



KEMA-Powertest, LLC

Test Report # 11144-D

Equipment Tested:

Non-Segregated Bus Duct

Tested For:

Withstand of Dielectric

July 13, 2011



REPORT OF PERFORMANCE NUMBER: 11144-D

CLIENT: THE CALVERT COMPANY – RICHLAND, MS USA

EQUIPMENT TESTED: NON-SEGREGATED BUS DUCT

MANUFACTURER'S RATINGS:

Voltage:	15	kV
Continuous Current:	3000	A
Short-Circuit Current:	62	kA asym
BIL:	95	kV
Frequency:	60	Hz
Number of Phases:	3	

DATES OF TEST: July 13, 2011

TESTED FOR: Withstand of Dielectric

APPLICABLE TEST STANDARD: None

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

This report consists of 87 pages, and contains the results of tests performed at the KEMA-Powertest Laboratory on the above noted equipment. Publication or reproduction of the contents of this report in any form other than a complete copy is not permitted without written approval of KEMA-Powertest.

Measurement uncertainty can be verified by reviewing the instrument calibration records. The instruments used are calibrated on a regular basis and are traceable to the National Institute of Standards and Technology.

The results apply only to the specific devices tested and are recorded on the enclosed tables, oscillograms, photographs, etc. A table of contents is included on Page 2.

Richard J. Cabbage
Manager, Test Operations

August 25, 2011

Date



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TESTS WITNESSED BY:

STEVE POWELL	- CALVERT COMPANY
DENNIS GRZIC	- UL
BRIAN SPERA	- UL

REPORT PREPARED BY:

RICHARD P. McLAUGHLIN



TEST SUMMARY

A. Discussion

The client submitted one non-segregated bus duct, in good condition, to be subjected to withstand of dielectric tests in accordance with the client's instructions. The test sample is rated 15kV, 3000A I_{CONT} , 62kA asym I_{SC} , 95kV BIL, 60 Hertz, and three phases.

B. Test Requirements

The client requested tests to verify the non-segregated bus duct ability to withstand dielectric in accordance with the client's instructions. These test requirements are summarized in the following table:

Impulse Test	
Full Wave	
Voltage (kV)	Waveform (μ s)
95	1.2 x 50

The Impulse test sequence shall consist of applying three positive and three negative impulses, without causing damage or a flashover. The impulse shall consist of a high voltage 1.2 x 50 μ s impulse wave with a crest of 95 kV.

Reference standard: IEEE C37.23 - 2003.

C. Test Results

The withstand of dielectric tests for the non-segregated bus duct was performed in accordance with the test standards mentioned above and the client's instructions.

Detailed results are reported in the Impulse Test Record and Remarks on pages 5-9 of this report.

This report will be forwarded to the client for evaluation.



REQUEST FOR LABORATORY TESTS

Requested By: Steve Powell Test No.: 11144-D

Company: Calvert Company Quote No.: Q11168

Required Test Date: July 12 – July 18, 2011 Request Date: 6/5/2011

Equipment To Be Tested: Non-Segregated Phase Bus

Rated: 15kV, 63kA Isc, 3000A Icont, 3 ϕ , 60Hz

Type Of Tests: Impulse Voltage Withstand

Test Standards: IEEE Std C37.23 – 2003

Test Program:

- TEST PROCEDURE ATTACHED
- CERTIFICATE OF PERFORMANCE REQUIRED

DIELECTRIC TEST			
IMPULSE		60Hz WITHSTAND	
VOLTAGE (kV)	WAVEFORM (μ SEC)	VOLTAGE (kV)	TIME (min)
95	1.2 x 50	-	-

MEASUREMENTS:

<input checked="" type="checkbox"/> VOLTAGE ACROSS UNIT	<input type="checkbox"/> CURRENT THROUGH UNIT	<input checked="" type="checkbox"/> OBSERVATIONS
<input checked="" type="checkbox"/> ATMOSPHERIC CONDITIONS	<input checked="" type="checkbox"/> 60HZ WITHSTAND TIME	<input checked="" type="checkbox"/> IMPULSE WAVE T1 & T2
<input checked="" type="checkbox"/> PEAK VOLTAGE	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Witness(s): Calvert Company Representatives

Copies of Test Reports To: Steve Powell

IMPULSE TEST RECORD

TEST NO.: 11144-D

Calvert - Non-Segregated Phase Bus

TEST DEVICE:

Date:	Time:	Bar. Pr. (mmHg):	T ₀ (°C):	RAD:	F _c : (Positive)	F _c : (Negative)
07.12.2011	9:30 AM	745	27	0.957	1.006	0.996
Date:	Time:	Bar. Pr. (mmHg):	T ₀ (°C):	RAD:	F _c : (Positive)	F _c : (Negative)
07.13.2011	7:30 AM	745	26	0.961	1.001	0.993

Atmospheric Conditions:

Initial Conditions:

Enclosure was grounded for all tests.

TEST OBSERVERS:

Steve Powell (Calvert), Dennis Grzic (UL)

TESTER: RPM, Si

Trial #	Device Under Test	Grounded Parts	Test Device Position	Charge Voltage (V)	Polarity	Test Voltage (kV)	Corrected Voltage (kV)	Time to Chop (ms)	Resulting Waveform	Remarks
1	Left (A) Phase	Center & Right Phases	-	45.3	Positive	62.21	61.8	-	Reduced	1
2	Left (A) Phase	Center & Right Phases	-	80.0	Positive	109.20	108.5	4.191	Flashover	2,3,4
3	Left (A) Phase	Center & Right Phases	-	80.0	Positive	110.60	109.9	5.419	Flashover	5
4	Left (A) Phase	Center & Right Phases	-	80.0	Positive	110.20	109.5	4.324	Flashover	6
5	Left (A) Phase	Center & Right Phases	-	69.4	Positive	97.15	96.6	-	Full	7
6	Left (A) Phase	Center & Right Phases	-	68.0	Positive	95.35	94.8	-	Full	
7	Left (A) Phase	Center & Right Phases	-	68.0	Positive	95.07	94.5	-	Full	
8	Center (B) Phase	Right & Left Phases	-	68.8	Positive	95.97	95.4	-	Full	
9	Center (B) Phase	Right & Left Phases	-	68.8	Positive	95.63	95.1	-	Full	
10	Center (B) Phase	Right & Left Phases	-	68.8	Positive	95.58	95.0	-	Full	
11	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.55	95.0	-	Flashover	3
12	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.68	95.1	-	Full	
13	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.56	95.0	-	Full	
14	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.47	94.9	-	Full	
15	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.43	94.9	-	Full	
16	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.33	94.8	-	Full	
17	Right (C) Phase	Left & Center Phases	-	68.6	Positive	95.45	94.9	4.211	Flashover	3,8
18	Right (C) Phase	Left & Center Phases	-	69.0	Positive	96.60	96.5	-	Full	9,10,11
19	Right (C) Phase	Left & Center Phases	-	68.2	Positive	95.48	95.4	-	Full	12
20	Right (C) Phase	Left & Center Phases	-	68.2	Positive	95.68	95.6	-	Full	

Remarks: For detailed information refer to the Impulse Test Remarks page.



IMPULSE TEST RECORD

TEST DEVICE:

Calvert - Non-Segregated Phase Bus

TEST NO.: 11144-D

Date:	Time:	Bar. Pr. (mmHg):	T ₀ (°C):	Hum. (%):	RAD:	F _c : (Positive)	F _c : (Negative)
07.13.2011	7:30 AM	745	26	67	0.961	1.001	0.993
Date:	Time:	Bar. Pr. (mmHg):	T ₀ (°C):	Hum. (%):	RAD:	F _c : (Positive)	F _c : (Negative)

Atmospheric Conditions:

Initial Conditions:

Enclosure was grounded for all tests.

TEST OBSERVERS:

Steve Powell (Calvert), Dennis Grzic (UL)

TESTER: RPM, SI

Trial #	Device Under Test	Grounded Parts	Test Device Position	Charge Voltage (V)	Polarity	Test Voltage (kV)	Corrected Voltage (kV)	Time to Chop (ms)	Resulting Waveform	Remarks
21	Right (C) Phase	Left & Center Phases	-	68.2	Positive	95.51	95.4	-	Full	
22	Center (B) Phase	Right & Left Phases	-	68.2	Positive	95.62	95.5	-	Full	
23	Center (B) Phase	Right & Left Phases	-	68.2	Positive	95.63	95.5	-	Full	
24	Center (B) Phase	Right & Left Phases	-	68.2	Positive	95.66	95.6	-	Full	
25	Left (A) Phase	Center & Right Phases	-	68.2	Positive	95.41	95.3	-	Full	
26	Left (A) Phase	Center & Right Phases	-	68.2	Positive	95.43	95.3	-	Full	
27	Left (A) Phase	Center & Right Phases	-	68.2	Positive	95.56	95.5	-	Full	
28	Left (A) Phase	Center & Right Phases	-	45.5	Positive	-63.32	-63.8	-	Reduced	13
29	Left (A) Phase	Center & Right Phases	-	45.5	Positive	-63.33	-63.8	-	Reduced	
30	Left (A) Phase	Center & Right Phases	-	67.5	Negative	-94.90	-95.6	-	Full	
31	Left (A) Phase	Center & Right Phases	-	67.5	Negative	-95.10	-95.8	-	Full	
32	Left (A) Phase	Center & Right Phases	-	67.5	Negative	-95.10	-95.8	-	Full	
33	Center (B) Phase	Right & Left Phases	-	44.5	Negative	-61.29	-61.7	-	Reduced	
34	Center (B) Phase	Right & Left Phases	-	44.5	Negative	-61.13	-61.6	-	Reduced	
35	Center (B) Phase	Right & Left Phases	-	68.6	Negative	-96.73	-97.4	-	Full	
36	Center (B) Phase	Right & Left Phases	-	66.5	Negative	-93.98	-94.6	-	Full	
37	Center (B) Phase	Right & Left Phases	-	67.1	Negative	-94.80	-95.5	-	Full	
38	Right (C) Phase	Left & Center Phases	-	45.4	Negative	-63.30	-63.7	-	Reduced	
39	Right (C) Phase	Left & Center Phases	-	45.4	Negative	-63.19	-63.6	-	Reduced	
40	Right (C) Phase	Left & Center Phases	-	66.5	Negative	-93.84	-94.5	-	Full	

Remarks: For detailed information refer to the Impulse Test Remarks page.



IMPULSE TEST RECORD

TEST DEVICE:

Calvert - Non-Segregated Phase Bus

TEST NO.: 11144-D

Date:	Time:	Bar. Pr. (mmHg):	T _o (°C):	Hum. (%):	RAD:	Fc: (Positive)	Fc: (Negative)
07.13.2011	7:30 AM	745	26	67	0.961	1.001	0.993
Date:	Time:	Bar. Pr. (mmHg):	T _o (°C):	Hum. (%):	RAD:	Fc: (Positive)	Fc: (Negative)
07.13.2011	10:00 AM	745	28	58	0.954	0.991	0.984

Atmospheric Conditions:

Initial Conditions:

Enclosure was grounded for all tests.

TEST OBSERVERS:

Steve Powell (Calvert), Dennis Grzic, Brian Spera (UL)

TESTER: RPM, SI

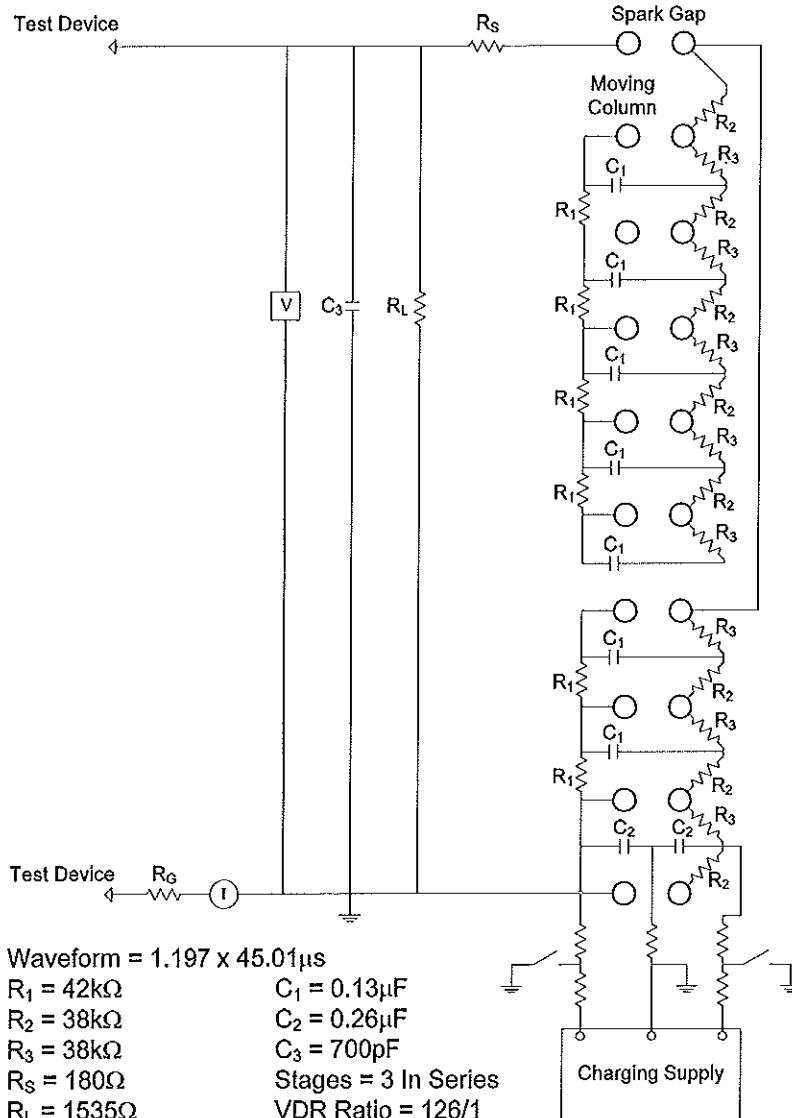
Trial #	Device Under Test	Grounded Parts	Test Device Position	Charge Voltage (V)	Polarity	Test Voltage (kV)	Corrected Voltage (kV)	Time to Chop (ms)	Resulting Waveform	Remarks
41	Right (C) Phase	Left & Center Phases	-	66.0	Negative	-93.34	-94.0	-	Full	
42	Right (C) Phase	Left & Center Phases	-	67.7	Negative	-95.88	-96.6	-	Full	
43	Right (C) Phase	Left & Center Phases	-	76.6	Negative	-107.60	-109.3	-	Full	
44	Right (C) Phase	Left & Center Phases	-	77.3	Negative	-108.80	-110.6	4.743	Flashover	3
45	Right (C) Phase	Left & Center Phases	-	77.3	Negative	-109.40	-111.2	-	Full	
46	Right (C) Phase	Left & Center Phases	-	77.1	Negative	-108.30	-110.1	-	Full	
47	Right (C) Phase	Left & Center Phases	-	77.1	Negative	-109.00	-110.8	-	Full	
48	Right (C) Phase	Left & Center Phases	-	77.1	Negative	-108.50	-110.3	-	Full	
49	Right (C) Phase	Left & Center Phases	-	77.1	Negative	-108.40	-110.2	-	Full	
50	Right (C) Phase	Left & Center Phases	-	77.1	Negative	-108.30	-110.1	-	Full	
51	Right (C) Phase	Left & Center Phases	-	76.8	Negative	-107.80	-109.6	-	Full	
52	Right (C) Phase	Left & Center Phases	-	76.8	Negative	-107.70	-109.5	-	Full	
53	Right (C) Phase	Left & Center Phases	-	76.8	Negative	N.A.	-	-	Full	14
54	Right (C) Phase	Left & Center Phases	-	76.8	Negative	-107.80	-109.6	-	Full	
55	Right (C) Phase	Left & Center Phases	-	76.8	Negative	-107.90	-109.7	-	Full	
56	Center (B) Phase	Right & Left Phases	-	76.8	Negative	-108.30	-110.1	-	Full	
57	Center (B) Phase	Right & Left Phases	-	76.8	Negative	-108.50	-110.3	-	Full	
58	Center (B) Phase	Right & Left Phases	-	76.8	Negative	-108.40	-110.2	-	Full	
59	Left (A) Phase	Center & Right Phases	-	76.8	Negative	-108.10	-109.9	-	Flashover	
60	Left (A) Phase	Center & Right Phases	-	76.8	Negative	-107.70	-109.5	-	Full	

Remarks: For detailed information refer to the Impulse Test Remarks page...





IMPULSE GENERATOR SCHEMATIC



Waveform = $1.197 \times 45.01 \mu\text{s}$
 $R_1 = 42\text{k}\Omega$ $C_1 = 0.13\mu\text{F}$
 $R_2 = 38\text{k}\Omega$ $C_2 = 0.26\mu\text{F}$
 $R_3 = 38\text{k}\Omega$ $C_3 = 700\text{pF}$
 $R_S = 180\Omega$ Stages = 3 In Series
 $R_L = 1535\Omega$ VDR Ratio = 126/1
 $R_G = 0\Omega$ CT Ratio (A/V) = NA
 Test No: 11144-D Date: 07/12/2011
 Prepared By: RPM, SI



NICOLET POWER PRO 610 SET-UP SHEET

[Reference the Haefley Impulse Generator Test Procedure for more detailed information.]

Test Number: 11144-D Tested By: RPM, SI Date: 07.12.2011

A. Record the test information from the **Impulse Analysis Options** window: [by pressing the F12 key]

Measurement Type:

- Lightning Impulse with IEC Overshoot
- Switching Impulse - Upeak and Tp/T2
- Transfer Function
- Measure a Number of Calibration Shots
- Lightning Impulse - Upeak and T1/T2/Tc

Smoothing:

- Off
- 5 pt
- 9 pt
- 15 pt

Auto Plot:

- Off
- On

Auto Store to Disk:

- Off
- On

B. Record the test information from the **Attenuator Ratio** window: [by pressing the F12 key again, while in the **Impulse Analysis Options** window]

Ch. 1 Impulse Voltage

Ch. 2 Impulse Current

HV Attenuator: 126

Shunt Ratio (A/V) : -

LV Attenuator: 100

LV Attenuator: -

C. Record the test information from the Sweep Length window: [by pressing the Menu button then select Acquisition → Sweep Length]

Sweep Length: 10k pts

D. Record the Time Per Point value from the Time Window: [on the right-hand side of face of scope]

Time Per Point: 13 ns



ATMOSPHERIC CORRECTION FACTOR WORKSHEET - IEEE STD 4 - 2001

CONSTANTS

- t_0 = STANDARD REFERENCE TEMPERATURE = 20 °C
- b_0 = STANDARD REFERENCE PRESSURE = 101.3 kPa (101.3 mBar) (760 mmHg)
- h_0 = STANDARD ABSOLUTE HUMIDITY = 11 g/m³

PROCEDURE

- 1. MEASURE DRY TEMPERATURE t= 26 °C
- 2. MEASURE RELATIVE HUMIDITY %h= 70 %
- 3. MEASURE BAROMETRIC PRESSURE b= 745 mmHg
- 4. CALCULATE RELATIVE AIR DENSITY (δ) \delta= 0.961
 $(\delta) = (b/760) \times (293/(273+t))$
- 5. DETERMINE ABSOLUTE AIR HUMIDITY (h) h= 17.0 g/m³
 FROM (t) AND (%h) USING FIGURE 1.5
- SELECT TEST VOLTAGE TYPE (AC,IMPULSE,DC) TYPE= IMPULSE
0.954
- 6. DETERMINE (k) FROM ABSOLUTE AIR HUMIDITY AND TYPE OF VOLTAGE k= 0.954
 USING FIGURE 1.3, Curve b
- ENTER TEST VOLTAGE (ie. $V_{TEST} = 95$ kV) $V_{TEST} = 95$ kV

Electrode Form

Rod to Rod

- 10. DETERMINE (m) AND (w) USING TABLE 1.3 m= 1.0
- w+ = 1
- w- = 0.8
- 11. CALCULATE (k_1) = δ^m $k_1 = 0.961$
- k_1 = Air Density Correction Factor
- 12. CALCULATE (k_2) = k^w $k_2+ = 0.954$
- k_2 = Humidity Correction Factor $k_2- = 0.963$
- 13. CALCULATE THE VOLTAGE CORRECTION $K+ = 1.007$
 FACTOR = (K) = (k_1 / k_2) $K- = 0.998$

TEST # 11144-D

TESTED BY: RPM
DATE: 7/12/2011



ATMOSPHERIC CORRECTION FACTOR WORKSHEET - IEEE STD 4 - 2001

CONSTANTS

- t_0 = STANDARD REFERENCE TEMPERATURE = 20 °C
- b_0 = STANDARD REFERENCE PRESSURE = 101.3 kPa (101.3 mBar) (760 mmHg)
- h_0 = STANDARD ABSOLUTE HUMIDITY = 11 g/m³

PROCEDURE

- 1. MEASURE DRY TEMPERATURE t = 26 °C
- 2. MEASURE RELATIVE HUMIDITY %h = 67 %
- 3. MEASURE BAROMETRIC PRESSURE b = 745 mmHg
- 4. CALCULATE RELATIVE AIR DENSITY (δ) $\delta = 0.961$
 $(\delta) = (b/760) \times (293/(273+t))$
- 5. DETERMINE ABSOLUTE AIR HUMIDITY (h) h = 16.2 g/m³
FROM (t) AND (%h) USING FIGURE 1.5
- SELECT TEST VOLTAGE TYPE (AC,IMPULSE,DC) TYPE = IMPULSE
0.960
- 6. DETERMINE (k) FROM ABSOLUTE AIR k = 0.960
HUMIDITY AND TYPE OF VOLTAGE
USING FIGURE 1.3, Curve b
- ENTER TEST VOLTAGE (ie. $V_{TEST} = 95$ kV) $V_{TEST} = 95$ kV

Electrode Form

Rod to Rod

- 10. DETERMINE (m) AND (w) USING TABLE 1.3 m = 1.0
w+ = 1
w- = 0.8
- 11. CALCULATE ($k_1 = \delta^m$) k₁ = 0.961
 k_1 = Air Density Correction Factor
- 12. CALCULATE ($k_2 = k^w$) k₂₊ = 0.960
 k_2 = Humidity Correction Factor k₂₋ = 0.968
- 13. CALCULATE THE VOLTAGE CORRECTION K+ = 1.001
FACTOR = (K) = (k_1 / k_2) K- = 0.993

TEST # 11144-D

TESTED BY: RPM
DATE: 7/12/2011



ATMOSPHERIC CORRECTION FACTOR WORKSHEET - IEEE STD 4 - 2001

CONSTANTS

t0 = STANDARD REFERENCE TEMPERATURE = 20 °C
b0 = STANDARD REFERENCE PRESSURE = 101.3 kPa (101.3 mBar) (760 mmHg)
h0 = STANDARD ABSOLUTE HUMIDITY = 11 g/m³

PROCEDURE

- 1. MEASURE DRY TEMPERATURE t = 28 °C
2. MEASURE RELATIVE HUMIDITY %h = 58 %
3. MEASURE BAROMETRIC PRESSURE b = 745 mmHg
4. CALCULATE RELATIVE AIR DENSITY (delta) delta = 0.954
5. DETERMINE ABSOLUTE AIR HUMIDITY (h) h = 15.8 g/m³
6. DETERMINE (k) FROM ABSOLUTE AIR HUMIDITY AND TYPE OF VOLTAGE k = 0.963
ENTER TEST VOLTAGE (ie. VTEST = 95 kV) VTEST = 95 kV

Electrode Form

Rod to Rod

- 10. DETERMINE (m) AND (w) USING TABLE 1.3 m = 1.0
11. CALCULATE (k1) = delta^m k1 = 0.954
12. CALCULATE (k2) = k^w k2 = 0.970
13. CALCULATE THE VOLTAGE CORRECTION FACTOR = (K) = (k1 / k2) K = 0.984

TEST # 11144-D

TESTED BY: RPM
DATE: 7/12/2011

KEMA-Powertest, Inc.

Instrumentation Information Sheet

TEST NO: 11144-D

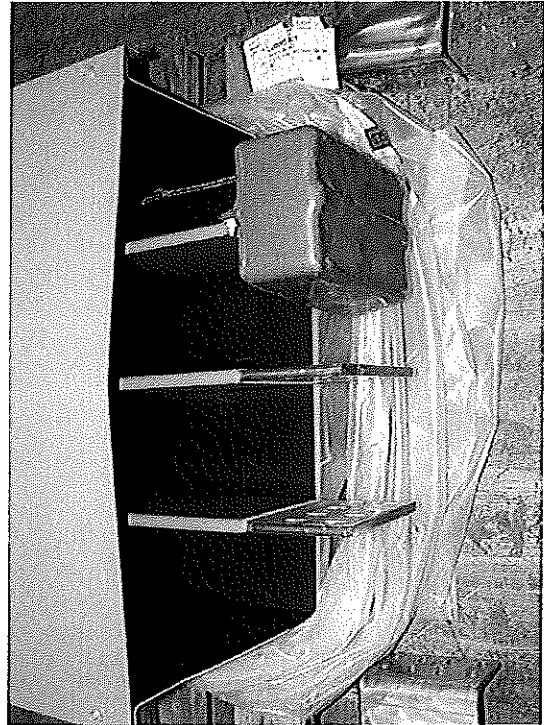
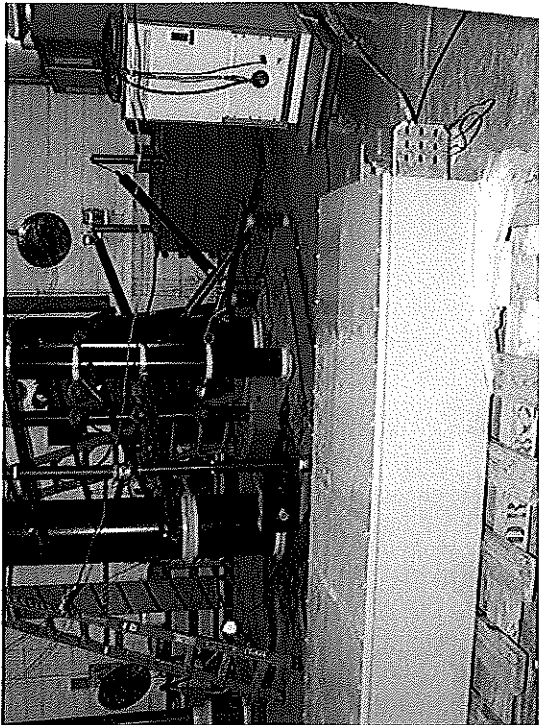
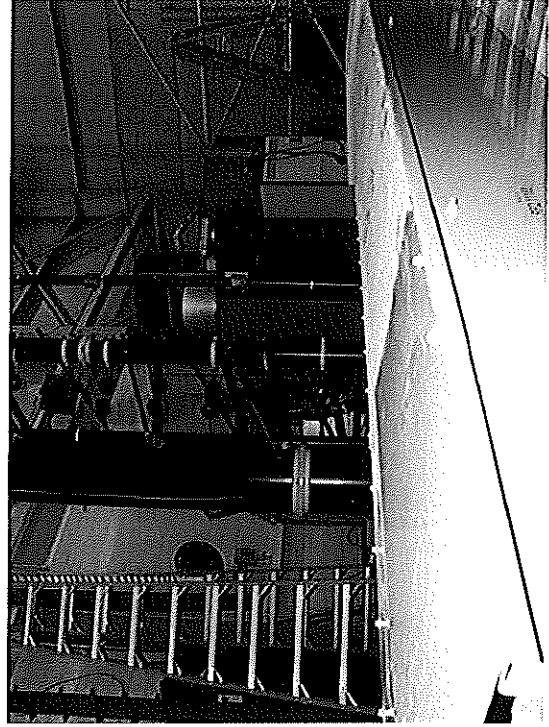
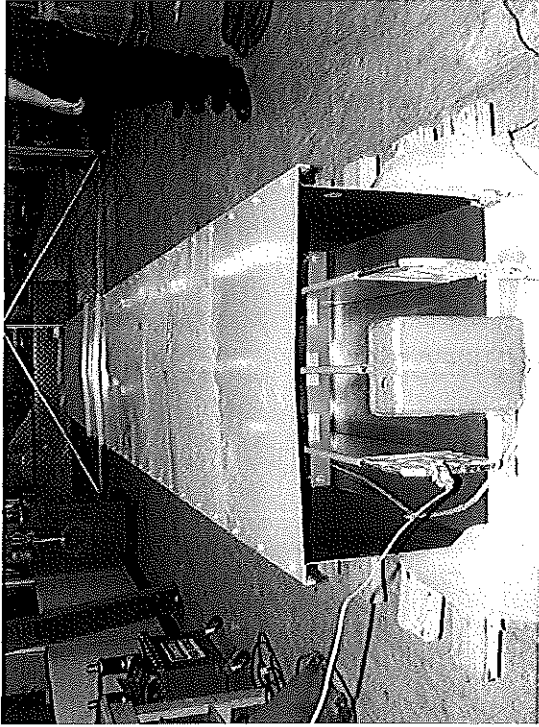
DATE: 07/15/2011

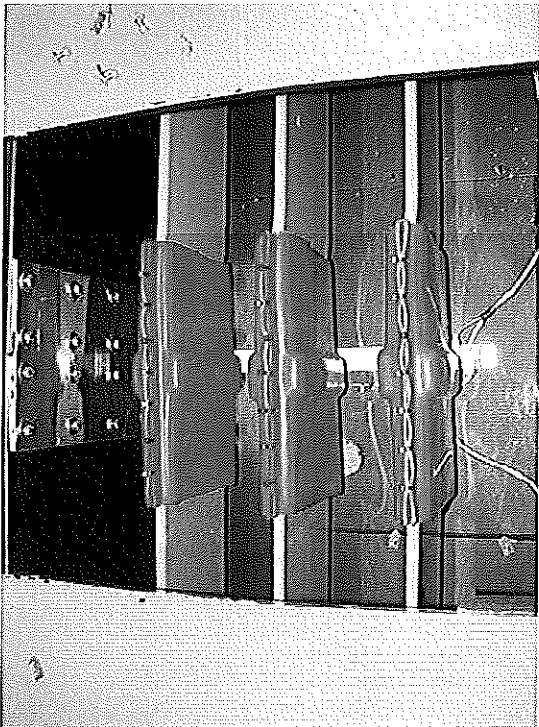
TEST DEVICE: Calvert - Non-Segregated Phase Bus

TESTED BY: S. Iacovella, R. McLaughlin

CALIBRATION

CODE#	TYPE	MANUFACTURER	MODEL#	SERIAL#	LAST	DUE
MSC92	HYGROMETER	COLE PARMER	3310-20	N/A	3/28/2011	10/14/2011
BAR01	BAROMETER	OAKTON	03316-72	37211	3/11/2011	9/27/2011
MUL94	DMM	WAVETEK	85XT	970705675	3/2/2011	9/18/2011
SCP35	DIG.SCOPE	NICOLET	610E	IBT9500160	7/8/2011	7/22/2012
MSC108	SCOPE PROBE	PMK	X100	N/A	2/9/2011	8/28/2011
MSC109	SCOPE PROBE	PMK	X100	N/A	2/9/2011	8/28/2011
SHN161	TERM.RESIS.	KPT	N/A	N/A	2/9/2011	8/28/2011
VDR04	RES.VOL.DIV	POWERTEST	NON DIFF.	04	2/9/2011	8/28/2011
VDR05	RES.VOL.DIV	POWERTEST	NON DIFF.	05	2/9/2011	8/28/2011
VDR06	RES.VOL.DIV	POWERTEST	NON DIFF.	06	2/9/2011	8/28/2011





REPORT# 11144-D,
PICTURES

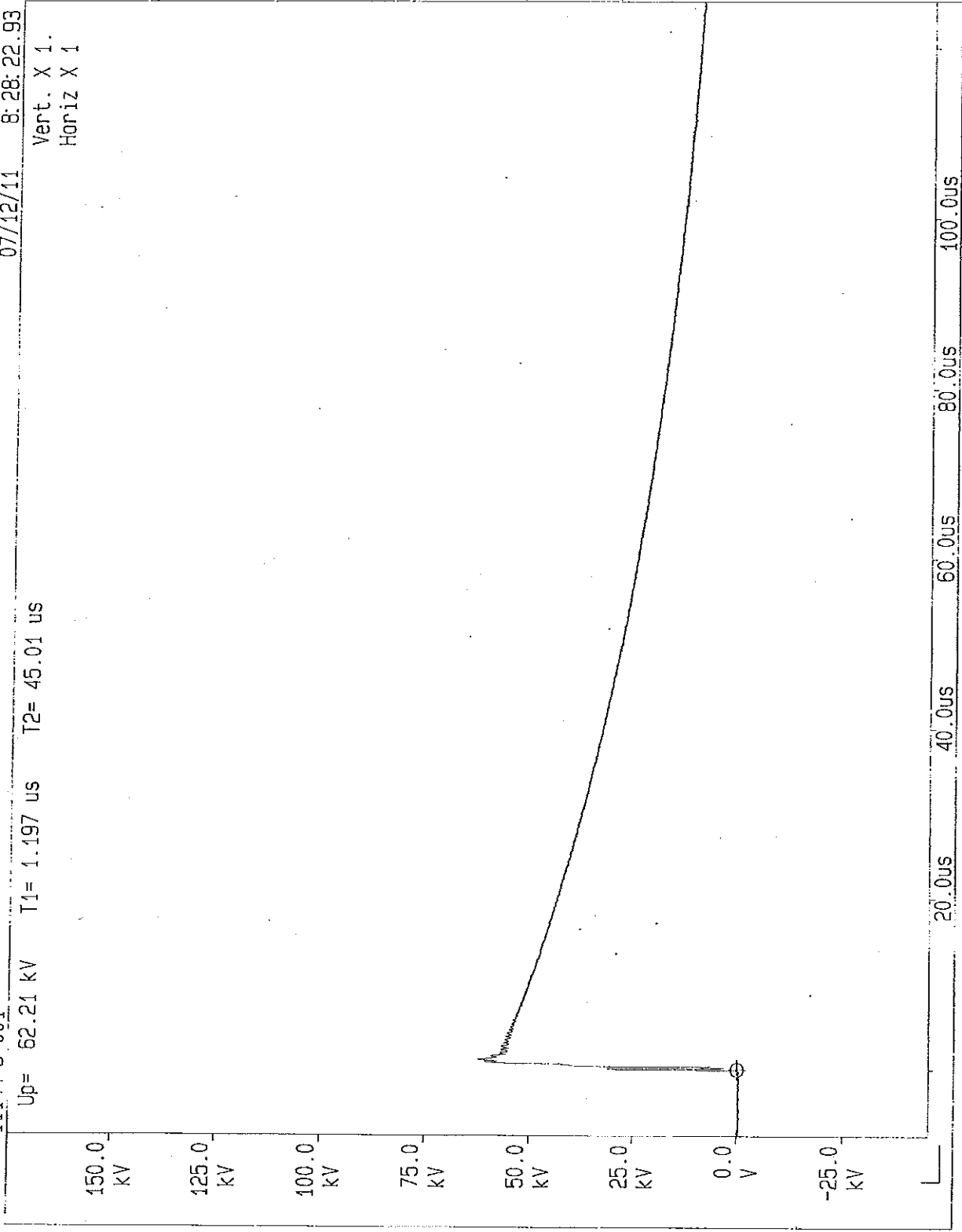
11144-D 001

Up= 62.21 kV T1= 1.197 us T2= 45.01 us

07/12/11

8:28:22.93

Vert. X 1.
Horiz X 1



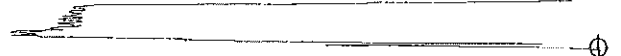
11144-D 002

07/12/11 9:29:24.14

Up= 109.2 kV T1= 1.122 us T2= 4.191 us

Vert. X 1.
Horiz X 1

150.0 kV
125.0 kV
100.0 kV
75.0 kV
50.0 kV
25.0 kV
0.0 V
-25.0 kV



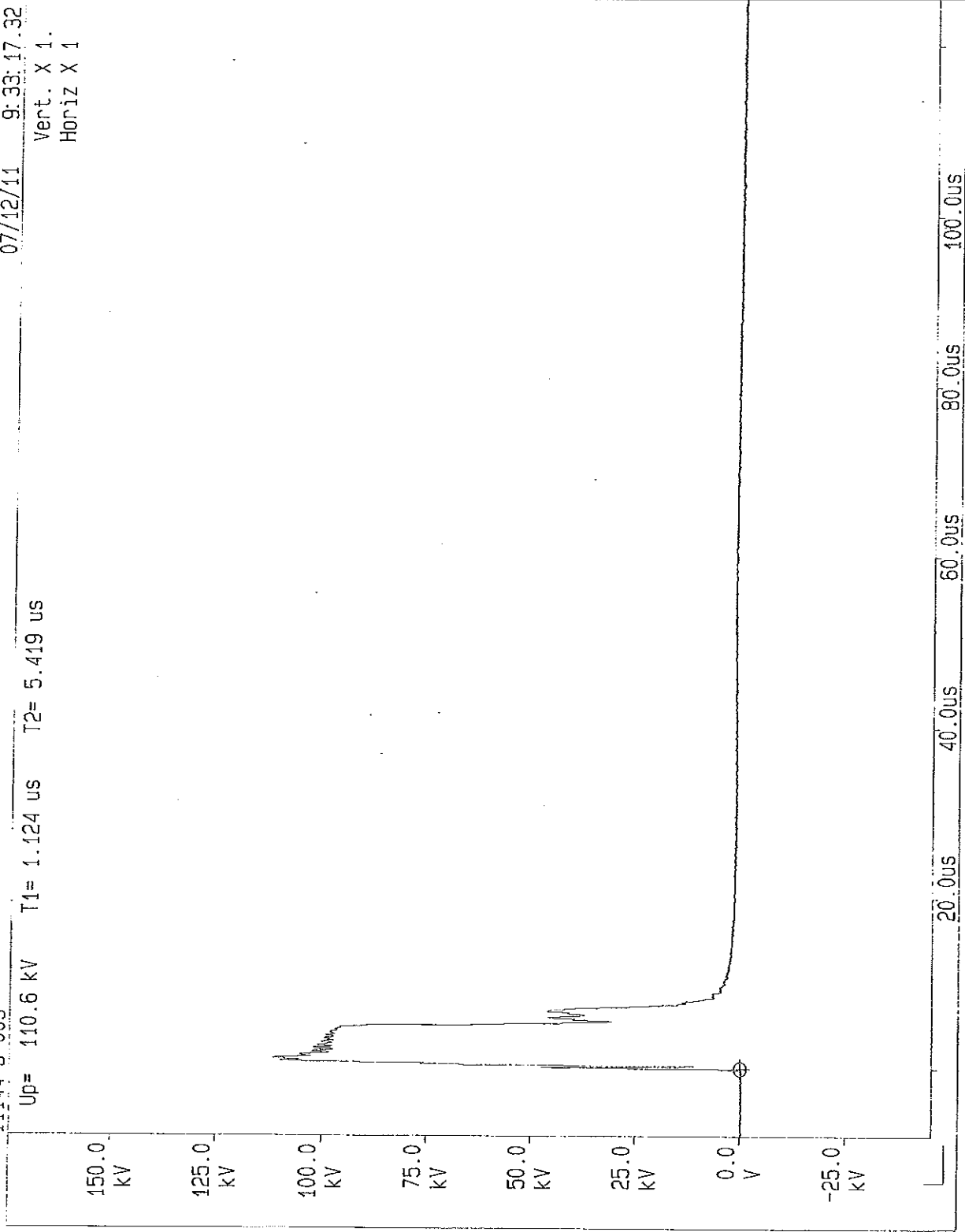
20.0us 40.0us 60.0us 80.0us 100.0us

11144-D 003

07/12/11 9:33:17.32

Up= 110.6 kV T1= 1.124 us T2= 5.419 us

Vert. X 1.
Horiz X 1

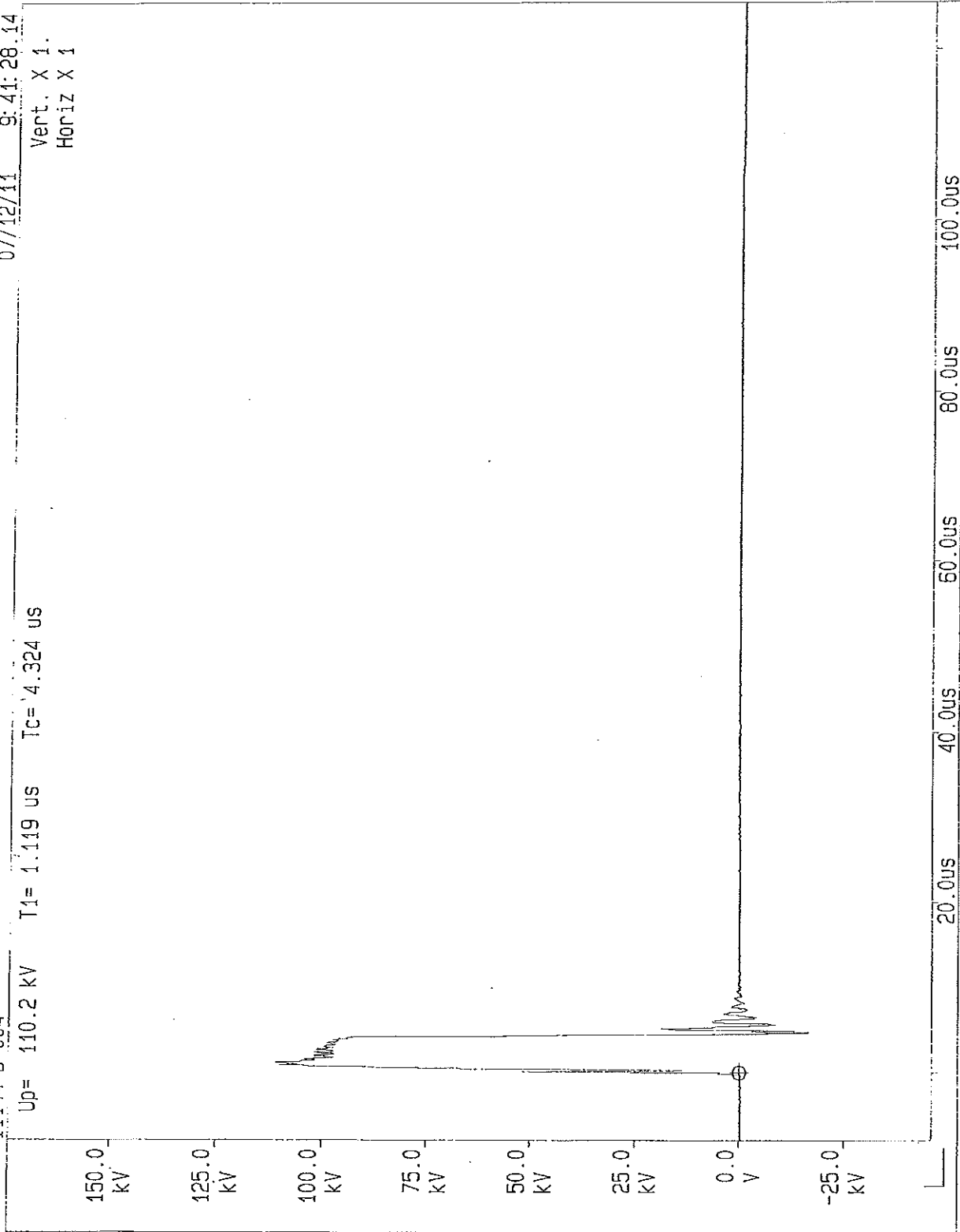


11144-D 004

07/12/11 9:41:28.14

Up= 110.2 kV T1= 1.119 us Tc= 4.324 us

Vert. X 1.
Horiz X 1



11144-D 005

Up= 97.15 kV

T1= 1.133 us

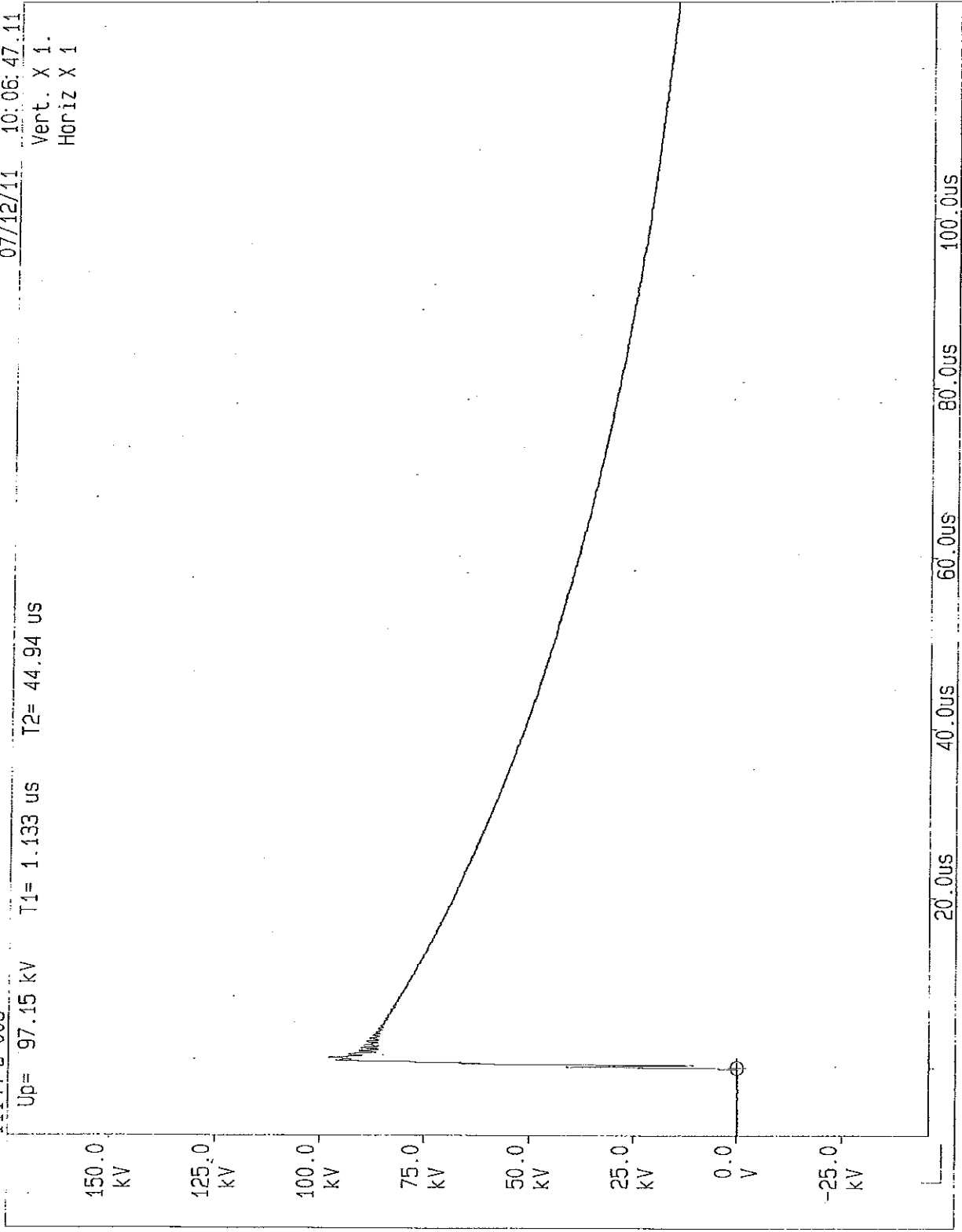
T2= 44.94 us

07/12/11

10:06:47.11

Vert. X 1.

Horiz X 1



11144-D 006

Up= 95.35 kV

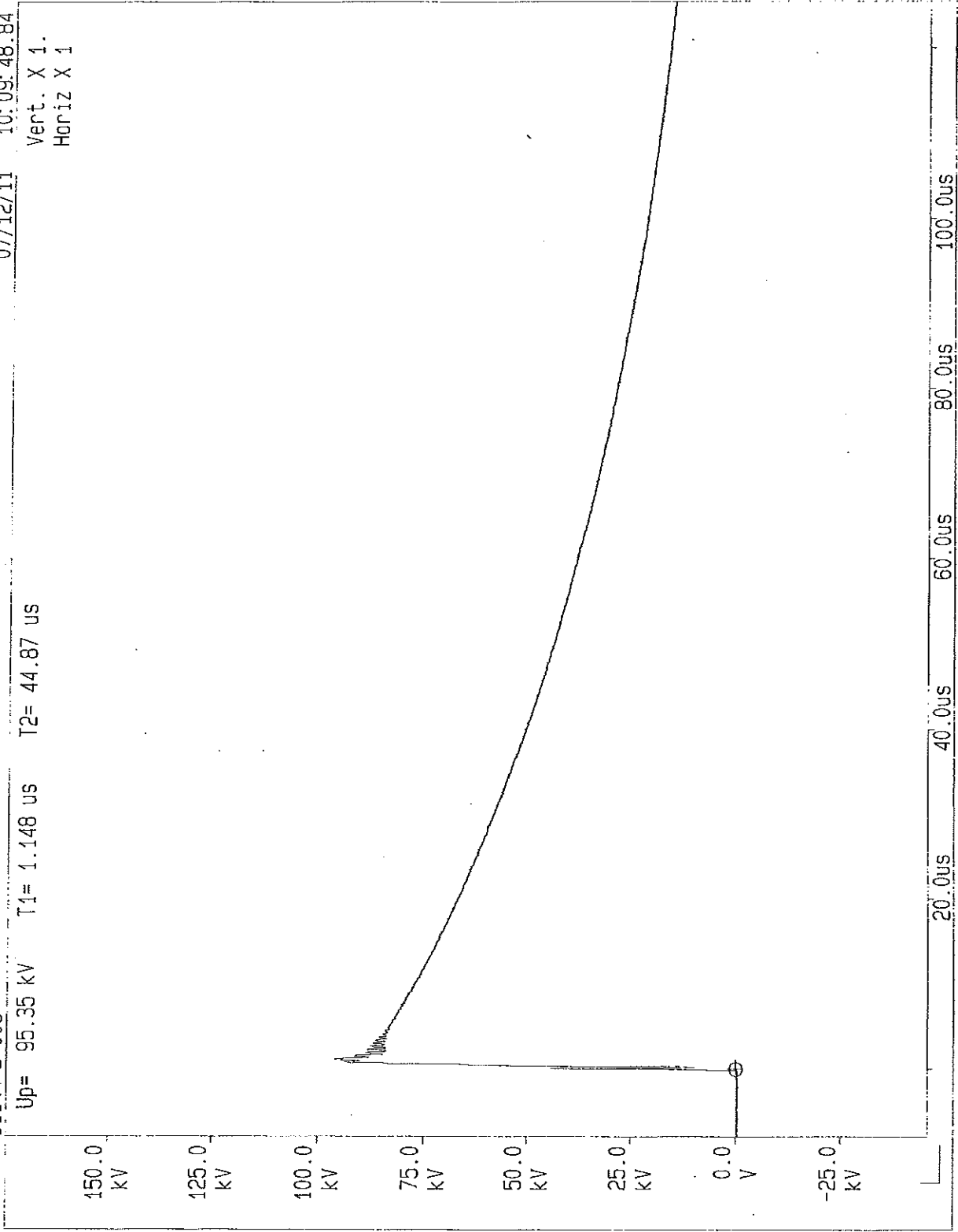
T1= 1.148 us

T2= 44.87 us

07/12/11

10:09:48.84

Vert. X 1.
Horiz X 1



11144-D 007

Up= 95.07 kV

T1= 1.136 us

T2= 44.93 us

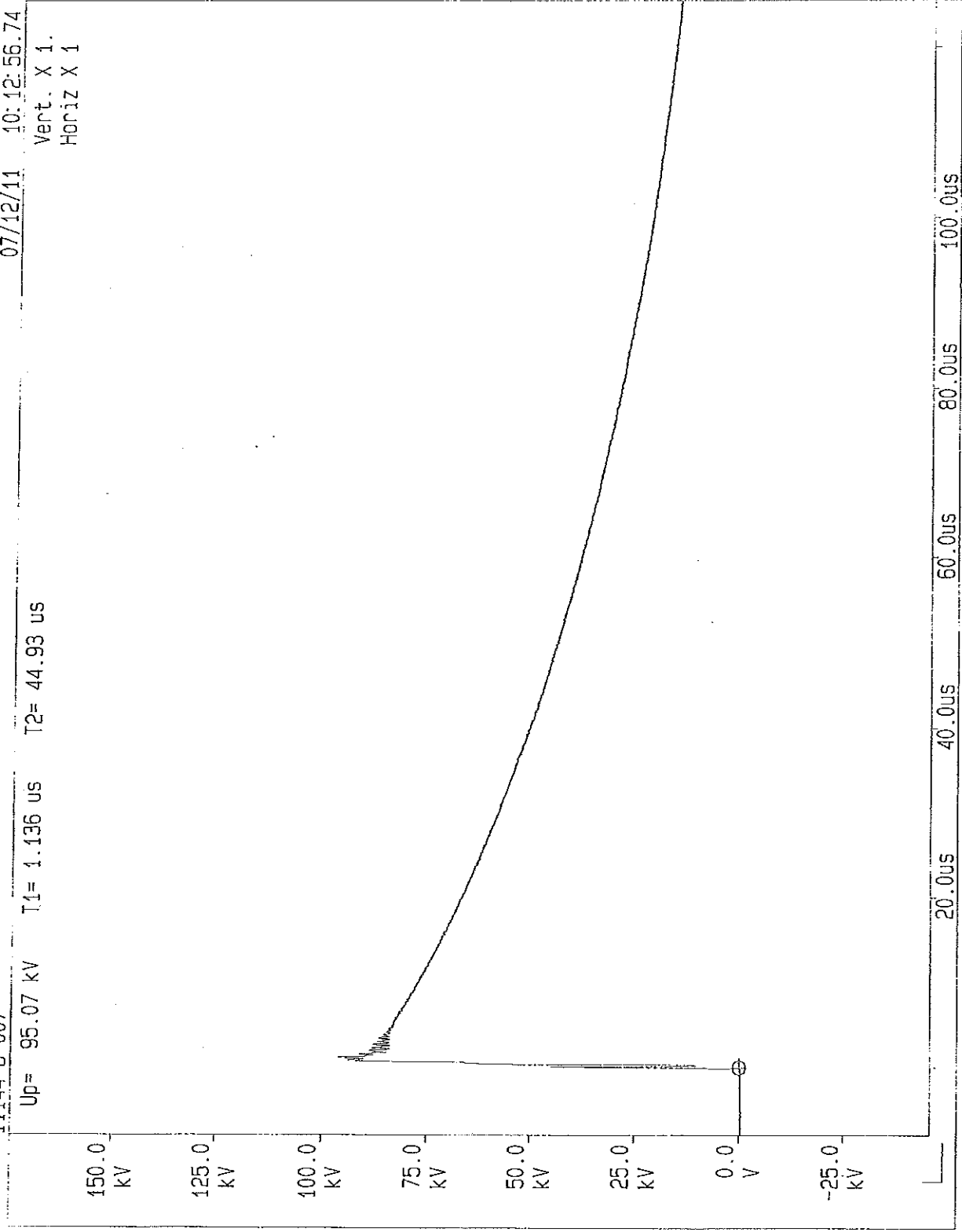
07/12/11

10:12:56.74

Vert. X 1.
Horiz X 1

150.0 kV
125.0 kV
100.0 kV
75.0 kV
50.0 kV
25.0 kV
0.0 V
-25.0 kV

20.0us 40.0us 60.0us 80.0us 100.0us



11144-D 008

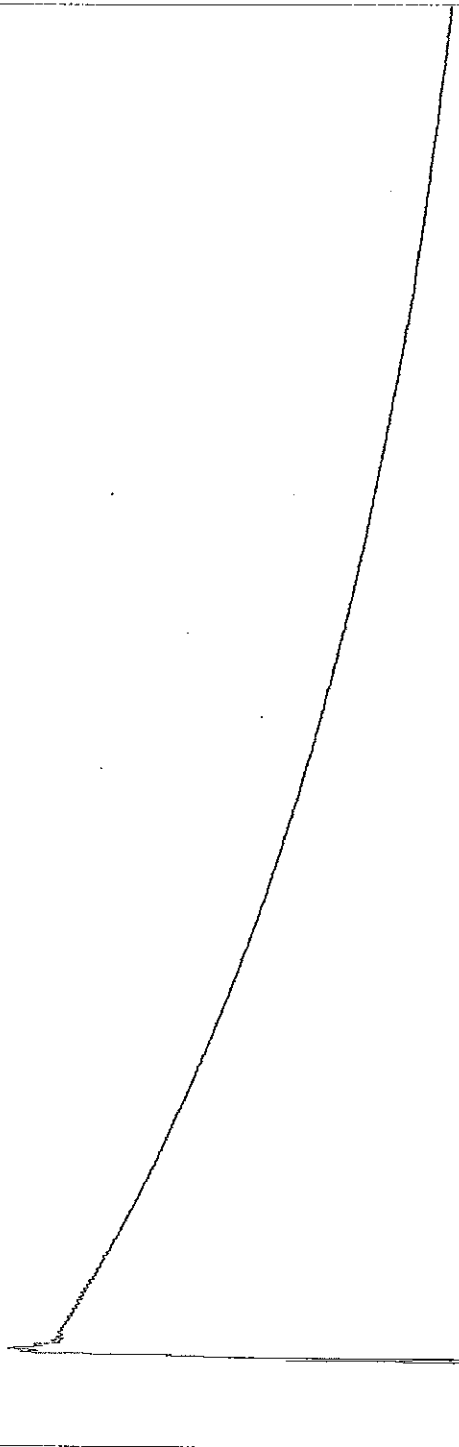
07/12/11 10:15:59.78

Up= 95.97 kV T1= 1.132 us T2= 45.14 us

Vert. X 1.
Horiz X 1

150.0 kV
125.0 kV
100.0 kV
75.0 kV
50.0 kV
25.0 kV
0.0 V
-25.0 kV

20.0us 40.0us 60.0us 80.0us 100.0us

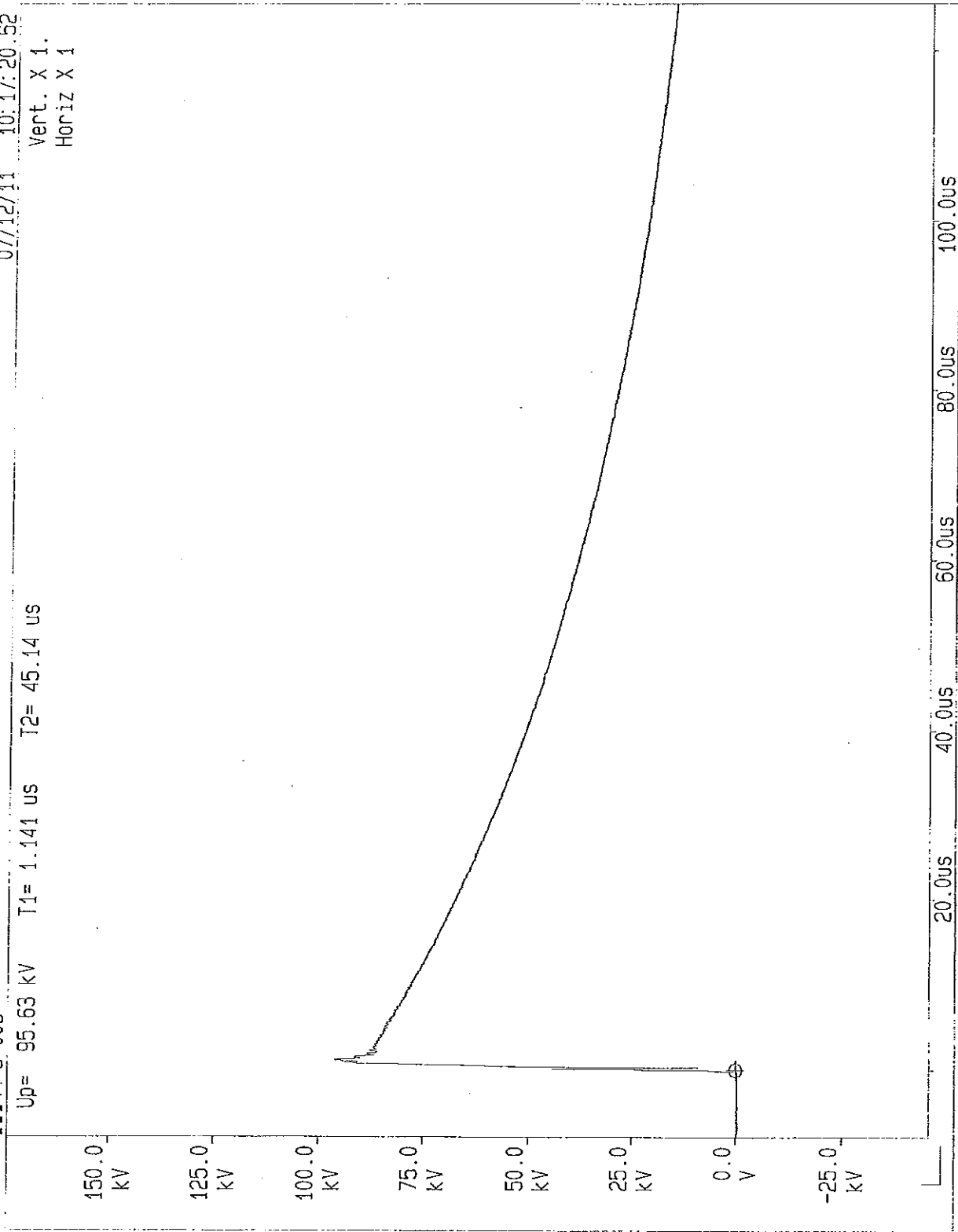


11144-0 009

07/12/11 10:17:20.52

Up= 95.63 kV T1= 1.141 us T2= 45.14 us

Vert. X 1.
Horiz X 1



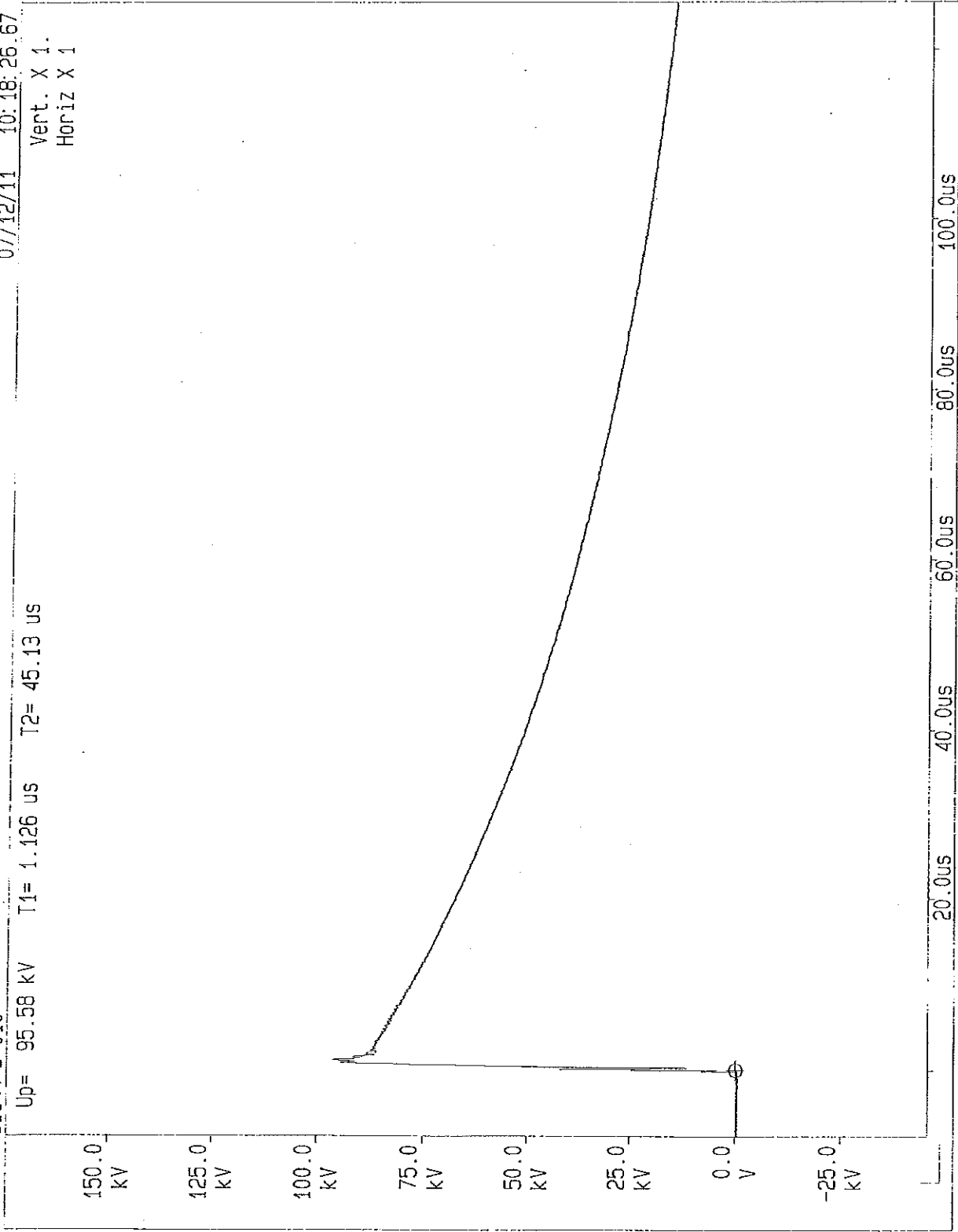
20.0us 40.0us 60.0us 80.0us 100.0us

11144-D 010

07/12/11 10:18:26.67

Up= 95.58 kV T1= 1.126 us T2= 45.13 us

Vert. X 1.
Horiz X 1

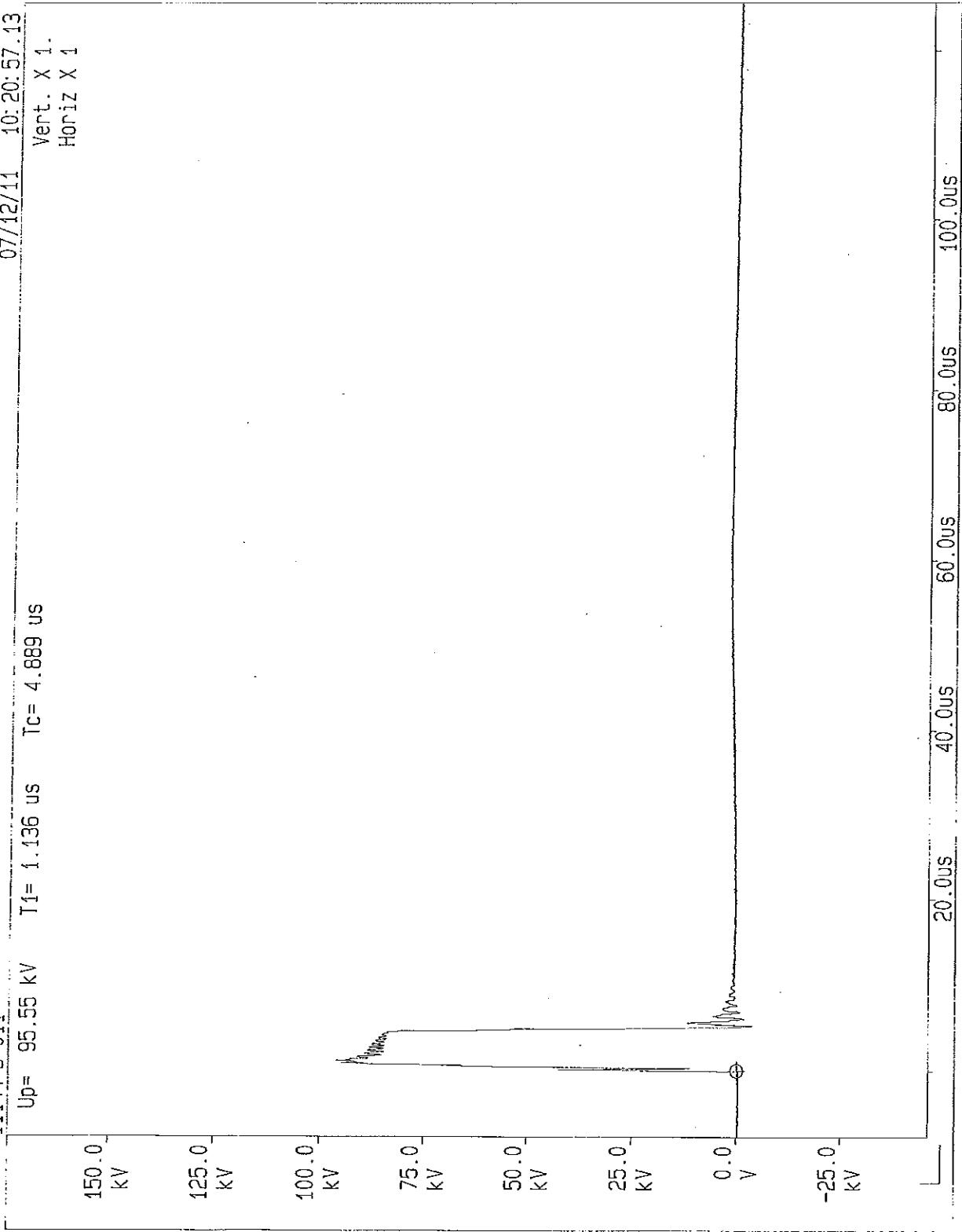


11144-D 011

07/12/11 10:20:57.13

Up= 95.55 kV T1= 1.136 us Tc= 4.889 us

Vert. X 1.
Horiz X 1

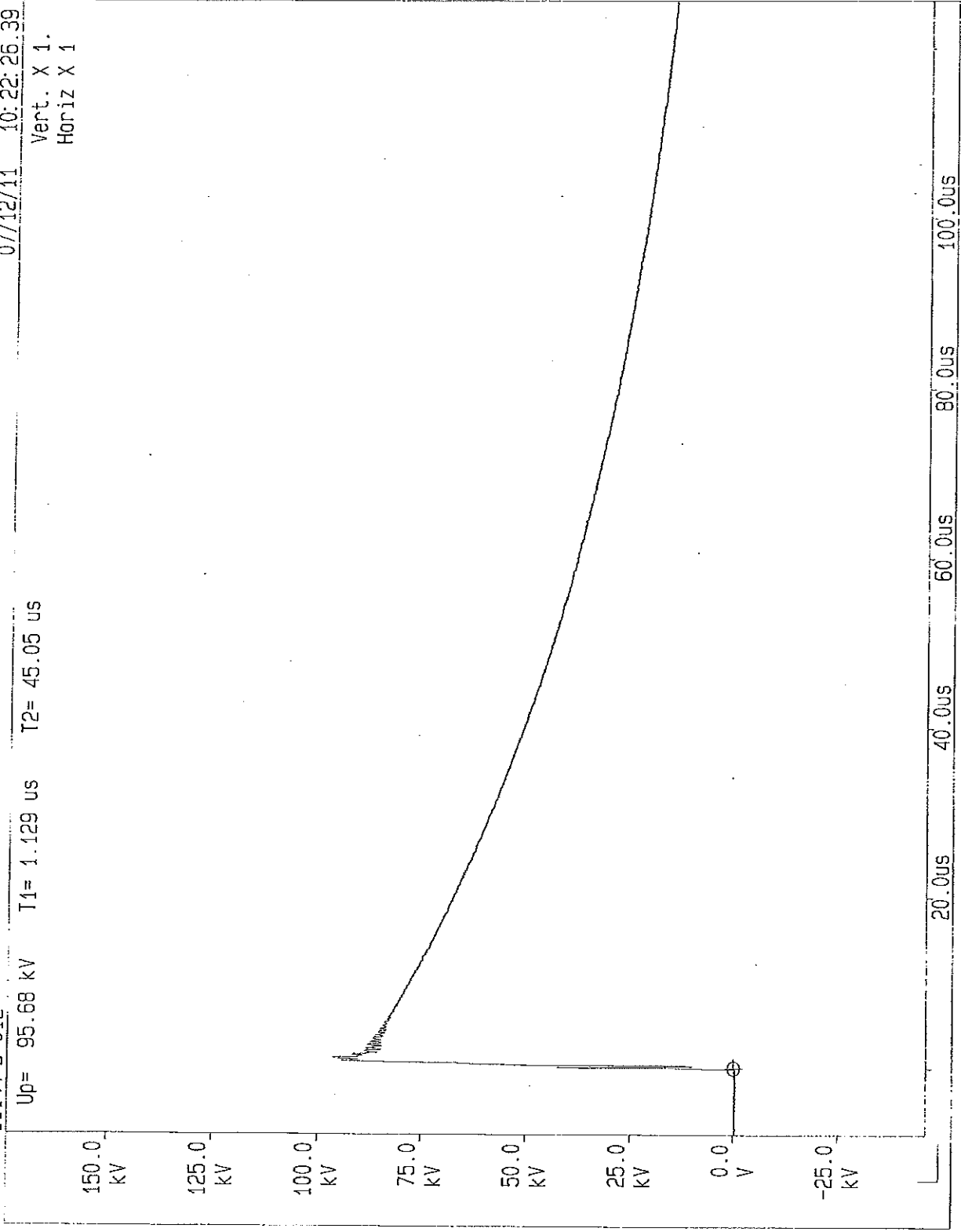


11144-D 012

07/12/11 10:22:26.39

Up= 95.68 kV T1= 1.129 us T2= 45.05 us

Vert. X 1.
Horiz X 1



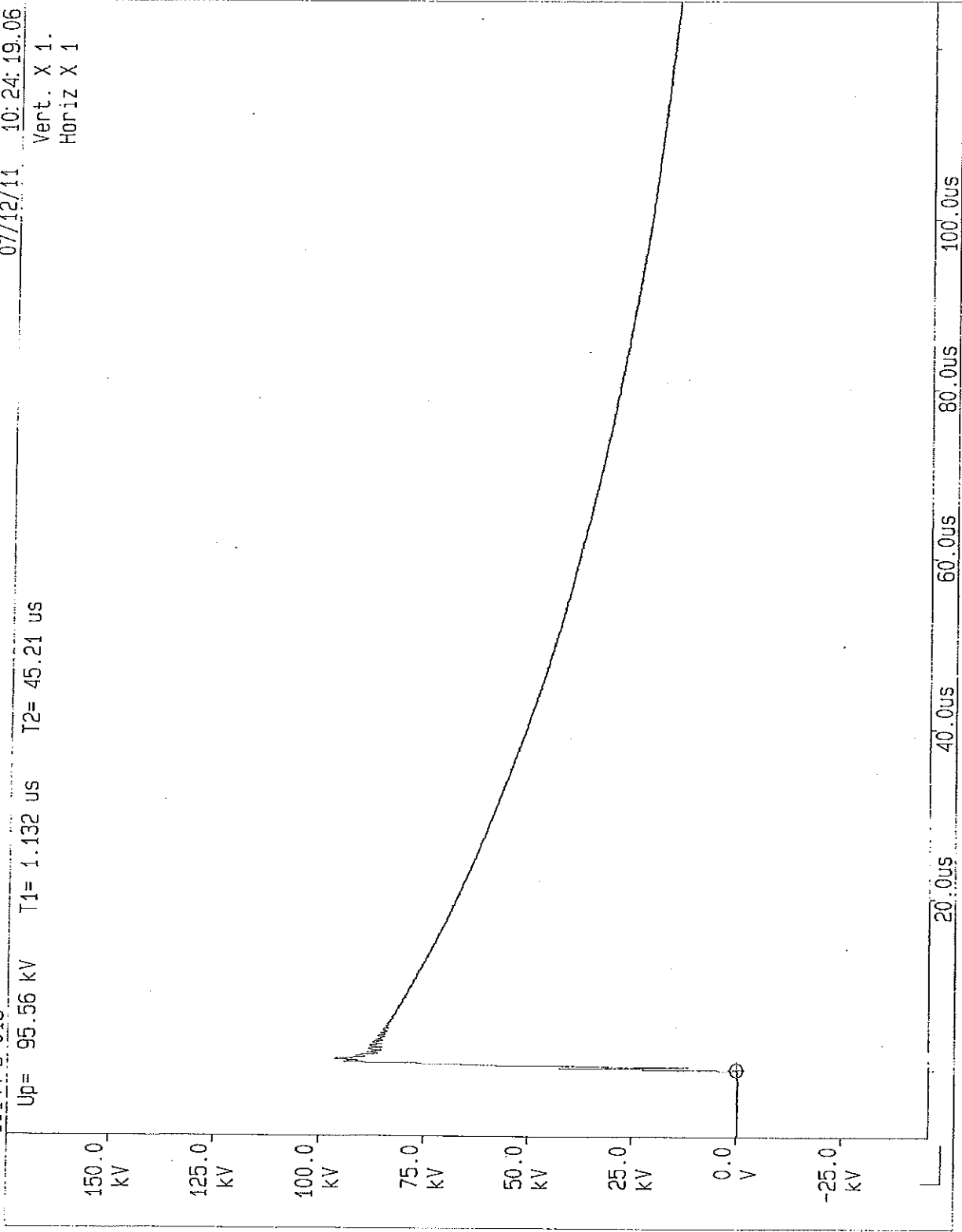
11144-D 013

Up= 95.56 kV T1= 1.132 us T2= 45.21 us

07/12/11

10:24:19.06

Vert. X 1.
Horiz X 1

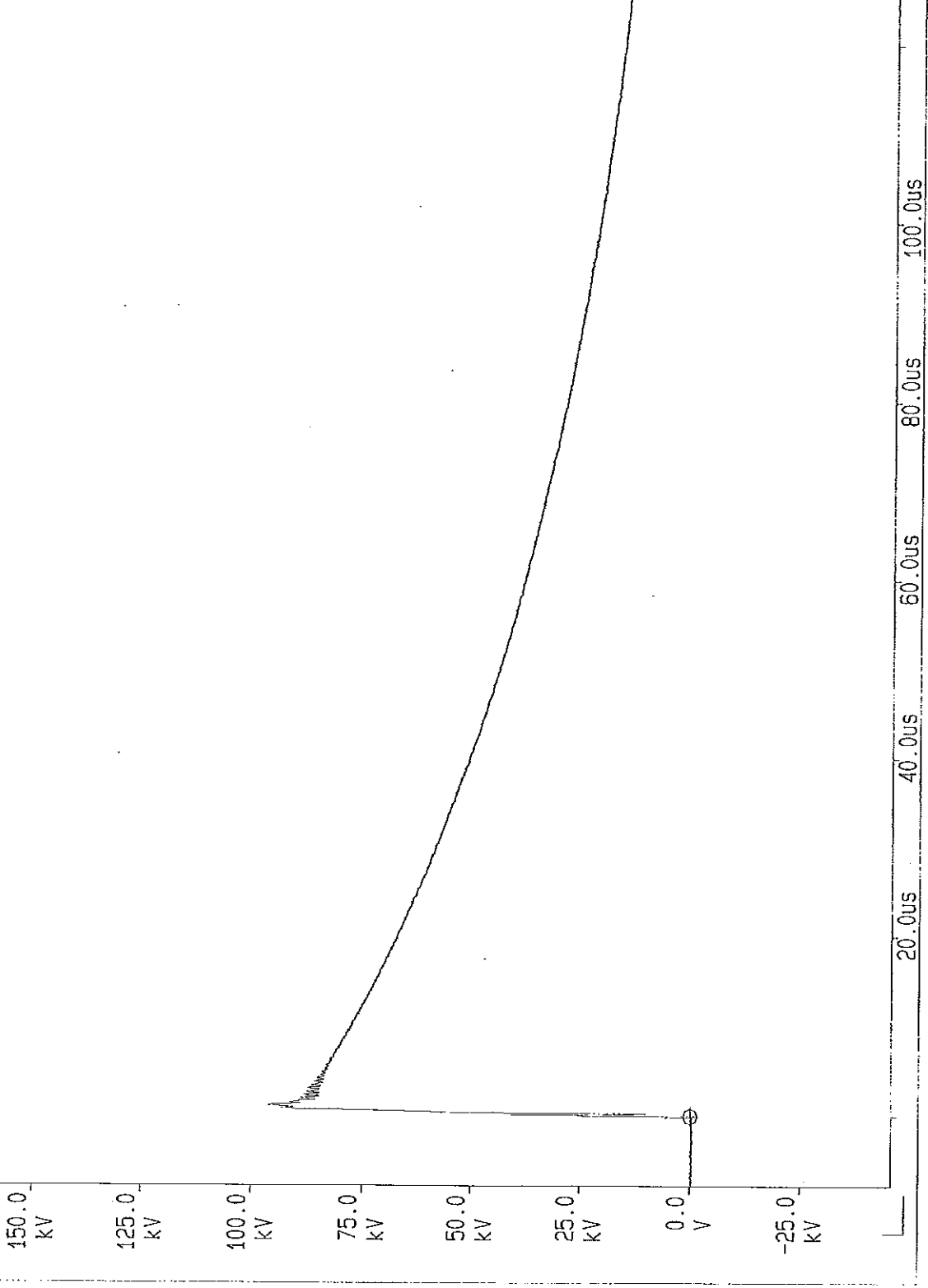


11144-D 014

07/12/11 10:25:39.54

Up= 95.47 kV T1= 1.140 us T2= 45.12 us

Vert. X 1.
Horiz X 1



11144-D 015

Up= 95.43 kV

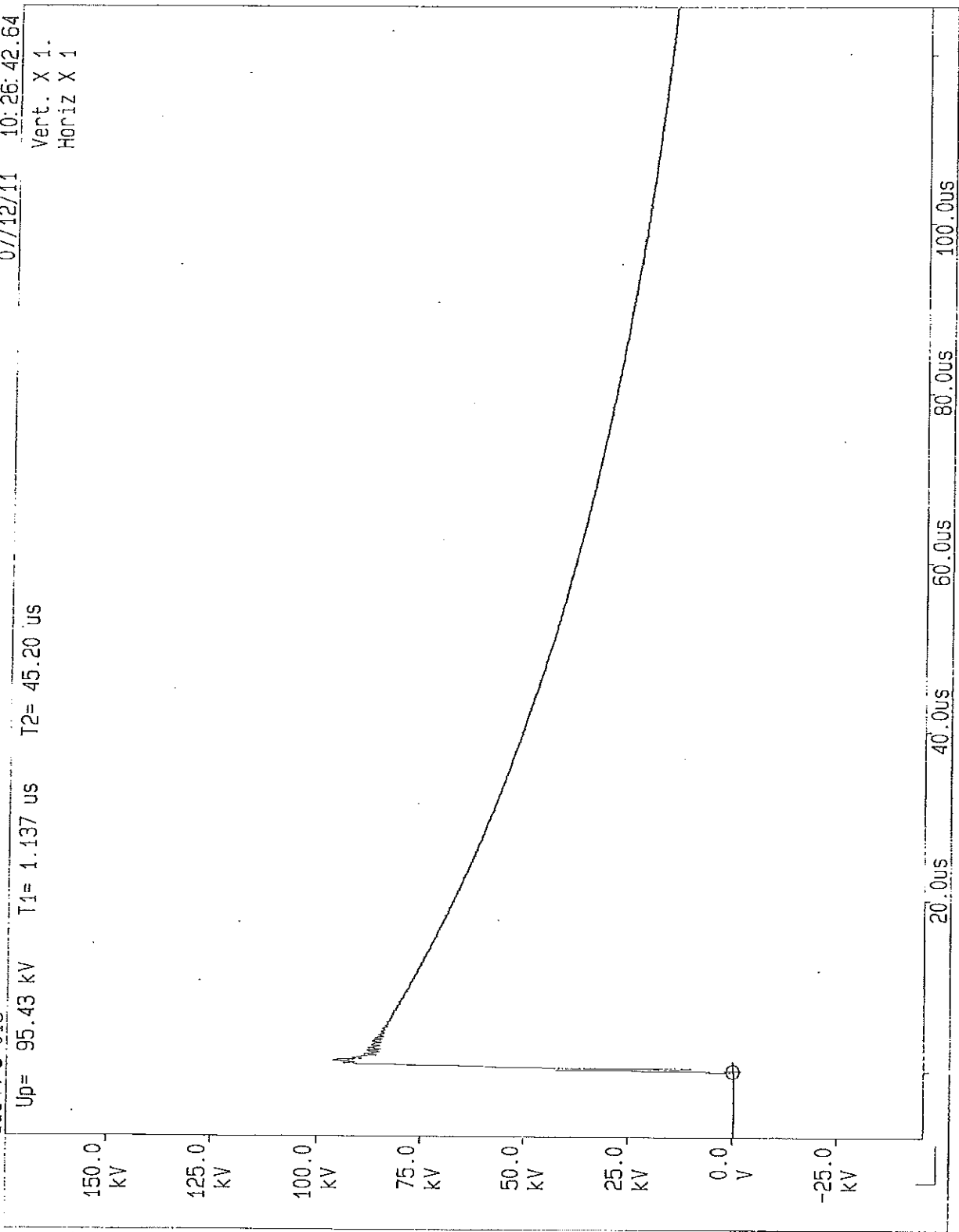
T1= 1.137 us

T2= 45.20 us

07/12/11

10:26:42.64

Vert. X 1.
Horiz X 1

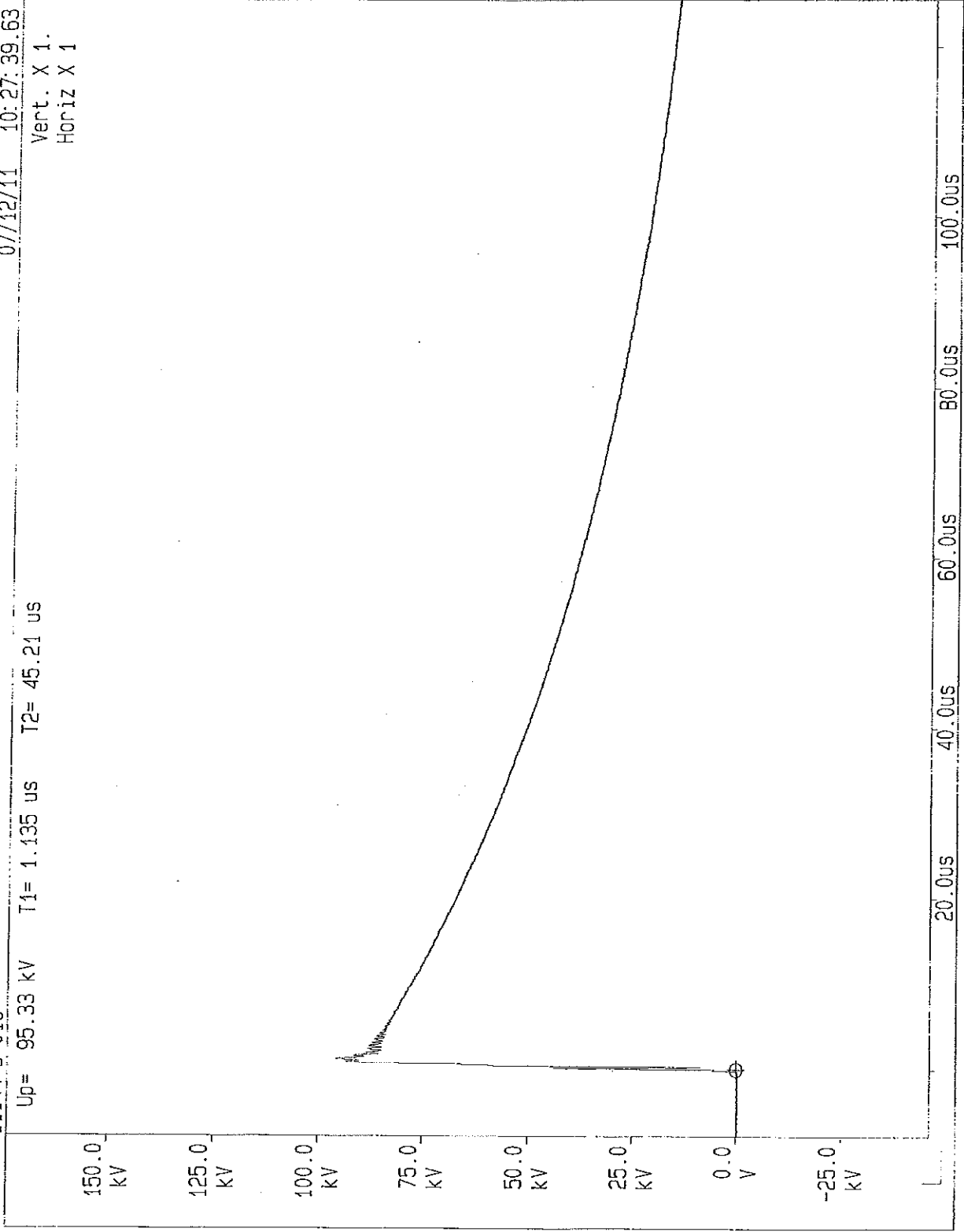


11144-D_016

07/12/11 10:27:39.63

Up= 95.33 kV T1= 1.135 us T2= 45.21 us

Vert. X 1.
Horiz X 1

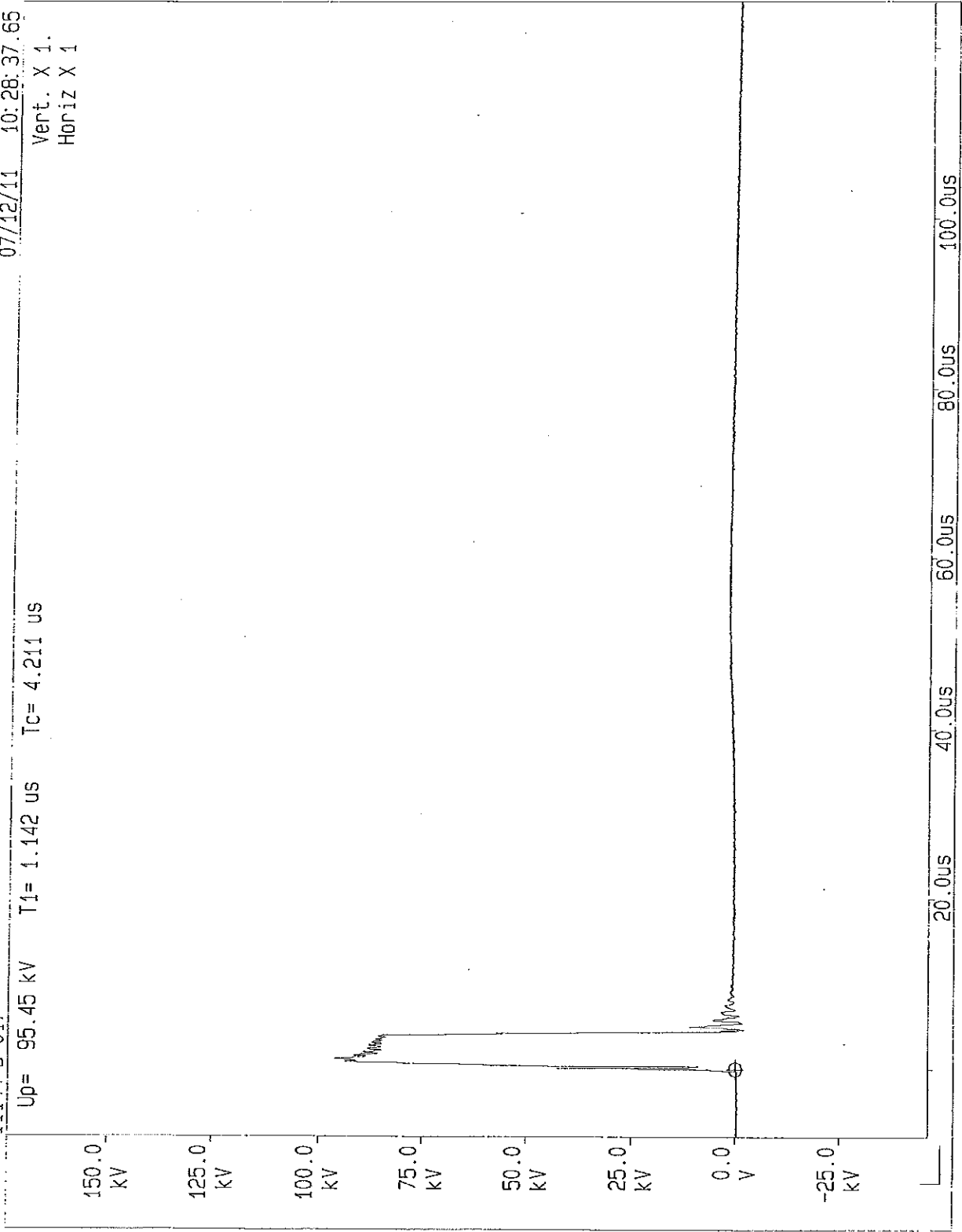


11144-D 017

07/12/11 10:28:37.65

Up= 95.45 kV T1= 1.142 US Tc= 4.211 US

Vert. X 1.
Horiz X 1

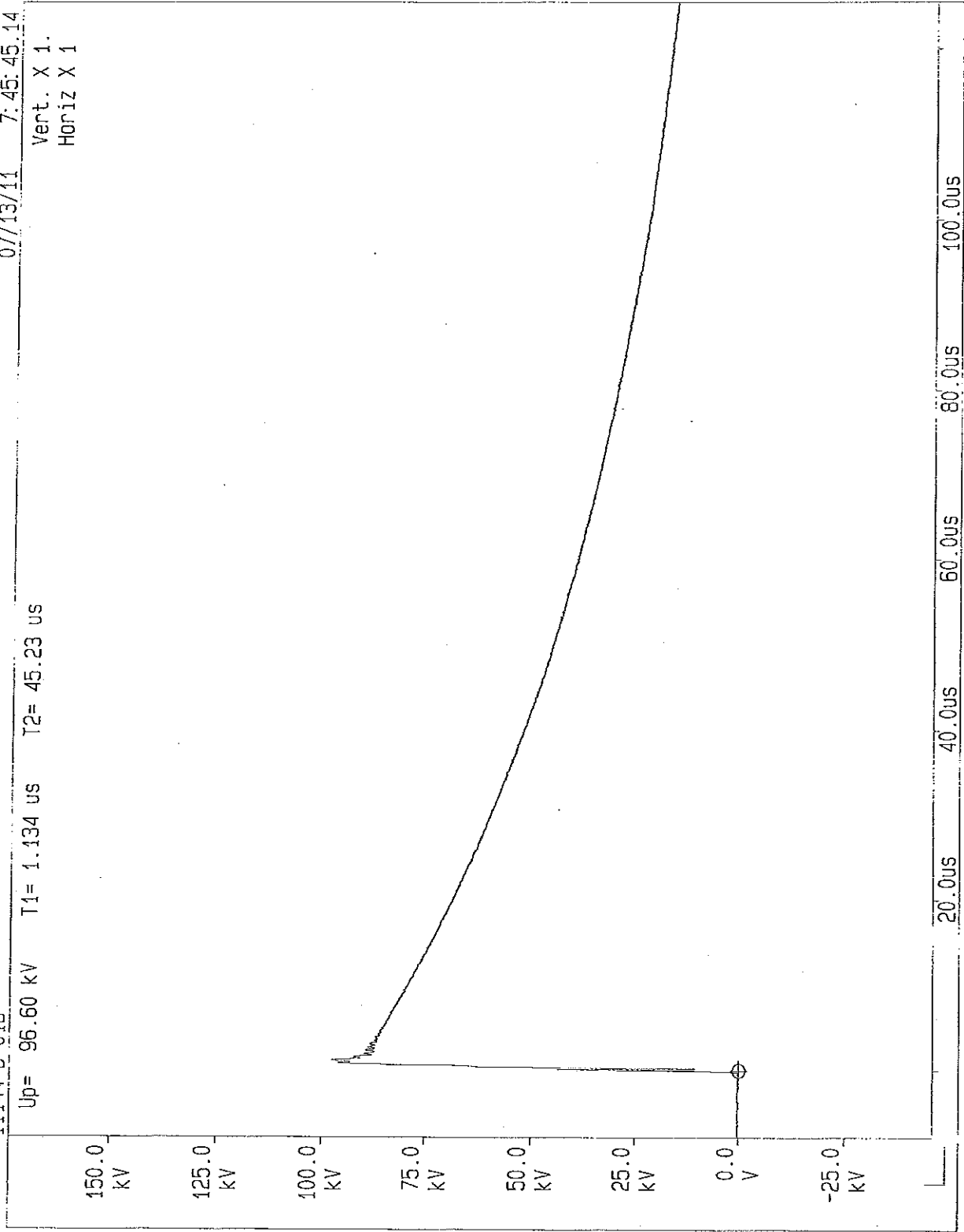


11144-D 01B

07/13/11 7:45:45.14

Up= 96.60 kV T1= 1.134 us T2= 45.23 us

Vert. X 1.
Horiz X 1



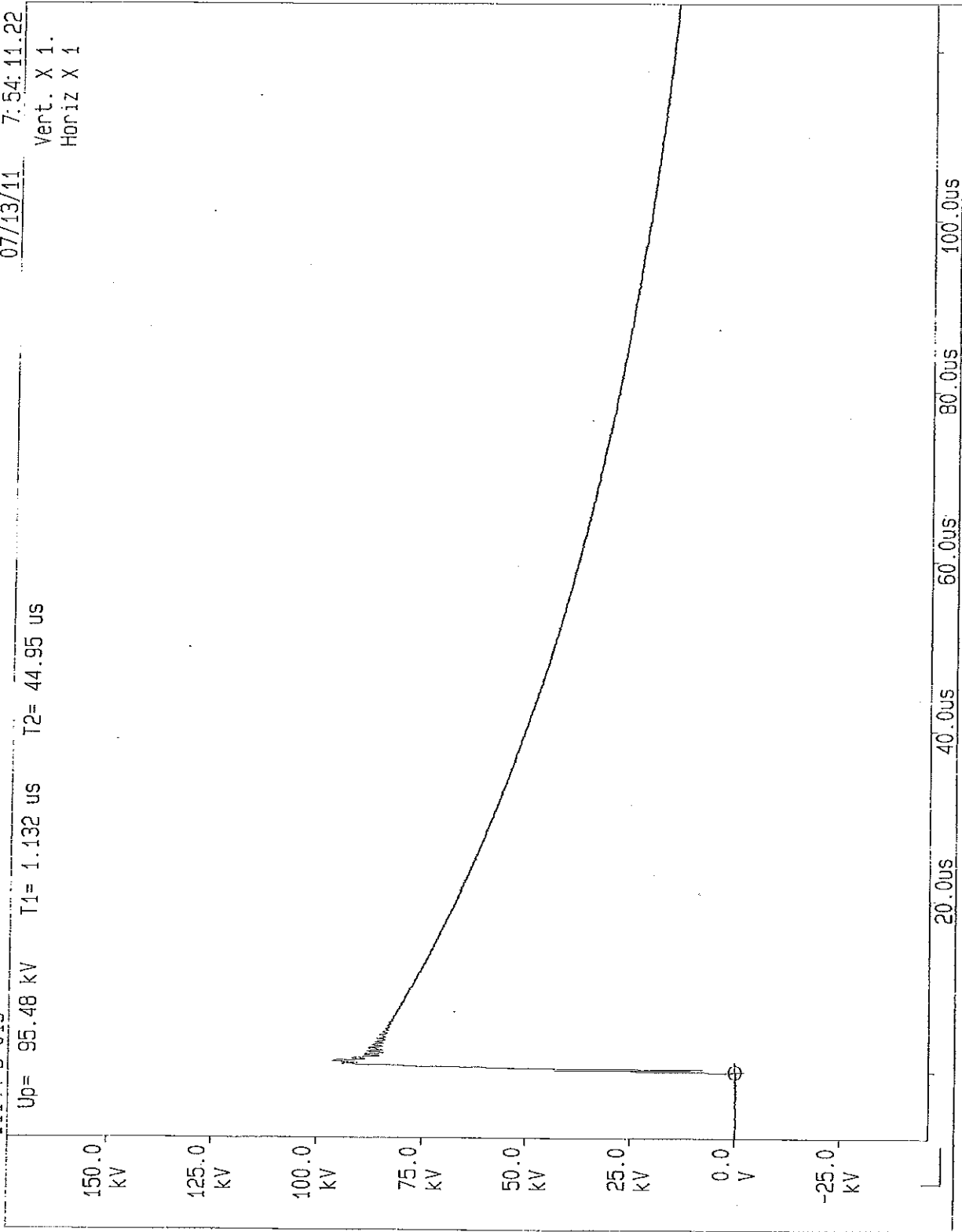
11144-D 019

07/13/11

7:54:11.22

Up= 95.48 kV T1= 1.132 us T2= 44.95 us

Vert. X 1.
Horiz X 1



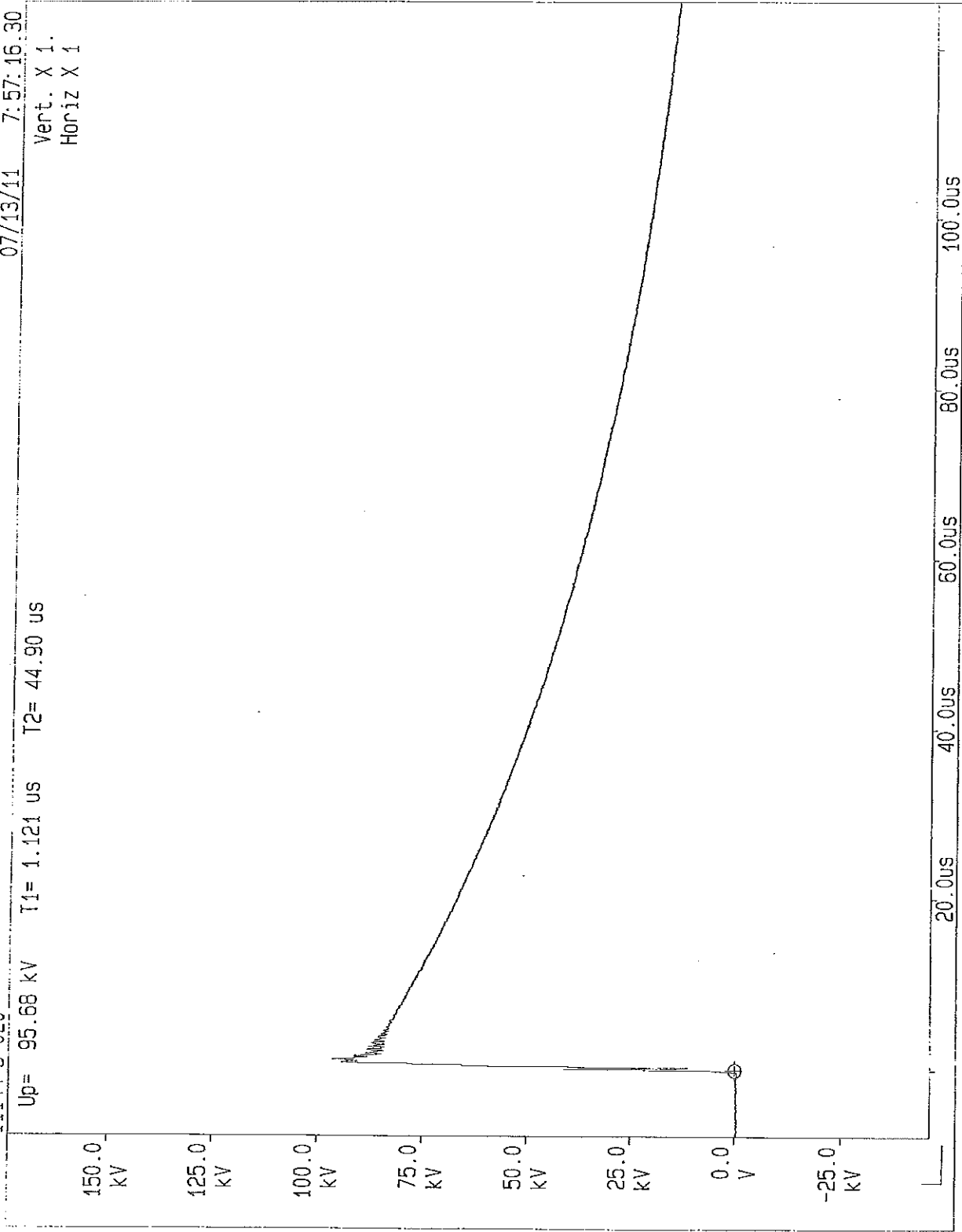
11144-D 020

07/13/11

7:57:16.30

Up= 95.68 kV T1= 1.121 us T2= 44.90 us

Vert. X 1.
Horiz X 1



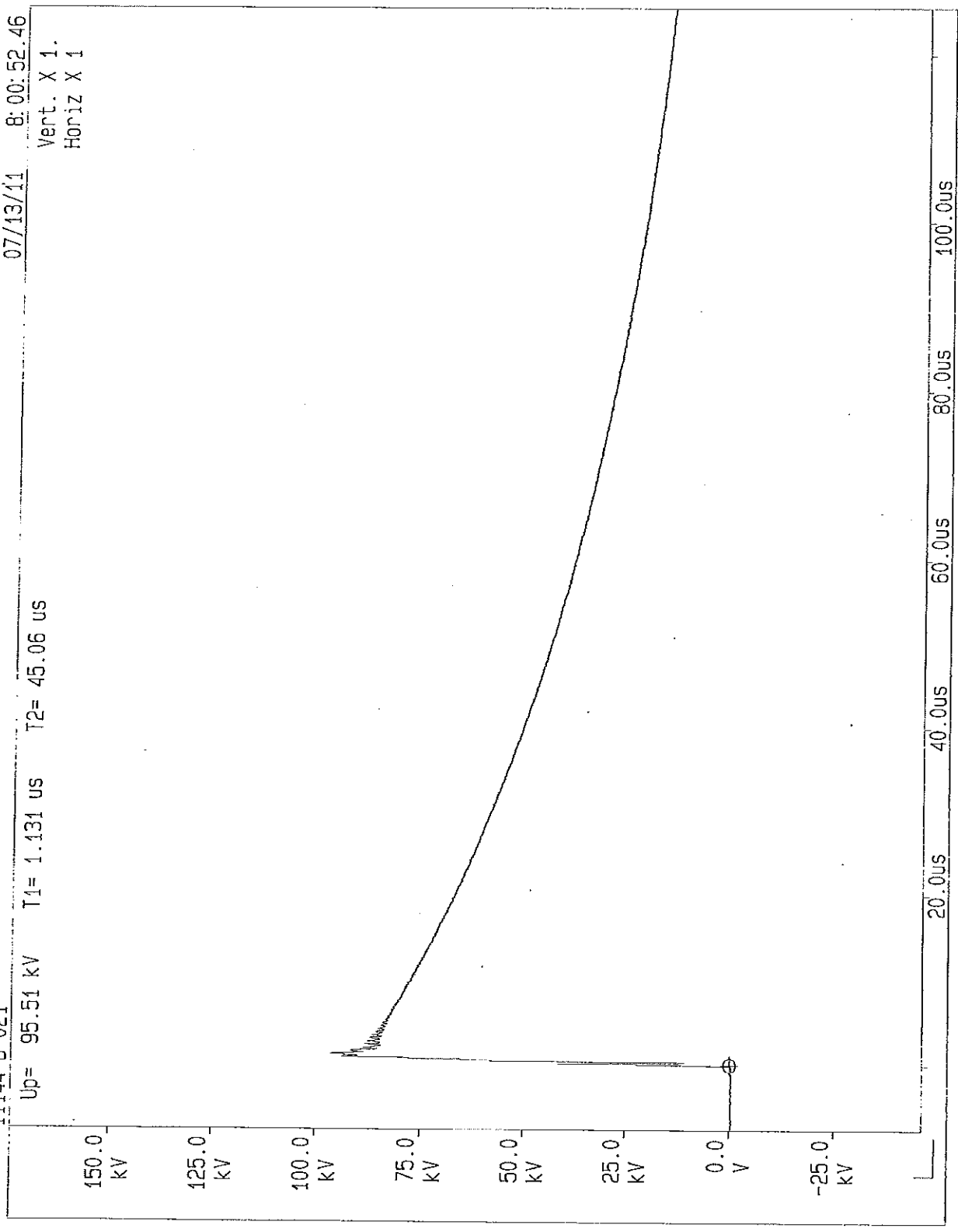
11144-D_021

07/13/11

8:00:52.46

Up= 95.51 kV T1= 1.131 us T2= 45.06 us

Vert. X 1.
Horiz X 1

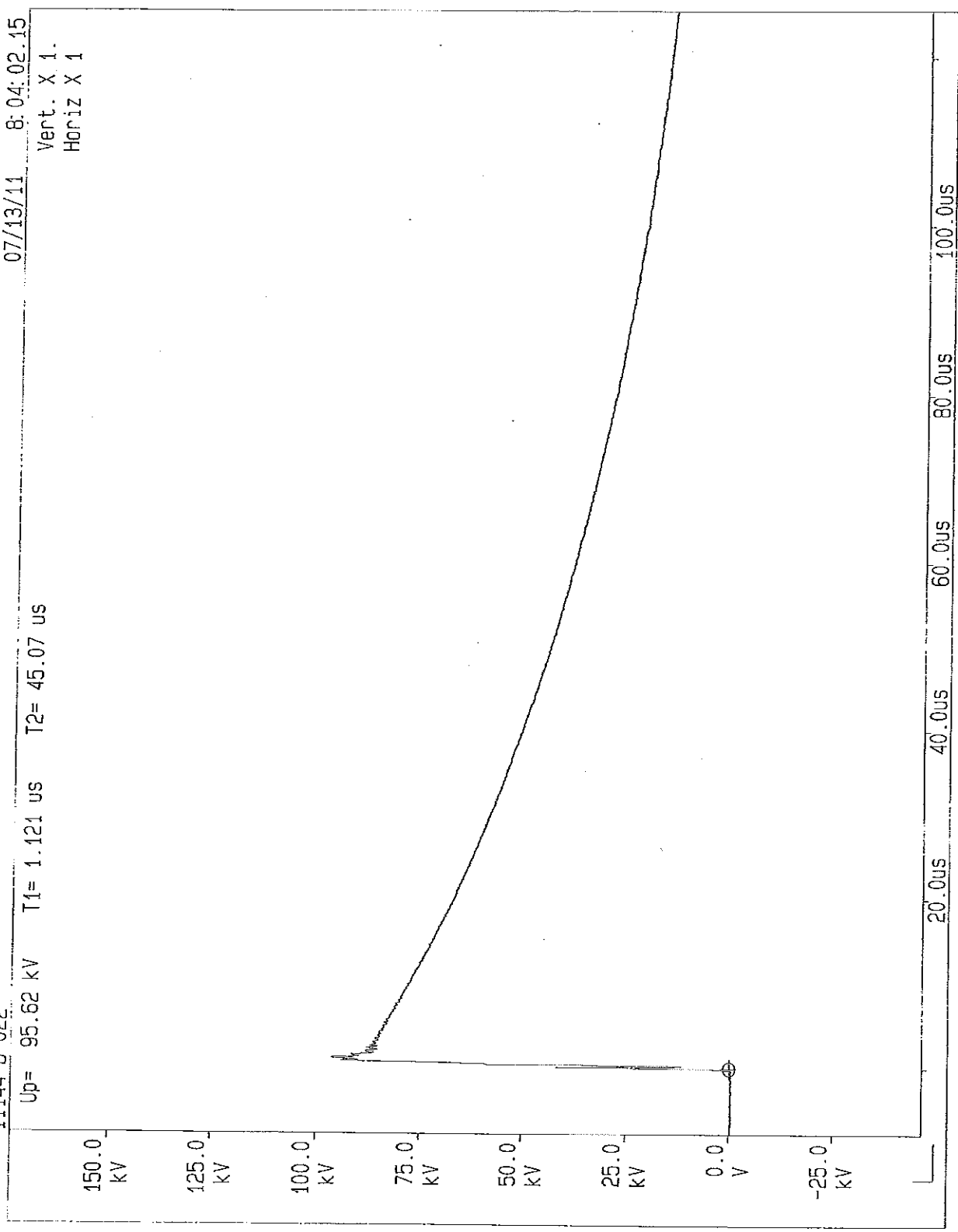


11144-D 022

07/13/11 8:04:02.15

Up= 95.62 kV T1= 1.121 us T2= 45.07 us

Vert. X 1.
Horiz X 1



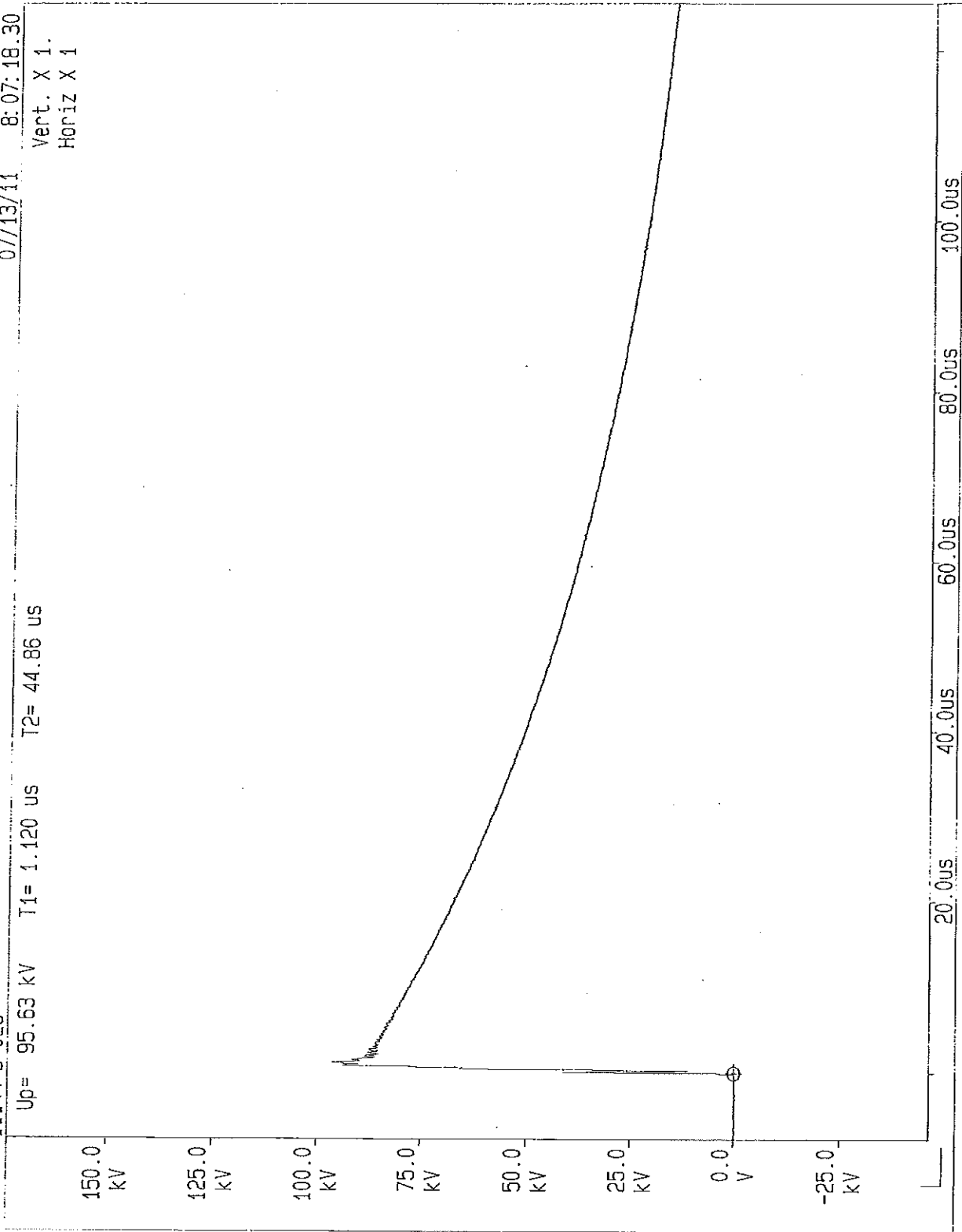
11144-D_023

07/13/11

8:07:18.30

Up= 95.63 kV T1= 1.120 us T2= 44.86 us

Vert. X 1.
Horiz X 1



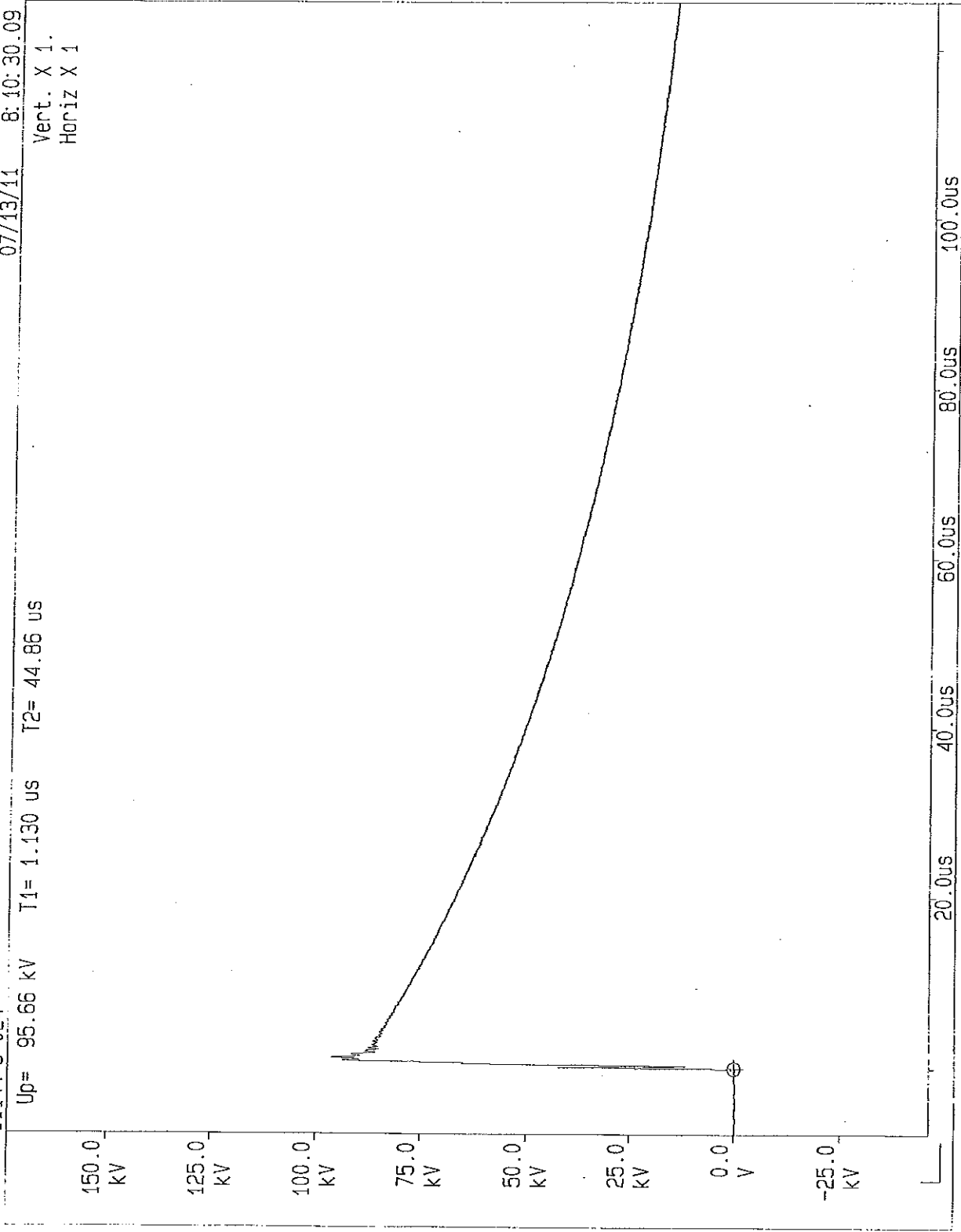
11144-D 024

07/13/11

8:10:30.09

Up= 95.66 kV T1= 1.130 US T2= 44.86 US

Vert. X 1.
Horiz X 1



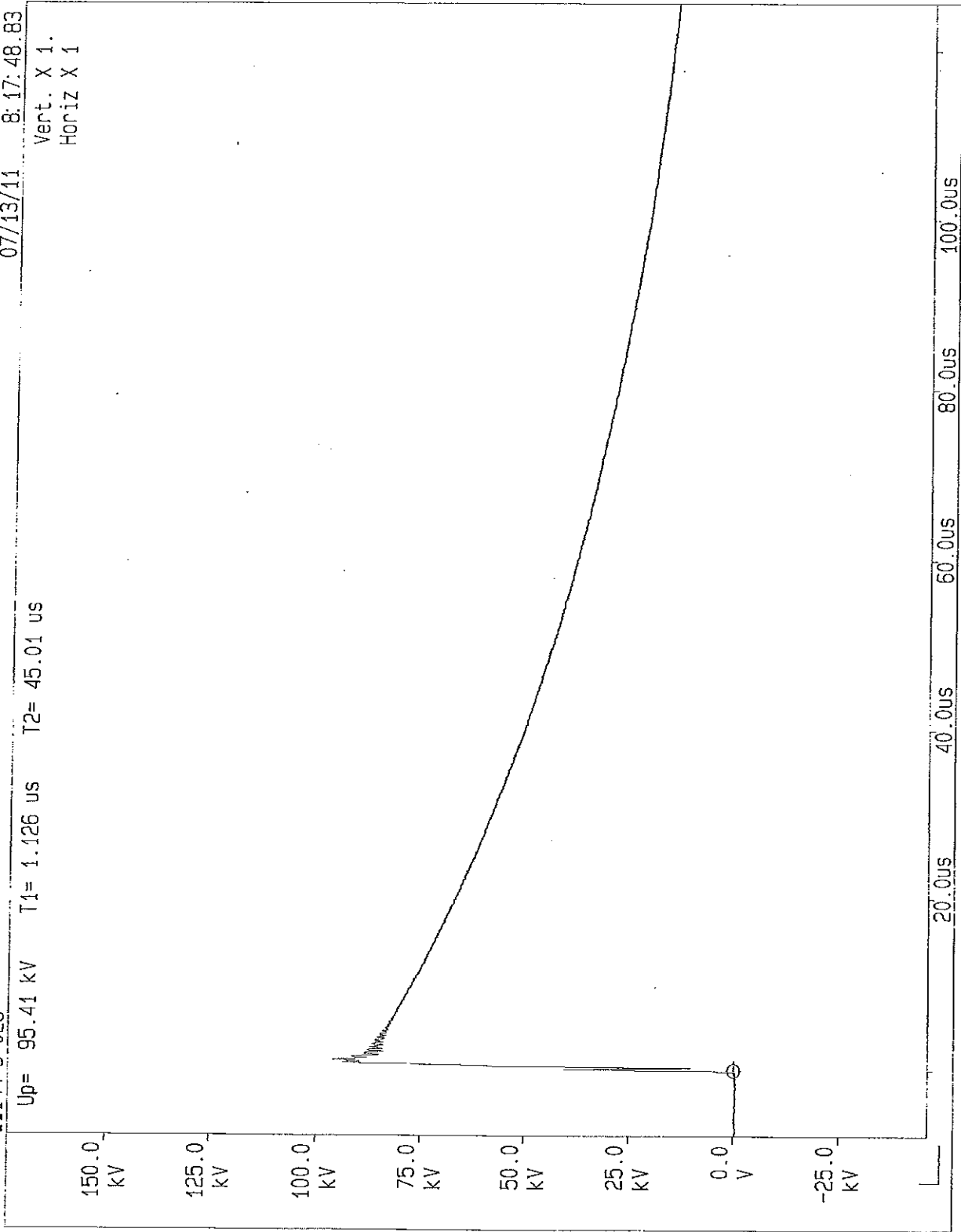
11144-D 025

07/13/11

8:17:48.83

Up= 95.41 kV T1= 1.126 us T2= 45.01 us

Vert. X 1.
Horiz X 1



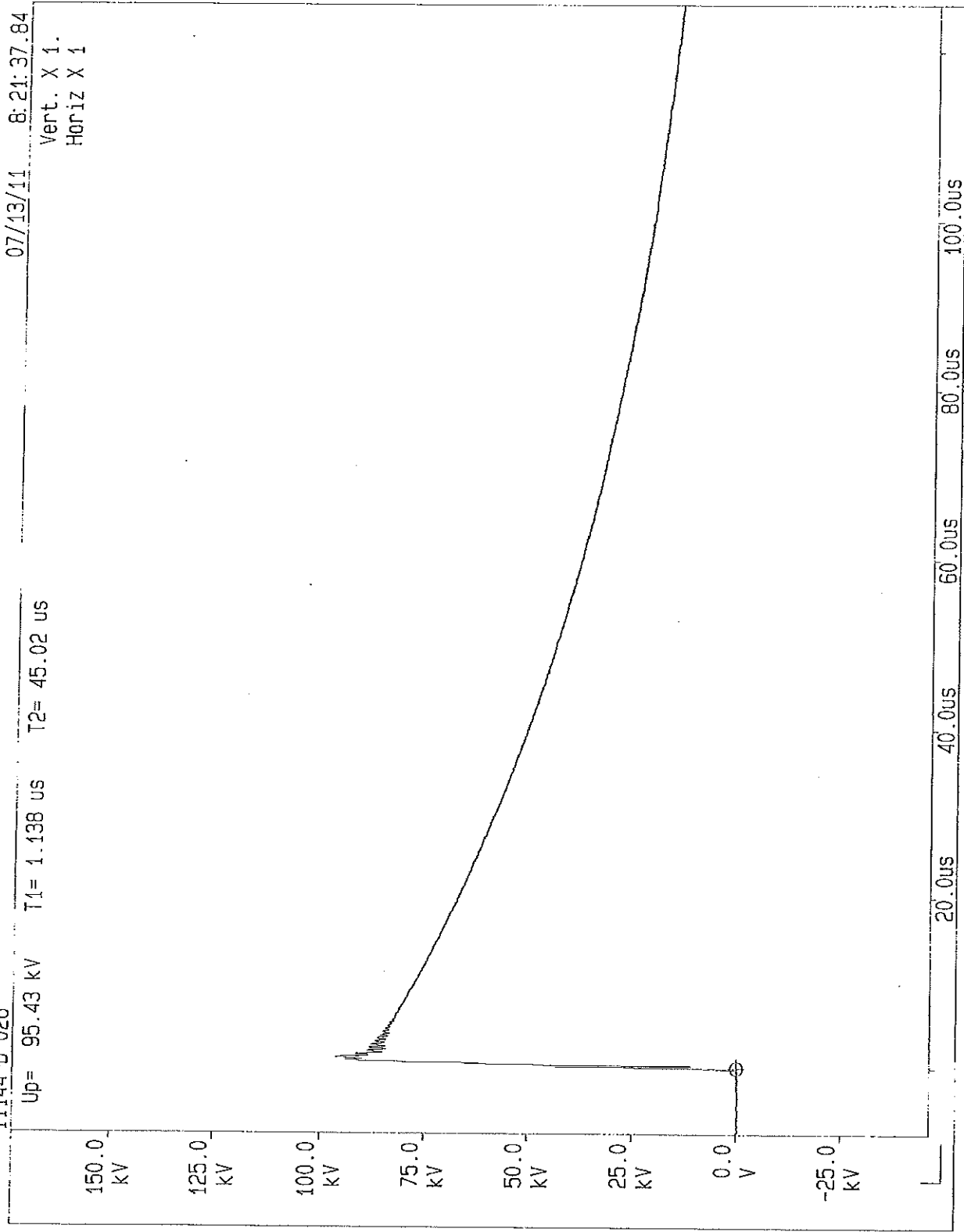
11144-D 026

Up= 95.43 kV T1= 1.138 us T2= 45.02 us

07/13/11

8:21:37.84

Vert. X 1.
Horiz X 1



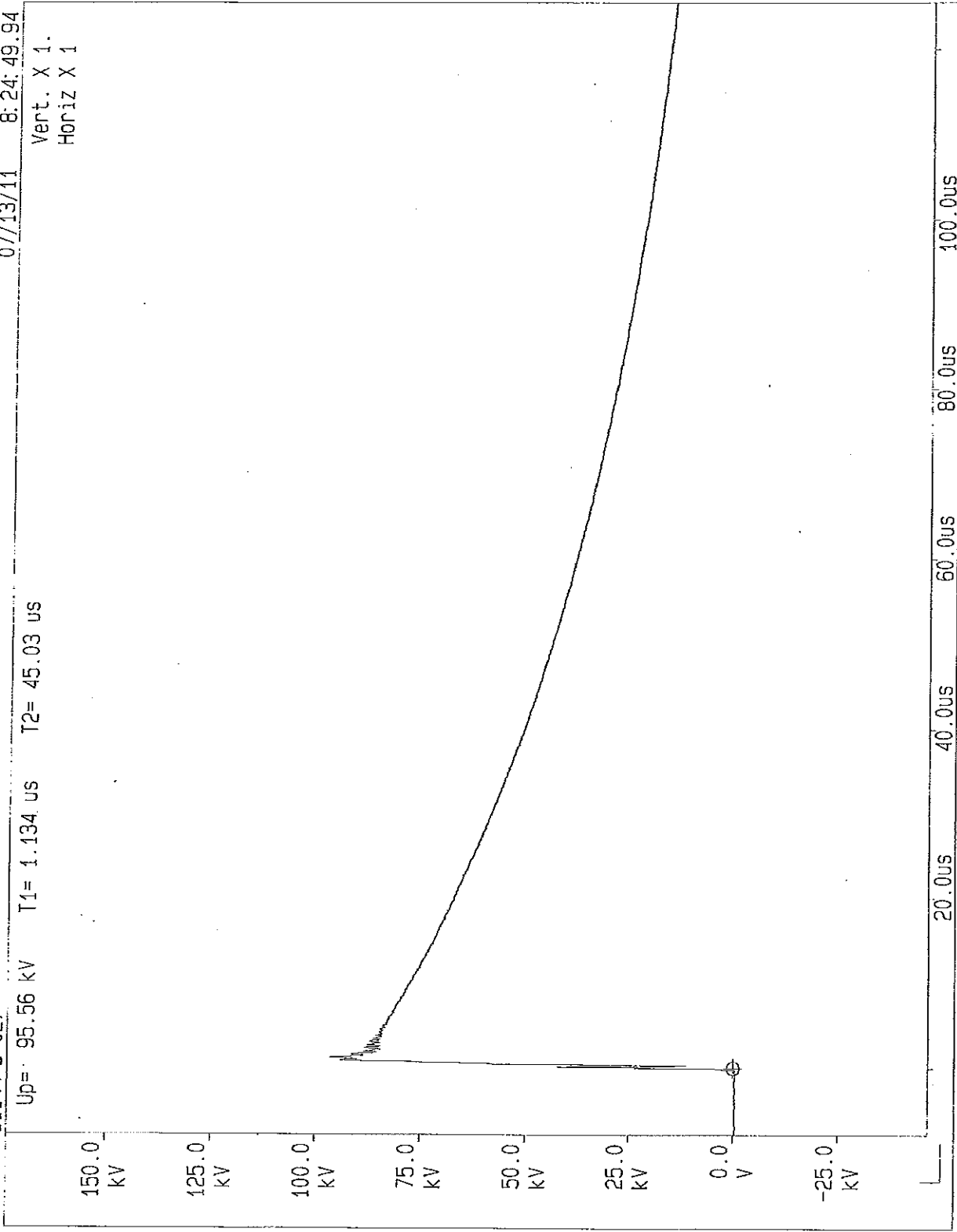
20.0us 40.0us 60.0us 80.0us 100.0us

11144-D 027

07/13/11 8:24:49.94

Up= 95.56 kV T1= 1.134 us T2= 45.03 us

Vert. X 1.
Horiz X 1



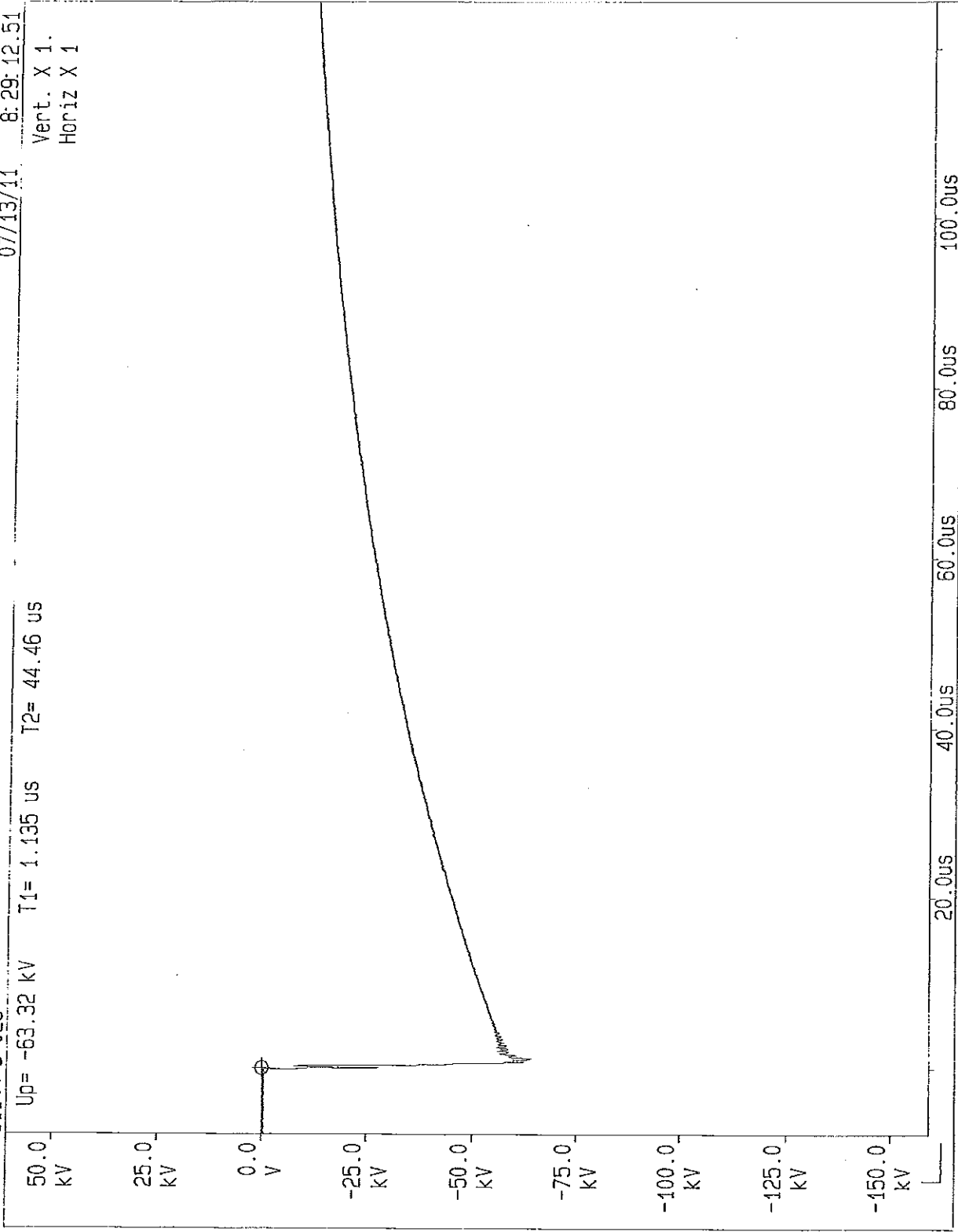
11144-D_028

07/13/11

8:29:12.51

Up= -63.32 kV T1= 1.135 us T2= 44.46 us

Vert. X 1.
Horiz X 1

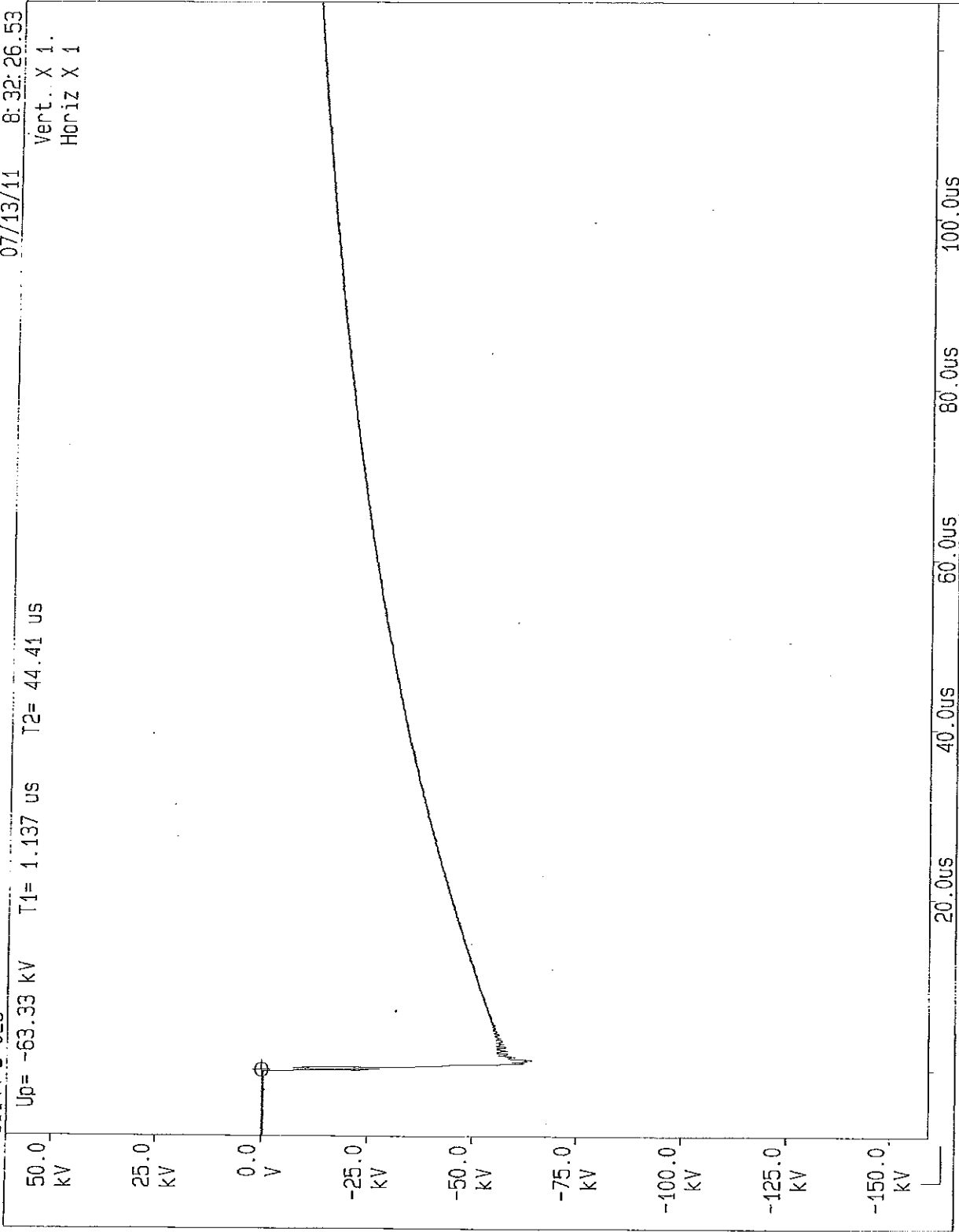


11144-D 029

Up= -63.33 kV T1= 1.137 us T2= 44.41 us

07/13/11 8:32:26.53

Vert. X 1.
Horiz X 1



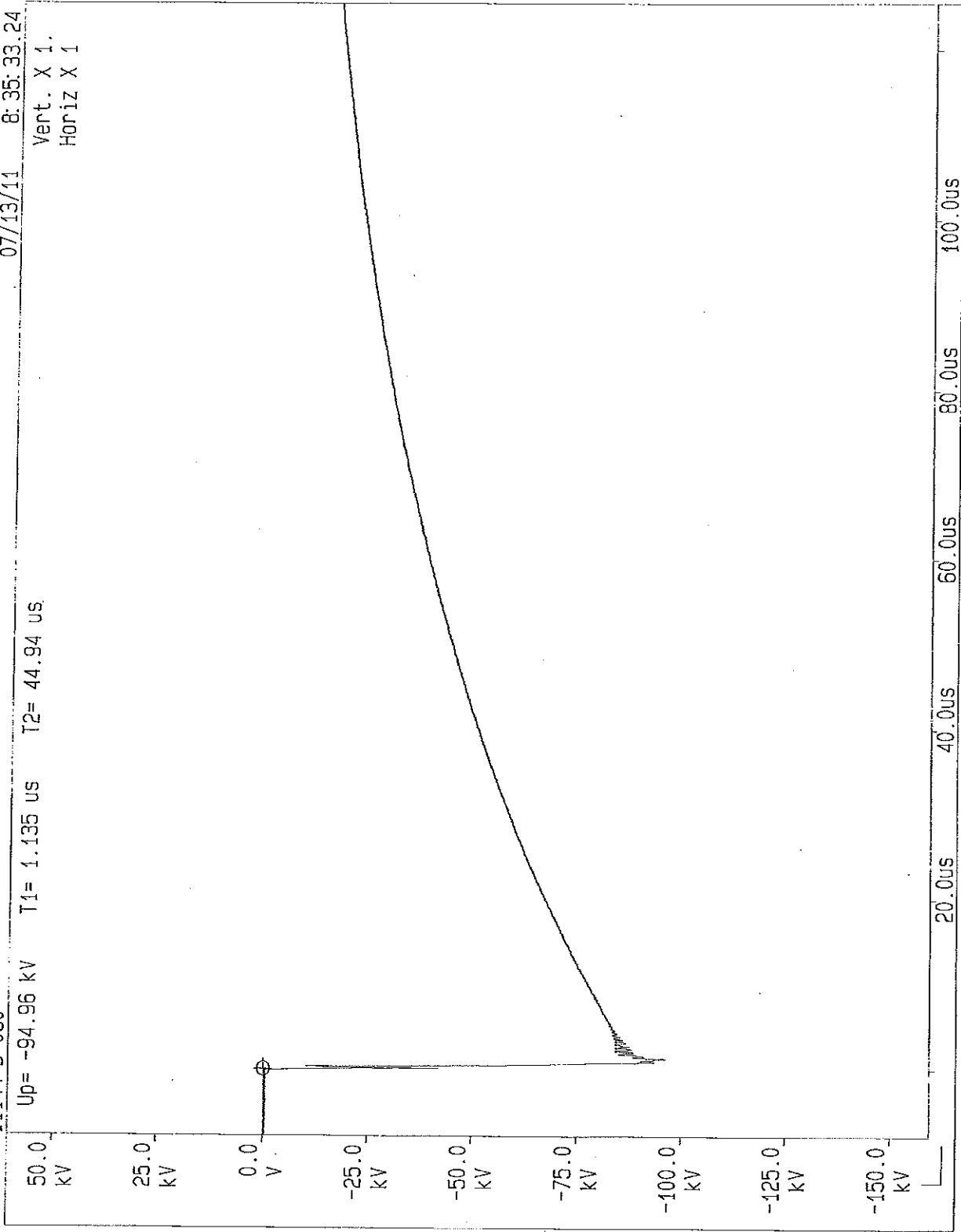
11144-D 030

07/13/11

8:35:33.24

Up= -94.96 kV T1= 1.135 us T2= 44.94 us

Vert. X 1.
Horiz X 1

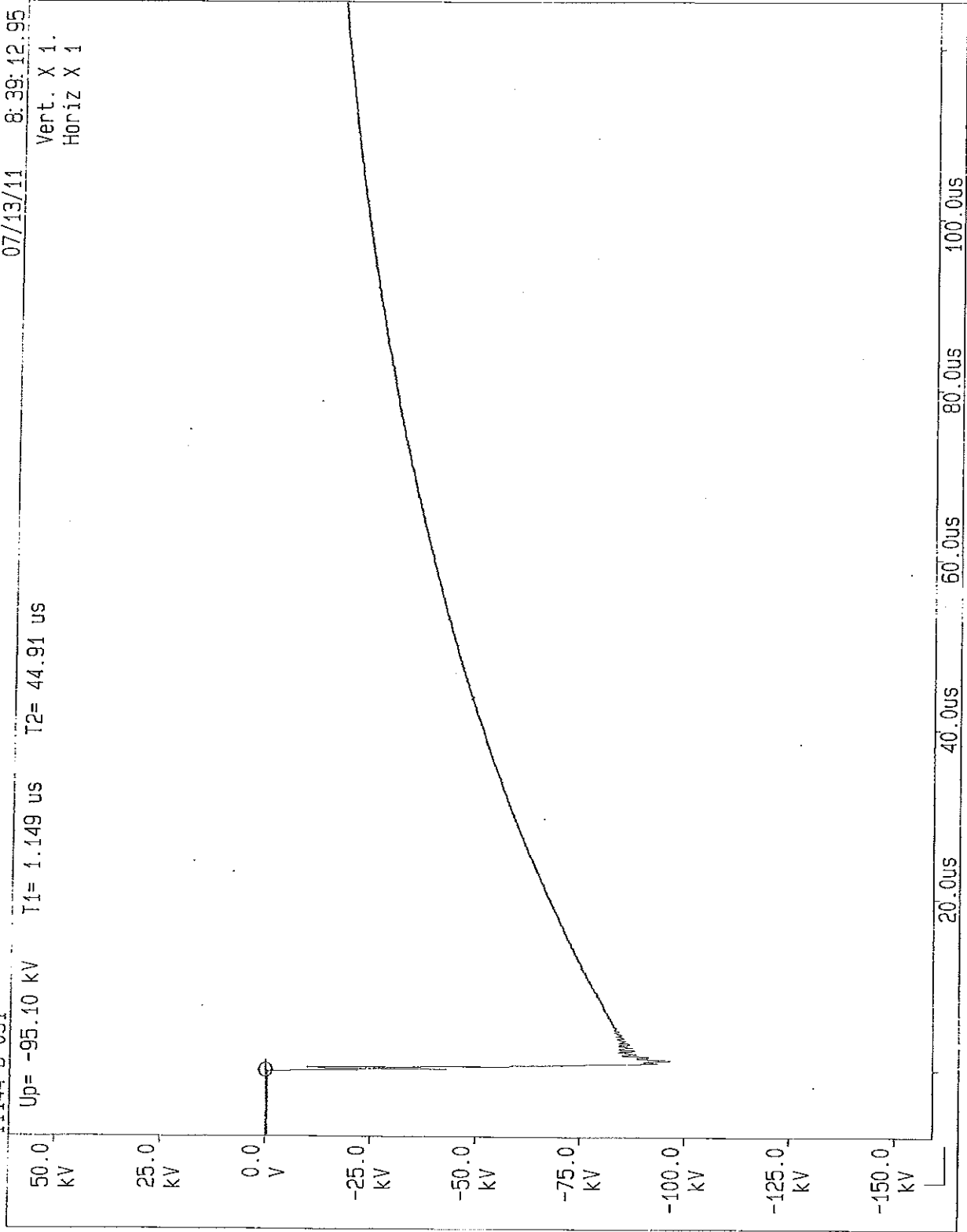


11144-D 031

07/13/11 8:39:12.95

Up= -95.10 kV T1= 1.149 us T2= 44.91 us

Vert. X 1.
Horiz X 1

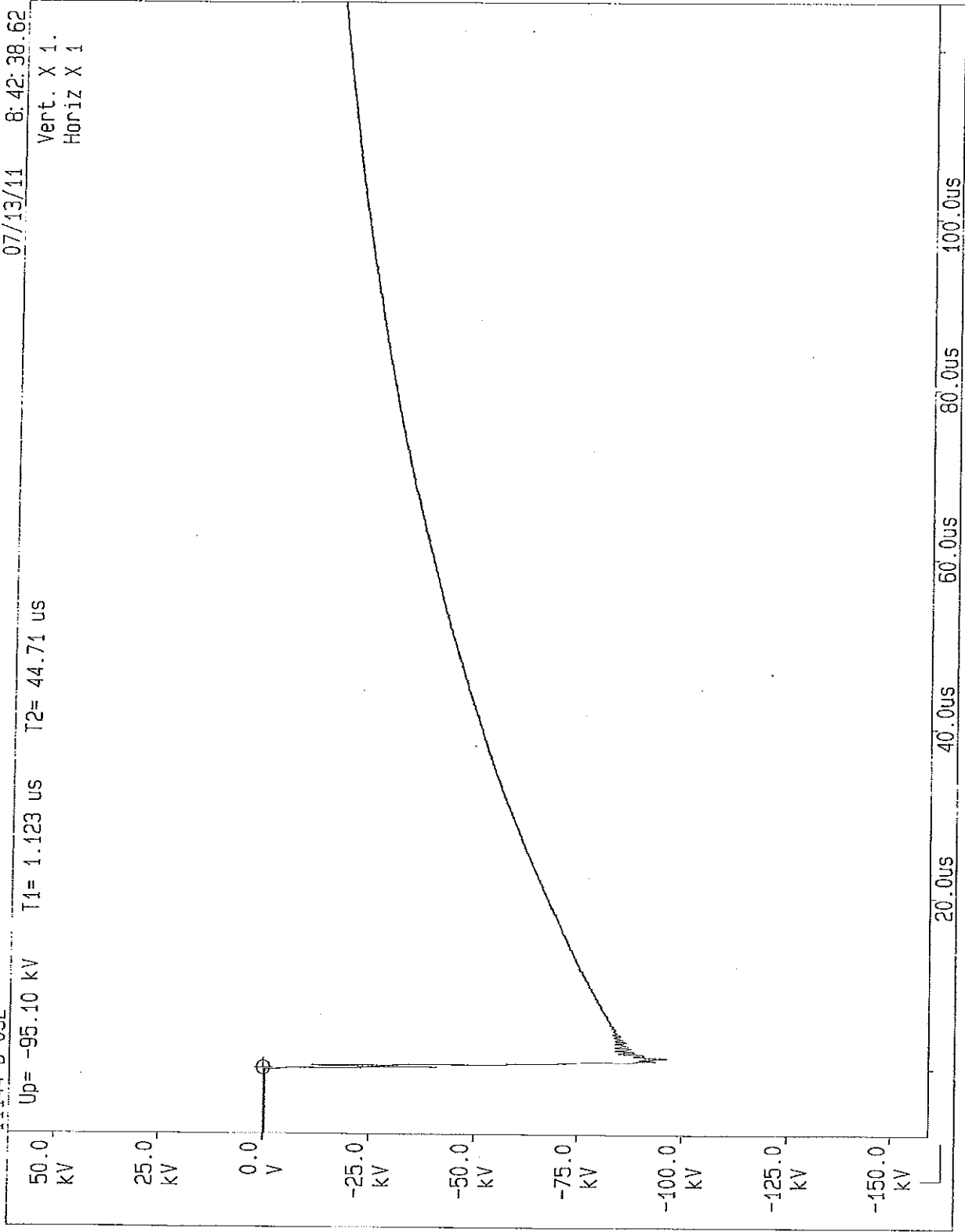


11144-D 032

07/13/11 8:42:38.62

Up= -95.10 kV T1= 1.123 us T2= 44.71 us

Vert. X 1.
Horiz X 1

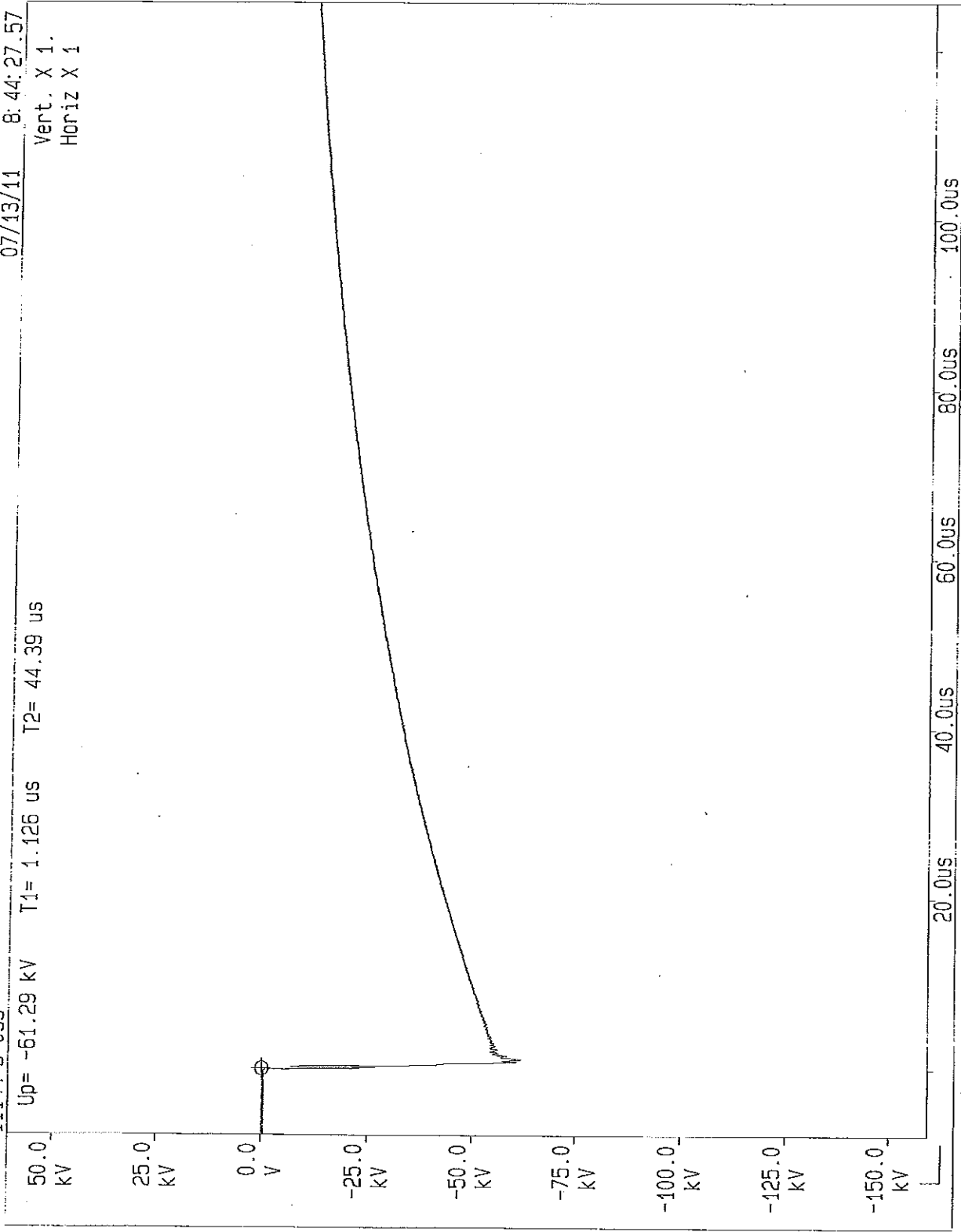


11144-D 033

07/13/11 8:44:27.57

Up= -61.29 kV T1= 1.126 us T2= 44.39 us

Vert. X 1.
Horiz X 1



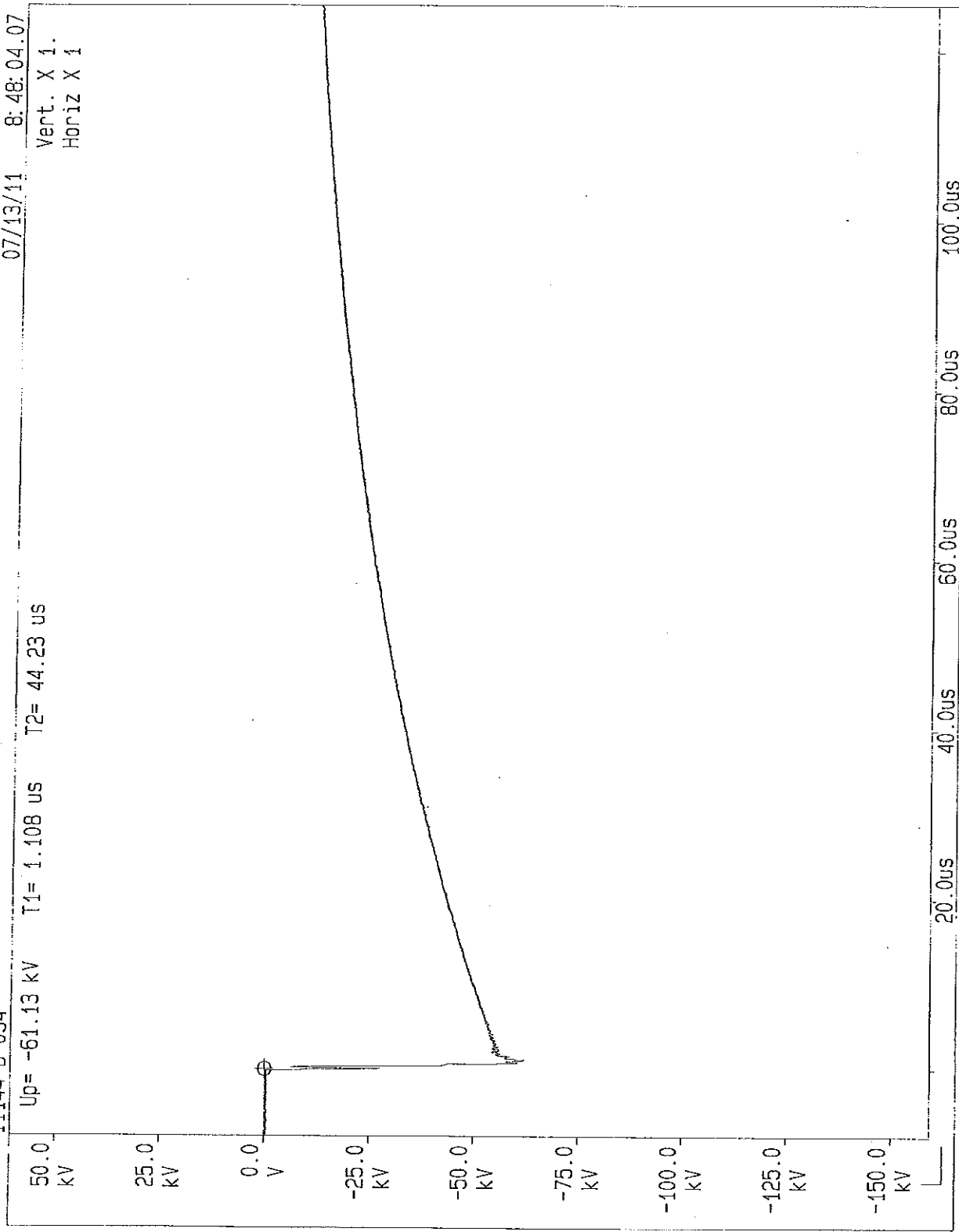
11144-D_034

Up= -61.13 kV T1= 1.108 us T2= 44.23 us

07/13/11

8:48:04.07

Vert. X 1.
Horiz X 1

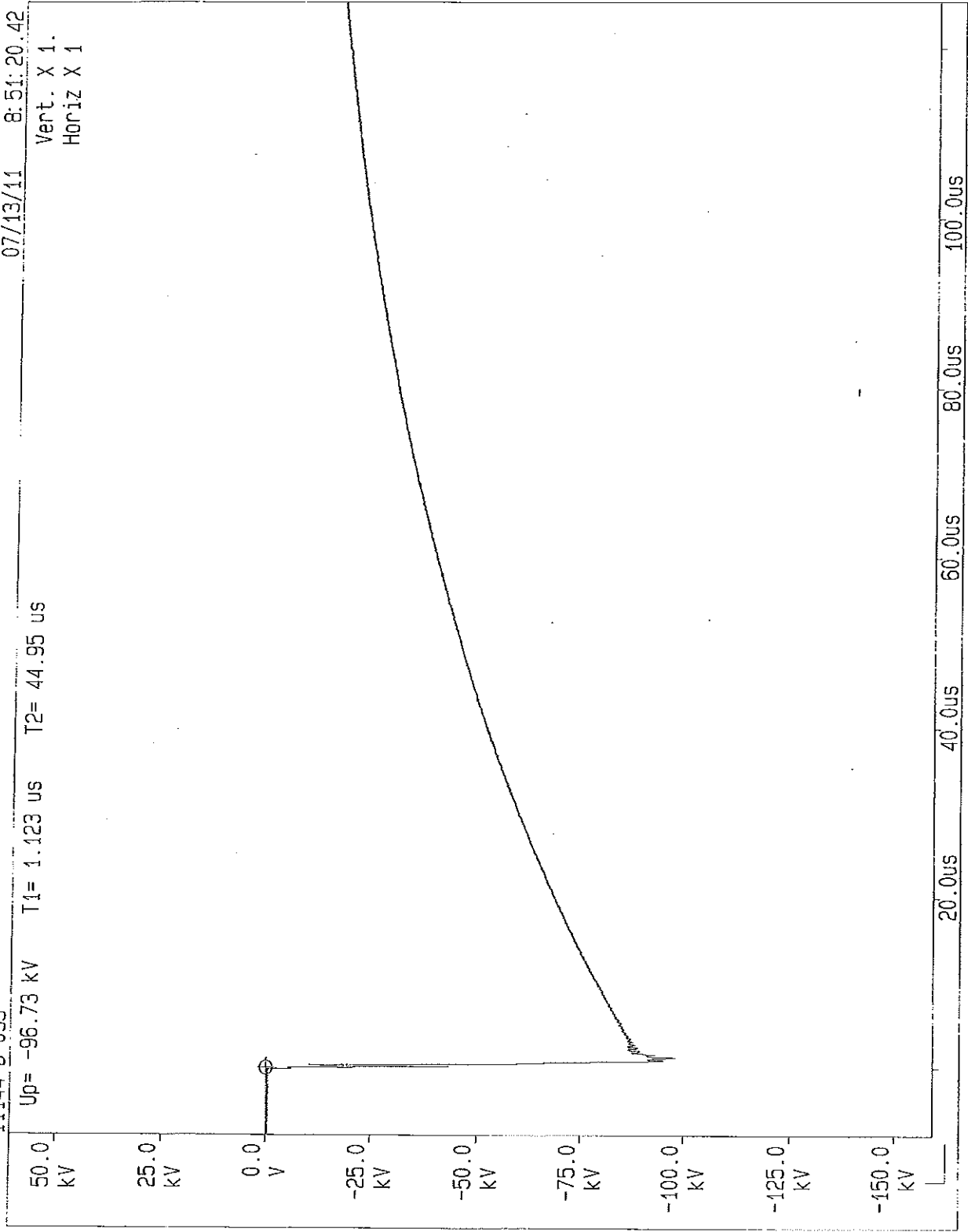


11144-D_035

07/13/11 8:51:20.42

Up= -96.73 kV T1= 1.123 us T2= 44.95 us

Vert. X 1.
Horiz X 1

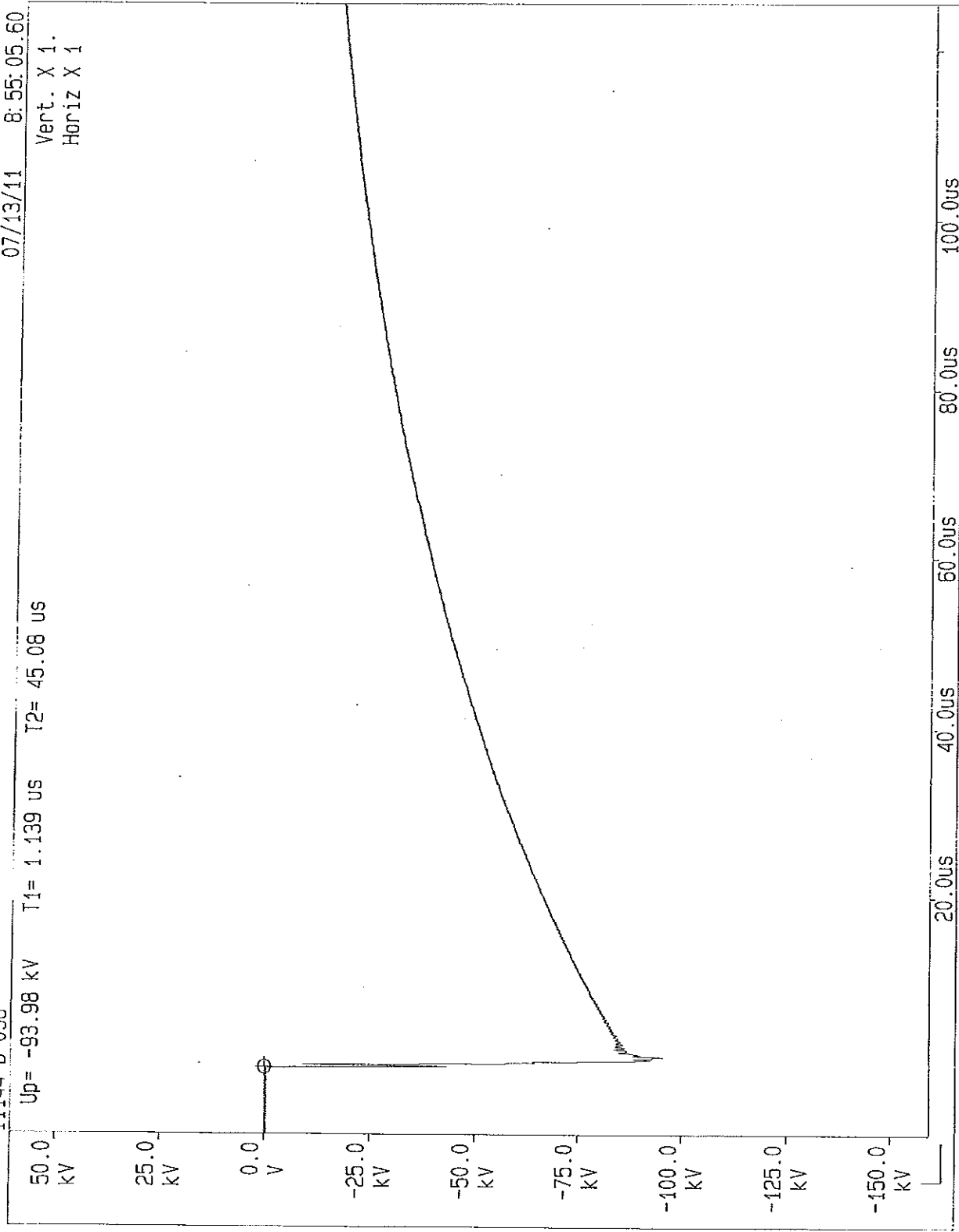


11144-D_036

07/13/11 8:55:05.60

Up= -93.98 kV T1= 1.139 us T2= 45.08 us

Vert. X 1.
Horiz X 1



11144-D 037

Up= -94.68 kV

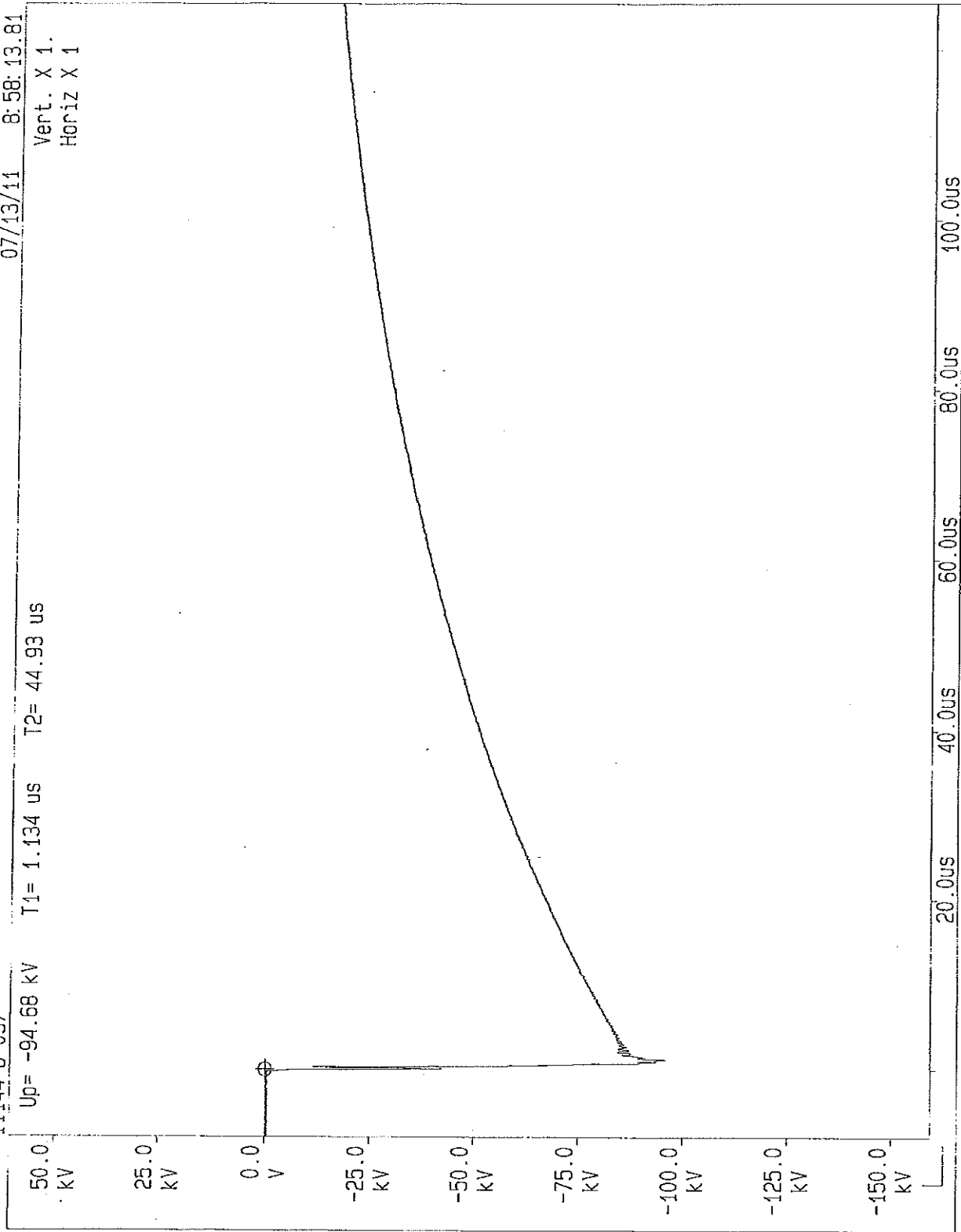
T1= 1.134 us

T2= 44.93 us

07/13/11

8:58:13.81

Vert. X 1.
Horiz X 1

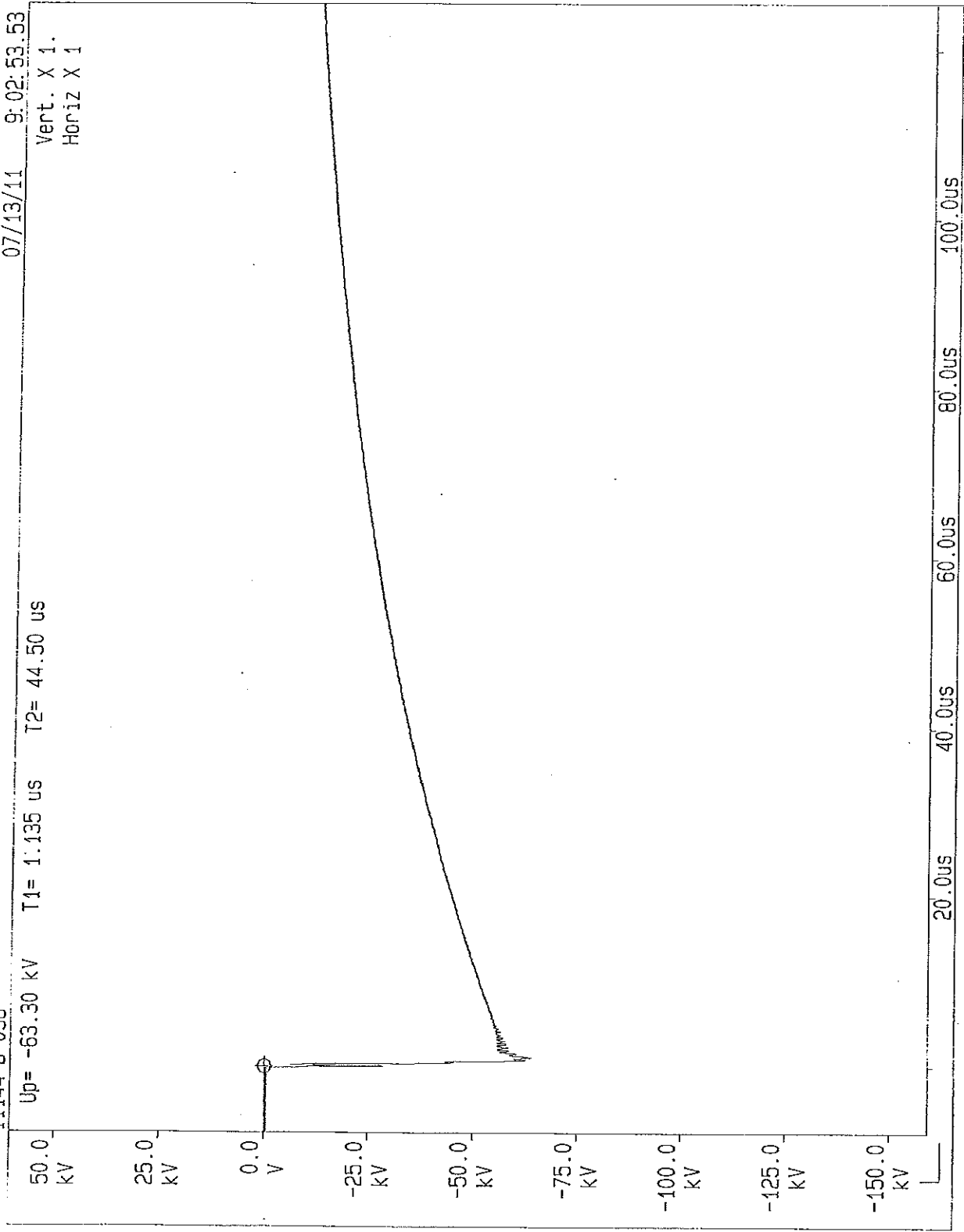


11144-D 038

07/13/11 9:02:53.53

Up= -63.30 kV T1= 1.135 us T2= 44.50 us

Vert. X 1.
Horiz X 1

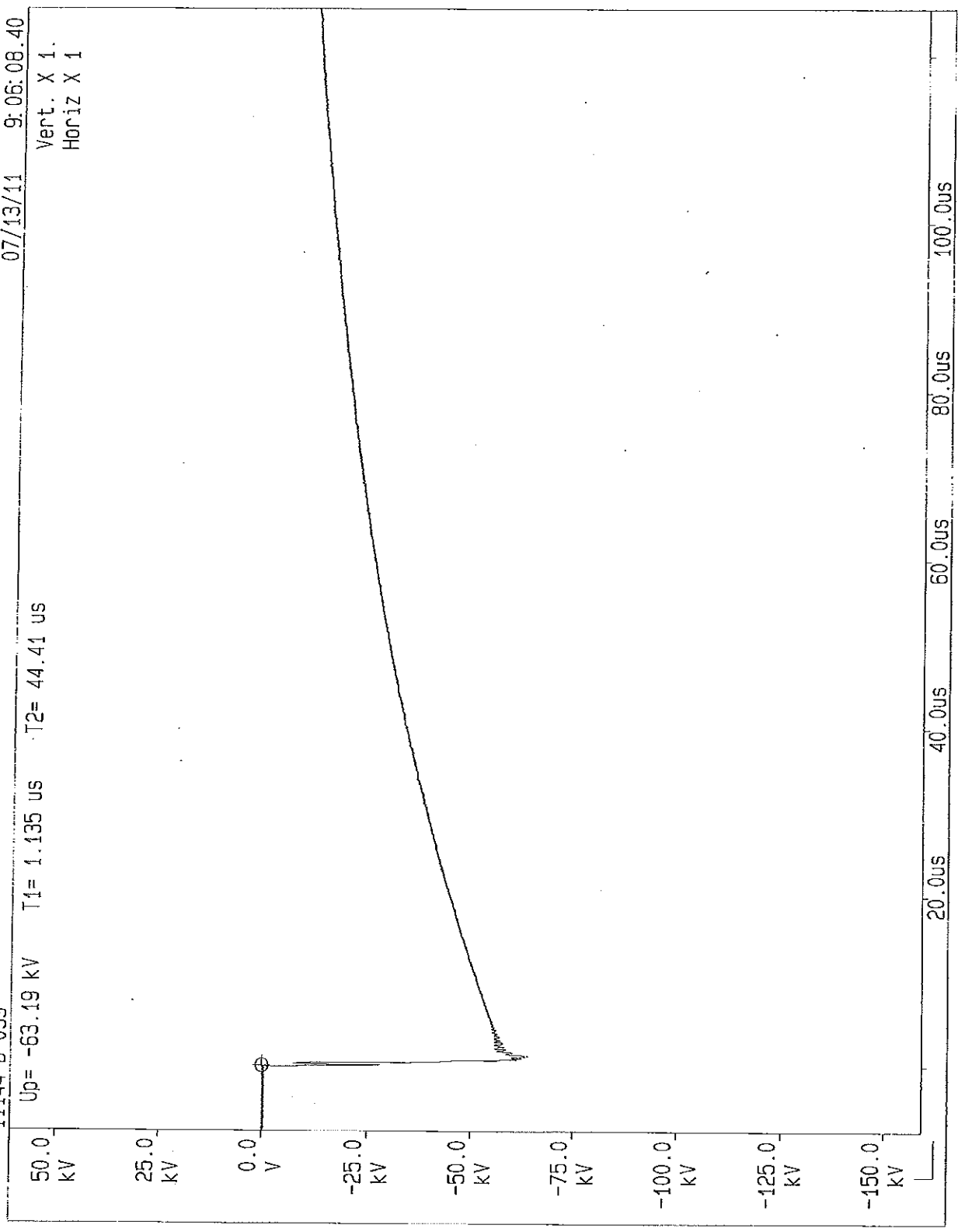


11144-D 039

07/13/11 9:06:08.40

Up= -63.19 kV T1= 1.135 us T2= 44.41 us

Vert. X 1.
Horiz X 1



20.0us 40.0us 60.0us 80.0us 100.0us

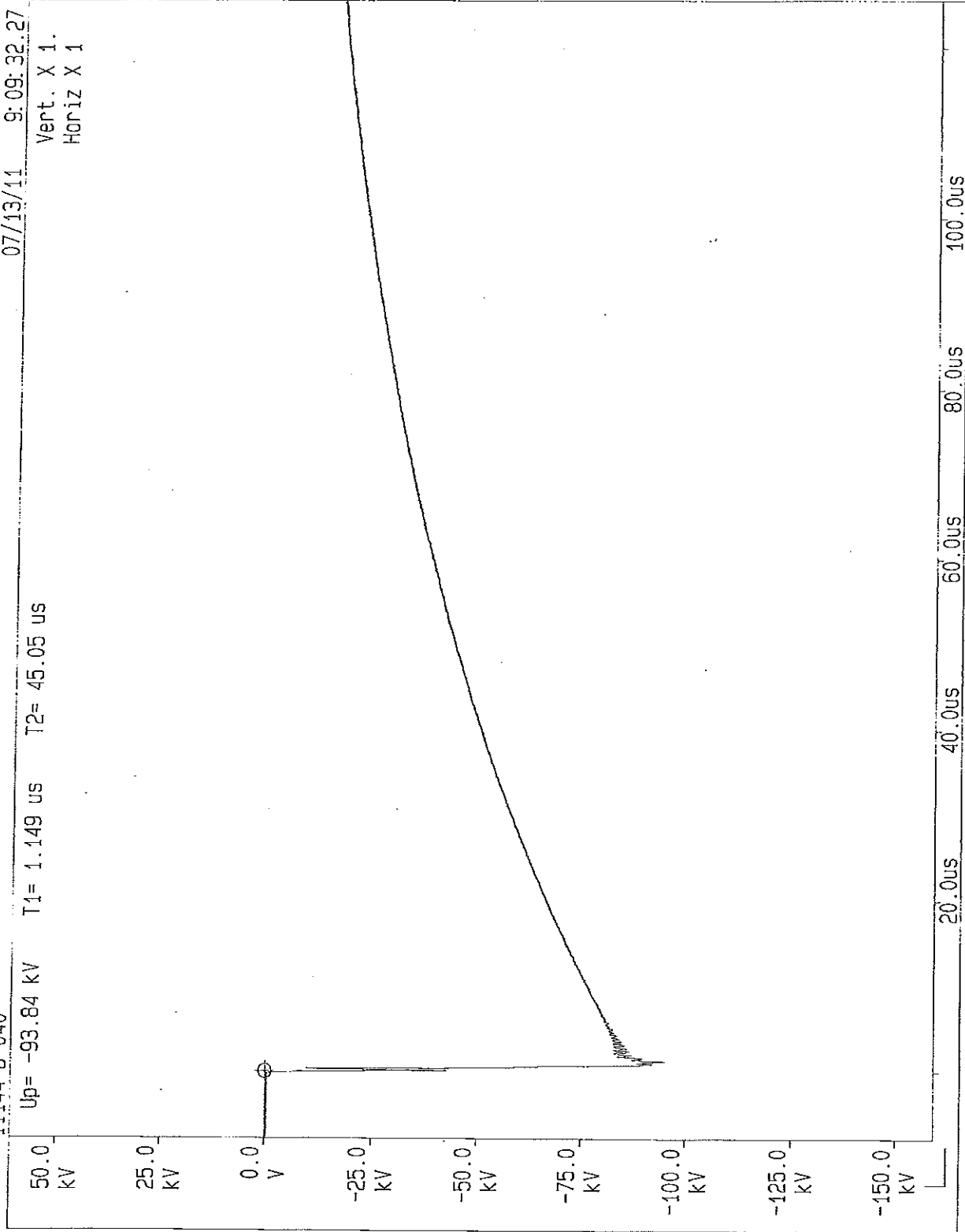
11144-D 040

Up= -93.84 kV
T1= 1.149 us T2= 45.05 us

07/13/11

9:09:32.27

Vert. X 1.
Horiz X 1



11144-D 041

Up= -93.34 kV

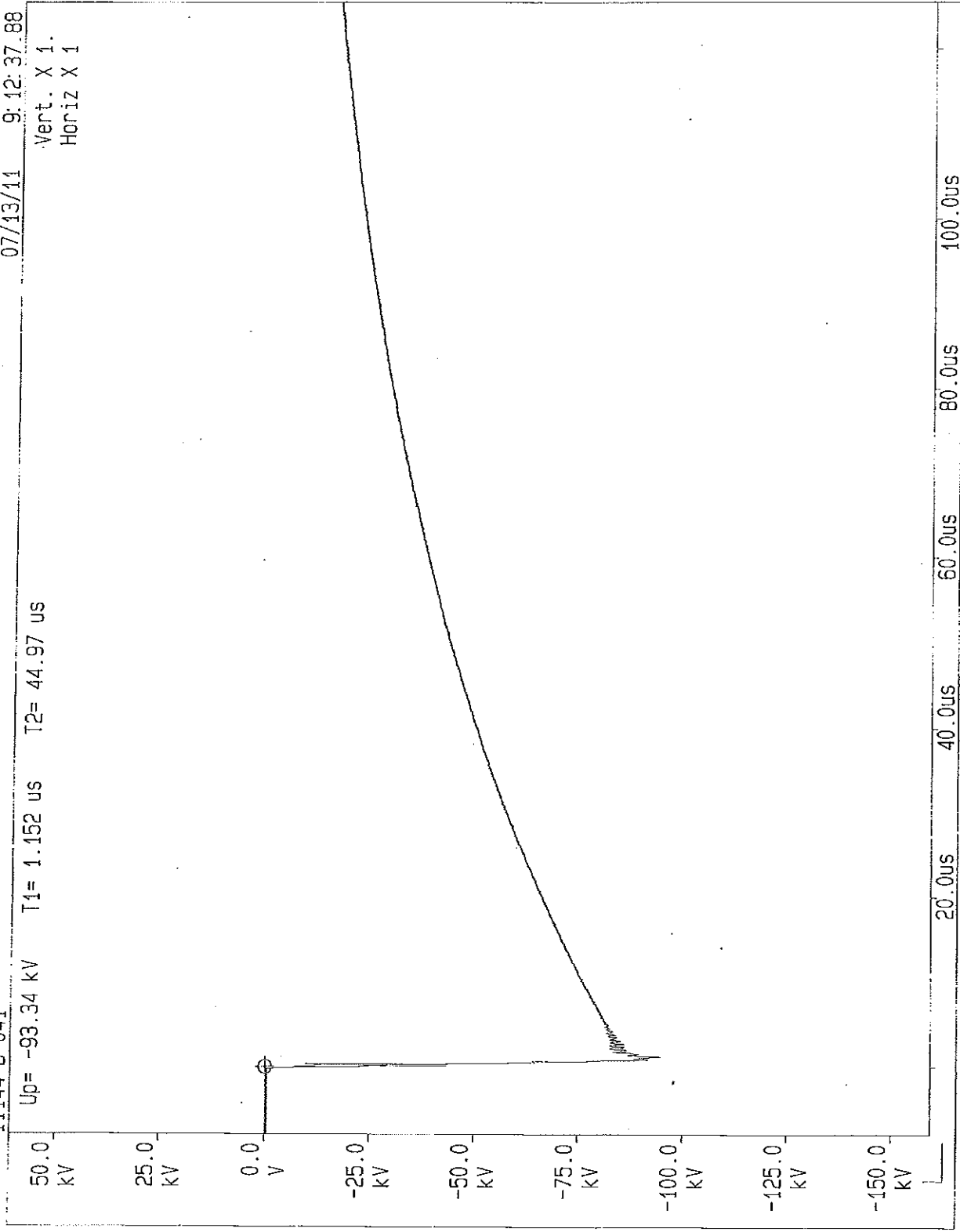
T1= 1.152 us

T2= 44.97 us

07/13/11

9:12:37.88

Vert. X 1.
Horiz X 1



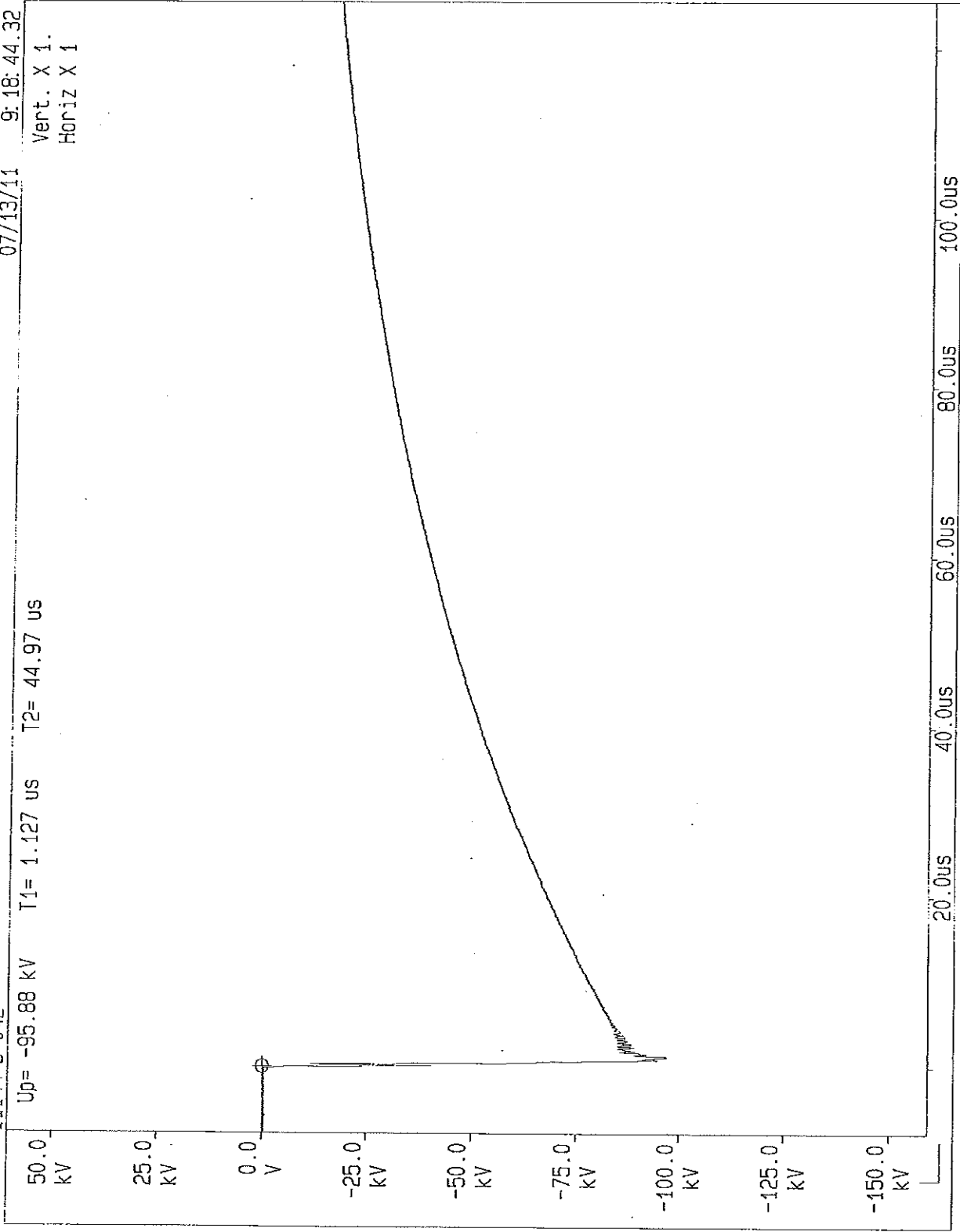
11144-D 042

Up= -95.88 kV T1= 1.127 us T2= 44.97 us

07/13/11

9:18:44.32

Vert. X 1.
Horiz X 1



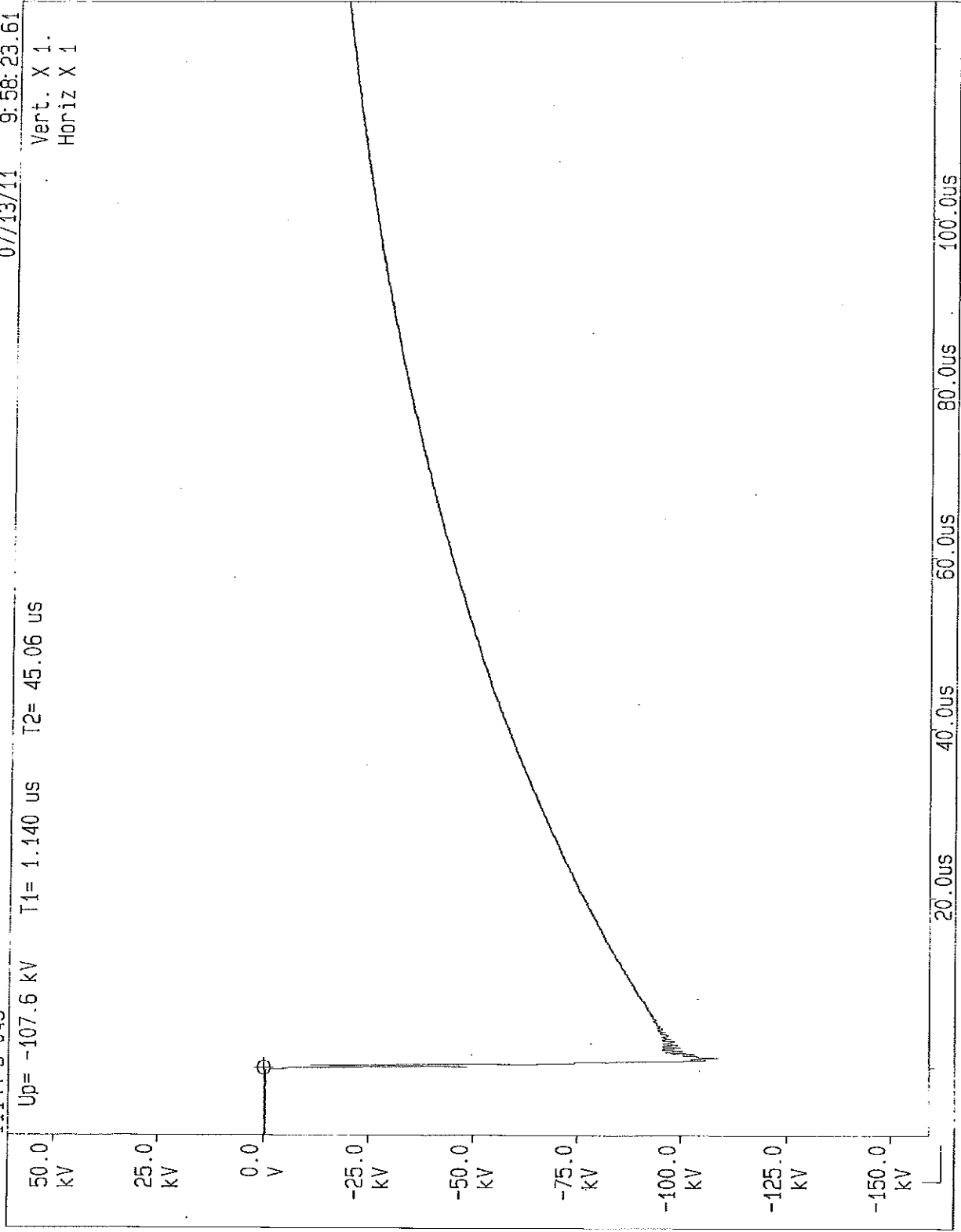
11144-D 043

07/13/11

9:58:23.61

Up= -107.6 kV T1= 1.140 us T2= 45.06 us

Vert. X 1.
Horiz X 1

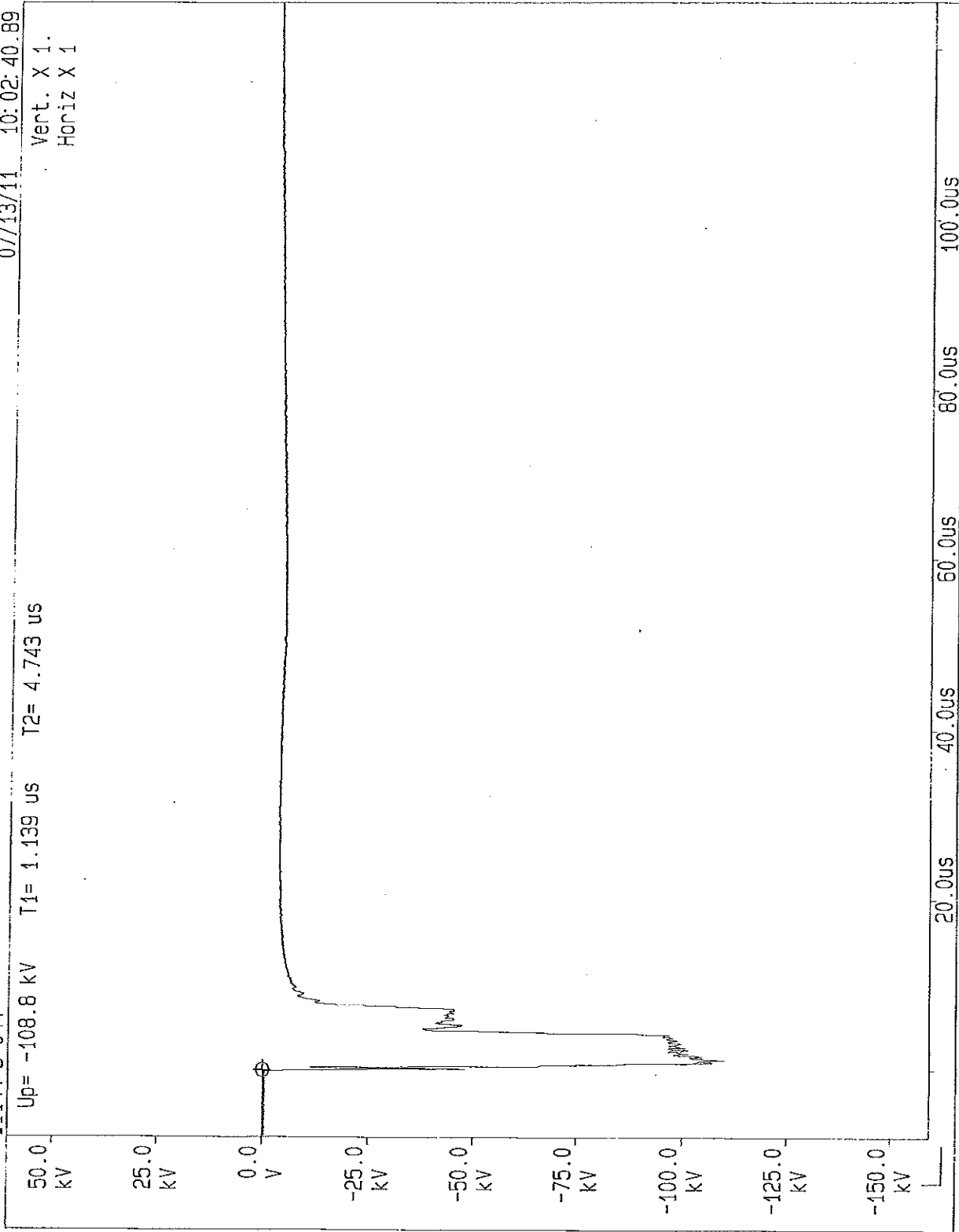


11144-D 044

07/13/11 10:02:40.89

Up= -108.8 kV T1= 1.139 us T2= 4.743 us

Vert. X 1.
Horiz X 1

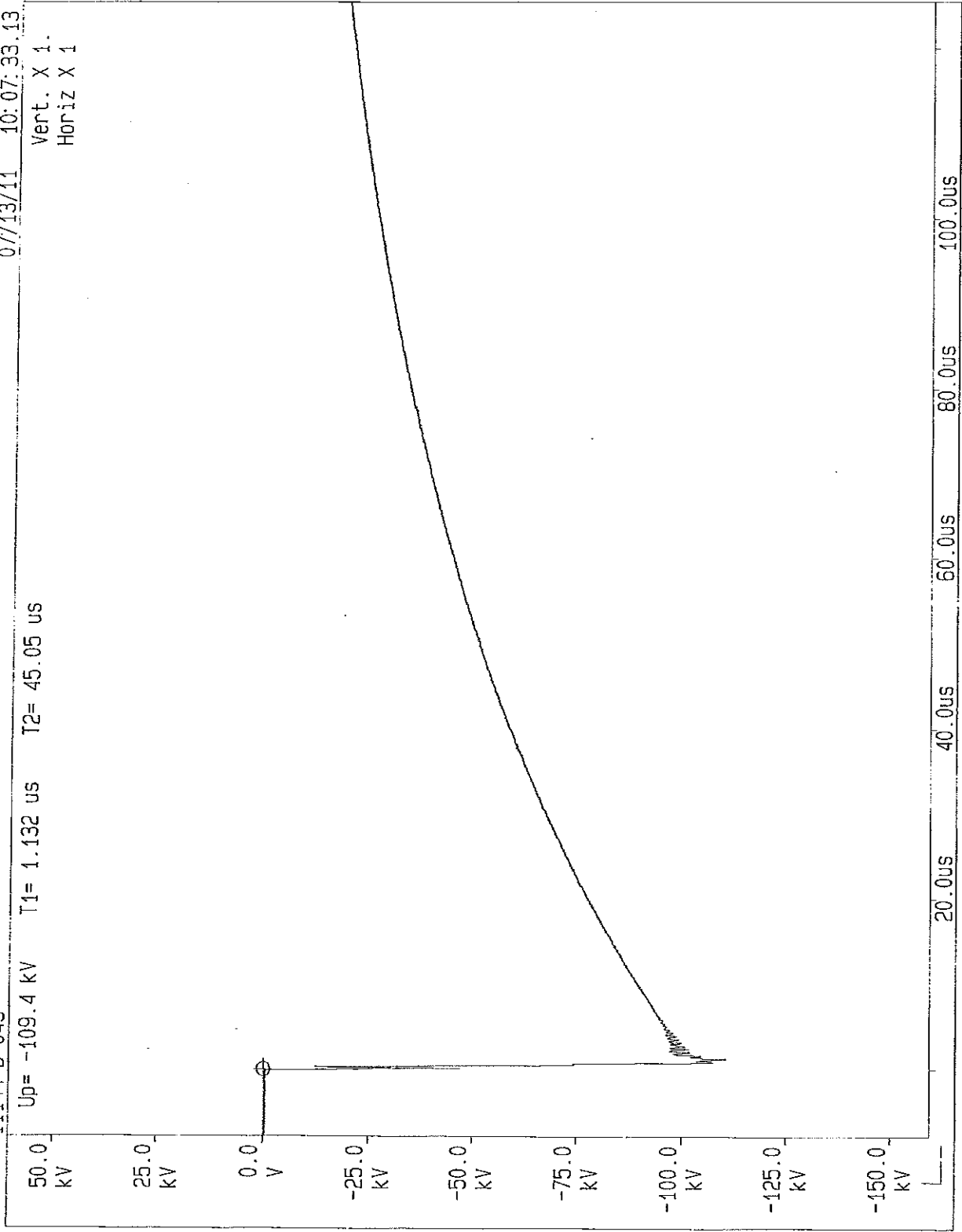


11144-D 045

07/13/11 10:07:33.13

Up= -109.4 kV T1= 1.132 us T2= 45.05 us

Vert. X 1.
Horiz X 1

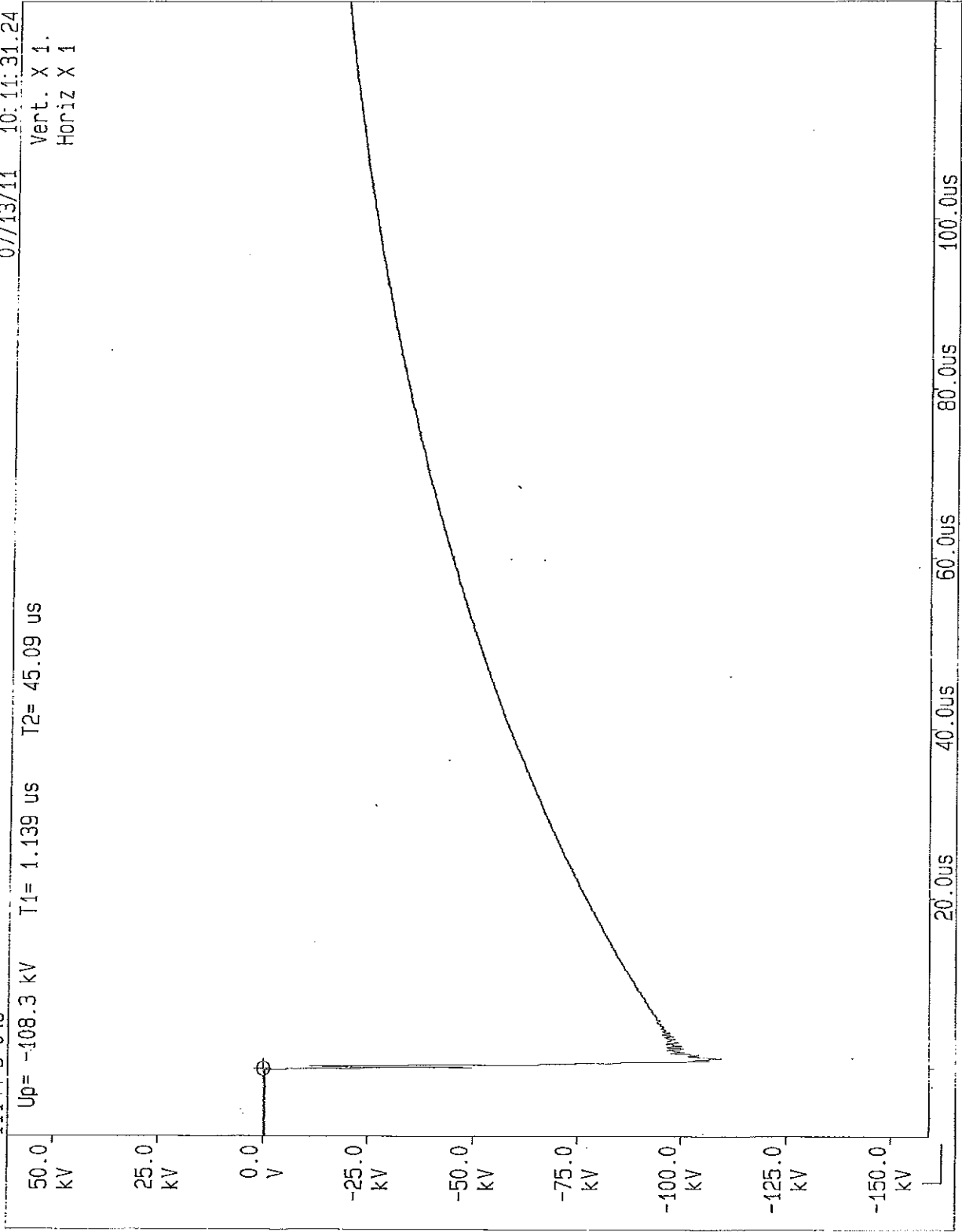


11144-D 046

07/13/11 10:11:31.24

Up= -108.3 kV T1= 1.139 us T2= 45.09 us

Vert. X 1.
Horiz X 1

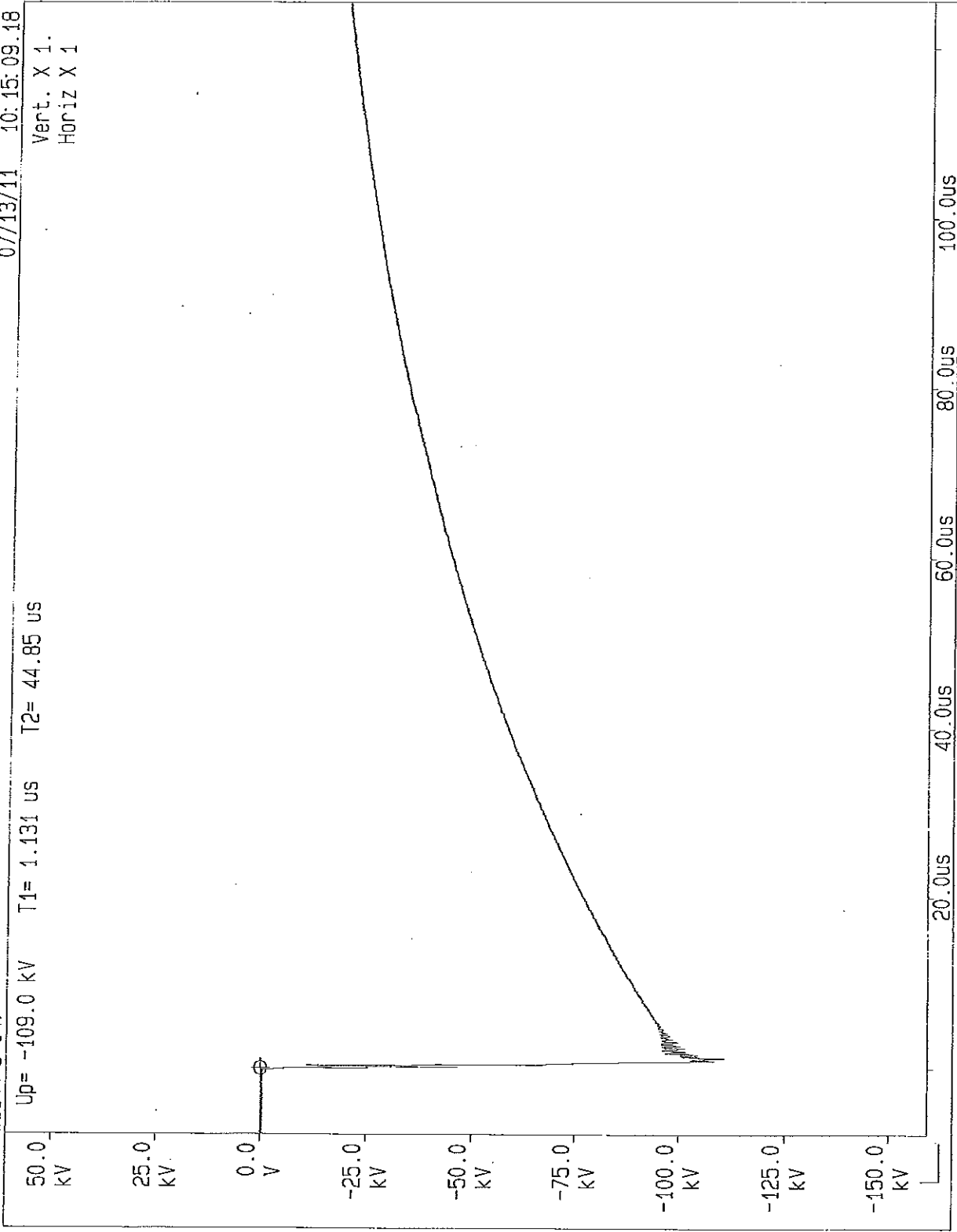


11144-D 047

07/13/11 10:15:09.18

Up= -109.0 kV T1= 1.131 us T2= 44.85 us

Vert. X 1.
Horiz X 1

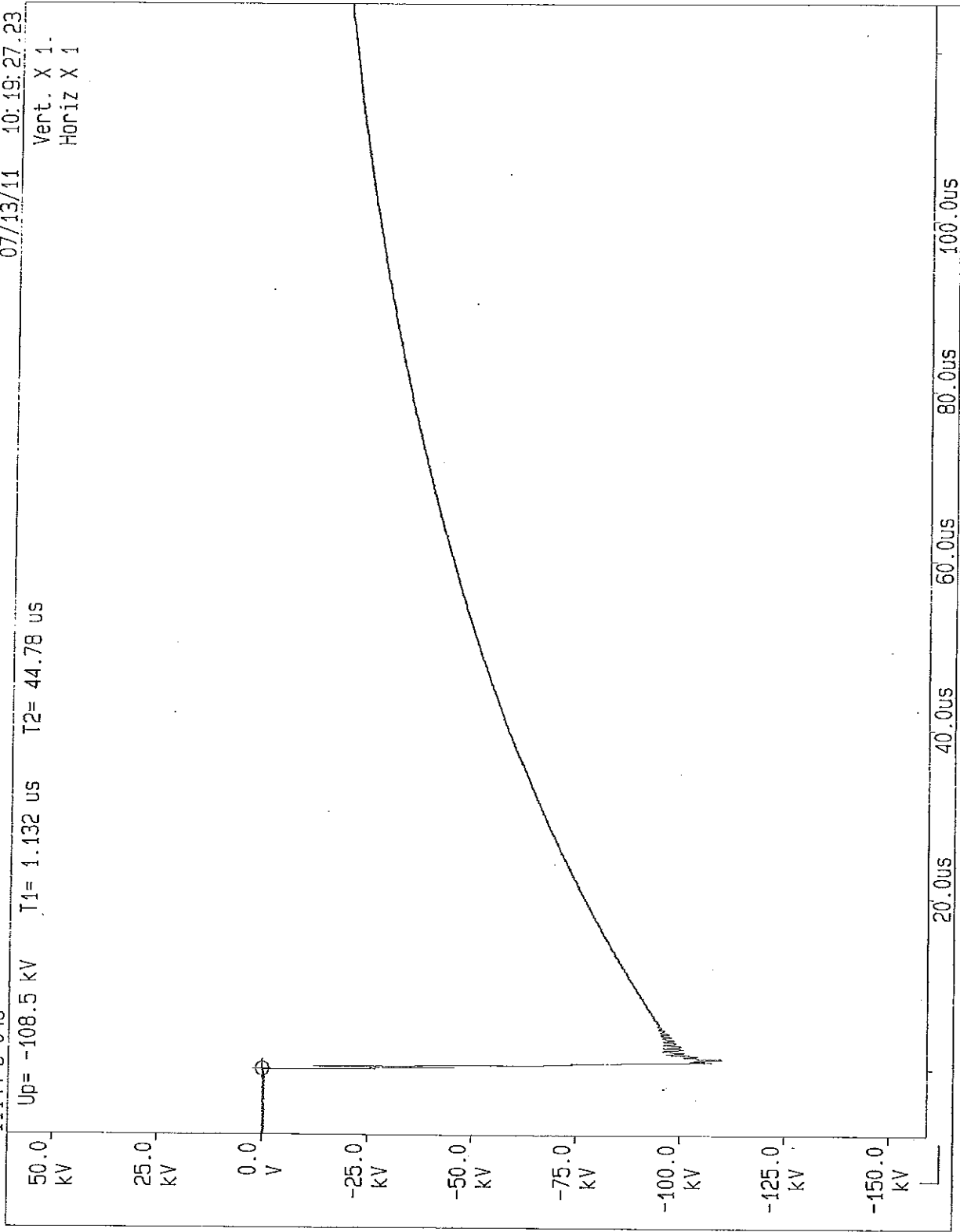


11144-D 048

Up= -108.5 kV T1= 1.132 us T2= 44.78 us

07/13/11 10:19:27.23

Vert. X 1.
Horiz X 1

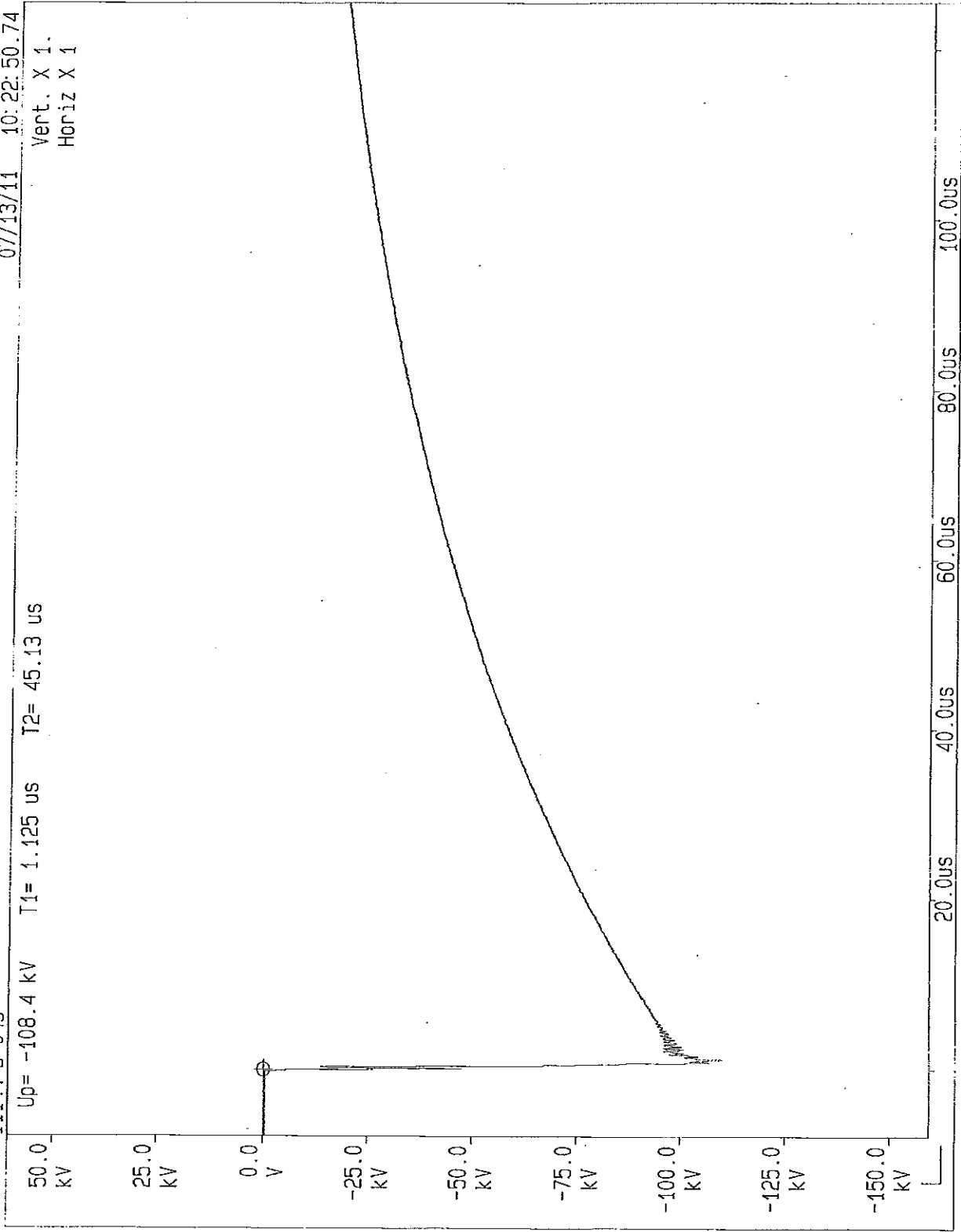


11144-D 049

07/13/11 10:22:50.74

Up= -108.4 kV T1= 1.125 us T2= 45.13 us

Vert. X 1.
Horiz X 1



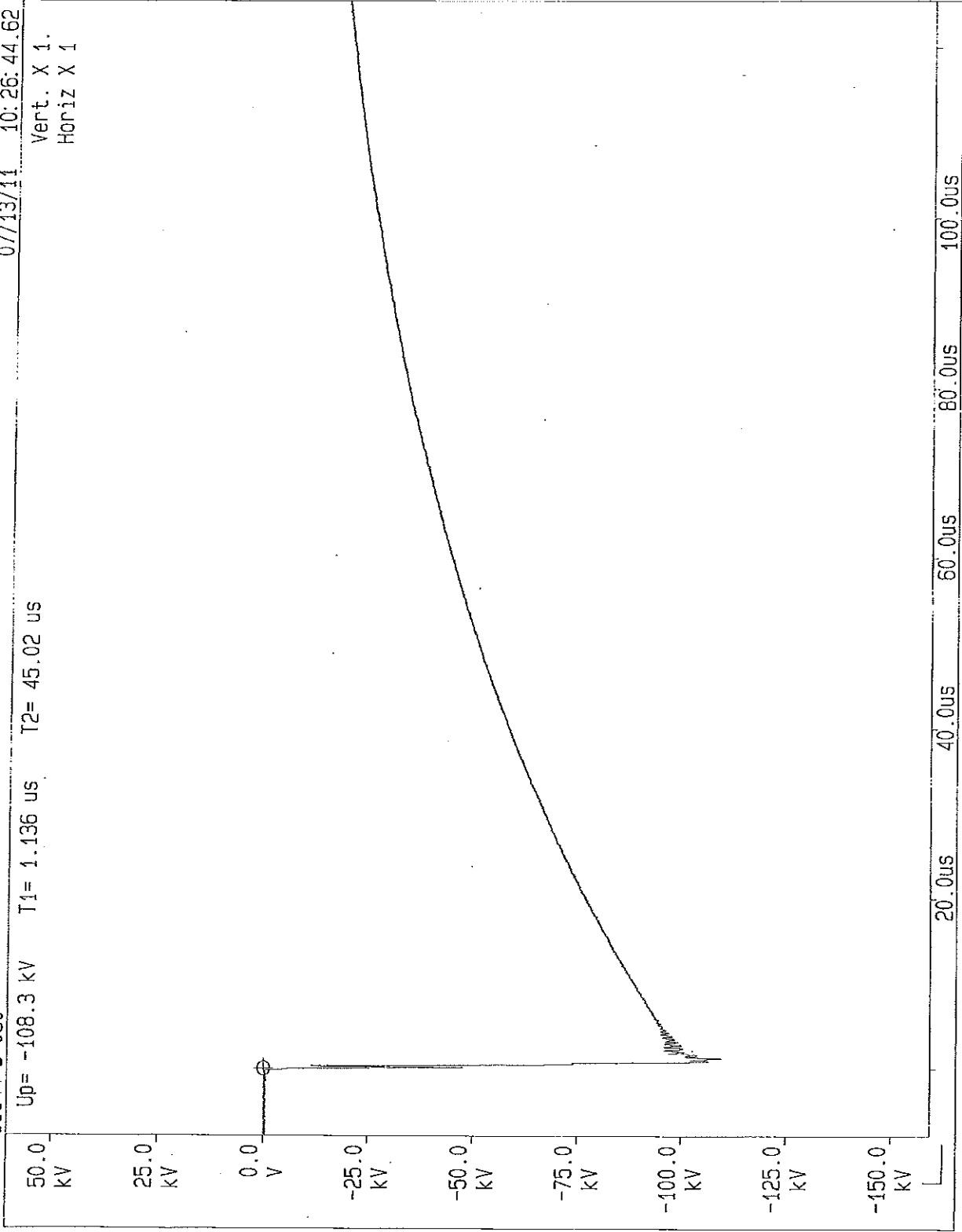
11144-D 050

07/13/11

10:26:44.62

Up= -108.3 kV T1= 1.136 us T2= 45.02 us

Vert. X 1.
Horiz X 1

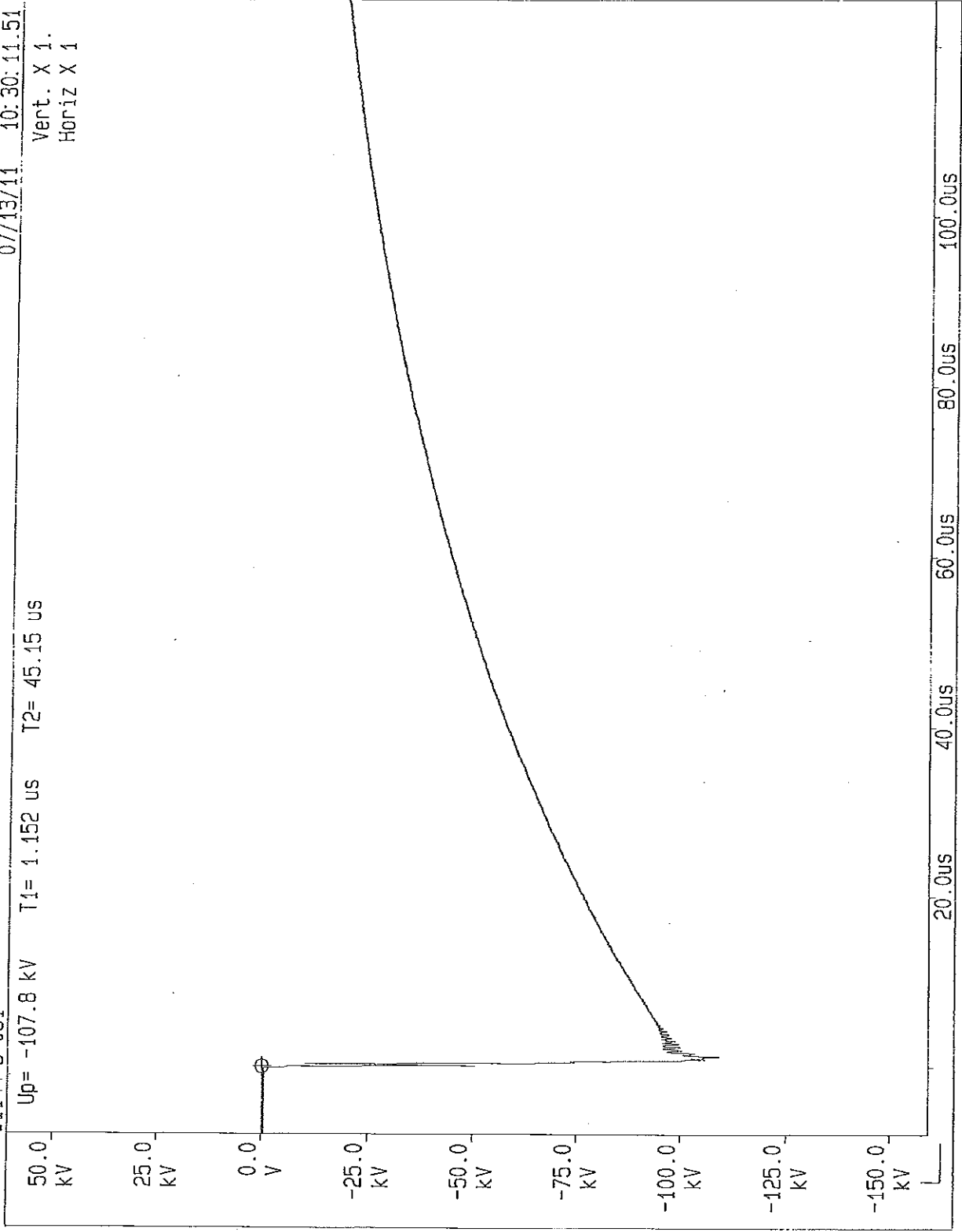


11144-D 051

07/13/11 10:30:11.51

Up= -107.8 kV T1= 1.152 us T2= 45.15 us

Vert. X 1.
Horiz X 1

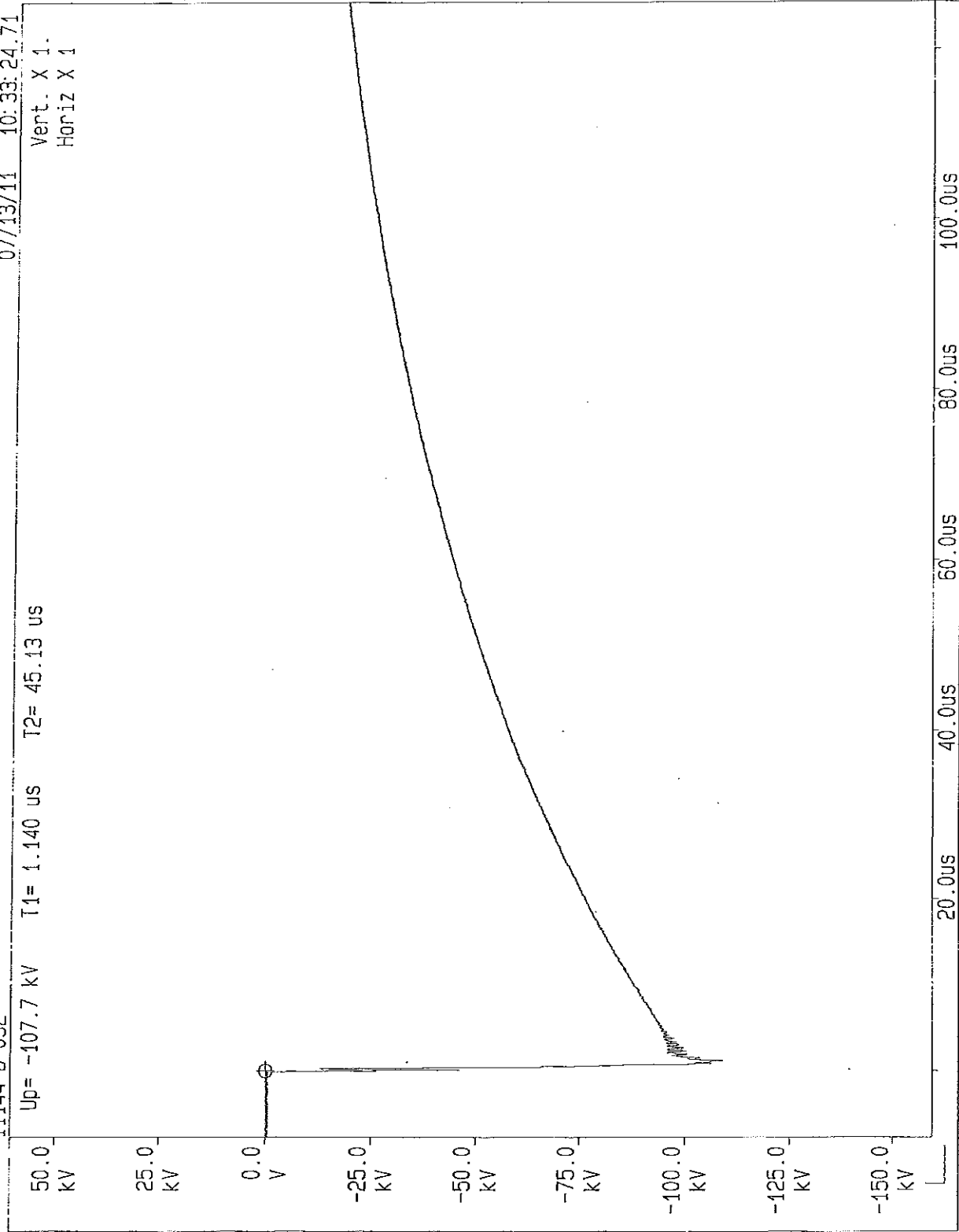


11144-D 052

07/13/11 10:33:24.71

Up= -107.7 kV T1= 1.140 us T2= 45.13 us

Vert. X 1.
Horiz X 1



11144-D 053

07/13/11 10:36:16.97

Channel 1

Vert. X 1.
Horiz X 1

50.0
kV

25.0
kV

0.0
V

-25.0
kV

-50.0
kV

-75.0
kV

-100.0
kV

-125.0
kV

-150.0
kV

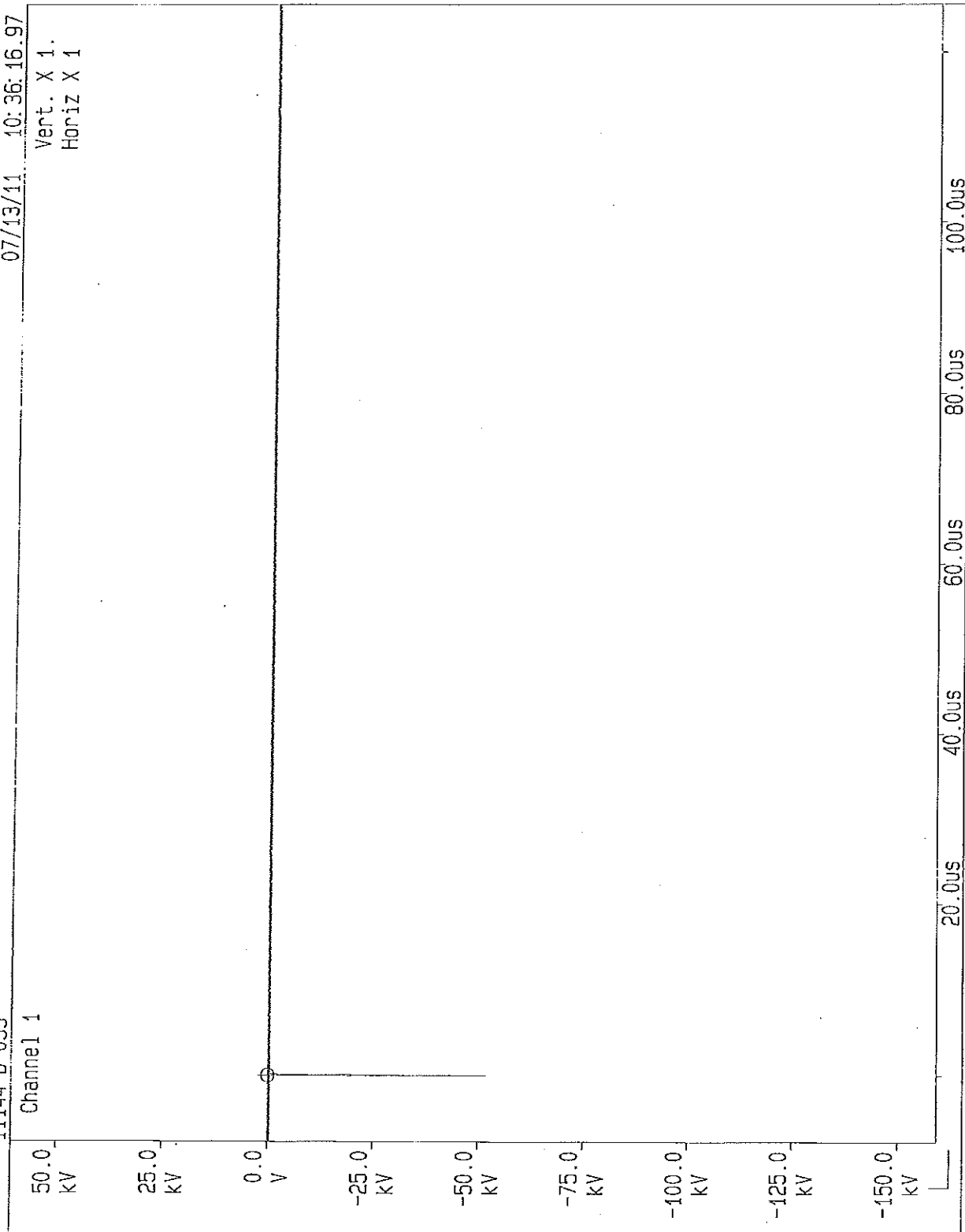
20.0us

40.0us

60.0us

80.0us

100.0us

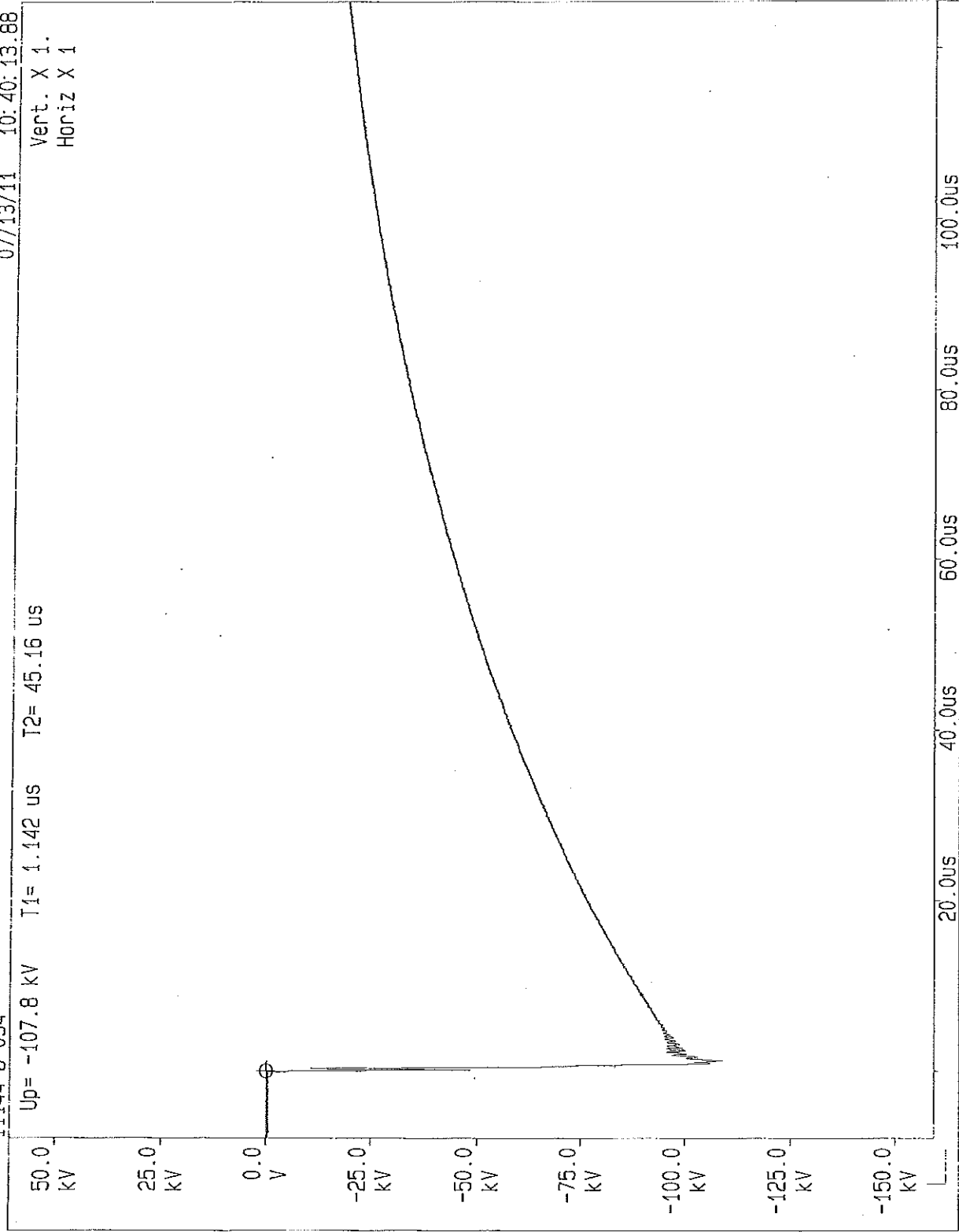


11144-D 054

07/13/11 10:40:13.88

Up= -107.8 kV T1= 1.142 us T2= 45.16 us

Vert. X 1.
Horiz X 1

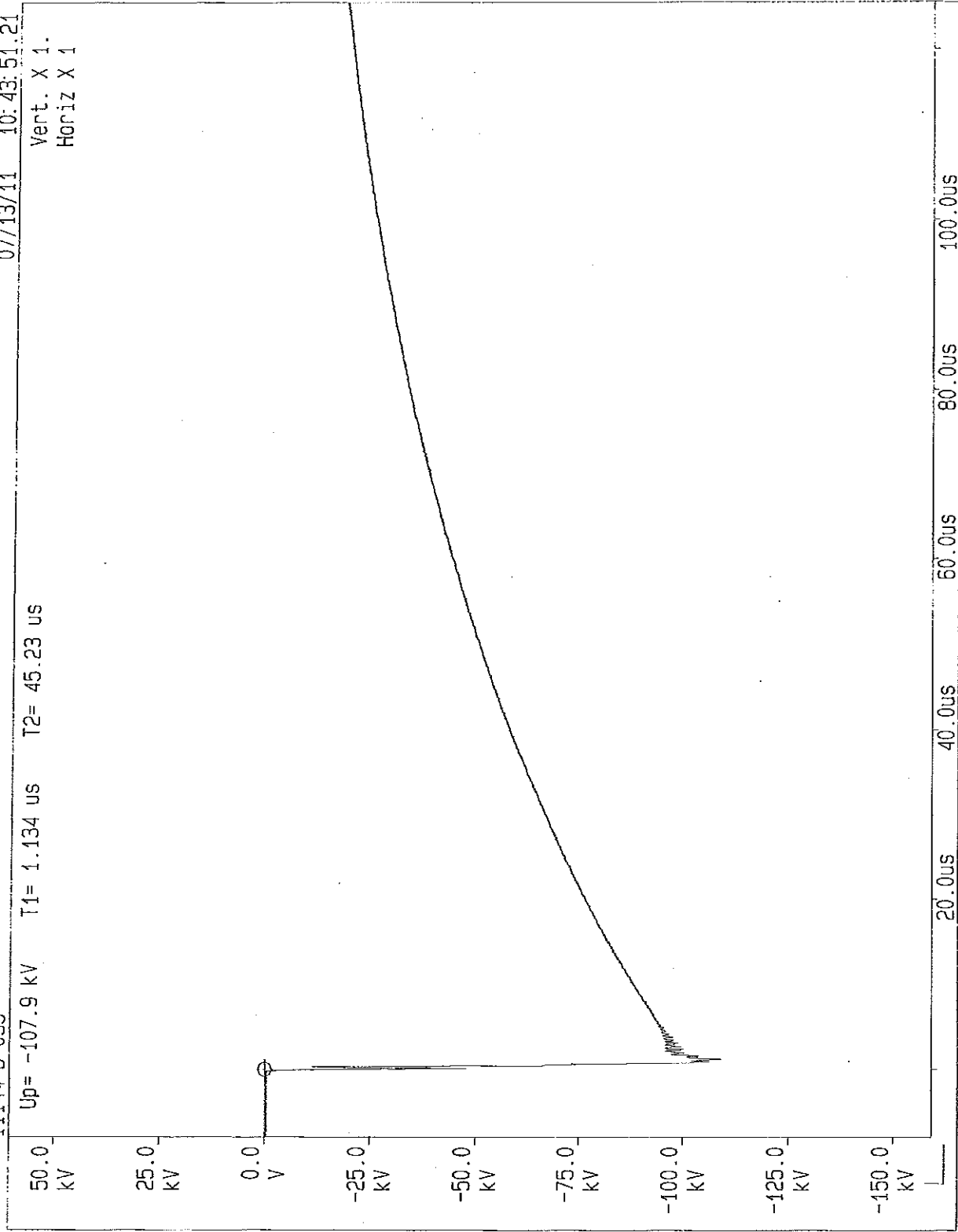


11144-D 055

07/13/11 10:43:51.21

Up= -107.9 kV T1= 1.134 us T2= 45.23 us

Vert. X 1.
Horiz X 1

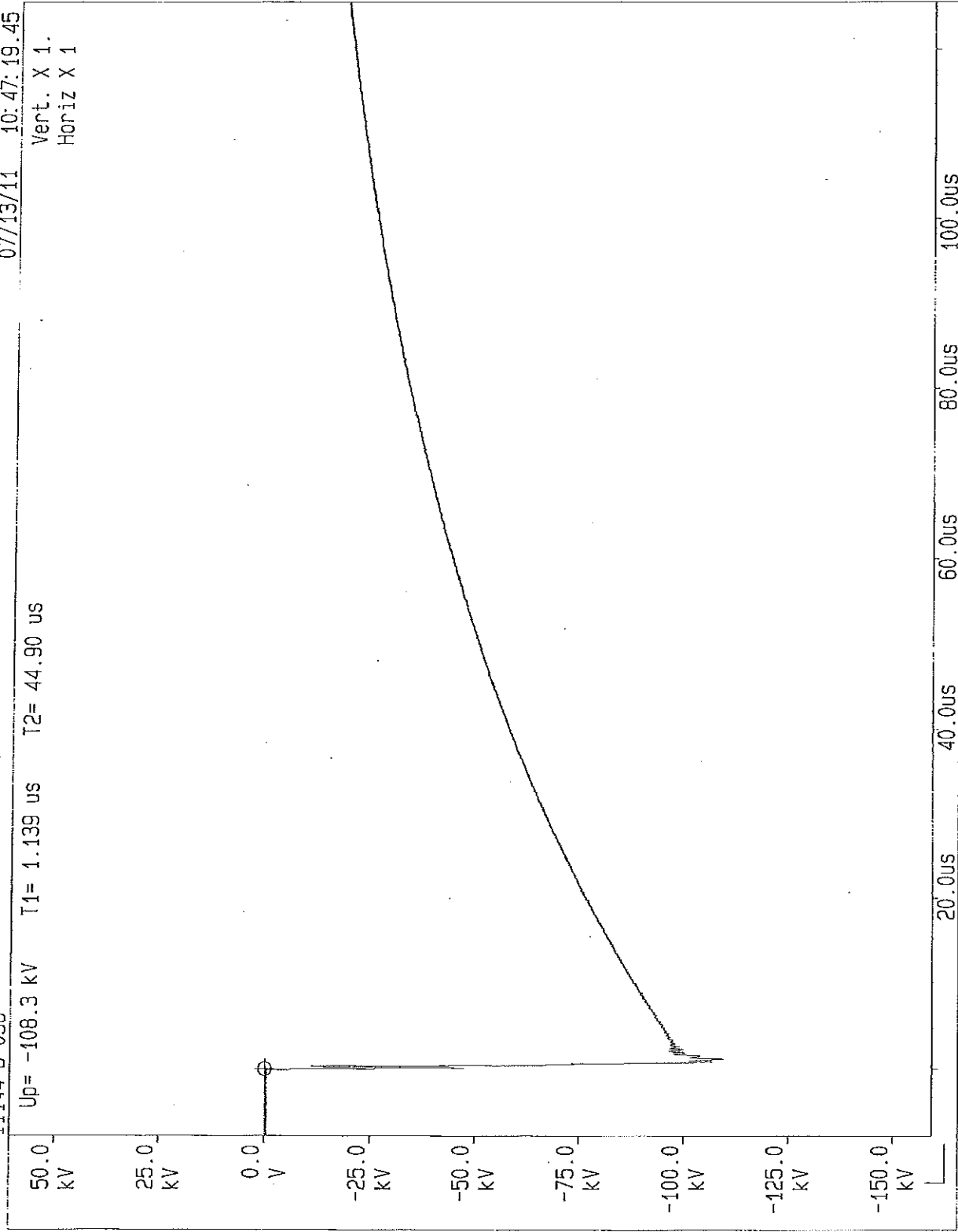


11144-D 056

07/13/11 10:47:19.45

Up= -108.3 kV T1= 1.139 us T2= 44.90 us

Vert. X 1.
Horiz X 1

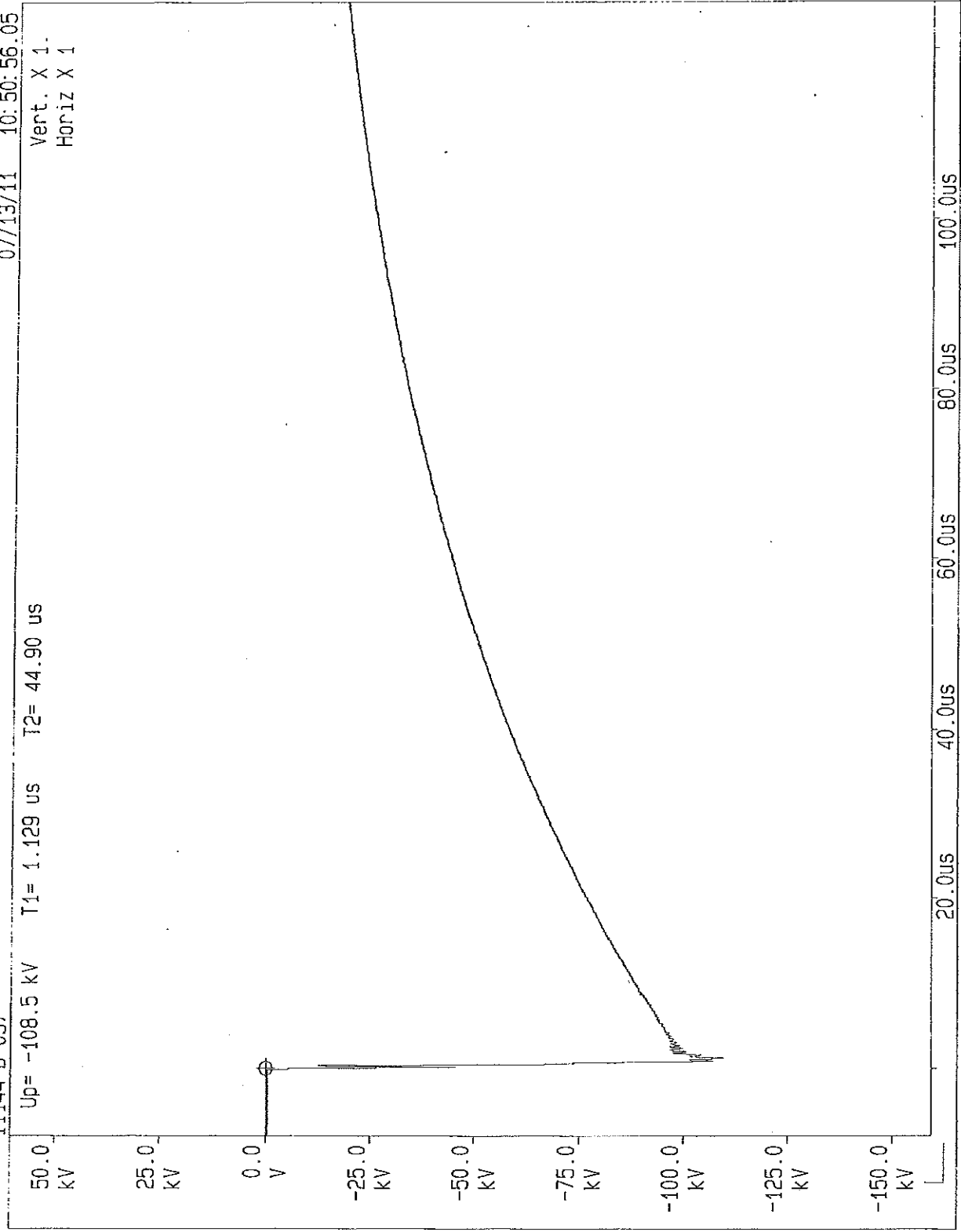


11144-D 057

07/13/11 10:50:56.05

Up= -108.5 kV T1= 1.129 us T2= 44.90 us

Vert. X 1.
Horiz X 1

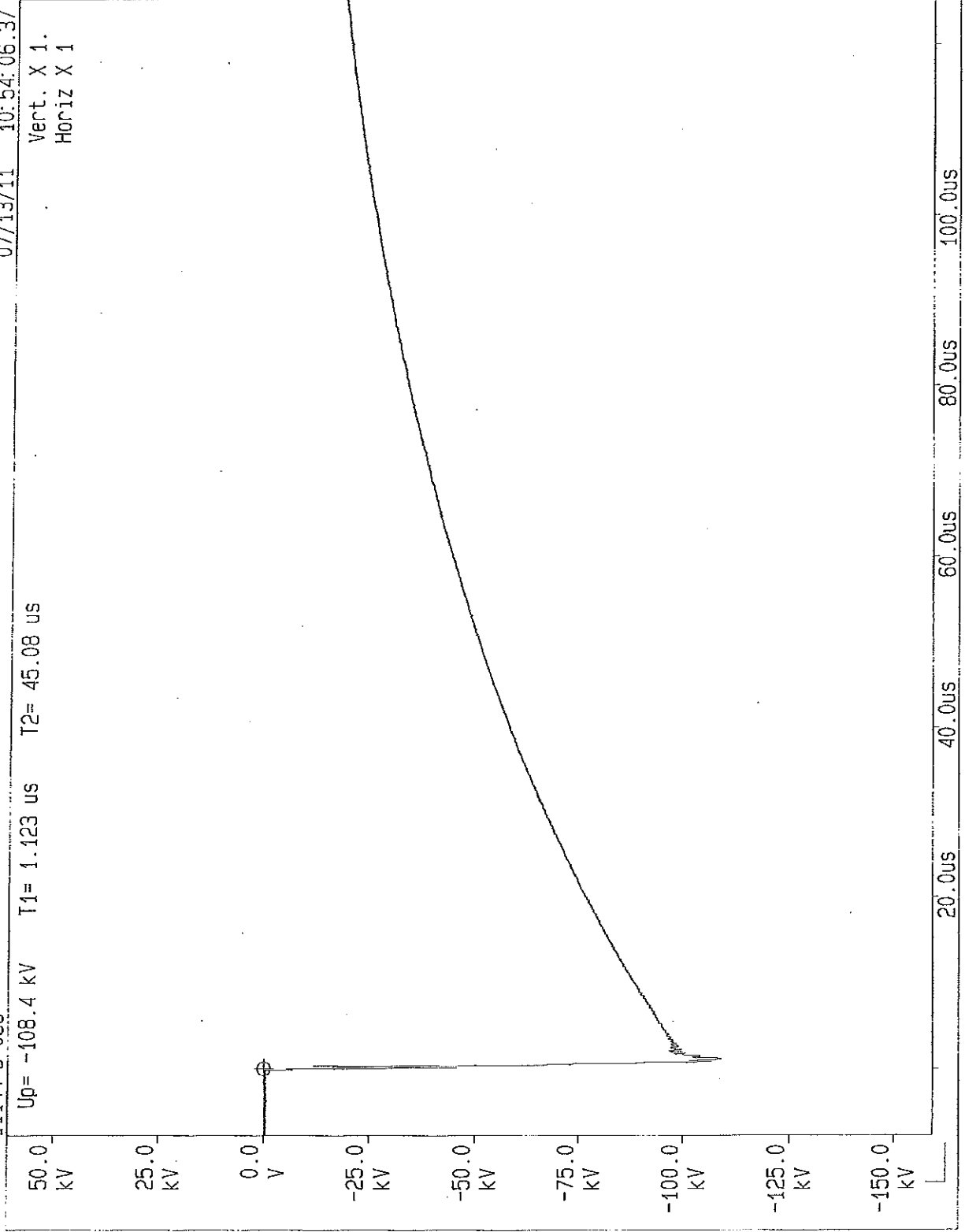


11144-D 058

07/13/11 10:54:06.37

Up= -108.4 kV T1= 1.123 us T2= 45.08 us

Vert. X 1.
Horiz X 1

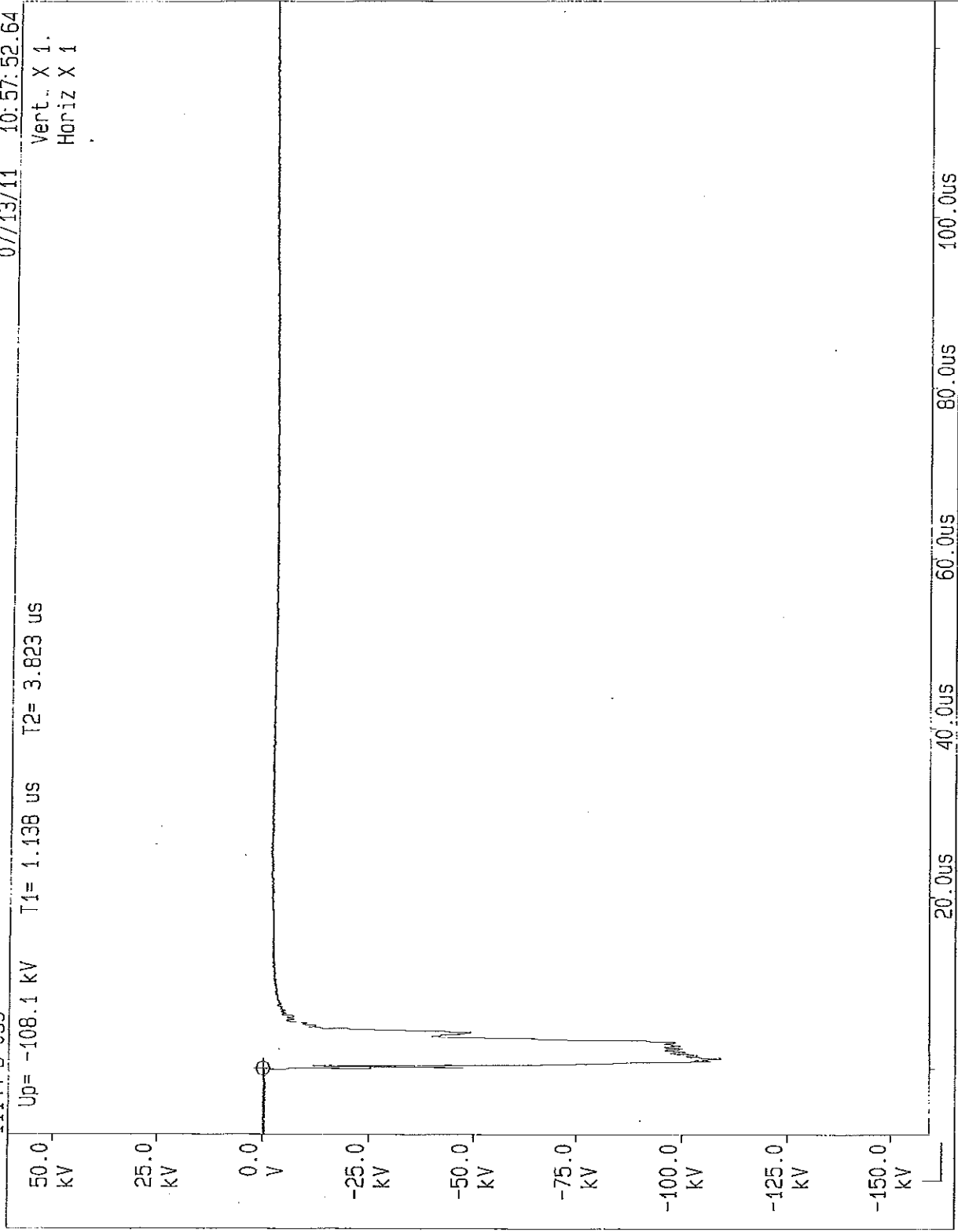


11144-D 059

07/13/11 10:57:52.64

Up= -108.1 kV T1= 1.138 us T2= 3.823 us

Vert. X 1.
Horiz X 1

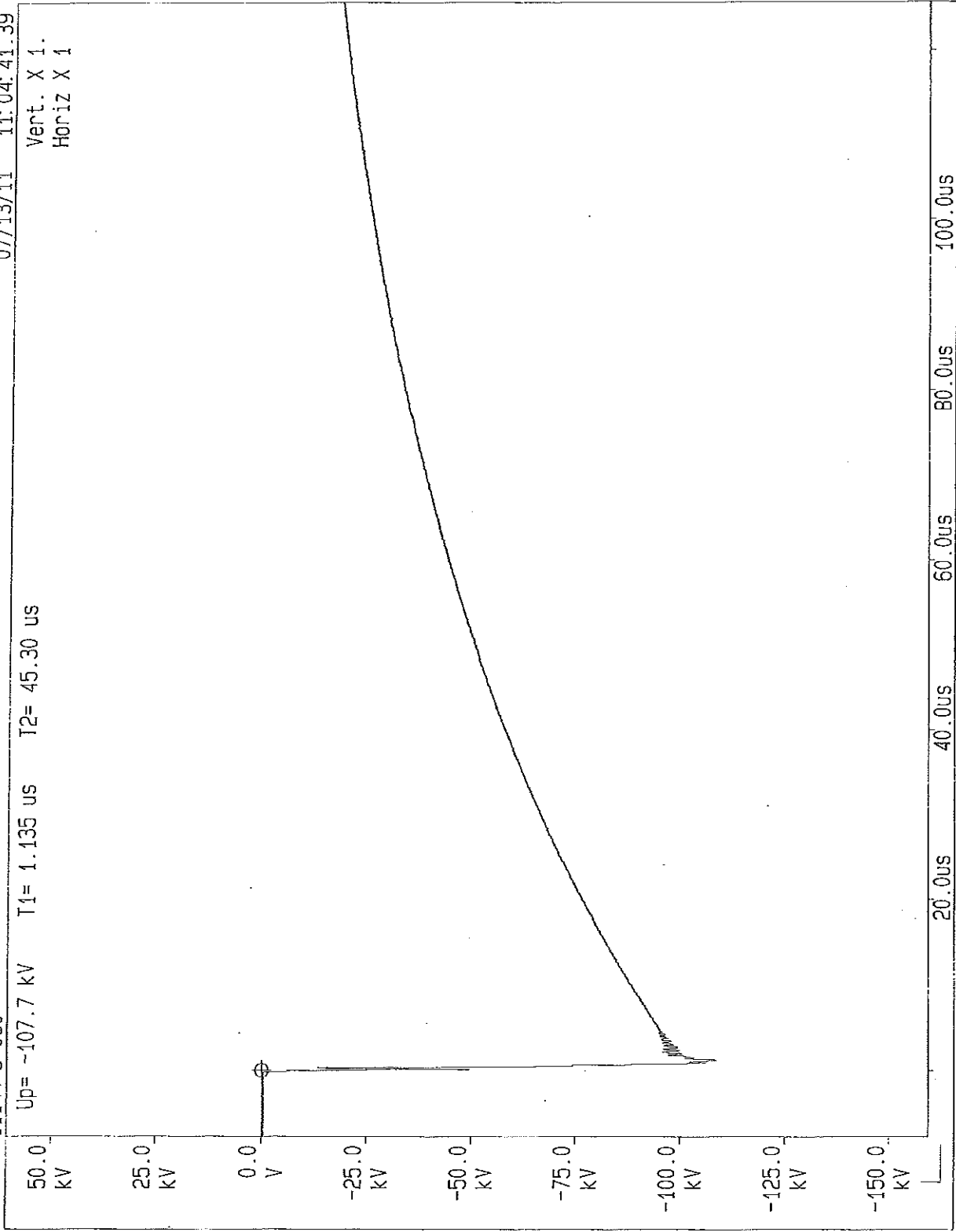


11144-D 060

07/13/11 11:04:41.39

Up= -107.7 kV T1= 1.135 us T2= 45.30 us

Vert. X 1.
Horiz X 1

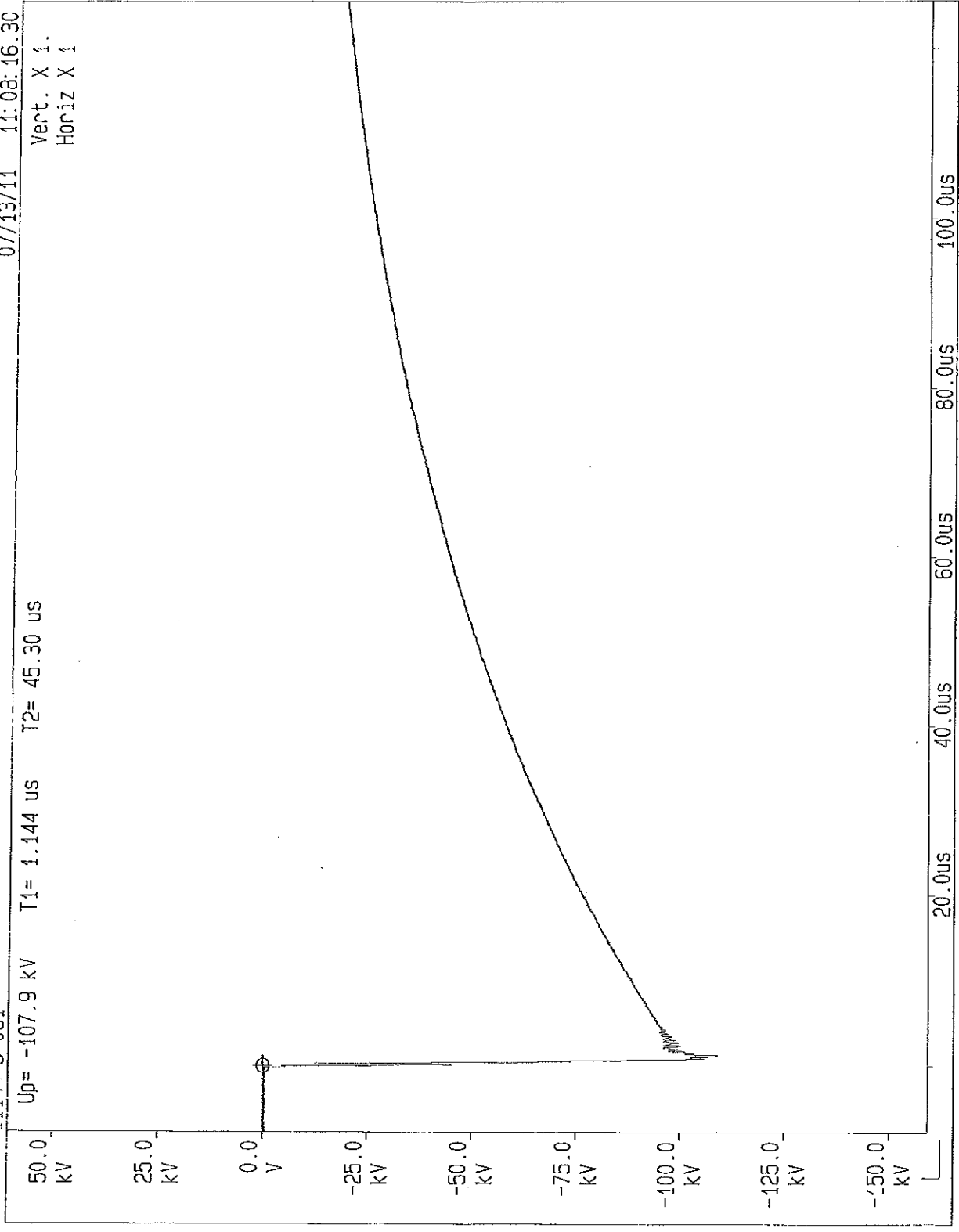


11144-D 061

07/13/11 11:08:16.30

Up= -107.9 kV T1= 1.144 us T2= 45.30 us

Vert. X 1.
Horiz X 1



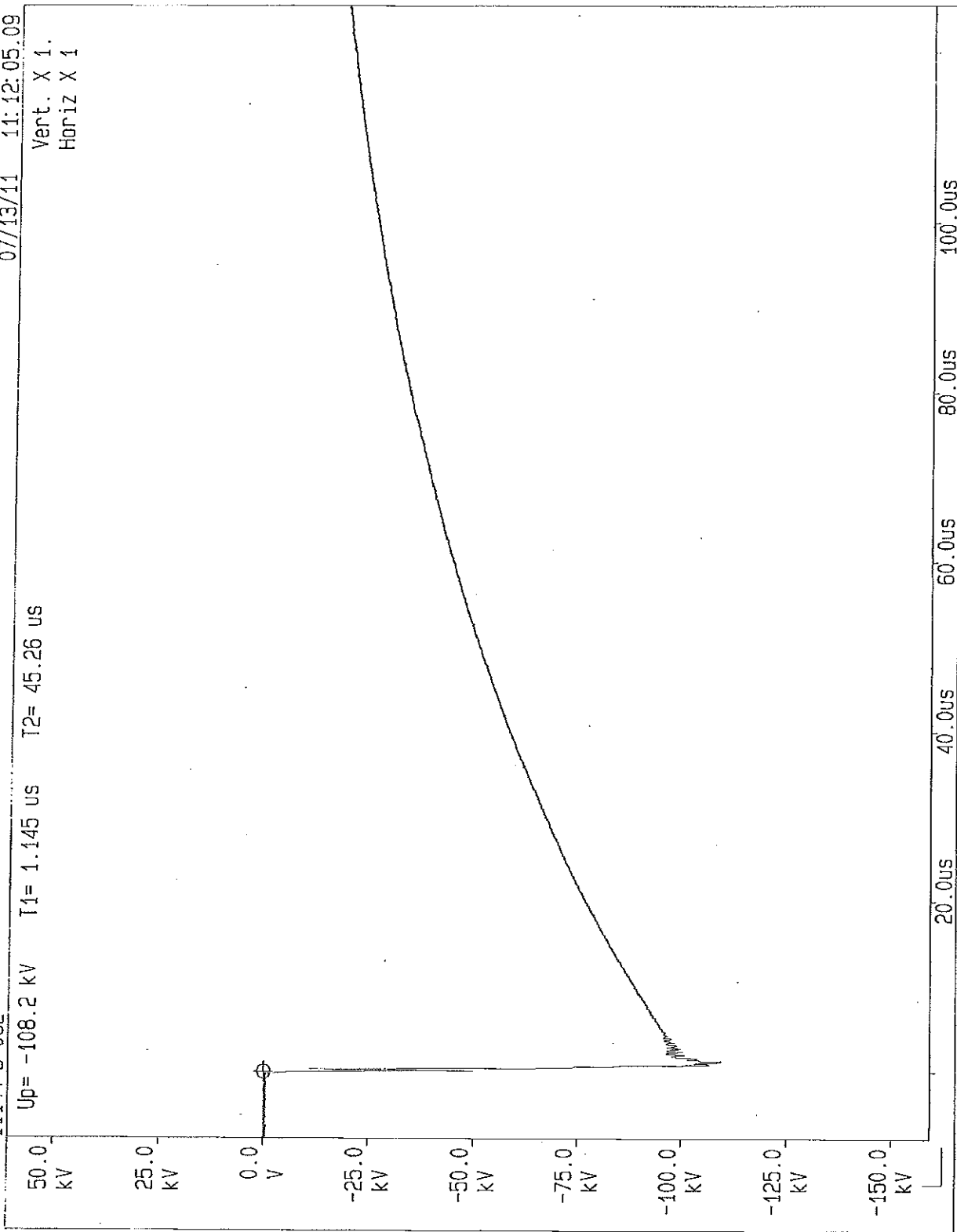
11144-D 062

07/13/11

11:12:05.09

Up= -108.2 kV T1= 1.145 us T2= 45.26 us

Vert. X 1.
Horiz X 1

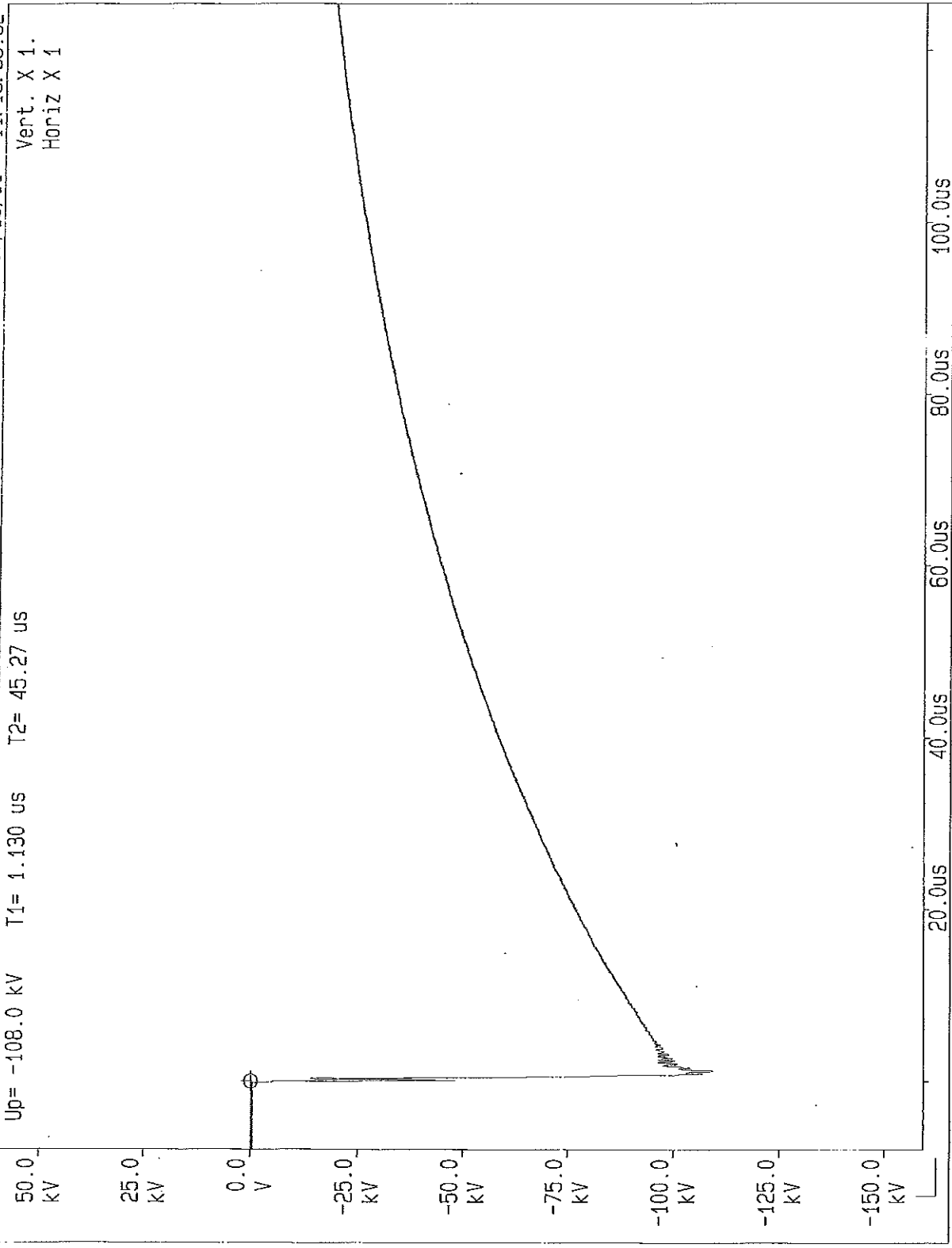


11144-D 063

07/13/11 11:15:35.82

Up= -108.0 kV T1= 1.130 us T2= 45.27 us

Vert. X 1.
Horiz X 1

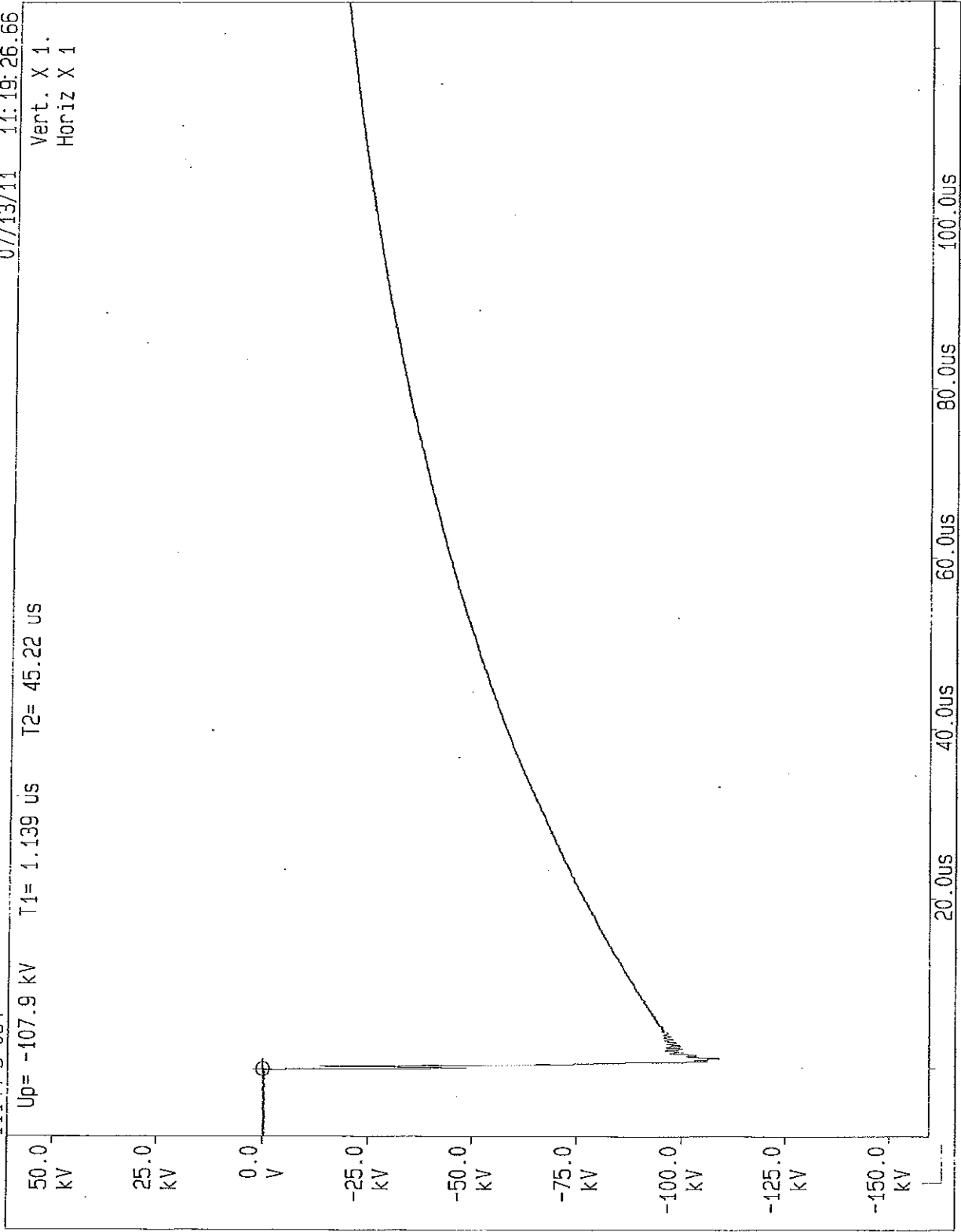


11144-D 064

07/13/11 11:19:26.66

Up= -107.9 kV T1= 1.139 us T2= 45.22 us

Vert. X 1.
Horiz X 1



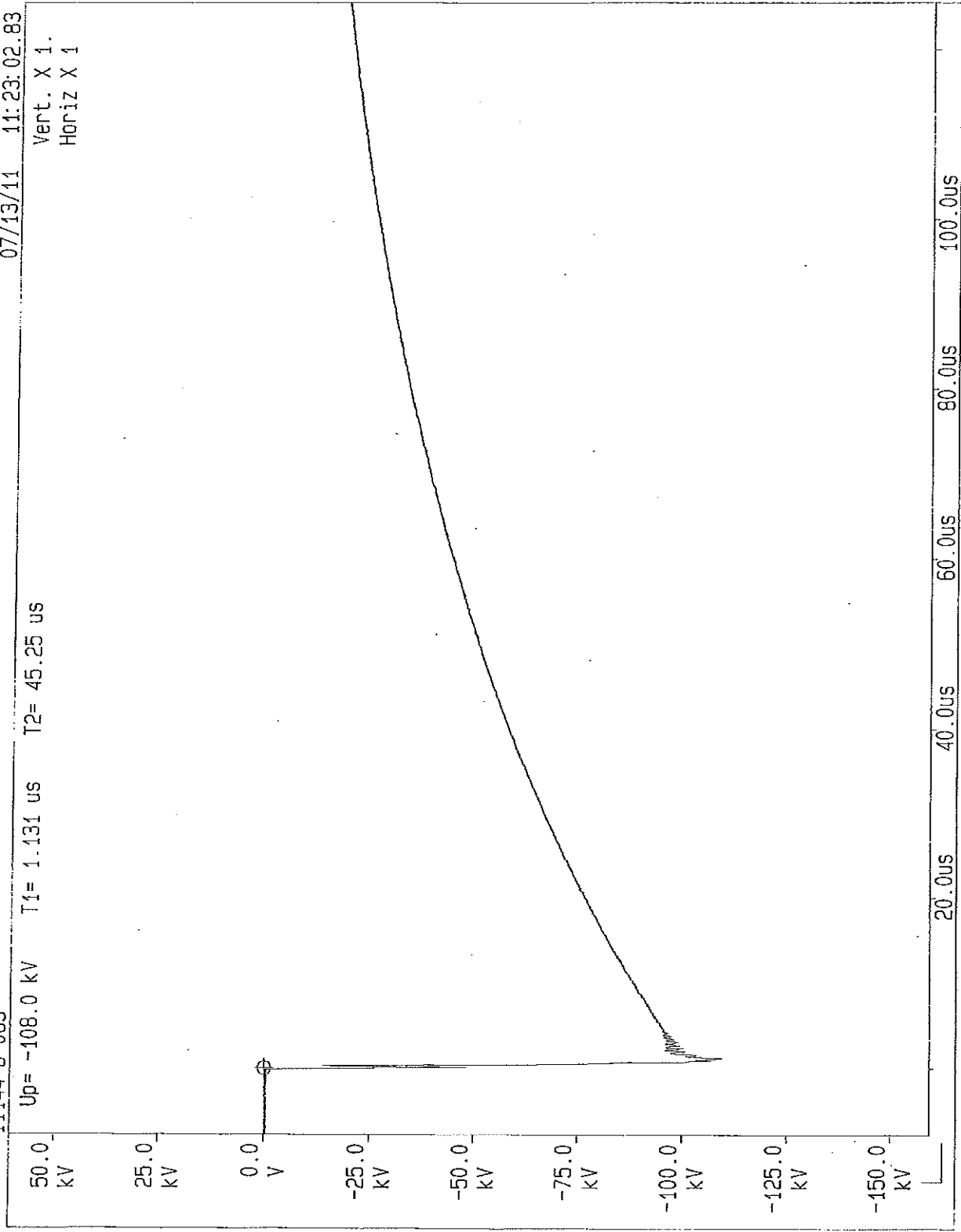
11144-D 065

07/13/11

11:23:02.83

Up= -108.0 kV T1= 1.131 us T2= 45.25 us

Vert. X 1.
Horiz X 1



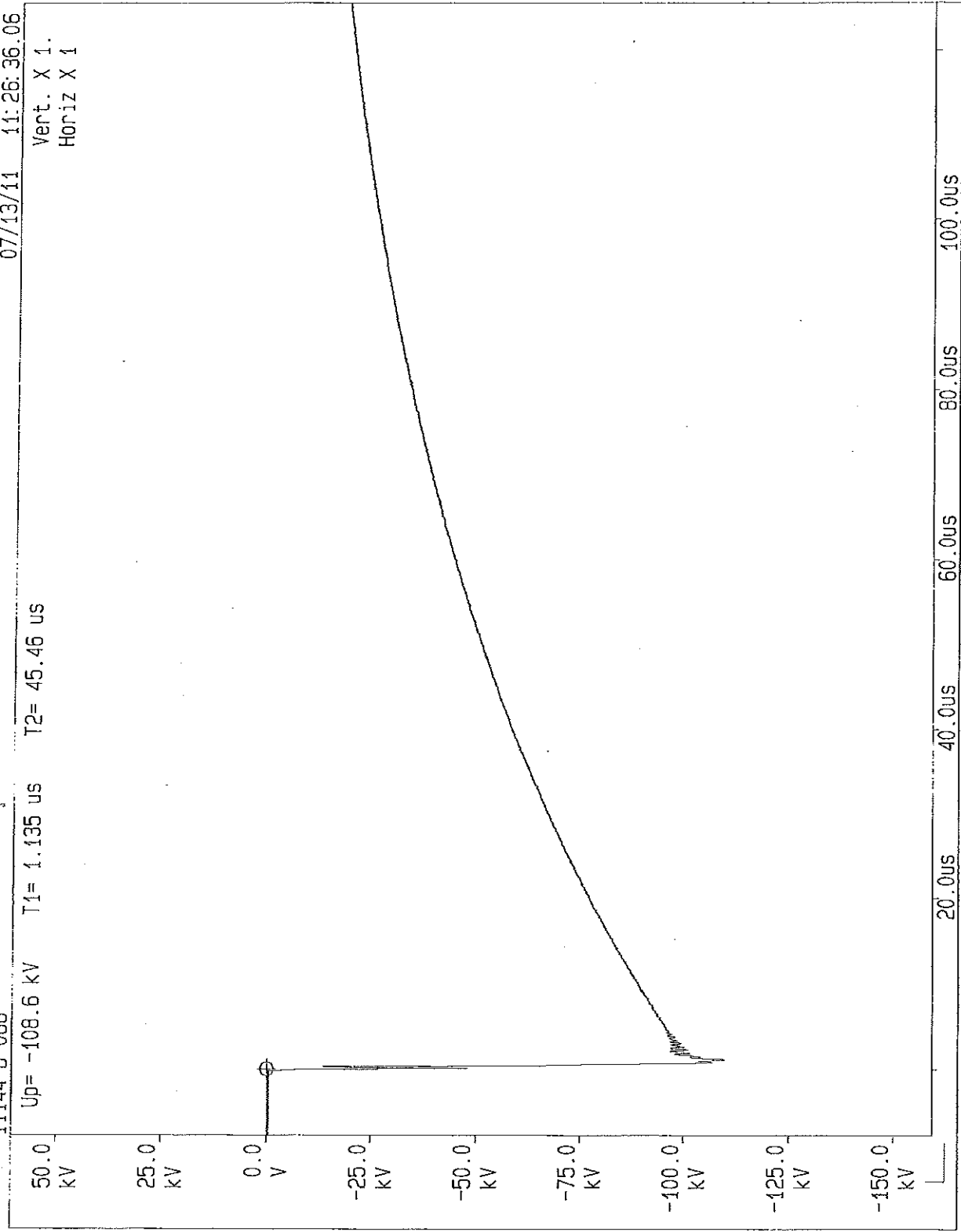
11144-D 066

07/13/11

11:26:36.06

Up= -108.6 kV T1= 1.135 us T2= 45.46 us

Vert. X 1.
Horiz X 1

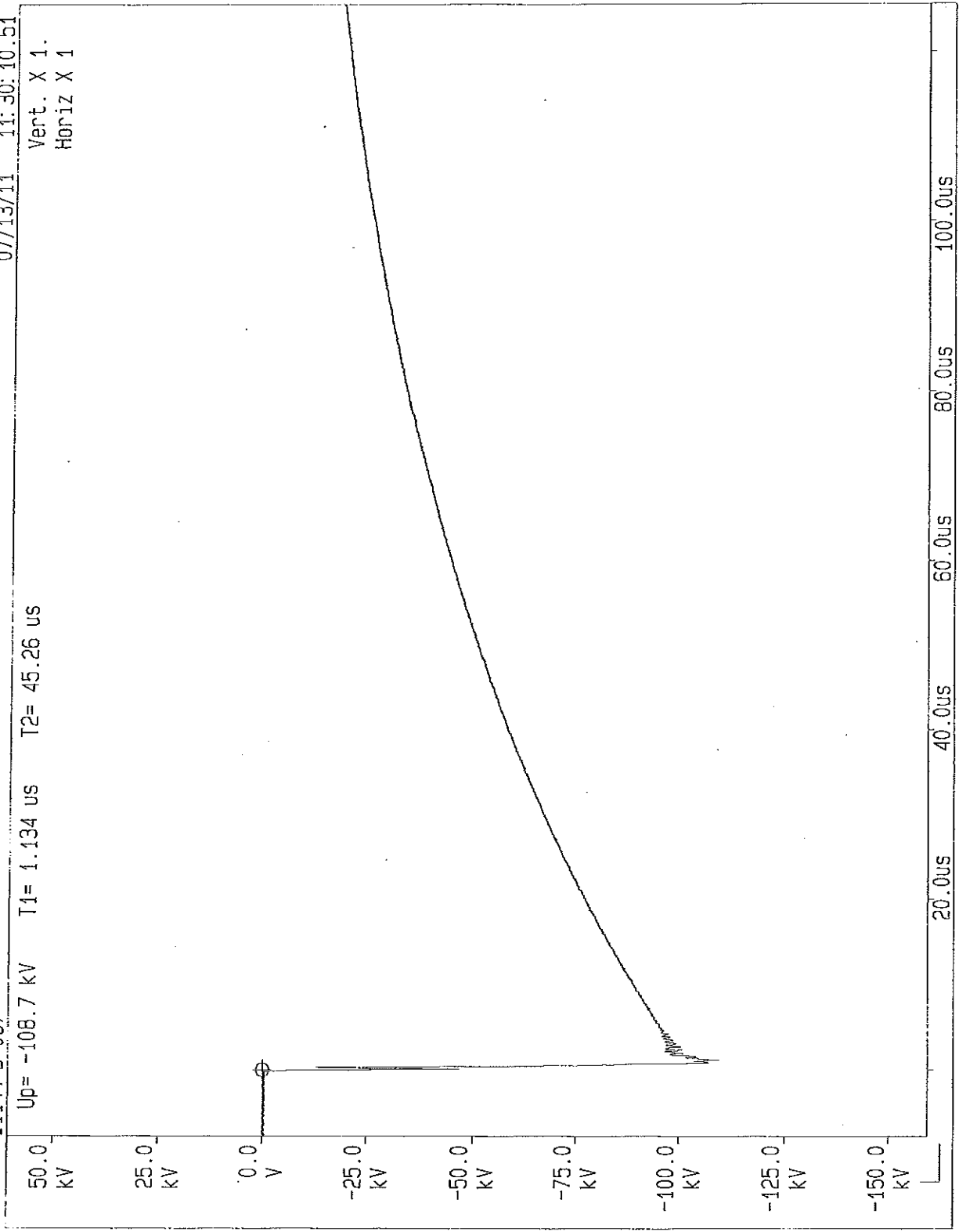


11144-D 067

07/13/11 11:30:10.51

Up= -108.7 kV T1= 1.134 us T2= 45.26 us

Vert. X 1.
Horiz X 1

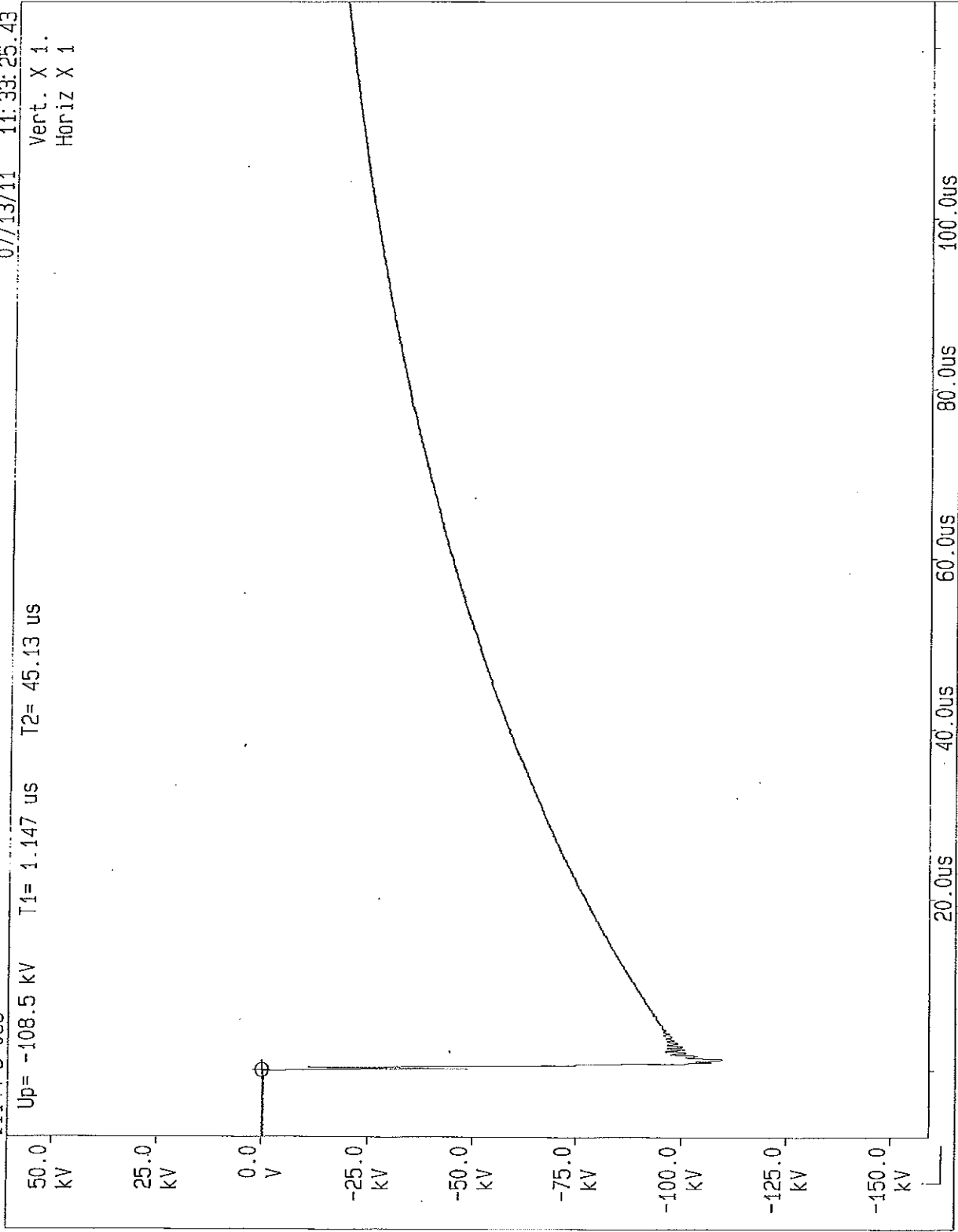


11144-D 068

07/13/11 11:33:25.43

Up= -108.5 kV T1= 1.147 us T2= 45.13 us

Vert. X 1.
Horiz X 1

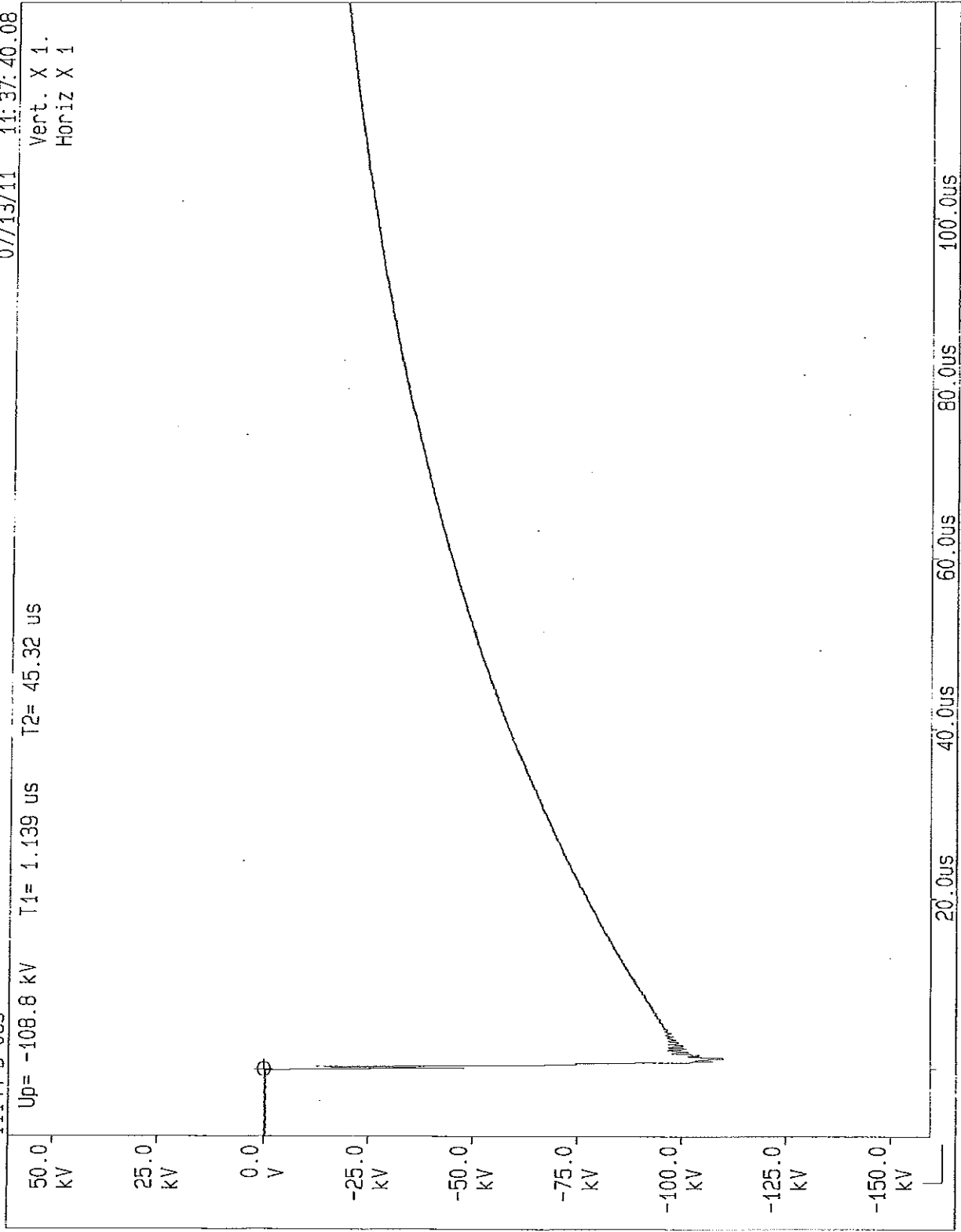


11144-D 069

07/13/11 11:37:40.08

Up= -108.6 kV T1= 1.139 us T2= 45.32 us

Vert. X 1.
Horiz X 1



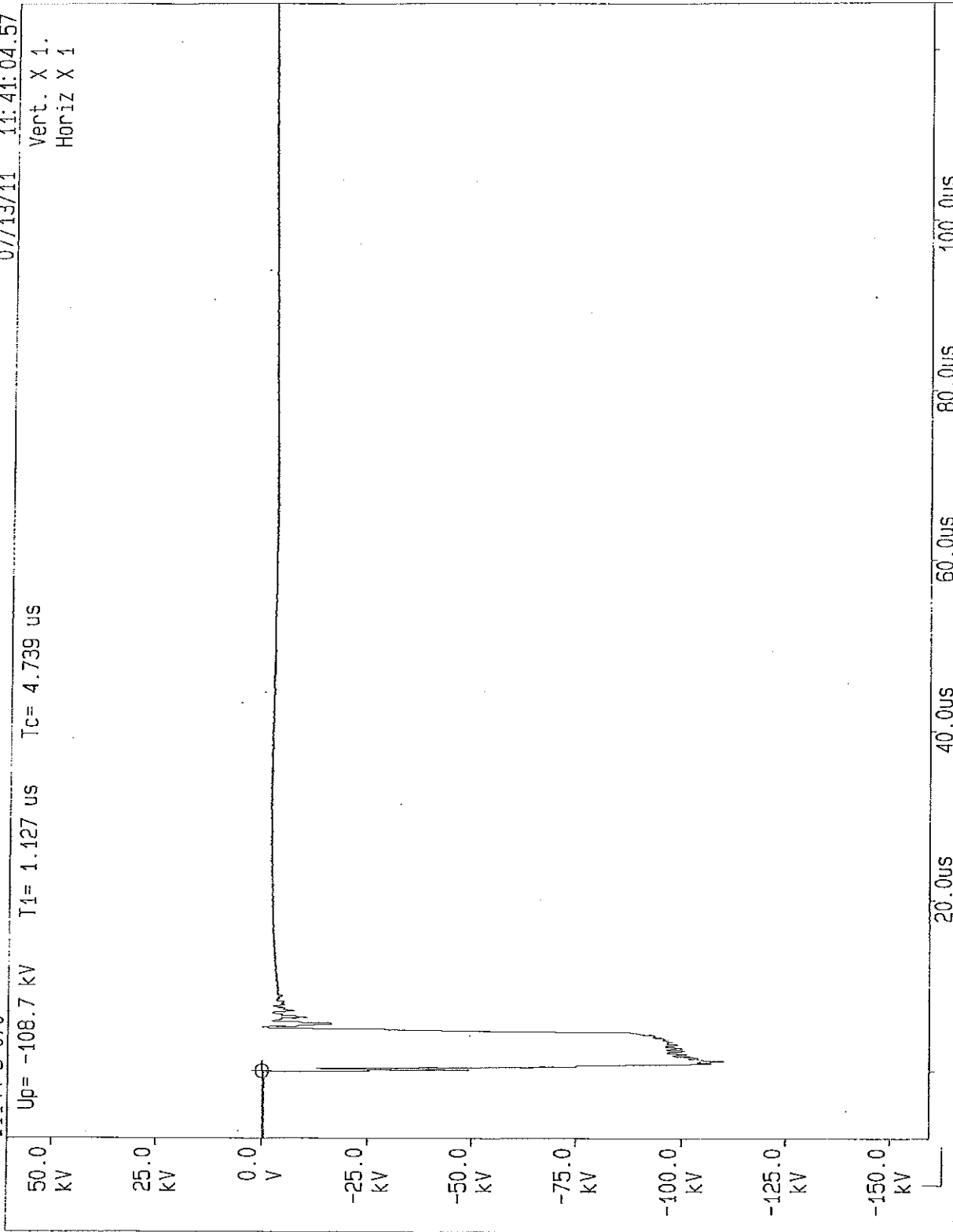
11144-D 070

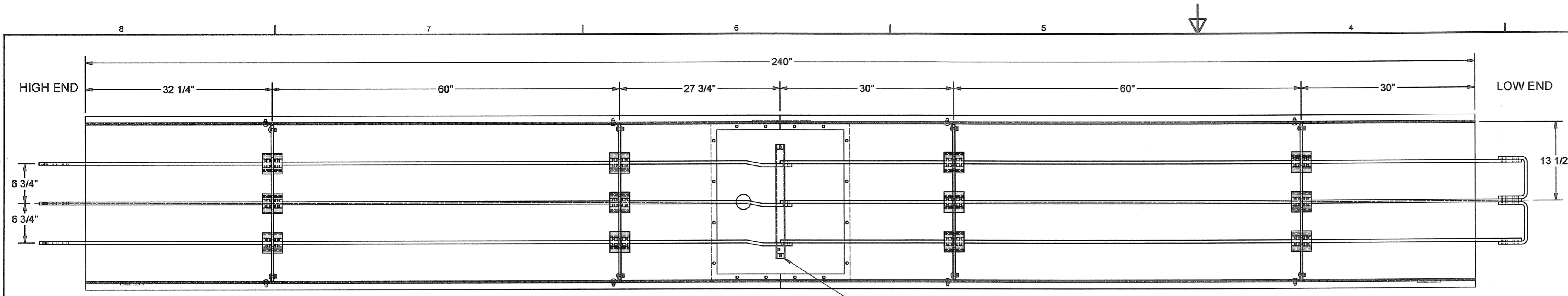
07/13/11

11:41:04.57

Up= -108.7 kV T1= 1.127 us Tc= 4.739 us

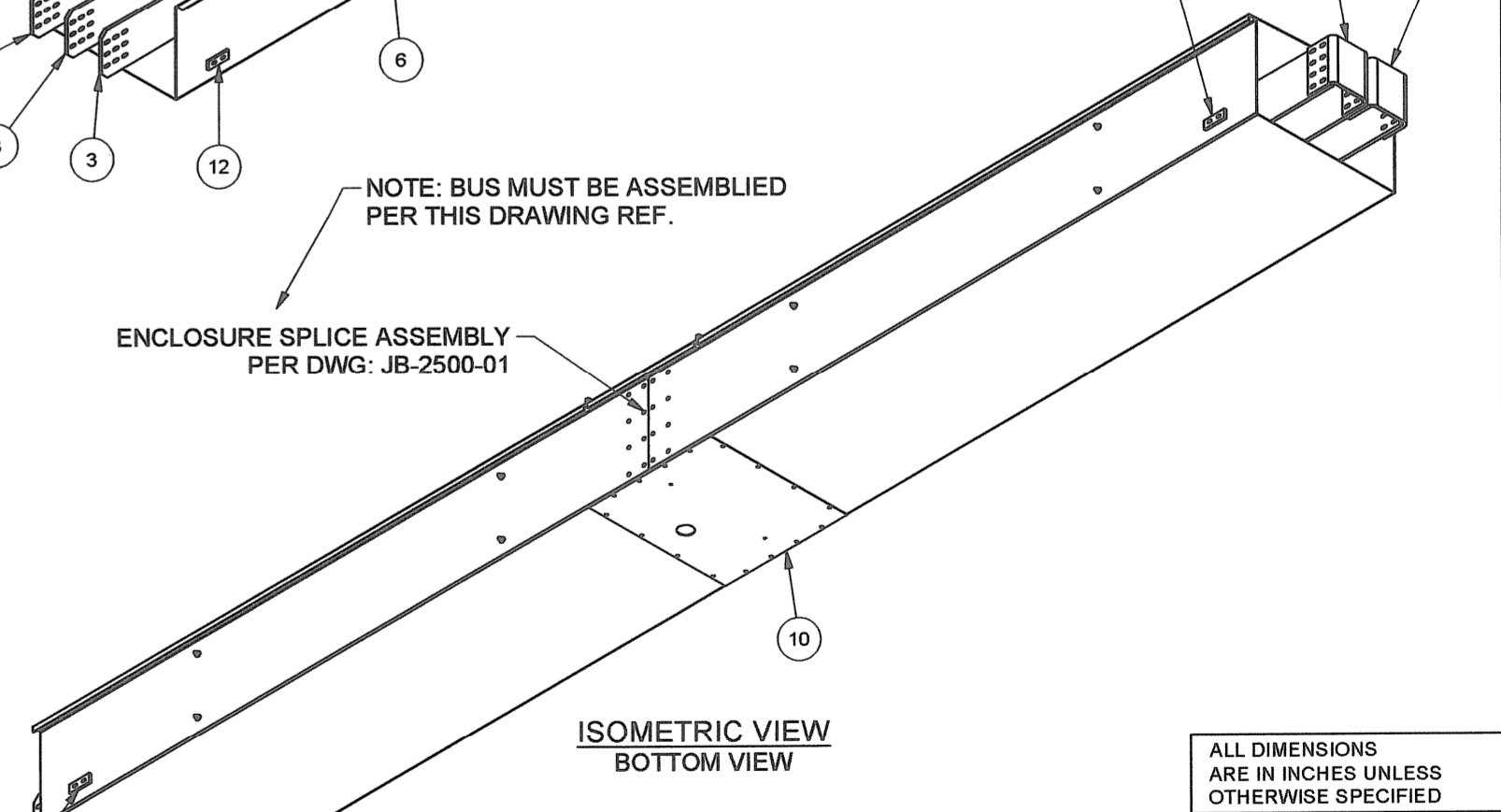
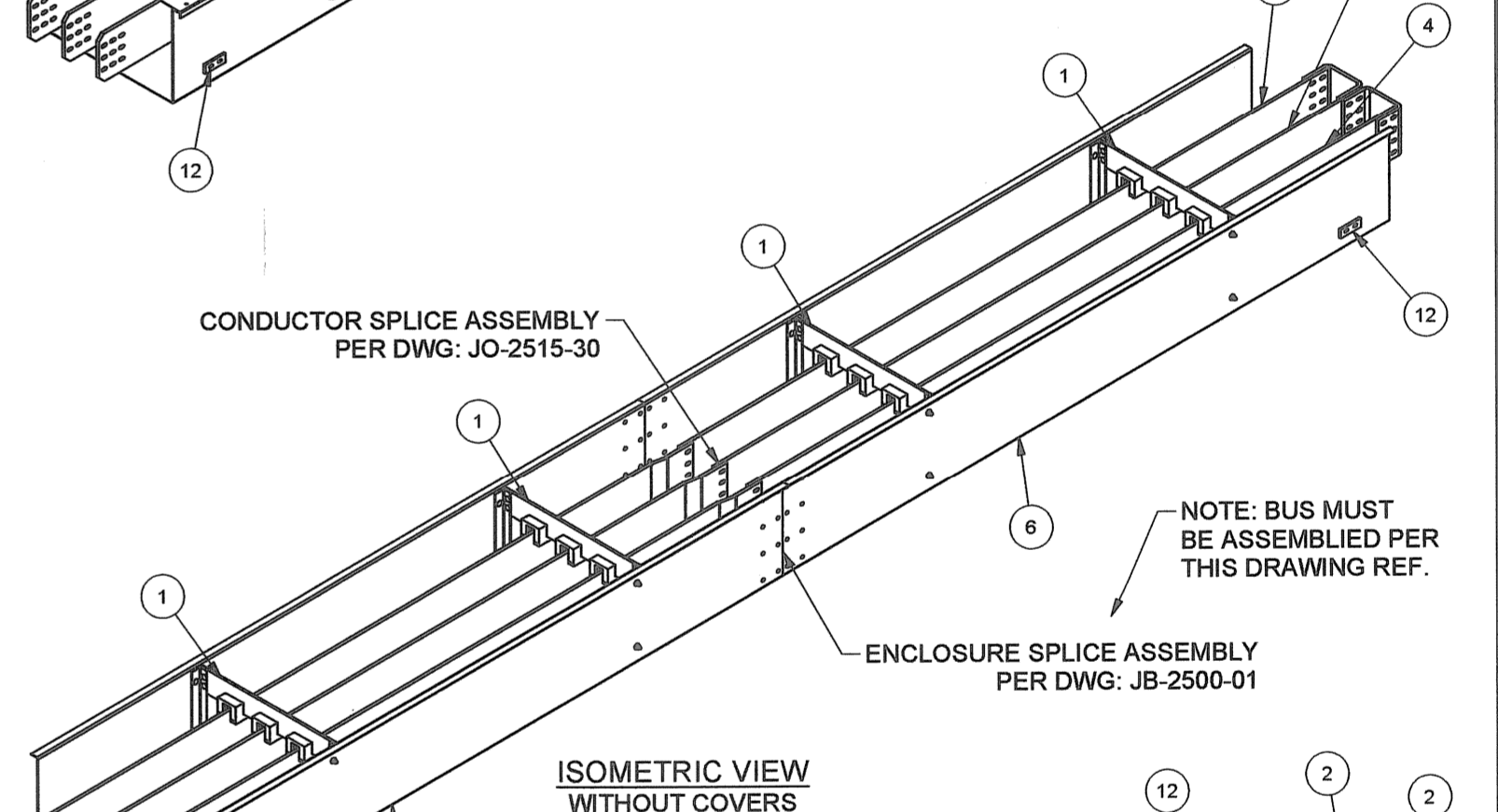
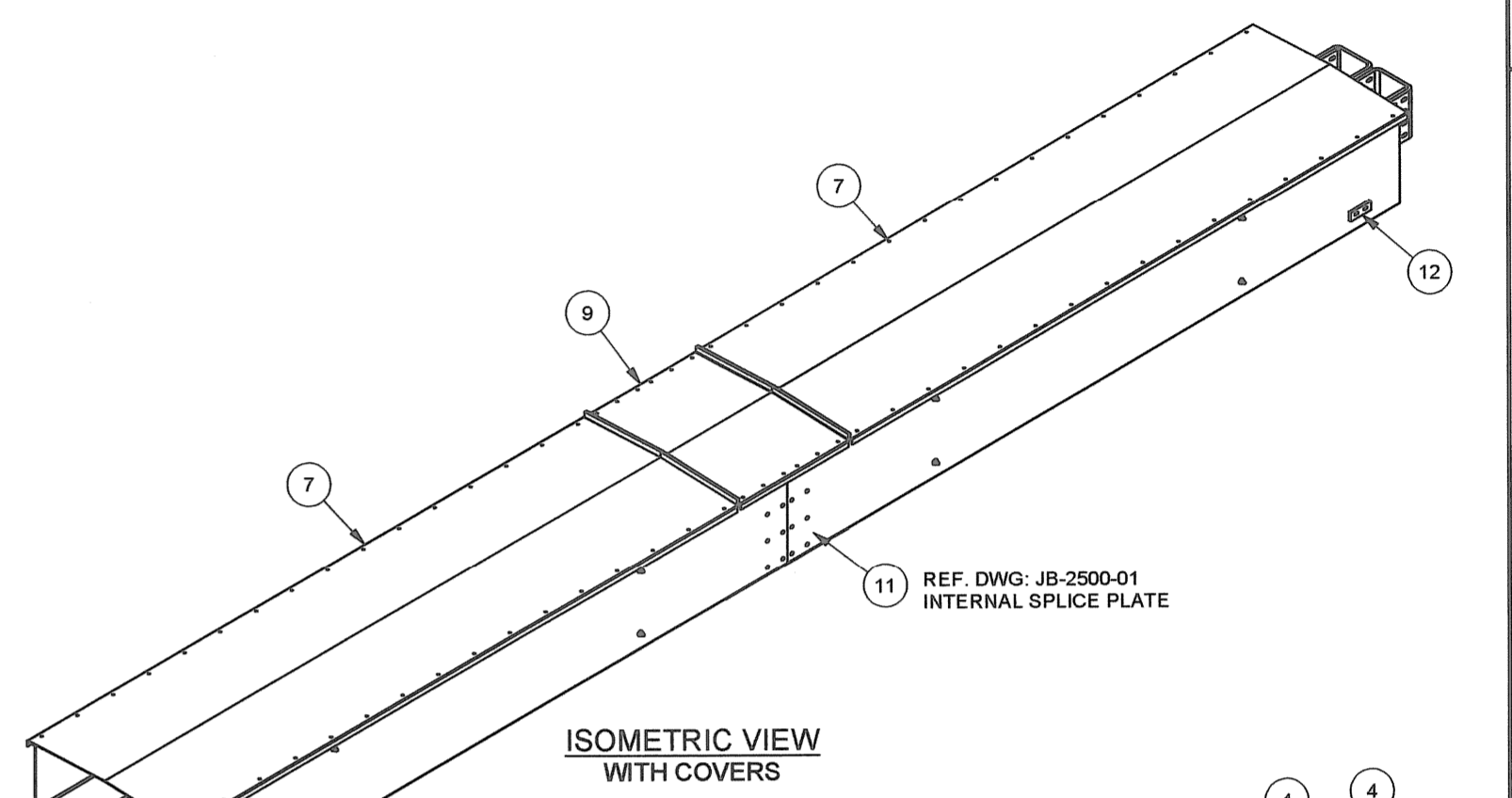
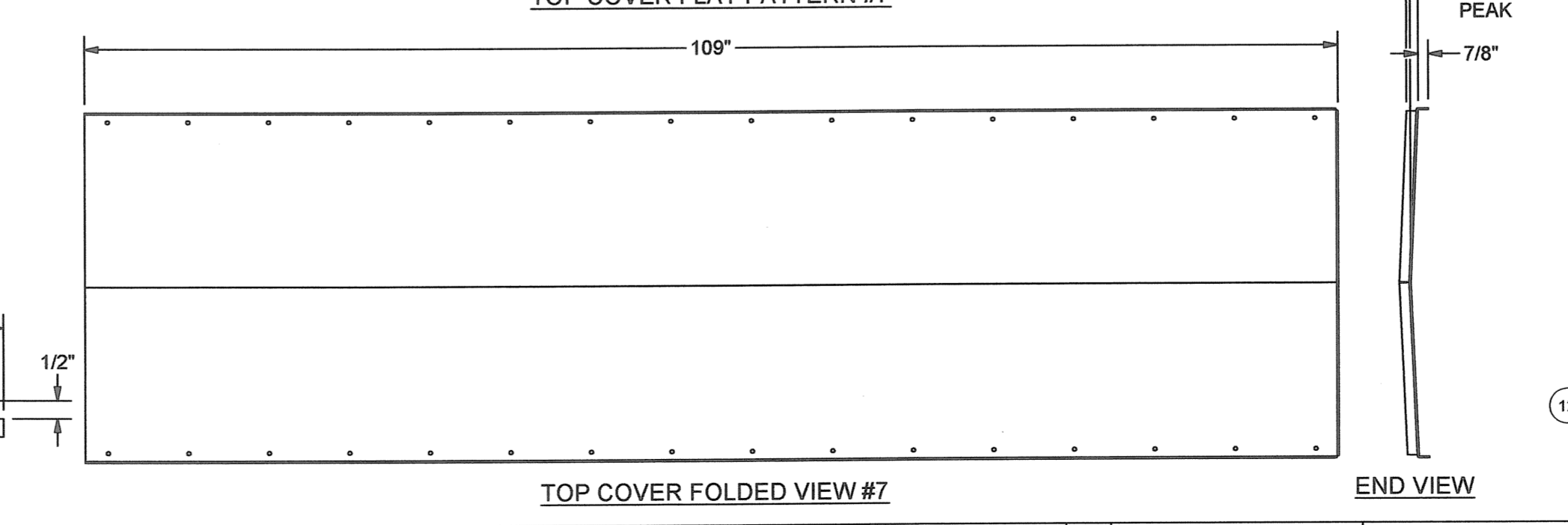
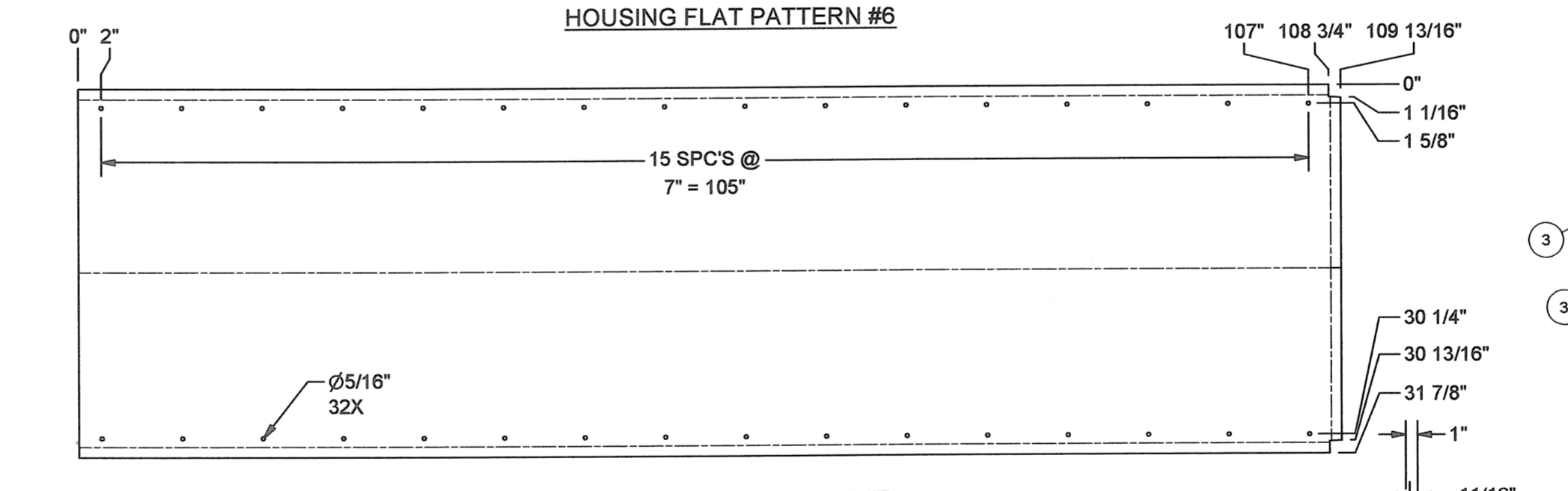
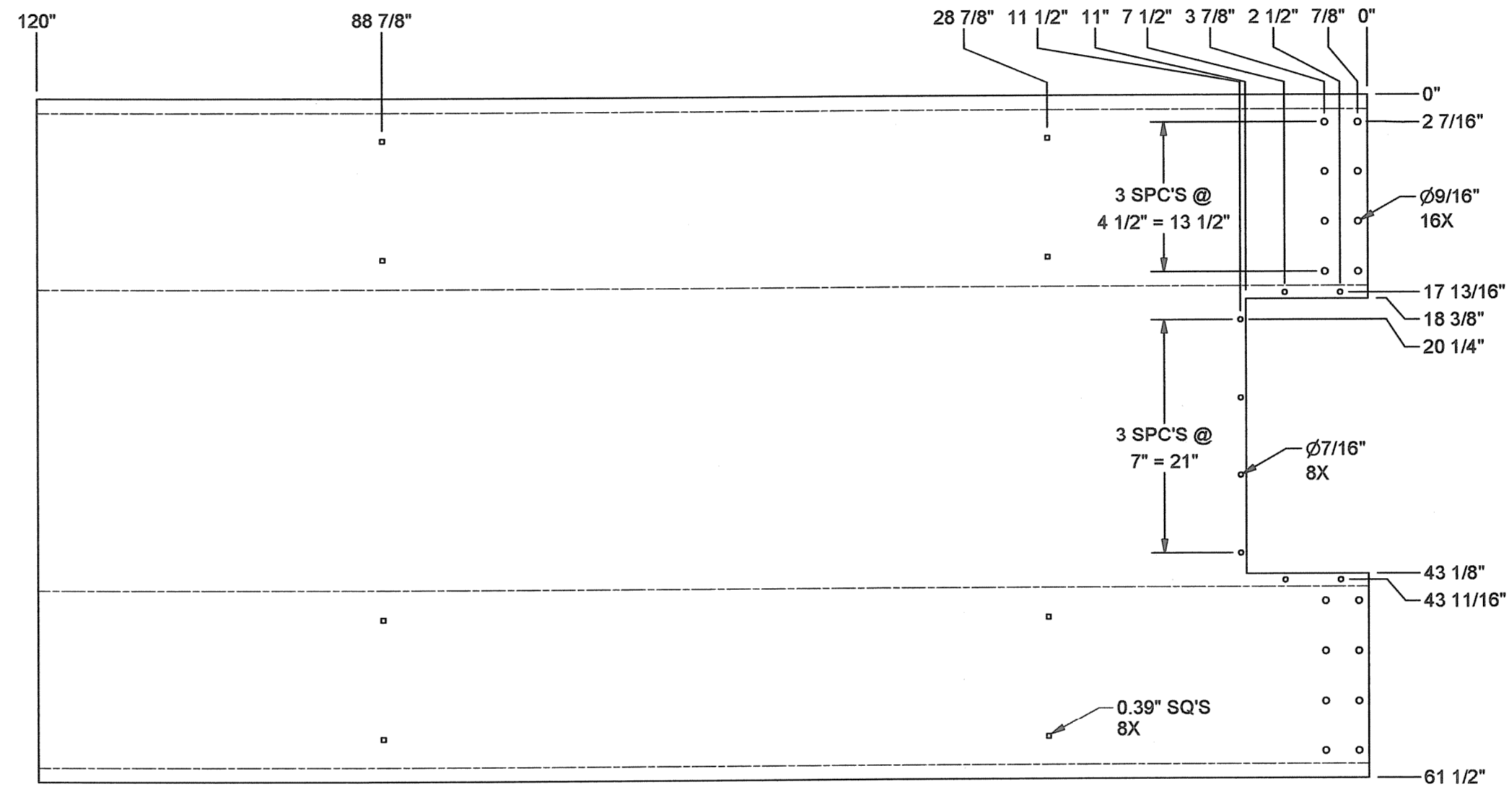
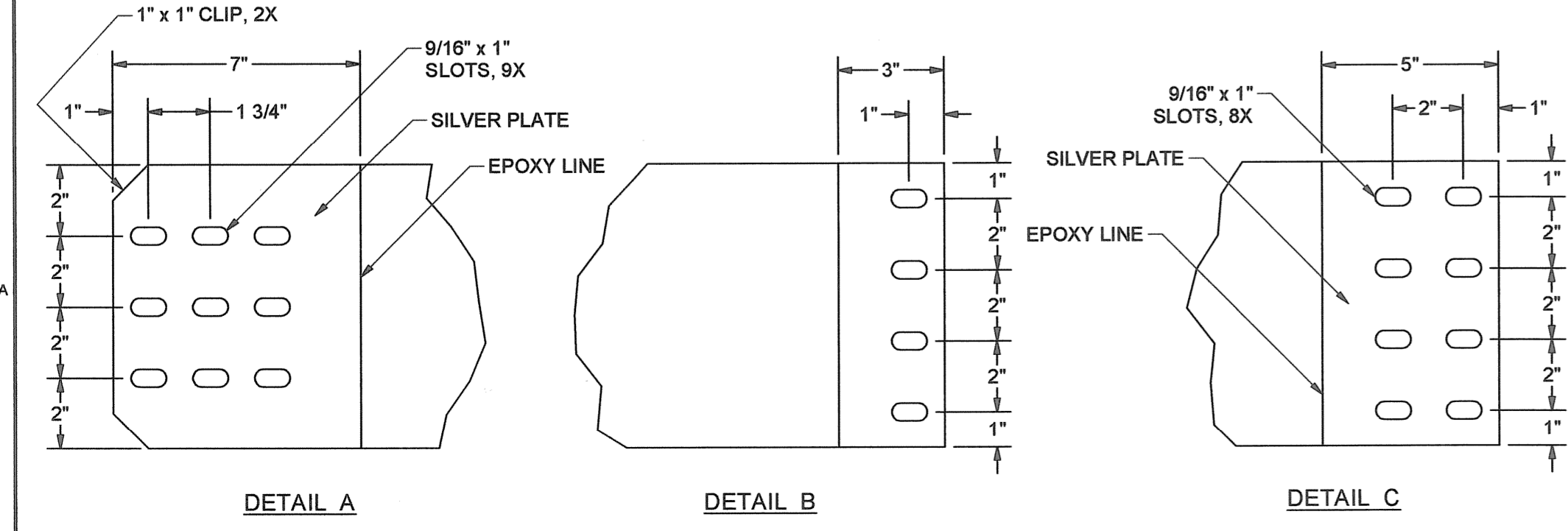
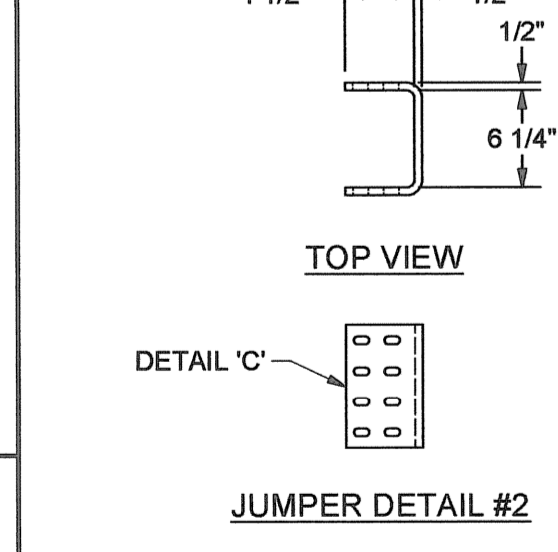
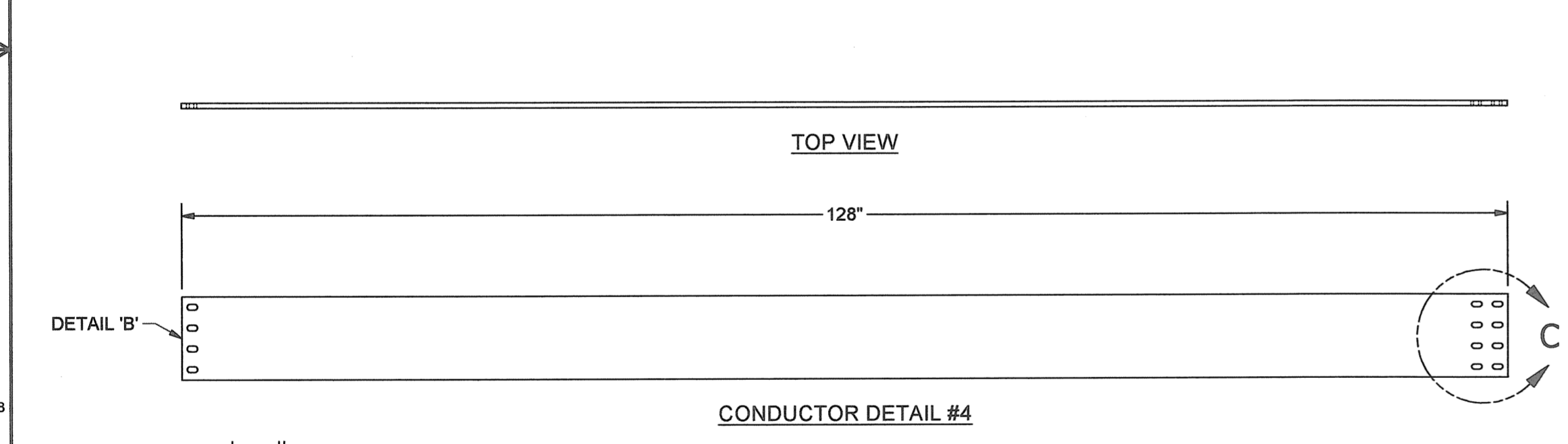
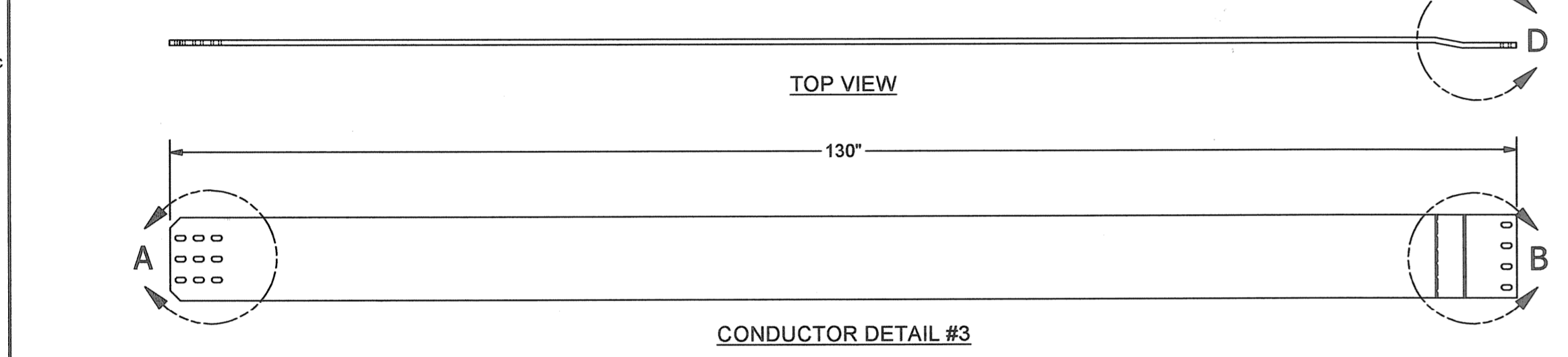
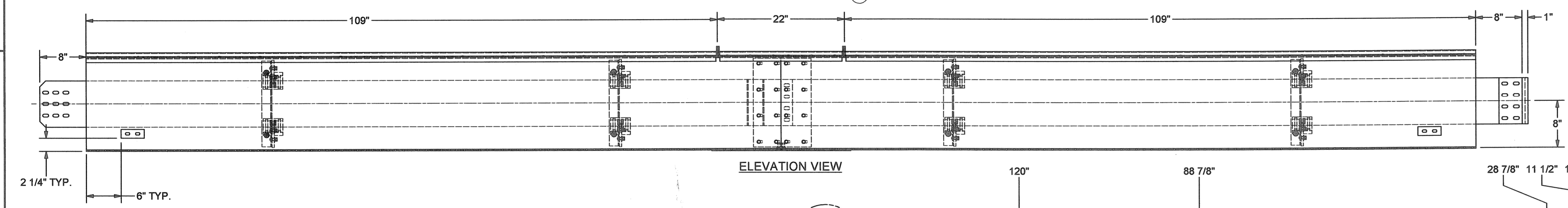
Vert. X 1.
Horiz X 1





ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	A-6756NOT7-2041	27" BUS, 1/2" x 8" SINGLE BAR
2	2	CAL12002049	BAR, RE, CU, 1/2" x 8"
3	3	CAL12002049	BAR, RE, CU, 1/2" x 8"
4	3	CAL12002049	BAR, RE, CU, 1/2" x 8"
5	3	CAL21500586	BOOT, SPLICE, 8" BAR, B-340-586
6	2	CAL41023108	SHEET, ALUM, SMOOTH, 3003-H14, .125
7	2	CAL41023301	SHEET, ALUM, SMOOTH, 3003-H14, .125
8	1	CAL71001040	240V 1000W HEATER
9	1	JB-2501-01	16" X 27" BUS HORIZONTAL TOP
10	1	JB-2502-01	27" BUS BOTTOM SPLICE COVER
11	2	JB-2503-01	16" BUS SPLICE PLATE
12	2	K-2000	GROUND PAD ASSEMBLY

PAINT: ANSI-61 HIGH GLOSS



ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ±.06 UNLESS NOTED AS BELOW
XXX = ±.02
ANGLES ±.2

3	2	1
8/10/2011 JB / ADDED DETAIL #12, GROUND PAD	8/3/2011 SP / RP ADDED NOTE AT SPLICE	8/1/11 JB / KG CERTIFIED FOR CONSTRUCTION

TEST BUS
15.5 kV, 3000A, 62 kA ASYMM
CUST: N/A
FOR: UL CERTIFICATION

ORDER NO. N/A	WORK ORDER # CAL6756NOT7
DRN JB	CH KG
DATE 06/01/11	SCALE: NTS
CUSTOMER PC# N/A	ISS 3
	6756NOT7-SA