

FCC RF Exposure Evaluation

1. Product Information

FCC ID:	2AANYVT320	
Contain FCC ID:	XMR201910BG95M3	
Product name	Vehicle Telematics	
Test Model number	VT320-FQ02,VT200-FQ02,VT210-FQ02,VT220-FQ02,VT300-FQ02,VT310-FQ02	
Power supply*	9-48Vdc for Adapter, 4.8Vdc from Ni-MH battery	
Modulation Type	EGPRS	GMSK,8PSK
	LTE(eMTC)	QPSK,16QAM
	Bluetooth LE	GFSK
	GPS	CDMA/BPSK
Antenna Type&Gain	For Bluetooth LE: Ceramic built-in Antenna with 3.45dBi gain For EGPRS/LTE/GPS: FPC built-in Antenna: with 5dBi gain	
Hardware version	V1.1	
Software version	V1.1	
FCC Operation frequency	GSM(EGPRS)	824.2 MHz ~ 848.8 MHz (GSM850) 1850.2 MHz ~ 1909.8 MHz (GSM1900)
	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: 790.5 MHz ~ 795.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26@part 22: 824.7 MHz ~ 848.3 MHz LTE Band 26@part 90: 814.7 MHz ~ 823.3 MHz TE Band 66: 1710.7 MHz ~ 1779.3 MHz LTE Band 85: 700.5 MHz ~ 713.5 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 EGPRS/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	4.72	4	1
GSM	EGPRS850	25.97	25	1
	EGPRS1900	22.97	22	1
LTE(eMTC)	Band 2	22.00	22	1
	Band 4	22.00	22	1
	Band 5	22.00	22	1
	Band 12	22.00	22	1
	Band 13	22.00	22	1
	Band 14	22.00	22	1
	Band 25	22.00	22	1
	Band 26	22.00	22	1
	Band 66	22.00	22	1
	Band 85	22.00	22	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.

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)
EGPRS 850	824.2	20	3.16	26	28.85	0.767	1258.93	0.249	0.55
EGPRS 1900	1850.2	20	3.16	23	28.00	0.631	630.96	0.124	1.00
LTE Band 2	1850.7	20	3.16	23	28.00	0.631	630.96	0.124	1.00
LTE Band 4	1710.7	20	3.16	23	28.00	0.631	630.96	0.124	1.00
LTE Band 5	824.7	20	3.16	23	25.85	0.385	630.96	0.124	0.55
LTE Band 12	699.7	20	3.16	23	25.85	0.385	630.96	0.124	0.47
LTE Band 13	779.5	20	3.16	23	25.85	0.385	630.96	0.124	0.52
LTE Band 14	790.5	20	3.16	23	25.85	0.385	630.96	0.124	0.53
LTE Band 25	1850.7	20	3.16	23	28.00	0.631	630.96	0.124	1.00
LTE Band 26	814.7	20	3.16	23	25.85	0.385	630.96	0.124	0.54
LTE Band 66	1710.7	20	3.16	23	25.85	0.385	630.96	0.124	1.00
LTE Band 85	700.5	20	3.16	23	25.85	0.385	630.96	0.124	0.47

2.4GHz BLE	2402	20	2.21	5	8.45	0.007	10.00	0.0001	1.00
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For BLE 2.4G and LTE EGPRS 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	EGPRS 850	0.45	0.00007	0.45	1	0.55	PASS
2	EGPRS 1900	0.12	0.00007	0.12	1	0.88	PASS
3	LTE Band 2	0.12	0.00007	0.12	1	0.88	PASS
4	LTE Band 4	0.12	0.00007	0.12	1	0.88	PASS
5	LTE Band 5	0.22	0.00007	0.22	1	0.78	PASS
6	LTE Band 12	0.27	0.00007	0.27	1	0.73	PASS
7	LTE Band 13	0.24	0.00007	0.24	1	0.76	PASS
8	LTE Band 14	0.23	0.00007	0.23	1	0.77	PASS
9	LTE Band 25	0.12	0.00007	0.12	1	0.88	PASS
10	LTE Band 26	0.23	0.00007	0.23	1	0.77	PASS
11	LTE Band 66	0.12	0.00007	0.12	1	0.88	PASS
12	LTE Band 85	0.26	0.00007	0.26	1	0.74	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.....