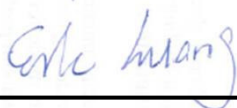


# FCC SAR Test Report

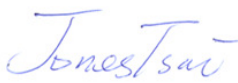
**APPLICANT** : LG Electronics Mobile Comm USA  
**EQUIPMENT** : Smart phone  
**BRAND NAME** : LG  
**MODEL NAME** : LG-X240ds  
**FCC ID** : ZNFX240DS  
**STANDARD** : FCC 47 CFR Part 2 (2.1093)  
ANSI/IEEE C95.1-1992  
IEEE 1528-2013

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Manager



Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL INC.**

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)



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Appendix B. SAR Spot Check Data

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### Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA6D1019	Rev. 01	Initial issue of report	Mar. 23, 2017
FA6D1019	Rev. 02	Revised typo on page 7	Mar. 29, 2017



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for LG Electronics Mobile Comm USA, Smart phone, LG-X240ds, are as follows.

Table with 5 columns: Equipment Class, Frequency Band, Head (Separation 0mm), Body-worn (Separation 15mm), Hotspot (Separation 10mm), and Highest Simultaneous Transmission 1g SAR (W/kg). Rows include Licensed (GSM850, GSM1900, WCDMA V, LTE Band 7) and DTS (2.4GHz WLAN).

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

2. Administration Data

Table with 2 columns: Field (Test Site, Test Site Location) and Value (SPORTON INTERNATIONAL INC., No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978)

Table with 2 columns: Field (Company Name, Address) and Value (LG Electronics Mobile Comm USA, LG Twin Towers 20, Yeouido-Dong Youngdeungpo-Gu, Seoul 150-721, Republic Of Korea)

Table with 2 columns: Field (Company Name, Address) and Value (Arima Communications Corp., 6F,No.866,Jhongjheng Rd., Jhonghe Dist., New Taipei City 23586, Taiwan)



3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2013
FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
FCC KDB 865664 D02 SAR Reporting v01r02
FCC KDB 447498 D01 General RF Exposure Guidance v06
FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
FCC KDB 941225 D01 3G SAR Procedures v03r01
FCC KDB 941225 D05 SAR for LTE Devices v02r05
FCC KDB 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Table with columns for Product Feature & Specification and rows for Equipment Name, Brand Name, Model Name, FCC ID, Wireless Technology and Frequency Range, Mode, HW Version, SW Version, GSM / (E)GPRS Transfer mode, EUT Stage, and Remark.



4.2 Spot Check Evaluation

1. Introduction Section

For WWAN :

This report referenced from the FCC ID: ZNFX240YK (GSM 850 / 1900, WCDMA Band 5 and LTE Band 7)

For WLAN/BT :

This report referenced from the FCC ID: ZNFX240H (DTS and DSS)

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID (FCC ID: ZNFX240DS).

2. Difference Section

For WWAN:

(FCC ID: ZNFX240DS, model: LG-X240ds) is a variant model of (FCC ID: ZNFX240YK, model: LG-X240YK) with removed LTE Band 5, and all the divergent bands have been properly tested to ensure compliance. The detailed comparison of (FCC ID: ZNFX240DS, model: LG-X240ds) and (FCC ID: ZNFX240YK, model: LG-X240YK) is included in the OpDes\_Data Reuse.

For WLAN/BT:

The original model (FCC ID: ZNFX240H) and the variant model (FCC ID: ZNFX240DS) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi. The details comparison can be found in the Produce Equality Declaration.

The product specification is outlined in the following table:

Table with 4 columns: FCC ID, Wireless Tech, Mode, and Frequency (MHz). Rows include GSM, UMTS, LTE (FDD), Wi-Fi, and Bluetooth specifications for models ZNFX240H, ZNFX240YK, and ZNFX240DS.



3. Spot Check Verification Data Section

<Head SAR>

Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Original Model(FCC ID: X240YK)				Spot Check Mode(FCC ID: X240DS)				Deviation
						Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
GSM850	GPRS (4 Tx slots)	Right Cheek	0mm	251	848.8	27.93	28.00	0.603	0.613	28.00	28.00	0.541	0.541	-11.7%
GSM1900	GPRS (4 Tx slots)	Left Cheek	0mm	810	1909.8	24.92	25.00	0.138	0.141	25.00	25.00	0.136	0.136	-3.5%
WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	4233	846.6	24.98	25.00	0.459	0.461	25.00	25.00	0.407	0.407	-11.7%
LTE Band 7	20M_QPSK_1_0	Left Cheek	0mm	20850	2510	23.24	23.30	0.579	0.587	23.18	23.30	0.458	0.471	-19.8%

Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Original Model (FCC ID: ZNFX240H)					Spot Check Mode(FCC ID: X240DS)					Deviation
						Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	6	2437	16.97	17.00	100	0.970	0.977	16.97	17.00	100	0.936	0.942	-3.6%

<Hotspot SAR>

Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Original Model(FCC ID: X240YK)				Spot Check Mode(FCC ID: X240DS)				Deviation
							Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
GSM850	GPRS (4 Tx slots)	Back	10mm	OFF	251	848.8	27.93	28.00	0.819	0.832	28.00	28.00	0.742	0.742	-10.8%
GSM1900	GPRS (4 Tx slots)	Front	10mm	OFF	810	1909.8	24.92	25.00	0.315	0.321	25.00	25.00	0.264	0.264	-17.8%
WCDMA V	RMC 12.2Kbps	Back	10mm	OFF	4233	846.6	24.98	25.00	0.638	0.641	25.00	25.00	0.624	0.624	-2.7%
LTE Band 7	20M_QPSK_50_0	Back	10mm	ON	20850	2510	18.27	18.30	0.565	0.569	18.26	18.30	0.470	0.474	-16.7%

Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Original Model (FCC ID: ZNFX240H)					Spot Check Mode(FCC ID: X240DS)					Deviation
						Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
WLAN2.4GHz	802.11b 1Mbps	Front	10mm	6	2437	16.97	17.00	100	0.123	0.124	16.97	17.00	100	0.111	0.112	-9.7%

<Body-Worn SAR>

Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Original Model(FCC ID: X240YK)				Spot Check Mode(FCC ID: X240DS)				Deviation
						Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
GSM850	GPRS (4 Tx slots)	Back	15mm	251	848.8	27.93	28.00	0.619	0.629	28.00	28.00	0.546	0.546	-13.2%
GSM1900	GPRS (4 Tx slots)	Front	15mm	810	1909.8	24.92	25.00	0.177	0.180	25.00	25.00	0.148	0.148	-17.8%
WCDMA V	RMC 12.2Kbps	Back	15mm	4233	846.6	24.98	25.00	0.540	0.542	25.00	25.00	0.527	0.527	-2.8%
LTE Band 7	20M_QPSK_1_0	Back	15mm	21350	2560	21.92	22.00	1.110	1.131	21.99	22.00	0.920	0.922	-18.5%

Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Original Model (FCC ID: ZNFX240H)					Spot Check Mode(FCC ID: X240DS)					Deviation
						Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
WLAN2.4GHz	802.11b 1Mbps	Back	15mm	6	2437	16.97	17.00	100	0.051	0.051	16.97	17.00	100	0.045	0.045	-11.8%

Note:

1. The spot check verification shows the WWAN SAR performance of X240YK represents the performance of X240DS.
2. The spot check verification shows the WLAN SAR performance of ZNFX240H represents the performance of X240DS.



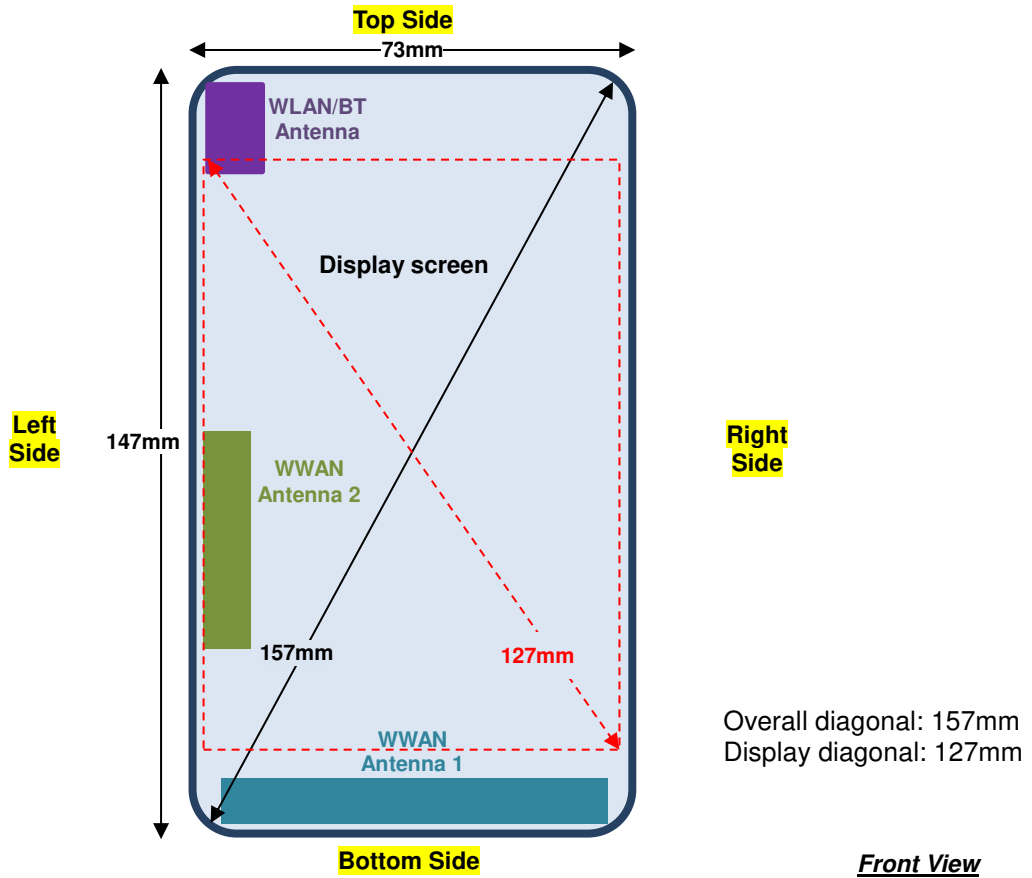
**4. Reference detail Section**

Rule Part	Frequency Band (MHz)	Wireless Technology	Reference FCC ID	Reference Report Title	Reference Report No.	Reference Report Sections
22	824.2 ~ 848.8	GSM 850	ZNFX240YK	FCC SAR Test Report	FA6D1013	Sections related to GSM 850 test data
24	1850.2 ~ 1909.8	GSM 1900	ZNFX240YK	FCC SAR Test Report	FA6D1013	Sections related to GSM 1900 test data
22	826.4 ~ 846.6	WCDMA B5	ZNFX240YK	FCC SAR Test Report	FA6D1013	Sections related to WCDMA B5 test data
27	2502.5 ~ 2567.5	LTE B7	ZNFX240YK	FCC SAR Test Report	FA6D1013	Sections related to LTE B7 test data
15C	2402~2480	Bluetooth	ZNFX240H	FCC SAR Test Report	FA6O1802	Sections related to Bluetooth test data
15C	2412~2462	Wi-Fi	ZNFX240H	FCC SAR Test Report	FA6O1802	Sections related to WiFi test data



### 5. Antenna Location

<Mobile Phone>



WWAN Antenna	Support Band
WWAN Antenna 1	GSM 850 / 1900, WCDMA B5
WWAN Antenna 2	LTE B7

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Antenna 1	≤ 25mm	≤ 25mm	138 mm	≤ 25mm	≤ 25mm	≤ 25mm
WWAN Antenna 2	≤ 25mm	≤ 25mm	75 mm	35 mm	66 mm	≤ 25mm
BT / WLAN	≤ 25mm	≤ 25mm	≤ 25mm	130 mm	64 mm	≤ 25mm

Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Antenna 1	Yes	Yes	No	Yes	Yes	Yes
WWAN Antenna 2	Yes	Yes	No	No	No	Yes
BT / WLAN	Yes	Yes	Yes	No	No	Yes

**General Note:**

- Referring to KDB 941225 D06 v02r01, when the overall device length and width are ≥ 9cm\*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge

## 6. Uncertainty Assessment

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture’s specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor <sup>(a)</sup>	1/ $\kappa$ <sup>(b)</sup>	1/ $\sqrt{3}$	1/ $\sqrt{6}$	1/ $\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b)  $\kappa$  is the coverage factor

**Table 6.1. Standard Uncertainty for Assumed Distribution**

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.



Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
<b>Measurement System</b>							
Probe Calibration	6.00	N	1	1	1	6.0	6.0
Axial Isotropy	4.70	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.60	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	1.00	R	1.732	1	1	0.6	0.6
Linearity	4.70	R	1.732	1	1	2.7	2.7
System Detection Limits	1.00	R	1.732	1	1	0.6	0.6
Modulation Response	4.68	R	1.732	1	1	2.7	2.7
Readout Electronics	0.30	N	1	1	1	0.3	0.3
Response Time	0.00	R	1.732	1	1	0.0	0.0
Integration Time	2.60	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.00	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.00	R	1.732	1	1	1.7	1.7
Probe Positioner	0.40	R	1.732	1	1	0.2	0.2
Probe Positioning	2.90	R	1.732	1	1	1.7	1.7
Max. SAR Eval.	2.00	R	1.732	1	1	1.2	1.2
<b>Test Sample Related</b>							
Device Positioning	3.03	N	1	1	1	3.0	3.0
Device Holder	3.60	N	1	1	1	3.6	3.6
Power Drift	5.00	R	1.732	1	1	2.9	2.9
Power Scaling	0.00	R	1.732	1	1	0.0	0.0
<b>Phantom and Setup</b>							
Phantom Uncertainty	6.10	R	1.732	1	1	3.5	3.5
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.03	N	1	0.78	0.71	0.0	0.0
Liquid Conductivity (target)	5.00	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.50	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.68	R	1.732	0.78	0.71	1.7	1.5
Liquid Permittivity Repeatability	0.02	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.00	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.50	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.84	R	1.732	0.23	0.26	0.1	0.1
<b>Combined Std. Uncertainty</b>						11.6%	11.6%
<b>Coverage Factor for 95 %</b>						K=2	K=2
<b>Expanded STD Uncertainty</b>						23.2%	23.1%

**Table 6.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz**



## **7. References**

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [6] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [7] FCC KDB 648474 D04 v01r03, "SAR Evaluation Considerations for Wireless Handsets", Oct 2015.
- [8] FCC KDB 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [9] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [10] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.
- [11] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [12] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.