EMISSIONS TEST REPORT

Report Number: 3069813.EMI
Project Number: 3069813

Testing performed on the
JETTce with RFID Module
Model: JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-BK-DV

to

FCC Part 15 Subpart B Class A
FCC Part 15 Subpart C 15.225
ICES-003 Class A
RSS-210 Issue 5 6.2.2(e)

For

Two Technologies

Test Performed by:	Test Authorized by:
Intertek – ETL SEMKO	Two Technologies
70 Codman Hill Road	419 Sargon Way
Boxborough, MA 01719	Horsham, PA, 19044

Prepared by: _____ Date: 8/25/2005
Nicholas Abbondante

Reviewed by: _____ Date: 8-26-05
Michael F. Murphy

1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of

Company:	Two Technologies 419 Sargon Way Horsham, PA 19044
Contact:	Roger Mick
Telephone:	215-773-7186
Fax:	215-441-8819

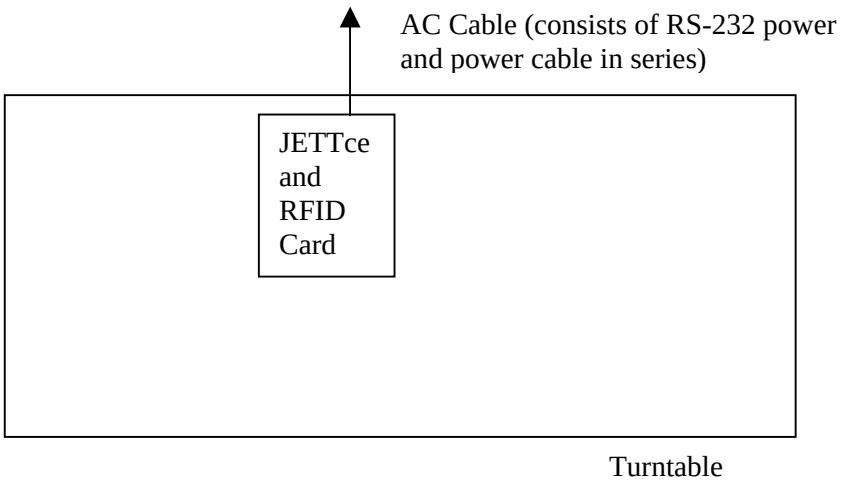
1.2 Equipment Under Test

Equipment Type:	JETTce with RFID Module
Model Number(s):	JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-BK-DV
Serial number(s):	HH272990
Manufacturer:	Two Technologies
EUT receive date:	07/28/2005
EUT received condition:	Good
Test start date:	08/10/2005
Test end date:	08/12/2005

1.3 Test Plan Reference: Tested according to the standards listed.

1.4 Test Configuration

1.4.1 Block Diagram



1.4.2 Cable List:

Cable	Shielding	Connector	Length (m)	Qty.
RS-232 Power Cable	Foil	Metal/360 at power and plastic at EUT	5	1
Power Cable	None	Metal/360	1	1

1.4.3 Support Equipment:

Name: RFID Tag
Model No.: 14443A
Serial No.: N/A

1.5 Mode of Operation:

The EUT was activated from 120V/60Hz AC power in charging mode and from a charged battery in transmit mode. During charging mode the EUT was active but idle with the RF test software initiated. The EUT software disables transmission while in charge mode. During transmit mode, the EUT was placed next to an RFID card and the card was read continuously throughout testing.

2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 15 Subpart B Class A FCC Part 15 Subpart C 15.225 ICES-003 Class A RSS-210 Issue 5 6.2.2(e)		
SUB-TEST	**TEST PARAMETER**	**COMMENT**
FCC Parts 2.1046, 2.1053, 15.109 Class A, 15.205, 15.209, 15.225 ICES-003, RSS-210 5.17, 6.2.2(e), 6.3 RF Output Power and Radiated and Restricted Band Emissions	Emissions below specified limits	Pass
FCC Part 15.107 Class B, 15.207 RSS-210 6.6, ICES-003 Class B Line-Conducted Emissions	Emissions below specified limits	Pass
FCC Parts 2.1055, 15.225 RSS-210 6.2.2(e), 6.4 Frequency Stability	Frequency drift must not exceed ±0.01%	Pass
FCC Parts 2.1049, 15.205 RSS-210 5.9.1, 6.3 Occupied Bandwidth and Restricted Bands	The 20dB bandwidth must not extend into or drift into the restricted bands	Pass

3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

Level in μV/m = [10(32 dBμV/m)/20] = 39.8 μV/m

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(48.1\ dB\mu V / 20)}$ = 254 μV/m

3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.
The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be:

±3.5 dB at 10m, ±3.8 dB at 3m

The expanded uncertainty (k = 2) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

±2.6 dB

The expanded uncertainty (k = 2) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

±3.2 for ISN and voltage probe measurements
±3.1 for current probe measurements

3.2 Site Description

Test Site(s): 2, Field Behind Site 2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-1992 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

The EMC Lab has two Semi-anechoic Chambers and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference groundplanes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Test Results: Pass

Test Standard: FCC Parts 2.1046, 2.1053, 15.109, 15.205, 15.209, 15.225, RSS-210 5.17, 6.2.2(e), 6.3, ICES-003

Test: RF Output Power and Radiated and Restricted Band Emissions

Performance Criterion: RF Output Power is subject to the limits set forth in FCC Part 15.225 and RSS-210 6.2.2(e), Spurious Emissions up to the tenth harmonic and in restricted bands are subject to the limits set forth in FCC Part 15.209 and RSS-210 Tables 3 and 7, Spurious Emissions above the tenth harmonic are subject to the limits set forth in FCC Part 15.109 Class A and ICES-003 Class A. Spurious Emissions in charge mode are subject to the limits set forth in FCC Part 15.109 Class A and ICES-003 Class A.

Test Environment:
See Data Tables

Maximum Test Disturbance Parameters: Emissions must not exceed specified limits.
Pre-test Verification:
Software:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	2/07/05 Revision

Test Date: 08/10/2005 **Engineer Initials:** NNA **Date:** 8/25/05
Test Engineer: Nicholas Abbondante **Reviewer Initials:** MFM **Date:** 8-26-05

Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
BAR2	Mannix	0ABA116	BAR2	08/02/2006
LOG2	EMCO	3142	9711-1223	12/13/2005
REC2	Hewlett Packard	8542E	3520A00125	02/08/2006
RECFL2	Hewlett Packard	85420E	3427A00126	02/08/2006
ROS002	Rohde & Schwarz	ESCI	100067	11/25/2005
CBL022	Belden	RG-58/U	CBL022	11/17/2005
LOOP 145-019	EMCO	6502/1	9902-3267	01/26/2006
S2, 10M FLR	ITS	RG-214B/U	S2, 10M FLR	09/15/2005

Test Details:

Radiated Emissions / Interference

Company: Two Technologies
Engineer: Nicholas Abbondante
Project #: 3069813
Date: 08/10/05
Standard: FCC Part 15.225/15.209
Class: -
Barometer: BAR2
Pressure: 1004mB
Temp: 27c
Humidity: 60%
Group: None
Model #: JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-DV
Serial #: HH267368 4304
Receiver: R&S ESCI (ROS002)
Antenna: LOOP145-019-E 1-26-06.txt LOOP145-019-H 1-26-06.txt
PreAmp: NONE.
Cable(s): CBL022 11-17-2005.cbl NONE.
Limit Distance: 30 meters
Test Distance: 3 meters
Location: Site 2 Field
Voltage/Frequency: Fresh Battery
Frequency Range: 150 kHz - 30 MHz
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	13.563	60.9	10.5	0.4	0.0	40.0	31.8	84.0	-52.2	9/30 kHz
QP	V	13.552	41.3	10.5	0.4	0.0	40.0	12.2	50.5	-38.3	9/30 kHz
QP	V	13.568	34.5	10.5	0.4	0.0	40.0	5.4	50.5	-45.1	9/30 kHz
QP	V	13.409	19.1	10.5	0.4	0.0	40.0	-10.0	40.5	-50.5	9/30 kHz
QP	V	13.711	19.4	10.5	0.4	0.0	40.0	-9.7	40.5	-50.2	9/30 kHz
QP	V	27.126	16.8	9.5	0.6	0.0	40.0	-13.0	29.5	-42.5	9/30 kHz

Transmit Mode

Radiated Emissions / Interference

Company: Two Technologies
Engineer: Nicholas Abbondante
Project #: 3069813
Date: 08/10/05
Standard: FCC Part 15 15.209
Class: -
Barometer: BAR2
Pressure: 1004mB
Temp: 22c
Humidity: 60%
Group: None
Model #: JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-DV
Serial #: HH267368 4304
Receiver: HP 8542E (REC2/RECFL2)
Antenna: LOG2 12-13-05 V10.txt LOG2 12-13-05 H10.txt
PreAmp: NONE.
Cable(s): Site2, 10M Floor 9-15-05.cbl NONE.
Limit Distance: 3 meters
Test Distance: 10 meters
Location: Site 2
Voltage/Frequency: Fresh Battery
Frequency Range: 30 - 135.6 MHz
Tx Mode
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	40.690	14.6	11.3	1.0	0.0	-10.5	37.3	40.0	-2.7	120/300 kHz
QP	V	108.500	0.1	7.6	1.6	0.0	-10.5	19.8	43.5	-23.7	120/300 kHz
QP	V	122.000	-1.2	6.8	1.7	0.0	-10.5	17.8	43.5	-25.7	120/300 kHz
QP	V	135.600	0.7	7.1	1.8	0.0	-10.5	20.1	43.5	-23.4	120/300 kHz

Transmit Mode

Radiated Emissions / Interference

Company: Two Technologies
Engineer: Nicholas Abbondante
Project #: 3069813
Date: 08/10/05
Standard: FCC Part 15.109
Class: A
Group: None
Limit Distance: 10 meters
Voltage/Frequency: Fresh Battery
Barometer: BAR2
Pressure: 1004mB
Temp: 22c
Humidity: 60%
Model #: JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-DV
Serial #: HH267368 4304
Receiver: HP 8542E (REC2/RECFL2)
Antenna: LOG2 12-13-05 V10.txt LOG2 12-13-05 H10.txt
PreAmp: NONE.
Cable(s): Site2, 10M Floor 9-15-05.cbl NONE.
Test Distance: 10 meters
Location: Site 2
Frequency Range: 135.6 - 1000 MHz

Tx Mode

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	149.200	-0.9	8.7	1.9	0.0	0.0	9.7	43.5	-33.8	120/300 kHz
QP	H	162.700	-2.4	9.2	2.0	0.0	0.0	8.8	43.5	-34.7	120/300 kHz
QP	H	185.200	3.9	9.9	2.2	0.0	0.0	16.0	43.5	-27.5	120/300 kHz
QP	H	190.800	5.7	10.0	2.2	0.0	0.0	17.9	43.5	-25.6	120/300 kHz
QP	H	206.600	6.2	10.2	2.3	0.0	0.0	18.7	43.5	-24.8	120/300 kHz
QP	H	216.960	10.1	10.7	2.4	0.0	0.0	23.2	46.4	-23.2	120/300 kHz
QP	H	218.300	8.9	10.8	2.4	0.0	0.0	22.1	46.4	-24.3	120/300 kHz
QP	H	224.100	11.7	11.1	2.4	0.0	0.0	25.2	46.4	-21.2	120/300 kHz
QP	H	230.500	9.7	11.3	2.5	0.0	0.0	23.5	46.4	-22.9	120/300 kHz
QP	H	240.400	8.5	11.7	2.5	0.0	0.0	22.8	46.4	-23.6	120/300 kHz
QP	H	244.100	13.8	11.9	2.6	0.0	0.0	28.2	46.4	-18.2	120/300 kHz
QP	H	246.300	7.7	12.0	2.6	0.0	0.0	22.2	46.4	-24.2	120/300 kHz
QP	H	262.600	15.0	12.5	2.7	0.0	0.0	30.1	46.4	-16.3	120/300 kHz
QP	H	271.200	17.1	12.7	2.7	0.0	0.0	32.5	46.4	-13.9	120/300 kHz
QP	H	284.700	15.2	12.9	2.8	0.0	0.0	30.9	46.4	-15.5	120/300 kHz
QP	H	298.600	22.8	13.0	2.9	0.0	0.0	38.7	46.4	-7.7	120/300 kHz
QP	H	317.900	18.2	13.9	3.0	0.0	0.0	35.0	46.4	-11.4	120/300 kHz
QP	H	323.500	19.3	14.1	3.0	0.0	0.0	36.4	46.4	-10.0	120/300 kHz
QP	H	329.000	19.4	14.4	3.0	0.0	0.0	36.8	46.4	-9.6	120/300 kHz
QP	H	344.200	10.9	15.0	3.1	0.0	0.0	29.0	46.4	-17.4	120/300 kHz
QP	H	378.800	10.7	16.6	3.3	0.0	0.0	30.5	46.4	-15.9	120/300 kHz
QP	H	400.900	9.7	17.5	3.4	0.0	0.0	30.5	46.4	-15.9	120/300 kHz
QP	H	416.000	5.2	16.9	3.4	0.0	0.0	25.5	46.4	-20.9	120/300 kHz
QP	H	445.100	3.6	17.2	3.6	0.0	0.0	24.4	46.4	-22.0	120/300 kHz
QP	H	483.700	1.3	18.0	3.7	0.0	0.0	23.0	46.4	-23.4	120/300 kHz
QP	H	497.900	8.2	18.2	3.8	0.0	0.0	30.2	46.4	-16.2	120/300 kHz

Transmit Mode

Radiated Emissions / Interference

Company:	Two Technologies			Model #:	JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-DV
Engineer:	Nicholas Abbondante	Barometer:	BAR2	Serial #:	HH267368 4304
Project #:	3069813	Pressure:	1001mB	Receiver:	HP 8542E (REC2/RECFL2)
Date:	08/10/05	Temp:	23c	Antenna:	LOG2 12-13-05 V10.txt LOG2 12-13-05 H10.txt
Standard:	FCC Part 15/Cispr22	Humidity:	61%	PreAmp:	NONE.
Class:	A	Group:	None	Cable(s):	Site2, 10M Floor 9-15-05.cbl NONE.

Limit Distance: 10 meters Test Distance: 10 meters Location: Site 2

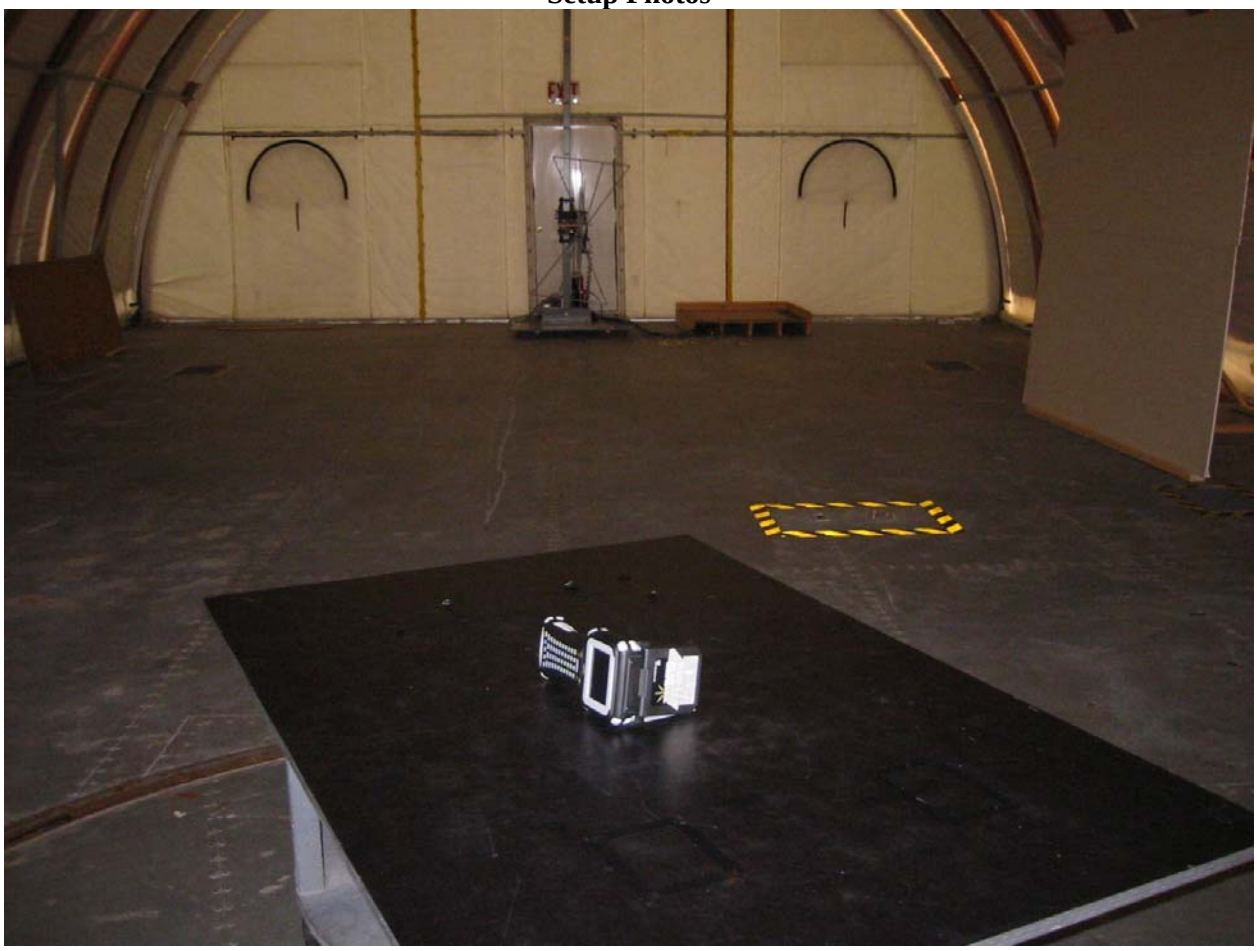
Voltage/Frequency: 120V/60Hz Frequency Range: 30 - 1000 MHz

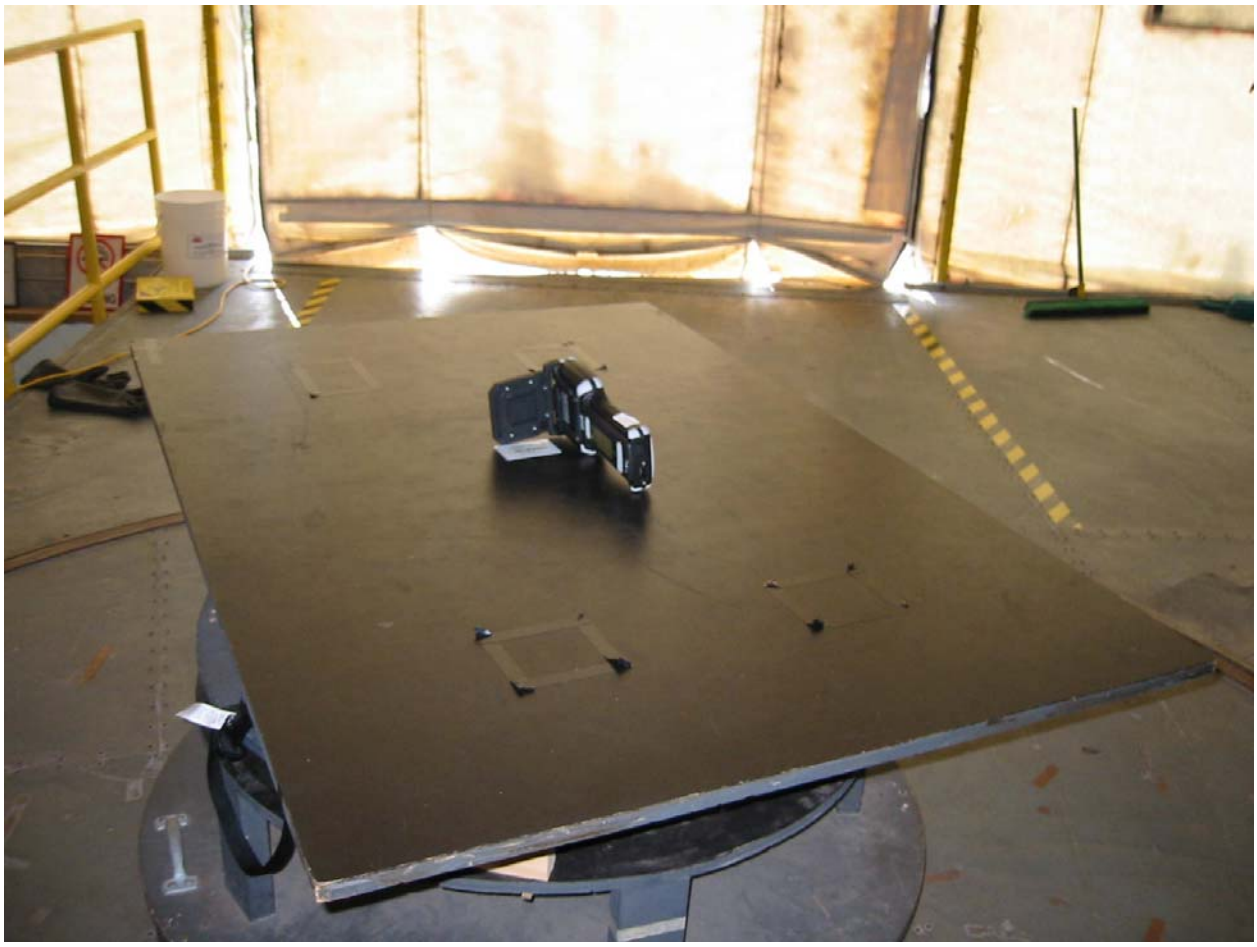
Charge Mo Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	117.300	4.5	7.0	1.7	0.0	0.0	13.2	40.0	-26.8	120/300 kHz
QP	V	127.300	8.7	6.7	1.8	0.0	0.0	17.2	40.0	-22.8	120/300 kHz
QP	V	149.300	5.2	8.7	1.9	0.0	0.0	15.8	40.0	-24.2	120/300 kHz
QP	V	160.700	4.1	9.3	2.0	0.0	0.0	15.4	40.0	-24.6	120/300 kHz
QP	V	169.500	8.4	9.3	2.1	0.0	0.0	19.8	40.0	-20.2	120/300 kHz
QP	V	171.400	12.8	9.4	2.1	0.0	0.0	24.3	40.0	-15.7	120/300 kHz
QP	V	182.500	10.2	10.1	2.2	0.0	0.0	22.4	40.0	-17.6	120/300 kHz
QP	V	184.400	6.4	10.1	2.2	0.0	0.0	18.7	40.0	-21.3	120/300 kHz
QP	V	204.600	11.0	10.4	2.3	0.0	0.0	23.7	40.0	-16.3	120/300 kHz
QP	V	208.200	9.0	10.6	2.3	0.0	0.0	21.9	40.0	-18.1	120/300 kHz
QP	V	215.700	15.0	10.9	2.4	0.0	0.0	28.3	40.0	-11.7	120/300 kHz
QP	V	219.200	12.9	11.0	2.4	0.0	0.0	26.4	40.0	-13.6	120/300 kHz
QP	V	226.700	15.8	11.4	2.5	0.0	0.0	29.6	40.0	-10.4	120/300 kHz
QP	V	237.800	15.4	11.8	2.5	0.0	0.0	29.7	47.0	-17.3	120/300 kHz
QP	V	248.900	12.8	12.2	2.6	0.0	0.0	27.6	47.0	-19.4	120/300 kHz
QP	V	262.300	7.6	12.6	2.7	0.0	0.0	22.9	47.0	-24.1	120/300 kHz
QP	V	298.700	27.7	13.4	2.9	0.0	0.0	44.0	47.0	-3.0	120/300 kHz
QP	V	307.700	13.0	13.7	2.9	0.0	0.0	29.6	47.0	-17.4	120/300 kHz
QP	V	315.200	15.3	14.0	3.0	0.0	0.0	32.3	47.0	-14.7	120/300 kHz
QP	V	337.300	10.6	14.8	3.1	0.0	0.0	28.5	47.0	-18.5	120/300 kHz
QP	V	497.700	10.9	18.0	3.8	0.0	0.0	32.7	47.0	-14.3	120/300 kHz

Charge Mode

Setup Photos





Test Results: Pass

Test Standard: FCC Part 15.107, 15.207, RSS-210 6.6, ICES-003

Test: Line-conducted Emissions

Performance Criterion: Class B

Test Environment:
See Data Table

Maximum Test Disturbance Parameters: Emissions must not exceed specified limits
Pre-test Verification:
Software:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	2/07/05 Revision

Test Date: 08/11/2005 **Engineer Initials:** NN4 **Date:** 8/25/05
Test Engineer: Nicholas Abbondante **Reviewer Initials:** MFM **Date:** 8-26-05

Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
CBL022	Belden	RG-58/U	CBL022	11/17/2005
DS22A	Mini Circuits	20 dB, 50 Ohm	DS22A	11/17/2005
ROS002	Rohde & Schwarz	ESCI	100067	11/25/2005
BAR3	Mannix	0ABA116	BAR3	08/03/2006
LISN11	Solar Electronics	9252-50-R-24-BNC	941714	07/05/2006

Test Details:

Conducted Emissions / Interference

Company:	Two Technologies			Model #:	JETTRFIDBTFTTP45EKR2-SP-128CF-CARD-DV
Engineer:	Nicholas Abbondante	Barometer:	BAR3	Serial #:	HH267368 4304
Project #:	3069813	Pressure:	1000mB	Receiver:	R&S ESCI (ROS002)
Date:	08/11/05	Temp:	21c	Cable:	CBL022 11-17-2005.cbl
Standard:	FCC Part 15.207	Humidity:	54%	LISN 1, 2:	LISN11 [1] 7-05-06.lsn LISN11 [2] 7-05-06.lsn
Class:	-	Group:	None	LISN 3, N:	NONE. NONE.
				Attenuator:	DS22A 11-17-2005.att Location: Site 3

Voltage/Frequency: 120V/60Hz Frequency Range: 150 kHz - 30 MHz

Net is the sum of worst-case lisn, cable, & attenuator losses, preamp gain, and initial reading

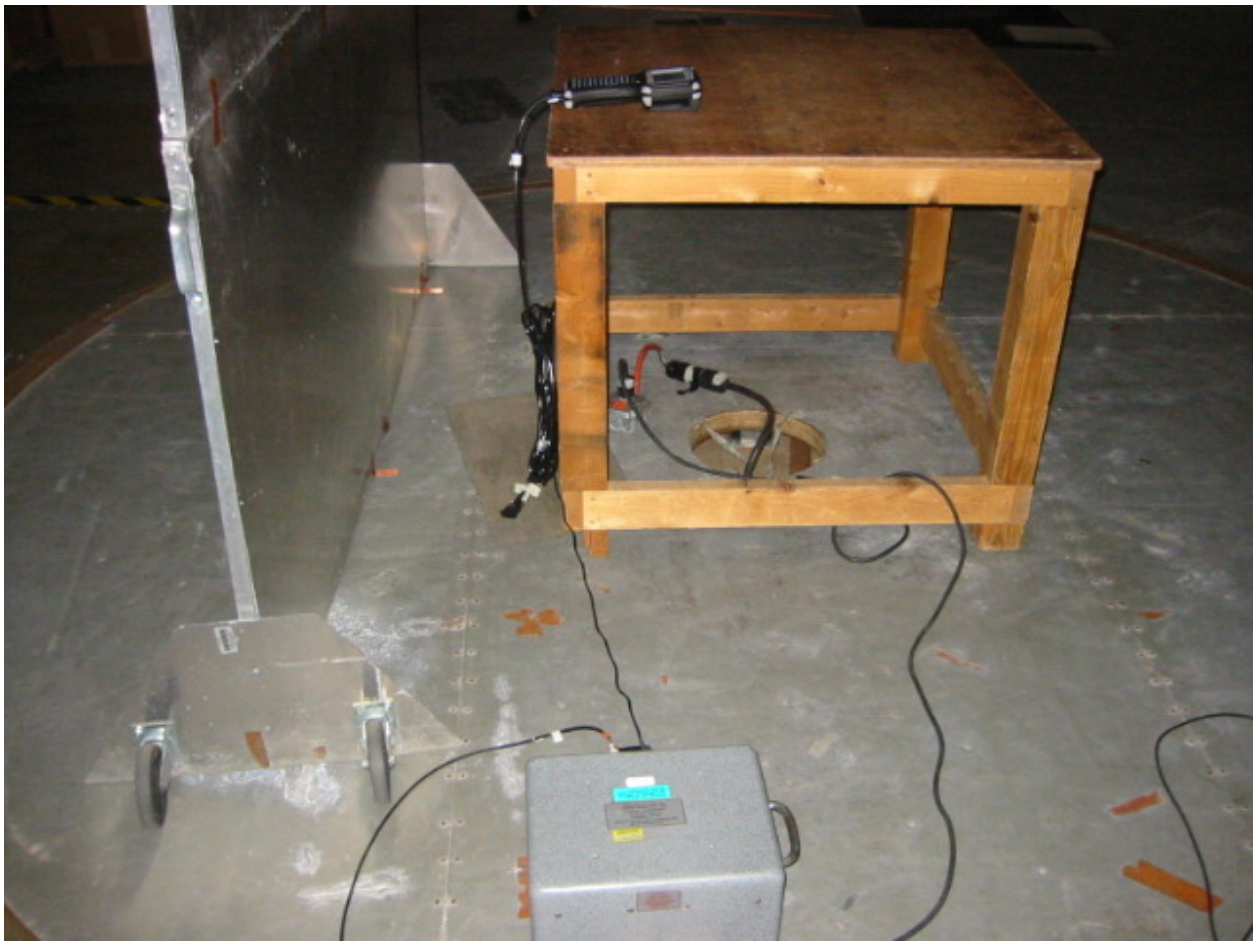
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; Bandwidth denoted as RBW/VBW

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Neutral dB(uV)	Net dB(uV)	QP Limit dB(uV)	Margin dB	Bandwidth
QP	0.218	27.6	23.1			47.8	62.9	-15.1	9/30 kHz
QP	0.326	15.2	17.1			37.3	59.6	-22.2	9/30 kHz
QP	0.548	12.7	7.7			32.9	56.0	-23.1	9/30 kHz
QP	3.672	14.6	15.5			35.9	56.0	-20.1	9/30 kHz
QP	14.480	10.6	6.6			31.4	60.0	-28.6	9/30 kHz
QP	22.100	-0.3	-0.5			20.9	60.0	-39.1	9/30 kHz

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Neutral dB(uV)	Net dB(uV)	Average Limit dB(uV)	Margin dB	Bandwidth
AVG	0.218	17.6	10.8			37.8	52.9	-15.1	9/30 kHz
AVG	0.326	3.2	0.7			23.4	49.6	-26.1	9/30 kHz
AVG	0.548	1.8	-1.1			22.1	46.0	-23.9	9/30 kHz
AVG	3.672	-1.0	0.8			21.3	46.0	-24.7	9/30 kHz
AVG	14.480	0.8	-3.2			21.6	50.0	-28.4	9/30 kHz
AVG	22.100	-7.8	-8.1			13.4	50.0	-36.6	9/30 kHz

Charge mode only (EUT does not transmit when AC power is detected)

Setup Photos



Test Results: Pass

Test Standard: FCC Parts 2.1055, 15.225, RSS-210 6.2.2(e), 6.4

Test: Frequency Stability

Performance Criterion: The EUT must meet the requirements of FCC Part 15.225 and RSS-210 6.2.2(e)

Test Environment:
Temp: 22°C **Humidity:** 52%
Pressure: 1005 mbar

Maximum Test Disturbance Parameters: Frequency drift shall not exceed ±0.01%
Pre-test Verification:
Software:

Description	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3

Test Date: 08/12/2005 **Engineer Initials:** NNA **Date:** 8/25/05
Test Engineer: Nicholas Abbondante **Reviewer Initials:** MFM **Date:** 8-26-05

Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
CBL022	Belden	RG-58/U	CBL022	11/17/2005
SAF312	Mannix	0ABA116	SAF312	04/26/2006
ROS002	Rohde & Schwarz	ESCI	100067	11/25/2005
SAF187	Bryant Manufacturing	TH-5S	1207	04/06/2006
MET2	Meterman	15XP	050407779	07/28/2006
LOOP 145-019	EMCO	6502/1	9902-3267	01/26/2006
KEP2	Kepco	MBT 75-5M	F 81015	Verified

Test Details:

Channels	Freq MHz
Channel 1	13.56
Nominal Voltage	7.2 VDC
Passband:	13.56 MHz

Power measurements in this test are relative and do not represent actual power of EUT, the measurement was performed to show relative power drift only

Frequency and Power Stability over Voltage & Temperature 8/12/05 performed by Nicholas Abbondante

Temp, c	Freq MHz	Deviation, Hz	Deviation, MHz	PPM	Limit, Hz	Power dBuV	Deviation, dB
-20	13.559444	82	0.000082	6.05	1355.94	97.47	0.56
-10	13.559440	78	0.000078	5.75	1355.94	96.99	0.08
0	13.559420	58	0.000058	4.28	1355.94	97.10	0.19
10	13.559396	34	0.000034	2.51	1355.94	96.95	0.04
20	13.559362	0	0.000000	0.00	1355.94	96.91	0.00
30	13.559358	-4	-0.000004	-0.29	1355.94	96.70	-0.21
40	13.559340	-22	-0.000022	-1.62	1355.94	96.63	-0.28
50	13.559356	-6	-0.000006	-0.44	1355.94	96.66	-0.25
Voltage	Freq MHz	Deviation, Hz	Deviation, MHz	PPM	Limit, Hz	Power dBuV	Deviation, dB
6.12VDC	13.559362	0	0.000000	0.00	1355.94	96.68	-0.23
7.2VDC	13.559362	0	0.000000	0.00	1355.94	96.91	0.00

Test Results: Pass

Test Standard: FCC Parts 2.1049, 15.205 RSS-210 5.9.1, 6.3

Test: Occupied Bandwidth and Restricted Bands

Performance Criterion: The 20dB bandwidth must not extend into or drift into the restricted bands

Test Environment:
N/A

Maximum Test Disturbance Parameters: There is no limit on 20dB bandwidth

Test Date: 08/10/2005 **Engineer Initials:** NNA **Date:** 8/25/05
Test Engineer: Nicholas Abbondante **Reviewer Initials:** MFH **Date:** 8-26-05

Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
REC2	Hewlett Packard	8542E	3520A00125	02/08/2006
RECFL2	Hewlett Packard	85420E	3427A00126	02/08/2006

Test Details:
The 20dB bandwidth is 3.7 kHz, and the frequency drift measured is 82 Hz. The nearest restricted bands are located at 13.36-13.41 MHz and 16.42-16.423 MHz. Since the fundamental at nominal temperature and voltage is centered at 13.559632 MHz, the fundamental will not ever extend beyond 13.555-13.564 MHz.