RADIO TEST REPORT

Test Report No. 15058381S-C-R1

Customer	**ALPS ALPINE CO., LTD.**
Description of EUT	**Head unit**
Model Number of EUT	**AH00ICB 4**
FCC ID	**A269ZUA171**
Test Regulation	**FCC Part 15 Subpart E**
Test Result	**Complied**
Issue Date	**June 25, 2024**
Remarks	**WLAN (5 GHz band) part** **Antenna Terminal Conducted Tests(Except for DFS test)**

Representative Test Engineer	**Approved By**
Kouki Yamada Engineer	Kazuya Noda Leader

CERTIFICATE 1266.03

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☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No. 15058381S-C

This report is a revised version of 15058381S-C. 15058381S-C is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15058381S-C	March 25, 2024	-
1	15058381S-C-R1	June 25, 2024	Page 7 Corrected specifications listed in Clause 3.2 from RSS-247 6.2.4.1 to 6.2.4.2 for Maximum Conducted Output Power, Maximum Power Spectral Density and 6dB Emission Bandwidth tests, and from RSS-247 6.2.4.2 to 6.2.4.3 for Spurious Emission test.

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	ICES	Interference-Causing Equipment Standard
AC	Alternating Current	IEC	International Electrotechnical Commission
AFH	Adaptive Frequency Hopping	IEEE	Institute of Electrical and Electronics Engineers
AM	Amplitude Modulation	IF	Intermediate Frequency
Amp, AMP	Amplifier	ILAC	International Laboratory Accreditation Conference
ANSI	American National Standards Institute	ISED	Innovation, Science and Economic Development Canada
Ant, ANT	Antenna	ISO	International Organization for Standardization
AP	Access Point	JAB	Japan Accreditation Board
ASK	Amplitude Shift Keying	LAN	Local Area Network
Atten., ATT	Attenuator	LIMS	Laboratory Information Management System
AV	Average	MCS	Modulation and Coding Scheme
BPSK	Binary Phase-Shift Keying	MRA	Mutual Recognition Arrangement
BR	Bluetooth Basic Rate	N/A	Not Applicable
BT	Bluetooth	NIST	National Institute of Standards and Technology
BT LE	Bluetooth Low Energy	NS	No signal detect.
BW	BandWidth	NSA	Normalized Site Attenuation
Cal Int	Calibration Interval	NVLAP	National Voluntary Laboratory Accreditation Program
CCK	Complementary Code Keying	OBW	Occupied Band Width
Ch., CH	Channel	OFDM	Orthogonal Frequency Division Multiplexing
CISPR	Comite International Special des Perturbations Radioelectriques	P/M	Power meter
CW	Continuous Wave	PCB	Printed Circuit Board
DBPSK	Differential BPSK	PER	Packet Error Rate
DC	Direct Current	PHY	Physical Layer
D-factor	Distance factor	PK	Peak
DFS	Dynamic Frequency Selection	PN	Pseudo random Noise
DQPSK	Differential QPSK	PRBS	Pseudo-Random Bit Sequence
DSSS	Direct Sequence Spread Spectrum	PSD	Power Spectral Density
EDR	Enhanced Data Rate	QAM	Quadrature Amplitude Modulation
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QP	Quasi-Peak
EMC	ElectroMagnetic Compatibility	QPSK	Quadri-Phase Shift Keying
EMI	ElectroMagnetic Interference	RBW	Resolution Band Width
EN	European Norm	RDS	Radio Data System
ERP, e.r.p.	Effective Radiated Power	RE	Radio Equipment
EU	European Union	RF	Radio Frequency
EUT	Equipment Under Test	RMS	Root Mean Square
Fac.	Factor	RSS	Radio Standards Specifications
FCC	Federal Communications Commission	Rx	Receiving
FHSS	Frequency Hopping Spread Spectrum	SA, S/A	Spectrum Analyzer
FM	Frequency Modulation	SG	Signal Generator
Freq.	Frequency	SVSWR	Site-Voltage Standing Wave Ratio
FSK	Frequency Shift Keying	TR	Test Receiver
GFSK	Gaussian Frequency-Shift Keying	Tx	Transmitting
GNSS	Global Navigation Satellite System	VBW	Video BandWidth
GPS	Global Positioning System	Vert.	Vertical
Hori.	Horizontal	WLAN	Wireless LAN

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SECTION 1: Customer Information

Company Name	ALPS ALPINE CO., LTD.
Address	20-1 Yoshima Industrial park, Iwaki, Fukushima, Japan 970-1192
Telephone Number	+81-246-36-4111
Contact Person	Kenji Nagase

The information provided by the customer is as follows;
- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Head unit
Model Number	AH00ICB 4
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	January 12, 2024
Test Date	January 22 to March 5, 2024

2.2 Product Description

General Specification

Rating	DC 13.2 V
Operating temperature	-30 deg. C to +70 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer. The data provided by the customer is marked “a)” in the table below.

Bluetooth (BR / EDR / Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	BT: FHSS (GFSK, π/4 DQPSK, 8 DPSK) BT LE: GFSK
Antenna Type	Planar Inverted-F Antenna
Antenna Gain[a)]	-0.2 dBi

WLAN (IEEE802.11b/11g/11n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Type	Planar Inverted-F Antenna
Antenna Gain[a)]	-0.78 dBi

WLAN (IEEE802.11a/11n-20/11ac-20/11n-40/11ac-40/11ac-80)

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5720 MHz 5745 MHz to 5825 MHz
	40 MHz Band	5190 MHz to 5230 MHz 5270 MHz to 5310 MHz 5510 MHz to 5710 MHz 5755 MHz to 5795 MHz
	80 MHz Band	5210 MHz 5290 MHz 5530 MHz to 5690 MHz 5775 MHz
Type of Modulation	OFDM	
Antenna Type	Planar Inverted-F Antenna	
Antenna Gain[a)]	+2.71 dBi (Chain 1) +2.29 dBi (Chain 2)	

SECTION 3: Test specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart E The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (b) (6) / 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
26 dB Emission Bandwidth	**FCC:** KDB Publication Number 789033	**FCC:** 15.407 (a) (1) (2) (3)	See data	Complied	Conducted
	ISED: -	**ISED:** -			
Maximum Conducted Output Power	**FCC:** KDB Publication Number 789033	**FCC:** 15.407 (a) (1) (2) (3)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.2			
Maximum Power Spectral Density	**FCC:** KDB Publication Number 789033	**FCC :** 15.407 (a) (1) (2) (3)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.2			
Spurious Emission (below 30 MHz)	**FCC:** ANSI C63.10-2013 KDB Publication Number 789033	**FCC:** 15.407 (b), 15.205 and 15.209	See data	Complied	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.3			
6 dB Emission Bandwidth	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (e)	See data	Complied	Conducted
	ISED: -	**ISED:** RSS-247 6.2.4.2			

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.
* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

*1) The test is not applicable since the EUT does not have AC Mains.

FCC Part 15.31 (e)
The EUT provides stable voltage constantly to the RF Part regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99 % Occupied Band Width	**ISED:** RSS-Gen 6.7	**ISED:** -	N/A	-	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor *k*=2.

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector) SPM-06	1.1 dB
Power Measurement above 1 GHz (Peak Detector) SPM-06	1.8 dB
Power Measurement above 1 GHz (Average Detector) SPM-07	1.0 dB
Power Measurement above 1 GHz (Peak Detector) SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector) SPM-13	0.81 dB
Power Measurement above 1 GHz (Peak Detector) SPM-13	1.1 dB
Spurious Emission (Conducted) below 1 GHz	0.91 dB
Conducted Emissions Power Density Measurement 1 GHz to 3 GHz	1.3 dB
Conducted Emissions Power Density Measurement 3 GHz to 18 GHz	2.5 dB
Spurious Emission (Conducted) 18 GHz to 26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz to 40 GHz	2.6 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.96 deg.C.
Humidity_SCH-01	4.0 %
Temperature_SCH-02	2.2 deg.C.
Voltage	0.74 %

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan
Telephone: +81-463-50-6400
A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11a SISO (11a (SISO))	18 Mbps (Chain 2), PN9
IEEE 802.11n SISO 20 MHz BW (11n-20 (SISO))	MCS 2 (Chain 2), PN9
IEEE 802.11ac SISO 20 MHz BW (11ac-20 (SISO))	MCS 2 (Chain 2), PN9
IEEE 802.11n SISO 40 MHz BW (11n-40 (SISO))	MCS 3 (Chain 2), PN9
IEEE 802.11ac SISO 40 MHz BW (11ac-40 (SISO))	MCS 2 (Chain 2), PN9
IEEE 802.11ac SISO 80 MHz BW (11ac-80 (SISO))	MCS 5 (Chain 2), PN9
IEEE 802.11a CDD (11a (CDD))	18 Mbps (CDD), PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20 (CDD))	MCS 3 (1 SS), PN9
IEEE 802.11ac MIMO 20 MHz BW (11ac-20 (CDD))	MCS 3 (1 SS), PN9
IEEE 802.11n MIMO 40 MHz BW (11n-40 (CDD))	MCS 2 (1 SS), PN9
IEEE 802.11ac MIMO 40 MHz BW (11ac-40 (CDD))	MCS 2 (1 SS), PN9
IEEE 802.11ac MIMO 80 MHz BW (11ac-80 (CDD))	MCS 2 (1 SS), PN9

*The worst antenna (Chain 2) and condition was determined based on the test result of Maximum Conducted Output Power.

*Power of the EUT was set by the software as follows;

Power Setting: (SISO)
11a, 11n-20: 10.5 dBm
11n-40:11 dBm
11ac-20: 6 dBm
11ac-40, 11ac-80: 7 dBm
(MIMO)
11a, 11n-20: 7 dBm
11n-40:7.5 dBm
11ac-20: 3 dBm
11ac-40, 11ac-80: 3.5 dBm

Software: QRCT (Qualcomm Radio Control Toolkit) Version: 4.0.00195.0
(Date: 2021.10.18, Storage location: Driven by connected PC)

*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

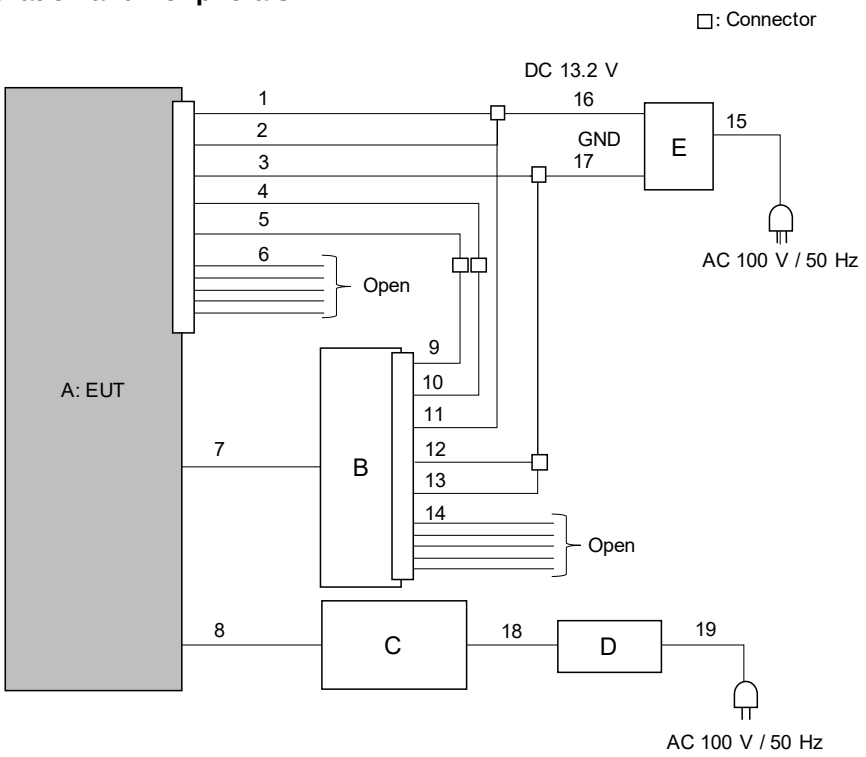
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009 and also was judged the necessity of 802.11ac mode by the pre-test.

*The Details of Operation Mode(s)

Test Item	Operating Mode	Tested Antenna	Tested Frequency			
			Lower Band	Middle Band	Additional Band	Upper Band
26 dB Emission Bandwidth	Tx 11a (SISO) Tx 11n-20 (SISO) Tx 11ac-20 (SISO) Tx 11a (CDD) Tx 11n-20 (CDD) Tx 11ac-20 (CDD)	Chain 2 *2)	-	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	-
	Tx 11n-40 (SISO) Tx 11ac-40 (SISO) Tx 11n-40 (CDD) Tx 11ac-40 (CDD)		-	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz 5710 MHz	-
	Tx 11ac-80 (SISO) Tx 11ac-80 (CDD)		-	5290 MHz	5530 MHz 5610 MHz 5690 MHz	-
99 % Occupied Bandwidth	Tx 11a (SISO) Tx 11n-20 (SISO) Tx 11ac-20 (SISO) Tx 11a (CDD) Tx 11n-20 (CDD) Tx 11ac-20 (CDD)	Chain 2 *2)	5180 MHz 5220 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	5745 MHz 5785 MHz 5825 MHz
	Tx 11n-40 (SISO) Tx 11ac-40 (SISO) Tx 11n-40 (CDD) Tx 11ac-40 (CDD)		5190 MHz 5230 MHz	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz 5710 MHz	5755 MHz 5795 MHz
	Tx 11ac-80 (SISO) Tx 11ac-80 (CDD)		5210 MHz	5290 MHz	5530 MHz 5610 MHz 5690 MHz	5775 MHz
Maximum Conducted Output Power, Maximum Power Spectral Density	Tx 11a (SISO) Tx 11n-20 (SISO) Tx 11ac-20 (SISO)	Chain 2 *2)	5180 MHz 5220 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	5745 MHz 5785 MHz 5825 MHz
	Tx 11a (CDD) Tx 11n-20 (CDD) Tx 11ac-20 (CDD)	Chain 1 + Chain 2				
	Tx 11n-40 (SISO) Tx 11ac-40 (SISO)	Chain 2 *2)	5190 MHz 5230 MHz	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz 5710 MHz	5755 MHz 5795 MHz
	Tx 11n-40 (CDD) Tx 11ac-40 (CDD)	Chain 1 + Chain 2				
	Tx 11ac-80 (SISO)	Chain 2 *2)	5210 MHz	5290 MHz	5530 MHz 5610 MHz 5690 MHz	5775 MHz
	Tx 11ac-80 (CDD)	Chain 1 + Chain 2				
6 dB Bandwidth	Tx 11a (SISO) Tx 11n-20 (SISO) Tx 11ac-20 (SISO) Tx 11a (CDD) Tx 11n-20 (CDD) Tx 11ac-20 (CDD)	Chain 2 *2)	-	-	-	5745 MHz 5785 MHz 5825 MHz
	Tx 11n-40 (SISO) Tx 11ac-40 (SISO) Tx 11n-40 (CDD) Tx 11ac-40 (CDD)		-	-	-	5755 MHz 5795 MHz
	Tx 11ac-80 (SISO) Tx 11ac-80 (CDD)		-	-	-	5775 MHz
Conducted Spurious Emission *1)	Tx 11a (SISO)	Chain 2 *2)	5180 MHz	-	-	-

*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.
*2) The test was performed with the antenna that had higher power as a representative.

4.2 Configuration and Peripherals



Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	Head unit	AH00ICB 4	No.3	ALPS ALPINE	EUT
B	Display	QH00274A	No.28	ALPS ALPINE	-
C	Laptop Computer	ThinkPad L580	PF-1PMM0X	LENOVO	-
D	AC Adapter	ADLX45YLC2A	8SSA10E75842L1CZ9480J61	LENOVO	-
E	Power Supply(DC)	PW16-5ADP	19100034	GW Instek	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	+B	2.2	Unshielded	Unshielded	-
2	ACC	2.2	Unshielded	Unshielded	-
3	GND	2.2	Unshielded	Unshielded	-
4	BCAN H	2.2	Unshielded	Unshielded	-
5	BCAN L	2.2	Unshielded	Unshielded	-
6	Signal	2.2	Unshielded	Unshielded	-
7	GVIF	2.4	Shielded	Shielded	-
8	USB	2.2 + 1.0	Shielded	Shielded	-
9	BCAN L	0.6	Unshielded	Unshielded	-
10	BCAN H	0.6	Unshielded	Unshielded	-
11	+B	0.6	Unshielded	Unshielded	-
12	GND	0.6	Unshielded	Unshielded	-
13	DISP CONT	0.6	Unshielded	Unshielded	-
14	Signal	0.6	Unshielded	Unshielded	-
15	AC	1.5	Unshielded	Unshielded	-
16	DC+	1.0	Unshielded	Unshielded	-
17	DC-	1.0	Unshielded	Unshielded	-
18	DC	1.8	Unshielded	Unshielded	-
19	AC	0.9	Unshielded	Unshielded	-

SECTION 5: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
26 dB Bandwidth	Enough to capture the emission	Close to 1 % of EBW	> RBW	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 160 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 470 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) KDB 789033 D02 says that RBW is set to be 500 kHz for 5.725 GHz to 5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor (10 log(500 kHz / 470 kHz)) was added to the test result.
*3) In the frequency range below 30 MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz to 150 kHz: RBW = 200 Hz, 150 kHz to 30 MHz: RBW = 10 kHz)
*4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohmes. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 – 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

Test results are rounded off and limit are rounded down, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test Data : **APPENDIX**
Test Result : **Pass**

APPENDIX 1: Test Data

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.1 Wireless Shielded Room
Date	January 31, 2024
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Kouki Yamada
Mode	Tx

11a (SISO)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5180	-	16674.9
	5220	-	16631.0
	5240	-	16661.2
	5260	19.854	16644.9
	5300	19.334	16648.4
	5320	19.683	16648.7
	5500	19.684	16651.7
	5580	19.628	16655.9
	5700	19.552	16633.4
	5720	19.475	16639.5
	5745	-	16620.4
	5785	-	16607.7
	5825	-	16651.7

11n-20 (SISO)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5180	-	17756.8
	5220	-	17776.3
	5240	-	17738.3
	5260	20.125	17810.9
	5300	20.100	17738.3
	5320	20.128	17767.2
	5500	20.359	17737.2
	5580	20.010	17787.2
	5700	20.199	17758.6
	5720	20.195	17762.8
	5745	-	17796.5
	5785	-	17750.9
	5825	-	17773.7

11ac-20 (SISO)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5180	-	17786.0
	5220	-	17775.4
	5240	-	17783.2
	5260	20.196	17779.4
	5300	20.083	17782.2
	5320	19.932	17774.1
	5500	19.929	17764.9
	5580	20.244	17765.7
	5700	20.182	17786.5
	5720	20.032	17762.7
	5745	-	17786.3
	5785	-	17786.1
	5825	-	17765.7

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.1 Wireless Shielded Room
Date	January 31, 2024
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Kouki Yamada
Mode	Tx

11n-40 (SISO)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5190	-	36502.2
	5230	-	36438.5
	5270	42.138	36461.3
	5310	40.998	36371.9
	5510	40.696	36361.4
	5550	40.747	36386.2
	5670	41.143	36478.1
	5710	40.958	36366.4
	5755	-	36435.3
	5795	-	36348.3

11ac-40 (SISO)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5190	-	36492.4
	5230	-	36353.6
	5270	40.203	36382.5
	5310	39.909	36465.3
	5510	40.432	36440.9
	5550	40.117	36466.5
	5670	40.160	36381.8
	5710	40.128	36408.0
	5755	-	36452.2
	5795	-	36456.7

11ac-80 (SISO)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5210	-	77454.8
	5290	90.489	77400.0
	5530	90.319	77418.0
	5610	90.108	77297.5
	5690	89.788	77275.7
	5775	-	77221.2

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.1 Wireless Shielded Room	
Date	January 31, 2024	February 1, 2024
Temperature / Humidity	21 deg. C / 23 % RH	23 deg. C / 29 % RH
Engineer	Kouki Yamada	Kouki Yamada
Mode	Tx	

11a (CDD)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5180	-	16673.0
	5220	-	16691.3
	5240	-	16707.6
	5260	19.480	16668.8
	5300	19.611	16726.1
	5320	19.487	16642.9
	5500	19.566	16641.2
	5580	19.476	16655.4
	5700	19.201	16692.9
	5720	19.530	16643.5
	5745	-	16653.8
	5785	-	16702.5
	5825	-	16688.3

11n-20 (CDD)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5180	-	17760.5
	5220	-	17761.2
	5240	-	17732.9
	5260	20.265	17731.6
	5300	20.443	17745.9
	5320	20.209	17725.9
	5500	20.166	17784.5
	5580	20.126	17750.3
	5700	20.196	17738.1
	5720	19.908	17767.5
	5745	-	17741.1
	5785	-	17803.0
	5825	-	17746.7

11ac-20 (CDD)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5180	-	17785.1
	5220	-	17775.9
	5240	-	17716.4
	5260	20.374	17738.4
	5300	20.309	17799.7
	5320	20.204	17764.6
	5500	20.299	17782.0
	5580	20.232	17808.2
	5700	19.859	17787.2
	5720	20.137	17753.6
	5745	-	17784.5
	5785	-	17764.0
	5825	-	17757.6

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.1 Wireless Shielded Room
Date	February 1, 2024
Temperature / Humidity	23 deg. C / 29 % RH
Engineer	Kouki Yamada
Mode	Tx

11n-40 (CDD)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5190	-	36546.2
	5230	-	36453.5
	5270	40.050	36441.1
	5310	39.817	36377.9
	5510	40.342	36444.9
	5550	39.981	36411.8
	5670	40.004	36413.1
	5710	39.687	36329.4
	5755	-	36422.1
	5795	-	36372.7

11ac-40 (CDD)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5190	-	36507.9
	5230	-	36335.0
	5270	40.279	36551.7
	5310	39.975	36474.4
	5510	40.442	36528.2
	5550	39.774	36369.5
	5670	40.305	36397.6
	5710	40.259	36415.8
	5755	-	36423.5
	5795	-	36398.3

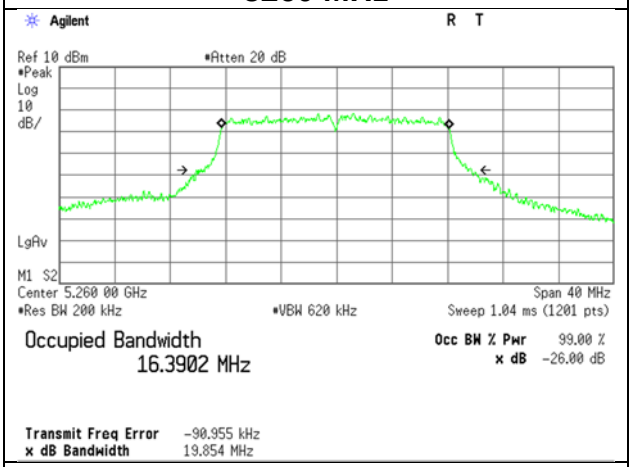
11ac-80 (CDD)

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Chain 2	5210	-	75786.4
	5290	82.548	75830.4
	5530	82.044	75768.3
	5610	82.466	75681.0
	5690	82.688	75721.0
	5775	-	75568.0

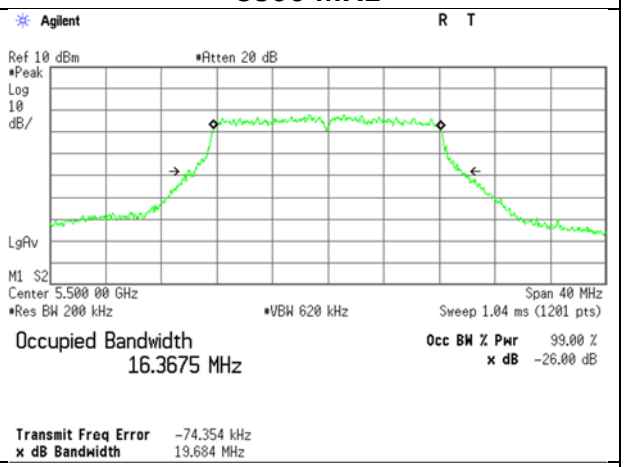
26 dB Emission Bandwidth

11a (SISO), Chain 2

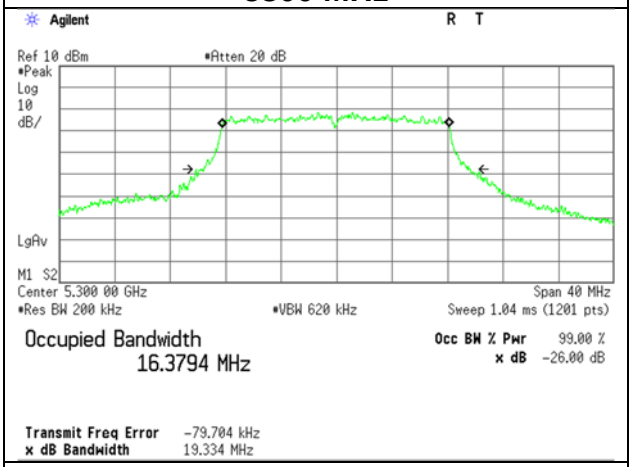
5260 MHz



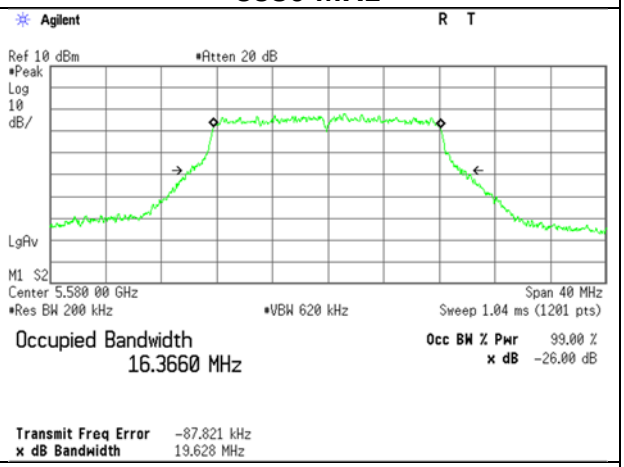
5500 MHz



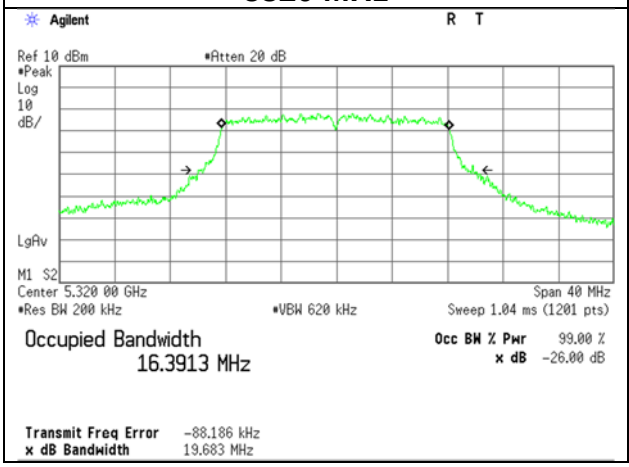
5300 MHz



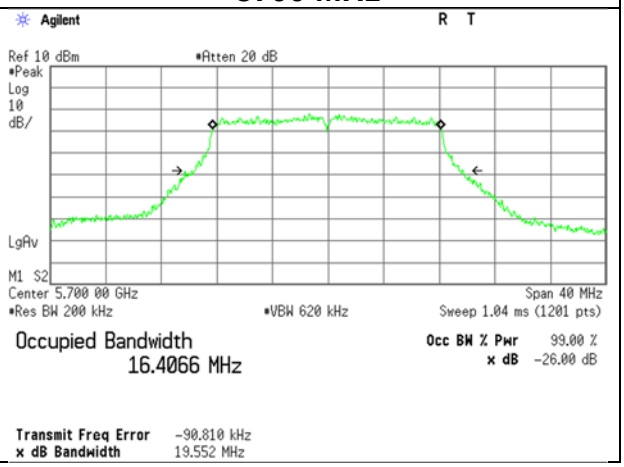
5580 MHz



5320 MHz



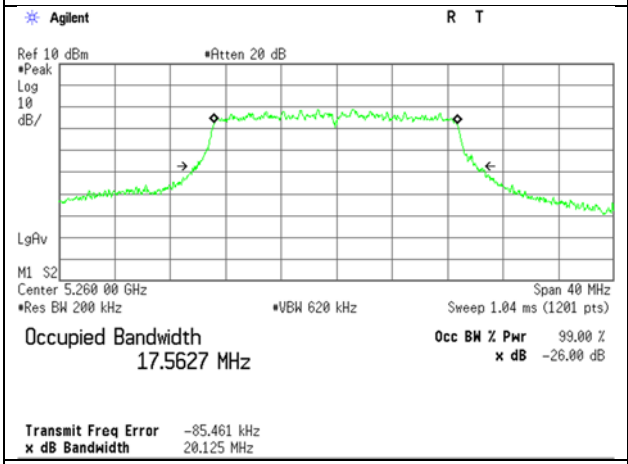
5700 MHz



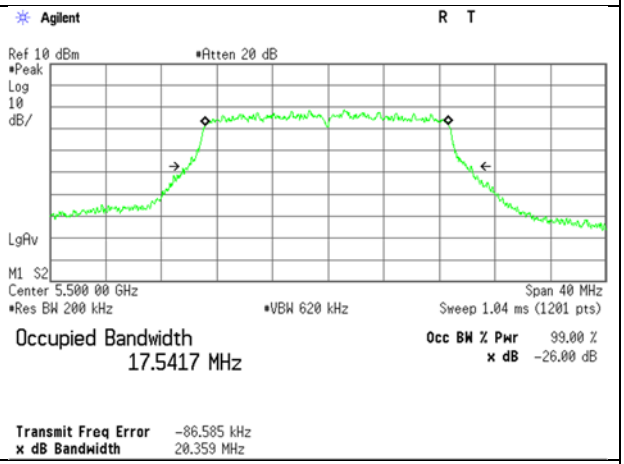
26 dB Emission Bandwidth

11n-20 (SISO), Chain 2

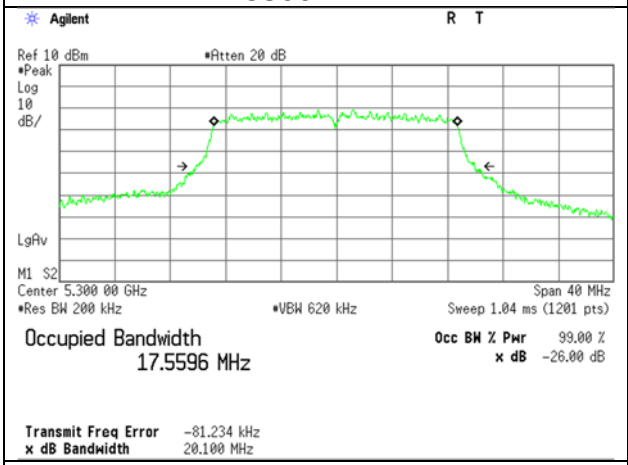
5260 MHz



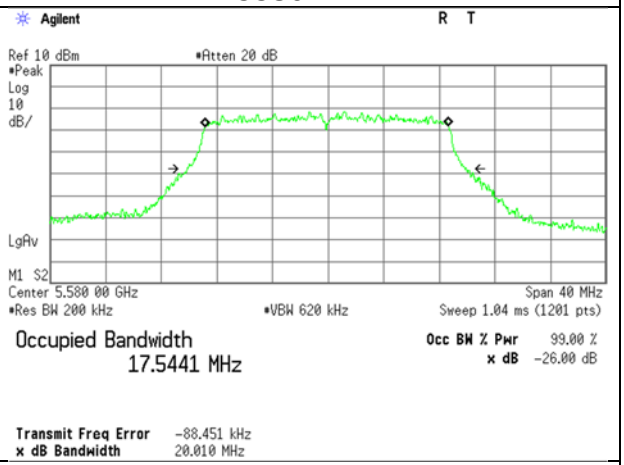
5500 MHz



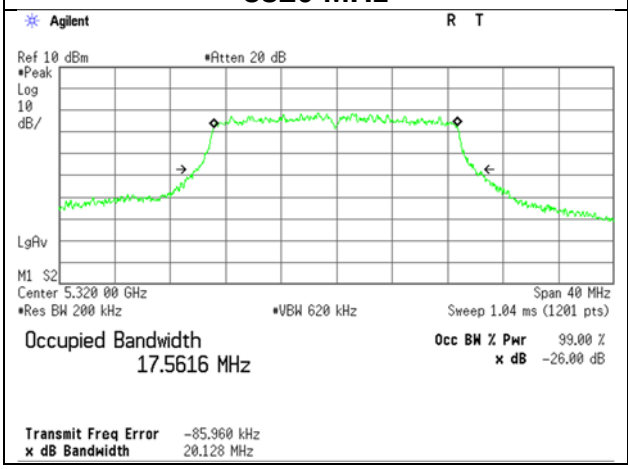
5300 MHz



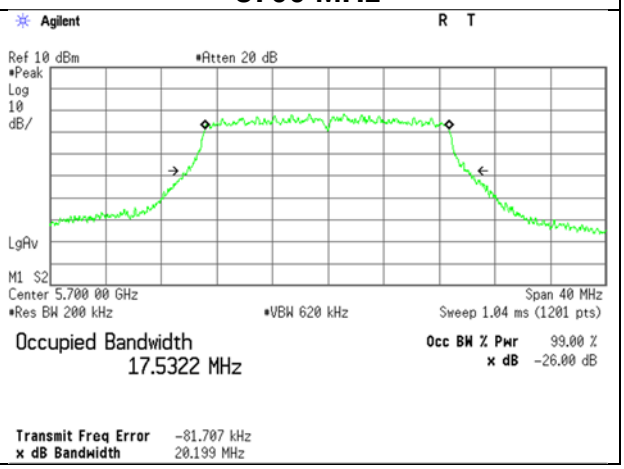
5580 MHz



5320 MHz



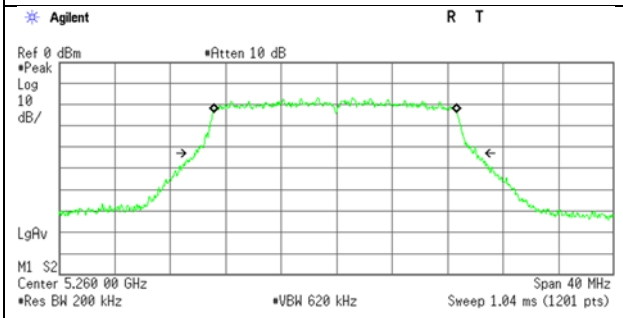
5700 MHz



26 dB Emission Bandwidth

11ac-20 (SISO), Chain 2

5260 MHz

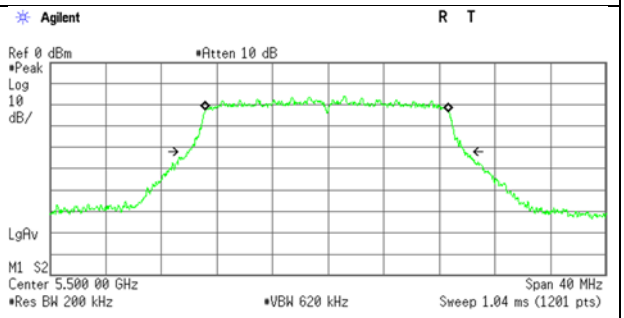


Occupied Bandwidth
17.5430 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -109.386 kHz
x dB Bandwidth 20.196 MHz

5500 MHz

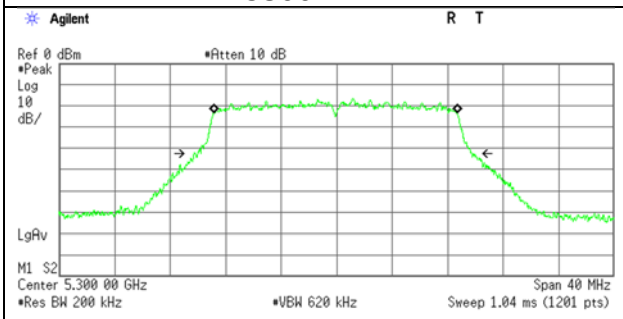


Occupied Bandwidth
17.5370 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -93.717 kHz
x dB Bandwidth 19.929 MHz

5300 MHz

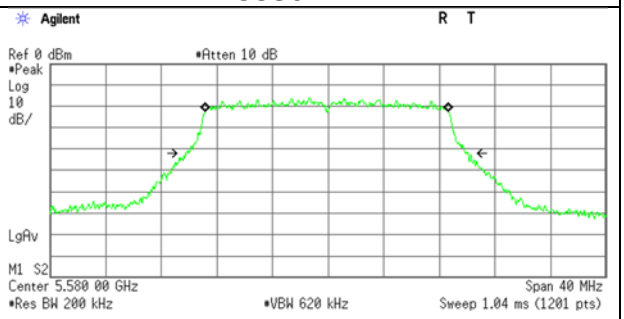


Occupied Bandwidth
17.5678 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -92.872 kHz
x dB Bandwidth 20.083 MHz

5580 MHz

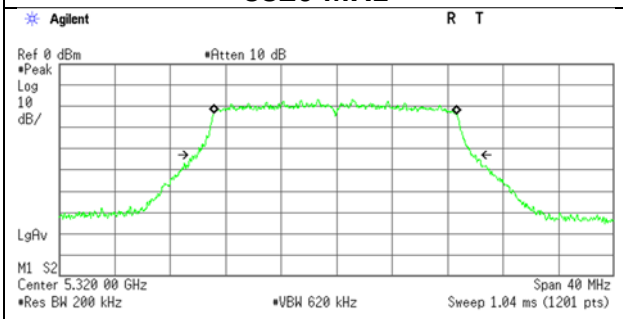


Occupied Bandwidth
17.5528 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -95.482 kHz
x dB Bandwidth 20.244 MHz

5320 MHz

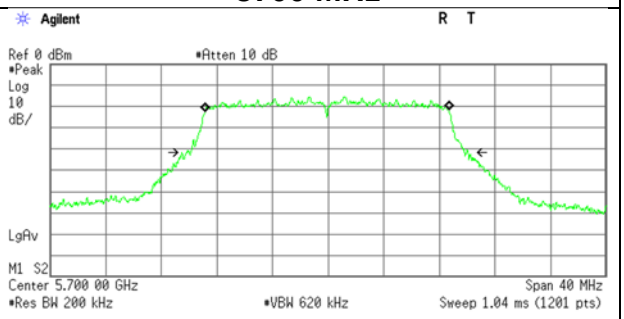


Occupied Bandwidth
17.5451 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -100.993 kHz
x dB Bandwidth 19.932 MHz

5700 MHz



Occupied Bandwidth
17.5524 MHz

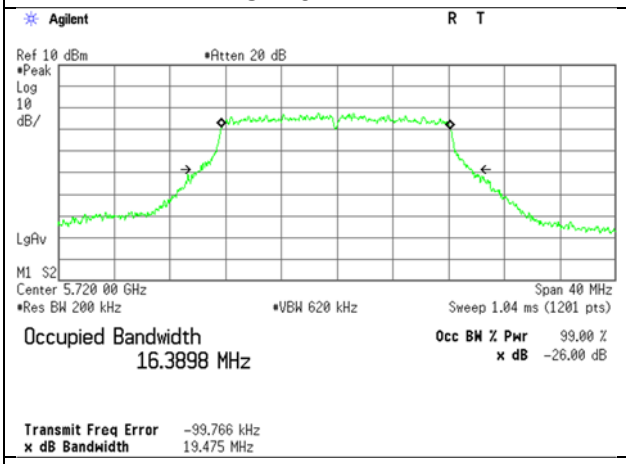
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -81.666 kHz
x dB Bandwidth 20.182 MHz

26 dB Emission Bandwidth

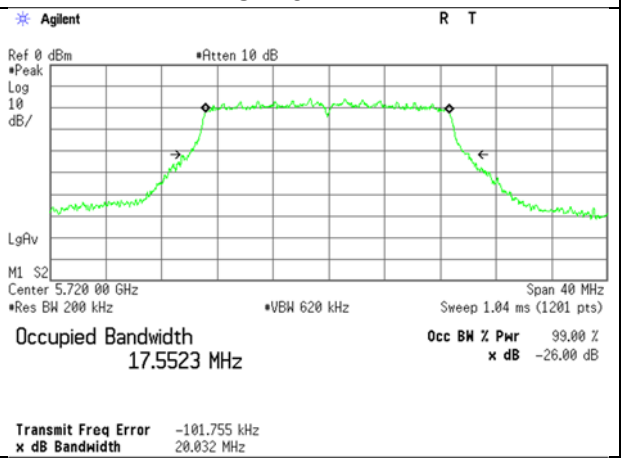
11a (SISO), Chain 2

5720 MHz



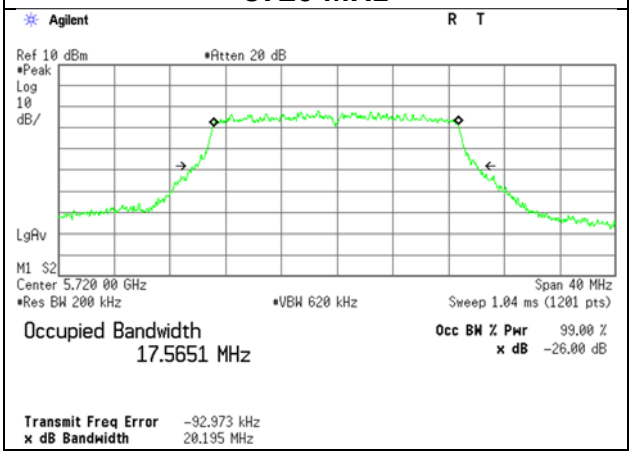
11ac-20 (SISO), Chain 2

5720 MHz



11n-20 (SISO), Chain 2

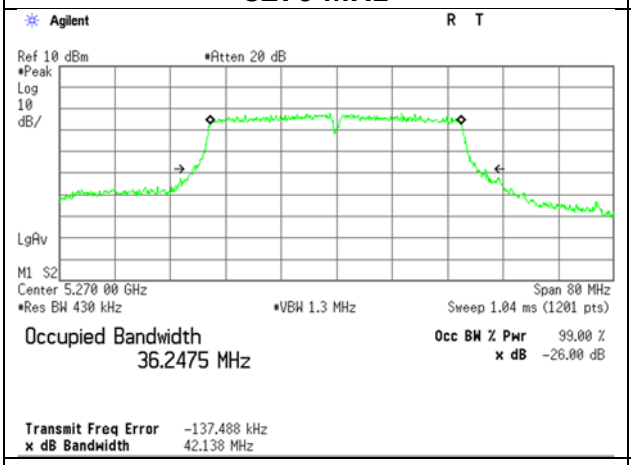
5720 MHz



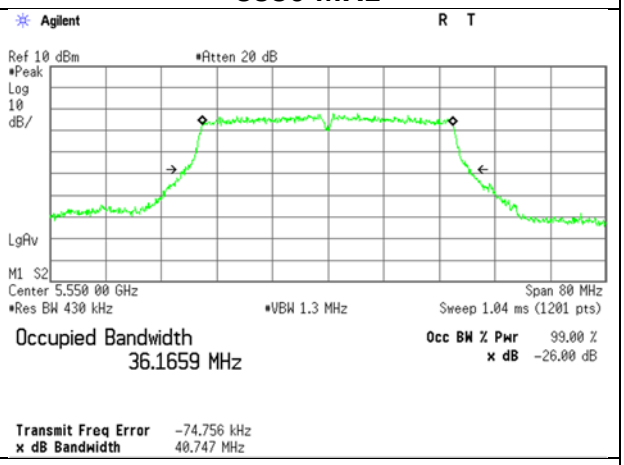
26 dB Emission Bandwidth

11n-40 (SISO), Chain 2

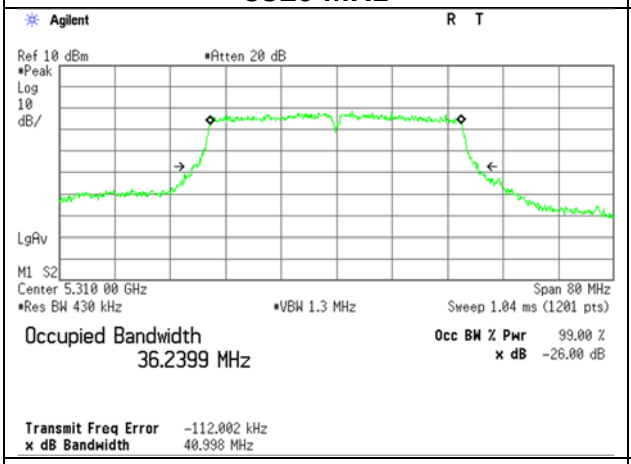
5270 MHz



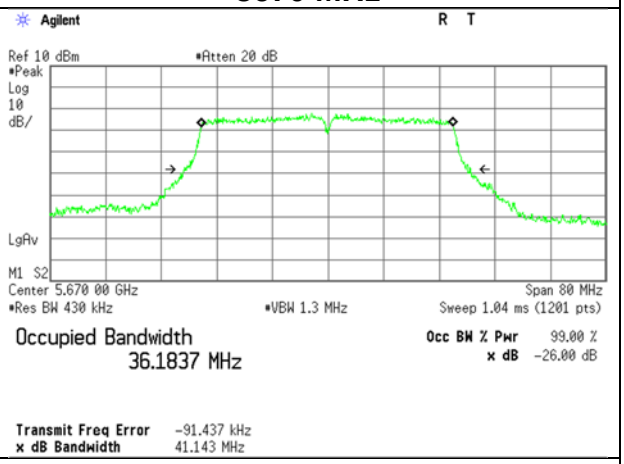
5550 MHz



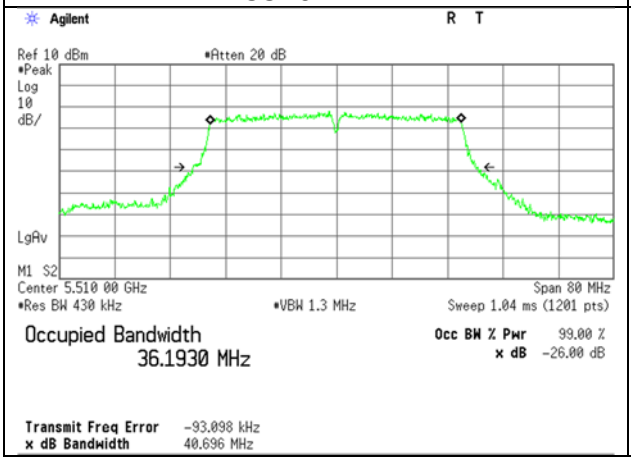
5310 MHz



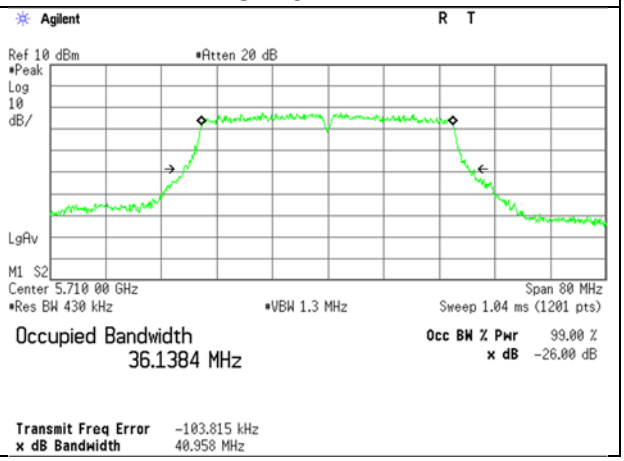
5670 MHz



5510 MHz



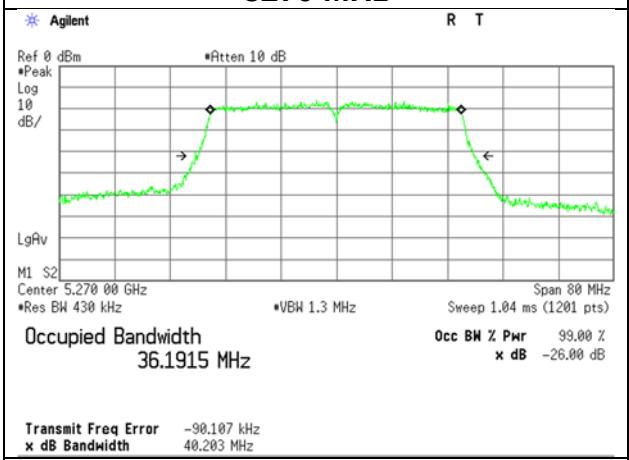
5710 MHz



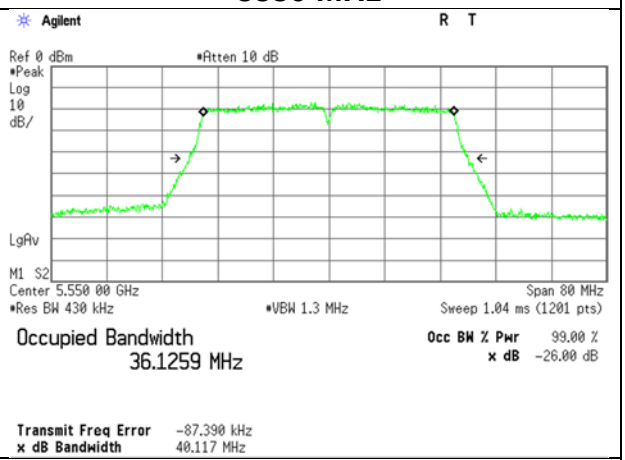
26 dB Emission Bandwidth

11ac-40 (SISO), Chain 2

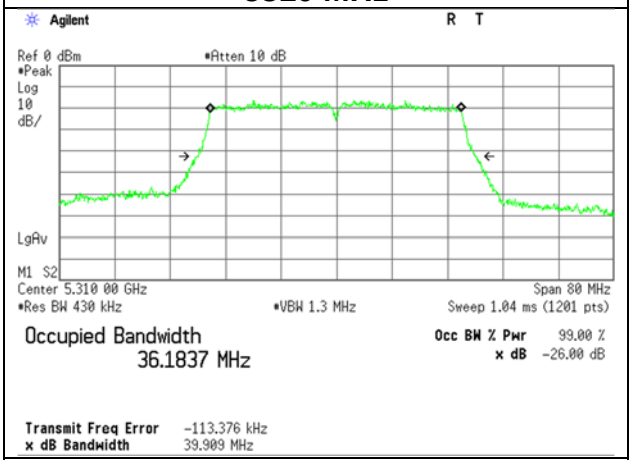
5270 MHz



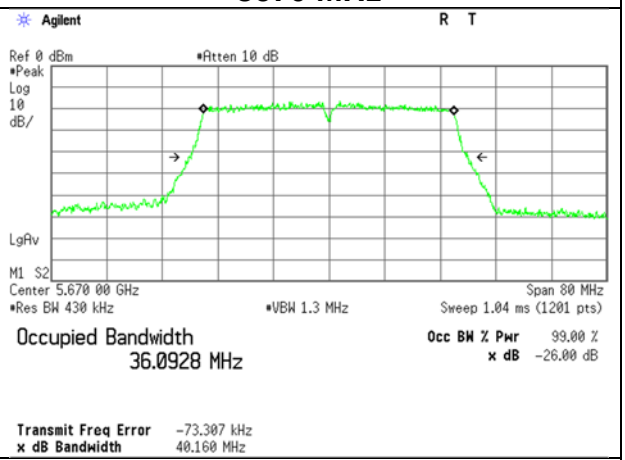
5550 MHz



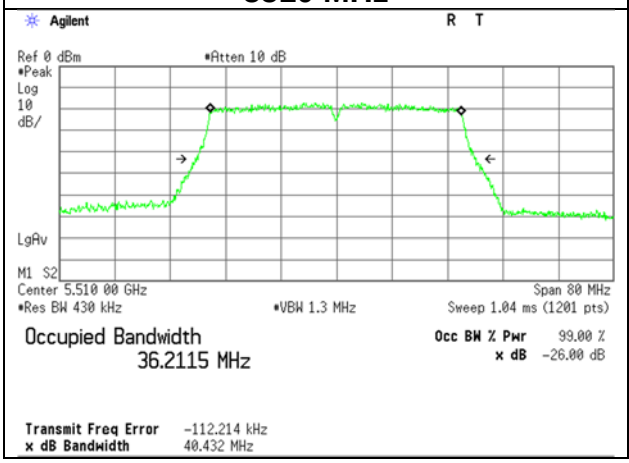
5310 MHz



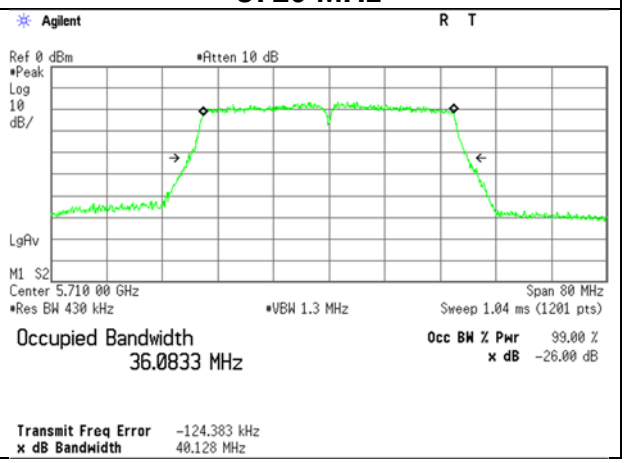
5670 MHz



5510 MHz



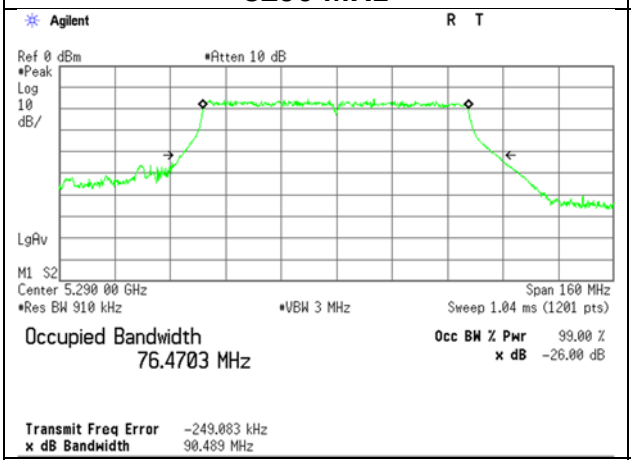
5710 MHz



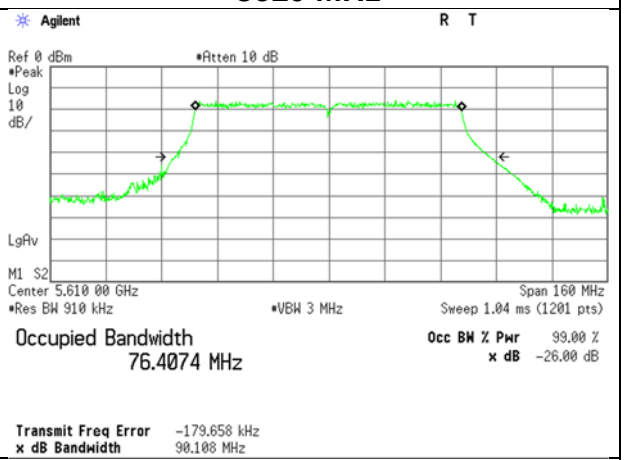
26 dB Emission Bandwidth

11ac-80 (SISO), Chain 2

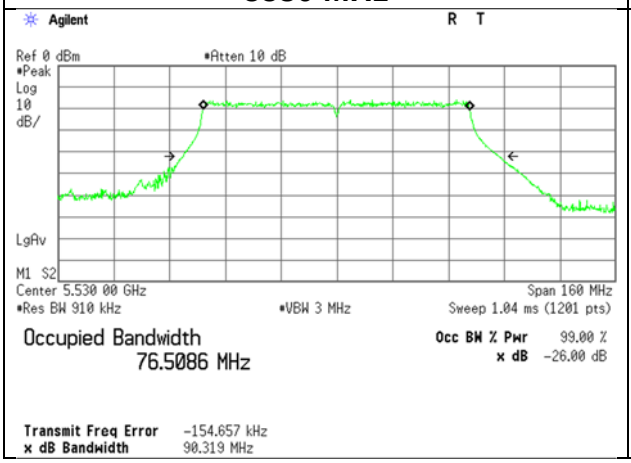
5290 MHz



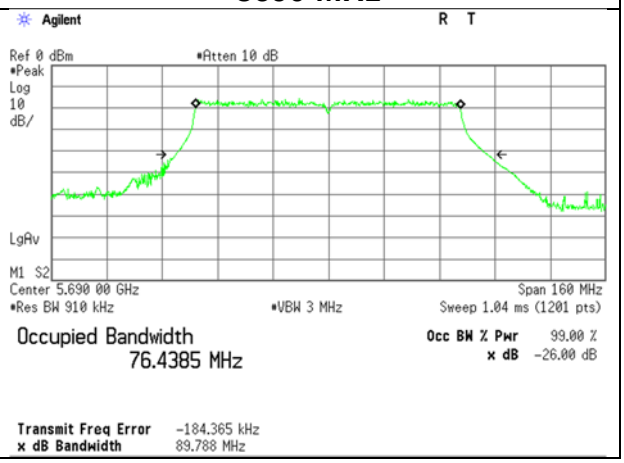
5610 MHz



5530 MHz



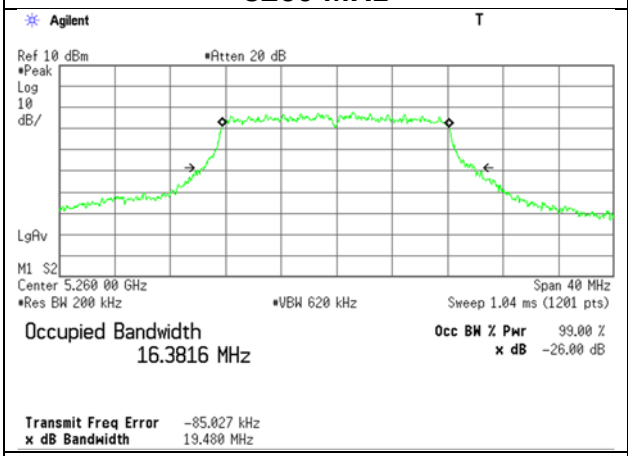
5690 MHz



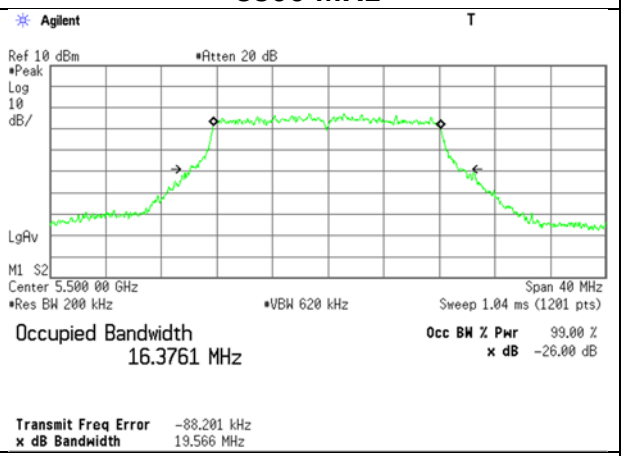
26 dB Emission Bandwidth

11a (CDD), Chain 2

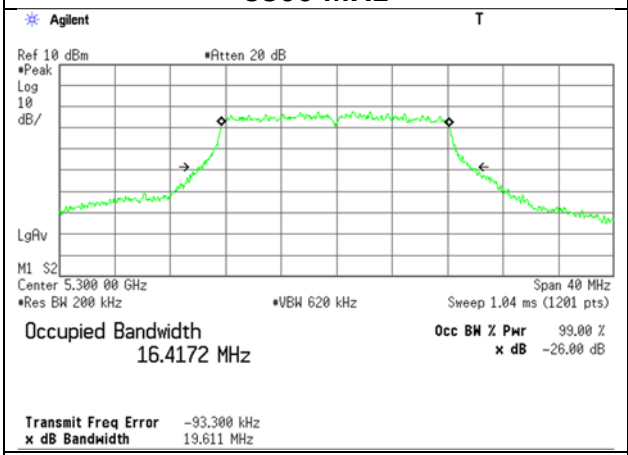
5260 MHz



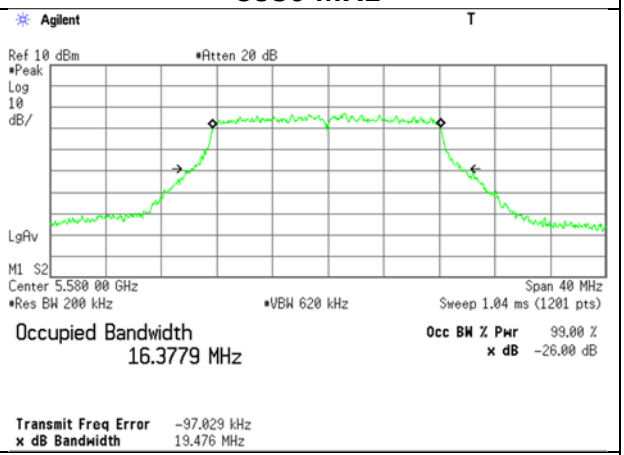
5500 MHz



5300 MHz



5580 MHz



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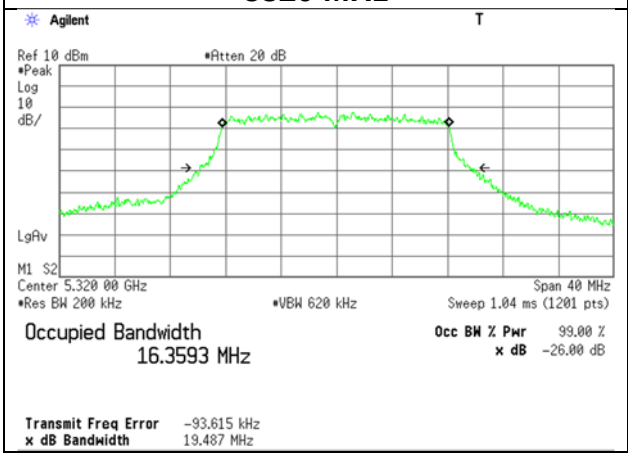
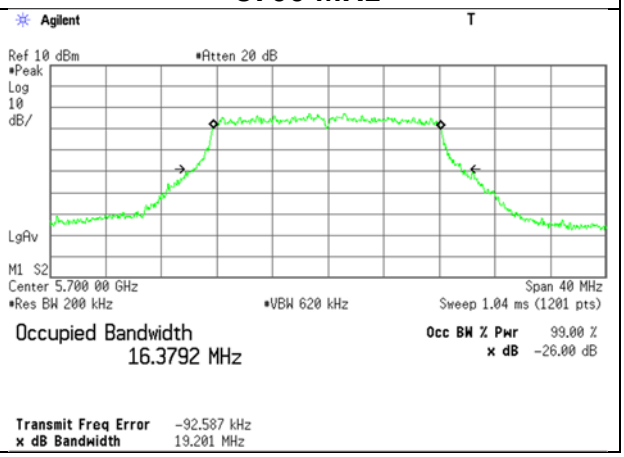


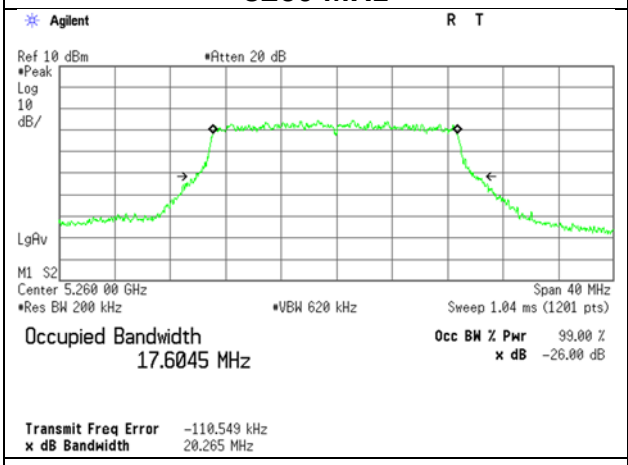
5700 MHz



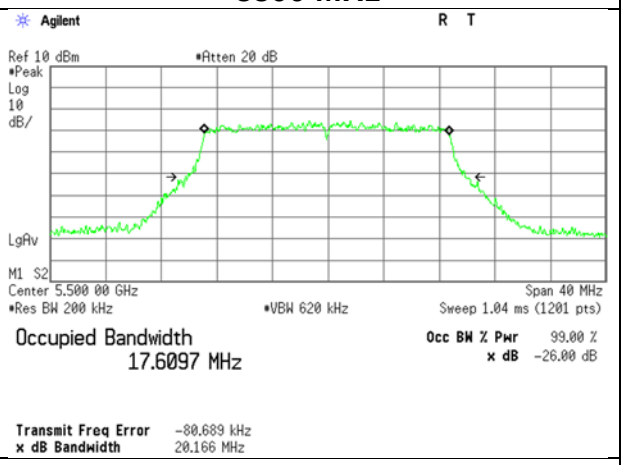
26 dB Emission Bandwidth

11n-20 (CDD), Chain 2

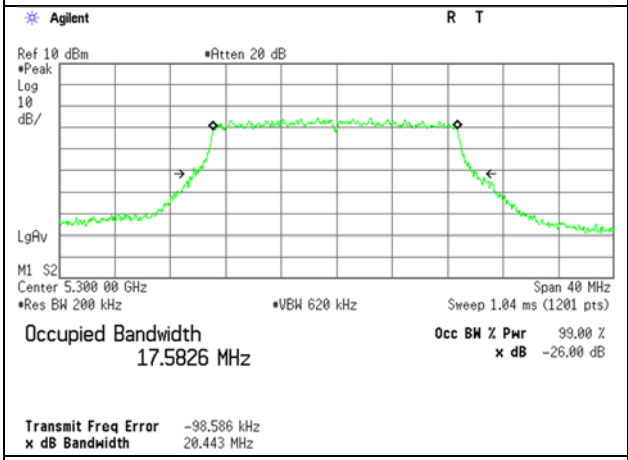
5260 MHz



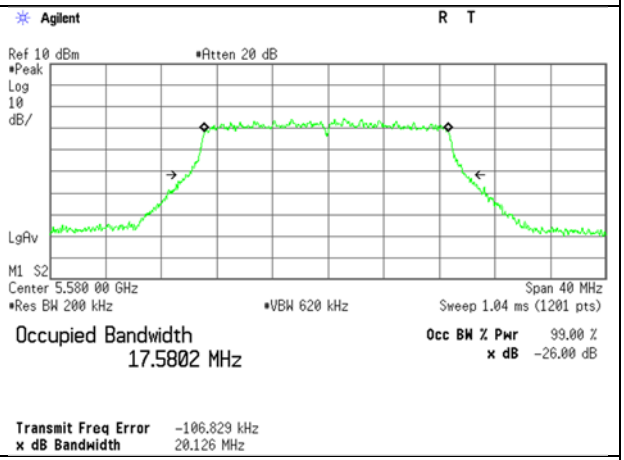
5500 MHz



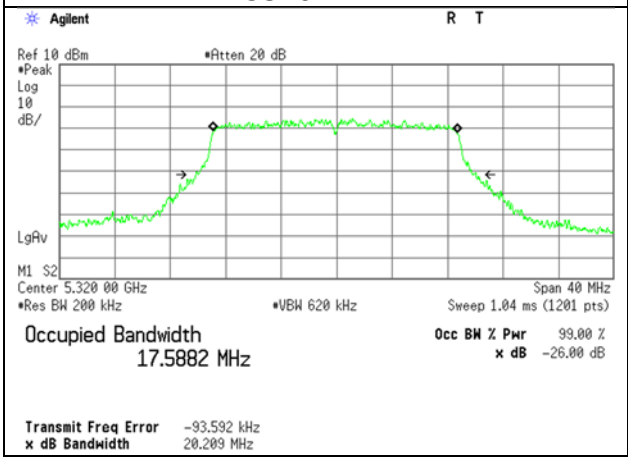
5300 MHz



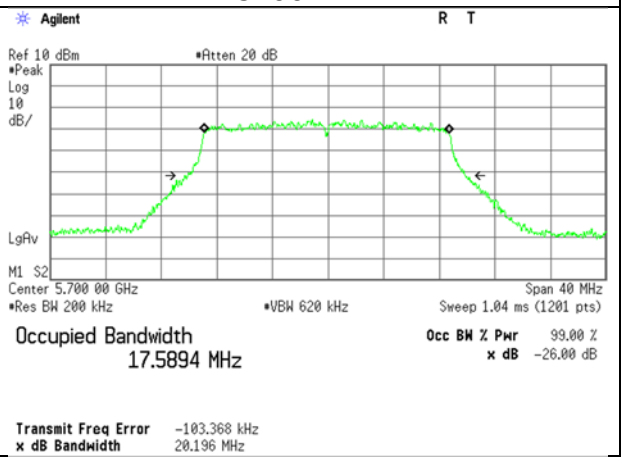
5580 MHz



5320 MHz



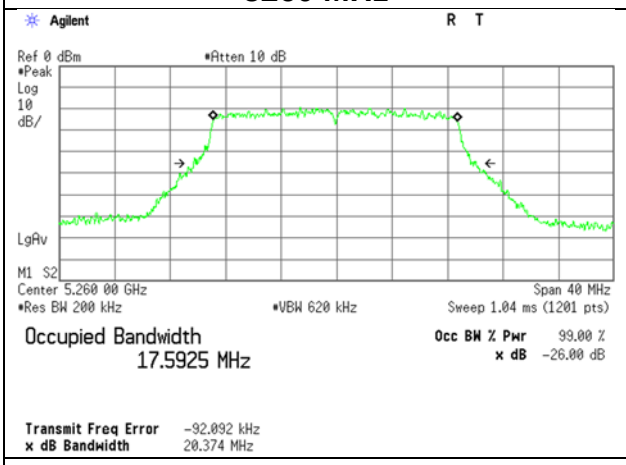
5700 MHz



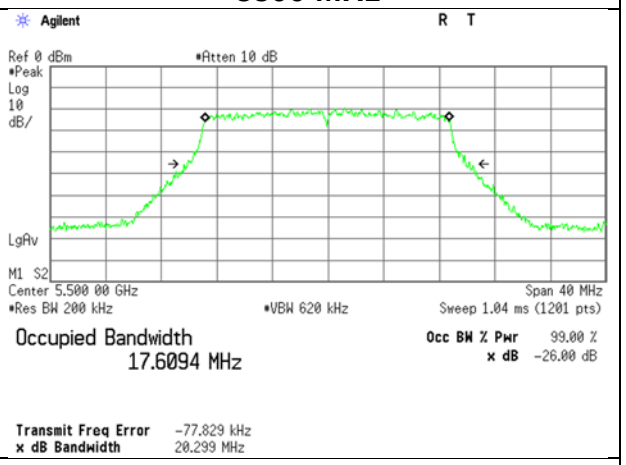
26 dB Emission Bandwidth

11ac-20 (CDD), Chain 2

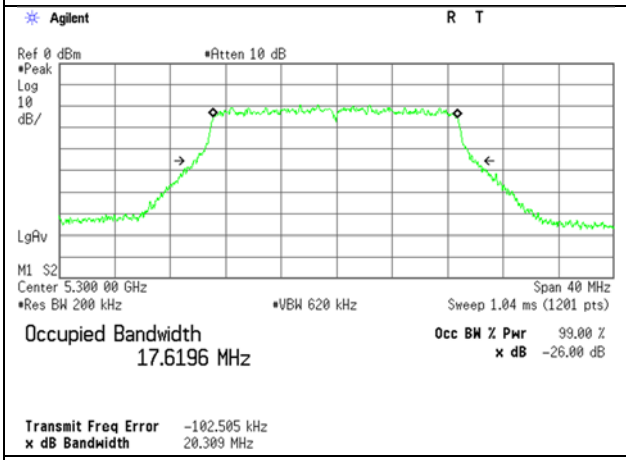
5260 MHz



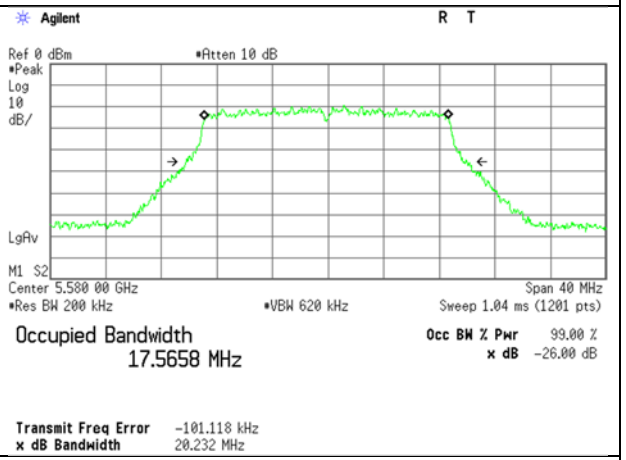
5500 MHz



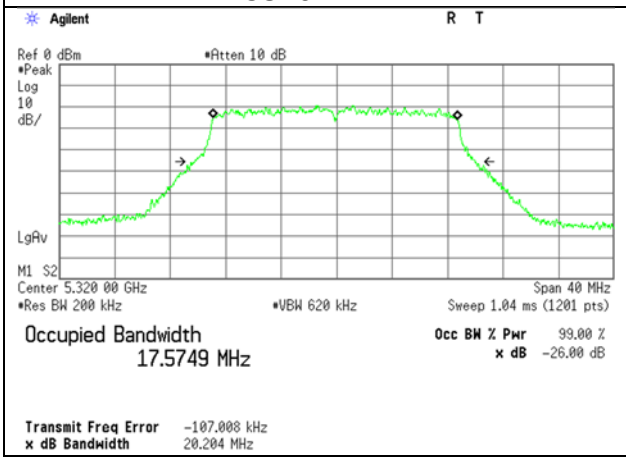
5300 MHz



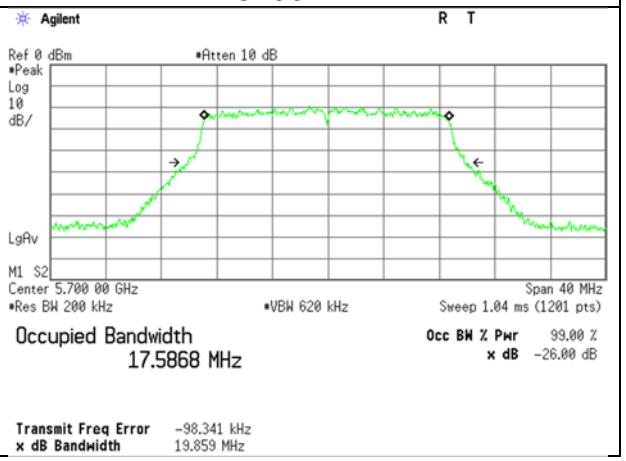
5580 MHz



5320 MHz



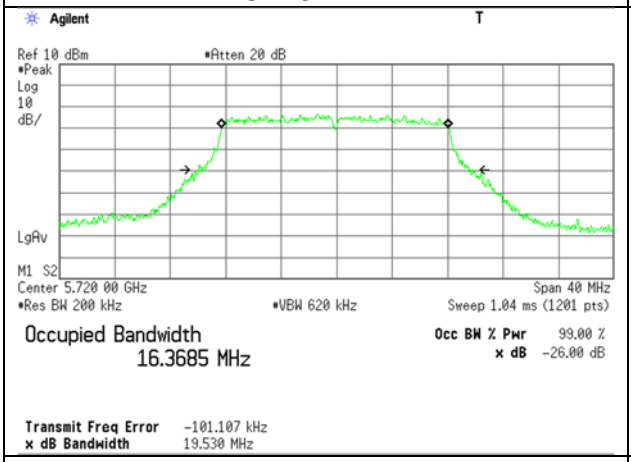
5700 MHz



26 dB Emission Bandwidth

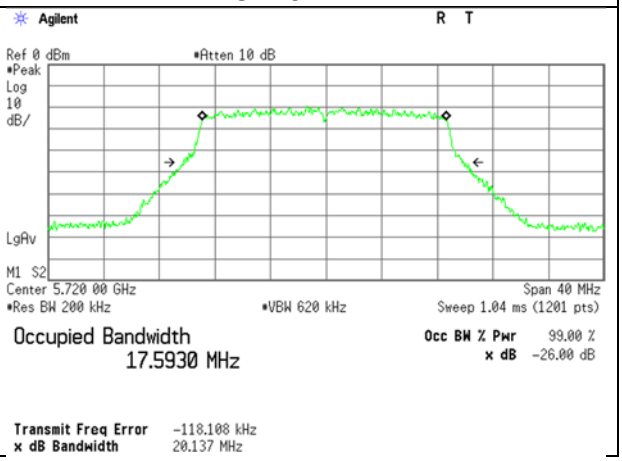
11a (CDD), Chain 2

5720 MHz



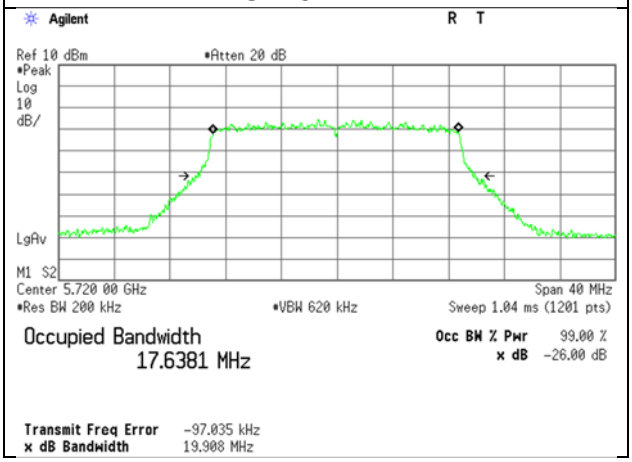
11ac-20 (CDD), Chain 2

5720 MHz



11n-20 (CDD), Chain 2

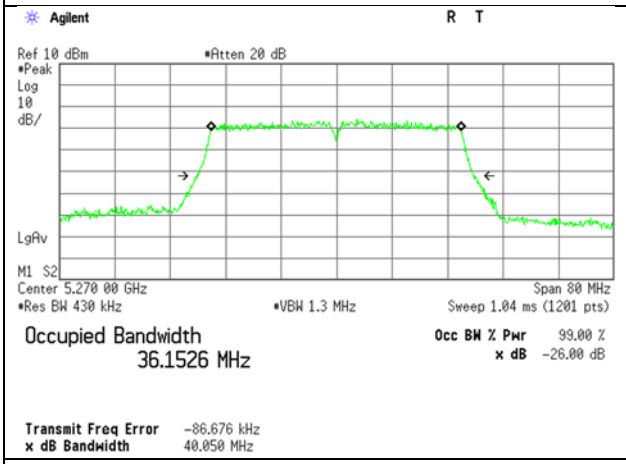
5720 MHz



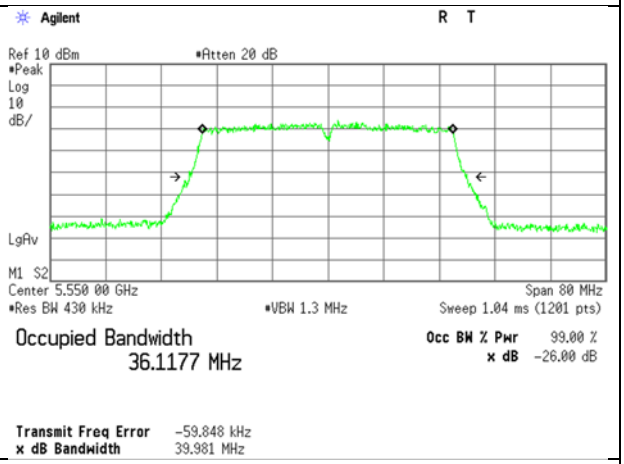
26 dB Emission Bandwidth

11n-40 (CDD), Chain 2

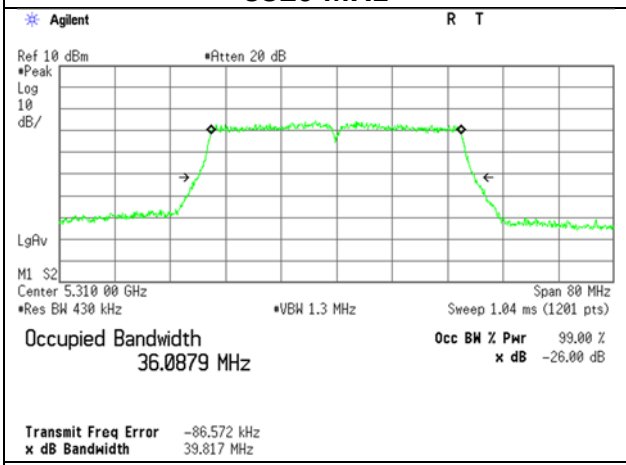
5270 MHz



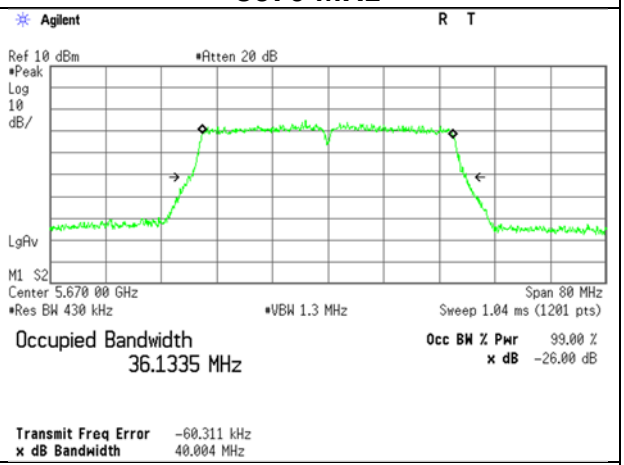
5550 MHz



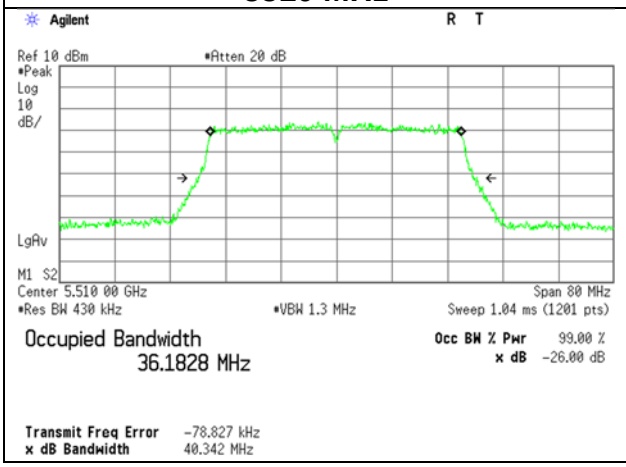
5310 MHz



5670 MHz



5510 MHz



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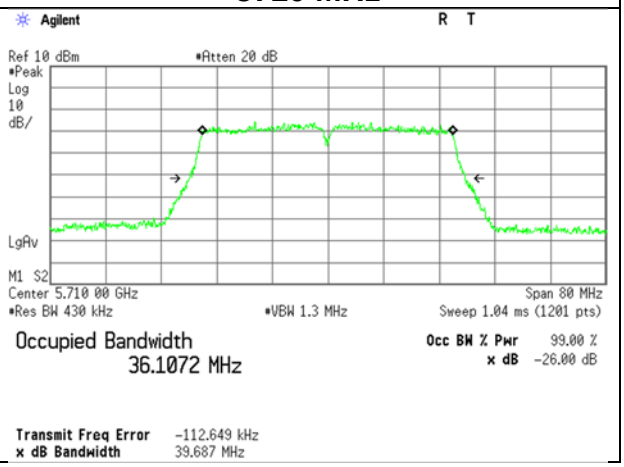
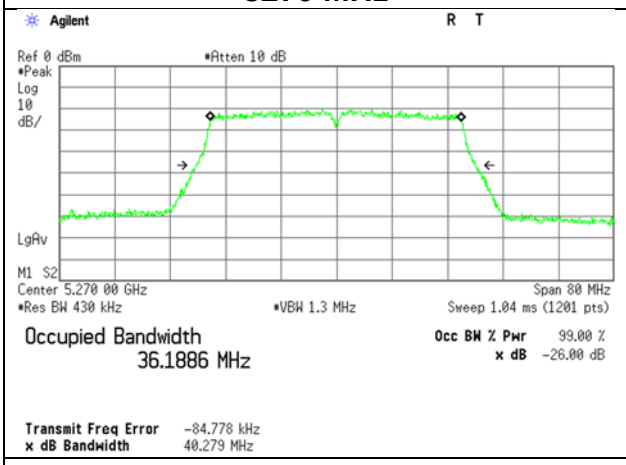


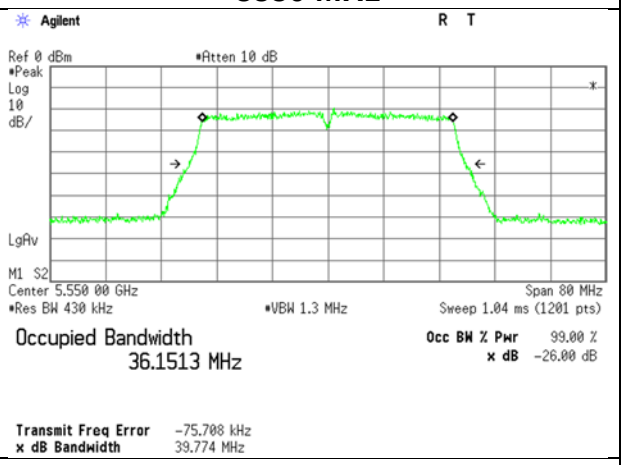
26 dB Emission Bandwidth

11ac-40 (CDD), Chain 2

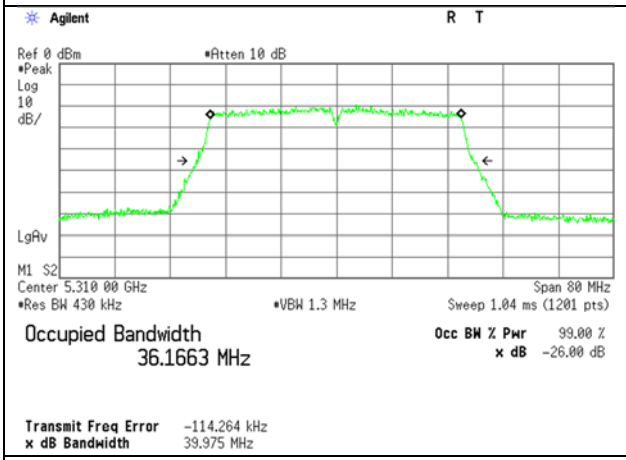
5270 MHz



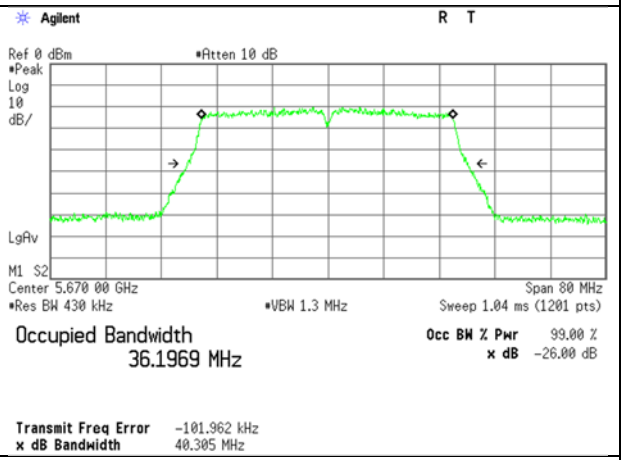
5550 MHz



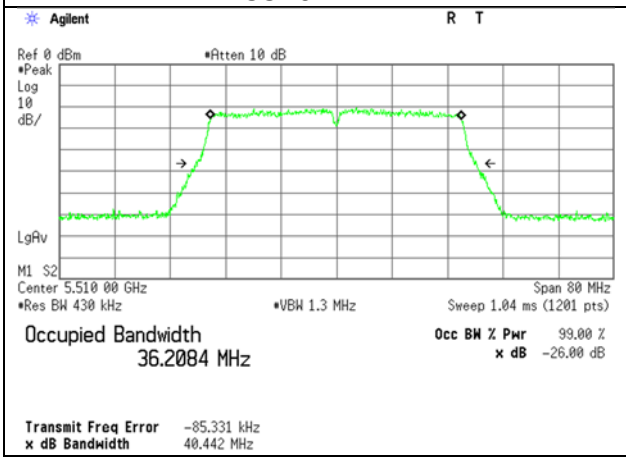
5310 MHz



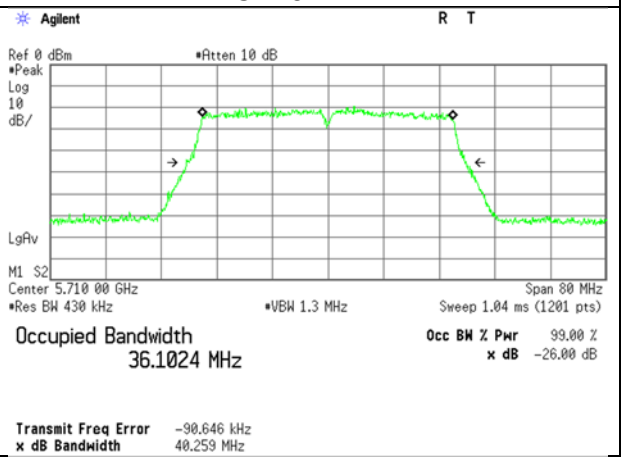
5670 MHz



5510 MHz



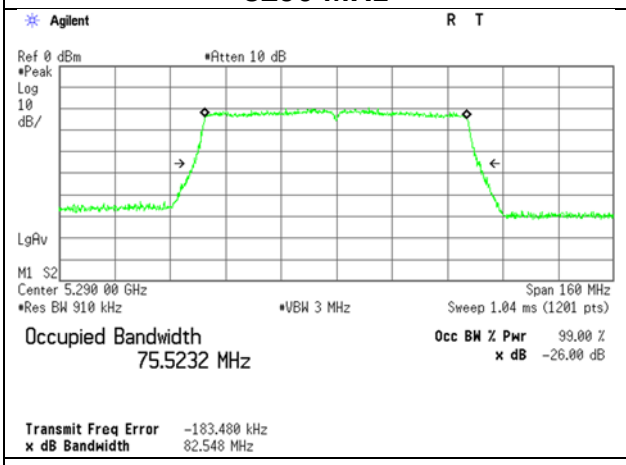
5710 MHz



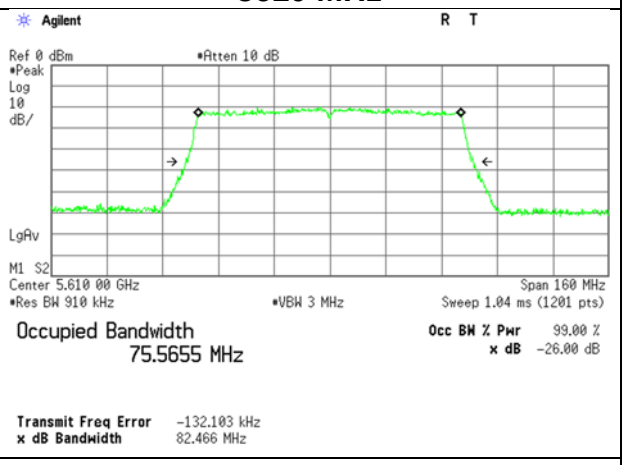
26 dB Emission Bandwidth

11ac-80 (CDD), Chain 2

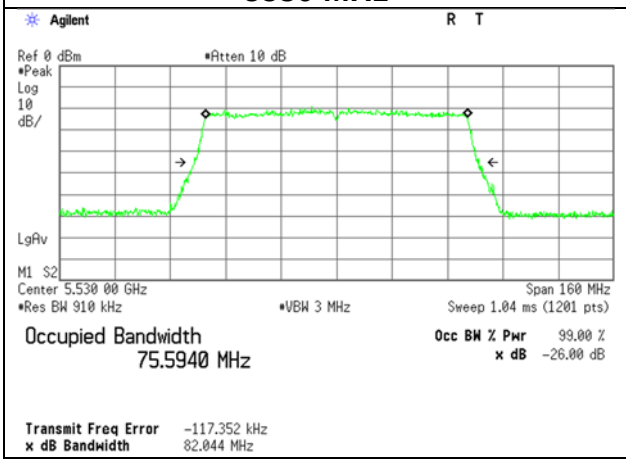
5290 MHz



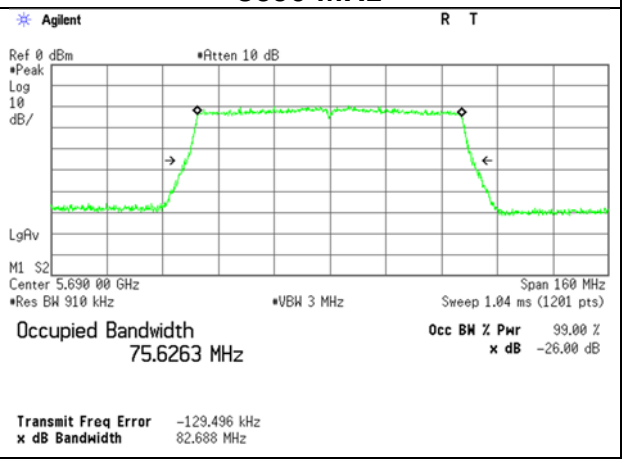
5610 MHz



5530 MHz



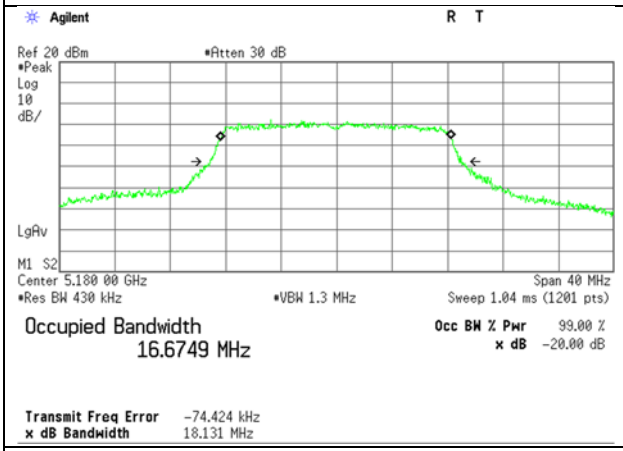
5690 MHz



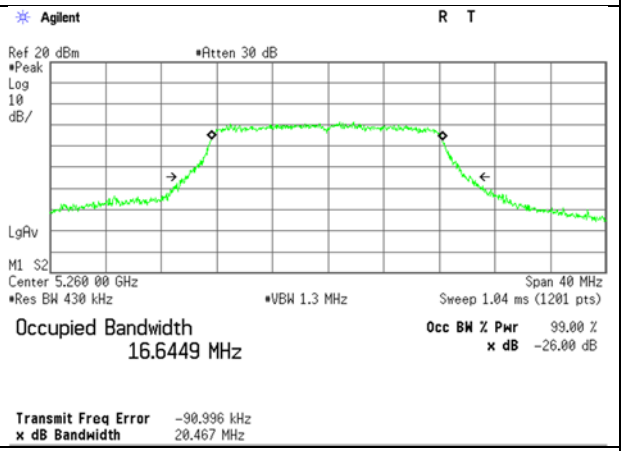
99 % Occupied Bandwidth

11a (SISO), Chain 2

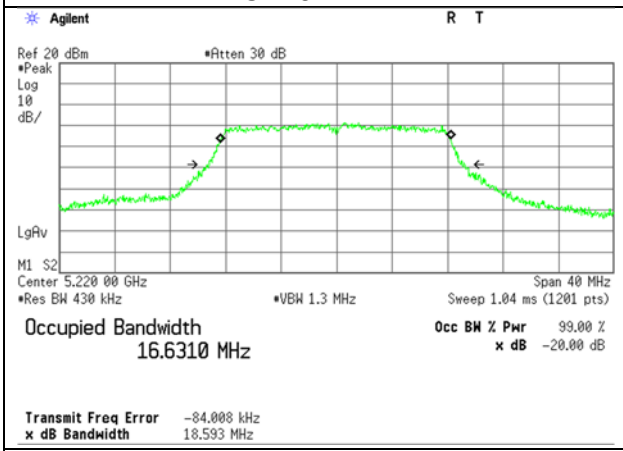
5180 MHz



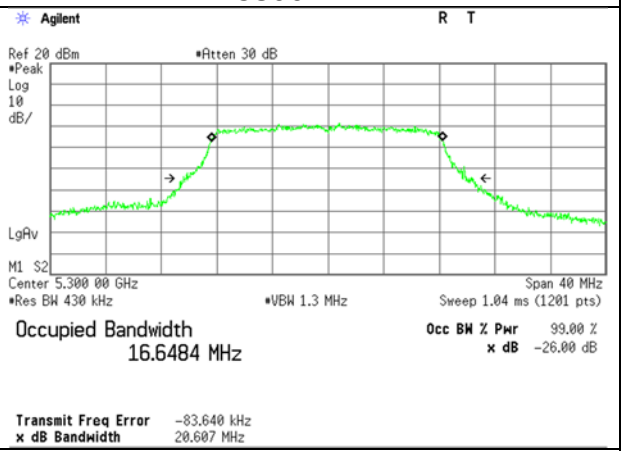
5260 MHz



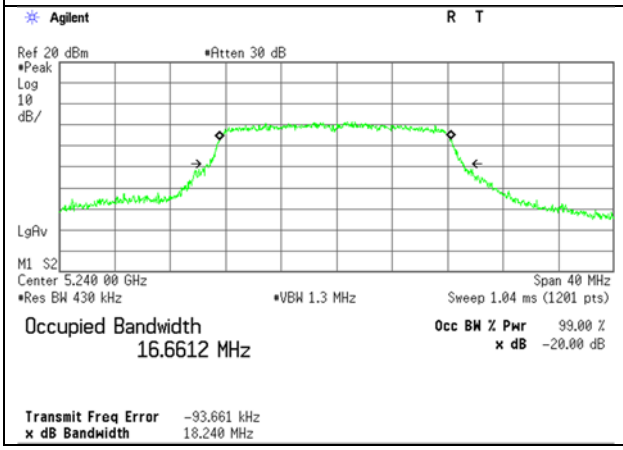
5220 MHz



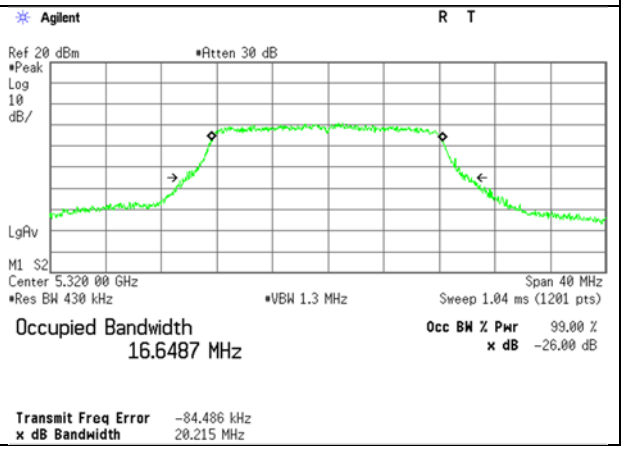
5300 MHz



5240 MHz



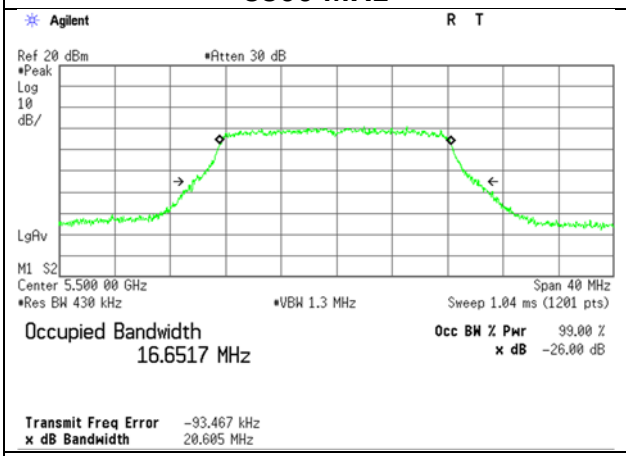
5320 MHz



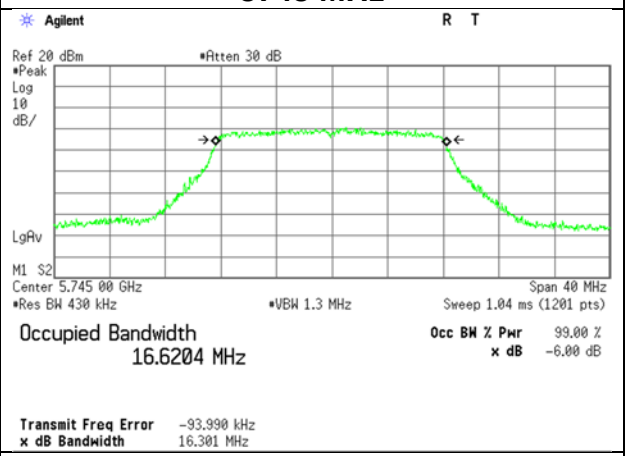
99 % Occupied Bandwidth

11a (SISO), Chain 2

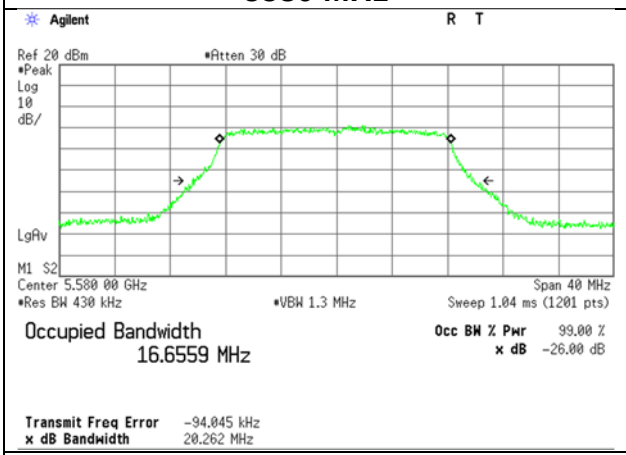
5500 MHz



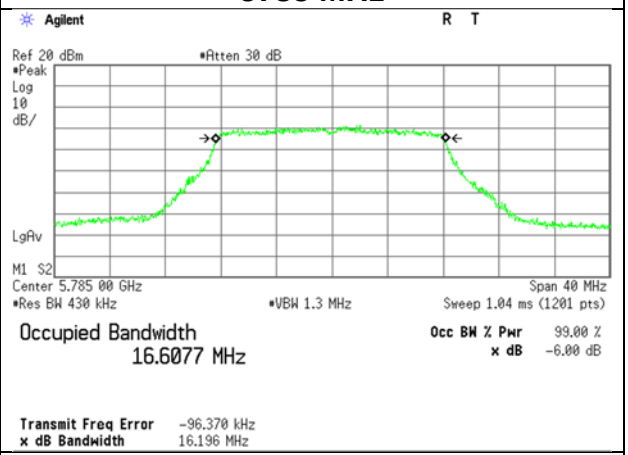
5745 MHz



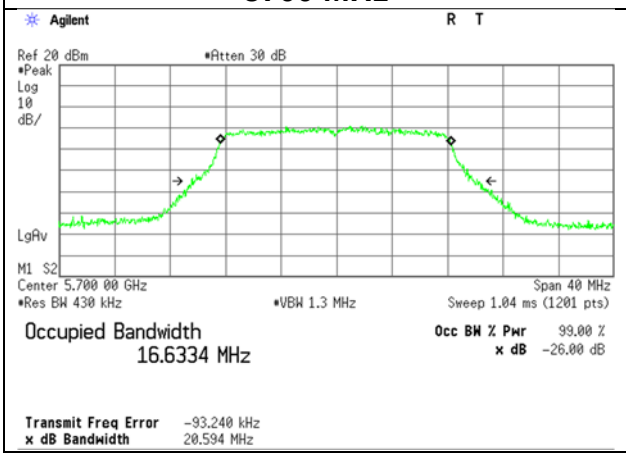
5580 MHz



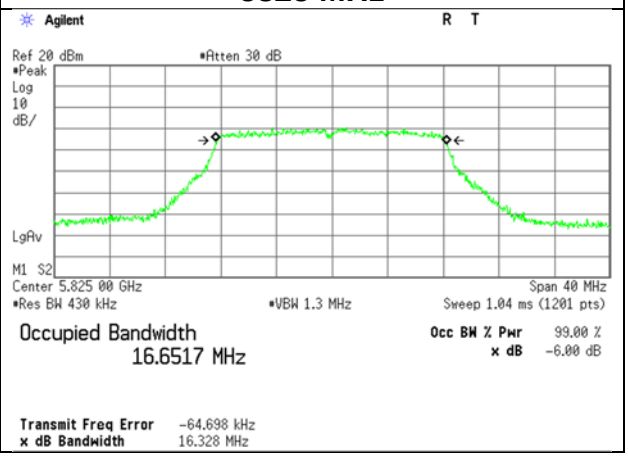
5785 MHz



5700 MHz



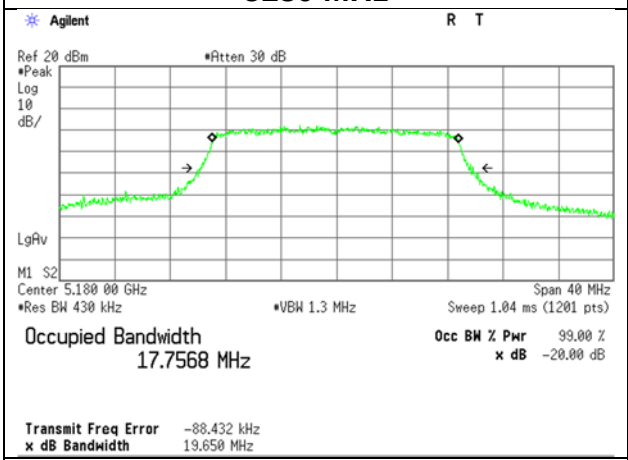
5825 MHz



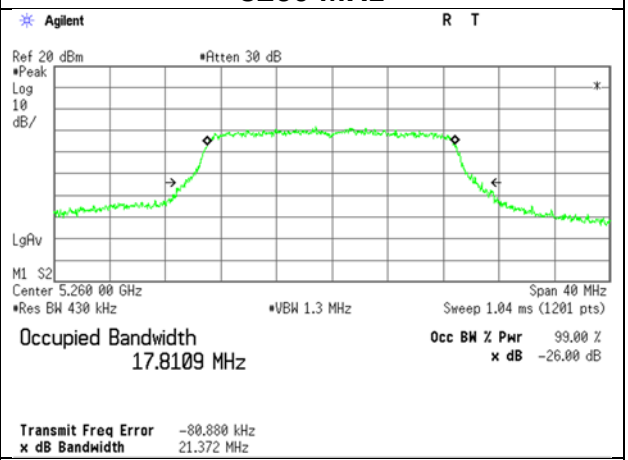
99 % Occupied Bandwidth

11n-20 (SISO), Chain 2

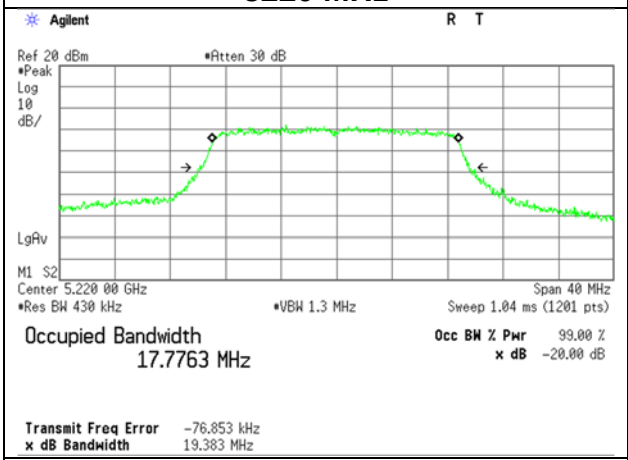
5180 MHz



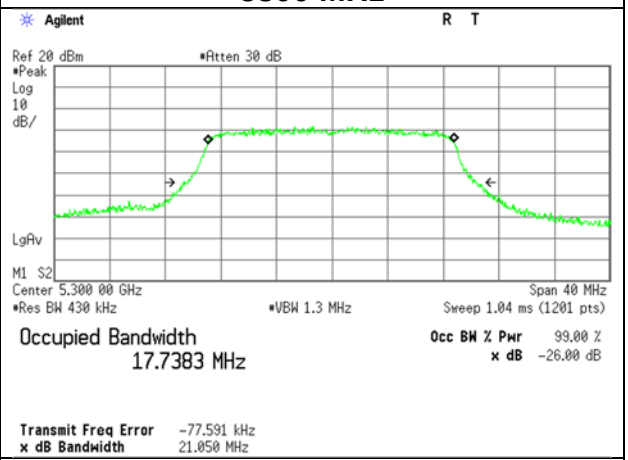
5260 MHz



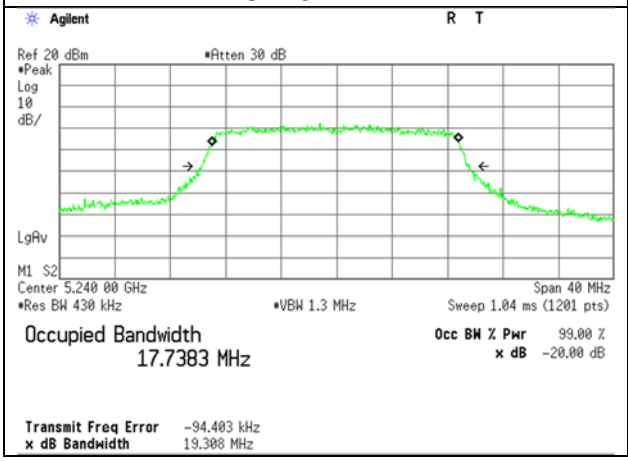
5220 MHz



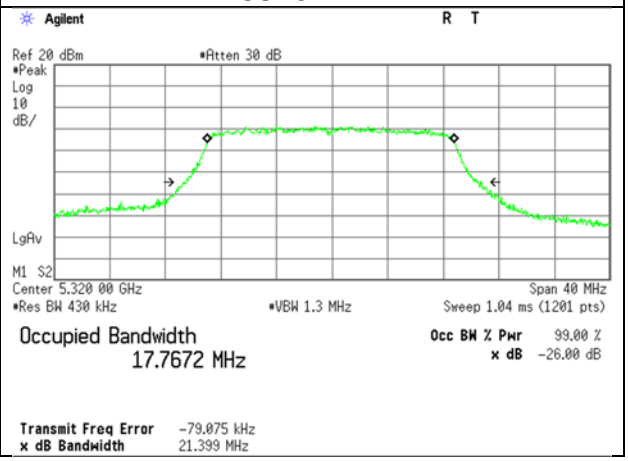
5300 MHz



5240 MHz



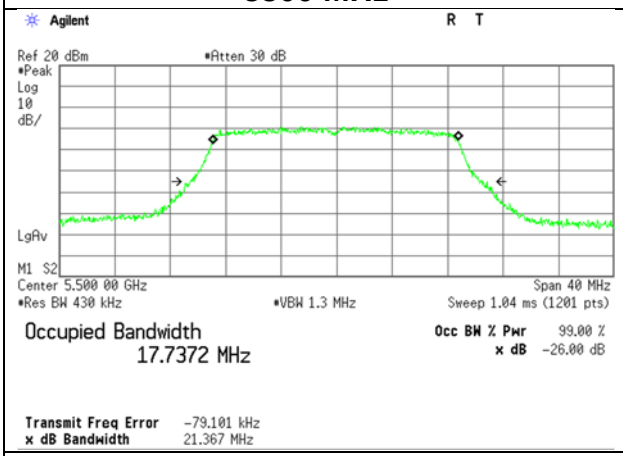
5320 MHz



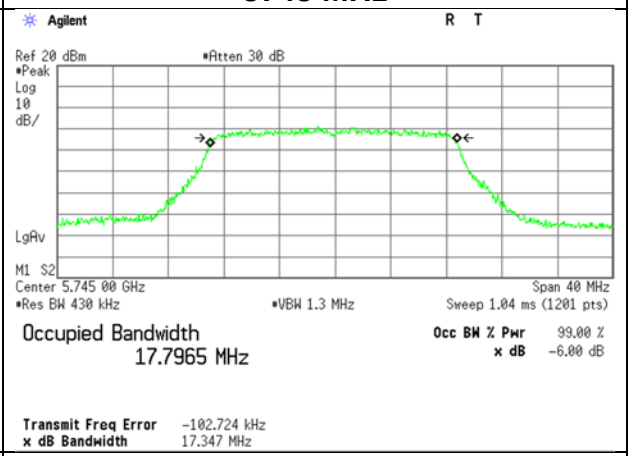
99 % Occupied Bandwidth

11n-20 (SISO), Chain 2

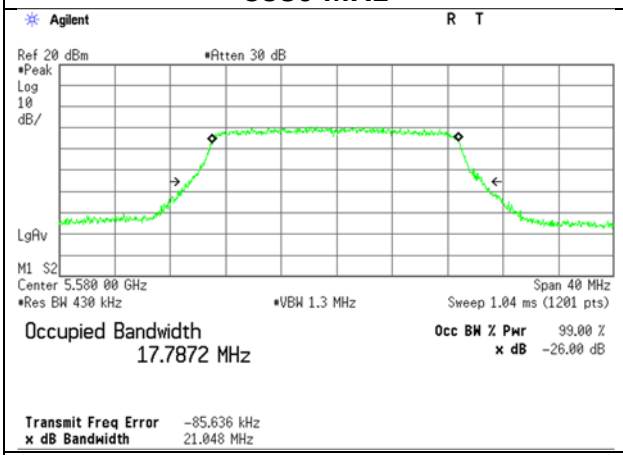
5500 MHz



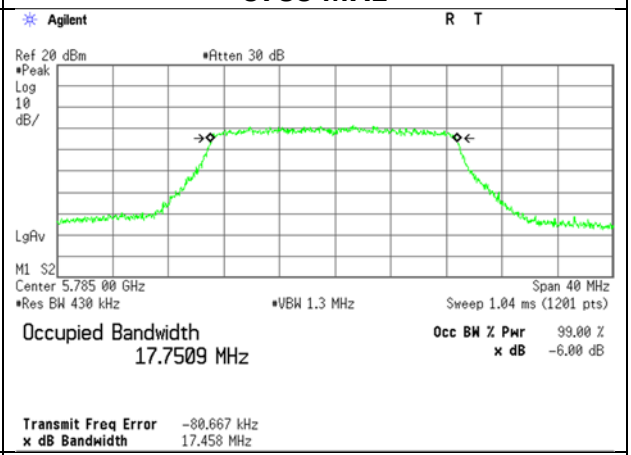
5745 MHz



5580 MHz



5785 MHz



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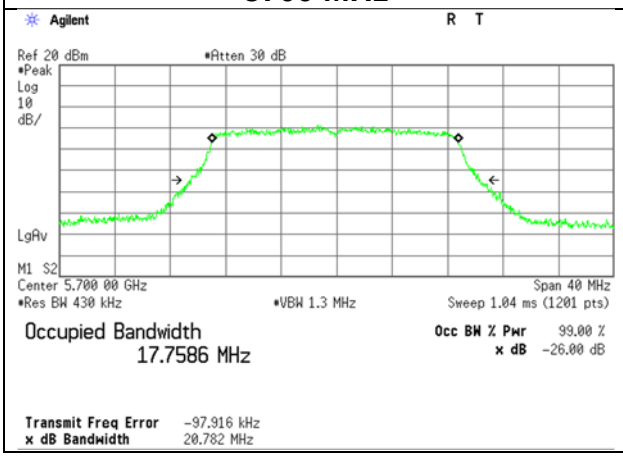
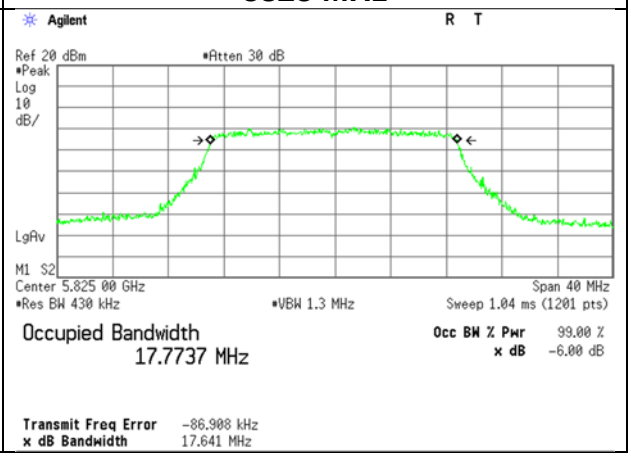


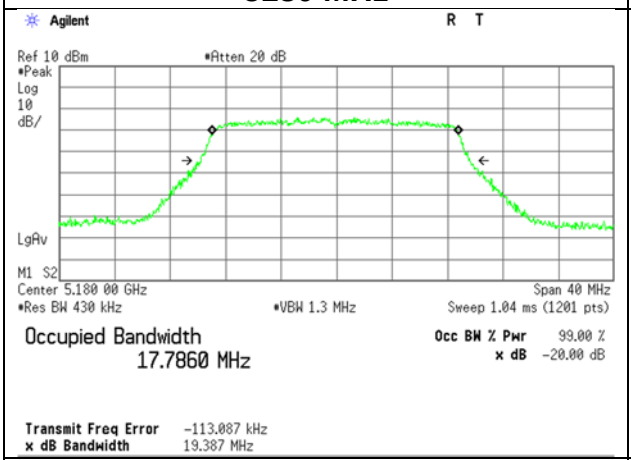
5825 MHz



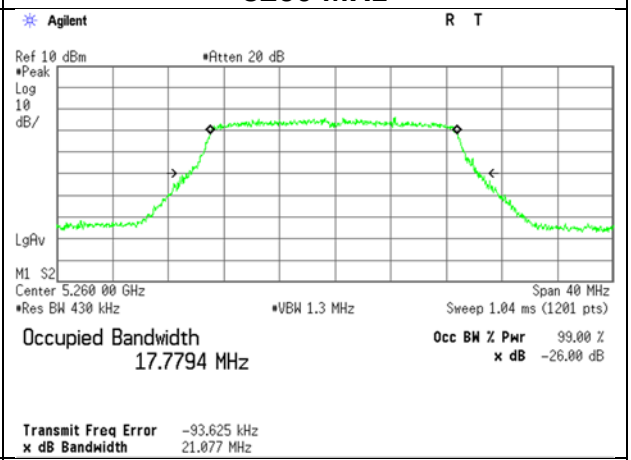
99 % Occupied Bandwidth

11ac-20 (SISO), Chain 2

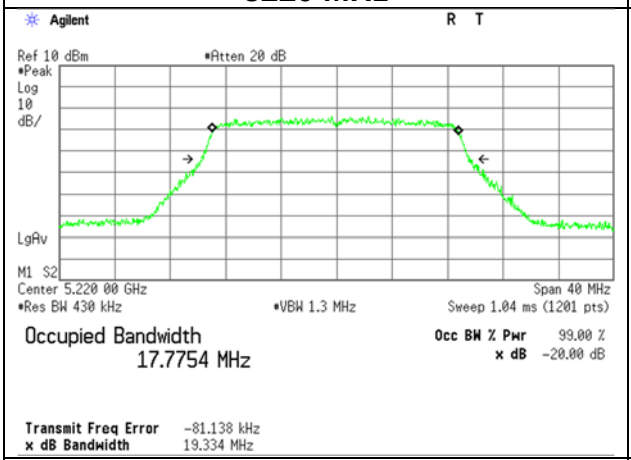
5180 MHz



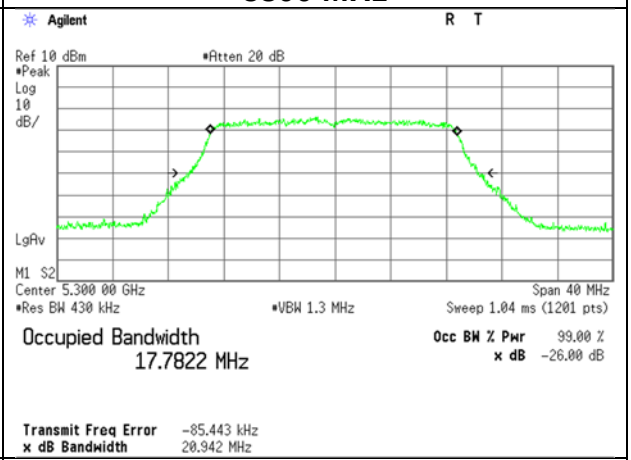
5260 MHz



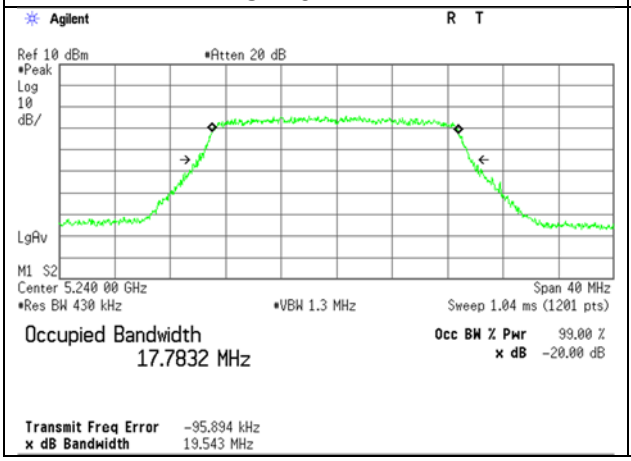
5220 MHz



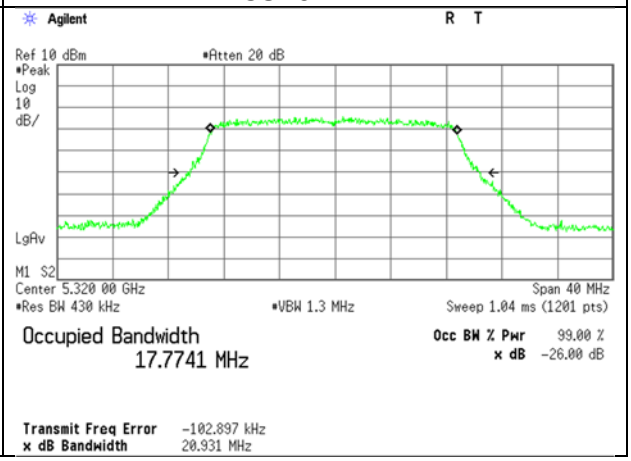
5300 MHz



5240 MHz



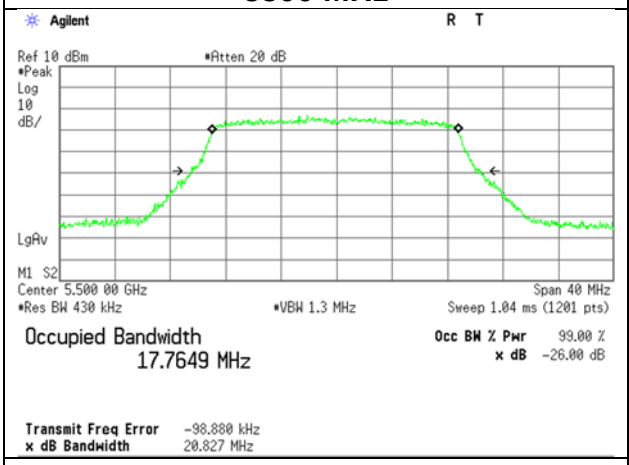
5320 MHz



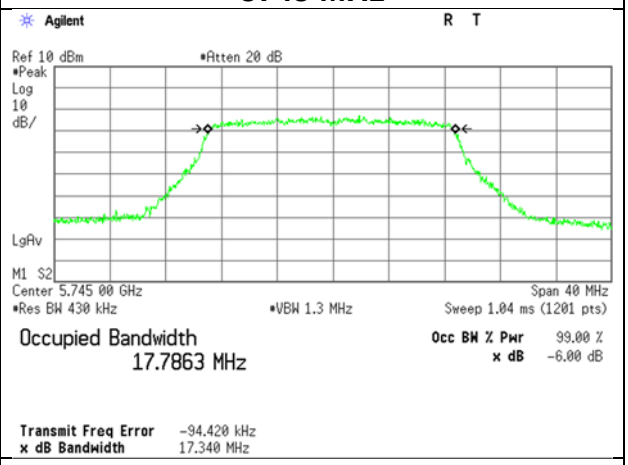
99 % Occupied Bandwidth

11ac-20 (SISO), Chain 2

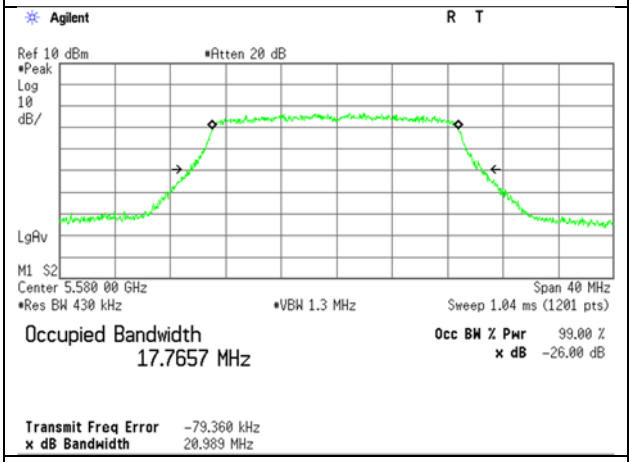
5500 MHz



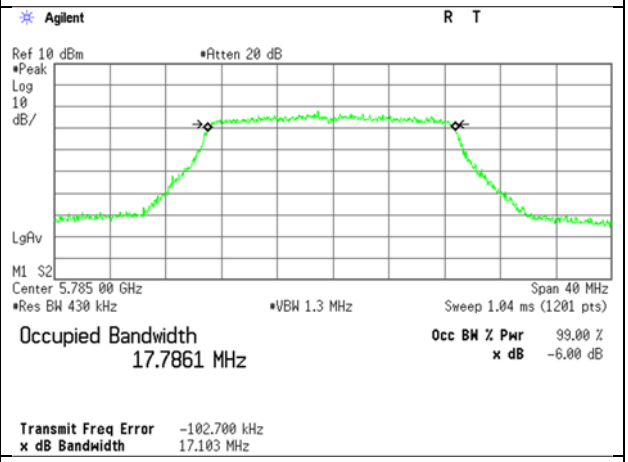
5745 MHz



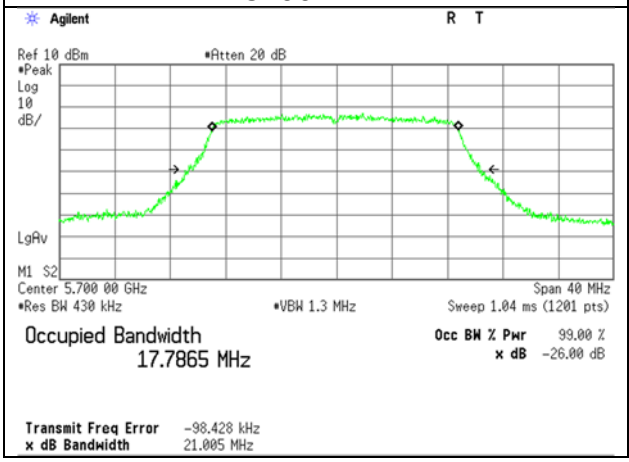
5580 MHz



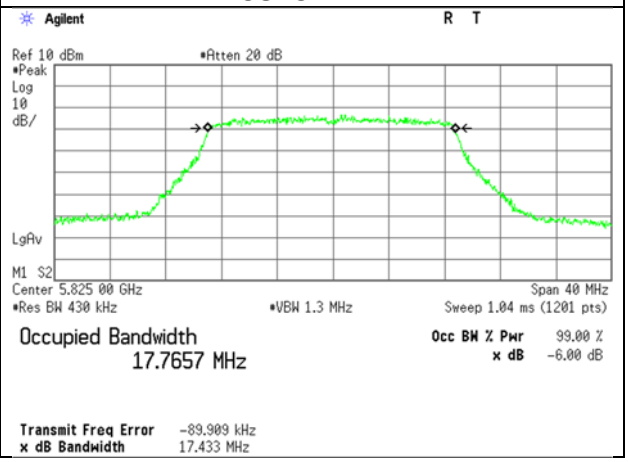
5785 MHz



5700 MHz



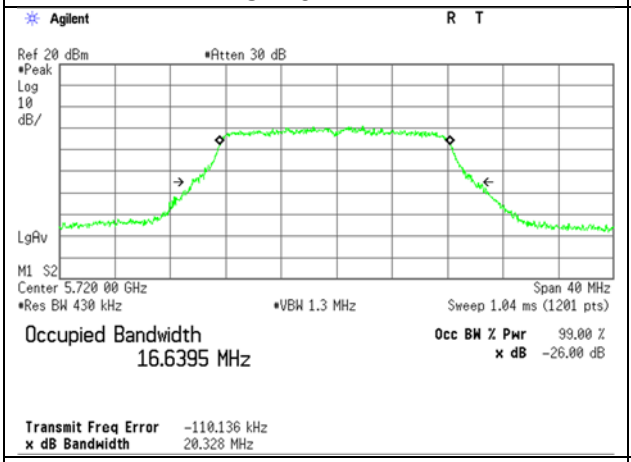
5825 MHz



99 % Occupied Bandwidth

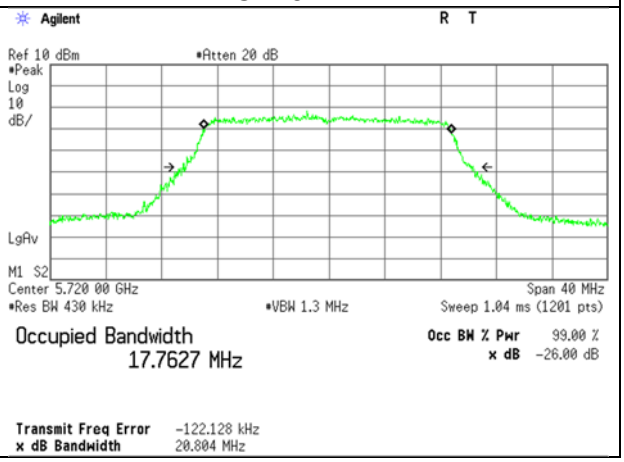
11a (SISO), Chain 2

5720 MHz



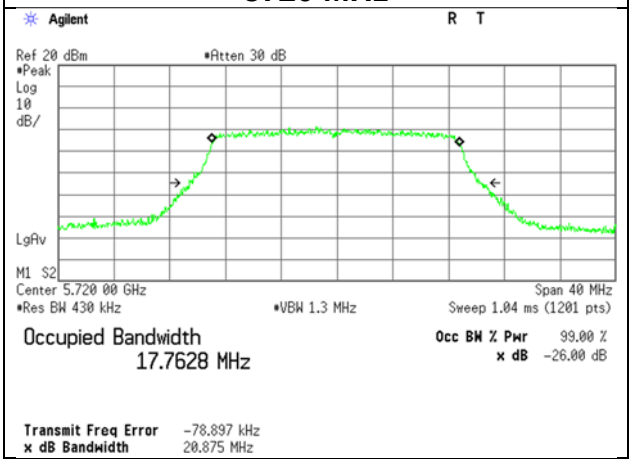
11ac-20 (SISO), Chain 2

5720 MHz



11n-20 (SISO), Chain 2

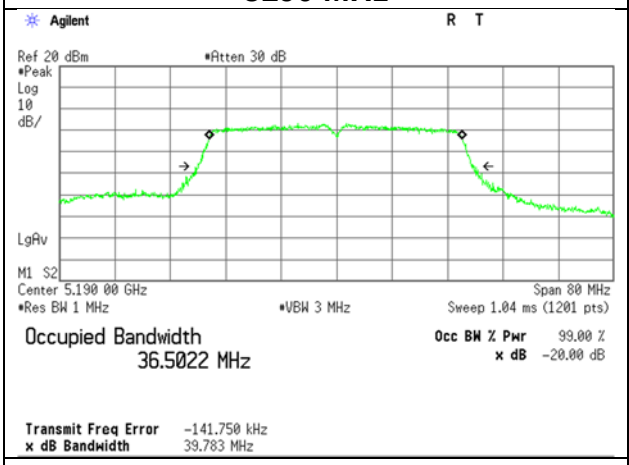
5720 MHz



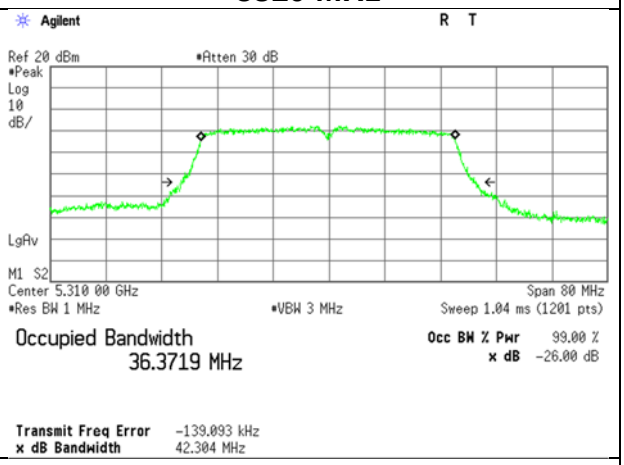
99 % Occupied Bandwidth

11n-40 (SISO), Chain 2

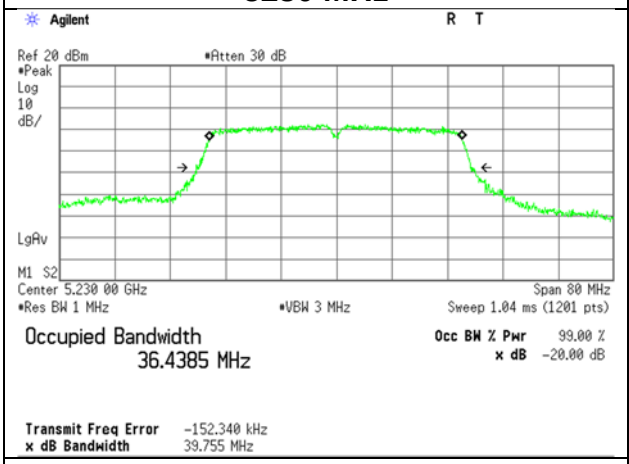
5190 MHz



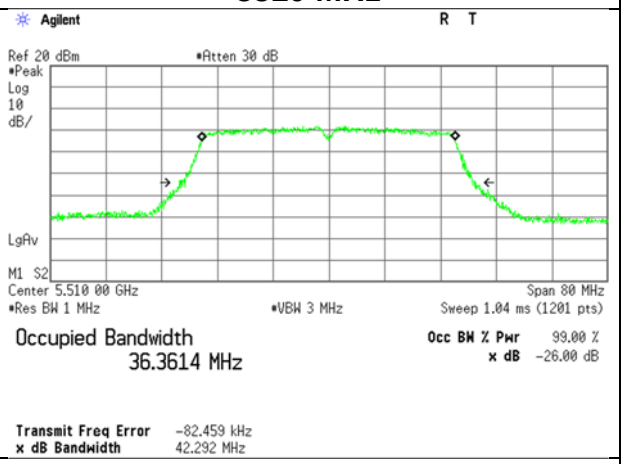
5310 MHz



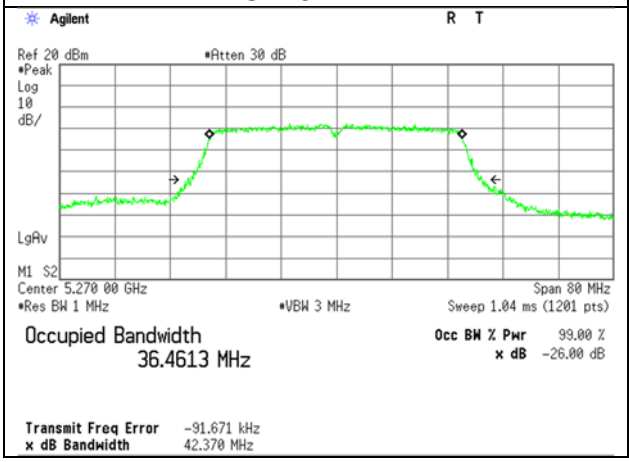
5230 MHz



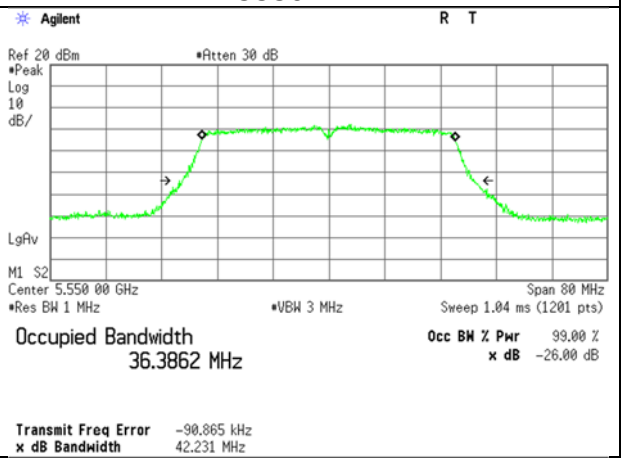
5510 MHz



5270 MHz



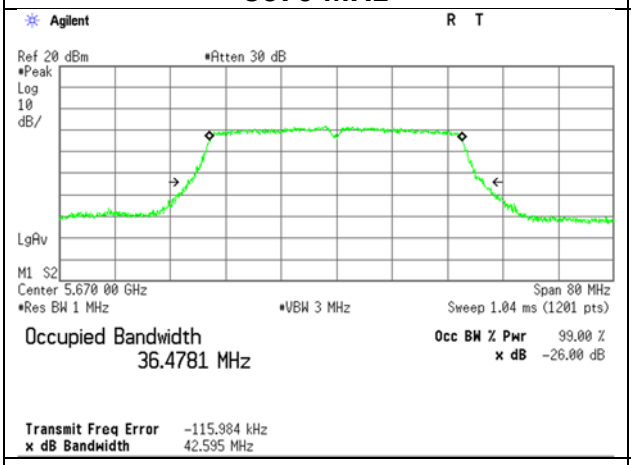
5550 MHz



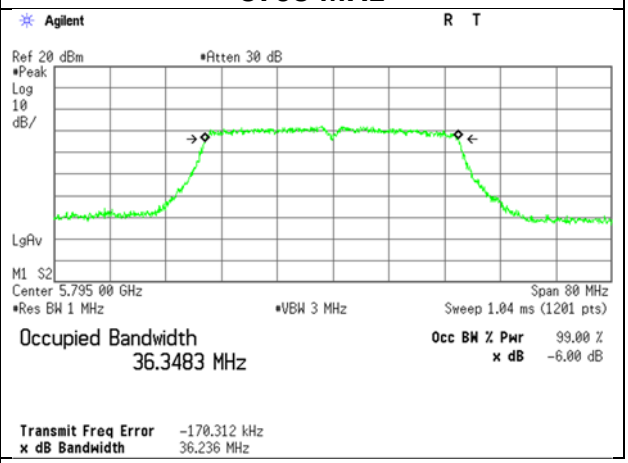
99 % Occupied Bandwidth

11n-40 (SISO), Chain 2

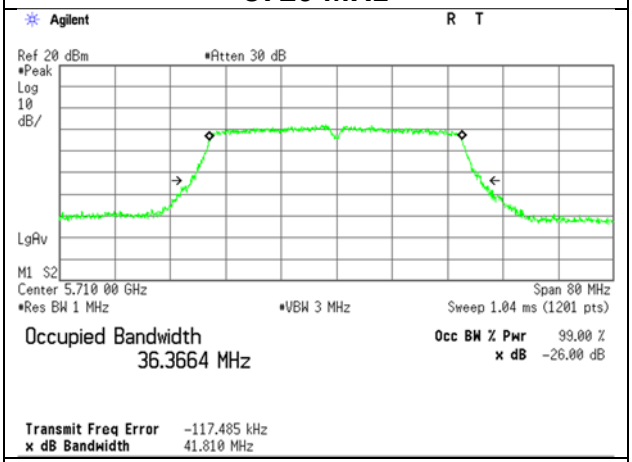
5670 MHz



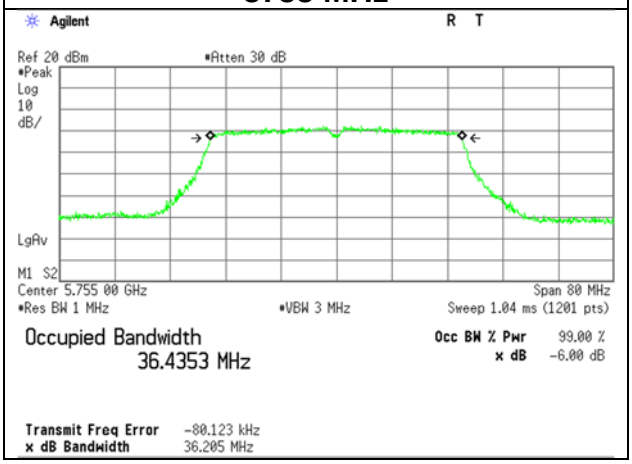
5795 MHz



5710 MHz



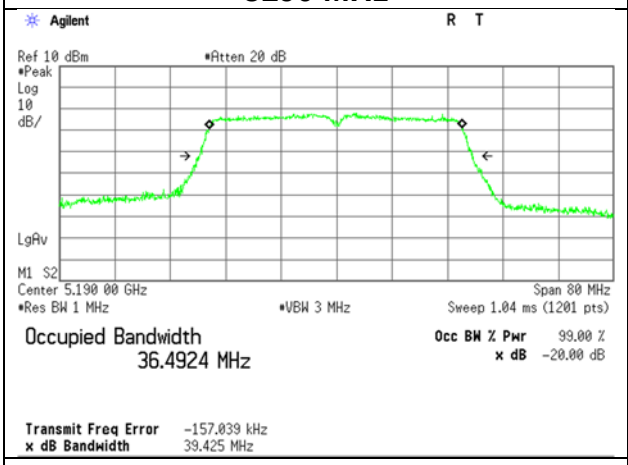
5755 MHz



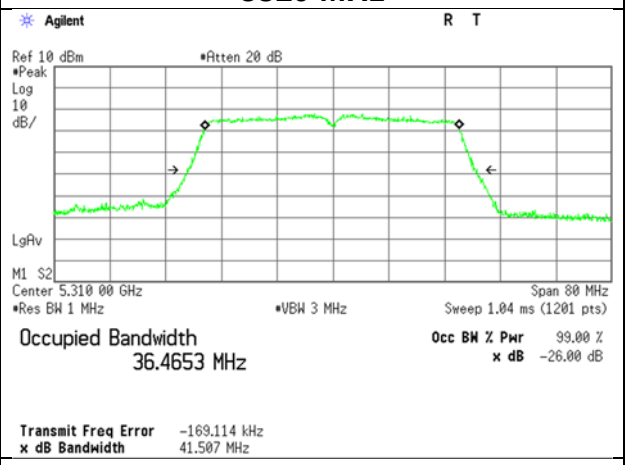
99 % Occupied Bandwidth

11ac-40 (SISO), Chain 2

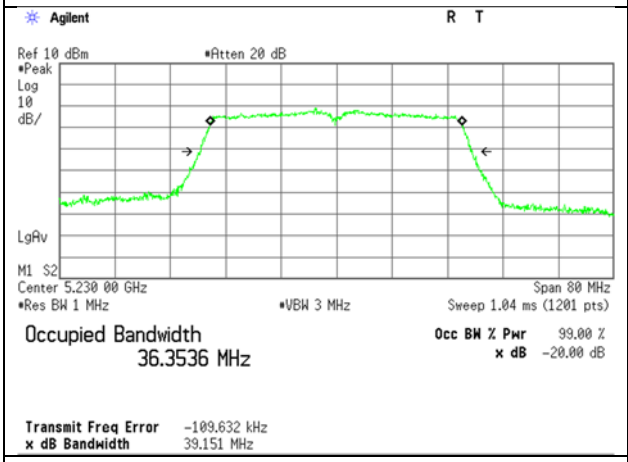
5190 MHz



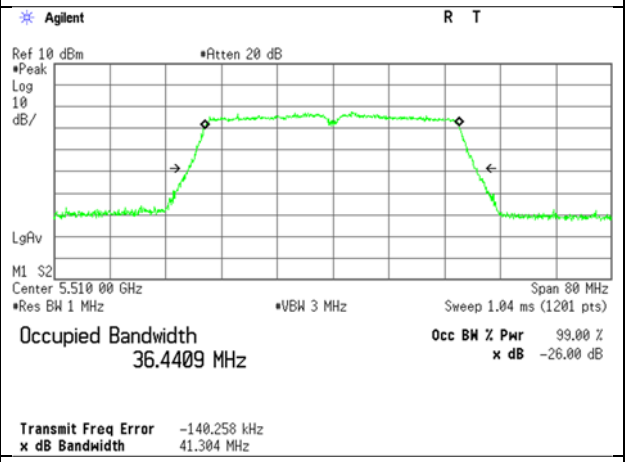
5310 MHz



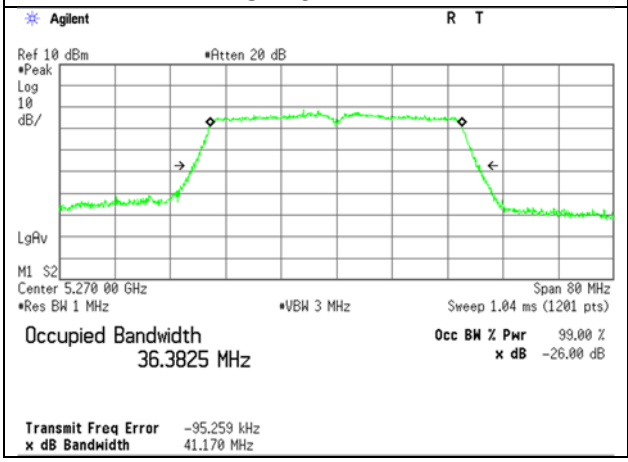
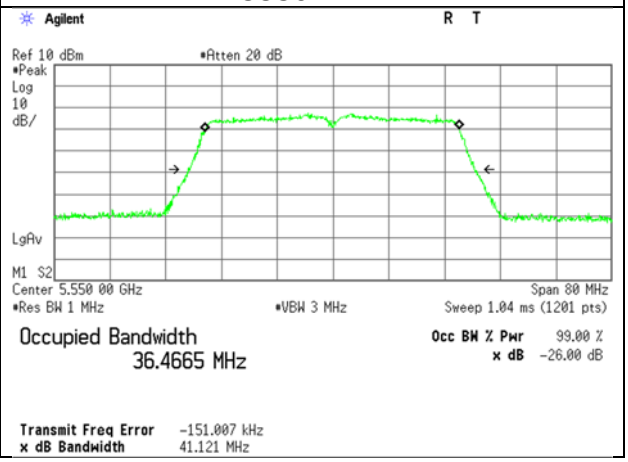
5230 MHz



5510 MHz



5270 MHz



5550 MHz