1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant:	LM Technologies Ltd.
Address of applicant:	Camrose House,2A Camrose Avenue, Edgware, London HA8 6EG, Penelope Victoria
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Address of applicant:	Camrose House,2A Camrose Avenue, Edgware, London HA8 6EG, Penelope Victoria

General Description of EUT:

Product Name:	LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module
Brand Name:	LM Technologies
Model No.:	LM843
Adding Model(s):	843-8430, 843-8431, 843-8432, 843-8433, 843-8434, 843-8435, 843-8436, 843-8437, 843-8438, 843-8439, 843-8440, 843-8441
Rated Voltage:	DC5V
Software Version:	/
Hardware Version:	PCB_843-84XX
FCC ID:	VVX-LM843

Technical Characteristics of EUT:	
Wi-Fi (2.4G)	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
RF Output Power:	Antenna A:13.70dBm (Conducted) Antenna B:13.40dBm (Conducted)
Type of Modulation:	DBPSK,BPSK,DQPSK,QPSK,16QAM,64QAM
Quantity of Channels:	11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
Channel Separation:	5MHz
Type of Antenna:	External antenna
Antenna Gain:	3dBi
Wi-Fi (5G)	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VHT80
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	Antenna A: 10.34dBm (Conducted) Antenna B: 9.49dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM
Type of Antenna:	External antenna

Antenna Gain:	3dBi
Bluetooth	
Bluetooth Version:	V5.0
Frequency Range:	2402-2480MHz
RF Output Power:	7.98dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, π/4 DQPSK, 8DPSK
Quantity of Channels:	79/40
Channel Separation:	1MHz/2MHz
Type of Antenna:	External antenna
Antenna Gain:	3dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

1.3 MPE Calculation Method

$S = (30*P*G) / (377*R^2)$

S = power density (in appropriate units, e.g., mw/cm^2)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

Wi-Fi (2.4G)

Maximum Tune-Up output power: 14(dBm)

Maximum peak output power at antenna input terminal: 25.12(mW)

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain:3.0(dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0100(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

Wi-Fi (5G)

Maximum Tune-Up output power: 11(dBm)

Maximum peak output power at antenna input terminal: 12.59(mW)

Prediction distance: >20(cm)

Prediction frequency: 5785 (MHz)

Antenna gain:3.0(dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0050(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

Bluetooth

Maximum Tune-Up output power: 8(dBm)

Maximum peak output power at antenna input terminal: 6.31(mW)

Prediction distance: >20(cm)

Prediction frequency: 2480 (MHz)

Antenna gain: 3.0(dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0025(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

Mode for Simultaneous Multi-band Transmission
Wi-Fi+ Bluetooth
The worst case is power density at prediction frequency at 20cm: 0.0100+0.0050+ 0.0025=0.0175(mw/cm2)
MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

Result: Pass