



APPENDIX I

RADIO FREQUENCY EXPOSURE

LIMIT

According to §Part22,Part 24 and Part 27 of the FCC rules are subject to routine environmental evaluation for RF exposure prior to equipment authorization.

EUT Specification

EUT	Module																	
Model	HL7548																	
Frequency band (Operating)	<input checked="" type="checkbox"/> LTE Band II: 1850.0MHz ~ 1910.0MHz <input checked="" type="checkbox"/> LTE Band IV: 1710.0MHz ~ 1755.0MHz <input checked="" type="checkbox"/> LTE Band V: 824.0MHz ~ 849.0MHz <input checked="" type="checkbox"/> LTE Band XVII: 704.0MHz ~ 716.0MHz <input type="checkbox"/> Others																	
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others																	
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ($S=1\text{mW/cm}^2$)																	
Measurement Average output power	<table border="1"><thead><tr><th>System</th><th>Power</th><th></th></tr></thead><tbody><tr><td>LTE Band II</td><td>23.31 dBm</td><td>(214.29 mW)</td></tr><tr><td>LTE Band IV</td><td>23.03 dBm</td><td>(200.91 mW)</td></tr><tr><td>LTE Band V</td><td>22.54 dBm</td><td>(179.47 mW)</td></tr><tr><td>LTE Band XVII</td><td>22.78 dBm</td><td>(189.67 mW)</td></tr></tbody></table>			System	Power		LTE Band II	23.31 dBm	(214.29 mW)	LTE Band IV	23.03 dBm	(200.91 mW)	LTE Band V	22.54 dBm	(179.47 mW)	LTE Band XVII	22.78 dBm	(189.67 mW)
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Max tune up Power / Max time Average Power GPRS/EGPRS 1 slot: -9dB 2 slot: -6dB 3 slot: -4dB 4 slot: -3dB	<table border="1"><thead><tr><th>System</th><th>Max Tune up Power</th><th>Time Average Power</th></tr></thead><tbody><tr><td>LTE Band II</td><td>24.0dBm (251.189mW)</td><td>24.0dBm (251.189mW)</td></tr><tr><td>LTE Band IV</td><td>24.0dBm (251.189mW)</td><td>24.0dBm (251.189mW)</td></tr><tr><td>LTE Band V</td><td>24.0dBm (251.189mW)</td><td>24.0dBm (251.189mW)</td></tr><tr><td>LTE Band XVII</td><td>24.0dBm (251.189mW)</td><td>24.0dBm (251.189mW)</td></tr></tbody></table>			System	Max Tune up Power	Time Average Power	LTE Band II	24.0dBm (251.189mW)	24.0dBm (251.189mW)	LTE Band IV	24.0dBm (251.189mW)	24.0dBm (251.189mW)	LTE Band V	24.0dBm (251.189mW)	24.0dBm (251.189mW)	LTE Band XVII	24.0dBm (251.189mW)	24.0dBm (251.189mW)
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<input checked="" type="checkbox"/> MPE Evaluation*																		
<input type="checkbox"/> SAR Evaluation																		
<input type="checkbox"/> N/A																		



Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2015/01/28	Initial Issue	ALL	Doris Chu



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:

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

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

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

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

**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 / cm²

LTE Band II mode:

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm ²)	ERP/EIRP Limit (W/cm ²)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
19150	1905.0	251.189	20	1.00		20.01	13.01	
19150	1905.0	251.189	20		2.0	7.96	9.01	9.01 dB

LTE Band IV mode:

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm ²)	ERP/EIRP Limit (W/cm ²)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
20300	1745.0	251.189	20	1.00		20.01	13.01	
20300	1745.0	251.189	20		1.0	3.98	6.00	6.00 dB

LTE Band V mode:

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm ²)	ERP/EIRP Limit (W/cm ²)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
20450	829.0	251.189	20	0.55		11.00	10.42	
20450	829.0	251.189	20		7.0	45.70	16.60	10.42 dB

LTE Band XVII mode:

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm ²)	ERP/EIRP Limit (W/cm ²)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
23790	710.0	251.189	20	0.47		9.40	9.73	
23790	710.0	251.189	20		3.0	19.59	12.92	9.73 dB