



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	LE920-NAG
Model	LE920-NAG
Frequency band (Operating)	<input checked="" type="checkbox"/> GSM 850MHz: 824.2MHz ~ 848.8MHz <input checked="" type="checkbox"/> GSM 1900MHz: 1850.2MHz ~ 1909.8MHz <input checked="" type="checkbox"/> WCDMA Band II: 1852.4MHz ~ 1907.6MHz <input checked="" type="checkbox"/> WCDMA Band IV: 1712.4MHz ~ 1752.6MHz <input checked="" type="checkbox"/> WCDMA Band V: 826.4MHz ~ 846.6MHz <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 = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)



Measurement Average output power	System	Power	
	GSM850	32.20 dBm	(1659.59 mW)
	GPRS850 (1 slot)	31.56 dBm	(1432.19 mW)
	GPRS850 (2 slot)	28.49 dBm	(706.32 mW)
	EDGE850 (1 slot)	26.96 dBm	(496.59 mW)
	EDGE850 (2 slot)	23.89 dBm	(244.91 mW)
	GSM1900	29.30 dBm	(851.14 mW)
	GPRS1900 (1 slot)	28.56 dBm	(717.79 mW)
	GPRS1900 (2 slot)	25.39 dBm	(345.94 mW)
	EDGE1900 (1 slot)	25.75 dBm	(375.84 mW)
	EDGE1900 (2 slot)	23.09 dBm	(203.70 mW)
	WCDMA Band II	24.96 dBm	(313.33 mW)
	WCDMA Band IV	24.96 dBm	(313.33 mW)
	WCDMA Band V	24.93 dBm	(311.17 mW)
	LTE Band II	24.64 dBm	(291.07 mW)
	LTE Band IV	24.02 dBm	(252.35 mW)
LTE Band V	24.06 dBm	(254.68 mW)	
LTE Band XVII	24.57 dBm	(286.42 mW)	

Power Target / Tolerance	System	Target Power	Tolerance
	GSM850	32.5 dBm	± 1 dB
	GPRS850	32.5 dBm	± 1.5 dB
	EGPRS850	27.0 dBm	± 1 dB
	GSM1900	29.5 dBm	± 1.5 dB
	GPRS1900	29.5 dBm	± 1.5 dB
	EGPRS1900	26.0 dBm	± 1 dB
	WCDMA Band II	24.0 dBm	+1/-3 dB
	WCDMA Band IV	24.0 dBm	+1/-3 dB
	WCDMA Band V	24.0 dBm	+1/-3 dB
	LTE Band II	23.0 dBm	± 2 dB
	LTE Band IV	23.0 dBm	± 2 dB
	LTE Band V	23.0 dBm	± 2 dB
	LTE Band XVII	23.0 dBm	± 2 dB



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>GSM850</td> <td>33.5dBm (2238.721mW)</td> <td>24.5dBm (281.838mW)</td> </tr> <tr> <td>GPRS850 (1 slot)</td> <td>34.0dBm (2511.886mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>GPRS850 (2 slot)</td> <td>34.0dBm (2511.886mW)</td> <td>28.0dBm (630.957mW)</td> </tr> <tr> <td>EGPRS850 (1 slot)</td> <td>28.0dBm (630.957mW)</td> <td>19.0dBm (79.433mW)</td> </tr> <tr> <td>EGPRS850 (2 slot)</td> <td>28.0dBm (630.957mW)</td> <td>22.0dBm (158.489mW)</td> </tr> <tr> <td>GSM1900</td> <td>31.0dBm (1258.925mW)</td> <td>22.0dBm (158.489mW)</td> </tr> <tr> <td>GPRS1900 (1 Slot)</td> <td>31.0dBm (1258.925mW)</td> <td>22.0dBm (158.489mW)</td> </tr> <tr> <td>GPRS1900 (2 Slot)</td> <td>31.0dBm (1258.925mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>EGPRS1900 (1 slot)</td> <td>27.0dBm (501.187mW)</td> <td>18.0dBm (63.096mW)</td> </tr> <tr> <td>EGPRS1900 (2 slot)</td> <td>27.0dBm (501.187mW)</td> <td>21.0dBm (125.893mW)</td> </tr> <tr> <td>WCDMA Band II</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>WCDMA Band IV</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>WCDMA Band V</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>LTE Band II</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>LTE Band IV</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>LTE Band V</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> <tr> <td>LTE Band XVII</td> <td>25.0dBm (316.228mW)</td> <td>25.0dBm (316.228mW)</td> </tr> </tbody> </table>	System	Max Tune up Power	Time Average Power	GSM850	33.5dBm (2238.721mW)	24.5dBm (281.838mW)	GPRS850 (1 slot)	34.0dBm (2511.886mW)	25.0dBm (316.228mW)	GPRS850 (2 slot)	34.0dBm (2511.886mW)	28.0dBm (630.957mW)	EGPRS850 (1 slot)	28.0dBm (630.957mW)	19.0dBm (79.433mW)	EGPRS850 (2 slot)	28.0dBm (630.957mW)	22.0dBm (158.489mW)	GSM1900	31.0dBm (1258.925mW)	22.0dBm (158.489mW)	GPRS1900 (1 Slot)	31.0dBm (1258.925mW)	22.0dBm (158.489mW)	GPRS1900 (2 Slot)	31.0dBm (1258.925mW)	25.0dBm (316.228mW)	EGPRS1900 (1 slot)	27.0dBm (501.187mW)	18.0dBm (63.096mW)	EGPRS1900 (2 slot)	27.0dBm (501.187mW)	21.0dBm (125.893mW)	WCDMA Band II	25.0dBm (316.228mW)	25.0dBm (316.228mW)	WCDMA Band IV	25.0dBm (316.228mW)	25.0dBm (316.228mW)	WCDMA Band V	25.0dBm (316.228mW)	25.0dBm (316.228mW)	LTE Band II	25.0dBm (316.228mW)	25.0dBm (316.228mW)	LTE Band IV	25.0dBm (316.228mW)	25.0dBm (316.228mW)	LTE Band V	25.0dBm (316.228mW)	25.0dBm (316.228mW)	LTE Band XVII	25.0dBm (316.228mW)	25.0dBm (316.228mW)
	System	Max Tune up Power	Time Average Power																																																				
	GSM850	33.5dBm (2238.721mW)	24.5dBm (281.838mW)																																																				
	GPRS850 (1 slot)	34.0dBm (2511.886mW)	25.0dBm (316.228mW)																																																				
	GPRS850 (2 slot)	34.0dBm (2511.886mW)	28.0dBm (630.957mW)																																																				
	EGPRS850 (1 slot)	28.0dBm (630.957mW)	19.0dBm (79.433mW)																																																				
	EGPRS850 (2 slot)	28.0dBm (630.957mW)	22.0dBm (158.489mW)																																																				
	GSM1900	31.0dBm (1258.925mW)	22.0dBm (158.489mW)																																																				
	GPRS1900 (1 Slot)	31.0dBm (1258.925mW)	22.0dBm (158.489mW)																																																				
	GPRS1900 (2 Slot)	31.0dBm (1258.925mW)	25.0dBm (316.228mW)																																																				
	EGPRS1900 (1 slot)	27.0dBm (501.187mW)	18.0dBm (63.096mW)																																																				
	EGPRS1900 (2 slot)	27.0dBm (501.187mW)	21.0dBm (125.893mW)																																																				
	WCDMA Band II	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																				
	WCDMA Band IV	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																				
	WCDMA Band V	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																				
	LTE Band II	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																				
	LTE Band IV	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																				
	LTE Band V	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																				
LTE Band XVII	25.0dBm (316.228mW)	25.0dBm (316.228mW)																																																					
Evaluation applied	<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	2014/01/13	Initial Issue	ALL	Scott Hsu
01	2014/01/27	Modify tune up limit	2	Scott Hsu
02	2014/02/6	Added Multislot Power and Maximum Permissible Exposure for GPRS / EGPRS	3,6,7	Scott Hsu
03	2014/02/12	1. Added max tune up power / max time average power 2. Modify Maximum Permissible Exposure	2,3,6,7,8,9	Scott Hsu
04	2014/02/21	1. Modify EGPRS ,p(mW)	6	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:

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

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

GSM850 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
128	824.4	281.838	20	0.55		9.81	9.92	7.10 dBi
128	824.4	2238.72	20		7.0	5.13	7.10	

GPRS850 mode(1 Slot):

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
190	836.6	316.228	20	0.56		8.90	9.49	6.60 dBi
190	836.6	2511.89	20		7.0	4.57	6.60	

GPRS850 mode(2 Slot):

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
190	836.6	630.957	20	0.56		4.46	6.49	6.49 dBi
190	836.6	2511.89	20		7.0	4.57	6.60	

EGPRS850 mode(1 Slot):

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
190	836.6	79.433	20	0.56		35.43	15.49	12.60 dBi
190	836.6	630.96	20		7.0	18.19	12.60	

EGPRS850 mode(2 Slot):

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
190	836.6	158.489	20	0.56		17.76	12.49	12.49 dBi
190	836.6	630.96	20		7.0	18.19	12.60	



GSM1900 mode:

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm2)	ERP/EIRP Limit (W/cm2)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
810	1909.8	158.489	20	1.00		31.71	15.01	2.01 dBi
810	1909.8	1258.93	20		2.0	1.59	2.01	

GPRS1900 mode(1 Slot):

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm2)	ERP/EIRP Limit (W/cm2)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
810	1909.8	158.489	20	1.00		31.71	15.01	2.01 dBi
810	1909.8	1258.93	20		2.0	1.59	2.01	

GPRS1900 mode(2 Slot):

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm2)	ERP/EIRP Limit (W/cm2)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
810	1909.8	316.228	20	1.00		15.89	12.01	2.01 dBi
810	1909.8	1258.93	20		2.0	1.59	2.01	

EGPRS1900 mode(1 Slot):

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm2)	ERP/EIRP Limit (W/cm2)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
810	1909.8	63.096	20	1.00		79.64	19.01	6.01 dBi
810	1909.8	501.19	20		2.0	3.99	6.01	

EGPRS1900 mode(2 Slot):

Ch.	Frq.(MHz)	P (mW)	D (cm)	MPE Limit (mW/cm2)	ERP/EIRP Limit (W/cm2)	Gain (num.)	Antenna Gain (dBi)	Max Ant. Gain to comply MPE and ERP/EIRP limits
810	1909.8	125.893	20	1.00		39.92	16.01	6.01 dBi
810	1909.8	501.19	20		2.0	3.99	6.01	



WCDMA 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
9262	1852.4	316.228	20	1.00		15.89	12.01	8.01 dBi
9262	1852.4	316.228	20		2.0	6.32	8.01	

WCDMA 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
1312	1712.4	316.228	20	1.00		15.89	12.01	5.00 dBi
1312	1712.4	316.228	20		1.0	3.16	5.00	

WCDMA 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
4132	826.4	316.228	20	0.55		8.75	9.42	9.42 dBi
4132	826.4	316.228	20		7.0	36.30	15.60	



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
18900	1880.0	316.228	20	1.00		15.89	12.01	8.01 dBi
18900	1880.0	316.228	20		2.0	6.32	8.01	

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
19950	1710.0	316.228	20	1.00		15.89	12.01	5.00 dBi
19950	1710.0	316.228	20		1.0	3.16	5.00	

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
20649	849.0	316.228	20	0.57		8.99	9.54	9.54 dBi
20649	849.0	316.228	20		7.0	36.30	15.60	

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
23849	716.0	316.228	20	0.48		7.59	8.80	8.80 dBi
23849	716.0	316.228	20		3.0	15.56	11.92	