



RF Exposure Evaluation Report

APPLICANT : NETGEAR, Inc.
EQUIPMENT : Mobile LTE Broadband 11n Wireless Router
BRAND NAME : NETGEAR
MODEL NAME : LG2200D
FCC ID : PY313400244
STANDARD : 47 CFR Part 2.1091

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

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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1. Administration Data

1.1. Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

1.2. Applicant

Company Name	NETGEAR, Inc.
Address	350 East Plumeria Drive, San Jose, California 95134, USA

1.3. Manufacturer

Company Name	NETGEAR, Inc.
Address	350 East Plumeria Drive, San Jose, California 95134, USA



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Mobile LTE Broadband 11n Wireless Router
Brand Name	NETGEAR
Model Name	LG2200D
FCC ID	PY313400244
Wireless Technology and Frequency Range	LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz
Mode	• LTE: QPSK, 16QAM • 802.11b/g/n HT20/HT40
Antenna Type	WWAN: External Dipole Antenna WLAN: Internal Printed Antenna
HW Version	005
SW Version	1.0.0.30
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



3. Maximum RF average output power among production units

Band / Frequency (MHz)	IEEE 802.11 Average Power (dBm)				
	Ant 0		Ant 1	Ant 0+1	
	11b	11g	11g	11g	HT20
2.4GHz Band	25.5		22	24	

LTE Band 4				
Average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	20	≤ 18	0	25
QPSK	20	> 18	1	24
16QAM	20	≤ 18	1	23
16QAM	20	> 18	2	23
QPSK	15	≤ 16	0	25
QPSK	15	> 16	1	24
16QAM	15	≤ 16	1	23
16QAM	15	> 16	2	23
QPSK	10	≤ 12	0	25
QPSK	10	> 12	1	24
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	23
QPSK	5	≤ 8	0	25
QPSK	5	> 8	1	24
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	23
QPSK	3	≤ 4	0	25
QPSK	3	> 4	1	24
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	23
QPSK	1.4	≤ 5	0	25
QPSK	1.4	> 5	1	24
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	23



LTE Band 5				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	10	≤ 12	0	25
QPSK	10	> 12	1	24
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	23
QPSK	5	≤ 8	0	25
QPSK	5	> 8	1	24
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	23
QPSK	3	≤ 4	0	25
QPSK	3	> 4	1	24
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	23
QPSK	1.4	≤ 5	0	25
QPSK	1.4	> 5	1	24
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	23

LTE Band 12				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	22
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	22
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	22
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	22
16QAM	1.4	> 5	2	22



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

FCC ID	PY313400244																																																	
EUT	Mobile LTE Broadband 11n Wireless Router																																																	
Operating Frequency Range of each LTE transmission band	LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz																																																	
Channel Bandwidth	LTE Band 12: 1.4MHz, 3MHz, 5MHz, 10MHz, LTE Band 5: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 4: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz																																																	
Transmission (H, M, L) channel numbers and frequencies in each LTE band																																																		
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)	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 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)	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																																						
E category, uplink modulations used	Category 3, QPSK, and 16QAM																																																	
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 border="1" style="margin-left: 20px;"> <thead> <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> </thead> <tbody> <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> </tbody> </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.																																																	
Base station simulator used for Testing	Anritsu MT8820C																																																	



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/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



5. Radio Frequency Radiation Exposure Evaluation

5.1. Power Density Calculations

Table with 10 columns: Band, Frequency (MHz), Antenna Gain (dBi), Maximum Power (dBm), Maximum ERP/EIRP (W), Maximum ERP/EIRP Limit (W), Average EIRP (mW), Power Density at 20cm (mW/cm2), Limit (mW/cm2), Power Density / Limit. Rows include LTE Band 12, LTE Band 5, LTE Band 4, and WLAN 2.4GHz Band.

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

Table with 3 columns: Mode, Maximum Power Density / Limit, and Σ (Power Density / Limit) of WWAN+WLAN. Rows for WWAN and WLAN.

Note:

- 1. 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.
2. Considering the WWAN module collocation with the WWAN and WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant

Conclusion:

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