APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

EUT	WLAN Module		
Model	WN4640R		
RF Module	MEDIATEK	Model:	MT7603UN
Model Discrepancy	N/A		
Frequency band (Operating)	☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz ☒ 802.11 n HT40: 2.422GHz ~ 2.452GHz ☐ Others		
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others		
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)		

Antenna Specification	PIFA Antenna
	1. LITE-ON Technology Corporation / WN4640R
	  2.4GHz: Antenna Gain : 2.93 dBi (Numeric gain 1.96)
	2. LITE-ON Technology Corporation / WN4640R
	  2.4GHz: Antenna Gain : 2.71 dBi (Numeric gain 1.87)		

Maximum Average output power	IEEE 802.11b Mode: 23.48 dBm (222.844 mW) IEEE 802.11g Mode: 24.12 dBm (258.226 mW) IEEE 802.11n HT 20 Mode: 25.83 dBm (382.825 mW) IEEE 802.11n HT 40 Mode: 25.76 dBm (376.704 mW)		
Maximum Tune up Power	IEEE 802.11b Mode: 25.00 dBm (316.228 mW) IEEE 802.11g Mode: 26.00 dBm (398.107 mW) IEEE 802.11n HT 20 Mode: 27.50 dBm (562.341 mW) IEEE 802.11n HT 40 Mode: 27.50 dBm (562.341 mW)		
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A		

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2015/6/25	Initial Issue	ALL	Becca Chen

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \dfrac{\sqrt{30 \times P \times G}}{d}$ & $S = \dfrac{E^2}{377}$

Where   E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{\textit{Equation 1}}$$

Where   d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where   P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm^2

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	316.228	1.96	20	0.1233	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	398.107	1.96	20	0.1553	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	562.341	1.96	20	0.2193	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	562.341	1.96	20	0.2193	1