



## SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR250300077407

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# RF EXPOSURE EVALUATION REPORT

**Application No.:** SZCR2503000774AT  
**Applicant:** CNH Industrial America LLC  
**Address of Applicant:** 700 State Street, Racine, WI 53404, Racine, Wisconsin 53404 United States  
**Manufacturer:** CNH Industrial America LLC  
**Address of Manufacturer:** 700 State Street, Racine, Wisconsin 53404, United States  
**Factory:** Raven Applied Technologies, LLC  
**Address of Factory:** 1101 W Algonquin Sioux Falls SD 57104 USA  
**Equipment Under Test (EUT):**  
**EUT Name:** Processing & Connectivity Module  
**Model No.:** PCM4  
**FCC ID:** 2BMQI-PCM4  
**Standard(s) :** FCC Rules 47 CFR §2.1091  
KDB 447498 D04 interim General RF Exposure Guidance v01  
**Date of Receipt:** 2025-03-03  
**Date of Evaluation:** 2025-05-08 to 2025-06-05  
**Date of Issue:** 2025-06-10

<b>Evaluation Result:</b>	<b>Pass*</b>
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\* In the configuration evaluated, the EUT complied with the standards specified above.

Keny Xu

EMC Laboratory Manager



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Shenzhen Branch EMC Laboratory

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2025-06-10		Original

Authorized for issue by:				
		Charlie Dai		
		Charlie Dai/Project Engineer		
		Eric Fu		
		Eric Fu/Reviewer		



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## 3 General Information

### 3.1 General Description of E.U.T.

Product Type:	<input type="checkbox"/> Portable device
	<input type="checkbox"/> Mobile device
	<input checked="" type="checkbox"/> Fixed device

### 3.2 Details of E.U.T.

Power supply:	DC 12V
Cable:	N/A
<b>For BT:</b>	
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Antenna Type:	Chip Antenna
Antenna Gain:	3.7dBi
<b>For BLE:</b>	
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Data Rate:	1Mbps, 2Mbps
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Chip Antenna
Antenna Gain:	3.7dBi

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<b>For 2.4G WIFI:</b>			
Operation Frequency:	802.11b/g/n(HT20)/ax(HEW20): 2412MHz to 2462MHz,		
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK), 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK), 802.11HEW20: OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK),		
Channel Spacing:	5MHz		
Number of Channels:	802.11b/g/n(HT20)/ax(HEW20): 11		
Antenna Type:	Chip Antenna		
Antenna Gain:	ANT 1&2: 2.1dBi		
<b>Radio System Type</b>	<input checked="" type="checkbox"/> <b>UMTS</b>		
Support Network:	RMC, HSDPA, HSUPA, DC-HSDPA		
Operation Frequency Band:	UMTS Band II/IV/V	TX	RX
	Band II	1850 to 1910 MHz	1930 to 1990 MHz
	Band IV	1710 to 1755 MHz	2110 to 2155 MHz
	Band V	824 to 849 MHz	869 to 894 MHz
Modulation Type:	BPSK, QPSK		
Supported Channel Bandwidth:	5MHz		
UMTS Power Class:	Level 3		
Antenna Type:	FAKRA Connector Telematics Antenna		
Antenna Gain:	700–1000 MHz: -0.5dBi; 1.6–2.6 GHz: 3.0dBi		
Cable Loss (for RF conducted test):	Below 1GHz: 0.5dB, 1GHz~2GHz:0.7dB, Above 2GHz: 1dB		
<b>Radio System Type:</b>	<input checked="" type="checkbox"/> <b>LTE</b>		
Modulation Type:	QPSK, 16QAM		
Supported Frequency Range	Band	TX	RX
	LTE Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE Band 5	824 to 849 MHz	869 to 894 MHz
	LTE Band 7	2500 to 2570 MHz	2620 to 2690 MHz
	LTE Band 12	699 to 716 MHz	729 to 746 MHz
	LTE Band 13	777 to 787 MHz	746 to 756 MHz
	LTE Band 26 (814 to 824 MHz )	814 to 824MHz	859 to 869 MHz
	LTE Band 26 (824 to 849 MHz )	824 to 849 MHz	869 to 894 MHz



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	LTE Band 38	2570 to 2620 MHz	2570 to 2620 MHz
	LTE Band 66	1710 to 1780 MHz	2110 to 2180 MHz
Antenna Type:	FAKRA Connector Telematics Antenna		
Antenna Gain:	700–1000 MHz: -0.5dBi; 1.6–2.6 GHz: 3.0dBi		

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

### 3.3 Separation Distance

Minimum test separation distance:	20cm
Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.	



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## 3.4 Test Location

All tests were performed at:

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Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

## 3.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### • A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

### • VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd.

Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

### • FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

### • Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

## 3.6 Deviation from Standards

None

## 3.7 Abnormalities from Standard Conditions

None



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## 4 FCC Radiofrequency radiation exposure limits

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

### 4.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

### 4.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

**Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation**

RF Source Frequency			Minimum Distance			Threshold ERP
$f_L$ MHz		$f_H$ MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	—	1.34	159 m	—	35.6 m	1,920 R <sup>2</sup>
1.34	—	30	35.6 m	—	1.6 m	3,450 R <sup>2</sup> /f <sup>2</sup>
30	—	300	1.6 m	—	159 mm	3.83 R <sup>2</sup>
300	—	1,500	159 mm	—	31.8 mm	0.0128 R <sup>2</sup> f
1,500	—	100,000	31.8 mm	—	0.5 mm	19.2R <sup>2</sup>
Subscripts L and H are low and high; $\lambda$ is wavelength.						
From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least  $\lambda/2\pi$ . The thresholds are



based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

For mobile devices that are not exempt per Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than  $ERP_{20cm}$  in Formula (B.1) [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only 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.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

Limit calculation			
Frequency range	Frequency(MHz)	$R(\lambda/2\pi)(m)$	Threshold ERP(W)
300~1500MHz	<b>915</b>	0.0522	0.032
1500~100000MHz	<b>2480</b>	0.0193	0.007

### 4.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of  $\lambda/4$ .

As for devices with antennas of length greater than  $\lambda/4$  where the gain is not well defined, but always less than that of a half-wave dipole (length  $\lambda/2$ ), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.



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The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.



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The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold  $P_{th}$  (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P_{th}$  is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20 \text{ cm}}$  is per Formula (B.1).



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Example values shown in Table B.2 are for illustration only.

**Table B.2—Example Power Thresholds (mW)**

Frequency (MHz)	Distance(mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Limit calculation				
Frequency range(GHz)	Frequency(GHz)	X	Distance(cm)	Pth (mW)
0.3~1.5	<b>0.915</b>	1.474	<b>0.5</b>	<b>8.133</b>
1.5~6	<b>2.48</b>	1.905	<b>0.5</b>	<b>2.717</b>



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## 5 Measurement and Calculation

For BT/WIFI:

Test Mode	Frequency (MHz)	EIRP [dBm]	EIRP (mW)	Exempt Limit(mW)	Verdict	Ratio
BT	2402	6.80	4.79	3060	PASS	0.002
BLE	2402	6.49	4.46	3060	PASS	0.001
2.4 Wi-Fi	2437	18.97	78.89	3060	PASS	0.026

Note: Refer to report No. SZCR250300077402, SZCR250300077403, SZCR250300077404 for EUT test Max Power Value.

For WCDMA/LTE:

Test Mode	Frequency (MHz)	Max. Average Power (dBm) Tune up	Antenna Gain (dBi)	Max. Power [dBm]	Max. Power (mW)	Exempt Limit(mW)	Verdict	Ratio
WCDMA B2	1880	23	3	26	398.107	3060	PASS	0.130
WCDMA B4	1732.6	23	3	26	398.107	3060	PASS	0.130
WCDMA B5	836.6	23	-0.5	23	199.526	1680.96	PASS	0.119
LTE B2	1880	23	3	26	398.107	3060	PASS	0.130
LTE B4	1732.5	23	3	26	398.107	3060	PASS	0.130
LTE B5	836.5	23	-0.5	23	199.526	1680.96	PASS	0.119
LTE B7	2535	23	3	26	398.107	3060	PASS	0.130
LTE B12	707.5	23	-0.5	23	199.526	1425.96	PASS	<b>0.140</b>
LTE B13	782	23	-0.5	23	199.526	1585.08	PASS	0.126
LTE B26 (814-824)	819	23	-0.5	23	199.526	1660.56	PASS	0.120
LTE B26 (824-849)	836.5	23	-0.5	23	199.526	1680.96	PASS	0.119
LTE B38	2595	23	3	26	398.107	3060	PASS	0.130
LTE B66	1745	23	3	26	398.107	3060	PASS	0.130



## Exposure condition for simultaneous transmission operations

Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated<sub>k</sub> term) shall be used to determine exemption for simultaneous transmission according to Formula (C.1) [repeated from § 1.1307(b)(3)(ii)(B)].

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1 \quad (C.1)$$

### Remark:

a -number of fixed, mobile, or portable RF sources claiming exemption using the §1.1307(b)(3)(i)(B) formula for P<sub>th</sub>, including existing exempt transmitters and those being added.

b -number of fixed, mobile, or portable RF sources claiming exemption using the applicable § 1.1307(b)(3)(i)(C) Table 1 formula 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.

P<sub>i</sub> -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<sub>th,i</sub> -the exemption threshold power (P<sub>th</sub>) according to the § 1.1307(b)(3)(i)(B) formula for fixed, mobile, or portable RF source i.

ERP<sub>j</sub> -the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j. ERP<sub>th,j</sub>

-exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π, according to the applicable § 1.1307(b)(3)(i)(C) Table 1 formula at the location in question.

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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.

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 sources, as applicable

**The Max. sum of the ratios = BT+WIFI+LTE= 0.002 +0.026 +0.140 = 0.168 < 1**

Therefore, the device is to qualify for simultaneous transmission SAR test exemption, the exemption report is in lieu of the SAR report.

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.



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## 6 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for SZCR2503000774AT

-End of the Report-



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