



RF Exposure Evaluation Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : 4G Wireless Router
BRAND NAME : ZTE
MODEL NAME : MF253L
FCC ID : SRQ-ZTEMF253L
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL (KUNSHAN) INC.
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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA422411	Rev. 01	Initial issue of report	Mar. 26, 2014

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

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

1.2. Applicant

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.3. Manufacturer

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification				
EUT Type	4G Wireless Router			
Brand Name	ZTE			
Model Name	MF253L			
FCC ID	SRQ-ZTEMF253L			
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 LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz			
Mode	• GPRS/EGPRS • RMC 12.2Kbps Rel 99 • HSDPA Rel 8, Cat 24 • HSUPA Rel 7, Cat 7 • DC-HSDPA Rel 8 Cat 24 • HSPA+ Rel 7, Cat 14 • 802.11b/g/n HT20/HT40			
Antenna Type	WWAN: Monopole Antenna WLAN: PCB Antenna			
Antenna Function for Transmitter		Chain Port 0	Chain Port 1	Chain Port 0 + Chain Port 1
	802.11 b	V	V	-
	802.11 g	V	V	-
	802.11 n	V	V	V
HW Version	d68A			
SW Version	EN_ZTE_MF253V1.0.0B05			
EUT Stage	Identical Prototype			

Remark:

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 10.

3. Maximum RF average output power among production units

Average Power (dBm)		
Band	GSM 850	GSM 1900
GPRS (GMSK, 1 Tx slot)	32.0	28.5
GPRS (GMSK, 2 Tx slots)	30.0	27.0
EDGE (8PSK, 1 Tx slot)	26.0	24.5
EDGE (8PSK, 2 Tx slots)	23.5	22.5

Average Power (dBm)	
Band	WCDMA Band V
RMC 12.2Kbps	22.5
HSDPA Subtest-1	22.5
HSDPA Subtest-2	22.5
HSDPA Subtest-3	22.0
HSDPA Subtest-4	22.0
DC-HSDPA Subtest-1	22.5
DC-HSDPA Subtest-2	22.5
DC-HSDPA Subtest-3	22.0
DC-HSDPA Subtest-4	22.0
HSUPA Subtest-1	22.0
HSUPA Subtest-2	21.5
HSUPA Subtest-3	21.5
HSUPA Subtest-4	21.5
HSUPA Subtest-5	22.0
HSPA+ (16QAM) Subtest-1	22.0



LTE Band 5				
Average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	10	≤ 12	0	23.0
QPSK	10	> 12	1	22.0
16QAM	10	≤ 12	1	22.0
16QAM	10	> 12	2	21.0
QPSK	5	≤ 8	0	23.0
QPSK	5	> 8	1	22.0
16QAM	5	≤ 8	1	22.0
16QAM	5	> 8	2	21.0
QPSK	3	≤ 4	0	23.0
QPSK	3	> 4	1	22.0
16QAM	3	≤ 4	1	22.0
16QAM	3	> 4	2	21.0
QPSK	1.4	≤ 5	0	23.0
QPSK	1.4	> 5	1	22.0
16QAM	1.4	≤ 5	1	22.0
16QAM	1.4	> 5	2	21.0

LTE Band 7				
Average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	20	≤ 18	0	24.0
QPSK	20	> 18	1	23.0
16QAM	20	≤ 18	1	23.0
16QAM	20	> 18	2	22.0
QPSK	15	≤ 16	0	24.0
QPSK	15	> 16	1	23.0
16QAM	15	≤ 16	1	23.0
16QAM	15	> 16	2	22.0
QPSK	10	≤ 12	0	24.0
QPSK	10	> 12	1	23.0
16QAM	10	≤ 12	1	23.0
16QAM	10	> 12	2	22.0
QPSK	5	≤ 8	0	24.0
QPSK	5	> 8	1	23.0
16QAM	5	≤ 8	1	23.0
16QAM	5	> 8	2	22.0

Remark:

1. By design, maximum LTE RF power of smaller supported bandwidth does not exceed the RF power of largest supported bandwidth; the information is included in "tune-up procedure" exhibit
2. LTE MPR implementation is the same for normal mode.

Average Power (dBm)				
Mode / Band	WLAN 2.4 GHz Band IEEE 802.11			
	11b	11g	11n-HT20	11n-HT40
Chain Port 0	15	14.5	14	12.5
Chain Port 1	15	15	14	12
Chain Port 0+1			14.5	13

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

FCC ID			SRQ-ZTEMF253L																																											
EUT			4G Wireless Router																																											
Operating Frequency Range of each LTE transmission band			LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz																																											
Channel Bandwidth			1.4MHz, 3MHz, 5MHz, 10MHz (LTE Band 5) 5MHz, 10MHz, 15MHz, 20MHz (LTE Band 7)																																											
Transmission (H, M, L) channel numbers and frequencies in each LTE band																																														
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)																																						
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 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)																																						
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																																						
E category, uplink modulations used			Category 3, QPSK, and 16QAM																																											
LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)			A primary antenna is used for LTE and other wireless interfaces (GSM/WCDMA) for transmitting and receiving. LTE and other wireless interfaces (GSM/WCDMA) share the same antenna, and cannot transmit simultaneously. A 2nd antenna is used for LTE and other wireless interfaces (GSM/WCDMA) for receiving only.																																											
LTE Voice / Data requirements			Data only																																											
LTE MPR permanently built-in by design			Yes, per 3GPP TS 36.101 v11.0.0 Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 <table><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>> 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>≤ 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>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr></table>						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
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 A-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)																																											
Base station simulator used for Testing			Anritsu MT8820C																																											

4. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

Band GSM850	Burst Average Power (dBm)			Frame-Average Power (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) – CS1	31.56	31.61	31.57	22.56	22.61	22.57
GPRS (GMSK, 2 Tx slots) – CS1	29.60	29.74	29.74	23.60	23.74	23.74
EDGE (8PSK, 1 Tx slot) – MCS5	25.50	25.58	25.62	16.50	16.58	16.62
EDGE (8PSK, 2 Tx slots) – MCS5	23.32	23.41	23.45	17.32	17.41	17.45
Band GSM1900	Burst Average Power (dBm)			Frame-Average Power (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) – CS1	28.43	28.21	28.29	19.43	19.21	19.29
GPRS (GMSK, 2 Tx slots) – CS1	26.47	26.24	26.67	20.47	20.24	20.67
EDGE (8PSK, 1 Tx slot) – MCS5	24.14	23.88	24.18	15.14	14.88	15.18
EDGE (8PSK, 2 Tx slots) – MCS5	21.97	21.75	22.08	15.97	15.75	16.08

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 Band V		
Tx Channel			4132	4182	4233
Rx Channel			4357	4407	4458
Frequency (MHz)			826.4	836.4	846.6
3GPP MPR (dB)	3GPP Rel 99	RMC 12.2Kbps	22.48	22.41	22.31
0	3GPP Rel 6	HSDPA Subtest-1	22.24	22.26	22.27
0	3GPP Rel 6	HSDPA Subtest-2	22.37	22.32	22.40
0.5	3GPP Rel 6	HSDPA Subtest-3	21.83	21.80	21.90
0.5	3GPP Rel 6	HSDPA Subtest-4	21.92	21.89	21.89
0	3GPP Rel 8	DC-HSDPA Subtest-1	22.19	22.01	22.04
0	3GPP Rel 8	DC-HSDPA Subtest-2	22.01	21.83	21.93
0.5	3GPP Rel 8	DC-HSDPA Subtest-3	21.72	21.46	21.61
0.5	3GPP Rel 8	DC-HSDPA Subtest-4	21.70	21.46	21.51
0	3GPP Rel 6	HSUPA Subtest-1	21.83	21.45	21.97
2	3GPP Rel 6	HSUPA Subtest-2	21.22	20.89	20.67
1	3GPP Rel 6	HSUPA Subtest-3	20.80	21.06	20.31
2	3GPP Rel 6	HSUPA Subtest-4	21.42	21.19	21.46
0	3GPP Rel 6	HSUPA Subtest-5	21.79	21.66	21.73
2.5	3GPP Rel 7	HSPA+ (16QAM) Subtest-1	21.83	21.75	21.80

<LTE Band 5 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	22.24	22.58	22.09	0
10	QPSK	1	24	22.14	22.32	21.95	
10	QPSK	1	49	22.17	22.36	21.84	
10	QPSK	25	0	21.06	21.04	20.90	1
10	QPSK	25	12	20.99	21.06	20.87	
10	QPSK	25	24	21.06	20.94	21.05	
10	QPSK	50	0	20.96	20.96	20.90	1
10	16QAM	1	0	21.39	21.42	21.19	
10	16QAM	1	24	21.18	21.39	20.80	
10	16QAM	1	49	20.87	21.10	21.08	2
10	16QAM	25	0	20.08	19.94	19.79	
10	16QAM	25	12	19.94	20.02	20.01	
10	16QAM	25	24	20.05	20.03	20.02	2
10	16QAM	50	0	19.93	19.98	19.89	
Channel				20425	20525	20625	Target MPR (dB)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.33	22.24	22.30	0
5	QPSK	1	12	22.20	22.22	22.28	
5	QPSK	1	24	22.30	22.01	22.14	
5	QPSK	12	0	21.23	21.17	21.20	1
5	QPSK	12	6	21.31	21.16	21.21	
5	QPSK	12	11	21.22	21.12	21.32	
5	QPSK	25	0	21.22	21.09	21.20	1
5	16QAM	1	0	21.14	21.46	21.59	
5	16QAM	1	12	20.86	21.31	21.53	
5	16QAM	1	24	21.04	21.25	21.45	2
5	16QAM	12	0	20.41	20.20	20.20	
5	16QAM	12	6	20.36	20.22	20.18	
5	16QAM	12	11	20.16	20.22	20.28	2
5	16QAM	25	0	20.27	20.14	20.09	



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Channel				20415	20525	20635	Target MPR (dB)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.35	22.27	22.45	0
3	QPSK	1	7	22.26	22.20	22.21	
3	QPSK	1	14	22.29	22.13	22.23	
3	QPSK	8	0	21.40	21.21	21.34	1
3	QPSK	8	4	21.38	21.14	21.31	
3	QPSK	8	7	21.32	21.23	21.33	
3	QPSK	15	0	21.35	21.16	21.33	
3	16QAM	1	0	21.68	21.38	21.29	1
3	16QAM	1	7	21.65	20.81	21.21	
3	16QAM	1	14	20.98	21.31	20.97	
3	16QAM	8	0	20.33	20.21	20.20	2
3	16QAM	8	4	20.38	20.07	20.25	
3	16QAM	8	7	20.26	20.20	20.15	
3	16QAM	15	0	20.34	20.23	20.20	
Channel				20407	20525	20643	Target MPR (dB)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.50	22.31	22.40	0
1.4	QPSK	1	2	22.48	22.28	22.29	
1.4	QPSK	1	5	22.42	22.16	22.25	
1.4	QPSK	3	0	22.43	22.20	22.27	
1.4	QPSK	3	1	22.42	22.22	22.29	
1.4	QPSK	3	2	22.41	22.16	22.22	
1.4	QPSK	6	0	21.47	21.23	21.29	1
1.4	16QAM	1	0	21.52	21.53	21.37	1
1.4	16QAM	1	2	21.18	21.52	21.16	
1.4	16QAM	1	5	21.18	21.34	21.27	
1.4	16QAM	3	0	21.32	21.24	21.36	
1.4	16QAM	3	1	21.45	21.26	21.26	
1.4	16QAM	3	2	21.25	21.20	21.32	
1.4	16QAM	6	0	20.52	20.22	20.37	2

<LTE Band 7 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				20850	21100	21350	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	23.07	23.27	23.07	0
20	QPSK	1	49	22.95	22.90	22.87	
20	QPSK	1	99	23.02	22.64	22.92	
20	QPSK	50	0	22.12	21.71	21.60	1
20	QPSK	50	24	22.18	21.63	21.58	
20	QPSK	50	49	21.83	21.64	21.41	
20	QPSK	100	0	21.65	21.71	21.61	1
20	16QAM	1	0	22.41	22.16	21.98	
20	16QAM	1	49	22.15	21.80	21.62	
20	16QAM	1	99	22.26	21.65	21.69	2
20	16QAM	50	0	21.05	20.79	20.63	
20	16QAM	50	24	21.06	20.80	21.00	
20	16QAM	50	49	21.15	20.61	21.32	2
20	16QAM	100	0	21.04	20.82	20.56	
Channel				20825	21100	21375	Target MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	23.26	23.18	23.07	0
15	QPSK	1	37	23.22	23.15	22.82	
15	QPSK	1	74	23.25	22.80	22.92	
15	QPSK	36	0	22.02	21.76	21.83	1
15	QPSK	36	18	22.09	21.72	21.71	
15	QPSK	36	37	22.00	21.64	21.85	
15	QPSK	75	0	21.95	21.67	21.64	1
15	16QAM	1	0	22.38	21.88	22.57	
15	16QAM	1	37	22.15	21.87	21.87	
15	16QAM	1	74	21.94	21.75	22.51	2
15	16QAM	36	0	20.98	20.69	20.83	
15	16QAM	36	18	21.23	20.71	20.77	
15	16QAM	36	37	21.19	20.61	20.88	2
15	16QAM	75	0	21.05	21.08	20.70	



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Channel				20800	21100	21400	Target MPR (dB)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	23.15	22.98	22.99	0
10	QPSK	1	24	23.07	22.66	22.57	
10	QPSK	1	49	23.09	22.77	22.87	
10	QPSK	25	0	22.09	21.83	21.71	1
10	QPSK	25	12	22.08	21.72	21.82	
10	QPSK	25	24	22.26	21.68	21.80	
10	QPSK	50	0	22.03	21.73	21.73	
10	16QAM	1	0	22.78	22.34	22.02	1
10	16QAM	1	24	22.50	22.16	21.90	
10	16QAM	1	49	21.97	22.13	21.82	
10	16QAM	25	0	21.53	20.78	20.75	2
10	16QAM	25	12	21.49	20.65	21.31	
10	16QAM	25	24	21.64	21.22	20.88	
10	16QAM	50	0	21.08	20.78	20.64	
Channel				20775	21100	21425	Target MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	23.12	23.13	23.07	0
5	QPSK	1	12	23.11	22.95	22.50	
5	QPSK	1	24	22.92	23.06	22.56	
5	QPSK	12	0	22.32	21.67	21.78	1
5	QPSK	12	6	21.95	22.13	21.80	
5	QPSK	12	11	21.92	22.05	21.74	
5	QPSK	25	0	21.83	21.60	21.73	
5	16QAM	1	0	21.97	22.36	22.42	1
5	16QAM	1	12	21.90	22.12	21.55	
5	16QAM	1	24	21.95	22.18	21.87	
5	16QAM	12	0	21.22	21.10	21.18	2
5	16QAM	12	6	21.33	21.03	20.80	
5	16QAM	12	11	21.35	20.98	21.22	
5	16QAM	25	0	21.15	20.58	20.72	



<WLAN 2.4GHz Band Conducted Power>

802.11b Average Power (dBm)						
Channel	Frequency (MHz)	Chain Port	Data Rate (bps)			
			1M bps	2M bps	5.5M bps	11M bps
CH 01	2412	0	14.89	14.59	14.63	14.85
CH 06	2437	0	14.96	14.73	14.84	14.94
CH 11	2462	0	12.68	12.43	12.55	12.52
CH 01	2412	1	14.72	14.54	14.58	14.59
CH 06	2437	1	14.02	13.72	13.75	13.95
CH 11	2462	1	12.55	12.57	12.52	12.75

802.11g Average Power (dBm)										
Channel	Frequency (MHz)	Chain Port	Data Rate (bps)							
			6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
CH 01	2412	0	12.97	13.69	13.75	13.97	13.96	13.98	14.14	14.11
CH 06	2437	0	13.46	13.84	13.84	13.96	13.97	14.01	14.12	14.15
CH 11	2462	0	11.58	11.94	11.92	12.13	12.06	12.10	12.28	12.23
CH 01	2412	1	13.72	13.78	13.81	14.01	14.25	14.07	14.46	14.50
CH 06	2437	1	13.12	12.97	13.36	13.44	13.60	13.41	13.60	13.64
CH 11	2462	1	11.83	12.10	12.07	12.11	12.24	12.25	12.57	12.45

WLAN 2.4GHz Band 802.11n-HT20 Average Power (dBm)										
Channel	Frequency (MHz)	Chain Port	MCS Index							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	0	13.71	12.81	13.18	13.31	13.45	13.44	13.29	13.60
CH 06	2437	0	13.08	13.10	13.36	13.38	13.52	13.37	13.25	13.43
CH 11	2462	0	11.18	10.93	11.35	11.38	11.47	11.50	11.65	11.85
CH 01	2412	1	13.16	13.51	13.60	13.74	13.80	13.71	13.74	13.94
CH 06	2437	1	12.44	12.69	12.90	13.03	13.04	13.02	13.19	13.09
CH 11	2462	1	11.21	11.50	11.52	11.61	11.71	11.77	11.82	11.95
Channel	Frequency (MHz)	Chain Port	MCS Index							
			MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 01	2412	0+1(0)	10.30	10.48	10.53	10.65	10.80	11.05	10.96	11.15
		0+1(1)	10.20	10.56	10.77	11.18	11.07	11.15	11.08	11.22
		0+1	13.26	13.53	13.66	13.93	13.95	14.11	14.03	14.19
CH 06	2437	0+1(0)	10.08	10.59	10.72	10.94	11.05	11.25	11.01	11.06
		0+1(1)	9.86	9.96	10.06	10.56	10.50	10.58	10.85	10.67
		0+1	12.98	13.30	13.41	13.77	13.79	13.94	13.94	13.88
CH 11	2462	0+1(0)	8.11	8.37	8.53	8.62	8.91	9.25	8.98	9.18
		0+1(1)	8.31	8.50	8.68	9.27	9.04	9.16	9.09	9.16
		0+1	11.22	11.44	11.62	11.97	11.99	12.21	12.04	12.18

WLAN 2.4GHz Band 802.11n-HT40 Average Power (dBm)										
Channel	Frequency (MHz)	Chain Port	MCS Index							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	0	12.11	11.77	11.69	11.65	11.54	11.13	11.93	11.98
CH 06	2437	0	11.13	11.53	11.53	11.45	11.35	11.12	11.76	11.78
CH 09	2452	0	10.30	10.61	10.75	10.88	10.59	10.23	11.05	10.99
CH 03	2422	1	11.30	11.39	11.60	11.57	11.42	11.20	11.94	11.95
CH 06	2437	1	10.65	11.14	11.05	11.19	11.00	10.72	11.33	11.42
CH 09	2452	1	10.12	10.36	10.31	10.25	9.95	10.10	10.56	10.45
Channel	Frequency (MHz)	Chain Port	MCS Index							
			MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 03	2422	0+1(0)	8.31	8.99	9.09	9.25	9.32	9.36	9.44	9.68
		0+1(1)	9.07	9.41	9.61	9.98	9.83	9.82	9.81	9.76
		0+1	11.72	12.22	12.37	12.64	12.59	12.61	12.64	12.73
CH 06	2437	0+1(0)	8.19	8.86	9.13	9.14	9.22	9.28	9.32	9.36
		0+1(1)	8.05	8.60	8.78	9.24	9.15	9.29	9.49	9.63
		0+1	11.13	11.74	11.97	12.20	12.19	12.30	12.42	12.51
CH 09	2452	0+1(0)	7.21	7.76	7.92	8.27	8.44	8.43	8.54	8.65
		0+1(1)	7.14	7.66	7.96	8.36	8.24	8.42	8.46	8.71
		0+1	10.19	10.72	10.95	11.32	11.35	11.44	11.51	11.69

5. 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 ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	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

6. Radio Frequency Radiation Exposure Evaluation

6.1. Standalone Power Density Calculations

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (W)	Maximum output power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
GPRS 850 (1 Tx slot)	824.2	0.9	32.0	1.19	7.0	245.47	0.05	0.55
GPRS 850 (2 Tx slots)	824.2	0.9	30.0	0.75	7.0	309.03	0.06	0.55
EGPRS 850 (1 Tx slot)	824.2	0.9	26.0	0.30	7.0	61.66	0.01	0.55
EGPRS 850 (2 Tx slots)	824.2	0.9	23.5	0.17	7.0	69.18	0.01	0.55
GPRS 1900 (1 Tx slot)	1850.2	2.9	28.5	1.38	2.0	173.78	0.03	1.00
GPRS 1900 (2 Tx slots)	1850.2	2.9	27.0	0.98	2.0	245.47	0.05	1.00
EGPRS 1900 (1 Tx slot)	1850.2	2.9	24.5	0.55	2.0	69.18	0.01	1.00
EGPRS 1900 (2 Tx slots)	1850.2	2.9	22.5	0.35	2.0	87.10	0.02	1.00
WCDMA Band V	826.4	0.9	22.5	0.13	7.0	218.78	0.04	0.55
LTE Band 5	824.7	2.55	23.0	0.22	7.0	358.92	0.07	0.55
LTE Band 7	2502.5	2.55	24.0	0.45	2.0	451.86	0.09	1.00
WLAN2.4GHz 802.11b Chain Port 0	2412.0	2.9	15.0	0.06	1.0	61.66	0.01	1.00
WLAN2.4GHz 802.11g Chain Port 0	2412.0	2.9	14.5	0.05	1.0	54.95	0.01	1.00
WLAN2.4GHz 802.11n-HT20 Chain Port 0	2412.0	2.9	14.0	0.05	1.0	48.98	0.01	1.00
WLAN2.4GHz 802.11n-HT40 Chain Port 0	2422.0	2.9	12.5	0.03	1.0	34.67	0.01	1.00
WLAN2.4GHz 802.11b Chain Port 1	2412.0	2.5	15.0	0.06	1.0	56.23	0.01	1.00
WLAN2.4GHz 802.11g Chain Port 1	2412.0	2.5	15.0	0.06	1.0	56.23	0.01	1.00
WLAN2.4GHz 802.11n-HT20 Chain Port 1	2412.0	2.5	14.0	0.04	1.0	44.67	0.01	1.00
WLAN2.4GHz 802.11n-HT40 Chain Port 1	2422.0	2.5	12.0	0.03	1.0	28.18	0.01	1.00
WLAN2.4GHz 802.11n-HT20 Chain Port 0+1	2412.0	2.7	14.5	0.05	1.0	52.48	0.01	1.00
WLAN2.4GHz 802.11n-HT40 Chain Port 0+1	2422.0	2.7	13.0	0.04	1.0	37.15	0.01	1.00

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

6.2. Collocated Power Density Calculations

Note:

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 15dBm.
2. A maximum antenna gain of 2.9 dBi for WLAN has been assumed for all collocated antennas.

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
GPRS 850 (1 Tx slot)	824.2	0.9	32.0	1.19	245.47	0.05	0.55	0.09
GPRS 850 (2 Tx slots)	824.2	0.9	30.0	0.75	309.03	0.06	0.55	0.11
EGPRS 850 (1 Tx slot)	824.2	0.9	26.0	0.30	61.66	0.01	0.55	0.02
EGPRS 850 (2 Tx slots)	824.2	0.9	23.5	0.17	69.18	0.01	0.55	0.03
GPRS 1900 (1 Tx slot)	1850.2	2.9	28.5	1.38	173.78	0.03	1.00	0.03
GPRS 1900 (2 Tx slots)	1850.2	2.9	27.0	0.98	245.47	0.05	1.00	0.05
EGPRS 1900 (1 Tx slot)	1850.2	2.9	24.5	0.55	69.18	0.01	1.00	0.01
EGPRS 1900 (2 Tx slots)	1850.2	2.9	22.5	0.35	87.10	0.02	1.00	0.02
WCDMA Band V	826.4	0.9	22.5	0.13	218.78	0.04	0.55	0.08
LTE Band 5	824.7	2.55	23.0	0.22	358.92	0.07	0.55	0.13
LTE Band 7	2502.5	2.55	24.0	0.45	451.86	0.09	1.00	0.09
WLNA2.4GHz Band	2412	2.9	15.0	0.06	61.66	0.01	1.00	0.01

Mode	Frequency (MHz)	EIRP (dBm)	Calculated Power Density (mW/cm ²)	Limit (mW/cm ²)	WLAN Power Density / Limit	LTE Band 5 Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN
WLNA2.4GHz Band Chain Port 0	2412 ~ 2462	15.0	0.01	1	0.01	0.13	0.14

Note:

1. For collocation analysis, LTE Band 5 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)], for WWAN + WLAN.

Conclusion:

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