

MPE / SAR exemption letter TR23-1-0043901T005a-C01

MPE / SAR exemption letter according Interim procedure KDB 447498 D04

Customer	Product	Model	Type	HW Status	SW status	FCC ID
Continental Engineering Services GmbH Nordostpark 30 90411 Nuremberg Germany	Telematic Device	STP-MID	STP-MID NA	B-Sample	otp-mdm9x28-2.64.1.16	2BDLN-STPMIDNA

Declared minimum distance to human body according to customer ≥ 20 cm according external customer's document "MPE Information Requirements_filledout_V3".

The customer thus declares that the device is not body-worn.

RF Exposure Test Exemptions for Single Source

MPE-based Exemption

According 1.1307(b)(3)(i)(C) Option C – ERP at frequencies above 300 kHz but at distances $R > \lambda/2\pi$ can be exempted as follows:

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES
SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R ²
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

MPE / SAR exemption letter TR23-1-0043901T005a-C01

SAR-based Exemption

According 1.1307(b)(3)(i)(B) Option B – Available maximum time-averaged power or effective radiated power (ERP) at frequencies above 300 kHz and below 6 GHz, but with distances from 0.5 cm to 40 cm may be exempted as follows:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

11/29/2021

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Calculation based on external document "MPE Information Requirements_filledout_V3", provided by customer.

MPE / SAR exemption letter TR23-1-0043901T005a-C01

GSM

SAR-based Exemption

Exemption acc. Formula of § 1.1307(b)(3)(i)(B)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION															
Band	Technology	Frequency	R	R ≥ 0.5 cm and R ≤ 40 cm fulfilled	Maximum Rated Conducted Output Power (dBm)	Maximum Tolerance (dB)	Minimum Path Loss to Antenna connector (dB)	Minimum Path Loss in Antenna cable (dB)	Maximum Antenna Gain (dBi)	Duty Cycle (%)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Threshold ERP (mW)	MPE Exemption fulfilled
		(MHz)	(m)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(mW)	(mW)	
GSM 850	GPRS 1UL slot	824.2	0.200	yes	32.5	1.0	1.02	0.0	0.2	12.5	24.7	22.5	178.612	1681.368	yes
		836.5	0.200	yes							24.7	22.5	178.612	1706.460	yes
		848.8	0.200	yes							24.7	22.5	178.612	1731.552	yes
	GPRS 2UL slot	824.2	0.200	yes	32.5	1.0	1.02	0.0	0.2	25.0	27.7	25.5	357.223	1681.368	yes
		836.5	0.200	yes							27.7	25.5	357.223	1706.460	yes
		848.8	0.200	yes							27.7	25.5	357.223	1731.552	yes
	GPRS 3UL slot	824.2	0.200	yes	32.5	1.0	1.02	0.0	0.2	37.5	29.4	27.3	535.835	1681.368	yes
		836.5	0.200	yes							29.4	27.3	535.835	1706.460	yes
		848.8	0.200	yes							29.4	27.3	535.835	1731.552	yes
	GPRS 4UL slot	824.2	0.200	yes	32.5	1.0	1.02	0.0	0.2	50.0	30.7	28.5	714.447	1681.368	yes
		836.5	0.200	yes							30.7	28.5	714.447	1706.460	yes
		848.8	0.200	yes							30.7	28.5	714.447	1731.552	yes

Exemption acc. Formula of § 1.1307(b)(3)(i)(B)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION															
Band	Technology	Frequency	R	R ≥ 0.5 cm and R ≤ 40 cm fulfilled	Maximum Rated Conducted Output Power (dBm)	Maximum Tolerance (dB)	Minimum Path Loss to Antenna connector (dB)	Minimum Path Loss in Antenna cable (dB)	Maximum Antenna Gain (dBi)	Duty Cycle (%)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Threshold ERP (mW)	MPE Exemption fulfilled
		(MHz)	(m)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(mW)	(mW)	
GSM 1900	GPRS 1UL slot	1850.2	0.200	yes	29.5	1.0	1.62	0.0	4.3	12.5	25.8	23.6	230.097	3060.000	yes
		1880.0	0.200	yes							25.8	23.6	230.097	3060.000	yes
		1909.8	0.200	yes							25.8	23.6	230.097	3060.000	yes
	GPRS 2UL slot	1850.2	0.200	yes	29.5	1.0	1.62	0.0	4.3	25.0	28.8	26.6	460.193	3060.000	yes
		1880.0	0.200	yes							28.8	26.6	460.193	3060.000	yes
		1909.8	0.200	yes							28.8	26.6	460.193	3060.000	yes
	GPRS 3UL slot	1850.2	0.200	yes	29.5	1.0	1.62	0.0	4.3	37.5	30.5	28.4	690.290	3060.000	yes
		1880.0	0.200	yes							30.5	28.4	690.290	3060.000	yes
		1909.8	0.200	yes							30.5	28.4	690.290	3060.000	yes
	GPRS 4UL slot	1850.2	0.200	yes	29.5	1.0	1.62	0.0	4.3	50.0	31.8	29.6	920.386	3060.000	yes
		1880.0	0.200	yes							31.8	29.6	920.386	3060.000	yes
		1909.8	0.200	yes							31.8	29.6	920.386	3060.000	yes

MPE / SAR exemption letter TR23-1-0043901T005a-C01

WCDMA

MPE-based Exemption

Exemption acc. TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION																
Band	Technology	Frequency	$\lambda/2\pi$	R	$R \geq \lambda/2\pi$ fulfilled	Maximum Rated Conducted Output Power (dBm)	Maximum Tolerance	Minimum Path Loss to Antenna connector	Minimum Path Loss in Antenna cable	Maximum Antenna Gain	Duty Cycle	EIRP	ERP	ERP	Threshold ERP	MPE Exemption fulfilled
		(MHz)	(m)	(m)			(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(W)	(W)	
FDDII	WCDMA	1850.0	0.026	0.200	yes	24.5	1.5	1.62	0.0	4.3	100	28.7	26.5	0.450	0.768	yes
		1880.0	0.025	0.200	yes							28.7	26.5	0.450	0.768	yes
		1910.0	0.025	0.200	yes							28.7	26.5	0.450	0.768	yes
FDDIV	WCDMA	1710.0	0.028	0.200	yes	24.5	1.5	1.50	0.0	4.2	100	28.7	26.6	0.452	0.768	yes
		1732.5	0.028	0.200	yes							28.7	26.6	0.452	0.768	yes
		1755.0	0.027	0.200	yes							28.7	26.6	0.452	0.768	yes
FDDV	WCDMA	824	0.058	0.200	yes	24.5	1.5	1.02	0.0	0.2	100	25.2	23.0	0.201	0.422	yes
		836.5	0.057	0.200	yes							25.2	23.0	0.201	0.428	yes
		849	0.056	0.200	yes							25.2	23.0	0.201	0.435	yes

LTE

MPE-based Exemption

Exemption acc. TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION																
Band	Technology	Frequency	$\lambda/2\pi$	R	$R \geq \lambda/2\pi$ fulfilled	Maximum Rated Conducted Output Power (dBm)	Maximum Tolerance	Minimum Path Loss to Antenna connector (dB)	Minimum Path Loss in Antenna cable (dB)	Maximum Antenna Gain (dBi)	Duty Cycle (%)	EIRP (dBm)	ERP (dBm)	ERP (W)	Threshold ERP (W)	MPE Exemption fulfilled
		(MHz)	(m)	(m)			(dB)	(dB)	(dB)			(dBm)	(dBm)	(W)	(W)	
B2	LTE	1850.0	0.026	0.200	yes	23.0	1.0	1.62	0.0	4.3	100	26.7	24.5	0.284	0.768	yes
		1880.0	0.025	0.200	yes							26.7	24.5	0.284	0.768	yes
		1910.0	0.025	0.200	yes							26.7	24.5	0.284	0.768	yes
B4	LTE	1710.0	0.028	0.200	yes	23.0	1.0	1.50	0.0	4.2	100	26.7	24.6	0.285	0.768	yes
		1732.5	0.028	0.200	yes							26.7	24.6	0.285	0.768	yes
		1755.0	0.027	0.200	yes							26.7	24.6	0.285	0.768	yes
B5	LTE	824.0	0.058	0.200	yes	23.0	1.0	1.02	0.0	0.2	100	23.2	21.0	0.127	0.422	yes
		836.5	0.057	0.200	yes							23.2	21.0	0.127	0.428	yes
		849.0	0.056	0.200	yes							23.2	21.0	0.127	0.435	yes
B7	LTE	2500.0	0.019	0.200	yes	23.0	1.0	2.11	0.0	3.3	100	25.2	23.0	0.201	0.768	yes
		2535.0	0.019	0.200	yes							25.2	23.0	0.201	0.768	yes
		2570.0	0.019	0.200	yes							25.2	23.0	0.201	0.768	yes
B12	LTE	699.0	0.068	0.200	yes	23.0	1.0	0.70	0.0	-0.4	100	22.9	20.8	0.119	0.358	yes
		707.5	0.067	0.200	yes							22.9	20.8	0.119	0.362	yes
		716.0	0.067	0.200	yes							22.9	20.8	0.119	0.367	yes
B13	LTE	777.0	0.061	0.200	yes	23.0	1.0	0.91	0.0	-0.1	100	23.0	20.8	0.121	0.398	yes
		782.0	0.061	0.200	yes							23.0	20.8	0.121	0.400	yes
		787.0	0.061	0.200	yes							23.0	20.8	0.121	0.403	yes

MPE / SAR exemption letter TR23-1-0043901T005a-C01

WLAN

MPE-based Exemption

Exemption acc. TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION																
Band	Technology	Frequency	$\lambda/2\pi$	R	$R \geq \lambda/2\pi$ fulfilled	Maximum Rated Conducted Output Power	Maximum Tolerance	Minimum Path Loss to Antenna connector	Minimum Path Loss in Antenna cable	Maximum Antenna Gain	Duty Cycle	EIRP	ERP	ERP	Threshold ERP	MPE Exemption fulfilled
		(MHz)	(m)	(m)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(W)	(W)	
2.4 GHz	WLAN	2412.0	0.020	0.200	yes	17.0	1.0	1.0	0.0	2.7	100	19.7	17.6	0.057	0.768	yes
		2440.0	0.020	0.200	yes							19.7	17.6	0.057	0.768	yes
		2484.0	0.019	0.200	yes							19.7	17.6	0.057	0.768	yes

Simultaneous Transmission

Simultaneous transmission is not considered.

Conclusion

MPE-/ SAR Based Exemption fulfilled

The current version of Test Report 23-1-0043901T005a-C01 replaces the test report 23-1-0043901T005a dated 2024-Feb-06. The replaced test report is herewith invalid.



B.Eng. Martin Nunier



Timo Franke

Version	Applied changes	Date of release
--	Initial release	2024-Feb-06
C01	Correction of power values for WCDMA	2024-Feb-29