RF exposure calculation

M210SE Handheld Terminal
WLAN + RFID
Version: 1.00

Inhaltsübersicht

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1 Description of the product:

The product is a handheld RFID reader.

Model: M210SE FCC ID: O2FM210SE	RFID: 13,56 MHz

The product also includes a precertified WiFi module (FCC ID: O2F-MSD40) The product is intended to be used in storages by trained personal only. The product is battery supplied.

2 RF exposure calculation RFID

Calculation of EIRP level

The calculation of the EIRP level of the fundamental frequency of the EuT is done according to KDB 412172 D01 subclause 1.3.1 formula (1). The used field strength is taken from test report ACN27_01 issued by EMCE GmbH.
Values according to report subclause 1.1.2.2:
Fieldstrength: 50,5 dBµV/m at a test distance of 10m

Used formula:	$EIRP = (E \times d)^2 / 30$
Where:	EIRP = equivalent isotropically radiated power in wats E = electrical field strength in V/m d = measurement distance in meters
Calculation:	$EIRP = (334.96 \times 10^{-6} \times 10)^2 / 30 = 373.994 \times 10^{-9}$
Result:	EIRP = 0.000374 mW

Threshold limits according to KDB447498
According to Appendix C:

For 50MHz and testdistance <50mm a threshold of 308 mW is listed. Compared with the transmitting power of the EuT in RFID mode with 0.000374 mW.

3   RF exposure calculation WiFi

The values of the transmit power are taken from the RF exposure calculation of the original certification file FCC ID: TWG-SDCMSD40NBT. The manufacturer defines test distance as 50mm; please refer to document "Test distance definition".

Transmit power levels taken from RF exposure calculation of TWG-SDCMSD40NBT:

Operation mode	Frequency [MHz]	Power [mW]
802.11b	2412	59
	2437	62
	2462	16
802.11g	2412	47
	2437	41
	2462	18
802.11a	5745	117
	5785	112
	5805	120

Used formula according to KDB447498 sub clause 4.3.1 a):

$$\text{(Power of channel in mW) / (Test distance in mm)} \times \sqrt{f \; in \; GHz} \le 7{,}5$$

7,5 is used due to handheld use of the product, without belt clip or any kind of holster which indicates body worn use.

Calculation:

Operation mode	Frequency [MHz]	EIRP [mW]	Test distance [mm]	Result	Limit
802.11b	2412	59	50	3,4	7,5
	2437	62	50	3,4	7,5
	2462	16	50	3,5	7,5
802.11g	2412	47	50	3,4	7,5
	2437	41	50	3,4	7,5
	2462	18	50	3,5	7,5
802.11a	5745	117	50	5,7	7,5
	5785	112	50	5,6	7,5
	5805	120	50	5,7	7,5

4   Simultaneous transmission of RFID and WiFi

Due the relative low power of the RFID transmitter, the influence of the RFID transmission is marginal. To show compliance the worst case of WiFi transmission is taken (802.11b on 2437MHz), and the transmitting power of the RFID is simply calculated with 0.1. This should symbolize the absolute worst case.

Operation mode	Frequency [MHz]	Power [mW]	Test distance [mm]	Result	Limit
802.11a	5805	120	42	5,7	7.5
HF-RFID	13,56	0.000314	50	< 0.1	7.5
			Total:	**5,7**	**7.5**