Excellence in Compliance Testing

Certification Test Report

FCC ID: TFT-IDLMAX01

FCC Rule Part: 15.225

ACS Report Number: 09-0001

Manufacturer: MaxID
Model: iDLMax

Test Begin Date: January 6, 2009
Test End Date: January 23, 2009

Report Issue Date: February 26, 2009

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

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This report contains 15 pages

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1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations.

1.2 Product Description

The product is a Multifunctional Mobile Computer called iDLMax designed for use in Identification applications. It allows the end user to access to their networks via wireless connections. The iDLMax contains an 802.11b/g module, a Bluetooth module, a GSM/GPRS module, a GPS receiver and a 13.56MHz RFID / smartcard reader. This report applies to the 13.56MHz RFID / smartcard reader under FCC Rule Part 15.225 and also addresses collocation of all radios. All other radio devices are covered under separate equipment authorizations.

Applicant Information:
MaxID Corp.
4445 Corporation Lane
Suite 233
Virginia Beach, VA. 23462

Test Sample Serial Number(s):RD000034

Test Sample Condition:
The test sample was provided in good working order with no visible defects.

Detailed photographs of the EUT are filed separately with this filing.

1.3 Test Methodology and Considerations

The iDLMax is designed such that the 802.11b/g and GSM/GPRS modules cannot operate simultaneously. Therefore there are two modes of simultaneous transmit: WiFi, BT, RFID, and GSM/GPRS, BT, RFID. For AC power line conducted emissions testing and radiated intermodulation products for simultaneous transmission, the device was tested in both modes of operation. Radiated intermodulation products were found to be in compliance.

The iDLMax can also be used in multiple orientations therefore radiated emissions were evaluated with the device positioned in the x, y, and z planes with worst case data presented in this report.

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 894540
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

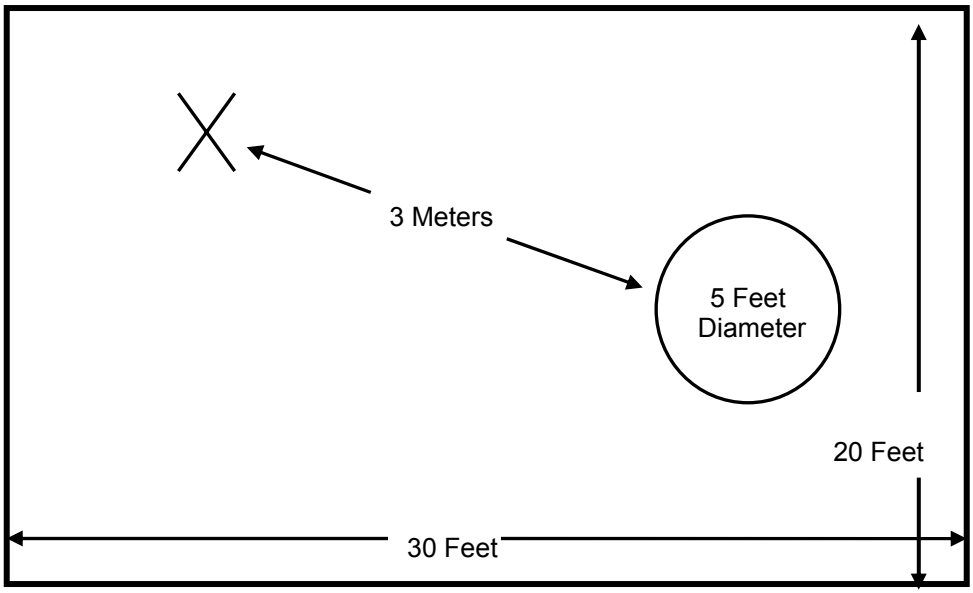

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

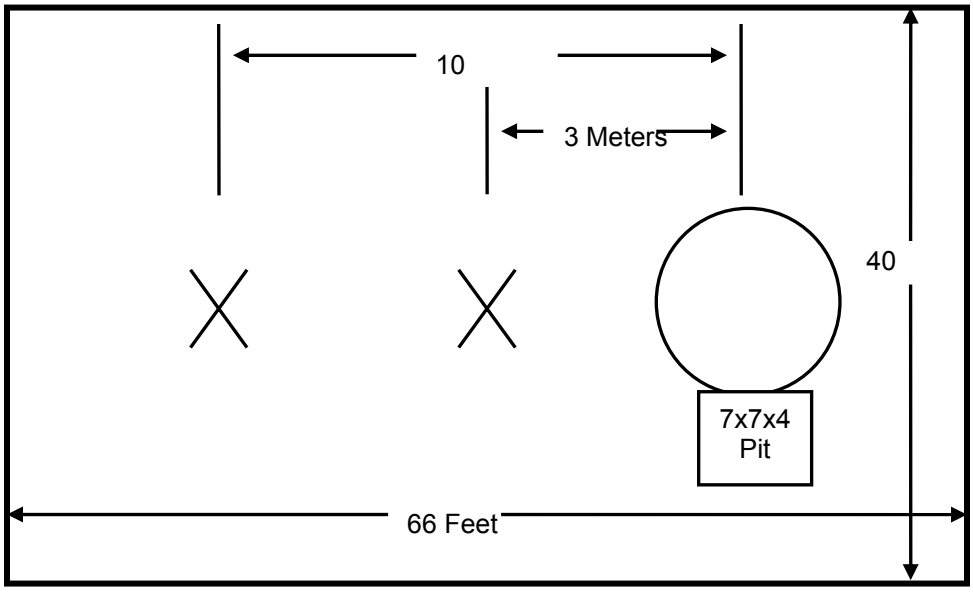

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

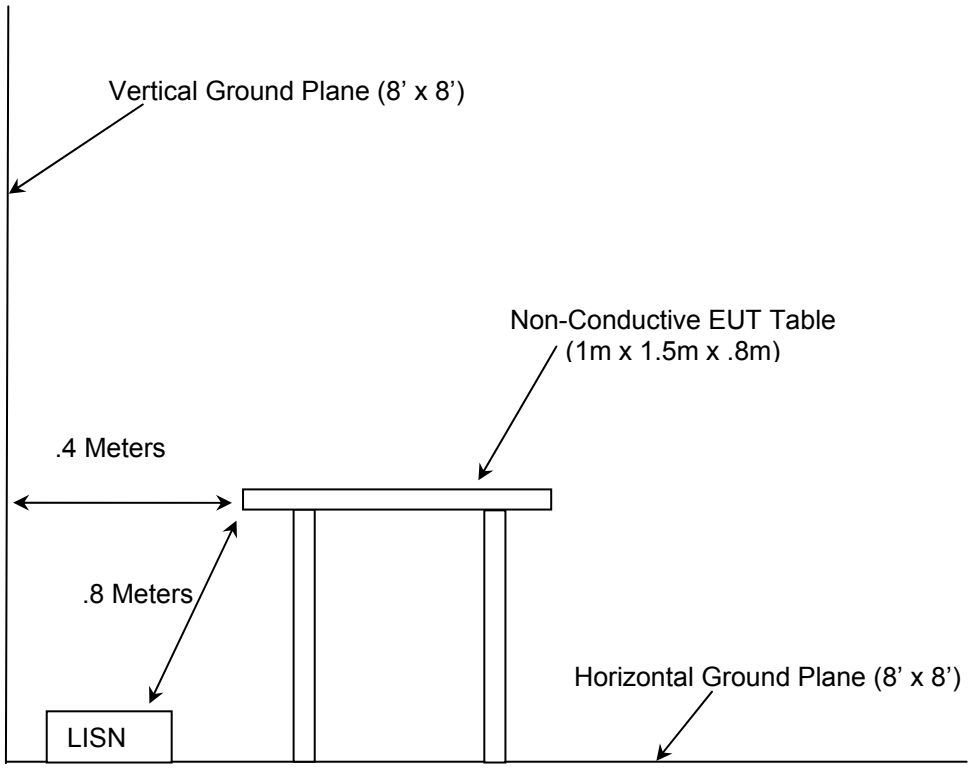

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2008
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2008

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	09-19-2009
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	09-19-2009
324	ACS	Cables	324	Conducted EMI Cable	07-28-2009
25	Chase	Antennas	CBL6111	1043	08-22-2009
78	EMCO	Antennas	6502	9104-2608	01-20-2010
140	Thermotron	Environmental Chamber	SM-16C	19639	08-30-2009
152	EMCO	LISN	Feb-25	9111-1905	03-26-2009
22	Agilent	Amplifiers	8449B	3008A00526	10-22-2009
167	ACS	Cables	Chamber EMI Cable Set	167	02-06-2010
168	Hewlett Packard	Attenuators	11947A	44829	02-18-2009
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	09-19-2009
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	10-08-2009
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-07-2009
338	Hewlett Packard	Amplifiers	8449B	3008A01111	10-22-2009
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11-24-2009
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11-24-2009
343	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	N/A	11-24-2009

5.0 SUPPORT EQUIPMENT

Table 5-0: Support Equipment

Item #	Manufacturer	Equipment Type	Model Number	Serial Number
1	MaxID	EUT	Unit 2	RD000034
2	Mean Well	Power Supply	GS25A12	R080936510

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

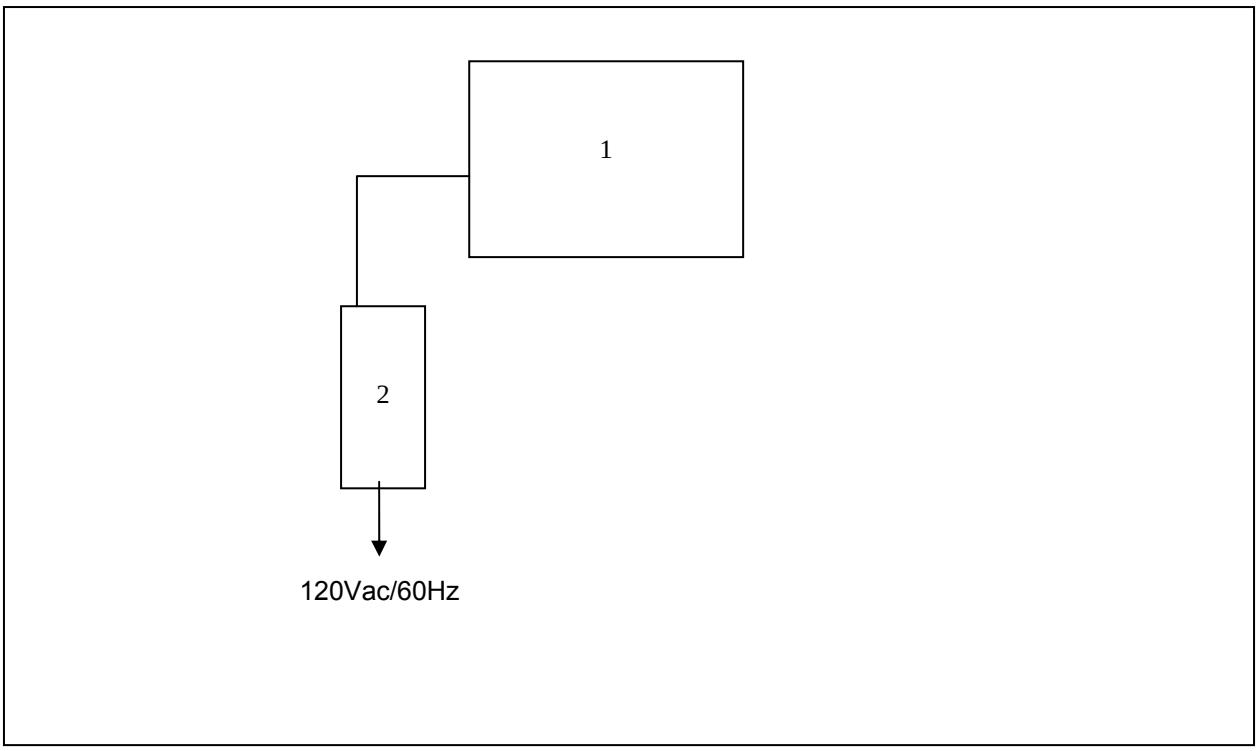

Figure 6-1: EUT Test Setup

See Test Setup photographs for additional detail.

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement

The iDLMax utilizes an integral loop antenna which can not be removed or modified without damaging or destroying the device therefore meeting the requirements of 15.203.

7.2 Power Line Conducted Emissions – FCC CFR 47 Part 15.207

7.2.1 Test Methodology

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

The AC power line conducted emissions were tested with integral antenna attached and repeated with the RF output properly loaded to show compliance only at the 13.56 MHz fundamental frequency.

7.2.2 Test Results

Results of the test are shown below in and Table 7.2-1 and 7.2-2.

Table 7.2-1: Conducted EMI Results – Bluetooth, WiFi, and RFID Simultaneous TX

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)		Line
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
Line 1										
0.2	35.7	21.2	9.80	45.50	31.00	63.61	53.61	18.1	22.6	GND
0.26	29.3	17.3	9.80	39.10	27.10	61.43	51.43	22.3	24.3	GND
0.33	26.1	17.7	9.81	35.91	27.51	59.45	49.45	23.5	21.9	GND
0.65	23.8	23.6	9.81	33.61	33.41	56.00	46.00	22.4	12.6	GND
27.12	33.7	33.9	10.40	44.10	44.30	60.00	50.00	15.9	5.7	GND
13.56	40	39.7	10.02	50.02	49.72	60.00	50.00	10.0	0.3	GND
Line 2										
0.2	34.1	21	9.80	43.90	30.80	63.61	53.61	19.7	22.8	GND
0.26	27.5	18.4	9.81	37.31	28.21	61.43	51.43	24.1	23.2	GND
0.65	24.9	24.6	9.90	34.80	34.50	56.00	46.00	21.2	11.5	GND
6.48	1.5	-1.5	9.91	11.41	8.41	60.00	50.00	48.6	41.6	GND
27.12	33.8	34	10.40	44.20	44.40	60.00	50.00	15.8	5.6	GND
13.56	39.8	39.6	10.02	49.82	49.62	60.00	50.00	10.2	0.4	GND

Table 7.2-2: Conducted EMI Results – Bluetooth, GSM/GPRS, and RFID Simultaneous TX

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)		Line
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
Line 1										
0.18	11.8	4.2	9.82	21.62	14.02	64.49	54.49	42.9	40.5	GND
0.33	22.2	16.1	9.81	32.01	25.91	59.45	49.45	27.4	23.5	GND
0.65	22.7	18.5	9.90	32.60	28.40	56.00	46.00	23.4	17.6	GND
0.72	24.1	23.4	9.90	34.00	33.30	56.00	46.00	22.0	12.7	GND
2.75	19.7	17.5	9.90	29.60	27.40	56.00	46.00	26.4	18.6	GND
6.65	19.1	16.8	9.91	29.01	26.71	60.00	50.00	31.0	23.3	GND
Line 2										
0.19	31.2	17.2	9.82	41.02	27.02	64.04	54.04	23.0	27.0	GND
0.26	25.1	17.8	9.81	34.91	27.61	61.43	51.43	26.5	23.8	GND
0.46	1.6	-2.1	9.90	11.50	7.80	56.69	46.69	45.2	38.9	GND
0.72	23.9	23.4	9.90	33.80	33.30	56.00	46.00	22.2	12.7	GND
4.32	20.3	19.5	9.90	30.20	29.40	56.00	46.00	25.8	16.6	GND
6.48	21.5	18.4	9.91	31.41	28.31	60.00	50.00	28.6	21.7	GND

7.3 Radiated Emissions – Intentional Radiation

7.3.1 In-Band Emissions Limitations – FCC CFR 47 Part 15.225(a),(b),(c)

7.3.1.1 Test Methodology

Measurements below 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. The EUT was rotated 360º and the loop antenna rotated about the vertical axis to maximize each emission. The magnetic loop receiving antenna was positioned with its center 1 meter above the ground.

The spectrum analyzer's resolution and video bandwidths were set to 9 kHz and 30 kHz respectively. A peak detector was used which shows worst case. The measurements were corrected by a distance correction factor, antenna correction factors, and cable loss for comparison to the limits. Sample correction factors and calculations can be found section 7.3.2.2 and 7.3.2.4.

7.3.1.2 Test Results

Compliance with the emissions levels are shown in figure 7.3.1-1 below. Only the worst case EUT orientation is shown.

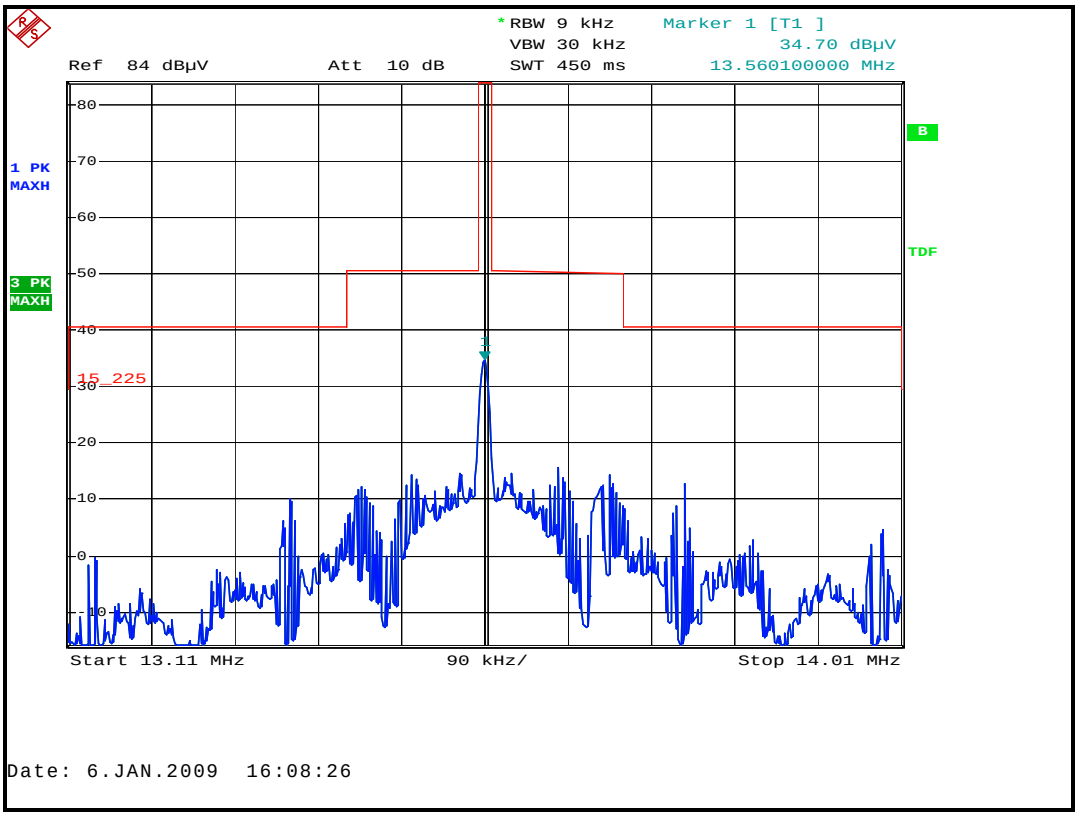

Figure 7.3.1-1: Emission Mask Plot

7.3.2 Out-of-Band Emission Limitations – FCC CFR 47 Part 15.225(d) / 15.209

7.3.2.1 Test Methodology

Section 15.33(a)(4) specifies, if the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to frequency specified in 15.33(b)(1) for unintentional radiators. The upper frequency range for the digital device is 1000MHz which greater than the 10th harmonic of the fundamental frequency. The upper frequency range measured was 1000MHz.

Measurements below 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. The EUT was rotated 360º and the loop antenna rotated about the vertical axis to maximize each emission. The magnetic loop receiving antenna was positioned with its center 1 meter above the ground.

For measurements in the frequency bands 9-90 kHz and 110-490 kHz, an average detector was used. When average measurements are specified, the peak emissions were also compared to a limit corresponding to 20 dB above the maximum permitted average limit according to Part 15.35. All other emissions were measured using a Quasi-peak detector. The final measurements were then corrected by a distance correction factor, antenna correction factors, and cable loss for comparison to the limits.

Measurements above 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made.

The spectrum analyzer's resolution bandwidth was set to equal to or greater than 100 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 120 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz.

7.3.2.2 Distance Correction for Measurements Below 30 MHz – Part 15.31

Radiated measurements were performed at a distance closer than 30m as required according to Part 15.209. Therefore a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 30m measurement distance.

Distance correction factor (30m Specified Test Distance) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

7.3.2.3 Test Results

Radiated spurious emissions found are reported in Tables 7.3.2-1.

Table 7.3.2-1: Radiated Spurious Emissions

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
27.04	---------	8.15	---------	10.01	---------	18.16	--------	69.5	---------	51.34
30	---------	40.70	V	-8.50	---------	32.20	--------	40.0	---------	7.80
83.88	---------	50.40	V	-17.79	---------	32.61	--------	40.0	---------	7.39
86.04	---------	48.49	V	-17.17	---------	31.32	--------	40.0	---------	8.68
139.93	---------	45.35	V	-13.10	---------	32.25	--------	43.5	---------	11.25
171.18	---------	47.68	V	-14.90	---------	32.78	--------	43.5	---------	10.72
187.35	---------	38.08	V	-15.45	---------	22.63	--------	43.5	---------	20.87
312.37	---------	43.85	V	-11.23	---------	32.62	--------	46.0	---------	13.38

Note: Spurious emissions associated with the transmitter that are not reported in the table above are below the noise floor of the measurement system.

7.3.2.4 Sample Calculation:
Example Calculation – Average/Quasi-Peak Limit < 30MHz

Limit (dBuV/m) = 20*log(30) - Distance Correction Factor (Section 7.3.2.2)
Limit (dBuV/m) = 29.5 + 40
Limit (dBuV/m) = 69.5

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain

Corrected Level: 8.15 + 10.01 = 18.16dBuV
Margin: 69.5dBuV – 18.16dBuV = 51.34dB

7.4 99% Occupied Bandwidth

7.4.1 Test Methodology

The spectrum analyzer span was set to 2 to 3 times the estimated bandwidth of the emission. The RBW was to ≥ 1% of the estimated bandwidth. The trace was set to max hold with a peak detector active. The measurement function of the analyzer was utilized to determine the 99% occupied bandwidth.

7.4.2 Test Results

The 99% OBW was measured to be 920 Hz. A plot is shown below in Figure 7.4-1.

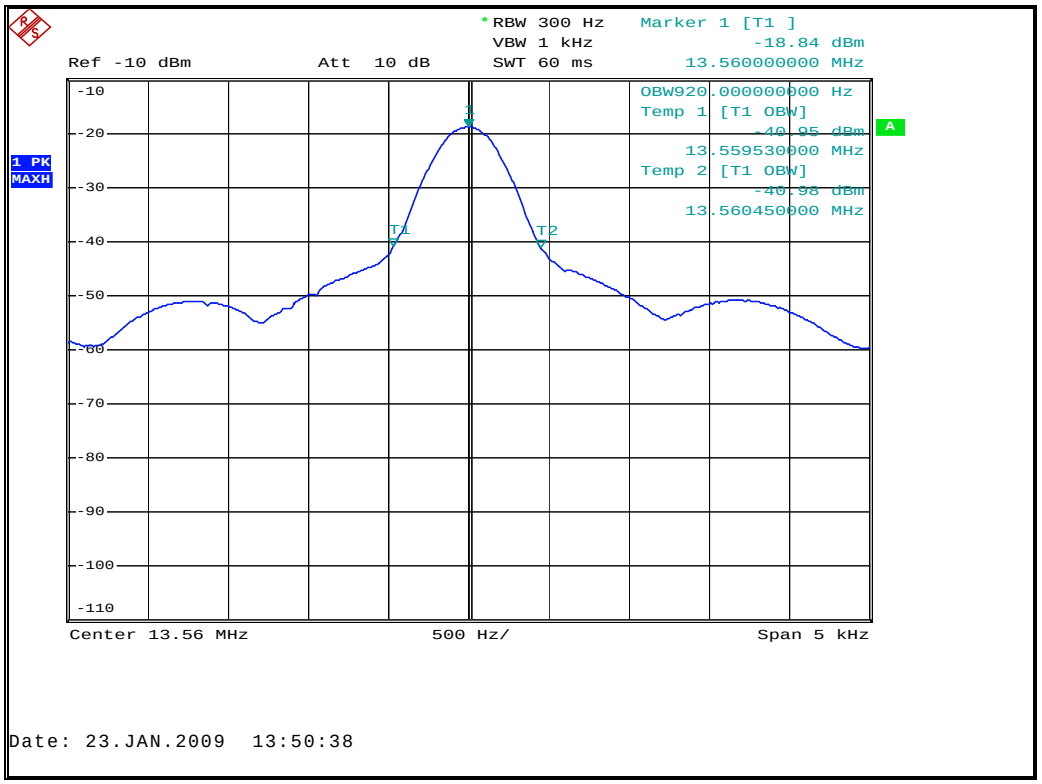

Figure 7.4-1: 99% Bandwidth

7.5 Frequency Stability – FCC CFR 47 Part 15.225

7.5.1 Test Methodology

The equipment under test is placed inside an environmental chamber. The RF output is coupled to the input of the measurement equipment via a near field probe.

Frequency measurements were made at the extremes of the of temperature range -20º C to +50º C and at intervals of 10º C at normal supply voltage. A period of time sufficient to stabilize all components of the equipment was allowed at each frequency measurement. At a temperature 20º C the supply voltage was varied from 85% to 115% from the normal. The maximum variation of frequency was recorded.

The limit from rule part 15.225 is 0.01% or 100ppm.

7.5.2 Test Results

Results of the test are shown below in Figure 7.5-1.

Frequency Stability

Frequency (MHz): 13.56
Deviation Limit (PPM): 100.0ppm

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-20 C	**13.560013**	**0.959**	100%	120
-10 C	**13.560019**	**1.401**	100%	120
0 C	**13.560018**	**1.327**	100%	120
10 C	**13.560010**	**0.737**	100%	120
20 C	**13.559970**	**-2.212**	100%	120
30 C	**13.559992**	**-0.590**	100%	120
40 C	**13.560001**	**0.074**	100%	120
50 C	**13.560045**	**3.319**	100%	120
20 C	**13.560002**	**0.147**	85%	102
20 C	**13.559996**	**-0.295**	115%	138

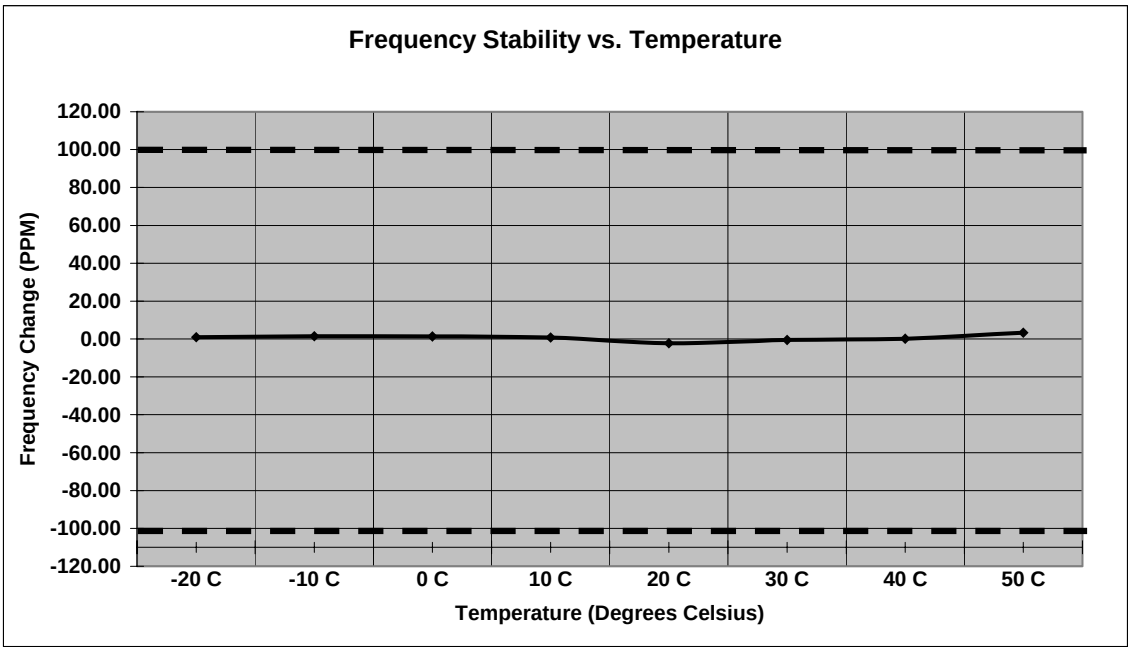

Figure 7.5-1: Frequency Stability

8.0 CONCLUSION

In the opinion of ACS, Inc. the iDLMax manufactured by MaxID meets the requirements of FCC Part 15 Subpart C.

END REPORT