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Report On

RF Exposure Assessment of the
L3 Broadcast Sports Inc.
IDT-4349-3U Data Transmitter

FCC ID: KTB-IDT43493U

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April 2014



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SECTION 1

REPORT SUMMARY

RF Exposure Assessment of the
L3 Broadcast Sports Inc.
IDT-4349-3U Data Transmitter



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Exposure Assessment of the L3 Broadcast Sports Inc. IDT-4349-3U Data Transmitter 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	L3 Broadcast Sports Inc.
Manufacturer	L3 Broadcast Sports Inc.
Manufacturing Description	Data Transmitter
Model Number(s)	IDT-4349-3U
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: 2013 FCC CFR 47 Part 2: 2013 Health Canada's Safety Code 6 ARPANSA ICNIRP 1998 National Council on Radiation Protection and Measurements (NRP) - Report No. 86(1986) EN 50383:2002 IEEE Std C95.1-2005 Australian Standard 2772.2 – 1988



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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 .20 m (20cm)	General Public Exposure Limit	Application
1.000	500	S	0.99 W/m ²	2.150 W/m ²	ICNIRP
		S	0.099 mW/cm ²	0.287 mW/cm ²	FCC 47 CFR § 1.1310
		S	0.99 W/m ²	2.867 W/m ²	Canada's RF Safety Code 6
		S	0.99 W/m ²	2.150 W/m ²	ARPANSA
		E	19.36 V/m	28.513 V/m	ICNIRP
		E	19.36 V/m	N/A V/m	FCC 47 CFR § 1.1310
		E	19.36 V/m	32.867 V/m	Canada's RF Safety Code 6
		E	19.36 V/m	28.409 V/m	ARPANSA
		H	0.05 A/m	0.077 A/m	ICNIRP
		H	0.05 A/m	N/A A/m	FCC 47 CFR § 1.1310
		H	0.05 A/m	0.087 A/m	Canada's RF Safety Code 6
		H	0.05 A/m	0.075 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 **20cm**, the point of investigation.



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1.2.2 Occupational Exposure Levels

Antenna Gain (Numeric)	Peak Output Power (mW)	Field	Calculated RF Exposure at .20 m (20cm)	Occupational Exposure Limit	Application
1.000	500	S	0.99 W/m ²	10.750 W/m ²	ICNIRP
		S	0.099 mW/cm ²	1.433 mW/cm ²	FCC 47 CFR § 1.1310
		S	0.99 W/m ²	14.333 W/m ²	Canada's RF Safety Code 6
		S	0.99 W/m ²	10.750 W/m ²	ARPANSA
		E	19.36 V/m	62.209 V/m	ICNIRP
		E	19.36 V/m	N/A V/m	FCC 47 CFR § 1.1310
		E	19.36 V/m	73.407 V/m	Canada's RF Safety Code 6
		E	19.36 V/m	63.661 V/m	ARPANSA
		H	0.05 A/m	0.166 A/m	ICNIRP
		H	0.05 A/m	N/A A/m	FCC 47 CFR § 1.1310
		H	0.05 A/m	0.195 A/m	Canada's RF Safety Code 6
		H	0.05 A/m	0.169 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.



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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 for both General public and Occupational. 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 L3 Broadcast Sports Inc. IDT-4349-3U Data Transmitter. 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 IDT-4349-3U Data Transmitter 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 IDT-4349-3U Data Transmitter operates in the frequency range of 430 – 490 MHz.

Gain	0 dBi
Power	0.5 W
Distance	0.20 m (20 cm)
Duty Cycle	100%



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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 $\lambda/4$ as the boundary between the radiated near-field and reactive near-field for RF exposure compliance assessment.



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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 430 MHz		
Power density (W/m ²)	= 2.150	ICNIRP
Power density (mW/cm ²)	= 0.287	FCC 47 CFR § 1.1310
Power density (W/m ²)	= 2.867	Canada's RF Safety Code 6
Power density (W/m ²)	= 2.150	Australian Radiation Protection Series Publication No. 3
E-Field (Vm-1)	= 28.513	ICNIRP
E-Field (Vm-1)	= N/A	FCC 47 CFR § 1.1310
E-Field (Vm-1)	= 32.867	Canada's RF Safety Code 6
E-Field (Vm-1)	= 28.409	Australian Radiation Protection Series Publication No. 3
H-Field (Am-1)	= 0.077	ICNIRP
H-Field (Am-1)	= N/A	FCC 47 CFR § 1.1310
H-Field (Am-1)	= 0.087	Canada's RF Safety Code 6
H-Field (Am-1)	= 0.075	Australian Radiation Protection Series Publication No. 3

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

At 430 MHz		
Power density (W/m ²)	= 10.750	ICNIRP
Power density (mW/cm ²)	= 1.433	FCC 47 CFR § 1.1310
Power density (W/m ²)	= 14.333	Canada's RF Safety Code 6
Power density (W/m ²)	= 10.750	Australian Radiation Protection Series Publication No. 3
E-Field (Vm-1)	= 62.209	ICNIRP
E-Field (Vm-1)	= N/A	FCC 47 CFR § 1.1310
E-Field (Vm-1)	= 73.407	Canada's RF Safety Code 6
E-Field (Vm-1)	= 63.661	Australian Radiation Protection Series Publication No. 3
H-Field (Am-1)	= 0.166	ICNIRP
H-Field (Am-1)	= N/A	FCC 47 CFR § 1.1310
H-Field (Am-1)	= 0.195	Canada's RF Safety Code 6
H-Field (Am-1)	= 0.169	Australian Radiation Protection Series Publication No. 3

2.3 ESTABLISHING WAVELENGTH AND 1/4 WAVELENGTH

Frequency (MHz)	$\lambda = \frac{3 \times 10^8}{f}$		$\frac{\lambda}{4}$	
	m	cm	m	cm
430	0.697674418604651	69.7674418604651	0.174418604651163	17.4418604651163
450	0.666666666666667	66.6666666666667	0.166666666666667	16.6666666666667
490	0.612244897959184	61.2244897959184	0.153061224489796	15.3061224489796



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2.4 FAR FIELD CALCULATIONS

The following calculations are based on: 0 dBi gain antenna

P = 0.5 (Power (Watts)) or 500 (Power milliwatts)
G = 1.000 (Numeric Gain)
r = 20 (Distance (centimetres)) or .20 (Distance (meters))

The power flux:

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

S = 0.99 W/m²
S = 0.099 mW/cm²

The electric field strength:

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

E = 19.36 V/m

The magnetic field strength:

$$H = \frac{E}{\eta_0}$$

H = 0.05 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



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SECTION 3

DISCLAIMERS AND COPYRIGHT



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3.1 DISCLAIMERS AND COPYRIGHT

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