

# FCC RF Exposure Evaluation

## 1. Product Information

FCC ID:	2AANY-VT2FQ33	
Product name	Vehicle Telematics	
Test Model number	VT200	
P/N or HVIN*	FQ33,FQ33-BAT,FQ33-ANT,FQ33-ANT-BAT	
Power supply*	9-36Vdc	
Modulation Type	WCDMA	BPSK, QPSK
	LTE	QPSK, 16QAM
Antenna Type	Patch Antenna for External Antenna Ceramic Chip Antenna for Internal Antenna	
Antenna Gain	Patch Antenna 1.23 dBi Ceramic Chip Antenna 3.2 dBi	
Hardware version	V1.1	
Software version	V1.2	
FCC Operation frequency	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: 1805.7 MHz ~ 1909.3MHz 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 : 1850.7MHz ~ 1914.3 MHz LTE Band 26 : 814.7MHz ~ 823.3 MHz LTE Band 26 : 824.7MHz ~ 848.3 MHz
Exposure category	General population/uncontrolled environment	
EUT Type	Production Unit	

**\*Note:**

- a. There are four types of EUT, FQ33 is an internal antenna without a battery, FQ33-BAT is an internal antenna with a battery, FQ33-ANT is an external antenna without a battery, and FQ33-ANT-BAT is an external antenna with a battery. For conducted measurement FQ33-ANT-BAT type is used for report evaluation.
- b. Pre-scan all voltages, the report only lists the worst voltage DC12V test results.

## 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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	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) &amp; Manufacturing tolerance

Specification	Operating Mode	Conducted Output Power (dBm)	Target (dBm)	Tolerance $\pm$ (dB)
WCDMA	Band II	22.51	23	1
	Band IV	22.68	23	1
	Band V	23.44	23	1
LTE CAT 1	Band 2	22.26	23	1
	Band 4	22.51	23	1
	Band 5	23.26	23	1
	Band 12	23.38	23	1
	Band 13	24.32	23.5	1
	Band 25	22.17	23	1
	Band 26	23.12	23	1
	Band 26	23.14	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  $\leq 1.0$ , 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.

#### 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)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
WCDMA Band II	1852.4	20	3.2	24	27.2	0.1044	1
WCDMA Band IV	1712.4	20	3.2	24	27.2	0.1044	1
WCDMA Band V	826.4	20	3.2	24	25.05	0.1044	0.55
LTE Band 2	1850.7	20	3.2	24	27.2	0.1044	1
LTE Band 4	1710.7	20	3.2	24	27.2	0.1044	1
LTE Band 5	824.7	20	3.2	24	25.05	0.1044	0.55
LTE Band 12	699.7	20	3.2	24	25.05	0.1044	0.47
LTE Band 13	779.5	20	3.2	24.5	25.55	0.1171	0.52
LTE Band 25	1850.7	20	3.2	24	27.2	0.1044	1
LTE Band 26	814.7	20	3.2	24	25.05	0.1044	0.54
LTE Band 26	824.7	20	3.2	24	25.05	0.1044	0.55

#### 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. EUT has two antenna types, and only the highest antenna gain mode is evaluated in the report

#### 5. Conclusion

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

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