APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

<table>
<tr><td>EUT</td><td>2G,3G wireless module</td></tr>
<tr><td>Model</td><td>UE910-NA V2</td></tr>
<tr><td>Frequency band (Operating)</td><td>☒ GSM 850MHz: 824.2MHz ~ 848.8MHz
☒ GSM 1900MHz: 1850.2MHz ~ 1909.8MHz
☒ WCDMA: 826.4MHz ~ 846.6MHz
☒ WCDMA: 1852.4MHz ~ 1907.6MHz
☐ Others</td></tr>
<tr><td>Device category</td><td>☐ Portable (<20cm separation)
☒ Mobile (>20cm separation)
☐ Others</td></tr>
<tr><td>Exposure classification</td><td>☐ Occupational/Controlled exposure (S = 5mW/cm^2)
☒ General Population/Uncontrolled exposure (S=1mW/cm^2)</td></tr>
<tr><td>Antenna Specification</td><td>HANKOOK TB-800/1900-SMA
Gain: 2dBi (824~2170MHz)</td></tr>
<tr><td>Average output power</td><td>GSM850 32.40 dBm (1737.801 mW)
GSM1900 29.30 dBm (851.138 mW)
WCDMA Band V 23.33 dBm (215.278 mW)
WCDMA Band II 22.78 dBm (189.671 mW)</td></tr>
<tr><td>Tune up limit (Frame Average Power)</td><td>
<table>
<tr><td></td><td>Avg. burst power (dBm)</td><td>Frame Avg Pwr (dBm)</td><td></td></tr>
<tr><td>GSM850</td><td>32.50 dBm</td><td>23.47 dBm</td><td>± 0.5 dB</td></tr>
<tr><td>GSM1900</td><td>29.50 dBm</td><td>20.47 dBm</td><td>± 0.5 dB</td></tr>
<tr><td>WCDMA Band V</td><td>23.50 dBm</td><td>23.50 dBm</td><td>+ 0.5 / -1 dBm</td></tr>
<tr><td>WCDMA Band II</td><td>23.50 dBm</td><td>23.50 dBm</td><td>+ 0.5 / -1 dBm</td></tr>
</table>
</td></tr>
<tr><td>Evaluation applied</td><td>☒ MPE Evaluation*
☐ SAR Evaluation
☐ N/A</td></tr>
</table>

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2013/10/24	Initial Issue	ALL	Scott Hsu
01	2013/11/01	Tune up limit (Frame Average Power)	Page 1	Scott Hsu
02	2013/11/19	Added Antenna gain (dBi) to comply with EIRP limits	Page 4	Scott Hsu
03	2013/12/10	Revise Maximum Permissible Exposure	Page 4	Scott Hsu

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

GSM850 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
190	836.6	249.408	11.19	20	0.5554	0.558

Antenna gain (dBi) to comply with EIRP limits: 10.49 dBi (11.19 numeric gain.)

GSM1900 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
661	1880.0	125	40.09	20	0.9972	1

Antenna gain (dBi) to comply with EIRP limits: 16.03 dBi (40.09 numeric gain.)

WCDMA Band V mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
4182	836.4	251.1886	11.09	20	0.5544	0.558

Antenna gain (dBi) to comply with EIRP limits: 10.45 dBi (11.09 numeric gain.)

WCDMA Band II mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
9538	1907.6	251.1886	20	20	0.9997	1

Antenna gain (dBi) to comply with EIRP limits: 13.01 dBi (20 numeric gain.)