

RF Exposure Report

Report No.: FCC_RF Exposure_SL19102501-XIR-017

XT3182D FCC ID: GKM-XT3182D

Quectel FCC ID: XMR201706SC20A

Test Model: XT3182D

Series Model: N/A

Received Date: 12/2/2019

Test Date: 12/5/2019 - 12/6/2019

Issued Date: 12/18/2019

Standards: FCC Part 2 (Section 2.1093)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

Applicant: Xirgo Technologies, LLC

Address: 188 Camino Ruiz, Camarillo CA 93012

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035

**FCC Registration /
Designation Number:** 540430



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Release Control Record

Issue No.	Description	Date Issued
FCC_RF Exposure_SL19102501-XIR-017	Original Release	12/18/2019

1 Certificate of Conformity

Product: Smart Trailer Platform with Integrated Cargo Sensor

Brand: Xirgo Technologies, LLC

Test Model: XT3182D

Series Model: N/A

Sample Status: Sample received in good condition

Applicant: Xirgo Technologies, LLC

Test Date: 12/5/2019 and 12/6/2019

Standards: FCC Part 2 (Section 2.1093)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  , **Date:** 12/18/2019
Chen Ge / Test Engineer

Approved by :  , **Date:** 12/18/2019
Shuo Zhang / Engineer Reviewer

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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

f = Frequency in MHz; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

This device, under normal use condition, must be installed and operated with a minimum distance of at least 20cm between the radiator and person. So, this device is classified as Mobile Device.

The external antenna of this product, under normal use condition, must be installed and operated with a minimum distance of at least 65cm between the antenna and person. So, this device is classified as Mobile Device.

2.1 Antenna Gain

The Internal antenna type is chip antenna with 1.5 dBi gain.

External Antenna Max gain

BT (standalone)	4 dBi
2.4GHz WLAN	4 dBi
5GHz WLAN	4 dBi
GSM/GPRS/EDGE:	
850:	6 dBi
1900	6 dBi
WCDMA:	
Band V:	2 dBi
Band II:	6 dBi
Band IV:	6 dBi
LTE Band 2 :	6 dBi
LTE Band 4 :	6 dBi
LTE Band 5 :	2 dBi
LTE Band 7 :	3.5 dBi
LTE Band 12 :	0 dBi
LTE Band 13 :	1.5 dBi
LTE Band 25 :	6 dBi
LTE Band 26 :	2 dBi

2.2 Maximum Output Power

BT (standalone)	3.96 dBm
2.4GHz WLAN	22.11 dBm
5GHz WLAN	13.91 dBm
GSM/GPRS/EDGE:	
850:	32.67 dBm
1900	30.45 dBm
WCDMA:	
Band V:	23.65 dBm
Band II:	23.54 dBm
Band IV:	23.76 dBm
LTE Band 2 :	23.54 dBm
LTE Band 4 :	23.81 dBm
LTE Band 5 :	23.50 dBm
LTE Band 7 :	24.08 dBm
LTE Band 12 :	23.64 dBm
LTE Band 13 :	23.55 dBm
LTE Band 25 :	23.51 dBm
LTE Band 26 :	23.41 dBm

2.3 Calculation Result of Maximum Conducted Power

Internal Antenna

Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Turn-Up Tolerance	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2440	3.96	2.48	± 1dB	1.5	20	0.0009	1

External Antenna

Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Turn-Up Tolerance	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2440	3.96	2.48	± 1dB	4	65	0.0002	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Calculate MPE test exclusion thresholds from condition "1" formulas.

Colocation MPE

BT + WIFI

Internal Antenna

Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Turn-Up Tolerance	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2440 (BT)	3.96	2.48	± 1dB	1.5	20	0.0009	1
2452 (WLAN)	22.11	204.64	± 1dB	1.5	20	0.0575	1
5670 (WLAN)	13.91	30.97	± 1dB	1.5	20	0.0087	1

BT + WLAN + Cellular (Worst case output power + antenna gain)

External Antenna

Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Turn-Up Tolerance	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2440 (BT)	3.96	2.48	± 1dB	4	65	0.0002	1
2452 (WLAN)	22.11	162.55	± 1dB	4	65	0.0097	1
5670 (WLAN)	13.91	24.6	± 1dB	4	65	0.0014	1
GSM850	32.67	1849.27	± 1dB	6	65	0.1746	0.549

Colocation Calculation:

The formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Internal Antenna Worst case Colocation: BT + WIFI

$$0.0009/1 \text{ mW/cm}^2 + 0.0575/1 \text{ mW/cm}^2 + 0.0087/1 \text{ mW/cm}^2 = 0.0671 \text{ mW/cm}^2 \times 100 = 6.71\% < 100\%$$

External Antenna Worst case Colocation: BT + WLAN + Cellular

BT: 0.0002 mW/cm^2

2.4GHzWLAN: 0.0097 mW/cm^2

5GHzWLAN: 0.0014 mW/cm^2

GSM: $0.1746/0.549 \text{ mW/cm}^2 = 0.318 \text{ mW/cm}^2$

$$0.0002 + 0.0097 + 0.0014 + 0.318 = 0.3293 \text{ mW/cm}^2$$

$$0.3293 \text{ mW/cm}^2 \times 100 = 32.93\% < 100\%$$

3 Conclusion

Result

Internal Antenna

$$0.0671 \text{ mW/cm}^2 \times 100 = \mathbf{6.71\%} < 100\%$$

External Antenna

$$0.3278 \text{ mW/cm}^2 \times 100 = \mathbf{32.93\%} < 100\%$$

Therefore the maximum calculations of above situations are less than the “1” limit.

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