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RF Exposure Evaluation Report

Report No.: CQASZ20200800869E-03
Applicant: THINKCAR TECH CO., LTD.
Address of Applicant: B302, Floor3, Yuwei Factory, Qinghu community, Longhua district, Shenzhen China
Equipment Under Test (EUT):
EUT Name: THINKDIAG Automotive Diagnostic device
Model No.: TKD01
Brand Name: N/A
FCC ID: 2AUARTHINKDIAG
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-08-18
Date of Test: 2020-08-18 to 2020-09-02
Date of Issue: 2020-09-03
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By: Tiny You

(Tiny You)

Reviewed By: Sheek, Luo

(Sheek Luo)

Approved By: Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20200800869E-03	Rev.01	Initial report	2020-09-03

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3 General Information

3.1 Client Information

Applicant:	THINKCAR TECH CO., LTD.
Address of Applicant:	B302, Floor3, Yuwei Factory, Qinghu community, Longhua district, Shenzhen China
Manufacturer:	THINKCAR TECH CO., LTD.
Address of Manufacturer:	B302, Floor3, Yuwei Factory, Qinghu community, Longhua district, Shenzhen China
Factory:	THINKCAR TECH CO., LTD.
Address of Factory:	B302, Floor3, Yuwei Factory, Qinghu community, Longhua district, Shenzhen China

3.2 General Description of EUT

Product Name:	THINKDIAG Automotive Diagnostic device
Model No.:	TKD01
Trade Mark:	N/A
Hardware Version:	V1.00.000
Software Version:	V1.23.004
Sample Type:	☐ Mobile ☒ Portable ☐ Fix Location
EUT Power Supply:	DC 9~18V

3.3 General Description of BT

Operation Frequency:	2402MHz~2480MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Transfer Rate:	1Mbps/2Mbps/3Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Test Software of EUT:	RTLBTAPP (manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	2.0dBi

3.4 General Description of BLE

Operation Frequency:	2402MHz~2480MHz
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channel:	40
Test Software of EUT:	RTLBTAPP (manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	2.0dBi

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

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 Exclusion Threshold condition, listed below, is satisfied.

4.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{[\sqrt{f(\text{GHz})}]} \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where} \right.$$

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation¹⁷

The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion

4.1.3 EUT RF Exposure

1) For BT

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.440	-0.5±1	0.5	1.122
Middle(2441MHz)	0.970	0±1	1.0	1.259
Highest(2480MHz)	0.700	0±1	1.0	1.259

$\pi/4$ DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	1.020	0.5±1	1.5	1.413
Middle(2441MHz)	1.800	1.0±1	2.0	1.585
Highest(2480MHz)	1.580	1.0±1	2.0	1.585

8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	1.290	0.5±1	1.5	1.413
Middle(2441MHz)	2.100	1.5±1	2.5	1.778
Highest(2480MHz)	1.870	1.0±1	2.0	1.585

Worst case: 8DPSK mode						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune- up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	1.290	0.5±1	1.5	1.413	0.438	3.0
Middle (2441MHz)	2.100	1.5±1	2.5	1.778	0.556	
Highest (2480MHz)	1.870	1.0±1	2.0	1.585	0.499	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20200800869E-02

2) For BLE

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-0.03	-1±1	0	1.000
Middle(2440MHz)	0.21	-0.5±1	0.5	1.122
Highest(2480MHz)	0.2	-0.5±1	0.5	1.122

Worst case: GFSK						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune- up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	-0.03	-1±1	0	1.000	0.310	3.0
Middle (2440MHz)	0.21	-0.5±1	0.5	1.122	0.351	
Highest (2480MHz)	0.2	-0.5±1	0.5	1.122	0.353	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20200800869E-01
BDR and BLE can not simultaneous transmitting at same time.