

RF EXPOSURE REPORT



Applicant: Device Solutions Inc.
3211 Moorefields Road, Hillsborough North Carolina 27278

Product Name: Gateway

Brand Name: Cellio

Model No.: DS0052V-G

Model Difference: N/A

Report Number: ER/2021/40082

FCC ID OXW-AS0133

IC: 10572A-AS0133

Issue Date: Jun.18,2021

Approved By _____

John Yeh

We hereby certify that:

The above equipment was evaluate by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §2.1091 and RSS-102.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By
ER/2021/40082	Rev.00	Original.	Jun.18,2021	Viola Su

- 1、Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Gateway
Brand Name:	Cellio
Model No.:	DS0052V-G
Model Difference:	N/A
Hardware Version:	B
Firmware Version:	N/A
EUT Series No.:	BTGB03
WWAN Module:	ME310G1-W1
Power Supply:	3.7Vdc from Rechargeable Li-polymer Battery 5.9Vdc from AC/DC adapter.

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1.2 Antenna Information:

1.2.1 BLE

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Chip Antenna	ABRACON	AMCA31-2R450G-S1F-T3	2402-2480	0.5

1.2.2 LoRa

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Chip Antenna	johansontechnology	0915AT43A0026	902-928	-1

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2 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
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
1500-100000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equipment power density

Prediction of MPE limit at a given distance

$$S = PG / 4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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2.2 ISED Standard Applicable

This submittal(s) (test report) is intended to comply with RSS-102 issue 5 Radio frequency Radiation Exposure requirement.

This is a Mobile device, the MPE is required.

Limits for Maximum Permissible Exposure (MPE)

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field Strength (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/ f ^{0.5}	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}

F = frequency in MHz

* = Based on nerve stimulation (NS).

** = Based on specific absorption rate (SAR)

Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

$$S = PG / 4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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2.3 Power Density Calculation (Worst Case)

FCC Standalone MPE

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. output Power (dBm)	Antenna Gain (dBi)	Max. output Power EIRP (mW)	Power Density (PD) (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density / Limit	Collocated MPE
BLE	2442.00	20	4	0.50	2.82	0.0006	1.000	Pass	0.0006	V
LoRa	907.00	20	15.68	-1.00	29.38	0.006	0.605	Pass	0.010	V
eMTC-Band 2	1850.70	20	21.99	5.30	535.80	0.107	1.000	Pass	0.107	V

ISED Standalone MPE

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. output Power (dBm)	Antenna Gain (dBi)	Output Power EIRP (mW)	Power Density (PD) (W/m ²)	Limit (W/m ²)	Pass / Fail	Power Density / Limit	Collocated MPE
BLE	2442.00	20	4	0.50	2.82	0.006	5.412	Pass	0.0010	V
LoRa	907.00	20	15.68	-1	29.38	0.058	2.750	Pass	0.021	V
eMTC-Band 2	1850.70	20	21.99	5.30	535.80	1.066	4.477	Pass	0.238	V

2.4 Collocated Power Density Calculation

FCC Collocated MPE

Max BLE PD / Limit	Max LoRa PD / Limit	Max WWAN PD / Limit	Σ (Power Density / Limit)
0.0006	0.010	0.107	0.118

ISED Collocated MPE

Max BLE PD / Limit	Max LoRa PD / Limit	Max WWAN PD / Limit	Σ (Power Density / Limit)
0.001	0.021	0.238	0.260

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Note:

1. Σ (E- Power Density / Limit): This is a summation of [(E- Power Density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)].
2. Considering the collocated transmitters, the aggregated (E- Power Density /limit) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~

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