

TEST REPORT

Report Number: 3150826ATL-001

May 21, 2008

Product Designation: CAL TAG

Standard: FCC Part 15.250 - Operation of wideband systems within the band 5925 to 7250 MHz

Tested by:

Intertek Testing Services NA Inc.
1950 Evergreen Blvd., Suite 100
Duluth, GA 30096

Client:

Time Domain Corporation
Cummings Research Park
330 Wynn Drive, Suite 300
Huntsville, AL 25805
Contact: Keven Trach
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Tests performed by:

A handwritten signature in blue ink, appearing to read "Richard C. Bianco".

Richard C. Bianco
EMC Project Engineer

Report reviewed by:

A handwritten signature in blue ink, appearing to read "David J. Schramm".

David J. Schramm
EMC Department Manager

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1.0 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2.0 Test Summary

Section	Test Full Name	Test Date	Result
4.0	System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)		
5.0	15.250(a) and 15.250(b): -10 dB Bandwidth requirements (Bandwidth)	05/06/2008	PASS
6.0	15.250(d)(1) Radiated power (EIRP) density (EIRP power density)	05/04/2008	PASS
7.0	Peak Power in a 50 MHz bandwidth (Peak Power per 50 MHz)	05/04/2008	PASS
8.0	Radiated emissions below 960 MHz (Radiated Emissions (<960 MHz))	05/01/2008	PASS
9.0	15.250(d)(2) Radiated power (EIRP) density in GPS receive bands (EIRP power density (GPS))	05/01/2008	PASS

3.0 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
UWB Transmitter	Time Domain	P350 Cal Tag	NA

EUT receive date:	May 05, 2008
EUT receive condition:	Good

Description of EUT provided by Client:

The Cal Tag is a simple UWB transmit-only device for a RFID (Radio Frequency Identification) Tracking System, which sends out very short packets at predetermined transmission rates. These very short packets (less than 100 microseconds) allows for several tags to be tracked. This information is used to calibrate the transmit antenna.

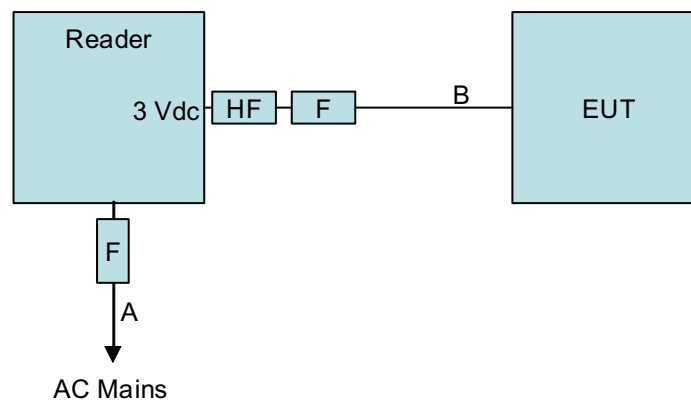
Description of EUT exercising:

The Tag transmits its normal signal at all times. There is no user control to change its power level or mode of operation.

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)

Method:

Record the details of EUT cabling, document the support equipment, and show the interconnections in a block diagram.

Drawing:

Setup block diagram

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)

Data:

EUT Cabling						
ID	Description	Length	Shielding	Ferrites	Connection	
					From	To
A	Power cable	1.0 m	None	Yes	Reader	AC Mains
B	CAL TAG power	0.5 m	None	Yes	Reader	CAL TAG

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Reader	Time Domain	Reader	Not labeled

5.0 15.250(a) and 15.250(b): -10 dB Bandwidth requirements (Bandwidth)**Method:**

The -10 dB bandwidth of a device operating under the provisions of this section must be contained within the 5925–7250 MHz band under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

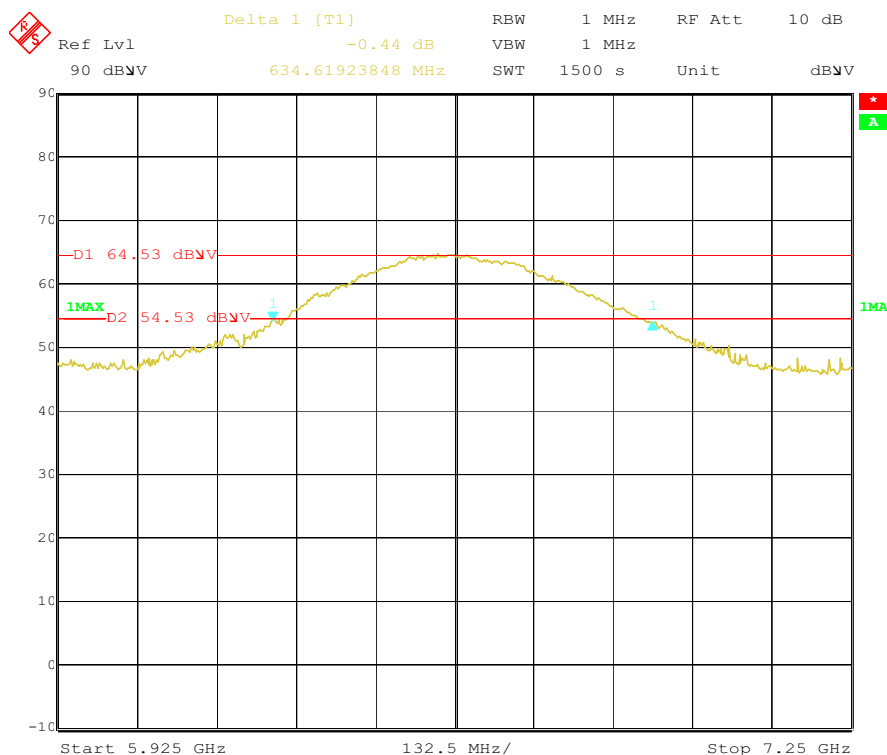
The -10 dB bandwidth of the fundamental emission shall be at least 50 MHz. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency following the provisions of §15.31(m).

The -10 dB bandwidth is based on measurement using a peak detector, a 1 MHz resolution bandwidth, and a video bandwidth greater than or equal to the resolution bandwidth.

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Antenna, Horn, <18 GHz	EMCO	3115	213061	04/18/2008	04/18/2009
Cable ST1, 7m, N-N, 18 GHz	Storm Products Co.	PR90-206-7MTR	ST1	01/16/2008	01/16/2009
Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	200108	03/27/2008	03/27/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

Results: The sample tested was found to Comply.

Plot:

Date: 1.MAY.2008 21:45:02

Bandwidth Plot

5.0 15.250(a) and 15.250(b): -10 dB Bandwidth requirements (Bandwidth)**Data:**

Bandwidth: 15.250(a) and (b)

	Frequency MHz	Requirement	Compliant?	RBW	VBW	ST
-10dB Level below center:	6248.6	> 5925 MHz	yes	1 MHz	3 MHz	1500 sec
-10dB Level above center:	6883.2	< 7250 MHz	yes	1 MHz	3 MHz	1500 sec
Bandwidth:	634.6	> 50 MHz	yes	1 MHz	3 MHz	1500 sec

6.0 15.250(d)(1) Radiated power (EIRP) density (EIRP power density)**Method:**

(d) Emissions from a transmitter operating under this section shall not exceed the equivalent isotropically radiated power (EIRP) density levels:

(1) The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the RMS average limits based on measurements using a 1 MHz resolution bandwidth.

Emissions from digital circuitry used to enable the operation of the transmitter may comply with the limits in §15.209 provided it can be clearly demonstrated that those emissions are due solely to emissions from digital circuitry contained within the transmitter and the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in §15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the operation of the transmitter, are subject to the limits contained in subpart B of this part. Emissions from these digital circuits shall not be employed in determining the -10 dB bandwidth of the fundamental emission or the frequency at which the highest emission level occurs.

Measurement procedures:

All emissions at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Unless otherwise specified, all RMS average emission levels specified in this section are to be measured utilizing a 1 MHz resolution bandwidth with a one millisecond dwell over each 1 MHz segment. The frequency span of the analyzer should equal the number of sampling bins times 1 MHz and the sweep rate of the analyzer should equal the number of sampling bins times one millisecond. The provision in §15.35(c) that allows emissions to be averaged over a 100 millisecond period does not apply to devices operating under this section. The video bandwidth of the measurement instrument shall not be less than the resolution bandwidth and trace averaging shall not be employed. The RMS average emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

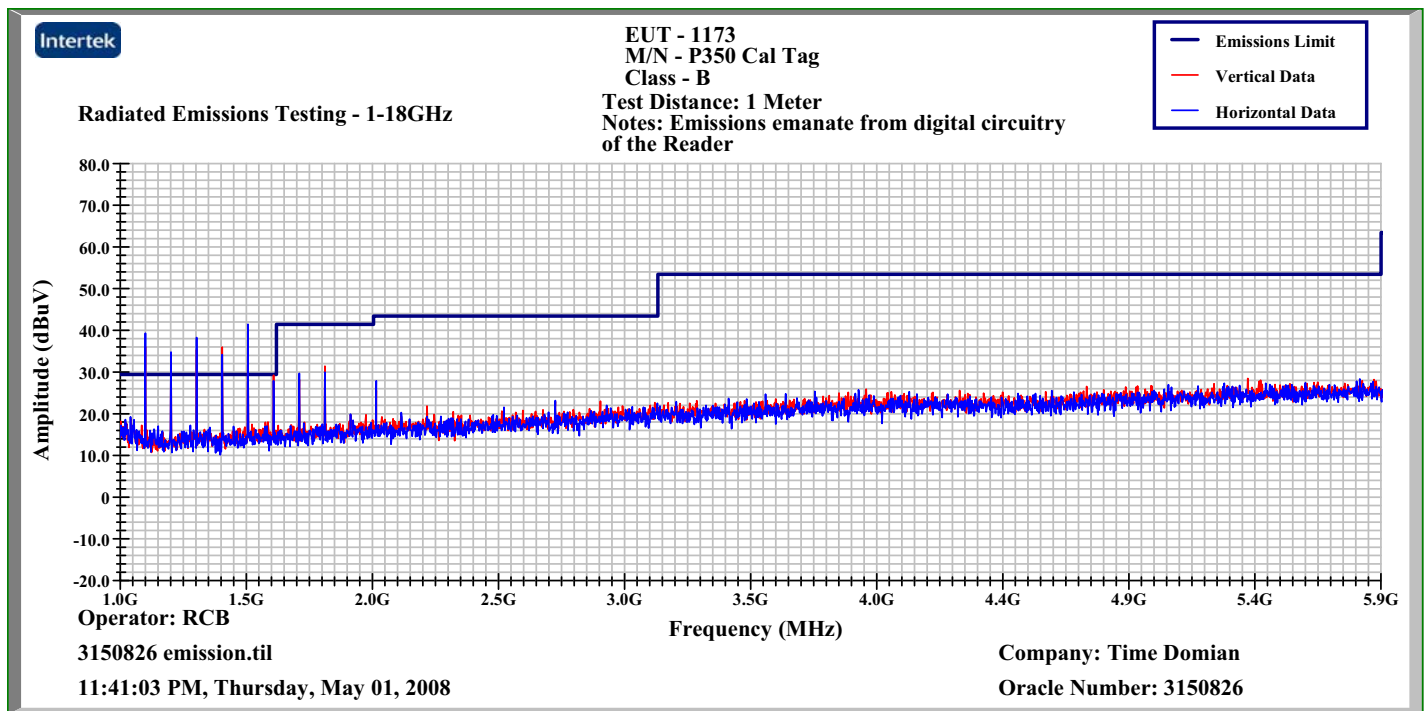
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Antenna, Horn, <18 GHz	EMCO	3115	213061	04/18/2008	04/18/2009
Cable ST1, 7m, N-N, 18 GHz	Storm Products Co.	PR90-206-7MTR	ST1	01/16/2008	01/16/2009
Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	200108	03/27/2008	03/27/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

Results: The sample tested was found to Comply.

6.0 15.250(d)(1) Radiated power (EIRP) density (EIRP power density)

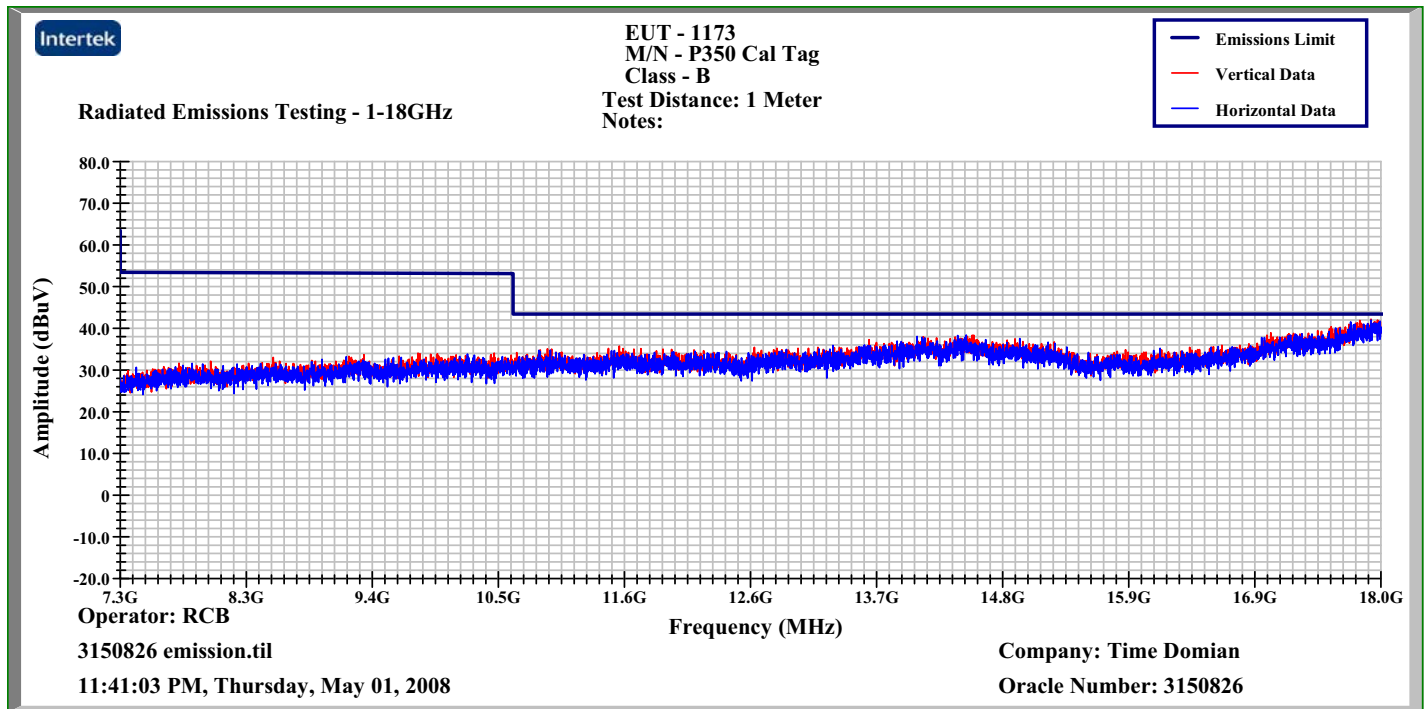
Plot:



Peak Plot

6.0 15.250(d)(1) Radiated power (EIRP) density (EIRP power density)

Plot:



Peak Plot

6.0 15.250(d)(1) Radiated power (EIRP) density (EIRP power density)

Data:

Date: 05/01/2008

Test Distance (m): 1

Frequency Range (MHz): 1000-40000

Limit: 15_250d1-1m

Input power: 120/60

Modifications for compliance (y/n): n

A	B	C	D	E	F	G	H	I	J
Ant. Pol. (V/H)	Frequency MHz	Reading dBm	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Net dBm	1m Limit dBm	Margin dB	Detectors / Bandwidths Det/RBW/VBW
V	6585.000	-44.0	35.3	5.3	39.9	-43.2	-41.3	-1.9	RMS/1M/3M
Calculations		G=C+D+E-F		I=G-H					

There were no measurable emissions above 18 GHz

7.0 Peak Power in a 50 MHz bandwidth (Peak Power per 50 MHz)

Method:

(3) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 5925–7250 MHz band. The peak EIRP limit is $20 \log(\text{RBW}/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than RBW. If RBW is greater than 3 MHz, the application for certification filed with the Commission shall contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Antenna, Horn, <18 GHz	EMCO	3115	213061	04/18/2008	04/18/2009
Cable ST1, 7m, N-N, 18 GHz	Storm Products Co.	PR90-206-7MTR	ST1	01/16/2008	01/16/2009
Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	200108	03/27/2008	03/27/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

Results: The sample tested was found to Comply.

Data:

Frequency Range (MHz): 5925 to 7250 MHz

Test Distance (m): 1

Input power: 120 Vac / 60 Hz

Limit: 15.250 at 1 m

Modifications for compliance (y/n): n

A	B	C	D	E	F
Ant. Pol. (V/H)	Frequency MHz	EIRP RBW: 1MHz dBm	1 MHz Limit dBm	Margin dB	Detectors / Bandwidths Det/RBW/VBW
V	6600.000	-33.7	-24.4	-9.3	Pk / 1M / 3M
Calculations		E=C-D			

Limit = $20 \log(\text{RBW}/50) = 20 \log(1/50) = -34$ dBm @ 3m

Limit = $20 \log(\text{RBW}/50) = 20 \log(1/50) + 20 \log(3/1) = -24.4$ dBm @ 1m

7.0 Peak Power in a 50 MHz bandwidth (Peak Power per 50 MHz)

8.0 Radiated emissions below 960 MHz (Radiated Emissions (<960 MHz))

Method:

Radiated emissions at or below 960 MHz shall not exceed the emission levels in §15.209.

Measurements in the frequency range of 30 MHz to 1000 MHz shall be performed with a quasi-peak detector instrument that meets the requirements of Section One of CISPR 16.

Bandwidths:

30 MHz to 1000 MHz: 120 kHz RBW and 1 MHz VBW

Measurements of the radiated field are made with the antenna located at a distance of 3 or 10 meters from the EUT. The limit applied to the measurement shall be appropriate for the test distance. The test distance shall be indicated in the results section.

The EUT shall be arranged and connected with cables terminated in accordance with the product specification.

Exploratory tests should be carried out while varying the cable positions to determine the maximum or near-maximum emission level. During manipulation, cables shall not be placed under or on top of the system test components unless such placement is required by the inherent equipment design.

The antenna shall be adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth shall be varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) shall be varied during the measurements to find the maximum field-strength readings.

If the EUT is intended for tabletop use, it shall be placed on a table whose top is 0.8m above the ground plane. The table shall be constructed of non-conductive materials. Its dimensions are at least 1m by 1.5m, but may be extended for larger EUT.

If EUT is floor standing, the EUT was placed on a horizontal metal ground plane and isolated from the ground plane by up to 12 mm of insulating material.

Equipment setup for radiated disturbance tests shall follow the guidelines of ANSI C63.4:2003.

TEST SITE

The test site for radiated emissions is located at 1950 Evergreen Blvd, Suite 100, Duluth, Georgia 30096.

MEASUREMENT UNCERTAINTY

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of $k=2$.

30 MHz to 1000 MHz at 3 meters: +/- 3.9 dB

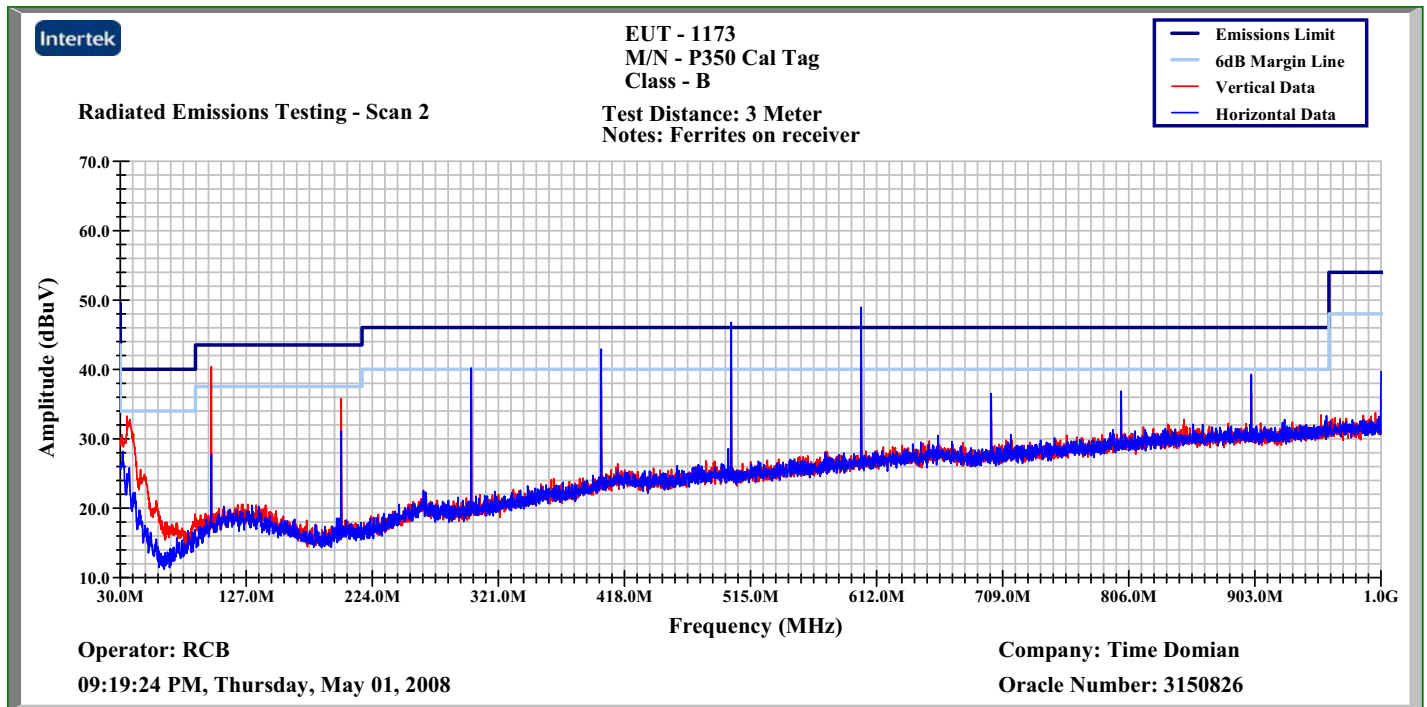
30 MHz to 1000 MHz at 10 meters: +/- 3.6 dB

1 GHz to 18 GHz at 3 meters: +/- 4.2 dB

Results: The sample tested was found to Comply.

8.0 Radiated emissions below 960 MHz (Radiated Emissions (<960 MHz))

Plot:



Peak Plot

8.0 Radiated emissions below 960 MHz (Radiated Emissions (<960 MHz))

Data:

Date: 05/01/2008

Test Distance (m): 3

Frequency Range (MHz): 30-1000

Limit: 15_209a-3m

Input power: 120/60

Modifications for compliance (y/n): n

A	B	C	D	E	F	G	H	I	J
Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Net dB(uV/m)	3m Limit dB(uV/m)	Margin dB	Detectors / Bandwidths Det/RBW/VBW
V	100.000	53.6	11.7	2.1	28.2	39.2	43.5	-4.3	QP/120k/300k
H	399.989	49.4	16.8	3.5	27.9	41.7	46.0	-4.3	QP/120k/300k
H	500.000	48.4	18.6	4.1	27.9	43.3	46.0	-2.8	QP/120k/300k
H	600.000	46.3	19.9	4.6	27.8	43.0	46.0	-3.1	QP/120k/300k
Calculations		G=C+D+E-F			I=G-H				

9.0 15.250(d)(2) Radiated power (EIRP) density in GPS receive bands (EIRP power density (GPS))**Method:**

(d) Emissions from a transmitter operating under this section shall not exceed the equivalent isotropically radiated power (EIRP) density levels:

Transmitters operating under the provisions of this section shall not exceed the RMS average limits when measured using a resolution bandwidth of no less than 1 kHz.

Emissions from digital circuitry used to enable the operation of the transmitter may comply with the limits in §15.209 provided it can be clearly demonstrated that those emissions are due solely to emissions from digital circuitry contained within the transmitter and the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in §15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the operation of the transmitter, are subject to the limits contained in subpart B of this part. Emissions from these digital circuits shall not be employed in determining the -10 dB bandwidth of the fundamental emission or the frequency at which the highest emission level occurs.

Measurement procedures:

All emissions at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Unless otherwise specified, all RMS average emission levels specified in this section are to be measured utilizing a resolution bandwidth greater than with a one millisecond dwell over each segment (equal to the RBW). The frequency span of the analyzer should equal the number of sampling bins times RBW and the sweep rate of the analyzer should equal the number of sampling bins times one millisecond. The provision in §15.35(c) that allows emissions to be averaged over a 100 millisecond period does not apply to devices operating under this section. The video bandwidth of the measurement instrument shall not be less than the resolution bandwidth and trace averaging shall not be employed. The RMS average emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

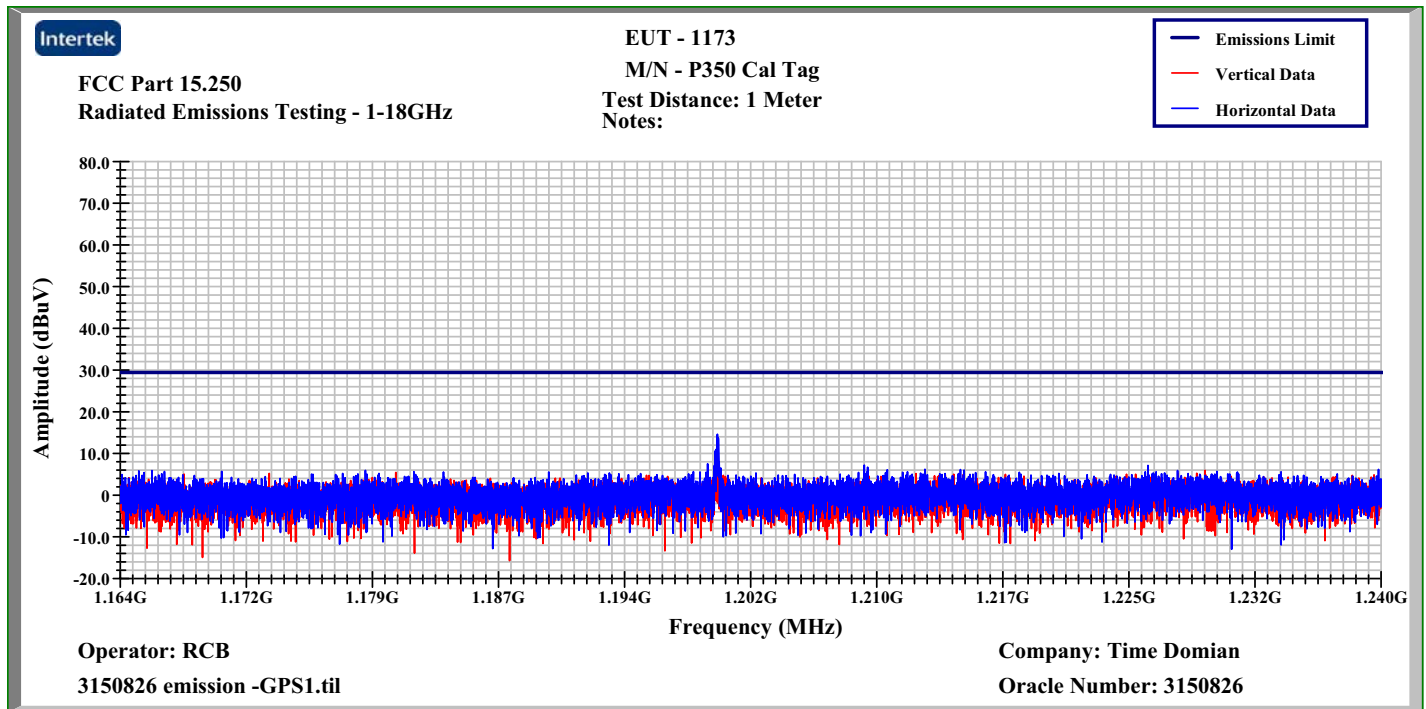
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
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Results: The sample tested was found to Comply.

9.0 15.250(d)(2) Radiated power (EIRP) density in GPS receive bands (EIRP power density (GPS))

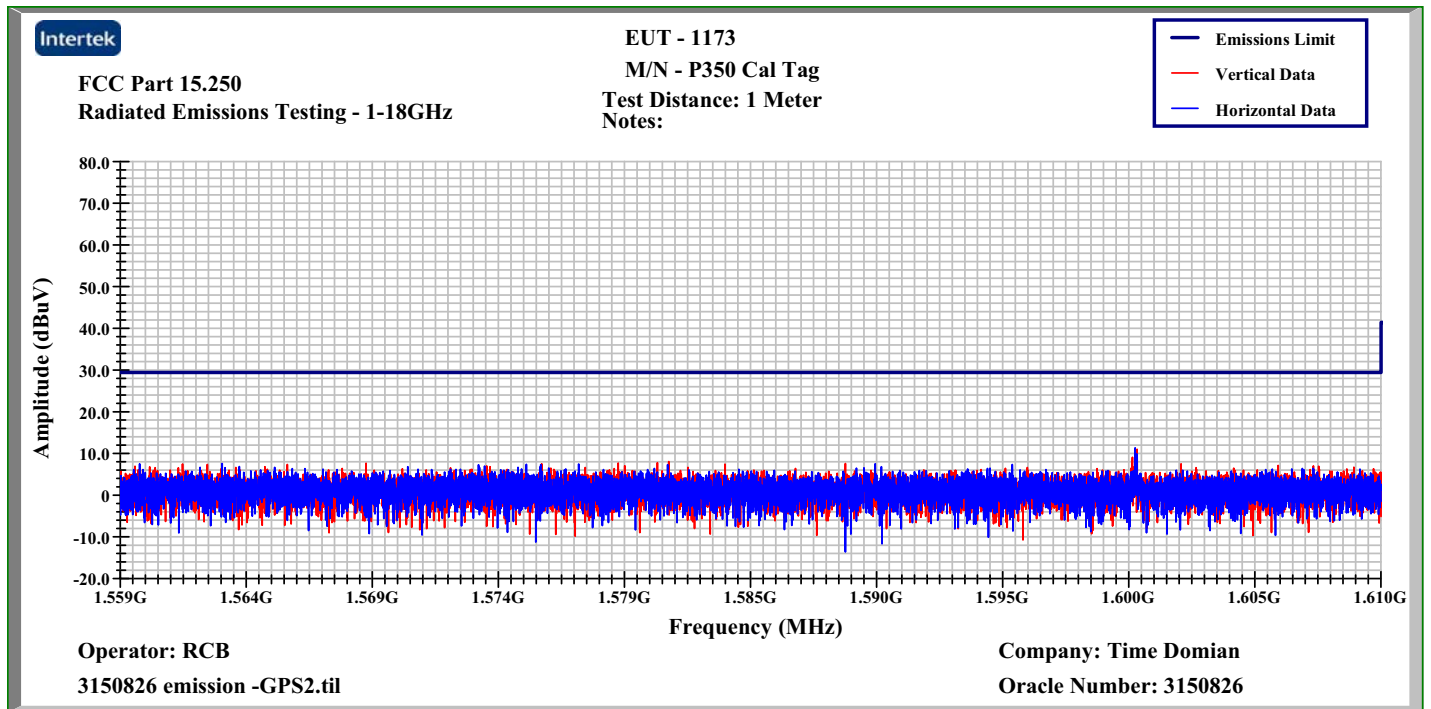
Plot:



Peak Plot

9.0 15.250(d)(2) Radiated power (EIRP) density in GPS receive bands (EIRP power density (GPS))

Plot:



Peak Plot