MOTOROLA SOLUTIONS

ACCREDITED
TESTING CERT # 2518.01

DECLARATION OF COMPLIANCE: MPE ASSESSMENT

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Date of Report: June 3rd, 2015
Report Revision: B

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Assessment Date(s):	02/19/2015
Manufacturer/Location:	Motorola Mexico – Renosa
Sector/Group/Div.:	Motorola Solutions – Israel
Date submitted:	02/12/2015
DUT Description:	VSM Data Modem – For Public Safety Vehicular Application Includes WiFi b/g/n, LTE, 3G, GPRS, EVDO, and EDGE.
TX mode(s):	LTE, 3G, GPRS, EVDO, WiFi b/g/n, and EDGE
Max. Power output:	Baseline: WiFi b/g/n 50mW; Module LM63S1 (FCC ID: 2AAGMLM63S1) 250mW; Module MC7354 (FCC ID: N7NMC7355) 1.959W For full description of max powers for each transmission mode refer to Table 4
TX Frequency Bands:	Baseline: WiFi b/g/n 2401-2473 MHz; Module LM63S1 (FCC ID: 2AAGMLM63S1) LTE BC1, LTE BC4, LTE BC14 Module MC7354 (FCC ID: N7NMC7355) LTE BC17, LTE BC13, LTE BC2, EVDO BC10, GPRS 850, LTE BC5, LTE BC25, 3G BC2, 3G BC5, EVDO BC0, EDGE 850, LTE BC4, 3G BC4, EVDO BC, EDGE 1900, GPRS 1900 For full description of specific transmit frequencies, refer to Table 4
Signaling type:	LTE, WiFi (OFDM with BPSK, DBPSK QPSK, DQPSK, CCK, 16QAM, and 64QAM), EVDO (QPSK, 8-PSK and 16-QAM), 3G (QPSK and 16 QAM), EDGE (QPSK, 8-PSK and 16-QAM) and GPRS (QPSK and 16 QAM)
Model(s) Certified:	F0025A (FLN2057A)
Classification:	Occupational/Controlled Environment
FCC ID:	AZ492FT7058 – Includes FCC ID:2AAGMLM63S1 and N7NMC7355 Results outside FCC bands are not applicable for FCC compliance demonstration.

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 4.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions Inc. 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 Zakharia

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Approval Date: 6/03/2015

Document Revision History

Date	Revision	Comments
03/16/2015	O	Initial release
03/19/2015	A	Correct reference to MC7355 module to MC7354 module in data
06/03/2015	B	Add 3G BC5 to Table 4 / Correct freq range for EVDO BC1

Table of Contents

1.0 Introduction

This report contains calculated Maximum Permissible Exposure (MPE) results for product VML750 model F0025A (FLN2057A). This product contains modules FCC ID: N7NMC7355 and FCC ID: 2AAGMLM63S1.

2.0 FCC MPE Summary

Table 1

Equipment Class	Frequency band (MHz)	Max. Power Density (with respect to MPE limits)* (mW/cm^2)	% of FCC MPE Limit
PCB	704-716, 777-787, 788-798, 816-832, 824-829, 824-849, 1710-1755,1810-1915, 1810-1910, 1850-1910, 1850-1915	.435	79.2%
DTS	2401 – 2473	0.099	9.9%
Simultaneous Results		.534	89.1%

* Although there may be higher power density levels reported in the data tables, these are the highest with respect to the applicable FCC limit at the test frequency and are therefore reported here..

3.0 Abbreviations / Definitions

BPSK: Binary Phase-Shift Keying
CCK: Complementary Code Keying
CDMA: Code Division Multiple Access
DBPSK: Differential Binary Phase-Shift Keying
DQPSK: Differential Quadrature Phase-Shift Keying
DTS: Digital Transmission System
DUT: Device Under Test
EDGE: Enhanced GPRS
EME: Electromagnetic Energy
EVDO: Evolution-Data Optimized
GPRS: General Packet Radio Service
LTE: Long Term Evolution
MPE: Maximum Permissible Exposure
OFDM: Orthogonal Frequency-Division Multiplexing
QAM: Quadrature Amplitude Modulation
QPSK: Quadrature Phase-Shift Keying
PCB: PCS Licensed Transmitter
WLAN: Wireless Local Area Network
WiFi: Wireless Fidelity

4.0 Referenced Standards and Guidelines

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

- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C.: 1997.
- 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.
- FCC KDB– 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03 (02/07/2014)
  D02 RF Exposure Reporting v01r01 (05/28/2013)
- FCC KDB – 447498 D01 General RF Exposure Guidance v05r02 (02/07/2014)

5.0 Power Density Limits

Table 2 – Occupational / Controlled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65	IEEE C95.1 1992/1999	IEEE C95.1 2005
	mW/cm^2	mW/cm^2	W/m^2
10 - 20			
20 – 48			
30 – 300	1.0		
48 – 100			
10 – 400			
100 – 300		1.0	10.0
100 – 6,000			
300 – 1,500	f/300		
300 - 3,000		f/300	f/30
400 – 2,000			
1,500 – 15,000			
1,500 – 100,000	5.0		
2,000 – 300,000			
3,000 – 300,000		10.0	100.0
6,000 – 15,000			
15000 – 150,000			
150000 –300,000			

Table 3 – General Population / Uncontrolled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65	IEEE C95.1 1992/1999	IEEE C95.1 2005
	mW/cm^2	mW/cm^2	W/m^2
10 - 20			
20 – 48			
30 – 300	0.2		
48 – 300			
10 – 400			
100 – 300		0.2	
100 – 400			2.0
300 – 1,500	f/1,500		
300 – 6000			
400 – 2,000			f/200
300 – 15,000		f/1,500	
1,500 – 15,000			
1,500 – 100,000	1.0		
2,000 – 100,000			10.0
2,000 – 300,000			
6,000 – 15,000			
15,000 – 150,000			
150,000 - 300,000			

6.0 Product and System Description

VML750 Model F0025A (FLN2057A) is a data modem for vehicular applications. The modem supports LTE Bands 2 / 4 / 5 / 13 / 14 / 17 and 25 (1850 – 1910 / 1710 – 1755 / 824 – 849 / 777-787 / 788-798 / 704 – 716 / 1850 – 1910 MHz), 3G Bands 2,4, and 5 (1850 – 1910 / 1710 – 1755 / 824 – 849 MHz), EVDO Bands 0, 1, and 10 (824 – 849 / 1850 – 1910 / and 816-832 MHz), GPRS bands 850 and 1900 (824-849 MHz and 1850 – 1910 MHz), EDGE bands 850 and 1900 (824 – 849 MHz and 1850 – 1910 MHz) and WiFi (2401-2473MHz). The maximum duty cycles are 100% for LTE / 3G / EVDO and WiFi. Simultaneous transmission is possible between WiFi and one of the other TX bands at any given time.

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 5 section 7.0 MPE Assessment.

Table 4 below summarizes the technologies, bands, maximum duty cycles and maximum output powers. Maximum output powers are defined as upper limit of the production line final test station.

Table 4

Radio Type	Band (MHz)	Transmission Type	Duty Cycle (%)	Max Power
Baseline Product				
WLAN	2401-2473	OFDM with BPSK, DBPSK QPSK, DQPSK, CCK, 16QAM, and 64QAM.	100	50 mW
Module LM63S1 (FCC ID: 2AAGMLM63S1)				
LTE BC13	777-787.0	QPSK and 16 QAM	100	250 mW
LTE BC4	1710-1755	QPSK and 16 QAM	100	250 mW
LTE BC14	788-798	QPSK and 16 QAM	100	250 mW
Module MC7354 (FCC ID: N7NMC7355)				
LTE BC17	704-716	QPSK and 16 QAM	100	220 mW
LTE BC13	777-787.0	QPSK and 16 QAM	100	229 mW
LTE BC2	1850-1910	QPSK and 16 QAM	100	224 mW
EVDO BC10	816 - 824	QPSK, 8-PSK and 16-QAM	100	275 mW
GPRS 850	824-849	GMSK and 8PSK	25	1.959 W
LTE BC5	824-849	QPSK and 16 QAM	100	228 mW
3G BC5	824-849	QPSK and 16 QAM	100	217 mW
LTE BC25	1850-1915	QPSK and 16 QAM	100	221 mW
3G BC2	1850-1910	QPSK and 16 QAM	100	205 mW
EVDO BC0	824-849	QPSK, 8-PSK and 16-QAM	100	275 mW
EDGE 850	824-849	QPSK and 16 QAM	37.5	428 mW
LTE BC4	1710-1755	QPSK and 16 QAM	100	226 mW
3G BC4	1710-1755	QPSK and 16 QAM	100	222 mW
EVDO BC1	1850-1910	QPSK, 8-PSK and 16-QAM	100	275 mW
EDGE 1900	1850-1910	QPSK, 8-PSK and 16-QAM	37.5	392 mW
GPRS 1900	1850-1910	QPSK and 16 QAM	25	1.159 W

7.0 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

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

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 = 1.0

8.0 MPE Assessment

Table 5

MPE Calculation Results

Antenna #	Tx Frequency (MHz)	MPE Spec Limit (mW/cm^2) FCC	Duty Cycle (%)	Max Power (W)	Antenna Gain (dBi)	Cable Loss, L (dB)	Dist., d (cm)	Max Calc. MPE (mW/cm^2)	% Result of FCC Spec Limit
Baseline									
WLAN									
AN000036A01	2401.0	1.00	100%	0.050	10.00	0.00	20	0.099	9.9
AN000036A01	2437.0	1.00	100%	0.050	10.00	0.00	20	0.099	9.9
AN000036A01	2473.0	1.00	100%	0.050	10.00	0.00	20	0.099	9.9
Module LM6351									
LTE BC13									
FIN7686A	777.0	0.52	100%	0.250	5.00	0.00	20	0.157	30.4
FIN7686A	782.0	0.52	100%	0.250	5.00	0.00	20	0.157	30.2
FIN7686A	787.0	0.52	100%	0.250	5.00	0.00	20	0.157	30.0
LTE BC4									
FIN0073A	1710.0	1.00	100%	0.250	6.0	0.00	20	0.198	19.8
FIN0073A	1732.5	1.00	100%	0.250	6.0	0.00	20	0.198	19.8
FIN0073A	1755.0	1.00	100%	0.250	6.0	0.00	20	0.198	19.8
LTE BC14									
FIN7686A	788.0	0.53	100%	0.250	5.00	0.00	20	0.157	29.9
FIN7686A	793.0	0.53	100%	0.250	5.00	0.00	20	0.157	29.8
FIN7686A	798.0	0.53	100%	0.250	5.00	0.00	20	0.157	29.6
Module MC7354									
LTE BC17									
FIN0073A	704.0	0.47	100%	0.220	9.0	0.00	20	0.348	74.1
FIN0073A	710.0	0.47	100%	0.220	9.0	0.00	20	0.348	73.4
FIN0073A	716.0	0.48	100%	0.220	9.0	0.00	20	0.348	72.8
LTE BC13									
FIN7686A	777.0	0.52	100%	0.229	5.00	0.00	20	0.144	27.8
FIN7686A	782.0	0.52	100%	0.229	5.00	0.00	20	0.144	27.6
FIN7686A	787.0	0.52	100%	0.229	5.00	0.00	20	0.144	27.5
LTE BC2									
FIN0073A	1850.0	1.00	100%	0.224	3.0	0.00	20	0.089	8.9
FIN0073A	1880.0	1.00	100%	0.224	3.0	0.00	20	0.089	8.9
FIN0073A	1910.0	1.00	100%	0.224	3.0	0.00	20	0.089	8.9
EVDO BC10									
FIN0073A	816.0	0.54	100%	0.275	6.5	0.00	20	0.244	44.9
FIN0073A	824.0	0.55	100%	0.275	6.5	0.00	20	0.244	44.5
FIN0073A	832.0	0.55	100%	0.275	6.5	0.00	20	0.244	44.1
GPRS 850									
FIN0073A	824.0	0.55	25%	1.959	6.5	0.00	20	0.435	79.2
FIN0073A	836.5	0.56	25%	1.959	6.5	0.00	20	0.435	78.0
FIN0073A	849.0	0.57	25%	1.959	6.5	0.00	20	0.435	76.9

Table 5 (Cont.)

Antenna #	Tx Frequency (MHz)	MPE Spec Limit (mW/cm^2) FCC	Duty Cycle (%)	Max Power (W)	Antenna Gain (dBi)	Cable Loss, L (dB)	Dist., d (cm)	Max Calc. MPE (mW/cm^2)	% Result of FCC Spec Limit
LTE BC5									
FTN0073A	824.0	0.55	100%	0.228	6.5	0.00	20	0.203	36.9
FTN0073A	836.5	0.56	100%	0.228	6.5	0.00	20	0.203	36.3
FTN0073A	849.0	0.57	100%	0.228	6.5	0.00	20	0.203	35.8
LTE BC25									
FTN0073A	1810.0	1.00	100%	0.221	3.0	0.00	20	0.088	8.8
FTN0073A	1862.5	1.00	100%	0.221	3.0	0.00	20	0.088	8.8
FTN0073A	1915.0	1.00	100%	0.221	3.0	0.00	20	0.088	8.8
3G BC2									
FTN0073A	1850.0	1.00	100%	0.205	3.0	0.00	20	0.081	8.1
FTN0073A	1880.0	1.00	100%	0.205	3.0	0.00	20	0.081	8.1
FTN0073A	1910.0	1.00	100%	0.205	3.0	0.00	20	0.081	8.1
3G BC5									
FTN0073A	824.0	0.55	100%	0.217	6.5	0.00	20	0.193	35.1
FTN0073A	826.5	0.55	100%	0.217	6.5	0.00	20	0.193	35.0
FTN0073A	829.0	0.55	100%	0.217	6.5	0.00	20	0.193	34.9
EVDO BC0									
FTN0073A	824.0	0.55	100%	0.275	6.5	0.00	20	0.244	44.5
FTN0073A	836.5	0.56	100%	0.275	6.5	0.00	20	0.244	43.8
FTN0073A	849.0	0.57	100%	0.275	6.5	0.00	20	0.244	43.2
EDGE 850									
FTN0073A	824.0	0.55	38%	0.428	6.5	0.00	20	0.143	26.0
FTN0073A	836.5	0.56	38%	0.428	6.5	0.00	20	0.143	25.6
FTN0073A	849.0	0.57	38%	0.428	6.5	0.00	20	0.143	25.2
LTE BC4									
FTN0073A	1710.0	1.00	100%	0.226	6.0	0.00	20	0.179	17.9
FTN0073A	1732.5	1.00	100%	0.226	6.0	0.00	20	0.179	17.9
FTN0073A	1755.0	1.00	100%	0.226	6.0	0.00	20	0.179	17.9
3G BC4									
FTN0073A	1710.0	1.00	100%	0.222	6.0	0.00	20	0.176	17.6
FTN0073A	1732.5	1.00	100%	0.222	6.0	0.00	20	0.176	17.6
FTN0073A	1755.0	1.00	100%	0.222	6.0	0.00	20	0.176	17.6
EVDO BC1									
FTN0073A	1850.0	1.00	100%	0.275	3.0	0.00	20	0.109	10.9
FTN0073A	1880.0	1.00	100%	0.275	3.0	0.00	20	0.109	10.9
FTN0073A	1910.0	1.00	100%	0.275	3.0	0.00	20	0.109	10.9
EDGE 1900									
FTN0073A	1850.0	1.00	100%	0.392	3.0	0.00	20	0.156	15.6
FTN0073A	1880.0	1.00	100%	0.392	3.0	0.00	20	0.156	15.6
FTN0073A	1910.0	1.00	100%	0.392	3.0	0.00	20	0.156	15.6
GPRS 1900									
FTN0073A	1850.0	1.00	25%	1.159	3.0	0.00	20	0.115	11.5
FTN0073A	1880.0	1.00	25%	1.159	3.0	0.00	20	0.115	11.5
FTN0073A	1910.0	1.00	25%	1.159	3.0	0.00	20	0.115	11.5

The following Table summarizes the highest MPE calculations for each transmit band as well as the direct summation results to evaluate simultaneous transmission condition.

Table 6
Simultaneous Transmit Condition MPE Evaluation

Frequency Band/Mode/ Option	Highest Max Calc. MPE	% of Lowest Spec Limit	Combined % results of lowest spec limit for Simultaneous Tx			
			Module LM6351 LTE BC13+WLAN	Module LM6351 LTE BC4+WLAN	Module LM6351 LTE BC14+WLAN	Module MC7355 LTE BC17+WLAN
Baseline						
WLAN	0.099	9.9				
Module LM6351						
LTE BC13	0.157	30.4	40.3			
LTE BC4	0.198	19.8		29.7		
LTE BC14	0.157	29.9			39.8	
Module MC7354						
LTE BC17	0.348	74.1				84.0

Table 6 (Cont.)
Simultaneous Transmit Condition MPE Evaluation

Frequency Band/Mode/ Option	Highest Max Calc. MPE	% of Lowest Spec Limit	Combined % results of lowest spec limit for Simultaneous Tx				
			Module MC7355 LTE BC13+WLAN	Module MC7355 LTE BC2+WLAN	Module MC7355 EVDO BC10+WLAN	Module MC7355 GPRS 850+WLAN	Module MC7355 LTE BC5+WLAN
Module MC7354							
LTE BC13	0.144	27.8	37.7				
LTE BC2	0.089	8.9		18.8			
EVDO BC10	0.244	44.9			54.8		
GPRS 850	0.435	79.2				89.1	
LTE BC5	0.203	36.9					46.8

Table 6 (Cont.)
Simultaneous Transmit Condition MPE Evaluation

Frequency Band/Mode/ Option	Highest Max Calc. MPE	% of Lowest Spec Limit	Combined % results of lowest spec limit for Simultaneous Tx				
			Module MC7355 LTE BC25+WLAN	Module MC7355 3G BC2+WLAN	Module MC7355 3G BC5+WLAN	Module MC7355 EVDO BC0+WLAN	Module MC7355 EDGE 850+WLAN
Module MC7354							
LTE BC25	0.088	8.8	18.70				
3G BC2	0.081	8.1		18.0			
3G BC5	0.193	35.1			45.0		
EVDO BC0	0.244	44.5				54.4	
EDGE 850	0.143	26.0					35.9

Table 6 (Cont.)
Simultaneous Transmit Condition MPE Evaluation

Frequency Band/Mode/ Option	Highest Max Calc. MPE	% of Lowest Spec Limit	Combined % results of lowest spec limit for Simultaneous Tx				
			Module MC7355 LTE BC4+WLAN	Module MC7355 3G BC4+WLAN	Module MC7355 EVDO BC1+WLAN	Module MC7355 EDGE 1900+WLAN	Module MC7355 GPRS 1900 +WLAN
Module MC7354							
LTE BC4	0.179	17.9	27.8				
3G BC4	0.176	17.6		27.5			
EVDO BC1	0.109	10.9			20.8		
EDGE 1900	0.156	15.6				25.5	
GPRS 1900	0.115	11.5					21.4

9.0 Conclusion

The MPE results per the assessment in Table 5 and Table 6 are compliant to the FCC General Population/Uncontrolled RF exposure limits in OET Bulletin 65.

Table 7: Maximum MPE RF Exposure Summary

Designator	Frequency (MHz)	Max. Power Density (with respect to MPE limits)* (mW/cm^2)	% of FCC Limit
Overall	824.0 MHz	.435	79.2%
WLAN	2401.0 MHz	0.099	9.9%
Simultaneous TX	NA	.534	89.1%

Results are based on highest percentage of limit.