
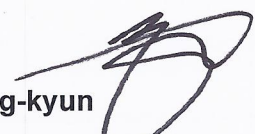


TEST REPORT

Report No. : SGS-R13-0612-EN
Applicant : GROUND Co., Ltd.
Address : #209, 52 Suntechcity2, Sagimakgol-ro,
 Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Product : Third Generation Digital Lightning Protection
 Grounding Device
Model : LM-34-38-90M
Environment : Temp. (23 ± 3) °C, Humidity (37 ± 5) % R.H.
Test Date : May 24, 2013
Standard : MIL-STD-810G: 2008 Method 514.6 (Table 514.6C-VI)
Test Result : Refer to the attached document
Use of report : Validation

This is certified that the above mentioned products have been tested for the sample provided by client.

Confirmation	Tested by	Approved by
	Name : Cha, Min-ha 	Name : Kim, Dong-kyun 

- ※ The test results is based on the test conducted on the test sample, which was requested by the client.
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May 30, 2013

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Summary of Test Results

Third Generation Digital Lightning Protection Grounding Device / LM-34-38-90M	
TEST ITEM	TEST RESULT
Vibration Test	No abnormal was found.

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1. Overview

As requested by the client, this test was conducted on test sample according to the test specification presented by the client.

2. Product

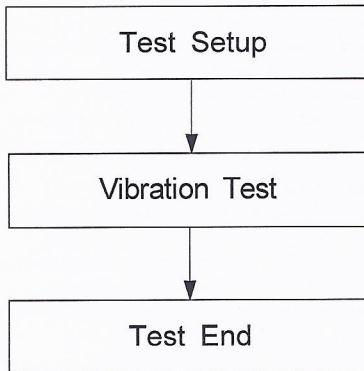
2.1 Description

Applicant : GROUND Co., Ltd
Manufacturer : GROUND Co., Ltd
Product : Third Generation Digital Lightning Protection Grounding Device
Model : LM-34-38-90M
Serial No. : G50LM0000358

2.2 Photograph



3. Test Process



4. Test Condition & Test Result

Refer to each test report (Next page)

4.1 Vibration Test

Applicant	GROUND Co., Ltd	Dept. in charge	Reliability Test Team
Product	Third Generation Digital Lightning Protection Grounding Device	Tester	Cha, Min-ha (+82-31-548-0725)
Model	LM-34-38-90M	Date	May 24, 2013
Serial No.	G50LM0000358		
Standard	MIL-STD-810G: 2008 Method 514.6 (Table 514.6C-VI)	Page	10

(1) Test Conditions

- 1) Test type : Random
- 2) Frequency : (5 ~ 500) Hz
- 3) Acceleration : Z axis - 21.952 m/s² r.m.s. (2.24 g_n r.m.s.)
 X axis - 15.504 m/s² r.m.s. (1.48 g_n r.m.s.)
 Y axis - 18.208 m/s² r.m.s. (1.96 g_n r.m.s.)
- 4) Test time : Total 6 h (2 h in each axis)
- 5) Test axis : Vertical (Z), Transverse (X), Longitudinal (Y)
- 6) Check time : Before and After the test
- 7) Sample condition : Unpackaged product / Non-operation
- 8) Sample quantity : 1 EA

(2) Environment Conditions : Temperature (23 ± 3) °C, Humidity (37 ± 5) % R.H.

(3) Test Method

- 1) Perform a visual inspection and an operational check for the specimen.
- 2) Fix the specimen on the vibration table.
- 3) Operate the vibration tester.
- 4) Repeat from steps 2) to step 3) for each required axis.
- 5) Perform a final visual inspection an operational check for the specimen.

(4) PSD Levels < Z >

Frequency [Hz]	PSD Levels [g_n^2 / Hz]
5	0.175 9
8	0.512 0
11	0.066 0
12	0.058 5
13	0.034 8
15	0.144 1
16	0.123 7
20	0.024 1
23	0.053 6
26	0.012 4
27	0.011 8
30	0.033 1
34	0.008 6
39	0.034 7
43	0.007 3
45	0.014 1
49	0.008 4
52	0.008 9
57	0.004 5

Frequency [Hz]	PSD Levels [g_n^2 / Hz]
67	0.016 0
80	0.003 7
90	0.007 7
93	0.005 3
98	0.006 5
99	0.006 3
111	0.004 6
123	0.006 9
128	0.005 5
164	0.003 1
172	0.003 5
215	0.013 3
264	0.005 6
276	0.009 6
292	0.003 2
348	0.004 4
417	0.003 1
500	0.000 8
2.24 g_n r.m.s. = 21.952 m/s^2 r.m.s.	


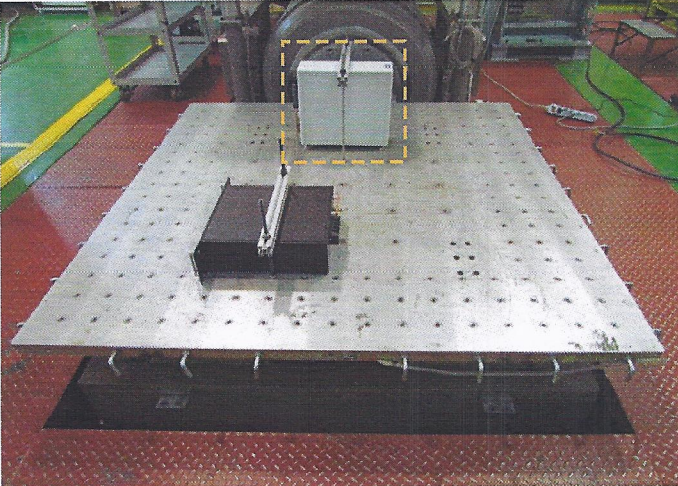
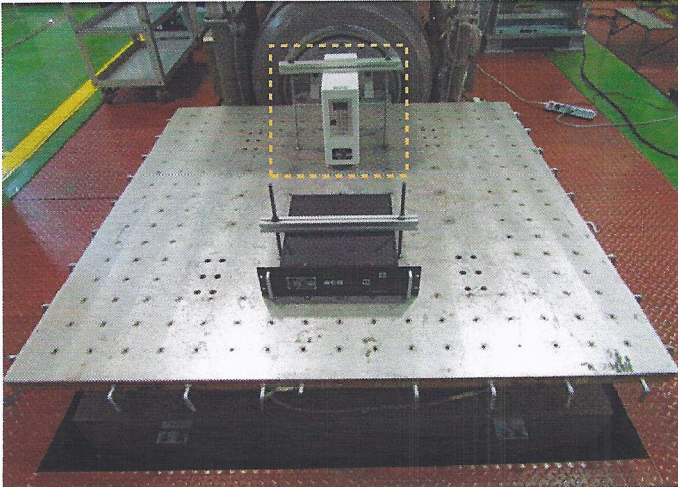
< X >

Frequency [Hz]	PSD Levels [g_n^2 / Hz]
5	0.099 8
7	0.079 9
9	0.111 5
10	0.057 7
14	0.029 4
15	0.065 1
16	0.064 6
17	0.043 6
18	0.039 3
19	0.062 2
24	0.010 0
37	0.004 5
38	0.006 5
44	0.003 3
55	0.002 4
57	0.004 2
59	0.001 9
76	0.001 2
79	0.002 1
83	0.001 0
114	0.000 6
135	0.001 7
142	0.001 0
158	0.001 8
185	0.001 0
191	0.000 7
206	0.000 8
273	0.003 5
300	0.001 6
364	0.007 4
374	0.002 2
395	0.003 1
500	0.001 2
1.48 g_n r.m.s. = 14.504 m/s^2 r.m.s.	

< Y >

Frequency [Hz]	PSD Levels [g _n ² / Hz]	Frequency [Hz]	PSD Levels [g _n ² / Hz]
5	0.044 1	69	0.003 0
7	0.039 0	77	0.000 7
8	0.057 6	85	0.001 5
9	0.043 0	90	0.001 2
10	0.029 3	97	0.001 5
13	0.022 1	104	0.003 6
15	0.055 8	114	0.004 0
16	0.058 5	122	0.001 5
18	0.016 0	132	0.001 3
20	0.009 9	206	0.003 3
23	0.045 2	247	0.022 6
25	0.011 0	257	0.004 1
35	0.003 6	264	0.005 4
37	0.009 8	276	0.004 0
40	0.004 0	303	0.007 3
41	0.004 4	332	0.009 2
45	0.023 0	353	0.017 2
47	0.004 7	382	0.007 1
50	0.001 6	428	0.015 7
54	0.001 7	500	0.001 6
64	0.001 0	1.90 g _n r.ms. = 18.620 m/s ² r.ms.	

(4) Test Photograph

Test axis	Test photograph
Vertical (Z)	
Transverse (X)	
Longitudinal (Y)	

(5) Test Equipment

Description	Manufacturer and Model	Serial Number	The due date of next Calibration	Calibration Laboratory
Vibration Tester	Shinken/G-0310L	SG-4763	May 16, 2014	SICT
Vibration Tester	Shinken/G-5250NS	SG-4764	May 16, 2014	SICT
Accelerometer	Fujisera/S41SCB	0107	May 16, 2014	SICT

(6) Test Result

Check List	Test Result
1. Visual inspection - Mechanical damage such as deformation, separation, loosening of screw, crack, etc.	No abnormal was found.
2. Performance check - Power ON/OFF - LED Lightning	See result photograph (11 page)

※ Result Photograph



(Before the test)



(After the test)



(Before the test)



(After the test)

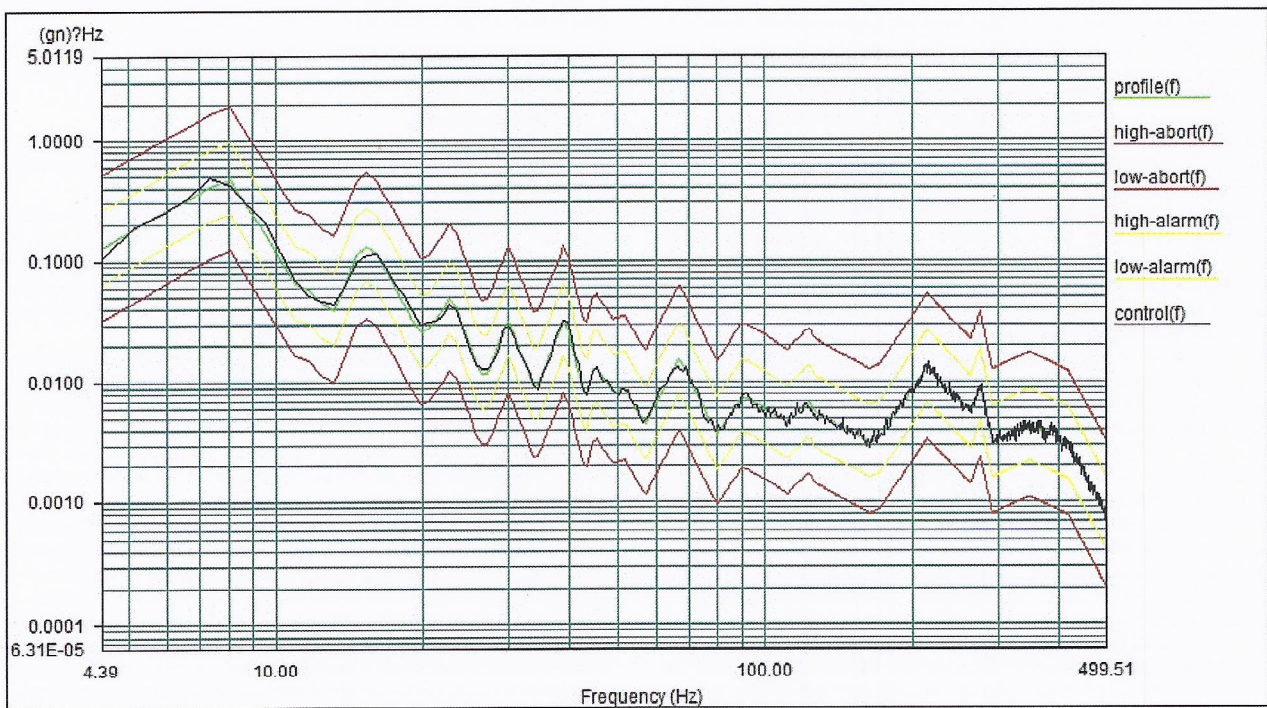
※ Appendix 1. Vibration data

Project File Name: MIL-STD-810G .prj

Profile Name: Vibration Test (Z axis)

Test Type: Random

Run Folder: \Run May 24, 2013



Level: 100 %

Control RMS: 2.280636 gn

Full Level Elapsed Time: 01:59:59

Lines: 800

Frame Time: 1.365333 Seconds

Demand RMS: 2.254850 gn

Remaining Time: 00:00:00

DOF: 154

dF: 0.732422 Hz

Data saved at 06:28:56 PM, Friday, May 24, 2013

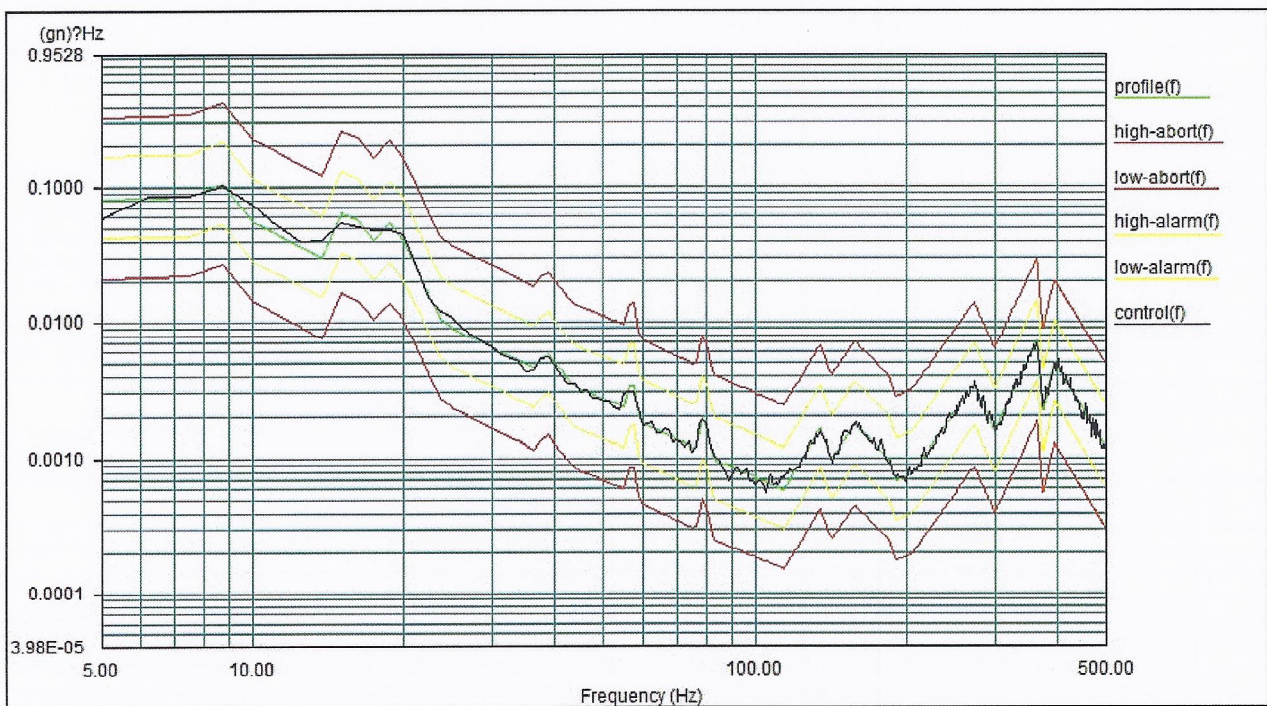
Report created at 06:28:59 PM, Friday, May 24, 2013

Project File Name: MIL-STD-810G .prj

Profile Name: Vibration Test (X axis)

Test Type: Random

Run Folder: \Run May 24, 2013



Level: 0 dB

Control RMS: 1.492004 gn

Full Level Elapsed Time: 01:59:57

Lines: 800

Frame Time: 0.800000 Seconds

Demand RMS: 1.471470 gn

Remaining Time: 00:00:00

DOF: 154

dF: 1.250000 Hz

Data saved at 03:35:55 PM, Friday, May 24, 2013

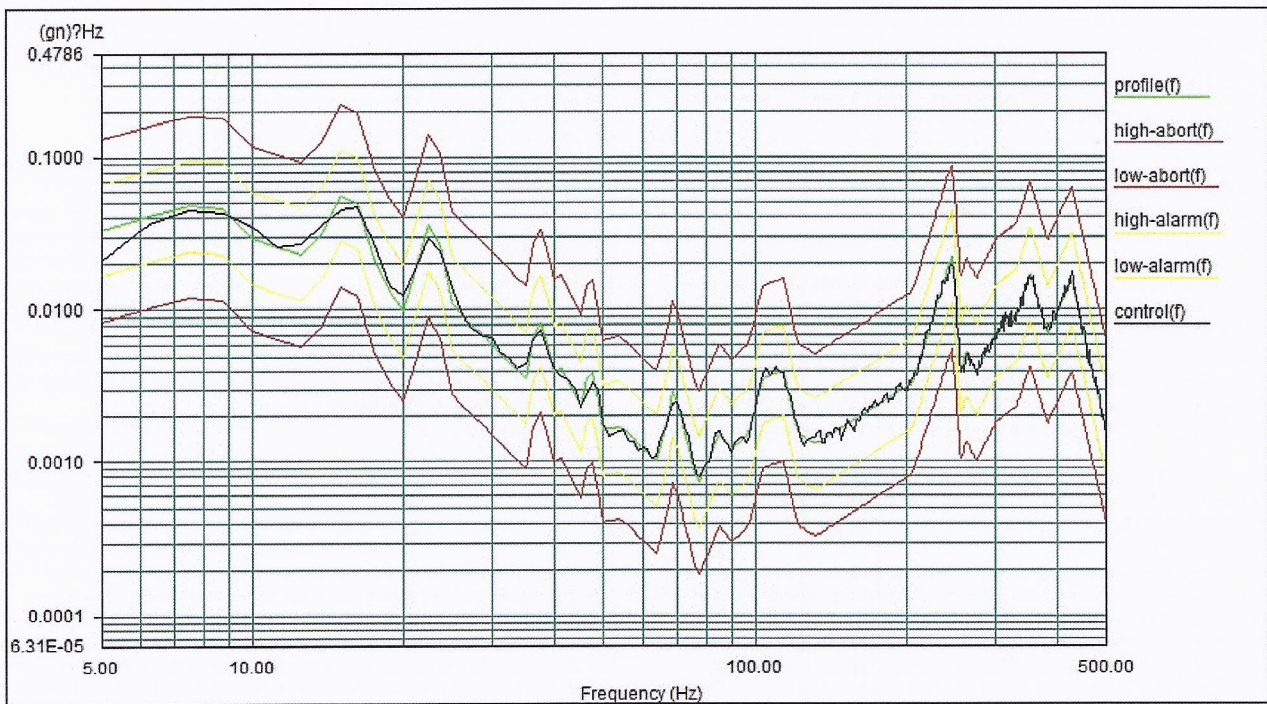
Report created at 03:36:01 PM, Friday, May 24, 2013

Project File Name: MIL-STD-810G .prj

Profile Name: Vibration Test (Y axis)

Test Type: Random

Run Folder: \Run May 24, 2013



Level: 0 dB

Control RMS: 1.907421 gn

Full Level Elapsed Time: 01:59:54

Lines: 800

Frame Time: 0.800000 Seconds

Demand RMS: 1.898276 gn

Remaining Time: 00:00:00

DOF: 154

dF: 1.250000 Hz

Data saved at 01:21:05 PM, Friday, May 24, 2013

Report created at 01:21:13 PM, Friday, May 24, 2013