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

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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)	☒ IEEE 802.11b/g/n HT20 Mode: 2.412GHz ~ 2.462GHz IEEE 802.11n HT40 Mode: 2.422GHz ~ 2.452GHz ☒ 908.4 ~ 916MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ 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	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

2. TEST RESULTS

No non-compliance noted.

Calculation

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

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 (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

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

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

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/cm2)
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