



Document Number: EDCS-654720
Revision 1.1
Author Fred Leffingwell
Project Manager Howard Ji

C3205WMIC-A-K9 (BEARTOOTH)

Colocation

Company Name: Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134 USA

EUT Description: CISCO 802.11bg WIRELESS RADIO
Model Number: C3201-WMIC-A-K9

EUT Description: CISCO 802.11a WIRELESS RADIO
Model Number: C3205WMIC-A-K9

Reviewers

Table with 2 columns: Department, Name/Title. Row 1: Compliance, Howard Ji, Manager.

The departments and/or individuals listed above should be notified in advance and given a sufficient time period to review this document. The Project Team determines requirements for approval according to the scope of the project.

A printed version of this document is an uncontrolled copy.

## Modification History

Rev	Date	Originator	Comment
1	2/26/2008	Fred Leffingwell	Initial
1.1	2/27/2008		Added 28 dbi and corrected 17 dbi

### 1. Test Results Summary

Applicable Standards	
Standard	Test Results
EN50385: 2002	PASS

### 2. Test Methodology

The calculations were performed in accordance with EN 50385: 2002. The limits referenced are taken from Table 2, Annex III Council Recommendation 1999/519/EC.

A printed version of this document is an uncontrolled copy.

### 3. Radio Module Combinations

Module	SKU	Number Possible Max =3/EUT
2.4 Ghz Wlan (802.11 bg)	C3201-WMIC-A-K9	1, 2, 3
5 Ghz Wlan (802.11 a)	C3205WMIC-A-K9	1, 2, 3

### 4. EN 50385 Requirements – Limits of Exposure

#### 4.1 Calculations

$$E = (30 * P * G)^{1/2} / d$$

Where:

E = field strength in Volts/meter

P = Power in Watts

G = Numeric Antenna Gain

d = Distance in meters

Using:

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

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

Result:

$$E = 17.32 * (P * G)^{1/2} / d$$

Using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)}/10)}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)}/10)}$$

Result:

$$E = 17.32 * (10^{((P + G)/20)}) / d$$

d = distance in cm

P = power in dBm

G = antenna gain in dBi

E = field strength in Volts/meter

A printed version of this document is an uncontrolled copy.

## 5. WLAN Operation and Contribution to Fraction of the Limit

### 5.1 Limits

Frequency Range	E Field Strength
2-300 Ghz	61 V/m

### 5.2 Calculations of contribution to fraction of the limit

Distance = 20 cm Calculated Values

Radio + Antenna	Band	Output Power (dBm)	Antenna Gain (dBi)	E-Field (V/m)	Limit (V/m)	Fraction of the Limit
802.11 bg	2.4 GHz	17.61	2.2	8.47	61	0.14
802.11 a (RPTNC) *	5 GHz	14.0	9.5	12.96	61	0.21
802.11 a (N) **	5 GHz	14.0	17	21.75	61	0.36
802.11 a (N Dish) ***	5 GHz	14.0	28	54.51 (40 CM)	61	0.89

Single Transmitter

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	1	2.4 GHz	20 cm	-	0.14	1

Single Transmitter

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 a (RPTNC) *	1	5 GHz	20 cm	-	0.21	1

A printed version of this document is an uncontrolled copy.

## \Single Transmitter

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 a (N) **	1	5 GHz	20 cm	-	0.36	1

## Single Transmitter

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 a (N-Dish) **	1	5 GHz	40 cm	-	0.89	1

## Two Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	1	2.4 GHz	20 cm	0.14		
802.11 a (RPTNC) *	1	5 GHz	20 cm	0.21		
Total				0.35	0.35	1

## Two Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	2	2.4 GHz	20 cm	2 * 0.14		
802.11 a (RPTNC) *	0	5 GHz	20 cm	0		
Total				0.28	0.28	1

A printed version of this document is an uncontrolled copy.

## Two Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	0	2.4 GHz	20 cm	0		
802.11 a (RPTNC) *	2	5 GHz	20 cm	$2 * 0.21$		
Total				0.42	0.42	1

## Three Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	3	2.4 GHz	20 cm	$3 * .14$		
802.11 a (RPTNC) *	0	5 GHz	20 cm	0		
Total				0.42	0.42	1

## Three Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	2	2.4 GHz	20 cm	$2 * 0.14$		
802.11 a (RPTNC) *	1	5 GHz	20 cm	0.21		1
Total				0.49	0.49	1

## Three Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	1	2.4 GHz	20 cm	0.14		
802.11 a (RPTNC) *	2	5 GHz	20 cm	$2 * 0.21$		
Total				0.56	0.56	1

A printed version of this document is an uncontrolled copy.

## Three Transmitters

Transmitter	How Many	Band	MPE Distance	Calculation	Fraction of the limit	Limit
802.11 bg	0	2.4 GHz	20 cm	0		
802.11 a (RPTNC) *	3	5 GHz	20 cm	$3 * 0.21$		
Total				0.63	0.63	1

\* Note: only RPTNC antennas (suffix R on page 6) can be directly mounted.

\*\* Note: N type antenna are mounted separately (cabled) and hence are not colocated.

\*\*\* Note: Dish antenna is highly directional.

A printed version of this document is an uncontrolled copy.