



RF Exposure Evaluation according to KDB 447498 D01 v06

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Certification numbers and labeling requirements

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Document authorised:

cn=Thomas Vogler, o=CTC advanced GmbH,
ou=VOG-211118,
email=thomas.vogler@ctcadvanced.com,
c=DE
2023.03.28 12:08:28 +02'00'

Thomas Vogler
Lab Manager
Radio Communications & EMC

cn=Marco Scigliano, o=CTC advanced
GmbH, ou=SCI-211118,
email=marco.scigliano@ctcadvanced.co
m, c=DE
2023.03.28 12:07:03 +02'00'

Marco Scigliano
Testing Manager
Radio Communications & EMC

1. SAR test exclusion (KDB 447498 D01 General RF Exposure Guidance v06)

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the *published RF exposure KDB procedures*, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding *SAR Test Exclusion Threshold* condition(s), listed below, is (are) satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum *test separation distance* required for the exposure conditions. The minimum *test separation distance* defined in 4.1 f) is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. To qualify for SAR test exclusion, the *test separation distances* applied must be fully explained and justified, typically in the SAR measurement or SAR analysis report, by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, according to the required *published RF exposure KDB procedures*. When no other RF exposure testing or reporting are required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for SAR test exclusion. When required, the device specific conditions described in the other *published RF exposure KDB procedures* must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops and tablets, etc.

- 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:

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

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 4.1 f) is applied to determine SAR test exclusion.

- 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

- 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.

2. EUT technologies

Declared minimum safety distance: **199 mm**

SRD Technology	Frequency [MHz]		Reference	Output Power [dBm]			Power [mW]		Share of Limit
	f _{Min}	f _{Max}	#	P _{cond}	P _{EIRP}	P _{RF Exp}	P _{Result}	P _{Limit}	%
RFID 13.56 MHz	13,56	13,56	A	30,5	N/A	30,5	1122,02	2400,40	46,74%

Referenced Documents:

#	Results from:
A	Datasheet: DB_NXP_PN5180.pdf (extract in Annex of this document)

3. Conclusion

This prediction demonstrates the following:

The power density levels for FCC at a distance of 199 mm are below the maximum levels allowed by regulations.

Conclusion: RF exposure evaluation is not required.

Annex A: Datasheet of RFID Chip for conducted Output Power

Table 120. Limiting Values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DD(PVDD)}$	supply voltage on pin PVDD	-	-	3.6	V
$V_{DD(TVDD)}$	supply voltage on pin TVDD	-	-	5.5	V
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM); 1500 Ω , 100 pF; JESD22-A114-B	-	1500	V
T_{stg}	storage temperature	no supply voltage applied	-55	+150	°C
P_{tot}	total power dissipation	in still air with exposed pins soldered on a 4 layer JEDEC PCB	-	1125	mW
$I_{DD(TVDD)}$	supply current on pin TVDD		-	300	mA
$I_{OUT(LDO_OUT)}$	output current of pin LDO_OUT	$V_{(OUT)LDO_OUT}=3.3V$, $I_{DD(TVDD)} = 250mA$	0.0	100	mA
T_j	junction temperature	-	-	150	°C

Table 1: Extract from DB_NXP_PN5180.pdf (p. 120) provided by customer.