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WLL Report #14742-03 Rev 1

Frederick Energy Products LLC
1769 Jeff Road
Huntsville, AL 35806

Model: DDAC-PDS Magnetic Field Generator with Collision Avoidance

FCC ID: QUI-DDAC-C-PDS
ISED: 11625A-DDACCPDS

Washington Laboratories, Ltd. performed RF Exposure on the DDAC-PDS Magnetic Field Generator with Collision Avoidance Product. This product is a mobile device with 2 single frequency transmitters transmitters, operating at 73 kHz and 916.49MHz.

RF Exposure Technical Brief:

RSS102 Issue 5 Routine RF evaluation:

1.1 RSS102 Limits Issue 5, Table 4 (uncontrolled environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Reference Period (minutes)
0.003-10^{21}	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10\text{-}4 f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz
*Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).

1.2 Device Description:

The Frederick Energy Products LLC DDAC-PDS Magnetic Field Generator with Collision Avoidance is a vehicle mounted that operates in conjunction with the Frederick Energy products PAD and other generator units. The DDAC-PDS Magnetic Field Generator with Collision Avoidance produces a 73 kHz proximity field (certified in this report). When a user wearing a PAD unit enters this field it causes the PAD unit to visually and audibly alarm.
In addition the PAD unit sends its serial number back to the Magnetic Field Generator (received at 916.49MHz) that causes the generator to visibly and audibly alarm. The
DDAC-PDS Magnetic Field Generator with Collision Avoidance device also monitors for other field generators and when in the presents of their magnetic fields alarms and generates a 916.49MHz (tested in a separate report) signal that will cause the other generator to also alarm.

1.3 Transmitters:

The Device contains a 73kHz and 916.49MHz Transmitter.

1.4 Compliance to RSS102 Exposure limits:

1.4.1 73kHz Transmitter:

The 73kHz transmitter was measured using the maximum V/m (rms) and maximum A/m (rms) hold functions of a Narda Broadband field probe. The probe was rotated around the unit at 20cm to capture the highest levels.
The results showed a value of 58.9V/m. As the limit for this frequency for RSS-102 Table 4 is 83V/m (electric field) this unit complies with the requirements.

The results showed a peak value of 0.163A/m. As the limit for this frequency for RSS-102 Table 4 is 90 A/m (magnetic field) this unit complies with the requirements.

1.4.2 916MHz Tranmitter

The 916.49MHz transmitter transmitter was measured using the maximum V/m (rms) hold functions of a Narda Broadband field probe. The probe was rotated around the unit at 20cm to capture the highest levels has a field strength 1.70V/m at 20cm. The limit is $3.142*(f^{0.3417})$ =3.142 *10.28=32.30V/m. This unit complies with the requirements of RSS102 issue 5.

1.4.3 Colocation Requirements of Industry Canada Safety Code 6

In accordance with Safety Code 6 "Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz" co-located deives must comply with Note 5 of Table 5. Note 5 is used as field strength was determined in the above test reports. The test requirement is as follows:

For frequencies above 10MHz

> "For simultaneous exposure to multiple frequencies and where exposure is estimated in terms of field strength, each of the squares of the field strength frequency component amplitudes shall be divided by the square of the corresponding field strength reference level for that frequency, and the sum of all thand Note these ratios shall not exceed unity. This may be expressed as $\sum (Ei/ERL)^2 \leq 1$ for electric field strength or $\sum (Hi/HRL)2 \leq 1$ for magnetic field strength"

For frequencies below 10MHz from table 3 Note 3:

> For simultaneous exposure to multiple frequencies and where comparison is to be made to the reference level based on NS, each of the field strength frequency component amplitudes shall be divided by the corresponding field strength reference level for that frequency, and the sum of all these ratios shall not exceed unity. This may be expressed as $\sum (Ei/ERL) \leq 1$ for electric field strength or $\sum (Hi/HRL) \leq 1$ for magnetic field strength.
>
> For this device the formula will be the sum of $\sum (Ei/ERL) \leq 1$ (73kHz TX) and $\sum (Ei/ERL)^2 \leq 1$ (916.49MHz)

1.4.3.1 Test summary

From Section 1.4.1 of this report the electric field strength of the 73 kHz transmitter is 58.9V/m. The reference level limit =83V/m from table 3

From Section 1.4.2 of this report the electric field strenght of the 916.49MHz transmitter is 1.70V/m. The reference level limit =32.30V/m.

73kHz TX:

$(Ei/ERL) = 58.9/83=0.71$

916.49MHzTX

$(Ei/ERL)^2 =(1.70/32.3)^2=0.002809$

The sum of these ratios = 0.71 + 0.002809= 0.712809

As 0.712809<1 the unit complies with co-located exposure limits.

Test Equipment

Test Name:	**Radiated Emissions**	Test Date:	**9/29/2016**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
693	Narda -520	Broadband Field Meter	10/05/2016

Prepared by:

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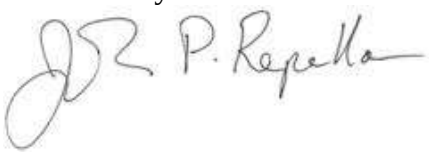
Reviewed by:



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