

SAR EXEMPTION EXHIBIT

FCC

APPLICANT

Tesla Motors, Inc.

MODEL NAME

1642783

FCC ID

2AEIM-1642783

REPORT NUMBER

HA210413-TES-002-R02

TEST REPORT

Date of Issue
April 30, 2021

Test Site
Hyundai C-Tech, Inc. dba HCT America, Inc.
1726 Ringwood Ave, San Jose, CA 95131, USA

Applicant	Tesla Motors, Inc.
Applicant Address	3500 Deer Creek Road, Palo Alto, CA 94304, USA
FCC ID	2AEIM-1642783
Model Name	1642783
EUT Type	Bluetooth USB Hub
FCC Rule Part(s)	Part 2 (§2.1091)
Test Procedure	KDB 447498 D01 v06

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was in accordance with the procedures specified in §2.947. The results in this report apply only to the product which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Hyundai C-Tech, Inc. dba HCT America, Inc. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By



Yongsoo Park

Test Engineer

Reviewed By



Sunwoo Kim

Technical Manager

REVISION HISTORY

The revision history for this document is shown in table.

TEST REPORT NO.	DATE	DESCRIPTION
HA210413-TES-002-R02	4/30/2021	Initial Issue

TABLE OF CONTENTS

1. EUT DESCRIPTION	4
2. INTRODUCTION.....	5
2.1. LIMIT	5
3. RESULT	6
3.1. SUMMARY OF RESULTS	6
3.2. CONCLUSION	6

1. EUT DESCRIPTION

Model	1642783
EUT Type	Bluetooth USB Hub
Power Supply	10 – 17.5 VDC (16 VDC nominal)
RF Specification	Bluetooth BDR/EDR
Frequency Range	2402 MHz - 2480 MHz
Max. RF Output Power	Max tune up power including the tolerance : 5 dBm (3.162 mW)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Number of Channels	79 Channels
Antenna Specification ¹⁾	Antenna Type : PCB Trace Antenna Peak Gain : 4.89 dBi
Transmitter Chain	1
Operating Environment ²⁾	Indoor and outdoor
Operating Temperature ²⁾	-40 °C ~ +85 °C

Note :

1. Antenna information is based on the document provided.
2. Environmental operating condition is declared by the manufacturer.

2. INTRODUCTION

2.1. LIMIT

The RF exposure from portable device, as defined by FCC, must be evaluated with respect to FCC-adopted limits for SAR in accordance with 47 CFR §2.1091.

If 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.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table, Appendix A, KDB 447498 D01 v06, 'General RF Exposure Guidance'.

MHz	5	10	15	20	25	30	35	40	45	50	mm
150	39	77	116	155	194	232	271	310	349	387	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	164	192	219	246	274	
450	22	45	67	89	112	134	157	179	201	224	
835	16	33	49	66	82	98	115	131	148	164	
900	16	32	47	63	79	95	111	126	142	158	
1500	12	24	37	49	61	73	86	98	110	122	
1900	11	22	33	44	54	65	76	87	98	109	
2450	10	19	29	38	48	57	67	77	86	96	
3600	8	16	24	32	40	47	55	63	71	79	
5200	7	13	20	26	33	39	46	53	59	66	
5400	6	13	19	26	32	39	45	52	58	65	
5800	6	12	19	25	31	37	44	50	56	62	

Note : 10-g Extremity SAR Test Exclusion Power Threshold are 2.5 times higher than the 1g SAR Test Exclusion Threshold indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.

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 equation according to 4.3.1 a), KDB 447498 D01 v06 :

1-g SAR Test Exclusion Thresholds

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

10-g SAR Test Exclusion Thresholds

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

3. RESULT

3.1. SUMMARY OF RESULTS

Mode	Frequency (MHz)	Measured Level (dBm)	Max Tune-up Power ¹⁾ (dBm)	Max. Power (mW)	Calculated Threshold
BDR (GFSK)	2402	3.281	5.000	3.162	0.980
	2441	4.250	5.000	3.162	0.988
	2480	4.943	5.000	3.162	0.996

Note :

1. Maximum output power including tune-up tolerance.
2. The worst case is at BDR mode.

The device is mounted at the rear wall inside the front compartment of the center console in the vehicle with the minimum separation distance 15 mm which is the minimum distance from the antenna to the surface of the rear wall of the front compartment. The device is being installed with antenna location lower part of the compartment.

Arms and legs for a driver / a passenger at the front seat are separated from the antenna with more than 15 mm in normal use condition.

Sample Calculation (Worst case) :

1g-SAR Exclusion Threshold :

$$\text{(max. power of channel including tune-up tolerance in mW)} / \text{(min. test separation distance)} \times \text{SQRT}(\text{frequency in GHz}) = (3.162 \text{ mW}) / (5 \text{ mm}) \times \text{SQRT}(2.480 \text{ GHz}) = 0.996 \leq 3.0 \text{ (1g-SAR exclusion threshold)}$$

10g-SAR Exclusion Threshold :

$$\text{(max. power of channel including tune-up tolerance in mW)} / \text{(min. test separation distance)} \times \text{SQRT}(\text{frequency in GHz}) = (3.162 \text{ mW}) / (5 \text{ mm}) \times \text{SQRT}(2.480 \text{ GHz}) = 0.996 \leq 7.5 \text{ (10g-SAR exclusion threshold)}$$

3.2. CONCLUSION

Though the minimum separation distance declared is 15 mm, the threshold was calculated with the worst separation distance specified in 4.3.1 a), KDB 447498 D01 v06, which is less than 5 mm. Since the calculated result also complies with 15mm for both 1g and 10g SAR exclusion threshold, SAR test is exempted.

END OF TEST REPORT