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Radio Test Report

FCC Part 95
MedRadio Transmitter

Serenity model 1000

FCC ID:	QHJ-10001001A
COMPANY:	MicroTransponder Inc. 2802 Flintrock Trace, Suite 225 Austin, TX 78738
TEST SITE(S):	NTS Silicon Valley 41039 Boyce Road. Fremont, CA. 94538-2435
REPORT DATE:	October 30, 2012
FINAL TEST DATES:	August 13, 14, 15 and 27, 2012
TOTAL NUMBER OF PAGES:	32

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A2LA ACCREDITED
Testing Cert #0214.26

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	10-30-2012	First release	

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SCOPE

Tests have been performed on the MicroTransponder Inc. Serenity model 1000, pursuant to the relevant requirements of the following standard(s) in order to obtain device certification against the regulatory requirements of the Federal Communications Commission and Industry Canada.

- Code of Federal Regulations (CFR) Title 47 Part 2
- CFR 47 Part 95 (Medical Device Radiocommunication Service) Subpart I

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in NTS Silicon Valley test procedures:

ANSI C63.4:2003
ANSI TIA-603-C August 17, 2004

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the MicroTransponder Inc. Serenity model 1000 and therefore apply only to the tested sample. The sample was selected and prepared by Chester Burress of MicroTransponder Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, the device requires certification. Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of MicroTransponder Inc. Serenity model 1000 complied with the requirements of the standards and frequency bands declared in the scope of this test report.

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS

FCC Part 95

Rule Part	Description	Measured	Limit	Result
Transmitter frequency, power, bandwidth, modulation and unwanted emissions				
§2.1033 (c) (5) § 95.628(c)	Frequency range(s)	402.45 – 404.55 MHz	402-405 MHz	Pass
§2.1033 (c) (6) §2.1033 (c) (7) §2.1046 § 95.639(f)	EIRP (Calculated from Field Strength)	0.138µW -38.6dBm	25µW –16dBm	Pass
§2.1033 (c) (4)	Emission types	F1D	-	-
§2.1047 §95.635(d)(4) & (5)	Unwanted emissions	0.079µW -51.0dBm	0.25µW -36dBm	Pass
§2.1049 §95.628(d), §95.633(e)(1)	Authorized Bandwidth	253 kHz	300 kHz	Pass
Transmitter spurious emissions				
§2.1053 §2.1057 §95.635(d)(1)	Field strength	35.3 dBµV/m (-4.7 dB)	See table	Pass
Receiver spurious emissions				
15.109		41.4 dBµV/m (-12.6dB)	See table	Pass
Other details				
95.628(a)	Frequency Monitoring	Does not apply to the implant	-	-
§2.1055 §95.628(g)(2)	Frequency stability	+10.0 ppm	100 ppm	Pass
§2.1093	RF Exposure	Refer to separate exhibit	-	Pass
§2.1033 (c) (8)	Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range	3.2V 2.5mA	-	-
Notes -				

EXTREME CONDITIONS

Frequency stability is determined over extremes of temperature and voltage. As the device is hand carried, battery powered equipment, the supply voltage was reduced to the battery operating end point of 2.3Vdc as specified by the manufacturer.

The extremes of temperature were 25°C to 45°C as specified in FCC §95.628(e)(1) for stations in the Medical Device Radiocommunication Service.

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2) and were calculated in accordance with NAMAS document NIS 81 and M3003.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF frequency	Hz	25 to 7,000 MHz	1.7×10^{-7}
Radiated emission (field strength)	dBµV/m	25 to 1,000 MHz 1 to 40 GHz	± 3.6 dB ± 6.0 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The MicroTransponder Inc. Serenity model 1000 is an implantable transceiver designed for vagus nerve stimulation. Since the EUT would be placed in the patient's body during operation, it was treated as an implantable device and tested in a phantom simulating human body with 403 MHz body tissue. The implant is battery powered.

The sample was received on August 13, 2012 and tested on August 13, 14, 15 and 27, 2012. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
MicroTransponder Inc	1000	Programmable implantable neurostimulator	134	QHJ-10001001A

OTHER EUT DETAILS

The Juliana IPG operates on channels from 402.45 to 405.55 MHz band with channels separated by 300 kHz. The antenna is integral to the device.

ENCLOSURE

The IPG enclosure is primarily constructed of titanium. It measures approximately 4.5 cm wide by 6.0 cm deep by 1.0 cm high

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

SUPPORT EQUIPMENT

No support equipment was used during testing.

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Nerve Stimulation	-	Lead	Unshielded	0.4

EUT OPERATION

During emissions testing the EUT was transmitting a modulated carrier in the 402-405 MHz frequency band. The transmission was on for 100 msec & off for 900 msec.

TESTING

GENERAL INFORMATION

Radiated spurious emissions measurements were taken at the NTS Silicon Valley Anechoic Chambers and/or Open Area Test Site(s) listed below. The sites conform to the requirements of ANSI C63.4: 2003 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are on file with the FCC and industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 3	769238	IC 2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	IC 2845B-4	
Chamber 5	211948	IC 2845B-5	

In the case of Open Area Test Sites, ambient levels are at least 6 dB below the specification limits with the exception of predictable local TV, radio, and mobile communications traffic.

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN. The measurement bandwidth is set to be at least 1% of the instrument's frequency span.

FREQUENCY STABILITY

The EUT is placed inside a temperature chamber with all support and test equipment located outside of the chamber. The temperature is varied across the specified frequency range in 10 degree increments with frequency measurements made at each temperature step. The EUT is allowed enough time to stabilize at each temperature variation.

The spectrum analyzer is configured to give a 5- or 6-digit display for the marker-frequency function. The spectrum analyzer's built-in frequency counter is used to measure the maximum deviation of the fundamental frequency at each temperature. Where possible the device is set to transmit an unmodulated signal. Where this is not possible the frequency drift is determined by finding a stable point on the signal (e.g. the null at the centre of an OFDM signal) or by calculating a centre frequency based on the upper and lower XdB points (where X is typically 6dB or 10dB) on the signal's skirts.

RADIATED EMISSIONS MEASUREMENTS

Receiver radiated spurious emissions measurements are made in accordance with ANSI ANSI C63.4:2003 by measuring the field strength of the emissions from the device at a specific test distance and comparing them to a field strength limit. Where the field strength limit is specified at a longer distance than the measurement distance the measurement is extrapolated to the limit distance.

Transmitter radiated spurious emissions are initially measured as a field strength. The eirp or erp limit as specified in the relevant rule part(s) is converted to a field strength at the test distance and the emissions from the EUT are then compared to that limit. Emissions within 20dB of this limit are the subjected to a substitution measurement.

All radiated emissions measurements are performed in two phases. A preliminary scan of emissions is conducted in either an anechoic chamber or on an OATS during which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed across the complete frequency range of interest and at each operating frequency identified in the reference standard. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. Initial scans are made using a peak detector (RBW=VBW) and using scan rates to ensure that the EUT transmits before the sweep moves out of each resolution bandwidth (for transmit mode).

During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit. For transmitter spurious emissions, where the limit is expressed as an effective radiated power, the eirp or erp is converted to a field strength limit.

Final measurements are made on an OATS or in a semi-anechoic chamber at the significant frequencies observed during the preliminary scan(s) using the same process of rotating the EUT and raising/lowering the measurement antenna to find the highest level of the emission. The field strength is recorded and, for receiver spurious emissions, compared to the field strength limit. For the final measurement the appropriate detectors (average, peak, normal, sample, quasi-peak) are used. For receiver measurements below 1GHz the detector is a Quasi-Peak detector, above 1GHz a peak detector is used and the peak value (RB=VB=1MHz) and average value (RB=1MHz, VB=10Hz) are recorded.

For transmitter spurious emissions, the radiated power of all emissions within 20dB of the calculated field strength limit are determined using a substitution measurement. The substitution measurement is made by replacing the EUT with an antenna of known gain (typically a dipole antenna or a double-ridged horn antenna), connected to a signal source. The output power of the signal generator is adjusted until the maximum field strength from the substitution antenna is similar to the field strength recorded from the EUT. The erp of the EUT is then calculated.

INSTRUMENTATION

An EMI receiver as specified in CISPR 16-1-1 is used for radiated emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary.

For measurements above the frequency range of the receivers and for all conducted measurements a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis.

Measurement bandwidths for the test instruments are set in accordance with the requirements of the standards referenced in this document.

Software control is used to correct the measurements for transducer factors (e.g. antenna) and the insertion loss of cables, attenuators and other series elements to obtain the final measurement value. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are exported in a graphic and/or tabular format, as appropriate.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the EUT antenna port or receiving antenna and the test receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A combination of biconical, log periodic or bi-log antennas are used to cover the range from 30 MHz to 1000 MHz. Broadband antennas or tuned dipole antennas are used over the entire 25 to 1000 MHz frequency range as the reference antenna for substitution measurements.

Above 1000 MHz, a dual-ridge guide horn antenna or octave horn antenna are used as reference and measurement antennas.

The antenna calibration factors are included in site factors that are programmed into the test receivers and instrument control software when measuring the radiated field strength.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

Table mounted devices are placed on a non-conductive table at a height of 80 centimeters above the floor. Floor mounted equipment is placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. The EUT is positioned on a motorized turntable to allow it to be rotated during testing to determine the angel with the highest level of emissions.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS - CONDUCTED SPURIOUS EMISSIONS

Measurements are compared directly to the conducted emissions specification limit (decibel form). The calculation is as follows:

$$R_r - S = M$$

where:

R_r = Measured value in dBm
S = Specification Limit in dBm
M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS –RADIATED FIELD STRENGTH

Measurements of radiated field strength are compared directly to the specification limit (decibel form). The receiver and/or control software corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor is sued when measurements are made at a test distance that is different to the specified limit distance by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_S = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS –RADIATED POWER

The erp/eirp limits for transmitter spurious measurements are converted to a field strength in free space using the following formula:

$$E = \frac{\sqrt{30\ P\ G}}{d}$$

where:

E = Field Strength in V/m
P = Power in Watts
G = Gain of isotropic antenna (numeric gain) = 1
D = measurement distance in meters

The field strength limit is then converted to decibel form (dBuV/m) and the margin of a given emission peak relative to the limit is calculated (refer to *SAMPLE CALCULATIONS –RADIATED FIELD STRENGTH*).

When substitution measurements are required (all signals with less than 20dB of margin relative to the calculated field strength limit) the eirp of the spurious emission is calculated using:

$$P_{EUT} = P_S - (E_S - E_{EUT})$$

and

$$P_S = G + P_{in}$$

where:

P_S = effective isotropic radiated power of the substitution antenna (dBm)
P_{in} = power input to the substitution antenna (dBm)
G = gain of the substitution antenna (dBi)
E_S = field strength the substitution antenna (dBm) at eirp P_S
E_{EUT} = field strength measured from the EUT

Where necessary the effective isotropic radiated power is converted to effective radiated power by subtracting the gain of a dipole (2.2dBi) from the eirp value.

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

For MedRadio, the above limits also apply to the transmitter per §95.635(d).

Appendix A Test Equipment Calibration Data

Radiated Emissions, 30 - 1,000 MHz, 13-Aug-12

Manufacturer	Description	Model	Asset #	Cal Due
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/7/2014
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103A	2359	2/14/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012

Radiated Emissions, 30 - 4000 MHz, 14-Aug-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/29/2013
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/7/2014
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103A	2359	2/14/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012

Radiated Emissions, 1000 - 4,100 MHz, 15-Aug-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/15/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/22/2012

Environmental Stability, 27-Aug-12

Manufacturer	Description	Model	Asset #	Cal Due
Fluke Mfg. Inc.	Fluke Multimeter, True RMS	175	1447	7/11/2013
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
Watlow	Temp Chamber (w/ F4 Watlow Controller)	Watlow F4	2170	7/11/2013

Appendix B Test Data

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Client:	MicroTransponder Inc	Job Number:	J88422
Product	Serenity model 1000	T-Log Number:	T88769
		Account Manager:	Sheareen Jacobs
Contact:	Federico de Mula		-
Emissions Standard(s):	FCC Parts 15 and 95, EN 301 839	Class:	B
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

MicroTransponder Inc

Product

Serenity model 1000

Date of Last Test: 9/17/2012

Client:	MicroTransponder Inc	Job Number:	J88422
Model:	Serenity model 1000	T-Log Number:	T88769
		Account Manager:	Sheareen Jacobs
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B

FCC Part 15 and 95 Radiated Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 8/13/2012 & 8/15/12 Config. Used: 1

Test Engineer: Deniz Demirci / John Caizzi Config Change: none

Test Location: Ch#5 EUT Voltage: Internal battery

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: °C

Rel. Humidity: %

Summary of Results - Device Operating in the 402-405 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a		low			Fundamental	85.2 dBµV/m	62.6 dBµV/m @ 402.47 MHz (-22.6 dB)
					20dB Bandwidth	300 kHz (95.628(d))	253 kHz (-47 kHz)
					Restricted Band Edge (402 MHz)	65.2 dBµV/m	50.2 dBµV/m @ 402.00 MHz (-15.0 dB)
					20dB Edge at +/-150 kHz	-20dBc	31.2 dBµV/m @ 402.251 MHz (-4.0 dB)
					Radiated Emissions, 25 - 4050 MHz	Part 95	35.3 dBµV/m @ 32.65 MHz (-4.7 dB)
1b		high			Fundamental	85.2 dBµV/m	62.9 dBµV/m @ 404.49 MHz (-22.3 dB)
					20dB Bandwidth	300 kHz (95.628(d))	240 kHz (-60 kHz)
					Restricted Band Edge (405 MHz)	65.2 dBµV/m	13.5 dBµV/m @ 405.05 MHz (-51.7 dB)
					20dB Edge at +/-150 kHz	-20dBc	33.4 dBµV/m @ 404.75 MHz (-3.7 dB)
					Radiated Emissions, 25 - 4050 MHz	Part 95	18.0 dBµV/m @ 76.16 MHz (-22.0 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Client:	MicroTransponder Inc	Job Number:	J88422
Model:	Serenity model 1000	T-Log Number:	T88769
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Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	MicroTransponder Inc	Job Number:	J88422
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		Account Manager:	Sheareen Jacobs
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B

Run #1: Radiated Spurious Emissions, 25 - 4050 MHz.

EUT and Test Configuration Details:

Fundamental level (Limit: 85.2 dBuV/m) - FCC 95.639(f) - 25uW EIRP in any 300kHz (see 95.628(g)(3))

Level more than 250kHz outside of the 402-405MHz band - FCC 95.635(d)(1) - equivalent to FCC Class B, QP detector (or peak)

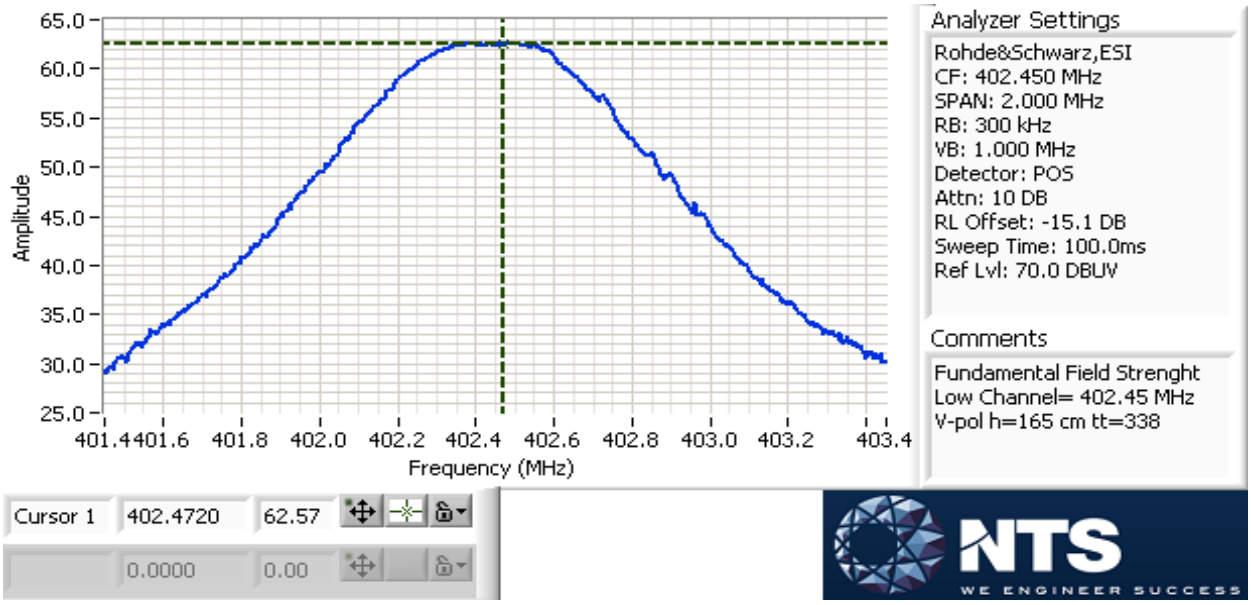
Emissions within 402-405MHz, more than 150kHz away from fundamental will be attenuated below the transmitter output power by at least 20dB - FCC 95.635(d)(4). RBW = 1% of emission bandwidth

Emissions outside of the band, but within 250kHz of the band (401.75-402.0MHz and 405-405.25MHz) will be attenuated below the maximum permitted output power by at least 20dB (= 65.2dBuV/m). - FCC 95.635(5). RBW=1% of emissions bandwidth

Run #1a: Low Channel @ 402.45 MHz

Fundamental Signal Field Strength: Peak values measured in 300kHz

Frequency	Level	Pol	95.639(f)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
402.472	62.6	V	85.2	-22.6	PK	338	1.65	EUT upright
402.496	53.7	H	85.2	-31.6	PK	213	2.08	EUT upright
402.472	54.4	V	85.2	-30.8	PK	66	1.69	EUT flat
402.420	53.0	H	85.2	-32.2	PK	256	1.28	EUT flat



20dB Bandwidth Plot

Client:	MicroTransponder Inc	Job Number:	J88422
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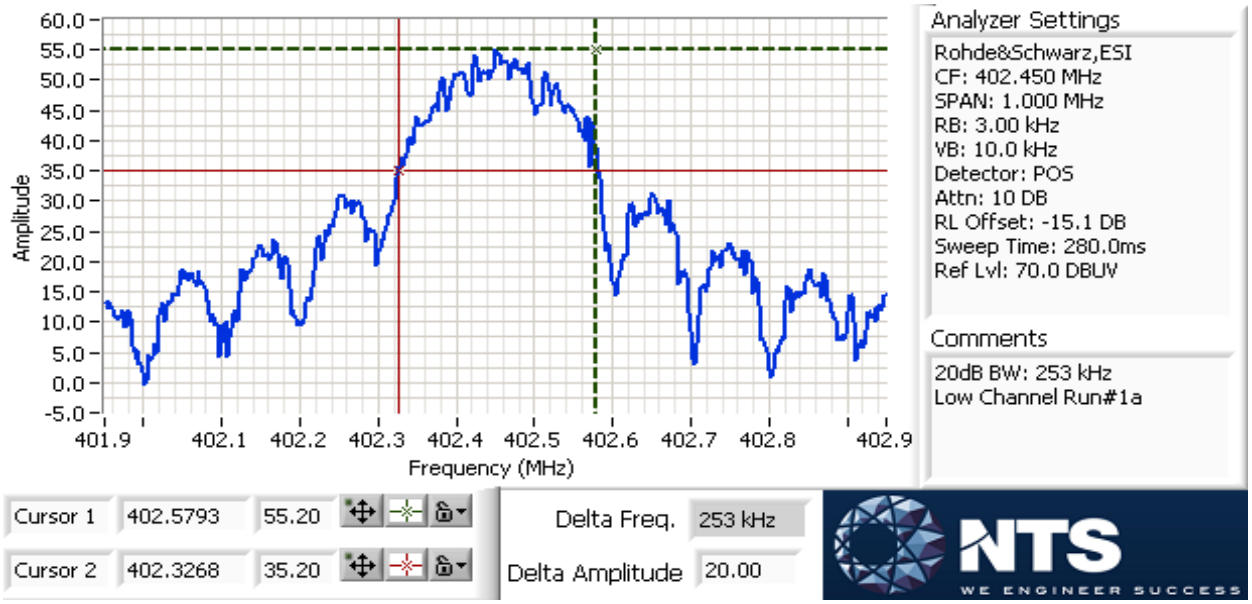
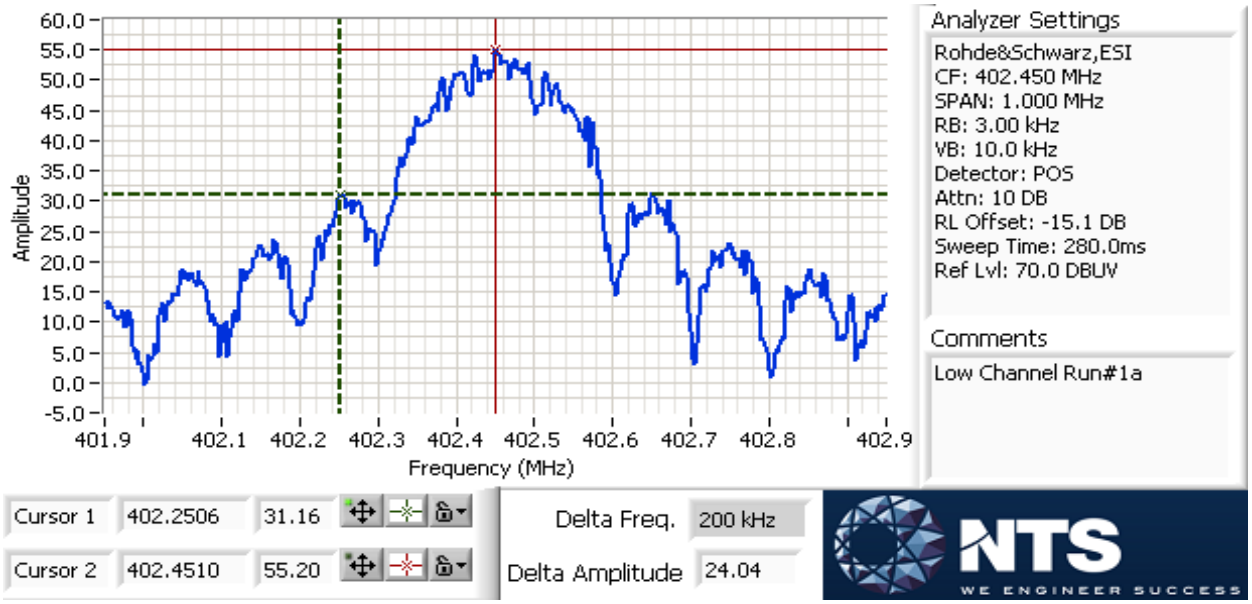
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B



EUT upright

Emissions within the band 402-405MHz, more than 150kHz away from fundamental plot



EUT upright

Client:	MicroTransponder Inc	Job Number:	J88422
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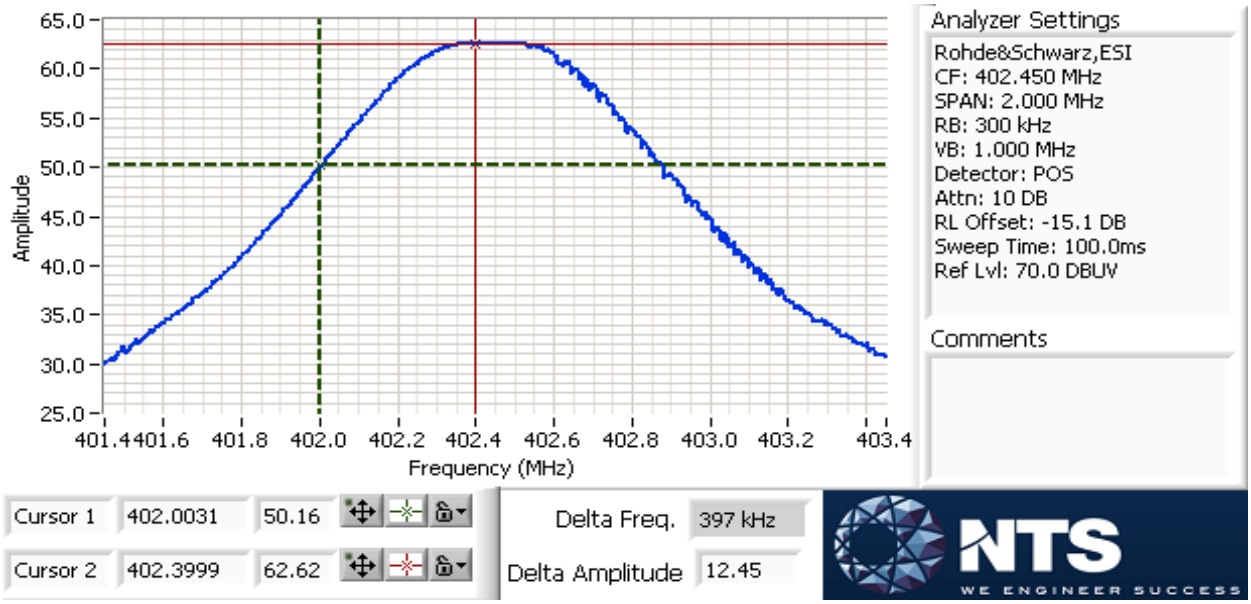
		Account Manager:	Sheareen Jacobs
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B

Band Edge Signal Field Strength - Direct measurement of field strength - Emissions within 250kHz of band

Frequency	Level	Pol	95.639(f)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
402.000	50.2	V	65.2	-15.0	PK	338	1.65	EUT upright

Note 1:	Test performed with RBW=300kHz. Represents worse case measurement.



Other Spurious Emissions
Maximized measurements

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
32.646	35.3	V	40.0	-4.7	Peak	155	1.0	EUT upright
40.071	21.8	H	40.0	-18.2	Peak	353	1.0	EUT upright
76.017	13.7	V	40.0	-26.3	Peak	70	1.0	EUT upright
804.900	35.6	H	46.0	-10.4	Peak	124	1.0	EUT upright
824.649	35.6	H	46.0	-10.4	Peak	124	1.0	EUT upright

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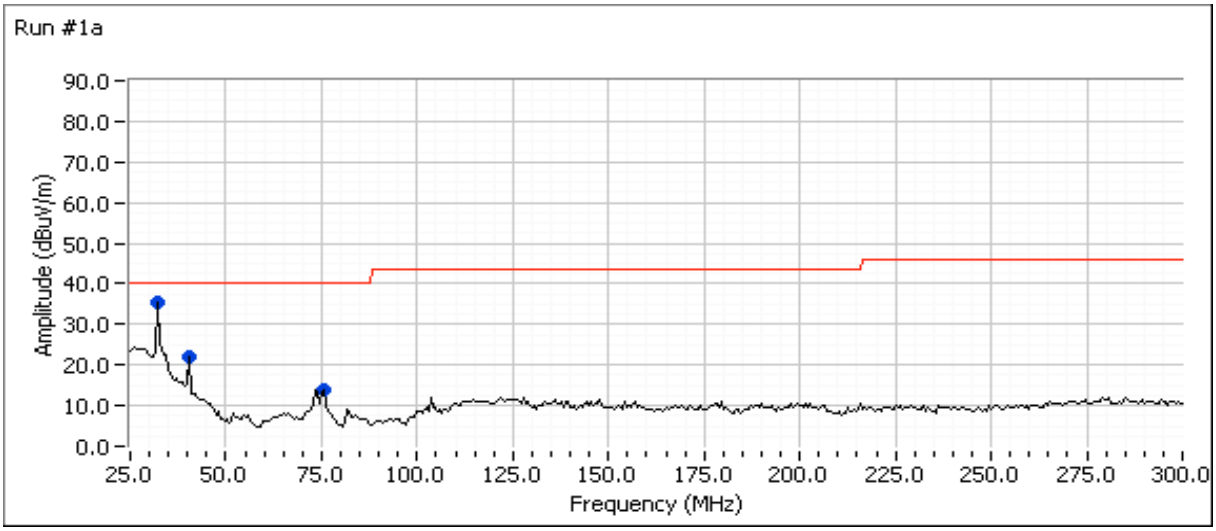
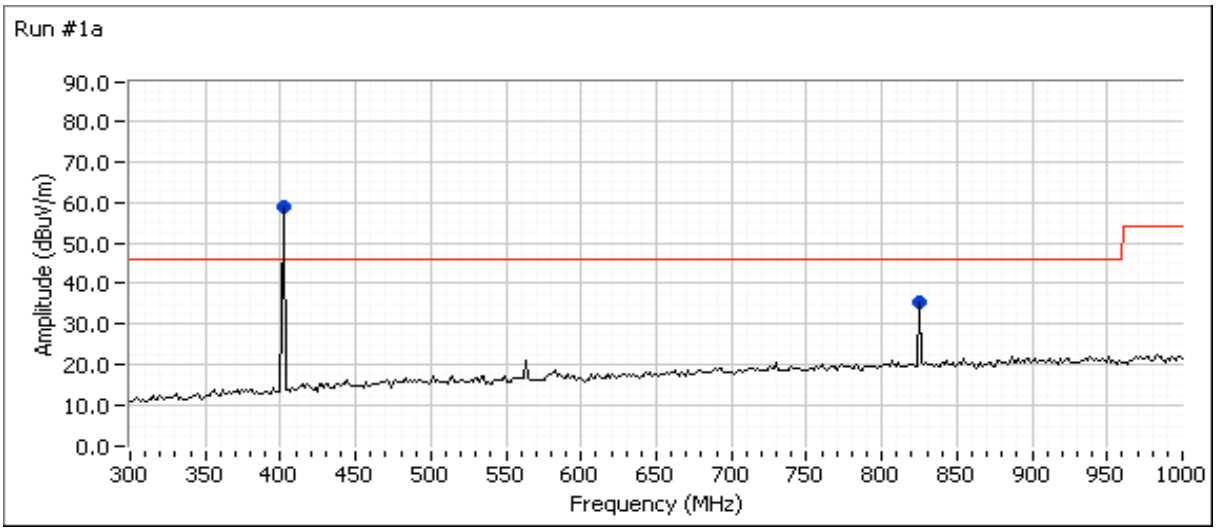
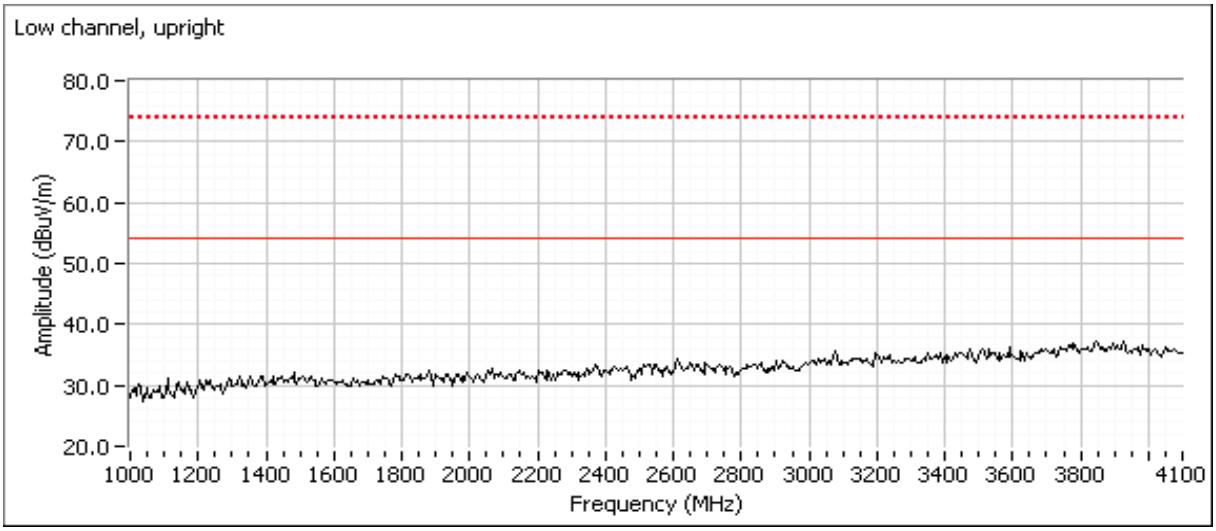
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B





Client:	MicroTransponder Inc	Job Number:	J88422
Model:	Serenity model 1000	T-Log Number:	T88769
		Account Manager:	Sheareen Jacobs
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B



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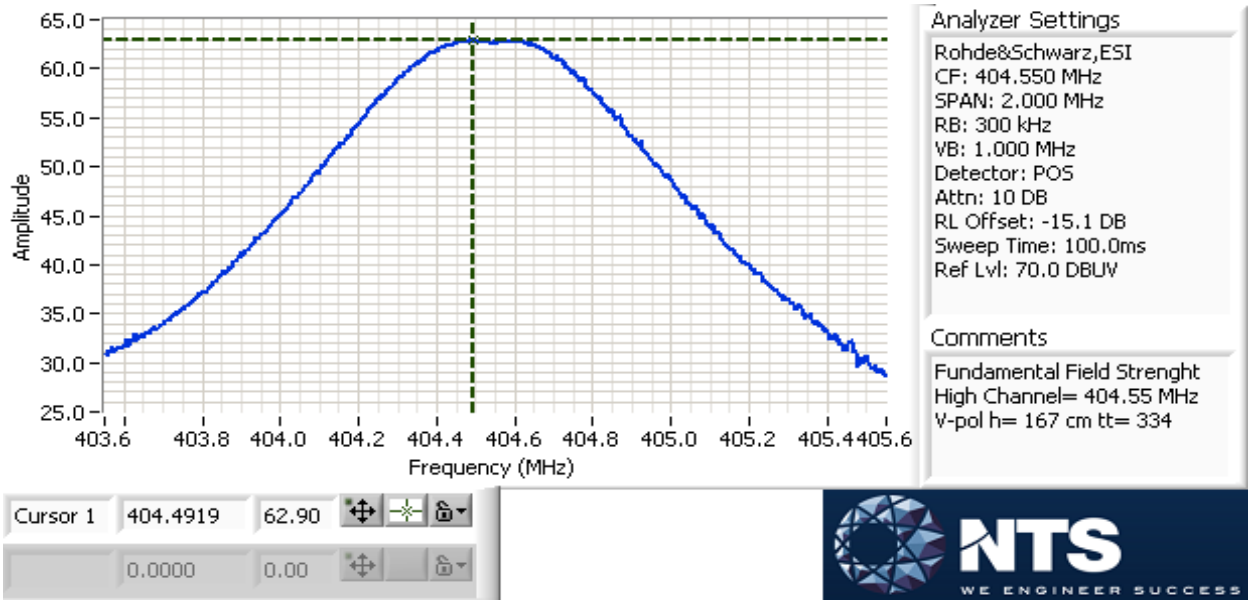
Run #1b: High Channel @ 404.55 MHz

Fundamental Signal Field Strength: Peak values measured in 300kHz

Frequency	Level	Pol	95.639(f)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
404.491	62.9	V	85.2	-22.3	PK	334	1.70	EUT upright
404.484	56.3	H	85.2	-28.9	PK	29	3.02	EUT upright
404.512	53.8	V	85.2	-31.4	PK	70	1.74	EUT flat
404.572	51.4	H	85.2	-33.8	PK	286	2.46	EUT flat



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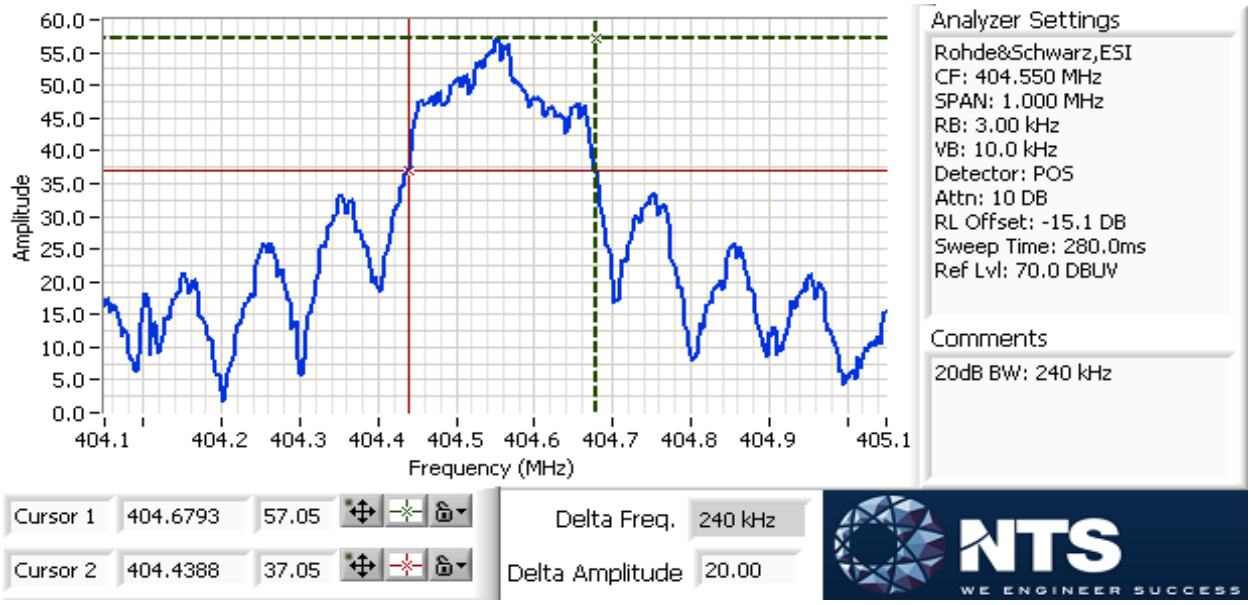
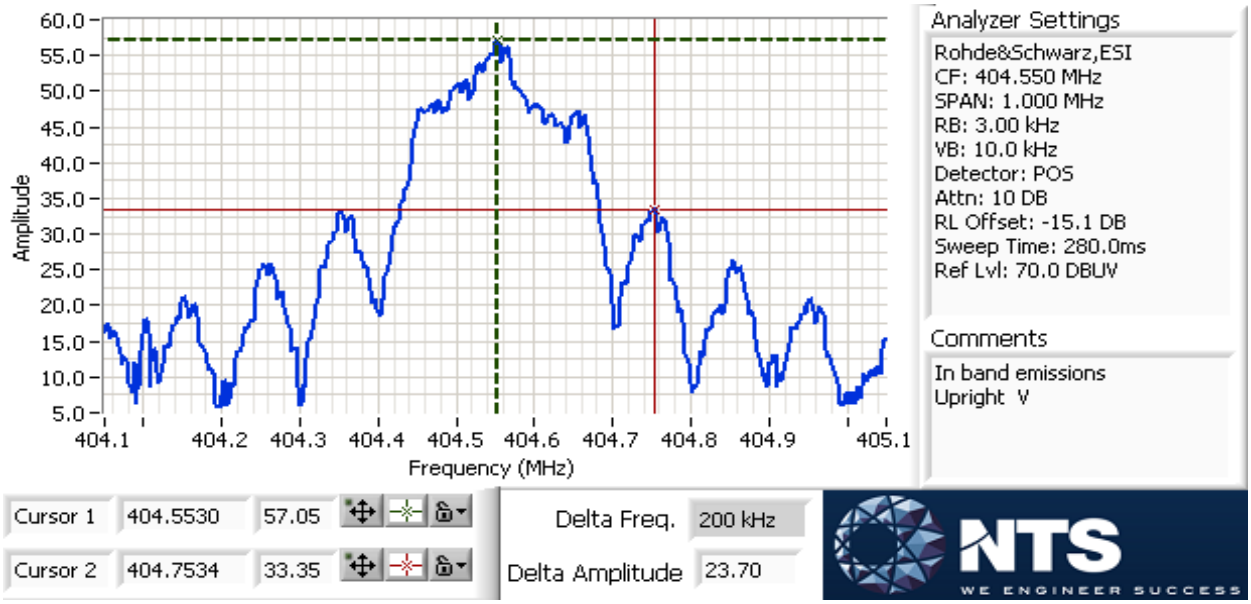
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	B

20dB Bandwidth Plot



EUT upright

Emissions within the band 402-405MHz, more than 150kHz away from fundamental plot



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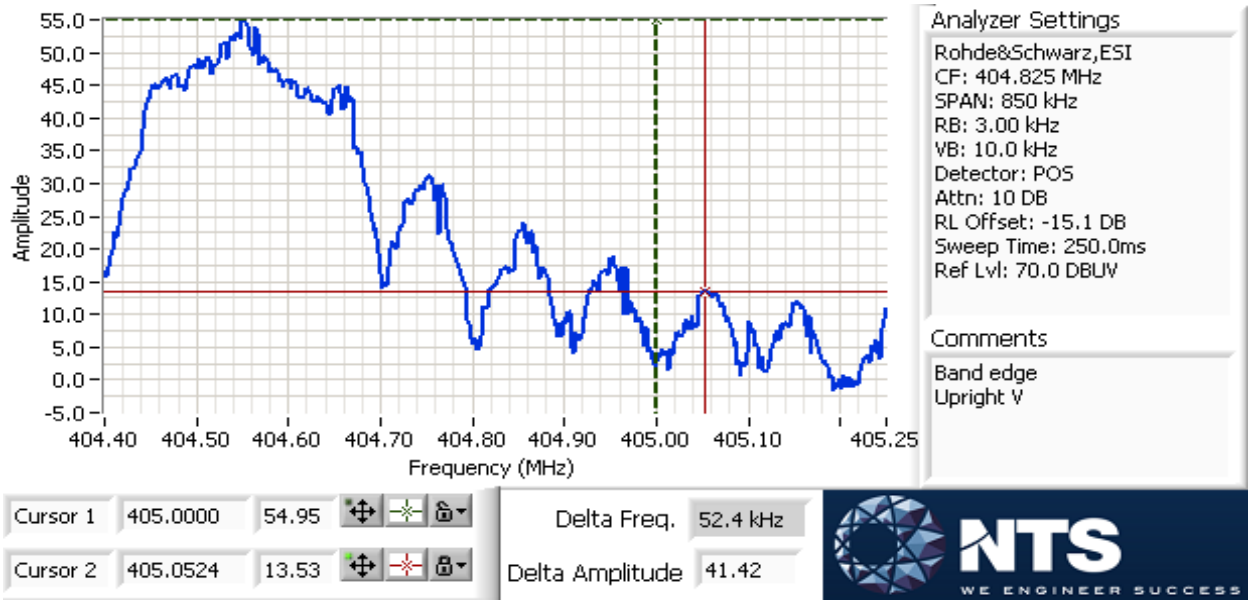
Band Edge Signal Field Strength - Direct measurement of field strength - Emissions within 250kHz of band

Frequency	Level	Pol	95.639(f)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
405.052	13.5	v/h	65.2	-51.7	PK	334	1.67	EUT upright

Bandedge Plot



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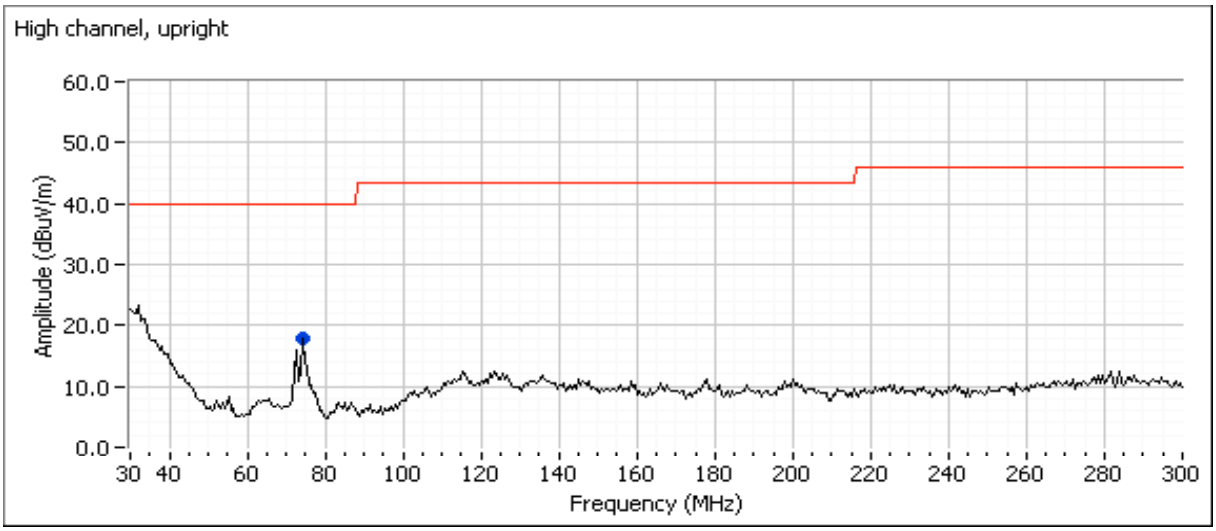
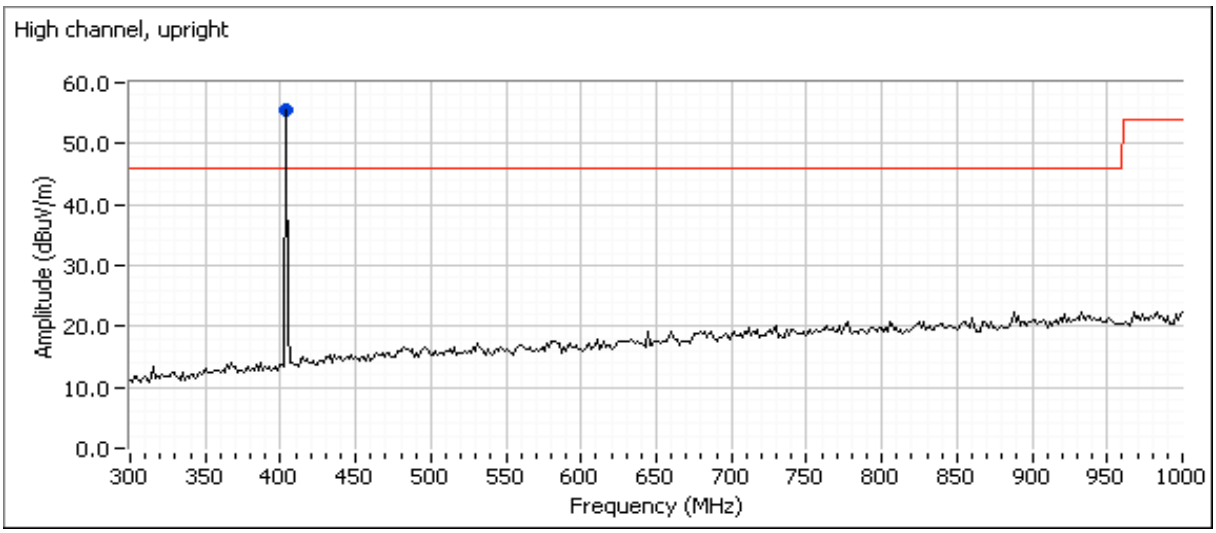
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
76.164	18.0	V	40.0	-22.0	Peak	92	1.0	EUT upright





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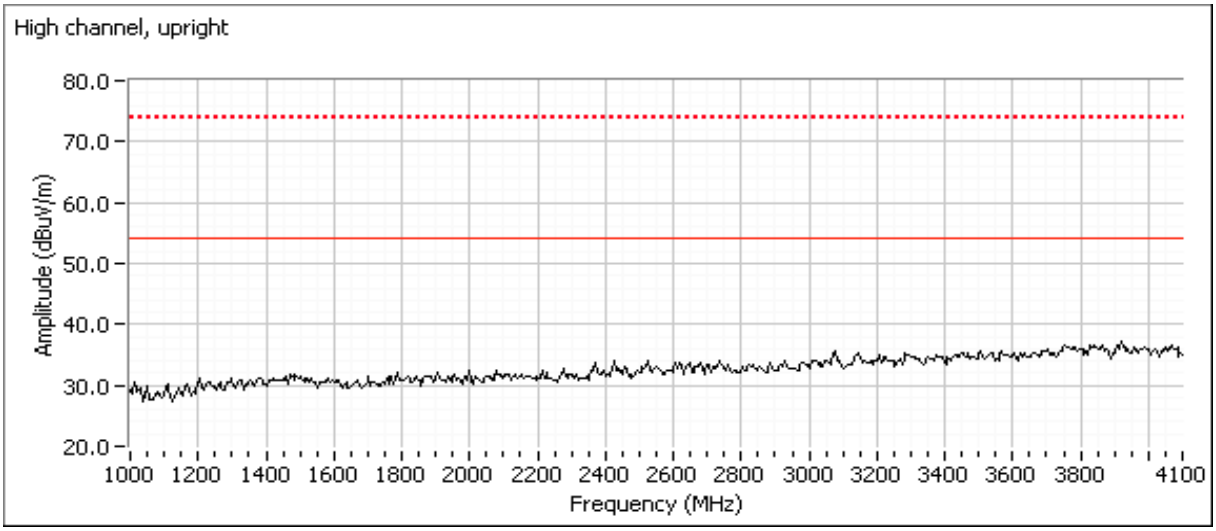

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Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	N/A

FCC Part 95.628(e)
Frequency Stability

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

With the exception of the radiated spurious emissions tests, all measurements are made with a probe. For frequency stability measurements the EUT was place inside an environmental chamber.

Radiated measurements are made with the EUT located on a non-conductive table, 3m from the measurement antenna.

Ambient Conditions:

Temperature: 20 °C

Rel. Humidity: 40 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result
1	Frequency Stability -Temperature	+/- 100 ppm	Pass	+10.0 ppm
1	Frequency Stability - Voltage	+/- 100 ppm	Pass	+10.0 ppm

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	MicroTransponder Inc	Job Number:	J88422
Model:	Serenity model 1000	T-Log Number:	T88769
		Account Manager:	Sheareen Jacobs
Contact:	Federico de Mula		
Standard:	FCC Parts 15 and 95, EN 301 839	Class:	N/A

Run #1: Frequency Stability

Date: 8/27/2012 Engineer: John Caizzi Location: Environmental Chamber

Nominal Frequency: 403.65 MHz

Frequency Stability Over Temperature

The EUT was soaked at each temperature for a minimum of 30 minutes prior to making the measurements to ensure the EUT and chamber had stabilized at that temperature.

Temperature	Frequency Measured	Drift	
(Celsius)	(MHz)	(Hz)	(ppm)
25	403.654020	4020	10.0
37	403.651585	1585	3.9
45	403.653610	3610	8.9
	Worst case:	4020	10.0

Frequency Stability Over Input Voltage

Battery endpoint is 2.3 VDC

Voltage	Frequency Measured	Drift	
(DC)	(MHz)	(Hz)	(ppm)
3.2	403.654020	4020	10.0
2.3	403.653904	3904	9.7

End of Report

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marks the last page of this test report.