

FCC RF EXPOSURE REPORT

FCC ID: QISR240D

Project No. : 1602C034
Equipment : Remote Radio Unit
Model : R240D
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 .

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MPE CALCULATION METHOD:

Calculation Method of RF Safety Distance:

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

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)	Note
1	Shanghai Jinghong Communication Technology Co., Ltd	N/A	Internal	N/A	3.7	2.4G
2	Shanghai Jinghong Communication Technology Co., Ltd	N/A	Internal	N/A	3.7	2.4G

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R).
2. ANT 1 for 1TX was found to be the worst case and recorded.

Remark:

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.

Directional gain = $3.7 + 10\log(2/2) = 3.7 + 0 = 3.7$ dBi.

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

5G

Table for Filed Antenna

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	Shanghai Jinghong Communication Technology Co., Ltd	N/A	Internal	N/A	5.5	5G
2	Shanghai Jinghong Communication Technology Co., Ltd	N/A	Internal	N/A	5.5	5G

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R).
2. ANT 1for 1TX was found to be the worst case and recorded.

Remark:

For 2TX with beamforming

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

Directional gain= $5.5 + 10\log(2/2) = 5.5 + 0 = 5.5$ dBi.

Operating Mode	1TX	2TX
TX Mode		
802.11a	V (ANT 1)	V (ANT 1+ANT 2)
802.11n(20MHz)	V (ANT 1)	V (ANT 1+ANT 2)
802.11n(40MHz)	V (ANT 1)	V (ANT 1+ANT 2)
802.11ac (20MHz)	V (ANT 1)	V (ANT 1+ANT 2)
802.11ac (40MHz)	V (ANT 1)	V (ANT 1+ANT 2)
802.11ac (80MHz)	V (ANT 1)	V (ANT 1+ANT 2)

TEST RESULTS

2.4G

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature :	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX B 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
3.7	2.3442	24.43	277.3320	0.12940480	1	Complies
3.7	2.3442	24.34	271.6439	0.12675070	1	Complies
3.7	2.3442	23.80	239.8833	0.11193100	1	Complies

2.4G 2TX with Beamforming

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-20M 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
3.7	2.3442	14.15	26.0016	0.01213250	1	Complies
3.7	2.3442	19.04	80.1678	0.03740678	1	Complies
3.7	2.3442	13.78	23.8781	0.01114167	1	Complies

UNII-1

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-20M 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
5.5	3.5481	18.05	63.8263	0.04507652	1	Complies
5.5	3.5481	18.14	65.1628	0.04602040	1	Complies
5.5	3.5481	18.08	64.2688	0.04538897	1	Complies

UNII-1 2TX with Beamforming

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-20M 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
5.5	3.5481	14.12	25.8226	0.01823687	1	Complies
5.5	3.5481	14.20	26.3027	0.01857592	1	Complies
5.5	3.5481	14.15	26.0016	0.01836328	1	Complies

UNII-2A

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-20M MODE / CH52, CH60, CH64-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	18.13	65.0130	0.04591455	1	Complies
5.5	3.5481	18.20	66.0693	0.04666061	1	Complies
5.5	3.5481	18.23	66.5273	0.04698404	1	Complies

UNII-2A 2TX with Beamforming

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-20M MODE / CH52, CH60, CH64-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	14.19	26.2422	0.01853320	1	Complies
5.5	3.5481	14.26	26.6686	0.01883434	1	Complies
5.5	3.5481	14.29	26.8534	0.01896489	1	Complies

UNII-2C

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-20M MODE / CH100, CH116, CH140-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	19.48	88.7156	0.06265423	1	Complies
5.5	3.5481	19.67	92.6830	0.06545614	1	Complies
5.5	3.5481	17.62	57.8096	0.04082727	1	Complies

UNII-2C 2TX with Beamforming

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC20 MODE / CH100, CH116, CH140-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	16.54	45.0817	0.03183834	1	Complies
5.5	3.5481	16.73	47.0977	0.03326215	1	Complies
5.5	3.5481	15.76	37.6704	0.02660421	1	Complies

UNII-3

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N40 MODE / CH151, CH159-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	18.23	66.5273	0.04698404	1	Complies
5.5	3.5481	18.49	70.6318	0.04988275	1	Complies

UNII-3 2TX with beamforming

EUT :	Remote Radio Unit	Model Name :	R240D
Temperature:	22 °C	Relative Humidity:	56 %
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
5.5	3.5481	15.52	35.6451	0.02517389	1	Complies
5.5	3.5481	15.38	34.5144	0.02437532	1	Complies
5.5	3.5481	11.23	13.2739	0.00937455	1	Complies

For 2.4G+5G simultaneous transmission MPE:

$$0.1294/1+0.0499/1=0.1793<1$$

Note: the calculated distance is 20 cm.