

FCC RF EXPOSURE REPORT

FCC ID: QISR250D

Project No. : 1609C073
Equipment : Remote Unit
Model : R250D
Applicant : Huawei Technologies Co.,Ltd.
**Address : Administration Building, Headquarters of Huawei
Technologies Co., Ltd., Bantian, Longgang District
Shenzhen China**
According: : FCC Guidelines for Human Exposure IEEE C95.1

B T L I N C .

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

MPE CALCULATION METHOD:

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi^2} = \frac{EIRP}{4\pi^2}$$

where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Table for Filed Antenna

2.4G

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain(dBi)
1	泓林微电子(昆山)有限公司	N/A	Internal	U.FL	5.5
2	HUAWEI	N/A	Internal	N/A	5.5

Note:

(1) The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R), all transmit signals are completely uncorrelated, then, **Direction gain = G_{ANT}**, that is Directional gain=5.5.

(2) For 2TX with beamforming:

The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}), where N_{SS} = the number of independent spatial streams of data.

For 2TX with beamforming: Directional gain=5.5+10log(2/2)=5.5+0=5.5 dBi.

Operating Mode	TX Mode	2TX
802.11b		V (ANT 1+ANT 2)
802.11g		V (ANT 1+ANT 2)
802.11n(20MHz)		V (ANT 1+ANT 2)
802.11n(40MHz)		V (ANT 1+ANT 2)

5G

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain(dBi)
1	泓林微电子(昆山)有限公司	N/A	Internal	U.FL	6.3
2	HUAWEI	N/A	Internal	N/A	6.3

Note:

(1) The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R), all transmit signals are completely uncorrelated, then, **Direction gain = G_{ANT}** , that is Directional gain=6.3.

The UNII-1 out power limit is $30-6.30+6=29.70$, UNII-3 out power limit is $30-6.30+6=29.70$
the UNII-1 power density limit is $17-6.30+6=16.70$,
UNII-3 power density limit is $30-6.30+6=29.70$

(2) For 2TX with beamforming:

The EUT with beamforming function, then, Direction gain = $G_{ANT}+10\log(N_{ANT}/N_{SS})$, where N_{SS} = the number of independent spatial streams of data.

For 2TX with beamforming: Directional gain= $6.3+10\log(2/2)=6.3+0=6.3$ dBi.

The UNII-1 out power limit is $30-6.30+6=29.70$, UNII-3 out power limit is $30-6.30+6=29.70$
the UNII-1 power density limit is $17-6.30+6=16.70$,
UNII-3 power density limit is $30-6.30+6=29.70$

Operating Mode	TX Mode	2TX
802.11a		V (Ant 1+Ant 2)
802.11n(20MHz)		V (Ant 1+Ant 2)
802.11n(40MHz)		V (Ant 1+Ant 2)
802.11ac(20MHz)		V (Ant 1+Ant 2)
802.11ac(40MHz)		V (Ant 1+Ant 2)
802.11ac80MHz)		V (Ant 1+Ant 2)

TEST RESULTS

2.4G

EUT :	Remote Unit	Model Name :	R250D
Temperature :	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX G MODE / CH01, CH06, CH11-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.5	3.5481	21.83	152.4053	0.06888590	1	Complies
5.5	3.5481	22.06	160.6941	0.07263239	1	Complies
5.5	3.5481	22.15	164.0590	0.07415328	1	Complies

2.4G 2TX with Beamforming

EUT :	Remote Unit	Model Name :	R250D
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N20 MODE / CH01, CH06, CH11-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.5	3.5481	18.70	74.1310	0.03350660	1	Complies
5.5	3.5481	20.89	122.7439	0.05547922	1	Complies
5.5	3.5481	16.99	50.0035	0.02260114	1	Complies

UNII-1

EUT :	Remote Unit	Model Name :	R250D
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N20 MODE / CH36, CH40, CH48-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
6.3	4.2658	21.16	130.6171	0.07097908	1	Complies
6.3	4.2658	21.32	135.5189	0.07364281	1	Complies
6.3	4.2658	21.23	132.7394	0.07213239	1	Complies

UNII-1 2TX with Beamforming

EUT :	Remote Unit	Model Name :	R250D
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC20 MODE / CH36, CH40, CH48-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
6.3	4.2658	20.47	111.4295	0.06055226	1	Complies
6.3	4.2658	20.99	125.6030	0.06825435	1	Complies
6.3	4.2658	21.09	128.5287	0.06984420	1	Complies

UNII-3

EUT :	Remote Unit	Model Name :	R250D
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N20 MODE / CH149, CH157, CH165-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
6.3	4.2658	21.36	136.7729	0.07432422	1	Complies
6.3	4.2658	21.36	136.7729	0.07432422	1	Complies
6.3	4.2658	21.31	135.2073	0.07347343	1	Complies

UNII-3 2TX with beamforming

EUT :	Remote Unit	Model Name :	R250D
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC20 MODE / CH149, CH157, CH165-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
6.3	4.2658	20.85	121.6186	0.06608918	1	Complies
6.3	4.2658	20.85	121.6186	0.06608918	1	Complies
6.3	4.2658	20.99	125.6030	0.06825435	1	Complies

For 2.4G+5G simultaneous transmission MPE:

$$0.0742/1+0.0743/1=0.1485<1$$

Note: the calculated distance is 25 cm.