

**TYCO SAFETY PRODUCTS  
SENSORMATIC  
EMC TEST PLAN and REPORT**

Model: AMB9010 Controller

**Standards Tested**

47 CFR, Part 15

RSS 210

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**1 Description and Characteristics of Equipment Under Test (EUT).**

**TYPE DESIGNATION**

(See Note 1)

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:**

| A | M | B | 9 | 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 a specific equipment in the series or "family" of equipments. It is often referred to as the "identification number".

**1.1 CONSTRUCTION OF EQUIPMENT**

[ ] Single unit (See Note 4)

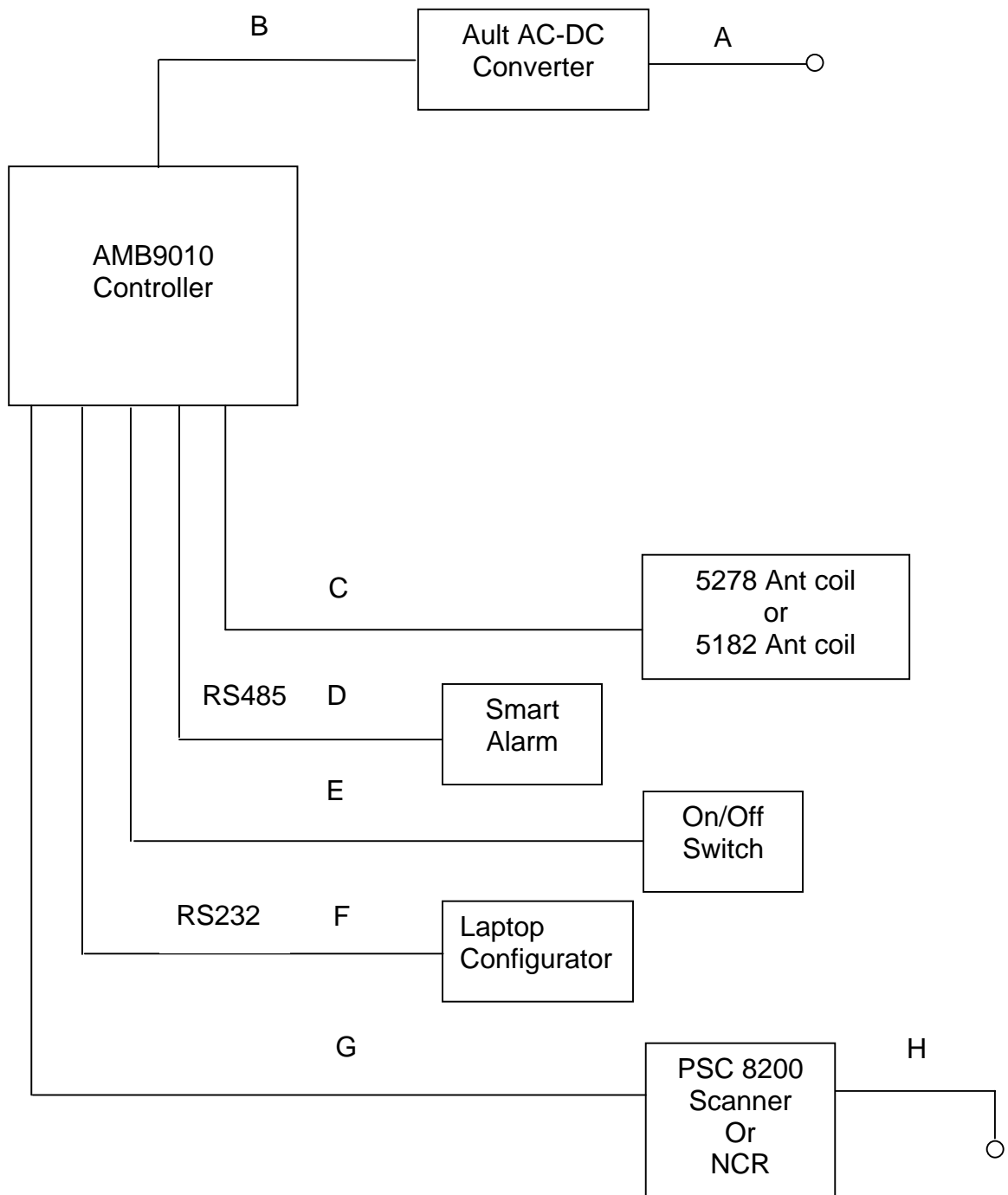
[ X ] Multiple units

If multiple units describe each one clearly:

Unit	Product Code	Part Number
Controller	AMB9010	
Antenna/s	AMB5182, AMB5278	
AC-DC Converter	Various suppliers	

Note 4:“UNIT” means a physically separate item of the equipment. The equipment under test may consist of two separate units. In this case additional sheets covering the transmitter and receiver characteristics for both units would be required, if unit 1 and unit 2 are covered by the same TYPE DESIGNATION.

### 1.1.1 Block Diagram of System to be Tested



1.2 LIST OF PORTS					
Ident	Function	* Classif.	** Max Cable Length	Test Length	Cable Type
A	AC Mains	ac power	> 1m but ≤ 3 m	1.83m; .3m	3 conductor unshielded
B	Power Supply Secondary	dc power	> 1m but ≤ 3 m	2.1m	2 conductor unshielded
C	Ant Cable 1	signal/control 1	< 3 m	1.5m	3 conductor Shielded
D	RS485 Network	signal/control 1	< 3 m	2.1m	4 conductor unshielded
E	RS 485 Network	signal/control 1	>3 m	2.1m	4 conductor unshielded
F	RS232	signal/control 1	>3 m	10m	4 conductor unshielded
G	RJ45	signal/control 1	>3 m	2.5m	8 conductor unshielded

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

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

### 1.3 EUT Characteristics

#### 1.3.1 FREQUENCY CHARACTERISTICS

Method of frequency generation

CRYSTAL

SYNTHESIZER

OTHER:

#### 1.3.2 FREQUENCY(S)

60 MHz

8 MHz

1.84 MHz

1.4 MHz

200 kHz

58 kHz

## 1.4 TRANSMITTER RF CARRIER CHARACTERISTICS

### 1.4.1 MAXIMUM RATED TRANSMITTER OUTPUT

-22.5 dB uV/m Field strength at 10 m

Is transmitter intended for:

Intermittent duty only  Yes  No

Transmitter ON 1.6ms seconds/minutes

Transmitter Period 5.55 / 11.11 / 16.67 / 22.22 ms seconds/minutes

AVERAGE DUTY CYCLE 14.4%

Is transmitter carrier output variable  Yes  No

RF output Maximum Minimum (Volts; provides max current relationship)

Is the RF output

continuously variable  Yes  No

or

stepped  Yes  No

#### EQUIPMENT RATINGS

Mains frequency : 50 - 60 Hz

Temperature range : 0 - 50 °C

Humidity range : 0 - 90 % non-condensing



## 1.5 OTHER EQUIPMENT CHARACTERISTICS

### INFORMATION TO DETERMINE PERFORMANCE ASSESSMENT

#### PRIMARY FUNCTIONS TO BE TESTED DURING AND AFTER EMC TESTS

The primary function to be tested is anti-theft label detection and deactivation.

#### ANCILLARY EQUIPMENT USED DURING TESTING

Hard tag  
Lap Top  
Remote Switch  
Smart Alarm  
POS Scanner

#### USER CONTROL FUNCTIONS:

None.

#### STORED DATA:

none.

#### METHODS USED TO ACCESS NORMAL OPERATION:

Power up system with no tags in the field. When the “ready” LED is properly illuminated, place a hard tag on the transmitter/deactivator pad. With these conditions, The LAPTOP connected to the service port via RS232 cable connection provides visual data for both detection and deactivation.

## 2 Summary of applicable tests

The standards applicable to transmitter tests include the following:

47 CFR Part 15

RSS 210 Issue 5

### 2.1 North American Transmitter Type Tests

The complete list of measurements called for in 47 CFR Part 15 is given below.

Sub clause	PARAMETER TO BE MEASURED	sel.*
15.107	CONDUCTED LIMITS, DIGITAL DEVICE	X
15.109a	RADIATED EMISSIONS LIMITS, DIGITAL DEVICE, CLASS B	
15.109b	RADIATED EMISSIONS LIMITS, DIGITAL DEVICE, CLASS A	X
15.207	CONDUCTED LIMITS, INTENTIONAL RADIATOR	X
15.209	RADIATED EMISSIONS LIMITS, INTENTIONAL RADIATORS, GENERAL REQUIREMENTS	X

\*sel.: Selected

Industry Canada accepts FCC test results with the addition of the bandwidth measurement. Therefore, only the following additional test is called for to comply with Canadian regulations:

Sub clause	PARAMETER TO BE MEASURED	sel.*
RSS 210 Issue 5.		
5.9.1	Emission Bandwidth	X

## 2.2 TESTS PER 47 CFR Part 15 and EN 55022

### 2.2.1 CONDUCTED EMISSIONS – Mains Port; CLAUSE 15.107 and 15.207

Equipment operation : Transmitting, modulated; deactivating.  
: 120 V / 60 Hz

#### Measured Levels

L1 / L2	Freq (MHz)	Peak Detector (dBuV)	QP Detector (dBuV)	Avg Detector (dBuV)	EN55022 Limits QP/Avg (dBuV)	Margin to QP/Avg Limit (dBuV)	Comments
L1	.150	56.3	50.5	27.1	65.6/55.6	15.1/28.5	Complies
L2	.160	53.4	48.2	20.9	65.5/55.5	17.3/34.6	Complies
L1	2.83	39.6	35.1	20.6	56.0/46.0	20.9/25.4	Complies
L2	9.55	45.1	41.1	23.6	60.0/50.0	18.9/26.4	Complies
L2	19.85	48.3	41.3	22.5	60.0/50.0	18.7/27.5	Complies
L2	20.15	52.7	44.9	17.9	60.0/50.0	15.1/32.1	Complies

#### LIMIT for FCC Part 15.107, Class B and 15.207 General

Frequency range	Quasi-peak	Average
0,15 - 0,5 MHz	66 - 56 dB $\mu$ V	56 - 46 dB $\mu$ V
> 0,5 - 5 MHz	56 dB $\mu$ V	46 dB $\mu$ V
>5 - 30 MHz	60 dB $\mu$ V	50 dB $\mu$ V

#### LIMIT for FCC Part 15.107, Class A,

Frequency range	Quasi-peak	Average
0,15 - 0,5 MHz	79 dB $\mu$ V	66 dB $\mu$ V
>0.5 - 30 MHz	73 dB $\mu$ V	60 dB $\mu$ V

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED (for references see test equipment listing)  
20, 21, 36, 37,

## 2.2.2 RADIATED EMISSIONS, E-Field, CLAUSE 15.109 and 15.209

Port : Enclosure  
 Equipment Operation : Transmitting, modulated, deactivating.  
 : 120V / 60 Hz

f(MHz)	Measured Level(dBuV)	Limit(dBuV)
33.1	38.1 #	40.0
120.1	37.8 #	43.5
240.1	43.1	46.0
360.1	35.8	46.0
480.3	34.5	46.0

# Quasi-Peak measurement is influenced by ambient. Ambient and intentional signals are below limit.

### LIMIT 15.109 and 15.209

Frequency Range MHz	General Limits uV/m	
0.009-0.490	2400/F (kHz) @ 300 m	
0.490-1.705	24000/F (kHz) @ 30 m	
1.705-30.0	30 @ 30 m	
LIMIT 15.109	Class B Quasi Peak Limit dBuV/m @3m	Class A Quasi Peak Limit dBuV/m @3m
30-88	40	50
88-216	43.5	54
216-960	46	57
>960	54	60

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED (for references see test equipment listing)

11, 16, 17, 18, 33, 34, 36, 37

### 2.2.3 RADIATED EMISSIONS, E-Field (Class A), EN 55022, Table 4.

Port : Enclosure  
 Equipment Operation : Transmitting, modulated, deactivating.  
 : 230V / 50 Hz

f(MHz)	Level(dBuV)	Limit(dBuV)
33.1	38.1 #	40.0
120.1	37.8 #	40.0
240.1	43.1	47.0
360.1	35.8	47.0
480.3	34.5	47.0

# Quasi-Peak measurement is influenced by ambient. Ambient and intentional signals are below limit.

#### LIMIT EN55022, Table 4, Class A

Frequency Range MHz	Quasi Peak Limit @10m dBuV/m	Quasi Peak Limit @3m dBuV/m
30-230	40	50
230 - 1000	47	57

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED (for references see test equipment listing)  
 11, 16, 17, 18, 33, 34, 36, 37

## 2.2.4 RADIATED EMISSIONS, H-Field, CLAUSE 15.209

Equipment Operation: Transmitting, normal modulation

Test conditions			Transmitter field strength @ Fundamental – 58kHz (dB $\mu$ V/m)	
Sub clause 15.31			MEASURED corrected to 300 m	LIMIT@300m
Tnom	25°C	Vnom 120 V	-22.5	32.3
		Vnom 138 V	-23.1	32.3
		Vnom 102 V	-22.0	32.3
Measured at 10 meters, corrected to Limit Distance.			NOTE: This is for the worst case antenna.	

Rx Loop Antenna STANDING up (Vertical to Ground)				Test Distance: 10m								
Freq	S.A.	Det	BW	Antenna Factor	Filter Factor	DCCF	DCF	Pk Cor	Actual	Limit	FCC	Margin
kHz	dB $\mu$ V			dB	dB	dB	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB $\mu$ V/m		dB
58	22.9	pk	9kHz	62.3	0.0	-22.8	-84.9	0.3	-22.5	32.3	@300m	54.8
116	1.6	pk	9kHz	56.7	1.9	-22.8	-84.9	-24.7	-47.5	26.3	@300m	73.8
174	17.4	pk	9kHz	53.2	0.8	-22.8	-84.9	-13.5	-36.3	22.8	@300m	59.1
232	12.7	pk	9kHz	50.6	0.5	-22.8	-84.9	-21.1	-43.9	20.3	@300m	64.2
290	8.4	pk	9kHz	48.7	0.4	-22.8	-84.9	-27.4	-50.3	18.4	@300m	68.7
348, nf	0.0	pk	9kHz	47.3	0.4	-22.8	-84.9	-37.2	-60.0	16.8	@300m	76.8
406	3.1	pk	9kHz	46.1	0.4	-22.8	-84.9	-35.3	-58.1	15.4	@300m	73.5
464	-2.6	pk	9kHz	45.2	0.2	-22.8	-84.9	-42.1	-64.9	14.3	@300m	79.2
522, nf	-1.2	qp	9kHz	44.4	0.2	-22.8	-27.4	16.0	-6.9	33.3	@30m	40.2
580, nf	-5.5	qp	9kHz	43.6	0.2	-22.8	-27.4	10.9	-12.0	32.3	@30m	44.3
	meas dist	5.0	10.0									
58(pwr-15%)	102 vac	40.3	22.4									
58(pwr+15%)	138 vac	40.8	23.5									

Green hilite is for input fields.

Notes

DCF: Distance Correction Factor

15.31(f)(2): DCF = 40 dB/decade or value determined by extrapolation with sufficient points

Spurious Limits: < Fundamental.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED (for references see test equipment listing)

8, 33, 34, 36, 37

## 2.3 TESTS PER RSS 210

### 2.3.1 MODULATION BANDWIDTH, RSS 210, Clause 5.9.1

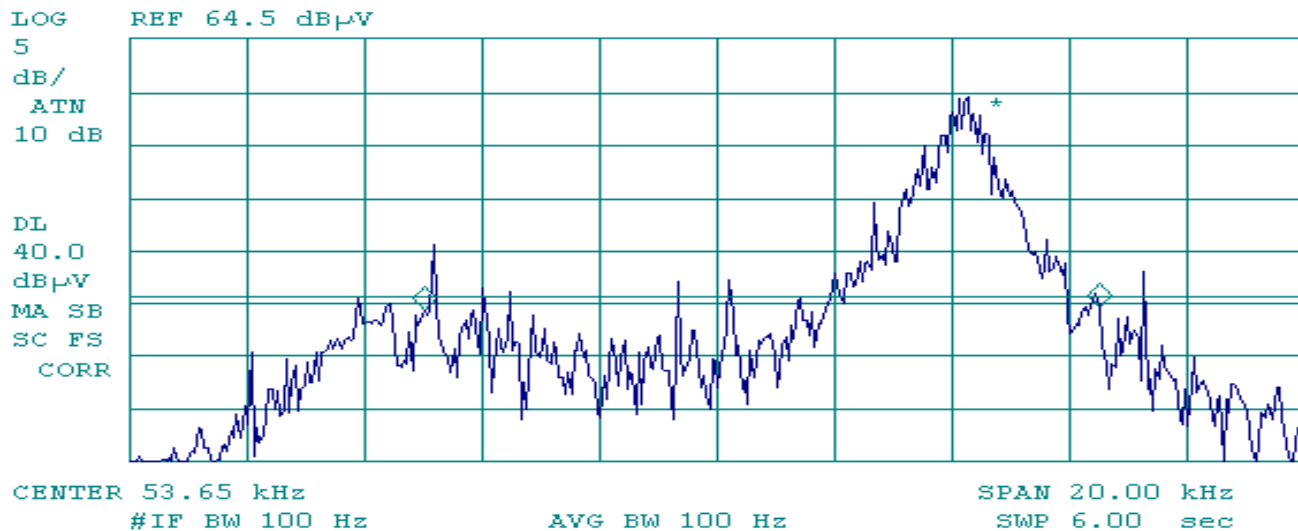
Ambient temperature : 24.6°C  
 Relative humidity : 51.4% RH  
 Date : 4/10/07  
 Line Input : 230VAC 50Hz

Modulation Bandwidth (kHz)			
Low Cut-Off Freq	Tx lo	Tx hi	High Cut-Off Freq
-20 dB			-20 dB
47.8kHz	34.5dBuv	36.5dBuv	59.5kHz

Bandwidth set to 100 Hz  
 Transmitter set to power level reported on previous page.  
 Cut-Off = Carrier - 20 dB

09:03:52 APR 10, 2007  
 AMB9010 20dB BW measurement 230vac 50hz

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 11.50 kHz  
 .30 dB



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED (for reference see test equipment listing)  
 8, 36, 37





### 3 EQUIPMENT LIST

	Model	Description	Serial #	Vendor
1	FM2000	Isotropic Field Monitor	15171	AR
2	FP2000	Isotropic Field Probe	15214	AR
3	888	Leveler	14998	AR
4	75A220	Low Band Amplifier	15208	AR
5	10W1000A	High Band Amplifier	15138	AR
6	1501L-1P	Power Source	4263	California Inst.
7	1201WP	Power Source	4286	California Inst.
8	ALP -70	Loop Antenna	163	Electro Metrics
9	ALR-30M	Adj Loop Ant .010 - 30MHz	801	Electro Metrics
10	EM 7600	Transient Limiter	187	Electro Metrics
11	3110B	Biconical Antenna	1017	Electro Metrics
12	3104	Biconical Antenna	3195	EMCO
13	3104C	Biconical Antenna	9009-4334	EMCO
14	3121C	Adjustable Dipole Antenna	1262	EMCO
15	3121C	Adjustable Dipole Antenna	1263	EMCO
16	3146	Log Periodic Antenna	3909	EMCO
17	3146	Log Periodic Antenna	3576	EMCO
18	3146	Log Periodic Antenna	4731	EMCO
19	* 3825/2	Line Imp Stable Network w/NEMA	1562	EMCO
20	3816/2NM	Line Imp Stable Network	1018	EMCO
21	3816/2NM	Line Imp Stable Network	1064	EMCO
22	F-203I	EM Injection Clamp	30	FCC
23	F-201	RF Absorbing Clamp	174	FCC
24	FCC-801-M3-16	Coupling Decoupling Network	58	FCC
25	FCC-801-M3-16	Coupling Decoupling Network	59	FCC
26	F-33-1	RF Current Probe	304	FCC
27	150/50	Adapter Kit	110/111	FCC
28	87IV	DMM	174	Fluke
29	6060B	Frequency Generator	5850202	Giga-tronics
30	PEFT Junior	EFT Generator	083 180-16	Haefely Trench
31	PEFT Junior	Capacitive Cable Clamp	083-078-31	Haefely Trench
32	34401A	Multimeter	US36078401	HP
33	8447F	High Band Amp .009-1300MHz	2805A03473	HP
34	8447F	High Band Amp .009-1300MHz	3113A06072	HP
35	8447A	High Band Amp.1-400MHz	1145A01085	HP
36	8591EM	Spectrum Analyzer w/Track Gen	3520A00190	HP
37	8591EM	Spectrum Analyzer	3649A01066	HP

	Model	Description	Serial #	Vendor
38	8562A	Spectrum Analyzer	2712A00534	HP
39	11940A	Close Field Probe 30MHz-1GHz	2650A06961	HP
40	11941A	Close Field Probe 9kHz-30MHz	2807A05261	HP
41	6843A	Harmonic Flicker Test System	3531A-00116	HP
42	CE50	Surge Coupler/Decoupler	9507535	Key Tek
43	CM-I/OCD	Signal Line Surge CDN unbalanced	9904213	Key Tek
44	CM-TELCD	Signal Line Surge CDN balanced	9904206	Key Tek
45	112AMX-UMC31	Power Source	190	Pacific Inst.
46	NSG435	ESD Simulator	1197	Shaffner
47	NSG431	ESD Simulator	1267	Shaffner
48	CBL6141	BiLog Antenna	4112	SchaffnerChase
49	C3910	Directional Coupler	6706	SchaffnerChase
50	CPM9830	RF Pulse Modulator	1019	SchaffnerChase
51	CBA9413A	Amplifier	9902	SchaffnerChase
52	CDN M3	Coupler/Decoupler	M3-007	CE Test
53	CDN M3	Coupler/Decoupler	M3-008	CE Test
54	CDN M3	Coupler/Decoupler	M3-00	CE Test
55	5001ix	4-11 Power Source	4263	California Instruments
56	4231	Power Meter		Boonton
57	51011-EMC	Power Sensor		Boonton
58	2024	Signal Generator 9k-2.4 GHz		Marconi
59	C5673	Directional Coupler		Werlatone
60		Amplifier 50W 0.8-2GHz		Comtech PST
61	EM3115	Horn Antenna		ETS Lindgren