Engineering Analysis per

FCC 2.1093

Industry Canada RSS-102

Australian ARPANSA Requirements

New Zealand Regulations

For

CP-DX650

Wireless IP Phone with Bluetooth ver 2.1 + EDR

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01/31/2013

1.0: Attestation Statement of Compliance

The Cisco Systems Inc CP-DX650 Series Wireless IP Phone with Bluetooth Ver 2.1+EDR has been evaluated for Maximum Permissible Exposure in compliance with 47 Code of Federal Regulations 2.1093. The evaluation was in accordance with methodology as referenced in FCC Bulletin OET 65C (rev 01-01)

This report serves as the technical analysis of Cisco of the radios in the CP-DX650 series. The technical information referenced for this study was derived from the FCC / Canada test report on the product.

For purposes of this study, the evaluation was only done with the worse case antennae for each programmable power level.

The limits used for this evaluation are in line with the recommendations of the World Health Organizations (WHO) International Committee on Non Ionizing Radiation Protection (ICNIRP) as well as the American National Standards Institute (ANSI) C95.1.

This analysis also complies with the requirements stated in Industry Canada RSS-102 as well as the applicable Australian and New Zealand regulations.

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2.0 EUT Description

This is a Cisco Wireless IP Phone with Bluetooth Ver. 2.1 + EDR contains both an 802.11a/b/g/n radio and an 802.15 Bluetooth Ver. 2.1 + EDR Radio.

3.0 Methodology

All calculations were made in accordance with ANSI C95.1, and FCC OET 65C.

4.0 Technical Requirements

4.1 Single Band Operation – Limits

As referenced by OET 65C / RSS-102

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	$(180/f^2)$*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

NOTE 1: See Section 1 for discussion of exposure categories.

NOTE 2: The averaging time for General Population/Uncontrolled exposure to fixed transmitters is not applicable for mobile and portable transmitters. See 47 CFR §§2.1091 and 2.1093 on source-based time-averaging requirements for mobile and portable transmitters.

Model Number: CP-DX650-K9 series

Excerpt from Australian Radiation Protection Standard

REFERENCE LEVELS FOR TIME AVERAGED EXPOSURE TO RMS ELECTRIC AND MAGNETIC FIELDS (UNPERTURBED FIELDS)

Exposure category	Frequency range	E-field strength (V/m rms)	H-field strength (A/m rms)	Equivalent plane wave power flux density S_{eq} (W/m_2)
Occupational	100 kHz – 1 MHz	614	1.63 / f	—
	1 MHz – 10 MHz	614 / f	1.63 / f	1000 / f^2 (see note 5)
	10 MHz – 400 MHz	61.4	0.163	10 (see note 5)
	400 MHz – 2 GHz	3.07 × $f^{0.5}$	0.00814 × $f^{0.5}$	f/ 40
	2 GHz – 300 GHz	137	0.364	50
General public	100 kHz – 150 kHz	86.8	4.86	—
	150 kHz – 1 MHz	86.8	0.729 / f	—
	1 MHz – 10 MHz	86.8 / $f^{0.5}$	0.729 / f	—
	10 MHz – 400 MHz	27.4	0.0729	2 (see note 6)
	400 MHz – 2 GHz	1.37 × $f^{0.5}$	0.00364 × $f^{0.5}$	f / 200
	2 GHz – 300 GHz	61.4	0.163	10

5.0 Calculations

The Power Density (mW/cm2) is calculated as follows:

$S = PG(\text{Duty Cycle}) / 4\pi R^2$

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

6.0 Results

Tx	Frequency (MHz)	MPE Distance (cm)	Filter /Cable Loss dB	Peak Tx Power (dBm)	Effective power (dBm)	Radio Power (mW)	Ant Gain (dBi)	Ant Gain (mW eq)	Duty Cycle	Power Density (mW/cm^2)	Limit (mW/cm^2)	%of Std
Tx1	2412-2472	20	0	15.56	15.56	35.975	4.3	2.692	1	**0.019**	0.44	0.044
Tx2	2402-2480	20	0	9.12	9.12	8.166	4.3	2.692	1	**0.004**	0.43	0.010
Tx3	5150-5250	20	0	14.76	14.76	29.923	2.4	1.738	1	**0.010**	0.855	0.012
Tx3	5250-5350	20	0	14.29	14.29	26.853	3.9	2.455	1	**0.013**	0.855	0.015
Tx3	5470-5735	20	0	15.32	15.32	34.041	3.8	2.399	1	**0.016**	0.855	0.019
Tx3	5745-5825	20	0	15.04	15.04	31.915	3.3	2.138	1	**0.014**	0.855	0.016

Calculations with additional transmitters

The Bluetooth radio operates in either the 2.4GHz or 5GHz Band but not both at same time.

Scenario 1 :

Bluetooth and 2.4GHz Radio

Tx1	Tx2	Tx3	% of Standard
0.044	0.01	0	0.054
D (estimate) = 20* $\sqrt{\%}$			
D=	**4.648**	**cm**	

Scenario 1 :

Bluetooth and 5GHz Radio

Tx1	Tx2	Tx3	% of Standard
0	0.01	0.019	0.029
D (estimate) = 20* $\sqrt{\%}$			
D=	**3.406**	**cm**	