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RF Exposure Evaluation Report

Report No. : CQASZ20191101206E-02
Applicant: Zhejiang PDW Industrial Co., Ltd.
Address of Applicant: Quanxi Industrial Park, Wuyi County, Jinhua City, Zhejiang, P.R. China 321200
Equipment Under Test (EUT):
EUT Name: Truck TPMS Internal Sensor
Model No.: 04.01.77, 04.01.55
Test Model No.: 04.01.77
Brand Name: PDW, PROCAST
FCC ID: 2ATWD-040177
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2019-11-28
Date of Test: 2019-11-28 to 2019-12-06
Date of Issue: 2019-12-06
Test Result : **PASS***

***In the configuration tested, the EUT complied with the standards specified above**

Tested By:

(Tom Chen)

Reviewed By:

(Aaron Ma)

Approved By:

(Jack Ai)

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20191101206E-02	Rev.01	Initial report	2019-12-06

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3 General Information

3.1 Client Information

Applicant:	Zhejiang PDW Industrial Co., Ltd.
Address of Applicant:	Quanxi Industrial Park, Wuyi County, Jinhua City, Zhejiang, P.R. China 321200
Manufacturer:	Zhejiang PDW Industrial Co., Ltd.
Address of Manufacturer:	Quanxi Industrial Park, Wuyi County, Jinhua City, Zhejiang, P.R. China 321200

3.2 General Description of EUT

Product Name:	Truck TPMS Internal Sensor
Model No.:	04.01.77, 04.01.55
Test Model No.:	04.01.77
Trade Mark:	PDW, PROCAST
Hardware Version:	V03
Software Version:	V09
Sample Type:	Portable production
Operation Frequency:	433.92MHz
Channel Numbers:	1
Modulation Type:	FSK
Antenna Type:	External antenna
Antenna Gain:	-1.09dBi
Power Supply:	DC3.0V

Note:

Model: 04.01.77, 04.01.55

Only the model 04.01.77 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being Trademarks and models.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

4.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{\text{min. test separation distance, mm}} \right] \cdot \sqrt{f(\text{GHz})} \leq 3.0$$
 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation¹⁷

The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

4.1.3 EUT RF Exposure

$$eirp = pt \times gt = (E \times d)^2 / 30$$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, $10^{((dB\mu V/m)/20)/10^6}$,

d = measurement distance in meters (m)---3m,

$$\text{So } pt = (E \times d)^2 / 30 / gt$$

The worst case (refer to report CQASZ20191101206E-01) is below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
433.92	80.04	Peak
433.92	61.63	Average

Antenna polarization: Vertical		
Frequency (MHz)	Level (dBuV/m)	Polarization
433.92	76.73	Peak
433.92	58.32	Average

For 433.92MHz wireless:

Field strength = 80.04dB μ V/m @3m

Ant. gain -1.09dBi; so Ant numeric gain=0.78

$$\text{So } pt = \{ [10^{(80.04/20)} / 10^6 \times 3]^2 / 30 / 0.78 \} \times 1000 \text{mW} = 0.039 \text{mW}$$

$$\text{So } (0.039 \text{mW} / 5 \text{mm}) \times \sqrt{0.43392 \text{GHz}} = 0.005,$$

0.005 < 3.0 for 1-g SAR

So the SAR report is not required.