

Test Report



Test report number:	02-100-FSV20-Standardtest-2017-02-28-e
Date of issue:	2017-02-28
Date of test:	2017-02-27/28
Tester:	Michael Benzin
Device under test:	FS-V20
Test requirement:	Clause 6 of IEC / EN 62561-3 (2012)
Number of pages including cover:	20

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1. Issued by

OBO BETTERMANN GmbH & Co. KG
BET Testcenter für Blitzschutz,
Elektrotechnik und Tragsysteme
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2. Test location

OBO BETTERMANN GmbH & Co. KG
Hüingser Ring 52
58710 Menden
Germany

3. Test participant

Michael Benzin (Tester)

4. Device under test

Type: FS-V20
Item no.: 5099 803
Technical data: The technical data are given in figure A.1 in annex A.
Manufacturer: OBO BETTERMANN GmbH & Co. KG
Hüingser Ring 52
58710 Menden
Germany
Date of test specimen receipt: 2017-02-24

5. Test requirement

Clause 6 "Tests" of IEC 62561-3 (2012-02) and EN 62561-3 (2012-06) "Lightning protection system components (LPSC) – Part 3: Requirements for isolating spark gaps (ISG)"

6. Test description

This test is a type test that is performed with 3 identical test specimens according to clause 6 "Tests" of IEC and EN 62561-3 (2012) "Lightning protection system components (LPSC) – Part 3: Requirements for isolating spark gaps (ISG)".

Clause 6.2.2.2 of IEC / EN 62561-3 (2012) is not applicable caused by the fact that a rated power frequency withstand voltage $U_{W AC}$ is not declared.

Clause 6.2.3 of IEC / EN 62561-3 (2012) is not applicable caused by the technology of DUT that consists of a voltage limiting component (MOV) in parallel to a voltage switching component (spark gap).

Clause 6.2.4 of IEC / EN 62561-3 (2012) is tested without conditioning according to Annex A of IEC / EN 62561-3 (2012) caused by the declared installation location indoor.

In addition to the lightning impulse current I_{imp} , a nominal discharge current I_n having the waveshape $8/20^1$ is declared. This value is tested during clause 6.2.4 of IEC / EN 62561-3 (2012) before the application of lightning impulse current, with one impulse of $0,5 I_n$ and I_n .

7. Test result

The lowest isolation resistance measured before the lightning current impulse application is 3500 M Ω and exceeds the required value of clause 6.2.1 of IEC / EN 62561-3 (2012) of 100 M Ω . The measured results are given in table C.1 in annex C.

During the DC withstand voltage test of clause 6.2.2.3 and clause 6.2.6 of IEC / EN 62561-3 (2012), DUT does not spark over or conduct a leakage current above 1 mA and no puncture appear on the enclosure. After this test, the housing shows no signs of cracks.

During the lightning current test of clause 6.2.4 of IEC / EN 62561-3 (2012), no puncture appear on the enclosure. After this test, the housing shows no signs of cracks. The measured parameters of the test current impulses are given in table C.4 in annex C.

The lowest isolation resistance measured after the lightning current impulse application is 140 M Ω and exceeds the required value of clause 6.2.5 of IEC / EN 62561-3 (2012) of 500 k Ω . The measured results are given in table C.2 in annex C. The oscillograms of the current impulses are given in annex D.

After the marking test of clause 6.3 of IEC / EN 62561-3 (2012), the marking of DUT is legible. The marking after this test is shown in the figures C.1, C.2 and C.3 in annex C.

The measured environmental conditions during the test are shown in table C.3 in annex C.

¹ The 8/20 current impulse definition of IEC 62475 (2010-09) "High-current test techniques – Definitions and requirements for test currents and measuring systems" is applied.

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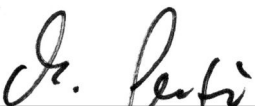


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8. Conclusion

The device under test "FS-V20" has passed the test of clause 6 "Tests" of IEC 62561-3 (2012-02) and EN 62561-3 (2012-06) "Lightning protection system components (LPSC) – Part 3: Requirements for isolating spark gaps (ISG)".

OBO BETTERMANN GmbH & Co. KG



i.V. Michael Benzin
Head of BET Testcenter



i.A. Jörg Neumann
Test engineer BET Testcenter

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Annex A

Datasheet of device under test

Technisches Datenblatt

Überspannungsschutz, Schutz- und Trennfunktenstrecken

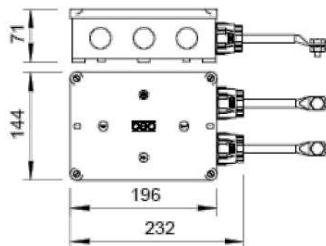


Das FS-V20-Gerät ist eine Trennfunktenstrecke mit parallel geschaltetem Überspannungsableiter. Es dient zur Kopplung von unterschiedlichen Erdungs-Systemen und wird direkt an die jeweilige Potentialausgleichsschiene angeschlossen.

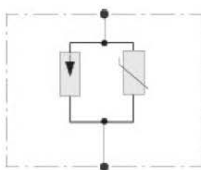
Anwendung: Kopplung von Erdungs-Systemen im Bereich der Datentechnik (Funktions- und Betriebserdung)

Type	Blitzstrom-tragfähigkeit I_{imp} (10/350) kA	Nennableit-stoßstrom I_n (8/20) kA	Verp. Stück	Gewicht kg/ 100 Stk..	Art.- Nr.
FS-V20	Class H 100	100	1	170.000	5099 80 3

Abmessungen



Anschlussmöglichkeiten



FS-V20		
Bemessungs-Stehgleichspannung	$U_{W DC}$	280 V
Einbauort		Innen
Anzugsdrehmoment		20 Nm
Schutzart		IP 54

1 OBO | 01/2017

Figure A.1: Datasheet² of device under test "FS-V20"

² Taken from www.obo.de, version 01/2017

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Annex B

Used measuring instruments and test equipment

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- B.1 DC power supply:
- | | |
|------------------|---------------------------------|
| Manufacturer: | Elektro-Automatik GmbH |
| Appellation: | DC High efficiency power supply |
| Type: | PSI 81500-30 3U HS PV S01 |
| Serial-no.: | 1190330001 |
| Maximum voltage: | 1,5 kV _{DC} |
| Maximum current: | 30 A _{DC} |
| Maximum power: | 15 kW |
| Frequency f: | DC |
- B.2 Digital multimeter:
- | | |
|-------------------|----------------------|
| Manufacturer: | Keysight |
| Type: | 34410A |
| Serial-no.: | MY47004368 |
| Ident.-no.: | P601027 |
| Display: | 6 ½ Digits |
| Sampling rate: | 1000 s ⁻¹ |
| Last calibration: | 2016-12-27 |
| Next calibration: | 2018-12-27 |
- B.3 AC/DC High voltage tester:
- | | |
|------------------------|---|
| Manufacturer: | ETL Prüftechnik |
| Appellation: | AC/DC High voltage tester |
| Type: | UX36-ADC-0608-0150-TPT |
| Serial-no.: | 205056 1013 0020 |
| Ident.-no.: | P602011 |
| Maximum voltage: | 6 kV _{AC} / 8 kV _{DC} |
| Maximum current: | 150 mA _{AC} / 100 mA _{DC} |
| Short circuit current: | > 300 mA |
| Frequency f: | 50 Hz / DC |
| Last calibration: | 2015-04-28 |
| Next calibration: | 2017-04-27 |
- B.4 Lightning current generator (LCG 1):
- | | |
|--|-----------------|
| Kapazität C _{max} : | 50 µF |
| Ladespannung U _{charge max} : | 100 kV |
| Impulsstrom I _{max} : | 200 kA |
| Wellenformen: | 8/20 und 10/350 |

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B.5 Shunt of LCG 1:

Hersteller:	Hilo Test GmbH, Stutensee
Typ:	ISM 200P/0.4 spez
Serien-Nr.:	4203
Ident.-Nr.:	P606006
Nennwiderstand R_N :	0,4 m Ω
Genauigkeit:	$\pm 1 \%$
Impulsbelastbarkeit I_{max} :	200 kA
Grenzlastintegral:	$56 \cdot 10^6$ A ² s
Bandbreite:	2 MHz
Anstiegszeit T_a :	175 ns
Letzte Kalibrierung:	2015-01-16
Nächste Kalibrierung:	2018-01-15

B.6 Oscilloscope:

Manufacturer:	Agilent
Type:	DSO5014A
Serial-no:	MY47260040
Ident.-no:	P603008
Channels:	4
Bandwidth:	100 MHz
Sampling rate:	200 MSa/s
Last calibration:	2015-09-04
Next calibration:	2017-09-03

B.7 Thermohygrometer:

Manufacturer:	Testo AG, Lenzkirch
Type:	testo 608-H1
Ident.-no.:	P505004
Serial-no.:	41301561
Measuring range:	0 ... 50 °C / 10 ... 95 %rH
Accuracy:	$\pm 0,5$ °C / ± 3 %rH (at 25 °C)
Last calibration:	2016-09-08
Next calibration:	2018-09-08

B.8 Thermohygrometer:

Manufacturer:	Testo AG, Lenzkirch
Type:	testo 608-H1
Ident.-no.:	P505005
Serial-no.:	34907880
Measuring range:	0 ... 50 °C / 10 ... 95 %rH
Accuracy:	$\pm 0,5$ °C / ± 3 %rH (at 25 °C)
Last calibration:	2016-09-08
Next calibration:	2018-09-08

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B.9 Barometer:

Manufacturer:	Greisinger electronic GmbH
Type:	GPB 3300
Ident.-no.:	P840021
Range:	300 - 1100 mbar
Accuracy:	± 2 mbar (0 - 50 °C)
Last calibration:	2016-09-08
Next calibration:	2018-09-08

B.10 Barometer:

Manufacturer:	Greisinger electronic GmbH
Type:	GPB 3300
Ident.-no.:	P840022
Range:	300 - 1100 mbar
Accuracy:	± 2 mbar (0 - 50 °C)
Last calibration:	2016-09-08
Next calibration:	2018-09-08

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Annex C

Measured results

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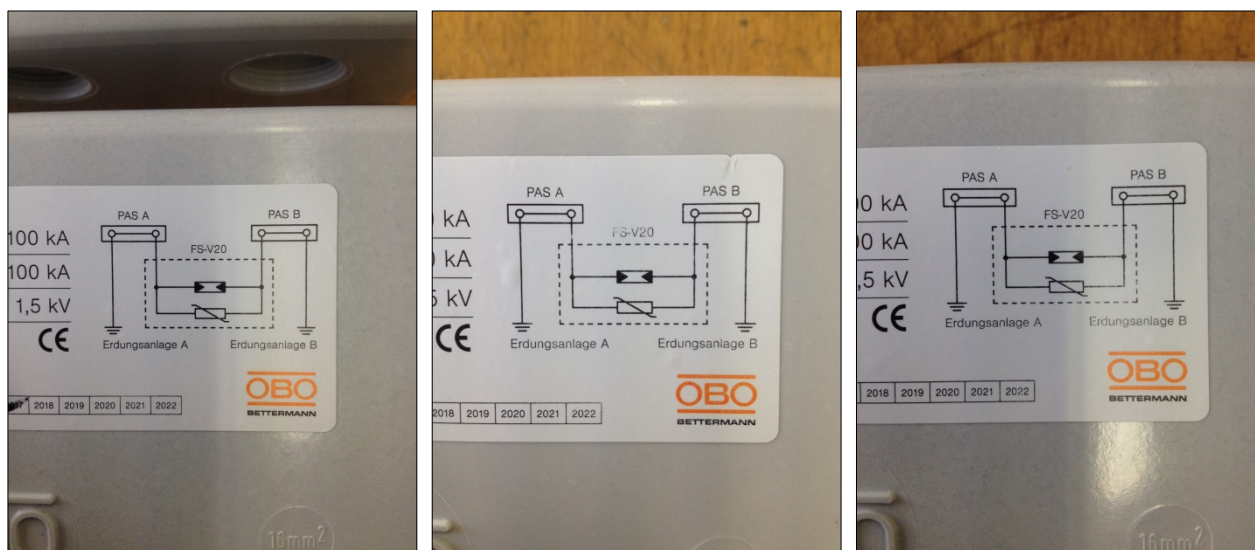


Figure C.1, C.2 and C.3: Test specimens after the marking test (Sample 1, 2 and 3 from left to right)

Sample	1	2	3
U	140 V	140 V	140 V
I	0,02 μ A	0,04 μ A	0,03 μ A
R _{iso}	7000 M Ω	3500 M Ω	4667 M Ω

Table C.1: Measured isolation resistance before the lightning current impulse application

Sample	1	2	3
U	140 V	140 V	140 V
I	0,15 μ A	0,40 μ A	1,00 μ A
R _{iso}	933 M Ω	350 M Ω	140 M Ω

Table C.2: Measured isolation resistance after the lightning current impulse application

Parameter	Minimum	Maximum	Unit
Temperature	20,4	23,5	$^{\circ}$ C
Humidity	29,0	35,9	%
Barometric pressure	970,1	975,2	mbar

Table C.3: Environmental conditions during the test

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Testname: OBO-FSV20-170228-LCG1		Date: 28.02.2017 09:17:04					
Sample	Counter	Channel1: Current					
		Peak Value	Front Time	Time To Half Value	Charge	Specific Energy	Duration
1	1	50.5 kA	8.27 µs	21.3 µs	1.02 As	36.1 kA²s	
	2	100 kA	8.41 µs	21.5 µs	2.04 As	143 kA²s	
2	3	47.9 kA	8.35 µs	21.8 µs	967 mAs	33.3 kA²s	
	4	100 kA	8.28 µs	21.4 µs	2.04 As	145 kA²s	
3	5	48.3 kA	8.42 µs	21.7 µs	971 mAs	33.6 kA²s	
	6	97.8 kA	8.59 µs	21.9 µs	1.99 As	138 kA²s	
1	7	49.9 kA	25.1 µs	502 µs	27.5 As	778 kA²s	1,38 ms
2	8	50.6 kA	25.0 µs	499 µs	27.6 As	798 kA²s	1,36 ms
3	9	49.8 kA	24.9 µs	489 µs	27 As	769 kA²s	1,32 ms
1	10	97.7 kA	19 µs	388 µs	42.3 As	2.25 MA²s	1,10 ms
2	11	100 kA	23 µs	381 µs	46.2 As	2.53 MA²s	1,16 ms
3	12	99.5 kA	18.9 µs	404 µs	43.3 As	2.37 MA²s	1,06 ms

Table C.4: Measured parameters of the current impulses

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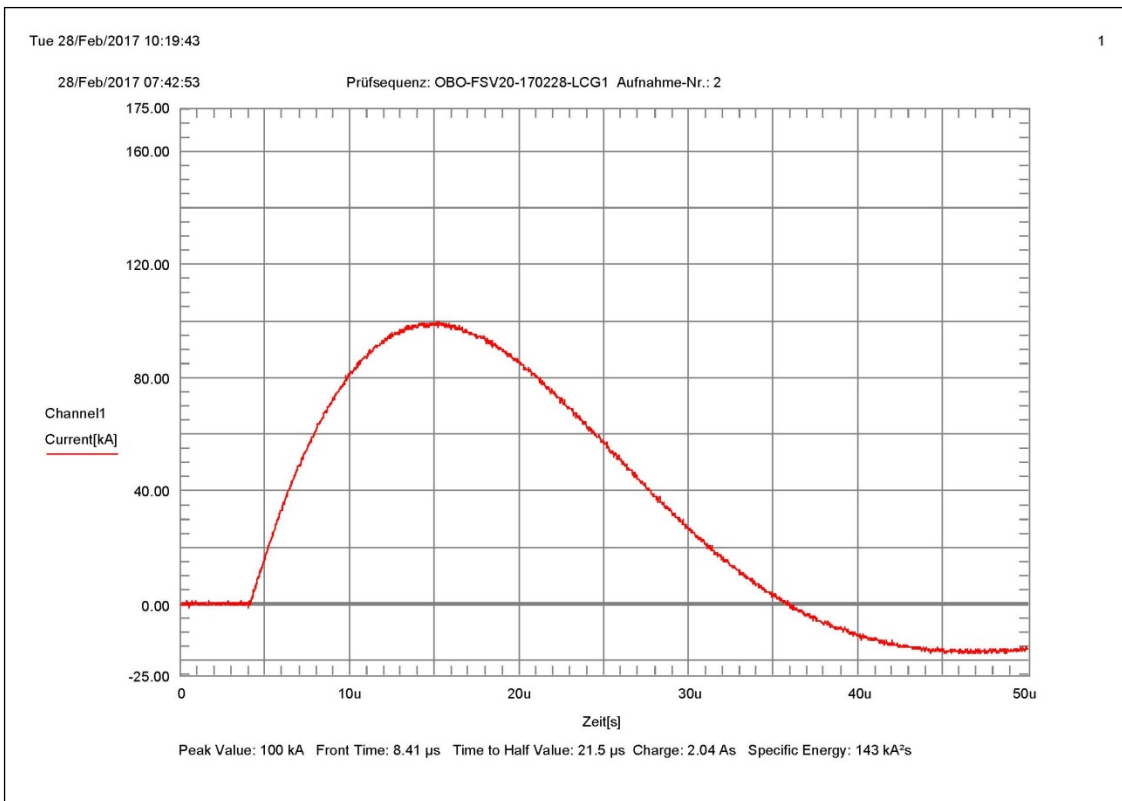
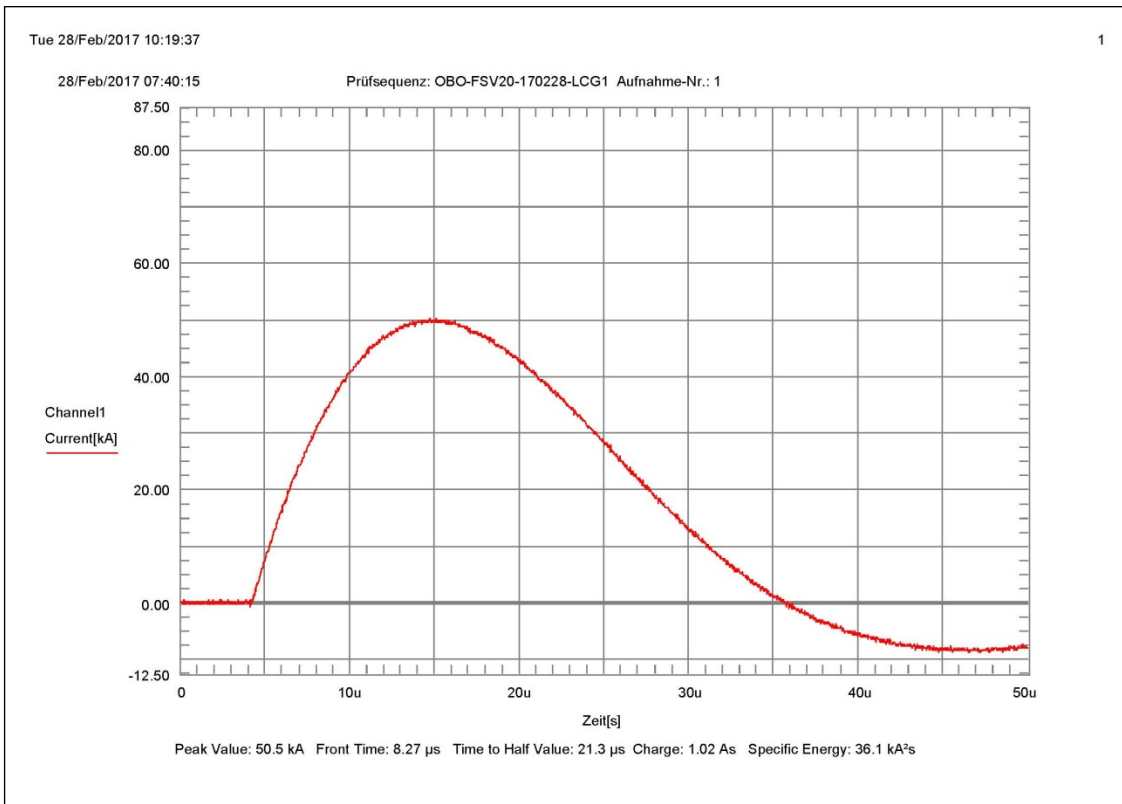
Annex D

Oscillograms of current impulses

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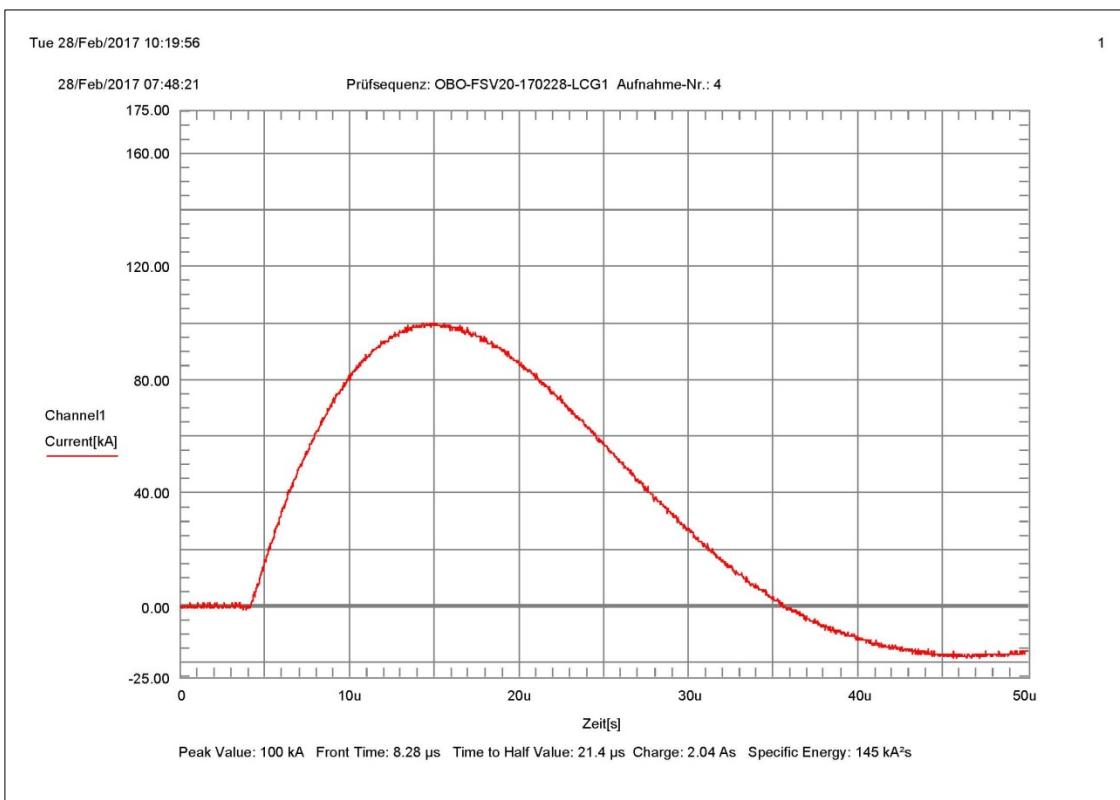
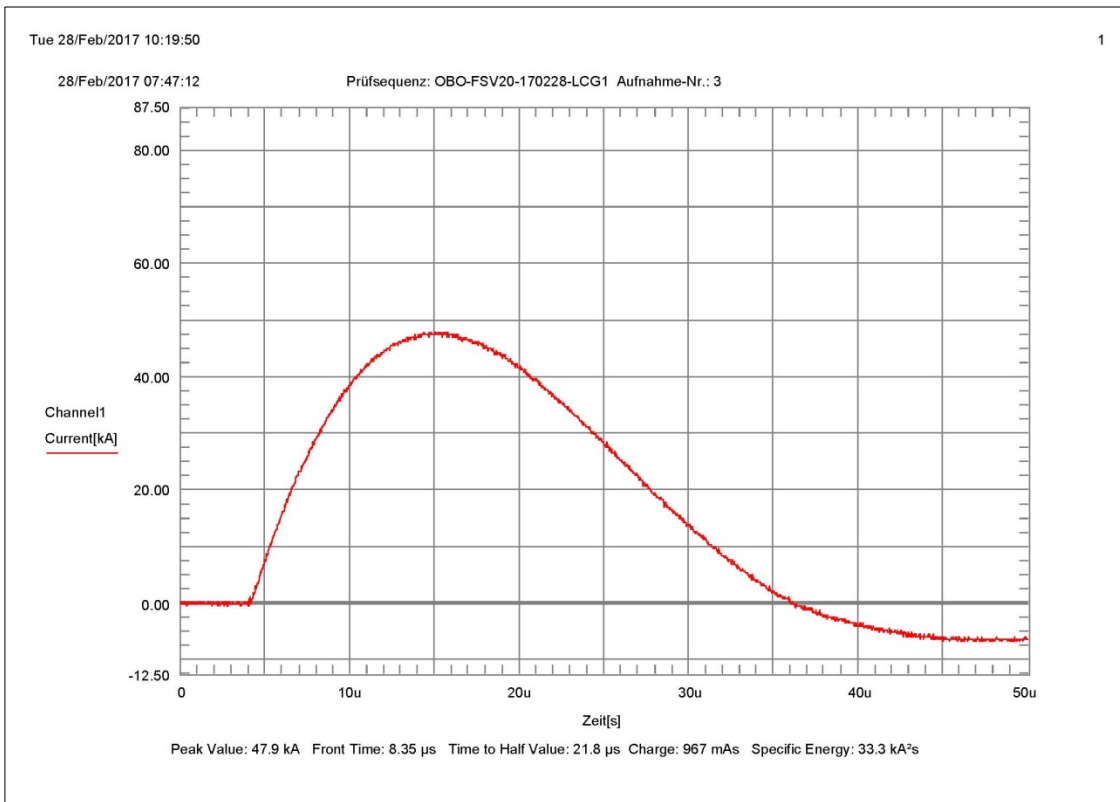
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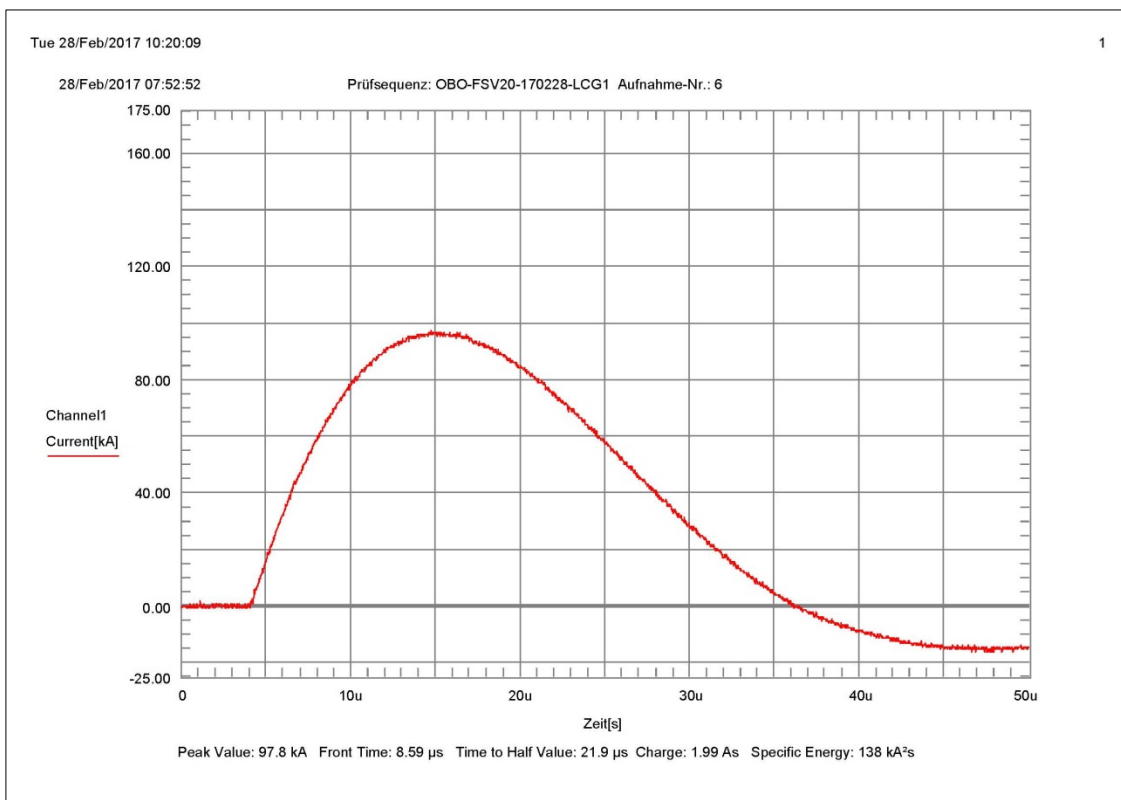
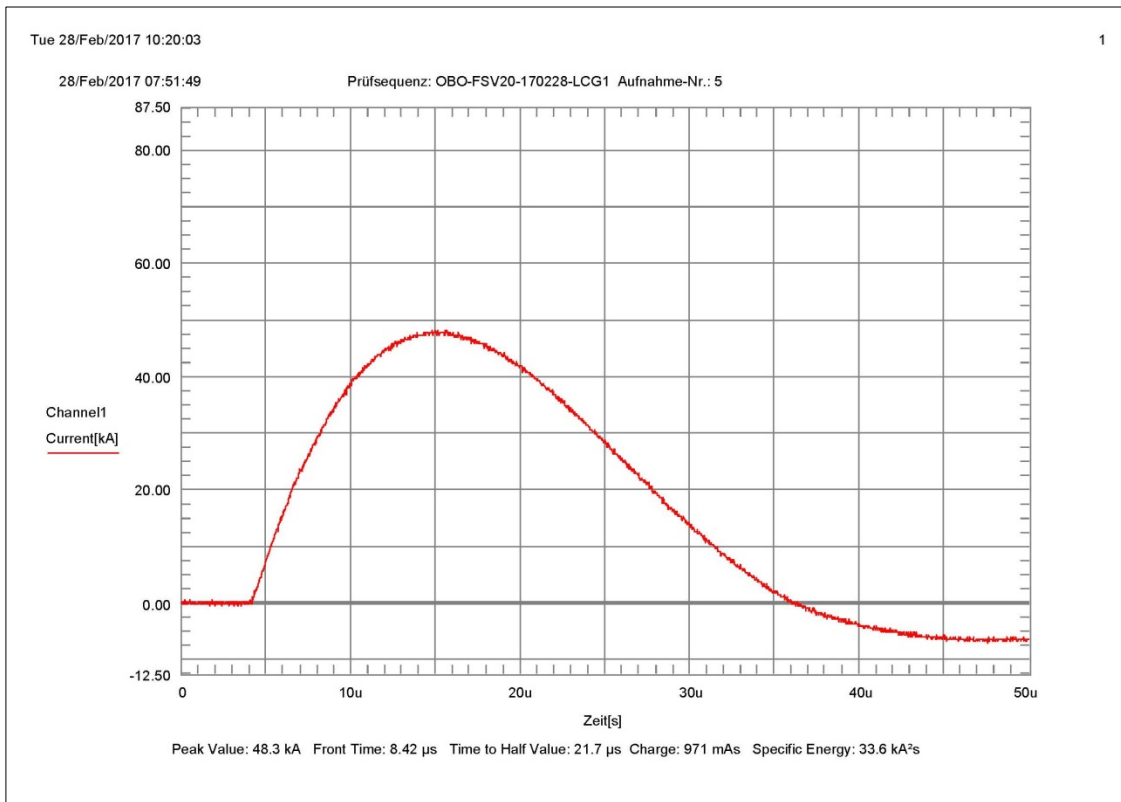
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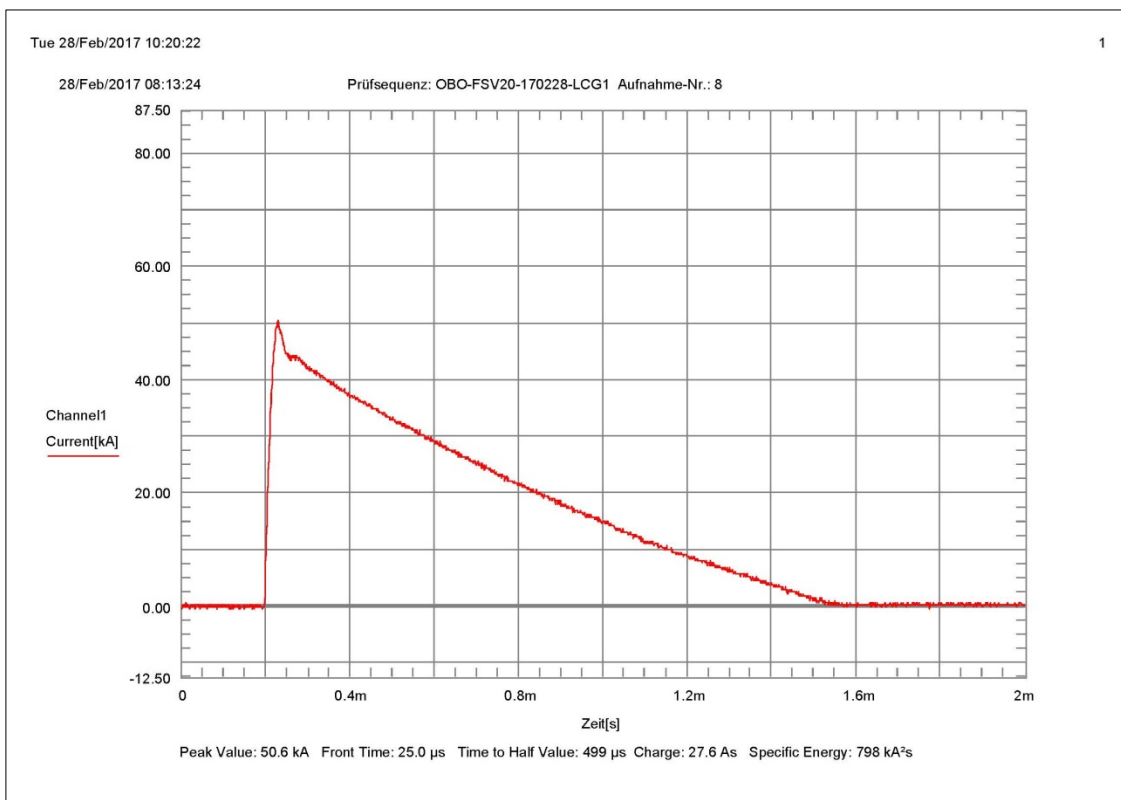
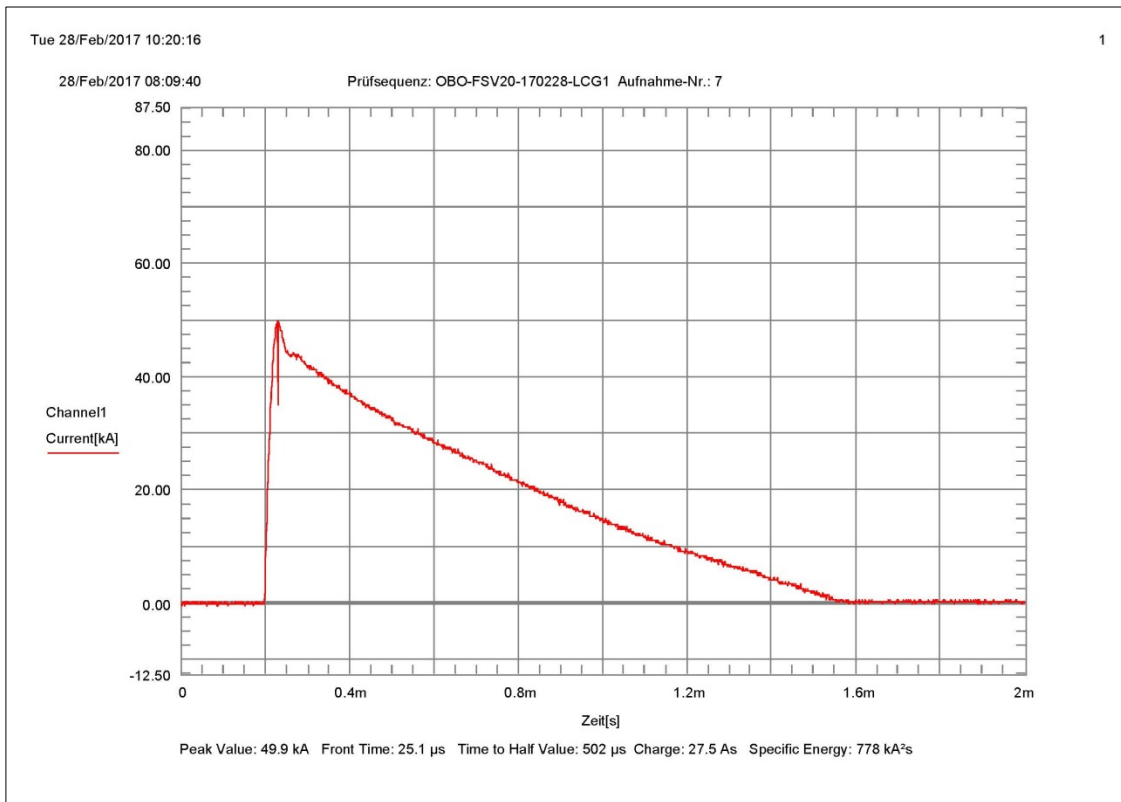
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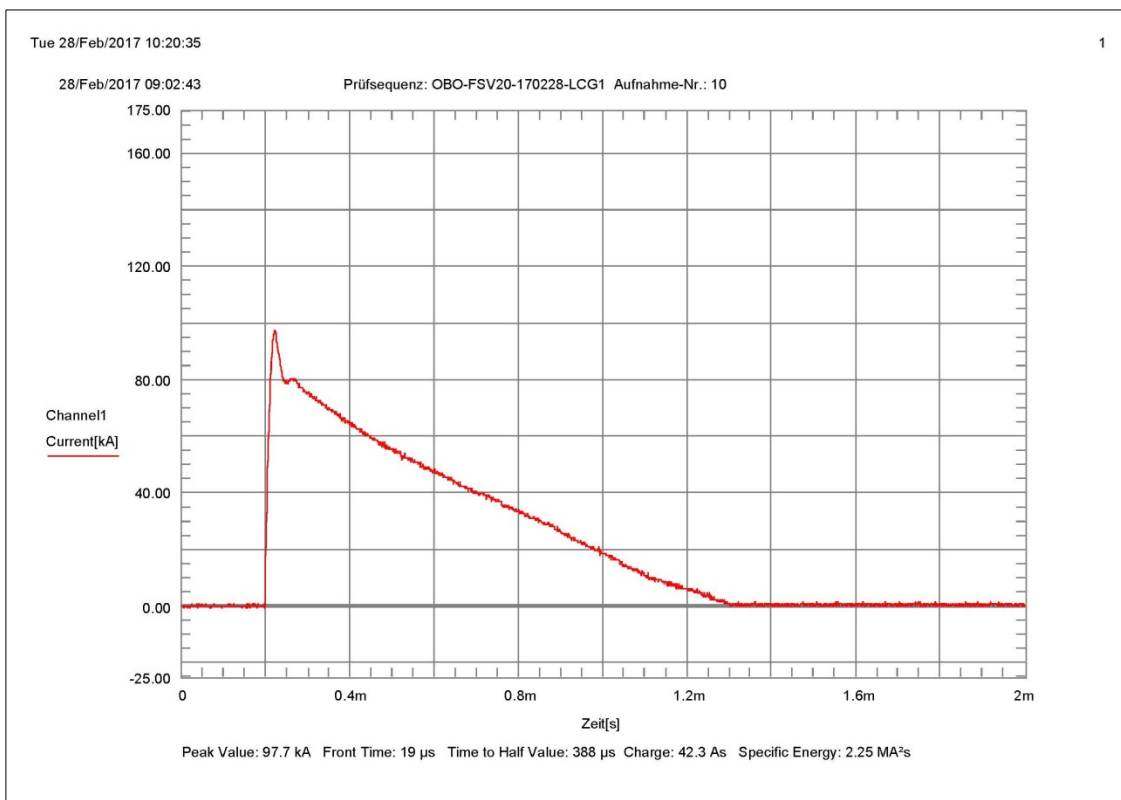
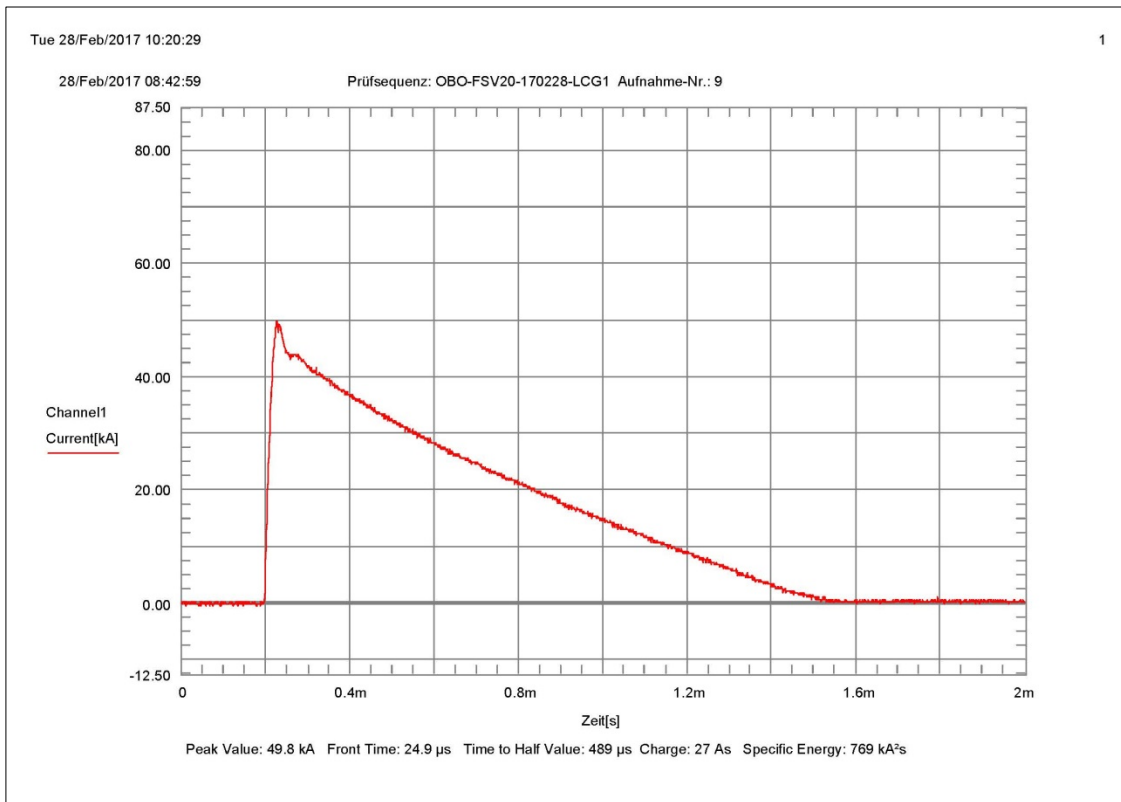
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