

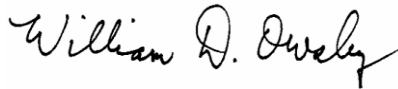
**TYCO SAFETY PRODUCTS
SENSORMATIC
EMC
TEST REPORT**

Model:
AMC-7010
FCC ID: BVCAMC7010
IC: 3506A-AMC7010

Intentional Radiator

FCC and IC
47 CFR, Part 15, Subpart B, AND Subpart C
Industry Canada
RSS GEN, ICES-003, RSS-210

Date:
August 23, 2010



EMC Engineer

Revision	Reason	Date
Rev 1	Initial	8/23/2010

1 SUMMARY OF RESULTS

1.1 47 CFR Part 15, Subpart B / Subpart C

Part	Parameter To Be Measured	selected	Comments
SubPart B	UNINTENTIONAL RADIATORS		
15.107	Conducted Disturbance (Conducted Emissions, 0.15-30 MHz)	X	complies
15.109	Radiated Disturbance (Radiated Emissions, 30-1000 MHz)	X	complies
SubPart C	INTENTIONAL RADIATORS		
15.207	Conducted Disturbance (Conducted Emissions, 0.15-30 MHz)	X	complies
15.209	Radiated Disturbance (Radiated Emissions, 0.009 plus MHz)	X	complies

Compliance with 15.203

The antenna is a professionally installed external antenna employing a terminal style connector; therefore the antenna is compliant with the requirements of this clause.

Compliance with 15.204

The only antenna type used with this transmitter is a loop. The loop with the highest gain (area x turns x current) has been used for testing and the transmit circuit adjusted for highest output.

1.2 IC RSS 210

Clause	Parameter To Be Measured	test	comment
5.9.1	Emission Bandwidth	X	complies

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2 DESCRIPTION AND CHARACTERISTICS OF THE EUT

The type designation may be either a single alphanumeric code or an alphanumeric/code divided into two parts.

TYPE DESIGNATION AS A SINGLE ALPHANUMERIC CODE: (See Note 1)

A	M	S	7	0	1	0													
---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--

OR TYPE DESIGNATION IN TWO PARTS:

1. EQUIPMENT SERIES No. (See Note 2)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

2. EQUIPMENT SPECIFIC No. (See Note 3)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note 1: This is the manufacturer's numeric or alphanumeric code or name that is specific to a particular equipment. It may contain information in coded form on the characteristics of the equipment e.g. frequency, power. The manufacturer is free to choose the form of the type designation.

Note 2: This is the number, code or trade name used by the manufacturer to describe a series or "family" of equipment of substantially the same mechanical and electrical construction which will include a number of related equipments. This number is often referred to as the "model no."

Note 3: This is the manufacturer's identification number given to specific equipment in the series or "family" of equipments. It is often referred to as the "identification number".

2.1 Description and Characteristics of Equipment Under Test (EUT).

Unit: AMC-7010 Power Pack Board Revision -02

Product Code: ZE7010

Part Number: 0319-0011-01

Regulatory ID: AMC-7010

2.1.1 Additional EUT Setup / Configuration Details

Configurator Version: 6.11

Application Version: 1.0082

2.2 CONSTRUCTION OF EQUIPMENT UNDER TEST (EUT)

[X] Single unit (power pack with antennas)

[] Multiple units

If multiple units describe each one clearly

2.2.1 Overview

The AMC-7010 is a controller capable of driving two antennas to generate a magnetic field to excite a receiver and send an alarm when certain conditions are detected and verified. The condition to be detected is the presence of a metal foil lined bag within or passing through the magnetic field. This controller functions by transmitting a ringing pulse for 1.6 mS at a maximum rate of 90 Hz. A single main PCB accommodates the Receiver, the Switching Amplifier Transmitter and the Power Supply.

There is no intelligence or data transmitted or received by the unit. The unit function determines from transmit current differences if any condition in the magnetic field has changed.

The AMC-7010 samples the transmit waveform by using coupling transformers and analyses the transmitted waveform to the antennas using an algorithm to determine if there may be a metal object passing between the antenna pedestals.

The common installation will be in parallel with the AMC-9050, a controller used to detect EAS AM tags. The setup is the parallel combination of AMC-7010 and AMC-9050, which share antennas by alternating time slices for each transmission coordinated by a sync circuit. Only one unit at a time is transmitting.

The AMC-7010 is a metal box with a circuit card inside. The antenna cables and sync cables from the AMC-9050 are routed between and through the AMC-7010 for synchronizing and antenna sharing. There is a signal output from the AMC-7010 to indicate the presence of metal foil lined bag passing between the antennas.

2.2.2 Installation

This system is professionally installed.

2.3 EQUIPMENT RATINGS

Electrical

Power Supply

Primary Input: 100-120Vac or 200-240Vac @ 50–60Hz
Primary power fuse: 2.5A, 250V, slo-blow, hi-breaking
Current draw: (120V) 0.4Arms
Current draw: (240V) 0.25Arms
Input power: (120/240V) <60W

Transmitter

Operating frequency56 kHz ($\pm 20\%$)
Transmit burst duration.....1.6 ms
Transmit current maximum.....16 A peak
Burst Repetition Rate:
Based on 50Hz ac.....75 Hz or 37.5 Hz
Based on 60Hz ac.....90 Hz or 45 Hz

Receiver

Center frequency56 kHz

Ambient temperature0°C to 50°C, (32°F to 122°F)

Relative humidity0 to 90%, non-condensing

2.4 FREQUENCY and INTERNAL CLOCKS

56 kHz +/- 20% - Intentional

112 kHz +/- 20% - Reference for Intentional

1 MHz – NVM CLK

2.560 MHz – Latch and POT CLK

20 MHz - crystal

100 MHz - DSP PLL CLK

2.4.1 Marketing And Installation Environment

Either; (FCC 15: Sub-part B, Class A or B) – Unintentional Radiator

Emissions Class A is non-residential, not advertised or marketed to general public.

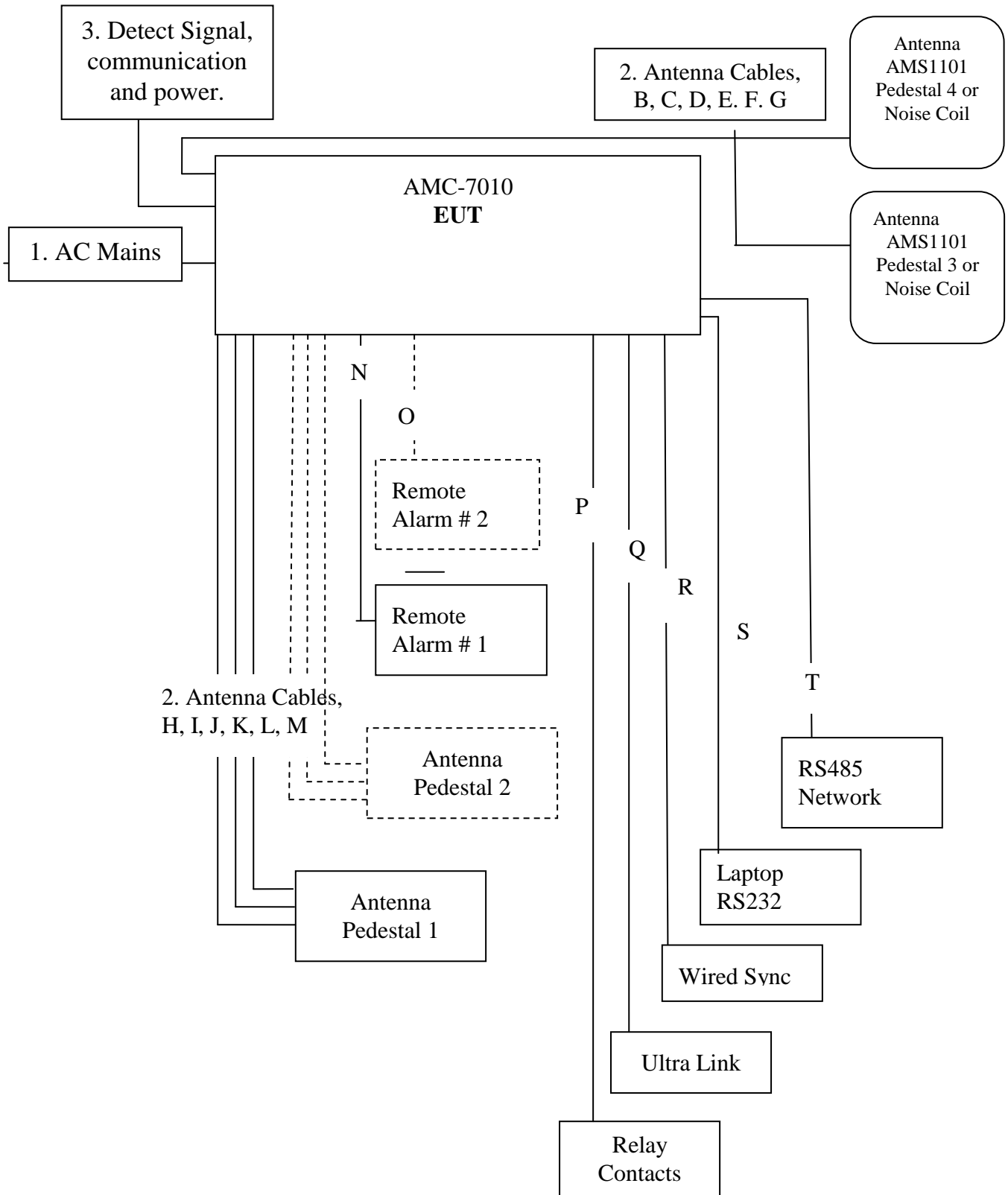
or

Emissions Class B is residential; advertised and marketed to general public

And/or

FCC 15, Sub-part C – Intentional Radiator

2.5 TEST SET-UP BLOCK DIAGRAM



2.6 LIST OF PORTS

	Function	Classification	Max Cable Length	Test Length	Cable Type/Description
1	AC Mains	AC power	> 1 m but < 3 m	1.83m	3 conductor unshielded
2	Antenna cables	Antennas	> 3 m	12m	Shielded 2 Twisted Pair w/drain. See below
3	Detect Signal, communications, and power	Signals + DC power	< 1 m	0.6m	6 conductor unshielded see below
B-E-H-K	Transmit	signal/control	> 3 m	20m max	10m and 20m Belden-E YQ48764 E34972 4C1S / four wires / shielded
C-F-I-L	Receive	signal/control	> 3 m	10m and 20m	Belden-E 4Q45167 E34972 9C22 / 9 Wires Shielded [both ports – C and D]
D-G-J-M	Pedestal Alarm & TX Inhibit	signal/control	> 3m	10m and 20m	Combined in cable with port C – same cable
N-O	Remote Alarm	signal/control	> 3 m	10m and 25m	10m and 25m 22AWG 2 pairs Shielded [common drain]
P	Relay Output N/O – N/C	signal/control	> 3 m	10m / 25m / and 20 meters	10m / 2m' / and 20 meters 24 AWG 2 wire shielded
Q	Sync Link	signal/control	> 3 m	25m	25m 22 AWG 2 pair [4 wire] shielded
R	Wired Sync	signal/control	> 3 m	25m	25m 22 AWG 2 pair [4 wire] shielded
S	RS232 (service)	signal/control	> 3 m	10m	Defined as For Service Only
T	RS485 Network	telecom port	> 3 m	10m / 25m / and 20 meters	10m / 25m / and 20 meters 24 AWG 2 wire shielded

* Classify ports as ac power, dc power, or signal/control.

** Classify maximum cable lengths as ≤ 1 m, > 1 m but ≤ 3 m, or > 3 m

*** Classify cables for use either indoors or outdoors.

3 FCC TESTS

3.1 Sample Calculation – Radiated & Conducted Emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where:

RAW = Measured level before correction (dB μ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\text{dB}\mu\text{V/m} = 20 * \log * \mu\text{V/m}$$

Margin to Limit is calculated by subtracting corrected measurement from Limit. Positive margin indicates compliance. Negative margin indicates non-compliance

To convert dB μ V/m to dB μ A/m,

Reduce reading in dB μ V/m by 51.5 dB to convert to dB μ A/m.

Radiated and Conducted Emissions tests were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration.

3.1.1 Test Site Registration

The Tyco Safety Products / Sensormatic Electronics Corp OATS located at 6600 Congress Ave. Boca Raton, FL. 33487 is registered with the FCC, number – 616407 and with Industry Canada, number – 3506A-1.

3.2 Conducted Emissions, FCC Part 15, Clause 15.107 And 15.207

Port : AC mains of AMC-7010
 Limit : Class B – (15.107 is same as 15.207)
 : Intentional Radiator Limit for conducted emissions Sub-Part C.
 Equipment operation : Metal Detecting
 Line Voltage and Freq: 120V / 60 Hz
 Temp : 22° C
 Humidity : 52.0% RH
 Date : 7/26/2010

FCC Class B 15.107 and 15.207 limits

Frequency range	Quasi-peak (dBuV)	Average (dBuV)
0,15 - 0,50	66 - 56	56 - 46
0,50 - 5	56	46
5 - 30	60	50

FCC 120 volts 60 Hz

Freq (MHz)	Det	Measure dbUv	Line	LISN fac	cable fac	No Trans Lim	Corrected	Limit	Margin
0.281	QP	43.3	L1	0.04	0.08	0.00	43.42	60.82	17.39
	Avg	34.9					35.02	50.82	15.79
3.975	QP	42.7	L1	0.06	0.13	0.00	42.89	56.00	13.11
	Avg	20.6					20.79	46.00	25.21
0.471	QP	41.3	L1	0.04	0.09	0.00	41.43	56.51	15.09
	Avg	39.4					39.53	46.51	6.99
0.281	Qp	42.1	L2	0.04	0.08	0.00	42.22	60.82	18.59
	Avg	34.5					34.62	50.82	16.19
3.976	Qp	41.5	L2	0.07	0.13	0.00	41.70	56.00	14.30
	Avg	19.6					19.80	46.00	26.20
0.471	Qp	41.7	L2	0.04	0.09	0.00	41.83	56.51	14.69
	Avg	39.8					39.93	46.51	6.59

Ferrite bead applied to Green Wire Ground.

This ferrite bead will applied to all units in production as part of the Bill of Materials.

Figure 1. Conducted Emissions on Line 1 (L1) (peak hold over time)

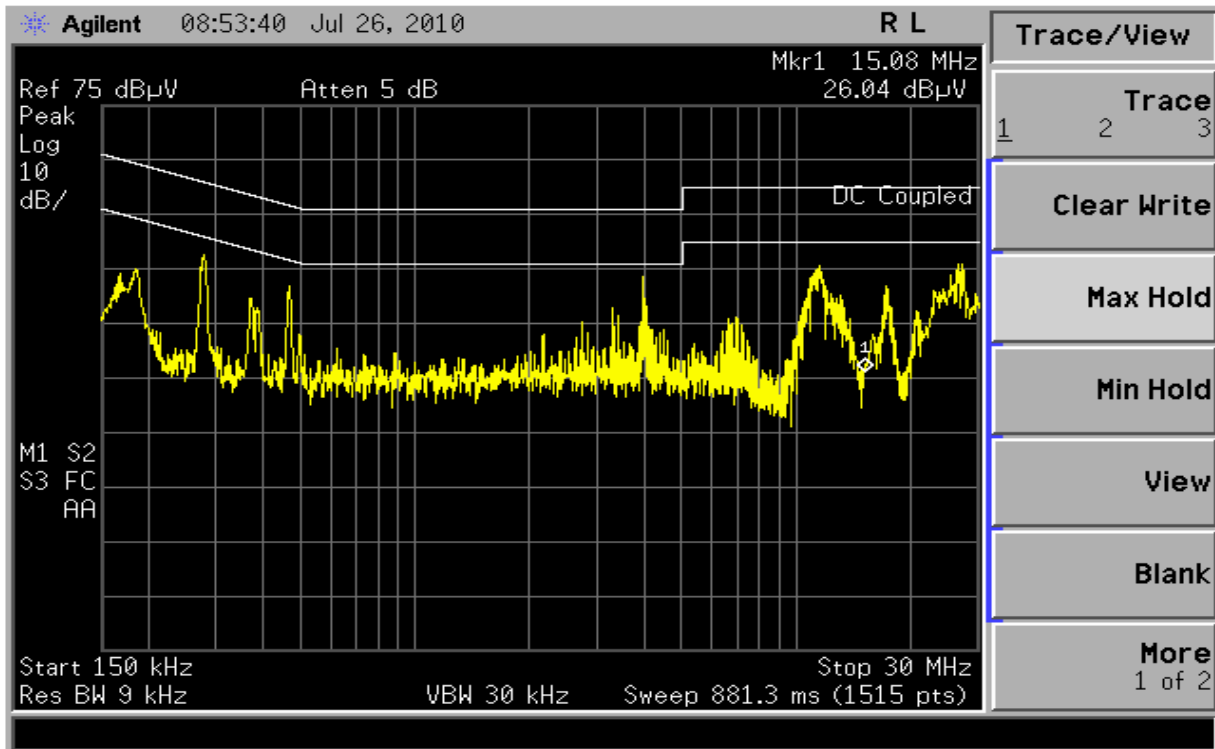
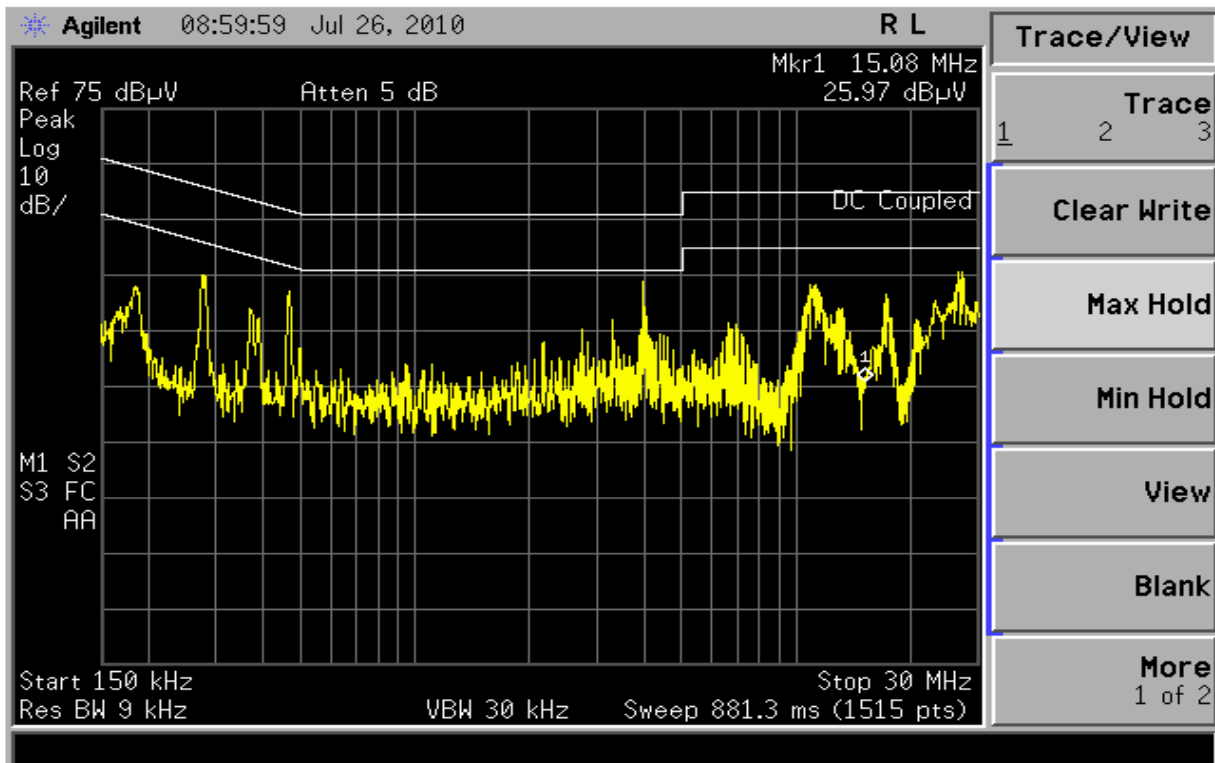
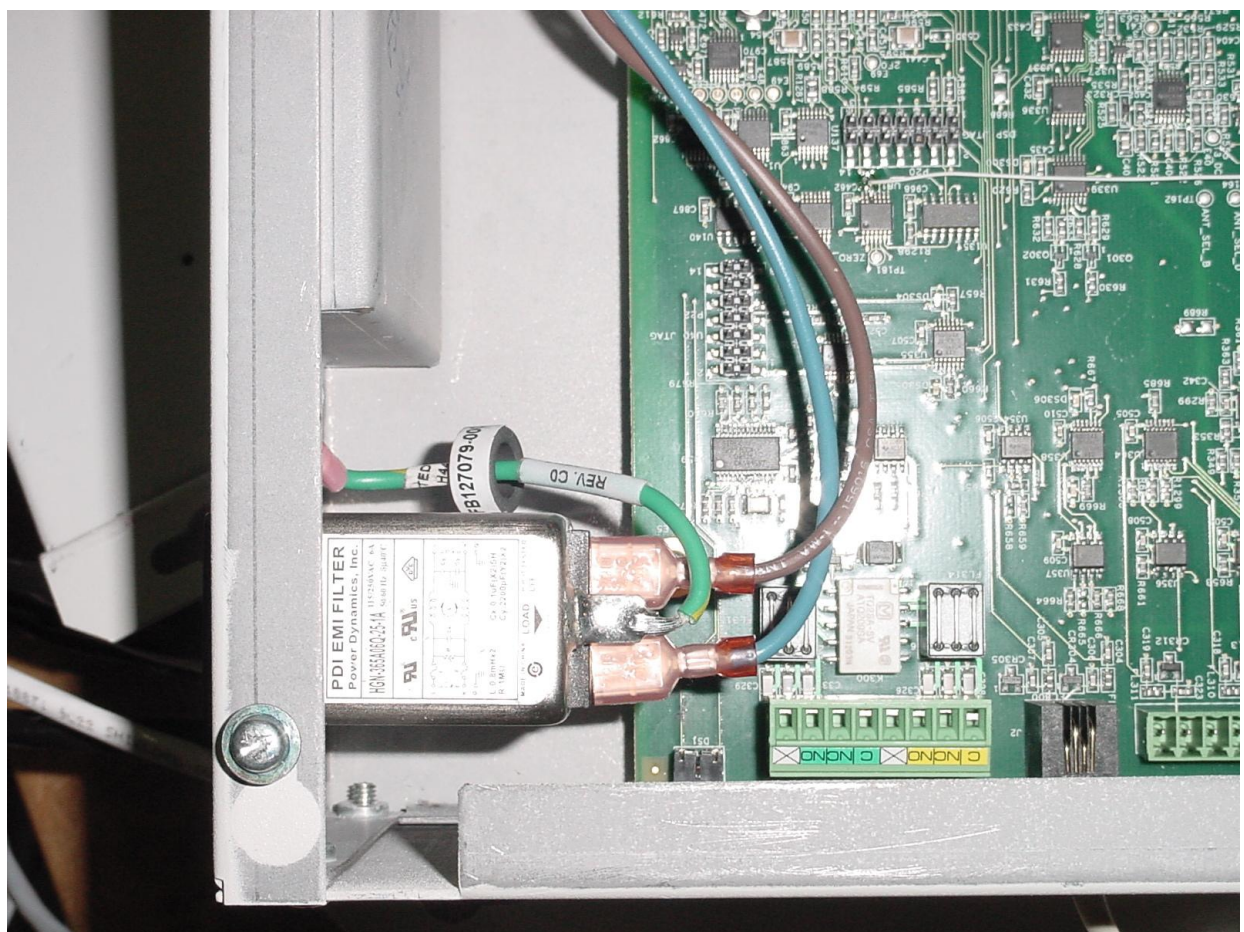


Figure 2. Conducted Emissions on Line 2 (L2) (peak hold over time)





3.3 Radiated Emissions, FCC Part 15, Clause 15.109 (Above 30 Mhz)

Port : Enclosure
 Limit : Class B
 Highest Clock Freq : 150 MHz
 Equipment operation : Metal Detecting
 Line Voltage and Freq: 120V / 60 Hz
 Distance : 3 meters OATS
 Temp : 21° C
 Humidity : 51.5% RH
 Date : 5/21/2010

The antennas are shielded loops to minimize E-field emissions while allowing H-field emissions.
 The sum of the emissions, fundamental, spurious, and unwanted, from multiple antennas being driven by the controller do not exceed the specified limits.

LIMIT FCC Part 15, subpart B, Class B at 3 meters

Frequency of emission (MHz)	Field strength (microvolts/meter)	Field strength (dBuV/m) at 3 meters
30–88	100	40
88–216	150	43.5
216–960	200	46
Above 960	500	54

Results

Freq (MHz)	QP (dBuV)	Antenna	Polarity	Ant fac	Cable fac	3473 amp	Corrected	Class B	Margin
33.1	39.9	Bi-con #2	Vert	10.5	0.7	-25.9	25.2	40.0	14.8
44	48.3	Bi-con #2	Vert	10.0	0.8	-25.8	33.2	40.0	6.8
125	32.4	Bi-con #2	Vert	13.4	1.3	-25.6	21.5	43.0	21.5
140.8	36.6	Bi-con #2	Vert	12.8	1.3	-25.5	25.3	43.0	17.7
140.8	42.7	Bi-con #2	Horz	13.0	1.3	-25.5	31.6	43.0	11.4
154.5	34.5	Bi-con #2	Horz	13.9	1.3	-25.5	24.3	43.0	18.7
154.9	34.7	Bi-con #2	Vert	14.5	1.3	-25.5	25.1	43.0	17.9
166.6	35.5	Bi-con #2	Horz	14.4	1.4	-25.5	25.8	43.0	17.2
200	30.1	Bi-con #2	Vert	17.6	1.5	-25.2	24.0	43.0	19.0
473.6	35.2	LP #2	Horz	17.3	2.3	-26.4	28.4	46.0	17.6
473.6	39.8	LP #2	Vert	16.9	2.3	-26.4	32.8	46.0	13.4

Figure 1. Pre-Compliance Chamber scan for Frequency Identification (Vert. peak hold over time)

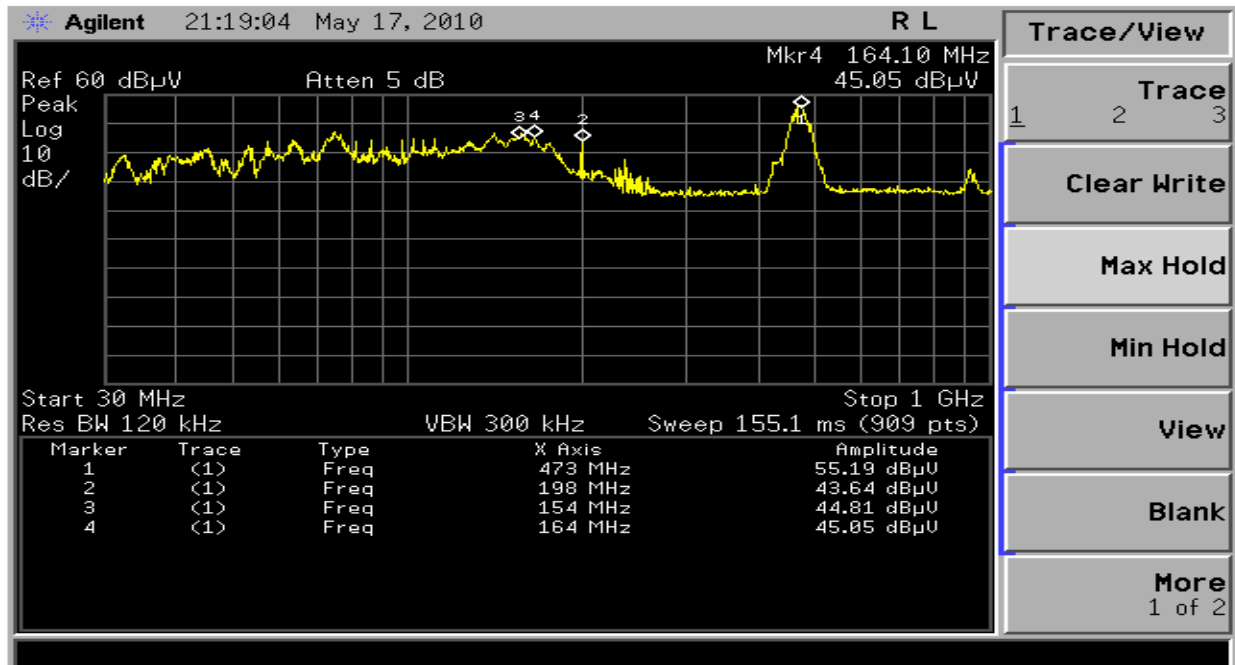
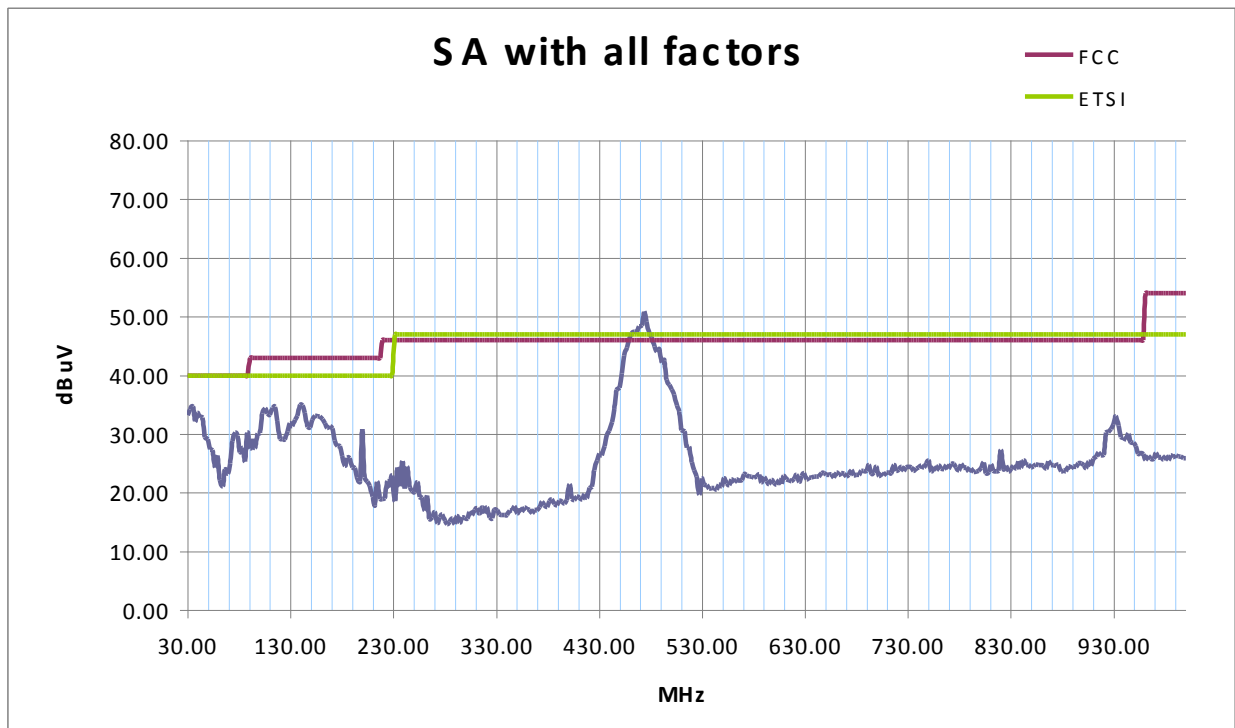
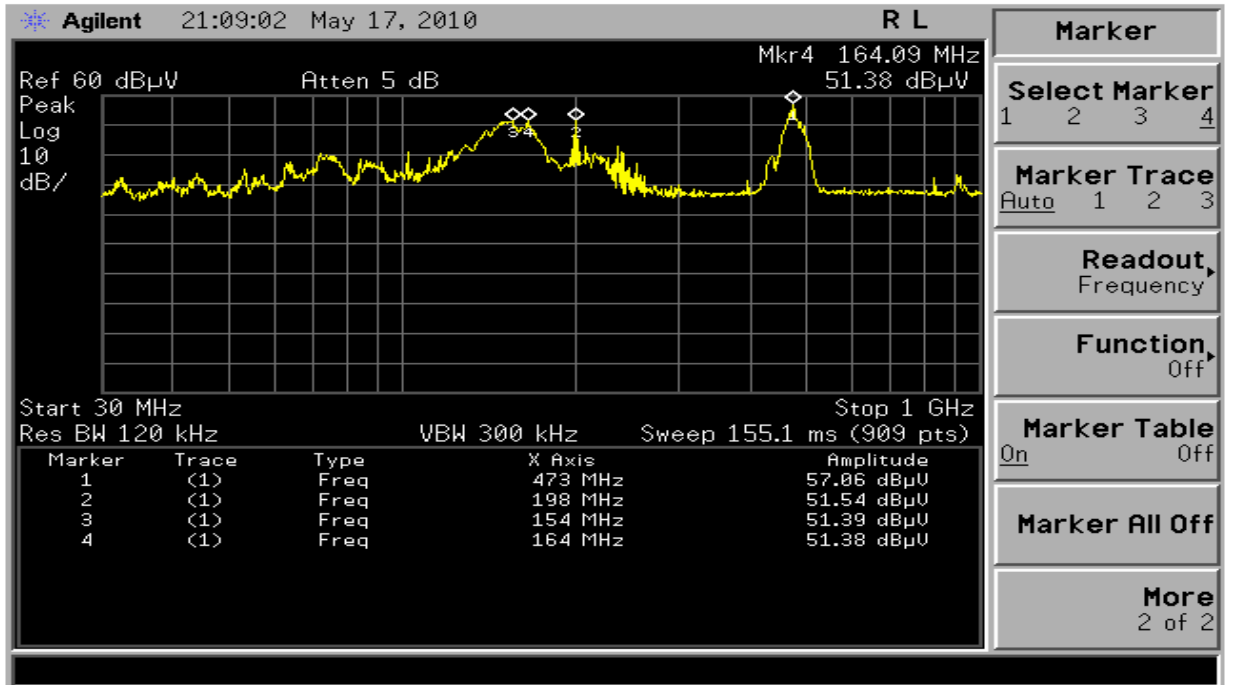
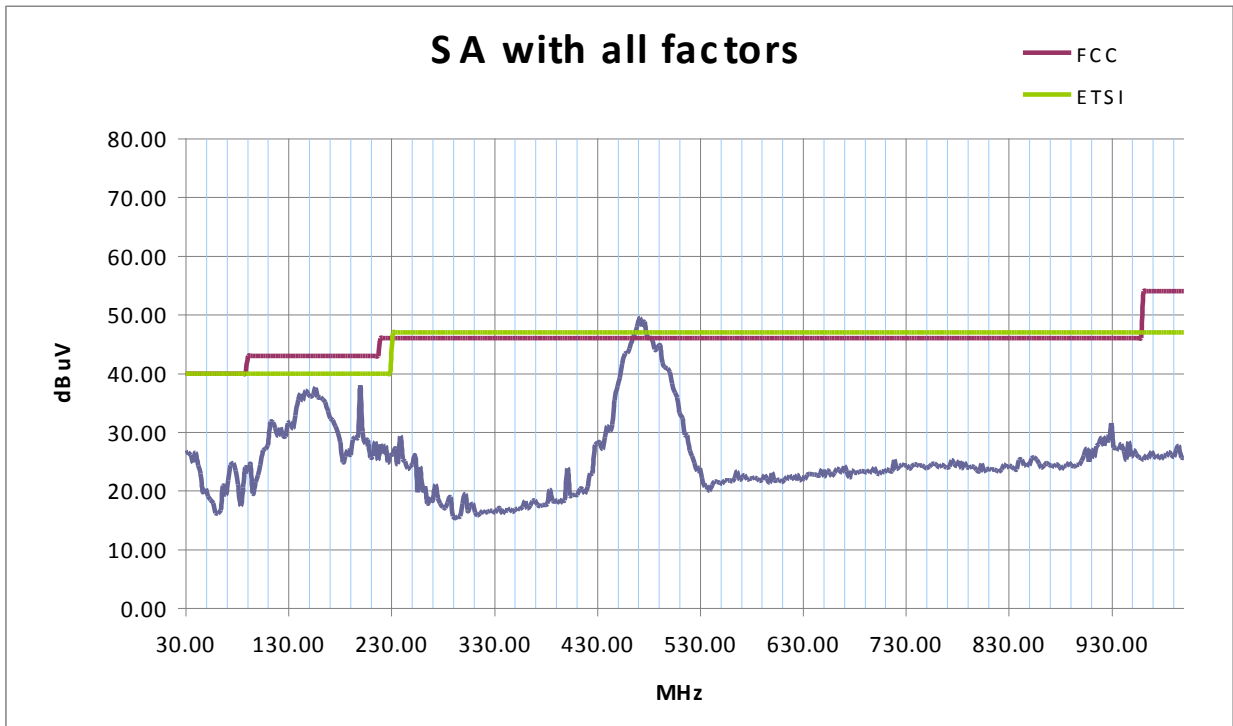


Figure 2. Pre-Compliance Chamber scan for Frequency Identification (Hori. peak hold over time)



3.4 Radiated Emissions, FCC Part 15, Clause 15.209 (Below 30 MHz)

Line Voltage and Freq: 120V / 60 Hz

Distance : 10 meters, H-field test site south end of property.

Temp : 38.8° C

Humidity : 40.7% RH

Date : 8/2-3/2010

The antennas are shielded loops to minimize E-field emissions while allowing H-field emissions. The sum of the emissions, fundamental, spurious, and unwanted, from multiple antennas being driven by the controller do not exceed the specified limits.

FCC 15.209 subpart C - Radiated General Limits

Frequency (MHz)	Field strength (uV/m)	Field strength (dBuV/m)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	49-14	300
0.490–1.705	24000/F(kHz)	34-23	30
1.705–30.0	30	30	30
30–88	100	40	3
88–216	150	44	3
216–960	200	46	3
Above 960	500	54	3

56 kHz

Dist	Harm	Freq	SA			AF	FF	DCF	DCCF	Pk Cor	QP Cor	AvgCor	FCC Limit	Limit	Margin	Peak Limit	Peak Margin
m	#	kHz	pk	QP	av	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	Distance	dB	dBuV/m	dB
10		102vac	50.7	44.5	34.0	61.60	0	-82.7	-16.8	29.6	23.4	12.9	32.6	av@300m	19.7	52.6	23.1
10		138vac	53.2	47.0	36.6	61.60	0	-82.7	-16.8	32.1	25.9	15.5	32.6	av@300m	17.2	52.6	20.5
10	1	56	52.1	46.0	35.5	61.60	0	-82.7	-16.8	31.0	24.8	14.4	32.6	av@300m	18.3	52.6	21.7
10	2	112	9.3	3.1	-5.9	55.75	1.3	-82.7	-16.8	-16.4	-22.6	-31.6	26.6	av@300m	58.2	46.6	63.0
10	3	168	-2.0	-3.0	-14.0	52.80	0.7	-82.7	-16.8	-31.2	-32.2	-43.2	23.1	av@300m	66.3	43.1	74.3
10	4	224	9.0	-3.7	-13.5	50.60	0.4	-82.7	-16.8	-22.7	-35.4	-45.2	20.6	av@300m	65.8	40.6	63.3
10	5	280	0.2	-9.2	-15.0	48.80	0.3	-82.7	-16.8	-33.4	-42.8	-48.6	18.7	av@300m	67.3	38.7	72.1
10	6	336	-2.5	-8.6	-15.0	47.35	0.3	-82.7	-16.8	-37.6	-43.7	-50.1	17.1	av@300m	67.1	37.1	74.6
10	7	392	9.6	7.1	-11.0	46.15	0.2	-82.7	-16.8	-26.8	-29.3	-47.4	15.7	av@300m	63.1	35.7	62.5
10	8	448	-6.5	-11.7	-17.0	45.05	0.2	-82.7	-16.8	-44.0	-49.2	-54.5	14.6	av@300m	69.0	34.6	78.5
10	9	504	12.9	11.0	-7.7	44.25	0.2	-26.7	-16.8	30.6	28.7	10.0	33.6	QP@30m	4.8	53.6	22.9
10	10	560	19.0	14.0	13.0	43.70	0.2	-26.7	-16.8	36.2	31.2	30.2	32.6	QP@30m	1.5	52.6	16.5

Harmonics 9 and 10 are influenced by nearby AM radio stations.

Table Legend follows:

Legend for Radiated Emissions below 30 MHz Table.

Note: Limits and details change at 490 kHz, per 15.209(a)
Detector bandwidths are specified in ANSI C63.4-2003, sec 4.2 which references ANSI C63.2-1996 and CISPR 16-1-1:2003-11
Video bandwidth is set to at least 3 times wider than the IF bandwidth.
Use Average detector for Freq bands 9-90 kHz and 110-490 kHz and above 1000 MHz per 15.209(d)
Use QP detector for other Freq bands below 1000 MHz per 15.209(d)
Average Detector measuring time is set to 100 mSec per 15.35(c)
QuasiPeak Detector measuring time is set to at least 1 second per CISPR 16
Peak Detector values may be used instead of QP if the value complies with the limit. 15.35(a)
Peak Limit is 20 dB higher than QuasiPeak or Average Limit in Table of 15.209 per 15.35(b)
Measure Variation of Fundamental Emission due to power supply variation +/-15% per 15.31(e)
Direction of maximum emissions was determined by sampling at 22.5 degrees around the system.
AF = Antenna Factor
FF = Filter Factor: Insertion loss of High Pass Filter, excluding fundamental.
DCCF (Duty Cycle Correction Factor) = $20 \log(\text{duty cycle}) = 20 \log(\text{pulse duration/pulse repetition period})$
Math Average of DCCF can be used instead of using Average Detector
DCF: Use square law (40 dB).
Otherwise determine actual rolloff factor by using the 2 or more point method using the factor P per formula below.
Where P is the roll-off exponent . P is found by the 2 point method as follows:
Roll off Factor $P = (\text{Level}(@ \text{Distance } 1) - \text{Level}(@ \text{Distance } 2)) / 20 \log(\text{Distance } 2 / \text{Distance } 1)$
Distance Correction Factor (DCF) = $20 \log(\text{Test Dist} / 300)^P = 20 P \log(\text{Test Dist} / 300)$ to adjust measurement to 300 m.

3.5 Occupied Bandwidth For IC

Occupied Bandwidth by calculation

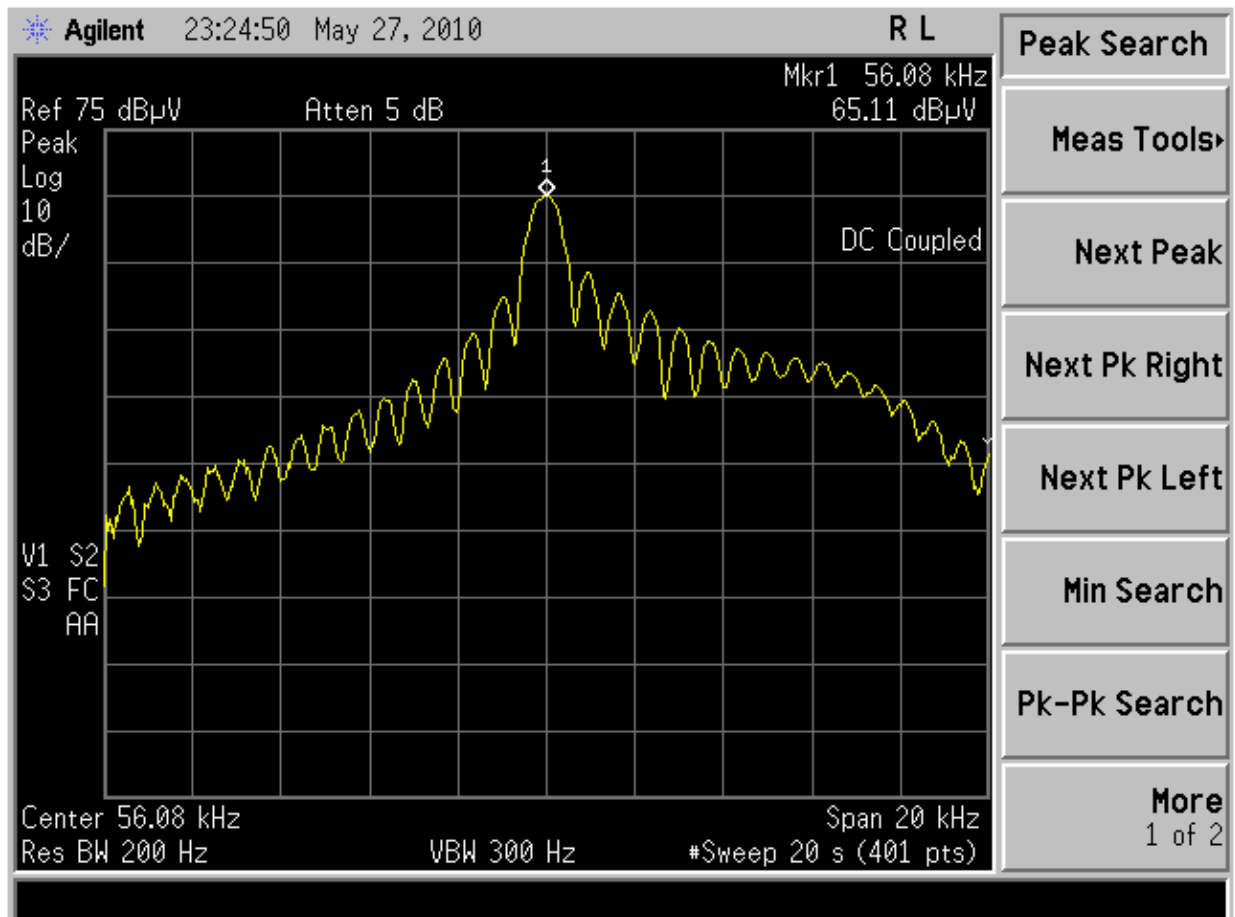
- Sum data points
- Calculate .5% of sum
- For lower point: Take running sum from lowest frequency until 0.5% of sum is reached
- For upper point: Take running sum from highest frequency until 0.5% of sum is reached

Lower Point = 51550

Upper Point = 60975

Occupied Bandwidth = 60975 – 51550 = 9425

Sweep taken for calculation:

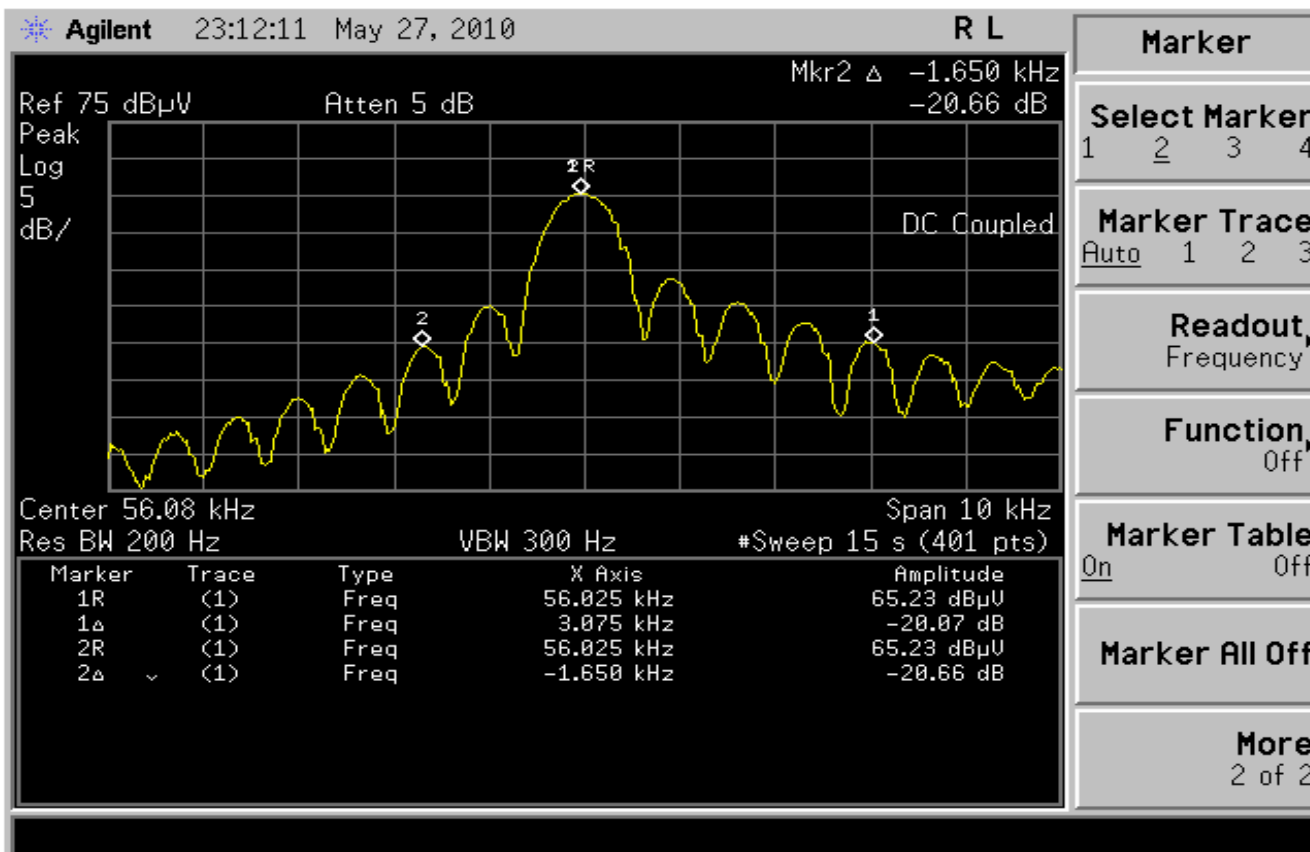


Data for calculation:

kHz	mV						
51.08	0.030	52.43	0.056	53.83	0.102	55.23	0.266
51.10	0.037	52.45	0.056	53.85	0.094	55.25	0.190
51.13	0.035	52.48	0.054	53.88	0.090	55.28	0.185
51.15	0.036	52.50	0.053	53.90	0.087	55.30	0.174
51.18	0.034	52.53	0.050	53.93	0.056	55.33	0.148
51.20	0.034	52.55	0.051	53.95	0.064	55.35	0.148
51.23	0.032	52.58	0.039	53.98	0.056	55.38	0.158
51.25	0.030	52.60	0.039	54.00	0.044	55.40	0.208
51.28	0.028	52.63	0.040	54.03	0.044	55.43	0.264
51.30	0.025	52.65	0.033	54.05	0.046	55.45	0.353
51.33	0.024	52.68	0.028	54.08	0.051	55.48	0.406
51.35	0.021	52.70	0.028	54.10	0.062	55.50	0.530
51.38	0.021	52.73	0.027	54.13	0.072	55.53	0.617
51.40	0.019	52.75	0.028	54.15	0.089	55.55	0.650
51.43	0.019	52.78	0.029	54.18	0.105	55.58	0.777
51.45	0.020	52.80	0.041	54.20	0.111	55.60	0.862
51.48	0.023	52.83	0.042	54.23	0.129	55.63	0.910
51.50	0.022	52.85	0.044	54.25	0.140	55.65	1.025
51.53	0.027	52.88	0.053	54.28	0.145	55.68	1.112
51.55	0.029	52.90	0.057	54.30	0.157	55.70	1.204
51.58	0.032	52.93	0.059	54.33	0.162	55.73	1.275
51.60	0.033	52.95	0.066	54.35	0.165	55.75	1.384
51.63	0.037	52.98	0.070	54.38	0.169	55.78	1.451
51.65	0.041	53.00	0.074	54.40	0.168	55.80	1.483
51.68	0.040	53.03	0.075	54.43	0.165	55.83	1.567
51.70	0.042	53.05	0.074	54.45	0.160	55.85	1.624
51.73	0.044	53.08	0.077	54.48	0.155	55.88	1.648
51.75	0.043	53.10	0.074	54.50	0.153	55.90	1.718
51.78	0.043	53.13	0.072	54.53	0.146	55.93	1.756
51.80	0.045	53.15	0.071	54.55	0.143	55.95	1.772
51.83	0.042	53.18	0.069	54.58	0.100	55.98	1.799
51.85	0.040	53.20	0.063	54.60	0.093	56.00	1.816
51.88	0.039	53.23	0.066	54.63	0.097	56.03	1.826
51.90	0.039	53.25	0.046	54.65	0.084	56.05	1.826
51.93	0.032	53.28	0.048	54.68	0.068	56.08	1.820
51.95	0.032	53.30	0.046	54.70	0.071	56.10	1.798
51.98	0.030	53.33	0.042	54.73	0.081	56.13	1.776
52.00	0.023	53.35	0.033	54.75	0.094	56.15	1.739
52.03	0.023	53.38	0.035	54.78	0.121	56.18	1.735
52.05	0.023	53.40	0.034	54.80	0.136	56.20	1.697
52.08	0.022	53.43	0.040	54.83	0.173	56.23	1.608
52.10	0.024	53.45	0.044	54.85	0.201	56.25	1.524
52.13	0.025	53.48	0.056	54.88	0.212	56.28	1.524
52.15	0.028	53.50	0.062	54.90	0.242	56.30	1.440
52.18	0.029	53.53	0.071	54.93	0.267	56.33	1.430
52.20	0.034	53.55	0.079	54.95	0.272	56.35	1.201
52.23	0.038	53.58	0.086	54.98	0.297	56.38	1.170
52.25	0.043	53.60	0.089	55.00	0.307	56.40	1.175
52.28	0.046	53.63	0.097	55.03	0.308	56.43	1.096
52.30	0.050	53.65	0.101	55.05	0.314	56.45	0.784
52.33	0.053	53.68	0.106	55.08	0.317	56.48	0.779
52.35	0.051	53.70	0.107	55.10	0.312	56.50	0.788
52.38	0.054	53.73	0.109	55.13	0.303	56.53	0.668
52.40	0.055	53.75	0.106	55.15	0.295	56.55	0.643
		53.78	0.103	55.18	0.280	56.58	0.416
		53.80	0.100	55.20	0.279	56.60	0.351

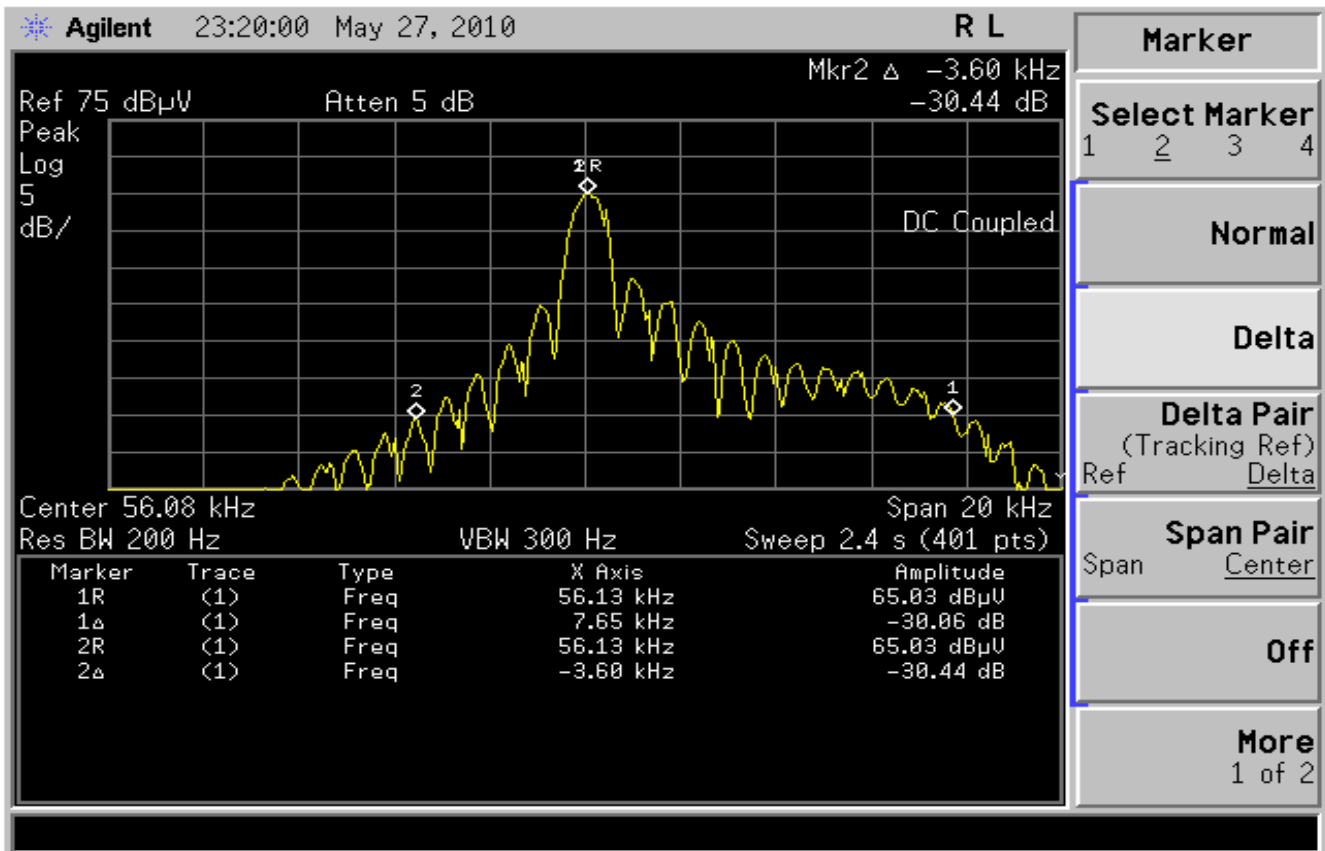
56.63	0.348	58.10	0.111	59.58	0.114	61.05	0.121
56.65	0.271	58.13	0.122	59.60	0.122	61.08	0.119
56.68	0.189	58.15	0.135	59.63	0.137		
56.70	0.191	58.18	0.161	59.65	0.141		
56.73	0.198	58.20	0.180	59.68	0.145		
56.75	0.240	58.23	0.203	59.70	0.148		
56.78	0.291	58.25	0.209	59.73	0.147		
56.80	0.334	58.28	0.228	59.75	0.146		
56.83	0.375	58.30	0.235	59.78	0.145		
56.85	0.412	58.33	0.237	59.80	0.138		
56.88	0.441	58.35	0.245	59.83	0.140		
56.90	0.451	58.38	0.246	59.85	0.130		
56.93	0.469	58.40	0.246	59.88	0.133		
56.95	0.480	58.43	0.243	59.90	0.122		
56.98	0.479	58.45	0.233	59.93	0.099		
57.00	0.480	58.48	0.216	59.95	0.105		
57.03	0.467	58.50	0.226	59.98	0.095		
57.05	0.461	58.53	0.209	60.00	0.078		
57.08	0.457	58.55	0.202	60.03	0.067		
57.10	0.448	58.58	0.155	60.05	0.070		
57.13	0.373	58.60	0.147	60.08	0.067		
57.15	0.370	58.63	0.153	60.10	0.067		
57.18	0.333	58.65	0.124	60.13	0.074		
57.20	0.330	58.68	0.074	60.15	0.081		
57.23	0.325	58.70	0.066	60.18	0.089		
57.25	0.212	58.73	0.061	60.20	0.099		
57.28	0.202	58.75	0.057	60.23	0.106		
57.30	0.201	58.78	0.060	60.25	0.112		
57.33	0.137	58.80	0.066	60.28	0.118		
57.35	0.133	58.83	0.076	60.30	0.125		
57.38	0.136	58.85	0.102	60.33	0.128		
57.40	0.141	58.88	0.123	60.35	0.134		
57.43	0.168	58.90	0.141	60.38	0.131		
57.45	0.189	58.93	0.148	60.40	0.128		
57.48	0.206	58.95	0.165	60.43	0.127		
57.50	0.239	58.98	0.170	60.45	0.123		
57.53	0.267	59.00	0.176	60.48	0.120		
57.55	0.293	59.03	0.182	60.50	0.119		
57.58	0.303	59.05	0.180	60.53	0.115		
57.60	0.319	59.08	0.181	60.55	0.116		
57.63	0.331	59.10	0.181	60.58	0.096		
57.65	0.333	59.13	0.173	60.60	0.087		
57.68	0.335	59.15	0.170	60.63	0.093		
57.70	0.328	59.18	0.159	60.65	0.086		
57.73	0.333	59.20	0.161	60.68	0.075		
57.75	0.332	59.23	0.159	60.70	0.076		
57.78	0.304	59.25	0.126	60.73	0.076		
57.80	0.283	59.28	0.122	60.75	0.077		
57.83	0.285	59.30	0.115	60.78	0.080		
57.85	0.262	59.33	0.076	60.80	0.087		
57.88	0.255	59.35	0.071	60.83	0.095		
57.90	0.237	59.38	0.061	60.85	0.094		
57.93	0.180	59.40	0.061	60.88	0.102		
57.95	0.180	59.43	0.057	60.90	0.108		
57.98	0.159	59.45	0.062	60.93	0.112		
58.00	0.118	59.48	0.071	60.95	0.117		
58.03	0.101	59.50	0.073	60.98	0.120		
58.05	0.100	59.53	0.090	61.00	0.124		
58.08	0.094	59.55	0.104	61.03	0.120		

Figure 1.
 20 dB Bandwidth from highest level. (peak hold over time)



Delta to each side from center: $3.075 + 1.650 = 4.725$ kHz.

Figure 2.
30 dB Bandwidth from highest level. (peak hold over time)



Delta to each side from center: $7.65 + 3.6 = 11.25$ kHz

4 EQUIPMENT LIST

Description	Manufacturer	Model	Serial .	Cal Date	DueDate
Loop Antenna	Electro Metrics	ALP -70	163	2010-05-27	2011-05-27
AC Power Source	Pacific	120ASX	1513 05894	2010-05-26	2011-05-26
Biconical Antenna	Electro Metrics	3110B	1017	2010-05-18	2011-05-18
Biconical Antenna	ETS	3110B	3380	2010-05-18	2011-05-18
Log Periodic Antenna	EMCO	3146	3909	2010-05-18	2011-05-18
Log Periodic Antenna	EMCO	3146	4731	2010-05-18	2011-05-18
Spectrum Analyzer	Agilent	E7405A	MYY49510320	2010-05-14	2011-05-14
Spectrum Analyzer	Agilent	E7405A	MYY49510099	2010-05-12	2011-05-12
Radiation Meter	Narda	EMR-200	AN-0055	2010-05-05	2011-05-05
LISN	Solar	C5086-10	91471	2010-05-05	2011-05-05
Log Periodic Antenna	EMCO	3146	3576	2010-04-29	2011-04-29
Biconical Antenna	EMCO	3104C	4334	2010-04-03	2011-04-03
Double-Ridge Waveguide Horn	EMCO	3115	3006	2009-04-02	2011-04-02
Signal Generator	Marconi	2024	783031	2010-03-02	2011-03-02
5kv VA AC Power Source	California Inst.	500lix	54328	2009-10-06	2010-10-06
Power Analyzer & Cond System	California Inst.	PACS-1	72376	2009-10-06	2010-10-06
Electronic Output Switch	California Inst.	EOS-1	72377	2009-10-06	2010-10-06
Humidity & Temperature Meter	Davis Inst	4465CF	10304858	2009-08-20	2010-08-20
Surge Coupler/Decoupler	Key Tek	CE50	9507535	2009-07-21	2010-07-21
ESD Simulator with 2 Tips	Shaffner	NSG435	1197	2009-07-15	2010-07-15
EFT Generator	Haefely Trench	PEFT Junior	083 180-16	2009-07-10	2010-07-10
LISN	EMCO	3816/2NM	1018	2009-06-10	2010-06-10
RF Current Probe	FCC	F-33-1	304	2009-06-10	2010-06-10
RF Absorbing Clamp	FCC	F-201	174	2009-06-09	2010-06-09
RF Power Meter	Boonton	4231-30	53701	2009-06-05	2010-06-05
Power Sensor	Boonton	51011-EMC	31932	2009-06-05	2010-06-05
LISN	EMCO	3816/2NM	1064	2009-02-05	2010-02-05
Loop Antenna (Immunity)	Solar Elect	7334-1	73626	Verify	Before use
58 kHz Filter	In House	unique	N/A	2009-12-13	2010-12-13
Coupling Decoupling Netwk	FCC	FCC-801-M3-16	58	Verify	Before use
Coupling Decoupling Netwk	FCC	FCC-801-M3-16	59	Verify	Before use
Coupling Decoupling Netwk	FCC	FCC-801-M3-16A	2036	Verify	Before use
Coupling Decoupling Netwk	FCC	FCC-801-M3-16A	2037	Verify	Before use
Directional Coupler	Werlatone	C3910	6706	2009-12-04	2010-12-04
Directional Coupler	Werlatone	C5673	11481	2009-12-04	2010-12-04
Transient Limiter	Electro Metrics	EM 7600	187	2009-12-03	2010-12-03
Pre-Amp .009-1300MHz	HP	8447F	2805A03473	2009-12-02	2010-12-02
Pre-Amp .009-1300MHz	HP	8447F	3113A06072	2009-12-02	2010-12-02
BiLog Antenna (Immunity)	Schaffner Chase	CB16141	4112	Verify	Before use

5 ANTENNA FACTORS.

Customer Name: Tyco Safety Products - Sensormatic

Antenna Manufacturer: Electro-Metrics

Antenna Model: ALP-70 Loop

Antenna Serial No.: 163

Temperature (Deg C): 21.0

Humidity (%): 50.0

Measurement Distance in Meters = 1.0

NOTES: ACF valid to 10 meters per NIST methods.

CAL CERT #: 2009042912

Freq (MHz)	E-field ACF (dB)	H-field ACF (dB)
0.01	75.6	24.1
0.02	71.6	20.2
0.03	68.3	16.9
0.04	65.5	14.0
0.05	63.6	12.2
0.06	61.1	9.7
0.07	59.6	8.2
0.08	58.5	7.0
0.09	57.8	6.4
0.10	56.8	5.4
0.20	51.8	0.4
0.30	48.5	-3.0
0.40	46.3	-5.1
0.50	45.0	-6.5
0.60	43.6	-7.8
0.70	42.8	-8.6
0.80	41.6	-9.8
0.90	41.1	-10.3
1.00	40.5	-11.0
2.00	38.2	-13.3
3.00	37.2	-14.3
4.00	37.0	-14.4
5.00	36.7	-14.8
6.00	37.6	-13.8
7.00	37.7	-13.8
8.00	37.7	-13.7
9.00	37.6	-13.9
10.00	37.6	-13.8
15.00	37.4	-14.0
20.00	37.2	-14.2
25.00	36.2	-15.2
30.00	37.4	-14.1

Customer Name: Tyco Safety Products - Sensormatic
 Antenna Manufacturer: EMCO
Antenna Model: 3104C BiconicalAntenna Serial No.: 9009-4334
 Temperature (Deg C). 3
 Humidity (%). 65
 Measurement Distance in Meters = 3
 Antenna Polarization = VERT / HORZ
 NOTES:
 CAL CERT #: 2009033120

Freq (MHz)	Ver ACF (dB)	Hor ACF (dB)
20.0	17.7	20.6
21.0	17.4	20.0
22.0	16.4	18.6
23.0	16.1	18.1
24.0	15.3	16.9
25.0	14.9	16.4
26.0	14.2	15.5
27.0	13.6	15.0
28.0	13.0	14.3
29.0	12.3	13.7
30.0	11.9	13.3
31.0	11.3	12.7
32.0	11.0	12.4
33.0	10.5	11.9
34.0	10.3	11.7
35.0	9.9	11.3
36.0	9.8	11.3
37.0	9.6	11.0
38.0	9.6	11.0
39.0	9.5	10.8
40.0	9.5	10.7
40.0	9.5	10.7
41.0	9.6	10.7
42.0	9.7	10.7
43.0	9.9	10.6
44.0	10.0	10.6
45.0	10.2	10.7
46.0	10.4	10.7
47.0	10.5	10.7
48.0	10.7	10.7
49.0	11.0	10.8
50.0	11.2	10.8
51.0	11.4	10.8
52.0	11.6	10.8
53.0	11.9	10.9
54.0	12.0	10.9
55.0	12.1	11.0

56.0	11.9	10.9
57.0	11.9	11.0
58.0	11.4	10.9
59.0	11.2	10.9
60.0	10.8	10.8
61.0	10.5	10.8
62.0	10.0	10.5
63.0	9.7	10.4
64.0	9.2	10.1
65.0	8.9	9.9
66.0	8.5	9.5
67.0	8.2	9.3
68.0	7.8	8.9
69.0	7.6	8.6
70.0	7.3	8.2
71.0	7.2	7.9
72.0	7.0	7.5
73.0	7.0	7.3
74.0	6.8	7.0
75.0	6.8	6.8
75.0	6.8	6.8
76.0	6.7	6.5
77.0	6.7	6.4
78.0	6.6	6.3
79.0	6.7	6.3
80.0	6.7	6.3
81.0	6.9	6.3
82.0	7.2	6.4
83.0	7.4	6.5
84.0	7.6	6.7
85.0	7.9	6.8
86.0	8.2	7.1
87.0	8.3	7.2
88.0	8.7	7.6
89.0	8.8	7.7
90.0	9.1	8.0
91.0	9.2	8.1
92.0	9.5	8.5
93.0	9.5	8.6
94.0	9.8	8.9

95.0	9.9	9.0
96.0	10.2	9.4
97.0	10.6	9.9
98.0	11.4	11.2
99.0	11.7	12.0
100.0	11.7	11.7
101.0	11.4	11.3
102.0	11.6	11.4
103.0	11.5	11.2
104.0	11.8	11.5
105.0	11.9	11.5
106.0	12.1	11.8
107.0	12.2	11.8
108.0	12.5	12.1
109.0	12.6	12.2
110.0	12.9	12.6
111.0	13.1	12.7
112.0	13.5	13.2
113.0	13.8	13.5
114.0	14.3	14.2
115.0	14.8	14.9
116.0	15.6	15.7
117.0	16.3	15.8
118.0	16.3	15.3
119.0	15.6	14.5
120.0	15.0	14.1
121.0	14.3	13.6
122.0	14.1	13.5
123.0	13.8	13.3
124.0	13.6	13.3
125.0	13.4	13.2
126.0	13.4	13.3
127.0	13.2	13.1
128.0	13.1	13.2
129.0	12.9	13.0
130.0	13.0	13.2
131.0	12.8	13.0
132.0	12.8	13.2
133.0	12.7	13.0
134.0	12.8	13.1

135.0	12.7	13.0
136.0	12.8	13.0
137.0	12.8	13.0
138.0	12.8	13.1
139.0	12.8	13.0
140.0	12.8	13.0
141.0	12.8	13.0
142.0	12.9	13.1
143.0	13.0	13.1
144.0	13.0	13.2
145.0	13.2	13.3
146.0	13.3	13.4
147.0	13.5	13.6
148.0	13.7	13.8
149.0	14.0	14.1
150.0	14.2	14.2
151.0	14.4	14.3
152.0	14.3	14.2
153.0	14.5	14.1
154.0	14.5	13.9
155.0	14.6	13.9
156.0	14.7	13.8
157.0	14.8	13.8
158.0	14.7	13.7
159.0	14.8	13.8
160.0	14.8	13.8
161.0	15.0	14.0
162.0	15.1	14.0
163.0	15.3	14.2
164.0	15.4	14.2
165.0	15.7	14.4
166.0	15.7	14.4
167.0	16.0	14.7
168.0	15.9	14.7
169.0	16.1	14.9
170.0	16.1	15.0
171.0	16.1	15.2
172.0	16.1	15.2
173.0	16.2	15.4
174.0	16.3	15.5
175.0	16.4	15.7
176.0	16.5	15.8
177.0	16.7	16.0
178.0	16.8	16.1
179.0	16.9	16.3
180.0	17.0	16.4
181.0	17.1	16.6
182.0	17.1	16.7
183.0	17.2	16.9

184.0	17.2	17.0
185.0	17.3	17.1
186.0	17.3	17.2
187.0	17.5	17.3
188.0	17.6	17.5
189.0	17.8	17.6
190.0	17.8	17.7
191.0	17.9	17.7
192.0	17.8	17.5
193.0	17.8	17.5
194.0	17.7	17.3
195.0	17.8	17.4
196.0	17.7	17.4
197.0	17.9	17.5
198.0	17.8	17.4
199.0	17.7	17.5
200.0	17.6	17.3
201.0	17.7	17.4
202.0	17.6	17.3
203.0	17.5	17.3
204.0	17.4	17.3
205.0	17.4	17.3
206.0	17.2	17.2
207.0	17.2	17.2
208.0	17.2	17.2
209.0	17.2	17.2
210.0	17.1	17.1
211.0	17.0	17.2
212.0	16.9	17.0
213.0	16.9	17.0
214.0	16.8	16.9
215.0	16.7	16.9
216.0	16.6	16.8
217.0	16.5	16.7
218.0	16.5	16.7
219.0	16.4	16.5
220.0	16.5	16.4
221.0	16.5	16.3
222.0	16.4	16.2
223.0	16.4	16.1
224.0	16.2	16.1
225.0	16.2	15.9
226.0	16.0	16.0
227.0	16.1	16.0
228.0	16.1	15.9
229.0	16.0	15.8
230.0	16.1	15.7
231.0	16.1	15.7
232.0	16.2	15.7

233.0	16.2	15.6
234.0	16.3	15.7
235.0	16.3	15.6
236.0	16.5	15.7
237.0	16.6	15.7
238.0	16.6	15.7
239.0	16.6	15.7
240.0	16.7	15.7
241.0	16.7	15.8
242.0	16.8	15.9
243.0	16.8	15.9
244.0	16.9	16.0
245.0	17.0	16.0
246.0	17.0	16.1
247.0	17.2	16.2
248.0	17.2	16.3
249.0	17.4	16.4
250.0	17.4	16.5
251.0	17.5	16.6
252.0	17.5	16.7
253.0	17.5	16.8
254.0	17.5	17.0
255.0	17.5	17.1
256.0	17.6	17.3
257.0	17.7	17.4
258.0	17.9	17.5
259.0	18.1	17.6
260.0	18.2	17.7
261.0	18.4	17.9
262.0	18.5	18.0
263.0	18.5	18.1
264.0	18.6	18.3
265.0	18.6	18.4
266.0	18.6	18.6
267.0	18.7	18.7
268.0	18.7	18.8
269.0	18.7	19.0
270.0	18.8	19.1
271.0	18.9	19.2
272.0	18.9	19.3
273.0	19.1	19.4
274.0	19.2	19.5
275.0	19.3	19.5
276.0	19.4	19.6
277.0	19.5	19.7
278.0	19.6	19.7
279.0	19.8	19.8
280.0	19.9	19.9
281.0	20.1	20.0

282.0	20.1	20.1
283.0	20.1	20.2
284.0	20.1	20.3
285.0	20.1	20.4
286.0	20.2	20.6
287.0	20.2	20.7
288.0	20.3	21.0

289.0	20.3	21.2
290.0	20.5	21.3
291.0	20.6	21.5
292.0	20.6	21.7
293.0	20.6	21.8
294.0	20.7	21.8
295.0	20.6	21.9

296.0	20.6	22.0
297.0	20.7	22.1
298.0	20.7	22.2
299.0	20.8	22.3
300.0	20.8	22.4

Customer Name: Tyco Safety Products - Sensormatic

Antenna Manufacturer: EMCO

Antenna Model: 3146 – Log periodic

Antenna Serial No.: 9303-3576

Temperature (Deg C). 3

Humidity (%). 65

Measurement Distance in Meters = 3

Antenna Polarization = VERT / HORZ

NOTES:

CAL CERT #: 2009033116

Freq (MHz)	Ver ACF (dB)	Hor ACF (dB)
200.0	11.7	12.1
205.0	11.6	12.1
210.0	11.7	11.9
215.0	11.6	11.7
220.0	11.5	11.5
225.0	11.2	11.4
230.0	11.1	11.4
235.0	11.5	11.6
240.0	11.8	11.9
245.0	12.2	12.1
250.0	12.6	12.4
255.0	12.6	12.6
260.0	12.8	13.0
265.0	12.9	13.2
270.0	13.0	13.5
275.0	13.3	13.6
280.0	13.6	13.7
285.0	13.9	13.8
290.0	14.1	14.0
295.0	14.1	14.1
300.0	14.2	14.3
305.0	14.5	14.8
310.0	14.8	15.2
315.0	14.8	15.1
320.0	14.7	14.8
325.0	14.7	14.6
330.0	14.6	14.6
335.0	14.3	14.7
340.0	14.1	14.9
345.0	14.2	14.9
350.0	14.5	14.9
355.0	14.8	14.8
360.0	15.0	14.9
365.0	15.3	15.0
370.0	15.2	15.1
375.0	15.1	15.2

380.0	15.0	15.3
385.0	15.4	15.5
390.0	15.7	15.8
395.0	15.5	15.9
400.0	15.4	16.1
405.0	15.5	16.0
410.0	15.7	15.9
415.0	16.0	16.1
420.0	16.0	16.2
425.0	15.9	16.4
430.0	15.8	16.5
435.0	15.9	16.5
440.0	16.1	16.4
445.0	16.4	16.5
450.0	16.7	16.7
455.0	16.9	16.9
460.0	16.9	17.2
465.0	16.9	17.3
470.0	16.9	17.3
475.0	17.1	17.4
480.0	17.2	17.4
485.0	17.5	17.5
490.0	17.7	17.6
495.0	17.9	17.9
500.0	17.9	17.9
505.0	18.0	18.2
510.0	18.3	18.6
515.0	18.5	19.0
520.0	18.3	18.8
525.0	18.0	18.6
530.0	17.7	18.5
535.0	17.6	18.6
540.0	17.6	18.4
545.0	17.9	18.3
550.0	18.2	18.3
555.0	18.3	18.6
560.0	18.2	18.7
565.0	18.1	18.8
570.0	18.0	18.9

575.0	18.2	18.7
580.0	18.4	18.6
585.0	18.7	18.8
590.0	18.8	19.1
595.0	18.7	19.2
600.0	18.7	19.2
605.0	18.7	19.1
610.0	18.8	19.3
615.0	19.0	19.5
620.0	19.2	19.4
625.0	19.4	19.4
630.0	19.2	19.4
635.0	19.2	19.4
640.0	19.5	19.7
645.0	19.7	19.9
650.0	19.9	20.0
655.0	20.1	20.1
660.0	20.3	20.3
665.0	20.4	20.4
670.0	20.5	20.6
675.0	20.5	20.7
680.0	20.5	20.9
685.0	20.4	20.9
690.0	20.4	21.1
695.0	20.4	21.0
700.0	20.5	21.0
705.0	20.6	21.0
710.0	20.5	21.0
715.0	20.5	21.0
720.0	20.5	21.2
725.0	20.7	21.3
730.0	20.7	21.2
735.0	20.7	21.2
740.0	20.6	21.1
745.0	20.6	21.2
750.0	20.6	21.4
755.0	20.6	21.4
760.0	20.7	21.3
765.0	20.7	21.4

770.0	20.7	21.4
775.0	20.7	21.4
780.0	20.7	21.4
785.0	20.7	21.4
790.0	20.8	21.5
795.0	20.9	21.6
800.0	21.1	21.6
805.0	21.0	21.7
810.0	21.1	21.7
815.0	21.1	21.8
820.0	21.3	22.0
825.0	21.4	22.1
830.0	21.5	22.1
835.0	21.6	22.2
840.0	21.7	22.3
845.0	21.7	22.4

850.0	21.8	22.4
855.0	21.9	22.5
860.0	22.2	22.7
865.0	22.4	22.9
870.0	22.5	23.0
875.0	22.6	23.1
880.0	22.6	23.1
885.0	22.5	23.2
890.0	22.6	23.1
895.0	22.6	23.1
900.0	22.7	23.3
905.0	22.7	23.3
910.0	22.8	23.3
915.0	22.8	23.2
920.0	22.6	23.3
925.0	22.6	23.4

930.0	22.6	23.4
935.0	22.7	23.4
940.0	22.7	23.5
945.0	22.7	23.6
950.0	22.6	23.5
955.0	22.7	23.6
960.0	22.9	23.7
965.0	22.9	23.9
970.0	23.1	23.8
975.0	23.1	23.8
980.0	23.1	23.9
985.0	23.2	23.9
990.0	23.3	24.1
995.0	23.5	24.4
1000	23.6	24.4

Customer Name: Tyco Safety Products - Sensormatic

Antenna Manufacturer: EMCO

Antenna Model: 3115 Horn

Antenna Serial No.: 3006

Temperature (Deg C): 20.0

Humidity (%): 37.0

Measurement Distance in Meters = 3.0

Antenna Polarization = VERT / HORZ

NOTES: Observed Pin Depth: -0.0003" from typical.

CAL CERT #: 2009033119

Freq	Vertical	Horizontal
(MHz)	ACF	ACF
	(dB)	(dB)
1000.0	23.377	23.524
1500.0	25.067	25.087
2000.0	27.357	27.365
2500.0	29.000	29.024
3000.0	30.277	30.385
3500.0	31.557	31.512
4000.0	32.827	32.580
4500.0	32.593	32.499
5000.0	33.481	33.288
5500.0	34.467	34.421
6000.0	34.894	34.639
6500.0	34.730	34.612
7000.0	35.473	35.489
7500.0	36.832	36.780
8000.0	37.271	37.207
8500.0	37.649	37.600
9000.0	37.956	37.940
9500.0	37.858	37.743
10000.0	38.517	38.433
10500.0	38.992	39.004
11000.0	40.566	40.541
11500.0	39.704	39.684
12000.0	39.424	39.396
12500.0	38.797	38.822
13000.0	39.622	39.615
13500.0	40.408	40.394
14000.0	41.209	41.203
14500.0	41.665	41.584
15000.0	40.325	40.233
15500.0	38.024	38.049
16000.0	37.320	37.358
16500.0	38.400	38.340
17000.0	41.136	40.903
17500.0	42.866	42.522
18000.0	44.717	44.269

6 Test Setup Photos

Radiated Emissions >30 MHz



Radiated Emissions <30 MHz



Conducted Emissions



Occupied Bandwidth



7 PCB Photos – Top and Bottom

