



# RF Exposure Evaluation Report

APPLICANT : FIBOCOM WIRELESS INC.  
EQUIPMENT : LTE Module  
BRAND NAME : Fibocom  
MODEL NAME : L811-EA  
FCC ID : ZMOL811  
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

**SPORTON INTERNATIONAL (SHENZHEN) INC.**

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Nanshan District, Shenzhen, Guangdong, P. R. China**



## **Table of Contents**

<b>1. ADMINISTRATION DATA .....</b>	<b>4</b>
1.1. Testing Laboratory .....	4
<b>2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) .....</b>	<b>5</b>
<b>3. CONDUCTED RF OUTPUT POWER (UNIT: DBM).....</b>	<b>6</b>
<b>4. RF EXPOSURE LIMIT INTRODUCTION .....</b>	<b>22</b>
<b>5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION .....</b>	<b>23</b>
5.1. Standalone Power Density Calculation .....	23

**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA531804-01	Rev. 01	Initial issue of report	Oct. 09, 2015

**1. Administration Data****1.1. Testing Laboratory**

Testing Laboratory	
Test Site	SPORTON International (SHENZHEN) Inc.
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: 86-755-8637-9589 FAX: 86-755-8637-9595

Applicant	
Company Name	FIBOCOM WIRELESS INC.
Address	5/F, Tower A, Technology Building II, 1057# Nanhai Blvd, Shenzhen, P. R. China

Manufacturer	
Company Name	FIBOCOM WIRELESS INC.
Address	5/F, Tower A, Technology Building II, 1057# Nanhai Blvd, Shenzhen, P. R. China

## 2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	LTE Module
Brand Name	Fibocom
Model Name	L811-EA
FCC ID	ZMOL811
IMEI Code	867890020001950
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz
Mode	<ul style="list-style-type: none"> <li>• GPRS/EGPRS</li> <li>• RMC12.2Kbps</li> <li>• HSDPA</li> <li>• HSUPA</li> <li>• DC-HSDPA</li> <li>• HSPA+(16QAM uplink is not supported)</li> <li>• LTE</li> </ul>
Antenna Type	Fixed External Antenna
Antenna Gain	3dBi
HW Version	V1.0.1
SW Version	L811_V3E.0C.01.00
EUT Stage	Identical Prototype
<b>Remark:</b> 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. The device supports GPRS/EGPRS Class 33. 3. The device has no voice function.	

### 3. Conducted RF Output Power (Unit: dBm)

#### <GSM Conducted Power>

Band GSM850		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		128	189	251		128	189	251	
Frequency (MHz)		824.2	836.4	848.8		824.2	836.4	848.8	
GPRS (GMSK, 1 Tx slot)		32.58	32.62	32.70	33.00	23.58	23.62	23.70	24.00
GPRS (GMSK, 2 Tx slots)		32.65	32.70	32.79	33.00	26.65	26.70	26.79	27.00
GPRS (GMSK, 3 Tx slots)		31.98	32.05	32.16	32.50	27.72	27.79	27.90	28.24
GPRS (GMSK, 4 Tx slots)		30.53	30.64	30.71	31.00	27.53	27.64	27.71	28.00
EDGE (8PSK, 1 Tx slot)		27.27	27.25	27.22	27.50	18.27	18.25	18.22	18.50
EDGE (8PSK, 2 Tx slots)		27.23	27.25	27.22	27.50	21.23	21.25	21.22	21.50
EDGE (8PSK, 3 Tx slots)		26.44	26.47	26.44	26.50	22.18	22.21	22.18	22.24
EDGE (8PSK, 4 Tx slots)		25.34	25.36	25.36	25.50	22.34	22.36	22.36	22.50
Band GSM1900		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		512	661	810		512	661	810	
Frequency (MHz)		1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS (GMSK, 1 Tx slot)		30.22	30.25	30.23	30.50	21.22	21.25	21.23	21.50
GPRS (GMSK, 2 Tx slots)		30.36	30.38	30.35	30.50	24.36	24.38	24.35	24.50
GPRS (GMSK, 3 Tx slots)		29.50	29.43	29.41	30.00	25.24	25.17	25.15	25.74
GPRS (GMSK, 4 Tx slots)		28.20	28.18	28.19	28.50	25.20	25.18	25.19	25.50
EDGE (8PSK, 1 Tx slot)		26.53	26.56	26.65	27.00	17.53	17.56	17.65	18.00
EDGE (8PSK, 2 Tx slots)		26.54	26.57	26.65	27.00	20.54	20.57	20.65	21.00
EDGE (8PSK, 3 Tx slots)		25.75	25.78	25.86	26.00	21.49	21.52	21.60	21.74
EDGE (8PSK, 4 Tx slots)		24.52	24.55	24.67	25.00	21.52	21.55	21.67	22.00

**Remark:** The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.

The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB

Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB

Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB



## <WCDMA Conducted Power>

Band		WCDMA V			Tune-up Limit (dBm)	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
TX Channel		4132	4182	4233		9262	9400	9538		1312	1413	1513	
Rx Channel		4357	4407	4458		9662	9800	9938		1537	1638	1738	
Frequency (MHz)		826.4	836.4	846.6		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	RMC 12.2Kbps	23.21	23.34	23.36	23.50	23.54	23.48	23.31	24.00	23.54	23.63	23.61	24.00
3GPP Rel 6	HSDPA Subtest-1	21.02	21.11	21.20	21.50	21.13	21.12	21.09	21.50	21.11	21.21	21.19	21.50
3GPP Rel 6	HSDPA Subtest-2	21.02	21.11	21.20	21.50	21.12	21.12	21.08	21.50	21.13	21.23	21.18	21.50
3GPP Rel 6	HSDPA Subtest-3	21.02	21.11	21.18	21.50	21.12	21.12	21.09	21.50	21.12	21.23	21.18	21.50
3GPP Rel 6	HSDPA Subtest-4	21.03	21.11	21.16	21.50	21.13	21.11	21.09	21.50	21.11	21.23	21.18	21.50
3GPP Rel 8	DC-HSDPA Subtest-1	21.58	21.65	21.63	22.00	21.72	21.66	21.64	22.00	21.75	21.81	21.78	22.00
3GPP Rel 8	DC-HSDPA Subtest-2	21.51	21.61	21.66	22.00	21.67	21.56	21.57	22.00	21.63	21.67	21.79	22.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.49	21.59	21.62	22.00	21.61	21.58	21.61	22.00	21.59	21.69	21.75	22.00
3GPP Rel 8	DC-HSDPA Subtest-4	21.48	21.57	21.60	22.00	21.62	21.59	21.56	22.00	21.61	21.65	21.76	22.00
3GPP Rel 6	HSUPA Subtest-1	22.43	22.65	22.69	23.00	22.82	22.72	22.66	23.00	22.78	22.96	22.90	23.00
3GPP Rel 6	HSUPA Subtest-2	20.62	20.81	20.86	21.00	21.00	20.94	20.83	21.50	21.00	21.12	21.10	21.50
3GPP Rel 6	HSUPA Subtest-3	21.77	21.88	21.91	22.00	21.99	21.98	21.84	22.00	22.00	22.15	22.11	22.50
3GPP Rel 6	HSUPA Subtest-4	20.95	21.07	21.09	21.50	21.17	21.13	21.08	21.50	21.19	21.38	21.31	21.50
3GPP Rel 6	HSUPA Subtest-5	23.00	23.00	23.10	23.50	23.20	23.20	23.10	23.50	23.20	23.40	23.30	23.50



**<LTE Conducted Power>**

**<LTE Band 17>**

Channel				23780	23790	23800	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				709	710	711		
10	QPSK	1	0	23.16	22.86	23.01	23.50	0
10	QPSK	1	24	23.23	22.93	22.99		
10	QPSK	1	49	22.91	22.92	22.80		
10	QPSK	25	0	22.10	22.16	22.13	22.50	0-1
10	QPSK	25	12	22.20	22.10	22.02		
10	QPSK	25	24	22.07	22.03	21.99		
10	QPSK	50	0	22.17	22.15	22.04	23.00	0-1
10	16QAM	1	0	22.46	22.35	22.25		
10	16QAM	1	24	22.58	22.57	22.35		
10	16QAM	1	49	22.37	22.30	22.06	21.50	0-2
10	16QAM	25	0	21.16	21.23	21.26		
10	16QAM	25	12	21.14	21.32	21.22		
10	16QAM	25	24	21.16	21.14	21.16	21.50	0-2
10	16QAM	50	0	21.06	21.23	21.17		
Channel				23755	23790	23825	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				706.5	710	713.5		
5	QPSK	1	0	23.07	22.94	23.06	23.50	0
5	QPSK	1	12	23.07	23.00	23.05		
5	QPSK	1	24	22.99	22.85	22.92		
5	QPSK	12	0	22.27	22.18	22.03	22.50	0-1
5	QPSK	12	6	22.25	22.11	22.01		
5	QPSK	12	11	22.22	22.08	22.10		
5	QPSK	25	0	22.16	22.15	22.00	23.00	0-1
5	16QAM	1	0	22.33	22.30	22.60		
5	16QAM	1	12	22.36	22.32	22.56		
5	16QAM	1	24	22.26	22.63	22.48	21.50	0-2
5	16QAM	12	0	21.28	21.18	21.08		
5	16QAM	12	6	21.26	21.19	21.06		
5	16QAM	12	11	21.23	21.24	21.08	21.50	0-2
5	16QAM	25	0	21.31	21.19	21.12		





**<LTE Band 13>**

Channel				23230			Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				782				
10	QPSK	1	0	22.75			23.00	0
10	QPSK	1	24	22.31				
10	QPSK	1	49	22.26				
10	QPSK	25	0	21.69			22.00	0-1
10	QPSK	25	12	21.66				
10	QPSK	25	24	21.67				
10	QPSK	50	0	21.71				
10	16QAM	1	0	21.57			22.50	0-1
10	16QAM	1	24	21.79				
10	16QAM	1	49	21.30				
10	16QAM	25	0	20.83			21.50	0-2
10	16QAM	25	12	20.76				
10	16QAM	25	24	20.81				
10	16QAM	50	0	20.85				
Channel				23205	23230	23255	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5		
5	QPSK	1	0	22.54	22.57	22.52	23.00	0
5	QPSK	1	12	22.68	22.61	22.52		
5	QPSK	1	24	22.61	22.54	22.49		
5	QPSK	12	0	21.66	21.68	21.70	22.00	0-1
5	QPSK	12	6	21.63	21.72	21.76		
5	QPSK	12	11	21.66	21.71	21.72		
5	QPSK	25	0	21.65	21.64	21.70		
5	16QAM	1	0	22.08	22.11	21.92	22.50	0-1
5	16QAM	1	12	22.22	22.37	21.90		
5	16QAM	1	24	22.21	22.08	21.75		
5	16QAM	12	0	20.80	20.85	20.91	21.50	0-2
5	16QAM	12	6	20.78	20.82	21.00		
5	16QAM	12	11	20.80	20.80	20.83		
5	16QAM	25	0	20.84	20.79	20.83		



**<LTE Band 5>**

Channel				20450	20525	20600	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	22.84	22.87	22.54	23.00	0
10	QPSK	1	24	22.82	22.74	22.45		
10	QPSK	1	49	22.66	22.57	22.42		
10	QPSK	25	0	21.82	21.72	21.66	22.00	0-1
10	QPSK	25	12	21.77	21.71	21.56		
10	QPSK	25	24	21.69	21.59	21.61		
10	QPSK	50	0	21.57	21.61	21.61	22.50	0-1
10	16QAM	1	0	22.22	22.14	21.97		
10	16QAM	1	24	22.20	21.99	21.84		
10	16QAM	1	49	22.14	21.94	21.84	21.50	0-2
10	16QAM	25	0	20.84	20.72	20.67		
10	16QAM	25	12	20.96	20.72	20.57		
10	16QAM	25	24	20.70	20.68	20.65	21.02	20.66
10	16QAM	50	0	21.02	20.78	20.66		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	22.74	22.64	22.48	23.00	0
5	QPSK	1	12	22.73	22.70	22.54		
5	QPSK	1	24	22.67	22.71	22.41		
5	QPSK	12	0	21.77	21.57	21.62	22.00	0-1
5	QPSK	12	6	21.78	21.58	21.44		
5	QPSK	12	11	21.77	21.61	21.60		
5	QPSK	25	0	21.72	21.61	21.72	22.50	0-1
5	16QAM	1	0	22.18	22.01	21.77		
5	16QAM	1	12	22.33	22.09	21.74		
5	16QAM	1	24	22.23	22.00	21.65	21.50	0-2
5	16QAM	12	0	20.78	20.82	20.65		
5	16QAM	12	6	20.64	20.63	20.70		
5	16QAM	12	11	20.91	20.81	20.63	20.84	20.71
5	16QAM	25	0	20.84	20.72	20.71		



# RF Exposure Evaluation Report

Report No. : FA531804-01

Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	22.67	22.57	22.51	23.00	0
3	QPSK	1	7	22.69	22.55	22.51		
3	QPSK	1	14	22.62	22.55	22.53		
3	QPSK	8	0	21.71	21.58	21.57	22.00	0-1
3	QPSK	8	4	21.69	21.60	21.52		
3	QPSK	8	7	21.68	21.57	21.50		
3	QPSK	15	0	21.70	21.57	21.55		
3	16QAM	1	0	21.96	21.89	21.67	22.50	0-1
3	16QAM	1	7	22.01	21.83	21.70		
3	16QAM	1	14	21.95	21.74	21.64		
3	16QAM	8	0	20.86	20.69	20.67	21.50	0-2
3	16QAM	8	4	20.76	20.67	20.58		
3	16QAM	8	7	20.81	20.68	20.65		
3	16QAM	15	0	20.80	20.72	20.72		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	22.74	22.60	22.59	23.00	0
1.4	QPSK	1	2	22.70	22.54	22.58		
1.4	QPSK	1	5	22.70	22.55	22.55		
1.4	QPSK	3	0	22.78	22.66	22.57		
1.4	QPSK	3	1	22.78	22.64	22.59		
1.4	QPSK	3	2	22.77	22.64	22.58		
1.4	QPSK	6	0	21.72	21.60	21.58	22.00	0-1
1.4	16QAM	1	0	22.03	21.90	21.84	22.50	0-1
1.4	16QAM	1	2	22.04	21.87	21.82		
1.4	16QAM	1	5	22.05	21.81	21.87		
1.4	16QAM	3	0	21.83	21.66	21.61		
1.4	16QAM	3	1	21.86	21.67	21.61		
1.4	16QAM	3	2	21.80	21.66	21.61		
1.4	16QAM	6	0	20.85	20.67	20.64	21.50	0-2



## <LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300	23.50	0
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.35	23.09	23.22	23.50	0
20	QPSK	1	49	22.76	22.72	22.88		
20	QPSK	1	99	22.76	22.46	22.64		
20	QPSK	50	0	22.17	22.02	22.14	22.50	0-1
20	QPSK	50	24	21.84	21.82	21.89		
20	QPSK	50	49	21.78	21.82	21.85		
20	QPSK	100	0	22.04	22.02	22.02	23.00	0-1
20	16QAM	1	0	22.51	22.42	22.52		
20	16QAM	1	49	21.95	22.01	21.99		
20	16QAM	1	99	21.81	21.75	21.85	21.50	0-2
20	16QAM	50	0	21.19	21.07	21.09		
20	16QAM	50	24	20.83	20.85	20.95		
20	16QAM	50	49	20.83	20.70	20.83		
20	16QAM	100	0	20.91	20.83	21.03	23.50	0
Channel				20025	20175	20325		
Frequency (MHz)				1717.5	1732.5	1747.5	23.50	0
15	QPSK	1	0	23.32	23.32	23.18		
15	QPSK	1	37	22.71	22.77	23.05		
15	QPSK	1	74	22.81	22.81	22.93	22.50	0-1
15	QPSK	36	0	22.13	22.09	22.20		
15	QPSK	36	18	21.91	21.90	22.01		
15	QPSK	36	37	21.83	21.97	21.93		
15	QPSK	75	0	22.01	22.08	22.14	23.00	0-1
15	16QAM	1	0	22.63	22.79	22.68		
15	16QAM	1	37	22.05	22.33	22.23		
15	16QAM	1	74	21.99	22.35	22.15	21.50	0-2
15	16QAM	36	0	21.19	21.06	21.12		
15	16QAM	36	18	20.88	21.07	21.02		
15	16QAM	36	37	21.06	20.87	20.90		
15	16QAM	75	0	21.02	20.98	20.96	23.50	0



# RF Exposure Evaluation Report

Report No. : FA531804-01

Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.10	23.21	23.21	23.50	0
10	QPSK	1	24	22.81	22.85	22.92		
10	QPSK	1	49	22.73	22.86	22.93		
10	QPSK	25	0	22.02	22.04	22.05	22.50	0-1
10	QPSK	25	12	21.86	21.88	21.94		
10	QPSK	25	24	21.84	21.91	21.93		
10	QPSK	50	0	21.87	21.93	22.03	23.00	0-1
10	16QAM	1	0	22.32	22.44	22.18		
10	16QAM	1	24	22.03	22.10	22.10		
10	16QAM	1	49	21.98	22.11	21.87	21.50	0-2
10	16QAM	25	0	20.90	21.06	21.06		
10	16QAM	25	12	20.80	20.93	20.96		
10	16QAM	25	24	20.72	20.91	20.92	20.93	20.89
10	16QAM	50	0	20.93	20.89	21.06		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.04	23.07	23.02	23.50	0
5	QPSK	1	12	22.97	23.06	23.06		
5	QPSK	1	24	22.93	22.94	23.00		
5	QPSK	12	0	21.93	21.91	22.00	22.50	0-1
5	QPSK	12	6	21.90	21.80	21.95		
5	QPSK	12	11	21.85	21.80	21.87		
5	QPSK	25	0	21.95	21.90	21.92	23.00	0-1
5	16QAM	1	0	22.11	22.45	22.59		
5	16QAM	1	12	22.02	22.32	22.45		
5	16QAM	1	24	21.86	22.31	22.41	21.50	0-2
5	16QAM	12	0	21.02	21.11	20.96		
5	16QAM	12	6	20.92	20.97	20.94		
5	16QAM	12	11	20.94	20.95	20.91	20.89	20.83
5	16QAM	25	0	20.89	20.83	21.01		



# RF Exposure Evaluation Report

Report No. : FA531804-01

Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	22.81	22.78	22.71	23.50	0
3	QPSK	1	7	22.70	22.77	22.69		
3	QPSK	1	14	22.62	22.71	22.65		
3	QPSK	8	0	21.74	21.75	21.73	22.50	0-1
3	QPSK	8	4	21.72	21.71	21.72		
3	QPSK	8	7	21.68	21.70	21.70		
3	QPSK	15	0	21.71	21.70	21.72		
3	16QAM	1	0	22.02	22.05	22.07	23.00	0-1
3	16QAM	1	7	21.99	22.05	22.06		
3	16QAM	1	14	21.91	21.95	21.92		
3	16QAM	8	0	20.78	20.76	20.74	21.50	0-2
3	16QAM	8	4	20.73	20.71	20.69		
3	16QAM	8	7	20.72	20.78	20.72		
3	16QAM	15	0	20.79	20.74	20.80		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	22.80	22.75	22.71	23.50	0
1.4	QPSK	1	2	22.76	22.74	22.69		
1.4	QPSK	1	5	22.77	22.76	22.72		
1.4	QPSK	3	0	22.86	22.80	22.81		
1.4	QPSK	3	1	22.85	22.75	22.79		
1.4	QPSK	3	2	22.83	22.73	22.73		
1.4	QPSK	6	0	21.71	21.71	21.72	22.50	0-1
1.4	16QAM	1	0	22.04	22.02	22.00	23.00	0-1
1.4	16QAM	1	2	22.06	22.01	22.00		
1.4	16QAM	1	5	22.06	21.99	22.00		
1.4	16QAM	3	0	21.87	21.83	21.82		
1.4	16QAM	3	1	21.85	21.86	21.78		
1.4	16QAM	3	2	21.86	21.79	21.78		
1.4	16QAM	6	0	20.84	20.74	20.71	21.50	0-2



## <LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	22.93	22.29	22.76	23.00	0
20	QPSK	1	49	22.28	22.43	22.28		
20	QPSK	1	99	22.36	21.85	22.08		
20	QPSK	50	0	21.73	21.61	21.68	22.00	0-1
20	QPSK	50	24	21.51	21.59	21.47		
20	QPSK	50	49	21.61	21.26	21.44		
20	QPSK	100	0	21.75	21.41	21.65	23.00	0-1
20	16QAM	1	0	22.58	21.94	22.38		
20	16QAM	1	49	21.93	22.06	21.89		
20	16QAM	1	99	21.98	21.28	21.55	21.00	0-2
20	16QAM	50	0	20.94	20.75	20.85		
20	16QAM	50	24	20.64	20.63	20.57		
20	16QAM	50	49	20.67	20.44	20.42	20.72	20.46
20	16QAM	100	0	20.72	20.46	20.55		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.81	22.83	22.77	23.00	0
15	QPSK	1	37	22.47	22.47	22.20		
15	QPSK	1	74	22.38	22.41	22.14		
15	QPSK	36	0	21.71	21.93	21.73	22.00	0-1
15	QPSK	36	18	21.55	21.73	21.54		
15	QPSK	36	37	21.55	21.65	21.40		
15	QPSK	75	0	21.70	21.74	21.49	23.00	0-1
15	16QAM	1	0	22.25	22.26	22.13		
15	16QAM	1	37	21.80	21.77	21.69		
15	16QAM	1	74	22.05	21.82	21.51	21.00	0-2
15	16QAM	36	0	20.89	20.91	20.78		
15	16QAM	36	18	20.65	20.73	20.55		
15	16QAM	36	37	20.64	20.71	20.50	20.67	20.83
15	16QAM	75	0	20.67	20.83	20.51		



# RF Exposure Evaluation Report

Report No. : FA531804-01

Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	22.58	22.87	22.71	23.00	0
10	QPSK	1	24	22.40	22.57	22.35		
10	QPSK	1	49	22.36	22.53	22.22		
10	QPSK	25	0	21.60	21.79	21.59	22.00	0-1
10	QPSK	25	12	21.50	21.69	21.35		
10	QPSK	25	24	21.47	21.68	21.38		
10	QPSK	50	0	21.57	21.62	21.38	23.00	0-1
10	16QAM	1	0	21.83	22.32	22.17		
10	16QAM	1	24	21.70	22.07	21.84		
10	16QAM	1	49	21.54	21.75	21.71	21.00	0-2
10	16QAM	25	0	20.71	20.73	20.58		
10	16QAM	25	12	20.61	20.65	20.42		
10	16QAM	25	24	20.71	20.64	20.40	20.55	20.76
10	16QAM	50	0	20.55	20.76	20.56		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	22.27	22.48	22.27	23.00	0
5	QPSK	1	12	22.27	22.44	22.22		
5	QPSK	1	24	22.27	22.40	22.11		
5	QPSK	12	0	21.56	21.72	21.46	22.00	0-1
5	QPSK	12	6	21.38	21.62	21.38		
5	QPSK	12	11	21.47	21.62	21.35		
5	QPSK	25	0	21.40	21.61	21.35	23.00	0-1
5	16QAM	1	0	21.75	21.96	21.68		
5	16QAM	1	12	21.66	21.82	21.60		
5	16QAM	1	24	21.59	21.86	21.46	21.00	0-2
5	16QAM	12	0	20.56	20.79	20.57		
5	16QAM	12	6	20.52	20.65	20.38		
5	16QAM	12	11	20.46	20.79	20.48	20.47	20.81
5	16QAM	25	0	20.47	20.81	20.51		





# RF Exposure Evaluation Report

Report No. : FA531804-01

Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	22.21	22.49	22.33	23.00	0
3	QPSK	1	7	22.20	22.49	22.26		
3	QPSK	1	14	22.15	22.44	22.18		
3	QPSK	8	0	21.35	21.63	21.37	22.00	0-1
3	QPSK	8	4	21.34	21.60	21.35		
3	QPSK	8	7	21.36	21.57	21.31		
3	QPSK	15	0	21.38	21.61	21.36		
3	16QAM	1	0	21.46	21.92	21.67	23.00	0-1
3	16QAM	1	7	21.47	21.83	21.61		
3	16QAM	1	14	21.46	21.74	21.55		
3	16QAM	8	0	20.37	20.70	20.48	21.00	0-2
3	16QAM	8	4	20.42	20.66	20.44		
3	16QAM	8	7	20.41	20.66	20.45		
3	16QAM	15	0	20.45	20.71	20.50		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	22.24	22.42	22.25	23.00	0
1.4	QPSK	1	2	22.26	22.41	22.21		
1.4	QPSK	1	5	22.26	22.47	22.25		
1.4	QPSK	3	0	22.29	22.53	22.34		
1.4	QPSK	3	1	22.26	22.52	22.33		
1.4	QPSK	3	2	22.26	22.48	22.28		
1.4	QPSK	6	0	21.32	21.59	21.34	22.00	0-1
1.4	16QAM	1	0	21.64	21.89	21.66	23.00	0-1
1.4	16QAM	1	2	21.67	21.90	21.60		
1.4	16QAM	1	5	21.63	21.88	21.60		
1.4	16QAM	3	0	21.48	21.71	21.37		
1.4	16QAM	3	1	21.51	21.70	21.44		
1.4	16QAM	3	2	21.46	21.63	21.46		
1.4	16QAM	6	0	20.45	20.66	20.33	21.00	0-2



## <LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Measured Power			Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	21.58	21.37	21.63	22.50	0
20	QPSK	1	49	21.14	20.87	21.23		
20	QPSK	1	99	20.98	20.86	21.02		
20	QPSK	50	0	20.52	20.35	20.53	21.50	0-1
20	QPSK	50	24	20.19	20.00	20.24		
20	QPSK	50	49	20.16	20.05	20.30		
20	QPSK	100	0	20.28	20.26	20.43	21.50	0-1
20	16QAM	1	0	21.02	20.77	21.04		
20	16QAM	1	49	20.56	20.31	20.54		
20	16QAM	1	99	20.30	20.23	20.49	21.00	0-2
20	16QAM	50	0	19.75	19.41	19.68		
20	16QAM	50	24	19.40	19.00	19.38		
20	16QAM	50	49	19.33	19.15	19.36	21.00	0-2
20	16QAM	100	0	19.46	19.25	19.54		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	21.60	21.54	21.71	22.50	0
15	QPSK	1	37	21.01	20.98	21.02		
15	QPSK	1	74	21.14	21.16	21.25		
15	QPSK	36	0	20.47	20.34	20.55	21.50	0-1
15	QPSK	36	18	20.25	20.00	20.31		
15	QPSK	36	37	20.24	20.08	20.44		
15	QPSK	75	0	20.35	20.12	20.47	21.50	0-1
15	16QAM	1	0	20.95	20.88	21.13		
15	16QAM	1	37	20.46	20.16	20.48		
15	16QAM	1	74	20.53	20.40	20.72	21.00	0-2
15	16QAM	36	0	20.45	19.39	19.69		
15	16QAM	36	18	20.46	19.18	19.41		
15	16QAM	36	37	20.96	19.19	19.40	21.00	0-2
15	16QAM	75	0	19.49	19.33	19.54		



# RF Exposure Evaluation Report

Report No. : FA531804-01

Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	21.43	21.21	21.57	22.50	0
10	QPSK	1	24	21.17	20.97	21.22		
10	QPSK	1	49	21.10	20.83	21.25		
10	QPSK	25	0	20.24	20.08	20.37	21.50	0-1
10	QPSK	25	12	20.13	19.98	20.11		
10	QPSK	25	24	20.14	19.91	20.20		
10	QPSK	50	0	20.20	20.00	20.15	21.50	0-1
10	16QAM	1	0	20.77	20.37	20.84		
10	16QAM	1	24	20.52	20.23	20.55		
10	16QAM	1	49	20.47	20.13	20.47	21.00	0-2
10	16QAM	25	0	20.43	19.21	19.65		
10	16QAM	25	12	20.45	19.08	19.41		
10	16QAM	25	24	20.78	19.12	19.32	21.00	0-2
10	16QAM	50	0	19.41	19.09	19.28		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	21.08	20.99	21.30	22.50	0
5	QPSK	1	12	21.07	20.90	21.25		
5	QPSK	1	24	21.06	20.89	21.08		
5	QPSK	12	0	20.22	20.09	20.24	21.50	0-1
5	QPSK	12	6	20.16	20.02	20.32		
5	QPSK	12	11	20.17	19.93	20.21		
5	QPSK	25	0	20.16	19.85	20.18	21.50	0-1
5	16QAM	1	0	20.45	20.22	20.55		
5	16QAM	1	12	20.41	20.18	20.46		
5	16QAM	1	24	20.35	20.09	20.40	21.00	0-2
5	16QAM	12	0	19.41	19.10	19.46		
5	16QAM	12	6	19.35	19.26	19.55		
5	16QAM	12	11	19.37	19.13	19.41	21.00	0-2
5	16QAM	25	0	19.36	19.19	19.37		

**The table below summarized necessary items addressed in KDB 941225 D05 v02r03**

FCC ID	ZMOL811																																														
EUT	LTE Module																																														
Operating Frequency Range of each LTE transmission band	LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 7: 2506.5 MHz ~ 2567.5 MHz																																														
Channel Bandwidth	LTE Band 17: 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 5: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 4: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 2: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz																																														
uplink modulations used	QPSK and 16QAM																																														
LTE MPR permanently built-in by design	<table><tr><th colspan="8">Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</th></tr><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 2</td></tr></table>	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3								Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3																																															
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																								
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																									
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																								
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																								
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																								
LTE -MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI).																																														
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																														



Transmission (H, M, L) channel numbers and frequencies in each LTE band												
Band 17												
	Bandwidth 5 MHz					Bandwidth 10 MHz						
	Channel #		Frequency (MHz)			Channel #		Frequency (MHz)				
L	23755		706.5			23780		709				
M	23790		710			23790		710				
H	23825		713.5			23800		711				
Band 13												
	Bandwidth 5 MHz					Bandwidth 10 MHz						
	Channel #		Frequency (MHz)			Channel #		Frequency (MHz)				
L	23205		779.5			23230		782				
M	23230		782									
H	23255		784.5									
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	20407	824.7	20415	825.5	20425	826.5	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535				
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560				

#### **4. RF Exposure Limit Introduction**

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

## **5. Radio Frequency Radiation Exposure Evaluation**

### **5.1. Standalone Power Density Calculation**

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
GPRS 850 (1 Tx slot)	824.2	3.00	33.00	36.00	3.98	501.19	0.10	0.55
GPRS 850 (2 Tx slots)	824.2	3.00	33.00	36.00	3.98	1000.00	0.20	0.55
GPRS 850 (3 Tx slots)	824.2	3.00	32.50	35.50	3.55	1330.45	0.26	0.55
GPRS 850 (4 Tx slots)	824.2	3.00	31.00	34.00	2.51	1258.93	0.25	0.55
EGPRS 850 (1 Tx slot)	824.2	3.00	27.50	30.50	1.12	141.25	0.03	0.55
EGPRS 850 (2 Tx slots)	824.2	3.00	27.50	30.50	1.12	281.84	0.06	0.55
EGPRS 850 (3 Tx slots)	824.2	3.00	26.50	29.50	0.89	334.20	0.07	0.55
EGPRS 850 (4 Tx slots)	824.2	3.00	25.50	28.50	0.71	354.81	0.07	0.55
GPRS 1900 (1 Tx slot)	1850.2	3.00	30.50	33.50	2.24	281.84	0.06	1.00
GPRS 1900 (2 Tx slots)	1850.2	3.00	30.50	33.50	2.24	562.34	0.11	1.00
GPRS 1900 (3 Tx slots)	1850.2	3.00	30.00	33.00	2.00	748.17	0.15	1.00
GPRS 1900 (4 Tx slots)	1850.2	3.00	28.50	31.50	1.41	707.95	0.14	1.00
EGPRS 1900 (1 Tx slot)	1850.2	3.00	27.00	30.00	1.00	125.89	0.03	1.00
EGPRS 1900 (2 Tx slots)	1850.2	3.00	27.00	30.00	1.00	251.19	0.05	1.00
EGPRS 1900 (3 Tx slots)	1850.2	3.00	26.00	29.00	0.79	297.85	0.06	1.00
EGPRS 1900 (4 Tx slots)	1850.2	3.00	25.00	28.00	0.63	316.23	0.06	1.00
WCDMA Band V	826.4	3.00	23.50	26.50	0.45	446.68	0.09	0.55
WCDMA Band IV	1712.4	3.00	24.00	27.00	0.50	501.19	0.10	1.00
WCDMA Band II	1852.4	3.00	24.00	27.00	0.50	501.19	0.10	1.00
LTE Band 17	706.5	3.00	23.50	26.50	0.45	446.68	0.09	0.47
LTE Band 13	779.5	3.00	23.00	26.00	0.40	398.11	0.08	0.52
LTE Band 5	824.7	3.00	23.00	26.00	0.40	398.11	0.08	0.55
LTE Band 4	1710.7	3.00	23.50	26.50	0.45	446.68	0.09	1.00
LTE Band 2	1850.7	3.00	23.00	26.00	0.40	398.11	0.08	1.00
LTE Band 7	2502.5	3.00	22.50	25.50	0.35	354.81	0.07	1.00

**Note:** For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

### **Conclusion:**

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.