

FCC SAR Exclusion Report

Report No. : SFBBQJ-WTW-P23100340

Applicant : Panasonic Corporation of North America

Address : Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490, USA

Product : RFID Module

Brand : Panasonic

FCC ID : ACJ9TGRI23B

Model No. : RI23B

FCC Rule Part : CFR §2.1093

Standards : IEEE Std 1528:2013
KDB 865664 D01 v01r04, KDB 865664 D02 v01r02,
KDB 447498 D01_v06_2015.10.23_General RF Exposure Guidance

Sample Received Date : Oct. 16, 2023

Date of Evaluation : Oct. 25, 2023

Lab Address : No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location : No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City, Taiwan

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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FCC Accredited No.: TW0003

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Release Control Record

Issue No.	Reason for Change	Date Issued
SFBBQJ-WTW-P23100340	Initial release	Nov. 16, 2023

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1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest Reported SAR _{1g} (W/kg)
DXX	RFID	Not Required

Note:

1. The SAR limit (**Head & Body: SAR_{1g} 1.6 W/kg**) for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

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2. Description of Equipment Under Test

EUT Type	RFID Module
Brand Name	Panasonic
FCC ID	ACJ9TGRI23B
Model Name	RI23B
Tx Frequency Bands (Unit: MHz)	13.56
Uplink Modulations	RFID : ASK
Maximum Tune-up Conducted Power (Unit: dBm)	Please refer to section 3.1 of this report
Antenna Model	FZ-VNF552 RFID
Antenna Type	Loop Antenna
Antenna Connector	Connector for FPC/FFC
EUT Stage	Engineering Sample

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

Product	Brand	Model
Contactless Smart Card Reader	Panasonic	FZ-VNF552

2. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.
3. This module is exclusively for use in the host device FZ-VNF552 RFID Reader, which is available both as a pre-installed and user-attachable accessory solely designed to be inserted into an expansion slot of the host system FZ-55 Personal Computer. Evaluation and testing was conducted for this combined system as a whole.

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3. SAR Measurement Evaluation

3.1 Maximum Output Power

The maximum Tune up power (Unit: mW) including tune-up tolerance is shown as below.

Mode	Frequency	Ant. 0 Max Tune-up (mW)
RFID	13.56	212.7

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3.2 SAR Testing Exclusions

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

A. For the test separation distance ≤ 50 mm

$$\frac{\text{Max. Tune up Power}_{(\text{mW})}}{\text{Min. Test Separation Distance}_{(\text{mm})}} \times \sqrt{f_{(\text{GHz})}} \leq 3.0$$

- When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

For the test separation distance > 50 mm, and the frequency at 100 MHz to 1500 MHz

$$\left[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50 \text{ mm}) \times \left(\frac{f_{(\text{MHz})}}{150} \right) \right]_{(\text{mW})}$$

For the test separation distance > 50 mm, and the frequency at > 1500 MHz to 6 GHz

$$[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50 \text{ mm}) \times 10]_{(\text{mW})}$$

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.

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

C. For frequencies below 100 MHz, the following may be considered for SAR test exclusion.

- 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 $[1 + \log(100/f_{(\text{MHz})})]$
- 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 $\frac{1}{2}$
- SAR measurement procedures are not established below 100 MHz.

Mode	Frequency (MHz)	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Exclusion (mW)	Require SAR Testing?
RFID	13.56	23.277	212.7	442.97	No

Note:

- When the device output power is less than the power threshold shown in above table, the SAR testing exclusion is applied.

Summary:

Since the SAR assess for all device orientations apply SAR test exclusion per KDB 447498, SAR testing for this device is not required.

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<Estimated SAR Calculation>

According to KDB 447498 D01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of ≤ 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(\text{mW})}}{\text{Min. Test Separation Distance}_{(\text{mm})}} \times \frac{\sqrt{f_{(\text{GHz})}}}{7.5}$$

If the minimum test separation distance is < 5 mm, a distance of 5 mm is used for estimated SAR calculation. When the test separation distance is > 50 mm, the 0.4 W/kg is used for SAR-1g.

Mode / Band	Frequency (GHz)	Max. Tune-up Power (dBm)	Test Position	Separation Distance (mm)	Estimated SAR (W/kg)
RFID	0.01356	23.277	Bottom	0	0.40

Note:

1. The separation distance is determined from the outer housing of the EUT to the user.
2. This SAR estimation formula has been considered in conjunction with the SAR Test Exclusion Thresholds to result in substantially conservative SAR values of ≤ 0.4 W/kg.
3. When standalone SAR testing is not required, an estimated SAR can be applied to determine simultaneous transmission SAR test exclusion.

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< Σ SAR + Σ MPE Summation Analysis >

According to KDB 447498 D01, 7.2 Transmitters used in mobile device exposure conditions for simultaneous transmission operations.

- The Σ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + Σ of MPE ratios] is ≤ 1.0 .
- The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04 , and the Σ of MPE ratios] is ≤ 1.0 .

No.	Conditions	MAX WWAN MPE Ratio	MAX WLAN MPE Ratio	MAX BT MPE Ratio	MAX RFID SAR Ratio	Σ SAR + Σ MPE Summation	Analysis
1	MAX WWAN + MAX WLAN + MAX BT +MAX RFID	0.115	0.097	0.004	0.25	0.466	Σ SAR < 1.0, Not required

Note:

- The separation distance is determined from the outer housing of the EUT to the user.
- Calculation Result of Maximum Conducted Power

Band	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	MPE Ratio
WCDMA 2	1852.4-1907.6	24	0.1	20	0.051	1.00	0.051
WCDMA 4	1712.4-1752.6	24	1.16	20	0.065	1.00	0.065
WCDMA 5	826.4-846.6	24	-0.65	20	0.043	0.55	0.078
LTE 2	1850.7-1909.3	24	0.1	20	0.051	1.00	0.051
LTE 4	1710.7-1754.3	24	1.16	20	0.065	1.00	0.065
LTE 5	824.7-848.3	24	-0.65	20	0.043	0.55	0.078
LTE 7	2502.5-2567.5	23.8	-0.24	20	0.045	1.00	0.045
LTE 12	699.7-715.3	24	0.36	20	0.054	0.47	0.115
LTE 13	779.5-784.5	24	-0.26	20	0.047	0.52	0.090
LTE 14	790.5-795.5	24	-0.26	20	0.047	0.53	0.089
LTE 26	814.7-848.3	24	-0.65	20	0.043	0.54	0.080
LTE 41	2498.5-2687.5	23.8	-0.24	20	0.045	1.00	0.045
LTE 48	3552.5-3697.5	17.81	3.65	20	0.028	1.00	0.028
LTE 66	1710.7-1779.3	24	1.16	20	0.065	1.00	0.065
WLAN	2412-2462	23.87	2.99	20	0.097	1.00	0.097
	5180-5240	22.61	2.33	20	0.062	1.00	0.062
	5260-5320	22.87	2.33	20	0.066	1.00	0.066
	5500-5700	23.96	1.80	20	0.075	1.00	0.075
	5745-5825	24.10	1.78	20	0.077	1.00	0.077
	5925-7125	13.15	3.15	20	0.008	1.00	0.008
BT	2402-2480	10.50	2.66	20	0.004	1.00	0.004
BLE	2402-2480	8.72	2.66	20	0.003	1.00	0.003

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4. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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The road map of all our labs can be found in our web site also.

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