Maximum Permissible Exposure Evaluation

FCC ID:WWE-2MNCA2212

1. Client Information

Applicant	:	LIFEWORKS TECHNOLOGY GROUP LLC.
Address	:	530 7th Ave 21st Fl New York, United States 10018
Manufacturer	:	LIFEWORKS TECHNOLOGY GROUP LLC.
Address	:	530 7th Ave 21st Fl New York, United States 10018

2. General Description of EUT

EUT Name	:	Car Wireless FM Transmitter	
Model(s) No.	:	2MNCA2212B0T2, BT25L, IQ-311BT, 2MNCA2212	
Model Difference	:	All PCB boards and circuit diagrams are the same, the only difference is that appearance.	
Product Description	:	Operation Frequency:	Bluetooth V5.3: 2402MHz~2480MHz
		RF Output Power:	BT: 1.335dBm
		Antenna Gain:	-0.68dBi PCB Antenna
		Operation Frequency:	FM: 88.1-107.9 MHz
		Number of Channel:	199(Channel spacing 100KHz)
		Antenna Gain:	-0.68dBi Spring Antenna
Power Supply	:	Input: DC 12V/24V USB Output: QC3.0(5V/3A, 9V/2A, 12V/1.5A) Type-c Output: PD20W(5V/3A, 9V/2.22A, 12V/1.67A)	
Software Version	:	231211_JMS_DYQ_56C4_BT25S(MONSTER TRANSMITTER)_3D_EN_82ED	
Hardware Version	:	BT25L-56C-V1.0	
Remark: The antenna gain provided by the applicant, the adapter and verified for the RF conduction test and adapter provided by TOBY test lab.			

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MPE Calculations

1. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

2. Exposure Evaluation:

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: power gain of the antenna in the direction of interest relative to an isotropic radiator.
R: distance to the center of radiation of the antenna

3. Simultaneous transmission MPE Considerations

According to KDB447498: All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. 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 modeled or measured field strengths or power density, is ≤ 1.0.

This means that:

∑ of MPE ratios ≤ 1.0

4. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

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/Controlled 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. Test Result:

Bluetooth worst reported.

Mode	N_{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/cm^2) [S]
GFSK	1	2.402	-1.545	-2±1	-1	-0.68	20	0.0001
		2.441	-0.638	-1±1	0	-0.68	20	0.0002
		2.480	-0.162	0±1	1	-0.68	20	0.0002
Pi/4-DQ PSK	1	2.402	-0.63	-1±1	0	-0.68	20	0.0002
		2.441	0.238	0±1	1	-0.68	20	0.0002
		2.480	0.76	1±1	2	-0.68	20	0.0003
8-DPSK	1	2.402	0.003	0±1	1	-0.68	20	0.0002
		2.441	0.853	1±1	2	-0.68	20	0.0003
		2.480	1.335	1±1	2	-0.68	20	0.0003

Note:
N_{TX}= Number of Transmit Antennas
RF Output power specifies that Maximum Conducted Peak Output Power.

FM worst reported.

$$E = EIRP - 20\log D + 104.8$$

where:

E = electric field strength in dBμV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

EIRP=E-104.8+20logD=37.48-104.8+20log3 =-57.75dBm
EIRP=E-104.8+20logD=39.45-104.8+20log3 =-55.81dBm
EIRP=E-104.8+20logD=50.40-104.8+20log3 =-44.86dBm

Frequency (MHz)	Measured Power (dBm)	Tune up Tolerance ± (dB)	Calculation Value
88.1	-57.75	-57±1	0.000000003
98	-55.81	-55±1	0.000000004
107.9	-44.86	-44±1	0.00000005

For Bluetooth &FM

Bluetooth MPE (Ratio)	NFC MPE (Ratio)	simultaneous MPE (Ratio)	MPE Limits (Ratio)
0.0003	0.00000005	0.00300005	1.0000

So, RF exposure limit warning or SAR test are not required.

The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR2.1091 (b).

The RF Exposure Information page from the manual is included here for reference.

Note

For a more detailed features description, please refer to the RF Test Report.

6. Conclusion:

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

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