ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

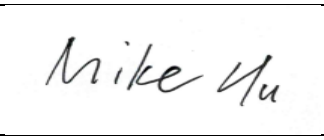
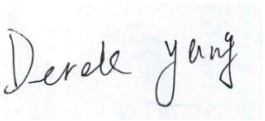
INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Applicant:	Sony Mobile Communications INC.
EUT Description:	Mobile Phone
FCC ID:	PY7-04605A
Report Number:	ZR/2018/A001105
FCC Rule Part:	§15.407, Cat: NII
Issue Date:	2018/12/14
Date of Test:	2018/10/19 to 2018/11/14
Date of EUT Received:	2018/10/18

We hereby certify that:

The above equipment was tested by SGS Shenzhen Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits. The test results of this report relate only to the tested sample identified in this report.

Authorized for issue by:		
Tested By		2018/12/14
	(Mike Hu) /Project Engineer	**Date**
Checked By		2018/12/14
	(David Chen) /Reviewer	**Date**
Approved By		2018/12/14
	(Derek Yang) Wireless Laboratory Manager	**Date**

Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
--	Rev.00	Initial creation of document	All	2018/11/28	--
--	Rev.01	Revised the channel description for UNII-C	Page 10	2018/12/14	--

The difference between PY7-04605Aand PY7-50241M is show in the below table:

		PY7-04605A (Updated approval)	PY7-50241M (Full approval)
Licensed Frequency	LTE	1,2,3,5,7,8,28,38,39,40,41M	1,2,3,5,7,8,20,38
	UMTS	the same	the same
	GSM	the same	the same
	IC	the same	the same
	Antenna	the same	the same
Unlicensed Frequency	Bluetooth	The same	The same
	2.4G Wi-Fi	the same	the same
	5G Wi-Fi	the same	the same
	IC	the same	the same
	Antenna	the same	the same
Hardware	Ram / Rom	the same	the same
	Camera	The same	the same
	PCB	the same	the same
	USB Port	the same	the same
Appearance	Dimension	the same	the same
Accessory	Battery	the same	the same
	External Charger	the same	the same
	USB cable	the same	the same
other	SIM card	Double	Double

Considering to the difference, all data were copied from the original report (Report No.: ZR/2018/9002705)

Contents

1 GENERAL INFORMATION

1.1 Product Description

General:

EUT Description:	Mobile Phone
Trade Mark:	Sony
IEEE 802.11 WLAN Mode Supported	☒ 802.11a (20 MHz channel bandwidth) ; ☒ 802.11n (20 MHz channel bandwidth); ☒ 802.11n (40 MHz channel bandwidth); ☐ 802.11ac (20 MHz channel bandwidth); ☐ 802.11ac (40 MHz channel bandwidth); ☐ 802.11ac (80 MHz channel bandwidth),
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM)
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300.0Mbps
DFS mode:	☐Master ☐ Slave with radar detection ☒Slave without radar detection
Sample Type:	☒ Portable Device, ☐Module
Antenna Type:	☐ External, ☒ Integrated
Antenna Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3
Smart System	☒ SISO (for 802.11a/n), ☐ MIMO (for 802.11n/ac), ☐ Diversity (for 802.11a) : Tx & Rx
Antenna Gain:	-0.30dBi,
Power Supply:	Lithium-ion battery:3.85V or charge by USB

1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407
KDB 789033 D02 General UNII Test Procedures New Rules v02
FCC KDB 558074 D01 DTS Meas Guidance v05
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB 905462 D03 Client Without DFS New Rules v01r02

ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices

Note:

All test items have been performed and record as per the above standards.

1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.
Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

1.4 Special Accessories

AC Charger, USB cable and Earphone are used while the test is conducted and there is no other accessory attached. This is the worst case condition.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.1.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.1.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.1.3 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

2.5 Configuration of Tested System

Fig. 2-1 Conducted Emission Configuration

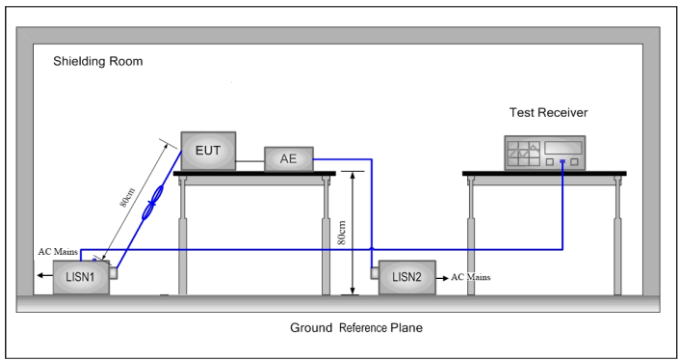


Fig. 2-2 Conducted test Configuration (RF)

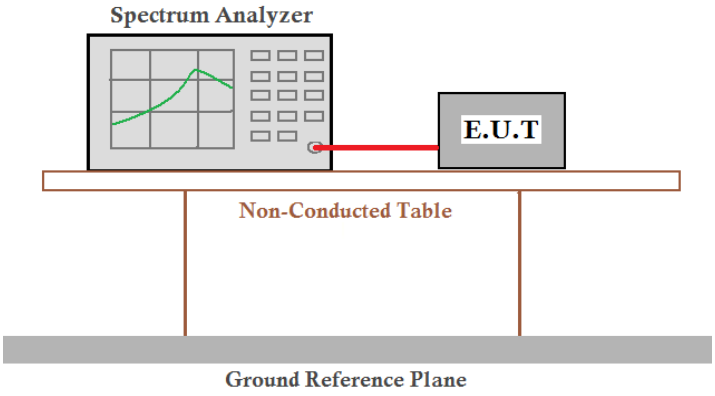
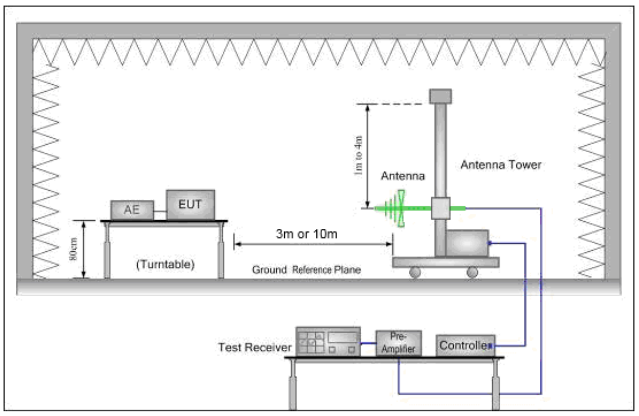
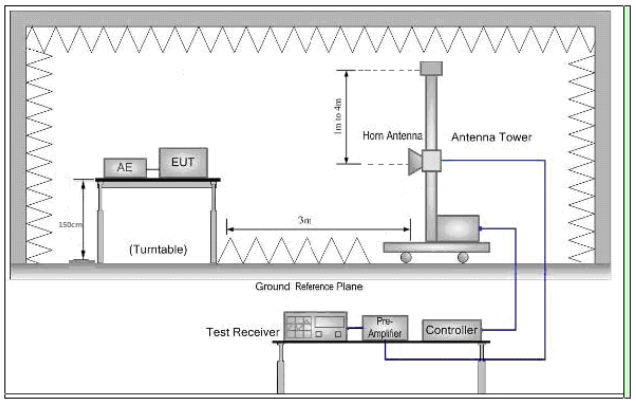


Fig. 2-3 Radiated Emission Configuration



30MHz to 1GHz



Above 1 GHz

3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.407	Dynamic Frequency Selection	Compliant
、§15.203 §15.407(a)	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

For UNII Band I:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n 20MHz	The Lowest channel	5180
	The Middle channel	5200
	The Highest channel	5240
IEEE 802.11n 40MHz	The Lowest channel	5190
	The Highest channel	5230

For UNII Band II-A:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n 20MHz	The Lowest channel	5260
	The Middle channel	5280
	The Highest channel	5320
IEEE 802.11n 40MHz	The Lowest channel	5270
	The Highest channel	5310

For UNII Band II-C:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n 20MHz	The Lowest channel	5500
	The Middle channel	5580
	The Highest channel	5700
IEEE 802.11n 40MHz	The Lowest channel	5510
	The Middle channel	5500
	The Highest channel	5670

For UNII Band III:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825
IEEE 802.11n 40MHz	The Lowest channel	5755
	The Highest channel	5795

Note：

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

5 MEASUREMENT UNCERTAINTY

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Radiated Spurious emission test	±4.5dB (30MHz-1GHz)
		±4.8dB (1GHz-25GHz)
5	Conduct emission test	±3.12 dB(9KHz- 30MHz)
6	Temperature test	±1°C
7	Humidity test	±3%
8	DC and low frequency voltages	±0.5%

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6 CONDUCTED EMISSION TEST

6.1. Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

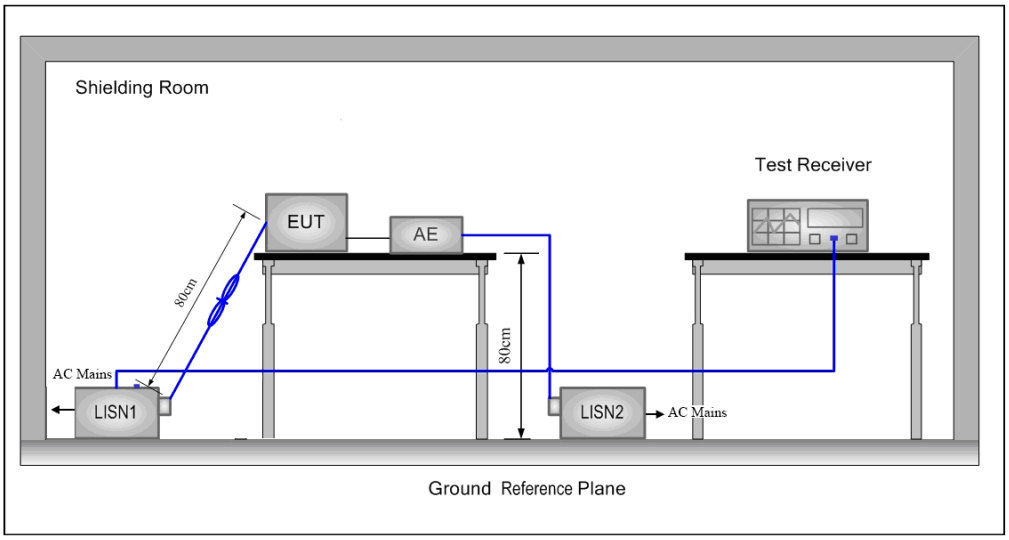
6.2. Measurement Equipment Used

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018/9/2	2019/9/2
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2018/4/2	2019/4/1
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018/7/12	2019/7/11
8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2018/2/14	2019/2/13
4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2018/2/14	2019/2/13
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2018/2/14	2019/2/13
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018/4/2	2019/4/1

6.3. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the table top.
3. The LISN was connected with 120Vac/60Hz power source.

6.4. Test SET-UP



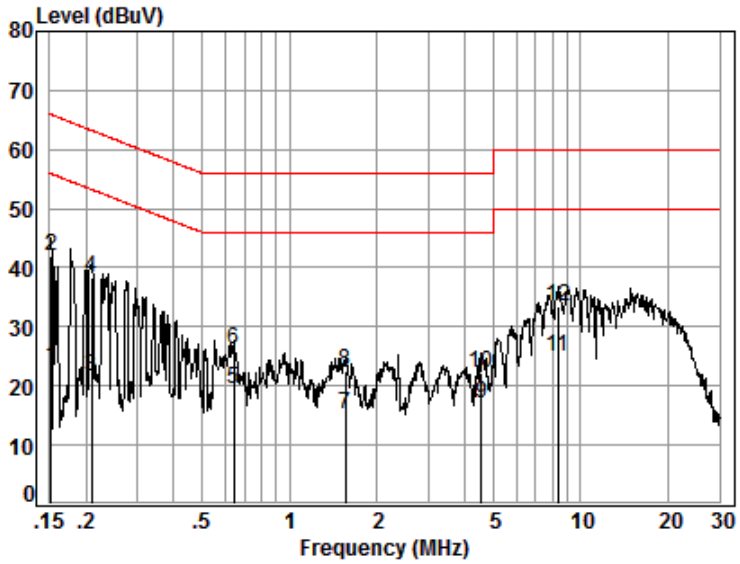
6.5. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

6.6. Measurement Result

Note: Refer to next page for measurement data and plots.
Note2: The * reveals the worst-case results that closet to the limit

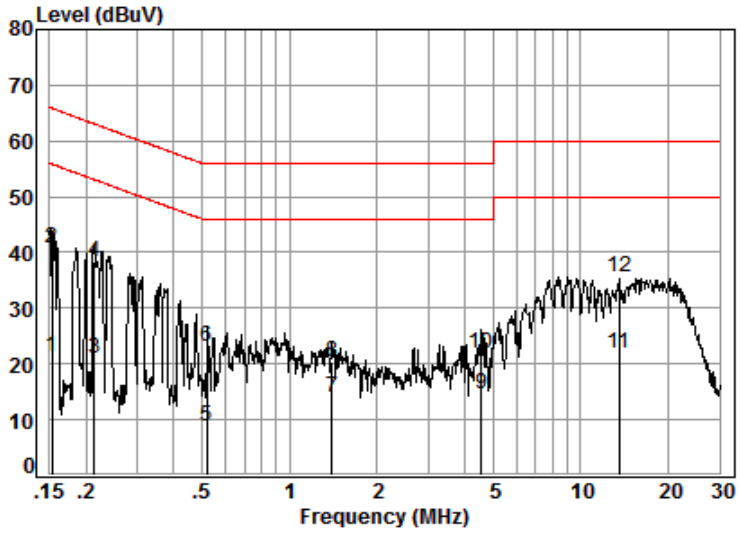
AC POWER LINE CONDUCTED EMISSION TEST DATA : L



Site : Shielding Room
Condition: Line
Job No. : 90027
Test mode: e

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.66	13.35	23.02	55.91	-32.89	Average
2	0.15	0.01	9.66	32.18	41.85	65.91	-24.06	QP
3	0.21	0.02	9.66	12.00	21.68	53.23	-31.55	Average
4	0.21	0.02	9.66	28.74	38.42	63.23	-24.81	QP
5	0.64	0.07	9.67	9.64	19.38	46.00	-26.62	Average
6	0.64	0.07	9.67	16.43	26.17	56.00	-29.83	QP
7	1.56	0.13	9.73	5.22	15.08	46.00	-30.92	Average
8	1.56	0.13	9.73	12.57	22.43	56.00	-33.57	QP
9	4.57	0.17	9.73	7.21	17.11	46.00	-28.89	Average
10	4.57	0.17	9.73	12.46	22.36	56.00	-33.64	QP
11	8.32	0.17	9.81	14.82	24.80	50.00	-25.20	Average
12	8.32	0.17	9.81	23.51	33.49	60.00	-26.51	QP

AC POWER LINE CONDUCTED EMISSION TEST DATA : N



Site : Shielding Room
Condition: Neutral
Job No. : 90027
Test mode: e

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.63	11.67	21.31	55.87	-34.56	Average
2	0.15	0.01	9.63	30.99	40.63	65.87	-25.24	QP
3	0.21	0.02	9.64	11.26	20.92	53.10	-32.18	Average
4	0.21	0.02	9.64	28.59	38.25	63.10	-24.85	QP
5	0.52	0.06	9.64	-0.92	8.78	46.00	-37.22	Average
6	0.52	0.06	9.64	13.35	23.05	56.00	-32.95	QP
7	1.40	0.12	9.70	4.22	14.04	46.00	-31.96	Average
8	1.40	0.12	9.70	10.50	20.32	56.00	-35.68	QP
9	4.55	0.17	9.70	4.78	14.65	46.00	-31.35	Average
10	4.55	0.17	9.70	12.08	21.95	56.00	-34.05	QP
11	13.55	0.20	10.24	11.52	21.96	50.00	-28.04	Average
12	13.55	0.20	10.24	25.21	35.65	60.00	-24.35	QP

7 DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.
All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

Duty Cycle = Ton / (Ton+Toff)
Duty Cycle Factor = 10*log(1/Duty Cycle)

Measurement Procedure:

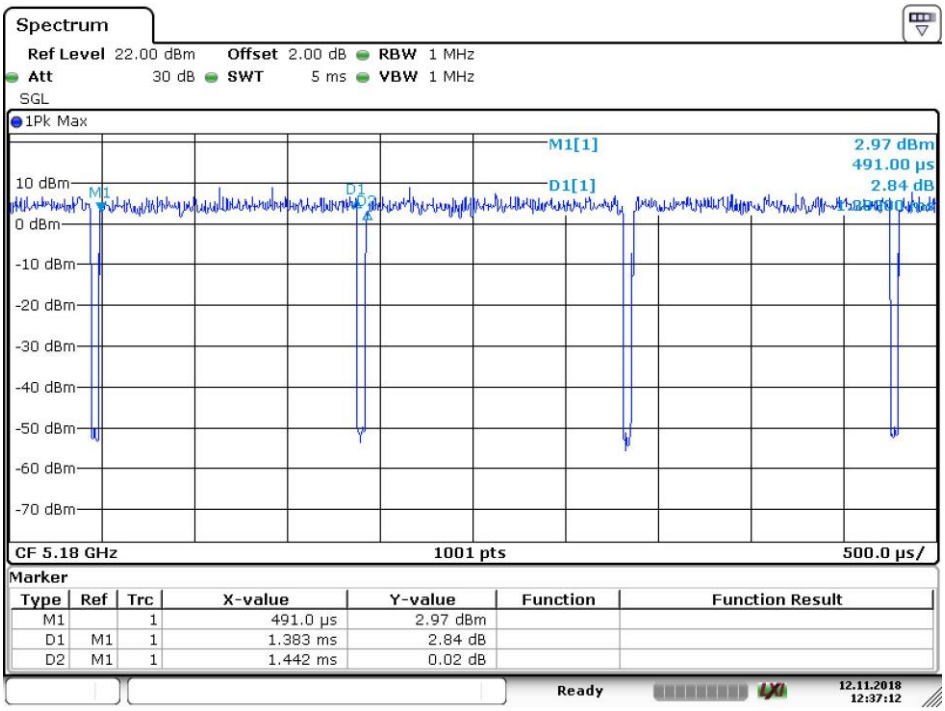
1. Set span = Zero
2. RBW = 1MHz
3. VBW = 1MHz,
4. Detector = Peak

Duty Cycle:

Mode	Duty Cycle(%)	Duty Factor(dB) =10*log(1/Duty Cycle)
802.11a	95.91	0.18
802.11n_20	96.35	0.16
802.11n_40	93.61	0.29

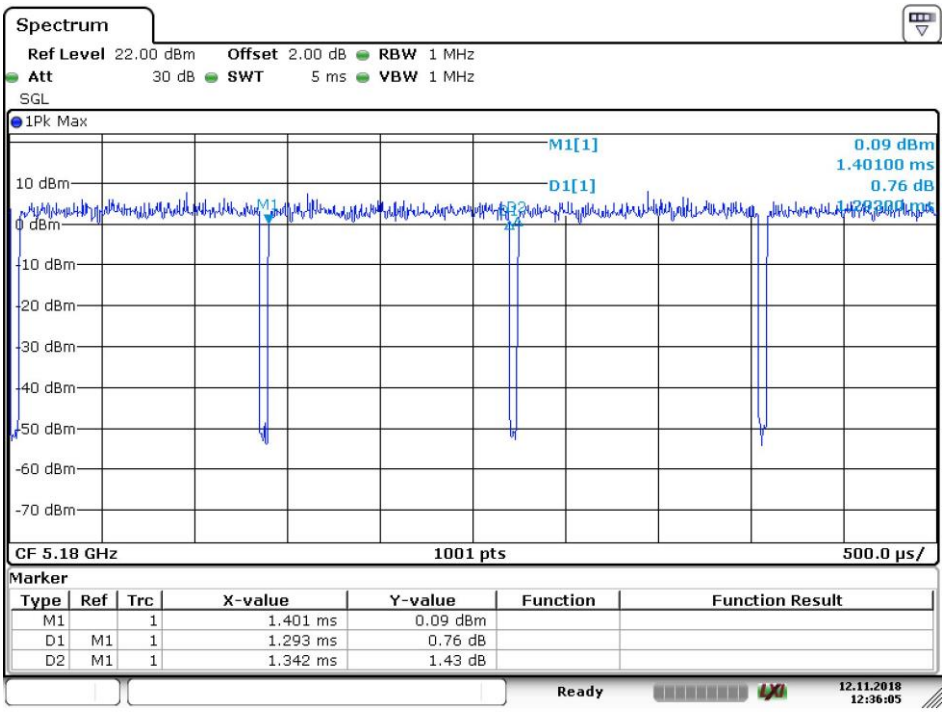
DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



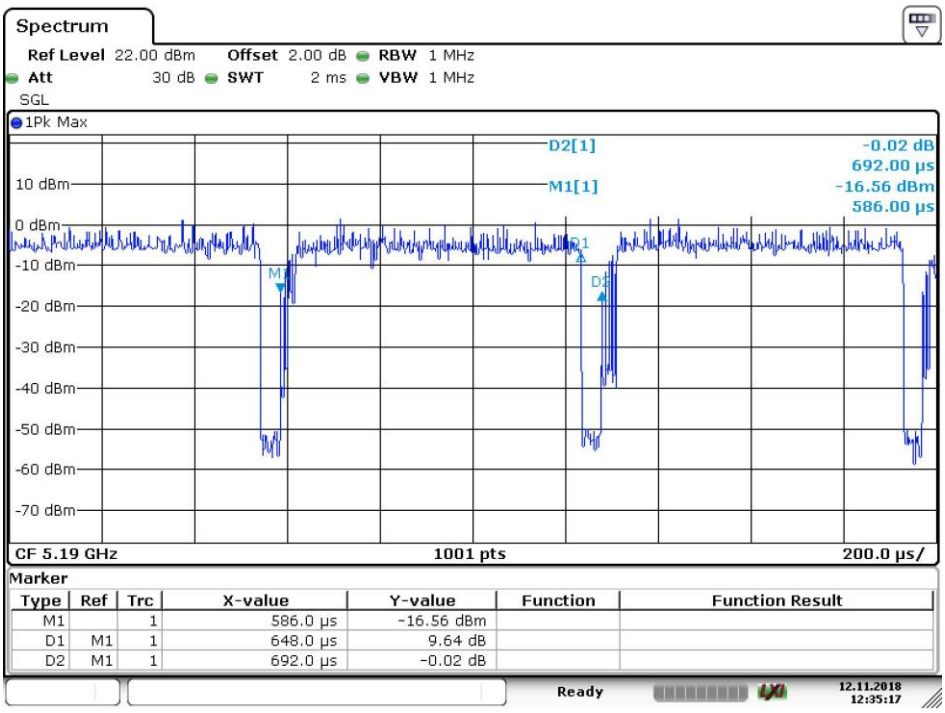
Date: 12.NOV.2018 12:37:12

802.11n HT20



Date: 12.NOV.2018 12:36:06

802.11n HT 40



Date: 12.NOV.2018 12:35:17

8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.
The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
   a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
   b. Mark the peak frequency and –26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
   a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/60MHz, Detector=Peak, Sweep=auto
   b. Mark the peak frequency and –6dB (upper and lower) frequency.
6. For 99% Bandwidth:

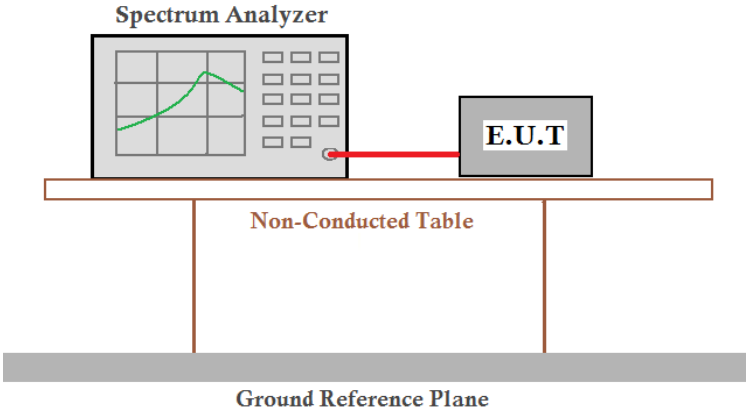
   Set the spectrum analyzer as RBW=1%, VBW = 3*RBW, Span = 30M/60MHz, Detector=Peak, Sweep=auto.

7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

8.3 Measurement Equipment Used

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018/9/2	2019/9/2
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2018/3/13	2019/3/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/12	2019/7/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2

8.4 Test Set-up



8.5 Measurement Result

6.5.1 26dB Bandwidth

Test Mode	Test Channel	Frequency [MHz]	Antenna Port	26dB Emission Bandwidth [MHz]	Verdict
11A20	36	5180	ANT 1	20.11	PASS
	44	5220	ANT 1	20.20	PASS
	48	5240	ANT 1	20.17	PASS
	52	5260	ANT 1	19.96	PASS
	60	5300	ANT 1	20.20	PASS
	64	5320	ANT 1	20.23	PASS
	100	5500	ANT 1	20.32	PASS
	116	5580	ANT 1	20.17	PASS
	140	5700	ANT 1	20.02	PASS
11N20	36	5180	ANT 1	20.59	PASS
	44	5220	ANT 1	20.41	PASS
	48	5240	ANT 1	20.41	PASS
	52	5260	ANT 1	20.38	PASS
	60	5300	ANT 1	20.44	PASS
	64	5320	ANT 1	20.44	PASS
	100	5500	ANT 1	20.50	PASS
	116	5580	ANT 1	20.50	PASS
	140	5700	ANT 1	20.50	PASS
11N40	38	5190	ANT 1	40.93	PASS
	46	5230	ANT 1	40.82	PASS
	54	5270	ANT 1	40.88	PASS
	62	5310	ANT 1	40.76	PASS
	102	5510	ANT 1	40.94	PASS
	110	5550	ANT 1	40.82	PASS
	134	5670	ANT 1	40.76	PASS

6.5.2 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

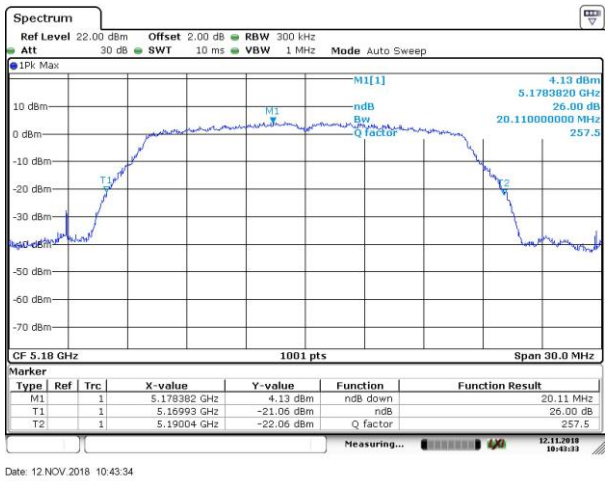
Test Mode	Test Channel	Frequency [MHz]	ANT	6dB Emission Bandwidth [MHz]	Verdict
11A20	149	5745	ANT 1	15.11	PASS
	157	5785	ANT 1	15.17	PASS
	165	5825	ANT 1	15.14	PASS
11N20	149	5745	ANT 1	15.11	PASS
	157	5785	ANT 1	15.14	PASS
	165	5825	ANT 1	15.17	PASS
11N40	151	5755	ANT 1	35.19	PASS
	159	5795	ANT 1	35.19	PASS

6.5.3 Occupied Bandwidth

Test Mode	Test Channel	Frequency [MHz]	Antenna Port	Occupied Bandwidth [MHz]	Verdict
11A20	36	5180	ANT 1	16.73	PASS
	44	5220	ANT 1	16.69	PASS
	48	5240	ANT 1	16.72	PASS
	52	5260	ANT 1	16.69	PASS
	60	5300	ANT 1	16.66	PASS
	64	5320	ANT 1	16.66	PASS
	100	5500	ANT 1	16.72	PASS
	116	5580	ANT 1	16.75	PASS
	140	5700	ANT 1	16.72	PASS
	149	5745	ANT 1	16.66	PASS
	157	5785	ANT 1	16.66	PASS
	165	5825	ANT 1	16.66	PASS
11N20	36	5180	ANT 1	17.68	PASS
	44	5220	ANT 1	17.68	PASS
	48	5240	ANT 1	17.68	PASS
	52	5260	ANT 1	17.65	PASS
	60	5300	ANT 1	17.68	PASS
	64	5320	ANT 1	17.68	PASS
	100	5500	ANT 1	17.71	PASS
	116	5580	ANT 1	17.71	PASS
	140	5700	ANT 1	17.71	PASS

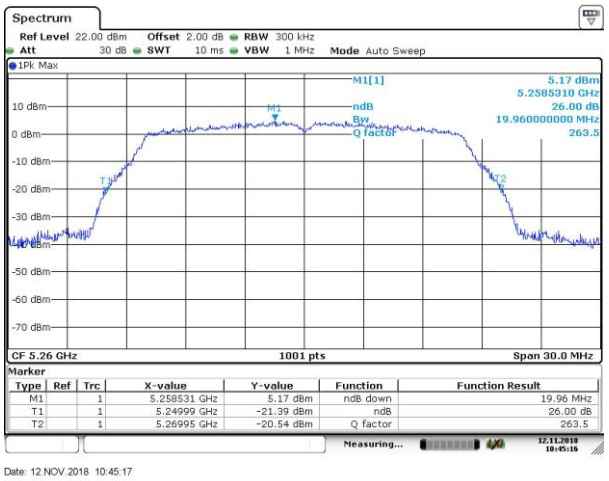
	149	5745	ANT 1	17.74	PASS
	157	5785	ANT 1	17.68	PASS
	165	5825	ANT 1	17.71	PASS
11N40	38	5190	ANT 1	36.14	PASS
	46	5230	ANT 1	36.14	PASS
	54	5270	ANT 1	36.08	PASS
	62	5310	ANT 1	36.14	PASS
	102	5510	ANT 1	36.14	PASS
	110	5550	ANT 1	36.14	PASS
	134	5670	ANT 1	36.08	PASS
	151	5710	ANT 1	36.08	PASS
	159	5795	ANT 1	36.14	PASS

26dB_802.11a _5180MHz



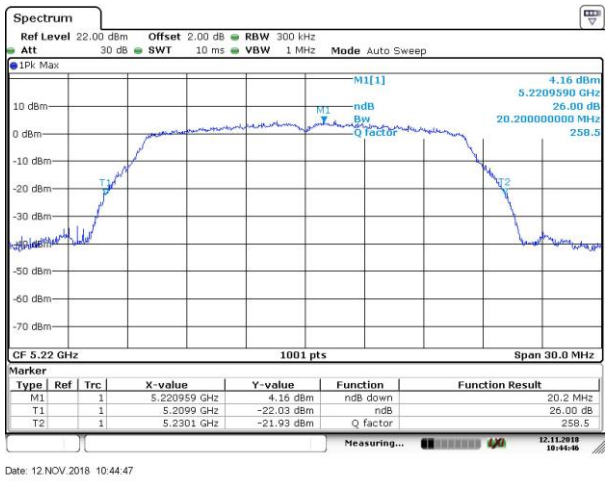
Date: 12.NOV.2018 10:43:34

26dB_802.11a _5260MHz



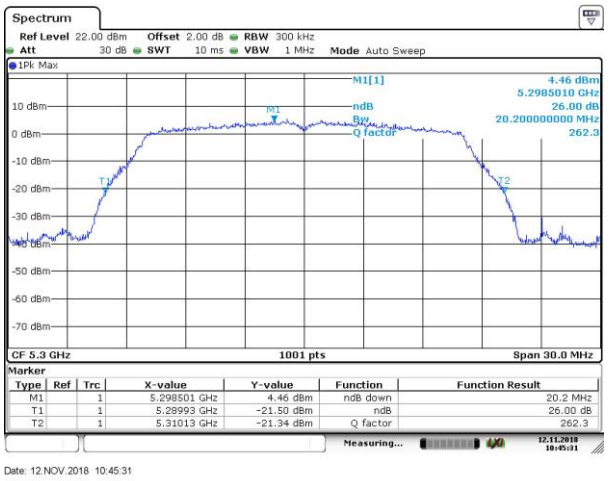
Date: 12.NOV.2018 10:45:17

26dB_802.11a _5220MHz



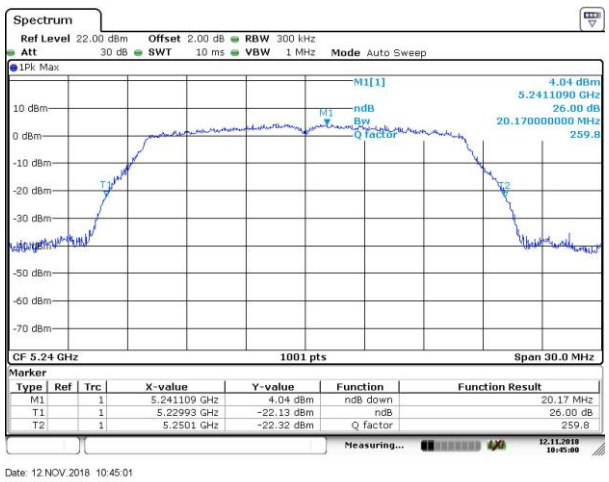
Date: 12.NOV.2018 10:44:47

26dB_802.11a _5300MHz



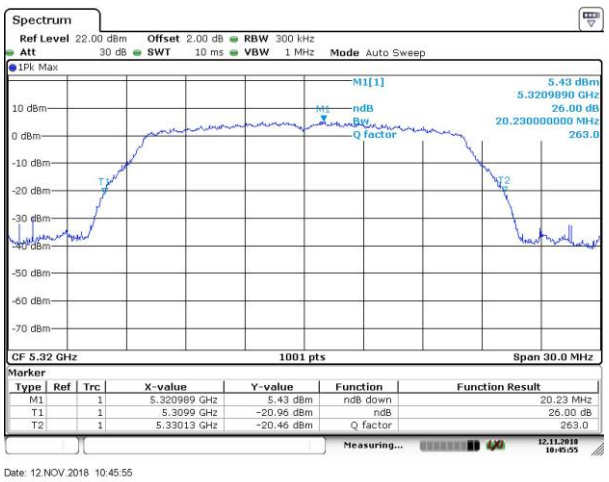
Date: 12.NOV.2018 10:45:31

26dB_802.11a _5240MHz



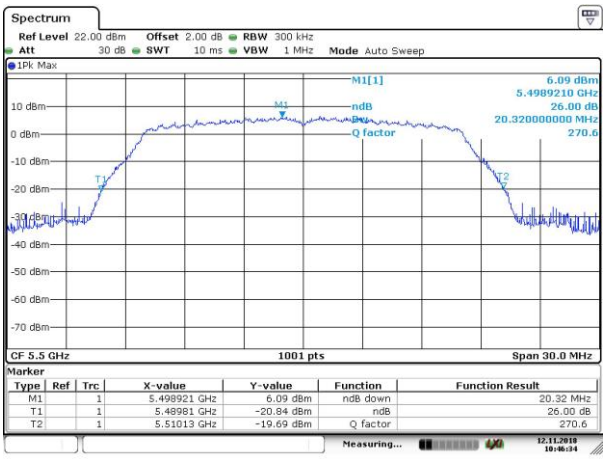
Date: 12.NOV.2018 10:45:01

26dB_802.11a _5320MHz



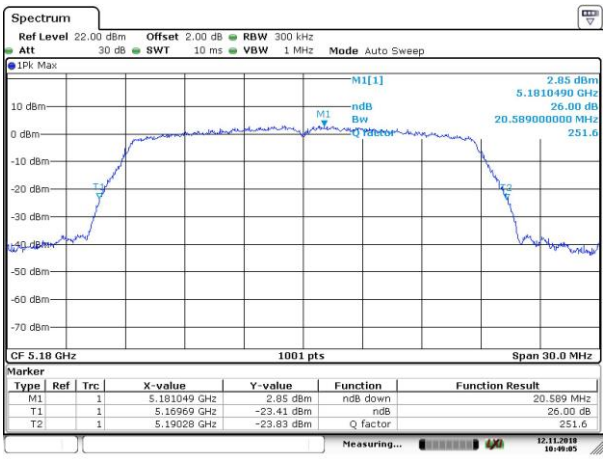
Date: 12.NOV.2018 10:45:55

26dB_802.11a _5500MHz



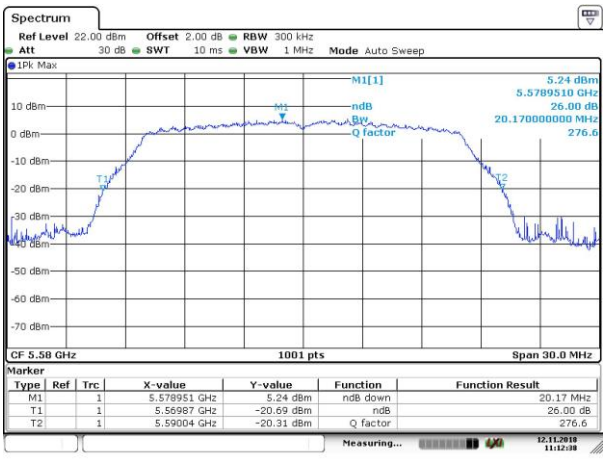
Date: 12.NOV.2018 10:46:34

26dB_802.11n HT20_5180MHz



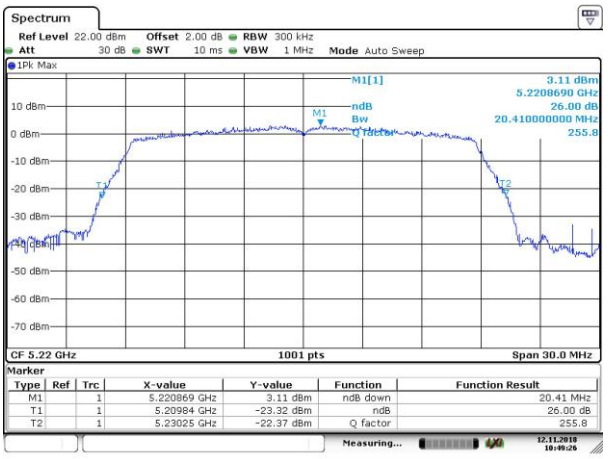
Date: 12.NOV.2018 10:49:05

26dB_802.11a _5580MHz



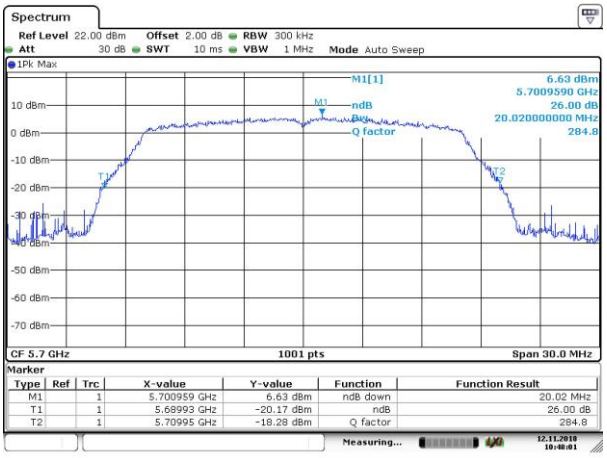
Date: 12.NOV.2018 11:12:38

26dB_802.11n HT20_5220MHz



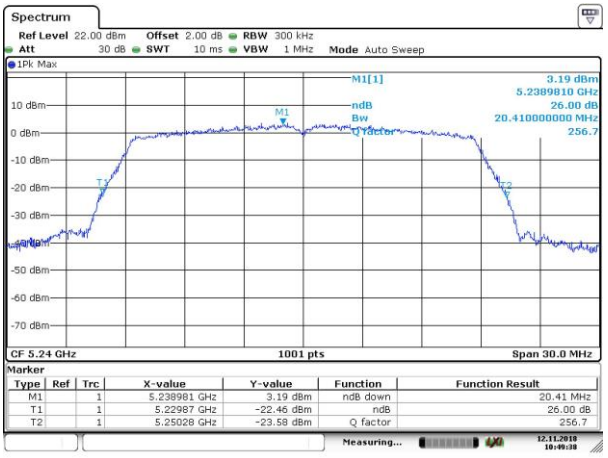
Date: 12.NOV.2018 10:49:27

26dB_802.11a _5700MHz



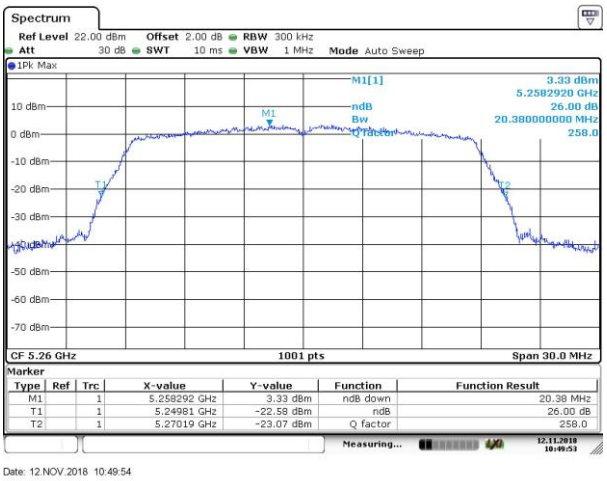
Date: 12.NOV.2018 10:48:01

26dB_802.11n HT20_5240MHz



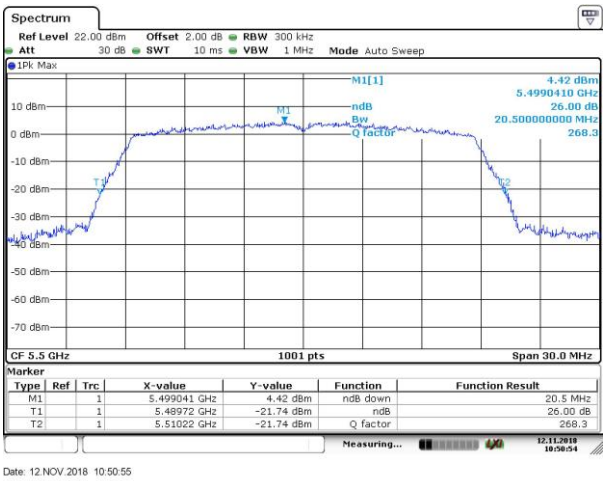
Date: 12.NOV.2018 10:49:39

26dB_802.11n_HT20_5260MHz



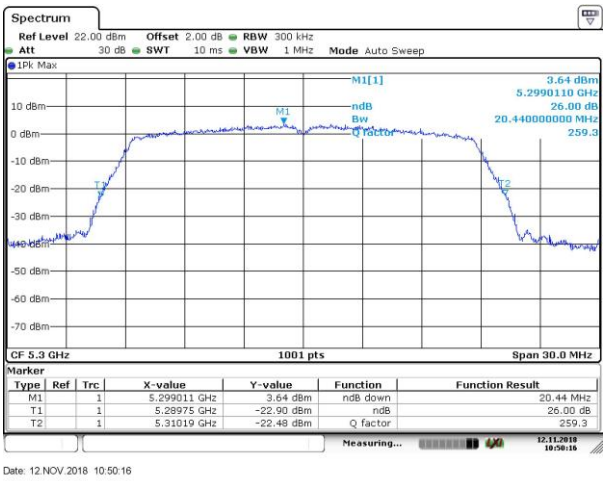
Date: 12.NOV.2018 10:49:54

26dB_802.11n_HT20_5500MHz



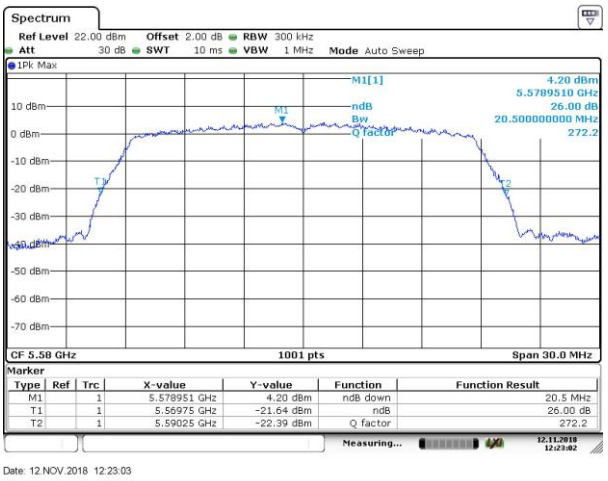
Date: 12.NOV.2018 10:50:55

26dB_802.11n_HT20_5300MHz



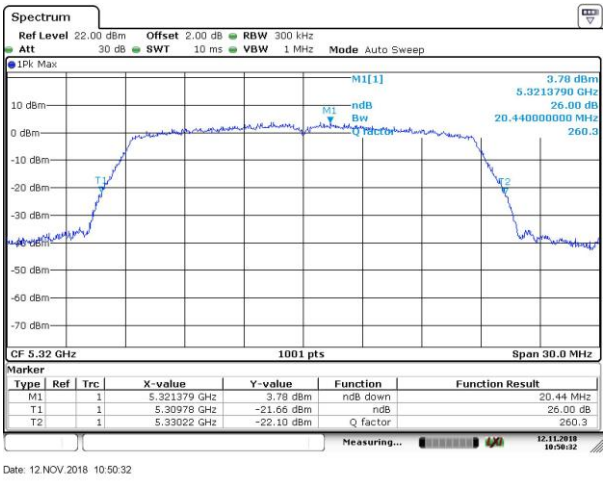
Date: 12.NOV.2018 10:50:16

26dB_802.11n_HT20_5580MHz



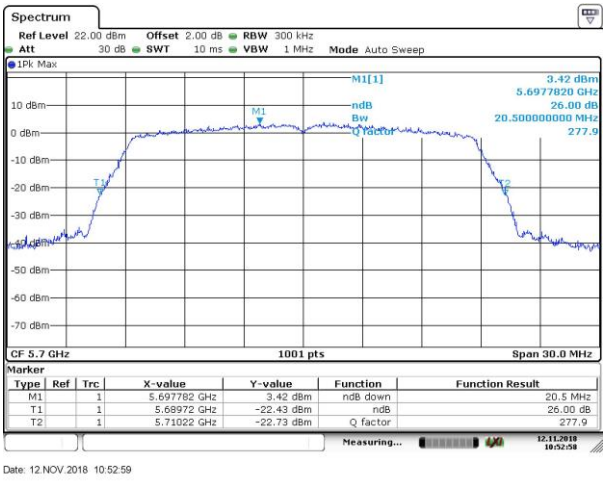
Date: 12.NOV.2018 12:23:03

26dB_802.11n_HT20_5320MHz



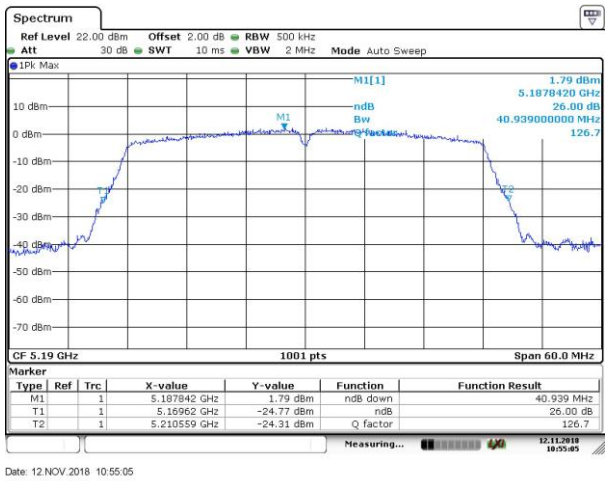
Date: 12.NOV.2018 10:50:32

26dB_802.11n_HT20_5700MHz



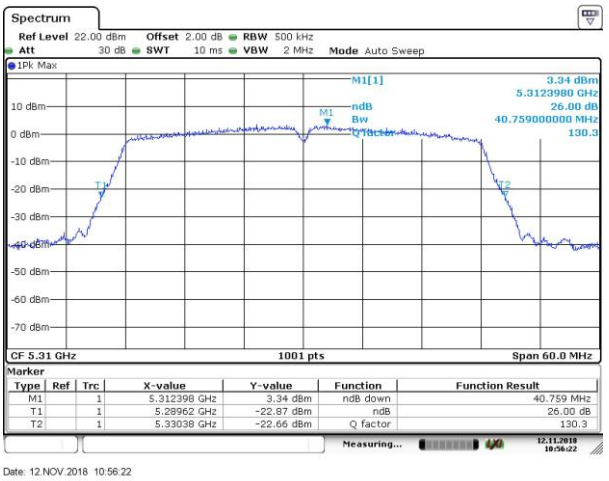
Date: 12.NOV.2018 10:52:59

26dB_802.11n_HT40_5190MHz



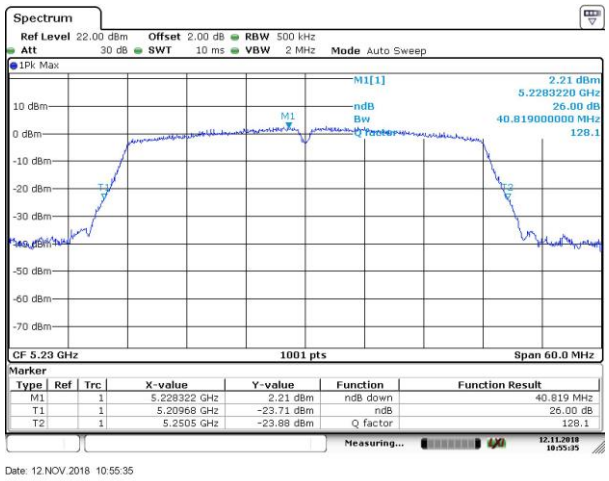
Date: 12.NOV.2018 10:55:05

26dB_802.11n_HT40_5310MHz



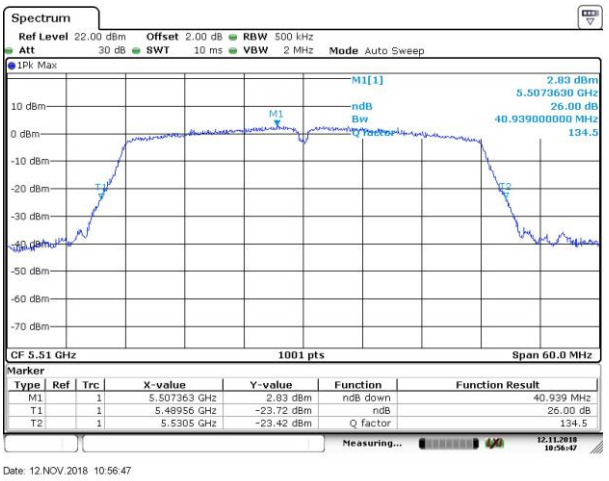
Date: 12.NOV.2018 10:56:22

26dB_802.11n_HT40_5230MHz



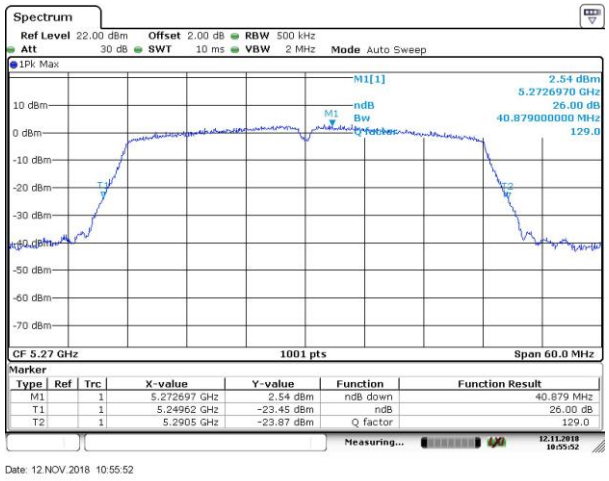
Date: 12.NOV.2018 10:55:35

26dB_802.11n_HT40_5510MHz



Date: 12.NOV.2018 10:56:47

26dB_802.11n_HT40_5270MHz

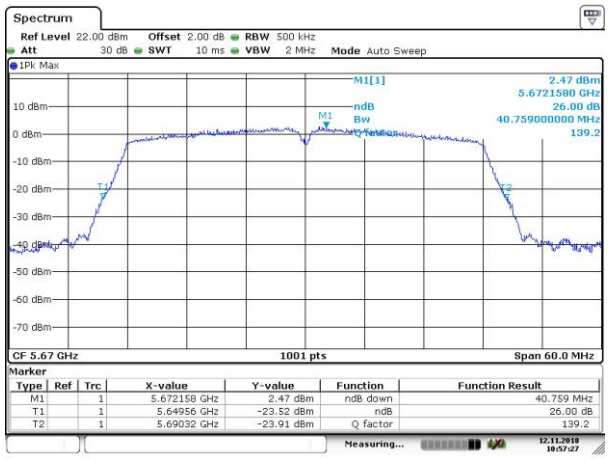


Date: 12.NOV.2018 10:55:52

26dB_802.11n_HT40_5550MHz

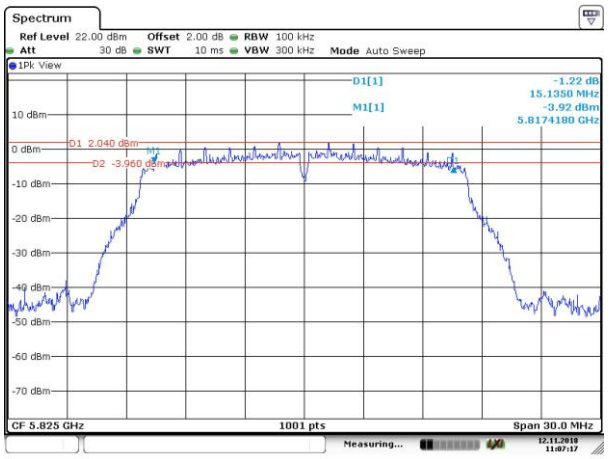
Date: 12.NOV.2018 10:57:04

26dB_802.11n_HT40_5670MHz



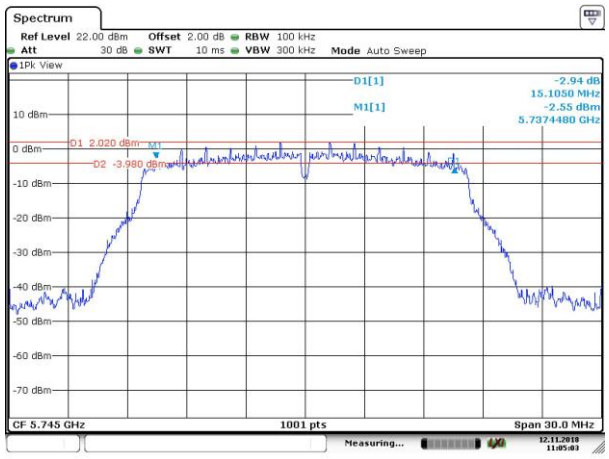
Date: 12.NOV.2018 10:57:27

6dB BW_802.11a_5825MHz



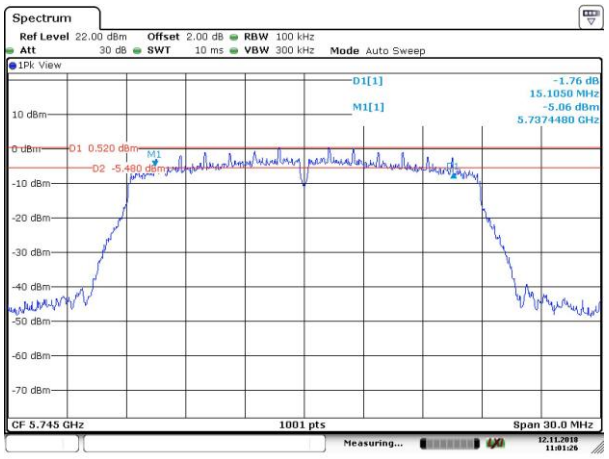
Date: 12.NOV.2018 11:07:17

6dB BW_802.11a_5745MHz



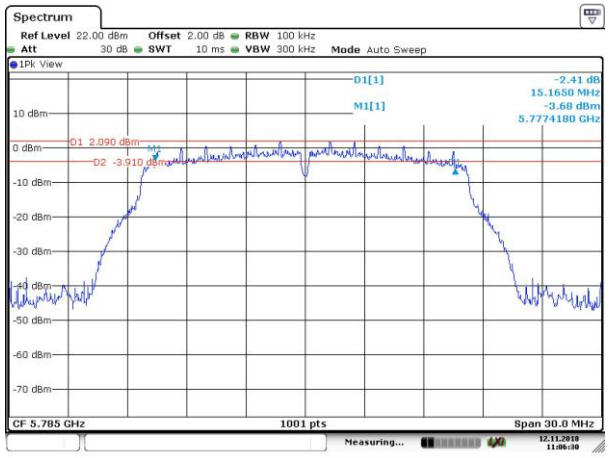
Date: 12.NOV.2018 11:05:03

6dB BW_802.11n_HT20_5745MHz



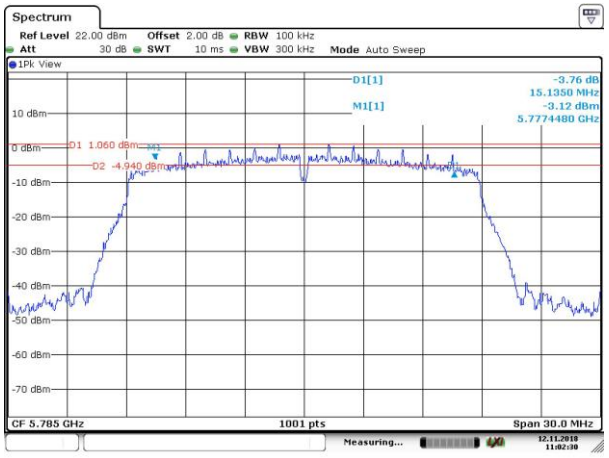
Date: 12.NOV.2018 11:01:26

6dB BW_802.11a_5785MHz



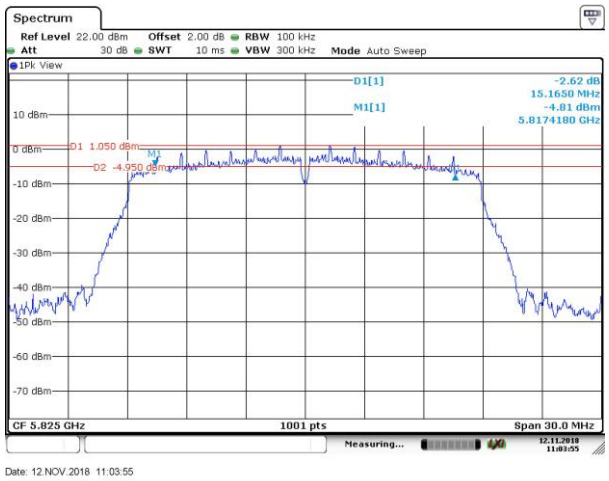
Date: 12.NOV.2018 11:06:30

6dB BW_802.11n_HT20_5785MHz

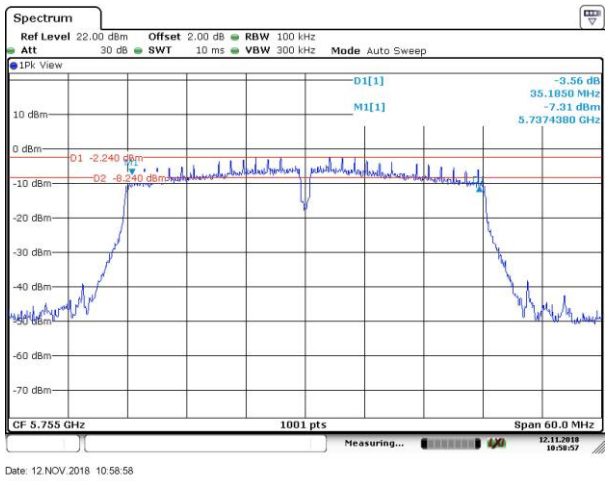


Date: 12.NOV.2018 11:02:30

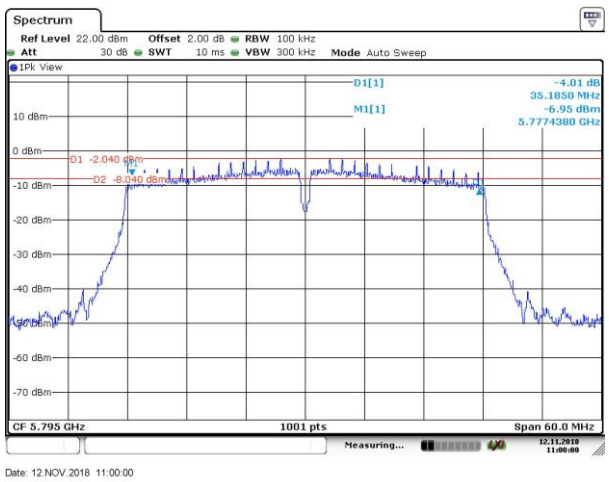
6dB BW_802.11n_HT20_5825MHz



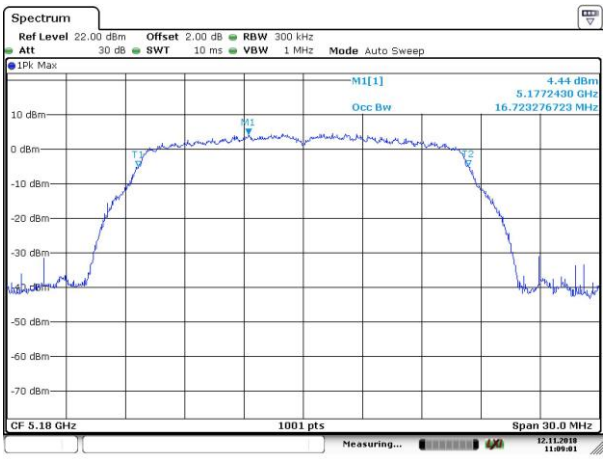
6dB BW_802.11n_HT40_5755MHz



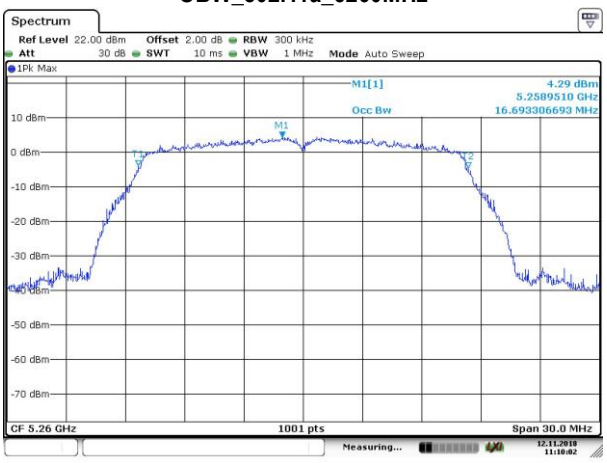
6dB BW_802.11n_HT40_5795MHz



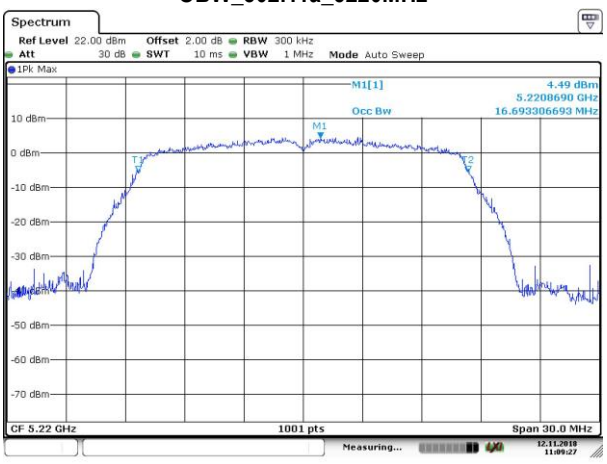
OBW_802.11a_5180MHz



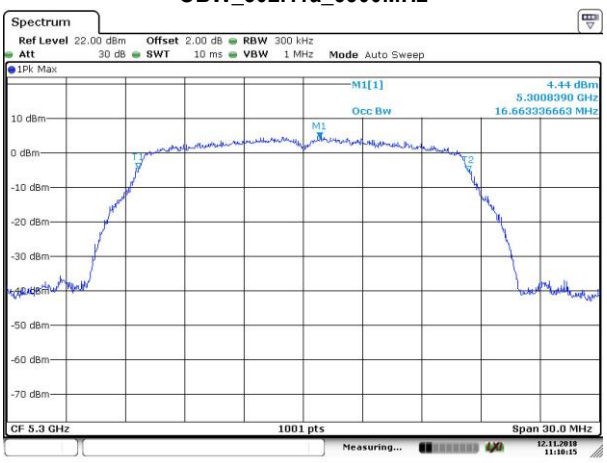
OBW_802.11a_5260MHz



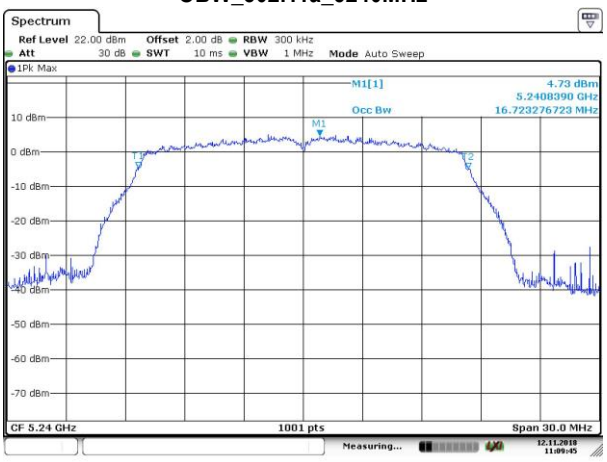
OBW_802.11a_5220MHz



OBW_802.11a_5300MHz



OBW_802.11a_5240MHz



OBW_802.11a_5320MHz

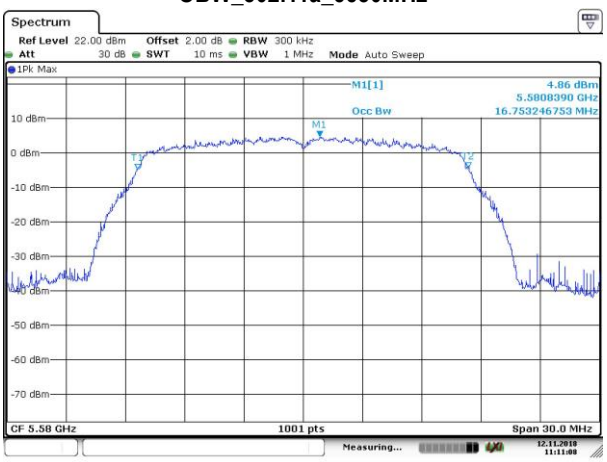
OBW_802.11a_5500MHz

Date: 12.NOV.2018 11:10:45

OBW_802.11a_5745MHz

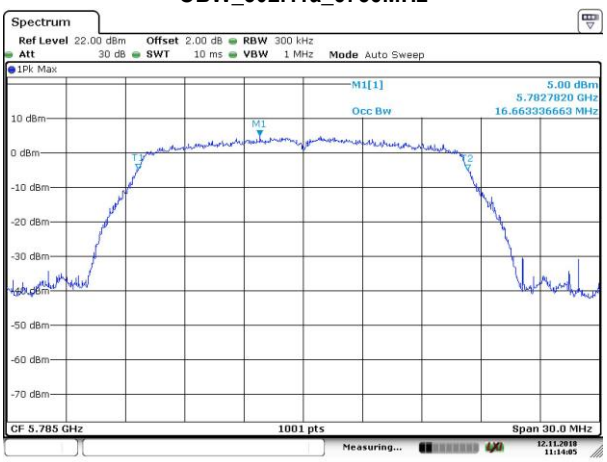
Date: 12.NOV.2018 11:13:45

OBW_802.11a_5580MHz



Date: 12.NOV.2018 11:11:08

OBW_802.11a_5785MHz

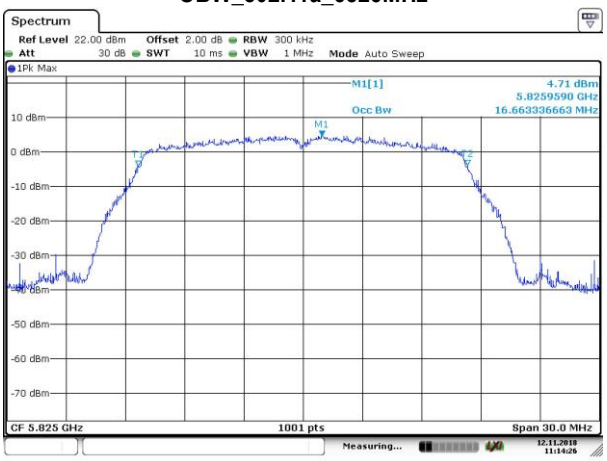


Date: 12.NOV.2018 11:14:06

OBW_802.11a_5700MHz

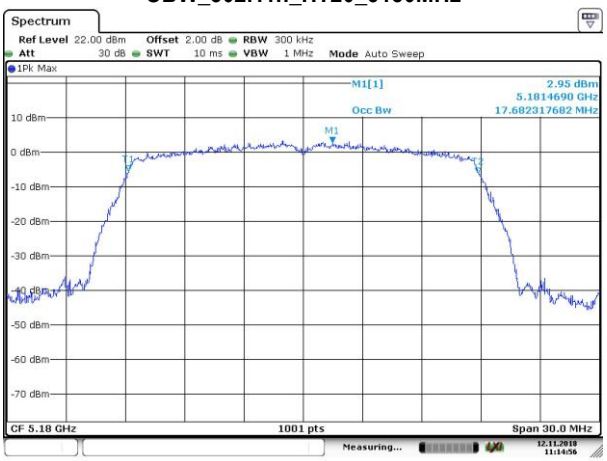
Date: 12.NOV.2018 11:11:30

OBW_802.11a_5825MHz



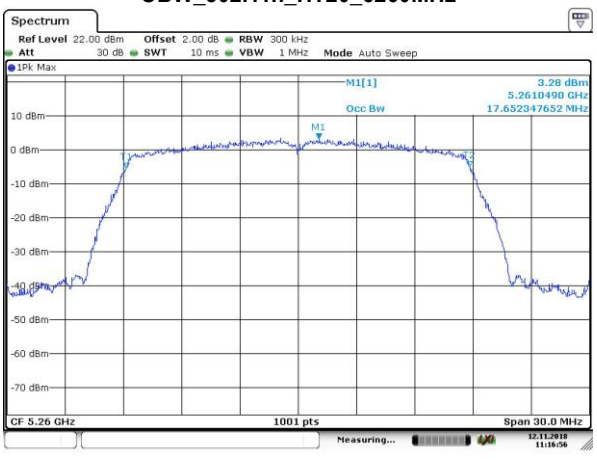
Date: 12.NOV.2018 11:14:26

OBW_802.11n_HT20_5180MHz



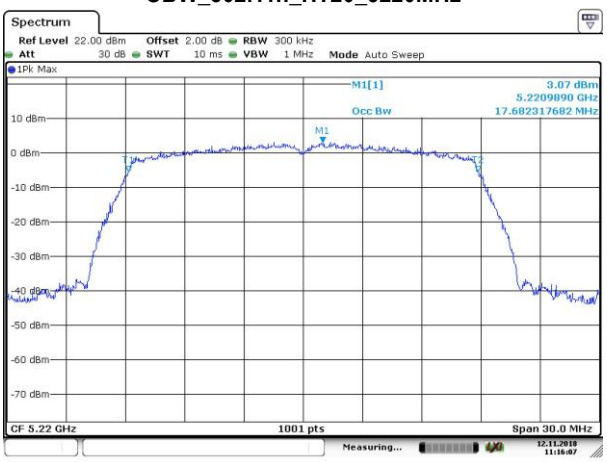
Date: 12.NOV.2018 11:14:57

OBW_802.11n_HT20_5260MHz



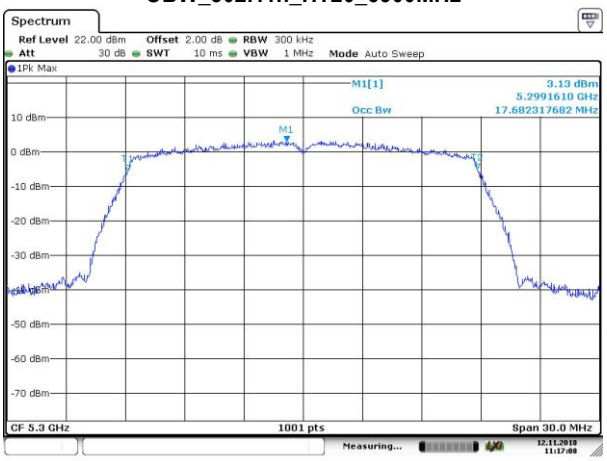
Date: 12.NOV.2018 11:16:56

OBW_802.11n_HT20_5220MHz



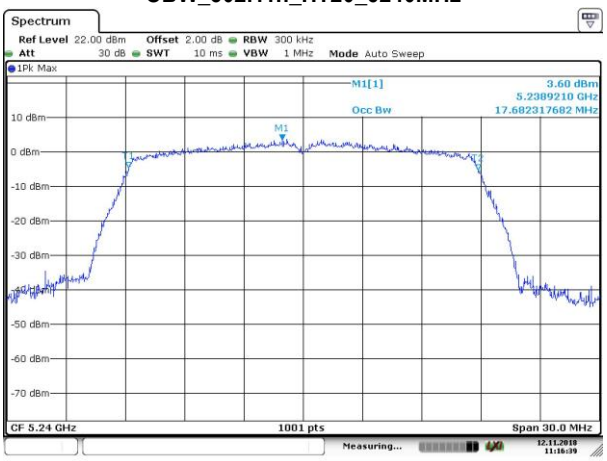
Date: 12.NOV.2018 11:16:08

OBW_802.11n_HT20_5300MHz



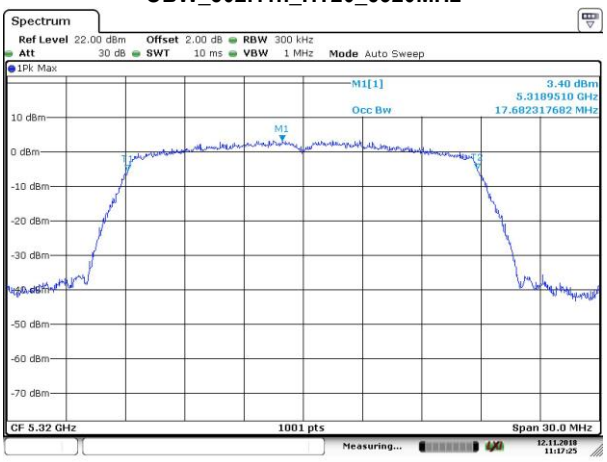
Date: 12.NOV.2018 11:17:09

OBW_802.11n_HT20_5240MHz



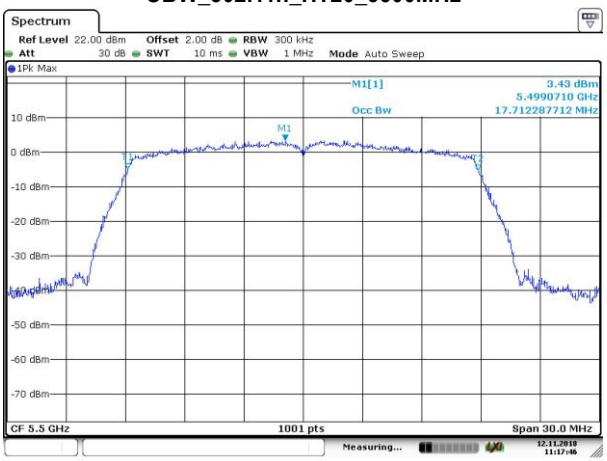
Date: 12.NOV.2018 11:16:40

OBW_802.11n_HT20_5320MHz



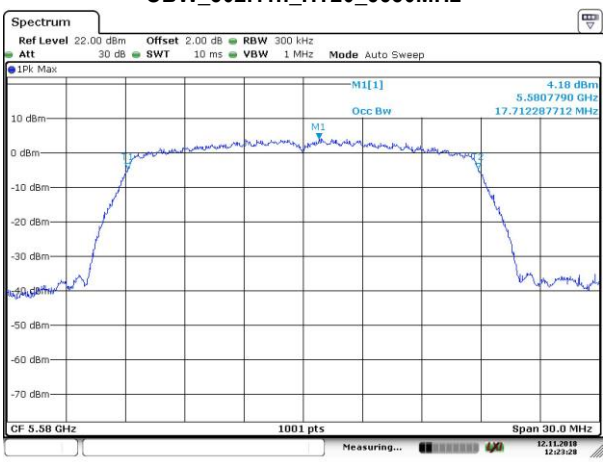
Date: 12.NOV.2018 11:17:26

OBW_802.11n_HT20_5500MHz



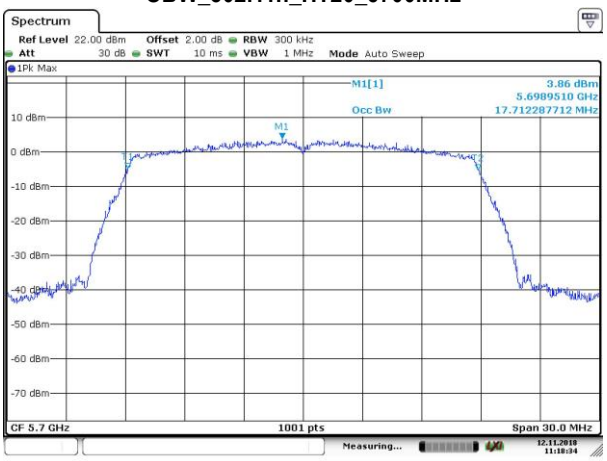
Date: 12.NOV.2018 11:17:47

OBW_802.11n_HT20_5580MHz



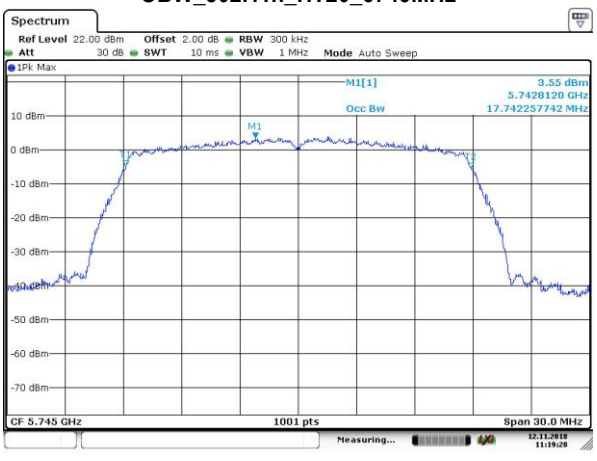
Date: 12.NOV.2018 12:23:28

OBW_802.11n_HT20_5700MHz



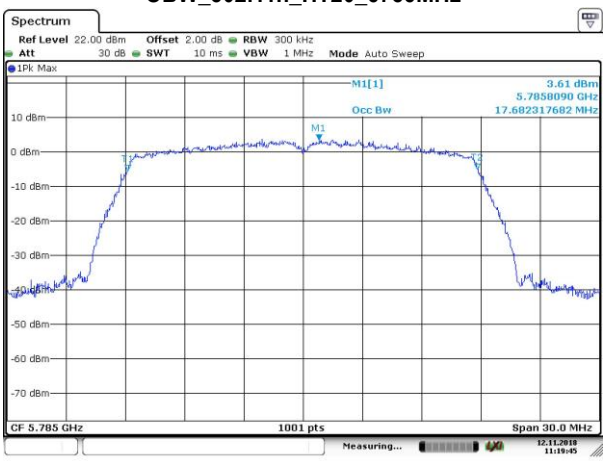
Date: 12.NOV.2018 11:18:34

OBW_802.11n_HT20_5745MHz



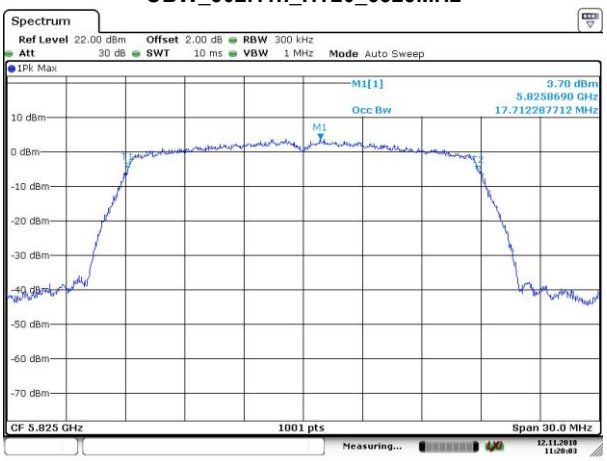
Date: 12.NOV.2018 11:19:28

OBW_802.11n_HT20_5785MHz



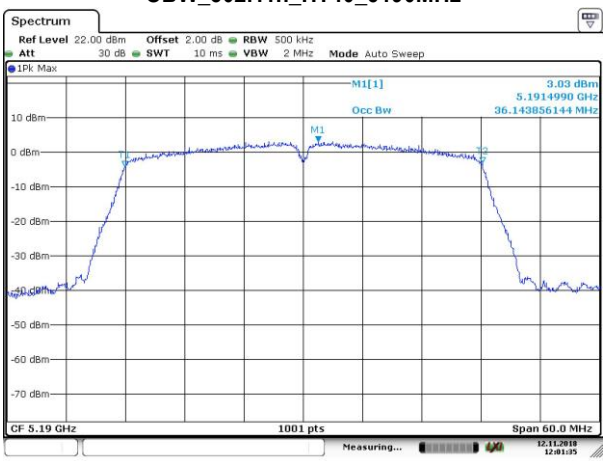
Date: 12.NOV.2018 11:19:45

OBW_802.11n_HT20_5825MHz



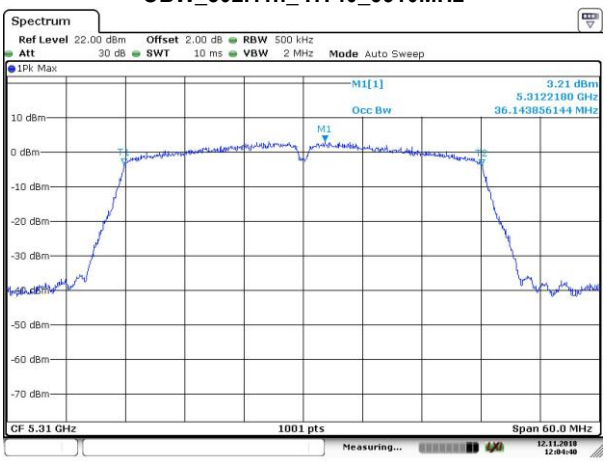
Date: 12.NOV.2018 11:20:03

OBW_802.11n_HT40_5190MHz



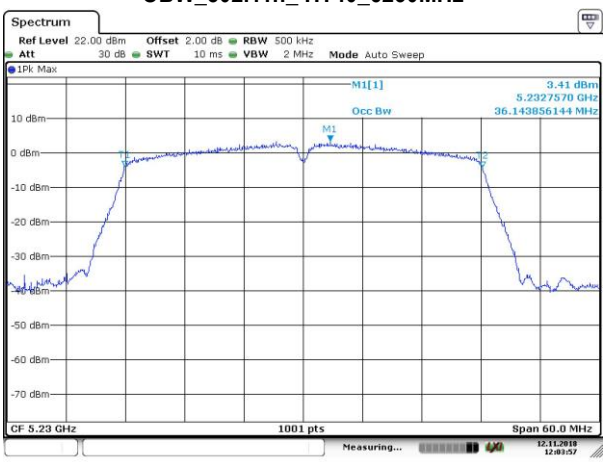
Date: 12.NOV.2018 12:01:35

OBW_802.11n_ HT40_5310MHz



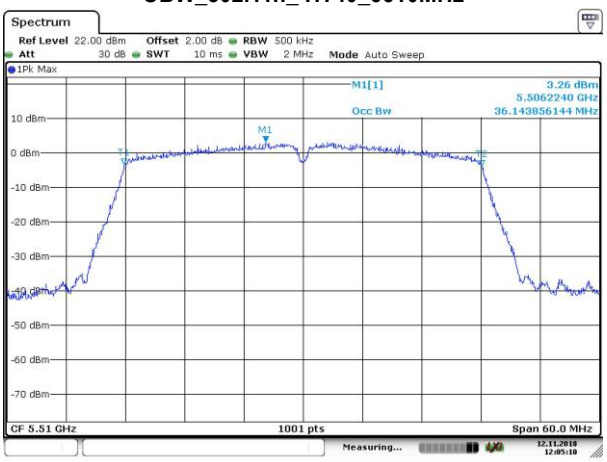
Date: 12.NOV.2018 12:04:41

OBW_802.11n_ HT40_5230MHz



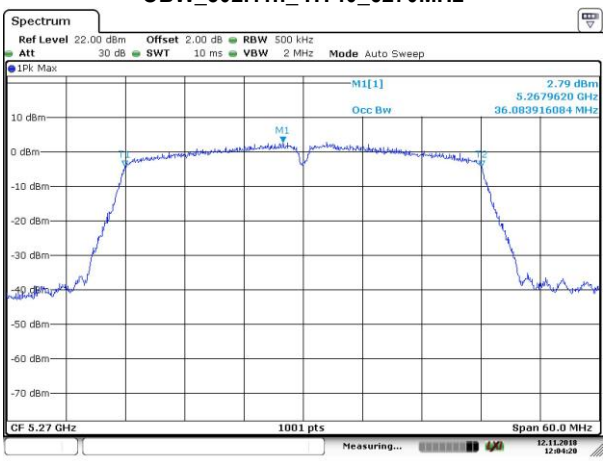
Date: 12.NOV.2018 12:03:57

OBW_802.11n_ HT40_5510MHz



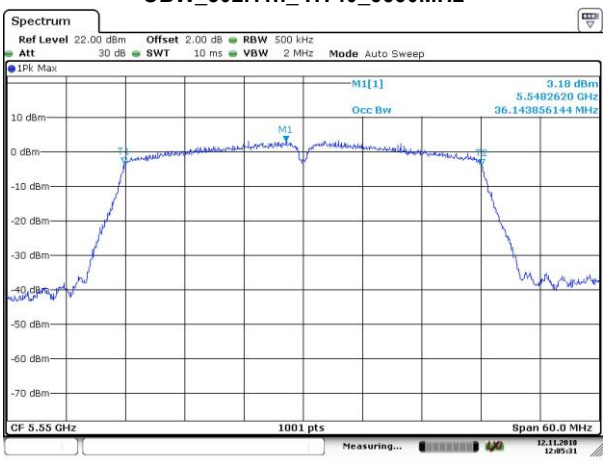
Date: 12.NOV.2018 12:05:10

OBW_802.11n_ HT40_5270MHz



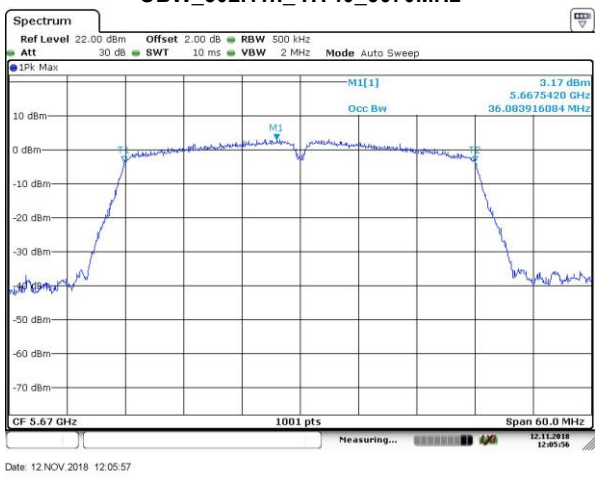
Date: 12.NOV.2018 12:04:21

OBW_802.11n_ HT40_5550MHz



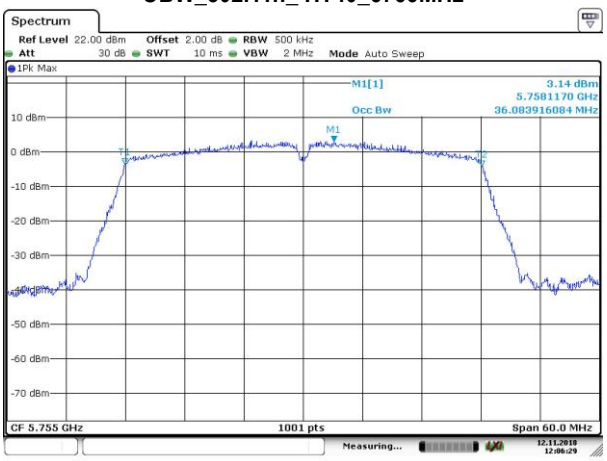
Date: 12.NOV.2018 12:05:31

OBW_802.11n_ HT40_5670MHz



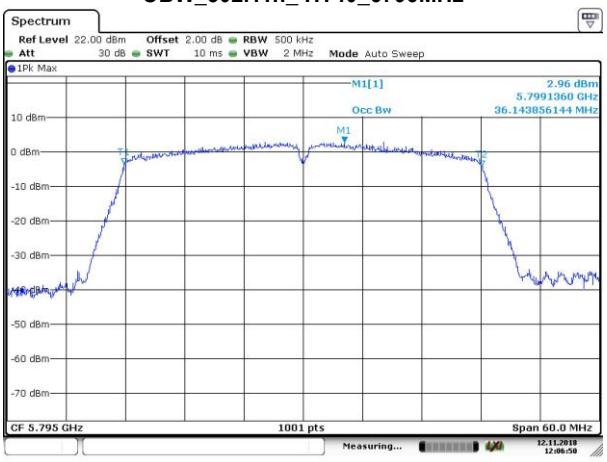
Date: 12.NOV.2018 12:05:57

OBW_802.11n_ HT40_5755MHz



Date: 12.NOV.2018 12:06:29

OBW_802.11n_ HT40_5795MHz



Date: 12.NOV.2018 12:06:51

9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Master device)	1 Watt(30dBm)
		Fixed point-to-point Access Ponit	1 Watt(30dBm)
	√	Mobile and portable client device	250mW(23.98dBm)
U-NII-2A	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	√		1 Watt(30dBm)
If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.			

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, …, GN dBi.

(i) If transmit signals are correlated, then Directional gain

$= 10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is not granter than 6 dBi. Therefore, reduction of power is not required.

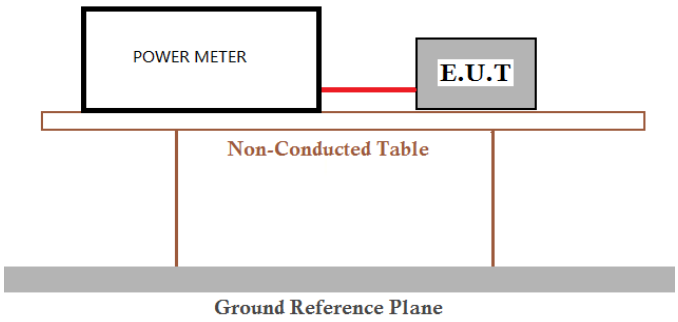
9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add 10 log(1/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

9.3 Measurement Equipment Used

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018/9/2	2019/9/2
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2018/3/13	2019/3/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/12	2019/7/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2

9.4 Test Set-up



9.5 Measurement Result

Conducted output power (FCC)

Test Mode	Test Channel	Frequency [MHz]	Antenna Port	Meas. Level (Cond.) [dBm]	Meas. Level (EIRP) [dBm]	Verdict
11A20	36	5180	ANT 1	11.37	11.07	PASS
	44	5220	ANT 1	11.26	10.96	PASS
	48	5240	ANT 1	11.20	10.90	PASS
	52	5300	ANT 1	11.24	10.94	PASS
	60	5280	ANT 1	11.19	10.89	PASS
	64	5320	ANT 1	11.21	10.91	PASS
	100	5500	ANT 1	11.63	11.33	PASS
	116	5580	ANT 1	11.33	11.03	PASS
	140	5700	ANT 1	11.34	11.04	PASS
	149	5745	ANT 1	11.33	11.03	PASS
	157	5785	ANT 1	11.07	10.77	PASS
	165	5825	ANT 1	11.26	10.96	PASS
11N20	36	5180	ANT 1	10.24	9.94	PASS
	44	5220	ANT 1	10.08	9.78	PASS
	48	5240	ANT 1	10.02	9.72	PASS
	52	5300	ANT 1	10.12	9.82	PASS
	60	5280	ANT 1	10.08	9.78	PASS
	64	5320	ANT 1	10.21	9.91	PASS
	100	5500	ANT 1	10.53	10.23	PASS
	116	5580	ANT 1	10.26	9.96	PASS
	140	5700	ANT 1	10.18	9.88	PASS
	149	5745	ANT 1	10.38	10.08	PASS
	157	5785	ANT 1	10.28	9.98	PASS
	165	5825	ANT 1	10.13	9.83	PASS
11N40	38	5190	ANT 1	10.19	9.89	PASS
	46	5230	ANT 1	10.13	9.83	PASS
	54	5270	ANT 1	10.11	9.81	PASS
	62	5310	ANT 1	10.31	10.01	PASS
	102	5510	ANT 1	10.68	10.38	PASS
	110	5710	ANT 1	10.36	10.06	PASS
	134	5670	ANT 1	10.26	9.96	PASS
	151	5755	ANT 1	10.14	9.84	PASS
	159	5795	ANT 1	9.97	9.67	PASS

10 MAXIMUM POWER SPECTRAL DENSITY

10.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Master device)	17dBm/ MHz
		Fixed point-to-point Access Ponit	
	√	Mobile and portable client device	11dBm/ MHz
U-NII-2A	√		11dBm/ MHz
U-NII-2C	√		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz
If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.			

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, …, GN dBi.

(i) If transmit signals are correlated, then Directional gain

$= 10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is not grater than 6 dBi. Therefore, reduction of power is not required.

10.2 Measurement Procedure

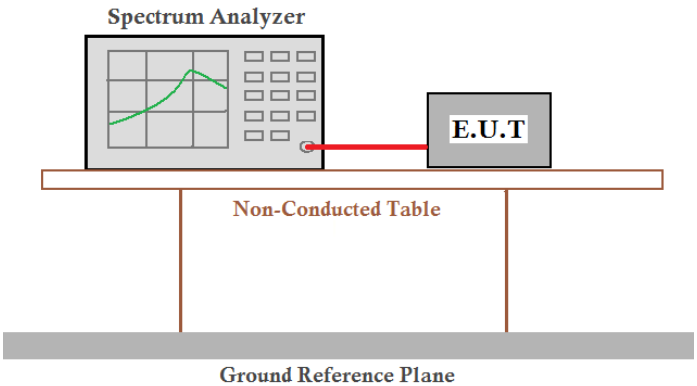
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band**:
   Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (1001 pts), detector = RMS. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
   For U-NII-3 Band:
   Set RBW=500 kHz, VBW≥ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (1001 pts), detector = RMS. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. User the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome

10.3 Measurement Equipment Used

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018/9/2	2019/9/2
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2018/3/13	2019/3/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/12	2019/7/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2

10.4 Test Set-up

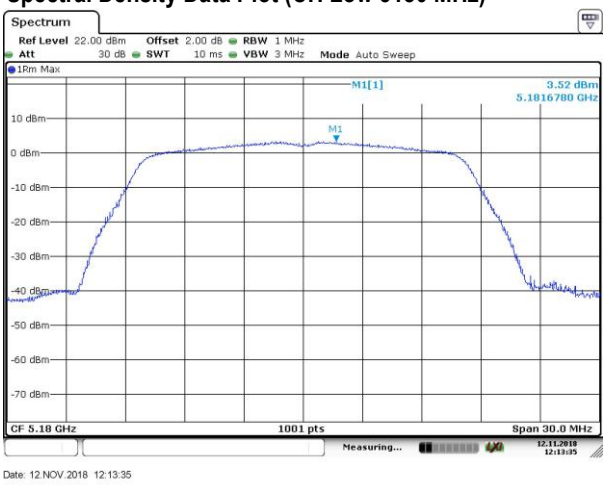


10.5 Measurement Result

Measurement Data: Test Mode	Test Channel	Frequency [MHz]	Meas. Level (Cond.) [dBm/MHz]	Verdict
11A20	36	5180	3.52	PASS
	44	5220	3.46	PASS
	48	5240	3.44	PASS
	52	5260	3.62	PASS
	60	5300	4.07	PASS
	64	5320	3.98	PASS
	100	5500	4.10	PASS
	116	5580	3.63	PASS
	140	5700	3.89	PASS
	149	5745	2.46	PASS
	157	5785	2.57	PASS
	165	5825	2.70	PASS
11N20	36	5180	1.95	PASS
	44	5220	1.83	PASS
	48	5240	1.99	PASS
	52	5260	2.42	PASS
	60	5300	2.60	PASS
	64	5320	2.41	PASS
	100	5500	2.47	PASS
	116	5580	2.83	PASS
	140	5700	2.78	PASS
	149	5745	1.43	PASS
	157	5785	1.39	PASS
	165	5825	1.62	PASS
11N40	38	5190	-0.95	PASS
	46	5230	-0.77	PASS
	54	5270	-0.34	PASS
	62	5310	-0.14	PASS
	102	5510	0.00	PASS
	110	5550	-0.21	PASS
	134	5670	-0.11	PASS
	151	5755	-1.37	PASS
	159	5795	-1.24	PASS

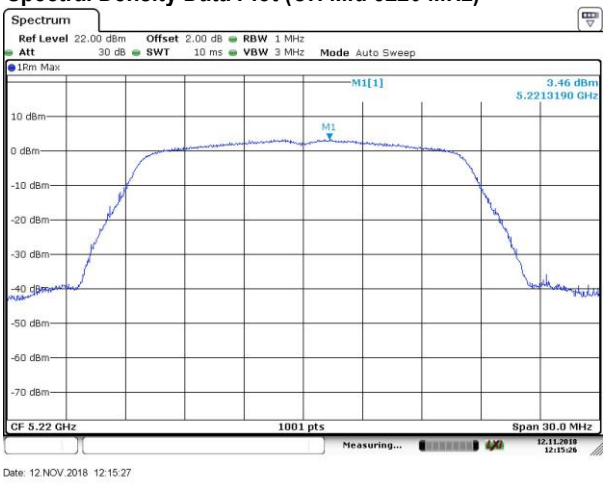
802.11a 5150~5250 MHz

Power Spectral Density Data Plot (CH Low 5180 MHz)



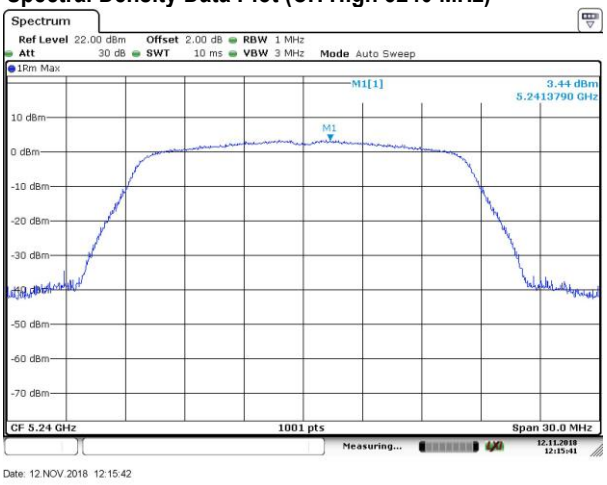
Date: 12.NOV.2018 12:13:35

Power Spectral Density Data Plot (CH Mid 5220 MHz)



Date: 12.NOV.2018 12:15:27

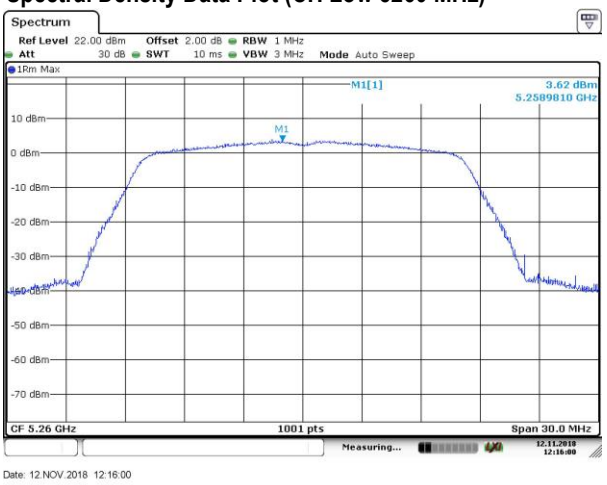
Power Spectral Density Data Plot (CH High 5240 MHz)



Date: 12.NOV.2018 12:15:42

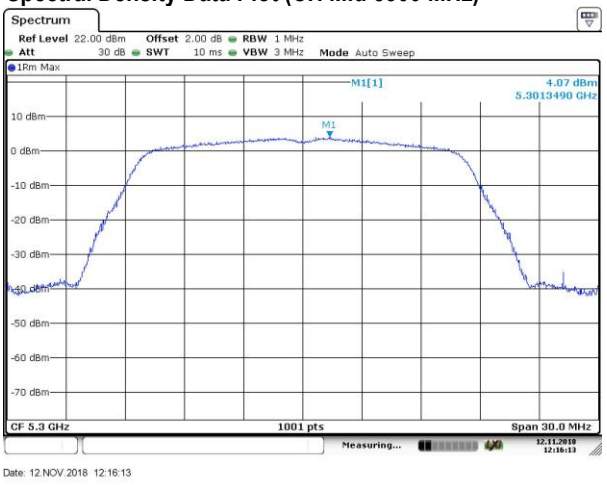
802.11a 5250~5350 MHz

Power Spectral Density Data Plot (CH Low 5260 MHz)



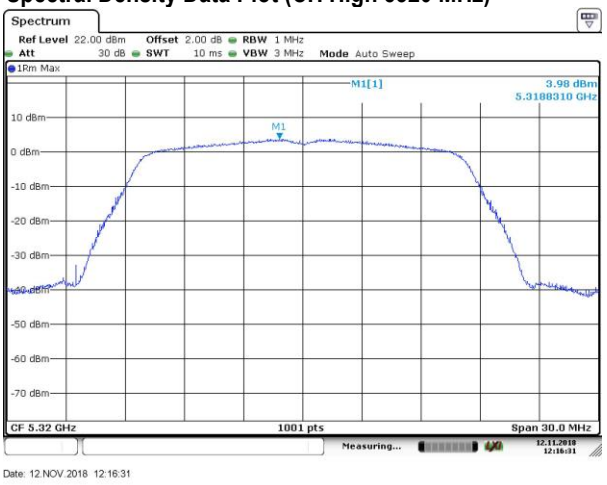
Date: 12.NOV.2018 12:16:00

Power Spectral Density Data Plot (CH Mid 5300 MHz)



Date: 12.NOV.2018 12:16:13

Power Spectral Density Data Plot (CH High 5320 MHz)



Date: 12.NOV.2018 12:16:31