FCC TEST REPORT
FOR THE
APPLIED RESEARCH ASSOCIATES, INC.
EXPENDABLE UNATTENDED
GROUND SENSORS (E-UGS) SYSTEM
FCC ID: 2AA89-I2400

Prepared for:

Applied Research Associates, Inc. (NED)
250 Beanville Road
Randolph, VT 05060
USA

Submitted by:

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A2LA ACCREDITED
Test Lab
Cert 898.01

Applied Research Associates, Inc.
FCC Testing
At
Green Mountain Electromagnetics, Inc.

Unit: Expendable Unattended Ground Sensors (E-UGS) System
Received: 9/16/13
Tested: September 26, 2013

I. Applicable Standards:

The units described in this report were measured for verification of compliance with "47 CFR, Part 15 – Radio Frequency Devices, Subpart C: Intentional Radiators," paragraphs 15.207 "Conducted Emissions", 15.209 "Radiated Emissions" and 15.249 "Operation in the Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24.0-24.25 GHz." Measurement procedures were in accordance with ANSI C63.4, "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2009)," and FCC OET Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Jan. 2001)."

Additionally, the units described in this report were measured for certification with the Code of Federal Regulations Chapter 47 – "Telecommunication, Part 2 – Frequency Allocations and Radio Treaty Matters: General Rules and Regulations, Subpart J – Equipment Authorization Procedures." Measurements required were per paragraphs 2.1046 RF Power Output, 2.1047 Modulation Characteristics, 2.1049 Occupied Bandwidth, 2.1053 Field Strength of Spurious Radiation, 2.1055 Frequency Stability and 2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices.

II. Measurement Location:

The GME laboratory and Open Area Test Site (OATS) are located at 219 Blake Roy Road, Middlebury, VT. The OATS is a 10/3/1-meter site complete with antenna positioner, ground plane and motorized turntable. The OATS is constructed in accordance with ANSI C63.7-2005 and complies with the requirements for radiated emissions testing in ANSI C63.4-2009 and CISPR standards. GME is internationally accredited by the American Association for Laboratory Accreditation (A2LA) and meets the quality requirements in ISO/IEC 17025 (2005), "General Requirements for the Competence of Testing and Calibration Laboratories."

III. Unit Tested:

The Applied Research Associates, Inc. Expendable Unattended Ground Sensors (E-UGS) system consists of sensors and a receiver. Sensors are connected to a siren and a power supply. The receiver is connected to a laptop PC. A sensor consists of a metal enclosure with low-voltage electronics, a 916-MHz transmitter and an integral antenna. The receiver consists of a metal enclosure with low-voltage electronics, receiver circuitry, custom USB connector and a coaxial antenna connector. The table below describes the units that were subjected to measurements determining compliance with applicable EMC standards:

Product	Manufacturer	Part	Serial Number
Receiver	ARA	ENCL-0102	ENG001
Sensor Transmitter	ARA	ENCL-0101-400	77027

The following table describes the system physical and electrical properties:

Part	Volts/Amps/Hertz	H/W/D in cm
Receiver	USB Powered	18/12/6
Sensor Transmitters (2)	EUT: 12 VDC, 1.67 A PS: 100-240 VAC, 50/60 Hz, 0.55 A	12/6/6

The following table describes the support equipment used during testing:

Product	Manufacturer	Part	Serial Number
Laptop PC	Dell	EG520	26086624813
Antenna	Laird	FG9023	06021207
Power Supply	Meanwell	LPV-20-12	HB33728444
Siren	Velleman	HAA40R	1210

Power/signal cables were used for testing and are supplied by the manufacturer. The following table describes the system cables used for testing:

Cable	Manufacturer	Description
Power (DC Transmitter)	ITC	22AWG/4, UL
Signal (Receiver - 2)	ARA	p/n CBL-0013/0015, Custom USB and RF

IV. Summary of Results:

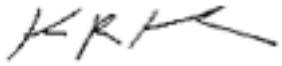
The Applied Research Associates, Inc. Expendable Unattended Ground Sensors (E-UGS) system complies FR 47, Paragraphs 2 and 15. Section X contains the results summarized in the table below.

	Test	Mode/Port	CFR 47 Paragraph	Frequency Range/Level	Specified Values	Measured Values
1	Output Power	Transmit	**2.1046(a)** **15.249(a)**	916 MHz	94 dBuV/m	93 dBuV/m
2	Modulation Characteristic	Transmit	**2.1047(d)** **15.249(d)**	All modulation products below general limit	46 dBuV/m	45 dBuV/m
3	Occupied Bandwidth	Transmit	**2.1049(i)** **15.249(d)**	OBW below general limit @ f for 0.5% power	46 dBuV	45 dBuV @ f = 480 kHz
4	Frequency Stability	Transmit	**2.1055**	-30˚C to +50˚C 10.2 – 13.8 VDC	916.40 MHz 916.40 MHz	916.40 MHz 916.40 MHz
5	Radiated and Spurious Emissions	Enclosure	**15.209** **15.249** **2.1053**	30 - 88 MHz 88 - 216 MHz 216 - 960 MHz 960 - 9160 MHz Above 915 (Spur)	40 dBuV/m 43.5 dBuV/m 46 dBuV/m 54 dBuV/m 54 dB/V/m	Within All Limits at 3 Meters
6	Conducted Emissions	AC Port	**15.207**	150 – 500 kHz 0.5 – 5 MHz 5 – 30 MHz	66-56 dBuv QP 56 dBuV QP 60 dBuV QP	Within Quasi-Peak Limits
7	Exposure Evaluation	Enclosure	**2.1093**	916 MHz	0.08 W/kg Body 1.6 W/kg 1g Vol	Within All Limits

Exploratory measurements indicate maximum radiation is found when the antenna polarization is aligned with the EUT antenna and when the antenna is pointed directly at the EUT at scan heights >10% of EUT height.

Testing was performed by Kyle R. Kowalczyk, president, Green Mountain Electromagnetics and requested by:

Applied Research Associates, Inc. (NED)
250 Beanville Road
Randolph, VT 05060
USA



Kyle R. Kowalczyk
11/8/13

V. Equipment, Software and Cable Configuration:

GME witnessed the unit in satisfactory condition for testing, however the manufacturer is responsible for ensuring that the equipment under test (EUT) represents the product line. The manufacturer is also responsible for the test plan and for assuring that this report is consistent with that plan. The EUT was operating in a continuous mode utilizing and testing its sensor functions. The EUT was also tested upon power up. The EUT configuration was arranged to produce maximum radiated emissions as shown in the block diagram below. The equipment was subjected to complete emissions tests per the manufacturer's test plan.

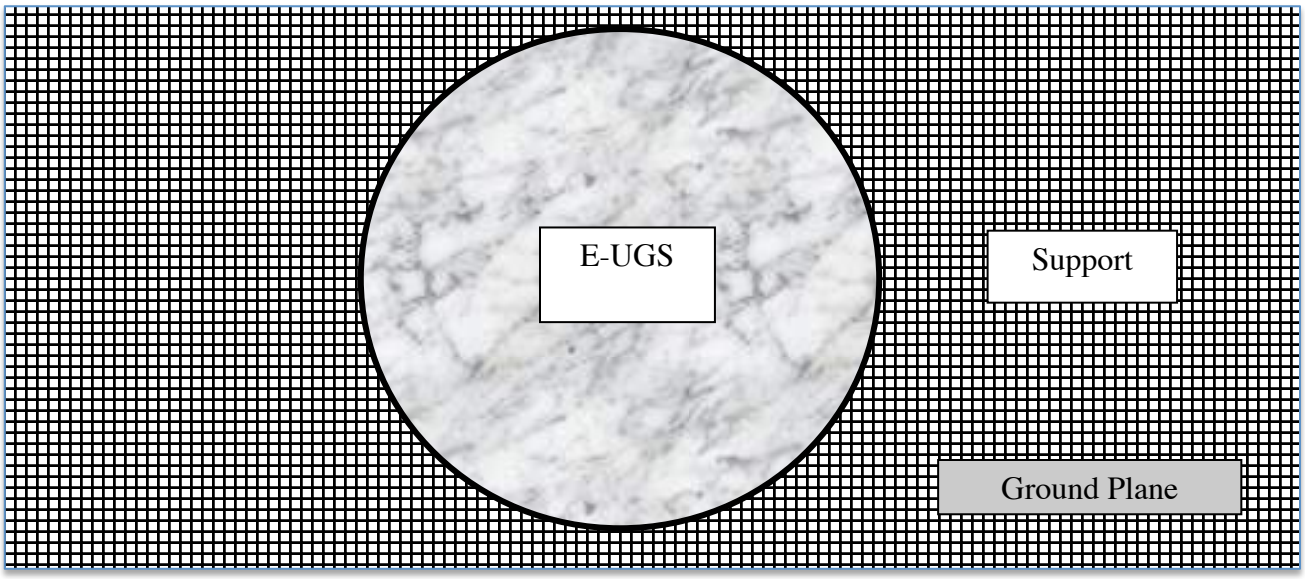


Figure 1 – Block Diagram of EUT on Turntable

VI. Units of Measurement and Uncertainty:

Measurements of radiated electric fields were made in units of dB referenced to 1 microvolt per meter (dBuV/m). Limits appearing on the spectrum analyzer data were corrected for the appropriate antenna factor, cable loss, amplifier gain (when used) and measurement distances X_{std} and X_{site} in meters.

The following equation was employed:
Corrected Limit (dBuV) = Limit (dBuV/m) + 20 Log(X_{std}/X_{site}) + Amplifier Gain (dB) – Antenna Factor (dB/m) – Cable Loss (dB).
Sample calculation at 30 MHz (Vertical Polarization):
42 dBuV corrected limit = 40.0 dBuV/m limit + 20 log(3/3) dB distance + 20 dB amp gain – 17 dB/m AF – 1 dB cable loss.

Measurements of conducted emissions were made in units of dB referenced to 1 microvolt (dBuV). Limits appearing on the spectrum analyzer data were corrected for the appropriate insertion loss.

The following equations were employed:
Corrected Limit (dBuV) = Limit (dBuV) – LISN Insertion Loss (dB).
Sample calculations at 30 MHz:
58 dBuV corrected limit = 60 dBuV limit – 2 dB IL.

Uncertainty
The uncertainty budgets in GME EMC measurements are identified as follows:

1. Field strength between 30 MHz and 26 GHz on a ten-meter OATS using broadband antennas:

Contribution	Probability Distribution	Uncertainty (dB)
antenna factor calibration	normal k=2	0.5
cable loss calibration	normal k=2	0.5
analyzer specification	rectangular	1.5
distance variation	rectangular	0.6
height variation	rectangular	0.5
site imperfection	rectangular	2.0
mismatch	u-shaped	1.5
repeatability	standard deviation	0.5
combined uncertainty u(y)	normal	1.946
expanded uncertainty U	normal k=2	3.892

$$u(y) = \sqrt{(\frac{0.5}{2})^2 + (\frac{0.5}{2})^2 + \frac{1.5^2 + 0.6^2 + .5^2 + 2.0^2}{3} + \frac{1.5^2}{2} + 0.5^2}$$

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2. Conducted emissions between 150 kHz and 30 MHz:

Contribution	Probability Distribution	Uncertainty (dB)
cable loss calibration	normal k=2	0.5
analyzer specification	rectangular	1.5
probe specification	rectangular	1.5
mismatch	u-shaped	0.05
repeatability	standard deviation	0.35
combined uncertainty u(y)	normal	1.298
expanded uncertainty U	normal k=2	2.596

$$u(y) = \sqrt{(\frac{0.5}{2})^2 + \frac{1.5^2 + 1.5^2}{3} + \frac{0.05^2}{2} + 0.35^2}$$

U = k u(y)

Other GME uncertainty values are available upon request. Note: "U" represents an expanded uncertainty expressed at an approximately 95% confidence level using a coverage factor of k=2.

VII. Measuring Equipment:

The table below describes the instrumentation used by Green Mountain Electromagnetics to perform this testing:

Unit	Manufacturer	Model	Serial #	Last Cal.	Next Cal.
Spectrum Analyzer	HP	8592L	3624A00631	11/13/12	11/13/13
Spectrum Analyzer	GW Instek	GSP-830	E1180708	9/11/13	9/11/14
Horn Antenna	ElectroMetrics	RGA-60	6139	9/25/12	9/25/14
Broadband E-field Antenna	ARA	LPB-2526	1125	10/15/12	10/15/13
Pre-Amplifier	MiniCircuits	ZFL-2500VH+	041012	5/6/13	5/6/14
LISN	Com-Power	LI-115	241031	1/17/13	1/17/14
Weather Station	Davis Insts.	Perception II	PC30923A07	1/22/13	1/22/14
Temperature-Humidity Probe	PTC	RHTemp101	N00532	8/8/13	8/8/14

Temperature-Humidity Chamber	Thermotron	SM8S	25-2300-04	n/a	n/a
Isotropic Probe	EMCO	905	n/a	n/a	n/a

VIII. Measurement Procedures:

1. RF Power Output.

Specification: ≤50,000 uV/m (100% Duty) @ 3m

a. Set up EUT on OATS and test instrumentation in laboratory.
b. Verify spectrum analyzer and EUT operation.
   i. Spectrum analyzer uses internal attenuators.
   ii. Set analyzer to carrier frequency and use span >OBW.
c. Operate EUT at normal power unmodulated.
d. Record level displayed on analyzer.

2. Modulation Characteristic.

Specification: Modulation Products <46 dBuV @ 3m

a. Set up EUT on OATS and test instrumentation in laboratory.
b. Verify analyzer and EUT operation.
   i. Spectrum analyzer uses internal attenuators.
   ii. Set analyzer to carrier frequency and use span necessary to view all modulation products.
c. Operate EUT with standard modulation.
d. Record signal displayed on analyzer.

3. Occupied Bandwidth.

Specification: <46 dBuV @ 3m for f @ 0.5% power

a. Set up EUT and test instrumentation in laboratory.
b. Verify analyzer and EUT operation.
   i. Spectrum analyzer uses internal attenuators.
   ii. Set analyzer to carrier frequency and use RBW <10 % of span.
c. Operate EUT with standard modulation.
d. Record signal displayed on analyzer.

4. Frequency Stability.

Frequency Band: 916.40 MHz

Voltage Specification: 85% to 115%, 10.2 – 13.8 VDC

Temperature Specification: -30˚C to +50˚C

a. Set up EUT in temperature chamber and test instrumentation in laboratory.
b. Verify analyzer and EUT operation.
   i. Spectrum analyzer uses internal attenuators.
   ii. Set analyzer to carrier frequency and use narrowband span.
c. Operate EUT with standard modulation.
d. Record signal displayed on analyzer for high/low temperature and voltage.

5. Radiated Emissions.

Frequency range: 30 MHz to 88 MHz
Limit: 40 dBuV/m @ 3 meters
Frequency range: 88 kHz to 216 MHz
Limit: 43.5 dBuV/m @ 3 meters
Frequency range: 216 MHz to 960 MHz
Limit: 46 dBuV/m @ 3 meters
Frequency range: 960 MHz to 9160 MHz & Spurious > 916 MHz
Limit: 54 dBuV/m @ 3 meters

a. Set up instrumentation at open area test site.
   i. Mount EUT on ground plane and broadband antenna on antenna positioner.
   ii. Observe temperature, humidity and atmospheric pressure.
   iii. Measurement distance is 3 meters <1 GHz/1 meter >1 GHz and antenna scan height is 1 to 4 meters. Use RF absorber on ground plane >1 GHz.
b. Verify spectrum analyzer and antenna operation.
   i. Spectrum analyzer is connected to antenna. Use broadband horn >1 GHz.
   ii. Preamplifier is inserted between antenna and analyzer to ensure analyzer noise threshold is at least 6 dB below specification limit.
c. Set up, power and operate EUT as in block diagram in Section V.
d. Perform preliminary evaluation of equipment in the near field.
   i. Vary antenna height, antenna polarization, and antenna orientation to EUT.
   ii. Repeat step d.i. while evaluating radiation in the 30-MHz to 9160-MHz spectrum.
   iii. Refer to ANSI C63.4-2009: for exploratory measurements >1 GHz.
e. Determine frequencies and equipment orientations that produce maximum radiation.
   i. Identify processor, clock and beat frequencies, and harmonics.
f. Perform final evaluation of unit by recording spectrum analyzer data.
   i. Ensure the EUT is producing the maximum radiation found in step e.
   ii. Collect data over the entire frequency range.
   iii. Refer to ANSI C63.4-2009: for final measurements >1 GHz – Manually ensure measurement antenna is in cone of radiation for emission areas determined in steps

d.-e. by adjusting in both azimuth and elevation positions. Polarization is oriented for maximum response.

6. Conducted Emissions:

Frequency range: 150 kHz to 500 kHz
Limit: 66 dBuV log decrease to 56 dBuV
Frequency range: 500 kHz to 5 MHz
Limit: 56 dBuV
Frequency range: 5 MHz to 30 MHz
Limit: 60 dBuV

a. Set up instrumentation in laboratory.
   i. Observe temperature, humidity and atmospheric pressure.
b. Perform measurement check.
   i. Use internal attenuation of spectrum analyzer.
   ii. Determine conducted ambient.
c. Set up instrumentation as in Section V.
   i. Use internal attenuation of spectrum analyzer.
   ii. Connect spectrum analyzer to LISN, apply power and stabilize EUT.
   iii. Scan over the frequency range with appropriate bandwidth and measurement times.
d. Perform evaluation of EUT by recording spectrum analyzer data.
   i. Perform test on VAC 1 and repeat for other leads.
   ii. Automatically collect continuous data over the entire frequency range.

7. Exposure Evaluation.

Frequency: 916 MHz
Limit: 0.8 W/kg and 1.6 W/kg

a. Set up instrumentation at open area test site.
   i. Mount EUT on table and isotropic probe or loop on antenna positioner.
   ii. Observe temperature, humidity and atmospheric pressure.
   iii. Measurement distance is 1 meter and antenna scan height is varied over human body dimensions (0.1 to 2 meters).
b. Verify spectrum analyzer and antenna operation.
   i. Spectrum analyzer is connected to antenna.
   ii. Preamplifier is inserted between antenna and analyzer to ensure analyzer noise threshold is at least 6 dB below specification limit (not normally necessary below 30 MHz).
c. Set up, power and operate EUT as described in Section V.
d. Perform preliminary evaluation of equipment in the near field.
   i. Vary antenna height, antenna polarization, and antenna orientation to EUT.

ii. Repeat step d.i. while evaluating electromagnetic radiation at 916 MHz.
iii. Ensure appropriate resolution bandwidth is set and less than or equal to VBW.
iv. Near field measurements of unit emissions are made at ambient frequencies.

e. Determine equipment orientations that produce maximum radiation.
   i. Set peak hold on analyzer for 30 minutes while slowly varying antenna height.

f. Perform final evaluation of unit by recording spectrum analyzer data.
   i. Ensure the EUT is producing the maximum radiation found in step e.
   ii. Collect data over the entire frequency range.
   iii. Identify all ambient signals.

IX. Photographs of Measurement Setup:

The following pages are photographs of the equipment as it was tested.

Photograph 1 – E-UGS on OATS

Photograph 2 – Transmitter in T/H Chamber

Photograph 3 – Conducted Emissions – E-UGS

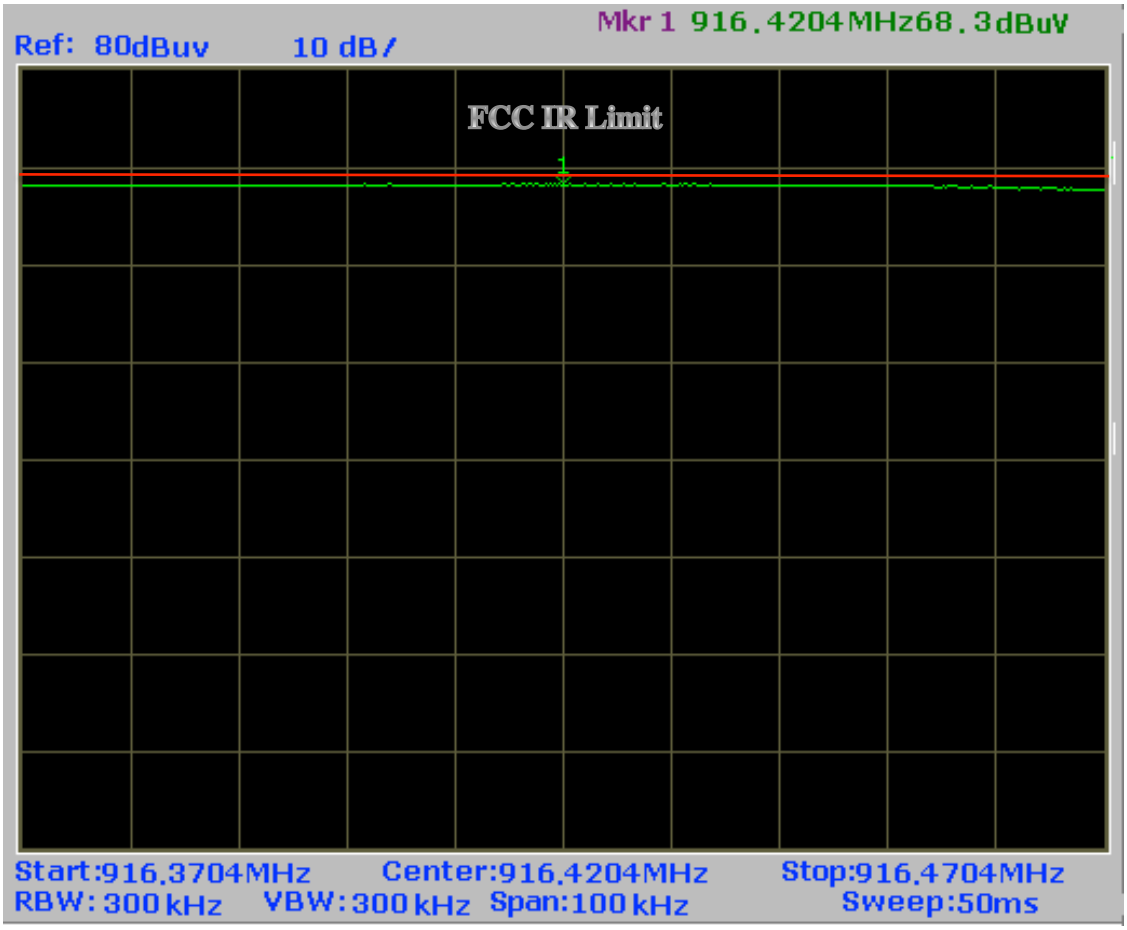
X. Measurement Results:

1. RF Power Output.

Specification uV/m	Specification dBuV/m	Antenna Factor dB	Cable Loss dB	Corrected Limit dBuV
50,000	94	24.0	1	69

Corrected Limit (dBuV) = Specification (dBuV/m) – Antenna Factor (dB/m) – Cable Loss (dB).
dBuV/m = 20 log (uV/m)

E-UGS

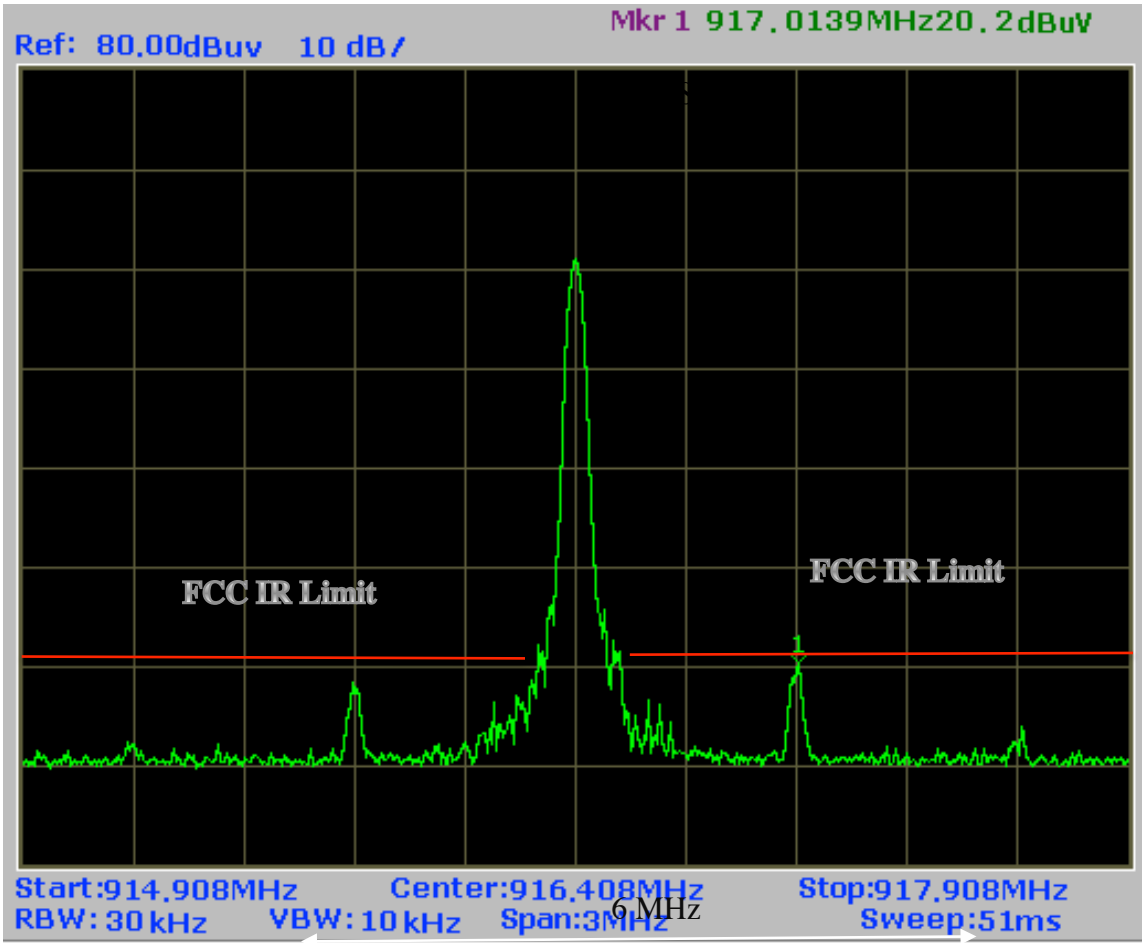


X. Measurement Results Cont'd:

2. Modulation Characteristic.

Specification uV/m	Specification dBuV/m	Antenna Factor dB	Cable Loss dB	Corrected Limit dBuV
200	46	24.0	1	21

Corrected Limit (dBuV) = Specification (dBuV/m) – Antenna Factor (dB/m) – Cable Loss (dB).
dBuV/m = 20 log (uV/m)



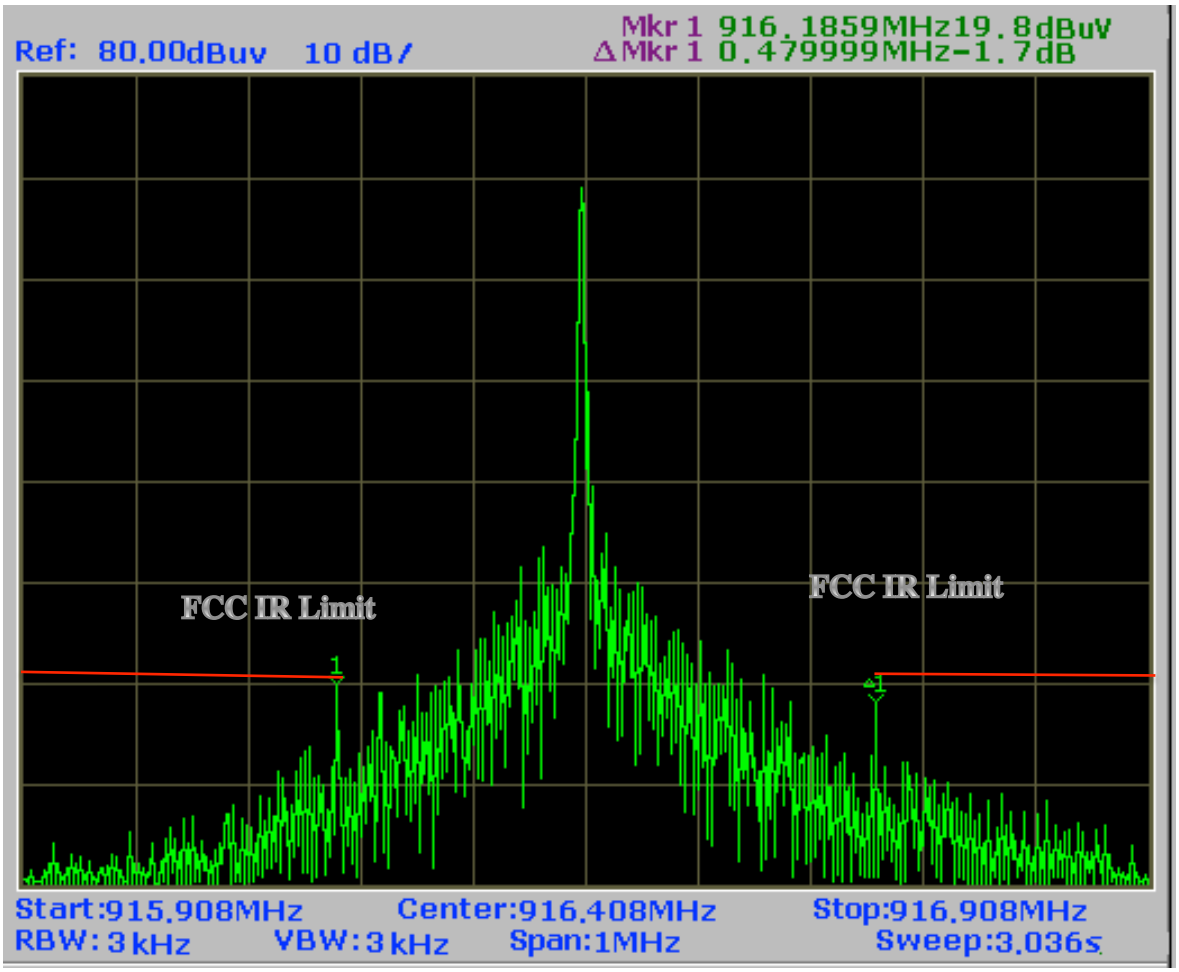
6 MHz

X. Measurement Results Cont'd:

3. Occupied Bandwidth.

Specification uV/m	Specification dBuV/m	Antenna Factor dB	Cable Loss dB	Corrected Limit dBuV
200	46	24.0	1	21

Corrected Limit (dBuV) = Specification (dBuV/m) – Antenna Factor (dB/m) – Cable Loss (dB).
dBuV/m = 20 log (uV/m)



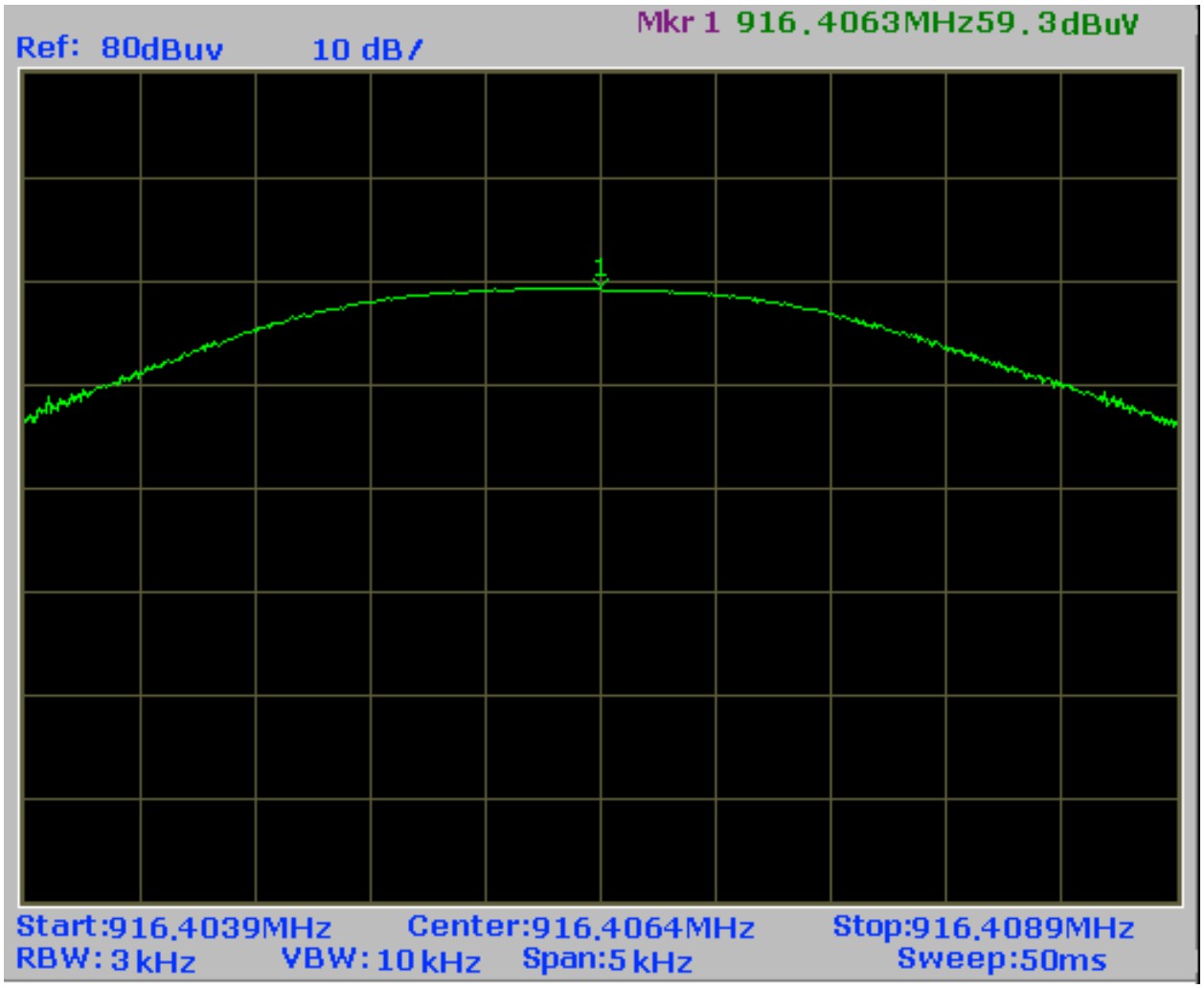
X. Measurement Results Cont'd:

4. Frequency Stability.

Frequency: 916.40 MHz

Specification: 10.2 and 13.8 VDC (Normal Operation)

The graph below is the baseline for the measurements.



X. Measurement Results Cont'd:

4. Frequency Stability.

Frequency: 916.40 MHz
Specification: 10.2 and 13.8 VDC (Normal Operation)

The tables below show that there is not any variation in frequency with selected applied voltage or temperature:

Voltage (VDC)	Frequency (MHz)
10.2	916.40
12	916.40
13.8	916.40

Table 1 – Frequency Vs. Voltage – E-UGS

Temperature (˚C)	Frequency (MHz)
-30	916.40
-20	916.40
-10	916.40
0	916.40
10	916.40
20	916.40
30	916.40
40	916.40
50	916.40

Table 2 – Frequency Vs. Temperature – E-UGS

X. Measurement Results Cont'd:

5. Radiated Emissions.

Vertical Polarization

The table below describes the correction factors necessary to apply the limit to the spectrum analyzer output. The following page contains the spectrum analyzer output with the corrected specification limits superimposed. The black trace is the ambient condition, and the purple trace identifies EUT emissions. Maximum amplitudes of vertical polarization are shown in the results below.

Note: Occasional known ambient signals may persist (e.g. local AM/FM/Cell). Unit produced no discernible emissions so data is interpolated through any known ambient signal. Units producing in-band emissions are examined at nearer measurement distances.

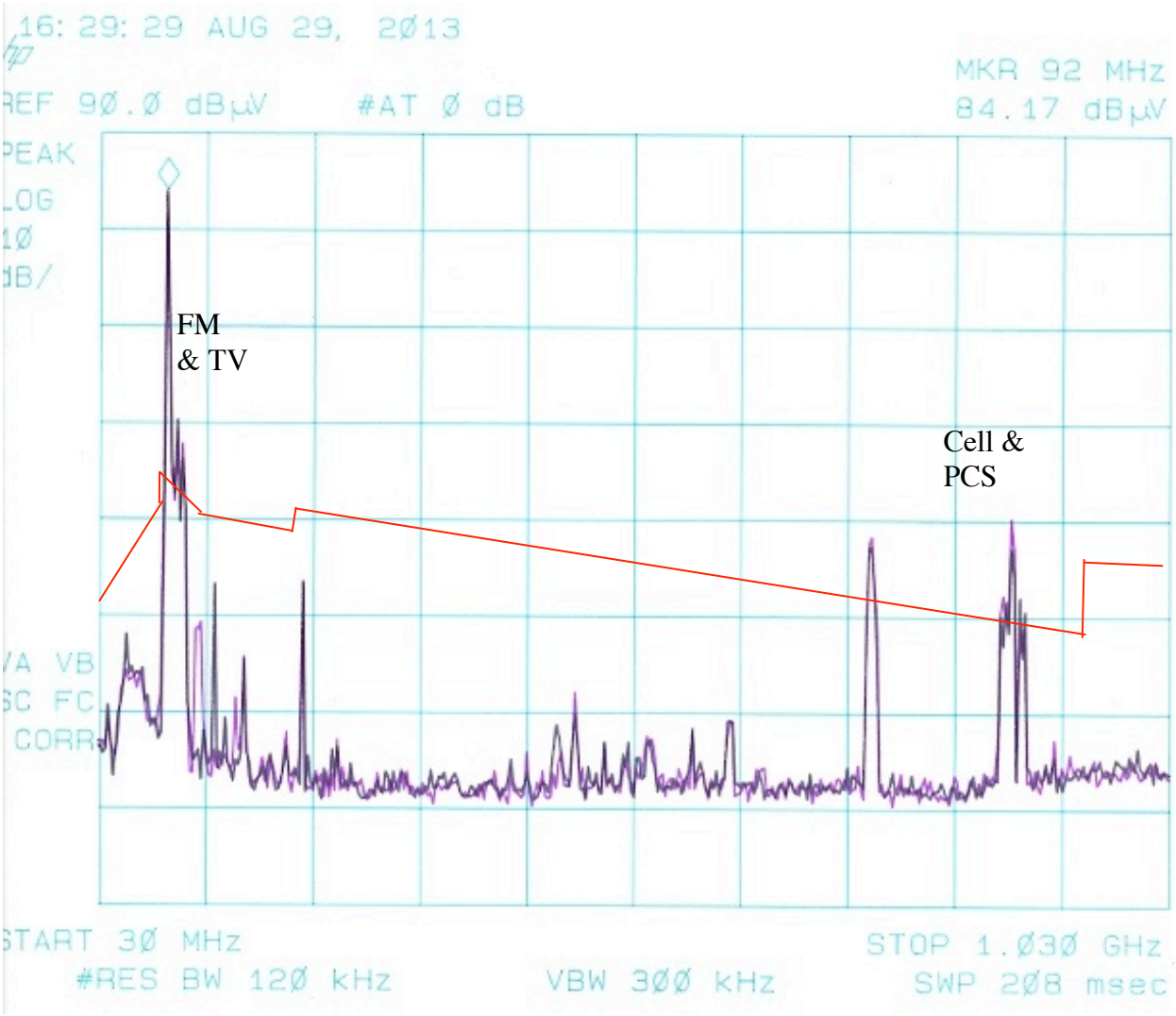
Frequency MHz	IR limit @ 3m dBuV	Amp Gain dB	Antenna Factor dB	Cable Loss dB	Corrected Limit dBuV
30	40	20	17.0	1	42.0
50	40	20	13.6	1	45.4
88	40	20	8.1	1	50.9
89	43.5	20	8.1	1	54.4
125	43.5	20	9.4	2	52.1
150	43.5	20	8.5	3	52.0
216	43.5	20	11.3	3	49.2
217	46	20	11.3	3	51.7
300	46	20	13.5	3	49.5
500	46	20	17.8	4	44.2
960	46	20	23.8	4	38.2
961	54	20	23.8	4	46.2

Table 3 – Corrected Limit - Vertical Polarization

X. Measurement Results Cont'd:

5. Radiated Emissions.

E-UGS
Maximum of Vertical Polarization
All Ambient – No Discernible Emissions
in Near field



X. Measurement Results Cont'd:

5. Radiated Emissions.

Horizontal Polarization

The table below describes the correction factors necessary to apply the limit to the spectrum analyzer output. The following page contains the spectrum analyzer output with the corrected specification limits superimposed. The black trace is the ambient condition, and the purple trace identifies EUT emissions. Maximum amplitudes of horizontal polarization are shown in the results below.

Note: Occasional known ambient signals may persist (e.g. local AM/FM/Cell). Unit produced no discernible emissions so data is interpolated through any known ambient signal. Units producing in-band emissions are examined at nearer measurement distances.

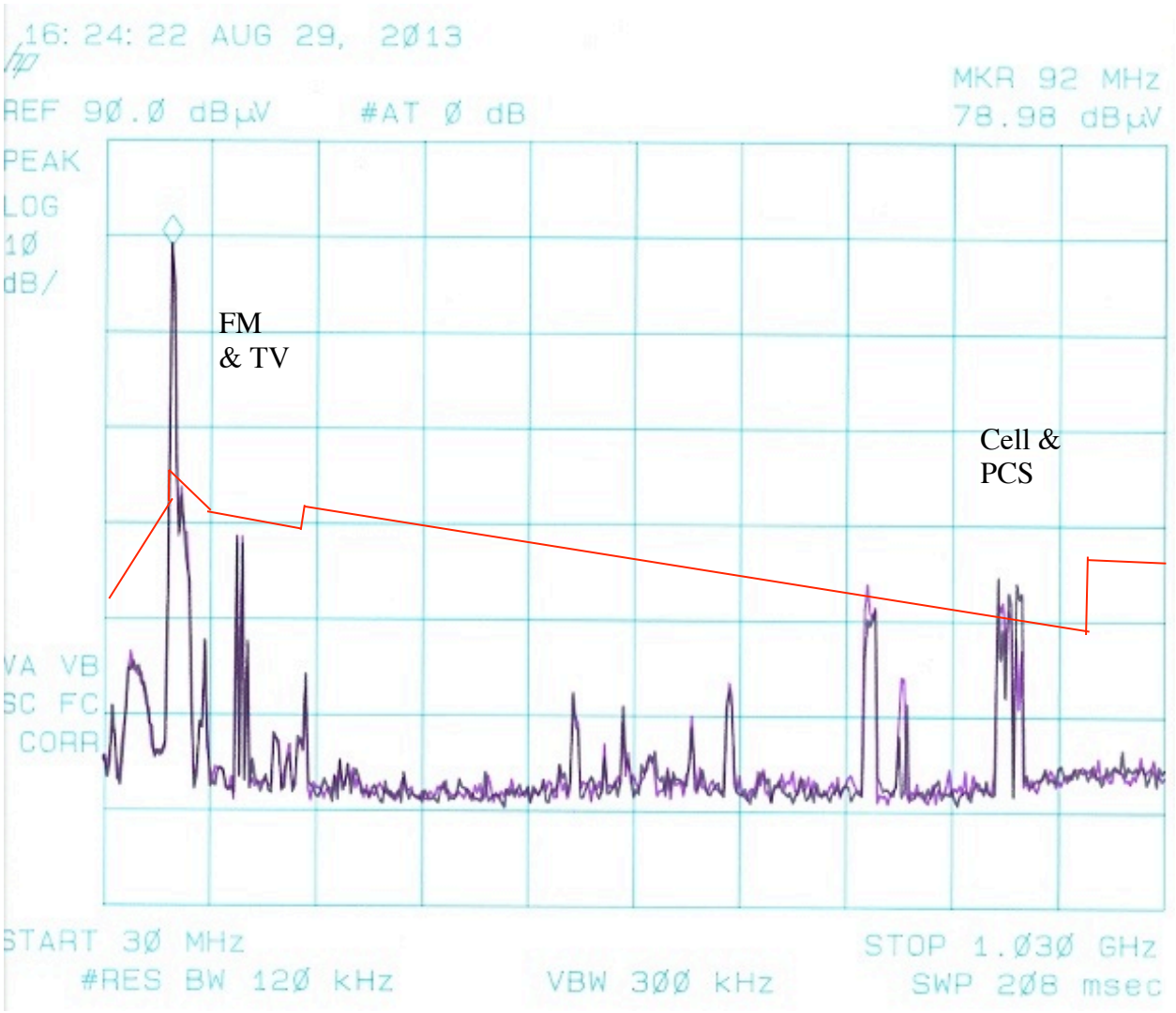
Frequency MHz	IR limit @ 3m dBuV	Amp Gain dB	Antenna Factor dB	Cable Loss dB	Corrected Limit dBuV
30	40	20	17.5	1	41.5
50	40	20	14.5	1	44.5
88	40	20	6.7	1	52.3
89	43.5	20	6.7	1	55.8
125	43.5	20	10.7	2	50.8
216	43.5	20	11.8	3	48.7
217	46	20	11.8	3	51.2
300	46	20	13	3	50.0
500	46	20	16.7	4	45.3
960	46	20	23.2	4	38.8
961	54	20	23.2	4	46.8

Table 4 – Corrected Limit - Horizontal Polarization

X. Measurement Results Cont'd:

5. Radiated Emissions.

E-UGS
Maximum of Horizontal Polarization
All Ambient – No Discernible Emissions
in Near field



X. Measurement Results Cont'd:

5. Radiated Emissions.

Vertical & Horizontal Polarization >1 GHz.

The table below describes the correction factors necessary to apply the limit to the spectrum analyzer output. The following pages contain the spectrum analyzer output with the corrected specification limits superimposed. The black trace is the ambient condition, and the purple trace identifies EUT emissions. Maximum amplitudes of both polarizations are shown in the results below.

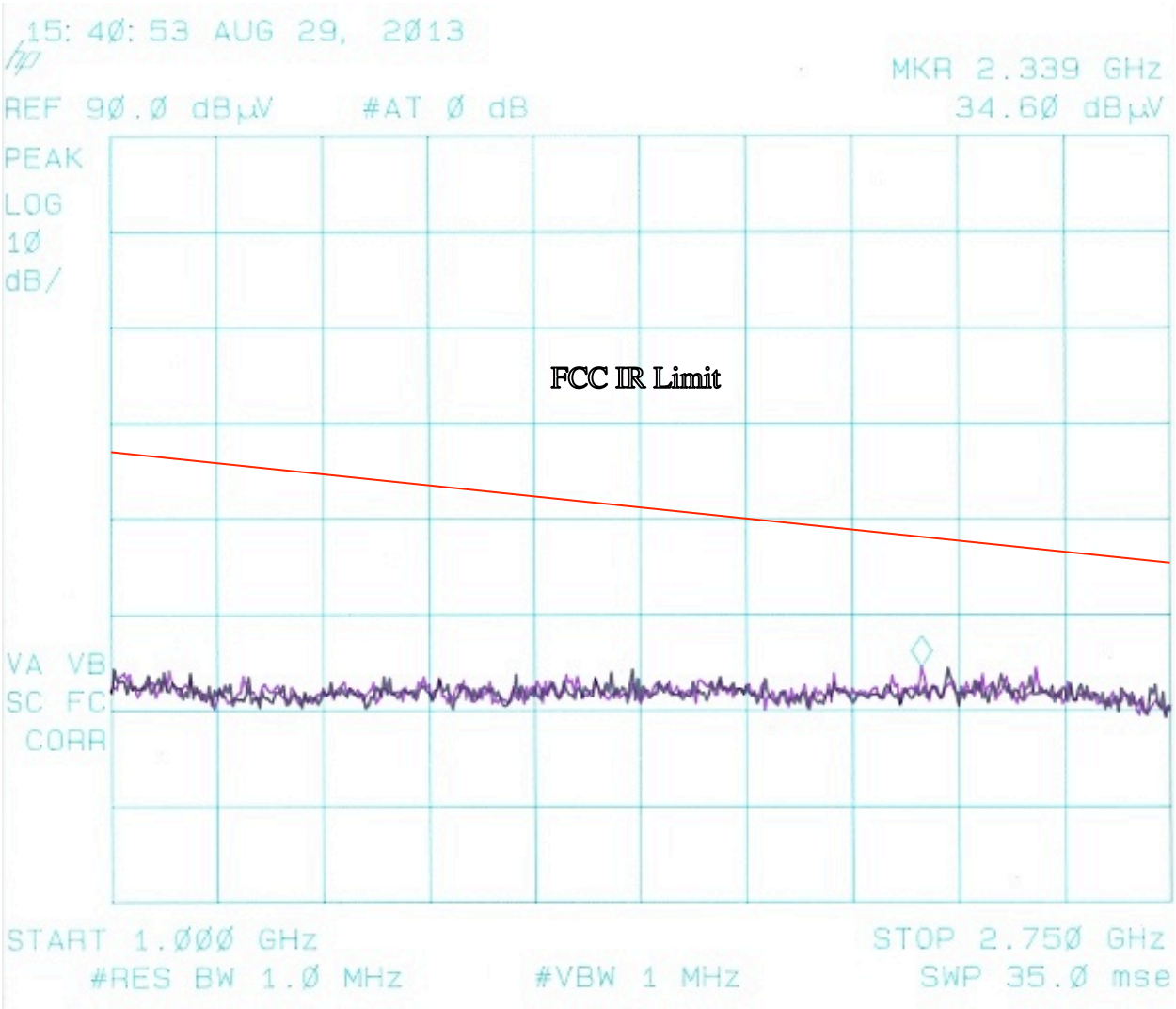
Frequency	IR limit @ 3m	Amp Gain	Antenna Factor	Cable Loss	Corrected Limit
MHz	dBuV	dB	dB	dB	dBuV
1000	54	30	24	3	57
2400	54	30	28	6	50
2750	54	30	31	7	46

Table 5 – Corrected Limit - >1 GHz

X. Measurement Results Cont'd:

5. Radiated Emissions.

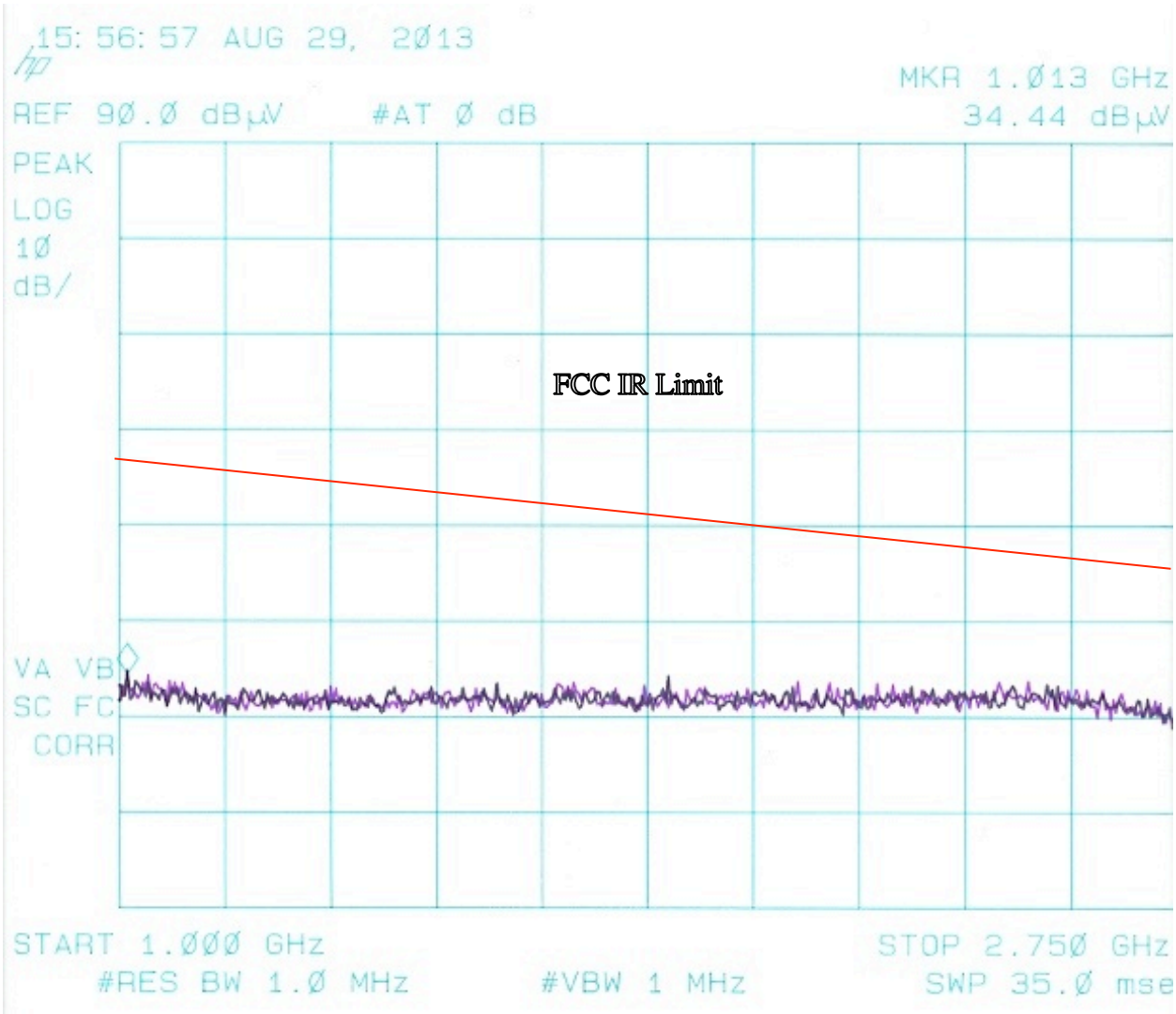
E-UGS
Maximum of Vertical
Polarization



X. Measurement Results Cont'd:

5. Radiated Emissions.

E-UGS
Maximum of Horizontal
Polarization



X. Measurement Results Cont'd:

5. Radiated Emissions.

Vertical & Horizontal Polarization >2.75 GHz.

The table below describes the correction factors necessary to apply the limit to the spectrum analyzer output. The following page contains the spectrum analyzer output with the corrected specification limits superimposed. The black trace is the ambient condition, and the purple trace identifies EUT emissions. Maximum amplitudes of both polarizations are shown in the results below.

Frequency	IR limit @ 3 m	Distance Correction *Note	Amp Gain	Antenna Factor	Cable Loss	Corrected Limit
MHz	dBuV	dB	dB	dB	dB	dBuV
2750	54	20	40	35.0	8	71
9160	54	20	40	38.0	12	64

Table 6 – Corrected Limit - >2.75 GHz

- Unit brought to 30 cm of antenna.
- Near field at ≥2.75 GHz is ≤ 10 cm, so antenna is not in reactive field of EUT.

Limits appearing on the spectrum analyzer data were corrected for the appropriate antenna factor, cable loss, amplifier gain (when used) and measurement distances X_{std} and X_{site} in meters.

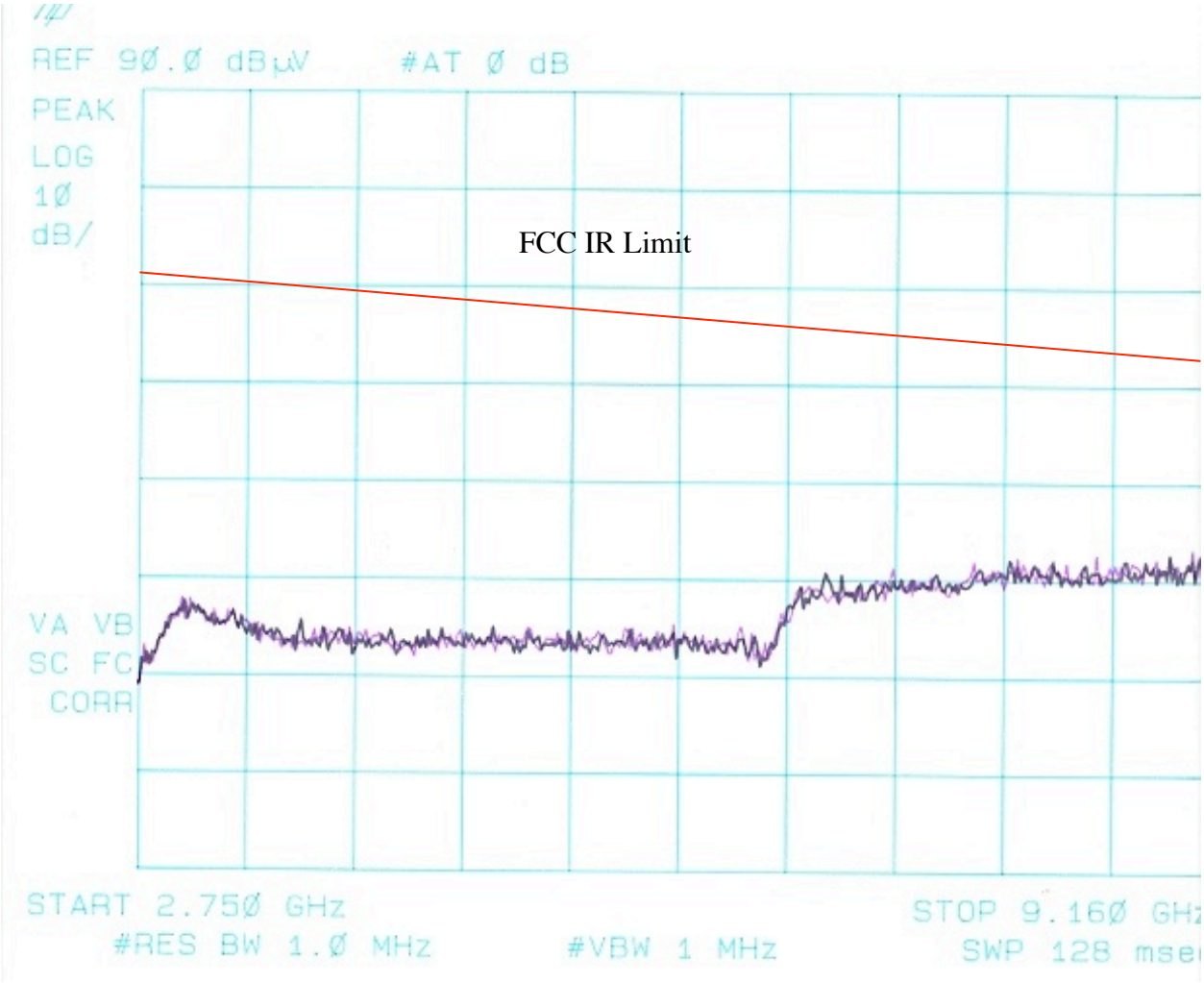
The following equation was employed:

- Corrected Limit (dBuV) = Limit (dBuV/m) + 20 Log(X_{std}/X_{site}) + Amplifier Gain (dB) – Antenna Factor (dB/m) – Cable Loss (dB).
- Sample calculation at 2750 MHz:
- 71 dBuV corrected limit = 54.0 dBuV/m limit + 20 log(3/0.3) dB distance + 40 dB amp gain – 35 dB/m AF – 8 dB cable loss.
- Note that 20 Log(X_{std}/X_{site}) = 20 Log 3/0.3 = 20 dB

X. Measurement Results Cont'd:

5. Radiated Emissions.

E-UGS
Maximum of Horizontal
and Vertical Polarization



X. Measurement Results Cont'd:

6. Conducted Emissions Data:

The following pages contain the spectrum analyzer output from the testing. Limits superimposed on the data are corrected for transducer and measurement system gain or loss. Correction factors at selected frequencies are shown below:

Corrected Limit (dBuV) = Limit (dBuV) - LISN Insertion Loss (dB).

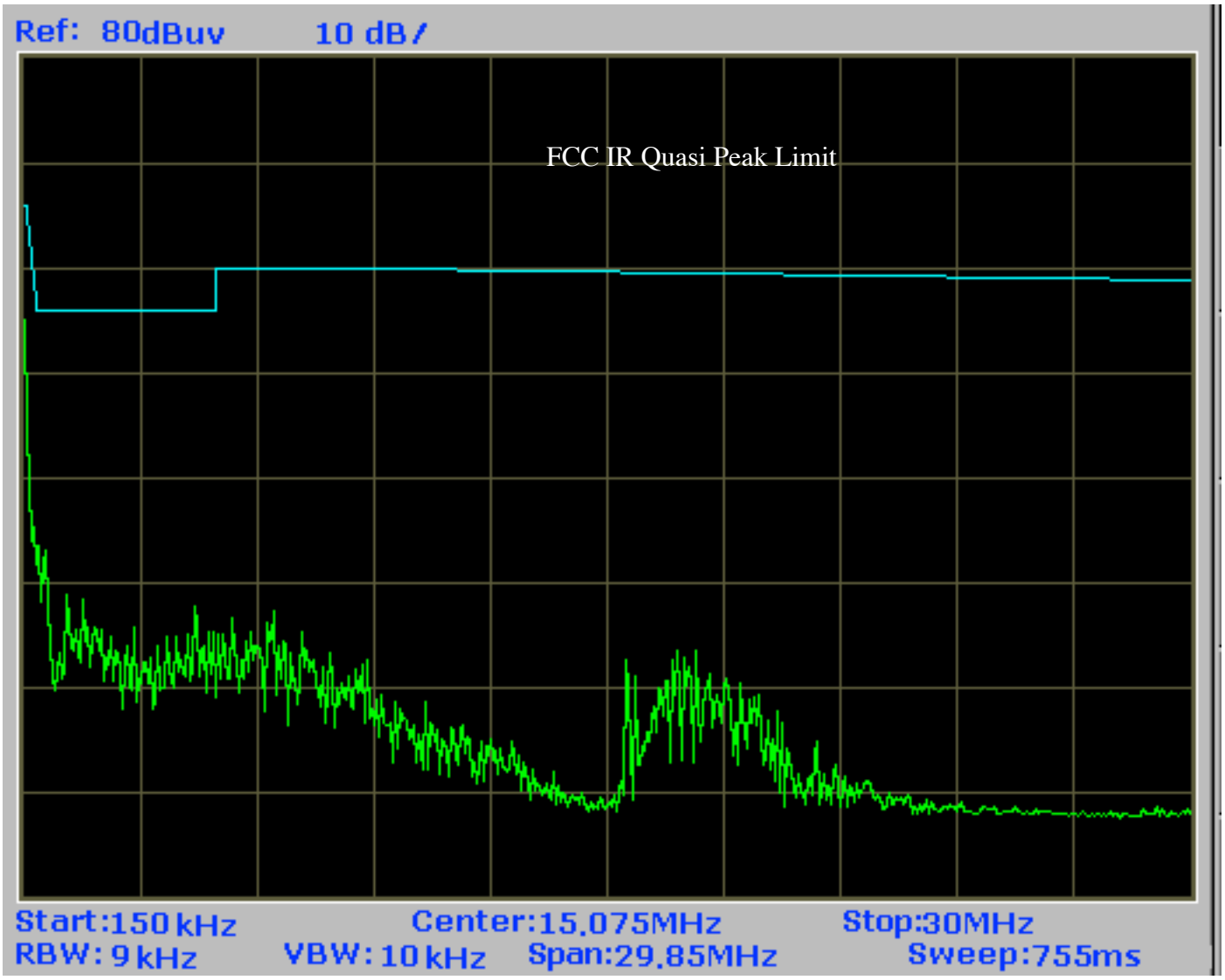
Frequency	Limit	Insertion Loss	Corrected Limit
MHz	dBuV	dB	dBuV
0.15	66	0	66
0.5	56	0	56
5	60	1	59
30	60	2	58

Table 7 – Corrected Cond. Ems. Quasi-Peak Limit

X. Measurement Results Cont'd:

6. Conducted Emissions Data:

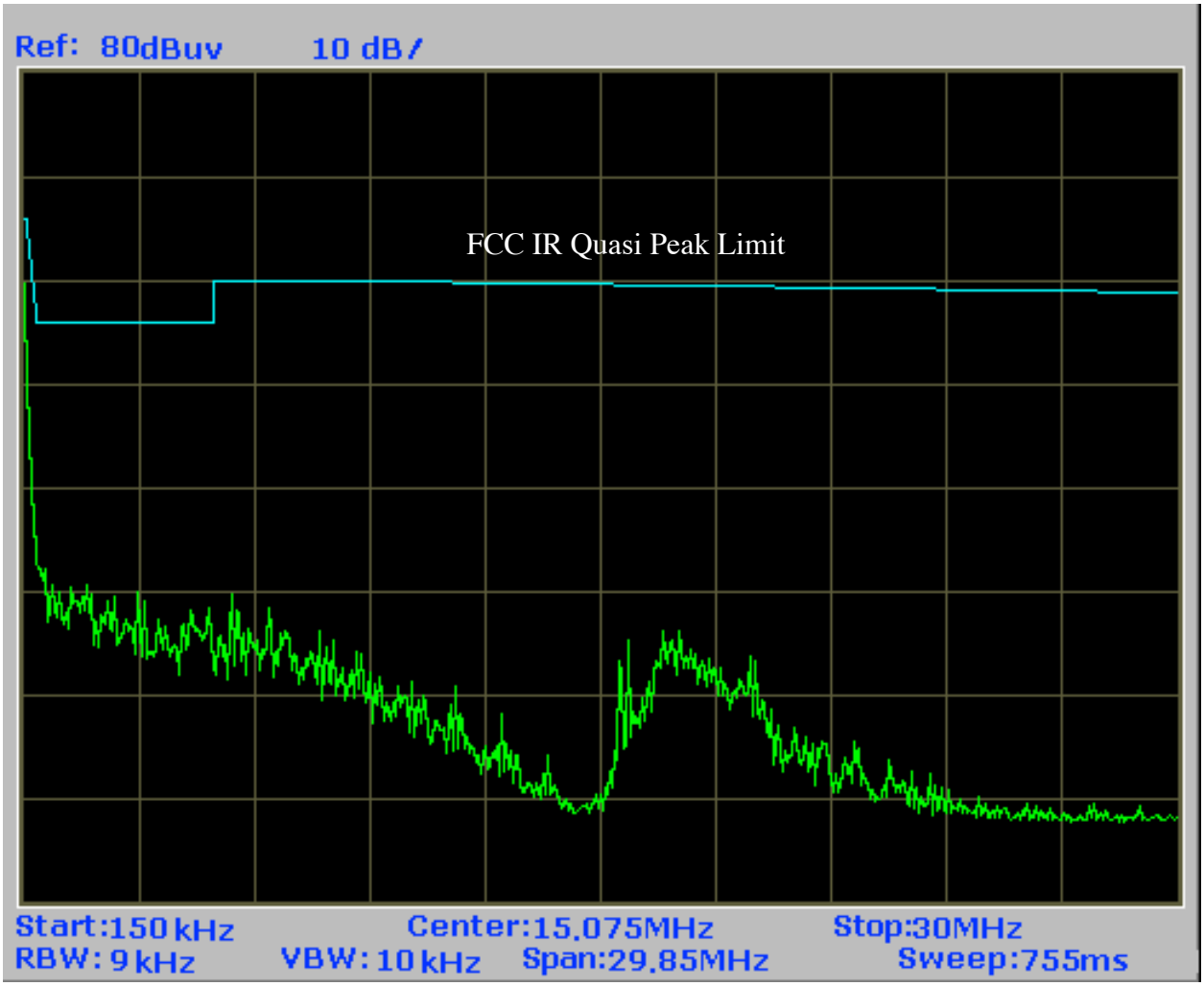
E-UGS
L1



X. Measurement Results Cont'd:

6. Conducted Emissions Data:

E-UGS
L2



X. Measurement Results Cont'd:

7. Exposure Evaluation.

The analysis below compares the measured power to the maximum permissible exposure limit for general population with uncontrolled access. The E-UGS can be used continuously; no special averaging time or limit relaxations are employed. Maximum peak available power is used in calculations.

Unit Frequency: 916 MHz
Unit Maximum Average Power .001 Watt available (0 dBm from design)
Standard User Weight: 100 kg

Specific Absorption Rate (SAR) Limit for whole-body: 0.08 W/kg
Specific Absorption Rate (SAR) Limit for one-gram tissue volume: 1.6 W/kg

SAR Whole body = .001 W/100 kg = 0.00001 W/kg for E-UGS
SAR 1g tissue = .001 W/.001 kg * = 1 W/kg for E-UGS

In addition per IEEE C95.1 paragraph 6.10 (2): low power devices are unlikely to expose users in excess of the criteria when power is less than or equal to:
Pmax = 1.4 * (450/f) Watts where f is in MHz.
Pmax is significantly greater than the power available at the Alert Monitor:
Pmax = 1.4 * (450/916) = 0.69 W.