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SAR EXCLUSION DOCUMENT

Document 75950067-16 Issue 01

126 kHz & 133 kHz Transmitters:

FCC Standalone SAR Test Exclusion Considerations (KDB 447498 D01) Section 4.3.1 c)

<100 MHz – Separation Distance ≤50 mm or Separation Distance >50 mm and <200 mm

The 1g head or body SAR test exclusion thresholds for <100 MHz are determined by the following steps:

Step a) Threshold result from Formula in Section 4.3.1 a):

[(max power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1g SAR.

- $f_{(GHz)}$ 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
- When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied.

Step b) requires formula to be re-arranged to give power allowed at numeric threshold at 50 mm test separation distance and Step c) requires $f_{(GHz)}$ to be set to 100 MHz (0.1 GHz) giving:

Step a) Power threshold = (3 * 50) / ($\sqrt{0.1}$) = 474.3 mW

Step b) Threshold result from Formula in Section 4.3.1 b) 1);

{[Power allowed at numeric threshold for 50 mm {Formula Step A})] + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW

- f_{MHz} is the RF channel transmit frequency in MHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison

Power threshold = 474.3 mW + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW

Step c) requires $f_{(MHz)}$ to be set to 100 MHz giving:

Step b) Power threshold = 474.3 mW + [(test separation distance – 50 mm)·(100)/150)] mW

Approved by ..... **Date** 16 April 2021

Ryan Henley
Authorised Signatory

Step c) 1) Threshold result from Formula in Section 4.3.1 c) 1); >50 mm and <200 mm

Threshold result from Formula in Section 4.3.1 b) 1) is multiplied by [1+log(100/f_{MHz})]

Power threshold = [474.3 mW + (test separation distance – 50 mm)· (100)/150)] * [1+log(100/f_{MHz})] mW

- f_{MHz} is the RF channel transmit frequency in MHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison

Step c) 2) Threshold result from Formula in Section 4.3.1 c) 2); ≤50 mm

Threshold result from the formula in 4.3.1 c) 1) above for >50 mm and <200 mm for 50 mm and 100 MHz is multiplied by 0.5.

Power threshold = [474.3 mW + (50 mm – 50 mm)· (100)/150)] * [1+log(100/f_{MHz})] * 0.5 mW

Which simplifies to:

Power threshold = 474.3 mW * [1+log(100/f_{MHz})] * 0.5 mW

- f_{MHz} is the RF channel transmit frequency in MHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison>>

SAR Exclusion Result (1 g Head or Body)

Frequency (MHz)	Power Output mW	Duty Cycle %	Maximum Power (Tune up Value) * (mW)	Test Separation Distance (mm)	SAR Exclusion Power Threshold Section 4.3.1 c) (mW)	SAR Test Exclusion (Yes/No)
0.126	116	100	116	0	924.9	Yes
0.133	95	100	95	0	919.3	Yes

SAR Exclusion Result (10 g Extremity)

Frequency (MHz)	Power Output mW	Duty Cycle %	Maximum Power (Tune up Value) * (mW)	Test Separation Distance (mm)	SAR Exclusion Power Threshold Section 4.3.1 c) (mW)	SAR Test Exclusion (Yes/No)
0.126	116	100	116	0	2312.2	Yes
0.133	95	100	95	0	2298.3	Yes

*Maximum power including tolerance of the time averaged declared conducted output power of the device. Derived from FCC Determination of the Equivalent Isotropically Radiated Power (EIRP) given in the measurement and calculations overleaf.

The SAR exclusion threshold has been evaluated using the formula described above from information supplied by the manufacturer below. Based on the calculation above, the EUT is categorically excluded from SAR testing

FCC Determination of the Equivalent Isotropically Radiated Power (EIRP) of an RF Transmitting System (KDB 412172)

Section 2.2 Direct calculation from the DUT power measured in a radiated test configuration

Section 2.2. states: When the DUT power is measured using a radiated test configuration, the eirp can be directly determined using the field strength (linear) approach by applying Equation:

$eirp = p_t \times g_t = (E \times d)^2/30$

- Eirp is the equivalent isotropically radiated power in watts.
- p_t transmitter output power in watts (not required)
- g_t numeric gain of the transmitting antenna (unitless) (not required)
- E electric field strength in V/m
- D measurement distance in meters (m)

Measure the electric field strength E at test distance d m.

If magnetic field strength is measured, convert to electric field strength in accordance with the antenna manufacturers' conversion factors.

Calculate the eirp using the equation above. Increase the eirp to include any declared tune-up tolerance value to give the maximum output power.

The result is the Maximum Power (Tune up Value) required in the SAR exclusion assessment.

Frequency kHz	Magnetic Field Strength [1] (dBµA/m)	Conversion Factor H to E Field [2] (dB)	Electric Field Strength (dBµV/m)	Electric Field Strength (V/m)	Test Distance (m)	Eirp (W)	Eirp (mW)	Tune-up Tolerance (%)	Maximum Power (Tune up Value) (mW)
126	64.34	51.5	115.8	0.6194411	3	0.11511	115.11	0	115.1
133	63.47	51.5	115.0	0.5604024	3	0.09422	94.22	0	94.2

Note 1: Maximum magnetic field strength measured at 3 m from report 75950067_04.
Note 2: Since Electric and magnetic fields are related by their wave impedance:
E/H=377 ohms; E (dBµV/m) = H (dBµA/m) + 51.5 (dB)
377 ohms assumes worst case plane wave conditions for an inductive loop antenna, actual wave impedance would be lower giving lower result.

Manufacturer's Declaration of Product information:

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	The iCWS is a pet drinking station designed to provide the user with a measurement of how much their pet is drinking. The unit includes load cells to weight the water as it is drunk and an RFID antenna to identify the animal drinking. The units also includes a 2.4 GHz link (802.15.4) for communication to the user App via a Sure Petcare Hub.
Manufacturer:	SureFlap Ltd.
Model:	iCWS
Part Number:	iCWSWT

If more than one frequency band is supported, please confirm which combinations of bands are capable of Simultaneous Transmit.	

Frequency Band 1: RFiD 126 kHz

Antenna Model:		
Antenna length:		cm
Bottom frequency:	0.126	MHz
Middle frequency:		MHz
Top frequency:	0.126	MHz

Maximum power (input to the antenna including a tolerance):		W
Antenna gain (or maximum gain allowed):		dBi

Or

Field Strength Measurement:	64.34	dBµA/M
Measurement Distance:	3	m

Separation distance from antenna to the user/bystander		cm
Transmitter Duty Cycle:		%

Frequency Band 2: RFiD 133kHz

Antenna Model:		
Antenna length:		cm
Bottom frequency:	0.133	MHz
Middle frequency:		MHz
Top frequency:	0.133	MHz

Maximum power (input to the antenna including a tolerance):		W
Antenna gain (or maximum gain allowed):		dBi

Or

Field Strength Measurement:	63.47	dBµA/M
Measurement Distance:	3	m

Separation distance from antenna to the user/bystander		cm

Transmitter Duty Cycle:		%

I hereby declare that the information supplied is correct and complete.

Name: Dr David Hallas
Position held: Managing Director
Date: 05-01-2021