TEST REPORT

Report Number: 3091972MIN-009L
Project Number: 3091972
July 26, 2006

Evaluation of the
Proximity Mifare Door Lock RF ID
FCC ID: UKCA9XX

to
FCC Part 2
FCC Part 15, Subpart C, Section 15.225

For
Salto Systems SL

Test Performed by:	Test Authorized by:
Intertek	Salto Systems SL
7250 Hudson Blvd. Suite 100	TXATXAMENDI, 26, Pol 110
Oakdale, MN 55128	20100 Lezo Spain

Prepared by: _____ Date: July 26, 2006
Norman Shpilsher

Reviewed by: _____ Date: July 26, 2006
Uri Spector

CONTENTS

1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the *Door Lock RF ID* Transmitter for Certification under Part 15 Subpart C. There are no other simultaneous applications.

1.2 Product Description

The *Door Lock RF ID* Transmitter is operating at 13.56 MHz under **CFR 47:2005**, Section 15.225.
The intended use of the *Door Lock RF ID* Transmitter is to generate and transmit a RF signal from the Antenna in order to communicate with the RF ID Card.
The *Door Lock RF ID* Transmitter powered at 4.5VDC from three internal AA-size batteries.
The *Door Lock RF ID* Transmitter antenna is an

Sample Submitted: June 23, 2006
Test Work Started: July 14, 2006
Test Work Completed: July 25, 2006

1.3 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.

1.4 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 fully described in a report dated on December 2005 submitted to FCC. Please reference the site registration number: 90706, dated December 6, 2006.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

N/A

2.2 EUT Setup

To demonstrate the *Door Lock RF ID* Transmitter compliance, the regular unit and continuously transmitting unit were tested; testing was performed with or without RF ID Card to obtain the worst emissions.

2.3 EUT Exercising Software

N/A.

2.4 Special Accessories

There are no special accessories necessary for compliance of these products.

2.5 Equipment Modification

No modifications were installed during the testing.

2.6 Support Equipment List and Description

RF ID Card

2.7 Test Configuration Block Diagrams

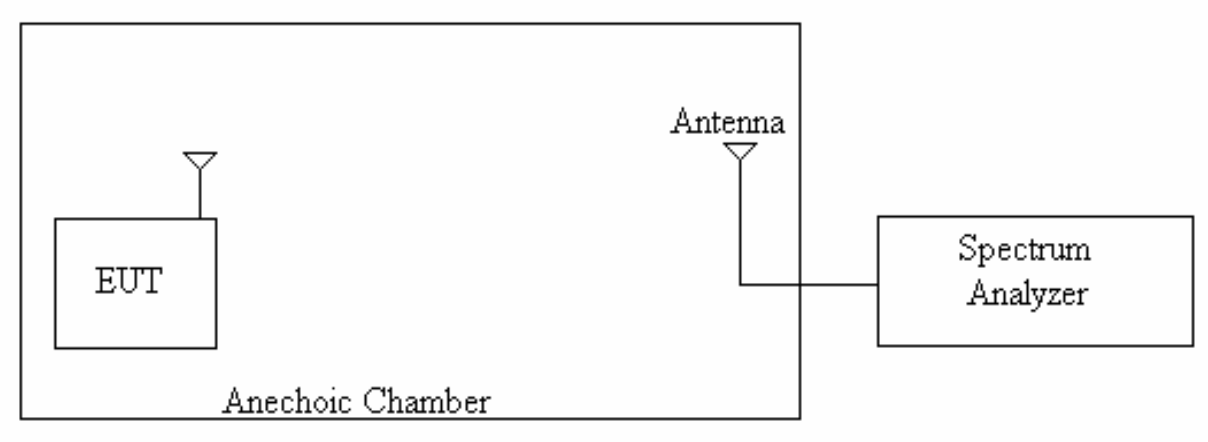
The EUT was setup as tabletop equipment.

The Radiated Emissions pre-test in frequency range below 30MHz was performed in Anechoic Chamber at 3m-measurement distance and final measurements were performed at 10-m measurement distance.

Measurements from 30MHz to 1GHz were performed in Anechoic Chamber at 3m-measurement distance.

The EUT was powered at 4.5VDC from three internal fresh AA-size batteries.

Field Strength Measurements



3.0 TEST RESULTS

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

The EUT is intended for operation under the requirements of Part 15 Subpart C. Specific test requirements includes the following:

47 CFR 15.225(a)(b)(c)	Field Strength of Fundamental
47 CFR 15.225(d), 15.209	Out of Band Spurious Emissions
47 CFR 15.225(d), 15.209	Field Strength of Spurious Emissions
47 CFR 15.225(e)	Frequency Tolerance
47 CFR 15.215	Bandwidth of the Emission
47 CFR 15.109, Class B	Radiated Emissions

3.1 Field Strength of Radiated Emissions, FCC 15.225(a)(b)(c), 15.209

Field Strength of Fundamental and Harmonics Emissions measurements were made at Fundamental frequency of 13. 56 MHz.

FCC Part 15.225 limits at 30m are:

15848µV/m, or 84.0dBµV/m within the band 13.553-13567MHz
334µV/m, or 50.5dBµV/m within the bands 13.410-13.553MHz and 13.567-13.710MHz
106µV/m, or 40.5dBµV/m within the bands 13.110-13.410MHz and 13.710-14.010MHz

The maximum emissions were measured with margin 64.3dB below limits.

The Table 3-1-1 below shows the Field Strength of Fundamental Radiation.

Radiated Emissions at Fundamental Frequency **Date:** 07-14-2006

Company:	Salto Systems
Model:	Door Lock
Test Engineer:	Norman Shpilsher
Special Info:	Continuous operation mode
Standard:	FCC Part15, Subpart C, 15.209, 15.225
Note:	Measurement distance 3m with Loop antenna SAS 200/562B
	Distance Factor 40dB/decade
	Measurements were taken using a Peak detector

Table # 3-1-1

Frequency MHz	Reading dBµV	Antenna Factor dB/m	Antenna Position	Pre-Amp Gain (dB)	Net at 10m. dBµV/m	Distance Factor (dB)	Limit dBµV/m	Margin dB
13.560	61.3	6.9	Front	29.4	38.8	19.1	84.0	-64.3
13.560	62.0	6.9	Side	29.4	39.5	19.1	84.0	-63.6

Comments:

3.2 Out of Band Spurious Emissions, FCC 15.225(d), 15.209

To demonstrate the EUT compliance with the Out of band spurious emissions, measurements were made for frequencies 15.553 and 15.567MHz and the general limits FCC Part 15.209 were applied.

The EUT operating frequency is 13.560MHz

FCC Part 15.209 limits at 30m is 30µV/m, or 29.5dBµV/m

The maximum emissions were measured with margin 26.2dB below the FCC Part 15.209 limits.

The Table 3-2-1 below shows the Out of Band Spurious Emissions.

Out Of Band Spurious Emissions **Date:** 07-14-2006

Company:	Salto Systems
Model:	Door Lock
Test Engineer:	Norman Shpilsher
Special Info:	Continuous operation mode
Standard:	FCC Part15, Subpart C, 15.209, 15.225
Note:	Measurement distance 3m with Loop antenna SAS 200/562B Distance Factor 40dB/decade Measurements were taken using a Peak detector

Table # 3-2-1

Frequency MHz	Reading dBµV	Antenna Factor dB/m	Antenna Position	Pre-Amp Gain (dB)	Net at 10m. dBµV/m	Distance Factor (dB)	Limit dBµV/m	Margin dB
13.553	44.8	7.0	Front	29.4	22.4	19.1	29.5	-26.2
13.567	44.7	6.9	Front	29.4	22.2	19.1	29.5	-26.4
13.553	44.5	7.0	Side	29.4	22.1	19.1	29.5	-26.5
13.567	44.3	6.9	Side	29.4	21.8	19.1	29.5	-26.8

Comments:

3.3 Field Strength of Spurious Emissions, FCC 15.205, 15.209

Field Strength of Spurious Emissions measurements were made in frequency range from the EUT operating frequency of 13.560MHz up to 1000MHz.

FCC Part 15.209 limits are:

1.705-30MHz at 30m is 30µV/m, or 29.5dBµV/m
30-88MHz at 3m is 100µV/m, or 40.0dBµV/m
88-216MHz at 3m is 150µV/m, or 43.5dBµV/m
216-960MHz at 3m is 200µV/m, or 46.0dBµV/m
above 960MHz at 3m is 500µV/m, or 54.0dBµV/m

The maximum emissions were measured with margin 5.3dB below limits.

The Tables 3-3-1 and 3-3-2 and Graphs 3-3-1 and 3-3-2 show the Spurious Emissions

Spurious Radiated Emissions below 30MHz **Date:** 07-14-2006

Company:	Salto Systems
Model:	Door Lock
Test Engineer:	Norman Shpilsher
Special Info:	Continuous operation mode
Standard:	FCC Part15, Subpart C, 15.209, 15.225
Note:	Measurement distance 3m with Loop antenna SAS 200/562B Distance Factor 40dB/decade Measurements were taken using a Peak detector

Table # 3-3-1

Frequency MHz	Reading dBµV	Antenna Factor dB/m	Antenna Position	Pre-Amp Gain (dB)	Net at 10m. dBµV/m	Distance Factor (dB)	Limit dBµV/m	Margin dB
27.120	34.6	14.7	Front	29.3	20.0	19.1	29.5	-28.6
27.120	34.7	14.7	Side	29.3	20.1	19.1	29.5	-28.5

Comments:

Radiated Emissions from 30MHz to 1GHz **Date:** 07-14-2006

Company: Salto Systems
Model: Door Lock
Test Engineer: Norman Shpilsher
Special Info: Continuous operation mode
Standard: FCC Part 15.205, 15.209
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a Peak detector

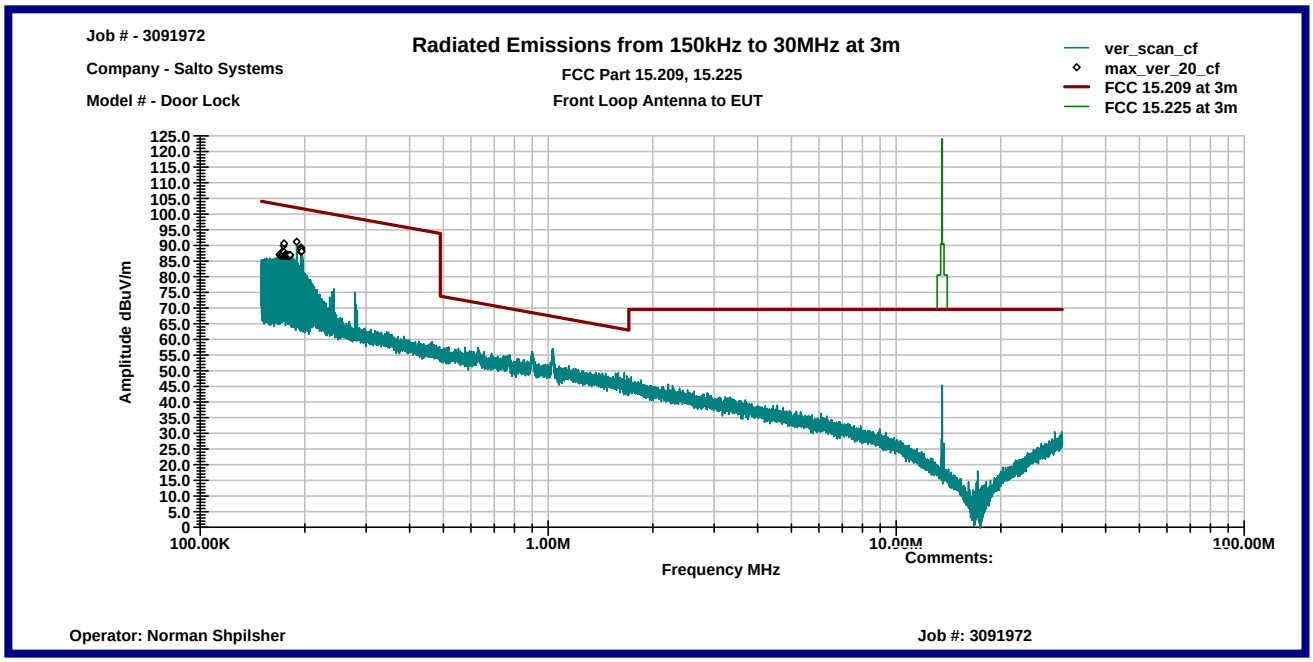
Table # 3-3-2

Frequency	Ant. Polarity	Reading dBµV	Ant. Factor dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
30.139 MHz	V	14.3	18.8	33.1	40.0	-6.9
135.67 MHz	V	15.2	12.8	28.0	43.5	-15.5
176.22 MHz	V	18.3	10.9	29.1	43.5	-14.4
189.72 MHz	V	20.4	10.8	31.2	43.5	-12.3
203.55 MHz	V	17.7	11.8	29.4	43.5	-14.1
217.05 MHz	V	23.5	11.6	35.1	46.0	-10.9
365.8 MHz	V	18.1	17.6	35.7	46.0	-10.4
953.32 MHz	V	15.3	25.4	40.7	46.0	-5.3
30.9 MHz	H	13.8	18.4	32.2	40.0	-7.8
176.22 MHz	H	17.4	10.9	28.3	43.5	-15.2
189.72 MHz	H	20.2	10.8	31.0	43.5	-12.6
203.55 MHz	H	19.3	11.8	31.1	43.5	-12.4
217.05 MHz	H	26.6	11.6	38.2	46.0	-7.8
230.55 MHz	H	20.5	12.6	33.1	46.0	-12.9
985.85 MHz	H	14.8	25.7	40.5	54.0	-13.5

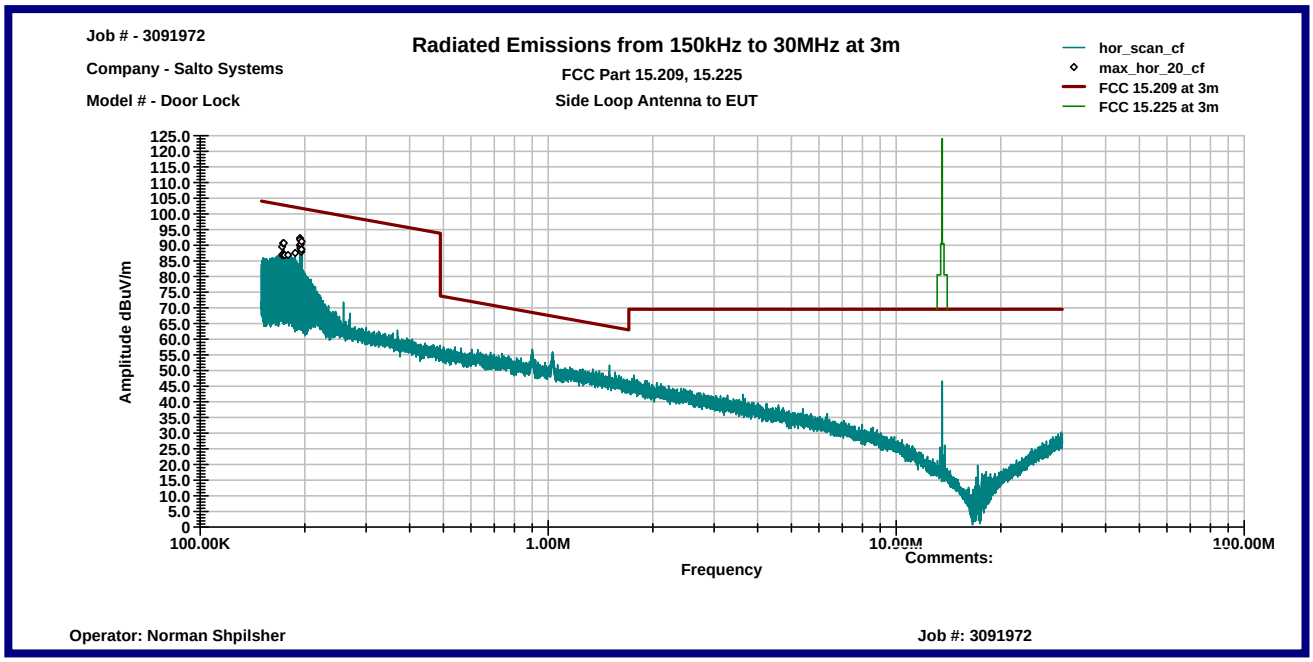
Graph # 3-3-1

Spurious Radiated Emissions from 150kHz to 30MHz

Front Loop Antenna to EUT

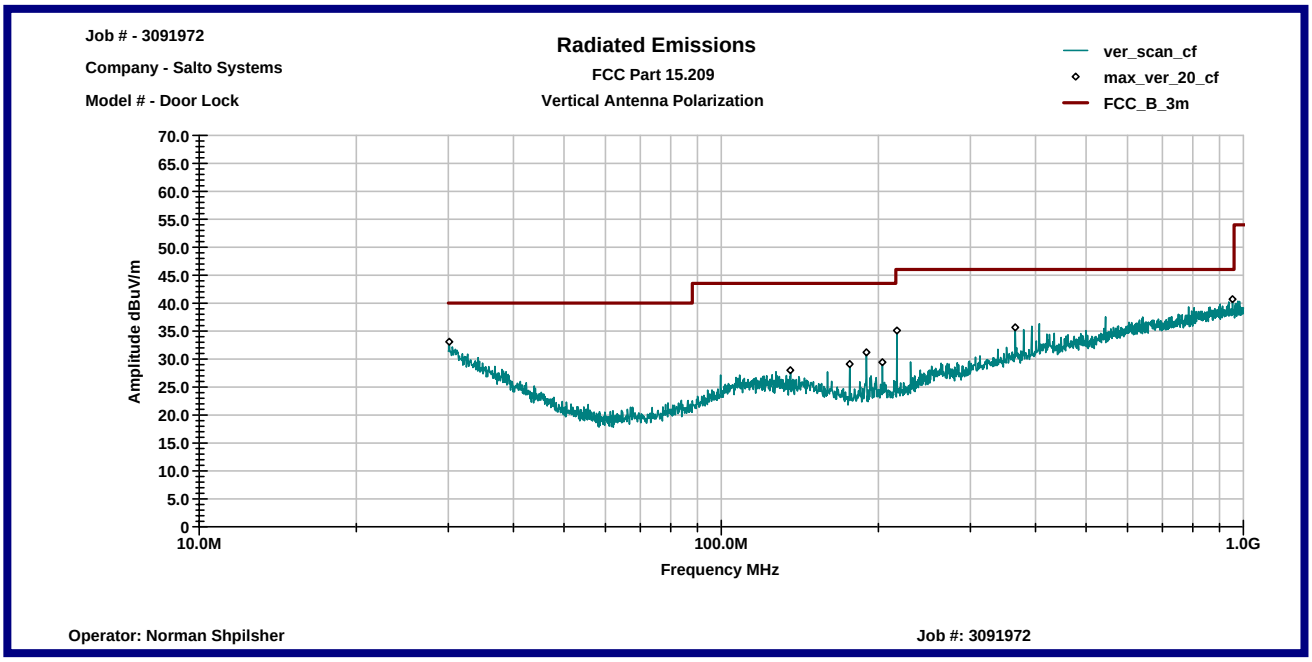


Side Loop Antenna to EUT

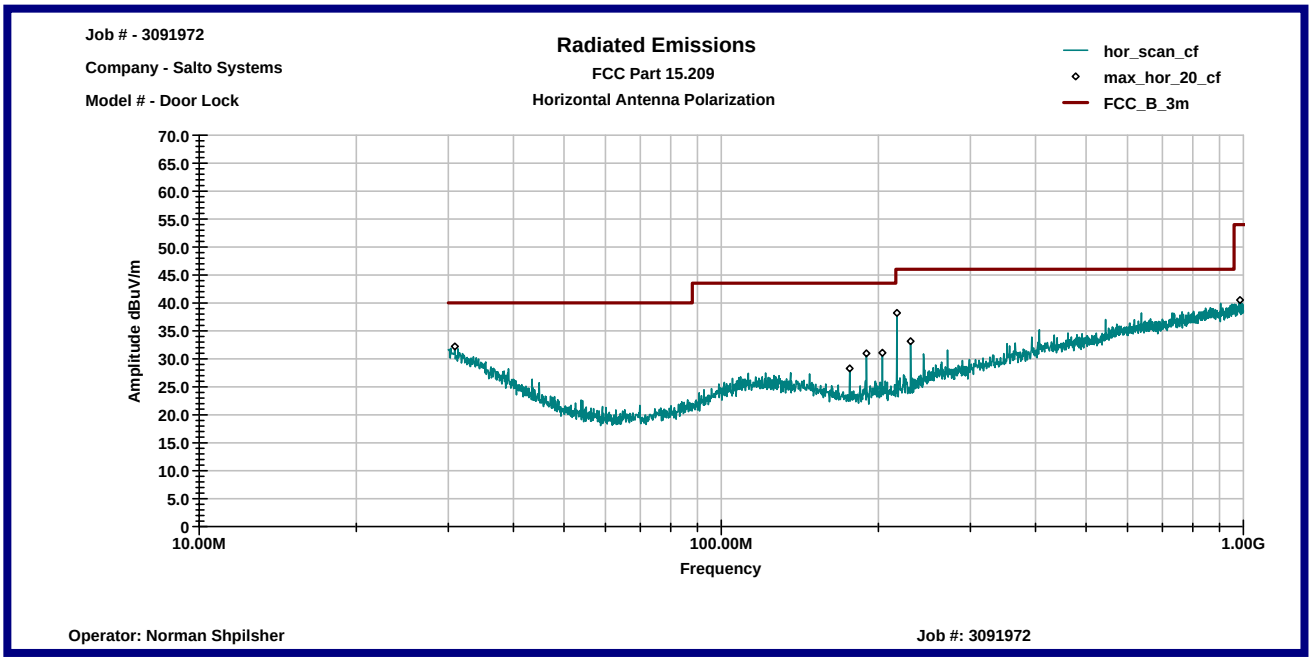


Graph # 3-3-2
Spurious Radiated Emissions from 30MHz to 1GHz

Vertical Antenna Polarization



Horizontal Antenna Polarization



3.4 Frequency Tolerance, FCC 15.225(e)

Frequency Stability with variation of ambient temperature was measured from –20 degrees C to +50 degrees C at frequency 13.56 MHz, the EUT powered at 4.5VDc from three new AA-size batteries.

The Table 3-4-1 below shows the frequency stability vs. temperature ambient.

Frequency Stability **Date:** 07/17-21/2006

Company: Salto Systems
Model: Door Lock
Special Info: Enviromental Chamber (Frequency Stability testing)
Test Engineer: Norman Shpilsher
Standard: FCC 15.225(e)

Table # 3-4-1

Temperature Degree C	Output Frequency MHz	Frequency Deviation Hz	Max. Deviation + /- 0.01% Hz	Test Result
-20	13.56	180	1356	Pass
-10	13.56	116	1356	Pass
0	13.56	28	1356	Pass
10	13.56	10	1356	Pass
20	13.56	0	1356	Pass
25	13.56	0	1356	Pass
30	13.56	0	1356	Pass
40	13.56	10	1356	Pass
50	13.56	16	1356	Pass
55	13.56	26	1356	Pass

3.5 Bandwidth of Emissions, FCC 15.215

Bandwidth of Emissions measurements was made for the Fundamental frequency of 13.56MHz.

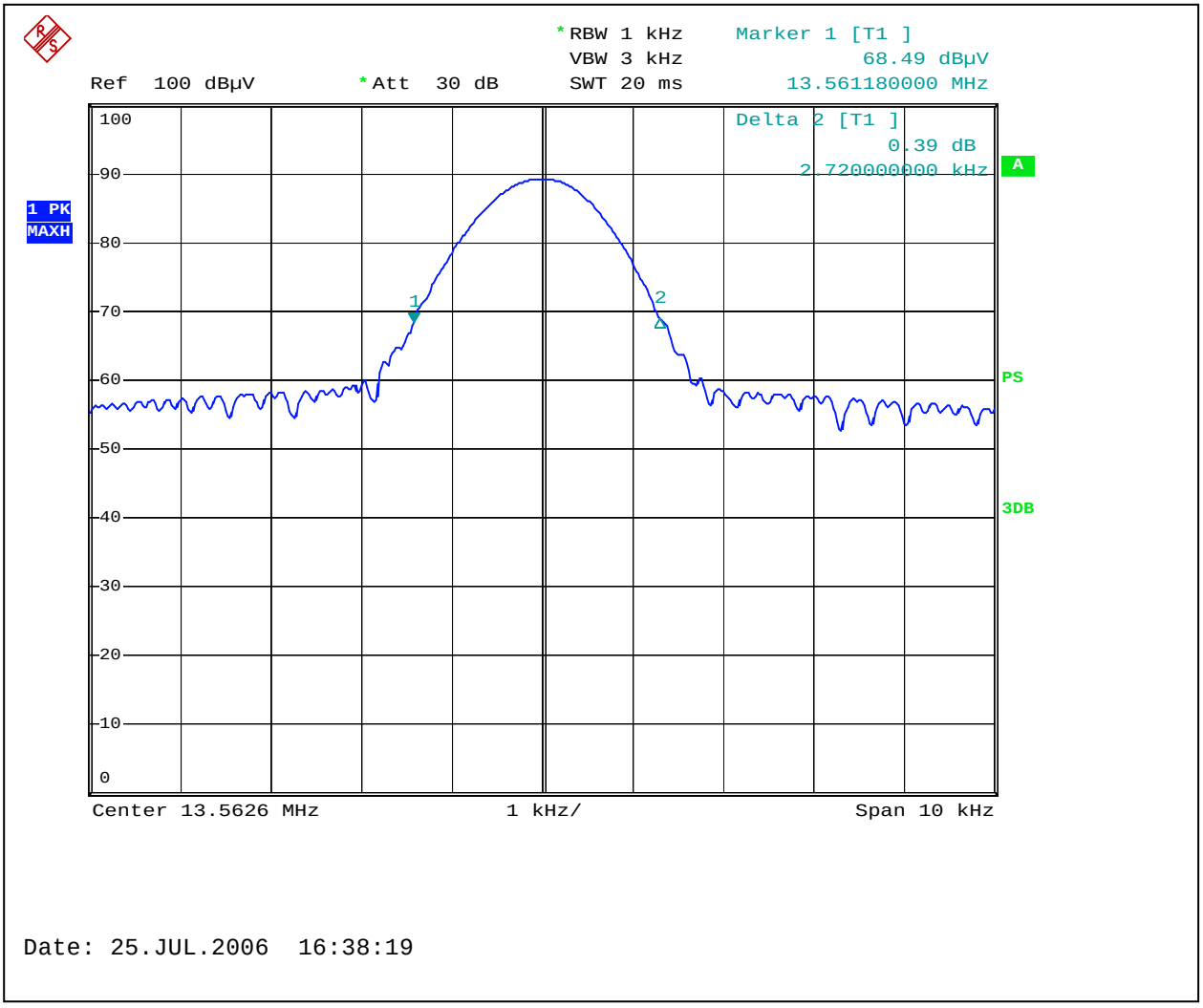
The Specified by FCC Part 15.225 frequency band is 13.553-13.567MHz, or 13560±7kHz.

20dB Bandwidth of Emissions at fundamental frequency was measured at 2.72kHz.

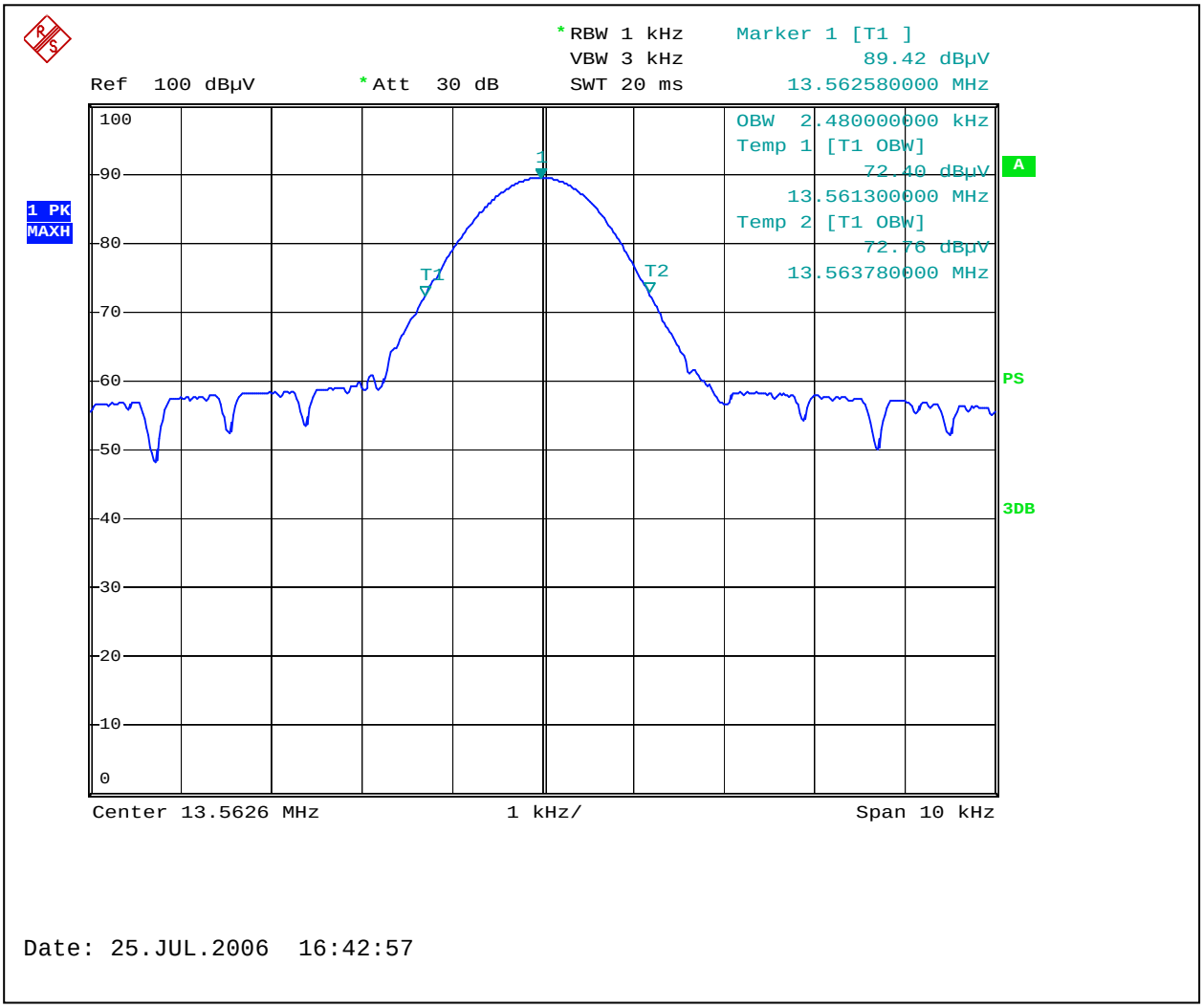
99% Bandwidth of Emissions at fundamental frequency was measured at 2.48kHz.

The Graphs 3-5-1 and 3-5-2 show the Bandwidth of Emissions.

Graph # 3-5-1
20dB Bandwidth



Graph # 3-5-2
99% Bandwidth



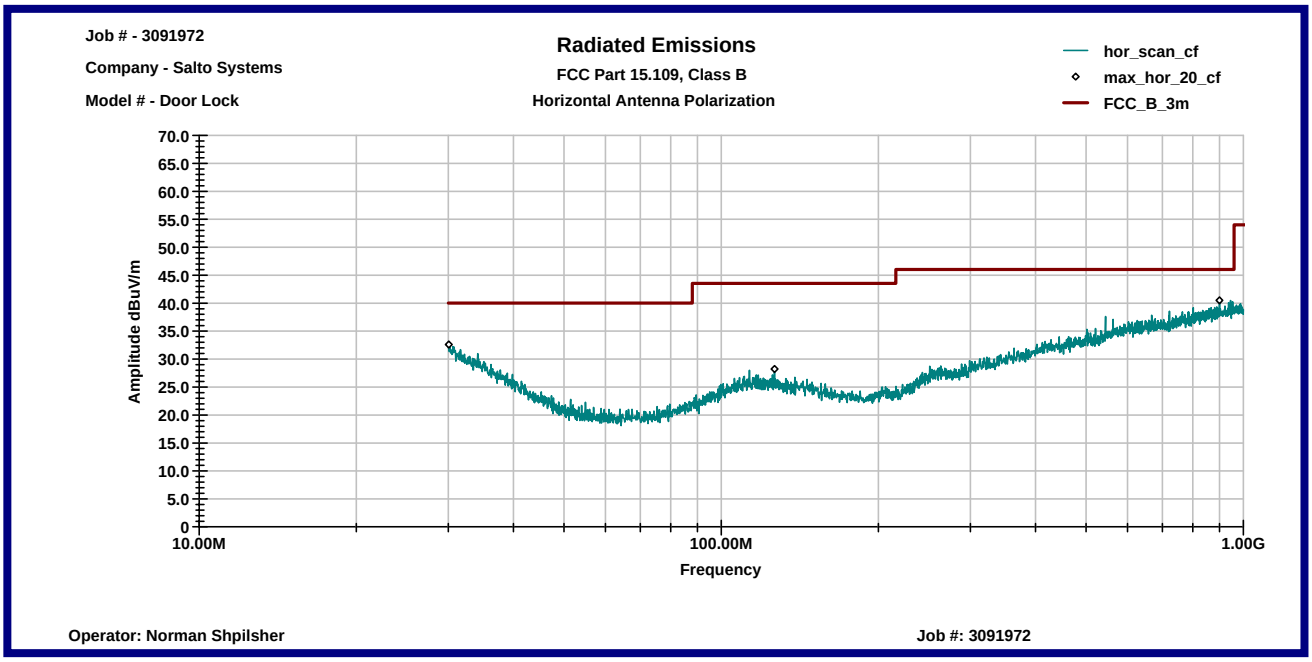
3.6 Radiated Emissions, FCC 15.109, Class B

Radiated Emissions testing was performed in frequency range from 30MHz to 1GHz for the “regular” unit in standby mode.

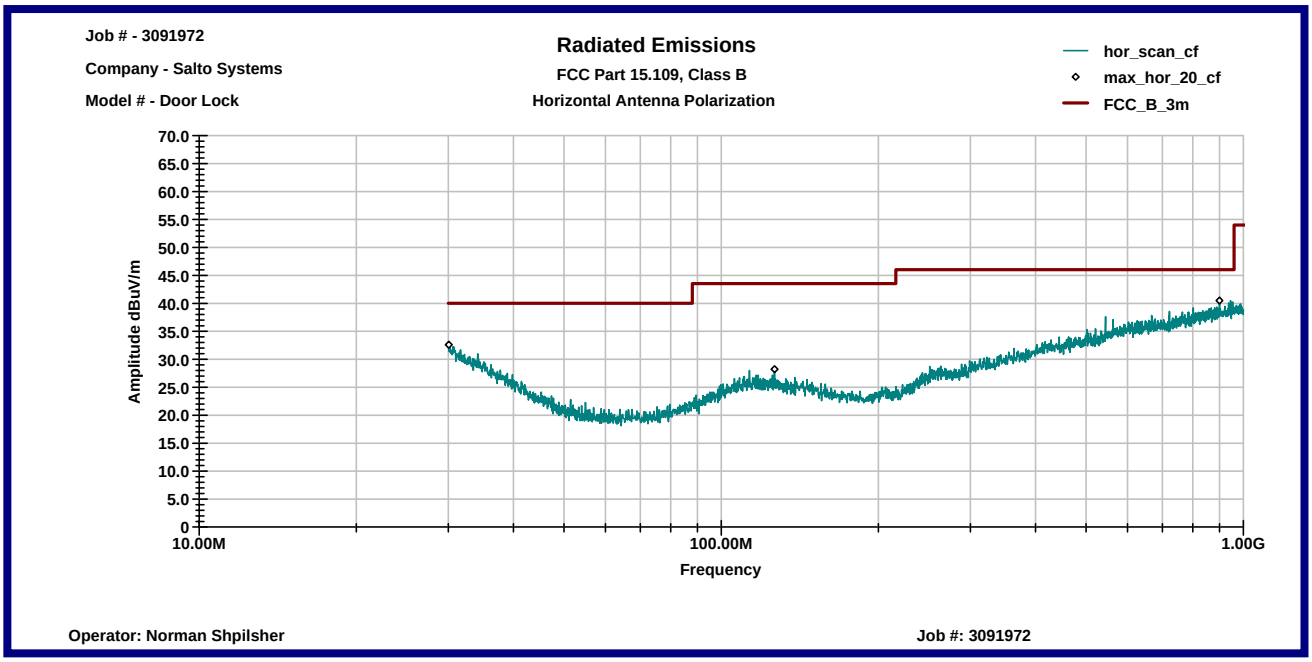
The Graph # 3-6-1 shows the Radiated Emissions.

Graph # 3-6-1
Radiated Emissions from 30MHz to 1GHz

Vertical Antenna Polarization



Horizontal Antenna Polarization



3.7 Test Procedure

Field Strength Measurements

The EUT was placed on a non-conductive table 0.8m above the ground plane. The table was centered on a motorized turntable, which allows 360-degree rotation. The measurement antenna was positioned at 3m distance. The Bicono-Log antenna was used in frequency range from 30MHz to 1GHz. The radiated emissions were maximized by configuring the EUT, by rotating the EUT, by changing antenna polarization, and by changing antenna height from 1 to 4m.
In frequency range below 30MHz the Loop antenna was used at 10m measurement distance with antenna heights of 1m and antenna loop and side faced to the EUT.
Method of the direct Field Strength Calculation is shown in Section 3.7.

Frequency Tolerance

The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output. The Chamber was programmed to cool from room temperature to minus 20 degrees C and then step in 10-degree increments to plus 50 degrees C.

3.7 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)

In the tables the Cable correction factors are included to the Antenna Factors.

3.8 Measurement Uncertainty

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

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

Tested by:

Norman Shpilsher
EMC Staff Engineer
Intertek ETL SEMKO

Signature

Date: July 26, 2006

4.0 TEST EQUIPMENT

Receivers/Spectrum Analyzers and Test Software

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
HP85462A Receiver RF Section	3325A00106	04/06	04/07	
HP85460A RF Filter Section	3330A00109	04/06	04/07	
HP85462A Receiver RF Section	3549A00306	02/06	02/07	X
HP85460A RF Filter Section	3448A00276	02/06	02/07	X
Rohde & Schwarz FSP 40 Spectrum Analyzer	100024	08/05	08/06	
Rohde & Schwarz ESCI Spectrum Analyzer	100358	04/06	04/07	X
Advantest R3271A Spectrum Analyzer	55050084	08/05	08/06	
Agilent E7402A Spectrum Analyzer	MY44212200	09/05	09/06	
TILE! Instrument Control System	Ver. 3.4 K.12	N/A	N/A	X

Antennas

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
Schaffner-Chase Bicono-Log Antenna	2468	01/06	01/07	X
Schaffner-Chase Bicono-Log Antenna	2630	08/05	08/06	X
EMCO Horn Antenna 3115	9507-4513	01/06	01/07	
A.H. System Loop Antenna SAS-200/562	215	05/06	05/07	X
HP 8447F Pre-Amplifier	3113A04974	02/06	02/07	X
MITEQ AMF-5D Pre-Amplifier	1122951	02/06	02/07	

Artificial Mains Networks/Absorbing Clamps

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
FCC LISN-2	316	05/06	05/07	
FCC-LISN-50-25-2	2014	09/05	09/06	