TEST REPORT

Report Number. : R13541206-E7

Applicant	:	Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399 USA
Model	:	1964
FCC ID	:	C3K1964
IC	:	3048A-1964
EUT Description	:	Portable Computing Device
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5 + A2

Date Of Issue:
2021-08-20

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

ACCREDITED
CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
v1	2021-05-25	Initial Issue	Niklas Haydon
v2	2021-06-22	Reformatted 802.11a data as CDD mode is not supported.	Brian T. Kiewra
v3	2021-08-20	Updated 5775 VHT80 Max Power table & updated 11a PSD 1TX Antenna B (IC) table	Cristian Melara

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
USA

EUT DESCRIPTION: Portable Computing Device

MODEL: 1964

SERIAL NUMBER: 0F0002Z211200C (radiated)
0F000AN211200C (radiated)
0F0008Z211200C (radiated)
0F0003K211200C (antenna port conducted)
0F0003W211200C (antenna port conducted)
0F0003V211200C (antenna port conducted)

SAMPLE RECEIPT DATE: 2021-04-12

DATE TESTED: 2021-04-13 to 2021-05-04

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A2	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

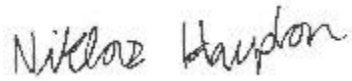
The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL LLC By:

Michael Antola
Staff Engineer
Consumer Technology Division
UL LLC

Prepared By:



Niklas Haydon
Operations Leader
Consumer Technology Division
UL LLC

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2. TEST RESULT SUMMARY

This report contains data provided by the applicant which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
See Comment	RSS-GEN 6.7	26dB BW/99% OBW	Reporting purposes only	Per ANSI C63.10 Sections 6.9.2 and 6.9.3
15.407 (e)	RSS-247 6.2.4.1	6 dB BW	Complies	None.
15.407 (a) (3), (h) (1)	RSS-247 6.2	Output Power	Complies	None.
15.407 (a) (12)	RSS-247 6.2	PSD	Complies	None.
15.209, 15.205, 15.407 (b)	RSS-GEN 8.9, 8.10, RSS-247 6.2	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with;

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- FCC KDB 662911 D01 v02r01,
- FCC KDB 905462 D06 v02
- FCC KDB 789033 D02 v02r01,
- KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013
- RSS-GEN Issue 5 + A2
- RSS-247 Issue 2

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	703469
☒	Building: 2800 Perimeter Park Dr Morrisville, NC 27560, U.S.A			

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57%
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a portable computing device. This report covers the 5.8 WLAN non-ax radio in the device.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.8 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 1TX, ANT A			
5745-5825	802.11a	19.91	97.95
5745-5825	802.11n HT20	19.77	94.84
5755-5795	802.11n HT40	18.89	77.45
5775	802.11ac VHT80	14.96	31.33
5.8 GHz band, 1TX, ANT B			
5745-5825	802.11a	19.63	91.83
5745-5825	802.11n HT20	19.50	89.13
5755-5795	802.11n HT40	19.33	85.70
5775	802.11ac VHT80	14.75	29.85
5.8 GHz band, 2TX			
5745-5825	802.11n HT20 SDM	21.71	148.25
5755-5795	802.11n HT40 SDM	19.72	93.76
5775	802.11ac VHT80 SDM	15.86	38.55

5.8 GHz BAND (IC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 1TX, ANT A			
5745-5825	802.11a	19.91	97.95
5745-5825	802.11n HT20	19.77	94.84
5755-5795	802.11n HT40	18.89	77.45
5775	802.11ac VHT80	14.96	31.33
5.8 GHz band, 1TX, ANT B			
5745-5825	802.11a	19.63	91.83
5745-5825	802.11n HT20	19.50	89.13
5755-5795	802.11n HT40	19.33	85.70
5775	802.11ac VHT80	14.75	29.85
5.8 GHz band, 2TX			
5745-5825	802.11n HT20 SDM	21.71	148.25
5755-5795	802.11n HT40 SDM	19.72	93.76
5775	802.11ac VHT80 SDM	15.86	38.55

6.1. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

The radio utilizes two PIFA antennas, with the following gains:

Frequency	Antenna A	Antenna B
5725 to 5850MHz	7.8 dBi	7.7 dBi

6.2. SOFTWARE AND FIRMWARE

OS: Windows Build 19041.vb_release 191206-1406
Test tool version 22.35020.0.0-01924
WLAN driver 22.20.0.5
BT driver 22.30.0.4

6.3. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in the three available configurations (A, B and C as described in the test setup photos) for Antenna A. Where a configuration can be portable it was also investigated in three orthogonal orientations (X, Y, Z) modes. It was determined that C (portable) configuration in Y orientation was the worst-case configuration orientation; therefore, all final radiated testing was performed with the EUT in C (portable) configuration in Y orientation. for Antenna A.

The fundamental of the EUT was investigated in the three available configurations (A, B and C as described in the test setup photos) for Antenna B. Where a configuration can be portable it was also investigated in three orthogonal orientations (X, Y, Z) modes. It was determined that C (portable) configuration in Z orientation was the worst-case configuration orientation; therefore, all final radiated testing was performed with the EUT in C (portable) configuration in Z orientation. for Antenna B.

The fundamental of the EUT was investigated in the three available configurations (A, B and C as described in the test setup photos) for Antenna A + Antenna B. Where a configuration can be portable it was also investigated in three orthogonal orientations (X, Y, Z) modes. It was determined that A configuration was the worst-case configuration orientation; therefore, all final radiated testing was performed with the EUT in configuration A for Antenna A + Antenna B.

All radios that can transmit simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

Note: 802.11a does not support CDD mode, however for radiated testing this mode was tested as ANT A + ANT B using SISO power as worst-case scenario, except if this was non-compliant. In this case 1 Tx mode was tested.

Worst-case data rates as provided by the client were:

802.11a 1TX mode: 6 Mbps
802.11n HT20 1Tx mode: MCS0
802.11n HT40 1Tx mode: MCS0
802.11ac VHT80 1Tx mode: MCS0
802.11n HT20 2Tx, SDM mode: MCS8
802.11n HT40 2Tx, SDM mode: MCS8
802.11ac VHT80 2Tx, SDM mode: MCS0 NSS2

Radiated band edge emissions (outer channels only), output power, average power, and power spectral density were performed with the EUT set to the max power setting of each modulation/channel/mode the EUT will be set at:

Frequency Band	2Tx CCD/SDM				
	Wi-Fi Channels	802.11a	802.11n20	Wi-Fi Channels	802.11n40
5725 to 5850 MHz	144	15	15	142	15
	149	19	18	151	16
	153	-	-		
	157	19	18	159	16
	161	-	-		
	165	19	18		

Frequency Band	2Tx CCD/SDM	
	Wi-Fi Channels	802.11ac80
5725 to 5850 MHz	138	14
	155	12

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Frequency Band	1Tx Antenna A/B			
	Wi-Fi Channels	802.11n20	Wi-Fi Channels	802.11n40
5725 to 5850 MHz	144	19/16	142	19
	149	19	151	18
	153	-		
	157	19	159	18
	161	-		
	165	19		

Frequency Band	1Tx Antenna A/B	
	Wi-Fi Channels	802.11ac80
5725 to 5850 MHz	138	16
	155	14

26dB and 99% bandwidth were performed with the EUT set in 2Tx modes at 1Tx power levels:

Frequency Band	2Tx CCD/SDM				
	Wi-Fi Channels	802.11a	802.11n20	Wi-Fi Channels	802.11n40
5725 to 5850 MHz	144	19	19	142	19
	149	19	19	151	18
	153	-	-		
	157	19	19	159	18
	161	-	-		
	165	19	19		

Frequency Band	2Tx CCD/SDM	
	Wi-Fi Channels	802.11ac80
5725 to 5850 MHz	138	16
	155	14

Radiated spurious emissions between 1GHz and 18GHz outside of radiated band edge emissions, were performed with the EUT set to transmit on low, middle and high channels on each modulation with the highest output power:

Frequency Band	2Tx CCD/SDM				
	Wi-Fi Channels	802.11a	802.11n20	Wi-Fi Channels	802.11n40
5725 to 5850 MHz	149	19	-	151	-
	153	-	-		
	157	19	-	159	-
	161	-	-		
	165	19	-		

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit on the channel and modulation with the highest output power:

Frequency Band	2Tx CCD/SDM				
	Wi-Fi Channels	802.11a	802.11n20	Wi-Fi Channels	802.11n40
5725 to 5850 MHz	149	-	-	151	-
	153	-	-		
	157	-	-	159	-
	161	-	-		
	165	19	-		

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6.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
USB Hub	J5create	JCA374	AY2A1904000477	NA
USB Hub	J5create	JCA374	AY3A2010013253	NA
USB Hub	J5create	JCD383	DL3A1903011541	NA
USB Hub	J5create	JCD383	FY5A2010034764	NA
Earbuds	Sony	MDR-EX14AP	NA	NA
Earbuds	Sony	MDR-EX14AP	NA	NA
Earbuds	JVC	HA-FXL	NA	NA
Power Supply	Microsoft	1706	0D130U0HD210C	NA
Power Supply	Microsoft	1706	0D130U0GX310C	N/A
Power Supply	Microsoft	1706	0D130U0HD710C	N/A
Power Supply	Microsoft	1706	0D130U0GU310C	N/A
Power Supply	Microsoft	1706	0D130U0HDL10C	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Mains	1	12-pin	Mains	<3	Goes to ac/dc adapter
2	USB-C	2	USB-C	USB	<3	None

TEST SETUP

Test software on the EUT exercised the radio card.

SETUP DIAGRAMS

Please refer to R13541206-EP2 for setup diagrams.

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7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

6 dB Emission BW: KDB 789033 D02 v02r01, Section C.2

99% Occupied BW: KDB 789033 D02 v02r01, Section D.

Conducted Output Power: KDB 789033 D02 v02r01, Section E.3.b (Method PM-G)

Power Spectral Density: KDB 789033 D02 v02r01, Section F

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.1, G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.2, G.3, G.4, and G.5.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 1				
SA0025	Spectrum Analyzer	Agilent	N9030A	2021-04-01	2022-04-01
PWM002 (PRE0137344)	RF Power Meter	Keysight Technologies	N1911A	2020-07-31	2021-07-31
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2020-05-27	2021-05-27
PWS002 (PRE0137348)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2020-07-31	2021-07-31
HI0090 (PRE0191271)	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
SOFTEMI	Antenna Port Software	UL	Version 2021.04.28	NA	NA
	Conducted Room 2				
SA0027 (PRE0126407)	Spectrum Analyzer	Keysight Technologies	N9030A	2020-06-10	2021-06-10
PWM004 (PRE0137346)	RF Power Meter	Keysight Technologies	N1911A	2020-07-31	2021-07-31
PWS002 (PRE0137348)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2020-07-31	2021-07-31
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
SOFTEMI	Antenna Port Software	UL	Version 2021.4.28	NA	NA

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2021-04-05	2022-04-05
HI0090 (PRE0191271)	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2020-08-18	2021-08-18
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2020-08-18	2021-08-18
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2021-04-05	2022-04-05
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 2021)		

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2020-08-20	2021-08-20
	30-1000 MHz				
AT0075	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2020-10-27	2021-10-27
	1-18 GHz				
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-04-28	2021-04-28
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-05-26	2021-05-26
	18-40 GHz				
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2020-10-30	2021-10-30
AT0061	Horn Antenna, 26-40GHz	ARA	MWH-2640/B	2020-10-30	2021-10-30
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-10	2021-07-10
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-07-10	2021-07-10
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-06	2021-07-06
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-07-07	2021-07-07
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-10	2022-03-10
SA0026	Spectrum Analyzer	Agilent	N9030A	2020-07-16	2021-07-16
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 2021)		
	Additional Equipment used				
s/n 200037635	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22

Test Equipment Used - Radiated Disturbance Emissions (E-field) – Chamber C

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0062	HORN Antenna	ETS-Lindgren	3117	2021-02-03	2022-02-03
	Gain-Loss Chains				
C-SAC02	Gain-loss string: 1-18GHz	Various	Various	2021-04-15	2022-04-15
C-SAC02 Path 7	Gain-loss string 1-7GHz	Various	Various	2021-04-15	2022-04-15
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2020-03-09	2022-03-09
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 21)	NA	NA
	Additional Equipment used				
HI0085	Temp/Humid/Pressure Meter	EXTECH	SD700	2020-04-20	2021-04-30

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-04-27	2021-04-27
	Gain-Loss Chains				
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-28	2021-07-28
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 2021)		
	Additional Equipment used				
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2020-08-06	2021-08-06

NOTES:

1. For equipment listed above that was calibrated during the testing period, please note the equipment was used for testing after calibration.
2. For equipment listed above that has a calibration due date during the testing period, the testing was completed before the equipment expiration date.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

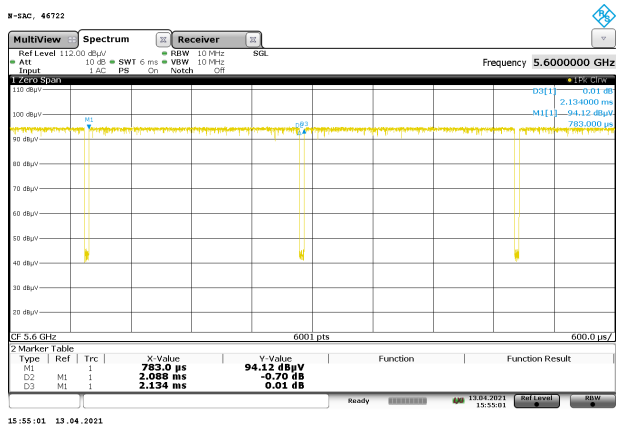
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

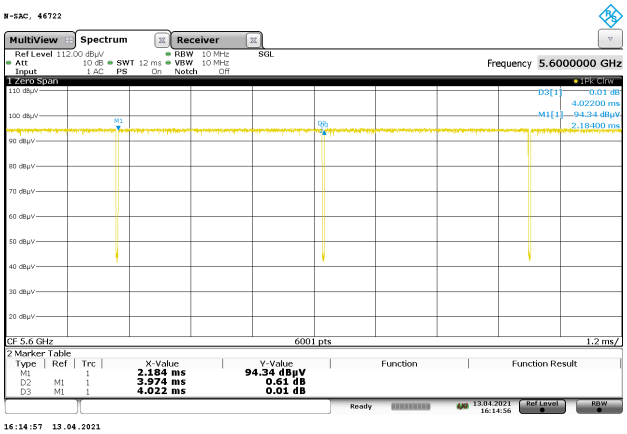
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction - RMS (dB)	Duty Cycle Correction - Voltage (dB)	1/B Minimum VBW (kHz)
802.11a	2.088	2.134	0.978	97.84%	0.09	0.19	0.479
802.11n HT20 Ant A	3.974	4.022	0.988	98.81%	0.00	0.00	0.010
802.11n HT20 Ant B	3.974	4.022	0.988	98.81%	0.00	0.00	0.010
802.11n HT40 Ant A	3.972	4.014	0.990	98.95%	0.00	0.00	0.010
802.11n HT40 Ant B	3.972	4.020	0.988	98.81%	0.00	0.00	0.010
802.11ac VHT80 Ant A	3.972	4.014	0.990	98.95%	0.00	0.00	0.010
802.11ac VHT80 Ant B	3.972	4.014	0.990	98.95%	0.00	0.00	0.010

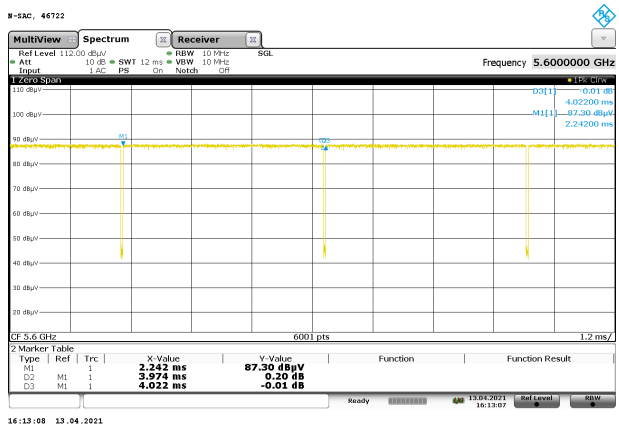
DUTY CYCLE PLOTS



DUTY CYCLE 802.11a MODE

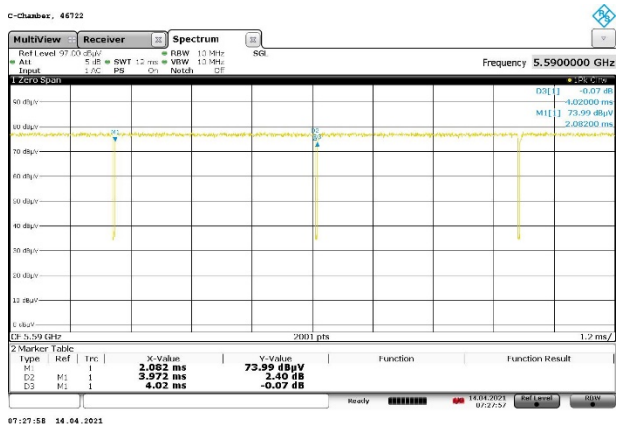


DUTY CYCLE 802.11nHT20 ANT A MODE



DUTY CYCLE 802.11nHT20 ANT B MODE

DUTY CYCLE 802.11n HT40 ANT A MODE



DUTY CYCLE 802.11n HT40 ANT B MODE

DUTY CYCLE 802.11 ac VHT80 ANT A MODE

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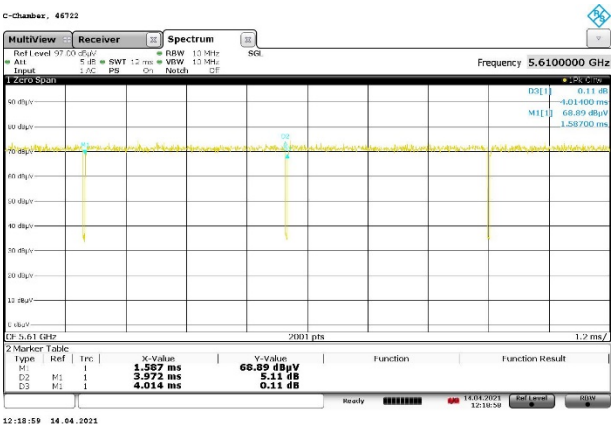

DUTY CYCLE 802.11ac VHT80 ANT B MODE

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9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

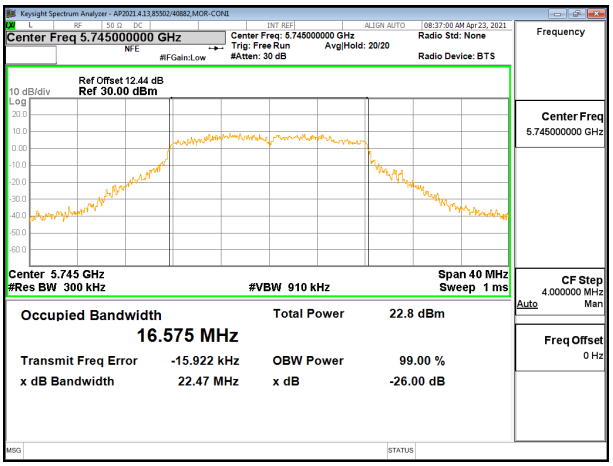
RESULTS

9.2.1. 802.11a MODE IN THE 5.8 GHz BAND

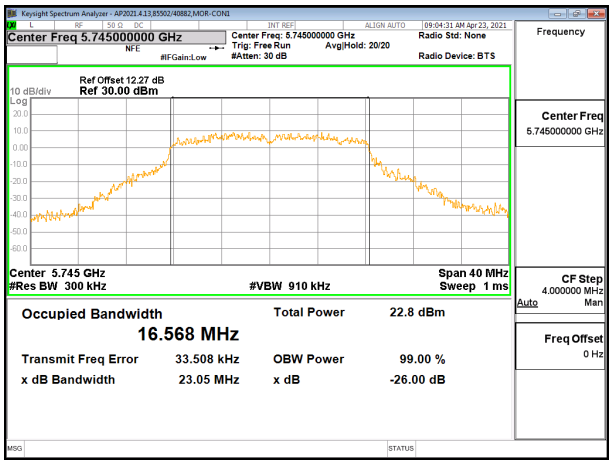
1TX Antenna A and 1TX Antenna B MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna A (MHz)	99% Bandwidth Antenna B (MHz)
Low	5745	16.5750	16.5680
Mid	5785	16.7110	16.5980
High	5825	16.7080	16.6180

LOW CHANNEL

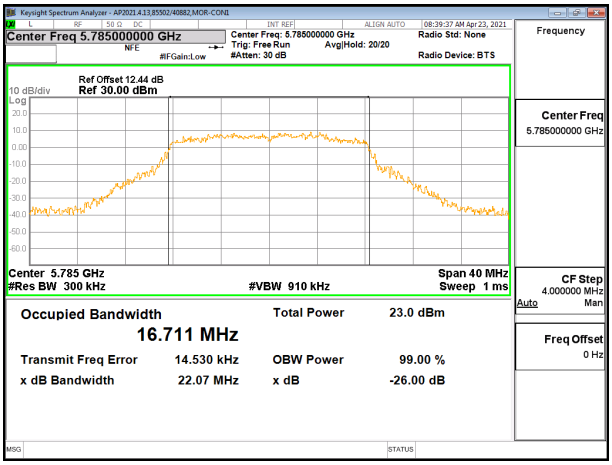


LOW CHANNEL ANT A

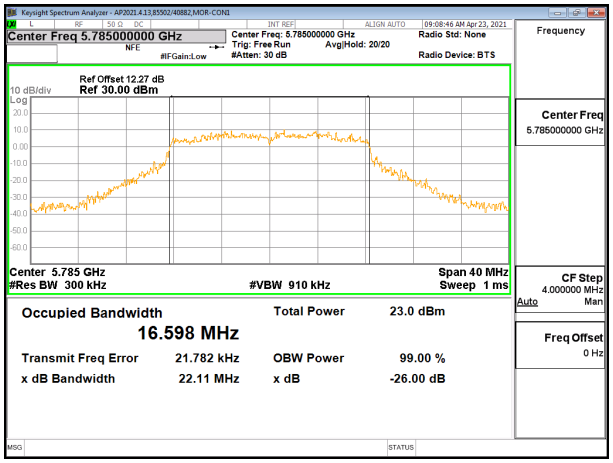


LOW CHANNEL ANT B

MID CHANNEL

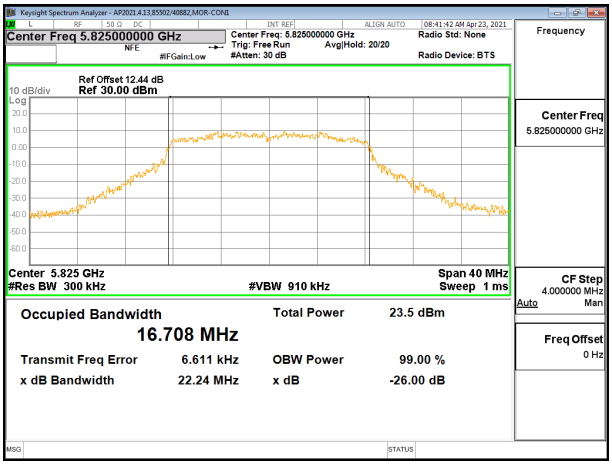


MID CHANNEL ANT A

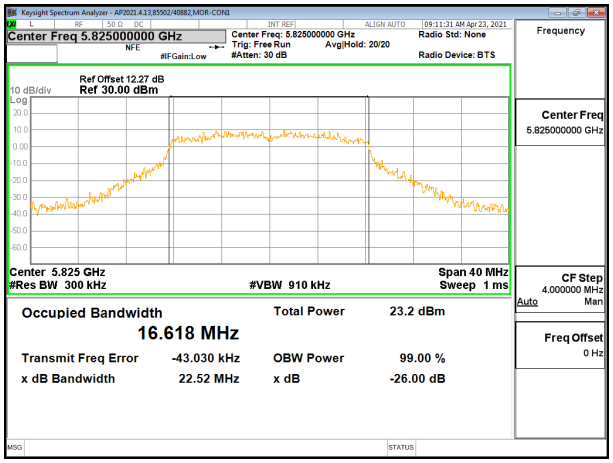


MID CHANNEL ANT B

HIGH CHANNEL



HIGH CHANNEL ANT A



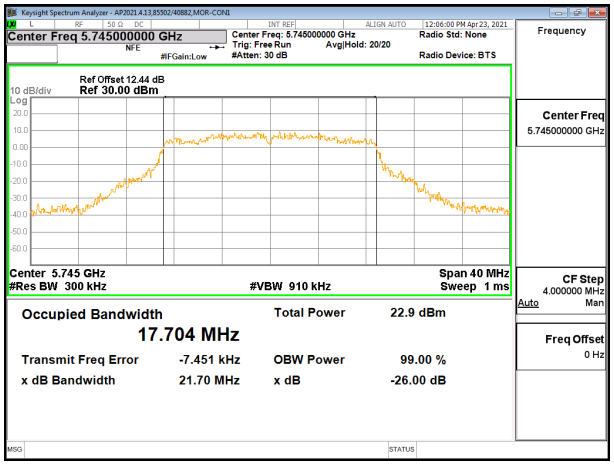
HIGH CHANNEL ANT B

9.2.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

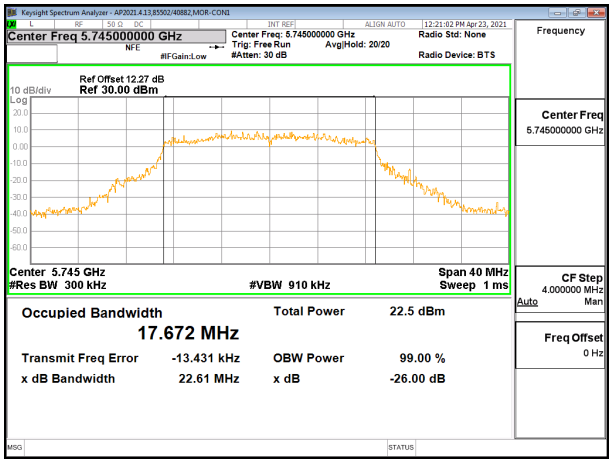
2TX Antenna A + Antenna B SDM MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna A (MHz)	99% Bandwidth Antenna B (MHz)
Low	5745	17.7040	17.6720
Mid	5785	17.6660	17.7530
High	5825	17.7550	17.7120

LOW CHANNEL

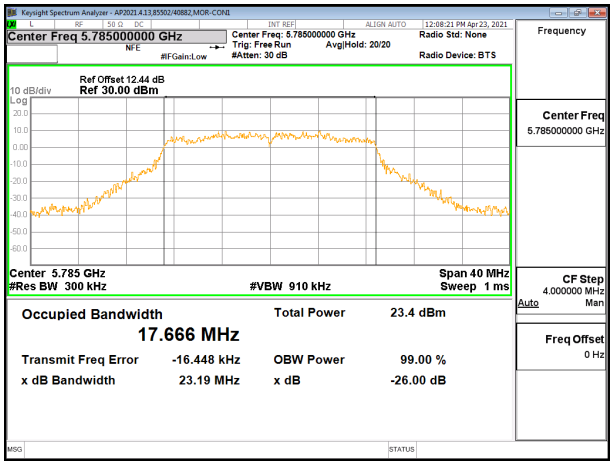


LOW CHANNEL ANT A

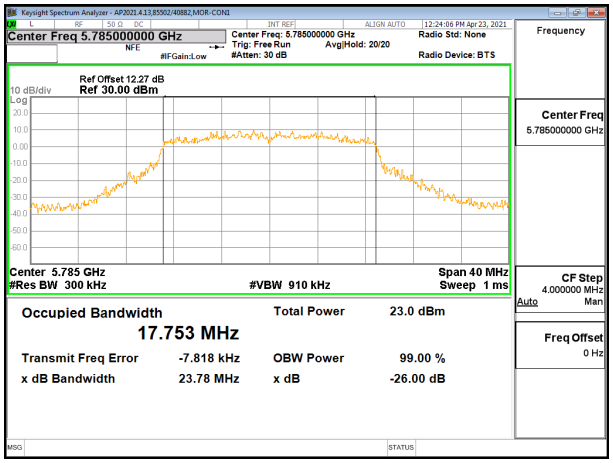


LOW CHANNEL ANT B

MID CHANNEL

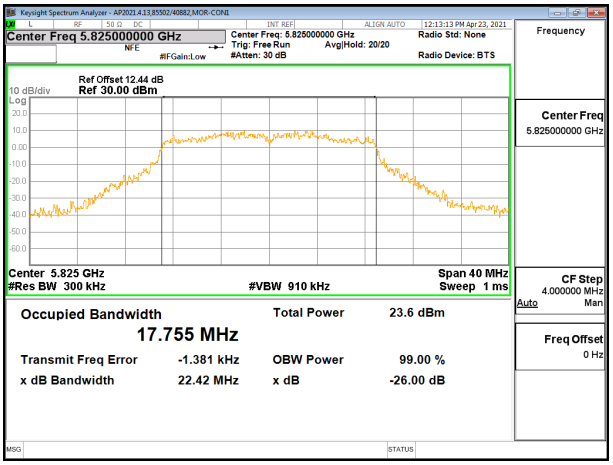


MID CHANNEL ANT A

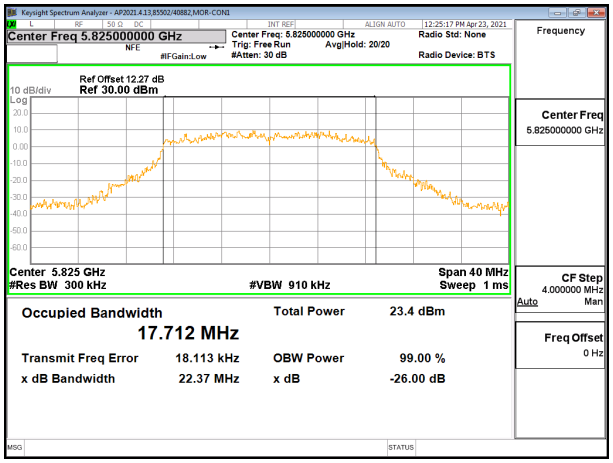


MID CHANNEL ANT B

HIGH CHANNEL



HIGH CHANNEL ANT A



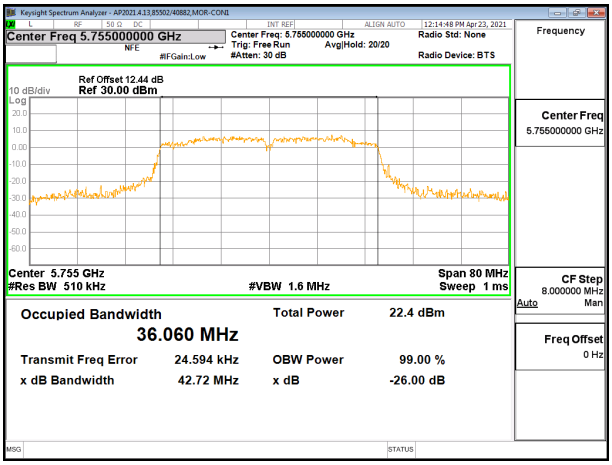
HIGH CHANNEL ANT B

9.2.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

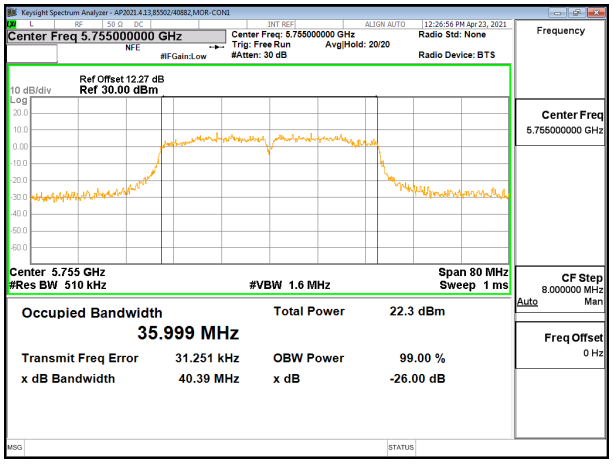
2TX Antenna A + Antenna B SDM MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna A (MHz)	99% Bandwidth Antenna B (MHz)
Low	5755	36.0600	35.9990
High	5795	36.0210	36.1650

LOW CHANNEL

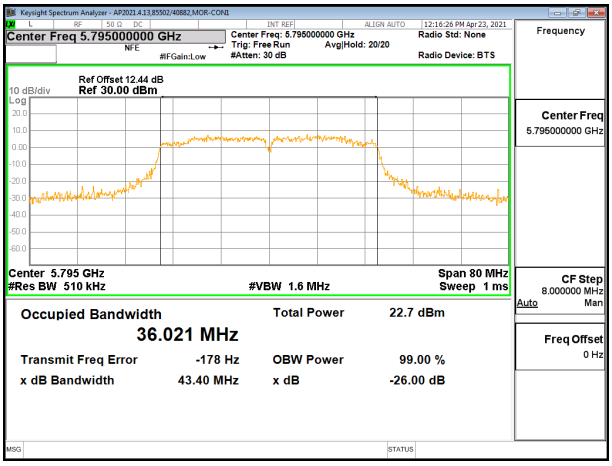


LOW CHANNEL ANT A

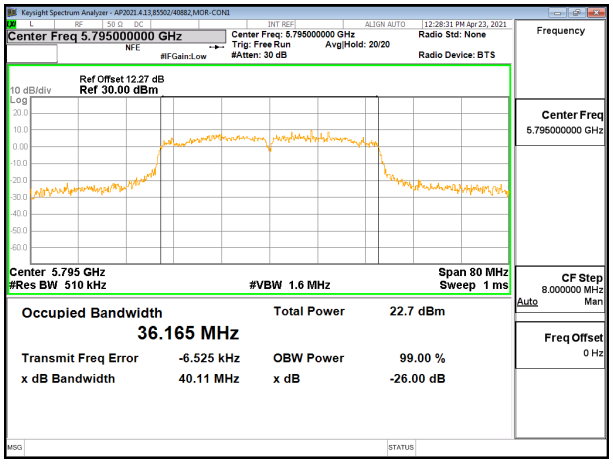


LOW CHANNEL ANT B

HIGH CHANNEL



HIGH CHANNEL ANT A



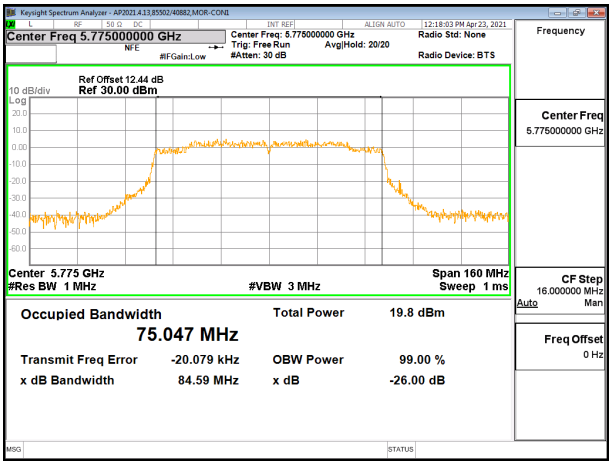
HIGH CHANNEL ANT B

9.2.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

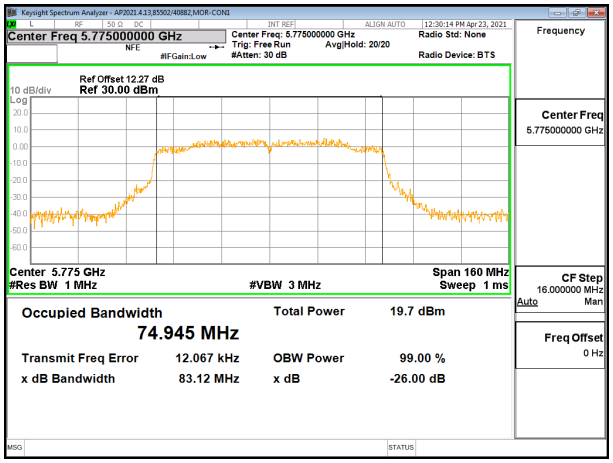
2TX Antenna A + Antenna B SDM MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna A (MHz)	99% Bandwidth Antenna B (MHz)
Mid	5775	75.0470	74.9450

MID CHANNEL



MID CHANNEL ANT A



MID CHANNEL ANT B

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9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)
RSS-247 6.2.4.1

The minimum 6 dB bandwidth shall be at least 500 kHz.

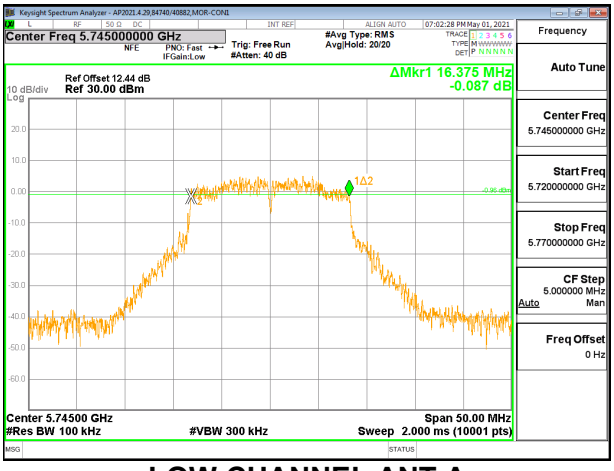
RESULTS

9.3.1. 802.11a MODE IN THE 5.8 GHz BAND

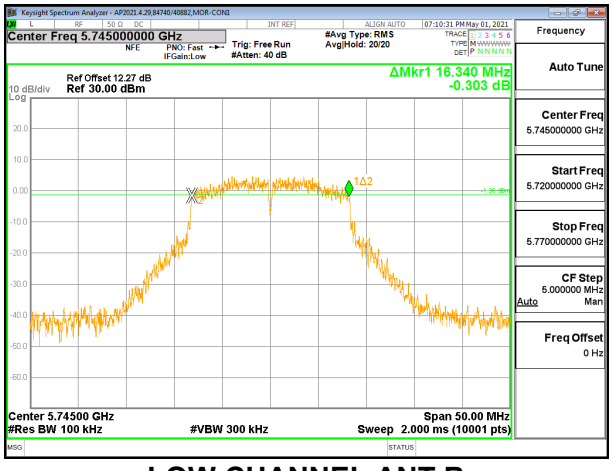
1TX Antenna A and 1TX Antenna B MODE

Channel	Frequency (MHz)	6 dB BW Antenna A (MHz)	6 dB BW Antenna B (MHz)	Minimum Limit (MHz)
Low	5745	16.3750	16.3400	0.5
Mid	5785	16.0050	16.3150	0.5
High	5825	16.3500	16.2350	0.5
144	5720	16.3700	14.3350	0.5

LOW CHANNEL

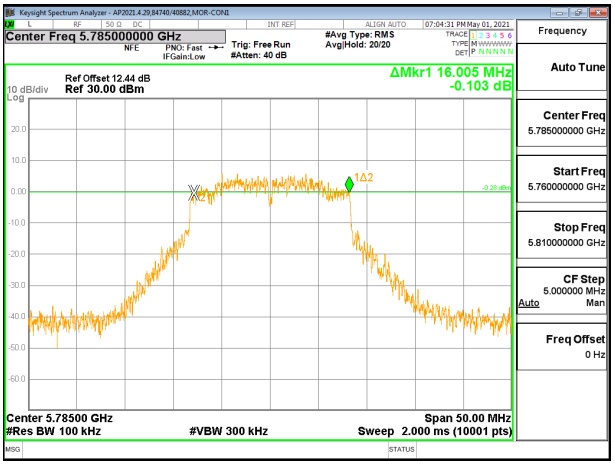


LOW CHANNEL ANT A

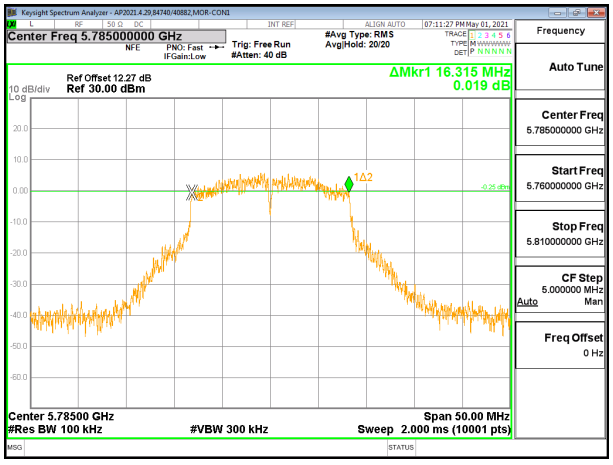


LOW CHANNEL ANT B

MID CHANNEL

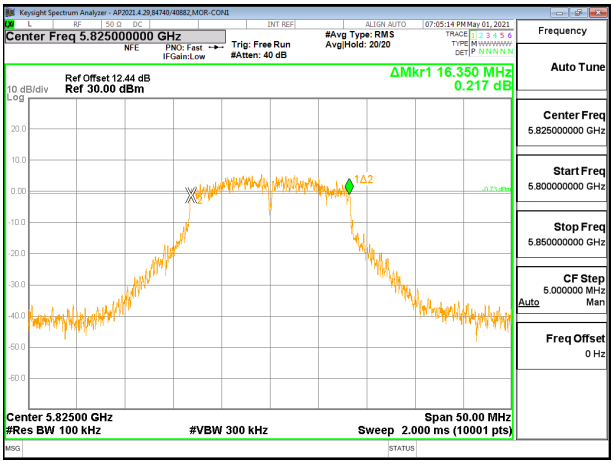


MID CHANNEL ANT A

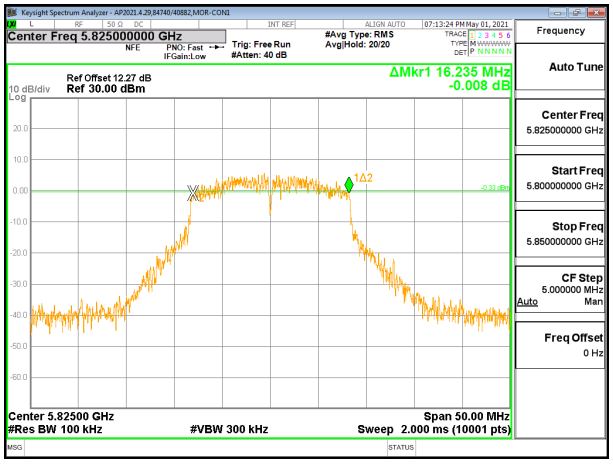


MID CHANNEL ANT B

HIGH CHANNEL

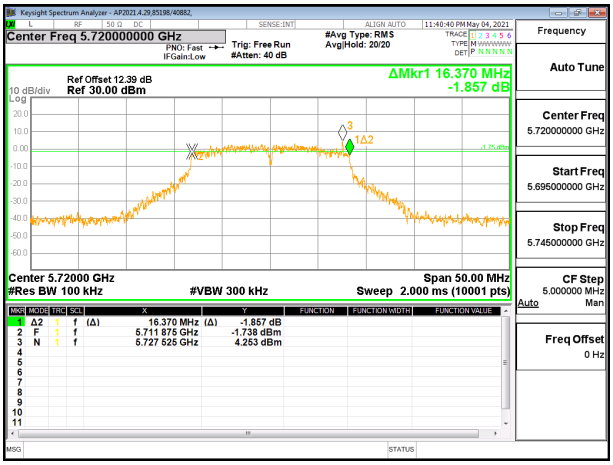


HIGH CHANNEL ANT A

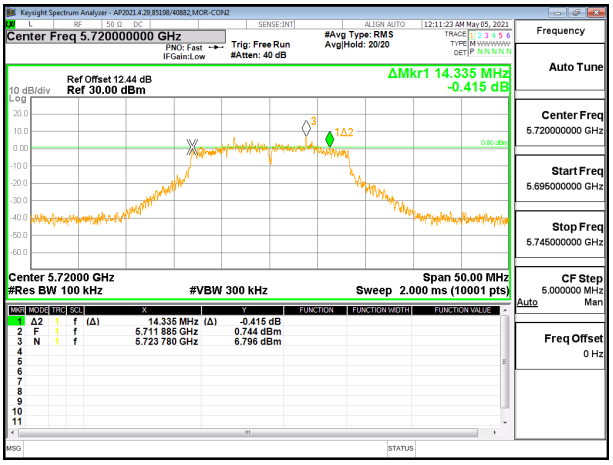


HIGH CHANNEL ANT B

CHANNEL 144



CHANNEL 144 ANT A



CHANNEL 144 ANT B

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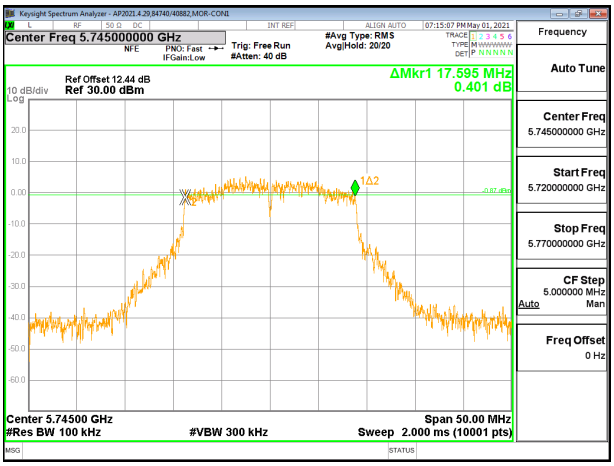
9.3.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

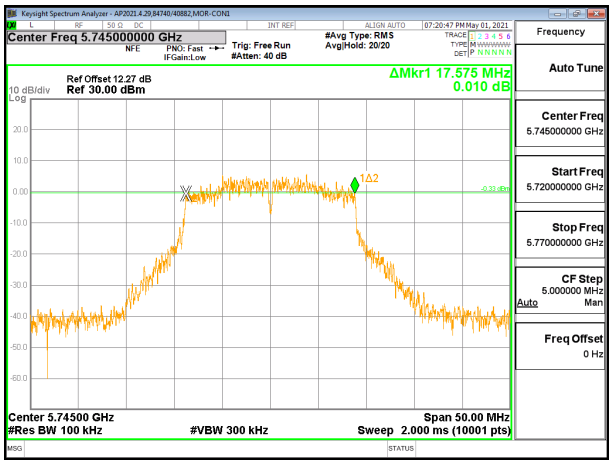
2TX Antenna A + Antenna B SDM MODE

Channel	Frequency (MHz)	6 dB BW Antenna A (MHz)	6 dB BW Antenna B (MHz)	Minimum Limit (MHz)
Low	5745	17.5950	17.5750	0.5
Mid	5785	17.5300	17.2900	0.5
High	5825	17.5500	17.2250	0.5
144	5720	15.6450	17.5850	0.5

LOW CHANNEL

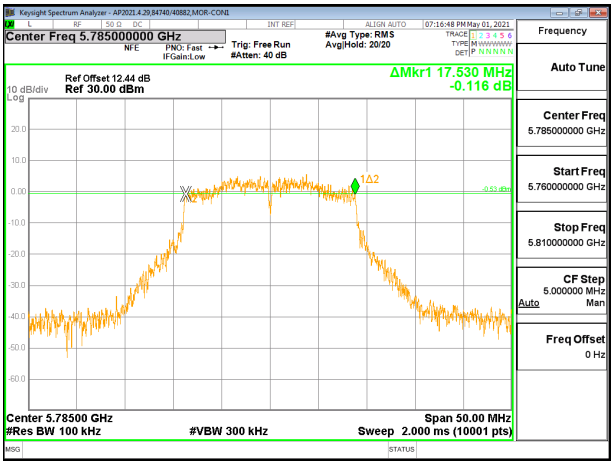


LOW CHANNEL ANT A

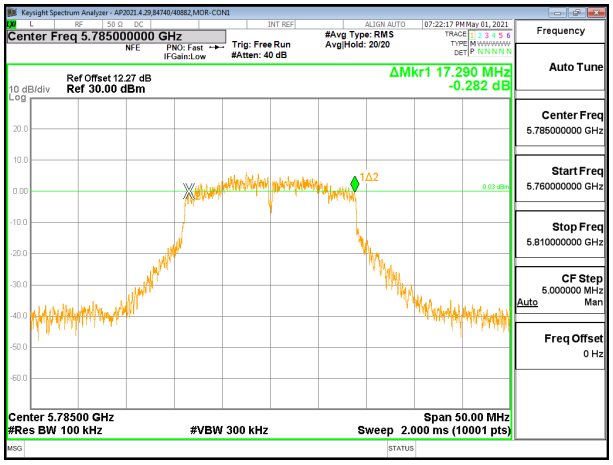


LOW CHANNEL ANT B

MID CHANNEL

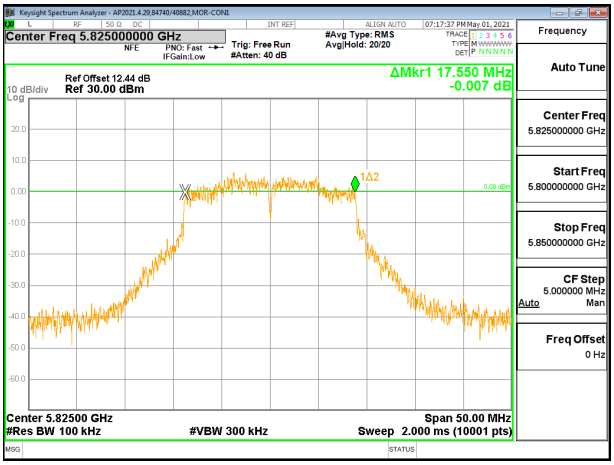


MID CHANNEL ANT A

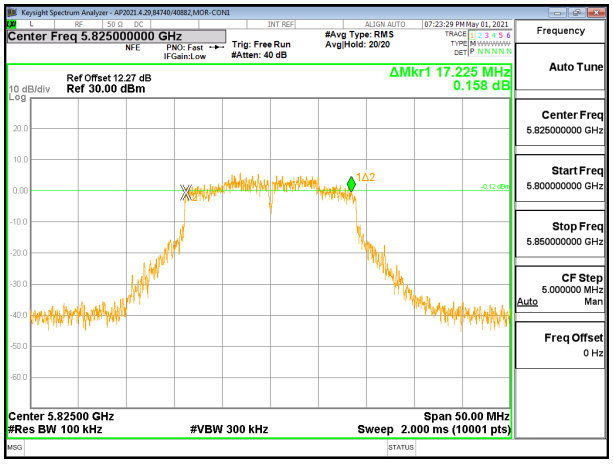


MID CHANNEL ANT B

HIGH CHANNEL

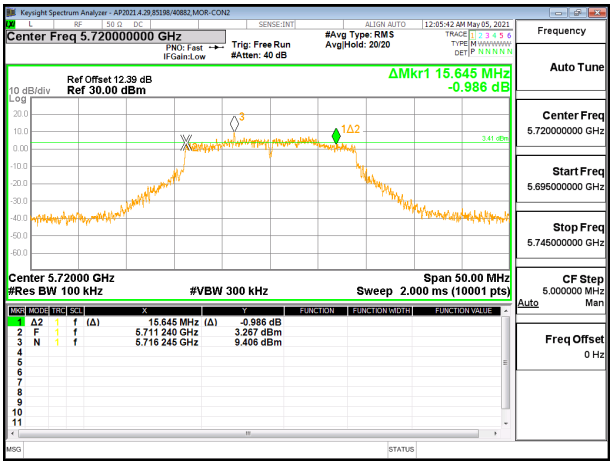


HIGH CHANNEL ANT A

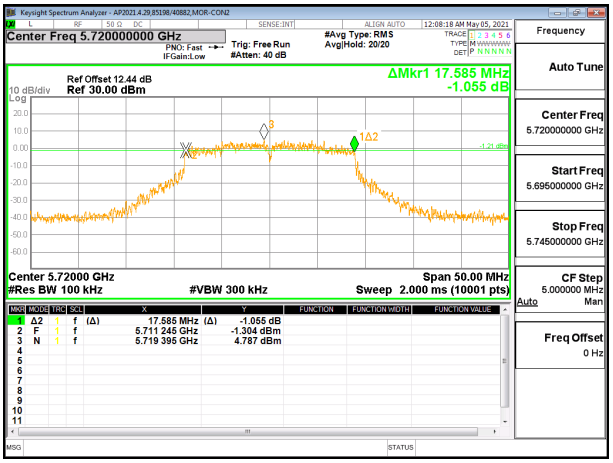


HIGH CHANNEL ANT B

CHANNEL 144



CHANNEL 144 ANT A



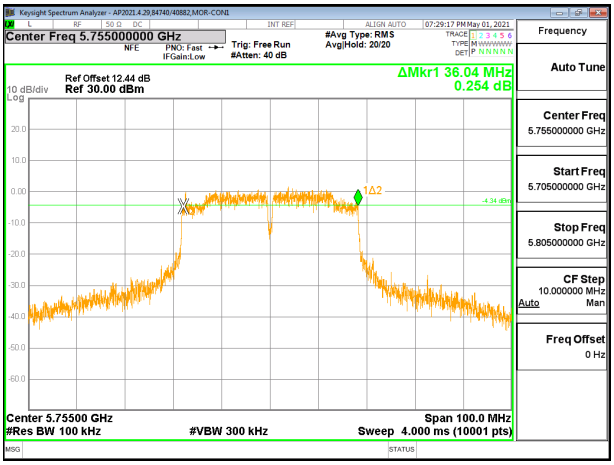
CHANNEL 144 ANT B

9.3.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

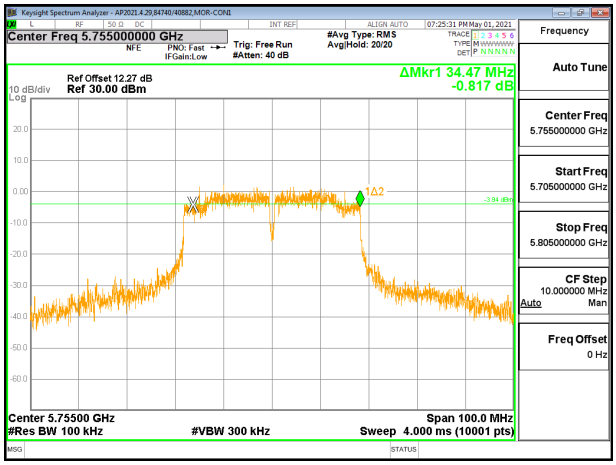
2TX Antenna A + Antenna B SDM MODE

Channel	Frequency (MHz)	6 dB BW Antenna A (MHz)	6 dB BW Antenna B (MHz)	Minimum Limit (MHz)
Low	5755	36.0400	34.4700	0.5
High	5795	36.3500	35.5300	0.5
142	5710	34.4300	36.3700	0.5

LOW CHANNEL

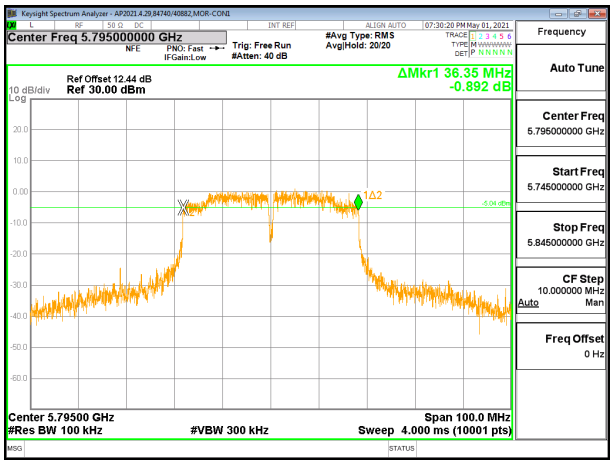


LOW CHANNEL ANT A

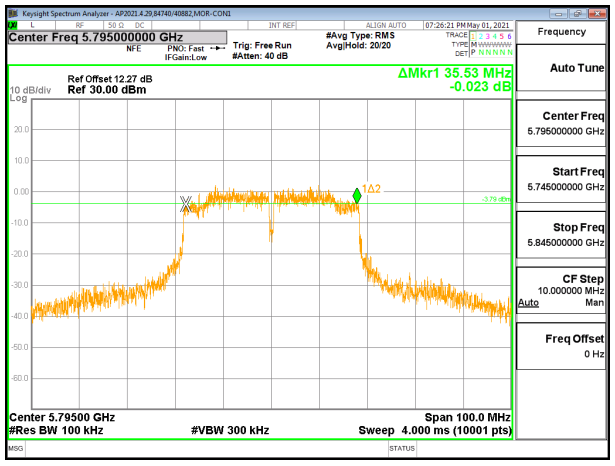


LOW CHANNEL ANT B

HIGH CHANNEL



HIGH CHANNEL ANT A



HIGH CHANNEL ANT B

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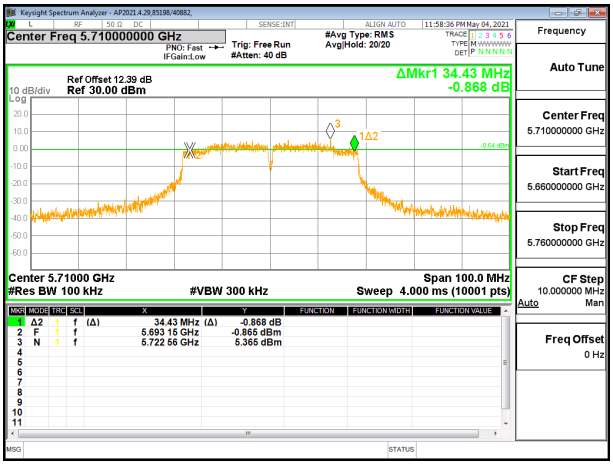
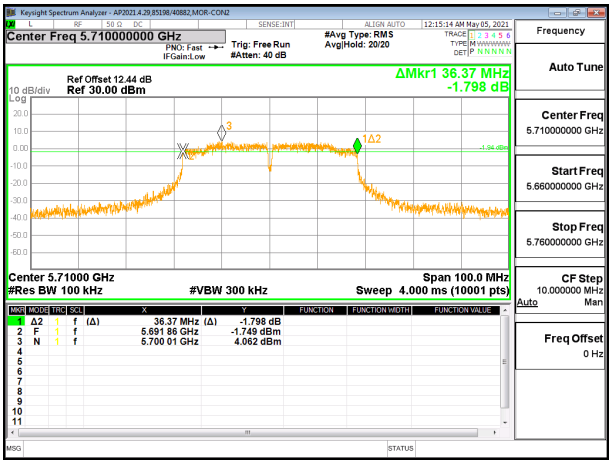
CHANNEL 142



CHANNEL 142 ANT A



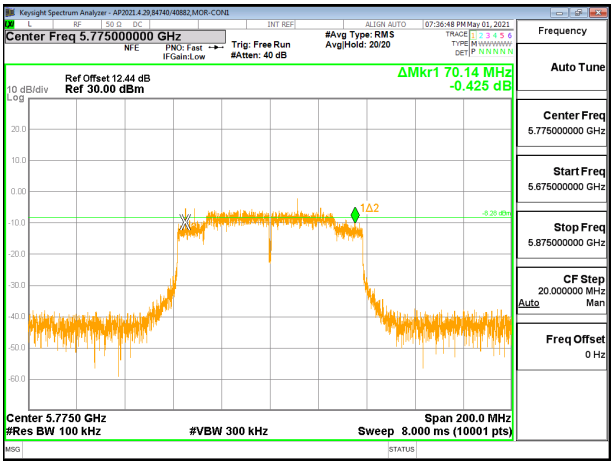
CHANNEL 142 ANT B

9.3.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

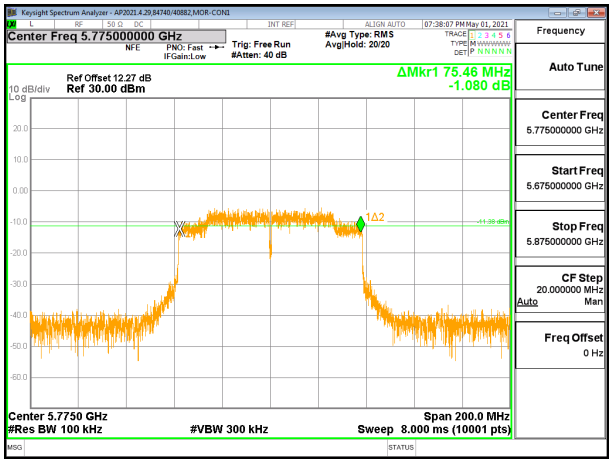
2TX Antenna A + Antenna B SDM MODE

Channel	Frequency (MHz)	6 dB BW Antenna A (MHz)	6 dB BW Antenna B (MHz)	Minimum Limit (MHz)
Mid	5775	70.1400	75.4600	0.5
138	5690	66.2400	70.0800	0.5

MID CHANNEL

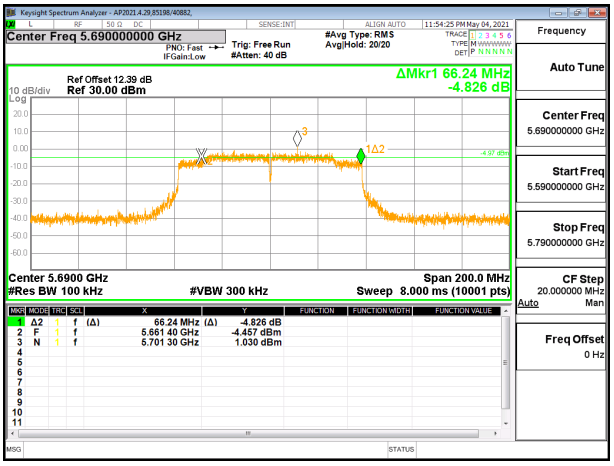


MID CHANNEL ANT A

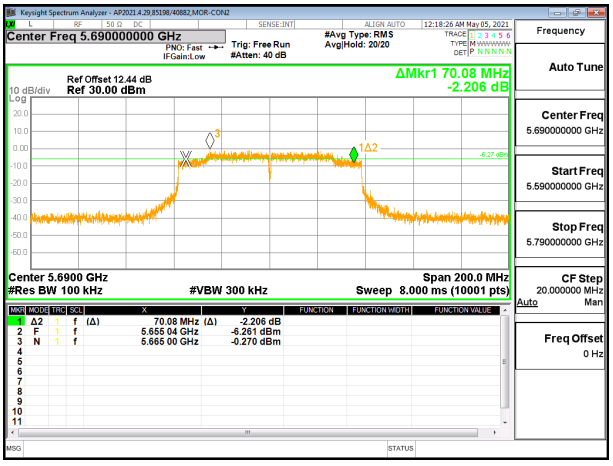


MID CHANNEL ANT B

CHANNEL 138



CHANNEL 138 ANT A



CHANNEL 138 ANT B

9.4. OUTPUT POWER AND PSD

LIMITS

FCC §15.407

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.

RSS-247

Band 5.725-5.85 GHz
The maximum conducted output power shall not exceed 1 W. The 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 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 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.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G) and for straddles channels KDB 789033 D02 v02r01, Section E.2.b (Method SA-1) was used.

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F

DIRECTIONAL ANTENNA GAIN

For 1 TX:

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

For 2 TX:

Tx antennas are uncorrelated for power.
Tx antennas are correlated for 11a PSD.
Tx antennas are uncorrelated for 11n/ac PSD.

The directional gains are as follows:

Band (GHz)	ANT A Antenna Gain (dBi)	ANT B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
5.2	4.50	3.40	3.98	6.98
5.3	4.60	4.60	4.60	7.61
5.6	6.40	6.90	6.66	9.66
5.8	7.80	7.70	7.75	10.76

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RESULTS

9.4.1. 802.11a MODE IN THE 5.8 GHz BAND

1TX Antenna A MODE (FCC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.80	28.20	28.20
Mid	5785	7.80	28.20	28.20
High	5825	7.80	28.20	28.20
144	5720	7.80	28.20	28.20

Duty Cycle CF (dB)	0.09	**Included in Calculations of Corr'd PSD**

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.57	19.570	28.20	-8.63
Mid	5785	19.73	19.730	28.20	-8.47
High	5825	19.91	19.910	28.20	-8.29
144	5720	14.86	14.860	28.20	-13.34

PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.445	4.535	28.20	-23.67
Mid	5785	4.490	4.580	28.20	-23.62
High	5825	5.026	5.116	28.20	-23.08
144	5720	-0.993	-0.903	28.20	-29.10

1TX Antenna B MODE (FCC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.70	28.30	28.30
Mid	5785	7.70	28.30	28.30
High	5825	7.70	28.30	28.30
144	5720	7.70	28.30	28.30

Duty Cycle CF (dB)	0.09	**Included in Calculations of Corr'd PSD**

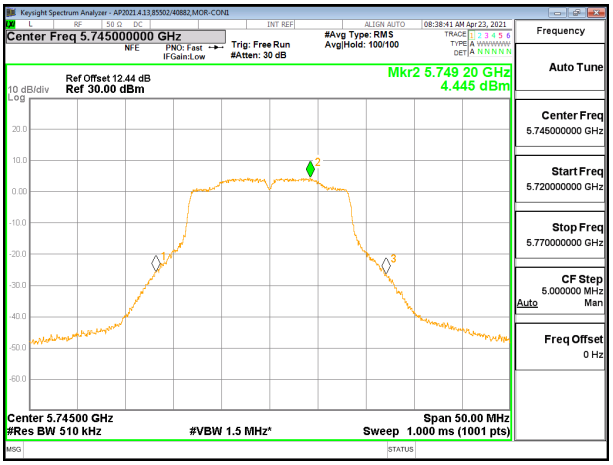
Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.41	19.410	28.30	-8.89
Mid	5785	19.62	19.620	28.30	-8.68
High	5825	19.63	19.630	28.30	-8.67
144	5720	14.79	14.790	28.30	-13.51

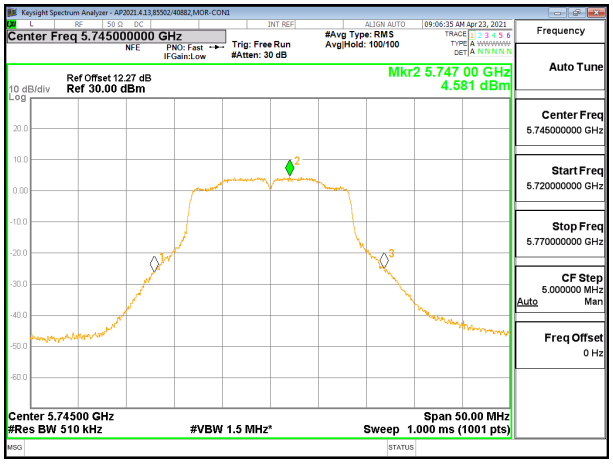
PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.581	4.671	28.30	-23.63
Mid	5785	4.765	4.855	28.30	-23.45
High	5825	4.920	5.010	28.30	-23.29
144	5720	-0.735	-0.645	28.30	-28.95

LOW CHANNEL

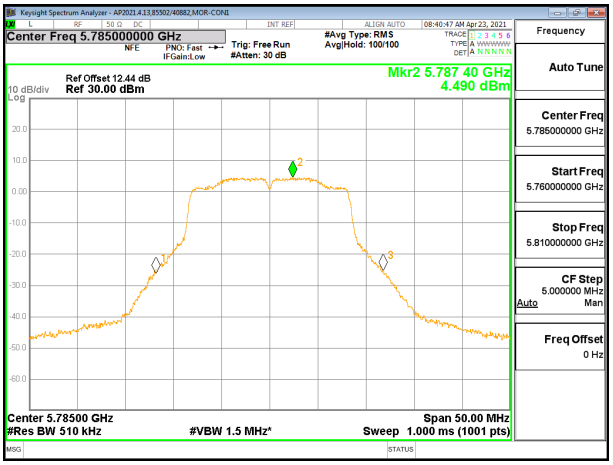


LOW CHANNEL ANT A

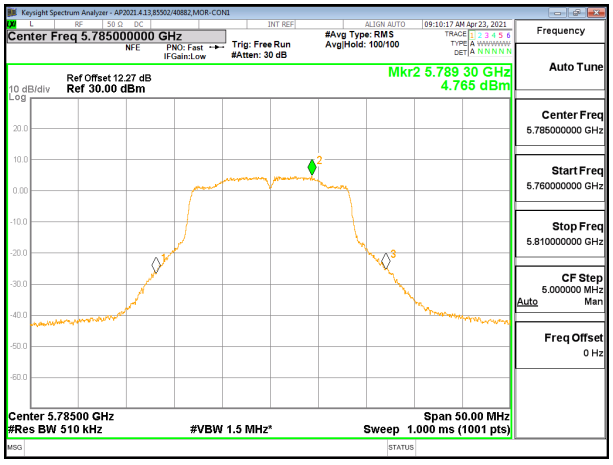


LOW CHANNEL ANT B

MID CHANNEL



MID CHANNEL ANT A



MID CHANNEL ANT B

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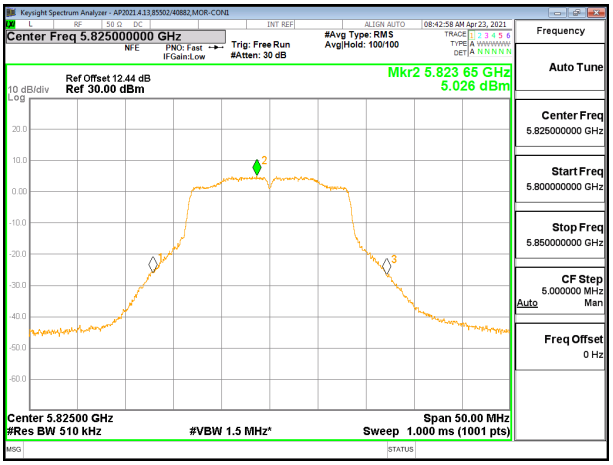
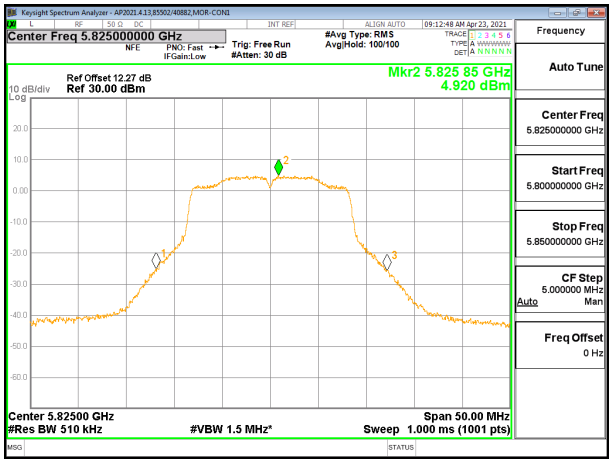
HIGH CHANNEL

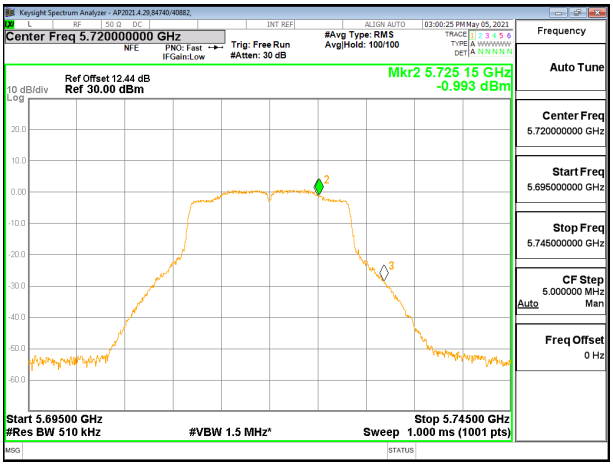


HIGH CHANNEL ANT A

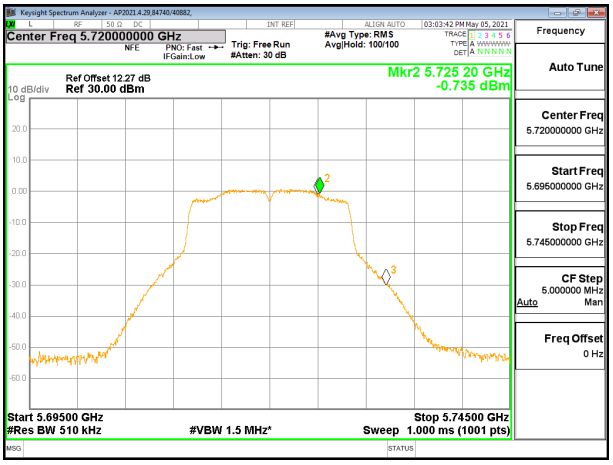


HIGH CHANNEL ANT B

CHANNEL 144



CHANNEL 144 ANT A



CHANNEL 144 ANT B

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1TX Antenna A MODE (IC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.80	28.20	28.20
Mid	5785	7.80	28.20	28.20
High	5825	7.80	28.20	28.20
144	5720	7.80	28.20	28.20

Duty Cycle CF (dB)	0.09	**Included in Calculations of Corr'd PSD**

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.57	19.570	28.20	-8.63
Mid	5785	19.73	19.730	28.20	-8.47
High	5825	19.91	19.910	28.20	-8.29
144	5720	14.86	14.860	28.20	-13.34

PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.445	4.535	28.20	-23.67
Mid	5785	4.490	4.580	28.20	-23.62
High	5825	5.026	5.116	28.20	-23.08
144	5720	-0.993	-0.903	28.20	-29.10

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1TX Antenna B MODE (IC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.70	28.30	28.30
Mid	5785	7.70	28.30	28.30
High	5825	7.70	28.30	28.30
144	5720	7.70	28.30	28.30

Duty Cycle CF (dB)	0.09	**Included in Calculations of Corr'd PSD**

Output Power Results

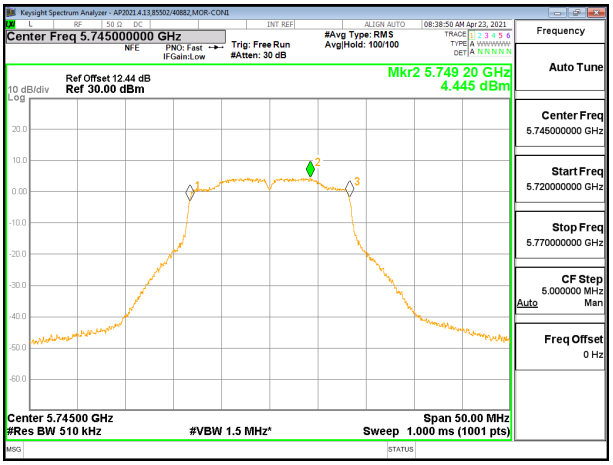
Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.41	19.410	28.30	-8.89
Mid	5785	19.62	19.620	28.30	-8.68
High	5825	19.63	19.630	28.30	-8.67
144	5720	14.79	14.790	28.30	-13.51

PSD Results

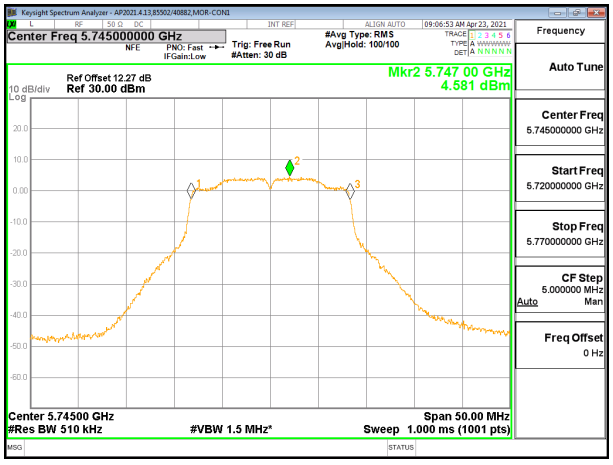
Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.581	4.671	28.30	-23.63
Mid	5785	4.765	4.855	28.30	-23.45
High	5825	4.920	5.010	28.30	-23.29
144	5720	-0.735	-0.645	28.30	-28.95

Note: Average power taken as gated measurements.

LOW CHANNEL

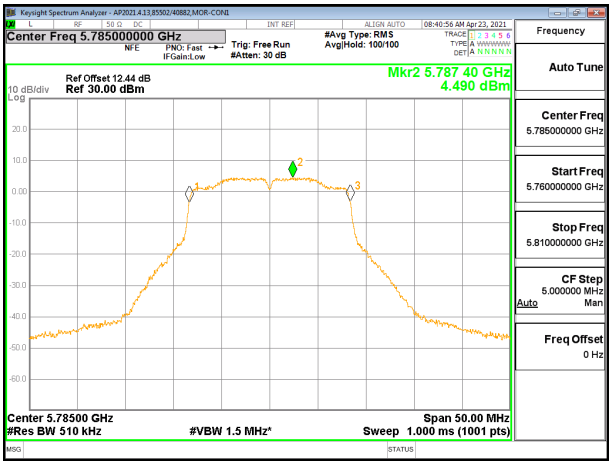


LOW CHANNEL ANT A

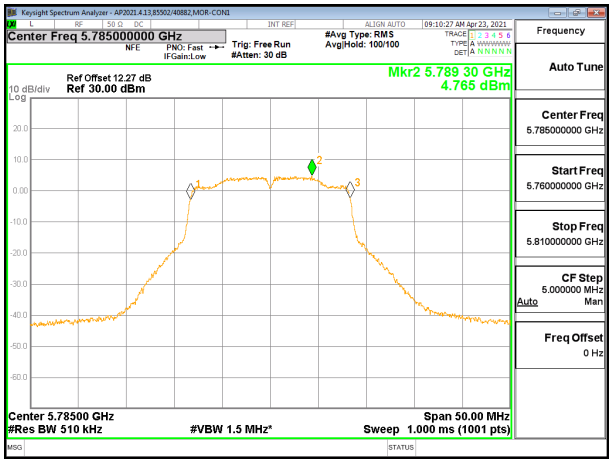


LOW CHANNEL ANT B

MID CHANNEL



MID CHANNEL ANT A



MID CHANNEL ANT B

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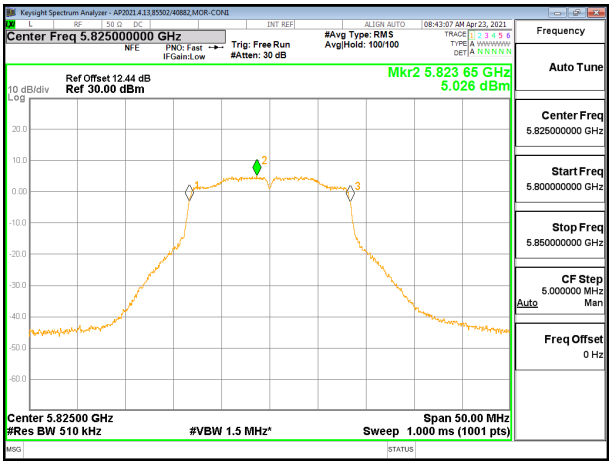
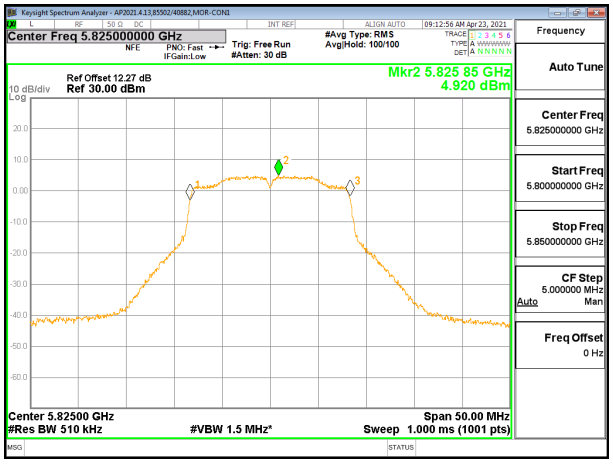
HIGH CHANNEL

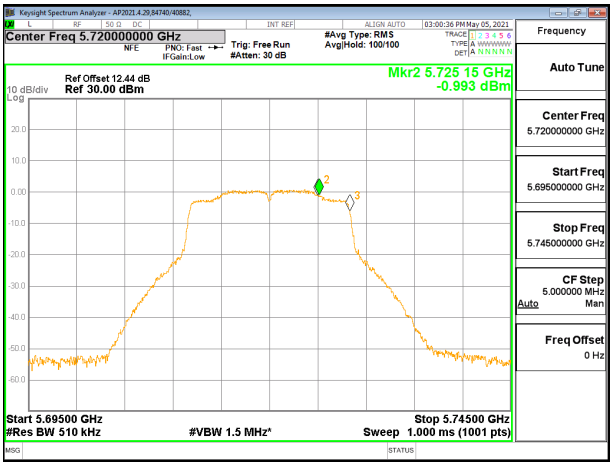


HIGH CHANNEL ANT A

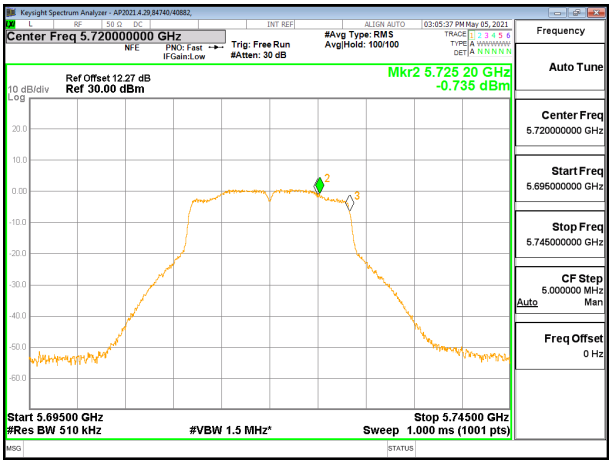


HIGH CHANNEL ANT B

CHANNEL 144



CHANNEL 144 ANT A



CHANNEL 144 ANT B

9.4.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

1TX Antenna A MODE (FCC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.80	28.20	28.20
Mid	5785	7.80	28.20	28.20
High	5825	7.80	28.20	28.20
144	5720	7.80	28.20	28.20

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

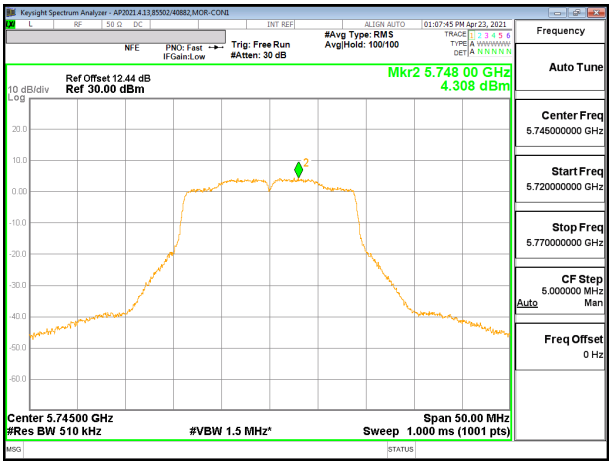
Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.460	19.460	28.20	-8.74
Mid	5785	19.610	19.610	28.20	-8.59
High	5825	19.770	19.770	28.20	-8.43
144	5720	18.670	18.670	28.20	-9.53

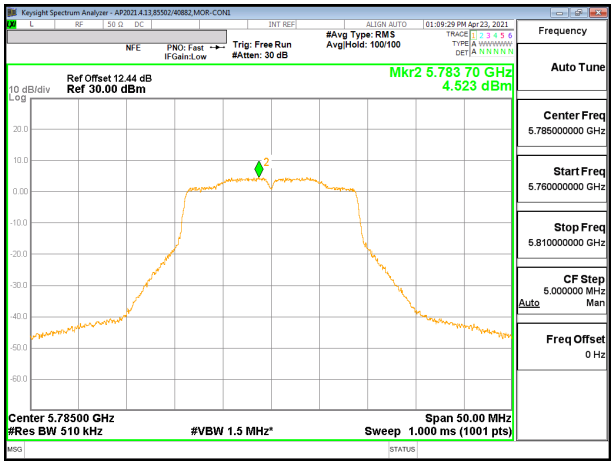
PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.308	4.308	28.20	-23.89
Mid	5785	4.523	4.523	28.20	-23.68
High	5825	4.784	4.784	28.20	-23.42
144	5720	3.275	3.275	28.20	-24.93

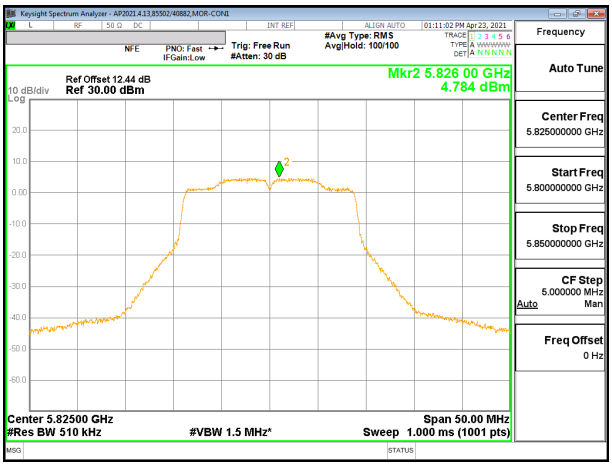
Note: Average power taken as gated measurements.



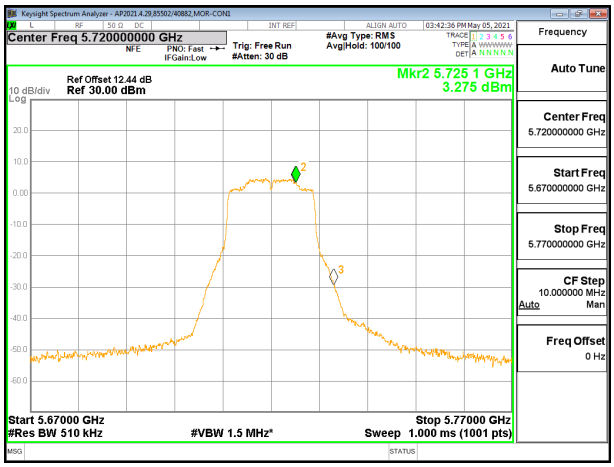
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



CHANNEL 144

1TX Antenna A MODE (IC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.80	28.20	28.20
Mid	5785	7.80	28.20	28.20
High	5825	7.80	28.20	28.20
144	5720	7.80	28.20	28.20

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

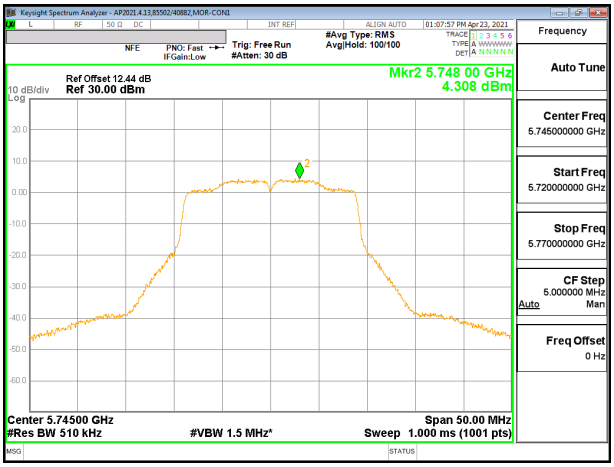
Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.460	19.460	28.20	-8.74
Mid	5785	19.610	19.610	28.20	-8.59
High	5825	19.770	19.770	28.20	-8.43
144	5720	18.670	18.670	28.20	-9.53

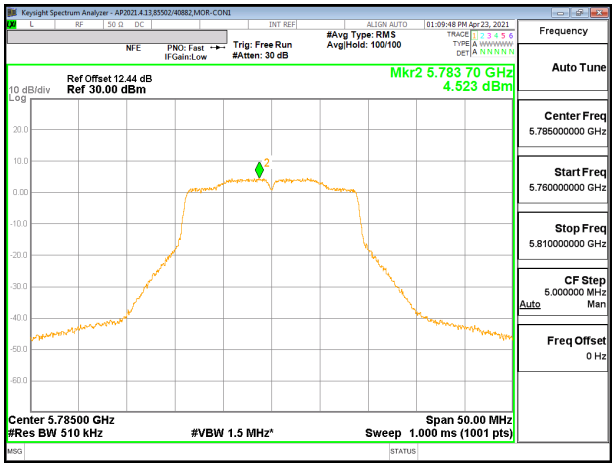
PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.308	4.308	28.20	-23.89
Mid	5785	4.523	4.523	28.20	-23.68
High	5825	4.784	4.784	28.20	-23.42
144	5720	3.275	3.275	28.20	-24.93

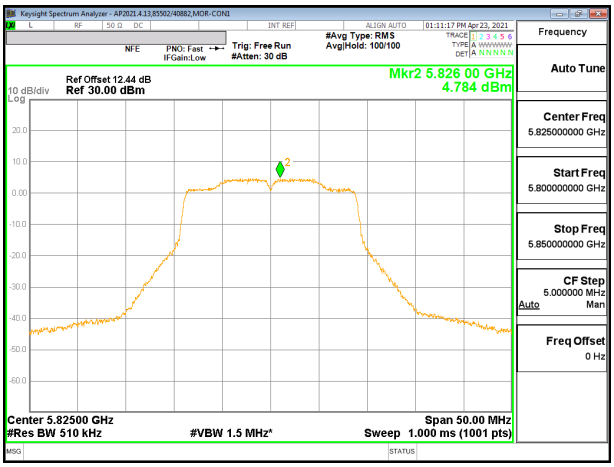
Note: Average power taken as gated measurements.



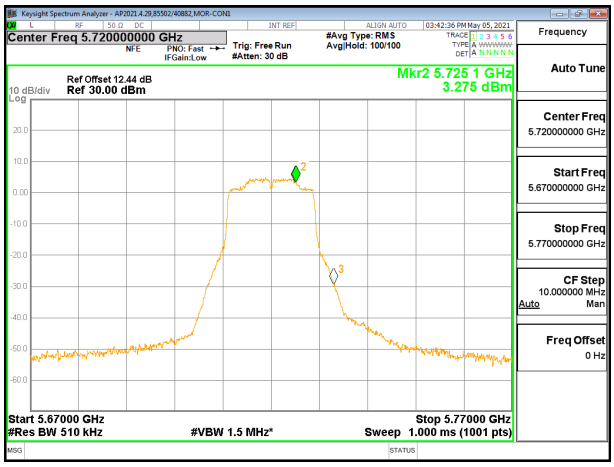
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



CHANNEL 144

1TX Antenna B MODE (FCC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.70	28.30	28.30
Mid	5785	7.70	28.30	28.30
High	5825	7.70	28.30	28.30
144	5720	7.70	28.30	28.30

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

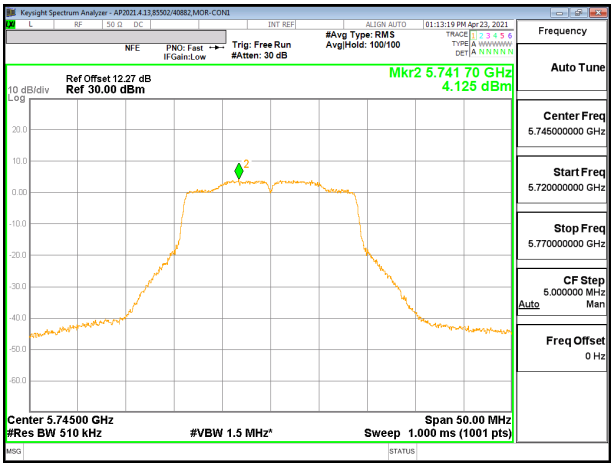
Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.290	19.290	28.30	-9.01
Mid	5785	19.480	19.480	28.30	-8.82
High	5825	19.500	19.500	28.30	-8.80
144	5720	16.360	16.360	28.30	-11.94

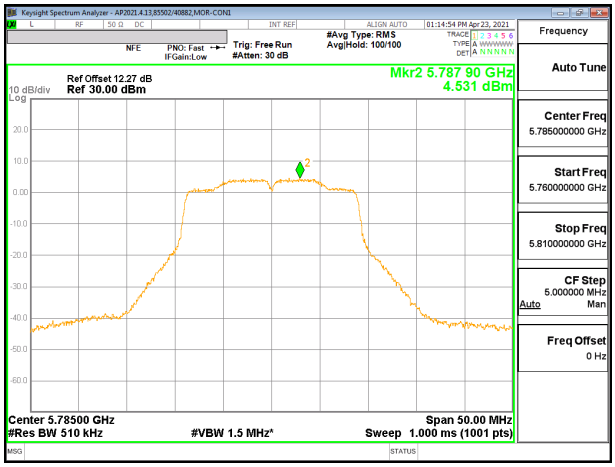
PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.125	4.125	28.30	-24.18
Mid	5785	4.531	4.531	28.30	-23.77
High	5825	4.580	4.580	28.30	-23.72
144	5720	0.207	0.207	28.30	-28.09

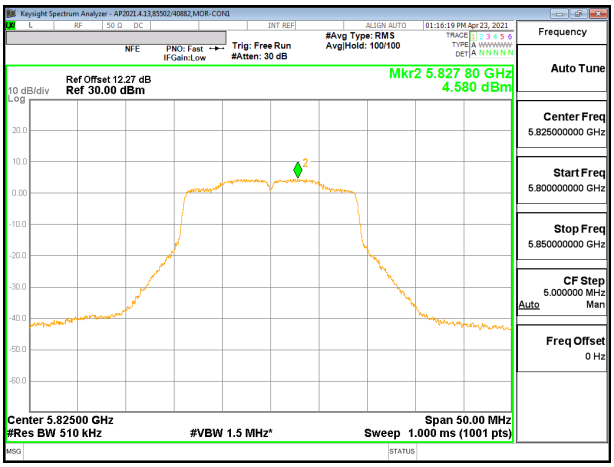
Note: Average power taken as gated measurements.



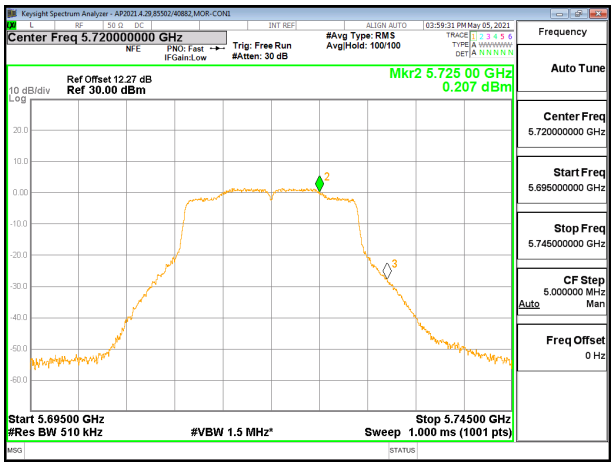
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



CHANNEL 144

1TX Antenna B MODE (IC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.70	28.30	28.30
Mid	5785	7.70	28.30	28.30
High	5825	7.70	28.30	28.30
144	5720	7.70	28.30	28.30

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

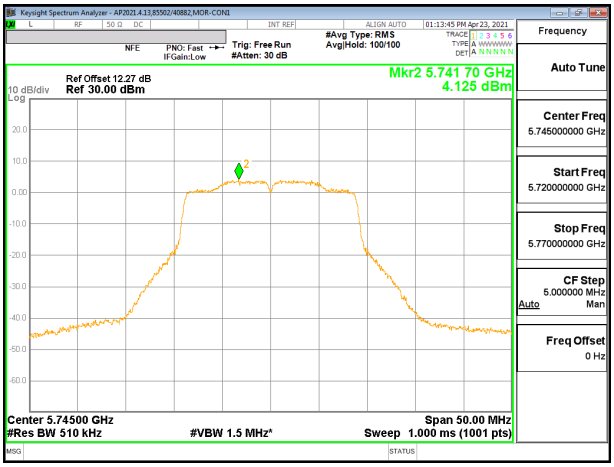
Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.290	19.290	28.30	-9.01
Mid	5785	19.480	19.480	28.30	-8.82
High	5825	19.500	19.500	28.30	-8.80
144	5720	16.360	16.360	28.30	-11.94

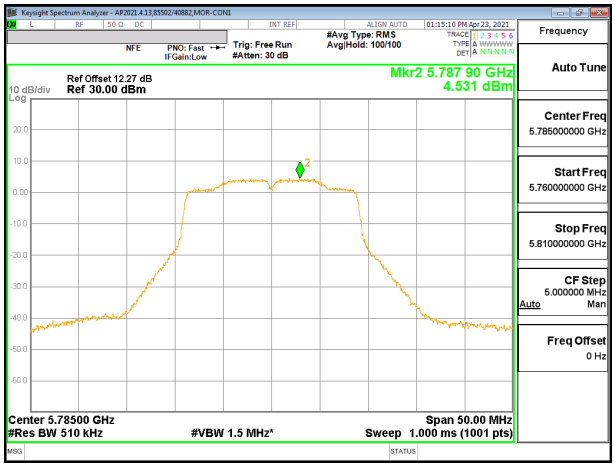
PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	4.125	4.125	28.30	-24.18
Mid	5785	4.531	4.531	28.30	-23.77
High	5825	4.580	4.580	28.30	-23.72
144	5720	0.207	0.207	28.30	-28.09

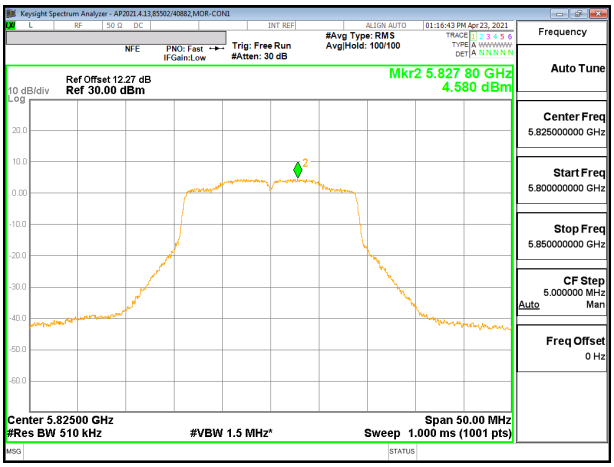
Note: Average power taken as gated measurements.



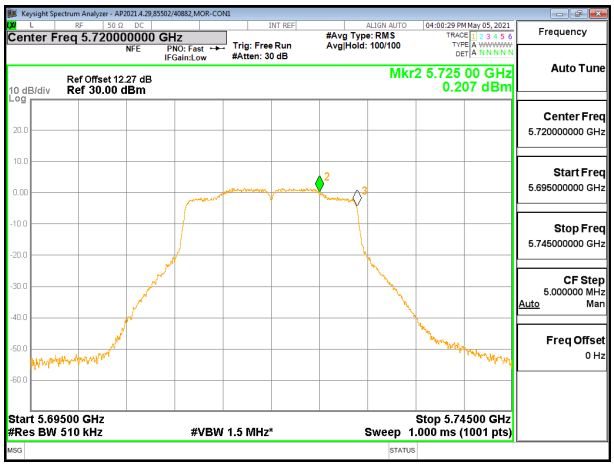
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



CHANNEL 144

2TX Antenna A + Antenna B SDM MODE (FCC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain For Power (dBi)	Directional Gain For PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.75	7.75	28.25	28.25
Mid	5785	7.75	7.75	28.25	28.25
High	5825	7.75	7.75	28.25	28.25
144	5720	7.75	7.75	28.25	28.25

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

Output Power Results

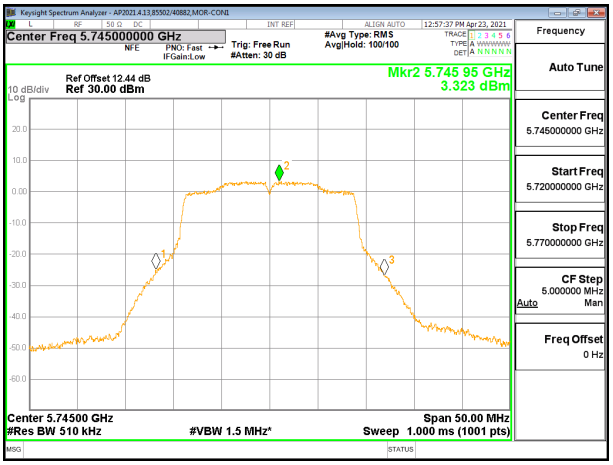
Channel	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	18.61	18.38	21.51	28.25	-6.74
Mid	5785	18.72	18.54	21.64	28.25	-6.61
High	5825	18.71	18.69	21.71	28.25	-6.54
144	5720	14.75	14.67	19.47	28.25	-8.78

PSD Results

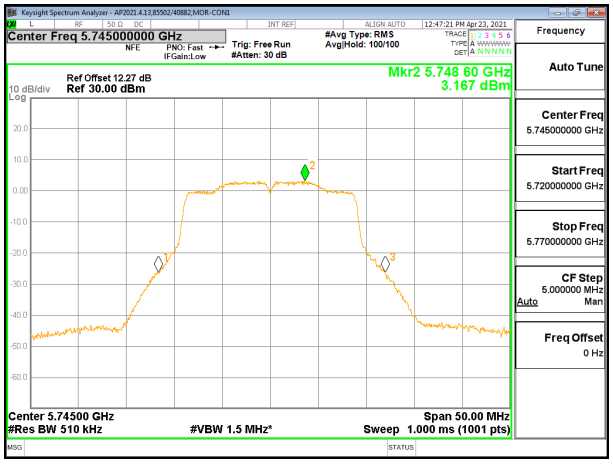
Channel	Frequency (MHz)	Antenna 1 Meas PSD (dBm/ 500KHz)	Antenna 2 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	3.323	3.167	6.26	28.25	-21.99
Mid	5785	3.809	3.659	6.74	28.25	-21.51
High	5825	3.618	3.605	6.62	28.25	-21.63
144	5720	-0.690	-0.879	2.23	28.25	-26.02

Note: Average power taken as gated measurements.

LOW CHANNEL

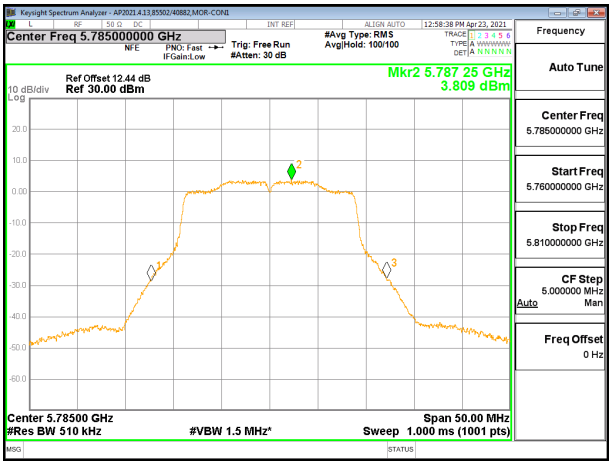


LOW CHANNEL ANTENNA A

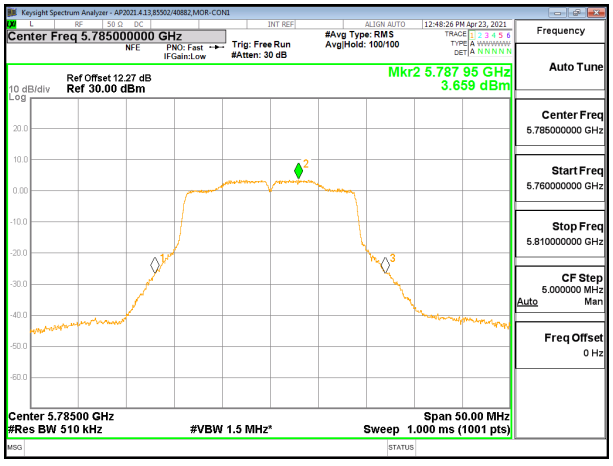


LOW CHANNEL ANTENNA B

MID CHANNEL



MID CHANNEL ANTENNA A



MID CHANNEL ANTENNA B

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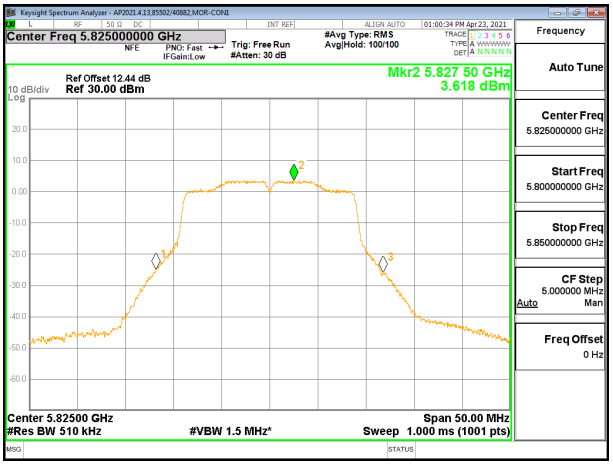
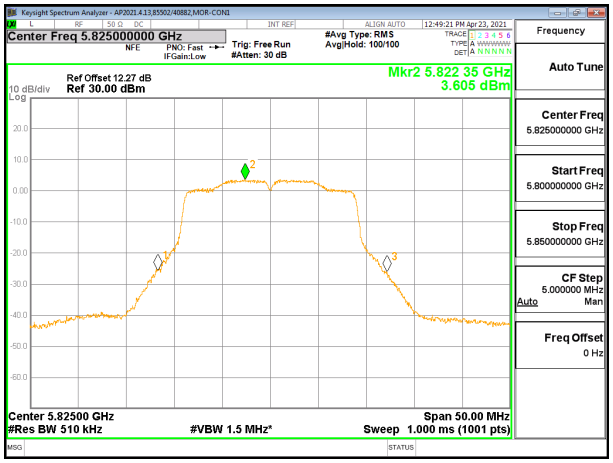
12 Laboratory Dr., RTP, NC 27709; USA TEL: (919) 549-1400

HIGH CHANNEL

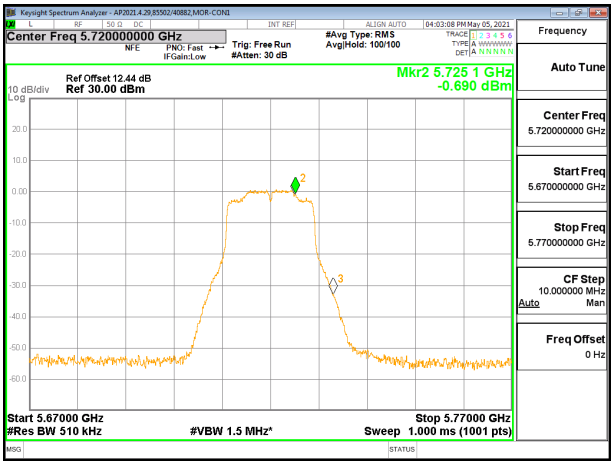


HIGH CHANNEL ANTENNA A

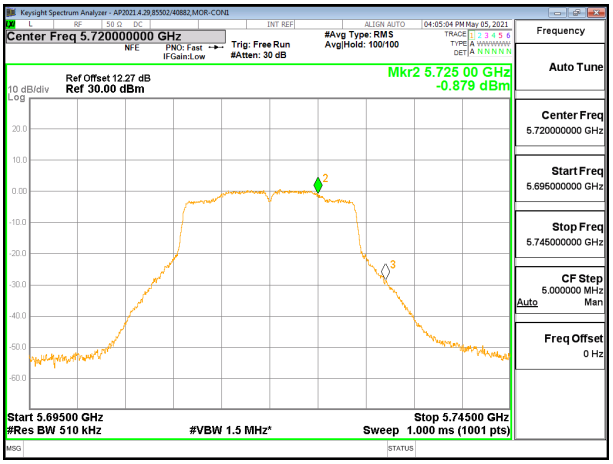


HIGH CHANNEL ANTENNA B

CHANNEL 144



CHANNEL 144 ANTENNA A



CHANNEL 144 ANTENNA B

2TX Antenna A + Antenna B SDM MODE (IC)

Test Engineer:	85502/40882
Test Date:	4/23/2021-4/24/2021, 5/5/2021

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain For Power (dBi)	Directional Gain For PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 500KHz)
Low	5745	7.75	7.75	28.25	28.25
Mid	5785	7.75	7.75	28.25	28.25
High	5825	7.75	7.75	28.25	28.25
144	5720	7.75	7.75	28.25	28.25

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

Output Power Results

Channel	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	18.61	18.38	21.51	28.25	-6.74
Mid	5785	18.72	18.54	21.64	28.25	-6.61
High	5825	18.71	18.69	21.71	28.25	-6.54
144	5720	14.75	14.67	17.72	28.25	-10.53

PSD Results

Channel	Frequency (MHz)	Antenna 1 Meas PSD (dBm/ 500KHz)	Antenna 2 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	3.323	3.167	6.26	28.25	-21.99
Mid	5785	3.809	3.659	6.74	28.25	-21.51
High	5825	3.618	3.605	6.62	28.25	-21.63
144	5720	-0.690	-0.879	2.23	28.25	-26.02

Note: Average power taken as gated measurements.