

RF Exposure Analysis

Product: DVD Loader

FCC ID: 2AAKLD189050

Analysis for FCC portable use

Standalone SAR test exclusion considerations are defined in KDB 447498D01 (v05r01) Chapter 4.3.1 where the 1-g head or body and 10-g extremity SAR exclusion threshold is defined by the following formula:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

- f(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 above formula is applied to the DVD Loader with the following considerations:

- The maximum peak conducted output power including tune-up tolerance, taken from the Operational Description document, is specified as 14 dBm (25.1 mW).
- Appendix's A and B (below) show the DVD Loader mounting position, within the vehicle seat, in relation to the typical front and rear seat passengers and their separation distances.
- These distances are variable, therefore a worst case scenario is used in the calculation where the smallest internal separation distance between the PCB trace antenna and the outer surface of the device enclosure is used.
- Appendix C shows a cross sectional view of the device with the PCB antenna to case separation dimensions marked. These are 16.55 mm and 13.85 mm to the outer surfaces closest to the rear and front seat passengers respectively.

Applying the above to the given formula, using the smallest separation distance of 13.85 mm, the following result is achieved:

$$(25 \text{ mW} / 14 \text{ mm}) \times \sqrt{2.474 \text{ GHz}} \leq 3.0$$

$$1.7857 \times 1.5729 = 2.81$$

Therefore the resultant value of 2.81 is <3.0 limit for 1-g head / body SAR and ≤ 7.5 for 10-g extremity SAR, meaning RF exposure exemption (head, body and extremity) is applicable to both the front and rear seat occupants.

Audiovox Incaar Systems GmbH

Branch Office: 14 Boundary Business Centre, Boundary Way, Woking, Surrey, GU21 5DH United Kingdom

Tel: +44 (0)1483 722 531 Fax: +44 (0)1483 740 204

Vat Number: GB915196124 • **Company Registration Number:** FC027852 • **Branch Number:** BR009601

Head Office: Lise-Meitner-Strasse 9, 50259 Pulheim, Germany Tel: +49 (0) 2234 807 0 Fax: +49 (0) 2234 807 399

UST (VAT) - ID: DE255639566 • HRB 611693 (Trade Register) applied for Köln (Cologne)
Bankverbindung (Bankaccount) • Commerzbank Köln • Konto (Account) 133 00 26 • BLZ (BIC) 370 400 44

• Geschäftsführer (Directors): Ciaran Mitchell, Mark Finger, John Verbinnen •

Rearranging the formula to calculate the distance at which a value of 3 for 1-g Head/Body SAR is reached:

Min. test separation distance, mm = $\{(\text{max. power of channel, including tune-up tolerance, mW}) * [\sqrt{f(\text{GHz})}]\} / 3$

Min. test separation distance = $(25 * \sqrt{2.474}) / 3$
= 13.1 mm

.



Signature:

_____ Date: 02.December .2013

NAME: Damian Trybuszewski

TITLE: Development manager

COMPANY: Audiovox Incaar Systems GmbH

Audiovox Incaar Systems GmbH

Branch Office: 14 Boundary Business Centre, Boundary Way, Woking, Surrey, GU21 5DH United Kingdom
Tel: +44 (0)1483 722 531 Fax: +44 (0)1483 740 204

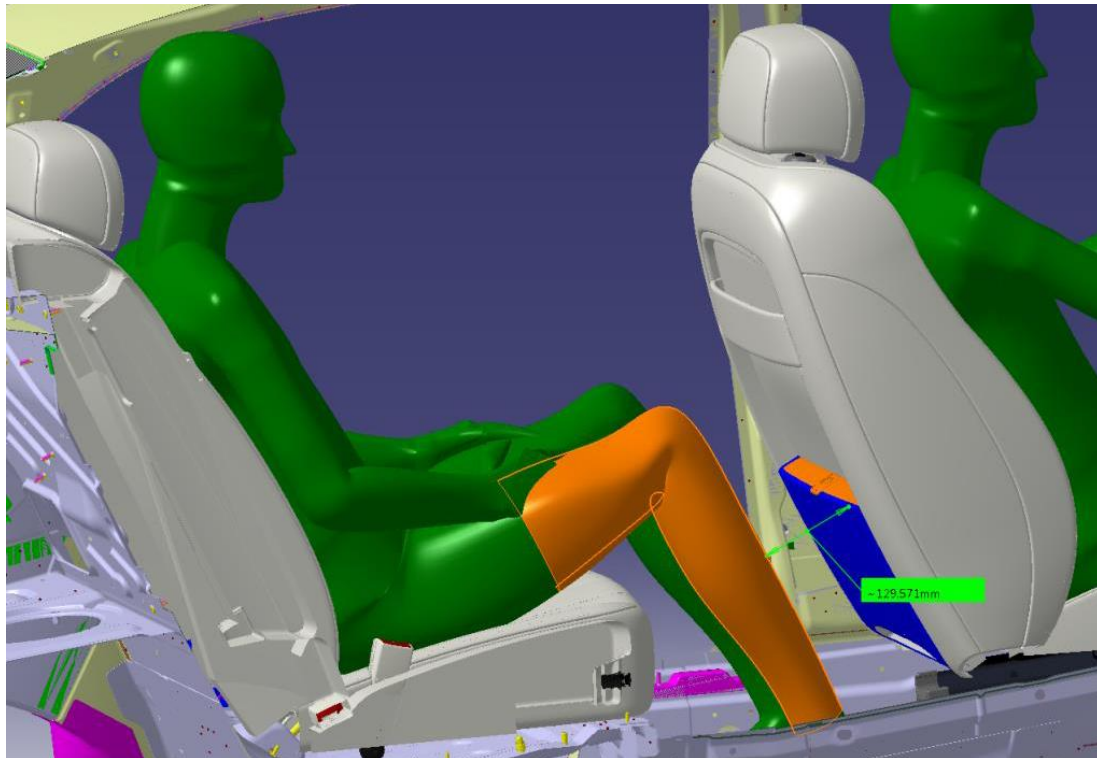
Vat Number: GB915196124 • **Company Registration Number:** FC027852 • **Branch Number:** BR009601

Head Office: Lise-Meitner-Strasse 9, 50259 Pulheim, Germany Tel: +49 (0) 2234 807 0 Fax: +49 (0) 2234 807 399

UST (VAT) - ID: DE255639566 • HRB 611693 (Trade Register) applied for Köln (Cologne)
Bankverbindung (Bankaccount) • Commerzbank Köln • Konto (Account) 133 00 26 • BLZ (BIC) 370 400 44

• Geschäftsführer (Directors): Ciaran Mitchell, Mark Finger, John Verbinnen •

Appendix A: DVD Loader to Vehicle Rear Seat Occupant Positioning



The dimensions shown on the above drawing are typical values and not relevant to the exemption justification.

Audiovox Incaar Systems GmbH

Branch Office: 14 Boundary Business Centre, Boundary Way, Woking, Surrey, GU21 5DH United Kingdom

Tel: +44 (0)1483 722 531 Fax: +44 (0)1483 740 204

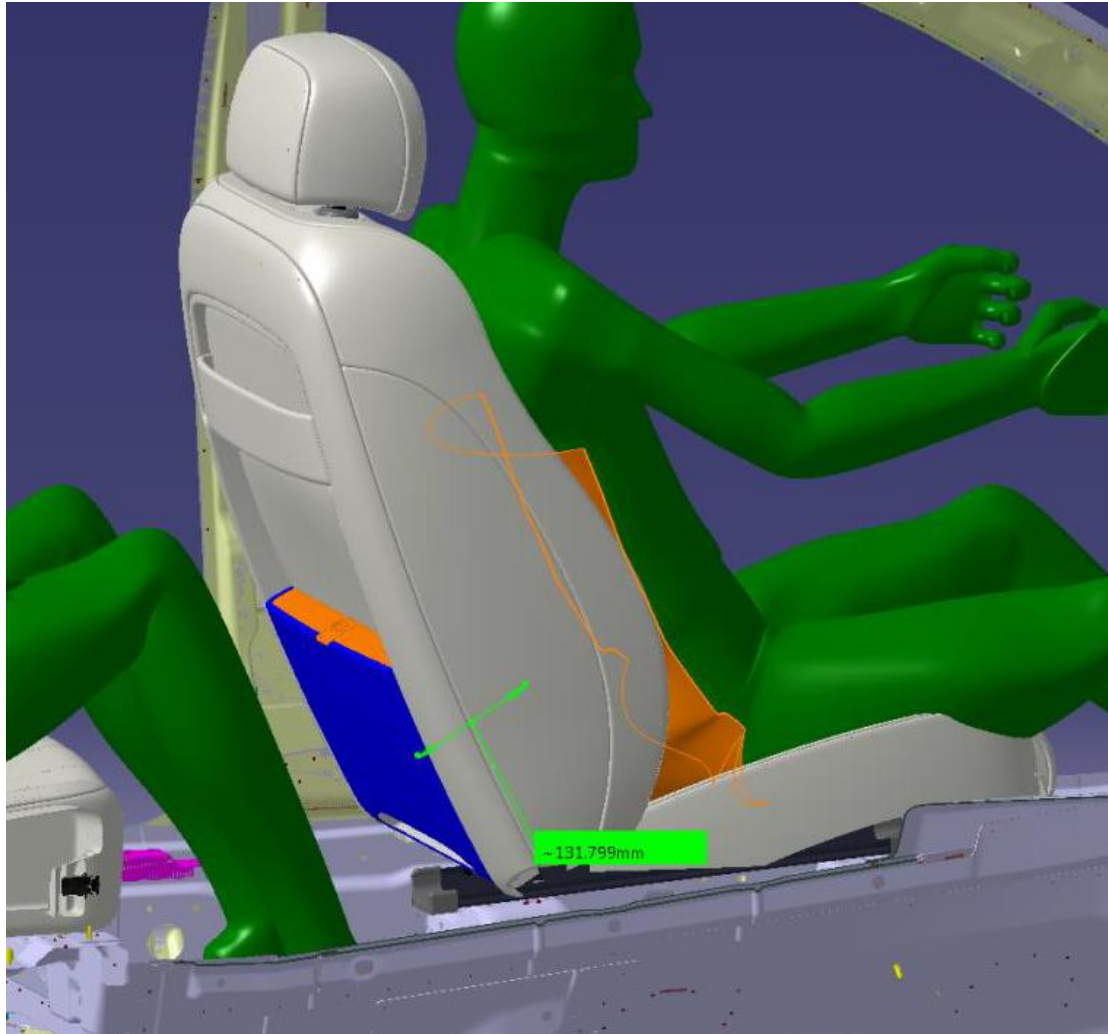
Vat Number: GB915196124 • **Company Registration Number:** FC027852 • **Branch Number:** BR009601

Head Office: Lise-Meitner-Strasse 9, 50259 Pulheim, Germany Tel: +49 (0) 2234 807 0 Fax: +49 (0) 2234 807 399

UST (VAT) - ID: DE255639566 • HRB 611693 (Trade Register) applied for Köln (Cologne)
Bankverbindung (Bankaccount) • Commerzbank Köln • Konto (Account) 133 00 26 • BLZ (BIC) 370 400 44

• Geschäftsführer (Directors): Ciaran Mitchell, Mark Finger, John Verbinnen •

Appendix B: DVD Loader to Vehicle Front Seat Occupant Positioning



The dimensions shown on the above drawing are typical values and not relevant to the exemption justification.

Audiovox Incair Systems GmbH

Branch Office: 14 Boundary Business Centre, Boundary Way, Woking, Surrey, GU21 5DH United Kingdom

Tel: +44 (0)1483 722 531 Fax: +44 (0)1483 740 204

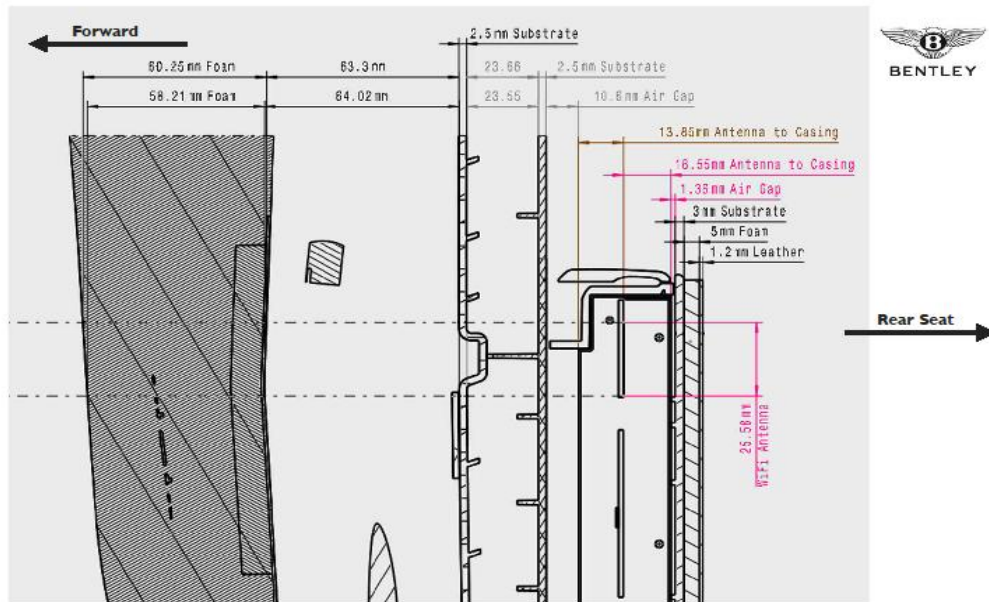
Vat Number: GB915196124 • **Company Registration Number:** FC027852 • **Branch Number:** BR009601

Head Office: Lise-Meitner-Strasse 9, 50259 Pulheim, Germany Tel: +49 (0) 2234 807 0 Fax: +49 (0) 2234 807 399

UST (VAT) - ID: DE255639566 • HRB 611693 (Trade Register) applied for Köln (Cologne)
Bankverbindung (Bankaccount) • Commerzbank Köln • Konto (Account) 133 00 26 • BLZ (BIC) 370 400 44

• Geschäftsführer (Directors): Ciaran Mitchell, Mark Finger, John Verbinnen •

Appendix C: Sectional Drawing of Front Seat Back Rest Showing DVD Loader and Internal Antenna Mounting Position



Audiovox Incair Systems GmbH

Branch Office: 14 Boundary Business Centre, Boundary Way, Woking, Surrey, GU21 5DH United Kingdom

Tel: +44 (0)1483 722 531 Fax: +44 (0)1483 740 204

Vat Number: GB915196124 • **Company Registration Number:** FC027852 • **Branch Number:** BR009601

Head Office: Lise-Meitner-Strasse 9, 50259 Pulheim, Germany Tel: +49 (0) 2234 807 0 Fax: +49 (0) 2234 807 399

UST (VAT) - ID: DE255639566 • HRB 611693 (Trade Register) applied for Köln (Cologne)
Bankverbindung (Bankaccount) • Commerzbank Köln • Konto (Account) 133 00 26 • BLZ (BIC) 370 400 44

• Geschäftsführer (Directors): Ciaran Mitchell, Mark Finger, John Verbinnen •