



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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February 11, 2016

Sirius XM Satellite Radio
1500 Eckington Place, NE
Washington, DC 20002

Dear Beejay Jolayemi,

Enclosed is the EMC Wireless test report for MPE measurements of the Sirius XM Satellite Radio, TLB Low Power Transmitter (Low Band) as evaluated to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 1, Subpart I, Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 2, Subpart J, and RSS-102, Issue 4, March 2010.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Sirius XM Satellite Radio\EMC88434-MPE Rev. 3)

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RF Maximum Permissible Exposure (MPE) Report For Controlled and Uncontrolled Environments

for the

**Sirius XM Satellite Radio
TLB Low Power Transmitter (Low Band)**

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 1 Subpart I & Part 2 Subpart J
&
RSS-102, Issue 4, March 2010

MET Report: EMC88434-MPE Rev. 3

February 11, 2016

Prepared For:

**Sirius XM Satellite Radio
1500 Eckington Place, NE
Washington, DC 20002**

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230



RF Maximum Permissible Exposure (MPE) Report For Controlled and Uncontrolled Environments

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Sirius XM Satellite Radio TLB Low Power Transmitter (Low Band)

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 1 Subpart I & Part 2 Subpart J
&
RSS-102, Issue 4, March 2010

Benjamin Taylor, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Parts 1 and 2, and Industry Canada standards RSS-102, Issue 4, March 2010 under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab



Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	February 1, 2016	Initial Issue.
1	February 8, 2016	Customer corrections.
2	February 9, 2016	Modified block diagram.
3	February 11, 2016	Editorial correction.



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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB μ A	Decibels above one microamp
dB μ V	Decibels above one microvolt
dB μ A/m	Decibels above one microamp per meter
dB μ V/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μ H	microhenry
μ F	microfarad
μ s	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane



I. Executive Summary



A. Purpose of Test

An MPE evaluation was performed to determine compliance of the Sirius XM Satellite Radio TLB Low Power Transmitter (Low Band), with the requirements of Part 1 and 2. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the TLB Low Power Transmitter (Low Band). Sirius XM Satellite Radio should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the TLB Low Power Transmitter (Low Band), has been **permanently** discontinued.

B. MPE Measurements and Applicable Regulations

This test report presents the results of Maximum Permissible Exposure (MPE)¹ measurements performed on the Sirius XM Satellite Radio TLB Low Power Transmitter (Low Band), operating in the frequency ranges 869 - 894 MHz, 1930 - 1990 MHz, and 2110 - 2155 MHz. The tests were performed in accordance with TCB training material and the following parts of the FCC Rules and Regulations and Industry Canada Radio Standard Specification:

- IEEE Std. C95.1: 2005: "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz"
- IEEE Std. C95.3: 2002: "IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz – 300 GHz"
- FCC OET Bulletin 65, Edition 97-01: "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields"
- FCC Supplement C to OET Bulletin 65, Edition 01-01: "Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emission."
- Subpart I, Part 1 of 47 CFR FCC Rules and Regulations, Edition 10-1-11: "Procedures Implementing the National Environmental Policy Act of 1969." Specifically, Paragraph 1.1310: "Radiofrequency Radiation Exposure Limits"
- Subpart J, Part 2 of 47 CFR FCC Rules and Regulations, Edition 10-1-11: "Equipment Authorization Procedures." Specifically, Paragraph 2.1091: "Radiofrequency Radiation Exposure Evaluation: Mobile Devices"
- FCC KDB 447498 D01 Mobile Portable RF Exposure v04: "RF Exposure and Equipment Authorization Policies"
- RSS-102, Issue 4, March 2010: "Spectrum Management and Telecommunications Radio Standards Specification. Radiofrequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands.)"

¹ By definition, maximum permissible exposure (MPE) is rms or peak electric (or magnetic) field strength, or the plane-wave equivalent power densities associated with these fields to which a person may be exposed without harmful effect and with an acceptable safety factor.



II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Sirius XM Satellite Radio to perform testing on the TLB Low Power Transmitter (Low Band), under Sirius XM Satellite Radio's purchase order number 317819.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Sirius XM Satellite Radio, TLB Low Power Transmitter (Low Band).

The results obtained relate only to the item(s) tested.

Model(s) Tested:	TLB Low Power Transmitter (Low Band)	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	EUT Frequency Ranges:	2326.25 MHz
	Type of Modulations:	Satellite Radio Terrestrial Service Repeater
	Applicable FCC Rule Part:	25
	Maximum Driven Power:	36.39dBm/4.35 Watts
	Antenna Gain:	18dBi
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Benjamin Taylor	
Report Date(s):	February 11, 2016	

Table 1. EUT Summary Table

B. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

C. Description of Test Sample

The TLB Low Power Transmitter (Low Band) is intended to be used to transmit low power SXM terrestrial service primarily for trade shows and demonstrations. The EUT consists of a Low Band Exciter (LBE) with transmission modulation scheme that is coded orthogonal frequency division multiplex (COFDM) format, which is transmitted as a Pi/4 differential quadrature phase shift keyed (DQPSK) constellation in the low band center frequency slot. The overlay data is modulated onto the base COFDM symbol stream by offset of the original DQPSK symbol amplitude. The source data for the LBE is a VSAT Ku band down-converted to L-band via a low noise block (LNB) for direct input to the LBE Unit and a GPS receiver which will provide location, time code, and synchronization reference.

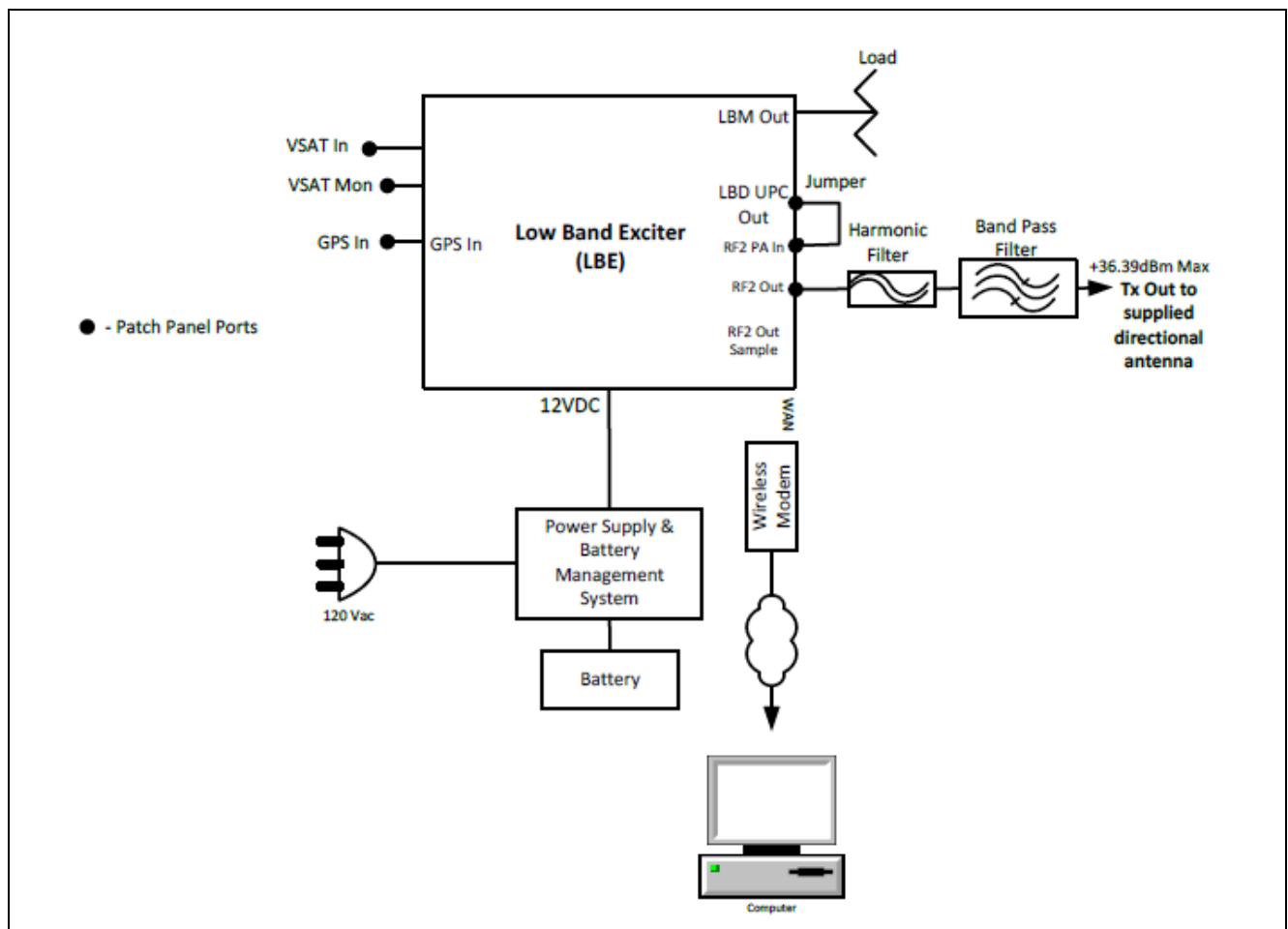


Figure 1. Block Diagram of Test Configuration



D. Equipment Configuration

Slot #	Name / Description	Model Number	Part Number	Serial Number
1-3	Low Band Exciter	Low Band Exciter 3	300034918	236530-02-01-03-0617
5	Patch Panel	N/A	N/A	N/A
7-8	Power Supply	Samlex	SEC-1223BBM	03064-1507-0023
7-8	Battery	Genesis	G13EP	0611G142830129
On top	Band Pass Filter	Pivotone	P15038	200728081
5	Harmonic Filter	RLC	F-30-3000-N	1533

Table 2. Equipment Configuration

E. Support Equipment

Name / Description	Manufacturer	Model Number
VSAT	Skyware	--
GPS	Trimble	57860-30
Dell PC	Dell	--
Directional Panel Antenna	WISPerformance	WISP24013PTNF
50 ft. RF Cable	Pasternack	LMR-240

Table 3. Support Equipment

F. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	AC Input	3 conductor, 18 awg	1	2.74	6.10	No	(120v/50hz)
2	GPS In	Coax – SMA connector	1	0.61	0.61	Yes	LBE-GPS In
--	Vsat In	Coax – Type F connector	1	0.61	0.61	Yes	LBE -
--	Vsat Mon	Coax – SMA connector	1	0.61	0.61	Yes	--
--	LDB UPC In	Coax – SMA connector	1	0.61	0.61	Yes	--
--	LMN Out	Coax – SMA connector	1	0.61	0.61	Yes	--
--	RF2 PA In	Coax – SMA connector	1	0.61	0.61	Yes	--
--	RF2 Out Sample	Coax – SMA connector	1	0.61	0.61	Yes	--
--	RF2 Out	Coax – Type N Connector	1	0.51	0.51	Yes	--
--	LAN	Ethernet	1	TBD	15.24	No	--

Table 4. Ports and Cabling Information



G. Mode of Operation

When the EUT is turned on, it will initially be in a 'Standby' mode where the active units are powered on but no RF output power. A WAN Ethernet cable is connected from the EUT to a personal computer that provides remote control of the unit allowing an operator to change operating modes. The EUT modes that will be tested during this certification are the 'Standby' mode (no RF) and the 'Broadcast' mode which produces a RF modulated signal as described above.

H. Monitoring Method

There are two active units in the EUT, they are:

1. The Power Supply (a backup battery is connected to the power supply in case of temporary power outage).
2. The Low Band Exciter (LBE) - The LBE has a built-in RF power amplifier.

I. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

J. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Sirius XM Satellite Radio upon completion of testing.



III.MPE Limits



A. Limits for Maximum Permissible Exposure (MPE)

Requirements: FCC Guidelines for evaluating exposure to RF Emissions, from the FCC OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.

(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30
f = frequency in MHz		*Plane-wave equivalent power density		

Procedures: Prior to radiated testing, the radio was connected to a power meter to verify the anticipated driven power as per the calculated MPE. The antenna used for testing was an 18dBi panel antenna. MPE evaluation testing was performed bore-sighted (90°) and every 10° increment on either side lobe from 180° to 0°. The driven power used to calculate the MPE evaluation distance was 4.35 watts. Only the General Population/Uncontrolled Exposure limit was evaluated.

Note: Testing was performed with a 50' LMR-240 cable assembly connecting the panel antenna to the transmitter (yielding an approximate 7dB insertion loss); which is the minimal typical cable length that will be used with any installation of this EUT.



B. Calculating MPE Distance from Antenna

Part 25

MPE Limit Calculation: EUT's operating frequencies @ 2326.25 MHz; highest conducted power = 36.39 dBm therefore, **Limit for General Population/Uncontrolled Exposure: 1 mW/cm²**

EUT maximum antenna gain = 18 dBi.

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S = Power Density (1 mW/cm²)
P = Power Input to antenna (4355 mW)
G = Antenna Gain (63.1 numeric)

$$R = (4355 * 63.1 / 4\pi * 1)^{1/2} = 1.478\text{m}$$

Test Procedures:

1. The test setup was as described in the EUT Configuration section of this test report. The EUT, panel antenna and RF field probe were inside the chamber while a laptop controlling the EUT was located outside the chamber.
2. The antenna under test was mounted to a mast (as is the antenna's intended design) 80cm above ground.
3. The EUT was set to transmit continuously at maximum RF power. The distance between the field intensity probe and the EUT's antenna was equal to the calculated distance R applicable either for uncontrolled environments.
4. Field intensity measurements were taken at different heights of the probe from the ground (0.1 to 2 meters) in 10cm increments, while rotating versus azimuth (from 0° to 180°).
5. Each maximized peak field intensity measurement was recorded.
6. Average values of power density were calculated for the imaginary whole human body (0.1–2.0 m), for the lower part of the body (0.1–0.9 m) and for the upper part of the body (1.0–2.0 m). The results of calculations are shown in the following tables.

Test Results: The EUT was compliant with this requirement.

Test Engineer: Benjamin Taylor

Test Date: 01/14/16



180°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	1.56	1.56	0.0006455
20	2.07	2.07	0.0011366
30	2.52	2.52	0.0016845
40	1.84	1.84	0.000898
50	2.08	2.08	0.0011476
60	2.51	2.51	0.0016711
70	1.6	1.6	0.000679
80	2.24	2.24	0.0013309
90	2.21	2.21	0.0012955
100	2.92	2.92	0.0022616
110	2.51	2.51	0.0016711
120	2.41	2.41	0.0015406
130	2.44	2.44	0.0015792
140	2.02	2.02	0.0010823
150	2.22	2.22	0.0013073
160	1.31	1.31	0.0004552
170	1.61	1.61	0.0006876
180	1.79	1.79	0.0008499
190	1.89	1.89	0.0009475
200	1.62	1.62	0.0006961

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.001
Lower Body (0.1 m to 0.9 m)	0.001
Upper Body (1.0 m to 2.0 m)	0.001



170°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	1.68	1.67328	0.0007427
20	1.69	1.68324	0.0007515
30	1.75	1.743	0.0008058
40	1.71	1.70316	0.0007694
50	1.77	1.76292	0.0008244
60	2.18	2.17128	0.0012505
70	1.54	1.53384	0.000624
80	1.53	1.52388	0.000616
90	2.11	2.10156	0.0011715
100	2.22	2.21112	0.0012968
110	2.81	2.79876	0.0020777
120	2.73	2.71908	0.0019611
130	2.71	2.69916	0.0019325
140	2.51	2.49996	0.0016578
150	2.23	2.22108	0.0013085
160	2.49	2.48004	0.0016315
170	2.61	2.59956	0.0017925
180	2.47	2.46012	0.0016054
190	2.39	2.38044	0.001503
200	2.23	2.22108	0.0013085

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.001
Lower Body (0.1 m to 0.9 m)	0.001
Upper Body (1.0 m to 2.0 m)	0.002



160°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.64	2.65056	0.001863519
20	2.12	2.12848	0.001201705
30	2.27	2.27908	0.001377773
40	2.13	2.13852	0.001213068
50	2.32	2.32928	0.001439137
60	1.41	1.41564	0.000531575
70	1.37	1.37548	0.000501842
80	2.62	2.63048	0.001835391
90	2.84	2.85136	0.002156566
100	2.54	2.55016	0.001725018
110	2.73	2.74092	0.001992743
120	3.05	3.0622	0.002487286
130	3.68	3.69472	0.003620943
140	3.69	3.70476	0.003640649
150	2.72	2.73088	0.001978171
160	2.07	2.07828	0.001145689
170	1.65	1.6566	0.000727937
180	1.56	1.56624	0.000650692
190	1.83	1.83732	0.000895423
200	1.69	1.69676	0.000763659

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.002
Lower Body (0.1 m to 0.9 m)	0.001
Upper Body (1.0 m to 2.0 m)	0.002



150°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.23	2.55112	0.001726317
20	3.21	3.67224	0.003577015
30	1.44	1.64736	0.00071984
40	2.23	2.55112	0.001726317
50	2.32	2.65408	0.001868472
60	1.44	1.64736	0.00071984
70	2.22	2.53968	0.001710869
80	2.3	2.6312	0.001836396
90	2.56	2.92864	0.002275048
100	2.61	2.98584	0.002364785
110	3.22	3.68368	0.003599336
120	3.36	3.84384	0.003919126
130	3.41	3.90104	0.004036635
140	2.17	2.48248	0.00163467
150	1.94	2.21936	0.001306514
160	1.83	2.09352	0.001162553
170	1.81	2.07064	0.001137281
180	1.63	1.86472	0.000922329
190	2.07	2.36808	0.001487481
200	2.56	2.92864	0.002275048

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.002
Lower Body (0.1 m to 0.9 m)	0.002
Upper Body (1.0 m to 2.0 m)	0.002



140°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	3.07	3.51208	0.003271805
20	2.56	2.92864	0.002275048
30	3.71	4.24424	0.004778136
40	3.1	3.5464	0.003336062
50	3.18	3.63792	0.003510467
60	4.71	5.38824	0.007701096
70	4.85	5.5484	0.008165714
80	3.48	3.98112	0.004204063
90	1.75	2.002	0.001063131
100	2.51	2.87144	0.002187047
110	1.64	1.87616	0.000933681
120	1.95	2.2308	0.001320018
130	1.71	1.95624	0.001015086
140	3.71	4.24424	0.004778136
150	4.04	4.62176	0.005665959
160	3.86	4.41584	0.005172319
170	3.02	3.45488	0.0031661
180	2.42	2.76848	0.002033019
190	2.74	3.13456	0.002606225
200	3.38	3.86672	0.003965921

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.004
Lower Body (0.1 m to 0.9 m)	0.004
Upper Body (1.0 m to 2.0 m)	0.003



130°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.62	2.97108	0.002341463
20	2.57	2.91438	0.002252947
30	3.46	3.92364	0.004083541
40	2.36	2.67624	0.001899804
50	2.43	2.75562	0.002014175
60	2.89	3.27726	0.002848921
70	2.78	3.15252	0.002636176
80	3.37	3.82158	0.003873866
90	3.43	3.88962	0.004013035
100	2.58	2.92572	0.002270514
110	2.54	2.88036	0.002200656
120	2.61	2.95974	0.002323624
130	3.01	3.41334	0.003090422
140	3.1	3.5154	0.003277994
150	2.65	3.0051	0.002395392
160	2.73	3.09582	0.002542202
170	2.71	3.07314	0.00250509
180	1.91	2.16594	0.001244376
190	2.06	2.33604	0.001447502
200	2.13	2.41542	0.001547547

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.003
Lower Body (0.1 m to 0.9 m)	0.003
Upper Body (1.0 m to 2.0 m)	0.002



120°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.52	2.85768	0.002166137
20	2.45	2.7783	0.002047467
30	2.51	2.84634	0.002148979
40	3.46	3.92364	0.004083541
50	4.11	4.66074	0.005761936
60	2.93	3.32262	0.00292833
70	1.83	2.07522	0.001142318
80	3.21	3.64014	0.003514753
90	3.15	3.5721	0.003384588
100	3.89	4.41126	0.005161595
110	2.04	2.31336	0.001419532
120	4.01	4.54734	0.00548496
130	4.22	4.78548	0.006074488
140	4.61	5.22774	0.007249142
150	4.65	5.2731	0.007375486
160	1.69	1.91646	0.000974223
170	1.51	1.71234	0.000777748
180	1.62	1.83708	0.000895189
190	1.64	1.85976	0.000917429
200	1.29	1.46286	0.000567628

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.003
Lower Body (0.1 m to 0.9 m)	0.003
Upper Body (1.0 m to 2.0 m)	0.003



110°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.55	2.8662	0.002179072
20	2.51	2.84634	0.002148979
30	5.13	5.81742	0.008976757
40	4.18	4.74012	0.005959877
50	4.45	5.0463	0.00675468
60	6.37	7.22358	0.013840877
70	8.23	9.33282	0.023103854
80	7.01	7.94934	0.016761805
90	6.25	7.0875	0.013324312
100	4.45	5.0463	0.00675468
110	3.82	4.33188	0.004977502
120	4.45	5.0463	0.00675468
130	4.39	4.97826	0.006573759
140	4.06	4.60404	0.005622595
150	3.08	3.49272	0.003235834
160	1.63	1.84842	0.000906275
170	2.56	2.90304	0.002235449
180	5.29	5.99886	0.009545443
190	4.23	4.79682	0.006103311
200	3.92	4.44528	0.005241516

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.008
Lower Body (0.1 m to 0.9 m)	0.010
Upper Body (1.0 m to 2.0 m)	0.005



100°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.56	2.87744	0.0021962
20	2.59	2.93706	0.0022881
30	4.18	4.74012	0.0059599
40	2.32	2.63088	0.0018359
50	3.56	4.03704	0.004323
60	2.41	2.73294	0.0019812
70	7.33	8.31222	0.0183271
80	10.92	12.38328	0.0406752
90	12.92	14.65128	0.056939
100	15.44	17.50896	0.0813166
110	16.04	18.18936	0.0877594
120	15.67	17.76978	0.0837573
130	13.29	15.07086	0.0602469
140	12.25	13.8915	0.0511867
150	5.93	6.72462	0.0119948
160	4.7	5.3298	0.007535
170	3.25	3.6855	0.0036029
180	5.83	6.61122	0.0115937
190	6.34	7.18956	0.0137108
200	4.2	4.7628	0.006017

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.028
Lower Body (0.1 m to 0.9 m)	0.015
Upper Body (1.0 m to 2.0 m)	0.038



90°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	3.64	4.09136	0.0044401
20	3.81	4.32054	0.0049515
30	4.83	5.47722	0.0079575
40	6.3	7.1442	0.0135384
50	7.62	8.64108	0.0198059
60	8.54	9.68436	0.0248771
70	6.54	7.41636	0.0145895
80	6.31	7.15554	0.0135814
90	6.32	7.16688	0.0136244
100	9.32	10.56888	0.029629
110	9.44	10.70496	0.0303969
120	9.61	10.89774	0.0315015
130	7.81	8.85654	0.0208059
140	9.22	10.45548	0.0289966
150	10.82	12.26988	0.0399337
160	12.86	14.58324	0.0564114
170	12.59	14.27706	0.0540675
180	9.56	10.84104	0.0311746
190	7.68	8.70912	0.020119
200	7.32	8.30088	0.0182771

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.024
Lower Body (0.1 m to 0.9 m)	0.013
Upper Body (1.0 m to 2.0 m)	0.033



80°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	5.16	5.79984	0.0089226
20	1.18	1.33812	0.000475
30	1.12	1.27008	0.0004279
40	1.13	1.28142	0.0004356
50	1.28	1.45152	0.0005589
60	3.73	4.22982	0.0047457
70	9.31	10.55754	0.0295654
80	13.53	15.34302	0.0624425
90	16.91	19.17594	0.0975376
100	20.98	23.79132	0.1501398
110	22.27	25.25418	0.1691707
120	23.64	26.80776	0.1906249
130	19.81	22.46454	0.1338609
140	15.79	17.90586	0.085045
150	12.36	14.01624	0.0521101
160	9.7	10.9998	0.0320943
170	8.56	9.70704	0.0249938
180	4.31	4.88754	0.0063364
190	5.82	6.59988	0.011554
200	6.31	7.15554	0.0135814

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.054
Lower Body (0.1 m to 0.9 m)	0.023
Upper Body (1.0 m to 2.0 m)	0.079



70°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	4.42	4.96808	0.0065469
20	4.37	4.95558	0.006514
30	4.48	5.08032	0.0068461
40	5.18	5.87412	0.0091526
50	6.25	7.0875	0.0133243
60	5.28	5.98752	0.0095094
70	5.06	5.73804	0.0087334
80	5.25	5.9535	0.0094016
90	5.58	6.32772	0.0106207
100	7.62	8.64108	0.0198059
110	7.23	8.19882	0.0178304
120	7.59	8.60706	0.0196503
130	6.31	7.15554	0.0135814
140	5.72	6.48648	0.0111603
150	4.37	4.95558	0.006514
160	3.79	4.29786	0.0048996
170	4.51	5.11434	0.0069381
180	4.03	4.57002	0.0055398
190	3.39	3.84426	0.00392
200	2.56	2.90304	0.0022354

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.010
Lower Body (0.1 m to 0.9 m)	0.009
Upper Body (1.0 m to 2.0 m)	0.010



60°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.14	2.40536	0.0015347
20	2.41	2.73294	0.0019812
30	3.45	3.9123	0.00406
40	2.28	2.58552	0.0017732
50	2.72	3.08448	0.0025236
60	3.12	3.53808	0.0033204
70	2.81	3.18654	0.0026934
80	2.25	2.5515	0.0017268
90	1.38	1.56492	0.0006496
100	2.24	2.54016	0.0017115
110	2.29	2.59686	0.0017888
120	1.93	2.18862	0.0012706
130	2.79	3.16386	0.0026552
140	3.39	3.84426	0.00392
150	2.66	3.01644	0.0024135
160	3.94	4.46796	0.0052951
170	3.11	3.52674	0.0032992
180	3.1	3.5154	0.003278
190	1.81	2.05254	0.0011175
200	2.1	2.3814	0.0015043

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.002
Lower Body (0.1 m to 0.9 m)	0.002
Upper Body (1.0 m to 2.0 m)	0.003



50°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	3.01	3.38324	0.0030362
20	2.97	3.36798	0.0030088
30	2.49	2.82366	0.0021149
40	3.24	3.67416	0.0035808
50	3.37	3.82158	0.0038739
60	2.39	2.71026	0.0019484
70	3.41	3.86694	0.0039664
80	4.24	4.80816	0.0061322
90	5.98	6.78132	0.012198
100	4.27	4.84218	0.0062193
110	4.51	5.11434	0.0069381
120	3.61	4.09374	0.0044453
130	5.61	6.36174	0.0107352
140	5.03	5.70402	0.0086302
150	4.73	5.36382	0.0076314
160	4.91	5.56794	0.0082233
170	2.31	2.61954	0.0018202
180	2.27	2.57418	0.0017577
190	1.79	2.02986	0.0010929
200	1.99	2.25666	0.0013508

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.005
Lower Body (0.1 m to 0.9 m)	0.004
Upper Body (1.0 m to 2.0 m)	0.005



40°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.71	3.04604	0.0024611
20	2.51	2.84634	0.002149
30	3.85	4.3659	0.005056
40	2.31	2.61954	0.0018202
50	3.02	3.42468	0.003111
60	4.08	4.62672	0.0056781
70	1.73	1.96182	0.0010209
80	2.51	2.84634	0.002149
90	2.31	2.61954	0.0018202
100	5.22	5.91948	0.0092945
110	4.61	5.22774	0.0072491
120	5.01	5.68134	0.0085617
130	1.91	2.16594	0.0012444
140	3.39	3.84426	0.00392
150	3.5	3.969	0.0041785
160	2.71	3.07314	0.0025051
170	1.69	1.91646	0.0009742
180	1.67	1.89378	0.0009513
190	1.42	1.61028	0.0006878
200	2.03	2.30202	0.0014056

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.003
Lower Body (0.1 m to 0.9 m)	0.003
Upper Body (1.0 m to 2.0 m)	0.004



30°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.66	2.98984	0.0023711
20	2.58	2.92572	0.0022705
30	1.61	1.82574	0.0008842
40	2.11	2.39274	0.0015186
50	2.45	2.7783	0.0020475
60	2.77	3.14118	0.0026172
70	2.87	3.25458	0.0028096
80	3.24	3.67416	0.0035808
90	2.61	2.95974	0.0023236
100	3.29	3.73086	0.0036921
110	2.29	2.59686	0.0017888
120	2.83	3.20922	0.0027319
130	2.79	3.16386	0.0026552
140	3.1	3.5154	0.003278
150	3.65	4.1391	0.0045443
160	2.26	2.56284	0.0017422
170	1.81	2.05254	0.0011175
180	3.31	3.75354	0.0037372
190	2.45	2.7783	0.0020475
200	2.31	2.61954	0.0018202

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.002
Lower Body (0.1 m to 0.9 m)	0.002
Upper Body (1.0 m to 2.0 m)	0.003



20°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.12	2.38288	0.0015061
20	2.18	2.47212	0.0016211
30	2.08	2.35872	0.0014757
40	2.81	3.18654	0.0026934
50	2.56	2.90304	0.0022354
60	2.71	3.07314	0.0025051
70	2.81	3.18654	0.0026934
80	1.42	1.61028	0.0006878
90	2.08	2.35872	0.0014757
100	3.37	3.82158	0.0038739
110	3.12	3.53808	0.0033204
120	3.32	3.76488	0.0037598
130	3.39	3.84426	0.00392
140	3.02	3.42468	0.003111
150	2.97	3.36798	0.0030088
160	2.29	2.59686	0.0017888
170	3.11	3.52674	0.0032992
180	3.02	3.42468	0.003111
190	3.01	3.41334	0.0030904
200	2.99	3.39066	0.0030495

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.003
Lower Body (0.1 m to 0.9 m)	0.002
Upper Body (1.0 m to 2.0 m)	0.003



10°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	2.12	2.38288	0.0015061
20	2.07	2.34738	0.0014616
30	1.61	1.82574	0.0008842
40	1.23	1.39482	0.0005161
50	1.69	1.91646	0.0009742
60	2.95	3.3453	0.0029684
70	2.34	2.65356	0.0018677
80	3.32	3.76488	0.0037598
90	3.39	3.84426	0.00392
100	4.52	5.12568	0.0069689
110	4.89	5.54526	0.0081565
120	4.87	5.52258	0.0080899
130	4.12	4.67208	0.00579
140	4.13	4.68342	0.0058181
150	2.12	2.40408	0.0015331
160	2.17	2.46078	0.0016062
170	2.07	2.34738	0.0014616
180	2.61	2.95974	0.0023236
190	1.73	1.96182	0.0010209
200	1.91	2.16594	0.0012444

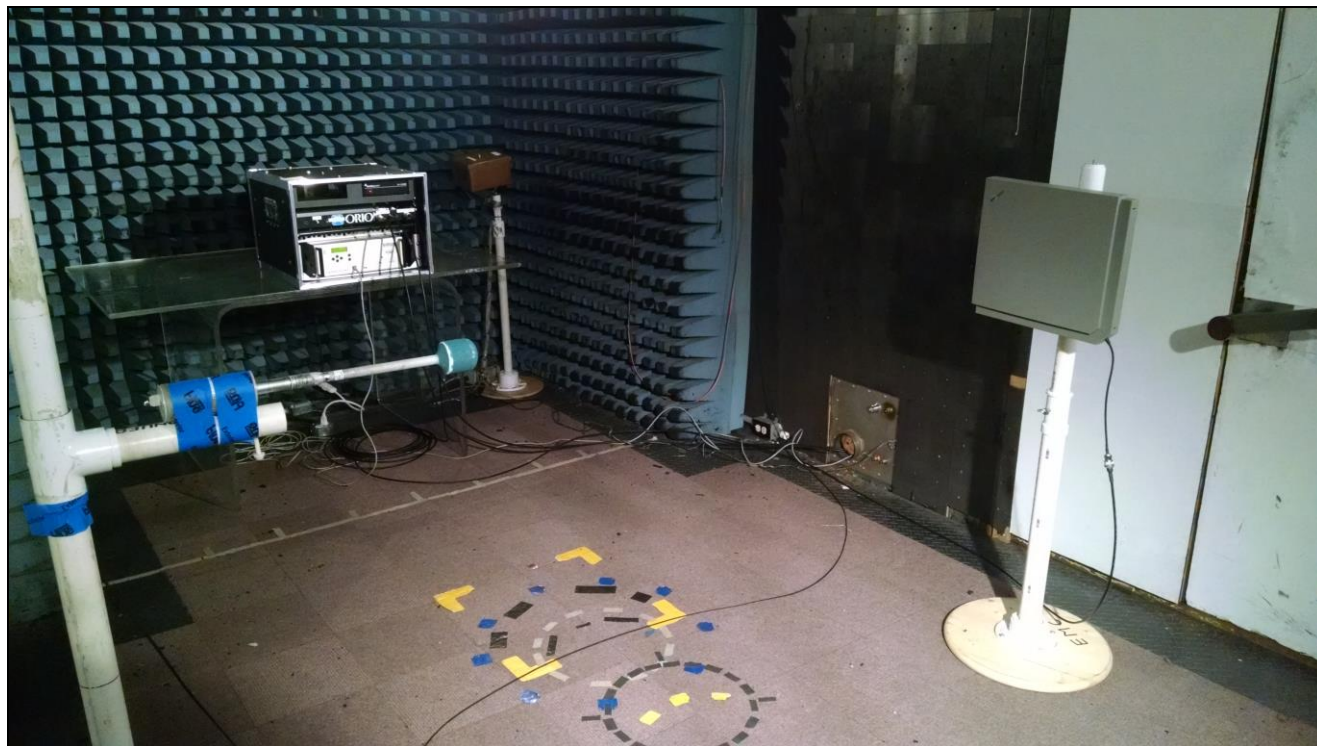
Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.003
Lower Body (0.1 m to 0.9 m)	0.002
Upper Body (1.0 m to 2.0 m)	0.004



0°

2326.250 MHz			
Population/Uncontrolled Exposure 1.478m			
	Raw	Corrected V/m	PD mW/cm2
10	1.88	2.11312	0.0011844
20	2.92	3.31128	0.0029084
30	1.67	1.89378	0.0009513
40	1.32	1.49688	0.0005943
50	2.79	3.16386	0.0026552
60	1.4	1.5876	0.0006686
70	1.51	1.71234	0.0007777
80	1.53	1.73502	0.0007985
90	1.79	2.02986	0.0010929
100	1.84	2.08656	0.0011548
110	2.44	2.76696	0.0020308
120	1.91	2.16594	0.0012444
130	1.15	1.3041	0.0004511
140	2.39	2.71026	0.0019484
150	1.35	1.5309	0.0006217
160	2.08	2.35872	0.0014757
170	1.74	1.97316	0.0010327
180	1.58	1.79172	0.0008515
190	2.58	2.92572	0.0022705
200	1.35	1.5309	0.0006217

Population/Uncontrolled Exposure 1.478m	18dBi
Part of the Body/Averaging Points	Averaged Power Density
Whole Body (0.1 m to 2.0 m)	0.001
Lower Body (0.1 m to 0.9 m)	0.001
Upper Body (1.0 m to 2.0 m)	0.001



Photograph 1. Test Setup



IV. Test Equipment



Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4148	SHIELD ROOM #2 SEMI-ANECHOIC	RANTEC	20	SEE NOTE	
1T4768	FIELD PROBE	NARDA	EP183 / OR03	10/23/2014	04/23/2016
1T4820	DIGITAL THERMOMETER/BAROMETER/HUMIDITY	VWR SCIENTIFIC	89030-410	11/04/2015	05/04/2017

Table 5. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



End of Report