RF EXPOSURE REPORT

For

Hoymiles Power Electronics Inc.

No.18 Kangjing Road, Hangzhou, Zhejiang Province, P.R. China

FCC ID: 2ARNB-DTUPLUSSC

Report Type:	**Product Name:**
Class II permissive change Report	Data Transfer Unit

Report Number:	RSHA240204002-00B
Report Date:	2024-07-10
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REPORT REVISION HISTORY

Version	Issue Date	Description	Report No.
R1V1	2024-07-10	Class II permissive change Report	RSHA240204002-00B

FILING DESCRIPTION

Report Number	Information about Changes
RSHA240204002-00B	Antenna; Power Supply

Note:

This is a C2PC report, based on report CR230847711-00C★. Grant on 12/19/2023, the details as below:

1. Changed SRD and WWAN antenna.

2. Remove power supply (model: HDR-15-12), the EUT is sold without power supply

The above changes will affect the data, we recalculate it .

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Hoymiles Power Electronics Inc.
Product Name:	Data Transfer Unit
Tested Model:	DTU-Plus-S-C
Power Supply:	DC 12V
Maximum Peak Output Power★:	2.4G Wi-Fi: 802.11b: 21.55 dBm 802.11g: 21.62 dBm 802.11n20: 21.76 dBm 802.11n40: 21.79 dBm SRD: 15.5 dBm
RF Function:	2.4G Wi-Fi; SRD
Operating Band/Frequency:	2.4G Wi-Fi: 2412~2462 MHz(802.11b/g/n20), 2422~2452 MHz(802.11n40) SRD: 915.25-927.5MHz
Channel Number:	2.4G Wi-Fi: 11(802.11b/g/n20), 7(802.11n40) SRD: 50
Modulation Type:	802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g/n: OFDM-BPSK, QPSK,16QAM,64QAM SRD: GFSK
★Maximum Antenna Gain:	2.4G Wi-Fi:1.79 dBi SRD: 3.47 dBi

Note: The maximum antenna gain and output power were declared by the manufacturer.

All measurement and test data in this report was gathered from production sample serial number: RSHA240204002-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-02-04.)

1. RF EXPOSURE EVALUATION

1.1 Simultaneous Transmission with both SAR-based

1.1.1 Applicable Standard

According to §1.1307(b)(3)(i)(B)

Simultaneous Transmission with both SAR-based and MPE-Based Test Exemptions

This case is described in detail in § 1.1307(b)(3)(i)(B) and covers the situations where both SAR-based and MPE-based exemption may be considered for test exemption in fixed, mobile, or portable device exposure conditions. For these cases, a device with multiple RF sources transmitting simultaneously wil be considered an RF exempt device if the condition of Formula (1) is satisfied.

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\,cm}(d/20\,\text{cm})^{x} & d \le 20\,\text{cm} \\ ERP_{20\,cm} & 20\,\text{cm} < d \le 40\,\text{cm} \end{cases}$$

Where

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

and

$$ERP_{20\,cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

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

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (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 (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 (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 (b)(3)(i)(C) of this section.

$Evaluated_k$ = 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.

$Exposure\ Limit_k$ = 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.

1.1.2 EUT WWAN Information:

Operation Modes	Operation Frequency (MHz)	Maximum Conducted Power Including Tune-up Tolerance (dBm)	Antenna Gain (dBi)	Max Gain Allowed (dBi)
WCDMA B2	1850-1910	25	2.94	8.00
WCDMA B4	1710-1755	25	3.97	5.00
WCDMA B5	824-849	25	3.31	9.41
LTE B2	1850-1910	25	2.94	8.00
LTE B4	1710-1755	25	3.97	5.00
LTE B5	824-849	25	3.31	9.41
LTE B12	699-716	25	3.22	8.73
LTE B13	777-787	25	3.10	9.17
LTE B25	1850-1915	25	2.94	8.00
LTE B26(Part 22)	824-849	25	3.31	9.41
LTE B26(Part 90)	814-824	25	3.31	9.41
Note: The devices contain certified WWAN Module, FCC ID: XMR202008EG95NAXD				

1.1.3 Calculation results

Radio	Operation Frequency (MHz)	Distance (mm)	P_{th} (mW)	Maximum Conducted Power Including Tune-up Tolerance (dBm)	Antenna Gain (dBi)	The Greater of Conducted Power or ERP	
						dBm	mW
WiFi	2412-2462	200	3060	22	1.79	22.00	158.49
GFSK	915.25-927.5	200	1867	16	3.47	17.32	53.95
WCDMA B2	1850-1910	200	3060	25	2.94	25.79	379.31
WCDMA B4	1710-1755	200	3060	25	3.97	26.82	480.84
WCDMA B5	824-849	200	1681	25	3.31	26.16	413.05
LTE B2	1850-1910	200	3060	25	2.94	25.79	379.31
LTE B4	1710-1755	200	3060	25	3.97	26.82	480.84
LTE B5	824-849	200	1681	25	3.31	26.16	413.05
LTE B12	699-716	200	1426	25	3.22	26.07	404.58
LTE B13	777-787	200	1585	25	3.10	25.95	393.55
LTE B25	1850-1915	200	3060	25	2.94	25.79	379.31
LTE B26(Part 22)	824-849	200	1681	25	3.31	26.16	413.05
LTE B26(Part 90)	814-824	200	1661	25	3.31	26.16	413.05

Note:

The WWAN, GFSK and WiFi can transmit simultaneously.

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

$=P_{WWAN} / P_{th} + P_{WiFi} / P_{th} + P_{GFSK} / P_{th}$

=404.58/1426 + 158.49/3060 + 53.95/1867
=0.364
<1.0

Result: The device compliant the exemption at 20 cm distance.

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A - EUT EXTERNAL PHOTOGRAPHS

Declarations

1. The laboratory is not responsible for the authenticity of any information provided by the applicant. Information from the applicant that may affect test results is marked with "★".

2. The test data was only valid for the test sample(s).

3. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95.45% confidence interval.

******* END OF REPORT *******