RF Exposure Evaluation Report

APPLICANT	**:**	**Quectel Wireless Solutions Co., Ltd.**
EQUIPMENT	**:**	**LTE Module**
BRAND NAME	**:**	**Quectel**
MODEL NAME	**:**	**SC20-A**
FCC ID	**:**	**XMR201706SC20A**
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.

Mark Qu

Reviewed by: Mark Qu / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Sporton International (KunShan) INC.
No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA741007	Rev. 01	Initial issue of report	Aug. 11, 2017

1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	Sporton International (KunShan) INC.
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

Applicant	
Company Name	Quectel Wireless Solutions Co., Ltd.
Address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Manufacturer	
Company Name	Quectel Wireless Solutions Co., Ltd.
Address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	LTE Module
Brand Name	Quectel
Model Name	SC20-A
FCC ID	XMR201706SC20A
IMEI Code	861097036472516 861097036472524
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is not supported) LTE: QPSK, 16QAM 802.11b/g/n HT20/HT40 802.11a/n HT20/HT40 Bluetooth v3.0 + EDR, Bluetooth v4.0 LE, Bluetooth v4.1 LE
Antenna Type	WWAN: Dipole Antenna WLAN: Dipole Antenna Bluetooth: Dipole Antenna
HW Version	R1.0
SW Version	SC20ASAR04A03H8G
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 33.	

3. Maximum RF average output power among production units

<GSM>

Mode	Burst Average Power (dBm)	
	GSM 850	GSM 1900
GSM 1 Tx slot	33.00	30.50
GPRS 1 Tx slot	33.00	30.50
GPRS 2 Tx slots	33.00	30.50
GPRS 3 Tx slots	31.50	30.50
GPRS 4 Tx slots	30.00	30.50
EDGE 1 Tx slot	27.00	26.50
EDGE 2 Tx slots	27.00	26.50
EDGE 3 Tx slots	27.00	26.50
EDGE 4 Tx slots	27.00	26.50

<WCDMA>

Mode	Average Power (dBm)		
	WCDMA Band II	WCDMA Band IV	WCDMA Band V
AMR 12.2Kbps	24.00	24.00	24.00
RMC 12.2Kbps	24.00	24.00	24.00
HSDPA Subtest-1	23.00	23.00	23.00
HSDPA Subtest-2	23.00	23.00	23.00
HSDPA Subtest-3	22.50	22.50	22.50
HSDPA Subtest-4	22.50	22.50	22.50
DC-HSDPA Subtest-1	22.00	22.00	22.00
DC-HSDPA Subtest-2	22.00	22.00	22.00
DC-HSDPA Subtest-3	22.00	22.00	22.00
DC-HSDPA Subtest-4	22.00	22.00	22.00
HSUPA Subtest-1	22.50	23.00	22.50
HSUPA Subtest-2	21.50	21.50	21.50
HSUPA Subtest-3	21.50	21.50	21.50
HSUPA Subtest-4	22.00	22.00	22.00
HSUPA Subtest-5	23.00	23.00	23.00

<LTE>

Average Power (dBm)											
Modulation	BW (MHz)	RB Size	Target MPR	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 7	LTE Band 12	LTE Band 13	LTE Band 25	LTE Band 26
QPSK	20	≤ 18	0	24.00	24.50	-	24.50	-	-	24.00	-
QPSK	20	> 18	0-1	23.00	23.50	-	23.50	-	-	23.00	-
16QAM	20	≤ 18	0-1	23.00	23.50	-	23.50	-	-	23.00	-
16QAM	20	> 18	0-2	22.00	22.50	-	22.50	-	-	22.00	-
QPSK	15	≤ 16	0	24.00	24.50	-	24.50	-	-	24.00	24.00
QPSK	15	> 16	0-1	23.00	23.50	-	23.50	-	-	23.00	23.00
16QAM	15	≤ 16	0-1	23.00	23.50	-	23.50	-	-	23.00	23.00
16QAM	15	> 16	0-2	22.00	22.50	-	22.50	-	-	22.00	22.00
QPSK	10	≤ 12	0	24.00	24.50	24.50	24.50	24.00	24.00	24.00	24.00
QPSK	10	> 12	0-1	23.00	23.50	23.50	23.50	23.00	23.00	23.00	23.00
16QAM	10	≤ 12	0-1	23.00	23.50	23.50	23.50	23.00	23.00	23.00	23.00
16QAM	10	> 12	0-2	22.00	22.50	22.50	22.50	22.00	22.00	22.00	22.00
QPSK	5	≤ 8	0	24.00	24.50	24.50	24.50	24.00	24.00	24.00	24.00
QPSK	5	> 8	0-1	23.00	23.50	23.50	23.50	23.00	23.00	23.00	23.00
16QAM	5	≤ 8	0-1	23.00	23.50	23.50	23.50	23.00	23.00	23.00	23.00
16QAM	5	> 8	0-2	22.00	22.50	22.50	22.50	22.00	22.00	22.00	22.00
QPSK	3	≤ 4	0	24.00	24.50	24.50	-	24.00	-	24.00	24.00
QPSK	3	> 4	0-1	23.00	23.50	23.50	-	23.00	-	23.00	23.00
16QAM	3	≤ 4	0-1	23.00	23.50	23.50	-	23.00	-	23.00	23.00
16QAM	3	> 4	0-2	22.00	22.50	22.50	-	22.00	-	22.00	22.00
QPSK	1.4	≤ 5	0	24.00	24.50	24.50	-	24.00	-	24.00	24.00
QPSK	1.4	> 5	0-1	23.00	23.50	23.50	-	23.00	-	23.00	23.00
16QAM	1.4	≤ 5	0-1	23.00	23.50	23.50	-	23.00	-	23.00	23.00
16QAM	1.4	> 5	0-2	22.00	22.50	22.50	-	22.00	-	22.00	22.00

Remark: The mark "-" in gray means that this bandwidth is not supported.

<2.4GHz WLAN>

Frequency	Mode	Maximum Average Power (dBm)
WLAN 2.4GHz	802.11b	16.50
	802.11g	14.50
	802.11n-HT20	14.00
	802.11n-HT40	14.00

<5GHz WLAN>

Frequency	Mode	Maximum Average Power (dBm)
WLAN 5.2GHz	802.11a	13.00
	802.11n-HT20	14.00
	802.11n-HT40	13.50
WLAN 5.3GHz	802.11a	13.50
	802.11n-HT20	14.00
	802.11n-HT40	13.50
WLAN 5.5GHz	802.11a	13.00
	802.11n-HT20	13.50
	802.11n-HT40	12.50
WLAN 5.8GHz	802.11a	12.50
	802.11n-HT20	12.00
	802.11n-HT40	11.00

<Bluetooth>

Frequency	Mode	Maximum Average Power (dBm)
Bluetooth	v3.0+EDR	8.00
	v4.0/4.1 LE	3.00

The table below summarized necessary items addressed in KDB 941225 D05 v02r05

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>XMR201706SC20A</td></tr>
<tr><td>Equipment Name</td><td>LTE Module</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz
LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
LTE Band 5: 824.7 MHz ~ 848.3 MHz
LTE Band 7: 2502.5 MHz ~ 2567.5 MHz
LTE Band 12: 699.7 MHz ~ 715.3 MHz
LTE Band 13: 779.5 MHz ~ 784.5 MHz
LTE Band 25: 1850.7 MHz ~ 1914.3 MHz
LTE Band 26: 814.7 MHz ~ 848.3 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 13: 5MHz, 10MHz
LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz</td></tr>
<tr><td>Uplink modulations used</td><td>QPSK and 16QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data Only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>
Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth configuration [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>
Table 6.2.3_3.3-1: Maximum Power Reduction (MPR) for Power Class 3
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<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth configuration [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>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>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)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>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.</td></tr>
<tr><td>LTE Release Version</td><td>R11, Cat 4</td></tr>
<tr><td>CA Support</td><td>Not Supported</td></tr>
</table>

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
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 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 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
LTE Band 12								
	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	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

LTE Band 13				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		

LTE Band 25												
	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905

LTE Band 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

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^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/f2)	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/f2)	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)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
GSM850 (1 Tx slot)	824.2	3.0	33.0	36.00	3.981	7.000	501.187	0.100	0.549	0.182
GPRS850 (1 Tx slot)	824.2	3.0	33.0	36.00	3.981	7.000	501.187	0.100	0.549	0.182
GPRS850 (2 Tx slots)	824.2	3.0	33.0	36.00	3.981	7.000	1000.000	0.199	0.549	0.362
GPRS850 (3 Tx slots)	824.2	3.0	31.5	34.50	2.818	7.000	1056.818	0.210	0.549	0.383
GPRS850 (4 Tx slots)	824.2	3.0	30.0	33.00	1.995	7.000	1000.000	0.199	0.549	0.362
EGPRS850 (1 Tx slot)	824.2	3.0	27.0	30.00	1.000	7.000	125.893	0.025	0.549	0.046
EGPRS850 (2 Tx slots)	824.2	3.0	27.0	30.00	1.000	7.000	251.189	0.050	0.549	0.091
EGPRS850 (3 Tx slots)	824.2	3.0	27.0	30.00	1.000	7.000	374.973	0.075	0.549	0.136
EGPRS850 (4 Tx slots)	824.2	3.0	27.0	30.00	1.000	7.000	501.187	0.100	0.549	0.182
GSM1900 (1 Tx slot)	1850.2	2.5	30.5	33.00	1.995	2.000	251.189	0.050	1.000	0.050
GPRS1900 (1 Tx slot)	1850.2	2.5	30.5	33.00	1.995	2.000	251.189	0.050	1.000	0.050
GPRS1900 (2 Tx slots)	1850.2	2.5	30.5	33.00	1.995	2.000	501.187	0.100	1.000	0.100
GPRS1900 (3 Tx slots)	1850.2	2.5	30.5	33.00	1.995	2.000	748.170	0.149	1.000	0.149
GPRS1900 (4 Tx slots)	1850.2	2.5	30.5	33.00	1.995	2.000	1000.000	0.199	1.000	0.199
EGPRS1900 (1 Tx slot)	1850.2	2.5	26.5	29.00	0.794	2.000	100.000	0.020	1.000	0.020
EGPRS1900 (2 Tx slots)	1850.2	2.5	26.5	29.00	0.794	2.000	199.526	0.040	1.000	0.040
EGPRS1900 (3 Tx slots)	1850.2	2.5	26.5	29.00	0.794	2.000	297.852	0.059	1.000	0.059
EGPRS1900 (4 Tx slots)	1850.2	2.5	26.5	29.00	0.794	2.000	398.107	0.079	1.000	0.079
WCDMA Band II	1852.4	2.5	24.0	26.50	0.447	2.000	446.684	0.089	1.000	0.089
WCDMA Band IV	1712.4	5.0	24.0	29.00	0.794	1.000	794.328	0.158	1.000	0.158
WCDMA Band V	826.4	3.0	24.0	27.00	0.501	7.000	501.187	0.100	0.551	0.181
LTE Band 2	1850.7	2.5	24.0	26.50	0.447	2.000	446.684	0.089	1.000	0.089
LTE Band 4	1710.7	5.0	24.5	29.50	0.891	1.000	891.251	0.177	1.000	0.177
LTE Band 5	824.7	3.0	24.5	27.50	0.562	7.000	562.341	0.112	0.550	0.204
LTE Band 7	2502.5	8.5	24.5	33.00	1.995	2.000	1995.262	0.397	1.000	0.397
LTE Band 12	699.7	6.0	24.0	30.00	1.000	3.000	1000.000	0.199	0.466	0.427
LTE Band 13	779.5	6.0	24.0	30.00	1.000	3.000	1000.000	0.199	0.520	0.383
LTE Band 25	1850.7	2.5	24.0	26.50	0.447	2.000	446.684	0.089	1.000	0.089
LTE Band 26	814.7	3.0	24.0	27.00	0.501	7.000	501.187	0.100	0.543	0.184

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz 802.11b	2412	3.0	16.5	19.50	0.089	1.000	89.125	0.018	1.000	0.018
WLAN2.4GHz 802.11g	2412	3.0	14.5	17.50	0.056	1.000	56.234	0.011	1.000	0.011
WLAN2.4GHz 802.11n-HT20	2412	3.0	14.0	17.00	0.050	1.000	50.119	0.010	1.000	0.010
WLAN2.4GHz 802.11n-HT40	2422	3.0	14.0	17.00	0.050	1.000	50.119	0.010	1.000	0.010
WLAN5.2GHz 802.11a	5180	4.0	13.0	17.00	0.050	0.250	50.119	0.010	1.000	0.010
WLAN5.2GHz 802.11n-HT20	5180	4.0	14.0	18.00	0.063	0.250	63.096	0.013	1.000	0.013
WLAN5.2GHz 802.11n-HT40	5190	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.3GHz 802.11a	5260	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.3GHz 802.11n-HT20	5260	4.0	14.0	18.00	0.063	0.250	63.096	0.013	1.000	0.013
WLAN5.3GHz 802.11n-HT40	5270	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.5GHz 802.11a	5500	4.0	13.0	17.00	0.050	0.250	50.119	0.010	1.000	0.010
WLAN5.5GHz 802.11n-HT20	5500	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.5GHz 802.11n-HT40	5510	4.0	12.5	16.50	0.045	0.250	44.668	0.009	1.000	0.009
WLAN5.8GHz 802.11a	5745	4.0	12.5	16.50	0.045	1.000	44.668	0.009	1.000	0.009
WLAN5.8GHz 802.11n-HT20	5745	4.0	12.0	16.00	0.040	1.000	39.811	0.008	1.000	0.008
WLAN5.8GHz 802.11n-HT40	5755	4.0	11.0	15.00	0.032	1.000	31.623	0.006	1.000	0.006
Bluetooth v3.0+EDR	2402	3.0	8.0	11.00	0.013	0.125	12.589	0.003	1.000	0.003
Bluetooth v4.0/4.1 LE	2402	3.0	3.0	6.00	0.004	1.000	3.981	0.001	1.000	0.001

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

5.2. Collocated Power Density Calculation

Power Density / Limit				Σ(Power Density / Limit) of WWAN+2.4GHz WLAN+5GHz WLAN+Bluetooth
1	2	3	4	1+2+3+4
WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth	
0.427	0.018	0.013	0.003	0.461

Note:

1. For colocation analysis, LTE Band 12 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)].

Conclusion:

Based on 47 CFR §2.1091, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Technology	Band	Maximum Conducted Power (dBm)	Maximum Antenna Gain (dBi)
GSM	GSM850	33.0	3.0
	GSM1900	30.5	2.5
WCDMA	Band II	24.0	2.5
	Band IV	24.0	5.0
	Band V	24.0	3.0
LTE	Band 2	24.0	2.5
	Band 4	24.5	5.0
	Band 5	24.5	3.0
	Band 7	24.5	8.5
	Band 12	24.0	6.0
	Band 13	24.0	6.0
	Band 25	24.0	2.5
	Band 26	24.0	3.0
WLAN	2.4GHz WLAN	16.5	3.0
	5GHz WLAN	14.0	4.0
Bluetooth	2.4GHz Bluetooth	8.0	3.0