TEST REPORT

Applicant Name:	PACBRAKE COMPANY
Address:	26688 56 Ave,Langley BC Canada V4W 3X5
Report Number:	2401U80232E-RF-00C
FCC ID:	2BKZI-HP10660

Test Standard (s)

FCC PART 15.407

Sample Description

Product Type:	WIRELESS AIR CONTROLS REMOTE
Model No.:	HP10660
Multiple Model(s) No.:	N/A
Trade Mark:	PACBRAKE
Date Received:	2024/06/18
Issue Date:	2024/10/24

Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Ekko. Wu

Ekko Wu
RF Engineer

Approved By:

Nancy Wang

Nancy Wang
RF Supervisor

Note: The information marked# is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2401U80232E-RF-00C	Original Report	2024/10/24

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	WIRELESS AIR CONTROLS REMOTE
Tested Model	HP10660
Multiple Model(s)	N/A
Frequency Range	5G Wi-Fi: 5150-5250MHz; 5725-5850MHz
Mode	802.11a/n20/n40
Maximum Conducted Average Output Power	5150-5250 MHz: 11.97dBm 5725-5850 MHz: 13.77dBm
Modulation Technique	OFDM
Antenna Specification#	-2dBi (provided by the applicant)
Voltage Range	DC 3.8V from battery or DC 5V from USB Port
Sample serial number	2NB8-2 for Conducted and Radiated Emissions Test 2NB8-1 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Frequency		213.55 Hz(k=2, 95% level of confidence)
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.75 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.94dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(k=2, 95% level of confidence)
Temperature		±1°C
Humidity		±1%
Supply voltages		±0.4%

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

Test Facility

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

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

For 5150-5250MHz Band, 6 channels are provided to testing:

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

For 802.11a/n20 mode: channel 36, 40, 48 were tested;
For 802.11n40 mode: channel 38, 46 were tested;

For 5725-5850MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	159	5795
151	5755	161	5805
153	5765	165	5825
157	5785	/	/

For 802.11a/n20 mode: channel 149, 157, 165 were tested;
For 802.11n40 mode: channel 151, 159 were tested;

EUT Exercise Software

EUT was test in engineering mode. The power level was provided by the applicant. The device was tested with the worst case was performed as below:

5150-5250 MHz Band:				
Test Modes	**Test Channels**	**Test Frequency (MHz)**	**Data rate**	**Power Level Setting#**
802.11a	Lowest	5180	6Mbps	16
	Middle	5200	6Mbps	16
	Highest	5240	6Mbps	16
802.11n-HT20	Lowest	5180	MCS0	16
	Middle	5200	MCS0	16
	Highest	5240	MCS0	16
802.11n-HT40	Lowest	5190	MCS0	16
	Highest	5230	MCS0	16

5725-5850 MHz Band:				
Test Modes	**Test Channels**	**Test Frequency (MHz)**	**Data rate**	**Power Level Setting#**
802.11a	Lowest	5745	6Mbps	16
	Middle	5785	6Mbps	16
	Highest	5825	6Mbps	16
802.11n-HT20	Lowest	5745	MCS0	16
	Middle	5785	MCS0	16
	Highest	5825	MCS0	16
802.11n-HT40	Lowest	5755	MCS0	16
	Highest	5795	MCS0	16
The above are the worst-case data rates, which are determined for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.				

Duty cycle

Please refer to the Appendix.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

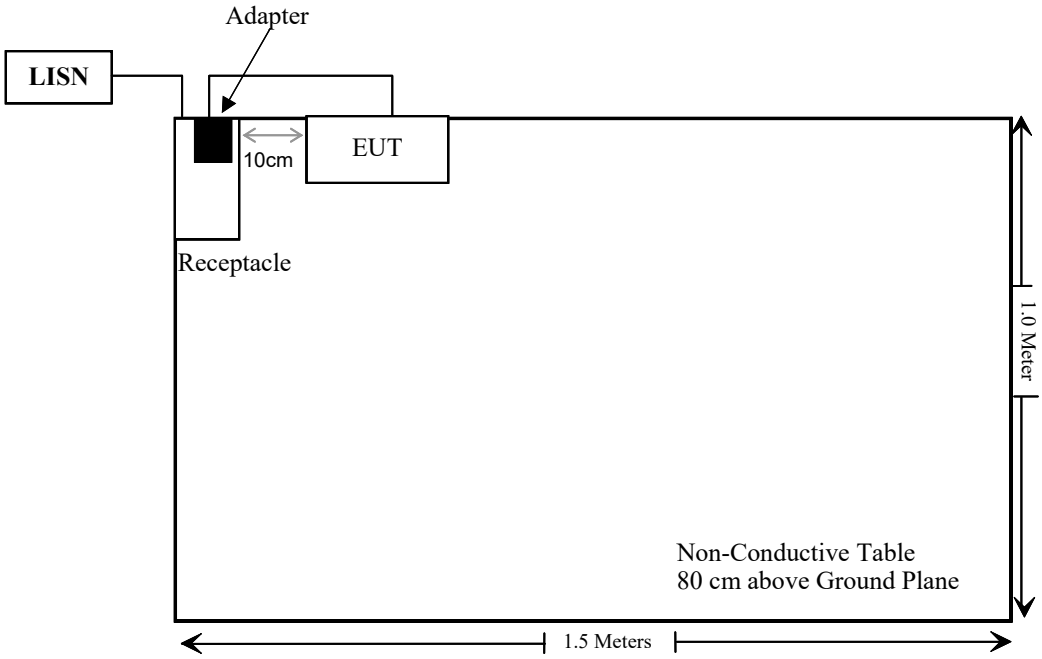
Manufacturer	Description	Model	Serial Number
XED	Adapter	XED-UL 050100CU	Unknown

External I/O Cable

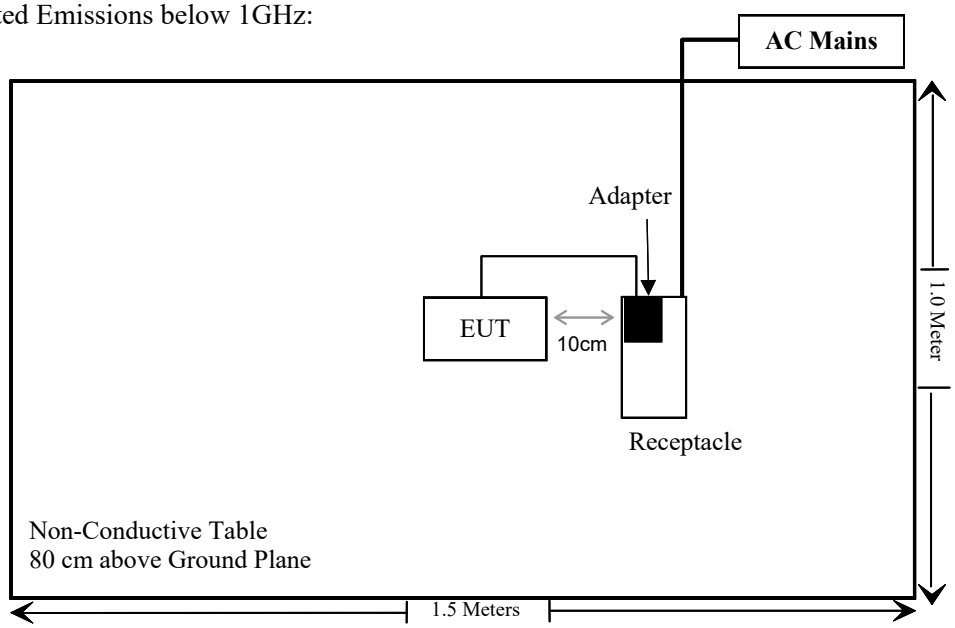
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

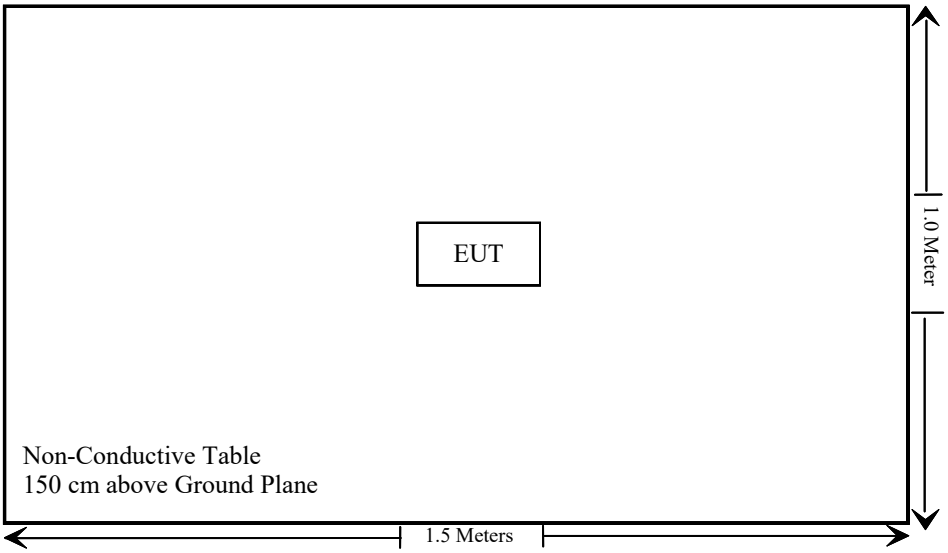
For Conducted Emission:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §1.1307 & §2.1093	RF EXPOSURE	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(9)& §15.207(a)	Conducted Emissions	Compliant
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliant
§15.407(a)	Conducted Transmitter Output Power	Compliant
§15.407 (a)	Power Spectral Density	Compliant
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Not Applicable

Not Applicable: The EUT only supports W52 & W58 Bands.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/01/16	2025/01/15
Rohde & Schwarz	LISN	ENV216	101613	2024/01/16	2025/01/15
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2024/05/21	2025/05/20
Unknown	CE Cable	Unknown	UF A210B-1-0720-504504	2024/05/21	2025/05/20
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Unknown	Cable	2Y194	0735	2024/05/21	2025/05/20
Unknown	Cable	PNG214	1354	2024/05/21	2025/05/20
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
Unknown	RF Cable	XH750A-N	J-10M	2024/06/18	2025/06/17
JD	Multiplex Switch Test Control Set	DT7220FSU	DQ77926	2024/06/18	2025/06/17
A.H.System	Pre-amplifier	PAM-1840VH	190	2024/06/18	2025/06/17
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/06/18	2025/06/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Tonscend	RF control Unit	JS0806-2	19D8060154	2023/09/06	2024/09/05
ANRITSU	Microwave peak power sensor	MA24418A	12622	2024/05/21	2025/05/20
Rohde &Schwarz	Spectrum Analyzer	FSV40	101473	2024/01/16	2025/01/15
Narda	20dB Attenuator	99899	0107	2024/06/27	2025/06/26
Unknown	RF Cable	65475	01670515	2024/06/27	2025/06/26

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

FCC §1.1307 & §2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: 2401U80232E-SAA.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Antenna Connector Construction

The EUT has one internal antenna which was permanently attached, and the maximum antenna gain# is -2dBi, fulfill the requirement of this section. Please refer to the EUT photos.

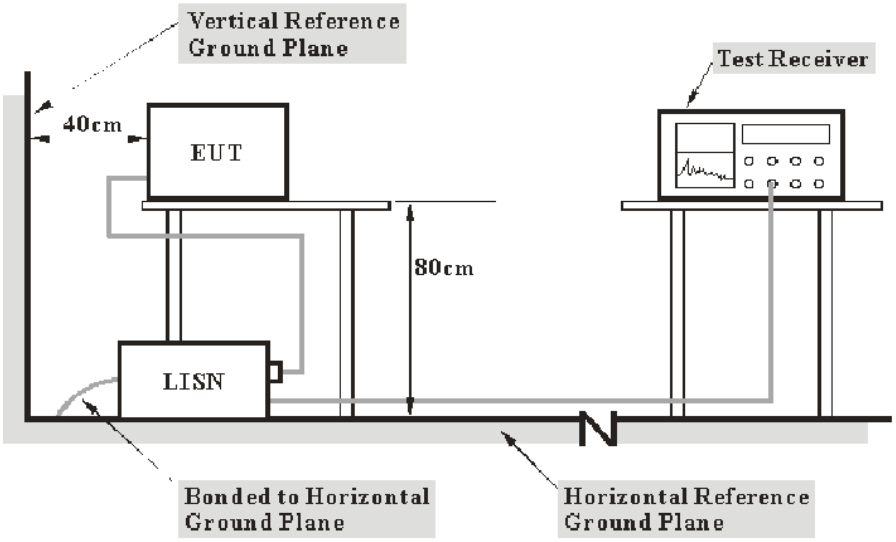
Result: Compliant

FCC §15.407 (b) (6) §15.207 (a) - CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and Average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

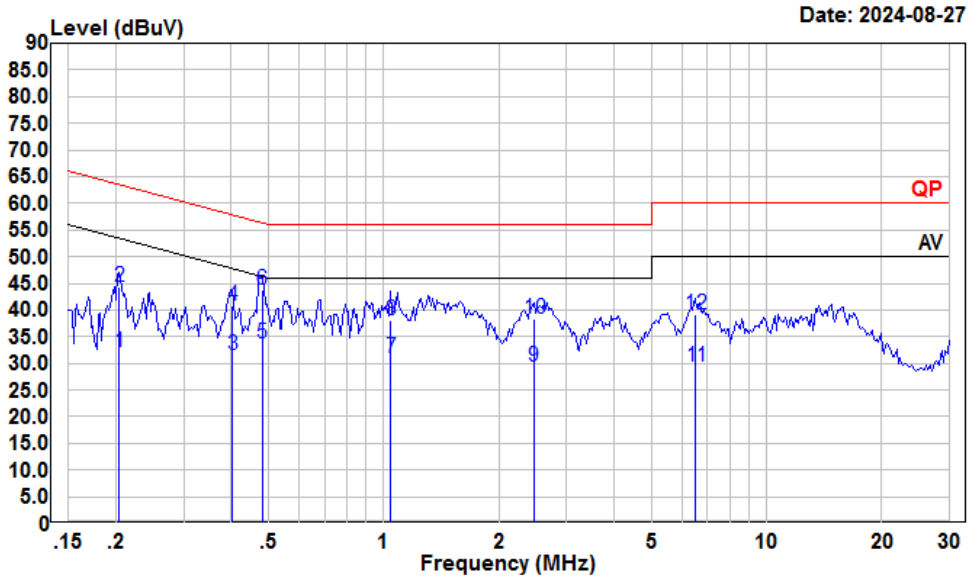
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	65 %
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-08-27.

EUT operation mode: Transmitting (Maximum output power mode, 802.11n40 5755MHz)

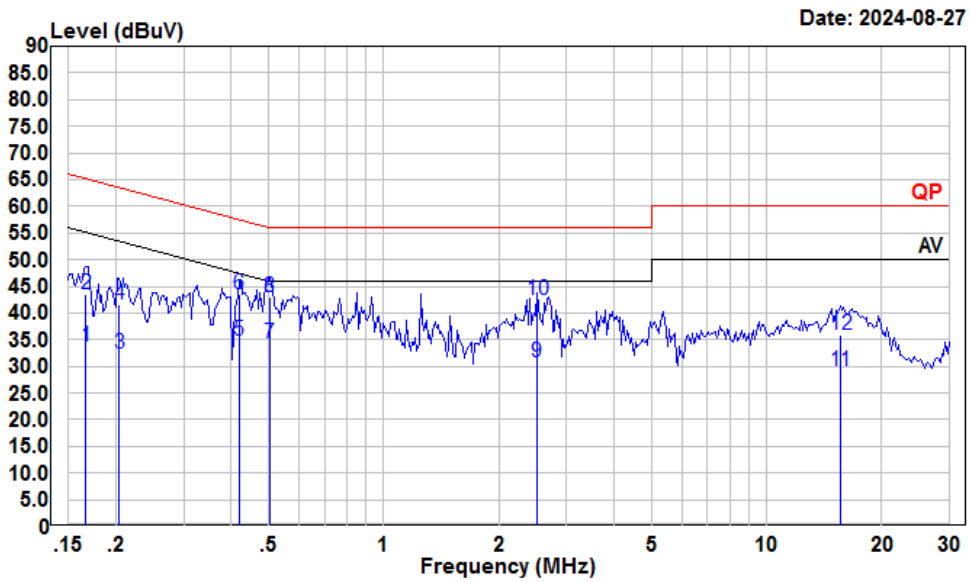
AC 120V/60 Hz, Line



Condition: Line
Project : 2401U80232E-RF
tester : Macy.shi
Note : Transmitting

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.204	11.12	32.00	10.79	10.09	53.45	-21.45	Average
2	0.204	23.34	44.22	10.79	10.09	63.45	-19.23	QP
3	0.402	11.00	31.67	10.57	10.10	47.81	-16.14	Average
4	0.402	20.00	40.67	10.57	10.10	57.81	-17.14	QP
5	0.481	13.08	33.72	10.51	10.13	46.32	-12.60	Average
6	0.481	23.14	43.78	10.51	10.13	56.32	-12.54	QP
7	1.043	10.46	30.99	10.41	10.12	46.00	-15.01	Average
8	1.043	17.44	37.97	10.41	10.12	56.00	-18.03	QP
9	2.461	8.69	29.37	10.51	10.17	46.00	-16.63	Average
10	2.461	17.62	38.30	10.51	10.17	56.00	-17.70	QP
11	6.523	8.82	29.48	10.47	10.19	50.00	-20.52	Average
12	6.523	18.40	39.06	10.47	10.19	60.00	-20.94	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : 2401U80232E-RF
tester : Macy.shi
Note : Transmitting

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.167	13.16	33.79	10.53	10.10	55.12	-21.33	Average
2	0.167	22.76	43.39	10.53	10.10	65.12	-21.73	QP
3	0.204	11.92	32.42	10.41	10.09	53.45	-21.03	Average
4	0.204	21.22	41.72	10.41	10.09	63.45	-21.73	QP
5	0.419	14.00	34.75	10.64	10.11	47.46	-12.71	Average
6	0.419	22.90	43.65	10.64	10.11	57.46	-13.81	QP
7	0.502	13.55	34.39	10.70	10.14	46.00	-11.61	Average
8	0.502	22.23	43.07	10.70	10.14	56.00	-12.93	QP
9	2.513	10.08	30.65	10.40	10.17	46.00	-15.35	Average
10	2.513	21.72	42.29	10.40	10.17	56.00	-13.71	QP
11	15.552	8.04	29.04	10.79	10.21	50.00	-20.96	Average
12	15.552	14.93	35.93	10.79	10.21	60.00	-24.07	QP

§15.205 & §15.209 & §15.407(B) - UNDESIRABLE EMISSION

Applicable Standard

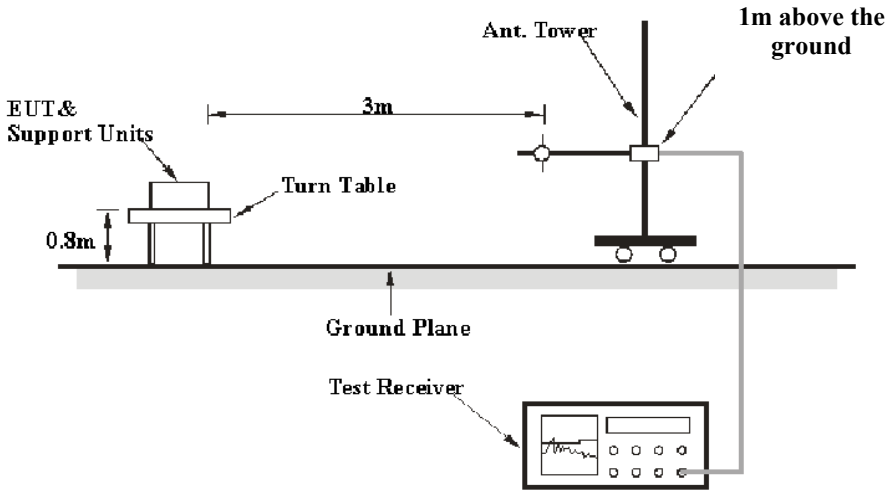
FCC §15.407 (b); §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band:
(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

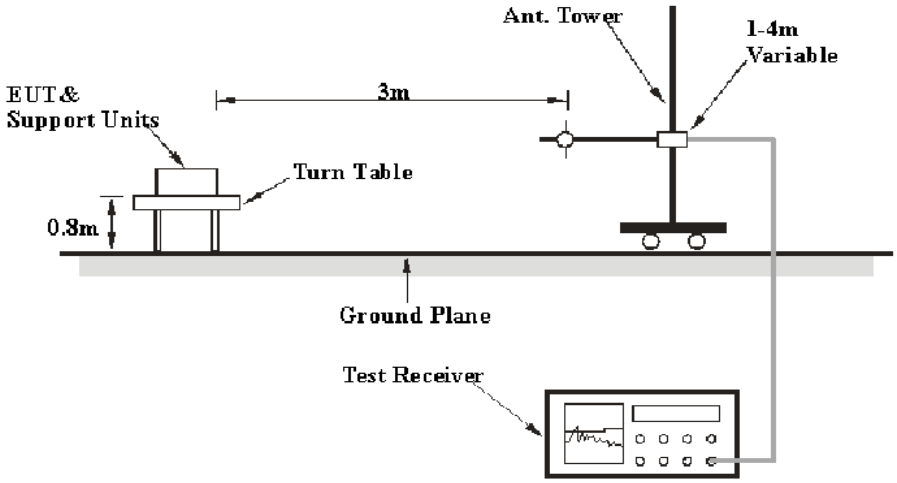
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

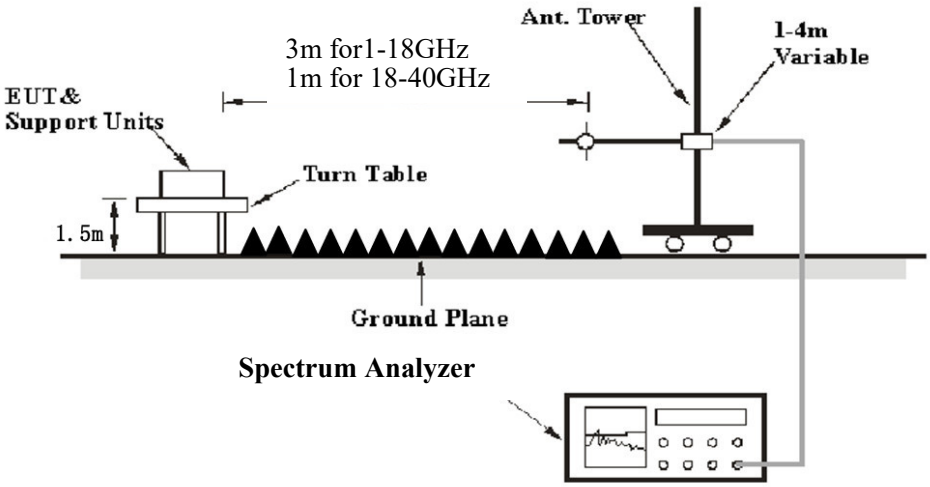
9 kHz-30MHz:



30MHz-1GHz:



Above 1 GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9 kHz-1GHz:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP
	300 Hz	1 kHz	/	PK
150 kHz – 30 MHz	/	/	9 kHz	QP
	10 kHz	30 kHz	/	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP
	100 kHz	300 kHz	/	PK

1-40GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Average	>98%	1MHz	≥10 Hz Note 1
	<98%	1MHz	≥1/Ton Note 2
Note 1: The detail test parameters please refer to duty cycle section. Note 2: Ton is minimum transmission duration.			

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Radiated Spurious Emission

During the radiated emission test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

All emissions under the average limit and under the noise floor have not recorded in the report.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified, extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

$$E_{\text{SpecLimit}} = E_{\text{Meas}} + 20\log\left(\frac{d_{\text{Meas}}}{d_{\text{SpecLimit}}}\right)$$

where

$E_{\text{SpecLimit}}$	is the field strength of the emission at the distance specified by the limit, in dBμV/m
E_{Meas}	is the field strength of the emission at the measurement distance, in dBμV/m
d_{Meas}	is the measurement distance, in m
$d_{\text{SpecLimit}}$	is the distance specified by the limit, in m

So the extrapolation factor of 1m is 20*log(1/3)= -9.5 dB, for 18-40GHz range, the limit of 1m distance was added by 9.5dB from limit of 3m to compared with the result measurement at 1m distance.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit; Margin = Limit–Corrected Amplitude
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	22~25 °C
Relative Humidity:	50~54 %
ATM Pressure:	101 kPa

The testing was performed by Anson Su on 2024-10-10 for below 1GHz and Zenos Qiao on 2024-09-04 and Dylan Yang on 2024-10-23 for above 1GHz.

EUT operation mode: Transmitting

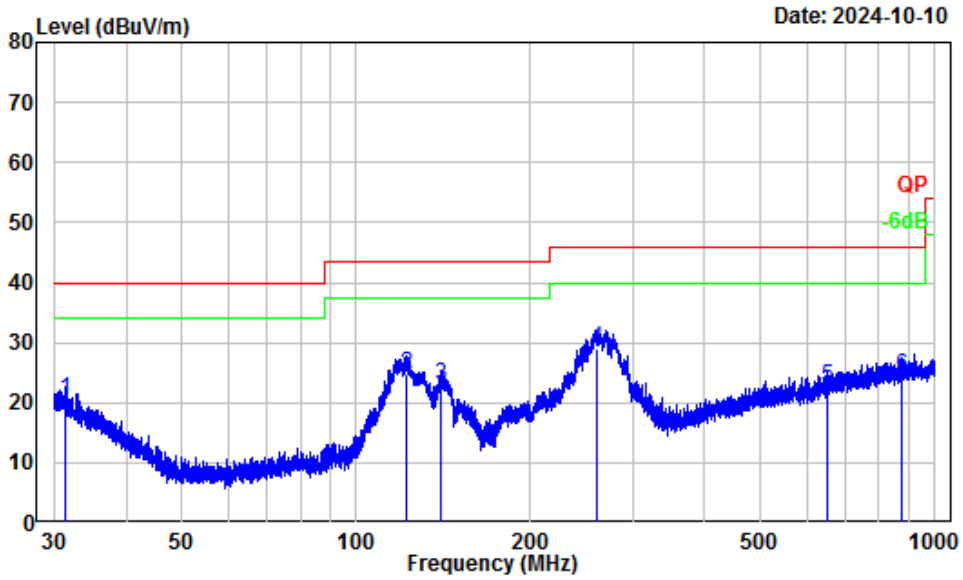
Note: Pre-scan in the X, Y and Z axes of orientation, the worst case Y-axis of orientation was recorded.

9 kHz-30MHz: *(Maximum output power mode, 802.11n40 5755MHz)*

The amplitude of spurious emissions attenuated more than 20 dB below the limit was not recorded.

30 MHz–1 GHz: *(Maximum output power mode, 802.11n40 5755MHz)*

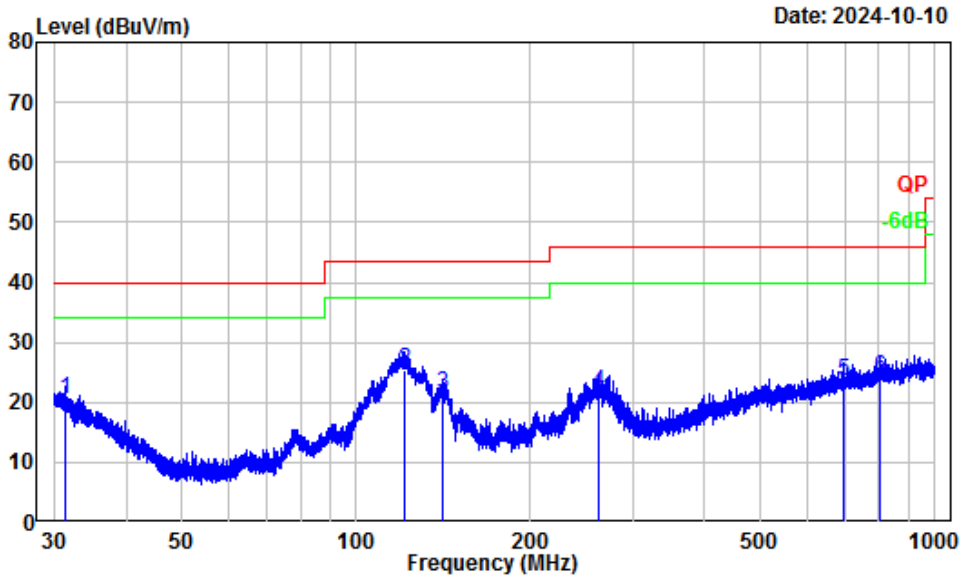
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: 2401U80232E-RF
Test Mode : 5G WIFI Transmitting
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	31.32	-6.66	27.24	20.58	40.00	-19.42	QP
2	121.98	-11.24	35.92	24.68	43.50	-18.82	QP
3	140.40	-11.89	34.91	23.02	43.50	-20.48	QP
4	260.03	-12.77	41.82	29.05	46.00	-16.95	QP
5	652.23	-4.08	26.72	22.64	46.00	-23.36	QP
6	876.01	-1.52	25.92	24.40	46.00	-21.60	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: 2401U80232E-RF
Test Mode : 5G WIFI Transmitting
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	31.33	-6.67	27.27	20.60	40.00	-19.40	QP
2	120.75	-11.37	36.72	25.35	43.50	-18.15	QP
3	140.84	-11.89	33.35	21.46	43.50	-22.04	QP
4	261.52	-12.62	34.32	21.70	46.00	-24.30	QP
5	695.03	-3.54	27.22	23.68	46.00	-22.32	QP
6	806.37	-2.10	26.37	24.27	46.00	-21.73	QP

Above 1GHz:

5150-5250 MHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/AV					
802.11a							
5180MHz							
5149.24	55.69	PK	H	2.71	58.40	74	-15.60
5149.24	41.55	AV	H	2.71	44.26	54	-9.74
5148.97	55.28	PK	V	2.71	57.99	74	-16.01
5148.97	41.32	AV	V	2.71	44.03	54	-9.97
10360.00	45.65	PK	H	13.07	58.72	68.2	-9.48
10360.00	45.40	PK	V	13.07	58.47	68.2	-9.73
5200MHz							
10400.00	44.87	PK	H	13.12	57.99	68.2	-10.21
10400.00	44.63	PK	V	13.12	57.75	68.2	-10.45
5240MHz							
5353.75	55.36	PK	H	3.07	58.43	74	-15.57
5353.75	41.28	AV	H	3.07	44.35	54	-9.65
5352.56	55.09	PK	V	3.07	58.16	74	-15.84
5352.56	41.17	AV	V	3.07	44.24	54	-9.76
10480.00	46.04	PK	H	13.07	59.11	68.2	-9.09
10480.00	45.81	PK	V	13.07	58.88	68.2	-9.32

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11n20							
5180MHz							
5149.71	55.87	PK	H	2.71	58.58	74	-15.42
5149.71	41.75	AV	H	2.71	44.46	54	-9.54
5149.46	55.58	PK	V	2.71	58.29	74	-15.71
5149.46	41.61	AV	V	2.71	44.32	54	-9.68
10360.00	45.78	PK	H	13.07	58.85	68.2	-9.35
10360.00	45.55	PK	V	13.07	58.62	68.2	-9.58
5200MHz							
10400.00	45.97	PK	H	13.12	59.09	68.2	-9.11
10400.00	45.74	PK	V	13.12	58.86	68.2	-9.34
5240MHz							
5351.87	55.54	PK	H	3.07	58.61	74	-15.39
5351.87	41.39	AV	H	3.07	44.46	54	-9.54
5352.32	55.27	PK	V	3.07	58.34	74	-15.66
5352.32	41.25	AV	V	3.07	44.32	54	-9.68
10480.00	46.19	PK	H	13.07	59.26	68.2	-8.94
10480.00	45.96	PK	V	13.07	59.03	68.2	-9.17

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11n40							
5190MHz							
5149.89	64.66	PK	H	2.71	67.37	74	-6.63
5149.38	47.92	AV	H	2.71	50.63	54	-3.37
5149.67	62.49	PK	V	2.71	65.20	74	-8.80
5148.23	46.82	AV	V	2.70	49.52	54	-4.48
10380.00	45.44	PK	H	13.09	58.53	68.2	-9.67
10380.00	45.21	PK	V	13.09	58.30	68.2	-9.90
5230MHz							
5351.19	55.78	PK	H	3.07	58.85	74	-15.15
5351.19	41.84	AV	H	3.07	44.91	54	-9.09
5352.36	55.52	PK	V	3.07	58.59	74	-15.41
5352.36	41.69	AV	V	3.07	44.76	54	-9.24
10460.00	45.78	PK	H	13.09	58.87	68.2	-9.33
10460.00	45.56	PK	V	13.09	58.65	68.2	-9.55

5725-5850 MHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/Ave					
802.11a							
5745MHz							
5650.00	55.21	PK	H	3.59	58.80	68.20	-9.40
5700.00	56.52	PK	H	4.09	60.61	105.20	-44.59
5720.00	60.06	PK	H	4.09	64.15	110.80	-46.65
5725.00	69.31	PK	H	4.09	73.40	122.20	-48.80
5650.00	55.45	PK	V	3.59	59.04	68.20	-9.16
5700.00	57.08	PK	V	4.09	61.17	105.20	-44.03
5720.00	61.57	PK	V	4.09	65.66	110.80	-45.14
5725.00	70.79	PK	V	4.09	74.88	122.20	-47.32
11490.00	44.48	PK	H	14.31	58.79	74	-15.21
11490.00	30.61	AV	H	14.31	44.92	54	-9.08
11490.00	44.70	PK	V	14.31	59.01	74	-14.99
11490.00	30.86	AV	V	14.31	45.17	54	-8.83
5785MHz							
11570.00	44.97	PK	H	14.05	59.02	74	-14.98
11570.00	31.25	AV	H	14.05	45.30	54	-8.70
11570.00	45.22	PK	V	14.05	59.27	74	-14.73
11570.00	31.48	AV	V	14.05	45.53	54	-8.47
5825MHz							
5850.00	59.67	PK	H	4.09	63.76	122.20	-58.44
5855.00	57.86	PK	H	4.09	61.95	110.80	-48.85
5875.00	56.91	PK	H	4.19	61.10	105.20	-44.10
5925.00	55.05	PK	H	4.69	59.74	68.20	-8.46
5850.00	60.72	PK	V	4.09	64.81	122.20	-57.39
5855.00	58.65	PK	V	4.09	62.74	110.80	-48.06
5875.00	57.58	PK	V	4.19	61.77	105.20	-43.43
5925.00	55.29	PK	V	4.69	59.98	68.20	-8.22
11650.00	45.54	PK	H	13.83	59.37	74	-14.63
11650.00	31.89	AV	H	13.83	45.72	54	-8.28
11650.00	45.78	PK	V	13.83	59.61	74	-14.39
11650.00	32.07	AV	V	13.83	45.90	54	-8.10

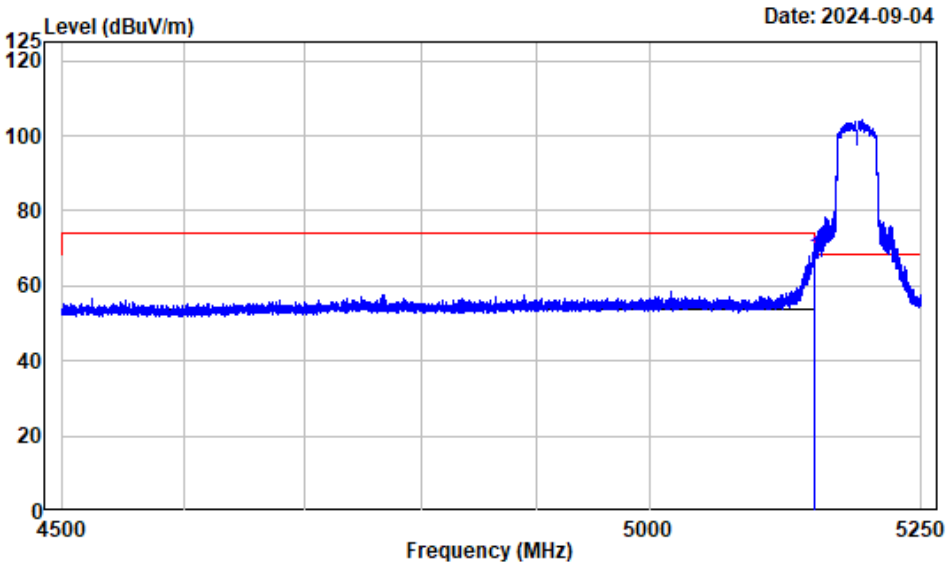
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/Ave					
802.11n20							
5745MHz							
5650.00	55.47	PK	H	3.59	59.06	68.20	-9.14
5700.00	57.02	PK	H	4.09	61.11	105.20	-44.09
5720.00	61.96	PK	H	4.09	66.05	110.80	-44.75
5725.00	71.13	PK	H	4.09	75.22	122.20	-46.98
5650.00	55.70	PK	V	3.59	59.29	68.20	-8.91
5700.00	57.69	PK	V	4.09	61.78	105.20	-43.42
5720.00	63.48	PK	V	4.09	67.57	110.80	-43.23
5725.00	72.54	PK	V	4.09	76.63	122.20	-45.57
11490.00	44.53	PK	H	14.31	58.84	74	-15.16
11490.00	30.65	AV	H	14.31	44.96	54	-9.04
11490.00	44.76	PK	V	14.31	59.07	74	-14.93
11490.00	30.77	AV	V	14.31	45.08	54	-8.92
5785MHz							
11570.00	45.06	PK	H	14.05	59.11	74	-14.89
11570.00	31.27	AV	H	14.05	45.32	54	-8.68
11570.00	45.30	PK	V	14.05	59.35	74	-14.65
11570.00	31.51	AV	V	14.05	45.56	54	-8.44
5825MHz							
5850.00	60.45	PK	H	4.09	64.54	122.20	-57.66
5855.00	58.83	PK	H	4.09	62.92	110.80	-47.88
5875.00	57.51	PK	H	4.19	61.70	105.20	-43.50
5925.00	55.32	PK	H	4.69	60.01	68.20	-8.19
5850.00	61.89	PK	V	4.09	65.98	122.20	-56.22
5855.00	59.74	PK	V	4.09	63.83	110.80	-46.97
5875.00	58.37	PK	V	4.19	62.56	105.20	-42.64
5925.00	55.56	PK	V	4.69	60.25	68.20	-7.95
11650.00	45.63	PK	H	13.83	59.46	74	-14.54
11650.00	31.96	AV	H	13.83	45.79	54	-8.21
11650.00	45.85	PK	V	13.83	59.68	74	-14.32
11650.00	32.14	AV	V	13.83	45.97	54	-8.03

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave					
802.11n40							
5755MHz							
5650.00	56.03	PK	H	3.59	59.62	68.20	-8.58
5700.00	58.25	PK	H	4.09	62.34	105.20	-42.86
5720.00	68.39	PK	H	4.09	72.48	110.80	-38.32
5725.00	70.48	PK	H	4.09	74.57	122.20	-47.63
5650.00	56.24	PK	V	3.59	59.83	68.20	-8.37
5700.00	59.57	PK	V	4.09	63.66	105.20	-41.54
5720.00	69.72	PK	V	4.09	73.81	110.80	-36.99
5725.00	71.91	PK	V	4.09	76.00	122.20	-46.20
11510.00	45.05	PK	H	14.29	59.34	74	-14.66
11510.00	31.57	AV	H	14.29	45.86	54	-8.14
11510.00	45.29	PK	V	14.29	59.58	74	-14.42
11510.00	31.76	AV	V	14.29	46.05	54	-7.95
5795MHz							
5850.00	58.36	PK	H	4.09	62.45	122.20	-59.75
5855.00	57.83	PK	H	4.09	61.92	110.80	-48.88
5875.00	56.97	PK	H	4.19	61.16	105.20	-44.04
5925.00	55.68	PK	H	4.69	60.37	68.20	-7.83
5850.00	59.25	PK	V	4.09	63.34	122.20	-58.86
5855.00	58.54	PK	V	4.09	62.63	110.80	-48.17
5875.00	57.39	PK	V	4.19	61.58	105.20	-43.62
5925.00	55.92	PK	V	4.69	60.61	68.20	-7.59
11590.00	45.72	PK	H	13.97	59.69	74	-14.31
11590.00	32.30	AV	H	13.97	46.27	54	-7.73
11590.00	45.93	PK	V	13.97	59.90	74	-14.10
11590.00	32.51	AV	V	13.97	46.48	54	-7.52

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is in the noise floor level was not recorded.

Test plots for worst Band Edge Measurements (Radiated)

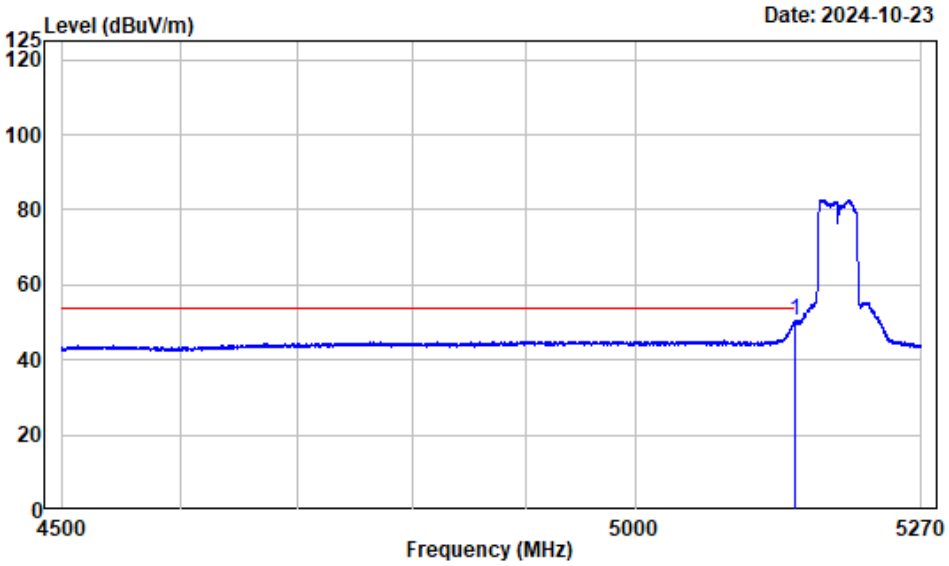
802.11n40-Peak			
Test Channel:	**5190MHz**	**Ant. Polar. :**	**Horizontal**




```
Condition   : Horizontal
Project No.: 2401U80232E-RF
Tester      : Zenos Qiao
Note        : 5GWiFi-Band1-N40-5190
```

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	5149.890	2.71	64.66	67.37	74.00	-6.63	Peak

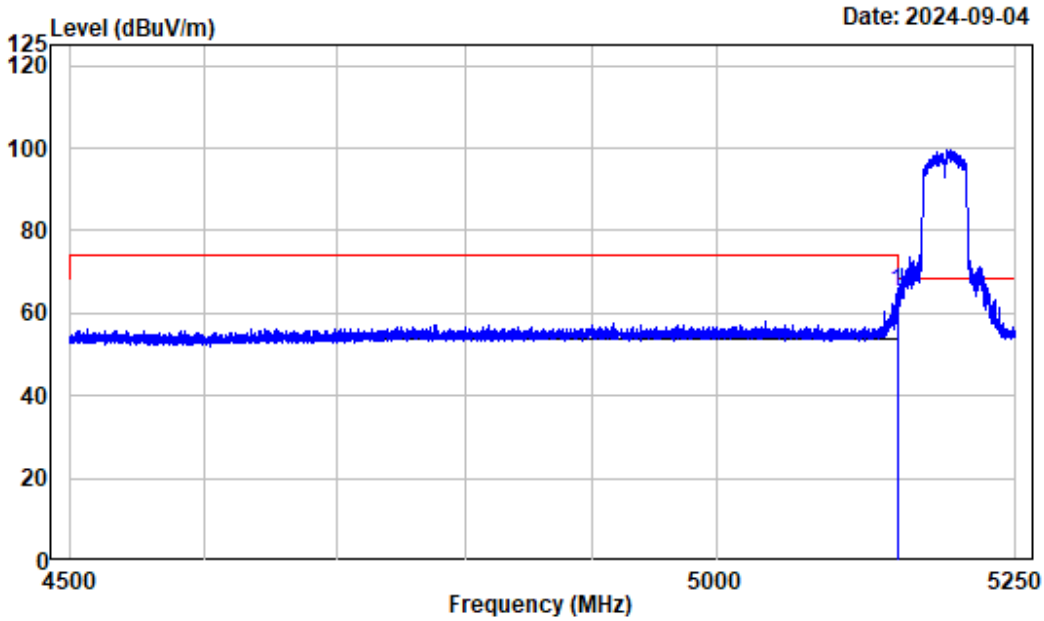
802.11n40-Average			
Test Channel:	**5190MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: 2401U80232E-RF
Tester : Dylan.Yang
Note : 5GWiFi_Band1_n40_5190

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	5149.384	2.71	47.92	50.63	54.00	-3.37	Average

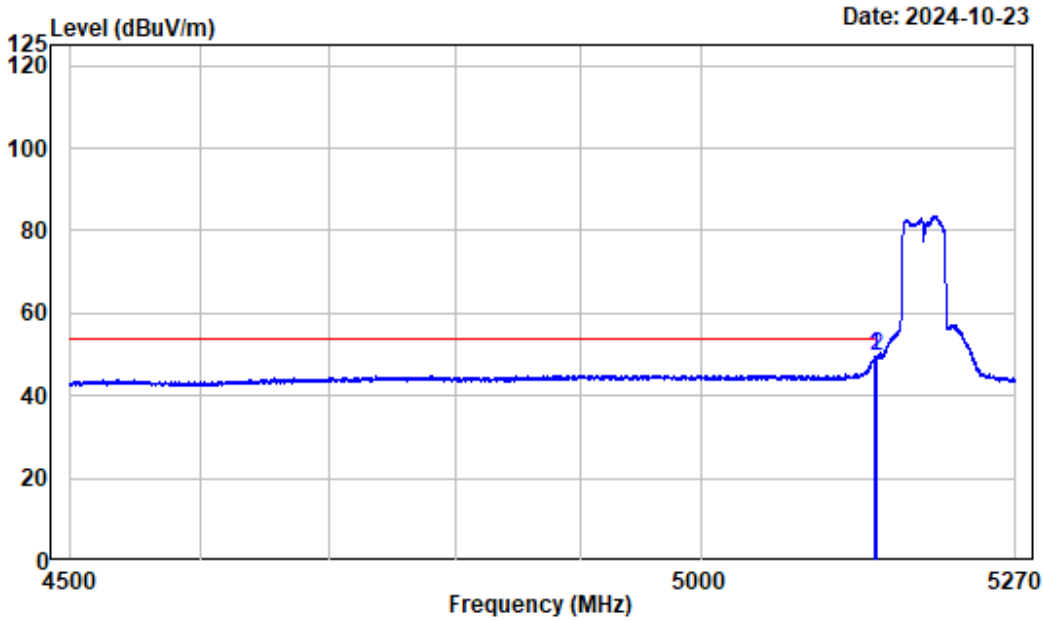
802.11n40-Peak			
Test Channel:	**5190MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Zenos Qiao
Note : 5GWiFi-Band1-N40-5190

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	5149.670	2.71	62.49	65.20	74.00	-8.80	Peak

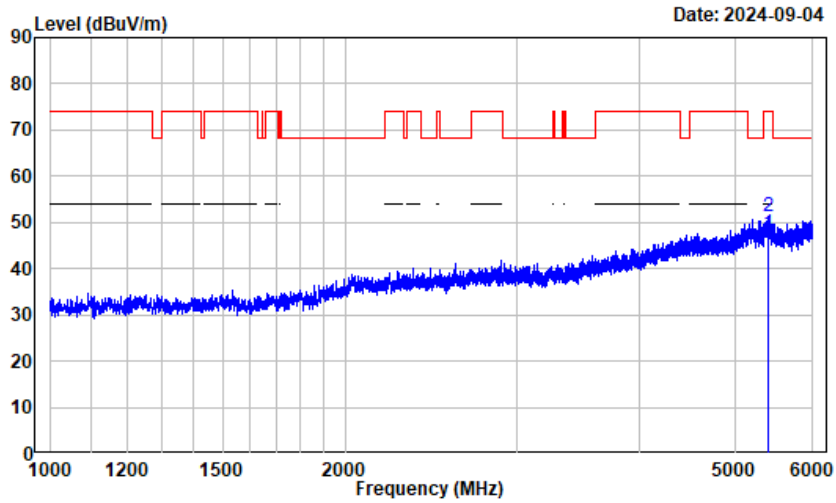
802.11n40-Average			
Test Channel:	**5190MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Dylan.Yang
Note : 5GWiFi_Band1_n40_5190

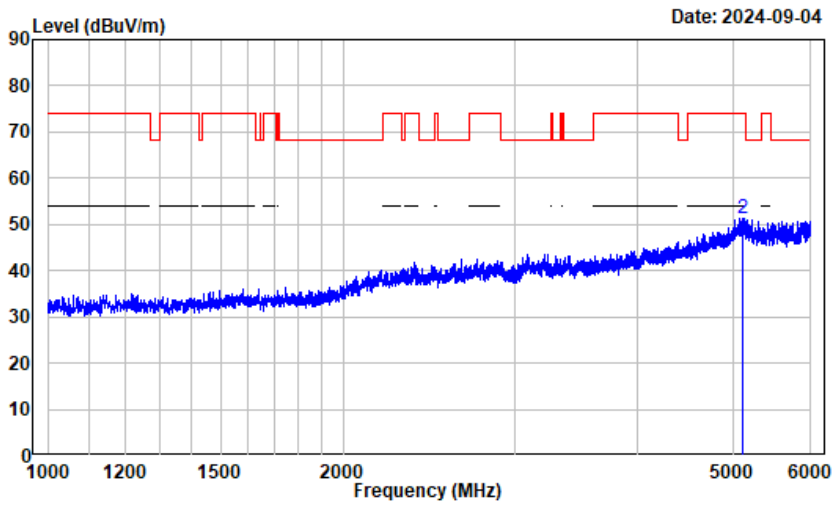
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	5148.229	2.70	46.82	49.52	54.00	-4.48	Average
2	5150.000	2.71	46.59	49.30	54.00	-4.70	Average

Listed with the worst harmonic margin test plot: (802.11n40, 5795MHz)

Horizontal	
1-6GHz	 Condition : Horizontal Project No.: 2401U80232E-RF Tester : Zenos Qiao Note : 5GWiFi-Band4-N40-5795 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 5406.250 2.99 44.49 47.48 54.00 -6.52 Average 2 5406.250 2.99 48.44 51.43 74.00 -22.57 Peak

Vertical

1-6GHz

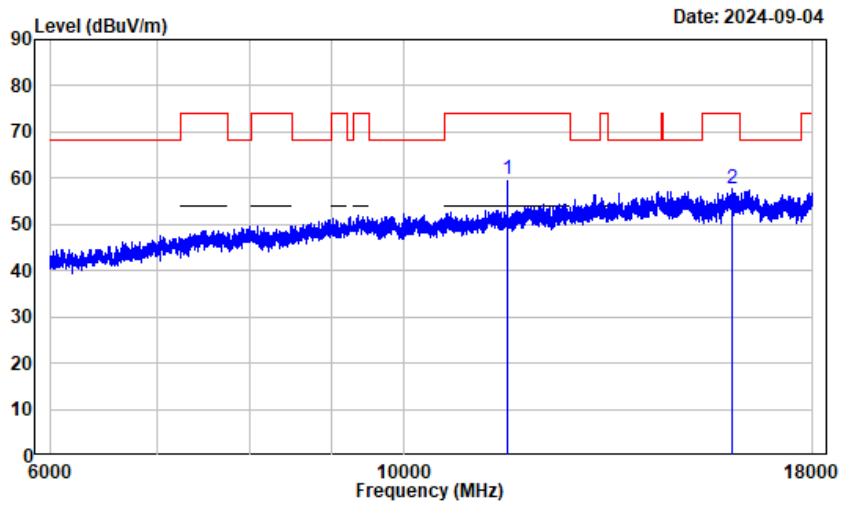


Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Zenos Qiao
Note : 5GWiFi-Band4-N40-5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	5115.000	2.71	44.66	47.37	54.00	-6.63	Average
2	5115.000	2.71	48.57	51.28	74.00	-22.72	Peak

Horizontal-Peak

6-18GHz

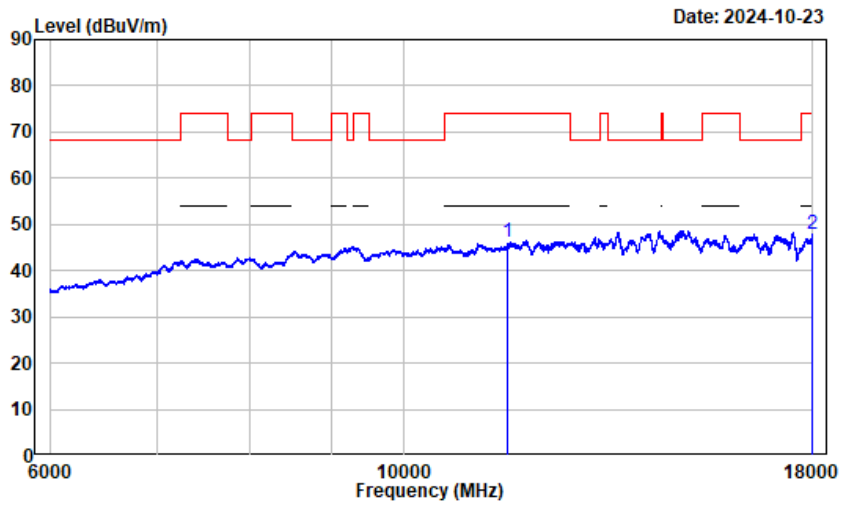


Condition : Horizontal
Project No.: 2401U80232E-RF
Tester : Zenos Qiao
Note : 5GWiFi-Band4-N40-5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	11590.000	13.97	45.72	59.69	74.00	-14.31	Peak
2	16023.000	13.63	44.15	57.78	74.00	-16.22	Peak

Horizontal-Average

6-18GHz



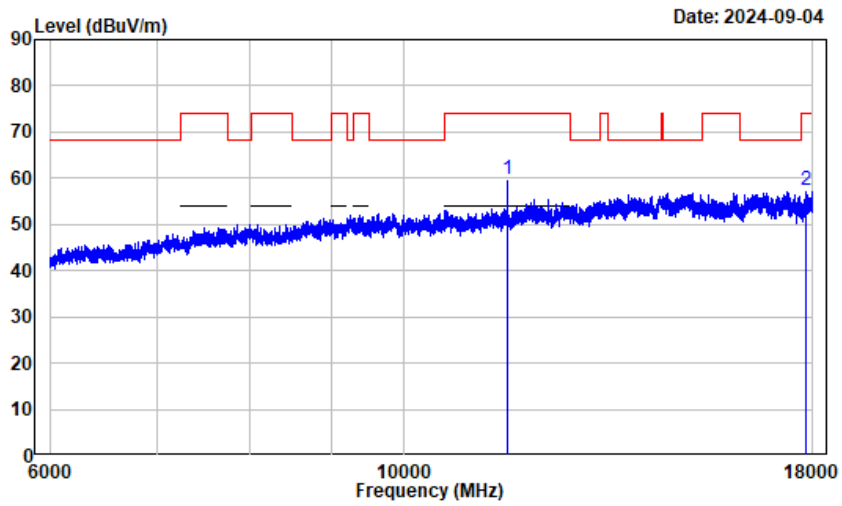
Condition : Horizontal
Project No.: 2401U80232E-RF
Tester : Dylan.Yang
Note : 5GWiFi_n40_5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	11590.000	13.97	32.30	46.27	54.00	-7.73	Average
2	17980.750	24.48	23.34	47.82	54.00	-6.18	Average

Note: Spectrum Analyzer Setting: RBW=1MHz, VBW=5kHz

Vertical-Peak

6-18GHz

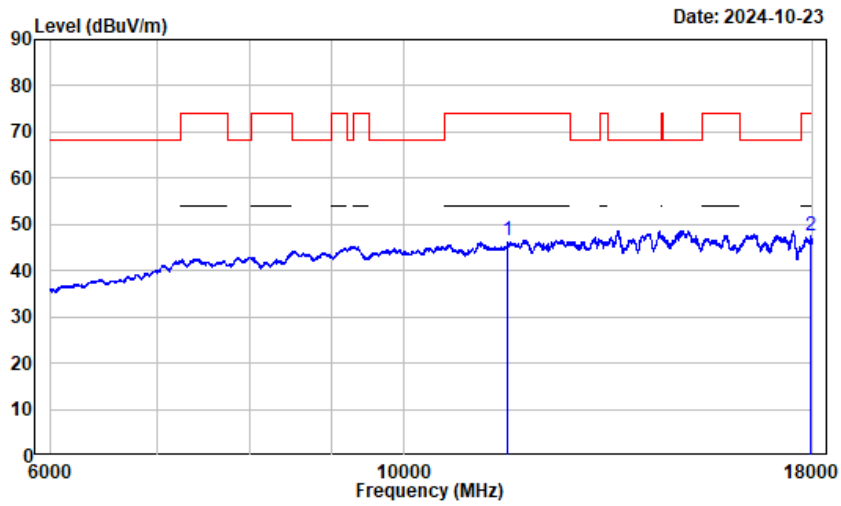


Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Zenos Qiao
Note : 5GWiFi-Band4-N40-5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	11590.000	13.97	45.93	59.90	74.00	-14.10	Peak
2	17842.500	22.98	34.52	57.50	74.00	-16.50	Peak

Vertical-Average

6-18GHz



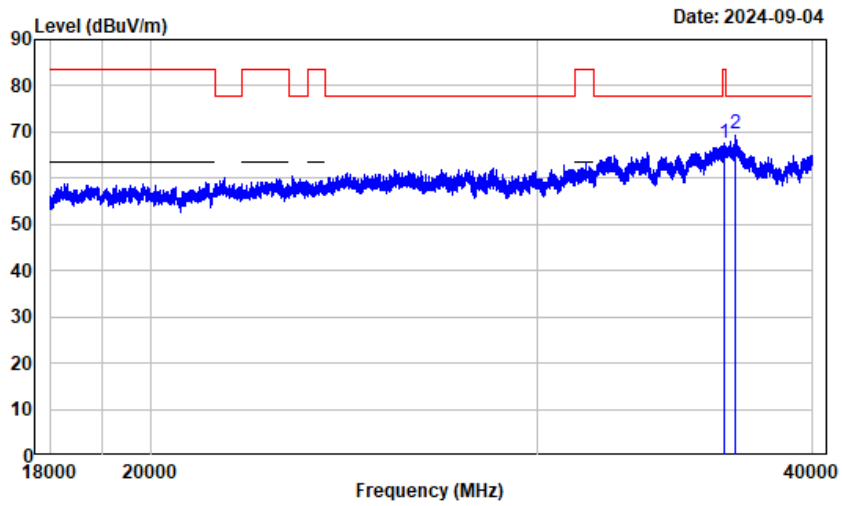
Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Dylan.Yang
Note : 5GWiFi_n40_5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	11590.000	13.97	32.51	46.48	54.00	-7.52	Average
2	17961.500	24.35	23.30	47.65	54.00	-6.35	Average

Note: Spectrum Analyzer Setting: RBW=1MHz, VBW=5kHz

Horizontal-Peak

18-40GHz

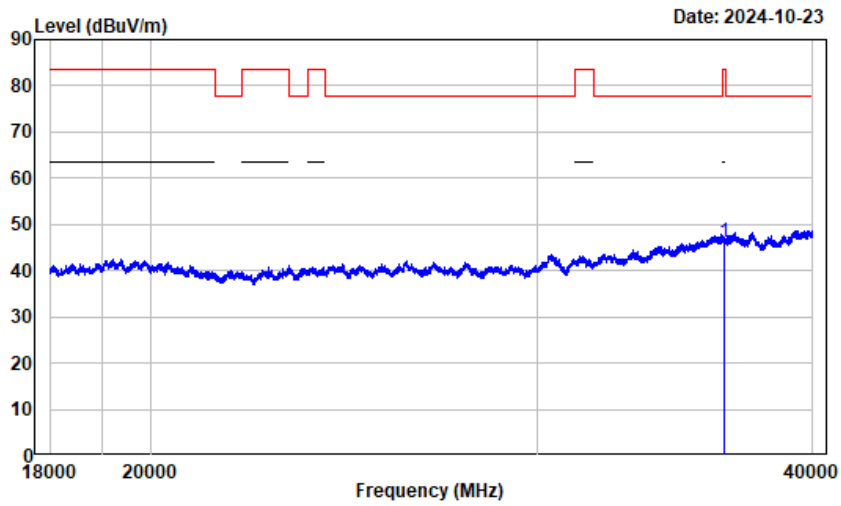


Condition : Horizontal
Project No.: 2401U80232E-RF
Tester : Zenos Qiao
Note : 5GWiFi-Band4-N40-5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36471.750	25.30	42.36	67.66	83.50	-15.84	Peak
2	36882.750	25.01	44.46	69.47	77.70	-8.23	Peak

Horizontal-Average

18-40GHz



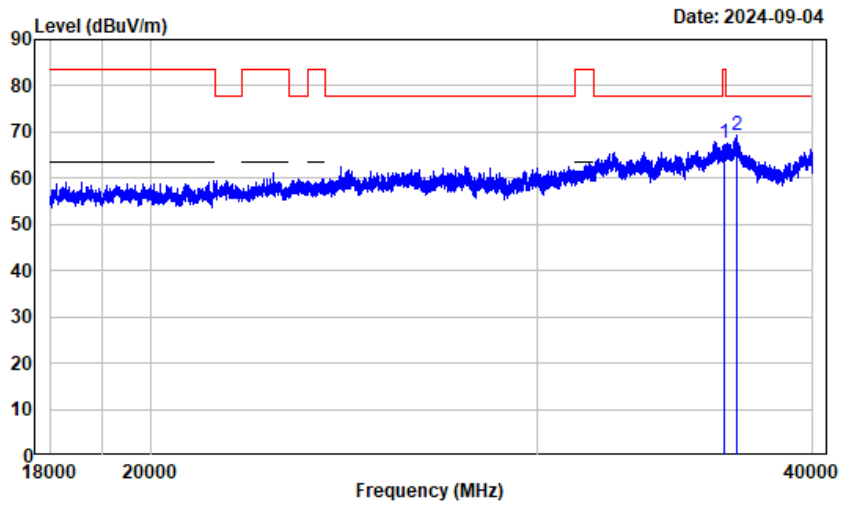
Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Dylan.Yang
Note : 5GWiFi_n40_5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36488.250	22.07	24.27	46.34	63.50	-17.16	Average

Note: Spectrum Analyzer Setting: RBW=1MHz, VBW=5kHz

Vertical-Peak

18-40GHz

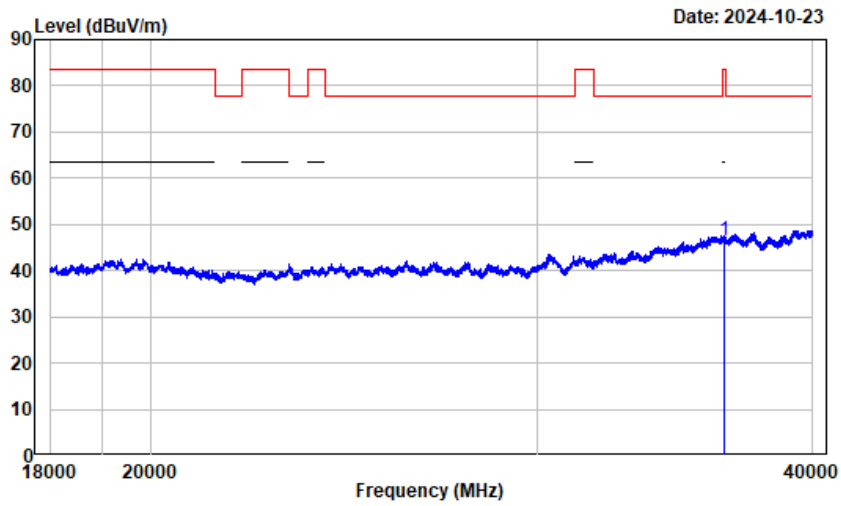


Condition : Vertical
Project No.: 2401U80232E-RF
Tester : Zenos Qiao
Note : 5GWiFi-Band4-N40-5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36488.250	25.35	42.15	67.50	83.50	-16.00	Peak
2	36957.750	24.94	44.39	69.33	77.70	-8.37	Peak

Vertical-Average

18-40GHz



Condition : Horizontal
Project No.: 2401U80232E-RF
Tester : Dylan.Yang
Note : 5GWiFi_n40_5795

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36471.750	22.07	24.46	46.53	63.50	-16.97	Average

Note: Spectrum Analyzer Setting: RBW=1MHz, VBW=5kHz

FCC §15.407(a), (e) - 26 dB & 6dB EMISSION BANDWIDTH

Applicable Standard

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

According to KDB789033 D02 section II.C and section II.D

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

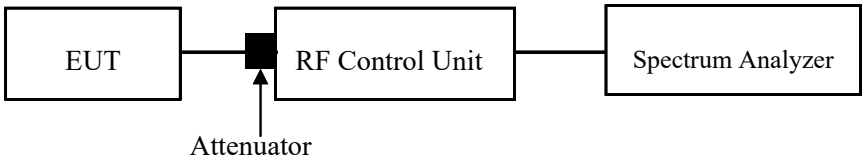
2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3. 99% Occupied Bandwidth:

According to ANSI C63.10-2013 Section 12.4.2&6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:
a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).



Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	54 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-08-27.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.407(a) - CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

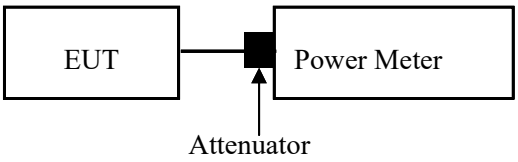
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method PM-G should be applied

a. Place the EUT on a bench and set it in transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.



Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	54 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-08-27.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.407(a) - POWER SPECTRAL DENSITY

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Duty cycle ≥98%

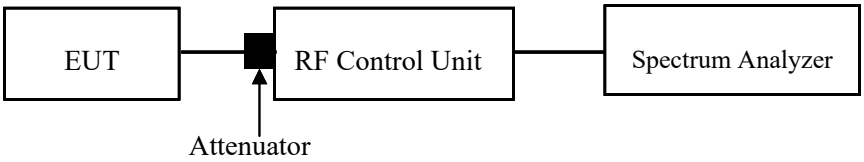
KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-1 should be applied.

Duty cycle <98%, duty cycle variations are less than ±2%

KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 should be applied.

Duty cycle <98%, duty cycle variations exceed ±2%

KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-3 should be applied.



Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	54 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-08-27.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

EUT PHOTOGRAPHS

Please refer to the attachment 2401U80232E-RF External photo and 2401U80232E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401U80232E-RFB Test Setup photo.

APPENDIX

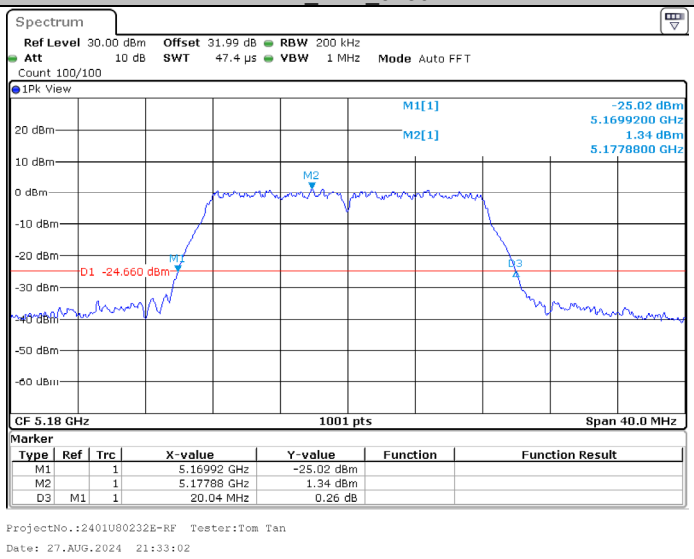
Appendix A1: Emission Bandwidth

Test Result

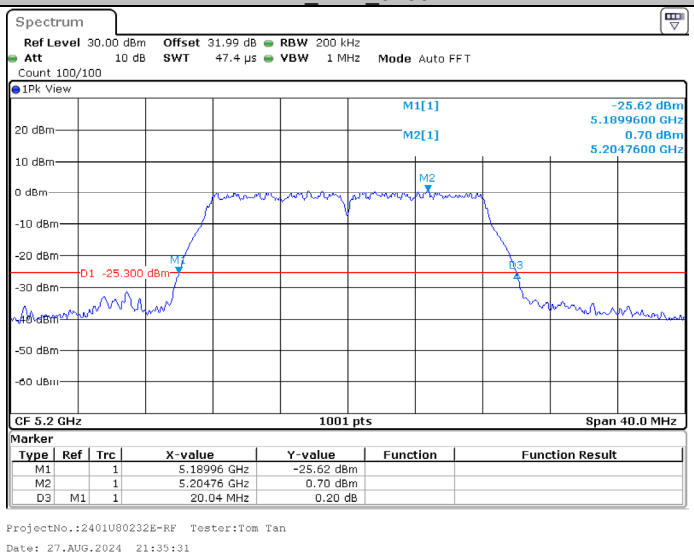
Test Mode	Antenna	Channel	26dB EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	20.04	---	---
		5200	20.04	---	---
		5240	19.96	---	---
11N20SISO	Ant1	5180	20.00	---	---
		5200	20.08	---	---
		5240	20.08	---	---
11N40SISO	Ant1	5190	40.80	---	---
		5230	40.72	---	---

Test Graphs

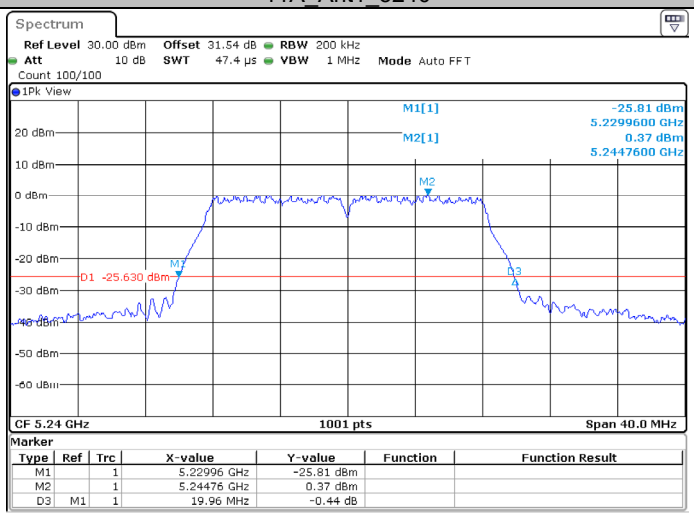
11A_Ant1_5180



11A_Ant1_5200

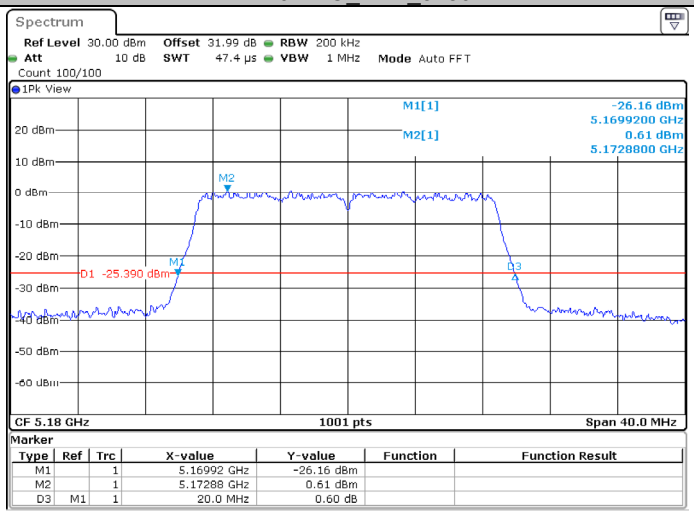


11A_Ant1_5240



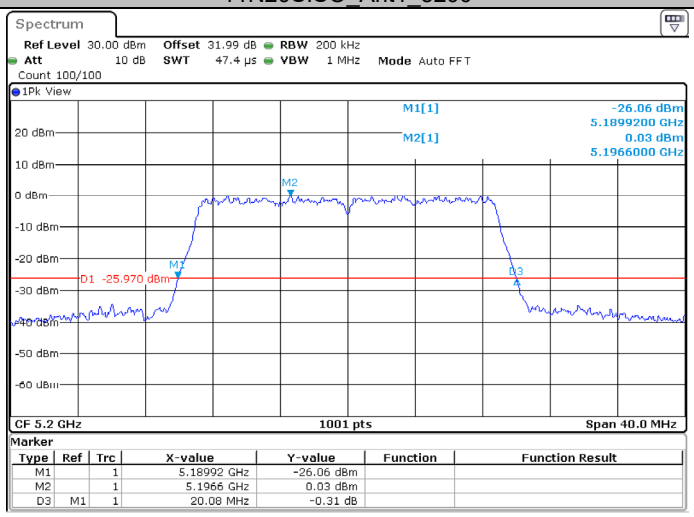
ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:37:58

11N20SISO_Ant1_5180



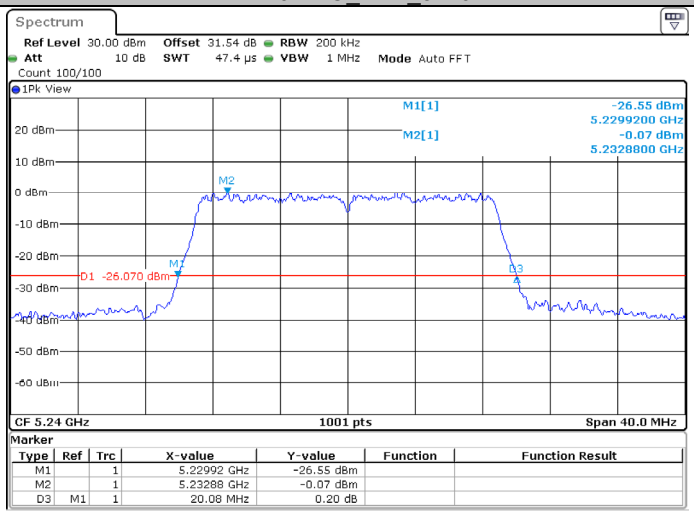
ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:54:08

11N20SISO_Ant1_5200



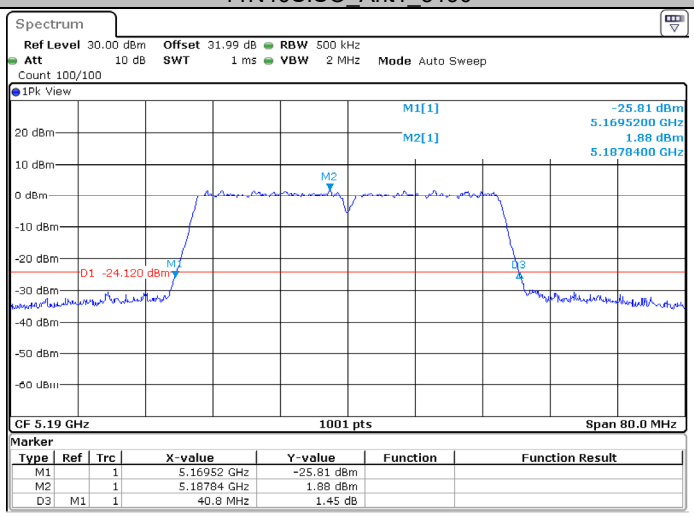
ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:56:09

11N20SISO_Ant1_5240

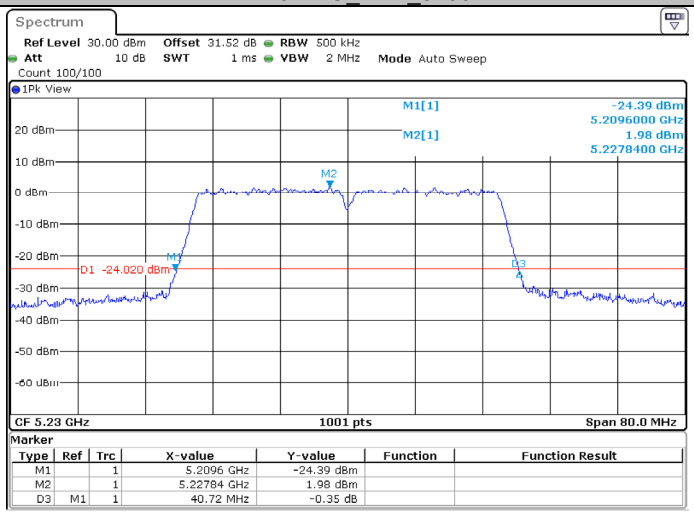


ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:58:28

11N40SISO_Ant1_5190



11N40SISO_Ant1_5230



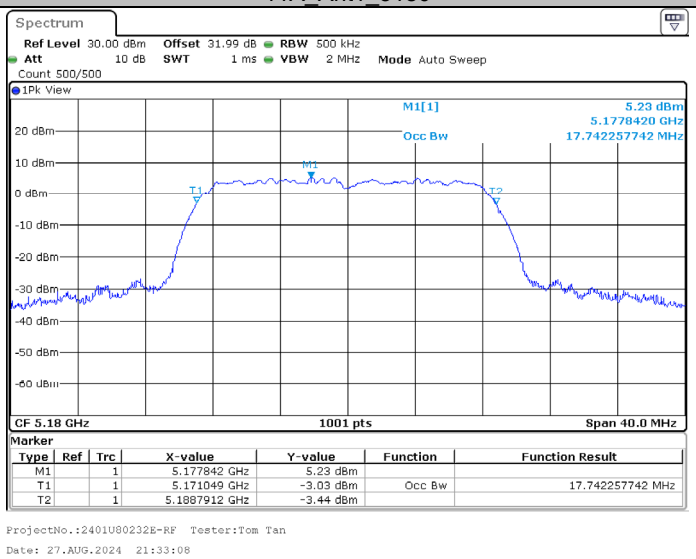
Appendix A2: Occupied Channel Bandwidth

Test Result

Test Mode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.742	---	---
		5200	17.782	---	---
		5240	17.542	---	---
		5745	17.502	---	---
		5785	17.223	---	---
		5825	17.223	---	---
11N20SISO	Ant1	5180	18.062	---	---
		5200	18.062	---	---
		5240	18.102	---	---
		5745	17.942	---	---
		5785	17.902	---	---
		5825	17.862	---	---
11N40SISO	Ant1	5190	36.683	---	---
		5230	36.603	---	---
		5755	36.364	---	---
		5795	36.364	---	---
Note: No transmitted signal in the 99% bandwidth extends into the U-NII-2A band and U-NII-2C band.					

Test Graphs

11A_Ant1_5180

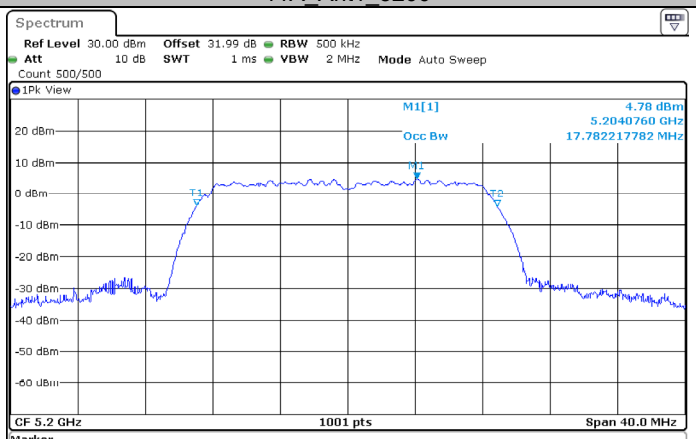


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.177842 GHz	5.23 dBm		
T1		1	5.171049 GHz	-3.03 dBm	Occ Bw	17.742257742 MHz
T2		1	5.1887912 GHz	-3.44 dBm		

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:33:08

11A_Ant1_5200

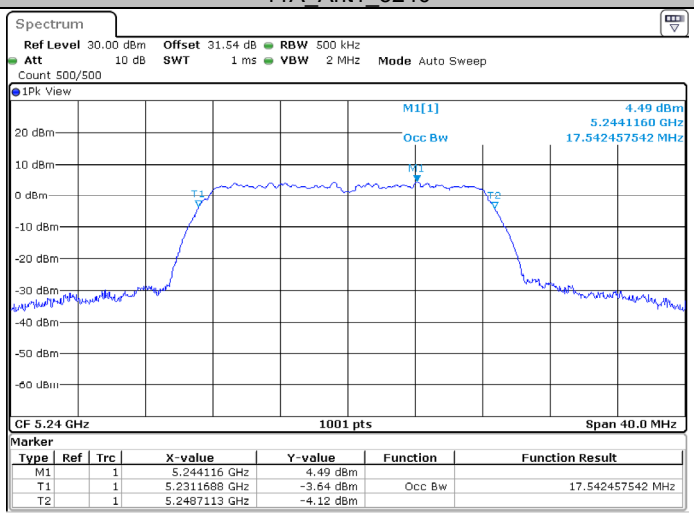


Marker

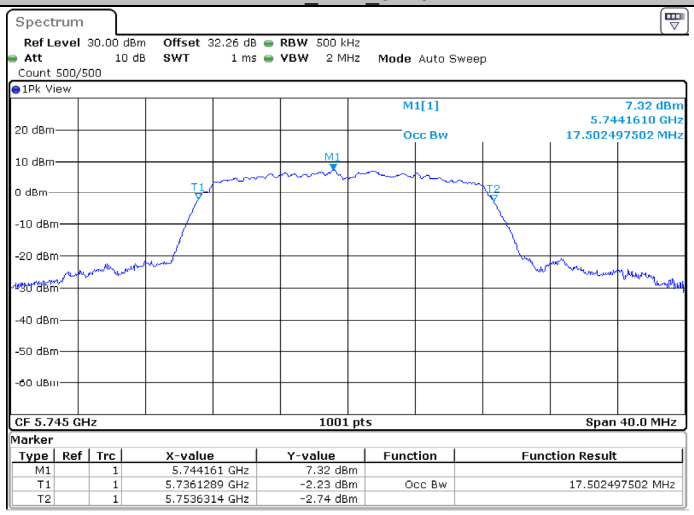
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.204076 GHz	4.78 dBm		
T1		1	5.191049 GHz	-3.88 dBm	Occ Bw	17.782217782 MHz
T2		1	5.2088312 GHz	-4.02 dBm		

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:35:38

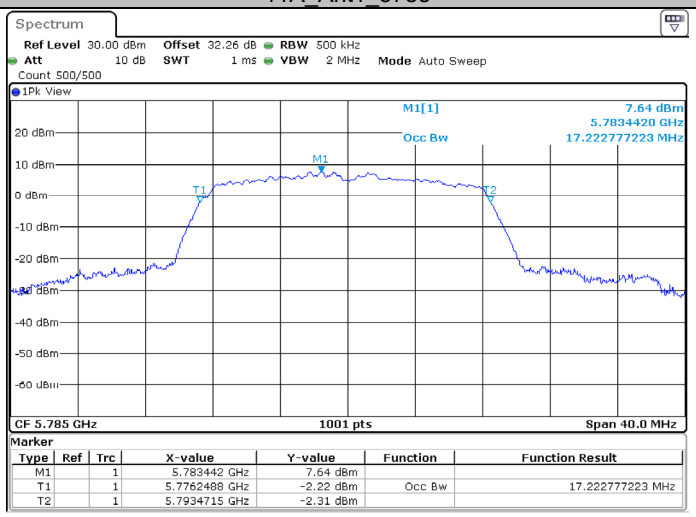
11A_Ant1_5240



11A_Ant1_5745



11A_Ant1_5785



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.783442 GHz	7.64 dBm		
T1		1	5.7762488 GHz	-2.22 dBm	Occ Bw	17.222777223 MHz
T2		1	5.7934715 GHz	-2.31 dBm		

ProjectNo.:2401U80232E-RF Tester:Tom Tan
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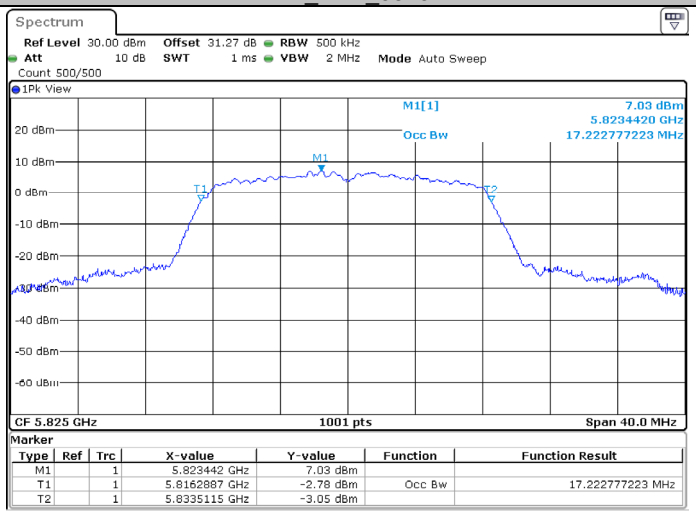
11A_Ant1_5825

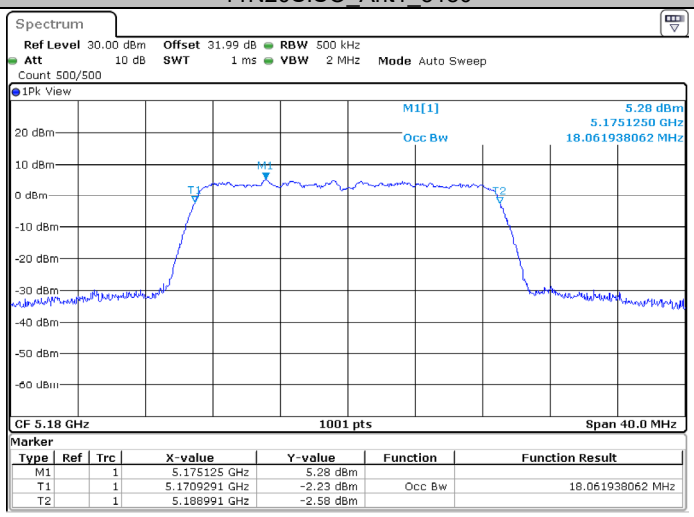


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.823442 GHz	7.03 dBm		
T1		1	5.8162887 GHz	-2.78 dBm	Occ Bw	17.222777223 MHz
T2		1	5.8335115 GHz	-3.05 dBm		

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:47:00

11N20SISO_Ant1_5180



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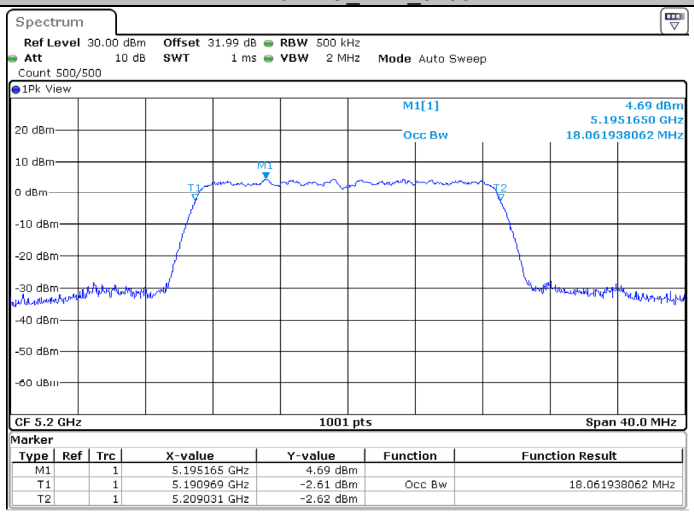

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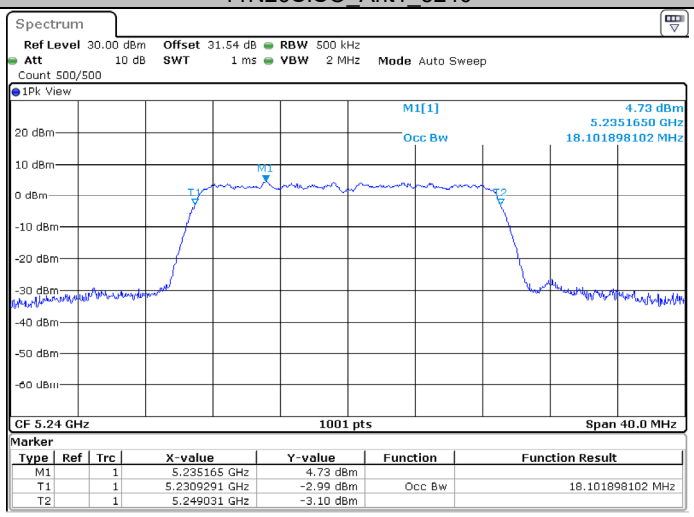

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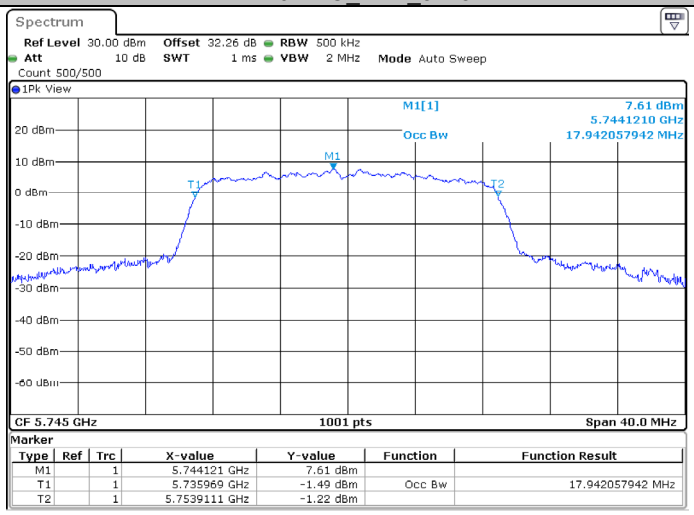

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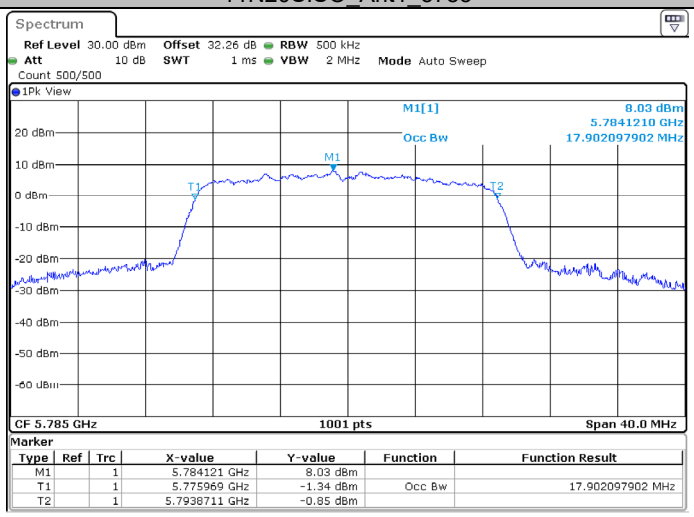

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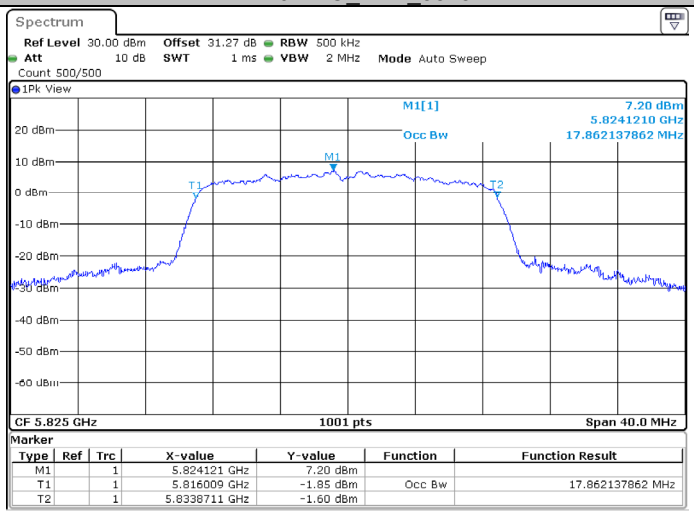

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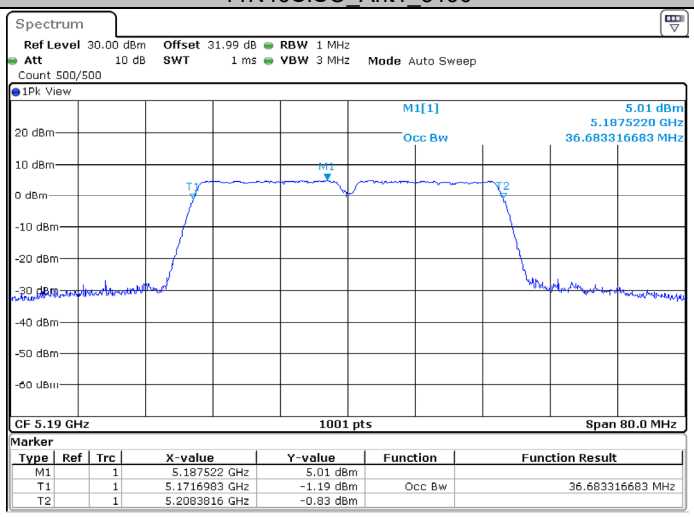

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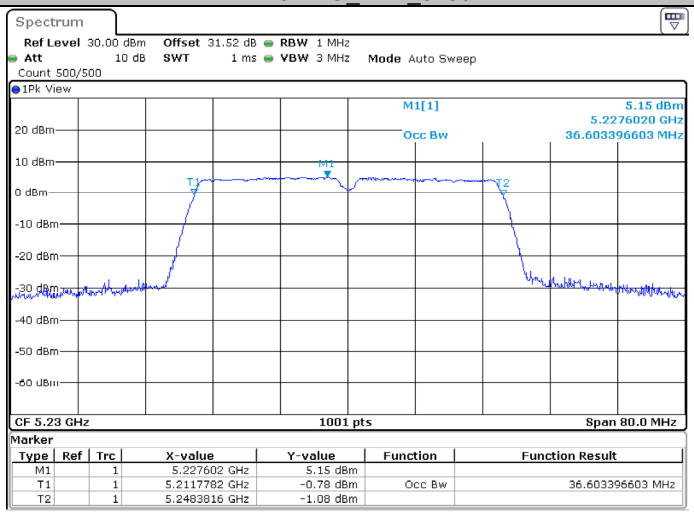

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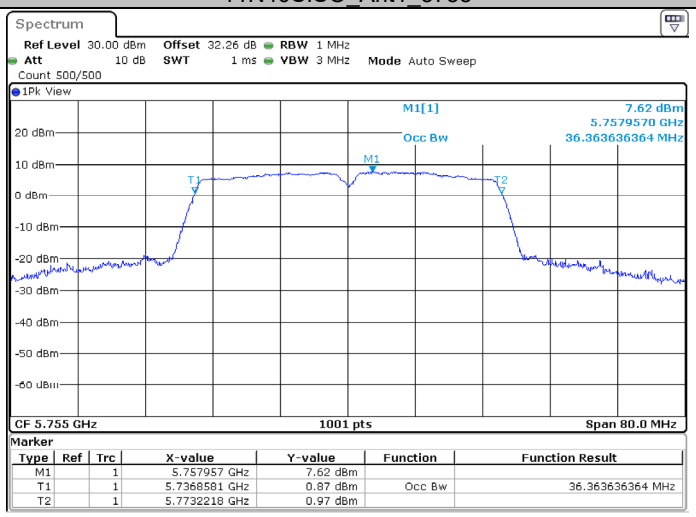
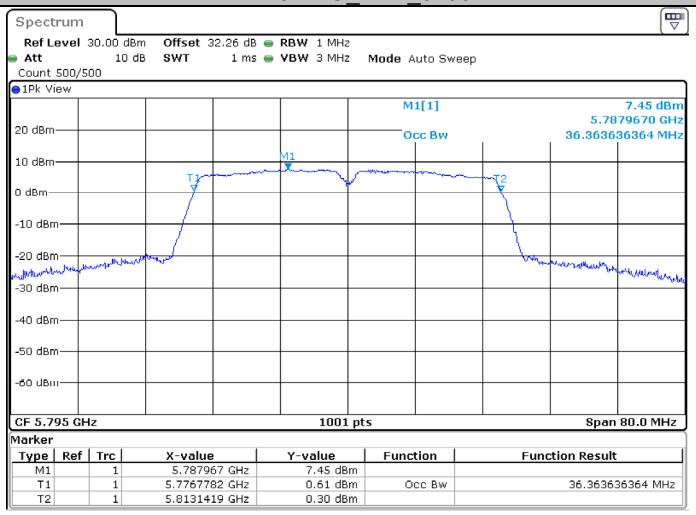


11N40SISO_Ant1_5795



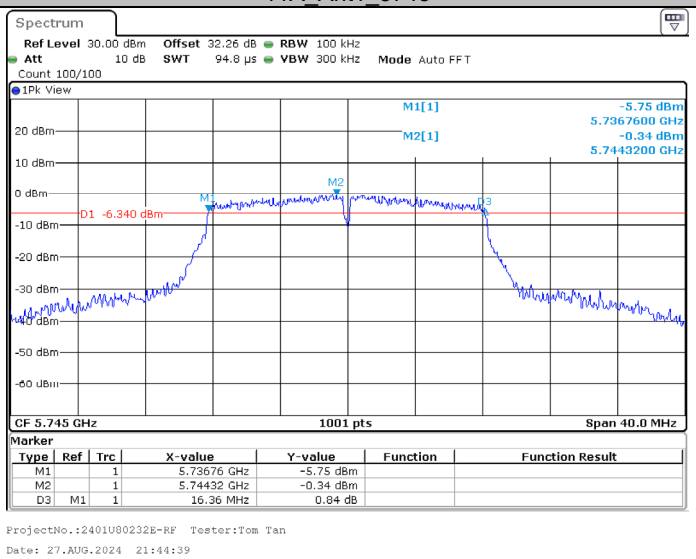
Appendix A3: Min Emission Bandwidth

Test Result

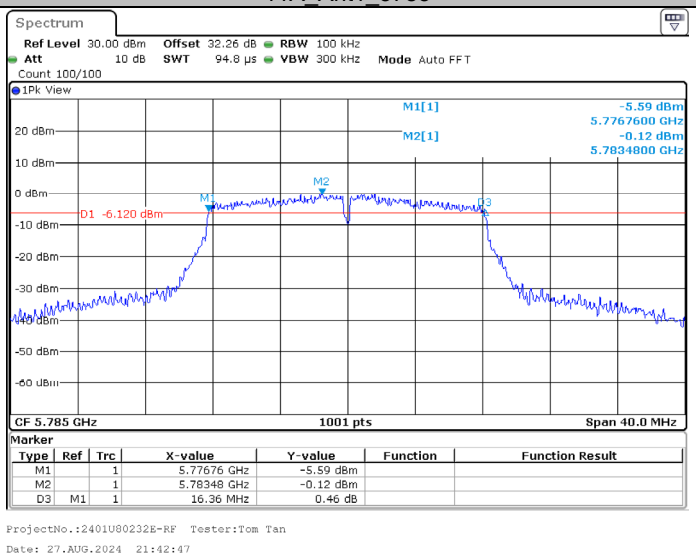
Test Mode	Antenna	Channel	6dB EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	16.36	0.5	PASS
		5785	16.36	0.5	PASS
		5825	16.36	0.5	PASS
11N20SISO	Ant1	5745	17.60	0.5	PASS
		5785	17.56	0.5	PASS
		5825	17.56	0.5	PASS
11N40SISO	Ant1	5755	36.40	0.5	PASS
		5795	36.32	0.5	PASS

Test Graphs

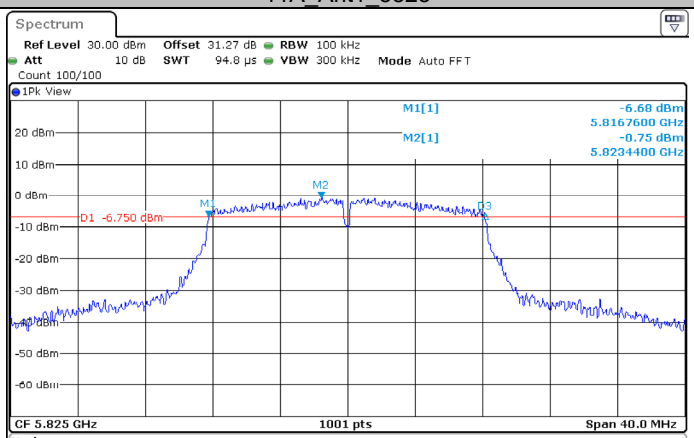
11A_Ant1_5745



11A_Ant1_5785



11A_Ant1_5825



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.81676 GHz	-6.68 dBm		
M2		1	5.82344 GHz	-0.75 dBm		
D3	M1	1	16.36 MHz	0.99 dB		

ProjectNo.:2401U80232E-RF Tester:Tom Tan
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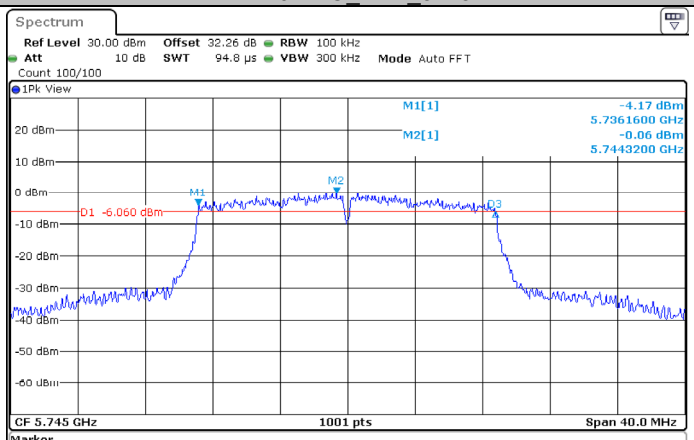
11N20SISO_Ant1_5745

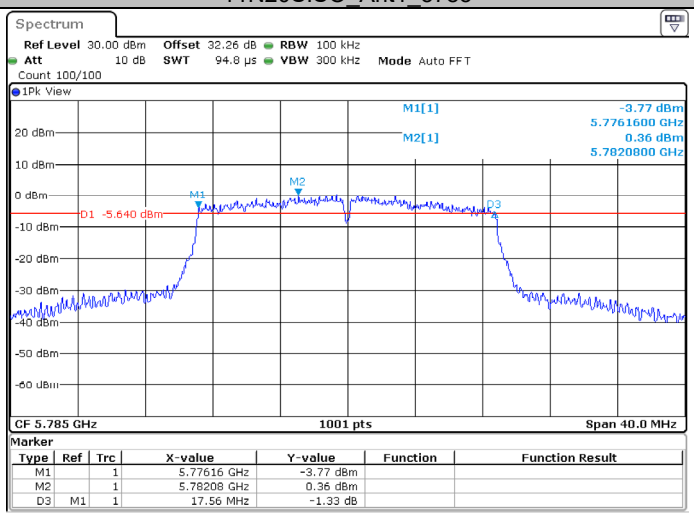


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.73616 GHz	-4.17 dBm		
M2		1	5.74432 GHz	-0.06 dBm		
D3	M1	1	17.6 MHz	-1.82 dB		

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 22:02:13

11N20SISO_Ant1_5785



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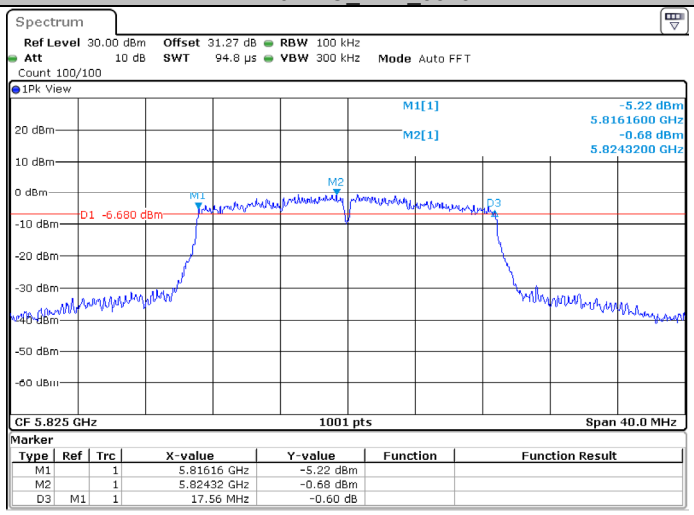
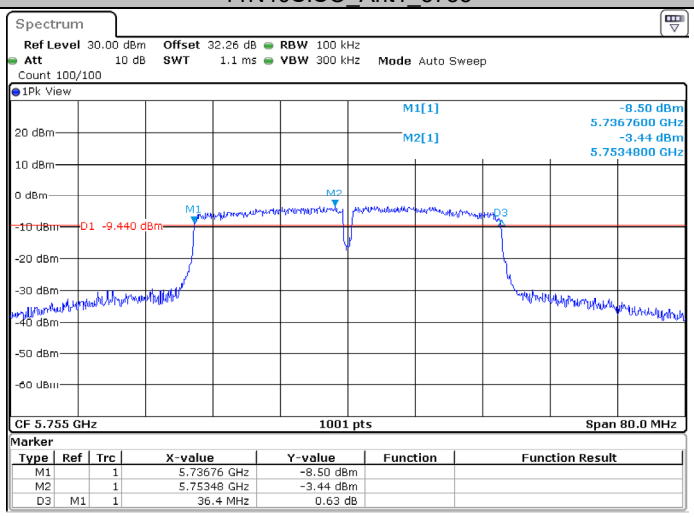
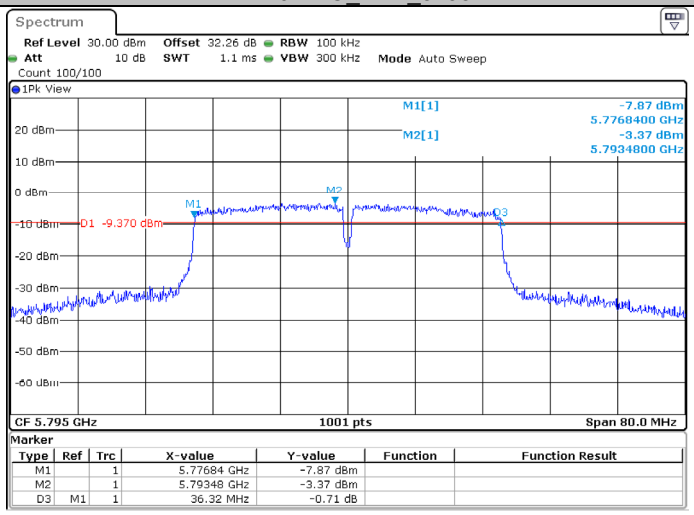


11N40SISO_Ant1_5755



11N40SISO_Ant1_5795



Appendix B: Maximum Conducted Output Power

Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	11.97	≤23.98	PASS
		5200	11.51	≤23.98	PASS
		5240	11.33	≤23.98	PASS
		5745	13.53	≤30.00	PASS
		5785	13.43	≤30.00	PASS
		5825	12.80	≤30.00	PASS
11N20SISO	Ant1	5180	11.89	≤23.98	PASS
		5200	11.56	≤23.98	PASS
		5240	11.43	≤23.98	PASS
		5745	13.44	≤30.00	PASS
		5785	13.68	≤30.00	PASS
		5825	12.88	≤30.00	PASS
11N40SISO	Ant1	5190	11.70	≤23.98	PASS
		5230	11.63	≤23.98	PASS
		5755	13.77	≤30.00	PASS
		5795	13.66	≤30.00	PASS
Note: The device is a client device.					

Appendix C: Maximum Power Spectral Density

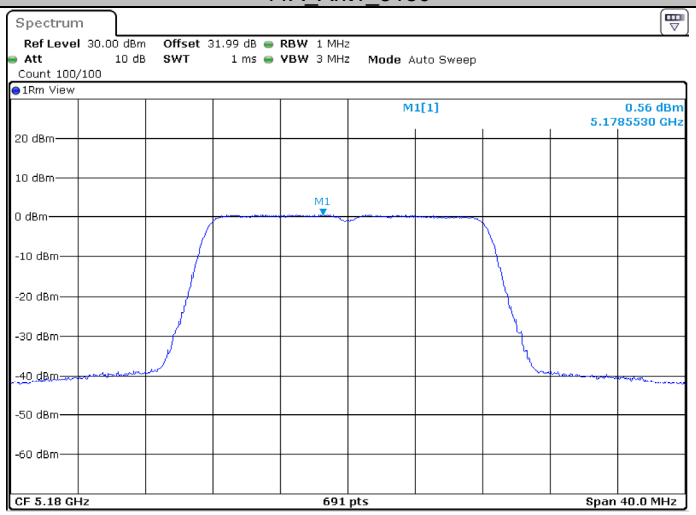
Test Result

Test Mode	Antenna	Channel	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	0.56	≤11.00	PASS
		5200	0.07	≤11.00	PASS
		5240	-0.21	≤11.00	PASS
		5745	0.37	≤30.00	PASS
		5785	0.36	≤30.00	PASS
		5825	-0.22	≤30.00	PASS
11N20SISO	Ant1	5180	0.23	≤11.00	PASS
		5200	-0.05	≤11.00	PASS
		5240	-0.37	≤11.00	PASS
		5745	0.14	≤30.00	PASS
		5785	0.54	≤30.00	PASS
		5825	-0.17	≤30.00	PASS
11N40SISO	Ant1	5190	-3.10	≤11.00	PASS
		5230	-3.00	≤11.00	PASS
		5755	-3.27	≤30.00	PASS
		5795	-3.47	≤30.00	PASS

Note:
1. The device is a client device.
2. The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.
3. The Duty Cycle Factor is compensated in the graph.

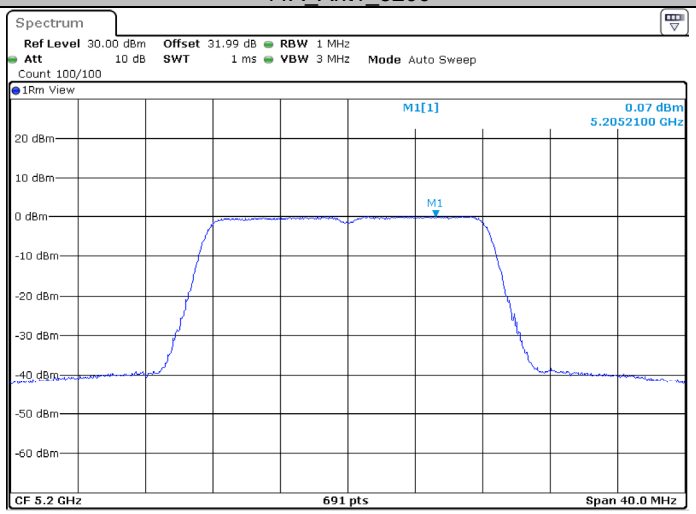
Test Graphs

11A_Ant1_5180



ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:33:44

11A_Ant1_5200



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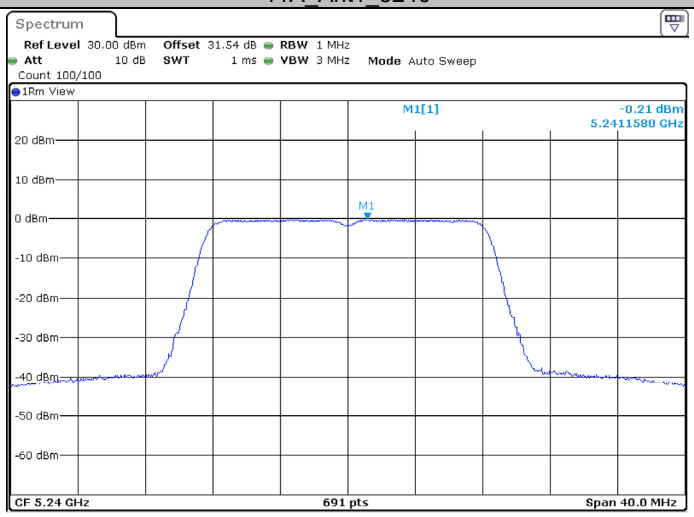
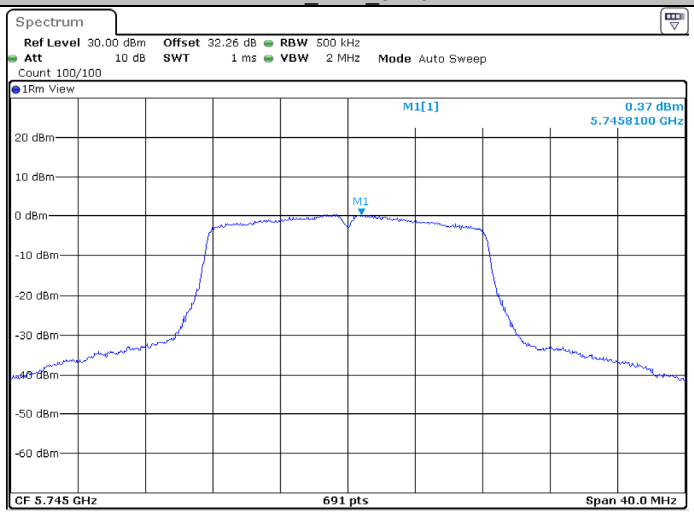
Date: 27.AUG.2024 21:36:04

11A_Ant1_5240



ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:38:31

11A_Ant1_5745



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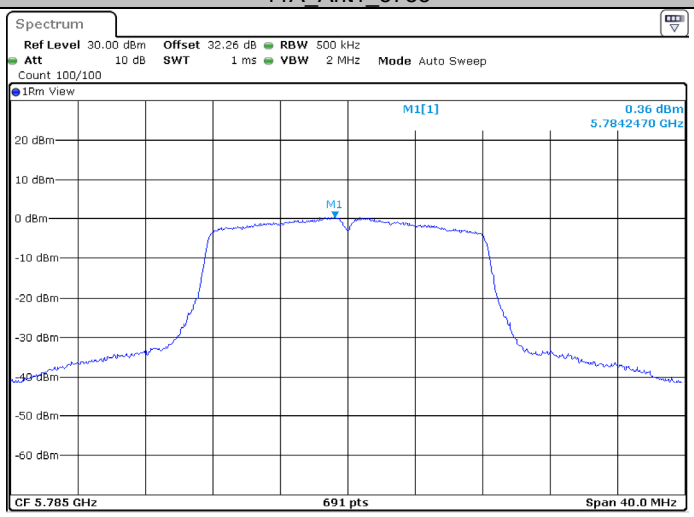
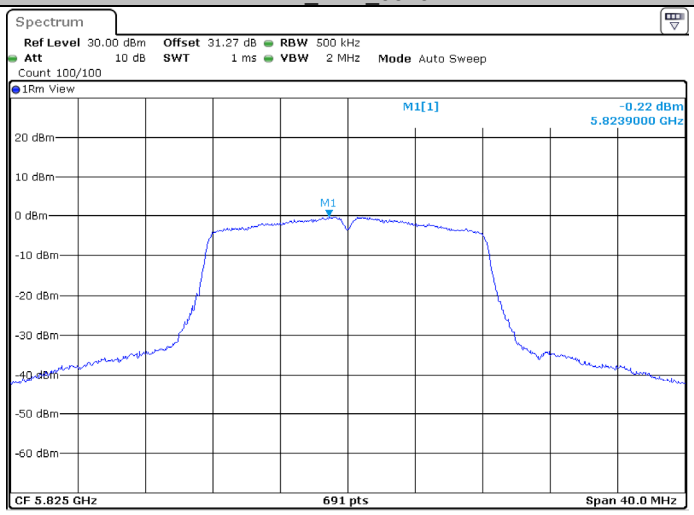
Date: 27.AUG.2024 21:45:12

11A_Ant1_5785



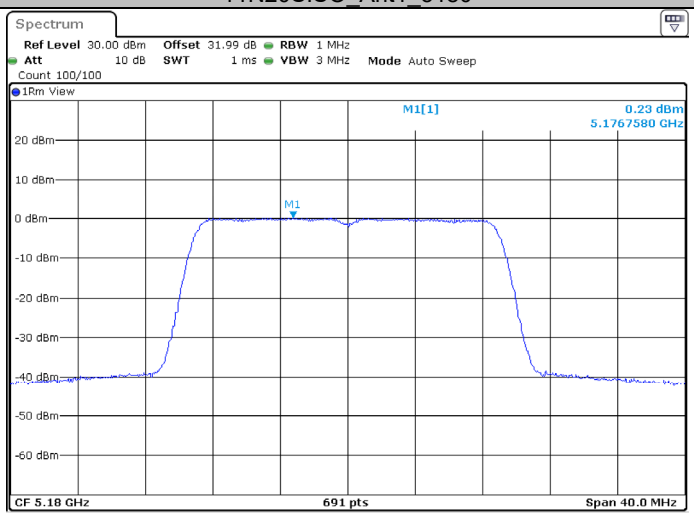
ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:43:20

11A_Ant1_5825



ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:47:27

11N20SISO_Ant1_5180



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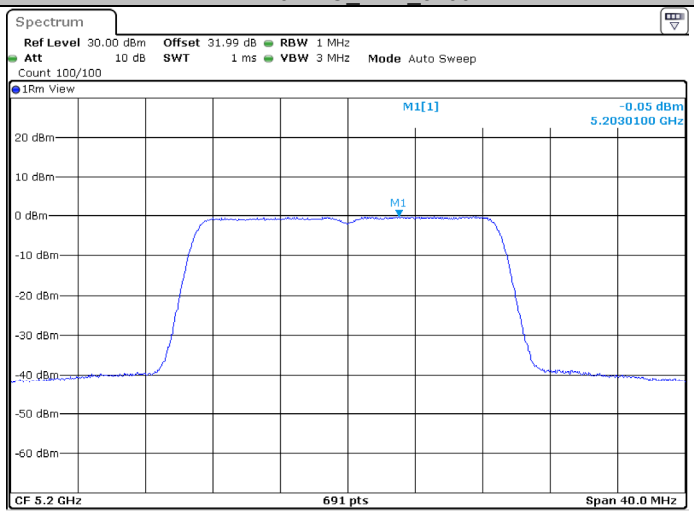
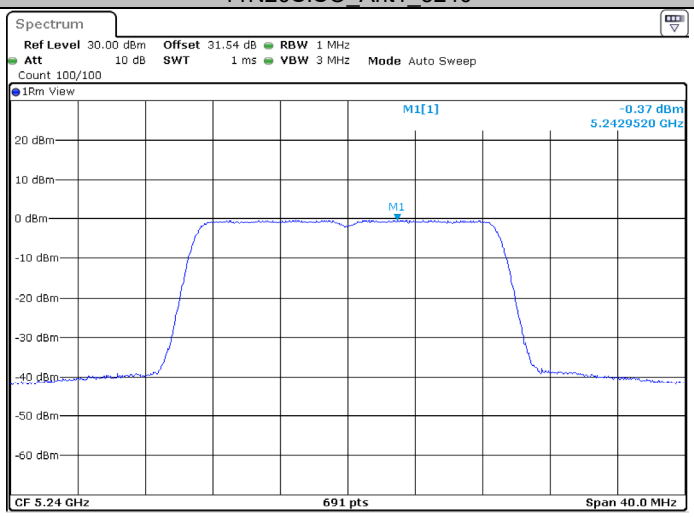


11N20SISO_Ant1_5240



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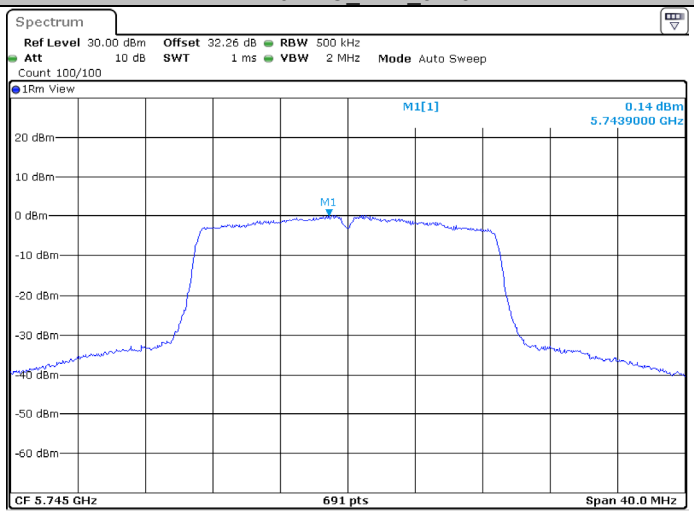
Date: 27.AUG.2024 21:59:01

11N20SISO_Ant1_5745



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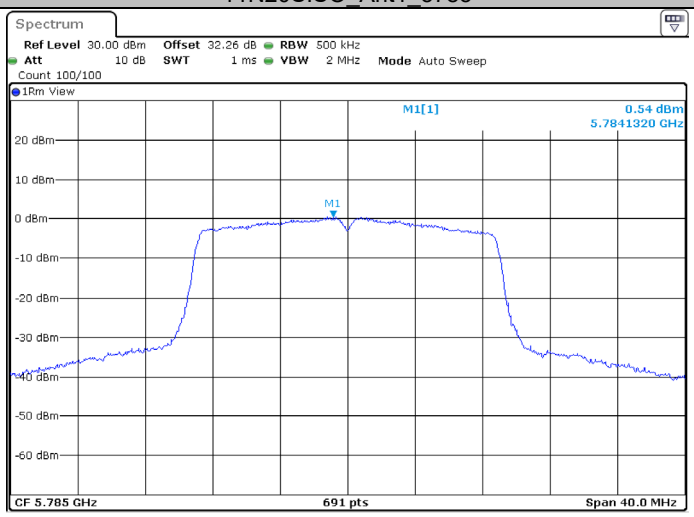
11N20SISO_Ant1_5785



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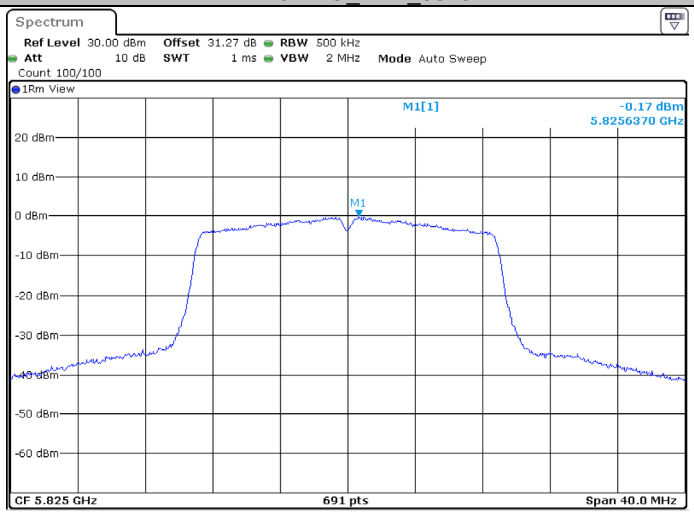
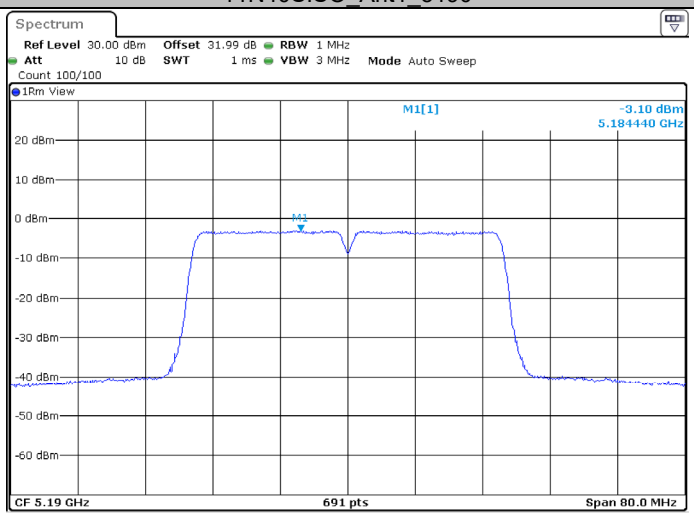
Date: 27.AUG.2024 22:04:43

11N20SISO_Ant1_5825



ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 22:07:41

11N40SISO_Ant1_5190



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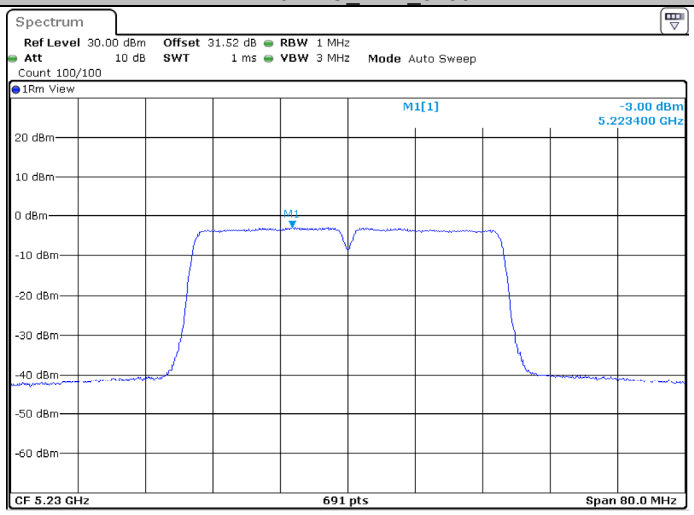

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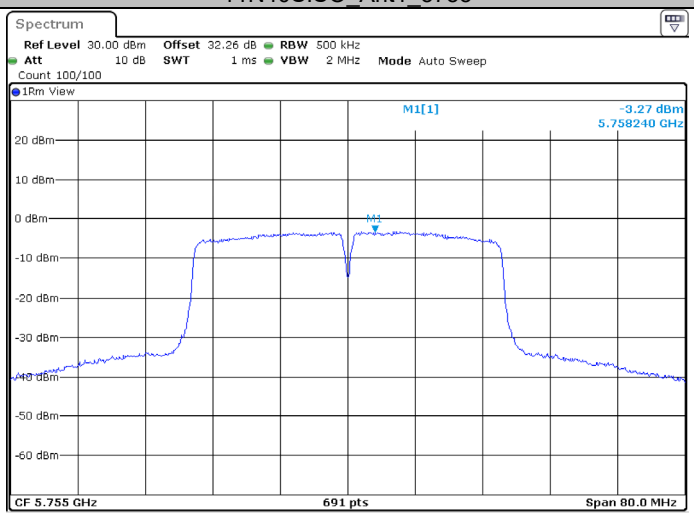

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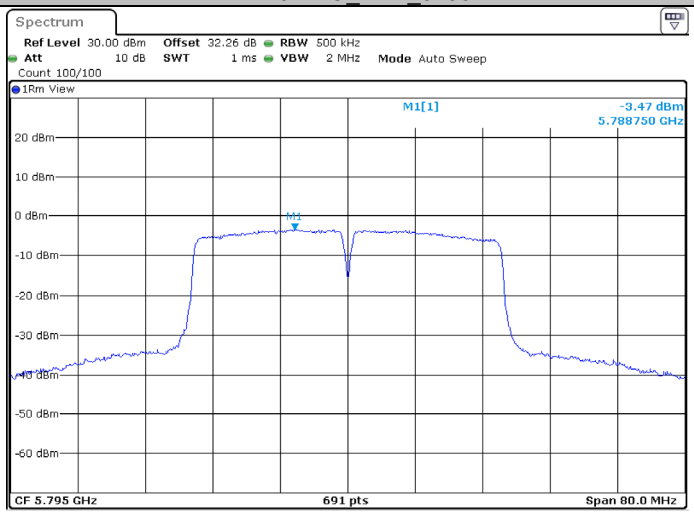


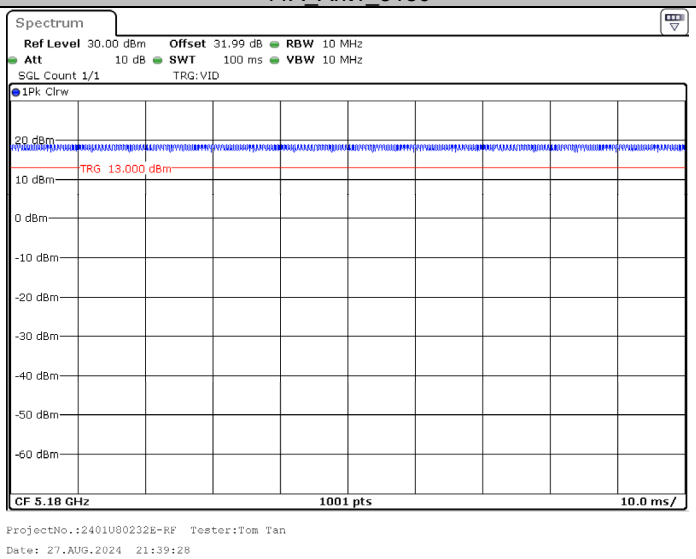
Appendix D: Duty Cycle

Test Result

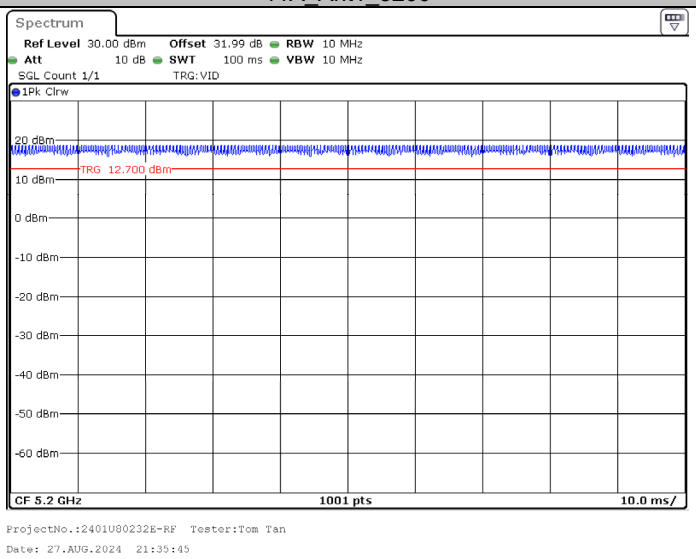
Test Mode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]	1/T[Hz]	VBW Setting [Hz]
11A	Ant1	5180	100.00	100.00	100.00	/	/	10
		5200	100.00	100.00	100.00	/	/	10
		5240	100.00	100.00	100.00	/	/	10
		5745	100.00	100.00	100.00	/	/	10
		5785	100.00	100.00	100.00	/	/	10
		5825	100.00	100.00	100.00	/	/	10
11N20SISO	Ant1	5180	100.00	100.00	100.00	/	/	10
		5200	100.00	100.00	100.00	/	/	10
		5240	100.00	100.00	100.00	/	/	10
		5745	100.00	100.00	100.00	/	/	10
		5785	100.00	100.00	100.00	/	/	10
		5825	100.00	100.00	100.00	/	/	10
11N40SISO	Ant1	5190	100.00	100.00	100.00	/	/	10
		5230	100.00	100.00	100.00	/	/	10
		5755	100.00	100.00	100.00	/	/	10
		5795	100.00	100.00	100.00	/	/	10

Test Graphs

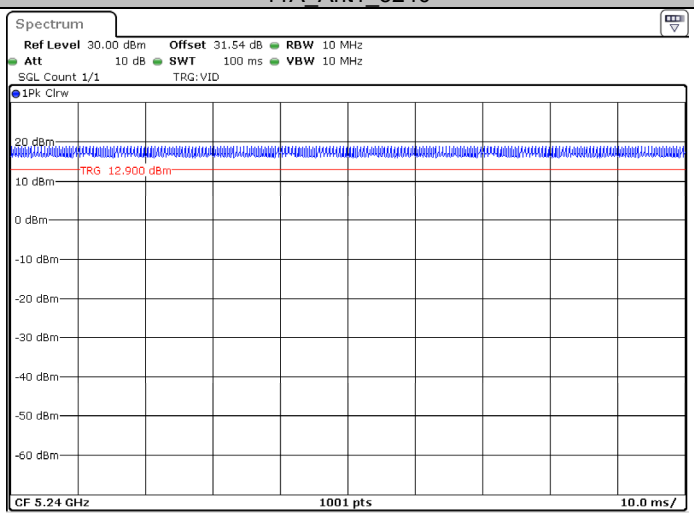
11A_Ant1_5180



11A_Ant1_5200

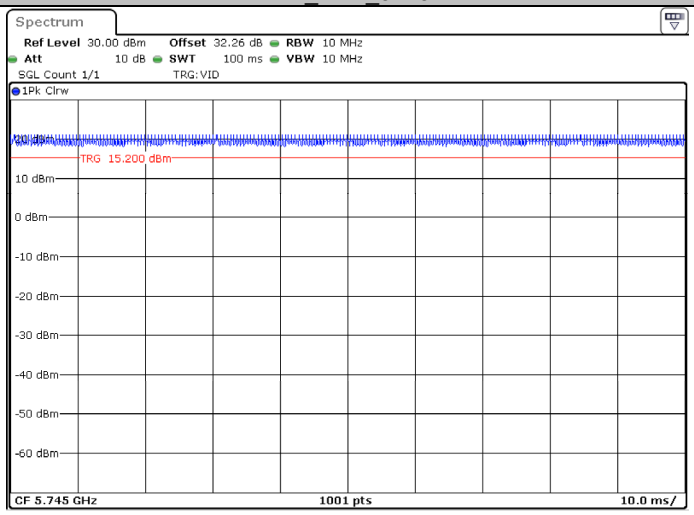


11A_Ant1_5240



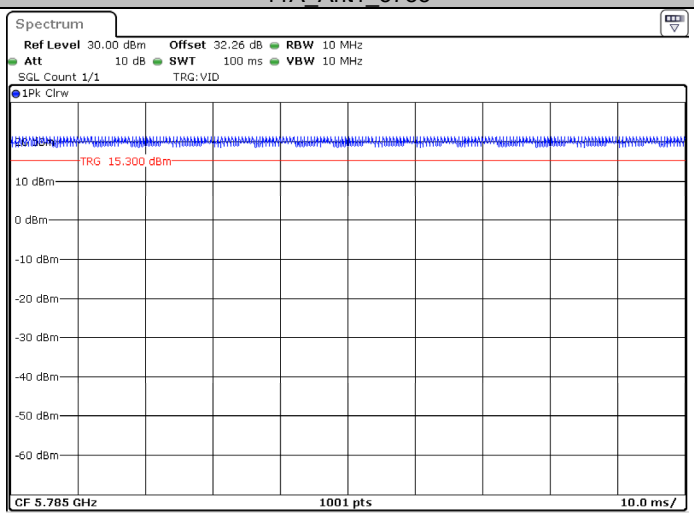
ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:38:12

11A_Ant1_5745



ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:44:53

11A_Ant1_5785



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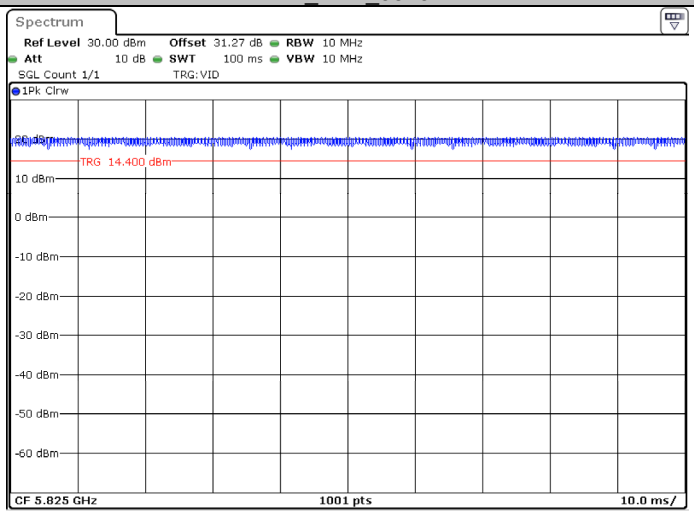

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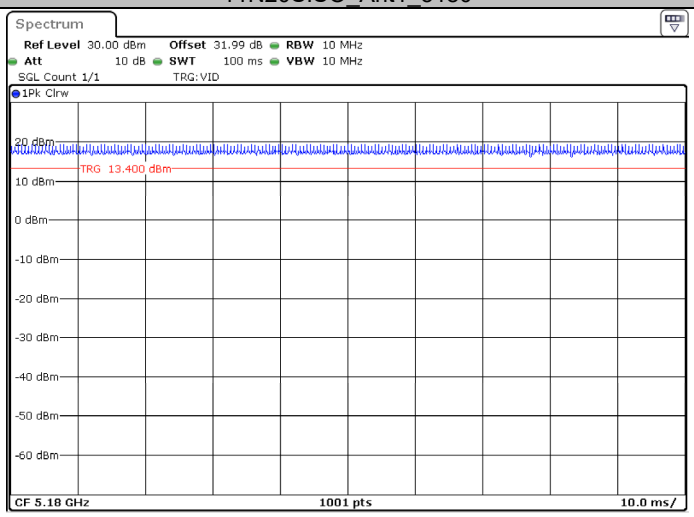

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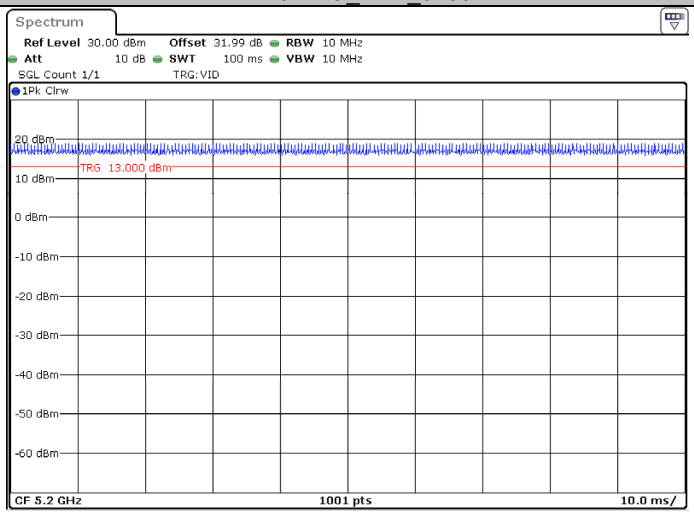

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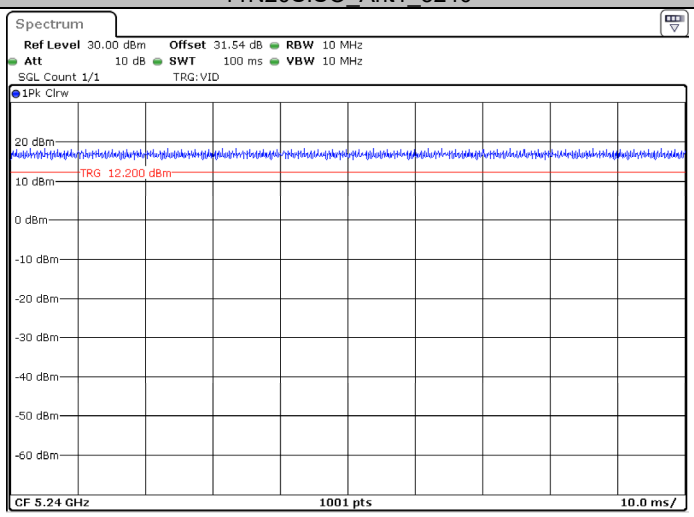

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 21:58:42

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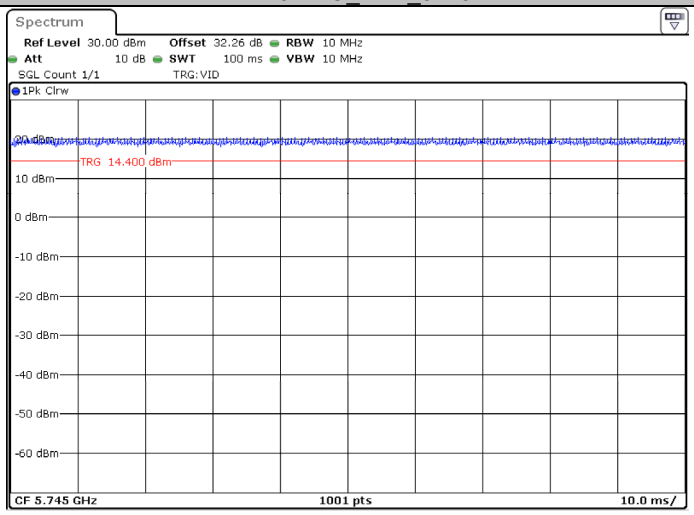

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 22:02:27

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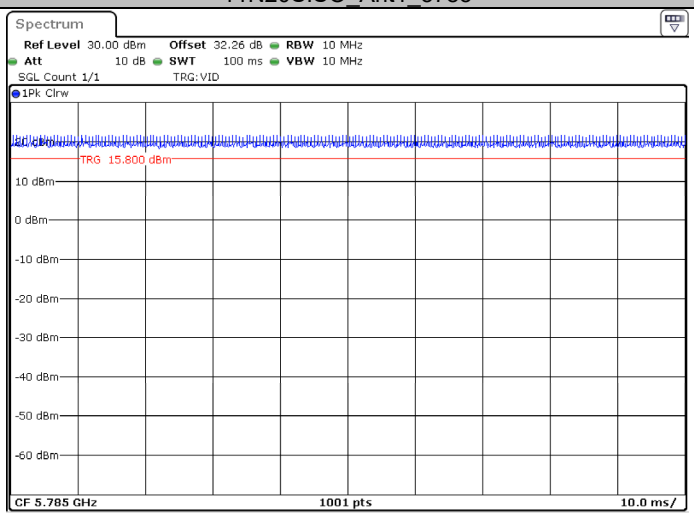

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 22:04:25

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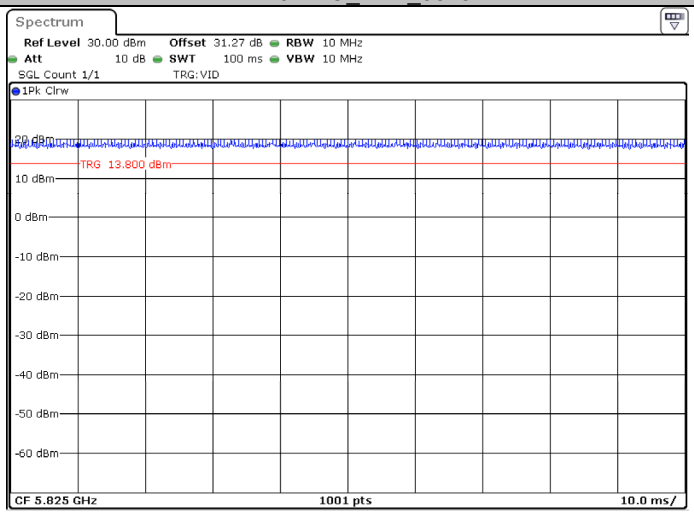

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 22:07:22

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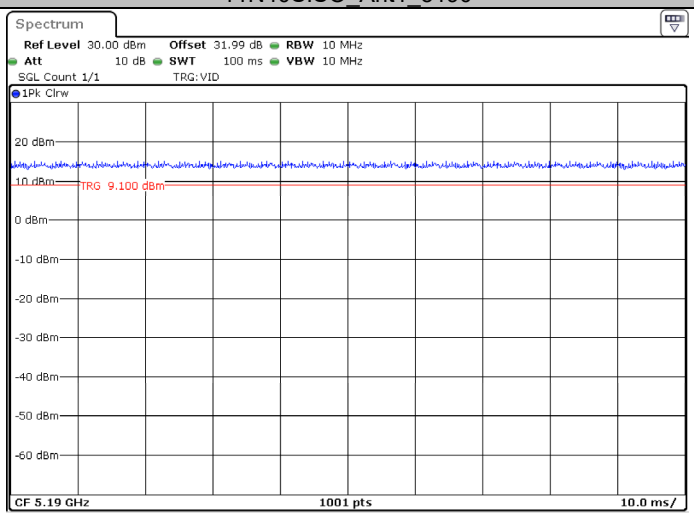

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Date: 27.AUG.2024 22:09:16

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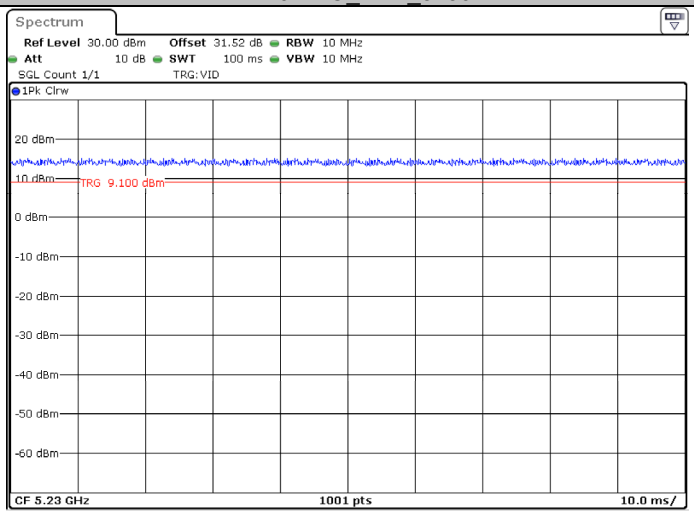

ProjectNo.:2401U80232E-RF Tester:Tom Tan
Date: 27.AUG.2024 22:11:02

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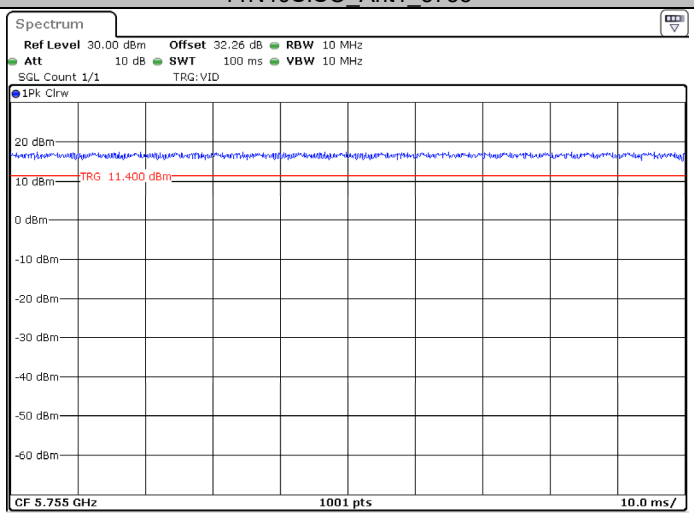

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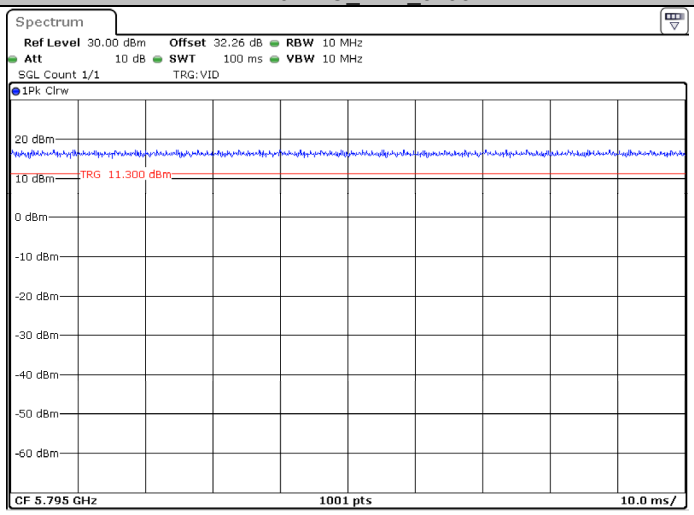

******* END OF REPORT *******