RF Exposure Evaluation Declaration

Product Name	:	LM960
Trade Name	:	Telit
Model No.	:	LM960
FCC ID.	:	RI7LM960
IC ID.	:	5131A-LM960

Applicant : Telit Wireless Solutions Co. Ltd.

Address : 13th Fl.,Shinyoung Securities Bld, 6, Gukjegeumyung-ro 8-gil, Yeongdeungpo-gu, Seoul, 07330, Korea

Date of Receipt	:	Apr. 09, 2018
Date of Declaration	:	Aug. 20, 2019
Report No.	:	1840058R-RF-US-Exp
Report Version	:	V2.0

ilac-MRA TAF Testing Laboratory 3024

RF Exposure Evaluation Declaration

Issued Date : Aug. 20, 2019

Report No. : 1840058R-RF-US-Exp

Product Name	:	LM960
Applicant	:	Telit Wireless Solutions Co. Ltd.
Address	:	13th Fl.,Shinyoung Securities Bld, 6, Gukjegeumyung-ro 8-gil, Yeongdeungpo-gu, Seoul, 07330, Korea
Manufacturer	:	Telit Wireless Solutions Co. Ltd.
Trade Name	:	Telit
Model No.	:	LM960
FCC ID	:	RI7LM960
IC	:	5131A-LM960
EUT Voltage	:	DC 3.3V
Testing Voltage	:	DC 3.3V
Applicable Standard	:	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices. ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Test Lab	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Tested By : Max Chang

(Max Chang / Engineer)

Approved By : Roy Wang

(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1840058R-RF-US-Exp	V1.0	Initial issue of report	Jun. 27, 2018
1840058R-RF-US-Exp	V2.0	Revised the usable maximum antenna gain under limit of output power and revised calculated data in page 7-10.	Aug. 20, 2019

1. Test Facility

USA	**:**	**FCC Registration Number: TW3024**
Canada		**IC Registration Number: 22397-1 / 22397-2 / 22397-3**

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

1 No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : info.tw@dekra.com

2 No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com

3 No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

According to IC RSS-102 Issue 5: For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline.

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	**Electric Field (V/m rms)**	**Magnetic Field (A/m rms)**	**Power Density (W/m2)**	**Reference Period (minutes)**
0.003-1021	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f 0.5	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f 0.25	0.1540/ f 0.25	8.944/ f 0.5	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f 0.3417	0.008335 f 0.3417	0.02619f0.6834	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f 1.2
150000-300000	0.158 f 0.5	4.21 x 10-4 f 0.5	6.67 x 10-5 f	616000/ f 1.2
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	**Electric Field (V/m rms)**	**Magnetic Field (A/m rms)**	**Power Density (W/m2)**	**Reference Period (minutes)**
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ f	-	6**
1.29-10	193/ f 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ f 0.25	0.3444/ f 0.25	44.72/ f 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 f 0.25	0.04138 f 0.25	0.6455f0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ f 1.2
150000-300000	0.354 f 0.5	9.40 x 10-4 f 0.5	3.33 x 10-4 f	616000/ f 1.2
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4*pi*r^2)

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm^2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18℃and 78％ RH.

2.3. Test Result of RF Exposure Evaluation

The device Telit LM960 is a module designed to be installed in other devices. This device is to be used only for fixed and mobile applications. If the final product after integration is intended for portable use, new applications and FCC and IC are required.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter except as under the conditions described KDB 447498 D01 General RF Exposure Guidance.

The maximum antenna gain that can be used in the LM960 is shown in the following table:

Band	Frequency (MHz) (Lowest Frequency)	Maximum conducted output power (per tune-up) (dBm)	Duty cycle (%)	FCC MPE limit (mW/cm^2)	IC MPE limit (mW/cm^2)	FCC/IC MPE limit (mW/cm^2)	FCC EIRP/ERP limit (W)	IC EIRP/ERP limit (W)	Evaluation distance for compliance with MPE limits (cm)	Antenna gain to meet FCC/IC MPE limit (dBi)	Antenna gain to meet FCC EIRP/ERP limit (dBi)	Antenna gain to meet IC EIRP/ERP limit (dBi)	Maximun antenna gain to meet all the limits (dBi)	Maximun antenna gain to meet all the limits per frequency band (dBi)
LTE Band 71	673	24.50	100	0.449		0.449	3.00		20	9.00	12.42		9.00	9.00
LTE Band 12	700.5	24.50	100	0.467	0.231	0.231	3.00	5.00	20	6.00	12.42	14.64	6.00	6.00
LTE Band 13	779.5	24.50	100	0.520	0.248	0.248	3.00	5.00	20	6.00	12.42	14.64	6.00	
LTE Band 14	790.5	24.50	100	0.527	0.250	0.250	3.00	3.00	20	6.40	12.42	12.42	6.40	
LTE Band 17	706.5	24.50	100	0.471	0.232	0.232	3.00	5.00	20	6.00	12.42	14.64	6.00	
WCDMA Band 5	826.4	24.00	100	0.551	0.258	0.258	7.00	11.50	20	6.80	16.60	18.76	6.80	6.00
LTE Band 5	829	24.50	100	0.553	0.259	0.259	7.00	11.50	20	6.00	16.10	18.26	6.00	
LTE Band 18	817.5	24.50	100	0.545		0.545	100		20	9.80	27.65		9.80	
LTE Band 19	832.5	24.50	100	0.555		0.555	7.00		20	9.90	16.10		9.90	
LTE Band 26	816.5	24.50	100	0.544	0.256	0.256	100	11.50	20	6.50	27.65	18.26	6.50	
WCDMA Band 4	1712.4	24.00	100	1.000	0.425	0.425	1.00	1.00	20	9.20	6.00	6.00	6.00	5.50
LTE Band 4	1717.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50	
LTE Band 66	1712.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50	
WCDMA Band 2	1850.2	24.00	100	1.000	0.448	0.448	2.00	2.00	20	9.50	9.01	9.01	9.01	8.51
LTE Band 2	1850.7	24.50	100	1.000	0.448	0.448	2.00	2.00	20	9.00	8.51	8.51	8.51	
LTE Band 25	1857.5	24.50	100	1.000	0.449	0.449	2.00	2.00	20	9.00	8.51	8.51	8.51	
LTE Band 30	2307.5	22.90	100	1.000	0.521	0.521	0.25	0.25	20	9.60	1.08	1.08	1.08	1.08
LTE Band 7	2510	24.50	100	1.000	0.551	0.551	2.00	2.00	20	9.80	8.51	8.51	8.51	5.51
LTE Band 38	2575	24.50	100	1.000	0.561	0.561	2.00	2.00	20	9.90	8.51	8.51	8.51	
LTE Band 41	2506	27.50	100	1.000	0.551	0.551	2.00	2.00	20	6.80	5.51	5.51	5.51	

Band	Frequency (MHz) (Lowest Frequency)	Maximum conducted output power (per tune-up) (dBm)	Duty Cycle (%)	Antenna gain (dBi)	FCC/IC MPE limit (mW/cm2)	FCC EIRP limit (W)	IC EIRP limit (W)	FCC/IC EIRP limit (W)	Evaluation distance for compliance with MPE limits (cm)	Power Density (mW/cm2)	MPE Ratio (S/MPE limit)
LTE Band 71	673	24.50	100	9.00	0.449	3.00		3.00	20	0.445	0.993
LTE Band 12	700.5	24.50	100	6.00	0.231	3.00	5.00	3.00	20	0.223	0.968
LTE Band 13	779.5	24.50	100	6.00	0.248	3.00	5.00	3.00	20	0.223	0.900
LTE Band 14	790.5	24.50	100	6.40	0.250	3.00	3.00	3.00	20	0.245	0.978
LTE Band 17	706.5	24.50	100	6.00	0.232	3.00	5.00	3.00	20	0.223	0.963
WCDMA Band 5	826.4	24.00	100	6.80	0.258	7.00	11.50	7.00	20	0.239	0.927
LTE Band 5	829	24.50	100	6.00	0.259	7.00	11.50	7.00	20	0.223	0.863
LTE Band 18	817.5	24.50	100	9.80	0.545	100		100	20	0.535	0.983
LTE Band 19	832.5	24.50	100	9.90	0.555	7.00		7.00	20	0.548	0.987
LTE Band 26	816.5	24.50	100	6.50	0.256	100	11.50	11.50	20	0.250	0.979
WCDMA Band 4	1712.4	24.00	100	6.00	0.425	1.00	1.00	1.00	20	0.199	0.469
LTE Band 4	1717.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.468
LTE Band 66	1712.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.469
WCDMA Band 2	1850.2	24.00	100	9.01	0.448	2.00	2.00	2.00	20	0.398	0.889
LTE Band 2	1850.7	24.50	100	8.51	0.448	2.00	2.00	2.00	20	0.398	0.889
LTE Band 25	1857.5	24.50	100	8.51	0.449	2.00	2.00	2.00	20	0.398	0.886
LTE Band 30	2307.5	22.90	100	1.08	0.521	0.25	0.25	0.25	20	0.050	0.096
LTE Band 7	2510	24.50	100	8.51	0.551	2.00	2.00	2.00	20	0.398	0.722
LTE Band 38	2575	24.50	100	8.51	0.561	2.00	2.00	2.00	20	0.398	0.709
LTE Band 41	2506	27.50	100	5.51	0.551	2.00	2.00	2.00	20	0.398	0.722

Note: For ISED, this device doesn't support the LTE band 18/19/71. And the LTE band 26 frequency range is 824-849MHz for ISED.

LTE 2CA combination

Band		Frequency (MHz) (Lowest Frequency)	Maximum conducted output power (per tune-up) (dBm)	Duty cycle (%)	FCC MPE limit (mW/cm2)	IC MPE limit (mW/cm2)	FCC/IC MPE limit (mW/cm2)	FCC EIRP/ERP limit (W)	IC EIRP/ERP limit (W)	Evaluation distance for compliance with MPE limits (cm)	Antenna gain to meet FCC/IC MPE limit (dBi)	Antenna gain to meet FCC EIRP/ERP limit (dBi)	Antenna gain to meet IC EIRP/ERP limit (dBi)	Maximun antenna gain to meet all the limits (dBi)
2A-5A	LTE Band 2	1850.7	24.50	100	1.000	0.448	0.448	2.00	2.00	20	9.00	8.51	8.51	8.51
	LTE Band 5	829	24.50	100	0.553	0.259	0.259	7.00	11.50	20	6.00	16.10	18.26	6.00
2A-12A	LTE Band 2	1850.7	24.50	100	1.000	0.448	0.448	2.00	2.00	20	9.00	8.51	8.51	8.51
	LTE Band 12	700.5	24.50	100	0.467	0.231	0.231	3.00	5.00	20	6.00	12.42	14.64	6.00
2A-13A	LTE Band 2	1850.7	24.50	100	1.000	0.448	0.448	2.00	2.00	20	9.00	8.51	8.51	8.51
	LTE Band 13	779.5	24.50	100	0.520	0.248	0.248	3.00	5.00	20	6.00	12.42	14.64	6.00
4A-5A	LTE Band 4	1717.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50
	LTE Band 5	829	24.50	100	0.553	0.259	0.259	7.00	11.50	20	6.00	16.10	18.26	6.00
4A-7A	LTE Band 4	1717.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50
	LTE Band 7	2510	24.50	100	1.000	0.551	0.551	2.00	2.00	20	9.80	8.51	8.51	8.51
4A-12A	LTE Band 4	1717.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50
	LTE Band 12	700.5	24.50	100	0.467	0.231	0.231	3.00	5.00	20	6.00	12.42	14.64	6.00
4A-13A	LTE Band 4	1717.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50
	LTE Band 13	779.5	24.50	100	0.520	0.248	0.248	3.00	5.00	20	6.00	12.42	14.64	6.00
5A-66A	LTE Band 5	829	24.50	100	0.553	0.259	0.259	7.00	11.50	20	6.00	16.10	18.26	6.00
	LTE Band 66	1712.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50
12A-66A	LTE Band 12	700.5	24.50	100	0.467	0.231	0.231	3.00	5.00	20	6.00	12.42	14.64	6.00
	LTE Band 66	1712.5	24.50	100	1.000	0.425	0.425	1.00	1.00	20	8.70	5.50	5.50	5.50
5A-5A	LTE Band 5	829	24.50	100	0.553	0.259	0.259	7.00	11.50	20	6.00	16.10	18.26	6.00
	LTE Band 5	829	24.50	100	0.553	0.259	0.259	7.00	11.50	20	6.00	16.10	18.26	6.00
7A-7A	LTE Band 7	2510	24.50	100	1.000	0.551	0.551	2.00	2.00	20	9.80	8.51	8.51	8.51
	LTE Band 7	2510	24.50	100	1.000	0.551	0.551	2.00	2.00	20	9.80	8.51	8.51	8.51
38A-38A	LTE Band 38	2575	24.50	100	1.000	0.561	0.561	2.00	2.00	20	9.90	8.51	8.51	8.51
	LTE Band 38	2575	24.50	100	1.000	0.561	0.561	2.00	2.00	20	9.90	8.51	8.51	8.51
41A-41A	LTE Band 41	2506	27.50	100	1.000	0.551	0.551	2.00	2.00	20	6.80	5.51	5.51	5.51
	LTE Band 41	2506	27.50	100	1.000	0.551	0.551	2.00	2.00	20	6.80	5.51	5.51	5.51

Band		Frequency (MHz) (Lowest Frequency)	Maximum conducted output power (per tune-up) (dBm)	Duty Cycle (%)	Antenna gain (dBi)	FCC/IC MPE limit (mW/cm2)	FCC EIRP limit (W)	IC EIRP limit (W)	FCC/IC EIRP limit (W)	Evaluation distance for compliance with MPE limits (cm)	Power Density (mW/cm2)	MPE Ratio (S/MPE limit)
2A-5A	LTE Band 2	1850.7	24.50	100	8.51	0.448	2.00	2.00	2.00	20	0.398	0.889
	LTE Band 5	829	24.50	100	6.00	0.259	7.00	11.50	7.00	20	0.223	0.863
2A-12A	LTE Band 2	1850.7	24.50	100	8.51	0.448	2.00	2.00	2.00	20	0.398	0.889
	LTE Band 12	700.5	24.50	100	6.00	0.231	3.00	5.00	3.00	20	0.223	0.968
2A-13A	LTE Band 2	1850.7	24.50	100	8.51	0.448	2.00	2.00	2.00	20	0.398	0.889
	LTE Band 13	779.5	24.50	100	6.00	0.248	3.00	5.00	3.00	20	0.223	0.900
4A-5A	LTE Band 4	1717.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.468
	LTE Band 5	829	24.50	100	6.00	0.259	7.00	11.50	7.00	20	0.223	0.863
4A-7A	LTE Band 4	1717.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.468
	LTE Band 7	2510	24.50	100	8.51	0.551	2.00	2.00	2.00	20	0.398	0.722
4A-12A	LTE Band 4	1717.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.468
	LTE Band 12	700.5	24.50	100	6.00	0.231	3.00	5.00	3.00	20	0.223	0.968
4A-13A	LTE Band 4	1717.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.468
	LTE Band 13	779.5	24.50	100	6.00	0.248	3.00	5.00	3.00	20	0.223	0.900
5A-66A	LTE Band 5	829	24.50	100	6.00	0.259	7.00	11.50	7.00	20	0.223	0.863
	LTE Band 66	1712.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.469
12A-66A	LTE Band 12	700.5	24.50	100	6.00	0.231	3.00	5.00	3.00	20	0.223	0.968
	LTE Band 66	1712.5	24.50	100	5.50	0.425	1.00	1.00	1.00	20	0.199	0.469
5A-5A	LTE Band 5	829	24.50	100	6.00	0.259	7.00	11.50	7.00	20	0.223	0.863
	LTE Band 5	829	24.50	100	6.00	0.259	7.00	11.50	7.00	20	0.223	0.863
7A-7A	LTE Band 7	2510	24.50	100	8.51	0.551	2.00	2.00	2.00	20	0.398	0.722
	LTE Band 7	2510	24.50	100	8.51	0.551	2.00	2.00	2.00	20	0.398	0.722
38A-38A	LTE Band 38	2575	24.50	100	8.51	0.561	2.00	2.00	2.00	20	0.398	0.709
	LTE Band 38	2575	24.50	100	8.51	0.561	2.00	2.00	2.00	20	0.398	0.709
41A-41A	LTE Band 41	2506	27.50	100	5.51	0.551	2.00	2.00	2.00	20	0.398	0.722
	LTE Band 41	2506	27.50	100	5.51	0.551	2.00	2.00	2.00	20	0.398	0.722