

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 5 of 5

Motorola Solutions, Inc.
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Report Revision: D
Report ID: SR10523 LEX 700
 Rev D 110112

Responsible Engineer: Stephen Whalen (Principal Staff Engineer)
Report Author: Stephen Whalen (Principal Staff Engineer)
Date/s Tested: 5/09/2012 – 6/13/2012; 7/25 & 26/2012
Manufacturer/Location: Motorola Solutions, Inc./One Motorola Plaza, Holtsville NY 11742-1300, USA
Sector/Group/Div.: MSI
Date submitted for test: 04/05/2012
DUT Description: The LEX 700 Mission Critical Handheld includes the following connectivity options to the field: " Band 14 Public Safety LTE " Band 13 Verizon Wireless LTE " CDMA2000: CDMA 1x, CDMA 1x EVDO (Rev0, RevA) " 802.11 a/b/g/n Wi-Fi " Mission Critical Wireless and Bluetooth Personal Area Network" Mobile VPN with prioritization.
Test TX mode(s): WLAN 802.11a/b/g/n, CDMA/EVDO and LTE
Max. Power output: Refer to Section 6 of Part 1 of Report
Nominal Power: Refer to Section 6 of Part 1 of Report
Tx Frequency Bands: LTE B13: 777-787MHz; LTE B14: 788-798MHz; CDMA (BC0): 824-849MHz, CDMA (BC1): 1850-1910MHz;EVDO (BC0): 824-849MHz, EVDO (BC1): 1850-1910MHz; BT:2402-2480MHz; WLAN802.11 b/g/n:2412-2462MHz, ;WLAN802.11a/n: 5.15-5.25 GHz; 5.25-5.35 GHz; 5.47-5.725 GHz and 5.725-5.85 GHz
Signaling type: LTE-FDD (QPSK & 16 QAM); CDMA2000: CDMA 1x, CDMA 1x EVDO (Rev0, RevA) GMSK modulation; Bluetooth FHSS; WLAN (802.11 a/b/g/n), OFDM & DSSS
Model(s) Tested: LEX 700
Model(s) Certified: LEX 700
Serial Number(s): 12053522500135; 12053522500224; 12053522500102; 12053522500227
Classification: General Population/Uncontrolled Environment
FCC ID: UZ7LEX700; Rule parts 15, 90, 22, 27 & 24
IC: 109AN-LEX700

* Refer to section 15 of part 1 for highest SAR summary results.

The test results clearly demonstrate compliance with FCC General Population/Uncontrolled RF Exposure limits of 1.6 W/kg averaged over 1 gram per the requirements of 47 CFR 2.1093(d). The 10 grams result is not applicable to FCC filing.
 The test results clearly demonstrate compliance with ICNIRP (1998) Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), Health Physics 74, 494-522 RF Exposure limits of 2.0 W/kg averaged over 10grams of contiguous tissue.

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 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-150 December 2004. The results and statements contained in this report pertain only to the device(s) evaluated.

Deanna Zakharia
 EMS EME Lab Senior Resource Manager,
 Laboratory Director
 Approval Date: 11/01/2012

Certification Date: 8/01/2012

Certification No.: L1120801P

Appendix I

Evaluation of simultaneous transmission SAR

The following section provides the information required to demonstrate compliance when multiple transmitters operate simultaneously.

I.1 Justification for not requiring Bluetooth stand-alone SAR

The Bluetooth 2.4 GHz transmitter operates at 1.6 mW maximum conducted power, which is below the 12 mW applicable threshold (P_{ref}).¹ Therefore, under certain circumstances¹ stand-alone SAR measurements may not be required. To determine the need for Bluetooth stand-alone SAR testing, the closest distance between the Bluetooth antenna and all other transmit antennas is examined.

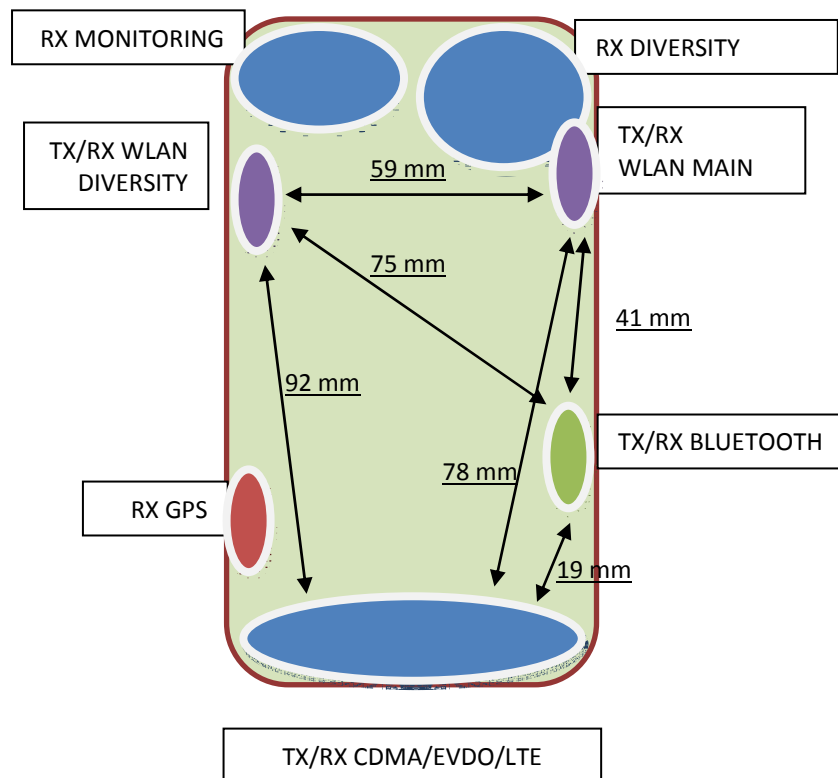


Fig. I.1 Sketch of the antenna architecture looking into the back of the device

Fig. I.1 shows the high-level product antenna architecture where the approximate location of each antenna is represented by the ovals (not to scale). The distances in this figure are not to scale. A detailed description of the antenna architecture, illustrating to-scale antennas and relative distances, is provided in Exhibit 7B, Section 7.0.

The Bluetooth antenna is more than 25 mm away from all other transmit antennas with the exception of the transmit CDMA/EVDO/LTE antenna. The closest distance between the Bluetooth and the transmit CDMA/EVDO/LTE antennas is marked as about 19 mm in Fig. I.1, closer than the 25 mm threshold,¹ therefore Bluetooth stand-alone SAR testing may still be required.

¹ KDB 648474 D01 v01r05

However, the maximum 1-g SAR due to the transmit CDMA/EVDO/LTE antenna, scaled for draft and max power, is 1.099 mW/g (Run # CM-Lear-120522-15), which is lower than the 1.2 mW/g threshold,¹ therefore stand-alone SAR evaluation is not required for this unlicensed transmitter.

Consequently, its SAR is considered zero¹ in applying the SAR to peak location separation ratio procedure to determine simultaneous transmission SAR evaluation requirements for the other simultaneously transmitting modes as defined in Table I.1, which describes the transmitters that can be operating simultaneously:

Table I.1 Possible simultaneous transmitters

	LTE 700 MHz Band 13	LTE 700 MHz Band 14	CDMA/EVDO 800 MHz	CDMA/EVDO 1900 MHz	WLAN 2.4 GHz	WLAN 5 GHz	Bluetooth 2.4 GHz
LTE 700 MHz Band 13		NO	NO	NO	YES	YES	YES
LTE 700 MHz Band 14	NO		NO	NO	YES	YES	YES
CDMA/EVDO 800 MHz	NO	NO		NO	YES	YES	YES
CDMA/EVDO 1900 MHz	NO	NO	NO		YES	YES	YES
WLAN 2.4 GHz	YES	YES	YES	YES		NO	YES
WLAN 5 GHz	YES	YES	YES	YES	NO		YES
Bluetooth 2.4 GHz	YES	YES	YES	YES	YES	YES	

Note the following technologies and associated SAR testing configurations;

LTE – Head and Body

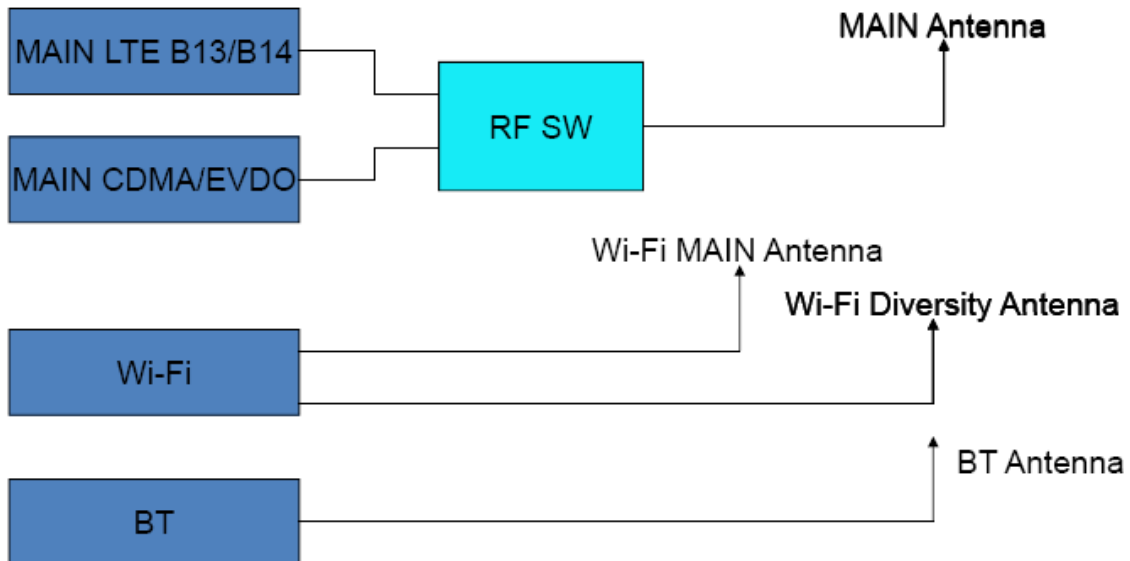
CDMA – Head and Body

WLAN (2.4GHz & 5GHz) – Head and Body

Bluetooth – Head and Body

LEX700

Simplified DUT Transmit Path Block Diagram



I.2 Evaluation of the SAR to peak location separation ratios (*SPLSRs*)

Considering the possible simultaneous transmission combinations in Table I.1 and the mentioned Bluetooth 2.4 GHz exclusion, the SAR to peak location separation ratio (*SPLSR*) procedure was applied to all the possible simultaneous transmission combinations for which the sum of the 1-g peak SARs (after scaling for drift and max power) was found to be 1.6 mW/g or higher. A total of 14 such combinations were found.

The corresponding peak SAR separation distances (L) were determined using the “Find distance of maxima” utility (called “distance tool” in the following) available in the DASY5 user interface. Such a utility is designed to provide both the peak SAR separation distance and the *SPLSR*. For what concerns the distance, calculations are carried out following the method outlined in Application Note SPEAG TN_110209_DASY_calculate_Hotspot_distance.

However, the current version of the distance tool does not allow including the drift and max power scaling factors, thus underestimating the *SPLSR*. Consequently, the distance tool was employed only to determine L , whereas the computation of the *SPLSR* was carried out in Microsoft Excel, using the following equation:

$$SPLSR_{ij} = \frac{SAR_{1g}^{(i)} + SAR_{1g}^{(j)}}{L_{ij}},$$

where L_{ij} is the peak SAR separation distances between the peak SARs due to transmitters i and j , as provided by the DASY5 distance tool, and $SAR_{1g}^{(i)}$, $SAR_{1g}^{(j)}$ are the respective peak 1-g SAR values, scaled for drift and max power.

All the applicable *SPLSRs* results are reported in Table I.2. The captured DASY 5 user-interface screen shots documenting the peak SAR separation distances used in the computation of the *SPLSRs* are reported in the table, right after the line of each applicable configuration. As mentioned above, the peak SAR values employed by this tool are not scaled for drift and max power, therefore the displayed *SPLSR* in the screen shots is lower than that computed in Excel.

The *SPLSRs* underlined in the following Table I.2 are below the applicable threshold (0.3)¹, therefore SAR evaluation for simultaneous transmission is not required.

For the combination that provided the highest *SPLSR* (Combination #9) the SAR area scans of each transmitter have been provided.

Table I.2 Applicable SAR to peak location separation ratios

Combination #	First transmitter					Second transmitter					Peak SAR separation distance [cm]	SAR to peak location separation ratio [W/kg/cm]
	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]		
1	JsT-Lear-120510-04	WLAN	0.03042	802.11a 5.18-5.32GHz (6Mbps) diversity	0.607	HvH-Lear-120521-09	CDMA	0.186	1850-1910MHz	1.088	9.16	0.185
2	JsT-Lear-120512-03	WLAN	0.02945	802.11a 5.5-5.7GHz (6Mbps) diversity	0.516	HvH-Lear-120521-09	CDMA	0.186	1850-1910MHz	1.088	9.05	0.177
3	CM-Lear-120513-09	WLAN	0.02945	802.11a 5.5-5.7GHz (6Mbps) diversity	0.512	HvH-Lear-120521-09	CDMA	0.186	1850-1910MHz	1.088	9.00	0.178

Table I.2 Applicable SAR to peak location separation ratios

Combination #	First transmitter					Second transmitter					Peak SAR separation distance [cm]	SAR to peak location separation ratio [W/kg/cm]
	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]		
4	JsT-Lear-120521-02	WLAN	0.03321	802.11n 5.745-5.825GHz (MCS0) diversity	0.545	HVH-Lear-120521-09	CDMA	0.186	1850-1910MHz	1.088	9.01	0.181
5	JsT-Lear-120510-04	WLAN	0.03042	802.11a 5.18-5.32GHz (6Mbps) diversity	0.607	HVH-Lear-120521-10	CDMA	0.186	1850-1910MHz	1.050	8.95	0.185
6	JsT-Lear-120510-04	WLAN	0.03042	802.11a 5.18-5.32GHz (6Mbps) diversity	0.607	CM-Lear-120522-13	EVDO	0.186	1850-1910MHz	1.092	9.82	0.173

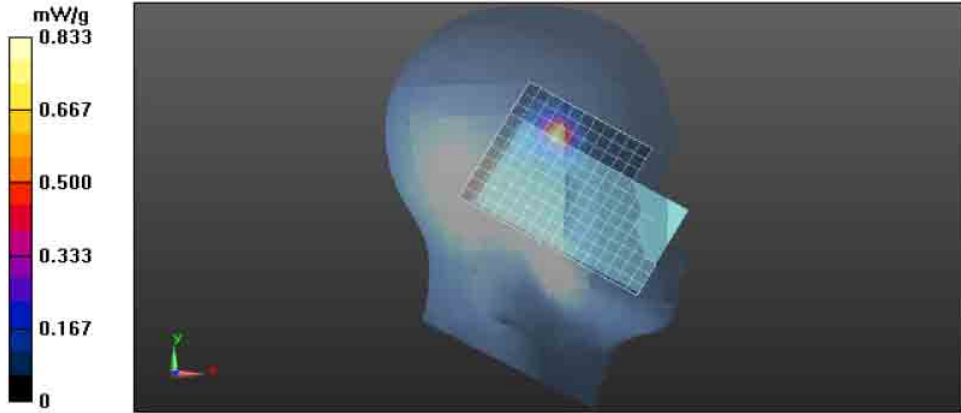
Table I.2 Applicable SAR to peak location separation ratios

Combination #	First transmitter					Second transmitter					Peak SAR separation distance [cm]	SAR to peak location separation ratio [W/kg/cm]
	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]		
7	JsT-Lear-120512-03	WLAN	0.02945	802.11a 5.5-5.7GHz (6Mbps) diversity	0.516	CM-Lear-120522-13	EVDO	0.186	1850-1910MHz	1.092	9.71	0.166
8	CM-Lear-120513-09	WLAN	0.02945	802.11a 5.5-5.7GHz (6Mbps) diversity	0.512	CM-Lear-120522-13	EVDO	0.186	1850-1910MHz	1.092	9.66	0.166
9	JsT-Lear-120510-04	WLAN	0.03042	802.11a 5.18-5.32GHz (6Mbps) diversity	0.607	CM-Lear-120522-11	EVDO	0.186	1850-1910MHz	1.044	8.43	0.196

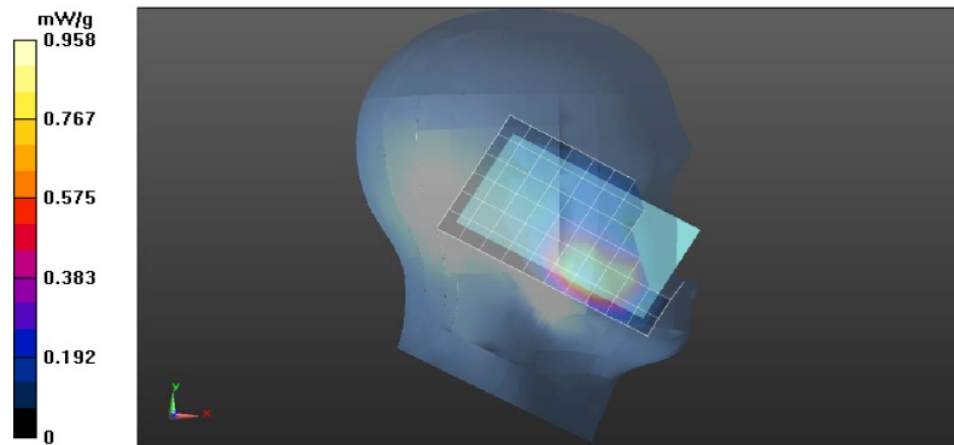
JsT-Lear-120510-04

Table I.2 Applicable SAR to peak location separation ratios

Combination #	First transmitter					Second transmitter					Peak SAR separation distance [cm]	SAR to peak location separation ratio [W/kg/cm]
	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]		



CM-Lear-120522-11



10	JsT-Lear-120521-02	WLAN	0.03321	802.11n 5.745-5.825GHz (MCS0) diversity	0.545	CM-Lear-120522-13	EVDO	0.186	1850-1910MHz	1.092	9.67	0.169
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Find distance of maxima

- Maxima | associated 1g averages
 - 2-Zoom Scan 2 (\\145.2.140.26\d\$\Data\Products Tested 2012\MSI\LEX...
 - Max. 1 at (4.79, 33.42, -17.47) 0.37 W/kg
 - 3-Zoom Scan (D:\Data\Products Tested 2012\MSI\LEX\SR 10523\120522...
 - Max. 2 at (7.61, 24.19, -17.07) 0.92 W/kg
- Distances and Separation Ratios
 - Max. 1 - Max. 2 Distance [cm]: 9.67 / Separation ratio [W/kg/cm]: 0.169

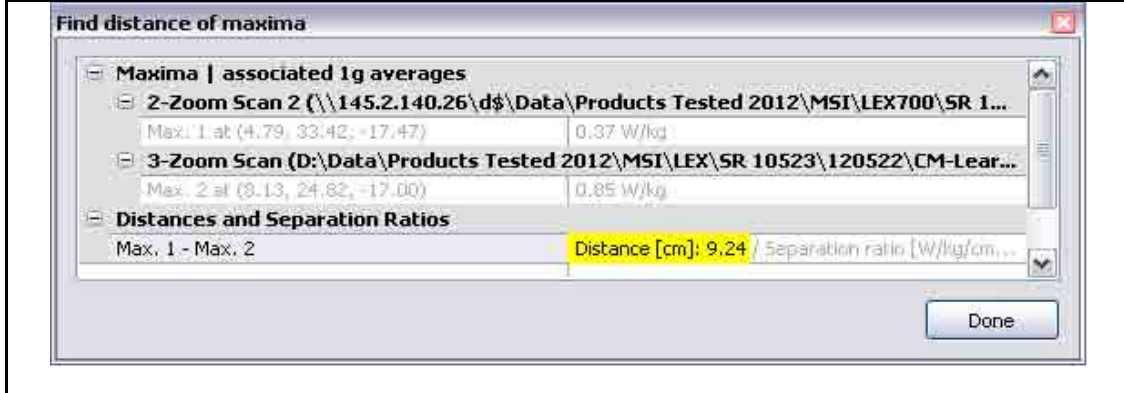
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Table I.2 Applicable SAR to peak location separation ratios

Combination #	First transmitter					Second transmitter					Peak SAR separation distance [cm]	SAR to peak location separation ratio [W/kg/cm]
	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]		
11	JsT-Lear-120510-04	WLAN	0.03042	802.11a 5.18-5.32GHz (6Mbps) diversity	0.607	CM-Lear-120522-15	EVDO	0.186	1850-1910MHz	1.099	9.40	<u>0.181</u>
12	JsT-Lear-120512-03	WLAN	0.02945	802.11a 5.5-5.7GHz (6Mbps) diversity	0.516	CM-Lear-120522-15	EVDO	0.186	1850-1910MHz	1.099	9.30	<u>0.174</u>
13	CM-Lear-120513-09	WLAN	0.02945	802.11a 5.5-5.7GHz (6Mbps) diversity	0.512	CM-Lear-120522-15	EVDO	0.186	1850-1910MHz	1.099	9.24	<u>0.174</u>

Table I.2 Applicable SAR to peak location separation ratios

Combination #	First transmitter					Second transmitter					Peak SAR separation distance [cm]	SAR to peak location separation ratio [W/kg/cm]
	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]	Run#	Mode	Max PWR [W]	Band	Max Calc. SAR [mW/g]		
14	JsT-Lear-120521-02	WLAN	0.03321	802.11n 5.745-5.825GHz (MCS0) diversity	0.545	CM-Lear-120522-15	EVDO	0.186	1850-1910MHz	1.099	9.24	0.178



Appendix J
DUT Test Position Photos

Photos available in Exhibit 7B – Temporary Confidentiality Requested

Appendix K
DUT, Body worn and Audio Accessories Photos

Photos available in Exhibit 7B – Temporary Confidentiality Requested