EMISSIONS TEST REPORT

Report Number: 3176546BOX-001
Project Number: 3176546

Testing performed on the

RFIDat Handheld RFID Reader &
RFIDock Modular Docking Station

Models: RFIDat & RFIDock
FCC IDs: XKC-RFIDAT & XKC-RFIDOCK

To

CFR47 "Telecommunications" FCC Part 15 Subpart C "Intentional Radiators" 15.209

For

PGA

Test Performed by:	Test Authorized by:
Intertek – ETL SEMKO	Intertek Italy SRL
70 Codman Hill Road	Via Principe di Udine
Boxborough, MA 01719	33030 Campoformido
	Italy

Prepared by: _____ Date: 12/02/2009
Nicholas Abbondante

Reviewed by: _____ Date: 12/11/09
Jeff Goulet

1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company:	Intertek Italy SRL Via Principe di Udine 33030 Campoformido Italy
Contact:	Arianna Fogar
Telephone:	39 432 653-411
Fax:	39 432 653-499
Email:	Arianna.fogar@intertek.com

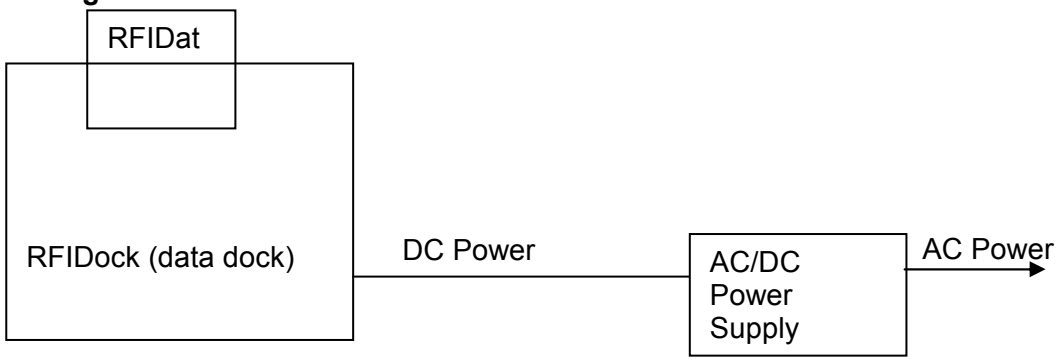
1.2 Equipment Under Test

Equipment Type:	RFIDat Handheld RFID Reader & RFIDock Modular Docking Station
Model Number(s):	RFIDat & RFIDock
Serial number(s):	10240803111 (RFIDat) BOX0811211651-001 (RFIDock, Intertek Assigned)
FCC IDs:	XKC-RFIDAT (model: RFIDat) & XKC-RFIDOCK (model: RFIDock)
Manufacturer:	PGA
EUT receive date:	11/21/2008 & 03/20/2009
EUT received condition:	Prototype in Good Condition
Test dates:	12/23/2009 to 12/24/2009, 03/23/2009

1.3 Test Plan Reference: Tested according to the standards listed and using the guidance of ANSI C63.4:2003.

1.4 Test Configuration

1.4.1 Block Diagram



1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
DC Power	None	Metal/360 Jack	1.8	1

1.4.3. Support Equipment:

Name: 12V AC/DC Power Supply
Model No.: 0299-120133
Serial No.: BOX0903101127-001

1.5 Mode(s) of Operation:

The RFIDat is battery powered. During testing, the RFIDat was placed in the RFIDock (data dock). While the RFIDat was placed in the RFIDock, the pair was transmitting nearly continuously.

1.6 Floor Standing Equipment: Applicable: Not Applicable: X

2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 15 Subpart C 15.209		
SUB-TEST	**TEST PARAMETER**	**COMMENT**
Radiated Spurious Emissions & Fundamental Field Strength FCC 15.209	The fundamental field strength at 125 kHz must not exceed 105.7 dBuV/m at a distance of 3 meters. Spurious emissions must not exceed the field strength limits of 15.209 at a distance of 3 meters.	Pass
Occupied Bandwidth FCC 15.215	There is no limit on occupied bandwidth.	Pass
Duty Cycle FCC 15.35	There is no limit on duty cycle.	Pass
Conducted Emissions FCC 15.207	AC Line-Conducted Emissions must not exceed limits for Part 15 Subpart C 15.207.	Pass

Notes: The EUT is a transmitter which transmits at 125 kHz.

REVISION SUMMARY – The following changes have been made to this Report:

Date	Project No.	Project Handler	Page(s)	Item	Description of Change
12/02/2009	3176546	Nicholas Abbondante	2-4, 8, 12-15	Report Merge	Added results for Occupied Bandwidth and Duty Cycle tests from report 3169546BOX-001.
12/02/2009	3176546	Nicholas Abbondante	1-3, 8-9, 12, 14, 16-17	Model and Serial Numbers	Updated Model and Serial numbers to reference both items tested, the RFIDat and RFIDock
12/02/2009	3176546	Nicholas Abbondante	1-2, 5-7	Report update	Added FCCIDs, updated sample calculation, measurement uncertainty and site description

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
NF = Net Reading in dBμV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

3.1 Measurement Uncertainty

For radiated emissions, U_{lab} (4.9 dB at 3m and 4.2 dB at 10m) < U_{CISPR} (5.2 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

For conducted emissions, U_{lab} (3.2 dB in worst case) < U_{CISPR} (3.6 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

3.2 Site Description

Test Site(s): OATS 1

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 C63.4-2003 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 ground-plane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with 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 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 ground-plane 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 ground-plane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical ground-plane is electrically connected to the reference ground-plane.

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 ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

The AMAP Building and Lab includes general lab space that can be used for testing where a shielded/enclosed environment is not required.

Our 10m ALSE chamber is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A wooden table 80 cm high is used for table-top equipment.

Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.209

Test: Fundamental Field Strength & Radiated Spurious Emissions

Performance Criterion: Spurious emissions must not exceed the field strength limits of 15.209 at a distance of 3 meters. The frequency range from 9 kHz – 30 MHz was tested as the highest frequency generated or used by the EUT is 125 kHz. The fundamental field strength at 125 kHz must not exceed 105.7 dBuV/m at a distance of 3 meters (65.7 dBuV/m at a distance of 30 meters).

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	19	Humidity (%):	32	Pressure (hPa):	1004
Pretest Verification Performed		Yes		Equipment under Test:		RFIDat & RFIDock	
Test Engineer(s):	Gary Ball			EUT Serial Number:		10240803111 & BOX0811211651-001 (Intertek Assigned)	
Engineer's Initials:	GB	Date Test Performed:	03/23/2009	Reviewer's Initials:		Date Reviewed:	12/11/09

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	4 Line Digital Barometer *	Mannix	0ABA116	SAF313	05/29/2009
2	Spectrum Analyzer	Agilent	E7405A	US40240205	08/21/2009
3	Active Loop Antenna (10 khz to 30 mhz)	EMCO	6502/1	9902-3267	11/07/2009
4	RG223 50ohm Coaxial Cable	Intertek	BNC-30	CBLBNC6	02/25/2010

Software Utilized:

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

Test Results:

Notes: No emissions other than the fundamental were observed in the range from 9-150 kHz. No emissions were observed in the range from 150 kHz – 30 MHz, but the ambient field strength at the harmonics up to the tenth harmonic was recorded. The limit has been normalized to a test distance of 3 meters using a 40 dB/decade distance scaling factor.

Radiated Emissions

Company: PGA
Model #: RFIDat in RFIDock
Serial #: 10240803111 & BOX0811211651-001 (Intertek Assigned)
Engineers: Gary Ball Location: Site 1
Project #: 3176546 Date(s): 03/23/09
Standard: FCC Part 15 Subpart C 15.209
Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
PreAmp Used? (Y or N): N Voltage/Frequency: 120VAC/60 Frequency Range: 9kHz-30 MHz

Antenna & Cables: N Bands: N, LF, HF, SHF
Antenna: LOOP 145-019 E-Field 11-07-09.txt NONE.
Cable(s): CBLBNC6 02-25-10.txt NONE.
Barometer: SAF313
Temp/Humidity/Pressure: 19C 32% 1004mb

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; 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
Note: Loop											
PK	V	0.125	57.7	11.9	0.5	0.0	0.0	70.0	105.7	-35.7	200/300 Hz
Avg	V	0.125	57.6	11.9	0.5	0.0	0.0	69.9	105.7	-35.8	200/300 Hz
PK	V	0.250	43.3	11.8	0.4	0.0	0.0	55.5	99.6	-44.1	9/30 kHz
PK	V	0.375	45.5	11.6	0.5	0.0	0.0	57.6	96.1	-38.6	9/30 kHz
PK	V	0.500	44.0	11.5	0.5	0.0	0.0	56.0	73.6	-17.7	9/30 kHz
PK	V	0.625	43.0	11.3	0.5	0.0	0.0	54.8	71.7	-16.9	9/30 kHz
PK	V	0.750	38.6	11.3	0.5	0.0	0.0	50.4	70.1	-19.7	9/30 kHz
PK	V	0.875	35.7	11.4	0.5	0.0	0.0	47.6	68.8	-21.2	9/30 kHz
PK	V	1.000	39.0	11.6	0.5	0.0	0.0	51.1	67.6	-16.5	9/30 kHz
PK	V	1.125	52.5	11.6	0.5	0.0	0.0	64.6	66.6	-2.0	9/30 kHz
PK	V	3.200	31.0	11.3	0.6	0.0	0.0	42.9	69.5	-26.6	9/30 kHz

Radiated Emissions Setup Photos

Radiated Emissions Setup Photos

Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.209

Test: Occupied Bandwidth

Performance Criterion: There is no limit on occupied bandwidth.

Test Environment:

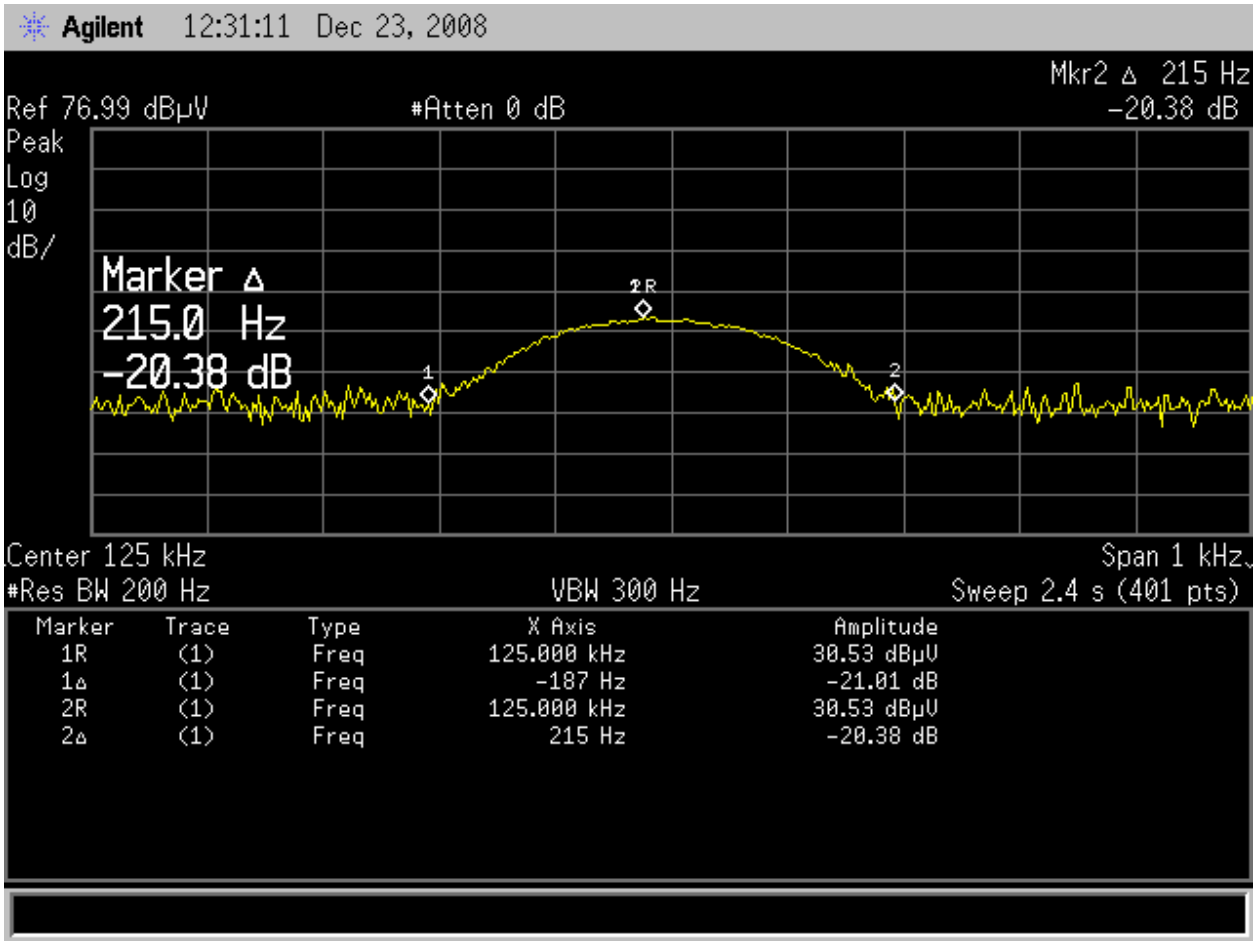
Environmental Conditions During Testing:		Ambient (°C):	18	Humidity (%):	30	Pressure (hPa):	995
Pretest Verification Performed		Yes		Equipment under Test:		RFIDat & RFIDock	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		10240803111 & BOX0811211651-001 (Intertek Assigned)	
Engineer's Initials:	NNA	Date Test Performed:	12/23/2008	Reviewer's Initials:	JC	Date Reviewed:	12/11/09

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR3	06/01/2009
2	Spectrum Analyzer	Agilent	E7405A	US40240205	08/21/2009
3	LOOP ANTENNA	Empire	LG-105	61	05/07/2009
4	3 Meter In floor cable for site 1	ITS	RG214B/U	S1 3M FLR	09/08/2009

Test Details:

Notes: The occupied bandwidth is 402 Hz.



Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.209

Test: Duty Cycle

Performance Criterion: There is no limit on duty cycle.

Test Environment:

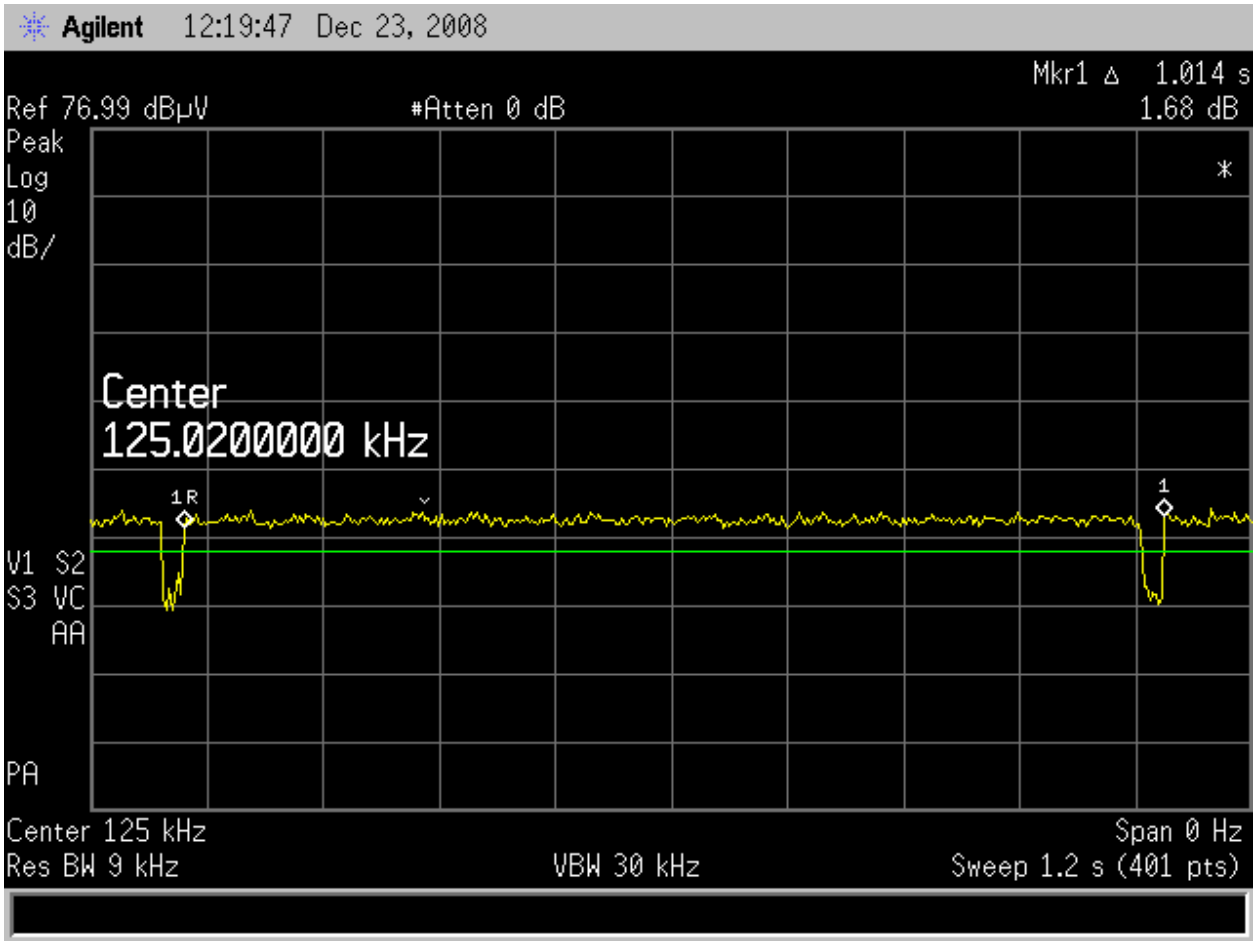
Environmental Conditions During Testing:		Ambient (°C):	18	Humidity (%):	30	Pressure (hPa):	995
Pretest Verification Performed		Yes		Equipment under Test:		RFIDat & RFIDock	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		10240803111 & BOX0811211651-001 (Intertek Assigned)	
Engineer's Initials:	NNA	Date Test Performed:	12/23/2008	Reviewer's Initials:	JC	Date Reviewed:	12/11/09

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR3	06/01/2009
2	Spectrum Analyzer	Agilent	E7405A	US40240205	08/21/2009
3	LOOP ANTENNA	Empire	LG-105	61	05/07/2009
4	3 Meter In floor cable for site 1	ITS	RG214B/U	S1 3M FLR	09/08/2009

Test Details:

Notes: The duty cycle was 100% when tested, as the burst intervals were longer than 100 ms.



Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.207

Test: Conducted Emissions

Performance Criterion: Emissions below the FCC Part 15 Subpart C 15.207 limits.

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	19	Humidity (%):	32	Pressure (hPa):	1005
Pretest Verification Performed		Yes		Equipment under Test:		RFIDat & RFIDock	
Test Engineer(s):	Gary Ball			EUT Serial Number:		10240803111 & BOX0811211651-001 (Intertek Assigned)	
Engineer's Initials:	GB	Date Test Performed:	03/23/2009	Reviewer's Initials:		Date Reviewed:	12/11/09

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	4 Line Digital Barometer *	Mannix	0ABA116	SAF313	05/29/2009
2	Spectrum Analyzer	Agilent	E7405A	US40240205	08/21/2009
3	30 ft 50 ohm coax, BNC - BNC	ITT Pomona	RG 58 C/U	CBLBNC7	02/25/2010
4	Attenuator, 10dB	Mini Circuits	10dB, 50 ohm	DS11	02/25/2010
5	LISN, 50uH, .01 - 50MHz, 24A	Solar Electronics	9252-50-R-24-BNC	941713	10/06/2009

Software Utilized:

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

Test Results:

Conducted Emissions

Company: PGA
Model #: RFIDat in RFIDock
Serial #: 10240803111 & BOX0811211651-001 (Intertek Assigned)
Engineer(s): Gary Ball
Location: Site 1
Project #: 3176546
Date: 03/23/09
Standard: FCC Part 15 Subpart C 15.209
Barometer: SAF313
Temp/Humidity/Pressure: 19C 32% 1005mb
Voltage/Frequency: 120VAC/60
Frequency Range: .150-30 MHz

Receiver: Agilent E7405A (AGL001)
Cable: CBLBNC7 02-25-10.txt
LISN 1: LISN11 [1] 10-06-09.txt
LISN 2: LISN11 [2] 10-06-09.txt
LISN 3: NONE.
LISN 4: NONE.
Attenuator: DS11 02-25-10.txt

Net is the sum of worst-case lisn, cable, & attenuator losses, and initial reading, factors are not shown
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor; 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 Line 4 dB(uV)	Net dB(uV)	QP Limit dB(uV)	Margin dB	Bandwidth
QP	0.176	24.8	24.7			35.2	64.7	-29.5	9/30 kHz
QP	0.265	19.0	19.4			29.9	61.3	-31.4	9/30 kHz
QP	0.442	9.9	9.0			20.4	57.0	-36.6	9/30 kHz
QP	0.531	15.0	14.7			25.5	56.0	-30.5	9/30 kHz
QP	1.140	6.5	5.4			17.1	56.0	-38.9	9/30 kHz
QP	8.300	15.6	13.6			26.8	60.0	-33.2	9/30 kHz

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	Average Limit dB(uV)	Margin dB	Bandwidth
AVG	0.176	19.7	19.5			30.1	54.7	-24.6	9/30 kHz
AVG	0.265	15.6	16.0			26.5	51.3	-24.8	9/30 kHz
AVG	0.442	7.5	6.8			18.0	47.0	-29.0	9/30 kHz
AVG	0.531	14.0	13.5			24.5	46.0	-21.5	9/30 kHz
AVG	1.140	3.3	2.0			13.9	46.0	-32.1	9/30 kHz
AVG	8.300	13.8	12.2			25.0	50.0	-25.0	9/30 kHz

Conducted Emissions Setup Photo