



FCC RF Exposure Evaluation

1. Product Information

FCC ID	:	2ATQ2-CESTR02
Product name	:	Strobe
Test Model	:	CE-STR-02
Power supply	:	DC 3.6V by Rechargeable Li-ion Battery 1, 16200mAh DC 3.6V by Rechargeable Li-ion Battery 2, 16200mAh
Hardware Version	:	/
Software Version	:	/
Bluetooth Frequency Range	:	2402MHz ~ 2480MHz
Channel Number	:	40 channels for Bluetooth V5.0 (DTS)
Channel Spacing	:	2MHz for Bluetooth V5.0 (DTS)
Modulation Type	:	GFSK for Bluetooth V5.0 (DTS)
Bluetooth Version	:	V5.0
Antenna Description	:	PCB Antenna, 1.86dBi(Max.)
Exposure category	:	General population/uncontrolled environment
EUT Type	:	Production Unit
Device Type	:	Stationary Device
LoRa		
Frequency Range	:	902.3MHz ~ 914.9MHz
Channel Number	:	64 channels
Modulation Type	:	GFSK
Antenna Description	:	Internal Antenna, -13.85dBi(Max.)

2. Evaluation method and Limit

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.





3. Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

4. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

5. Conducted Power Results

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BLE 1M	0	2402	1.40
	19	2440	1.57
	39	2480	1.59
LoRa	0	902.3	18.66
	31	908.5	19.85
	63	914.9	18.07





6. Manufacturing Tolerance

BLE 1M (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	1.0	1.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

LoRa (Peak)			
Channel	Channel 0	Channel 31	Channel 63
Target (dBm)	18	19.0	18
Tolerance $\pm$ (dB)	1.0	1.0	1.0

7. Evaluation Results

7.1 Standalone Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
BLE	2	1.5849	1.86	0.000484	1.0
LoRa	20	100.0	-13.85	0.001321	1.0

7.2 Simultaneous Transmission for SAR Exclusion

The sample support one BT modular and one LoRa modular. need consider simultaneous transmission. According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

$\sum \text{of MPE ratios} \leq 1.0$

Simultaneous Transmission				
BLE MPE ratios	RoLa MPE ratios	$\sum$ MPE ratios	Limit	Results
0.000484	0.001321	0.00181	1.0	Pass

Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of Stationary device.

-----THE END OF REPORT-----



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