

RF Exposure Evaluation Declaration

Product Name : LTE Module

Model No.: EC25-E, EC25-E MINIPCIE

Applicant : Quectel Wireless Solutions Co. Ltd
Address : Room 501, Building 13, No.99 Tianzhou Road, Xuhui
District, Shanghai,China

Date of Receipt : 03-22-2017

Issued Date : 04-24-2017

Report No. : UL32220170322CE006-7

Report Version : V1.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Address : Room 501, Building 13, No.99 Tianzhou Road, Xuhui District,
Shanghai,China
Manufacturer : Quectel Wireless Solutions Co. Ltd
Address : Room 501, Building 13, No.99 Tianzhou Road, Xuhui District,
Shanghai,China
EUT Voltage : Extreme Low: 3.3V Nominal: 4.0V Extreme High: 4.6V
Brand Name : Quectel
Applicable Standard : EN62311:2008
Test Result : Complied
Performed Location : Unilab (Shanghai) Co.,Ltd.
No.1350 Lianxi Rd., Pudong., Shanghai, China
TEL:+86-21-5027-5125/FAX:+86-21-5027-5126

Documented By :



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Reviewed By :



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Approved By :



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1.RF Exposure Evaluation

The scope of this standard is limited to apparatus which is intended for use by the general public as defined in the Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (Official Journal L 199 of 30 July 1999).

This generic standard applies to electronic and electrical apparatus for which no dedicated product or product family standard regarding human exposure to electromagnetic fields applies. This generic standard does not cover equipment, which fulfils the requirements given in EN50371 or is medical equipment as defined in the Council Directive 93/42/EEC of 14 June 1993 concerning medical devices.

The frequency range covered is 0 Hz to 300 GHz.

The object of this standard is to demonstrate the compliance of such apparatus with the basic restrictions or reference levels on exposure of the general public related to electric, magnetic, electromagnetic fields and induced and contact current.

1.1. Limits

The electronic and electro-technical apparatus shall comply with the basic restriction as specified in Annex II of Council Recommendation 1999/519/EC.

The reference levels in the Council Recommendation 1999/519/EC on public exposure to electromagnetic fields are derived from the basic restrictions using worst-case assumptions about exposure.

According to EN62311, the reference level listed in the following table 2 shall be used to evaluate the environment impact of human exposure human exposure to electromagnetic fields (0 Hz - 300 GHz) as specified in 1999/519/EC.

Council Recommendation 1999/519/EC of 12 July 1999

Table 2

Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

Frequency Range	E-Field Strength (V/m)	H-Field Strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq(W/m ²)
0-1 Hz	-	$3.2 \cdot 10^4$	$4 \cdot 10^4$	-
1-8 Hz	10000	$3.2 \cdot 10^4 / f^2$	$4 \cdot 10^4 / f^2$	-
8-25 Hz	10000	$4000 / f$	$5000 / f$	-
0.025-0.8 kHz	$250 / f$	$4 / f$	$5 / f$	-
0.8-3 kHz	$250 / f$	5	6.25	-
3-150 kHz	87	5	6.25	-
0.15-1 MHz	87	$0.73 / f$	$0.92 / f$	-
1-10 MHz	$87 / f^{1/2}$	$0.73 / f$	$0.92 / f$	-
10-400 MHz	28	0.73	0.092	2
400-2000MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	$f/200$
2-300 GHz	61	0.16	0.20	10

Notes:

1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, Seq, E₂, H₂, and B₂ are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, Seq, E₂, H₂, and B₂ are to be averaged over any $68 / f^{1.05}$ -minute period (f in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

1.2.Assessment

Under normal use of condition, this device has a separation distance of at least 20cm between the antenna and the body of the user. A radiation exposure statement" this equipment should be installed and operated with minimum distance between the antenna and your body" is shown on the user manual, so human exposure to the electromagnetic field of this product is at far-field region under normal use.

Far-field region Calculation Formula:

P watts are radiated, from a point, uniformly over the surface of sphere of radius r.

In free space

$$E = \mu_0 H = [30 * P * G(\theta, \phi)]^{0.5} / r$$

Where

G = antenna gain relative to an isotropic antenna

θ, ϕ = elevation and azimuth angles to point of investigation

r = distance from observation point to the antenna (m)

μ_0 = characteristic impedance of free space

Safety Distance Calculation Formula:

The power flux:

$$S = \frac{P * G(\theta, \phi)}{4 * \pi * r^2}$$

So safety distance as following:

$$r = \sqrt{\frac{P * G(\theta, \phi)}{4 * \pi * S}}$$

P = input power of the antenna

G = antenna gain relative to an isotropic antenna

θ, ϕ = elevation and azimuth angles.

r = distance from the antenna to the point of investigation

1.3. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 20°C and 56% RH.

1.4. Test Result of RF Exposure Evaluation

Product	EC25-E, EC25-E MINIPCIE
Test Item	RF Exposure Evaluation
Test Site	FACT-3

Antenna Gain:

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4dBi for GSM/WCDMA/LTE.

Output Power into Antenna & RF Exposure Evaluation Distance:

Test Mode	Frequency Band (MHz)	Maximum Output Power(dBm)	Average EIRP (dBm)	Limit of Power Density S (W/m ²)	Safety Distance (cm)
GSM 900	880~915	32.5	27.5	4.4	10.08
GPRS 900 4 Tx Slot	880~915	30.5	31.5	4.4	15.98
GSM 1800	1710~1785	29.5	24.5	8.55	5.12
GPRS 1800 4 Tx Slot	1710~1785	29.5	24.5	8.55	5.12

The averaged power calculated method are shown as below:
 Averaged power=Maximum burst averaged power (1 Tx Slot) - (10lg(1/8))dB
 Averaged power=Maximum burst averaged power (2 Tx Slot) - (10lg(2/8))dB
 Averaged power=Maximum burst averaged power (3 Tx Slot) - (10lg(3/8))dB
 Averaged power=Maximum burst averaged power (4 Tx Slot) - (10lg(4/8))dB
 Average EIRP Power=Average Power + Antenna Gain

Test Mode	Frequency Band (MHz)	Maximum Output Power(dBm)	Average EIRP (dBm)	Limit of Power Density S (W/m ²)	Safety Distance (cm)
WCDMA Band 1	1920-1980	23.5	27.5	9.6	6.83
WCDMA Band 8	880-915	23.5	27.5	4.4	10.08

The averaged power calculated method are shown as below:
 Average EIRP Power= Maximum Output Power+ Antenna Gain

Test Mode	Frequency Band (MHz)	Maximum Output Power(dBm)	Average EIRP (dBm)	Limit of Power Density S (W/m ²)	Safety Distance (cm)
LTE Band 1	1920-1980	23.5	27.5	9.6	6.83
LTE Band 3	1710-1785	23.5	27.5	8.55	7.23
LTE Band 7	2500-2570	23.5	27.5	10	6.69
LTE Band 8	880-915	23.5	27.5	4.4	10.08
LTE Band 20	832-862	23.5	27.5	4.16	10.37
LTE Band 38	2570-2620	23.5	27.5	10	6.69
LTE Band 40	2300-2400	23.5	27.5	10	6.69

The averaged power calculated method are shown as below:
 Average EIRP Power= Maximum Output Power+ Antenna Gain

So the safety distance is **15.98** cm for this device.

---END OF THE REPORT----