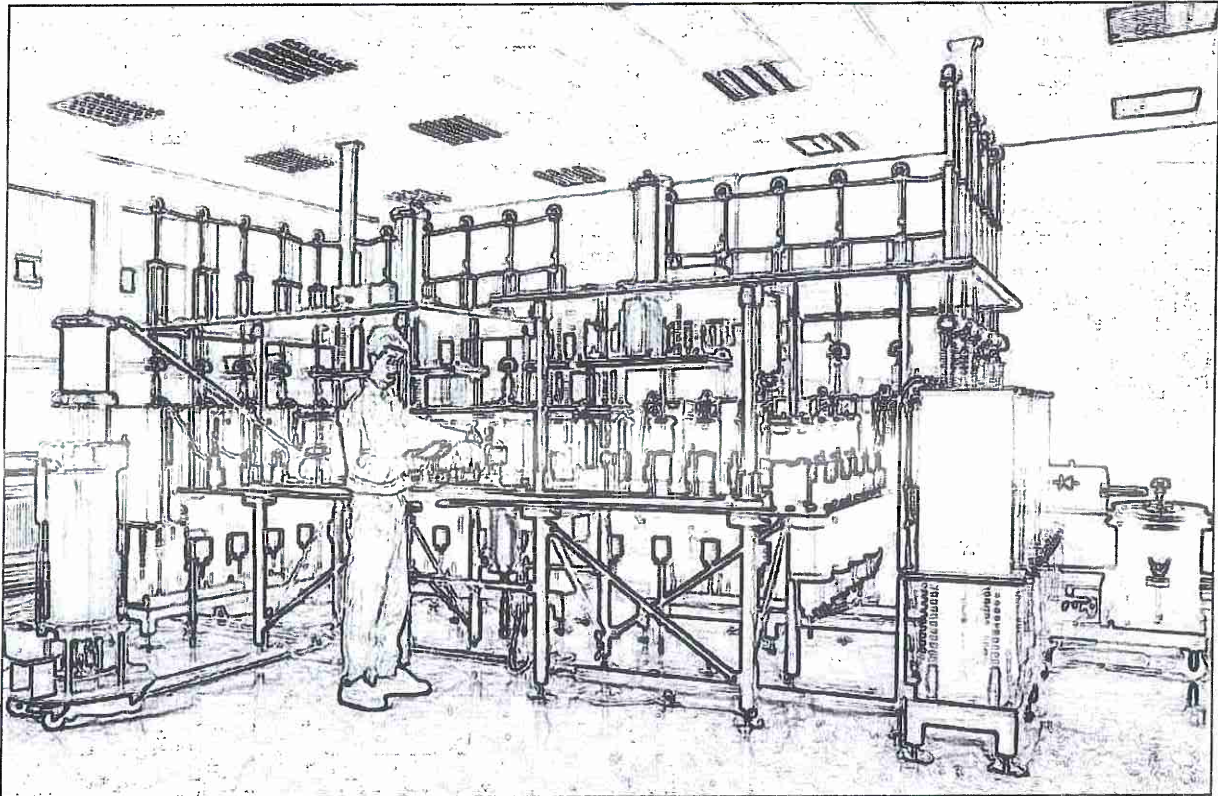


Test report



Report no.: BET/Schirtec 1-04-07-13

Date of test: 2004-06-21

Test engineer: Dipl.-Ing. M.Benzin

Customer: Schirtec Trading GmbH
Ignaz-Köck-Strasse 8 / Top 3
1210 Wien
Austria

1. Customer

Schirtec Trading GmbH
Ignaz-Köck-Strasse 8 / Top 3
1210 Wien
Austria

2. Device under test (DUT)

Name: Early Streamer Emission Lightning Conductor (ESELC)
type "Schirtec - A"

Supplier: Schirtec Trading GmbH
Ignaz-Köck-Strasse 8 / Top 3
1210 Wien
Austria

Technical data: Weight: 2,8kg
Length: 590mm
Maximum outside diameter: 120mm

A Photo is given in annex A.

3. Demand of test

At this very moment there are not any european standards to test active lightning protection components as known as early streamer emission rods with lightning current impulses. But the device under test is used as an external lightning component and therefore the impulse current test in accordance to the EN 50164-1 (1999-09) § 6.3 "Electrical test" class H is tested.

4. Realisation of test

Three samples of the device under test are stressed with 3 current impulses with the peak value of 100kA. The time interval between the individual shots allows the arrangement to cool down close to ambient temperature. The impulse current is defined by its peak value (100kA \pm 10%), its specific energy (2.5MJ/ Ω \pm 20%) and its duration (\leq 2ms).

For this test only the impulse current capability of the active part of the DUT is tested. The performance of the connection parts is neglected.

5. Measured results

Test name : Schirtec-040621			Date : 21.06.2004 12:00:26	
Counter	Sample	Peak Value	Specific Energy	Duration
1	1.1	101 kA	2.99 MA ² s	1,60ms
2	1.1	100 kA	2.60 MA ² s	1,40ms
3	1.1	100 kA	2.48 MA ² s	1,40ms
4	1.2	100 kA	2.50 MA ² s	1,35ms
5	1.2	100 kA	2.48 MA ² s	1,40ms
6	1.2	100 kA	2.44 MA ² s	1,35ms
7	1.3	100 kA	2.40 MA ² s	1,25ms
8	1.3	101 kA	2.50 MA ² s	1,45ms
9	1.3	105 kA	2.47 MA ² s	1,50ms

The oscillograms are given in annex B.

6. Test result

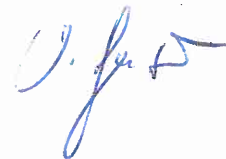
The active part of the device under test showed no visible damage due to the effects of the current impulses.

Photos of the test setup and the test samples are shown in annex A.

The DUT has passed the impulse current test that is described in subclause 3 with 100kA in accordance to the EN 50164-1 (1999-09).

2004-07-13
 BET GmbH
 Fischkuhle 39
 D- 58710 Menden

Test engineer
 Dipl.-Ing. M.Benzin



Annex A

Photos

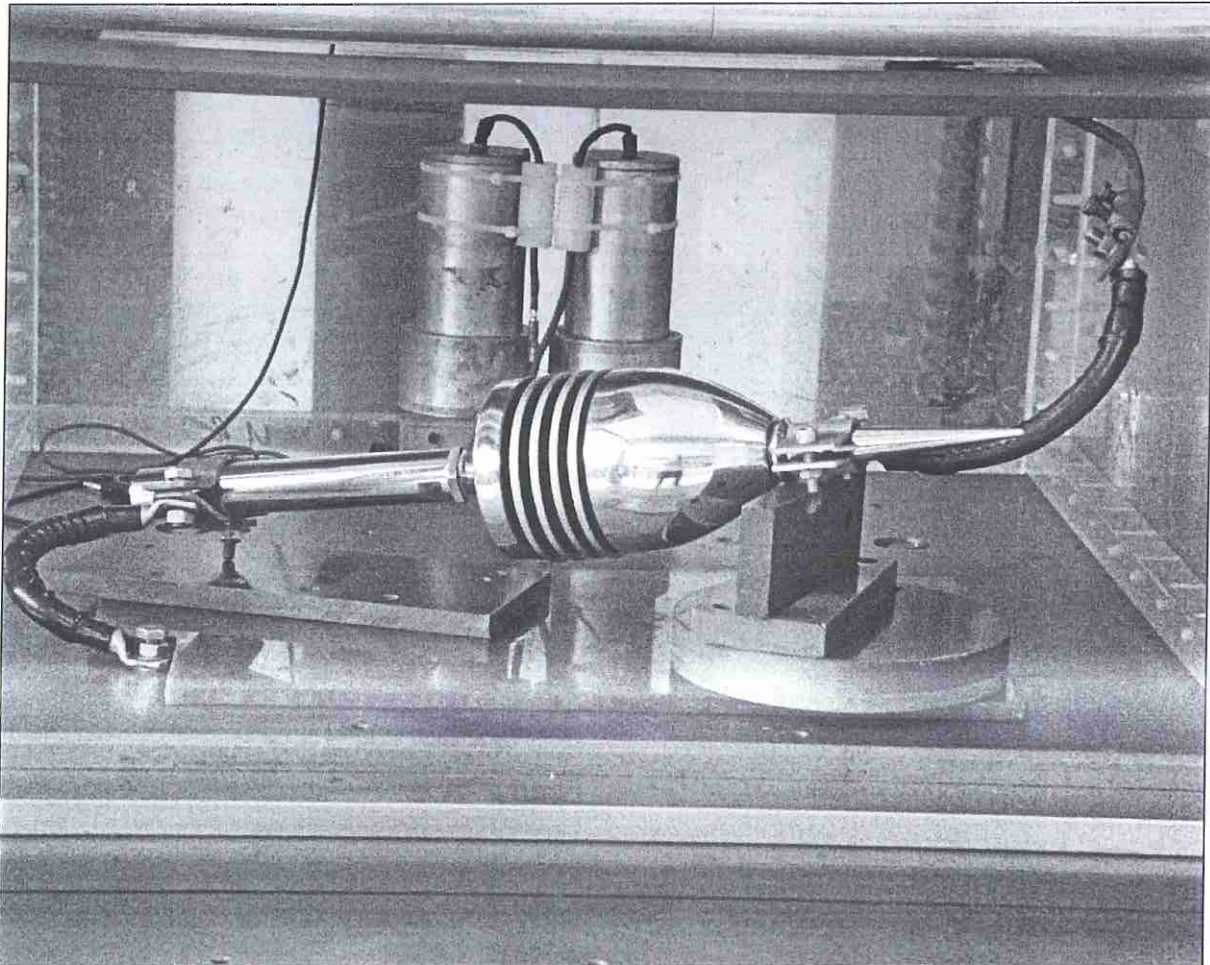


Figure 1: Test setup

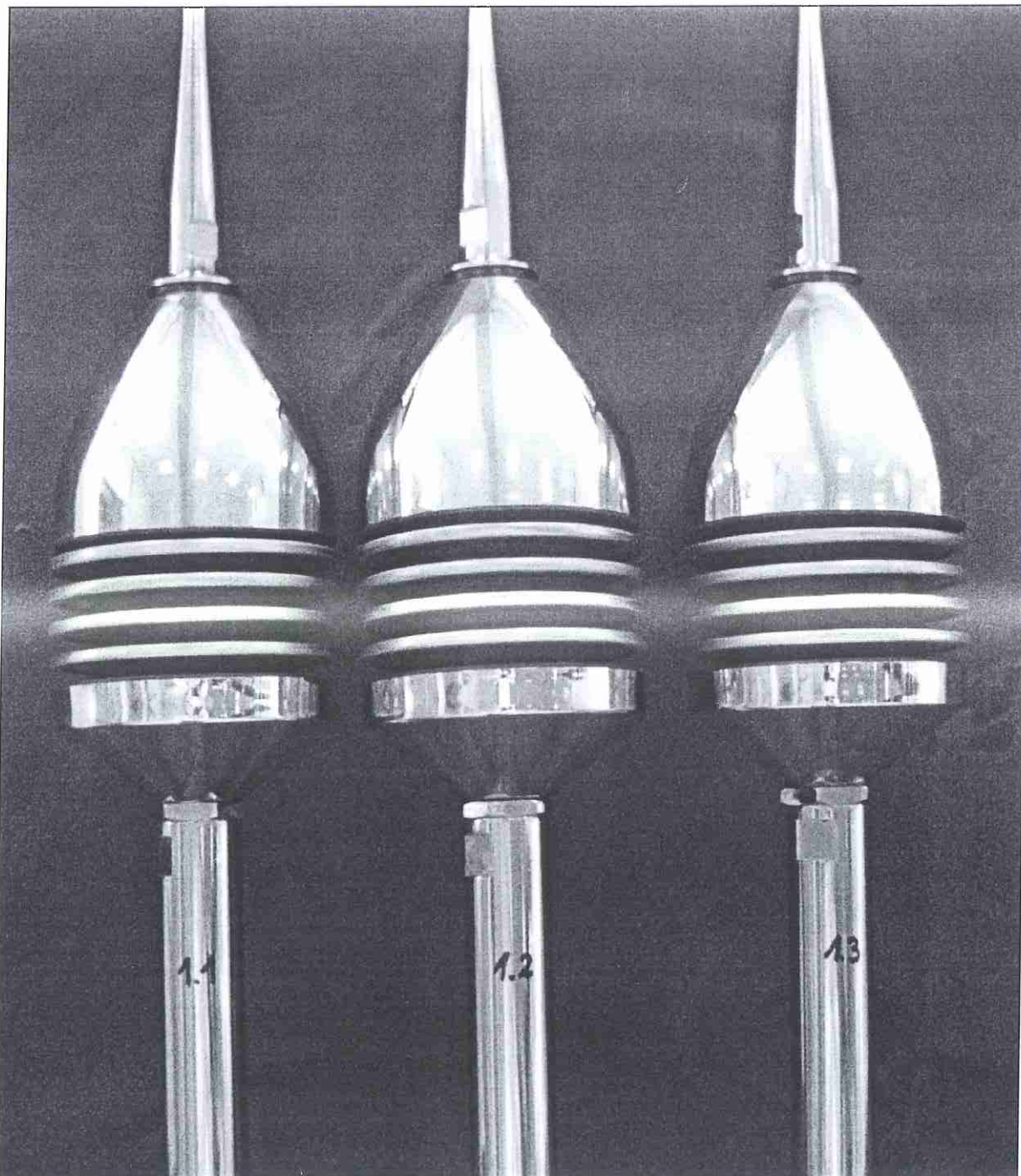


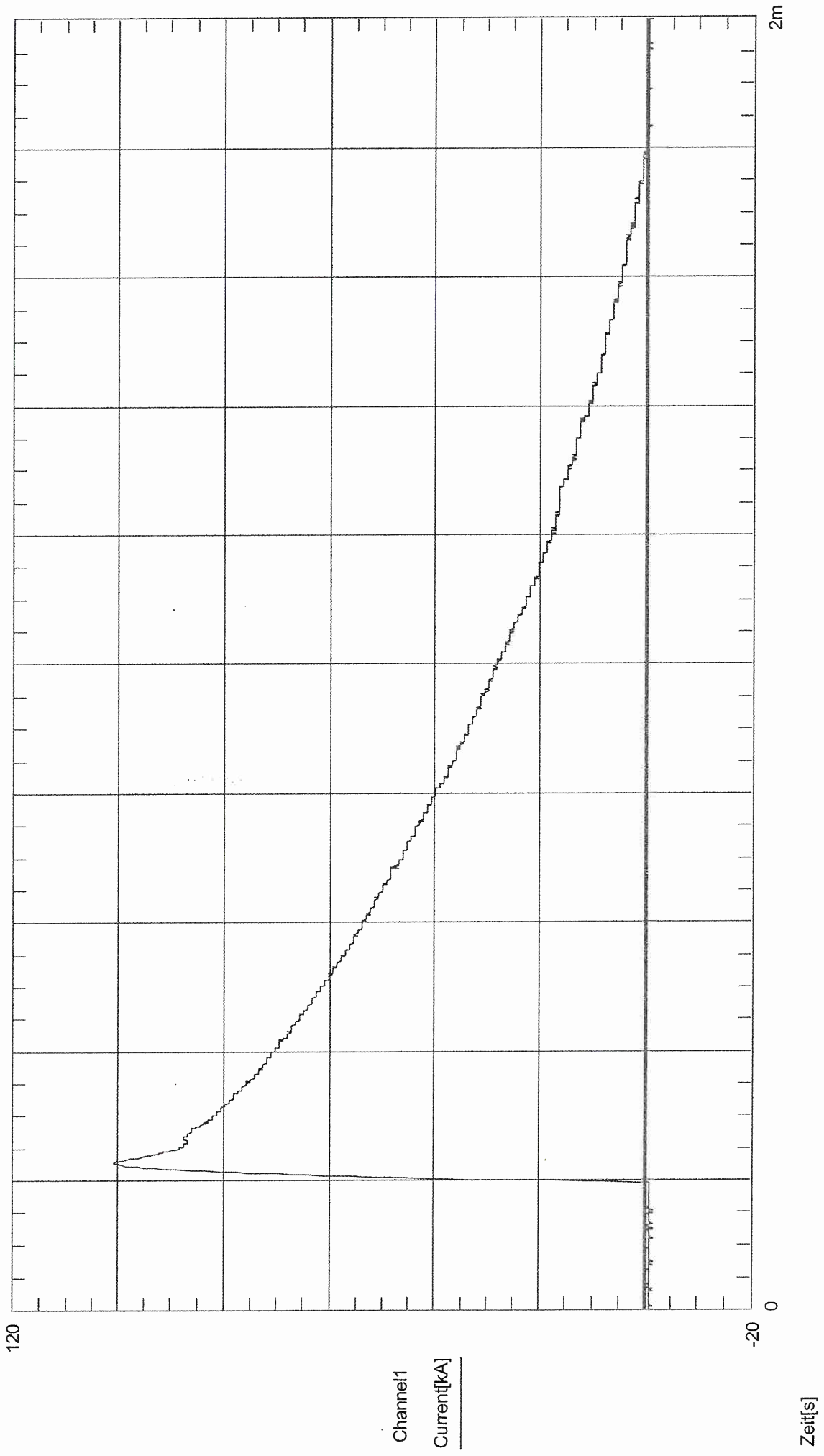
Figure 2: DUT after the impulse current test

Annex B

Impulse current oscillograms

21/Jun/2004 10:49:21

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 1



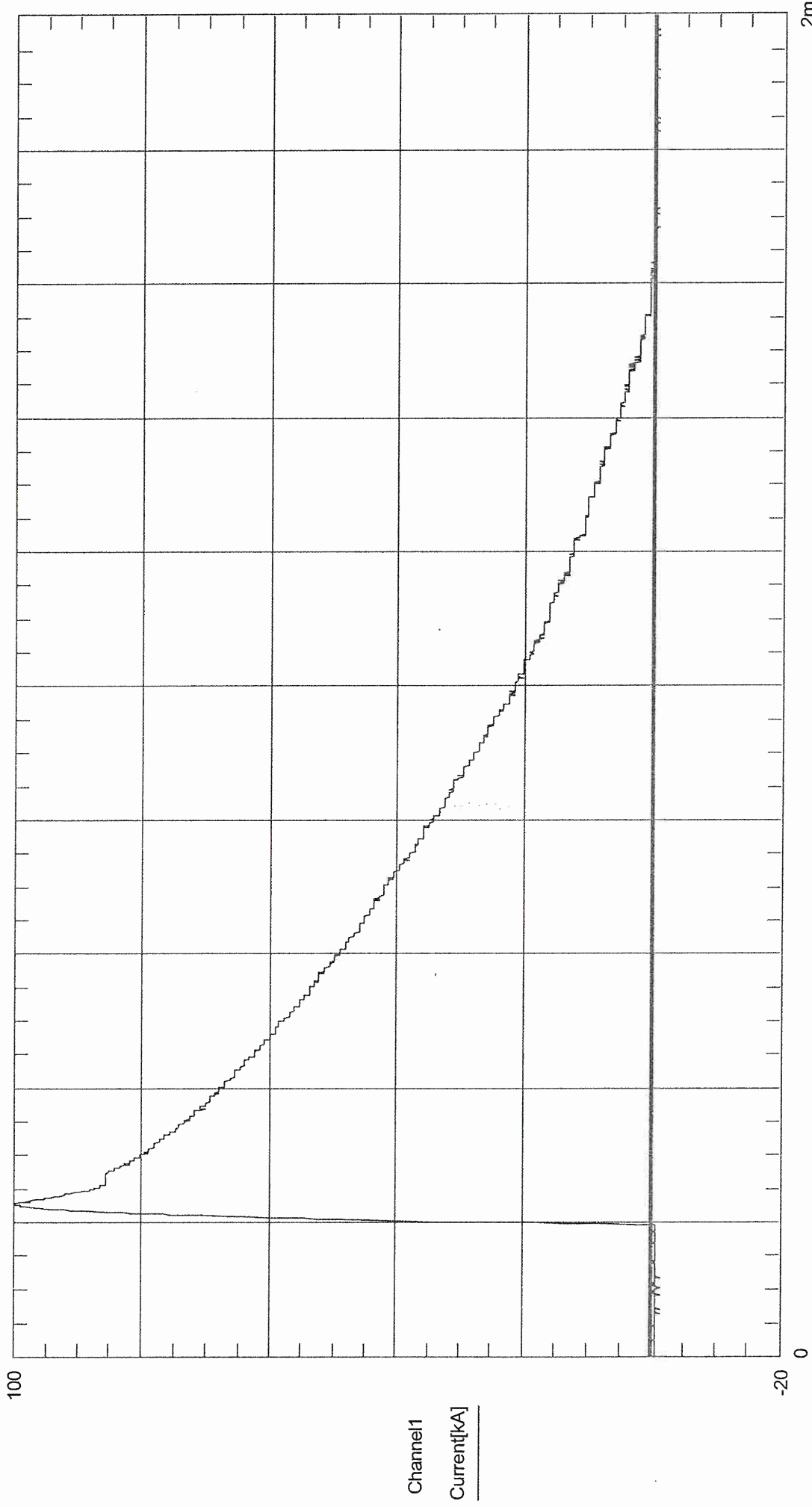
Channel1
Current[kA]

Zeit[s]

Peak Value: 101 kA Front Time: 25.2 μ s Time to Half Value: 464 μ s Charge: 55.4 As Specific Energy: 2.99 MA²s

21/Jun/2004 11:03:25

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 2

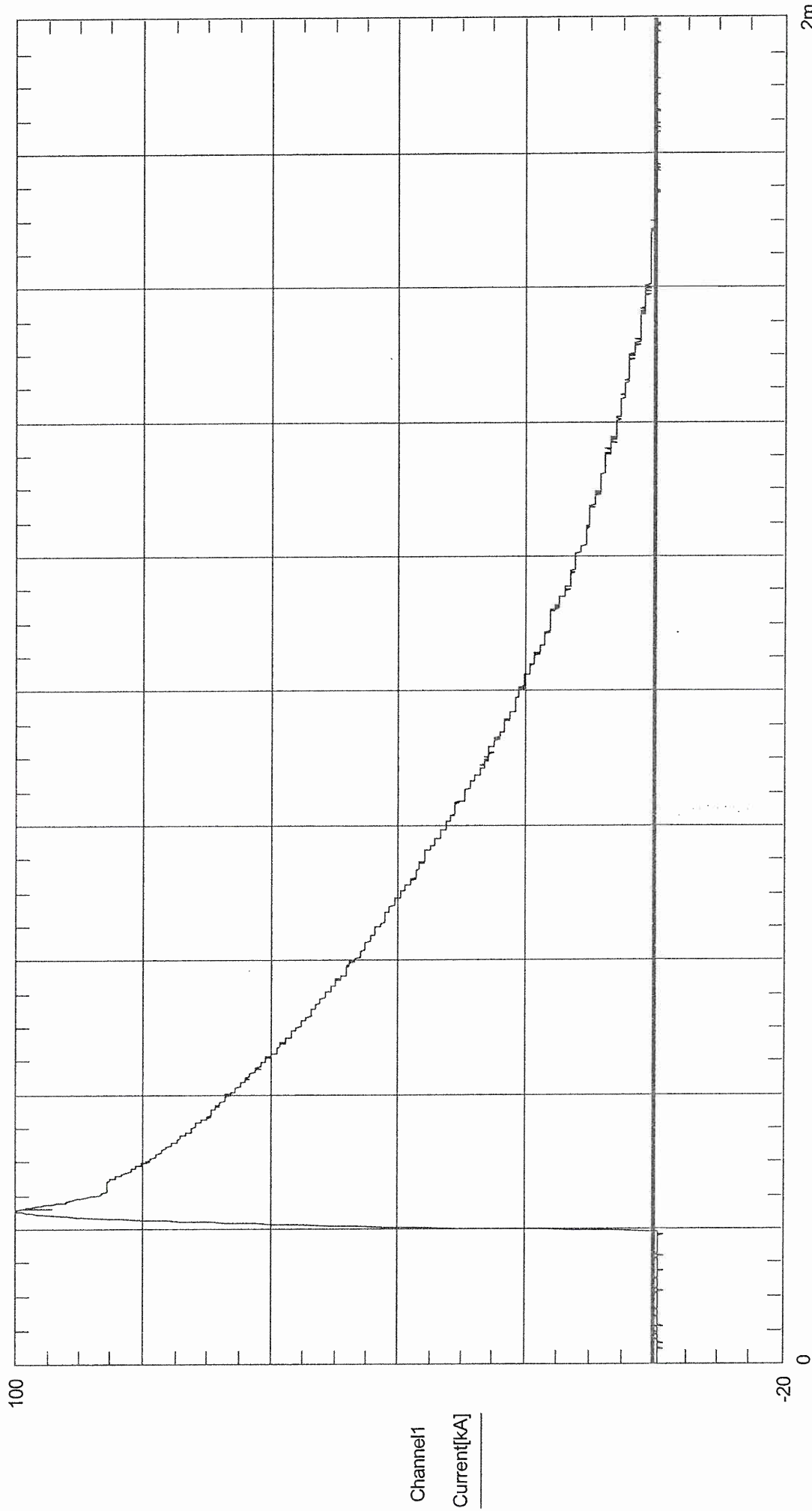


Zeit[s]

Peak Value: 100 kA Front Time: 25.3 μ s Time to Half Value: 401 μ s Charge: 48.5 As Specific Energy: 2.60 MA²s

21/Jun/2004 11:04:56

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 3



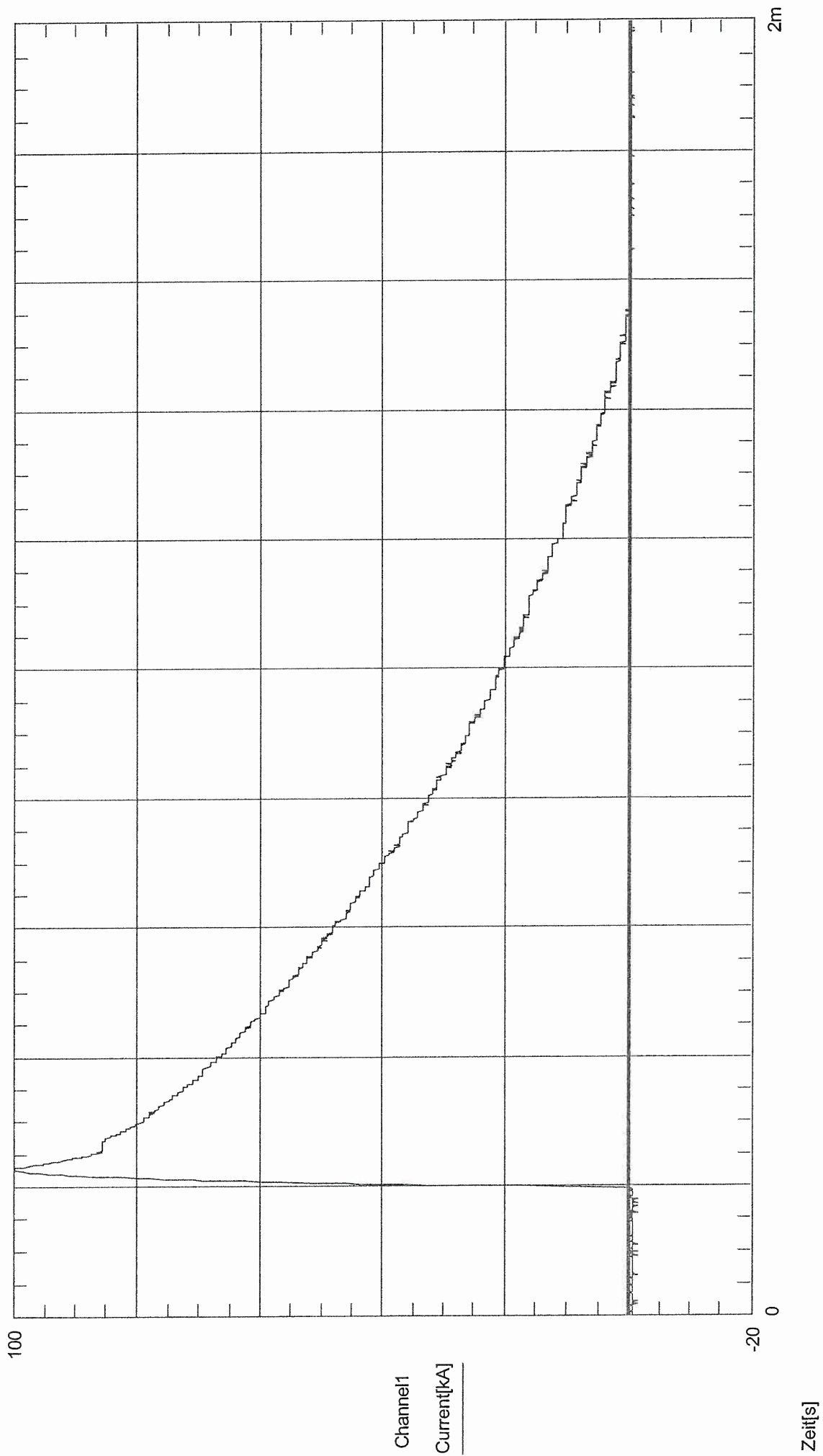
Channel1
Current[kA]

Zeit[s]

Peak Value: 100 kA Front Time: 24.6 μ s Time to Half Value: 375 μ s Charge: 47.3 As Specific Energy: 2.48 MA²s

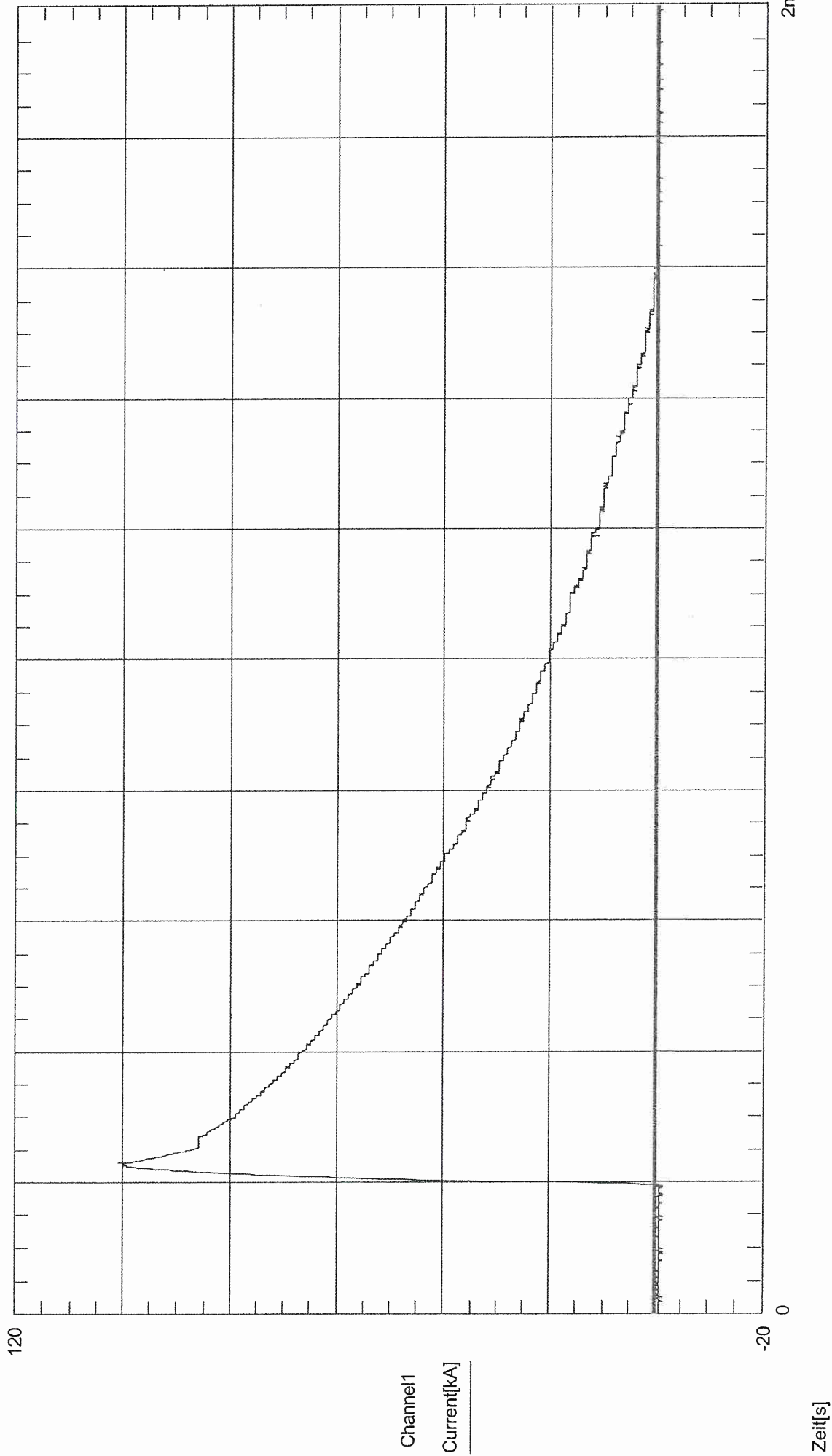
21/Jun/2004 11:14:32

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 4



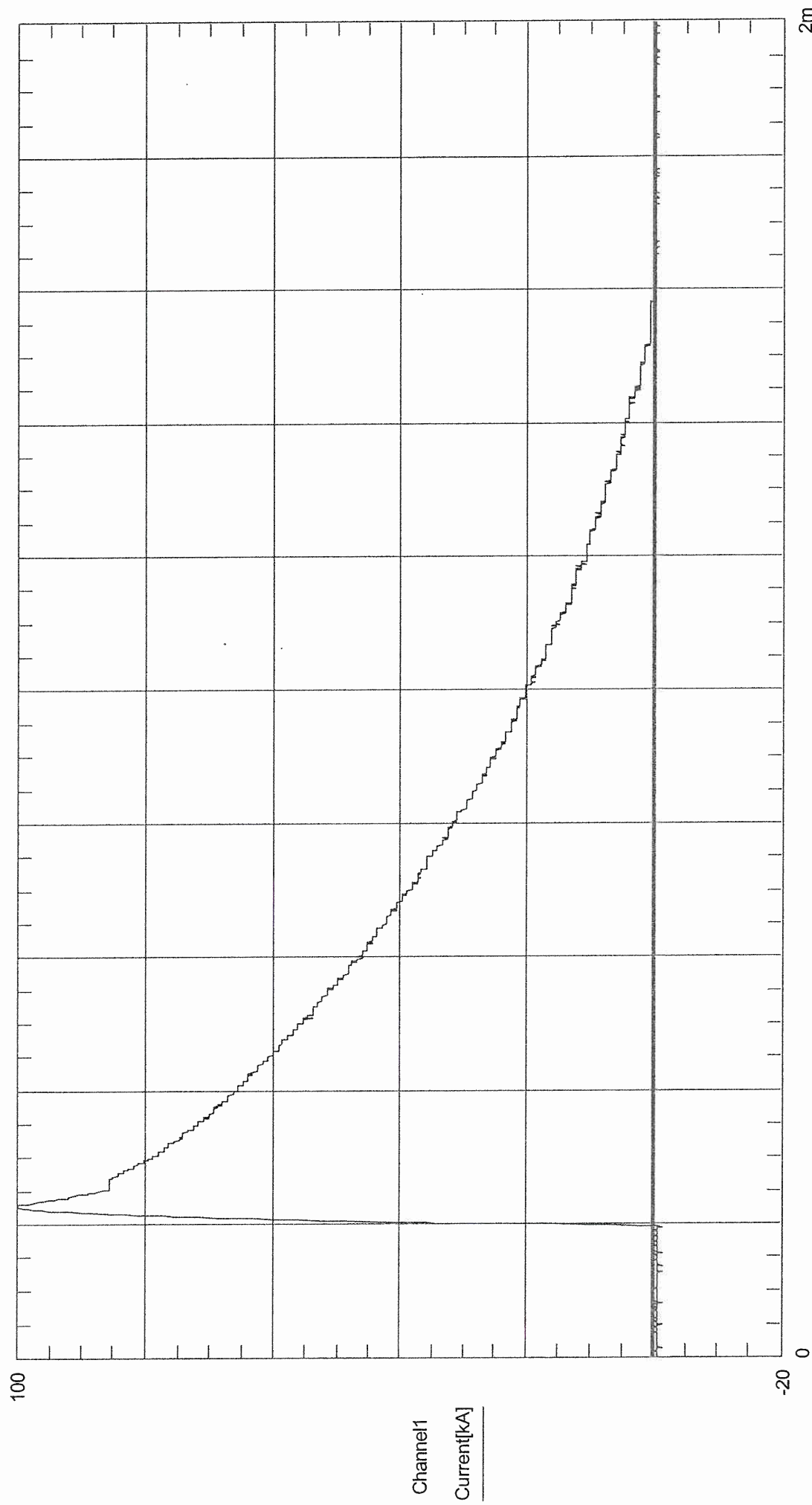
21/Jun/2004 11:16:11

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 5



21/Jun/2004 11:18:15

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 6



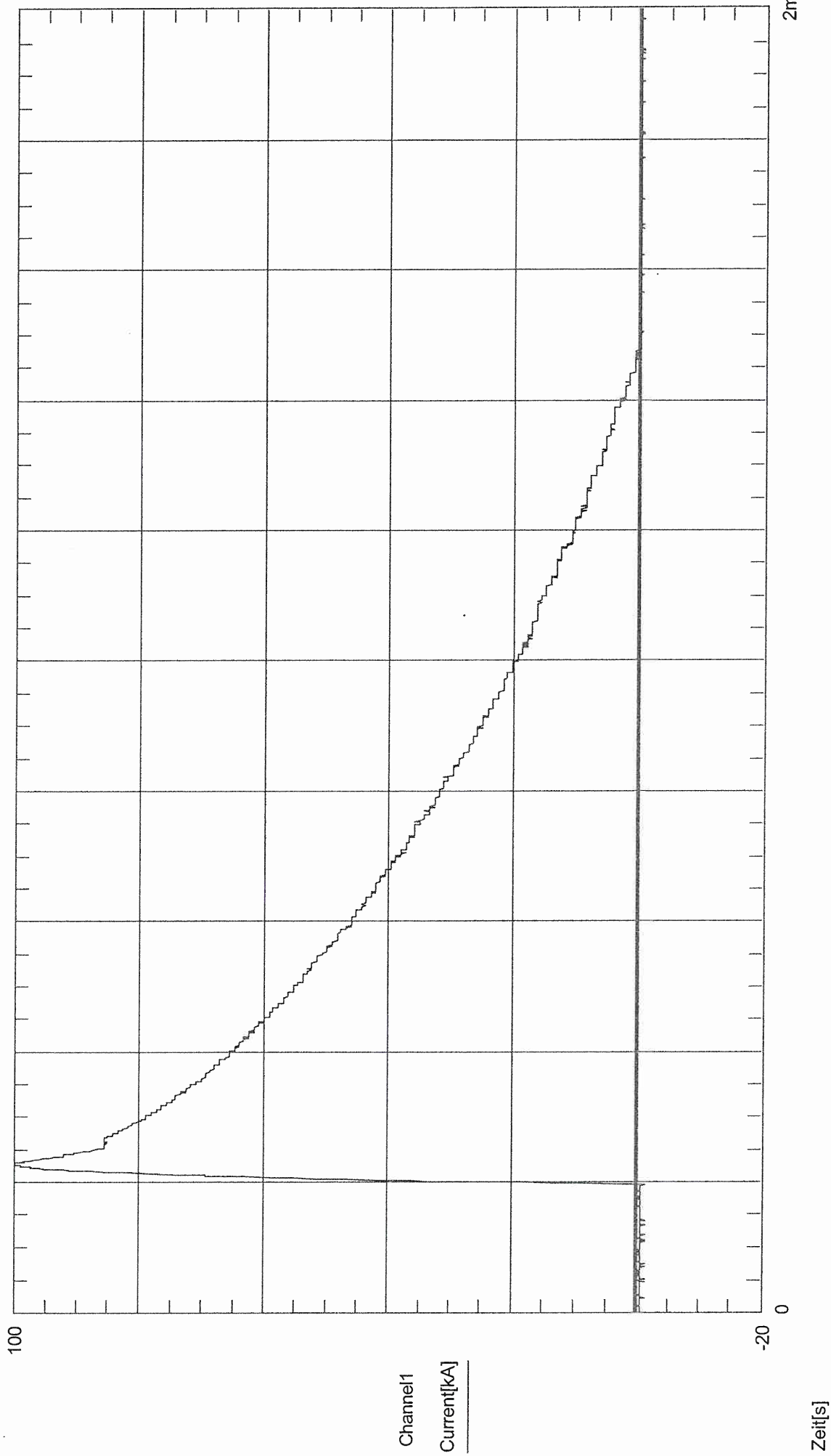
Channel1
Current[kA]

Zeit[s]

Peak Value: 100 kA Front Time: 25.4 μs Time to Half Value: 371 μs Charge: 46 As Specific Energy: 2.44 MA²s

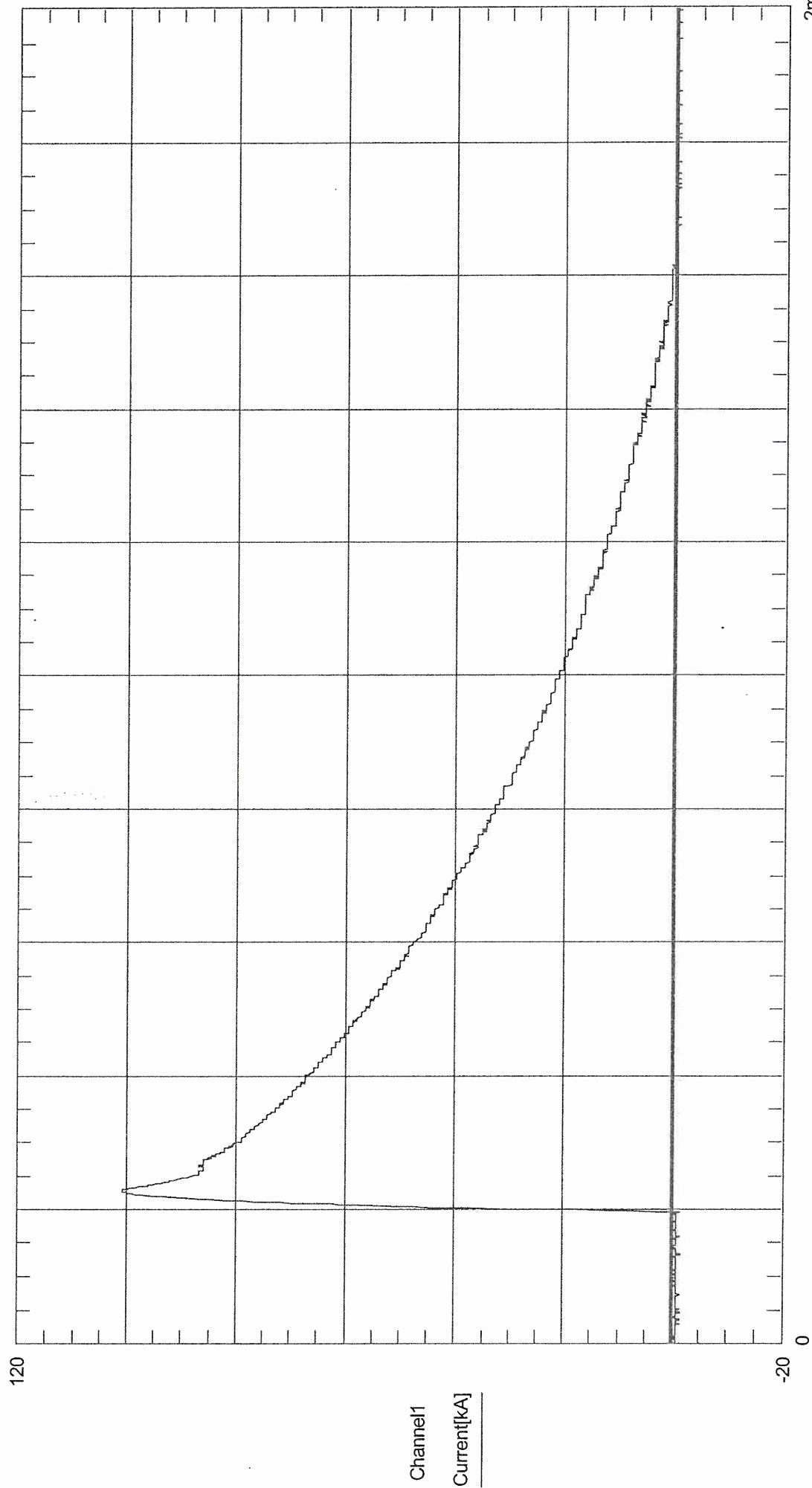
21/Jun/2004 11:24:00

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 7



21/Jun/2004 11:25:43

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 8



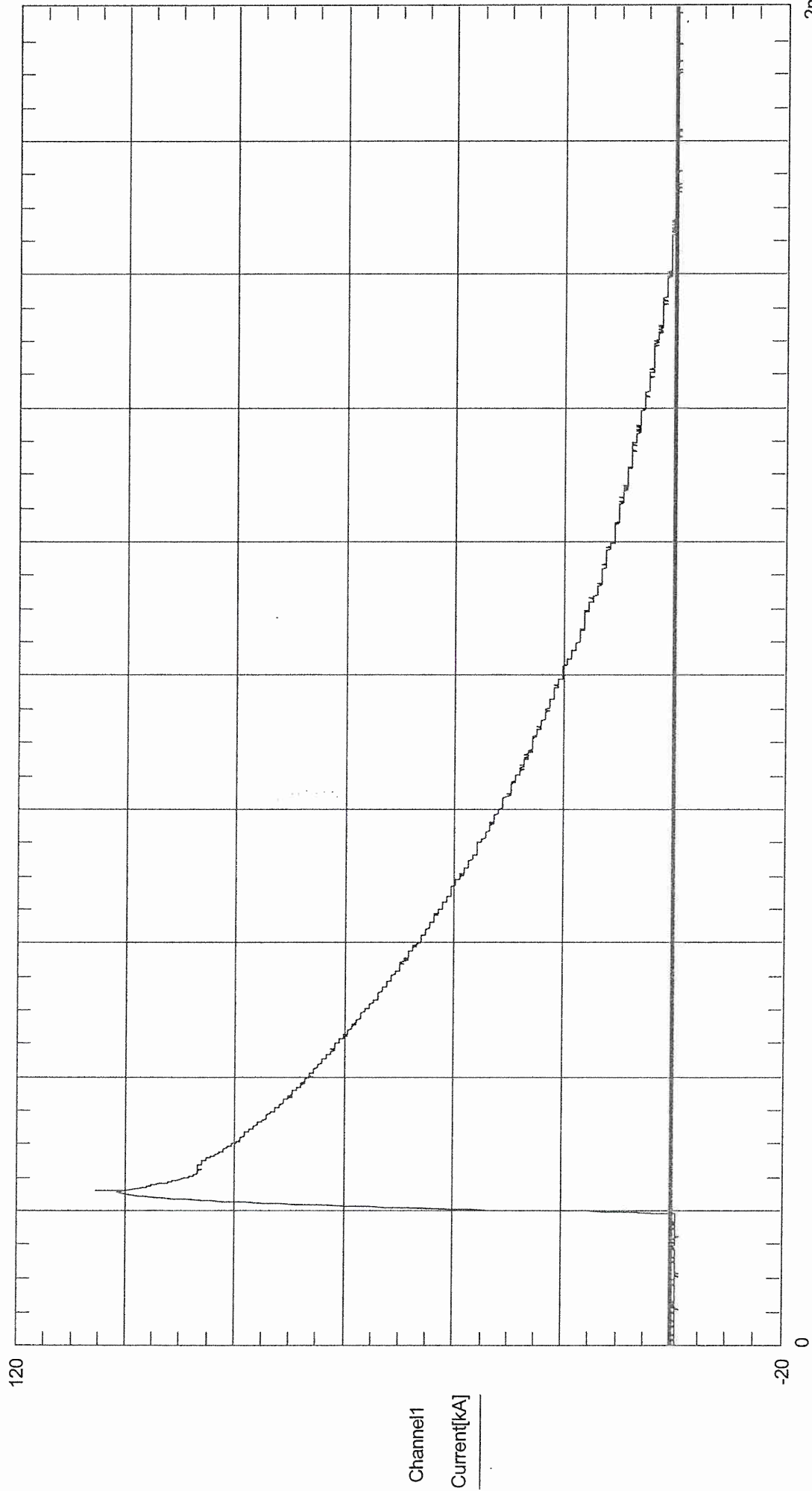
Channel1
Current[kA]

Zeit[s]

Peak Value: 101 kA Front Time: 25.9 μ s Time to Half Value: 366 μ s Charge: 47.2 As Specific Energy: 2.50 MA²s

21/Jun/2004 11:28:16

Prüfsequenz: Schirtec-040621 Aufnahme-Nr.: 9



Zeit[s]

Peak Value: 105 kA Front Time: 28.4 μ s Time to Half Value: 337 μ s Charge: 46.8 As Specific Energy: 2.47 MA²s