

MPE exemption letter according Interim procedure KDB 447498 D04

Customer	Product	Model	Type	HW Status	SW status	FCC ID
Nexxiot AG Hardstrasse 201 8005 Zurich Switzerland	Tracker device	Globehopper Edge	Orange	AC.2A	edge_v13_ sd-blt-ble- 2022-07-28.hex	contains FCC ID ZMOMA510GL

Declared minimum distance to human body according to customer ≥ 25 cm according customer's document "MPE Information Requirements_v3".

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

RF Exposure Test Exemptions for Single Source

According 1.1307(b)(3)(i)(C) Option C – ERP 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.

Calculation based on external document "MPE Information Requirements_v3" provided by customer.

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	Threshold ERP (W)	Cond. PWR incl. Tolerance (dBm)	Duty cycle (%)	Cond. PWR incl. Duty cycle (dBm)	Maximum Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	MPE Exemption fulfilled
GSM 850	CS	824.2	0.058	0.250	yes	0.659	33.5	12.5	24.5	0.4	24.9	22.7	0.187	yes
		836.5	0.057	0.250	yes	0.669	33.5	12.5	24.5	0.4	24.9	22.7	0.187	yes
		848.8	0.056	0.250	yes	0.679	33.5	12.5	24.5	0.4	24.9	22.7	0.187	yes
	GPRS 1UL slot	824.2	0.058	0.250	yes	0.659	33.5	12.5	24.5	0.4	24.9	22.7	0.187	yes
		836.5	0.057	0.250	yes	0.669	33.5	12.5	24.5	0.4	24.9	22.7	0.187	yes
		848.8	0.056	0.250	yes	0.679	33.5	12.5	24.5	0.4	24.9	22.7	0.187	yes
	GPRS 2UL slot	824.2	0.058	0.250	yes	0.659	31.5	25.0	25.5	0.4	25.9	23.7	0.236	yes
		836.5	0.057	0.250	yes	0.669	31.5	25.0	25.5	0.4	25.9	23.7	0.236	yes
		848.8	0.056	0.250	yes	0.679	31.5	25.0	25.5	0.4	25.9	23.7	0.236	yes
	GPRS 3UL slot	824.2	0.058	0.250	yes	0.659	29.0	37.5	24.7	0.4	25.1	23.0	0.199	yes
		836.5	0.057	0.250	yes	0.669	29.0	37.5	24.7	0.4	25.1	23.0	0.199	yes
		848.8	0.056	0.250	yes	0.679	29.0	37.5	24.7	0.4	25.1	23.0	0.199	yes
	GPRS 4UL slot	824.2	0.058	0.250	yes	0.659	27.5	50.0	24.5	0.4	24.9	22.7	0.188	yes
		836.5	0.057	0.250	yes	0.669	27.5	50.0	24.5	0.4	24.9	22.7	0.188	yes
		848.8	0.056	0.250	yes	0.679	27.5	50.0	24.5	0.4	24.9	22.7	0.188	yes

MPE exemption letter 22-1-0032101T15a_C02

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	Threshold ERP (W)	Cond. PWR incl. Tolerance (dBm)	Duty cycle (%)	Cond. PWR incl. Duty cycle (dBm)	Maximum Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	MPE Exemption fulfilled
GSM 1900	CS	1850.2	0.026	0.250	yes	1.200	30.5	12.5	21.5	3.1	24.6	22.4	0.175	yes
		1880.0	0.025	0.250	yes	1.200	30.5	12.5	21.5	3.1	24.6	22.4	0.175	yes
		1909.8	0.025	0.250	yes	1.200	30.5	12.5	21.5	3.1	24.6	22.4	0.175	yes
	GPRS 1UL slot	1850.2	0.026	0.250	yes	1.200	30.5	12.5	21.5	3.1	24.6	22.4	0.175	yes
		1880.0	0.025	0.250	yes	1.200	30.5	12.5	21.5	3.1	24.6	22.4	0.175	yes
		1909.8	0.025	0.250	yes	1.200	30.5	12.5	21.5	3.1	24.6	22.4	0.175	yes
	GPRS 2UL slot	1850.2	0.026	0.250	yes	1.200	28.5	25.0	22.5	3.1	25.6	23.4	0.220	yes
		1880.0	0.025	0.250	yes	1.200	28.5	25.0	22.5	3.1	25.6	23.4	0.220	yes
		1909.8	0.025	0.250	yes	1.200	28.5	25.0	22.5	3.1	25.6	23.4	0.220	yes
	GPRS 3UL slot	1850.2	0.026	0.250	yes	1.200	26.0	37.5	21.7	3.1	24.8	22.7	0.186	yes
		1880.0	0.025	0.250	yes	1.200	26.0	37.5	21.7	3.1	24.8	22.7	0.186	yes
		1909.8	0.025	0.250	yes	1.200	26.0	37.5	21.7	3.1	24.8	22.7	0.186	yes
	GPRS 4UL slot	1850.2	0.026	0.250	yes	1.200	24.5	50.0	21.5	3.1	24.6	22.4	0.175	yes
		1880.0	0.025	0.250	yes	1.200	24.5	50.0	21.5	3.1	24.6	22.4	0.175	yes
		1909.8	0.025	0.250	yes	1.200	24.5	50.0	21.5	3.1	24.6	22.4	0.175	yes

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	Threshold ERP (W)	Cond. PWR incl. Tolerance (dBm)	Duty cycle (%)	Cond. PWR incl. Duty cycle (dBm)	Maximum Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	MPE Exemption fulfilled
B02	LTE CAT-M1	1850.0	0.026	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1880.0	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1910.0	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes
B04	LTE CAT-M1	1710.0	0.028	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1732.5	0.028	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1755.0	0.027	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes
B05	LTE CAT-M1	824.0	0.058	0.250	yes	0.659	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		836.5	0.057	0.250	yes	0.669	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		849.0	0.056	0.250	yes	0.679	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
B12	LTE CAT-M1	699.0	0.068	0.250	yes	0.559	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		707.5	0.067	0.250	yes	0.566	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		716.0	0.067	0.250	yes	0.573	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
B13	LTE CAT-M1	777.0	0.061	0.250	yes	0.622	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		782.0	0.061	0.250	yes	0.626	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		787.0	0.061	0.250	yes	0.630	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
B25	LTE CAT-M1	1850.0	0.026	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1882.5	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1915.0	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes
B26	LTE CAT-M1	814.0	0.059	0.250	yes	0.651	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		831.5	0.057	0.250	yes	0.665	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		849.0	0.056	0.250	yes	0.679	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
B66	LTE CAT-M1	1710.0	0.028	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1745.0	0.027	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1780.0	0.027	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes

Exemption acc. TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION														
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B02	NB-IoT	1850.0	0.026	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1880.0	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1910.0	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes
B04	NB-IoT	1710.0	0.028	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1732.5	0.028	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1755.0	0.027	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes
B05	NB-IoT	824.0	0.058	0.250	yes	0.659	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		836.5	0.057	0.250	yes	0.669	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
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B25	NB-IoT	1850.0	0.026	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1882.5	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1915.0	0.025	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes
B26	NB-IoT	814.0	0.059	0.250	yes	0.651	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
		831.5	0.057	0.250	yes	0.665	22.5	100.0	22.5	0.4	22.9	20.8	0.119	yes
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B66	NB-IoT	1710.0	0.028	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1745.0	0.027	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.221	yes
		1780.0	0.027	0.250	yes	1.200	22.5	100.0	22.5	3.1	25.6	23.5	0.223	yes

MPE exemption letter 22-1-0032101T15a_C02

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Band	Technology	Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	R $\geq \lambda/2\pi$ fulfilled	Threshold ERP (W)	Cond. PWR incl. Tolerance (dBm)	Duty cycle (%)	Cond. PWR incl. Duty cycle (dBm)	Maximum Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	MPE Exemption fulfilled
2.4 GHz	BLE	2402.0	0.020	0.250	yes	1.200	4.0	100.0	4.0	2.4	6.4	4.3	0.003	yes
		2440.0	0.020	0.250	yes	1.200	4.0	100.0	4.0	2.4	6.4	4.3	0.003	yes
		2480.0	0.019	0.250	yes	1.200	4.0	100.0	4.0	2.4	6.4	4.3	0.003	yes

Simultaneous Transmission

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

		BLE
	Ratio of Value/Limit	0.002217
GSM 850	0.357946	0.360163
GSM 1900	0.183552	0.185769
B02 LTE CAT-M1	0.186131	0.188348
B04 LTE CAT-M1	0.186131	0.188348
B05 LTE CAT-M1	0.180295	0.182512
B12 LTE CAT-M1	0.212536	0.214753
B13 LTE CAT-M1	0.191200	0.193418
B25 LTE CAT-M1	0.186131	0.188348
B26 LTE CAT-M1	0.182510	0.184727
B66 LTE CAT-M1	0.186131	0.188348
B02 NB-IoT	0.186131	0.188348
B04 NB-IoT	0.186131	0.188348
B05 NB-IoT	0.180295	0.182512
B12 NB-IoT	0.212536	0.214753
B13 NB-IoT	0.191200	0.193418
B25 NB-IoT	0.186131	0.188348
B26 NB-IoT	0.182510	0.184727
B66 NB-IoT	0.186131	0.188348

Remark: only maximum value in band / mode is shown

Maximum-Value	=	0.360163
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Maximum value for simultaneous transmission is $< 0.37 < 1$ = limit fulfilled.

Conclusion: MPE-Based Exemption fulfilled

The current version of Test Report TR22-1-0032101T15a_C02 replaces the test report TR22-1-0032101T15a_C01 dated 2023-Feb-14. The replaced test report is herewith invalid.



Dipl.-Ing. Ninovic Perez

B.Eng. Martin Nunier

Version	Applied changes	Date of release
--	Initial release	2022-Nov-28
C01	Corrected duty cycle correction	2023-Feb-14
C02	Corrected typos in GSM 850 frequencies	2023-Feb-16