MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313
33439 WESTERN AVENUE • UNION CITY, CALIFORNIA 94587 • PHONE (510) 489-6300 • FAX (510) 489-6372
3162 BELICK STREET • SANTA CLARA, CA 95054 • PHONE (408) 748-3585 • FAX (510) 489-6372
13301 MCCALLEN PASS • AUSTIN, TEXAS 78753 • PHONE (512) 287-2500 • FAX (512) 287-2513

Electromagnetic Compatibility
MPE Calculation

For the

QinetiQ, NA
Transformer Meter

Tested under

Title 47 of the Code of Federal Regulations (CFR),
Part 15 Subpart C

MET Report: EMCS42319-MPE

August 7, 2014

Prepared For:

Qinetiq, NA
350 2nd Avenue
Waltham, MA 02451

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

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Ben 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 applicable limits. 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 Title 47 of the CFR, Part 15, Subpart C under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Electromagnetic Compatibility Criteria for Intentional Radiators

RF Exposure

Test Purpose: Co-location of two radios;

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Calculation – 2.4 GHz WiFi (FCC ID: TFB-TIWI1-01)

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

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

MPE Limit Calculation: EUT's operating frequency band is **2400 – 2483.5MHz**; highest conducted power = 93 mW. Therefore, Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2

EUT maximum antenna gain = **1.0 dBi.**

where, S = Power Density (mW/cm^2)
P = Power Input to antenna (93 mW)
G = Antenna Gain (1.2 numeric)

$S = (93*1.2/ 4*3.14*20.0^2)$ = **0.022 mW/cm^2** @ 20cm separation

MPE Calculation – 900 MHz Radio

MPE Limit Calculation: EUT's operating frequencies @ 902-928 MHz; highest conducted power = *28.88 dBm* (peak) therefore, **Limit for Uncontrolled exposure: 0.6 mW/cm^2 or 6 W/m^2**

EUT maximum antenna gain = *0 dBi.*

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

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

where, S = Power Density
P = Power Input to antenna (774 mW)
G = Antenna Gain (1 numeric)
R = 20 cm

$S = (774*1/ 4\pi*202) = 0.154$ mW/cm^2 @ 20cm separation

MPE Calculation – Co-Location

MPE Summary:

Frequency Range	MPE Result (mW/cm^2)	Limit (mW/cm^2)
2.4GHz	0.022	1
900 MHz	0.154	0.6

Test Requirements: [MPE(f1) / limit(f1) + MPE(f2) / limit(f2)] < 1

Test Results:

MPE(f1) Frequency (MHz)	MPE(f2) Frequency (MHz)	Calculation [MPE(f1) / limit(f1) + MPE(f2) / limit(f2)]	MPE Result (mW/cm^2)
2400	900	0.022 / 1 + 0.154/ 0.6 = (0.022+ 0.255)	**0.277**

Therefore, the combined total power density is less than 1 mW/cm^2 at 20cm.

