



FCC ID: 2ALIE-GWS1XX
Report No.: T180807D10-MF

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IEEE C95.1 2005
KDB 447498 D01 V06
47 C.F.R. Part 1, Subpart I, Section 1.1310
47 C.F.R. Part 2, Subpart J, Section 2.1091

RF EXPOSURE REPORT

For

IoT Gateway

Model: S1

Trade Name: **SIMPNIC**

Issued to

CONNECTION TECHNOLOGY SYSTEMS INC.
18F-6, No.79, Sec.1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, TAIWAN, R.O.C.

Issued by

Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
Issued Date: November 19, 2018

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 19, 2018	Initial Issue	ALL	Allison Chen



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1. EUT SPECIFICATION

EUT	IoT Gateway
Model	S1
Model Discrepancy	N/A
Frequency band (Operating)	<input checked="" type="checkbox"/> IEEE 802.11b/g/n HT20 Mode: 2.412GHz ~ 2.462GHz IEEE 802.11n HT40 Mode: 2.422GHz ~ 2.452GHz <input checked="" type="checkbox"/> 908.4 ~ 916MHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna Specification	For WIFI 2.4GHz Antenna 1 Gain : 3.24 dBi (Numeric gain: 2.11) Antenna 2 Gain : 3.46 dBi (Numeric gain: 2.22) Power Directional Gain : 3.35 dBi (Numeric gain: 2.16) For Z-Wave Antenna Gain : 0.36 dBi (Numeric gain: 1.09)
Maximum Average output power	For WIFI 2.4GHz IEEE 802.11b Mode: 22.00 dBm (158.489 mW) IEEE 802.11g Mode: 21.50 dBm (141.254 mW) IEEE 802.11n HT 20 Mode: 21.50 dBm (141.254 mW) IEEE 802.11n HT 40 Mode: 21.00 dBm (125.893 mW) For Z-Wave Z-Wave 3.00 dBm (1.995 mW)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

2. TEST RESULTS

No non-compliance noted.

Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{377}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

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

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

3. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where $P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²

Z-Wave:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
916	1.995	1.09	20	0.0004	1

IEEE 802.11b Mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
11	2462	158.489	2.22	20	0.0700	1.000

IEEE 802.11g Mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
6	2437	141.254	2.22	20	0.0624	1.000

IEEE 802.11n HT20 Mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1	2412	141.254	2.16	20	0.0607	1.000

IEEE 802.11n HT40 Mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
6	2437	125.893	2.16	20	0.0541	1.000