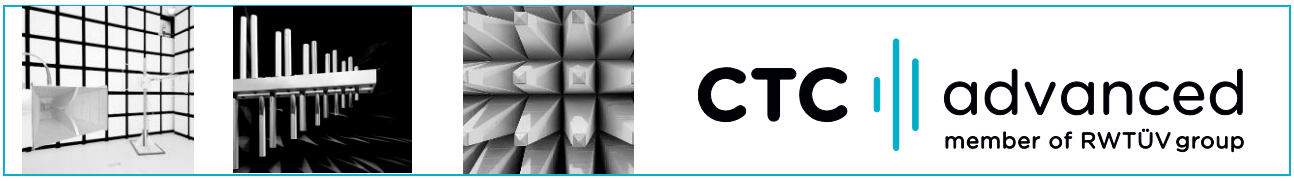

Bundesnetzagentur

BNetzA-CAB-02/21-102

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-03

Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-9100/19-02-14 MPE (FCC_ISED)

Certification numbers and labeling requirements	
FCC ID	ZKSQC1000B
ISED number	9849A-QC1000B
HVIN (Hardware Version Identification Number)	QC1000 Rev.B
PMN (Product Marketing Name)	QC1000
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

This report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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EUT technologies:

Technologies:	Max. power [dBm]		Antenna gain max.: [dBi]	Max. EIRP declared by customer [dBm]	#
	conducted	EIRP			
UMTS FDD II 1900 MHz	25.0	29.0	4.0	29.0	A, B
UMTS FDD IV 1750 MHz	25.0	29.0	4.0	29.0	A, B
UMTS FDD V 850 MHz	25.0	29.0	4.0	29.0	A, B
LTE FDD 2 Cat M1/Cat NB1 1900 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 4 Cat M1/Cat NB1 1750 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 5 Cat M1/Cat NB1 850 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 7 Cat M1/Cat NB1 2600 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 12 Cat M1/Cat NB1 700 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 13 Cat M1/Cat NB1 700 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 25 Cat M1/Cat NB1 1900 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 26 Cat M1/Cat NB1 850 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 38 Cat M1/Cat NB1 2600 MHz	25.0	28.0	3.0	28.0	A, B
LTE FDD 41 Cat M1/Cat NB1 2500 MHz	25.0	28.0	3.0	28.0	A, B

Details and origins of the measurements shown in the table above:

#	Results from:	Additional information
A	Quectel_EG25-G_LTE_Standard_Specification_V1.3	Max. conducted output power
B	Antenna Gains from Customer 2020-11-05	Antenna gains

Technologies:	Max. power [dBm]		Antenna gain max.: [dBi]	Max. EIRP declared by customer [dBm]	#
	conducted	EIRP			
Radio 902 to 928 MHz	17.1 (peak)	18.2 (peak)	1.4	18.5 (peak)	C
WLAN 2450 MHz	22.55	20.55	-2.0	25.55	D, B
Proprietary 2450 MHz	6.6 dBm (peak)	8.6 dBm (peak)	2.0	9.0	--
WB/UWB 6.28 GHz	--	-11.64 (full bandwith)	--	-11.64 (full bandwith)	E

Details and origins of the measurements shown in the table above:

#	Results from:		Additional information
C	1-9100/20-01-10	CTC advanced GmbH report	Max measured peak EIRP on page 20.
D	1-9100/20-01-12-B	CTC advanced GmbH report	Max measured EIRP on page 24.
E	1-9100/20-01-13	CTC advanced GmbH report	Max measured AVG EIRP/MHz on page 25. BW on page 19.

Collocation overview:

Active scenario: / **Technology**	**1***	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	..	32
UMTS / LTE	**x**	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	..	
900 MHz Radio	**x**	x	x	x	x	x	x	x									..	
WLAN 2450 MHz	**x**	x	x	x					x	x	x	x					..	
Proprietary 2450 MHz	**x**	x			x	x			x	x			x	x			..	
UWB 6.28 GHz	**x**		x		x		x		x		x		x		x		..	

*) Worst Case Scenario:
All bands active the same time.

Prediction of MPE limit at given distance - FCC

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG / 4\pi R^2$

where: S = Power density
P = Power input to the antenna
G = Antenna gain
R = Distance to the center of radiation of the antenna
PG = Output Power including antenna gain

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled “Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure”

Frequency Range (MHz)	Power Density (mW/cm^2)	Averaging Time (minutes)
300 -1500	f/1500	30
1500 - 100000	1.0	30

where f = Frequency (MHz)

Prediction: worst case

	Technologies:	UMTS/LTE	WLAN	Proprietary	900 MHz Radio	WB/UWB	
	Frequency (MHz)	850	2450	2450	900	6280	
PG	Declared max power (EIRP)	29	20.55	9	18.5	-11.64	dBm
R	Distance	20	20	20	20	20	cm
S	MPE limit for uncontrolled exposure	0.6	1	1	0.6	1	mW/cm^2
	Calculated Power density:	0.1581	0.0226	0.0016	0.0141	0.0000	mW/cm^2
	Calculated percentage of Limit:	27.90%	2.26%	0.16%	2.35%	0.00%	
	Collocation:						
	Scenario 1: All technologies active Calculated percentage of Limit:	32.67%					

This prediction demonstrates the following:

The power density levels for FCC at a distance of 20 cm are below the maximum levels allowed by regulations.

Prediction of MPE limit at given distance - ISED

RSS-102, Issue 5, 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Prediction: worst case

	UMTS	WLAN	Proprietary	Radio	UWB	
Frequency	850	2450	2450	900	6280	MHz
Distance	20	20	9	20	20	cm
Maximum EIRP	25	20.55	20.55	17.1	-11.64	dBm
Maximum EIRP	316.2	113.5	113.5	51.3	0.1	mW
Exclusion Limit from above:	1.32	2.71	2.71	1.37	5.00	W
Calculated percentage of Limit:	24.03%	4.18%	4.18%	3.75%	0.00%	
Collocation:						
Scenario 1: All technologies active Calculated percentage of Limit:	36.15%					

Conclusion: RF exposure evaluation is not required.