
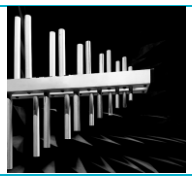
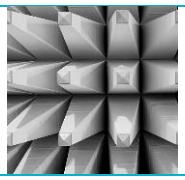

CTC advanced
member of RWTÜV group

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BNetzA-CAB-02/21-102

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-04

SAR Test exclusion documentation according to FCC KDB 447498, RSS-102

Report identification number: 1-2775/21-01-09 Exclusion (FCC)

contains the module with the following certification numbers	
FCC ID	TCN-023

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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EUT technologies:

Technologies:	Max. declared cond. AVG Power	Max. measured EIRP @ 30m[1)]	Antenna gain	MAX EIRP for RF exposure
NFC 13.56 MHz	24.07 dBm (255 mW) [3)]	42.0 dBµV (Peak) = -33.3 dBm	< 0 dBi	24.07 dBm (255 mW)
BT LE 2450 MHz [2)]	8.0 dBm (6.31 mW)	--	4.9 dBi	12.9 dBm (14.5 mW)

NOTE:
The measured PEAK EIRP @30m proofs that the EUT antenna gain is far below 0dBi and that considering the max. declared output power of 24.07dBm (=255mW) is by far larger than the EIRP. Thus for it is correct to use the conducted value as the worst case base for the RF exposure calculation.

[1)] Test result taken from CTC advanced GmbH report 1-2775/21-01-05.

[2)] Values for BT LE 2450 MHz according customer declaration.

[3)] Max. power from data sheet – WT 300/310: 0.85 W (Duty Cyle 30%)

Collocation overview:

Active scenario: / Technology	1	2	3	4
NFC 13.56 MHz	x		x	
BT LE 2450 MHz	x	x		

Declared minimum safety distance: 20cm
According the manual a safety distance of 20cm shall be applied between the user (and/or bystanders) to the EUT antenna whilst active transmitting.

SAR test exclusion according to KDB447498 (General RF Exposure Guidance v06)

(3a) Standalone SAR test exclusion below 100 MHz at test separation distances > 50mm and < 200mm

($Threshold_{100MHz > 50mm}$) × (1+log(100/f))

where

$Threshold_{1\text{-}g;10\text{-}g}$	is 3 for 1-g; 7.5 for 10-g
$d_{seperation}$	is the min. test separation distance (>50mm and <200mm)
f	is the RF channel transmit frequency
$Threshold_{50mm;\ 100MHz < 50mm}$	is $Threshold_{1\text{-}g;10\text{-}g}$ × d / $f^{0.5}$ with f = 100MHz and d=50mm
$Threshold_{100MHz > 50mm}$	is ($Threshold_{50mm;\ 100MHz < 50mm}$) + ($d_{seperation\ -50mm}$) × f / 150 with f = 100MHz

The table below gives the calculated maximal power that could be used for source based time averaged conducted power, adjusted for tune up tolerance. If this is below the calculated value SAR testing is excluded.

frequency [MHz]	$d_{separation}$ [mm]	$Threshold_{1\text{-}g}$	$Threshold_{50mm}$ (100MHz)		Powerlimit [mW]	$P_{max\text{-}declared}$		Exclusion
			< 50mm	> 50mm		[dBm]	[mW]	
13.56	199.99	3	128.64	228.63	427.03	24.07	255.27	yes

2b) Standalone SAR test exclusion for 1.5 GHz to 6 GHz at test separation distances ≥ 50mm

[$Threshold_{50mm}$ + ($d_{separation}$ - 50mm) × 10]

where

$Threshold_{1\text{-}g;10\text{-}g}$	is 3 for 1-g; 7.5 for 10-g
$d_{seperation}$	is the min. test separation distance; not less than 50mm
f	is the RF channel transmit frequency
$Threshold_{50mm}$	is $Threshold_{1\text{-}g;10\text{-}g}$ × d / $f^{0.5}$; with d = 50mm

The table below gives the calculated maximal power that could be used for source based time averaged conducted power, adjusted for tune up tolerance. If this is below the calculated value SAR testing is excluded.

frequency [MHz]	$d_{separation}$ [mm]	$Threshold_{1\text{-}g}$	$Threshold_{50mm}$	Powerlimit [mW]	$P_{max\text{-}declared}$		Exclusion
					[dBm]	[mW]	
2450.00	200	3	95.83	1595.83	12.90	19.50	yes

Collocation:

Overview:

Technology , [MHz]	NFC, 13.56 MHz	BT LE, 2450
Exemption based on	SAR , 200 mm distance	SAR , 200mm distance
Limit EIRP [mW]:	427.03	1595.83
Result EIRP [mW]:	255.3	19.5
Limit-Exhaustion [%]	59.8	1.2
Collocated percentage [%]	61.0	
Verdict:	PASS	