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August 27, 2013

Timco Engineering Inc.
849 NW State Road 45
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Applicant:	Motion Computing Inc.	FCC ID: Q3QUMDNMA92	
	8601 Ranch Road 2222, Building 2	CORES number: 0008 7988 94	
	Austin, TX 78730		

RE: MPE Evaluation for Q3QUMDNMA92

To Whom It May Concern:

This Maximum Permissible Exposure (MPE) analysis demonstrates compliance for
Q3QUMDNMA92 module with CFR47 2.1091 and collocated simultaneous transmission and mobile
exposure conditions. The MPE analyses for various configurations are addressed and valid for
transmitter configurations operating within the defined parameters. General population/uncontrolled
exposure limits are applicable when operating and public may be exposed or persons who are exposed
as a consequence of employment and fully aware of the potential for exposure or cannot exercise
control over their exposure. A separation distance of 20 cm (8 inches) or more shall be maintained
between the end user and the equipment while operational and transmitting.

Limits

FCC radio frequency radiation exposure limits per 1.1310		
Frequency Band (MHz)	Occupational Limit (mW/cm^2)	Public Limit (mW/cm^2)
30-300	1	0.2
300-1,500	f/300	f/1500
1,500-10,000	5	1

Based on FCC Bulletin OET 65, the MPE calculations in case of multiple transmitters have been
performed based on the following assumptions and equations:
1) For transmitters, which operate in the frequency band with a same MPE limit the Power Densities,
   are summed. The Total Power Density shall not exceed the Limit for this band
2) For transmitters that operate in frequency bands with a different MPE the Power Densities are
   calculated separately for each band, and then divided by Limit for each band. The sum of these
   ratios shall not exceed 1.

The calculation of the Power Density based on equation given in OET 65:

$$E = \sqrt{(30 \times P \times DC \times G)} / d \quad (Eq.1)$$

and

$$S = E^2 / 3770 \quad (Eq.2)$$

Where: E = field strength in volts/meter P = power in watts DC = numeric duty cycle G = numeric antenna gain d = distance in meters S = power density in Milliwatts / square centimeter Combining (Eq.1) and (Eq.2), S may be calculated as:

$$S = (30 \times P \times DC \times G) / (3770 \times d^2) \quad (Eq.3)$$

By changing units for P to mW and distance to cm, (Eq.3) can be written as:
$$S = [30 \times (0.001 \times P) \times DC \times G] / [3770 \times (0.01 \times d)^2] \quad (Eq.4)$$

Or:

$$S = (0.0795756 \times P \times DC \times G) / d^2 \quad (Eq.4)$$

Where:
P = power in mW DC = numeric duty cycle G = numeric antenna gain d = distance in cm S = power density in mW/cm²

Cellular/PCS GSM/EDGE/WCDMA/SDMA/700 MHz LTE transmitter (FCC ID: N7NMC7700) operates under Parts 22, 24 and 27 of CFR47. Device transmitting characteristics and MPE calculations are presented in Table1.

Table 1

Authorized Part	Frequency Range (MHz)	Maximum output power (mW)	Duty Cycle	Peak Antenna Gain for calculation MPE (dBi)	Calculated MPE at 20 cm
24E	1850 -1910	1.14	1	3.0	**0.452**
22H	824 – 849	1.778	0.25	7.5	0.497
27	706 – 713	0.256	1	3.0	**0.101**
24E	1712 - 1752	0.277	1	3.0	**0.110**

Cellular/PCS GSM/EDGE/WCDMA/SDMA/700 MHz LTE transmitter (FCC ID: N7NMC7750) operates under Parts 22, 24 and 27 of CFR47. Device transmitting characteristics and MPE calculations are presented in Table 2.

Table 2

Authorized Part	Frequency Range (MHz)	Maximum output power (mW)	Duty Cycle	Peak Antenna Gain for calculation MPE (dBi)	Calculated MPE at 20 cm
24E	1850 -1910	0.899	1	3.0	0.357
22H	824 – 849	1.82	0.25	7.5	0.509
22H	824 – 849	1.82	0.25	7.5	**0.226 @ 30cm**
27	779 – 785	0.227	1	3.0	0.090

802.11 a/b/g/n transmitter (FCC ID: Q3QUMDNMA92) operates under Part 15C of CFR47 in ISM band. Device transmitting characteristics and MPE calculations are presented in Table 3

Table 3

Authorized Part	Frequency Range (MHz)	Maximum output power (mW)	Duty Cycle	Peak Antenna Gain for calculation MPE (dBi)	Calculated MPE at 20 cm
15C	2412 - 2462	0.4425	1	3.9	**0.216**
15C	5745 - 5825	0.187	1	5.1	0.121

802.11 a/b/g/n transmitter (FCC ID: Q3QUMDNXA92) operates under Parts 15C CFR47 in ISM band. Device transmitting characteristics and MPE calculations are presented in Table 4.

Table 4

Authorized Part	Frequency Range (MHz)	Maximum output power (mW)	Duty Cycle	Peak Antenna Gain for calculation MPE (dBi)	Calculated MPE at 20 cm
15C	2412 - 2462	0.90721	1	3.9	0.443
15C	5745 - 5825	0.96515	1	3.9	**0.471**
15E	5180 - 5320	0.23312	1	3.9	**0.114**
15E	5500 - 5700	0.2278	1	3.9	0.111

MPE calculations for worst-case collocated equipment configurations are presented in table 5.

Table 5

WLAN/WiMAX Band (GHz)	MPE (mW/cm^2)	Limit (mW/cm^2)	Total MPE	Cellular Band (GHz)	MPE	Limit (mW/cm^2)	Cellular Total MPE
2.4-2.48	0.216	1	0.216	0.7-0.8	0.101	0.473	0.214
5.1-5.3	0.114	1	0.114	0.8-0.85	0.226	0.566	0.412
5.5-5.7	0.111	1	0.111	1.7-1.75	0.110	1	0.110
5.7-5.8	0.471	1	0.471	1.85-1.9	0.452	1	0.452

Configuration options conclusion

Option	Q3QUMDNMA92	Q3QUMDNMA92	Q3QUMDNXA92	MC7700	MC7750	Sum	Pass/Fail
1	0.216	0.216		0.412		0.844	Pass
	0.216	0.216			0.412	0.844	Pass
2			0.471	0.412		0.883	Pass
			0.471		0.412	0.883	Pass
3	0.216			0.412		0.628	Pass
	0.216				0.412	0.628	Pass
4	0.216		0.471			0.685	Pass