

RADIO TEST REPORT

Test Report No. 15701840H-C-R1

Customer	Yaesu Musen Co., Ltd.
Description of EUT	RF Power Amplifier
Model Number of EUT	SPA-1
FCC ID	K660D730X50
Test Regulation	FCC Part 97
Test Result	Complied
Issue Date	April 23, 2025
Remarks	-

Representative Test EngineerJunya Okuno
Engineer**Approved By**Takumi Shimada
Engineer

CERTIFICATE 5107.02

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.
- ☒ There is no testing item of "Non-accreditation".

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- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No. 15701840H-C

This report is a revised version of 15701840H-C. 15701840H-C is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15701840H-C	April 10, 2025	-
1	15701840H-C-R1	April 23, 2025	Section 2.2 -Modified Operating temperature. 10 deg. C to 50 deg. C →-10 deg. C to 50 deg. C APPENDIX 1 Spurious Emission (Mode: Standby AMP Off) -Added limit to result table. -Modified limit information under the table. (Antenna Port 1 for 1.800000 MHz to 53.999999 MHz Band) Limit: Not applicable → Limit: -10 dBm = 50 dBm (Rated Output Power) - 60 dBc (Section 97.307(e)) (Antenna Port for 144.000000 MHz to 148.000000 MHz Band) Limit: Not applicable → Limit: - 13 dBm = 47 dBm (Rated Output Power)- 60 dBc (Section 97.307(e))

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	Yaesu Musen Co., Ltd.
Address	Omori Bellport D building 3F, 6-26-3 Minamioi, Shinagawa-ku, Tokyo 140-0013 Japan
Telephone Number	+81-3-6410-8121
Contact Person	Tetsuya Masubuchi

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	RF Power Amplifier
Model Number	SPA-1
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	February 23, 2025
Test Date	March 5 to April 7, 2025

2.2 Product Description

General Specification

Rating	DC 13.8 V
Operating temperature	-10 deg. C to 50 deg. C

Radio Specification

Equipment Type	External RF power amplifier	
Frequency of Operation / Specific operating power level	1.800000 MHz to 1.999999 MHz	100 W
	3.500000 MHz to 3.999999 MHz	100 W
	5.167500 MHz	100 W
	5.332000 MHz to 5.405000 MHz	100 W
	7.000000 MHz to 7.299999 MHz	100 W
	10.100000 MHz to 10.149999 MHz	100 W
	14.000000 MHz to 14.349999 MHz	100 W
	18.068000 MHz to 18.167999 MHz	100 W
	21.000000 MHz to 21.449999 MHz	100 W
	24.890000 MHz to 24.989999 MHz	100 W
	28.000000 MHz to 29.699999 MHz	100 W
	50.000000 MHz to 53.999999 MHz	100 W
	144.000000 MHz to 148.000000 MHz	50 W
	430.000000 MHz to 450.000000 MHz *	50 W
Types of emission	A1A, A3E, J3E, F3E, F7W, F1D, F2D	

* Not subject to testing as there are no FCC authorization requirements.

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 97 The latest version on the first day of the testing period.
Title	FCC 47CFR Part 97 AMATEUR RADIO SERVICE

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Spurious Emission	[FCC] Section 2.1051	[FCC] Section 97.317 (a) (1) Section 97.307 (d) Section 97.307 (e)	See data.	Complied	Conducted
RF Power Gain	[ANSI/TIA-603-E-2016] Section 2.2.1	[FCC] Section 97.317 (a) (2) Section 97.317 (a) (3)	See data.	Complied	Conducted

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591.

*These tests were also referred to ANSI/TIA-603-E-2016 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

3.3 Addition to Standard

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 Conducted

Item	Unit	Calculated Uncertainty (+/-)
Antenna terminated conducted emission / Power density / Burst power	dB	3.50
Adjacent channel power (ACP)	dB	2.32
Bandwidth (OBW)	%	0.96
Time readout (time span upto 100 msec)	%	0.11
Time readout (time span upto 1000 msec)	%	0.11
Time readout (time span upto 60 sec)	%	0.02
Power measurement (Power meter < 8 GHz)	dB	1.43
Power measurement (Call box < 6 GHz)	dB	1.89
Frequency readout (Frequency counter)	ppm	0.67
Frequency readout (Spectrum analyzer frequency readout function)	ppm	2.13
Temperature (constant temperature bath)	deg. C	0.69
Humidity (constant temperature bath)	%RH	2.98
Modulation characteristics	%	6.93
Frequency for mobile	ppm	0.08
Contention-based protocol	dB	2.97

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan

Telephone: +81-596-24-8999

A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

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
Transmitting (Tx)	Transmitting duty was 100 % on all tests.
Standby	-

*The details of Operating mode(s)

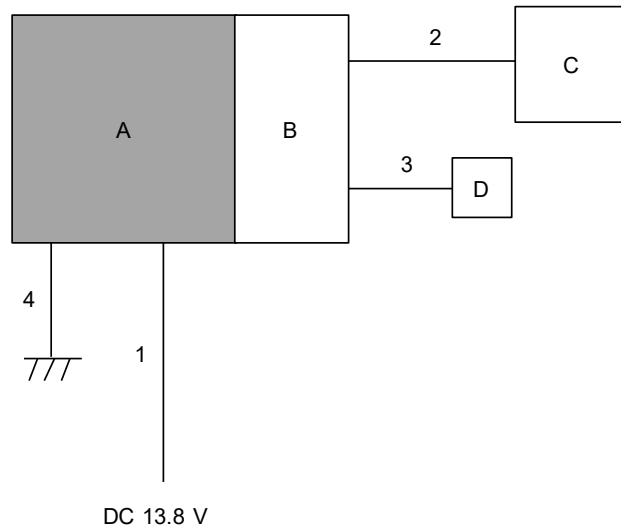
Test Item	Operating Mode	Tested frequency	Remarks
Spurious Emission	Tx, with AMP (Tx, AMP ON) Tx, without AMP (Tx, AMP OFF)	1.900000 MHz 3.750000 MHz 5.167500 MHz 5.358500 MHz 7.150000 MHz 10.125000 MHz 14.175000 MHz 18.118000 MHz 21.225000 MHz 24.940000 MHz 28.850000 MHz 52.000000 MHz 146.000000 MHz	-
	Standby, AMP function: OFF (Standby)	-	-
RF Power Gain	Tx, AMP ON Tx, AMP OFF	1.900000 MHz 3.750000 MHz 5.167500 MHz 5.358500 MHz 7.150000 MHz 10.125000 MHz 14.175000 MHz 18.118000 MHz 21.225000 MHz 24.940000 MHz 28.850000 MHz 52.000000 MHz 146.000000 MHz	-
		26.000000 MHz 27.000000 MHz 27.999999 MHz	*1)

These tests were performed on the center frequency of each operation band, according to the Section 2.1060 (b) except for the frequency range 26.000000 MHz to 27.999999 MHz.

*1) The information provided by the customer is as follows;
The AMP does not work by itself and its ON/OFF is controlled by the transceiver (Model: FTX-1).
The AMP function is OFF in the frequency range 26.000000 MHz - 27.999999 MHz, because the transceiver does not work in this frequency range.

Software	N/A
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4.2 Configuration and Peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	RF Power Amplifier	SPA-1	001	Yaesu Musen Co., Ltd.	EUT
B	Transceiver	FTX-1	-	Yaesu Musen Co., Ltd.	-
C	MIC JIG	-	-	Yaesu Musen Co., Ltd.	-
D	KEY JIG	-	-	Yaesu Musen Co., Ltd.	-

List of Cables Used

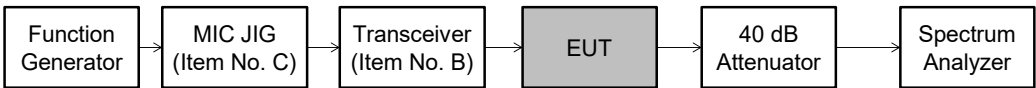
No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.7	Unshielded	Unshielded	-
2	Signal Cable	0.9	Unshielded	Unshielded	-
3	Signal Cable	0.5	Unshielded	Unshielded	-
4	GND Cable	2.4	Unshielded	Unshielded	-

SECTION 5: Spurious Emission

Test Procedure

The test was performed with connection below.

Test Setup



[Spectrum analyzer settings]

Frequency	9 kHz - 150 kHz	150 kHz - 30 MHz	30 MHz - 1000 MHz	1 GHz - 1.5 GHz
RBW	200 Hz	10 kHz	100 kHz	1 MHz
VBW	620 Hz	30 kHz	300 kHz	3 MHz
Detector	Peak	Peak	Peak	Peak
Trace mode	Max hold	Max hold	Max hold	Max hold

Peak detector and Max hold were applied as Worst-case measurement.

[Function Generator and Transceiver settings]

Modulation	Single sideband, J3E (A3J)
Input signal	Two tone signals, 400 Hz and 1800 Hz sine wave
Input level	Necessary to produce rated peak envelope power

These settings were according to the Section 2.1051 (2.1049). This modulation is the worst case in actual operation.

In addition, intermodulation distortions were measured for the purpose of reference. These plots show that EUT does not cause splatter interference outside the necessary bandwidth. (Section 97.307 (a) and (b))

The test results are rounded off to two decimals place, so some differences might be observed.

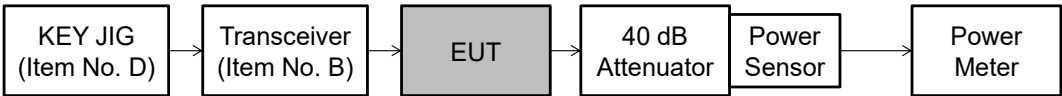
Measurement range : 9 kHz - 10th harmonic of the highest fundamental frequency
Test data : APPENDIX
Test result : Pass

SECTION 6: RF Power Gain

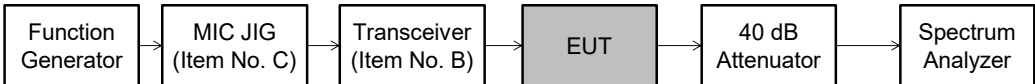
Test Procedure

The test was performed with connection below.

Test Setup (other than 5.167500 MHz)



Test Setup (5.167500 MHz)



[Transceiver settings other than 5.167500 MHz]

Modulation	None, Continuous Wave, A1A
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This setting is the most appropriate setting to test the RF Power Gain.

[Function Generator, Transceiver and Spectrum Analyzer settings for 5.167500 MHz]

Modulation	Single sideband, J3E (A3J)
Input signal	Two tone signals, 400 Hz and 1800 Hz sine wave
Input level	Necessary to produce rated peak envelope power
Spectrum Analyzer	Center Frequency: 5.167500 MHz, Span: 50 kHz Detector: Peak RBW: 10 kHz, VBW: 30 kHz Trace: Max Hold Sweep time: Auto

*5.167500 MHz only supports single sideband modulation.

The test results are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test Data

Spurious Emission

Test place Ise EMC Lab. No.5 Measurement Room
Date March 25, 2025 March 26, 2025
Temperature / Humidity 20 deg. C / 40 % RH 20 deg. C / 38 % RH
Engineer Junya Okuno Junya Okuno
Mode Tx, AMP ON

Tx Freq. [MHz]	Reading		Loss		Level [dBm]	Result [dBc]	Limit [dBc]	Margin [dB]
	Freq. [MHz]	Level [dBm]	Cable 1 [dB]	Atten. [dB]				
1.900000	1.9022	9.983	0.00	40.30	0.03	50.31 Carrier	-	-
	0.0093	-80.967	0.00	40.30	0.01	-40.66	90.97	43 47.97
	3.8036	-67.226	0.01	40.30	0.05	-26.87	77.18	43 34.18
	5.7021	-65.468	0.01	40.31	0.06	-25.09	75.40	43 32.40
	7.6035	-74.769	0.01	40.31	0.07	-34.38	84.69	43 41.69
	9.5050	-73.705	0.02	40.31	0.08	-33.30	83.61	43 40.61
3.750000	11.4035	-79.312	0.02	40.31	0.09	-38.89	89.21	43 46.21
	3.7499	9.887	0.01	40.30	0.05	50.25 Carrier	-	-
	0.0096	-81.749	0.00	40.30	0.01	-41.44	91.69	43 48.69
	7.5021	-65.386	0.01	40.31	0.07	-25.00	75.24	43 32.24
	11.2542	-63.570	0.02	40.31	0.09	-23.15	73.40	43 30.40
	15.0003	-79.061	0.03	40.31	0.10	-38.62	88.87	43 45.87
5.167500	18.7555	-67.321	0.03	40.31	0.12	-26.86	77.11	43 34.11
	26.2568	-75.264	0.03	40.31	0.13	-34.79	85.04	43 42.04
	33.792	-71.482	0.03	40.31	0.07	-31.07	81.32	43 38.32
	5.1675	9.851	0.01	40.31	0.06	50.23 Carrier	-	-
	0.0090	-81.117	0.00	40.30	0.01	-40.81	91.04	43 48.04
	10.3378	-60.706	0.02	40.31	0.08	-20.30	70.53	43 27.53
5.358500	15.5048	-64.399	0.03	40.31	0.10	-23.96	74.19	43 31.19
	20.6749	-78.304	0.03	40.31	0.12	-37.84	88.08	43 45.08
	31.029	-72.048	0.03	40.31	0.06	-31.65	81.88	43 38.88
	5.3588	9.820	0.01	40.31	0.06	50.20 Carrier	-	-
	0.0090	-81.482	0.00	40.30	0.01	-41.17	91.37	43 48.37
	10.7169	-67.971	0.02	40.31	0.08	-27.56	77.76	43 34.76
7.150000	16.0750	-64.998	0.03	40.31	0.10	-24.56	74.76	43 31.76
	21.4331	-77.271	0.03	40.31	0.12	-36.81	87.01	43 44.01
	37.532	-72.823	0.04	40.31	0.08	-32.39	82.59	43 39.59
	7.1498	9.720	0.01	40.31	0.07	50.11 Carrier	-	-
	0.0091	-81.489	0.00	40.30	0.01	-41.18	91.29	43 48.29
	14.3019	-64.743	0.03	40.31	0.10	-24.30	74.41	43 31.41
10.125000	21.4539	-64.390	0.03	40.31	0.12	-23.93	74.04	43 31.04
	28.6060	-79.775	0.03	40.31	0.14	-39.30	89.41	43 46.41
	50.111	-72.731	0.04	40.30	0.09	-32.30	82.41	43 39.41
	10.1259	9.812	0.02	40.31	0.08	50.22 Carrier	-	-
	0.0097	-82.034	0.00	40.30	0.01	-41.72	91.95	43 48.95
	20.2510	-60.226	0.03	40.31	0.12	-19.77	69.99	43 26.99
	30.396	-62.127	0.03	40.31	0.06	-21.73	71.95	43 28.95

Sample calculation: Level = Level Reading + Cable 1 Loss + Attenuator Loss + Cable 2 Loss
Result = Carrier Level - Spurious Level

Limit: Section 97.317 (a) (1), 97.307 (d)

*After the comparison between Antenna Port 1 and Port 2, test was performed with the antenna Port 1 that had the higher emission level as a representative.

Spurious Emission

Test place Ise EMC Lab. No.5 Measurement Room
Date March 25, 2025 March 26, 2025
Temperature / Humidity 20 deg. C / 40 % RH 20 deg. C / 38 % RH
Engineer Junya Okuno Junya Okuno
Mode Tx, AMP ON

Tx Freq. [MHz]	Reading		Loss			Level [dBm]	Result [dBc]	Limit [dBc]	Margin [dB]
	Freq. [MHz]	Level [dBm]	Cable 1 [dB]	Atten. [dB]	Cable 2 [dB]				
14.175000	14.1765	9.689	0.03	40.31	0.10	50.13	Carrier	-	-
	0.0092	-81.185	0.00	40.30	0.01	-40.88	91.00	43	48.00
	28.3523	-65.853	0.03	40.31	0.14	-25.37	75.50	43	32.50
	42.540	-56.555	0.04	40.31	0.08	-16.13	66.25	43	23.25
	56.700	-69.814	0.05	40.30	0.09	-29.37	79.50	43	36.50
	70.908	-64.551	0.05	40.29	0.10	-24.11	74.24	43	31.24
	85.068	-68.780	0.06	40.28	0.12	-28.32	78.45	43	35.45
	99.240	-69.964	0.06	40.28	0.12	-29.50	79.63	43	36.63
18.118000	18.1197	9.451	0.03	40.31	0.11	49.90	Carrier	-	-
	0.0090	-80.608	0.00	40.30	0.01	-40.30	90.20	43	47.20
	21.8778	-79.372	0.03	40.31	0.12	-38.91	88.81	43	45.81
	36.239	-66.128	0.04	40.31	0.07	-25.71	75.61	43	32.61
	54.378	-56.972	0.04	40.30	0.09	-16.54	66.44	43	23.44
	72.466	-69.478	0.05	40.29	0.10	-29.04	78.94	43	35.94
21.225000	21.2271	9.733	0.03	40.31	0.12	50.19	Carrier	-	-
	0.0120	-80.866	0.00	40.30	0.01	-40.56	90.75	43	47.75
	16.7645	-77.563	0.03	40.31	0.11	-37.11	87.31	43	44.31
	18.4361	-78.641	0.03	40.31	0.11	-38.19	88.38	43	45.38
	25.6867	-77.925	0.03	40.31	0.13	-37.46	87.65	43	44.65
	42.474	-64.311	0.04	40.31	0.08	-23.88	74.07	43	31.07
	63.682	-56.220	0.05	40.30	0.09	-15.78	65.97	43	22.97
	84.912	-60.495	0.06	40.28	0.12	-20.04	70.23	43	27.23
	106.142	-70.427	0.06	40.27	0.13	-29.97	80.16	43	37.16
	127.372	-63.742	0.07	40.26	0.14	-23.27	73.47	43	30.47
24.940000	24.9404	9.689	0.03	40.31	0.13	50.16	Carrier	-	-
	0.0092	-82.982	0.00	40.30	0.01	-42.67	92.83	43	49.83
	18.4301	-78.786	0.03	40.31	0.11	-38.34	88.50	43	45.50
	49.910	-58.866	0.04	40.30	0.09	-18.44	68.60	43	25.60
	74.836	-59.517	0.05	40.29	0.10	-19.08	69.24	43	26.24
	99.762	-68.136	0.06	40.28	0.12	-27.68	77.84	43	34.84
	124.754	-71.140	0.07	40.26	0.14	-30.67	80.83	43	37.83
	149.664	-67.579	0.08	40.24	0.16	-27.10	77.26	43	34.26
28.850000	28.8508	9.541	0.03	40.31	0.14	50.02	Carrier	-	-
	0.0094	-82.637	0.00	40.30	0.01	-42.33	92.35	43	49.35
	24.0390	-67.114	0.03	40.31	0.13	-26.64	76.67	43	33.67
	33.699	-65.361	0.03	40.31	0.07	-24.95	74.97	43	31.97
	57.729	-60.183	0.05	40.30	0.09	-19.74	69.76	43	26.76
	86.565	-50.346	0.06	40.28	0.12	-9.89	59.91	43	16.91
	115.428	-70.563	0.07	40.27	0.13	-30.09	80.11	43	37.11
	173.100	-72.317	0.08	40.22	0.17	-31.85	81.87	43	38.87
52.000000	52.002	9.470	0.04	40.30	0.09	49.90	Carrier	-	-
	0.0095	-81.256	0.00	40.30	0.01	-40.95	90.85	60	30.85
	3.2962	-78.684	0.01	40.30	0.04	-38.33	88.23	60	28.23
	6.5886	-66.954	0.01	40.31	0.07	-26.56	76.46	60	16.46
	13.1795	-65.634	0.02	40.31	0.09	-25.21	75.11	60	15.11
	38.835	-59.804	0.04	40.31	0.08	-19.37	69.27	60	9.27
	45.447	-61.937	0.04	40.30	0.09	-21.51	71.41	60	11.41
	58.614	-61.310	0.05	40.30	0.09	-20.87	70.77	60	10.77
	65.226	-57.781	0.05	40.29	0.10	-17.34	67.24	60	7.24
	104.043	-54.784	0.06	40.28	0.12	-14.32	64.22	60	4.22
	156.027	-56.981	0.08	40.23	0.16	-16.51	66.41	60	6.41
	208.011	-65.776	0.09	40.19	0.19	-25.31	75.21	60	15.21
	520.029	-62.725	0.17	39.89	0.20	-22.47	72.37	60	12.37

Sample calculation: Level = Level Reading + Cable 1 Loss + Attenuator Loss + Cable 2 Loss
Result = Carrier Level - Spurious Level

Limit: Section 97.317 (a) (1), 97.307 (d), 97.307 (e)

*After the comparison between Antenna Port 1 and Port 2, test was performed with the antenna Port 1 that had the higher emission level as a representative.

Spurious Emission

Test place	Ise EMC Lab. No.5 Measurement Room	
Date	March 25, 2025	March 26, 2025
Temperature / Humidity	20 deg. C / 40 % RH	20 deg. C / 38 % RH
Engineer	Junya Okuno	
Mode	Tx, AMP ON	

Tx Freq. [MHz]	Reading		Loss			Level [dBm]	Result [dBc]	Limit [dBc]	Margin [dB]
	Freq. [MHz]	Level [dBm]	Cable 1 [dB]	Atten. [dB]	Cable 2 [dB]				
146.000000	146.012	6.943	0.08	40.24	0.16	47.42	Carrier	-	-
	0.0090	-81.212	0.00	40.30	0.01	-40.90	88.33	60	28.33
	7.5170	-80.865	0.01	40.31	0.07	-40.48	87.90	60	27.90
	128.746	-71.237	0.07	40.26	0.14	-30.77	78.19	60	18.19
	138.446	-66.002	0.08	40.25	0.15	-25.52	72.95	60	12.95
	153.578	-65.733	0.08	40.24	0.16	-25.25	72.68	60	12.68
	163.278	-66.342	0.08	40.23	0.16	-25.87	73.30	60	13.30
	437.982	-64.164	0.15	39.96	0.18	-23.87	71.30	60	11.30
	1284.7	-61.889	0.30	39.80	0.33	-21.46	68.88	60	8.88

Sample calculation: Level = Level Reading + Cable 1 Loss + Attenuator Loss + Cable 2 Loss
Result = Carrier Level - Spurious Level

Limit: Section 97.317 (a) (1), 97.307(e)

Spurious Emission

Test place	Ise EMC Lab.	
	No.6 Measurement Room	No.5 Measurement Room
Date	March 7, 2025	March 26, 2025
Temperature / Humidity	22 deg. C / 40 % RH	20 deg. C / 38 % RH
Engineer	Junya Okuno	Junya Okuno
Mode	Standby AMP Off	

(Antenna Port 1 for 1.800000 MHz to 53.999999 MHz Band)

Mode	Reading		Loss			Level	Limit	Margin
	Freq. [MHz]	Level [dBm]	Cable 1 [dB]	Atten. [dB]	Cable 2 [dB]			
Standby	0.0132	-87.747	0.00	40.30	0.01	-47.44	-10.00	37.44
	5.1051	-93.470	0.01	40.31	0.06	-53.09	-10.00	43.09
	406.371	-81.847	0.14	39.99	0.17	-41.55	-10.00	31.55

Sample calculation:

$$\text{Level} = \text{Level Reading} + \text{Cable 1 Loss} + \text{Attenuator Loss} + \text{Cable 2 Loss}$$

Requirement Section 97.317 (a) (1), 97.307 (d), 97.307 (e)

Limit: -10 dBm = 50 dBm (Rated Output Power) - 60 dBc (Section 97.307(e))

*After the comparison between Antenna Port 1 and Port 2, test was performed with the antenna Port 1 that had the higher emission level as a representative.

(Antenna Port for 144.000000 MHz to 148.000000 MHz Band)

Mode	Reading		Cable 1 [dB]	Loss		Level [dBm]	Limit [dBm]	Margin [dB]
	Freq. [MHz]	Level [dBm]		Atten. [dB]	Cable 2 [dB]			
Standby	0.0093	-88.134	0.00	40.30	0.01	-47.82	-13.00	34.82
	0.2127	-92.888	0.00	40.30	0.01	-52.58	-13.00	39.58
	872.64	-80.564	0.24	39.75	0.27	-40.31	-13.00	27.31
	1397.1	-71.366	0.32	39.84	0.34	-30.87	-13.00	17.87

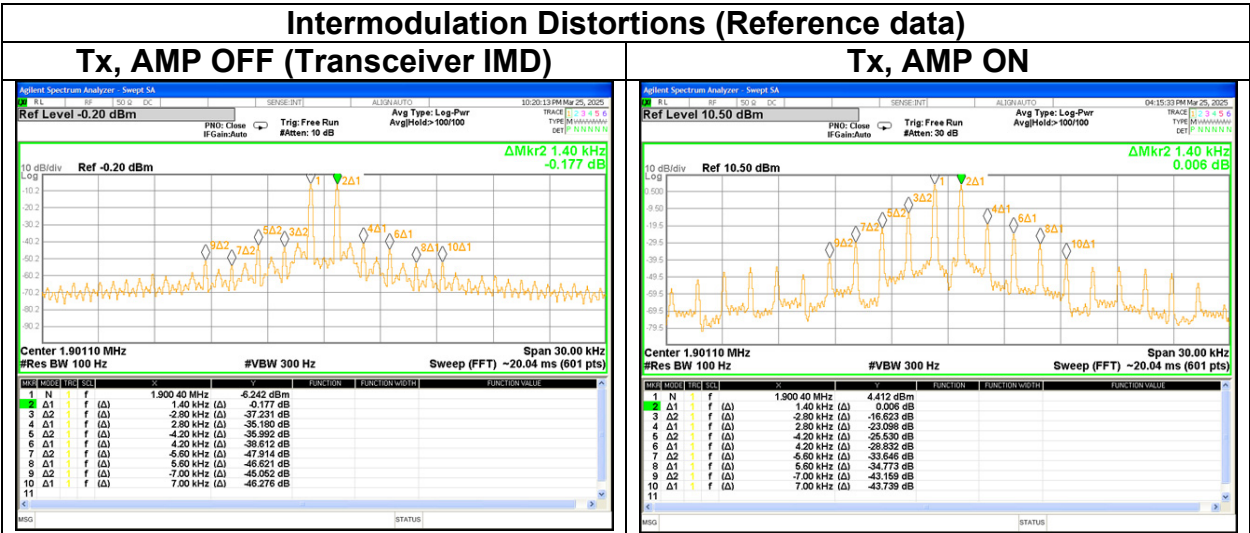
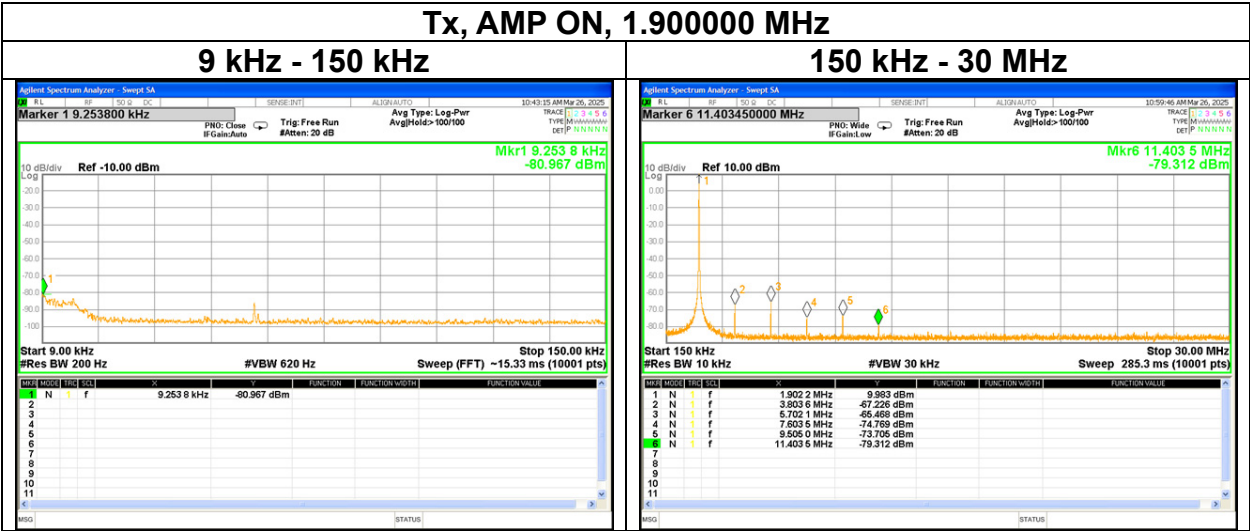
Sample calculation:

$$\text{Level} = \text{Level Reading} + \text{Cable 1 Loss} + \text{Attenuator Loss} + \text{Cable 2 Loss}$$

Requirement Section 97.317 (a) (1), 97.307 (d), 97.307 (e)

Limit: -13 dBm = 47 dBm (Rated Output Power) - 60 dBc (Section 97.307(e))

Spurious Emission

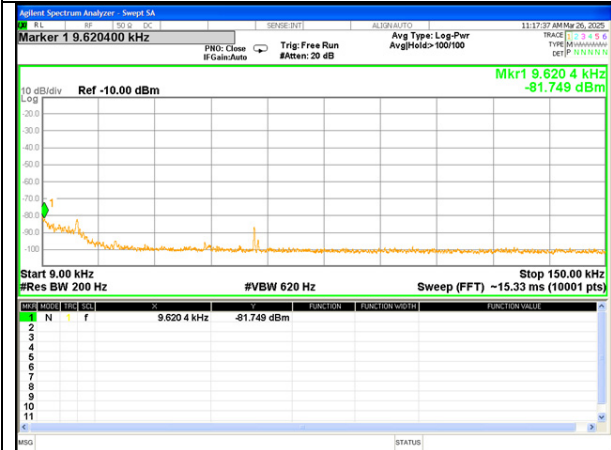


The analyzer reference level was set to the 6 dB above the peak marker.

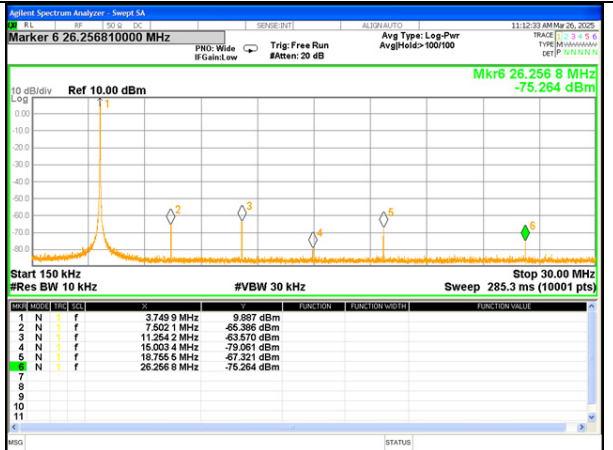
Spurious Emission

Tx, AMP ON, 3.750000 MHz

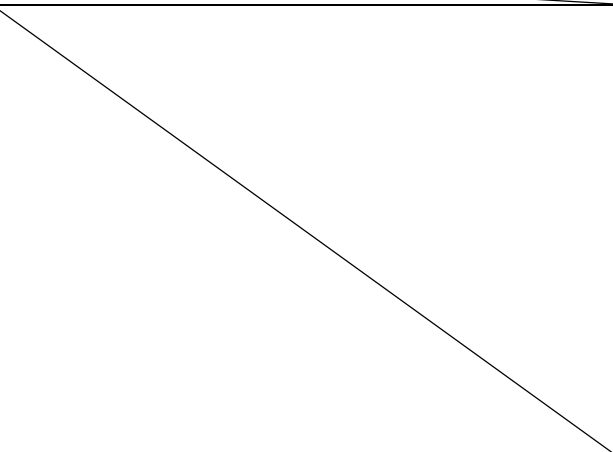
9 kHz - 150 kHz



150 kHz - 30 MHz

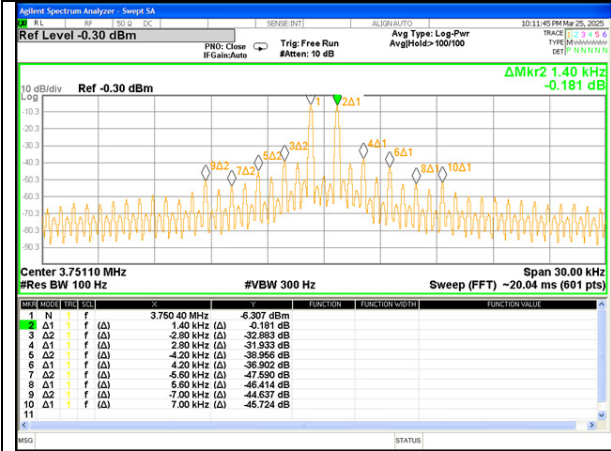


30 MHz - 50 MHz

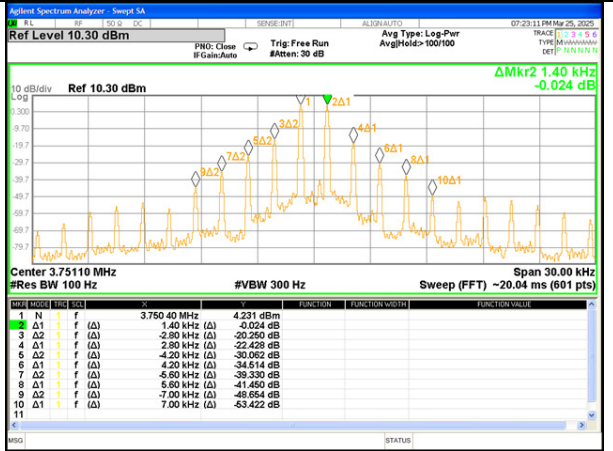


Intermodulation Distortions (Reference data)

Tx, AMP OFF (Transceiver IMD)

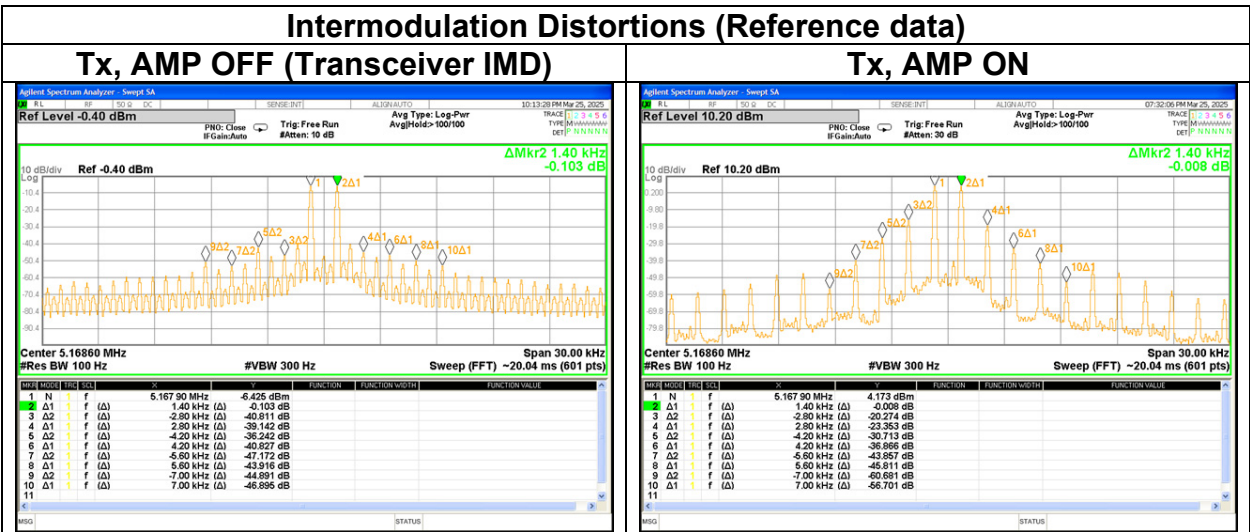
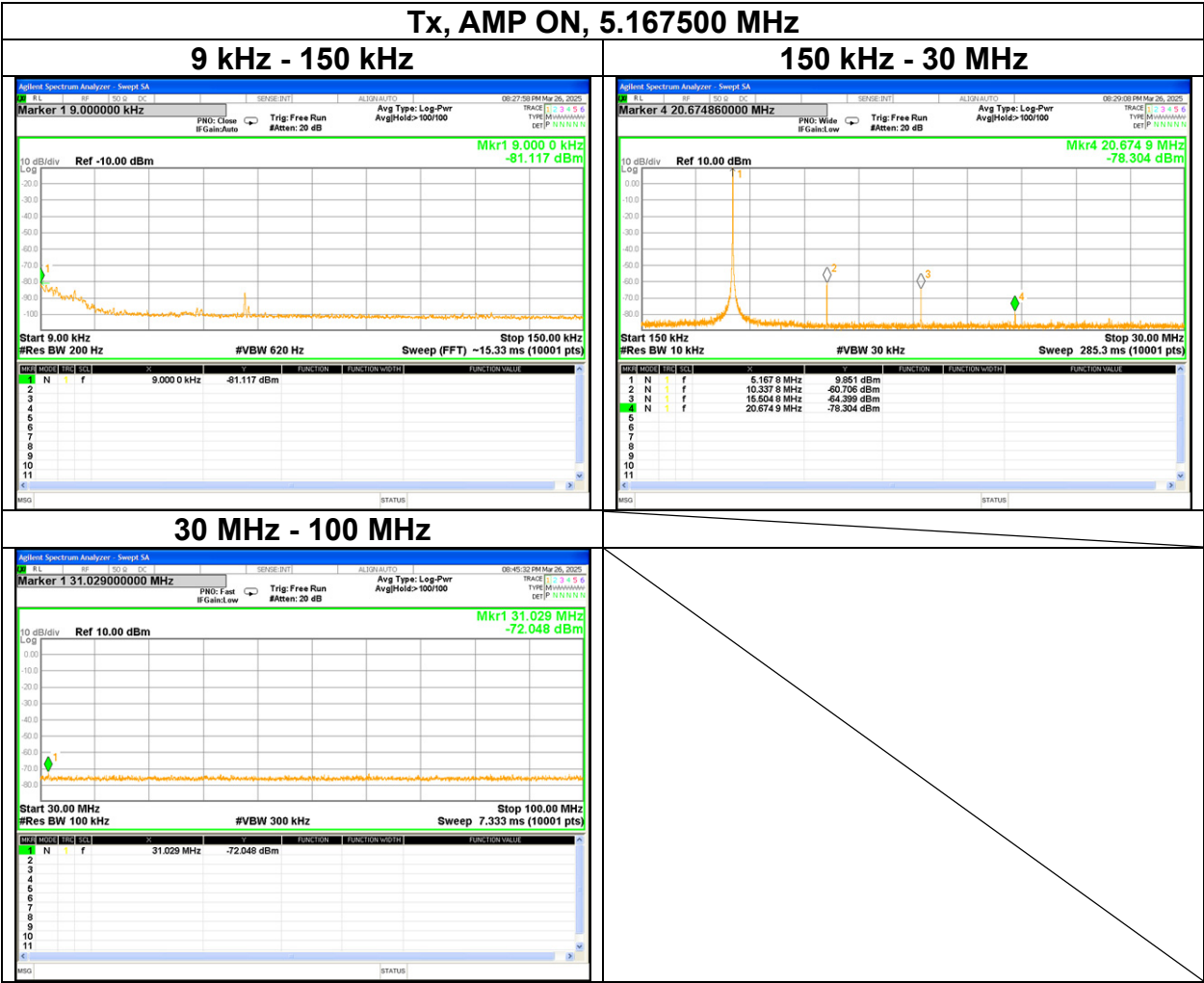


Tx, AMP ON



The analyzer reference level was set to the 6 dB above the peak marker.

Spurious Emission

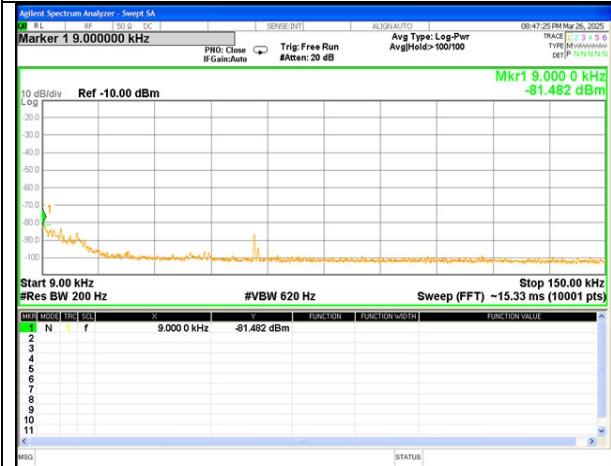


The analyzer reference level was set to the 6 dB above the peak marker.

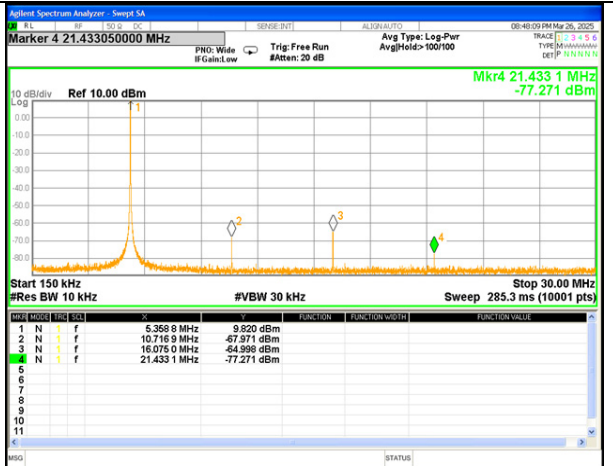
Spurious Emission

Tx, AMP ON, 5.358500 MHz

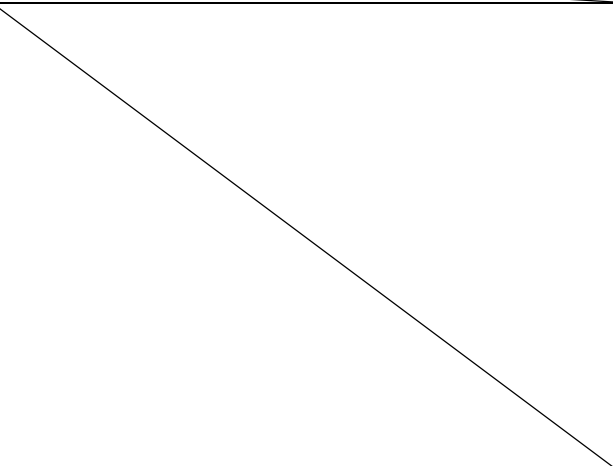
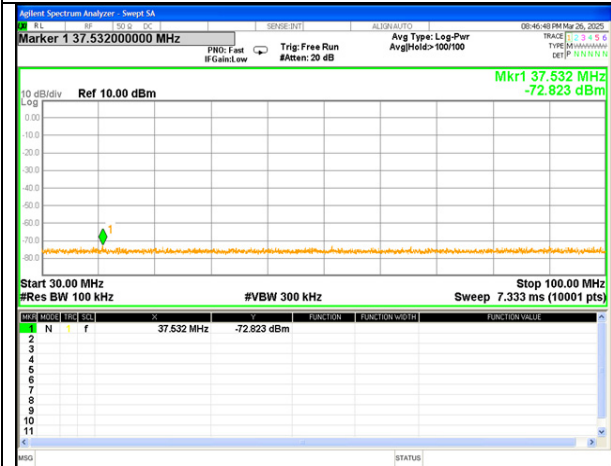
9 kHz - 150 kHz



150 kHz - 30 MHz

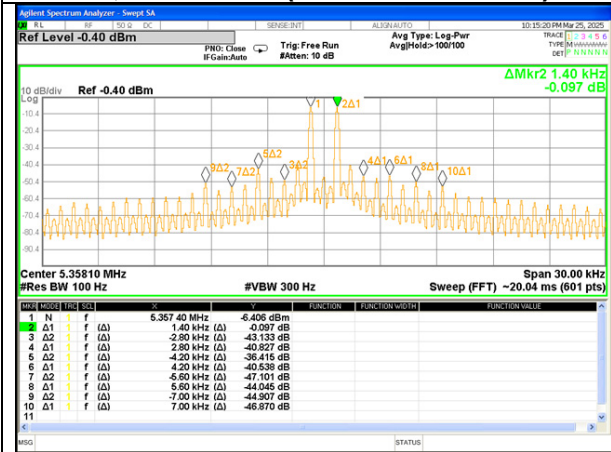


30 MHz - 100 MHz

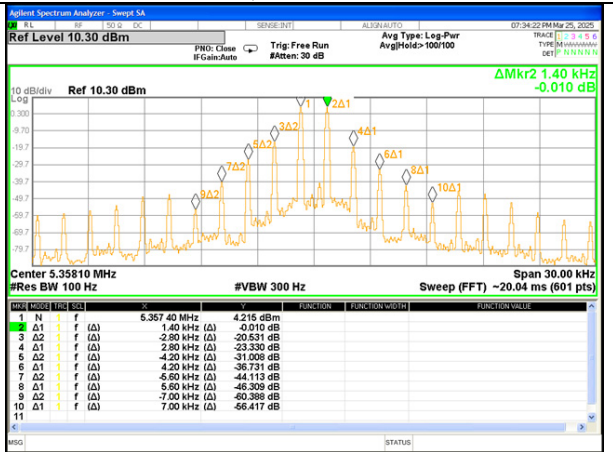


Intermodulation Distortions (Reference data)

Tx, AMP OFF (Transceiver IMD)



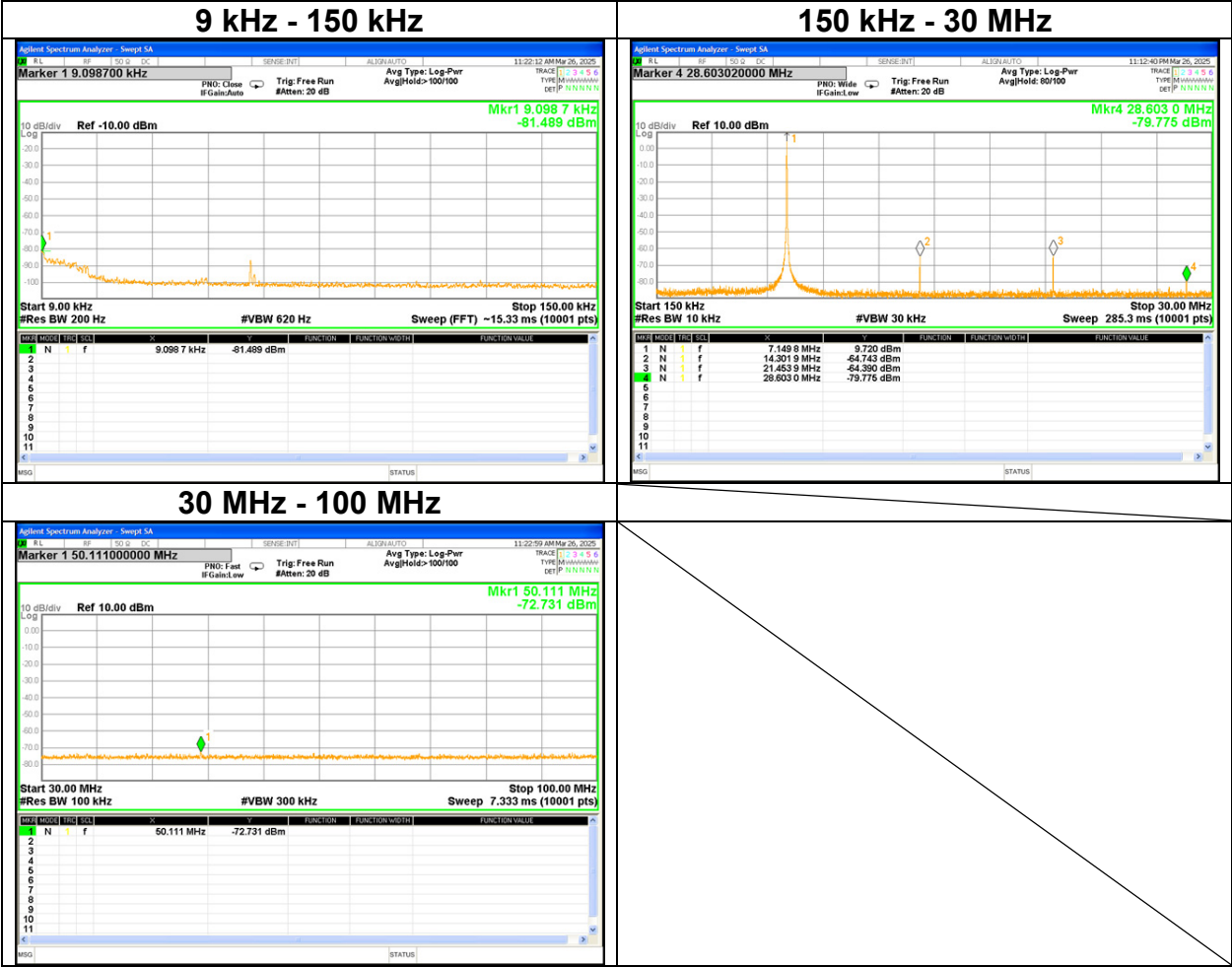
Tx, AMP ON



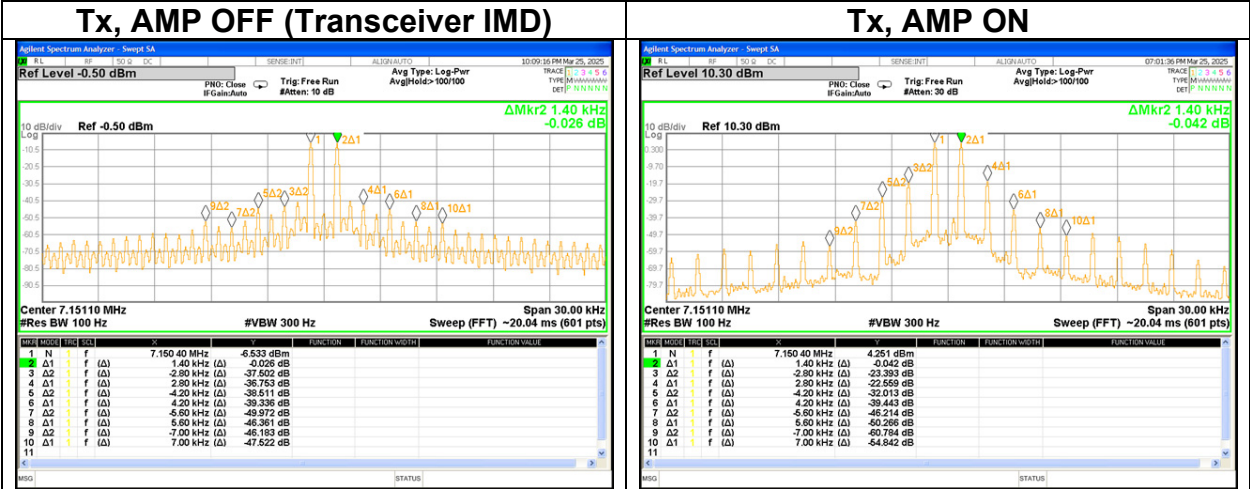
The analyzer reference level was set to the 6 dB above the peak marker.

Spurious Emission

Tx, AMP ON, 7.150000 MHz



Intermodulation Distortions (Reference data)

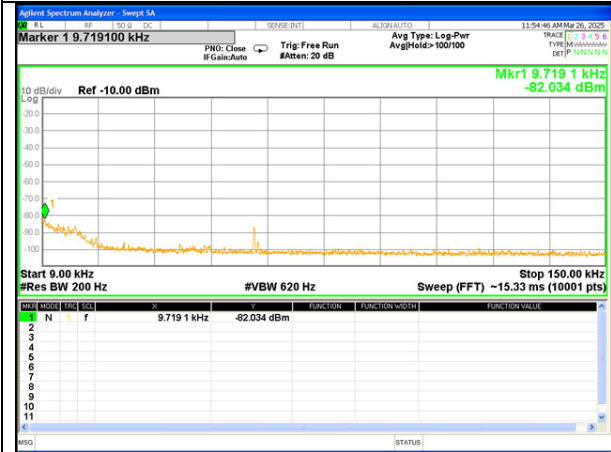


The analyzer reference level was set to the 6 dB above the peak marker.

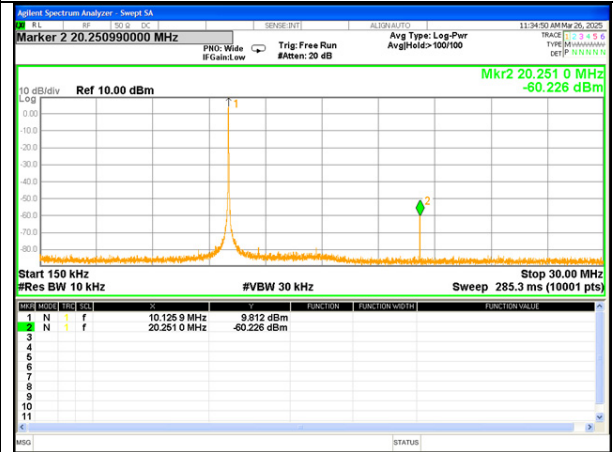
Spurious Emission

Tx, AMP ON, 10.125000 MHz

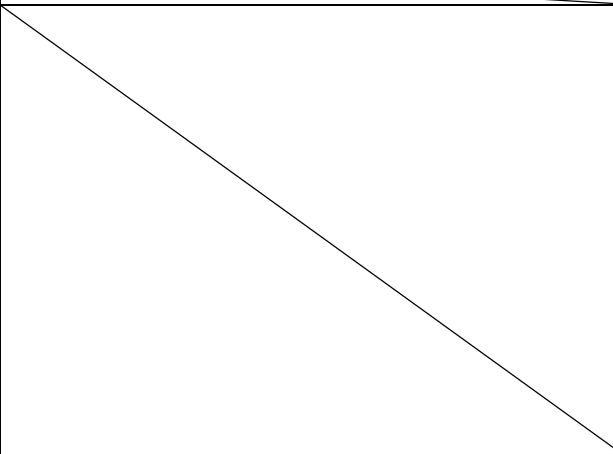
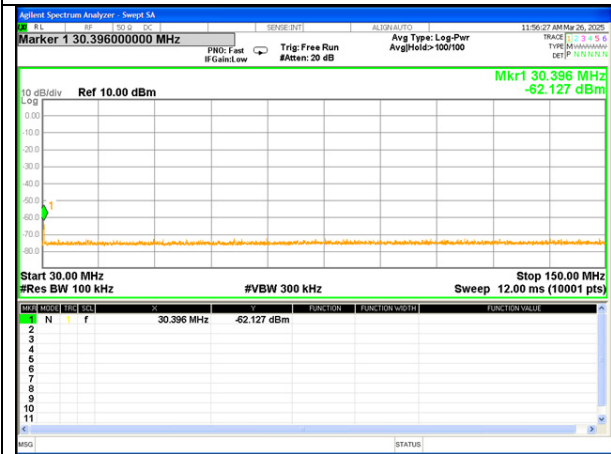
9 kHz - 150 kHz



150 kHz - 30 MHz

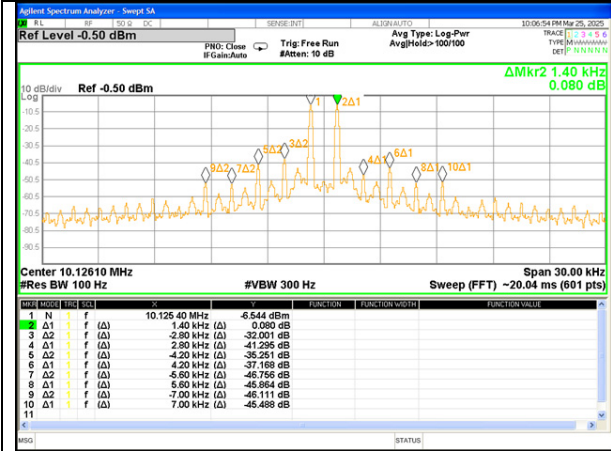


30 MHz - 150 MHz

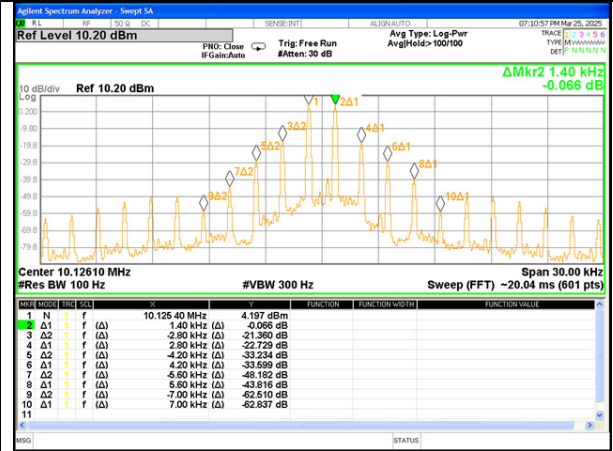


Intermodulation Distortions (Reference data)

Tx, AMP OFF (Transceiver IMD)



Tx, AMP ON

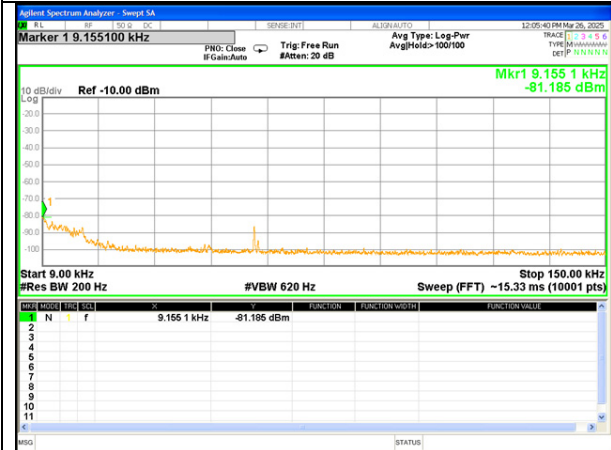


The analyzer reference level was set to the 6 dB above the peak marker.

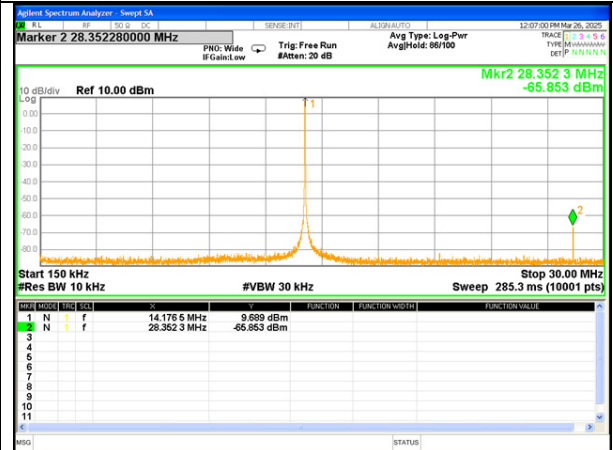
Spurious Emission

Tx, AMP ON, 14.175000 MHz

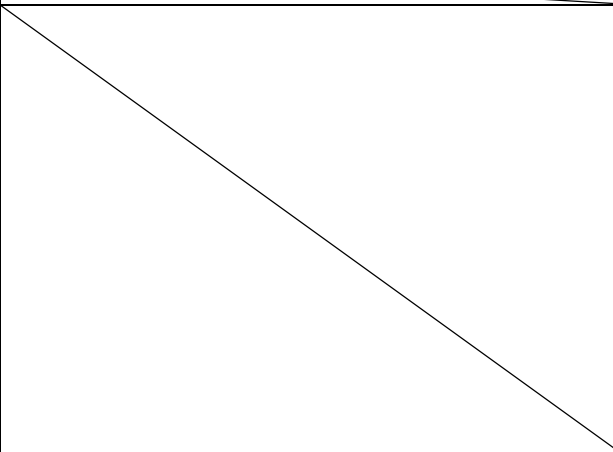
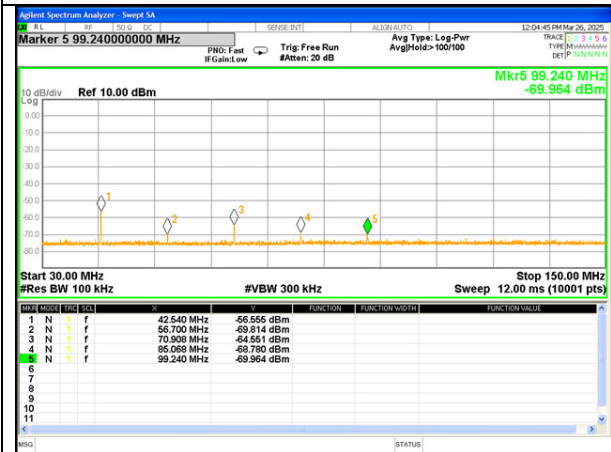
9 kHz - 150 kHz



150 kHz - 30 MHz

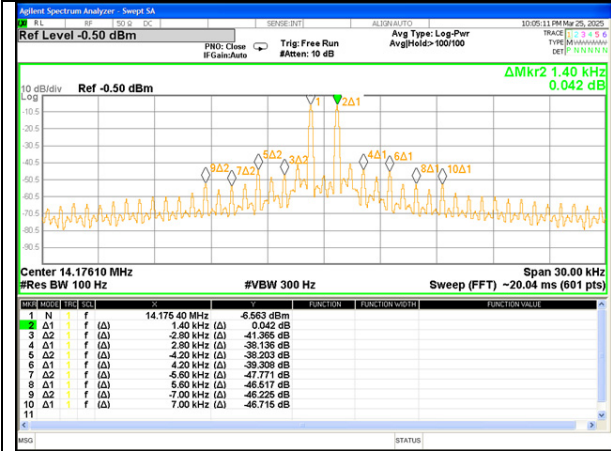


30 MHz - 150 MHz

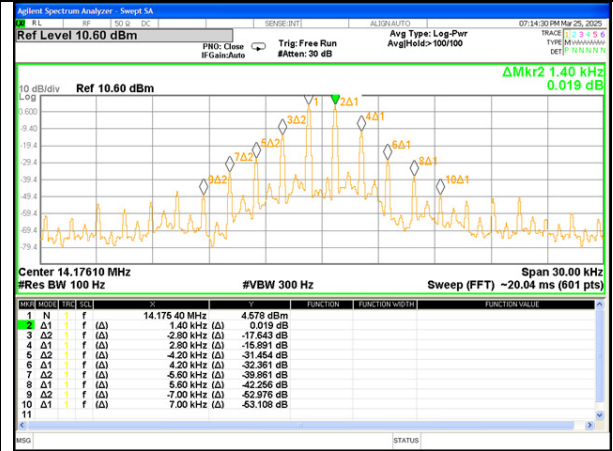


Intermodulation Distortions (Reference data)

Tx, AMP OFF (Transceiver IMD)



Tx, AMP ON

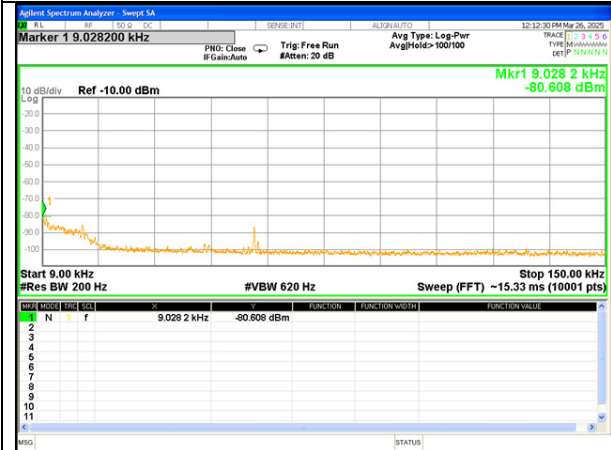


The analyzer reference level was set to the 6 dB above the peak marker.

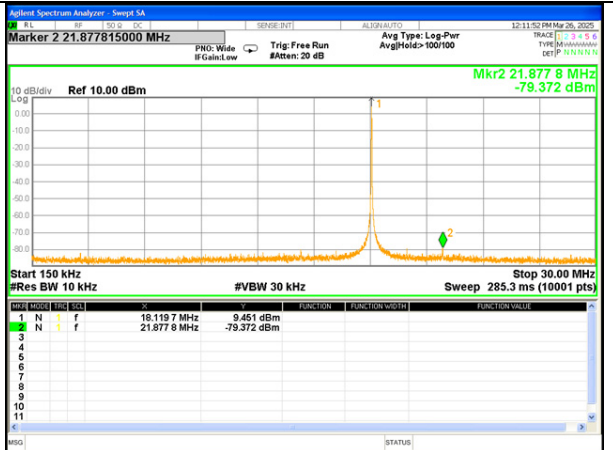
Spurious Emission

Tx, AMP ON, 18.118000 MHz

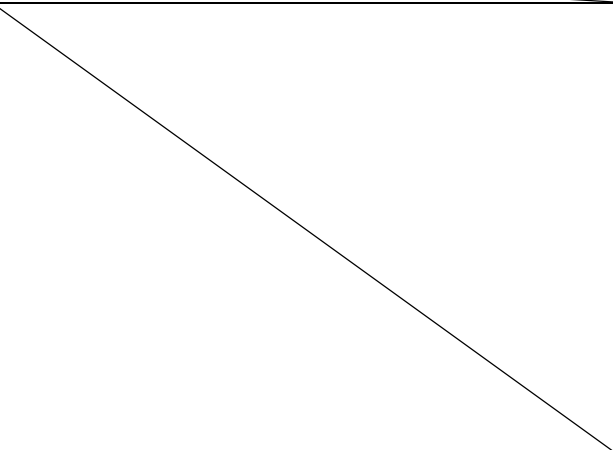
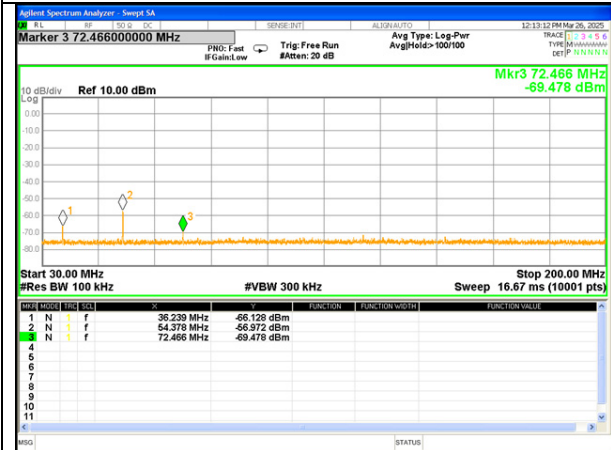
9 kHz - 150 kHz



150 kHz - 30 MHz

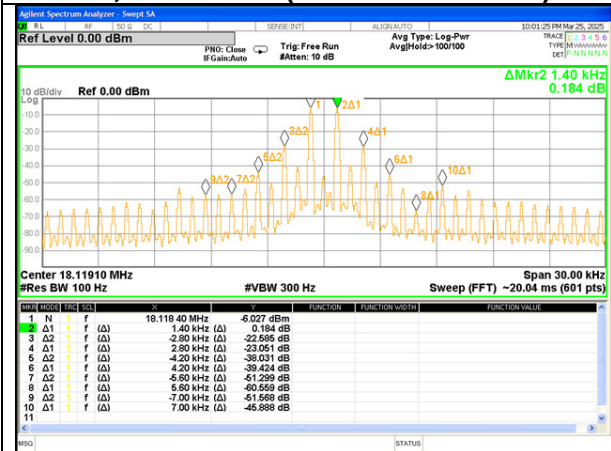


30 MHz - 200 MHz

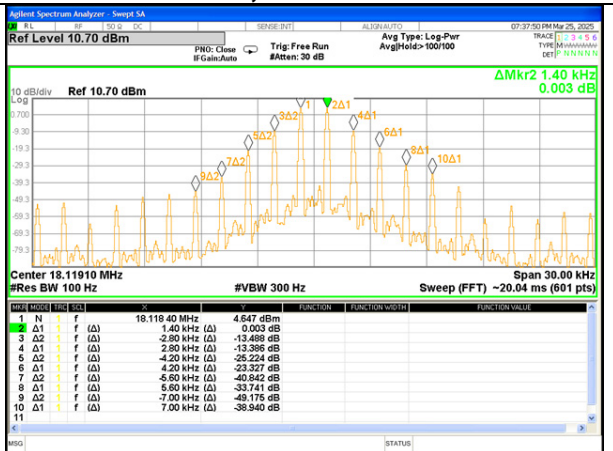


Intermodulation Distortions (Reference data)

Tx, AMP OFF (Transceiver IMD)

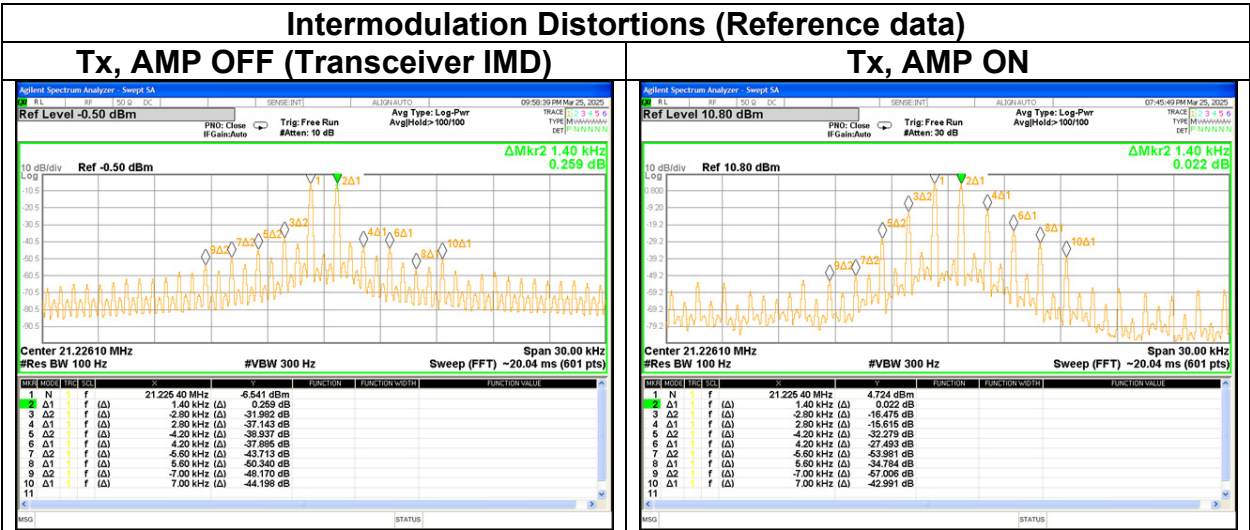
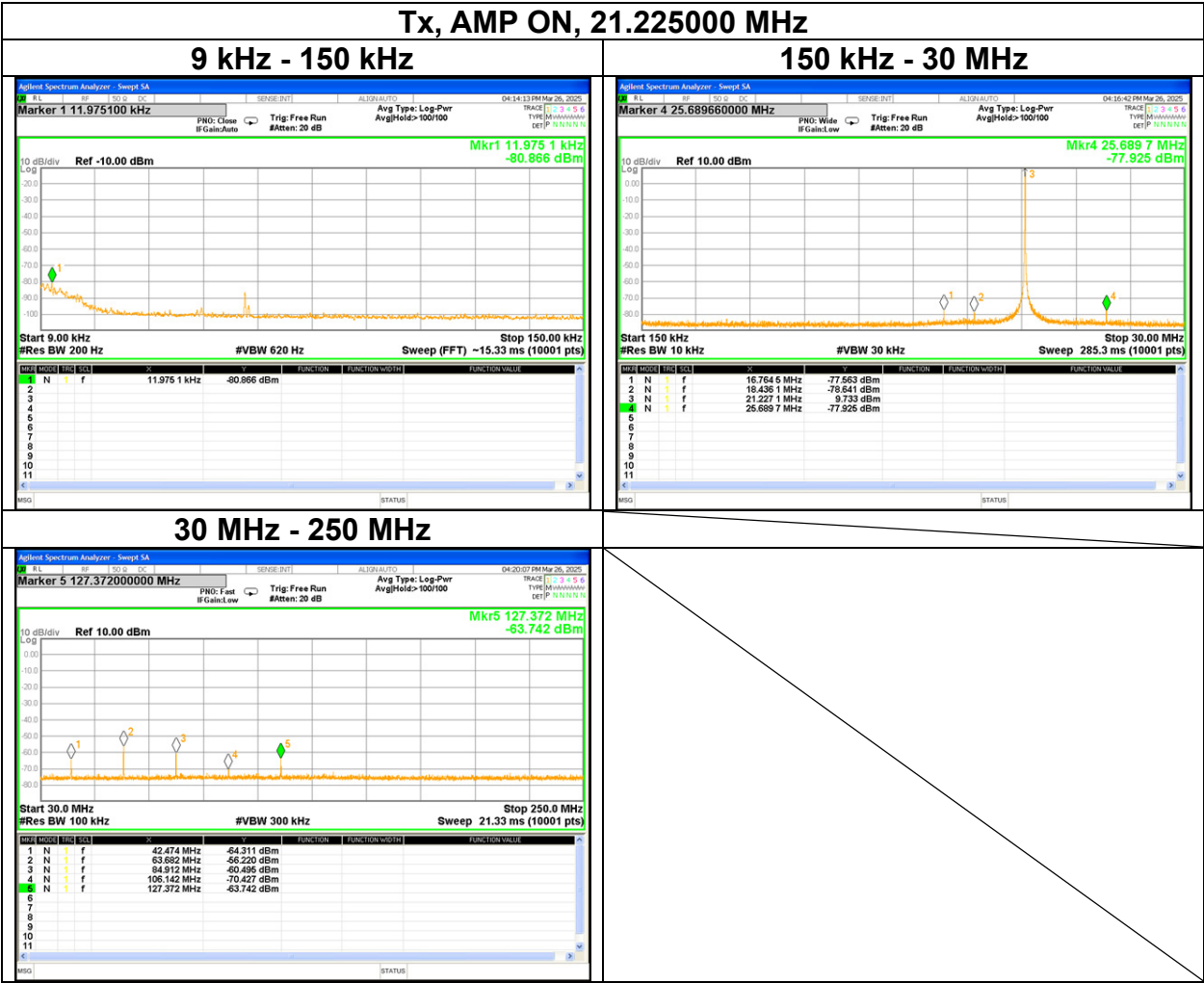


Tx, AMP ON



The analyzer reference level was set to the 6 dB above the peak marker.

Spurious Emission



The analyzer reference level was set to the 6 dB above the peak marker.