FCC 15.209, RSS 210
TEST REPORT

FOR:

Integrated Vehicular Receiver

MODEL #: WIN (Wireless Ignition Node)

Marquardt Switches
2917 Waterview Dr.
Rochester Hills, Michigan 48309
U.S.A

TEST REPORT #: EMC_MARQU_001_08001_WIN_FCC15_rev3
DATE: 2008-11-18

ilac-MRA ACCREDITED Certificate # 2135.01

Bluetooth

Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Test Lab
LAB CODE 20020328-00

FCC listed: A2LA accredited

IC recognized # 3462B

***CETECOM* Inc.**
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Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

Table of Contents

1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Parts 15, of Title 47 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS210.

Company	Description	Model #
Marquardt Switches	**Integrated Vehicular Receiver**	**WIN (Wireless Ignition Node)**

Technical responsibility for area of testing:

Date	Section	Name	Signature
2008-11-18	**EMC & Radio**	**Marc Douat (EMC Project Engineer)**	Marc Douat I am approving this document

This report is prepared by:

Date	Section	Name	Signature
2008-11-18	**EMC & Radio**	**Satya Radhakrishna (EMC Project Engineer)**	Satya Radhakrishna I am the author of this document

The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	**CETECOM Inc.**
Department:	**EMC**
Address:	**411 Dixon Landing Road Milpitas, CA 95035 U.S.A.**
Telephone:	**+1 (408) 586 6200**
Fax:	**+1 (408) 586 6299**
Responsible Test Lab Manager:	**Lothar Schmidt**
Responsible Project Leader:	**Satya Radhakrishna**

2.2 Identification of the Client

Applicant's Name:	**Marquardt Switches**
Street Address:	**2917 Waterview Dr.**
City/State/Zip Code	**Rochester Hills, Michigan 48309**
Country	**U.S.A**
Contact Person:	**Drake Boroja**
Phone No.	**248-293-7727**
e-mail:	**Drake.Boroja@Marqswitch.com**

2.3 Identification of the Manufacturer

Same as above client.

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	**WIN (Wireless Ignition Node)**
Description:	**Integrated Vehicular Receiver**
Model No:	**WIN (Wireless Ignition Node)**
FCC ID:	**IYZ-C01B**
IC ID:	**2701A-C01B**
Type(s) of Modulation:	**ASK**
Number of Channels:	**1**
Antenna Type:	**Wound coil**
Field strength of the transmitter:	**14.51 dBµV/m at 300 meters**

3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	**Integrated Vehicular Receiver**	**Marquardt Switches**	**WIN (Wireless Ignition Node)**	**03336030103**

4 Subject of Investigation

All testing was performed on the EUT listed in Section 3. The EUT was maximized in the X,Y, Z positions , all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Parts15.209 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS210. Test methods for FCC 15.209 were based on the procedure mentioned in ANSI C63.4.

5 Measurements

5.1 Radiated emission

(Measurement of the active transponder of the EUT)

Section 15.209 Radiated emission limits, general requirements.
(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other Sections within this Part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in Sections 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this Part.

(f) In accordance with Section 15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in Section 15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in Section 15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in Section 15.109 that are applicable to the incorporated digital device.

(g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

5.2 Results

Measurements were performed at 1m distance using loop antenna which was placed a height of 1m from the ground.

Measuring the fundamental: Please refer to Plot 1

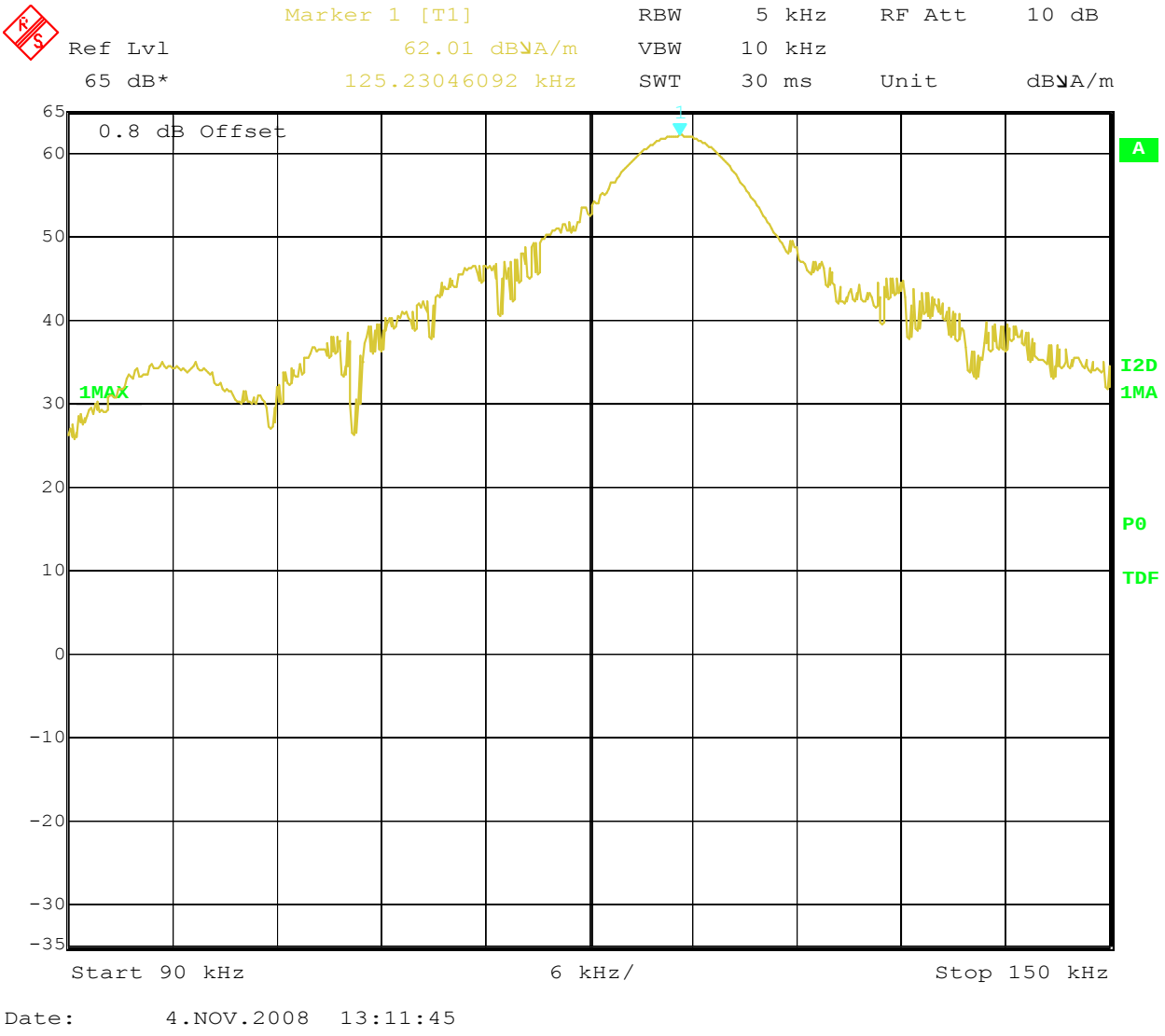
The fundamental has a level of 62.01dBµA/m. In order to convert to dBµV/m add 51.5 dB. Electric field strength= Magnetic field strength + 51.5 dB = **113.51 dBµV/m**. FCC 15.209 states that the field strength limits for the fundamental in the frequency range 0.009 - 0.490 MHz = 2400/F (kHz) for a given test distance of 300 meters. So the limit is 2400/125 kHz = 19.2µV/m. In order to convert to dBµV/m, the formula used is 20 * log (19.2 µV/m) = 25.67 dBµV/m at 300 meters.

The measured value at 1 meter distance is 113.51dBµV/m. To extrapolate to 300 meters use the formula, 40 * log (1/300) = -99 dB. [Note: a 40dB/decade can be used below 30 MHz per FCC 15.31 (b)(2). 20dB/decade is to be used above 30 MHz per FCC 15.31(b)(1))]

Extrapolation result will be 113.51 dBµV/m - 99 dB = **14.51 dBµV/m** at 300 meters.

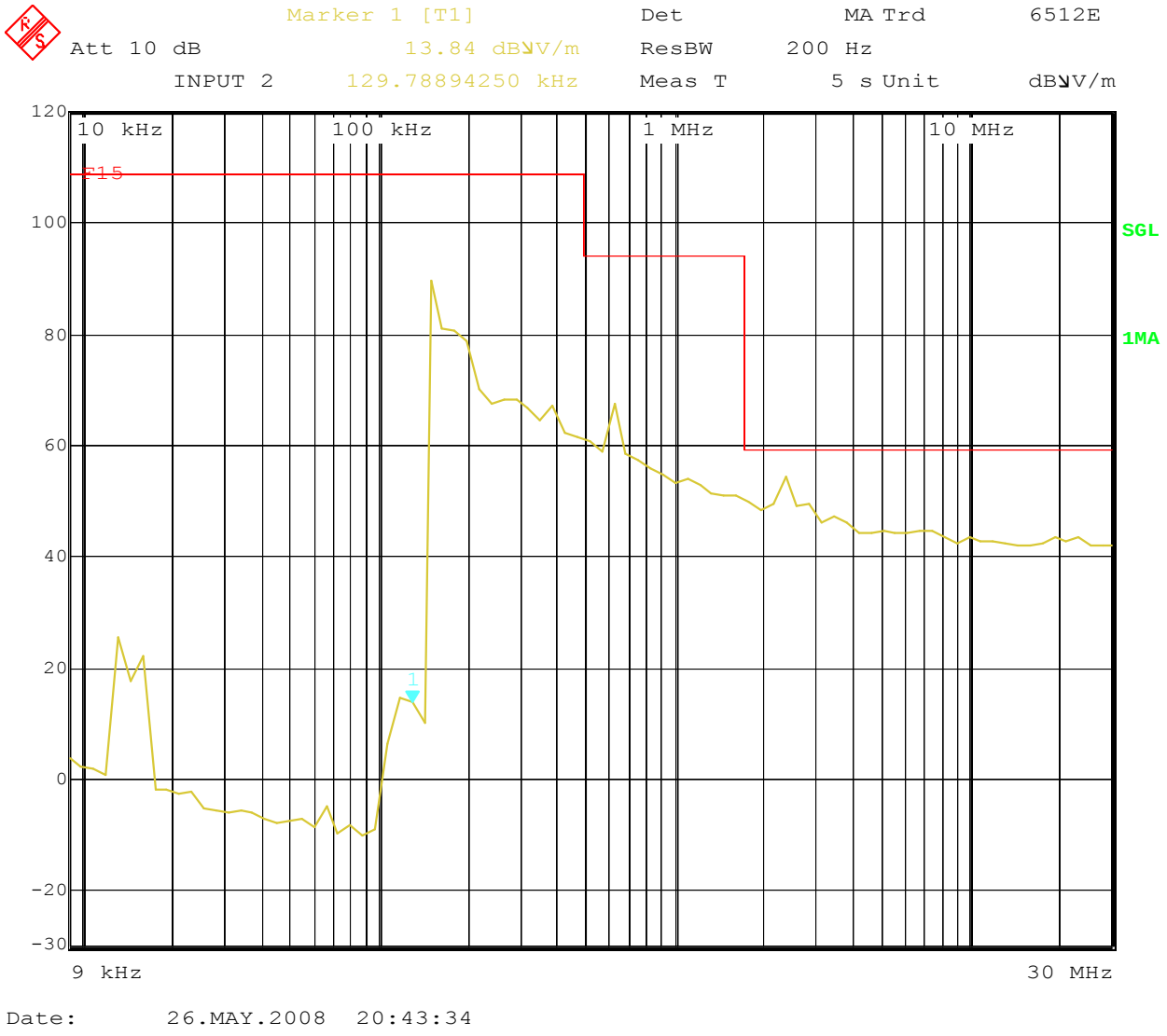
PLOT 1

Field strength of fundamental



PLOT 2

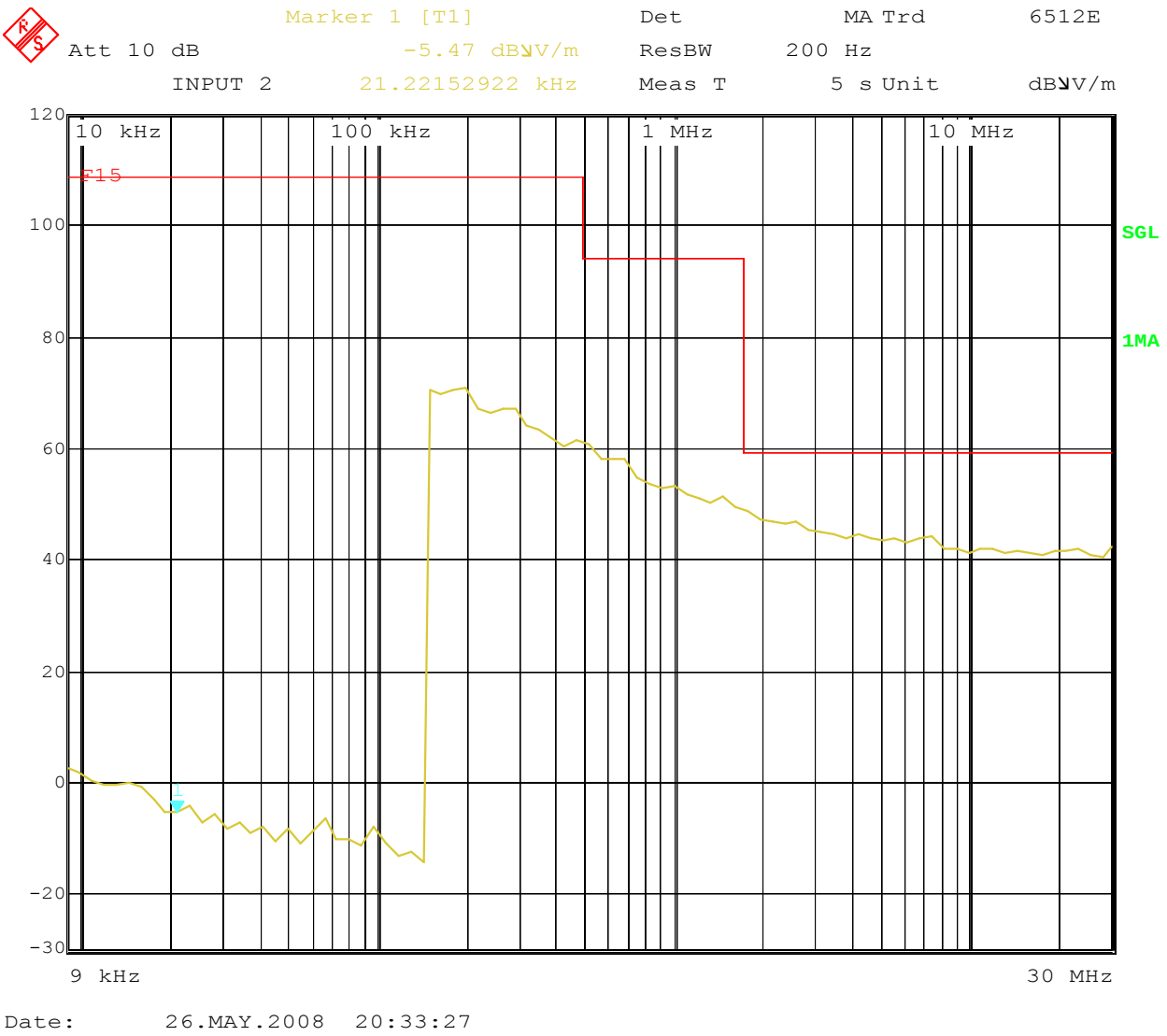
9 kHz- 30 MHz Tx mode



Noise Floor at 30 MHz: 41.33 dBµV/m

PLOT 3

9 kHz- 30 MHz Rx mode



Noise Floor at 30 MHz: 41.33 dBµV/m

5.3 RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-210

NOTE:

1. **The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the noise level.**

Limits **SUBCLAUSE § RSS-210**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

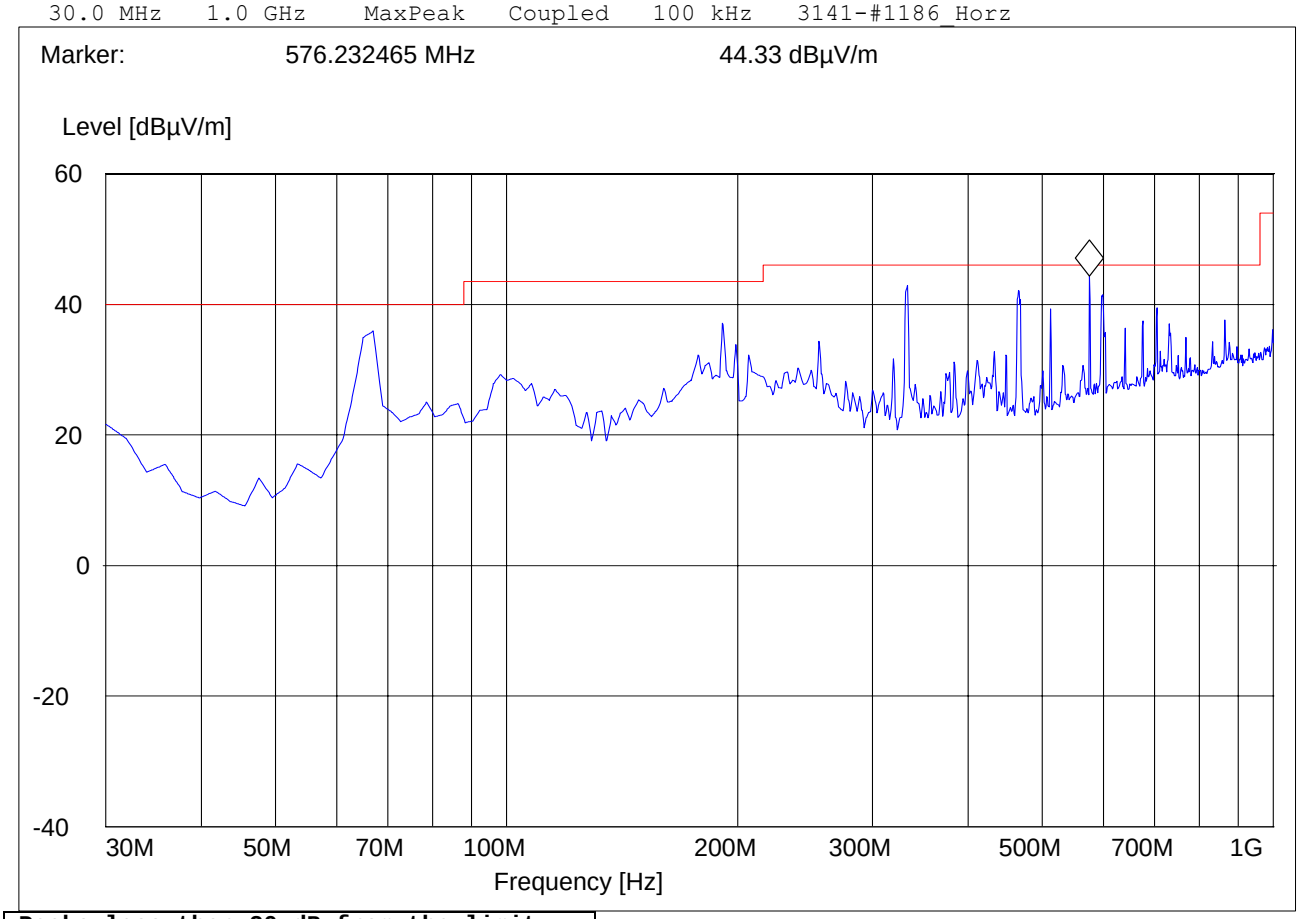
5.3.1 Receiver Radiated Emissions

PLOT 4
EUT in Idle Mode: 30MHz – 1GHz
Antenna: horizontal
Note: Peak Reading Vs. Quasi-Peak Limit.
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:               WIN
Customer::         MARQUARDT SWITCHES
Test Mode:         Rx mode
ANT Orientation:   H
EUT Orientation:   V
Test Engineer:     Chris
Voltage:           car battery
```

SWEEP TABLE: "CANDA RE_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz



Peaks less than 20 dB from the limit		
No.	Frequency	Peak value
1	334.375 MHz	42.85dBµV/m
2	470 MHz	41.7597 dBµV/m
3	513.27 MHz	39.23 dBµV/m
4	599.78 MHz	41.173 dBµV/m
5	702.56 MHz	39.57 dBµV/m
6	862 MHz	37.64 dBµV/m

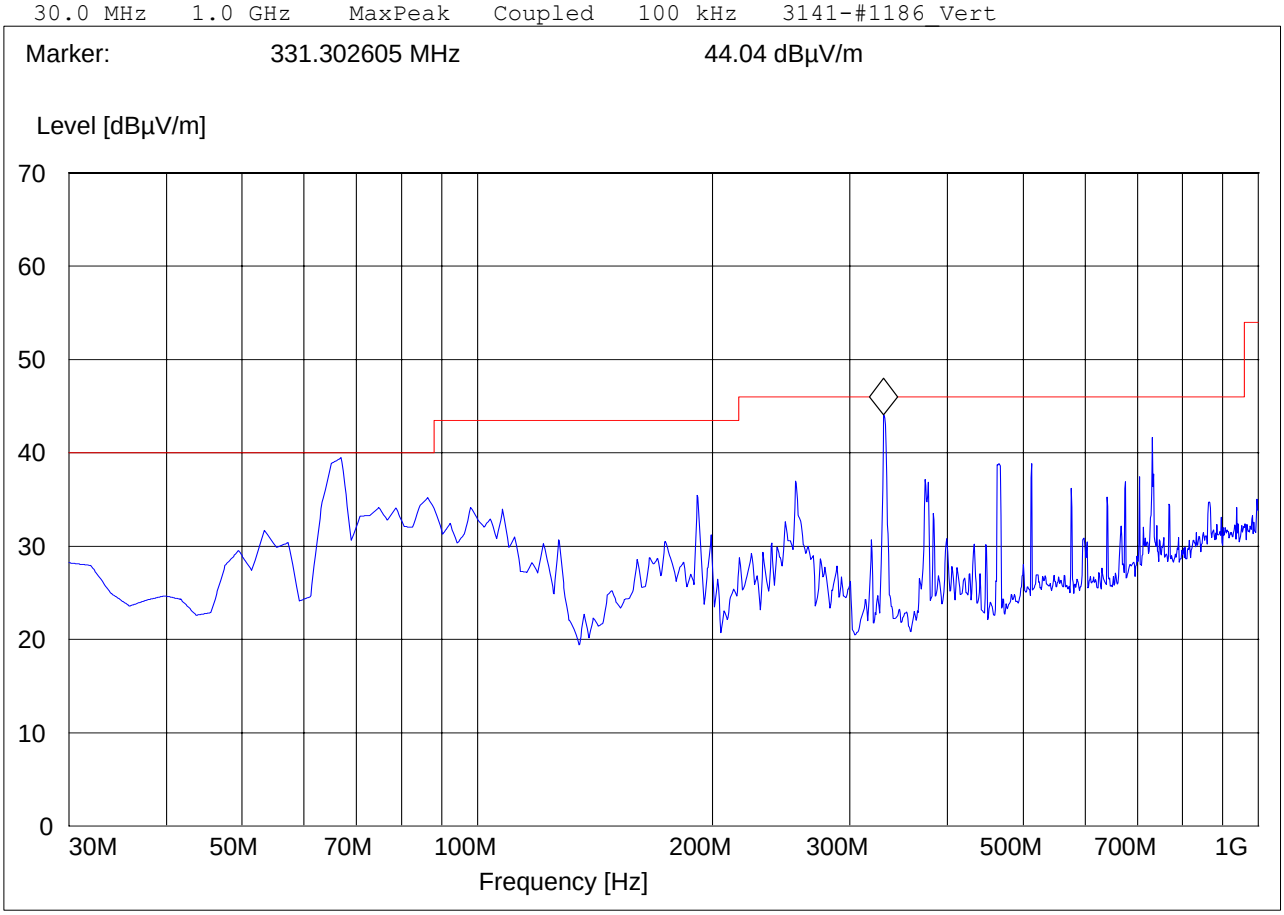
PLOT 5

EUT in Idle Mode: 30MHz – 1GHz **Antenna: vertical**

EUT: WIN
Customer:: MARQUARDT SWITCHES
Test Mode: Rx mode
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: car battery

SWEEP TABLE: "CANADA RE_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186 Vert



Peaks less than 20 dB from the limit		
No.	Frequency (MHz)	Peak value (dBµV/m)
1	67.1419	39.21
2	380.769	37.6
3	467	38.7
4	512.5	38.8
5	702	37.6
6	733.33	41.68

PLOT 6

RECEIVER RADIATED EMISSIONS

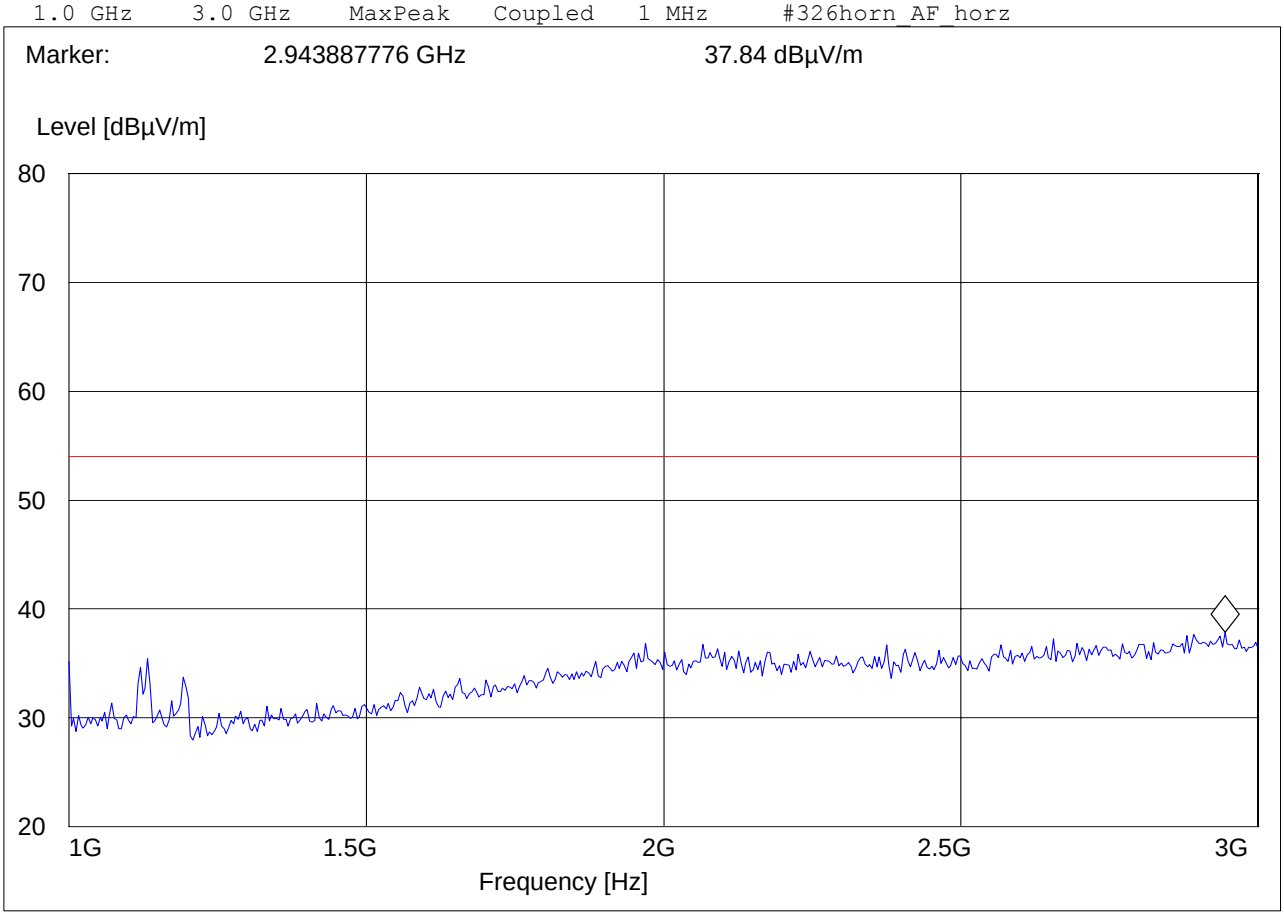
EUT in Idle Mode: 1GHz – 3GHz

Note: Peak Reading Vs. Average Limit. This plot is valid for Horizontal and Vertical polarization (worst-case plot)

```
EUT:              WIN
Customer::        MARQUARDT SWITCHES
Test Mode:        Rx mode
ANT Orientation:  H
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          car battery
```

SWEEP TABLE: "CANADA RE_1-3G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz



Peaks less than 20 dB from the limit		
No.	Frequency(MHz)	Peak value(dBµV/m)
1	1974.359	37.05
2	2064.102	36.90
3	2371.79	36.67
4	2656.25	37.33
5	2884.61	37.42
6	2897.436	37.50

PLOT 7

RECEIVER RADIATED EMISSIONS

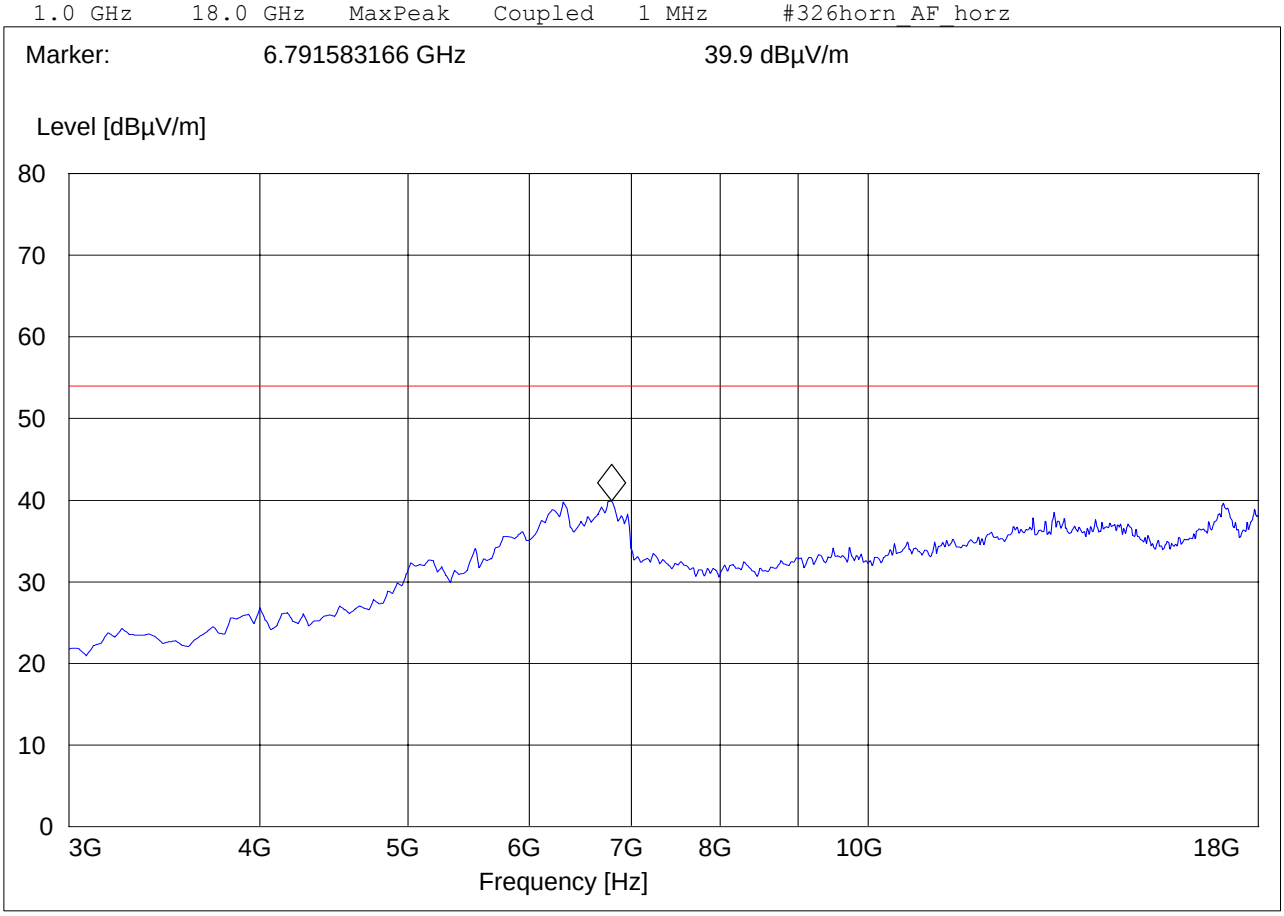
EUT in Idle Mode: 3GHz – 18GHz

Note: Peak Reading Vs. Average Limit. This plot is valid for Horizontal and Vertical polarization (worst-case plot)

```
EUT:              WIN
Customer::        MARQUARDT SWITCHES
Test Mode:        Rx mode
ANT Orientation:  H
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          car battery
```

SWEEP TABLE: "CANADA RE_3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

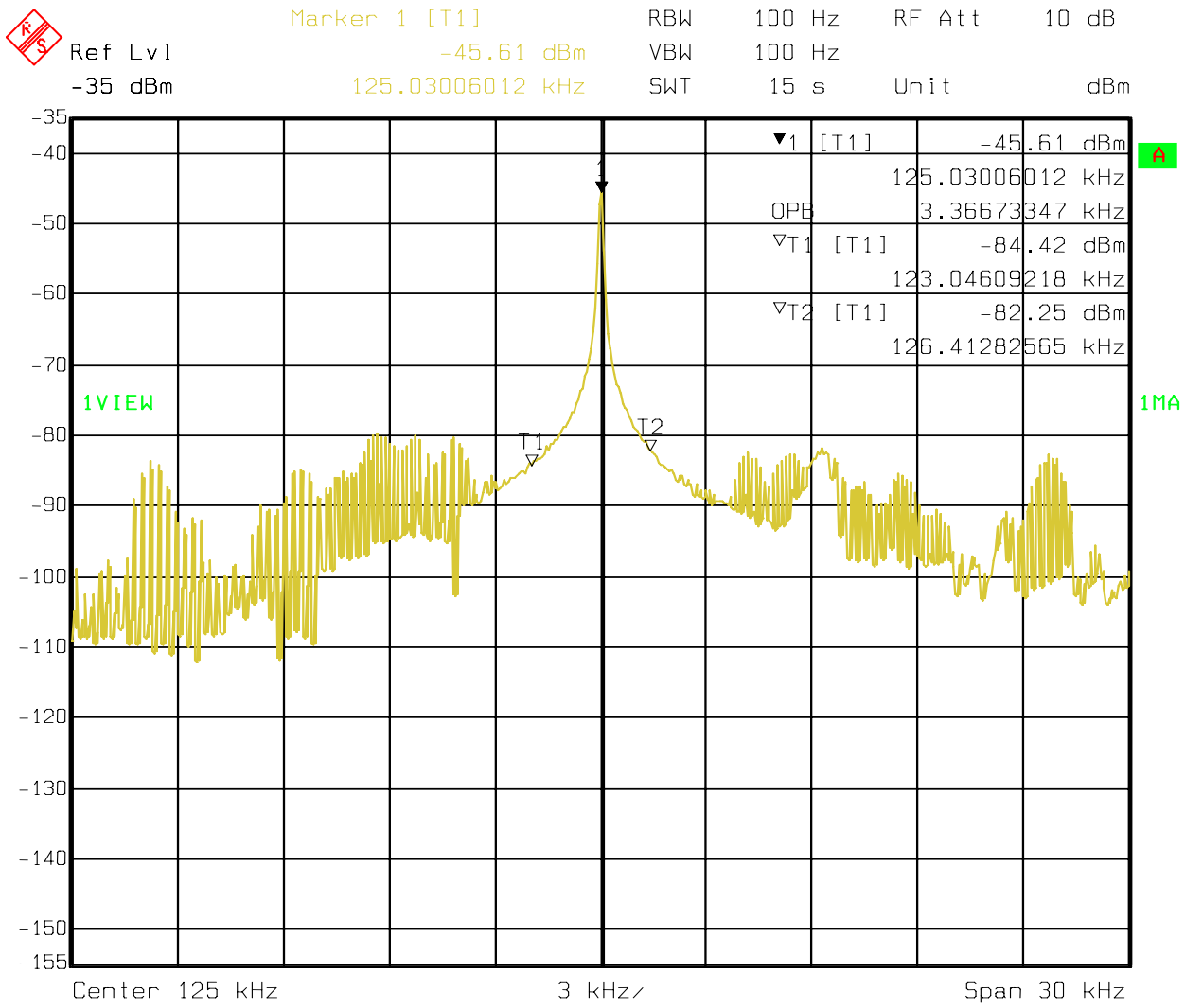


Peaks less than 20 dB from the limit		
No.	Frequency(MHz)	Peak value(dBµV/m)
1	5543.75	34.12
2	6333.33	39.78
3	13419.548	38.095
4	13843.07	38.57
5	17372.42	39.048
6	17922.33	38.6

99% BANDWIDTH

PLOT 8

99% BANDWIDTH MEASURED IS 3.36673347 kHz



6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2009	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	May 2009	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2009	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2009	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2009	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2009	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2009	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2009	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2009	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2009	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2009	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2009	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	July 2010	2 years
17	Loop Antenna	6512	EMCO	00049838	May 2009	1 year

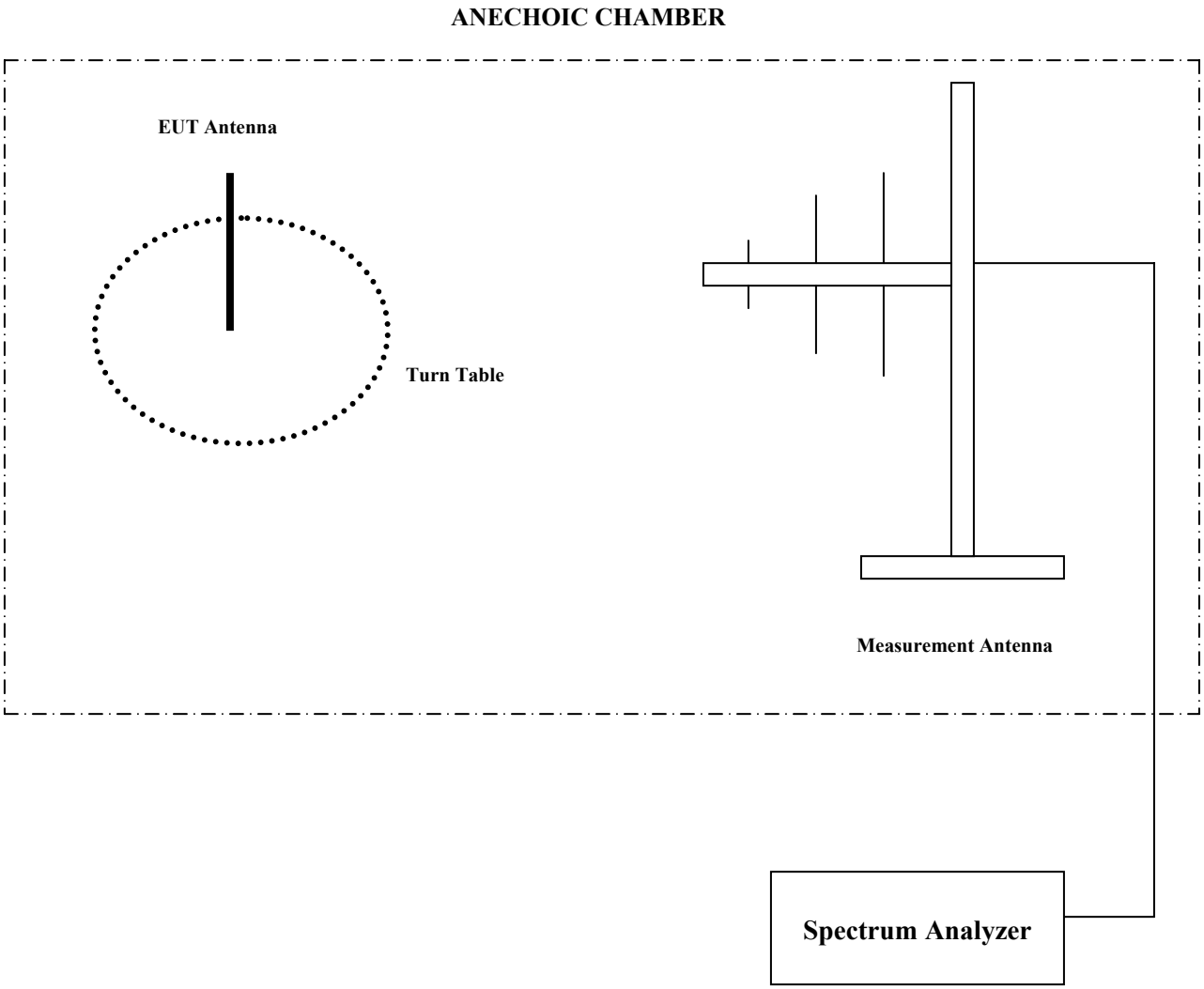
7 References

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION,
PART 15 RADIO FREQUENCY DEVICES September 20, 2007.

ANSI C63.4: American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz 30th January, 2004
.
RSS-210 Low-power Licence-exempt Radio communication Devices (All Frequency Bands): Category I Equipment

8 BLOCK DIAGRAMS

Radiated Testing



9 Revision History

2008-06-12- EMC_ MARQU_001_08001 _WIN_FCC15- Original report
2008-07-11- EMC_ MARQU_001_08001 _WIN_FCC15_rev1- Field strength measurement included
2008-11-04- EMC_ MARQU_001_08001 _WIN_FCC15_rev2- Field strength measurement result changed and tables listing peaks included.
2008-11-18- EMC_MARQU_001_08001_WIN_FCC15_rev3- Calibration dates in the test equipment table updated.