

RF exposure Estimation

1. Introduction

Applicant:	Yanfeng Visteon Automotive Electronics Co.,Ltd
Product:	Car Radio With Bluetooth
Model no.:	R013-CMFB, R013PH2-X07, R013PH2-1DIN R013-CMFB WDAB, R013PH2-X07 WDAB, R013PH2-1DIN WDAB
FCC ID:	RQ9CMFB
Modulation:	GFSK, π/4DQPSK,8DPSK
Radio technology:	Bluetooth 2.1+EDR
Operational Frequency:	2402MHz-2480MHz

2. Limit and Guidelines on Exposure to Electromagnetic Fields

According to §15.247(e)(i) and §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.

According to KDB 447498 D01 Mobile Portable RF Exposure v05r02, no SAR required if power is lower than the flowing threshold:

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:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})]$

$[\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation²⁵
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

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 according to 5) in section 4.1 is applied to determine SAR test exclusion.

3. Calculation method

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$

According the test report of 708881833512-00 clause 9.2 conducted peak output power:

Test Mode	Channel No.	Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)
DH5	00	2402	3.82	< 30
DH5	39	2441	6.02	< 30
DH5	78	2480	6.9	< 30
2DH5	00	2402	2.14	< 30
2DH5	39	2441	5.12	< 30
2DH5	78	2480	5.81	< 30
3DH5	00	2402	2.53	< 30
3DH5	39	2441	5.32	< 30
3DH5	78	2480	6.08	< 30

Bluetooth antenna gain: -1dBi

Conducted Power + tune up tolerance = 4.90mW (6.90dBm)

Distance = 5 mm

f = 2.480 GHz

$[4.90/5] * \text{SQRT}(2.480) = 1.61$

$1.61 \leq 3.0$

Therefore, excluded from SAR testing.