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FCC PART 90

406.1-512MHz UHF BASE STATION

TEST REPORT

APPLICANT	SPECTRA ENGINEERING PTY LTD
	731 MARSHALL RD MALAGA WESTERN AUSTRALIA 6090 AUSTRALIA
FCC ID	OKRMXDR4V
MODEL NUMBER	MXDR4V
PRODUCT DESCRIPTION	MXDR/ATLAS 4500 BASE STATION UHF
DATE SAMPLE RECEIVED	10/18/2016
FINAL TEST DATE	12/05/2016
TESTED BY	Cory Leverett
APPROVED BY	Tim Royer
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
2104AUT16TestReport_	Rev1	Initial Issue	12/05/2016
	Rev2	Added WB analog Data	12/06/2016

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

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

Tested by: _____
Name and Title: Cory Leverett, Project Manager/Testing Technician

Date: 12/05/2016

Reviewed and approved by:
Name and Title: Tim Royer, Engineer

Date: 12/06/2016

GENERAL INFORMATION

EUT Specification

EUT Description	MXDR/ATLAS 4500 BASE STATION UHF
FCC ID	OKRMXDR4V
Model Number	MXDR4V
Operating Frequency	406.1 – 520 MHz (Tested on allowed frequencies)
Test Frequencies	406.25, 415.25, 429.75, 450.25, 462.50, 465.75, 469.75, & 511.75 MHz
Type of Emission	16K0F3E, 14K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, & 9K80F7E
Modulation	FM
EUT Power Source	☒ 110–120Vac/50– 60Hz
	☐ DC Power 12V
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☐ Pre-Production
	☒ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Test Conditions	The temperature was 24-26ºC with a relative humidity of 50 - 65%.
Modification to the EUT	None
Test Exercise	The EUT was operated and modulated as per the standard listed. Special engineering test software was provided from manufacturer to enable the various test modes.
Regulatory Standard	FCC CFR 47 Part 2, & 90
Measurement Standard	ANSI/TIA 603-D:2010
Test Facility	**Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.**

TEST REPORT SUMMARY

Rule Part No.	Scope of Work	Status Pass/Fail/NA
Part 2.1033(c)(8), Part 2.1046(a), Part 90	RF Power Output	Pass
Part 2.1033(c) (4) Part 2.1047(a)(6)	Modulation Characteristics	Pass
2.1049(c), 90.210	Emission Mask and Occupied Bandwidths	Pass
2.1051(a), 90.210	Antenna Conducted Emissions	Pass
2.1053, Part 90.210	Field Strength Spurious Emissions	Pass
Part 2.1055, Part 90.213	Frequency Stability	Pass
Part 90.214	Transient Frequency Behavior	Pass

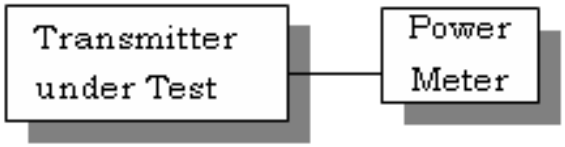
RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), Part 90

Test Requirements: Manufacturer's Specification

Method of Measurement:

Test Setup Diagram:



Test Data: Analog Mode Power Output Measurement Table

Tuned Freq. MHz	Power Output			
	High		Low	
	dBm	Watts	dBm	Watts
406.25	50.02	100.46	37.34	5.42
415.25	50.10	102.33	37.39	5.48
429.75	49.90	97.72	37.12	5.15
450.25	50.07	101.62	37.33	5.41
462.50	50.28	106.66	37.55	5.69
465.75	50.28	106.66	37.58	5.73
469.75	50.35	108.39	37.54	5.68
511.75	50.17	103.99	37.67	5.85

Test Data: Digital Mode Power Output Measurement Table

Tuned Freq. MHz	Power Output			
	High		Low	
	dBm	Watts	dBm	Watts
406.25	50.03	100.69	37.46	5.57
415.25	50.16	103.75	37.52	5.65
429.75	49.98	99.54	37.38	5.47
450.25	50.12	102.80	37.50	5.62
462.50	50.34	108.14	37.74	5.94
465.75	50.35	108.39	37.71	5.90
469.75	50.41	109.90	37.69	5.87
511.75	50.37	108.89	37.76	5.97

MODULATION CHARACTERISTICS

Rule Part: Part 2.1033(c), Part 2.1033(c) (4), Part 90.209, Part 90.207

Type of Emission: 16K0F3E

Bn = 2M + 2DK
M = 3000
D = 5000
K=1
Bn = 2(3000) +2(5000) = 16.0k

Type of Emission: 14K0F3E

Bn = 2M + 2DK
M = 3000
D = 4000
K=1
Bn = 2(3000) +2(4000) = 14.0k

Type of Emission: 11K0F3E

Bn = 2M + 2DK
M = 3000
D = 2500
K=1
Bn = 2(3000) +2(2500) = 11.0k

Type of Emission: 8K10F1E / 8K10F1D

APCO 25 modulation phase 1 as defined in ANSI/ TIA-102.BABA.

Type of Emission: 9K80F7E

APCO 25 modulation phase 2 as defined in ANSI/ TIA-102.BABA.

MODULATION CHARACTERISTICS

The audio frequency response was measured in accordance with test procedures detailed in the standard list above. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

Test Data: Audio Frequency Response 16K0F3E

Input Freq (Hz)	RMS Dev (KHz)	AFR (dB)
100	0.11	-20.1
200	0.13	-18.6
300	0.26	-12.6
500	0.63	-4.9
1000	1.11	0.0
1500	1.59	3.1
2000	2.12	5.6
2500	2.68	7.7
3000	3.01	8.7
3500	2.61	7.4
4000	0.11	-20.1
4500	0.11	-20.1
5000	0.11	-20.1

MODULATION CHARACTERISTICS

Test Data: Audio Frequency Response 14K0F3E

Input Freq (Hz)	RMS Dev (KHz)	AFR (dB)
100	0.11	-18.0
200	0.12	-17.2
300	0.27	-10.2
500	0.62	-2.9
1000	0.87	0.0
1500	1.62	5.4
2000	2.16	7.9
2500	2.72	9.9
3000	3.11	11.1
3500	2.51	9.2
4000	0.11	-18.0
4500	0.11	-18.0
5000	0.11	-18.0

MODULATION CHARACTERISTICS

Test Data: Audio Freq Response 11K0F3E

Input Freq (Hz)	RMS Dev (KHz)	AFR (dB)
100	0.08	-15.9
200	0.08	-15.9
300	0.13	-11.7
500	0.29	-4.7
1000	0.50	0.0
1500	0.73	3.3
2000	0.97	5.8
2500	1.19	7.5
3000	1.37	8.8
3500	1.15	7.2
4000	0.07	-17.1
4500	0.07	-17.1
5000	0.07	-17.1

MODULATION CHARACTERISTICS

Test Data: Low Pass Filter Response 16K0F3E

Input Freq (Hz)	Lev $_{Freq}$ (dB)	LPFR (dB)
1000	14.1	0.0
3000	7.3	-6.8
3500	3.0	-11.1
4000	-37.8	-51.9
4500	-37.9	-52.0
5000	-37.9	-52.0
6000	-37.9	-52.0
7000	-37.9	-52.0
8000	-37.9	-52.0
9000	-37.9	-52.0
10000	-37.9	-52.0
12500	-37.9	-52.0
15000	-37.9	-52.0
20000	-37.9	-52.0

MODULATION CHARACTERISTICS -VOICE MODULATED COMMUNICATION EQUIPMENT

Test Data: Low Pass Filter Response 14K0F3E

Input Freq (Hz)	Lev $_{Freq}$ (dB)	LPFR (dB)
1000	14.3	0.0
3000	7.2	-7.1
3500	3.0	-11.3
4000	-37.8	-52.1
4500	-37.8	-52.1
5000	-37.8	-52.1
6000	-37.8	-52.1
7000	-37.8	-52.1
8000	-37.8	-52.1
9000	-37.8	-52.1
10000	-37.8	-52.1
12500	-37.8	-52.1
15000	-37.8	-52.1
20000	-37.8	-52.1

MODULATION CHARACTERISTICS

Test Data: Low Pass Filter Response 11K0F3E

Input Freq (Hz)	Lev $_{Freq}$ (dB)	LPFR (dB)
1000	5.78	0.0
3000	5.69	-0.1
3500	3.44	-2.3
4000	-30.60	-36.4
4500	-30.87	-36.7
5000	-30.87	-36.7
6000	-30.87	-36.7
7000	-30.87	-36.7
8000	-30.87	-36.7
9000	-30.87	-36.7
10000	-30.87	-36.7
12500	-30.87	-36.7
15000	-30.87	-36.7
20000	-30.87	-36.7

MODULATION CHARACTERISTICS

Rule Part No.: Part 2.1047(b) & 90

Test Requirements:

Method of Measurement: The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

Test Data: Modulation Limiting 16K0F3E

Positive Peak Deviation (kHz)							
Audio Input Level (dB > 1Khz Ref)	Audio Input Frequency (Hz)						
	300	500	1000	1500	2000	2500	3000
0	0.5	1.8	3.1	4.4	4.4	4.4	4.4
20	4.2	4.3	4.3	4.4	4.4	4.4	4.4
Limit (KHz)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Margin (KHz)	0.8	0.7	0.7	0.6	0.6	0.6	0.6

Test Data: Modulation Limiting 14K0F3E

Positive Peak Deviation (kHz)							
Audio Input Level (dB > 1Khz Ref)	Audio Input Frequency (Hz)						
	300	500	1000	1500	2000	2500	3000
0	0.3	1.6	3.1	3.7	3.7	3.7	3.7
20	3.2	3.2	3.4	3.7	3.7	3.7	3.7
Limit (KHz)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Margin (KHz)	0.8	0.8	0.6	0.3	0.3	0.3	0.3

Test Data: Modulation Limiting 11K0F3E

Positive Peak Deviation (kHz)							
Audio Input Level (dB > 1Khz Ref)	Audio Input Frequency (Hz)						
	300	500	1000	1500	2000	2500	3000
0	0.52	0.94	1.49	2.06	2.43	2.43	2.41
20	2.19	2.37	2.39	2.21	2.42	2.39	2.39
Limit (KHz)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Margin (KHz)	0.31	0.13	0.11	0.29	0.08	0.11	0.11

OCCUPIED BANDWIDTH

Part 2.1049(c) EMISSION BANDWIDTH:

Part 90.210(d) Emission Mask D - 12.5 kHz channel BW 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 f0 to 5.625 kHz removed from f0: Zero dB.

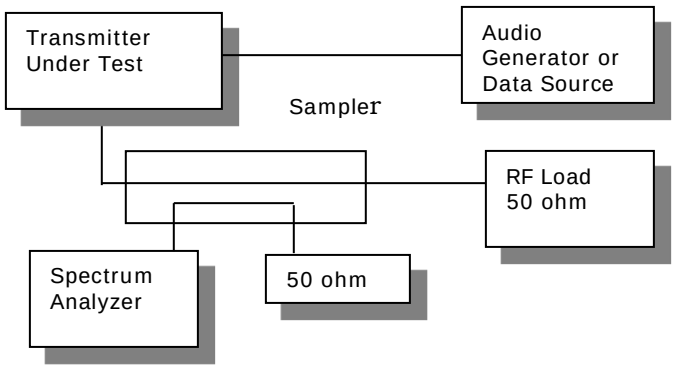
(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 (fd - 2.88 kHz) dB.

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

Method of Measurement: Were in accordance with test procedures detailed in the standard list above.

Notes: The following results are the worst case for all test frequencies and power levels

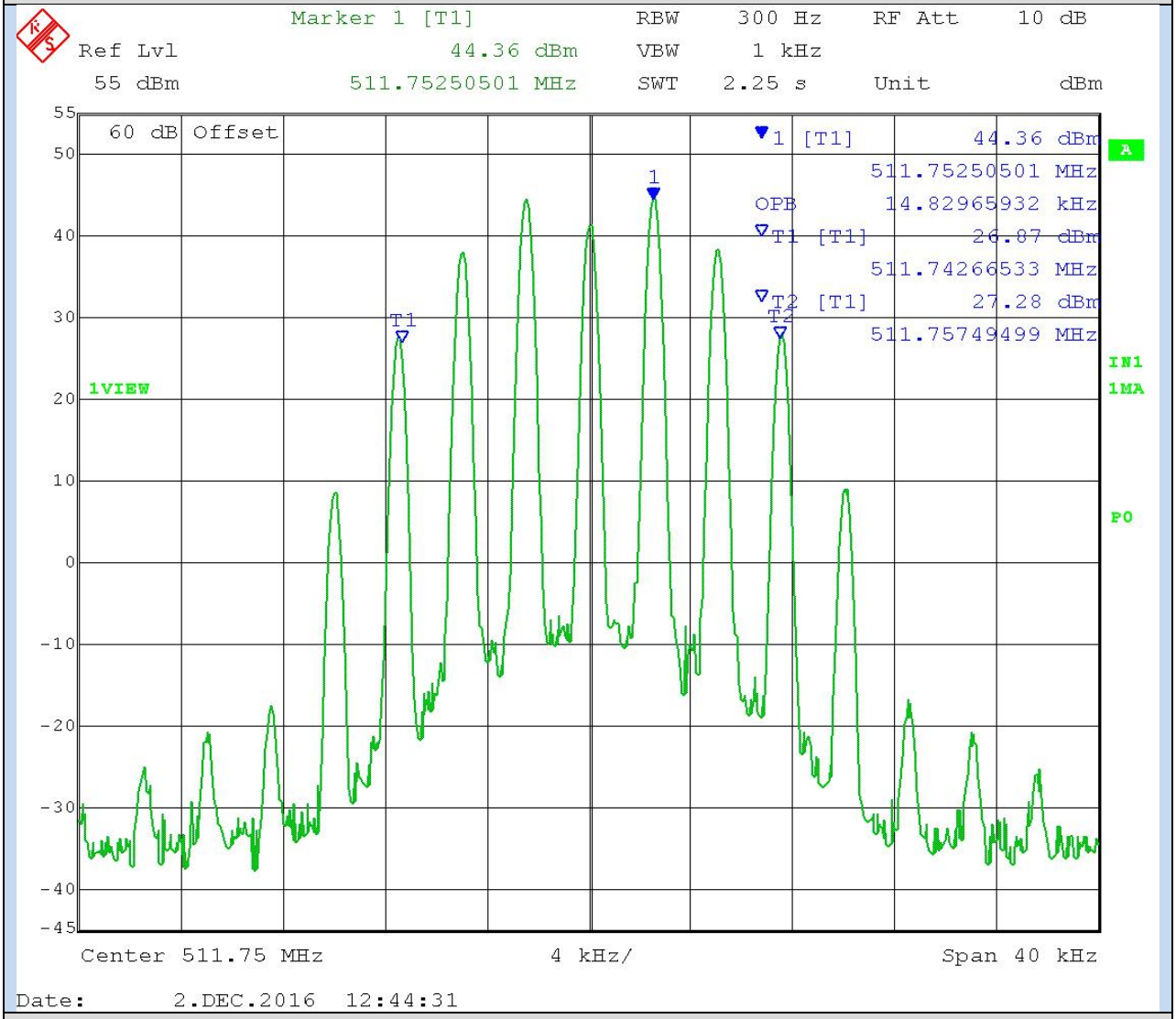
Test Setup Diagram:



OCCUPIED BANDWIDTH

Test Data: 511.75 MHz 99% 16K0F3E

Occupied Bandwidth Plot

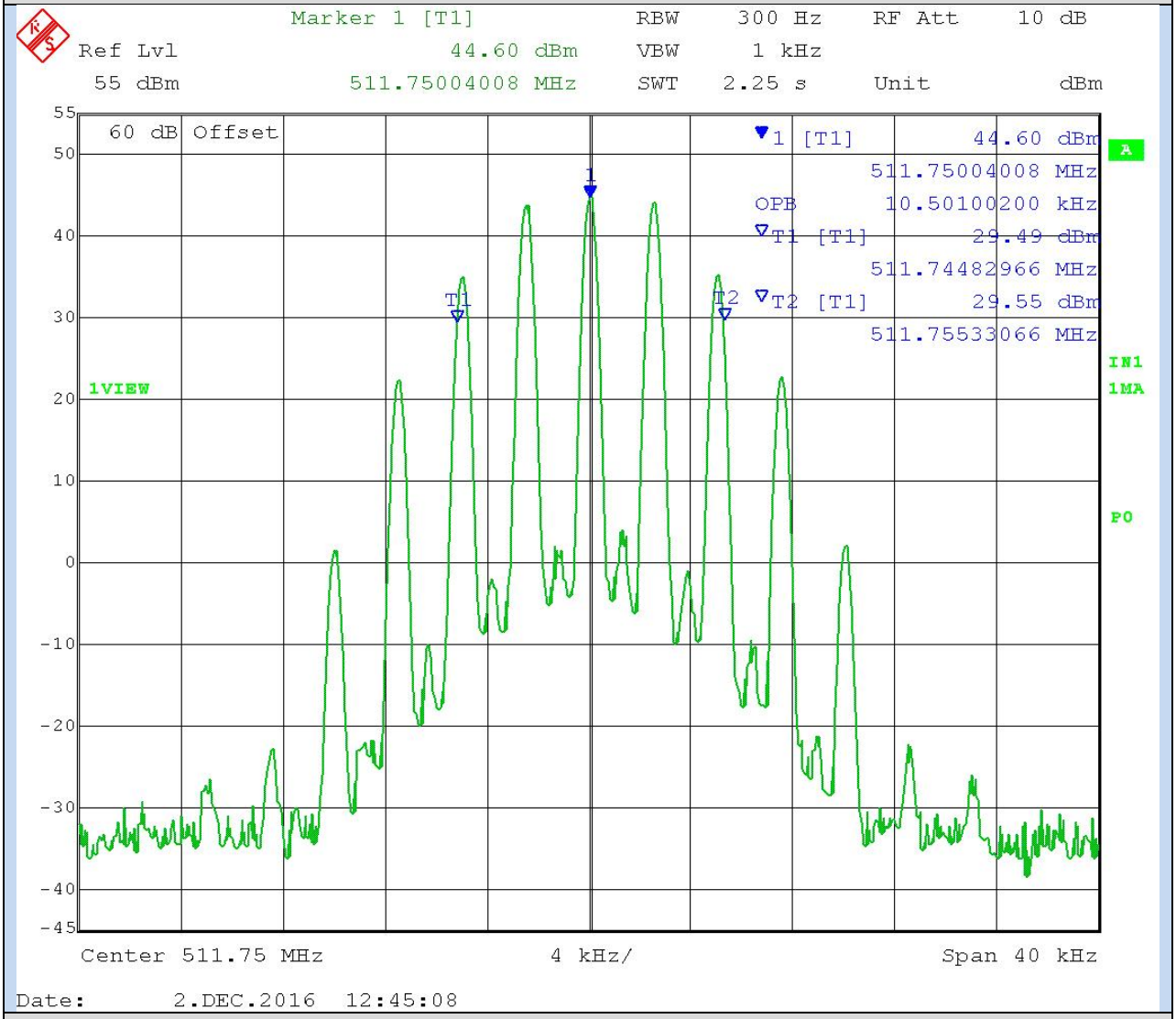


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 511.75 MHz 99% 14K0F3E

Occupied Bandwidth Plot

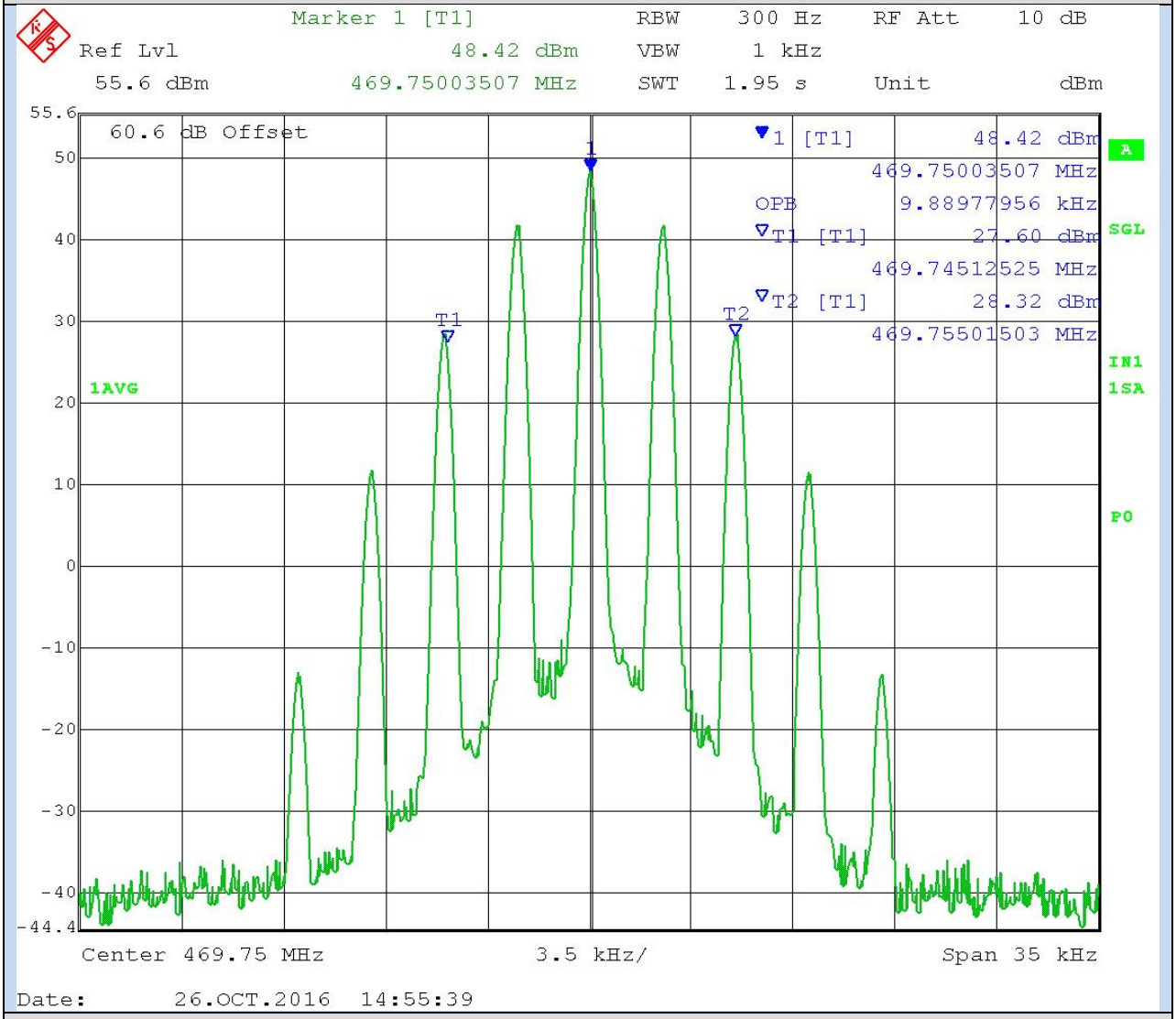


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz 99% 11K0F3E

Occupied Bandwidth Plot

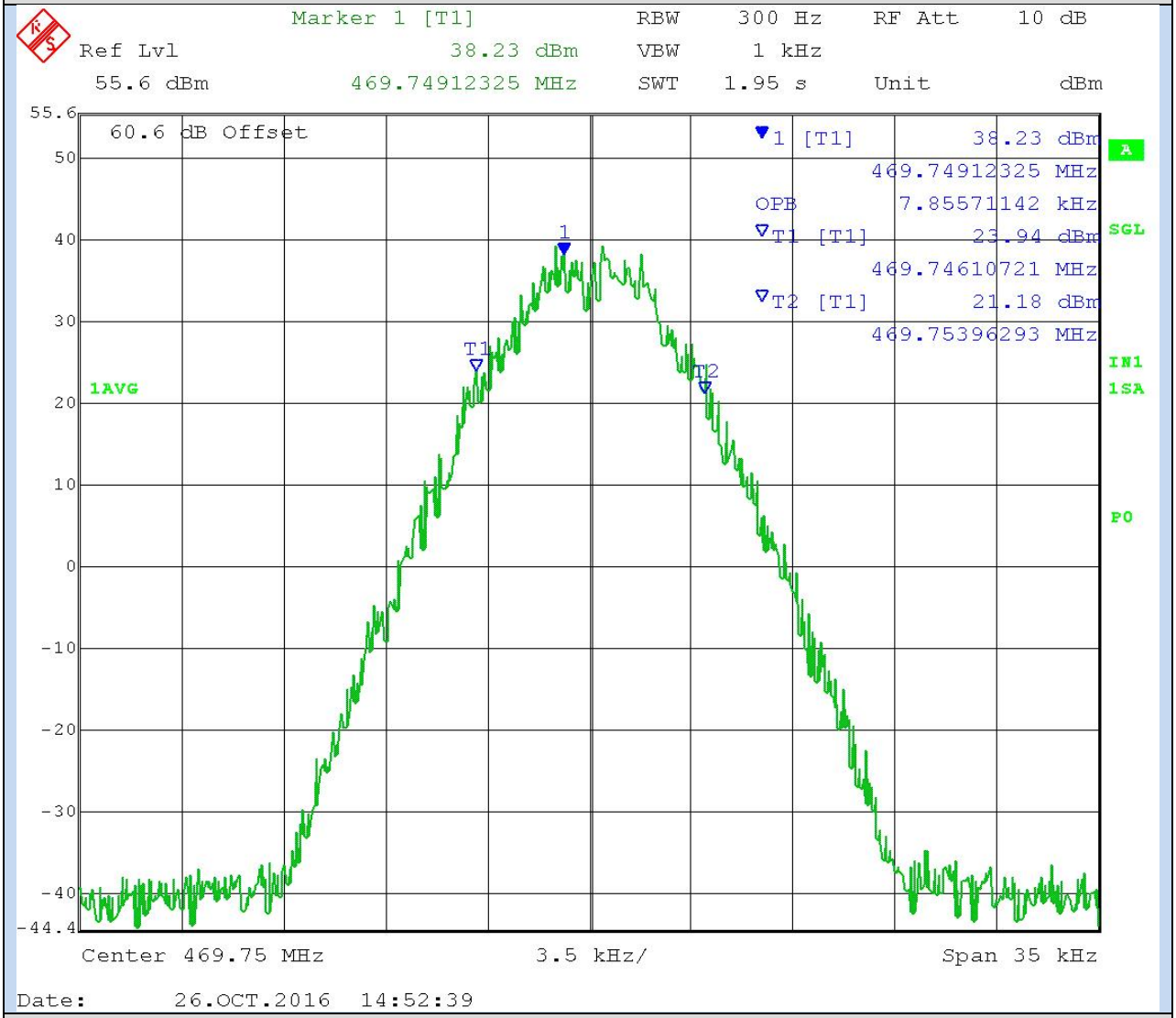


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz 99% 8K10F1E / 8K10F1D

Occupied Bandwidth Plot

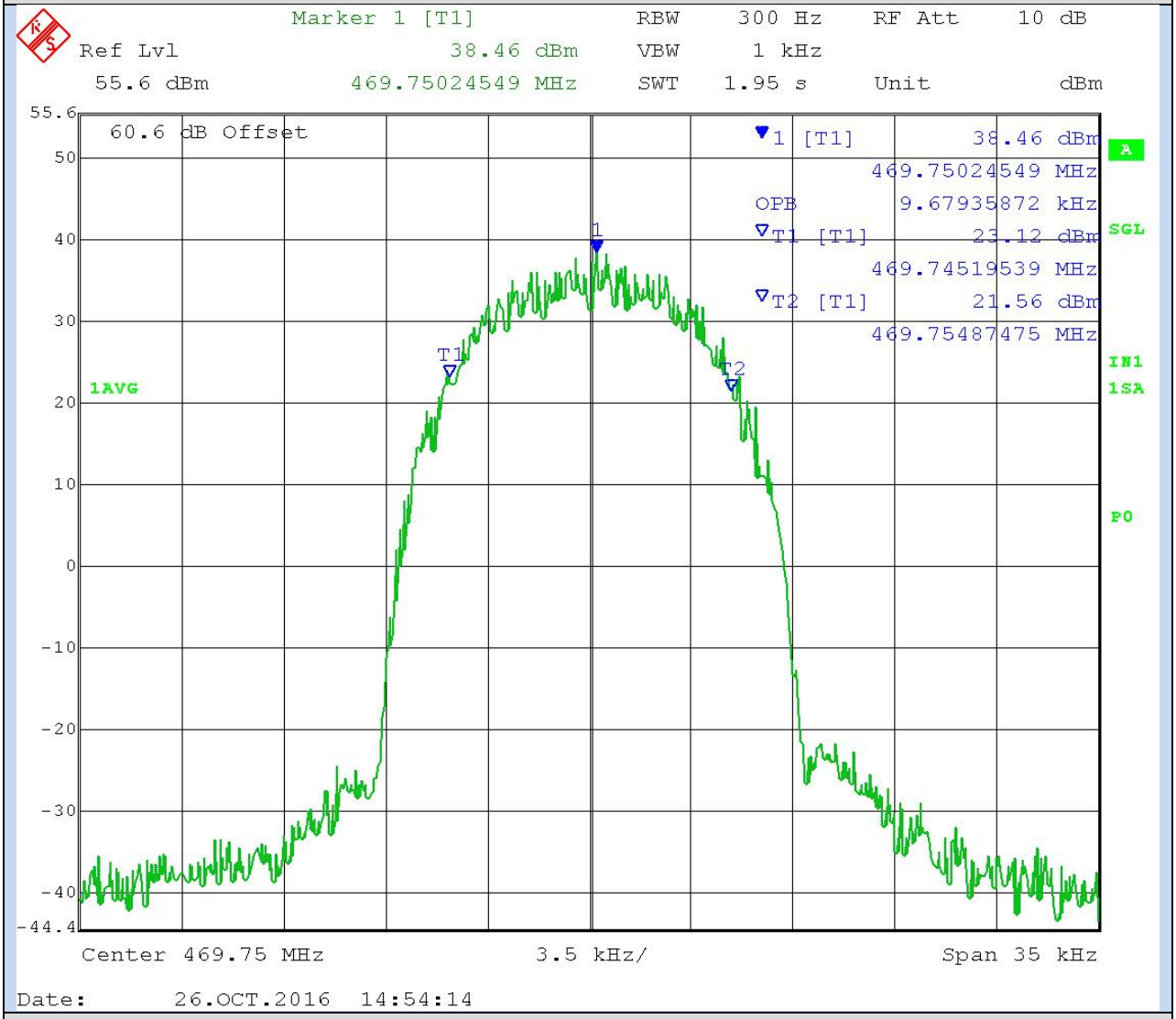


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz 99% 9K80F7E

Occupied Bandwidth Plot

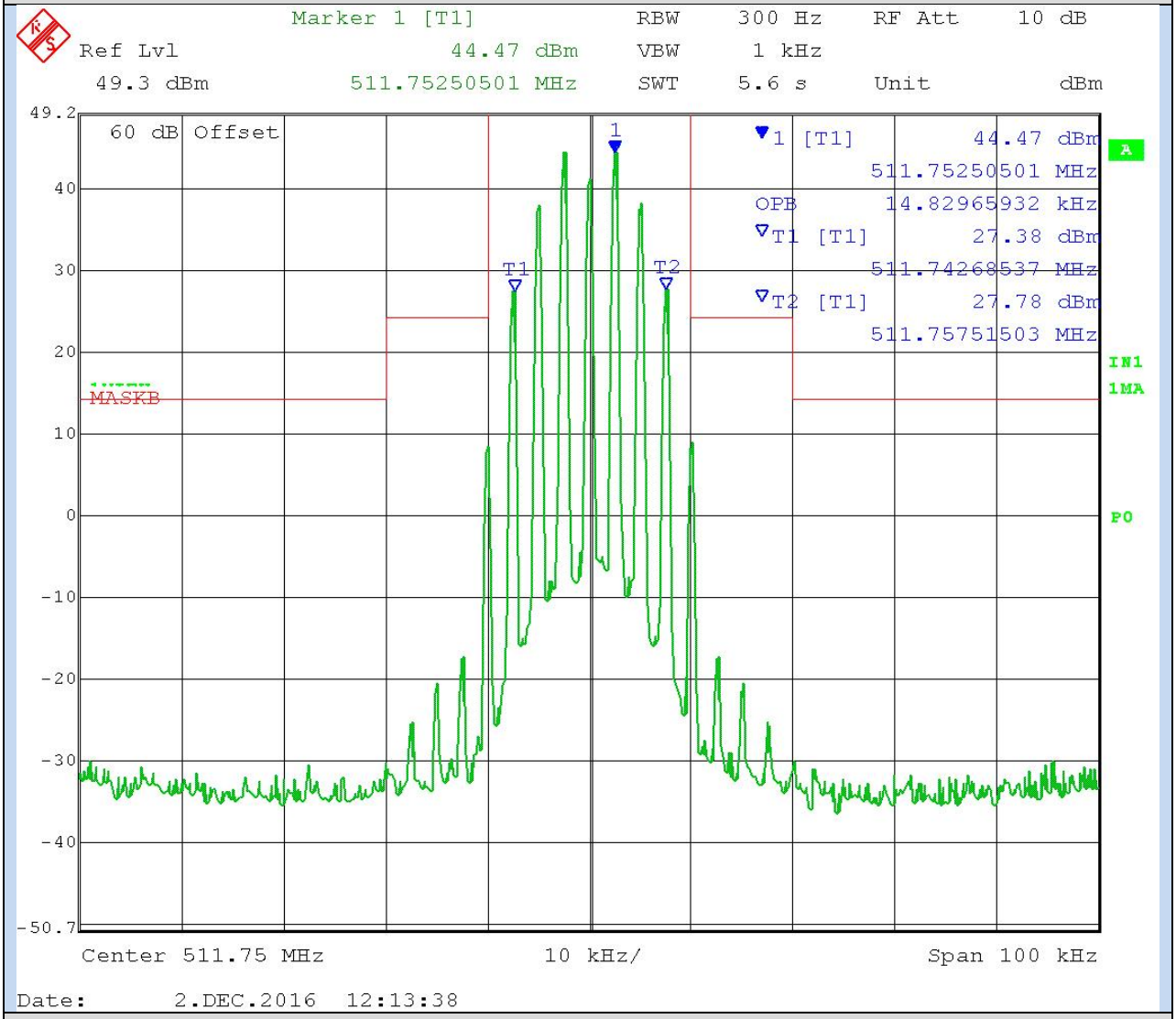


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 511.75 MHz Mask B 16K0F3E High

Occupied Bandwidth Plot

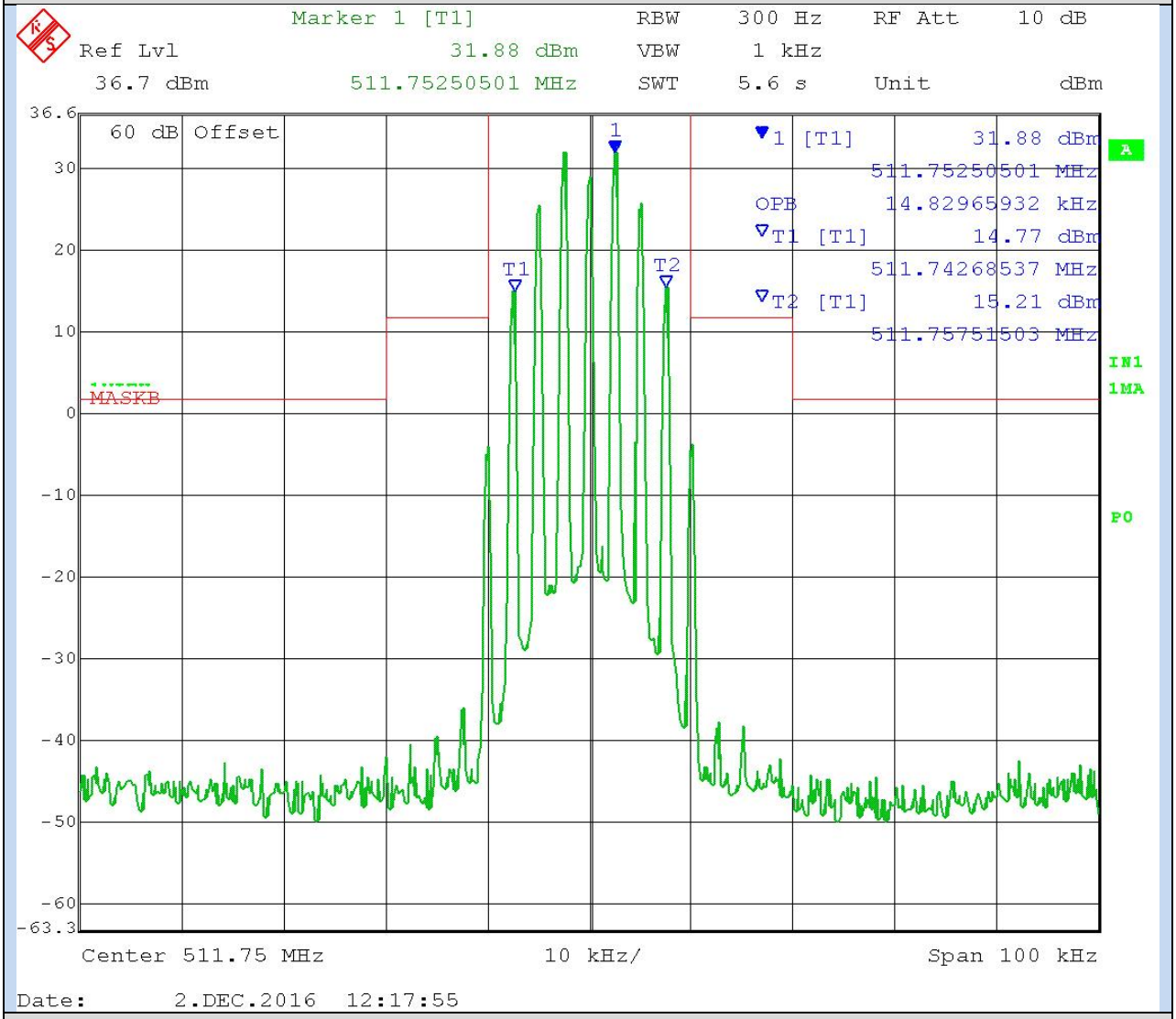


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 511.75 MHz Mask B 16K0F3E Low

Occupied Bandwidth Plot

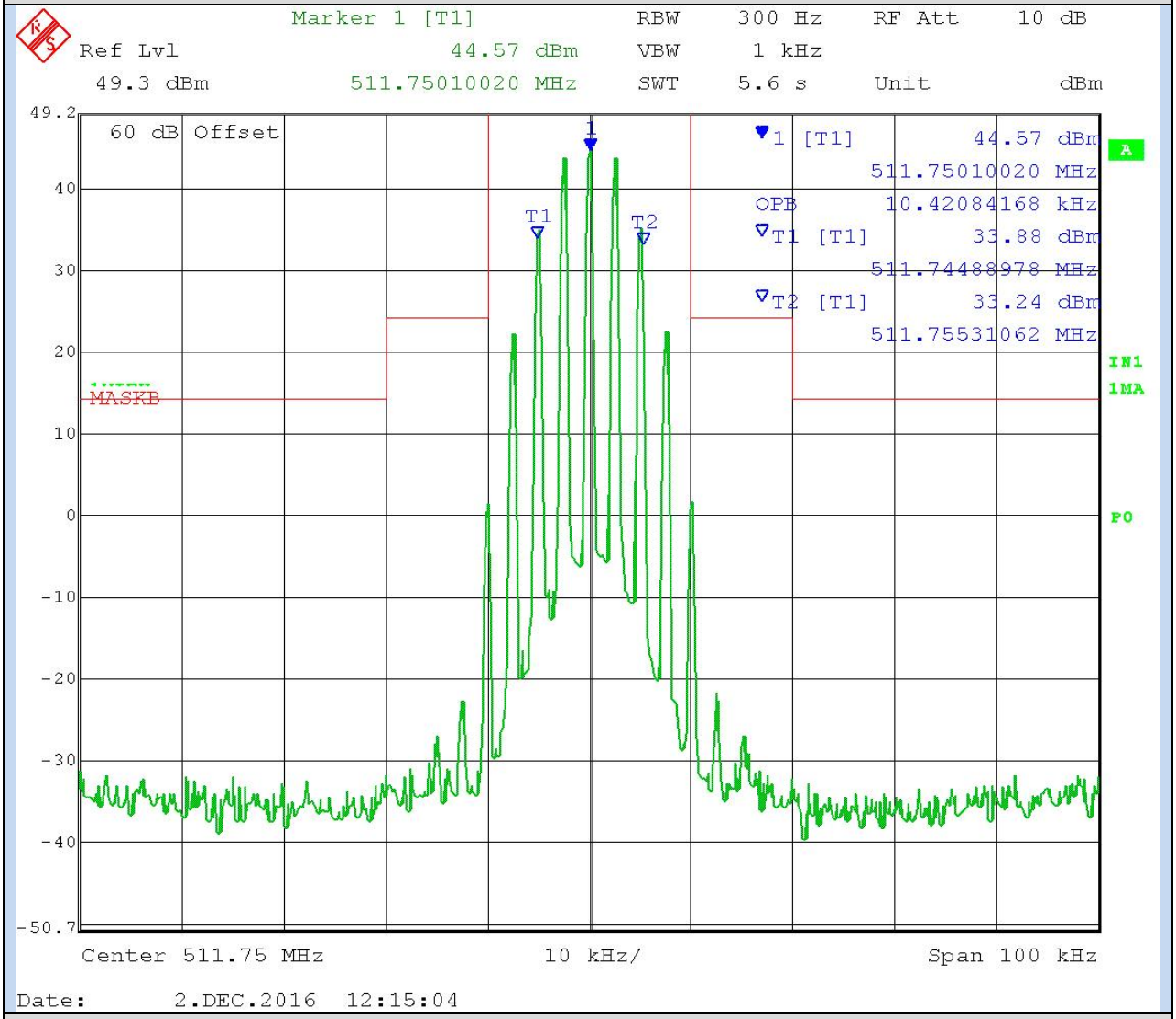


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 511.75 MHz Mask B 14K0F3E High

Occupied Bandwidth Plot

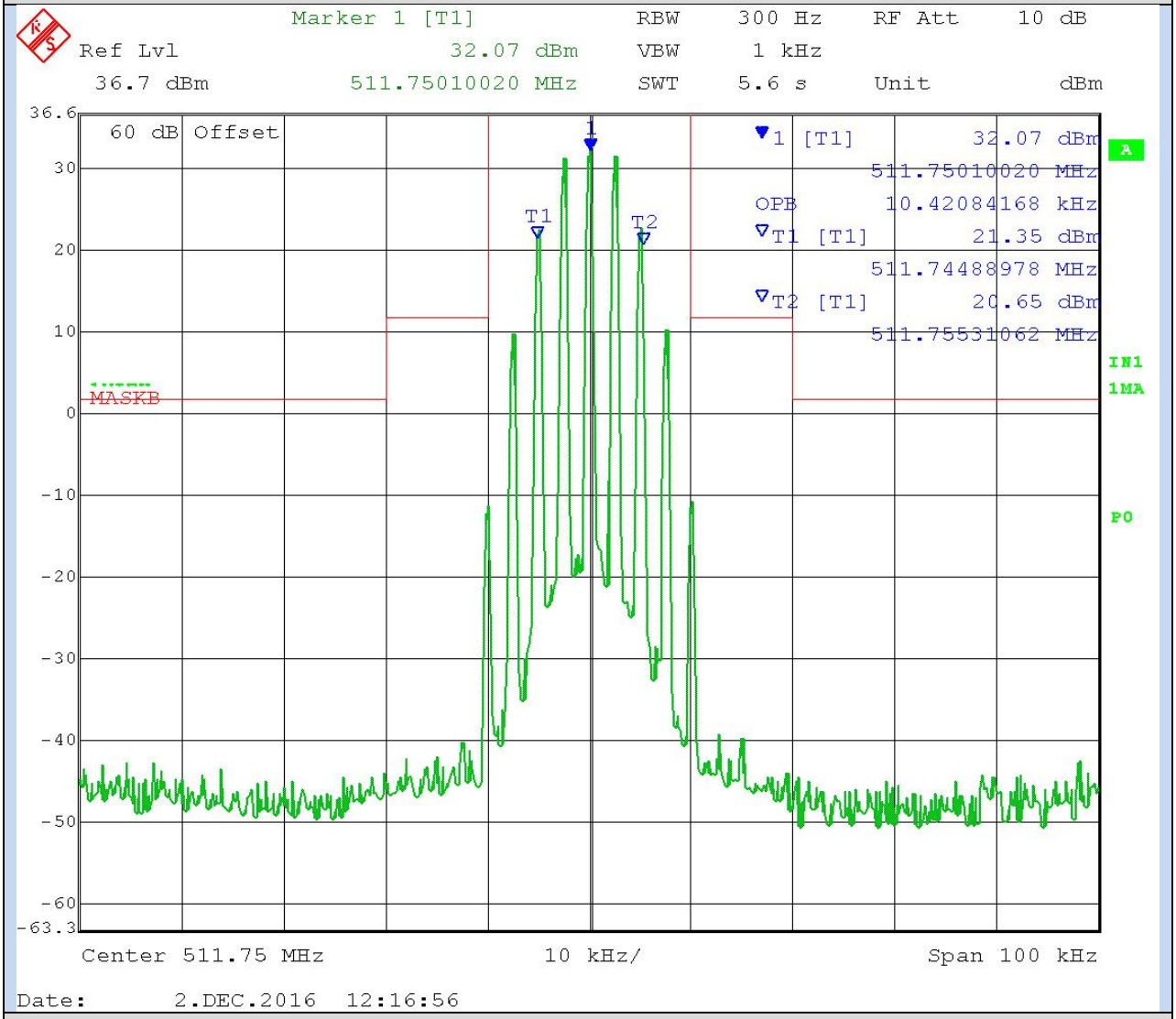


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 511.75 MHz Mask B 14K0F3E Low

Occupied Bandwidth Plot

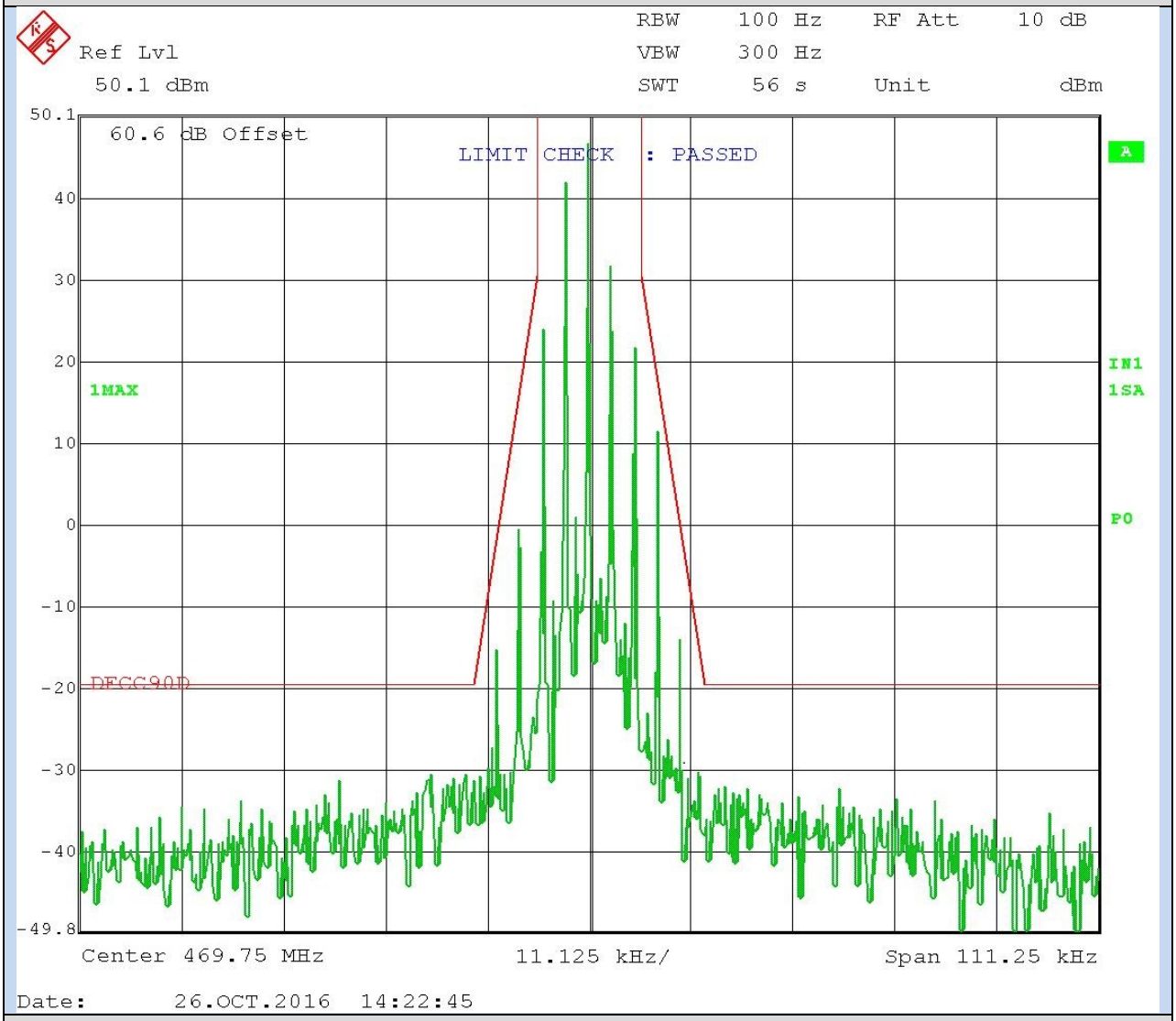


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz Mask D 11K0F3E High

Occupied Bandwidth Plot

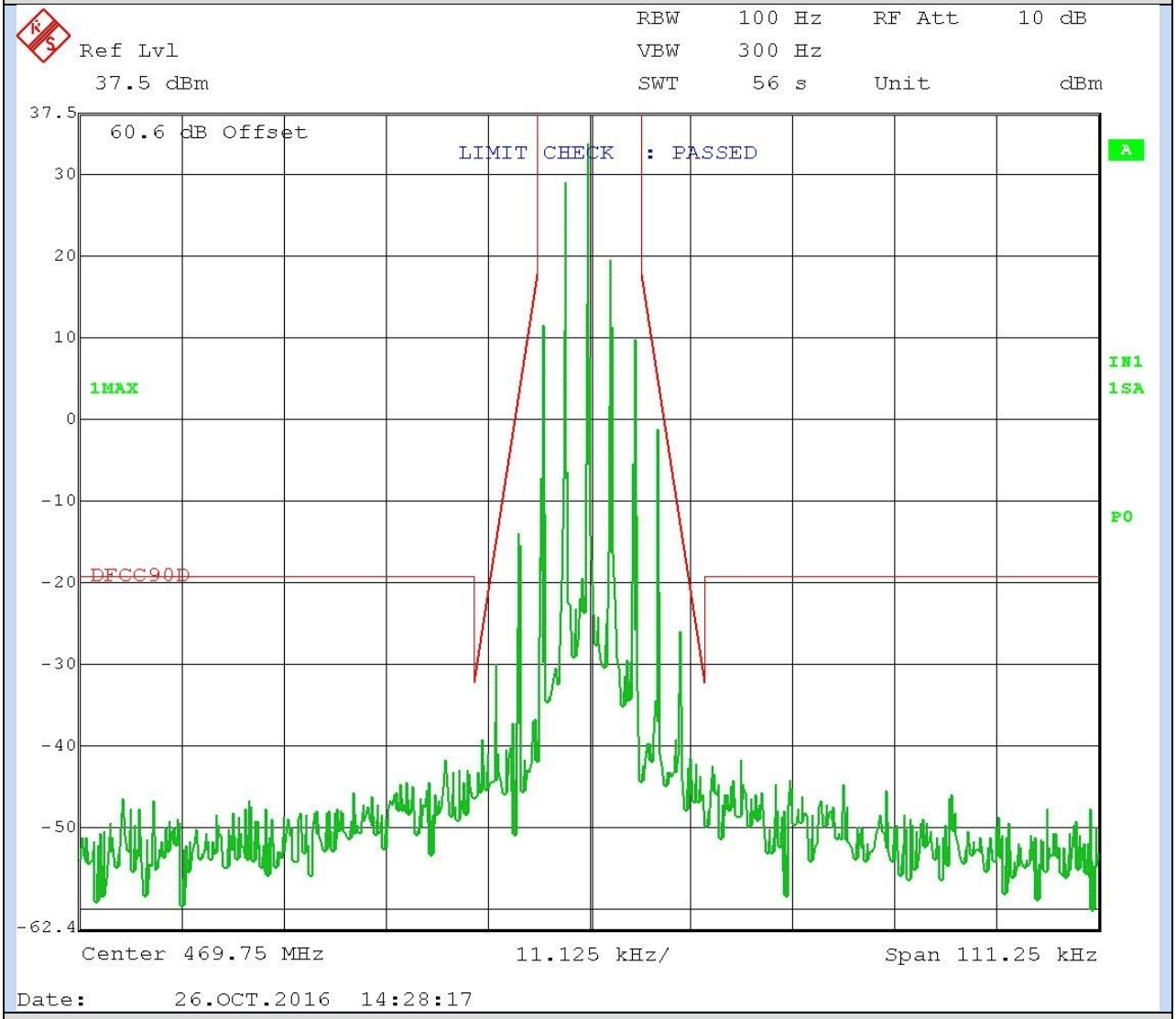


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz Mask D 11K0F3E Low

Occupied Bandwidth Plot

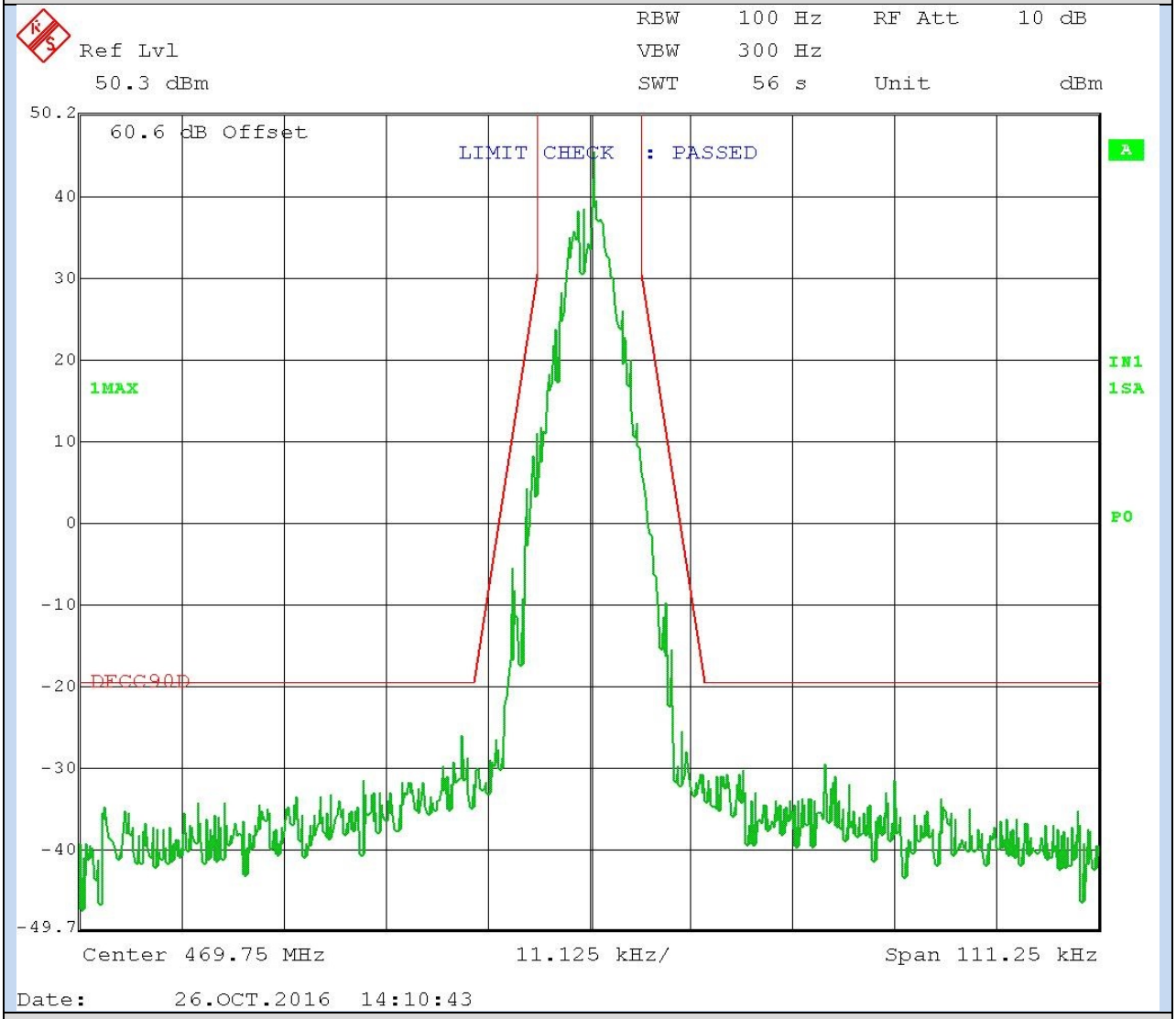


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz Mask D 8K10F1D / 8K10F1E High

Occupied Bandwidth Plot

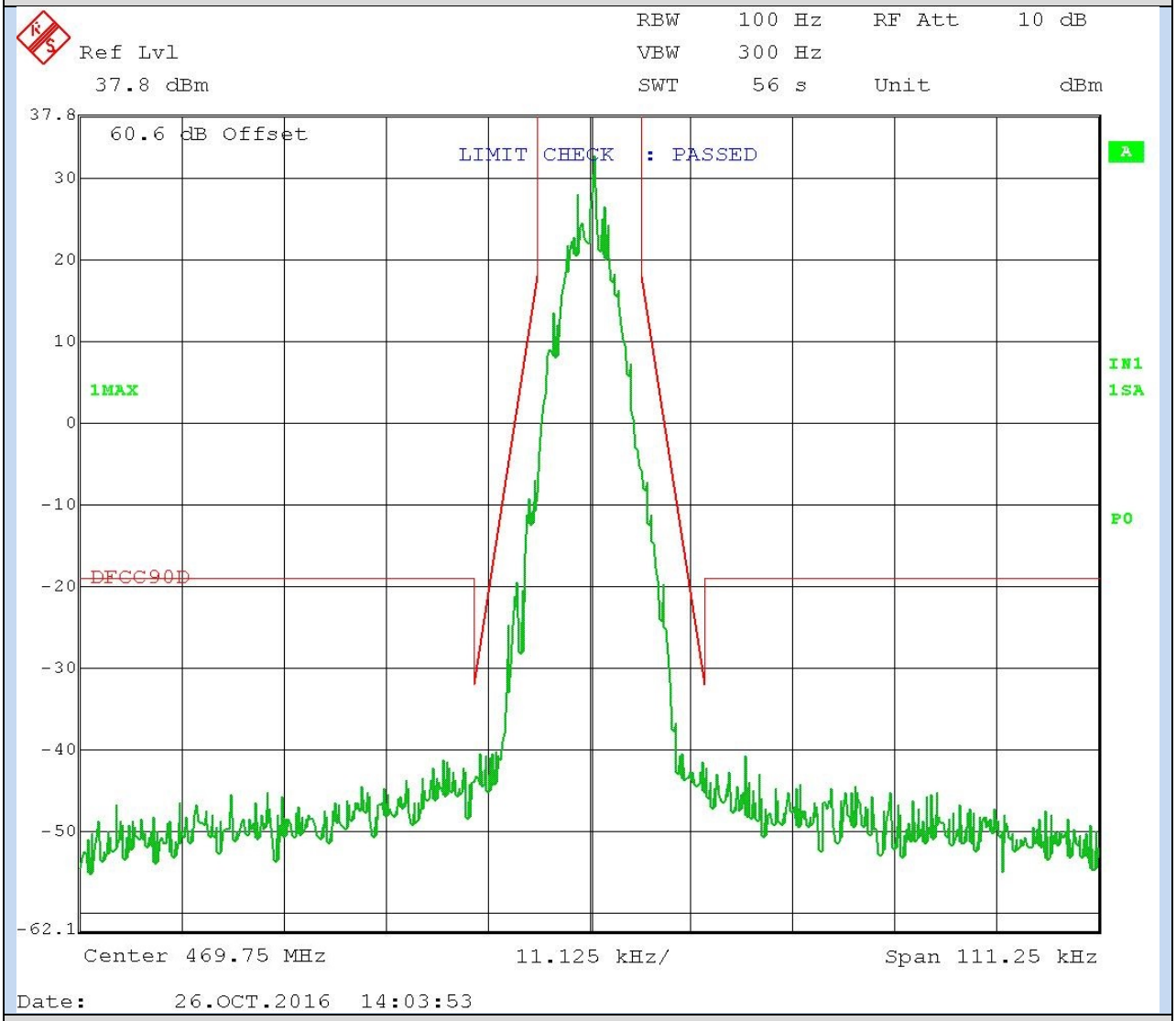


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz Mask D 8K10F1D / 8K10F1E Low

Occupied Bandwidth Plot

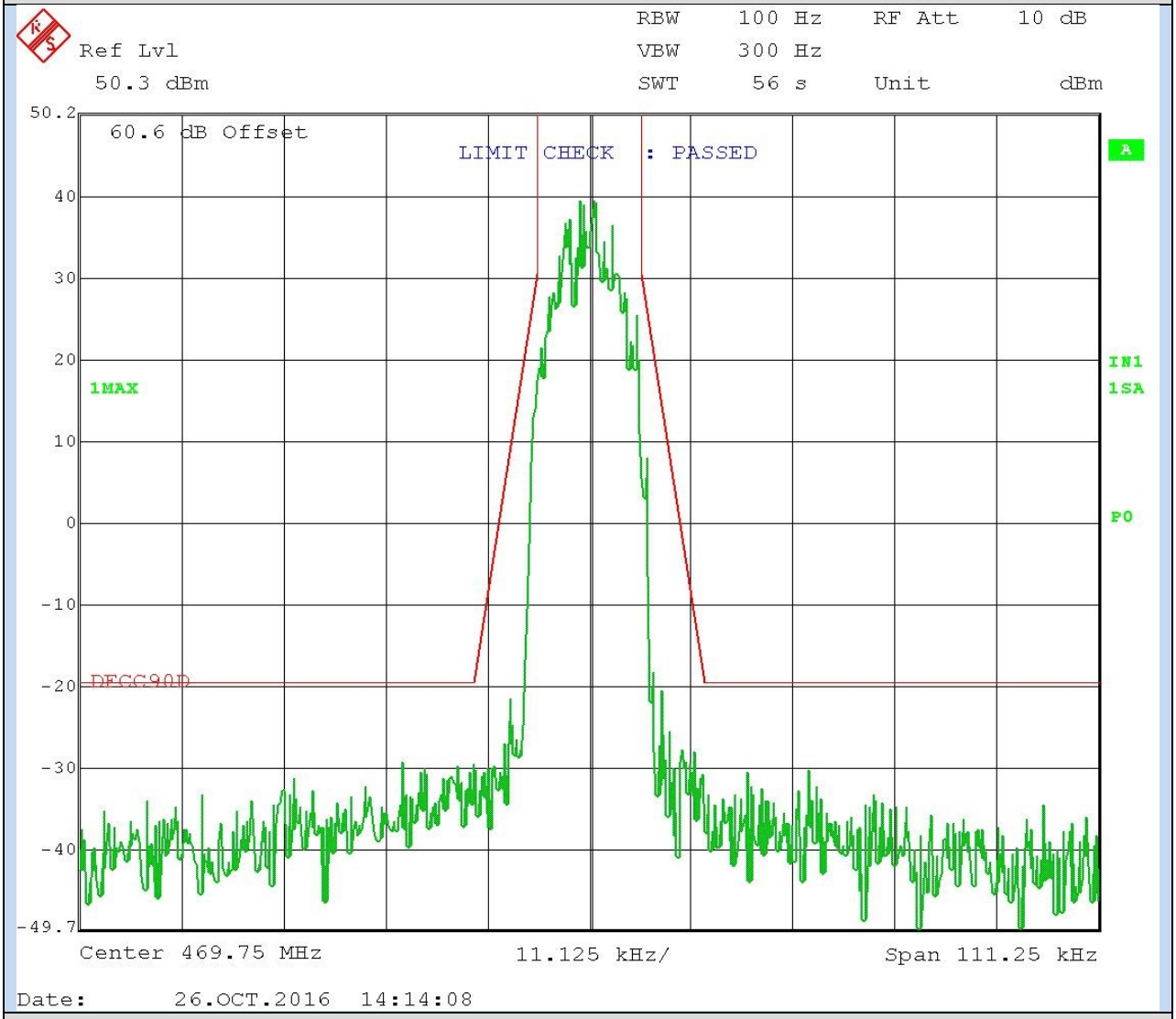


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz Mask D 9K80F7E High

Occupied Bandwidth Plot

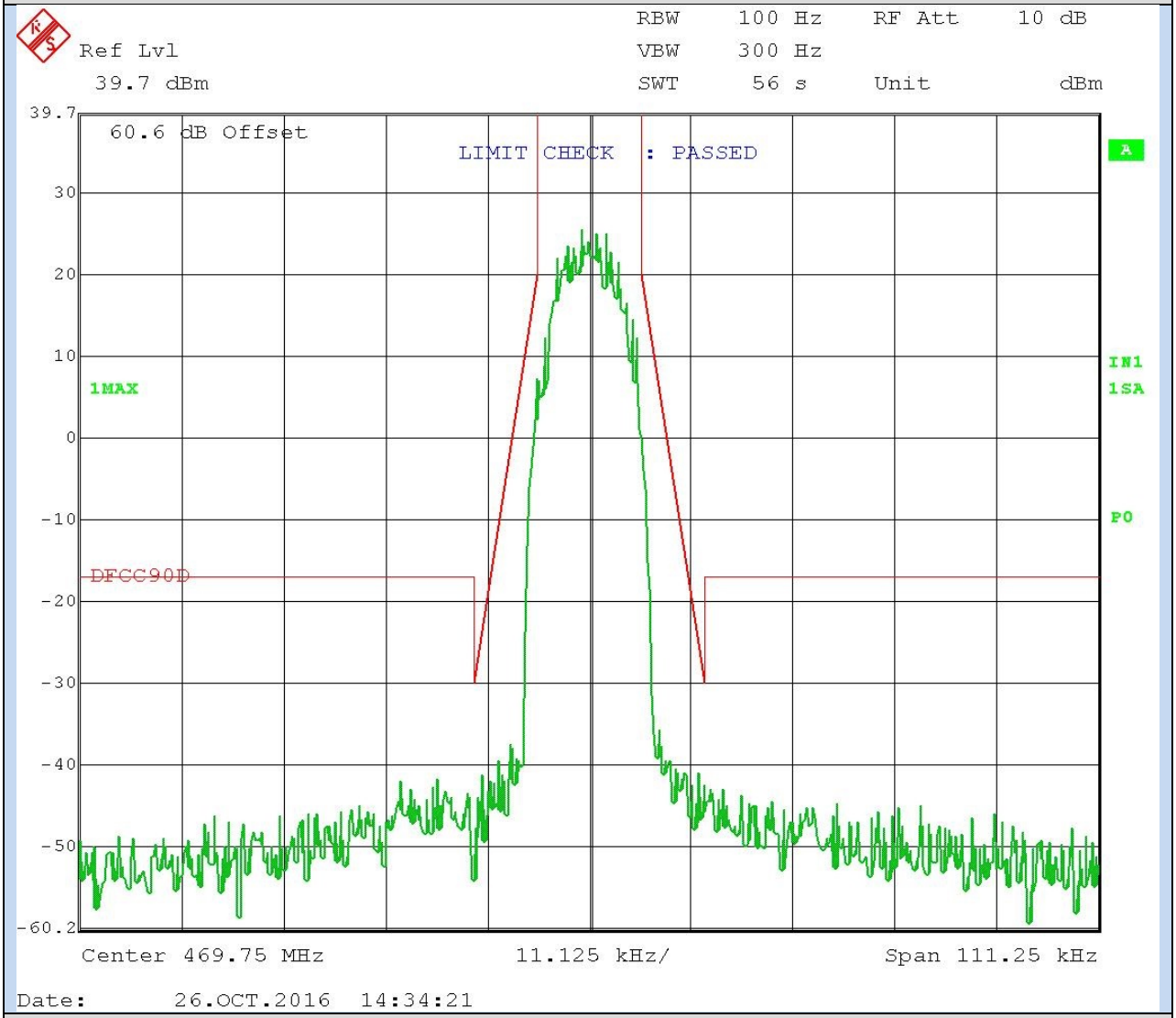


Result Meets The Requirement

OCCUPIED BANDWIDTH

Test Data: 469.75 MHz Mask D 9K80F7E Low

Occupied Bandwidth Plot



Result Meets The Requirement

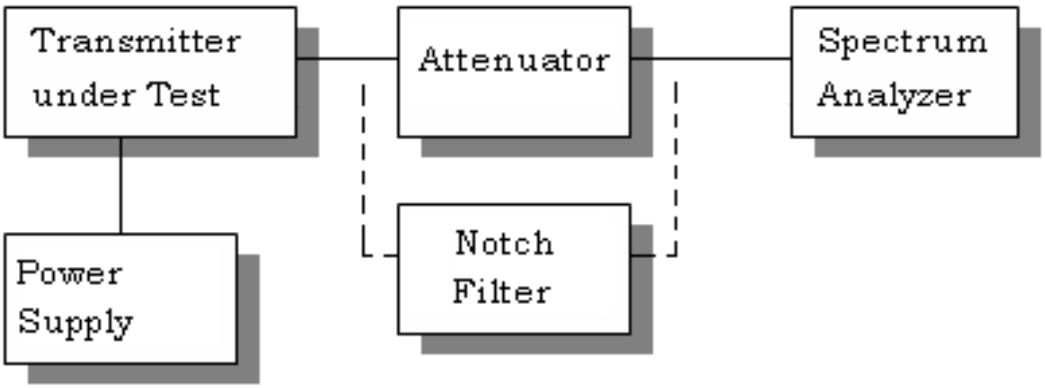
SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a), Part 90.210

Requirements: 12.5 kHz Channel Spacing = 50+10 log (P) = dBc

Method of Measurement: For Analog modulations the carrier was modulated using a 2.5 KHz tone at a level 16 dB above the level required for 50% modulation. For Digital modulations the carrier is modulated as specified by the manufacturer The spectrum was scanned from the lowest frequency generated to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard test procedures detailed in the standard list above.

Method of Measuring Conducted Spurious Emissions



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Note: All modes of modulation were tested; the Results shown are for the worst case modulation 11K0F3E

Test Data: 406.25 MHz 11K0F3E High

	dBm	Watts	dBc
Power Output	50.02	100.46	70
	Frequency (MHz)	Level (dBc)	Margin (dB)
	406.25	0	0.0
	812.50	91.5	21.4
	1218.75	75.3	5.3
	1625.00	89.3	19.3
*	2031.25	92.2	22.1
*	2437.50	92.6	22.6
*	2843.75	94.5	24.5
*	3250.00	94.7	24.7
*	3656.25	95.1	25.1
*	4062.50	94.8	24.8

Note: "*" Indicates the noise floor.

Test Data: 406.25 MHz 11K0F3E Low

	dBm	Watts	dBc
Power Output	37.34	5.42	57.34
	Frequency (MHz)	Level (dBc)	Margin (dB)
	406.25	0	0.0
*	812.50	84.9	27.6
*	1218.75	81.8	24.5
*	1625.00	80.8	23.5
*	2031.25	80.7	23.3
*	2437.50	82.2	24.9
*	2843.75	82.5	25.1
*	3250.00	82.0	24.7
*	3656.25	82.9	25.5
*	4062.50	82.4	25.1

Note: "*" Indicates the noise floor.

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: 450.25 MHz 11K0F3E High

	dBm	Watts	dBc
Power Output	50.07	101.62	70
	Frequency (MHz)	Level (dBc)	Margin (dB)
	450.25	0	0.0
	900.50	88.5	18.4
	1350.75	90.5	20.5
	1801.00	81.4	11.3
	2251.25	85.4	15.4
*	2701.50	94.3	24.2
*	3151.75	95.2	25.1
*	3602.00	95.0	24.9
*	4052.25	95.2	25.2
*	4502.50	94.7	24.7

Note: "*" Indicates the noise floor.

Test Data: 450.25 MHz 11K0F3E Low

	dBm	Watts	dBc
Power Output	37.33	5.41	57.33
	Frequency (MHz)	Level (dBc)	Margin (dB)
	450.2500	0	0.0
	900.5000	84.6	27.3
*	1350.7500	83.2	25.8
*	1801.0000	81.7	24.4
*	2251.2500	81.0	23.7
*	2701.5000	81.8	24.5
*	3151.7500	81.5	24.2
*	3602.0000	82.3	25.0
*	4052.2500	82.6	25.3
*	4502.5000	82.3	25.0

Note: "*" Indicates the noise floor.

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 511.75 MHz 11K0F3E High

	dBm	Watts	dBc
Power Output	50.17	103.99	70
	Frequency (MHz)	Level (dBc)	Margin (dB)
	511.75	0	0.0
	1023.50	82.2	12.1
	1535.25	83.3	13.1
	2047.00	87.5	17.3
*	2558.75	95.1	24.9
*	3070.50	93.9	23.8
*	3582.25	94.9	24.8
*	4094.00	95.4	25.3
*	4605.75	95.3	25.2
*	5117.50	89.3	19.1

Note: "*" Indicates the noise floor.

Test Data: 511.75 MHz 11K0F3E Low

	dBm	Watts	dBc
Power Output	37.67	5.85	57.67
	Frequency (MHz)	Level (dBc)	Margin (dB)
	511.75	0	0.0
	1023.50	77.3	19.7
*	1535.25	81.4	23.8
*	2047.00	79.8	22.1
*	2558.75	81.8	24.2
*	3070.50	83.0	25.3
*	3582.25	83.0	25.3
*	4094.00	83.0	25.3
*	4605.75	82.9	25.2
*	5117.50	83.1	25.4

Note: "*" Indicates the noise floor.

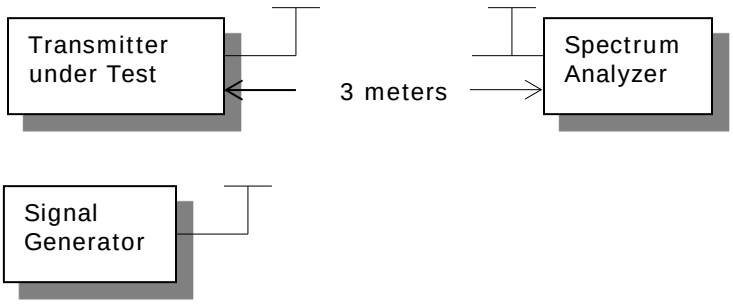
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

Requirements: 12.5kHz Channel Spacing = 50+10log (OP) = dBc

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted in accordance with test procedures detailed in the standard list 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.**

Test Setup Diagram:



Note: The following results are from the worst case modulation for all modes of operation and power levels

Test Data: 406.25 MHz 11K0F3E High

Tuned Freq (MHz)	Power Mode (HI/LO)	Power Output (dBm)	Power Output (Watts)	Requirement (dBc)	Bandwidth (kHz)
406.25	Hi	50.02	100.46	70	12.5

Emission Frequency (MHz)	Ant. Polarity (H/V)	Below Carrier (dBc)	Margin (dB)
812.50	H	77.73	7.73
1218.75	H	106.29	36.29
1625.00	V	81.27	11.27
2031.25	H	94.43	24.43
2437.50	H	89.12	19.12
2843.75	H	104.93	34.93
3250.00	V	102.11	32.11
3656.25	V	101.27	31.27
4062.50	V	104.06	34.06

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 90.213

Requirements: Temperature range requirements: -30 to +50º C.
Voltage Variation +, -15%
±2.5 PPM

Method of Measurements: Were in accordance with test procedures detailed in the standard list above.

Test Data: 469.75 MHz 11K0F3E

Temperature	Frequency MHz	Cycles	PPM
25°C (reference)	469750046		
-30°C	469750035	-11000000	-0.023
-20°C	469750046	0	0.000
-10°C	469750053	7000000	0.015
0°C	469750060	14000000	0.030
10°C	469750052	6000000	0.013
20°C	469750050	4000000	0.009
30°C	469750051	5000000	0.011
40°C	469750052	6000000	0.013
50°C	469750052	6000000	0.013
Battery Voltage	Frequency	Cycles	PPM
-15%	469750046	0	0.000
15%	469750046	0	0.000

TRANSIENT FREQUENCY BEHAVIOR

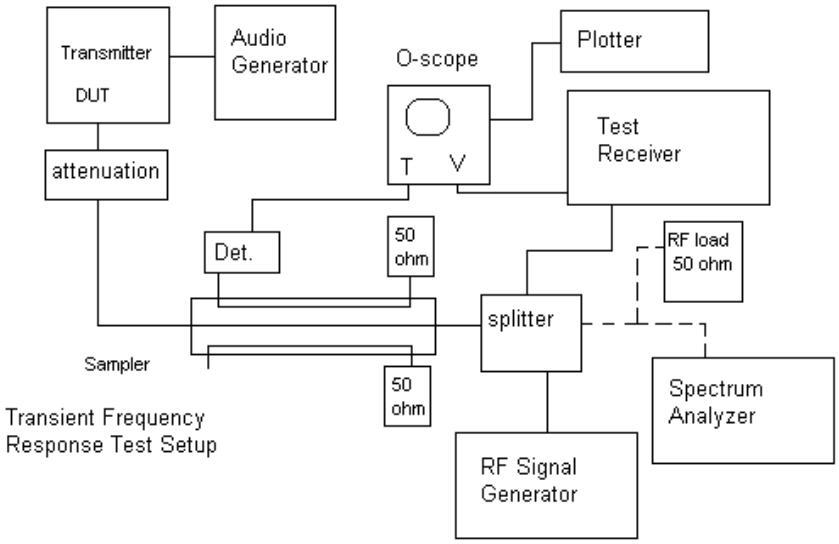
Part 90.214 Transient Frequency Behavior

REQUIREMENTS: Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time Intervals	Maximum frequency difference	All Equipment	
		150-174 MHz	421-512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t_1[4]	±25.0 kHz	5.0 ms	10.0 ms
t_2	±12.5 kHz	20.0 ms	25.0 ms
t_3[4]	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t_1[4]	±12.5 kHz	5.0 ms	10.0 ms
t_2	±6.25 kHz	20.0 ms	25.0 ms
t_3[4]	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t_1[4]	±6.25 kHz	5.0 ms	10.0 ms
t_2	±3.125 kHz	20.0 ms	25.0 ms
t_3[4]	±6.25 kHz	5.0 ms	10.0 ms

TEST PROCEEDURE: Was in accordance with test procedures detailed in the standard list above, the levels were set as follows:

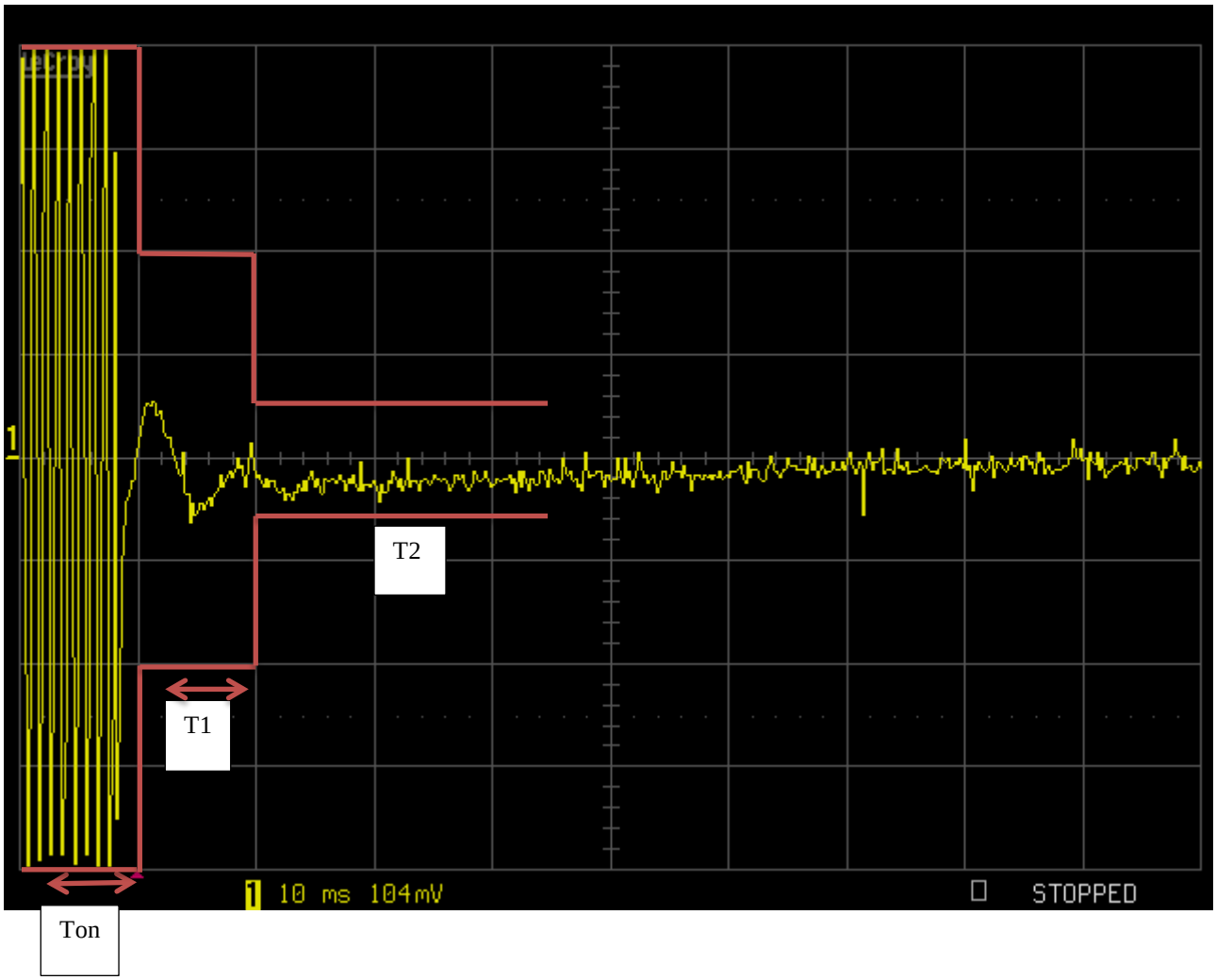
Setup Diagram:



Transient Frequency Response Test Setup

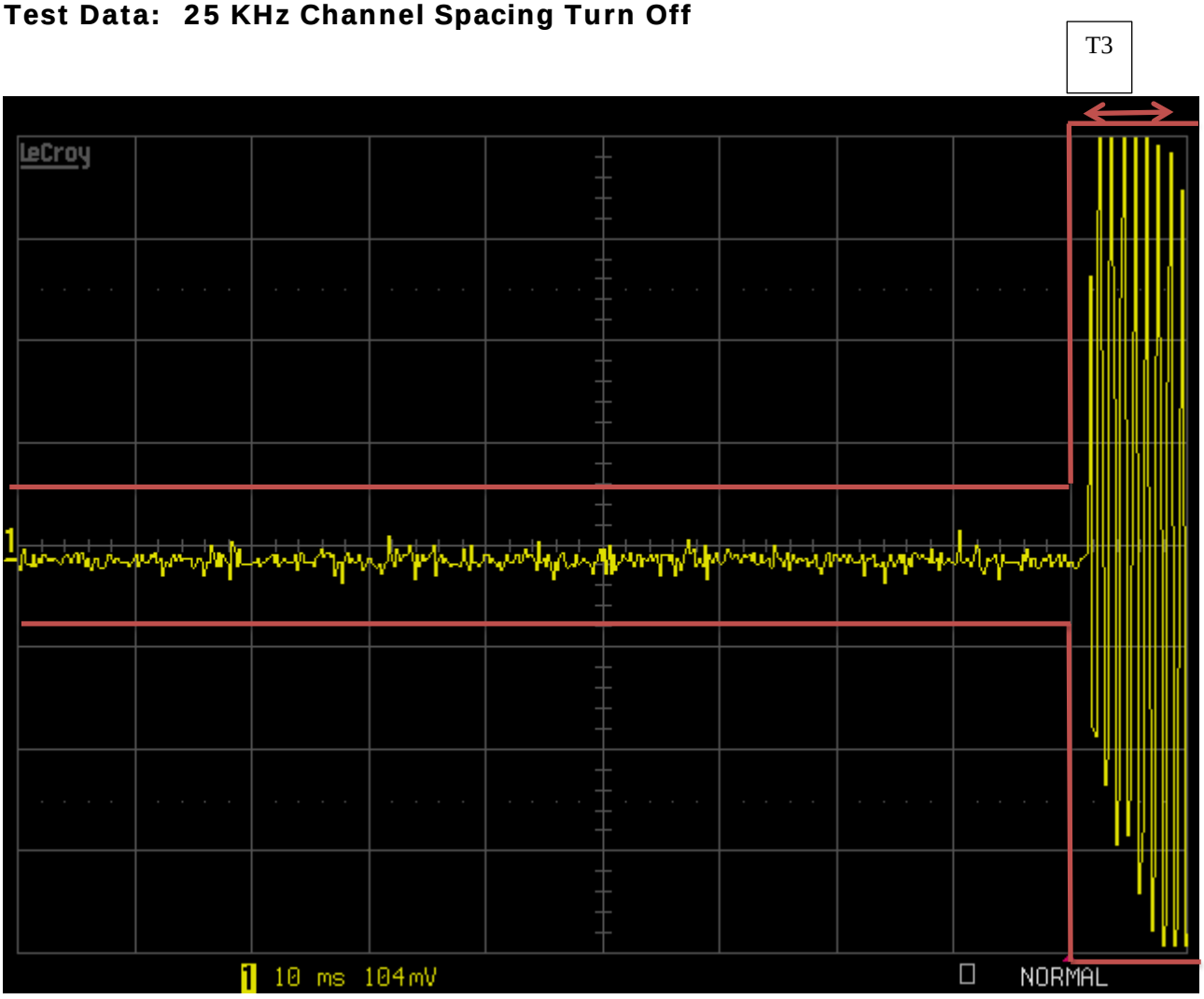
TRANSIENT FREQUENCY BEHAVIOR

Test Data: 25 KHz Channel Spacing Turn On

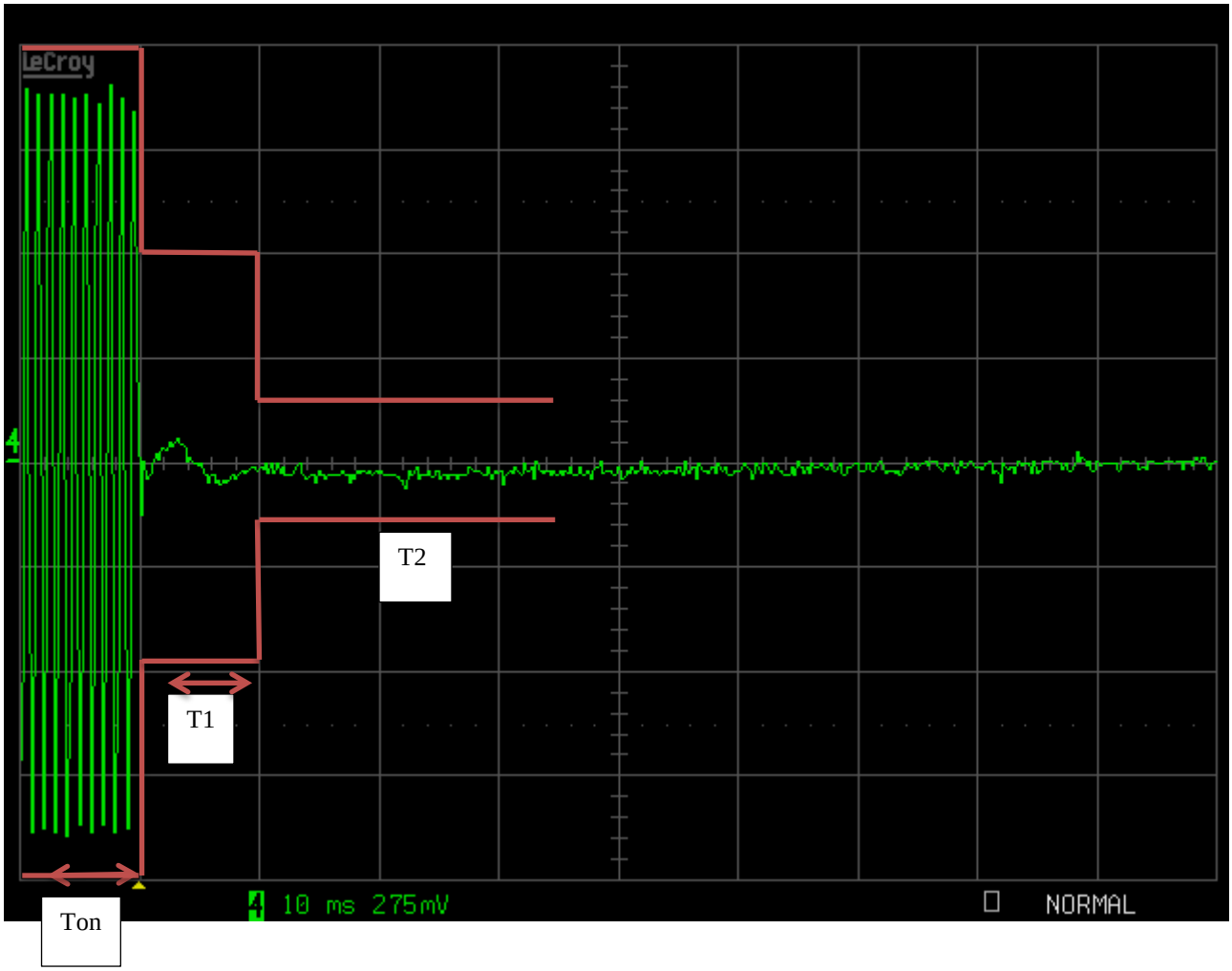


TRANSIENT FREQUENCY BEHAVIOR

Test Data: 25 KHz Channel Spacing Turn Off

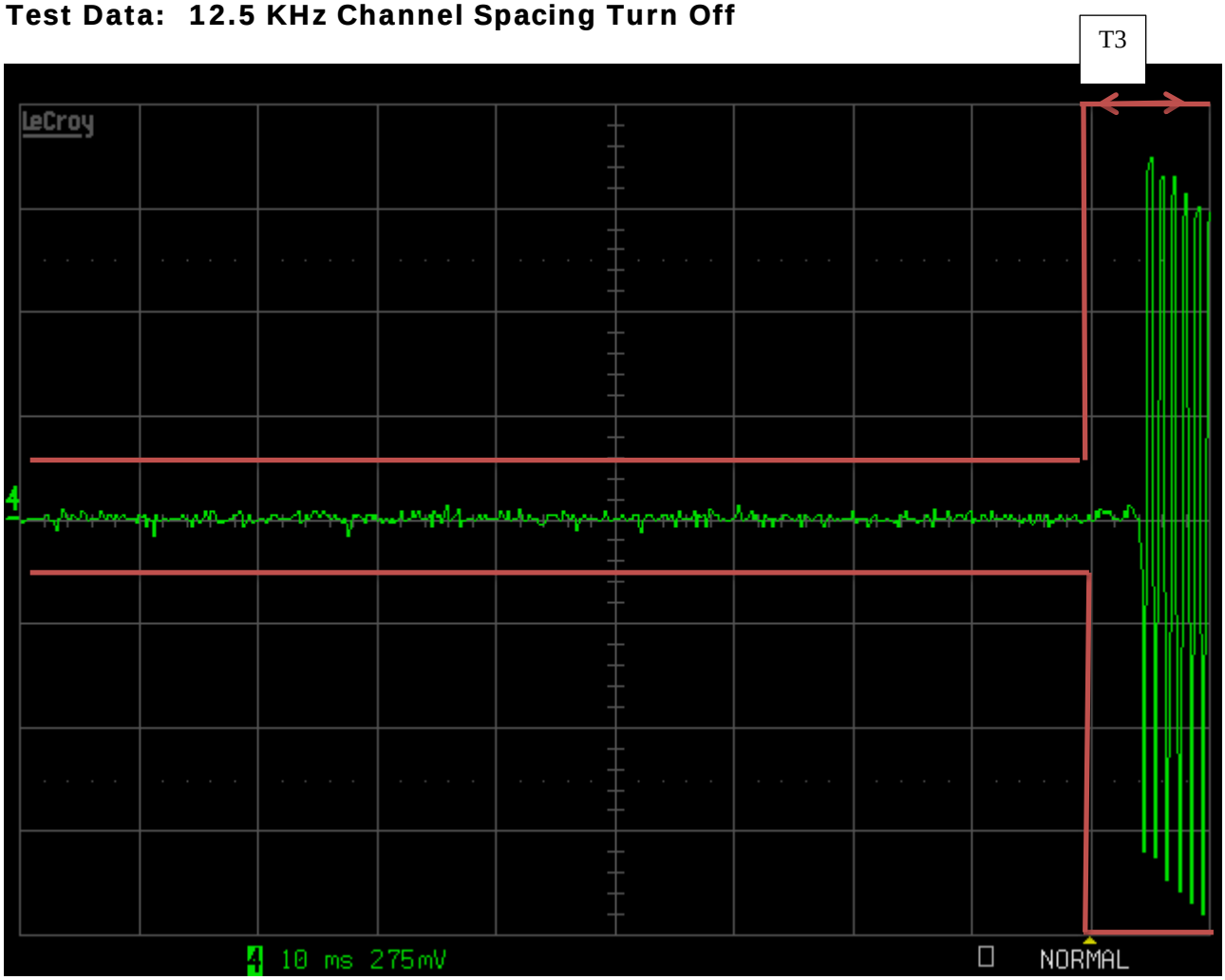


Test Data: 12.5 KHz Channel Spacing Turn On



TRANSIENT FREQUENCY BEHAVIOR

Test Data: 12.5 KHz Channel Spacing Turn Off



EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal Date	Due Date
Antenna: Biconical 1096 Chamber	Eaton	94455-1	1096	07/14/15	07/14/17
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/14/15	07/14/17
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	09/01/16	09/01/18
Digital Multimeter	Fluke	77	35053830	10/21/15	10/21/17
Bi-Directional Coupler	HP	778D	1144A01731	09/15/15	09/15/17
Frequency Counter Large Chamber	HP	5352B	2632A00165	07/01/15	07/01/17
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Sweep/Signal Generator	Anritsu	68369B	985112	10/28/15	10/28/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/16/16	08/16/18
Software: Field Strength Program	Timco	N/A	Version 4.0	NA	NA
Antenna: Active Loop	ETS-Lindgren	6502	00062529	11/18/15	11/18/17
Crystal Detector	Keysight	8470B	MY51340829	11/12/14	02/12/17
Hygro-Thermometer	Extech	445703	0602	06/30/15	06/30/17
RF Combiner	Edison Elect.	M530		05/18/15	05/18/17
Type K J Thermometer	Martel	303	080504494	10/26/15	10/26/17
Communications Service Monitor FM/AM 1200S	IFR	FM/AM 1200S	6593	07/01/15	07/01/17
Modulation Analyzer	HP	8901A	3050A05856	04/16/15	04/16/17
Audio Analyzer	HP	8903	3011A13084	1/23/16	1/23/18
Attenuator 30 dB 20W	Class III	34078	M3933/10-5	5/19/15	5/19/17
Attenuator 30dB 500W	Bird	8325	1761	05/18/15	05/18/17
Digital O-Scope	LeCroy	LT364L	00543	10/23/15	10/23/17
Coaxial Cable	Micro-Coax	UFB311A-0-0720-50U50U	225362-002 (#101)	7/18/16	7/18/18
Coaxial Cable	Micro-Coax	Chamber 3 cable set	KMKM-0244-01; KMKM-0670-00; KFKF-0198-01	08/08/16	08/08/18
Coaxial Cable	Micro-Coax	UFB311A-0-0720-50U50U	225362-001	7/14/16	7/14/18
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	NA	NA
Tunable Notch Filter	Eagle	TNF-200	250-850 MHz	06/26/15	06/26/17
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	01/04/16	01/04/18

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

MEASUREMENT UNCERTAINTY

State of the measurement uncertainty - 160419

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 Conducted Power	±1.4dB	(1)
RF Antenna Conducted Emissions	± 2.4 dB	(1)
Maximum Deviation	± 1.3%	(1)
Occupied Bandwidth	± 2.5%	(1)
Adjacent Channel Power	± 1.5dB	(1)
Frequency Stability	± 69.5 Hz	(1)
Transmitter power Radiated Substitution Method	±4.0 dB	(1)
Transmitter Transient Frequency Response	±2.0 dB	(1)

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

END OF REPORT