TEST REPORT

Report Number: 100024851MIN-001
Project Number: G100024851

Testing performed on the
2WTTS

FCC ID: B4Z-924-2WTTS
Industry Canada ID: 1175C-9242WTTS

to
47 CFR Part 15. 231:2008
RSS- 210, Issue 7, 2007

GE Security Inc.

Test Performed by:
Intertek Testing Services NA, Inc.
7250 Hudson Blvd., Suite 100
Oakdale, MN 55128

Test Authorized by:
GE Security Inc.
1275 Red Fox Road
Arden Hills, MN 55112

Prepared by: _____ Date: January 27, 2010
Norman Shpilsher

Reviewed by: _____ Date: January 27, 2010
Simon Khazon

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1.0 GENERAL DESCRIPTION

Model:	2WTTS
Type of EUT:	Transmitter
FCC ID:	B4Z-924-2WTTS
Industry Canada ID:	1175C-9242WTTS
Related Submittal(s) Grants:	None
Company:	GE Security Inc.
Customer:	Mr. Rick Conner
Address:	1275 Red Fox Road Arden Hills, MN 55112
Phone:	651-779-4824
Fax:	651-779-4884
e-mail:	Rick.Conner@ge.com
Test Standards:	☒ 47 CFR, Part 15:2008, §15.231 ☒ RSS–210, Issue 7, 2007 ☒ RSS-Gen, Issue 2, 2007 ☒ 47 CFR, Part 15:2008, §15.107 and §15.109, Class B ☐ Other
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	January 25, 2010
Test Work Started:	January 25, 2010
Test Work Completed:	January 27, 2010
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good

1.1 Product Description; Test Facility

Product Description:	Two Way Talking Touch Screen Security Remote Control Transmitter
Operating Frequency	319.5 MHz
Modulation:	FSK
Emission Designator:	K1D
Antenna(s) Info:	Transmitter antenna: integral antenna Receiver antenna: permanently attached soldered wire antenna
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter power configuration:	☒ Internal battery, 6VDC (4 x 1.5V AA-size batteries) ☒ External power source, 6VDC via 100-240VAC, 50/60Hz / 6VDC Power Adapter, model MGT-6500SPS
Special Test Arrangement:	The EUT is a wall-mounted device, therefore was tested as a table top equipment with normal (vertical) position
Test Facility Accreditation:	A2LA (Certificate No. 1427.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.4-2003

1.2 EUT Configuration

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

☒ - Standby / receiving mode
☒ - Continuous transmitting mode
☐ - Test program (customer specific)
☐ -

Operating modes of the EUT:

No.	Description
1	Two units were tested: - a "regular" unit was tested in standby / receiving mode and for average correction factor calculations - a wired to transmit continuously unit was tested for other tests
2	

Cables:

No.	Type	Length	Designation	Note
1	N/A			
2				

Support equipment/Services:

No.	Item	Description
1	Generator R&S SMR20	Signal source for the EUT testing in standby / receiver mode
2		

General notes: None

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)

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	Pass
15.109/ICES-003/ RSS-Gen 4.10	Receiver/digital device radiated emissions	Pass
15.107/ ICES-003	Digital device conducted emissions	Pass

3.0 TEST CONDITIONS AND RESULTS

3.1 Transmitter deactivation time

Maximum allowed deactivation time: 5 sec

Measured deactivation time: 0.03 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-4000MHz

Test result: **Pass**

Max. Emissions margin at fundamental: 1.1dB below the limits

Max. margin of harmonics and spurious emissions: 13.0dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Table 3.2.1 and Graphs 3.2.1 to 3.2.4).

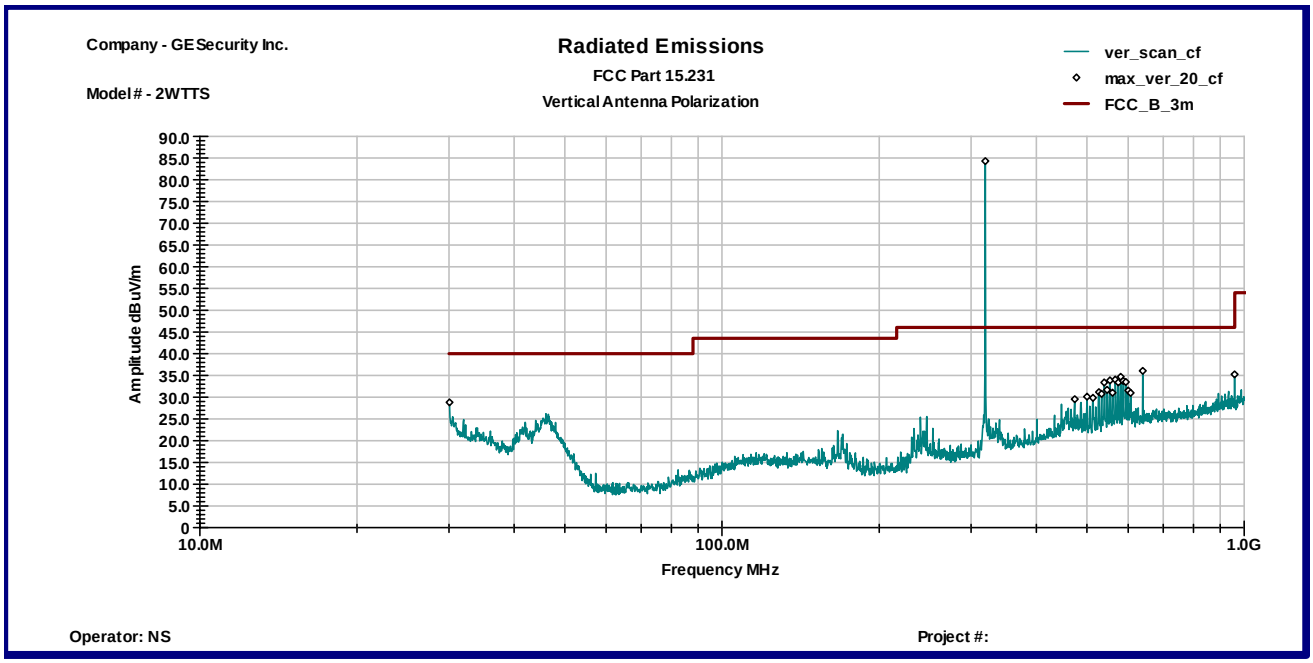
Date:	January 25 – 26, 2010	**Result:** **Pass**
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:		

Table 3.2.1

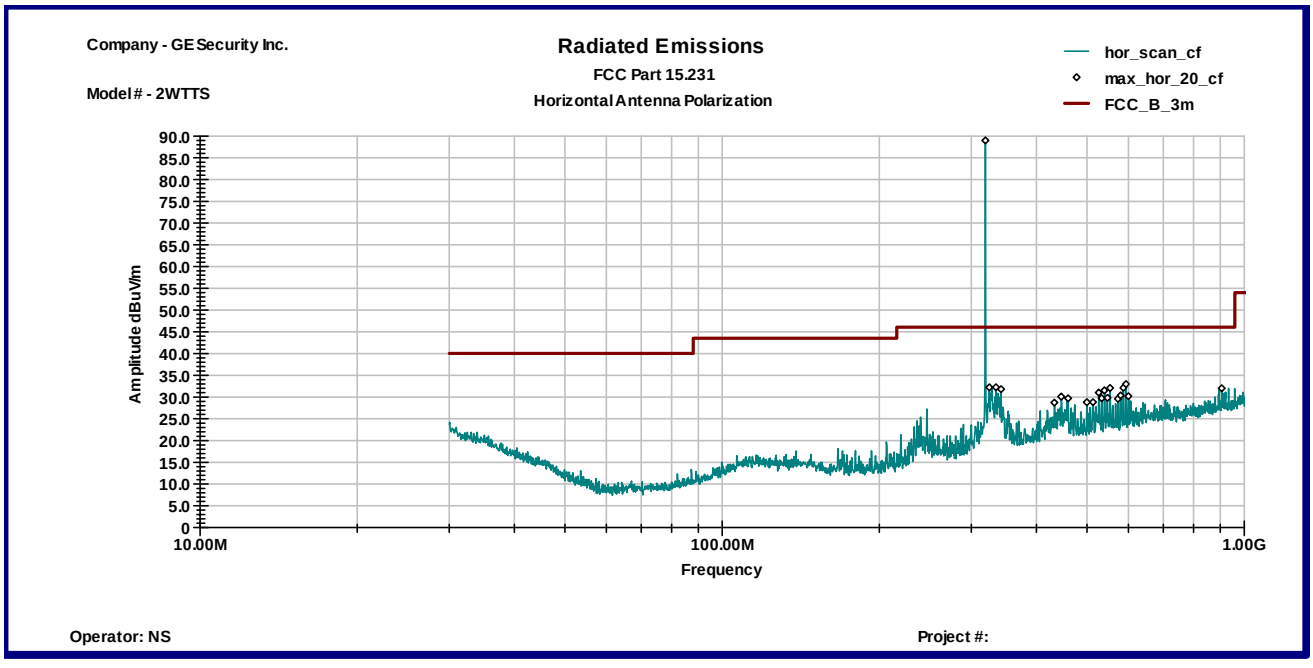
Frequency MHz	Antenna Polarity	Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dBµV	Average Factor dB	Total @ 3m dBµV/m	Limit dBµV/m	Margin dB
		Peak Emissions at Fundamental Frequency							
319.51	V	14.3	2.0	0.0	78.1		94.4	95.9	-1.5
319.51	H	14.3	2.0	0.0	72.4		88.7	95.9	-7.2
		Average Emissions at Fundamental Frequency							
319.51	V	14.3	2.0	0.0	78.1	19.6	74.8	75.9	-1.1
319.51	H	14.3	2.0	0.0	72.4	19.6	69.1	75.9	-6.8
		Spurious and Harmonics Emissions, Average Limits							
639.14	V	19.6	3.0	0.0	20.1		42.7	55.9	-13.2
639.14	H	19.6	3.0	0.0	15.3		37.9	55.9	-18.0
958.73	V	21.6	3.7	0.0	15.5		40.8	55.9	-15.1
958.73	H	21.6	3.7	0.0	17.6		42.9	55.9	-13.0
639.14	V	19.6	3.0	0.0	20.1		42.7	55.9	-13.2
1012.00	H	23.3	2.2	42.4	51.3		34.5	55.9	-21.4
1079.20	H	23.6	2.3	42.5	51.2		34.6	55.9	-21.3
1118.80	V	23.7	2.4	42.5	54.4		38.0	55.9	-17.9
1133.20	V	23.7	2.4	42.5	54.3		38.0	55.9	-17.9
3839.20	H	31.8	4.5	43.0	45.9		39.2	55.9	-16.7
3900.40	V	31.9	4.5	43.0	45.5		39.0	55.9	-16.9

Graph 3.2.1

Vertical antenna polarization

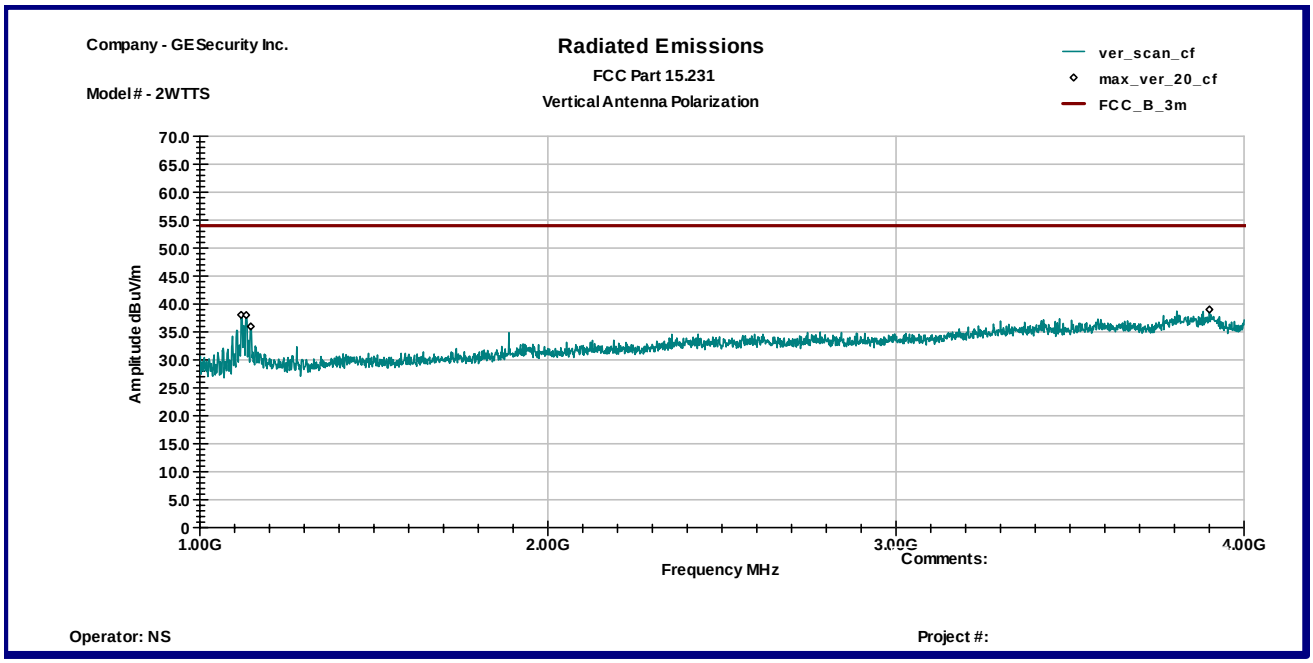


Horizontal antenna polarization

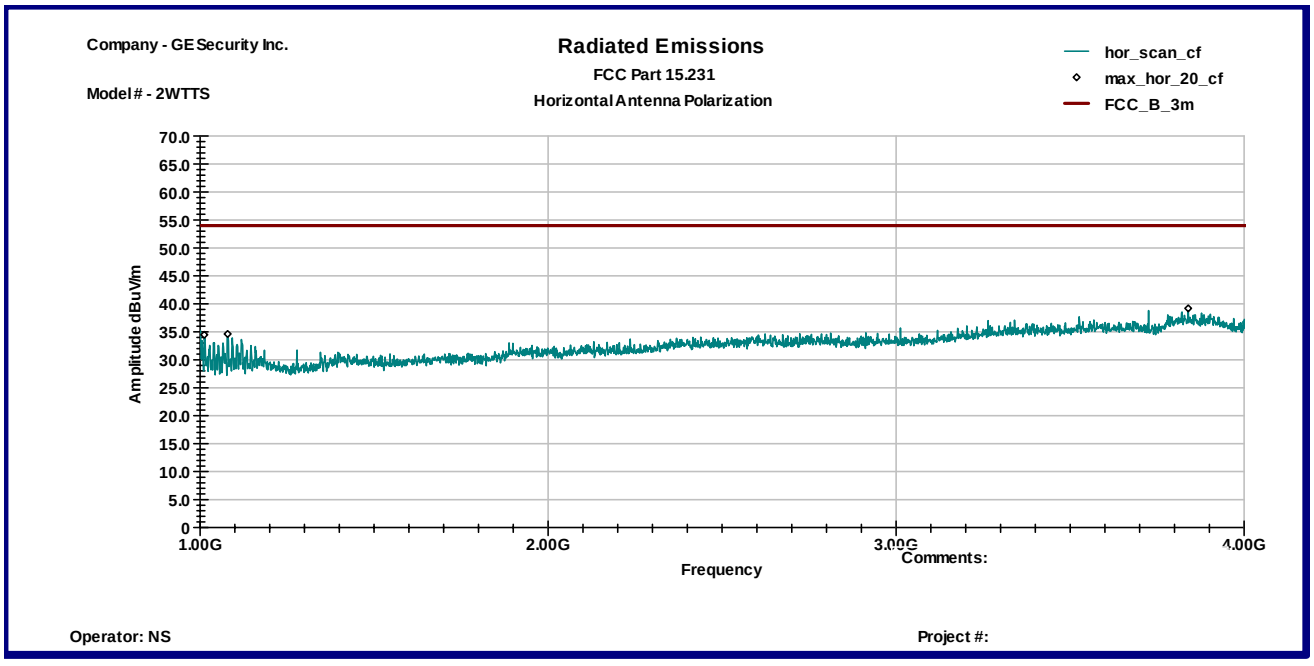


Graph 3.2.2

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.

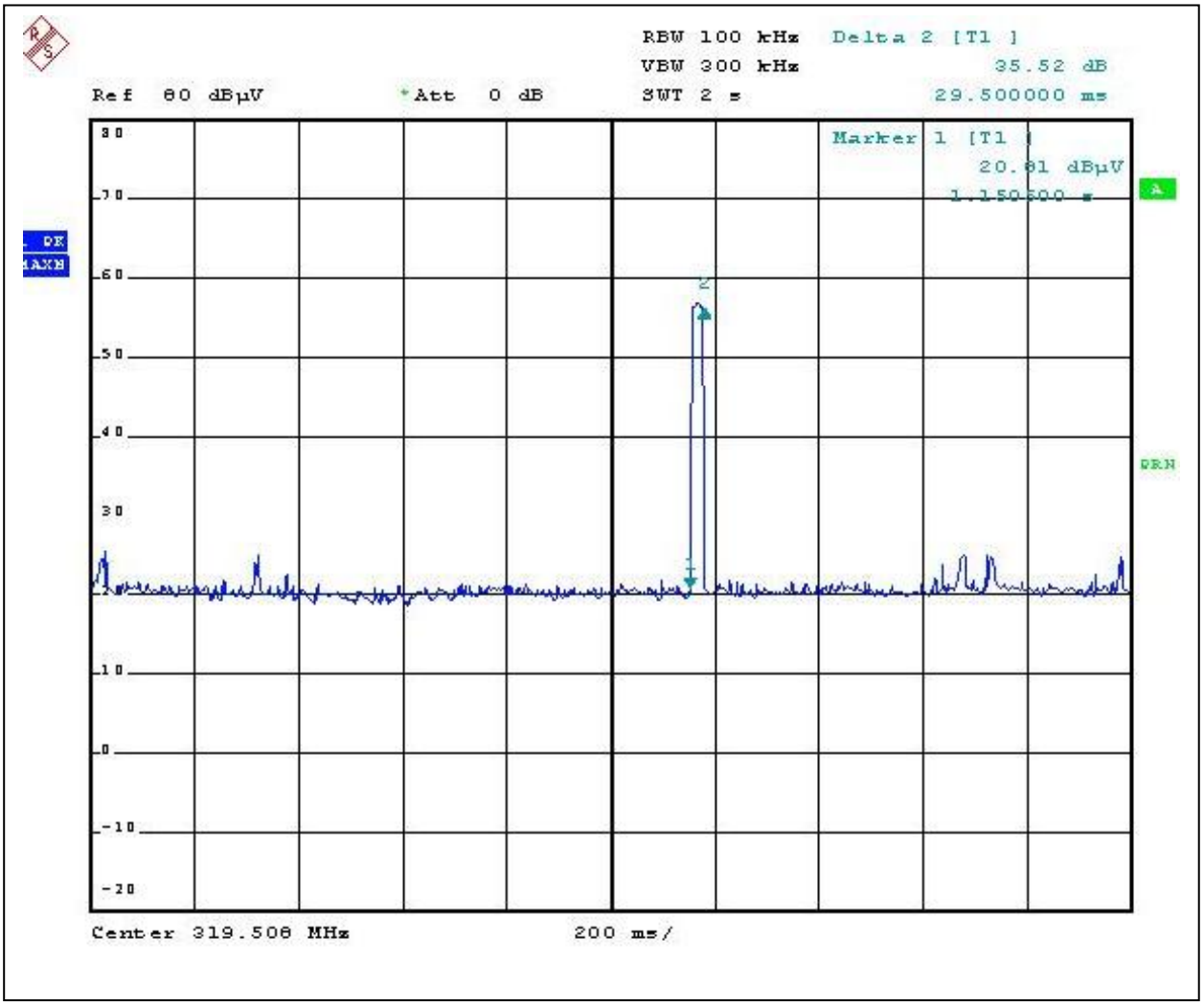
One complete pulse train, including blanking intervals more than 100ms

Time with field strength is in its maximum value (length of pulses) = 10.5ms
(Number of pulses=81, pulse length=130µs, total transmitting = 130µs x 81 = 10.5m)

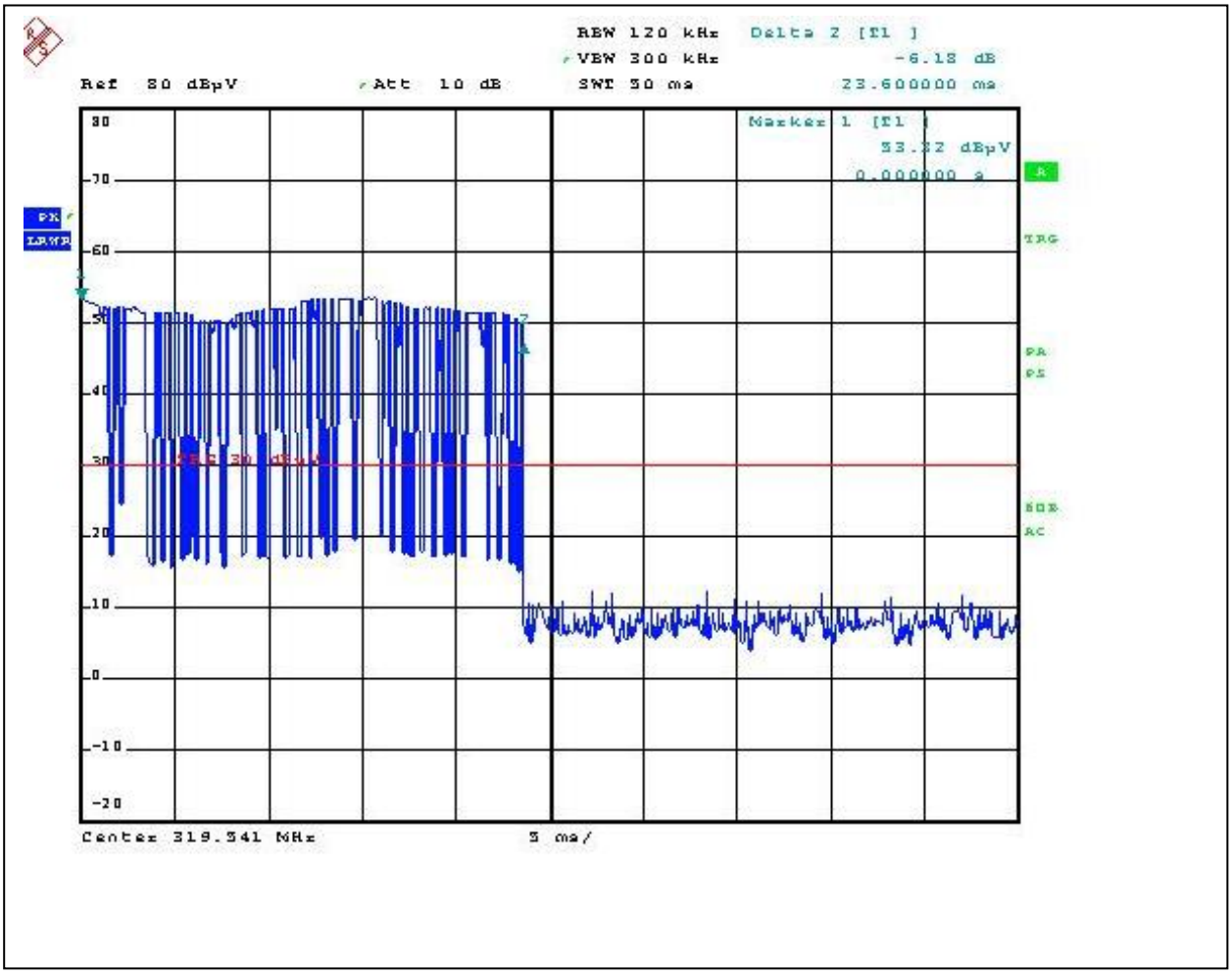
Average Correction Factor = 20Log(10.5ms/100ms) = -19.6dB

Graphs 3-2-3 to 3-2-5 are show pulse train timing.

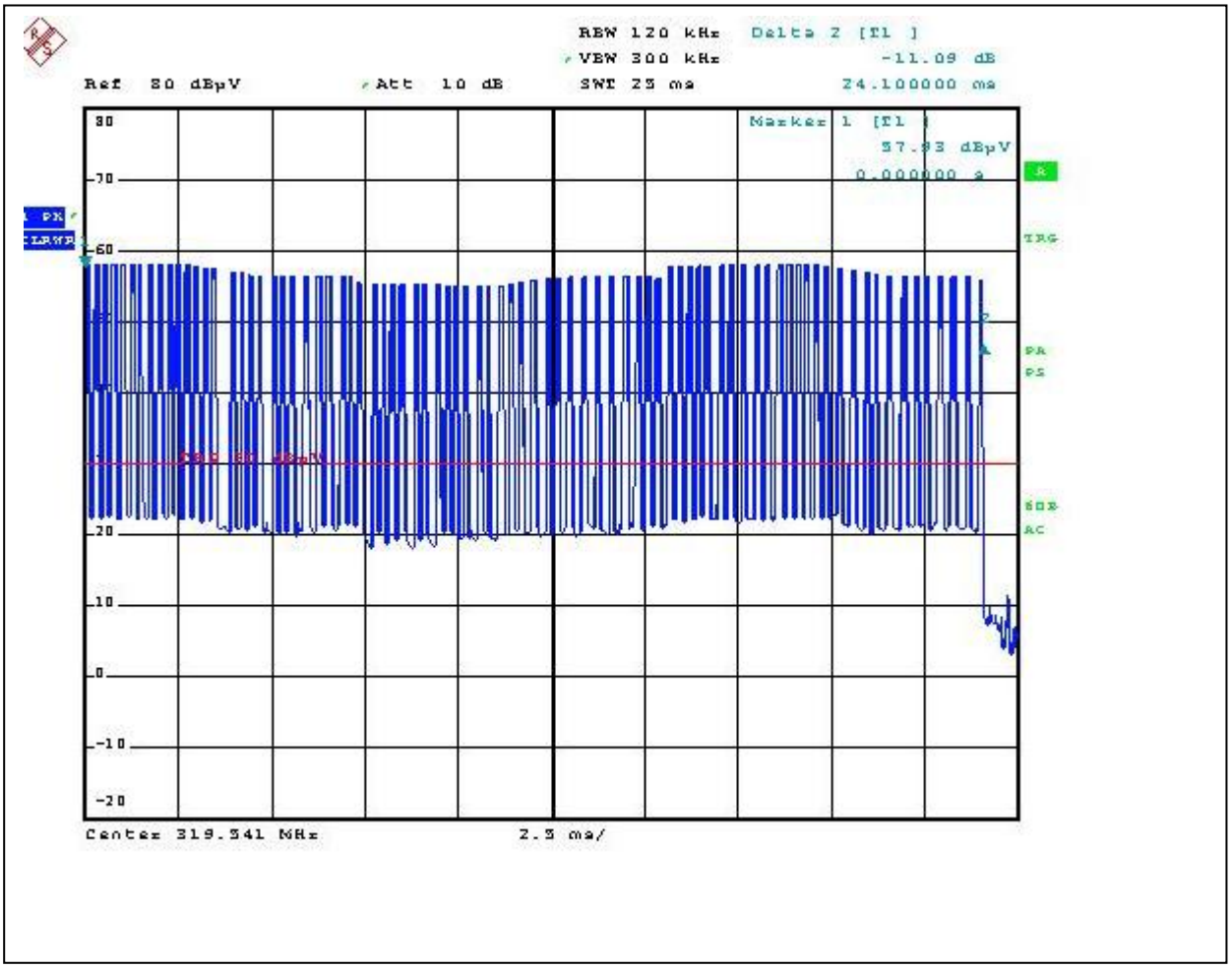
Graph 3.2.3


RBW 100 kHz
VBW 300 kHz
SWT 2 s
Delta 2 [T1]
35.52 dB
29.500000 ms
Ref 80 dBµV
*Att 0 dB
Marker 1 [T1]
20.61 dBµV
1.150500 s
80
70
60
50
40
30
10
0
-10
-20
Center 319.508 MHz
200 ms/

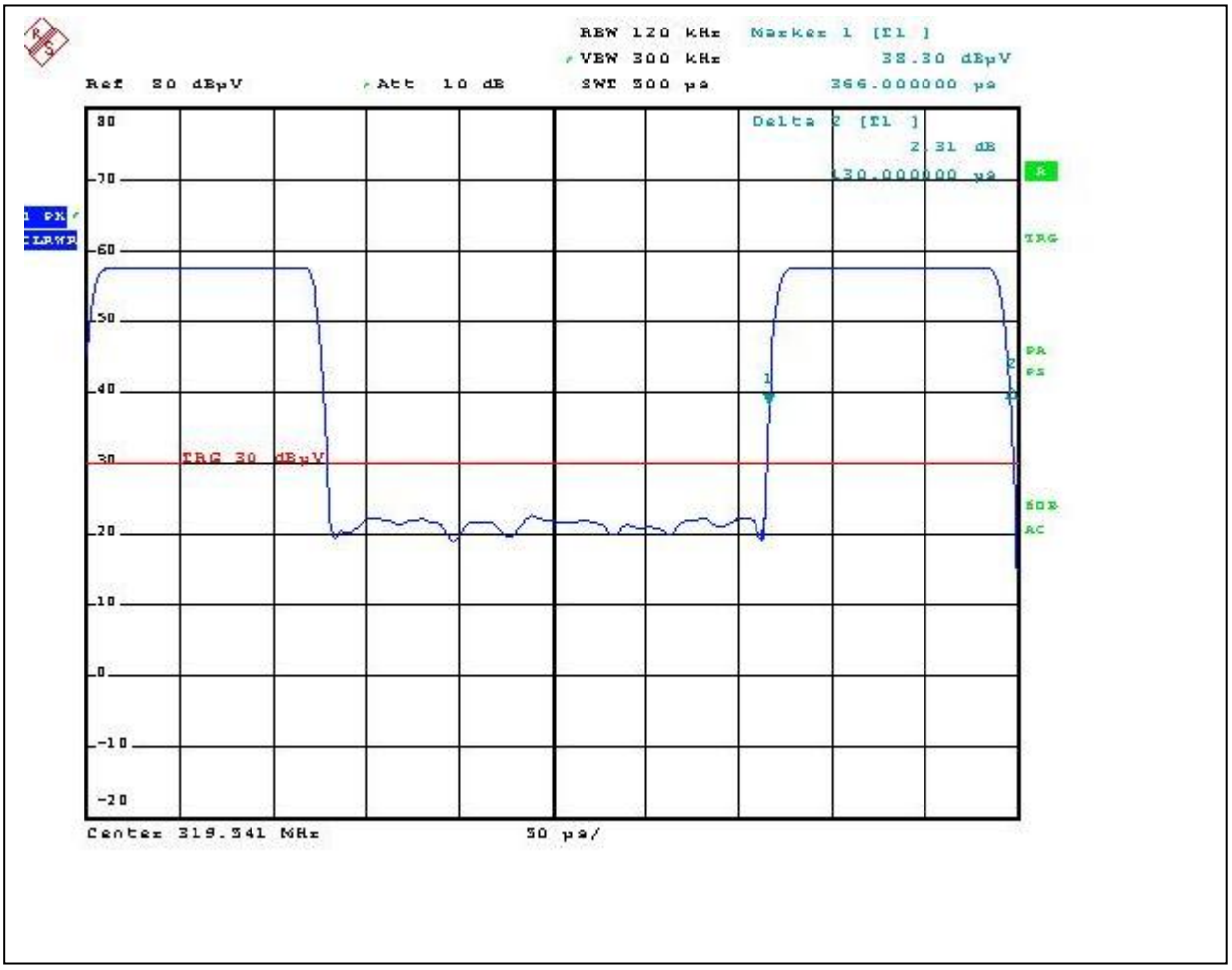
Graph 3.2.4


RBW 120 kHz
VBW 300 kHz
SWT 50 ms
Delta 2 [T1]
-6.18 dB
23.600000 ms
Ref 80 dBµV
Att 10 dB
Marker 1 [T1]
53.22 dBµV
0.000000 s
PK
CLRWR
TRG
PA
PS
80
70
60
50
40
30
20
10
0
-10
-20
Center 319.541 MHz
5 ms/

Graph 3.2.5


RBW 120 kHz
VBW 300 kHz
SWT 25 ms
Delta 2 [T1]
-11.09 dB
24.100000 ms
Ref 80 dBµV
Att 10 dB
Marker 1 [T1]
57.93 dBµV
0.000000 s
80
70
60
20
10
0
-10
-20
Center 319.541 MHz
2.5 ms/
TRG
PA
PS
BOR
AC

Graph 3.2.6


RBW 120 kHz
VBW 300 kHz
SWT 500 µs
Marker 1 [T1]
38.30 dBµV
366.000000 µs
Ref 80 dBµV
Att 10 dB
Delta 2 [T1]
2.31 dB
130.000000 µs
TRG 30 dBµV
80
70
60
50
40
30
20
10
0
-10
-20
Center 319.341 MHz
50 µs/
TRG
SGL
AC

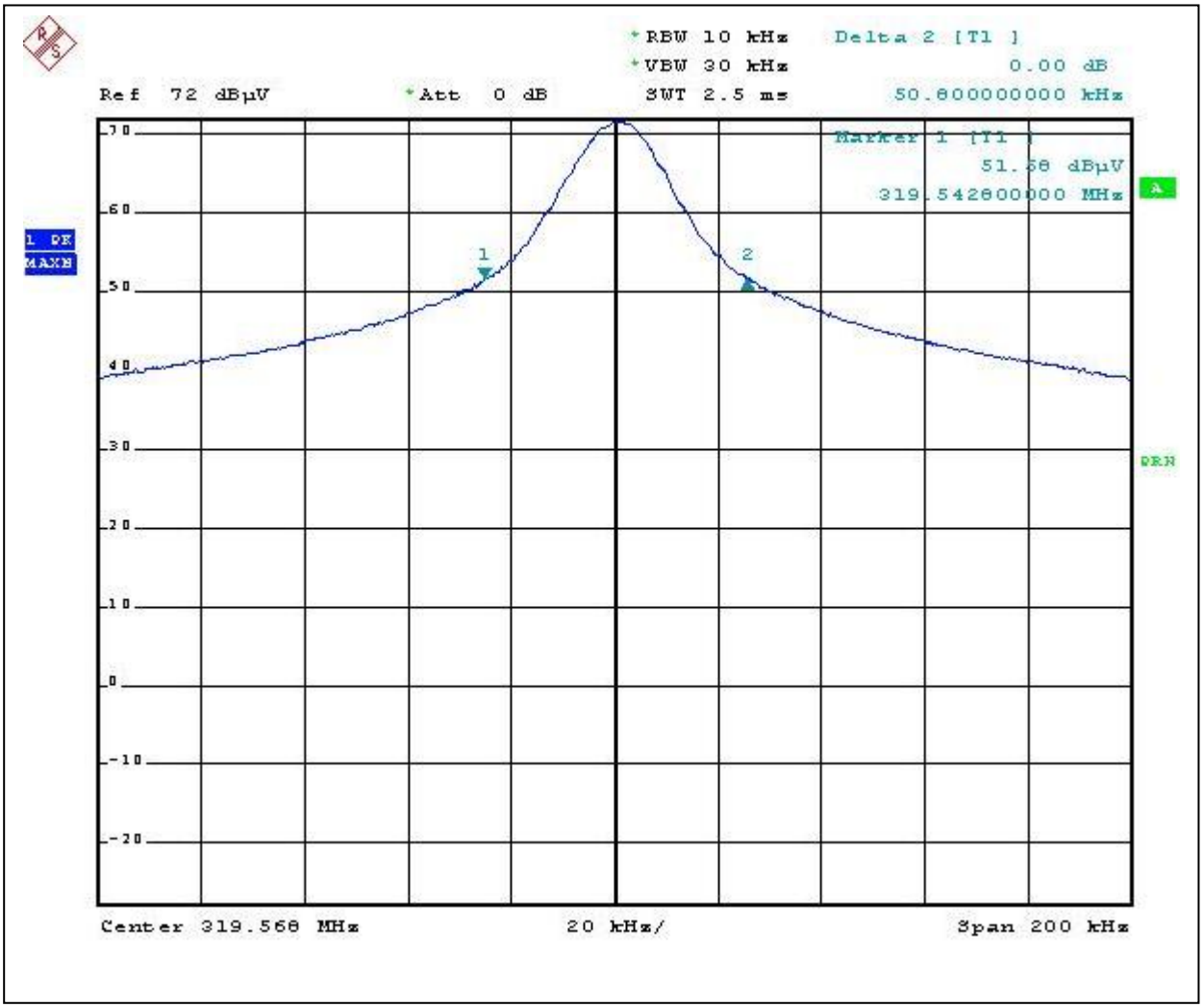
3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Maximum allowed bandwidth kHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz	Result
319.5	798.8	50.8	90.3	**Pass**
Maximum allowed bandwidth:	☒ 0.25% of the centre operating frequency ☐ 0.5% of the centre operating frequency			
RBW: **VBW:**	☒ 10kHz ☐ 100kHz ☐ other kHz ☒ 30kHz ☐ 300kHz ☐ other kHz			

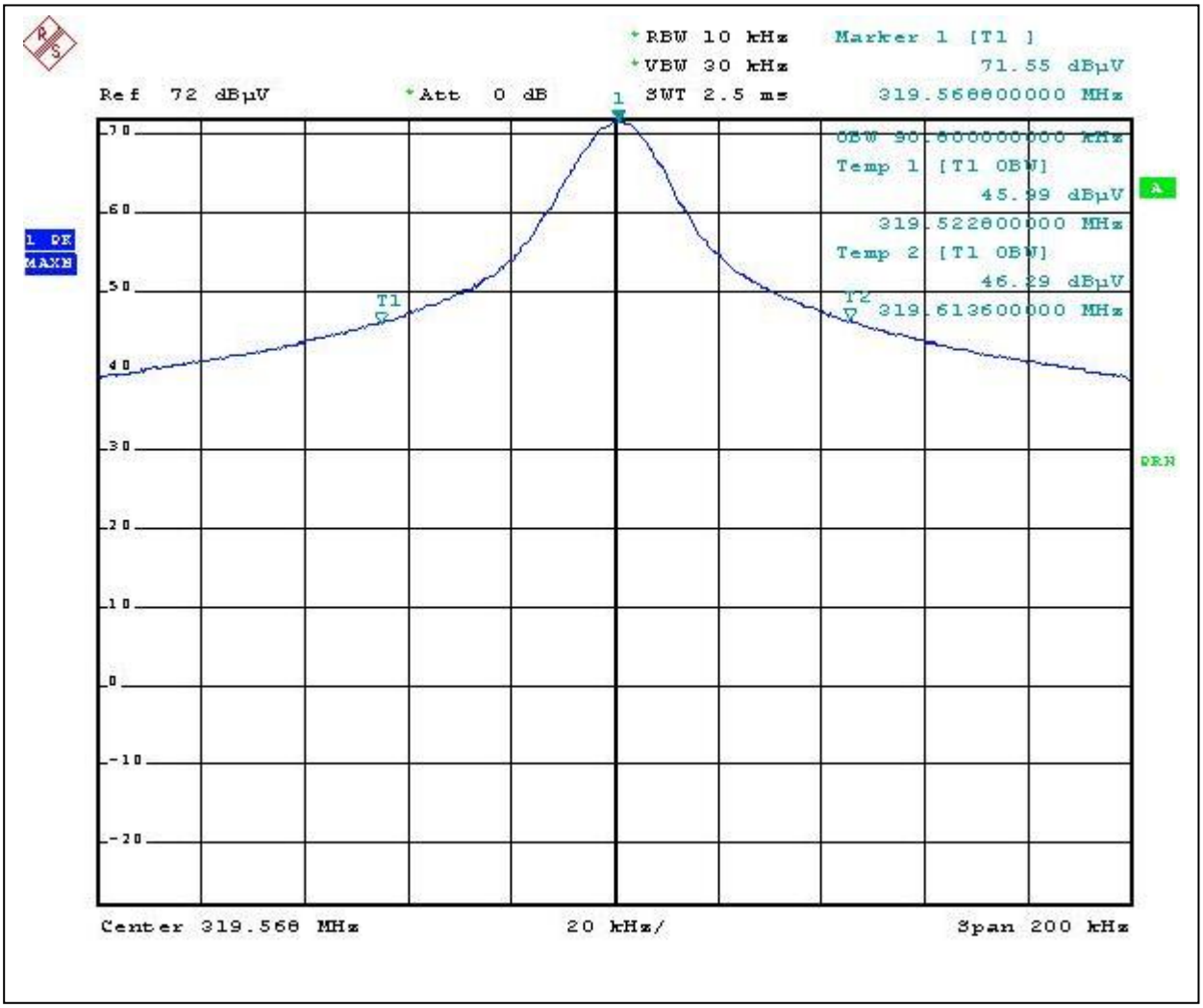
Graph 3-3-1 shows 20dB bandwidth of emissions
Graph 3-3-2 shows 99%bandwidth of emissions

Notes: None

Graph 3.3.1


*RBW 10 kHz
*VBW 30 kHz
SWT 2.5 ms
Delta 2 [T1]
0.00 dB
50.800000000 kHz
Ref 72 dBµV
*Att 0 dB
Marker 1 [T1]
51.58 dBµV
319.542800000 MHz
1 PK
MAXH
A
VIEW
70
60
50
40
30
20
10
0
-10
-20
Center 319.560 MHz
20 kHz/
Span 200 kHz

Graph 3.3.2


*RBW 10 kHz
*VBW 30 kHz
Ref 72 dBµV
*Att 0 dB
SWT 2.5 ms
Marker 1 [T1]
71.55 dBµV
319.568000000 MHz
OBW 90.000000000 kHz
Temp 1 [T1 OBW]
45.99 dBµV
319.522000000 MHz
Temp 2 [T1 OBW]
46.29 dBµV
319.613600000 MHz
1 PK
MAXH
T1
T2
70
60
50
40
30
20
10
0
-10
-20
Center 319.568 MHz
20 kHz/
Span 200 kHz

3.4 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 5.2dB below the limits

Notes: None

Date:	January 27, 2010	**Result:** **Pass**
Standard:	FCC Part 15.207 / RSS-Gen 7.2.2	
Tested by:	Norman Shpilsher	
Test Point:	Power Line	
Operation mode:	See Page 5	
Note:		

Table 3.4.1

Line 1

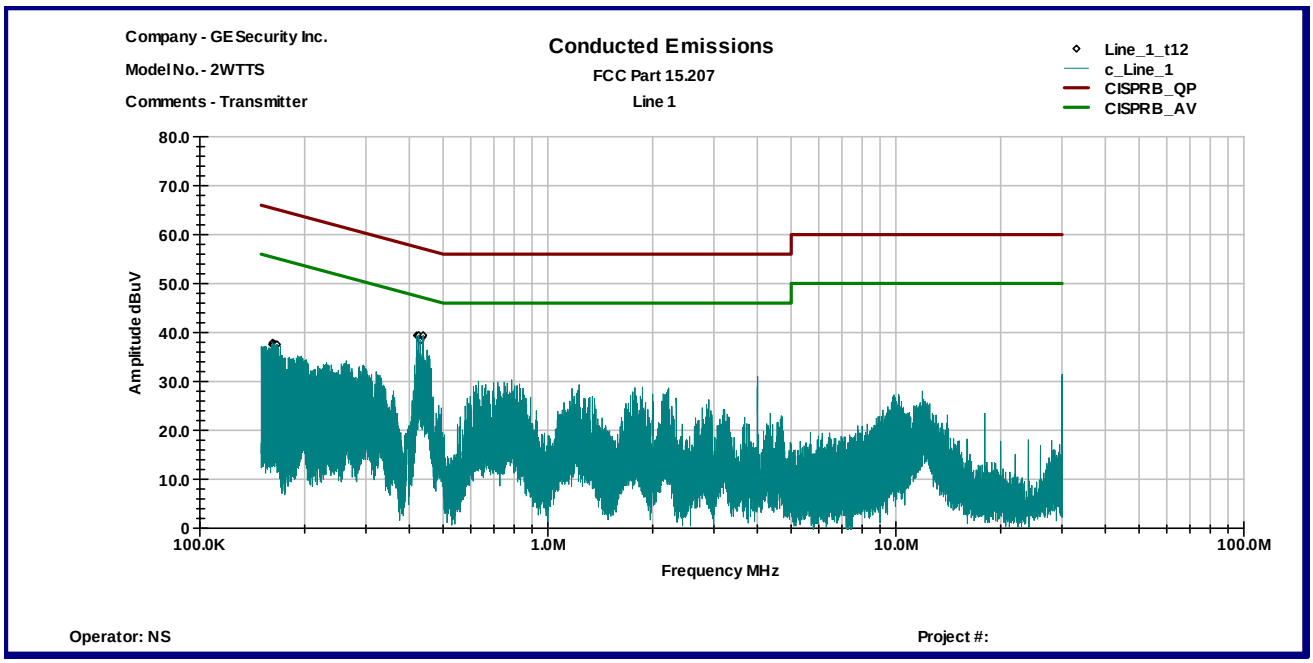
Frequency MHz	Peak Reading dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.263	34.2	0.1	61.3	51.3	-27.0	-17.0
0.438	39.4	0.1	57.1	47.1	-17.6	-7.6
0.718	29.8	0.1	56.0	46.0	-26.1	-16.1
1.230	29.3	0.2	56.0	46.0	-26.5	-16.5
1.868	28.8	0.2	56.0	46.0	-27.0	-17.0
4.004	31.0	0.3	56.0	46.0	-24.7	-14.7
9.861	27.3	0.5	60.0	50.0	-32.2	-22.2
11.910	28.0	0.5	60.0	50.0	-31.5	-21.5

Line 2

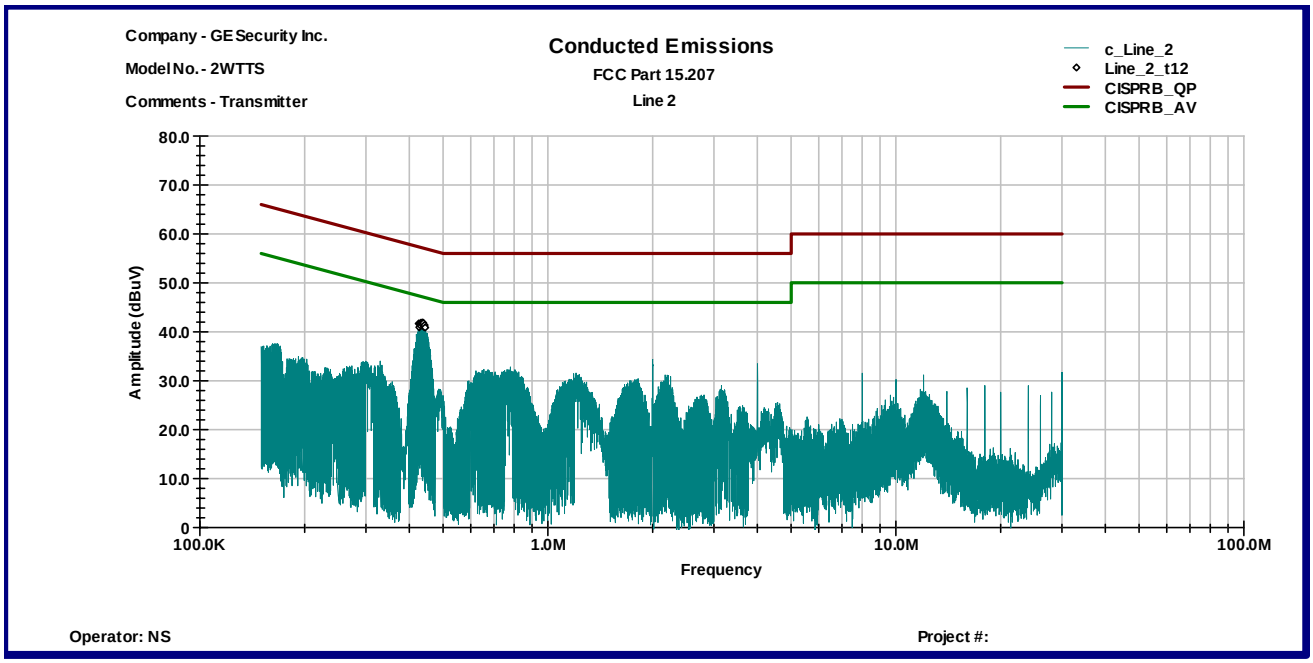
Frequency MHz	Peak Reading dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.293	33.9	0.1	60.4	50.4	-26.5	-16.5
0.436	41.9	0.1	57.1	47.1	-15.2	-5.2
0.804	32.3	0.1	56.0	46.0	-23.6	-13.6
1.200	31.6	0.2	56.0	46.0	-24.3	-14.3
1.998	34.4	0.2	56.0	46.0	-21.4	-11.4
3.998	33.5	0.3	56.0	46.0	-22.2	-12.2
8.000	31.5	0.5	60.0	50.0	-28.0	-18.0
12.000	31.2	0.5	60.0	50.0	-28.3	-18.3

Graph 3.4.1

Line 1



Line 2



3.5 Receiver/digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-2000MHz

Max. Emissions margin: 9.4dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Table 3.5.1 and Graphs 3.5.1 and 3.5.2).
Emissions at 319.5MHz from the Signal Generator were excluded from the Table.

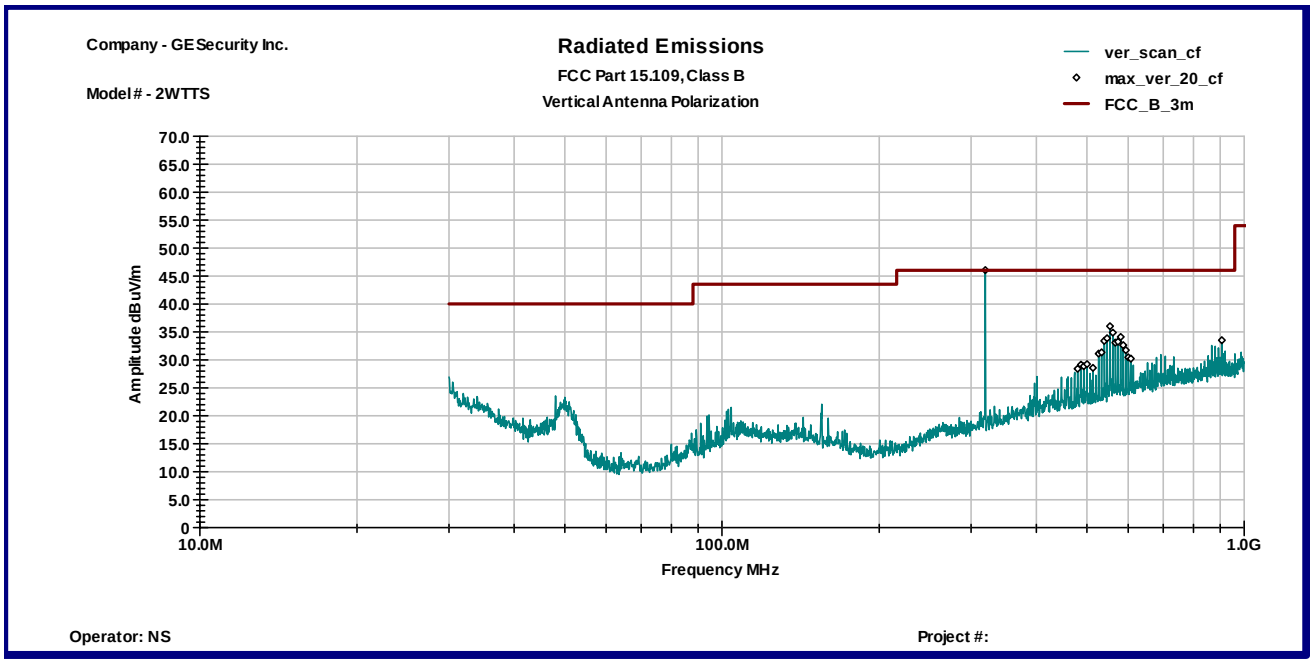
Date:	January 26, 2010	**Result:** **Pass**
Standard:	FCC Part 15.109, Class B / ICES-003 / RSS-Gen 4.10	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure	
Operation mode:	Receiving / Standby Mode	
Note:		

Table 3.5.1

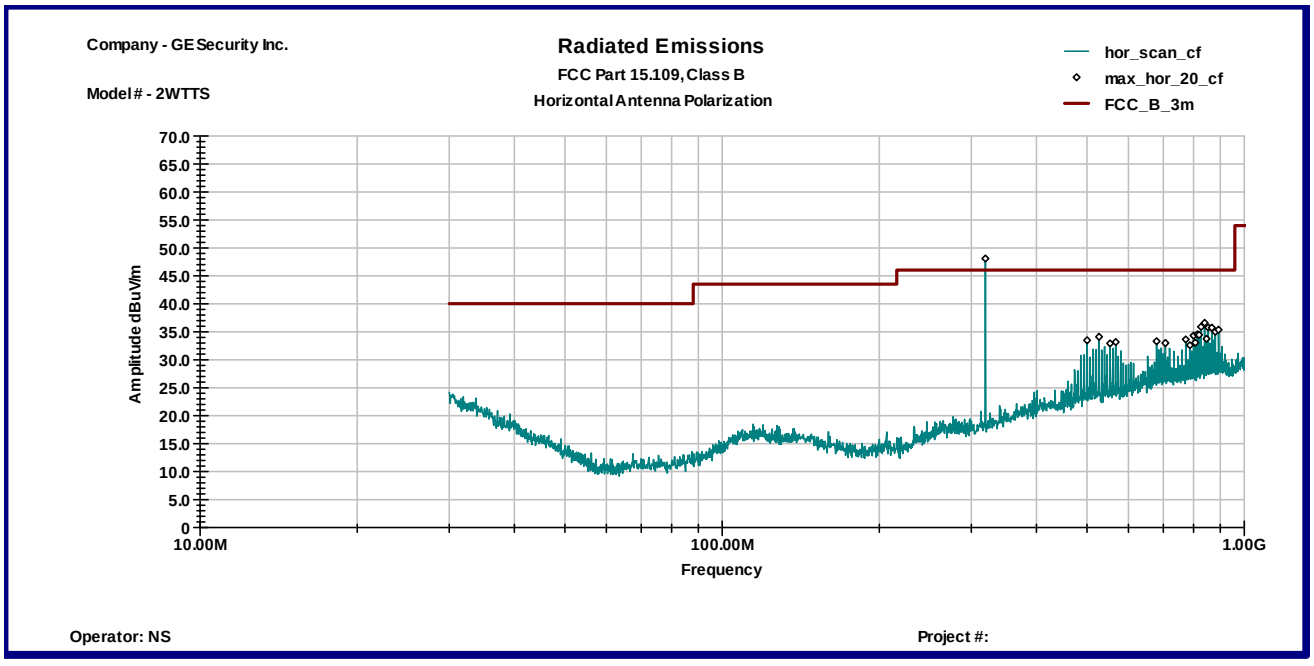
Frequency	Ant. Polarity	Peak Reading dBµV	Ant.Factor dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
30.00 MHz	V	6.2	20.8	27.0	40.0	-13.1
50.02 MHz	V	13.0	10.3	23.3	40.0	-16.7
546.59 MHz	V	12.5	21.3	33.9	46.0	-12.2
553.51 MHz	V	14.4	21.6	36.0	46.0	-10.0
580.53 MHz	V	12.4	21.8	34.1	46.0	-11.9
906.63 MHz	V	8.0	25.5	33.5	46.0	-12.5
30.48 MHz	H	3.3	20.5	23.8	40.0	-16.2
500.18 MHz	H	12.9	20.6	33.5	46.0	-12.6
527.19 MHz	H	13.3	20.8	34.1	46.0	-11.9
679.58 MHz	H	10.3	23.0	33.3	46.0	-12.7
813.26 MHz	H	10.0	24.5	34.5	46.0	-11.5
840.14 MHz	H	11.8	24.8	36.6	46.0	-9.4
867.02 MHz	H	10.6	25.1	35.7	46.0	-10.3
893.19 MHz	H	10.0	25.4	35.4	46.0	-10.7

Graph 3.5.1

Vertical antenna polarization

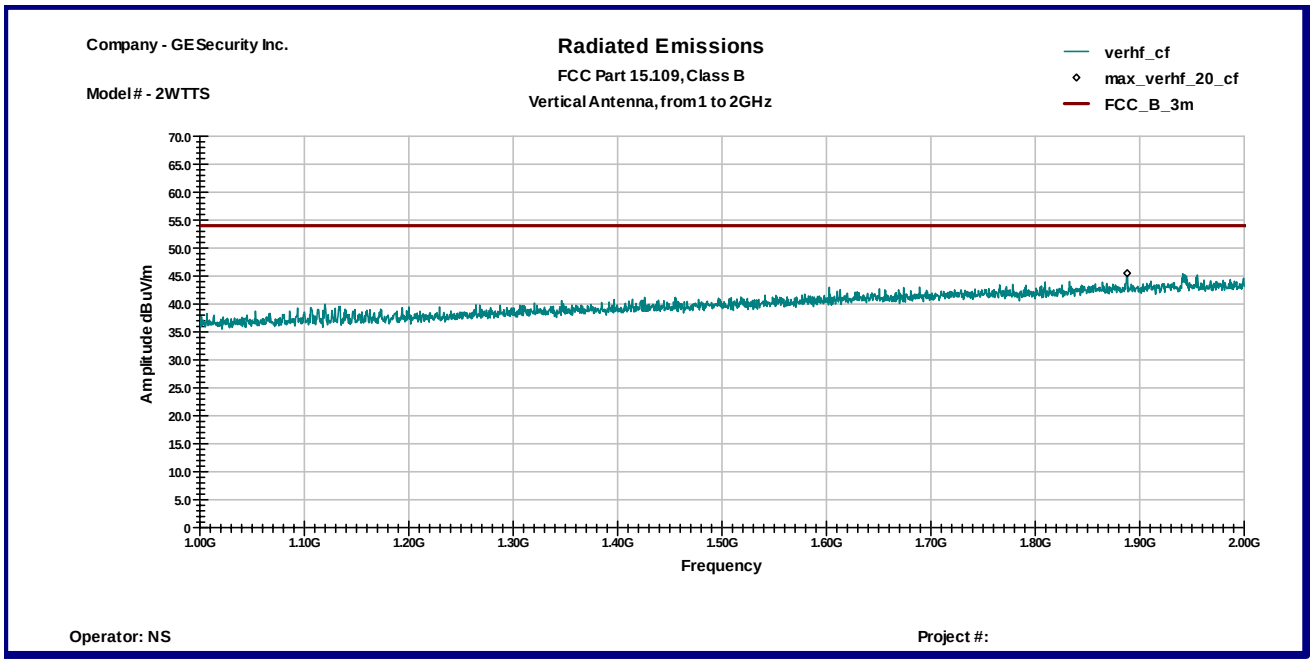


Horizontal antenna polarization

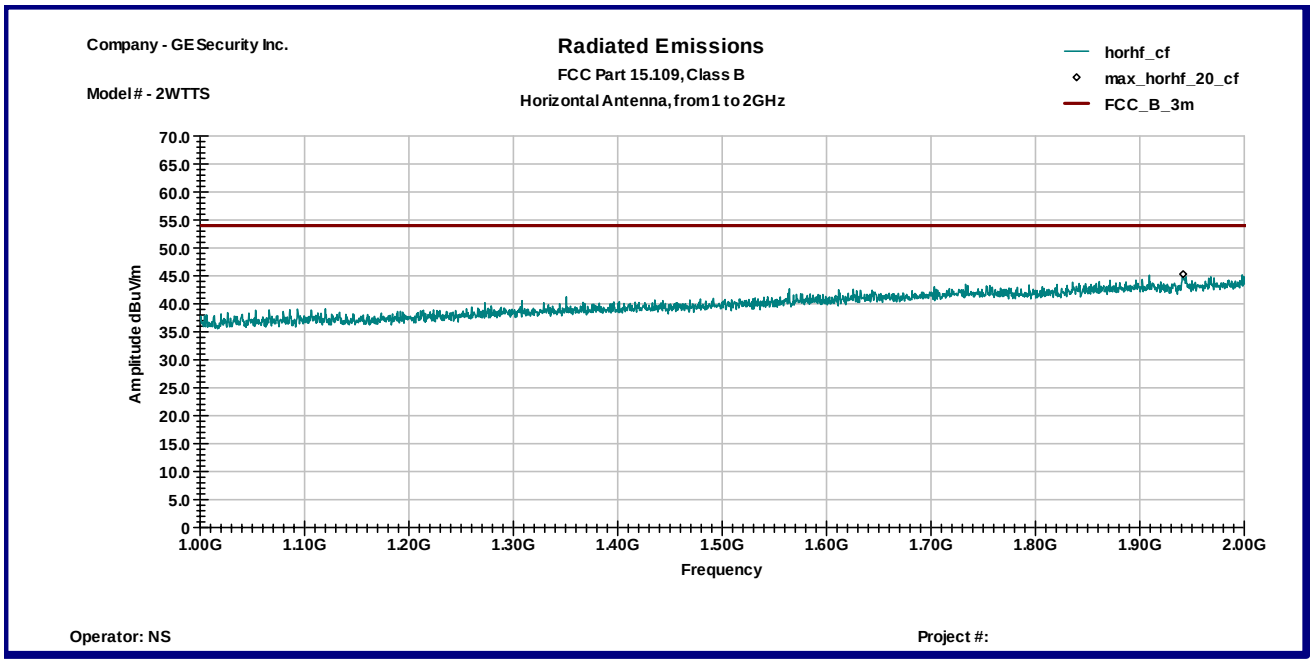


Graph 3.5.2

Vertical antenna polarization



Horizontal antenna polarization



3.6 Digital device conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 3.9dB below the limits

Notes: None

Date:	January 27, 2010	**Result:** **Pass**
Standard:	FCC Part 15.107, Class B / ICES-003	
Tested by:	Norman Shpilsher	
Test Point:	Power Line	
Operation mode:	See Page 5	
Note:		

Table 3.6.1

Line 1

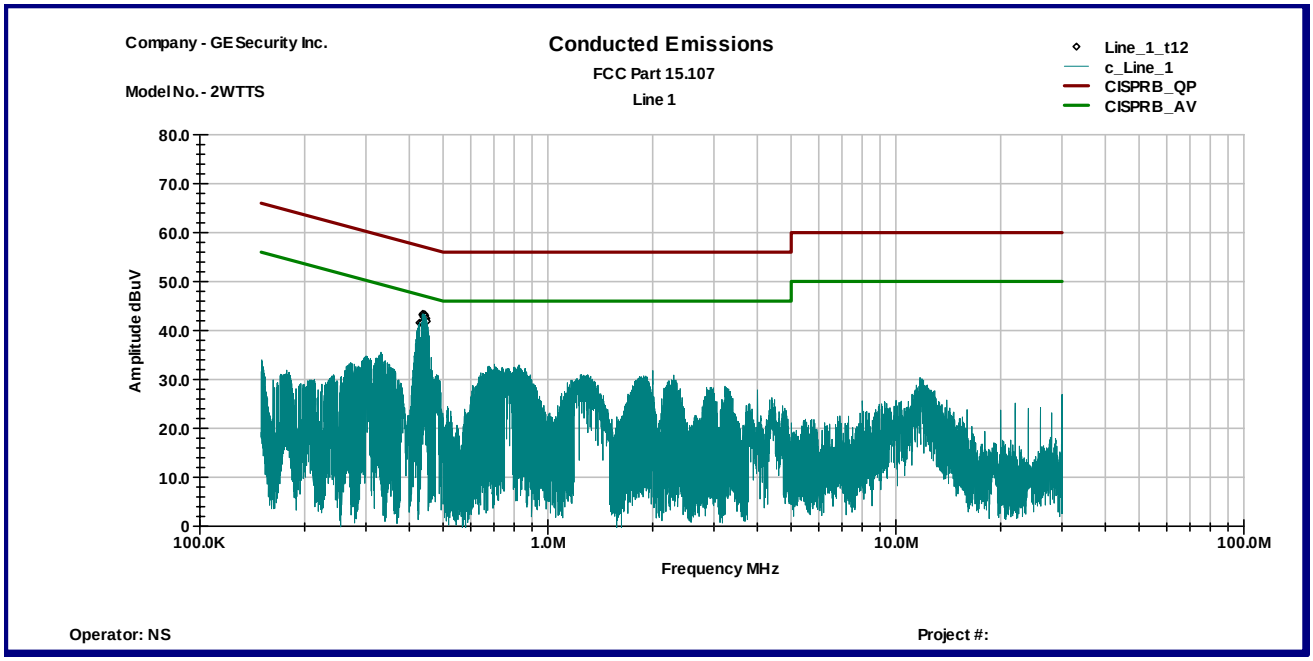
Frequency MHz	Peak Reading dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.331	35.6	0.1	59.4	49.4	-23.8	-13.8
0.435	43.2	0.1	57.2	47.2	-13.9	-3.9
0.770	32.2	0.1	56.0	46.0	-23.6	-13.6
2.000	31.8	0.2	56.0	46.0	-24.0	-14.0
3.990	27.8	0.3	56.0	46.0	-27.9	-17.9
8.000	25.6	0.5	60.0	50.0	-33.9	-23.9
11.720	30.4	0.5	60.0	50.0	-29.1	-19.1
22.000	25.2	0.8	60.0	50.0	-34.1	-24.1
26.000	24.2	0.8	60.0	50.0	-34.9	-24.9

Line 2

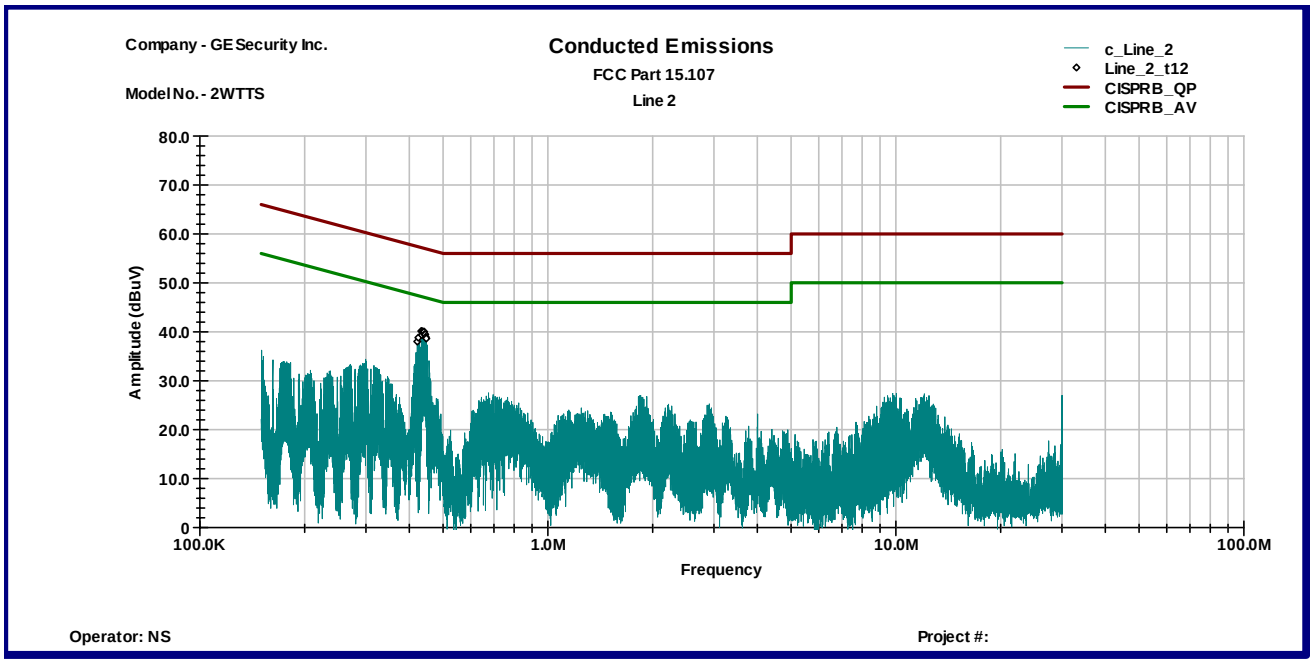
Frequency MHz	Peak Reading dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.179	33.6	0.1	64.5	54.5	-30.9	-20.9
0.299	34.4	0.1	60.3	50.3	-25.8	-15.8
0.432	40.2	0.1	57.2	47.2	-17.0	-7.0
0.696	27.1	0.1	56.0	46.0	-28.8	-18.8
1.247	24.4	0.2	56.0	46.0	-31.4	-21.4
1.922	26.8	0.2	56.0	46.0	-29.0	-19.0
2.907	25.3	0.3	56.0	46.0	-30.4	-20.4
9.783	27.5	0.5	60.0	50.0	-32.0	-22.0
12.439	26.9	0.6	60.0	50.0	-32.5	-22.5

Graph 3.6.1

Line 1



Line 2



4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Receiver RF Section	HP	85462A	3549A00306	9995	02/27/2010	☐
RF Filter Section	HP	85460A	3448A00276	9937	02/27/2010	☐
Spectrum Analyzer	R & S	FSP 40	100024	12559	09/10/2010	☒
Spectrum Analyzer	R & S	ESCI	100358	12909	05/18/2010	☒
Spectrum Analyzer	Agilent	E7402A	MY44212200	12660	11/20/2010	☐
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	09/22/2010	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2630	14459	10/02/2010	☐
Horn Antenna	EMCO	3115	9507-4513	9936	03/04/2010	☒
Loop Antenna	A.H.Systems	SAS-200/562	215	9817	05/26/2010	☐
Loop Antenna	ETS	6512	00060486	19942	08/10/2010	☐
Monopole Antenna	A.H.Systems	SAS-200/550-1	692	9986	05/27/2010	☐
LISN	Fischer Custom Communications	FCC-LISN-2 MOD.SD	316	9945	11/06/2010	☒
LISN	Fischer Custom Communications	FCC-LISN-50-25-2	2014	9665	11/30/2010	☐
LISN	Fischer Custom Communications	FCC-LISN-50-32-2-01	97-01	9835	11/06/2010	☐
LISN	Fischer Custom Communications	FCC-TLISN-T4	15333.01	9671	04/28/2010	☐
Field Monitor	NARDA	ELT-400	J-0039	12740	02/18/2010	☐
B-Field Sensor	NARDA	BN 2300	J-0049	12769	02/18/2010	☐
RF Current Probe	Fischer Custom Communications	F-33-2	330	15298	04/14/2010	☐
Absorbing Clamp	Fischer Custom Communications	F-201	167	9964	03/03/2010	☐
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1402232	172081	08/07/2010	☒
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	MIN-0065	08/07/2010	☐
Pre-Amplifier	MITEQ	AMF-6F-26004000-40-8P	13224444	MIN-0064	08/07/2010	☐
Pre-Amplifier	HP	8447F OPT H64	3113A04974	9934	05/21/2010	☐
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	☒
5001ix	California Instruments System	5001	55864, 55863, 55862, 72277	17672	01/08/2011	☐
CTS 3.0.19	California Instruments Harmonic/Flicker Software	632		12723	01/08/2011	☐