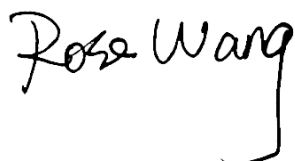


# RF Exposure Evaluation Report

APPLICANT : Quectel Wireless Solutions Co., Ltd.  
EQUIPMENT : LTE Module  
BRAND NAME : Quectel  
MODEL NAME : AG35-LA  
FCC ID : XMR201905AG35LA  
STANDARD : 47 CFR Part 2.1091  
FCC KDB 447498 D01 v06

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Reviewed by: Rose Wang / Supervisor



Approved by: Kat Yin / Manager



**Sporton International (Kunshan) Inc.**

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province  
215300 People's Republic of China



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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA932502	Rev. 01	Initial issue of report	Jun. 26, 2019



## **1. Administration Data**

### **1.1. Testing Laboratory**

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
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	AG35-LA
FCC ID	XMR201905AG35LA
IMEI Code	864506031249668
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
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+: 16QAM (Uplink is not supported) LTE: QPSK, 16QAM, 64QAM(Downlink only)
HW Version	R1.0
SW Version	AG35LAVAR08A01T4G
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. Maximum RF average output power among production units****<GSM>**

Mode	Burst Average Power (dBm)	
	GSM 850	GSM 1900
GSM 1 Tx slot	33.50	31.00
GPRS 1 Tx slot	33.50	31.00
GPRS 2 Tx slots	32.50	30.00
GPRS 3 Tx slots	31.50	28.00
GPRS 4 Tx slots	30.50	27.50
EDGE 1 Tx slot	27.50	27.00
EDGE 2 Tx slots	27.00	26.50
EDGE 3 Tx slots	25.00	24.50
EDGE 4 Tx slots	24.50	23.50

**<WCDMA>**

Mode		Maximum Average power(dBm)
WCDMA	Band II	23.50
	Band IV	23.50
	Band V	23.50

**<LTE>**

Mode		Maximum Average power(dBm)
LTE	Band 2	24.00
	Band 4	24.00
	Band 5	24.00
	Band 7	24.00



#### **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)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
GSM 850 (1 Tx slot)	824.2	4.50	33.50	38.00	794.33	0.158	0.549
GPRS 850 (1 Tx slot)	824.2	4.50	33.50	38.00	794.33	0.158	0.549
GPRS 850 (2 Tx slots)	824.2	4.50	32.50	37.00	1252.97	0.249	0.549
GPRS 850 (3 Tx slots)	824.2	4.50	31.50	36.00	1492.79	0.297	0.549
GPRS 850 (4 Tx slots)	824.2	4.50	30.50	35.00	1584.89	0.315	0.549
EGPRS 850 (1 Tx slot)	824.2	4.50	27.50	32.00	199.53	0.040	0.549
EGPRS 850 (2 Tx slots)	824.2	4.50	27.00	31.50	353.13	0.070	0.549
EGPRS 850 (3 Tx slots)	824.2	4.50	25.00	29.50	334.22	0.067	0.549
EGPRS 850 (4 Tx slots)	824.2	4.50	24.50	29.00	397.16	0.079	0.549
GSM 1900 (1 Tx slot)	1850.2	2.00	31.00	33.00	251.19	0.050	1.000
GPRS 1900 (1 Tx slot)	1850.2	2.00	31.00	33.00	251.19	0.050	1.000
GPRS 1900 (2 Tx slots)	1850.2	2.00	30.00	32.00	396.22	0.079	1.000
GPRS 1900 (3 Tx slots)	1850.2	2.00	28.00	30.00	374.97	0.075	1.000
GPRS 1900 (4 Tx slots)	1850.2	2.00	27.50	29.50	446.68	0.089	1.000
EGPRS 1900 (1 Tx slot)	1850.2	2.00	27.00	29.00	100.00	0.020	1.000
EGPRS 1900 (2 Tx slots)	1850.2	2.00	26.50	28.50	176.99	0.035	1.000
EGPRS 1900 (3 Tx slots)	1850.2	2.00	24.50	26.50	167.51	0.033	1.000
EGPRS 1900 (4 Tx slots)	1850.2	2.00	23.50	25.50	177.41	0.035	1.000
WCDMA Band 2	1852.4	2.00	23.50	25.50	354.81	0.071	1.000
WCDMA Band 4	1712.4	5.00	23.50	28.50	707.95	0.141	1.000
WCDMA Band 5	826.4	4.50	23.50	28.00	630.96	0.126	0.551
LTE Band 2	1850.7	2.00	24.00	26.00	398.11	0.079	1.000
LTE Band 4	1710.7	5.00	24.00	29.00	794.33	0.158	1.000
LTE Band 5	824.7	4.50	24.00	28.50	707.95	0.141	0.550
LTE Band 7	2502.5	7.00	24.00	31.00	1258.93	0.251	1.000

**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

**Note:**

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 29.5dBm and for Bluetooth is less than or equal to 29.5dBm.
2. A maximum antenna gain of 6dBi for WLAN/BT has been assumed for all collocated antennas.

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Power Density / Limit
GSM 850 (1 Tx slot)	824.2	4.50	33.50	38.00	794.33	0.158	0.549	0.288
GPRS 850 (1 Tx slot)	824.2	4.50	33.50	38.00	794.33	0.158	0.549	0.288
GPRS 850 (2 Tx slots)	824.2	4.50	32.50	37.00	1252.97	0.249	0.549	0.454
GPRS 850 (3 Tx slots)	824.2	4.50	31.50	36.00	1492.79	0.297	0.549	0.541
GPRS 850 (4 Tx slots)	824.2	4.50	30.50	35.00	1584.89	0.315	0.549	0.574
EGPRS 850 (1 Tx slot)	824.2	4.50	27.50	32.00	199.53	0.040	0.549	0.072
EGPRS 850 (2 Tx slots)	824.2	4.50	27.00	31.50	353.13	0.070	0.549	0.128
EGPRS 850 (3 Tx slots)	824.2	4.50	25.00	29.50	334.22	0.067	0.549	0.121
EGPRS 850 (4 Tx slots)	824.2	4.50	24.50	29.00	397.16	0.079	0.549	0.144
GSM 1900 (1 Tx slot)	1850.2	2.00	31.00	33.00	251.19	0.050	1.000	0.050
GPRS 1900 (1 Tx slot)	1850.2	2.00	31.00	33.00	251.19	0.050	1.000	0.050
GPRS 1900 (2 Tx slots)	1850.2	2.00	30.00	32.00	396.22	0.079	1.000	0.079
GPRS 1900 (3 Tx slots)	1850.2	2.00	28.00	30.00	374.97	0.075	1.000	0.075
GPRS 1900 (4 Tx slots)	1850.2	2.00	27.50	29.50	446.68	0.089	1.000	0.089
EGPRS 1900 (1 Tx slot)	1850.2	2.00	27.00	29.00	100.00	0.020	1.000	0.020
EGPRS 1900 (2 Tx slots)	1850.2	2.00	26.50	28.50	176.99	0.035	1.000	0.035
EGPRS 1900 (3 Tx slots)	1850.2	2.00	24.50	26.50	167.51	0.033	1.000	0.033
EGPRS 1900 (4 Tx slots)	1850.2	2.00	23.50	25.50	177.41	0.035	1.000	0.035
WCDMA Band II	1852.4	2.00	23.50	25.50	354.81	0.071	1.000	0.071
WCDMA Band IV	1712.4	4.00	23.50	27.50	562.34	0.112	1.000	0.112
WCDMA Band V	826.4	4.50	23.50	28.00	630.96	0.126	0.551	0.228
LTE Band 2	1850.7	2.00	24.00	26.00	398.11	0.079	1.000	0.079
LTE Band 4	1710.7	4.00	24.00	28.00	630.96	0.126	1.000	0.126
LTE Band 5	824.7	4.50	24.00	28.50	707.95	0.141	0.550	0.256
LTE Band 7	2502.5	7.00	24.00	31.00	1258.93	0.251	1.000	0.251
WLAN2.4GHz Band	2412	6.00	23.50	29.50	891.25	0.177	1.000	0.177
WLAN5GHz Band	5180	6.00	23.50	29.50	891.25	0.177	1.000	0.177
Bluetooth	2402	6.00	23.50	29.50	891.25	0.177	1.000	0.177

WWAN Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	$\Sigma$ (Power Density / Limit) of WWAN + WLAN + Bluetooth
0.574	0.177	0.177	0.928

**Note:**

1. For collocation analysis, GPRS 850 (4 Tx slots) is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2.  $\Sigma$ (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 + Bluetooth.
3. Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

**Conclusion:**

Based on 47 CFR §2.1091 and FCC KDB 447498 D01 v06, 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:

Device	Band	Frequency (MHz)	Maximum Conducted Power (dBm)	Standalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
LTE Module	GSM850	824.2	33.50	4.50	4.50
	GSM1900	1850.2	31.00	2.00	2.00
	WCDMA Band II	1852.4	23.50	2.00	2.00
	WCDMA Band IV	1712.4	23.50	5.00	4.00
	WCDMA Band V	826.4	23.50	4.50	4.50
	LTE Band 2	1850.7	24.00	2.00	2.00
	LTE Band 4	1710.7	24.00	5.00	4.00
	LTE Band 5	824.7	24.00	4.50	4.50
	LTE Band 7	2502.5	24.00	7.00	7.00
Collocated Transmitters	WLAN2.4GHz	2412.0	23.50		6.00
	WLAN5GHz	5180.0	23.50		6.00
	Bluetooth	2402.0	23.50		6.00