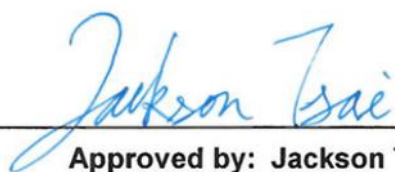


Radio Exposure Evaluation Report

Contains FCC ID : RI7ME910G1WW, 2A8O9-EM2050
FCC ID : 2BAH4SBG-3
Equipment : Silvanet Border Gateway
Brand Name :  **DRYAD**  **DRYAD**
Model Name : SBG-3X
(Where X = "empty" or "S" that represents satellite variant)
Applicant : Dryad Networks GmbH
Eisenbahnstr. 37, 16225 Eberswalde, Germany
Manufacturer : Dryad Networks GmbH
Eisenbahnstr. 37, 16225 Eberswalde, Germany
Standard : 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on Oct. 28, 2024, and testing was started from Nov. 12, 2024 and completed on Nov. 12, 2024. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR FCC Part 2 Subpart J, section 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Hsinhua Laboratory, the test report shall not be reproduced except in full.



Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)



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Photographs of EUT V01	



History of this test report

Report No.	Version	Description	Issued Date
FA481416	01	Initial issue of report	Jan. 16, 2025



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None

Reviewed by: Ryan Hsiao

Report Producer: Michelle Tsai



1 General Description

1.1 Information

1.1.1 EUT General Information

RF General Information		
Evaluation Mode	Frequency Range (MHz)	Modulation Type
LoRa	902–928	LoRa (125kHz/500kHz)
P-GSM 900	890–915	GMSK / 8PSK
DCS 1800	1710–1785	GMSK / 8PSK
Satellite	2010–2020	Satellite (125kHz)
Cat-M1 Band 2	1850–1910	QPSK/16QAM
Cat-M1 Band 4	1710–1755	QPSK/16QAM
Cat-M1 Band 5	824–849	QPSK/16QAM
Cat-M1 Band 12	699–716	QPSK/16QAM
Cat-M1 Band 13	777–787	QPSK/16QAM
Cat-M1 Band 25	1850–1915	QPSK/16QAM
Cat-M1 Band 26	814–849	QPSK/16QAM
Cat-M1 Band 66	1710–1780	QPSK/16QAM
Cat-M1 Band 85	698–716	QPSK/16QAM
NB-IoT Band 2	1850–1910	QPSK/16QAM
NB-IoT Band 4	1710–1755	QPSK/16QAM
NB-IoT Band 5	824–849	QPSK/16QAM
NB-IoT Band 12	699–716	QPSK/16QAM
NB-IoT Band 13	777–787	QPSK/16QAM
NB-IoT Band 25	1850–1915	QPSK/16QAM
NB-IoT Band 26	814–849	QPSK/16QAM
NB-IoT Band 66	1710–1780	QPSK/16QAM
NB-IoT Band 71	663–698	QPSK/16QAM
NB-IoT Band 85	698–716	QPSK/16QAM

**1.1.2 Antenna Information**

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	Dryad	LORA01Gen-3	PCB Antenna	N/A	0.75

For LoRa function:

Ant. 1 (port 1) could transmit/receive.

Ant.	Port	Brand	Model Name	Antenna Type	Connector
1	1	Dryad	LTE01Gen-3	PCB Antenna	N/A

WWAN 2G/4G Gain (dBi)					
P-GSM900	DCS 1800	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 12
1.0	3.7	1.79	1.96	-0.37	-0.17
LTE Band 13	LTE Band 25	LTE Band 26	LTE Band 66	LTE Band 71	LTE Band 85
-0.56	1.79	-0.95	1.96	-0.17	-0.17

For WWAN function:

Ant. 1 (port 1) could transmit/receive.

1.1.3 Table for Multiple Listing

Model Name		Description
SBG-3X (Where X = "empty" or "S" that represents satellite variant)	SBG-3	without satellite
	SBG-3S	with satellite

Note: The model SBG-3S was measured during the test.



1.2 Applicable Standards

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

- ♦ 47 CFR FCC Part 2 Subpart J, section 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

1.3 Testing Location

Test Lab. : Sporton International Inc. Hsinhua Laboratory		
☒ Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
	TEL: 886-3-327-3456	FAX: 886-3-327-0973
Test site Designation No. TW3785 with FCC.		

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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

Note: f = frequency in MHz ; *Plane-wave equivalent power density

Multiple Transmitters Condition

Co-location as simultaneously transmitting (co-transmitting) and the evaluation shall be consider that simultaneous transmissions from co-located devices the individual transmitters are evaluated separately. After sum of the individual value (basic restriction / reference level) are measured/calculated also have to under basic restriction / reference level.

Co-transmitting mode:

1. WWAN Cat M1 + Lora + Satellite
2. WWAN NB-IoT + Lora + Satellite
3. WWAN 2G + Lora + Satellite

2.2 RF Exposure Exempt Measurement

Option	Refer Std.	Exemption Exposure Thresholds (TL)
A	§1.1307(b)(3)(i)(A)	Available maximum time-averaged power is no more than 1 mW
B	§1.1307(b)(3)(i)(B)	$P_{th}(mW) = \begin{cases} ERP_{20cm} (d / 20cm)^x \rightarrow d \leq 20cm \\ ERP_{20cm} \rightarrow 20cm < d \leq 40cm \end{cases}$ $x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right) \text{ and } f \text{ is in GHz}$ $\begin{cases} ERP_{20cm} : 0.3GHz \leq f < 1.5GHz \rightarrow 2040f(mW) \\ ERP_{20cm} : 1.5GHz \leq f \leq 6GHz \rightarrow 3060(mW) \end{cases}$
C	§1.1307(b)(3)(i)(C)	$\begin{cases} 0.3 \sim 1.34MHz \rightarrow ERP(W) = 1920R^2 \\ 1.34 \sim 30MHz \rightarrow ERP(W) = 3450R^2 / f^2 \\ 30 \sim 300MHz \rightarrow ERP(W) = 3.83R^2 \\ 300 \sim 1500MHz \rightarrow ERP(W) = 0.0128R^2 f \\ 1500 \sim 100000MHz \rightarrow ERP(W) = 19.2R^2 \end{cases}$ f is in MHz; R is in m; $R > \lambda / 2\pi$

2.3 Multiple RF Sources Exposure

Refer Std.	Exemption Exposure Thresholds (TL)
§1.1307(b)(3)(ii)(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)
§1.1307(b)(3)(ii)(B)	$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k} \leq 1$ a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P , 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 λ/2π according to the applicable formula of paragraph §1.1307(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. Evaluated 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.



2.4 MPE Calculation Method

The MPE was calculated at 70 cm to show compliance with the power density limit.
The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

2.5 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

LoRa

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
0.9G;LoRa-500	0.75	18.27	16.87	0.00	48.641	70	C	5703.8	0.0085
0.9G-1;LoRa-500	0.75	17.62	16.22	0.00	41.879	70	C	5791.0	0.0072
0.9G;LoRa-125	0.75	19.35	17.95	0.00	62.373	70	C	5659.3	0.0110

Satellite

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2G;Satellite-125	7.50	23.3	28.65	0.00	732.825	70	C	9408.1	0.0779
2G;Satellite-125	7.50	21.5	26.85	0.00	484.172	70	C	9408.1	0.0515
2G;Satellite-125	7.50	27	32.35	0.00	1717.908	70	C	9408.1	0.1827

WWAN Cat M1

Mode	DG	Power	ERP	Tolerance	Tune-up ERP	Distance	Option	TL ERP	TL Ratio
M1;W7D	-0.37	25	22.48	0.00	177.011	70	C	5629.2	0.0315

WWAN NB-IoT

Mode	DG	Power	ERP	Tolerance	Tune-up ERP	Distance	Option	TL ERP	TL Ratio
NB-IOT;G7D	-0.37	25	22.48	0.00	177.011	70	C	5629.2	0.0315

WWAN 2G

Mode	DG	Power	ERP	Tolerance	Tune-up ERP	Distance	Option	TL ERP	TL Ratio
2G;GXW	3.70	35	36.55	0.00	4518.559	70	C	5644.8	0.8008
2G;GXW	3.70	35	36.55	0.00	4518.559	70	C	9408.1	0.4805

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)



Simultaneous Transmission Analysis Mode: WWAN Cat M1 + Lora + Satellite

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
0.9G;LoRa-125	0.75	19.35	17.95	0.00	62.373	70	C	5659.3	0.0110
2G;Satellite-125	7.50	27	32.35	0.00	1717.908	70	C	9408.1	0.1827
M1;W7D	-0.37	25	22.48	0.00	177.011	70	C	5629.2	0.0315
Sum TL Ratio_C	0.2252								
Ratio Limit	1								

Simultaneous Transmission Analysis Mode: WWAN NB-IoT + Lora + Satellite

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
0.9G;LoRa-125	0.75	19.35	17.95	0.00	62.373	70	C	5659.3	0.0110
2G;Satellite-125	7.50	27	32.35	0.00	1717.908	70	C	9408.1	0.1827
NB-IOT;G7D	-0.37	25	22.48	0.00	177.011	70	C	5629.2	0.0315
Sum TL Ratio_C	0.2252								
Ratio Limit	1								

Simultaneous Transmission Analysis Mode: WWAN 2G + Lora + Satellite

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
0.9G;LoRa-125	0.75	19.35	17.95	0.00	62.373	70	C	5659.3	0.0110
2G;Satellite-125	7.50	27	32.35	0.00	1717.908	70	C	9408.1	0.1827
2G;GXW	3.70	35	36.55	0.00	4518.559	70	C	5644.8	0.8008
Sum TL Ratio_C	0.9945								
Ratio Limit	1								

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, P_{th}(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

Note 4: Refer as clause 2.3 Multiple RF Sources Exposure. Please follow below option and sum TL ration table.

Option	Sum TL Ratio_B	Option	Sum TL Ratio_C	Option	Sum TL Ratio_E
B	$\sum_{i=1}^a \frac{P_i}{P_{th,i}}$	C	$\sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}}$	E	$\sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k}$

Note: The above antenna gain was declared by manufacturer.

—————THE END—————