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>CISCO EDUCATION ENABLED DEVELOPMENT 3700</td></tr>
<tr><td>Model</td><td>CEED 3700</td></tr>
<tr><td>Frequency band (Operating)</td><td>☒ GSM 850MHz: 824.2MHz ~ 848.8MHz
☒ GSM 1900MHz: 1850.2MHz ~ 1909.8MHz
☒ WCDMA Band II: 1852.4MHz ~ 1907.6MHz
☒ WCDMA Band IV: 1712.4MHz ~ 1752.6MHz
☒ WCDMA Band V: 826.4MHz ~ 846.6MHz
☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz
802.11n HT40: 2.422GHz ~ 2.452GHz
☐ 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>GSM 850: Antenna Gain : 2.70 dBi (Numeric gain 1.86)
GSM 1900: Antenna Gain : 1.70 dBi (Numeric gain 1.48)
WCDMA Band II: Antenna Gain 1.70 dBi (Numeric gain 1.48)
WCDMA Band II: Antenna Gain 2.70 dBi (Numeric gain 1.86)
2.4GHz: Antenna Gain : 3.16 dBi (Numeric gain 2.07)</td></tr>
<tr><td>Measurement Average output power</td><td>
<table>
<tr><th>System</th><th>Power</th><th></th></tr>
<tr><td>GSM850</td><td>31.70 dBm</td><td>(1479.11 mW)</td></tr>
<tr><td>GPRS850 (1 slot)</td><td>31.70 dBm</td><td>(1479.11 mW)</td></tr>
<tr><td>EDGE850 (1 slot)</td><td>26.80 dBm</td><td>(478.63 mW)</td></tr>
<tr><td>GSM1900</td><td>28.10 dBm</td><td>(645.65 mW)</td></tr>
<tr><td>GPRS1900 (1 slot)</td><td>28.10 dBm</td><td>(645.65 mW)</td></tr>
<tr><td>EDGE1900 (1 slot)</td><td>25.30 dBm</td><td>(338.84 mW)</td></tr>
<tr><td>WCDMA Band II</td><td>25.20 dBm</td><td>(331.13 mW)</td></tr>
<tr><td>WCDMA Band V</td><td>25.30 dBm</td><td>(338.84 mW)</td></tr>
<tr><td>IEEE 802.11b Mode</td><td>16.58 dBm</td><td>(45.50 mW)</td></tr>
<tr><td>IEEE 802.11g Mode</td><td>13.62 dBm</td><td>(23.01 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode</td><td>13.95 dBm</td><td>(24.83 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode</td><td>11.87 dBm</td><td>(15.38 mW)</td></tr>
</table>
</td></tr>
</table>

Power Target / Tolerance

System	Target Power	Tolerance
GSM850	32.0 dBm	± 1 dB
GPRS850	32.0 dBm	± 1 dB
EGPRS850	26.0 dBm	± 1 dB
GSM1900	28.0 dBm	± 1 dB
GPRS1900	28.0 dBm	± 1 dB
EGPRS1900	25.0 dBm	± 1 dB
WCDMA Band II	24.0 dBm	± 1.5 dB
WCDMA Band V	24.0 dBm	± 1.5 dB
IEEE 802.11b Mode	16.0 dBm	± 1 dB
IEEE 802.11g Mode	13.0 dBm	± 1 dB
IEEE 802.11n HT 20 Mode	13.3 dBm	± 1 dB
IEEE 802.11n HT40 Mode	12.1 dBm	± 1 dB

Max tune up Power / Max time Average Power

System	Max Tune up Power	Time Average Power
GSM850	33.0dBm (1995.262mW)	24.0dBm (251.189mW)
GPRS850 (1 slot)	33.0dBm (1995.262mW)	24.0dBm (251.189mW)
EGPRS850 (1 slot)	27.0dBm (501.187mW)	18.0dBm (63.096mW)
GSM1900	29.0dBm (794.328mW)	20.0dBm (100.000mW)
GPRS1900 (1 Slot)	29.0dBm (794.328mW)	20.0dBm (100.000mW)
EGPRS1900 (1 slot)	26.0dBm (398.107mW)	17.0dBm (50.119mW)
WCDMA Band II	25.5dBm (354.813mW)	25.5dBm (354.813mW)
WCDMA Band V	25.5dBm (354.813mW)	25.5dBm (354.813mW)
IEEE 802.11b	17.0dBm (50.119mW)	17.0dBm (50.119mW)
IEEE 802.11g	14.0dBm (25.119mW)	14.0dBm (25.119mW)
IEEE 802.11n HT 20	14.3dBm (26.915mW)	14.3dBm (26.915mW)
IEEE 802.11n HT 40	13.2dBm (20.893mW)	13.2dBm (20.893mW)

Evaluation applied

☒ MPE Evaluation*
☐ SAR Evaluation
☐ N/A

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2014/03/21	Initial Issue	ALL	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 / cm²

GSM850 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
128	824.2	251.189	2.49	20	0.1245	0.549

GPRS850 mode (1 Slot):

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
128	824.2	251.189	2.49	20	0.1245	0.549

EGPRS850 mode (1 Slot):

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
128	824.2	63.096	2.49	20	0.0313	0.549

GSM1900 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
512	1850.2	100.000	2.49	20	0.0496	1.000

GPRS1900 mode (1 Slot):

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
512	1850.2	100.000	2.49	20	0.0496	1.000

EGPRS1900 mode (1 Slot):

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
512	1850.2	50.119	2.49	20	0.0248	1.000

WCDMA Band II mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
9262	1852.4	354.813	2.92	20	0.2062	1.000

WCDMA Band V mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
4132	826.4	354.813	2.92	20	0.2062	0.551

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
1	2412	50.119	2.98	20	0.0297	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	25.119	2.98	20	0.0149	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
11	2462	26.915	2.98	20	0.0160	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	20.417	2.98	20	0.0121	1

Simultaneously MPE

Simultaneously MPE = MPE1/Limit1 + MPE2/Limit2

2G + WiFi

Simultaneously MPE = (0.1245 mW/cm^2 /1) + (0.0297 mW/cm^2 /1) = 0.1542

3G + WiFi

Simultaneously MPE = (0.2062 mW/cm^2 /1) + (0.0297 mW/cm^2 /1) = 0.2359