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Report No.: 2303RSU002-U3 Report Version: V01 Issue Date: 2023-03-22

# **RF Exposure Evaluation Declaration**

FCC ID: VZ4-3604AG

**Applicant:** Doran Manufacturing LLC

**Product:** Doran TPMS Sensor for Agriculture Truck

Model No.: 3604AG

Brand Name: Doran

FCC Rule Part(s): FCC Part 2.1091

**Result:** Complies

Reviewed By:

Kevin Guo

Approved By:

Robin Wu

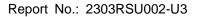




The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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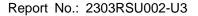
## **Revision History**

Report No.	Version	Description	Issue Date	Note
2303RSU002-U3	V01	Initial Report	2023-03-22	Valid



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#### 1. General Information

## 1.1. Applicant

Doran Manufacturing LLC

2851 Massachusetts Avenue Cincinnati, OH 45225 USA

#### 1.2. Manufacturer

Doran Manufacturing LLC

2851 Massachusetts Avenue Cincinnati, OH 45225 USA

## 1.3. Testing Facility

	Test Site – MRT Suzhou Laboratory						
	Laboratory Location (Suzhou - Wuzhong)						
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China Laboratory Location (Suzhou - SIP)						
	4b Building, Liand	o U Valley, No.200	Xingpu Rd., Shengpu	ມ Town, Suzhou Indu	strial Park, China		
	Laboratory Accre	editations					
	A2LA: 3628.01		CNAS	S: L10551			
	FCC: CN1166		ISED:	CN0001			
	VCCI:	□R-20025	☐G-20034	□C-20020	□T-20020		
	VCCI.	□R-20141	□G-20134	□C-20103	□T-20104		
	Test Site - MRT S	Shenzhen Laborat	ory				
	Laboratory Locat	tion (Shenzhen)					
	1G, Building A, Ju	nxiangda Building,	Zhongshanyuan Roa	d West, Nanshan Di	strict, Shenzhen,		
	China  Laboratory Accreditations						
	A2LA: 3628.02		CNAS:	: L10551			
	FCC: CN1284 ISED: CN0105						
	Test Site – MRT Taiwan Laboratory						
	Laboratory Location (Taiwan)  No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)  Laboratory Accreditations						
	TAF: L3261-19072	25					
	FCC: 291082, TW	/3261	ISED:	TW3261			



#### 1.4. Product Information

Product	Doran TPMS Sensor for Agriculture Truck
Model No.	3604AG
Brand Name	Doran
Operating Voltage	Internal lithium battery (2.3 ~ 3.6Vdc, Nominal 3.0Vdc)
Operating Temperature	-40 ~ 120°C

#### Note:

The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

#### 1.5. Radio Specification

Frequency Range	434.1MHz
Type of Modulation	FSK
Antenna Type	PCB Antenna
Antenna Gain	0 dBi

#### 1.6. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01

#### 1.7. Device Classification

According to the user manual, the device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.



## 2. RF Exposure Evaluation

#### 2.1. Limits

According to FCC §1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range	Electric Field	Magnetic Field	Power Density	Average Time			
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm²)	(Minutes)			
	(A) Limits for Occupational/ Control Exposures						
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) Limits for General Population/ Uncontrolled Exposures							
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.



#### 2.1. MPE Exemptions

**For single RF sources** (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

**(Option A)** The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

**(Option B)** Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$$P th(mW) = \{ERP_{20cm}(d / 20cm)^x d \le 20cm\}$$

$$P th(mW) = \{ERP_{20cm} 20cm < d \le 40cm\}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right)$$
 and f is in GHz;

and

$$ERP_{20cm}(mW) = \{2040f \ 0.3GHz \le f < 1.5GHz\}$$

$$ERP_{20cm}(mW) = \{3060 \ 1.5GHz \le f \le 6GHz \$$

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).



Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1920R <sup>2</sup>
1.34-30	3450R <sup>2</sup> /f <sup>2</sup>
30-300	3.83R <sup>2</sup>
300-1,500	0.0128R <sup>2</sup> f
1,500-100,000	19.2R <sup>2</sup>

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph 1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

 $P_i$  = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

 $P_{th,i}$  = the exemption threshold power ( $P_{th}$ ) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

 $ERP_j$  = the ERP of fixed, mobile, or portable RF source j.



 $ERP_{th,j}$  = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least  $\lambda/2\pi$  according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section.

**Evaluated**<sub>k</sub> = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

**Exposure Limit**<sub>k</sub> = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.



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#### 2.2. Calculation Result

Product	Doran TPMS Sensor for Agriculture Truck
Test Item	RF Exposure Evaluation

Test Mode	Frequency Range	Max. Fundamental Radiated	Max. EIRP (dBm)	Tune-up EIRP
	(MHz)	Emission (dBµV/m)@3m		(dBm)
SRD	434.1	74.329	-20.871	-10.0

Note 1: Max. EIRP (dBm) = E (dB $\mu$ V/m)@3m -95.2 = -20.871 dBm

Note 2: Tune-up EIRP was declared by manufacturer.

## For single RF source, Option A

The EUT available maximum time-averaged power is no more than 1 mW (0dBm).

Therefore, the device qualifies for RF exposure exemption.