

# STEREO *IMPACT*

FM2 Boom Suite EMC Test Report

IMPACT-FM2-BoomSuite\_EMC\_Report.doc  
Version A – 2005-Jun-02

---

David Curtis, UCB IMPACT Project Manager

## Document Revision Record

Rev.	Date	Description of Change	Approved By
A	2005-June-2	Preliminary Draft	-

## Distribution List

Dave Curtis, UCB  
Lil Richenthal, GSFC

## Table of Contents

<b>Document Revision Record</b> .....	<b>i</b>
<b>Distribution List</b> .....	<b>i</b>
<b>1. Overview</b> .....	<b>1</b>
1.1. <i>Introduction</i> .....	<i>1</i>
1.2. <i>Applicable Documents</i> .....	<i>1</i>
<b>2. Test Results</b> .....	<b>2</b>
2.1. <i>First Run</i> .....	<i>2</i>
2.2. <i>Second Run</i> .....	<i>2</i>

## 1. Overview

### 1.1. *Introduction*

STEREO is a NASA program to launch a pair of nearly identical spacecraft into heliocentric orbit to observe the Sun. STEREO is managed out of Goddard Space Flight Center (GSFC). IMPACT is a suite of instruments for STEREO to measure in-situ particles and magnetic fields. IMPACT is managed by the University of California at Berkeley (UCB) with collaborators from many institutions around the world.

The STEREO IMPACT Suite FM1 (Ahead) unit went through an extensive EMC test as called out in the IMPACT EMC test plan. The FM2 (Behind) boom suite was subjected to the more limited set of Acceptance testing called out in the specification, as defined by the STEREO Project EMC requirements, reference 1, sections 8.1, and the IMPACT Boom Suite EMC Acceptance Test Plan, reference 2. This Acceptance tests was done at U. C. Berkeley. Acceptance testing for the FM2 SEP suite will be described elsewhere.

### 1.2. *Applicable Documents*

The following documents are closely interrelated with this specification. All documents can be found on the Berkeley STEREO/IMPACT FTP site unless otherwise indicated:

<http://sprg.ssl.berkeley.edu/impact/dwc/>

1. 7381-9030, EMC spec (EMC requirements, on the APL web page)
2. TestProcs/IMPACT-BoomSuite-EMC-Acceptance – test plan
3. FM2BoomEMC/ - first run test data
4. FM2IDPUEMC/ - second run test data

## 2. Test Results

### 2.1. *First Run*

The test was set up with the FM2 IDPU and FM2 Boom suite connected together and placed on a copper ground plane (no SEP or PLASTIC instruments attached). The power was connected as indicated in the test plan and test data was taken, which can be found at reference 3.

The most obvious problem is the IDPU common mode noise, showing power converter harmonics up to 40MHz. Some of this noise gets on to the MAG heater at higher frequencies, and a little seems to be on SWEA (around 6MHz).

This test was repeated at APL on the spacecraft with similar results, so the unit was returned to UCB for re-work. The common mode filter was found to be wired wrong, and this was repaired (see PFR1042).

The SWEA emissions look as good as FM1 with the exception of the power converter harmonics at around 6MHz (common mode). We believe these are related to the IDPU common mode noise.

### 2.2. *Second Run*

For this run the boom was unavailable, so the IDPU was tested alone, but with an ETU MAG sensor. This ETU MAG sensor has a dummy heater installed, and the controlling temperature sensor was replaced with a variable resistor so the noise as a function of heater power level could be measured. The results of this test can be found in reference 4.

The IDPU measurements now look at least as good as the FM1 measurements. The MAG heater circuit measurements look higher, but this is due to the different configuration (ETU heater delivering power). The 50KHz power level seems to scale with the power delivered to the MAG heater as expected. The higher harmonics envelope seems to shift with power level, especially in differential mode. Even at max power these harmonics exceed the spec by a few dB in the 200kHz-1MHz range. The 24MHz line from the IDPU processor also seems a bit higher in FM2 MAG heater differential mode data, and is a few dB over spec.

These data fall within normal variations from the FM1 data, and the unit can now be considered to have passed this test.