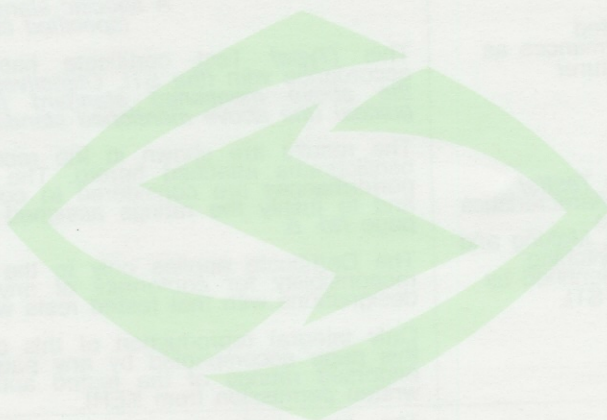


TEST REPORT

KERI



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한국전기연구원
KOREA ELECTROTECHNOLOGY
RESEARCH INSTITUTE



TEST REPORT

2007TS00188 1/3

CLASSIFICATION Performance Test(III)
APPARATUS Ground system
DESIGNATION ECA 3G-CM

RATINGS 1Ø AC (100 ~ 440) V, (30 ~ 90) MJ
APPLIED STANDARD IEC 61000-4-5(2005.11) and client's specification
RECEIPT No. TRD06S02110 (September 20, 2006)
APPLICANT Ground Co., Ltd.
#209, Suntech City2, 307-2, Sangdaewon-dong, Jungwon-gu,
Sunnam-si, Gyunggi-do, Korea
MANUFACTURER Ground Co., Ltd.
#209, Suntech City2, 307-2, Sangdaewon-dong, Jungwon-gu,
Sunnam-si, Gyunggi-do, Korea
DATE OF TESTS February 05, 2007
DATE OF ISSUE February 12, 2007

The tests have been carried out in accordance with the instructions of the client.

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Test results in this report are within the scopes accredited by Korea Laboratory Accreditation Scheme, which signed the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement



Prepared by

Kim, Jong-Hyung

Verified by

Kim, Oun-Seok

Approved by
(Technical manager)

Park, Byung-Rak

Power Apparatus Testing & Evaluation Division

KERI

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DF-E-21/14/02

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Tested by :

KERI

Kim, Jong-Hyung

Witnessed by :

Photos :

Photo DT 01 Tested apparatus

Ratings : given by test applicant

Ground system

Applied standard

IEC 61000-4-5(2005.11) and client's specification

Manufacturer

Ground Co. Ltd.

Designation

ECA 3G-CM

Ratings

1Ø AC (100 ~ 440) V, (30 ~ 90) MJ

List of tests :

Description of tests	Standard and clause	Sheet No.
1 Combination wave surge test	IEC 61000-4-5, Clause 7	3/3
2 Review of test results	-	3/3

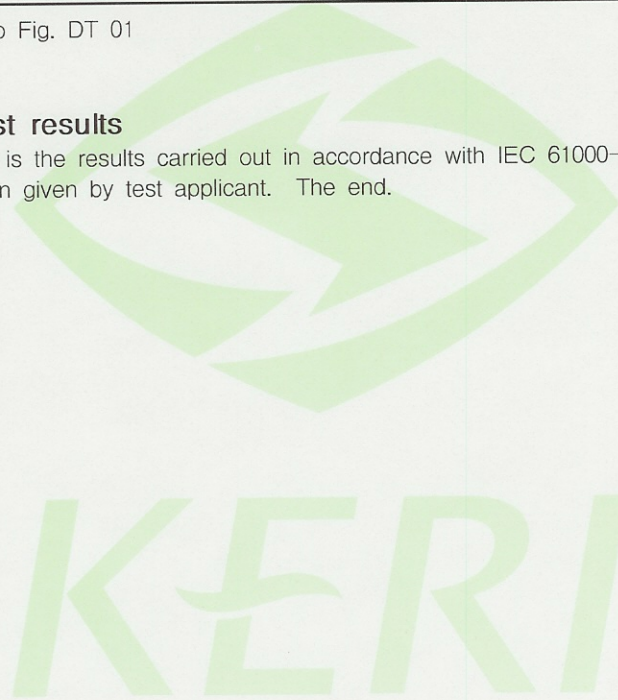
1 Surge test

Test method and requirement	Test point	Result
- o Test specification - Open-circuit voltage waveform of the surge generator : $1.2 \times 50 \mu s$ - Short-circuit current waveform of the surge generator : $8 \times 20 \mu s$ - Effective output impedance of the surge generator : 2Ω - Test level : 6 kV - Polarity : positive and negative - Repeat : 3 times each - Repetition rate : 1 per minute - o Requirements - During the test, there shall be no problems of flaming, glowing, melting, etc.	Line - Line	Good
	Line - Earth	Good
	Earth - Ground	Good

* Test point : Refer to Fig. DT 01

2 Review of test results

- 2.1 This test report is the results carried out in accordance with IEC 61000-4-5(2005.11) and client's specification for the specimen given by test applicant. The end.

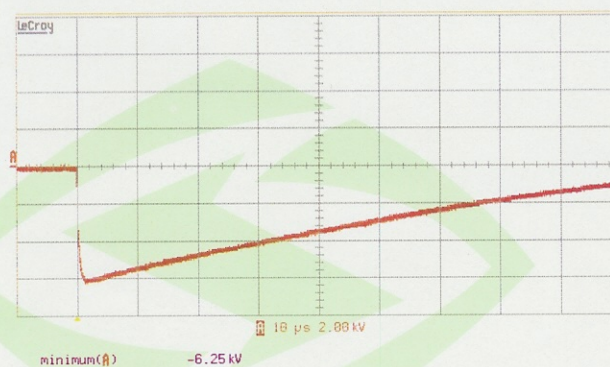
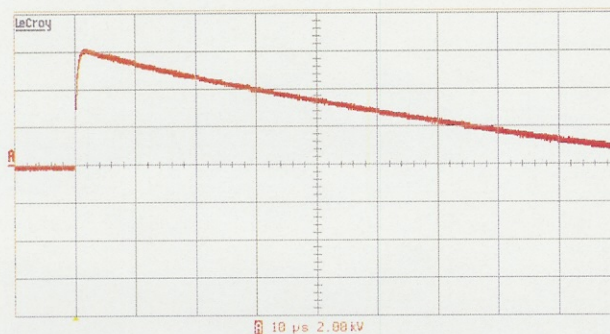


Photos

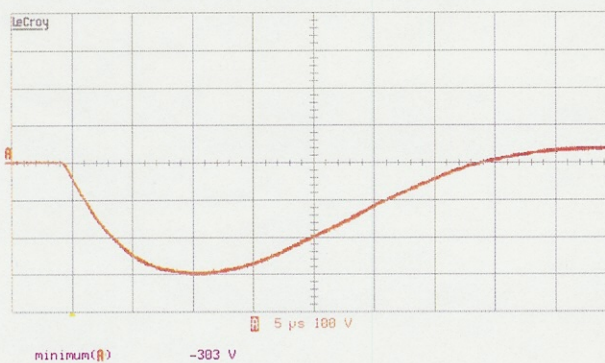


Tested apparatus

Calibration waveforms

Open circuit voltage waveform ($1.2 \times 50 \mu\text{s}$, 6 kV)

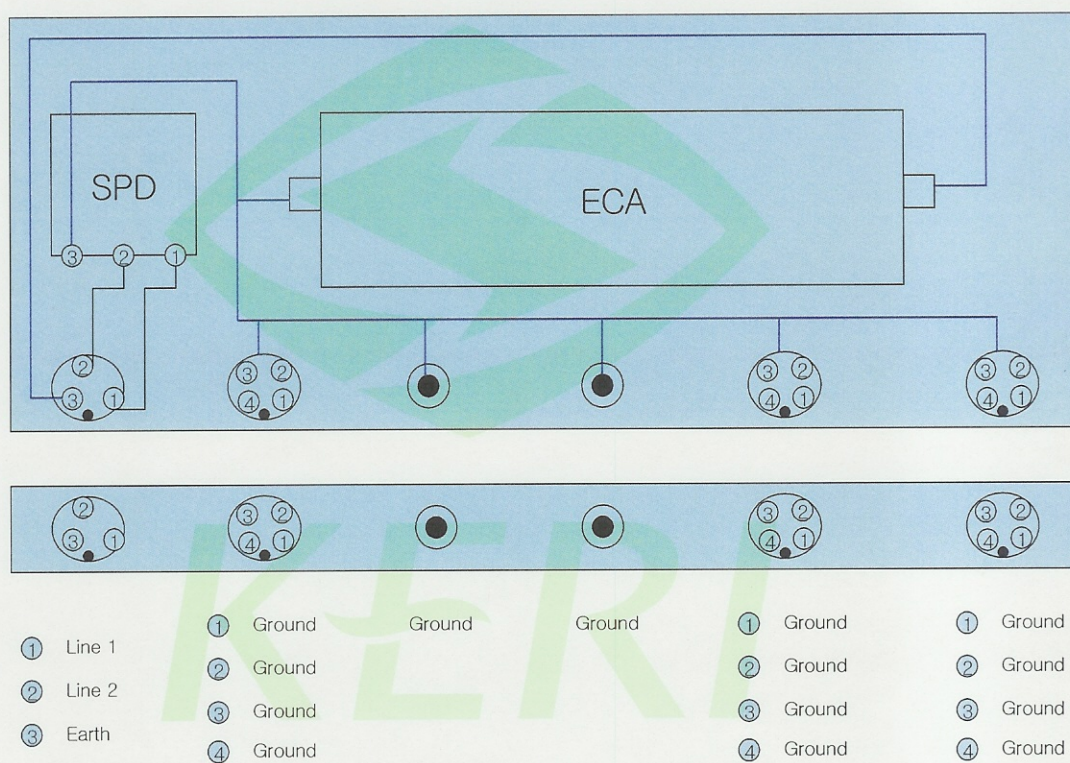
100 A / 1 V



100 A / 1 V

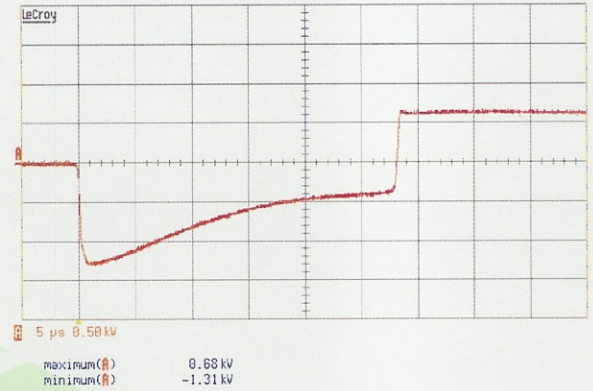
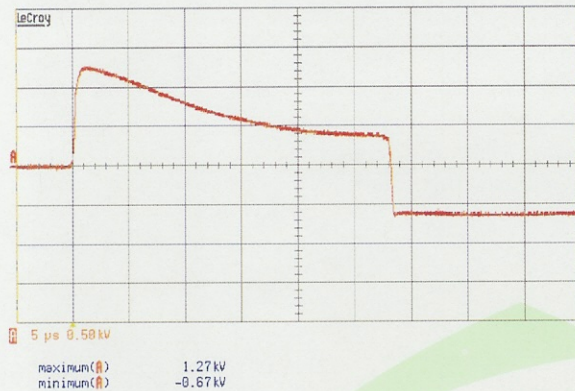
Short circuit current waveform ($8 \times 20 \mu\text{s}$, 3 kA)

Circuit diagram

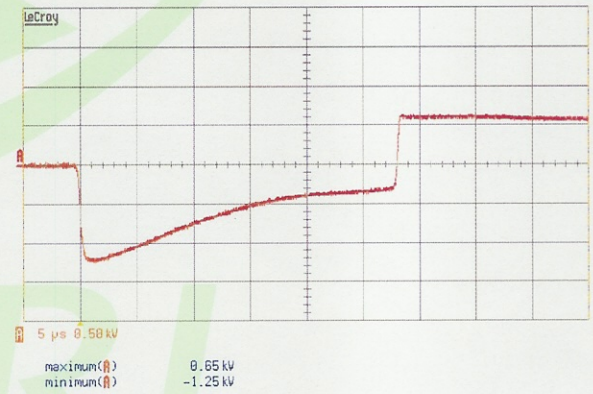


Configuration of Inner circuit and external terminals

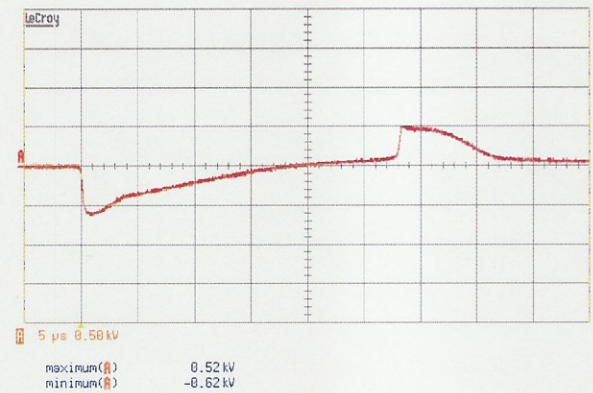
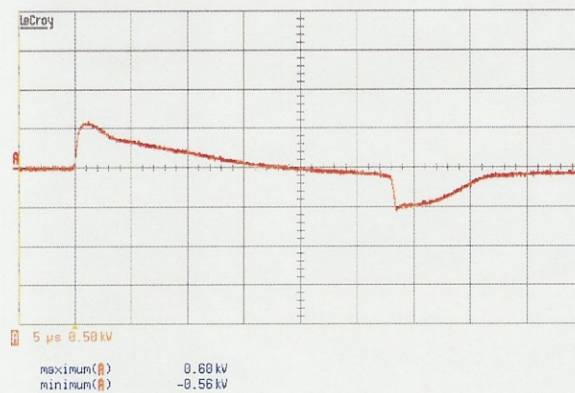
Measured voltage waveforms at each terminal



Line 1 - Line 2

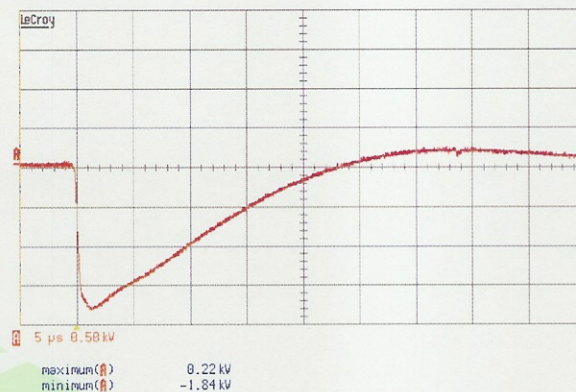
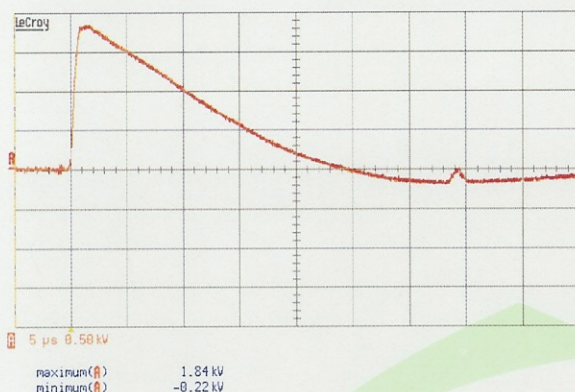


Line 1 - Earth

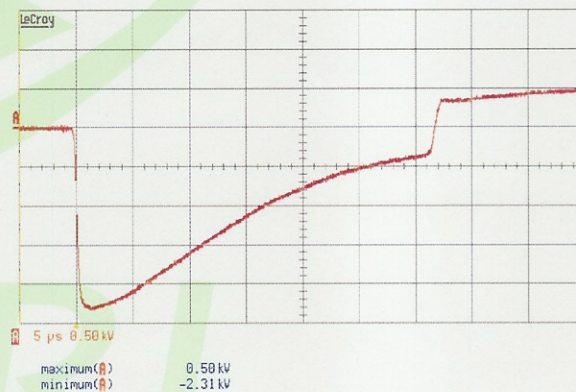
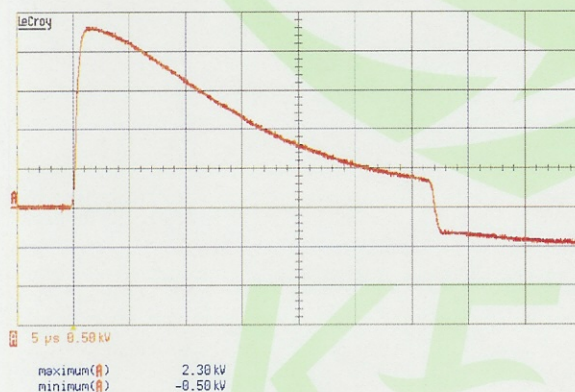


Line 2 - Earth

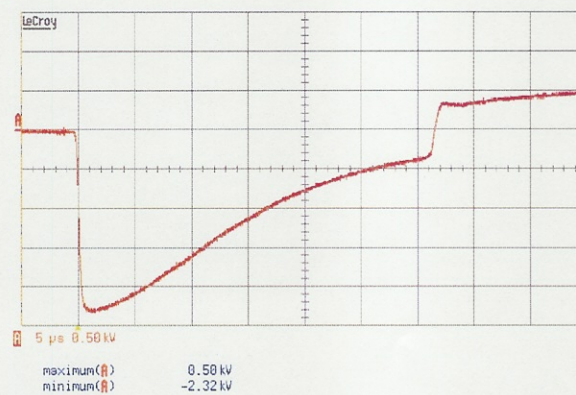
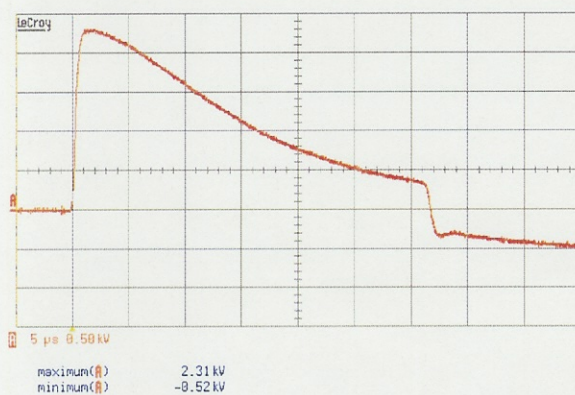
Measured voltage waveforms at each terminal



Earth - Ground



Line 1 - Ground



Line 2 - Ground

TEST REPORT



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KOREA ELECTROTECHNOLOGY
RESEARCH INSTITUTE



TEST REPORT

2007TS00189 1/3

CLASSIFICATION Performance Test(III)

APPARATUS Ground system

DESIGNATION ECA 3G-EM

RATINGS 1Ø AC (100 ~ 440) V, (30 ~ 90) MJ

APPLIED STANDARD IEC 61000-4-5(2005.11) and client's specification

RECEIPT No. TRD06S02111 (September 20, 2006)

APPLICANT Ground Co., Ltd.
#209, Suntech City2, 307-2, Sangdaewon-dong, Jungwon-gu,
Sungnam-si, Gyunggi-do, Korea

MANUFACTURER Ground Co., Ltd.
#209, Suntech City2, 307-2, Sangdaewon-dong, Jungwon-gu,
Sungnam-si, Gyunggi-do, Korea

DATE OF TESTS February 02, 2007 ~ February 05, 2007

DATE OF ISSUE February 12, 2007

The tests have been carried out in accordance with the instructions of the client.

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Prepared by Kim, Jong-Hyung

Verified by Kim Oun Seok
Kim, Oun-Seok

Approved by Park, Byung-Rak
(Technical manager) Park, Byung-Rak

Power Apparatus Testing & Evaluation Division

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DF-E-21/14/02

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Test results	3/3
Photos	-

Tested by :

KERI

Kim, Jong-Hyung

Witnessed by :

Photos :

Photo DT 01 Tested apparatus

Ratings : given by test applicant

Ground system

Applied standard

IEC 61000-4-5(2005.11) and client's specification

Manufacturer

Ground Co. Ltd.

Designation

ECA 3G-EM

Ratings

1Ø AC (100 ~ 440) V, (30 ~ 90) MJ

List of tests :

Description of tests

Standard and clause

Sheet No.

1 Combination wave surge test

IEC 61000-4-5, Clause 7

3/3

2 Review of test results

-

3/3

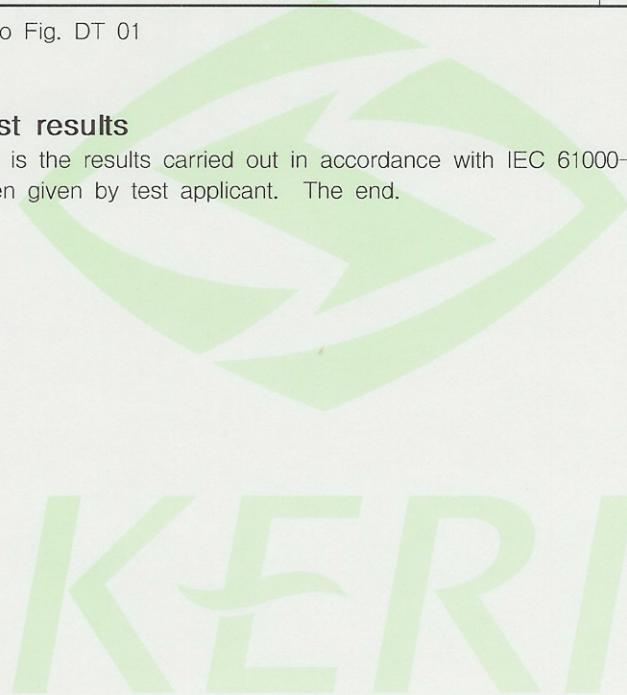
1 Surge test

Test method and requirement	Test point	Result
- o Test specification - Open-circuit voltage waveform of the surge generator : $1.2 \times 50 \mu s$ - Short-circuit current waveform of the surge generator : $8 \times 20 \mu s$ - Effective output impedance of the surge generator : 2Ω - Test level : 6 kV - Polarity : positive and negative - Repeat : 3 times each - Repetition rate : 1 per minute - o Requirements - During the test, there shall be no problems of flaming, glowing, melting, etc.	Line - Line	Good
	Line - Earth	Good
	Earth - Ground	Good

* Test point : Refer to Fig. DT 01

2 Review of test results

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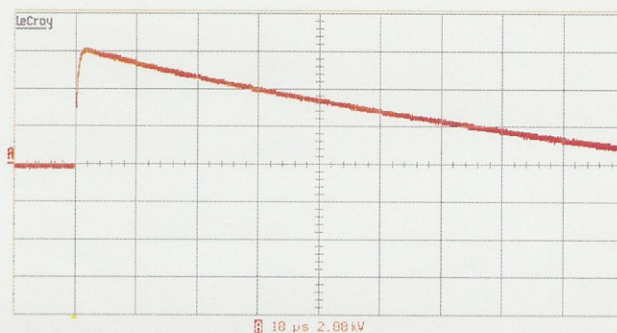


Photos

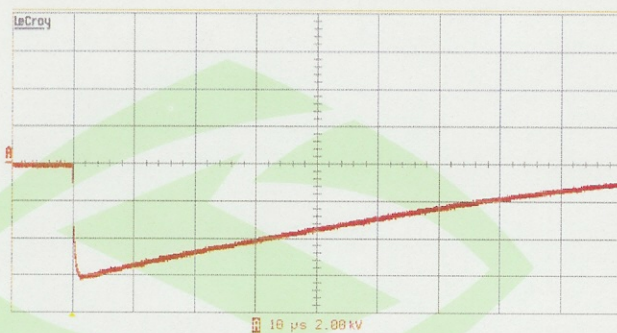


Tested apparatus

Calibration waveforms



maximum(A) 6.19 kV



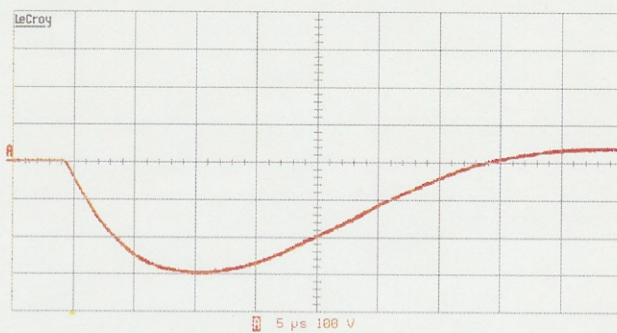
minimum(A) -6.25 kV

Open circuit voltage waveform ($1.2 \times 50 \mu$ s, 6 kV)



maximum(A) 301 V

100 A / 1 V

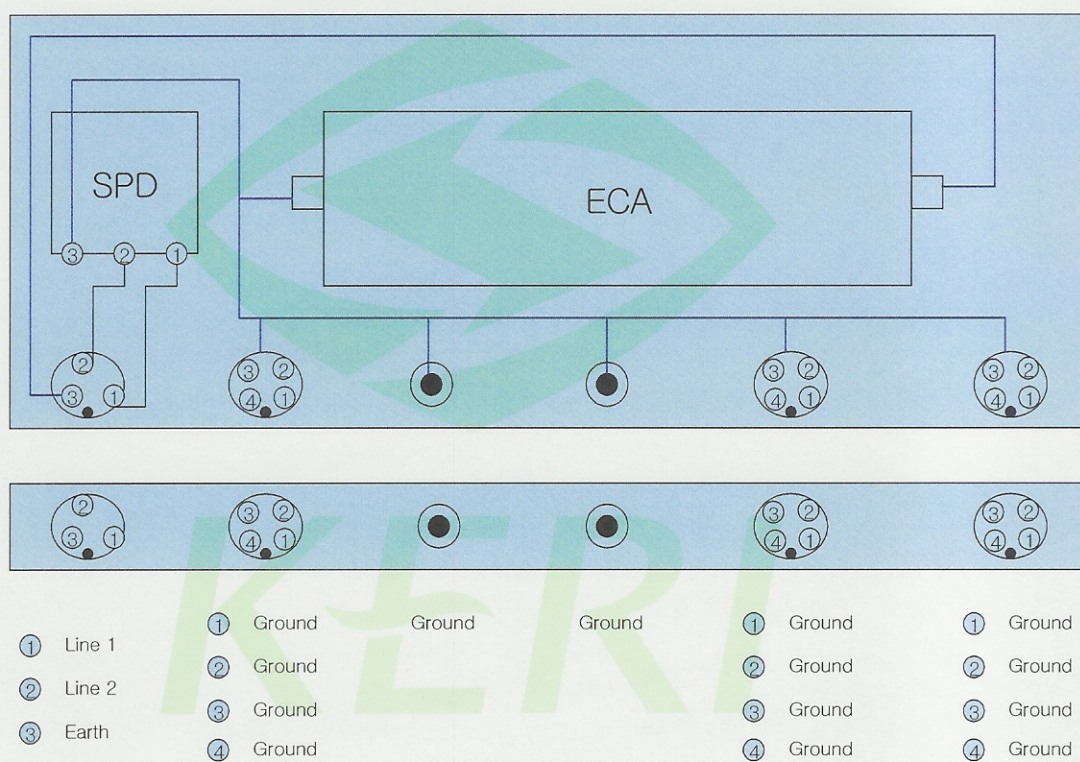


minimum(A) -303 V

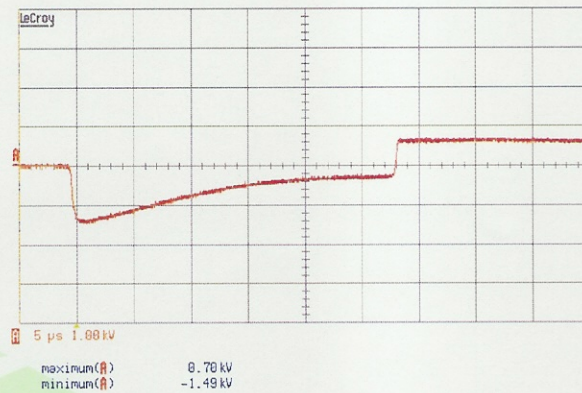
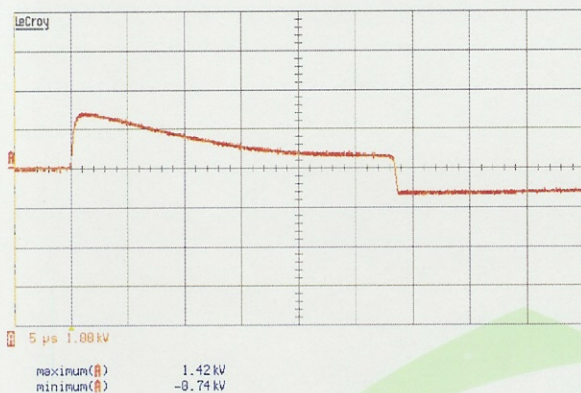
100 A / 1 V

Short circuit current waveform ($8 \times 20 \mu$ s, 3 kA)

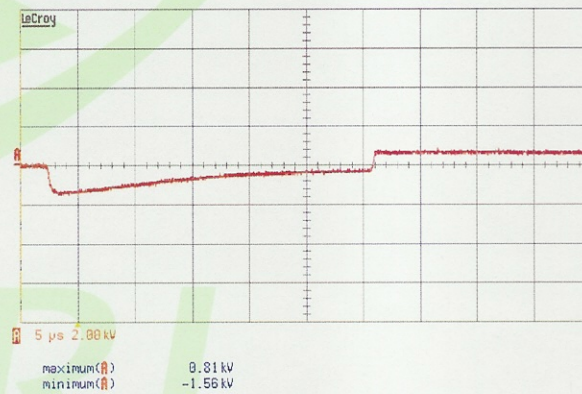
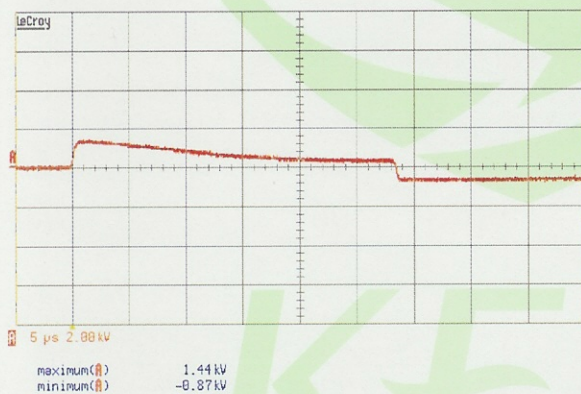
Circuit diagram



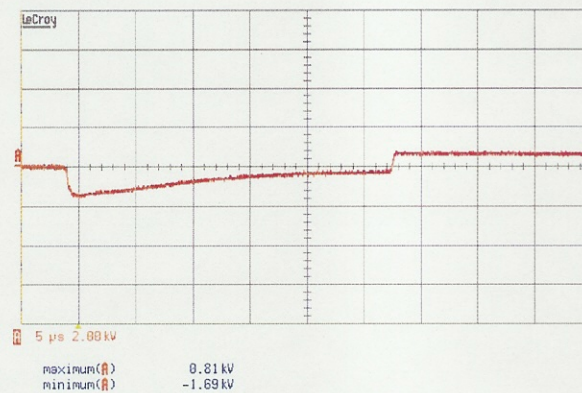
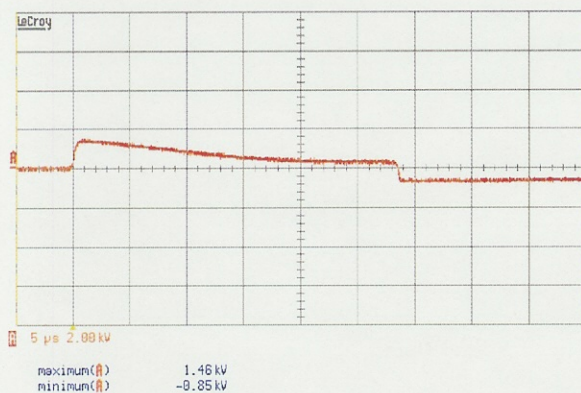
Measured voltage waveforms at each terminal



Line 1 - Line 2

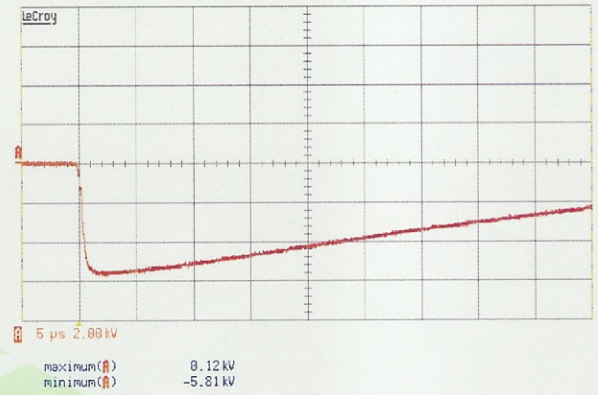
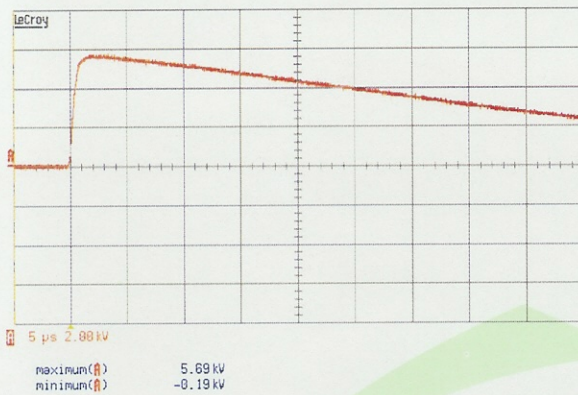


Line 1 - Earth

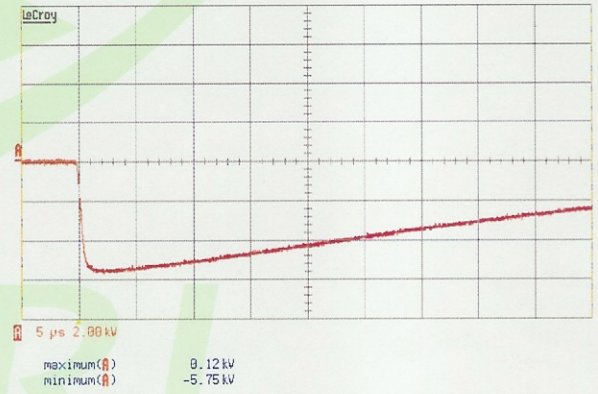
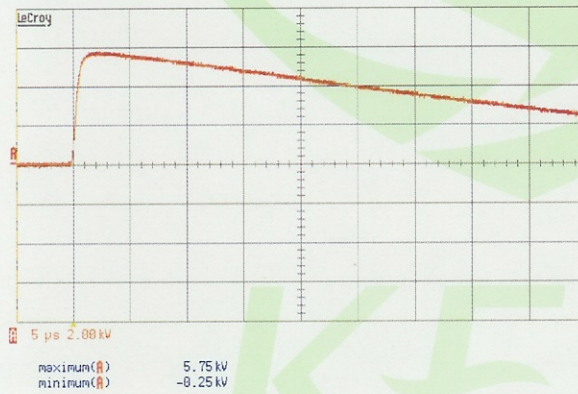


Line 2 - Earth

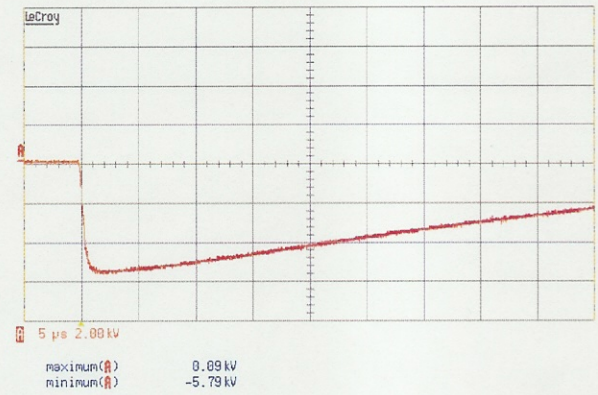
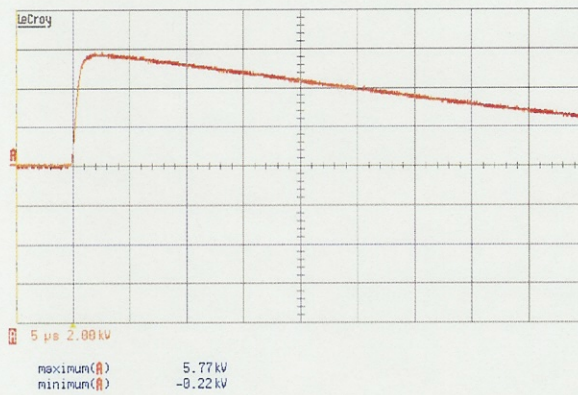
Measured voltage waveforms at each terminal



Earth - Ground



Line 1 - Ground



Line 2 - Ground

TEST REPORT



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KOREA ELECTROTECHNOLOGY
RESEARCH INSTITUTE



TEST REPORT

2007TS00190 1/3

CLASSIFICATION Performance Test(III)
APPARATUS Ground system
DESIGNATION ECA 3G-NM
RATINGS 1Ø AC (100 ~ 440) V, (30 ~ 90) MJ
APPLIED STANDARD IEC 61000-4-5(2005.11) and client's specification
RECEIPT No. TRD06S02112 (September 20, 2006)
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#209, Suntech City2, 307-2, Sangdaewon-dong, Jungwon-gu,
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MANUFACTURER Ground Co., Ltd.
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Prepared by

Kim, Jong-Hyung

Verified by

Kim, Oun-Seok

Approved by
(Technical manager)

Park, Byung-Rak

Power Apparatus Testing & Evaluation Division**KERI**

KOREA ELECTROTECHNOLOGY RESEARCH INSTITUTE

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Test results	3/3
Photos	-

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KERI

Kim, Jong-Hyung

Witnessed by :

Photos :

Photo DT 01 Tested apparatus

Ratings : given by test applicant

Ground system

Applied standard

IEC 61000-4-5(2005.11) and client's specification

Manufacturer

Ground Co. Ltd.

Designation

ECA 3G-NM

Ratings

1Ø AC (100 ~ 440) V, (30 ~ 90) MJ

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2 Review of test results	-	3/3

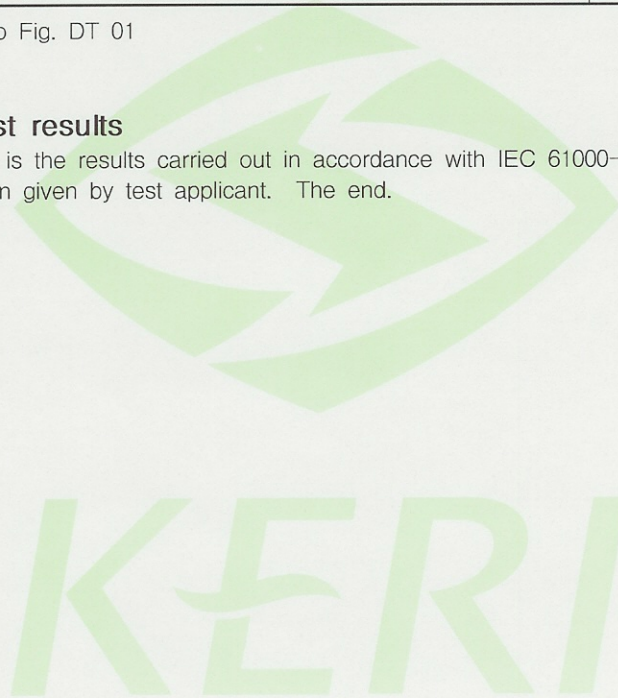
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	Earth - Ground	Good

* Test point : Refer to Fig. DT 01

2 Review of test results

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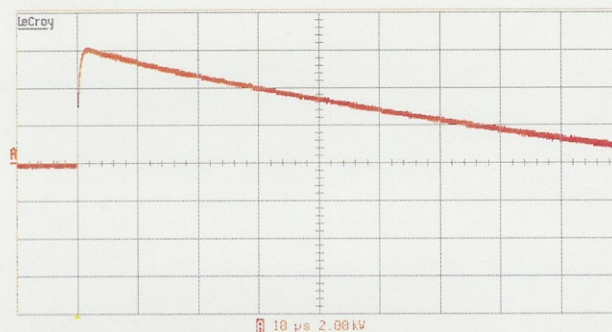


Photos

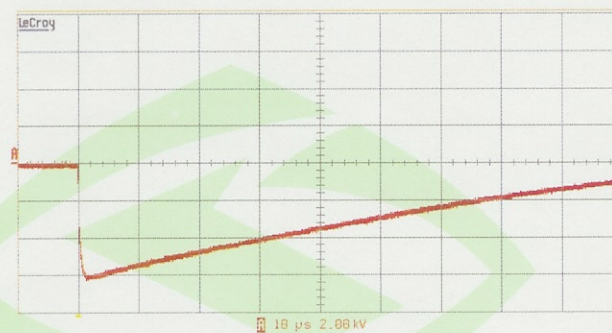


Tested apparatus

Calibration waveforms

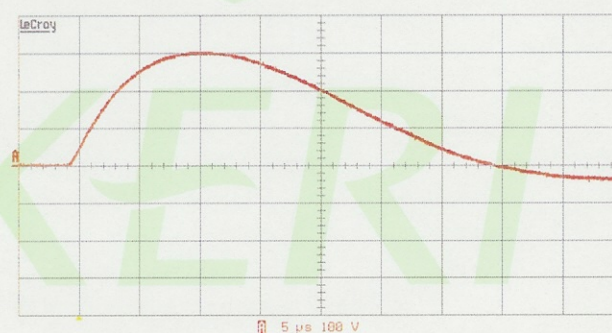


maximum(A) 6.19 kV



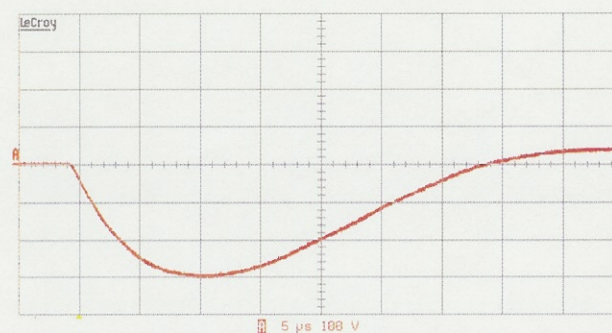
minimum(A) -6.25 kV

Open circuit voltage waveform ($1.2 \times 50 \mu\text{s}$, 6 kV)



maximum(A) 301 V

100 A / 1 V

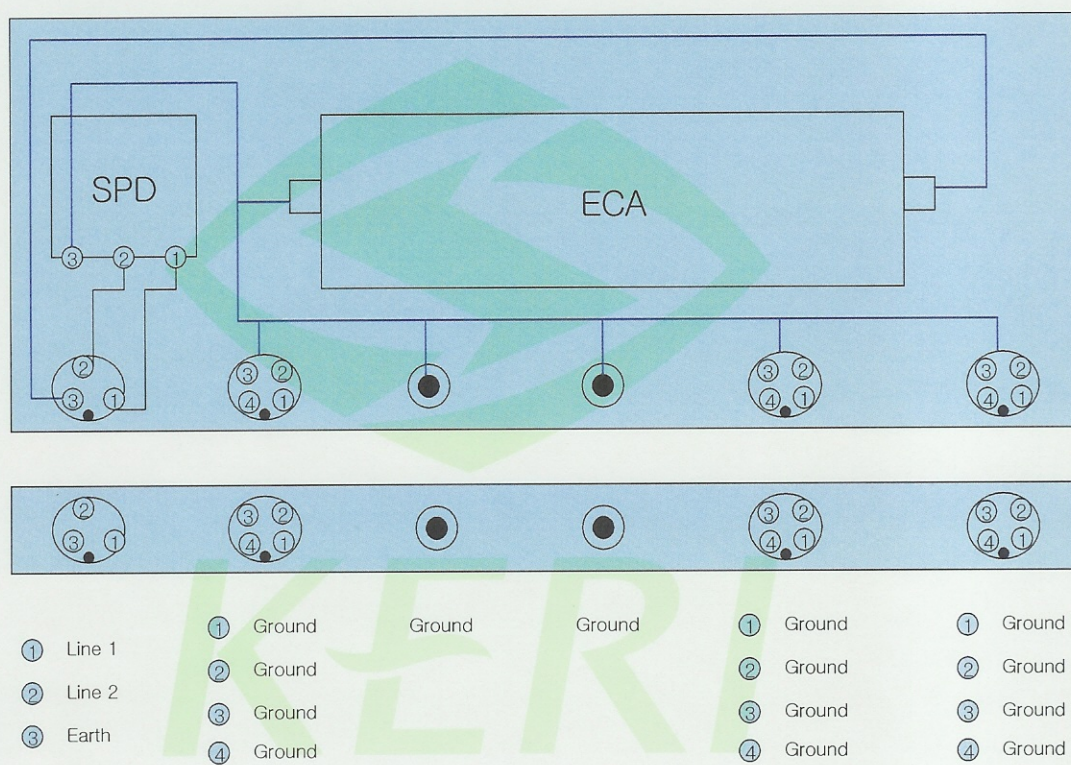


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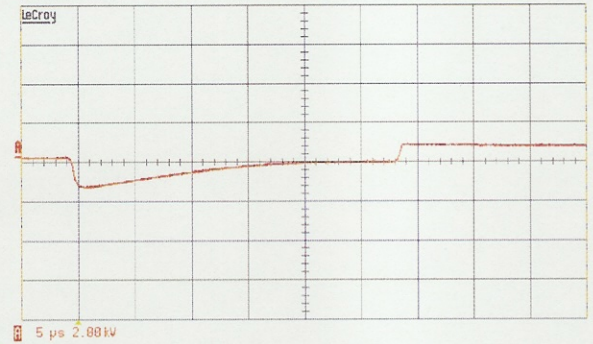
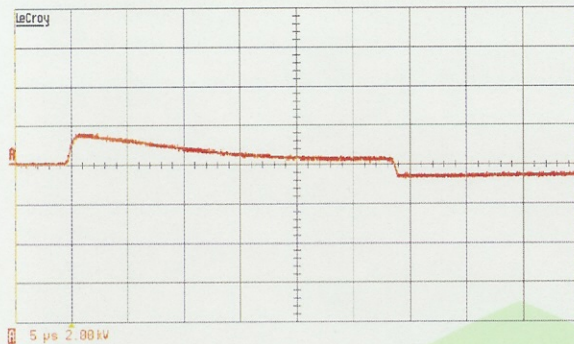
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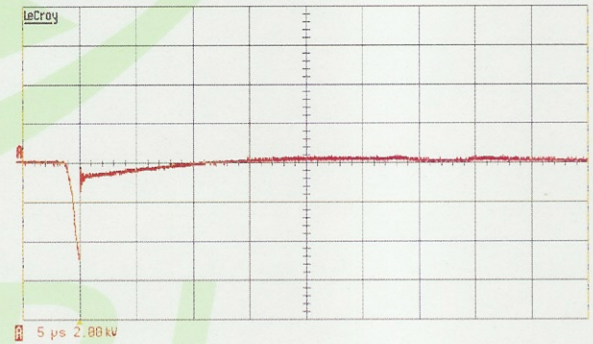
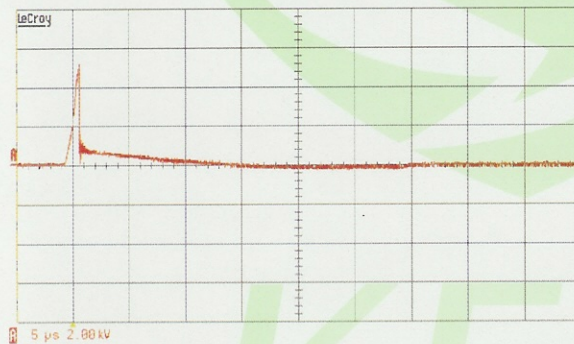


Configuration of Inner circuit and external terminals

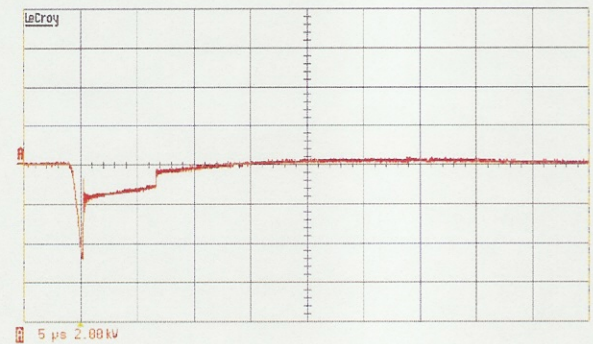
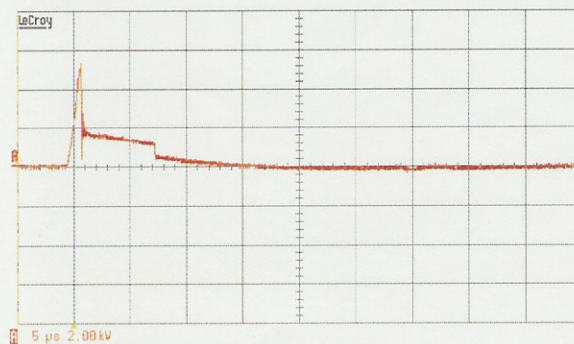
Measured voltage waveforms at each terminal



Line 1 - Line 2

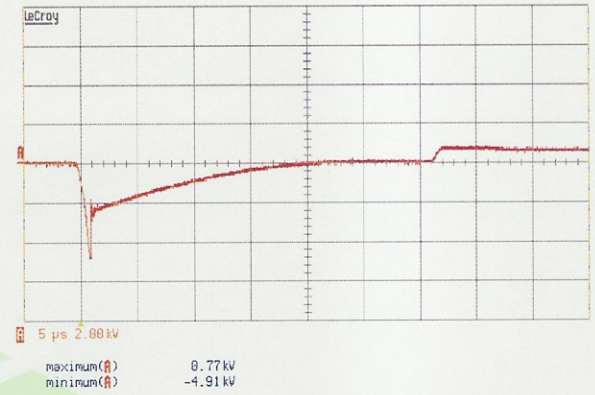
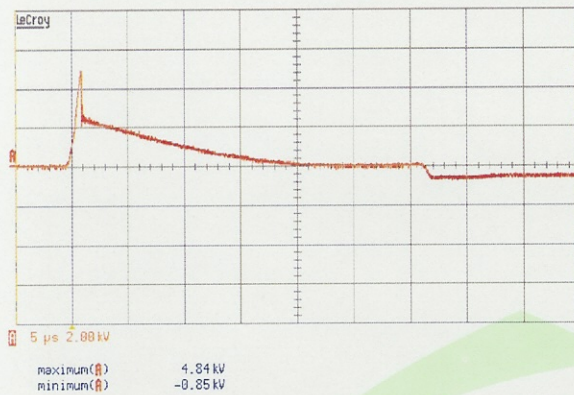


Line 1 - Earth

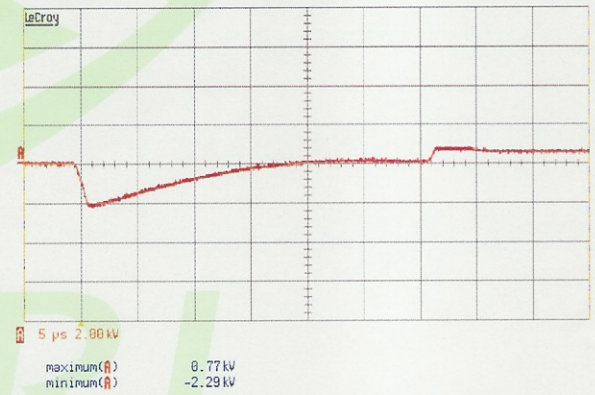
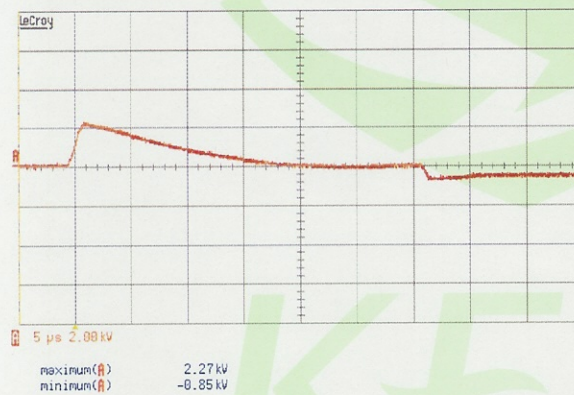


Line 2 - Earth

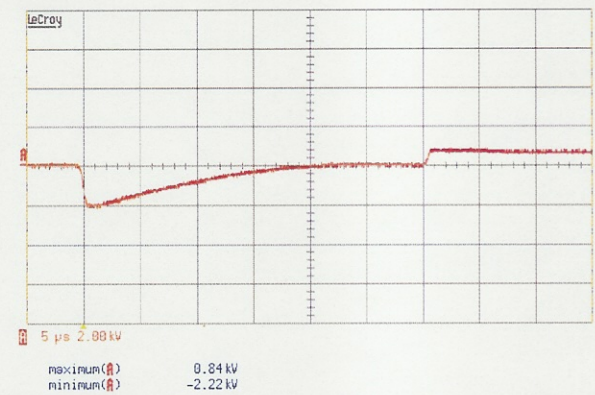
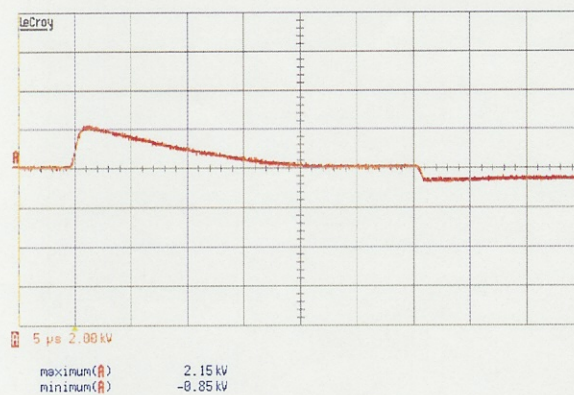
Measured voltage waveforms at each terminal



Earth - Ground



Line 1 - Ground



Line 2 - Ground

TEST REPORT





시험성적서

2006TS01997

1/3

"한국전기연구원의 확인이
없는 사본은 무효임"

시험종류 성능확인시험

제 품 명 접지장치

형 식 명 ECA 3G-LM

정 격 1Ø AC (100 ~ 440) V, (30 ~ 90) MJ

적용규격 시험의뢰자 시방

접수번호 TRD06S02109(2006.09.20)

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시험결과

참고시험으로써 서지제한전압측정시험 및 접지전류측정시험을 실시한 결과 첨부와 같음

시험결과는 시험을 실시한 제품에만 해당됨
KERI의 서면승인 없이 시험성적서의 일부만을 복사하여 사용할 수 없음

시험성적서 구성페이지 ; 성적서 (3), 사진 (1), 회로도 (1), Oscillograms (3),
도면 (0), 첨부 (0)

위 성적서는 국제시험소인정협력체(International Laboratory Accreditation Cooperation)
상호인정협정(Mutual Recognition Arrangement)에 서명한 한국교정시험기관인정기구(KOLAS)로부터 공인받
은 분야에 대한 시험결과입니다.



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사진	-

시험자 :

한국전기연구원

김종형

입회자 :

(주)그라운드

우제욱

사진 :

Photo DT 01 피시품 및 접지전류측정시험

정격 : 시험의뢰자 제시

접지장치

적용규격

시험의뢰자 시방

형식명

ECA 3G-LM

정격

1Ø AC (100 ~ 440) V, (30 ~ 90) MJ

시험목록

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1 서지제한전압측정시험

시험방법	인가 및 측정지점	측정결과(kV)	
o 시험방법 - 서지발생기 개방회로전압 : $1.2 \times 50 \mu s$, 6 kV - 서지발생기 단락회로전류 : $8 \times 20 \mu s$, 3 kA - 서지발생기 유효출력임피던스 : 2 Ω - 시험전압 극성 및 인가횟수 : 정극성 5 회 - 인가간격 : 60 s o 측정 - 각 측정 지점의 전압파형을 측정할 것	Line 1 - Line 2	1회	1.83
		2회	1.81
		3회	1.83
		4회	1.82
		5회	1.80
	Line 1 - Earth	1회	1.97
		2회	1.99
		3회	2.00
		4회	1.97
		5회	1.97
	Line 2 - Earth	1회	1.33
		2회	1.32
		3회	1.34
		4회	1.33
		5회	1.32

* 인가 및 측정지점 : Fig. DT 01 참조

* 측정결과 : Osc. DT 02 참조

2 접지전류측정시험

시험방법	측정결과(A)	
o 시험방법 - 서지발생기 개방회로전압 : $1.2 \times 50 \mu s$, 6 kV - 서지발생기 단락회로전류 : $8 \times 20 \mu s$, 3 kA - 서지발생기 유효출력임피던스 : 2 Ω - 서지인가지점 : 피시품의 Ground 단자와 Earth 단자 간 - 전류측정지점 : Earth 리드선 - 서지인가횟수 및 간격 : 정극성 3회, 60 s o 측정 - 상기 조합서지를 인가했을 때 Earth 단자로 흐르는 전류를 측정	1회	108
	2회	107
	3회	108

* 인가 및 측정지점 : Fig. DT 01 참조

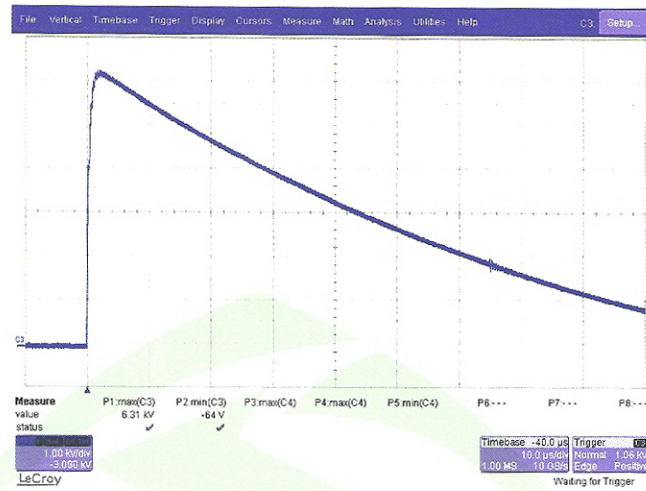
* 측정결과 : Osc. DT 03 참조

3 시험결과검토

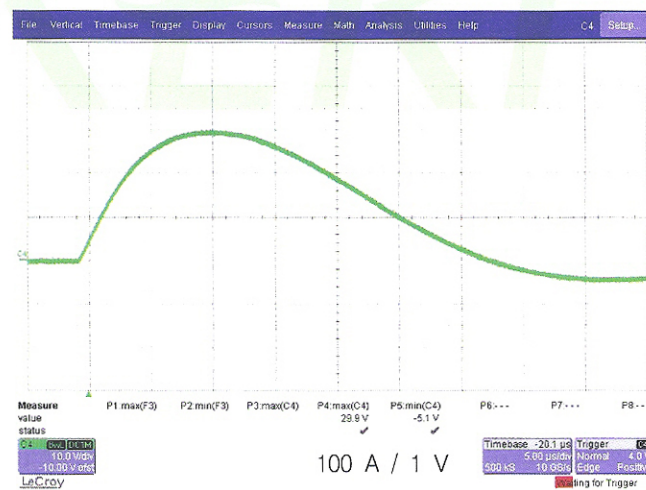
3.1 상기 시험성적은 의뢰자가 제출한 피시품에 대하여 시험의뢰자 시방에 의거 시험한 결과임

3.2 접지전류측정시험은 외부단자(Fig. DT 01 참조) 중 우측 2번째 Ground의 4번 단자와 Earth 단자에 대해 실시한 결과임 끝.

조합 서지 calibration 파형

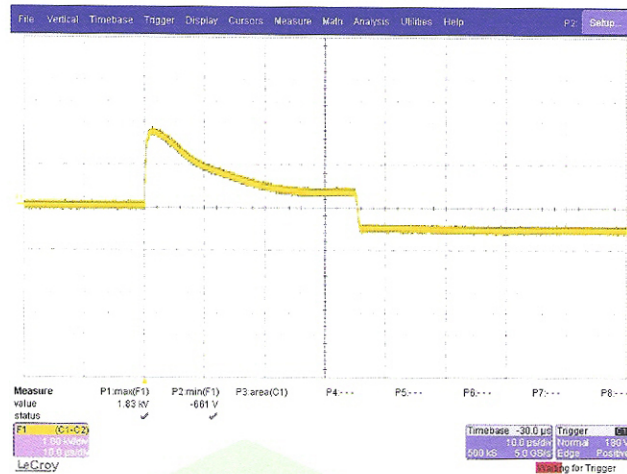


개방회로전압($1.2 \times 50 \mu$ s, 6 kV)

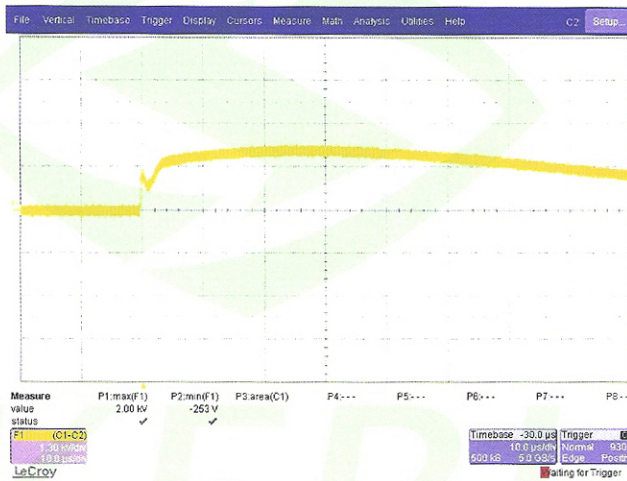


단락회로전류($8 \times 20 \mu$ s, 3 kA)

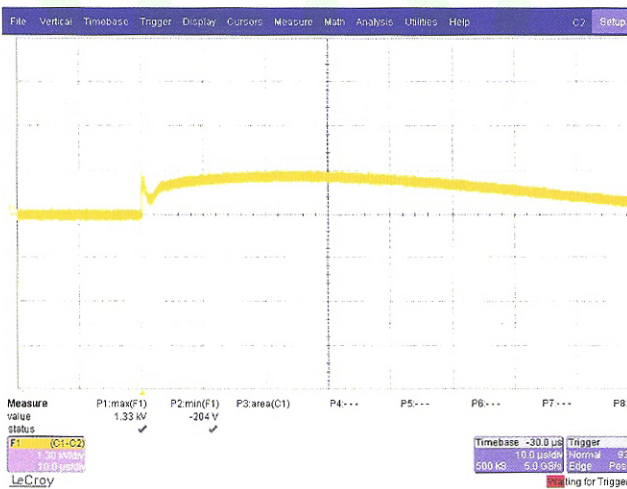
서지제한전압측정



Line 1 - Line 2



Line 1 - Earth



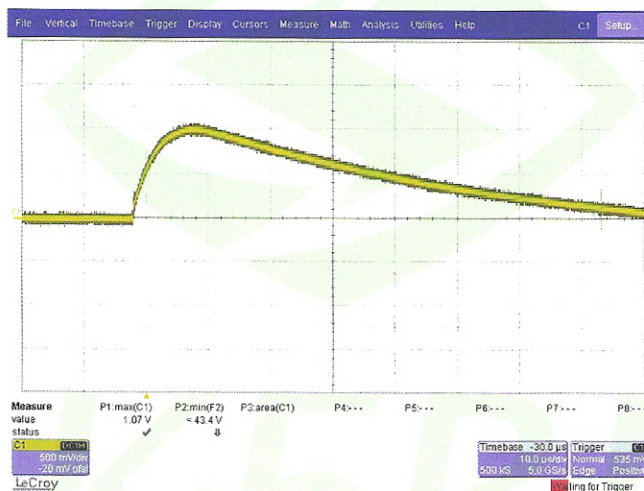
Line 2 - Earth

접지전류측정



100 A / 1 V

108 A



100 A / 1 V

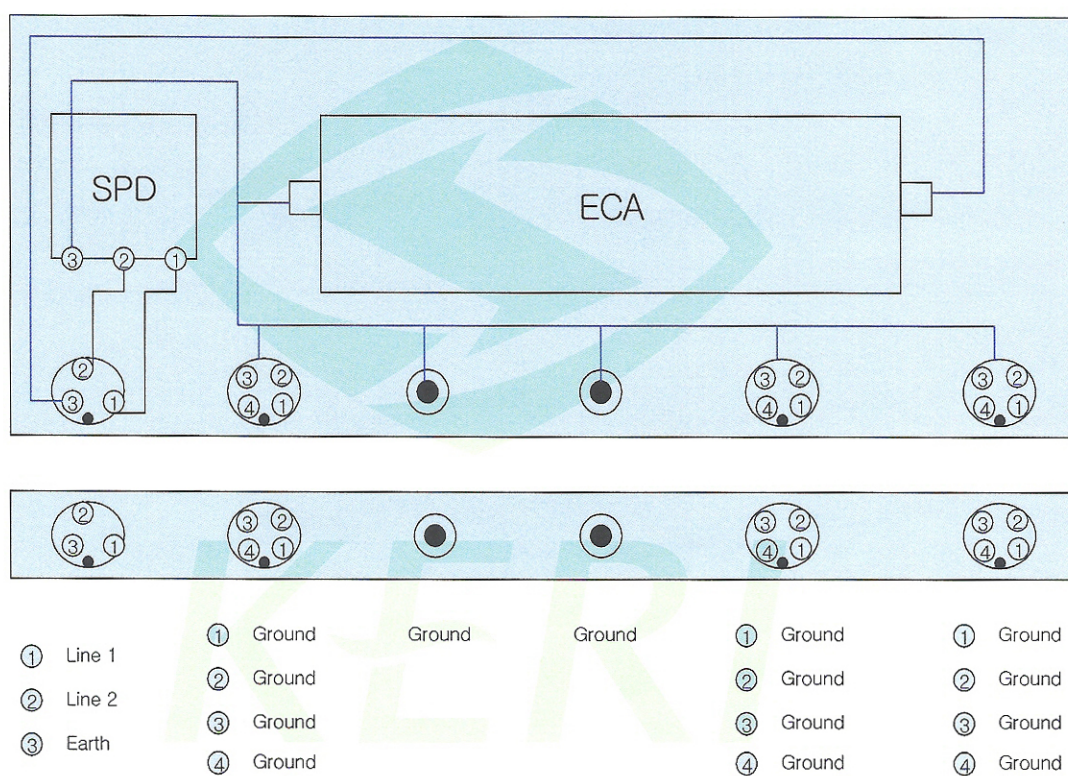
107 A



100 A / 1 V

108 A

회로도



피시품 내부회로 및 외부단자