



MAXIMUM PERMISSIBLE EXPOSURE REPORT

1. PRODUCT INFORMATION

FCC ID	: 2A7O9HR601M
IC	: 28732-HR601M
EUT	: RFID radio module
Test Model	: HR601M
Power Supply	: Input: DC 3.8~5.5V
PMN	: RFID radio module
HVIN	: HR601M
FVIN	: -/-
HMN	: -/-
Hardware Version	: V6
Software Version	: V2.3.6
RFID	:
Frequency Range	: 902.25MHz-927.75MHz
Channel Number	: 52 channels
Channel Spacing	: 500KHz
Modulation Type	: RFID UHF - DSB-ASK
Antenna Description	: Ceramic Antenna, 1.91dBi(Max.)
Exposure category	: General population/uncontrolled environment
EUT Type	: Production Unit
Device Type	: Mobile Device





2. MAXIMUM PERMISSIBLE EXPOSURE(LIMIT AND EQUATIONS)

2.1 FCC RULES

§ 1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency(RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter.

Table 1-Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6
Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density





2.2 ISED RULES

For the purpose of this standard, Innovation, Science and Economic Development (ISED) has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}

Note: f is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).





3. POWER DENSITY

Power density is given by:

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density in mW/cm²

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

Power density in units of mW/cm² converted to units of W/m² by multiplying by 10.

4. Antenna Information

Ceramic Antenna can only use antennas certificated as follows provided by manufacturer;

Internal/External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Antenna	Ceramic Antenna	902-928 MHz	1.91dBi	RFID Antenna

5. Conducted Power

[RFID]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
ASK	00	902.25	25.424
	26	914.75	25.676
	52	927.75	25.769

6. Manufacturing Tolerance

ASK(Peak)			
Channel	Channel 00	Channel 26	Channel 52
Target (dBm)	25	25	25
Tolerance ± (dB)	1.0	1.0	1.0





7. RF EXPOSURE RESULTS

7.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[RFID]

band	mode	Output power (dBm)	Antenna Gain (dBi)	EIRP (mW)	FCC MPE (mW/cm ²)	ISED MPE (W/m ²)	FCC MPE Limits (mW/cm ²)	ISED MPE Limits (W/m ²)
900MHz	ASK	26.0	1.91	618.02	0.1230	1.2301	0.6	2.7357

Remark:

1. Output power including turn-up tolerance;
2. Output power was adjust to duty cycle at 100%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

7.2 Simultaneous Transmission MPE Evaluation

The EUT equiped with one module and one antenna. So no need consider simultaneous transmission.

8. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 and the RSS-102 Issue 5 for the uncontrolled RF Exposure of mobile device.

-----THE END OF REPORT-----

