ENGINEERING TEST REPORT

MF/HF MARINE TRANSCEIVER
Model No.: IC-M803
FCC ID: AFJ410000

Applicant:

ICOM Incorporated
1-1-32, Kamiminami, Hirano-ku
Osaka, Japan, 547-0003

Tested in Accordance With

Federal Communications Commission (FCC)
47 CFR, Parts 80 and 90 (Subpart I)

UltraTech's File No.: 26ICOM639_FCC80

This Test report is Issued under the Authority of Tri M. Luu, BASc, Vice President of Engineering UltraTech Group of Labs Date: June 15, 2026	
Report Prepared by: Santhosh Fernandez Issued Date: June 15, 2026	Tested by: Angus Au Test Dates: May 12- May 29, 2026

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Parts 80 and 90 (Subpart I)
Title:	Code of Federal Regulations (CFR), Title 47 Telecommunication – Parts 80 and 90 (Subpart I)
Purpose of Test:	To obtain FCC C2PC Authorization for Radio operating in the Frequency Band 1.6-27.5 MHz
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with TIA/EIA Standard TIA/EIA-603-E – Land Mobile FM or PM Communications Equipment Measurement and performance Standards.

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 0-19, 80-End	2026	Code of Federal Regulations – Telecommunication
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
TIA/EIA 603, Edition E	2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters used in Licensed Radio Services

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Icom Incorporated
Address:	1-1-32, Kamiminami Hirano-ku, Osaka Japan, 547-0003
Contact Person:	Mr. Tatsuo Yano Phone #: +81 6 6793 5302 Fax #: +81 6 6793 0013 Email Address: world_support@icom.co.jp

MANUFACTURER	
Name:	Icom Incorporated
Address:	1-1-32, Kamiminami Hirano-ku, Osaka Japan, 547-0003
Contact Person:	Mr. Tatsuo Yano Phone #: +81 6 6793 5302 Fax #: +81 6 6793 0013 Email Address: world_support@icom.co.jp

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The applicant has supplied the following information (with the exception of the Date of Receipt).

Brand Name:	ICOM Incorporated
Product Name:	MF/HF MARINE TRANSCEIVER
Model Name or Number:	IC-M803
Serial Number:	00000002
Type of Equipment:	Licensed Non-Broadcast Transceiver
Power Supply Requirement:	13.6 VDC nominal
Transmitting/Receiving Antenna Type:	Non-integral
Primary User Functions of EUT:	2-Way Wireless Communication

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	Mobile
Intended Operating Environment:	Marine
Power Supply Requirement:	13.6 VDC nominal
RF Output Power Rating:	150 Watt (High); 20 Watt (Low)
Operating Frequency Range:	1.6-27.5 MHz
RF Output Impedance:	50 Ω
Occupied Bandwidth (99%):	151 Hz (A1A) 2.06 kHz (J3E) 0.79 kHz (J2B) 256 Hz (F1B) 1.47 kHz (F1B)
Emission Designation:	2K80J3E; 2K80J2B; 2K80F1B*; 300HF1B; 160HA1A
*Part 90 only	

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type
1	Microphone connector (Front panel remote)	1	8 Pin Connector
2	RF Antenna (Tx/Rx)	1	UHF
3	Controller Jack	1	10 Pin Connector
4	Accessory	1	8 pin connector
5	GPS-Data	1	BNC
6	Remote	1	DB9
7	AF/MOD	1	DB9
8	GPS-ANT	1	SMA
9	Ext Speaker	1	1/8 mini jack
10	Tuner control Socket	1	4 pin socket
11	Ground terminal	1	terminal
12	DC Power Socket	1	6 pin socket
13	DSC Antenna Connector (Rx)	1	UHF

2.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	Speaker Microphone
Brand Name:	Icom Inc.

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C - 24°C
Humidity:	45% to 58%
Pressure:	102 kPa
Power Input Source:	13.6 VDC Nominal

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

Operating Modes:	The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	N/A
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT is tested with the antenna port terminated to a 50 Ohm RF Load.

Transmitter Test Signals		
Frequency Band(s):	Part 80	1.6-2.9999 MHz, 4-4.9999 MHz 6-6.9999 MHz, 8-8.9999 MHz 12-13.9999 MHz, 16-17.9999 MHz 18-19.9999 MHz, 22-22.9999 MHz 25-27.5 MHz
	Part 90	1.6-27.5 MHz
Test Frequencies: (MHz) (Near lowest, near middle & near highest frequencies in the frequency range of operation.)	1.605; 4.065; 16.36; 27.5 MHz	
Transmitter Wanted Output Test Signals: Transmitter Power (measured maximum output power): Normal Test Modulation: Modulating signal source:	149.62W A1A, F1B, J2B, J3E External	

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. TEST LAB AND LOCATION

Company name:	**Ultratech Engineering labs Inc.**	
Address:	3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4 Tel.: (905) 829-1570 Fax.: (905) 829-8050 Website: www.ultratech-labs.com,	
Test Site/Company Number:	**FCC**	**ISED**
	MRA: APEC TEL Designation no. CA0001 FRN: 0003781366	Company No.2049A CAB Identifier: CA0001

4.2. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Applicability (Yes/No)
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	N/A for this C2PC Addressed in original filing
2.1046, 22.565, 74.461, 80.215 & 90.205	RF Power Output	Yes
2.1047(a), 80.213(e) & 90.242(b)(8)	Audio Frequency Response	Yes.
2.1047(b), 74.463, 80.213 & 90.210	Modulation Limiting	Yes
2.1049, 74.462, 80.211(f), 90.209 & 90.210	Emission Limitation & Emission Mask	Yes
2.1051, 2.1057, 80.211(f)(3), & 90.210	Emission Limits - Spurious Emissions at Antenna Terminal	Yes
2.1053, 2.1057, 22.359, 80.211(f)(3), & 90.210	Emission Limits - Field Strength of Spurious Emissions	Yes
2.1055, 22.355, 74.464 80.209 & 90.213	Frequency Stability	Yes

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

4.3.1. DEVIATION OF STANDARD TEST PROCEDURES

None

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in EXHIBIT 8 of this report.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.
Refer to Exhibit 7 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER

The essential function of the EUT is to communicate to and from radios over RF link.

5.5. RF POWER OUTPUT [§§ 2.1046, 80.215 & 90.205]

5.5.1. Limits

Please refer to FCC 47 CFR 90.205, 74.461, 80.215 & 22.565 for specification details.

RSS 181 Section 11.4
Equipment employing single sideband emission shall have the carrier power: at 40 dB below PEP, for suppressed carrier transmitters;

5.5.2. Method of Measurements

Refer to Section 8.1 (Conducted) and 8.2 (Radiated) of this report for measurement details

5.5.3. Test Data

5.5.3.1. Mode A1A

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
1.605	High	150.0	51.76	51.61	144.88
1.605	Mid-H	100.0	50.00	49.85	96.61
1.605	Mid-L	60.0	47.78	48.28	67.30
1.605	Low	20.0	43.01	42.74	18.79
2.182	High	150.0	51.76	51.70	147.91
2.182	Mid-H	100.0	50.00	49.96	99.08
2.182	Mid-L	60.0	47.78	48.37	68.71
2.182	Low	20.0	43.01	42.84	19.23
4.065	High	150.0	51.76	51.62	145.21
4.065	Mid-H	100.0	50.00	49.91	97.95
4.065	Mid-L	60.0	47.78	48.37	68.71
4.065	Low	20.0	43.01	42.72	18.71
6.2	High	150.0	51.76	51.47	140.28
6.2	Mid-H	100.0	50.00	49.76	94.62
6.2	Mid-L	60.0	47.78	48.20	66.07
6.2	Low	20.0	43.01	42.67	18.49
8.195	High	150.0	51.76	51.58	143.88
8.195	Mid-H	100.0	50.00	49.92	98.17
8.195	Mid-L	60.0	47.78	48.35	68.39
8.195	Low	20.0	43.01	42.65	18.41
12.23	High	150.0	51.76	51.55	142.89
12.23	Mid-H	100.0	50.00	49.91	97.95
12.23	Mid-L	60.0	47.78	48.34	68.23
12.23	Low	20.0	43.01	42.74	18.79
16.36	High	150.0	51.76	51.58	143.88
16.36	Mid-H	100.0	50.00	49.89	97.50
16.36	Mid-L	60.0	47.78	48.32	67.92
16.36	Low	20.0	43.01	42.72	18.71

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
18.78	High	150.0	51.76	51.61	144.88
18.78	Mid-H	100.0	50.00	49.88	97.27
18.78	Mid-L	60.0	47.78	48.31	67.76
18.78	Low	20.0	43.01	42.72	18.71
22.05	High	150.0	51.76	51.62	145.21
22.05	Mid-H	100.0	50.00	49.95	98.86
22.05	Mid-L	60.0	47.78	48.34	68.23
22.05	Low	20.0	43.01	42.68	18.54
25.07	High	150.0	51.76	51.48	140.60
25.07	Mid-H	100.0	50.00	49.83	96.16
25.07	Mid-L	60.0	47.78	48.26	66.99
25.07	Low	20.0	43.01	42.76	18.88
27.5	High	150.0	51.76	51.26	133.66
27.5	Mid-H	100.0	50.00	49.57	90.57
27.5	Mid-L	60.0	47.78	48.01	63.24
27.5	Low	20.0	43.01	42.41	17.42

5.5.3.2. Mode F1B

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
1.605	High	150.0	51.76	51.67	146.89
1.605	Mid-H	100.0	50.00	49.93	98.40
1.605	Mid-L	60.0	47.78	48.37	68.71
1.605	Low	20.0	43.01	42.90	19.50
2.182	High	150.0	51.76	51.75	149.62
2.182	Mid-H	100.0	50.00	50.02	100.46
2.182	Mid-L	60.0	47.78	48.45	69.98
2.182	Low	20.0	43.01	42.99	19.91
4.065	High	150.0	51.76	51.67	146.89
4.065	Mid-H	100.0	50.00	49.97	99.31
4.065	Mid-L	60.0	47.78	48.44	69.82
4.065	Low	20.0	43.01	42.85	19.28
6.2	High	150.0	51.76	51.53	142.23
6.2	Mid-H	100.0	50.00	49.82	95.94
6.2	Mid-L	60.0	47.78	48.27	67.14
6.2	Low	20.0	43.01	42.81	19.10
8.195	High	150.0	51.76	51.62	145.21
8.195	Mid-H	100.0	50.00	49.98	99.54
8.195	Mid-L	60.0	47.78	48.42	69.50
8.195	Low	20.0	43.01	42.79	19.01
12.23	High	150.0	51.76	51.61	144.88
12.23	Mid-H	100.0	50.00	49.96	99.08
12.23	Mid-L	60.0	47.78	48.40	69.18
12.23	Low	20.0	43.01	42.88	19.41

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
16.36	High	150.0	51.76	51.63	145.55
16.36	Mid-H	100.0	50.00	49.95	98.86
16.36	Mid-L	60.0	47.78	48.39	69.02
16.36	Low	20.0	43.01	42.84	19.23
18.78	High	150.0	51.76	51.65	146.22
18.78	Mid-H	100.0	50.00	49.94	98.63
18.78	Mid-L	60.0	47.78	48.37	68.71
18.78	Low	20.0	43.01	42.83	19.19
22.05	High	150.0	51.76	51.66	146.55
22.05	Mid-H	100.0	50.00	50.00	100.00
22.05	Mid-L	60.0	47.78	48.39	69.02
22.05	Low	20.0	43.01	42.79	19.01
25.07	High	150.0	51.76	51.52	141.91
25.07	Mid-H	100.0	50.00	49.88	97.27
25.07	Mid-L	60.0	47.78	48.32	67.92
25.07	Low	20.0	43.01	42.87	19.36
27.5	High	150.0	51.76	51.31	135.21
27.5	Mid-H	100.0	50.00	49.63	91.83
27.5	Mid-L	60.0	47.78	48.07	64.12
27.5	Low	20.0	43.01	42.53	17.91

5.5.3.3. Mode J2B

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
1.605	High	150.0	51.76	51.63	145.55
1.605	Mid-H	100.0	50.00	49.86	96.83
1.605	Mid-L	60.0	47.78	48.29	67.45
1.605	Low	20.0	43.01	42.74	18.79
2.182	High	150.0	51.76	51.70	147.91
2.182	Mid-H	100.0	50.00	49.96	99.08
2.182	Mid-L	60.0	47.78	48.38	68.87
2.182	Low	20.0	43.01	42.84	19.23
4.065	High	150.0	51.76	51.62	145.21
4.065	Mid-H	100.0	50.00	49.91	97.95
4.065	Mid-L	60.0	47.78	48.37	68.71
4.065	Low	20.0	43.01	42.72	18.71
6.2	High	150.0	51.76	51.49	140.93
6.2	Mid-H	100.0	50.00	49.77	94.84
6.2	Mid-L	60.0	47.78	48.22	66.37
6.2	Low	20.0	43.01	42.70	18.62

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
8.195	High	150.0	51.76	51.58	143.88
8.195	Mid-H	100.0	50.00	49.94	98.63
8.195	Mid-L	60.0	47.78	48.37	68.71
8.195	Low	20.0	43.01	42.80	19.05
12.23	High	150.0	51.76	51.57	143.55
12.23	Mid-H	100.0	50.00	49.92	98.17
12.23	Mid-L	60.0	47.78	48.35	68.39
12.23	Low	20.0	43.01	42.78	18.97
16.36	High	150.0	51.76	51.60	144.54
16.36	Mid-H	100.0	50.00	49.91	97.95
16.36	Mid-L	60.0	47.78	48.34	68.23
16.36	Low	20.0	43.01	42.76	18.88
18.78	High	150.0	51.76	51.62	145.21
18.78	Mid-H	100.0	50.00	49.90	97.72
18.78	Mid-L	60.0	47.78	48.32	67.92
18.78	Low	20.0	43.01	42.74	18.79
22.05	High	150.0	51.76	51.63	145.55
22.05	Mid-H	100.0	50.00	49.97	99.31
22.05	Mid-L	60.0	47.78	48.36	68.55
22.05	Low	20.0	43.01	42.83	19.19
25.07	High	150.0	51.76	51.50	141.25
25.07	Mid-H	100.0	50.00	49.85	96.61
25.07	Mid-L	60.0	47.78	48.28	67.30
25.07	Low	20.0	43.01	42.81	19.10
27.5	High	150.0	51.76	51.28	134.28
27.5	Mid-H	100.0	50.00	49.60	91.20
27.5	Mid-L	60.0	47.78	48.03	63.53
27.5	Low	20.0	43.01	42.45	17.58

5.5.3.4. Mode J3E

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
1.605	High	150.0	51.76	51.69	147.57
1.605	Mid-H	100.0	50.00	49.94	98.63
1.605	Mid-L	60.0	47.78	48.37	68.71
1.605	Low	20.0	43.01	42.88	19.41
2.182	High	150.0	51.76	51.75	149.62
2.182	Mid-H	100.0	50.00	50.02	100.46
2.182	Mid-L	60.0	47.78	48.45	69.98
2.182	Low	20.0	43.01	42.99	19.91
4.065	High	150.0	51.76	51.66	146.55
4.065	Mid-H	100.0	50.00	49.95	98.86
4.065	Mid-L	60.0	47.78	48.42	69.50
4.065	Low	20.0	43.01	42.81	19.10

Frequencies MHz	Power Level	Power Rating Watts	Power Rating dBm	Measured dBm	Actual Power Watts
6.2	High	150.0	51.76	51.52	141.91
6.2	Mid-H	100.0	50.00	49.80	95.50
6.2	Mid-L	60.0	47.78	48.27	67.14
6.2	Low	20.0	43.01	42.79	19.01
8.195	High	150.0	51.76	51.61	144.88
8.195	Mid-H	100.0	50.00	49.97	99.31
8.195	Mid-L	60.0	47.78	48.41	69.34
8.195	Low	20.0	43.01	42.78	18.97
12.23	High	150.0	51.76	51.60	144.54
12.23	Mid-H	100.0	50.00	49.96	99.08
12.23	Mid-L	60.0	47.78	48.39	69.02
12.23	Low	20.0	43.01	42.86	19.32
16.36	High	150.0	51.76	51.63	145.55
16.36	Mid-H	100.0	50.00	49.95	98.86
16.36	Mid-L	60.0	47.78	48.39	69.02
16.36	Low	20.0	43.01	42.86	19.32
18.78	High	150.0	51.76	51.64	145.88
18.78	Mid-H	100.0	50.00	49.92	98.17
18.78	Mid-L	60.0	47.78	48.35	68.39
18.78	Low	20.0	43.01	42.81	19.10
22.05	High	150.0	51.76	51.66	146.55
22.05	Mid-H	100.0	50.00	49.99	99.77
22.05	Mid-L	60.0	47.78	48.39	69.02
22.05	Low	20.0	43.01	42.79	19.01
25.07	High	150.0	51.76	51.53	142.23
25.07	Mid-H	100.0	50.00	49.88	97.27
25.07	Mid-L	60.0	47.78	48.31	67.76
25.07	Low	20.0	43.01	42.88	19.41
27.5	High	150.0	51.76	51.31	135.21
27.5	Mid-H	100.0	50.00	49.63	91.83
27.5	Mid-L	60.0	47.78	48.08	64.27
27.5	Low	20.0	43.01	42.55	17.99

5.5.3.5. Carrier Suppression- J2B

Frequencies MHz	Carrier Suppression Level (dB)	Limit (dB)
1.605	51.57	40.0
2.182	53.04	40.0
4.065	54.60	40.0
6.2	55.24	40.0
8.195	55.25	40.0
12.23	55.21	40.0
16.36	55.13	40.0
18.78	55.45	40.0
22.05	54.71	40.0
25.07	55.15	40.0
27.5	54.87	40.0

5.5.3.6. Carrier Suppression- J3E

Frequencies MHz	Carrier Suppression Level (dB)	Limit (dB)
1.605	45.29	40.0
2.182	46.57	40.0
4.065	46.07	40.0
6.2	44.73	40.0
8.195	47.62	40.0
12.23	46.32	40.0
16.36	45.53	40.0
18.78	47.45	40.0
22.05	47.41	40.0
25.07	46.46	40.0
27.5	46.88	40.0

5.6. Modulation Characteristics and Modulation Limiting [§ 2.1047(a), 80.213(3)]

5.6.1. Limits

§ **2.1047(a):** Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

5.6.2. Method of Measurements

The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the Spectrum Analyzer.

5.6.3. Test Data

5.6.3.1. Audio Frequency response

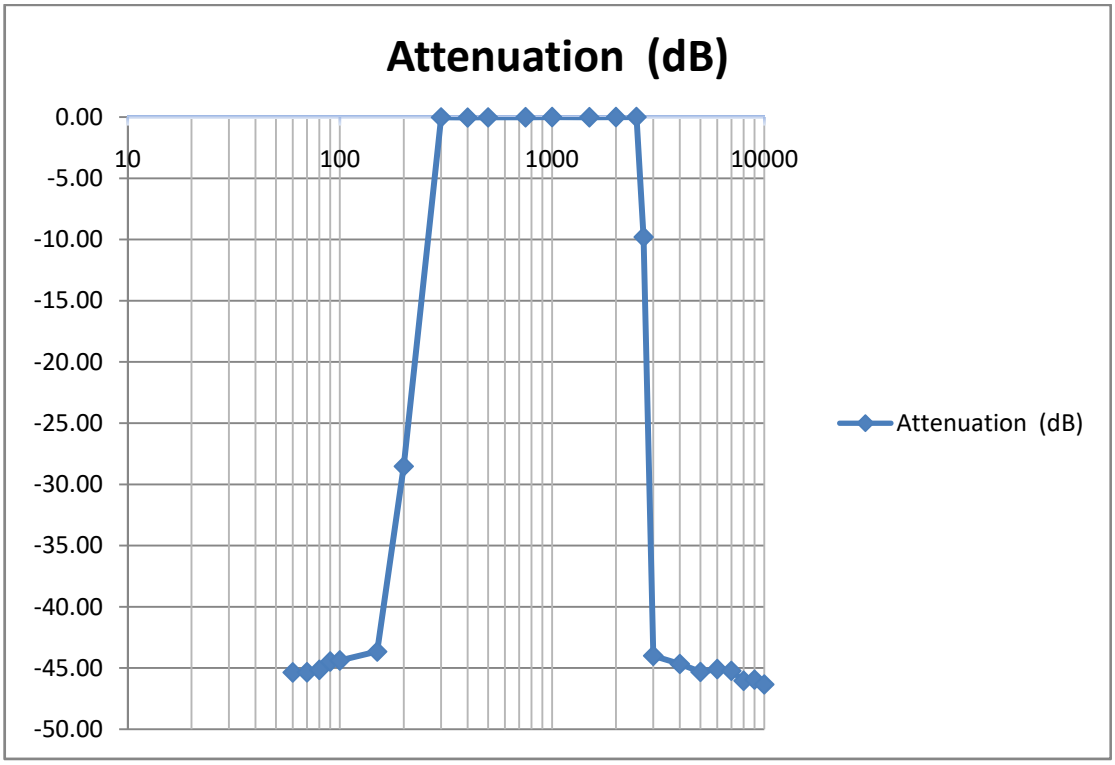
J3E Upper side band (Test frequency @ 16.36 MHz)

Input level Used for 0dB reference at 1 KHz: 10 mV

Input Audio Frequency (Hz)	Attenuation (dB)	**Attenuation Rel. to 1 KHz**
60	6.19	-45.36
70	6.21	-45.34
80	6.40	-45.15
90	7.08	-44.47
100	7.17	-44.38
150	7.90	-43.65
200	23.03	-28.52
300	51.53	-0.02
400	51.52	-0.03
500	51.53	-0.02
750	51.54	-0.01
1000	51.55	0.00
1500	51.54	-0.01
2000	51.54	0.00
2500	51.54	0.00
2700	41.75	-9.80
3000	7.55	-44.00
4000	6.89	-44.66
5000	6.24	-45.31

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Input Audio Frequency (Hz)	Attenuation (dB)	**Attenuation Rel. to 1 KHz**
6000	6.47	-45.08
7000	6.33	-45.22
8000	5.51	-46.04
9000	5.61	-45.94
10000	5.22	-46.33



5.7. MODULATION LIMITING [§§ 2.1047 (b), 80.213 & 90.210]

5.7.1. Limits

§ **2.1047(b):** Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

Recommended frequency deviation characteristics are given below:

- 1.25 KHz for 6.25 kHz Channel Spacing System
- 2.5 KHz for 12.5 kHz Channel Spacing System

.

80.213 (3) In single sideband operation the upper sideband must be transmitted. Single sideband transmitters must automatically limit the peak envelope power to their authorized operating power and meet the requirements in §80.207(c).

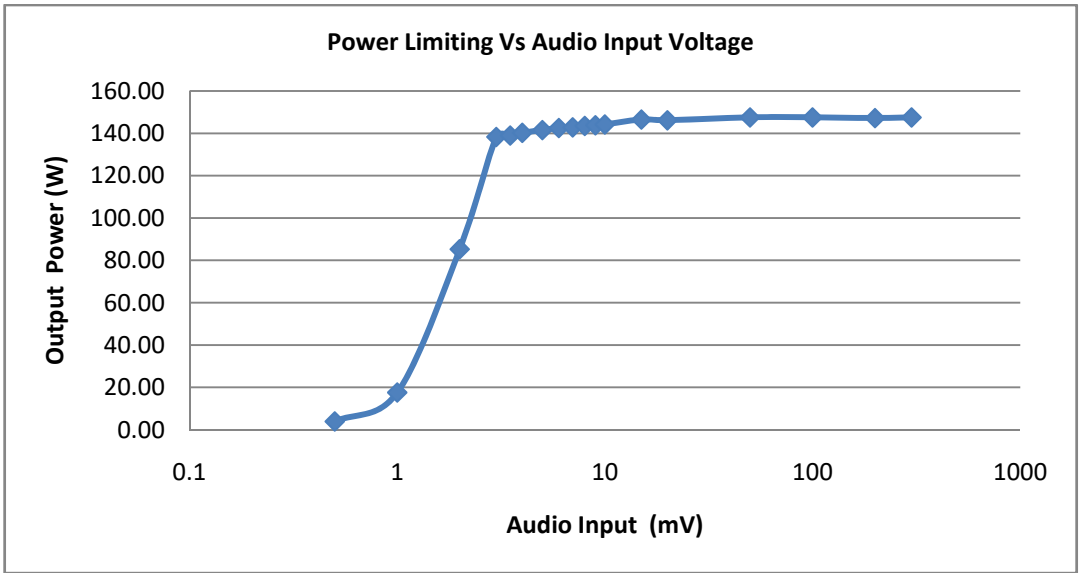
5.7.2. Method of Measurements

For J3 E two audio tones of 400 Hz and 1800 Hz were applied to transmitter in equal level. The input level was varied and the PEP was measured.
For J2B a single tone of 1.7 kHz was applied and the Power output was measured.

5.7.3. Test Data

5.7.3.1. J3E - Power Limiting @ 1.605 MHz

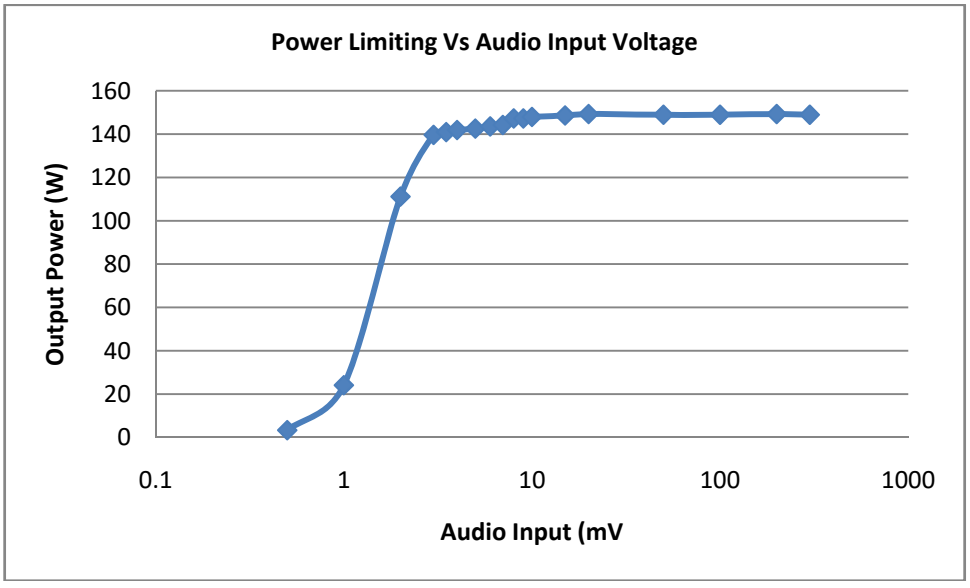
Input audio signal level (mV)	Measured Power PEP (W)
0.5	3.01
1	11.43
2	67.3
3	132.13
3.5	151.71
4	155.24
5	155.96
6	155.24
7	154.88
8	154.17
9	154.53
10	153.82
15	154.53
20	153.82
50	153.82
100	154.17
200	155.24
300	157.04



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.7.3.2. J3E - Power Limiting @ 2.182 MHz

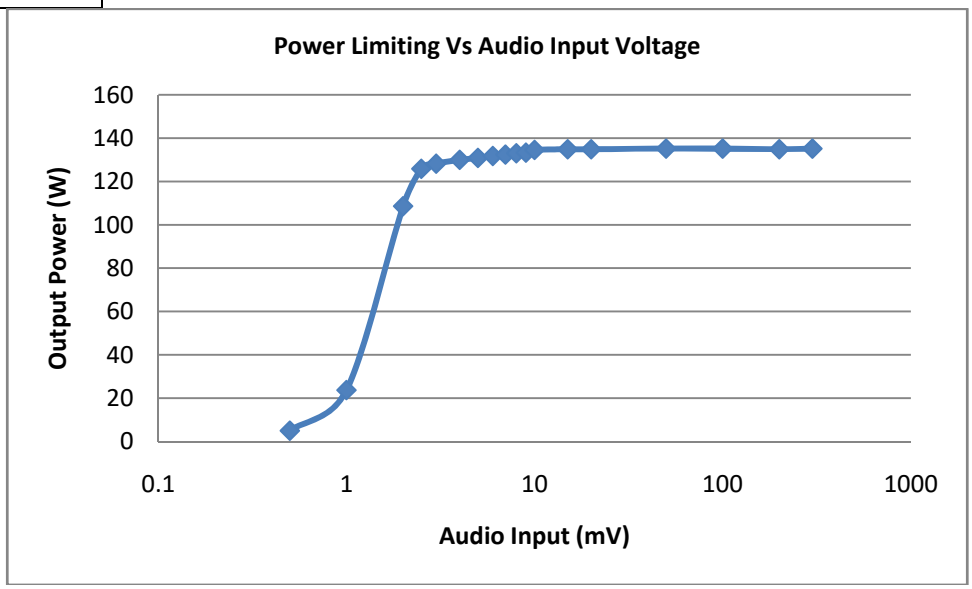
Input audio signal level (mV)	Measured Power PEP (W)
0.5	3.39
1	24.15
2	111.17
3	139.64
3.5	140.93
4	141.91
5	142.56
6	143.55
7	144.21
8	147.23
9	147.23
10	147.91
15	148.59
20	149.28
50	148.94
100	148.94
200	149.28
300	148.94



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.7.3.3. J3E - Power Limiting @ 27.5 MHz

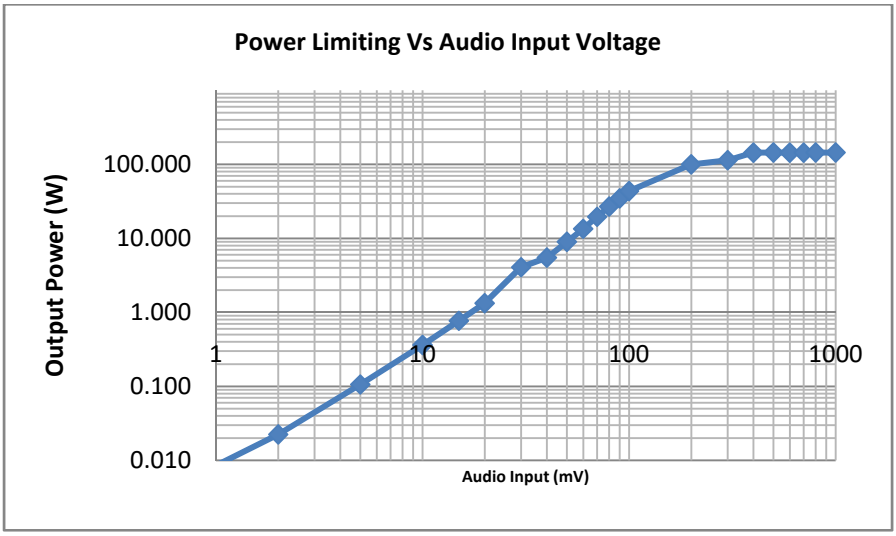
Input audio signal level (mV)	Measured Power PEP (W)
0.5	5.02
1	23.77
2	108.64
2.5	125.89
3	128.23
4	130.02
5	130.92
6	131.83
7	132.43
8	133.05
9	133.35
10	134.59
15	134.90
20	134.90
50	135.21
100	135.21
200	134.90
300	135.21



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.7.3.4. J2B- Power Limiting @ 1.605 MHz

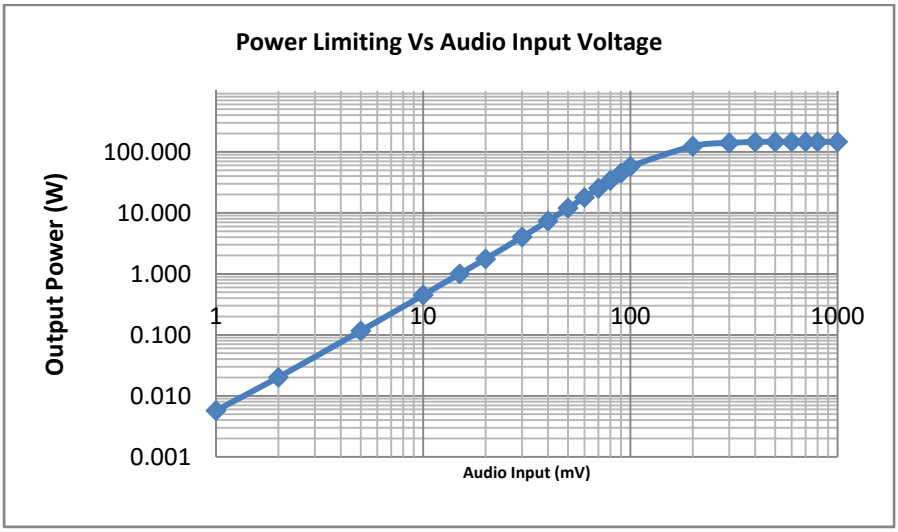
Input audio signal level (mV)	Measured Power (W)
1	0.009
2	0.022
5	0.106
10	0.361
15	0.769
20	1.327
30	4.074
40	5.483
50	8.974
60	13.459
70	19.543
80	26.792
90	34.594
100	43.451
200	99.770
300	113.501
400	143.880
500	144.212
600	143.880
700	143.549
800	144.212
1000	144.212



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.7.3.5. J2B- Power Limiting @ 2.182 MHz

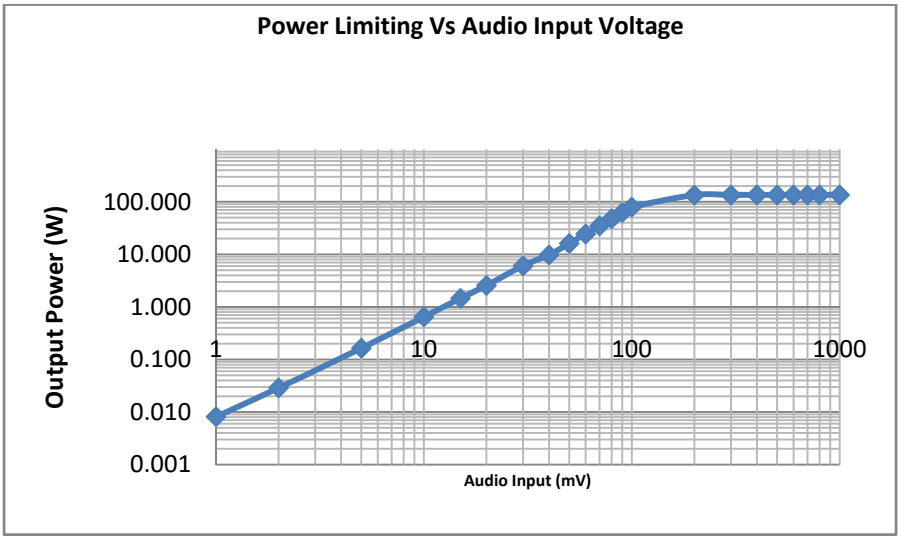
Input audio signal level (mV)	Measured Power (W)
1	0.006
2	0.020
5	0.116
10	0.451
15	1.002
20	1.758
30	4.009
40	7.345
50	11.967
60	17.865
70	25.177
80	34.041
90	44.668
100	57.943
200	123.310
300	139.637
400	145.546
500	145.881
600	146.218
700	146.218
800	146.218
1000	145.881



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.7.3.6. J2B- Power Limiting @ 27.5 MHz

Input audio signal level (mV)	Measured Power (W)
1	0.008
2	0.029
5	0.163
10	0.646
15	1.452
20	2.559
30	6.053
40	9.727
50	16.106
60	24.434
70	34.914
80	47.534
90	62.373
100	79.250
200	133.968
300	134.586
400	135.207
500	134.896
600	135.519
700	135.519
800	135.519
1000	135.519



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.8. OCCUPIED BANDWIDTH & EMISSION MASK [§§ 2.1049, 80.205 80.211(f), 90.209 & 90.210]

5.8.1. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

Class Of Emission	Maximum Authorized BW (KHz)
A1A	0.4(0.25**)
F1B*	0.5
F1B**	3
J2B	3
J3E	3

*NB-DP radiotelegraph and data transmissions for communications with public coast stations.
** For Part 90 only

§80.211 Emission limitations

(a) The mean power when using emissions H3E, J3E and R3E:

(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 150 percent of the authorized bandwidth: at least 28 dB for transmitters installed on or after February 1, 1992;

(2) On any frequency removed from the assigned frequency by more than 150 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus 10log10 (mean power in watts) dB.

(f) other type emissions designators; emissions shall be attenuated below the mean output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;

(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

§90.210 Emission Masks

Frequency Band MHz	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25*	**A or B**	**A or C**
25-50	**B**	**C**

***** Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.

5.8.2. Method of Measurements

For J3 E two audio tones of 400 Hz and 1800 Hz were applied to transmitter in equal level.
For J2B a single tone of 1.7 kHz was applied.
For A1A 16 dots per second were keyed through the transmitter
For F1B a Mark frequency 1615 Hz and shift frequency of 170 Hz were used for 0.5kHz Bandwidth and a Mark frequency 1200 Hz and shift frequency of 850 Hz were used for 3 kHz Bandwidth

5.8.3. Test Data

5.8.3.1. 99% Occupied Bandwidth

Frequency MHz	A1A		F1B		F1B Part 90 only		J2B		J3E	
	Measured 99% OBW (Hz)	Maximum Authorized Bandwidth (kHz)	Measured 99% OBW (Hz)	Maximum Authorized Bandwidth (kHz)	Measured 99% OBW (kHz)	Maximum Authorized Bandwidth (kHz)	Measured 99% OBW (kHz)	Maximum Authorized Bandwidth (kHz)	Measured 99% OBW (kHz)	Maximum Authorized Bandwidth (kHz)
1.605	144	0.25	256	0.5	1.47	3	0.74	3	2.06	3
4.065	144	0.25	256	0.5	1.47	3	0.75	3	2.06	3
16.36	141	0.25	256	0.5	1.47	3	0.77	3	2.06	3
27.5	151	0.25	256	0.5	1.47	3	0.79	3	2.06	3

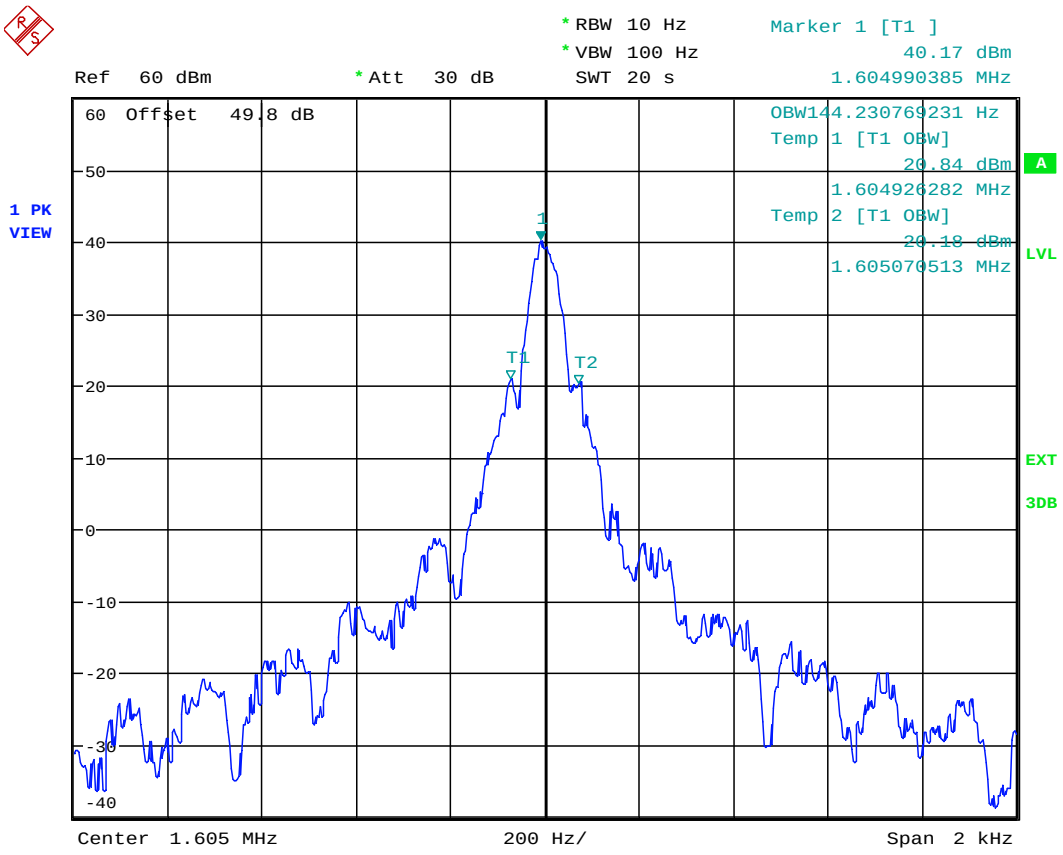
Note: 99% Occupied Bandwidth measurements were done using the built-in auto function of the analyzer.

Refer to the following test data plots for details.

5.8.3.2. OBW Plots- A1A

Configuration: A1A (CW), 1.605MHz, High power, 16 dots/ second

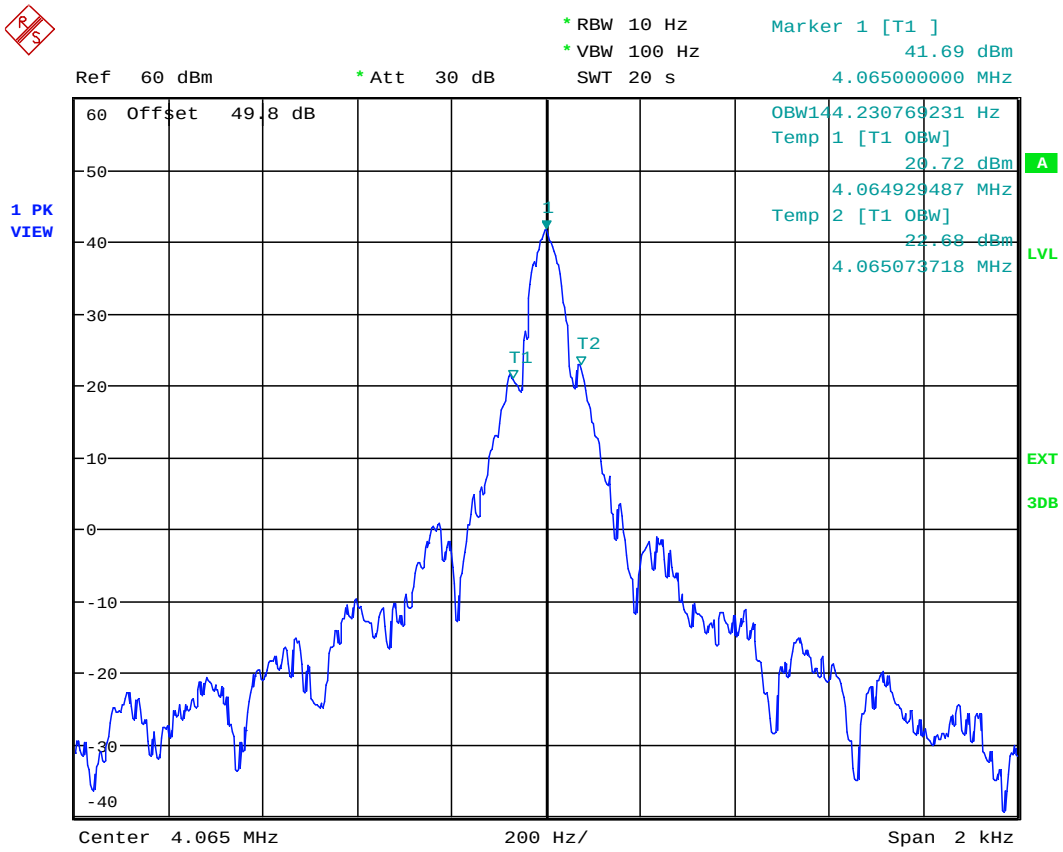
OBW:144 Hz



Date: 21.MAY.2026 19:01:22

Configuration: A1A (CW), 4.065MHz, High power, 16 dots/ second

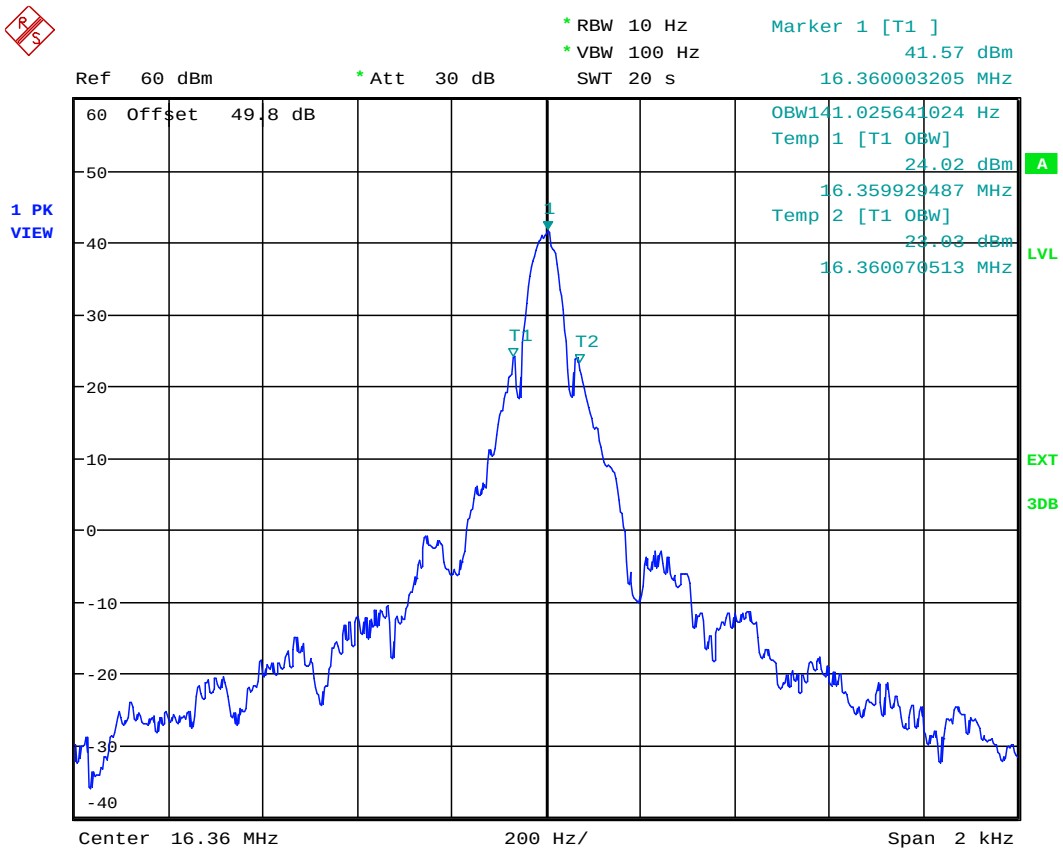
OBW: 144 Hz



Date: 21.MAY.2026 19:13:54

Configuration: A1A (CW), 16.360MHz, High power, 16 dots/ second

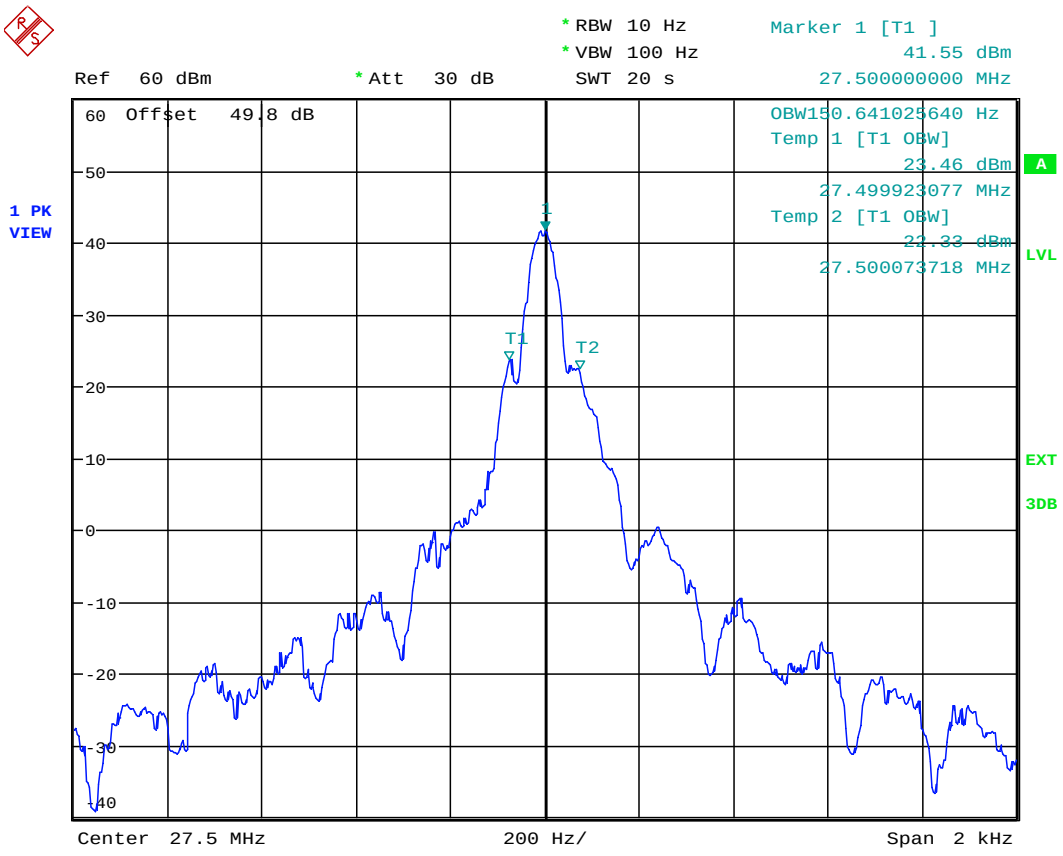
OBW: 141 Hz



Date: 21.MAY.2026 19:16:24

Configuration: A1A (CW), 27.5MHz, High power, 16 dots/ second

OBW: 151 Hz

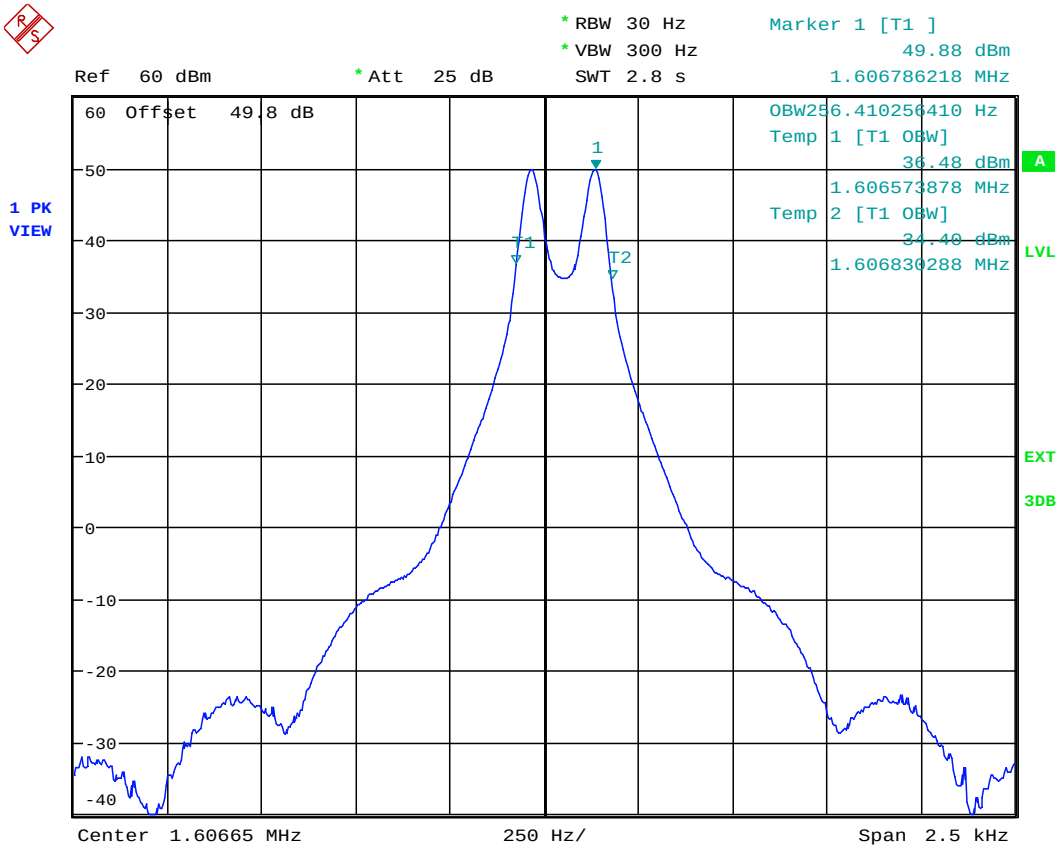


Date: 21.MAY.2026 19:21:31

OBW Plots- F1B 0.5 kHz

Configuration: F1B (FSK), 1.605MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz

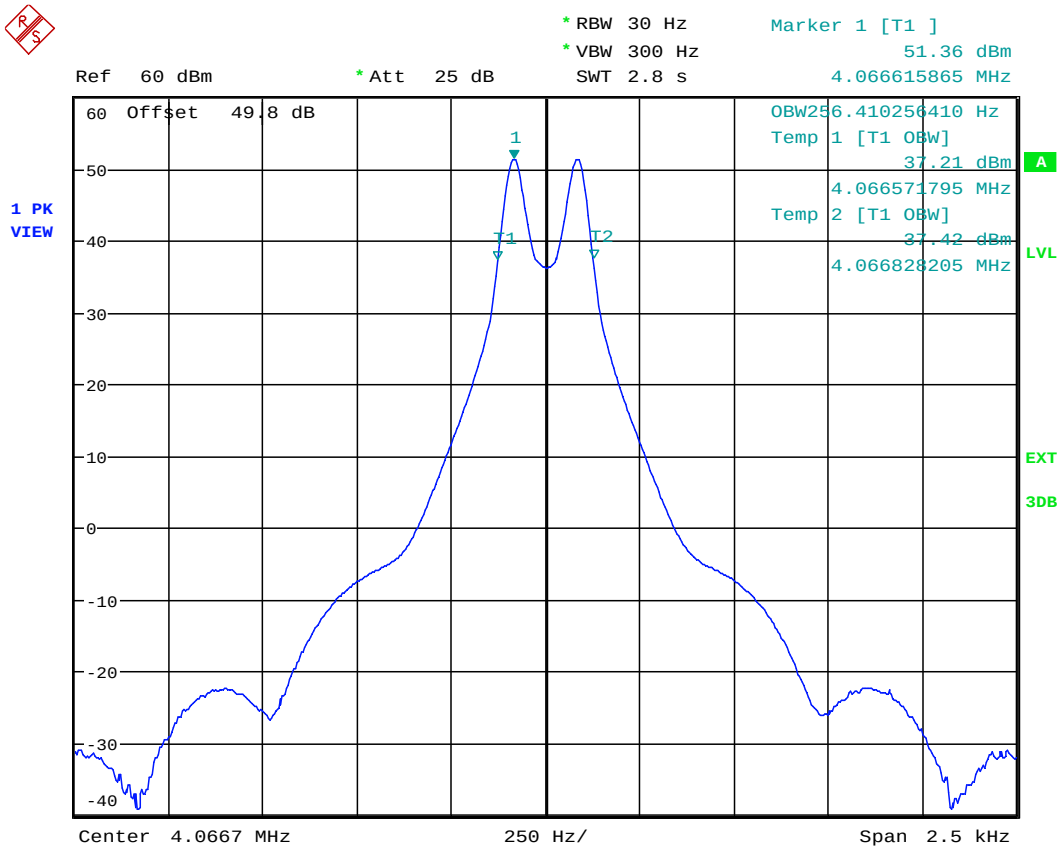
OBW: 256 Hz



Date: 25.MAY.2026 17:55:58

Configuration: F1B (FSK), 4.065MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz

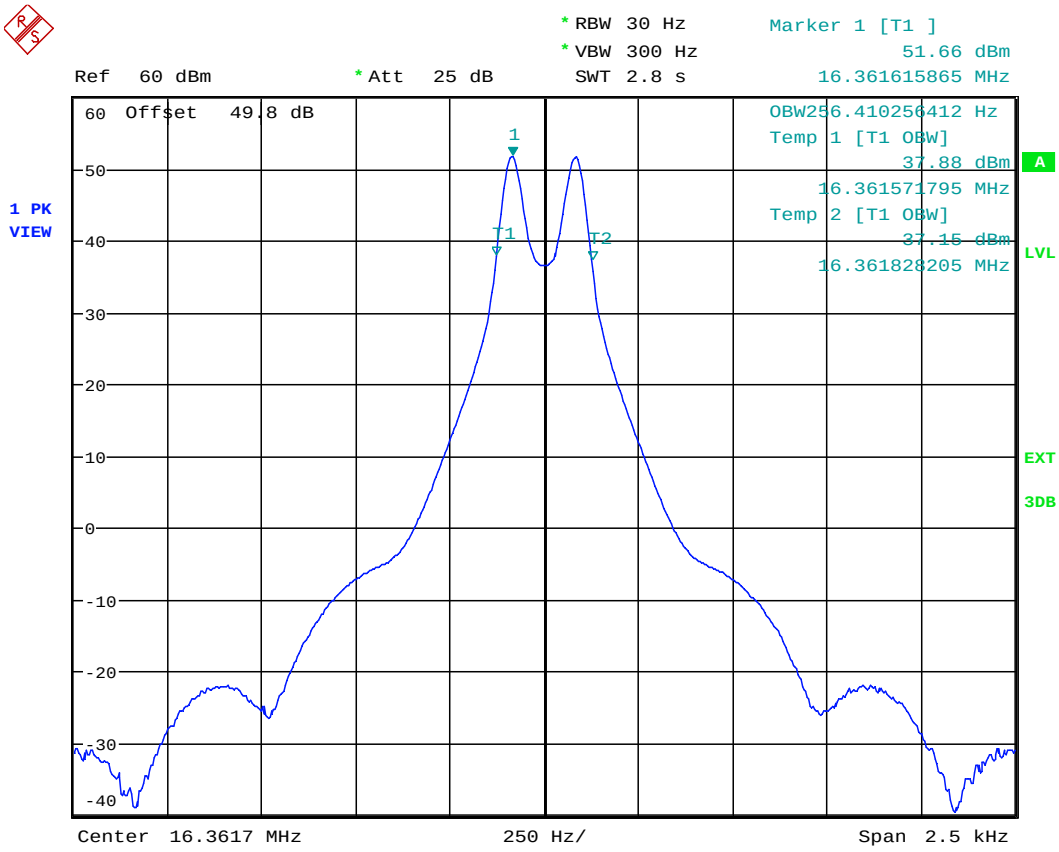
OBW: 256 Hz



Date: 25.MAY.2026 18:02:35

Configuration: F1B (FSK), 16.36MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz

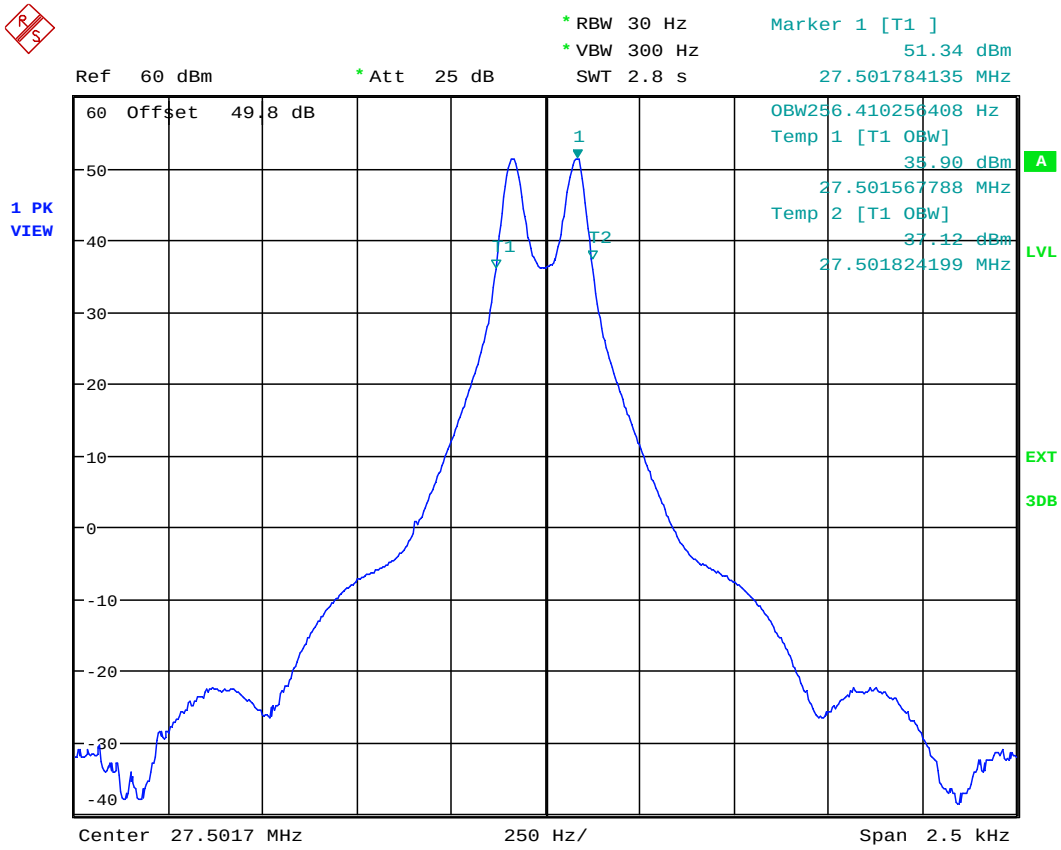
OBW: 256 Hz



Date: 25.MAY.2026 18:05:17

Configuration: F1B (FSK), 27.5MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz

OBW: 256 Hz

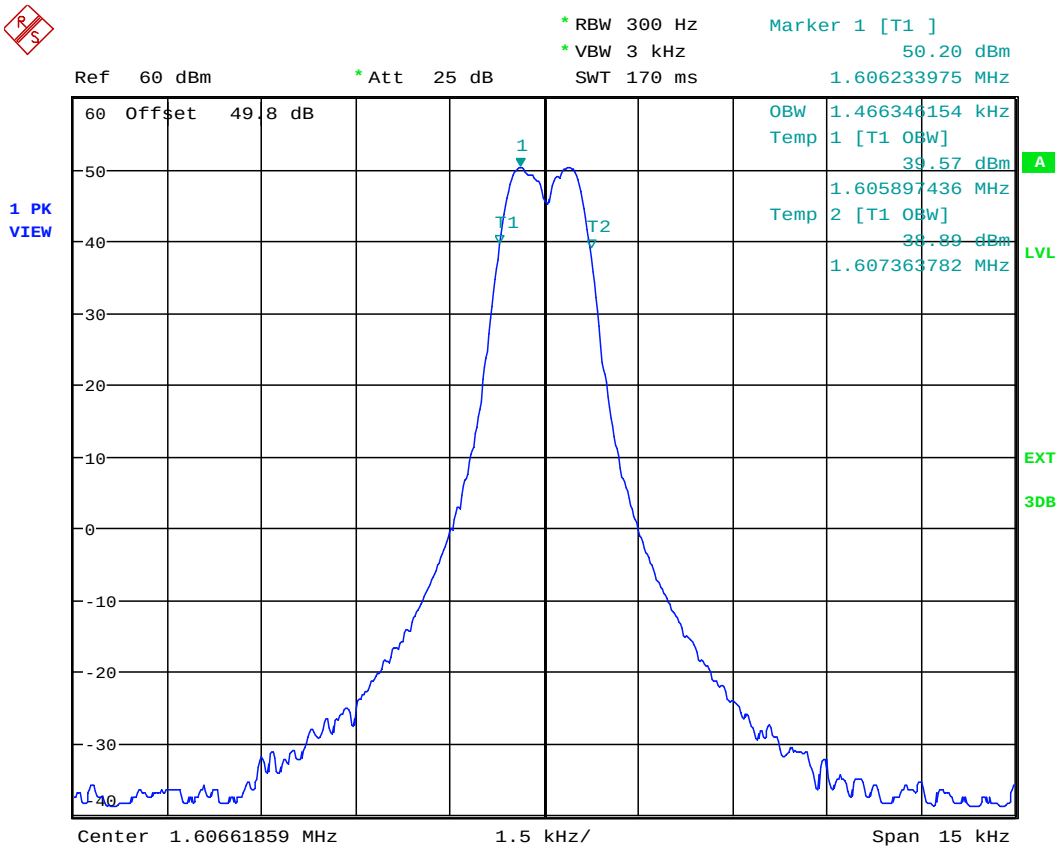


Date: 25.MAY.2026 18:07:33

OBW Plots- F1B 3 kHz

Configuration: F1B (FSK), 1.605MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz

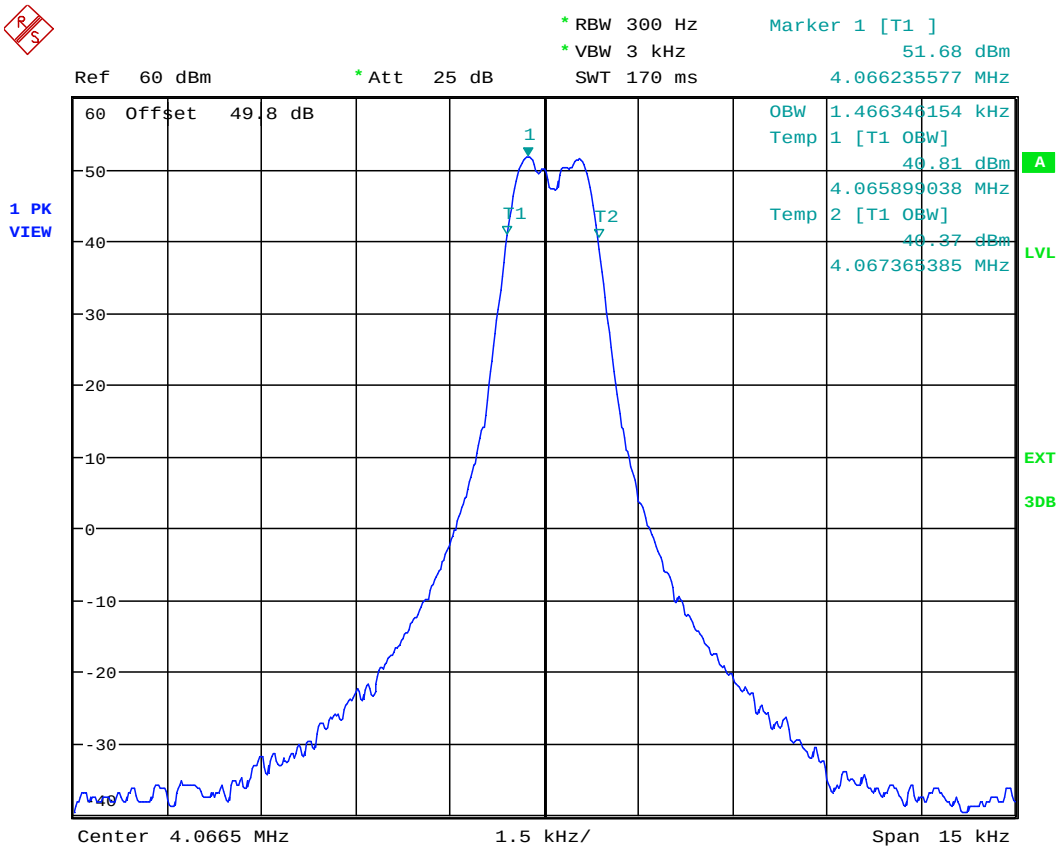
OBW: 1.466 KHz



Date: 25.MAY.2026 17:33:48

Configuration: F1B (FSK), 4.065MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz

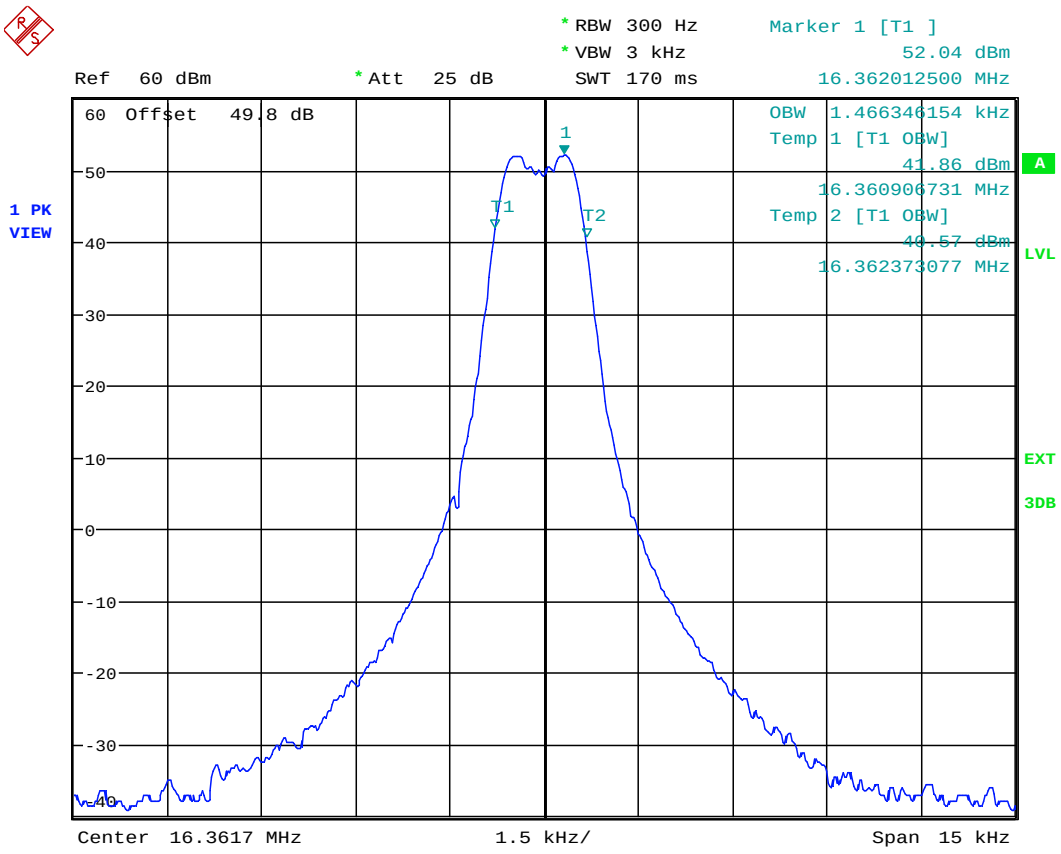
OBW: 1.466 KHz



Date: 25.MAY.2026 17:38:33

Configuration: F1B (FSK), 16.36MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz

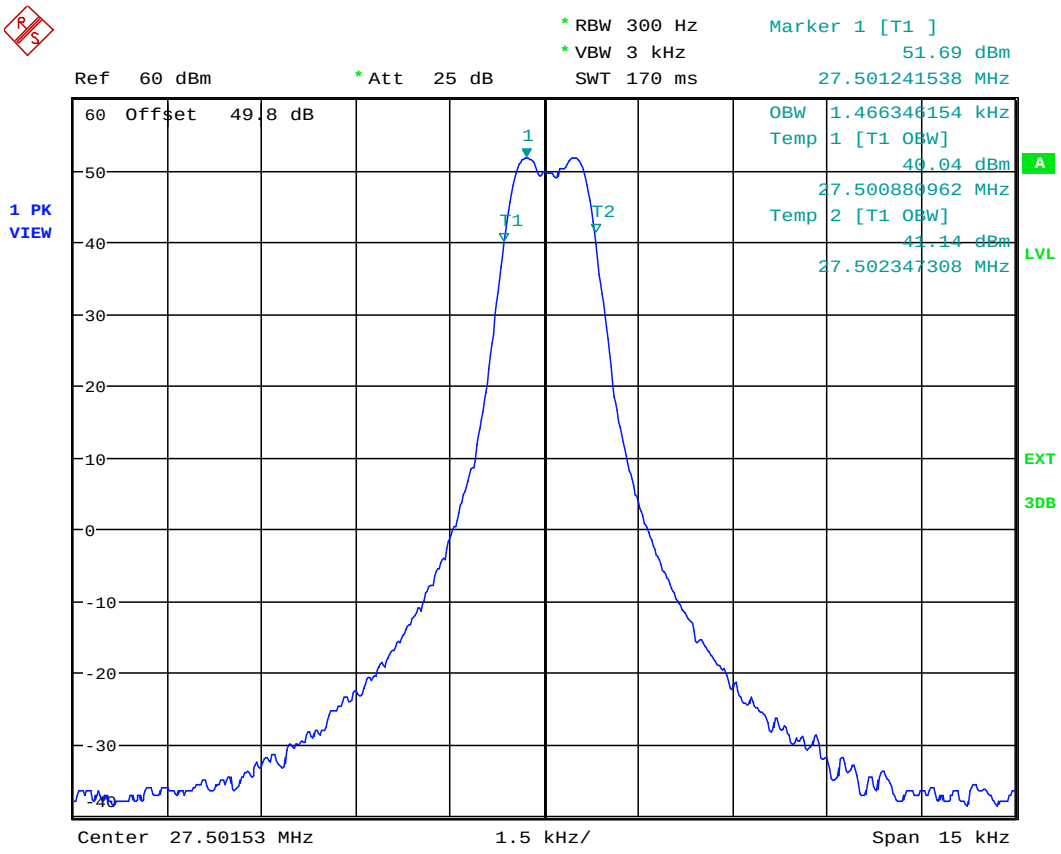
OBW: 1.466 KHz



Date: 25.MAY.2026 17:42:33

Configuration: F1B (FSK), 27.5MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz

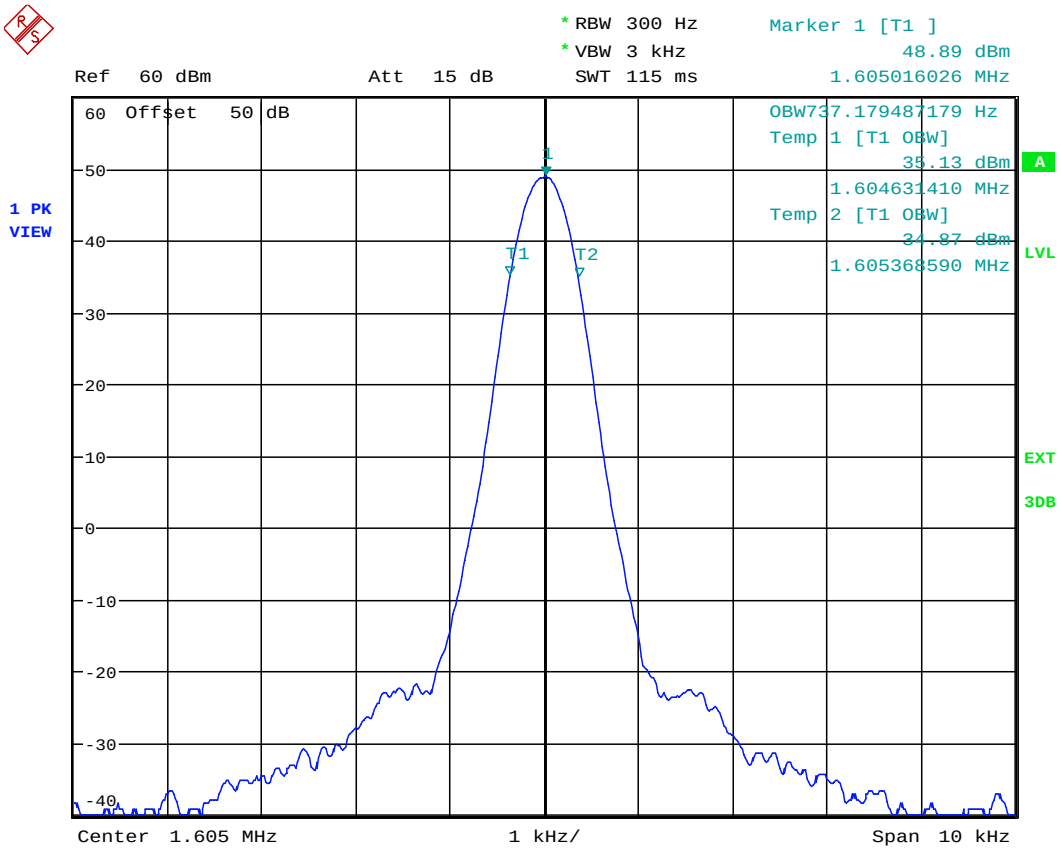
OBW: 1.466 KHz



OBW Plots- J2B

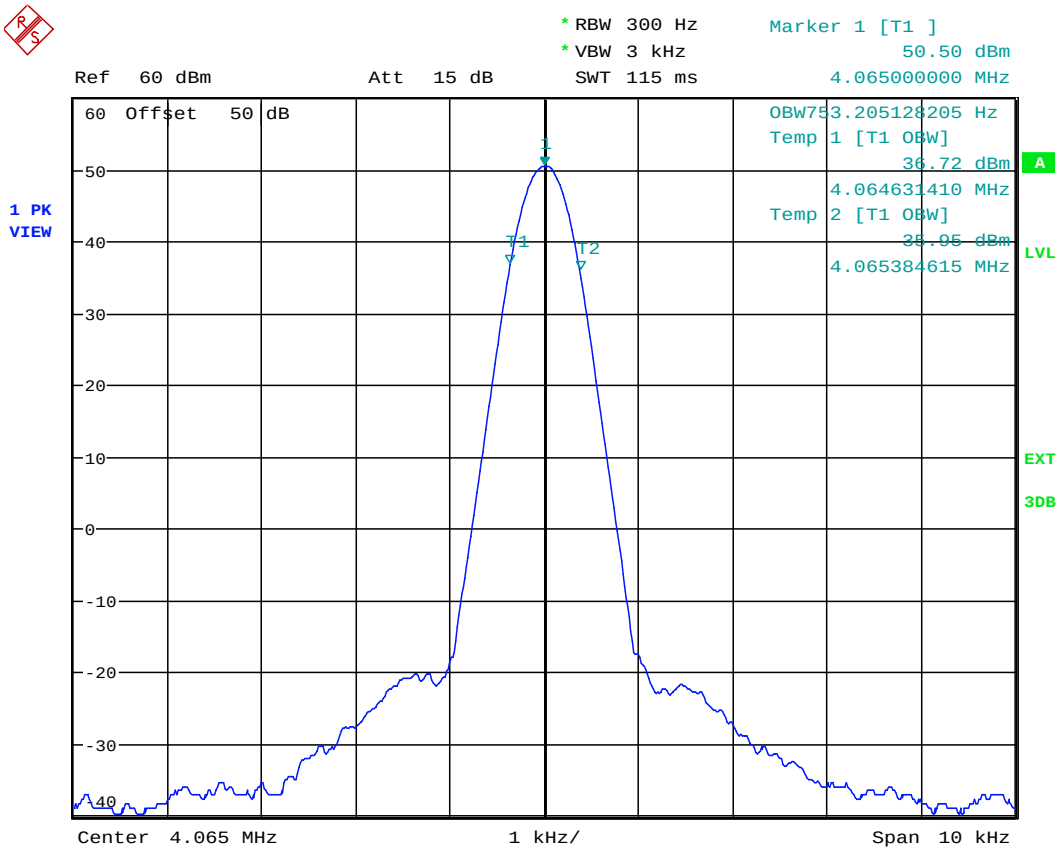
Configuration: J2B (AFSK), 1.605MHz, High power, Modulation: 1.7 KHz

OBW: 0.737 KHz



Configuration: J2B (AFSK), 4.065MHz, High power, Modulation: 1.7 KHz

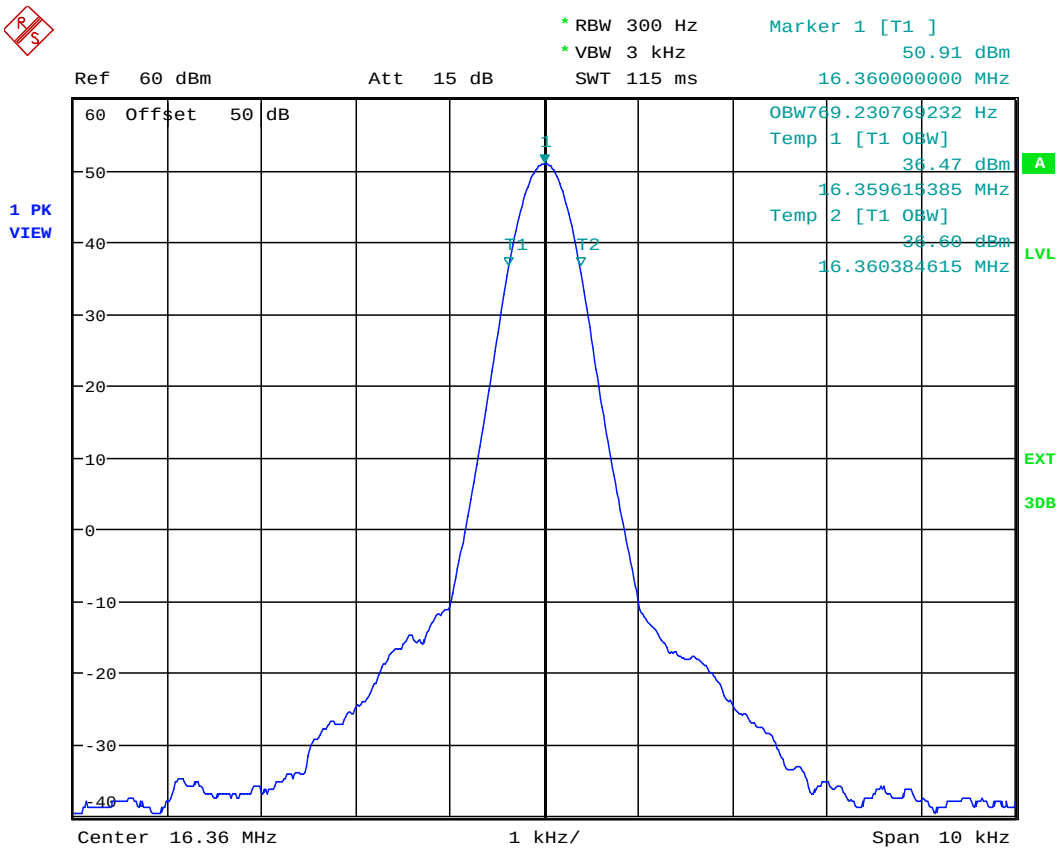
OBW: 0.753 KHz



Date: 14.MAY.2026 14:55:34

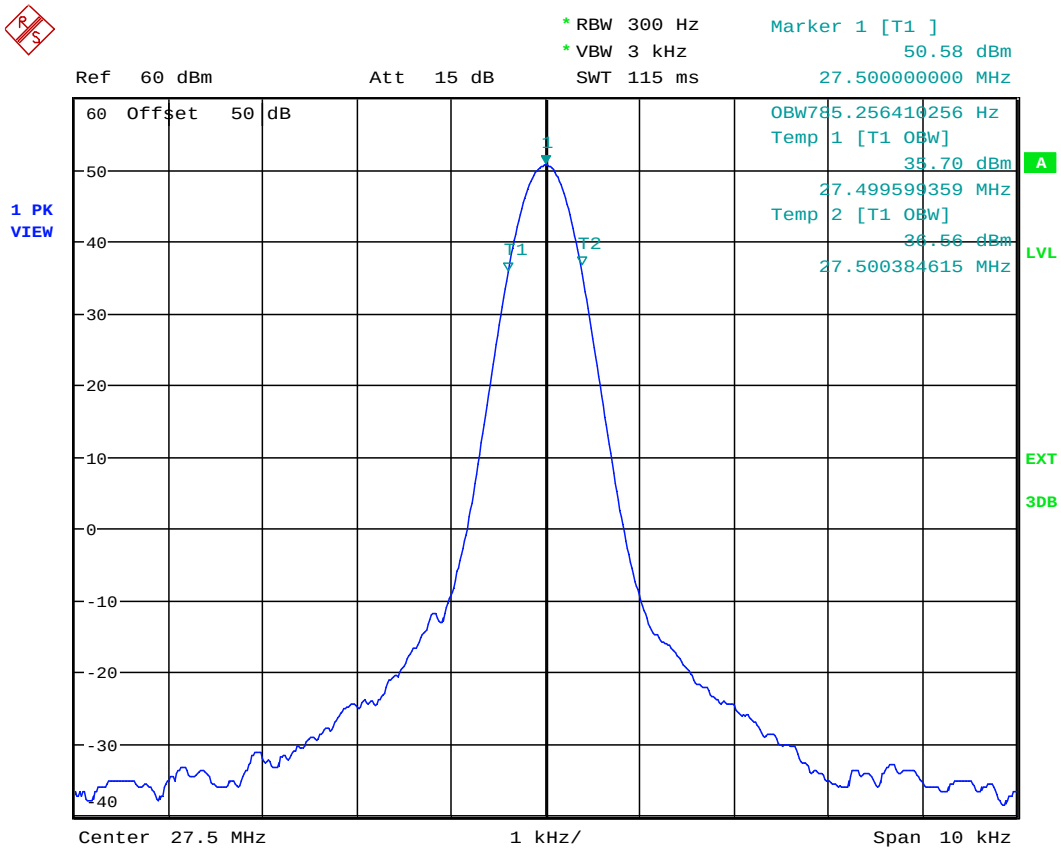
Configuration: J2B (AFSK), 16.36MHz, High power, Modulation: 1.7 KHz

OBW: 0.769 KHz



Configuration: J2B (AFSK), 27.5MHz, High power, Modulation: 1.7 KHz

OBW: 0.785 KHz

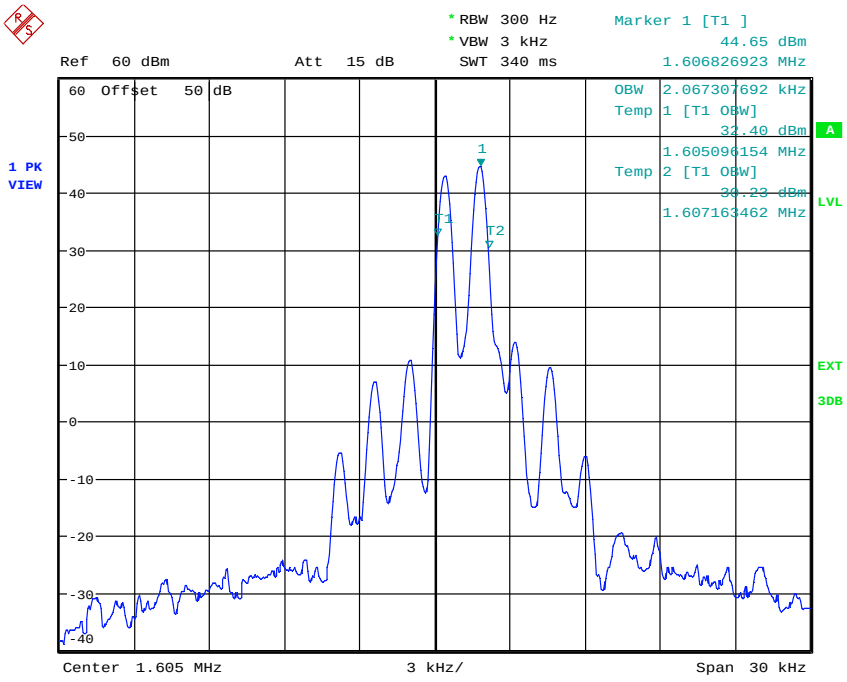


Date: 14.MAY.2026 15:12:29

OBW Plots- J3E

Configuration: J3E (USB), 1.605MHz, High power, Modulation: 400+1800Hz

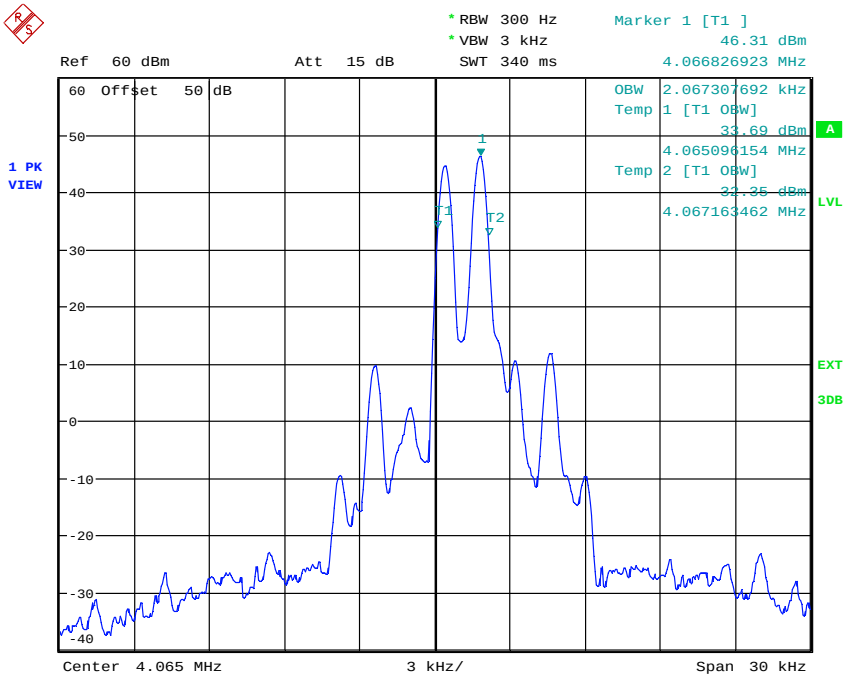
OBW: 2.06 KHz



Date: 13.MAY.2026 20:41:37

Configuration: J3E (USB), 4.065MHz, High power, Modulation: 400+1800Hz

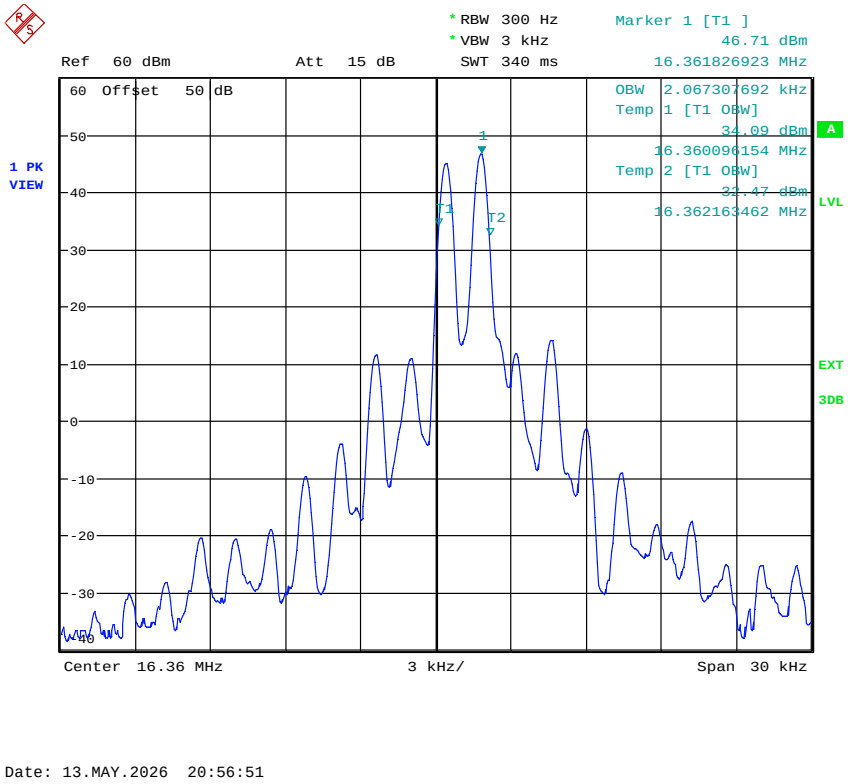
OBW: 2.06 KHz



Date: 13.MAY.2026 20:52:48

Configuration: J3E (USB), 16.360MHz, High power, Modulation: 400+1800Hz

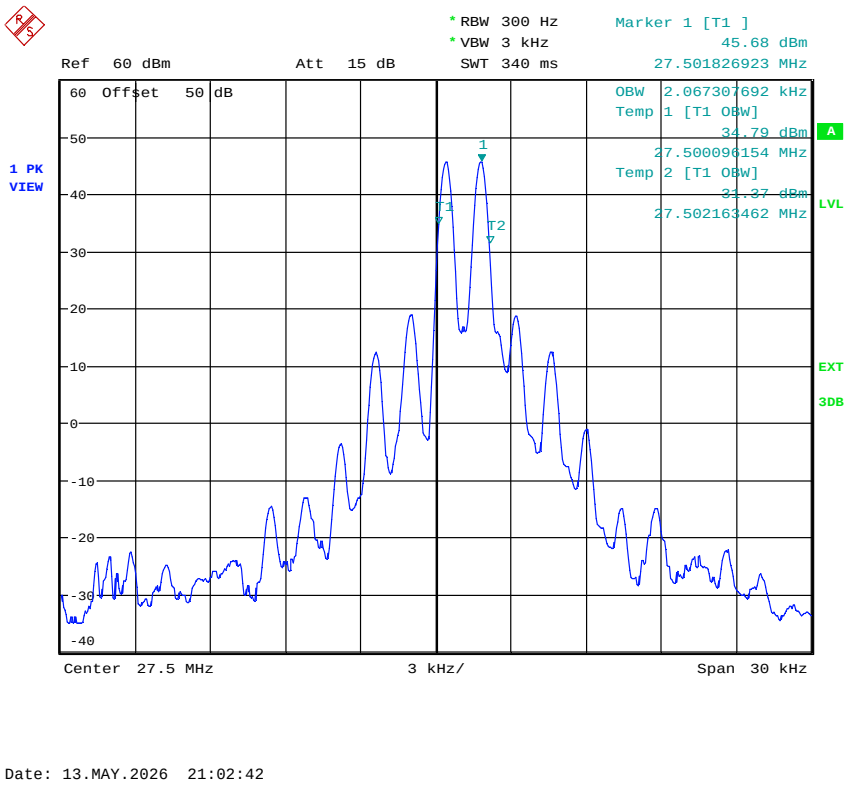
OBW: 2.06 KHz



Date: 13.MAY.2026 20:56:51

Configuration: J3E (USB), 27.5MHz, High power, Modulation: 400+1800Hz

OBW: 2.06 KHz



Date: 13.MAY.2026 21:02:42

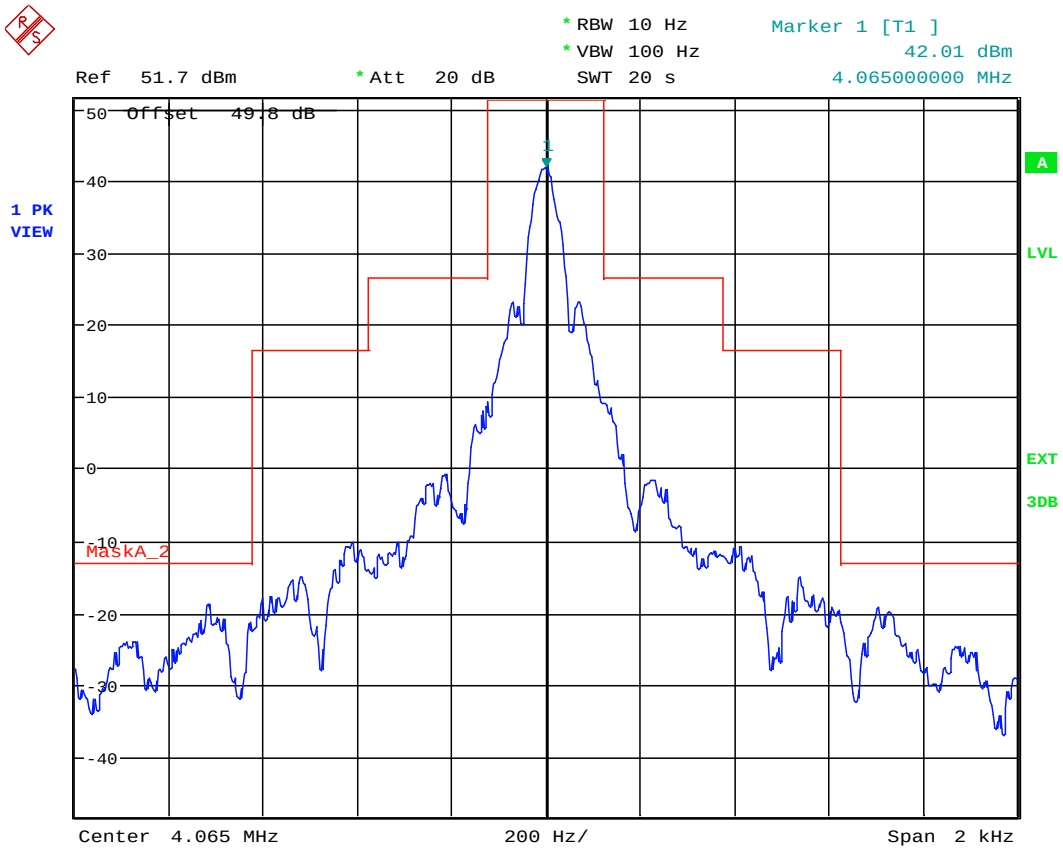
MASK FOR A1A

Configuration: A1A (CW), 1.605MHz, High power, 16 dots/second

Date: 22.MAY.2026 17:32:37

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Configuration: A1A (CW), 4.065MHz, High power, 16 dots/second

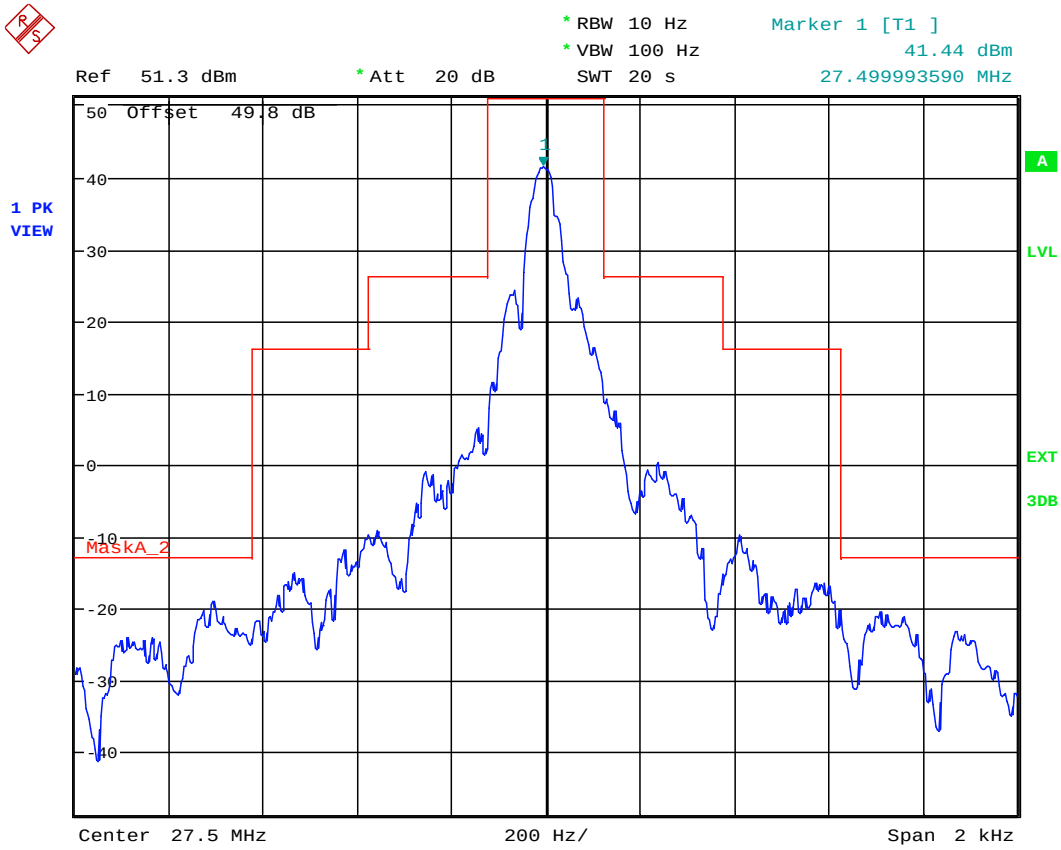


Date: 22.MAY.2026 17:48:58

Configuration: A1A (CW), 16.36MHz, High power, 16 dots/ second

Date: 22.MAY.2026 18:03:54

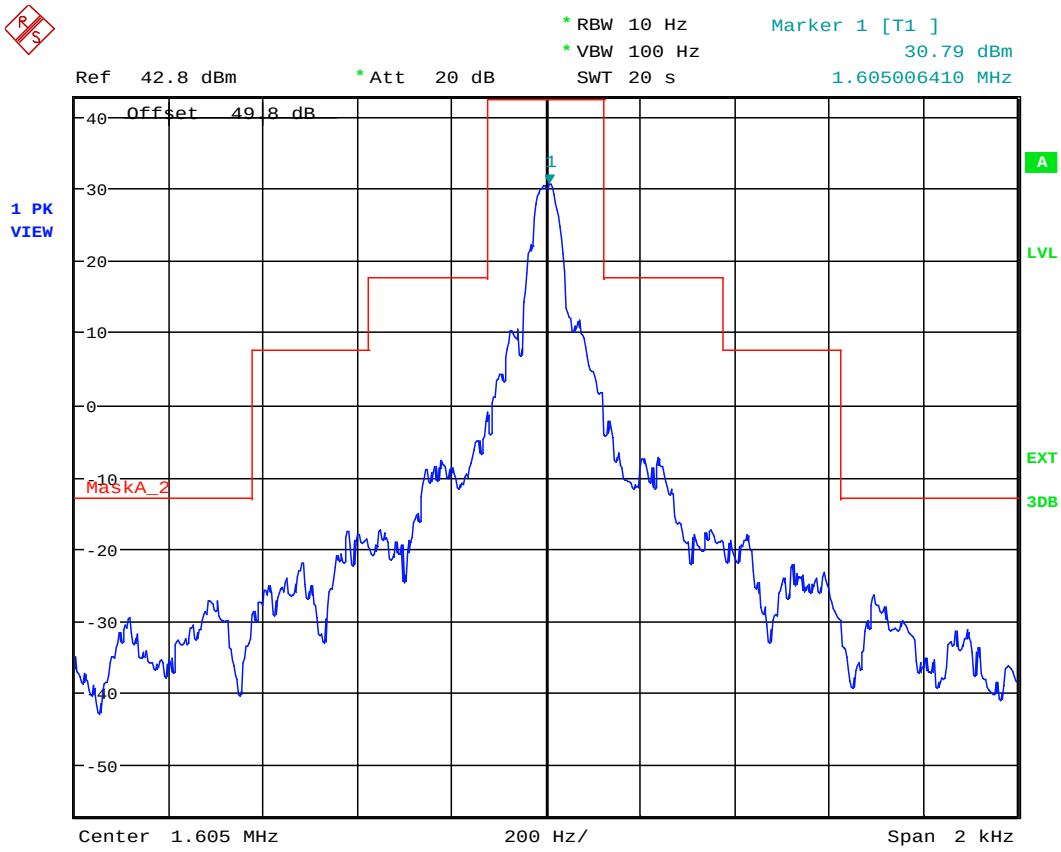
Configuration: A1A (CW), 27.5MHz, High power, 16 dots/second



Date: 22.MAY.2026 18:16:39

Low Power

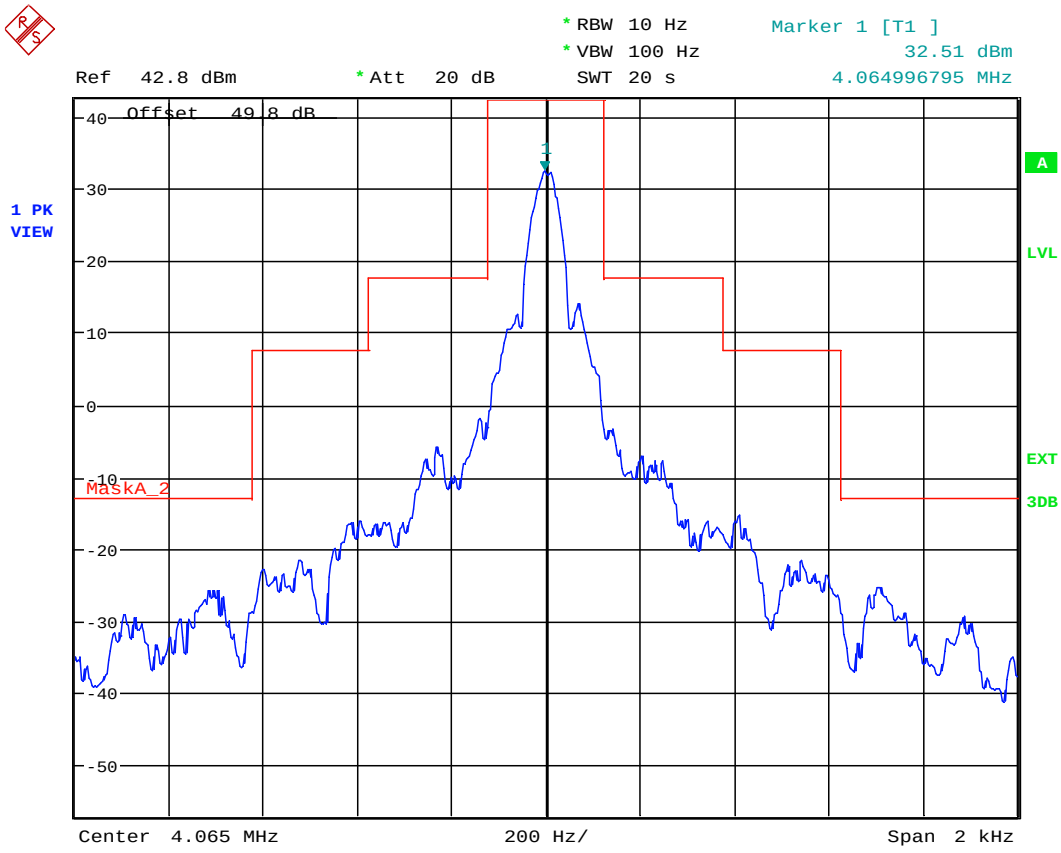
Configuration: A1A (CW), 1.605MHz, Low power, 16 dots/second



Date: 22.MAY.2026 18:41:35

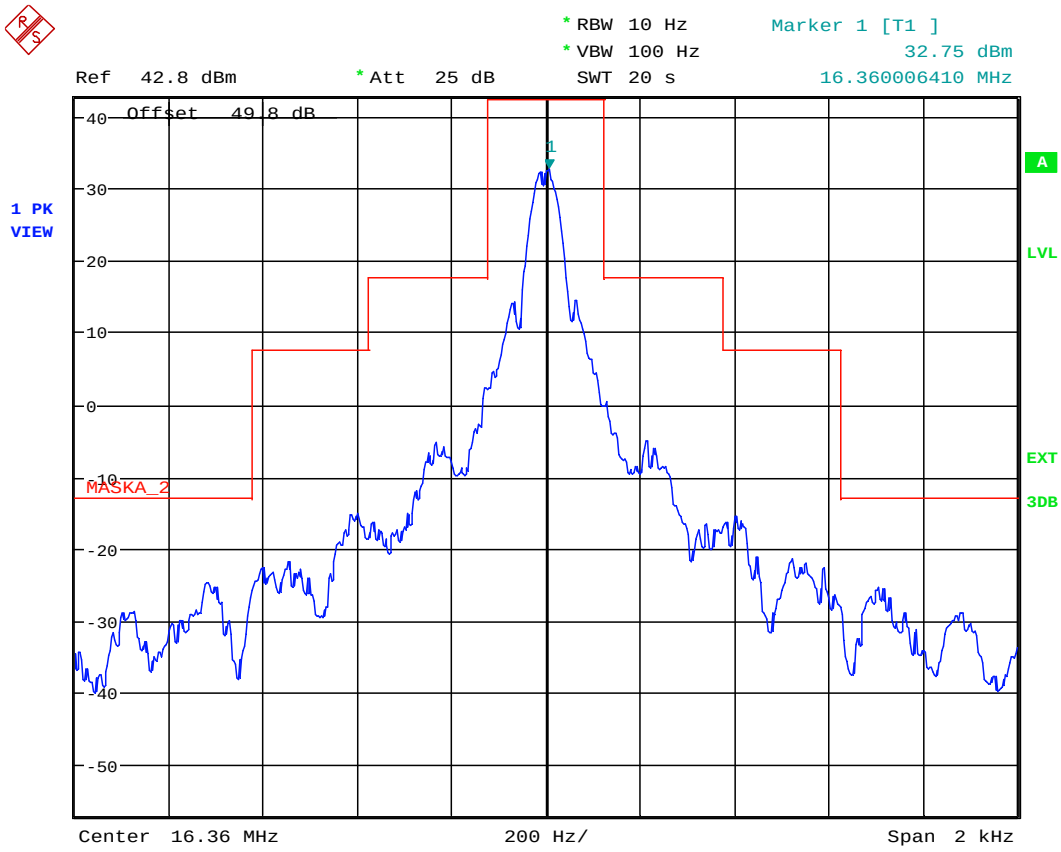
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Configuration: A1A (CW), 4.065MHz, Low power, 16 dots/second



Date: 22.MAY.2026 18:51:53

Configuration: A1A (CW), 16.36MHz, Low power, 16 dots/ second



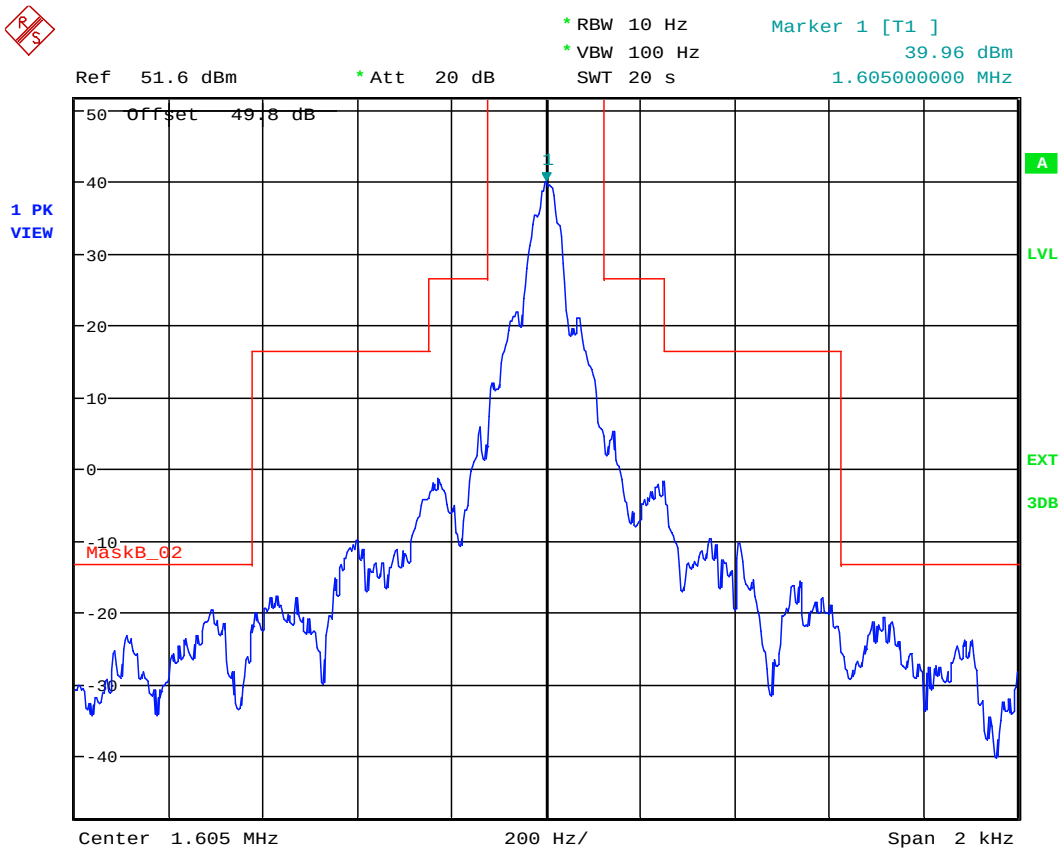
Date: 22.MAY.2026 19:17:28

Configuration: A1A (CW), 27.5MHz, Low power, 16 dots/second

Date: 22.MAY.2026 19:28:01

Part 90
High Power

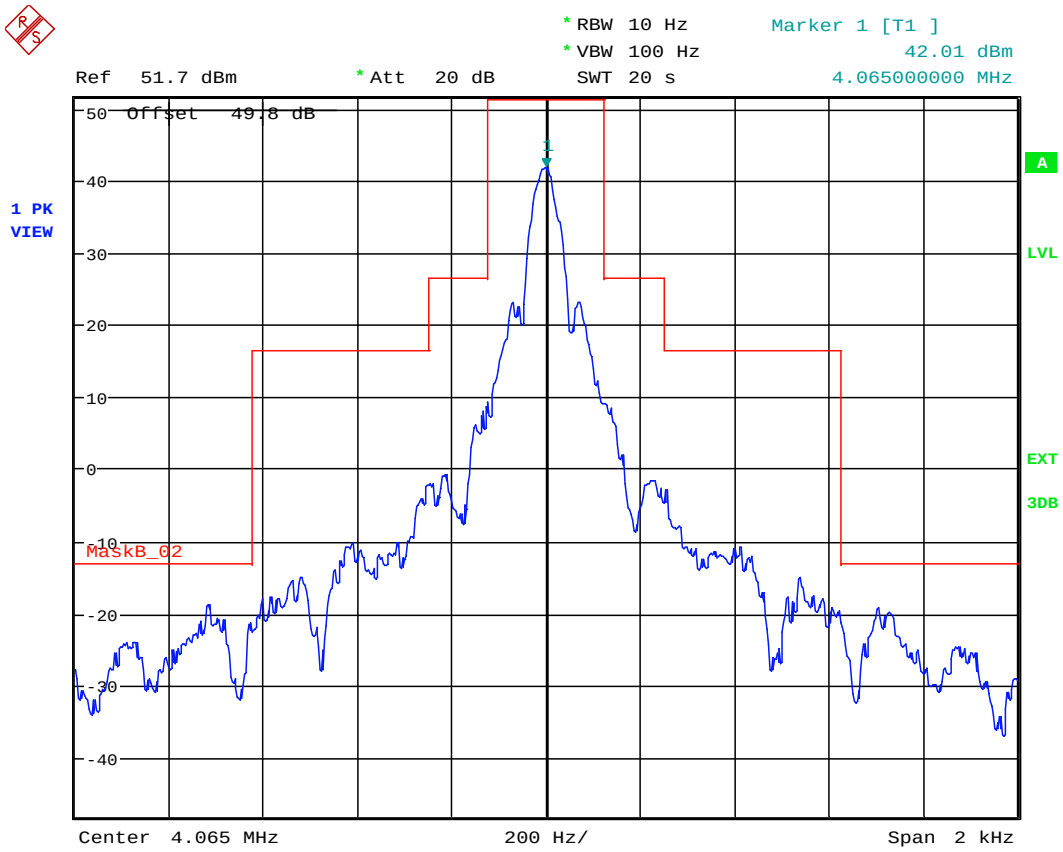
Configuration: A1A (CW), 1.605MHz, High power, 16 dots/second



Date: 22.MAY.2026 17:33:29

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Configuration: A1A (CW), 4.065MHz, High power, 16 dots/second

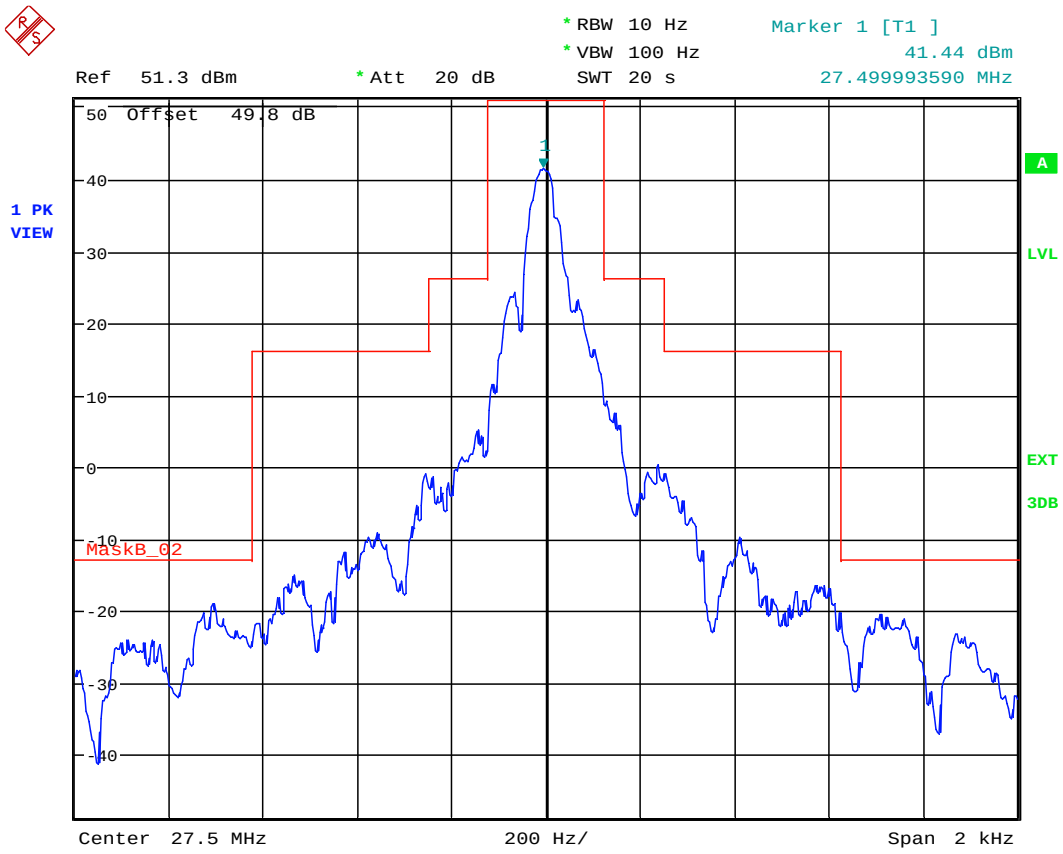


Date: 22.MAY.2026 17:49:32

Configuration: A1A (CW), 16.36MHz, High power, 16 dots/second

Date: 22.MAY.2026 18:04:23

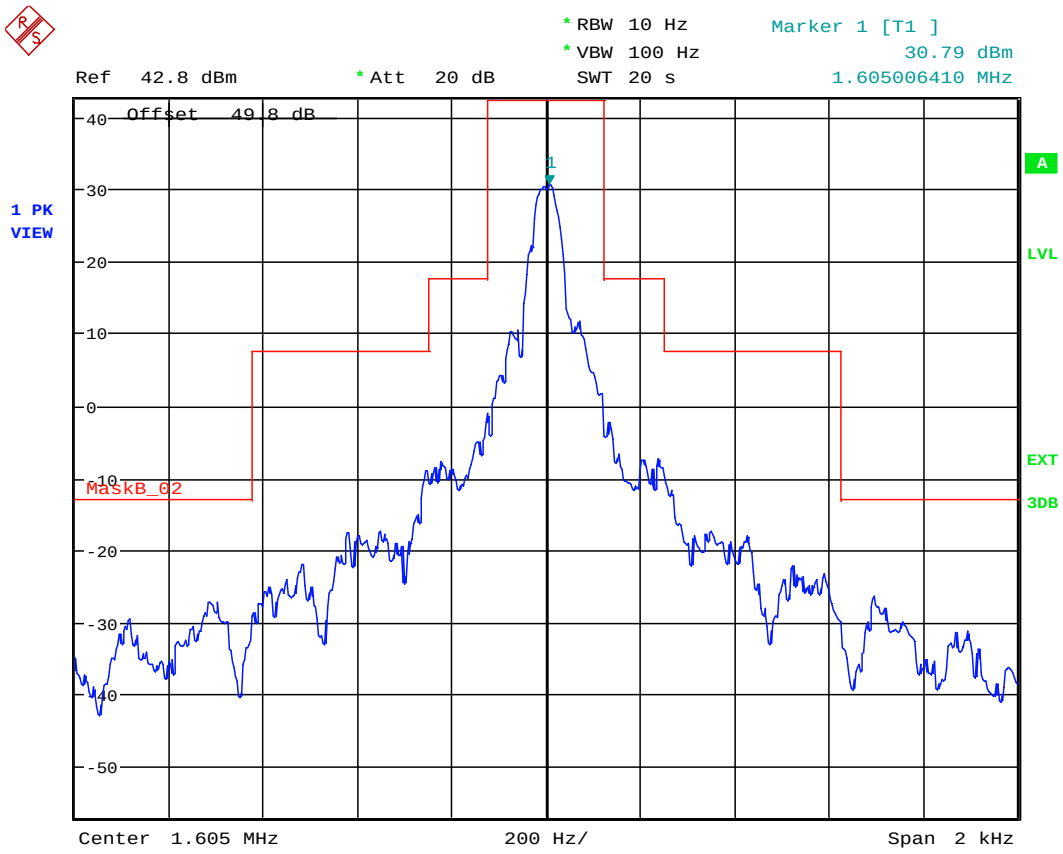
Configuration: A1A (CW), 27.5MHz, High power, 16 dots/second



Date: 22.MAY.2026 18:17:01

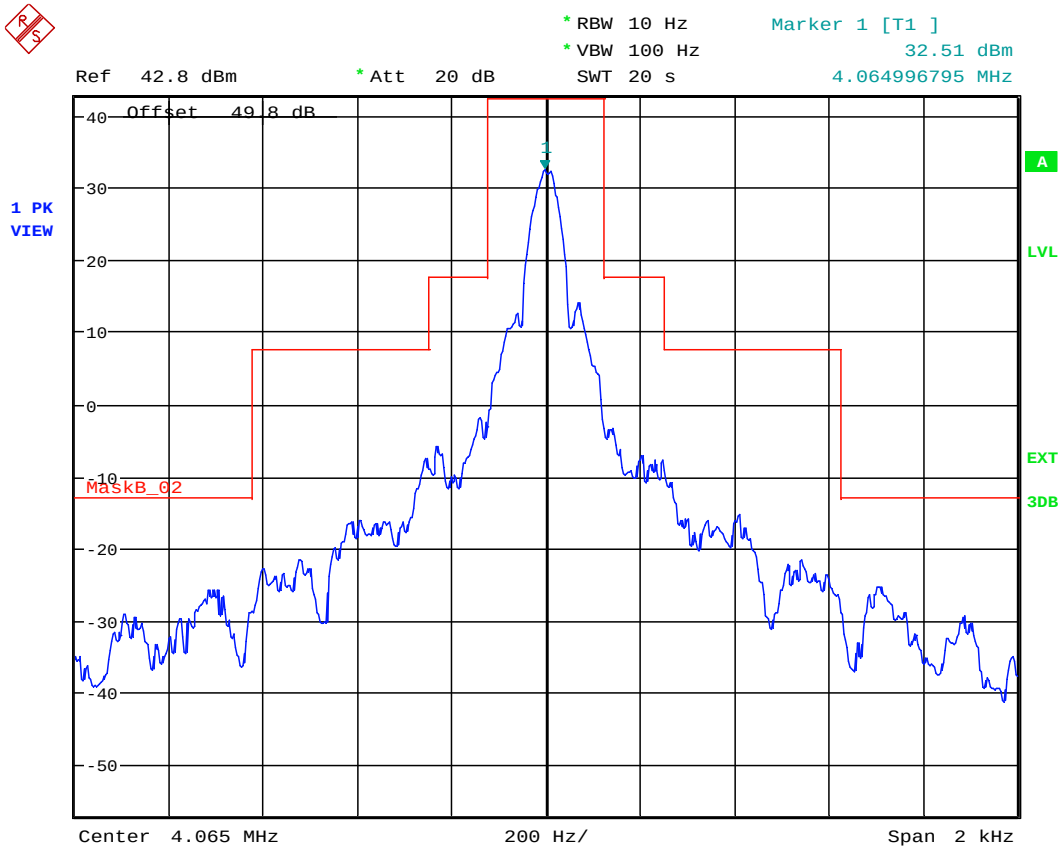
Low Power

Configuration: A1A (CW), 1.605MHz, Low power, 16 dots/second



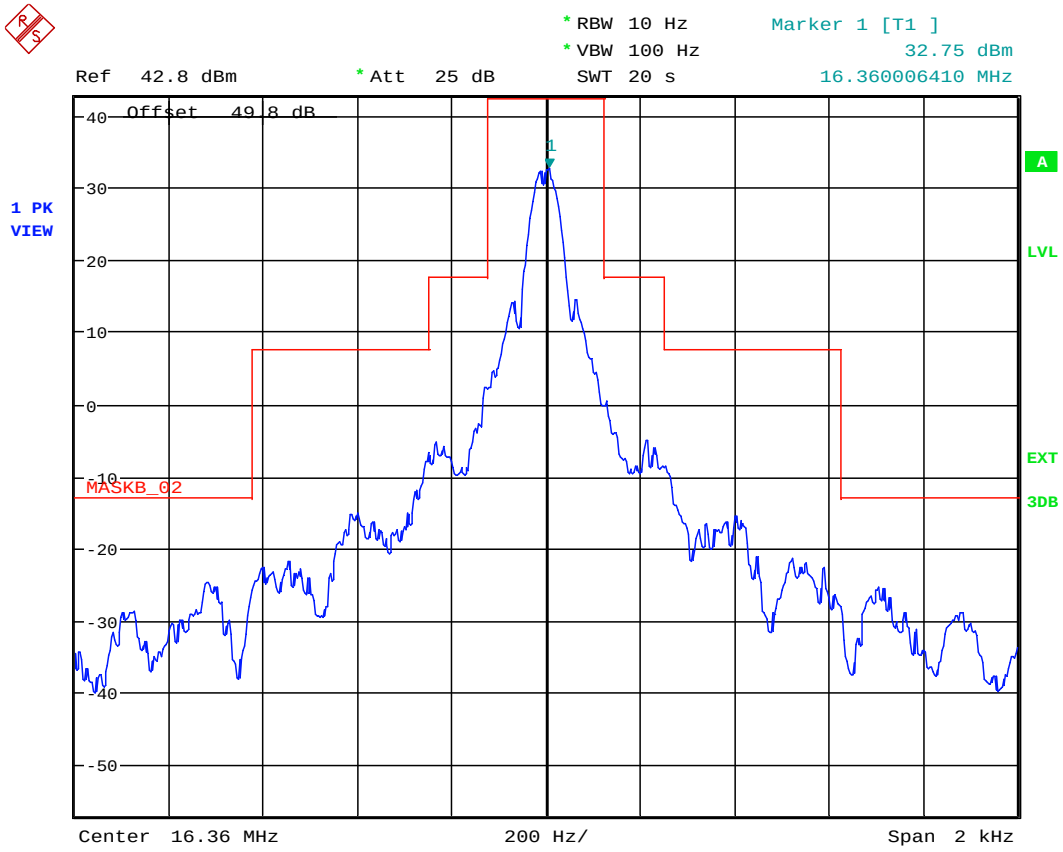
Date: 22.MAY.2026 18:42:08

Configuration: A1A (CW), 4.065MHz, High power, 16 dots/second



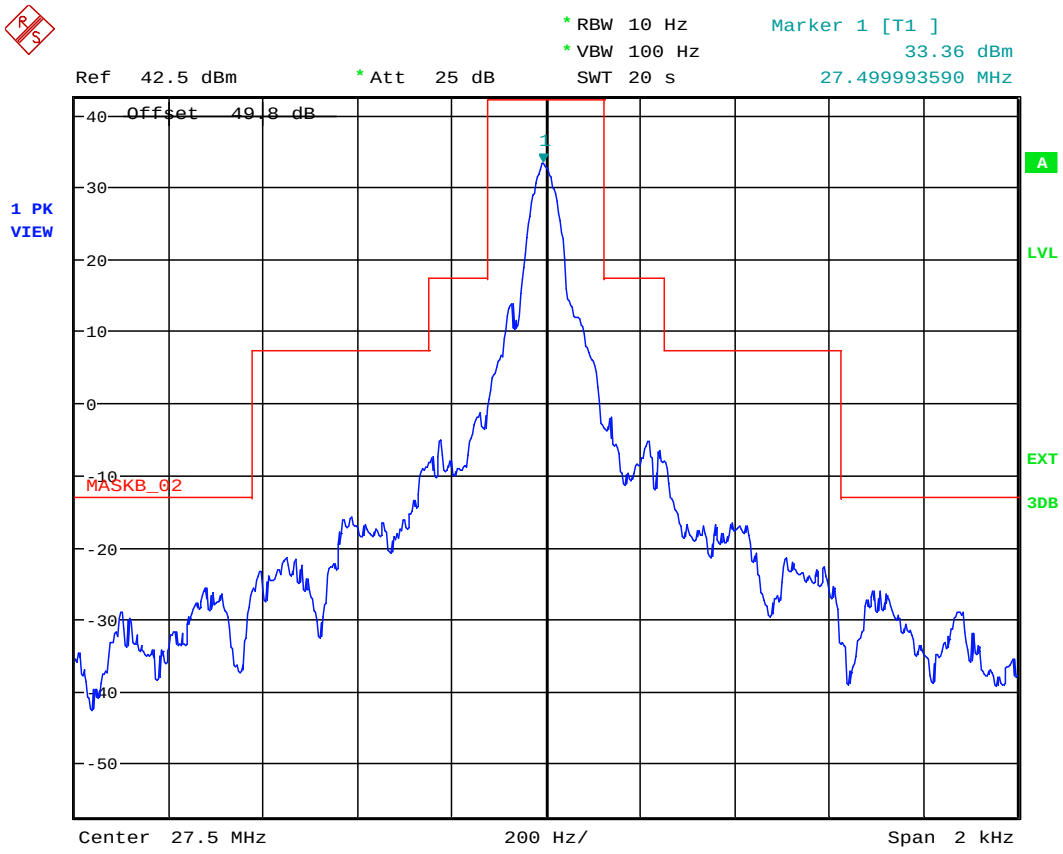
Date: 22.MAY.2026 18:52:23

Configuration: A1A (CW), 16.36MHz, Low power, 16 dots/second



Date: 22.MAY.2026 19:17:52

Configuration: A1A (CW), 27.5MHz, Low power, 16 dots/second

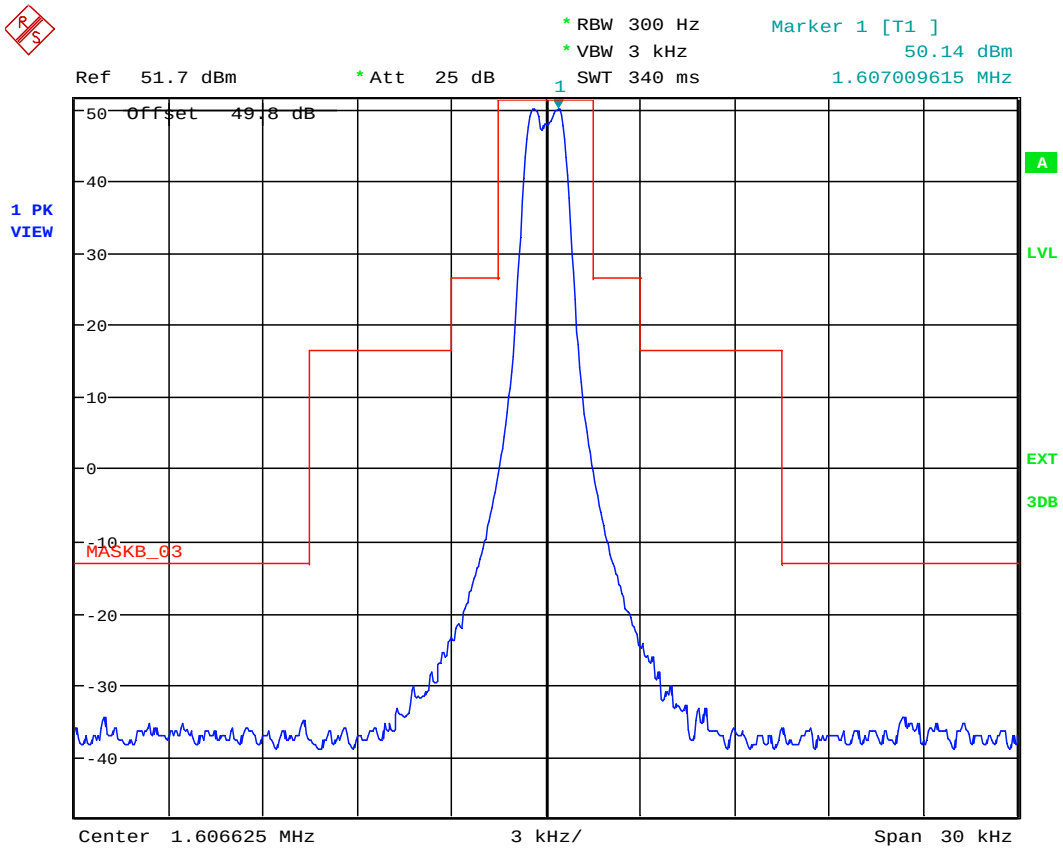


Date: 22.MAY.2026 19:28:32

MASK FOR F1B
Part 90

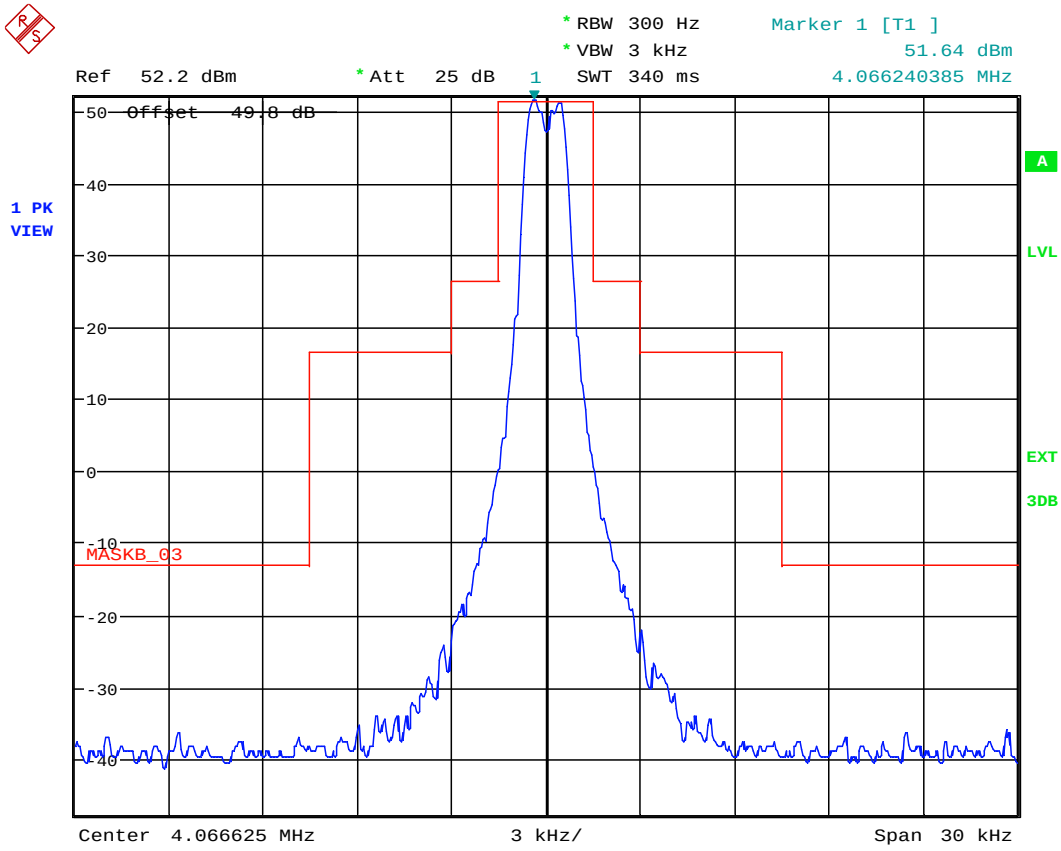
High Power

Configuration: F1B (FSK), 1.605MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850 Hz



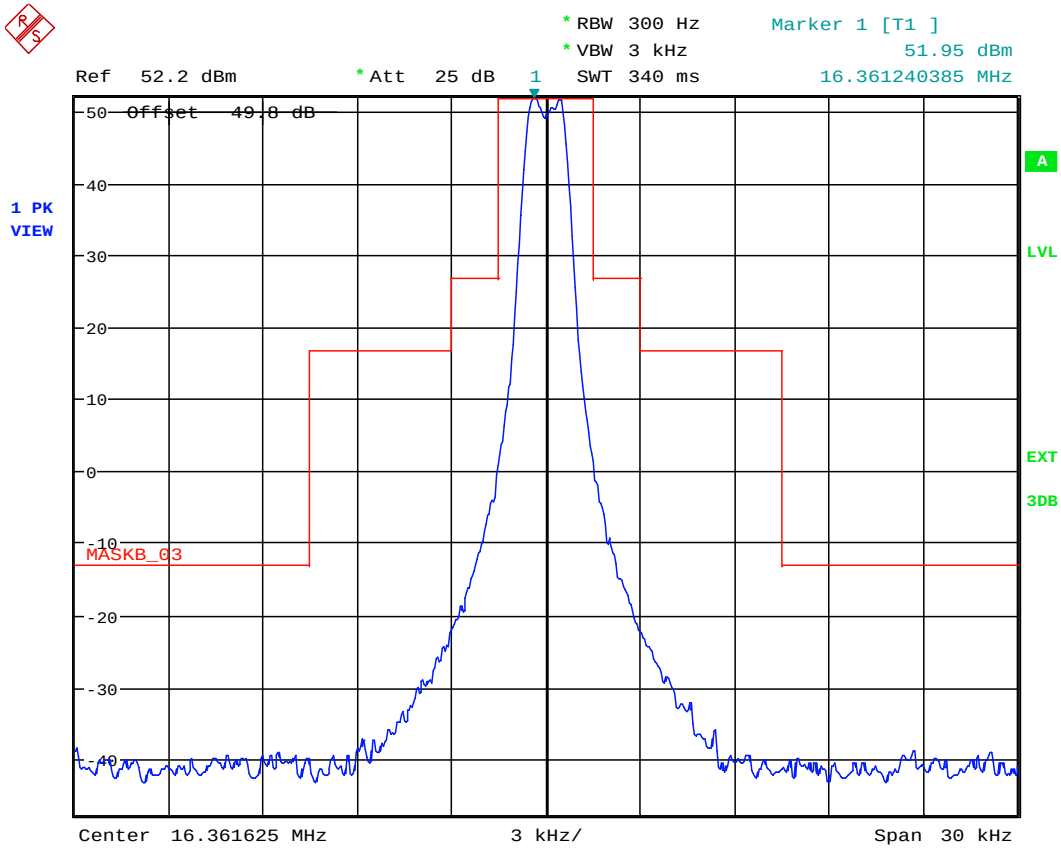
Date: 26.MAY.2026 15:30:03

Configuration: F1B (FSK), 4.065MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



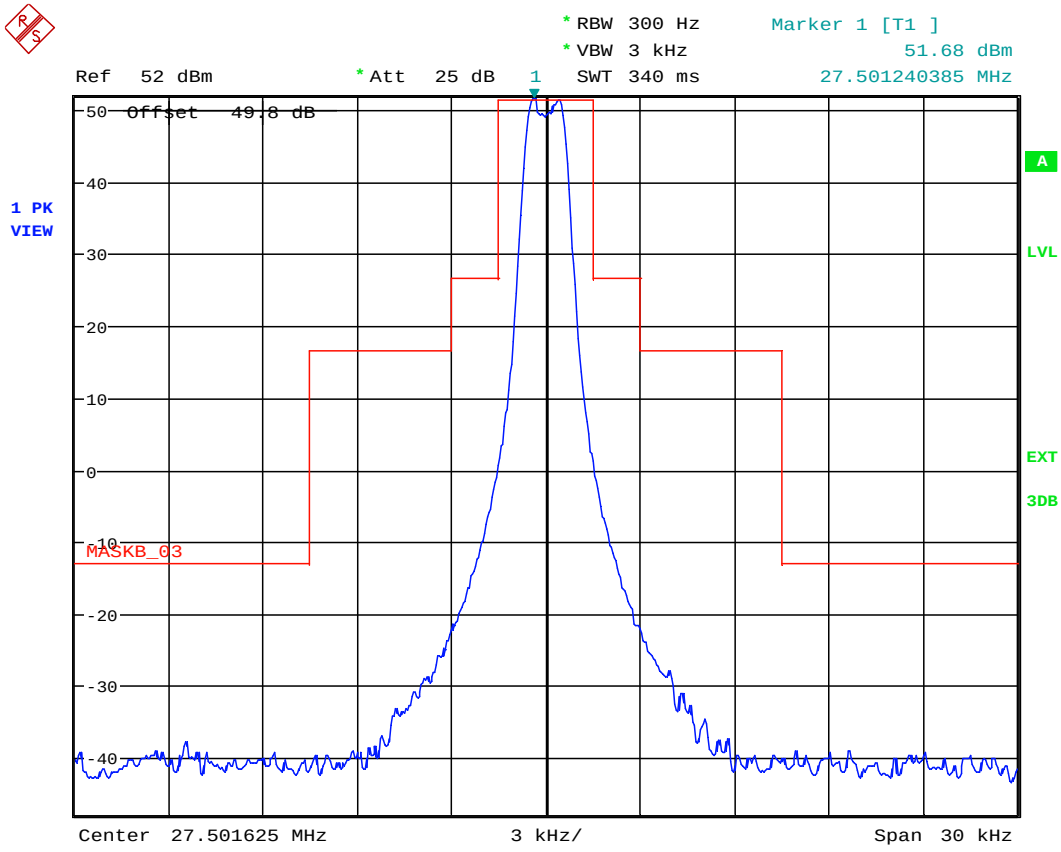
Date: 26.MAY.2026 15:35:28

Configuration: F1B (FSK), 16.36MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



Date: 26.MAY.2026 15:48:33

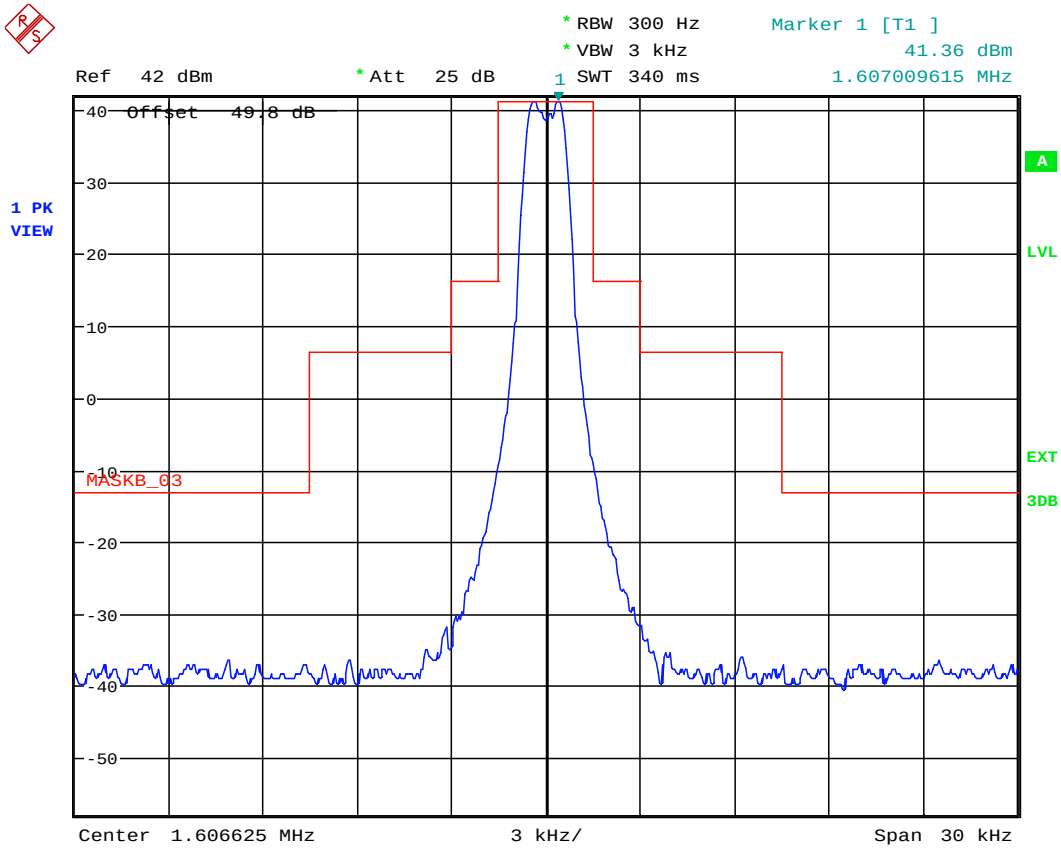
Configuration: F1B (FSK), 27.5MHz, High power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



Date: 26.MAY.2026 15:52:51

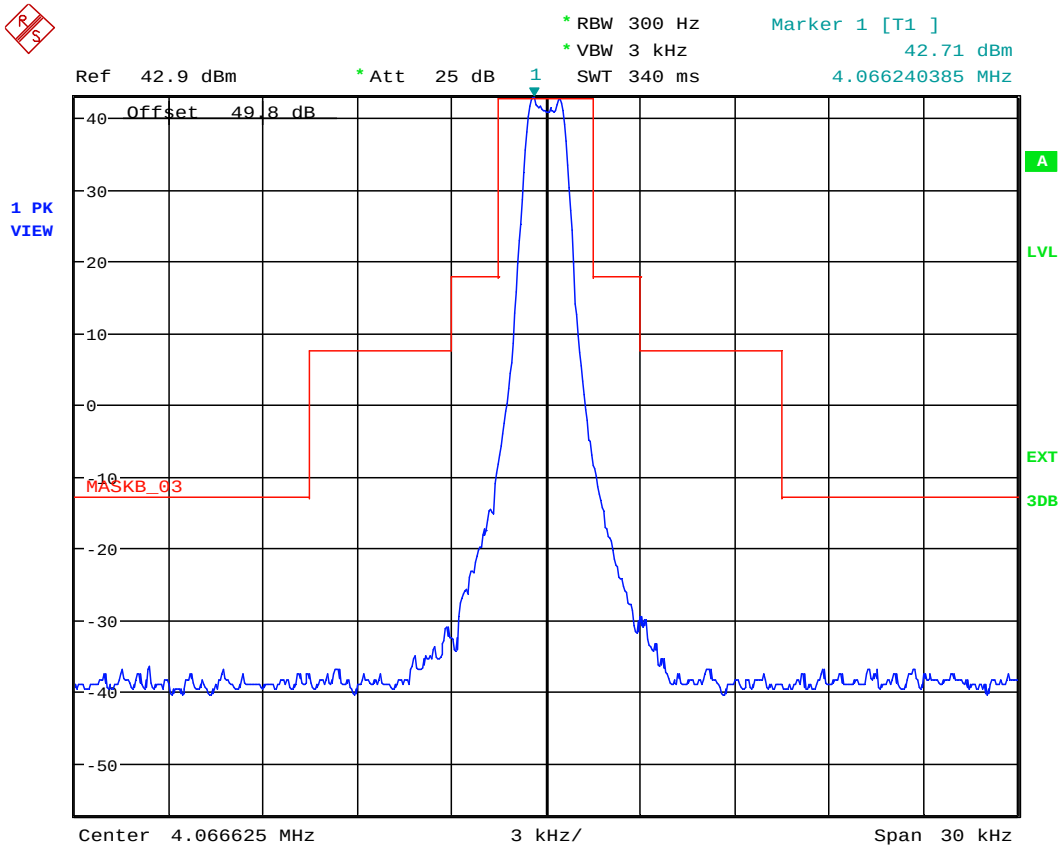
Low Power

Configuration: F1B (FSK), 1.605MHz, Low power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



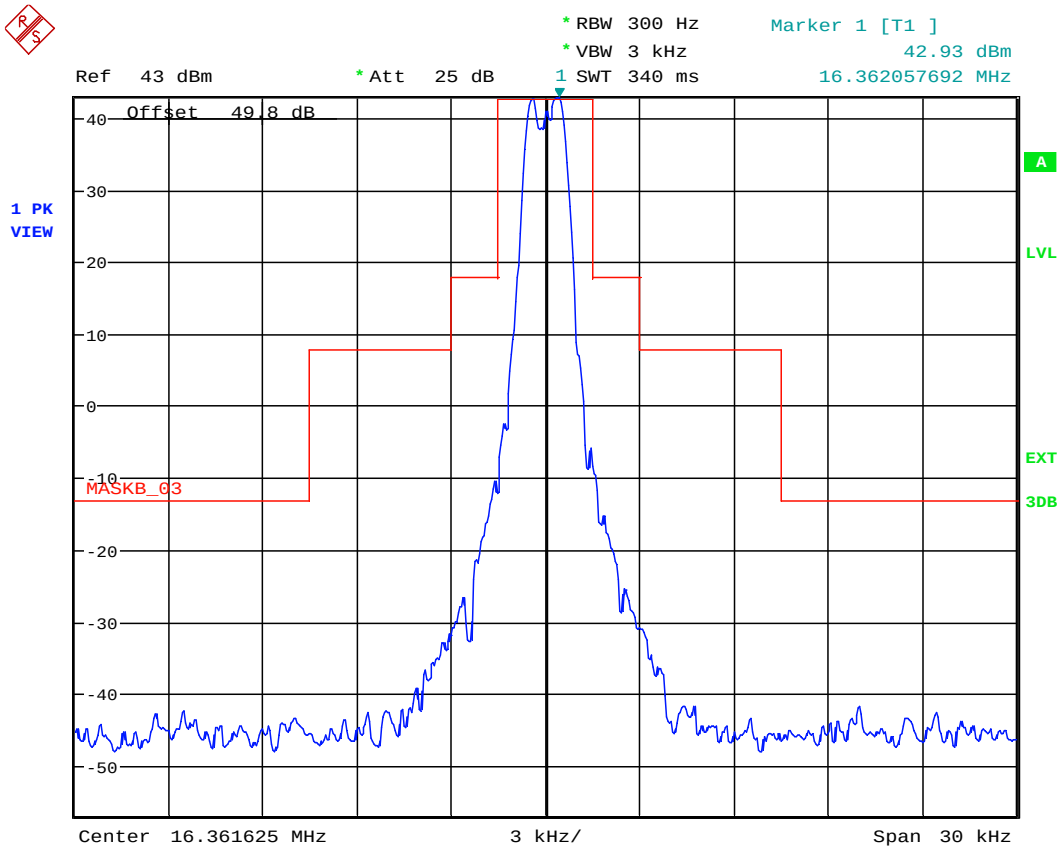
Date: 26.MAY.2026 15:55:22

Configuration: F1B (FSK), 4.065MHz, Low power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



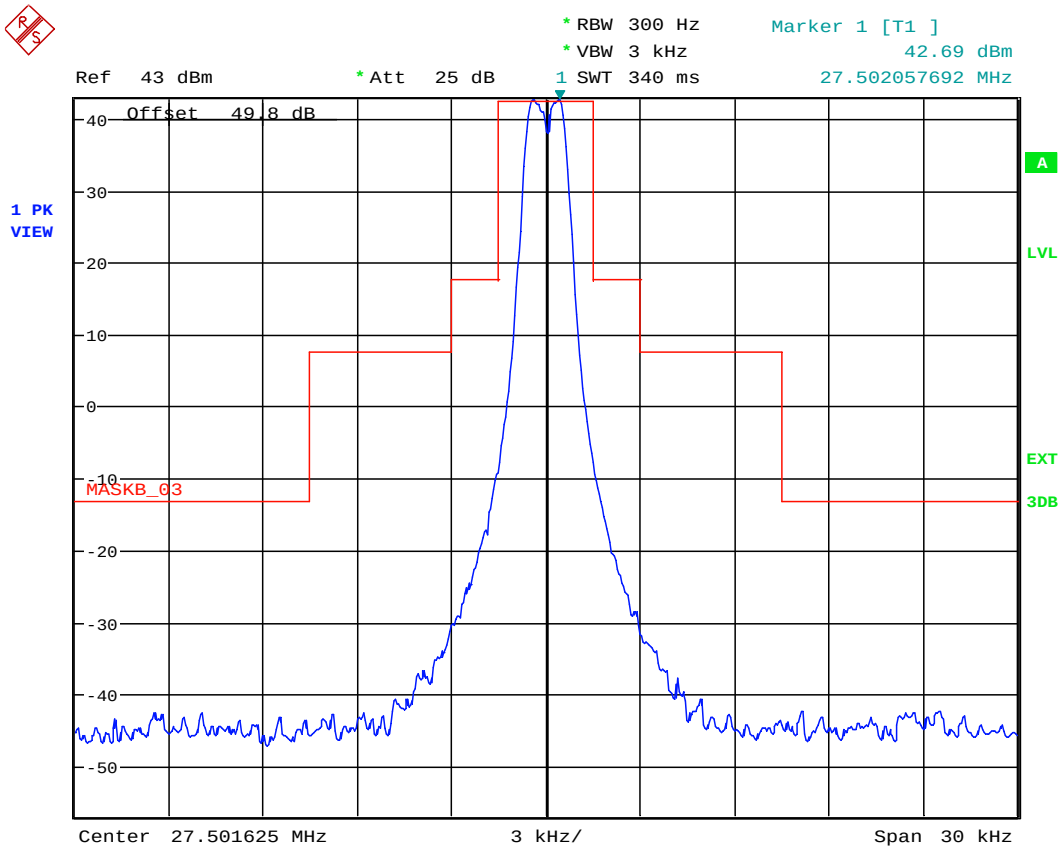
Date: 26.MAY.2026 15:57:54

Configuration: F1B (FSK), 16.36MHz, Low power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



Date: 26.MAY.2026 16:02:09

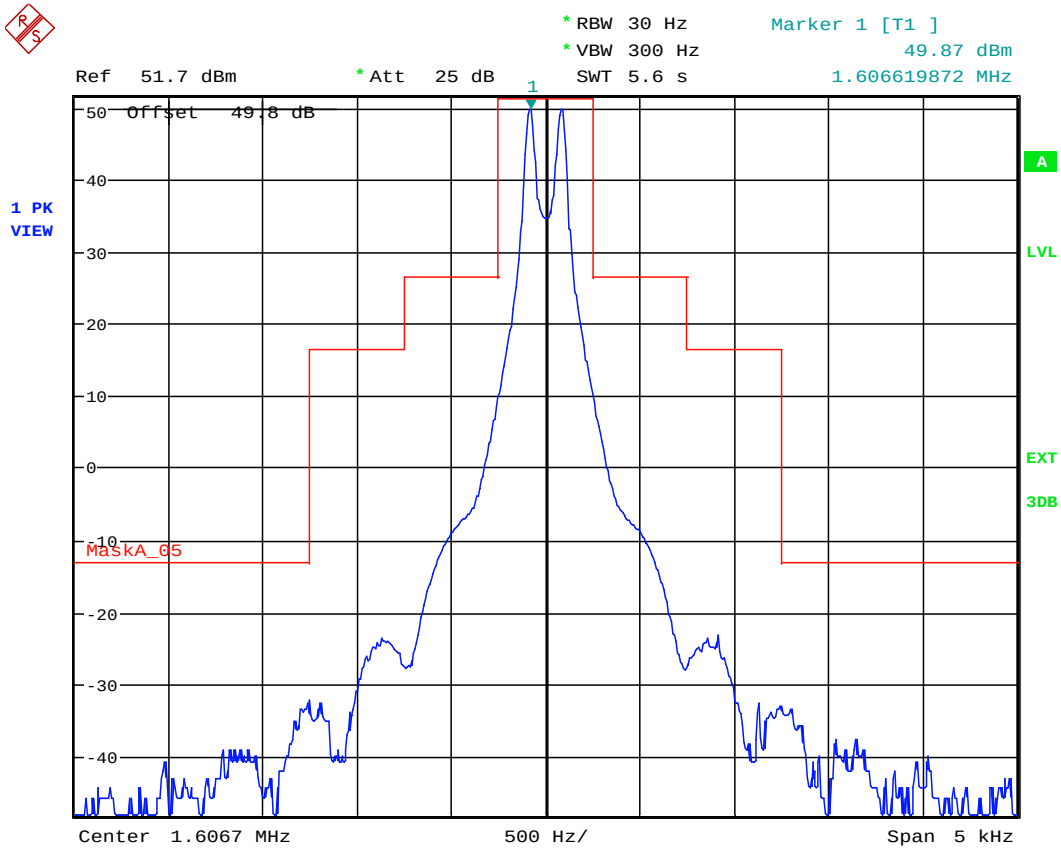
Configuration: F1B (FSK), 27.5MHz, Low power, Mark Frequency: 1200Hz, Shift Frequency: 850Hz



Date: 26.MAY.2026 16:04:52

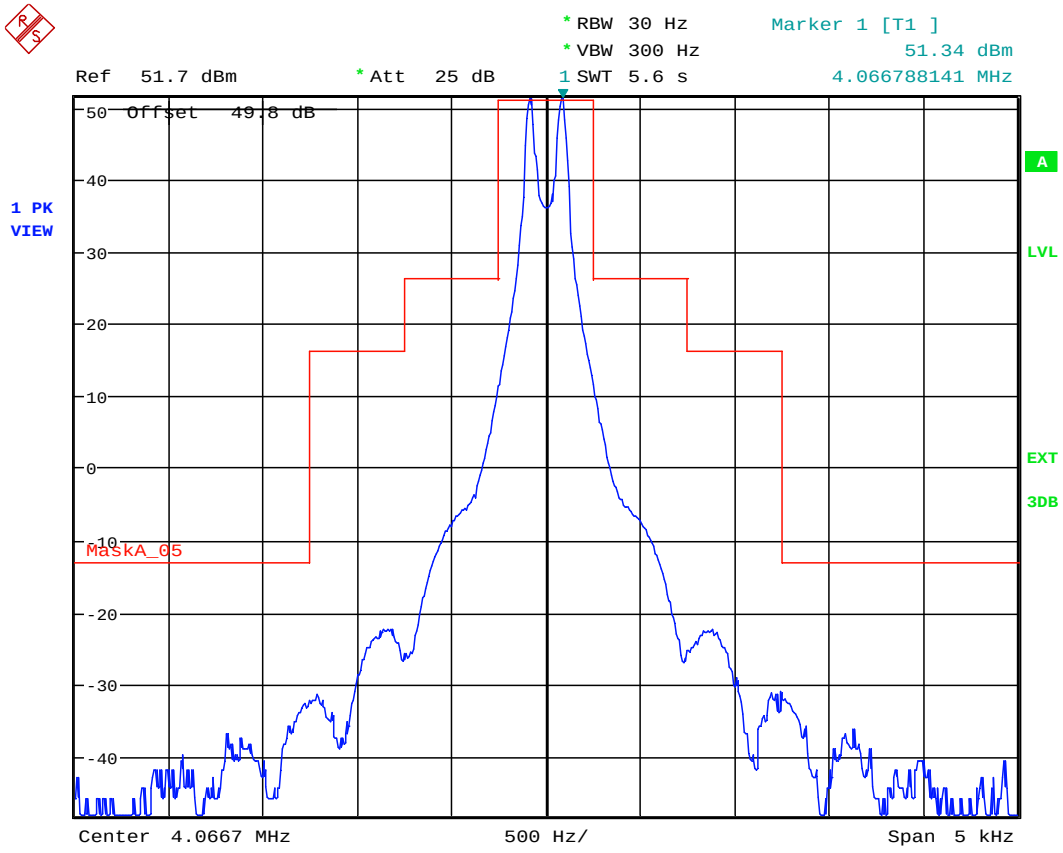
Part 80

Configuration: F1B (FSK), 1.605MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170 Hz, AB: 0.5 KHz



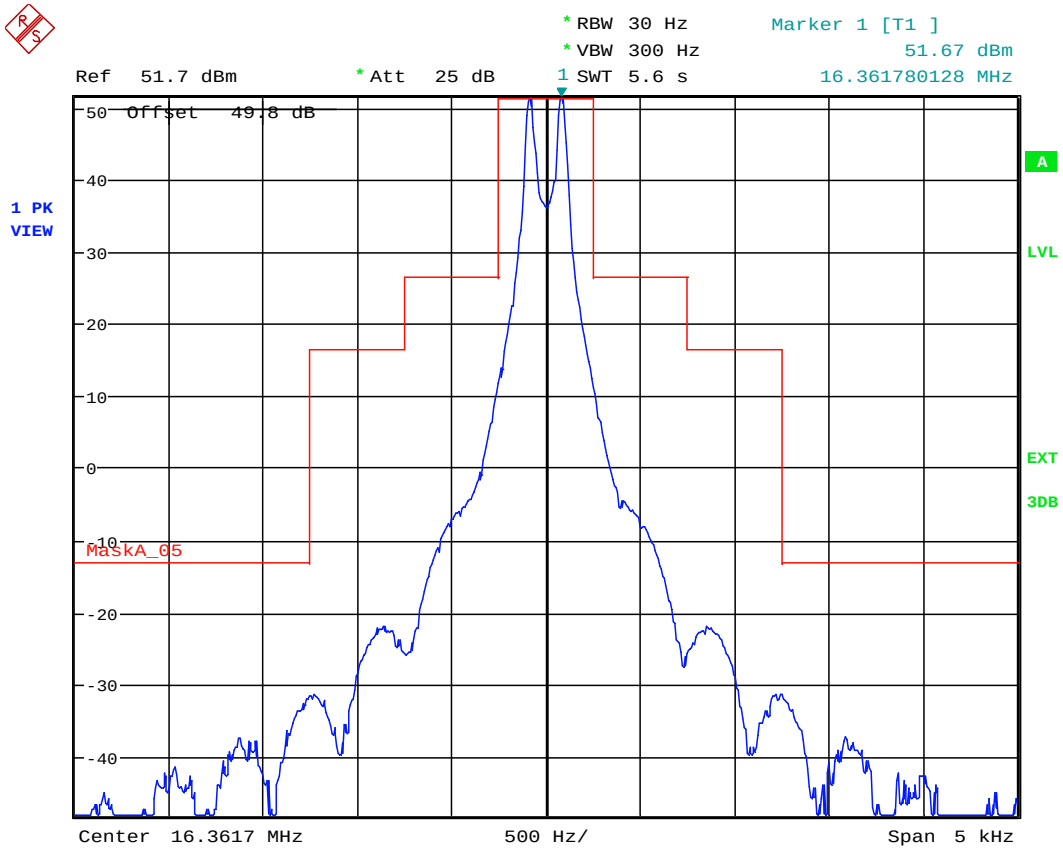
Date: 22.MAY.2026 20:19:41

Configuration: F1B (FSK), 4.065MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz



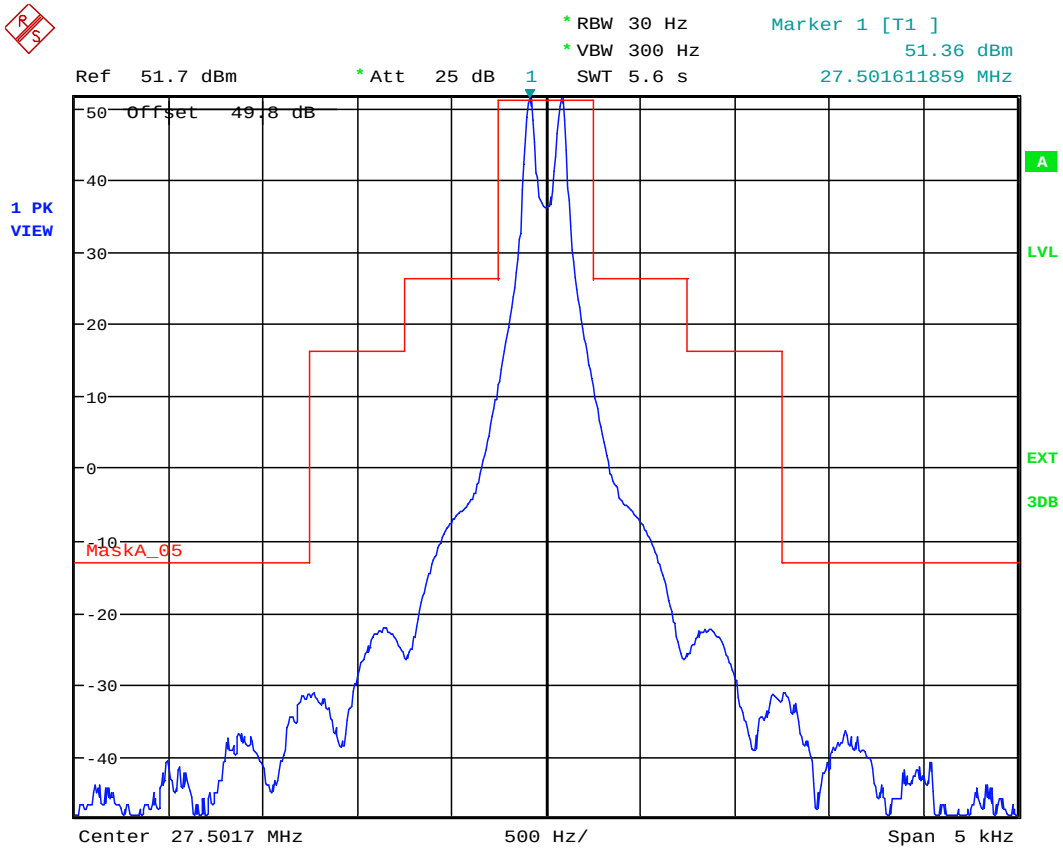
Date: 26.MAY.2026 16:09:35

Configuration: F1B (FSK), 16.36MHzMHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz



Date: 25.MAY.2026 14:06:45

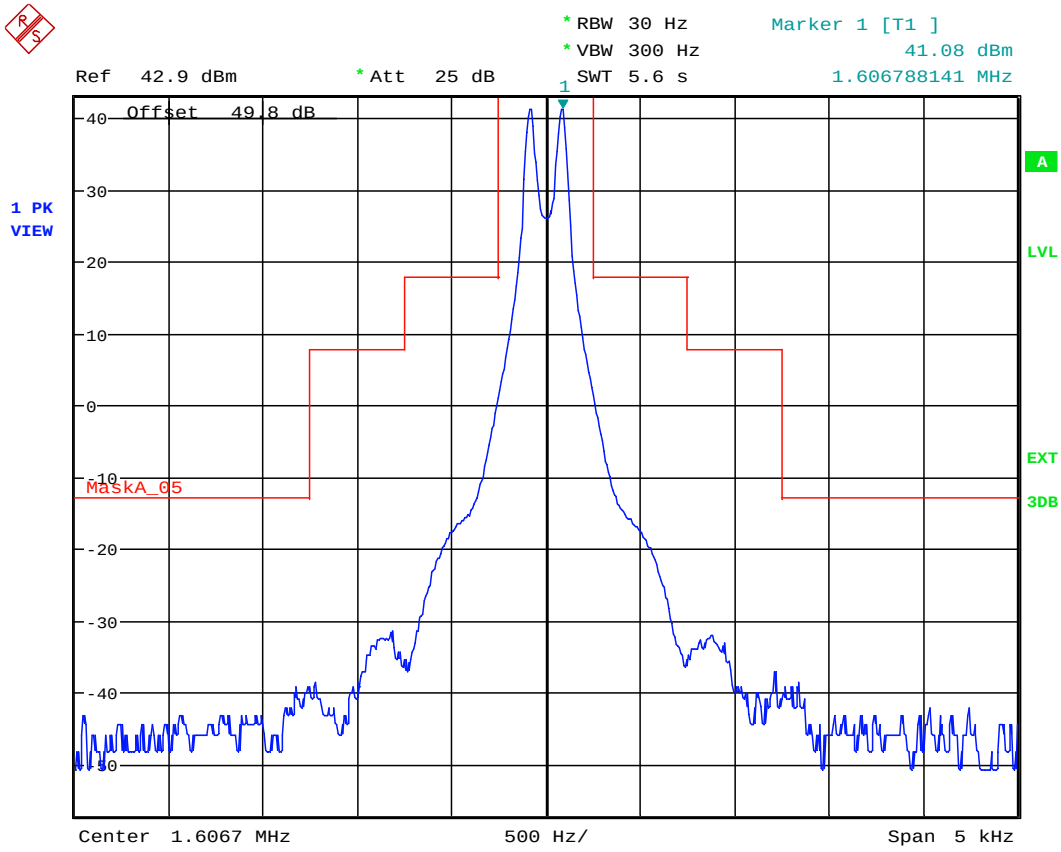
Configuration: F1B (FSK), 27.5MHz, High power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz



Date: 26.MAY.2026 16:13:38

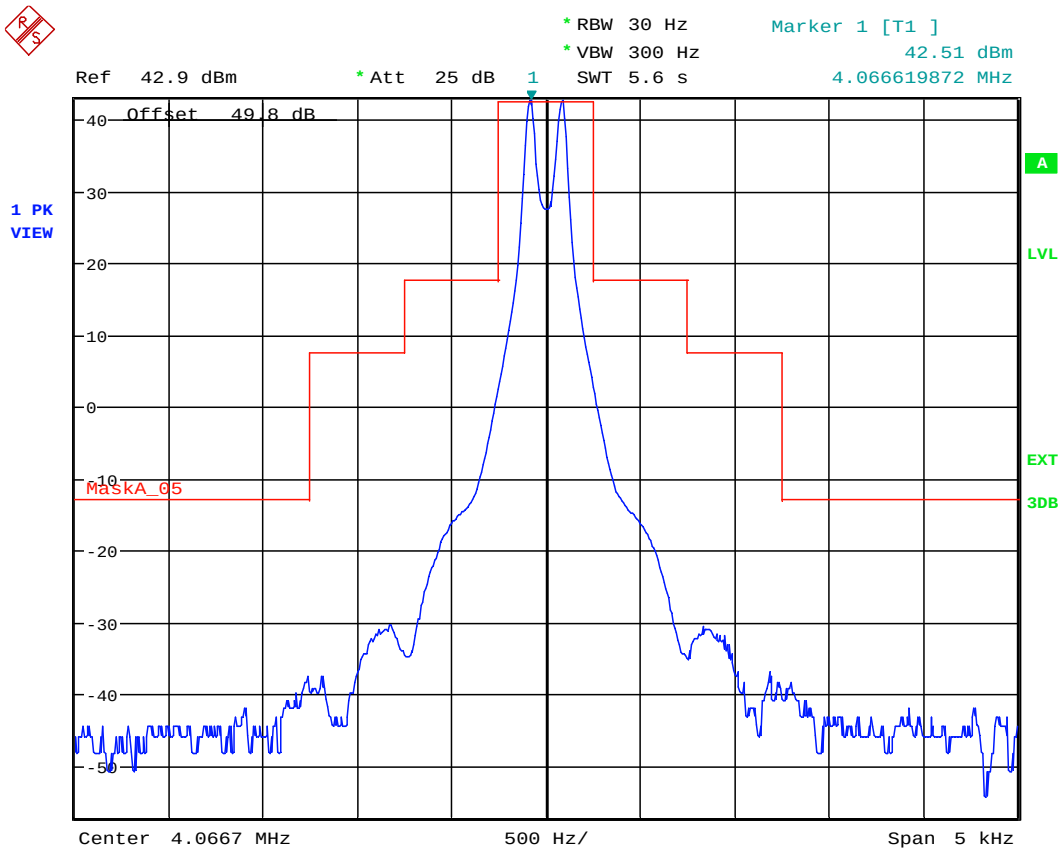
Low Power

Configuration: F1B (FSK), 1.605MHz, Low power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz



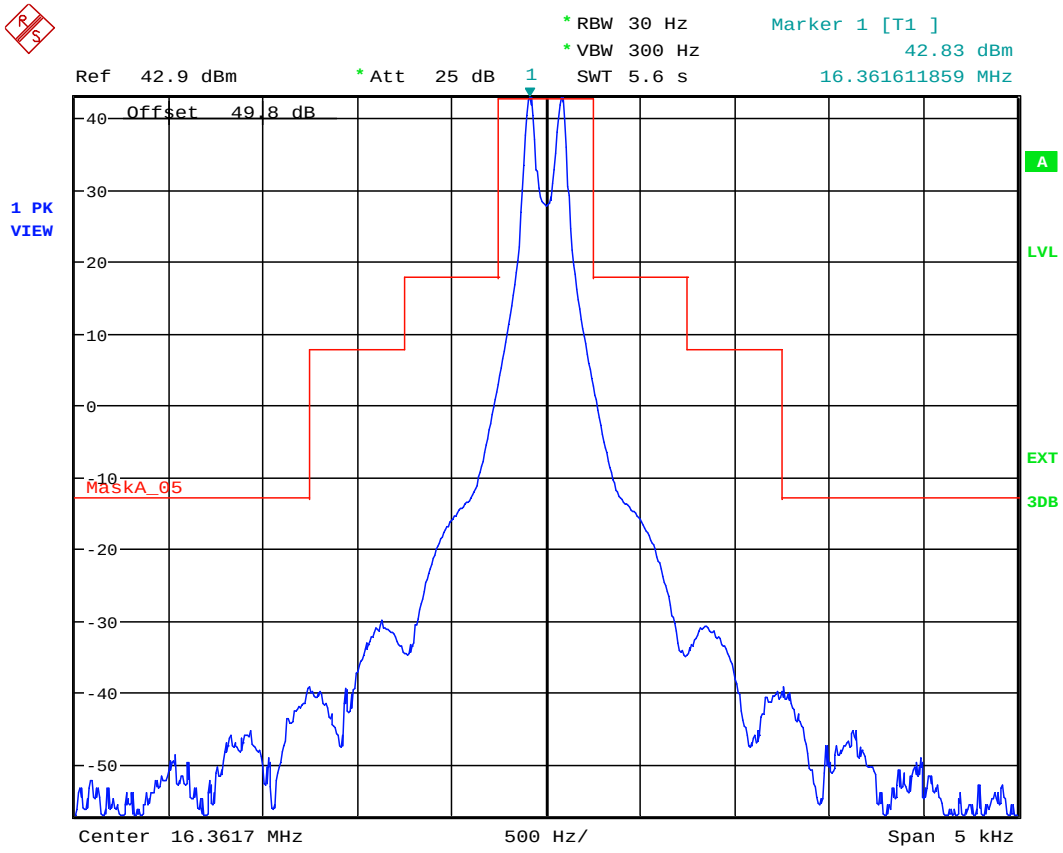
Date: 25.MAY.2026 14:17:33

Configuration: F1B (FSK), 4.065MHz, Low power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz



Date: 26.MAY.2026 16:18:05

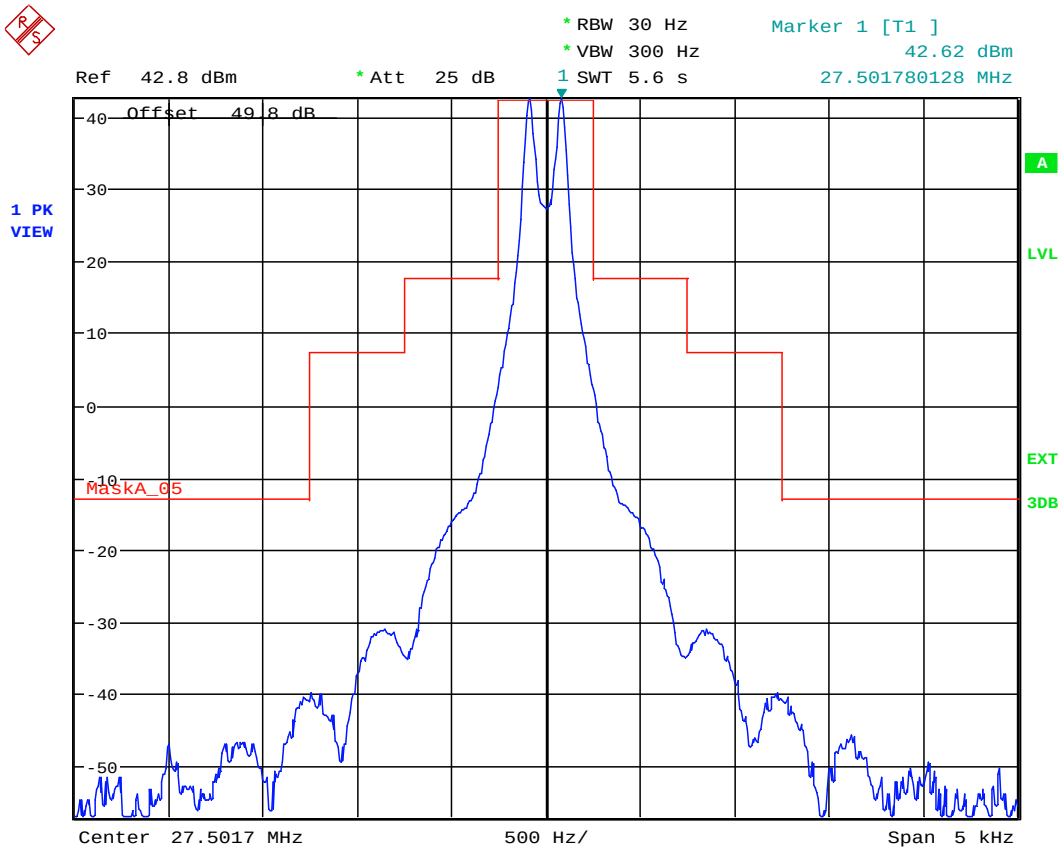
Configuration: F1B (FSK), 16.36MHz, Low power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz



Date: 25.MAY.2026 14:26:46

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Configuration: F1B (FSK), 27.5MHz, Low power, Mark Frequency: 1615Hz, Shift Frequency: 170Hz

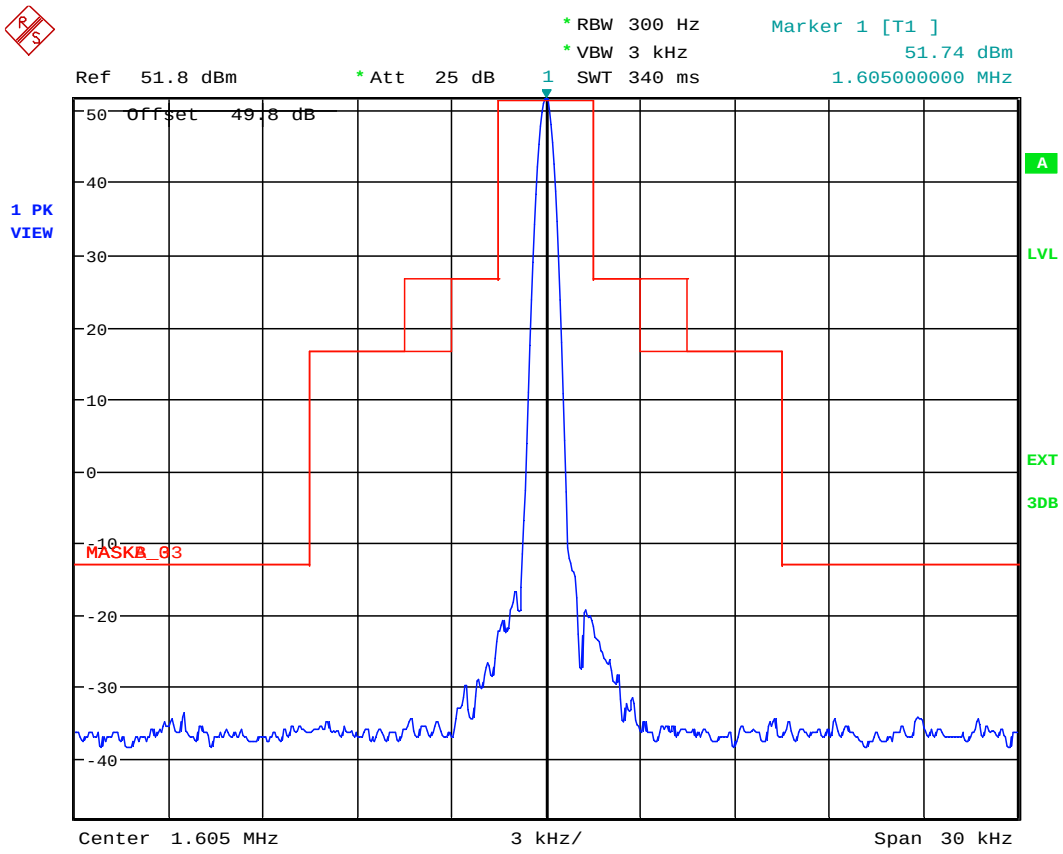


Date: 26.MAY.2026 16:20:54

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

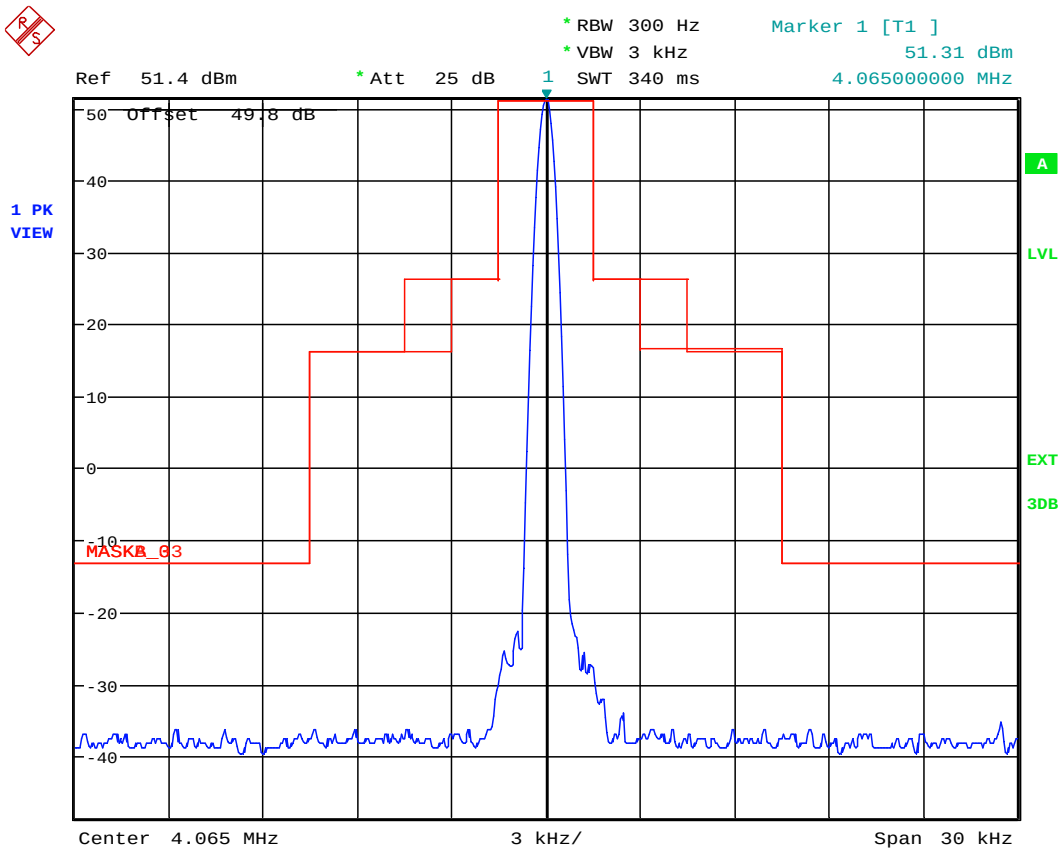
MASK FOR J2B

Configuration: J2B (AFSK), 1.605MHz, High power, Modulation: 1.7 KHz



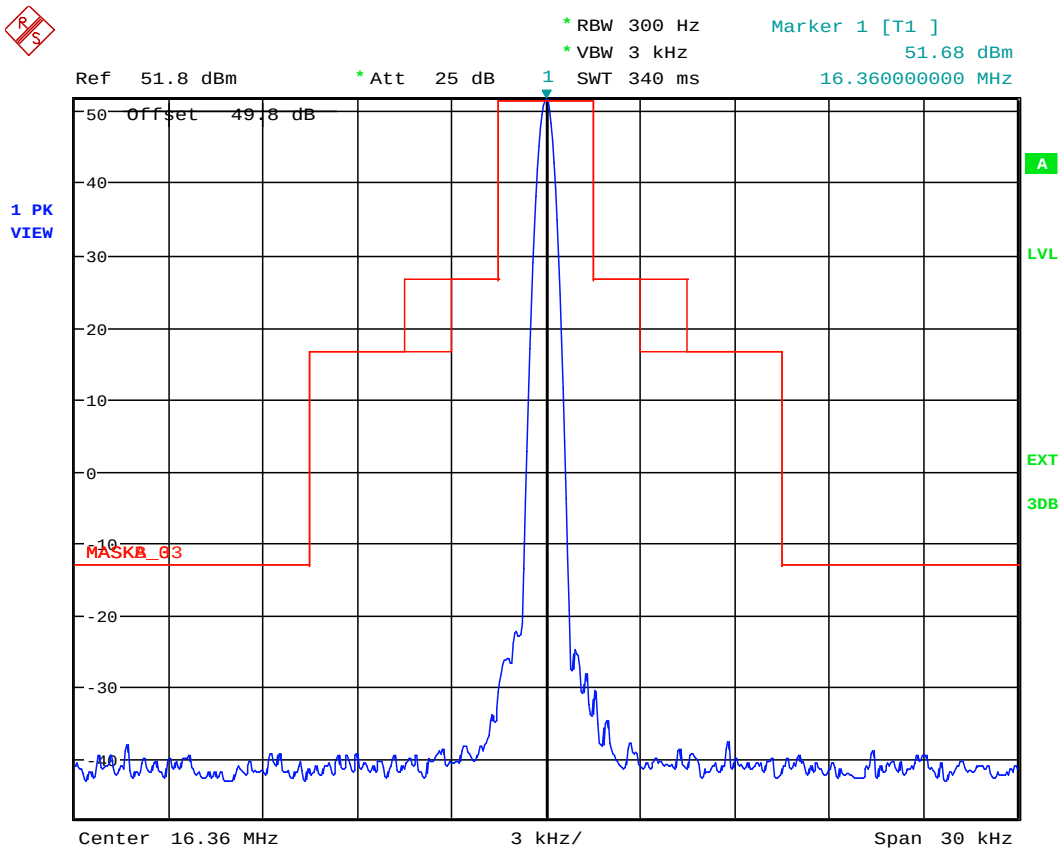
Date: 25.MAY.2026 18:56:54

Configuration: J2B (AFSK), 4.065MHz, High power, Modulation: 1.7 KHz



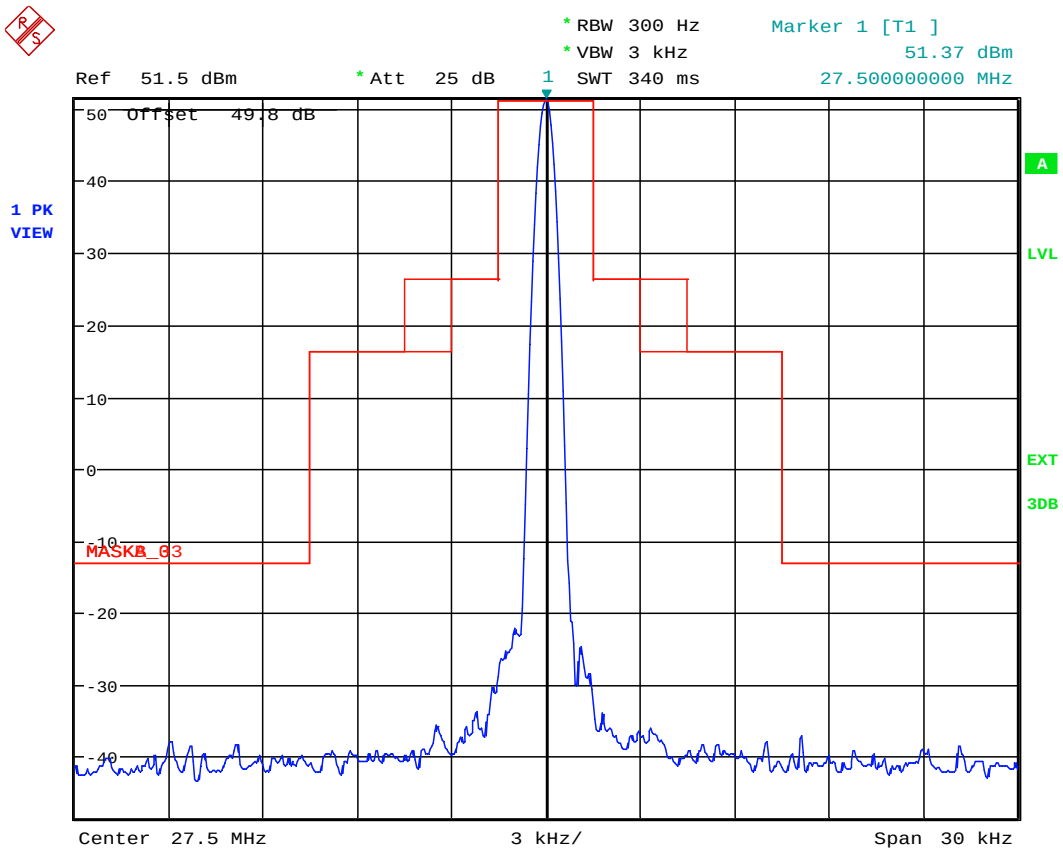
Date: 25.MAY.2026 19:06:07

Configuration: J2B (AFSK), 16.36MHz, High power, Modulation: 1.7 KHz



Date: 25.MAY.2026 19:19:38

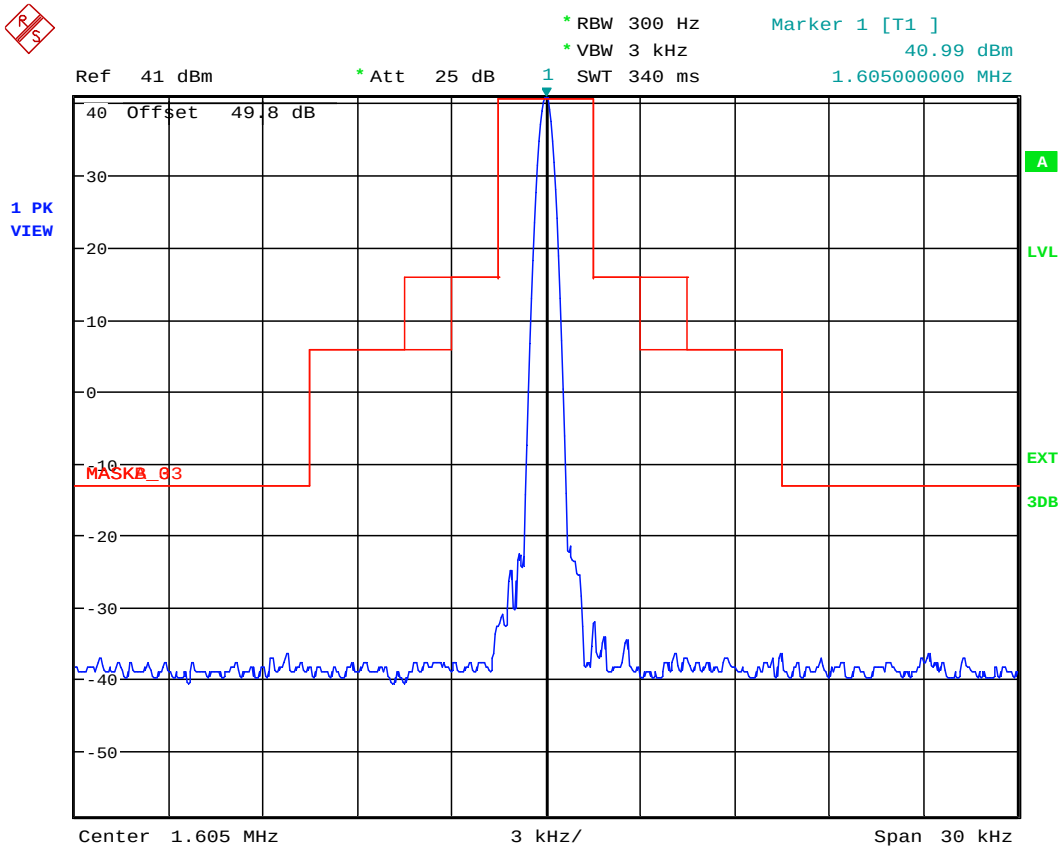
Configuration: J2B (AFSK), 27.50MHz, High power, Modulation: 1.7 KHz



Date: 25.MAY.2026 19:23:38

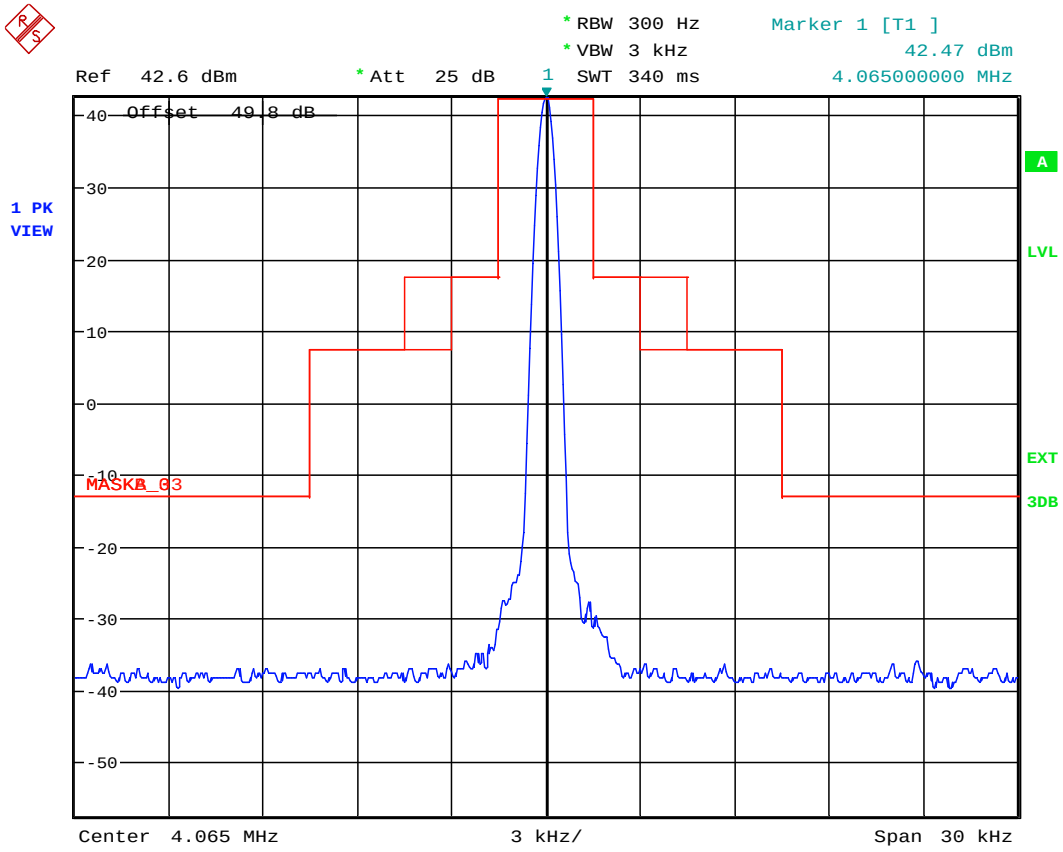
Low Power

Configuration: J2B (AFSK), 1.605MHz, Low power, Modulation: 1.7 KHz



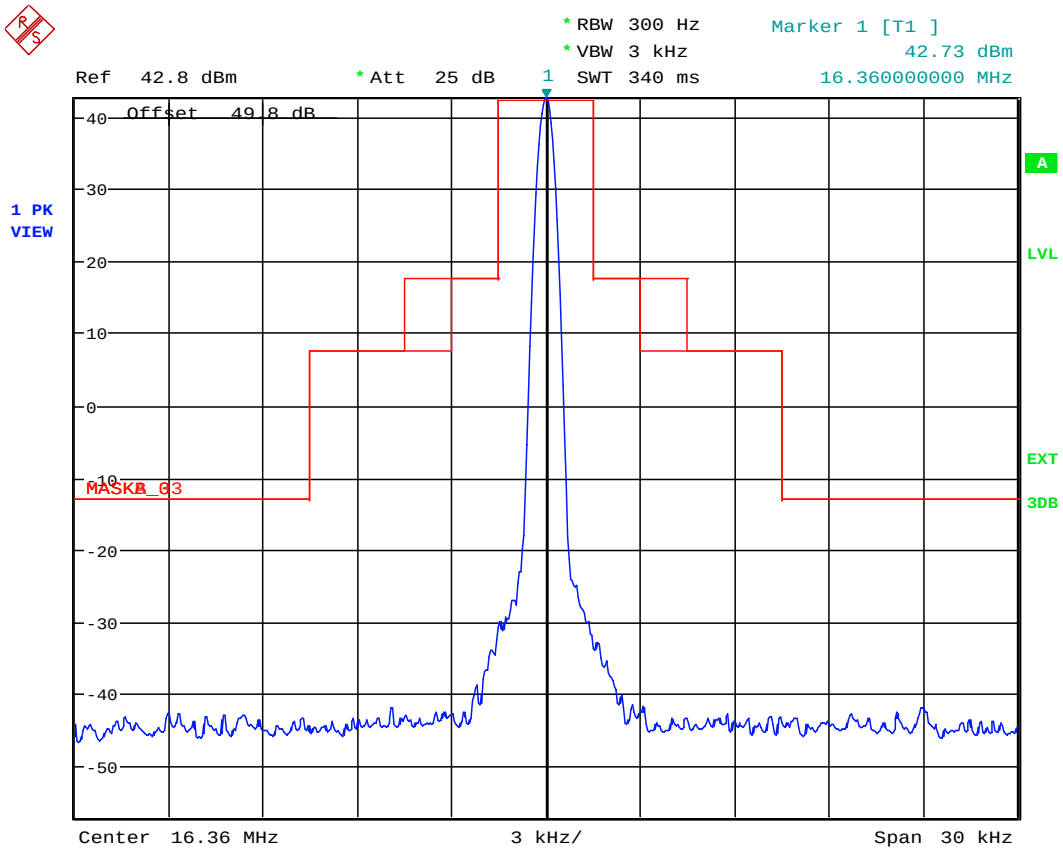
Date: 25.MAY.2026 19:37:59

Configuration: J2B (AFSK), 4.065MHz, Low power, Modulation: 1.7 KHz



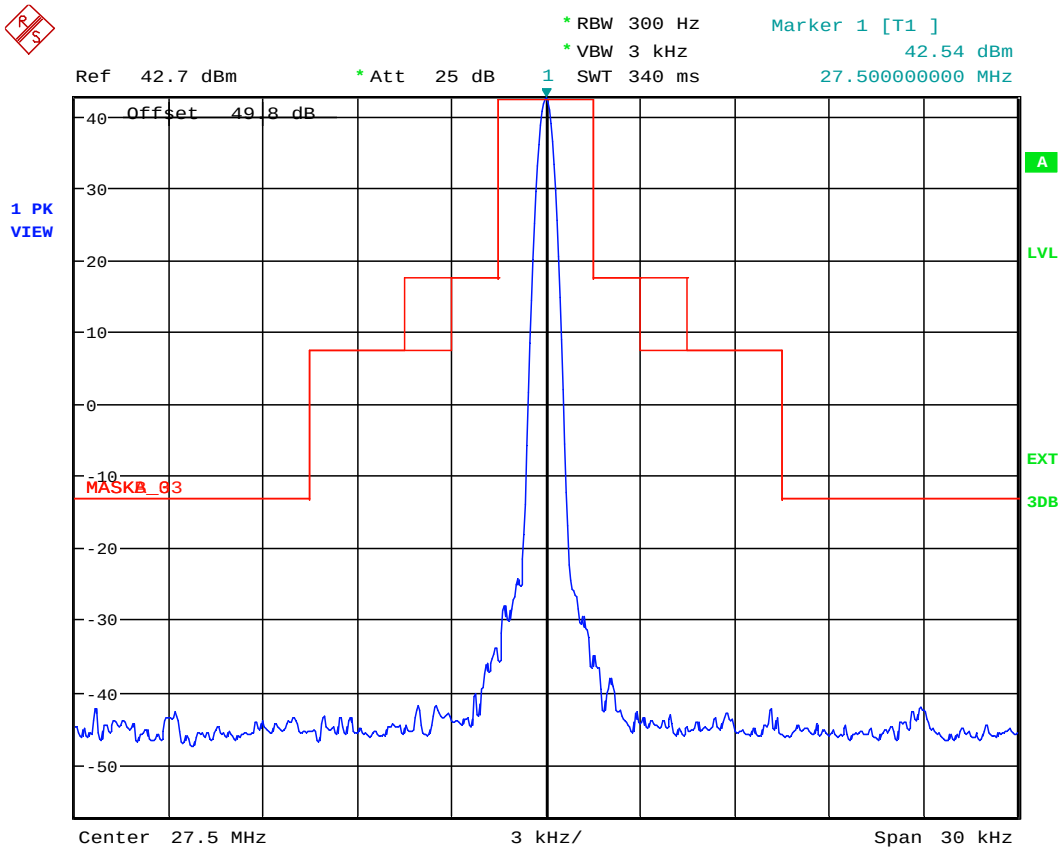
Date: 25.MAY.2026 19:53:37

Configuration: J2B (AFSK), 16.36MHz, Low power, Modulation: 1.7 KHz



Date: 25.MAY.2026 20:00:06

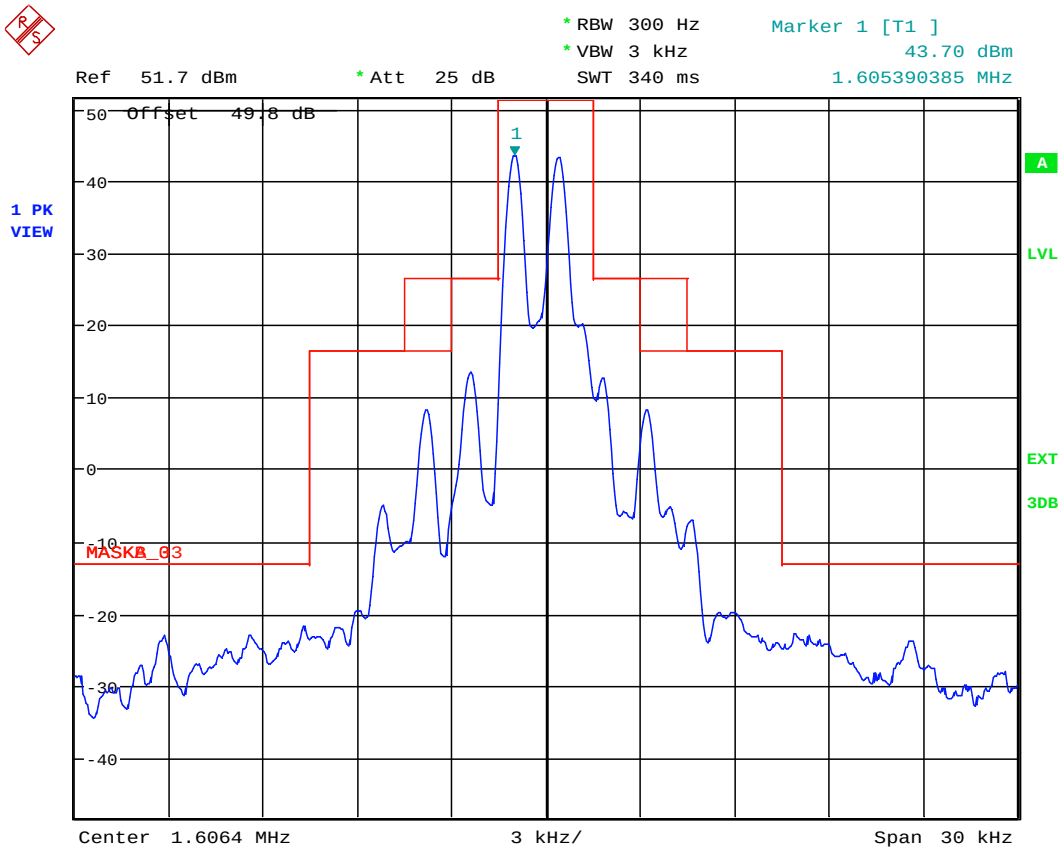
Configuration: J2B (AFSK), 27.50MHz, Low power, Modulation: 1.7 KHz



Date: 25.MAY.2026 20:05:59

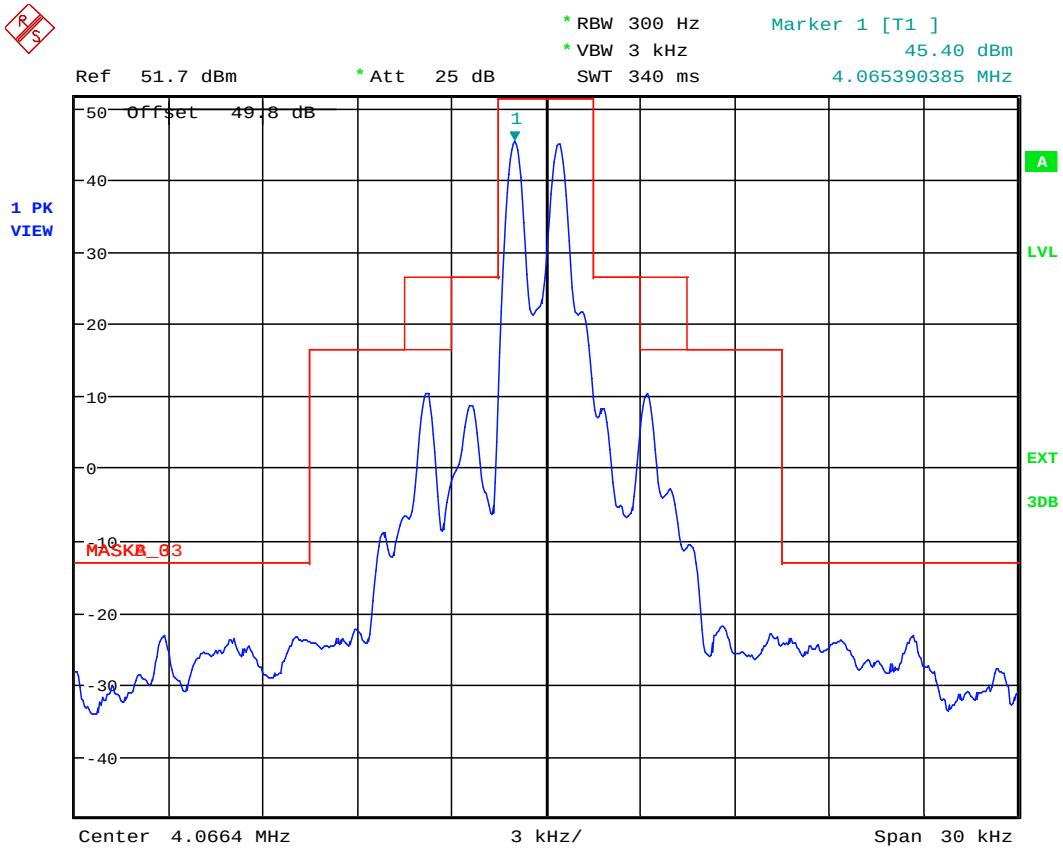
MASK FOR J3E

Configuration: Mask A, J3E (USB), 1.605MHz, High power, Modulation: 400+1800Hz



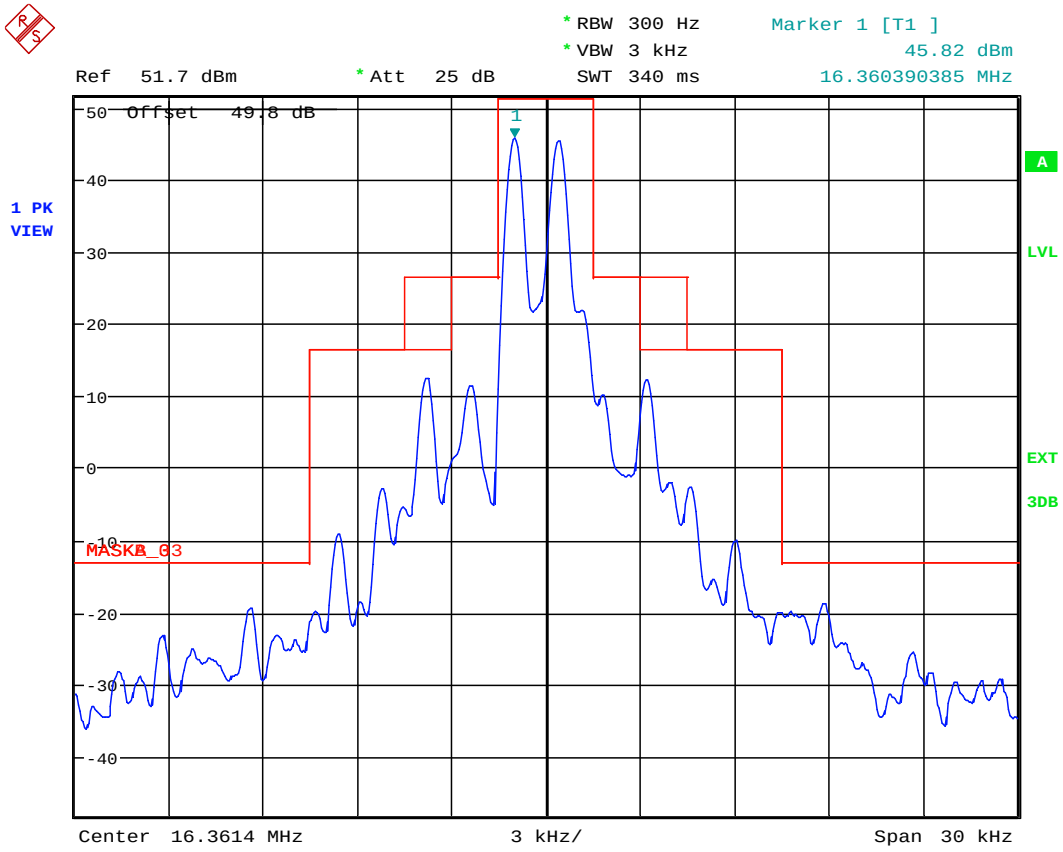
Date: 26.MAY.2026 14:37:01

Configuration: Mask A, J3E (USB), 4.065MHz, High power, Modulation: 400+1800Hz



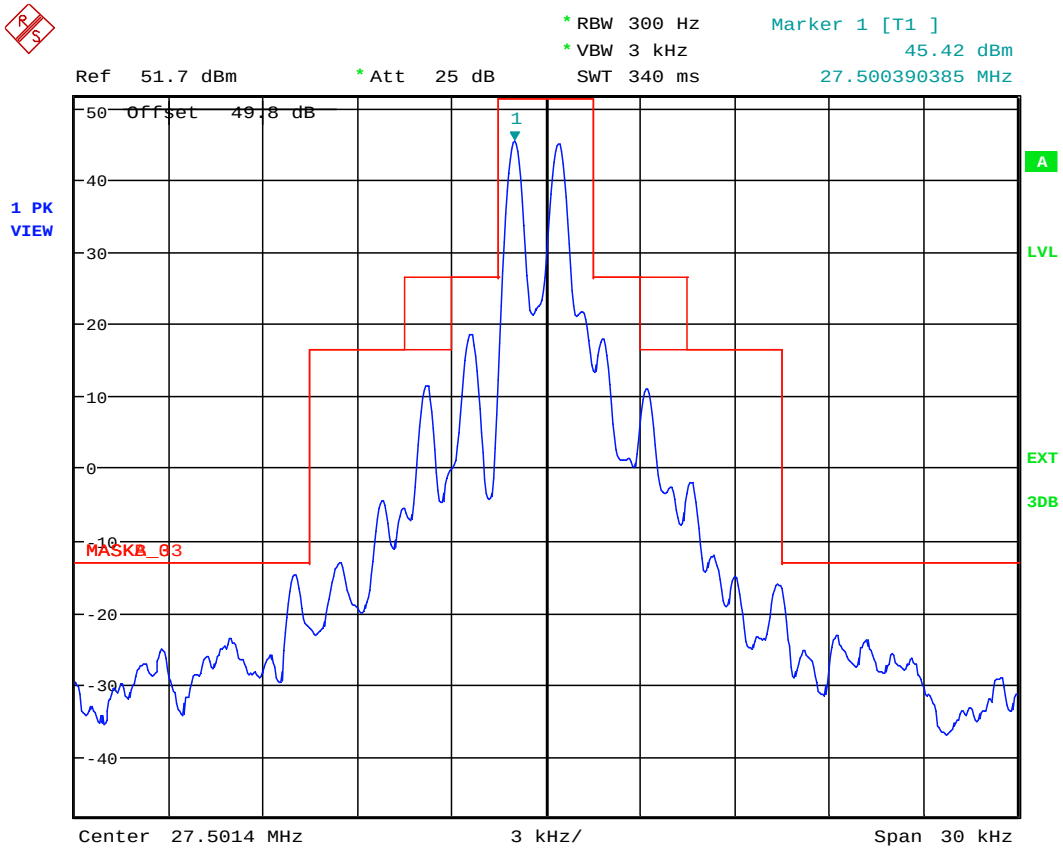
Date: 26.MAY.2026 14:35:49

Configuration: Mask A, J3E (USB), 16.36MHz, High power, Modulation: 400+1800Hz



Date: 26.MAY.2026 14:40:08

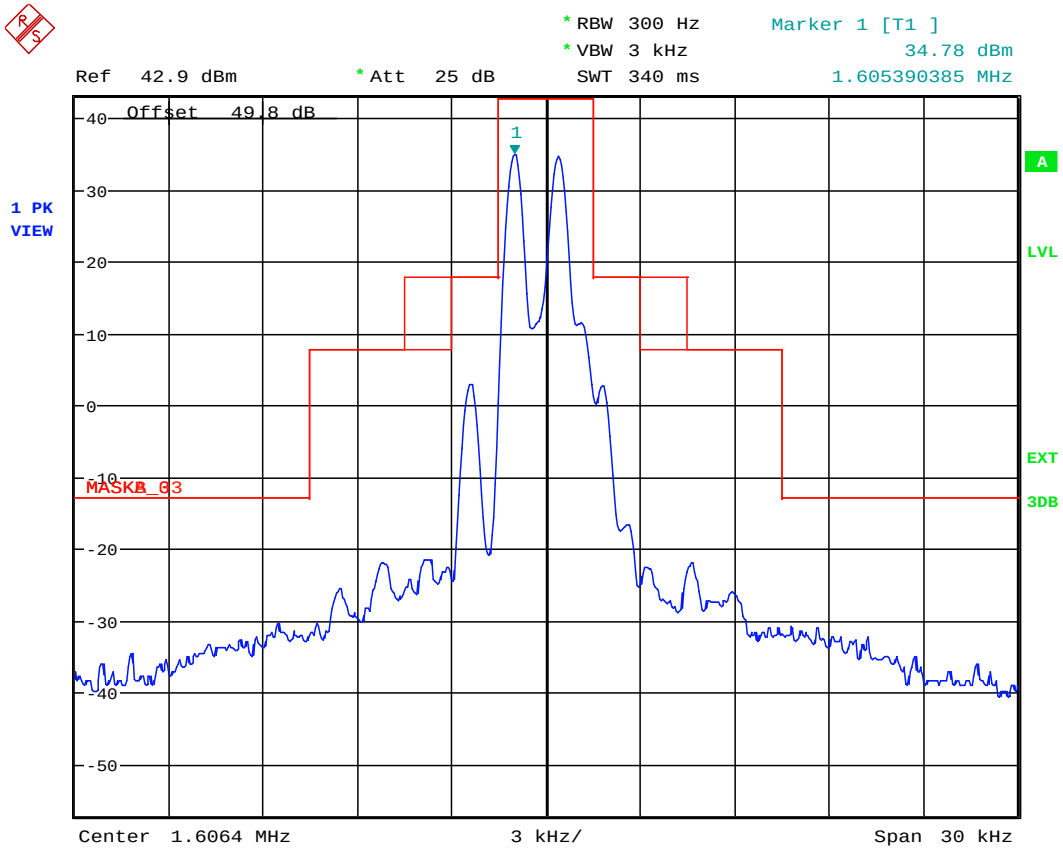
Configuration: Mask A, J3E (USB), 27.5MHz, High power, Modulation: 400+1800Hz



Date: 26.MAY.2026 14:31:06

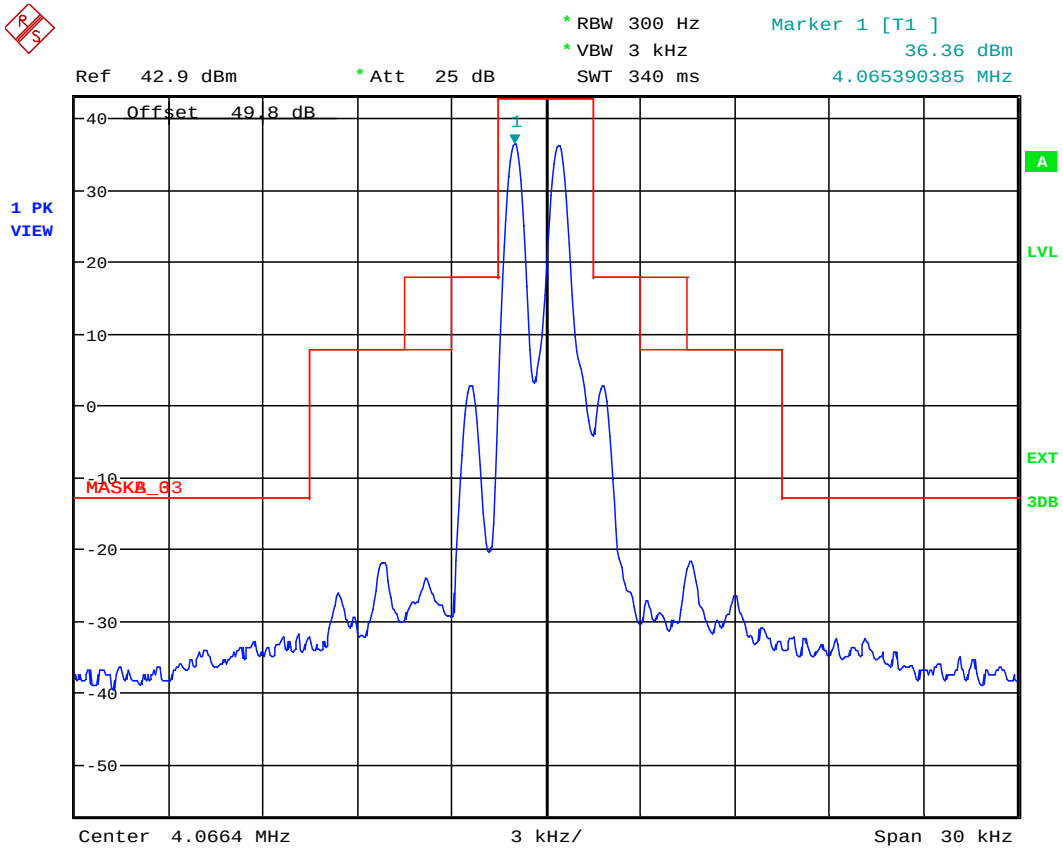
Low Power

Configuration: Mask A, J3E (USB), 1.605MHz, Low power, Modulation: 400+1800Hz



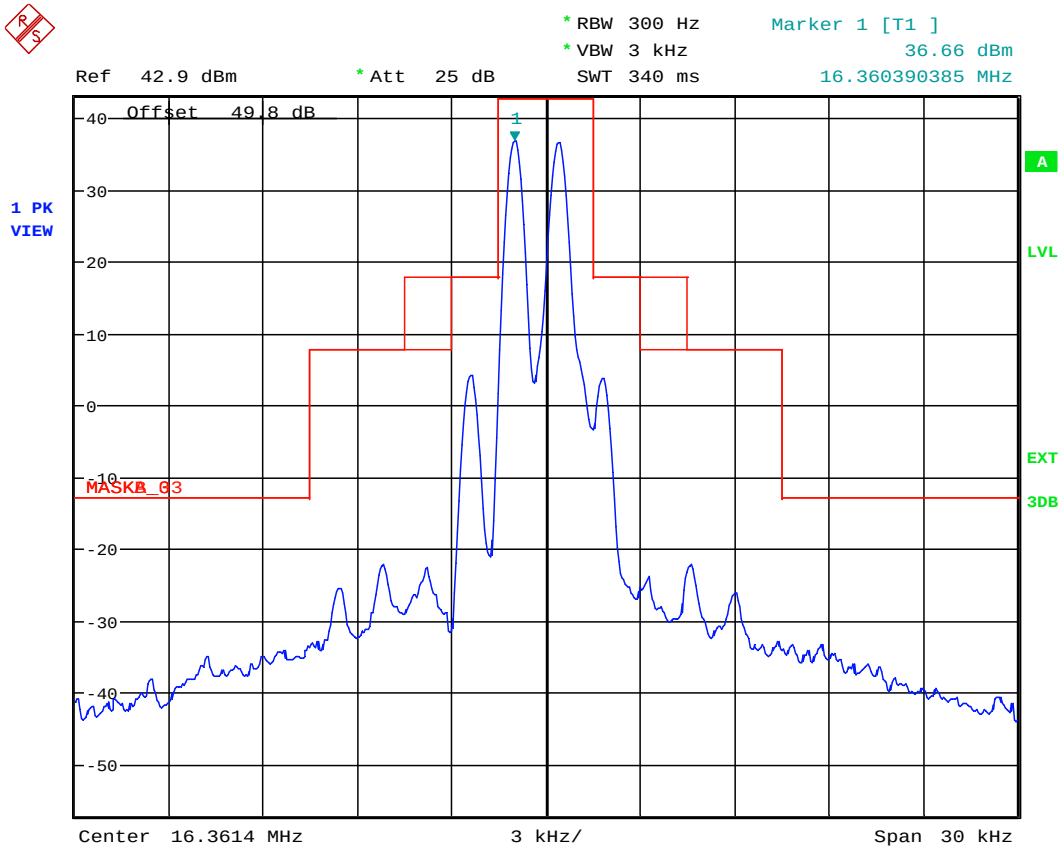
Date: 26.MAY.2026 14:47:43

Configuration: Mask A, J3E (USB), 4.065MHz, Low power, Modulation: 400+1800Hz



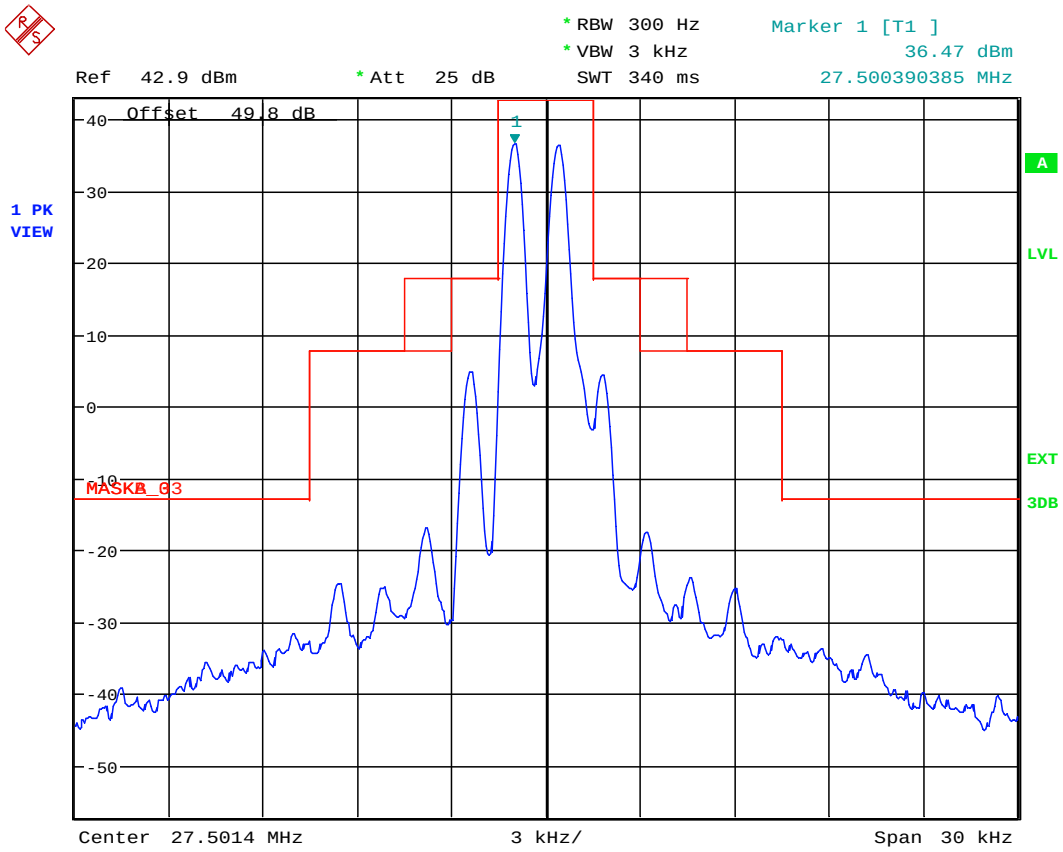
Date: 26.MAY.2026 14:55:32

Configuration: Mask A, J3E (USB), 16.36MHz, Low power, Modulation: 400+1800Hz



Date: 26.MAY.2026 15:00:51

Configuration: Mask A, J3E (USB), 27.50MHz, Low power, Modulation: 400+1800Hz



Date: 26.MAY.2026 15:08:26

5.9. TRANSMITTER ANTENNA POWER SPURIOUS/HARMONIC CONDUCTED EMISSIONS [§ 2.1051, 2.1057, 80.211(f)(3) & 90.210]

5.9.1. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 22.359	At least 43 + 10 log (P) dB.
§ 80.211(f)(3),	At least 43 +10$\log_{10}$ (mean power in watts) dB
§ 90.210(b)	At least 43 + 10 log (P) dB
§ 90.210(d)	At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
§ 90.210(e)	At least 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.

5.9.2. Method of Measurements

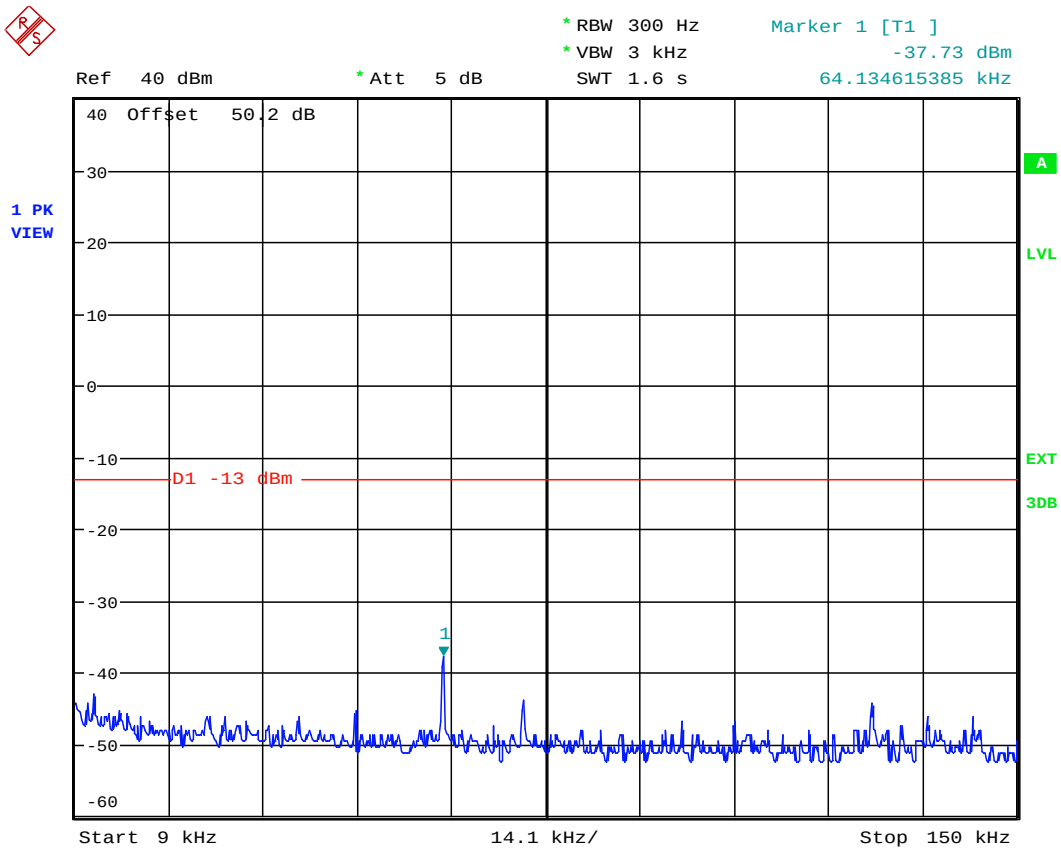
Refer to Section 8.4 of this report for measurement details

5.9.3. Test Data

- **Note**:
- The spurious/harmonic emissions of J3E is tested to represent worst case
- The emissions were scanned from 9 kHz to 1000 MHz; all spurious emissions that are in excess of 20dB below the specified limits were recorded.

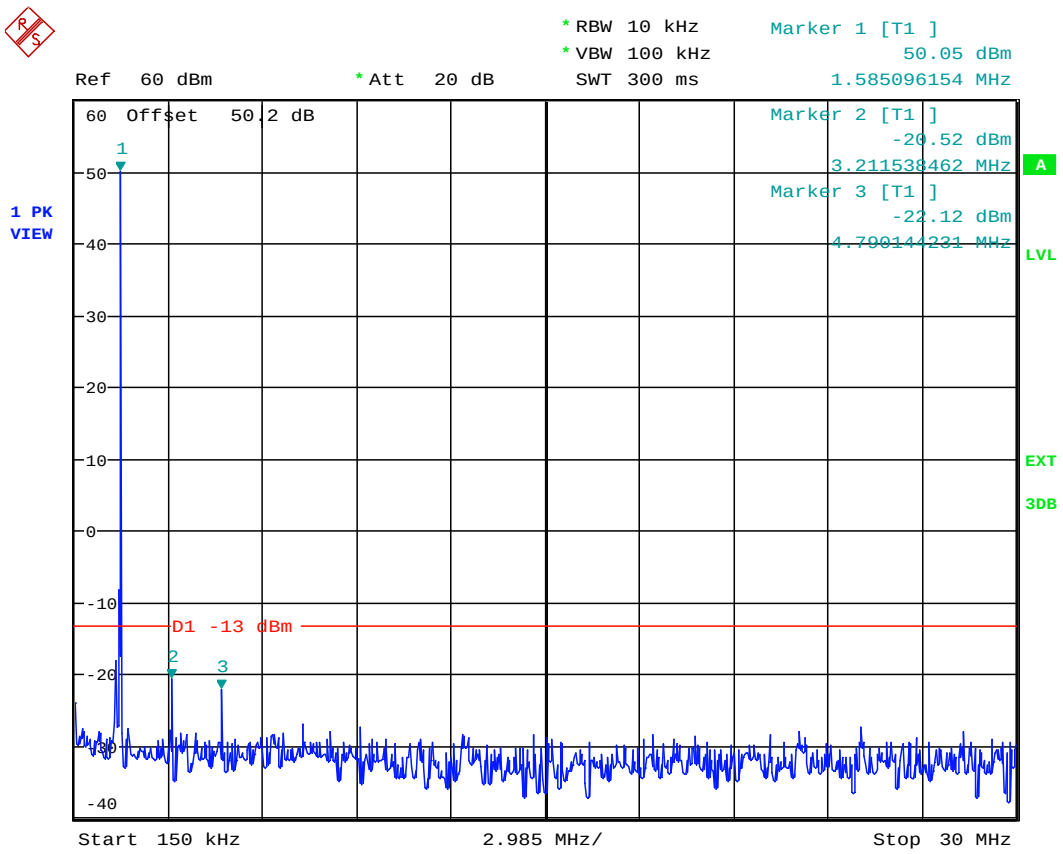
High Power

5.9.3.1. Configuration: Tx Conducted, J3E (USB), 1.605MHz, High power, Modulation: 400+1800Hz

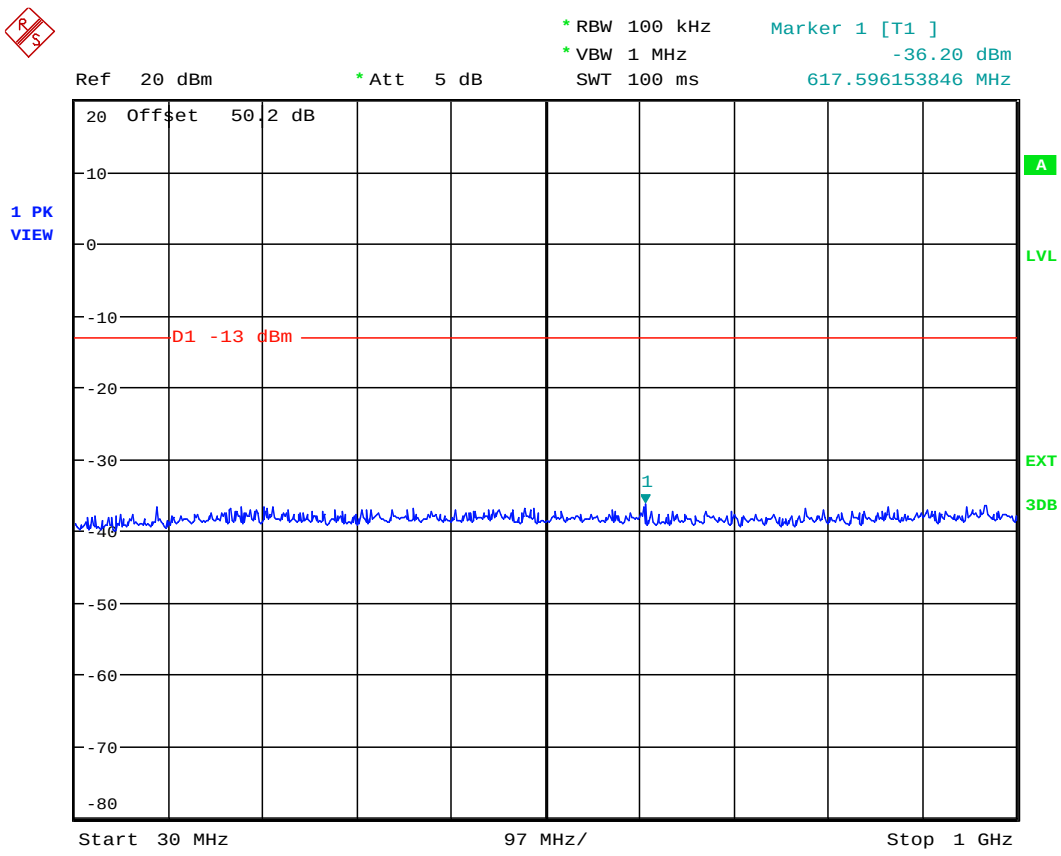


Date: 27.MAY.2026 14:10:14

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

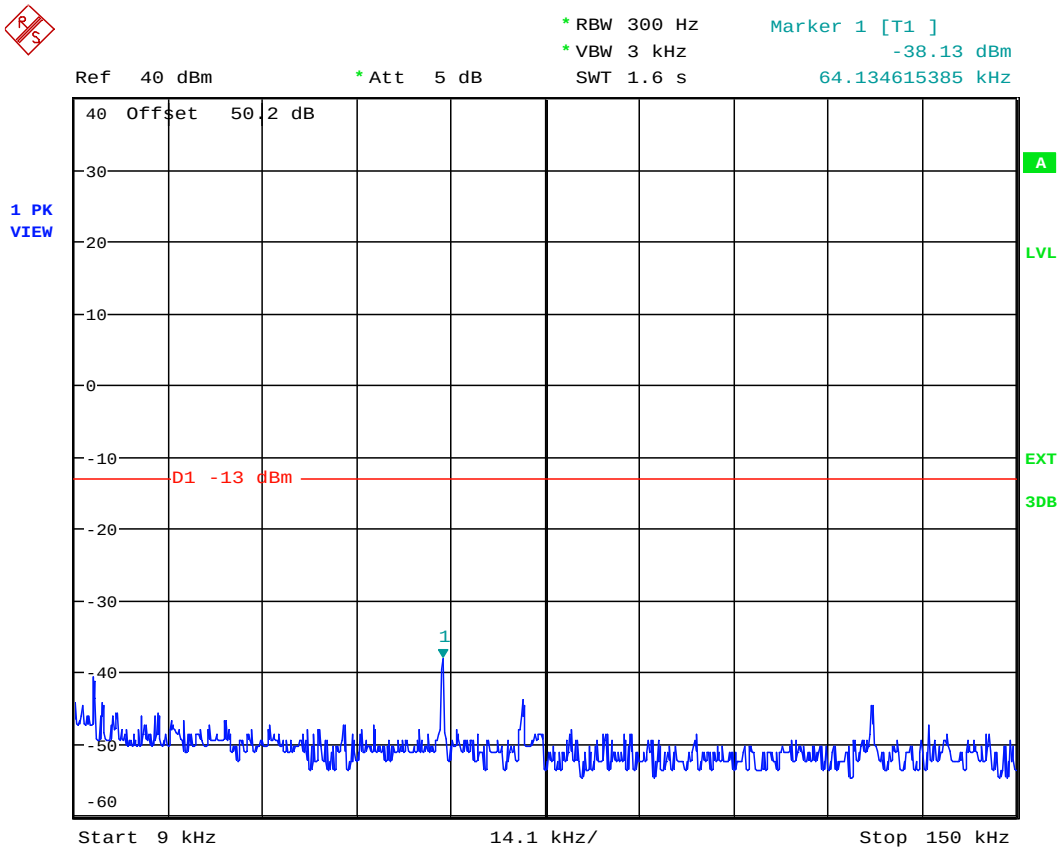


Date: 27.MAY.2026 14:22:49

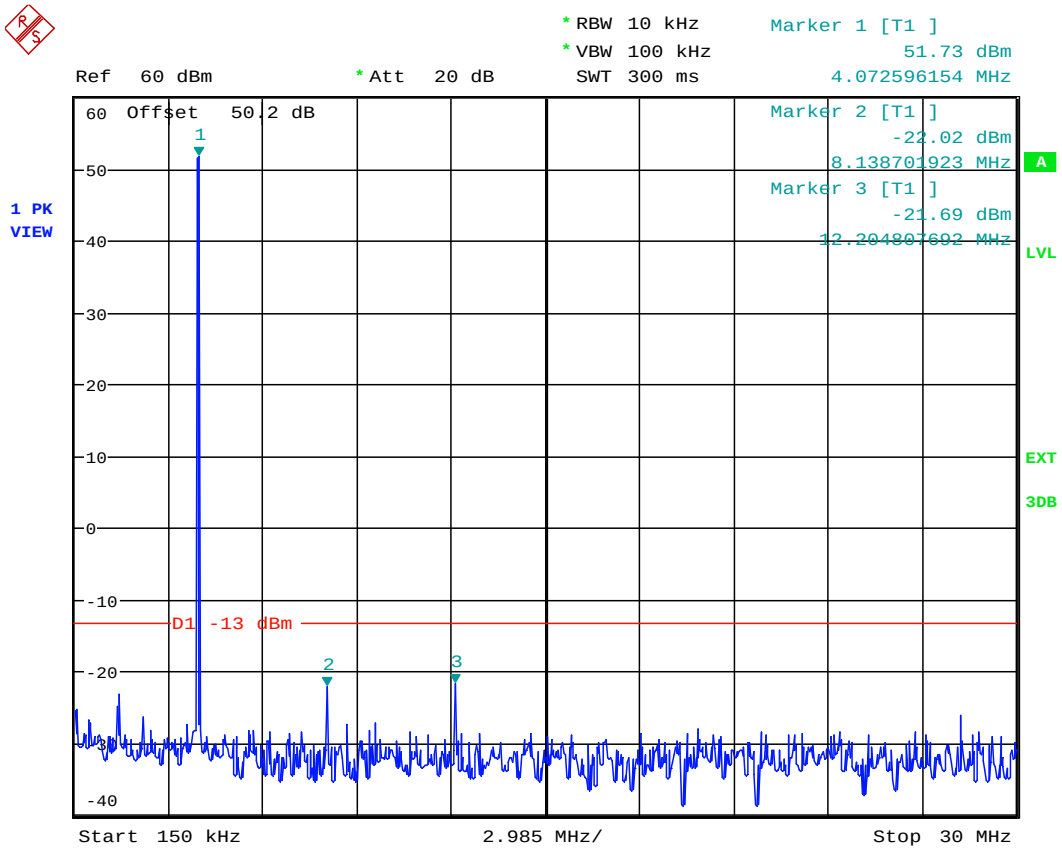


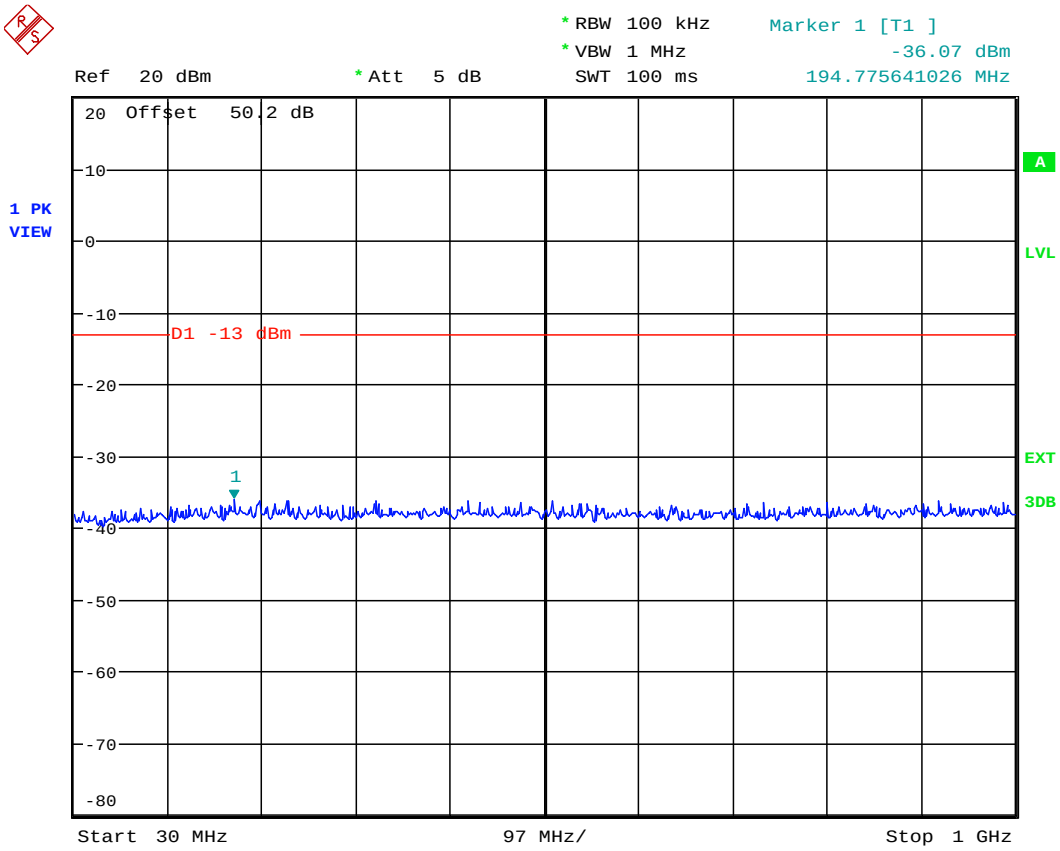
Date: 27.MAY.2026 14:16:25

5.9.3.2. Configuration: Tx Conducted, J3E (USB), 4.065MHz, High power, Modulation: 400+1800Hz



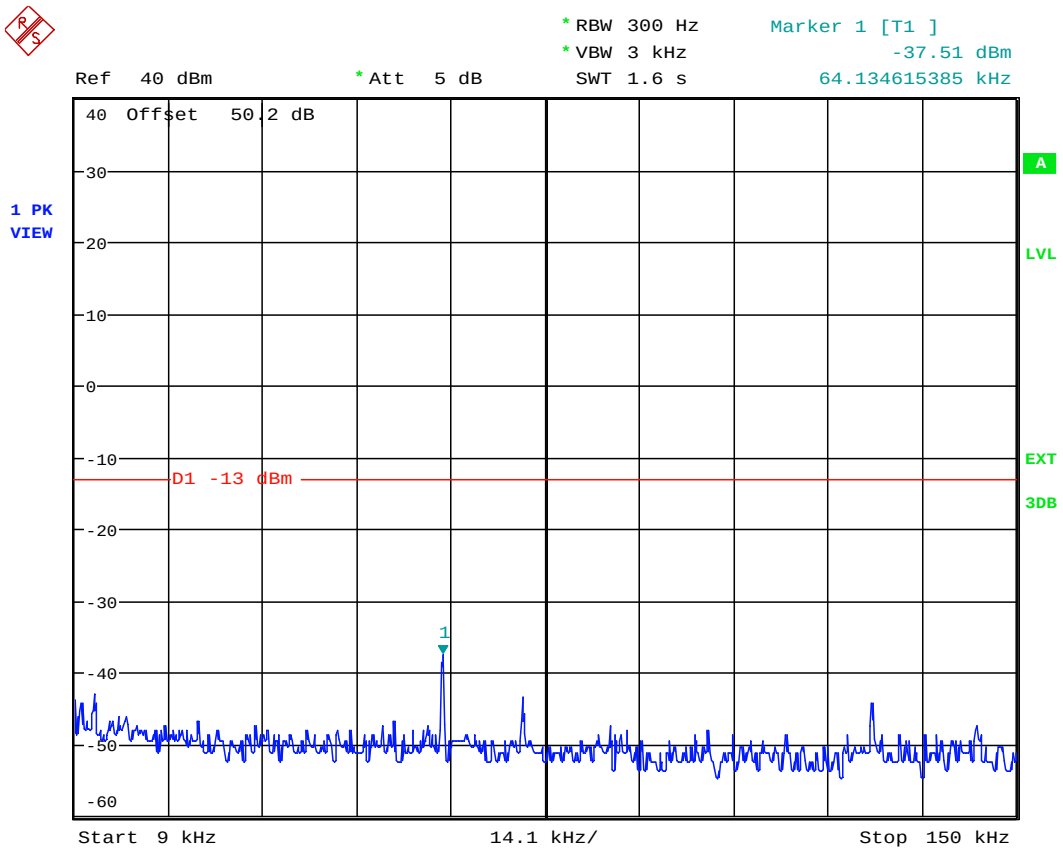
Date: 27.MAY.2026 14:17:45


*RBW 10 kHz
*VBW 100 kHz
SWT 300 ms
Marker 1 [T1]
51.73 dBm
4.072596154 MHz
Marker 2 [T1]
-22.02 dBm
8.138701923 MHz
Marker 3 [T1]
-21.69 dBm
12.204807692 MHz
Ref 60 dBm
*Att 20 dB
60 Offset 50.2 dB
1 PK
VIEW
A
LVL
EXT
3DB
D1 -13 dBm
Start 150 kHz
2.985 MHz/
Stop 30 MHz
Date: 27.MAY.2026 14:22:01

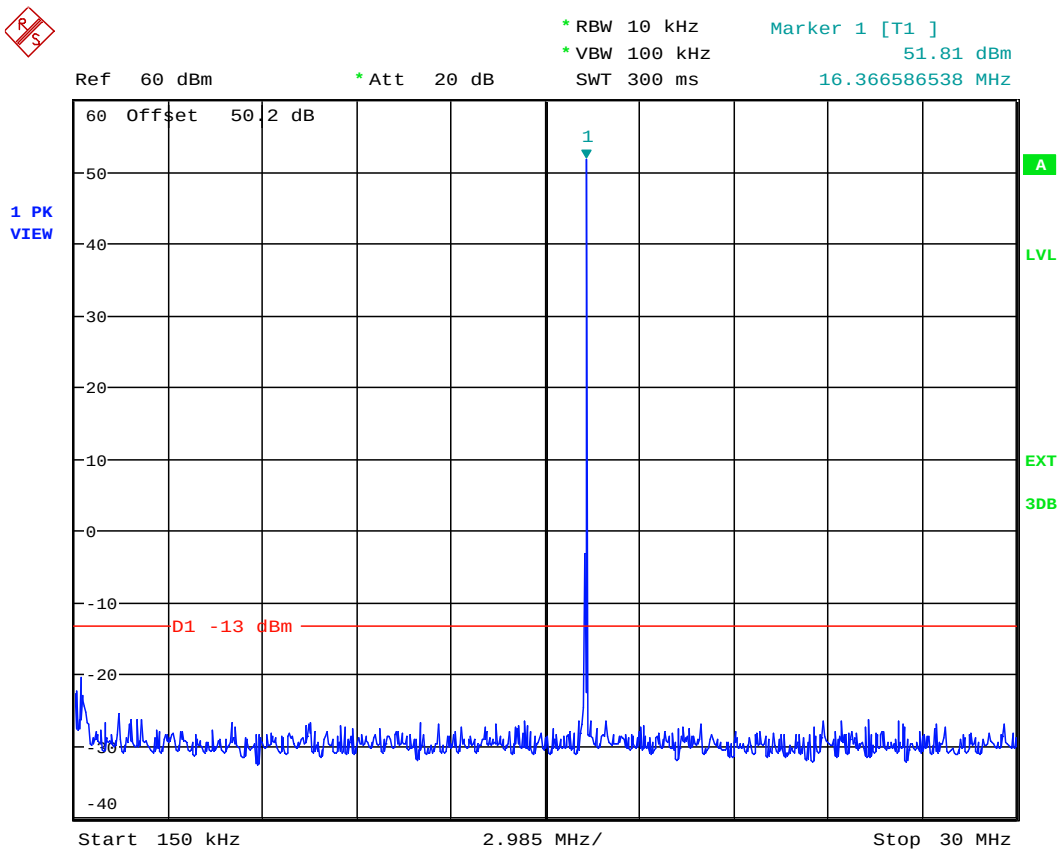


Date: 27.MAY.2026 14:24:22

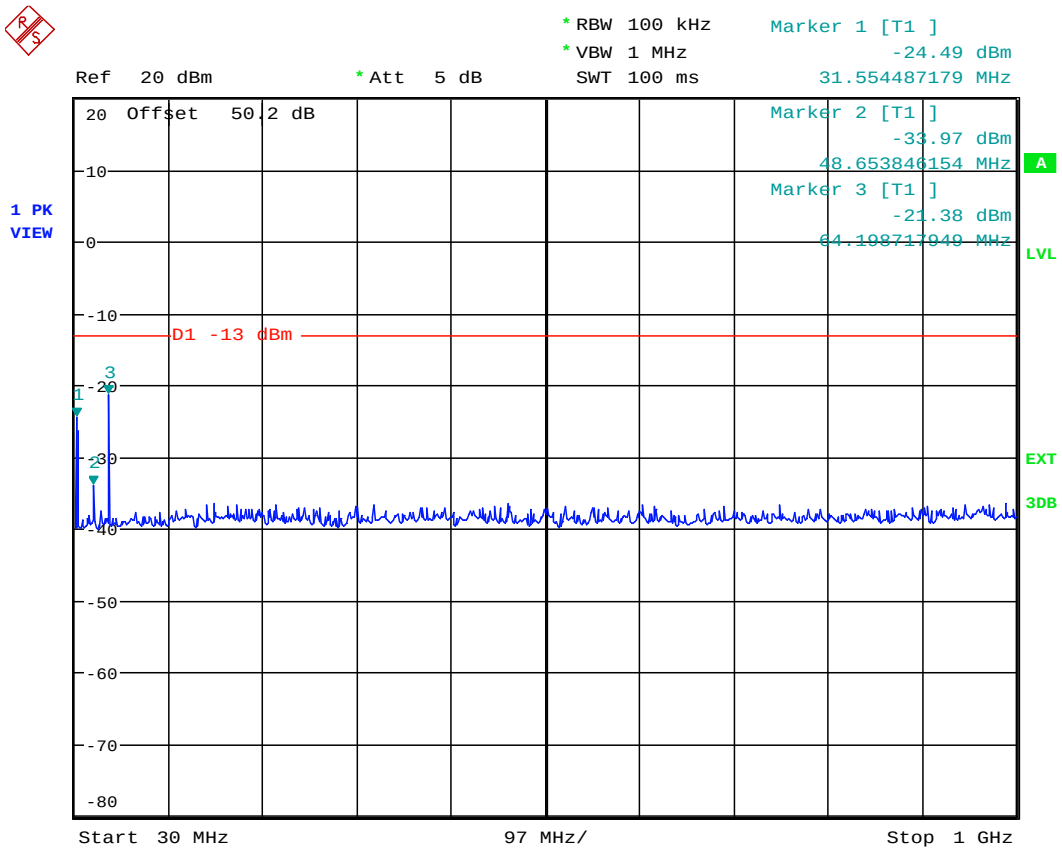
5.9.3.3. Configuration: Tx Conducted, J3E (USB), 16.36MHz, High power, Modulation: 400+1800Hz



Date: 27.MAY.2026 14:26:28

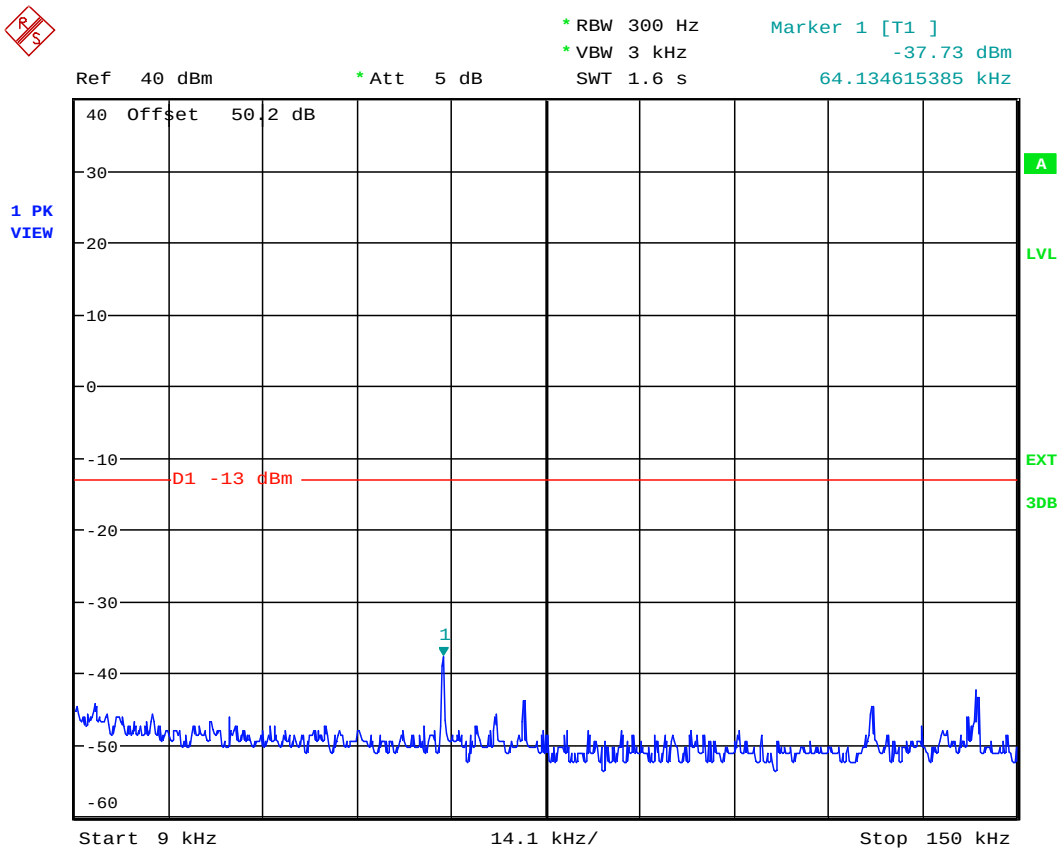


Date: 27.MAY.2026 14:28:15



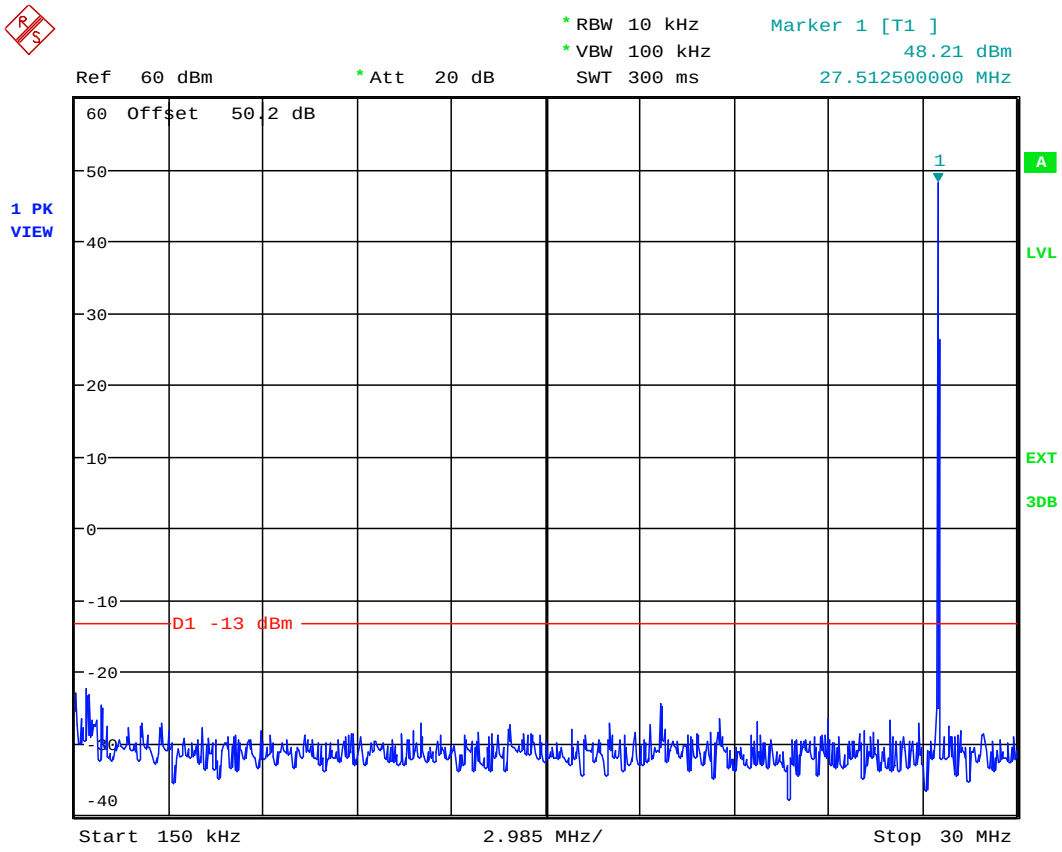
Date: 27.MAY.2026 14:36:08

5.9.3.4. Configuration: Tx Conducted, J3E (USB), 27.50MHz, High power, Modulation: 400+1800Hz

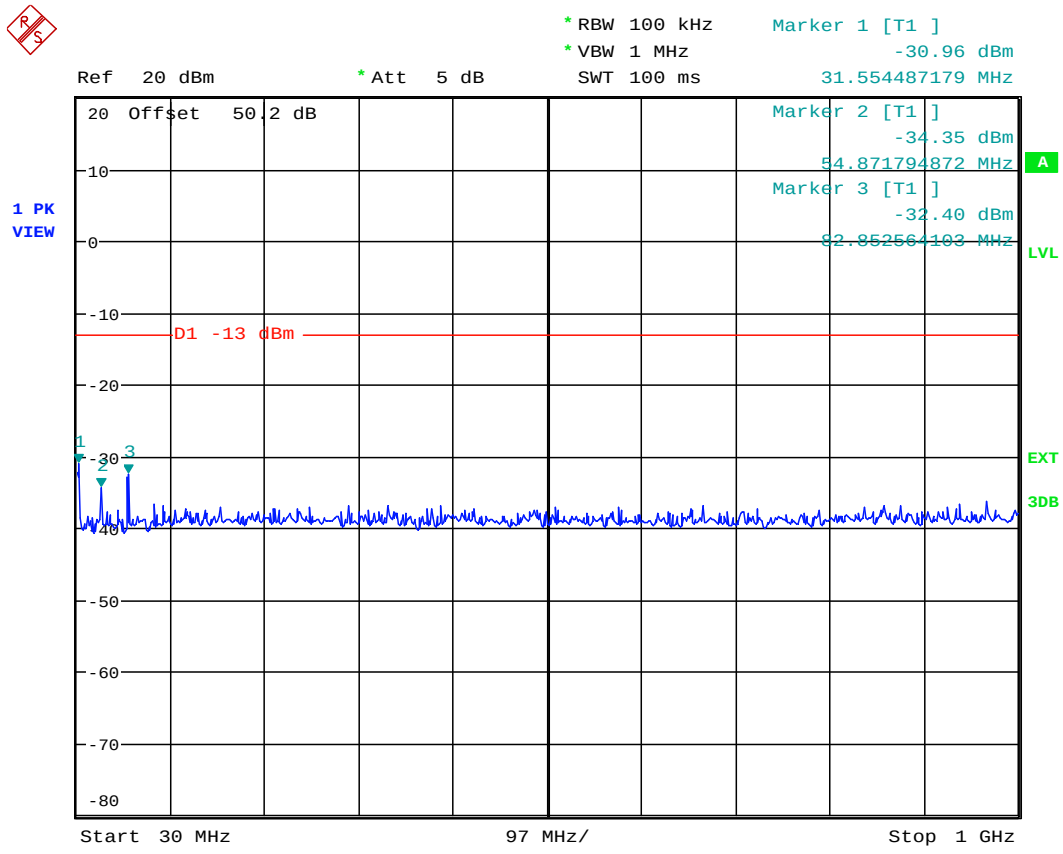


Date: 27.MAY.2026 14:38:00

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)



Date: 27.MAY.2026 14:40:07



Date: 27.MAY.2026 14:41:41

5.10. TRANSMITTER SPURIOUS/HARMONIC RADIATED EMISSIONS [§§ 2.1053, 2.1057, 80.211(f)(3) & 90.210]

5.10.1. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 22.359	At least 43 + 10 log (P) dB.
§ 80.211(f)(3),	At least 43 +10log$_{10}$ (mean power in watts) dB
§ 90.210(b)	At least 43 + 10 log (P) dB
§ 90.210(d)	At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
§ 90.210(e)	At least 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.

5.10.2. Method of Measurements

The radiated measurements are made using method specified in Section 8.2 of this report.

5.10.3. Test Data

Remarks:

- The radiated emissions were performed with high power setting at 3 m distance to represents the worst-case test configuration.
- The spurious/harmonic emissions of J3E is tested to represent worst case
- The emissions were scanned from 9 kHz to 1000 MHz; all spurious emissions that are in excess of 20dB below the specified limits were recorded.

5.10.3.1. Near Lowest Frequency (1.605)

Test Frequency (MHz):	1.605
Power Setting:	High
Limit (dBm):	-13
All emissions are more than 20 dB below the limit line.	

5.10.3.2. Near Lowest Frequency (4.065)

Test Frequency (MHz):	4.065
Power Setting:	High
Limit (dBm):	-13
All emissions are more than 20 dB below the limit line.	

5.10.3.3. Near Highest Frequency (16.36 MHz)

Test Frequency (MHz):		16.36				
Power Setting:		High				
Limit (dBm):		-13				
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP (dBm)**	**Limit (dBm)**	**Margin (dB)**
49.08	78.86	PEAK	V	-18.49	-13	-5.49
49.08	69.86	PEAK	H	-27.49	-13	-14.49
65.44	65.98	PEAK	V	-31.37	-13	-18.37
All other emissions are more than 20 dB below the limit line.						

5.10.3.4. Near Highest Frequency (27.5 MHz)

Test Frequency (MHz):		27.5				
Power Setting:		High				
Limit (dBm):		-13				
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP (dBm)**	**Limit (dBm)**	**Margin (dB)**
55	68.15	PEAK	V	-29.2	-13	-16.2
137.5	64.49	PEAK	H	-32.86	-13	-19.86
192.5	70.27	PEAK	V	-27.08	-13	-14.08
192.5	74.81	PEAK	H	-22.54	-13	-9.54
All other emissions are more than 20 dB below the limit line.						

5.11. FREQUENCY STABILITY [§§ 2.1055, 80.209 & 90.213]

5.11.1. Limits

§ 90.213 Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Range (MHz)	Frequency Tolerance (ppm)		
	Fixed and Base Stations	Mobile Stations	
		> 2 W	≤ 2 W
Below 25 MHz	100ppm[123]	100	200
25-50 MHz	20 ppm	20	50

1 Fixed and base stations with over 200 watts transmitter power must have a frequency stability of 50 ppm except for equipment used in the Public Safety Pool where the frequency stability is 100 ppm.
2 For single sideband operations below 25 MHz, the carrier frequency must be maintained within 50 Hz of the authorized carrier frequency.
3 Travelers information station transmitters operating from 530-1700 kHz and transmitters exceeding 200 watts peak envelope power used for disaster communications and long distance circuit operations pursuant to §§ 90.242 and 90.264 must maintain the carrier frequency to within 20 Hz of the authorized frequency.

§ 80.209
Band 1.6-4MHz and 4-27.5 MHz: Ship Stations 10 Hz

5.11.2. Method of Measurements

Refer to Section 8.3 of this report for measurement details

5.11.3. Test Data

Test Frequency:	27.5 MHz
Full Power Level:	150W setting
Frequency Tolerance Limit:	± 10 Hz
Max. Frequency Tolerance Measured:	-6 Hz
Input Voltage Rating:	13.6 VDC (nominal)

Ambient Temperature (°C)	Frequency Drift (Hz)		
	Supply Voltage (Nominal) 13.6 VDC	Supply Voltage (-15%) 11.56 VDC	Supply Voltage (+15%) 15.64 VDC
-30	-4	--	--
-20	-5	--	--
-10	-5	--	--
0	-4	--	--
10	-5	--	--
20	-4	-6	-6
30	-6	--	--
40	-4	--	--
50	-3	--	--
60	-1	--	--

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.12. SUPPRESSION OF INTERFERENCE ABOARD SHIPS [§§ 80.217]

5.12.1. Limits

Deliver not more than the following amounts of power, to an artificial antenna having electrical characteristics equivalent to those of the average receiving antenna(s) use on shipboard:

Frequency of interfering emissions	Power to artificial antenna in microwatts
Below 30 MHz	400 (-4dBm)
30 to 100 MHz	4,000
100 to 300 MHz	40,000
Over 300 MHz	400,000

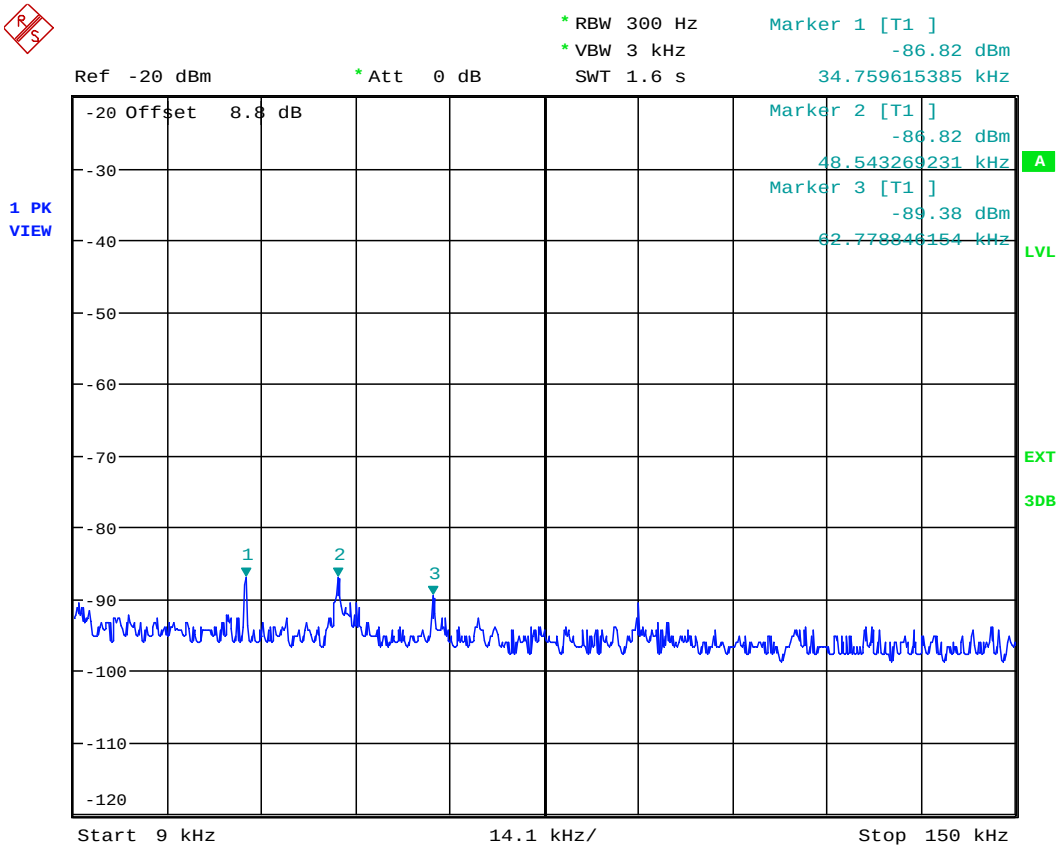
5.12.2. Method of Measurements

ANSI C63.26

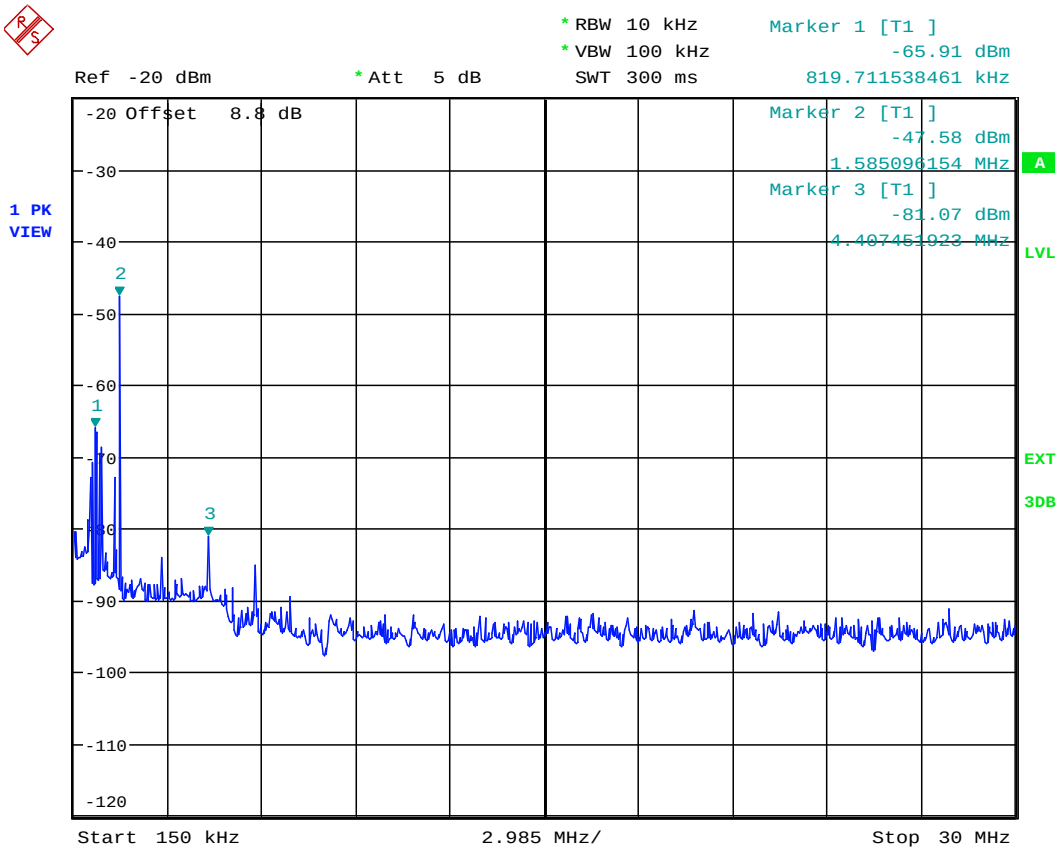
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.12.3. Test Data

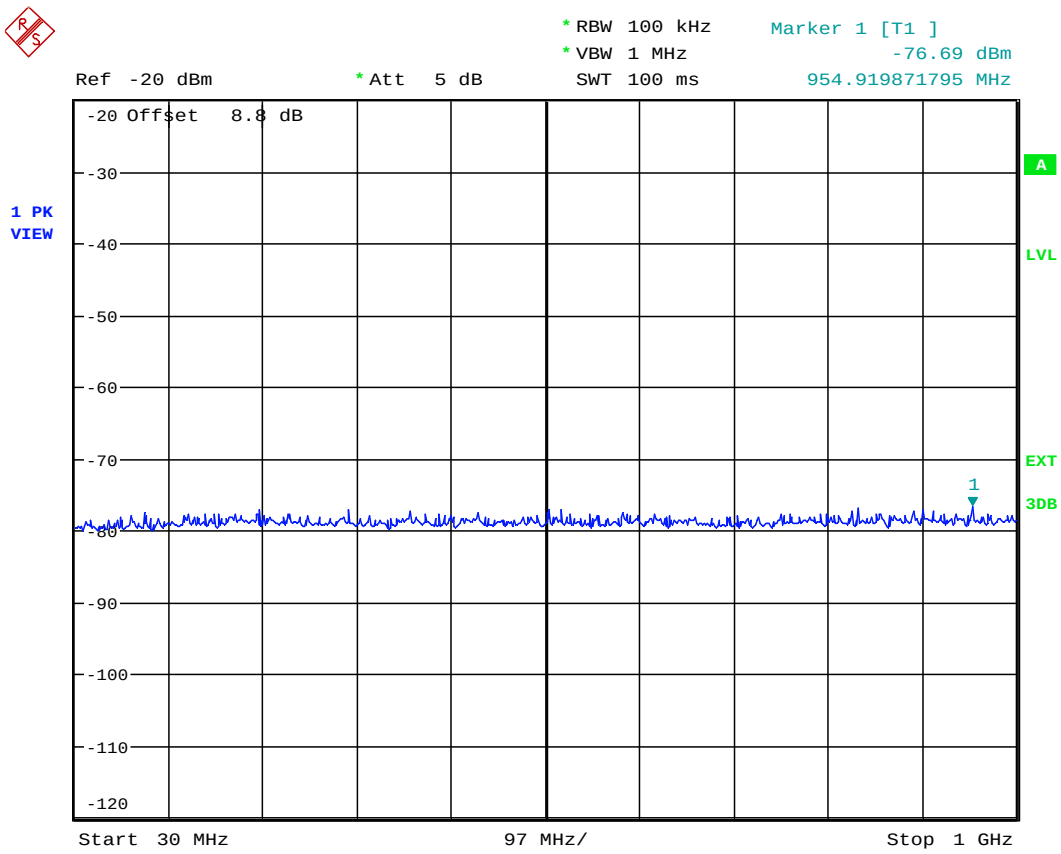
5.12.3.1. Configuration: 1.605MHz Rx @ TRX port



Date: 26.MAY.2026 17:14:59

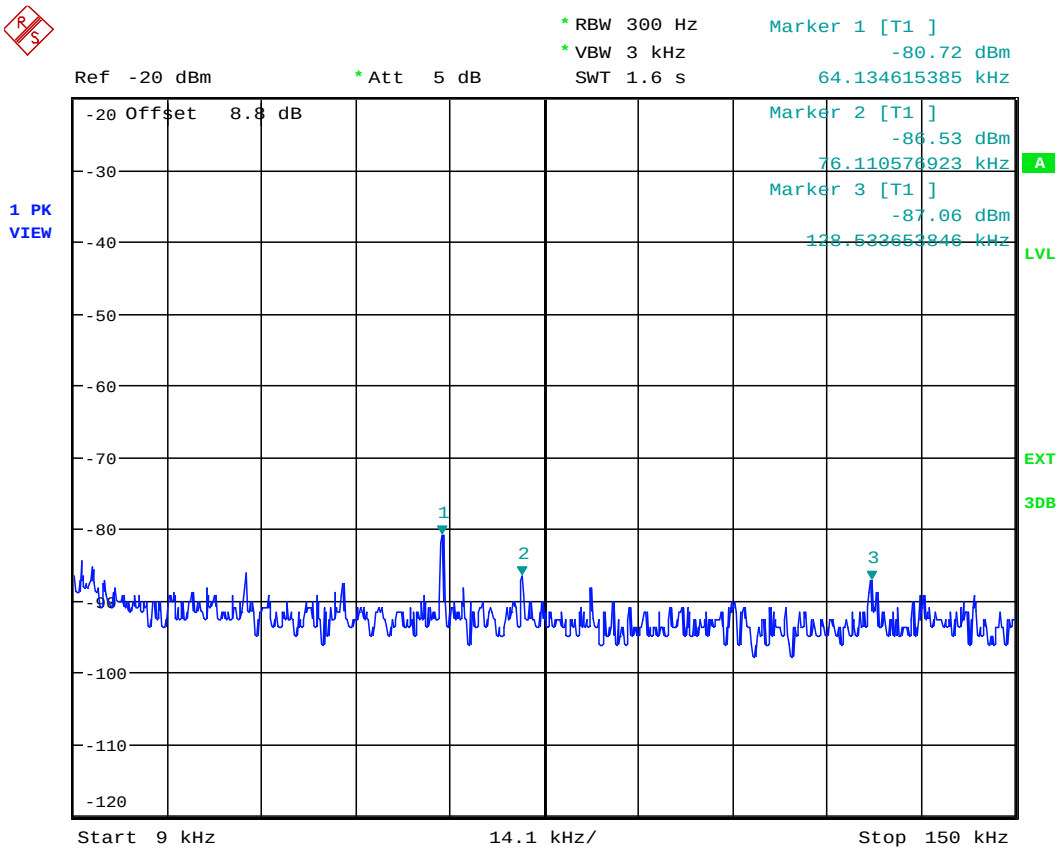


Highest peak is Rx Signal input (1mV rms)



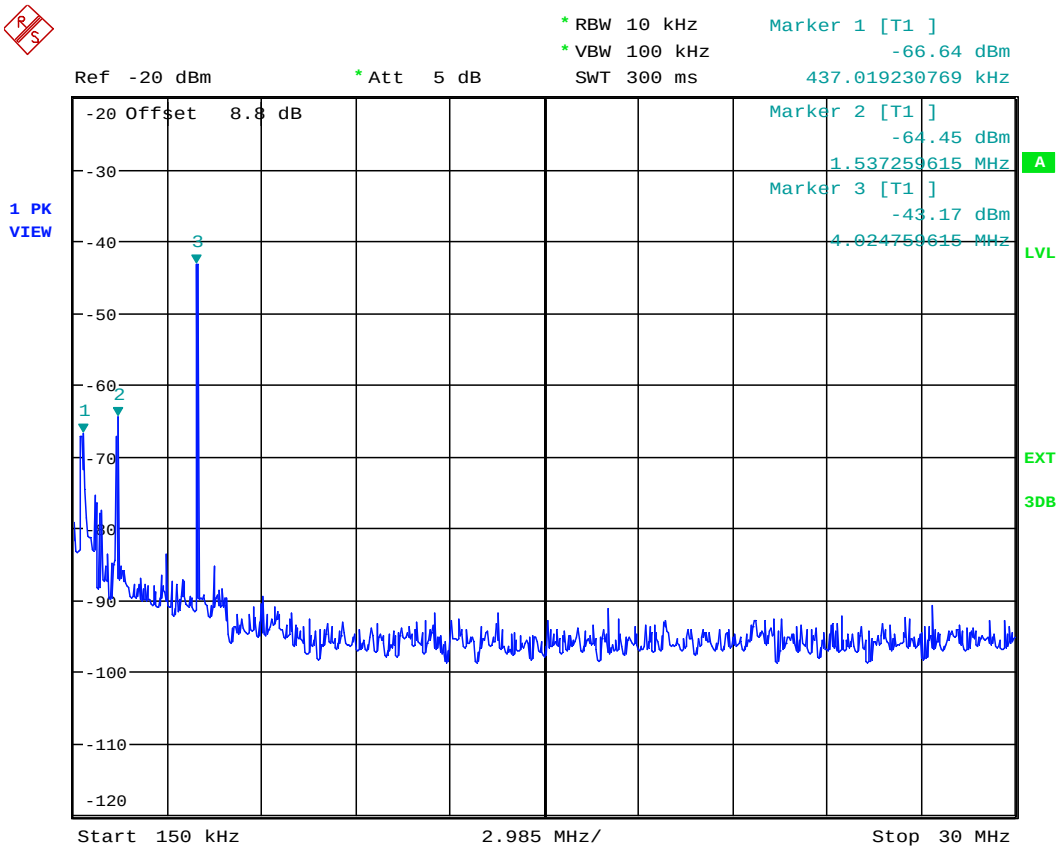
Date: 26.MAY.2026 17:43:54

5.12.3.2. Configuration: 4.065MHz Rx @ TRX port

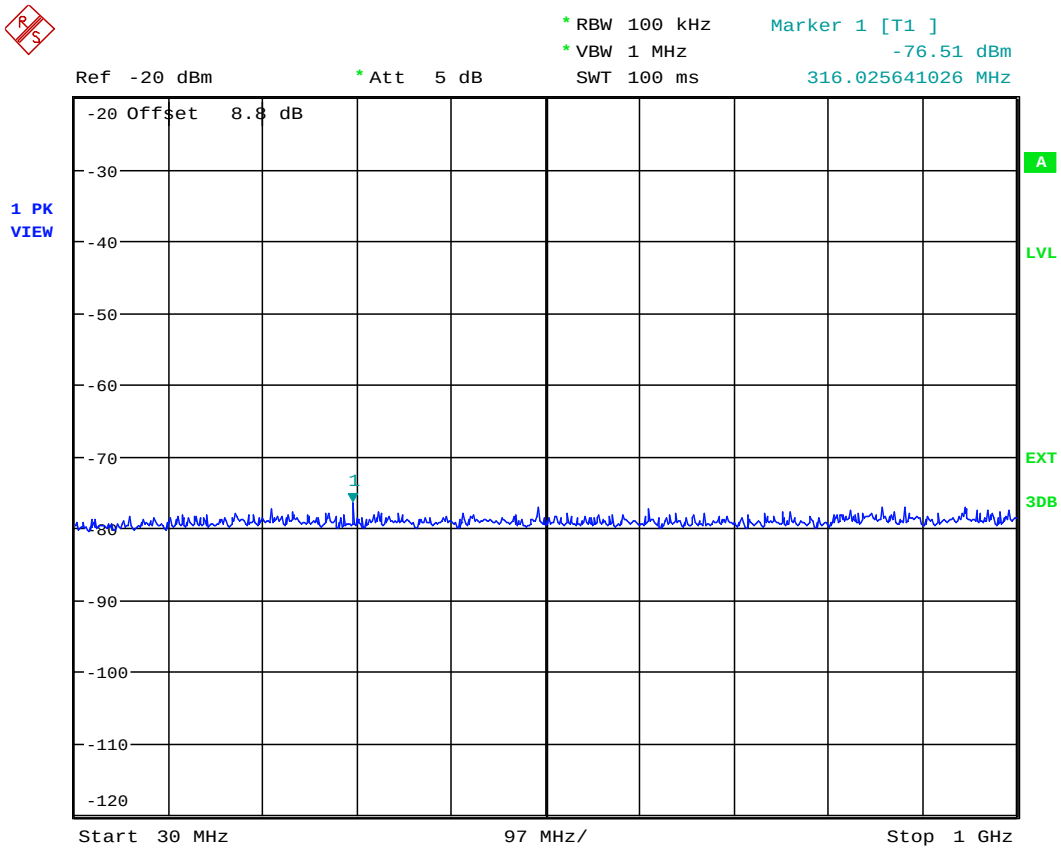


Date: 26.MAY.2026 17:47:26

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

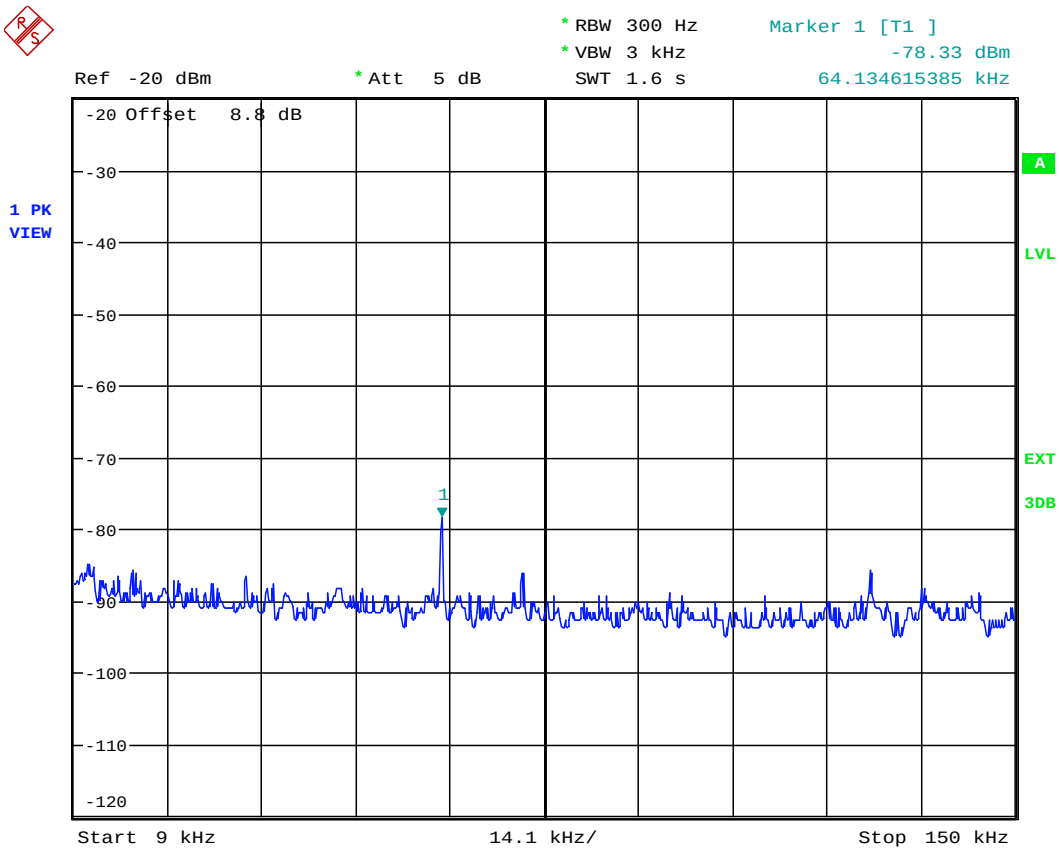


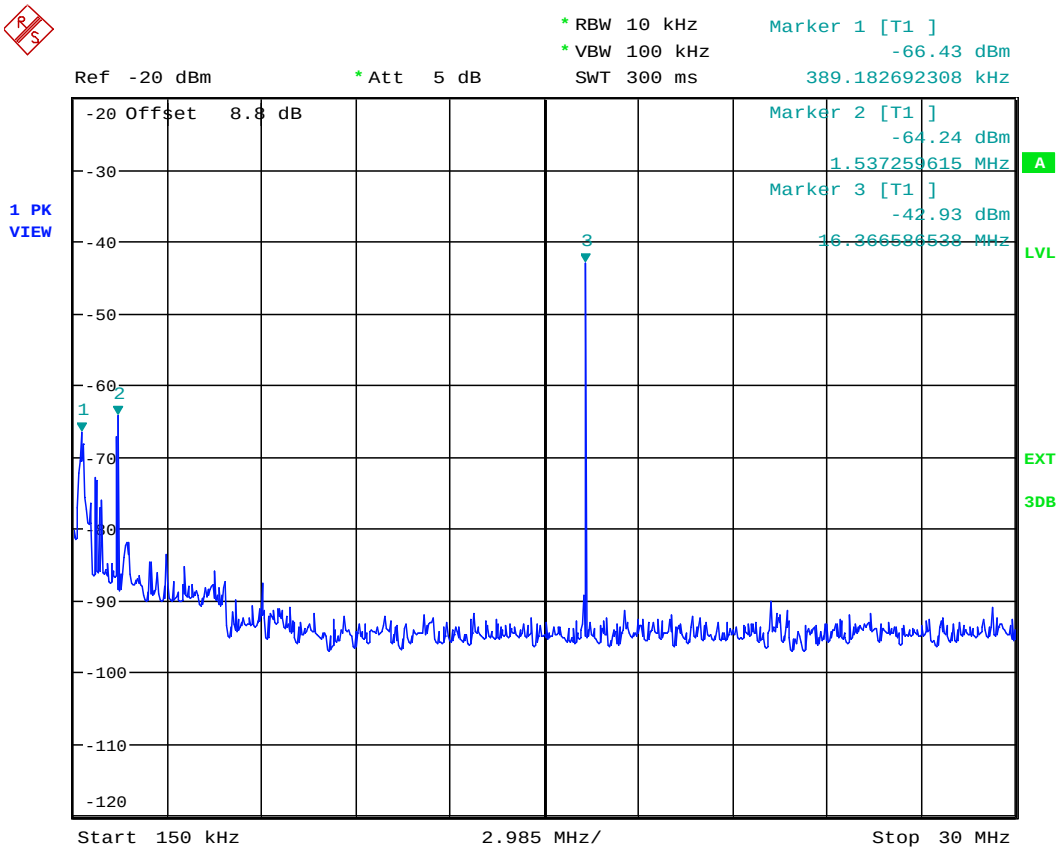
Highest peak is Rx Signal input (1mV rms)



Date: 26.MAY.2026 17:51:04

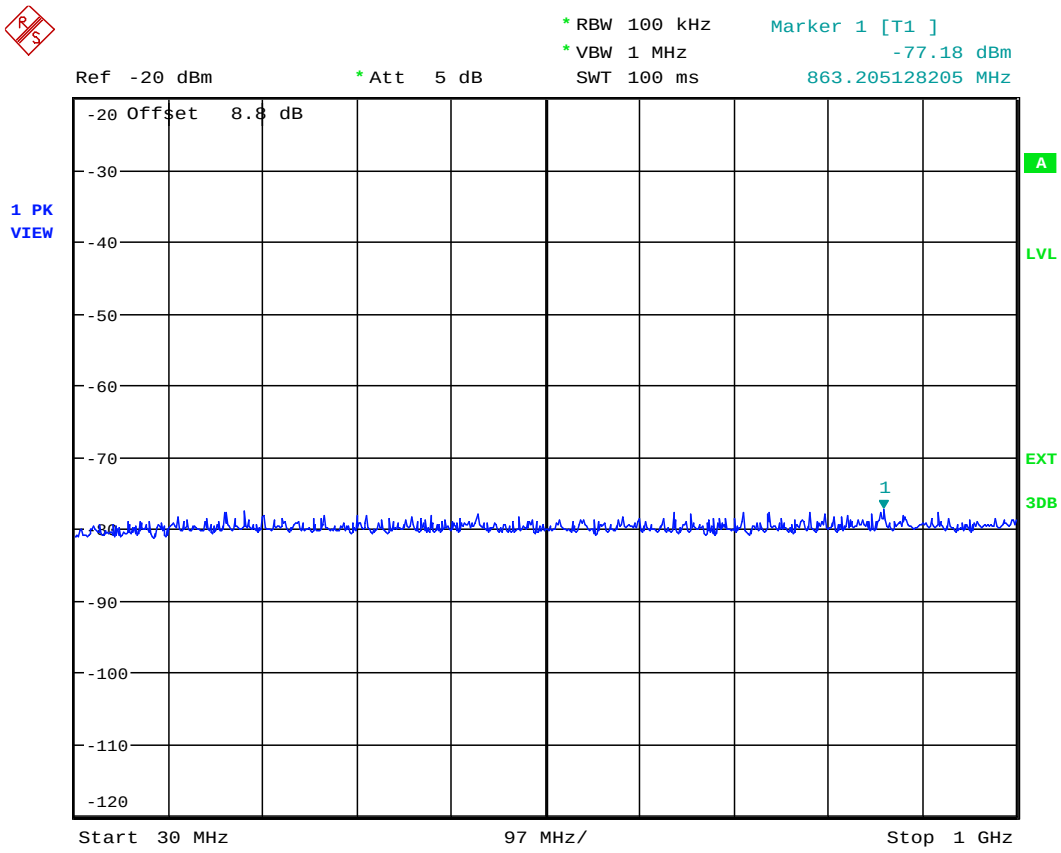
5.12.3.3. Configuration: 16.36MHz Rx @ TRX port





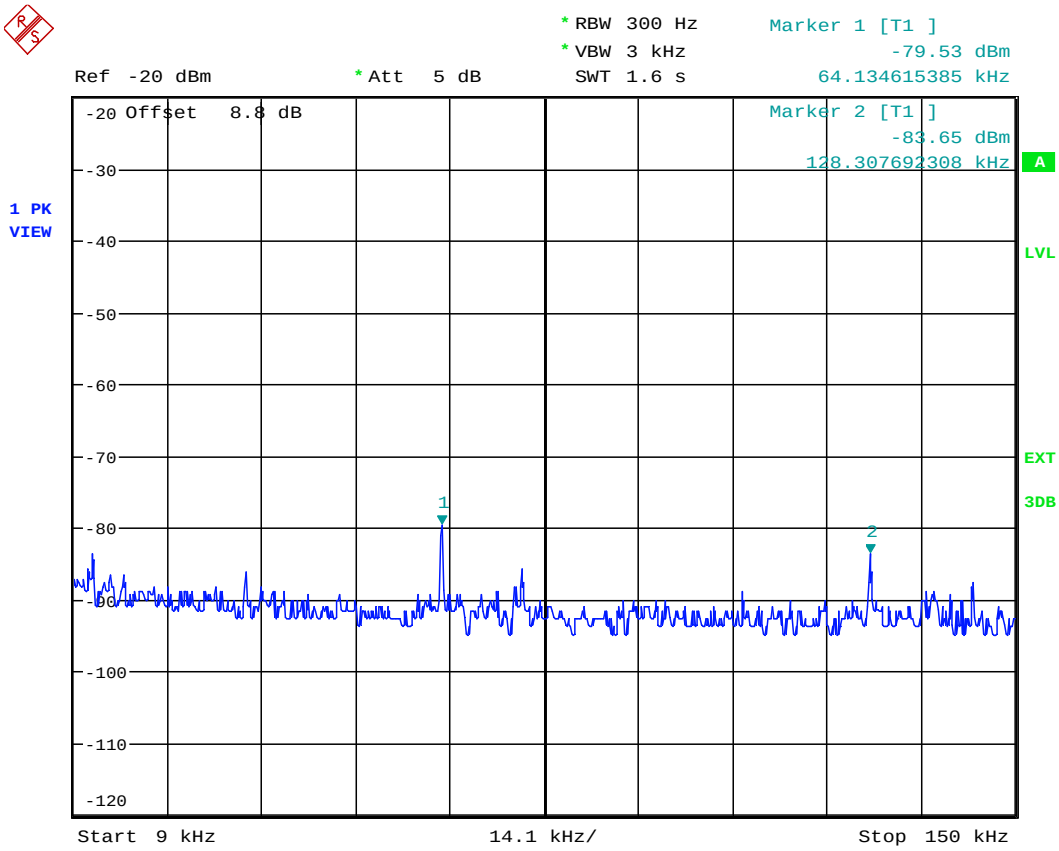
Date: 26.MAY.2026 17:53:49

Highest peak is Rx Signal input (1mV rms)

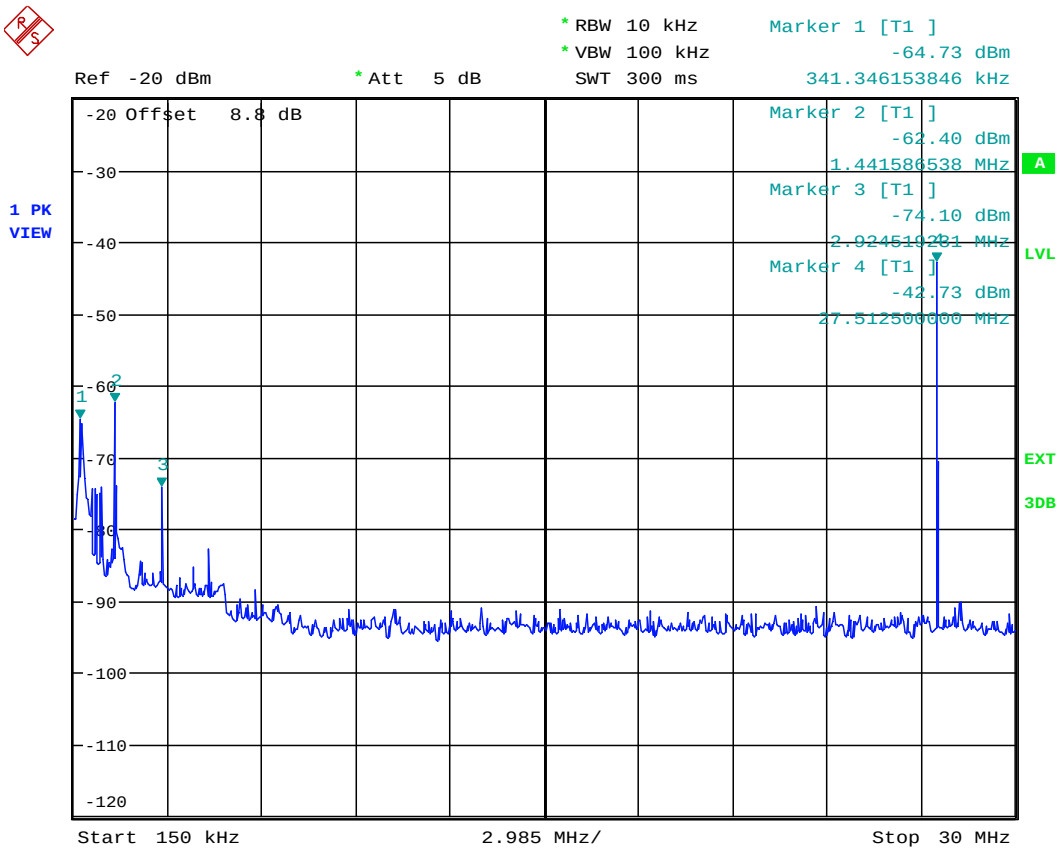


Date: 26.MAY.2026 17:54:33

5.12.3.4. Configuration: 27.50MHz Rx @ TRX port

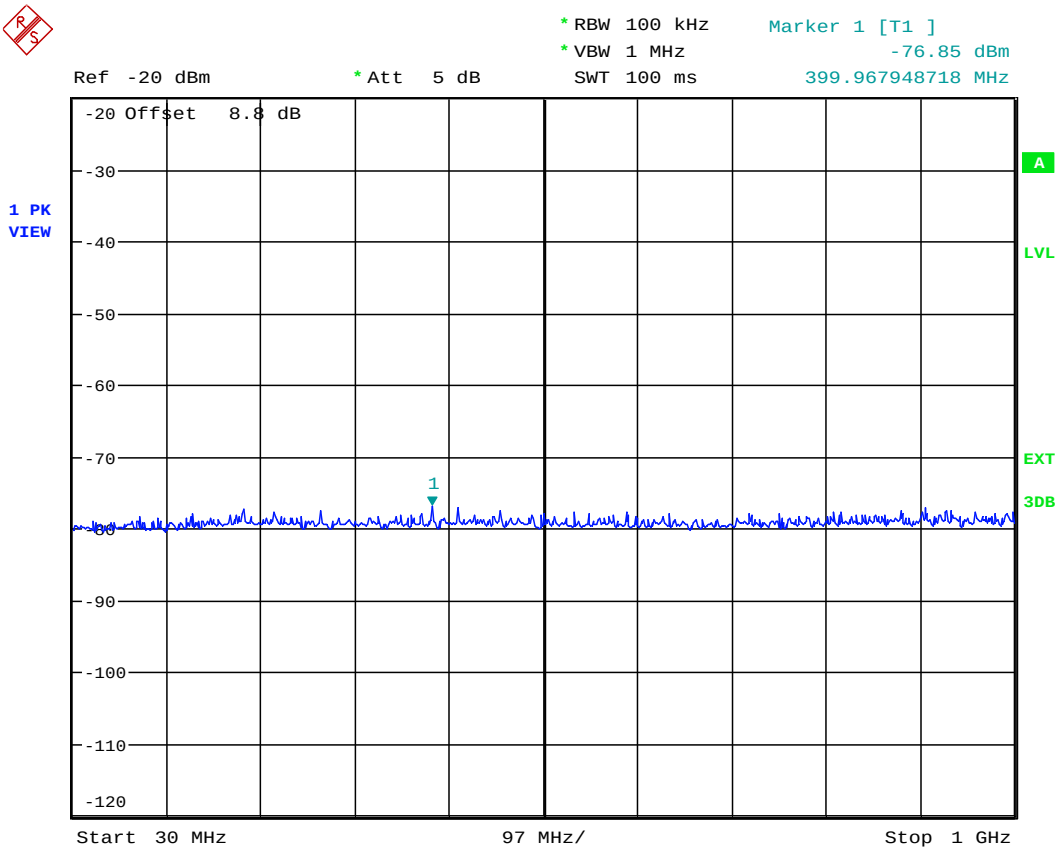


Date: 26.MAY.2026 17:56:59



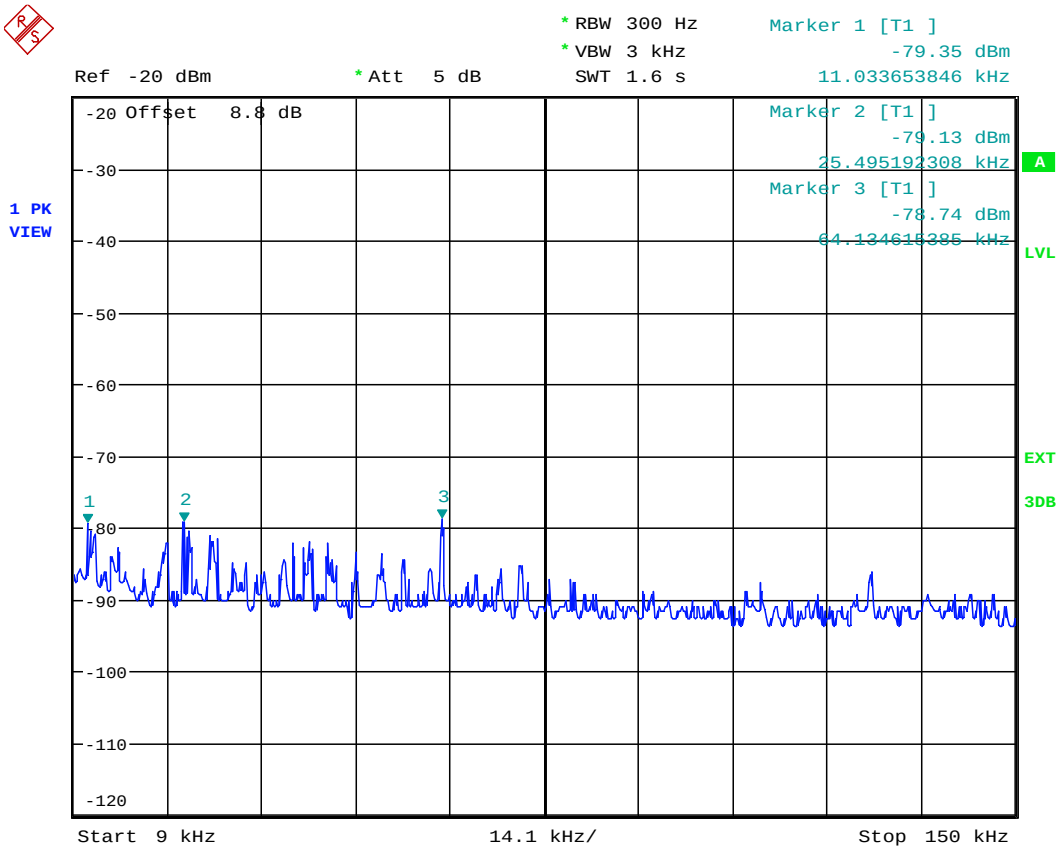
Date: 26.MAY.2026 17:57:48

Highest peak is Rx Signal input (1mV rms)

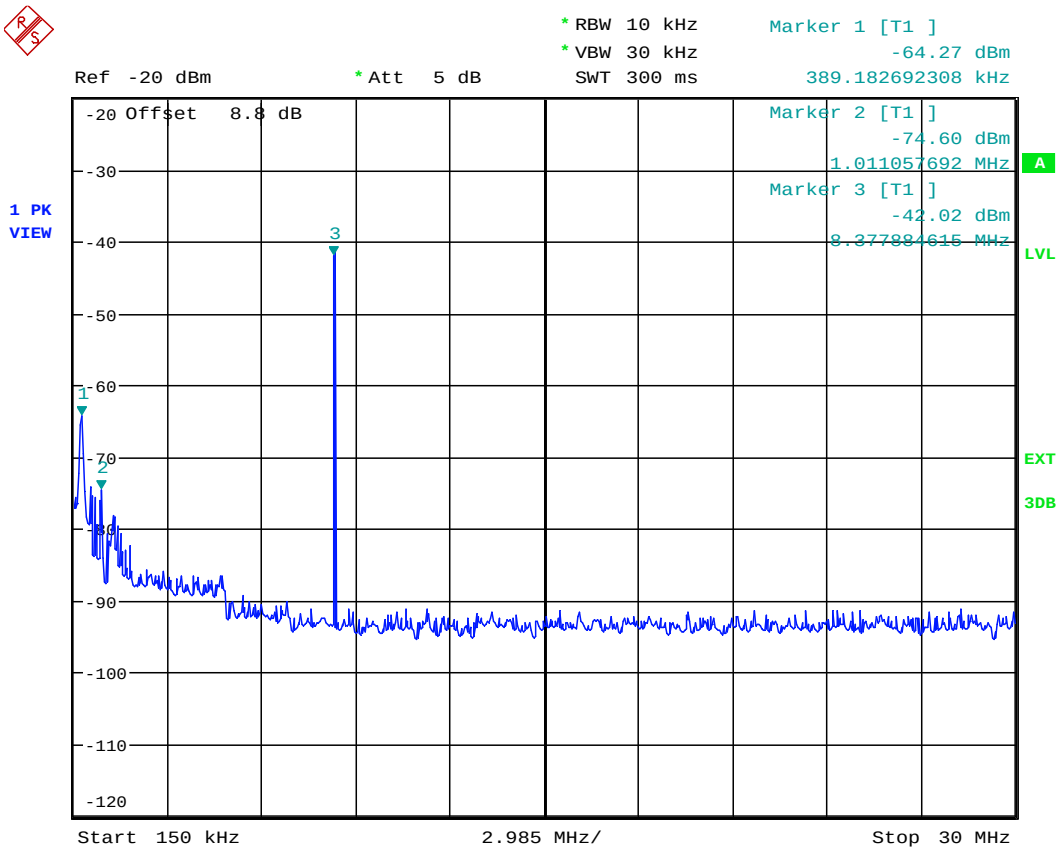


Date: 26.MAY.2026 17:58:56

5.12.3.5. Configuration: 1.605MHz Rx @ DSC port

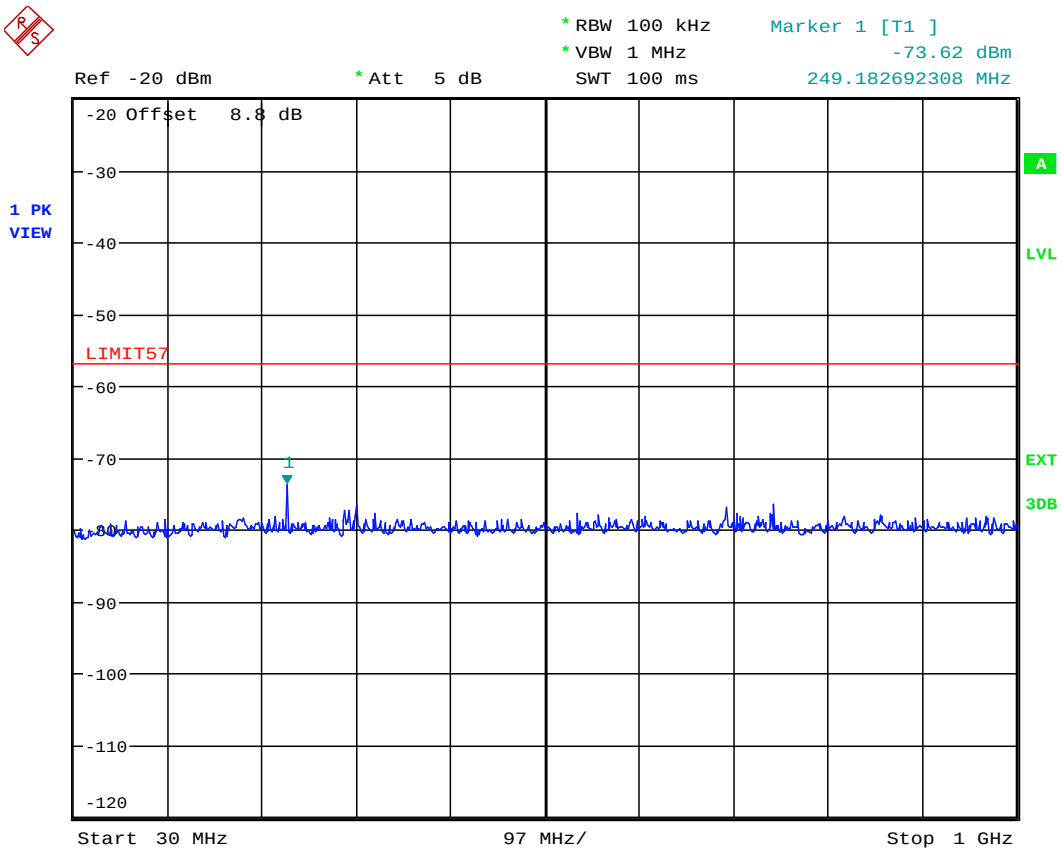


Date: 27.MAY.2026 13:54:59



Date: 27.MAY.2026 13:56:00

Highest peak is Rx Signal input (1mV rms)



Date: 27.MAY.2026 13:57:58

Highest peak is Rx Signal input (1mV rms)

5.13. RF EXPOSURE REQUIREMENTS [§§ 1.1310 & 2.1091]

5.13.1. Limits

§ **1.1310:** The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*($900/f^2$)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Note 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

5.13.2. Method of Measurements

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Where, P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

$$r = \sqrt{\frac{PG}{4\pi \cdot S}} = \sqrt{\frac{EIRP}{4\pi \cdot S}}$$

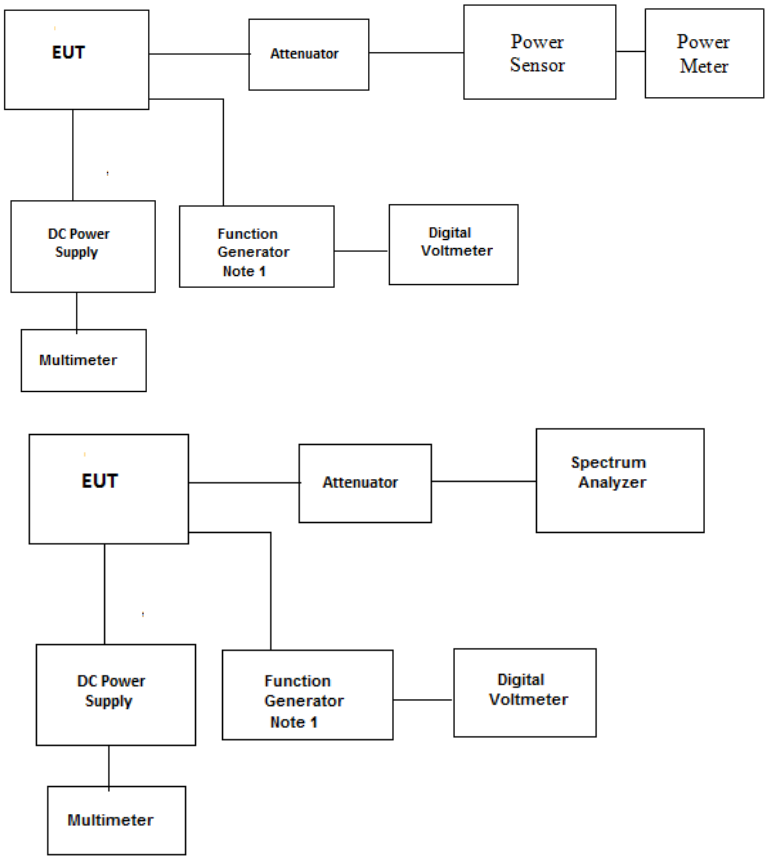
FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device.

5.13.3. Evaluation of RF Exposure Compliance Requirements

Note: The output power rating is not changed and the original certification MPE report can be referred for this.

EXHIBIT 6. TEST SETUP DIAGRAMS AND EQUIPMENT LIST

6.1. Conducted Power

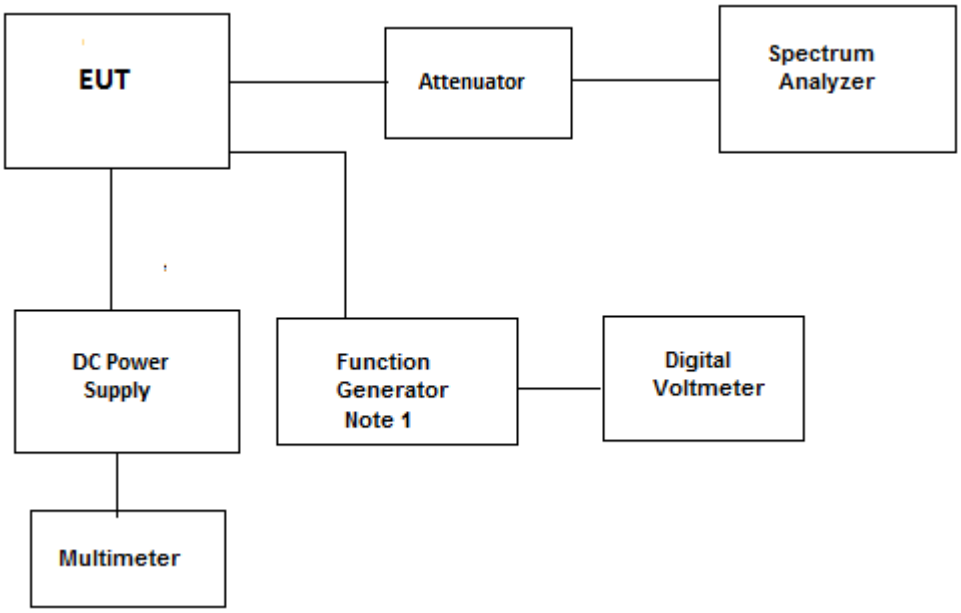


Note 1: Kuman FY6600-60M and HP 8920B or HP 33120A

Test date: May 12-13, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum analyzer	Rohde&schwarz	FSU26	100398	20Hz-26.5GHz	26-Sep-2027
Power Meter	HP	436A	2709A27515	Sensor Dependant	17-Sep-2026
Power Sensor	Agilent	8482A	MY41172054	100kHz to 4.2GHz	10-Dec-2026
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
Function generator	Kuman	FY6600-60M	170966000106	DC-60M	28-Mar-2027
AF Signal Generator	HP	HP-8920B	US39064699	250kHz-1GHz	24-Apr-2028
Function generator	HP	33120A	US34011688	15M	24-Apr-2028
Digital Voltmeter	HP	3456A	2015A04523	--	09-Mar-2028
Combiner	Weinschel	1515	--	DC-18GHz	Cal on use
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

6.2. Modulation Limit



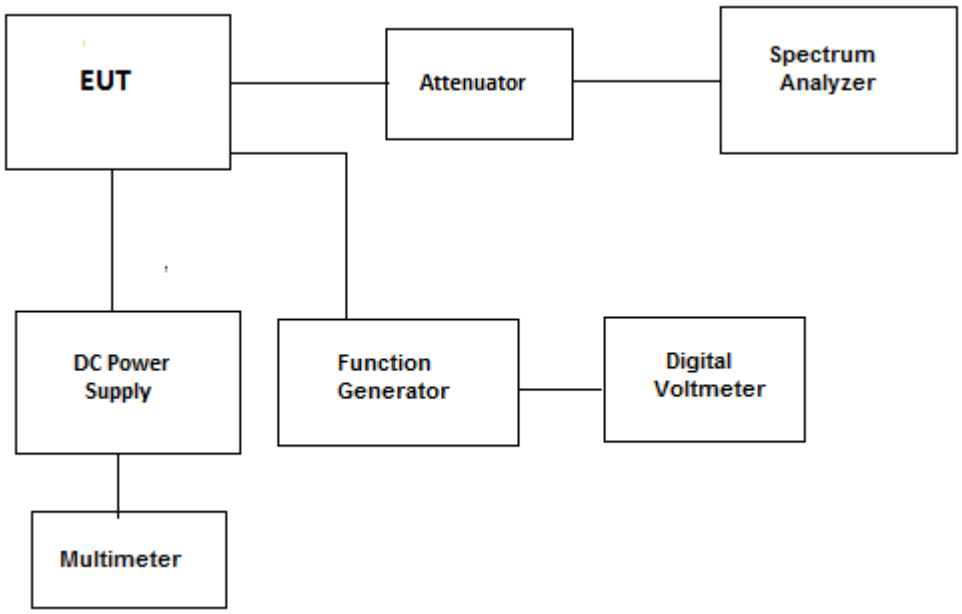
Note 1: Kuman FY6600-60M and HP 8920B or HP 33120A

Test date: May 20, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum analyzer	Rohde&schwarz	FSU26	100398	20Hz-26.5GHz	26-Sep-2027
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
Function generator	Kuman	FY6600-60M	170966000106	DC-60M	28-Mar-2027
AF Signal Generator	HP	HP-8920B	US39064699	250kHz-1GHz	24-Apr-2028
Function generator	HP	33120A	US34011688	15M	24-Apr-2028
Digital Voltmeter	HP	3456A	2015A04523	--	09-Mar-2028
Combiner	Weinschel	1515	--	DC-18GHz	Cal on use
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.3. Audio Frequency Response

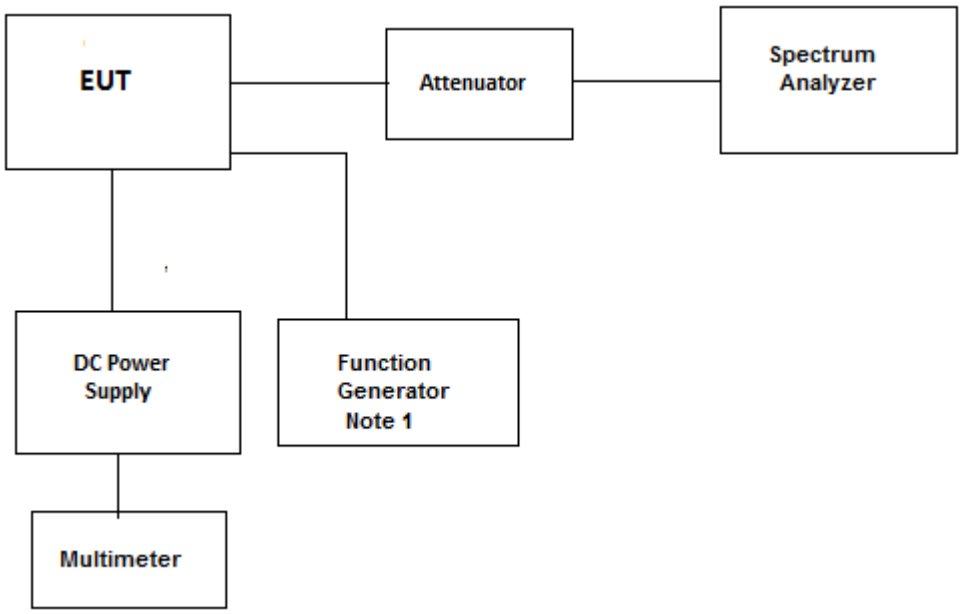


Test date: May 27, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum analyzer	Rohde&schwarz	FSU26	100398	20Hz-26.5GHz	26-Sep-2027
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
AF Signal Generator	HP	HP-8920B	US39064699	250kHz-1GHz	24-Apr-2028
Digital Voltmeter	HP	3456A	2015A04523	--	09-Mar-2028
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.4. 99% OBW and Mask



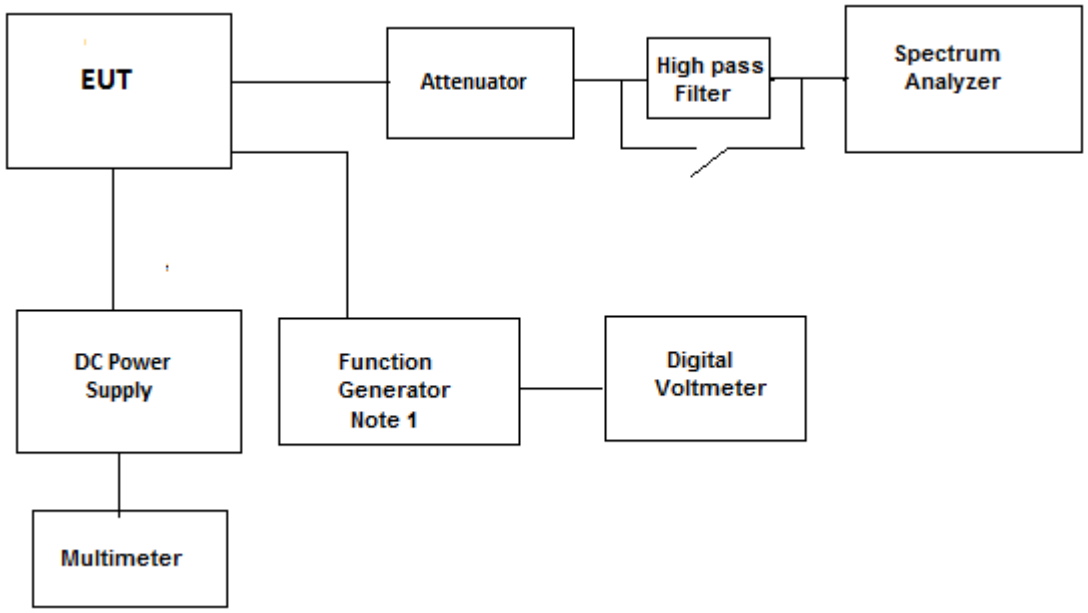
Note 1: Kuman FY6600-60M and HP 8920B or HP 33120A

Test date: May 13- 26, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum analyzer	Rohde&schwarz	FSU26	100398	20Hz-26.5GHz	26-Sep-2027
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
Function generator	Kuman	FY6600-60M	170966000106	DC-60M	28-Mar-2027
AF Signal Generator	HP	HP-8920B	US39064699	250kHz-1GHz	24-Apr-2028
Function generator	HP	33120A	US34011688	15M	24-Apr-2028
Digital Voltmeter	HP	3456A	2015A04523	--	09-Mar-2028
Combiner	Weinschel	1515	--	DC-18GHz	Cal on use
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.5. Tx Conducted Emission

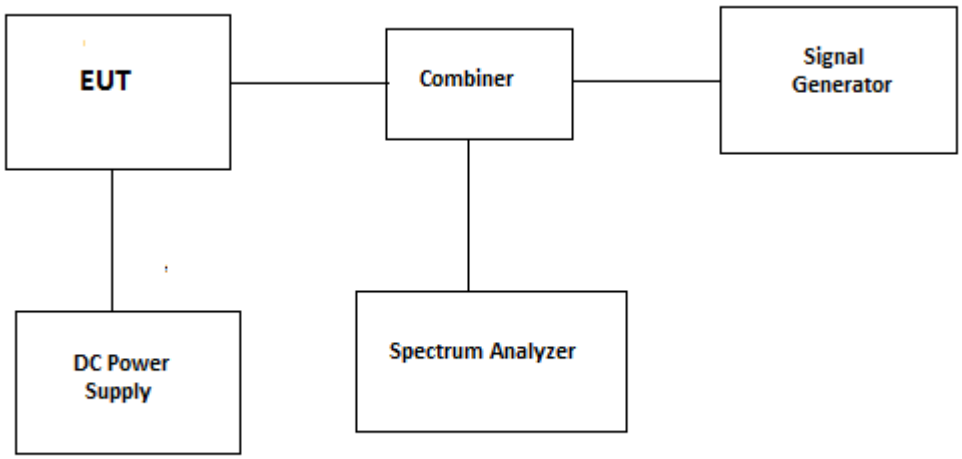


Test date: May 27, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum analyzer	Rohde&schwarz	FSU26	100398	20Hz-26.5GHz	26-Sep-2027
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
Function generator	Kuman	FY6600-60M	170966000106	DC-60M	28-Mar-2027
AF Signal Generator	HP	HP-8920B	US39064699	250kHz-1GHz	24-Apr-2028
Digital Voltmeter	HP	3456A	2015A04523	--	09-Mar-2028
High pass filter	Mini-Circuits	SHP-25+	15542	27.5-800MHz	Cal on use
High pass filter	Mini-Circuits	SHP-50+	15542	41-800MHz	Cal on use
Combiner	Weinschel	1515	--	DC-18GHz	Cal on use
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.6. Rx Conducted Emission

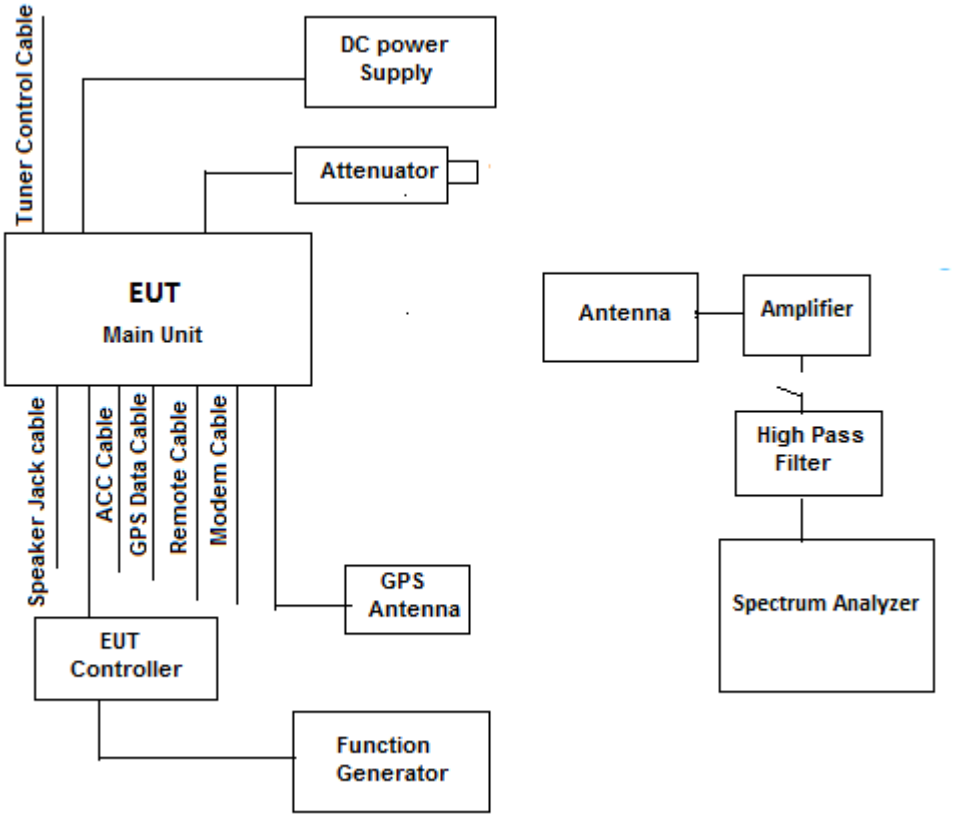


Test date: May 27, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum analyzer	Rohde&schwarz	FSU26	100398	20Hz-26.5GHz	26-Sep-2027
Signal Generator	HP	8648C	3537A02098	100kHz to 3.2GHz	10-Oct-2027
Combiner	Weinschel	1515	--	DC-18GHz	Cal on use
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.7. Tx Radiated

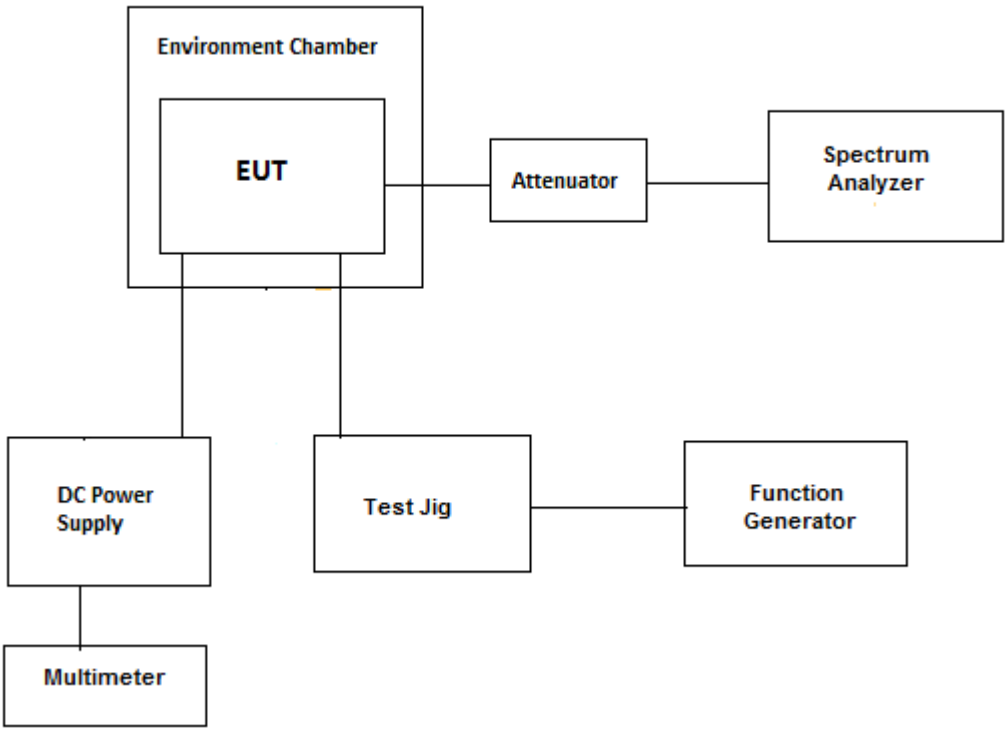


Test date: May 28, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20Hz-40GHz	15-Sep-2026
Biconilog Antenna	EMCO	3142B	1575	26-2000 MHz	11-Dec-2026
Loop Antenna	EMCO	6502	9104-2611	9KHz-30MHz	13-Jun-2026
Horn Antenna	EMCO	3115	9911-5955	1-18 GHz	18-Feb-2027
Pre-Amplifier	Com-Power	PAM-118A	551052	500MHz-18GHz	08-Oct-2026
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
Function generator	Kuman	FY6600-60M	170966000106	DC-60M	28-Mar-2027
AF Signal Generator	HP	HP-8920B	US39064699	250kHz-1GHz	24-Apr-2028
Combiner	Weinschel	1515	--	DC-18GHz	Cal on use
High pass filter	Mini-Circuits	SHP-25+	15542	27.5-800MHz	Cal on use
High pass filter	Mini-Circuits	SHP-50+	15542	41-800MHz	Cal on use
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.8. Frequency Stability



Test date: May 29, 2026

Test Instrument	Manufacturer	Model No	Serial No	Frequency Range	Cal Due date
Environmental Chamber	Envirotronics	SSH32C	11994847-S-11059	-68 to 177° C	25-Aug-2027
Frequency Counter	HP	5352B	3049A04423	10Hz to 40GHz	29-Nov-2026
Attenuator(20dB)	Weinschel	24-20-34	BH0740	DC-8.5 GHz	Cal on use
Attenuator(30dB)	Weinschel	46-30-34	RA725	DC-18 GHz	Cal on use
Function generator	Kuman	FY6600-60M	170966000106	DC-60M	28-Mar-2027
Power supply	Pyramid	PS-36KX	--	12-15Vdc, 35A	--
Multimeter	Fluke	8842A	5021295	---	25-Jul-2027

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

EXHIBIT 7. MEASUREMENT UNCERTAINTY

Test description		Uncertainty
Conducted Output Power		+/- 0.62 dB
Occupied bandwidth		+/-0.2Hz
Emission Mask	Amplitude	+/- 0.63 dB
	Frequency	+/-0.2Hz
Conducted Out of Band/Spurious Emissions		+/- 0.72 dB
Radiated Out of Band/Spurious Emissions	<30 MHz	+/-3.05 dB
	30-1000 MHz	+/-4.82 dB
	1-18 GHz	+/-3.43 dB
	18-26.5GHz	+/-4.04 dB
	26.5-40GHz	+/-5.00 dB
Frequency Stability		+/-1.2 Hz
Transient Frequency Behavior		+/- 0.05%
Power Line Conducted Emission		± 2.62dB

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

EXHIBIT 8. MEASUREMENT METHODS

8.1. CONDUCTED POWER MEASUREMENTS

- The following shall be applied to the combination(s) of the radio device and its intended antenna(e).
- I f the RF level is user adjustable, all measurements shall be made with the highest power level available to the user for that combination.
- The following method of measurement shall apply to both conducted and radiated measurements.
- The radiated measurements are performed at the Ultratech Calibrated Open Field Test Site.
- The measurement shall be performed using normal operation of the equipment with modulation.

Test procedure shall be as follows:

Step 1: Duty Cycle measurements if the transmitter's transmission is transient

- Using a EMI Receiver with the frequency span set to 0 Hz and the sweep time set at a suitable value to capture the envelope peaks and the duty cycle of the transmitter output signal;
- The duty cycle of the transmitter, x = Tx on / (Tx on + Tx off) with 0<x<1, is measure and recorded in the test report. For the purpose of testing, the equipment shall be operated with a duty cycle that is equal or more than 0.1.

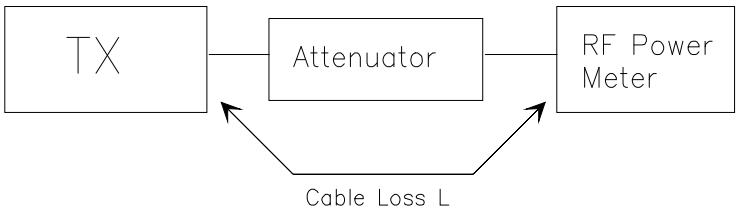
Step 2: Calculation of Average EIRP. See Figure 1

- The average output power of the transmitter shall be determined using a wideband, calibrated RF average power meter with the power sensor with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
- The e.i.r.p. shall be calculated from the above measured power output "A", the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:

EIRP = A + G + 10log(1/x)

{X = 1 for continuous transmission => 10log(1/x) = 0 dB}

Figure 1.



All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

8.2. RADIATED POWER MEASUREMENTS

8.2.1. MAXIMIZING RF EMISSION LEVEL (E-FIELD)

(a) The measurements were performed with full rf output power and modulation.
(b) Test was performed at listed 3m open area test site (listed with FCC, IC, ITI, NVLAP, ACA & VCCI).
(c) The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)
(d) The LOOP Antenna (<30 MHz), BICONILOG antenna (20 MHz to 1 GHz) or HORN antenna (1 GHz to 18 GHz) was used for measuring.
(e) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level

Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBμV/m) = Reading (dBμV) + Total Correction Factor (dB/m)

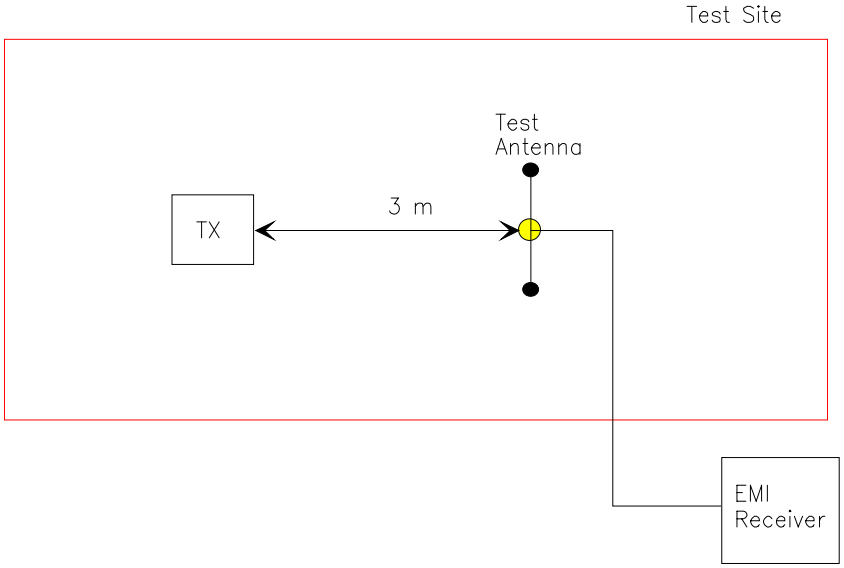
(f) Set the EMI Receiver and #2 as follows:

Center Frequency:	test frequency
Resolution BW:	100 KHz
Video BW:	same
Detector Mode:	positive
Average:	off
Span:	3 x the signal bandwidth

(g) The test antenna was lowered or raised from 1 to 4 meters until the maximum signal level was detected.
(h) The transmitter was rotated through 360^{o} about a vertical axis until a higher maximum signal was received.
(i) The test antenna was lowered or raised again from 1 to 4 meters until a maximum was obtained. This level was recorded.
(j) The recorded reading was corrected to the true field strength level by adding the antenna factor, cable loss and subtracting the pre-amplifier gain.
(k) The above steps were repeated with both transmitters' antenna and test receiving antenna placed in vertical and horizontal polarization. Both readings with the antennas placed in vertical and horizontal polarization shall be recorded.
(l) Repeat for all different test signal frequencies.

Calculation of ERP: KDB 412172 D01, KDB 971168 D01
EIRP (dBm) = E (dBμV/m) +20logD-104.8; D is measurement distance in m.
ERP=EIRP-2.15

Figure 2



8.3. FREQUENCY STABILITY

Refer to FCC @ 2.1055.

(a) The frequency stability shall be measured with variation of ambient temperature as follows: From -30 to +50 centigrade except that specified in subparagraph (2) & (3) of this paragraph.

(b) Frequency measurements shall be made at extremes of the specified temperature range and at intervals of not more than 10 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stability circuitry need be subjected to the temperature variation test.

(d) The frequency stability supply shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment).

8.4. SPURIOUS EMISSIONS (CONDUCTED)

With transmitter modulation characteristics described in Out-of-Band Emissions measurements @ 2.1049, the transmitter spurious and harmonic emissions were scanned. The spurious and harmonic emissions were measured with the EMI Receiver. The transmitter was operated at a full rated power output, and modulated as follows:

FCC 47 CFR 2.1057 - Frequency spectrum to be investigated: The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10^{th} harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC 47 CFR 2.1051 - Spurious Emissions at Antenna Terminal: The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of the harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in 2.1049 as appropriate. The magnitude of spurious emissions, which are attenuated more than 20 dB below the permissible value, need not be specified.

END OF REPORT