MOTOROLA SOLUTIONS

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TESTING CERT # 2518.01

DECLARATION OF COMPLIANCE: MPE ASSESSMENT

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Report ID: SR9690 MPE Calc rpt VML700 Rev O 110721

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Assessment Date(s):	06/29/2011 & 07/20/2011
Manufacturer/Location:	Motorola, Israel
Date submitted:	06/28/2011
DUT Description:	VML700 VSM data modem, vehicular application (LTE, EVDO, WiFi and GPS)
TX mode(s):	LTE, EVDO (CDMA) and WiFi
Max. Power output:	372mW (LTE), 282mW (EVDO) & 22.4mW (WiFi)
TX Frequency Bands:	LTE B13 777-787MHz, LTE B14 788-798MHz, EVDO BC0 824-849MHz, EVDO BC1 1850-1910MHz, WiFi 2.401-2.472 GHz
Signaling type:	LTE (5MHz & 10MHz frequency division duplexing) EVDO (CDMA2000, CDMA 1x, CDMA 1x EVDO, WiFi (WLAN Direct Sequence)
Model(s) Certified:	F4080A
Classification:	Occupational/Controlled Environment
FCC ID:	AZ492FT7045
IC:	109U-92FT7045

Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 3.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola EME Laboratory.
I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements.
This reporting format is consistent with the suggested guidelines of the TIA TSB-159 April 2006
The results and statements contained in this report pertain only to the device(s) evaluated herein.

Deanna M. Zakharia
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Approval Date: 7/27/2011

Certification Date: 07/27/2011

Certification No.: L1110705

Document Revision History

Date	Revision	Comments
07/21/2011	O	Initial release

Table of Contents

1.0 Introduction

This report contains calculated Maximum Permissible Exposure (MPE) results for product model F4080A.

2.0 Abbreviations / Definitions

CDMA: Code Division Multiple Access
DUT: Device Under Test
EME: Electromagnetic Energy
EVDO: Evolution Data Only
GPS: Global Positioning System
LTE: Long Term Evolution
MPE: Maximum Permissible Exposure
WLAN: Wireless Local Area Network
WiFi: Wireless Fidelity

3.0 Referenced Standards and Guidelines

This product is designed to comply with the following applicable national and international standards and guidelines.

- United States Federal Communications Commission, Code of Federal Regulations; Rule Part 47CFR § 1.1310, § 2.1091 (d) and § 2.1093 for RF Exposure, where applicable.
- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1999
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1992. Specific to FCC rules and regulations.
- Institute of Electrical and Electronics Engineers (IEEE) C95.3-2002
- Ministry of Health (Canada) Safety Code 6 (2009), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz

4.0 Power Density Limits

Table 1 – Occupational / Controlled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65 Supplement C mW/cm^2	IEEE C95.1 1992/1999 mW/cm^2	RSS 102 issue 4 - 2010 W/m^2
30 - 300	1.0		*10.0
10 - 400			
100 - 300		1.0	
300 - 1,500	f/300		f/30
300 - 3,000		f/300	
400 - 2,000			
1,500 - 15,000			50.0
1,500 - 100,000	5.0		
2,000 – 300,000			
3,000 - 300,000		10.0	

*Power density limit is applicable at frequencies greater than 100MHz

Table 2 – General Population / Uncontrolled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65 Supplement C mW/cm^2	IEEE C95.1 1992/1999 mW/cm^2	RSS 102 issue 4 – 2010 W/m^2
30 – 300	0.2		*2.0
10 – 400			
100 – 300		0.2	
100 – 400			
300 – 1,500	f/1,500		f/150
400 – 2,000			
300 – 15,000		f/1,500	
1,500 – 15,000			10.0
1,500 – 100,000	1.0		
2,000 – 100,000			
2,000 – 300,000			

*Power density limit is applicable at frequencies greater than 100MHz

5.0 Product and System Description

VML700 Model F4080A is a data modem for vehicular applications. The modem supports LTE (777-787MHz & 788-798MHz), EVDO (824-849MHz & 1850-1910MHz) and WiFi (2401-2472MHz). The maximum duty cycles are 100% for LTE, EVDO and WiFi. Simultaneous transmission is possible but limited to only one LTE (777-787MHz or 788-798MHz) and one EVDO (824-849MHz & 1850-1910MHz) and WiFi (2.401-2.472GHz).

This device is capable of operating in the TX frequency range(s), duty cycle(s), maximum output power(s) and antenna gain(s) presented in Table 3 section 7.0 MPE Assessment.

6.0 Assessment Method

MPE calculations were used to determine the RF exposure for this device. According to FCC's OET Bulletin 65 Edition 97-01 Section 2, calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations (1) or (2) below. These equations are generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction. Equation 2 was used to show compliance for this device.

Equation 1

$$S = \frac{PG}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

Where: S = power density (mW/cm^2)
P = power input to the antenna (mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator (dBi)
R = distance to center of radiation of the antenna (cm)
EIRP = equivalent (or effective) isotropically radiated power

Or Equation 2

$$S = \frac{P_t\, G}{4\pi d^2 L}\mathrm{F}$$

Equation (2) accounts for the maximum duty cycle of the signal, and the factor, F, to provide a worst-case prediction of power density per FCC OET Bulletin 65, Edition 97-01 1997.

Where: S = power density (mW/cm^2)
P_t = maximum output power scaled by the maximum duty cycle of the signal
G = power gain of the antenna in the direction of interest relative to an isotropic radiator (dBi)
d = distance from antenna (cm)
L = cable loss (dB)
F = 2.56

7.0 MPE Assessment

Table 3

MPE calculation Results

Tx Frequency (MHz)	User Category Limits	FCC MPE Limit (mW/cm^2)	Duty cycle (%)	Max Power (W)	Antenna #	Antenna Gain, G (dBi)	Cable loss, L (dB)	Dist., r (cm)	MPE Calc. (mW/cm^2)	Percent of FCC limit
LTE B13 (777-787MHz)										
777.0	Uncontrolled	0.52	100	0.372	FAF5266A	0.10	0	20	0.19	37.4%
782.0	Uncontrolled	0.52	100	0.372	FAF5266A	0.10	0	20	0.19	37.2%
787.0	Uncontrolled	0.52	100	0.372	FAF5266A	0.10	0	20	0.19	37.0%
LTE B14 (788-798MHz)										
788.0	Uncontrolled	0.53	100	0.372	FAF5266A	0.10	0	20	0.19	36.9%
793.0	Uncontrolled	0.53	100	0.372	FAF5266A	0.10	0	20	0.19	36.7%
798.0	Uncontrolled	0.53	100	0.372	FAF5266A	0.10	0	20	0.19	36.4%
EVDO BC0 (824-849MHz)										
824.0	Uncontrolled	0.55	100	0.282	FAF5266A	2.60	0	20	0.26	47.6%
836.5	Uncontrolled	0.56	100	0.282	FAF5266A	2.60	0	20	0.26	46.9%
849.0	Uncontrolled	0.57	100	0.282	FAF5266A	2.60	0	20	0.26	46.2%
EVDO BC1 (1850-1910MHz)										
1850.0	Uncontrolled	1.00	100	0.282	FAF5266A	2.60	0	20	0.26	26.1%
1880.0	Uncontrolled	1.00	100	0.282	FAF5266A	2.60	0	20	0.26	26.1%
1910.0	Uncontrolled	1.00	100	0.282	FAF5266A	2.60	0	20	0.26	26.1%
Wi-Fi (2.401-2.472GHz)										
2.4010	Uncontrolled	1.00	100	0.0224	FTN7651A	1.46	0	20	0.02	1.6%
2.4365	Uncontrolled	1.00	100	0.0224	FTN7651A	1.46	0	20	0.02	1.6%
2.4720	Uncontrolled	1.00	100	0.0224	FTN7651A	1.46	0	20	0.02	1.6%

Table 4

Simultaneous TX Summary

LTE B13 (777-787MHz)	EVDO BC0 (824-849MHz)	Wi-Fi (2.401-2.472GHz)	Simultaneous (Combined %)
37.4%	**47.6%**	**1.6%**	**86.6%**

*The combined % result for simultaneous transmission must be less than 100%.

As noted in section 5.0 simultaneous transmission is possible but limited to only one LTE (777-787MHz or 788-798MHz) and one EVDO (824-849MHz & 1850-1910MHz) and WiFi (2.401-2.472GHz).

8.0 Conclusion

The MPE results per the assessment in section 7.0 are compliant to the FCC General population/Uncontrolled RF exposure limits per 47 CFR §1.1310 titled “Radio frequency radiation exposure limits”.