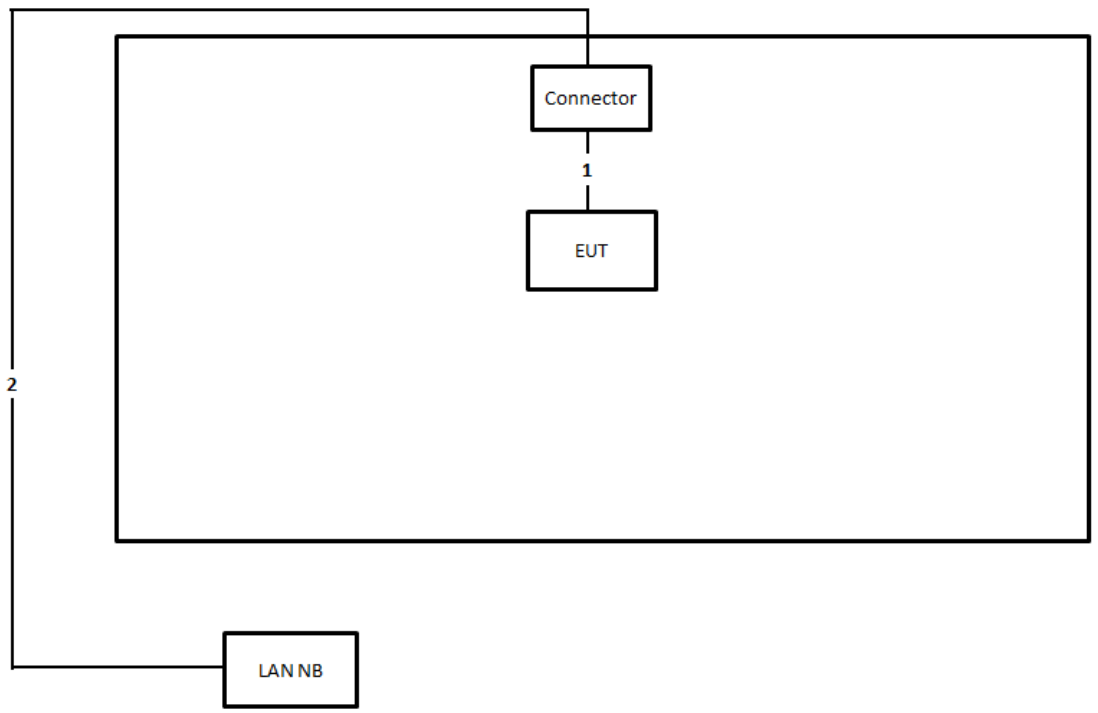
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E4300	N/A

1.5 EUT Setups

During the test, executed the test program to control the EUT continuously transmit/receive RF signal.

1.6 Test Setup Diagram

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length
1	RJ-45 cable	No	1m
2	RJ-45 cable	No	10m

1.7 Testing Applied Standards

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

- Draft EN 305 550 V2.1.0 (2017-10)

1.8 Testing Location

Testing Location							
☐	HWA YA	ADD	:	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)			
		TEL	:	886-3-327-3456	FAX	:	886-3-327-0973
☒	JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.			
		TEL	:	886-3-656-9065	FAX	:	886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	05CH01-CB	Zero Chen	22°C / 54%	Aug. 01, 2018~Sep. 05, 2018

2 Test Configuration of Equipment under Test

2.1 Test Channel Frequencies

Nominal Channel Bandwidth			
Channel Plan (GHz)	**Low Channel (GHz)**	**Middle Channel (GHz)**	**High Channel (GHz)**
57 GHz – 64 GHz	58.32	60.48	62.64

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz)
RF Output Power	58.32, 60.48, 62.64
Spectral Power Density	58.32, 60.48, 62.64
Permitted Range of Operating Frequencies	58.32, 60.48, 62.64
Out-of-Band Emissions	58.32, 60.48, 62.64
Unwanted Emissions in the Spurious Domain	58.32, 60.48, 62.64
Receiver Unwanted Emissions	58.32, 60.48, 62.64
Receiver interference signal handling	58.32, 60.48, 62.64

Note: The EUT can only be used at Y axis position.

3 Transmitter Test Result

3.1 RF Output Power

3.1.1 Limit of RF Output Power

Application	Limit
Non-specific SRD	20dBm(E.I.R.P)/10dBm(Output Power)

3.1.2 Measuring Instruments

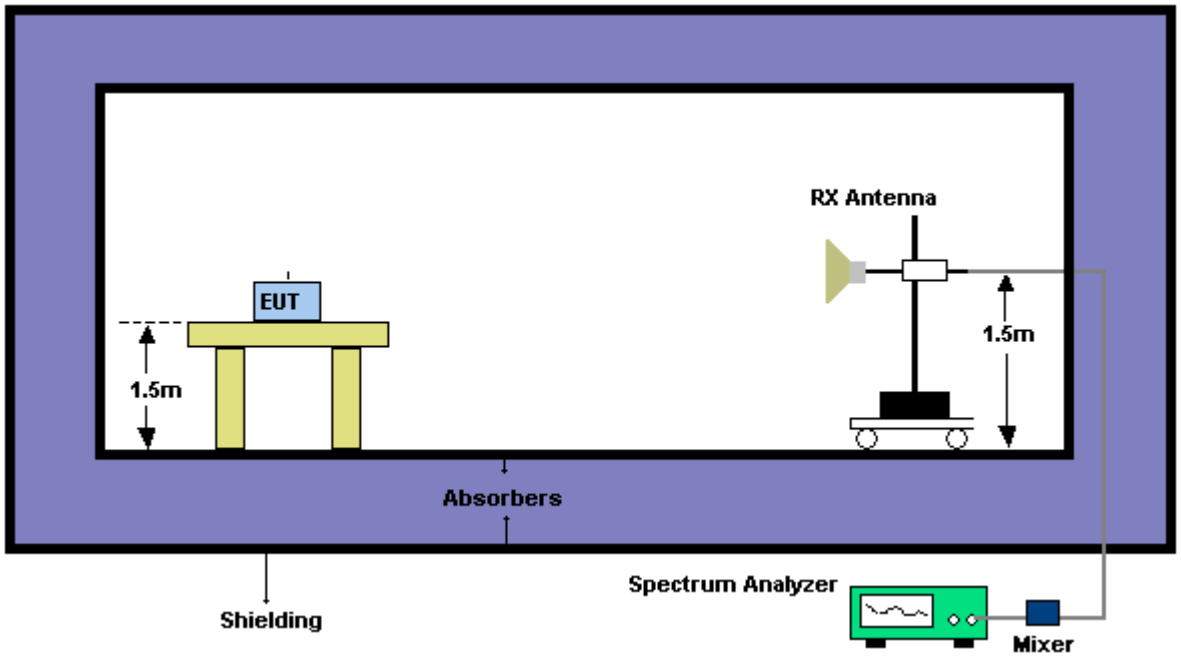
Refer a measuring instruments list in this test report.

3.1.3 Test Procedures

Method of measurement: Refer as Draft EN 305 550, clause 6.5.3.

3.1.4 Test Setup

RF Output Power



3.1.5 Test Result of RF Output Power

Test Conditions	see Draft EN 305 550 V2.1.0, clause 4.3.3
Test Setup	see EN Draft EN 305 550 V2.1.0, clause 6.5.3

Test Frequency (GHz)	Test Distance (m)	Measured Power (dBm)	Rx Gain (dBi)	Duty Cycle factor	EIRP Power (dBm)	EIRP Limit (dBm)	Output Power (dBm)	Output Power Limit (dBm)
58.32	1	-26.98	23.6	0.00	17.18	20	5.05	10
60.48	1	-24.48	23.6	0.00	19.99	20	6.51	10
62.64	1	-25.85	23.6	0.00	18.93	20	8.37	10

Note: The RX boresight antenna is moved vertically to find the maximum radiated power.

3.2 Spectral Power Density

3.2.1 Limit of EIRP Spectral Power Density

Power Density Limit	
Application	**EIRP Average Power Density**
Non-specific SRD	13 dBm / MHz

3.2.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement: Refer as Draft EN 305 550, clause 6.5.4.

3.2.4 Test Setup

Refer as report clause 3.1.4

3.2.5 Test Result of EIRP Spectral Power Density

Test Conditions	see Draft EN 305 550, clause 4.3.4
Test Setup	see Draft EN 305 550, clause 6.5.4

Test Frequency(GHz)	Test Distance (m)	Measured Power Density (dBm/MHz)	Rx Gain (dBi)	Duty Cycle factor	EIRP Power Density (dBm/MHz)	EIRP Power Density (dBm/MHz)
58.32	1	-56.82	23.6	0.00	-12.66	13
60.48	1	-50.42	23.6	0.00	-5.95	13
62.64	1	-59.37	23.6	0.00	-14.59	13

3.3 Permitted range of operating frequencies

3.3.1 Limit of Permitted range of operating frequencies

Permitted range of operating frequencies Limit	
Application	**Non-specific SRD**
fL > 57000 MHz	fH < 64000 MHz

3.3.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

Method of measurement: Refer as Draft EN 305 550 V2.1.0, clause 6.5.2.

3.3.4 Test Setup

Refer as report clause 3.1.4.

3.3.5 Test Result of range of operating frequencies

Test Conditions	see Draft EN 305 550 V2.1.0, clause 4.3.2
Test Setup	see Draft EN 305 550 V2.1.0, clause 6.5.2
NOTE: If the device can work in different modes and different frequency ranges these frequencies should be reported for each mode and frequency range.	

Test Distance	1 m

Test Conditions						**Measured Frequency (MHz)**	
						58320	
T nom	**(°C)**	20	**V nom**	**(V)**	230	57063.8500	59385.1200
T min	**(°C)**	-40	**V max**	**(V)**	253	57063.8521	59385.1223
			V min	**(V)**	207	57063.8532	59385.1236
T max	**(°C)**	50	**V max**	**(V)**	253	57063.8539	59385.1241
			V min	**(V)**	207	57063.8548	59385.1278
Max. Deviation Frequency						57063.8500	59385.1278
Limit (MHz)						$f_L > 57000$	$f_H < 64000$
Result						**PASS**	

Test Conditions						**Measured Frequency (MHz)**	
						60480	
T nom	**(°C)**	20	**V nom**	**(V)**	230	58992.3000	61411.9800
T min	**(°C)**	-40	**V max**	**(V)**	253	58992.3018	61411.9829
			V min	**(V)**	207	58992.3023	61411.9887
T max	**(°C)**	50	**V max**	**(V)**	253	58992.3054	61411.9825
			V min	**(V)**	207	58992.3059	61411.9811
Max. Deviation Frequency						58992.3000	61411.9887
Limit (MHz)						$f_L > 57000$	$f_H < 64000$
Result						**PASS**	

Test Conditions						Measured Frequency (MHz)	
						62640	
T nom	(°C)	20	V nom	(V)	230	60799.1929	63600.9334
T min	(°C)	-40	V max	(V)	253	60799.1967	63600.9347
			V min	(V)	207	60799.1955	63600.9387
T max	(°C)	50	V max	(V)	253	60799.1921	63600.9398
			V min	(V)	207	60799.1923	63600.9321
Max. Deviation Frequency						60799.1921	63600.9398
Limit (MHz)						$f_L > 57000$	$f_H < 64000$
Result						PASS	

3.4 Unwanted emissions in the out-of-band domain

3.4.1 Limit of Transmitter Unwanted Emissions

Frequency Range	Emission Limit
57 GHz to 64 GHz	-20dBm/MHz

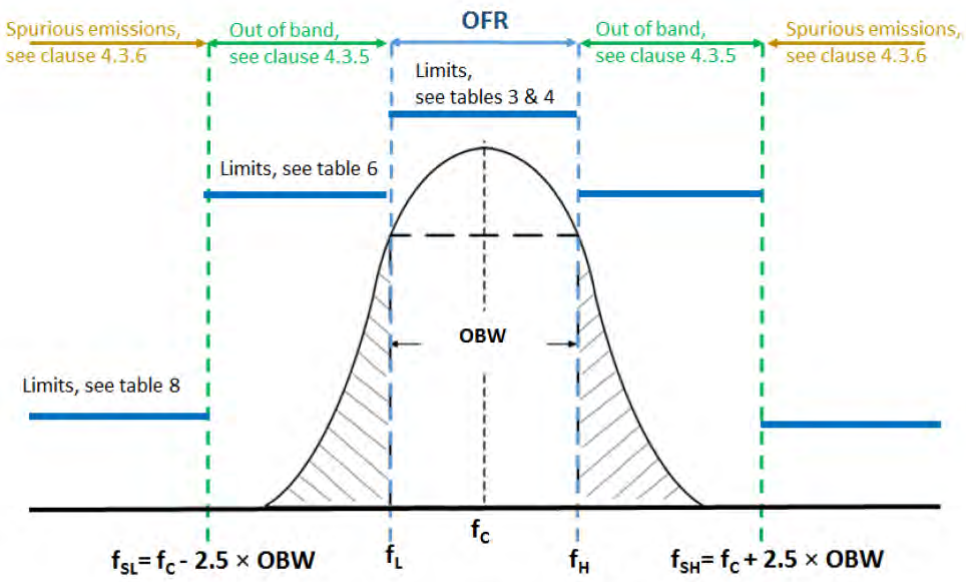


Figure 2: Emissions in the out-of-band and spurious domain

F1(fSL) = Centre frequency of OBW [GHz] - (2,5 * (fH - fL))

F2(fSH) = Centre frequency of OBW [GHz] + (2,5 * (fH - fL))

Note :

The boundary between the out-of-band and spurious domains is ±250 % of the necessary bandwidth (OBW) from the centre frequency of the emission.

The RMS power density radiated in the calculated OOB domain (between F1 ≤ f < fL and fH < f ≤ F2) band shall not exceed the Limits.

3.4.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.4.3 Test Procedures

Method of measurement: Refer as Draft EN 305 550 V2.1.0, clause 6.5.5.

3.4.4 Test Setup

Refer as report clause 3.1.4

3.4.5 Test Result of Unwanted emissions in the out-of-band domain

Test Conditions	see Draft EN 305 550 V2.1.0, clause 4.3.5
Test Setup	see Draft EN 305 550 V2.1.0, clause 6.5.5

Test Frequency (GHz)			58.32			
99% OBW (MHz)			2321.27			
OOB Frequency	**Rx Gain**	**Test Distance**	**OOB Measurement Level (dBm/MHz)**		**OOB Level (dBm/MHz)**	
			$f_{1\ Range}$	**$f_{L\ Range}$**	**$f_{1\ Range}$**	**$f_{L\ Range}$**
(GHz)	**(dBi)**	**(m)**	52516.83	57159.37	52516.83	57159.37
55.85933	23.6	0.5	-74.91		-37.15	
OOB Frequency	**Rx Gain**	**Test Distance**	**OOB Measurement Level (dBm/MHz)**		**OOB Level(dBm/MHz)**	
			$f_{H\ Range}$	**$f_{2\ Range}$**	**$f_{H\ Range}$**	**$f_{2\ Range}$**
(GHz)	**(dBi)**	**(m)**	59480.64	64123.18	59480.64	64123.18
59.96774	23.6	0.5	-76.58		-38.20	
Limit(dBm/MHz)			**-20**			
Result			**PASS**			

Test Frequency (GHz)			60.48			
99% OBW (MHz)			2419.68			
OOB Frequency	Rx Gain	Test Distance	OOB Measurement Level (dBm/MHz)		OOB Level (dBm/MHz)	
			$f_{1\ Range}$	$f_{L\ Range}$	$f_{1\ Range}$	$f_{L\ Range}$
(GHz)	(dBi)	(m)	54430.80	59270.16	54430.80	59270.16
58.7554	23.6	0.5	-73.71		-35.51	
OOB Frequency	Rx Gain	Test Distance	OOB Measurement Level (dBm/MHz)		OOB Level(dBm/MHz)	
			$f_{H\ Range}$	$f_{2\ Range}$	$f_{H\ Range}$	$f_{2\ Range}$
(GHz)	(dBi)	(m)	61689.84	66529.20	61689.84	66529.20
62.08554	23.6	0.5	-77.3		-38.62	
Limit(dBm/MHz)			-20			
Result			PASS			

Test Frequency (GHz)			62.64			
99% OBW (MHz)			2801.74			
OOB Frequency	Rx Gain	Test Distance	OOB Measurement Level (dBm/MHz)		OOB Level (dBm/MHz)	
			$f_{1\ Range}$	$f_{L\ Range}$	$f_{1\ Range}$	$f_{L\ Range}$
(GHz)	(dBi)	(m)	55635.65	61239.13	55635.65	61239.13
57.41565	23.6	0.5	-75.14		-37.14	
OOB Frequency	Rx Gain	Test Distance	OOB Measurement Level (dBm/MHz)		OOB Level(dBm/MHz)	
			$f_{H\ Range}$	$f_{2\ Range}$	$f_{H\ Range}$	$f_{2\ Range}$
(GHz)	(dBi)	(m)	64040.87	69644.35	64040.87	69644.35
67.76707	23.6	0.5	-79.78		-40.34	
Limit(dBm/MHz)			-20			
Result			PASS			

3.5 Transmitter Unwanted Emissions

3.5.1 Limit of Transmitter Unwanted Emissions

Frequency Range	Emission Limit	Measurement 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 300 GHz(Note)	-30 dBm	1 MHz
NOTE: According to CEPT/ERC/REC 74-01 [i.3], spurious emission is measured up to the 2nd harmonic of the fundamental frequency.		

3.5.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.5.3 Test Procedures

Method of measurement: Refer as Refer as Draft EN 305 550 V2.1.0, clause 6.5.5

3.5.4 Test Setup

Refer as report clause 3.1.4

3.5.5 Test Result of Transmitter Unwanted Emissions

Test Conditions	see Draft EN 305 550 V2.1.0, clause 4.3.6
Test Setup	see Draft EN 305 550 V2.1.0, clause 6.5.5

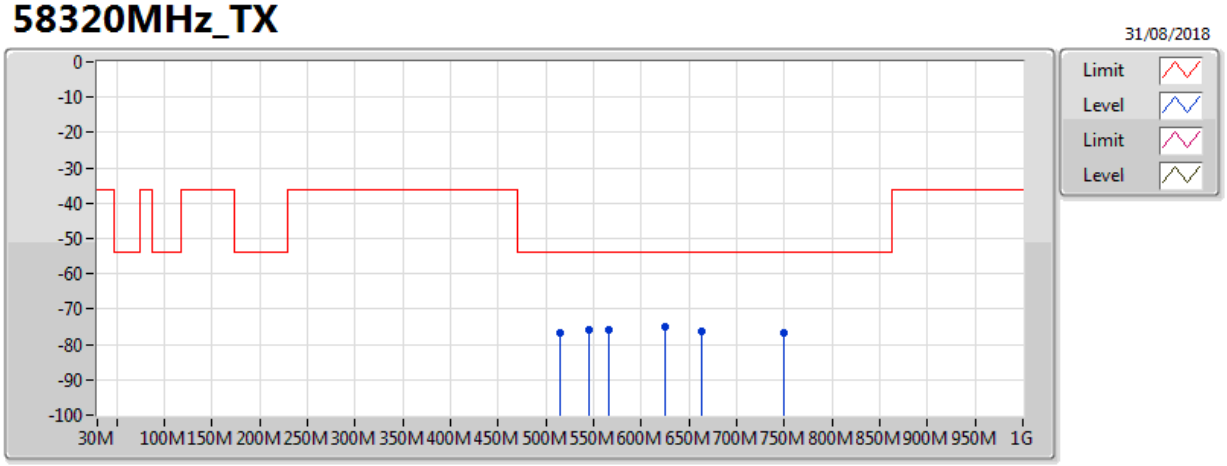
3.5.5.1 Test Result of Transmitter Unwanted Emissions (30MHz~1GHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBm)	Limit (dBm)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
60G	-	-	-	-	-	-	-	-	-	-	-	-
802.11ad_Nss1_1TX	Pass	PK	746.95125M	-59.67	-54.00	-5.67	2.94	1	Horizontal	360	1.65	-

802.11ad_Nss1_1TX

58320MHz_TX

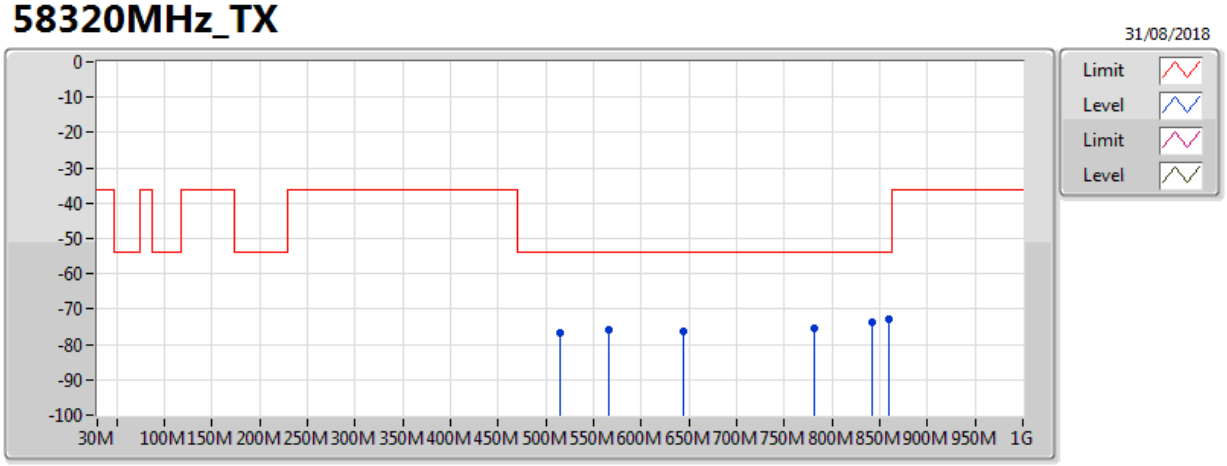


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
514.418M	-76.93	-54.00	-22.93	-0.03	Vertical
544.682M	-75.75	-54.00	-21.75	0.66	Vertical
566.313M	-75.70	-54.00	-21.70	1.15	Vertical
624.998M	-75.09	-54.00	-21.09	2.13	Vertical
663.119M	-76.40	-54.00	-22.40	2.43	Vertical
750.031M	-76.58	-54.00	-22.58	2.96	Vertical

802.11ad_Nss1_1TX

58320MHz_TX

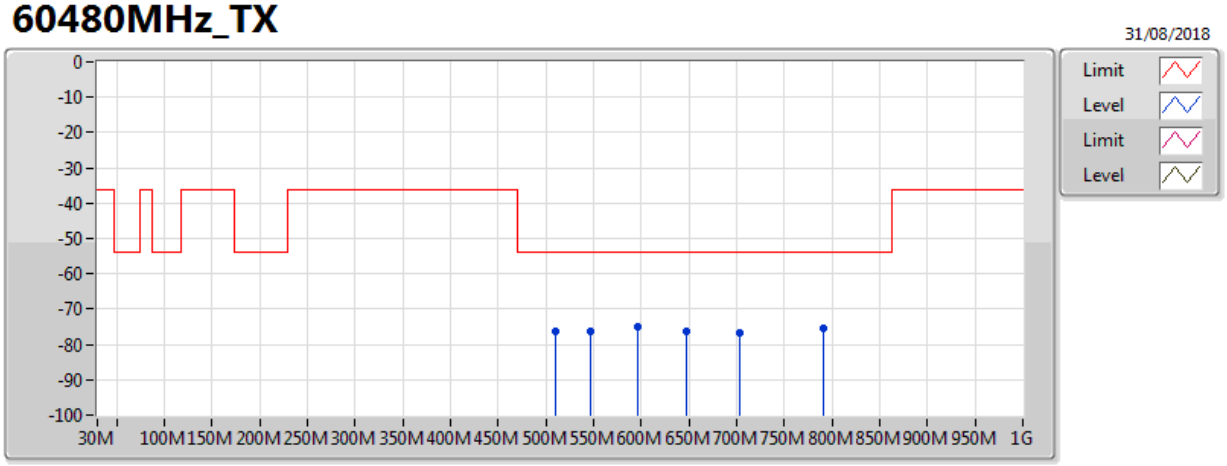


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
514.418M	-76.85	-54.00	-22.85	0.05	Horizontal
566.313M	-75.71	-54.00	-21.71	1.14	Horizontal
643.913M	-76.09	-54.00	-22.09	2.29	Horizontal
780.683M	-75.44	-54.00	-21.44	3.01	Horizontal
842.569M	-73.86	-54.00	-19.86	3.31	Horizontal
860.029M	-72.85	-54.00	-18.85	3.42	Horizontal

802.11ad_Nss1_1TX

60480MHz_TX

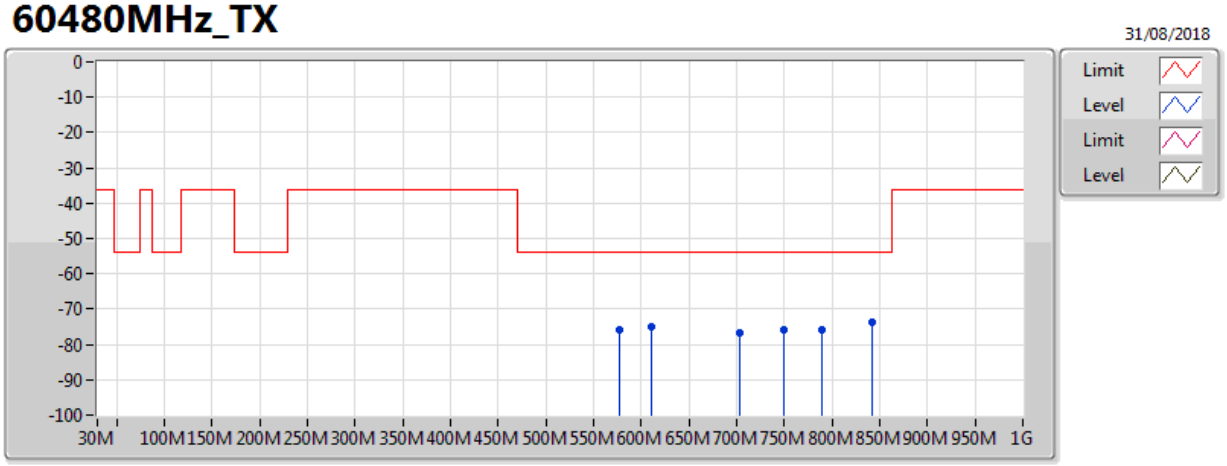


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
510.635M	-76.32	-54.00	-22.32	-0.12	Vertical
546.331M	-76.50	-54.00	-22.50	0.70	Vertical
596.189M	-74.95	-54.00	-20.95	1.84	Vertical
647.405M	-76.22	-54.00	-22.22	2.31	Vertical
702.792M	-76.68	-54.00	-22.68	2.74	Vertical
791.256M	-75.32	-54.00	-21.32	3.16	Vertical

802.11ad_Nss1_1TX

60480MHz_TX

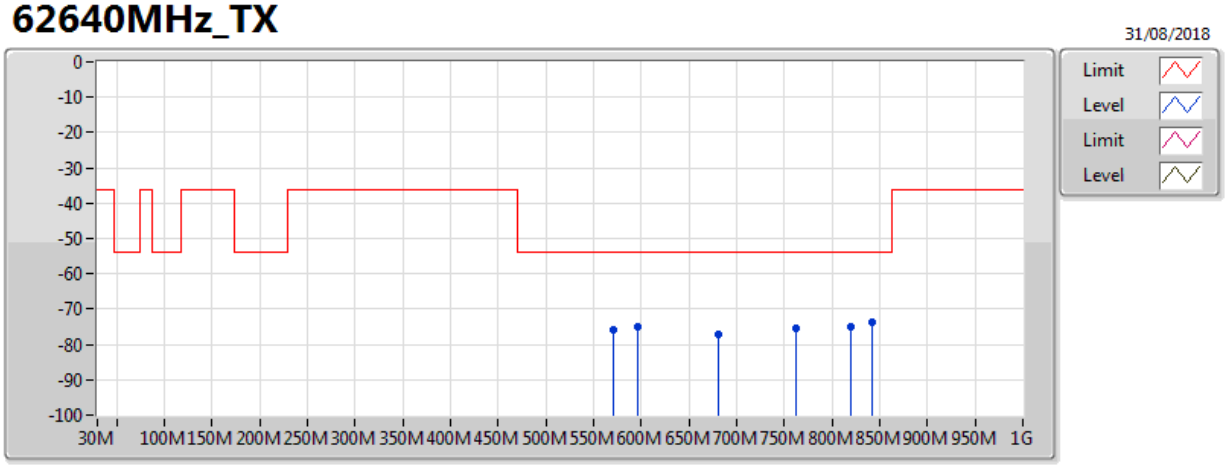


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
577.274M	-75.74	-54.00	-21.74	1.37	Horizontal
611.224M	-74.92	-54.00	-20.92	1.96	Horizontal
702.792M	-76.56	-54.00	-22.56	2.86	Horizontal
750.031M	-76.02	-54.00	-22.02	2.95	Horizontal
789.704M	-75.74	-54.00	-21.74	3.03	Horizontal
841.502M	-73.58	-54.00	-19.58	3.30	Horizontal

802.11ad_Nss1_1TX

62640MHz_TX

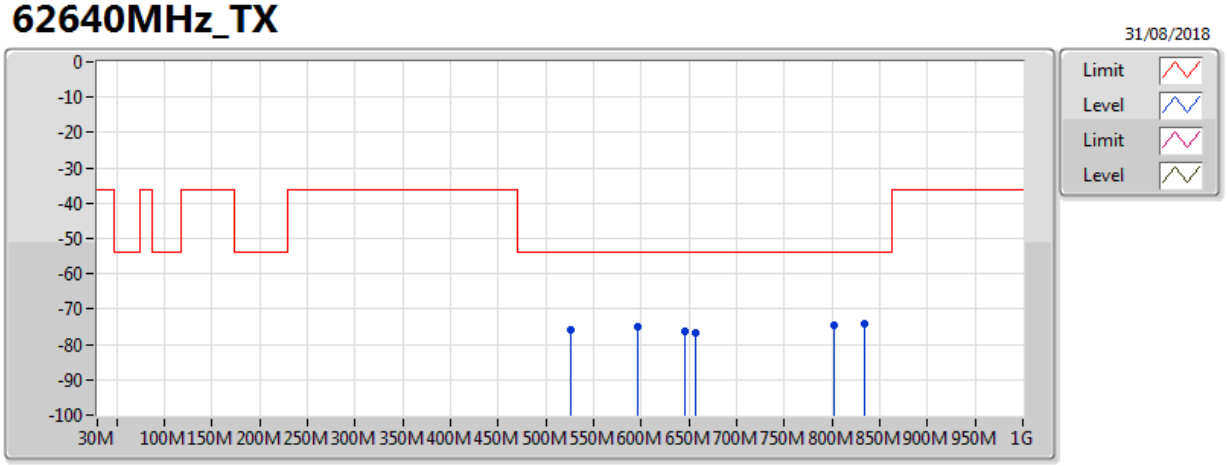


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
571.551M	-75.87	-54.00	-21.87	1.28	Vertical
596.189M	-74.95	-54.00	-20.95	1.84	Vertical
680.385M	-77.07	-54.00	-23.07	2.57	Vertical
761.671M	-75.58	-54.00	-21.58	3.02	Vertical
819.677M	-74.88	-54.00	-20.88	3.26	Vertical
841.502M	-73.54	-54.00	-19.54	3.34	Vertical

802.11ad_Nss1_1TX

62640MHz_TX



EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
525.864M	-75.69	-54.00	-21.69	0.29	Horizontal
596.189M	-75.02	-54.00	-21.02	1.77	Horizontal
646.435M	-76.08	-54.00	-22.08	2.31	Horizontal
657.687M	-76.86	-54.00	-22.86	2.42	Horizontal
801.441M	-74.54	-54.00	-20.54	3.06	Horizontal
833.354M	-74.35	-54.00	-20.35	3.25	Horizontal

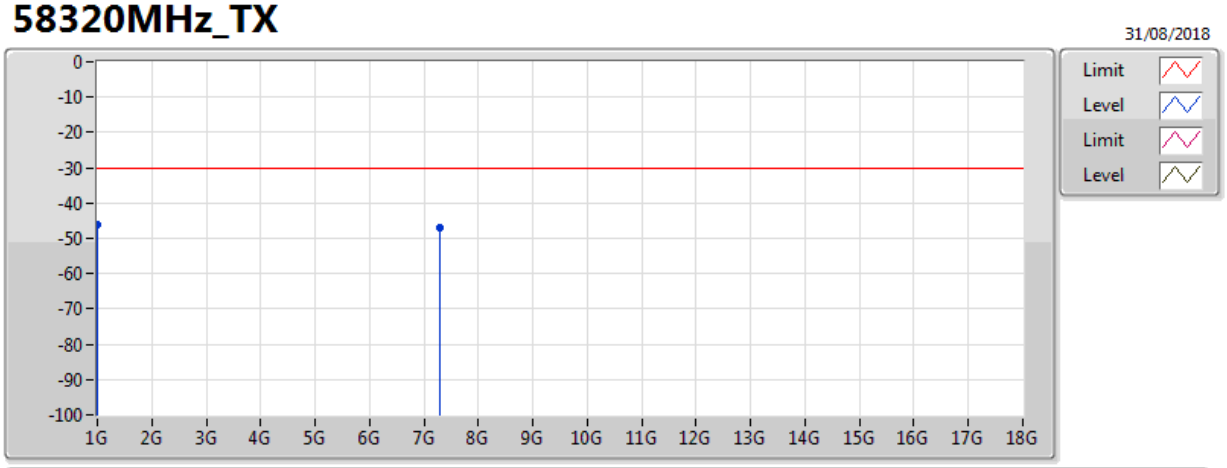
3.5.5.2 Test Result of Transmitter Unwanted Emissions (1GHz~40GHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBm)	Limit (dBm)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
60G	-	-	-	-	-	-	-	-	-	-	-	-
802.11ad_Nss1_1TX	Pass	PK	999.961335 M	-46.17	-36.00	-10.17	-21.67	1	Vertical	0	1.65	-

802.11ad_Nss1_1TX

58320MHz_TX

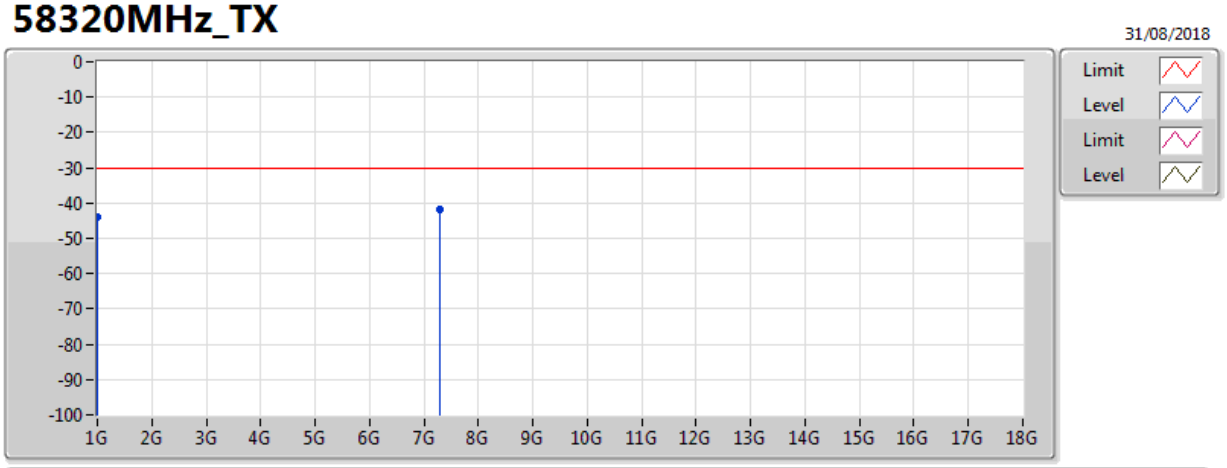


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
999.961335M	-46.17	-36.00	-10.17	-21.67	Vertical
7.290104G	-46.81	-30.00	-16.81	2.03	Vertical

802.11ad_Nss1_1TX

58320MHz_TX

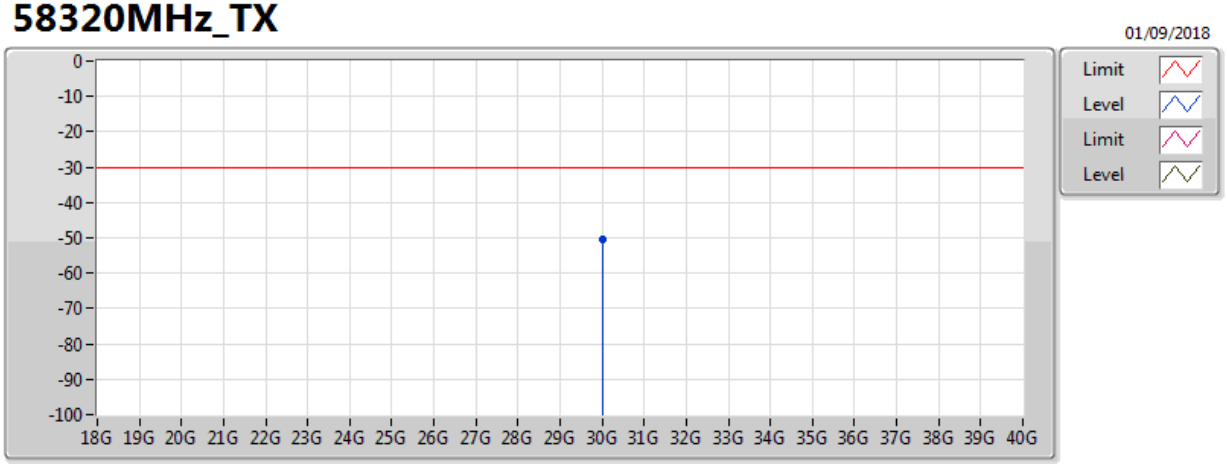


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1.00001G	-44.03	-30.00	-14.03	-20.62	Horizontal
7.290029G	-41.76	-30.00	-11.76	0.92	Horizontal

802.11ad_Nss1_1TX

58320MHz_TX

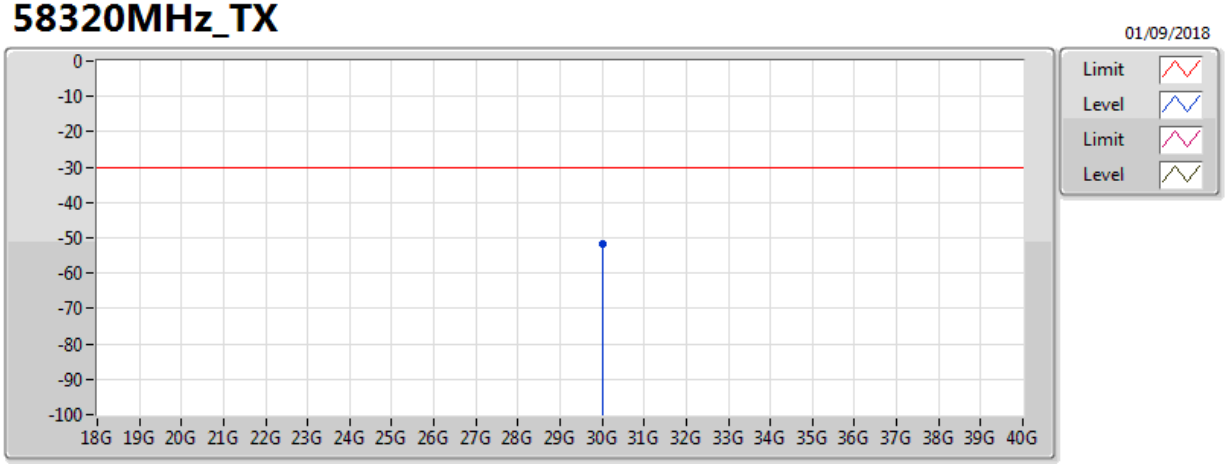


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.001733G	-50.28	-30.00	-20.28	16.92	Vertical

802.11ad_Nss1_1TX

58320MHz_TX

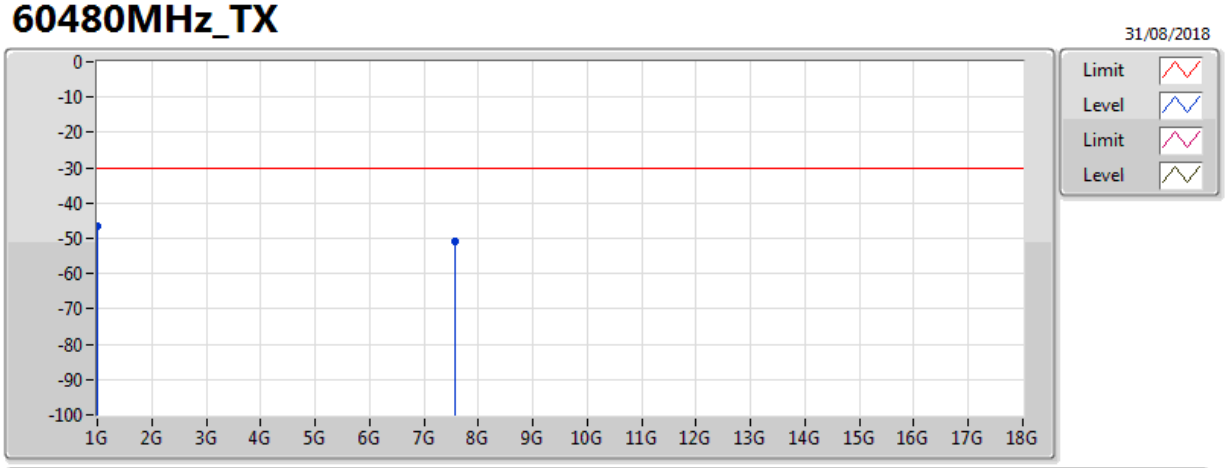


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.0032G	-51.83	-30.00	-21.83	15.53	Horizontal

802.11ad_Nss1_1TX

60480MHz_TX

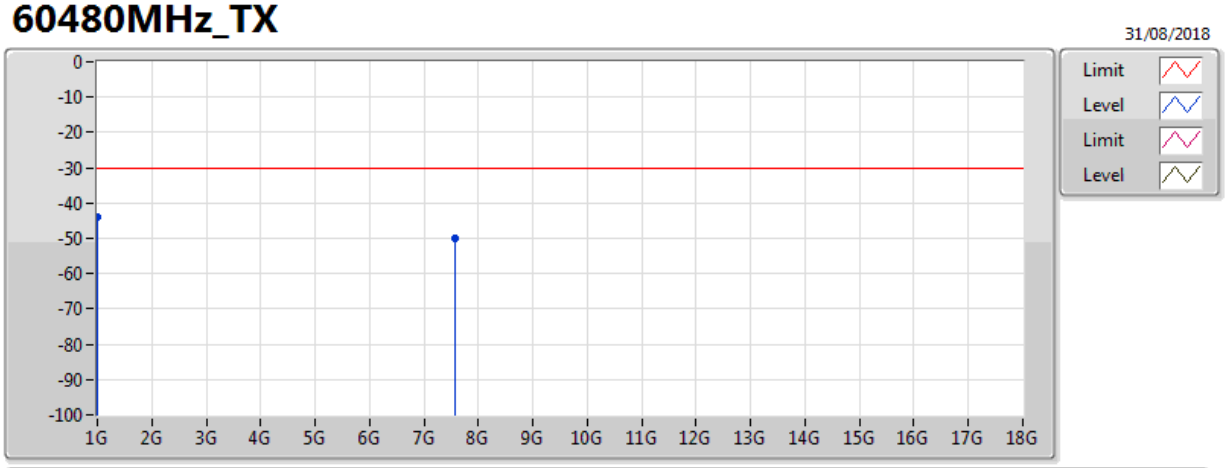


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1G	-46.53	-30.00	-16.53	-21.67	Vertical
7.560074G	-50.86	-30.00	-20.86	3.23	Vertical

802.11ad_Nss1_1TX

60480MHz_TX

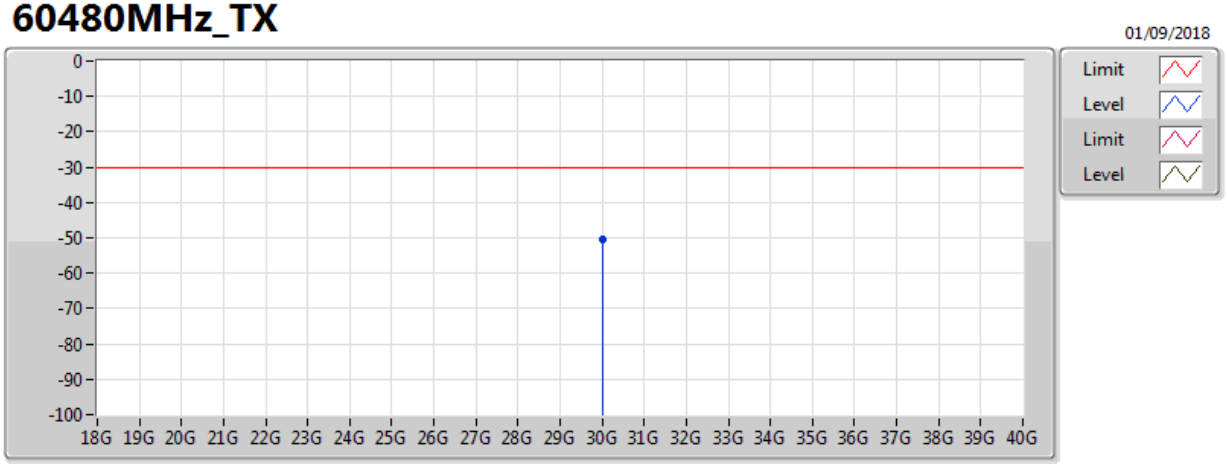


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1G	-44.06	-30.00	-14.06	-20.62	Horizontal
7.559929G	-50.16	-30.00	-20.16	1.12	Horizontal

802.11ad_Nss1_1TX

60480MHz_TX

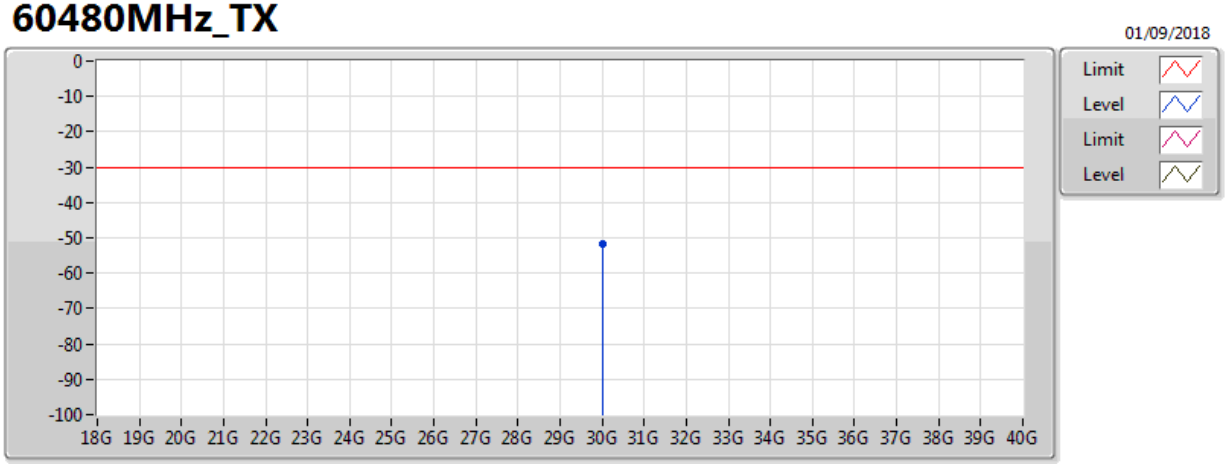


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.004667G	-50.43	-30.00	-20.43	16.92	Vertical

802.11ad_Nss1_1TX

60480MHz_TX

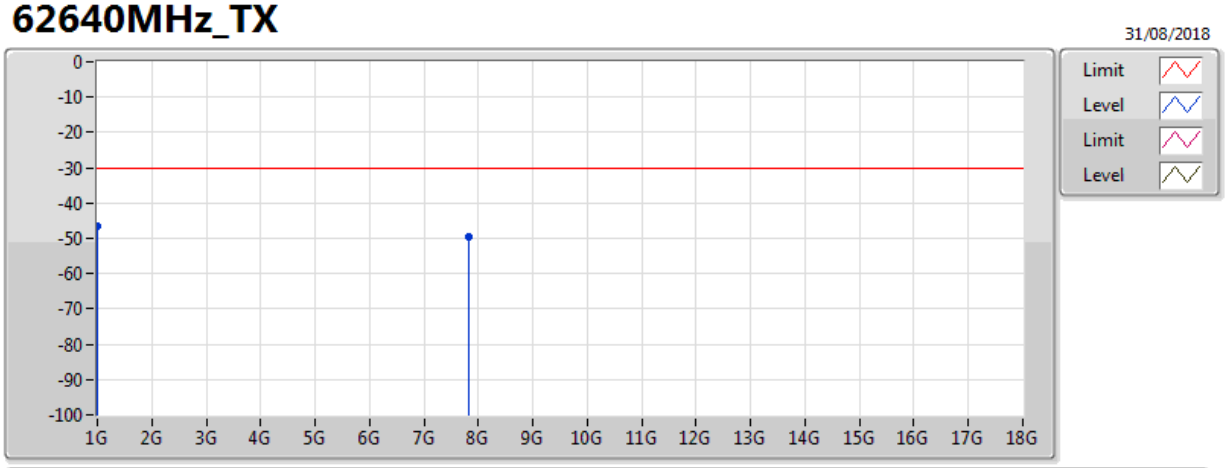


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.0032G	-51.58	-30.00	-21.58	15.53	Horizontal

802.11ad_Nss1_1TX

62640MHz_TX

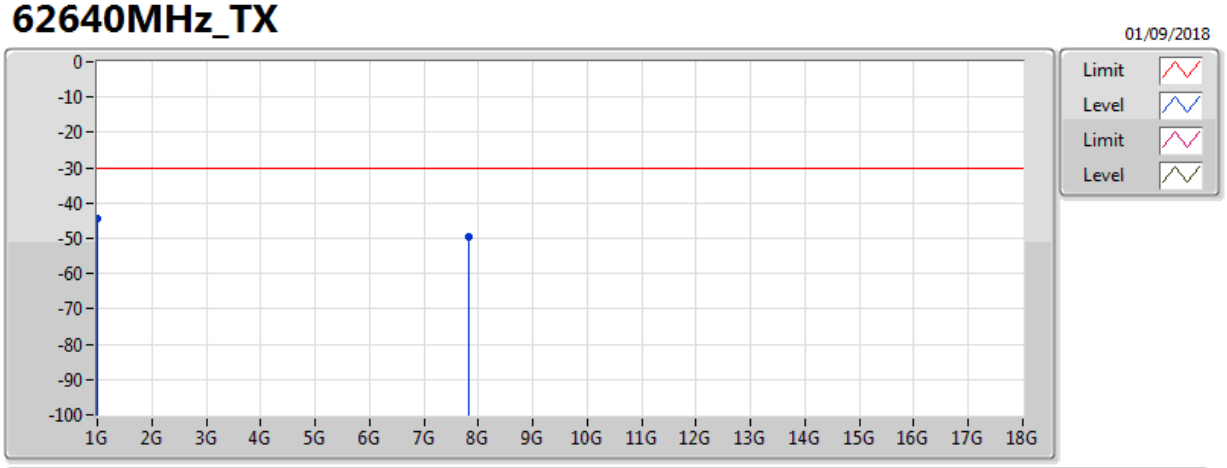


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1G	-46.47	-30.00	-16.47	-21.67	Vertical
7.83001G	-49.64	-30.00	-19.64	4.03	Vertical

802.11ad_Nss1_1TX

62640MHz_TX

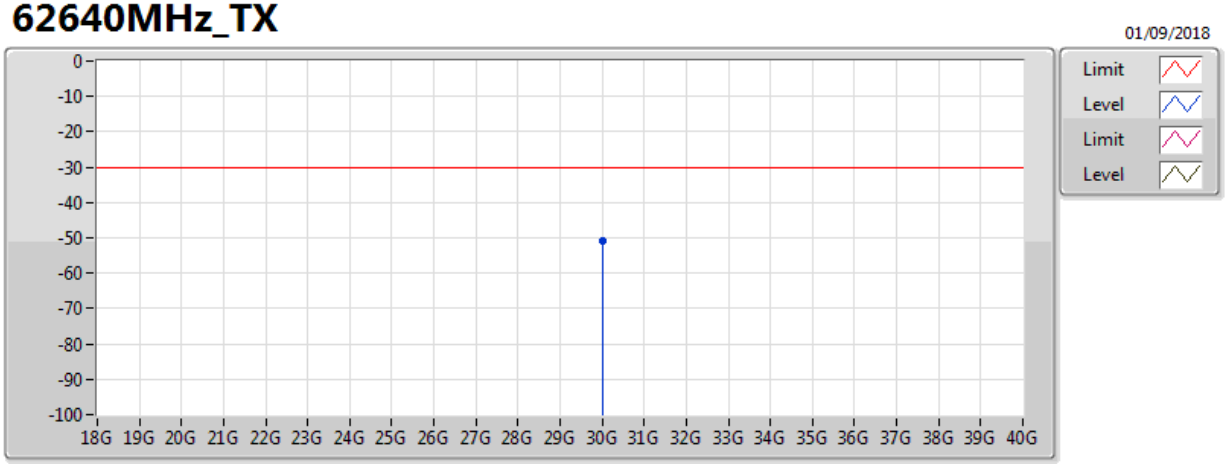


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1.000028G	-44.29	-30.00	-14.29	-20.62	Horizontal
7.830021G	-49.71	-30.00	-19.71	1.92	Horizontal

802.11ad_Nss1_1TX

62640MHz_TX

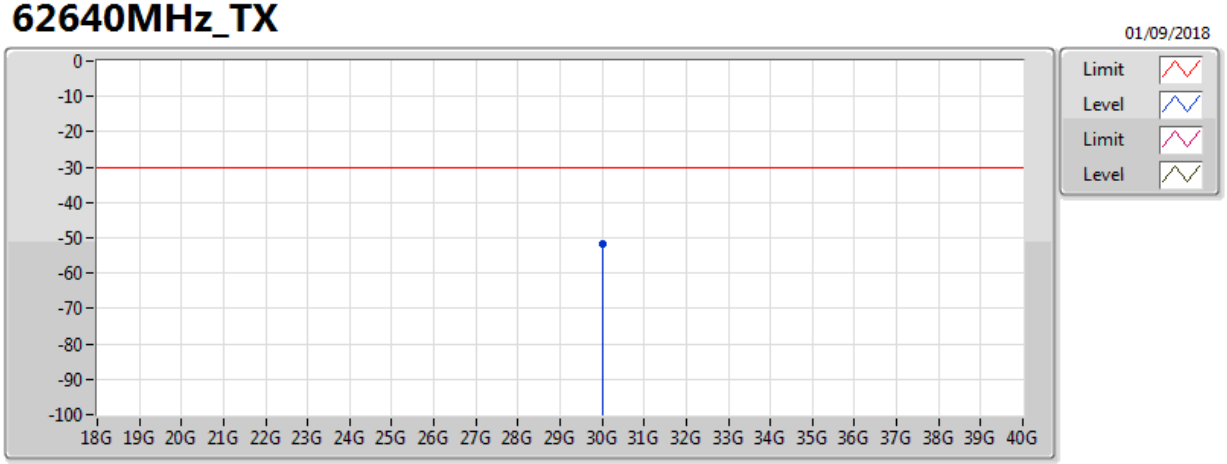


EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.001733G	-50.72	-30.00	-20.72	16.92	Vertical

802.11ad_Nss1_1TX

62640MHz_TX



EUT Y_1TX
Setting Default
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.0032G	-51.76	-30.00	-21.76	15.53	Horizontal

3.5.5.3 Test Result of Transmitter Unwanted Emissions (40GHz~2th Harmonic)

Test Frequency(GHz)			58.32		
Emission Frequency (GHz)	Test Distance (m)	Measured Level(dBm)	Rx Gain (dBi)	Emission Level(dBm)	Limit(dBm)
50.0856	0.5	-74.46	23.6	-37.64	-30.00

Test Frequency(GHz)			60.48		
Emission Frequency (GHz)	Test Distance (m)	Measured Level(dBm)	Rx Gain (dBi)	Emission Level(dBm)	Limit(dBm)
51.369	0.5	-77.89	23.6	-40.85	-30.00

Test Frequency(GHz)			62.64		
Emission Frequency (GHz)	Test Distance (m)	Measured Level(dBm)	Rx Gain (dBi)	Emission Level(dBm)	Limit(dBm)
55.5989	0.5	-75.14	23.6	-37.42	-30.00

Note:

The measured power level is converted to EIRP using the Fries equation:

$EIRP = P_T * G_T = (P_R / G_R) * (4 * Pi * D / \lambda)^2$

P_R = measured channel power

G_R = 23.6 dBi, The gain of the receive measurement antenna

D = The measurement distance

λ = The wavelength.

Note 1: DUT - Receive Antenna Distance = Test Distance, all test was conducted at far-field distance.
Note 2: Factor: Transmit Antenna Gain + Signal Generator Level - SA reading - Transmit Cable Loss.
Level= Read Level + Factor.

4 Receiver Test Result

4.1 Receiver Unwanted Emissions

4.1.1 Limit of Receiver Unwanted Emissions

Frequency Range	Limit
30 MHz - 1 GHz	2 nW (-57dBm erp)
1 GHz – 2th Harmonic	20 nW (-47dBm erp)

4.1.2 Measuring Instruments

Refer a measuring instruments list in this test report.

4.1.3 Test Procedures

Method of measurement: Refer as Draft EN 305 550 V2.1.0, clause 6.6.1

4.1.4 Test Setup

Refer as report clause 3.1.4

4.1.5 Test Result of Receiver Unwanted Emissions

Test Conditions:	Standby Mode
Test Setup :	see Draft EN 305 550 V2.1.0, clause 6.6.1

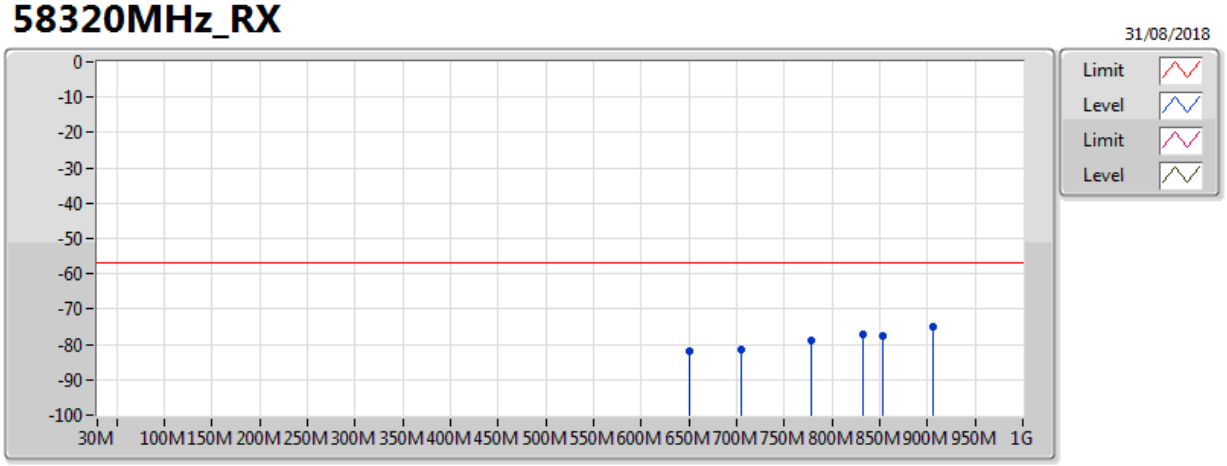
4.1.5.1 Test Result of Receiver Unwanted Emissions (30MHz~1GHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBm)	Limit (dBm)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
60G	-	-	-	-	-	-	-	-	-	-	-	-
802.11ad_Nss1_1TX	Fail	AV	999.9883M	-50.89	-57.00	6.11	4.38	3	Horizontal	360	1.57	-

802.11ad_Nss1_1RX

58320MHz_RX

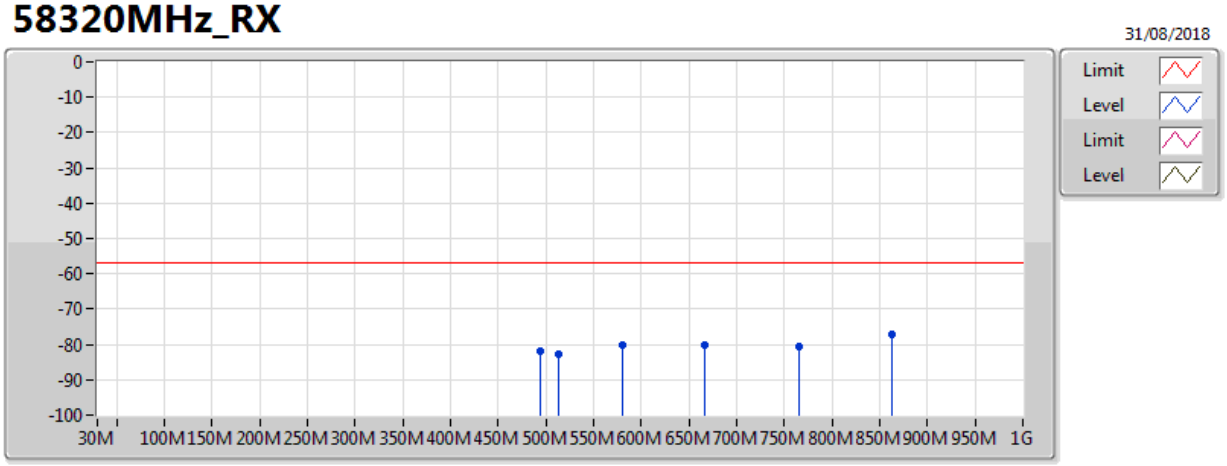


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
650.897M	-81.94	-57.00	-24.94	2.34	Vertical
704.926M	-81.36	-57.00	-24.36	2.75	Vertical
778.452M	-79.08	-57.00	-22.08	3.09	Vertical
831.802M	-76.94	-57.00	-19.94	3.31	Vertical
853.821M	-77.58	-57.00	-20.58	3.39	Vertical
906.104M	-75.19	-57.00	-18.19	3.60	Vertical

802.11ad_Nss1_1RX

58320MHz_RX

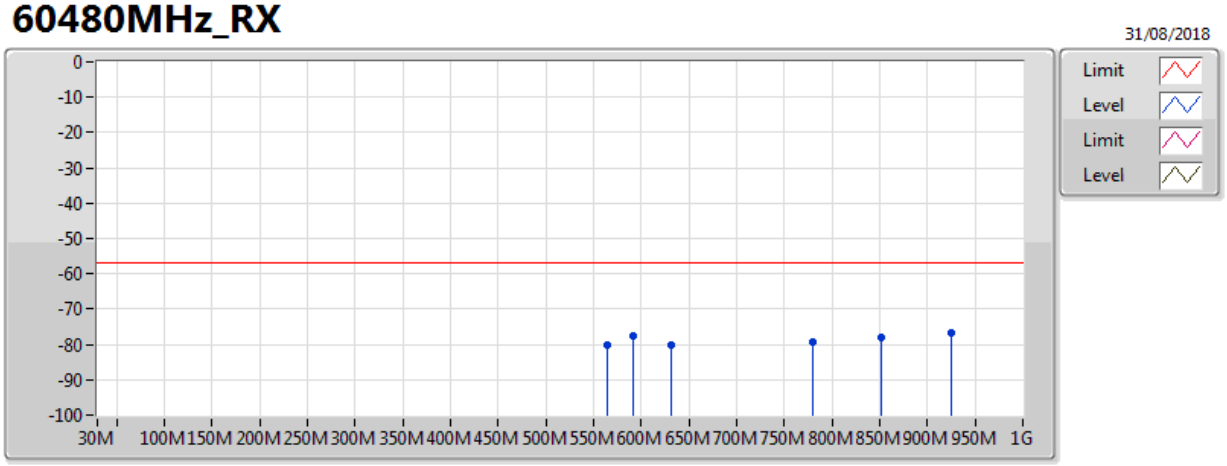


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
494.048M	-82.07	-57.00	-25.07	-0.41	Horizontal
512.963M	-82.56	-57.00	-25.56	0.02	Horizontal
581.154M	-79.96	-57.00	-22.96	1.44	Horizontal
666.417M	-80.17	-57.00	-23.17	2.51	Horizontal
765.454M	-80.60	-57.00	-23.60	2.98	Horizontal
862.745M	-77.34	-57.00	-20.34	3.44	Horizontal

802.11ad_Nss1_1RX

60480MHz_RX



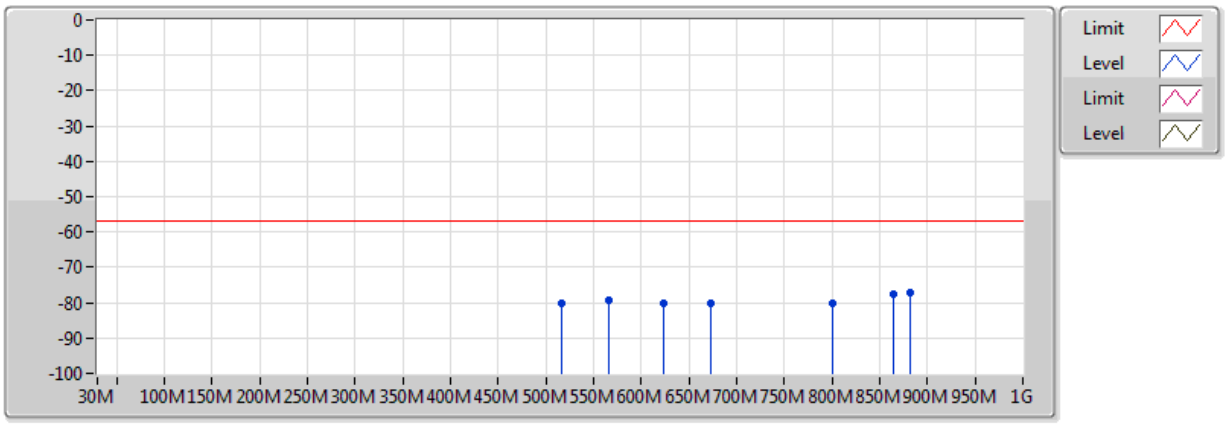
EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
564.955M	-80.25	-57.00	-23.25	1.12	Vertical
592.115M	-77.64	-57.00	-20.64	1.74	Vertical
630.721M	-80.00	-57.00	-23.00	2.18	Vertical
779.81M	-79.12	-57.00	-22.12	3.10	Vertical
852.075M	-78.23	-57.00	-21.23	3.38	Vertical
925.698M	-76.90	-57.00	-19.90	3.75	Vertical

802.11ad_Nss1_1RX

60480MHz_RX

31/08/2018

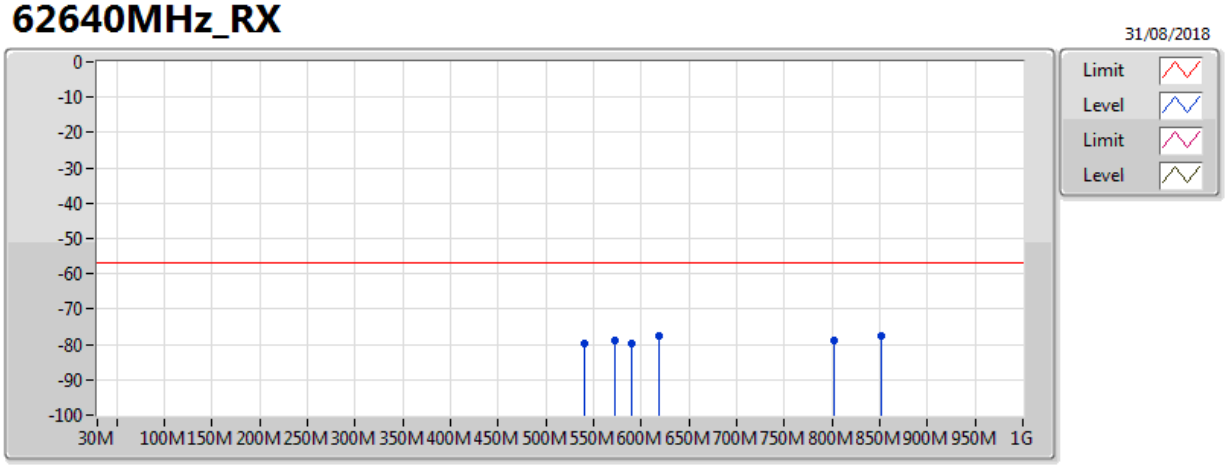


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
516.455M	-80.24	-57.00	-23.24	0.10	Horizontal
565.828M	-79.18	-57.00	-22.18	1.13	Horizontal
623.252M	-80.34	-57.00	-23.34	2.08	Horizontal
672.528M	-80.00	-57.00	-23.00	2.58	Horizontal
801.053M	-80.12	-57.00	-23.12	3.06	Horizontal
864.006M	-77.38	-57.00	-20.38	3.44	Horizontal
882.339M	-77.03	-57.00	-20.03	3.55	Horizontal

802.11ad_Nss1_1RX

62640MHz_RX



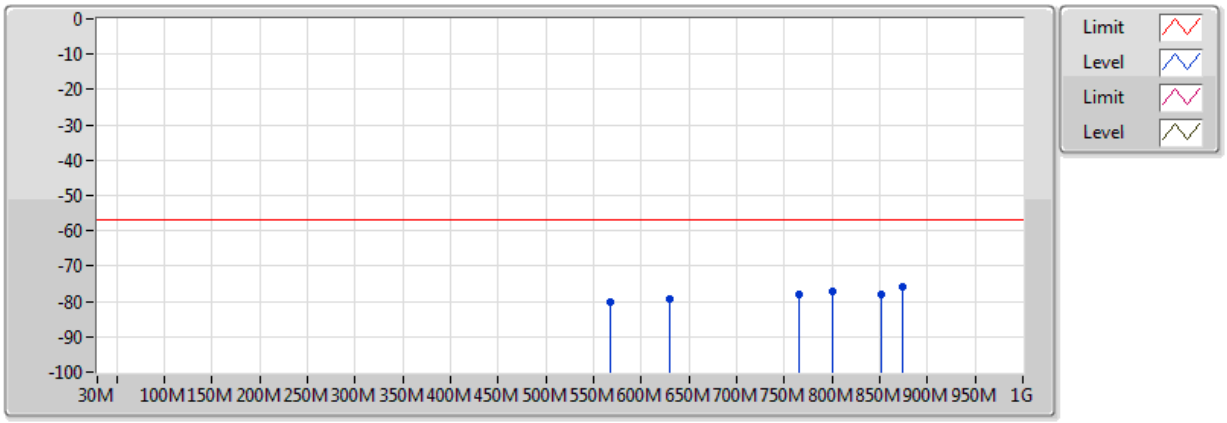
EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
540.026M	-79.54	-57.00	-22.54	0.56	Vertical
572.521M	-78.74	-57.00	-21.74	1.30	Vertical
590.078M	-79.72	-57.00	-22.72	1.69	Vertical
618.984M	-77.53	-57.00	-20.53	2.08	Vertical
801.732M	-78.71	-57.00	-21.71	3.20	Vertical
851.687M	-77.41	-57.00	-20.41	3.38	Vertical

802.11ad_Nss1_1RX

62640MHz_RX

31/08/2018



EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
567.962M	-80.27	-57.00	-23.27	1.18	Horizontal
630.624M	-79.23	-57.00	-22.23	2.16	Horizontal
765.551M	-78.13	-57.00	-21.13	2.98	Horizontal
799.986M	-77.33	-57.00	-20.33	3.05	Horizontal
850.911M	-77.89	-57.00	-20.89	3.36	Horizontal
873.318M	-75.75	-57.00	-18.75	3.50	Horizontal

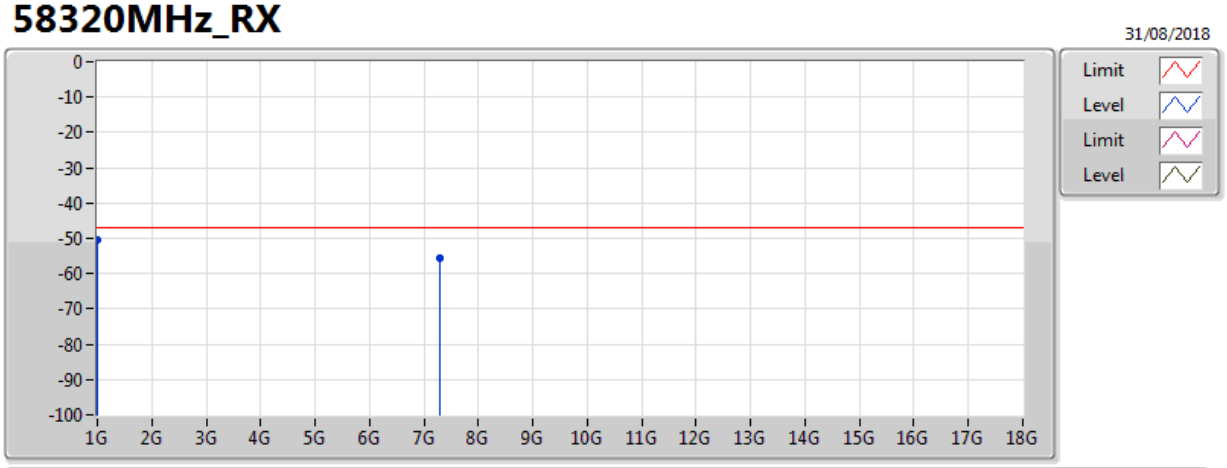
4.1.5.2 Test Result of Receiver Unwanted Emissions (1GHz~40GHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBm)	Limit (dBm)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
60G	-	-	-	-	-	-	-	-	-	-	-	-
802.11ad_Nss1_1TX	Pass	PK	1.00005G	-47.60	-47.00	-0.60	-20.62	1	Horizontal	360	1.65	-

802.11ad_Nss1_1RX

58320MHz_RX

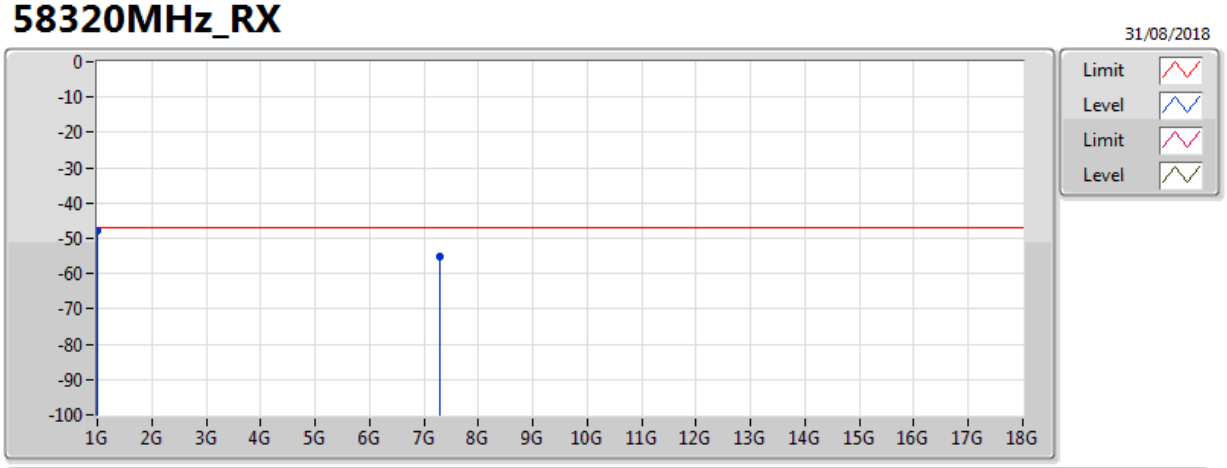


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1.000008G	-50.53	-47.00	-3.53	-21.67	Vertical
7.289883G	-55.67	-47.00	-8.67	2.03	Vertical

802.11ad_Nss1_1RX

58320MHz_RX

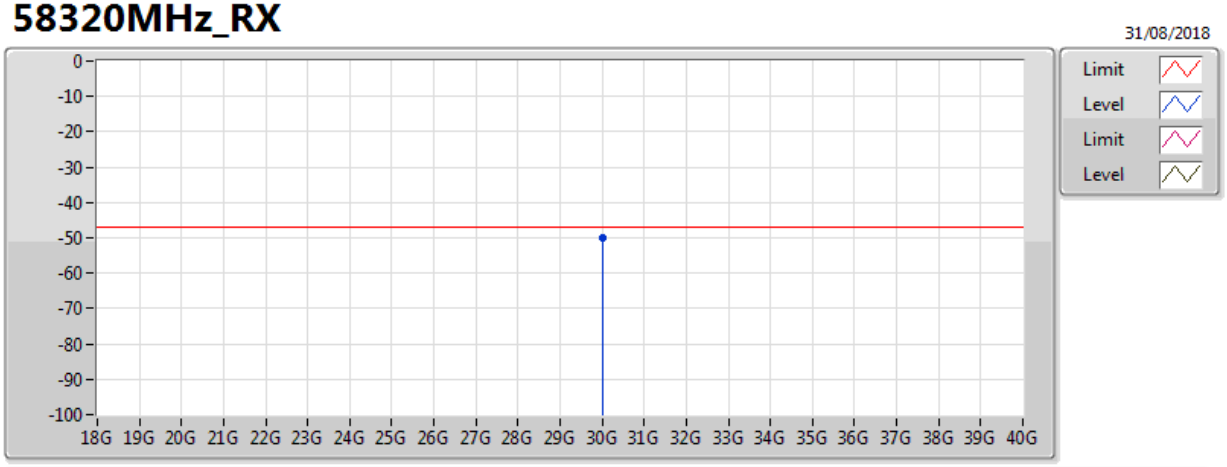


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1G	-47.67	-47.00	-0.67	-20.62	Horizontal
7.289963G	-55.36	-47.00	-8.36	0.92	Horizontal

802.11ad_Nss1_1RX

58320MHz_RX

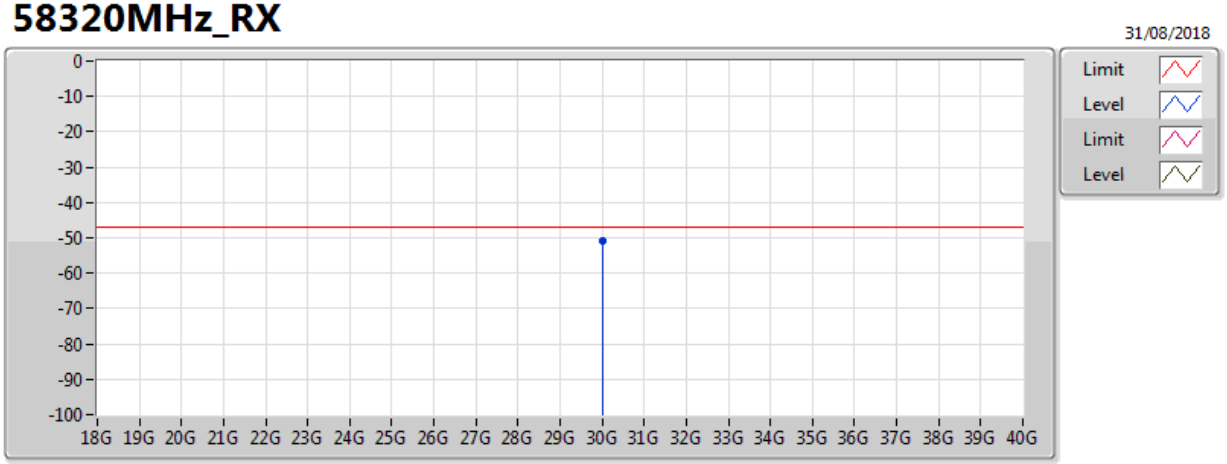


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.001733G	-49.79	-47.00	-2.79	16.92	Vertical

802.11ad_Nss1_1RX

58320MHz_RX

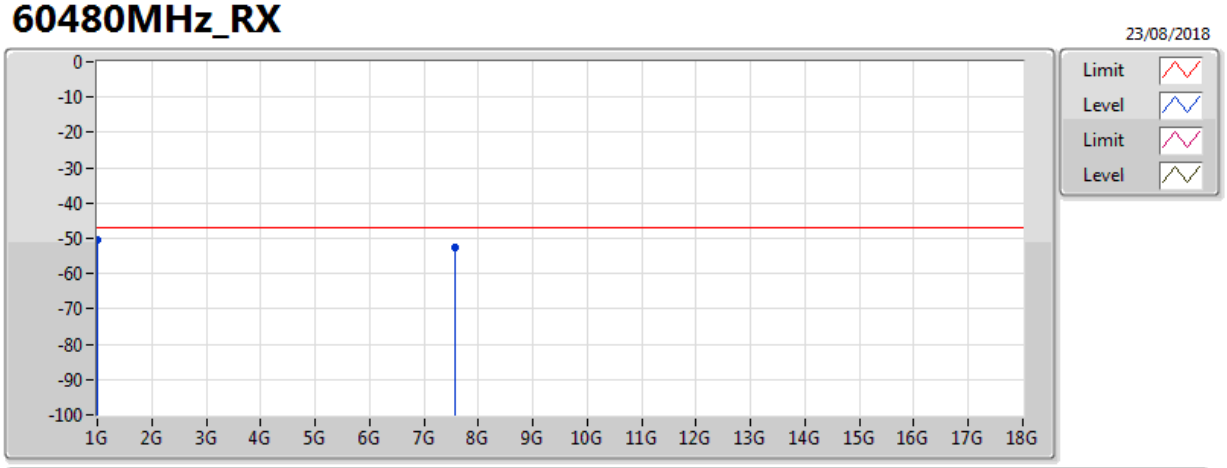


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.0032G	-50.80	-47.00	-3.80	15.53	Horizontal

802.11ad_Nss1_1RX

60480MHz_RX

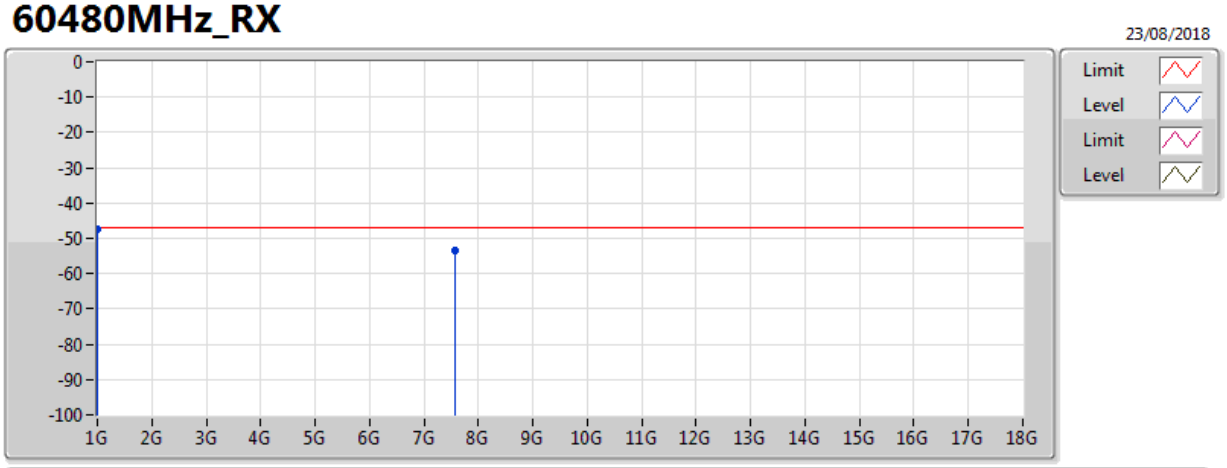


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1G	-50.58	-47.00	-3.58	-21.67	Vertical
7.559935G	-52.62	-47.00	-5.62	3.23	Vertical

802.11ad_Nss1_1RX

60480MHz_RX

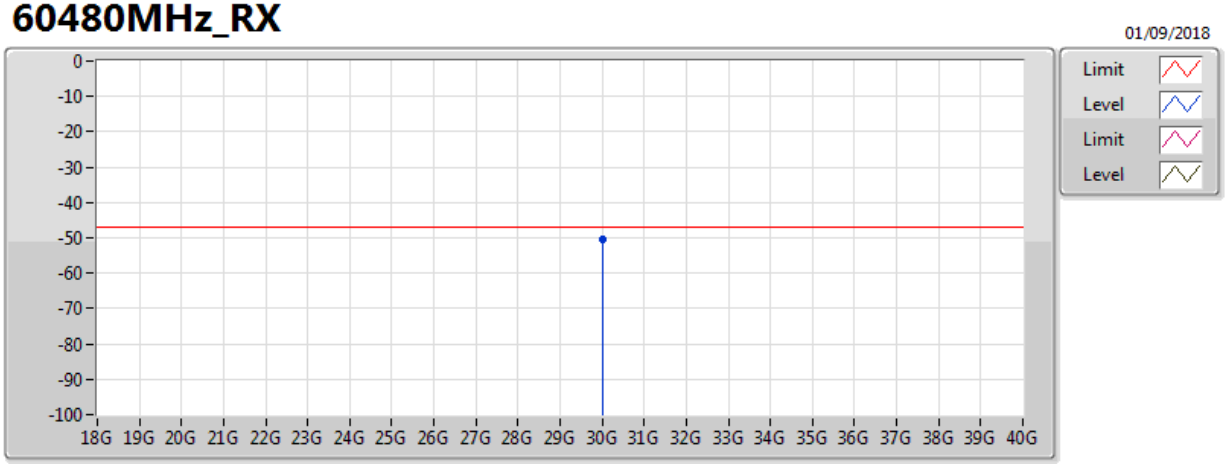


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1.00005G	-47.60	-47.00	-0.60	-20.62	Horizontal
7.559991G	-53.50	-47.00	-6.50	1.12	Horizontal

802.11ad_Nss1_1RX

60480MHz_RX

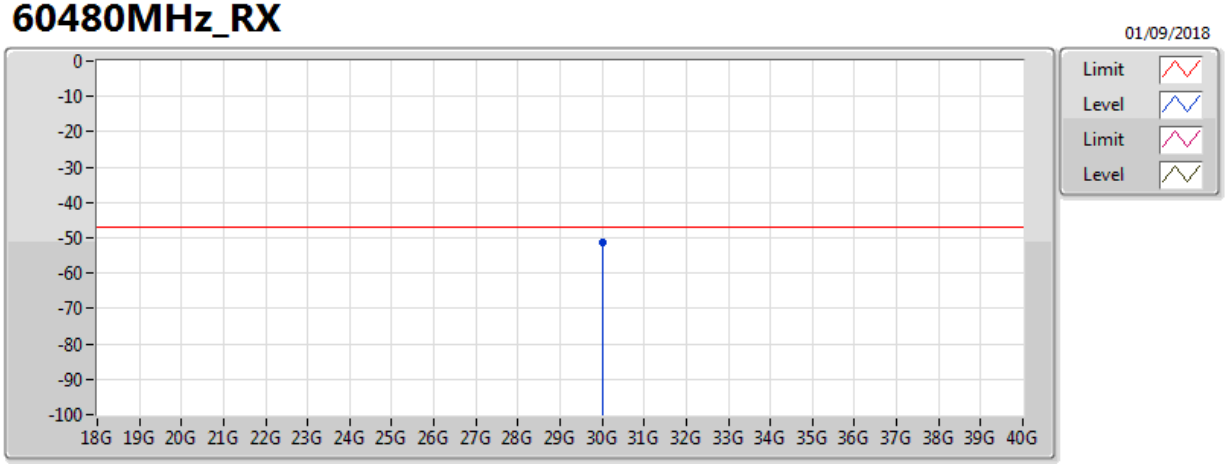


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.003933G	-50.25	-47.00	-3.25	16.92	Vertical

802.11ad_Nss1_1RX

60480MHz_RX

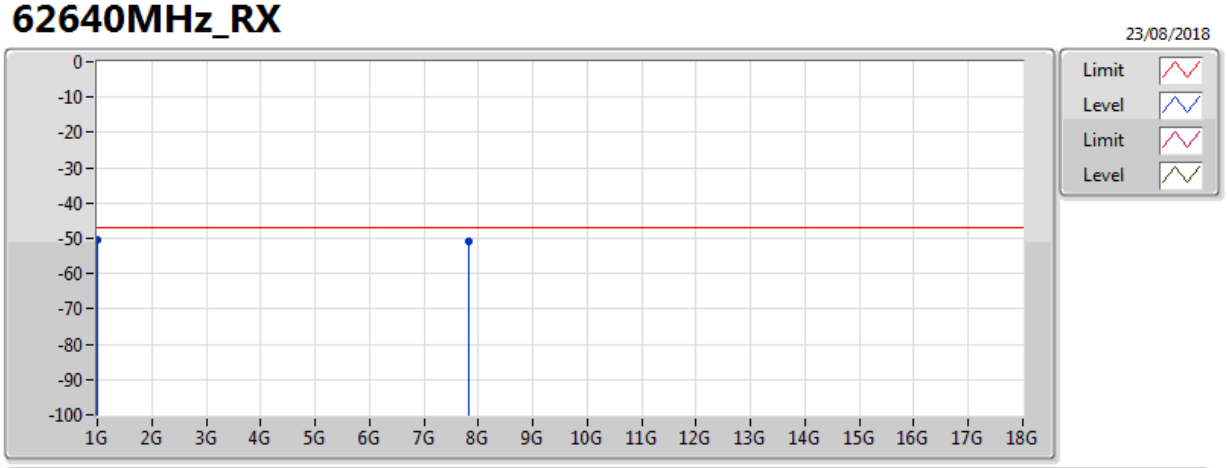


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.008333G	-51.09	-47.00	-4.09	15.54	Horizontal

802.11ad_Nss1_1RX

62640MHz_RX

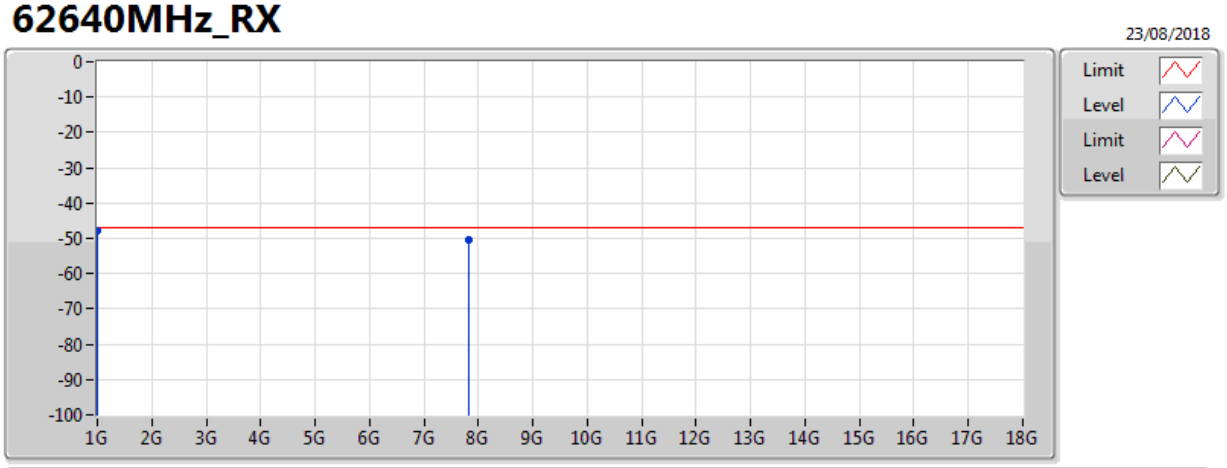


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
7.830075G	-50.70	-47.00	-3.70	4.03	Vertical
1.000024G	-50.57	-47.00	-3.57	-21.67	Vertical

802.11ad_Nss1_1RX

62640MHz_RX

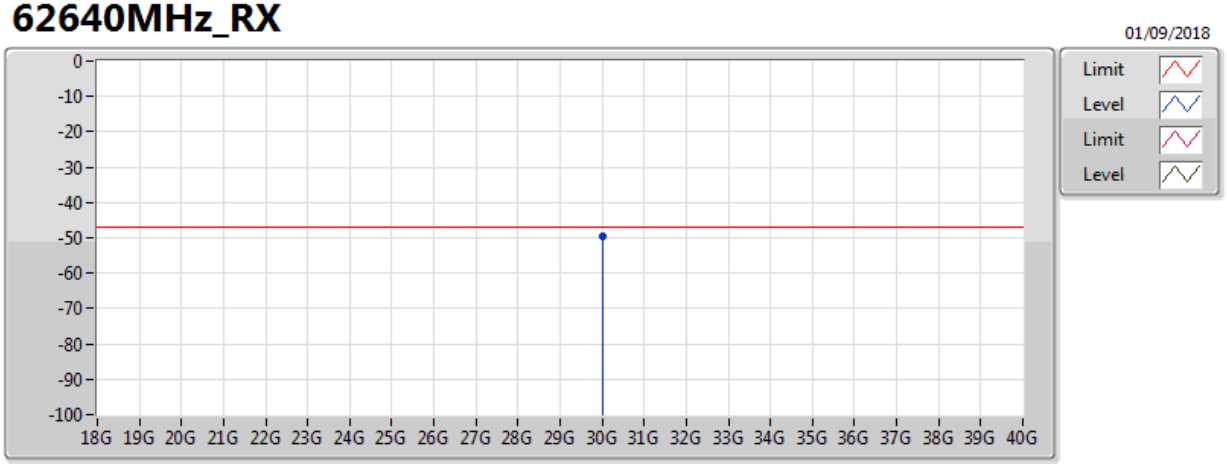


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
1G	-47.67	-47.00	-0.67	-20.62	Horizontal
7.829991G	-50.27	-47.00	-3.27	1.92	Horizontal

802.11ad_Nss1_1RX

62640MHz_RX

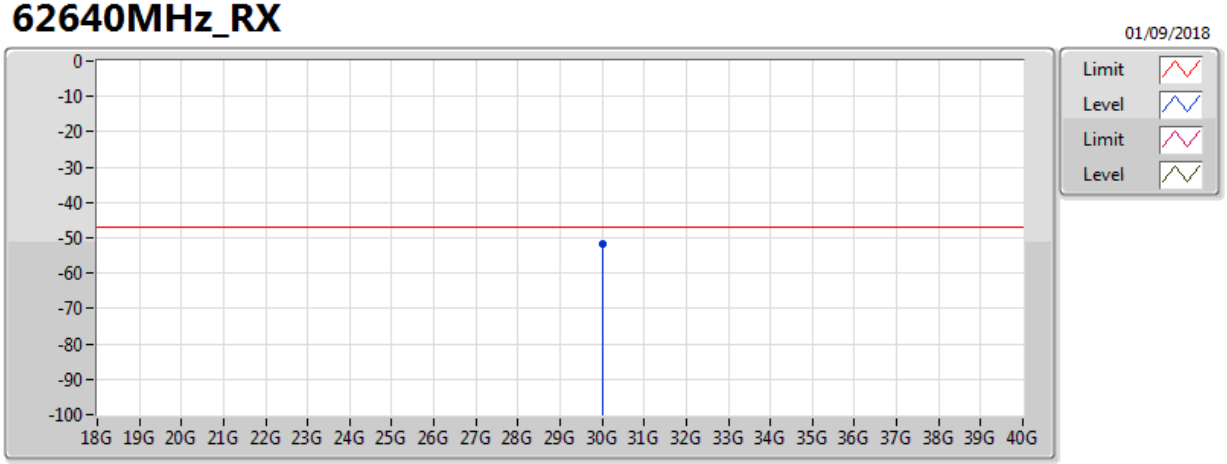


EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.0032G	-49.42	-47.00	-2.42	16.92	Vertical

802.11ad_Nss1_1RX

62640MHz_RX



EUT Y_1RX
Setting
1277-Z-1
FSV

Freq	Level	Limit	Margin	Factor	Condition
(Hz)	(dBm)	(dBm)	(dB)	(dB)	
30.004667G	-51.92	-47.00	-4.92	15.53	Horizontal

4.1.5.3 Test Result of Receiver Unwanted Emissions (40GHz~2th Harmonic)

Test Frequency(GHz)			58.32		
Emission Frequency (GHz)	Test Distance (m)	Measured Level(dBm)	Rx Gain (dBi)	Emission Level(dBm)	Limit(dBm)
50.177	0.5	-87.52	23.6	-50.69	-47.00

Test Frequency(GHz)			60.48		
Emission Frequency (GHz)	Test Distance (m)	Measured Level(dBm)	Rx Gain (dBi)	Emission Level(dBm)	Limit(dBm)
50.025	0.5	-87.49	23.6	-50.69	-47.00

Test Frequency(GHz)			62.64		
Emission Frequency (GHz)	Test Distance (m)	Measured Level(dBm)	Rx Gain (dBi)	Emission Level(dBm)	Limit(dBm)
50.025	0.5	-87.43	23.6	-50.63	-47.00

Note:

The measured power level is converted to EIRP using the Fries equation:

$EIRP = P_T * G_T = (P_R / G_R) * (4 * Pi * D / \lambda)^2$

P_R = measured channel power

G_R = 23.6 dBi, The gain of the receive measurement antenna

D = The measurement distance

λ = The wavelength.

Note 1: DUT - Receive Antenna Distance = Test Distance, all test was conducted at far-field distance.
Note 2: Factor: Transmit Antenna Gain + Signal Generator Level - SA reading - Transmit Cable Loss.
Level= Read Level + Factor.

4.2 Receiver interference signal handling

4.2.1 Receiver interference signal handling Limit

The equipment shall meet the performance criteria as declared by the manufacturer.

	In-band signal	OOB signal	Remote-band signal
Frequency	Centre frequency (f_c) of the EUT modulated signal (see clause 4.3.1)	$f = f_c \pm OBW$	$f = f_c \pm 10 \times OBW$
Signal level field strength at the EUT	55 mV/m	173 mV/m	173 mV/m
Equivalent EIRP at 10 m	10 dBm	20 dBm	20 dBm

4.2.2 Measuring Instruments

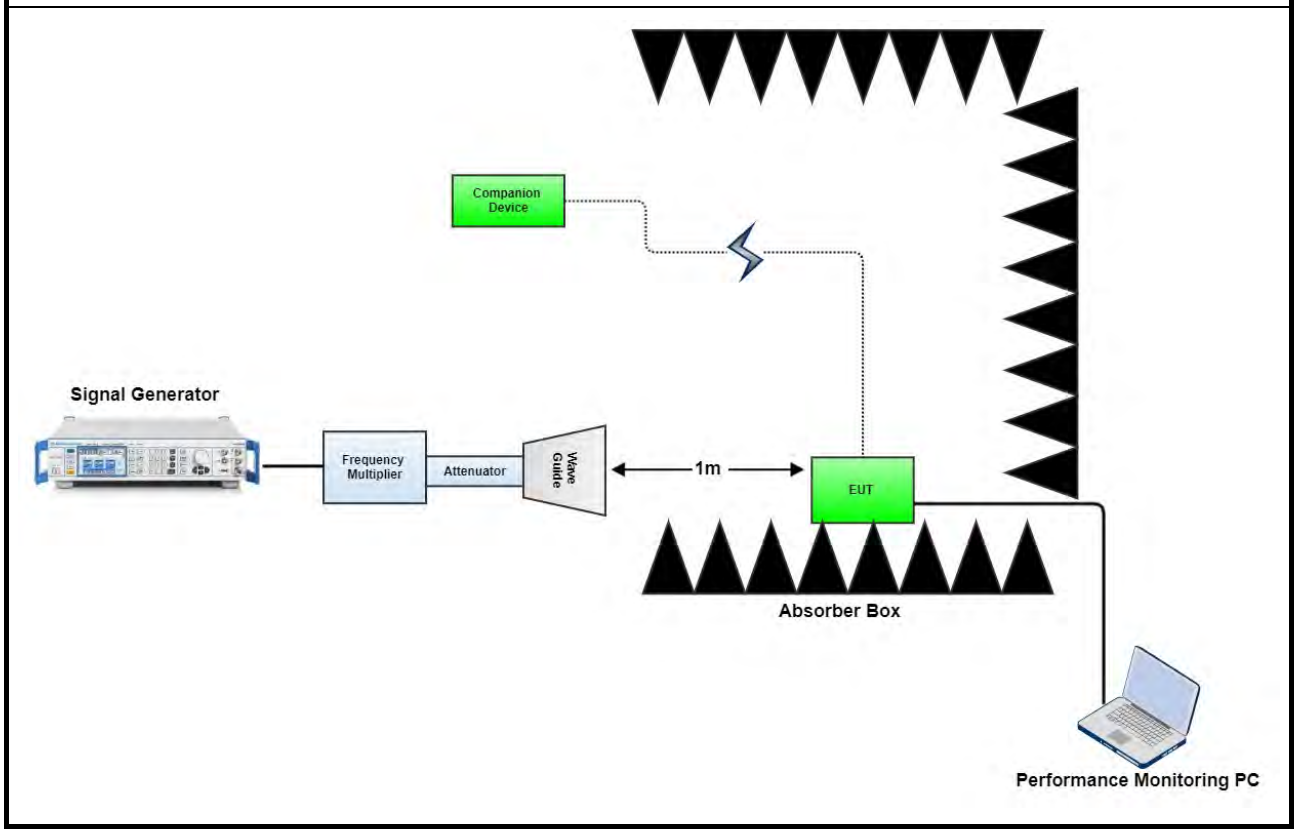
Refer a measuring instruments list in this test report.

4.2.3 Test Procedures

Method of measurement: Refer as Refer as ETSI EN 305 550, clause 4.4.3.

4.2.4 Test Setup

Receiver interference signal handling



4.2.5 Test Result of Receiver Adjacent Channel Rejection

Test Conditions: These measurements shall only be performed at normal test conditions

Test Frequency (GHz): 58.32

Receiver Interference Signal Handling									
In Band Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT(dB)**	**RX Receive Criteria**
57.24	2.16	1	55	-10	23	-33	13	46	PASS
58.32	2.16	1	55	-10	23	-33	13	46	PASS
59.40	2.16	1	55	-10	23	-33	13	46	PASS
OOB Signal Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT(dB)**	**RX Receive Criteria**
56.16	2.16	1	173	0	23	-23	13	36	PASS
60.48	2.16	1	173	0	23	-23	13	36	PASS
Remote-Band Signal Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT (dB)**	**RX Receive Criteria**
36.72	2.16	1	173	0	19	-19	-19	0	PASS
79.92	2.16	1	173	0	23	-23	-23	0	PASS

Note :

E = 55mV/m = 10dBm at 10m.

E = 55mV/m = -10dBm at 1m.

E = 173mV/m = 20dBm at 10m.

E = 173mV/m = 0dBm at 1m.

Test Frequency (GHz): 60.48

Receiver Interference Signal Handling									
In Band Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT(dB)**	**RX Receive Criteria**
59.40	2.16	1	55	-10	23	-33	13	46	PASS
60.48	2.16	1	55	-10	23	-33	13	46	PASS
61.56	2.16	1	55	-10	23	-33	13	46	PASS
OOB Signal Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT(dB)**	**RX Receive Criteria**
58.32	2.16	1	173	0	23	-23	13	36	PASS
62.64	2.16	1	173	0	23	-23	13	36	PASS
Remote-Band Signal Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT (dB)**	**RX Receive Criteria**
38.88	2.16	1	173	0	19	-19	-19	0	PASS
82.08	2.16	1	173	0	23	-23	-23	0	PASS

Note :

E = 55mV/m = 10dBm at 10m.

E = 55mV/m = -10dBm at 1m.

E = 173mV/m = 20dBm at 10m.

E = 173mV/m = 0dBm at 1m.

Test Frequency (GHz): 62.64

Receiver Interference Signal Handling									
In Band Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT(dB)**	**RX Receive Criteria**
61.56	2.16	1	55	-10	23	-33	13	46	PASS
62.64	2.16	1	55	-10	23	-33	13	46	PASS
63.72	2.16	1	55	-10	23	-33	13	46	PASS
OOB Signal Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT(dB)**	**RX Receive Criteria**
60.48	2.16	1	173	0	23	-23	13	36	PASS
64.80	2.16	1	173	0	23	-23	13	36	PASS
Remote-Band Signal Freq. (GHz)	**OBW (GHz)**	**d (m)**	**E (mV/m)**	**Peirp (dBm)**	**TX Gain (dBi)**	**Power (dBm)**	**SG (dBm)**	**ATT (dB)**	**RX Receive Criteria**
41.04	2.16	1	173	0	19	-19	-19	0	PASS
84.24	2.16	1	173	0	23	-23	-23	0	PASS

Note :

E = 55mV/m = 10dBm at 10m.

E = 55mV/m = -10dBm at 1m.

E = 173mV/m = 20dBm at 10m.

E = 173mV/m = 0dBm at 1m.

5 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101024	9kHz ~ 40GHz	Aug. 31, 2017	Aug. 30, 2018	Radiation (05CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980537	30MHz~1GHz	Mar. 07, 2018	Mar. 06, 2019	Radiation (05CH01-CB)
Pre-Amplifier	EMCI	EMC012645SE	980341	1GHz ~ 26.5GHz	Dec. 06, 2017	Dec. 05, 2018	Radiation (05CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (05CH01-CB)
Bilog Antenna	Schaffner	CBL6112B	2894	30MHz ~ 1GHz	Feb. 12, 2018	Feb. 11, 2019	Radiation (05CH01-CB)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120D-01816	1GHz~18GHz	Jan. 26, 2018	Jan. 25, 2019	Radiation (05CH01CB)
CABLE	Marvelous	N/A	Low Cable-6	30MHz ~ 1GHz	Apr. 03, 2018	Apr. 02, 2019	Radiation (05CH01-CB)
CABLE	Woken	N/A	High Cable-25+26	1GHz ~ 26.5GHz	Apr. 03, 2018	Apr. 02, 2019	Radiation (05CH01-CB)
Test Software	Audix	E3	5.04.1019f	N/A	N/A	N/A	Radiation (05CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (05CH01-CB)
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (05CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (05CH01-CB)
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (05CH01-CB)
Detector	Millitech	DET-15-RPFW0	#A18185(074)	50 ~ 75 GHz	Jan. 29, 2018*	Jan. 29, 2020*	Radiation (05CH01-CB)
Standard Horn Antenna	Custom Microwave	M19RH	U91113-A	40 ~ 60 GHz	N.C.R	N.C.R	Radiation (05CH01-CB)
Standard Horn Antenna	Custom Microwave	M15RH	V91113-A	50 ~ 75 GHz	N.C.R	N.C.R	Radiation (05CH01-CB)
Standard Horn Antenna	Custom Microwave	M12RH	E91113-A	60 ~ 90 GHz	N.C.R	N.C.R	Radiation (05CH01-CB)
Standard Horn Antenna	Custom Microwave	M08RH	F91113-A	90 ~ 140 GHz	N.C.R	N.C.R	Radiation (05CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz ~ 40GHz	Dec. 21, 2017	Dec. 20, 2018	Radiation (05CH01-CB)
RF Cable-high	Woken	RG402	High Cable-53	1GHz ~ 18GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (05CH01-CB)
Signal Generator	R&S	SMR40	100302	10MHz ~ 40GHz	Dec. 01, 2017	Nov. 30, 2018	Radiation (05CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (05CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Q Band X2 Passive Frequency Multiplier	SAGE	SFP-222K-S1	134945-01	33 ~ 50GHz	N.C.R	N.C.R	Radiation (05CH01-CB)
Q Band Rectangular Horn Antenna	SAGE	SAR-2309-22-S2	134945-01	33 ~ 50GHz	N.C.R.	N.C.R.	Radiation (05CH01-CB)
V-Band X2 Passive Frequency Multiplier	SAGE	SFP-152KF-S1	13475-01	50~75GH	N.C.R.	N.C.R.	Radiation (05CH01-CB)
V Band Rectangular Horn Antenna	SAGE	SAR-2309-12-S2	13475-01	50~75GH	N.C.R.	N.C.R.	Radiation (05CH01-CB)
W Band X3 Passive Frequency Multiplier	SAGE	SFP-10328-S1	13963-01	75 to 110 GHz	N.C.R.	N.C.R.	Radiation (05CH01-CB)
W Band Rectangular Horn Antenna	SAGE	SAR-2309-10-S2	13963-01	75 to 110 GHz	N.C.R.	N.C.R.	Radiation (05CH01-CB)

Note: Calibration Interval of instruments listed above is one year.
"*" Calibration Interval of instruments listed above is two years.
N.C.R. means Non-Calibration required.

6 Measurement Uncertainty

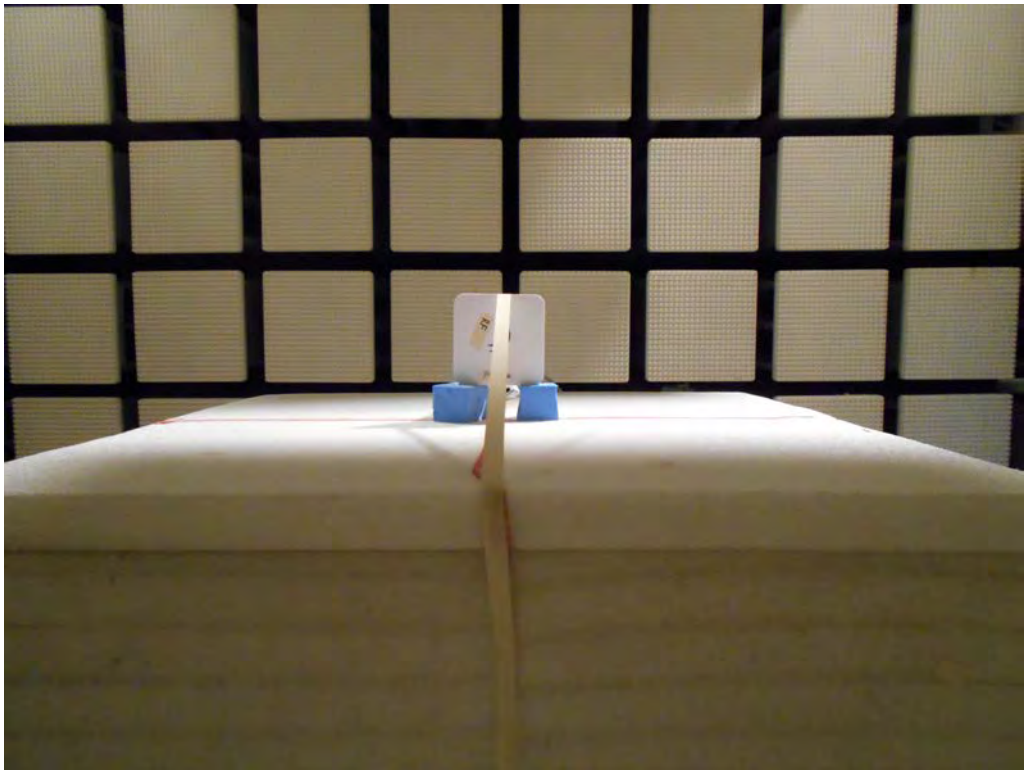
Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 220GHz)	4.7 dB	Confidence levels of 95%

Radiated Emission (40GHz ~ 220GHz)					
No.	Input quantity (Xi)	Uncertainty of Xi			U(Xi)
		dB		Pr Dist; K	
1	Receiver reading	±	0.880	K=1	0.9
2	Cable loss	±	0.156	K=2	0.1
3	Antenna gain	±	0.223	K=2	0.1
4	Site imperfection	±	0.232	Triangular	0.1
5	Transmitter antenna	±	1.710	Rectangular	0.9
6	Signal generator	±	0.780	Rectangular	0.4
7	Mismatch	±	0.670	U-shape	0.7
8	Spectrum analyzer	±	0.380	Rectangular	0.2
9	Mixer	±	3.700	K=2	1.9
Combined standard uncertainty Uc(y)					2.4
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)					4.7

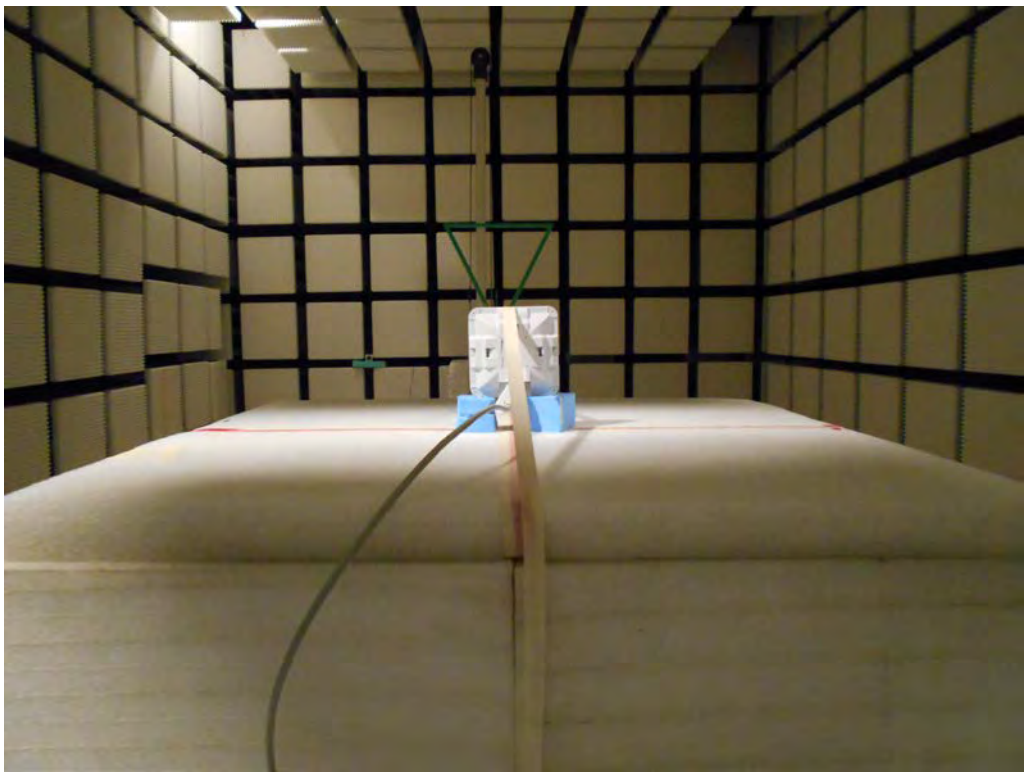
Appendix A. Test Photos

1. Photographs of Test Configuration

FRONT VIEW



REAR VIEW



———THE END———

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