

RF EXPOSURE REPORT



Applicant: TSC Auto ID Technology Co., Ltd.
No. 35, Sec. 2, Ligong 1st Rd., Wujie Town, I Lan Hsien, 268,
Taiwan

Manufacturer: TSC Auto ID Technology Co., Ltd.
9 F., No. 95, Minquan Rd., Xindian Dist., New Taipei City
231023, Taiwan

Product Name: 13.56MHz NFC Antenna Module

Brand Name: TSC AUTO ID TECHNOLOGY CO., LTD

Model No.: RF-NR30N

FCC ID VTV-RFNR30N

Date of EUT Received: Oct. 8, 2024

Issue Date: Nov. 01, 2024

Approved By

John Yeh

We hereby certify that:

The above equipment was evaluated by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §2.1093, KDB 447498 D01 v06.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

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TESA2410000660ES	00	Original	Oct. 28, 2024	Cindy Chou	
TESA2410000660ES	01	Update Test Distance	Nov. 01, 2024	Cindy Chou	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	13.56MHz NFC Antenna Module
Brand Name:	TSC AUTO ID TECHNOLOGY CO., LTD
Model No.:	RF-NR30N

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2 RF EXPOSURE EVALUATION FOR PORTABLE CONDITIONS

2.1 FCC Standard Applicable:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

2.1.1 As per KDB 447498 D01 4.3.1,

Step 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:

$$\left[\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \right] \cdot \sqrt{f(\text{GHz})} \leq 3.0 \text{ for 1-g Head \& Body SAR and } \leq 7.5 \text{ for 10-g extremity Hand SAR, where}$$

- $f(\text{GHz})$ 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
- The values 3.0 and 7.5 are referred to as numeric thresholds in **step b)** below

Step b: 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 (also illustrated in Appendix B):

- 1) $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)]\}$ mW, for 100 MHz to 1500 MHz
- 2) $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$ mW, for > 1500 MHz and ≤ 6 GHz

Step c: For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

- 1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$
- 2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- 3) SAR measurement procedures are not established below 100 MHz

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2.2 Measurement Result:

2.2.1 As per KDB447498D01v06 4.3.1 c)

SAR test exclusion threshold for NFC (13.56MHz) shall be evaluated as below,

- For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in 4.3.1 c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- The power threshold at 50mm/100 MHz in 4.3.1 b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$ where f is 13.56MHz
- The power threshold in 4.3.1 b) is $[\text{Power allowed at numeric threshold for 50 mm in 4.3.1 a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)] \text{ mW}$, for 100 MHz to 1500 MHz where test separation distance is 50mm, frequency is 100MHz.

- Power allowed at numeric threshold for 50 mm in 4.3.1 a) is $[3/\sqrt{f(\text{GHz})}] \cdot (\text{test separation distance})$

Hence, SAR test exclusion threshold is calculated in reverse sequence:

$$d) : [3/\sqrt{0.1}] \cdot 50 = 474.3416\text{mW}$$

$$c) : 474.3416 + (50-50) \cdot (100/150) = 474.3416\text{mW}$$

$$b) : 474.3416 \cdot [1 + \log(100/13.56)] = 885.9470\text{mW}$$

$$a) : 885.9470 \cdot 0.5 = 442.974\text{mW}$$

Frequency (MHz)	E-FIELD dBuV/m	Test Distance (m)	EIRP (dBm)	EIRP (mW)	Threshold (mW)
13.56	20.74	30	-54.41757	0.00000362	442.973

Note:

Distance Factor = $40\log(\text{Test Distance (m)} / \text{Separation Distance (m)})$

E-FIELD (dBuV/m) = E-FIELD (dBuV/m) + Distance Factor(dB)

EIRP (dBm) = (E-FIELD(dBuV/m)+ 20log(d(m)))-104.7

EIRP(W) = $(10^{(EIRP(\text{dBm})/10)})/1000$

~ End of Report ~

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