

FCC RF Exposure Evaluation

1. Product Information

FCC ID:	2AANY-IG974	
Contain FCC ID:	XMR201808EC25AF	
Product name	Edge computing gateway	
Test Model number	IG974	
Additional Model No	FCC:IG904,IG914,IG924,IG934,IG944,IG954,IG964,IG984,IG994 IC: IG944,IG954,IG984	
Power supply*	12-48Vdc	
Modulation Type	WIFI	802.11b : DSSS 802.11g/n : OFDM 802.11a/n/ac : OFDM
	WCDMA	QPSK
	LTE	QPSK, 16QAM
Antenna Type	Suction cup Antenna	
Antenna Gain	For WIFI: Suction cup Antenna 2.4G WLAN:2.72 dBi 5G RLAN: 0.21dBi For WCDMA/LTE: Suction cup Antenna Main antenna: 2.5dBi AUX-Only RX: 2.5dBi	
Hardware version	V1.3	
Software version	V2.0	
FCC Operation frequency	WIFI	2412MHz~2462MHz 5180MHz~5240MHz 5745MHz~5825MHz
	WCDMA	824 MHz ~ 849 MHz (FOR WCDMA 850) 1710 MHz ~ 1755 MHz (FOR WCDMA 1700) 1850 MHz ~ 1910 MHz (FOR WCDMA 1900)
	LTE	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 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz LTE Band 71: 665.5 MHz ~ 695.5 MHz
Exposure category	General population/uncontrolled environment	
EUT Type	Production Unit	

*Note: Pre-scan all voltages, the report only lists the worst voltage DC12V test results.
Contain WCDMA /LTE Module

2. Evaluation method and Limit

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

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

Maximum conducted output power (Measured) & Manufacturing tolerance

Specification	Operating Mode	Conducted Output Power (dBm)	Target (dBm)	Tolerance $\pm$ (dB)
2.4GWIFI	802.11b	17.42	17	1
	802.11g	18.70	18.5	1
	802.11n(HT20)	18.27	18.5	1
	802.11n(HT40)	18.88	18.5	1
5GWIFI	802.11a	17.70	17.5	1
	802.11n20	19.08	19	1
	802.11n40	19.12	19	1
	802.11ac20	19.15	19	1
	802.11ac40	19.12	19	1
	802.11ac80	19.19	19	1
WCDMA	Band II	23.19	23	1
	Band IV	23.46	23	1
	Band V	23.21	23	1
LTE	Band 2	23.85	23	1
	Band 4	23.72	23	1
	Band 5	24.19	23.5	1
	Band 12	23.74	23	1
	Band 13	23.85	23	1
	Band 14	23.90	23	1
	Band 66	23.82	23	1
	Band 71	23.47	23	1

Note:

According to KDB Publication 447498 D01, Section 7.2

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to the MPE limit at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios.

3. Conducted Power

3.1 Test Setup Block Diagram for WWAN



3.2 Test Setup Block Diagram for WLAN



3.3 Test Procedure

WWAN:

- 1) The EUT was directly connected to the Base Station and antenna output port as show in the Block diagram;
- 2) Reading average power in RMS detector.

WLAN/RLAN

- 1) The EUT was directly connected to the spectrum analyser and antenna output port as show in the Block diagram;
- 2) Reading average power in RMS detector.

3.3 Measurement Equipment

Item	Equipment	Manufacturer	Model No.	Inventory No.	Last Cal.	Next Cal.
1	Base Station	R&S	CMW500	164998	2022-12-26	2023-12-25
2	Spectrum Analyzer	Keysight	N9010A	MY56070788	2022-12-26	2023-12-25

4. Evaluation Results

Collocated WWAN and other Wireless								For FCC	
Band	Frequency (MHz)	Antenna Distance (cm)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP(ERP) (dBm)	Maximum EIRP(ERP) (W)	Average EIRP(mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
WCDMA Band II	1852.4	20	2.5	24	26.50	0.447	446.68	0.089	1
WCDMA Band IV	1712.4	20	2.5	24	26.50	0.447	446.68	0.089	1
WCDMA Band V	826.4	20	2.5	24	24.35	0.343	342.768	0.068	0.55
LTE Band 2	1850.7	20	2.5	24	26.50	0.447	446.68	0.089	1
LTE Band 4	1710.7	20	2.5	24	26.50	0.447	446.68	0.089	1
LTE Band 5	824.7	20	2.5	24.5	24.85	0.305	305.492	0.061	0.55
LTE Band 12	699.7	20	2.5	24	24.35	0.272	272.270	0.054	0.47
LTE Band 13	779.5	20	2.5	24	24.35	0.272	272.270	0.054	0.52

LTE Band 14	788	20	2.5	24	24.35	0.272	272.270	0.054	0.53
LTE Band 66	1710.7	20	2.5	24	26.50	0.447	446.68	0.089	1
LTE Band 71	665.5	20	2.5	24	24.35	0.272	272.270	0.054	0.44
2.4GHz WLAN	2412	20	2.72	19.5	22.22	0.167	158.49	0.032	1
5.8GHz RLAN	5745	20	0.21	20	20.21	0.105	177.83	0.020	1
5.2GHz RLAN	5180	20	0.21	20	20.21	0.105	104.95	0.020	1

For WIFI 2.4G/5G and LTE/WCDMA can transmit simultaneously, the total evaluation result as below:

Collocated WWAN and other Wireless						For FCC	
No.	Configurations	Maximum MPE Value			Limits	Margin	PASS/Fail
		WWAN	WLAN	Transmit simultaneously			
1	WCDMA Band 2	0.09	0.03	0.12	1	0.88	PASS
2	WCDMA Band 4	0.09	0.03	0.12	1	0.88	PASS
3	WCDMA Band 5	0.12	0.03	0.15	1	0.85	PASS
4	LTE Band 2	0.09	0.03	0.12	1	0.88	PASS
5	LTE Band 4	0.09	0.03	0.12	1	0.88	PASS
6	LTE Band 5	0.11	0.03	0.14	1	0.86	PASS
7	LTE Band 12	0.11	0.03	0.14	1	0.86	PASS
8	LTE Band 13	0.10	0.03	0.13	1	0.87	PASS
9	LTE Band 14	0.10	0.03	0.13	1	0.87	PASS
10	LTE Band 66	0.09	0.03	0.12	1	0.88	PASS
11	LTE Band 71	0.12	0.03	0.15	1	0.85	PASS

Collocated WWAN and other Wireless					For FCC		
No.	Configurations	Maximum MPE Value			Limits	Margin	PASS/Fail
		WWAN	RLAN	Transmit simultaneously			
1	WCDMA Band 2	0.09	0.02	0.11	1	0.89	PASS
2	WCDMA Band 4	0.09	0.02	0.11	1	0.89	PASS
3	WCDMA Band 5	0.12	0.02	0.14	1	0.86	PASS
4	LTE Band 2	0.09	0.02	0.11	1	0.89	PASS
5	LTE Band 4	0.09	0.02	0.11	1	0.89	PASS
6	LTE Band 5	0.11	0.02	0.13	1	0.87	PASS
7	LTE Band 12	0.11	0.02	0.13	1	0.87	PASS
8	LTE Band 13	0.10	0.02	0.12	1	0.88	PASS
9	LTE Band 14	0.10	0.02	0.12	1	0.88	PASS
10	LTE Band 66	0.09	0.02	0.11	1	0.89	PASS
11	LTE Band 71	0.12	0.02	0.14	1	0.86	PASS

Remark:

1. Output power including tune up tolerance;
2. The exposure safety distance is 20cm;
3. EIRP=. Maximum Output Power + Antenna Gain
4. ERP=. Maximum Output Power + Antenna Gain – 2.15

5. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure.

.....THE END OF REPORT.....