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SAR EXCLUSION REPORT

Applicant Name: **JVC KENWOOD CORPORATION** 1-16-2 Hakusan Midori-ku Yokohama-shi Kanagawa 226-8525 Japan	**Date of Issue: 08.06, 2018** **Test Report No.: HCT-SR-1807-FI004-R1** **Test Site: HCT CO., LTD.**

FCC ID: **ISED ID:**	**K44431400** **282F-431400**
Equipment Type:	**VHF DIGITAL TRANSCEIVER**
Application Type	**Certification**
FCC Rule Part(s):	**47CFR §2.1093**
ISED Rule Part(s):	**RSS-102 Issue 5; Health Canada Safety Code 6**
FCC Model Name:	**NX-5200-K2, NX-5200-K3, NX-5200-F2, NX-5200-F3, TK-5230-F2, TK-5230-F3, VP5230-F2, VP5230-F3, VP6230-F2, VP6230-F3**
ISED Model Name:	**NX-5200-K2, NX-5200-K3, TK-5230-F2, TK-5230-F3, VP5230-F2, VP5230-F3, VP6230-F2, VP6230-F3**

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
Bluetooth 4.0 LE	Data	2 402 – 2 480 MHz
Maximum Output Power : 2.5 mW		

This device has been excluded from SAR measurements based on FCC FDB KDB 447498 D01 v06 and ISED RSS102 Issue 5.

Reviewed By

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1. SAR Test Exclusions Applied

Calculation Result:
Tx frequency range: 2 402 MHz ~ 2 480 MHz
Min. test separation distance: 5 mm
Maximum Output Power: 2.5 mW
The Highest RF channel frequency: 2 480 MHz

1.1 Bluetooth for FCC

Per FCC KDB 447498 D01v06, The SAR exclusion threshold for distance < 50mm is defined by the following equation:

$$\frac{Max\ \ Power\ \ of\ \ Channel(mW)}{Test\ \ \ Separation\ \ Distance\ \ (mm)} * \sqrt{Frequency(GHz)} \leq\ \ 3.0\ \ for\ \ 1-g\ \ SAR$$

Mode	Frequency	Maximum Allowed Power	Separation Distance	≤ 3.0 for 1g SAR
	[MHz]	[mW]	[mm]	
Bluetooth 4.0 LE	2 480	2.5	5	0.8

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(2.5/5)*√2.480] = 0.8 < 3.0.

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v06 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6W/kg. When standalone SAR is not required to be measured per FCC KDB 447498 D01v06 4.3.22, the following equation must be used to estimate the standalone 1-g SAR and 10g SAR for simultaneous transmission assessment involving that transmitter.

$$Estimated\ \ SAR = \frac{\sqrt{f(GHZ)}}{7.5} * \frac{(Max\ \ Power\ \ of\ \ channel\ \ mW)}{Min\ \ Seperation\ \ Distance}.$$

Estimated 1-g SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated 1g SAR (Body)
	[MHz]	[mW]	[mm]	[W/kg]
Bluetooth 4.0 LE	2 480	2.5	5	0.105

Note:
Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. The Estimated SAR results were determined according to FCC KDB447498 D01v06.

1.2 Bluetooth for ISED

Per RSS102 Issue 5, 2.5.1 Exemption Limits for Routine Evaluation

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance[4,5]

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

The SAR exemption from RSS102: Issue 5 was also exempted by the above exclusion conditions.

The estimate SAR value is calculated based the following equation:
(maximum power level including tune-up tolerance for transmitter A / maximum power level of exemption at the same frequency and distance) * 0.4W/Kg

The estimate SAR for Bluetooth 4.0 LE = 2.5/4*0.4(W/Kg) = 0.25 W/kg

2. Simultaneous SAR Analysis

2.1 Simultaneous Transmission Summation for Body-Worn FCC

Simultaneous Transmission Summation Scenario with Bluetooth for FCC				
Exposure condition	Band	VHF SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	Body-worn Belt clip	**4.74**	0.105	4.845

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498 D01v06. Estimated SAR results were used for SAR summation for body-worn back side at 5 mm to determine simultaneous transmission SAR test exclusion.
The simultaneous transmission summation is applied only for body-worn case according to user condition. Bluetooth transmission is using for Bluetooth headset when DUT is on the body-worn case.

2.2 Simultaneous Transmission Summation for Body-Worn ISED

Simultaneous Transmission Summation Scenario with Bluetooth For ISED				
Exposure condition	Band	VHF SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	Body-worn Belt clip	**4.98**	0.250	5.25

Note: Bluetooth SAR was not required to be measured per RSS102:Issue 5 .Estimated SAR results were used for SAR summation for body-worn back side at 5 mm to determine simultaneous transmission SAR test exclusion.
The simultaneous transmission summation is applied only for body-worn case according to user condition. Bluetooth transmission is using for Bluetooth headset when DUT is on the body-worn case.

2.3 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and RSS102 :Issue 5.

3. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1- 2005.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.