

SAR Test exclusion documentation according to FCC KDB 447498

Report identification number: 1-1845/21-01-92 Exclusion (FCC)

Certification numbers and labeling requirements	
FCC ID	QZ9-WCACS

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EUT technologies:

Technologies:	Max. meas. cond. AVG Power*
NFC 13.56 MHz	17.74 dBm

)* according test report R-HF_167-20/08 provided by the manufacturer (Annex A)

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

Equations from Chapter 4.3.1: Standalone SAR test exclusion considerations page 11 and ff. and tables in Annex C

(c) (2) Standalone SAR test exclusion below 100 MHz < 50mm

$$0.5 \times (\text{Threshold}_{100\text{MHz}}) \times (1 + \log(100/f))$$

where

Threshold_{1-g;10-g} is 3 for 1-g; 7.5 for 10-g
 f is the RF channel transmit frequency
 Threshold_{100MHz,50mm} is Threshold_{1-g;10-g} × d / f^{0.5} ; with f = 100MHz and 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]	Threshold _{1-g;10-g}	Threshold _{100MHz,50mm}	Powerlimit [mW]	P _{max-declared}		Exclusion
				[dBm]	[mW]	
13.56	3	474.34	442.97	17.74	59.4	yes

Annex A: Test report R-HF 167-20/08:

BMW – WCA Center Stack			BURY TECHNOLOGIES	
Report no.:	R-HF_167-20/08			
Project no.:	Project name	Project Stage	Report version	No. of page
M0854_061	BMW WCA Center Stack	Certification	8	7

M0854_061

BMW WCA Center Stack



NFC Power analysis

Prepared by: Michal Rak

Date: 25.01.2022



1. Introduction

Performance of NFC , NFC Output power, Duty Cycle

2. Used Equipment

- a) RTO2044 - Real Time Oscilloscope from Rohde&Schwarz
- b) FSW27 - Signal & Spectrum Analyzer from R&S
- c) SMBV100B - Vector Signal Generator
- d) PCB Main: BL14210.P14 – from BURY

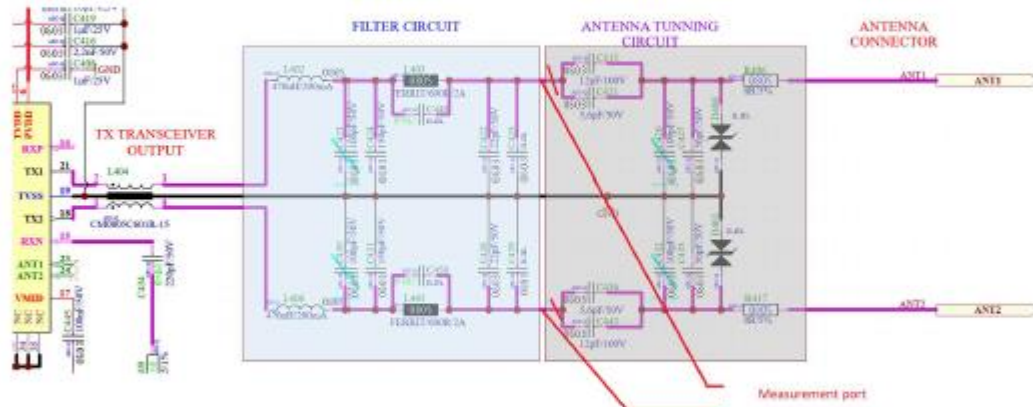
3. Performed Test

- a) Output power without antenna
- b) Output power with circuit matching to 50 Ohm
- c) Duty Cycle



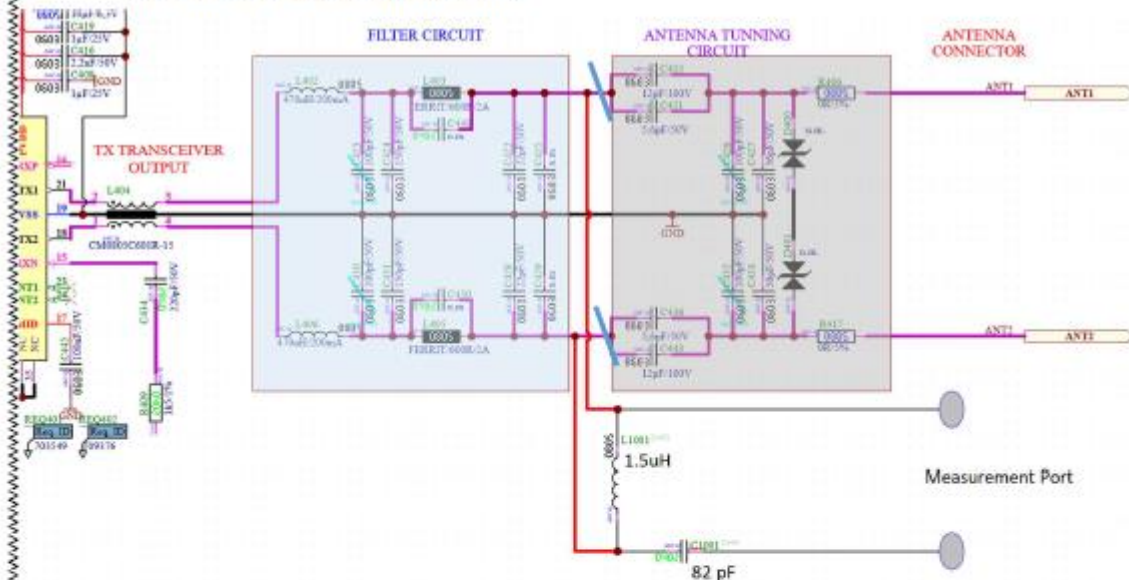
4. NFC circuit for:

a) Output power



For this case Antenna Tuning Circuit was removed and antenna was disconnected

b) Output power with matching



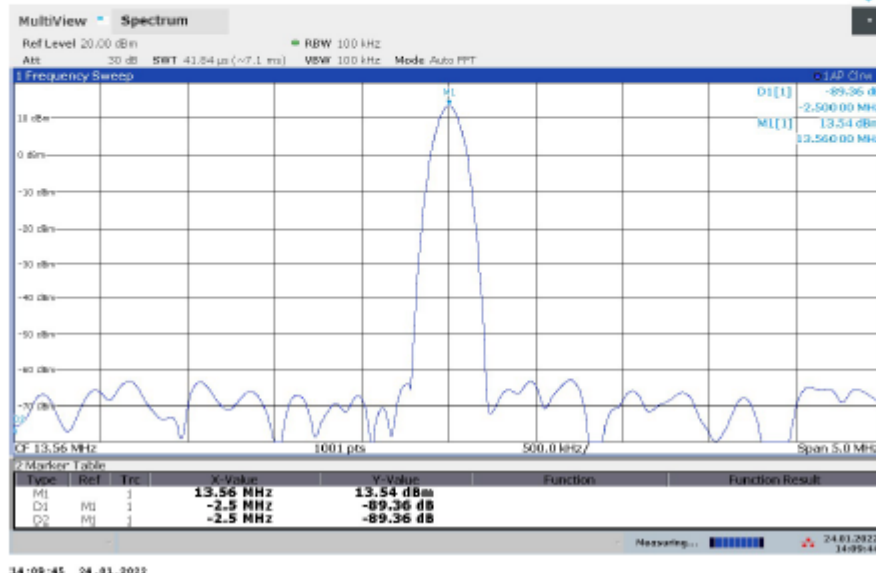
For this case Antenna Tuning Circuit was removed and antenna was disconnected, additional TX transceiver and Filter circuit was matched to 50 Ohm

c) Duty cycle was measured by magnetics coupling on oscilloscope



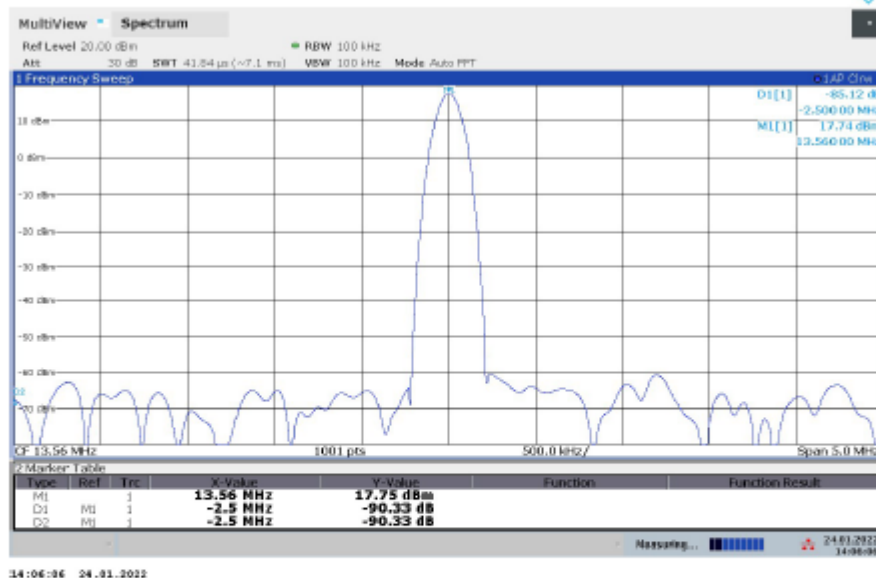
5. NFC Measurement Result

a) Result without matching

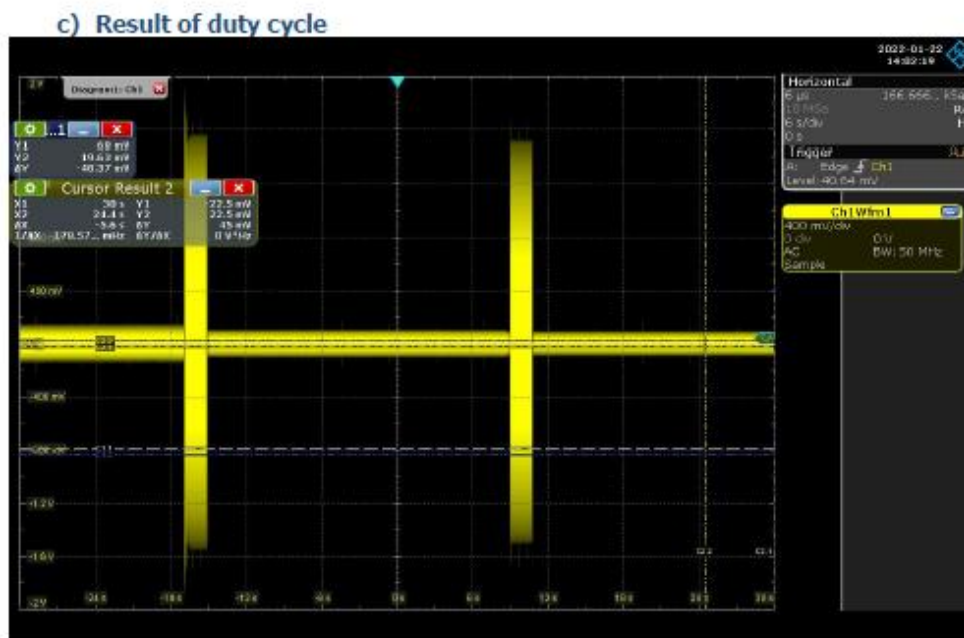


Result without matching circuit = 13,54 dBm = 22,59mW

b) Result with matching



Result with matching circuit = 17,74 dBm = 59,42mW



Result per one minute

$$2 \cdot 1,8 \text{ s} \rightarrow P_{\max}$$

$$60 - (2 \cdot 1,8 \text{ s}) \rightarrow P_{\text{LP0D}}$$

$$P_{\text{LP0D}} \text{ measured power} = -13,5 \text{ dBm} = 0,045 \text{ mW}$$

$$\text{Medium Power} = \frac{2 \cdot 1,8 \text{ s} \cdot P_{\max} + (60 - 2 \cdot 1,8) \text{ s} \cdot P_{\text{LP0D}}}{60}$$

$$\text{Medium Power} = \frac{2 \cdot 1,8 \text{ s} \cdot 59,42 \text{ mW} + (60 - 2 \cdot 1,8) \text{ s} \cdot 0,045 \text{ mW}}{60}$$

$$\text{Medium Power} = \frac{215,538}{60} = 3,59 \text{ mW}$$

6. NFC Result overview



Correction factor of Matching circuit equals:

$$\text{Correction Factor} = P_{\text{matching}} - P_{\text{nominal}}$$

P_{matching} from point 5b → 17,74dBm
 P_{nominal} from point 5a → 13,54dBm

$$\text{Correction Factor} = 17,74 - 13,54 = 3,93 \text{ dB}$$

Below attached picture from DUT

