Wavetrend

TEST REPORT FOR

RF Tag, L-TG 501-MS

Tested To The Following Standards:

FCC 15.231 & Manufacturer Defined Criteria

Report No.: 92779-1

Date of issue: February 22, 2012

This report contains a total of 15 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc.

Testing the Future

CKC LABORATORIES, INC.

TABLE OF CONTENTS

Administrative Information 3
Test Report Information 3
Report Authorization 3
Test Facility Information 4
Conditions During Testing 5
Equipment Under Test 5
Peripheral Devices 5
Summary of Results 5
Background 6
Purpose of Test 6
Test Method 6
Individual Trigger Tests 8
Impulse Shock Tests 3

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Wavetrend
Parkshot House, 5 Kew Road, Richmond
Surrey TW9 2PR
United Kingdom

Representative: Will Damerell
Customer Reference Number: 000043

REPORT PREPARED BY:

Randy Clark
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 92779

DATE OF EQUIPMENT RECEIPT: February 15, 2012
DATE(S) OF TESTING: February 15, 2012

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive SE
Suite A
Bothell, WA 98021

DTL Canyon Park
2200 222nd ST. SE
Bothell, WA 98021
(425) 984-2715

CONDITIONS DURING TESTING

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST

Description	Tag Sensitivity	Model Number	Serial Number
RF Tag	0	L-TG 501 MS	66360-30595
RF Tag	2	L-TG 501 MS	66360-30671
RF Tag	4	L-TG 501 MS	36920-30318
RF Tag	6	L-TG 501 MS	66360-30323
RF Tag	8	L-TG 501 MS	66360-30244

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

SUMMARY OF RESULTS

As demonstrated in the following tests, there exist external shock conditions and motion sensor sensitivity level settings where transmitter pulse trains operating under 47 CFR 15.231(a) occur with a finite time delay between successive triggers. As the shock frequency increases and sensitivity level setting increases, the time delay between successive transmissions decreases. As sensitivity level setting decreases, the time delay between successive transmissions increases even with increasing shock frequency. In summary, the tests performed indicate that there exists a variety of operational characteristics where repeated immediately successive triggering of the transmitter pulse train is avoided.

Background

The equipment under test (EUT) is an RF active tag operating at 433.9 MHz. The TG501-MS (FCC ID: O6XL-TG501) tag is equipped with a motion sensor to detect or monitor the movement of tagged assets or personnel – this is typically used to provide increased asset protection and security or provide constant monitoring of personnel movement such as in 'man down' applications. Each tag is factory programmed with a specific sensitivity setting.

Purpose of Test

To demonstrate tag transmit timing as a function of motion sensor triggering via shock impulse frequency variations and tag trigger sensitivity setting variations.

Test Method

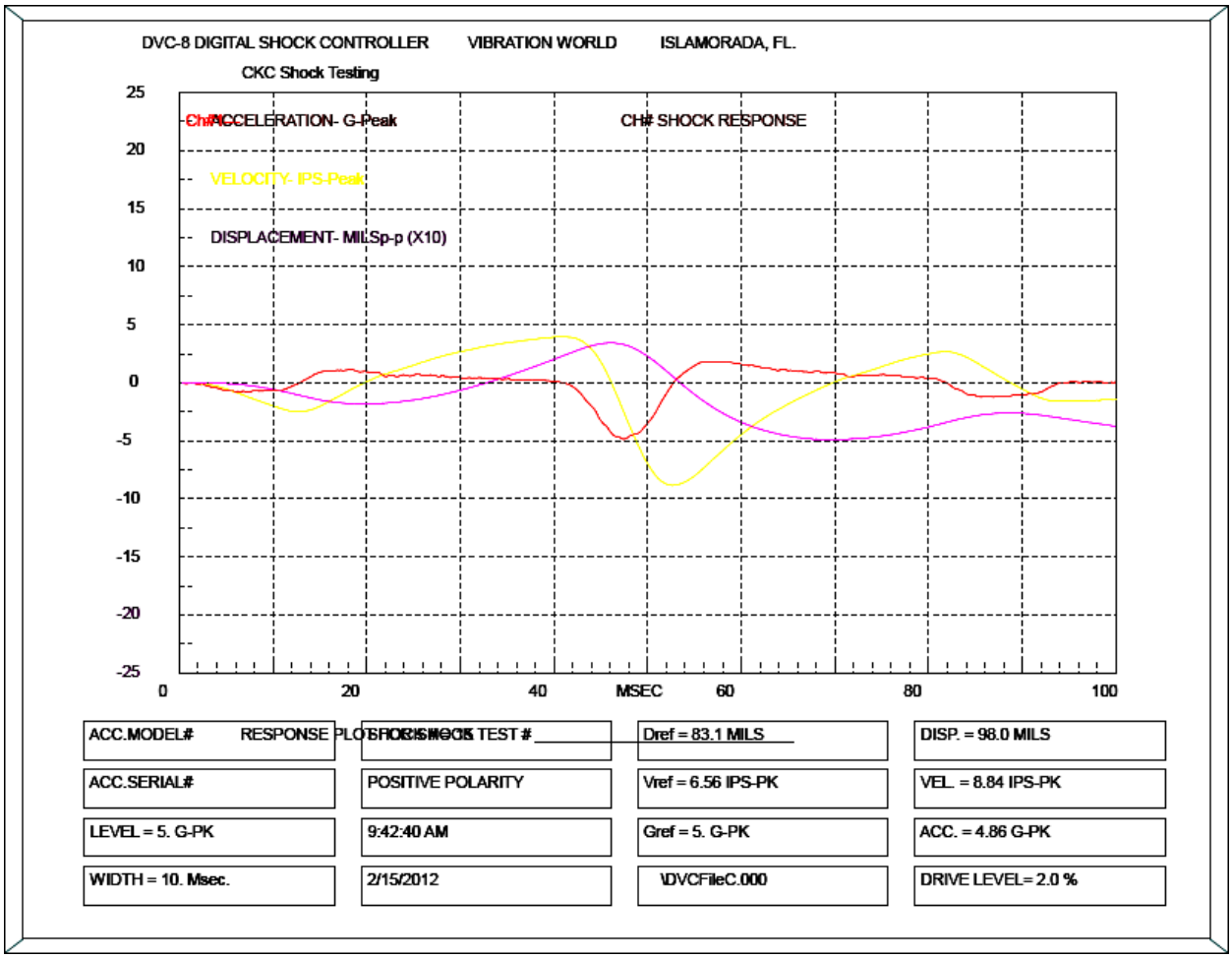
In the single trigger mode tests, the tag was manually triggered. A near-field probe and spectrum analyzer set in 0Hz span was used to measure the transmitter output timing; the amplitude of these measurements is not calibrated. In order to demonstrate EUT timing for a single trigger event Tag serial number 66360-30244 (sensitivity 8) was used in single-trigger events. The results are intended to show detail within the different operational modes. The individual trigger tests were all performed using varying time spans to clearly demonstrate device timing for an individual pulse.

In the impulse shock tests, the tags were attached to a vibration/shock table provided by DTL. A near-field probe and spectrum analyzer set in 0Hz span was used to measure the transmitter output timing; the amplitude of these measurements is not calibrated. Due to slight frequency shifts between tags, amplitude varies in the following data.

Each tag was subjected to a 5-G shock of duration 10ms at a varying repetition rate of 0.25Hz, 0.5Hz, 1Hz and 2Hz. An example of this impulse is shown in figure 1. The impulse shock tests were all performed using a static time span of 30 seconds for ease of comparison.

The green line in all provided plots indicates the video trigger level.

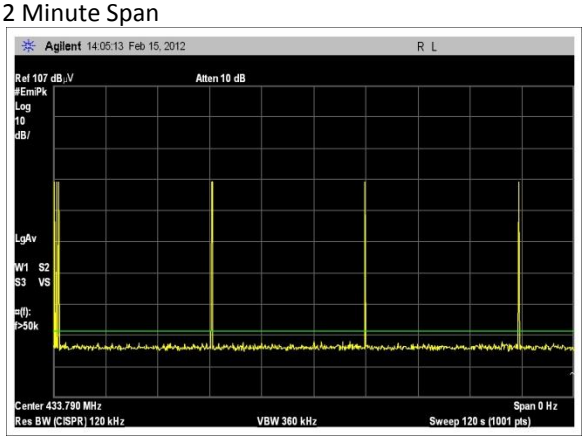
Figure 1. Example 5-G Impulse



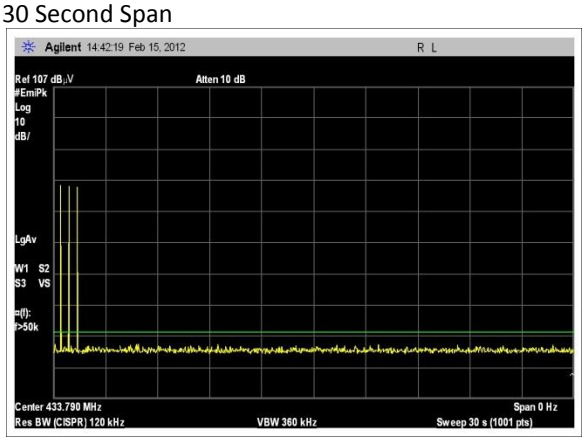
Test Equipment						
Asset/Serial#	**Description**	**Manufacturer**	**Model**	**Serial**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	Agilent	E4446A	US44300437	7/29/2010	7/29/2012
--	Near Field Probe	CKC	--	--	--	--
--	Cable	Pasternack Enterprises	RG58C/U	--	--	--
DTL 14333	Vibe Controller	Vibration World	DVC 8			3/2012
DTL 14364	Input Amp	Labworks	Ia-120			5/2012
DTL 14361	Accelerometer	PCB	W357B22/00310			5/2012
DTL -------	Vibration System	LDS	V894			--

INDIVIDUAL TRIGGER TESTS

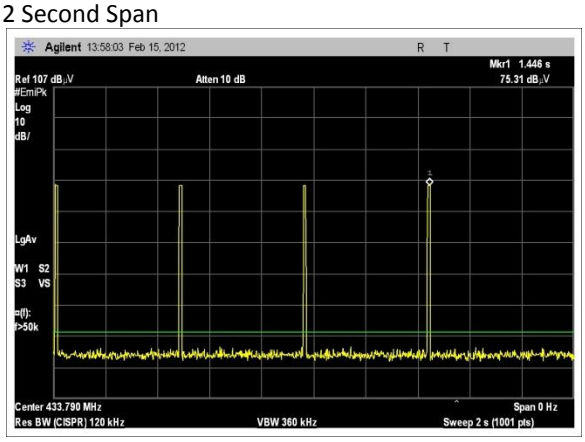
2 Minute Span



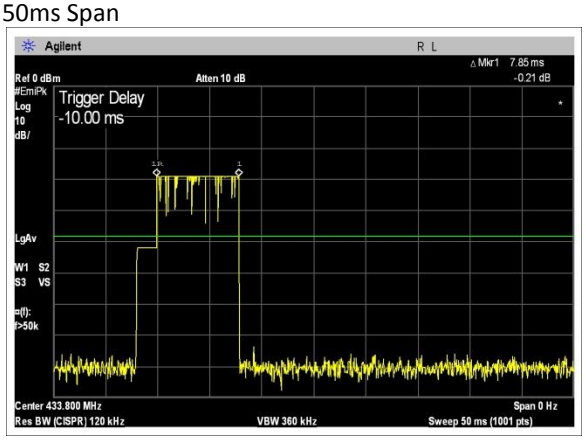
30 Second Span



2 Second Span



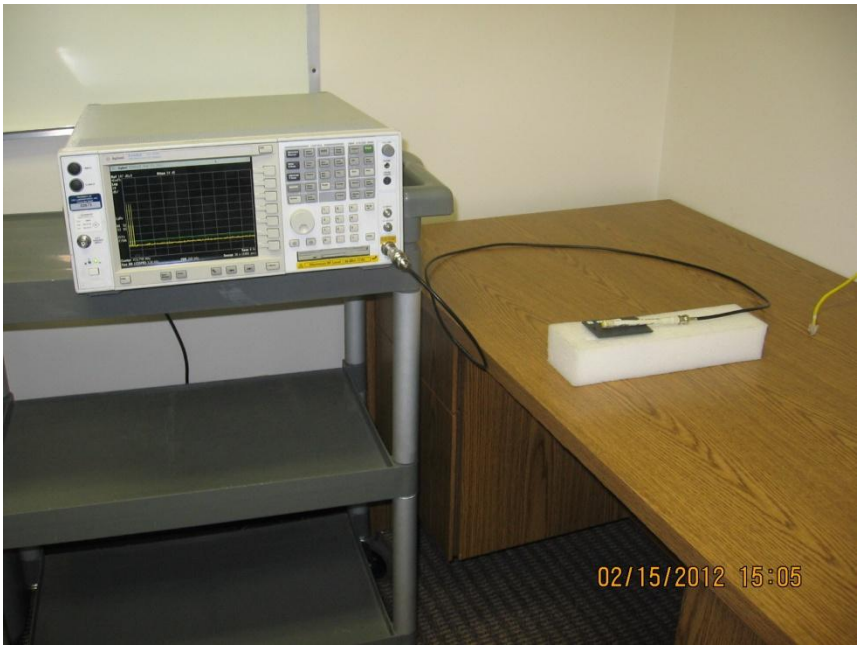
50ms Span



Notes:

1) In the 2 minute span test, the "first pulse" is the sequence of 4 pulses after motion sensor triggered transmission (shown in more detail in the 30 and 2- second span tests). After this initial burst, the next three pulses are individual transmissions at a predetermined interval subject to FCC rules 47CFR 15.231(e).
2) In the 30 and 2 second span tests, four repeated pulses are shown after motion sensor triggered transmission.
3) In the 50ms span, one individual pulse is shown; this pulse is approximately 7.9ms as measured at approximately 20 dBc (e.g. the necessary bandwidth). Each individual pulse during operation under 15.231(a) or 15.231(e) are of the same approximate duration. Additionally, each pulse carries a modulation waveform.

Test Setup Photo

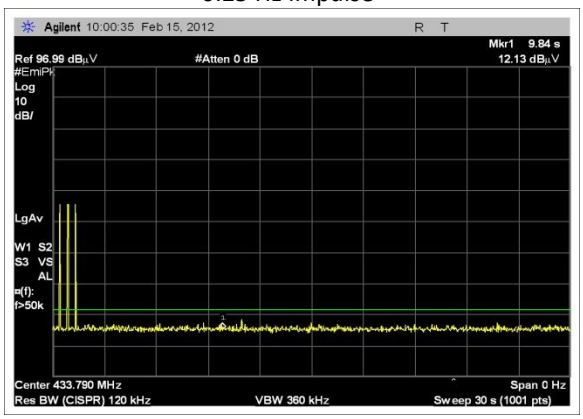


IMPULSE SHOCK TESTS

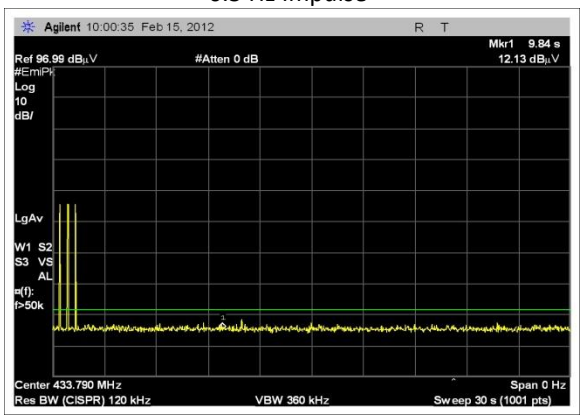
Tag used for this test:

Tag Sensitivity	Model Number	Serial Number
0	L-TG 501 MS	66360-30595

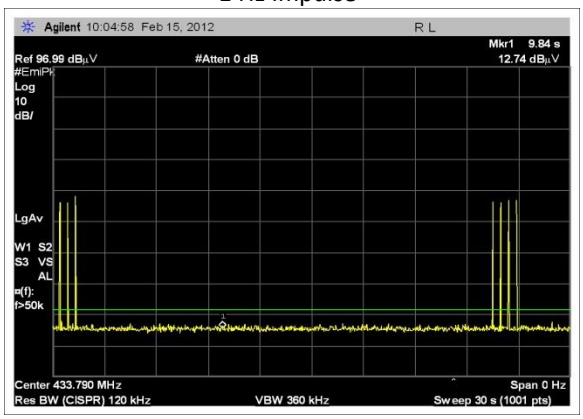
0.25 Hz Impulse



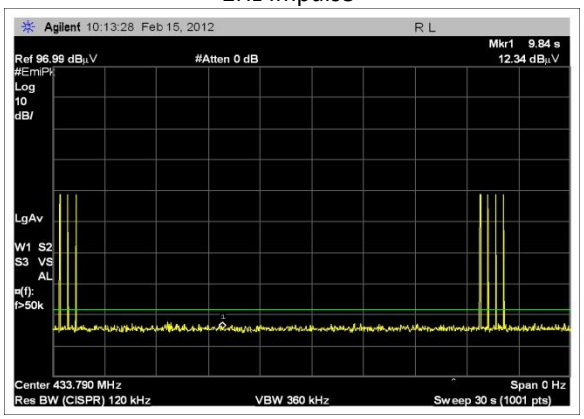
0.5 Hz Impulse



1 Hz Impulse



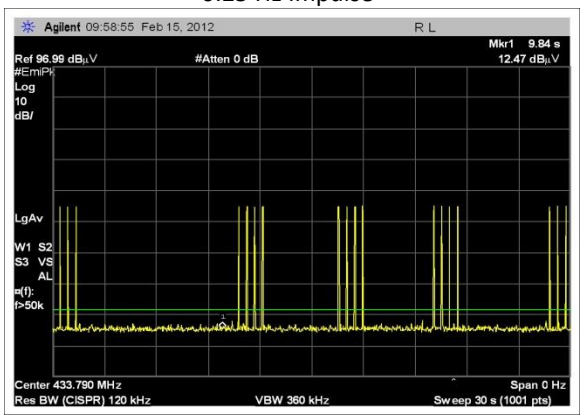
2Hz Impulse



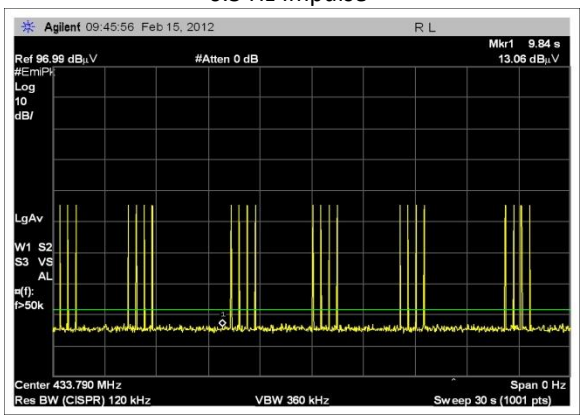
Tag used for this test:

Tag Sensitivity	Model Number	Serial Number
2	L-TG 501 MS	66360-30671

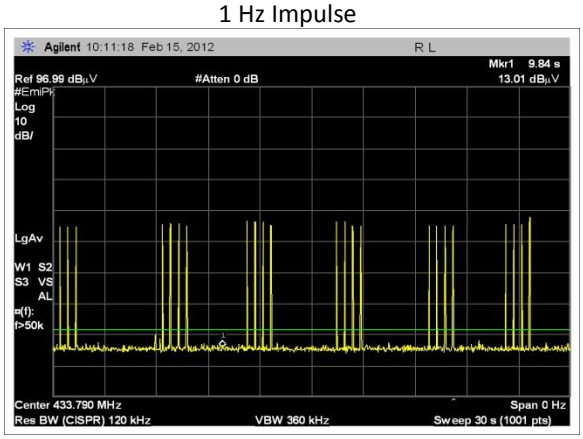
0.25 Hz Impulse



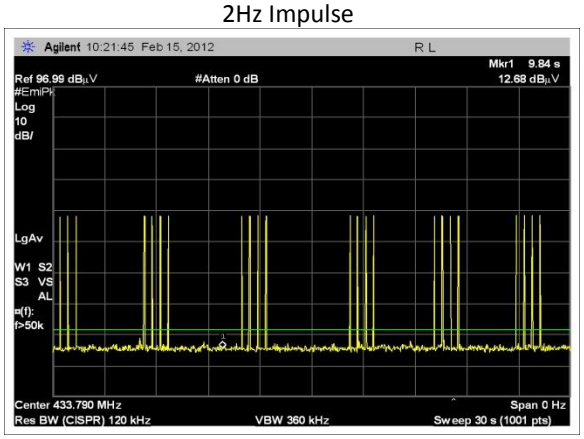
0.5 Hz Impulse



1 Hz Impulse



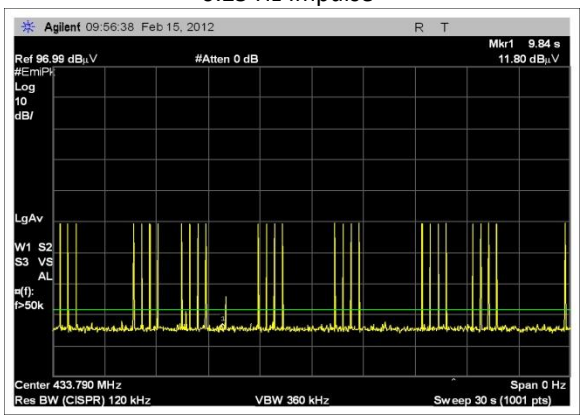
2Hz Impulse



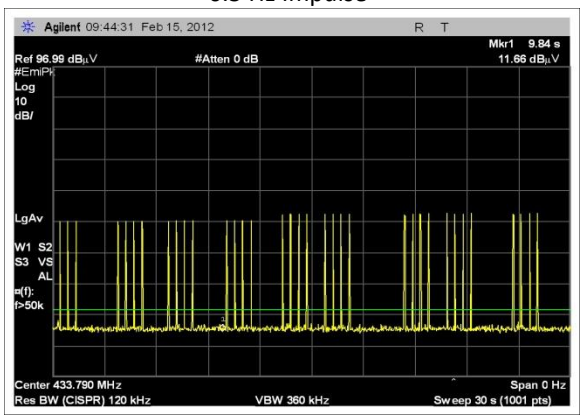
Tag used for this test:

Tag Sensitivity	Model Number	Serial Number
4	L-TG 501 MS	36920-30318

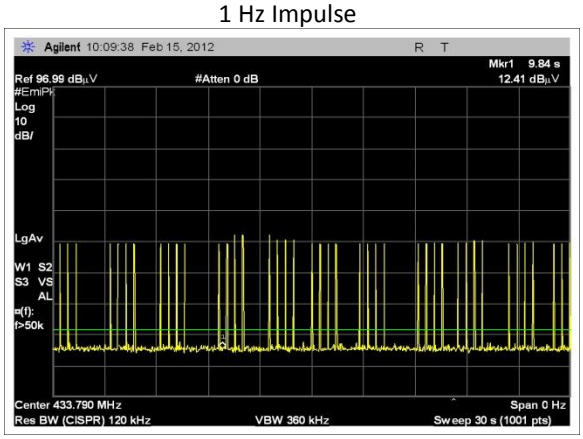
0.25 Hz Impulse



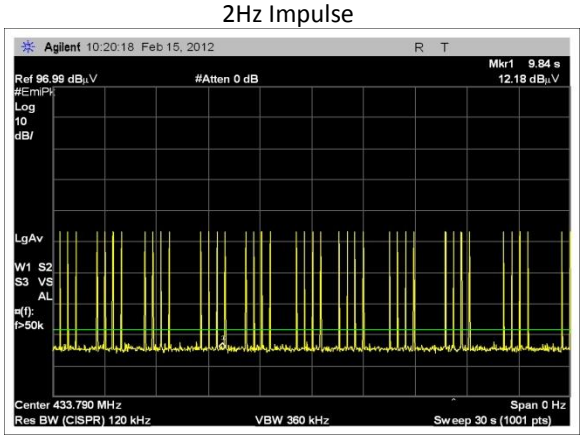
0.5 Hz Impulse



1 Hz Impulse



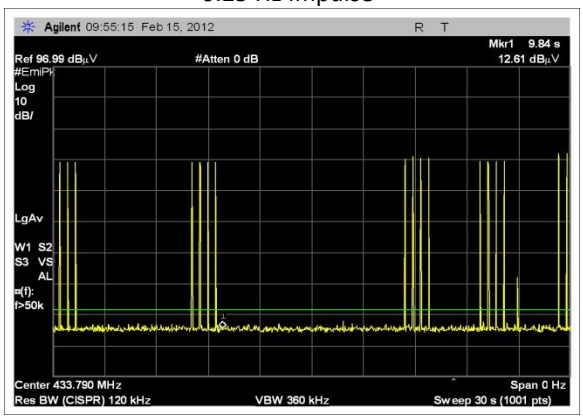
2Hz Impulse



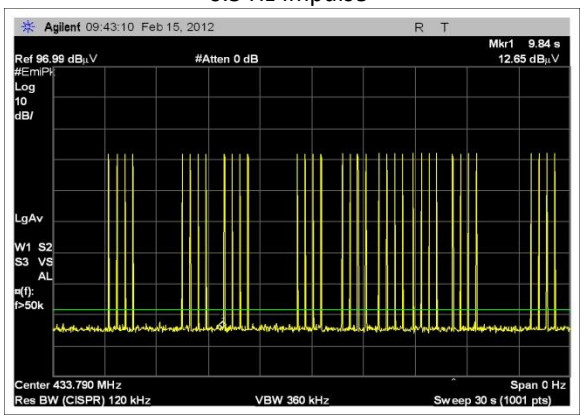
Tag used for this test:

Tag Sensitivity	Model Number	Serial Number
6	L-TG 501 MS	66360-30323

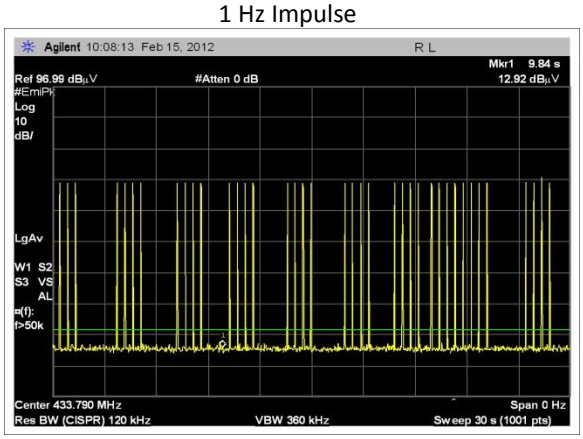
0.25 Hz Impulse



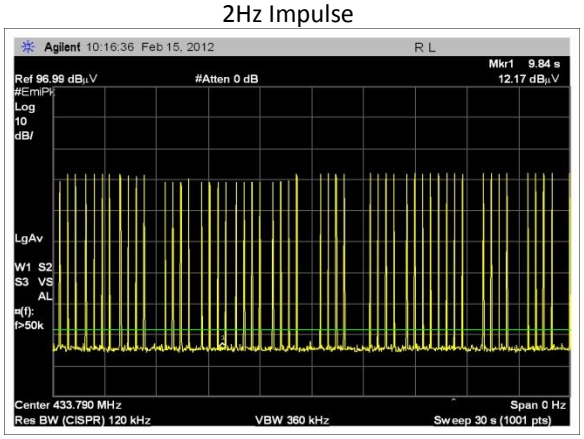
0.5 Hz Impulse



1 Hz Impulse



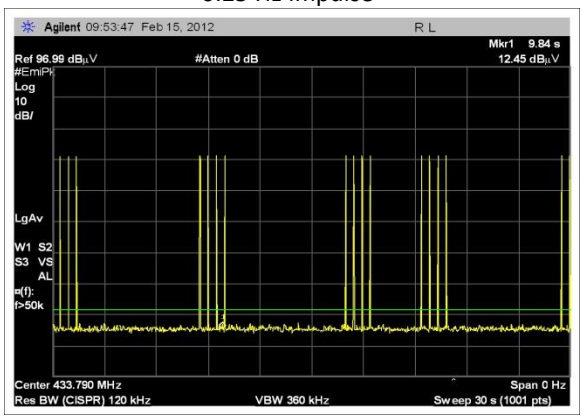
2Hz Impulse



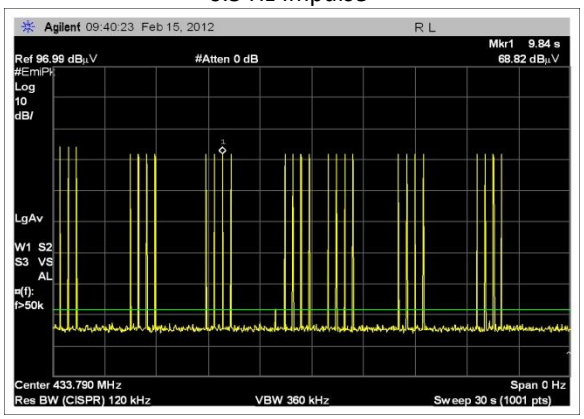
Tag used for this test:

Tag Sensitivity	Model Number	Serial Number
8	L-TG 501 MS	66360-30244

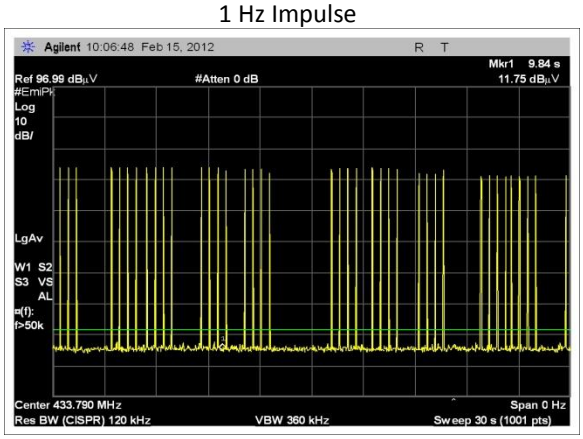
0.25 Hz Impulse



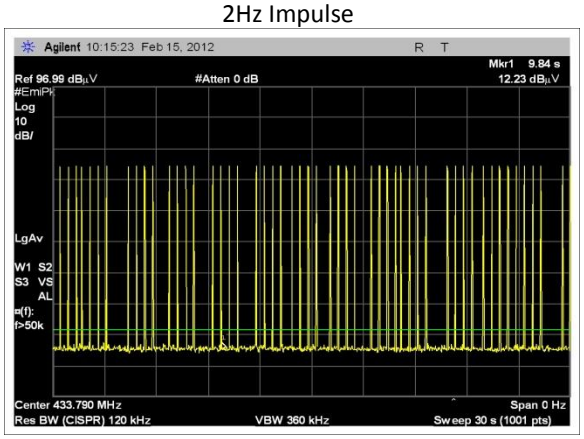
0.5 Hz Impulse



1 Hz Impulse



2Hz Impulse



Test Setup Photos