849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA

PHONE: 888.472.2424 OR 352.472.5500
EMAIL: INFO@TIMCOENGR.COM
WEB: HTTP://WWW.TIMCOENGR.COM

TIMCO ENGINEERING, Inc.

An IIA Company

FCC CFR 47 Part 90, 22, & 24 LMR Repeater Test Report

APPLICANT	RADIO ACTIVITY S.R.L
ADDRESS	VIA PRIVATA CASCIA, 11 MILANO 20128 ITALY
FCC ID	Y9M-KA900
MODEL NUMBER	KA-900
PRODUCT DESCRIPTION	800/900 Band LMR/PS Repeater
DATE SAMPLE RECEIVED	03/15/2019
FINAL TEST DATE	10/01/2019
TESTED BY	Franklin Rose
APPROVED BY	Tim Royer
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Report Version	Description	Issue Date
573AUT19 PT90_TestReport_	Rev1	Initial Report	04/18/2019
573AUT19 PT90_TestReport_	Rev2	Updated Results	10/01/2019
573AUT19 PT90_TestReport_	Rev3	Added Operational Range	10/08/2020

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GENERAL REMARKS

Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.

☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
Designation #: US1070

Tested by:

Name and Title	Franklin Rose, Project Manager / EMC Specialist
Date	04/18/2019

Reviewed and Approved by:

Name and Title	Tim Royer, Project Manager / EMC Testing Engineer
Date	04/18/2019

GENERAL INFORMATION

EUT Description	800/900 Band LMR/PS Repeater
FCC ID	Y9M-KA900
Model Number	KA-900
Type of Emission	11K0F3E (Narrowband Analog FM Voice), 8K10F1E (P25 Phase I C4FM Voice), 8K10F1D (P25 Phase I C4FM Data), 7K60FXE (DMR Voice), 7K60FXD (DMR Data)
Operational Range	806 – 849 MHz (Part 90), 851 – 894 MHz (Part 90), 897 – 901 MHz (Part 90), 901 – 902 MHz (Part 24), 902 – 930 MHz (Part 90), 930 – 931 MHz (Part 24), 931 – 935 MHz (Part 22), 935 – 940 MHz (Part 90), 940 – 941 MHz (Part 24)
Modulation	FM
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power (13.8 V)
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Antenna Connector	SMA
Test Conditions	The temperature was 26ºC Relative humidity of 50%.
Modification to the EUT	No Modification to EUT.
Test Exercise	The EUT was operated according to the manufacturer's instructions and placed into transmit mode(s) as applicable. A laptop was used to operate the EUT, with the aid of a network switch hub and cabling per the normal EUT setup.
Applicable Standards	ANSI C63.26, FCC CFR 47 Part 2, Part 90, Part 22, Part 24 Referencing ANSI/TIA 603-E:2016
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070

RESULTS SUMMARY

FCC Rule Part No.	Test Item	Results
2.1046(a); 90.205(k), (m), 90.635(a), 90.494(f); 24.132	RF Power Output	**PASS**
2.1033(c)(4), 22.357	Modulation Characteristics	**PASS**
2.1047(a)	Audio Frequency Response & Low Pass Filter	**PASS**
2.1047(b)	Modulation Limiting	**PASS**
2.1049 (c), 90.209, 24.131	Occupied Bandwidth	**PASS**
90.210(b) - (d), (g) - (j), 24.133(a)(1)	Emission Masks	**PASS**
2.1051, 90.210(b) - (d), (g) - (j), 24.133(a)(1), 22.359(a)	Spurious Emissions at Antenna Terminals	**PASS**
2.1053(a), 90.210(b) - (d), (g) - (j), 24.133(a)(1), 22.359(a)	Field Strength of Spurious Emissions	**PASS**
2.1055(a)(2), 90.213, 24.135	Frequency Stability	**PASS**

RF POWER OUTPUT

Rule Parts: FCC Part 2.1046(a); 90.205(k), (m), 90.635(a), 90.494(f); 24.132

(k) *806-824 MHz, 851-869 MHz, 896-901 MHz and 935-940 MHz.* Power and height limitations are specified in §90.635

(m) *929-930 MHz.* Limitations on power and antenna heights are specified in §90.494.

§90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

§90.494 Paging operations on shared channels in the 929-930 MHz band.

(f) The effective radiated power for base stations providing paging service on the shared channels must not exceed 3500 watts.

§24.132 Power and antenna height limits.

(a) Stations transmitting in the 901-902 MHz band are limited to 7 watts e.r.p.

(c) Base stations transmitting in the 930-931 MHz and 940-941 MHz bands are limited to 3500 watts e.r.p. per authorized channel and are unlimited in antenna height except as provided in paragraph (d) of this section.

(f) All power levels specified in this section are expressed in terms of the maximum power, averaged over a 100 millisecond interval, when measured with instrumentation calibrated in terms of an rms-equivalent voltage with a resolution bandwidth equal to or greater than the authorized bandwidth.

§22.535 Effective radiated power limits.

The effective radiated power (ERP) of transmitters operating on the channels listed in §22.531 must not exceed the limits in this section.

(a) *Maximum ERP.* The ERP must not exceed the applicable limits in this paragraph under any circumstances.

Frequency range (MHz)	Maximum ERP (Watts)
931-932	3500

§22.627 Effective radiated power limits.

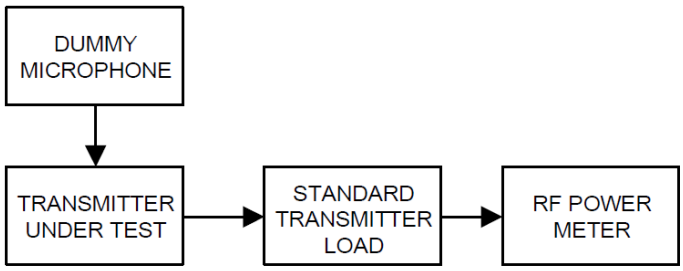
The effective radiated power (ERP) of transmitters operating on the channels listed in §22.621 must not exceed the limits in this section.

(a) *Maximum ERP.* The ERP must not exceed the applicable limits in this paragraph under any circumstances.

Frequency range (MHz)	Maximum ERP (watts)
928-929	50
932-933	30

RF POWER OUTPUT

Method of Measurement: TIA-603-E, 2.2.1



Power Measurement Table, High Power

	Frequency (MHz)	dBm	Watts	Gain/Loss (dB)	Limit ERP (W)	Margin ERP (W)
Part 90	806.0625	42.56	18.03	0.00	1000.00	981.97
	824.0000	42.54	17.95	0.00	1000.00	982.05
	848.9875	42.56	18.03	0.00		
	851.0625	42.56	18.03	0.00	1000.00	981.97
	869.0000	42.27	16.87	0.00	1000.00	983.13
	893.9875	41.93	15.60	0.00		
Part 90 Paging	898.0000	42.18	16.52	0.00	1000.00	983.48
Part 24	901.5000	42.13	16.33	-9.33	7.00	0.00
Part 90 Paging	929.5000	41.55	14.29	0.00	3500.00	3485.71
Part 24	930.5000	41.80	15.14	0.00	3500.00	3484.86
Part 22	933.0000	41.74	14.93	0.00	30.00	15.07
Part 90	938.0000	41.72	14.86	0.00		
Part 24	940.5000	41.63	14.55	0.00	3500.00	3485.45

Power Measurement Table, Low Power

	Frequency (MHz)	dBm	Watts	Gain/Loss (dB)	Limit ERP (W)	Margin ERP (W)
Part 90	806.0625	26.60	0.46	0.00	1000.00	999.54
	824.0000	26.66	0.46	0.00	1000.00	999.54
	848.9875	26.24	0.42	0.00		
	851.0625	26.40	0.44	0.00	1000.00	999.56
	869.0000	26.07	0.40	0.00	1000.00	999.60
	893.9875	25.84	0.38	0.00		
Part 90 Paging	898.0000	25.72	0.37	0.00	1000.00	999.63
Part 24	901.5000	25.84	0.38	0.00	7.00	6.62
Part 90 Paging	929.5000	25.23	0.33	0.00	3500.00	3499.67
Part 24	930.5000	25.29	0.34	0.00	3500.00	3499.66
Part 22	933.0000	25.29	0.34	0.00	30.00	29.66
Part 90	938.0000	25.34	0.34	0.00		
Part 24	940.5000	25.43	0.35	0.00	3500.00	3499.65

Part 2.1033 (c)(8) DC Input into Final Amplifier

INPUT POWER: (13.8 V) (3.0 A) = **41.4 Watts**

MODULATION CHARACTERISTICS

FCC Rule Parts: Part 2.1033(c)(4), 22.357

§22.357 Emission types.

Any authorized station in the Public Mobile Services may transmit emissions of any type(s) that comply with the applicable emission rule, *i.e.* §22.359, §22.861 or §22.917.

Note: FCC Parts 90 and 24 give no specific emission designation guidance for this frequency range.

Analog Signals

Emission Designator	Description	Modulation Type	M (modulation Freq., kHz)	R (rate, baud)	D (deviation, kHz)	K (numeric constant)	S (symbols)	Bandwidth Calculation	Necessary Bandwidth
11K0F3E	Narrowband Analog FM Voice	FM	3.0	-	2.5	1.0	-	Bn = 2M + 2DK	11.00

Digital Signals

Emission Designator	Description	Modulation Type	M (modulation Freq., kHz)	R (rate, baud)	D (deviation, kHz)	K (numeric constant)	S (symbols)	Bandwidth Calculation	Bn (necessary bandwidth, kHz)
7K60FXE	DMR Voice	4FSK	-	9600	1.8	0.778	4	$Bn = (R/\log_2 S) + 2DK$	7.60
7K60FXD	DMR Data	4FSK	-	9600	1.8	0.778	4		7.60
8K10F1E	P25 Phase I C4FM Voice	4FSK	-	9600	1.8	0.916	4	$Bn = (R/\log_2 S) + 2DK$	8.10
8K10F1D	P25 Phase I C4FM Data	4FSK	-	9600	1.8	0.916	4		8.10
8K10F1W	P25 Phase II H-CPM Voice/Data	4FSK	-	9600	1.8	0.916	4		8.10

AUDIO FREQUENCY RESPONSE & LOW PASS FILTER

Rule Part No.: 2.1047(a)

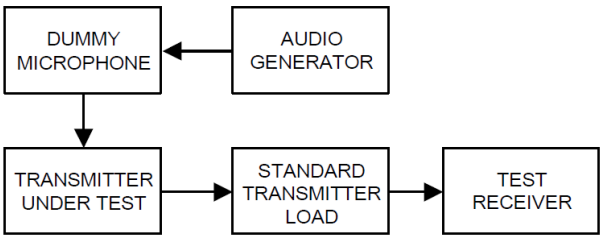
Requirements:

(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.

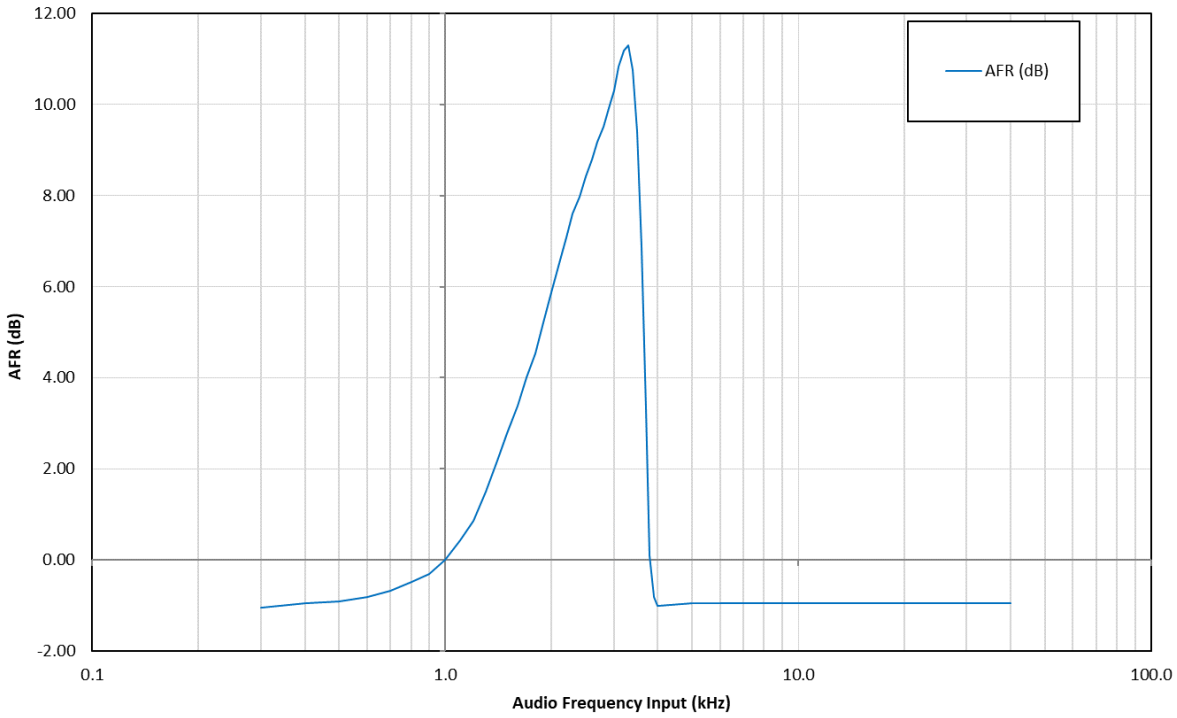
Test Procedure: TIA 603-E, 2.2.6.2.2, 2.2.15 (Using the Test Setup from section 2.2.6).

Note: The Low Pass Filter is digital, and has no "input" or "output" as found in the method of measurement, above. Testing has been altered accordingly to show the operation of the filter.

Note: Testing deviates from TIA 603-E 2.2.6.2.2 and 2.2.15. The Audio Frequency Response and Low Pass Filter Response plot data has been taken simultaneously using the Modulation Meter reading of Deviation (kHz), satisfying the requirements above.



12.5 kHz FM Audio Frequency Response & Low Pass Filter



MODULATION LIMITING

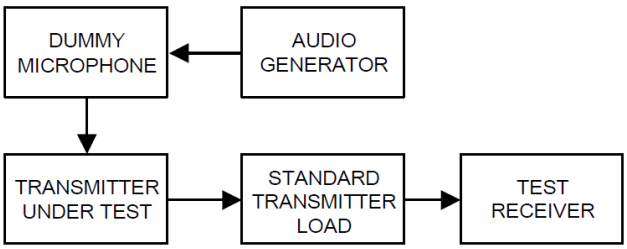
Rule Part No.: 2.1047(b)

Requirements:

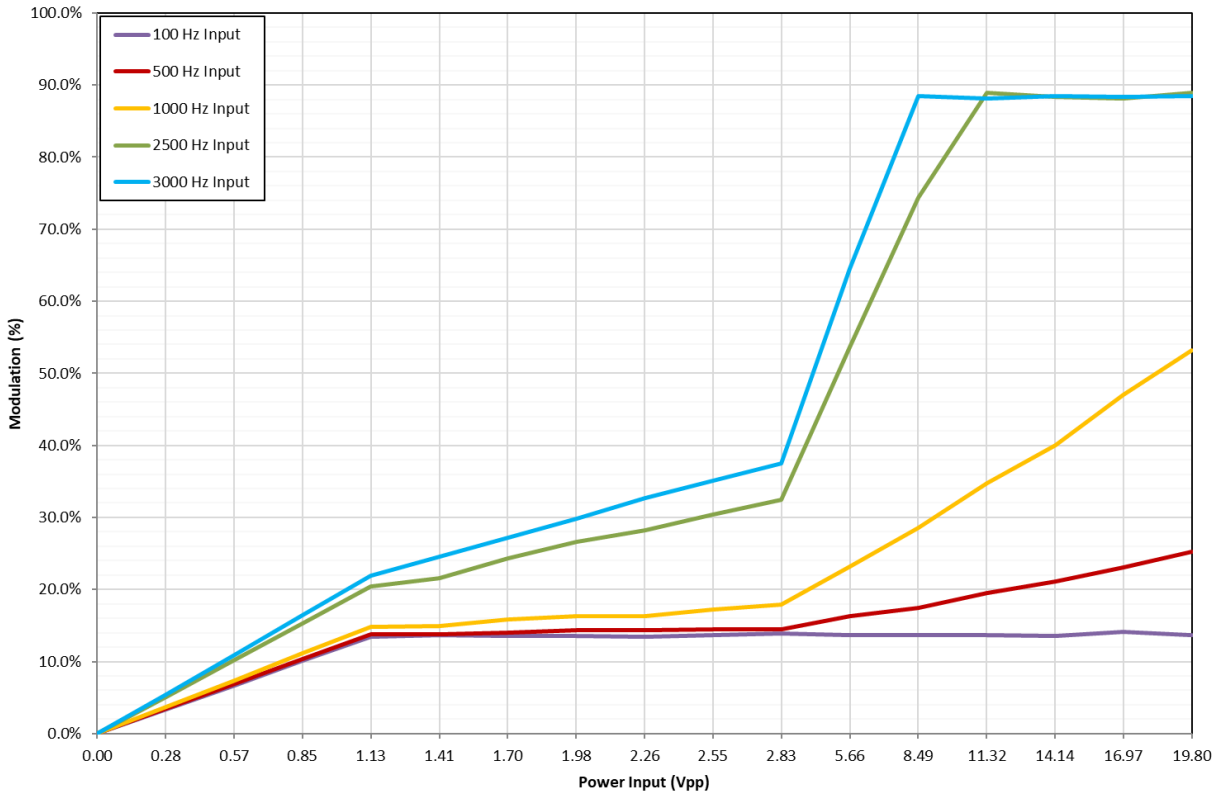
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies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

Test Procedure: TIA 603-E, 2.2.3

Note: The test method is not sufficient to meet the standard of FCC Pt. 2.1047 alone. Deviation (kHz), as recorded from test equipment, has been converted into percentage as required above.



12.5 kHz FM Modulation Limiting



OCCUPIED BANDWIDTH

FCC Rule Parts: 2.1049 (c), 90.209, 24.131

§2.1049 Measurements required: Occupied bandwidth.

(c) Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows. For single sideband and independent sideband transmitters, the input level of the modulating signal shall be 10 dB greater than that necessary to produce rated peak envelope power.

(1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

§90.209 Bandwidth limitations.

STANDARD CHANNEL SPACING/BANDWIDTH

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
806-809/851-854	12.5	20
809-817/854-862	12.5	[6]20/11.25
817-824/862-869	25	[6]20
896-901/935-940	12.5	13.6
902-928[4]		
929-930	25	20

[4]The maximum authorized bandwidth shall be 12 MHz for non-multilateration LMS operations in the band 909.75-921.75 MHz and 2 MHz in the band 902.00-904.00 MHz. The maximum authorized bandwidth for multilateration LMS operations shall be 5.75 MHz in the 904.00-909.75 MHz band; 2 MHz in the 919.75-921.75 MHz band; 5.75 MHz in the 921.75-927.25 MHz band and its associated 927.25-927.50 MHz narrowband forward link; and 8.00 MHz if the 919.75-921.75 MHz and 921.75-927.25 MHz bands and their associated 927.25-927.50 MHz and 927.50-927.75 MHz narrowband forward links are aggregated.

[6]Operations using equipment designed to operate with a 25 kilohertz channel bandwidth may be authorized up to a 20 kilohertz bandwidth unless the equipment meets the Adjacent Channel Power limits of §90.221 in which case operations may be authorized up to a 22 kilohertz bandwidth. Operations using equipment designed to operate with a 12.5 kilohertz channel bandwidth may be authorized up to an 11.25 kilohertz bandwidth.

§24.131 Authorized bandwidth.

The authorized bandwidth of narrowband PCS channels will be 10 kHz for 12.5 kHz channels and 45 kHz for 50 kHz channels. For aggregated adjacent channels, a maximum authorized bandwidth of 5 kHz less than the total aggregated channel width is permitted.

For 11K0F3E:

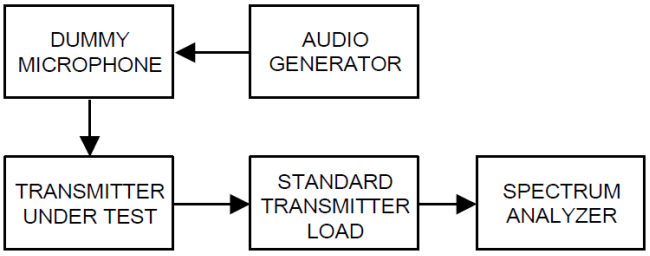
2 Aggregated channels = 20 kHz Channel Bandwidth – 5 kHz = 15 kHz Authorized Bandwidth

Note: FCC Part 22 does not specify an authorized bandwidth for this frequency band.

OCCUPIED BANDWIDTH

Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)

Note: The receiver's automatic 99% Occupied Bandwidth function was used. The function is identical in operation to ANSI C63.26, 5.4.4, Step e).



Note: Plots were taken at High power. Low power was investigated, and was identical in its Occupied Bandwidth.

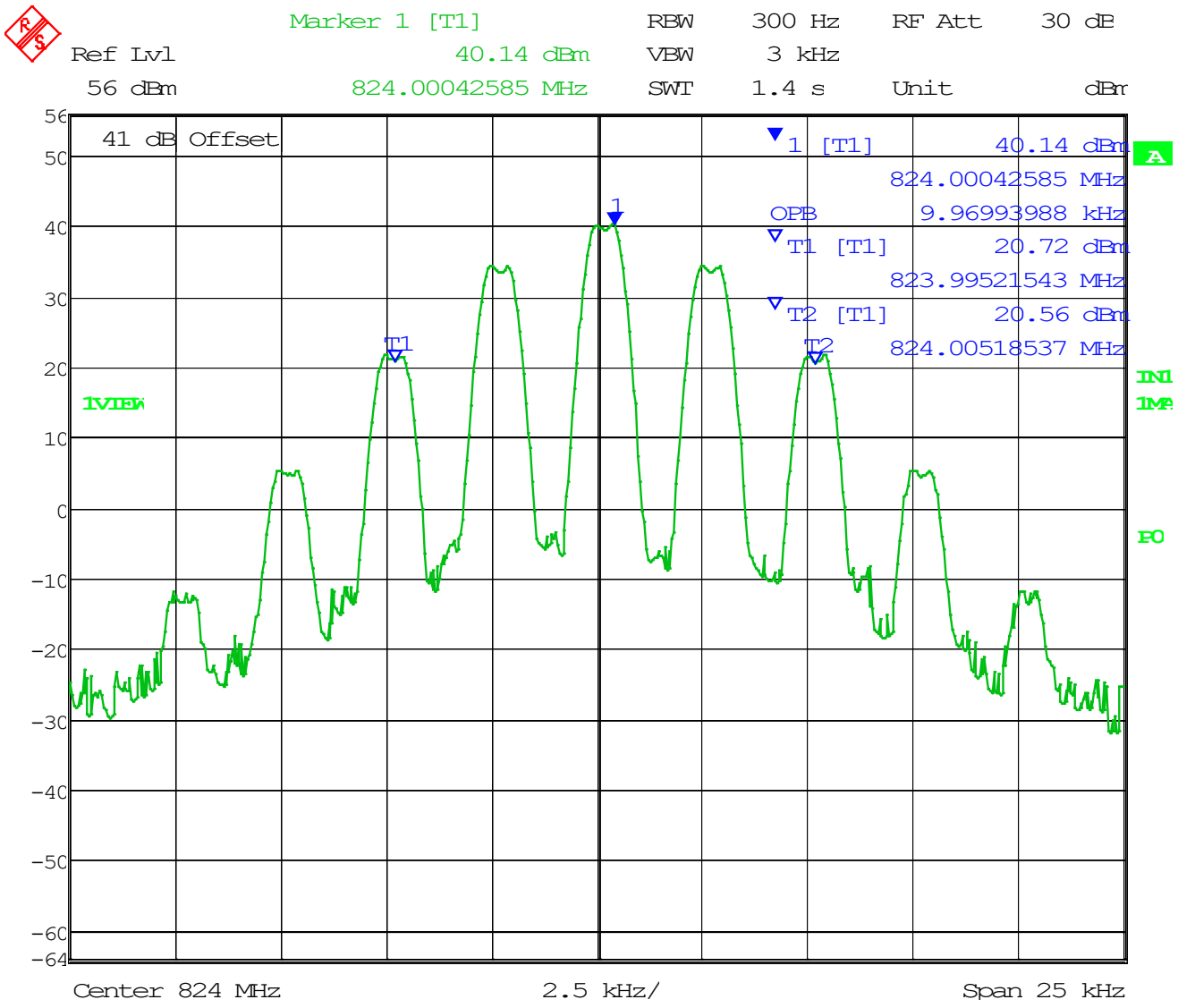
99% Occupied Bandwidth Measurement Table

Frequency (MHz)	99% Occupied Bandwidth (kHz)		
	FM	P25	DMR
824.0	9.970	8.357	8.297
869.0	9.970	8.056	8.297
898.0	9.970	8.237	8.176
901.5	9.970	8.056	8.417
929.5	10.020	8.267	8.317
930.5	10.020	8.176	8.297
933.0	9.970	8.056	8.116
938.0	10.020	8.176	8.357
940.5	10.070	8.357	8.176

OCCUPIED BANDWIDTH

Part 90 Bands

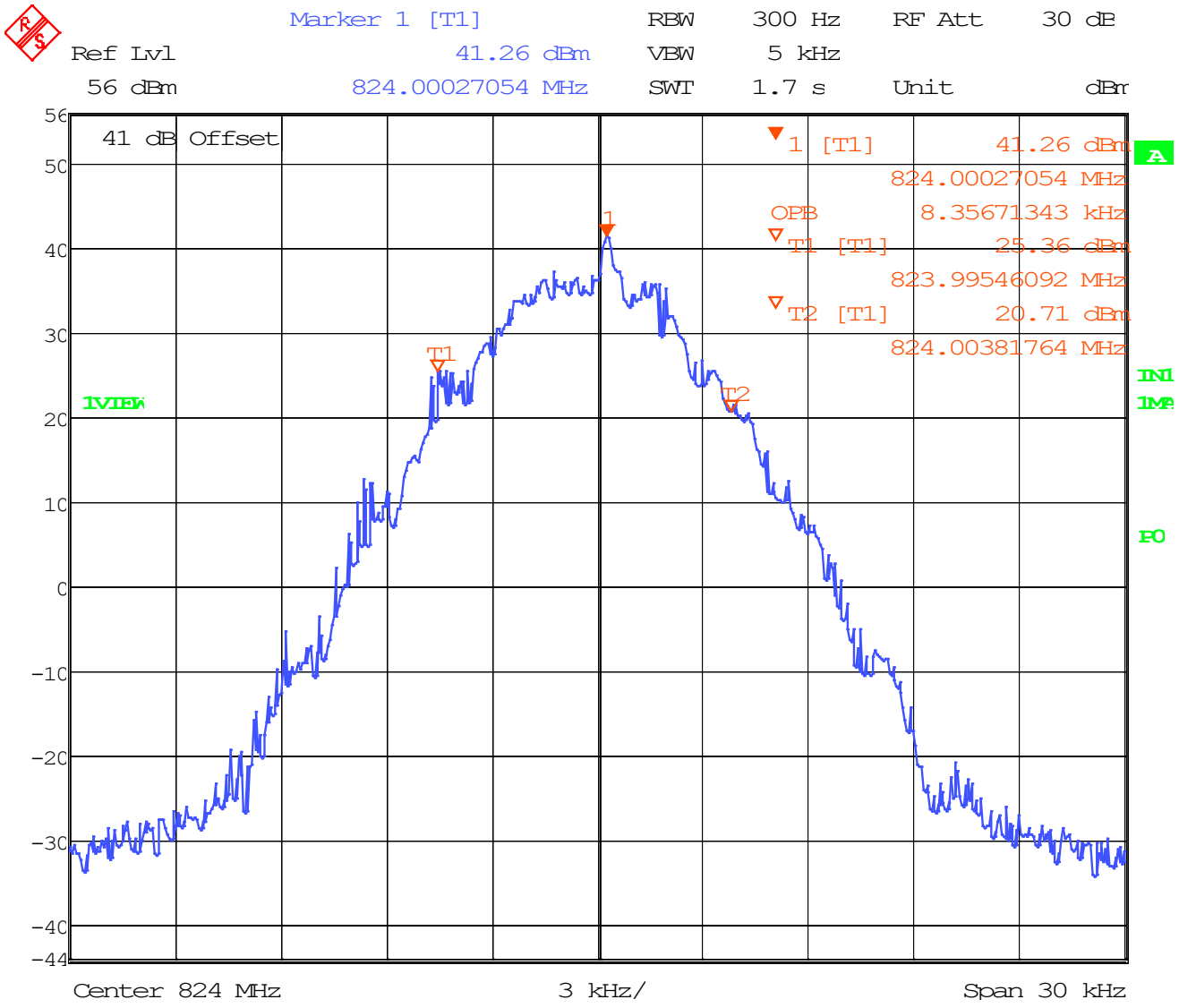
824 MHz, 11K0F3E



99% OBW = 9.970 kHz

OCCUPIED BANDWIDTH

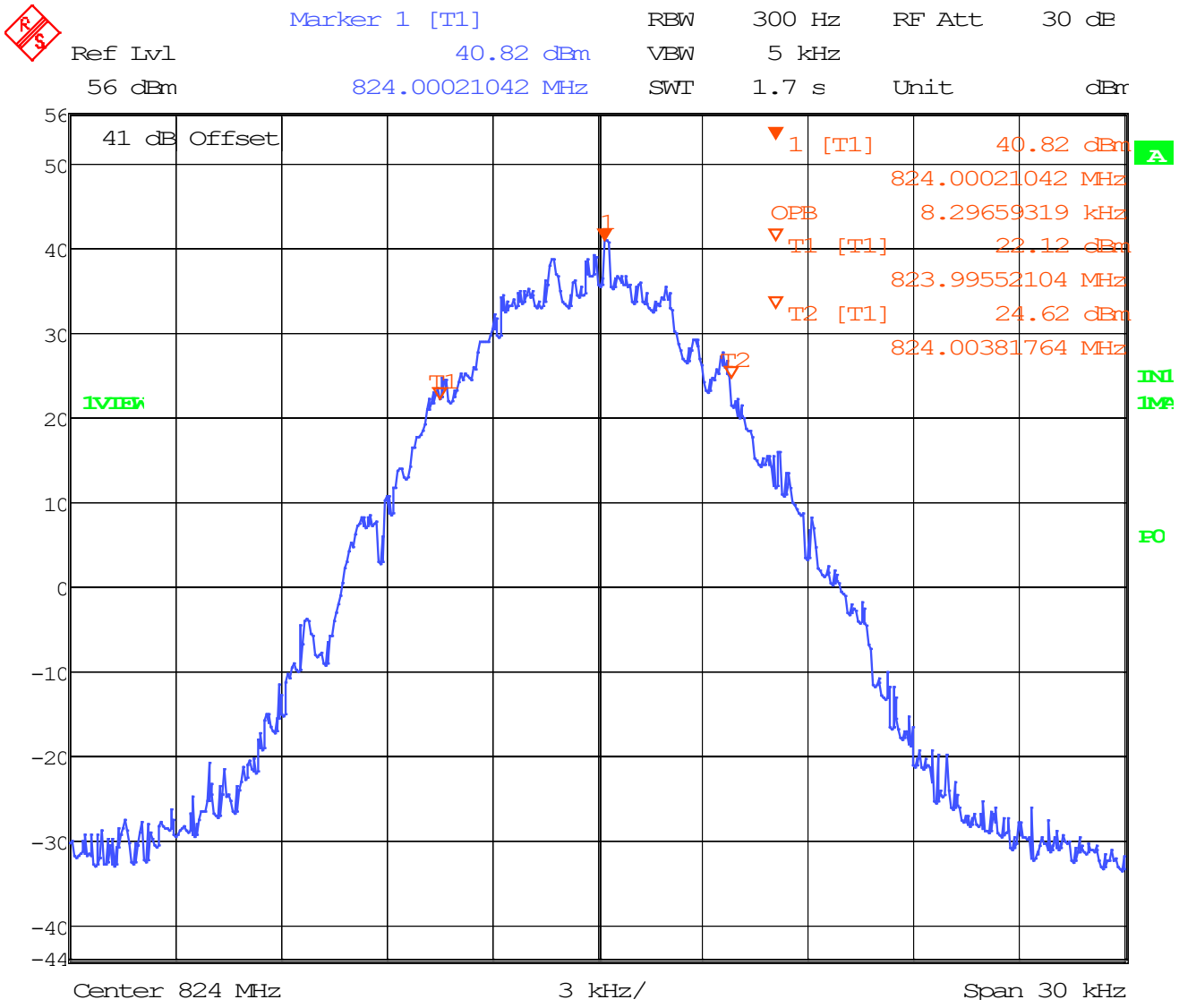
824 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.357 kHz

OCCUPIED BANDWIDTH

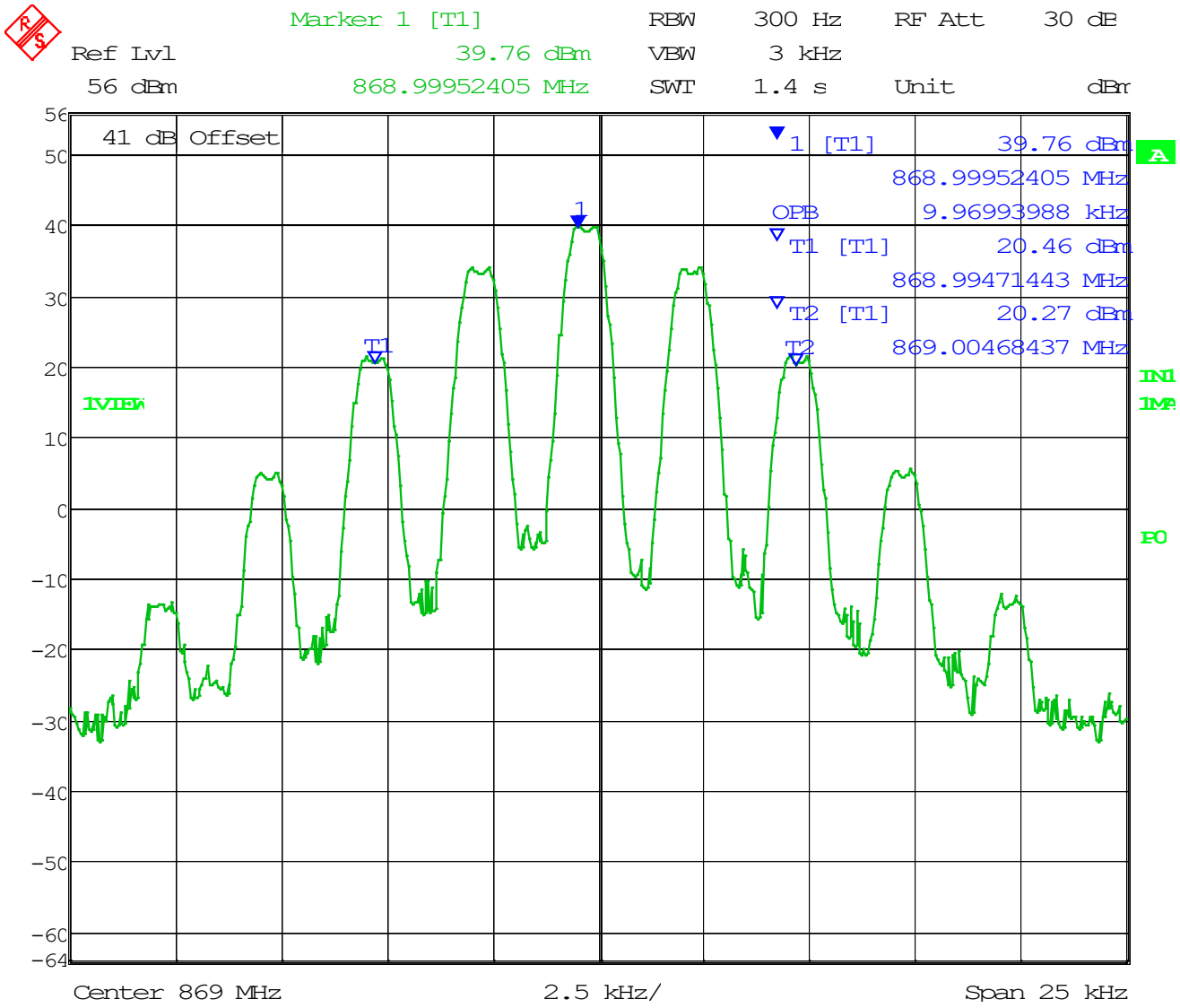
824 MHz, 7K60FXE/FXD



99% OBW = 8.297 kHz

OCCUPIED BANDWIDTH

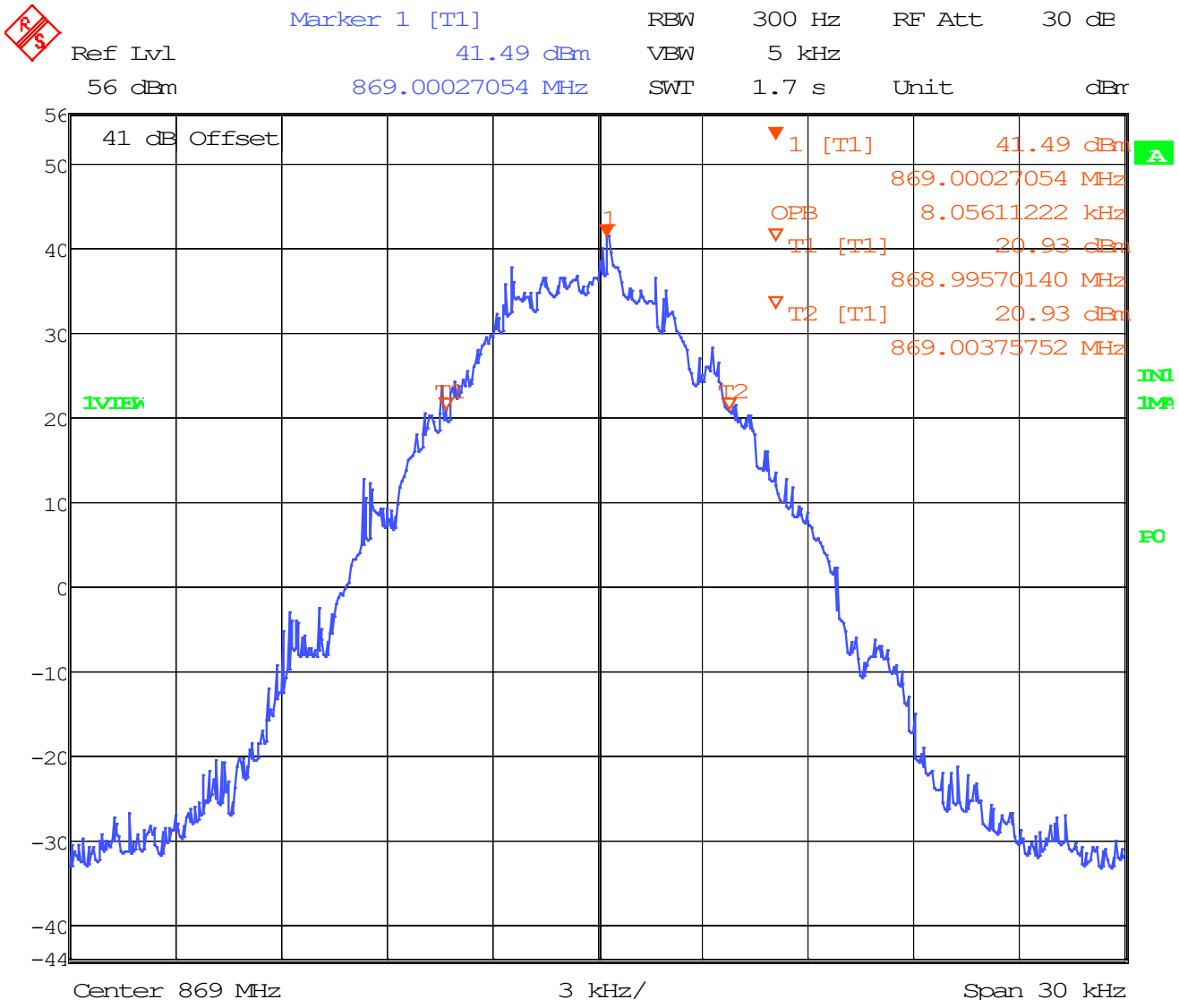
869 MHz, 11K0F3E



99% OBW = 9.970 kHz

OCCUPIED BANDWIDTH

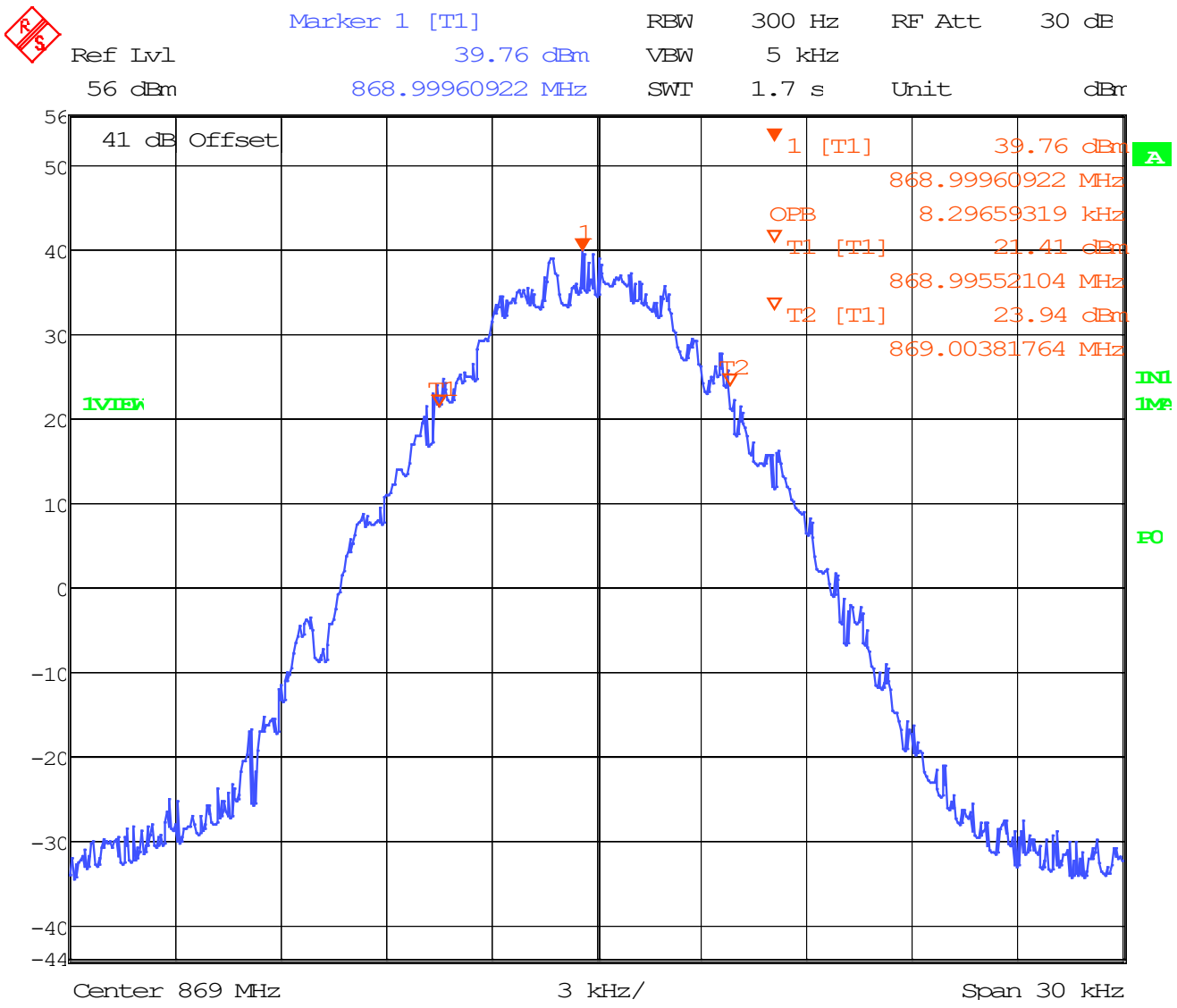
869 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.056 kHz

OCCUPIED BANDWIDTH

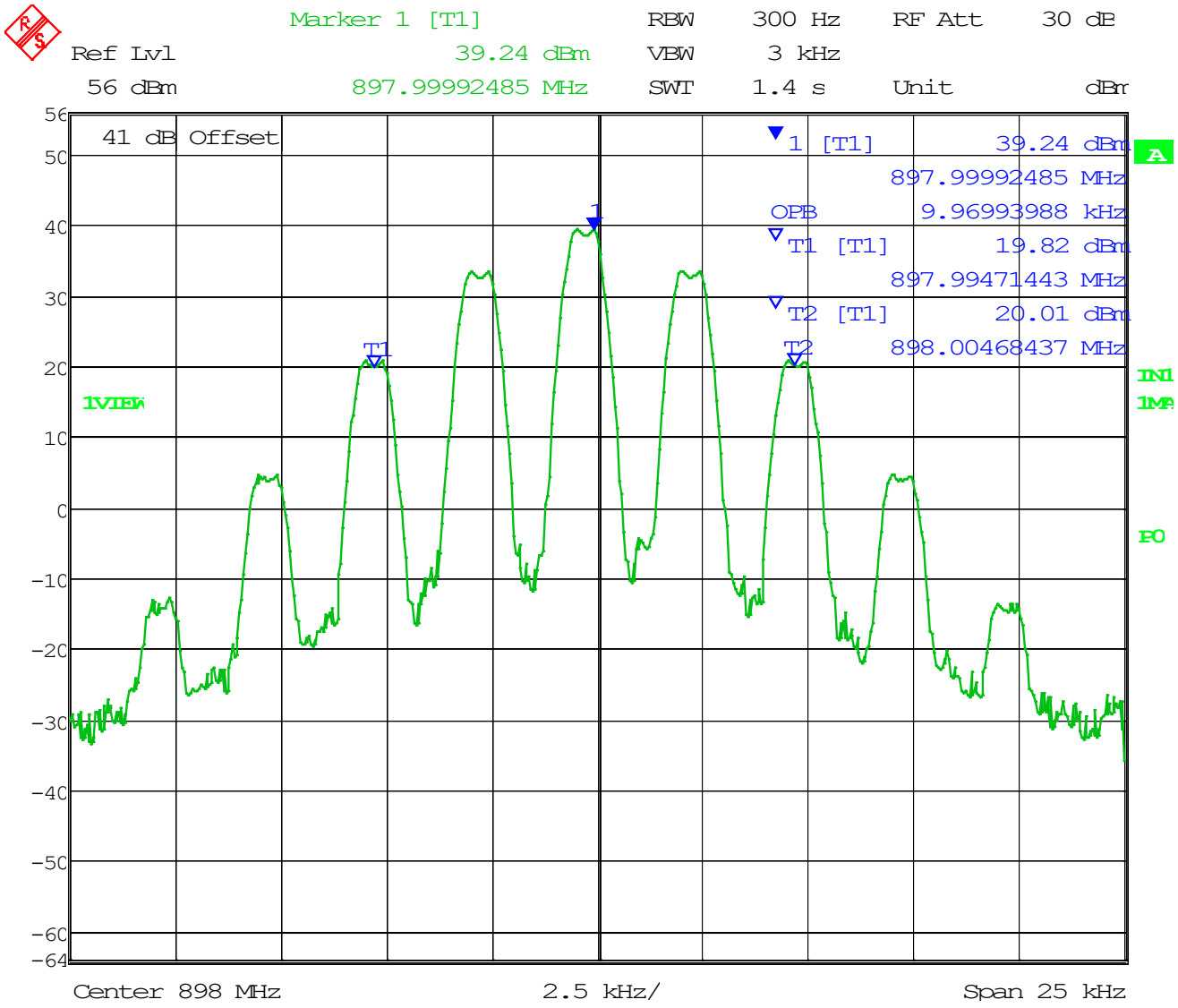
869 MHz, 7K60FXE/FXD



99% OBW = 8.297 kHz

OCCUPIED BANDWIDTH

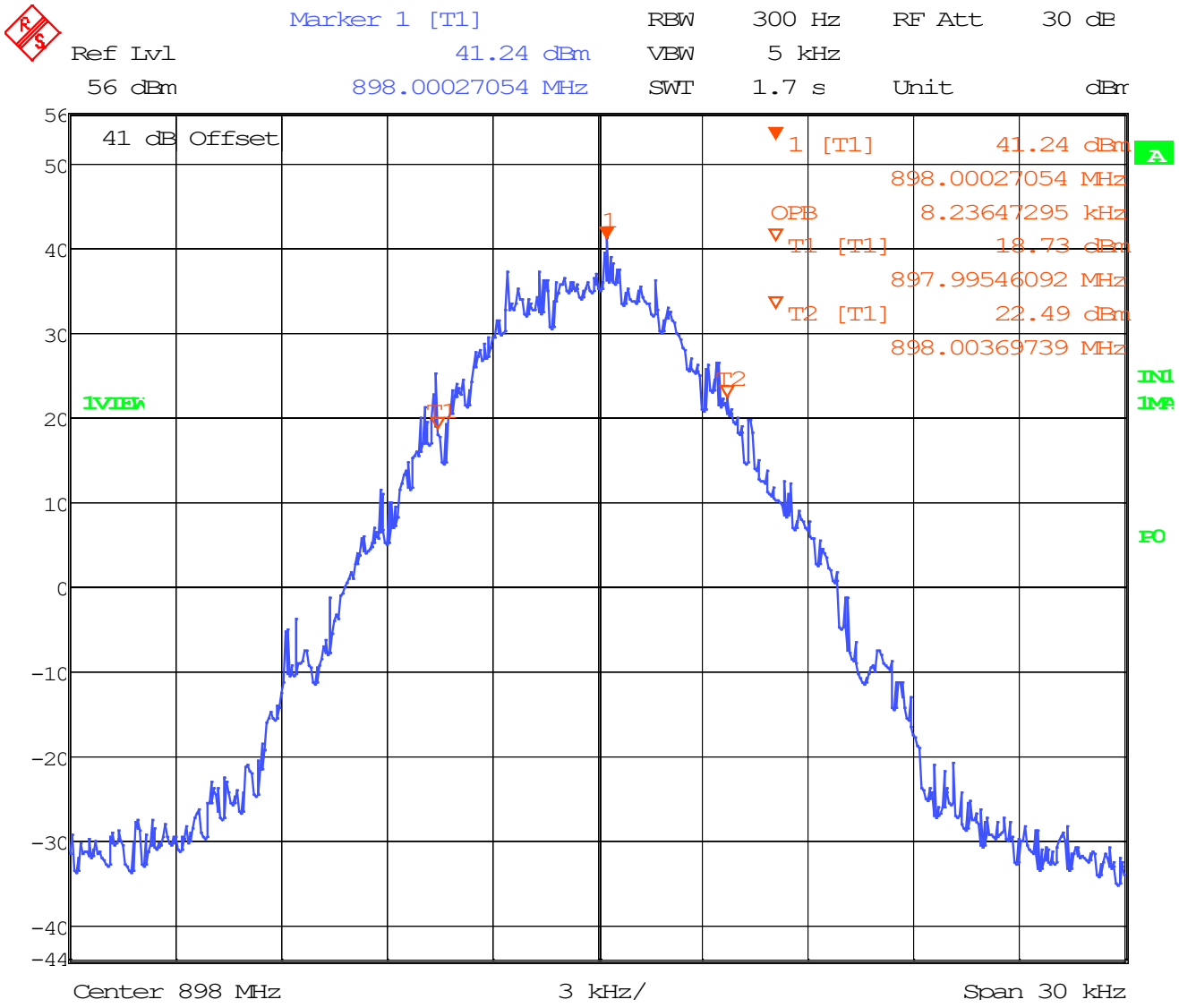
898 MHz, 11K0F3E



99% OBW = 9.970 kHz

OCCUPIED BANDWIDTH

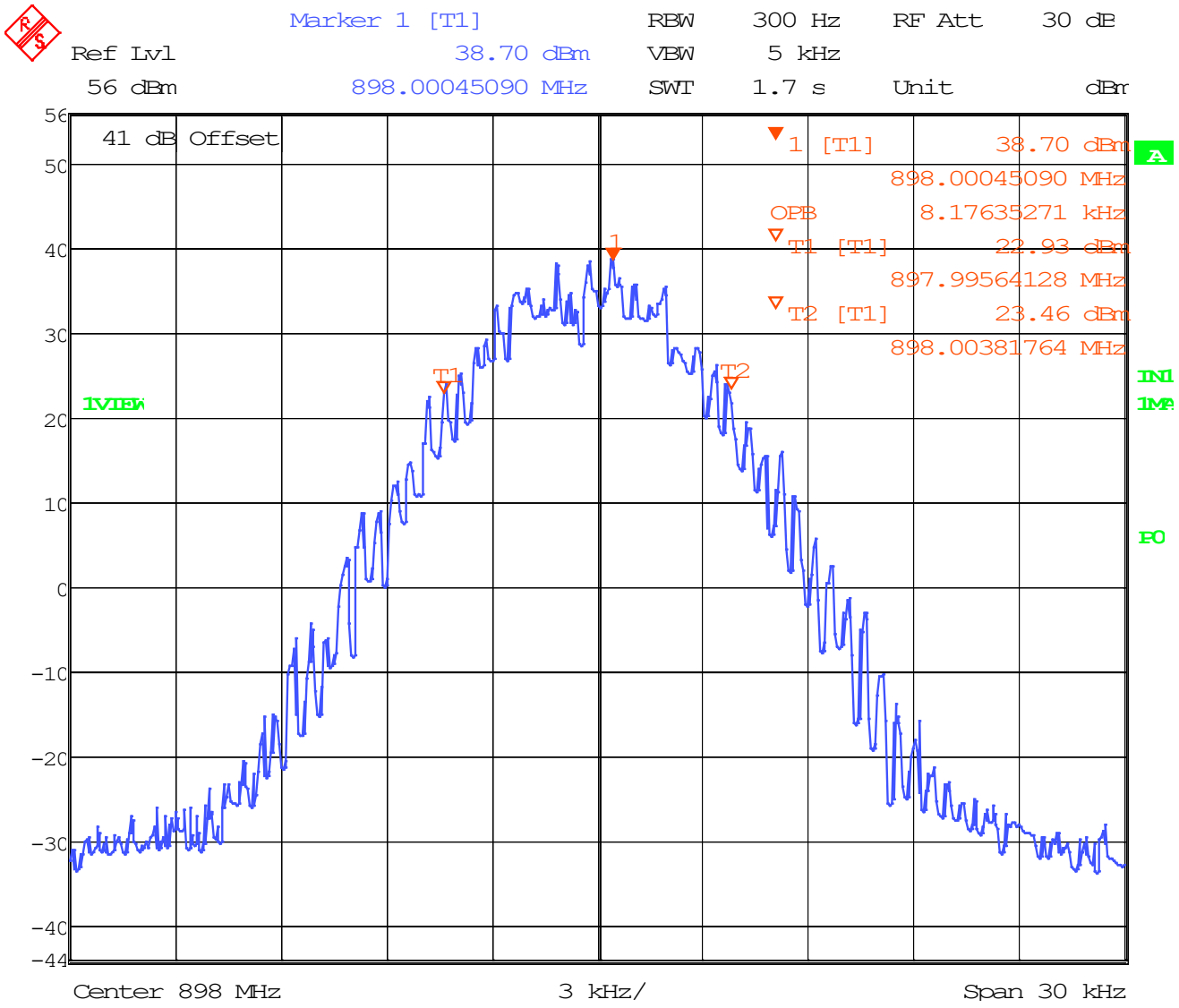
898 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.237 kHz

OCCUPIED BANDWIDTH

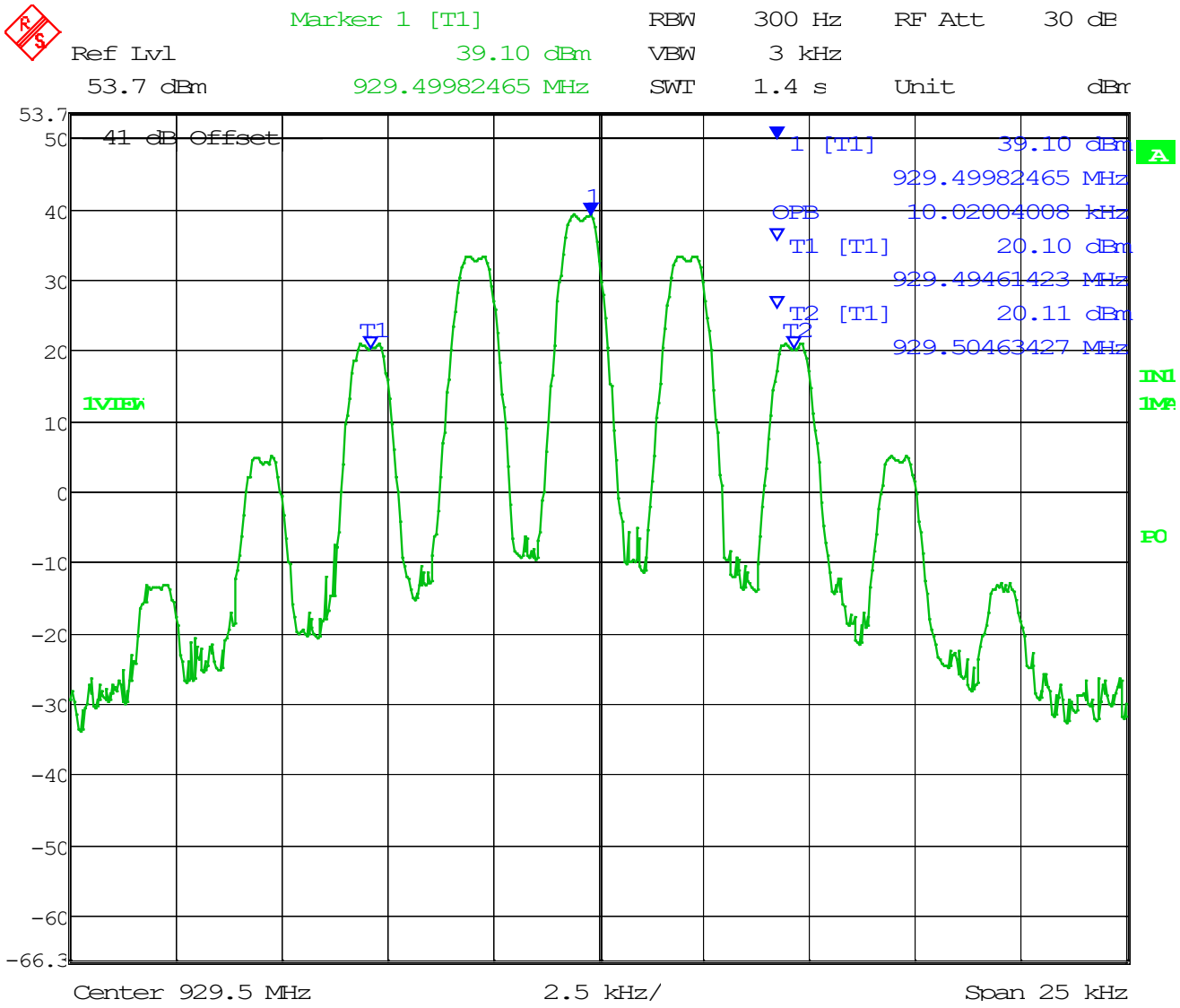
898 MHz, 7K60FXE/FXD



99% OBW = 8.176 kHz

OCCUPIED BANDWIDTH

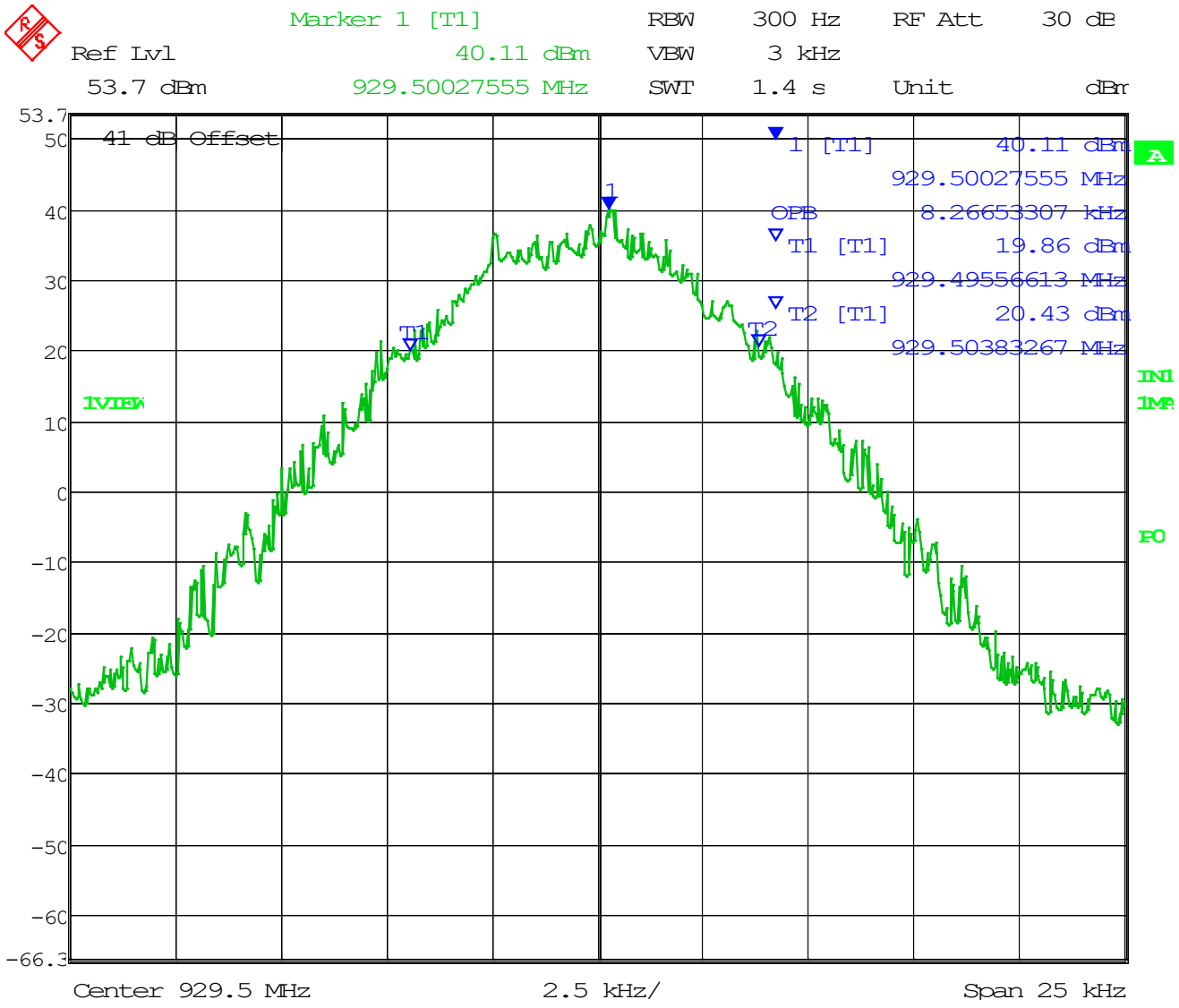
929.5 MHz, 11K0F3E



99% OBW = 10.020 kHz

OCCUPIED BANDWIDTH

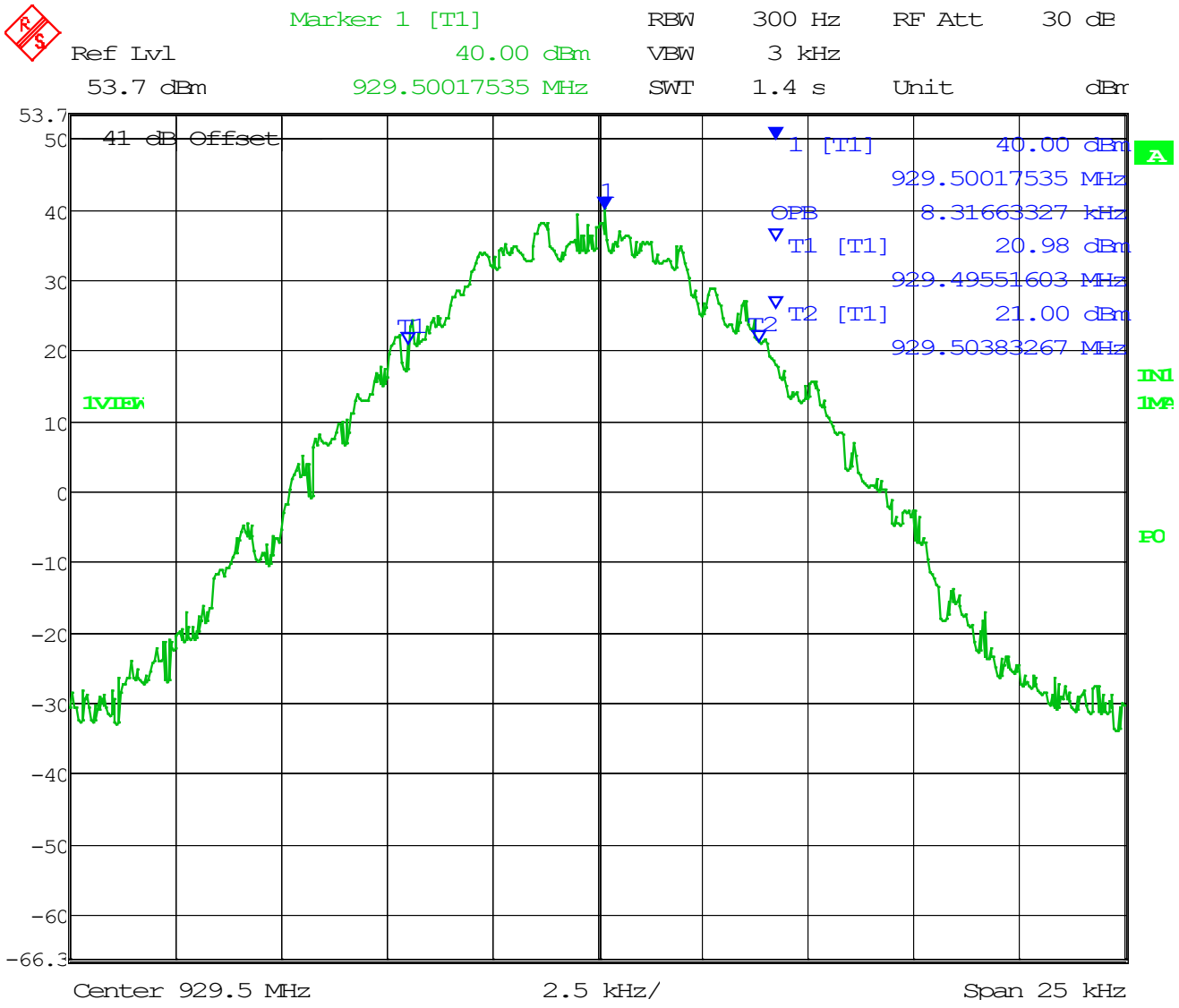
929.5 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.267 kHz

OCCUPIED BANDWIDTH

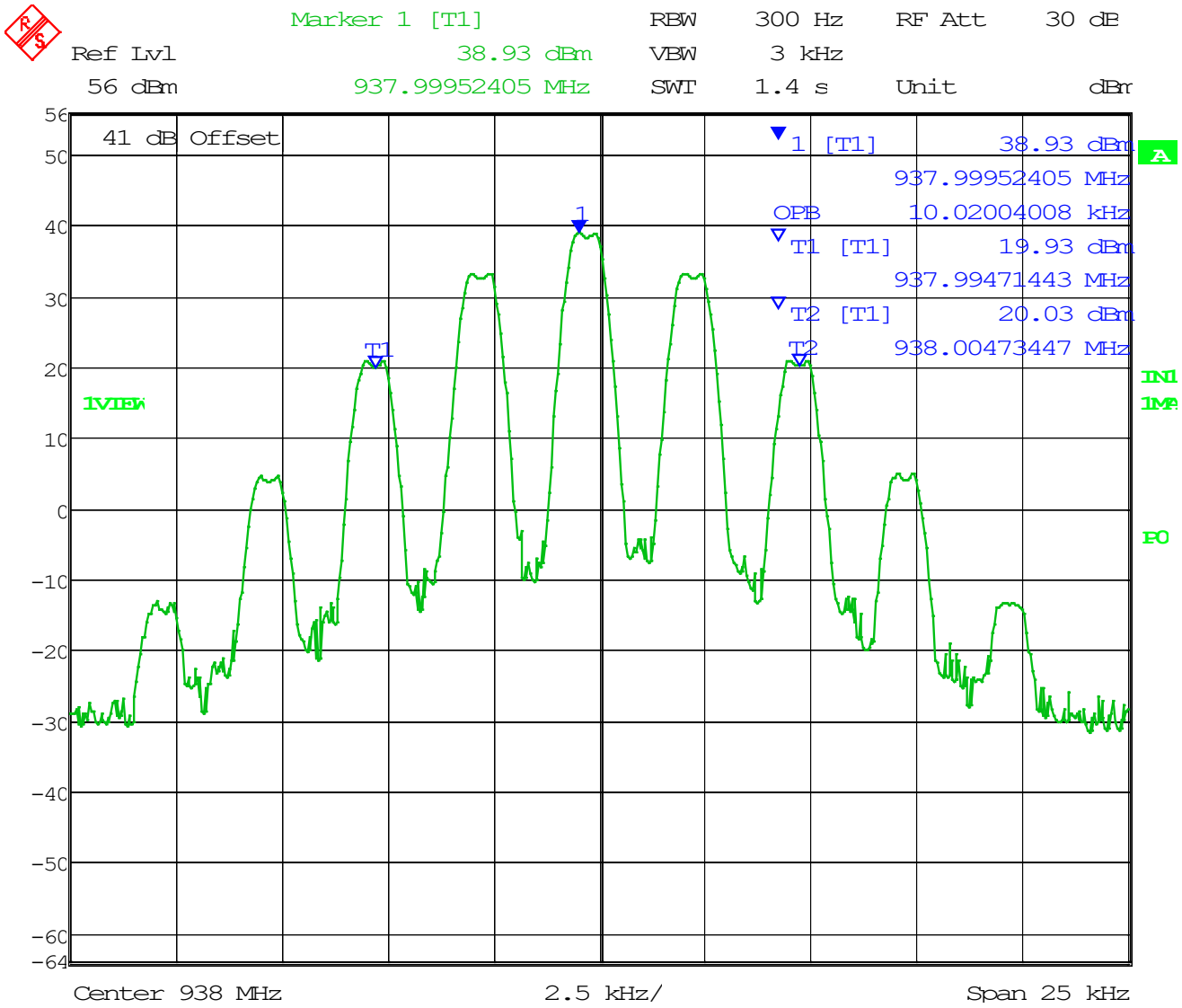
929.5 MHz, 7K60FXE/FXD



99% OBW = 8.317 kHz

OCCUPIED BANDWIDTH

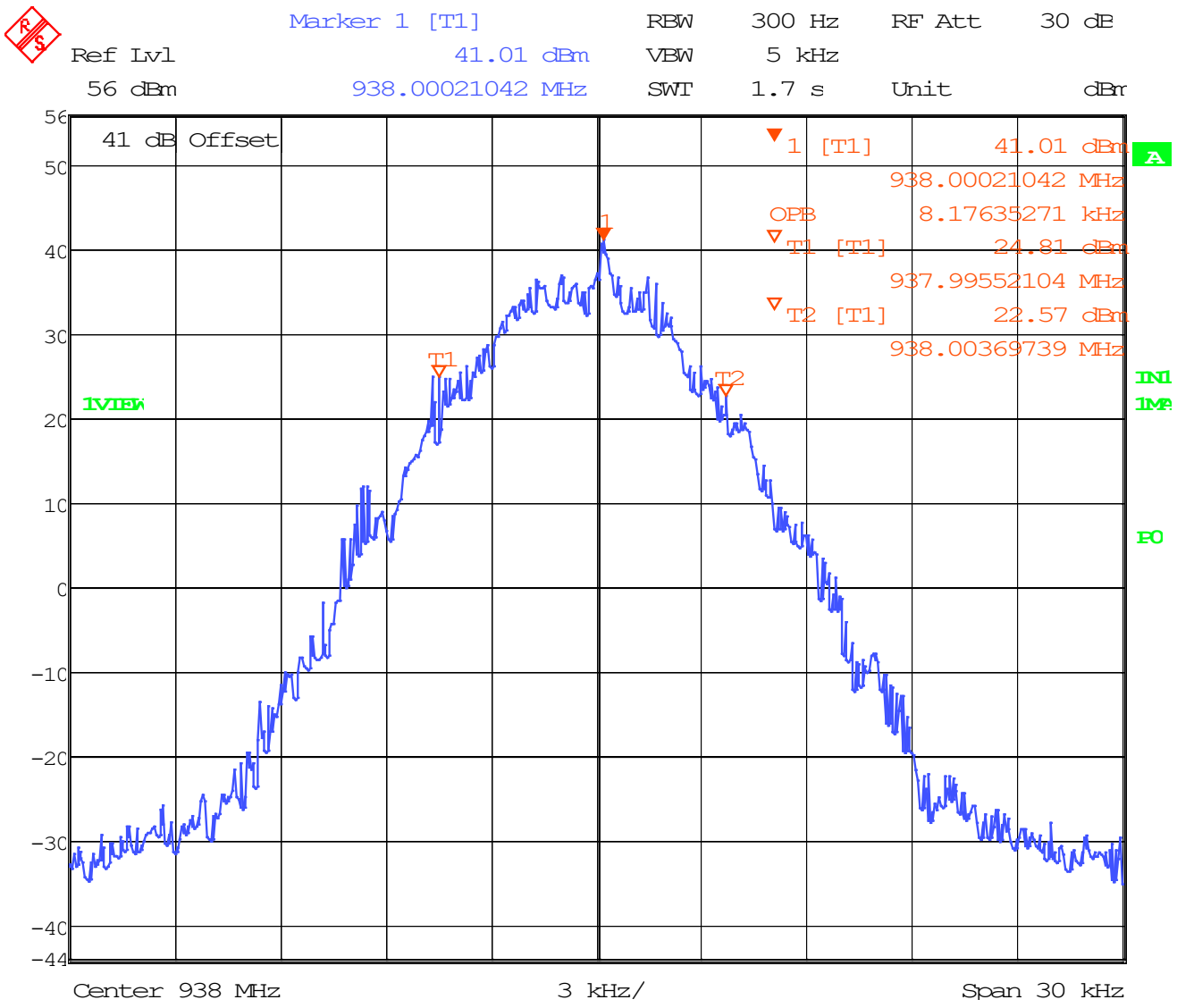
938 MHz, 11K0F3E



99% OBW = 10.020 kHz

OCCUPIED BANDWIDTH

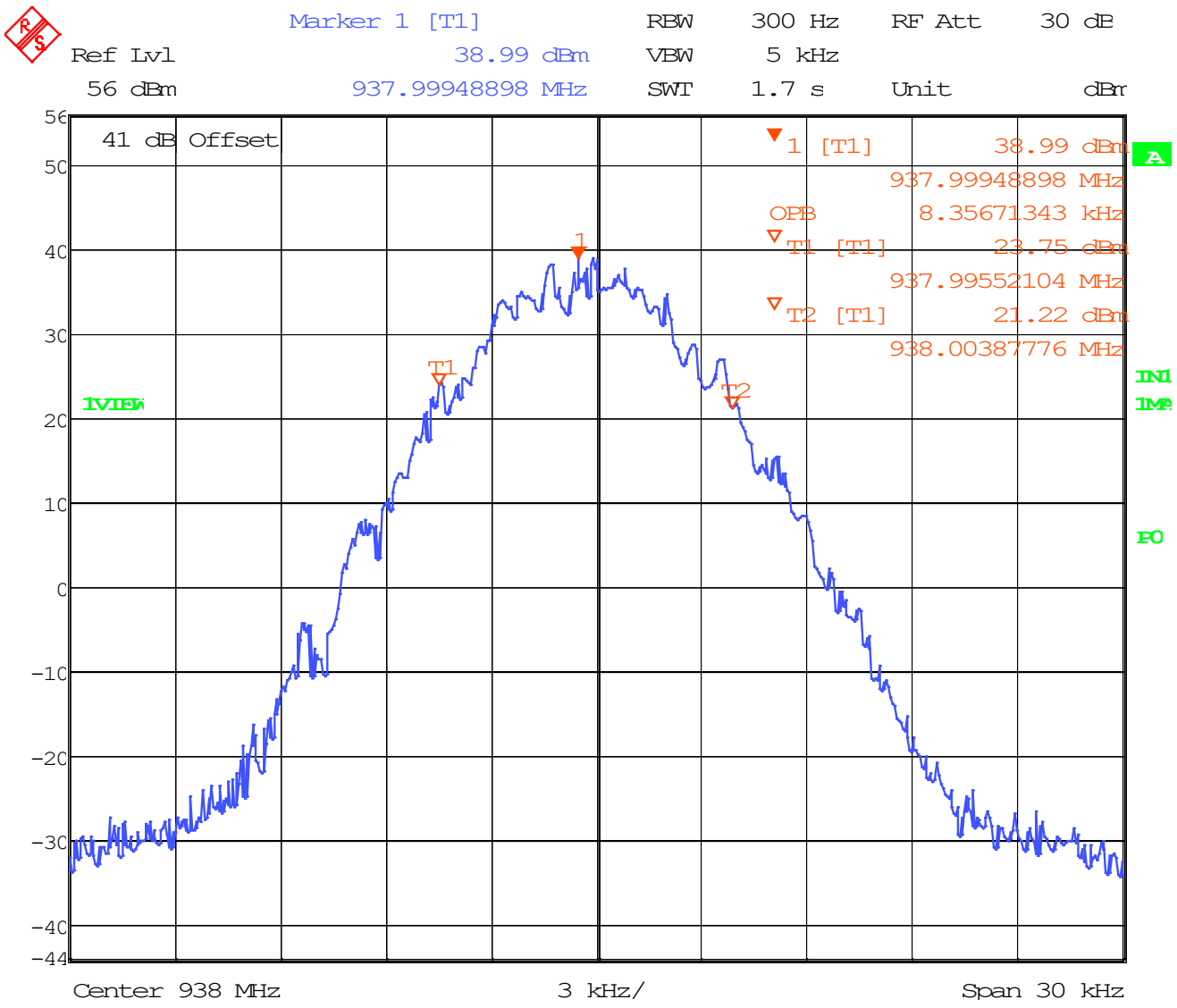
938 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.176 kHz

OCCUPIED BANDWIDTH

938 MHz, 7K60FXE/FXD

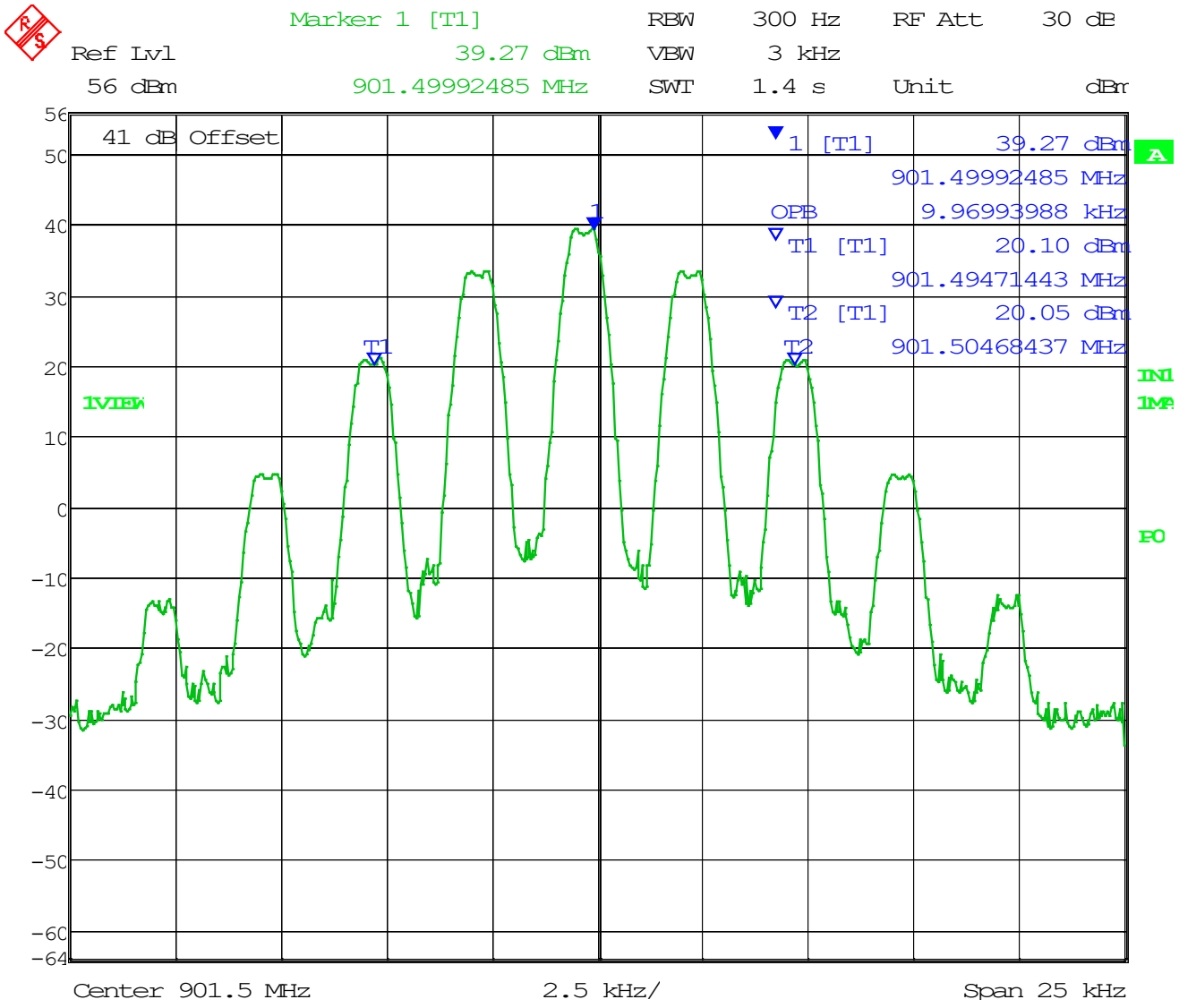


99% OBW = 8.357 kHz

OCCUPIED BANDWIDTH

Part 24 Bands

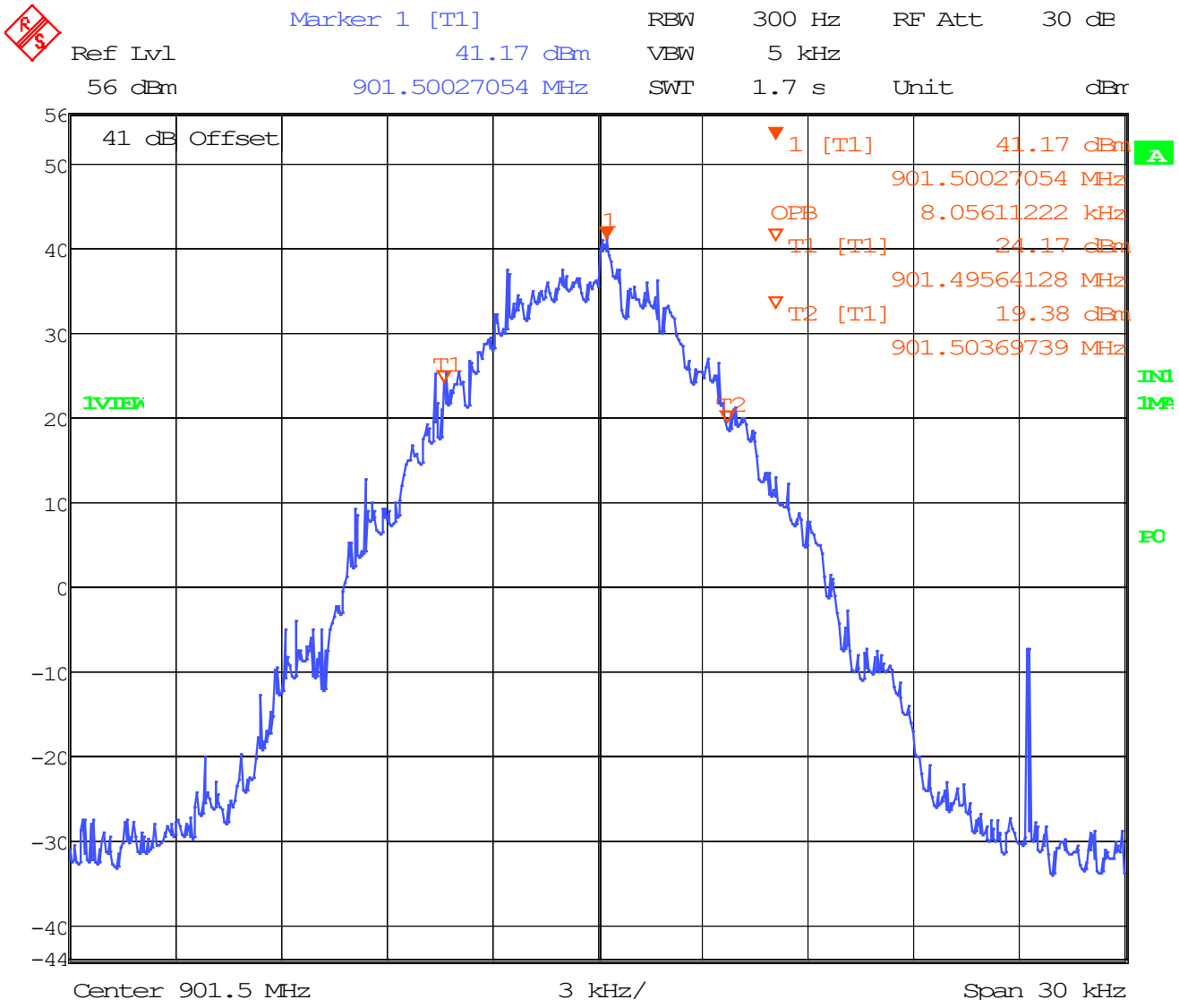
901.5 MHz, 11K0F3E



99% OBW = 9.970 kHz

OCCUPIED BANDWIDTH

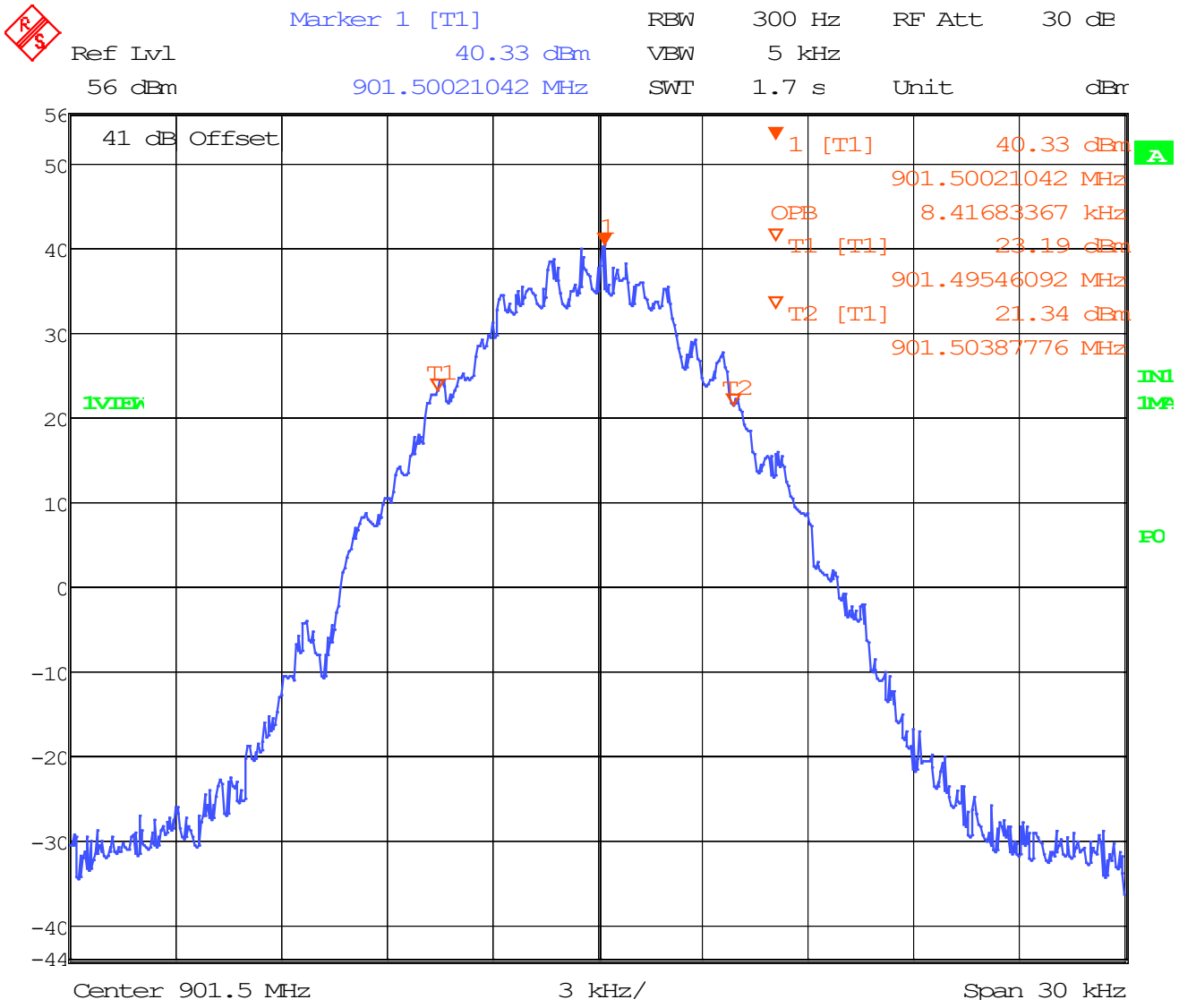
901.5 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.056 kHz

OCCUPIED BANDWIDTH

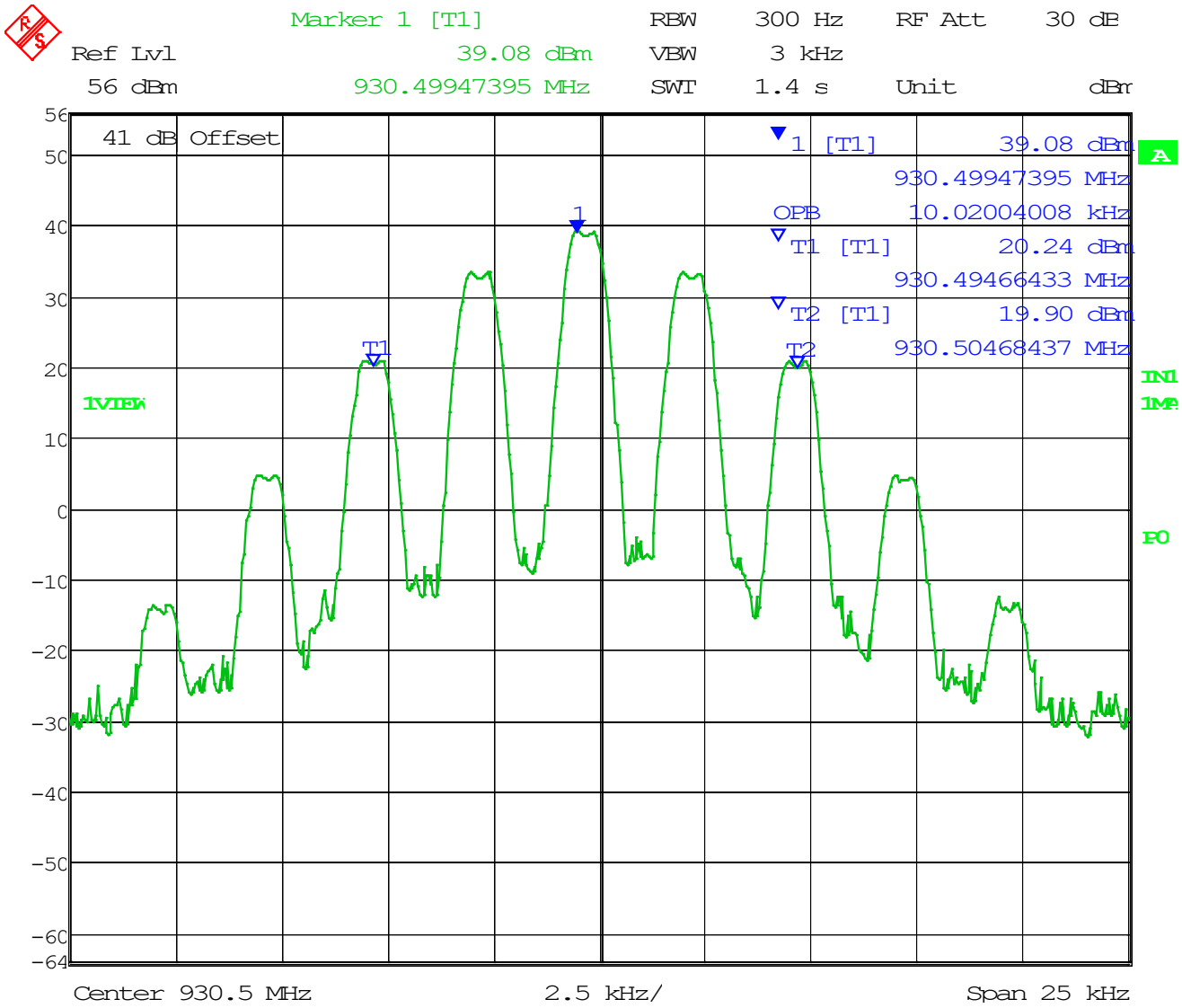
901.5 MHz, 7K60FXE/FXD



99% OBW = 8.417 kHz

OCCUPIED BANDWIDTH

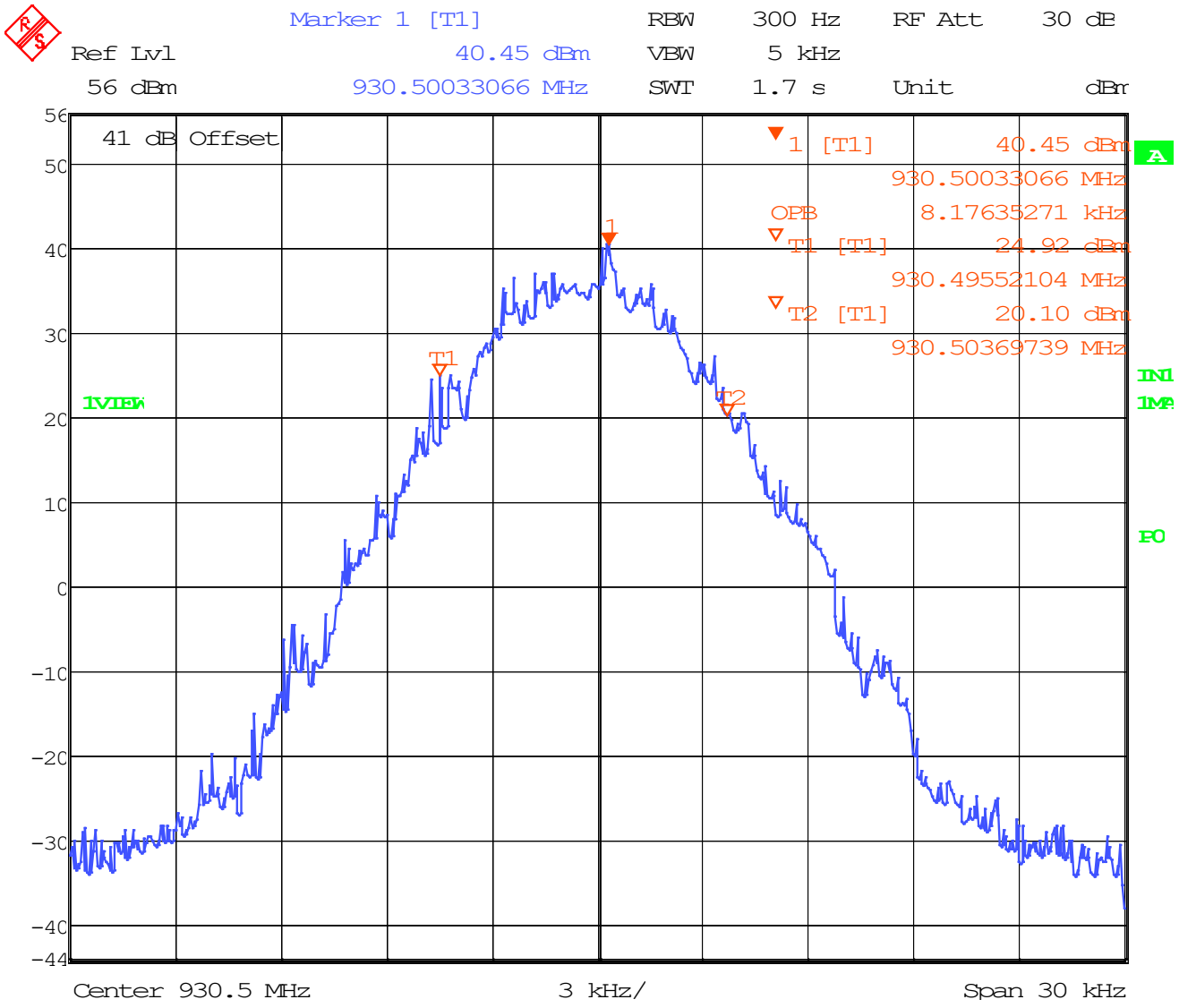
930.5 MHz, 11K0F3E



99% OBW = 10.020 kHz

OCCUPIED BANDWIDTH

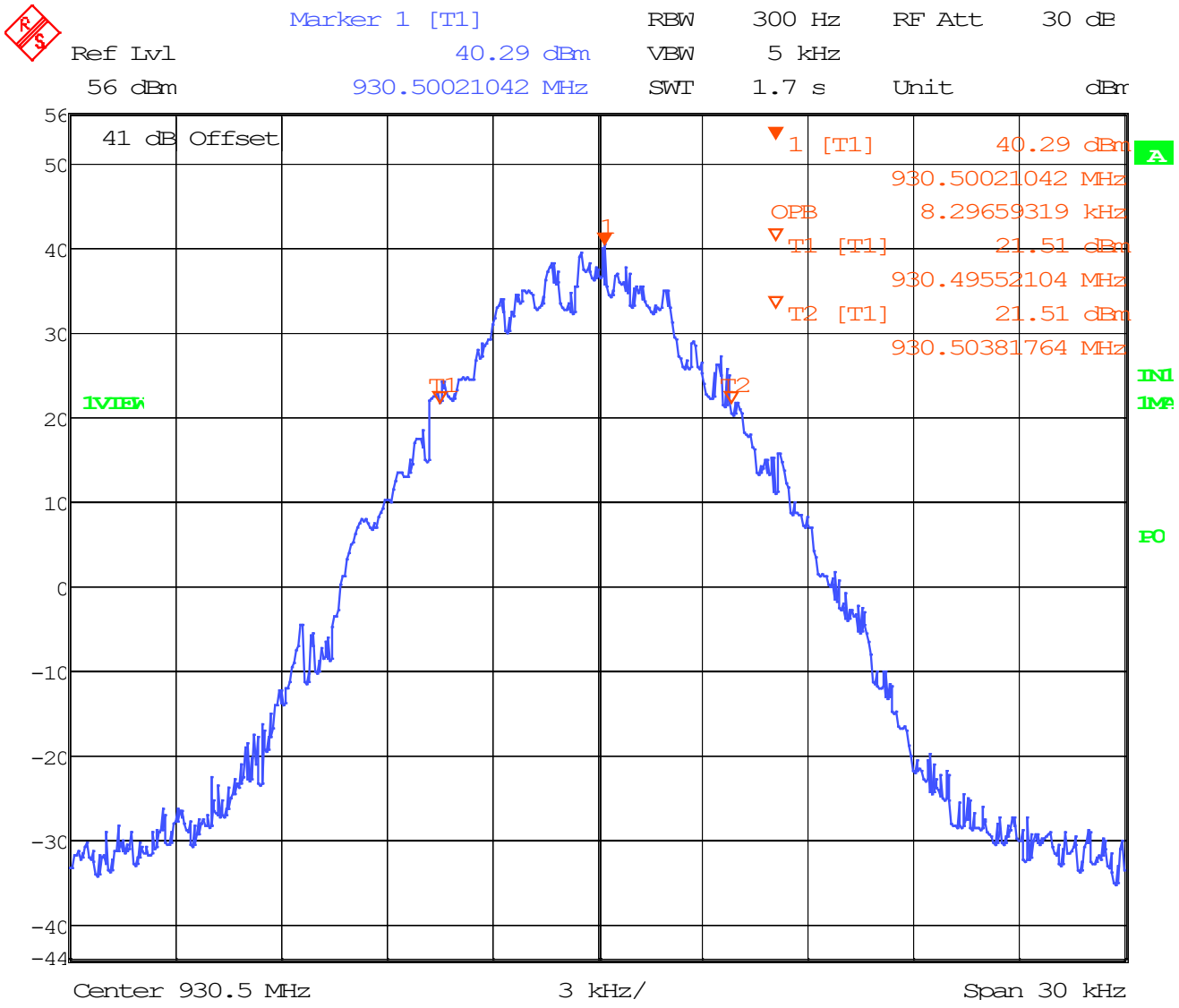
930.5 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.176 kHz

OCCUPIED BANDWIDTH

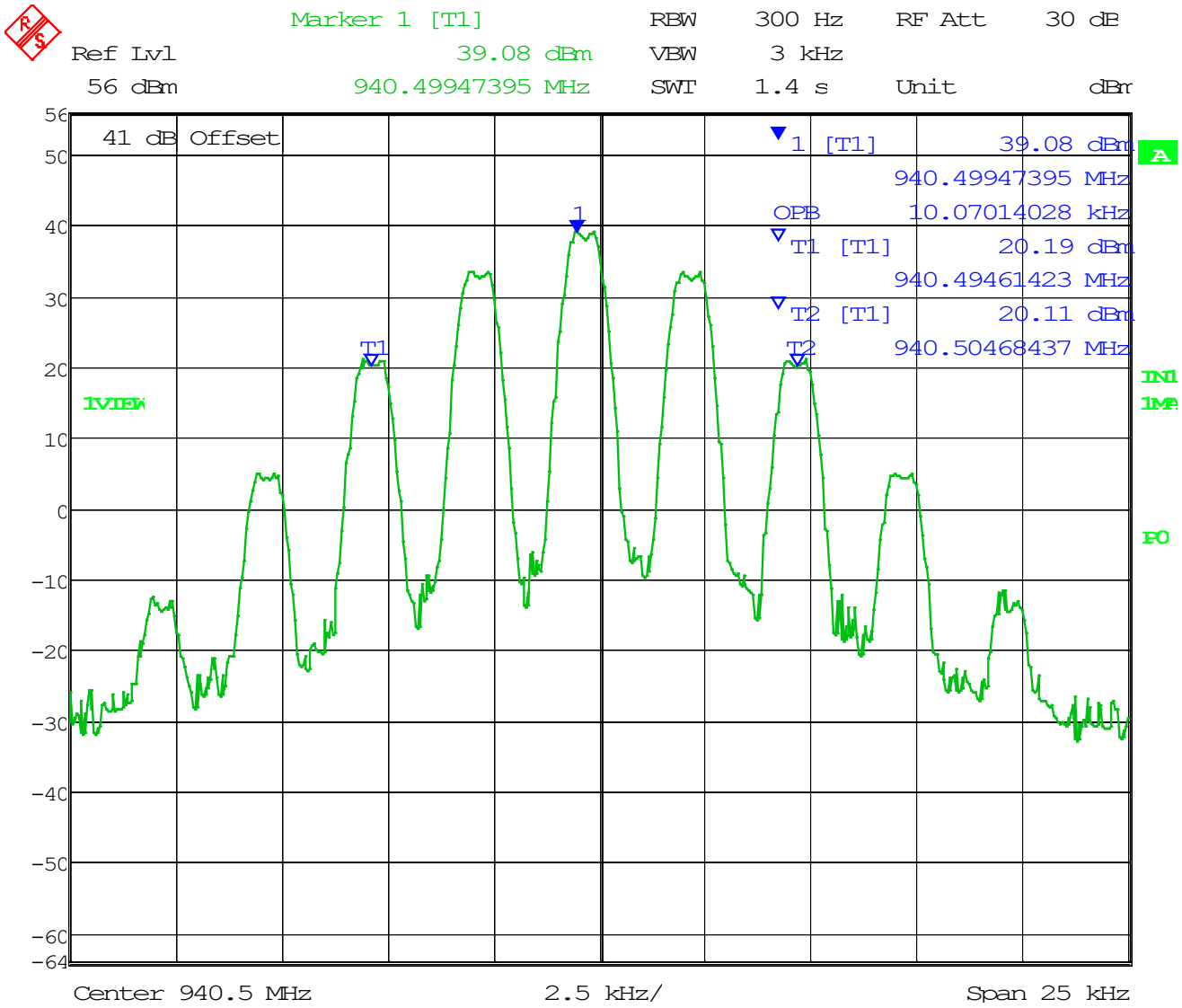
930.5 MHz, 7K60FXE/FXD



99% OBW = 8.297 kHz

OCCUPIED BANDWIDTH

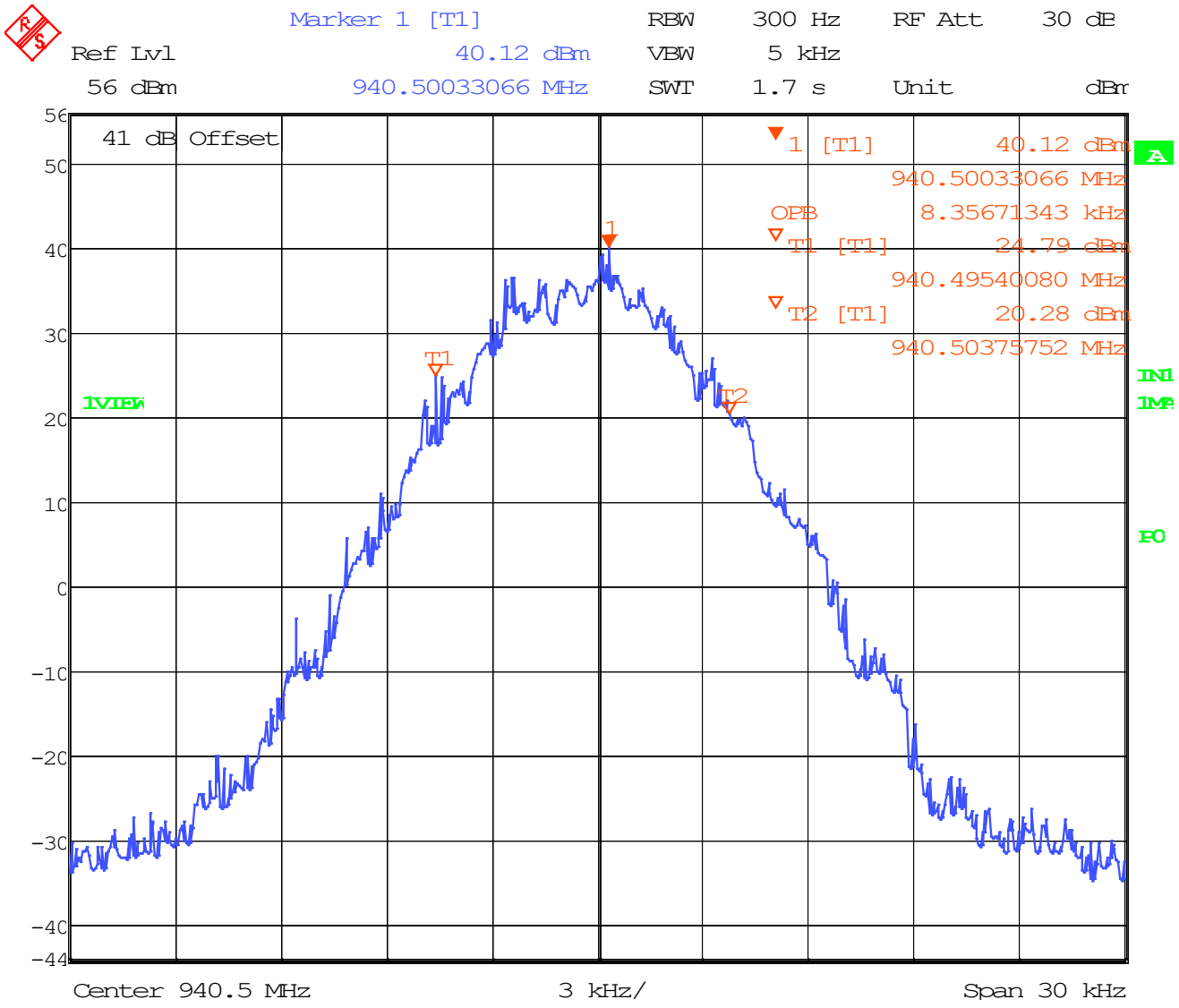
940.5 MHz, 11K0F3E



99% OBW = 10.070 kHz

OCCUPIED BANDWIDTH

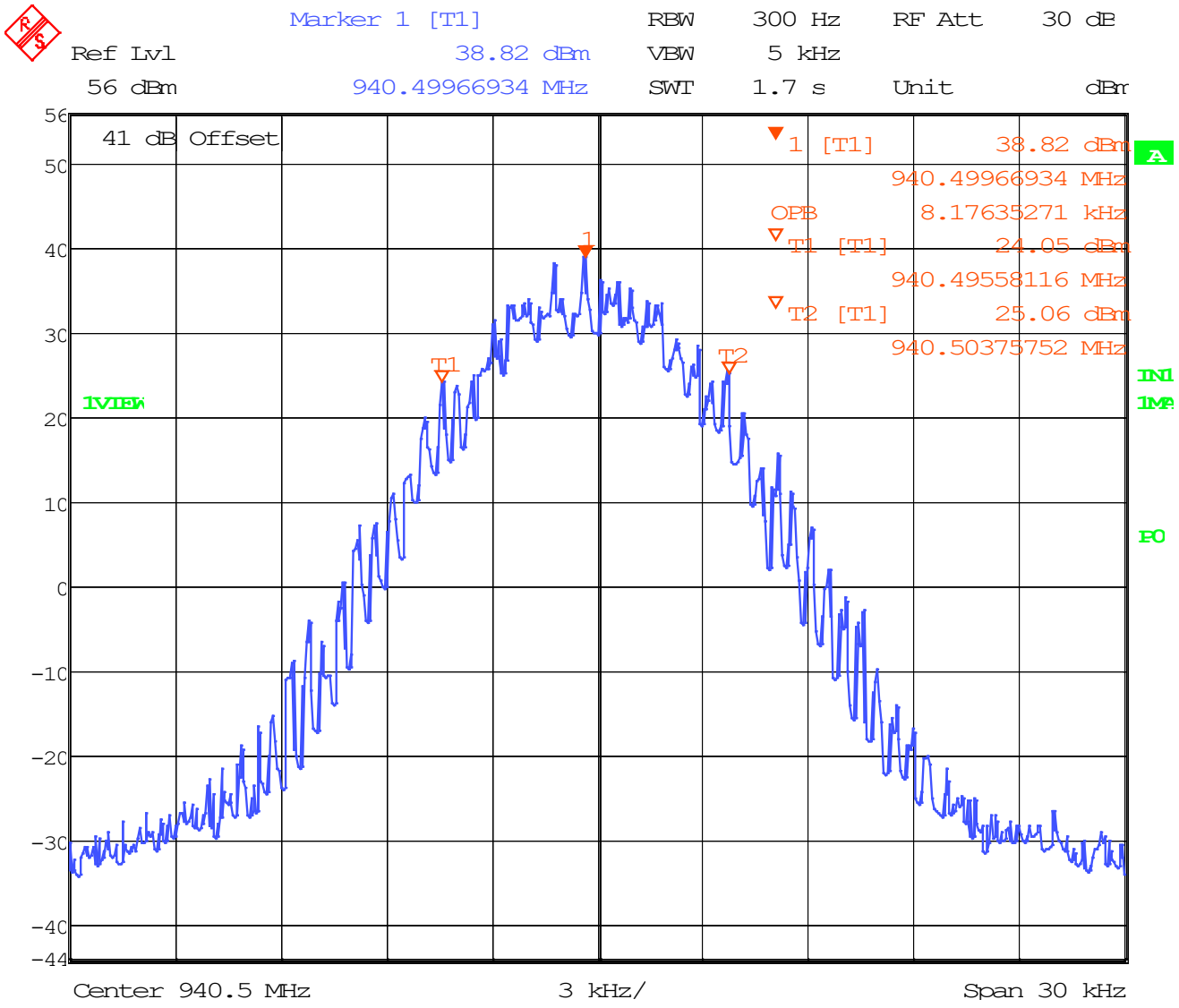
940.5 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.357 kHz

OCCUPIED BANDWIDTH

940.5 MHz, 7K60FXE/FXD

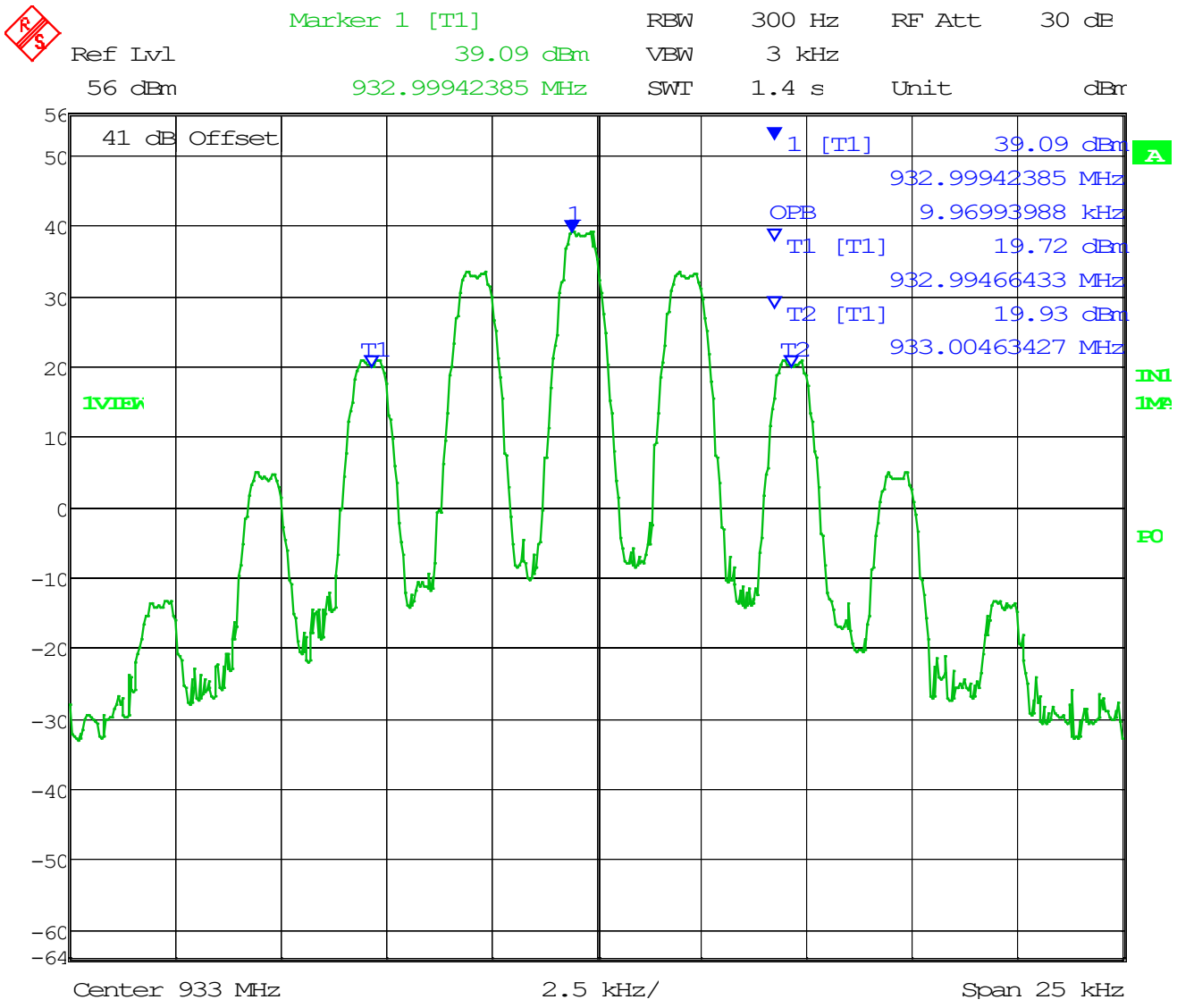


99% OBW = 8.176 kHz

OCCUPIED BANDWIDTH

Part 22 Band

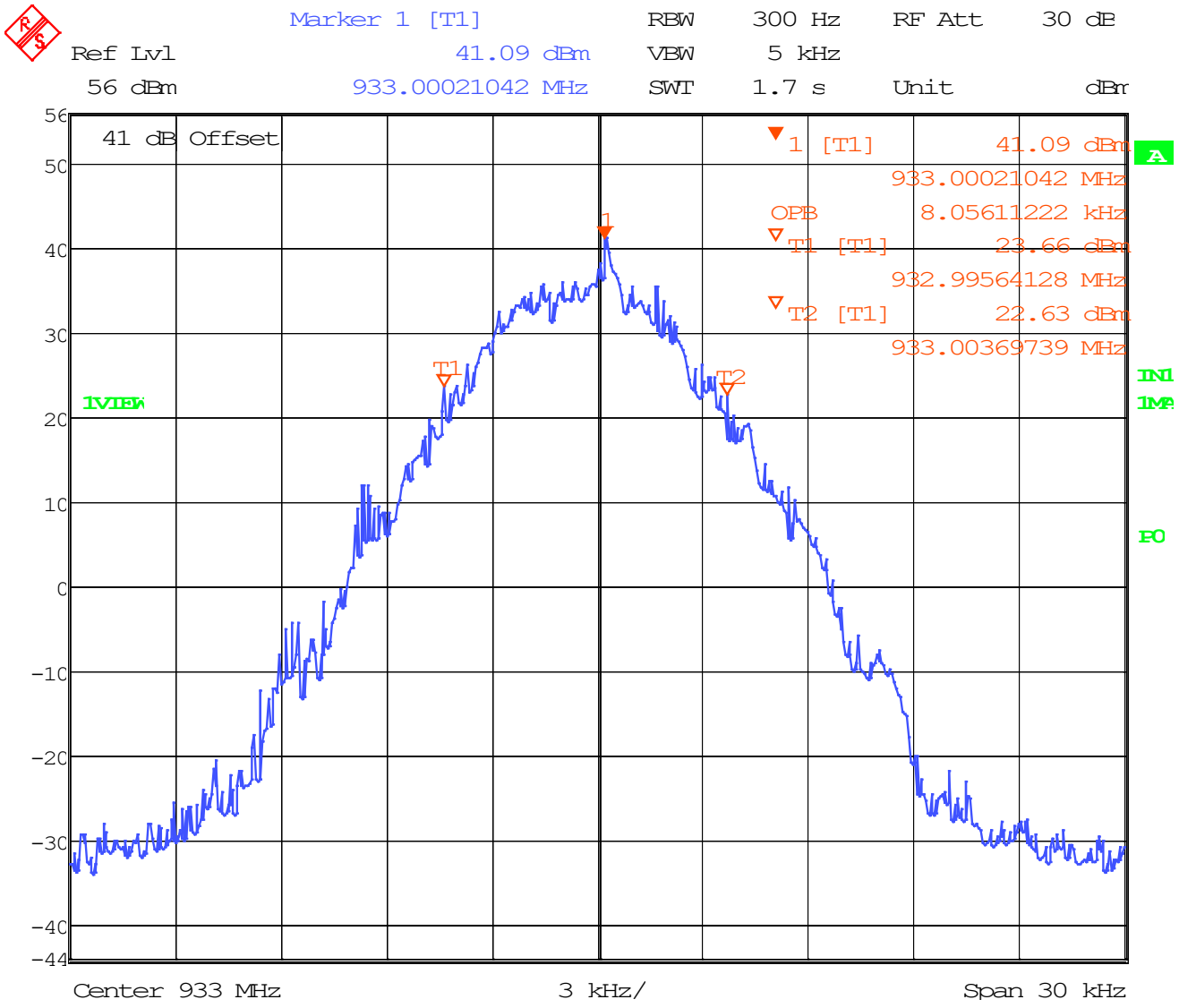
933 MHz, 11K0F3E



99% OBW = 9.970 kHz

OCCUPIED BANDWIDTH

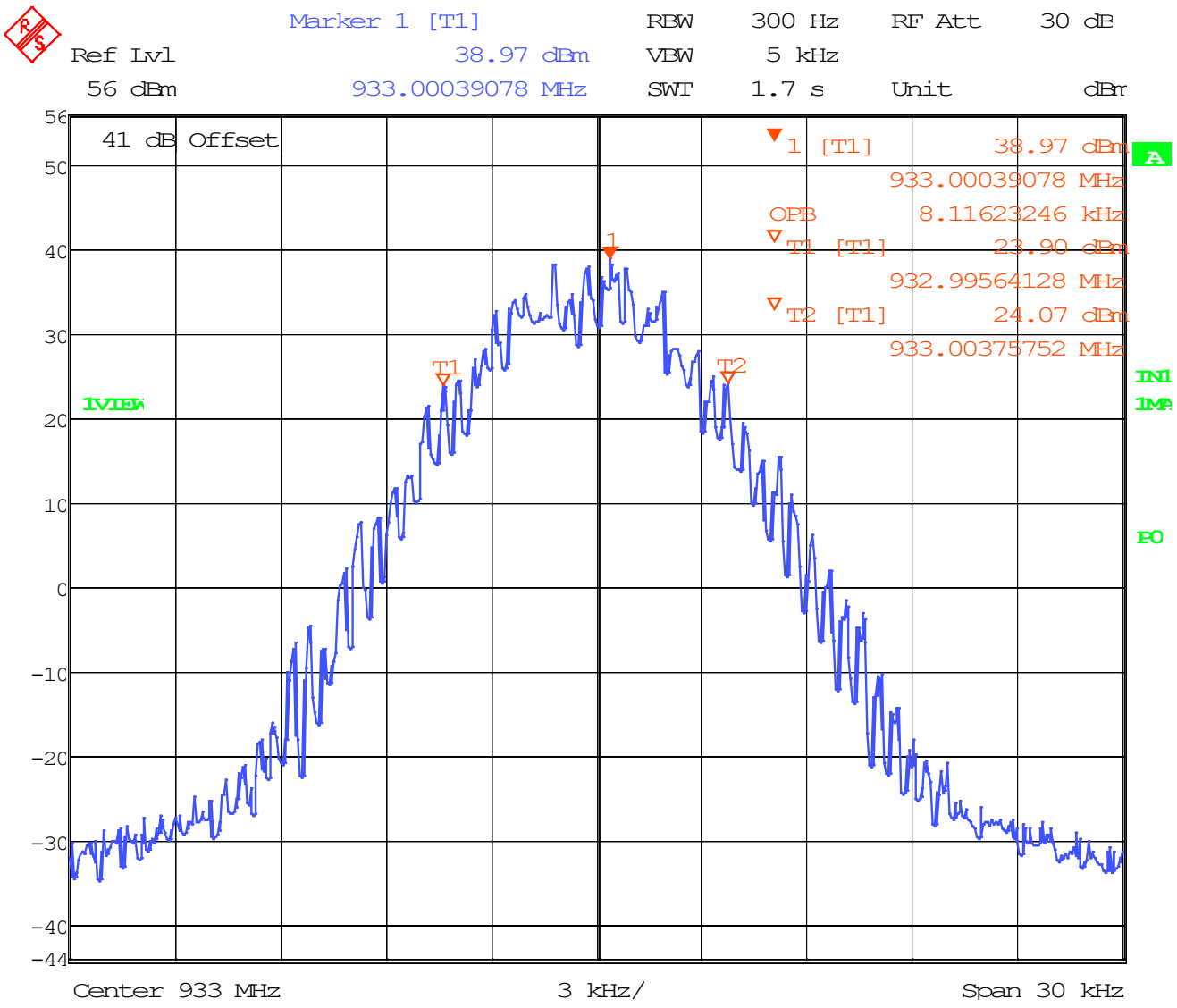
933 MHz, 8K10F1D/F1E/F1W



99% OBW = 8.056 kHz

OCCUPIED BANDWIDTH

933 MHz, 7K60FXE/FXD



99% OBW = 8.116 kHz

EMISSION MASKS

FCC Rule Parts: 90.210(b) - (d), (g) - (j), 24.133(a)(1)

§90.210 Emission masks.

APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
929-930	B	G
All other bands	B	C

[3]Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691 of this chapter.

[5]Equipment designed to operate on 25 kilohertz bandwidth channels must meet the requirements of either Emission Mask B or G, whichever is applicable, while equipment designed to operate on 12.5 kilohertz bandwidth channels must meet the requirements of Emission Mask D. Equipment designed to operate on 25 kilohertz bandwidth channels may alternatively meet the Adjacent Channel Power limits of §90.221.

[6]Transmitters utilizing analog emissions that are equipped with an audio low-pass filter must meet Emission Mask B. All transmitters utilizing digital emissions and those transmitters using analog emissions without an audio low-pass filter must meet Emission Mask H.

EMISSION MASKS

(b) *Emission Mask B.* For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(c) *Emission Mask C.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(4) In the 1427-1432 MHz band, licensees are encouraged to take all reasonable steps to ensure that unwanted emissions power does not exceed the following levels in the 1400-1427 MHz band:

(i) For stations of point-to-point systems in the fixed service: −45 dBW/27 MHz.

(ii) For stations in the mobile service: −60 dBW/27 MHz.

(d) *Emission Mask D—12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(f_d−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

EMISSION MASKS

(g) *Emission Mask G.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (f_d/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(h) *Emission Mask H.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

(i) *Emission Mask I.* For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: At least 25 dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: At least 35 dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: At least 43 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.

(j) *Emission Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2.5 kHz, but no more than 6.25 kHz: At least 53 log (f_d/2.5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: At least 103 log (f_d/3.9) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5 kHz: At least 157 log (f_d/5.3) dB, or 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

EMISSION MASKS

§24.133 Emission limits.

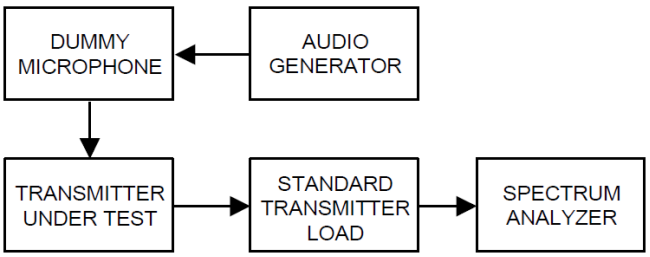
(a) The power of any emission shall be attenuated below the transmitter power (P), as measured in accordance with §24.132(f), in accordance with the following schedule:

(1) For transmitters authorized a bandwidth greater than 10 kHz:

(i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of up to and including 40 kHz: at least 116 Log_{10} ((f_d + 10)/6.1) decibels or 50 plus 10 Log_{10} (P) decibels or 70 decibels, whichever is the lesser attenuation;

(ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 40 kHz: at least 43 + 10 Log_{10} (P) decibels or 80 decibels, whichever is the lesser attenuation.

Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)



EMISSION MASKS

Applicable Emission Limitations

FCC Rule Part	Frequency (MHz)	Special Conditions	Applicable Emission Mask	Channel Bandwidth (kHz)	Authorized Bandwidth (kHz)
90	806.0125	Low Pass	Pt 90 Mask B	12.5	20
		No Low Pass	Pt 90 Mask H		
	824.0000	n/a	Pt 90 Mask D	25.0	11.25
	848.9875	Low Pass	Pt 90 Mask B	n/a	n/a
		No Low Pass	Pt 90 Mask H		
90	851.0125	Low Pass	Pt 90 Mask B	12.5	20
		No Low Pass	Pt 90 Mask H		
	869.0000	n/a	Pt 90 Mask D	25.0	11.25
	893.9875	Low Pass	Pt 90 Mask B	n/a	n/a
		No Low Pass	Pt 90 Mask H		
90	898.0000	Low Pass	Pt 90 Mask I	12.5	13.6
		No Low Pass	Pt 90 Mask J		
24	901.5000		Pt 24.133(a)(1)	15	20
90	929.5000	Low Pass	Pt 90 Mask B	25	20
		No Low Pass	Pt 90 Mask G		
24	930.5000		Pt 24.133(a)(1)	15	20
90	938.0000	Low Pass	Pt 90 Mask B	n/a	n/a
		No Low Pass	Pt 90 Mask C		
24	940.5000		Pt 24.133(a)(1)	15	20

Note: FCC Part 22 does not specify in-band emission limitations for this frequency range.

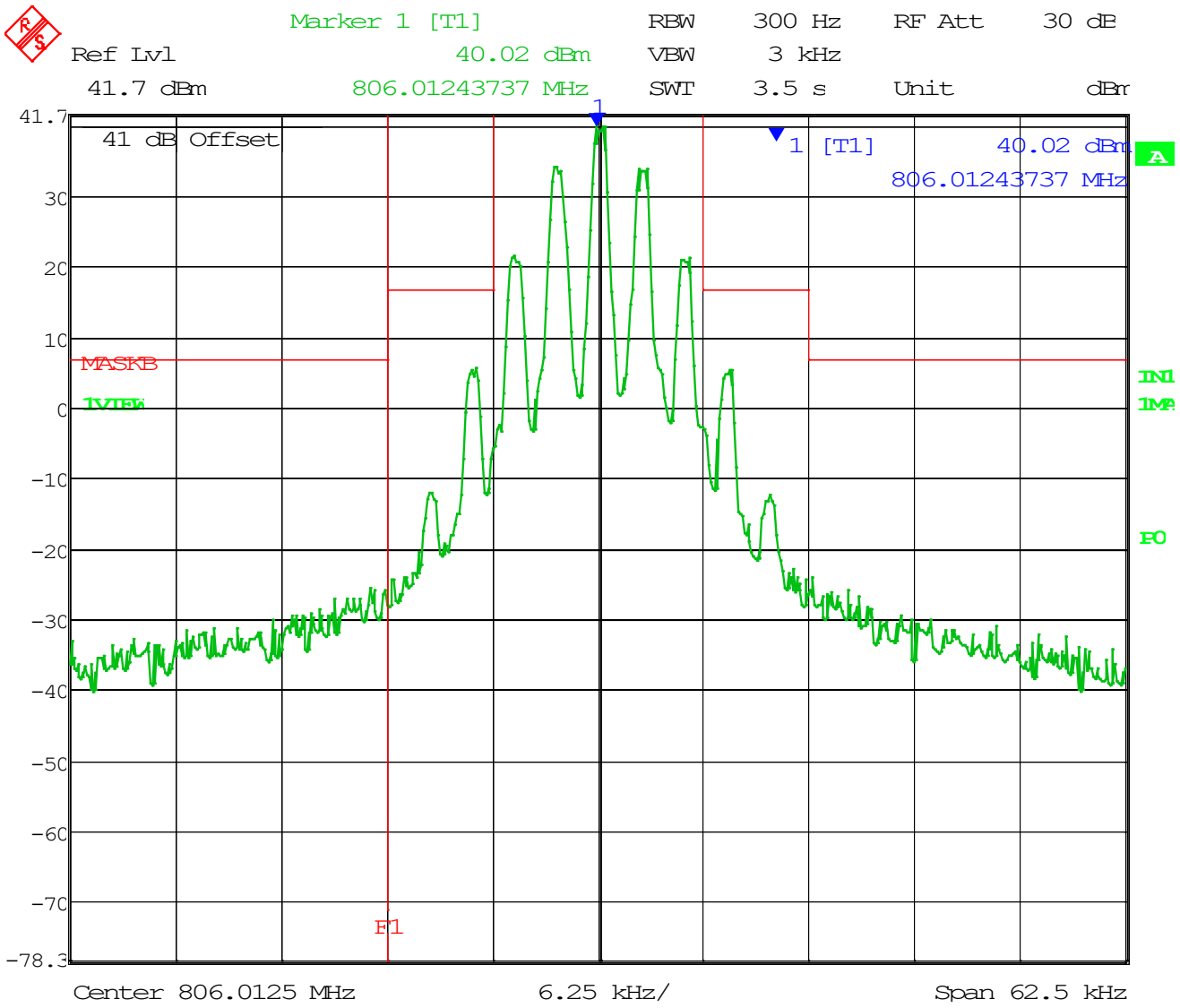
Note: Plots were taken at High power. Low power was investigated, and was identical in its compliance to each of the following emission masks.

Note: In the following plots, Marker Line F1 indicates the band edge (if applicable).

EMISSION MASKS

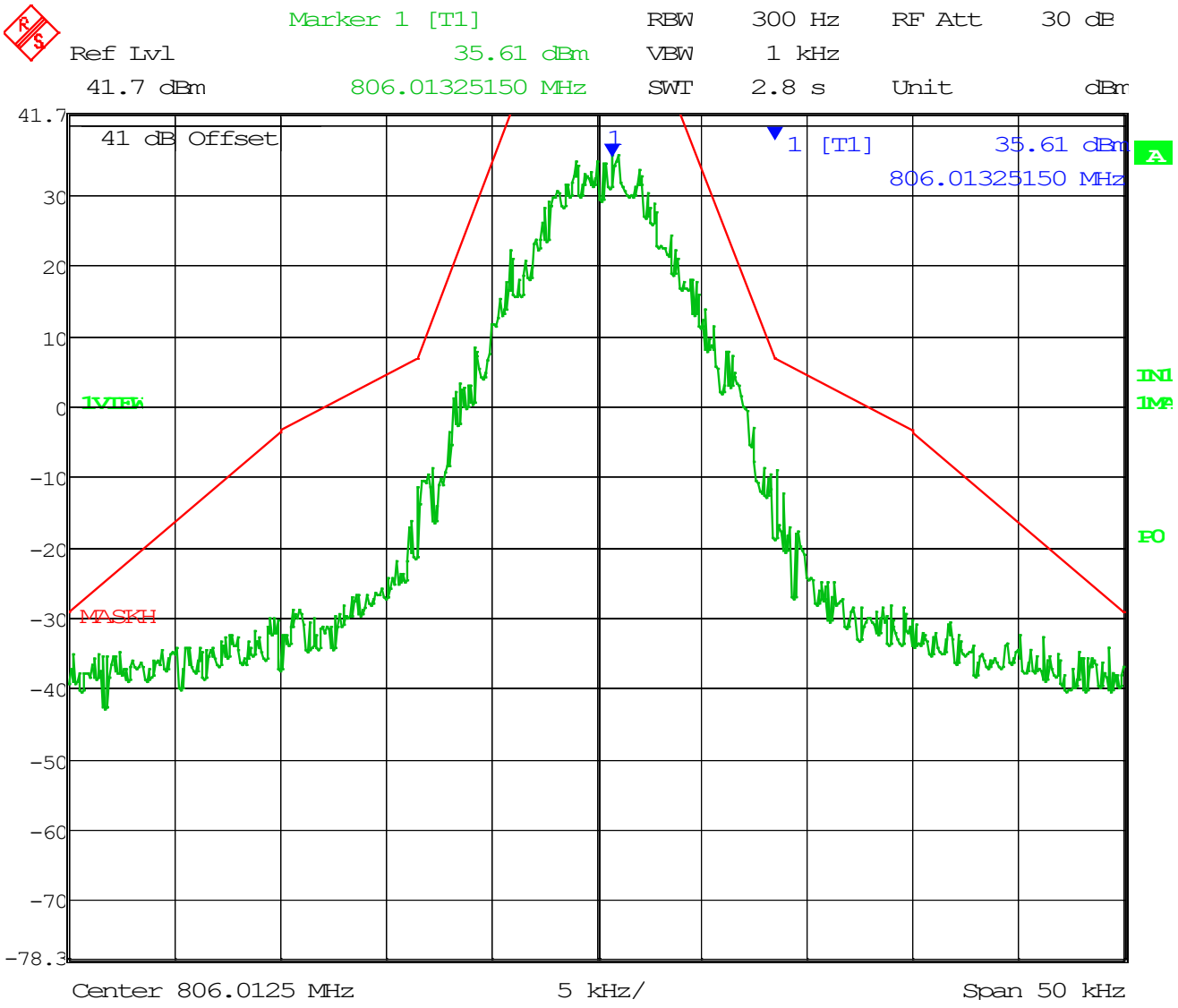
Part 90 Bands

806.0125 MHz, 11K0F3E (Low Pass Filter)



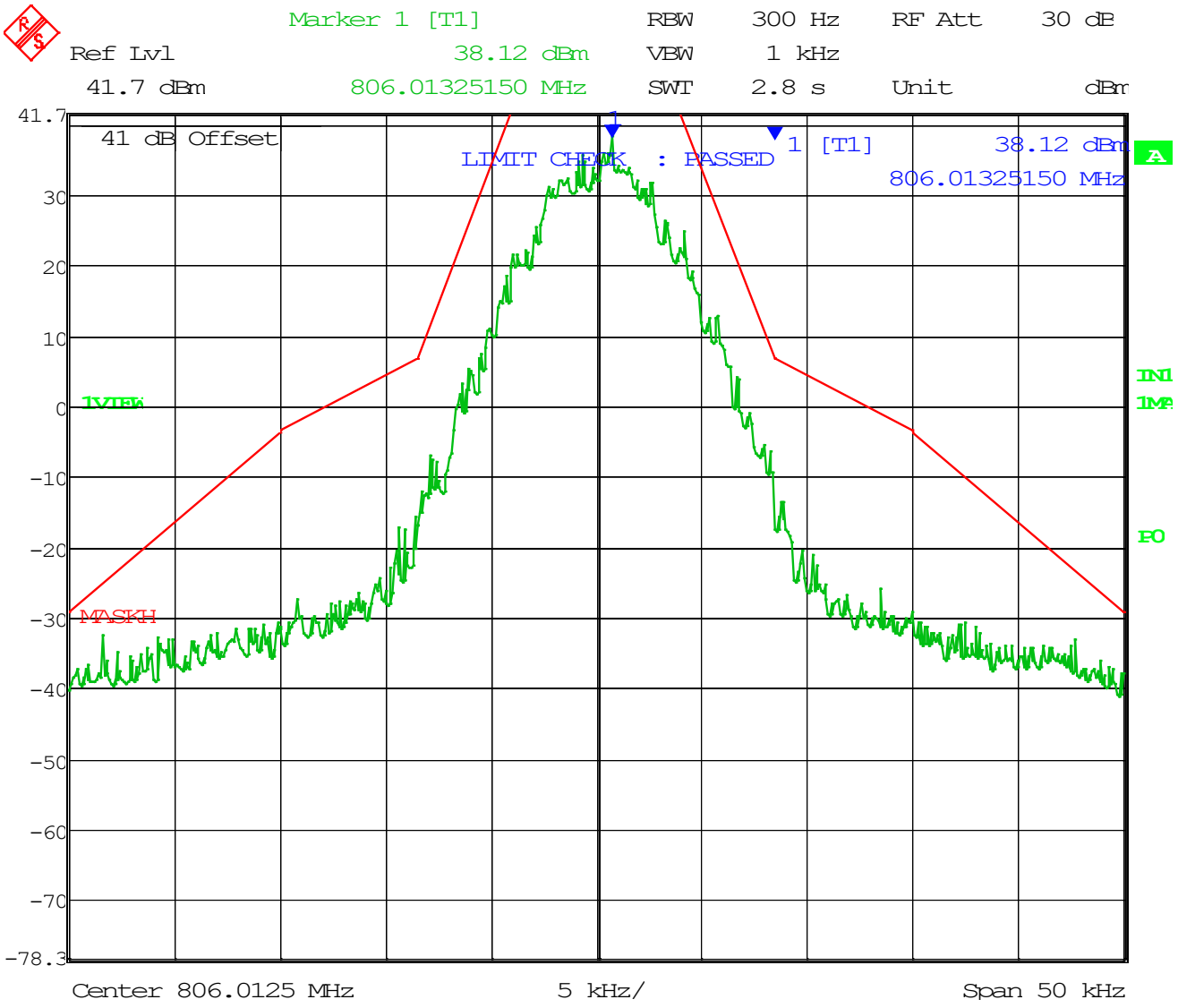
EMISSION MASKS

806.0125 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



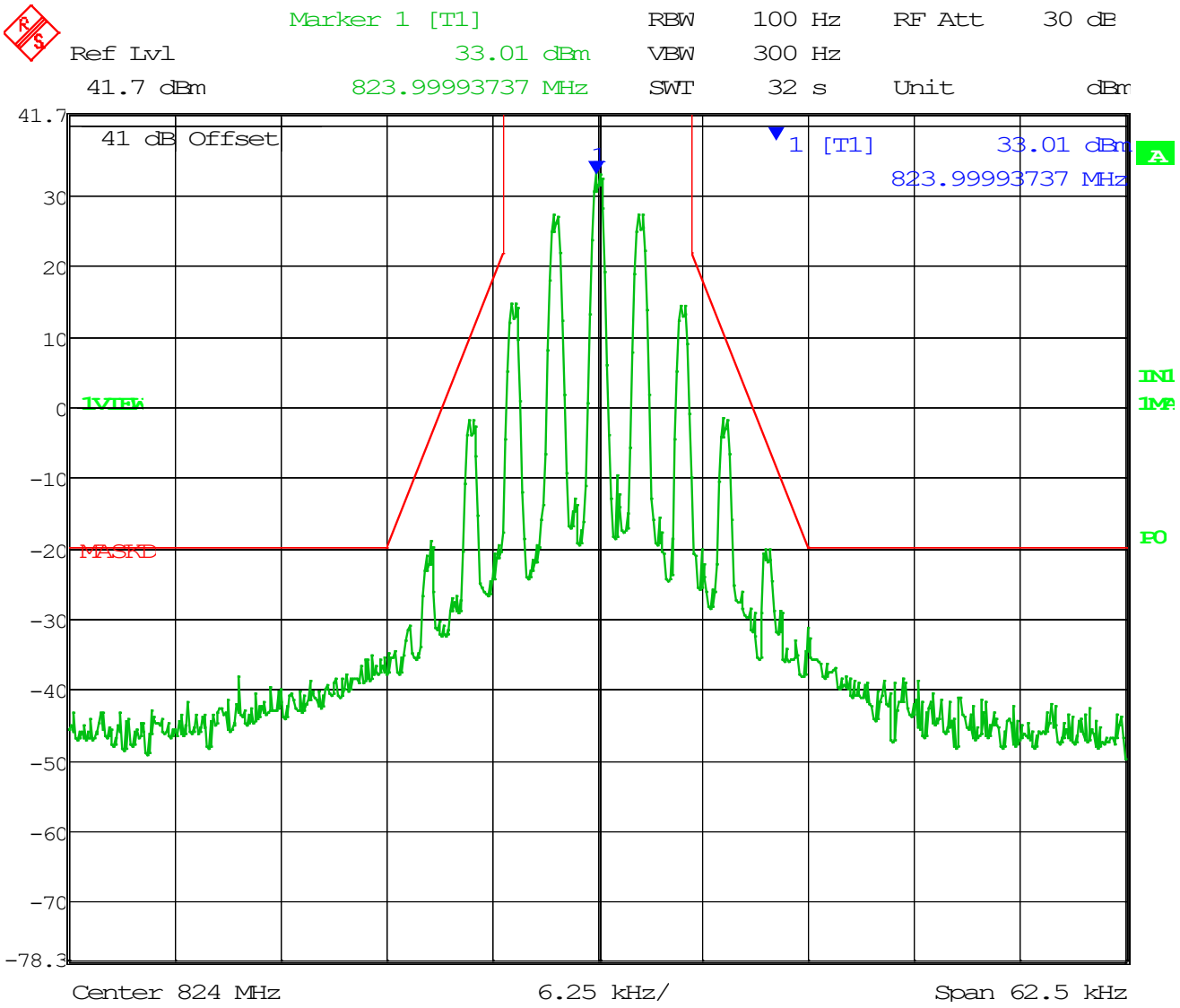
EMISSION MASKS

806.0125 MHz, 7K60FXE/FXD (No Low Pass Filter)



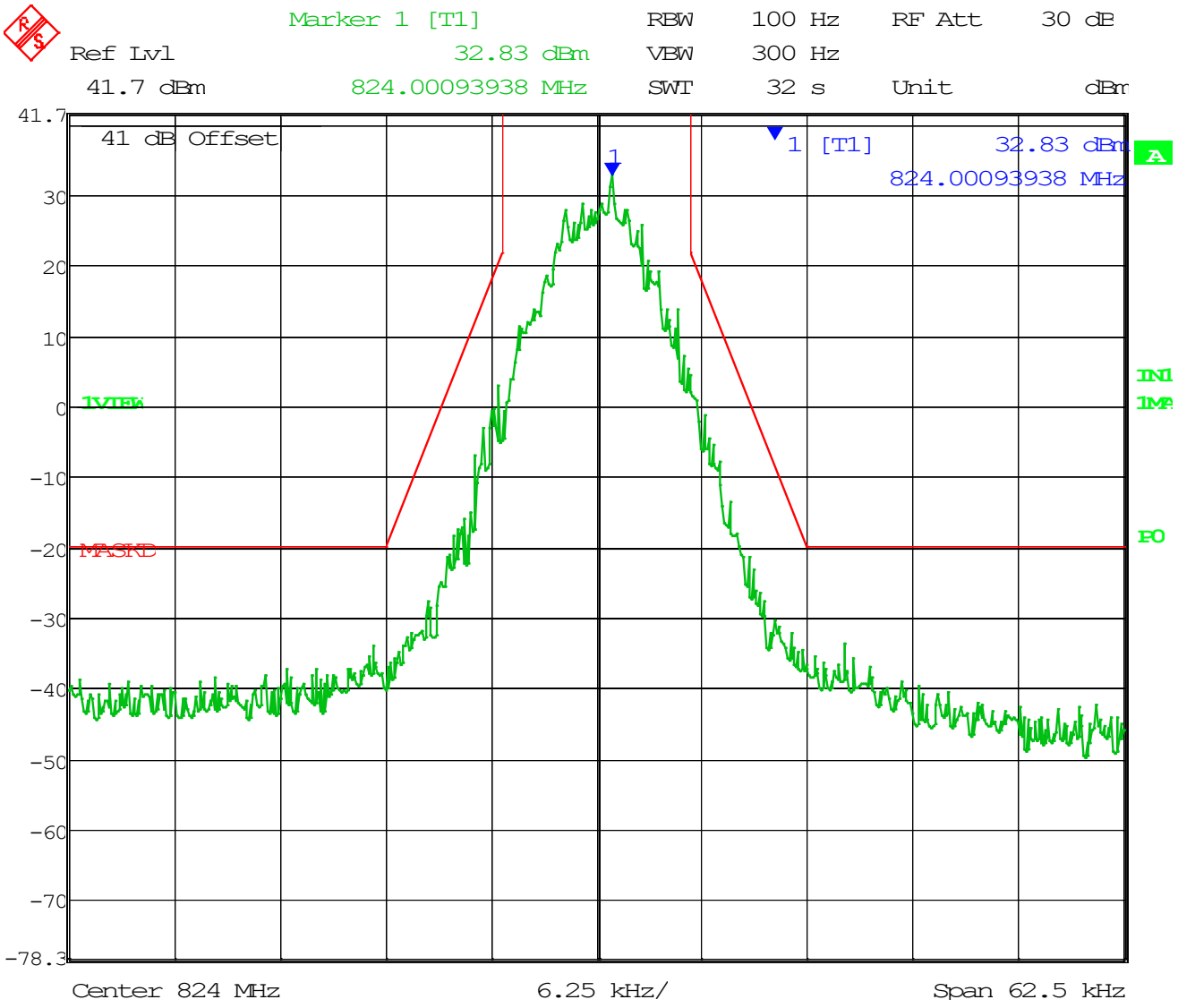
EMISSION MASKS

824 MHz, 11K0F3E



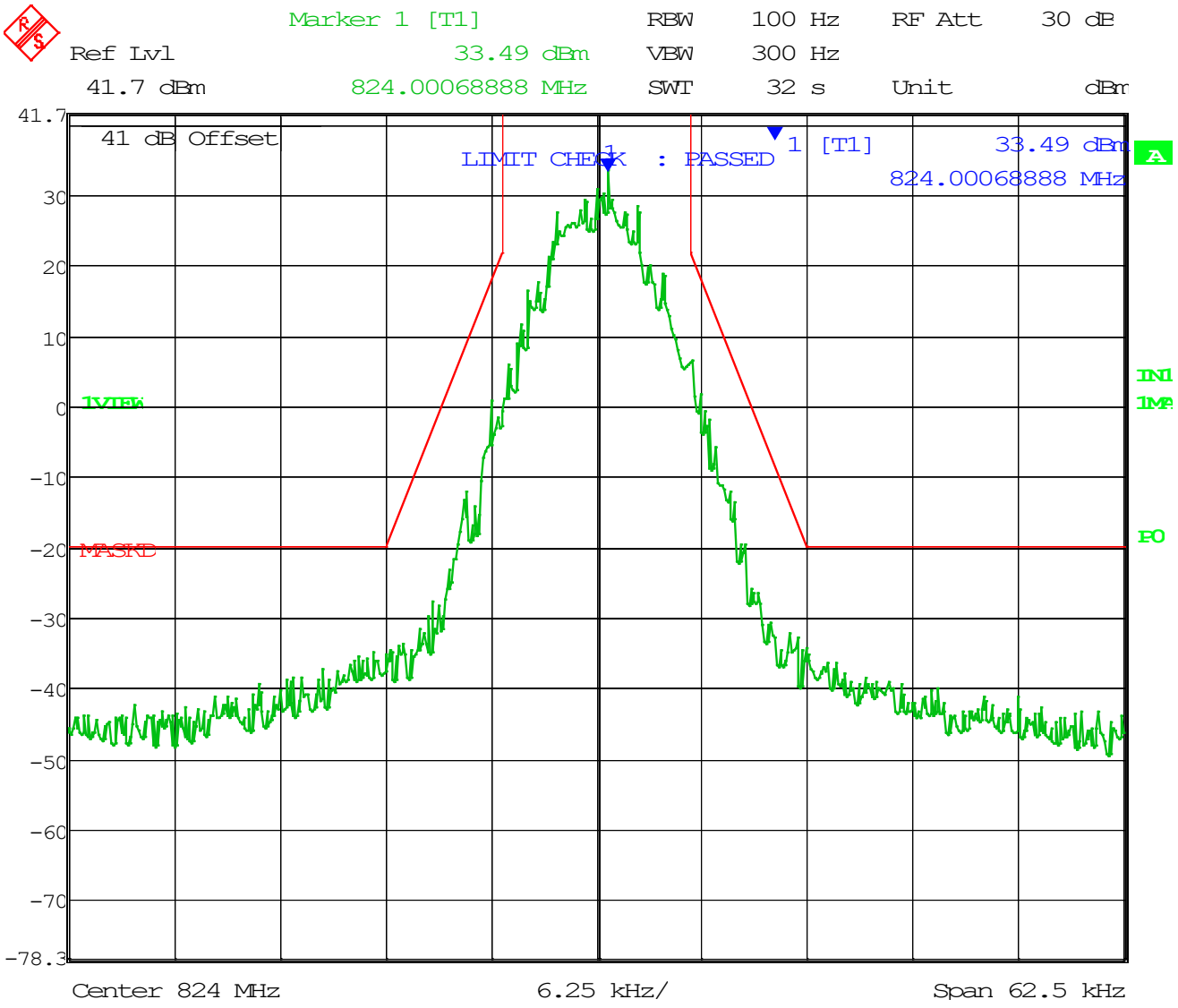
EMISSION MASKS

824 MHz, 8K10F1D/F1E/F1W



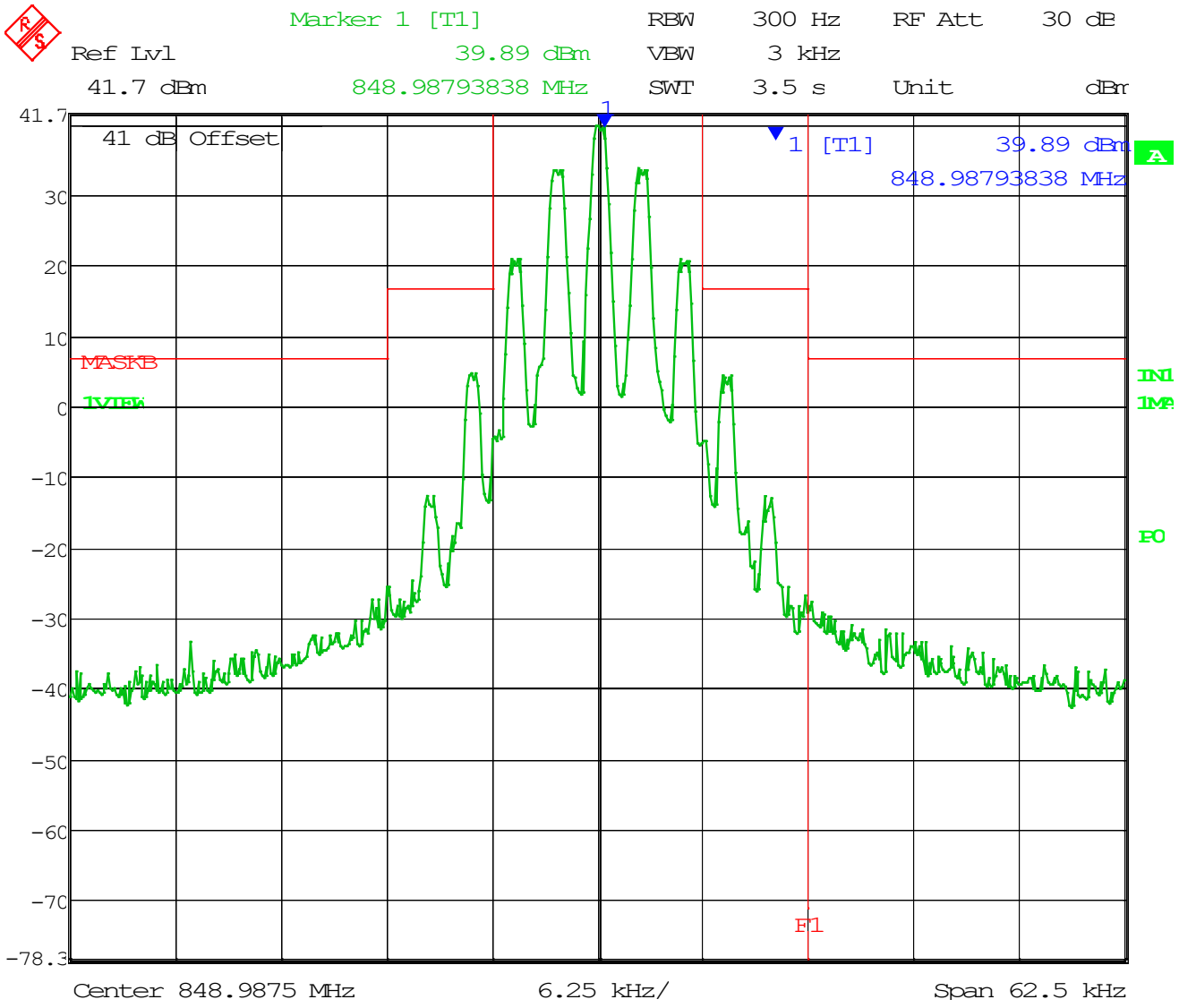
EMISSION MASKS

824 MHz, 7K60FXE/FXD



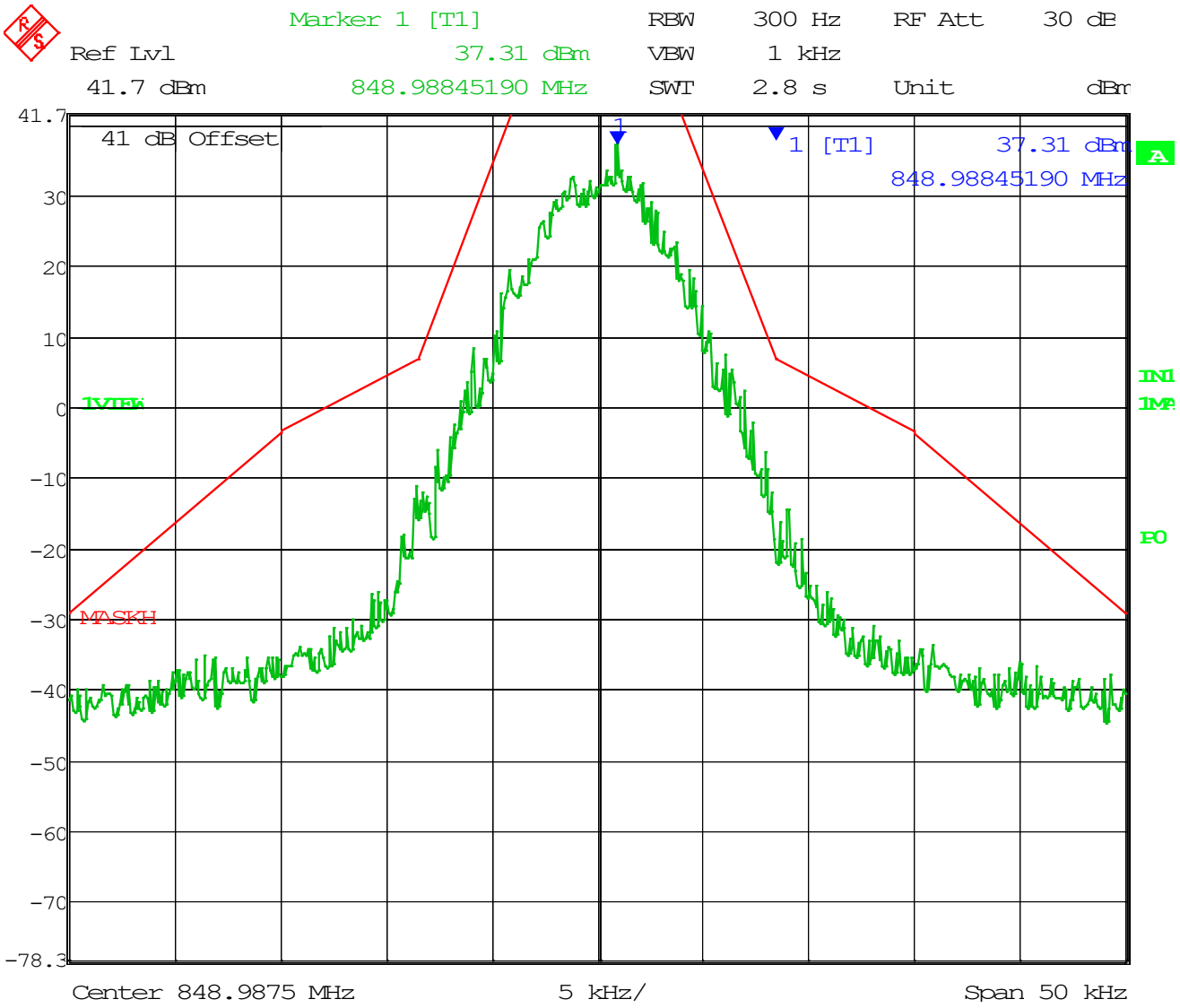
EMISSION MASKS

848.9875 MHz, 11K0F3E (Low Pass Filter)



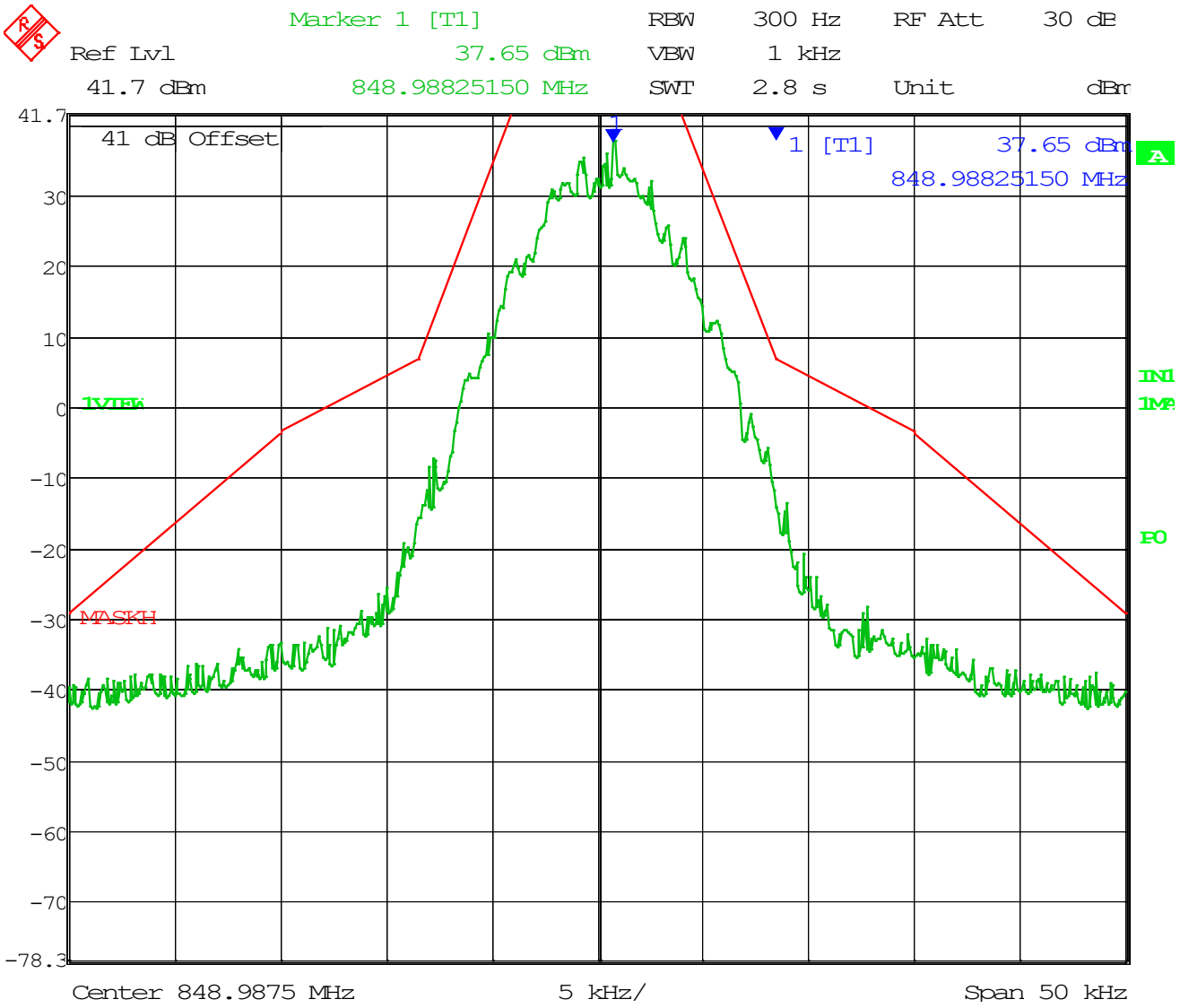
EMISSION MASKS

848.9875 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



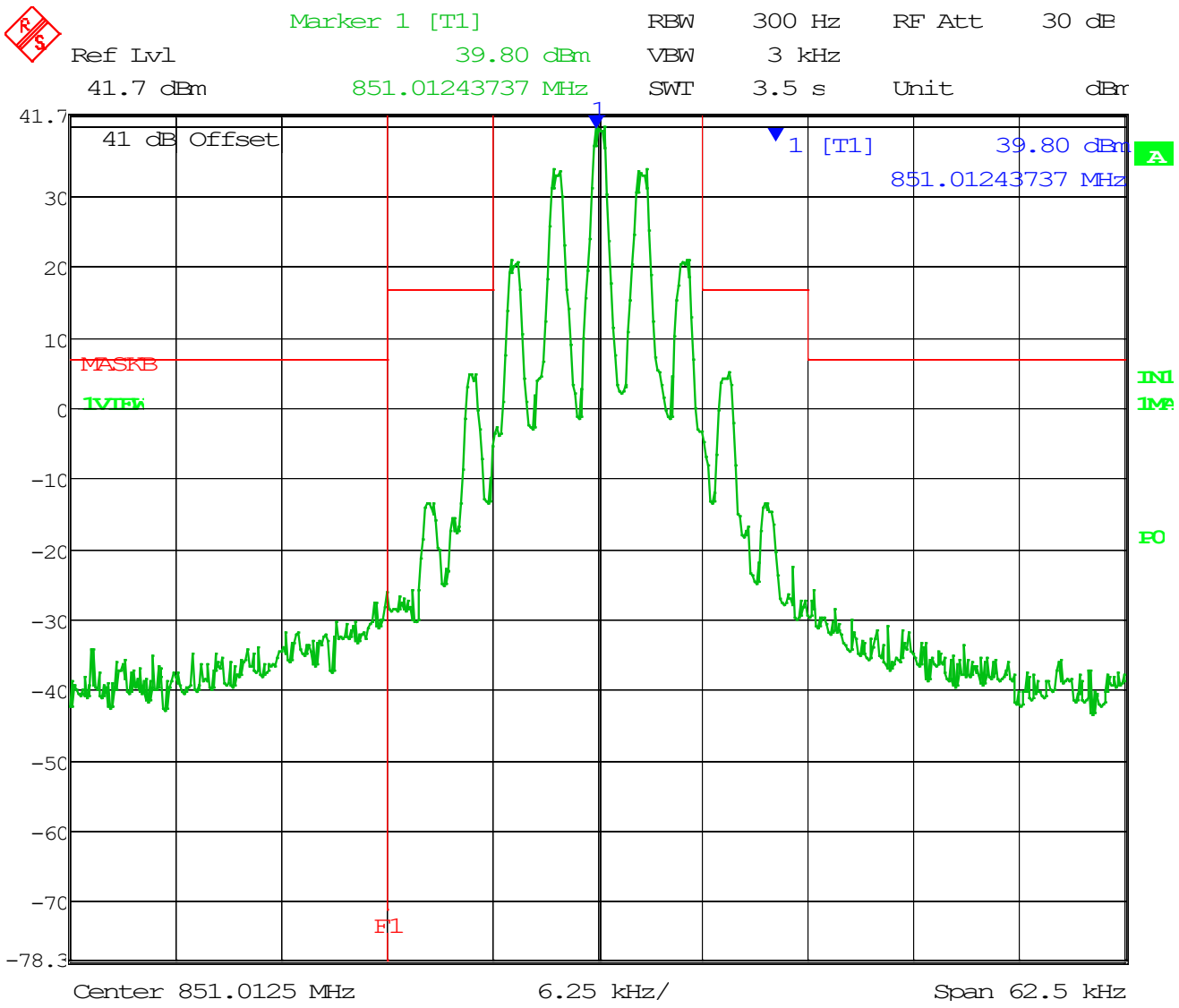
EMISSION MASKS

848.9875 MHz, 7K60FXE/FXD (No Low Pass Filter)



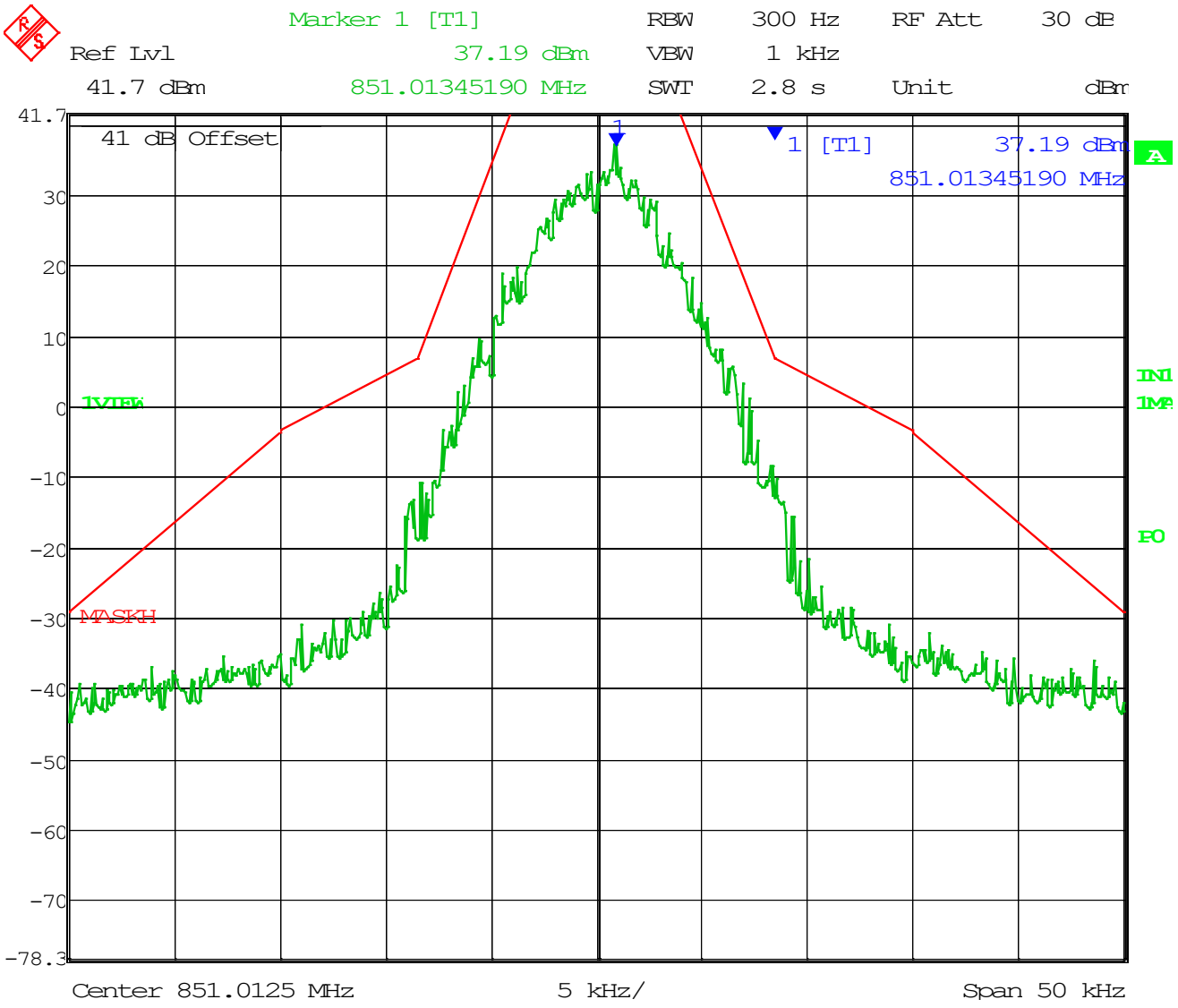
EMISSION MASKS

851.0125 MHz, 11K0F3E (Low Pass Filter)



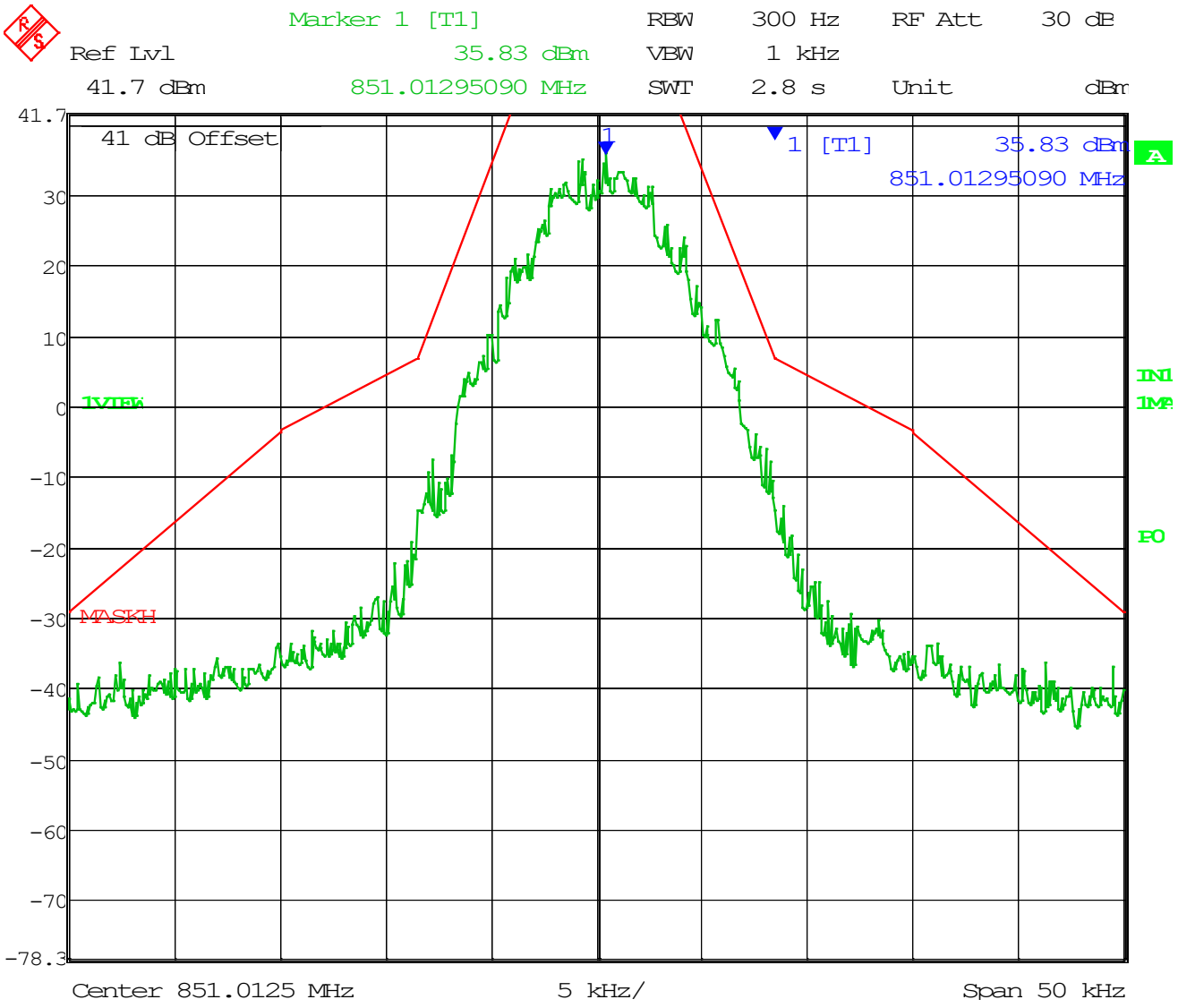
EMISSION MASKS

851.0125 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



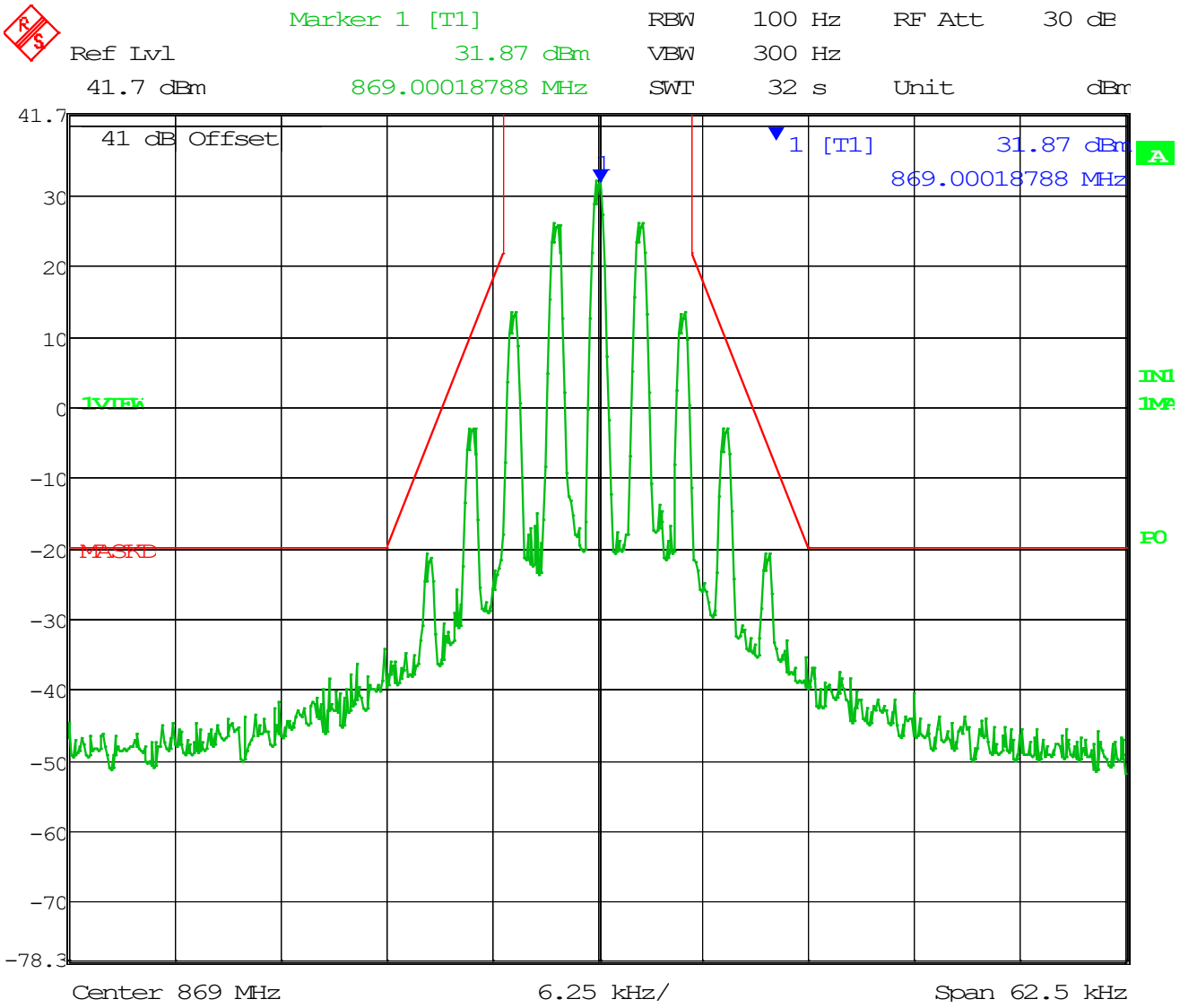
EMISSION MASKS

851.0125 MHz, 7K60FXE/FXD (No Low Pass Filter)



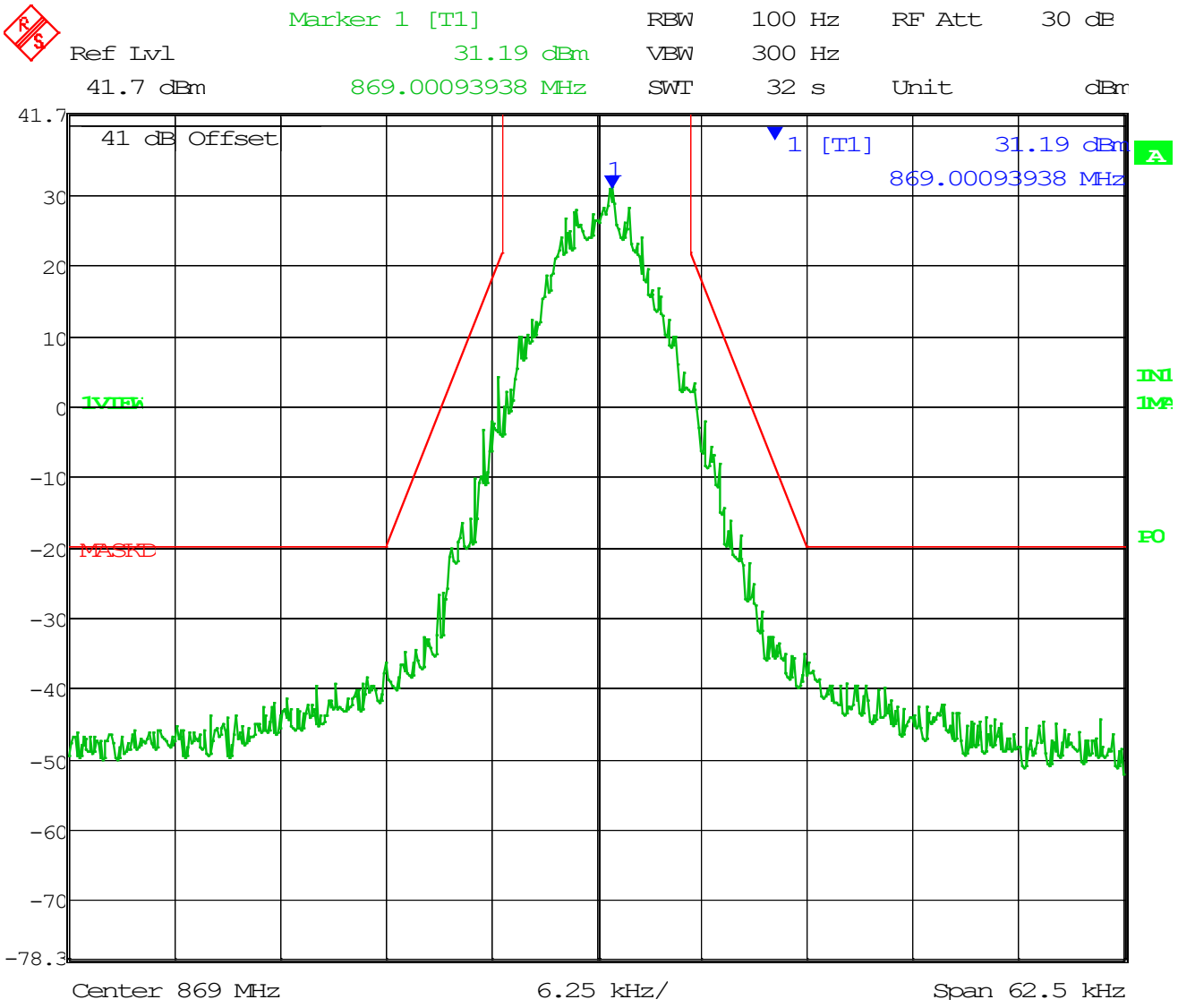
EMISSION MASKS

869 MHz, 11K0F3E



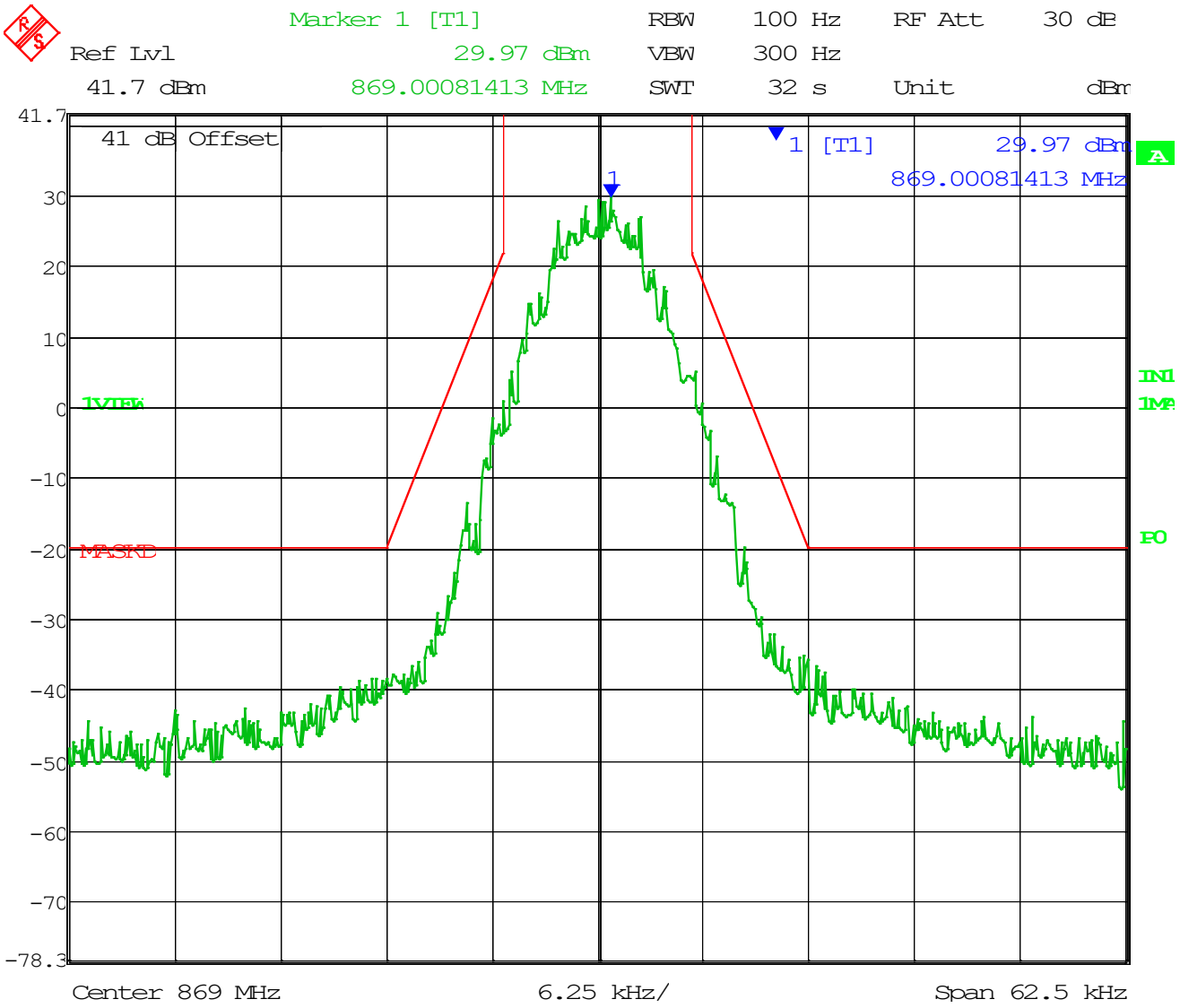
EMISSION MASKS

869 MHz, 8K10F1D/F1E/F1W



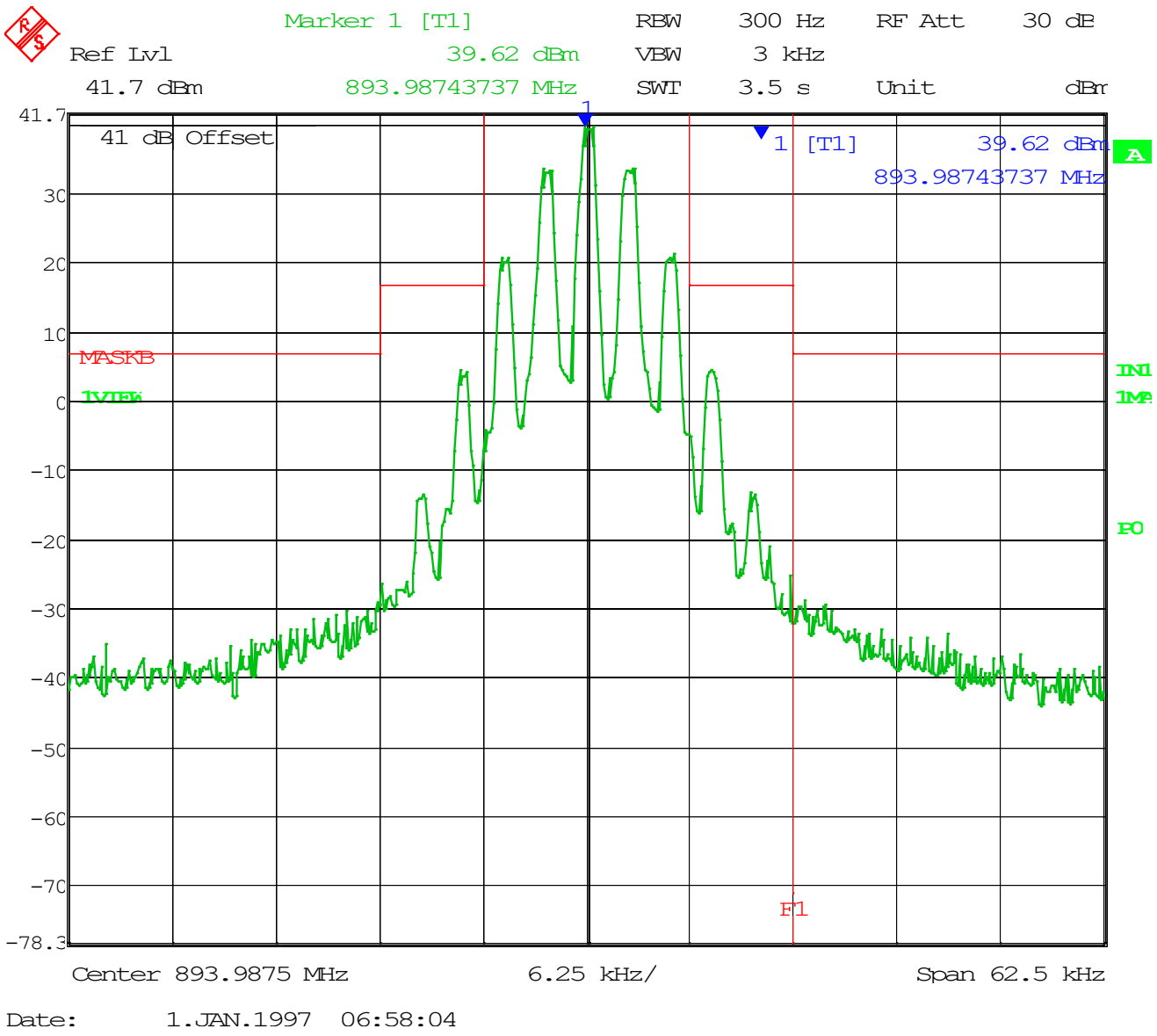
EMISSION MASKS

869 MHz, 7K60FXE/FXD



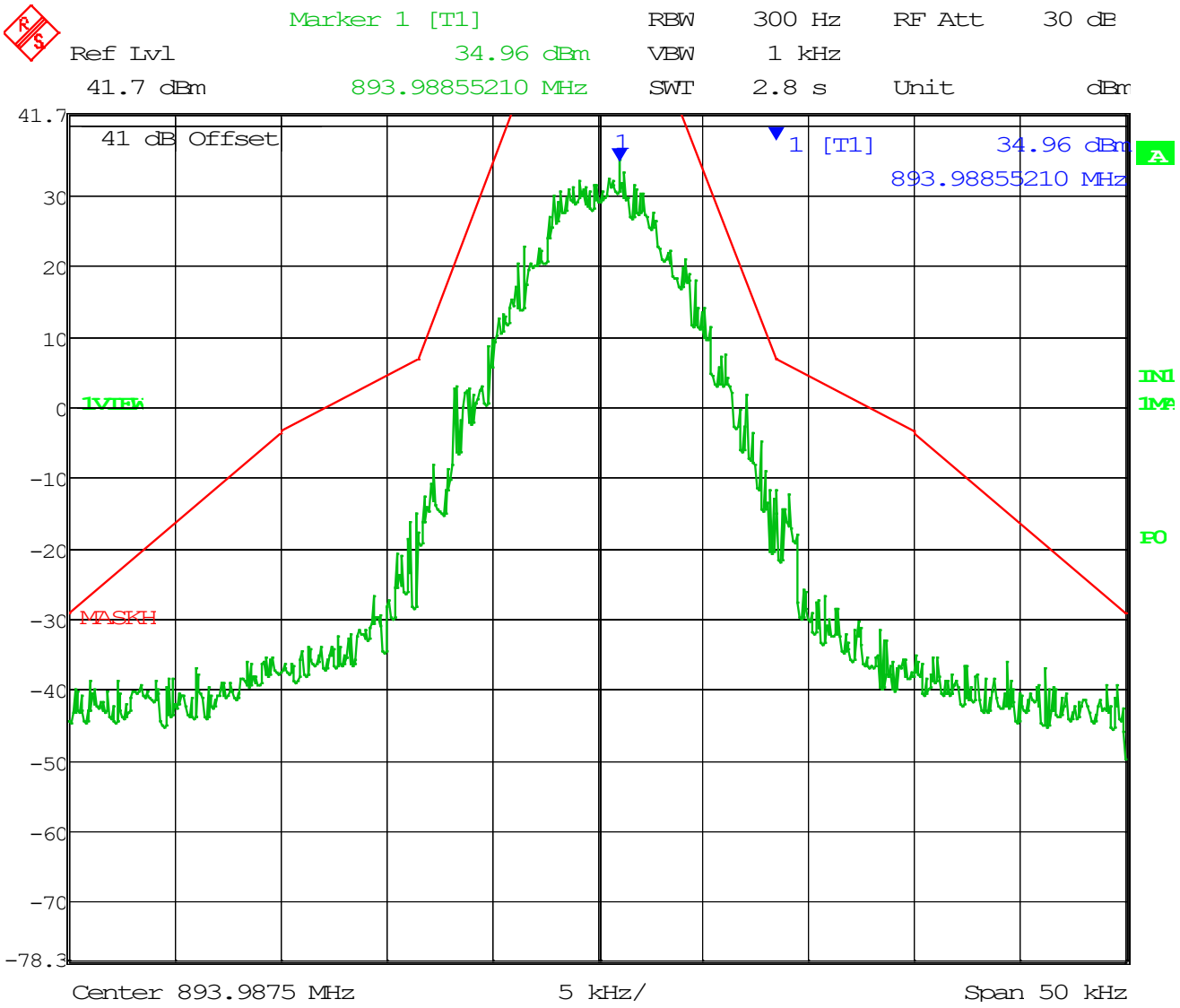
EMISSION MASKS

893.9875 MHz, 11K0F3E (Low Pass Filter)



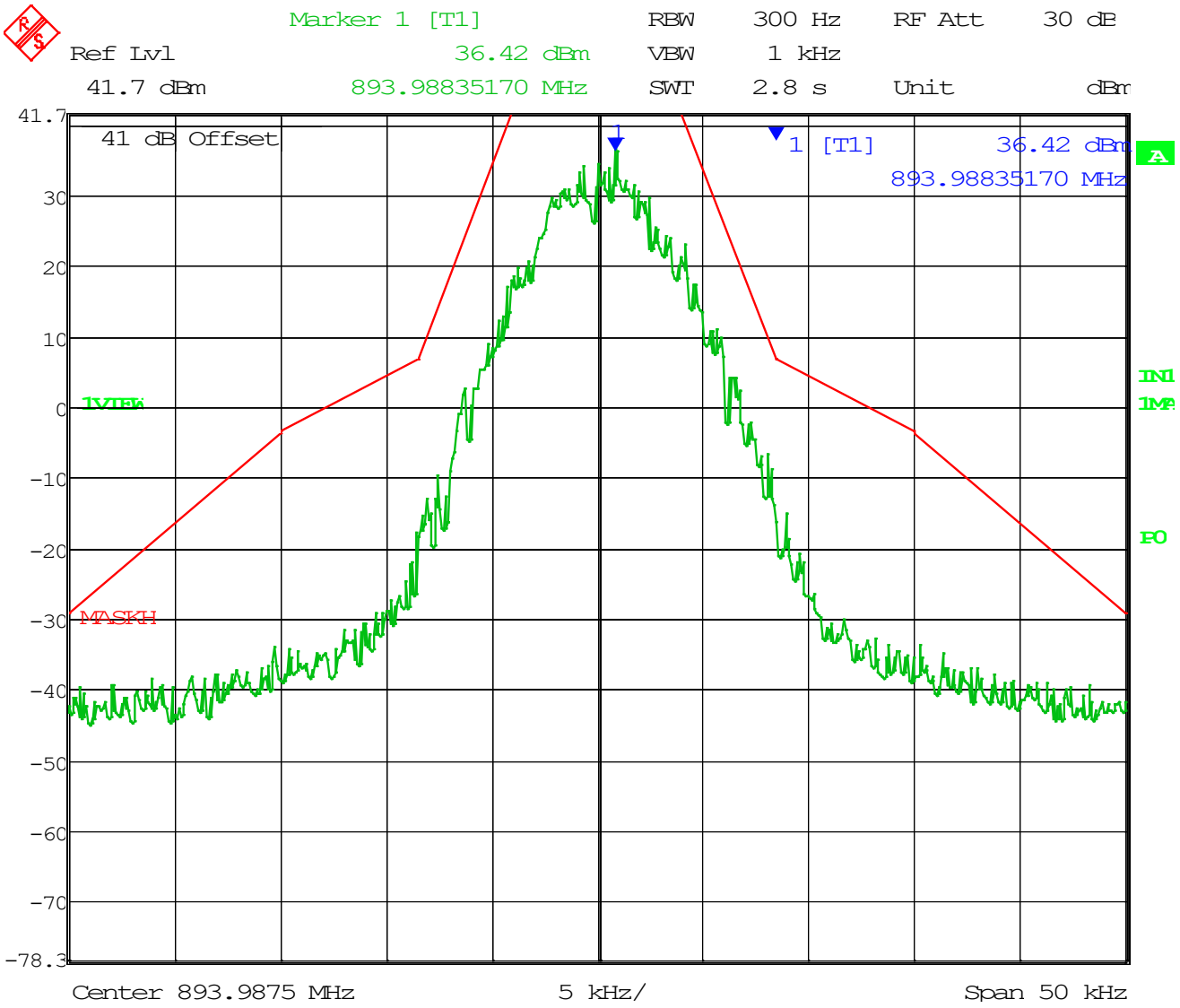
EMISSION MASKS

893.9875 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



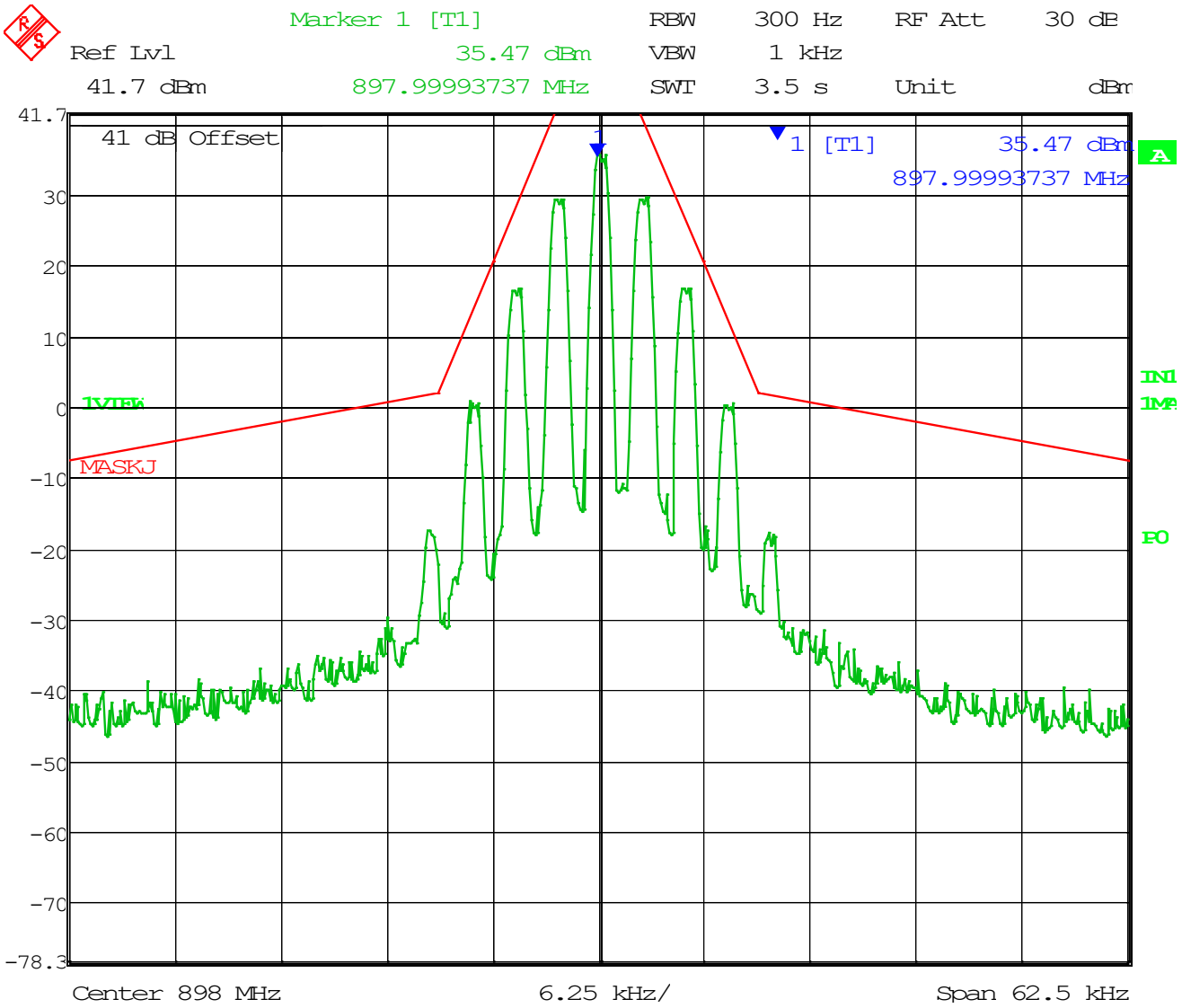
EMISSION MASKS

893.9875 MHz, 7K60FXE/FXD (No Low Pass Filter)



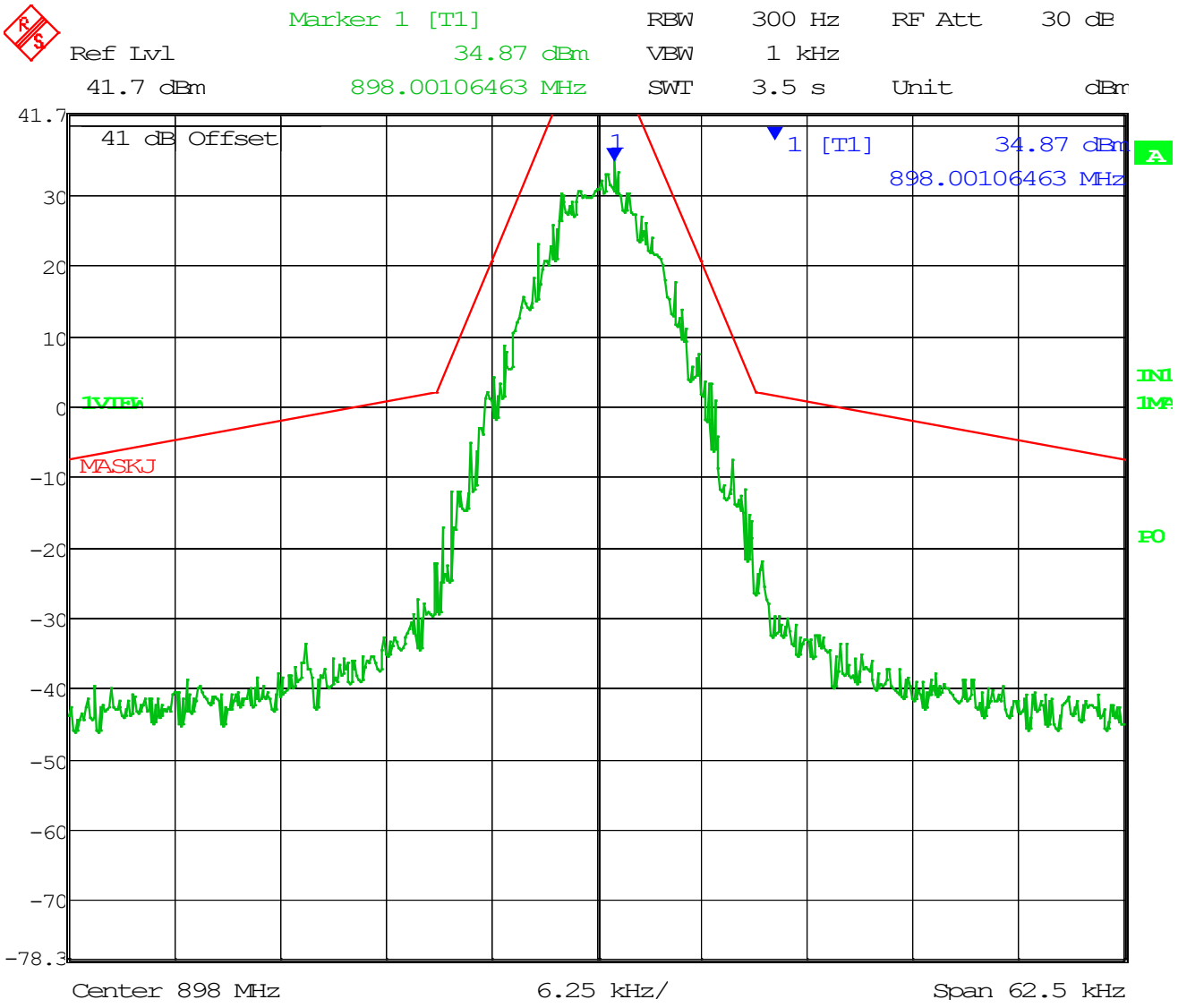
EMISSION MASKS

898 MHz, 11K0F3E (Low Pass Filter)



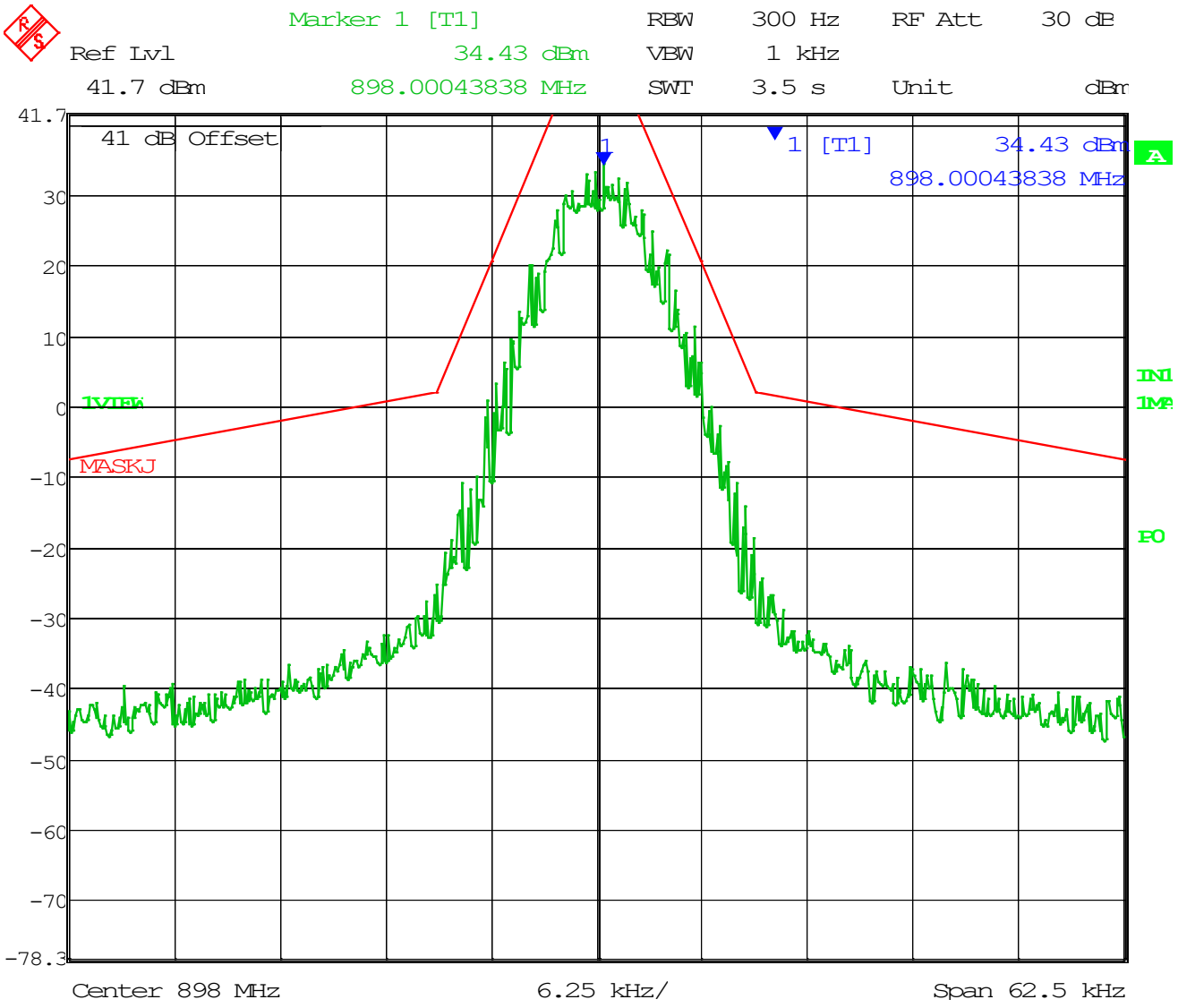
EMISSION MASKS

898 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



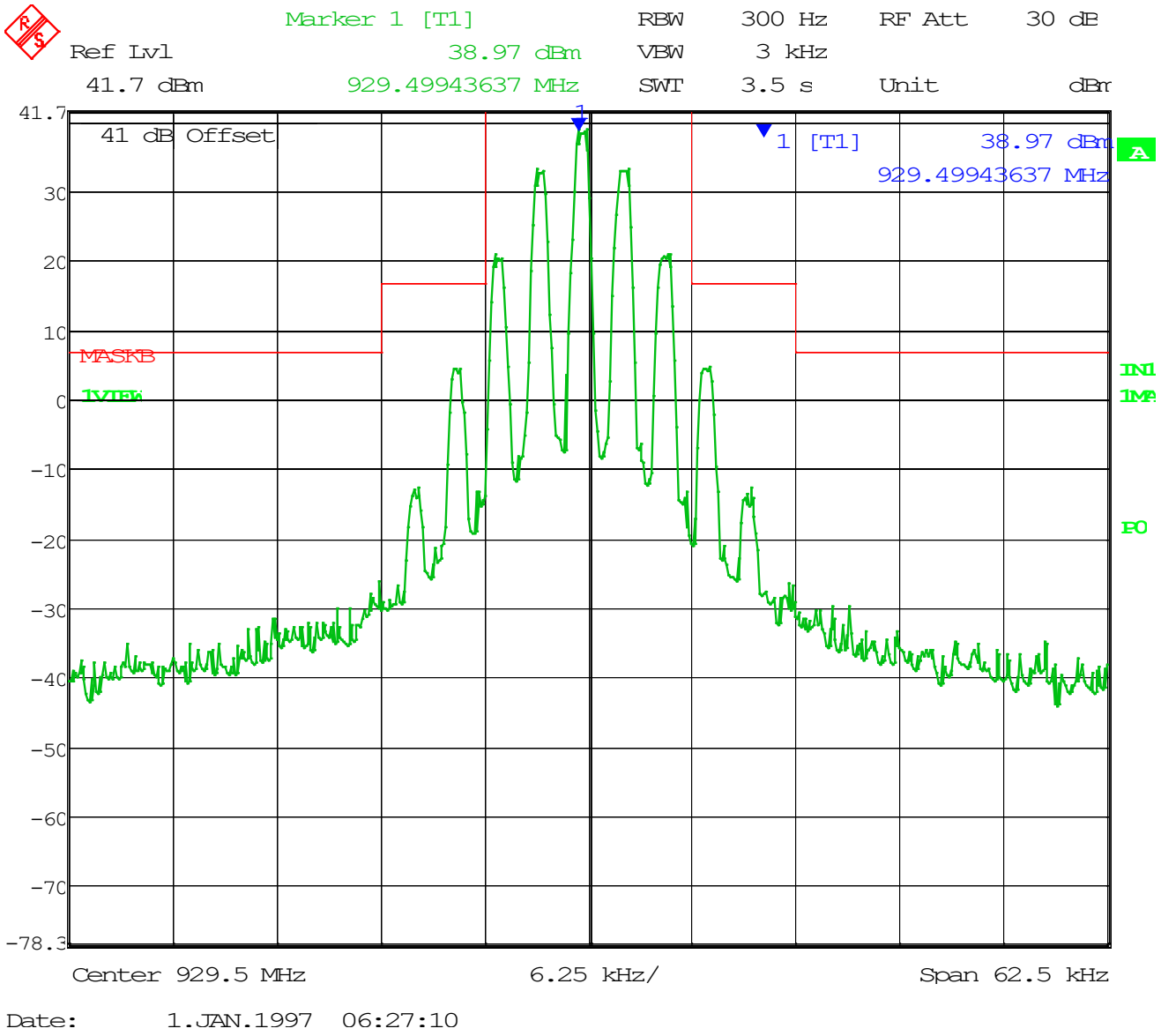
EMISSION MASKS

898 MHz, 7K60FXE/FXD (No Low Pass Filter)



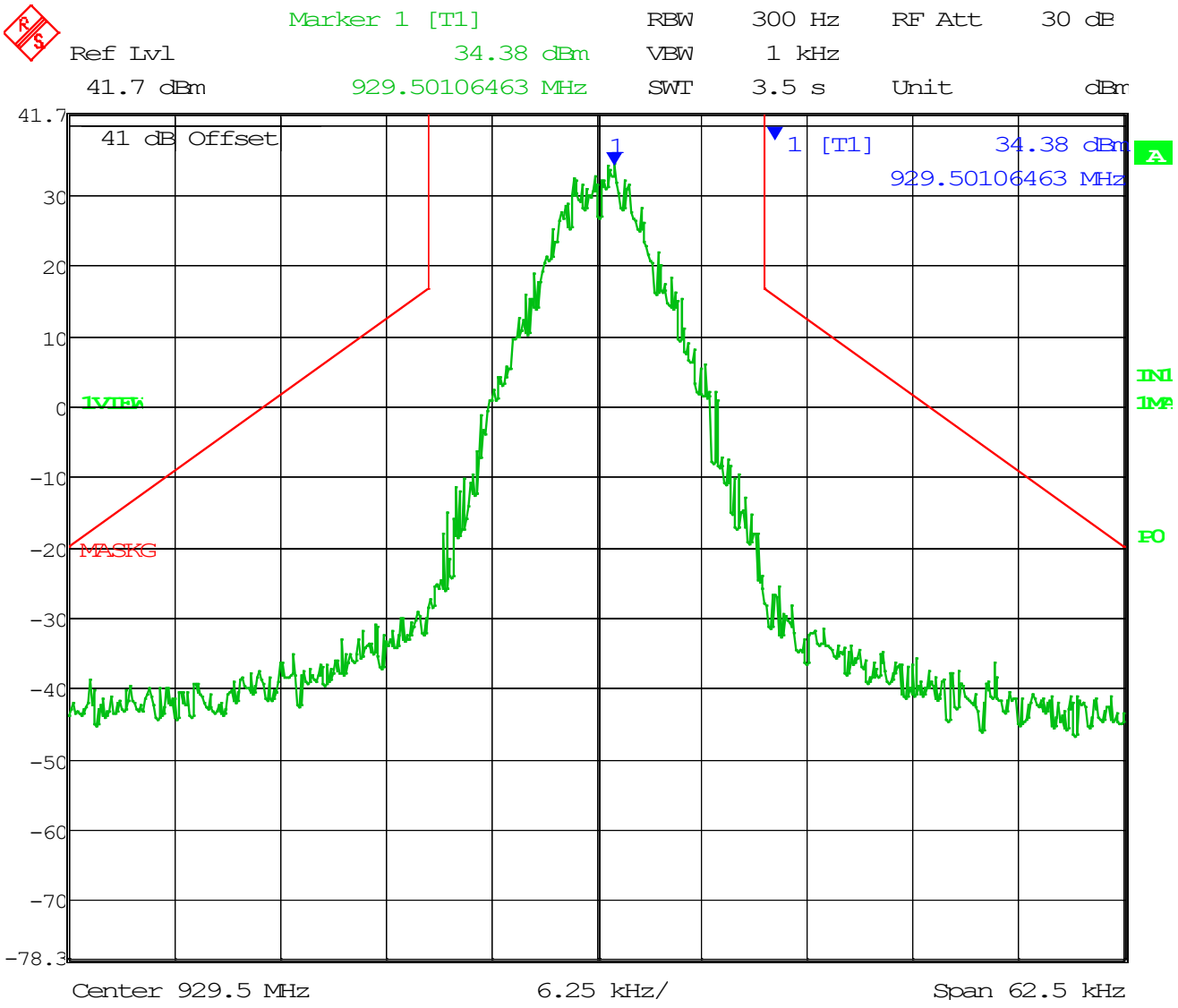
EMISSION MASKS

929.5 MHz, 11K0F3E (Low Pass Filter)



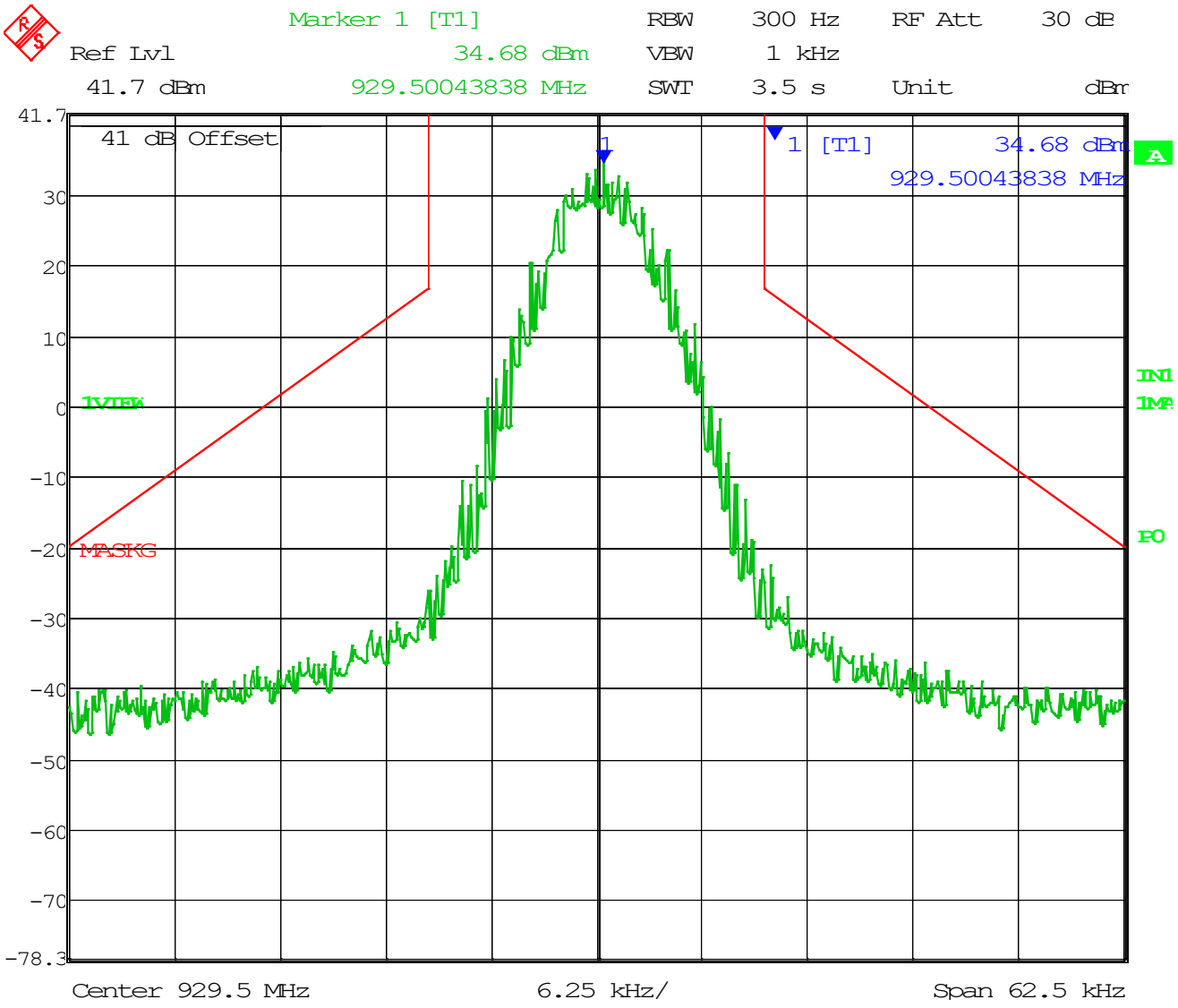
EMISSION MASKS

929.5 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



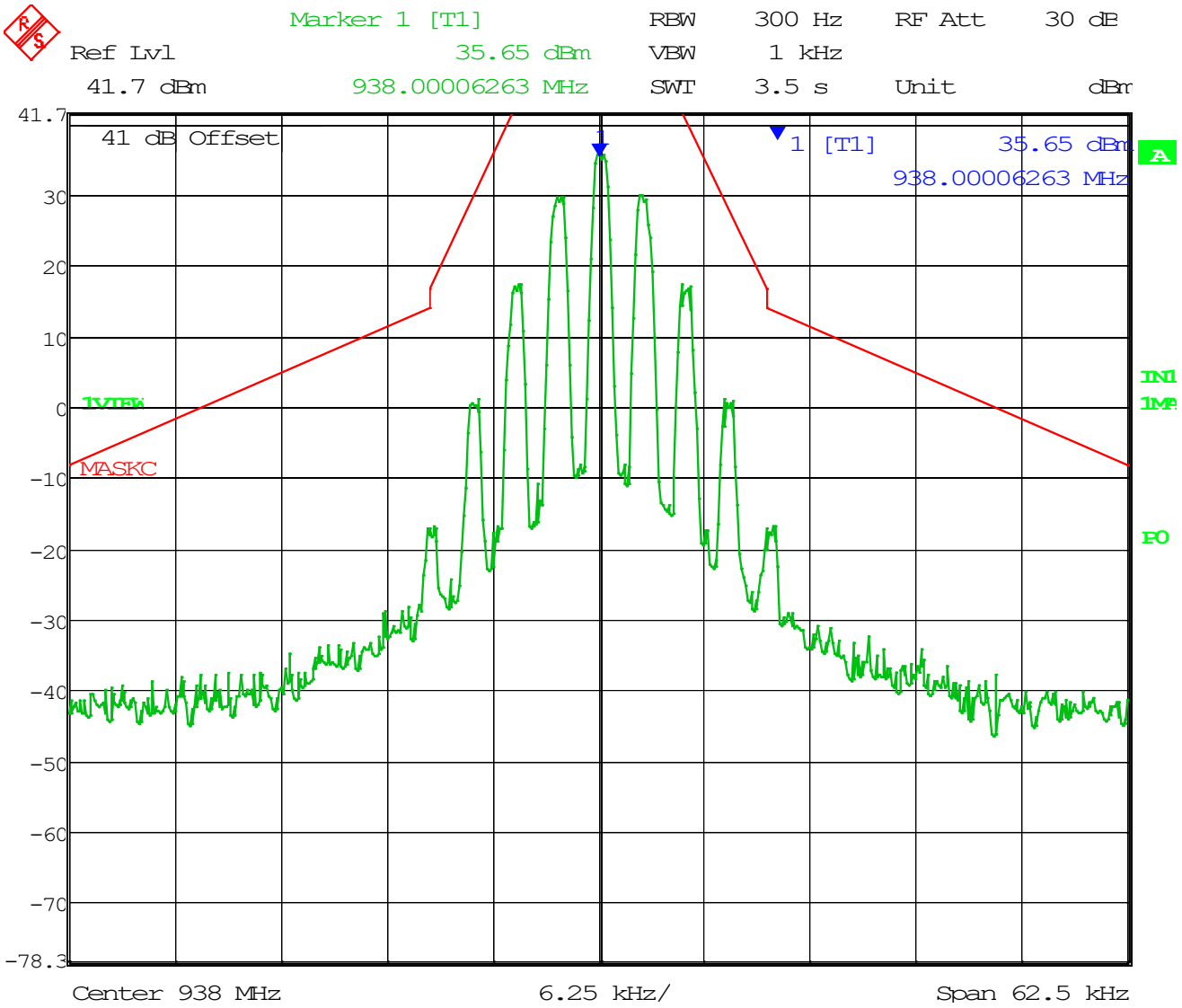
EMISSION MASKS

929.5 MHz, 7K60FXE/FXD (No Low Pass Filter)



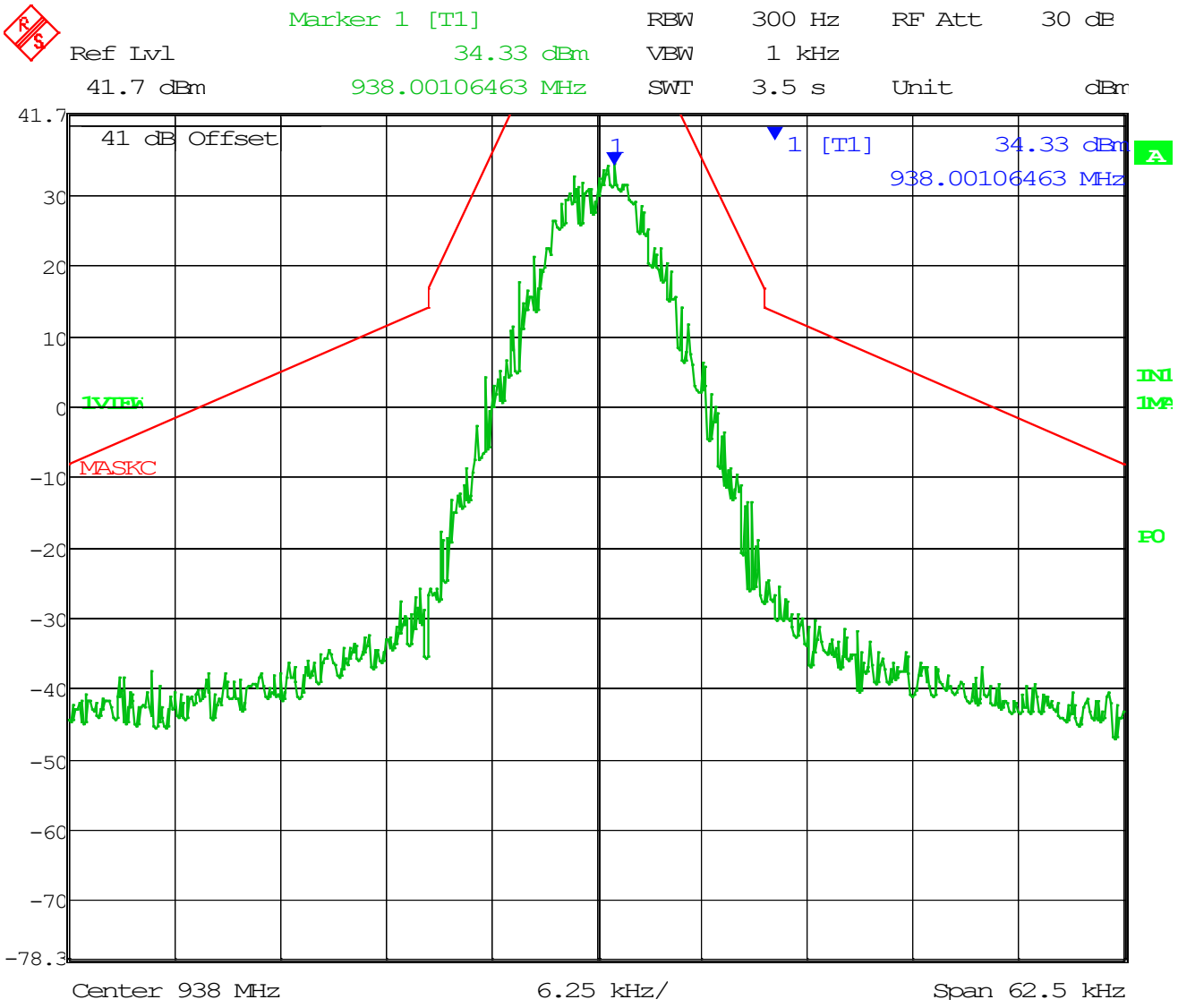
EMISSION MASKS

938 MHz, 11K0F3E (Low Pass Filter)



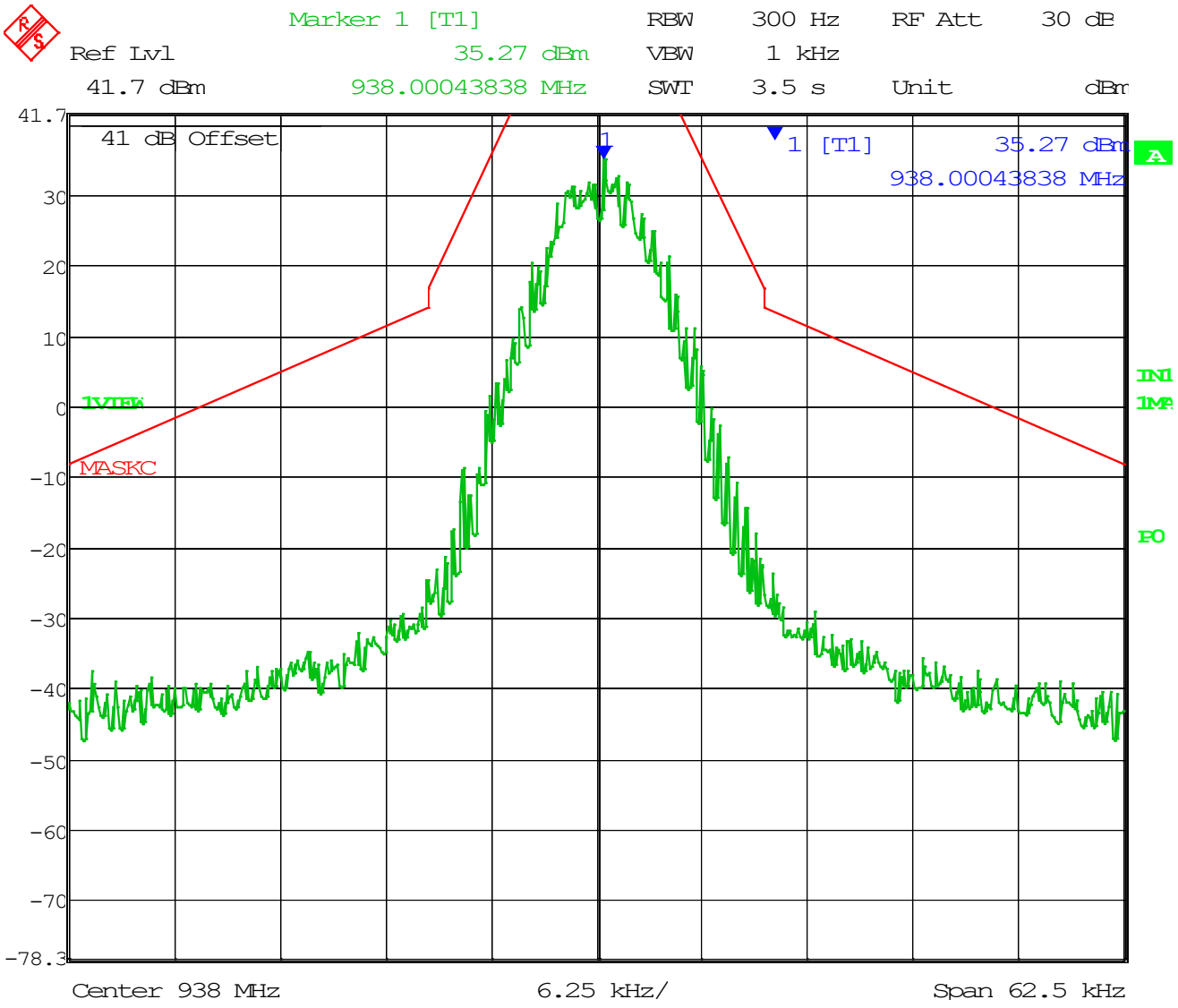
EMISSION MASKS

938 MHz, 8K10F1D/F1E/F1W (No Low Pass Filter)



EMISSION MASKS

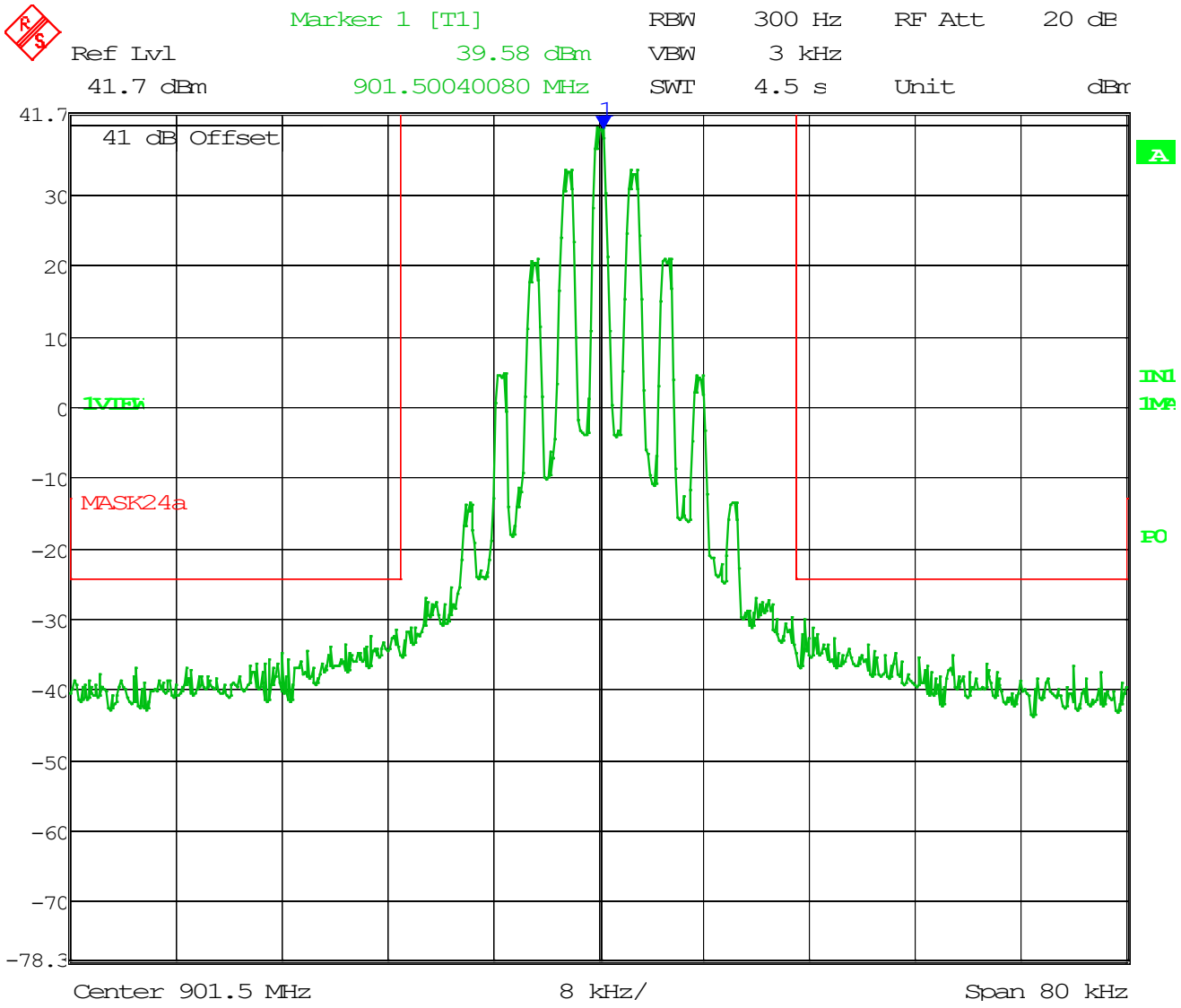
938 MHz, 7K60FXE/FXD (No Low Pass Filter)



EMISSION MASKS

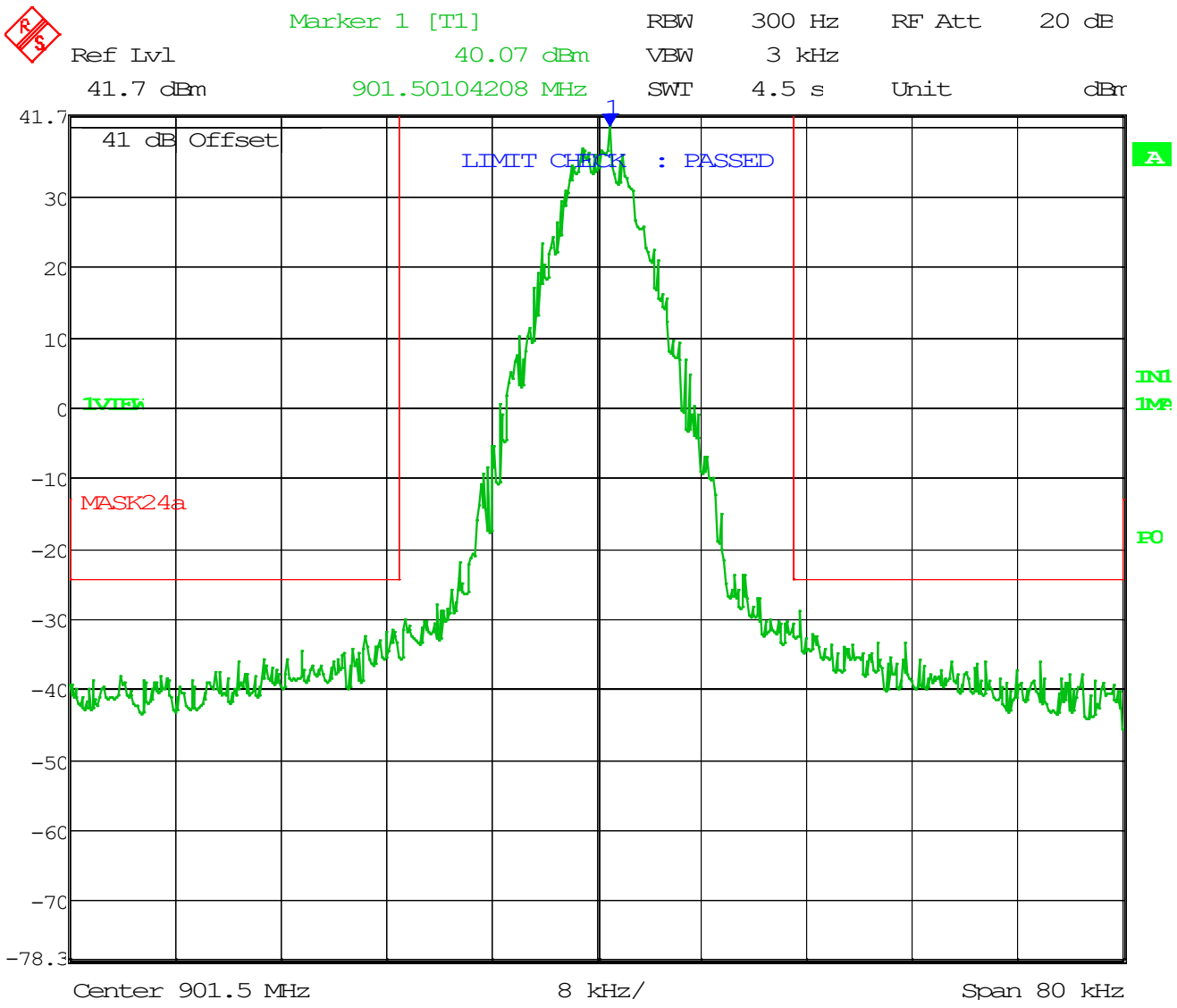
Part 24 Bands

901.5 MHz, 11K0F3E



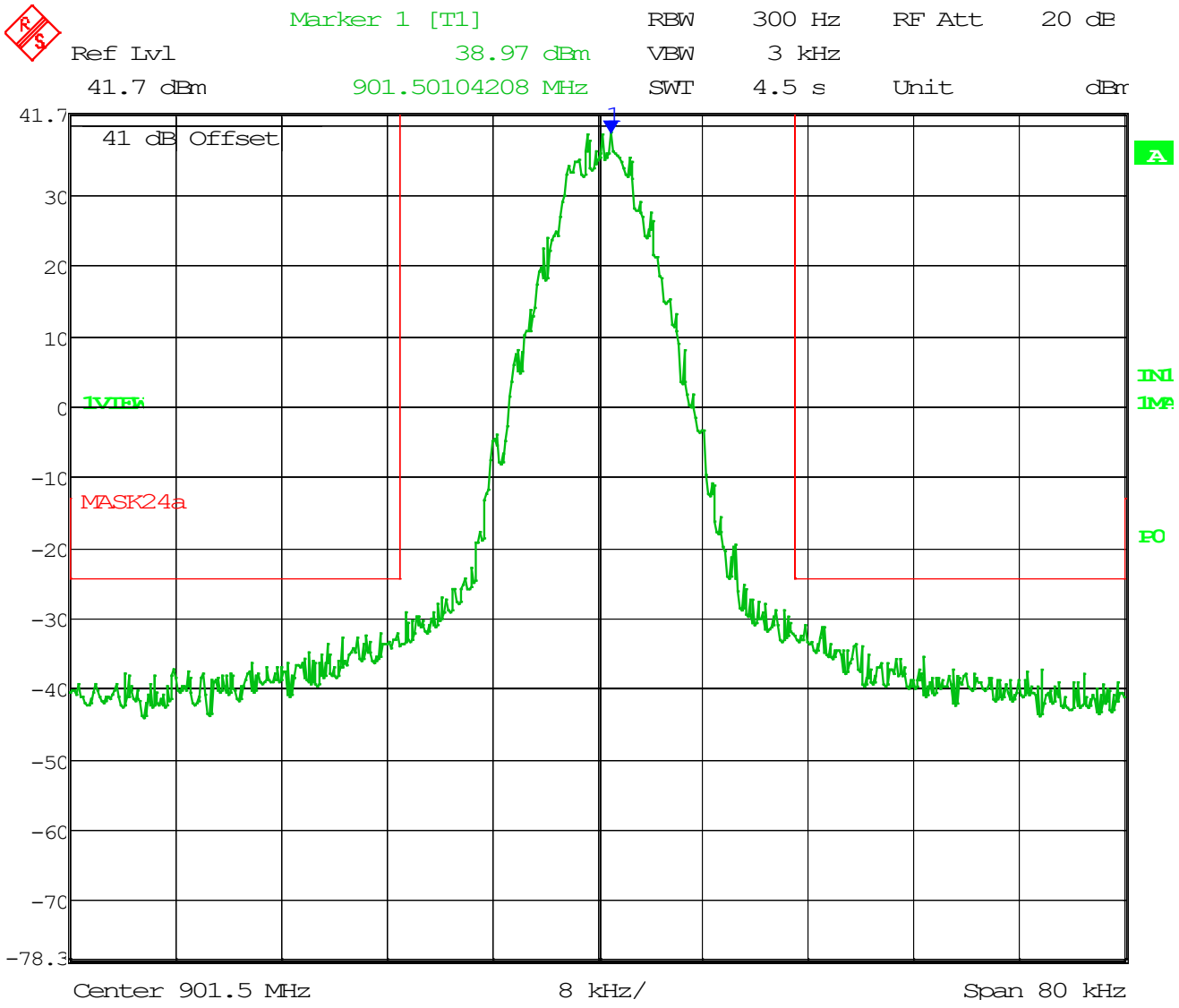
EMISSION MASKS

901.5 MHz, 8K10F1D/F1E/F1W



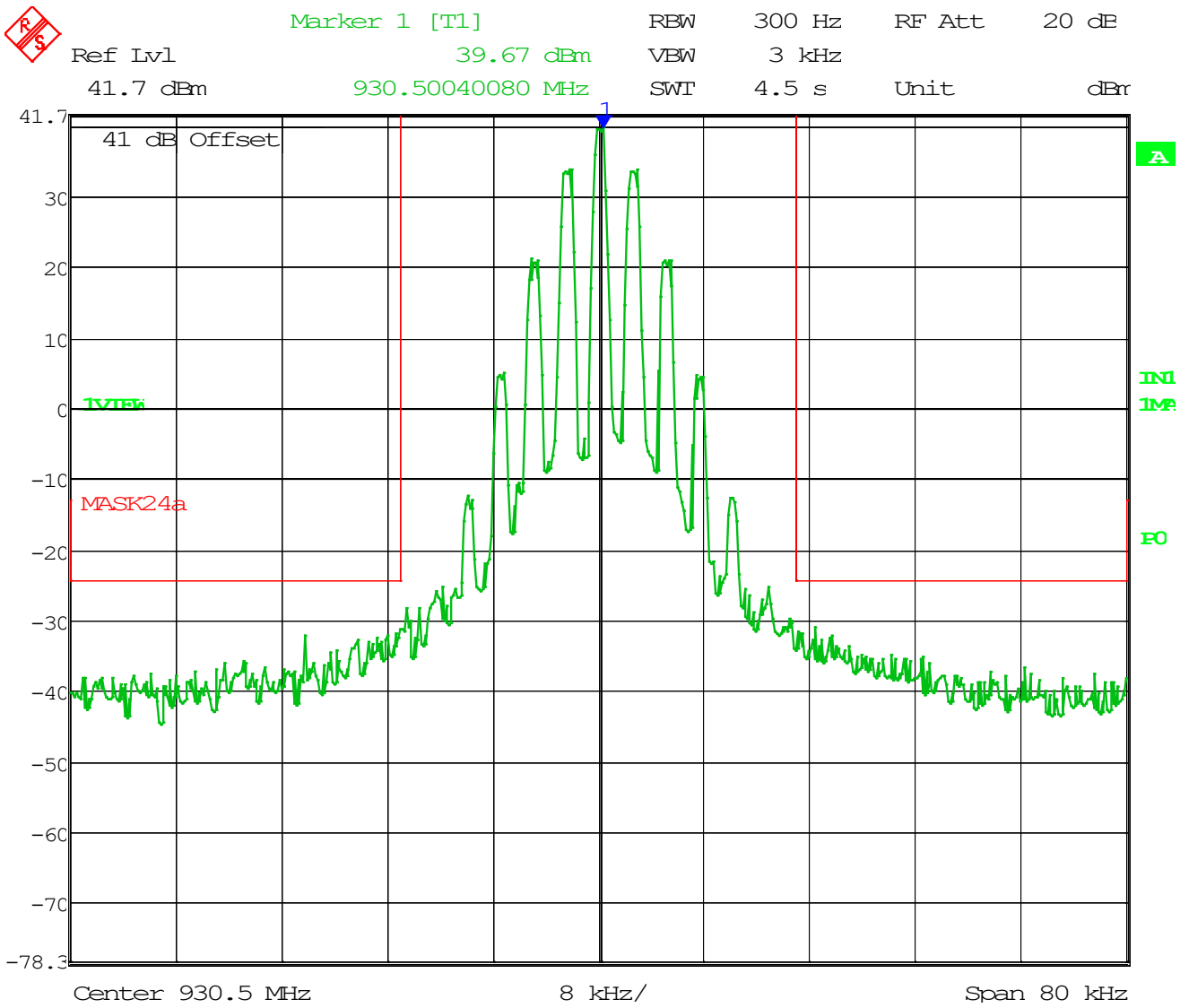
EMISSION MASKS

901.5 MHz, 7K60FXE/FXD



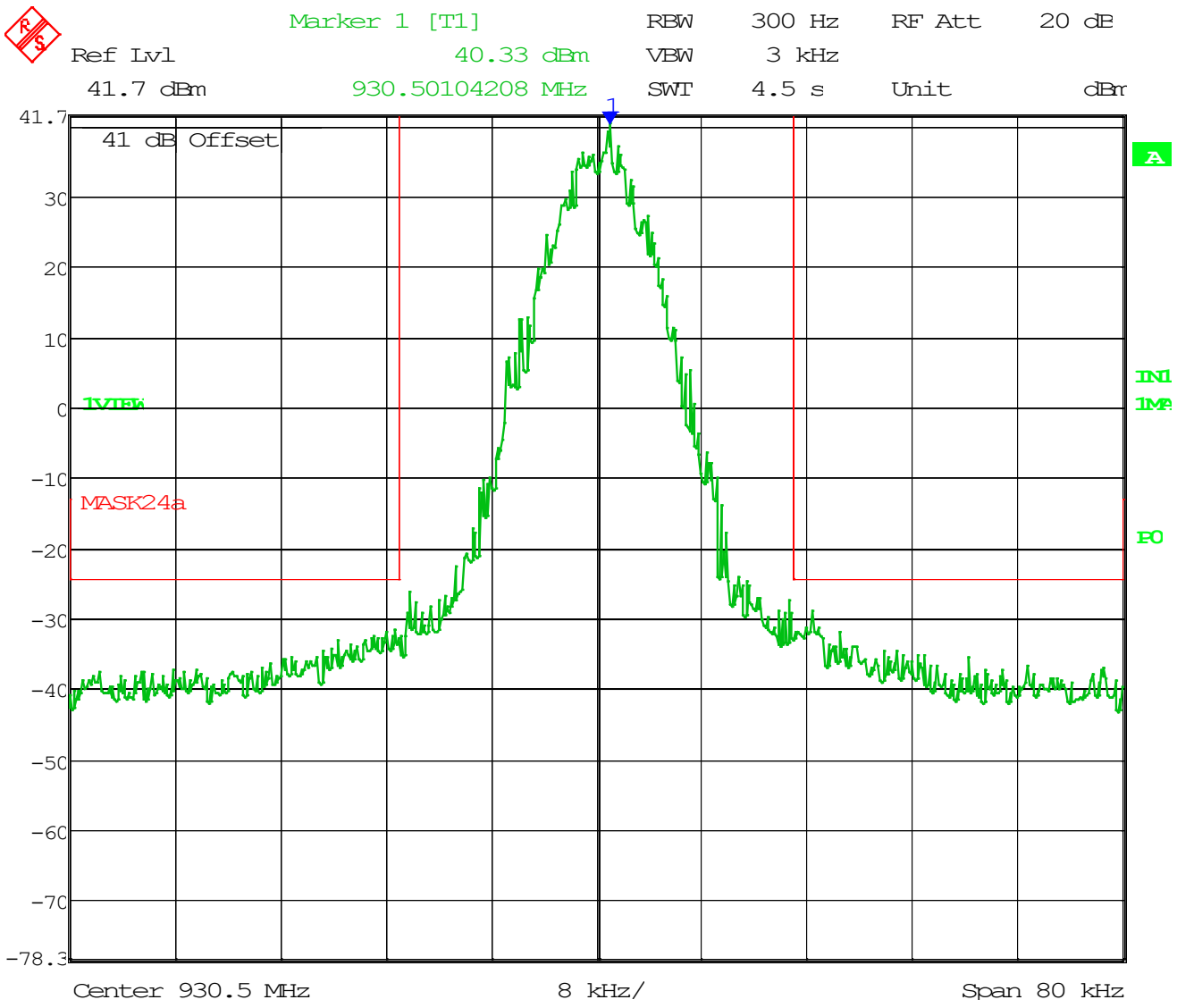
EMISSION MASKS

930.5 MHz, 11K0F3E



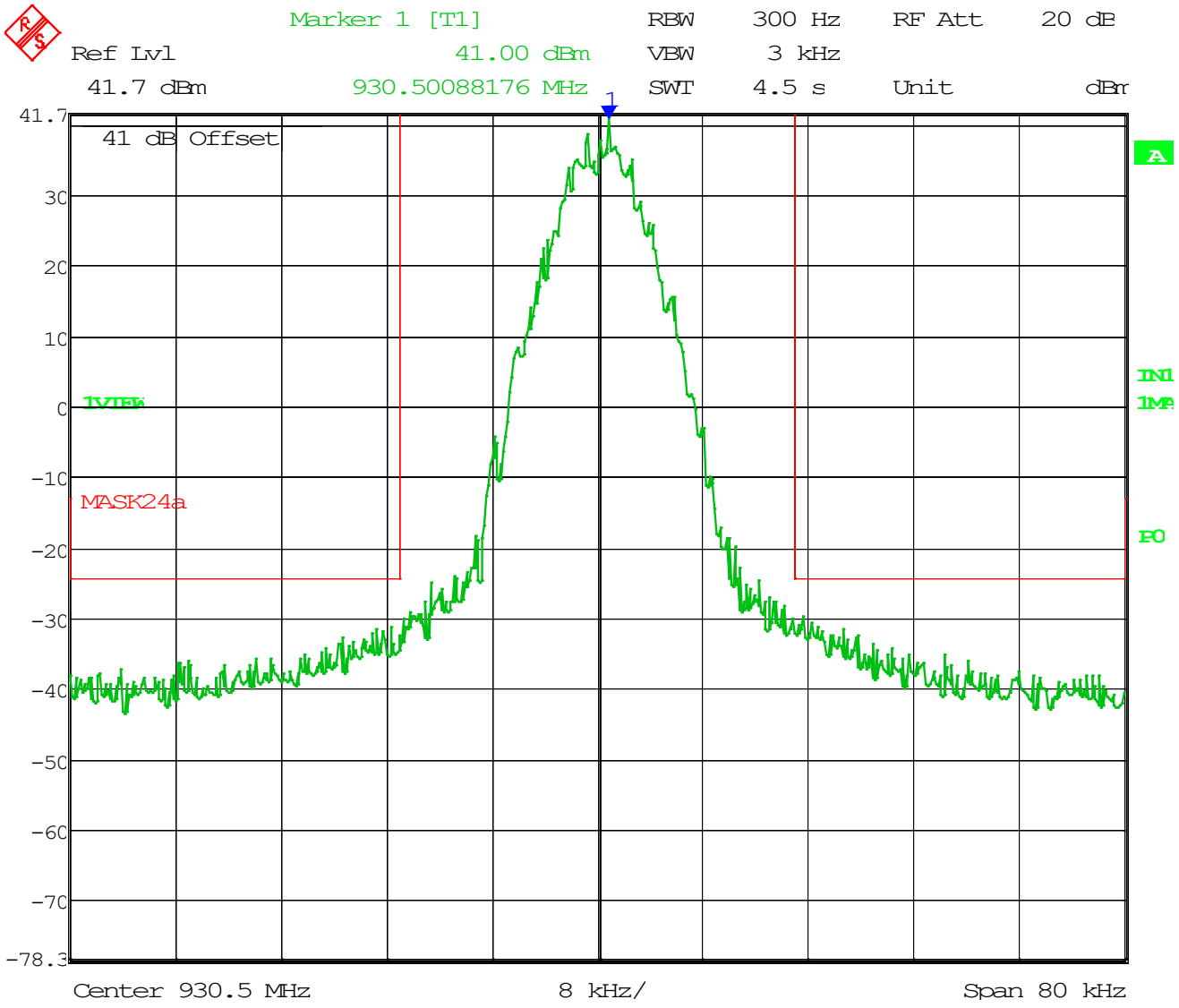
EMISSION MASKS

930.5 MHz, 8K10F1D/F1E/F1W



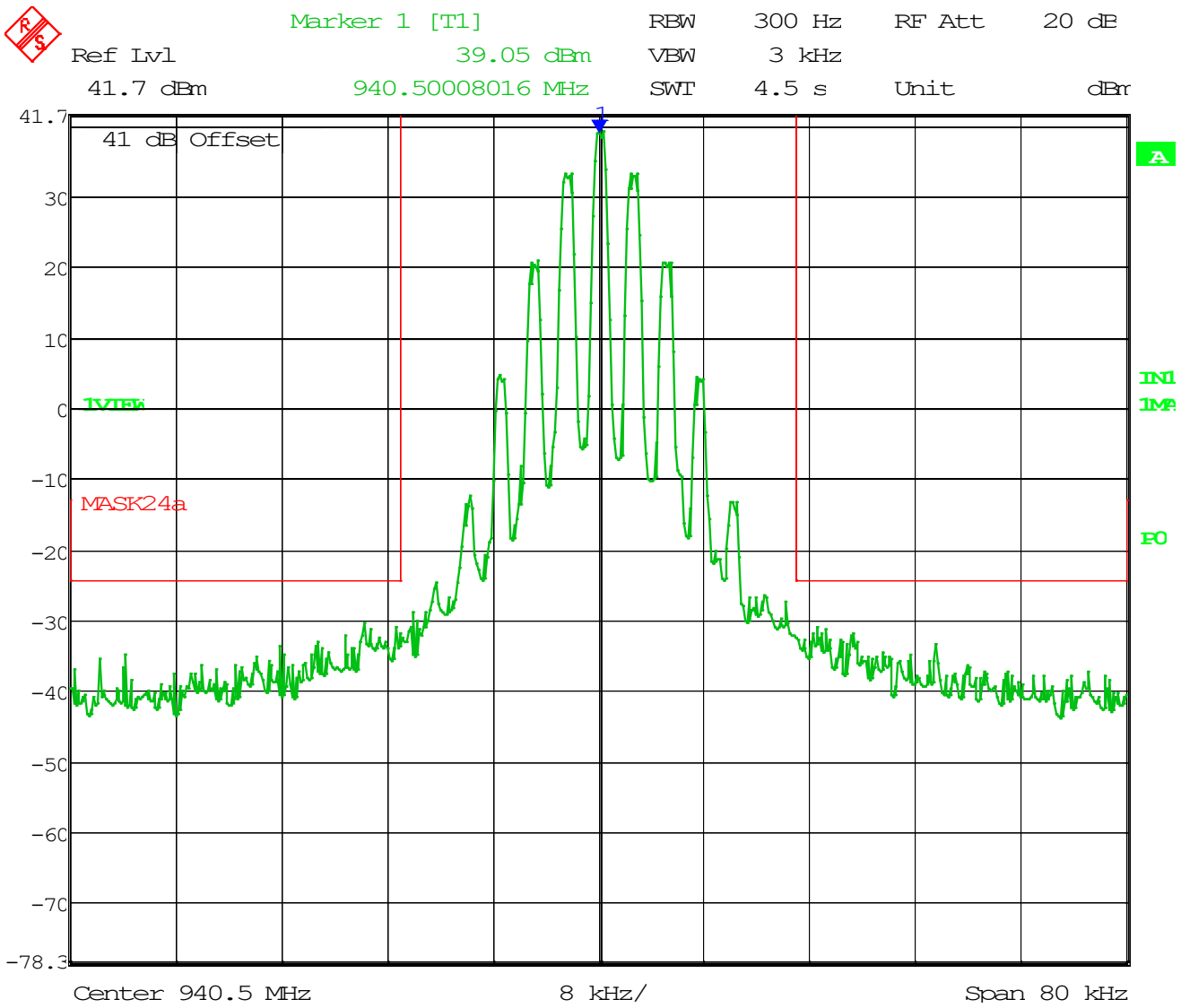
EMISSION MASKS

930.5 MHz, 7K60FXE/FXD



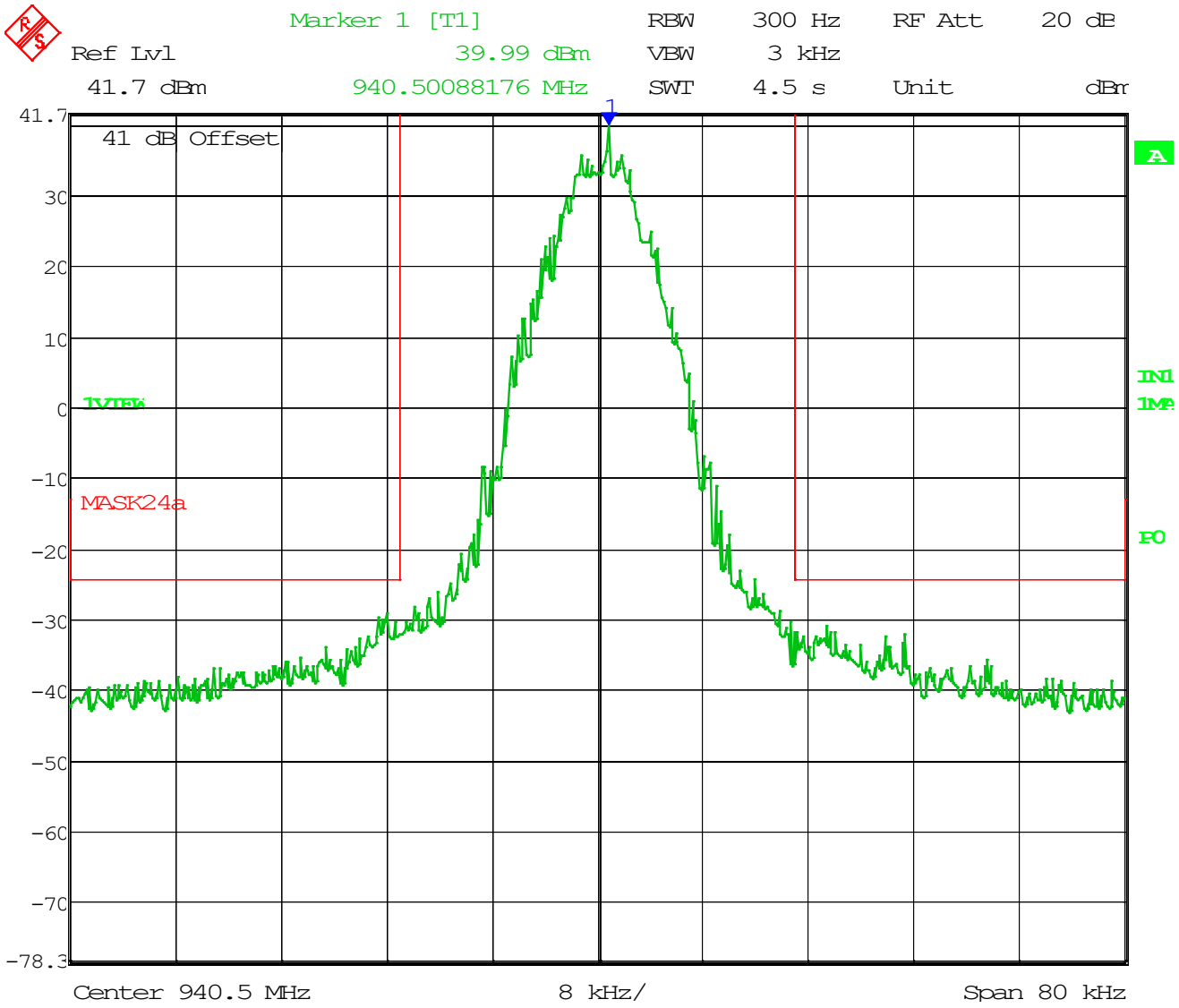
EMISSION MASKS

940.5 MHz, 11K0F3E



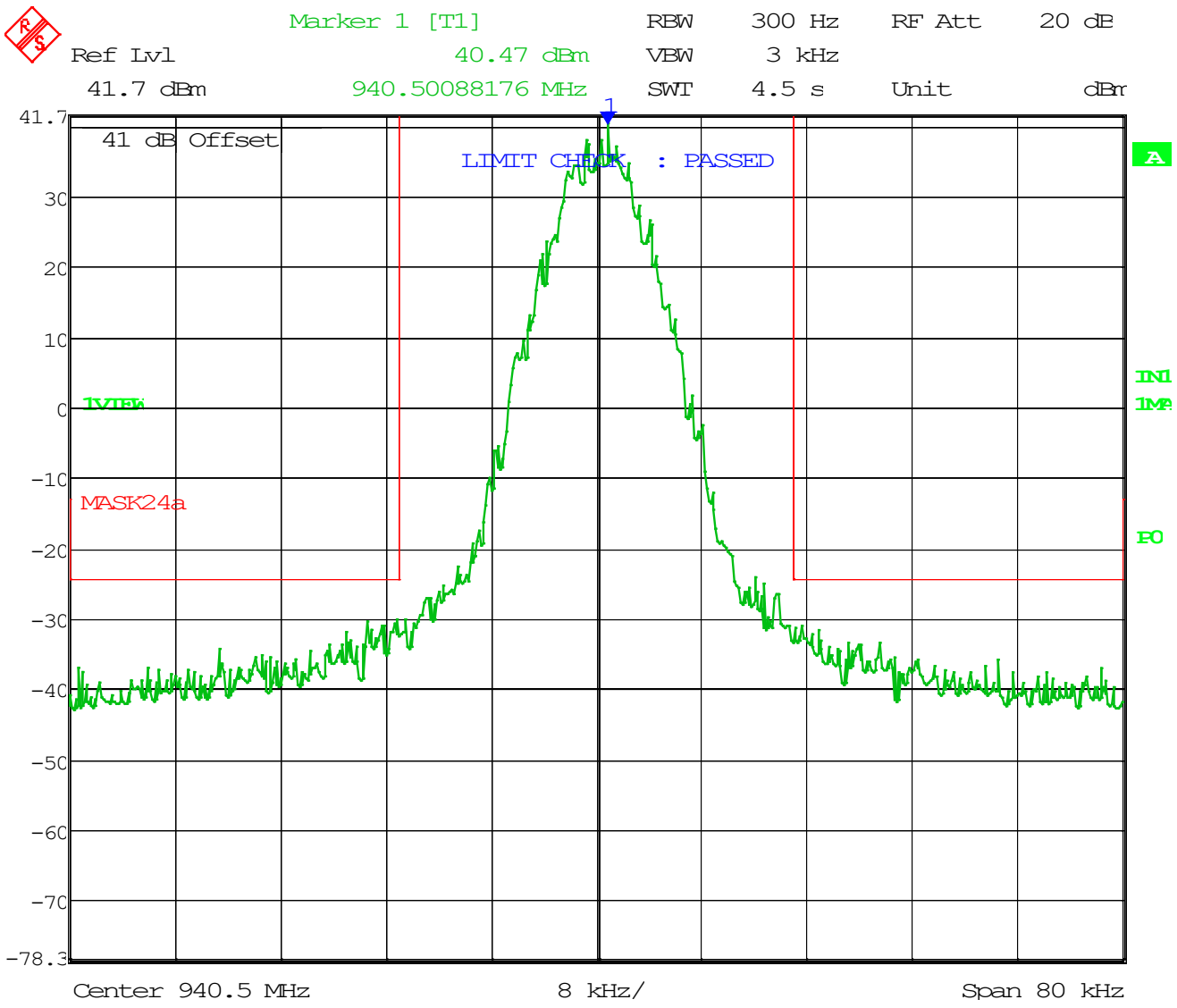
EMISSION MASKS

940.5 MHz, 8K10F1D/F1E/F1W



EMISSION MASKS

940.5 MHz, 7K60FXE/FXD



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

FCC Rule Parts: 2.1051, 90.210(b) - (d), (g) - (j), 24.133(a)(1), 22.359(a)

§90.210 Emission masks.

APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
929-930	B	G
All other bands	B	C

[3]Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691 of this chapter.

[5]Equipment designed to operate on 25 kilohertz bandwidth channels must meet the requirements of either Emission Mask B or G, whichever is applicable, while equipment designed to operate on 12.5 kilohertz bandwidth channels must meet the requirements of Emission Mask D. Equipment designed to operate on 25 kilohertz bandwidth channels may alternatively meet the Adjacent Channel Power limits of §90.221.

[6]Transmitters utilizing analog emissions that are equipped with an audio low-pass filter must meet Emission Mask B. All transmitters utilizing digital emissions and those transmitters using analog emissions without an audio low-pass filter must meet Emission Mask H.

SPURIOUS EMISSIONS

(b) *Emission Mask B.* For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(c) *Emission Mask C.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(4) In the 1427-1432 MHz band, licensees are encouraged to take all reasonable steps to ensure that unwanted emissions power does not exceed the following levels in the 1400-1427 MHz band:

(i) For stations of point-to-point systems in the fixed service: −45 dBW/27 MHz.

(ii) For stations in the mobile service: −60 dBW/27 MHz.

(d) *Emission Mask D—12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(f_d−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

SPURIOUS EMISSIONS

(g) *Emission Mask G.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (f_d/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(h) *Emission Mask H.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

(i) *Emission Mask I.* For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: At least 25 dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: At least 35 dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: At least 43 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.

(j) *Emission Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2.5 kHz, but no more than 6.25 kHz: At least 53 log (f_d/2.5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: At least 103 log (f_d/3.9) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5 kHz: At least 157 log (f_d/5.3) dB, or 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

SPURIOUS EMISSIONS

§24.133 Emission limits.

(a) The power of any emission shall be attenuated below the transmitter power (P), as measured in accordance with §24.132(f), in accordance with the following schedule:

(1) For transmitters authorized a bandwidth greater than 10 kHz:

(i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of up to and including 40 kHz: at least 116 Log_{10} ((f_d + 10)/6.1) decibels or 50 plus 10 Log_{10} (P) decibels or 70 decibels, whichever is the lesser attenuation;

(ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 40 kHz: at least 43 + 10 Log_{10} (P) decibels or 80 decibels, whichever is the lesser attenuation.

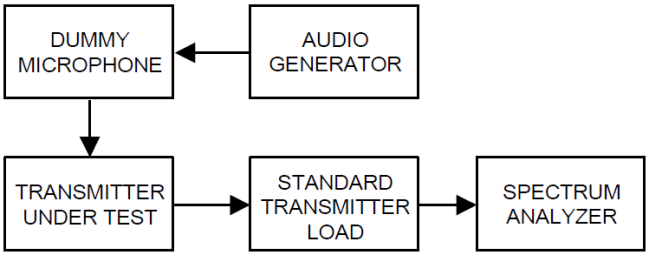
§22.359 Emission limitations.

The rules in this section govern the spectral characteristics of emissions in the Public Mobile Services, except for the Air-Ground Radiotelephone Service (see §22.861, instead) and the Cellular Radiotelephone Service (see §22.917, instead).

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)



SPURIOUS EMISSIONS

Applicable Emission Limitations

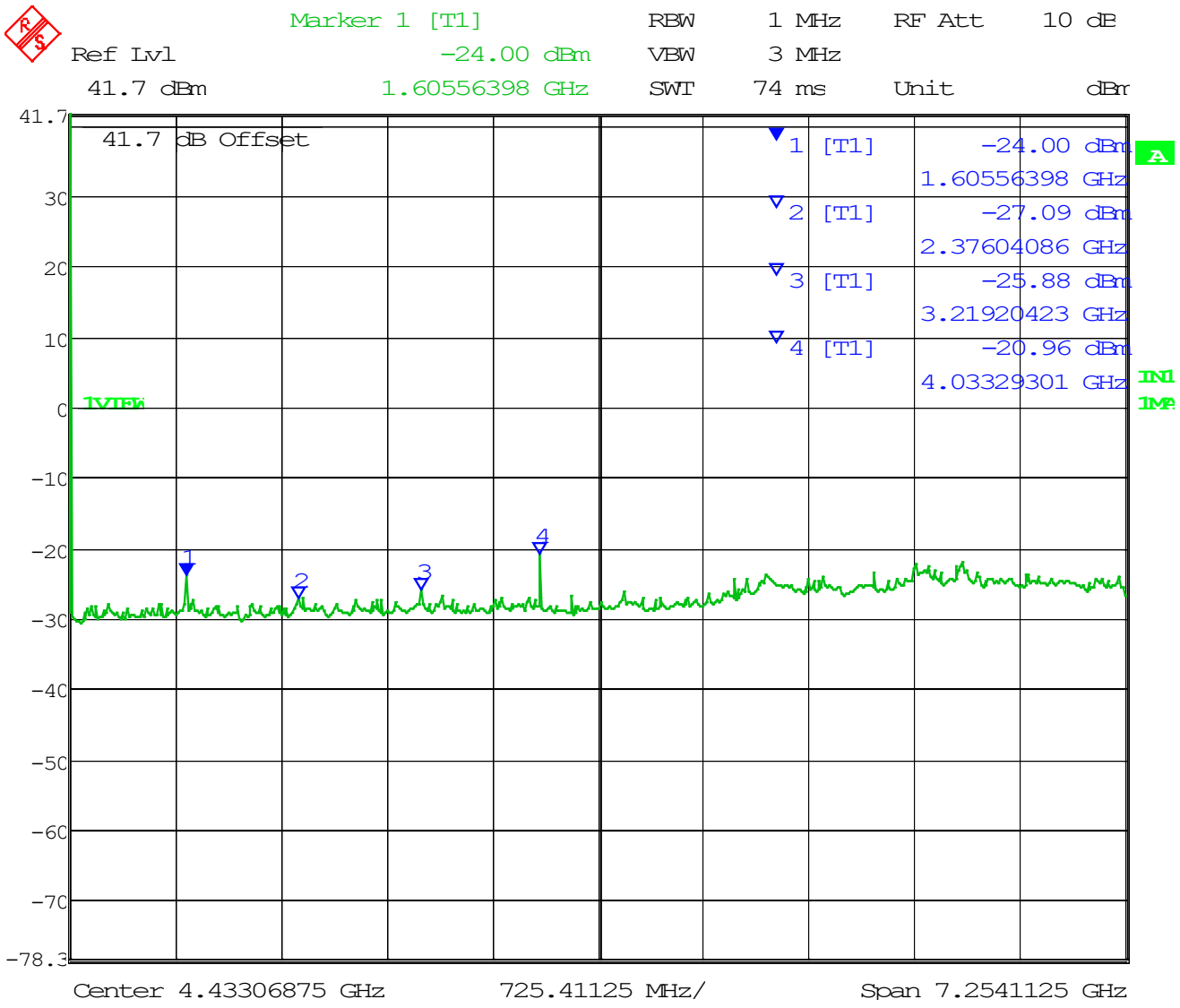
FCC Rule Part	Frequency (MHz)	Applicable Emission Mask	Out Of Band Limit Calculation	Out of Band Limit (dBm)
90	806.0125	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
	824.0000	Pt 90 Mask D	50 + 10*log(P) or 70	-20.00
	848.9875	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
90	851.0125	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
	869.0000	Pt 90 Mask D	50 + 10*log(P) or 70	-20.00
	893.9875	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
90	898.0000	Pt 90 Mask I	43 + 10*log(P) or 70	-13.00
		Pt 90 Mask J	50 + 10*log(P) or 70	-20.00
24	901.5000	Pt 24.133(a)(1)	43 + 10*log(P) or 80	-13.00
90	929.5000	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask G	43 + 10*log(P)	-13.00
24	930.5000	Pt 24.133(a)(1)	43 + 10*log(P) or 80	-13.00
22	933.0000	Pt 22.359(a)	43 + 10*log(P)	-13.00
90	938.0000	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask C	43 + 10*log(P)	-13.00
24	940.5000	Pt 24.133(a)(1)	43 + 10*log(P) or 80	-13.00

Note: Plots were taken at High power. Low power was investigated, and in all cases the low power emissions complied by a greater margin.

SPURIOUS EMISSIONS

Part 90 Bands

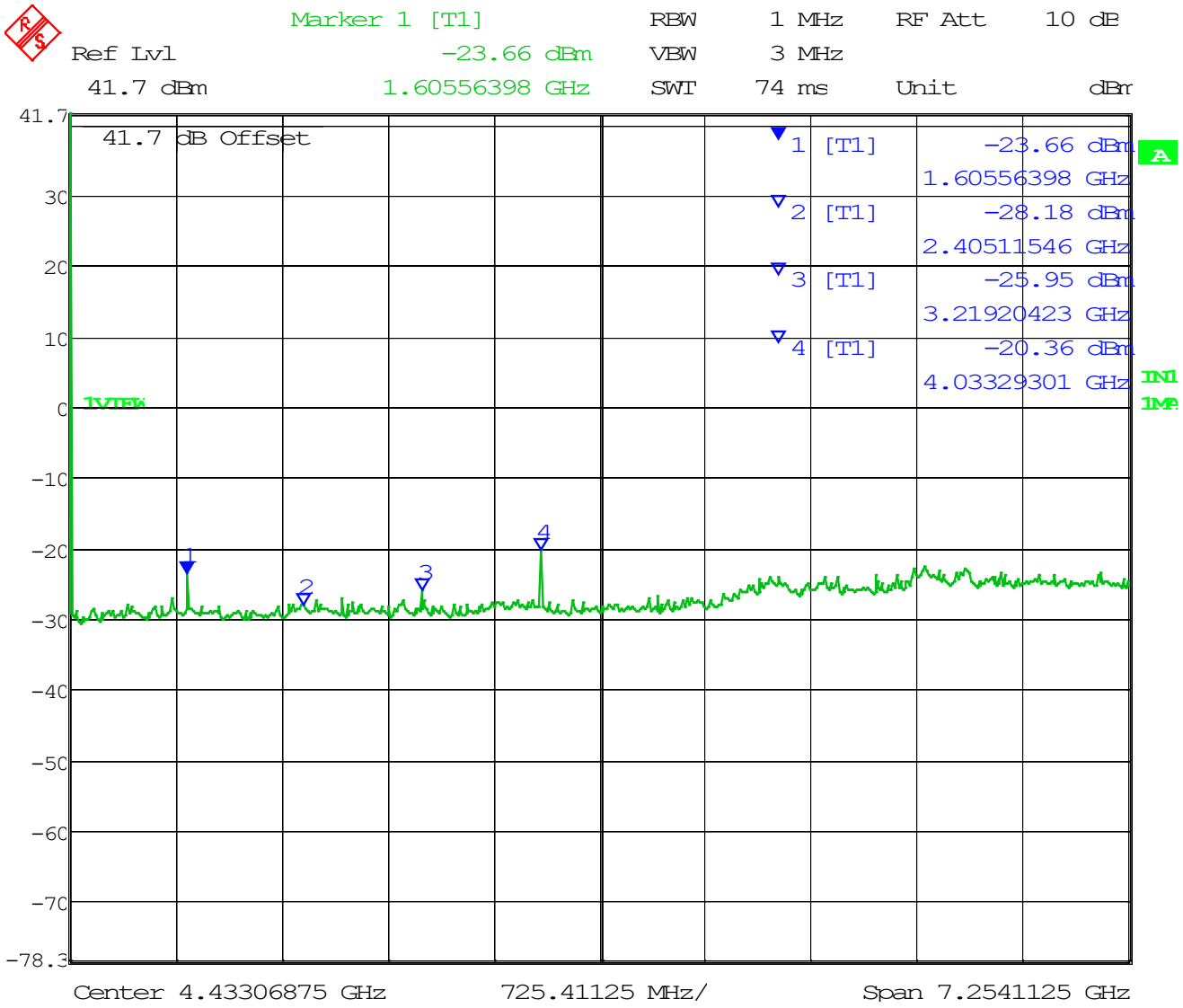
806.0125 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1605.56	-24.00	-0.03	-23.97	-13.00	10.97
2376.04	-27.09	-0.66	-26.43	-13.00	13.43
3219.20	-25.88	-1.04	-24.84	-13.00	11.84
4033.29	-20.96	-1.15	-19.81	-13.00	6.81

SPURIOUS EMISSIONS

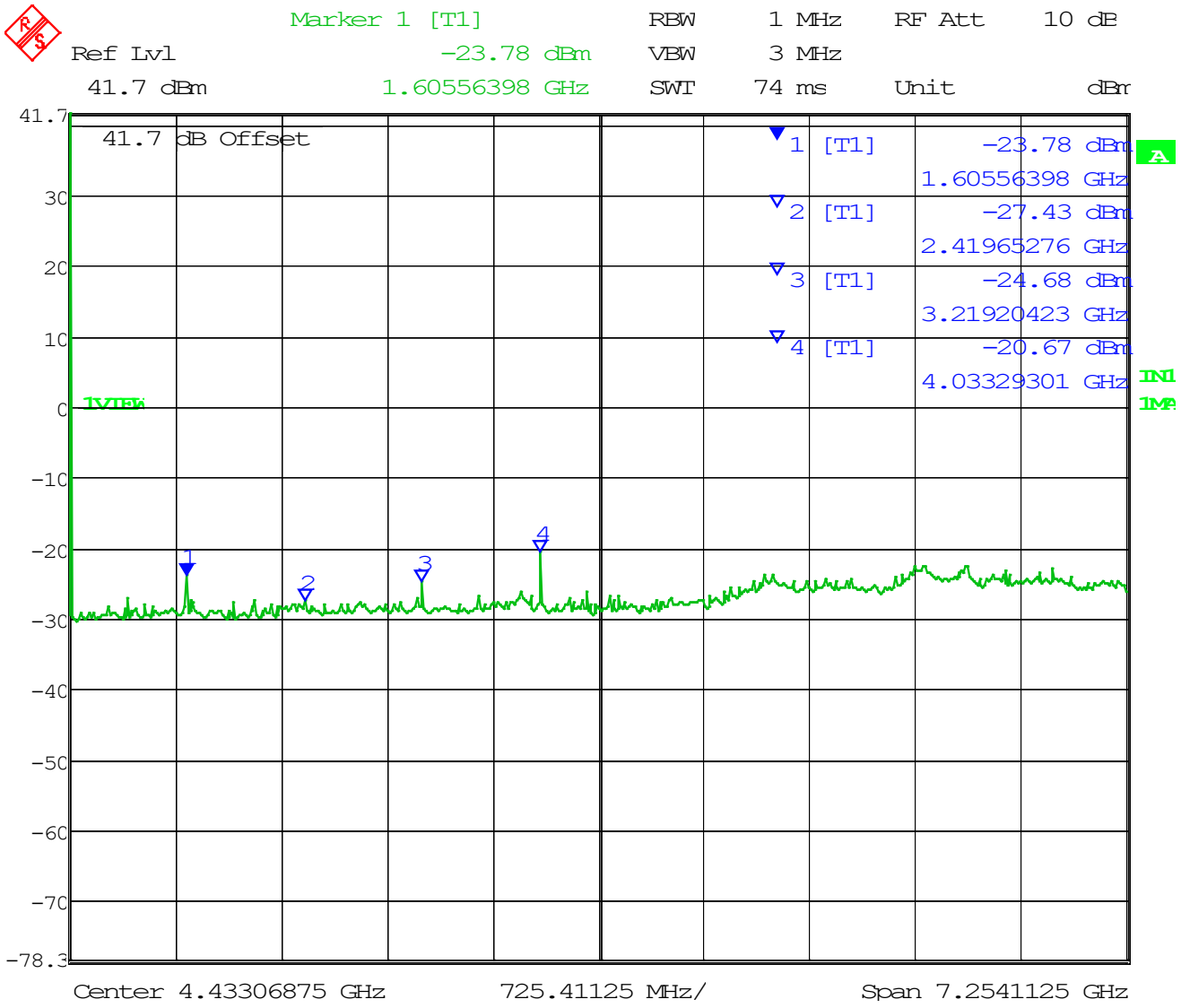
806.0125 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1605.56	-23.66	-0.20	-23.46	-13.00	10.46
2405.12	-28.18	-0.64	-27.54	-13.00	14.54
3219.20	-25.95	-1.04	-24.91	-13.00	11.91
4033.29	-20.36	-1.15	-19.21	-13.00	6.21

SPURIOUS EMISSIONS

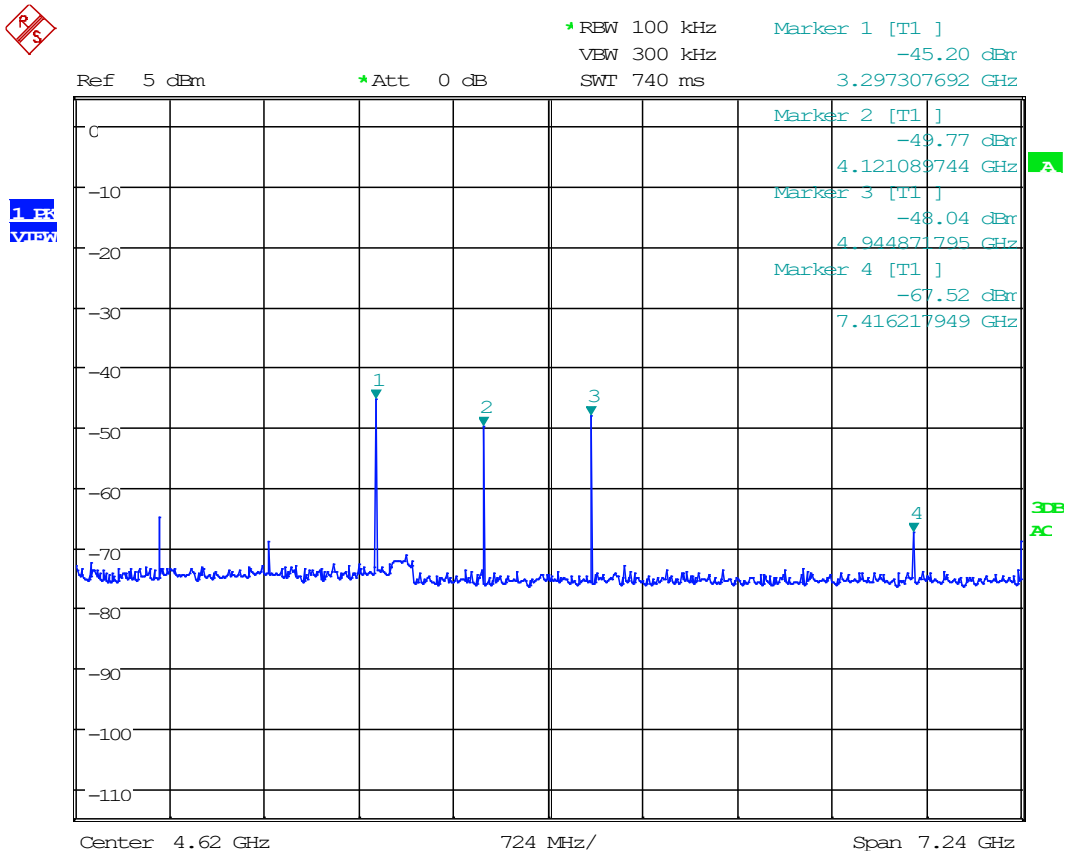
806.0125 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1605.56	-23.78	-0.20	-23.58	-13.00	10.58
2419.65	-27.43	-0.64	-26.79	-13.00	13.79
3219.20	-24.68	-1.04	-23.64	-13.00	10.64
4033.29	-20.67	-1.15	-19.52	-13.00	6.52

SPURIOUS EMISSIONS

824 MHz, 11K0F3E

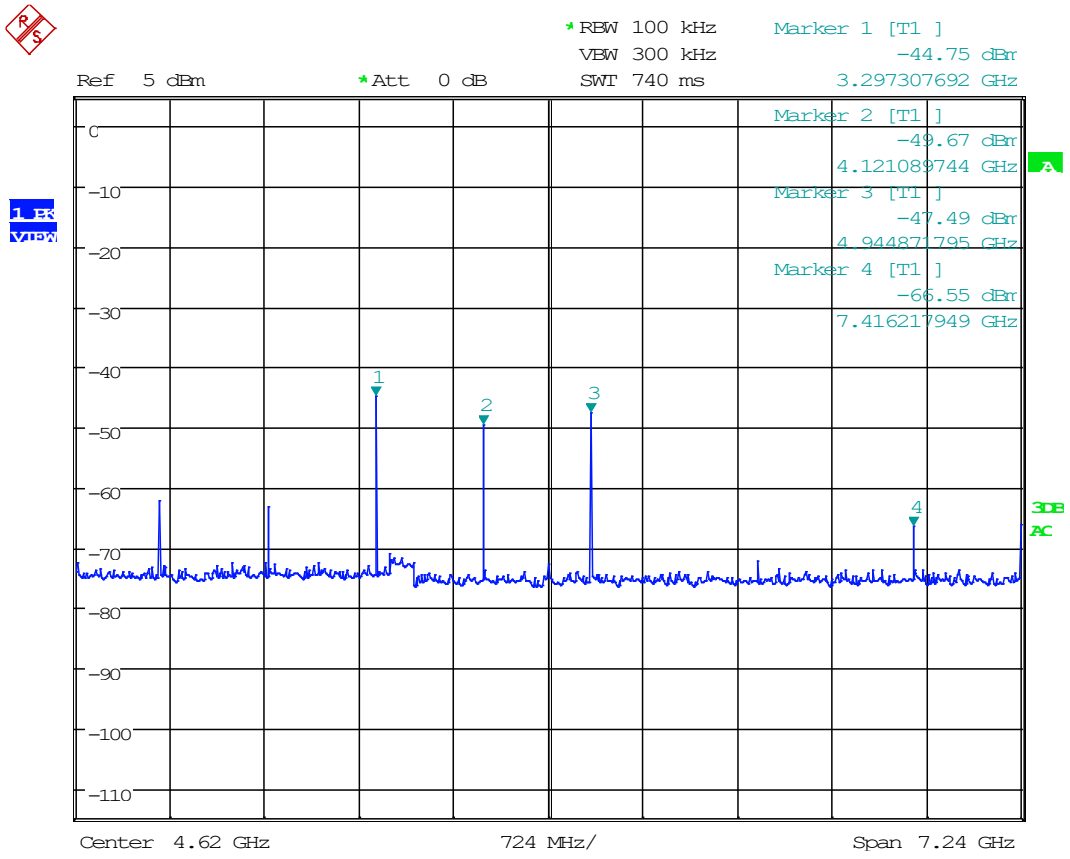


Date: 23.SEP.2019 16:16:14

Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	3297.30	-14.82	0.00	-45.20	-14.82	-30.38	55.56	-13.00	17.38
2	4121.09	-22.94	0.00	-45.77	-22.94	-22.83	55.56	-13.00	9.83
3	4944.87	-18.58	0.00	-48.04	-18.58	-29.46	55.56	-13.00	16.46
4	7416.22	-17.83	0.00	-67.52	-17.83	-49.69	55.56	-13.00	36.69

SPURIOUS EMISSIONS

824 MHz, 8K10F1D/F1E/F1W

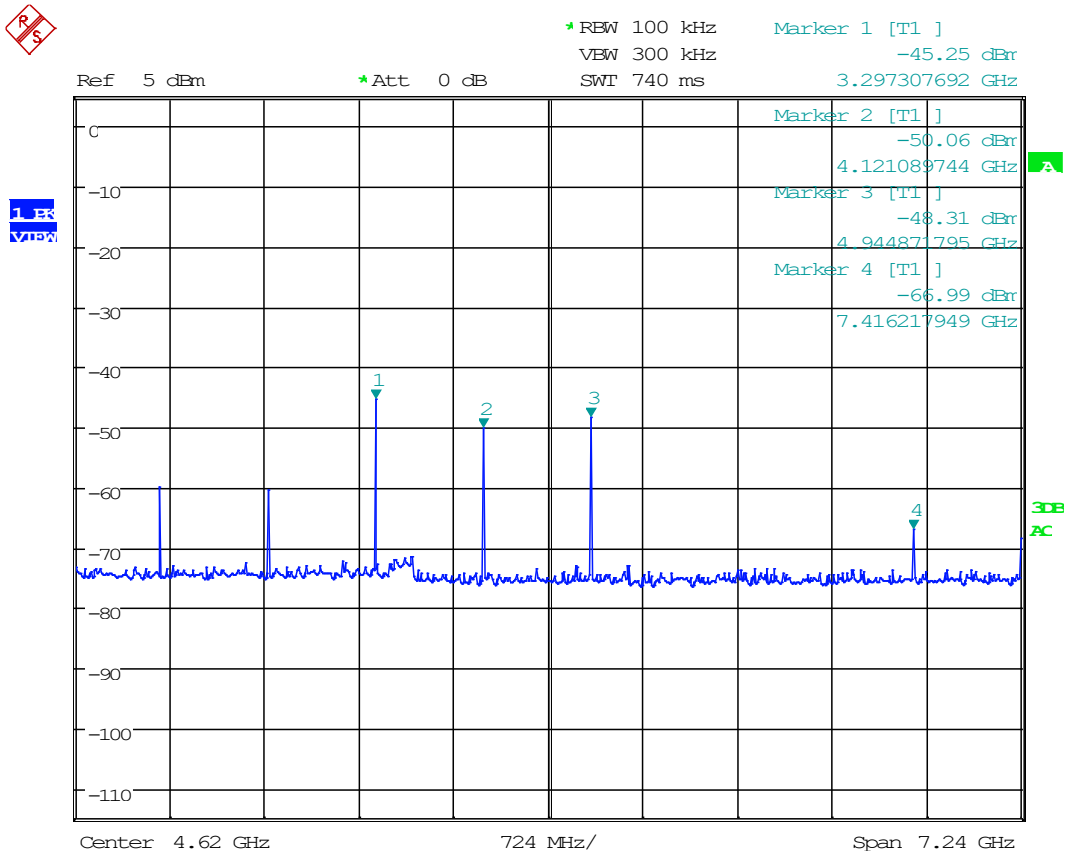


Date: 23.SEP.2019 16:08:30

Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	3297.30	-14.82	0.00	-44.75	-14.82	-29.93	55.56	-13.00	16.93
2	4121.09	-22.94	0.00	-49.67	-22.94	-26.73	55.56	-13.00	13.73
3	4944.87	-18.58	0.00	-47.49	-18.58	-28.91	55.56	-13.00	15.91
4	7416.22	-17.83	0.00	-66.55	-17.83	-48.72	55.56	-13.00	35.72

SPURIOUS EMISSIONS

824 MHz, 7K60FXE/FXD

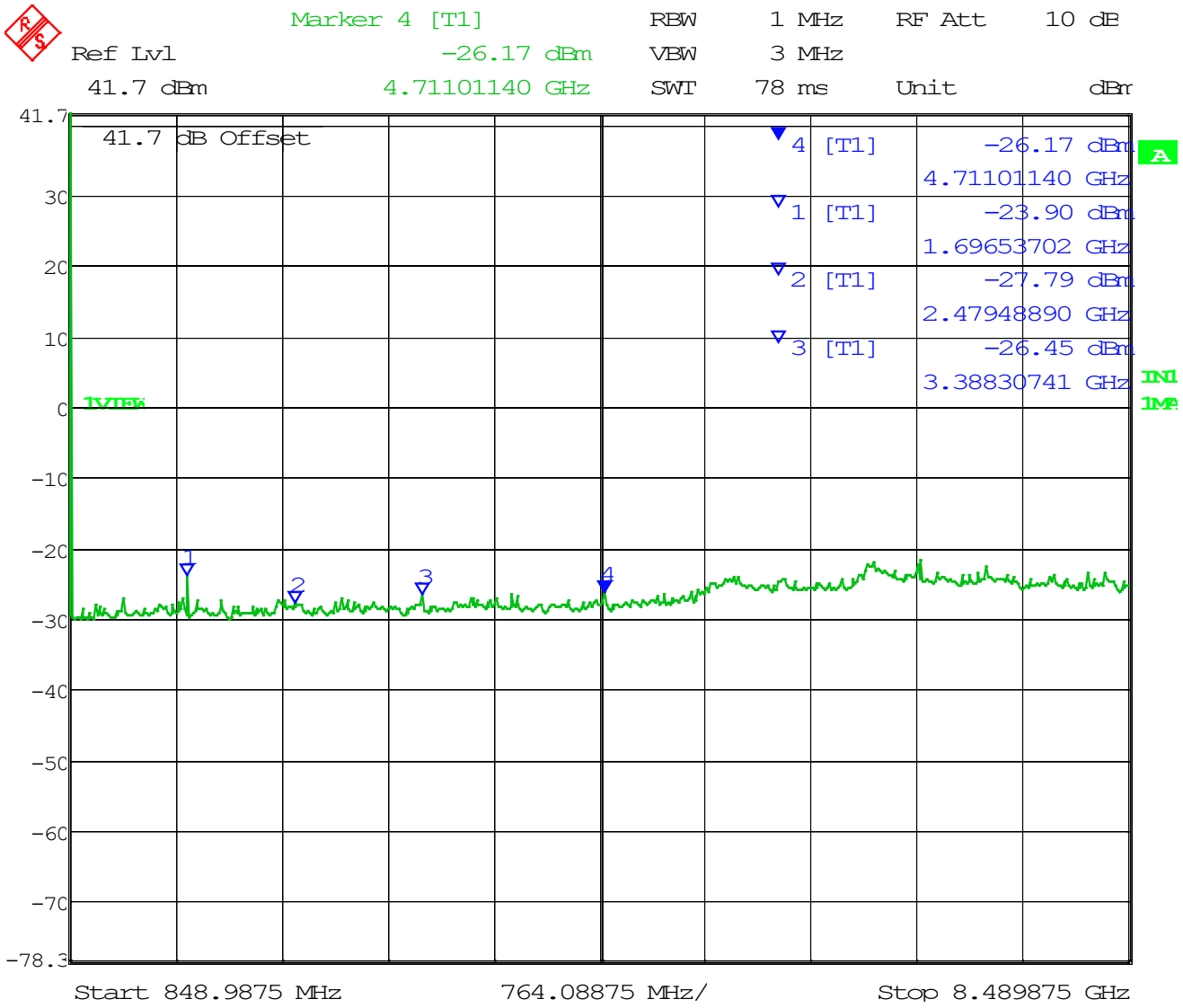


Date: 23.SEP.2019 16:04:19

Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	3297.30	-14.82	0.00	-45.25	-14.82	-30.43	55.56	-13.00	17.43
2	4121.09	-22.94	0.00	-50.06	-22.94	-27.12	55.56	-13.00	14.12
3	4944.87	-18.58	0.00	-48.31	-18.58	-29.73	55.56	-13.00	16.73
4	7416.22	-17.83	0.00	-66.99	-17.83	-49.16	55.56	-13.00	36.16

SPURIOUS EMISSIONS

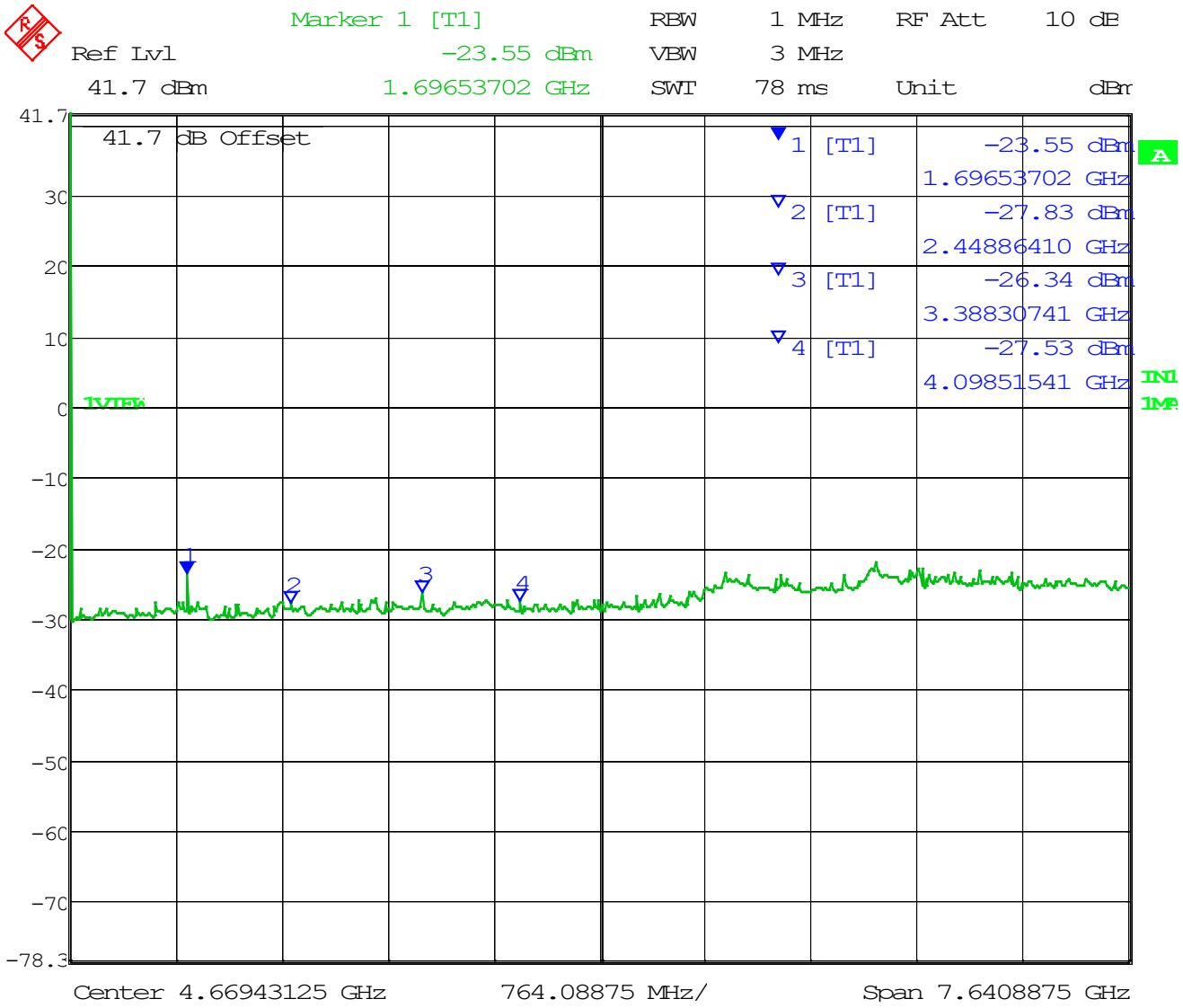
848.9875 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1696.54	-26.17	-0.16	-26.01	-13.00	13.01
2479.49	-23.90	-0.27	-23.63	-13.00	10.63
3388.31	-27.79	-1.04	-26.75	-13.00	13.75
4711.01	-26.45	-1.79	-24.66	-13.00	11.66

SPURIOUS EMISSIONS

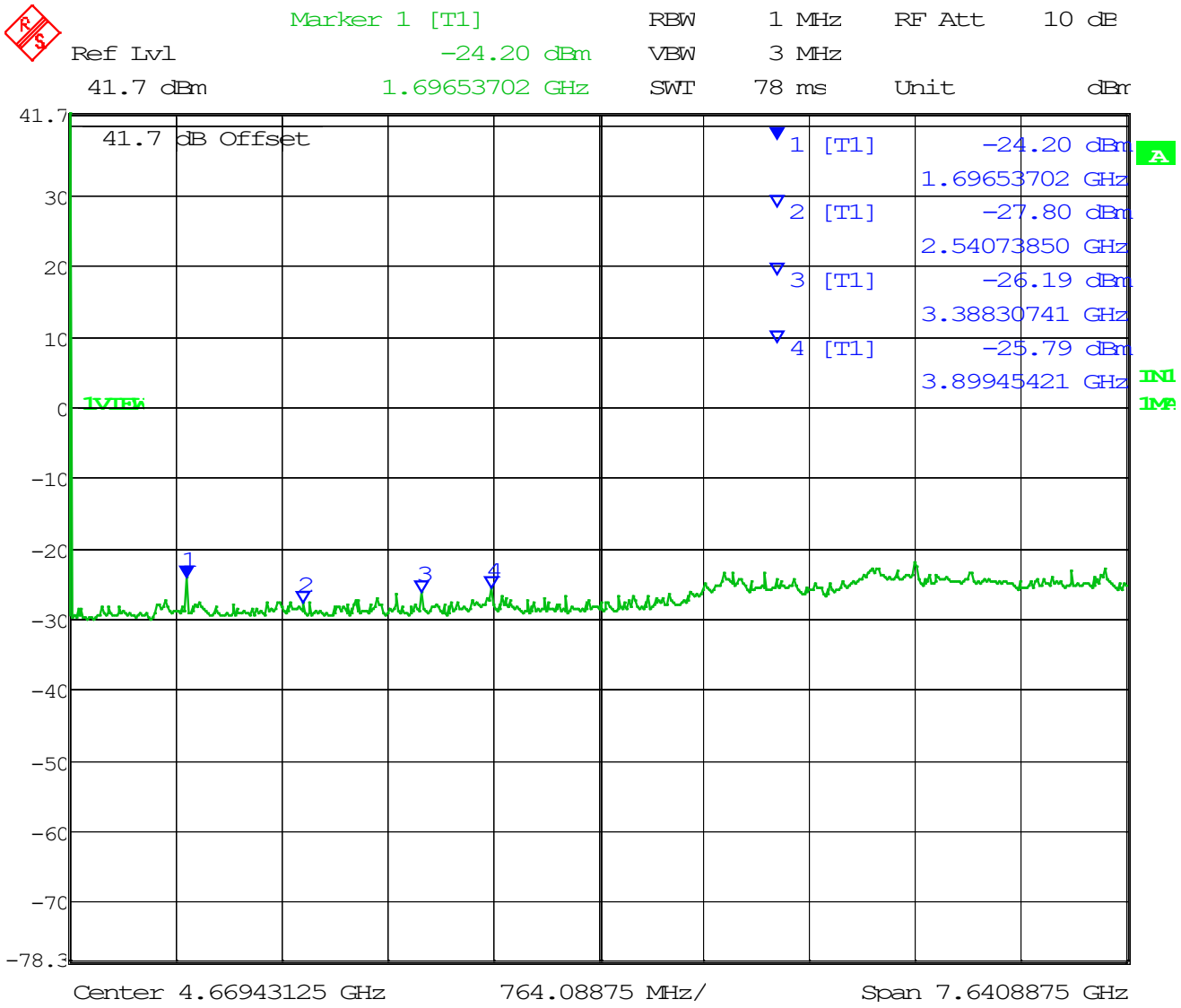
848.9875 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1696.54	-23.55	-0.16	-23.39	-13.00	10.39
2448.86	-27.83	-0.03	-27.80	-13.00	14.80
3388.31	-26.34	-1.04	-25.30	-13.00	12.30
4098.52	-27.53	-1.27	-26.26	-13.00	13.26

SPURIOUS EMISSIONS

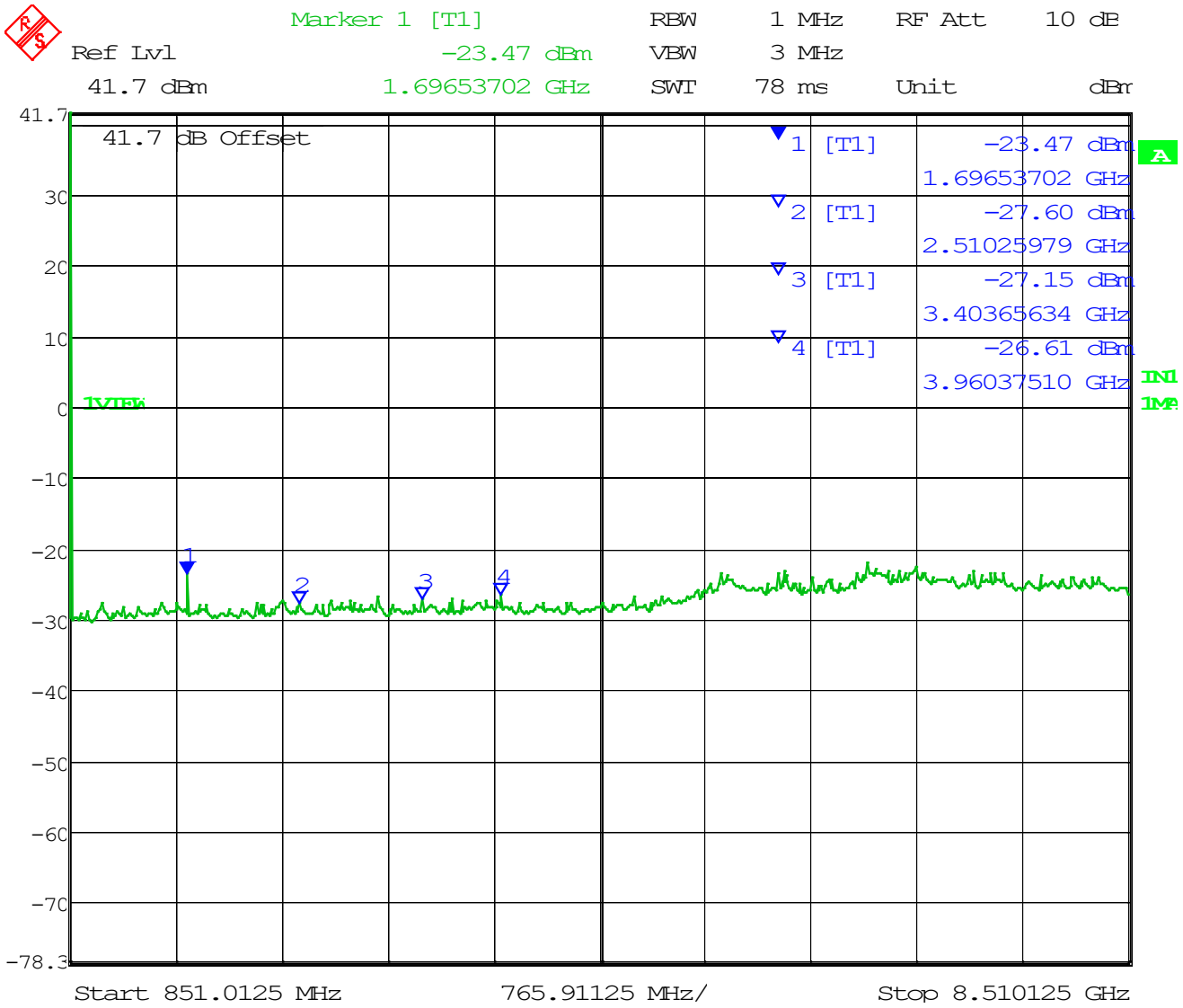
848.9875 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1696.54	-24.20	-0.16	-24.04	-13.00	11.04
2540.74	-27.80	-0.64	-27.16	-13.00	14.16
3388.31	-26.19	-1.04	-25.15	-13.00	12.15
3899.45	-25.79	-1.17	-24.62	-13.00	11.62

SPURIOUS EMISSIONS

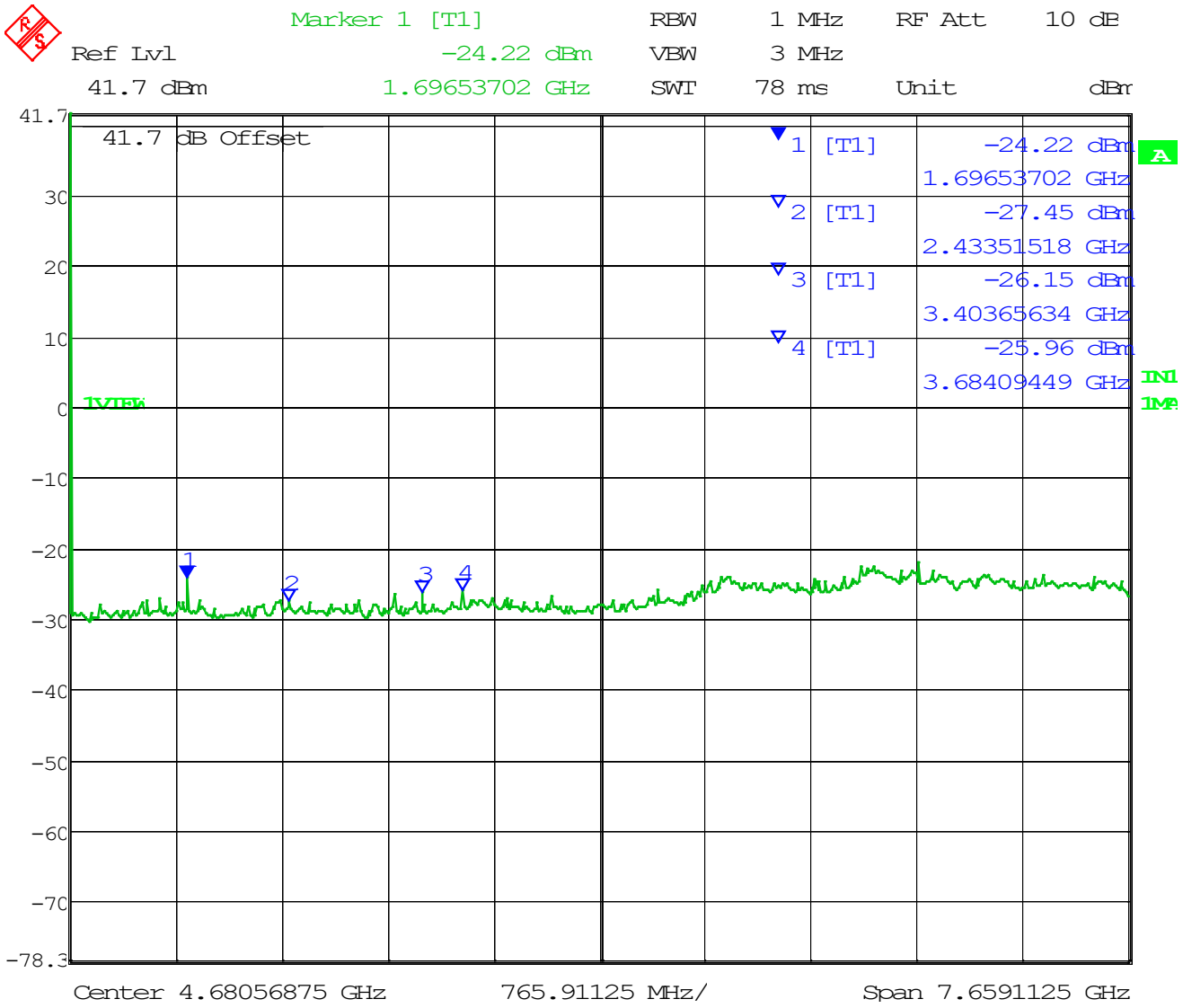
851.0125 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1696.54	-23.47	-0.16	-23.31	-13.00	10.31
2510.26	-27.60	-0.54	-27.06	-13.00	14.06
3403.66	-27.15	-1.04	-26.11	-13.00	13.11
3960.38	-26.61	-1.15	-25.46	-13.00	12.46

SPURIOUS EMISSIONS

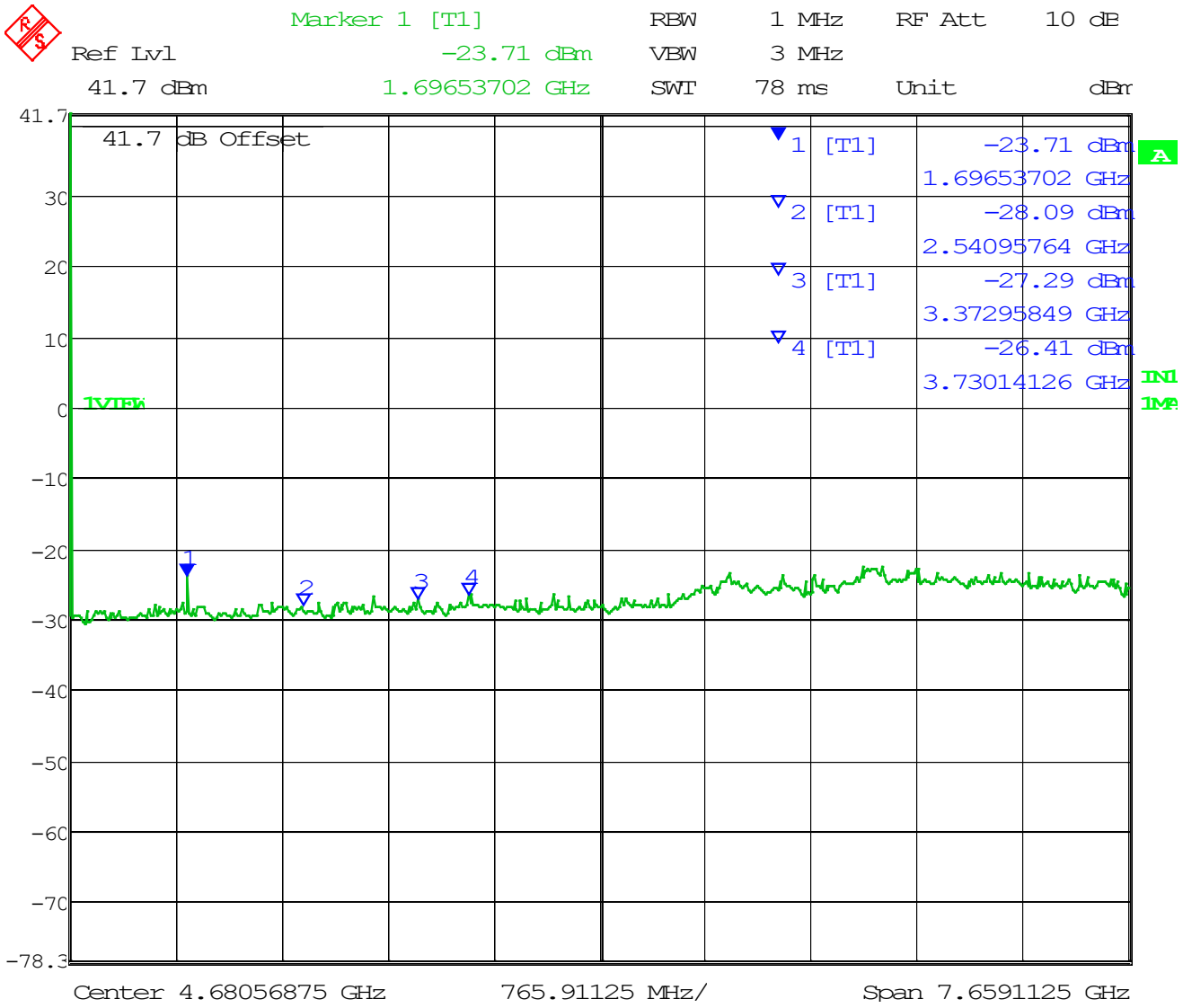
851.0125 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1696.54	-24.22	-0.16	-24.06	-13.00	11.06
2433.52	-27.45	-0.27	-27.18	-13.00	14.18
3403.66	-26.15	-1.04	-25.11	-13.00	12.11
3684.09	-25.96	-1.27	-24.69	-13.00	11.69

SPURIOUS EMISSIONS

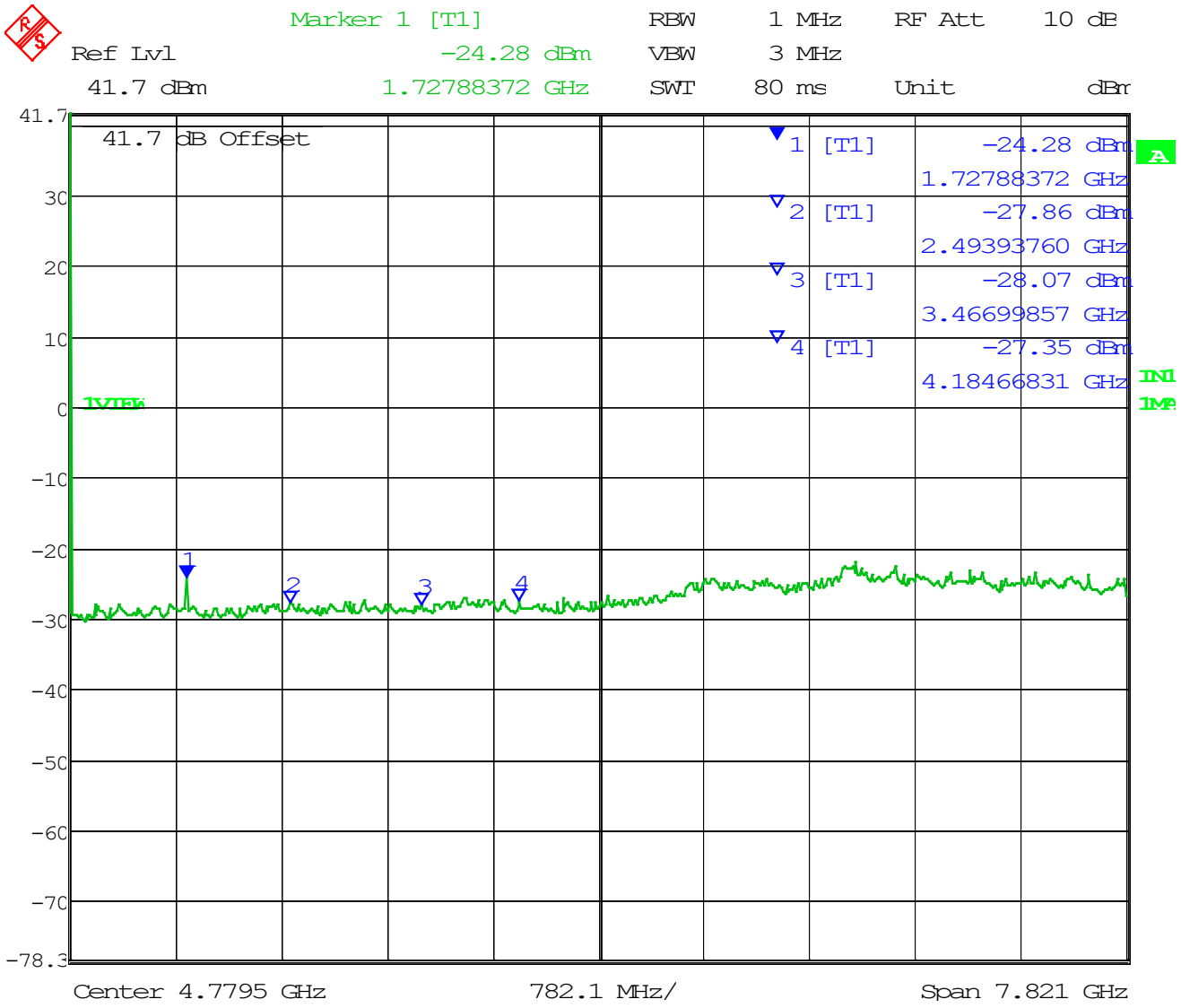
851.0125 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1696.54	-23.71	-0.16	-23.55	-13.00	10.55
2540.96	-28.09	-0.64	-27.45	-13.00	14.45
3372.96	-27.29	-1.09	-26.20	-13.00	13.20
3730.14	-26.41	-1.15	-25.26	-13.00	12.26

SPURIOUS EMISSIONS

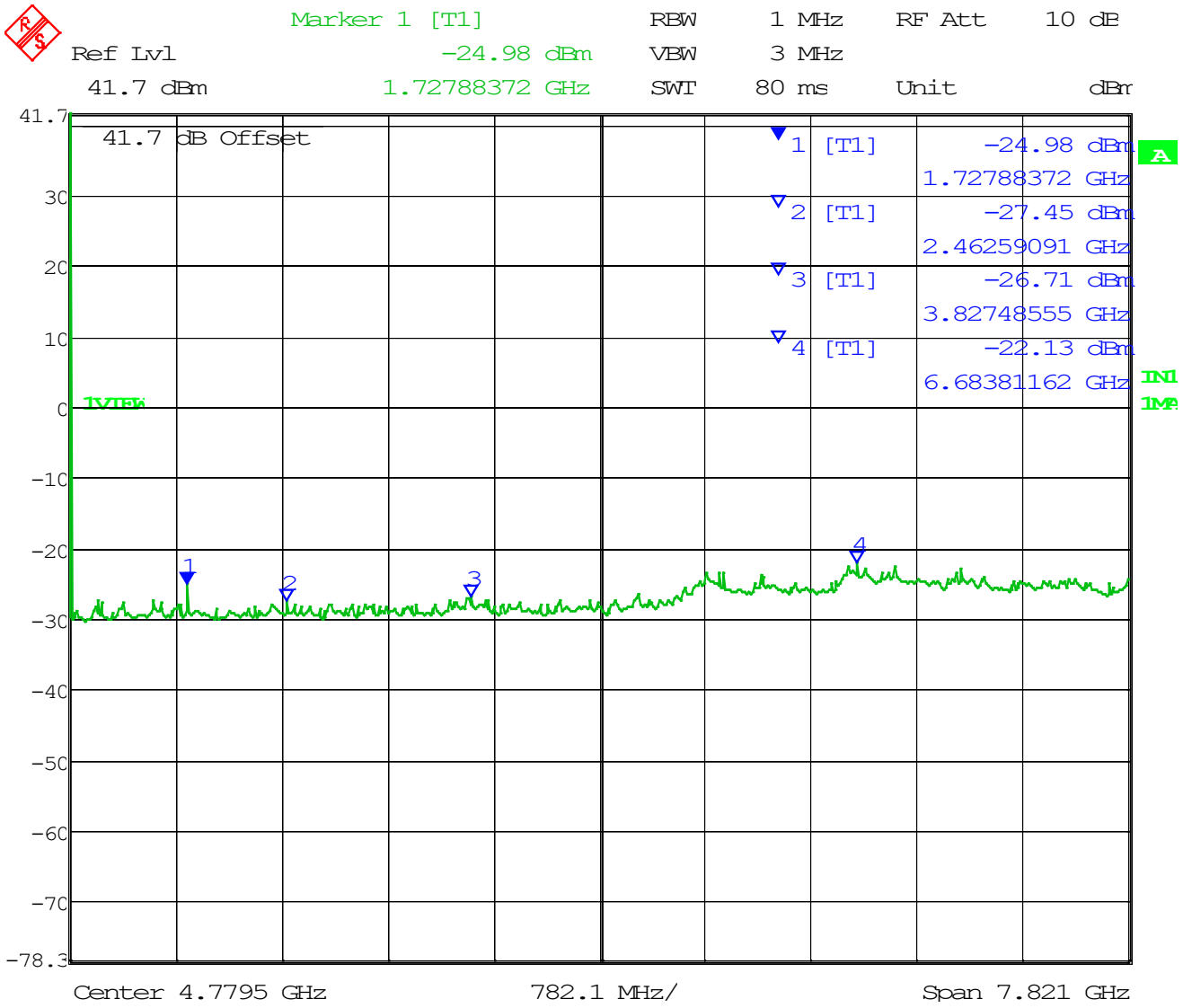
869 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1727.88	-24.28	-0.16	-24.12	-20.00	4.12
2493.94	-27.86	-0.58	-27.28	-20.00	7.28
3467.00	-28.07	-1.15	-26.92	-20.00	6.92
4184.67	-27.35	-1.42	-25.93	-20.00	5.93

SPURIOUS EMISSIONS

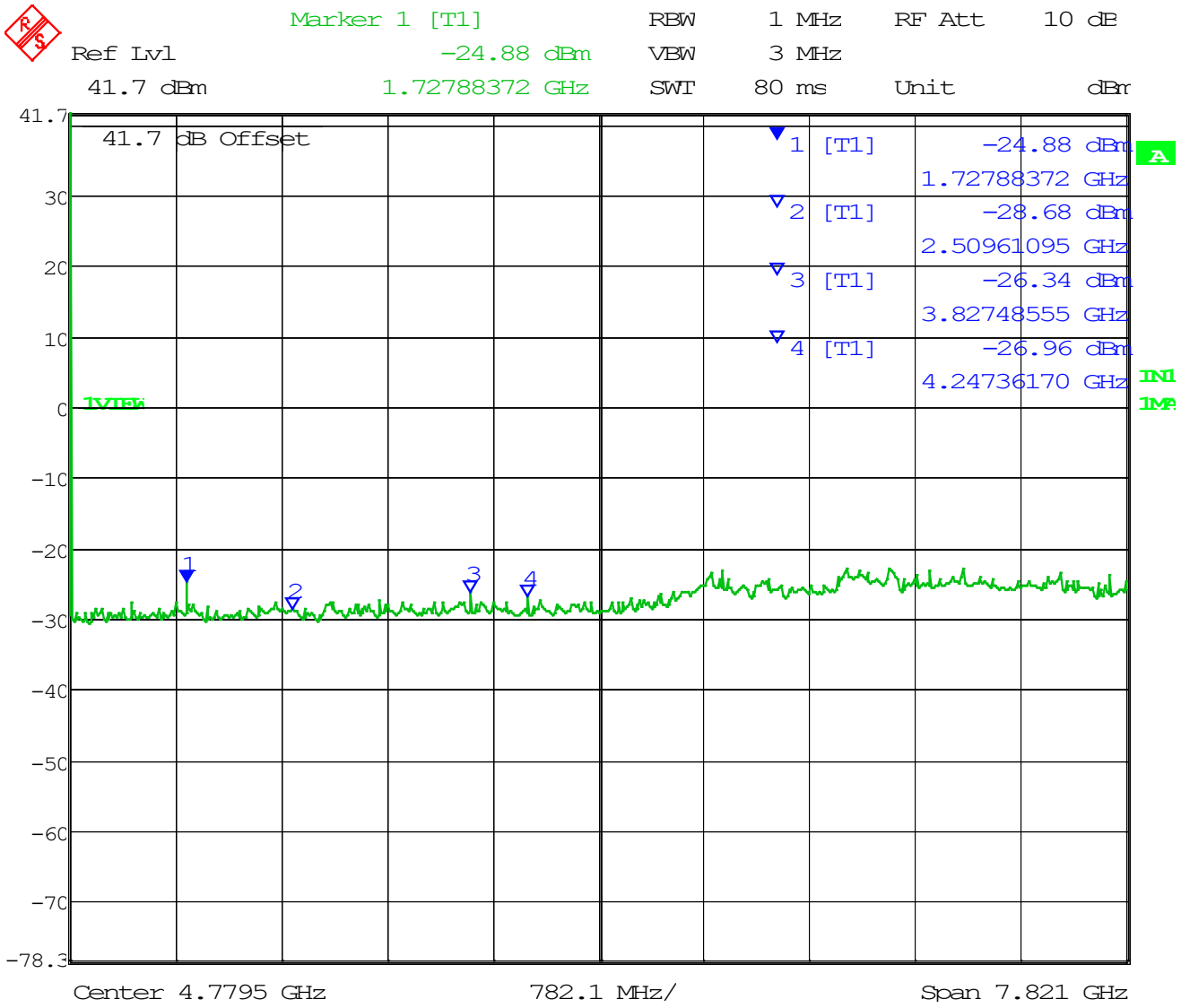
869 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1727.88	-24.98	-0.16	-24.82	-20.00	4.82
2462.59	-27.45	-0.52	-26.93	-20.00	6.93
3827.49	-26.71	-1.15	-25.56	-20.00	5.56
6683.12	-22.13	-2.05	-20.08	-20.00	0.08

SPURIOUS EMISSIONS

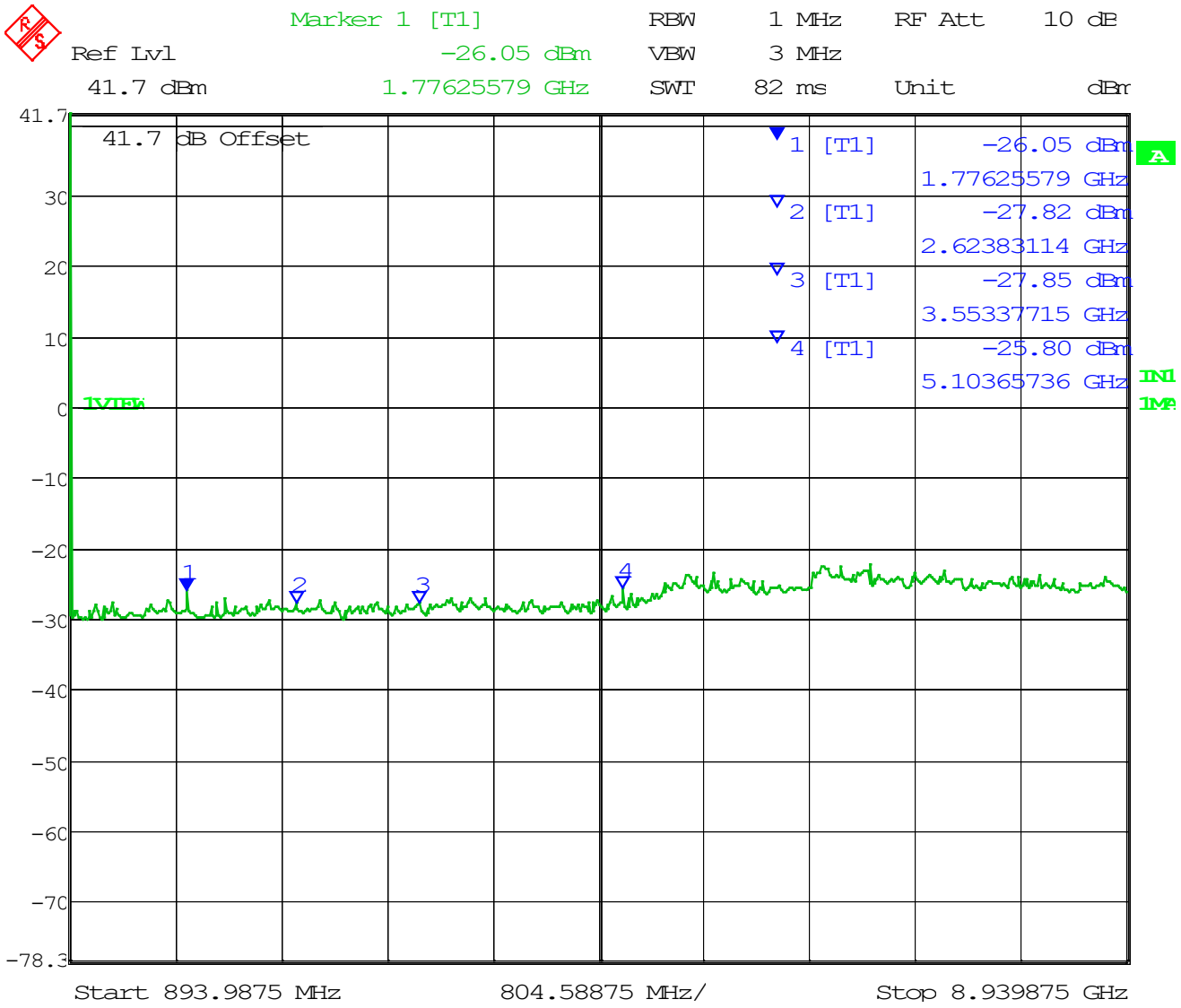
869 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1727.88	-24.88	-0.16	-24.72	-20.00	4.72
2509.61	-28.68	-0.54	-28.14	-20.00	8.14
3827.49	-26.34	-1.15	-25.19	-20.00	5.19
4247.36	-26.96	-1.42	-25.54	-20.00	5.54

SPURIOUS EMISSIONS

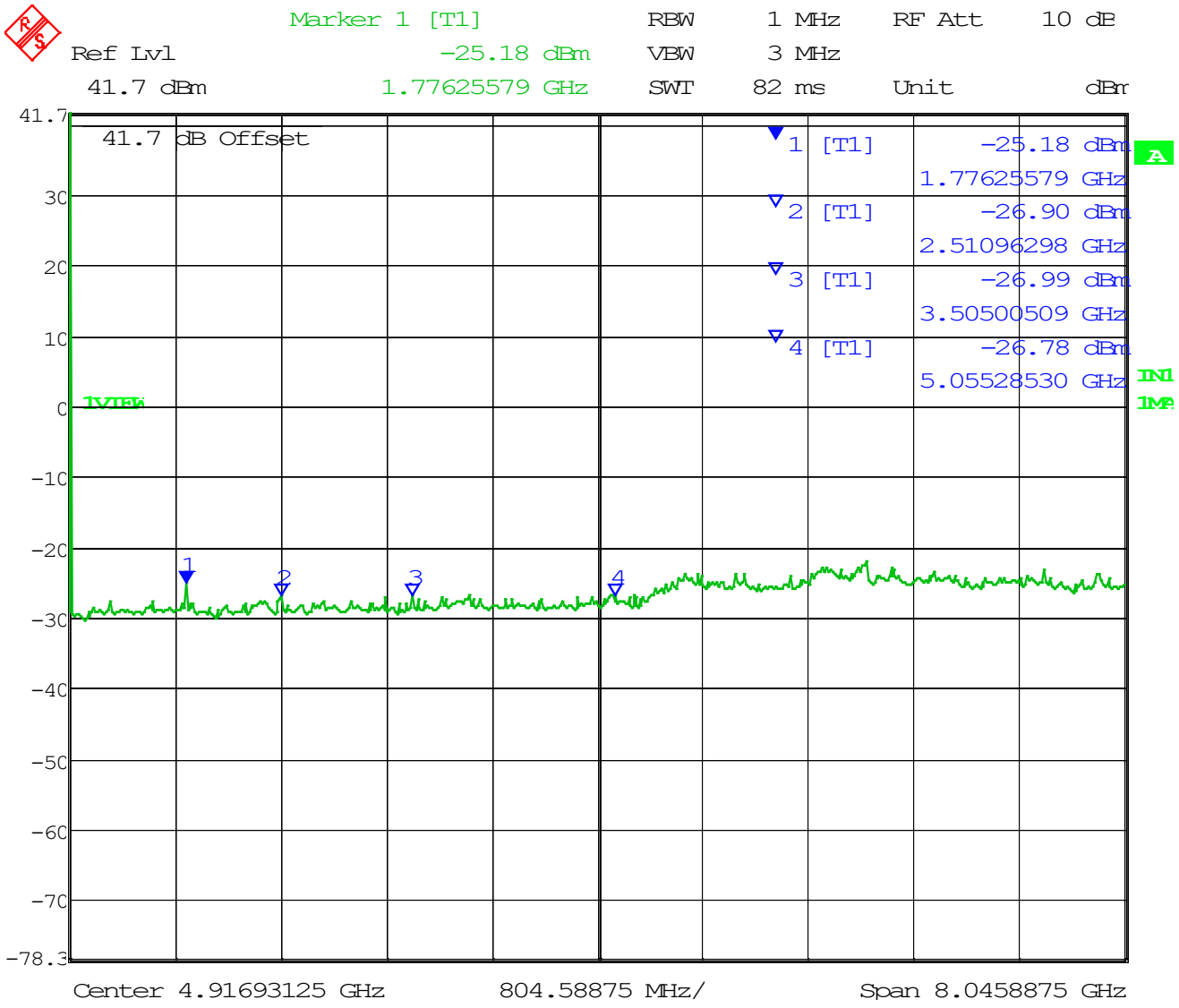
893.9875 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1776.26	-26.05	-0.27	-25.78	-13.00	12.78
2623.83	-27.82	-0.77	-27.05	-13.00	14.05
3553.38	-27.85	-1.03	-26.82	-13.00	13.82
5103.66	-25.80	-1.99	-23.81	-13.00	10.81

SPURIOUS EMISSIONS

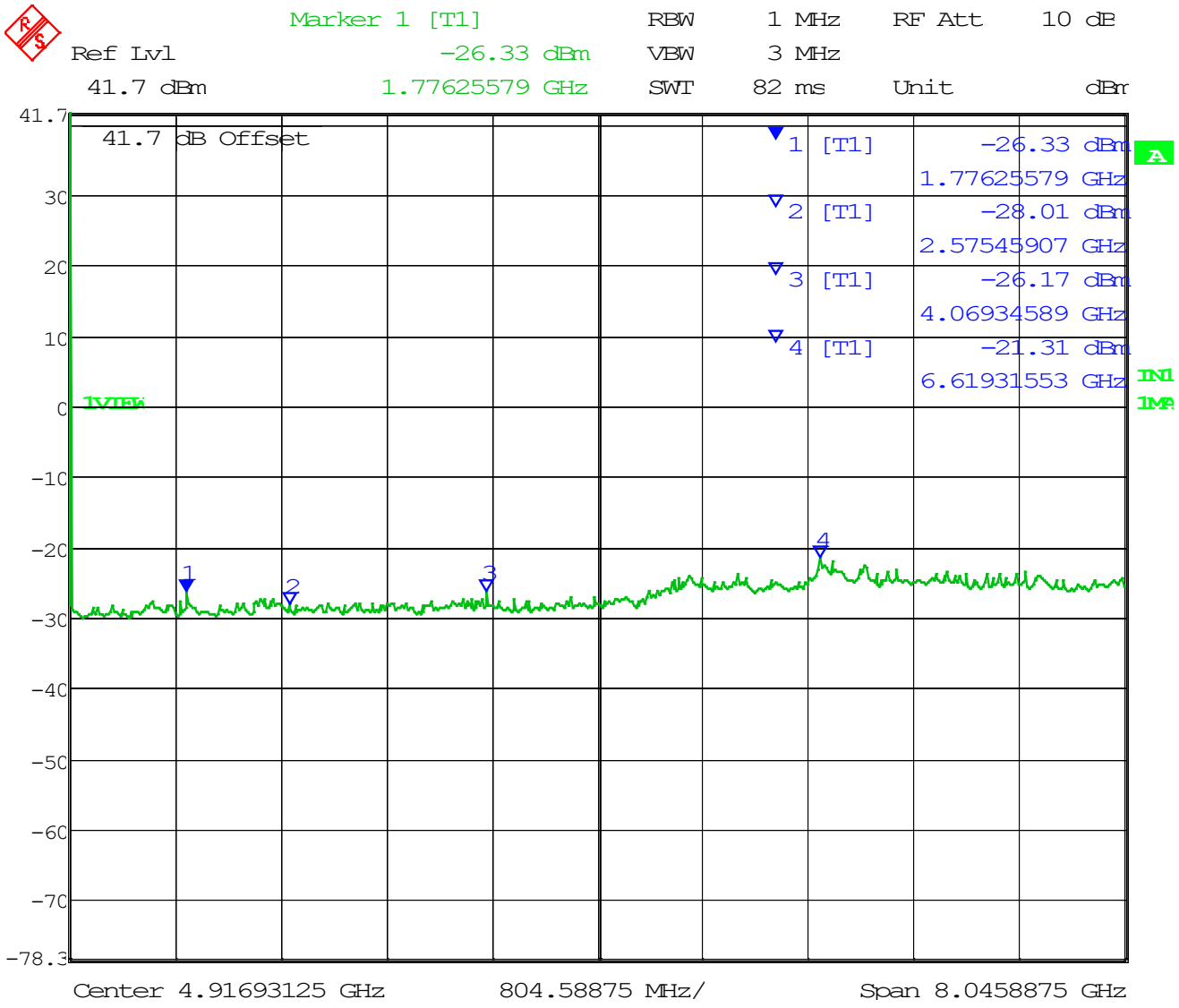
893.9875 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1776.26	-25.18	-0.27	-24.91	-13.00	11.91
2510.96	-26.90	-0.54	-26.36	-13.00	13.36
3505.01	-26.99	-0.96	-26.03	-13.00	13.03
5055.29	-26.78	-1.93	-24.85	-13.00	11.85

SPURIOUS EMISSIONS

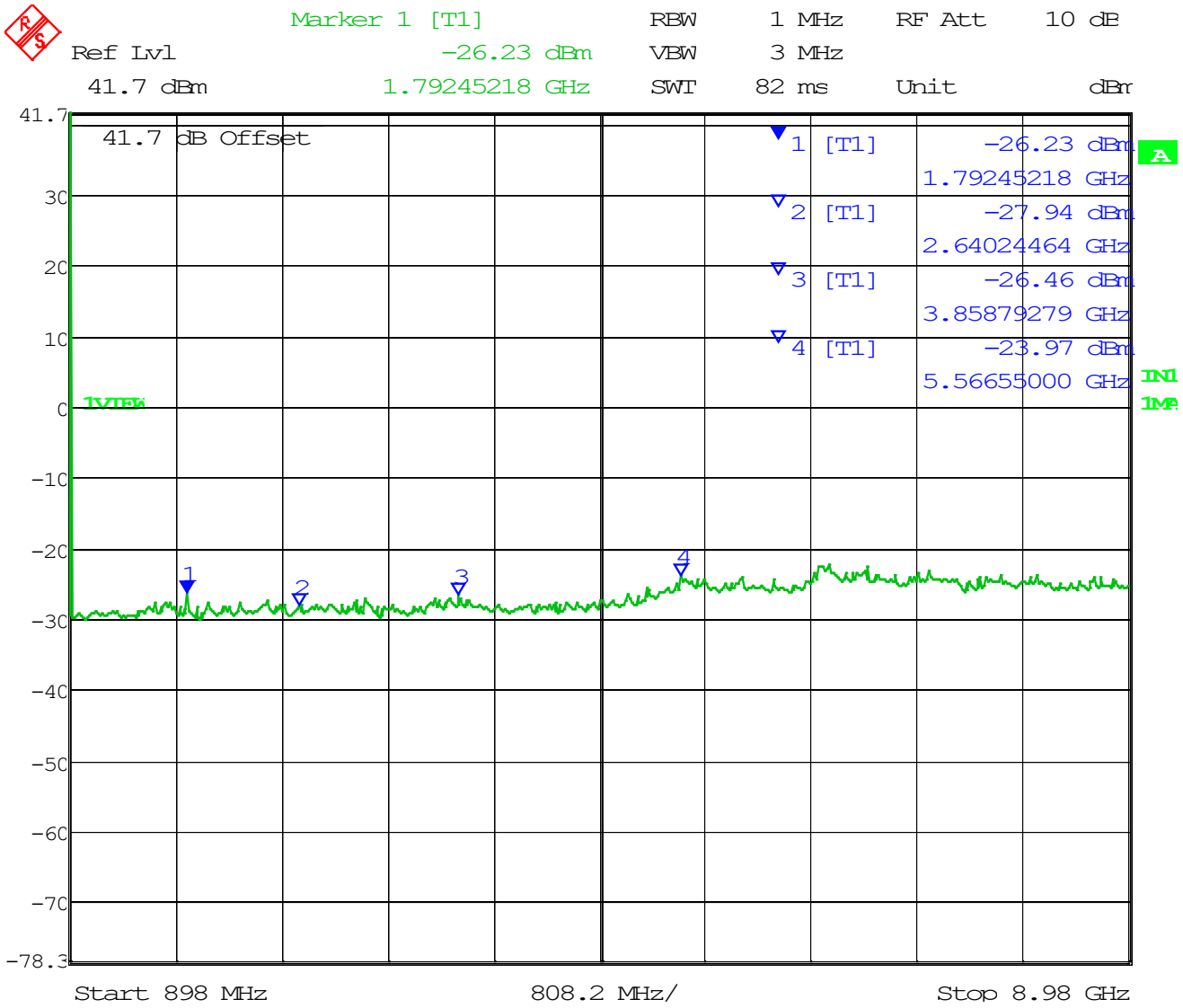
893.9875 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1776.26	-26.33	-0.27	-26.06	-13.00	13.06
2575.46	-28.01	-0.41	-27.60	-13.00	14.60
4069.35	-26.17	-1.34	-24.83	-13.00	11.83
6619.32	-21.31	-2.20	-19.11	-13.00	6.11

SPURIOUS EMISSIONS

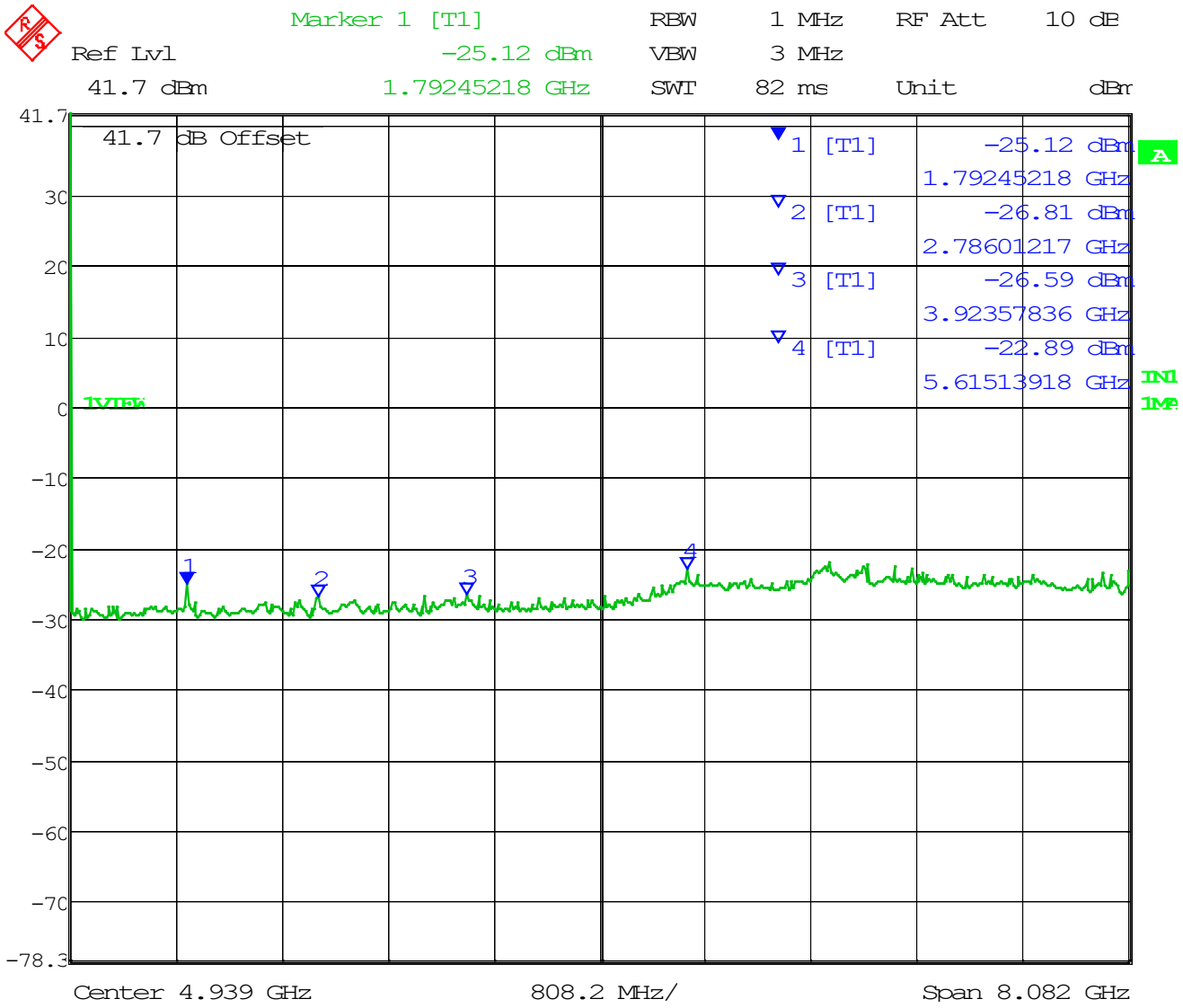
898 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1792.45	-26.23	-0.33	-25.90	-20.00	5.90
2640.25	-27.94	-0.71	-27.23	-20.00	7.23
3858.79	-26.46	-1.15	-25.31	-20.00	5.31
5566.55	-23.97	-2.24	-21.73	-20.00	1.73

SPURIOUS EMISSIONS

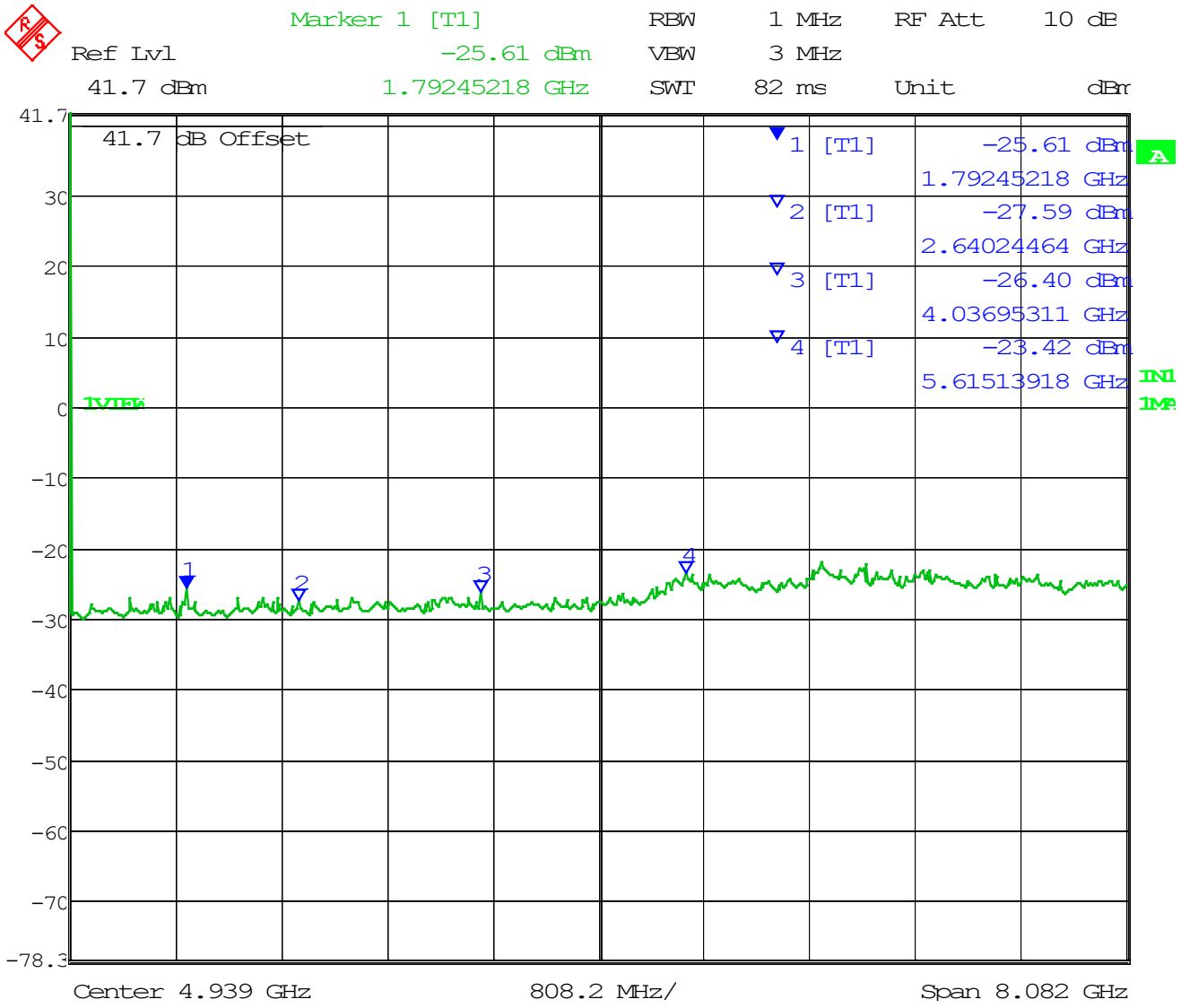
898 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1792.45	-25.12	-0.33	-24.79	-20.00	4.79
2786.01	-26.81	-0.77	-26.04	-20.00	6.04
3923.58	-26.59	-0.91	-25.68	-20.00	5.68
5615.14	-22.89	-2.05	-20.84	-20.00	0.84

SPURIOUS EMISSIONS

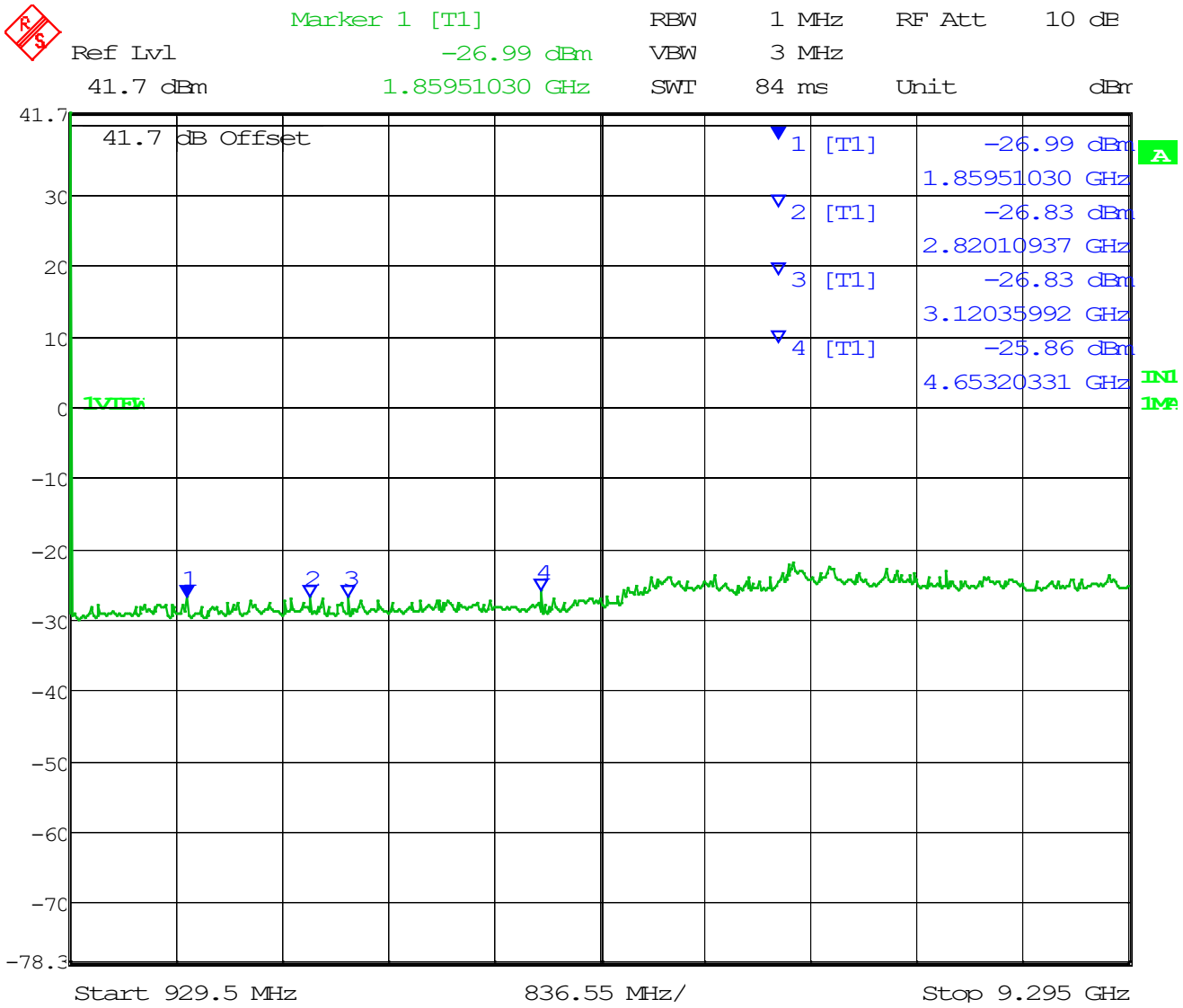
898 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1792.45	-25.61	-0.33	-25.28	-20.00	5.28
2640.25	-27.59	-0.71	-26.88	-20.00	6.88
4036.95	-26.40	-1.15	-25.25	-20.00	5.25
5615.14	-23.42	-2.05	-21.37	-20.00	1.37

SPURIOUS EMISSIONS

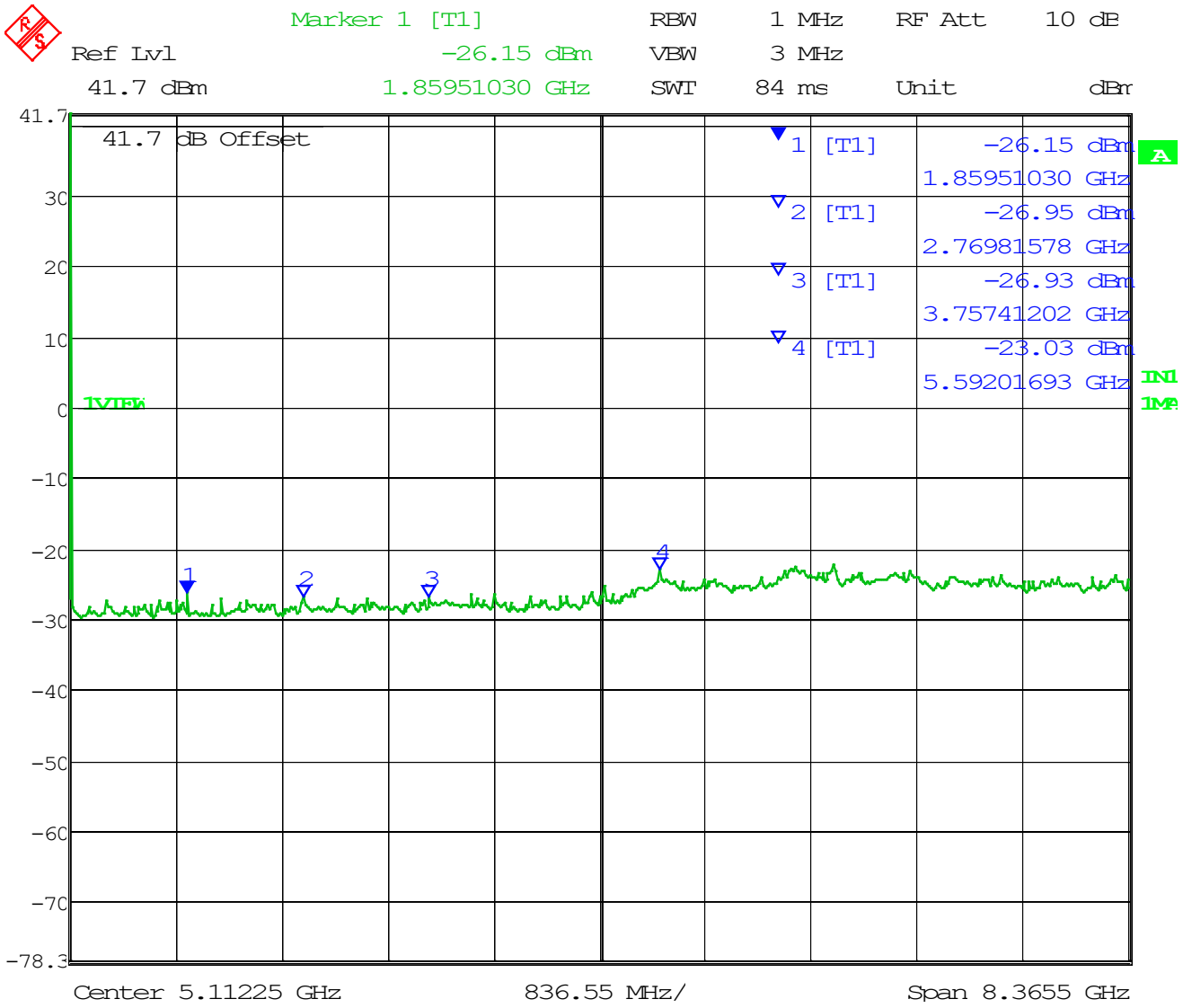
929.5 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.99	-0.22	-26.77	-13.00	13.77
2820.11	-26.83	-0.71	-26.12	-13.00	13.12
3120.36	-26.83	-1.04	-25.79	-13.00	12.79
4653.2	-25.86	-1.42	-24.44	-13.00	11.44

SPURIOUS EMISSIONS

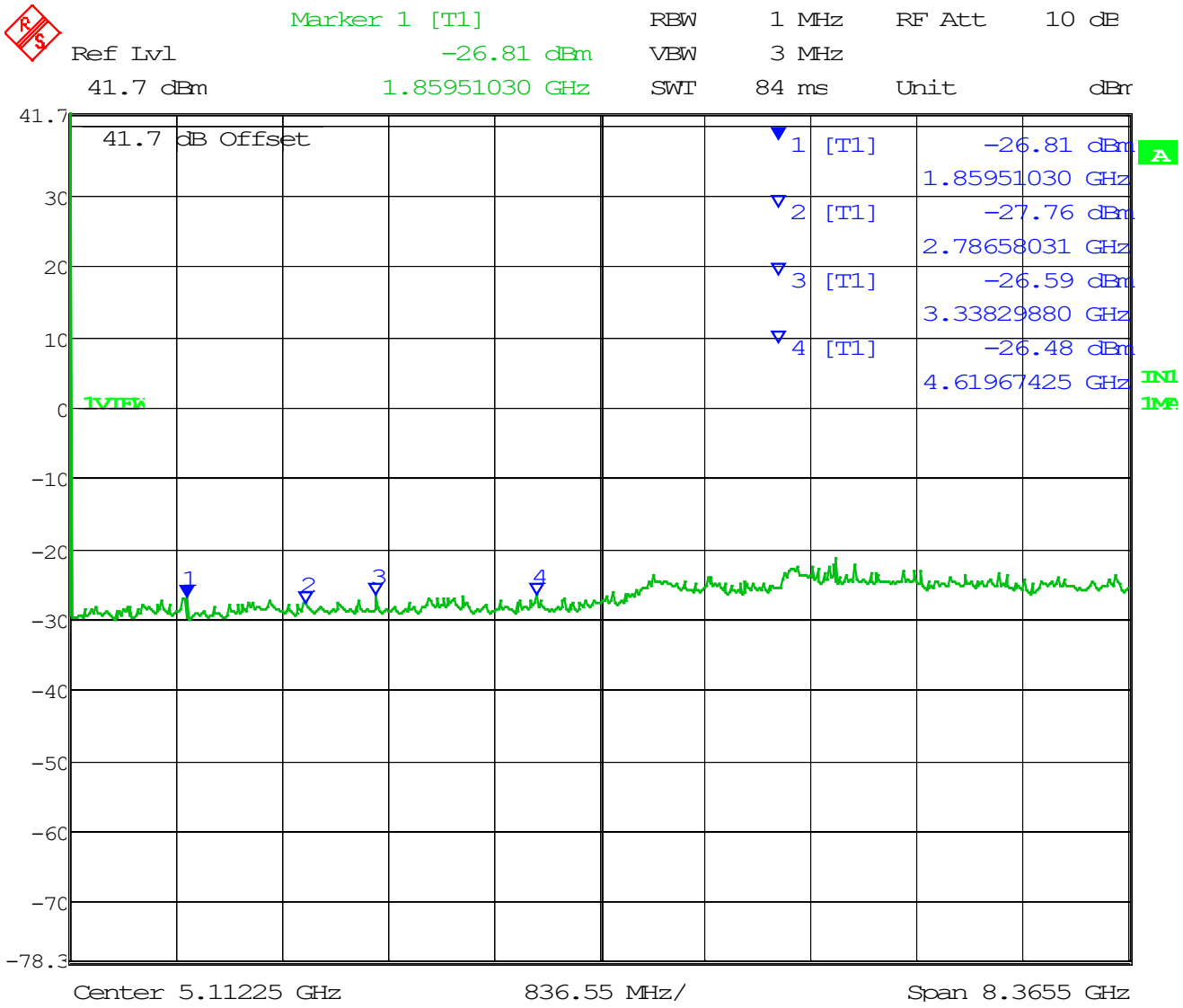
929.5 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.15	-0.22	-25.93	-13.00	12.93
2769.82	-26.95	-0.83	-26.12	-13.00	13.12
3757.41	-26.93	-1.17	-25.76	-13.00	12.76
5592.02	-23.03	-1.99	-21.04	-13.00	8.04

SPURIOUS EMISSIONS

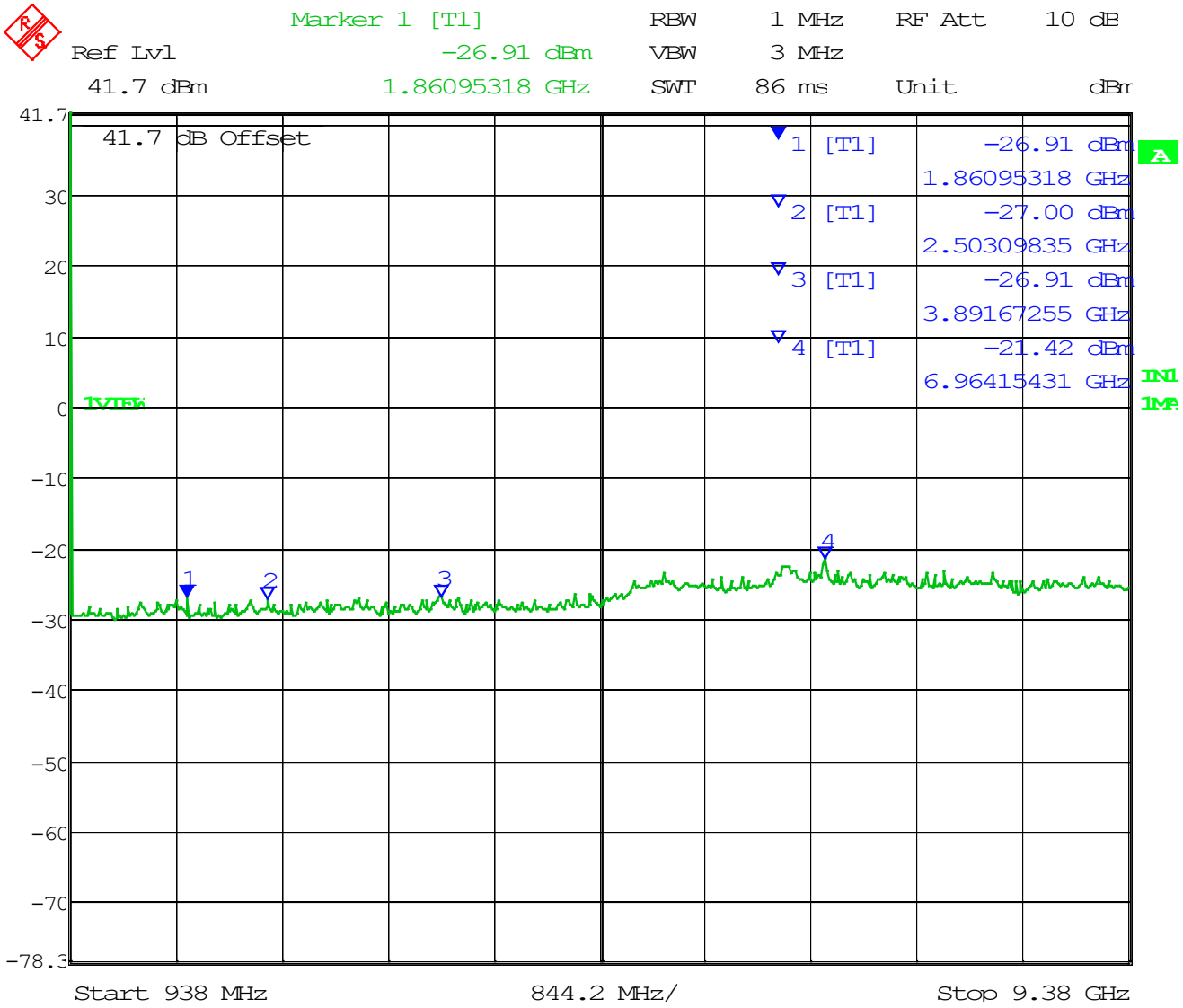
929.5 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.81	-0.22	-26.59	-13.00	13.59
2786.58	-27.76	-0.77	-26.99	-13.00	13.99
3338.30	-26.59	-1.04	-25.55	-13.00	12.55
4619.67	-26.48	-1.66	-24.82	-13.00	11.82

SPURIOUS EMISSIONS

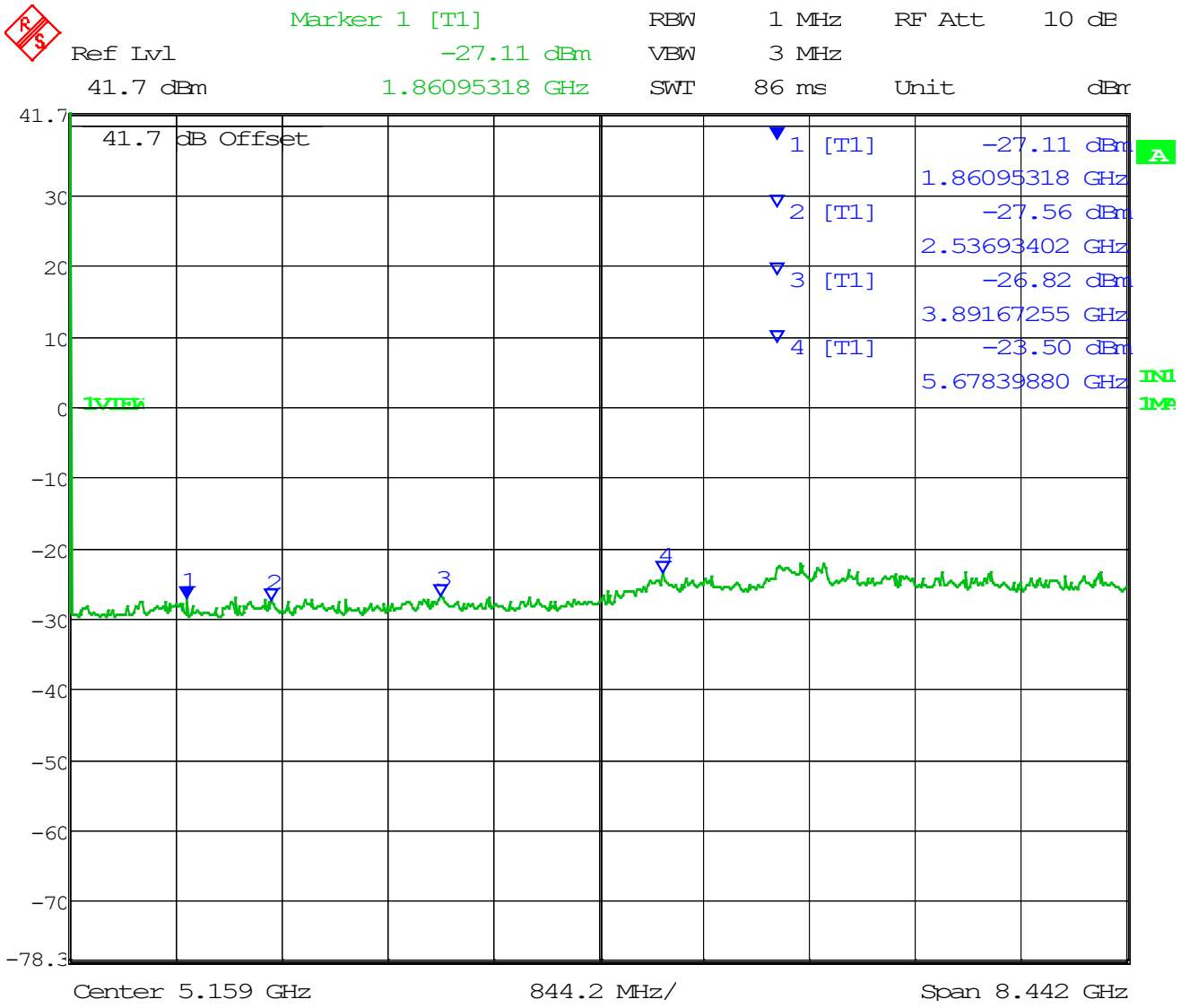
938 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1860.95	-26.91	-0.22	-26.69	-13.00	13.69
2503.1	-27.00	-0.58	-26.42	-13.00	13.42
3891.67	-26.91	-1.17	-25.74	-13.00	12.74
6964.15	-21.42	-2.38	-19.04	-13.00	6.04

SPURIOUS EMISSIONS

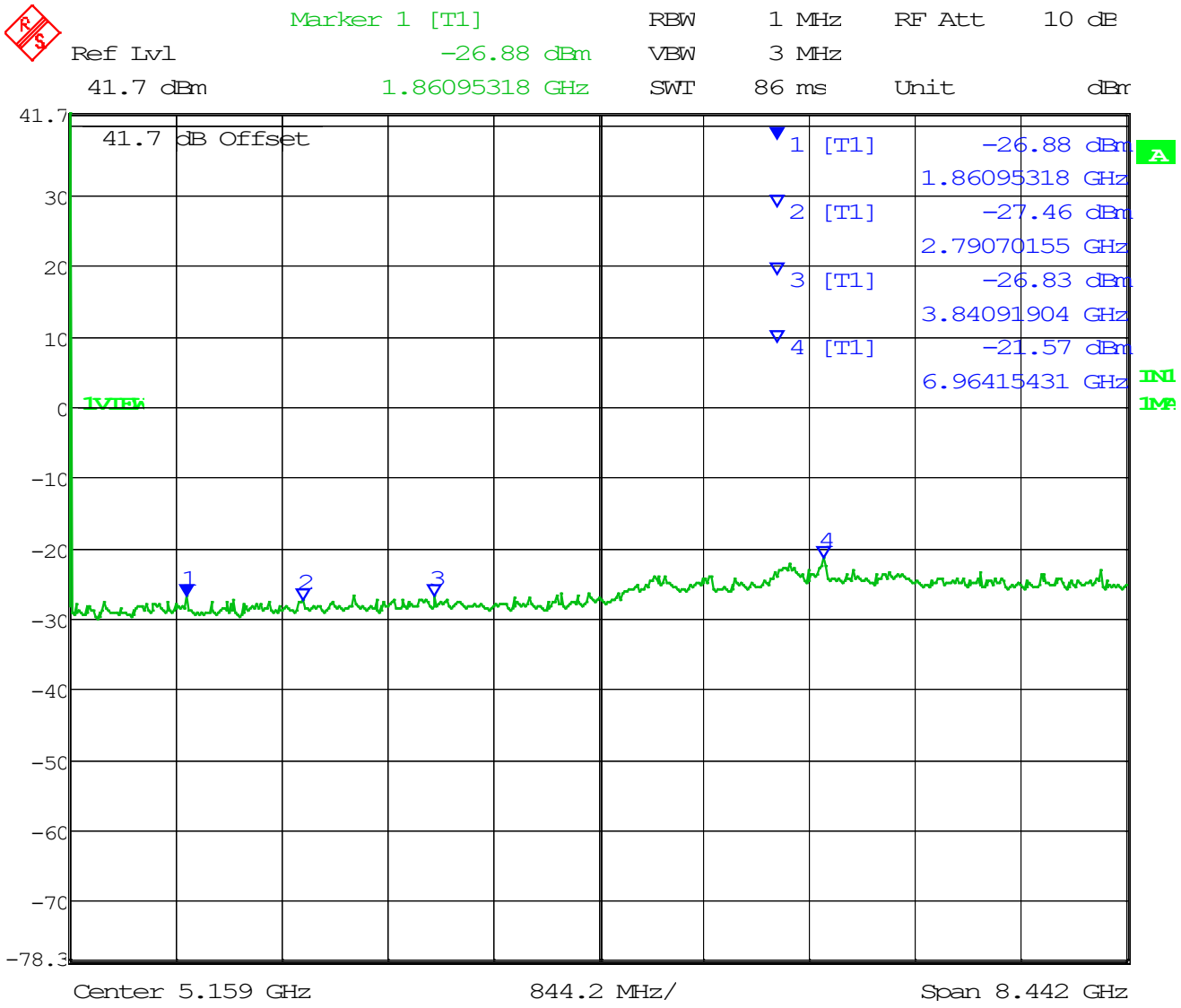
938 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1860.95	-27.11	-0.22	-26.89	-13.00	13.89
2536.93	-27.56	-0.64	-26.92	-13.00	13.92
3891.67	-26.82	-1.17	-25.65	-13.00	12.65
5678.4	-23.50	-2.11	-21.39	-13.00	8.39

SPURIOUS EMISSIONS

938 MHz, 7K60FXE/FXD

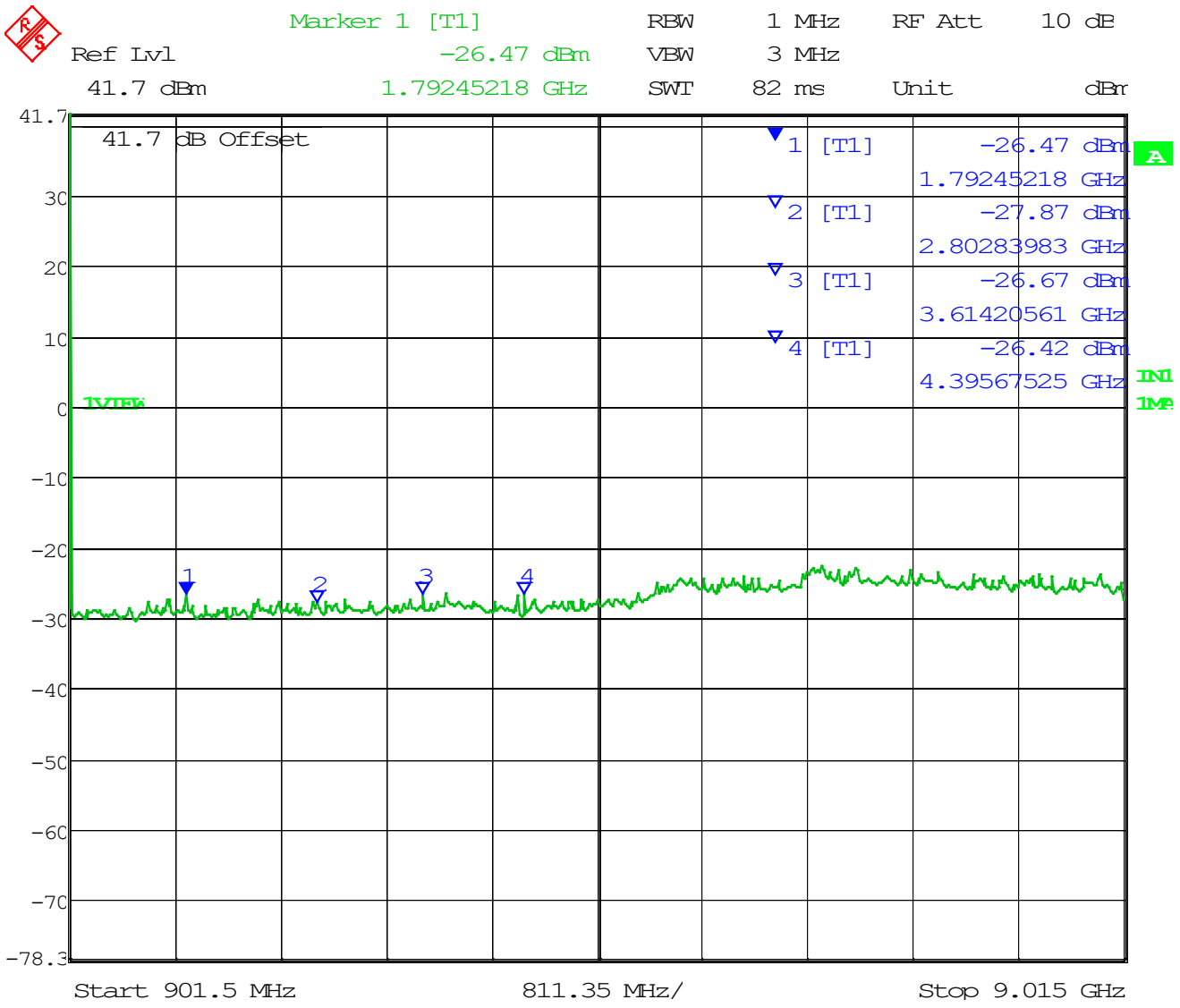


Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1860.95	-26.88	-0.22	-26.66	-13.00	13.66
2790.7	-27.46	-0.77	-26.69	-13.00	13.69
3840.92	-26.83	-1.21	-25.62	-13.00	12.62
6964.15	-21.57	-2.38	-19.19	-13.00	6.19

SPURIOUS EMISSIONS

Part 24 Bands

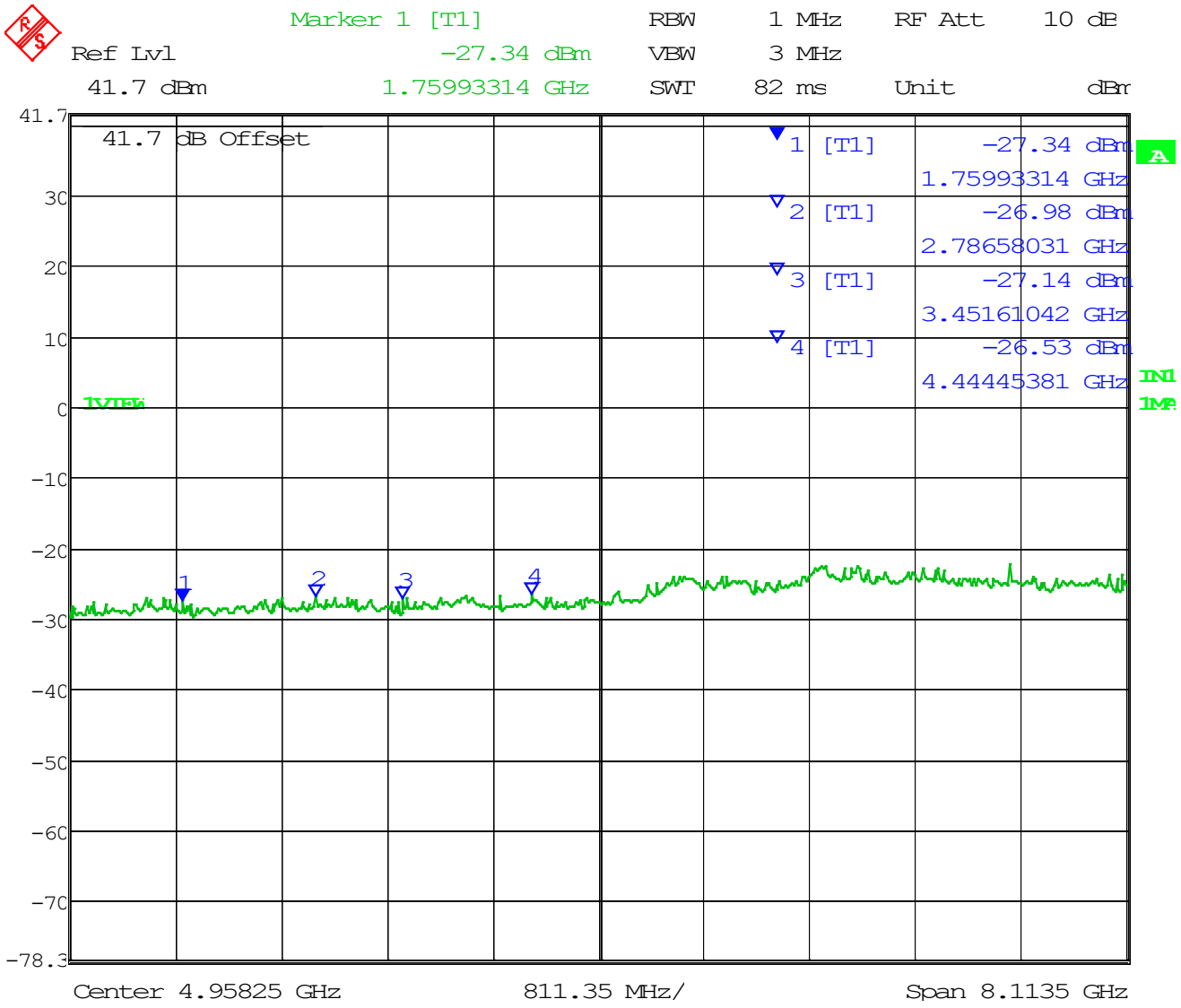
901.5 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1792.45	-26.47	-0.33	-26.14	-13.00	13.14
2802.84	-27.87	-0.90	-26.97	-13.00	13.97
3614.21	-26.67	-1.15	-25.52	-13.00	12.52
4395.68	-26.42	-1.53	-24.89	-13.00	11.89

SPURIOUS EMISSIONS

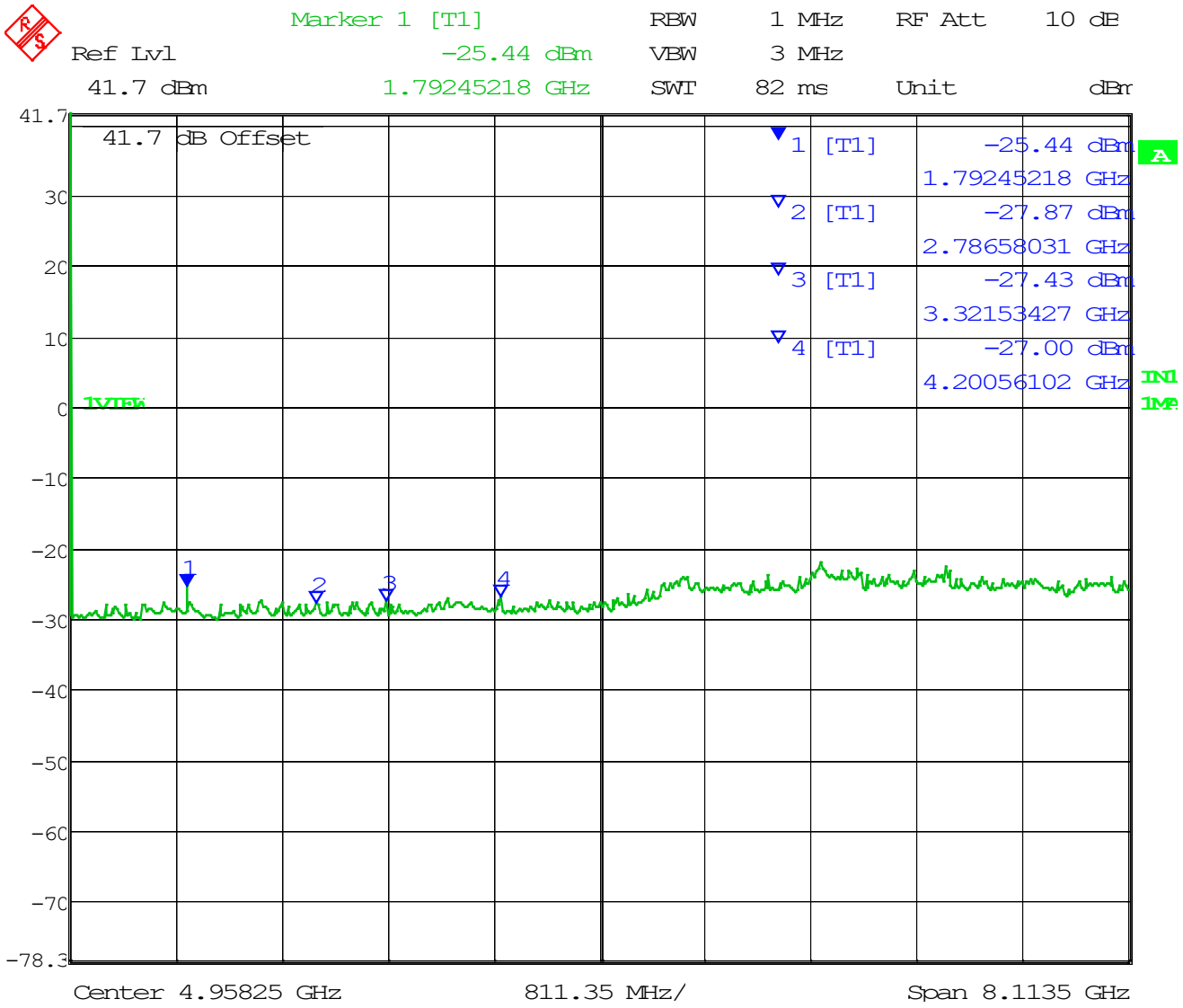
901.5 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1759.93	-27.34	-0.14	-27.20	-13.00	14.20
2786.58	-26.98	-0.77	-26.21	-13.00	13.21
3451.61	-27.14	-1.02	-26.12	-13.00	13.12
4444.45	-26.53	-1.53	-25.00	-13.00	12.00

SPURIOUS EMISSIONS

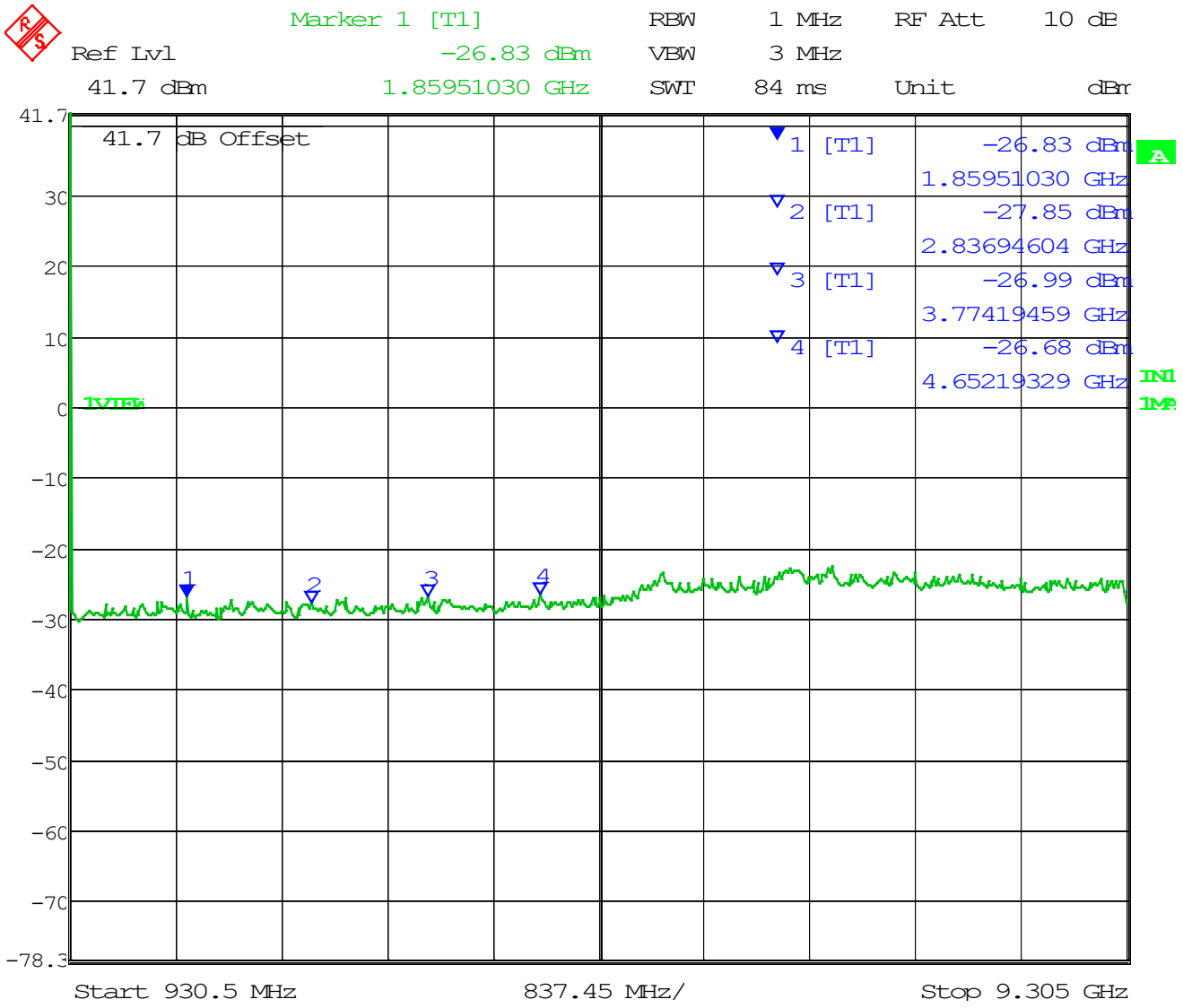
901.5 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1792.45	-25.44	-0.33	-25.11	-13.00	12.11
2786.58	-27.87	-0.77	-27.10	-13.00	14.10
3321.53	-27.43	-1.05	-26.38	-13.00	13.38
4200.56	-27.00	-1.42	-25.58	-13.00	12.58

SPURIOUS EMISSIONS

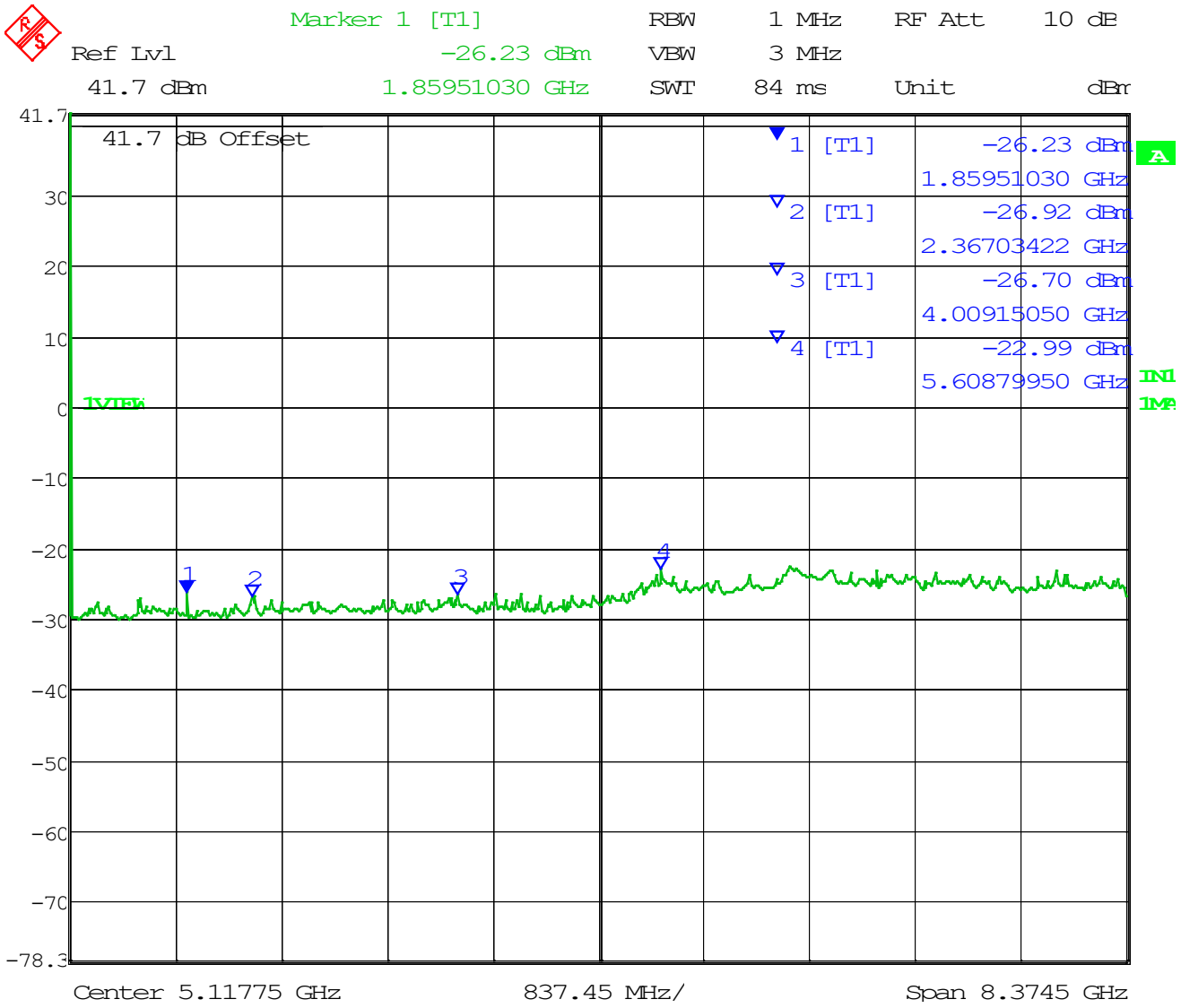
930.5 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.83	-0.22	-26.61	-13.00	13.61
2836.95	-27.85	-0.64	-27.21	-13.00	14.21
3774.42	-26.99	-1.09	-25.90	-13.00	12.90
4652.19	-26.68	-1.42	-25.26	-13.00	12.26

SPURIOUS EMISSIONS

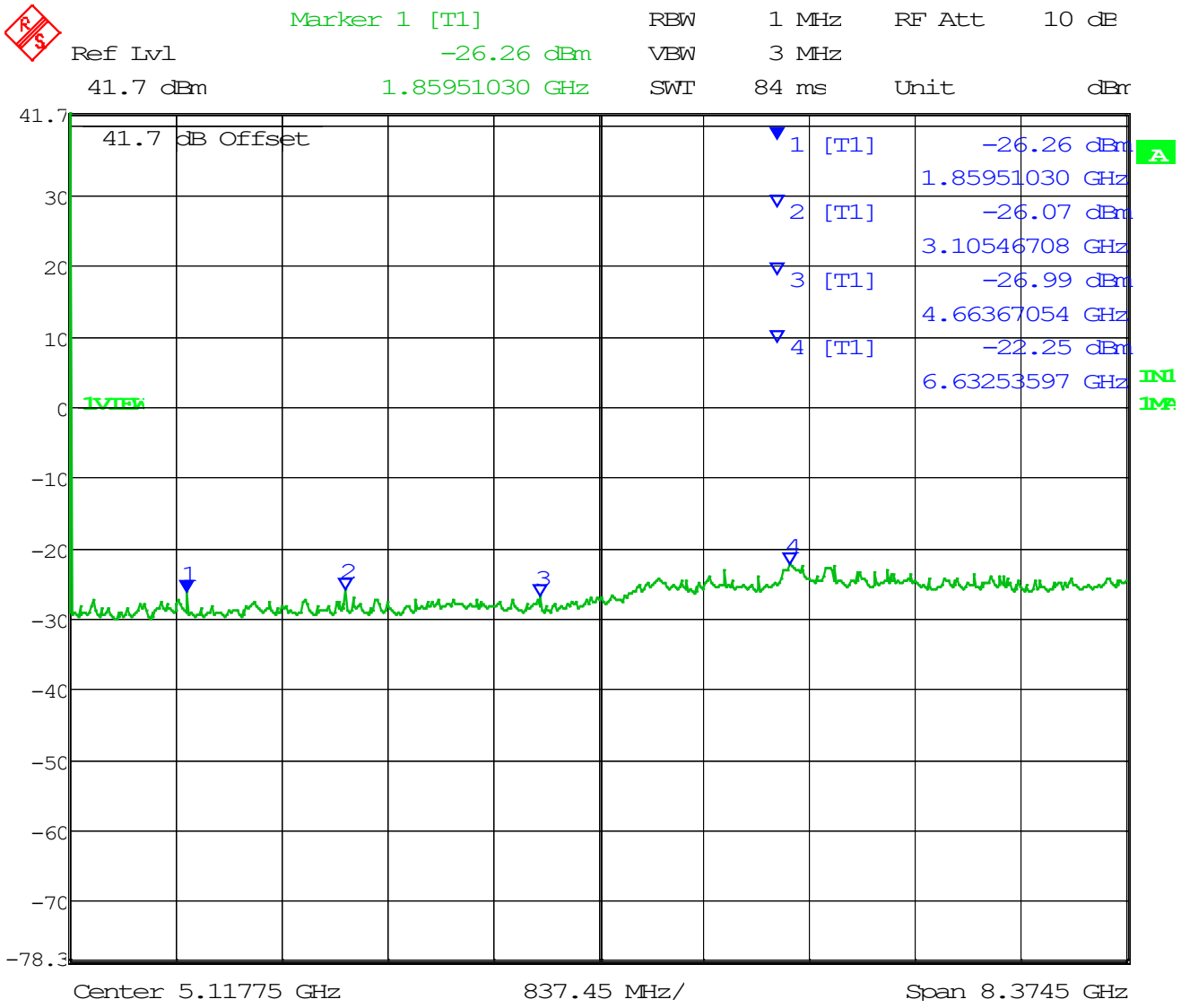
930.5 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.23	-0.22	-26.01	-13.00	13.01
2367.03	-26.92	-0.41	-26.51	-13.00	13.51
4009.15	-26.70	-1.15	-25.55	-13.00	12.55
5608.8	-22.99	-2.19	-20.80	-13.00	7.80

SPURIOUS EMISSIONS

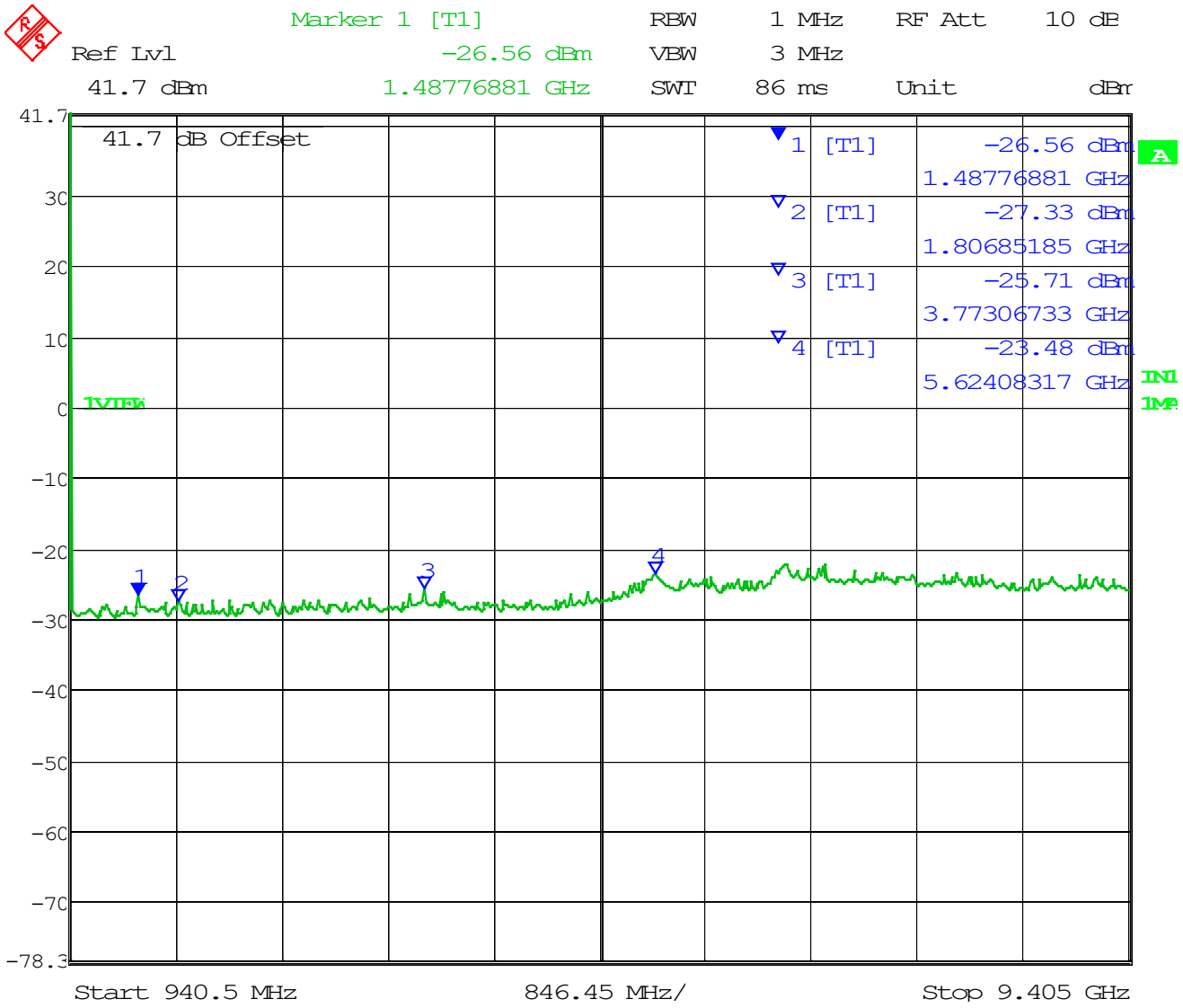
930.5 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.26	-0.22	-26.04	-13.00	13.04
3105.47	-26.07	-0.89	-25.18	-13.00	12.18
4663.67	-26.99	-1.53	-25.46	-13.00	12.46
6632.54	-22.25	-2.33	-19.92	-13.00	6.92

SPURIOUS EMISSIONS

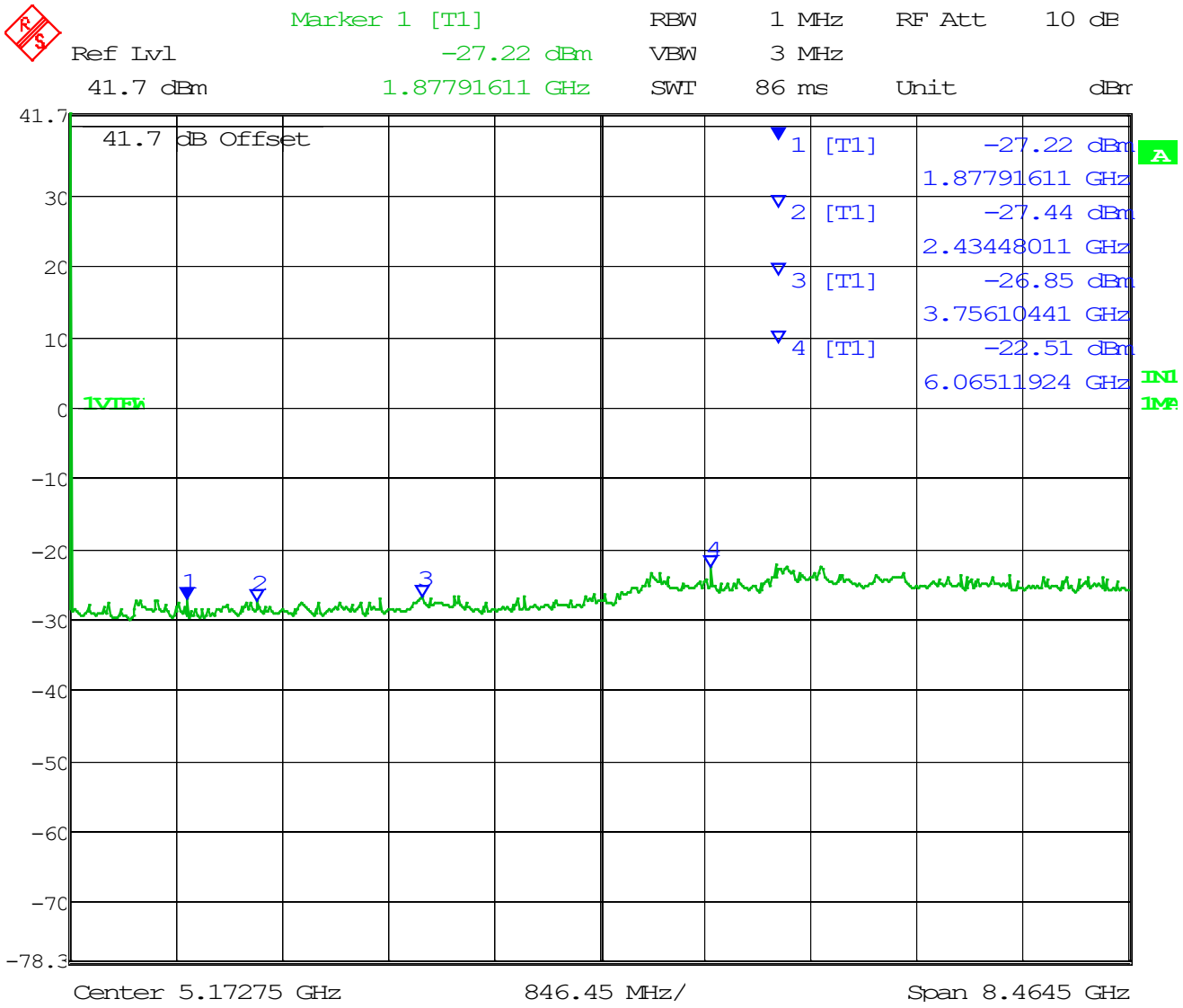
940.5 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1487.77	-26.56	-0.15	-26.41	-13.00	13.41
1806.85	-27.33	-0.09	-27.24	-13.00	14.24
3773.07	-25.71	-1.09	-24.62	-13.00	11.62
5624.08	-23.48	-2.05	-21.43	-13.00	8.43

SPURIOUS EMISSIONS

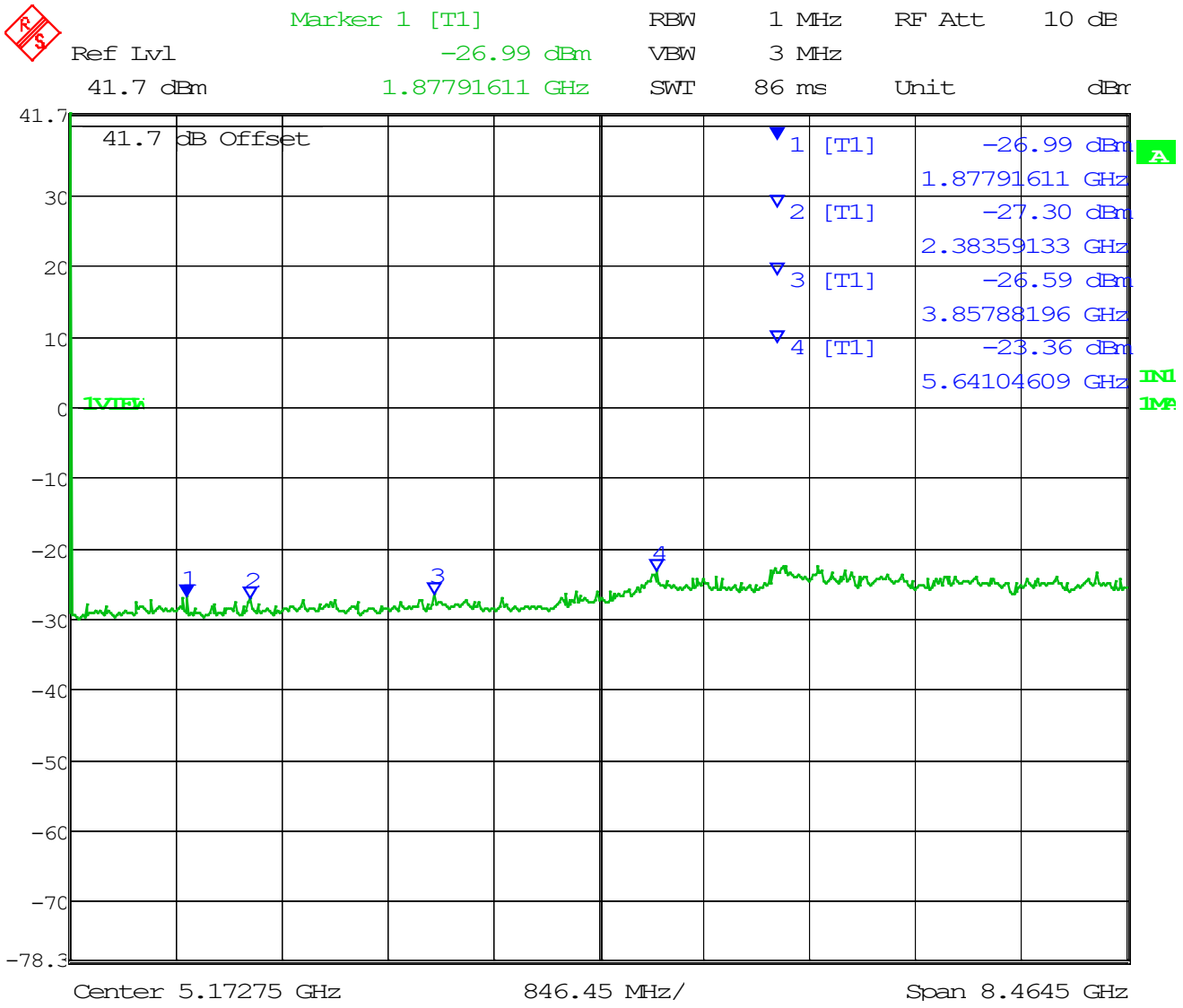
940.5 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1877.91	-27.22	-0.08	-27.14	-13.00	14.14
2434.48	-27.44	-0.27	-27.17	-13.00	14.17
3756.10	-26.85	-1.17	-25.68	-13.00	12.68
6065.12	-22.51	-1.92	-20.59	-13.00	7.59

SPURIOUS EMISSIONS

940.5 MHz, 7K60FXE/FXD

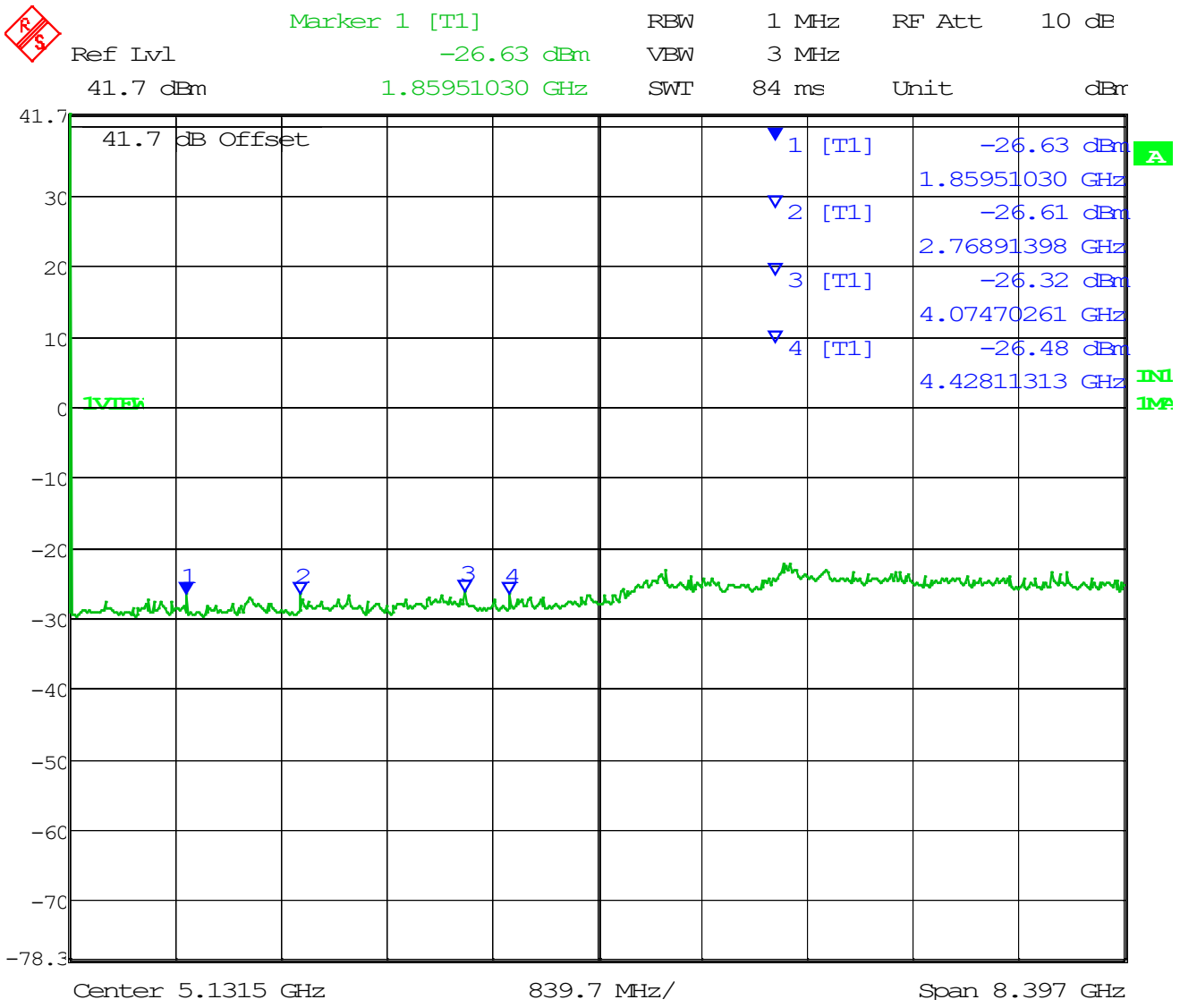


Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1877.91	-26.99	-0.08	-26.91	-13.00	13.91
2383.59	-27.30	-0.66	-26.64	-13.00	13.64
3857.88	-26.59	-1.15	-25.44	-13.00	12.44
5641.05	-23.36	-2.07	-21.29	-13.00	8.29

SPURIOUS EMISSIONS

Part 22 Band

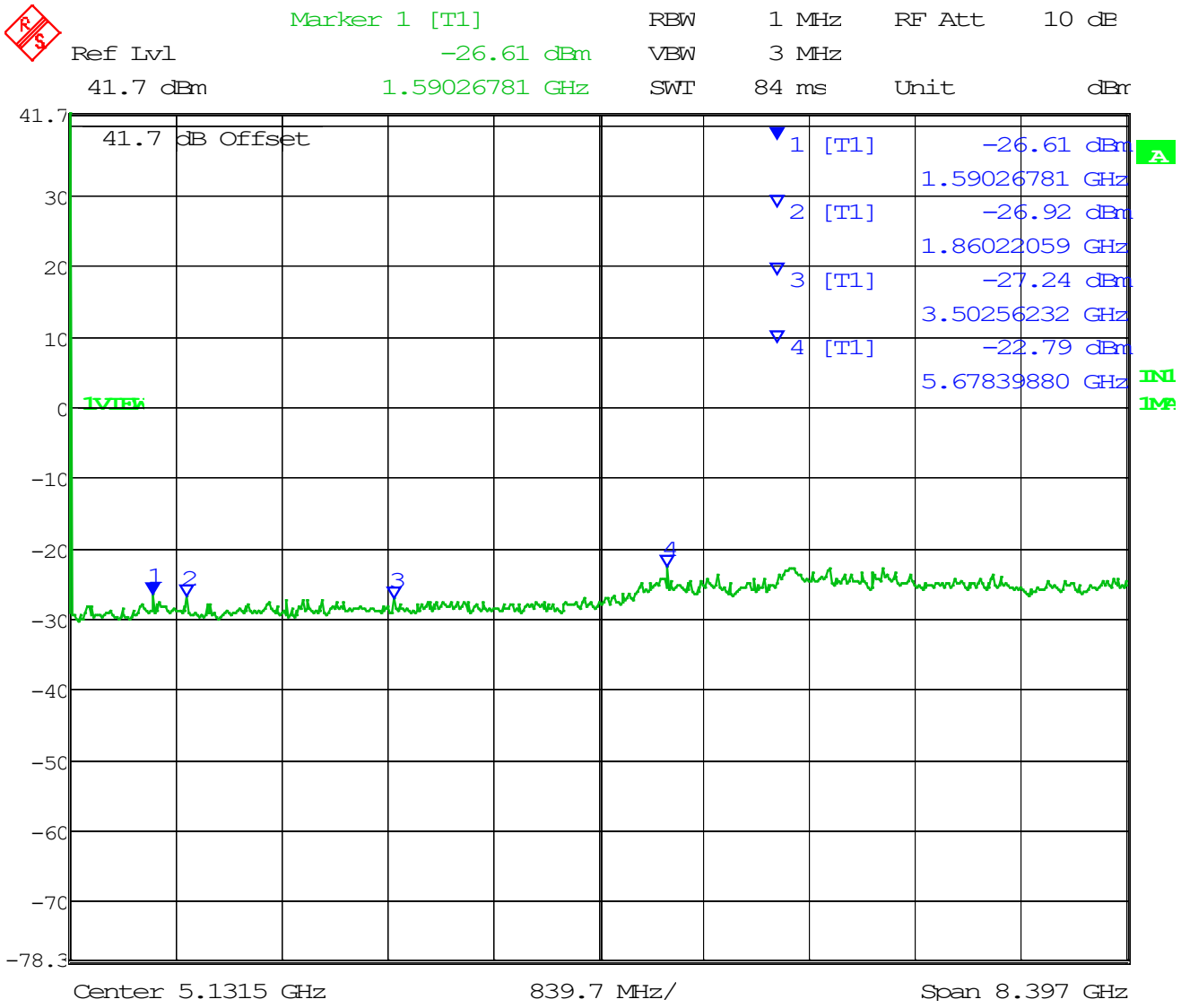
933 MHz, 11K0F3E



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.63	-0.22	-26.41	-13.00	13.41
2768.91	-26.61	-0.83	-25.78	-13.00	12.78
4074.70	-26.32	-1.34	-24.98	-13.00	11.98
4428.11	-26.48	-1.60	-24.88	-13.00	11.88

SPURIOUS EMISSIONS

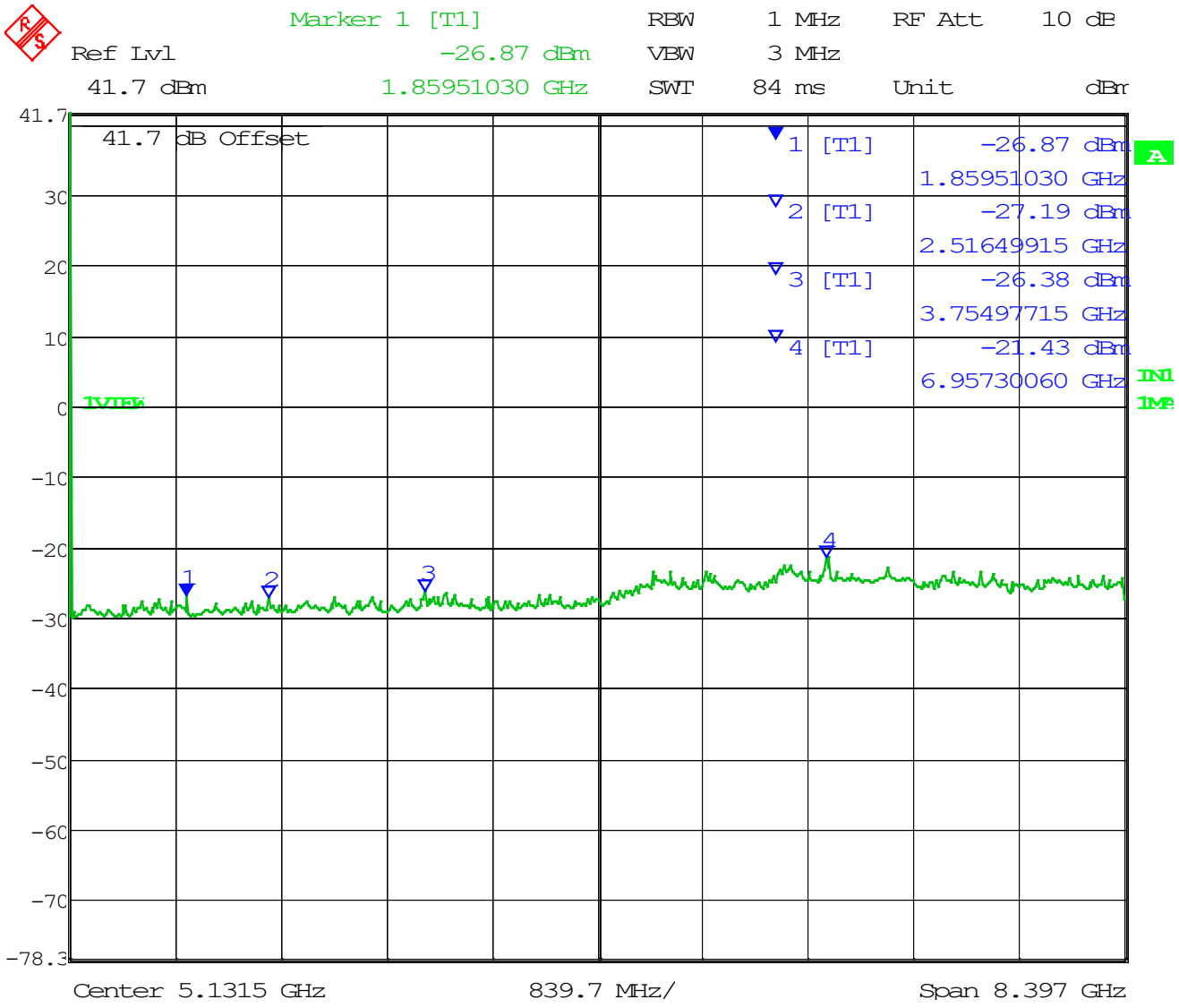
933 MHz, 8K10F1D/F1E/F1W



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1590.27	-26.61	-0.20	-26.41	-13.00	13.41
1860.22	-26.92	-0.22	-26.70	-13.00	13.70
3502.56	-27.24	-0.96	-26.28	-13.00	13.28
5678.4	-22.79	-2.11	-20.68	-13.00	7.68

SPURIOUS EMISSIONS

933 MHz, 7K60FXE/FXD



Frequency (MHz)	Measured Level (dBm)	Losses (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1859.51	-26.87	-0.22	-26.65	-13.00	13.65
2516.5	-27.19	-0.54	-26.65	-13.00	13.65
3754.98	-26.38	-1.17	-25.21	-13.00	12.21
6957.3	-21.43	-2.38	-19.05	-13.00	6.05

FIELD STRENGTH OF SPURIOUS EMISSIONS

FCC Rule Parts: 2.1053(a), 90.210(b) - (d), (g) - (j), 24.133(a)(1), 22.359(a)

§90.210 Emission masks.

APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
929-930	B	G
All other bands	B	C

[3]Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691 of this chapter.

[5]Equipment designed to operate on 25 kilohertz bandwidth channels must meet the requirements of either Emission Mask B or G, whichever is applicable, while equipment designed to operate on 12.5 kilohertz bandwidth channels must meet the requirements of Emission Mask D. Equipment designed to operate on 25 kilohertz bandwidth channels may alternatively meet the Adjacent Channel Power limits of §90.221.

[6]Transmitters utilizing analog emissions that are equipped with an audio low-pass filter must meet Emission Mask B. All transmitters utilizing digital emissions and those transmitters using analog emissions without an audio low-pass filter must meet Emission Mask H.

FIELD STRENGTH OF SPURIOUS EMISSIONS

(b) *Emission Mask B.* For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(c) *Emission Mask C.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(4) In the 1427-1432 MHz band, licensees are encouraged to take all reasonable steps to ensure that unwanted emissions power does not exceed the following levels in the 1400-1427 MHz band:

(i) For stations of point-to-point systems in the fixed service: −45 dBW/27 MHz.

(ii) For stations in the mobile service: −60 dBW/27 MHz.

(d) *Emission Mask D—12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(f_d−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

FIELD STRENGTH OF SPURIOUS EMISSIONS

(g) *Emission Mask G.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (f_d/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(h) *Emission Mask H.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

(i) *Emission Mask I.* For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: At least 25 dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: At least 35 dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: At least 43 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.

(j) *Emission Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2.5 kHz, but no more than 6.25 kHz: At least 53 log (f_d/2.5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: At least 103 log (f_d/3.9) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5 kHz: At least 157 log (f_d/5.3) dB, or 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

FIELD STRENGTH OF SPURIOUS EMISSIONS

§24.133 Emission limits.

(a) The power of any emission shall be attenuated below the transmitter power (P), as measured in accordance with §24.132(f), in accordance with the following schedule:

(1) For transmitters authorized a bandwidth greater than 10 kHz:

(i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of up to and including 40 kHz: at least 116 Log_{10} ((f_d + 10)/6.1) decibels or 50 plus 10 Log_{10} (P) decibels or 70 decibels, whichever is the lesser attenuation;

(ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 40 kHz: at least 43 + 10 Log_{10} (P) decibels or 80 decibels, whichever is the lesser attenuation.

§22.359 Emission limitations.

The rules in this section govern the spectral characteristics of emissions in the Public Mobile Services, except for the Air-Ground Radiotelephone Service (see §22.861, instead) and the Cellular Radiotelephone Service (see §22.917, instead).

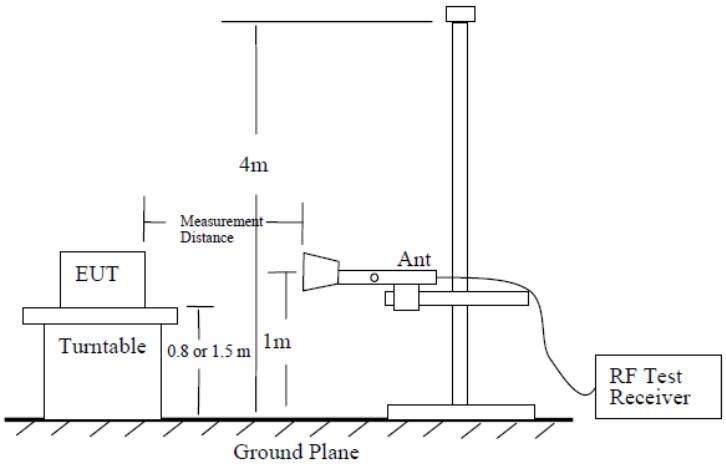
(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

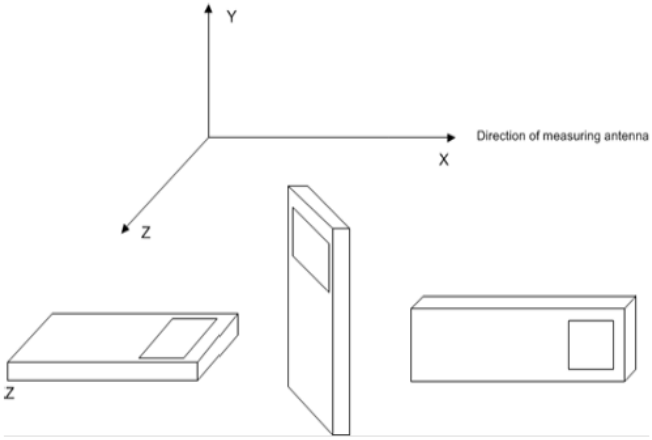
FIELD STRENGTH OF SPURIOUS EMISSIONS

Method of Measurement: ANSI C63.26, 5.5.4

Test Site Setup:



EUT Orientation(s):



Note: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from the lowest frequency generated internally to at least the tenth harmonic of the fundamental. This test was conducted in accordance with the standard listed above using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669. The measurements below represent the worst case of all the frequencies tested.

Note: The six (6) highest emissions or more of each worst-case operational modes of the EUT are represented below. Emissions 20 dB below the limit are not required to be reported.

FIELD STRENGTH OF SPURIOUS EMISSIONS

Applicable Emission Limitations

FCC Rule Part	Frequency (MHz)	Applicable Emission Mask	Out Of Band Limit Calculation	Out of Band Limit (dBm)
90	806.0125	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
	824.0000	Pt 90 Mask D	50 + 10*log(P) or 70	-20.00
	848.9875	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
90	851.0125	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
	869.0000	Pt 90 Mask D	50 + 10*log(P) or 70	-20.00
	893.9875	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask H	43 + 10*log(P)	-13.00
90	898.0000	Pt 90 Mask I	43 + 10*log(P) or 70	-13.00
		Pt 90 Mask J	50 + 10*log(P) or 70	-20.00
24	901.5000	Pt 24.133(a)(1)	43 + 10*log(P) or 80	-13.00
90	929.5000	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask G	43 + 10*log(P)	-13.00
24	930.5000	Pt 24.133(a)(1)	43 + 10*log(P) or 80	-13.00
22	933.0000	Pt 22.359(a)	43 + 10*log(P)	-13.00
90	938.0000	Pt 90 Mask B	43 + 10*log(P)	-13.00
		Pt 90 Mask C	43 + 10*log(P)	-13.00
24	940.5000	Pt 24.133(a)(1)	43 + 10*log(P) or 80	-13.00

Note: Measurements were taken at High power. Low power was investigated, and in all cases the low power emissions complied by a greater margin.

Note: The worst-case emission (DMR 7K60FXD/FXE) was chosen for radiated spurious measurements of the digital circuitry.

FIELD STRENGTH OF SPURIOUS EMISSIONS

Part 90 Bands

806.0125 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
806.013	1612.030	45.420	H	4.678	28.200	3.000	78.298	-19.079	-13.000	6.079
806.013	1612.030	43.290	V	4.678	28.200	3.000	76.168	-21.209	-13.000	8.209
806.013	2418.040	34.440	V	5.620	31.860	3.000	71.920	-25.457	-13.000	12.457
806.013	2418.040	34.390	H	5.620	31.860	3.000	71.870	-25.507	-13.000	12.507
806.013	3224.050	41.740	H	6.611	32.680	3.000	81.031	-16.347	-13.000	3.347
806.013	3224.050	38.470	V	6.611	32.680	3.000	77.761	-19.617	-13.000	6.617
806.013	4030.060	31.090	V	7.214	33.390	3.000	71.694	-25.683	-13.000	12.683
806.013	4030.060	26.310	H	7.214	33.390	3.000	66.914	-30.463	-13.000	17.463
806.013	4836.080	30.250	V	7.171	33.940	3.000	71.361	-26.016	-13.000	13.016
806.013	4836.080	26.480	H	7.171	33.940	3.000	67.591	-29.786	-13.000	16.786

806.0125 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
806.013	1612.030	45.820	H	4.678	28.200	3.000	78.698	-18.679	-13.000	5.679
806.013	1612.030	43.340	V	4.678	28.200	3.000	76.218	-21.159	-13.000	8.159
806.013	2418.040	35.100	H	5.620	31.860	3.000	72.580	-24.797	-13.000	11.797
806.013	2418.040	34.370	V	5.620	31.860	3.000	71.850	-25.527	-13.000	12.527
806.013	3224.050	41.680	H	6.611	32.680	3.000	80.971	-16.407	-13.000	3.407
806.013	3224.050	40.720	V	6.611	32.680	3.000	80.011	-17.367	-13.000	4.367
806.013	4030.060	30.580	V	7.214	33.390	3.000	71.184	-26.193	-13.000	13.193
806.013	4030.060	26.390	H	7.214	33.390	3.000	66.994	-30.383	-13.000	17.383
806.013	4836.080	29.790	V	7.171	33.940	3.000	70.901	-26.476	-13.000	13.476
806.013	4836.080	28.100	H	7.171	33.940	3.000	69.211	-28.166	-13.000	15.166

FIELD STRENGTH OF SPURIOUS EMISSIONS

824 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
824.00	1648.00	PK	43.16	H	4.73	28.58	3.00	76.47	-20.91	-13.00	7.91
824.00	2472.00	PK	19.78	H	5.62	32.03	3.00	57.43	-39.95	-13.00	26.95
824.00	3296.00	PK	19.73	H	6.68	32.63	3.00	59.04	-38.34	-13.00	25.34
824.00	4120.00	PK	20.96	H	7.08	33.41	3.00	61.45	-35.93	-13.00	22.93
824.00	4944.00	PK	21.22	H	7.45	33.94	3.00	62.61	-34.77	-13.00	21.77
824.00	1648.00	PK	41.21	V	4.73	28.58	3.00	74.52	-22.86	-13.00	9.86
824.00	2472.00	PK	26.93	V	5.62	32.03	3.00	64.58	-32.80	-13.00	19.80
824.00	3296.00	PK	29.34	V	6.68	32.63	3.00	68.65	-28.73	-13.00	15.73
824.00	4120.00	PK	22.08	V	7.08	33.41	3.00	62.57	-34.81	-13.00	21.81
824.00	4944.00	PK	21.16	V	7.45	33.94	3.00	62.55	-34.83	-13.00	21.83
824.00	5768.00	PK	21.10	V	8.19	34.70	3.00	63.99	-33.39	-13.00	20.39

824 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
824.00	1648.00	PK	43.64	H	4.73	28.58	3.00	76.95	-20.43	-13.00	7.43
824.00	2472.00	PK	27.85	H	5.62	32.03	3.00	65.50	-31.88	-13.00	18.88
824.00	3296.00	PK	32.83	H	6.68	32.63	3.00	72.14	-25.24	-13.00	12.24
824.00	4120.00	PK	27.85	H	7.08	33.41	3.00	68.34	-29.04	-13.00	16.04
824.00	4944.00	PK	23.82	H	7.45	33.94	3.00	65.21	-32.17	-13.00	19.17
824.00	1648.00	PK	39.80	V	4.73	28.58	3.00	73.11	-24.27	-13.00	11.27
824.00	2472.00	PK	29.97	V	5.62	32.03	3.00	67.62	-29.76	-13.00	16.76
824.00	3296.00	PK	32.94	V	6.68	32.63	3.00	72.25	-25.13	-13.00	12.13
824.00	4120.00	PK	25.11	V	7.08	33.41	3.00	65.60	-31.78	-13.00	18.78
824.00	4944.00	PK	23.14	V	7.45	33.94	3.00	64.53	-32.85	-13.00	19.85
824.00	5768.00	PK	19.79	V	8.19	34.70	3.00	62.68	-34.70	-13.00	21.70

FIELD STRENGTH OF SPURIOUS EMISSIONS

848.9875 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
848.988	1697.980	41.890	H	4.782	29.050	3.000	75.722	-21.655	-13.000	8.655
848.988	1697.980	37.510	V	4.782	29.050	3.000	71.342	-26.035	-13.000	13.035
848.988	2546.960	38.140	H	5.703	32.590	3.000	76.433	-20.945	-13.000	7.945
848.988	2546.960	35.880	V	5.703	32.590	3.000	74.173	-23.205	-13.000	10.205
848.988	3395.950	40.790	V	6.760	32.650	3.000	80.200	-17.177	-13.000	4.177
848.988	3395.950	39.930	H	6.760	32.650	3.000	79.340	-18.037	-13.000	5.037
848.988	4244.940	22.910	V	7.176	33.340	3.000	63.426	-33.952	-13.000	20.952

848.9875 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
848.988	1697.980	41.080	H	4.782	29.050	3.000	74.912	-22.465	-13.000	9.465
848.988	1697.980	35.930	V	4.782	29.050	3.000	69.762	-27.615	-13.000	14.615
848.988	2546.960	38.520	H	5.703	32.590	3.000	76.813	-20.565	-13.000	7.565
848.988	2546.960	32.320	V	5.703	32.590	3.000	70.613	-26.765	-13.000	13.765
848.988	3395.950	40.230	H	6.760	32.650	3.000	79.640	-17.737	-13.000	4.737
848.988	3395.950	36.300	V	6.760	32.650	3.000	75.710	-21.667	-13.000	8.667

FIELD STRENGTH OF SPURIOUS EMISSIONS

851.0125 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
851.013	1702.030	42.570	H	4.786	29.100	3.000	76.456	-20.921	-13.000	7.921
851.013	1702.030	35.920	V	4.786	29.100	3.000	69.806	-27.571	-13.000	14.571
851.013	2553.040	38.930	H	5.713	32.600	3.000	77.243	-20.134	-13.000	7.134
851.013	2553.040	33.670	V	5.713	32.600	3.000	71.983	-25.394	-13.000	12.394
851.013	3404.050	40.450	H	6.772	32.650	3.000	79.872	-17.505	-13.000	4.505
851.013	3404.050	36.620	V	6.772	32.650	3.000	76.042	-21.335	-13.000	8.335

851.0125 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
851.013	1702.030	41.200	H	4.786	29.100	3.000	75.086	-22.291	-13.000	9.291
851.013	1702.030	36.450	V	4.786	29.100	3.000	70.336	-27.041	-13.000	14.041
851.013	2553.040	38.970	H	5.713	32.600	3.000	77.283	-20.094	-13.000	7.094
851.013	2553.040	32.790	V	5.713	32.600	3.000	71.103	-26.274	-13.000	13.274
851.013	3404.050	40.560	H	6.772	32.650	3.000	79.982	-17.395	-13.000	4.395
851.013	3404.050	35.660	V	6.772	32.650	3.000	75.082	-22.295	-13.000	9.295

FIELD STRENGTH OF SPURIOUS EMISSIONS

869 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
869.000	1738.000	34.240	H	4.827	29.570	3.000	68.637	-28.741	-20.000	8.741
869.000	1738.000	30.550	V	4.827	29.570	3.000	64.947	-32.431	-20.000	12.431
869.000	2607.000	33.810	H	5.808	32.410	3.000	72.028	-25.349	-20.000	5.349
869.000	2607.000	29.770	V	5.808	32.410	3.000	67.988	-29.389	-20.000	9.389
869.000	3476.000	33.910	H	6.875	32.650	3.000	73.435	-23.942	-20.000	3.942
869.000	3476.000	31.070	V	6.875	32.650	3.000	70.595	-26.782	-20.000	6.782
869.000	6952.000	13.450	V	9.238	36.120	3.000	58.808	-38.569	-20.000	18.569
869.000	6952.000	11.590	H	9.238	36.120	3.000	56.948	-40.429	-20.000	20.429

869 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
869.100	1738.000	32.700	H	4.827	29.570	3.000	67.097	-30.281	-20.000	10.281
869.100	1738.000	29.640	V	4.827	29.570	3.000	64.037	-33.341	-20.000	13.341
869.100	2607.000	32.680	H	5.808	32.410	3.000	70.898	-26.479	-20.000	6.479
869.100	2607.000	24.050	V	5.808	32.410	3.000	62.268	-35.109	-20.000	15.109
869.100	3476.000	32.540	H	6.875	32.650	3.000	72.065	-25.312	-20.000	5.312
869.100	3476.000	26.260	V	6.875	32.650	3.000	65.785	-31.592	-20.000	11.592

FIELD STRENGTH OF SPURIOUS EMISSIONS

893.9875 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
893.988	3575.950	36.780	H	6.728	33.030	3.000	76.538	-20.840	-13.000	7.840
893.988	3575.950	29.860	V	6.728	33.030	3.000	69.618	-27.760	-13.000	14.760

893.9875 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
893.988	2681.960	25.800	H	5.954	32.480	3.000	64.234	-33.143	-13.000	20.143
893.988	3575.950	37.360	H	6.728	33.030	3.000	77.118	-20.260	-13.000	7.260
893.988	3575.950	33.740	V	6.728	33.030	3.000	73.498	-23.880	-13.000	10.880

FIELD STRENGTH OF SPURIOUS EMISSIONS

898 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
898.000	1796.000	22.510	V	4.906	30.250	3.000	57.666	-39.711	-20.000	19.711
898.000	2694.000	28.090	H	5.978	32.500	3.000	66.568	-30.809	-20.000	10.809
898.000	2694.000	23.060	V	5.978	32.500	3.000	61.538	-35.839	-20.000	15.839
898.000	3592.000	35.450	H	6.689	33.080	3.000	75.219	-22.158	-20.000	2.158
898.000	3592.000	31.120	V	6.689	33.080	3.000	70.889	-26.488	-20.000	6.488
898.000	4490.000	19.380	H	7.319	33.870	3.000	60.569	-36.808	-20.000	16.808
898.000	4490.000	17.220	V	7.319	33.870	3.000	58.409	-38.968	-20.000	18.968
898.000	8082.000	12.770	V	9.957	35.790	3.000	58.517	-38.861	-20.000	18.861

898 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
898.000	1796.000	21.400	V	4.906	30.250	3.000	56.556	-40.821	-20.000	20.821
898.000	1796.000	21.380	H	4.906	30.250	3.000	56.536	-40.841	-20.000	20.841
898.000	2694.000	28.810	V	5.978	32.500	3.000	67.288	-30.089	-20.000	10.089
898.000	2694.000	26.240	H	5.978	32.500	3.000	64.718	-32.659	-20.000	12.659
898.000	3592.000	36.090	V	6.689	33.080	3.000	75.859	-21.518	-20.000	1.518
898.000	3592.000	36.020	H	6.689	33.080	3.000	75.789	-21.588	-20.000	1.588
898.000	4490.000	17.850	V	7.319	33.870	3.000	59.039	-38.338	-20.000	18.338
898.000	4490.000	17.750	H	7.319	33.870	3.000	58.939	-38.438	-20.000	18.438

FIELD STRENGTH OF SPURIOUS EMISSIONS

929.5 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
929.500	1859.000	36.510	H	4.997	30.900	3.000	72.407	-24.970	-13.000	11.970
929.500	1859.000	31.640	V	4.997	30.900	3.000	67.537	-29.840	-13.000	16.840
929.500	2788.500	36.240	H	6.124	32.480	3.000	74.844	-22.533	-13.000	9.533
929.500	2788.500	30.640	V	6.124	32.480	3.000	69.244	-28.133	-13.000	15.133
929.500	3718.000	40.560	H	6.498	33.170	3.000	80.228	-17.149	-13.000	4.149
929.500	3718.000	36.980	V	6.498	33.170	3.000	76.648	-20.729	-13.000	7.729
929.500	4647.500	22.140	V	7.447	33.910	3.000	63.497	-33.881	-13.000	20.881
929.500	5577.000	24.730	V	8.165	34.430	3.000	67.325	-30.053	-13.000	17.053
929.500	5577.000	23.320	H	8.165	34.430	3.000	65.915	-31.463	-13.000	18.463
929.500	6506.500	21.210	V	9.085	35.540	3.000	65.835	-31.543	-13.000	18.543

929.5 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
929.500	1859.000	31.230	H	4.997	30.900	3.000	67.127	-30.250	-13.000	17.250
929.500	1859.000	30.580	V	4.997	30.900	3.000	66.477	-30.900	-13.000	17.900
929.500	2788.500	30.090	H	6.124	32.480	3.000	68.694	-28.683	-13.000	15.683
929.500	2788.500	29.140	V	6.124	32.480	3.000	67.744	-29.633	-13.000	16.633
929.500	3718.000	37.350	H	6.498	33.170	3.000	77.018	-20.359	-13.000	7.359
929.500	3718.000	36.830	V	6.498	33.170	3.000	76.498	-20.879	-13.000	7.879
929.500	5577.000	23.480	H	8.165	34.430	3.000	66.075	-31.303	-13.000	18.303
929.500	5577.000	23.380	V	8.165	34.430	3.000	65.975	-31.403	-13.000	18.403
929.500	6506.500	20.360	H	9.085	35.540	3.000	64.985	-32.393	-13.000	19.393
929.500	6506.500	19.950	V	9.085	35.540	3.000	64.575	-32.803	-13.000	19.803

FIELD STRENGTH OF SPURIOUS EMISSIONS

938 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
938.000	1876.000	35.410	H	5.021	30.940	3.000	71.371	-26.006	-13.000	13.006
938.000	1876.000	29.430	V	5.021	30.940	3.000	65.391	-31.986	-13.000	18.986
938.000	2814.000	37.890	H	6.146	32.450	3.000	76.486	-20.891	-13.000	7.891
938.000	2814.000	31.770	V	6.146	32.450	3.000	70.366	-27.011	-13.000	14.011
938.000	3752.000	39.100	H	8.914	33.120	3.000	81.134	-16.243	-13.000	3.243
938.000	3752.000	34.810	V	8.914	33.120	3.000	76.844	-20.533	-13.000	7.533
938.000	5628.000	21.770	V	8.228	34.500	3.000	64.498	-32.879	-13.000	19.879
938.000	5628.000	20.980	H	8.228	34.500	3.000	63.708	-33.669	-13.000	20.669

938 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
938.000	1876.000	35.300	H	5.021	30.940	3.000	71.261	-26.116	-13.000	13.116
938.000	1876.000	29.210	V	5.021	30.940	3.000	65.171	-32.206	-13.000	19.206
938.000	2814.000	37.180	H	6.146	32.450	3.000	75.776	-21.601	-13.000	8.601
938.000	2814.000	33.540	V	6.146	32.450	3.000	72.136	-25.241	-13.000	12.241
938.000	3752.000	37.630	H	8.914	33.120	3.000	79.664	-17.713	-13.000	4.713
938.000	3752.000	34.000	V	8.914	33.120	3.000	76.034	-21.343	-13.000	8.343

FIELD STRENGTH OF SPURIOUS EMISSIONS

Part 24 Bands

901.5 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
901.500	2704.500	28.000	H	5.999	32.500	3.000	66.499	-30.878	-13.000	17.878
901.500	2704.500	27.010	V	5.999	32.500	3.000	65.509	-31.868	-13.000	18.868
901.500	3606.000	36.020	V	6.656	33.120	3.000	75.796	-21.582	-13.000	8.582
901.500	3606.000	35.990	H	6.656	33.120	3.000	75.766	-21.612	-13.000	8.612

901.5 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
901.500	2704.500	26.860	V	5.999	32.500	3.000	65.359	-32.018	-13.000	19.018
901.500	2704.500	26.090	H	5.999	32.500	3.000	64.589	-32.788	-13.000	19.788
901.500	3606.000	35.930	V	6.656	33.120	3.000	75.706	-21.672	-13.000	8.672
901.500	3606.000	35.870	H	6.656	33.120	3.000	75.646	-21.732	-13.000	8.732

FIELD STRENGTH OF SPURIOUS EMISSIONS

930.5 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
930.500	1861.000	36.060	H	5.000	30.910	3.000	71.970	-25.407	-13.000	12.407
930.500	1861.000	32.020	V	5.000	30.910	3.000	67.930	-29.447	-13.000	16.447
930.500	2791.500	36.300	H	6.127	32.490	3.000	74.917	-22.461	-13.000	9.461
930.500	2791.500	30.650	V	6.127	32.490	3.000	69.267	-28.111	-13.000	15.111
930.500	3722.000	41.000	H	6.494	33.160	3.000	80.654	-16.724	-13.000	3.724
930.500	3722.000	34.910	V	6.494	33.160	3.000	74.564	-22.814	-13.000	9.814
930.500	5583.000	24.400	V	8.173	34.430	3.000	67.003	-30.374	-13.000	17.374
930.500	5583.000	21.680	H	8.173	34.430	3.000	64.283	-33.094	-13.000	20.094
930.500	6513.500	21.660	V	9.090	35.540	3.000	66.290	-31.088	-13.000	18.088

930.5 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
930.500	1861.000	29.460	H	5.000	30.910	3.000	65.370	-32.007	-13.000	19.007
930.500	1861.000	29.250	V	5.000	30.910	3.000	65.160	-32.217	-13.000	19.217
930.500	2791.500	33.310	V	6.127	32.490	3.000	71.927	-25.451	-13.000	12.451
930.500	2791.500	29.130	H	6.127	32.490	3.000	67.747	-29.631	-13.000	16.631
930.500	3722.000	37.400	H	6.494	33.160	3.000	77.054	-20.324	-13.000	7.324
930.500	3722.000	37.350	V	6.494	33.160	3.000	77.004	-20.374	-13.000	7.374
930.500	5583.000	23.520	H	8.173	34.430	3.000	66.123	-31.254	-13.000	18.254
930.500	5583.000	22.870	V	8.173	34.430	3.000	65.473	-31.904	-13.000	18.904
930.500	6513.500	20.620	V	9.090	35.540	3.000	65.250	-32.128	-13.000	19.128
930.500	6513.500	20.190	H	9.090	35.540	3.000	64.820	-32.558	-13.000	19.558

FIELD STRENGTH OF SPURIOUS EMISSIONS

940.5 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
940.500	1881.000	35.130	H	5.027	30.950	3.000	71.107	-26.270	-13.000	13.270
940.500	1881.000	28.420	V	5.027	30.950	3.000	64.397	-32.980	-13.000	19.980
940.500	2821.500	37.850	H	6.153	32.420	3.000	76.423	-20.954	-13.000	7.954
940.500	2821.500	34.860	V	6.153	32.420	3.000	73.433	-23.944	-13.000	10.944
940.500	3762.000	39.000	H	8.737	33.130	3.000	80.867	-16.510	-13.000	3.510
940.500	3762.000	33.730	V	8.737	33.130	3.000	75.597	-21.780	-13.000	8.780
940.500	5643.000	20.760	V	8.218	34.530	3.000	63.508	-33.869	-13.000	20.869

940.5 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
940.500	1881.000	33.640	H	5.027	30.950	3.000	69.617	-27.760	-13.000	14.760
940.500	1881.000	28.830	V	5.027	30.950	3.000	64.807	-32.570	-13.000	19.570
940.500	2821.500	37.060	H	6.153	32.420	3.000	75.633	-21.744	-13.000	8.744
940.500	2821.500	33.730	V	6.153	32.420	3.000	72.303	-25.074	-13.000	12.074
940.500	3762.000	36.660	H	8.737	33.130	3.000	78.527	-18.850	-13.000	5.850
940.500	3762.000	35.190	V	8.737	33.130	3.000	77.057	-20.320	-13.000	7.320
940.500	5643.000	21.800	V	8.218	34.530	3.000	64.548	-32.829	-13.000	19.829

FIELD STRENGTH OF SPURIOUS EMISSIONS

Part 22 Band

933 MHz, Analog

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
933.000	1866.000	36.970	H	5.007	30.920	3.000	72.897	-24.480	-13.000	11.480
933.000	1866.000	32.610	V	5.007	30.920	3.000	68.537	-28.840	-13.000	15.840
933.000	2799.000	35.630	H	6.133	32.500	3.000	74.263	-23.114	-13.000	10.114
933.000	2799.000	30.490	V	6.133	32.500	3.000	69.123	-28.254	-13.000	15.254
933.000	3732.000	40.320	H	6.482	33.150	3.000	79.952	-17.426	-13.000	4.426
933.000	3732.000	37.150	V	6.482	33.150	3.000	76.782	-20.596	-13.000	7.596
933.000	5598.000	24.880	V	8.193	34.440	3.000	67.513	-29.864	-13.000	16.864
933.000	5598.000	21.840	H	8.193	34.440	3.000	64.473	-32.904	-13.000	19.904
933.000	6531.000	21.660	V	9.102	35.550	3.000	66.312	-31.065	-13.000	18.065

933 MHz, Digital

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
933.000	1866.000	31.960	H	5.007	30.920	3.000	67.887	-29.490	-13.000	16.490
933.000	1866.000	28.210	V	5.007	30.920	3.000	64.137	-33.240	-13.000	20.240
933.000	2799.000	32.890	H	6.133	32.500	3.000	71.523	-25.854	-13.000	12.854
933.000	2799.000	30.660	V	6.133	32.500	3.000	69.293	-28.084	-13.000	15.084
933.000	3732.000	35.780	H	6.482	33.150	3.000	75.412	-21.966	-13.000	8.966
933.000	3732.000	34.450	V	6.482	33.150	3.000	74.082	-23.296	-13.000	10.296
933.000	5598.000	23.680	H	8.193	34.440	3.000	66.313	-31.064	-13.000	18.064
933.000	5598.000	21.950	V	8.193	34.440	3.000	64.583	-32.794	-13.000	19.794
933.000	6531.000	21.510	H	9.102	35.550	3.000	66.162	-31.215	-13.000	18.215
933.000	6531.000	20.580	V	9.102	35.550	3.000	65.232	-32.145	-13.000	19.145

FREQUENCY STABILITY

FCC Rule Parts: 2.1055(a)(2), 90.213, 24.135

§90.213 Frequency stability.

MINIMUM FREQUENCY STABILITY

[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928[13]	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5

[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.

[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.

[14]Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

§24.135 Frequency stability.

(a) The frequency stability of the transmitter shall be maintained within ±0.0001 percent (±1 ppm) of the center frequency over a temperature variation of −30 °Celsius to + 50 °Celsius at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20 °Celsius.

(b) For battery operated equipment, the equipment tests shall be performed using a new battery without any further requirement to vary supply voltage.

(c) It is acceptable for a transmitter to meet this frequency stability requirement over a narrower temperature range provided the transmitter ceases to function before it exceeds these frequency stability limits.

§22.355 Frequency tolerance.

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

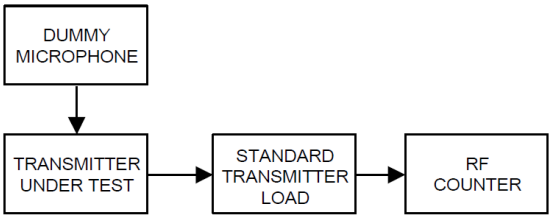
TABLE C-1—FREQUENCY TOLERANCE FOR TRANSMITTERS IN THE PUBLIC MOBILE SERVICES

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a

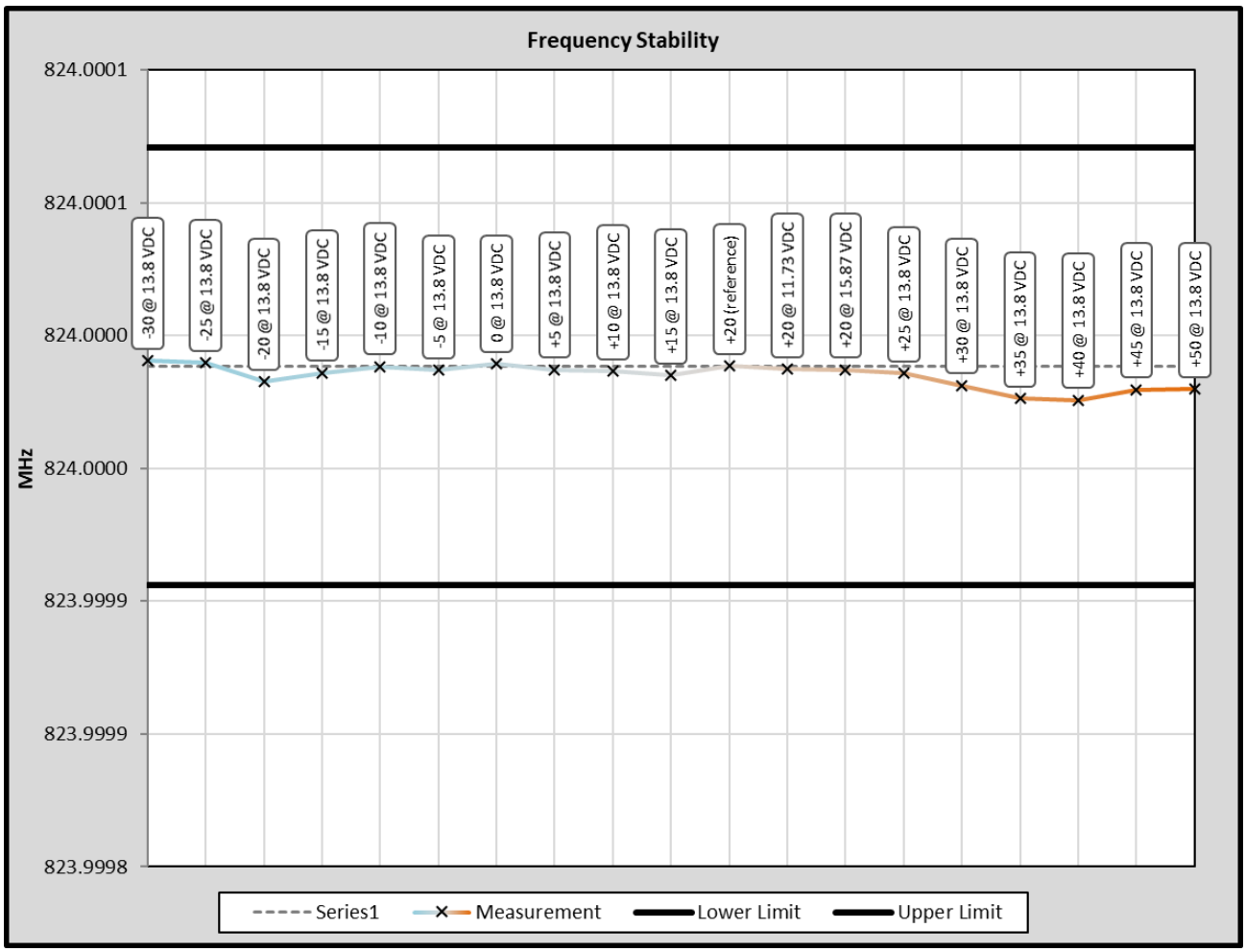
FREQUENCY STABILITY

Note: The equipment was tested to demonstrate frequency stability to the most strict limit of the operating bands, 0.1 ppm, within the associated band, at 900 MHz.

Method of Measurements: TIA 603-E, 2.2.2



Frequency Error Measurement Plot



FREQUENCY STABILITY

Frequency Error Measurement Table

Strictest Limit of FCC Pt 90, 22, 24	0.1	ppm
Limit, in Hz	82.400	Hz
Lower Limit	823.999906	MHz
Upper Limit	824.000071	MHz
Rated Supply Voltage	13.8	○ AC ◉ DC

Temperature / Voltage Variation			
Temperature (°C)	**Supplied Voltage (V)**	**Frequency (MHz)**	**Deviation (Hz)**
-30	13.8	823.999991	-2.0
-25	13.8	823.999990	-1.2
-20	13.8	823.999983	5.9
-15	13.8	823.999986	2.7
-10	13.8	823.999988	0.3
-5	13.8	823.999987	1.6
0	13.8	823.999989	-0.7
+5	13.8	823.999987	1.5
+10	13.8	823.999987	2.0
+15	13.8	823.999985	3.7
+20 (reference)	13.8	823.999989	0.0
+20	11.7	823.999987	1.2
+20	15.9	823.999987	1.4
+25	13.8	823.999986	2.8
+30	13.8	823.999981	7.3
+35	13.8	823.999976	12.3
+40	13.8	823.999976	12.9
+45	13.8	823.999980	9.0
+50	13.8	823.999980	8.8

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16–4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: "Uncertainty in EMC Measurements" and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Frequency Accuracy	± 49.5 Hz	(1)
RF Conducted Power	±0.93dB	(1)
Conducted spurious emission of transmitter valid up to 40GHz	±1.86dB	
Occupied Bandwidth	±2.65%	
Audio Frequency Response	±1.86dB	
Modulation limiting	±1.88%	
Radiated RF Power	±1.4dB	
Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq. Within 6kHz and 25kHz of audio Freq.	 ±1.88% ±2.04%	
Rad Emissions Sub Meth up to 26.5GHz	±2.14dB	
Adjacent channel power	±1.47dB	(1)
Transient Frequency Response	±1.88%	
Temperature	±1.0°C	(1)
Humidity	±5.0%	

Notes: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

EMC EQUIPMENT LIST, 04/18/2019

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconical 1096	Eaton	94455-1	1096	08/01/17	08/01/19
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/26/17	07/26/19
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 KMKM-0670-01 KFKF-0197-00	N/A	N/A
EMI Test Receiver R & S ESIB 40	Rohde & Schwarz	ESIB 40	100274	08/16/16	08/16/19
CHAMBER	Panashield	3M	N/A	05/05/17	05/05/19
Ant: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	01/30/17	01/30/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A
Attenuator N 30dB 100W DC-6G	Pasternack	PE7214-30	#109	05/24/17	05/23/19
Attenuator N 10dB 100W DC-6G	Pasternack	PE7214-10	#111	05/30/17	05/30/19
Attenuator N 3dB 20W DC-4G	Narda	766-3	#5	07/10/17	07/10/19
Coaxial Cable – NMNM-0180-00 Aqua	Micro-Coax	UFB311A-0-0720-50U50U	225362-001 (#100)	07/14/2016	07/14/19
Coaxial Cable – NMNM-0180-01 Aqua	Micro-Coax	UFB311A-0-0720-50U50U	225362-002 (#101)	07/14/2016	07/14/19
Coaxial Cable - BMBM-0184-01 Silver	TEK		BMBM-0184-01	2/17/2017	As Used
Coaxial Cable - BMBM-0122-01 RG400	Pasternack	PE3582LF-48	BMBM-0122-01	01/31/2017	01/31/20
Terminator N 20W DC-18G	Narda	8205	#14	04/06/17	04/06/19
Terminator N 20W DC-18G	Narda	5W	#48	04/06/2017	04/06/20
DC Power Supply	HP	6286A	1744A03842	NA	NA
Function Generator	Standford	DS340	25200	02/21/18	02/21/20
Modulation Analyzer	HP	8901A	3050A05856	04/13/17	04/13/19
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	NA	NA
Type K J Thermometer	Martel	303	080504494	11/06/17	11/06/19
Frequency Counter Small Chamber	HP	5385A	3242A07460	08/22/17	08/22/19

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

EMC EQUIPMENT LIST, 10/01/2019

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
CHAMBER	Panashield	3M	N/A	03/12/19	03/12/21
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	01/30/17	01/30/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
EMI Test Receiver R & S ESU 40	Rohde & Schwarz	ESU 40	100320	08/28/18	08/28/20
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	NA	NA
Type K J Thermometer	Martel	303	080504494	11/06/17	11/06/19
Frequency Counter Small Chamber	HP	5385A	3242A07460	08/22/17	08/22/20
DC Power Supply	HP	6264B	2032A04119	NA	NA
Attenuator BNC 20dB 50OHM DC-2G	Mini-Circuits	HAT-20	#56	09/01/19	09/01/21
Attenuator BNC 30dB 50OHM DC-2G	Mini-Circuits	HAT-30+	#59	09/01/19	09/01/21
Notch Filter 850 MHz	Lorch	5BRX-850/X100-N	AD-1	09/01/19	09/01/21
Coaxial Cable - BMBM-0122-01 RG400	Pasternack	PE3582LF-48	BMBM-0122-01	09/01/19	09/01/21
Coaxial Cable - BMBM-0122-02 RG400	Pasternack	PE3582LF-48	BMBM-0122-02	09/01/19	09/01/21

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT