TEST REPORT

Report Number: 3138589MIN-001
Project Number: 3138589

Testing performed on the
T3V
FCC ID: MMURTI0800
Industry Canada ID: 3166-RTI0800

to
47 CFR Part 15. 231:2006
RSS- 210 , Issue 7, 2007

For
Remote Technologies Inc.

Test Performed by:	Test Authorized by:
Intertek Testing Services NA, Inc.	Remote Technologies
7250 Hudson Blvd., Suite 100	7651 Anagram Drive
Oakdale, MN 55128	Eden Prairie, MN 55344

Prepared by: _____ Date: December 3, 2007
Norman Shpilsher

Reviewed by: _____ Date: December 3, 2007
Uri Spector

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. This report must not be used to claim product endorsement by A2LA, NIST nor any other agency of the U.S. Government.

TABLE OF CONTENTS

1.0 GENERAL DESCRIPTION

Model:	T3V
Type of EUT:	Universal Remote Control
Serial Number:	N/A
FCC ID:	MMURTI0800
Industry Canada ID:	3166-RTI0800
Related Submittal(s) Grants:	None
Company:	Remote Technologies
Customer:	Mr. Paul Weichelt
Address:	7651 Anagram Drive Eden Prairie, MN 55344
Phone:	(952) 253-3113
Fax:	(952) 253-3131
Test Standards:	☒ FCC Part 15.231 ☒ RSS–210, Issue 7, 2007 ☒ RSS-Gen, Issue 1, 2005 ☒ 47 CFR, Part 15:2005, §15.107 and §15.109, Class B ☐ Other
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	November 28, 2007
Test Work Started:	November 28, 2007
Test Work Completed:	November 29, 2007
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good

1.1 Product Description; Test Facility

Product Description:	Remote control transmitter
Operating Frequency	433.9 MHz
Modulation:	
Emission Designator:	
Antenna(s) Info:	Integral Antenna
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter power configuration:	☒ Internal rechargeable battery ☐ External power source ☐ 120VAC ☐ 230VAC ☐ 400VAC ☒ 3.6 VDC ☐ Other: Amp. ☐ 50Hz ☐ 60Hz
Test Methodology:	Emission measurements were performed according to the procedures in ANSI C63.4-2003. All field strength radiated emissions measurements were performed in the semi-anechoic chamber, and for each scan, the procedure for maximizing emissions in were followed. All field strength radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application
Special Test Arrangement:	As a hand-held device the EUT was rotated through three orthogonal axes to determine and tested with the maximum emissions
Test Facility:	The test site facility used to collect the radiated and conducted measurement data is located at 7250 Hudson Blvd., Suite 100, Oakdale, Minnesota. This test facility has been accredited by A2LA (Certificate No. 1427.01)
Justification:	None

1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

☐ - Standby
☐ - Continuous
☒ - Continuous transmission (see below)
☐ - Test program (customer specific)
☐ -

Operating modes of the EUT:

No.	Description
1	The special test mode which allowed transmit continuously was used
2	

Cables:

No.	Type	Length	Designation	Note
1	None			
2				

Support equipment/Services:

No.	Item	Description
1	None	
2		

1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ **Normal**

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

1.4 Measurement uncertainty

The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be: ±4 dB at 10m and ±5.4 dB at 3m

The expanded uncertainty (k = 2) for conducted emissions from 150 kHz to 30 MHz has been determined to be:
±2.6 dB

1.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.
The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

Where: FS = Field Strength in dB(µV/m)
RA = Receiver Amplitude in dB(µV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(m^{-1})
AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(µV) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(µV/m).

RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/m)

General notes: None

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST SPECIFICATION	TEST PARAMETERS	RESULT
15.231(a) / RSS-210 A1.1.1(a)	Transmitter deactivation time	Pass
15.231(b) / RSS-210 A1.1.2	Transmitter field strength of emissions	Pass
15.231(c) / RSS-210 A1.1.3	Bandwidth of the emission	Pass
15.207/RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	N/A
15.109/ICES-003	Receiver/digital device radiated emissions	Pass
15.107/ ICES-003	Digital device conducted emissions	N/A

3.0 TEST CONDITIONS AND RESULTS

3.1 Transmitter deactivation time

Maximum allowed deactivation time: 5 sec

Measured deactivation time: less than 0.4 sec

Test result: **Pass**

Notes: None

3.2 Transmitter field strength of emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Frequency range of measurements: 30MHz-1000MHz

Test result: **Pass**

Max. Emissions margin at fundamental: 3.6 dB below the limits

Max. margin of harmonics and spurious emissions: 8.2 dB below the limits

Notes: None

Date:	November 28, 2007	**Result:** **Pass**
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure	
Operation mode:	See Page 5	
Note:	Emissions at Fundamental and 2nd Harmonic	

Table 3.2.1

Frequency	Antenna			Amplifier	Peak Reading	Net at 3m.	Average Limit	Margin	Comments
MHz	Polarity	Hts(m)	Factor(dB/m)	Gain (dB)	dBµV	dBµV/m	dBµV/m	dB	
433.90	V	112	18.5	0.0	58.4	76.9	80.8	-3.9	Fundumental
433.90	H	100	18.5	0.0	58.7	77.2	80.8	-3.6	Fundumental
867.68	V	106	24.1	0.0	21.6	45.7	60.8	-15.1	2nd harm.
867.68	H	188	24.1	0.0	22.9	47.0	60.8	-13.8	2nd harm.

Comments: All measurements were taken using a Peak detector

Date:	November 28, 2007	**Result:** **Pass**
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure	
Operation mode:	See Page 5	
Note:	Emissions above 2nd Harmonic	

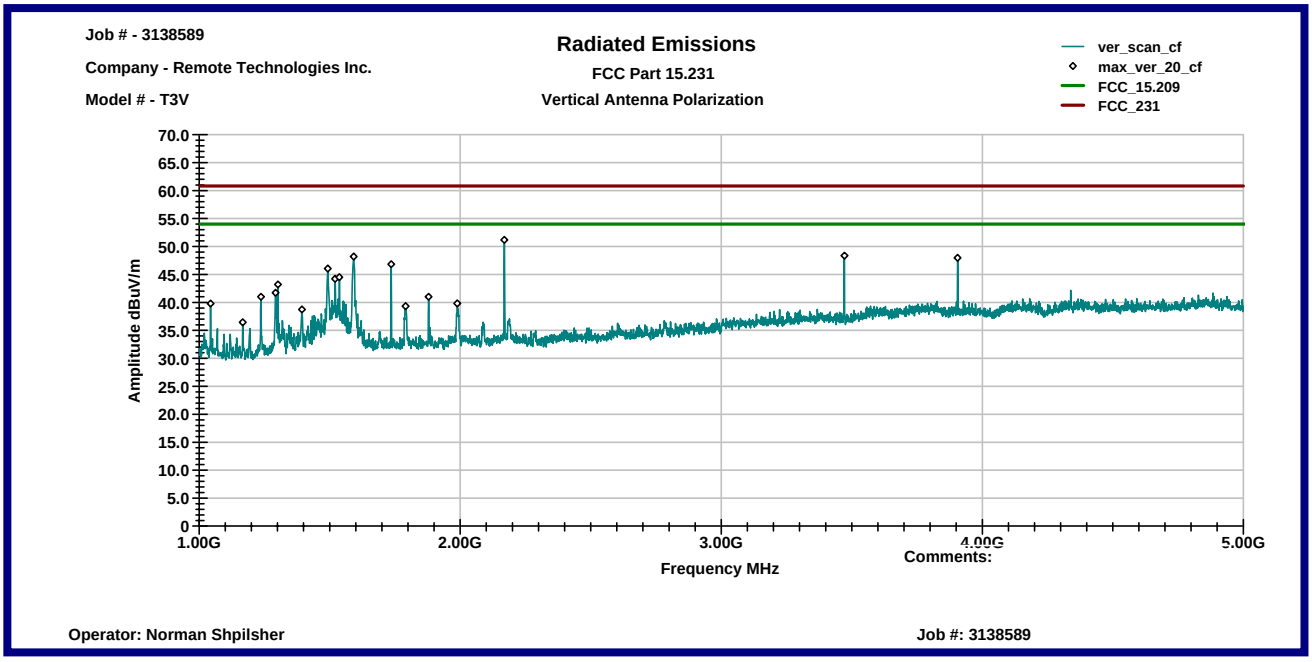
Table 3.2.2

Frequency MHz	Antenna Polarity	Reading dBµV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBµV/m	Average Limit dBµV/m	Margin dB
1.302 GHz	V	55.1	27.7	39.6	43.2	60.8	-17.6
1.394 GHz	V	50.3	27.9	39.5	38.7	60.8	-22.1
1.493 GHz	V	57.3	28.2	39.4	46.0	60.8	-14.8
1.521 GHz	V	55.3	28.3	39.4	44.2	60.8	-16.6
1.537 GHz	V	55.5	28.3	39.3	44.5	60.8	-16.3
1.592 GHz	V	58.9	28.6	39.3	48.2	60.8	-12.6
1.7354 GHz	V	58.7	29.3	39.0	49.0	60.8	-11.9
2.1694 GHz	V	60.1	30.8	38.3	52.6	60.8	-8.2
3.472 GHz	V	51.5	34.4	37.6	48.4	60.8	-12.5
3.905 GHz	V	49.8	35.9	37.7	48.0	60.8	-12.9
1.302 GHz	H	54.4	27.7	39.6	42.5	60.8	-18.4
1.591 GHz	H	56.7	28.6	39.3	46.0	60.8	-14.8
1.7355 GHz	H	61.4	29.3	39.0	51.7	60.8	-9.2
2.1694 GHz	H	53.3	30.8	38.3	45.8	60.8	-15.0
3.472 GHz	H	45.7	34.4	37.6	42.5	60.8	-18.3
4.908 GHz	H	41.8	37.5	37.7	41.6	60.8	-19.2

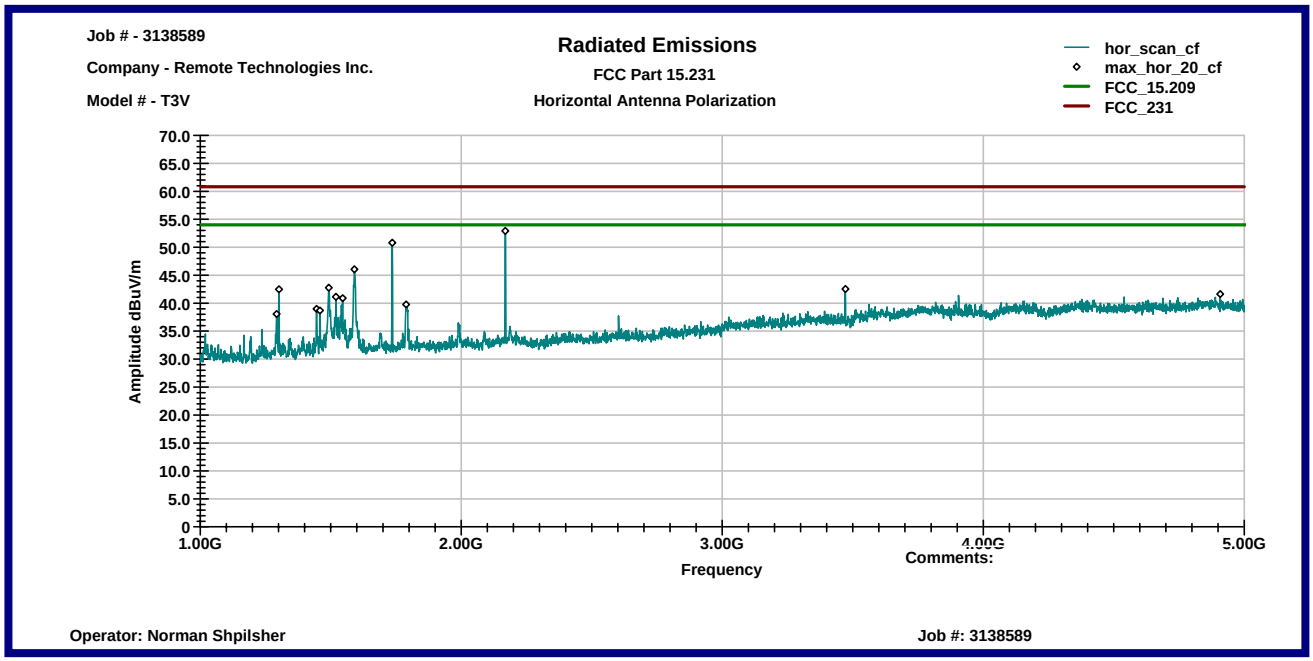
Comments: All measurements were taken using a Peak detector

Graph 3.2.1

Vertical antenna polarization



Horizontal antenna polarization



3.2.1 Average correction factor calculation

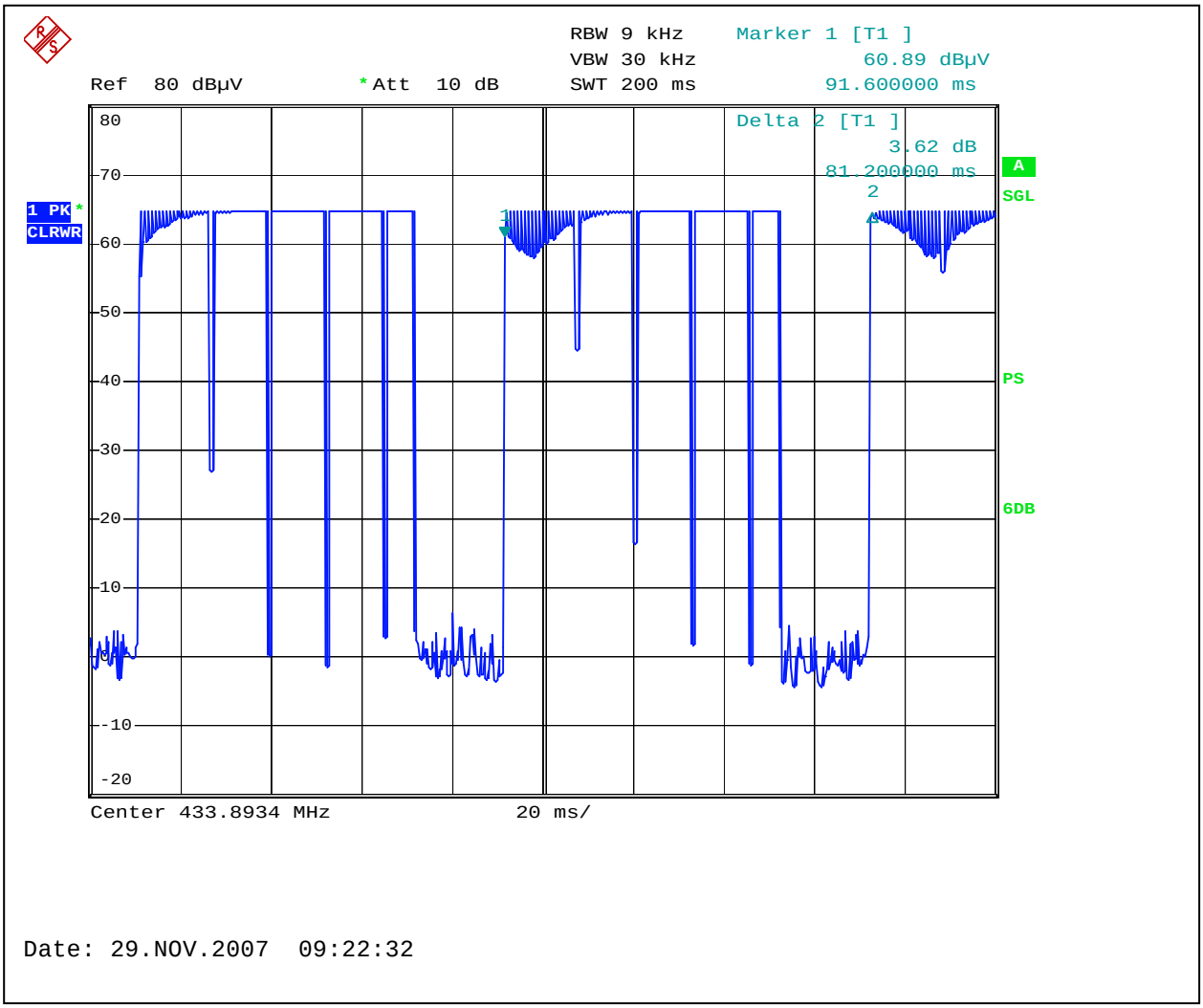
An Average correction factor is calculated by averaging one complete pulse train.

One complete pulse train, including blanking intervals = 81.2ms
Time with field strength is in its maximum value (length of pulses) = 36.7ms

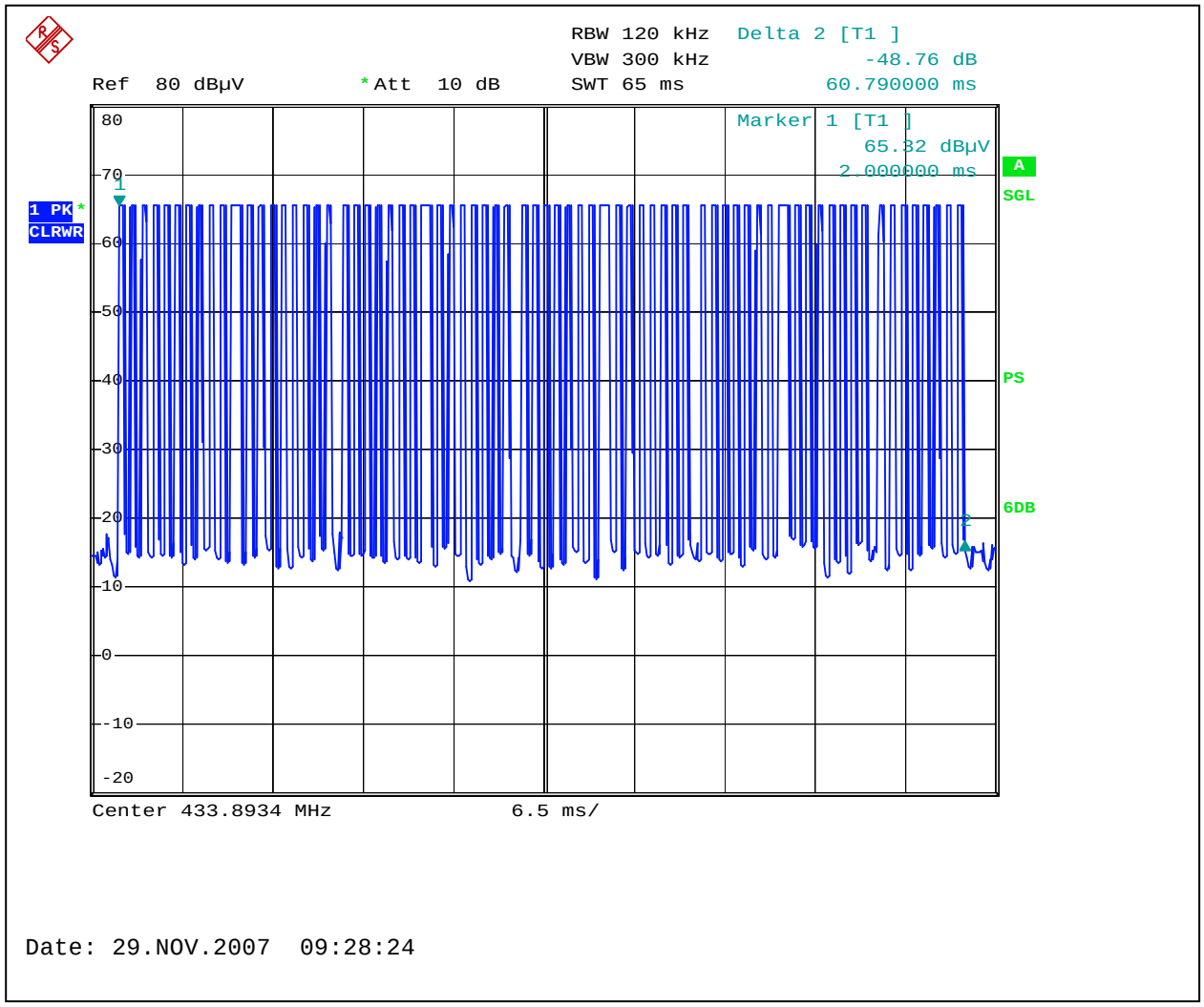
Average Correction Factor = 20Log(36.7ms/81.2ms) = -6.9dB

Graphs 3-2-2 to 3-2-4 are show pulse train timing.

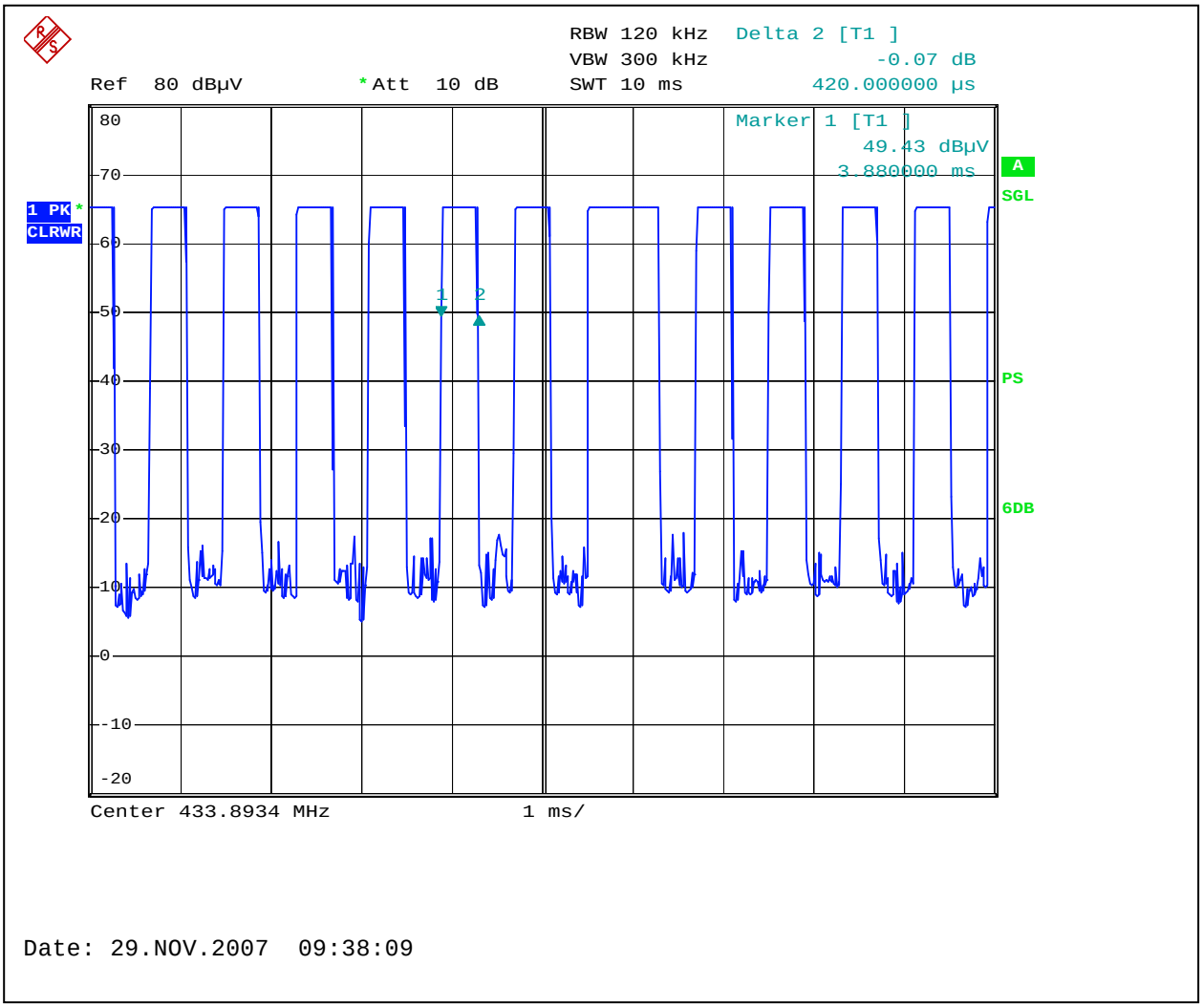
Graph 3.2.2


RBW 9 kHz
VBW 30 kHz
SWT 200 ms
Marker 1 [T1]
60.89 dBµV
91.600000 ms
Ref 80 dBµV
*Att 10 dB
Delta 2 [T1]
3.62 dB
81.200000 ms
2
1 PK *
CLRWR
A
SGL
PS
6DB
80
70
60
50
40
30
20
10
0
-10
-20
Center 433.8934 MHz
20 ms/
Date: 29.NOV.2007 09:22:32

Graph 3.2.3


RBW 120 kHz
VBW 300 kHz
SWT 65 ms
Delta 2 [T1]
-48.76 dB
60.790000 ms
Ref 80 dBµV
*Att 10 dB
Marker 1 [T1]
65.32 dBµV
2.000000 ms
1 PK *
CLRWR
A
SGL
PS
6DB
80
70
60
50
40
30
20
10
0
-10
-20
Center 433.8934 MHz
6.5 ms/
Date: 29.NOV.2007 09:28:24

Graph 3.2.4


RBW 120 kHz
VBW 300 kHz
SWT 10 ms
Delta 2 [T1]
-0.07 dB
420.000000 µs
Ref 80 dBµV
*Att 10 dB
Marker 1 [T1]
49.43 dBµV
3.880000 ms
1 PK
CLRWR
A
SGL
PS
6DB
80
70
60
50
40
30
20
10
0
-10
-20
Center 433.8934 MHz
1 ms/
Date: 29.NOV.2007 09:38:09

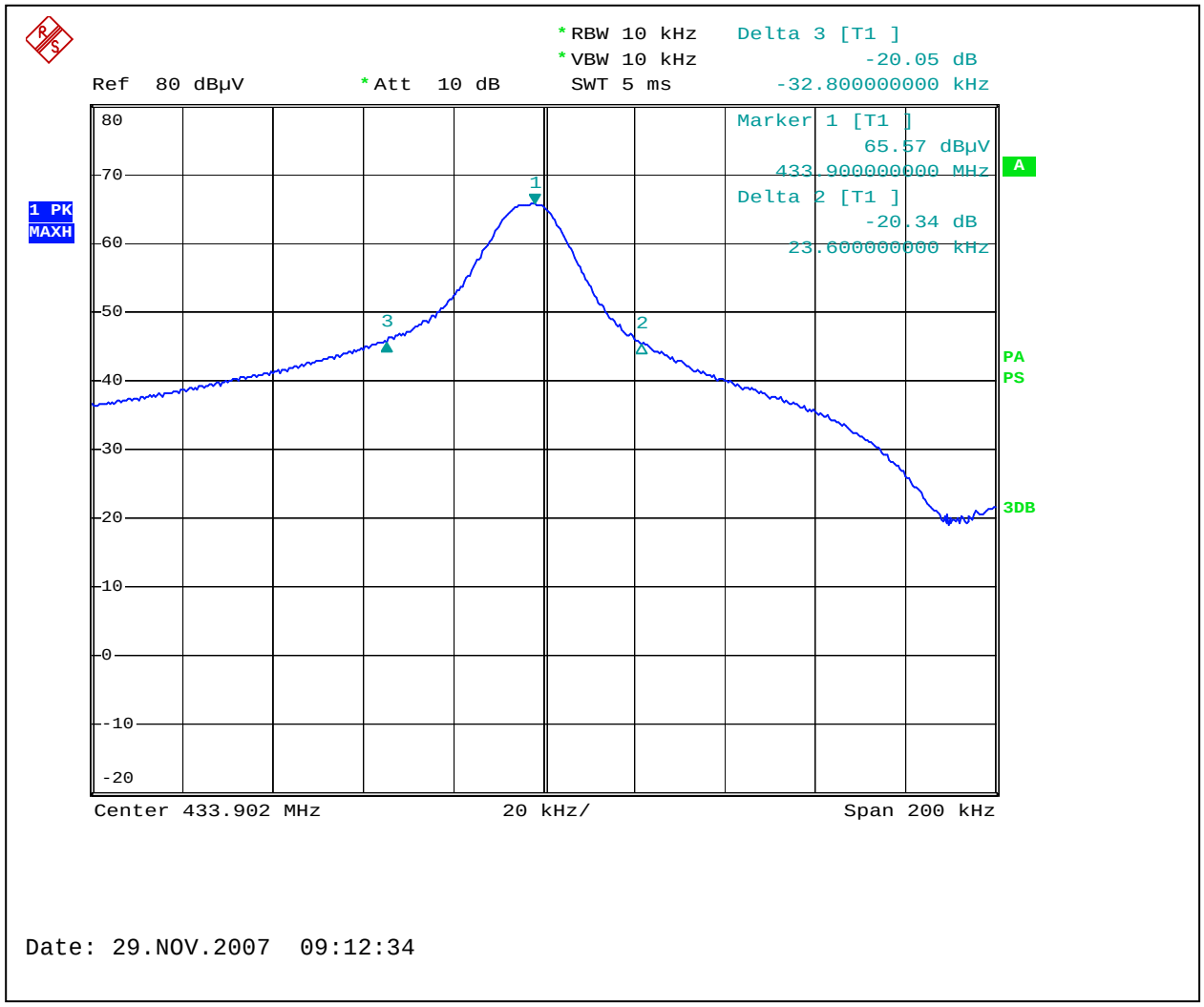
3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Maximum allowed bandwidth kHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz	Result
433.9	1085	56.4	96.0	**Pass**

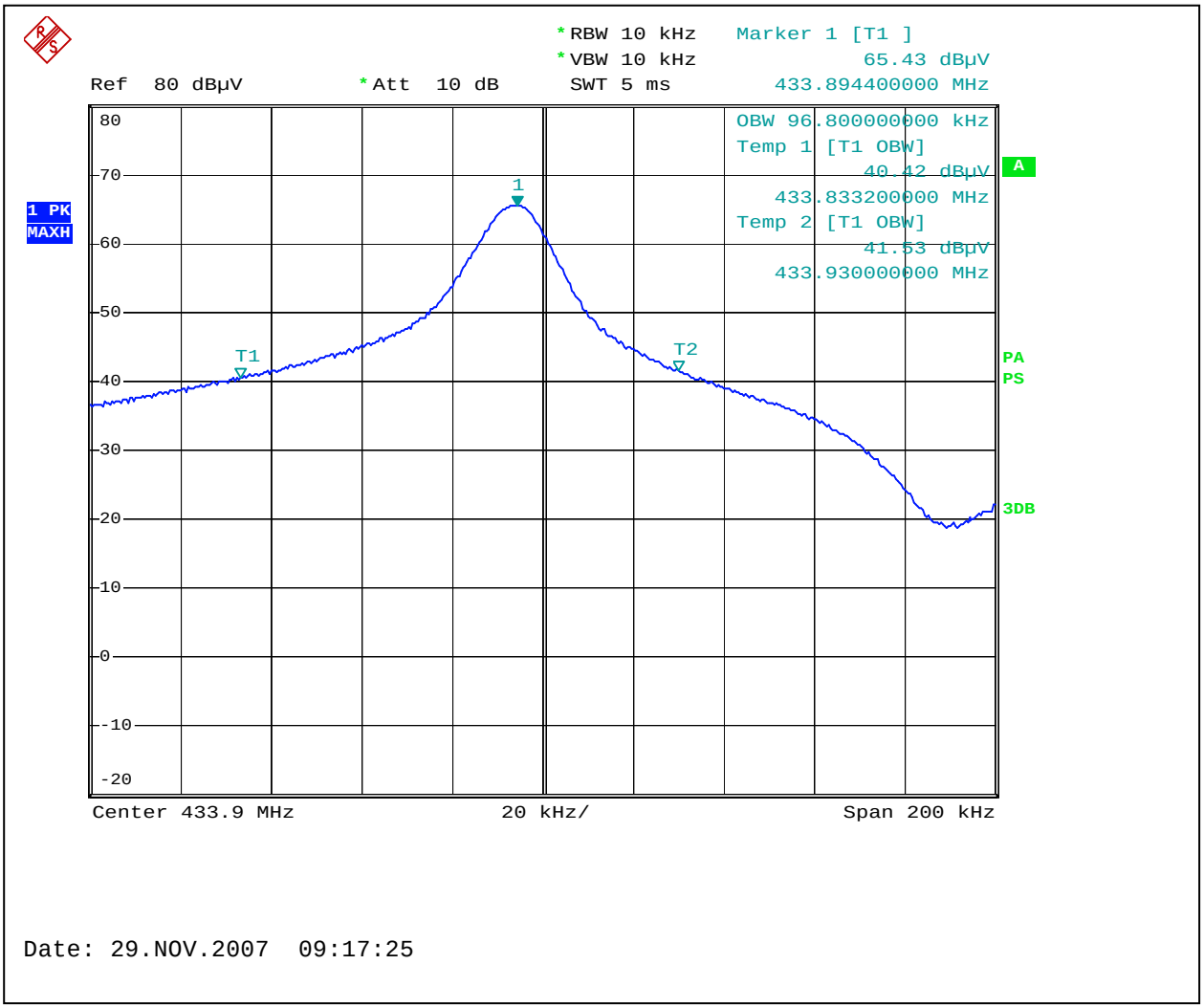
Graphs 3-3-1 and 3-3-2 are show bandwidth of emissions

Notes: None

Graph 3.3.1


*RBW 10 kHz
*VBW 10 kHz
Ref 80 dBµV
*Att 10 dB
SWT 5 ms
Delta 3 [T1]
-20.05 dB
-32.800000000 kHz
Marker 1 [T1]
65.57 dBµV
433.900000000 MHz
Delta 2 [T1]
-20.34 dB
23.600000000 kHz
1 PK
MAXH
A
PA
PS
3DB
80
70
60
50
40
30
20
10
0
-10
-20
Center 433.902 MHz
20 kHz/
Span 200 kHz
Date: 29.NOV.2007 09:12:34

Graph 3.3.2


*RBW 10 kHz
*VBW 10 kHz
Ref 80 dBµV
*Att 10 dB
SWT 5 ms
Marker 1 [T1]
65.43 dBµV
433.894400000 MHz
OBW 96.800000000 kHz
Temp 1 [T1 OBW]
40.42 dBµV
433.833200000 MHz
Temp 2 [T1 OBW]
41.53 dBµV
433.930000000 MHz
1 PK
MAXH
A
PA
PS
3DB
T1
T2
80
70
60
50
40
30
20
10
0
-10
-20
Center 433.9 MHz
20 kHz/
Span 200 kHz
Date: 29.NOV.2007 09:17:25

3.4 Transmitter power line conducted emissions

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test result: **N/A**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: dB below the limits

Notes: It was determined from consideration of the electrical characteristics and usage of particular apparatus that Conducted Emissions testing is inappropriate and therefore unnecessary (as battery operated equipment).

3.5 Digital device radiated emissions

Test location: ☐ OATS ☒ Anechoric Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-1000MHz

Max. Emissions margin: 2.1 dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Tables 3.5.1 and 3.5.2 and Graph 3.5.1)

Date:	November 28, 2007	**Result:** **Pass**
Standard:	FCC Part 15.109, Class B	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure	
Operation mode:	Transmitting function is off / standby mode	
Note:	Readings below 1GHz	

Table 3.5.1

Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	QP Reading	Total @ 3m	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dBµV/m	dB	
298.53	V	162	13.6	2.0	0.0	22.6	38.1	46.0	-7.9	
398.04	V	155	16.1	2.4	0.0	18.4	36.8	46.0	-9.2	
497.61	V	100	17.5	2.6	0.0	18.6	38.7	46.0	-7.3	
697.05	V	100	19.2	3.2	0.0	20.2	42.6	46.0	-3.4	
298.56	H	100	13.6	2.0	0.0	23.4	38.9	46.0	-7.1	
398.08	H	100	16.1	2.4	0.0	22.9	41.3	46.0	-4.7	
497.61	H	100	17.5	2.6	0.0	15.4	35.5	46.0	-10.5	
572.20	H	100	18.4	2.9	0.0	16.9	38.2	46.0	-7.8	
597.08	H	144	18.7	3.0	0.0	22.3	44.0	46.0	-2.1	
646.84	H	144	18.9	3.1	0.0	17.6	39.6	46.0	-6.4	
696.58	H	119	19.2	3.2	0.0	21.3	43.7	46.0	-2.3	
796.14	H	100	20.3	3.5	0.0	6.8	30.5	46.0	-15.5	

Comments:

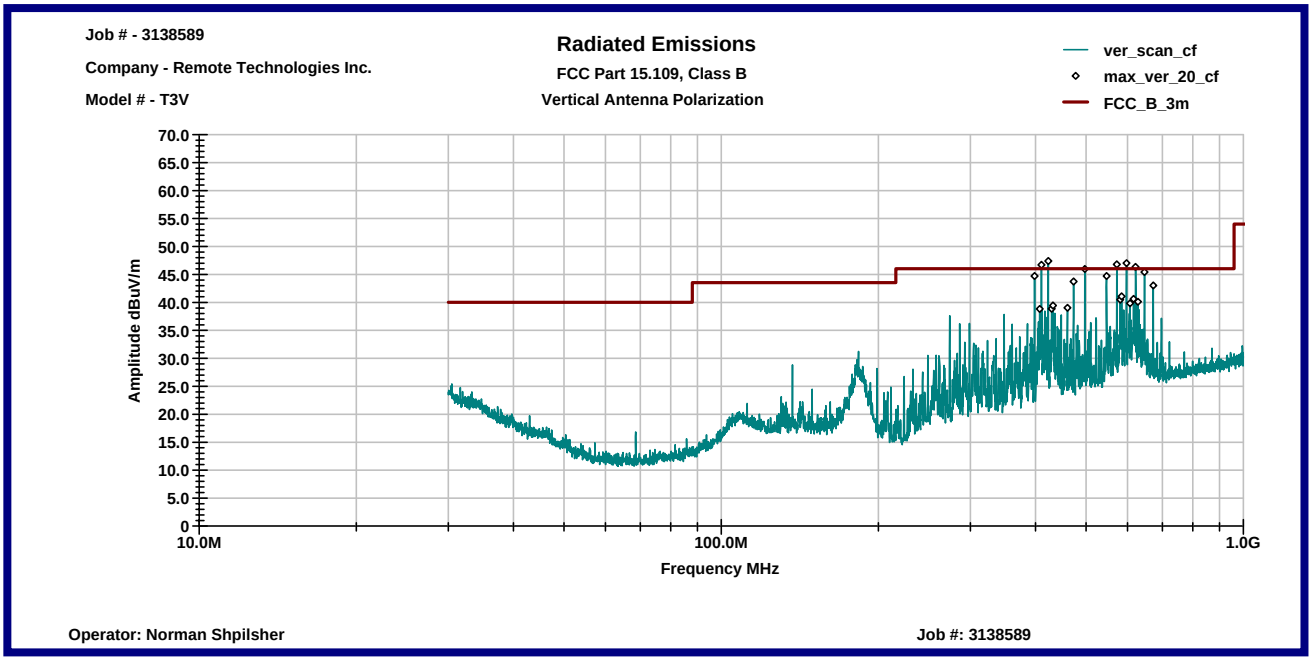
Date:	November 28, 2007	**Result:** **Pass**
Standard:	FCC Part 15.109, Class B	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure	
Operation mode:	Transmitting function is off / standby mode	
Note:	Readings above 1GHz	

Table 3.5.2

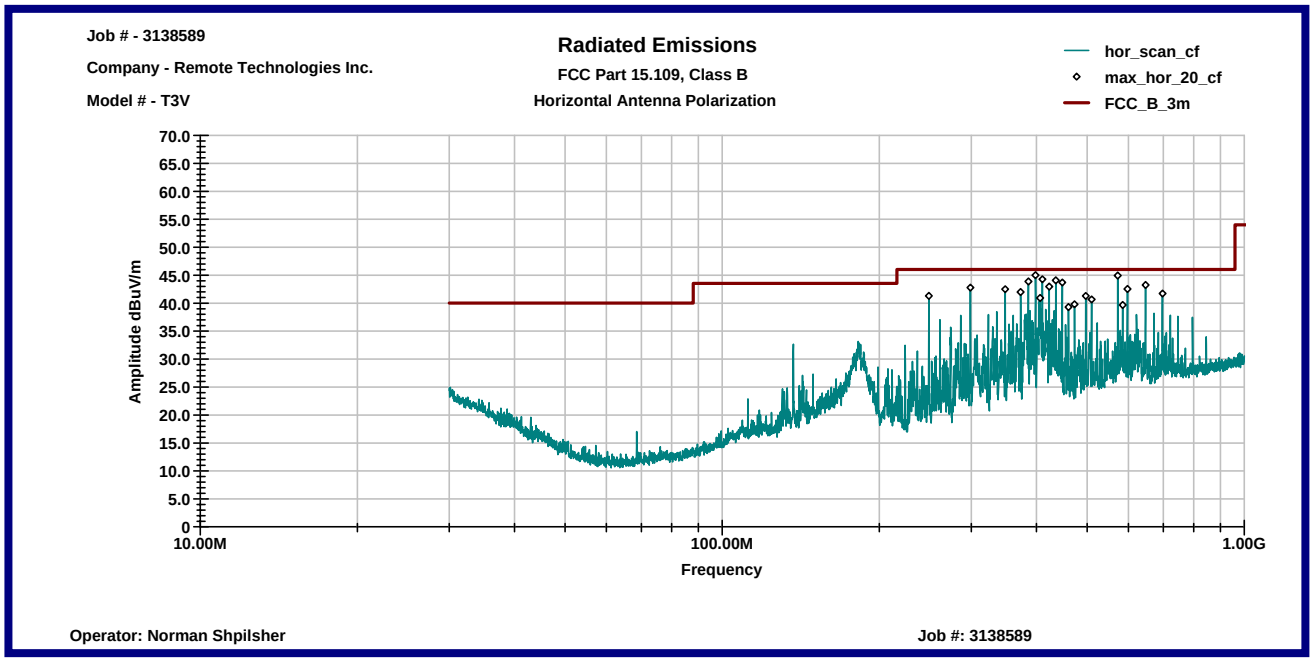
Frequency MHz	Antenna Polarity	Peak Reading dBµV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBµV/m	Average Limit dBµV/m	Margin dB
1.493 GHz	V	57.3	28.2	39.4	46.0	54.0	-8.0
1.521 GHz	V	55.3	28.3	39.4	44.2	54.0	-9.8
1.537 GHz	V	55.5	28.3	39.3	44.5	54.0	-9.5
1.592 GHz	V	58.9	28.6	39.3	48.2	54.0	-5.8
1.493 GHz	H	54.0	28.2	39.4	42.7	54.0	-11.2
1.52 GHz	H	52.2	28.3	39.4	41.1	54.0	-12.9
1.546 GHz	H	51.8	28.4	39.3	40.9	54.0	-13.1
1.591 GHz	H	56.7	28.6	39.3	46.0	54.0	-7.9
1.789 GHz	H	49.2	29.5	38.9	39.8	54.0	-14.2

Graph 3.5.1

Vertical antenna polarization



Horizontal antenna polarization



3.6 Digital device conducted emissions

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test result: **N/A**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: _____ dB below the limits

Notes: It was determined from consideration of the electrical characteristics and usage of particular apparatus that Conducted Emissions testing is inappropriate and therefore unnecessary (as battery operated equipment).

4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	CAL DUE	USED
Receiver RF Section	HP	85462A	3549A00306	02/27/2008	☐
RF Filter Section	HP	85460A	3448A00276	02/27/2008	☐
Spectrum Analyzer	R & S	FSP 40	100024	08/23/2008	☒
Spectrum Analyzer	R & S	ESCI	100358	04/27/2008	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	07/30/2008	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2630	09/07/2008	☐
Horn Antenna	EMCO	3115	9507-4513	01/09/2008	☒
Horn Antenna	EMCO	3115	6579	03/06/2008	☐
Waveguide Horn Antenna	EMCO	3116	9904-2423	07/20/2008	☐
Loop Antenna	A.H.Systems	SAS-200/562	215	05/04/2008	☐
Monopole Antenna	A.H.Systems	SAS-200/550-1	692	05/09/2008	☐
LISN	Fischer Custom Communications	FCC-LISN-2	316	09/24/2008	☐
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	04/24/2008	☒
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	11/05/2008	☐
Pre-Amplifier	MITEQ	AMF-6F-26004000-40-8P	13224444	11/05/2008	☐
Pre-Amplifier	HP	8447F OPT H64	3113A04974	03/07/2008	☐
System	TILE! Instrument Control		Ver. 3.4.K.29	VBU	☒