Test Report

Prepared for **Daimler Truck North America LLC**

This report presents Maximum Permissible Exposure for

Applicant: Daimler Truck North America LLC

Address: 4555 N. Channel Ave, PORTLAND OR 97217-3849 USA

Prepared by

James Ma / Test Engineer

Approved by

Suresh Kondapalli

Reviewing Engineer

Issue date: 06/29/2023

Contents

Test Request Information

Test Requested By: Daimler Truck North America LLC
4555 N. Channel Ave, PORTLAND OR 97217-3849 USA

Product / PMN: CTP2019DTNA

Model / HVIN: CTP19TNv3

DUT Sample Number: Engineering Sample

Category of DUT: Mobile Exposure; General Population / Uncontrolled Exposure

FCC ID(s): Contains LTE Module with FCC ID 2A3Z6TOBYL3404

FCC ID: 2AKC8CTP33000000

ISED: 22221-CTP33000000

Type of Test: FCC Exposure Exemption Calculation

References: KDB 447498 v06
FCC CFR Title 47, Chapter I, Subchapter A, Subpart I, Part 2.1091

Deviations from standard: None

Date of Evaluation: 06/29/2023

Test Laboratory Information

Location of Test Lab: Bureau Veritas Consumer Product Services, Inc.
775 Montague Expressway
Milpitas, CA 95035
Phone: +1-925-963-4420

Key Contact: Sarb Shelopal (General Manager)
Sarbjit.Shelopal@BureauVeritas.com
Phone: +1-925-963-4420

Laboratory Accreditations: BUREAU VERITAS CONSUMER PRODUCTS SERVICES, INC is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.

ISO/IEC 17025:2017: 2742.01

FCC Test Site Number: US1109 (540430)

IC Test Site Number: US0160 (4842D)

RF Exposure Summary

Test	Reference FCC	Reference Industry Canada	Result
Radio frequency Radiation Exposure Evaluation	47 CFR§2.1091	RSS-102 Issue 5	Complies

RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 are followed.

FCC LIMITS

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

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)
8(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^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

F = Frequency in MHz

* = plane wave equivalent density

INDUSTRY CANADA LIMITS

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous *
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ f0.5	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10-4 $f^{0.5}$	6.67 x 10^{-5} f	616000/$f^{1.2}$

Note: f is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

MPE Calculation Formula

$$S = \frac{P_{out}G}{4\pi R^2}$$

Where:

S = power density in mW/cm^2

$\mathbf{P_{out}}$ = output power to antenna in mW

G = gain of antenna in linear scale

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

Classification

The antenna of this product, under normal use condition, is at least 25cm away for FCC and 37cm for IC from the body of the user. Therefore, this device is classified as Mobile Device.

Antenna information

FCC ID	Antenna Type	Antenna Gain (dBi)
2A3Z6TOBYL3404	Cellular (698 - 960 MHz)	4.0
	Cellular (1710 - 2700 MHz)	3.0
Being Certified Under FCC: 2AKC8CTP33000000 ISED: 22221-CTP33000000	Cable Antenna WiFi/BT (2400 -2485 MHz)	4.0
	Cable Antenna WiFi/BT (5150 -5925 MHz)	5.0

Note:

1. Antenna that led to the highest gain from the individual module filings.
2. Highest allowable antenna gain from the individual filing for the worst case frequency band.
3. Client confirms that not using 5GHz Band.
4. FCC Grant LTE Module

FCC - OET TCB LTE Module Grant of Equi

Calculation Result of Single RF Source(s)

For FCC:

Note: Band 5 is the highest power (1.6444 W)

FCC ID	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2A3Z6TOBYL3404	824.2-848.8	32.16	1644.4	4.0	25	0.526	0.549

FCC ID	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
Being Certified Under 2AKC8CTP33000000	2400 - 2485	17.99	62.95	4.0	20	0.0315	1

Note: 802.11b is the highest power (0.06295 W)

For IC:

IC ID	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (W/m^2)	Limit (W/m^2)
29037-TOBYL3404	824.2-848.8	32.16	1644.4	4.0	37	2.40096	2.5760

Note: Band 5 is the highest power (1.6444 W)

IC ID	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (W/m^2)	Limit (W/m^2)
Being Certified Uder 22221-CTP33000000	2400 - 2485	17.99	62.95	4.0	20	0.31458	5.3478

Note: 802.11b is the highest power (0.06295 W)

Calculation Result of Simultaneous RF Sources

The formula of calculated the MPE is:

(CPD1 / LPD1) + (CPD2 / LPD2) + …….etc. < 1

CPD = Calculated power density

LPD = Limit of power density

0.526/0.549 + 0.0315/1 = 0.9896 < 1 (For FCC)

2.40096/2.5760 + 0.31458/5.3478 = 0.9909 < 1 (For IC)

Conclusion

The device complies with requirements when operated at 25cm away for FCC and 37cm for IC from the body of the user.

The worst-case summation of MPE ratios for simultaneous transmission are less than 1, therefore the "Integrated Device. Automotive Telematics Unit" manufactured by **Daimler Truck North America LLC** is compliant with Maximum Permissible Exposure requirements.

Document Revisions

Version	Date	Modifier	Changes
1.0	06/29/2023	James Ma	• Initial release
2.0	08/03/2023	Abhijit Patibandla	• Updated EUT name

End of Report