TEST REPORT

Report Number: R14634918-E7b

Applicant	:	Sony Corporation 1-7-1 Konan Minato-ku Tokyo, 108-0075, Japan
FCC ID	:	PY7-12907W
EUT Description	:	GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
2023-03-16

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

CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2023-02-24	Initial Issue	Brian Kiewra
V2	2023-03-08	Corrected typos in section 3	Brian Kiewra
V3	2023-03-16	Added clarification to the 2Tx covering 1Tx note in section 6.5	Brian Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Sony Corporation
1-7-1 Konan Minato-ku
Tokyo, 108-0075, Japan

EUT DESCRIPTION: GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC

SERIAL NUMBERS: QV7700E1FN, QV7700FRFN, QV70015FA

SAMPLE RECEIPT DATE: 2022-12-12

DATE TESTED: 2023-02-02 to 2023-02-15

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	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.

Approved & Released
For UL LLC By:

Michael Antola
Staff Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST RESULT SUMMARY

This report contains data/info provided by the customer 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.
Below is a list of the data/info provided by the customer:
1) Antenna gain and type (see section 6.3)
2) Worst-case data rates (see section 6.5)

Note - This report covers the 802.11ax mode in the 5.8GHz band testing requirements of the EUT.

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
15.407 (e)	6 dB BW	Compliant	None
15.407 (a) (3), (h) (1)	Output Power		
15.407 (a) (3)	PSD		
15.209, 15.205, 15.407 (b)	Radiated Emissions		
15.207	AC Mains Conducted Emissions	See Comment	Refer to test report R14634918-E5b

3. TEST METHODOLOGY

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

- FCC 47 CFR Part 2
- FCC 47 CFR 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

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	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

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	U_{Lab}
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

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

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 GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC. Note - This report pertains to the 802.11ax mode in the 5.8 GHz band requirements of the EUT.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a summed maximum conducted output power as follows:

5.8GHz BAND 802.11 ax MODE 2TX

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 2TX CDD			
5745-5825	802.11ax HE20 OFDMA, 242-Tones	13.95	24.83
	802.11ax HE20 OFDMA, 106-Tones	14.17	26.12
	802.11ax HE20 OFDMA, 52-Tones	14.04	25.35
	802.11ax HE20 OFDMA, 26-Tones	11.61	14.49
5755-5795	802.11ax HE40 OFDMA, 484-Tones	13.82	24.10
5775	802.11ax HE80 OFDMA, 996-Tones	13.63	23.07

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Chain	Designation in Documentation	Type	Frequency Range (MHz)	Maximum Gain (dBi)
0	WiFi Main	Loop	5725-5850	0.38
1	WiFi Sub	Monopole	5725-5850	-3.72

6.4. SOFTWARE AND FIRMWARE

The firmware version used during testing was 0.81.

6.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Band edge was performed with the EUT set to transmit on low and high channels. Radiated spurious and harmonic emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the worst-case mode/channel based on power and PSD.

For this report, the worst-case Radiated Emissions from 1-18 GHz was found to be HE20 26T and 106T.

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel/mode with highest output power/PSD as worst-case scenario and can be found in report R14634918-E5b.

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

- 802.11ax HE20mode: MCS0 (Nss = 1)
- 802.11ax HE40mode: MCS0 (Nss = 1)
- 802.11ax HE80mode: MCS0 (Nss = 1)
- 802.11ax HE160mode: MCS0 (Nss = 1)

All testing performed in 2Tx mode (NSS=1), where power per chain is equivalent to the 1Tx power on each chain. Based on preliminary testing, this allows 2Tx testing to cover all 1Tx testing.

802.11ax modes were determined by the following:
802.11ax HE20 26T, 52T, 106T, and 242T modes tested.
802.11ax HE40 484T mode tested. 26T, 52T, 106T, and 242T modes are covered by the HE 20MHz modes.
802.11ax HE80 996T mode tested. 26T, 52T, 106T, 242T, and 484T modes are covered by the HE20 and HE40 modes.

Preliminary Investigation scans were completed to compare Full RU Tone modes and Single User Tone modes. It was found that Full RU Tone modes were worst case over Single User in every instance. Therefore, only full tone was testing as it is representative of SU worst case scenario.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	Inspiron 15 3000	5KPQJP3	NA
AC Adaptor	Sony	XQZ-UC1	1821W34209742	NA
Headphones	Sony	MDR-EX15AP	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB-C	1	USB-C	Shielded	<3m	XQZ-UB1
2	Aux	1	AUX	Shielded	<3m	Headphones

TEST SETUP

The EUT is connected to a host laptop computer and configured via test software before the tests. Test software exercised the radio card.

SETUP DIAGRAM

Please refer to R14634918-EP5 for setup diagrams

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

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.3, G.4, G.5, and G.6.

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

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

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

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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.
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-02	2023-05-02
PWM005	RF Power Meter	Keysight Technologies	N1912A	2022-09-02	2024-09-02
PWM001 (PRE0136343)	RF Power Meter	Keysight Technologies	N1912A	2022-08-30	2023-08-30
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-07-07	2023-07-07
PWS002	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-09-27	2023-09-27
PWS005	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-06-15	2023-06-15
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
MM0167 (PRE0126458)	True RMS Multimeter	Agilent	U1232A	2021-08-17	2023-08-17
CBL091	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2022-02-15	2023-02-15
CBL092	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2022-02-15	2023-02-15
226561	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2022-05-03	2023-05-03
226563	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2022-05-03	2023-05-03

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
1-18 GHz					
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-05-11	2023-05-11
Gain-Loss Chains					
C1-SAC03	Gain-loss string: 1-18GHz	Various	Various	2022-12-02	2023-12-02
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-02-15	2023-02-15
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
200539	Environmental Meter	Fisher Scientific	15-077-963 s/n 181474341	2022-10-05	2023-10-05

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equipment ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
1-18 GHz					
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-03-21	2023-03-21
Gain-Loss Chains					
C2-SAC03	Gain-loss string: 1-18GHz	Various	Various	2022-05-10	2023-05-10
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
210642	Environmental Meter	Fisher Scientific	15-077-963 s/n 210701942	2021-08-16	2023-08-16

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equipment ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
1-18 GHz					
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-05-24	2023-05-24
Gain-Loss Chains					
207640	Gain-loss string: 1-18GHz	Various	Various	2022-05-20	2023-05-20
Receiver & Software					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
21642	Environmental Meter	Fisher Scientific	15-077-963 (s/n 210701692)	2021-08-16	2023-08-16

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 D02 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 Factor (dB)	1/B Minimum VBW (kHz)
802.11ax HE20 242T	0.924	0.980	0.943	94.29%	0.51	1.083
802.11ax HE20 106T	0.640	0.680	0.940	94.04%	0.53	1.564
802.11ax HE20 52T	1.269	1.343	0.945	94.49%	0.49	0.788
802.11ax HE20 26T	2.328	2.457	0.947	94.75%	0.47	0.430
802.11ax HE40 484T	0.507	0.542	0.935	93.55%	0.58	1.971
802.11ax HE80 996T	0.387	0.424	0.912	91.20%	0.80	2.587
802.11ax HE160 2x996T	0.381	0.420	0.906	90.60%	0.86	2.626

802.11ax HE20 242T

802.11ax HE20 106T

802.11ax HE20 52T

802.11ax HE20 26T

802.11ax HE40 484T

802.11ax HE80 996T

802.11ax HE160 2x996T

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9.2. 6 dB BANDWIDTH

LIMITS

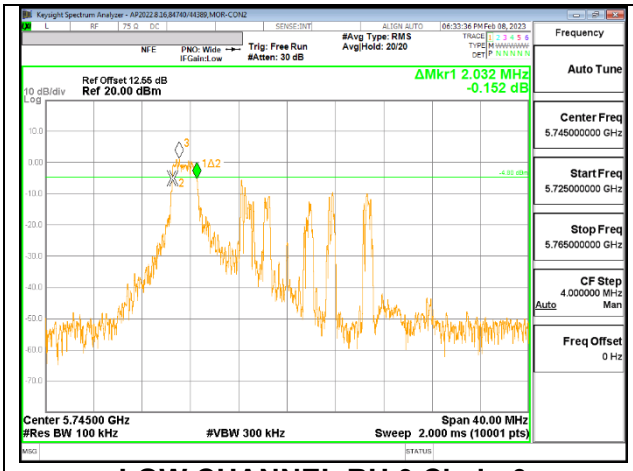
FCC §15.407 (e)
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

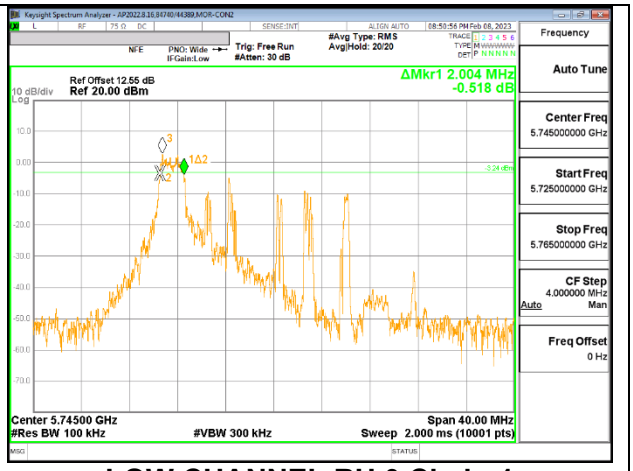
9.2.1. 802.11ax HE20 MODE 2TX IN THE 5.8GHz BAND

2Tx 26T MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5745	2.032	2.004	0.5
Mid	5785	2.556	2.564	0.5
High	5825	2.128	2.020	0.5
144	5720	1.984	1.988	0.5



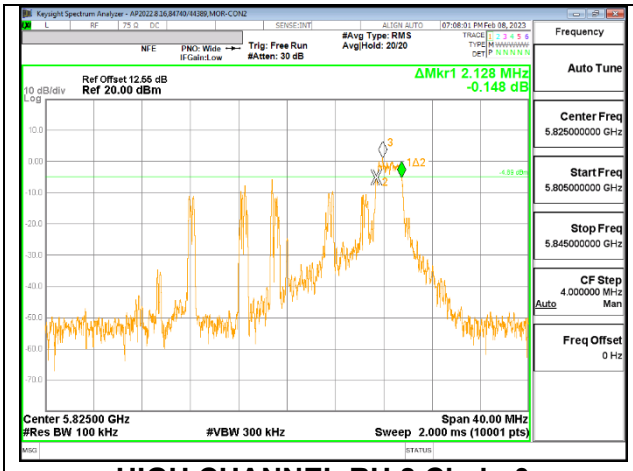
LOW CHANNEL RU 0 Chain 0



LOW CHANNEL RU 0 Chain 1

MID CHANNEL RU 4 Chain 0

MID CHANNEL RU 4 Chain 1



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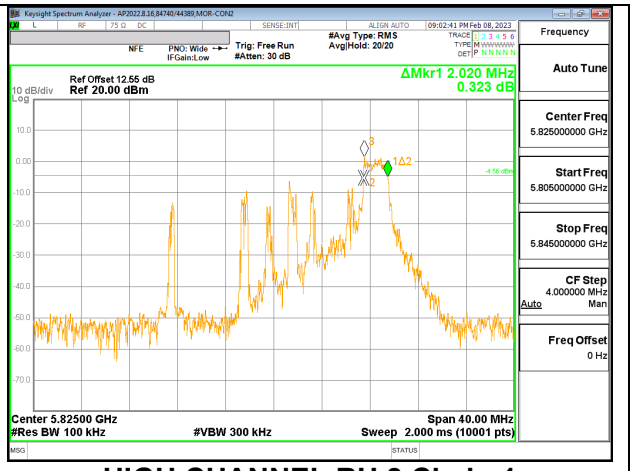

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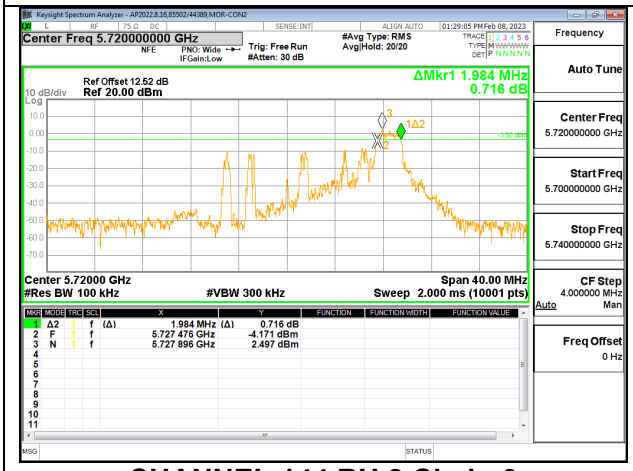
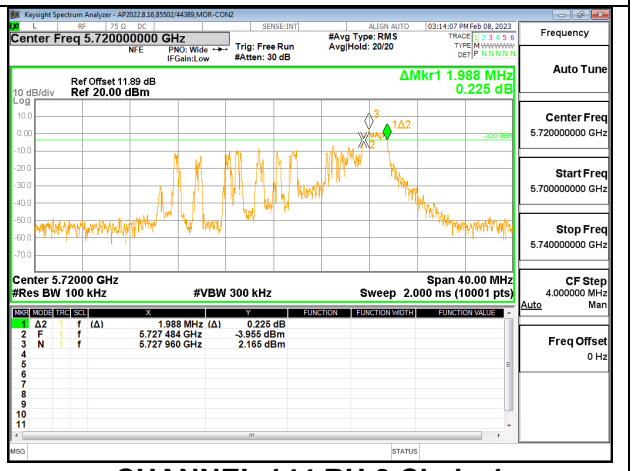


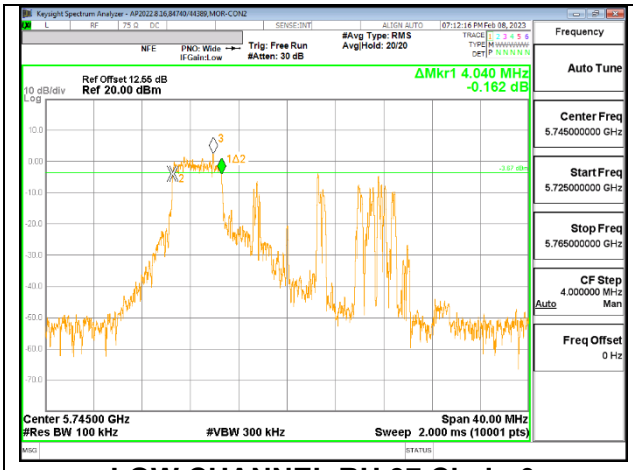
CHANNEL 144 RU 8 Chain 0



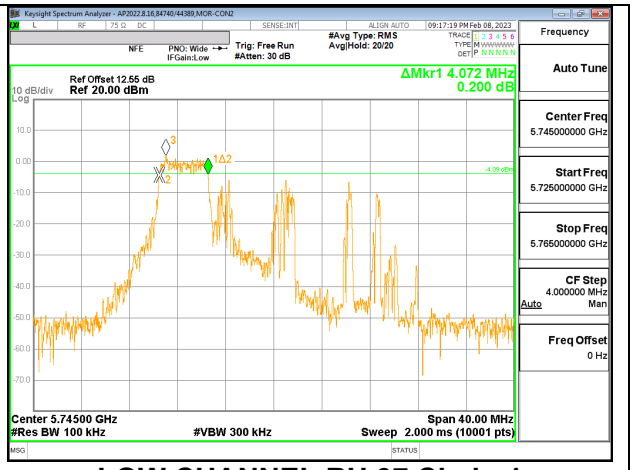
CHANNEL 144 RU 8 Chain 1

2Tx 52T MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5745	4.040	4.072	0.5
Mid	5785	4.040	4.004	0.5
High	5825	4.024	4.096	0.5
144	5720	4.456	4.468	0.5



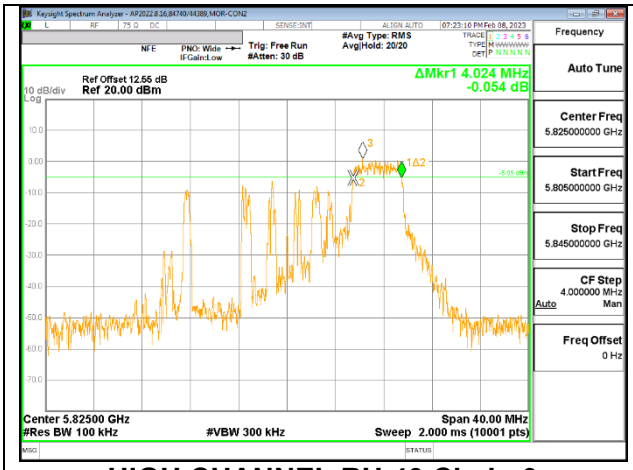
LOW CHANNEL RU 37 Chain 0



LOW CHANNEL RU 37 Chain 1

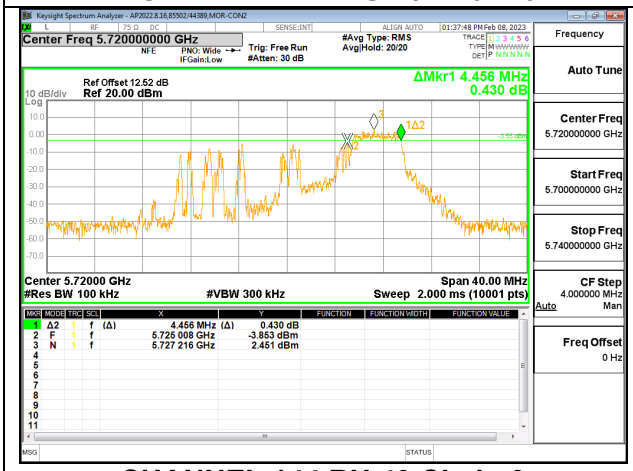
MID CHANNEL RU 38 Chain 0

MID CHANNEL RU 38 Chain 1



HIGH CHANNEL RU 40 Chain 0

HIGH CHANNEL RU 40 Chain 1

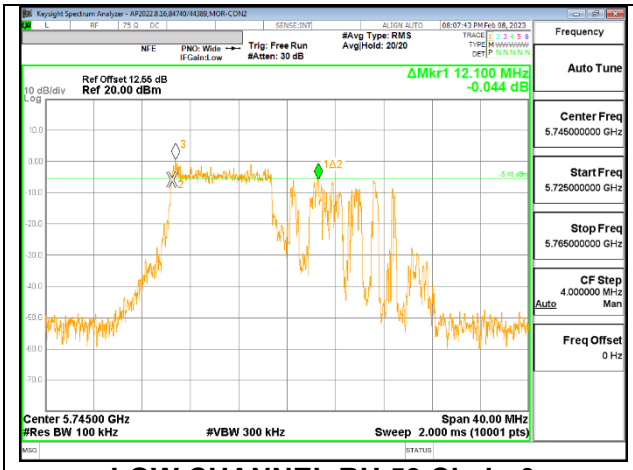


CHANNEL 144 RU 40 Chain 0

CHANNEL 144 RU 40 Chain 1

2Tx 106T MODE

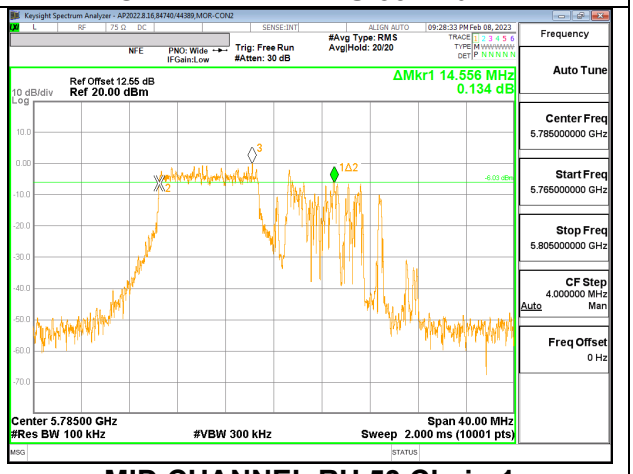
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5745	12.100	17.676	0.5
Mid	5785	13.272	14.556	0.5
High	5825	12.384	16.068	0.5
144	5720	4.454	4.604	0.5



LOW CHANNEL RU 53 Chain 0

LOW CHANNEL RU 53 Chain 1

MID CHANNEL RU 53 Chain 0



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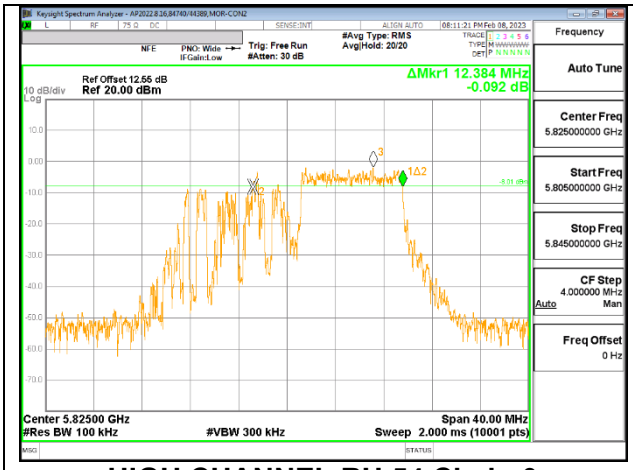

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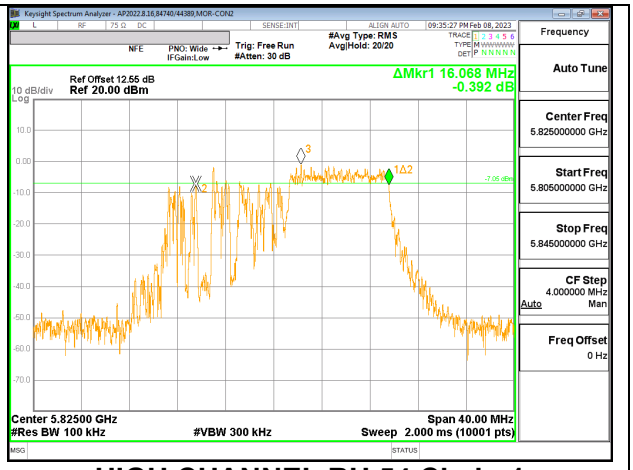


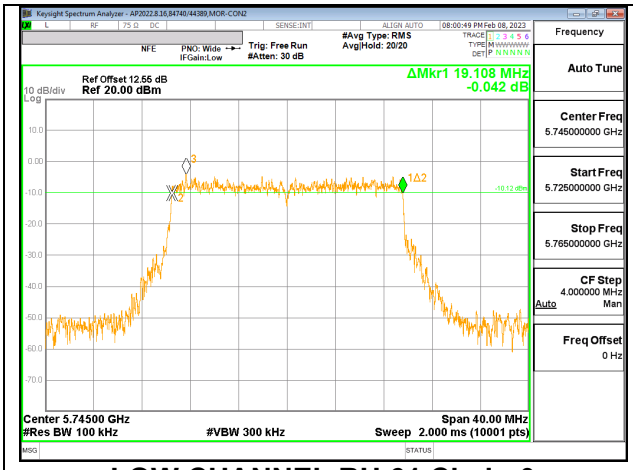
HIGH CHANNEL RU 54 Chain 1

CHANNEL 144 RU 54 Chain 0

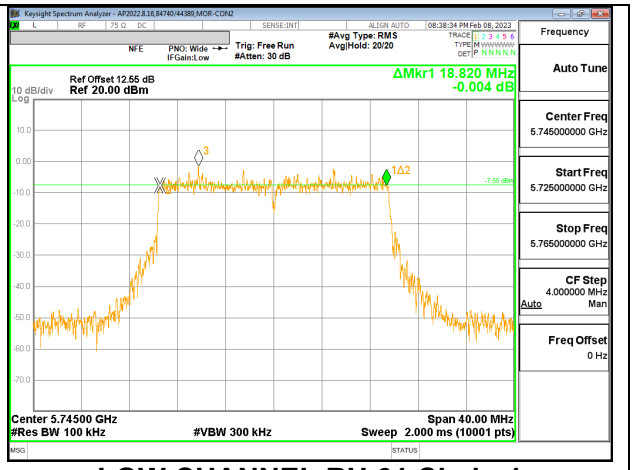
CHANNEL 144 RU 54 Chain 1

2Tx 242T MODE

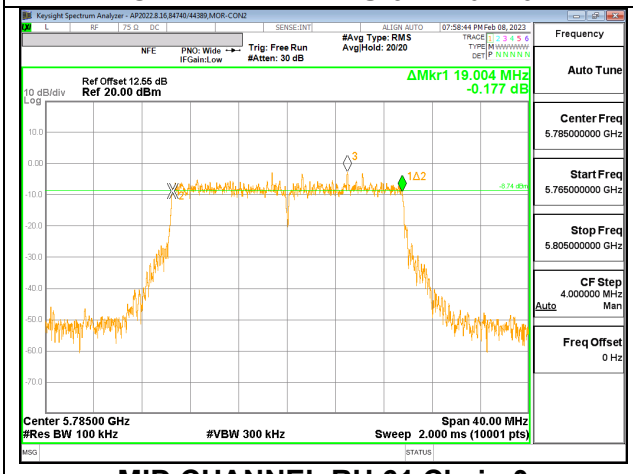
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5745	19.108	18.820	0.5
Mid	5785	19.004	19.032	0.5
High	5825	18.608	19.012	0.5
144	5720	4.454	4.536	0.5



LOW CHANNEL RU 61 Chain 0



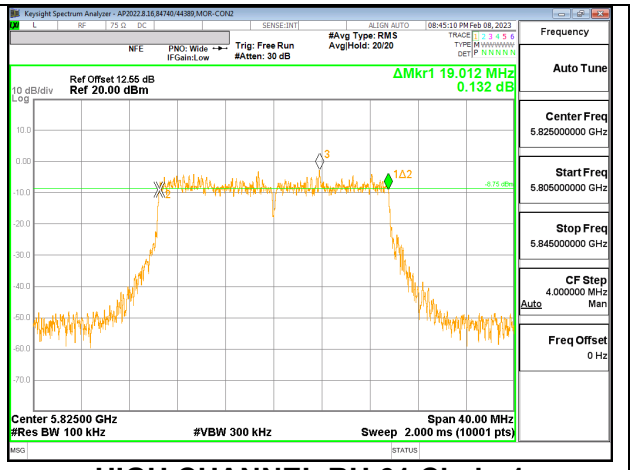
LOW CHANNEL RU 61 Chain 1



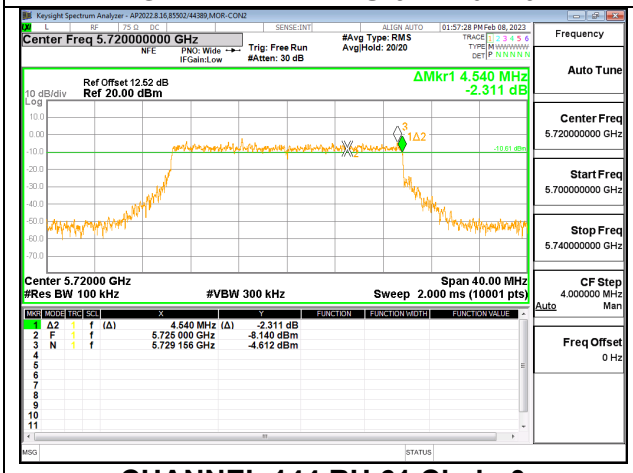
MID CHANNEL RU 61 Chain 0

MID CHANNEL RU 61 Chain 1

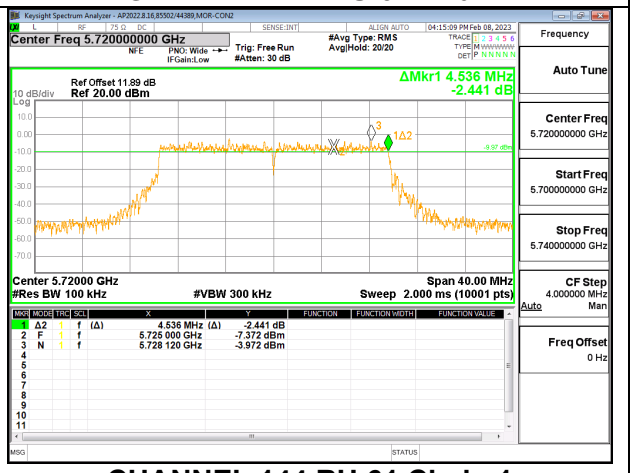
HIGH CHANNEL RU 61 Chain 0



HIGH CHANNEL RU 61 Chain 1



CHANNEL 144 RU 61 Chain 0

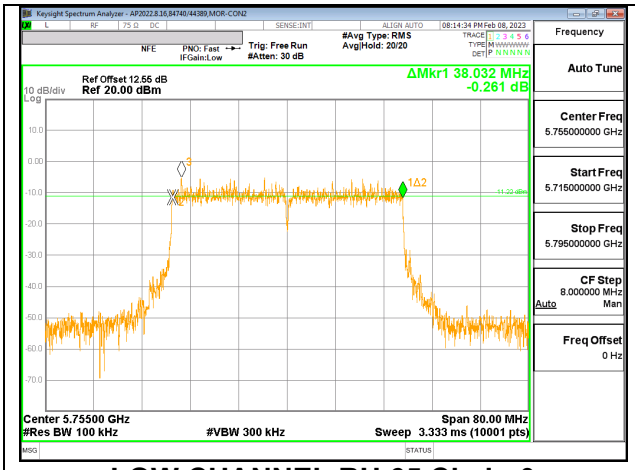


CHANNEL 144 RU 61 Chain 1

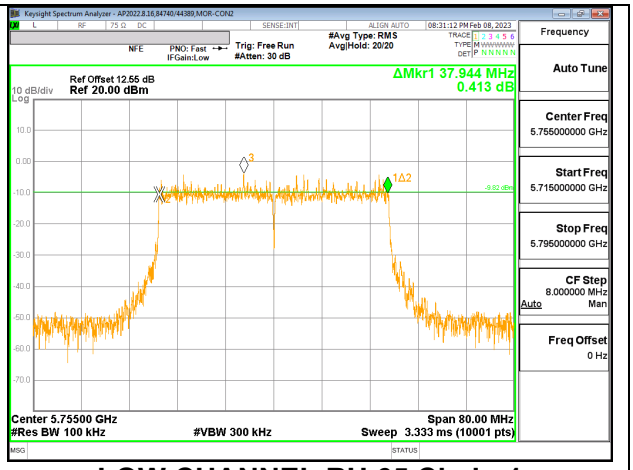
9.2.1. 802.11ax HE40 MODE 2TX IN THE 5.8GHz BAND

2Tx 484T MODE

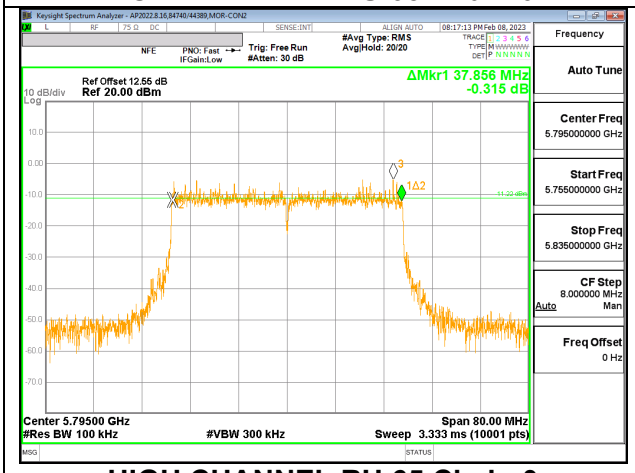
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5755	38.032	37.944	0.5
High	5795	37.856	37.808	0.5
142	5710	4.008	3.968	0.5



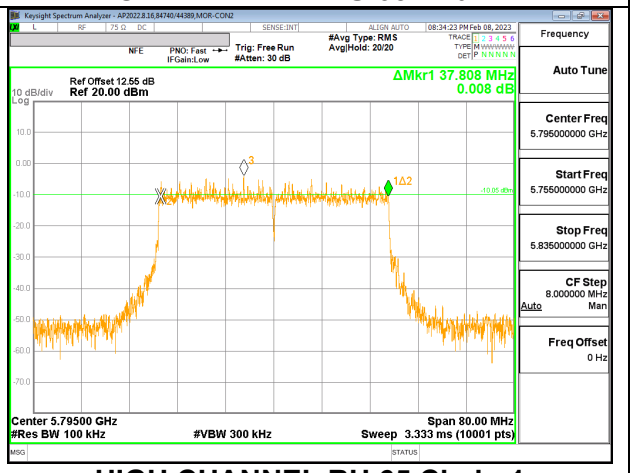
LOW CHANNEL RU 65 Chain 0



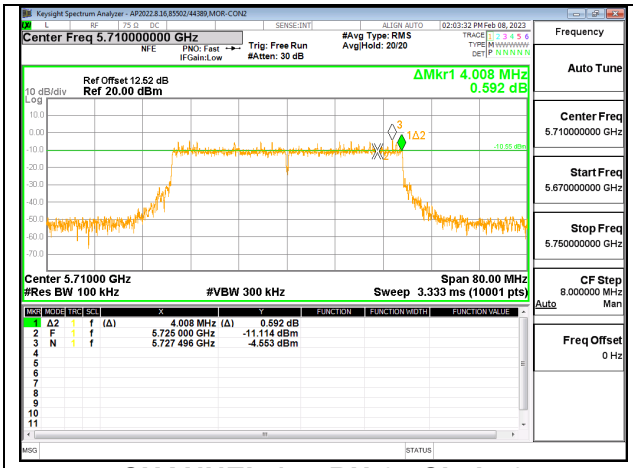
LOW CHANNEL RU 65 Chain 1



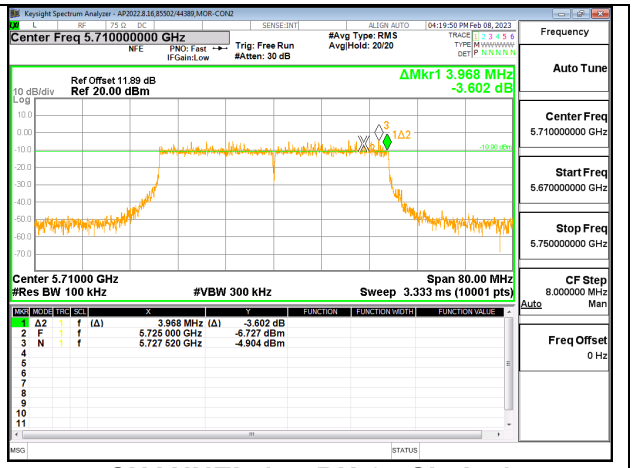
HIGH CHANNEL RU 65 Chain 0



HIGH CHANNEL RU 65 Chain 1



CHANNEL 144 RU 65 Chain 0

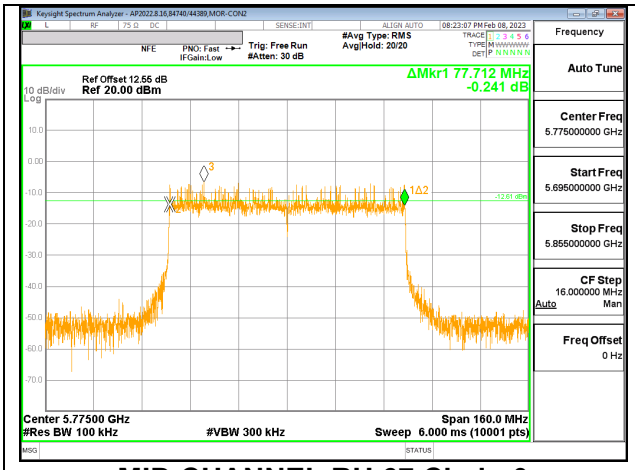


CHANNEL 144 RU 65 Chain 1

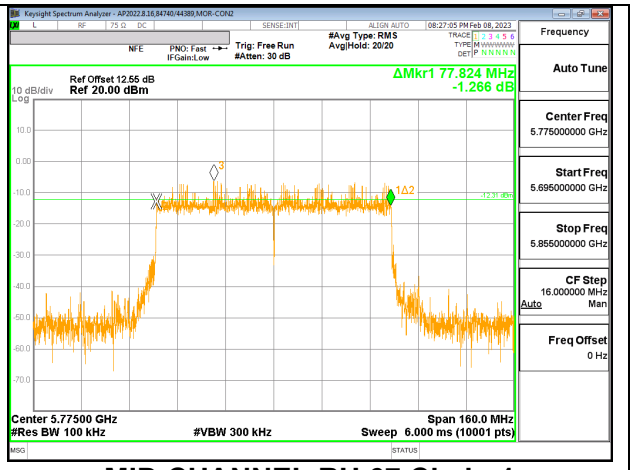
9.2.1. 802.11ax HE80 MODE 2TX IN THE 5.8GHz BAND

2Tx 996T MODE

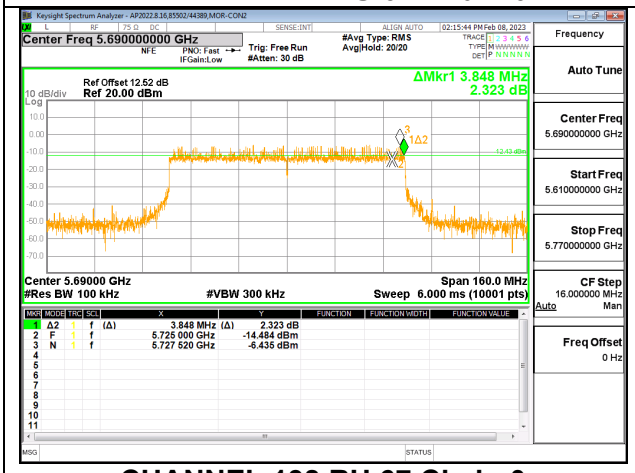
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Mid	5775	77.712	77.824	0.5
138	5690	3.848	3.816	0.5



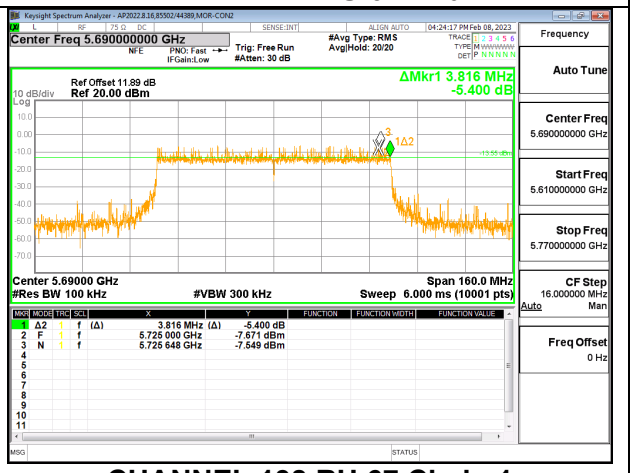
MID CHANNEL RU 67 Chain 0



MID CHANNEL RU 67 Chain 1



CHANNEL 138 RU 67 Chain 0



CHANNEL 138 RU 67 Chain 1

9.3. 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.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G).

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

DIRECTIONAL ANTENNA GAIN

For 2 TX:

Tx chains are uncorrelated for power and correlated for PSD due to the device supporting CDD in all MIMO modes. The directional gains are as follows:

Band (GHz)	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
5725-5850	0.38	-3.72	-1.20	1.58

RESULT

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

9.3.1. 802.11ax HE20 MODE 2TX IN THE 5.8GHz BAND

2TX 26T MODE

Test Engineer:	84740/44389, 85502/44389
Test Date:	2023-02-02 to 2023-02-08

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5745	-1.20	1.58	30.00	30.00
Mid	5785	-1.20	1.58	30.00	30.00
High	5825	-1.20	1.58	30.00	30.00
144	5720	-1.20	1.58	30.00	30.00

Duty Cycle CF (dB)	0.47	**Included in Calculations of Corr'd PSD**

Output Power Results

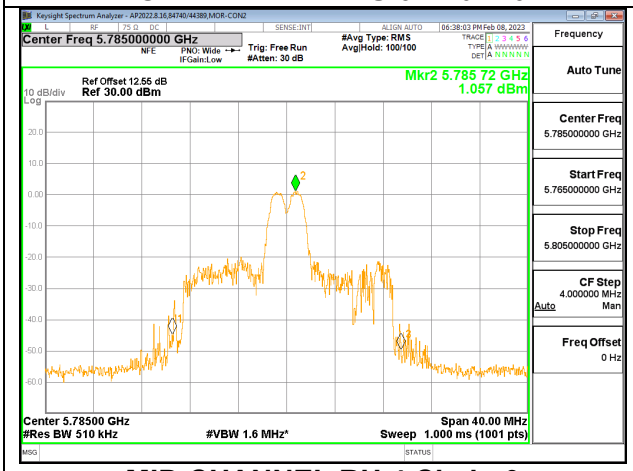
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	8.15	8.75	11.47	30.00	-18.53
Mid	5785	7.80	8.48	11.16	30.00	-18.84
High	5825	8.24	8.93	11.61	30.00	-18.39
144	5720	8.42	8.61	11.53	30.00	-18.47

PSD Results

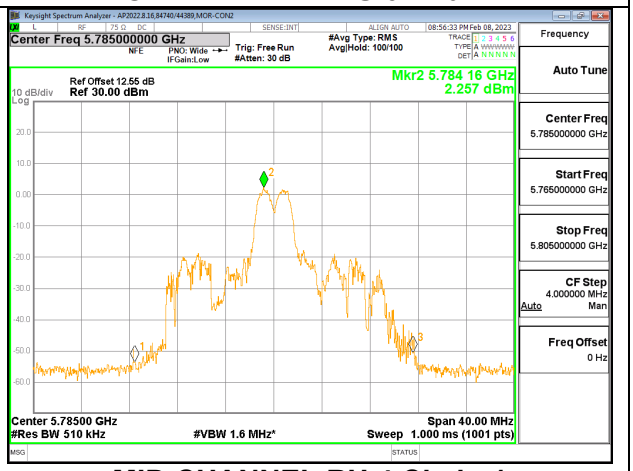
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 500KHz)	Chain 1 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	1.533	1.853	5.176	30.00	-24.82
Mid	5785	1.057	2.257	5.179	30.00	-24.82
High	5825	2.026	2.684	5.848	30.00	-24.15
144	5720	2.055	1.750	5.385	30.00	-24.61

LOW CHANNEL RU 0 Chain 0

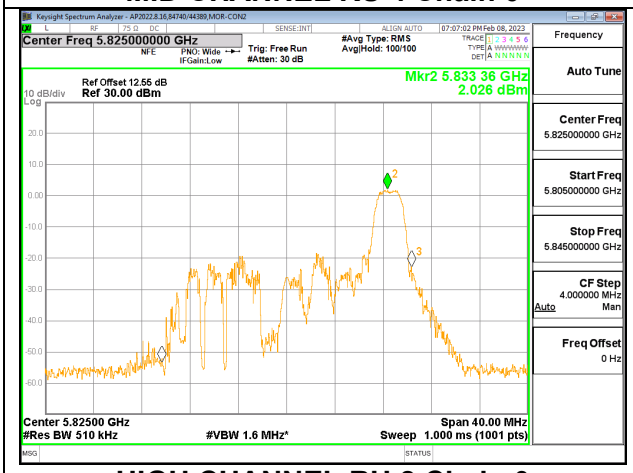
LOW CHANNEL RU 0 Chain 1



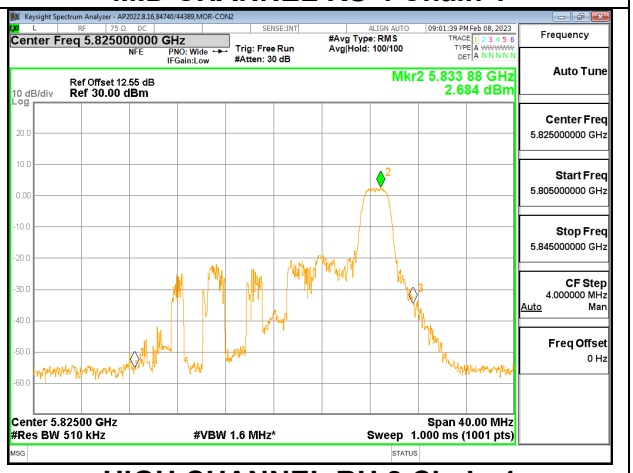
MID CHANNEL RU 4 Chain 0



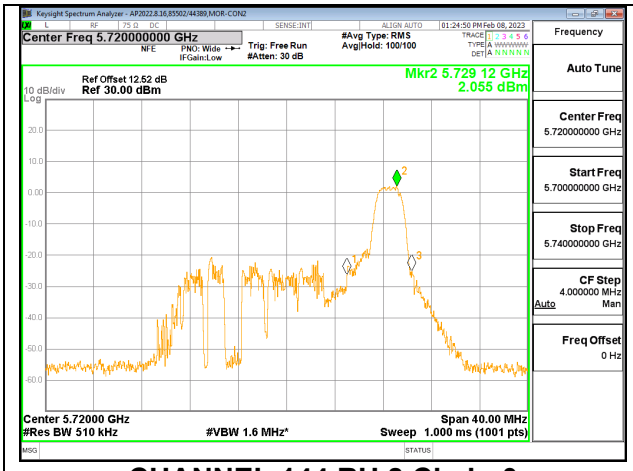
MID CHANNEL RU 4 Chain 1



HIGH CHANNEL RU 8 Chain 0



HIGH CHANNEL RU 8 Chain 1



CHANNEL 144 RU 8 Chain 0

CHANNEL 144 RU 8 Chain 1

2TX 52T MODE

Test Engineer:	84740/44389, 85502/44389
Test Date:	2023-02-02 to 2023-02-08

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5745	-1.20	1.58	30.00	30.00
Mid	5785	-1.20	1.58	30.00	30.00
High	5825	-1.20	1.58	30.00	30.00
144	5720	-1.20	1.58	30.00	30.00

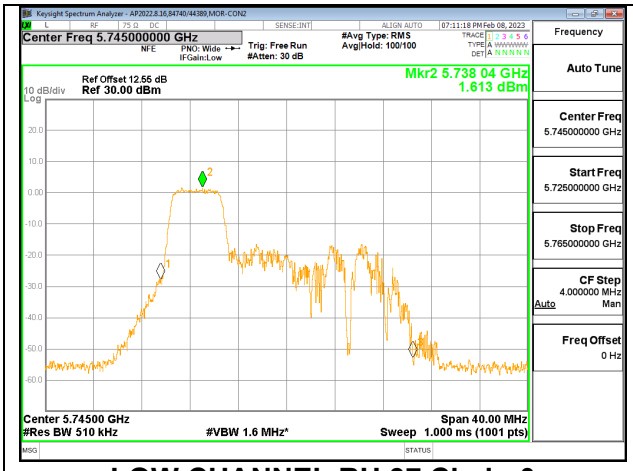
Duty Cycle CF (dB)	0.49	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	10.86	11.19	14.04	30.00	-15.96
Mid	5785	10.66	11.29	14.00	30.00	-16.00
High	5825	10.61	11.34	14.00	30.00	-16.00
144	5720	11.04	10.89	13.98	30.00	-16.02

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 500KHz)	Chain 1 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	1.613	1.700	5.157	30.00	-24.84
Mid	5785	1.084	1.777	4.945	30.00	-25.06
High	5825	1.373	2.000	5.198	30.00	-24.80
144	5720	1.551	1.589	5.070	30.00	-24.93

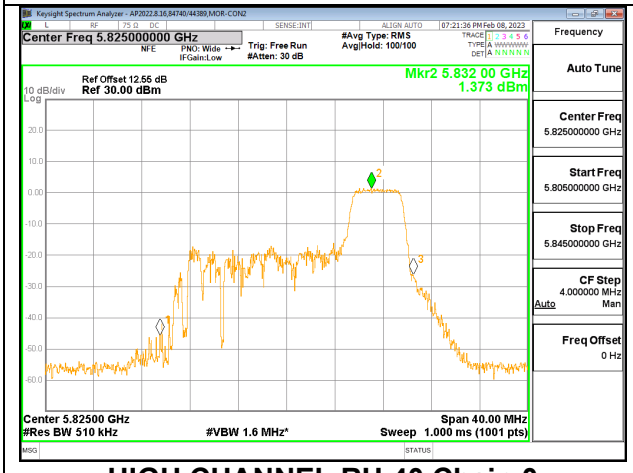


LOW CHANNEL RU 37 Chain 0

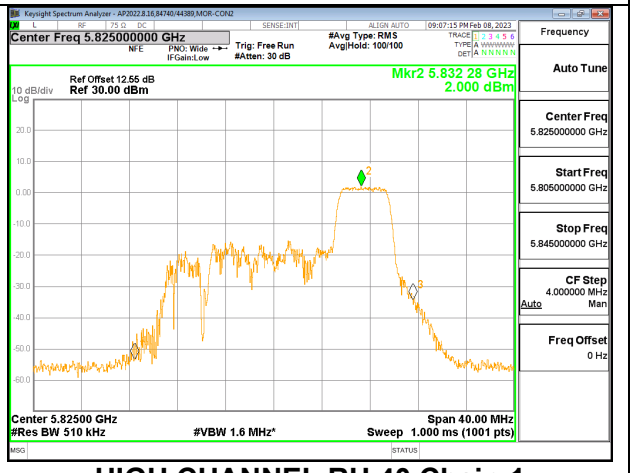
LOW CHANNEL RU 37 Chain 1

MID CHANNEL RU 38 Chain 0

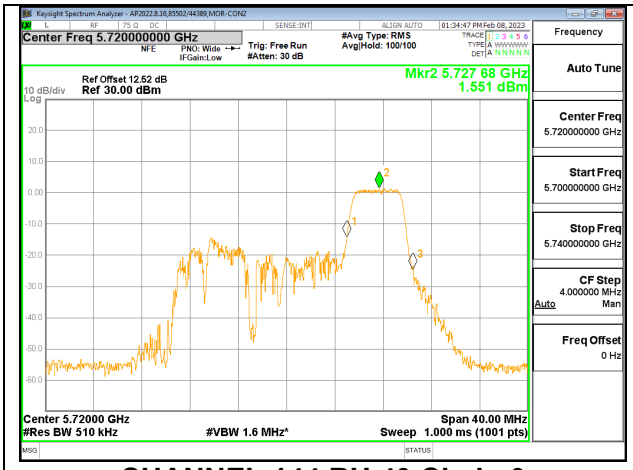
MID CHANNEL RU 38 Chain 1



HIGH CHANNEL RU 40 Chain 0



HIGH CHANNEL RU 40 Chain 1



CHANNEL 144 RU 40 Chain 0

CHANNEL 144 RU 40 Chain 1

2TX 106T MODE

Test Engineer:	84740/44389, 85502/44389
Test Date:	2023-02-02 to 2023-02-08

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5745	-1.20	1.58	30.00	30.00
Mid	5785	-1.20	1.58	30.00	30.00
High	5825	-1.20	1.58	30.00	30.00
144	5720	-1.20	1.58	30.00	30.00

Duty Cycle CF (dB)	0.53	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	10.70	11.20	13.97	30.00	-16.03
Mid	5785	10.85	11.44	14.17	30.00	-15.83
High	5825	10.55	11.18	13.89	30.00	-16.11
144	5720	10.80	10.79	13.81	30.00	-16.19

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 500KHz)	Chain 1 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	-1.960	-1.607	1.760	30.00	-28.24
Mid	5785	-1.497	-0.671	2.476	30.00	-27.52
High	5825	-1.894	-0.674	2.299	30.00	-27.70
144	5720	-1.665	-1.681	1.867	30.00	-28.13

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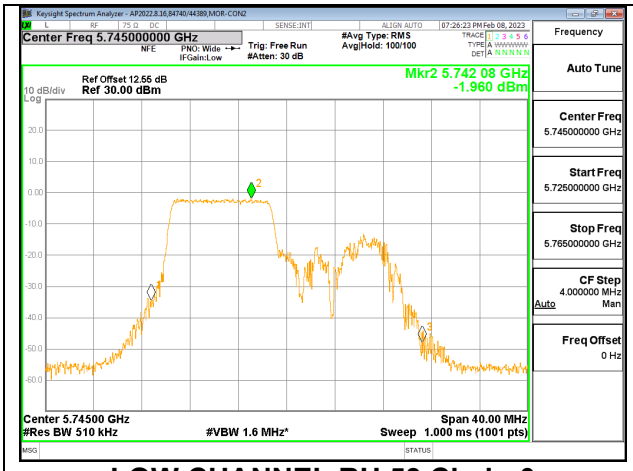
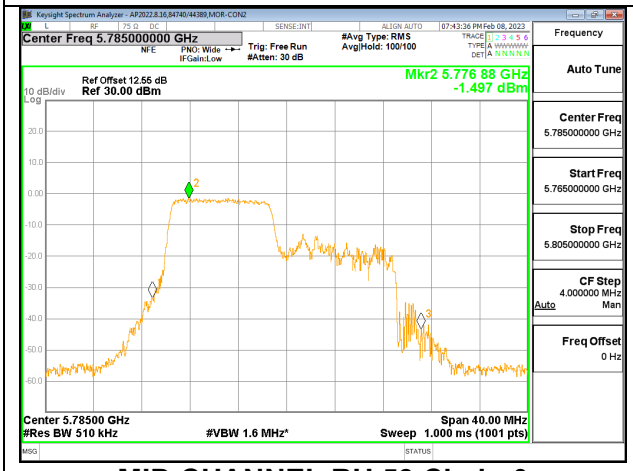


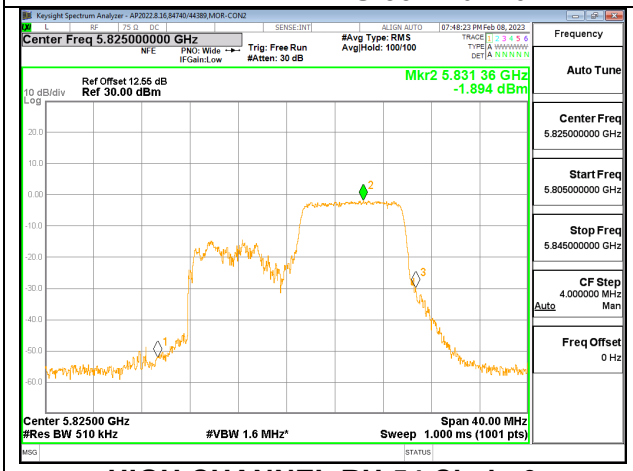
LOW CHANNEL RU 53 Chain 0

LOW CHANNEL RU 53 Chain 1

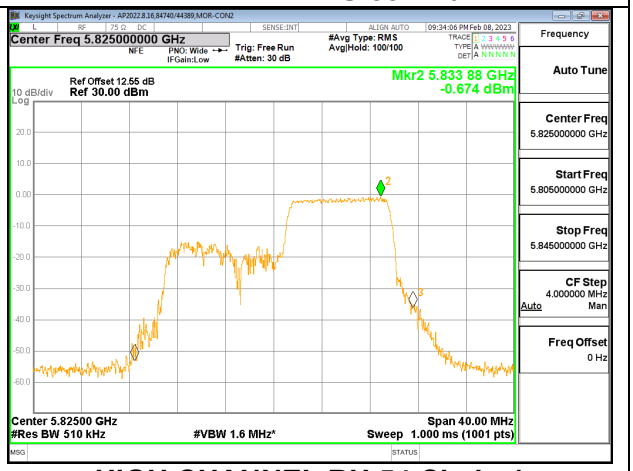


MID CHANNEL RU 53 Chain 0

MID CHANNEL RU 53 Chain 1

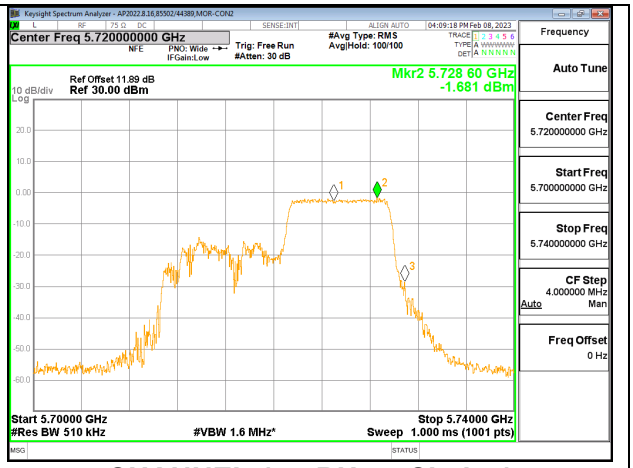


HIGH CHANNEL RU 54 Chain 0



HIGH CHANNEL RU 54 Chain 1

CHANNEL 144 RU 54 Chain 0



CHANNEL 144 RU 54 Chain 1

2TX 242T MODE

Test Engineer:	84740/44389, 85502/44389
Test Date:	2023-02-02 to 2023-02-08

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5745	-1.20	1.58	30.00	30.00
Mid	5785	-1.20	1.58	30.00	30.00
High	5825	-1.20	1.58	30.00	30.00
144	5720	-1.20	1.58	30.00	30.00

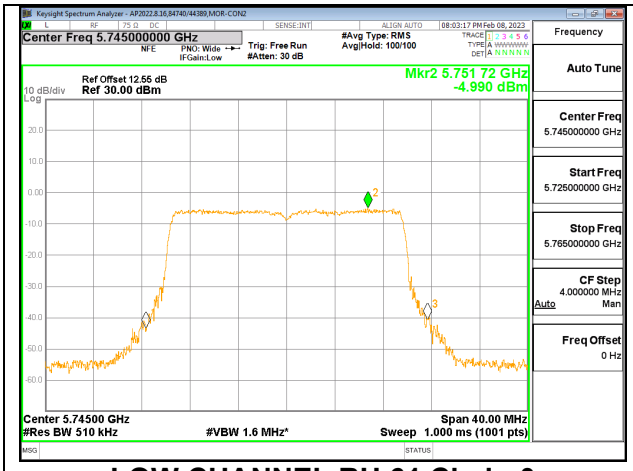
Duty Cycle CF (dB)	0.51	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	10.54	11.03	13.80	30.00	-16.20
Mid	5785	10.65	11.21	13.95	30.00	-16.05
High	5825	10.36	11.08	13.75	30.00	-16.25
144	5720	10.65	10.64	13.66	30.00	-16.34

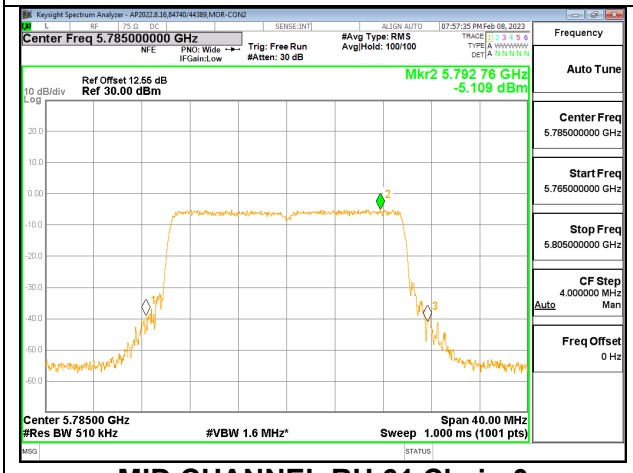
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 500KHz)	Chain 1 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	-4.990	-4.656	-1.299	30.00	-31.30
Mid	5785	-5.109	-4.554	-1.302	30.00	-31.30
High	5825	-5.052	-4.169	-1.068	30.00	-31.07
144	5720	-4.918	-5.320	-1.594	30.00	-31.59



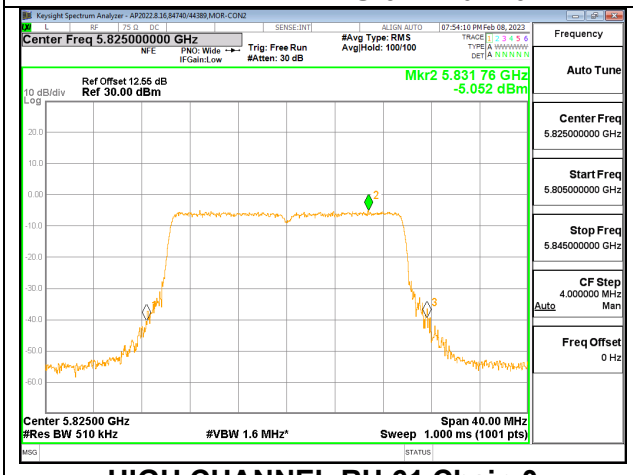
LOW CHANNEL RU 61 Chain 0

LOW CHANNEL RU 61 Chain 1

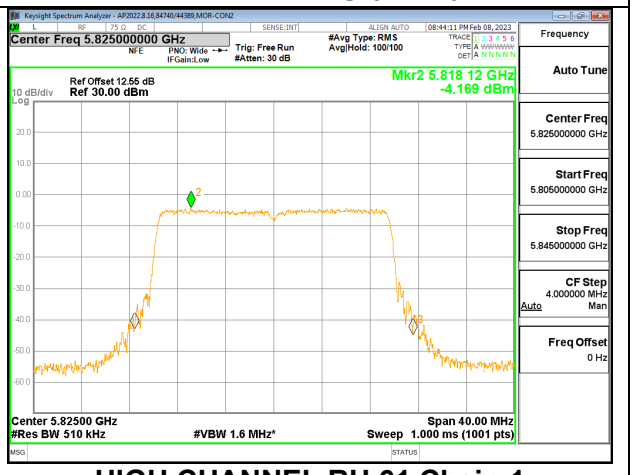


MID CHANNEL RU 61 Chain 0

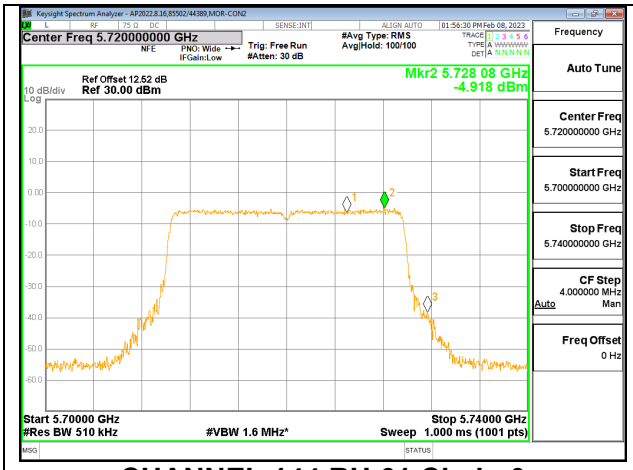
MID CHANNEL RU 61 Chain 1



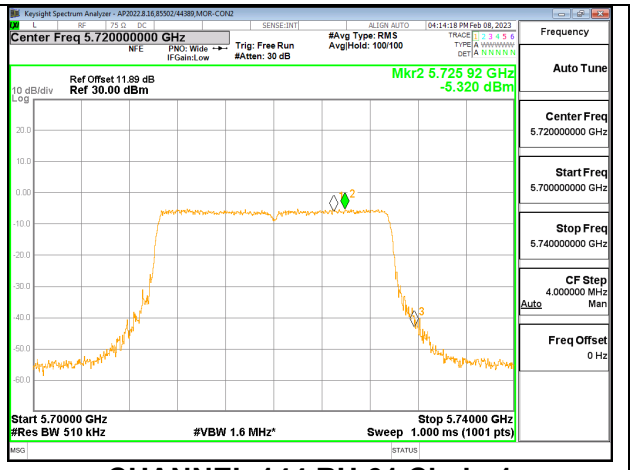
HIGH CHANNEL RU 61 Chain 0



HIGH CHANNEL RU 61 Chain 1



CHANNEL 144 RU 61 Chain 0



CHANNEL 144 RU 61 Chain 1

9.3.2. 802.11ax HE40 MODE 2TX IN THE 5.8GHz BAND

2TX 484T MODE

Test Engineer:	84740/44389, 85502/44389
Test Date:	2023-02-02 to 2023-02-08

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	FCC PSD Limit (dBm/ 500KHz)
Low	5755	-1.20	1.58	30.00	30.00
High	5795	-1.20	1.58	30.00	30.00
142	5710	-1.20	1.58	30.00	30.00

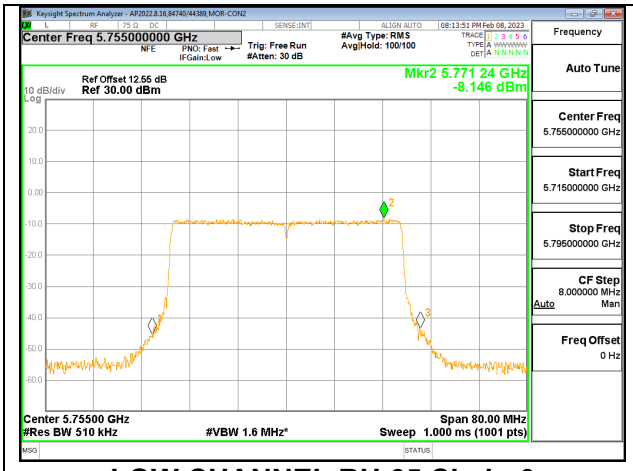
Duty Cycle CF (dB)	0.58	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

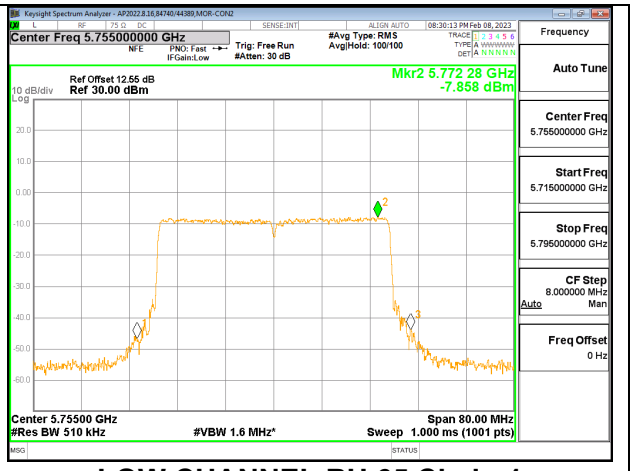
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	10.46	11.13	13.82	30.00	-16.18
High	5795	10.50	10.95	13.74	30.00	-16.26
142	5710	10.61	10.57	13.60	30.00	-16.40

PSD Results

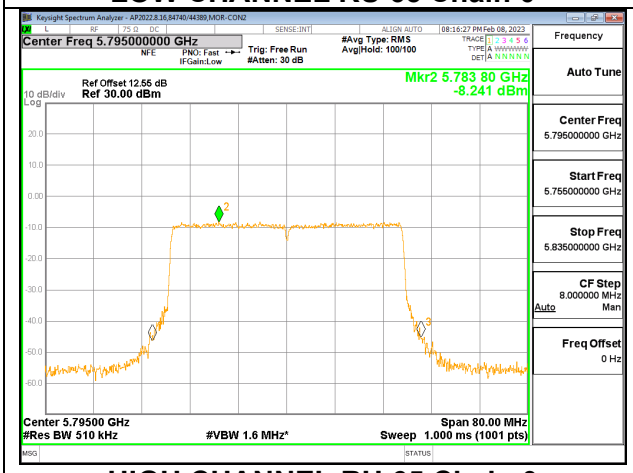
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 500KHz)	Chain 1 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5755	-8.15	-7.86	-4.41	30.00	-34.41
High	5795	-8.24	-7.89	-4.47	30.00	-34.47
142	5710	-8.38	-8.49	-4.84	30.00	-34.84



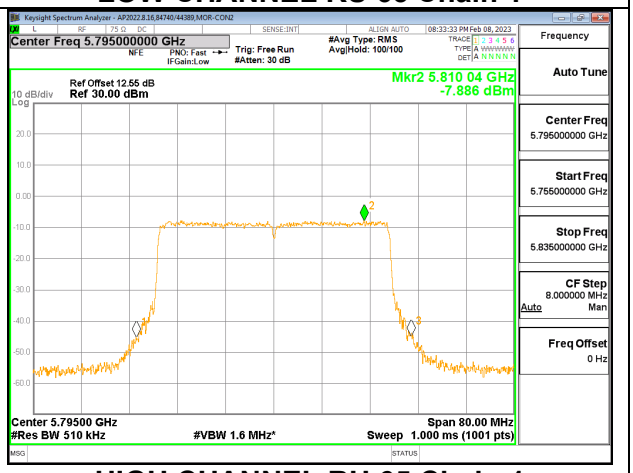
LOW CHANNEL RU 65 Chain 0



LOW CHANNEL RU 65 Chain 1



HIGH CHANNEL RU 65 Chain 0



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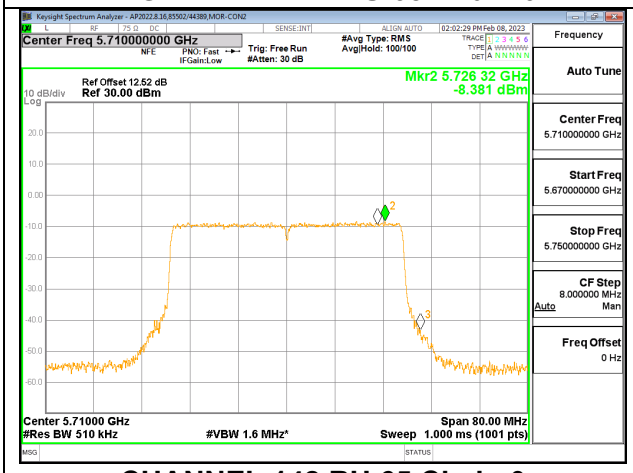
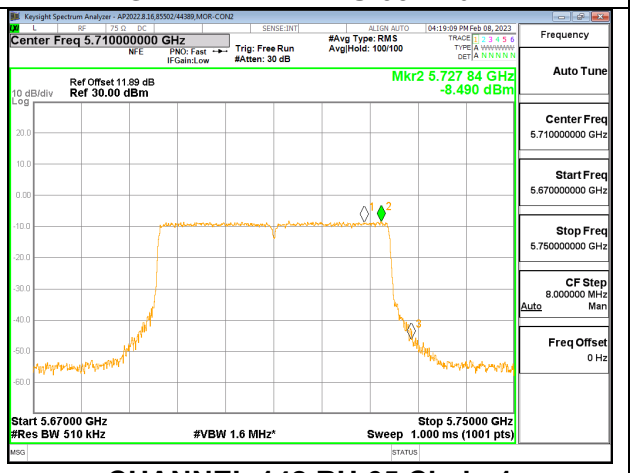


CHANNEL 142 RU 65 Chain 0



CHANNEL 142 RU 65 Chain 1

9.3.3. 802.11ax HE80 MODE 2TX IN THE 5.8GHz BAND

2TX 996T MODE

Test Engineer:	84740/44389, 85502/44389
Test Date:	2023-02-02 to 2023-02-08

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	FCC PSD Limit (dBm/ 500KHz)
Mid	5775	-1.20	1.58	30.00	30.00
138	5690	-1.20	1.58	30.00	30.00

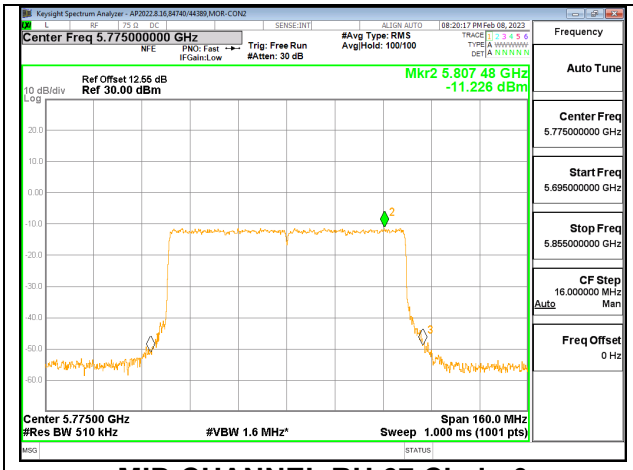
Duty Cycle CF (dB)	0.80	**Included in Calculations of Corr'd Power & PSD**

Output Power Results

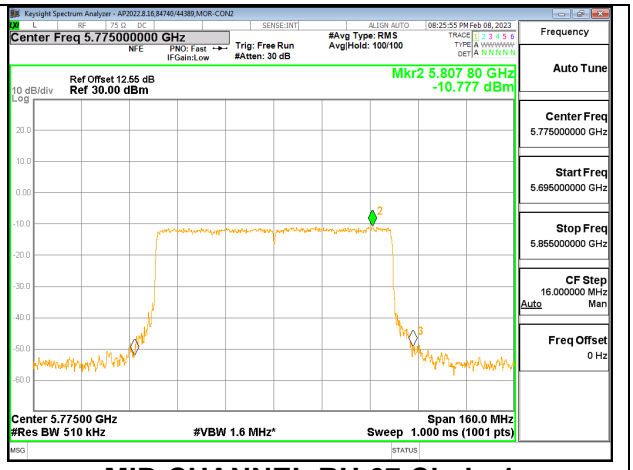
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5775	10.47	10.77	13.63	30.00	-16.37
138	5690	10.95	10.47	13.73	30.00	-16.27

PSD Results

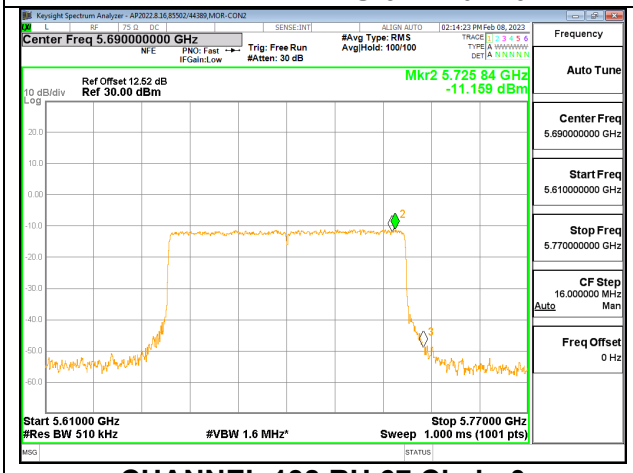
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 500KHz)	Chain 1 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Mid	5775	-11.23	-10.78	-7.19	30.00	-37.19
138	5690	-11.16	-11.94	-7.72	30.00	-37.72



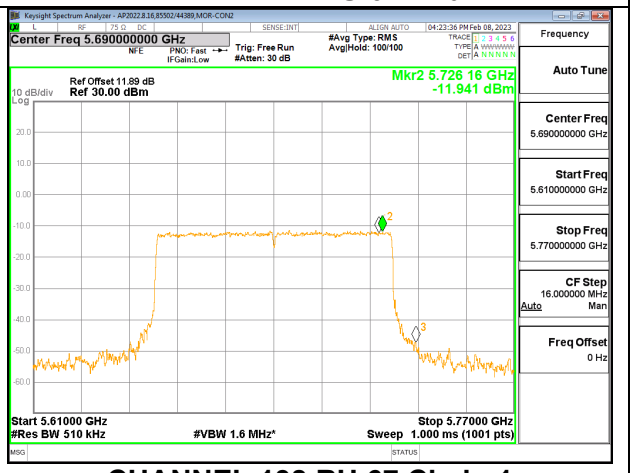
MID CHANNEL RU 67 Chain 0



MID CHANNEL RU 67 Chain 1



CHANNEL 138 RU 67 Chain 0



CHANNEL 138 RU 67 Chain 1

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209 -Restricted bands
FCC §15.407(b)(4) -Unrestricted bands

After January 01, 2019 for Outside of the Restricted Bands Emissions

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for linear voltage average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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

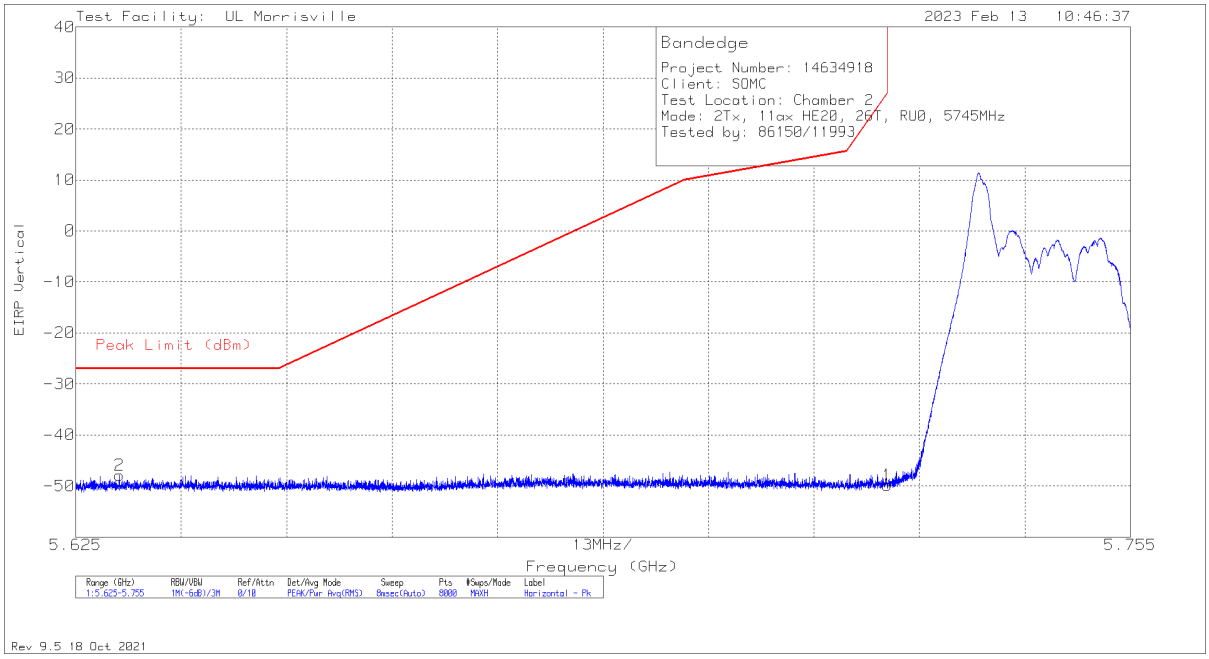
10.1. TRANSMITTER 1-18GHz

10.1.1. 802.11ax HE20 MODE IN THE 5.8GHz BAND

2TX 26T MODE

BANDEDGE (LOW CHANNEL)

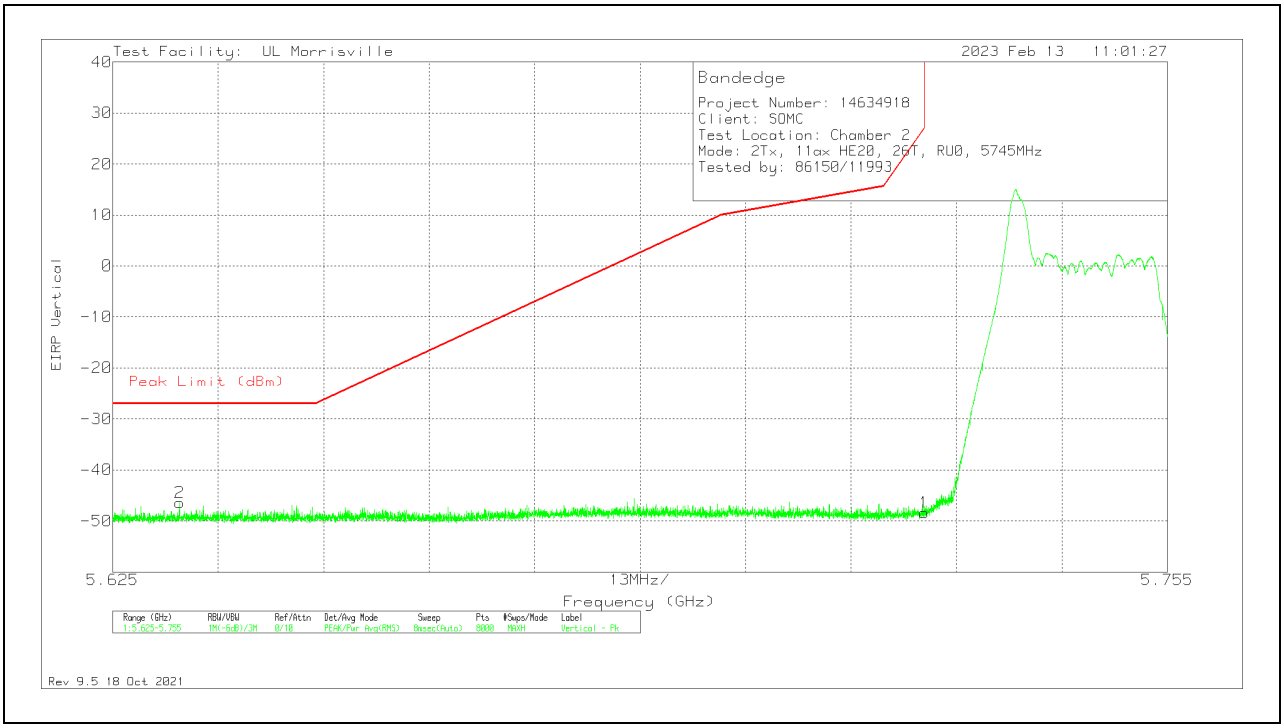
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.63041	-70.67	Pk	34.5	-23.5	11.8	0	-47.87	-27	-20.87	159	154	H
1	5.725	-72.91	Pk	34.6	-23.4	11.8	0	-49.91	27	-76.91	159	154	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

VERTICAL RESULT

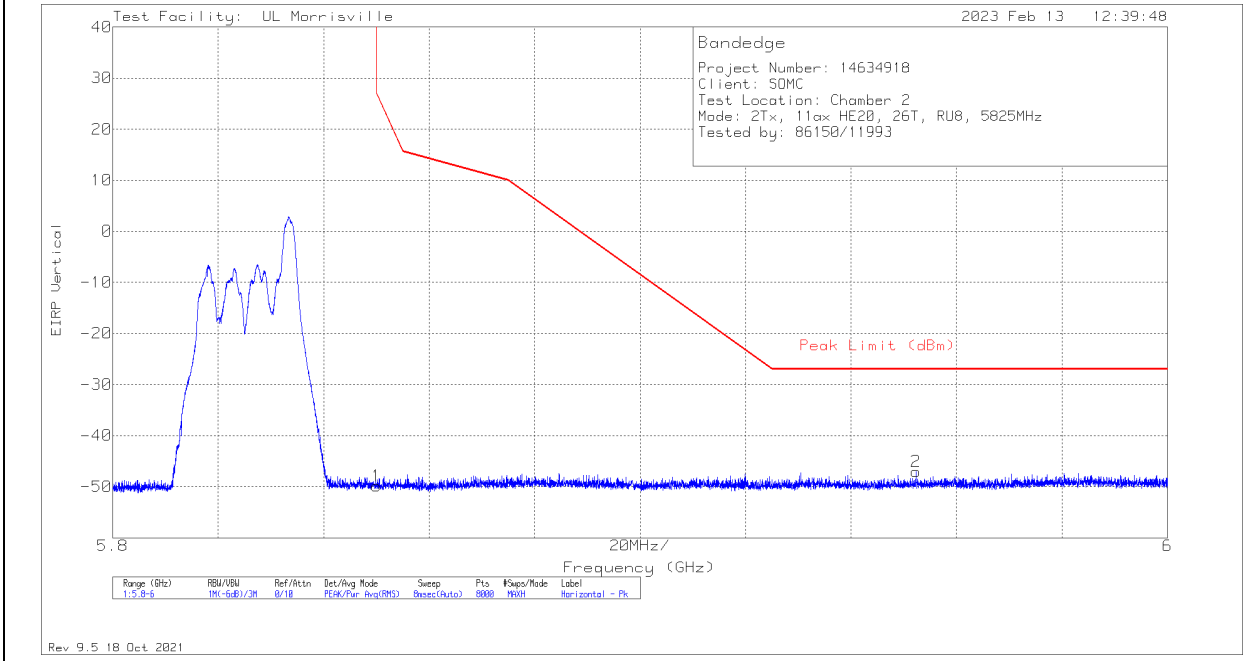


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.63322	-69.21	Pk	34.5	-23.5	11.8	0	-46.41	-27	-19.41	113	283	V
1	5.725	-71.39	Pk	34.6	-23.4	11.8	0	-48.39	27	-75.39	113	283	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-73.7	Pk	34.9	-22.9	11.8	0	-49.9	26.99	-76.89	225	143	H
2	5.95232	-71.34	Pk	35.1	-22.6	11.8	0	-47.04	-27	-20.04	225	143	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector