



RF Exposure Evaluation – Maximum Permissible Exposure (MPE)

Introduction

This document attempts to prove the safety of radiation generated by RF devices to the human body. The limit for Maximum Permissible Exposure (MPE), specified in FCC 1.1210, is listed below. The power generated by this product is measured by a power meter. Through use of the Friis transmission formula and the maximum gain of the antenna, the distance from the product at which compliance with the MPE limit is achieved may be calculated. Alternatively, near field measurements may be performed to demonstrate compliance at a specific measurement distance.

Near field probe: Wandel & Goltermann EMR-300. Calibration Due: 10/6/2007

This MPE report contains measurements that are applicable to the ML910 when configured with the PRM240 Wireless Modem Module. Multiple configurations of the ML910 were measured and are reported herein to ensure that the worst case MPE is reported.

EUT:

Model: ML910 S/N: 343AA77S0002

Grantee: Motorola

FCC ID: ABZ89FT7626

Configuration Table:

Motorola FCC ID	Modules
ABZ89FT7626	PRM240
ABZ89FT7627	WLAN (3945abg)
ABZ89FT7628	Bluetooth

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RF Exposure Limit

According to FCC 1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

Table H-1. Limits For Maximum Permissible Exposure (MPE)

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator (cm)

EUT Operating Condition

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

Measurement Procedure:

Measurements of the RF fields are measured in accordance with OET Bulletin 65. A broad-band radiation probe is used in making the measurements. For devices that contain multiple transmitters that operate simultaneously all transmitters are activated and transmitting during the test. For all measurements the EUT is placed on a non-metallic 80cm high table in a shielded anechoic chamber and the field probe is placed 20cm from the plane of the EUT. The probe is moved across the entire surface of the plane (i.e. front, right side, rear, left side) and the highest reading for each plane is recorded. The RF levels are then compared to the MPE limit to determine compliance.

Climate Condition

The temperature and relative humidity: 22°C and 78% RH

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Measurement Results

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0266	0.0218	0.0216	0.0140	See Table
2412 (802.11b)	15.86						
806	32.84						

Table H-2. MPE Measurement Result (Multiple Transmitters)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0265	0.0217	0.0195	0.0135	See Table
2437 (802.11g)	14.91						
806	32.84						

Table H-3. MPE Measurement Result (Multiple Transmitters)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0268	0.0230	0.0223	0.0159	See Table
5745 (802.11a)	14.42						
806	32.84						

Table H-4. MPE Measurement Result (Multiple Transmitters)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0291	0.0194	0.0232	0.0181	See Table
5180 (UNII)	14.52						
822.5	32.66						

Table H-5. MPE Measurement Result (Multiple Transmitters)

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Measurement Results (Cont'd.)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0270	0.0216	0.0227	0.0155	See Table
2412 (802.11b)	15.86						
822.5	32.66						

Table H-6. MPE Measurement Result (Multiple Transmitters)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0288	0.0232	0.0223	0.0145	See Table
2437 (802.11g)	14.91						
822.5	32.66						

Table H-6. MPE Measurement Result (Multiple Transmitters)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0293	0.0231	0.0237	0.0211	See Table
5745 (802.11a)	14.42						
822.5	32.66						

Table H-7. MPE Measurement Result (Multiple Transmitters)

Frequency (MHz)	Conducted Level (dBm)	Measurement Distance (cm)	Front MPE reading mW/cm ²	Rear MPE reading mW/cm ²	Right MPE reading mW/cm ²	Left MPE reading mW/cm ²	Limit mW/cm ²
2441 (BT)	3.97	20	0.0294	0.0241	0.0217	0.0196	See Table
5180 (UNII)	14.52						
822.5	32.66						

Table H-8. MPE Measurement Result (Multiple Transmitters)

Note: Measurements are made while all transmitters are operating simultaneously.

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Conclusion

The device meets the mobile 20cm separation distance as specified in Section 2.1091 of the FCC Rules. An appropriate RF exposure compliance statement will be placed in the user's manual.

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