

MPE / SAR exemption letter according Interim procedure KDB 447498 D04

Customer	Product	Model	Type	HW Status	SW status	FCC ID
Valeo Telematik und Akustik GmbH Max-Planck-Strasse 28-32 61381 Friedrichsdorf Germany	Emergency call control unit	MBECALL-NAR-01	---	D2	E120 R551	QWY-MBECALL-NAR01

Declared minimum distance to human body according to customer ≥ 20 cm according external customer's document

"MPE Information Requirements NAR".

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	$19.2 R^2$
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

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 documents

“MPE Information Requirements NAR” and “MBeCallBox_Tune-up-information_V1.2”, provided by customer.

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GSM – internal Antenna

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 (MHz)	$\lambda/2\pi$ (m)	R (m)	$R \geq \lambda/2\pi$ 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 (W)	Threshold ERP (W)	MPE Exemption fulfilled
GSM 1900	CS	1850.2	0.026	0.200	yes	26.0	2.0	2.3	0.0	8.0	12.5	24.7	22.5	0.179	0.768	yes
		1880.0	0.025	0.200	yes							24.7	22.5	0.179	0.768	yes
		1909.8	0.025	0.200	yes							24.7	22.5	0.179	0.768	yes
	GPRS 1UL slot	1850.2	0.026	0.200	yes	25.0	2.0	2.3	0.0	8.0	12.5	23.7	21.5	0.142	0.768	yes
		1880.0	0.025	0.200	yes							23.7	21.5	0.142	0.768	yes
		1909.8	0.025	0.200	yes							23.7	21.5	0.142	0.768	yes
	GPRS 2UL slot	1850.2	0.026	0.200	yes	25.0	2.0	2.3	0.0	8.0	25.0	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
		1909.8	0.025	0.200	yes							26.7	24.5	0.284	0.768	yes
	GPRS 3UL slot	1850.2	0.026	0.200	yes	25.0	2.0	2.3	0.0	8.0	37.5	28.4	26.3	0.426	0.768	yes
		1880.0	0.025	0.200	yes							28.4	26.3	0.426	0.768	yes
		1909.8	0.025	0.200	yes							28.4	26.3	0.426	0.768	yes
	GPRS 4UL slot	1850.2	0.026	0.200	yes	25.0	2.0	2.3	0.0	8.0	50.0	29.7	27.5	0.568	0.768	yes
		1880.0	0.025	0.200	yes							29.7	27.5	0.568	0.768	yes
		1909.8	0.025	0.200	yes							29.7	27.5	0.568	0.768	yes
	EGPRS 1UL slot	1850.2	0.026	0.200	yes	20.0	2.0	2.3	0.0	8.0	12.5	18.7	16.5	0.045	0.768	yes
		1880.0	0.025	0.200	yes							18.7	16.5	0.045	0.768	yes
		1909.8	0.025	0.200	yes							18.7	16.5	0.045	0.768	yes
	EGPRS 2UL slot	1850.2	0.026	0.200	yes	20.0	2.0	2.3	0.0	8.0	25.0	21.7	19.5	0.090	0.768	yes
		1880.0	0.025	0.200	yes							21.7	19.5	0.090	0.768	yes
		1909.8	0.025	0.200	yes							21.7	19.5	0.090	0.768	yes
	EGPRS 3UL slot	1850.2	0.026	0.200	yes	20.0	2.0	2.3	0.0	8.0	37.5	23.4	21.3	0.135	0.768	yes
		1880.0	0.025	0.200	yes							23.4	21.3	0.135	0.768	yes
		1909.8	0.025	0.200	yes							23.4	21.3	0.135	0.768	yes
	EGPRS 4UL slot	1850.2	0.026	0.200	yes	20.0	2.0	2.3	0.0	8.0	50.0	24.7	22.5	0.179	0.768	yes
		1880.0	0.025	0.200	yes							24.7	22.5	0.179	0.768	yes
		1909.8	0.025	0.200	yes							24.7	22.5	0.179	0.768	yes

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	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)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(mW)	(mW)	
GSM 850	CS	824.2	0.200	yes	26.0	2.0	1.6	0.0	7.5	12.5	24.9	22.7	187.029	1681.368	yes
		836.5	0.200	yes							24.9	22.7	187.029	1706.460	yes
		848.8	0.200	yes							24.9	22.7	187.029	1731.552	yes
	GPRS 1UL slot	824.2	0.200	yes	24.0	2.0	1.6	0.0	7.5	12.5	22.9	20.7	118.008	1681.368	yes
		836.5	0.200	yes							22.9	20.7	118.008	1706.460	yes
		848.8	0.200	yes							22.9	20.7	118.008	1731.552	yes
	GPRS 2UL slot	824.2	0.200	yes	24.0	2.0	1.6	0.0	7.5	25.0	25.9	23.7	236.015	1681.368	yes
		836.5	0.200	yes							25.9	23.7	236.015	1706.460	yes
		848.8	0.200	yes							25.9	23.7	236.015	1731.552	yes
	GPRS 3UL slot	824.2	0.200	yes	24.0	2.0	1.6	0.0	7.5	37.5	27.6	25.5	354.023	1681.368	yes
		836.5	0.200	yes							27.6	25.5	354.023	1706.460	yes
		848.8	0.200	yes							27.6	25.5	354.023	1731.552	yes
	GPRS 4UL slot	824.2	0.200	yes	24.0	2.0	1.6	0.0	7.5	50.0	28.9	26.7	472.030	1681.368	yes
		836.5	0.200	yes							28.9	26.7	472.030	1706.460	yes
		848.8	0.200	yes							28.9	26.7	472.030	1731.552	yes
	EGPRS 1UL slot	824.2	0.200	yes	21.0	2.0	1.6	0.0	7.5	12.5	19.9	17.7	59.144	1681.368	yes
		836.5	0.200	yes							19.9	17.7	59.144	1706.460	yes
		848.8	0.200	yes							19.9	17.7	59.144	1731.552	yes
	EGPRS 2UL slot	824.2	0.200	yes	21.0	2.0	1.6	0.0	7.5	25.0	22.9	20.7	118.288	1681.368	yes
		836.5	0.200	yes							22.9	20.7	118.288	1706.460	yes
		848.8	0.200	yes							22.9	20.7	118.288	1731.552	yes
	EGPRS 3UL slot	824.2	0.200	yes	21.0	2.0	1.6	0.0	7.5	37.5	24.6	22.5	177.432	1681.368	yes
		836.5	0.200	yes							24.6	22.5	177.432	1706.460	yes
		848.8	0.200	yes							24.6	22.5	177.432	1731.552	yes
	EGPRS 4UL slot	824.2	0.200	yes	21.0	2.0	1.6	0.0	7.5	50.0	25.9	23.7	236.576	1681.368	yes
		836.5	0.200	yes							25.9	23.7	236.576	1706.460	yes
		848.8	0.200	yes							25.9	23.7	236.576	1731.552	yes

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W-CDMA – internal Antenna

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)	
FDDII	WCDMA	1850.0	0.026	0.200	yes	23.0	2.0	2.3	0.0	8.0	100	30.7	28.6	0.716	0.768	yes
		1880.0	0.025	0.200	yes							30.7	28.6	0.716	0.768	yes
		1910.0	0.025	0.200	yes							30.7	28.6	0.716	0.768	yes
FDDIV	WCDMA	1710.0	0.028	0.200	yes	23.0	2.0	2.3	0.0	8.0	100	30.7	28.6	0.716	0.768	yes
		1732.5	0.028	0.200	yes							30.7	28.6	0.716	0.768	yes
		1755.0	0.027	0.200	yes							30.7	28.6	0.716	0.768	yes

SAR-based Exemption

Exemption acc. Formula of § 1.1307(b)(3)(i)(B)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION															
Band	Technology	Frequency (MHz)	R (m)	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
FDDV	WCDMA	824	0.200	yes	23.0	2.0	1.6	0.0	7.5	100.0	30.9	28.8	753.356	1680.960	yes
		836.5	0.200	yes							30.9	28.8	753.356	1708.460	yes
		849	0.200	yes							30.9	28.8	753.356	1731.960	yes

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LTE – internal Antenna

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	ERP	ERP	Threshold ERP	MPE Exemption fulfilled
		(MHz)	(m)	(m)							(%)	(dBm)	(dBm)	(W)	(W)	
B2	LTE	1850.0	0.026	0.200	yes	23.0	2.0	2.3	0.0	8.0	100	30.7	28.6	0.716	0.768	yes
		1880.0	0.025	0.200	yes							30.7	28.6	0.716	0.768	yes
		1910.0	0.025	0.200	yes							30.7	28.6	0.716	0.768	yes
B4	LTE	1710.0	0.028	0.200	yes	23.0	2.0	2.3	0.0	8.0	100	30.7	28.6	0.716	0.768	yes
		1732.5	0.028	0.200	yes							30.7	28.6	0.716	0.768	yes
		1755.0	0.027	0.200	yes							30.7	28.6	0.716	0.768	yes
B7	LTE	2500.0	0.019	0.200	yes	23.0	2.0	3.0	0.0	9.0	100	31.0	28.9	0.767	0.768	yes
		2535.0	0.019	0.200	yes							31.0	28.9	0.767	0.768	yes
		2570.0	0.019	0.200	yes							31.0	28.9	0.767	0.768	yes

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	ERP	ERP	Threshold ERP	MPE Exemption fulfilled
		(MHz)	(m)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(mW)	(mW)	
B5	LTE	824.0	0.200	yes	23.0	2.0	1.6	0.0	7.5	100.0	30.9	28.8	749.894	1680.960	yes
		836.5	0.200	yes							30.9	28.8	749.894	1708.460	yes
		849.0	0.200	yes							30.9	28.8	749.894	1731.960	yes
B12	LTE	699.0	0.200	yes	23.0	2.0	1.6	0.0	6.5	100.0	29.9	27.8	595.662	1425.960	yes
		707.5	0.200	yes							29.9	27.8	595.662	1443.300	yes
		716.0	0.200	yes							29.9	27.8	595.662	1460.640	yes
B13	LTE	777.0	0.200	yes	23.0	2.0	1.6	0.0	7.5	100.0	30.9	28.8	749.894	1585.080	yes
		782.0	0.200	yes							30.9	28.8	749.894	1595.280	yes
		787.0	0.200	yes							30.9	28.8	749.894	1605.480	yes
B17	LTE	704.0	0.200	yes	23.0	2.0	1.6	0.0	6.5	100.0	29.9	27.8	595.662	1436.160	yes
		710.0	0.200	yes							29.9	27.8	595.662	1448.400	yes
		716.0	0.200	yes							29.9	27.8	595.662	1460.640	yes

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Simultaneous Transmission

Simultaneous transmission is not considered.

Conclusion

MPE-/ SAR Based Exemption fulfilled

B.Eng. Martin Nunier

Timo Franke

Version	Applied changes	Date of release
R01	Initial release	2024-Sep-17