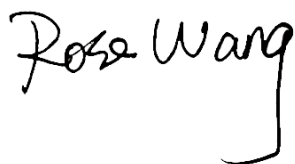


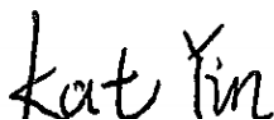
RF Exposure Evaluation Report

APPLICANT : Fibocom Wireless Inc.
EQUIPMENT : 5G Module
BRAND NAME : Fibocom
MODEL NAME : FM150-NA
FCC ID : ZMOFM150NA
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Reviewed by: Rose Wang / Supervisor



Approved by: Kat Yin / Manager



Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China



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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA051416-03	Rev. 01	Initial issue of report.	Mar. 12, 2021



1. Administration Data

1.1. Testing Laboratory

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
Company Name	Fibocom Wireless Inc.
Address	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

Manufacturer	
Company Name	Fibocom Wireless Inc.
Address	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	5G Module
Brand Name	Fibocom
Model Name	FM150-NA
FCC ID	ZMOFM150NA
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 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 7: 2502.5 MHz ~ 2567.5MHz 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 17: 706.5 MHz ~ 713.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz LTE Band 30: 2307.5 MHz ~ 2312.5 MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz LTE Band 42: 3552.5 MHz ~ 3597.5 MHz LTE Band 43: 3652.5 MHz ~ 3672.5 MHz LTE Band 48: 3552.5 MHz ~ 3697.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz LTE Band 71: 665.5 MHz ~ 695.5 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77 : 3700 MHz ~ 3980 MHz 5G NR n78 : 3700 MHz ~ 3800 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is not supported) LTE: QPSK, 16QAM, 64QAM, 256QAM DFT-s-OFDM (QPSK / 16QAM / 64QAM / 256QAM) CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM)
HW Version	V1.0.1
SW Version	89601.1000.00.03.04.33
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This device supports HPUE for LTE band 41 and 5G NR n41 with class 2 power level, so HPUE has been performed standalone power density calculation.
3. For DFT-s-OFDM and CP-OFDM output power measurement reduction, according to maximum power reduction for the CP-OFDM mode will not higher than DFT-s-OFDM mode, therefore, CP-OFDM measurement



is unnecessary. We always chose higher power (DFT-s-OFDM mode) to perform MPE analysis.

4. 5G NR supports NSA and SA mode.
5. The device implanted DPS (Dynamic Power Share) function to achieve higher uplink data rate keeping the total power unchanged in 5G NR NSA EN-DC mode according to 3GPP 38.213, when the equipment has a dynamic power sharing capability, it adjusts the LTE or NR transmission power so that the instantaneous total power does not exceed the specified value, when the maximum transmission power of NR (P_{LTE} , P_{NR}) and the specified total power (P_{total}) have been set and the instantaneous calculated total transmission power exceeds P_{total} , the NR transmission power is reduced so that the actual transmission power of the user equipment will not exceed P_{total} power. So if the LTE and NR standalone SAR is testing at total power level, the EN-DC combine MPE(LTE+NR) will not higher than the each standalone LTE and NR MPE, therefore, the simultaneous transmission analysis is used standalone MPE at total power level to show compliance.
6. This is a variant report for FM150-NA. For change note, please refer the product equality declaration exhibit separately. We added 5G NR n77/n78 MPE analysis, all the other test results are leveraged from original report which can be referred to Sporton Report Number FA051416.
7. For 5G NR n77 power level is higher than n78 and 5G NR n77 frequency range can include 5G NR n78, so we using 5G NR n77 perform MPE evaluation is more conservatively.

Comments and Explanations:

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

**3. Maximum RF average output tune up power among production units****<WCDMA>**

Mode		Maximum Average power(dBm)
WCDMA	Band II	25.00
	Band IV	25.00
	Band V	25.00

<LTE>

Mode		Maximum Average power(dBm)
LTE	Band 2	24.50
	Band 4	24.50
	Band 5	24.50
	Band 7	24.50
	Band 12	24.50
	Band 13	24.50
	Band 14	24.50
	Band 17	24.50
	Band 25	24.50
	Band 26	24.50
	Band 30	23.00
	Band 41	24.50
	Band 41-HPUE	27.50
	Band 42	22.00
	Band 43	22.00
	Band 48	22.00
	Band66	24.50
	Band71	24.50

**<5G NR>**

Mode		Maximum Average power(dBm)
5G NR	n2	24.50
	n5	24.50
	n7	24.50
	n12	24.50
	n25	24.50
	n41	24.50
	n41-HPUE	27.50
	n66	24.50
	n71	24.50
	n77	27.50
	n78	22.00

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)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
WCDMA Band 2	1852.4	8.0	25.00	33.000	1995.262	0.397	1.000
WCDMA Band 4	1712.4	5.0	25.00	30.000	1000.000	0.199	1.000
WCDMA Band 5	826.4	6.0	25.00	31.000	1258.925	0.251	0.551
LTE Band 2	1850.7	8.0	24.50	32.500	1778.279	0.354	1.000
LTE Band 4	1710.7	5.0	24.50	29.500	891.251	0.177	1.000
LTE Band 5	824.7	6.0	24.50	30.500	1122.018	0.223	0.550
LTE Band 7	2502.5	8.0	24.50	32.500	1778.279	0.354	1.000
LTE Band 12	699.7	5.5	24.50	30.000	1000.000	0.199	0.466
LTE Band 13	779.5	5.5	24.50	30.000	1000.000	0.199	0.520
LTE Band 14	790.5	5.5	24.50	30.000	1000.000	0.199	0.527
LTE Band 17	706.5	5.5	24.50	30.000	1000.000	0.199	0.471
LTE Band 25	1850.7	8.0	24.50	32.500	1778.279	0.354	1.000
LTE Band 26	814.7	6.0	24.50	30.500	1122.018	0.223	0.543
LTE Band 30	2307.5	1.0	23.00	24.000	251.189	0.050	1.000
LTE Band 41-HPUE	2498.5	5.5	27.50	33.000	1995.262	0.397	1.000
LTE Band 42	3552.5	1.0	22.00	23.000	199.526	0.040	1.000
LTE Band 43	3652.5	1.0	22.00	23.000	199.526	0.040	1.000
LTE Band 48	3552.5	1.0	22.00	23.000	199.526	0.040	1.000
LTE Band 66	1710.7	5.0	24.50	29.500	891.251	0.177	1.000
LTE Band 71	665.5	5.5	24.50	30.000	1000.000	0.199	0.444
5G NR n2	1850	8.0	24.50	32.500	1778.279	0.354	1.000
5G NR n5	824	6.0	24.50	30.500	1122.018	0.223	0.549
5G NR n7	2500	8.0	24.50	32.500	1778.279	0.354	1.000
5G NR n12	699	5.5	24.50	30.000	1000.000	0.199	0.466
5G NR n25	1850	8.0	24.50	32.500	1778.279	0.354	1.000
5G NR n41-HPUE	2496	5.5	27.50	33.000	1995.262	0.397	1.000
5G NR n66	1710	5.0	24.50	29.500	891.251	0.177	1.000
5G NR n71	663	5.5	24.50	30.000	1000.000	0.199	0.442
5G NR n77	3700	5.5	27.50	33.000	1995.262	0.397	1.000

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. This device supports HPUE for LTE band 41 and 5G NR n41 with class 2 power level, so HPUE has been performed standalone power density calculation.
3. For 5GNR n77 power level is higher than n78 and 5GNR n77 frequency range can include 5GNR n78, so we using 5GNR n77 perform MPE evaluation is more conservatively.

**5.2. Collocated Power Density Calculation****General Note:**

1. This MPE analysis is applicable to any collocated transmitters with EIRP for WLAN is less than or equal to 28.0dBm and EIRP for Bluetooth is less than or equal to 22.0dBm.
2. A maximum antenna gain of 8dBi for WLAN and 5dBi for Bluetooth has been assumed for all collocated antennas.

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	1852.4	7.5	25.00	32.500	1778.279	0.354	1.000	0.354
WCDMA Band 4	1712.4	5.0	25.00	30.000	1000.000	0.199	1.000	0.199
WCDMA Band 5	826.4	5.0	25.00	30.000	1000.000	0.199	0.551	0.361
LTE Band 2	1850.7	7.5	24.50	32.000	1584.893	0.315	1.000	0.315
LTE Band 4	1710.7	5.0	24.50	29.500	891.251	0.177	1.000	0.177
LTE Band 5	824.7	5.0	24.50	29.500	891.251	0.177	0.550	0.323
LTE Band 7	2502.5	8.0	24.50	32.500	1778.279	0.354	1.000	0.354
LTE Band 12	699.7	5.0	24.50	29.500	891.251	0.177	0.466	0.380
LTE Band 13	779.5	5.0	24.50	29.500	891.251	0.177	0.520	0.341
LTE Band 14	790.5	5.0	24.50	29.500	891.251	0.177	0.527	0.337
LTE Band 17	706.5	5.0	24.50	29.500	891.251	0.177	0.471	0.377
LTE Band 25	1850.7	7.5	24.50	32.000	1584.893	0.315	1.000	0.315
LTE Band 26	814.7	5.0	24.50	29.500	891.251	0.177	0.543	0.327
LTE Band 30	2307.5	1.0	23.00	24.000	251.189	0.050	1.000	0.050
LTE Band 41-HPUE	2498.5	5.5	27.50	33.000	1995.262	0.397	1.000	0.397
LTE Band 42	3552.5	1.0	22.00	23.000	199.526	0.040	1.000	0.040
LTE Band 43	3652.5	1.0	22.00	23.000	199.526	0.040	1.000	0.040
LTE Band 48	3552.5	1.0	22.00	23.000	199.526	0.040	1.000	0.040
LTE Band 66	1710.7	5.0	24.50	29.500	891.251	0.177	1.000	0.177
LTE Band 71	665.5	5.0	24.50	29.500	891.251	0.177	0.444	0.400
5G NR n2	1850	7.5	24.50	32.000	1584.893	0.315	1.000	0.315
5G NR n5	824	5.0	24.50	29.500	891.251	0.177	0.549	0.323
5G NR n7	2500	8.0	24.50	32.500	1778.279	0.354	1.000	0.354
5G NR n12	699	5.0	24.50	29.500	891.251	0.177	0.466	0.381
5G NR n25	1850	7.5	24.50	32.000	1584.893	0.315	1.000	0.315
5G NR n41-HPUE	2496	5.5	27.50	33.000	1995.262	0.397	1.000	0.397
5G NR n66	1710	5.0	24.50	29.500	891.251	0.177	1.000	0.177
5G NR n71	663	5.0	24.50	29.500	891.251	0.177	0.442	0.401
5G NR n77	3700	5.5	27.50	33.000	1995.262	0.397	1.000	0.397
WLAN2.4GHz Band	2412	5.0	20.00	25.000	316.228	0.063	1.000	0.063
WLAN5GHz Band	5180	8.0	20.00	28.000	630.957	0.126	1.000	0.126
Bluetooth	2402	5.0	17.00	22.000	158.489	0.032	1.000	0.032

WWAN Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN + Bluetooth
0.400	0.126	0.032	0.558

5NR Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN + Bluetooth
0.401	0.126	0.032	0.559

Note:

- For colocation analysis, LTE band 71 and 5GNR n71 are chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
- 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 + Bluetooth.
- The device implanted DPS (Dynamic Power Share) function to achieve higher uplink data rate keeping the total power unchanged in 5G NR NSA EN-DC mode according to 3GPP 38.213, when the equipment has a dynamic power sharing capability, it adjusts the LTE or NR transmission power so that the instantaneous total power does not exceed the specified value, when the maximum transmission power of NR (P_{LTE}, P_{NR}) and the specified total power (P_{total}) have been set and the instantaneous calculated total transmission power exceeds P_{total}, the NR transmission power is reduced so that the actual transmission power of the user equipment will not exceed P_{total} power. So if the LTE and NR standalone SAR is testing at total power level, the EN-DC combine MPE(LTE+NR) will not higher than the each standalone LTE and NR MPE, therefore, the simultaneous transmission analysis is used standalone MPE at total power level to show compliance.
- For colocation analysis, 5GNR n71 is chosen for summation due to the highest (power density/limit) among all 5GNR modes.
- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for 5GNR + WLAN + Bluetooth.
- Considering the WWAN/5GNR module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.



Conclusion:

Based on 47 CFR §2.1091 and FCC KDB 447498 D01 v06, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Device	Band	Frequency (MHz)	Maximum Conducted Power (dBm)	Standalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
FM150-NA	WCDMA Band 2	1852.4	25.00	8.0	7.5
	WCDMA Band 4	1712.4	25.00	5.0	5.0
	WCDMA Band 5	826.4	25.00	6.0	5.0
	LTE Band 2	1850.7	24.50	8.0	7.5
	LTE Band 4	1710.7	24.50	5.0	5.0
	LTE Band 5	824.7	24.50	6.0	5.0
	LTE Band 7	2502.5	24.50	8.0	8.0
	LTE Band 12	699.7	24.50	5.5	5.0
	LTE Band 13	779.5	24.50	5.5	5.0
	LTE Band 14	790.5	24.50	5.5	5.0
	LTE Band 17	706.5	24.50	5.5	5.0
	LTE Band 25	1850.7	24.50	8.0	7.5
	LTE Band 26	814.7	24.50	6.0	5.0
	LTE Band 30	2307.5	23.00	1.0	1.0
	LTE Band 41	2498.5	24.50	5.5	5.5
	LTE Band 41-HPUE	2498.5	27.50	5.5	5.5
	LTE Band 42	3552.5	22.00	1.0	1.0
	LTE Band 43	3652.5	22.00	1.0	1.0
	LTE Band 48	3552.5	22.00	1.0	1.0
	LTE Band 66	1710.7	24.50	5.0	5.0
	LTE Band 71	665.5	24.50	5.5	5.0
	5G NR n2	1850	24.50	8.0	7.5
	5G NR n5	824	24.50	6.0	5.0
	5G NR n7	2500	24.50	8.0	8.0
	5G NR n12	699	24.50	5.5	5.0
	5G NR n25	1850	24.50	8.0	7.5
	5G NR n41	2496	24.50	5.5	5.5
	5G NR n41-HPUE	2496	27.50	5.5	5.5
	5G NR n66	1710	24.50	5.0	5.0
	5G NR n71	663	24.50	5.5	5.0
	5G NR n77	3700	27.50	5.0	5.0
	5G NR n78	3700	22.00	5.0	5.0
Collocated Transmitters	WLAN2.4GHz	2412	20.00		5.0
	WLAN5GHz	5180	20.00		8.0
	Bluetooth	2402	17.00		5.0

-----THE END-----