Prüfbericht-Nr.: *Test Report No.:*	60243282-002	**Auftrags-Nr.:** *Order No.:*	23870168
Kunden Referenz-Nr.: Client Reference No.:	-	**Auftragsdatum** *Order date:*	2019-04-17
Auftraggeber: *Client:*	IKEA of Sweden AB Box 702 343 81 Älmhult Sweden	Torbjörn Samuelsson torbjorn.samuelsson@ikea.com 0705-353183	
Prüfgegenstand: *Test item:*	TRÅDFRI Shortcut button		
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	FCC ID: FHO-E1812 Model No.: E1812		
Auftrags-Inhalt: *Order content:*	RF Exposure Evaluation		
Prüfgrundlage: *Test specification:*	FCC 47 CFR §2.1091 KDB 447498 D01 v06		
Wareneingangsdatum: *Date of receipt:*	N/A		
Prüfmuster-Nr.: *Test sample No.:*	N/A		
Prüfzeitraum: *Testing period:*	N/A		
Ort der Prüfung: *Place of testing:*	Lund, Sweden		
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Sweden		
Prüfergebnis: *Test results:*	See detail in report		

Geprüft von *Tested by:*	Niall Forrester Technical Expert	**Kontrolliert von** *Reviewed by:*	Per Isacsson Lab Manager
2019-09-17	N. Forrester	2019-09-17	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
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Revisions
Revisions

Revision Revision	**Datum** Date	**Anmerkung** Remark	**Verfasser** Author
001	2019-07-01	First Release	Niall Forrester
002	2019-09-17	Clarified FCC ID text	Niall Forrester

Note: Latest revision report will replace all previous reports

TABLE OF CONTENTS

PRODUCT INFORMATION

1.1 Equipment under Test (EUT) description

Model name:	TRÅDFRI Shortcut button
Manufacturer:	IKEA of Sweden
Model number:	E1812
FCC ID:	FHO-E1812
Description:	It´s a programmable button which give the user a quick and easy way to access certain functions in the TRÅDFRI System quickly without the need for opening the app. Possible use cases could be :All OFF, Scenes, Welcome home and timer

1.2 Wireless Technologies and Frequency Bands supported by the DUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed
ZigBee	2.4 GHz	2400 MHz – 2480 MHz	YES

1.3 Conducted Power

Technology	Band	Maximum Conducted Output power (dBm)
ZigBee	2.4 GHz	4.5

Maximum Power and Antenna Gain are based on details supplied by the device manufacturer and include tune-up tolerances.

EVALUATION

1.4 Summary

Based on the thresholds for Extremities SAR listed in KDB 447498 D01 v06, SAR evaluation for hand-held use is not required for the device type with FCC ID: FHO-E1812.

1.5 Limits

Extract from KDB 447498 D01 v06 General RF Exposure Guidance

4.3. General SAR test exclusion guidance

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(s), listed below, is (are) 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.28 The minimum test separation distance defined in 4.1 f) 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. To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified, typically in the SAR measurement or SAR analysis report, by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, according to the required published RF exposure
KDB procedures. When no other RF exposure testing or reporting are required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for 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 and tablets, etc.29

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$\left[\frac{(max.power\ of\ channel,including\ tune{-}up\ tolerance,mW)}{(min.test\ separation\ distance,mm)}\right] \times \sqrt{\mathrm{f}\,(\mathrm{GHz})} \leq 3.0 \text{ for 1g SAR}$$

$$\left[\frac{(max.power\ of\ channel,including\ tune{-}up\ tolerance,mW)}{(min.test\ separation\ distance,mm)}\right] \times \sqrt{\mathrm{f}\,(\mathrm{GHz})} \leq 7.5 \text{ for 10g extremity SAR}$$

where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation31
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in step b) 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 4.1 f) is applied to determine SAR test exclusion.

1.6 Detailed Calculations

In order to determine if SAR testing could be excluded, the following calculation was performed and the result compared to the limits listed in KDB 447498 D01 section 4.3.1

To ensure a conservative estimate, the device has been treated here as a hand-held device and calculations are based on 'Extremity' SAR requirements. A distance of 0mm has been assumed, which means that a value of 5mm is used for the minimum test separation distance in the equation below

$$\text{Threshold Value} = \left[\frac{(max.power\ of\ channel,including\ tune{-}up\ tolerance,mW)}{(min.test\ separation\ distance,mm)}\right] \times \sqrt{\text{f, GHz}}$$

Technology	Band	Frequency* (GHz)	Min test Distance (mm)**	Max Conducted Power (dBm)	Max Conducted Power*** (mW)	Threshold Value	Limit
ZigBee	2.4 GHz	2.480	5	4.5	3	0.9	7.5

*The highest frequency in each band has been chosen, to give the most conservative limit

** Distance is rounded to nearest mm

**Max Conducted Power (mw) is rounded to nearest mW