

FCC RF Exposure Evaluation

1. Product Information

FCC ID:	2AANYVT3XX	
Contain FCC ID:	XMR202008EG91NAXD	
Product name	Vehicle Telematics	
Test Model number	VT320-FQ33,VT200-FQ33,VT210-FQ33,VT220-FQ33,VT300-FQ33,VT310-FQ33	
Power supply*	9-48Vdc for Adapter, 4.8Vdc from Ni-MH battery	
Modulation Type	WCDMA	QPSK
	LTE(CAT 1)	QPSK,16QAM
	Bluetooth LE	GFSK
	GPS	CDMA/BPSK
Antenna Type&Gain	For Bluetooth LE: Ceramic built-in Antenna with 3.45dBi gain For WCDMA/LTE/GPS: FPC build-in Antenna: with 5dBi gain	
Hardware version	V1.1	
Software version	V1.1	
FCC Operation frequency	WCDMA	826.4 MHz ~ 846.6 MHz (FOR WCDMA 850) 1712.4 MHz ~ 1752.6 MHz (FOR WCDMA 1700) 1852.4 MHz ~ 1907.6 MHz (FOR WCDMA 1900)
	LTE(CAT 1)	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 25: 1850.7 MHz ~ 1914.3MHz LTE Band 26@part 22: 824.7 MHz ~ 848.3 MHz LTE Band 26@part 90: 814.7 MHz ~ 823.3 MHz
	Bluetooth LE	2402 MHz ~ 2480 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)
Bluetooth	BLE	5.04	4.5	1
WCDMA	Band II	24	23	1
	Band IV	24	23	1
	Band V	24	23	1
LTE(CAT 1)	Band 2	24.5	23.5	1
	Band 4	24.5	23.5	1
	Band 5	24.5	23.5	1
	Band 12	24.5	23.5	1
	Band 13	24.5	23.5	1
	Band 25	25	24	1
	Band 26	25	24	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 BLE



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.

Bluetooth

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	2020-01-05	2022-01-04
2	Spectrum Analyzer	Keysight	N9010A	MY56070788	2020-01-05	2022-01-04

4. Evaluation Results

Collocated WWAN and other Wireless								For FCC	
Band	Frequency (MHz)	Antenna Distance (cm)	Antenna Gain in Linear	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	3.16	24	29.00	0.794	794.33	0.156	1
WCDMA Band IV	1712.4	20	3.16	24	29.00	0.794	794.33	0.156	1
WCDMA Band V	826.4	20	3.16	24	21.15	0.130	794.33	0.156	0.55
LTE Band 2	1850.7	20	3.16	24.5	29.50	0.891	891.25	0.175	1
LTE Band 4	1710.7	20	3.16	24.5	29.50	0.891	891.25	0.175	1
LTE Band 5	824.7	20	3.16	24.5	21.65	0.146	891.25	0.175	1
LTE Band 12	699.7	20	3.16	24.5	21.65	0.146	891.25	0.175	0.47
LTE Band 13	779.5	20	3.16	24.5	21.65	0.146	891.25	0.175	0.52
LTE Band 25	1850.7	20	3.16	25	29.00	0.794	794.33	0.156	1
LTE Band 26@Part 22	814.7	20	3.16	25	23.65	0.232	794.33	0.156	0.55
LTE Band 26@Part 90	824.7	20	3.16	25	23.65	0.232	794.33	0.156	0.54
2.4GHz BLE	2402	20	2.21	5.5	8.95	0.008	7.85	0.0002	1

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

Collocated WWAN and other Wireless					For FCC		
No.	Configurations	Maximum MPE Value (mw/cm ²)			Limits(mw/cm ²)	Margin(mw/cm ²)	PASS/Fail
		WWAN	BLE	Transmit simultaneously			
1	WCDMA Band II	0.16	0.00024	0.16	1	0.84	PASS
2	WCDMA Band IV	0.16	0.00024	0.16	1	0.84	PASS
3	WCDMA Band V	0.28	0.00024	0.28	1	0.72	PASS
4	LTE Band 2	0.18	0.00024	0.18	1	0.82	PASS
5	LTE Band 4	0.18	0.00024	0.18	1	0.82	PASS
6	LTE Band 5	0.18	0.00024	0.18	1	0.82	PASS
7	LTE Band 12	0.37	0.00024	0.37	1	0.63	PASS
8	LTE Band 13	0.34	0.00024	0.34	1	0.66	PASS
9	LTE Band 25	0.16	0.00024	0.16	1	0.84	PASS
10	LTE Band 26@Part 22	0.28	0.00024	0.28	1	0.72	PASS
11	LTE Band 26@Part 90	0.29	0.00024	0.29	1	0.71	PASS

Remark:

1. Output power including tune up tolerance;
2. The exposure safety distance is 20cm;
3. $EIRP = EPR + 2.15 (dB)$

5. Conclusion

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

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