FCC RF Exposure Evaluation

1. Product Information

FCC ID	:	2AXTE-CDT01
Product name	:	Sigfox Connected Seal
Test Model	:	Condat Link
Power supply	:	DC 3 V on battery
Bluetooth	:	902.1375MHz-904.6625MHz
Channel Number	:	54 channels
Modulation Type	:	BPSK uplink, GFSK downlink
Antenna Type	:	Internal Antenna
Antenna Gain	:	1.8dBi(Max.)
Hardware Version	:	/
Software Version	:	/
Exposure category	:	General population/uncontrolled environment
EUT Type	:	Production Unit
Device Type	:	Portable Device

2. Evaluation method and Limit

According to KDB447498 D01 General RF Exposure Guidance v06 Section 4.3.1 Standalone SAR test exclusion considerations: “Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.22 The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc.“
[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] · [√f (GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

When one of the following test exclusion conditions is satisfied for all combinations of simultaneous

transmission configurations, further equipment approval is not required to incorporate transmitter modules in host devices that operate in the mixed mobile and portable host platform exposure conditions. The grantee is responsible for documenting this according to Class I permissive change requirements. Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone SAR to determine simultaneous transmission test exclusion.

a) The [∑ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [∑ of MPE ratios] is ≤ 1.0.

b)The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04, and the [∑ of MPE ratios] is ≤ 1.0.

3. Refer Evaluation Method

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

FCC KDB publication 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.

FCC CFR 47 part2 2.1093: Radiofrequency radiation exposure evaluation: portable devices

4. Conducted Power Results

Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	902.1375	18	902.1875	36	902.2375
01	902.4375	19	902.4875	37	902.5375
02	902.7375	20	902.7875	38	902.8375
03	903.0375	21	903.0875	39	903.1375
04	903.3375	22	903.3875	40	903.4375
05	903.6375	23	903.6875	41	903.7375
06	903.9375	24	903.9875	42	904.0375
07	904.2375	25	904.2875	43	904.3375
08	904.5375	26	904.5875	44	904.6375
09	902.1625	27	902.2125	45	902.2625
10	902.4625	28	902.5125	46	902.5625
11	902.7625	29	902.8125	47	902.8625
12	903.0625	30	903.1125	48	903.1625
13	903.3625	31	903.4125	49	903.4625
14	903.6625	32	903.7125	50	903.7625
15	903.9625	33	904.0125	51	904.0625
16	904.2625	34	904.3125	52	904.3625
17	904.5625	35	904.6125	53	904.6625

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
RF ID	LCH	10.643	30	PASS
	MCH	10.635	30	PASS
	HCH	10.642	30	PASS

5. Manufacturing Tolerance

RF ID(Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	10.0	10.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0

6. Evaluation Results

6.1 Standalone Evaluation

f (GHz)	Antenna Distance (mm)	RF output power		SAR Test Exclusion Threshold	SAR Test Exclusion
		dBm	mW		
0.9046625	5	11.0	1.9953	2.3948< 3.0	Yes

Remark:

1. Output power including tune up tolerance;

2. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

6.2 Simultaneous Transmission for SAR Exclusion

The sample support one RF ID modular. No need consider simultaneous transmission.

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

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