MPE Calculation (for Mobile Device)

FCC ID: NKR-DNXAH1

Company: Wistron Corporation

Model: DNXA-H1

802.11abgn WLAN PCIe card, using LANCOM L-451, L452 host equipment with lower gain antennas than originally filed under this respective FCC ID.

Typical use distance: $d \ge 20$ cm

Power density limit for mobile devices at 2.4 and 5 GHz: $S \le 1 \text{ mW/cm}^2$

Remark: Average \leq Peak, which means that calculating the power density applying Peak power is worst case. The worst case operation mode generating the highest power in each frequency range is taken for calculation.

MODULATION MODE	FREQUENCY BAND (MHz)	MAX POWER (dBm)	MAX ANTENNA GAIN (dBi)	CABLE LOSS (dB)	Additional Power Reduction ONLY for L-452 (dB)	DISTANCE d (cm)	POWER DENSITY (mW/cm ²)	LIMIT (mW/cm²)
802.11b	2412-2462	24.7	3	0.64	0	20	0.101	1
802.11g	2412-2462	25.5	3	0.64	0	20	0.122	1
802.11n(20)	2412-2462	28.6	3	0.64	1	20	0.197	1
802.11n(40)	2422-2452	26.1	3	0.64	0	20	0.140	1
802.11a	5180-5240	10.7	5	1	0	20	0.006	1
802.11n(20)	5180-5240	15.6	5	1	0	20	0.018	1
802.11n(40)	5190-5230	15.4	5	1	0	20	0.017	1
802.11a	5745-5825	24.1	5	1	0	20	0.128	1
802.11n(20)	5745-5825	24.6	5	1	0	20	0.144	1
802.11n(40)	5755-5795	23.7	5	1	0	20	0.117	1

POWER DENSITY S = $(P_{radiated}) / (4\pi x d^2) = \dots mW/cm^2$

Evaluation for L-452 (equipped with two WLAN cards):

Both WLAN cards in L-452 can not (never) use the same channel number, and L-452 has additional power reduction of 1 dB for 2.4 GHz 802.11n(20) mode. This is fixed in the software by the manufacturer, end users cannot change this, see separate statement about this filed within this class 2 change application for certification.

The worst case power density is $2 \times 0.248 = approx$. 0.5 mW/cm² and remains within the limit of 1 mW/cm², whereas the sum of worst case conducted power emitted in the DTS band (28.6-0.64-1=26.96 dBm) is 2×496.6 mW remains within 1 W as specified in 15.247(3).

The sum of worst case conducted power emitted in the UNII band in HT20 mode (15.6-1=14.6 dBm) is 2 x 28.84 = approx 57.68 mW. This output power shall either be lower than 50 mW or lower than 4 + 10 log ([26dB BW in MHz, see NKR-DNXAH1 test report page 34]) = 4 + 10 log (25.95) = 4 + 14.1414 = 18.1414 dBm = 65.18 mW. Conclusion: 57.68 mW < 65.18 mW, so PASS.

The sum of worst case conducted power emitted in the UNII band in HT40 mode (15.4-1=14.4 dBm) is 2 x 27.54 = approx 55.08 mW shall either remain within 50 mW or within 4 + 10 log ([26dB BW in MHz, see NKR-DNXAH1 test report page 35]) = 4 + 10 log (50.29) = 4 + 17.01482 = 21.01482 dBm = 126.32 mW. Conclusion: 55.08 mW < 126.32 mW, so PASS.

Evaluation for L-451 (equipped with one WLAN card):

Compared to L-452 that has two WLAN cards, <u>L-451 does not need any power reduction</u>, because the worst case output power in the DTS band is 28.6-0.64=27.96 dBm = 625.17 mW which is < 1 W as specified in 15.247(3). All other DTS and UNII modes for L-451 are deemed meet the output power limit and power density limit, because L-452 complies already, and so will the less worst case configuration of L-451.