Report On

RF Exposure Assessment of the
Pace Plc
DC60Xu High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion

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REPORT ON	RF Exposure Assessment of the Pace Plc DC60Xu High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion Document 75916038 Report 03 Issue 2 November 2011
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This report has been up-issued to issue 2 to replace some typing errors

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SECTION 1

REPORT SUMMARY

RF Exposure Assessment of the
Pace Plc
DC60Xu High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion

1.1   INTRODUCTION

The information contained in this report is intended to show verification of the RF Exposure Assessment of the Pace Plc DC60Xu High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion to the requirements of the applied test specifications.

Objective	To perform RF Exposure Assessment to determine the Equipment Under Test's (EUT's) compliance of the applied rules.
Applicant	Pace Plc
Manufacturer	Pace Plc
Manufacturing Description	High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion
Model Number(s)	DC60Xu
Test Specification/Issue/Date	EN 62311:2008 OET Bulletin 65 Edition 97-01 August 1997 RSS-102 Issue 4 March 2010 Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard: 2003
Related Document(s)	Council Recommendation 1999/519/EC:1999 FCC CFR 47 Part 1: 2010 FCC CFR 47 Part 2.1091: 2011 Health Canada's Safety Code 6 ARPANSA ICNIRP 1998 National Council on Radiation Protection and Measurements (NRPC) - Report No. 86(1986) EN 50383:2002 IEEE Std C95.1-2005 Australian Standard 2772.2 – 1988

1.2 BRIEF SUMMARY OF RESULTS

1.2.1 General Public Exposure Levels

Antenna Gain (Numeric)	Peak Output Power (mW)	Field	Calculated RF Exposure at 0.2 m (20cm)	General Public Exposure Limit	Application
1.585	2	S	0.00 W/m²	10 W/m²	ICNIRP
		S	0.000 mW/cm²	1 mW/cm²	FCC 47 CFR § 1.1310
		S	0.00 W/m²	10 W/m²	Canada's RF Safety Code 6
		S	0.00 W/m²	10 W/m²	ARPANSA
		E	0.00 V/m	61 V/m	ICNIRP
		E	0.00 V/m	N/A V/m	FCC 47 CFR § 1.1310
		E	0.00 V/m	61.4 V/m	Canada's RF Safety Code 6
		E	0.00 V/m	61.4 V/m	ARPANSA
		H	0.00 A/m	0.16 A/m	ICNIRP
		H	0.00 A/m	N/A A/m	FCC 47 CFR § 1.1310
		H	0.00 A/m	0.163 A/m	Canada's RF Safety Code 6
		H	0.00 A/m	0.163 A/m	ARPANSA

The calculations have shown that they **meet** the General Public Exposure Levels described in the ICNIRP Guidelines, FCC 47 CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and the Australian ARPANSA limits at **20**cm, the point of investigation.

1.2.2 Occupational Exposure Levels

Antenna Gain (Numeric)	Peak Output Power (mW)	Field	Calculated RF Exposure at 0.2 m (20cm)	Occupational Exposure Limit	Application
1.585	2	S	0.00 W/m^2	50 W/m^2	ICNIRP
		S	0.000 mW/cm^2	5 mW/cm^2	FCC 47 CFR § 1.1310
		S	0.00 W/m^2	50 W/m^2	Canada's RF Safety Code 6
		S	0.00 W/m^2	50 W/m^2	ARPANSA
		E	0.00 V/m	137 V/m	ICNIRP
		E	0.00 V/m	N/A V/m	FCC 47 CFR § 1.1310
		E	0.00 V/m	137 V/m	Canada's RF Safety Code 6
		E	0.00 V/m	137 V/m	ARPANSA
		H	0.00 A/m	0.36 A/m	ICNIRP
		H	0.00 A/m	N/A A/m	FCC 47 CFR § 1.1310
		H	0.00 A/m	0.364 A/m	Canada's RF Safety Code 6
		H	0.00 A/m	0.364 A/m	ARPANSA

The calculations have shown that they **meet** the Occupational Exposure Levels described in the ICNIRP Guidelines, FCC 47 CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and the Australian ARPANSA limits at **20 cm,** the point of investigation.

1.3 PRODUCT INFORMATION

1.3.1 Attestation

The wireless device described within this report has been shown to be capable of compliance with the basic restrictions related to human exposure to electromagnetic fields (10 MHz - 300 MHz) - General public. The calculations shown in this report were made in accordance the procedures specified in the applied test specification(s).

1.3.2 Technical Description

The Equipment under test was a Pace Plc DC60Xu High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion. A full technical description can be found in the manufacturer's documentation.

All reported calculations were carried out on the relevant information supplied for the DC60Xu High Definition Digital Transport Adaptor. A cable TV interface device for digital to analogue conversion to demonstrate compliance with the applied test specification(s) the sample assessed was found to comply with the requirements of the applied rules.

1.4 SUMMARY

The RF exposure assessment is based upon the following criteria:

The Pace Plc DC60Xu High Definition Digital Transport Adaptor operates in the frequency range of 2425 – 2475 MHz.

Gain	2 dBi
Power	0.002 W
Distance	0.2 m (20 cm)
Duty Cycle	0.1%

SECTION 2

TEST DETAILS

2.1 RATIONALE FOR ASSESSMENT OF THE RF EXPOSURE

The aim of the assessment report is to evaluate the compliance boundary for a set of given input power(s) according to the basic restrictions (directly or indirectly via compliance with reference levels) related to human exposure to radio frequency electromagnetic fields.

The chosen assessment method to establish the compliance boundary in the far-field region is the reference method as defined in EN50383:2002 Clause 5.2; E-field or H-field calculation. The method of calculation used is defined in EN50383:2002; Clause 8.2.2, 8.2.3 and 8.2.4.

The calculated values have been compared with limits provided in the ICNIRP guidelines.

Calculations can be made in three separate regions, based on distance from the antenna. These are called:

- far-field region,
- radiating near-field region,
- reactive near-field region.

The theory that defines these regions is given in EN50383:2002 Annex A.

Far-field region

As shown in EN50383 Annex A, the far-field calculations are accurate when the distance, r, from an antenna of length D to a point of investigation is greater than

$$r = \frac{2D^2}{\lambda}$$

Where, r is the distance from the antenna to the point of investigation.

Radiating near-field region

The radiating near-field region of an antenna of length D as shown in EN50383 Annex A, this region is defined by

$$\frac{\lambda}{4} < r > \frac{2D^2}{\lambda}$$

Reactive near-field region

The reactive near-field region of an antenna as shown in EN50383 Annex A, this region is defined by

$$r \leq \frac{\lambda}{4}$$

Where, r is the distance from the antenna to the point of investigation.

Recommend λ/4 as the boundary between the radiated near-field and reactive near-field for RF exposure compliance assessment.

2.2 DEFINED LIMITS

Normative Reference: ICNIRP Advice on Limiting Exposure to Electromagnetic Fields (0-300GHz). Table A4, Reference Levels for General Public Exposure to Time Varying Electric & Magnetic Fields. Vol 15 No.2. 2004. The defined limits are in accordance with 47 CFR § 1.1310 Radiofrequency radiation exposure limits.

Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed rms values)

At 2425 MHz
Power density (W/m^2)   = 10   ICNIRP
Power density (mW/cm^2)   = 1   FCC 47 CFR § 1.1310
Power density (W/m^2)   = 10   Canada's RF Safety Code 6
Power density (W/m^2)   = 10   Australian Radiation Protection Series Publication No. 3
E-Field (Vm-1)   = 61   ICNIRP
E-Field (Vm-1)   = N/A   FCC 47 CFR § 1.1310
E-Field (Vm-1)   = 61.4   Canada's RF Safety Code 6
E-Field (Vm-1)   = 61.4   Australian Radiation Protection Series Publication No. 3
H-Field (Am-1)   = 0.16   ICNIRP
H-Field (Am-1)   = N/A   FCC 47 CFR § 1.1310
H-Field (Am-1)   = 0.163 Canada's RF Safety Code 6
H-Field (Am-1)   = 0.163 Australian Radiation Protection Series Publication No. 3

Reference levels for occupational exposure to time-varying electric and magnetic fields (unperturbed rms values)

At 2425 MHz
Power density (W/m^2)   = 50   ICNIRP
Power density (mW/cm^2)   = 5   FCC 47 CFR § 1.1310
Power density (W/m^2)   = 50   Canada's RF Safety Code 6
Power density (W/m^2)   = 50   Australian Radiation Protection Series Publication No. 3
E-Field (Vm-1)   = 137   ICNIRP
E-Field (Vm-1)   = N/A   FCC 47 CFR § 1.1310
E-Field (Vm-1)   = 137   Canada's RF Safety Code 6
E-Field (Vm-1)   = 137   Australian Radiation Protection Series Publication No. 3
H-Field (Am-1)   = 0.36   ICNIRP
H-Field (Am-1)   = N/A   FCC 47 CFR § 1.1310
H-Field (Am-1)   = 0.364 Canada's RF Safety Code 6
H-Field (Am-1)   = 0.364 Australian Radiation Protection Series Publication No. 3

2.3 ESTABLISHING WAVELENGTH AND 1/4 WAVELENGTH

Frequency (MHz)	$\lambda = \dfrac{3x10^8}{f}$		$\dfrac{\lambda}{4}$	
	m	cm	m	cm
2425	0.123711340206186	12.3711340206186	0.0309278350515464	3.09278350515464
2450	0.122448979591837	12.2448979591837	0.0306122448979592	3.06122448979592
2475	0.121212121212121	12.1212121212121	0.0303030303030303	3.03030303030303

2.4 FAR FIELD CALCULATIONS

The following calculations are based on: 2 dBi gain antenna

P = 0.002 (Power (Watts)) or 2 (Power milliwatts)
G = 1.585 (Numeric Gain)
r = 20 (Distance (centimetres)) or 0.2(Distance (meters))

The power flux:

$$S = \frac{PG_{(\theta,\phi)}}{4\pi r^2}$$

S = 0.00 W/m2

S= 0.000 mW/cm^2

The electric field strength:

$$E = \frac{\sqrt{30PG}_{(\theta,\phi)}}{r}$$

E = 0.00 V/m

The magnetic field strength:

$$H = \frac{E}{\eta_o}$$

H = 0.00 A/m

The calculations meet the General Public Exposure Levels described in the ICNIRP Guidelines.
The calculations meet the General Public Exposure Levels described in the FCC 47CFR§1.1310.
The calculations meet the General Public Exposure Levels described in the Canada's RF Safety Code 6.
The calculations meet the General Public Exposure Levels described in the Australian Radiation Protection Series Publication No. 3

The calculations meet the Occupational Exposure Levels described in the ICNIRP Guidelines.
The calculations meet the Occupational Exposure Levels described in the FCC 47CFR§1.1310
The calculations meet the Occupational Exposure Levels described in the Canada's RF Safety Code 6
The calculations meet the Occupational Exposure Levels described in the Australian Radiation Protection Series Publication No. 3

SECTION 3

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3.1 DISCLAIMERS AND COPYRIGHT

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