



FCC Part 74H Test Report

APPLICANT	ZAXCOM, INC.
	230 WEST PARKWAY, UNIT 9 POMPTON PLAINS N.J. 07444 USA
FCC ID	PR6XRT
MODEL NUMBER	XRT
PRODUCT DESCRIPTION	PLUG IN UHF DIGITAL AUDIO TRANSMITTER MODULE
DATE SAMPLE RECEIVED	08/03/2018
DATE TESTED	08/09/2018
TESTED BY	Tim Royer
APPROVED BY	Franklin Rose
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Report Version	Description	Issue Date
1179UT18TestReport	Rev1	Initial Issue	08/09/2018
1179UT18TestReport	Rev2	Corrected FCC ID	09/27/2018
1179UT18TestReport	Rev3	Updated KDB References	10/02/2018
1179UT18TestReport	Rev4	Clerical Updates	11/27/2018

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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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	Tim Royer, Project Manager / EMC Testing Engineer
Date	08/09/2018

Reviewed and Approved by:



Name and Title	Franklin Rose, Project Manager / EMC Testing Technician
Date	08/10/2018

GENERAL INFORMATION

EUT Description	PLUG IN UHF DIGITAL AUDIO TRANSMITTER MODULE
FCC ID	PR6XRT
Model Number	XRT
Operating Frequency	Band 1: 470.1 – 554 MHz Band 2: 512 – 607.9 MHz
Test Frequencies	Band 1: 470.1, 510, 554 MHz Band 2: 512, 550, 607.9 MHz
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☐ DC Power
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☐ Pre-Production
	☒ Production
Type of Equipment	☐ Fixed
	☐ Mobile
	☒ Portable
Antenna Connector	BNC
Test Conditions	The temperature was 26°C Relative humidity of 50%.
Modification to the EUT	No Modification to EUT.
Test Exercise	The EUT was placed in continuous transmit and was operated in “Test Mode” for digital emissions tests.
Applicable Standards	FCC CFR 47 Part 2, & 74, KDB 971168 D01 V03R01, KDB 206256 D01 v02, ANSI/TIA 603-D:2010, ANSI C63.4 2014, ANSI C63.26 2015, ETSI EN 300-422-1 V1.4.2
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070

RESULTS SUMMARY

FCC Rule Part	Requirement	Test Item	Result
PART 2.1046(a), 74.861(e) (1) (ii), (iii)	Conducted Power	RF Power Output	PASS
2.1049(c), 74.861(d)(4)(i)	Operating Bandwidth	Occupied Bandwidth	PASS
PART 74.861(e)(7), ETSI EN 300-422-1 s. 8.3.2	Unwanted Emissions	Emission Mask	PASS
2.1051(a), 74.861(e)(6)(iii)	Unwanted Emissions	Spurious Emissions at Antenna Terminals	PASS
2.1053, 74.861(e)(6)(iii)	Unwanted Emissions	Field Strength of Spurious Emissions	PASS

CHANGE(S) TO EUT, SUMMARY

The changes to Part 74 H, specifically in the 600 MHz band have impact on the granted function of this device. In order to comply with the changes outlined in KDB 206256 D01 v02 and KDB 971168 D01 v03r01, this device has been tested to show compliance with the new rulings.

This device's hardware has not been altered; only the software/firmware settings have been changed in order to become compliant with the newly updated rules, as per KDB 206256 v02, sections II and III. For more specific information, please see the updated Operational Description of the device.

This device was previously granted on the following frequency bands:

Date of Grant: 06/15/2015

512.1 – 607.9 MHz

614.1 – 697.9 MHz

And only the software has been altered to limit operation to:

Host: TRXLA3.5, Low Range

470.1 – 554

Host: TRXLA3.5, High Range

512 – 607.9

Note: The EUT is electrically identical, however the frequency range 470.1 – 512.0 MHz, have extended the lower end of the operating band. Additional testing on this EUT has been performed.

RF POWER OUTPUT

Rule Part No.: 2.1046(a), 74.861(e) (1) (ii), (iii)

Requirement:

§74.861 Technical requirements.

(e) For low power auxiliary stations operating in the 600 MHz duplex gap and the bands allocated for TV broadcasting, the following technical requirements apply:

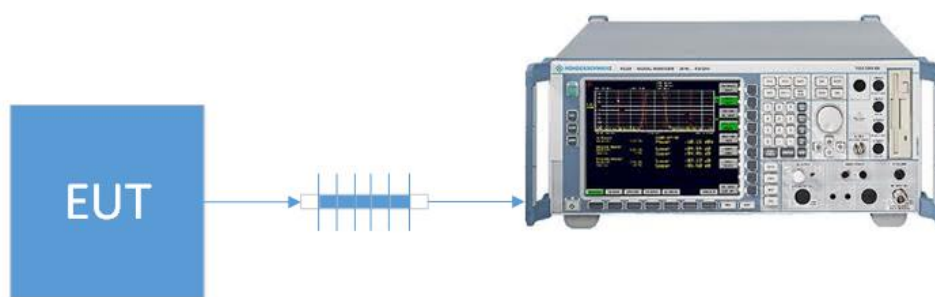
(1) The power may not exceed the following values.

(ii) 470-608 and 614-698: 250 mW conducted power

(iii) 600 MHz duplex gap: 20 mW EIRP

Procedure: KDB 971168 D01 Average Power Measurements section 5.2.1

Setup Diagram:



Test Data: Mean Output Power Measurement Table

Tuned Freq. MHz	Power Output			
	Level (dBm)	Ant. Gain (dBi)	Level (mW)	Margin (mW)
470.1	19.30	0.0	85.1	164.9
510	19.15	0.0	82.2	167.8
512	18.91	0.0	77.8	172.2
554	18.85	0.0	76.7	173.3
550	18.91	0.0	77.8	172.2
607.9	19.26	0.0	84.3	165.7

OCCUPIED BANDWIDTH

Rule Part No.: KDB 206256 Section III. (c)

Requirement: ETSI EN 300 422-1 Section 8.3.2

- (c) Compliance for emission mask and spurious emission requirements shall be demonstrated using the applicable measurement procedures of ETSI EN 300 422-1. Compliance with the emission limits shall be demonstrated using a RMS Average detector. Emissions shall be investigated up to the 10th harmonic of the fundamental. All other technical requirements shall be demonstrated utilizing the procedures specified in ANSI C63.26,⁴ as applicable.

8.3.2.2 Limits

The transmitter output spectrum shall be within the mask defined in figure 4. This mask may also be used for analogue.

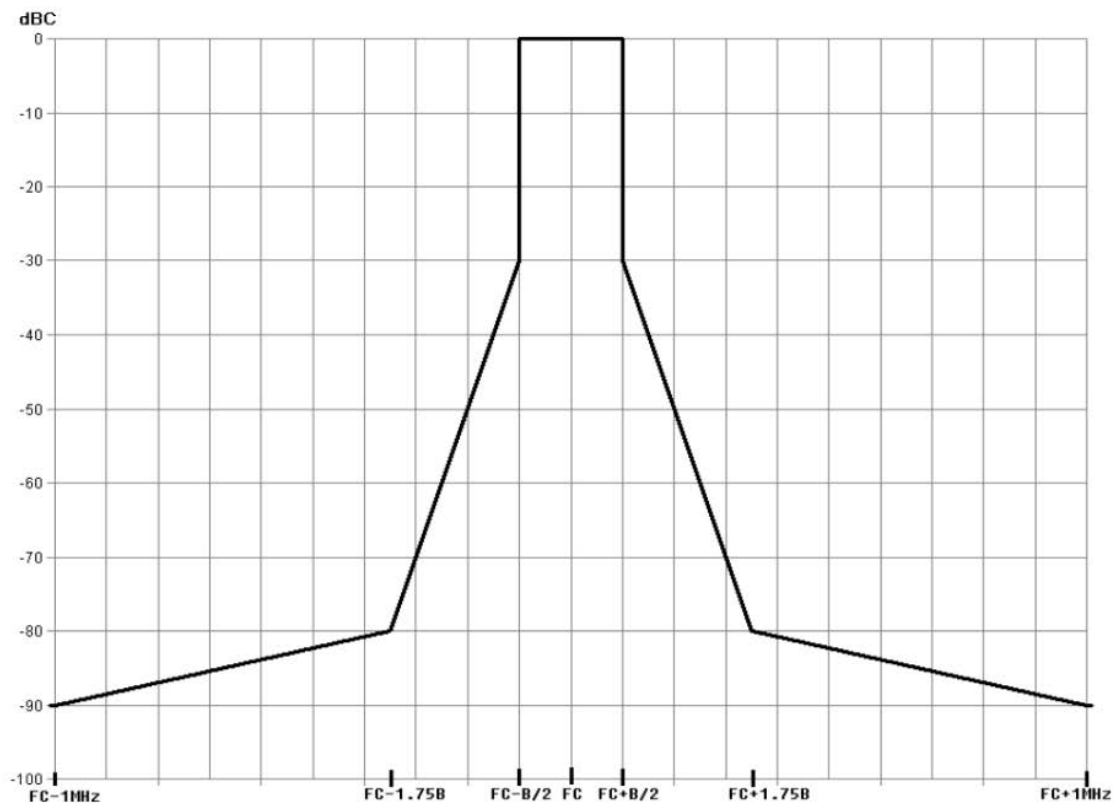
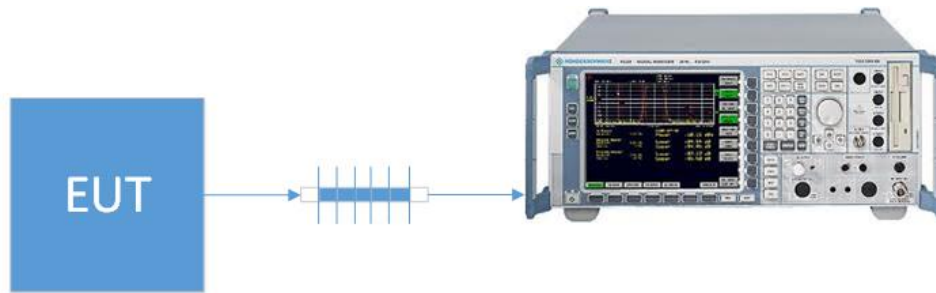


Figure 4: Spectrum mask for digital systems below 1 GHz

Procedure: KDB 971168 D01 Power Bandwidth 99% section 4.2
KDB 971168 D01 Spurious Emissions at antenna term section 6
ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)

OCCUPIED BANDWIDTH

Setup Diagram:



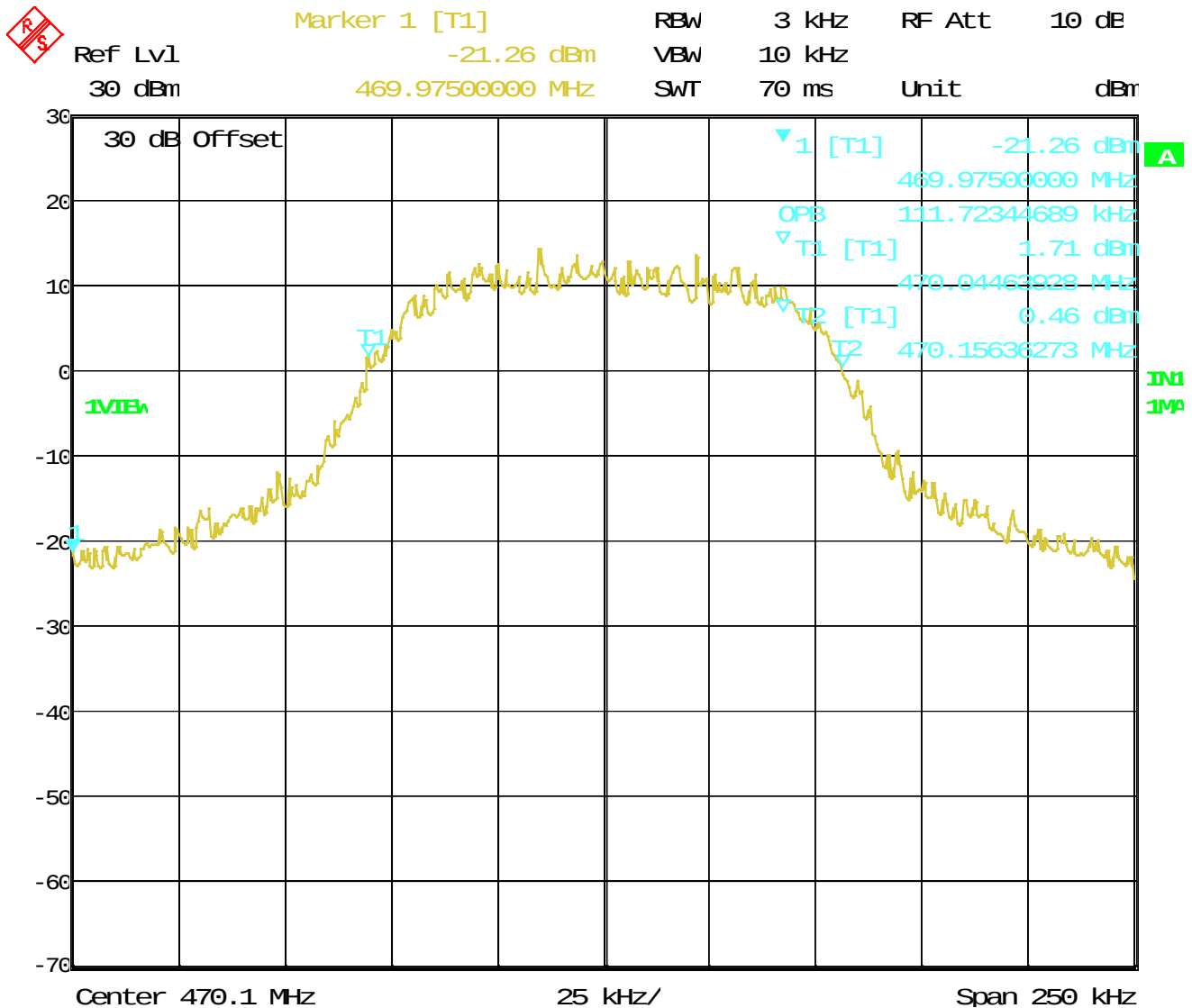
Test Data: Operating Bandwidth Measurement Table

Tuned Freq (MHz)	Measured 99% BW (KHz)	Margin (KHz)
470.1	112.22	87.78
510	112.22	87.78
512	111.22	88.78
550	113.72	86.28
554	112.72	87.28
607.9	110.22	89.78

Results Meet Requirements

OCCUPIED BANDWIDTH

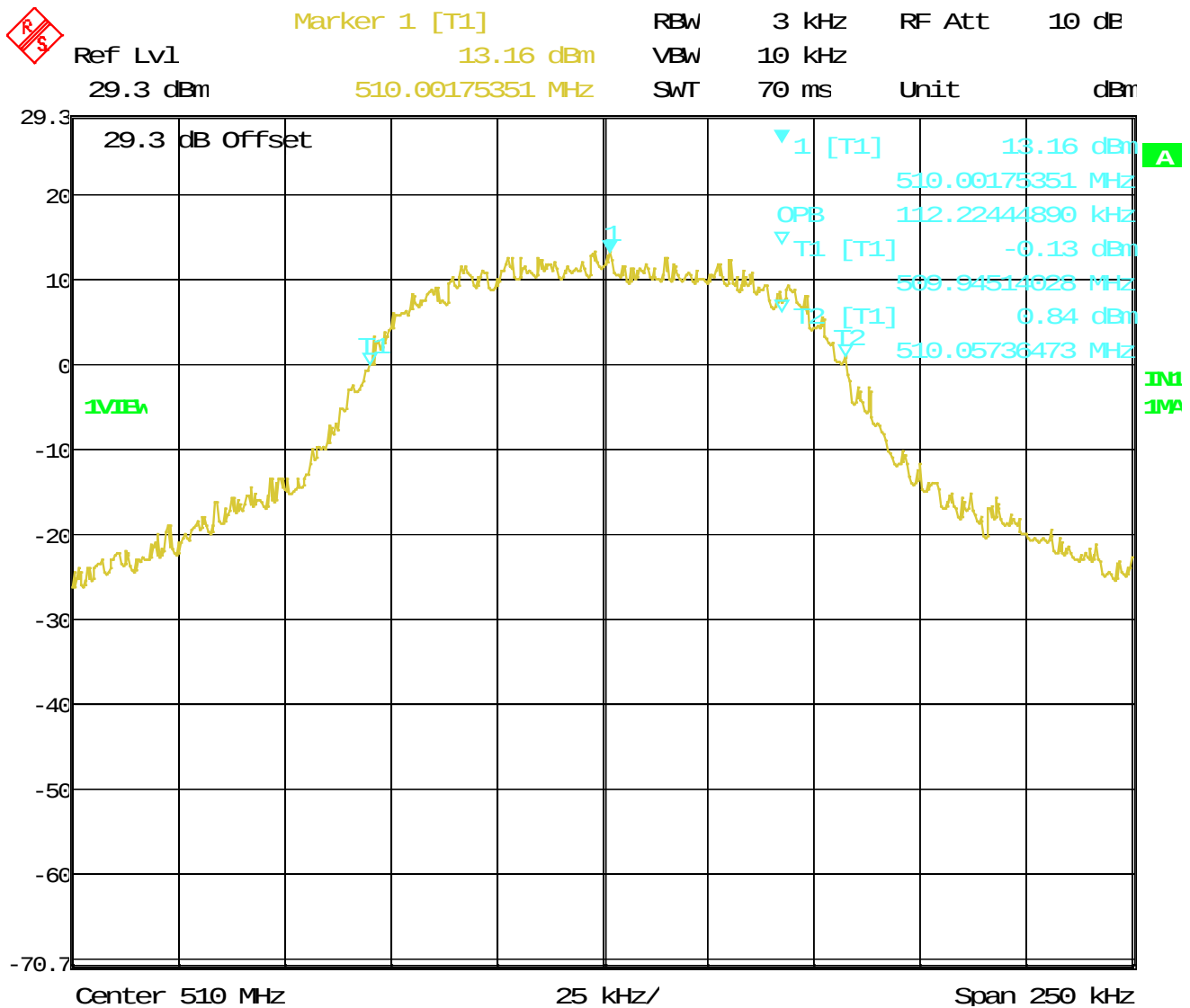
Test Data: 470.1 MHz 99 % OBW Plot



Date: 1.JAN.1997 02:42:29

OCCUPIED BANDWIDTH

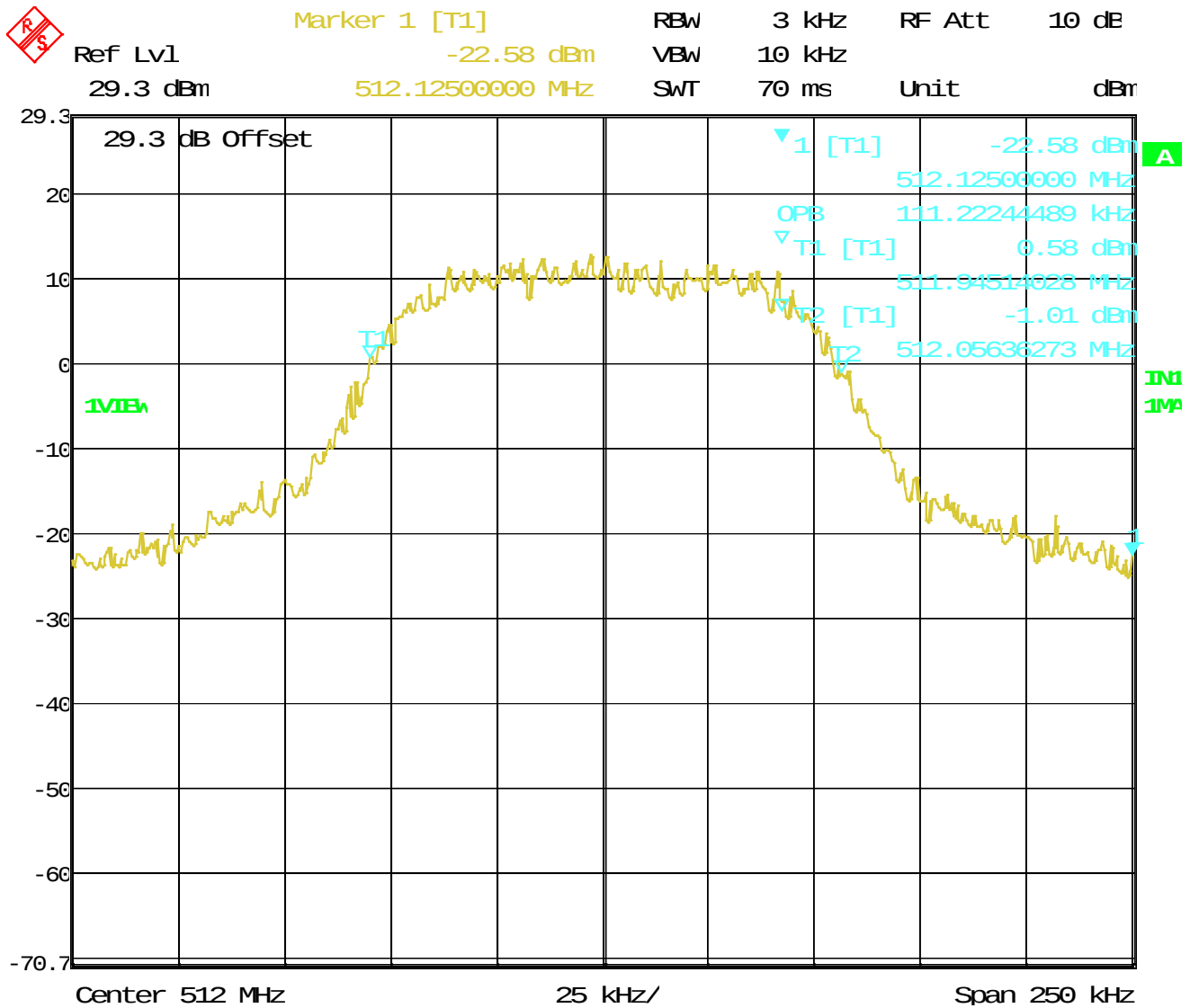
Test Data: 510 MHz 99 % OBW Plot



Date: 1.JAN.1997 04:46:37

OCCUPIED BANDWIDTH

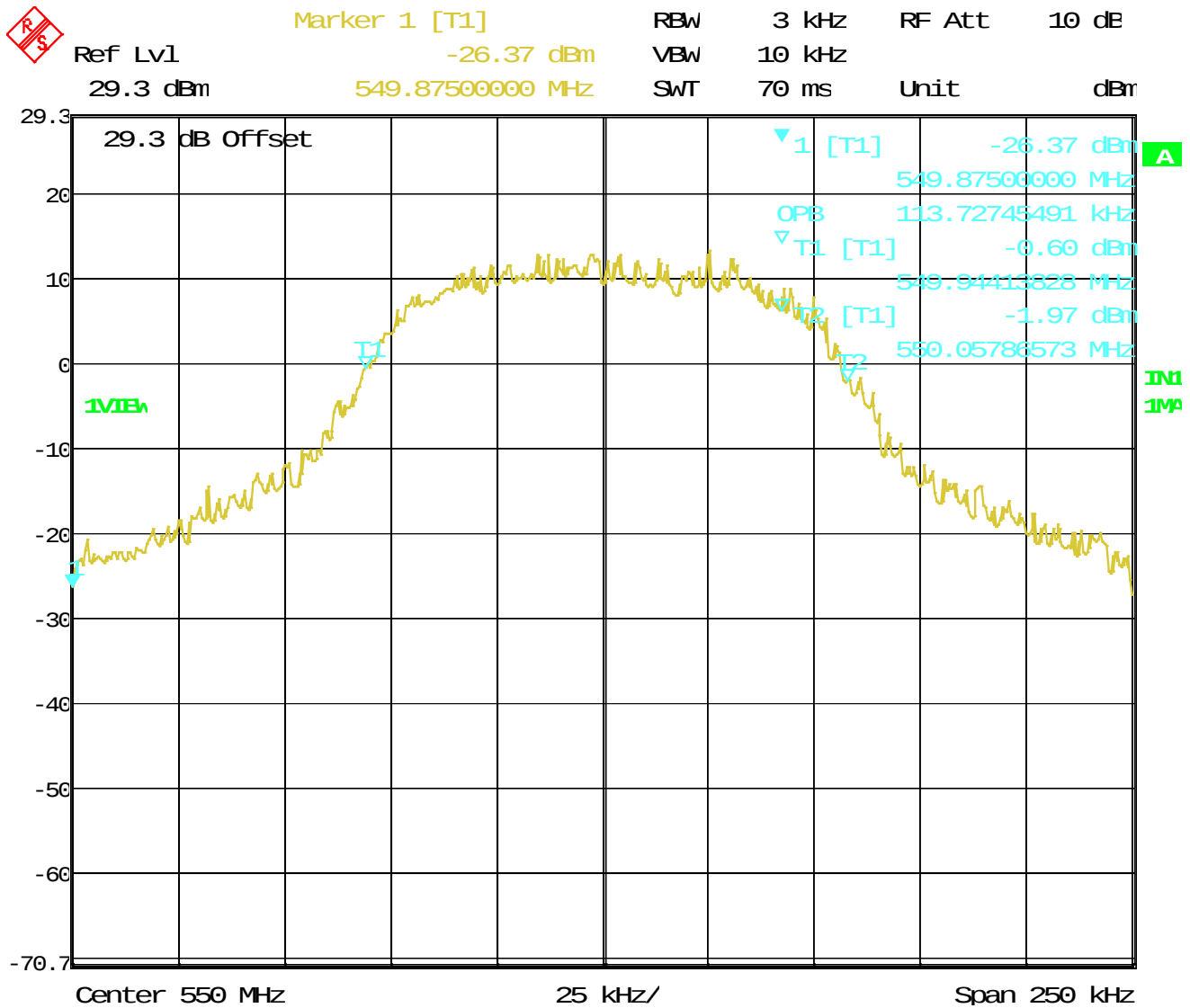
Test Data: 512 MHz 99 % OBW Plot



Date: 1.JAN.1997 04:50:11

OCCUPIED BANDWIDTH

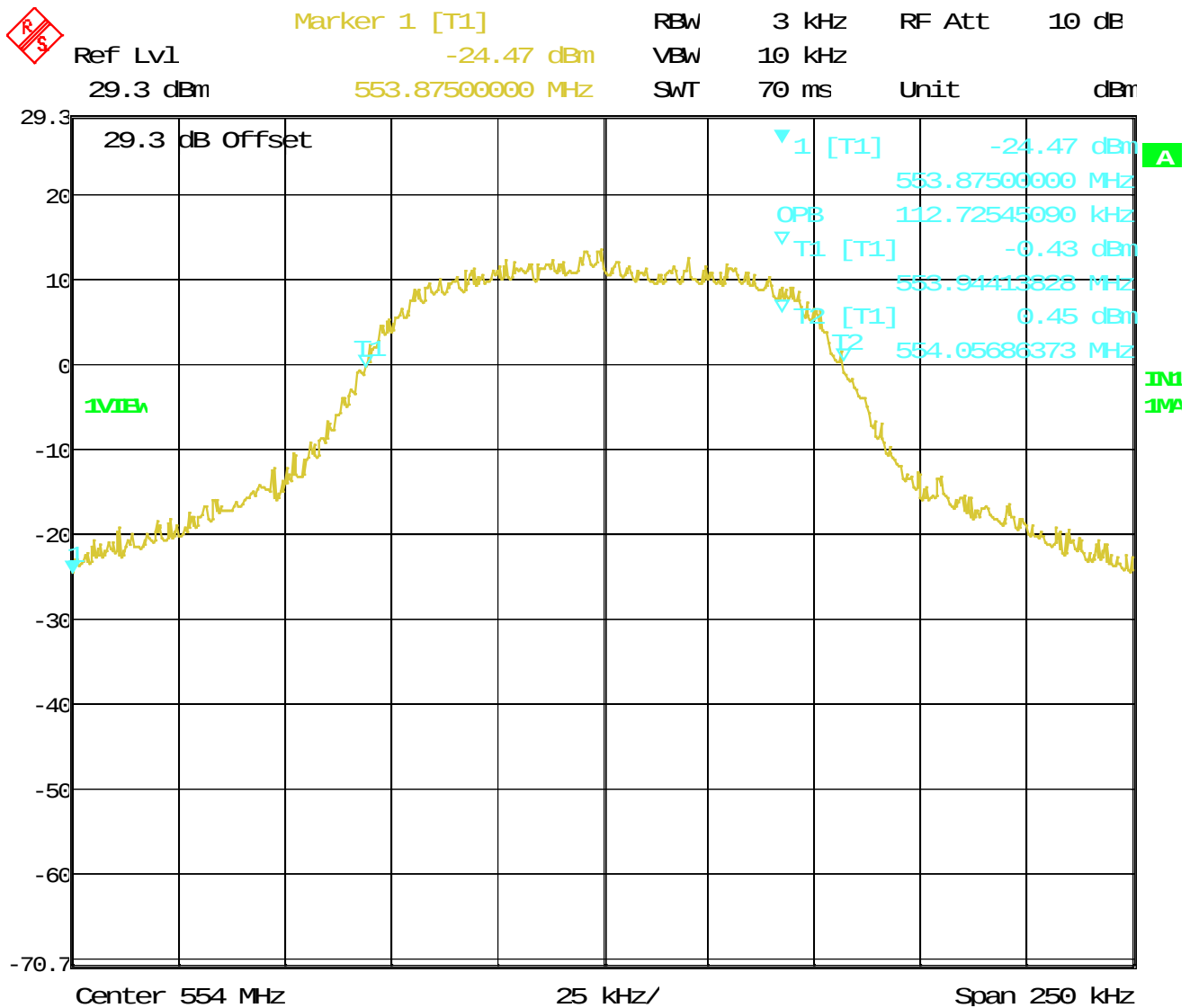
Test Data: 550 MHz 99 % OBW Plot



Date: 1.JAN.1997 04:49:30

OCCUPIED BANDWIDTH

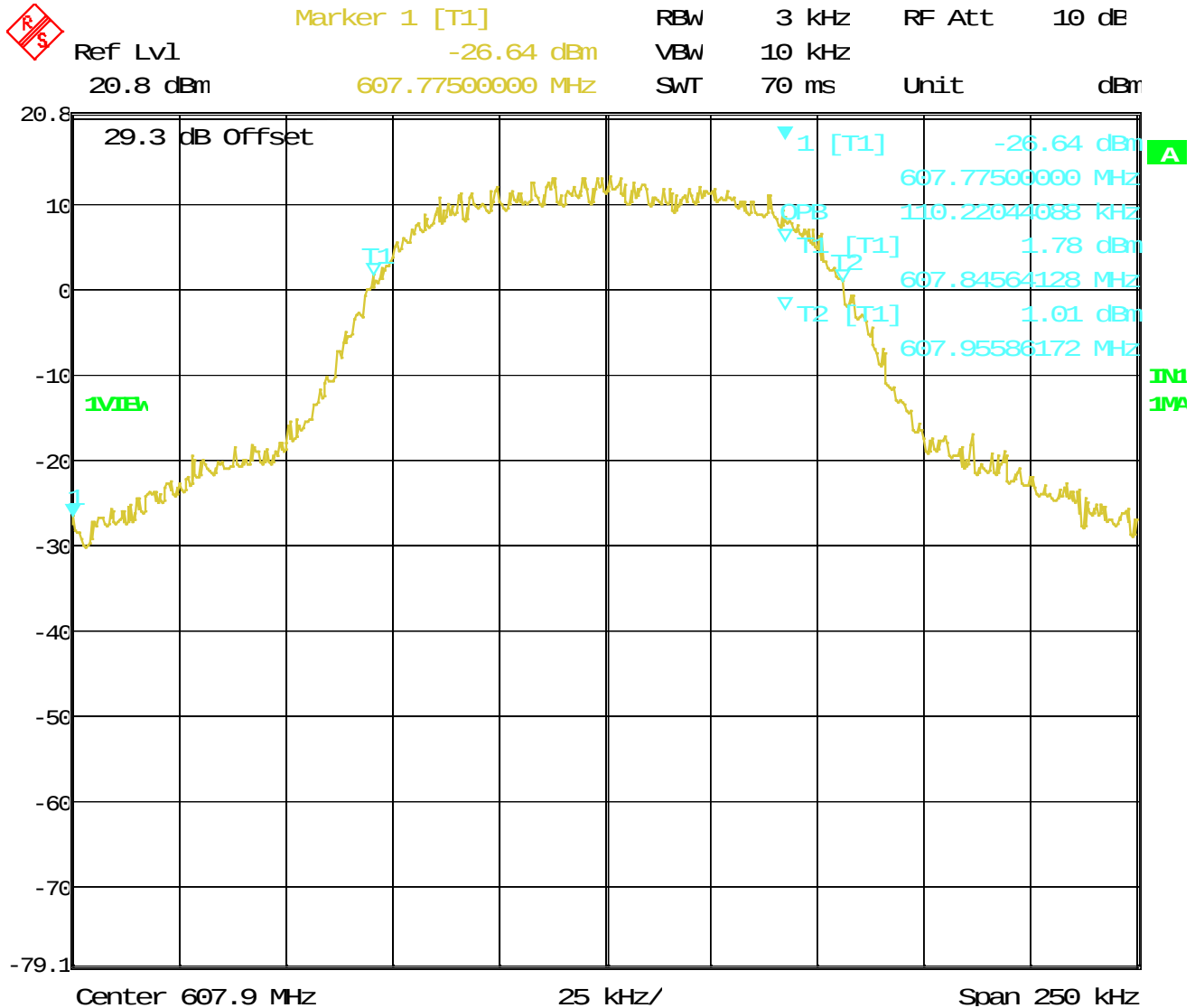
Test Data: 554 MHz 99 % OBW Plot



Date: 1.JAN.1997 04:45:40

OCCUPIED BANDWIDTH

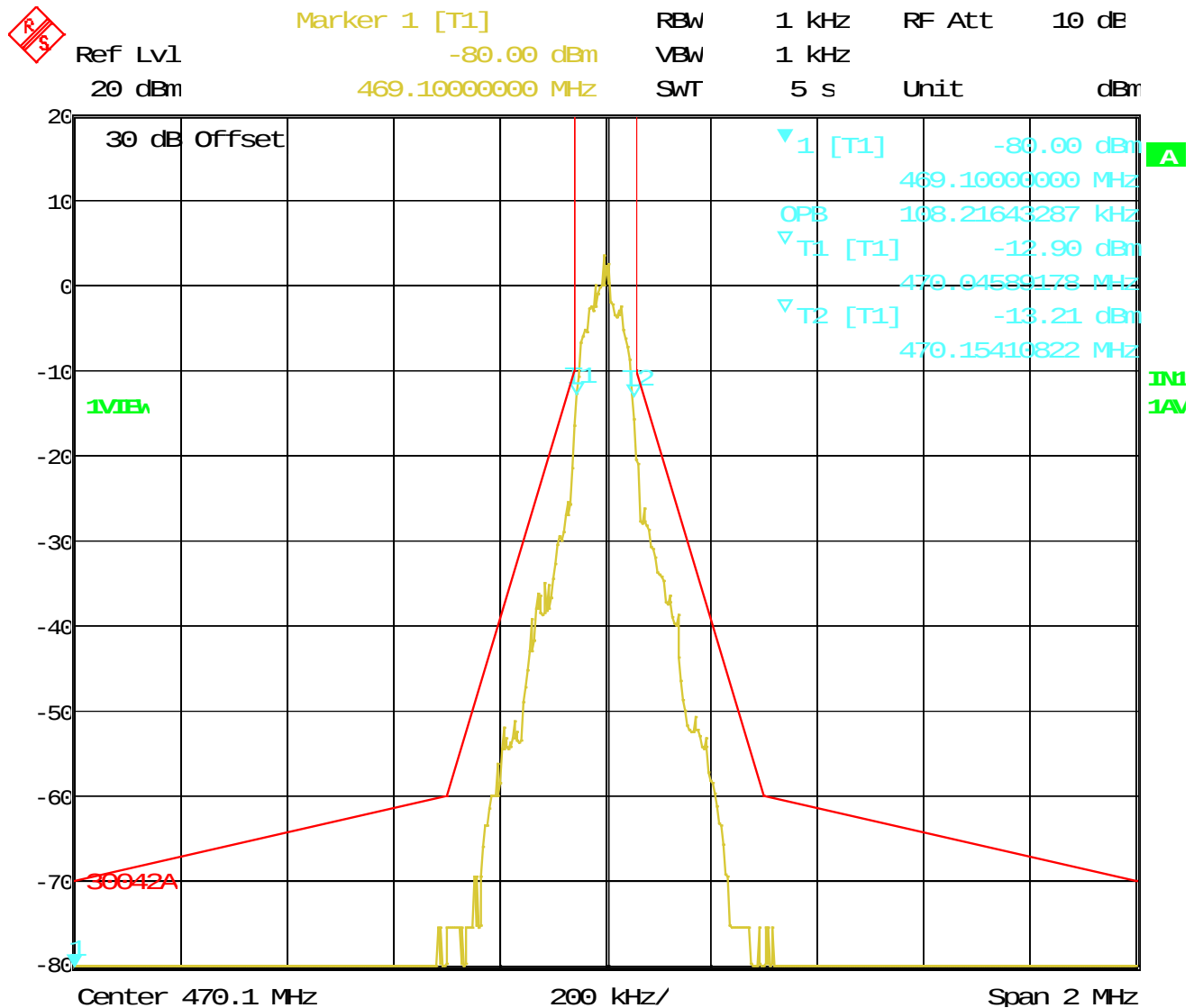
Test Data: 607.9 MHz 99 % OBW Plot



Date: 1.JAN.1997 06:49:29

EMISSION MASK

Test Data: 470.1 MHz Emission Mask Plot



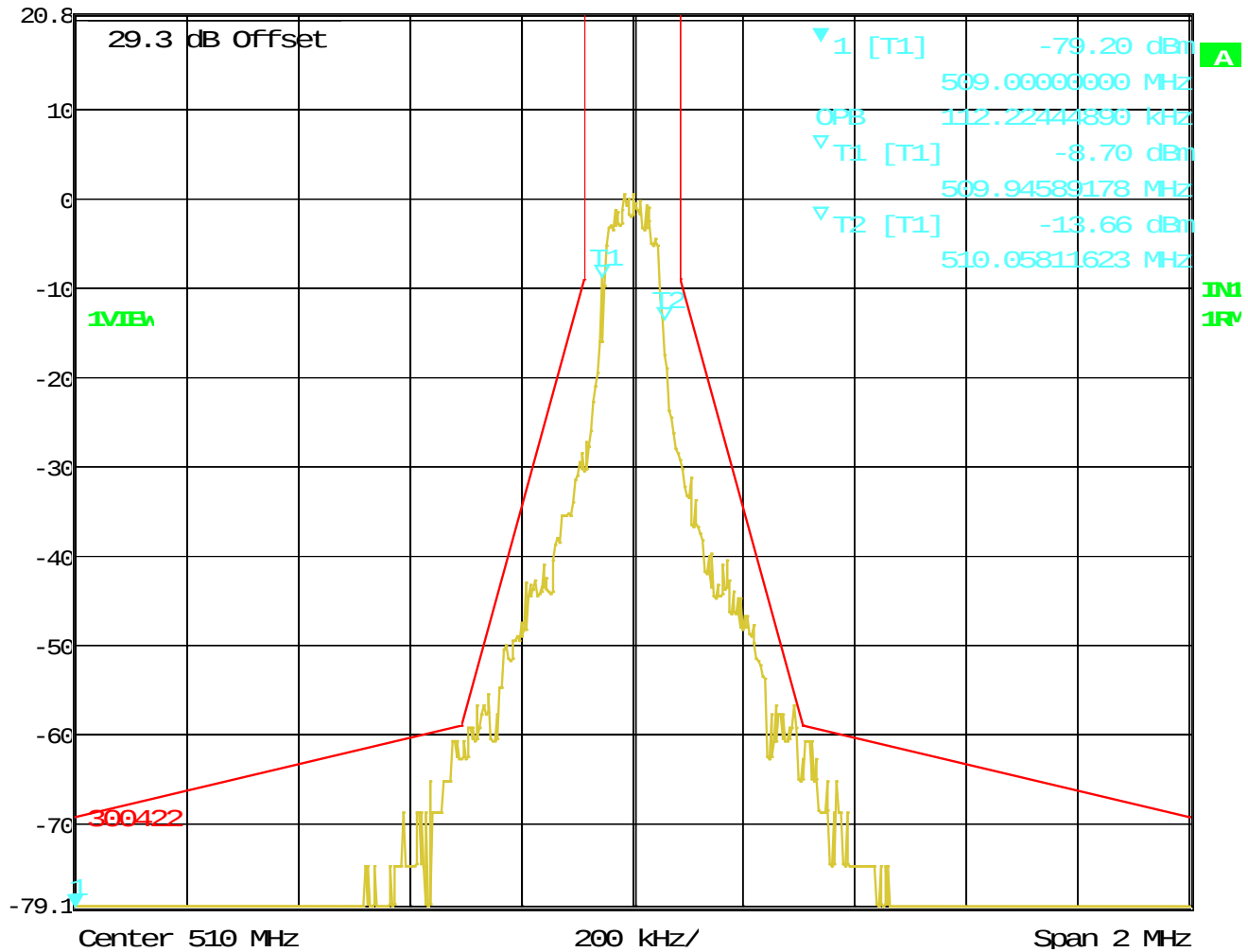
Date: 1.JAN.1997 02:13:46

EMISSION MASK

Test Data: 510 MHz Emission Mask Plot



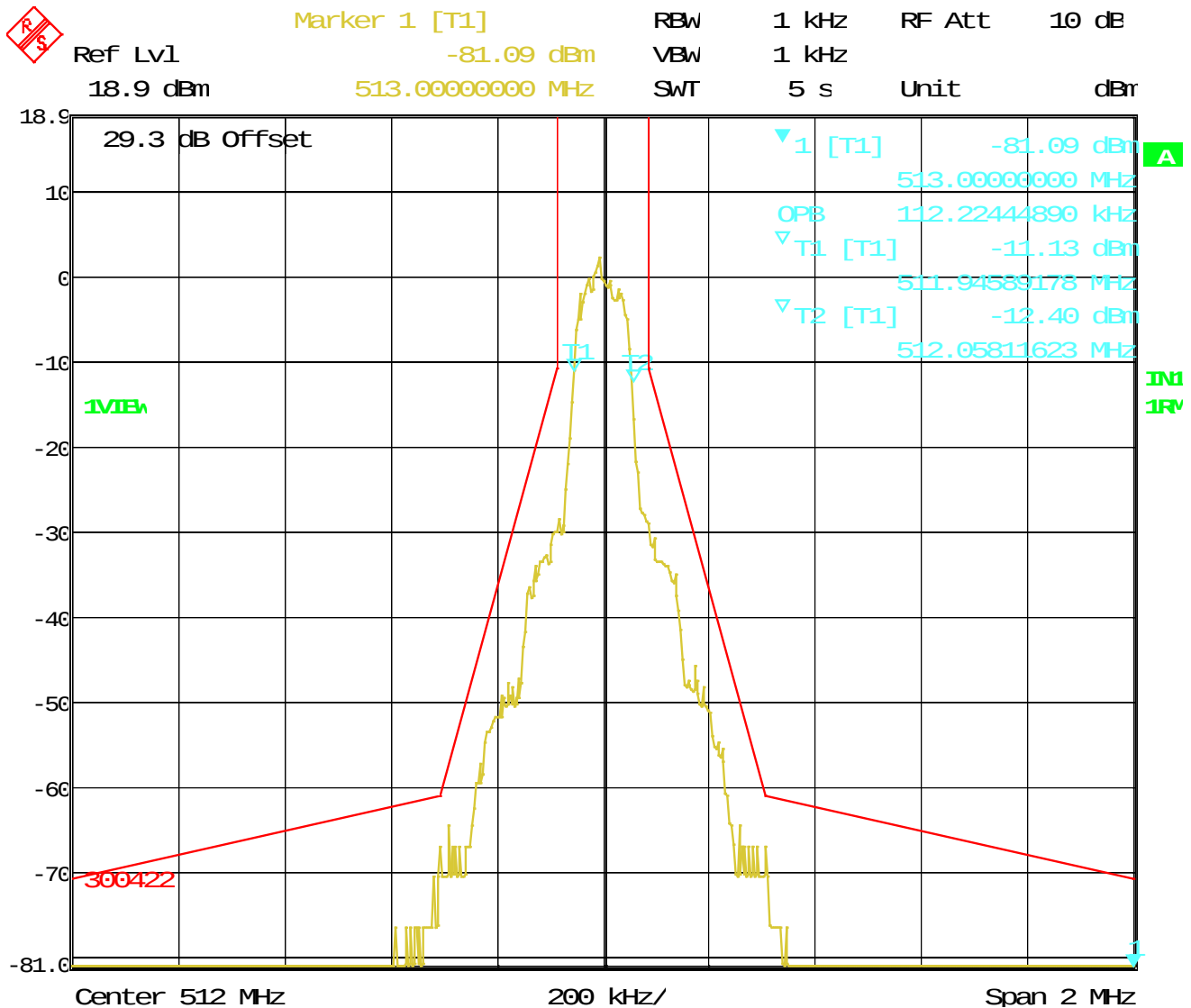
Ref Lvl 20.8 dBm
 Marker 1 [T1] -79.20 dBm
 509.00000000 MHz
 RBW 1 kHz
 VBW 1 kHz
 SWT 5 s
 RF Att 10 dB
 Unit dBm



Date: 1.JAN.1997 05:00:58

EMISSION MASK

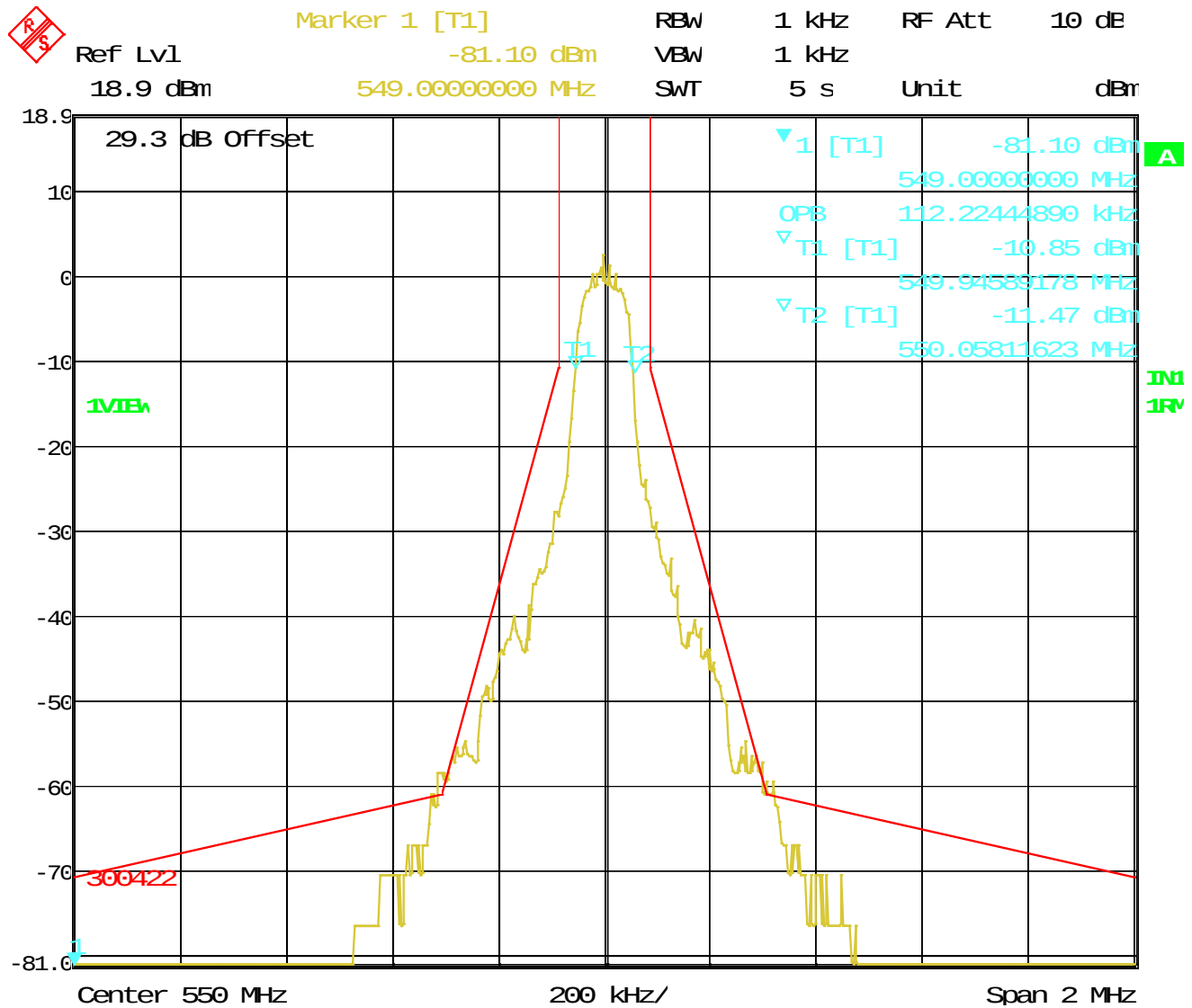
Test Data: 512 MHz Emission Mask Plot



Date: 1.JAN.1997 04:54:40

EMISSION MASK

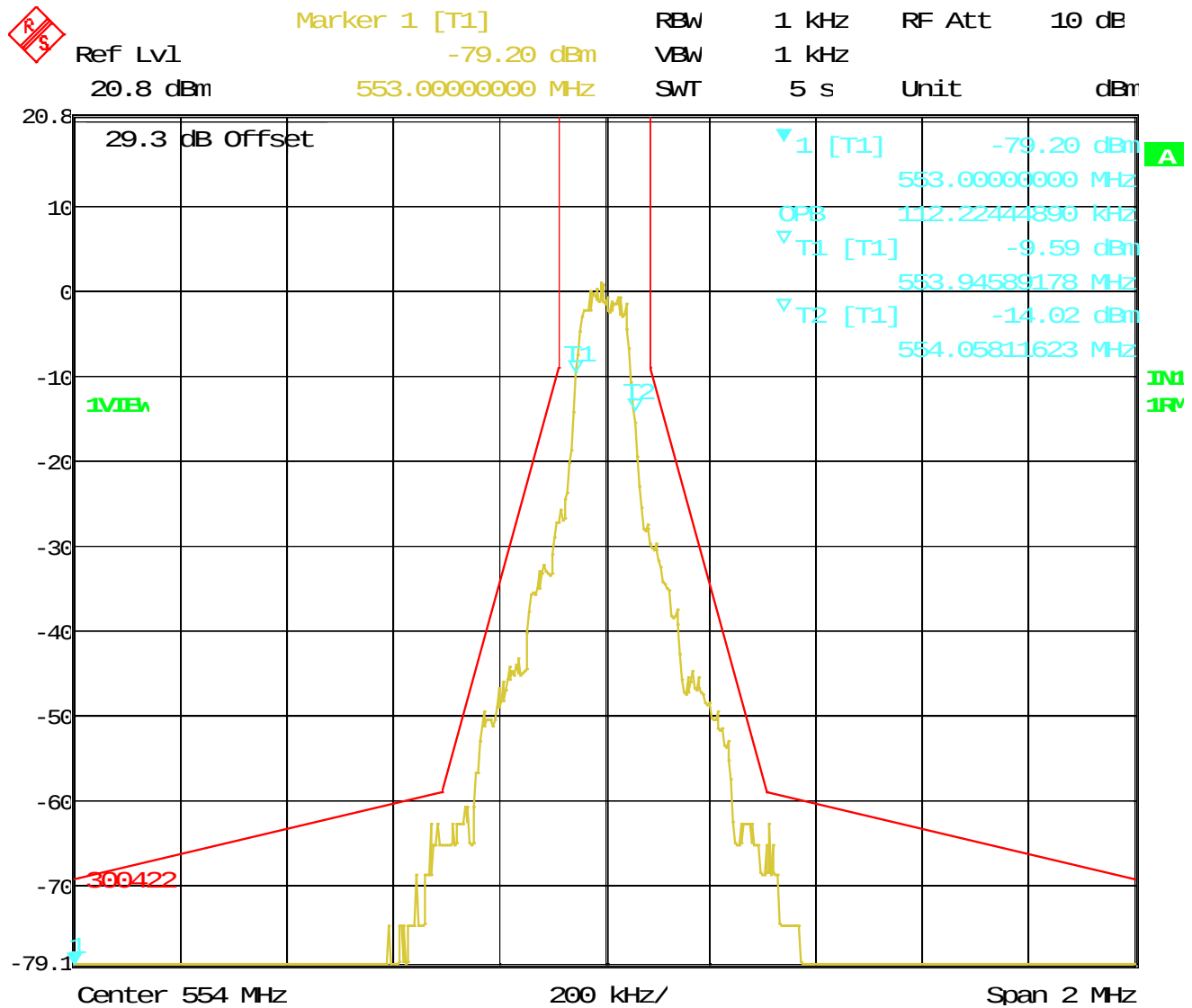
Test Data: 550 MHz Emission Mask Plot



Date: 1.JAN.1997 04:55:38

EMISSION MASK

Test Data: 554 MHz Emission Mask Plot



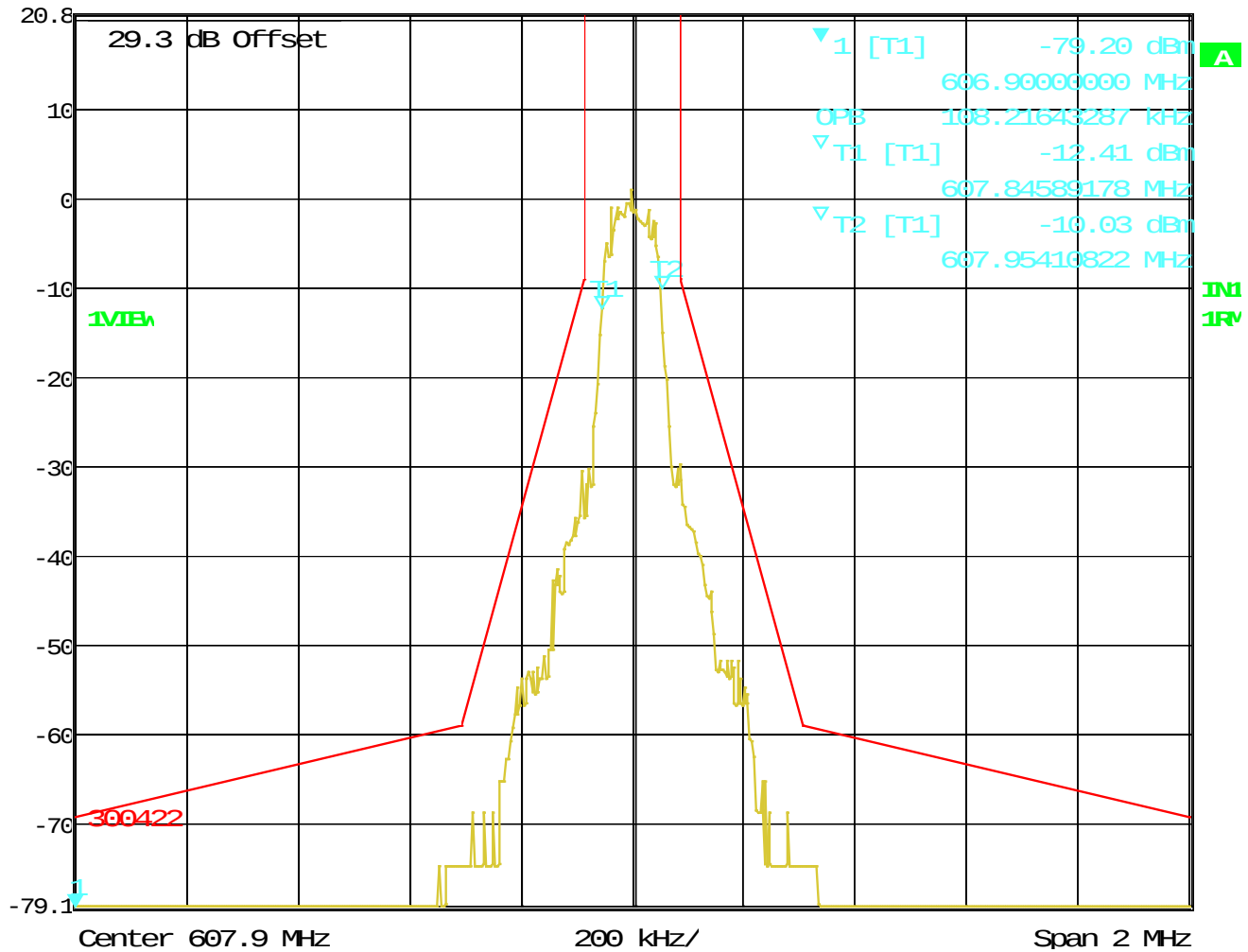
Date: 1.JAN.1997 05:01:49

EMISSION MASK

Test Data: 607.9 MHz Emission Mask Plot



Ref Lvl 20.8 dBm
 Marker 1 [T1] -79.20 dBm
 606.90000000 MHz
 RBW 1 kHz
 VBW 1 kHz
 SWT 5 s
 RF Att 10 dB
 Unit dBm



Date: 1.JAN.1997 06:48:20

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

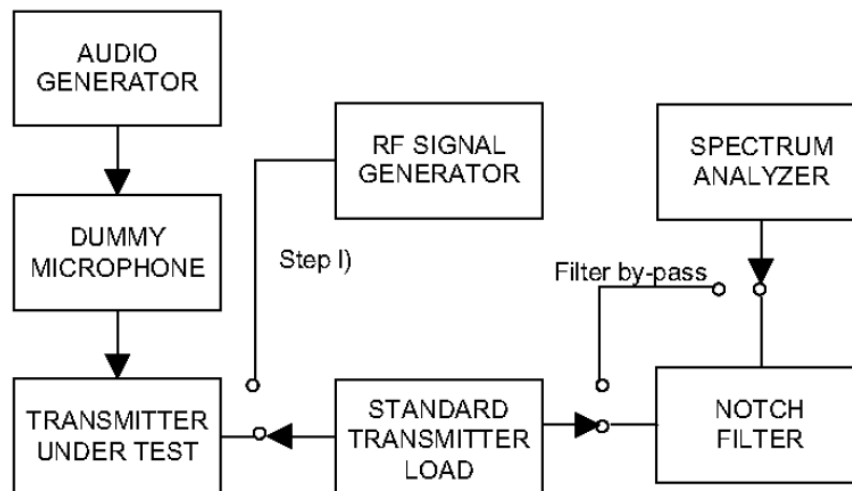
Rule Part No.: 2.1051(a), 74.861(e)(6)(iii)

Requirement: the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log_{10}$ (mean output power in watts) dB.

Procedure: KDB 971168 D01 Spurious Emissions at antenna term section 6
TIA 603-D Unwanted Emissions: Conducted section 2.2.13

Setup Diagram:



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: 470.1 MHz Spurious Conducted Emissions

Power Output	dBm	Watts	Limit (dBc)
	19.3	0.09	32.3

Frequency	Peak (dBm)	Margin
(fundamental) 470.100	0.00	0.00
940.200	-16.90	3.90
1410.300	-52.52	39.52
1880.400	-55.99	42.99
2350.500	-52.80	39.80
2820.600	-55.79	42.79
3290.700	-59.53	46.53
3760.800	-64.70	51.70
4230.900	-64.70	51.70
4701.000	-68.40	55.40

* Indicates Noise Floor

Result: Meets Requirements

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: 510 MHz Spurious Conducted Emissions

Power Output	dBm	Watts	Limit (dBc)
	19.15	0.08	32.15

Frequency	Peak (dBm)	Margin
(fundamental) 510.000	0.00	0.00
1020.000	-35.37	22.37
1530.000	-49.86	36.86
2040.000	-43.04	30.04
2550.000	7.10	-20.10
3060.000	-49.45	36.45
3570.000	-45.53	32.53
4080.000	-44.45	31.45
4590.000	-44.45	31.45
5100.000	-54.87	41.87

* Indicates Noise Floor

Result: Meets Requirements

FIELD STRENGTH OF SPURIOUS EMISSIONS

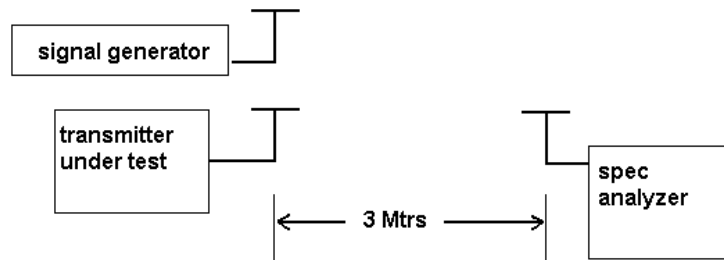
Rule Part No.: 2.1053, 74.861(e) (6) (iii),

Requirement: the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log_{10}$ (mean output power in watts) dB.

Procedure: KDB 971168 D01 Spurious Emissions at antenna term section 7
TIA 603-D Unwanted Emissions: Radiated section 2.2.12
ANSI C63.4 General Radiated Testing and Site Validation

Test Setup Diagram:



Limit Calculation:

Max Power Output (dBm)	Spurious Limit	
	Limit (dBc)	Limit (dBm)
19.74	32.74	-13.00

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 470.1 MHz Measurement Table

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 (dB)
470.10	32.40	8.02	V	0.65	13.44	3.000	22.107	-75.270	-13.00	62.27
470.10	95.21	22.61	H	1.15	10.92	3.000	34.680	-62.697	-13.00	49.70
470.10	95.21	17.68	V	1.15	10.92	3.000	29.750	-67.627	-13.00	54.63
470.10	185.52	10.93	H	1.58	13.50	3.000	26.007	-71.371	-13.00	58.37
470.10	185.52	4.79	V	1.58	13.50	3.000	19.867	-77.511	-13.00	64.51
470.10	238.47	30.81	H	1.77	11.10	3.000	43.675	-53.702	-13.00	40.70
470.10	244.88	18.09	V	1.83	11.50	3.000	31.419	-65.959	-13.00	52.96
470.10	318.63	13.80	V	2.09	13.80	3.000	29.689	-67.689	-13.00	54.69
470.10	318.63	21.39	H	2.09	13.80	3.000	37.279	-60.099	-13.00	47.10
470.10	344.28	23.99	H	2.12	14.10	3.000	40.206	-57.172	-13.00	44.17
470.10	940.68	8.73	V	3.59	23.60	3.000	35.921	-61.456	-13.00	48.46
470.10	940.68	7.28	H	3.59	23.60	3.000	34.471	-62.906	-13.00	49.91
470.10	1410.00	5.25	V	4.38	28.81	3.000	38.436	-58.941	-13.00	45.94
470.10	1410.00	5.25	H	4.38	28.81	3.000	38.436	-58.941	-13.00	45.94
470.10	1880.00	6.35	H	5.11	31.86	3.000	43.320	-54.057	-13.00	41.06
470.10	1880.00	6.18	V	5.11	31.86	3.000	43.150	-54.227	-13.00	41.23
470.10	2350.00	7.15	V	5.80	31.99	3.000	44.945	-52.432	-13.00	39.43
470.10	2350.00	11.25	H	5.80	31.99	3.000	49.045	-48.332	-13.00	35.33
470.10	2820.00	10.98	H	6.33	32.25	3.000	49.562	-47.815	-13.00	34.82
470.10	3290.00	4.05	H	6.83	33.08	3.000	43.964	-53.413	-13.00	40.41
470.10	3290.00	3.95	V	6.83	33.08	3.000	43.864	-53.513	-13.00	40.51
470.10	3760.00	10.44	V	7.29	33.62	3.000	51.352	-46.025	-13.00	33.03
470.10	3760.00	5.97	H	7.29	33.62	3.000	46.882	-50.495	-13.00	37.50
470.10	4230.00	4.42	H	7.77	33.60	3.000	45.787	-51.590	-13.00	38.59
470.10	4230.00	2.89	V	7.77	33.60	3.000	44.257	-53.120	-13.00	40.12
470.10	4700.00	4.42	V	8.19	34.06	3.000	46.670	-50.707	-13.00	37.71
470.10	4700.00	5.66	H	8.19	34.06	3.000	47.910	-49.467	-13.00	36.47

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 510 MHz Measurement Table

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 (dB)
510.00	32.24	6.78	V	0.65	13.42	3.000	20.846	-76.532	-13.00	63.53
510.00	83.01	21.53	V	1.10	9.50	3.000	32.128	-65.249	-13.00	52.25
510.00	83.01	29.85	H	1.10	9.50	3.000	40.448	-56.929	-13.00	43.93
510.00	244.88	17.29	H	1.83	11.50	3.000	30.619	-66.759	-13.00	53.76
510.00	244.88	10.03	H	1.83	11.50	3.000	23.359	-74.019	-13.00	61.02
510.00	318.60	18.76	H	2.09	13.80	3.000	34.649	-62.729	-13.00	49.73
510.00	368.33	14.47	H	2.20	14.73	3.000	31.402	-65.976	-13.00	52.98
510.00	368.33	6.59	H	2.20	14.73	3.000	23.522	-73.856	-13.00	60.86
510.00	318.63	12.29	H	2.09	13.80	3.000	28.179	-69.199	-13.00	56.20
510.00	1100.00	11.91	H	3.94	28.13	3.000	43.980	-53.397	-13.00	40.40
510.00	1100.00	8.21	V	3.94	28.13	3.000	40.280	-57.097	-13.00	44.10
510.00	1650.00	10.17	V	4.74	28.40	3.000	43.305	-54.072	-13.00	41.07
510.00	1650.00	10.90	H	4.74	28.40	3.000	44.035	-53.342	-13.00	40.34
510.00	2200.00	17.21	H	5.63	30.71	3.000	53.550	-43.827	-13.00	30.83
510.00	2200.00	16.60	V	5.63	30.71	3.000	52.940	-44.437	-13.00	31.44
510.00	2750.00	13.51	V	6.25	32.49	3.000	52.250	-45.127	-13.00	32.13
510.00	2750.00	11.79	H	6.25	32.49	3.000	50.530	-46.847	-13.00	33.85
510.00	3300.00	9.74	H	6.84	33.08	3.000	49.660	-47.717	-13.00	34.72
510.00	3300.00	7.38	V	6.84	33.08	3.000	47.300	-50.077	-13.00	37.08
510.00	3850.00	7.99	V	7.41	33.57	3.000	48.970	-48.407	-13.00	35.41
510.00	3850.00	6.14	H	7.41	33.57	3.000	47.120	-50.257	-13.00	37.26
510.00	4400.00	5.68	H	7.95	33.79	3.000	47.420	-49.957	-13.00	36.96
510.00	4400.00	5.14	V	7.95	33.79	3.000	46.880	-50.497	-13.00	37.50
510.00	4950.00	5.19	V	8.39	33.99	3.000	47.570	-49.807	-13.00	36.81
510.00	4950.00	7.38	H	8.39	33.99	3.000	49.760	-47.617	-13.00	34.62
510.00	5500.00	7.36	H	8.93	34.49	3.000	50.780	-46.597	-13.00	33.60
510.00	5500.00	5.70	V	8.93	34.49	3.000	49.120	-48.257	-13.00	35.26

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

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Sweep/Signal Generator	Anritsu	68369B	985112	11/08/17	11/08/19
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/16/16	08/16/18
Tunable Notch Filter 250-850 MHz	Eagle	TNF-200	250-850 MHz (#19)	01/19/17	11/19/19
Antenna: Biconical 1096 Chamber	Eaton	94455-1	1096	08/01/2017	08/01/2019
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/26/17	07/26/19
CHAMBER	Panashield	3M	N/A	12/31/17	12/31/19
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	01/30/17	01/30/19
Software: Field Strength Program	Timco	N/A	Version 4.0	NA	NA
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	NA	NA

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT