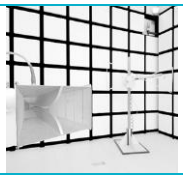
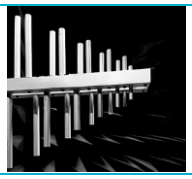
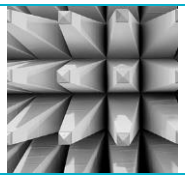




CTC advanced
member of RWTÜV group

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-7271/18-01-09-2KT

Certification numbers and labeling requirements	
FCC ID	LCGFMR2XKT
IC number	2519A-2KT
HVIN (Hardware Version Identification Number)	FMR10 FMR20
PMN (Product Marketing Name)	FMR10/20
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

Version –2KT: Separate document for 2519A-2KT

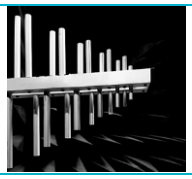
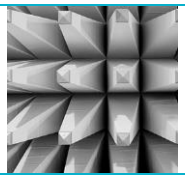
This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Document authorized:

Thomas Vogler

DN: cn=Thomas Vogler, o=CTC advanced GmbH, ou=VOG-161125, email=thomas.vogler@ctcadvanced.com, c=DE
Datum: 2019.04.08 16:02:42 +02'00'

Thomas Vogler
Lab Manager
Radio Communications & EMC

EUT technologies:

Technologies:	Max. power:	Max. EIRP:
24 GHz tank radar	---	-53 dBm/MHz @ 2663 MHz bandwith (-18.75 dBm)
Bluetooth LE	1.5 dBm (measured)	3.1 dBm (measured)

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

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

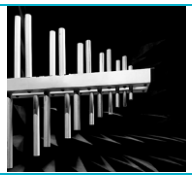
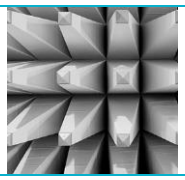
where f = Frequency (MHz)

Prediction: worst case

		> 1500 MHz	> 1500 MHz
	Technology	Bluetooth LE	24 GHz tank radar
PG	Max EIRP	3.1 dBm	< 0 dBm
R	Distance	20 cm	20 cm
S	MPE limit for uncontrolled exposure	1 mW/cm^2	1 mW/cm^2
	Calculated Power density:	0.0008 mW/cm^2	< 0.0002 mW/cm^2

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 - IC

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

	Technology	Bluetooth LE @ 2.4 GHz	24 GHz tank radar
PG	Max EIRP	3.1 Bm	< 0 dBm
	Max EIRP	2 mW	< 1 mW
	Exclusion Limit from above	2.71 W	5 W

Conclusion: RF exposure evaluation is not required.
For applications where minimum distance to radiating element is 20cm Annex C of RSS-102 should be filled out.