

RF Exposure Evaluation Report

APPLICANT : Mobile Devices Ingénierie
EQUIPMENT : Telematics embedded system
BRAND NAME : Mobile Devices Ingenierie /MUNIC
MODEL NAME : C4D-4G4USAA_V6+
MARKETING : C4D-4G4USAA_V6+
NAME
FCC ID : A6GC4D-4G4USV6
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

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Approved by: Mark Qu / Manager



Sporton International (Shenzhen) Inc.

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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA892506	Rev. 01	Initial issue of report	Oct. 19, 2018



1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	Sporton International (Shenzhen) Inc.
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

Applicant	
Company Name	Mobile Devices Ingénierie
Address	100 Avenue de Stalingrad 94800 Villejuif FRANCE

Manufacturer	
Company Name	Mobile Devices Ingénierie
Address	100 Avenue de Stalingrad 94800 Villejuif FRANCE

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Telematics embedded system
Brand Name	Mobile Devices Ingenierie /MUNIC
Model Name	C4D-4G4USAA_V6+
Marketing Name	C4D-4G4USAA_V6+
FCC ID	A6GC4D-4G4USV6
IMEI Code	358148061168279
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz 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 WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA LTE: QPSK, 16QAM WLAN 2.4GHz 802.11b/g/n HT20 Bluetooth BR/EDR/LE
HW Version	SAP00362+SAP00398
SW Version	V2093
EUT Stage	Identical Prototype
Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	

**3. Maximum RF average output power among production units****<WCDMA/LTE >**

Mode		Maximum Average power(dBm)
WCDMA	Band II	23.50
	Band V	24.50
LTE	Band 2	23.00
	Band 4	23.00
	Band 5	23.50
	Band 12	24.00
	Band 13	23.50

<Bluetooth>

Band / Mode	Average Power (dBm)
	LE
	GFSK
Bluetooth	9.00

<WLAN 2.4GHz>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	15.00
	802.11g	13.00
	802.11n-HT20	12.00

4. RF Exposure Limit Introduction

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 Exposures				
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
300-1500			f/300	6
1500-100,000			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
300-1500			f/1500	30
1500-100,000			1.0	30

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



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band II	1852.4	1.00	23.50	24.500	0.282	281.838	0.056	1.000	0.056
WCDMA Band V	826.4	0.50	24.50	25.000	0.316	316.228	0.063	0.551	0.114
LTE Band 2	1850.7	1.00	23.00	24.000	0.251	251.189	0.050	1.000	0.050
LTE Band 4	1710.7	1.00	23.00	24.000	0.251	251.189	0.050	1.000	0.050
LTE Band 5	824.7	0.50	23.50	24.000	0.251	251.189	0.050	0.550	0.091
LTE Band 12	699.7	0.50	24.00	24.500	0.282	281.838	0.056	0.466	0.120
LTE Band 13	779.5	0.50	23.50	24.000	0.251	251.189	0.050	0.520	0.096
WLAN2.4GHz	2412	2.40	15.00	17.400	0.055	54.954	0.011	1.000	0.011
Bluetooth LE	2402	2.40	9.00	11.400	0.014	13.804	0.003	1.000	0.003

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.

5.2. Collocated Power Density Calculation

WWAN Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN	Σ (Power Density / Limit) of WWAN+ Bluetooth
0.120	0.011	0.003	0.131	0.123

Note:

1. WLAN and Bluetooth share the same antenna, so they can't transmit simultaneously.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN 2.4GHz, WWAN + Bluetooth.
3. Considering the WWAN collocation with WLAN/ Bluetooth of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1 and MPE of 2 collocated transmitters is compliant.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.