



TEST REPORT

Title 47-Telecommunication

Chapter I - Federal Communications Commission

Subchapter A - General

Part 1 - Practice and procedure

Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Report Reference No.: REP050910

Tested by
(name, function and signature).....: O. Frau

(project handler)

Approved by
(name, function and signature).....: D. Guarnone

(verifier)

Date of issue: 2024-04-16

Testing Laboratory: **Nemko Spa**

Address.....: Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

Testing location: Nemko Spa

Address.....: Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

Registration number:: 682159

Applicant's name: **IDS GeoRadar Srl**

Address.....: Via A. Righi 1/2 - 56121 Pisa, Italy

Test specification:

Standard: FCC CFR 47 Part 1 Subpart I

§1.1310 – Radiofrequency radiation exposure limits



Test procedure.....: Nemko WM L0077, WM L0177 and WM L1002

Test Report Form No.: FCCTRF

TRF Originator: Nemko Spa

Master TRF: 2014-03

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Test item description : **Transmitter**

Trade Mark: n/a

Manufacturer.....: IDS GeoRadar Srl

Address of manufacturer: Via A. Righi 1/2 - 56121 Pisa, Italy

FCC ID.....: UFW-DA300

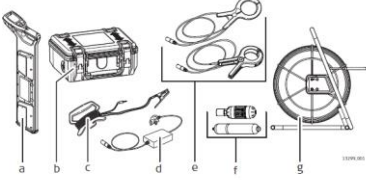
Model / Type (Tested): DA300

Variants.....: --

Ratings.....: 7.4 V DC from Lithium battery or 4 alkaline 1.6 V battery type D

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Test Report No. :	REP050910	2024-04-16
		Date of issue

Short description of the EuT and Copy of marking plate	
<p>The EUT is a (transmitter) is part of system composed of:</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> a Locator b Transmitter c Transmitter Cable Set Extension d Property Plug Connector e Transmitter Clamps f Sondes g Trace Rod (non-metallic utility tracer) 	
<p>Locators are used to detect buried conductive utilities that emit an electromagnetic signal. Such a signal is generated as an electrical current passes through the utility.</p> <p>Signal transmitters are used to apply a distinct signal to utilities with the following intention:</p> <ul style="list-style-type: none"> • To improve the detection success. • To trace the route of a utility. • To make a depth or current measurement. <p>Accessories are used with the locator and transmitter to localise the position of utilities, including some that are non-metallic.</p>	
Number of tested samples:	1
Serial number:	PRJ00535340001 (assigned by Nemko)
Operating frequency:	8 kHz and 33 kHz: induction mode Mixed 131 kHz + 33 kHz, 131 kHz, 83 kHz, 33 kHz, 8 kHz, 640 Hz, 512 Hz: direct connection mode
Accessories and detachable parts included:	--
Other options included:	--
Testing	
Date of receipt of test sample:	2024-03-18
Testing commenced on:	2024-04-16
Testing concluded on:	2024-04-16
Possible test case verdicts:	
test case does not apply to the test object:	N (Not applicable)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)
Symbols used in this test report	
<input checked="" type="checkbox"/> The crossed square indicates that the listed condition or equipment is applicable for this report.	
<input type="checkbox"/> The empty square indicates that the listed condition or equipment is not applicable for this report.	
Throughout this report point is used as decimal separator.	

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

Verdict according to the standards listed at page 5:

Pass

PROJECT HISTORY		
Report number	Modification to the report / comments	Date
REP050910	First release	2024-04-16
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REMARKS		
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PRODUCT VARIANTS		
Variant model	Difference against the main model	Test performed
DA300	Main model	Y
REMARKS		
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1 TEST STANDARDS

The tests were performed according to following standards and procedures.

NEMKO WM L0177: General routines for using instruments at Nemko

NEMKO WM L1002: Measurement Uncertainty - Policy and Statement

NEMKO WM L0077: General routines to perform EMC tests

FCC CFR 47 Part 1 Subpart I

Code of Federal Regulations – Title 47 – Part 1 Practice and procedure – Subpart I Procedures Implementing the National Environmental Policy Act of 1969

The main standard above contains references to other standards, which are listed below:

ANSI/IEEE Std C95.1-1992

IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

KDB 680106 D01 Wireless Power Transfer v04

Equipment Authorization Of Wireless Power Transfer Devices

2 SUMMARY OF TEST RESULTS

FCC Part 1 Subpart I requirements			
Part	Test description	Frequency range	Verdict
§1.1310	Radiofrequency radiation exposure limits	0 Hz – 300 kHz	P
GENERAL REMARKS			

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage:	<input type="checkbox"/>	230V/50 Hz / 1 ϕ	<input type="checkbox"/>	115V/60Hz / 1 ϕ
	<input type="checkbox"/>	400V/50 Hz 3PE	<input type="checkbox"/>	400V/50 Hz 3NPE
	<input type="checkbox"/>	3 V DC	<input checked="" type="checkbox"/>	7.4 V DC

3.2 EuT operation modes

Mode	Description
1	4 alkaline 1.6 V battery type D.

3.3 EuT configuration modes

The EuT was configured to measure its highest possible radiation level. The test modes selected are according to EuT instruction manual.

Mode	Description
1	The EUT has been tested forced in continuous transmission mode.

3.4 Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	ENCLOSURE	N/E	—	—	—
1	CAN BUS	I/O	<input type="checkbox"/>	<input type="checkbox"/>	RJ45 Multi-interface

*Note:

AC = AC Power Port

DC = DC Power Port

N/E = Non-Electrical

I/O = Signal/Control Input or Output Port

TP = Telecommunication Ports

3.5 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Remarks
EUT	DA300	IDS	DA300	--

Note: * Use:
EUT - Equipment Under Test
AE - Auxiliary/Associated Equipment (Not Subjected to Test)

3.6 Test software

--

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
Via del Carroccio, 4
20853 Biassono (MB) - Italy

Tests site/benches are in accordance with applicable standard/s and have been utilized by Nemko Spa testing engineer(s).

4.2 Environmental conditions

In the laboratory, the following ambient conditions are respected for each test reported below:

Ambient temperature:	<u>18 ÷ 33 °C ⁽¹⁾</u>
Relative Humidity:	<u>25 ÷ 70 % ⁽²⁾</u>
Atmospheric pressure:	<u>860 ÷ 1060 hPa</u>

⁽¹⁾ For luminaire, temperature during tests was verified to be within 18 ÷ 30 °C

⁽²⁾ During ESD test, humidity was verified to be within 30 ÷ 60 %

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model	Serial N°
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703
Barometer	Castle	GPB 3300	072015

4.3 Statement of the measurement uncertainty

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 10m Chamber	Antenna distance 3 m, 10 m 0.009 ÷ 200 MHz	5.0 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 200 ÷ 1000 MHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 1 ÷ 6 GHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m 6 ÷ 18 GHz	5.5 dB	(1)
	Antenna distance 1 m, 3 m 18 ÷ 40 GHz	7.2 dB	(1)
Radiated Disturbance with large loop antenna system (LLAS)	0.009 ÷ 30 MHz	3.3 dB	(1)
Conducted Disturbance	0.02 ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	150 kHz ÷ 30 MHz with current probe	2.9 dB	(1)
Clicks	9 ÷ 150 kHz	3.8 dB	(1)
	150 kHz ÷ 30 MHz	3.4 dB	(1)
Disturbance Power	30 MHz ÷ 300 MHz	4.5 dB	(1)
Frequency	10 Hz ÷ 1 kHz	0.2 %	(1)
	1 kHz ÷ 40 GHz	10 ⁻⁶	(1)
Harmonic Current Emission	50 Hz ÷ 2 kHz	3 %	(1)
Fluctuation and Flickers	Fluctuation	0.05 %	(1)
	Flickers	5 %	(1)
Radiated Immunity Anechoic Chambers	20 MHz ÷ 6 GHz	3.4 dB	(1) (3)
Radiated Immunity TEM Cell	0.01 ÷ 200 MHz	3.0 dB	(1) (3)
Bulk Current	1 ÷ 200 MHz	3.0 dB	(1)
Immunity to conducted disturbances	9 kHz ÷ 230 MHz	3.0 dB	(1)
ESD Immunity	Voltage, Current, Rise time, Duration	(2)	(1)
Burst Immunity	Voltage, frequency, burst period and duration, rise time and pulse width	(2)	(1)
Surge Immunity	Voltage, Current, Rise time, Duration	(2)	(1)
DIPS, Interruption and Voltage duration Immunity	Amplitude	5 %	(1)
	Duration	5 %	
Impulse Magnetic Field Immunity	Peak Current	10 %	(1) (3)
	Rise time, Duration	20 %	
Power Frequency Magnetic Field Immunity	16.7 Hz, 50 Hz, 60 Hz	2.0 dB	(1) (3)
Damped Oscillatory Wave Immunity Ring Wave Immunity	Voltage, front time, frequency 100 kHz, 1 MHz	(2)	(1)
Damped Magnetic Field	Amplitude: 100 kHz, 1 MHz	3 dB	(1)
	Frequency: 100 kHz, 1 MHz	10 %	
Low Frequency Immunity	15 Hz ÷ 150 kHz	2.2 dB	(1)
Automotive transients Immunity	Voltage, rise time, duration time Impulses 1, 2a, 2b, 3a, 3b and 4	(2)	(1)
Automotive transients Emission	Amplitude, Time	10 %	(1)
EMF for Lighting Equipment	-	25 %	(1)
Electromagnetic fields (EMF)	Magnetic, Electric and Electromagnetic fields: 0 Hz ÷ 40 GHz	25 %	(1)
Electrical quantities (voltage, current, resistance)	AC/DC Voltage 10 mV ÷ 1000 V 0÷100 kHz AC/DC Current 0.1 mA ÷ 400 A 0÷1 kHz Resistance 100 mΩ ÷ 10 MΩ	2.5 %	(1)

NOTES:

(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %

(2) The instruments used for this immunity test is according to the tolerances requested by the applicable standard

(3) The reported expanded uncertainty of measurement is related to the stimulus quantity

5 TEST CONDITIONS AND RESULTS

5.1 Radiofrequency radiation exposure limits

5.1.1 Photo documentation of the test set-up



Test set-up



Test on the frontal side



Test on the right side



Test on the left side



Test on the rear side



Test top side



Test bottom side



Test hand contact side

5.1.2 Test method

For devices designed for typical desktop applications, such as wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device.

5.1.3 Limits

KDB 680106 D01 - 3.2 Equipment Authorization Procedures for Devices Operating at Frequencies Below 4 MHz

The RF exposure limits, as set forth in § 1.1310, do not cover the frequency range below 100 kHz for Specific Absorption Rate (SAR) and below 300 kHz for Maximum Permitted Exposure (MPE). In addition, present limitations of RF exposure evaluation systems prevent an accurate evaluation of SAR below 4 MHz. For these reasons, a specific MPE-based RF Exposure compliance procedure for devices operating in the aforementioned low-frequency ranges has been set in place. This procedure is applicable to Equipment Authorization of all RF devices, thus including, but not limited to, Part 18 and WPT devices.

Accordingly, for § 2.1091-Mobile devices, the MPE limits between 100 kHz to 300 kHz are to be considered the same as those at 300 kHz in Table 1 of § 1.1310, that is, 614 V/m and 1.63 A/m, for the electric field and magnetic field, respectively. For § 2.1093-Portable devices below 4 MHz and down to 100 kHz, the MPE limits in § 1.1310 (with the 300 kHz limit applicable all the way down to 100 kHz) can be used for the purpose of equipment authorization in lieu of SAR evaluations.

Furthermore, consistent with FCC's equipment authorization RF exposure guidance, any device (both portable and mobile) operating at frequencies below 100 kHz is considered compliant for the purpose of equipment authorization when the external (unperturbed) temporal peak field strengths do not exceed the following reference levels:

83 V/m for the electric field strength (E)

and

90 A/m for the magnetic field strength (H).

These data may be provided through measurements and/or numerical simulations, and for all the positions in space relevant for any possible body exposure.

5.1.4 Test result

Induction mode 8 kHz

Test point	Distance	E-field strengths [V/m]		H-field strengths [A/m]		Verdict
		Measured	Limit	Measured	Limit	
Front side	15 cm	4.70	83.0	2.06	90.0	P
Right side	15 cm	2.35	83.0	8.10	90.0	P
Left side	15 cm	4.39	83.0	5.13	90.0	P
Rear side	15 cm	2.26	83.0	3.32	90.0	P
Top side	15 cm	1.11	83.0	2.17	90.0	P
Bottom side	15 cm	1.51	83.0	4.42	90.0	P
Hand contact side	0 cm	8.92	83.0	9.59	90.0	P

Induction mode 33 kHz

Test point	Distance	E-field strengths [V/m]		H-field strengths [A/m]		Verdict
		Measured	Limit	Measured	Limit	
Front side	15 cm	17.89	83.0	1.84	90.0	P
Right side	15 cm	8.72	83.0	5.50	90.0	P
Left side	15 cm	11.23	83.0	4.08	90.0	P
Rear side	15 cm	9.31	83.0	2.38	90.0	P
Top side	15 cm	4.39	83.0	1.80	90.0	P
Bottom side	15 cm	5.80	83.0	3.89	90.0	P
Hand contact side	0 cm	26.95	83.0	8.09	90.0	P

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	0 Hz – 300 kHz
Kind of test site:	Shielded room
Remarks:	

5.1.5 Test equipment used

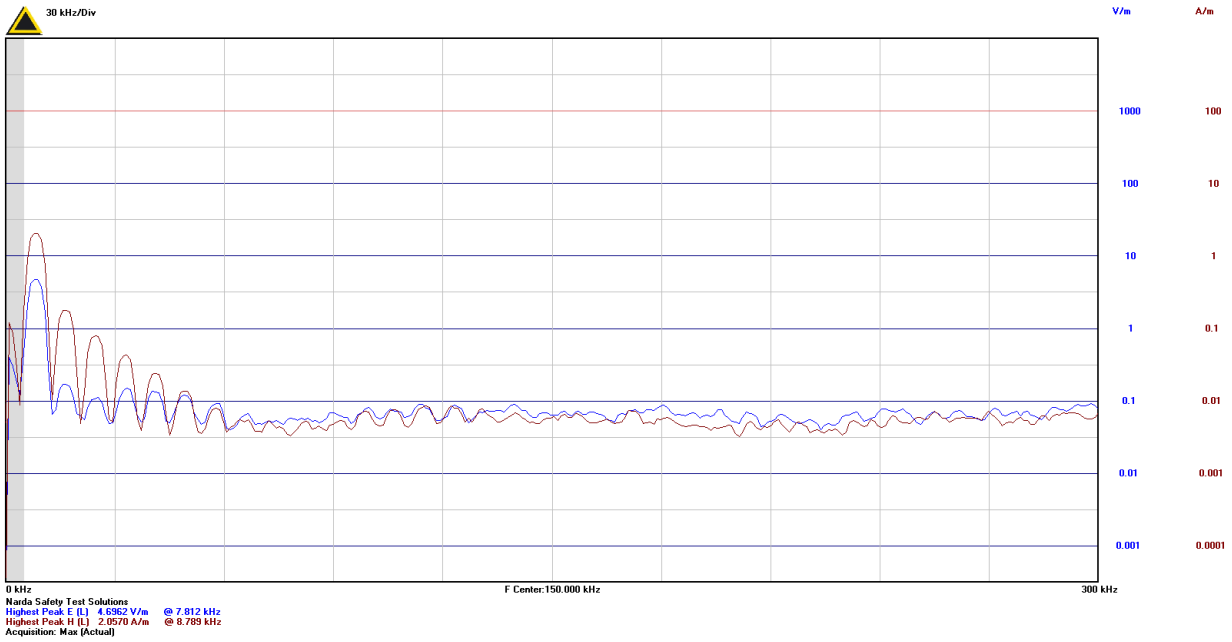
Equipment	Manufacturer	Model	Serial N°	Cal Date	Due Date
Filed meter	Narda	EHP-200A	170WX90208	2024-03	2026-03
Filed meter	Narda	EHP-50G	510ZY00109	2023-07	2025-07
Shielded room	Siemens	Conducted emission test room	1862	NSC	NSC

NSC = Not Subject to Calibration

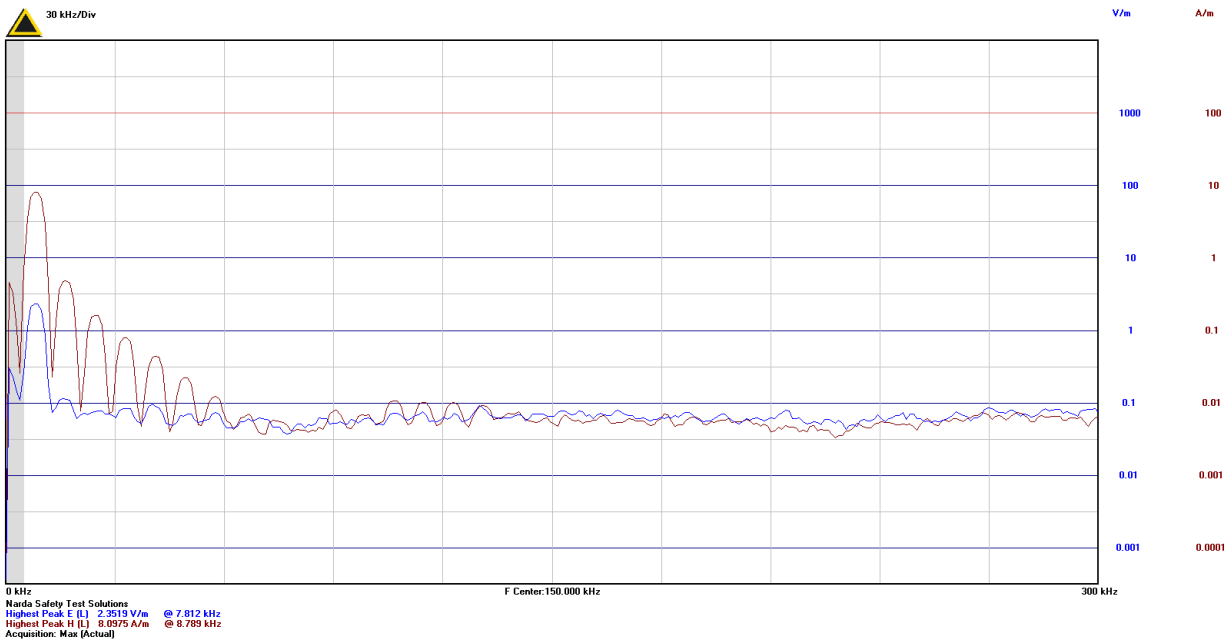
5.1.6 Test software details

Manufacturer of Software	Details
	See clause 3.6

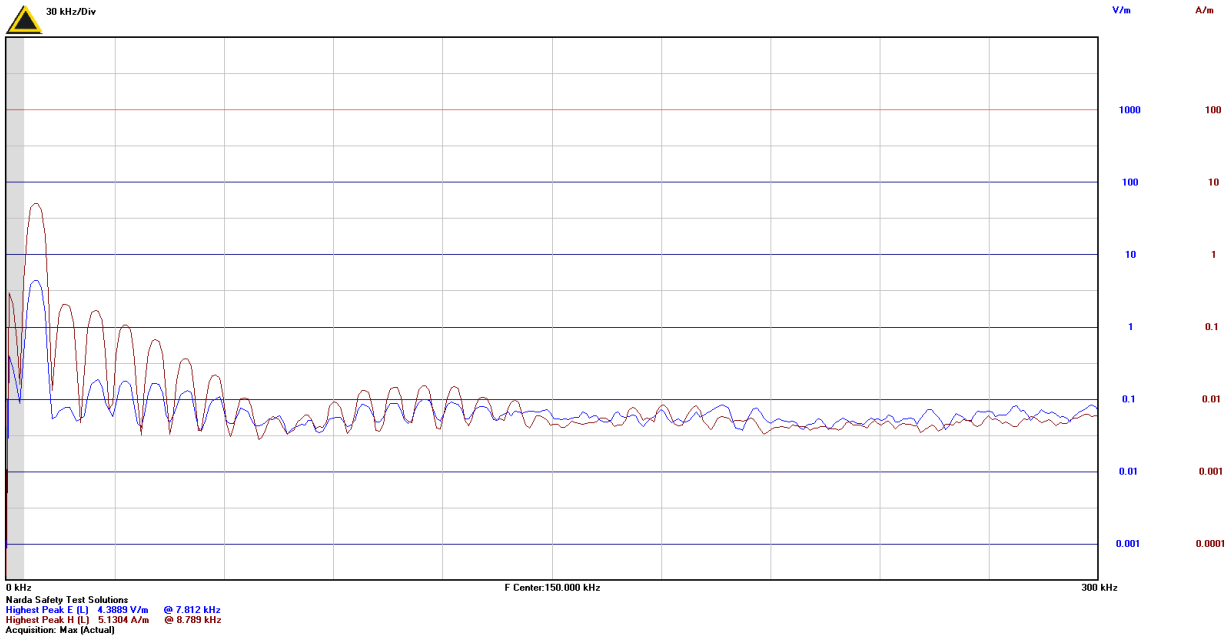
5.1.7 Test data



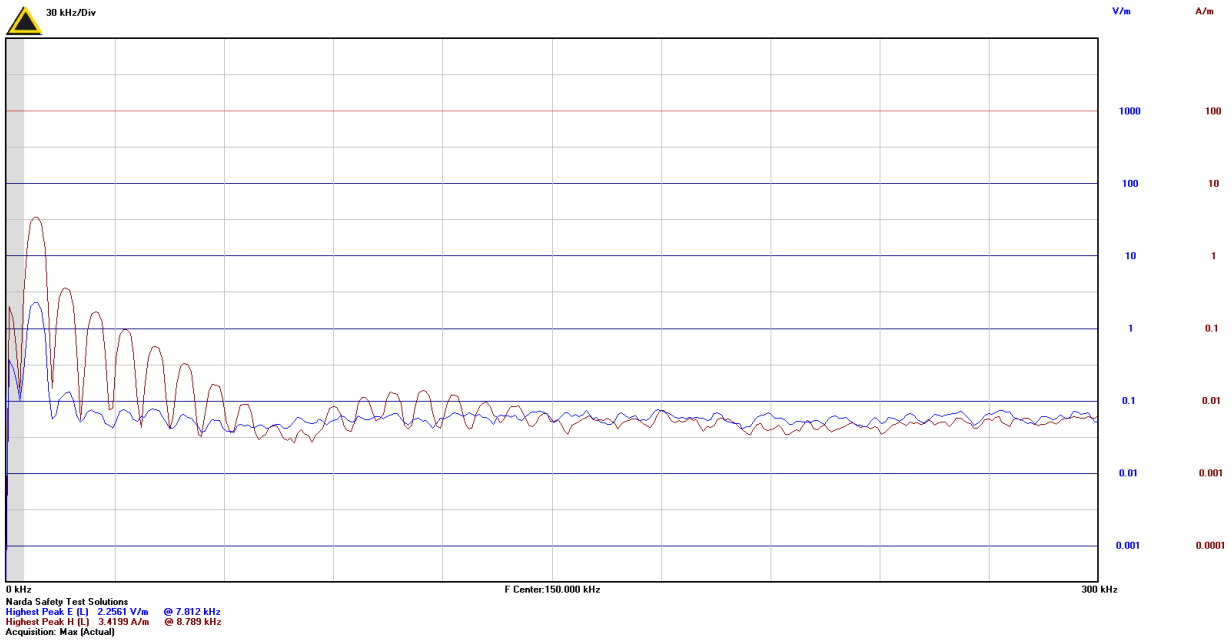
Front side 8 kHz



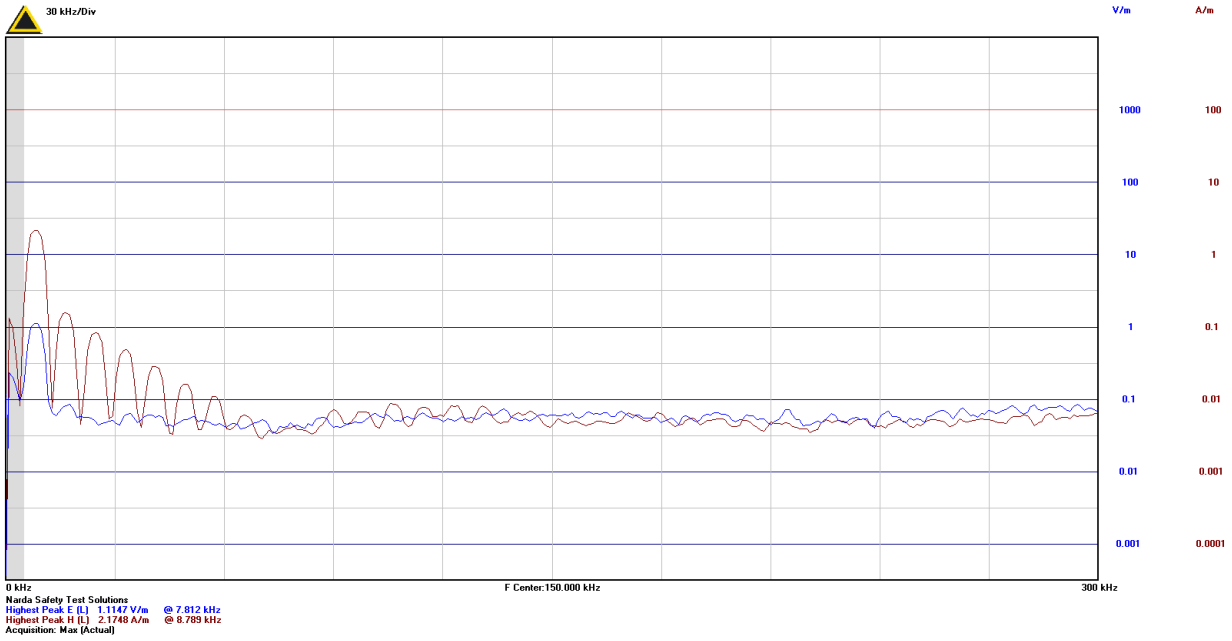
Right side 8 kHz



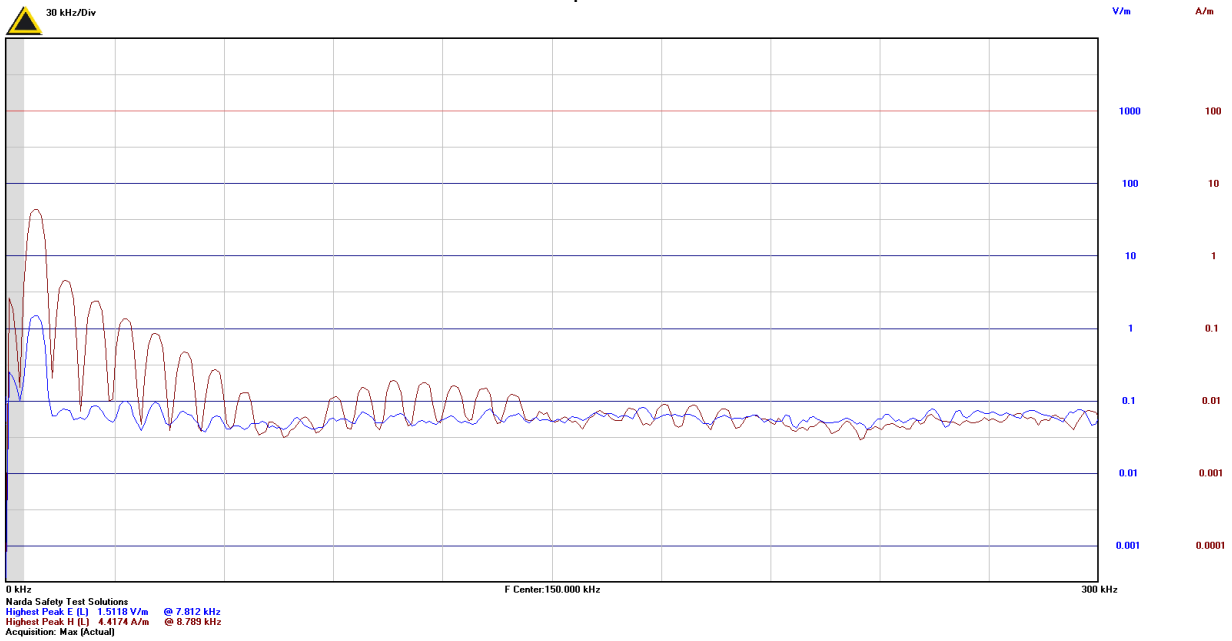
Left side 8 kHz



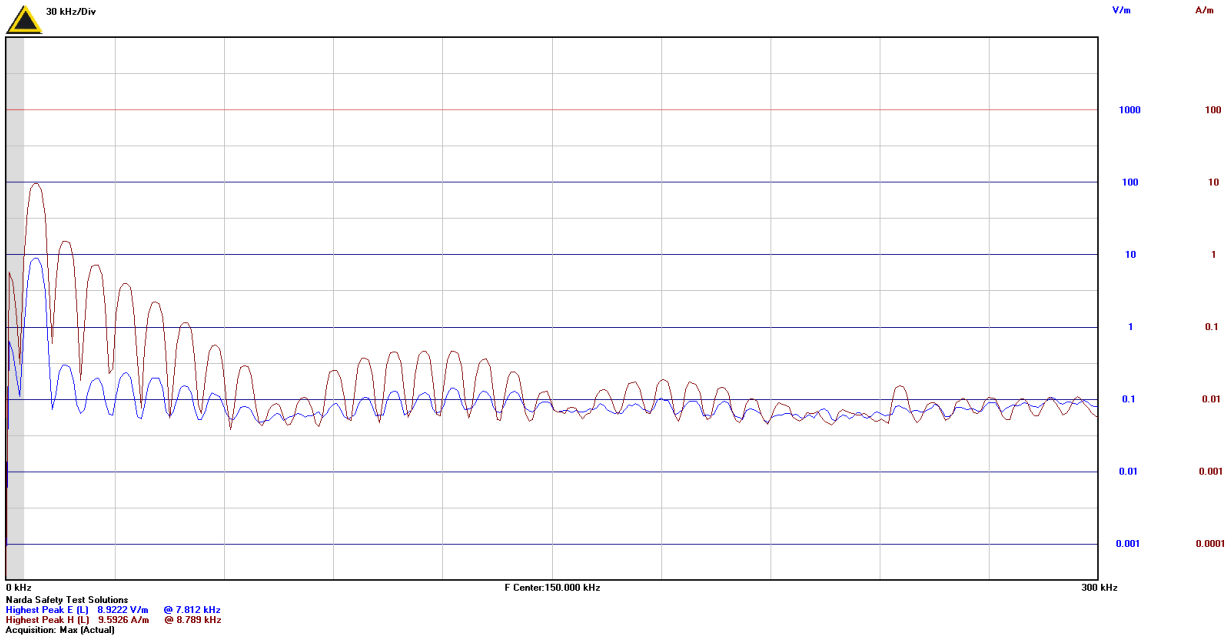
Rear side 8 kHz



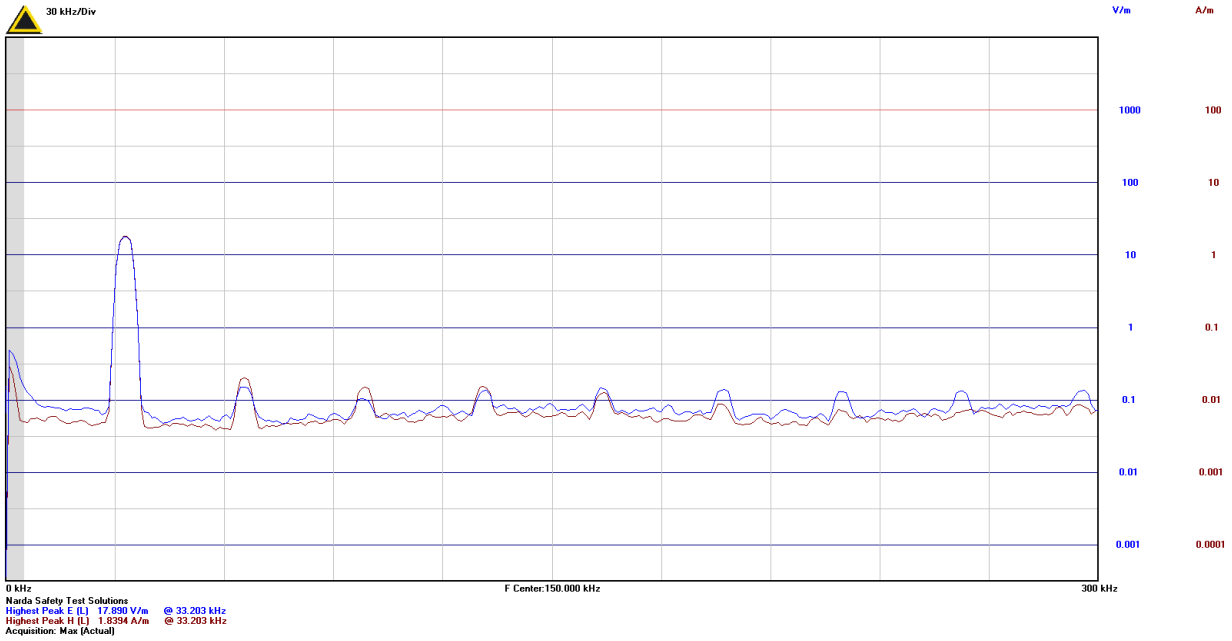
Top side 8 kHz



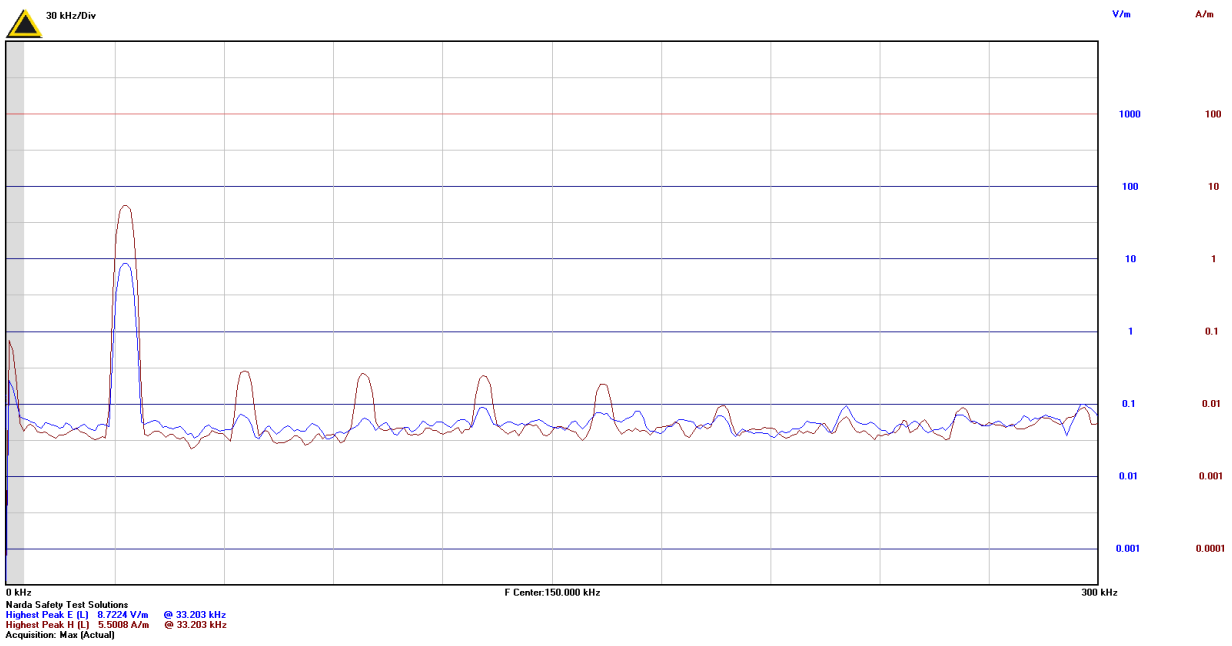
Bottom side 8 kHz



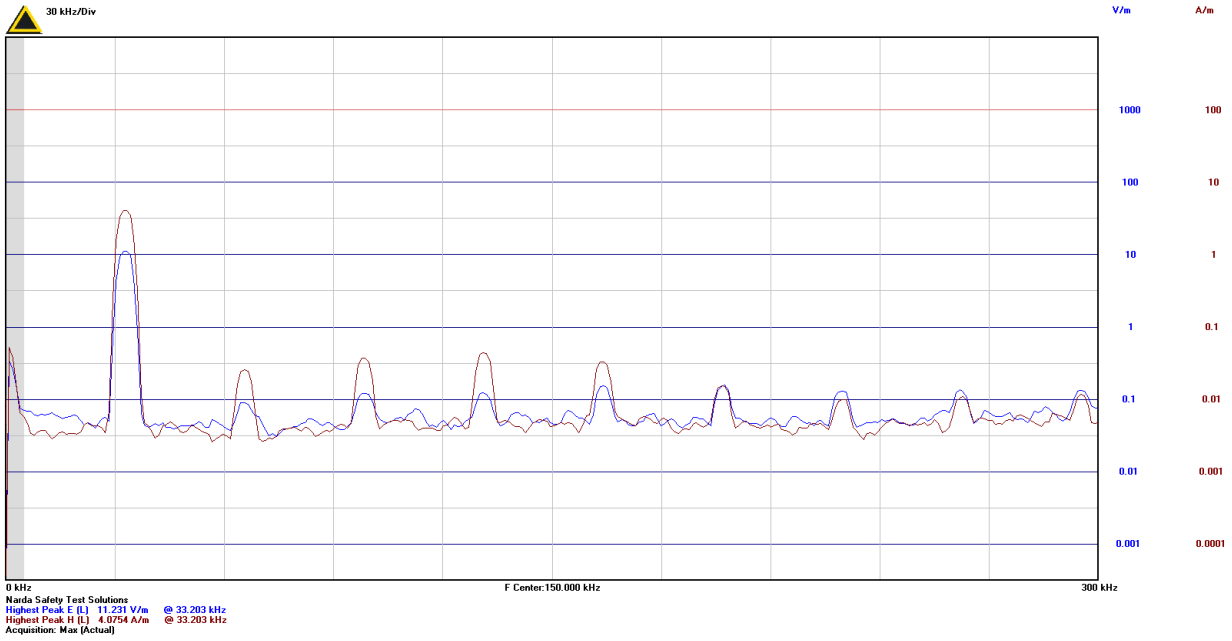
Hand contact side 8 kHz



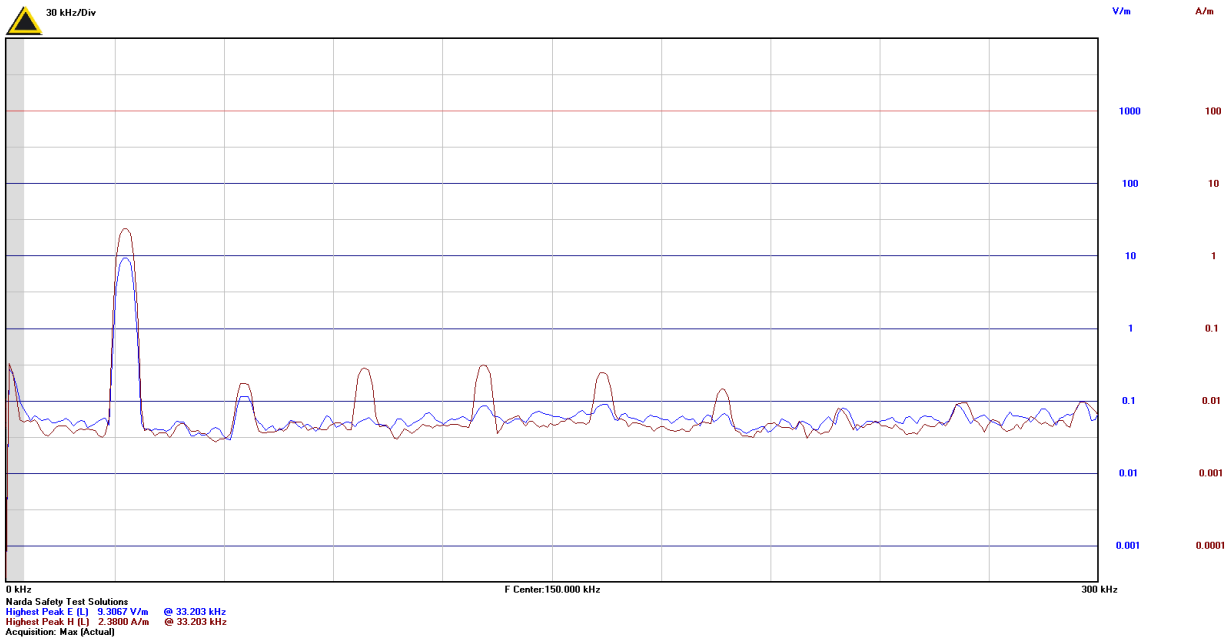
Front side 33 kHz



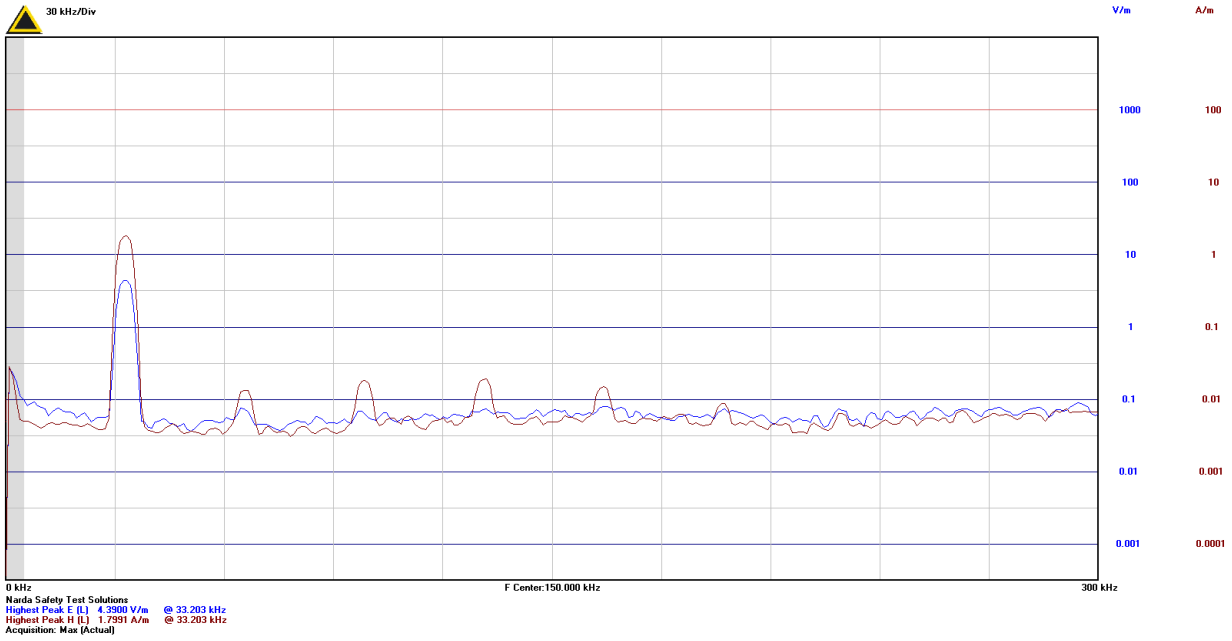
Right side 33 kHz



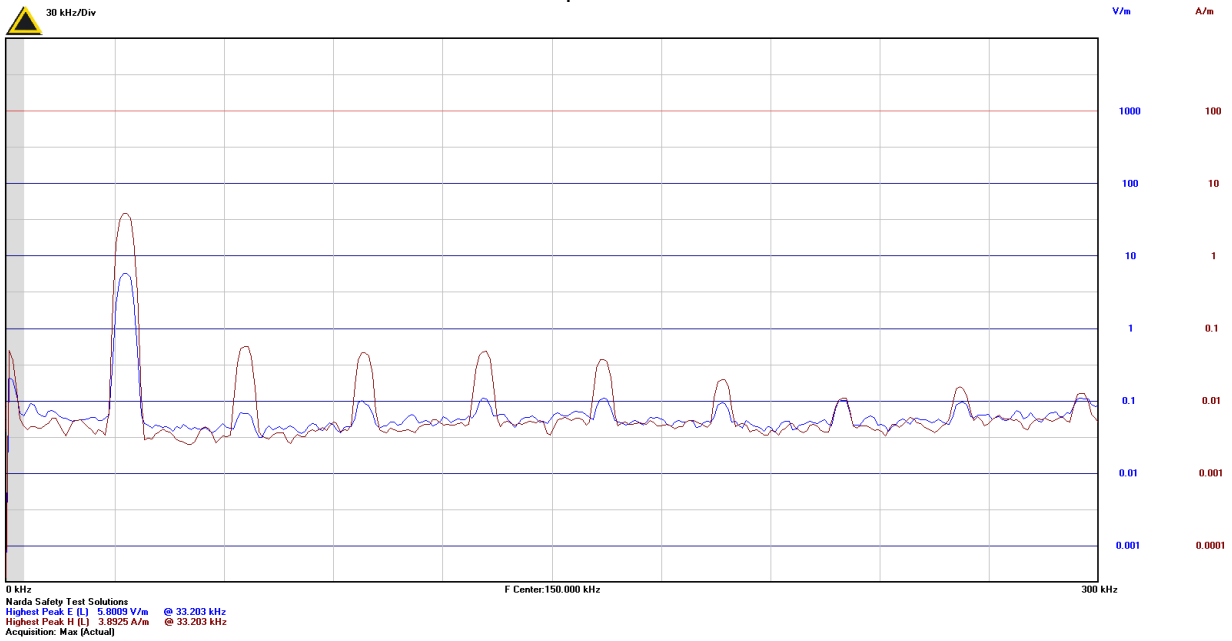
Left side 33 kHz



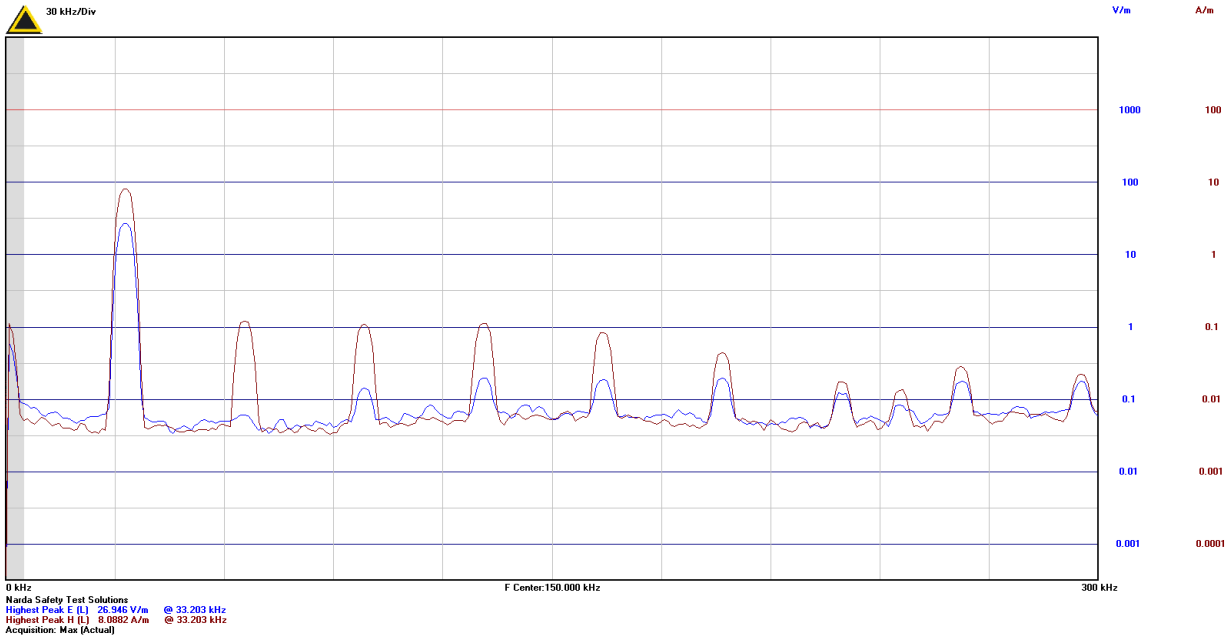
Rear side 33 kHz



Top side 33 kHz



Bottom side 33 kHz



Hand contact side 33 kHz

6 EUT PHOTOS









End of report