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FCC PART 87

TEST REPORT

APPLICANT	YAESU MUSEN CO., LTD.
	TENNOZU PARKSIDE BUILDING
	2-5-8 HIGASHI-SHINAGAWA,
	SHINAGAWA-KU, TOKYO 140-0002 JAPAN
FCC ID	K6650023X20
MODEL NUMBER	FTA-250
PRODUCT DESCRIPTION	AIR BAND HT RADIO
DATE SAMPLE RECEIVED	2/22/2017
DATE TESTED	2/27/2017
TESTED BY	Tim Royer
APPROVED BY	Sid Sanders
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
309AUT17TestReport	Rev1	Initial Issue	4/11/2017
309AUT17TestReport	Rev2	Updated EUT specifications	4/19/2017

Table of Contents

GENERAL REMARKS 3

GENERAL INFORMATION 4

EUT Specification 4

MODULATION CHARACTERISTICS 5

Type of Emission: 6K0A3E 5

DC Voltages & Current into Final Amplifier: 5

Test Data: Audio frequency response 6

VOICE MODULATED COMMUNICATION EQUIPMENT 7

Test data: Modulation Limiting 7

RF POWER OUTPUT 8

Test Data: Measurement Table 8

OCCUPIED BANDWIDTH 9

Test Data: Low End of Band 10

Test Data: Middle of Band 11

Test Data: High End of Band 12

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED) 13

Test Data: Low end of Band 13

Test Data: Middle of Band 14

Test Data: High end of Band 14

FIELD STRENGTH OF SPURIOUS EMISSIONS 15

Test Data: Low end of Band 15

Test Data: Middle of Band 16

Test Data: High end of Band 16

FREQUENCY STABILITY 17

Test Data: Measurement Table 17

EMC EQUIPMENT LIST 18

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: Tim Royer, Project Manager/Testing Engineer

Date: 3/1/2016

Reviewed and approved by: _____
Name and Title: Sid Sanders Engineer

Date: 3/6/2017

GENERAL INFORMATION

EUT Specification

EUT Description	VHF AIR BAND TRANSCEIVER
FCC ID	K6650023X20
Model Number	FTA-250
Operating Frequency	118 to 136.975 MHz
Test Frequencies	118.000, 127.500, 136.975
Emission Designator	6K0A3E
Type of Emission	AM voice = A3E
Modulation	Amplitude Modulated
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power 7.4V
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☐ Mobile
	☒ Portable
Test Conditions	The temperature was 26ºC with a relative humidity of 50%. Atmospheric Pressure: 30.01"
Revision History to the EUT	None
Test Exercise	The EUT was placed in continuous transmit mode.
Applicable Standards	***ANSI/TIA 603-D:2010,*** FCC CFR 47 Part 87
Test Facility	**Timco Engineering Inc.** **849 NW State Road 45** **Newberry, FL 32669 USA**.

MODULATION CHARACTERISTICS

Part 2.1033(c) (4)

Type of Emission: 6K0A3E

Bn = 2M
M = 3000
Bn = 2(3000) = 6k

The authorized bandwidth is 25 kHz.

Part 2.1033(c) (8)

DC Voltages & Current into Final Amplifier:

POWER INPUT:

FINAL AMPLIFIER ONLY
INPUT POWER – HIGH: (7.4 Vdc) (1.047A) = 7.75 Watts

MODULATION CHARACTERISTICS

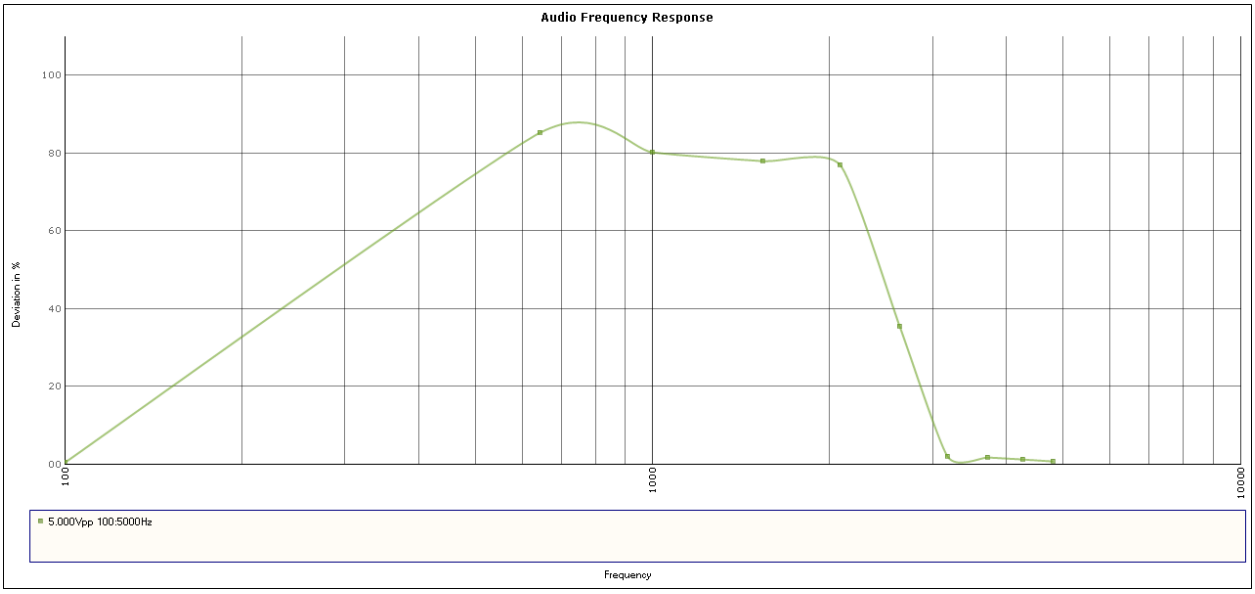
Rule Part No.: Part 2.1047(a) (b)

Test Requirements:

Method of Measurement:

Test Data: **Audio frequency response**

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with the exception that for an AM modulated transmitter the input was varied for a constant modulation of 20%. 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.



VOICE MODULATED COMMUNICATION EQUIPMENT

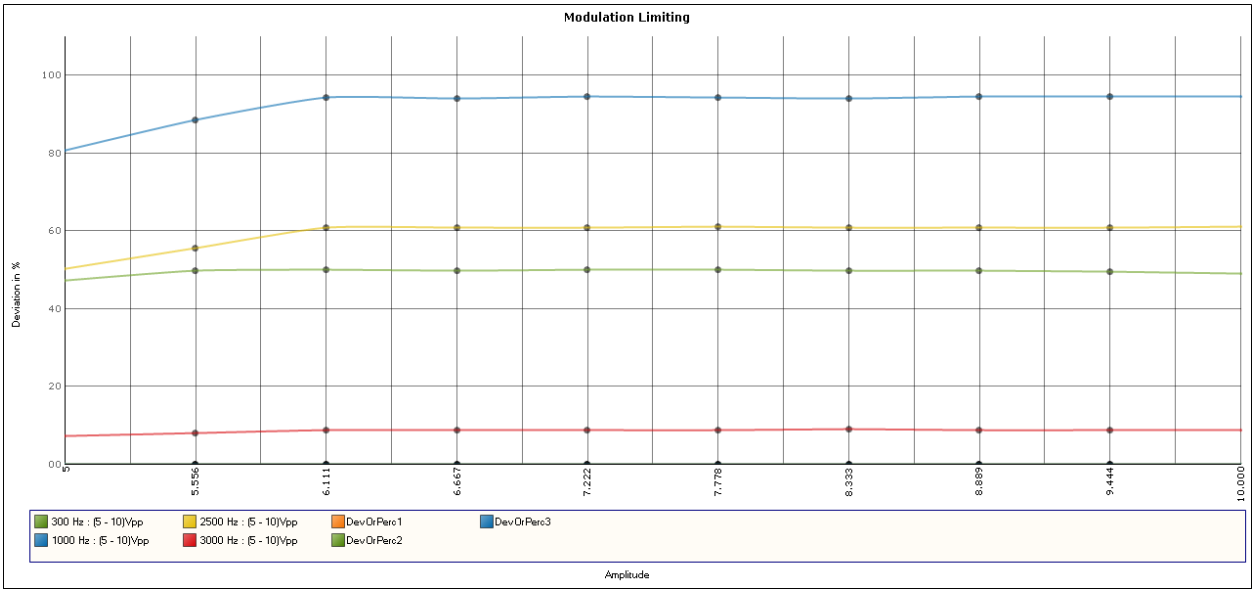
AUDIO INPUT VERSUS MODULATION

Rule Part No.: Part 2.1047(b) & 87.141

Test Requirements:

Method of Measurement: Modulation cannot exceed 100%, The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

Test data: **Modulation Limiting**



RF POWER OUTPUT

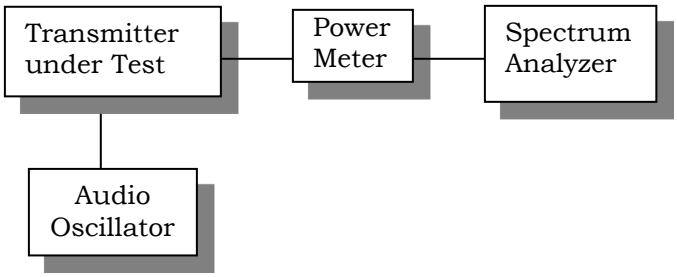
Rule Part No.: Part 2.1046(a), Part 87.131

Test Requirements:

Method of Measurement: RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage and the transmitter properly adjusted the RF output measures:

For the Device has a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used. With a nominal battery voltage and the transmitter properly adjusted the RF output measures:

Test Setup Diagram:



Test Data: Measurement Table

f MHz	Power dBm	Power W
118.000	31.43	1.39
127.500	32.07	1.61
136.975	32.36	1.72

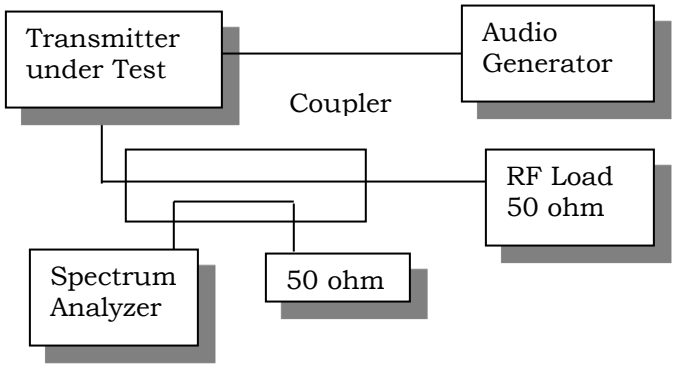
OCCUPIED BANDWIDTH

Rule Part No.: Part 2.1049, Part 87.139(d), RSS-141

Test Requirements: Data in the plots show that on any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth: At least 43 + 10log (P) dB.

Method of Measurement:

Test Setup Diagram:

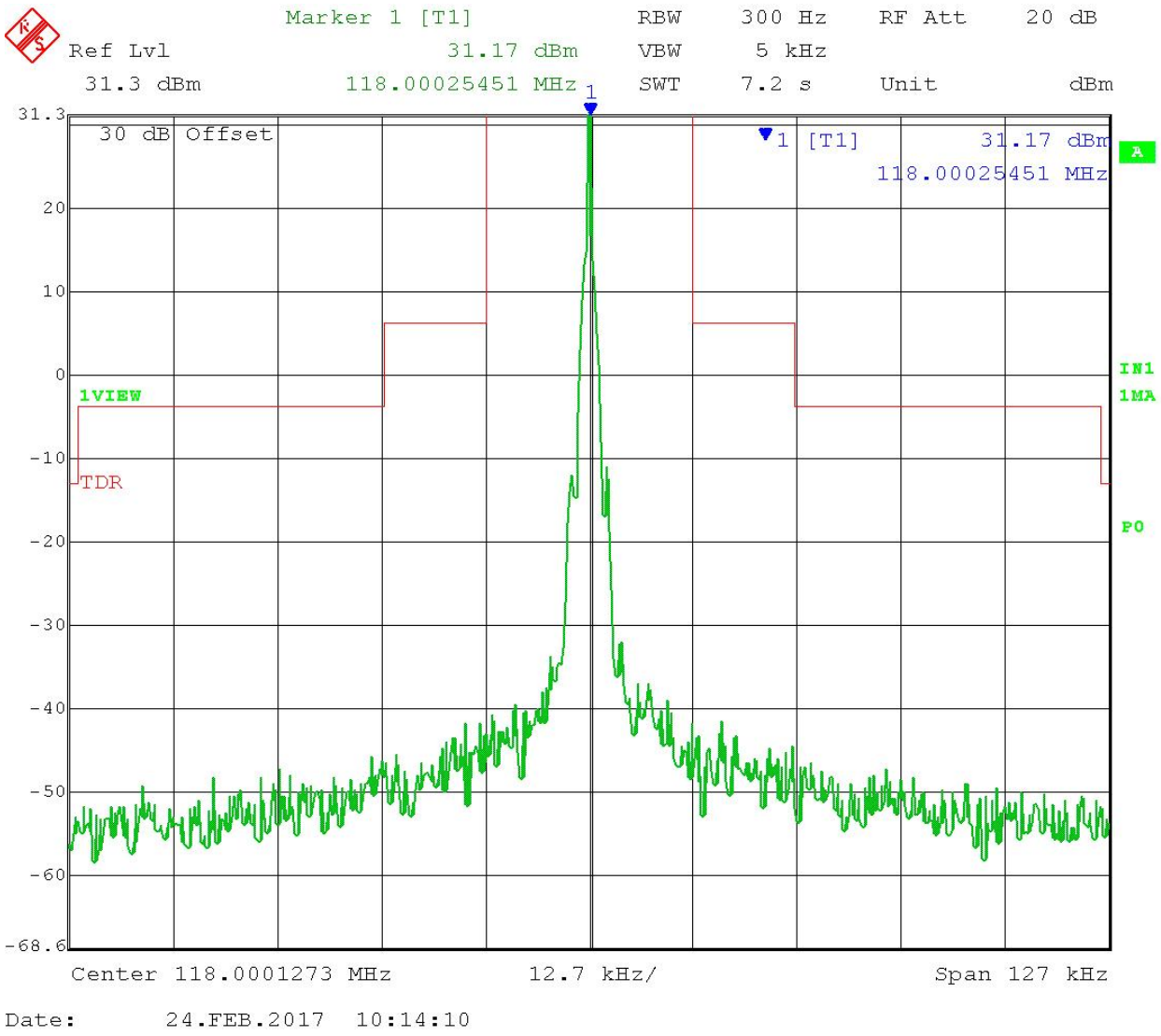


Test Data: See the plots below

The authorized BW is 25 kHz.

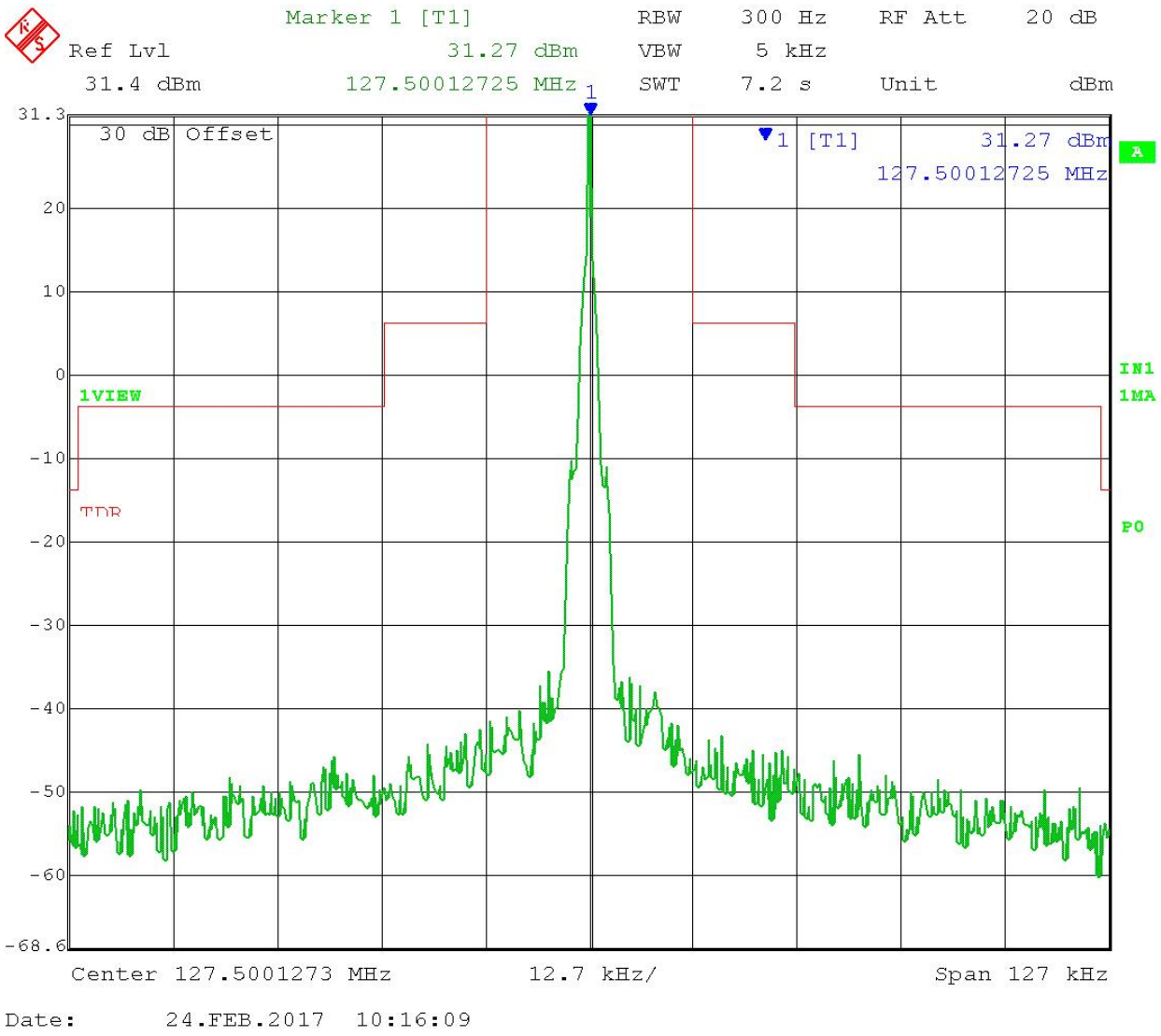
OCCUPIED BANDWIDTH

Test Data: **Low End of Band**



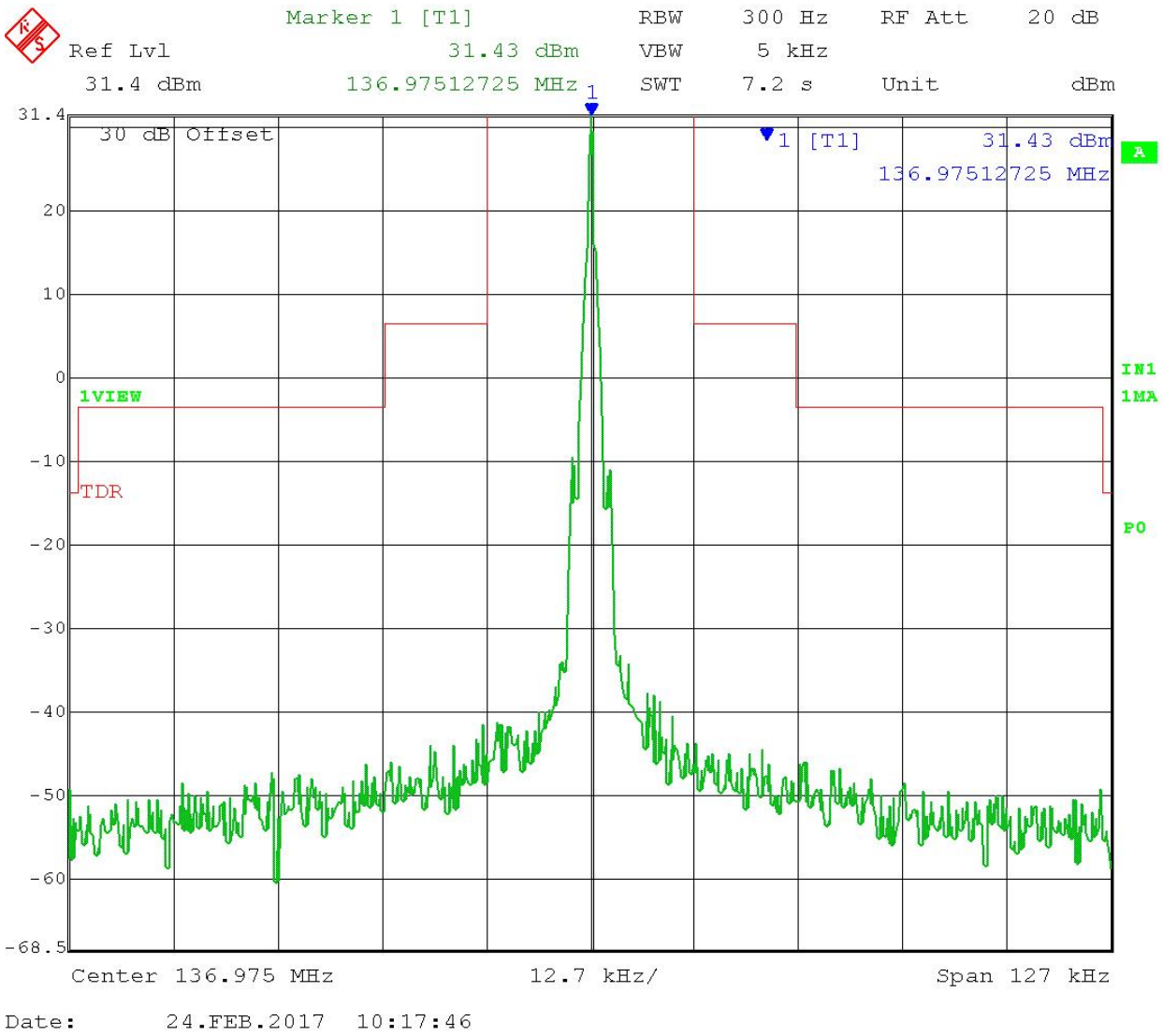
OCCUPIED BANDWIDTH

Test Data: **Middle of Band**



OCCUPIED BANDWIDTH

Test Data: **High End of Band**



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a), 87.139(d)

Requirements: **43+10log (pY) = 55 dB**

Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.3 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

Test Data: **Low end of Band**

	dBm	Watts	Limit dBc
Mean Power Output	31.43	1.39	44.43
	Frequency MHz	Level dBc	Margin dB
	118.00	31	0.0
	236.00	71.0	19.6
	354.00	87.0	35.6
	472.00	94.6	43.2
	590.00	96.0	44.6
	708.00	92.3	40.9
*	826.00	68.8	17.4
*	944.00	97.7	46.3
*	1062.00	94.7	43.3
*	1180.00	94.4	43.0

(*) denotes ambient measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: **Middle of Band**

	dBm	Watts	Limit dBc
Mean Power Output	32.07	1.61	45.07
	Frequency MHz	Level dBc	Margin dB
	127.50	32	0.0
	255.00	74.2	22.2
	382.50	85.0	32.9
	510.00	92.1	40.1
	637.50	90.1	38.1
	765.00	91.1	39.0
*	892.50	95.2	43.1
*	1020.00	90.0	37.9
*	1147.50	90.8	38.7
*	1275.00	92.6	40.5

(*) denotes ambient measurement

Test Data: **High end of Band**

	dBm	Watts	Limit dBc
Mean Power Output	32.36	1.72	45.36
	Frequency MHz	Level dBc	Margin dB
	136.98	32	0.0
	273.95	82.0	29.6
	410.93	85.7	33.4
	547.90	94.0	41.6
	684.88	82.5	30.1
	821.85	83.6	31.2
	958.83	98.1	45.7
*	1095.80	100.3	47.9
*	1232.78	101.5	49.1
*	1369.75	101.6	49.2

(*) denotes ambient measurement

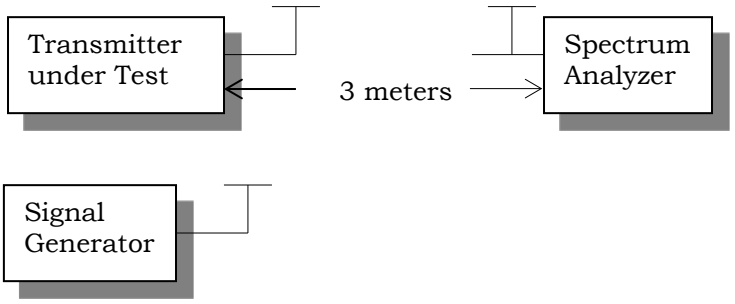
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

Test Requirements: The FCC limits for radiated emissions are the same as previously stated for the conducted emissions.

Method of Measurements: The spectrum was scanned from 9 KHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method.

Test Setup Diagram:



Test Data: **Low end of Band**

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
118.00	Hi	31.43	1.39	44.43	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
236.00	V	95.50	51.07
354.00	V	96.47	52.04
472.00	H	110.08	65.65
590.00	V	109.26	64.83
708.00	H	113.34	68.91
826.00	H	113.41	68.98
944.00	H	102.61	58.18
1,062.00	V	93.05	48.62
1,180.00	H	92.02	47.59

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: Middle of Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
127.50	Hi	32.07	1.61	45.07	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
255.00	V	101.07	56.00
382.50	V	97.56	52.49
510.00	V	103.91	58.84
637.50	H	115.76	70.69
765.00	H	110.09	65.02
892.50	V	104.72	59.65
1,020.00	V	92.90	47.83
1,147.50	H	92.14	47.07
1,275.00	H	91.49	46.42

Test Data: High end of Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
136.97	Hi	32.36	1.72	45.36	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
273.95	H	95.71	50.35
410.93	V	101.90	56.54
547.90	V	102.79	57.43
684.88	V	108.33	62.97
821.85	V	114.19	68.83
958.83	V	103.76	58.40
1,095.80	V	94.44	49.08
1,232.78	H	91.99	46.63
1,369.75	V	92.65	47.29

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 87.133

Requirements: Temperature range requirements: -30 to +50º C.
Voltage Variation +, -15% ±20 PPM

Method of Measurements: TIA/EIA Specification 603

Test Data: **Measurement Table**

Temperature	Frequency MHz	Cycles	PPM
25°C (reference)	136975031		
-30°C	136975180	149000000	1.088
-20°C	136975047	16000000	0.117
-10°C	136974963	-68000000	-0.496
0°C	136974983	-48000000	-0.350
10°C	136974999	-32000000	-0.234
20°C	136975020	-11000000	-0.080
30°C	136975022	-9000000	-0.066
40°C	136975050	19000000	0.139
50°C	136975122	91000000	0.664

Battery Voltage	Frequency	Cycles	PPM
-15%	136975032	1000000	0.007
15%	136975033	2000000	0.015

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Coaxial Cable - BMBM-0065-01 Black DC-2G	Belden		BMBM-0065-01	07/18/16	07/18/18
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
Attenuator N 6dB 20W DC-11G (6 dB, +/-0.3dB to 4GHz)	Narda	768-6	8802	05/22/15	05/22/17
LISN (Secondary)	Electro-Metrics	EM-7820	2682	05/08/15	05/08/17
DC Power Supply	HP	6264B	2032A04119	12/12/99	12/12/99
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
DC Power Supply	HP	6286A	2411A09414	12/12/99	12/12/99
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	12/12/99	12/12/99
Antenna: Active Loop	ETS-Lindgren	6502	00062529	11/18/15	11/18/17
RF Power Meter	Boonton	4531	11793	01/12/17	01/12/19
Hygro-Thermometer	Extech	445703	0602	06/30/15	06/30/17
Type K J Thermometer	Martel	303	080504494	10/26/15	10/26/17
Modulation Analyzer	HP	8901A	3050A05856	04/16/15	04/16/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Attenuator N 30dB 500W DC-2.5G	Bird	8325	1761	05/18/15	05/18/17
Coaxial Cable - BMBM-0130-00 Black	Alpha Wire		BMBM-0130-00	05/24/16	05/24/18
Function Generator	Standford	DS340	25200	02/02/16	02/02/18
Tunable Notch Filter 100-350 MHz	Eagle	220BFBF	100-350 MHz (#43)	07/01/15	07/01/17
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	12/12/99	12/12/99

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3