TIMCO ENGINEERING, Inc.
www.timcoengr.com

849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
HTTP://WWW.TIMCOENGR.COM

FCC

VHF MOBILE PART 90

TEST REPORT

APPLICANT	**STANDARD COMMUNICATIONS PTY.LTD.**
	P.O. BOX 96 WINSTON HILLS, NSW, AUSTRALIA 2153
FCC ID	TXJCM1039V
MODEL NUMBER	CM1039
PRODUCT DESCRIPTION	VHF MOBILE RADIO
STANDARD APPLIED	CFR 47 Part 90
DATE SAMPLE RECEIVED	10/10/2014
DATE TESTED	11/24/2014
REPORT ISSUE DATE	11/25/2014
TESTED BY	Cory Leverett
APPROVED BY	Sid Sanders
TIMCO REPORT NO.	1836AUT14TestReport.docx
TEST RESULTS	☒ PASS ☐ FAIL

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GENERAL REMARKS

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Summary

The device under test does:

☒ fulfill the general approval requirements as identified in this test report
☐ 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: 2005 requirements.

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

Authorized Signatory Name:

Cory Leverett
Engineering Project Manager

Date: 11/25/2014

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GENERAL INFORMATION

EUT Specification

EUT Description	VHF MOBILE RADIO
FCC ID	TXJCM1039V
Model Number	CM1039V
Operating Frequency	150-174MHz
Test Frequencies	150.8, 156.240, 162.05, 173.2MHz
Type of Emission	11K2F3E, 7K60F1D, 7K60F1E, 7K60F3E 7K60F1W, 7K60FXE, 7K60FXD
Modulation	FM, P25
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%.
Revision History to the EUT	None
Test Exercise	The EUT was placed in continuous transmit mode.
Applicable Standards	ANSI/TIA 603-C:2004, FCC CFR 47 Part 90
Test Facility	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.

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TEST PROCEDURE

Power Line Conducted Interference: The procedure used was ANSI/TIA 603-D:2010, using a 50uH LISN. Both lines were observed with the EUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Radiation Interference: The test procedure used was ANSI/TIA 603-D:2010, using an Rohde & Schwarz – EMI test receiver. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

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RF POWER OUTPUT

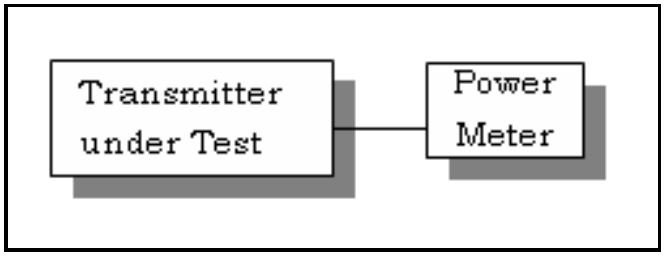
Rule Part No.: Part 2.1046(a), Part 90

Test Requirements: Manufacturer's Specification

Method of Measurement: RF power is measured by using a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures:

For the device with a fixed or integral antenna, the RF power is measured as ERP. The substitution method was used. The RF output measures:

Test Setup Diagram:



Test Data: RF power of the EUT can be set at 5W to 25W.

OUTPUT POWER:

Tuned Frequency (MHz)	dBm	Watts	dBm	Watts
150.8	43.53	22.54	30.8	1.2
157.2	43.51	22.38	30.7	1.17
161.8	43.68	23.33	30.5	1.1
162.05	43.68	23.33	30.5	1.1
173.9	44.1	25.7	30.4	1.1

Part 2.1033 (C)(8) DC Input into the final amplifier

INPUT POWER High Power : (13.8V)(6A) =82.8 Watts

INPUT POWER Low Power : (13.8V)(0.032A) =4.3 Watts

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MODULATION CHARACTERISTICS

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

Test Requirements:

Method of Measurement:
Part 2.1033(c)
Part 90.209
Part 90.207

Part 2.1033(c) (4) Type of Emission: 11K0F3E
Bn = 2M + 2DK
M = 3000
D = 2500
K=1
Bn = 2(3000)+2(2500) = 11.0k

Part 2.1033(c) (4) Type of Emission: 7K60F1D, 7K60F1E, 7K60F1W, 7K60FXE, 7K60FXD
Digital functions comply with DMR (Digital Mobile Radio).

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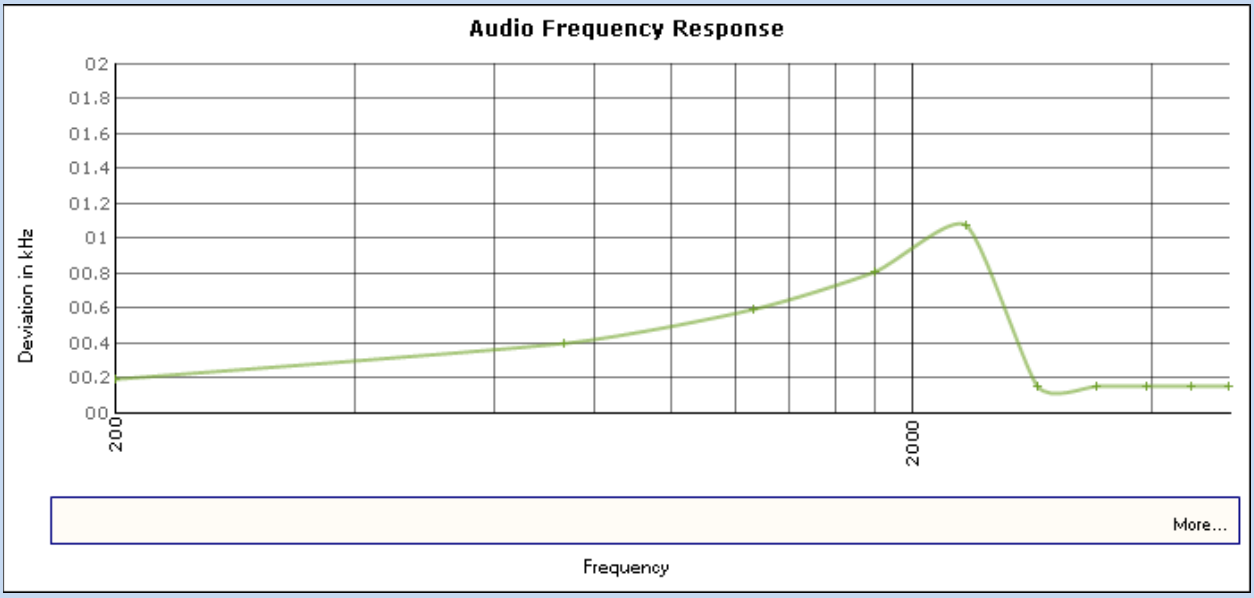
MODULATION CHARACTERISTICS

Audio frequency response

The audio frequency response was measured in accordance with ANSI/TIA 603-D: 2010. 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.

Audio Frequency Response Plot



Result Meets The Requirement

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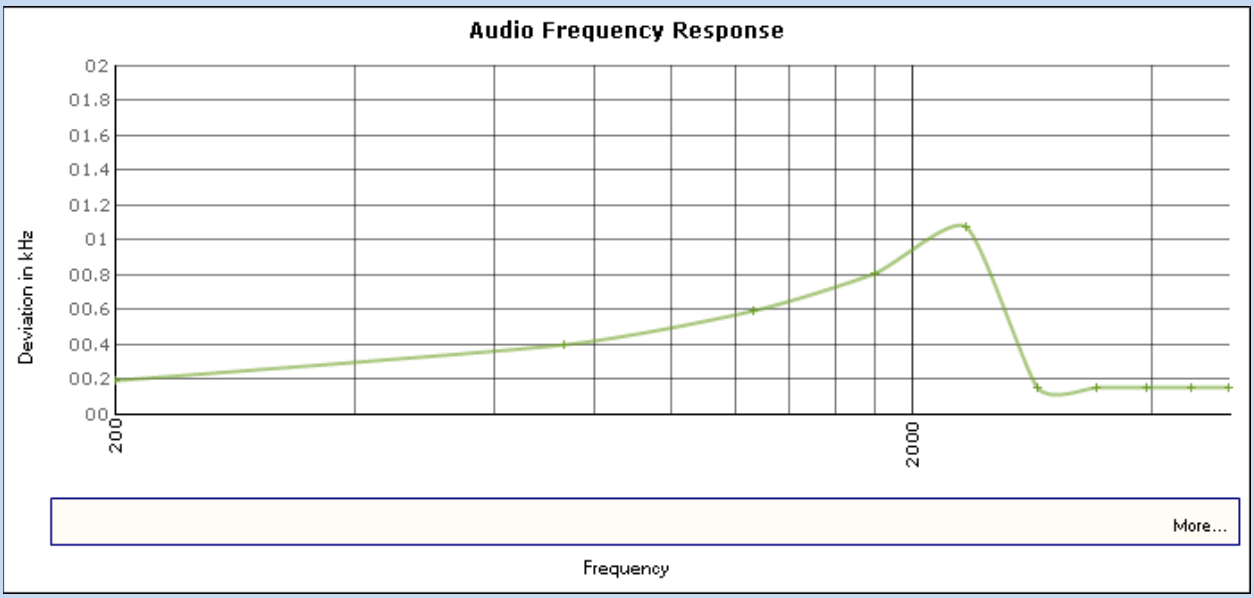
MODULATION CHARACTERISTICS

VOICE MODULATED COMMUNICATION EQUIPMENT

Part 2.1047(a): For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Audio Low Pass Filter Plot

Result Meets The Requirement

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AUDIO INPUT VERSUS MODULATION

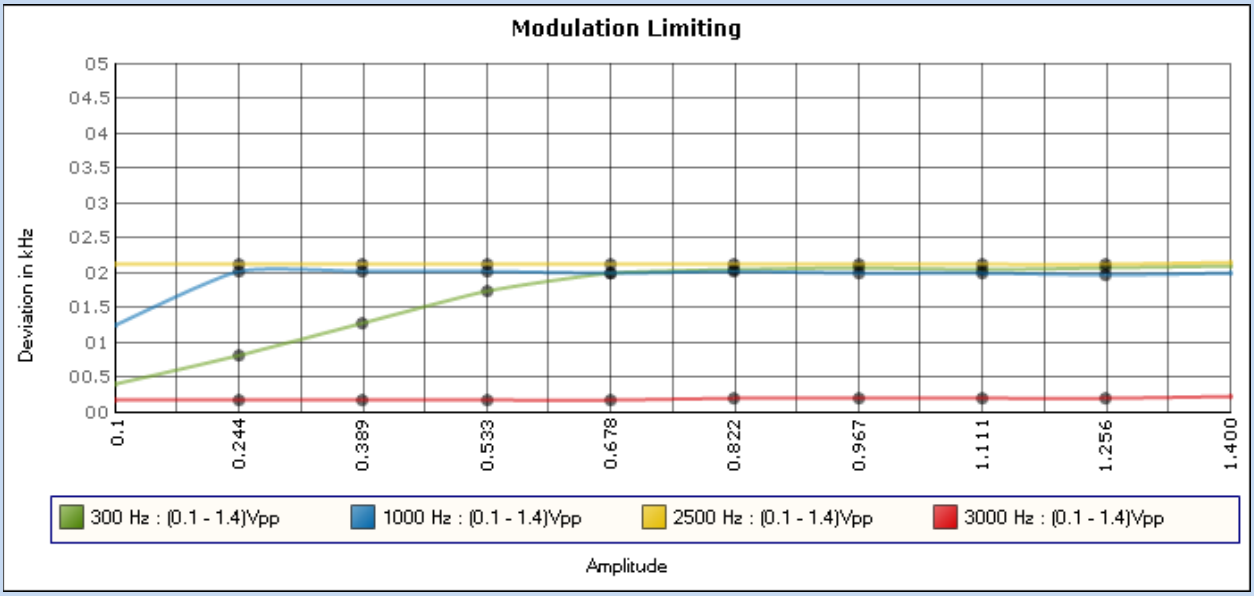
Rule Part No.: Part 2.1047(b) & 90

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 ANSI/TIA 603-D: 2010. 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 Plot



Result Meets The Requirement

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OCCUPIED BANDWIDTH

Part 2.1049(c) EMISSION BANDWIDTH:
Part 90.210(b) 25kHz Channel Spacing

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least 43 + 10log(P)dB.

Part 90.210(c) 25 kHz Channel Spacing Not Equipped with a Low Pass Filter

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz but not more than10 kHz: At least 83 log (fd/5) dB; (2) ON any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least 29 log(fd2/11)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% of the authorized bandwidth: At least 43+10 log(Po)dB.

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.

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OCCUPIED BANDWIDTH

Part 90.210(e) Emission Mask E – 6.25 kHz channel BW equipment.
For transmitters designed to operate with a 6.25 kHz bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

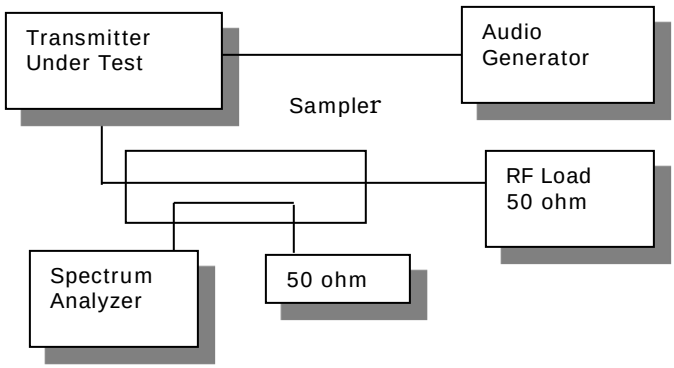
(1) On any frequency from the center of the authorized bandwidth f0 to 3.0 kHz removed from f0: Zero dB.

(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least 30 + 16.67(fd – 3.0 kHz) or 55 + 10 Log(P) or 65, whichever us the lesser attenuation.

(3) On any frequency removed from the center of the authorized bandwidth by more than 4.6kHz: At least 55 + 10log(P) dB or 65 dB, whichever is the lesser attenuation.

Method of Measurement: ANSI/TIA 603-D: 2010

Test Setup Diagram:



Test Data: See the plots below

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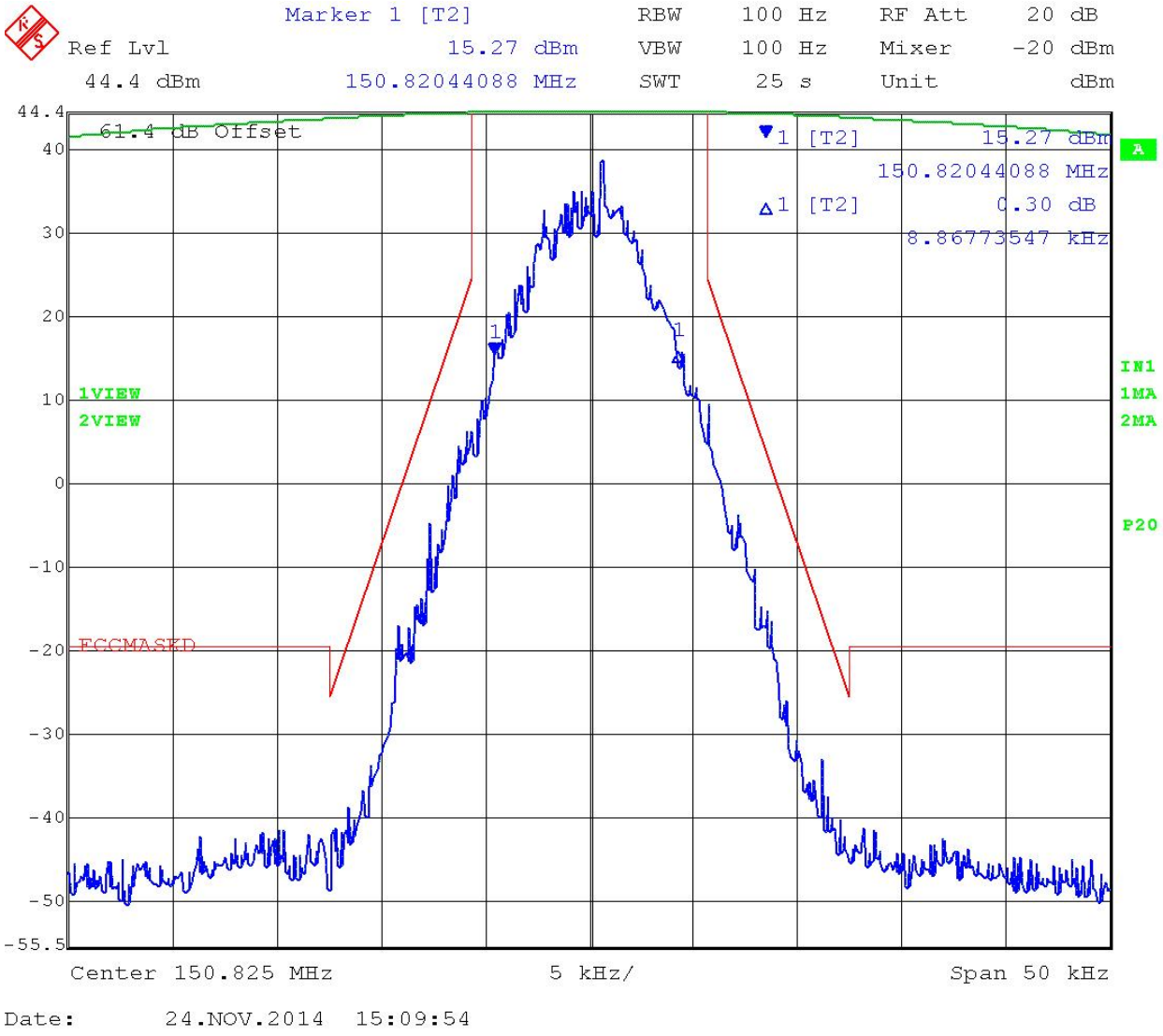
OCCUPIED BANDWIDTH

Test Data: Mask D Low end of Band P25 Conventional

NECESSARYBANDWIDTH : 7.60 KHz



RESULTS: MEETS REQUIREMENTS.

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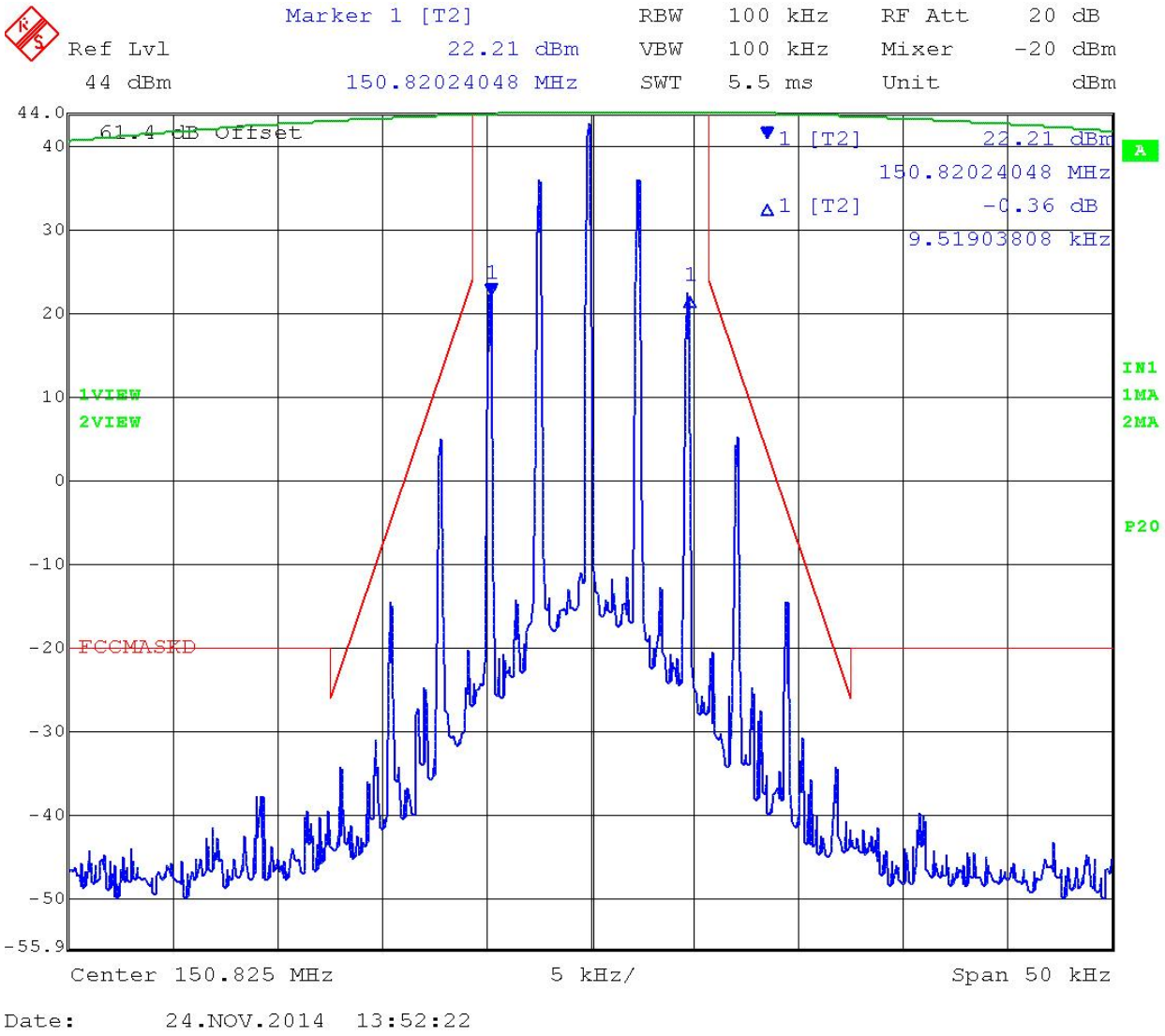
OCCUPIED BANDWIDTH

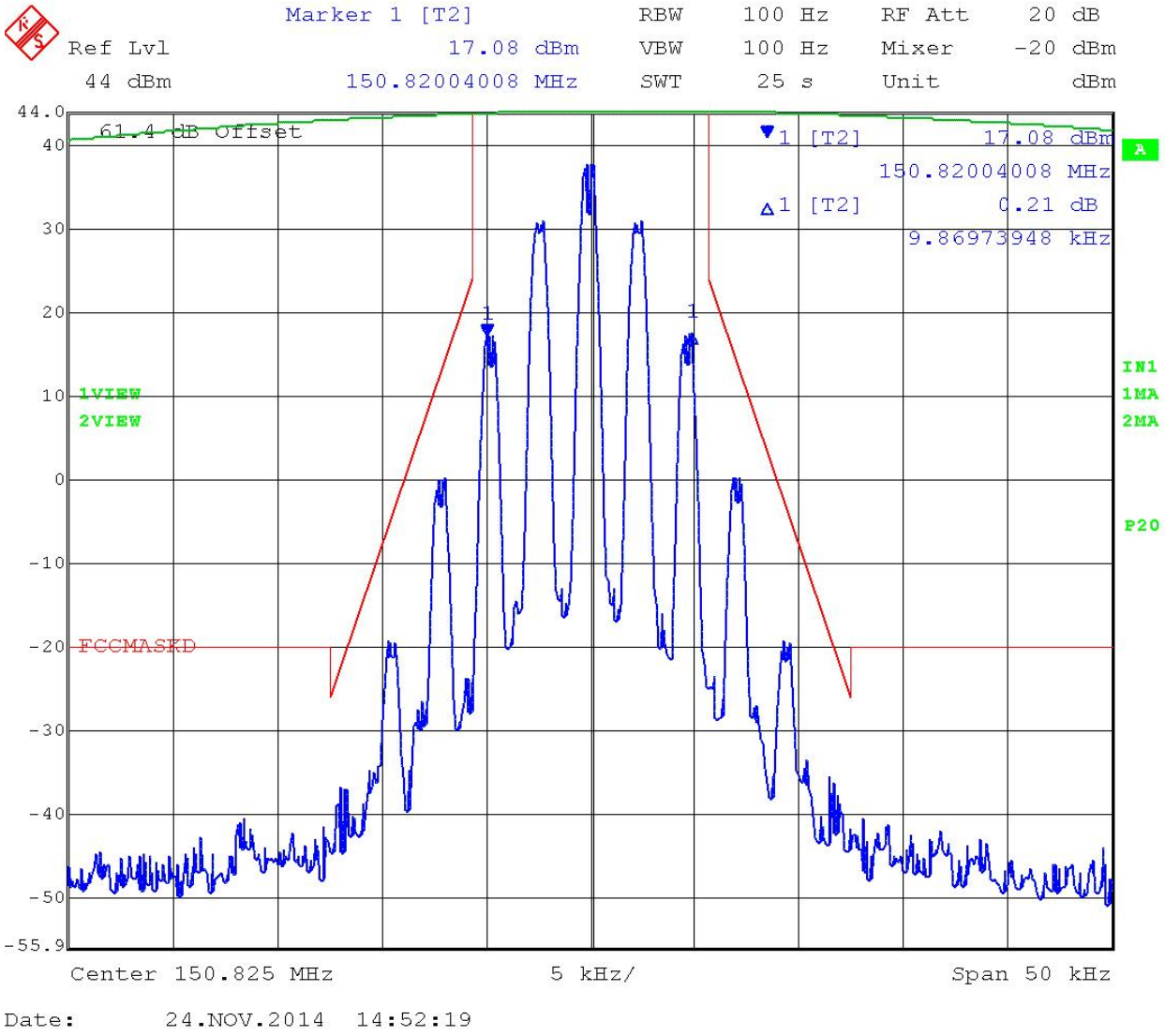
Test Data: Mask D Low end of Band ANALOG no CTCSS



RESULTS: MEETS REQUIREMENTS.

OCCUPIED BANDWIDTH

Test Data:Mask D Low end of Band ANALOG with CTCSS

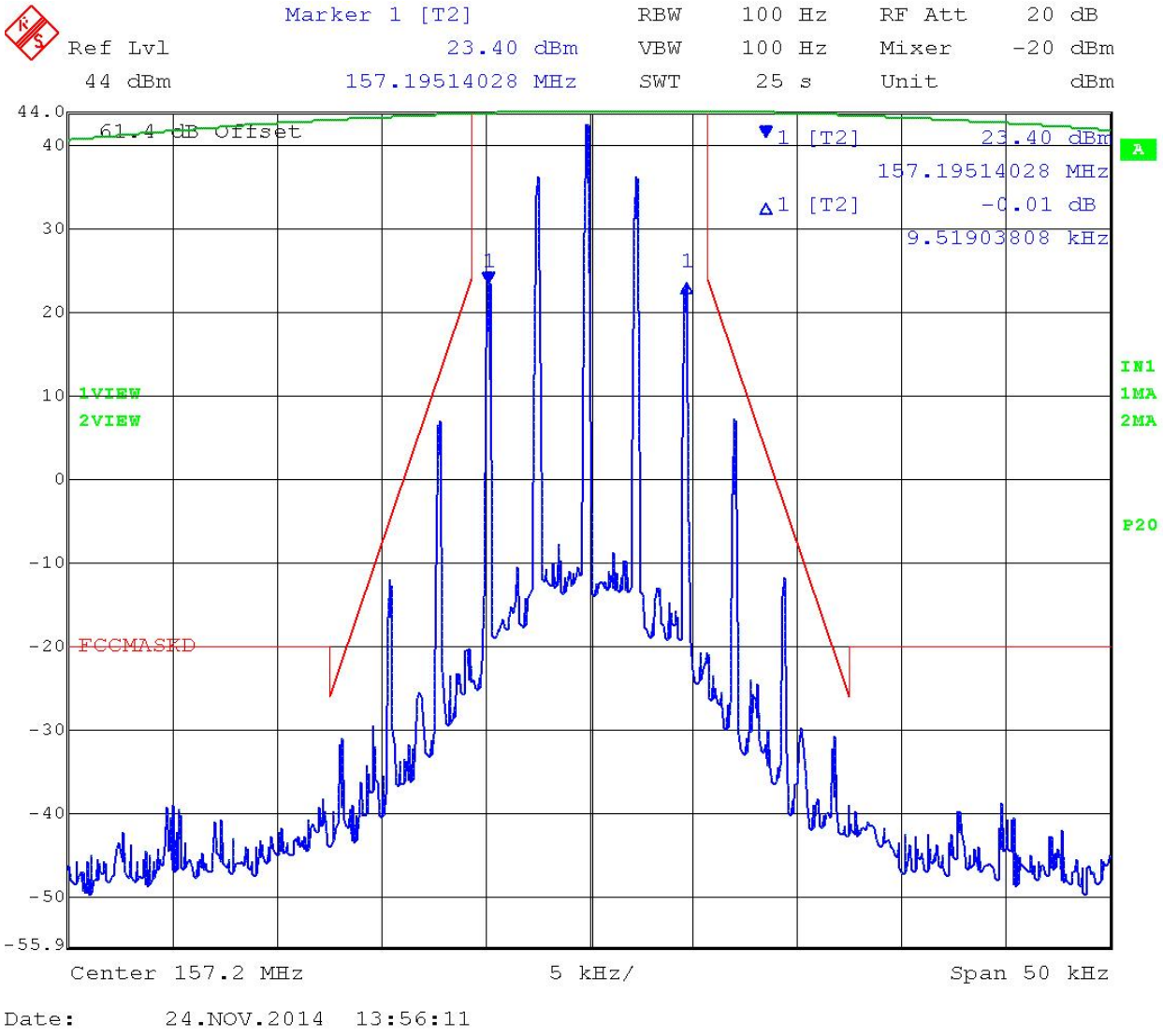


RESULTS: MEETS REQUIREMENTS.

NOTE: ANALOG MODULATION WITHOUT CTCSS WAS WORSE CASE SO ONLY THIS MODULATION WILL BE MEASURED on the REMAINDER OF FREQUENCIES..

OCCUPIED BANDWIDTH

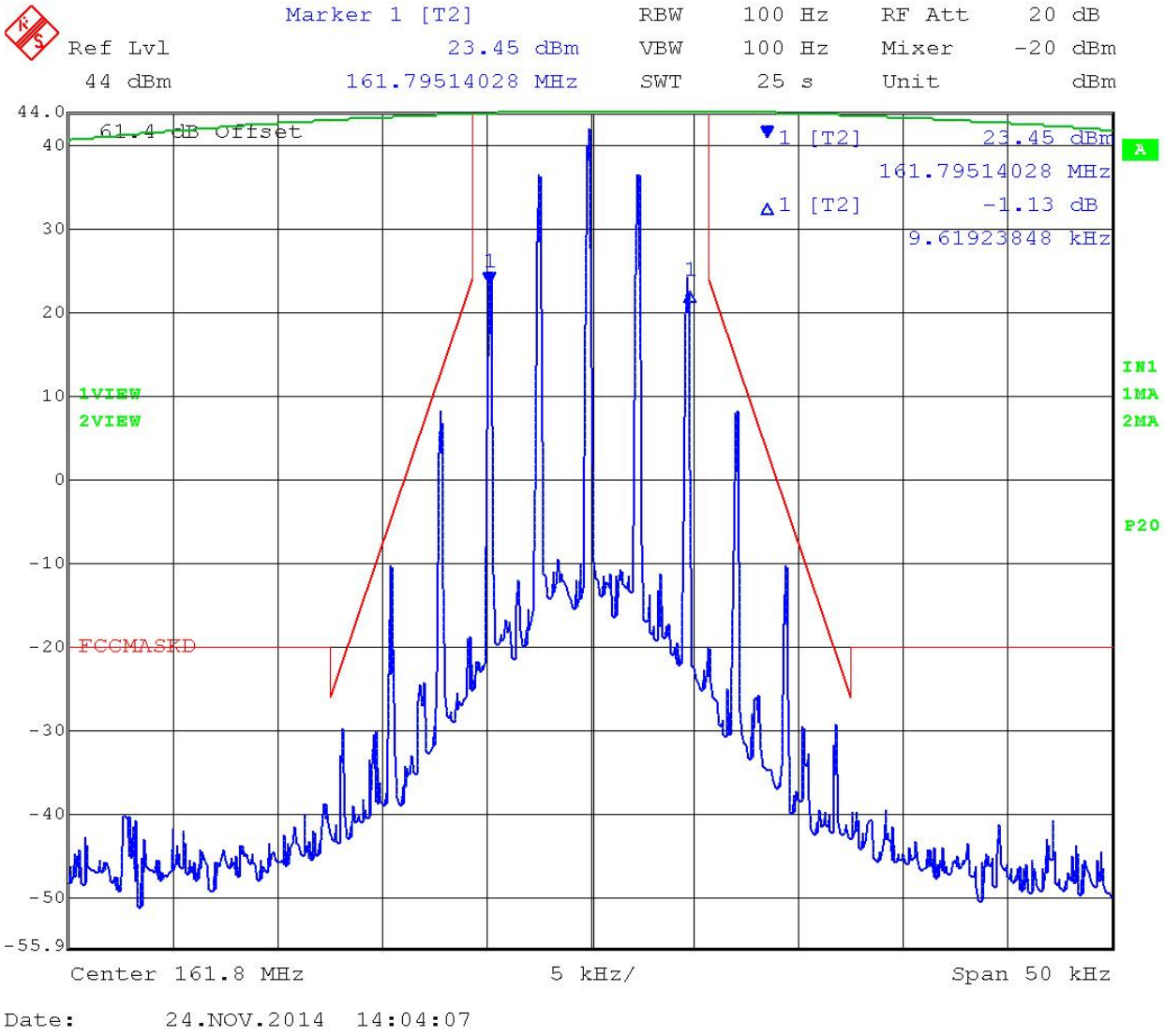
Test Data: Mask D HIGH POWER Middle of Band ANALOG



RESULTS: MEETS REQUIREMENTS.

OCCUPIED BANDWIDTH

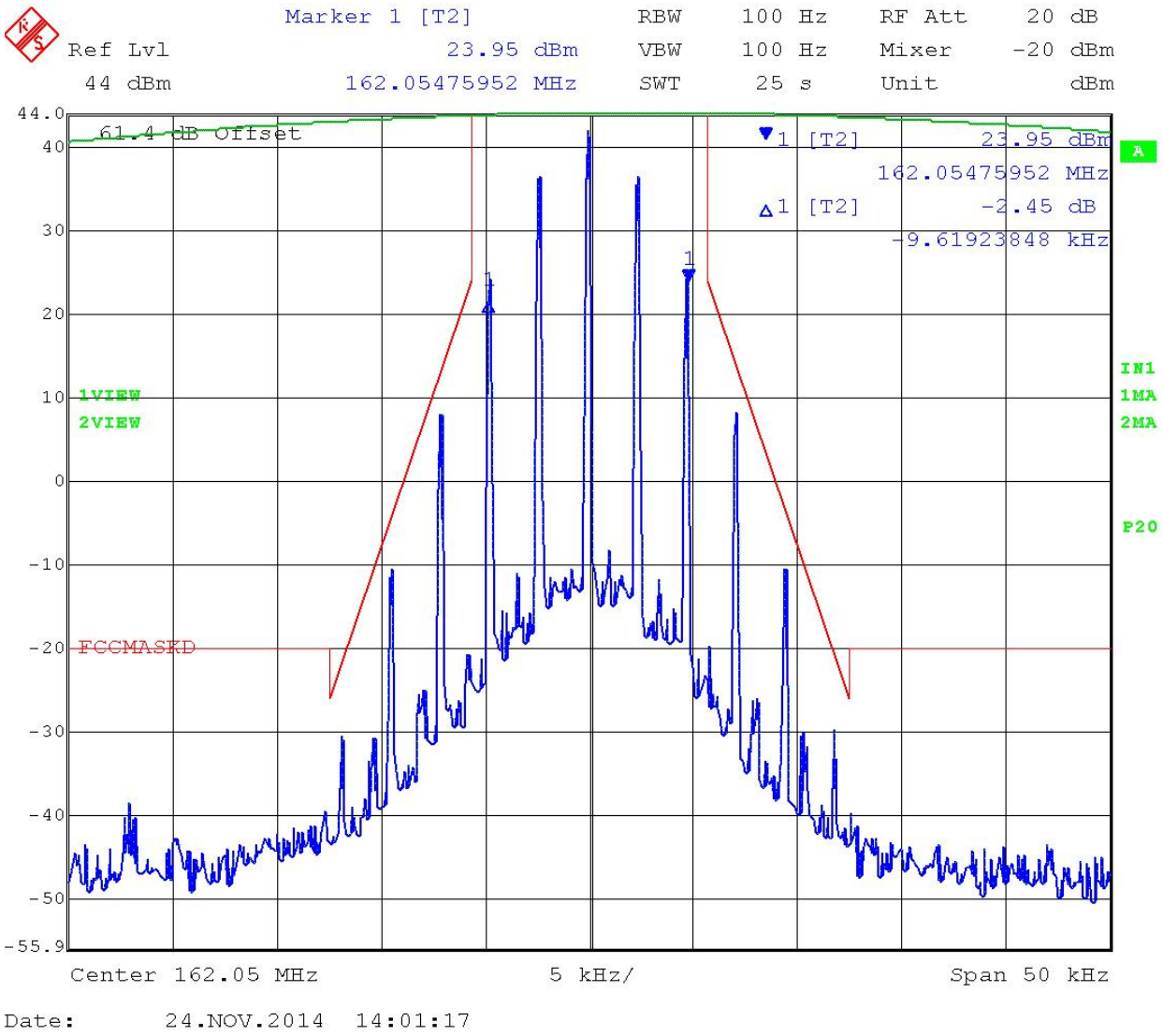
Test Data: Mask D Middle of Band ANALOG



RESULTS: MEETS REQUIREMENTS.

OCCUPIED BANDWIDTH

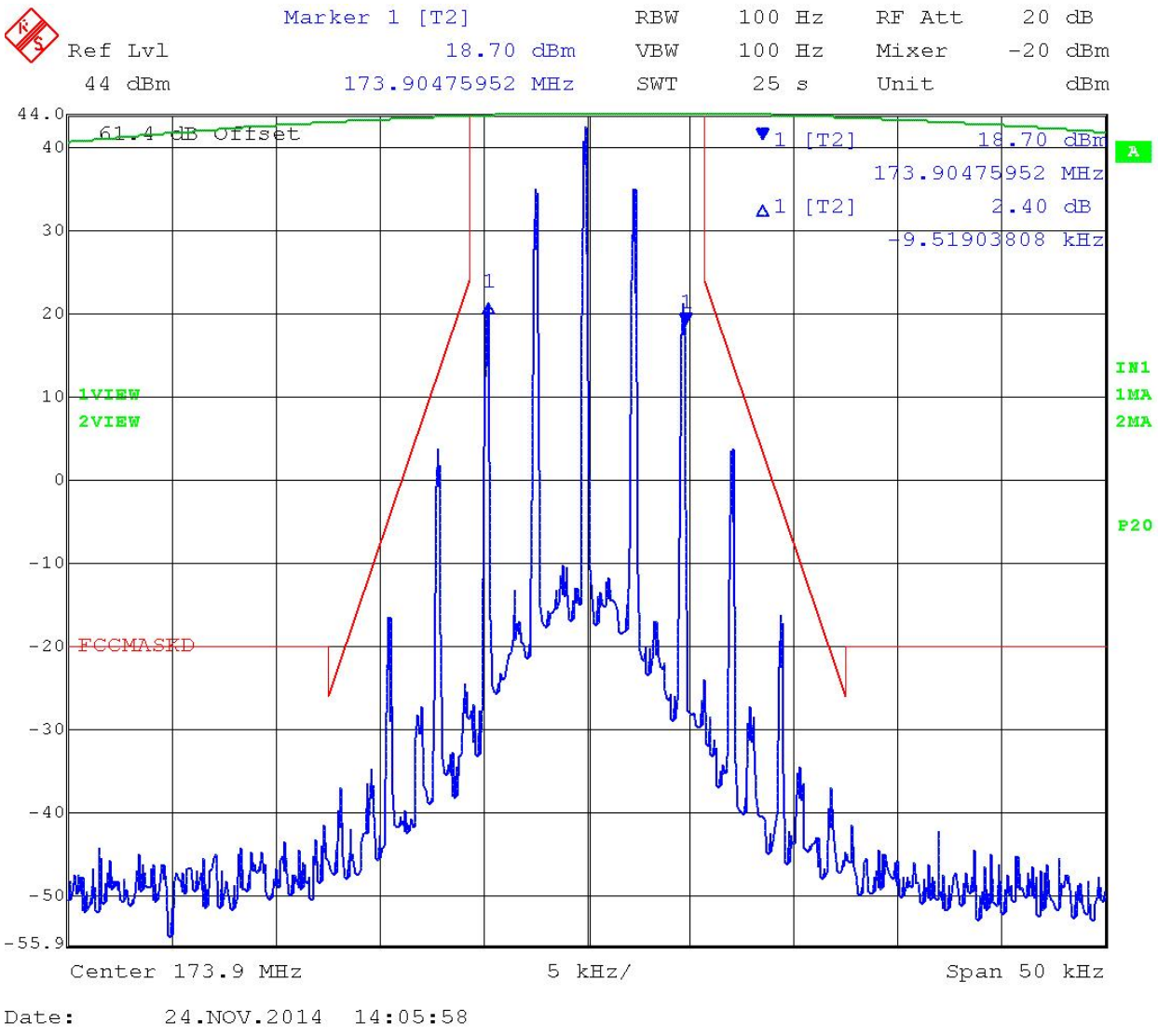
Test Data: Mask D HIGH POWER Middle of Band ANALOG



RESULTS: MEETS REQUIREMENTS.

OCCUPIED BANDWIDTH

Test Data: Mask D HIGH POWER High end of Band ANALOG



RESULTS: MEETS REQUIREMENTS.

Applicant: STANDARD COMMUNICATIONS PTY. LTD.
FCC ID: TXJCM1039V
Report: V:\S\STANDARD COMM AU\1836AUT14\1836AUT14TESTREPORTREV1.DOCX

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

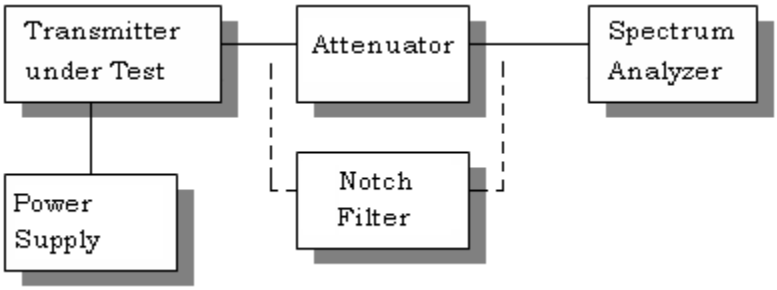
Rule Part No.: Part 2.1051(a)

Requirements:

12.5 kHz Channel Spacing = 50+10 log (25.0) = 64.0 dBc (high power)
12.5 kHz Channel Spacing = 50+10 log (1.2) = 50.8.0 dBc (low power)

Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. 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 ANSI/TIA 603-D: 2010.

Method of Measuring Conducted Spurious Emissions



Test Data: Mask D High Power Low end of Band P25 Conventional

	Watts	Limit dBc	Margin
Power Output	25	64	
	Frequency	dBc	dB
	150.825	0	0
	301.65	89.22	25.22
	452.475	97.95	33.95
	603.3	78.64	14.64
	754.125	91.8	27.8
	904.95	88.51	24.51
	1055.775	92.67	28.67
	1206.6	93.36	29.36
	1357.425	94.49	30.49
	1508.25	93.89	29.89

RESULTS: MEETS REQUIREMENTS.

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SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: Mask D Low Power Low end of Band ANALOG

	Watts	Limit dBc	Margin
Power Output	1.2	50.8	
	Frequency	dBc	dB
	150.825	0	0
	301.65	69.7	18.9
	452.475	69.2	18.4
	603.3	70.2	19.4
	754.125	71.4	20.6
	904.95	70.2	19.4
	1055.775	71.1	20.3
	1206.6	71	20.2
	1357.425	70.1	19.3
	1508.25	71	20.2

Test Data: Mask D High Power Low end of Band ANALOG

	Watts	Limit dBc	Margin
Power Output	25	64	
	Frequency	dBc	dB
	150.825	0	0
	301.65	89.55	25.55
	452.475	87.03	23.03
	603.3	87.89	23.89
	754.125	94.31	30.31
	904.95	90.98	26.98
	1055.775	92.94	28.94
	1206.6	94.25	30.25
	1357.425	94.04	30.04
	1508.25	93.18	29.18

RESULTS: MEETS REQUIREMENTS.

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: Mask D HIGH POWER Middle of Band ANALOG

	Watts	Limit dBc	Margin
Power Output	25	64	
	Frequency	dBc	dB
	161.8	0	0
	323.6	97.86	33.86
	485.4	94.61	30.61
	647.2	76.29	12.29
	809	83.86	19.86
	970.8	86.62	22.62
	1132.6	93.05	29.05
	1294.4	92.84	28.84
	1456.2	94.29	30.29
	1618	92.5	28.5

Test Data: Mask D Low Power Middle of Band ANALOG

	Watts	Limit dBc	Margin
Power Output	1.2	50.8	
	Frequency	dBc	dB
	157.2	0	0
	314.4	71	20.2
	471.6	70.4	19.6
	628.8	69.3	18.5
	786	70.8	20
	943.2	70.2	19.4
	1100.4	70.1	19.3
	1257.6	70	19.2
	1414.8	68.1	17.3
	1572	69.1	18.3

RESULTS: MEETS REQUIREMENTS.

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: Mask D High Power High end of Band ANALOG

	Watts	Limit dBc	Margin
Power Output	25	64	
	Frequency	dBc	dB
	173.9	0	0
	347.8	99.65	35.65
	521.7	84.38	20.38
	695.6	82.46	18.46
	869.5	97.71	33.71
	1043.4	94.36	30.36
	1217.3	94.57	30.57
	1391.2	94.02	30.02
	1565.1	93.22	29.22
	1739	93.2	29.2

Test Data: Mask D Low Power High end of Band ANALOG

	Watts	Limit dBc	Margin
Power Output	1.2	50.8	
	Frequency	dBc	dB
	173.9	0	0
	347.8	70.7	19.9
	521.7	71.2	20.4
	695.6	69.9	19.1
	869.5	69	18.2
	1043.4	68.9	18.1
	1217.3	64	13.2
	1391.2	68.1	17.3
	1565.1	69	18.2
	1739	68.2	17.4

RESULTS: MEETS REQUIREMENTS.

FIELD STRENGTH OF SPURIOUS EMISSIONS

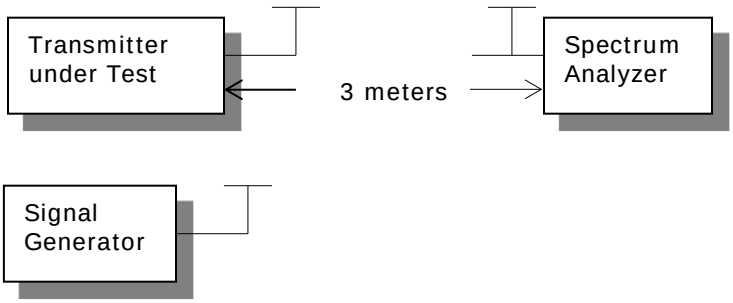
Rule Parts. No.: Part 2.1053

Requirements:

12.5kHz Channel Spacing = 50+10log(25W) = 64 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 per ANSI/TIA 603-D: 2010 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:



Test Data:

High POWER: Low End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
150.82	Hi	44.00	25.12	64.00	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
301.65	H	112.56	48.56
452.48	V	91.85	27.85
603.30	H	76.65	12.65
754.13	H	94.39	30.39
904.95	H	94.42	30.42
1,055.78	H	115.73	51.73
1,206.60	H	113.86	49.86
1,357.43	H	114.50	50.50
1,508.25	H	116.05	52.05

FIELD STRENGTH OF SPURIOUS EMISSIONS

High Power Middle of band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
157.20	Hi	44.00	25.12	64.00	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
314.40	V	109.31	45.31
471.60	V	95.78	31.78
628.80	H	74.42	10.42
786.00	H	88.99	24.99
943.20	H	88.65	24.65
1,100.40	H	115.18	51.18
1,257.60	H	113.31	49.31
1,414.80	H	115.19	51.19
1,572.00	H	114.88	50.88

HIGH POWER: Middle of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
162.05	Hi	44.00	25.12	64.00	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
324.10	H	111.11	47.11
486.15	H	98.11	34.11
648.20	H	71.66	7.66
810.25	H	91.20	27.20
972.30	H	91.99	27.99
1,134.35	H	114.76	50.76
1,296.40	H	113.77	49.77
1,458.45	H	115.71	51.71
1,620.50	H	113.99	49.99

FIELD STRENGTH OF SPURIOUS EMISSIONS

Low Power High end of band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
173.90	Lo	30.80	1.20	50.80	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
347.80	H	96.17	45.37
521.70	H	92.39	41.59
695.60	H	87.65	36.85
869.50	H	80.74	29.94
1,043.40	V	74.57	23.77
1,217.30	V	72.73	21.93
1,391.20	V	74.19	23.39
1,565.10	H	72.29	21.49
1,739.00	V	69.95	19.15

RESULTS: MEETS REQUIREMENTS.

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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: ANSI/TIA 603-D: 2010.

Test Data:

Temperature	Frequency MHz	PPM
25°C (reference)	155	
-30°C	155.00025	1.613
-20°C	155.000257	1.658
-10°C	155.00023	1.484
0°C	155.000216	1.394
10°C	155.000248	1.600
20°C	155.000248	1.600
30°C	155.000278	1.794
40°C	155.000207	1.335
50°C	155.00009	0.581
Battery Voltage	Frequency	PPM
-15%	155.00023	1.484
15%	155.000277	1.787

RESULTS: MEETS REQUIREMENTS.

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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

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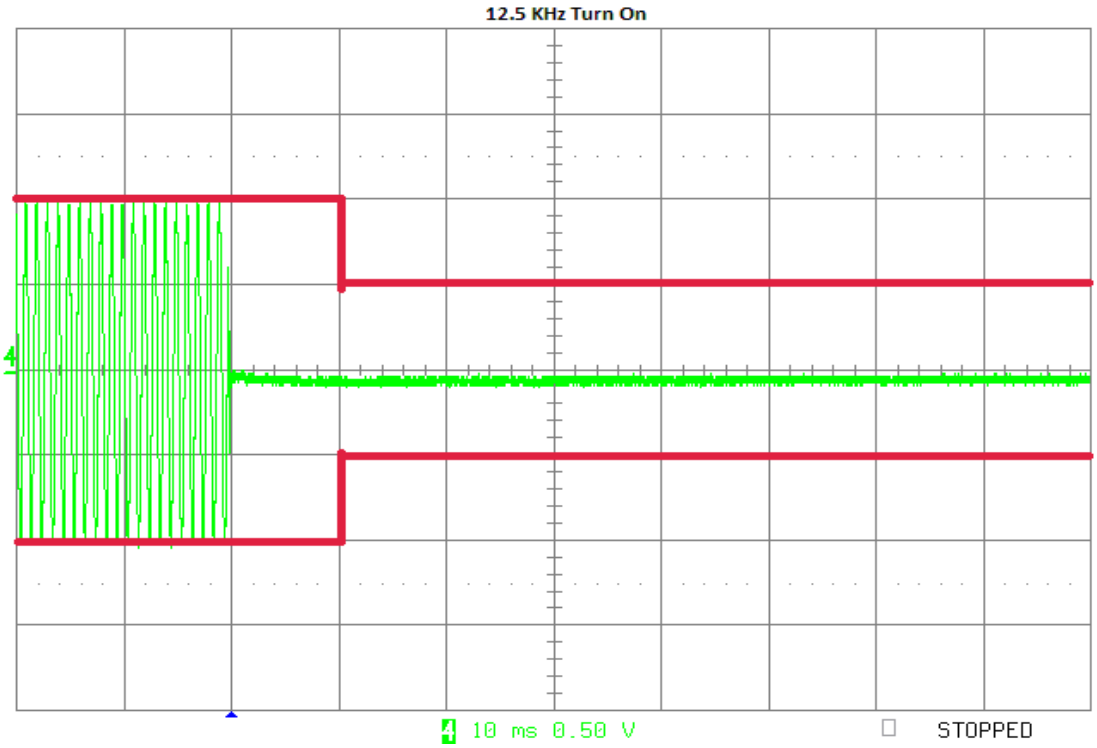
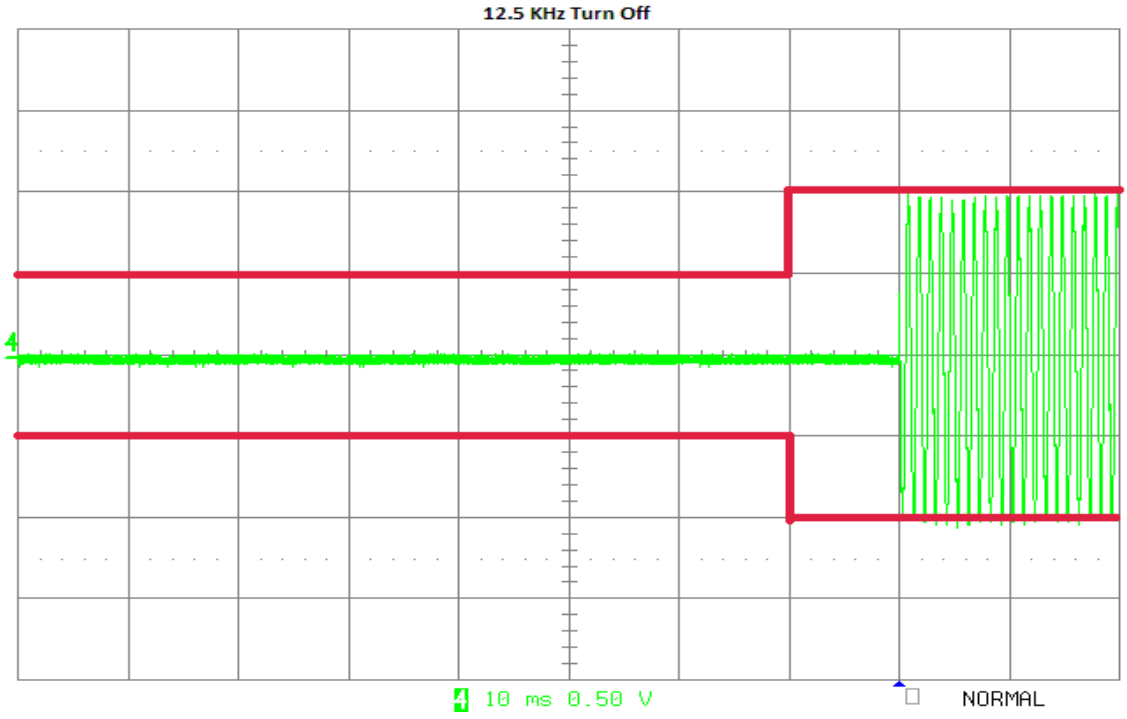
Test Data:





RESULTS: MEETS REQUIREMENTS.

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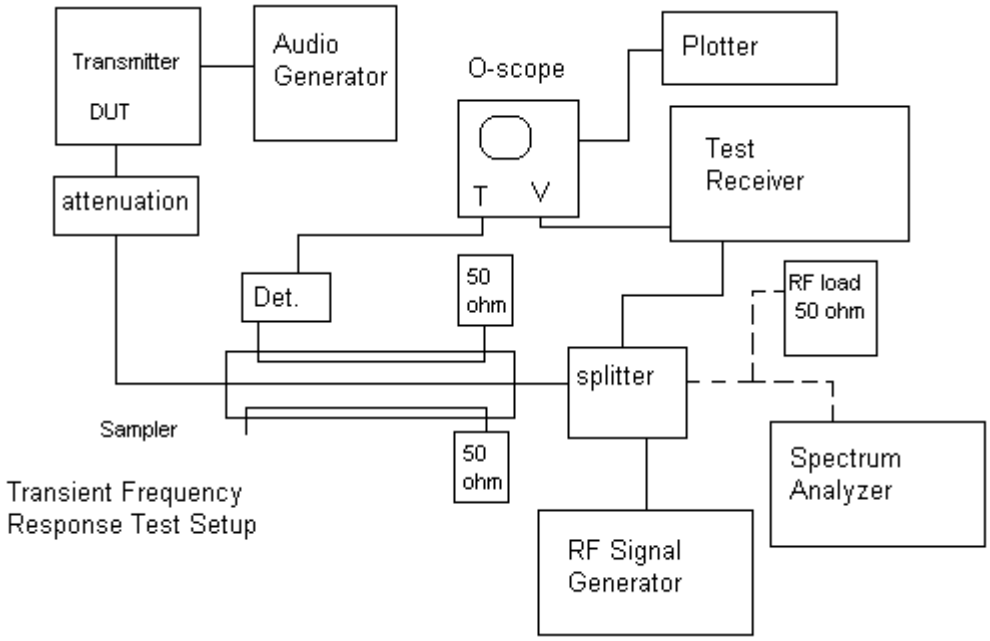
TEST PROCEEDURE: ANSI/TIA 603-D:2010, the levels were set as follows:

1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30 dB.
4. With the levels set as above, the transient frequency behavior was observed and recorded.



Transient Frequency Response Test Setup

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EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
12 Volt Power Supply	Astron	RS-12A	9312779	12/12/99	12/12/99
12 Volt Power Supply	Astron 50Amp.	VS-50M	9001191	12/12/99	12/12/99
DC Power Supply	HP	6286A	1744A03842	12/12/99	12/12/99
Antenna: Biconnical Chamber	Eaton Chamber	94455-1	1057	06/14/13	06/14/15
Antenna: Log-Periodic Chamber	Eaton	96005	1243	05/31/13	05/31/15
LISN (Primary)	Electro-Metrics	EM-7820	2682	02/26/13	02/26/15
DC Power Supply	HP	6264B	2032A04119	05/06/13	05/06/15
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	08/19/14	08/19/16
AC Voltmeter	HP	400FL	2213A14728	06/26/13	06/26/15
Digital Multimeter	Fluke	77	35053830	08/22/13	08/22/15
Audio Analyzer	HP	8903B	3011A13084	08/22/13	08/22/15
DC Power Supply	HP	6286A	2411A09414	12/12/99	12/12/99
Frequency Counter Large Chamber	HP	5352B	2632A00165	06/26/13	06/26/15
Frequency Counter Small Chamber	HP	5385A	3242A07460	06/16/13	06/16/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren Chamber	3117	00035923	06/13/14	06/13/16
Audio Analyzer	HP	8903A	2336A03066	08/30/13	08/30/15
Temperature Chamber Small	Thermotron Corp.	S1.2 Mini Max	25-1420-09	08/20/14	08/20/16
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/12/14	08/12/16
Software: Field Strength Program	Timco	N/A	Version 4.0	12/12/99	12/12/99
Analyzer Tan Tower	HP	85650	3303A0169	01/15/14	01/15/16

Quasi-Peak Adapter		A	0		
Analyzer Tan Tower Opt H02	HP	8449B	3008A00372	01/15/14	01/15/16
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	01/15/14	01/15/16
Analyzer Tan Tower Attenuator/Switch Driver	HP	11713A	2508A10022	01/15/14	01/15/16
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	01/15/14	01/15/16
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Signal Generator R & S SMIQ 02	Rohde & Schwarz	SMIQ02	DE24678	06/11/14	06/11/16
LISN (Secondary/Auxiliary)	Electro-Metrics	EM-7821	101	06/05/13	06/05/15
30 dB Attenuator	Narda	769-30	10267	03/15/13	03/15/15
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	03/11/14	03/11/16
Signal Generator HP 8648C	HP	8648C	3623A02898	08/29/13	08/29/15
Attenuator 30dB 500W	Bird	8325	1761	02/25/13	02/25/15

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