TEST REPORT

Report Number: 3197804MPK-001
Project Number: 3197804
March 18, 2010

Testing performed on the
TPM RFID Module
Model Number: 600-104443
FCCID: YHS-600-104443
ICID: 4690B-600104443

to

FCC Part 15.225 and RSS-210 Issue 7
For

AngioDynamics

Test Performed by:	Test Authorized by:
Intertek	AngioDynamics
1365 Adams Court	46421 Landing Parkway
Menlo Park, CA 94025 USA	Fremont, CA 94538 USA

Prepared by: _____ **Date:** March 18, 2010
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Reviewed by: _____ **Date:** March 18, 2010
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1.0 Summary of Tests

TEST	REFERENCE FCC 15.225	REFERENCE RSS-210	RESULTS
Field Strength of Fundamental	15.225(a)	A2.6	Complies
Radiated Emissions Outside the band	15.225(b), 15.225(c), 15.225(d), 15.209	A2.6	Complies
Frequency Tolerance of the Carrier	15.225(e)	A2.6	Complies
Line Conducted Emissions	15.207	RSS-GEN	Not Applicable[1]
Antenna requirement	15.203		Complies. The antenna is permanently connected, internal to the PCB.
Occupied Bandwidth			Complies

[1] EUT does not contain AC power ports. EUT is DC powered.

2.0 General Description

2.1 Product Description

The TPM RFID Module (EUT) is a RFID Reader Module. The TPM RFID Module consists of 7 transmitters.

Overview of the EUT

Applicant name & address	AngioDynamics 46421 Landing Parkway Fremont, CA 94538 USA
Contact info	Mr. Jim Lovewell, jlovewell@Angiodynamics.com
Model No.	600-104443
FCC Identifier	YHS-600-104443
IC Identifier	4690B-600104443
Operating Frequency	Single frequency, 13.56MHz
Number of Channels	1
Type of Modulation	ASK
Operating Temperature	-20^0C to $+50^0$C
Antenna Type	Internal PCB Loop Antenna

A prototype version of the EUT was received on January 4, 2010 in good operating condition. As declared by the Applicant, it is identical to production units.

2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application.

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The 10m anechoic chamber and conducted measurement facility used to collect the radiated data is site #1. This test facility and site measurement data have been fully placed on file with the FCC and A2LA accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

System Support Equipment

Item #	Description	Model No.	Serial No.
1	Host Equipment, NanoKnife	HVP01	00030907
2	EXTECH, DC power supply	EP-3003	D30030012
3	Compaq, Laptop	Compaq Evo N610c	INTERTEK LAB PC#1

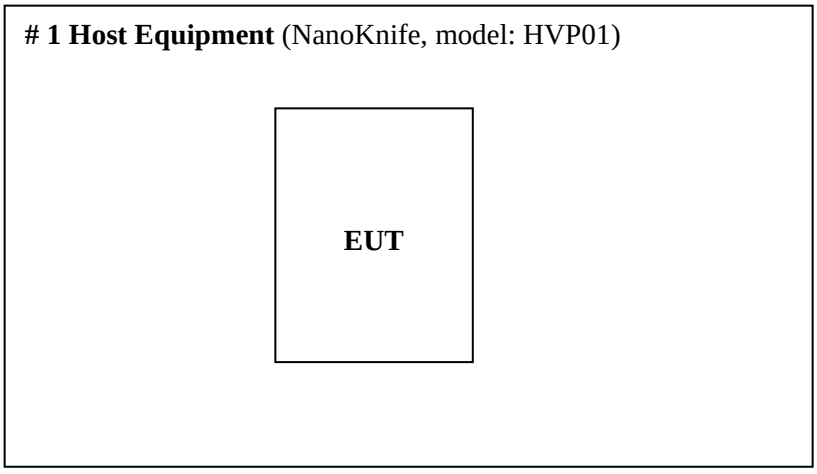
Cables Associated with EUT

Description	Length	Shielding	Ferrites	Connection	
				From	To
Serial cable	2.5 m	No	Yes	EUT	Laptop

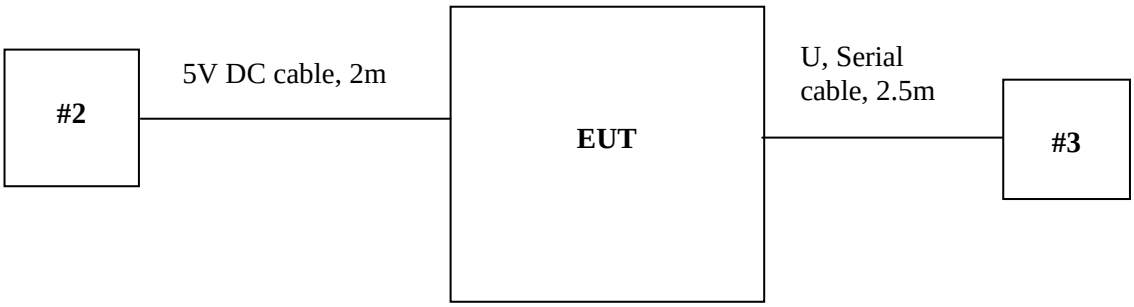
3.2 Block Diagram of Test Setup

The diagram shown below details the interconnection of the EUT and support equipment. For specific layout, refer to the test configuration photograph in the relevant section of this report.

Test Setup for radiated emissions tests



Test Setup for other than radiated emissions tests



S = Shielded **U** = Unshielded	**F** = With Ferrite **m** = Length in Meters

3.3 Justification

For emission testing, the test procedures, as described in American National Standards Institute C63.4, were employed. The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst-case emissions.

The TPM RFID Module consists of 7 transmitters. In normal operation, all transmitters are simultaneously ON with only one trasmitter at a time sequentially sending data to the host. All transmitter tests were performed on the TPM RFID Module with all transmitters ON with only one trasmitter at a time sequentially sending data to the host

All radiated emissions tests were performed on the EUT when it was installed inside the host equipment. All other tests were performed when EUT was outside the host equipment.

3.4 Software Exercise Program

None.

3.5 Mode of operation during test

TPM RFID Module was continuously transmitting during the tests. To make this operation the RFID Tags were placed on top the TPM RFID Module transmitters.

3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by AngioDynamics prior to compliance testing).

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results

4.1 Transmitter Radiated Emissions
FCC Rules 15.225, 15.209

Requirements

The Field Strength of emissions at fundamental frequency shall not exceed 80 dB (μV/m) at 30m, Emissions radiated outside of the specified frequency band shall not exceed the general radiated emission limits in 15.209.

Procedure

Below 30 MHz
During the test the EUT is rotated and the measuring antenna angle are varied during the search for maximum signal level.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Above 30 MHz
During the test the EUT is rotated and the measuring antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Radiated emission measurements were performed from 10 MHz to 1 GHz.
Analyzer resolution is:

9 kHz or greater for frequencies 30 MHz and below
100 kHz or greater for frequencies 1000 MHz and below,
For those frequencies quasi-peak value was measured.

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

Field Strength Calculation

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 is as follows:

FS = RA + AF + CF – AG – DCF

Where FS = Field Strength in dB (μV/m)

RA = Receiver Amplitude (including preamplifier) in dB (μV)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB (1/m)

AG = Amplifier Gain in dB

DCF = Distance Correction Factor

Test Result

The data below shows the significant emission frequencies, the limit and the margin of compliance.

Radiated emissions at fundamental frequency

Frequency MHz	SA Reading at 10m dB(uV)	Antenna Factor dB(1/m)	Preamp Gain dB	Cable Loss dB	Distance Correct. Factor dB	FS at 30 m dB(uV/m)	FS Limit at 30m dB(uV/m)	Margin dB
13.56	40.7	35.0	32.1	0.5	-20	24.1	84.0	-59.9

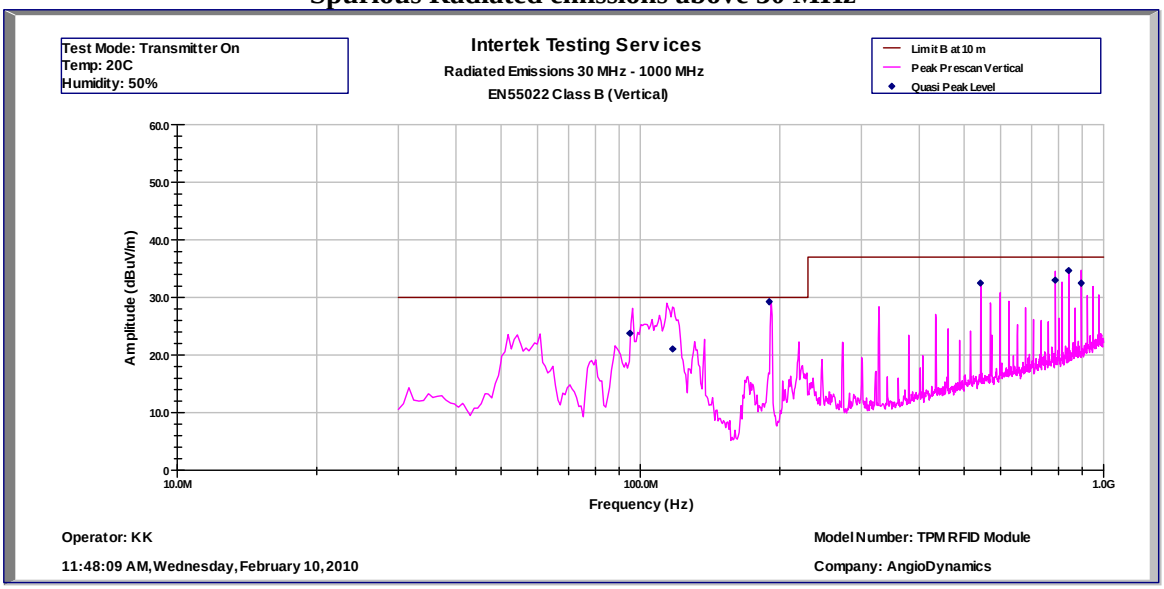
FS – Field Strength
FS was measured with loop antenna

Spurious Radiated emissions below 30 MHz

Frequency MHz	SA Reading at 10m dB(uV)	Antenna Factor dB(1/m)	Preamp Gain dB	Cable loss dB	Distance Correct. Factor dB	FS at 30m dB(uV/m)	FS Limit at 30m dB(uV/m)	Margin dB
13.553*	35.4	35.0	32.1	0.5	-20	18.8	50.5	-31.7
13.567*	34.9	35.0	32.1	0.5	-20	18.3	50.5	-32.2
13.453*	28.0	35.0	32.1	0.5	-20	11.4	50.5	-39.1
13.667*	28.5	35.0	32.1	0.5	-20	11.9	50.5	-38.6
13.349*	23.8	35.0	32.1	0.5	-20	7.2	40.5	-33.3
13.773*	25.9	35.0	32.1	0.5	-20	9.3	40.5	-31.2
27.12	17.8	34.2	32.1	0.5	-20	0.4	29.5	-29.1

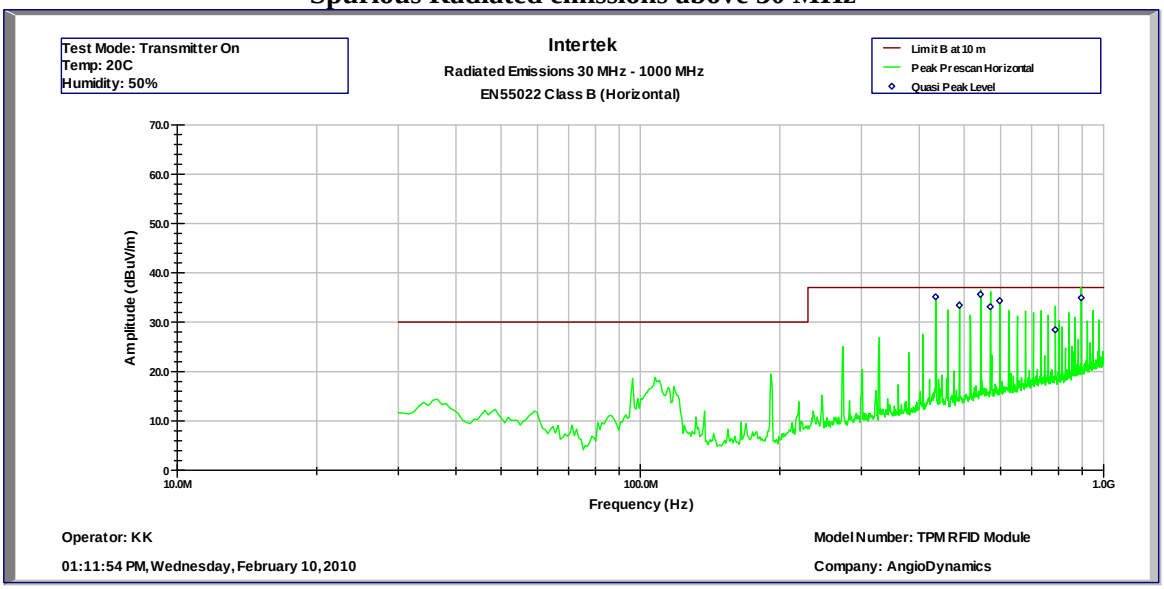
Note:
FS was measured with loop antenna
*The raw SA reading on the band-edge frequencies was obtained from plots in sec. 4.3.
All other emissions not reported are noise floor, which is at least 20 dB below the limit.

Spurious Radiated emissions above 30 MHz



Intertek Testing Services							
Radiated Emissions 30 MHz - 1000 MHz							
EN55022 Class B (QP-Vertical)							
Operator: KK			Model Number: TPM RFID Module				
February 24, 2010			Company: AngioDynamics				
Frequency	**Quasi Pk FS**	**Limit@10m**	**Margin**	**RA**	**AG**	**AF**	**CF**
MHz	**dB(uV/m)**	**dB(uV/m)**	**dB**	**dB(uV)**	**dB**	**dB(1/m)**	**dB**
94.93	23.8	30.0	-6.2	44.8	32.0	9.9	1.1
117.48	21.1	30.0	-8.9	41.0	32.0	10.8	1.3
189.8	29.3	30.0	-0.7	49.7	32.0	10.0	1.6
542.4	32.5	37.0	-4.5	43.5	32.2	18.4	2.8
786.5	33.0	37.0	-4.0	40.5	32.2	21.4	3.4
840.7	34.7	37.0	-2.3	41.4	32.1	21.9	3.5
895.0	32.5	37.0	-4.5	38.1	31.7	22.5	3.6
Test Mode: Normal							
Temperature: 20 C							
Humidity : 50%							

Spurious Radiated emissions above 30 MHz



Intertek Testing Services							
Radiated Emissions 30 MHz - 1000 MHz							
EN55022 Class B (QP-Horizontal)							
Operator: KK			Model Number: TPM RFID Module				
February 24, 2010			Company: AngioDynamics				
Frequency	**Quasi Pk FS**	**Limit@10m**	**Margin**	**RA**	**AG**	**AF**	**CF**
MHz	**dB(uV/m)**	**dB(uV/m)**	**dB**	**dB(uV)**	**dB**	**dB(1/m)**	**dB**
433.9	35.1	37.0	-1.9	48.2	32.1	16.5	2.5
488.2	33.4	37.0	-3.6	45.6	32.1	17.3	2.6
542.4	35.6	37.0	-1.4	47.0	32.2	18.0	2.8
569.5	33.2	37.0	-3.8	44.2	32.2	18.3	2.8
596.6	34.3	37.0	-2.7	45.1	32.3	18.6	2.9
786.5	28.5	37.0	-8.5	36.5	32.2	20.8	3.4
895.0	34.9	37.0	-2.1	41.0	31.7	22.0	3.6
Test Mode: Normal							
Temperature: 20 C							
Humidity : 50%							

The EUT passed by 59.9 dB at fundamental frequency and by 0.7 dB at spurious emission frequencies.

4.2 AC Line Conducted Emission
FCC Rule 15.207

AC line conducted emission test was performed according the ANSI C63.4 standard. The EUT was connected to its DC Power Supply, which was connected to the AC Line through the LISN.

Not Applicable. EUT does not contain AC power ports. EUT is 5V DC powered.

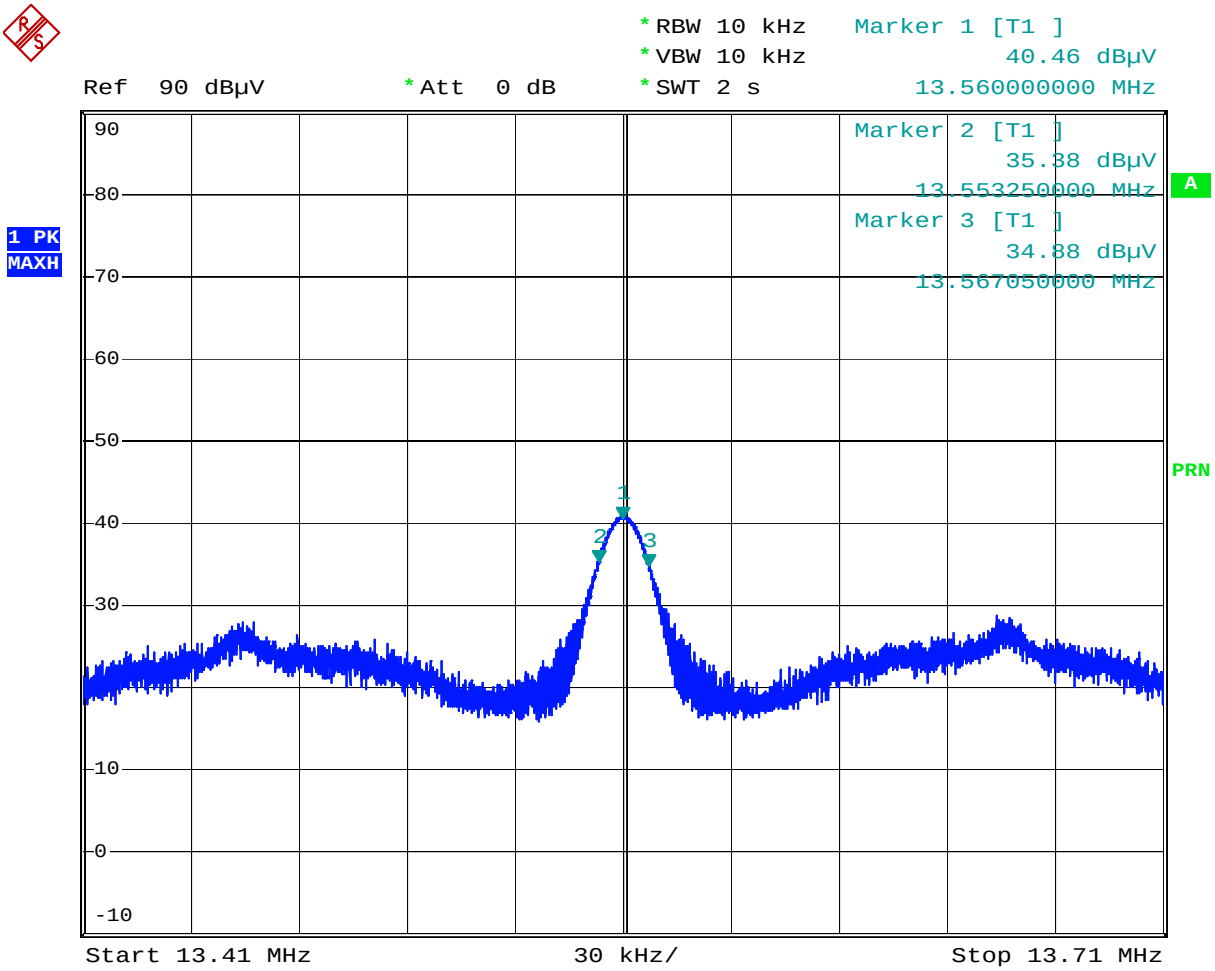
4.3 Occupied Bandwidth and Out-of-band Emission Plots

The EUT was setup to transmit in normal operating condition.

Measurements were made with the loop antenna at 10m distance using a Spectrum Analyzer. The spectrum analyzer reading was plotted. The following plots show the in-band and out-of-band emissions.

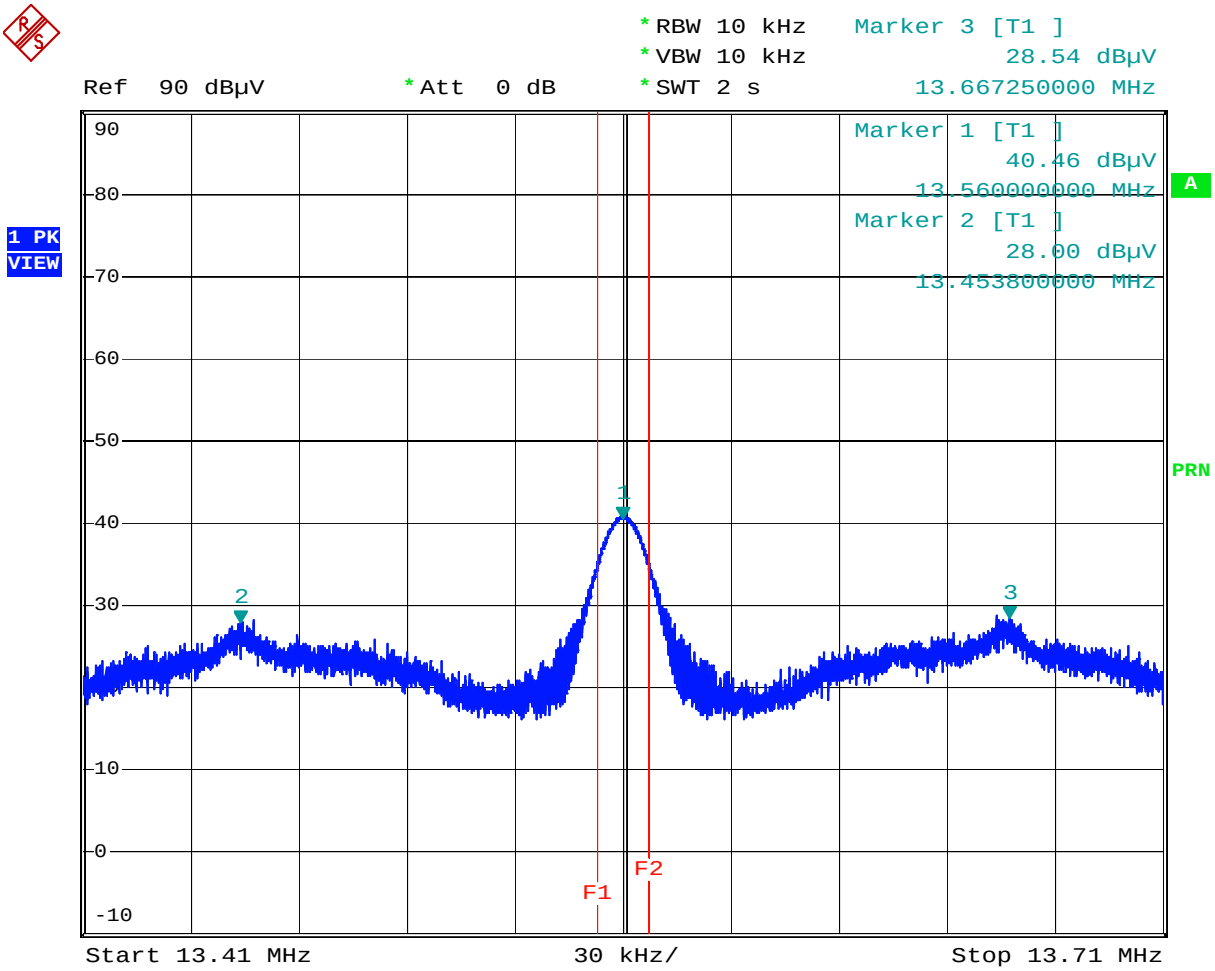
Plot #	Description
1	In-band emission, RBW=10 kHz
2	Out-of-band emission, scan 13.410 MHz to 13.710 MHz
3	Out-of-band emission, scan 13.110 MHz to 14.010 MHz
4	Occupied Bandwidth

Plot 1



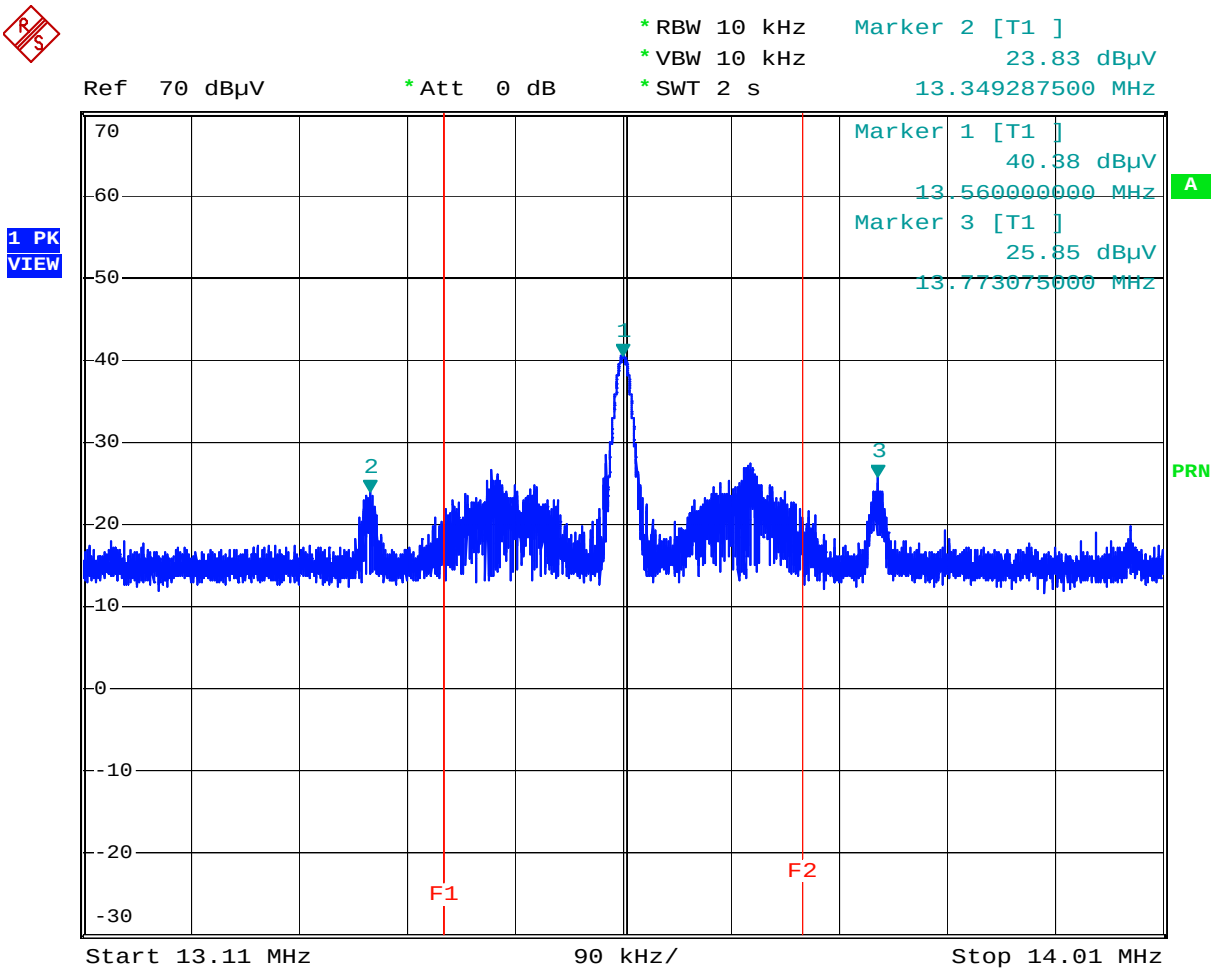
Date: 6.JAN.2010 10:10:30

Plot 2



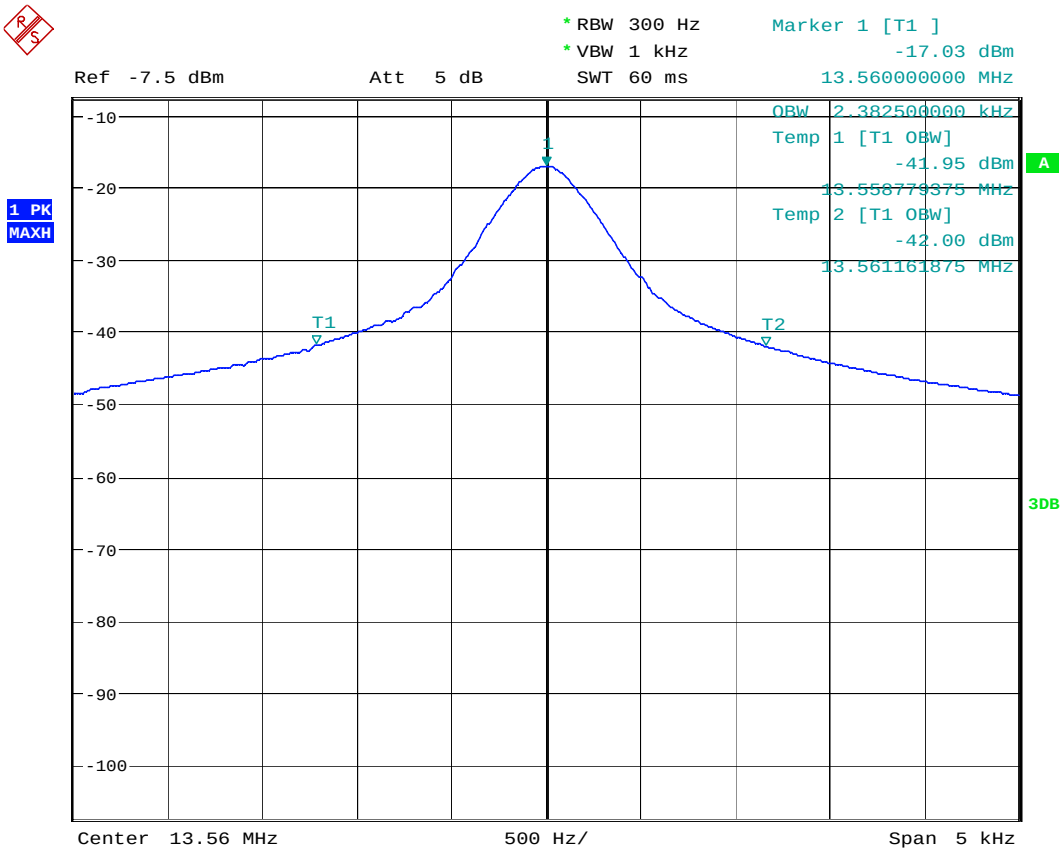
Date: 6.JAN.2010 10:18:10

Plot 3



Date: 6.JAN.2010 10:28:36

Plot 4



Occupied Bandwidth

Date: 2.MAR.2010 10:13:25

5.0 Frequency Tolerance

Requirement

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of -20^0C to $+50^0$C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of $+20^0$C.

Procedure

The EUT was placed in the temperature chamber and set to transmit unmodulated carrier. The transmitter was powered from a DC power supply 5V. The frequency counter was connected to the transmitter output. For each temperature, the carrier frequency was recorded. In addition, the carrier frequency was recorded when the power was set to 5.75 V DC (115% of 5V DC) and to 4.25 V DC (85% of 5V DC).

Result

Nominal Frequency: 13560000 Hz

Temperature, ^{0}C	**Measured Frequency, Hz**	**Measured Frequency, Hz**	**Measured Frequency, Hz**	**Maximum difference, Hz**
	5V DC	**4.25V DC**	**5.75V DC**	
+50	13559983			15
+40	13559988			10
+30	13559979			19
+20	13559998	13559998	13559998	0
+10	13559991			7
0	13559969			29
-10	13559842			156
-20	13559873			125

The frequency tolerance is within –0.00014% to 0.00092%.

6.0 List of test equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	12/04/10
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	12/04/10
BI-Log Antenna	Antenna Research	LPB-2513/A	1154	12	06/23/10
Pre-Amplifier	Sonoma	310N	185634	12	11/19/10
Loop Antenna	EMCO	6512	1029	12	06/04/10

7.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3197804	BG	March 18, 2010	Original document