



RF Exposure Evaluation Report

APPLICANT : MitraStar Technology Corporation
EQUIPMENT : M4G-3401 LTE Outdoor CPE
BRAND NAME : MitraStar
MODEL NAME : M4G-3401-IDU, M4G-3401-ODU
MARKETING NAME : M4G-3401-IDU, M4G-3401-ODU
FCC ID : ZMYM4G3401
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3N3019-01	Rev. 01	Initial issue of report	Jan. 16, 2015
FA3N3019-01	Rev. 02	Revised frequency Range and tune-up	Jan. 21, 2015



1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	MitraStar Technology Corporation
Address	No. 6, Innovation Rd II, Science-Based Industrial, Hsin-Chu, Taiwan

Manufacturer	
Company Name	MitraStar Technology Corporation
Address	No. 6, Innovation Rd II, Science-Based Industrial, Hsin-Chu, Taiwan

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	M4G-3401 LTE Outdoor CPE
Brand Name	MitraStar
Model Name	M4G-3401-IDU, M4G-3401-ODU
Marketing Name	M4G-3401-IDU, M4G-3401-ODU
FCC ID	ZMYM4G3401
Wireless Technology and Frequency Range	LTE Band 43: 3660MHz~3665MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz
Mode	• LTE: QPSK, 16QAM • 802.11b/g/n HT20/HT40
Antenna Type	WWAN: DUAL POLARIZATION PATCH WLAN: omni-PCB Antenna
HW Version	IDU: ABB(Rework to ACB) ODU: ABB(Rework to ACB)
SW Version	ODU: B022 IDU: SPC120
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**

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)									
		Ant 0				Ant 1				Ant 0+1	
		11b	11g	HT20	HT40	11b	11g	HT20	HT40	HT20	HT40
2.4GHz Band	2412	19	16	16		19	16	17		17	
	2422				14				14		16
	2437	19	16	16.5	17	19	16	17	17	17	17.5
	2452				14				14		16
	2462	19	16	16		19	16	17		17	

LTE	Average Power (dBm)
Band 43	22.4



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 27 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 27cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
LTE Band 43	3660.0	16.0	22.4	38.400	6.918	6918.310	0.756	1.000	0.756
2.4GHz WLAN	2412.0	2.4	19.0	21.400	0.138	138.038	0.015	1.000	0.015

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band

5.2. Collocated Power Density Calculation

WLAN Power Density / Limit	LTE B43 Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN
0.015	0.756	0.771

Note:

- For colocation analysis, LTE B43 is chosen for summation due to the highest (power density/limit).
- 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.
- Considering the WWAN module collocation with the WLAN transmitter 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.