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EMF ASSESSMENT REPORT

EN62311:2008

Report Reference No.....:	**TRE1303013508 R/C: 59940**
Compiled by (position+printed name+signature)..:	File administrators Tim Zhang
Supervised by (position+printed name+signature)..:	Test Engineer Eric Zhang
Approved by (position+printed name+signature)..:	Manager Wenliang Li
Date of issue.....:	May 22, 2013
Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address.....:	Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Applicant's name.....:	**RICON TECHNOLOGIES FZE**
Address.....:	Ras Al Khaimah,UAE P.O. Box 16111
Test specification:	
Standard .....:	**EN62311:2008**
TRF Originator.....:	Shenzhen Huatongwei International Inspection CO., Ltd
Master TRF.....:	Dated 2006-06

Test item description :	Cellular Router
Trade Mark .....:	RICON
Model/Type reference.....:	S9922
Listed Models .....:	/
Manufacturer .....:	**RICON TECHNOLOGIES FZE**
WLAN Operation Frequency .....:	From 2412MHz to 2472MHz
WCDMA Operation Frequency Band:	FDD Band I &FDD Band VIII
Operation Frequency.....	GPRS900:880MHz-915MHz/GPRS1800:1710MHz-1785MHz
Power Class .....:	GPRS900:Power Class 4/GPRS1800:Power Class 1 WCDMA: Power Class 3
Result.....:	**Positive**

EMF ASSESSMENT R E P O R T

Test Report No. :	**TRE1303013508**	May 22, 2013 Date of issue

Equipment under Test	:	Cellular Router
Model /Type	:	S9922
Listed Models	:	/
Applicant	:	**RICON TECHNOLOGIES FZE**
Address	:	Ras Al Khaimah,UAE P.O. Box 16111
Manufacturer	:	**RICON TECHNOLOGIES FZE**
Address	:	Ras Al Khaimah,UAE P.O. Box 16111

Contents

1 . SUMMARY

1.1. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

1.2. Short description of the Equipment under Test (EUT)

2.4GHz (Cellular Router (M/N:S9922))

For more details, refer to the user's manual of

the EUT. Serial number: Prototype

1.3. NOTE

The EUT including GPRS,EGPRS, WCDMA and WLAN function,The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio-WCDMA	ETSI EN 301 908-1 V5.2.1: 2011-05 ETSI EN 301 908-2 V4.2.1: 2010-03	TRE1303013501
Radio-GSM	ETSI EN 301 511 V9.0.2: 2003-03	TRE1303013502
Radio-WLAN	ETSI EN 300 328 V1.7.1: 2006-10	TRE1303013503
EMC-GSM	ETSI EN 301 489-1 V1.9.2: 2011-09 ETSI EN 301 489-7 V1.3.1: 2005-11	TRE1303013504
EMC-WCDMA	ETSI EN 301 489-1 V1.9.2: 2011-09 ETSI EN 301 489-24 V1.5.1: 2010-10	TRE1303013505
EMC-WLAN	ETSI EN 301 489-1 V1.9.2: 2011-09 ETSI EN 301 489-17 V2.2.1: 2012-09	TRE1303013506
EMC	EN 55022:2010 EN 55024:2010	TRE1303013507
EMF	EN62311:2008	TRE1303013508

2. TEST ENVIRONMENT

2.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

2.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

2.3. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3. Method of measurement

3.1. Applicable Standard

EN62311: Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300GHz) (Official Journal L 197 of 30 July 1999).

3.2. Limit

Basic restriction for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (mA/m^2)	Whole body average SAR(W/kg)	Localised SAR (head and trunk)(W/kg)	Localised SAR (limbs) (W/kg)	Power density, S (W/m^2)
0Hz	40	--	--	--	--	--
>0-1Hz	--	8	--	--	--	--
1-4Hz	--	8/f	--	--	--	--
4-1000Hz	--	2	--	--	--	--
1000Hz-100khz	--	f/500	--	--	--	--
100khz-10Mhz	--	f/500	0.08	2	4	--
10Mhz-10Ghz	--	--	0.08	2	4	--
10-300Ghz	--	--	--	--	--	10

Notes:
1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by $\sqrt{2}$(=1.414). For pulses of duration t_p the equivalent frequency to apply in the basic restrictions should be calculated as=1/ ($2t_p$)
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.
8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/($2t_p$). Additionally, for pulsed exposures, in the frequency range 0.3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (uT)	Equivalent plane wave power density S_{eq}(W/m^2)
0-1Hz	--	3.2×10^4	4×10^4	--
1-8Hz	10000	$3.2\times10^4/f^2$	$4\times10^4/f^2$	--
8-25Hz	10000	4000/f	5000/f	--
0.025-0.8KHz	250/f	4/f	5/f	--

0.8-3KHz	250/f	5	6.25	--
3-150KHz	87	5	6.25	--
0.15-1MHz	87	0.73/f	0.92/f	--
1-10MHz	$87/f^{1/2}$	0.73/f	0.92/f	--
10-400MHz	28	0.073	0.092	2
400-2000MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	f/200
2-300GHz	61	0.16	0.20	10

Notes: 1. As indicated in the frequency range column.

2. For frequencies between 100kHz and 10GHz, S_{eq}, E^2, H^2 and B^2 are to be averaged over any six-minute period.

3. For frequencies exceeding 10GHz, S_{eq}, E^2, H^2 and B^2 are to be averaged over any $68/f^{1.05}$-minute period (.in GHz).

4. No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 20kV/m. Spark discharges causing stress or annoyance should be avoided.

3.3. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 26 of EN 62311, Edition 2008

$$E=\eta_0 H=\frac{\sqrt{30PG(\theta,\phi)}}{r}$$

Where:
E: E-field strength (V/m)
P: power input to antenna (Watt)
G: is the antenna gain relative to an isotropic antenna;
θ,ϕ: are elevation and azimuth angles to point of investigation;
r: is the distance from observation point to the antenna;
η_0: is the characteristic impedance of free space.

From the maximum EUT RF output power, the minimum mobile separation distance, r=0.25m, as well as the gain of the used antenna is 2.0dBi for WIFI and 3.0dBi for GSM WCDMA, the RF power density can be obtained.

4. Test Result

FDD Band I

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
1922.60	25.00	24.00	0.25119	1.995	60.29	15.509
1950.00	25.00	22.50	0.17783	1.995	60.72	13.050
1977.40	25.00	23.00	0.19953	1.995	61.14	13.823

FDD Band VIII

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
822.60	25.00	22.40	0.17378	1.995	39.44	12.900
897.60	25.00	22.70	0.18621	1.995	41.19	13.353
912.40	25.00	22.40	0.17378	1.995	41.53	12.900

GPRS900

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
881.20	25.00	31.38	1.37404	1.995	40.82	36.274
902.40	25.00	31.50	1.41254	1.995	41.30	36.778
914.00	25.00	31.76	1.49968	1.995	41.57	37.896

GPRS1800

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
1711.80	25.00	29.01	0.79616	1.995	56.89	27.612
1747.40	25.00	29.14	0.82035	1.995	57.48	28.028
1783.80	25.00	29.00	0.79433	1.995	58.07	27.580

For 802.11b

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 20 cm (V/m)
2412	25.00	15.91	0.03899	1.585	61.00	5.446
2442	25.00	15.31	0.03396	1.585	61.00	5.083
2472	25.00	15.41	0.03475	1.585	61.00	5.142

For 802.11g

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
2412	25.00	12.90	0.01950	1.585	61.00	3.852
2442	25.00	12.58	0.01811	1.585	61.00	3.712
2472	25.00	13.16	0.02070	1.585	61.00	3.968

For 802.11n (20MHz)

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
2412	25.00	11.10	0.01288	1.585	61.00	3.130
2442	25.00	10.80	0.01202	1.585	61.00	3.024
2472	25.00	10.70	0.01175	1.585	61.00	2.990

For 802.11n (40MHz)

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 25 cm (V/m)
2422	25.00	9.56	0.00904	1.585	61.00	2.623
2442	25.00	9.37	0.00865	1.585	61.00	2.565
2462	25.00	9.70	0.00933	1.585	61.00	2.664

5. Conclusion

The measurement results comply with the relevant limits for general public exposure specified as reference levels in the Council Recommendation 1999/519/EC.

.....End of Report.....