The EMC Shop

Calibration Laboratory Cert: 5518.01

ISO/IEC 17025:2017 and ANSI/NCSL Z540.1-1994

Accredited Calibration Certificate

Customer:	
Order / RMA:	
Certificate:	
Product:	ESD Simulator
Manufacturer:	TESEQ
Model:	NSG438A
Serial:	187
Notes:	150pF / 330Ω INA 4380 - S/N: 38A187
Report Issued:	05/29/2025
Date of Calibration:	05/29/2025
Next Calibration:	

The next calibration date is defined by the equipment user/owner.

The above instrument was tested and found to be within the Manufacturer's specifications at the tested parameters. The results of the tests performed are held on file at The EMC Shop. The calibration was carried out in accordance with the general requirements of ISO/IEC 17025-2017 and ANSI Z-540-1 using laboratory standards which are traceable to the SI International System of Quantities through the National Institute of Standards and Technology (NIST), and or other Accredited bodies except where none exist. Tests are carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. This certificate shall not be reproduced except in full without the written approval of the laboratory. The uncertainty results meet the requirements of the ISO/IEC 17025-2017 standard and ILAC Doc.P14. Statements of conformity (e.g. Pass or Fail) are made in accordance with Simple Acceptance decision rules as defined in ILAC G8 with a TUR of 4:1 or greater. The customer is responsible for considering whether the inclusion of the uncertainties shown on the certificate would prevent their use of the equipment based on their risk evaluations. Results are accredited unless annotated with an asterisk "*". The results presented are only applicable to the Model/Serial number shown.

Ambient Conditions of Laboratory	
Temperature (°C):	**26.3**
Relative Humidity (%):	**38.0**

Technician: **Trevor Einspahr**

Technician Signature: _____

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Calibration Equipment				
Model	*Description*	*Serial Number*	*Certificate*	*Due Date*
ECO-2G	Oscilloscope	SDS62CCD5R0146	5523631031001725	6/17/2025
CST2	ESD Target and Attenuator	003170	A25011501RY	1/15/2026
ESVM	Electrostatic Voltmeter	20200105-01	A24062101TE	6/21/2025

Calibration method used: IEC 61000-4-2:Ed2

Contact discharge: Peak Voltage / Zsys (0.068848) = Peak Current

Condition as found:	In tolerance
Condition as left:	In tolerance

Measuring Uncertainties	
ESD Voltage	± 2.1%
ESD Current	± 2.8%
Rise Time	± 3.2%
Current at 30ns and 60ns	± 2.8%

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%

IEC 61000-4-2 Ed.2 defines five discharges per measured parameter. Each of the pulses must individually fulfill the ESD pulse specification. The shown measurements of peak and rise time are the mean value calculated from all pulses.

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Air Discharge DC Output Voltage

IEC Specification: ± 5% of Nominal Value

IEC-Level	Nominal Voltage (kV)	Measured Voltage (kV)	Deviation	Verdict
Pos. 1	2.00	**1.96**	2.0%	PASS
Pos. 2	4.00	**3.99**	0.2%	PASS
Pos. X	6.00	**5.99**	0.2%	PASS
Pos. 3	8.00	**7.97**	0.4%	PASS
Pos. 4	15.00	**15.13**	0.9%	PASS
Pos. X	25.00	**24.63**	1.5%	PASS
Pos. X	30.00	**29.43**	1.9%	PASS
Neg. 1	-2.00	**-2.02**	1.0%	PASS
Neg. 2	-4.00	**-4.03**	0.8%	PASS
Neg. X	-6.00	**-6.03**	0.5%	PASS
Neg. 3	-8.00	**-8.02**	0.2%	PASS
Neg. 4	-15.00	**-14.84**	1.1%	PASS
Neg. X	-25.00	**-24.84**	0.6%	PASS
Neg. X	-30.00	**-29.76**	0.8%	PASS

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Contact Discharge Pulse Measurements

Peak Current

IEC Specification: ± 15% of Nominal Value

Average Peak Voltage / Zsys (0.068848) = Average Peak Current

IEC- Level	Test Voltage (kV)	Nominal Current (A)	Measured Voltage (V)	Peak Current (A)	Deviation	Verdict
Pos. 1	2.00	7.50	**0.497**	7.22	3.7%	PASS
Pos. 2	4.00	15.00	**1.03**	15.00	0.0%	PASS
Pos. 3	6.00	22.50	**1.54**	22.40	0.5%	PASS
Pos. 4	8.00	30.00	**2.05**	29.82	0.6%	PASS
Pos. X	15.00	56.25	**3.92**	56.95	1.2%	PASS
Pos. X	25.00	93.75	**6.40**	92.94	0.9%	PASS
Neg. 1	-2.00	-7.50	**-0.500**	-7.26	3.2%	PASS
Neg. 2	-4.00	-15.00	**-1.03**	-14.96	0.3%	PASS
Neg. 3	-6.00	-22.50	**-1.55**	-22.56	0.3%	PASS
Neg. 4	-8.00	-30.00	**-2.09**	-30.28	0.9%	PASS
Neg. X	-15.00	-56.25	**-3.83**	-55.62	1.1%	PASS
Neg. X	-25.00	-93.75	**-6.32**	-91.77	2.1%	PASS

Risetime

IEC Specification: 800ps ± 25%

IEC- Level	Test Voltage (kV)	Measured Risetime (ps)	Deviation	Verdict
Pos. 1	2.00	**822**	2.8%	PASS
Pos. 2	4.00	**818**	2.3%	PASS
Pos. 3	6.00	**840**	5.0%	PASS
Pos. 4	8.00	**825**	3.1%	PASS
Pos. X	15.00	**847**	5.9%	PASS
Pos. X	25.00	**845**	5.6%	PASS
Neg. 1	-2.00	**815**	1.9%	PASS
Neg. 2	-4.00	**835**	4.4%	PASS
Neg. 3	-6.00	**843**	5.4%	PASS
Neg. 4	-8.00	**853**	6.6%	PASS
Neg. X	-15.00	**843**	5.4%	PASS
Neg. X	-25.00	**859**	7.4%	PASS

Curve Decay Points at 30 and 60 ns

IEC Specification: ± 30% of Nominal Value

Average Peak Voltage / Zsys (0.068848) = Average Peak Current

30ns

IEC- Level	Test Voltage (kV)	Nominal Current (A)	Measured Voltage (V)	Peak Current (A)	Deviation	Verdict
Pos. 1	2.00	4.00	**0.265**	3.85	3.8%	PASS
Pos. 2	4.00	8.00	**0.566**	8.22	2.8%	PASS
Pos. 3	6.00	12.00	**0.850**	12.35	2.9%	PASS
Pos. 4	8.00	16.00	**1.13**	16.35	2.2%	PASS
Pos. X	15.00	30.00	**2.23**	32.38	7.9%	PASS
Pos. X	25.00	50.00	**3.79**	55.05	10.1%	PASS
Neg. 1	-2.00	-4.00	**-0.279**	-4.05	1.3%	PASS
Neg. 2	-4.00	-8.00	**-0.581**	-8.44	5.5%	PASS
Neg. 3	-6.00	-12.00	**-0.869**	-12.62	5.2%	PASS
Neg. 4	-8.00	-16.00	**-1.17**	-17.01	6.3%	PASS
Neg. X	-15.00	-30.00	**-2.19**	-31.81	6.0%	PASS
Neg. X	-25.00	-50.00	**-3.73**	-54.18	8.4%	PASS

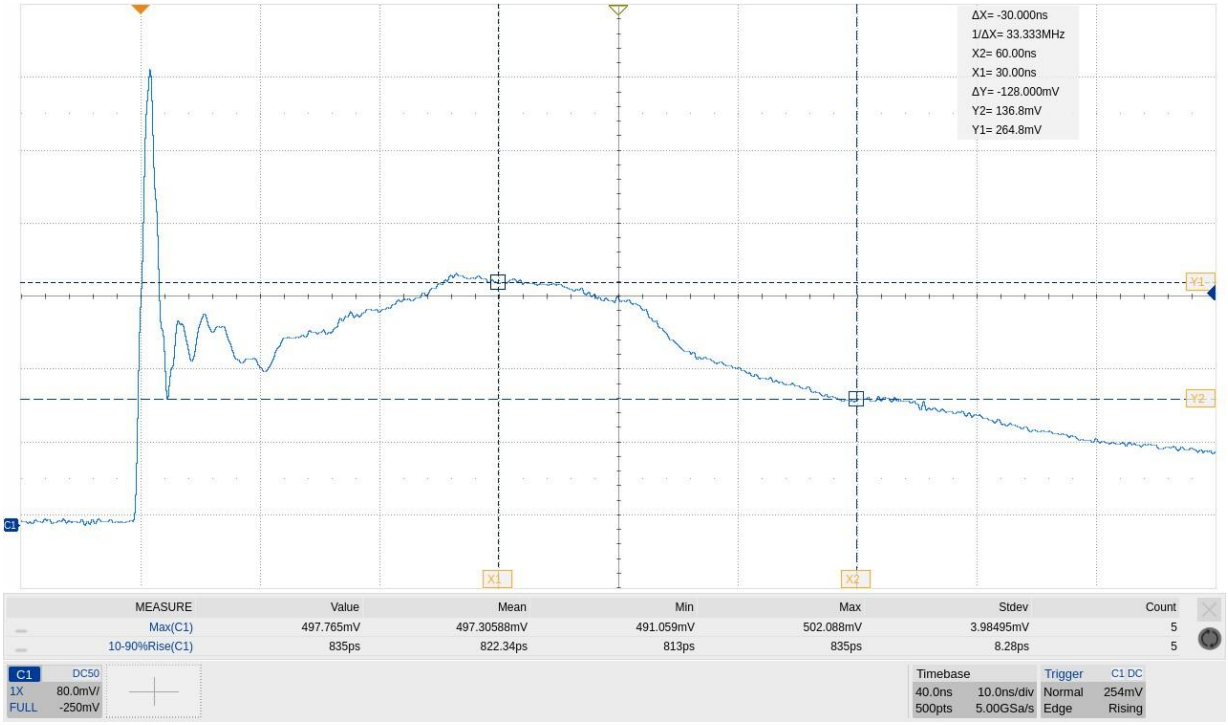
IEC Specification: ± 30% of Nominal Value

Average Peak Voltage / Zsys (0.068848) = Average Peak Current

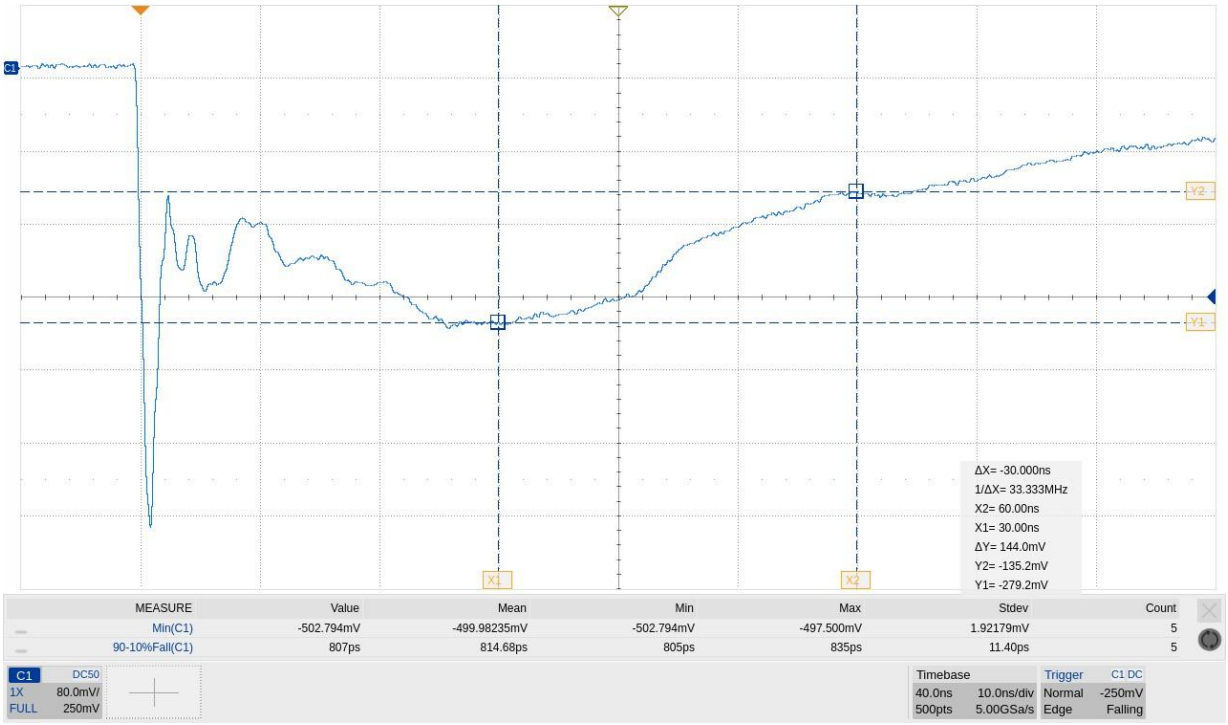
60ns

IEC- Level	Test Voltage (kV)	Nominal Current (A)	Measured Voltage (V)	Peak Current (A)	Deviation	Verdict
Pos. 1	2.00	2.00	**0.137**	1.99	0.7%	PASS
Pos. 2	4.00	4.00	**0.285**	4.14	3.5%	PASS
Pos. 3	6.00	6.00	**0.446**	6.48	8.0%	PASS
Pos. 4	8.00	8.00	**0.566**	8.22	2.8%	PASS
Pos. X	15.00	15.00	**1.14**	16.62	10.8%	PASS
Pos. X	25.00	25.00	**1.94**	28.18	12.7%	PASS
Neg. 1	-2.00	-2.00	**-0.135**	-1.96	2.0%	PASS
Neg. 2	-4.00	-4.00	**-0.278**	-4.04	0.9%	PASS
Neg. 3	-6.00	-6.00	**-0.430**	-6.25	4.1%	PASS
Neg. 4	-8.00	-8.00	**-0.566**	-8.22	2.8%	PASS
Neg. X	-15.00	-15.00	**-1.06**	-15.38	2.5%	PASS
Neg. X	-25.00	-25.00	**-1.82**	-26.44	5.7%	PASS

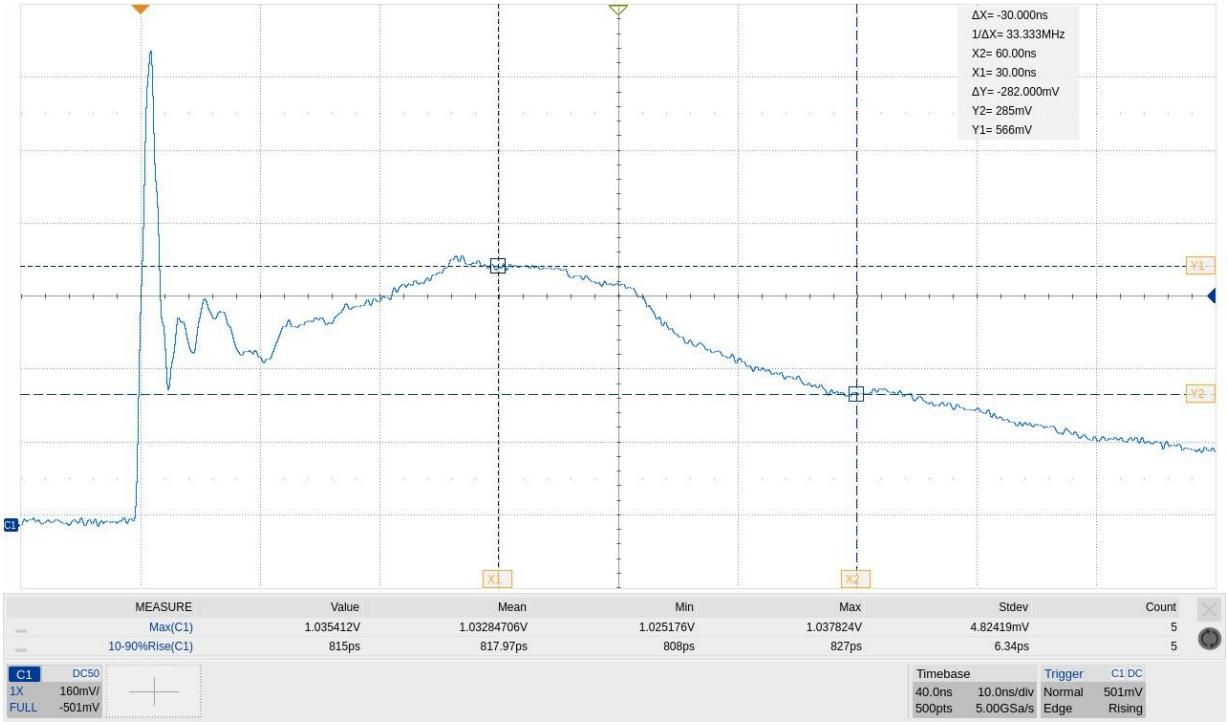
2kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= -128.000mV
Y2= 136.8mV
Y1= 264.8mV
MEASURE Value Mean Min Max Stdev Count
Max(C1) 497.765mV 497.30588mV 491.059mV 502.088mV 3.98495mV 5
10-90%Rise(C1) 835ps 822.34ps 813ps 835ps 8.28ps 5
C1 DC50
1X 80.0mV/
FULL -250mV
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal 254mV
Edge Rising

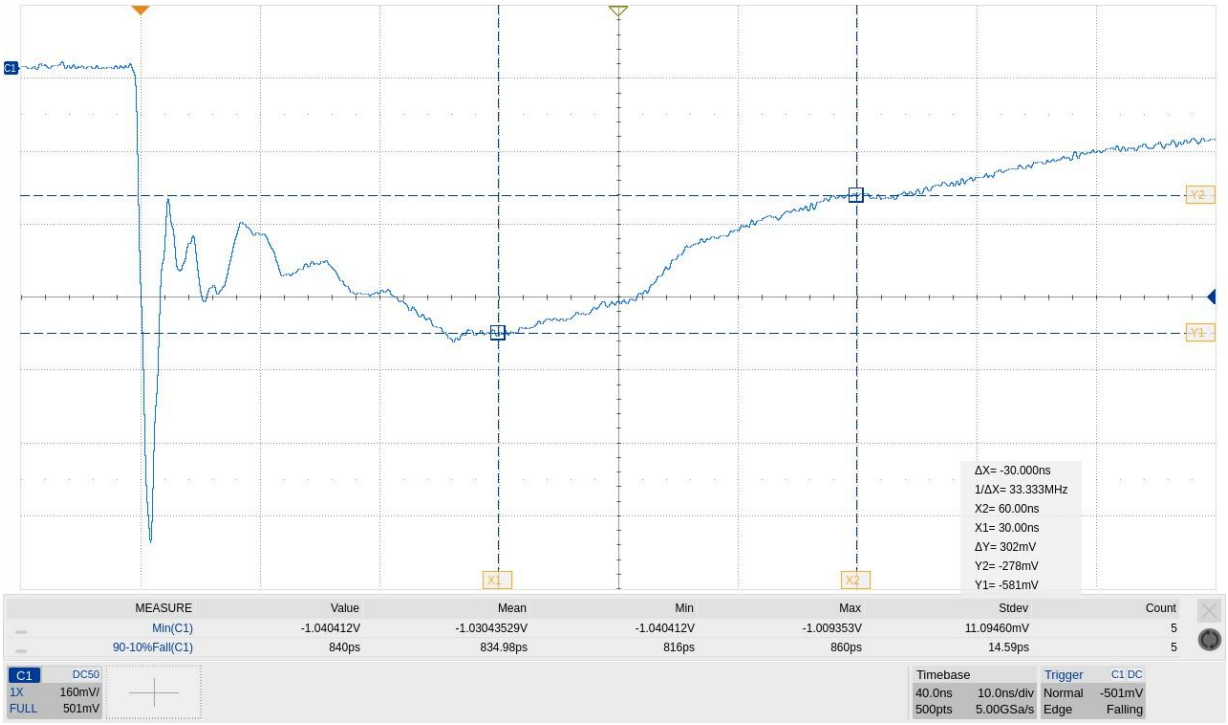
-2kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= 144.0mV
Y2= -135.2mV
Y1= -279.2mV
MEASURE Value Mean Min Max Stdev Count
Min(C1) -502.794mV -499.98235mV -502.794mV -497.500mV 1.92179mV 5
90-10%Fall(C1) 807ps 814.68ps 805ps 835ps 11.40ps 5
C1 DC50
1X 80.0mV/
FULL 250mV
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal -250mV
Edge Falling

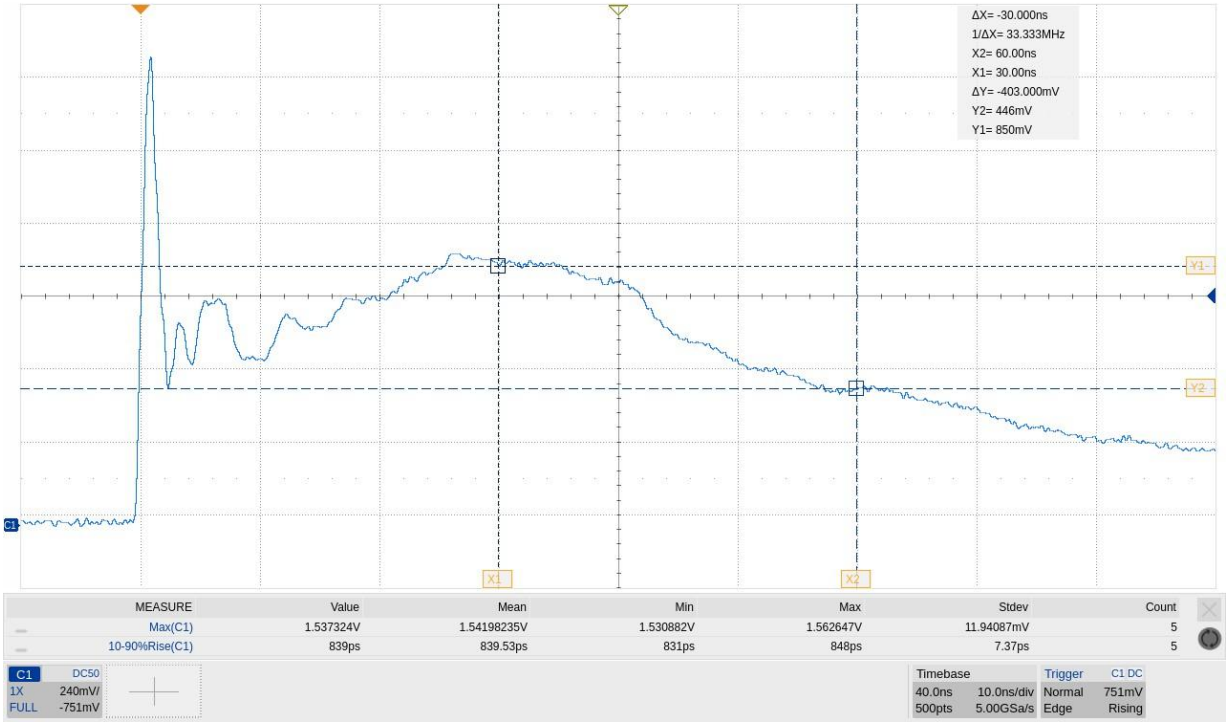
4kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= -282.000mV
Y2= 285mV
Y1= 566mV
MEASURE Value Mean Min Max Stdev Count
Max(C1) 1.035412V 1.03284706V 1.025176V 1.037824V 4.82419mV 5
10-90%Rise(C1) 815ps 817.97ps 808ps 827ps 6.34ps 5
C1 DC50
1X 160mV/
FULL -501mV
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal 501mV
Edge Rising

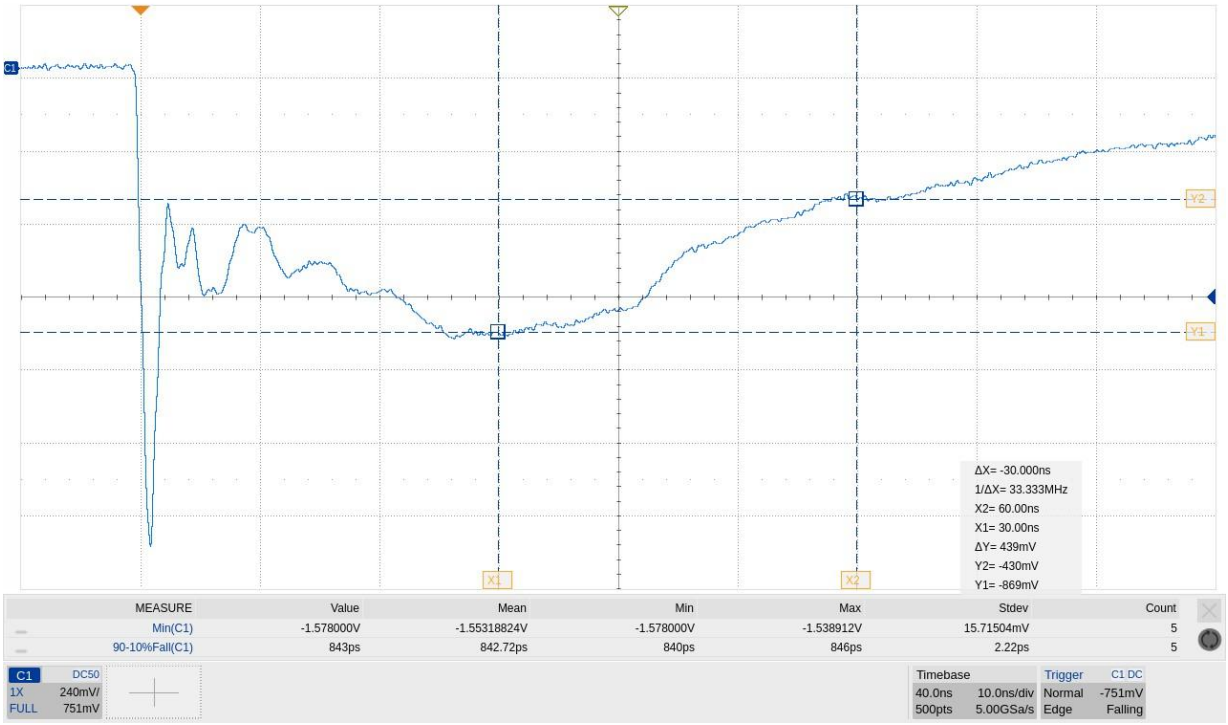
-4kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= 302mV
Y2= -278mV
Y1= -581mV
MEASURE Value Mean Min Max Stdev Count
Min(C1) -1.040412V -1.03043529V -1.040412V -1.009353V 11.09460mV 5
90-10%Fall(C1) 840ps 834.98ps 816ps 860ps 14.59ps 5
C1 DC50
1X 160mV/
FULL 501mV
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal -501mV
Edge Falling

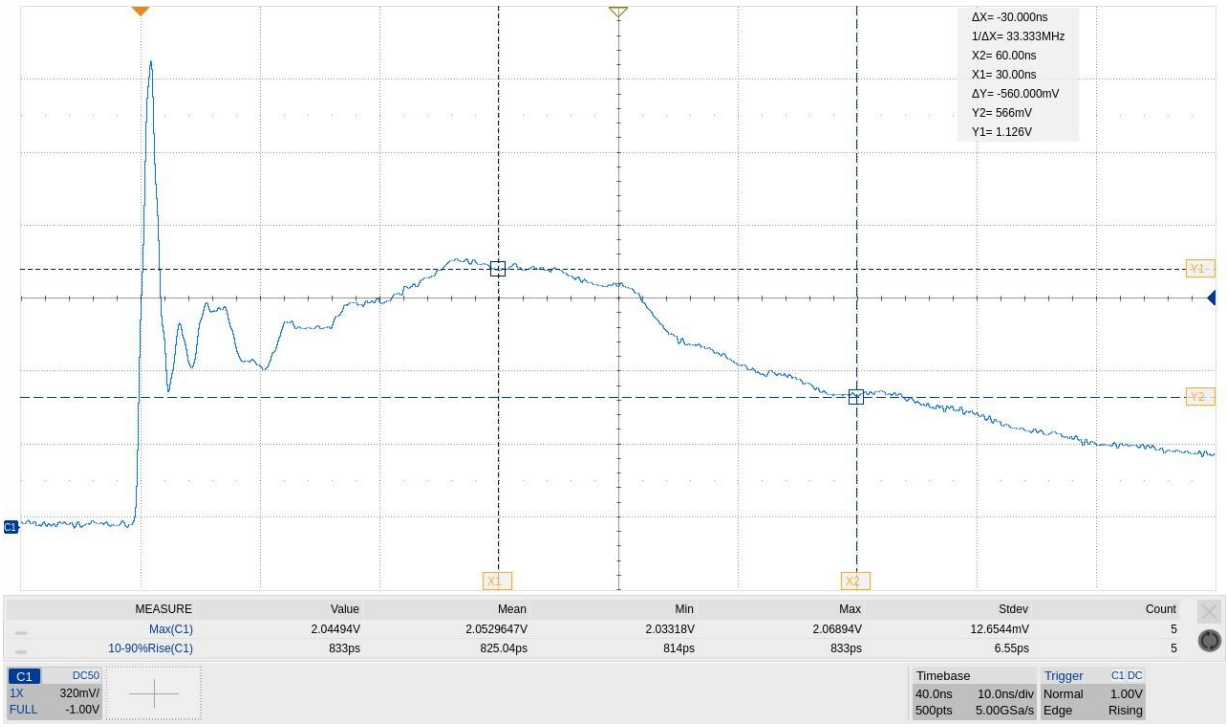
6kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= -403.000mV
Y2= 446mV
Y1= 850mV
MEASURE Value Mean Min Max Stdev Count
Max(C1) 1.537324V 1.54198235V 1.530882V 1.562647V 11.94087mV 5
10-90%Rise(C1) 839ps 839.53ps 831ps 848ps 7.37ps 5
C1 DC50
1X 240mV/
FULL -751mV
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal 751mV
Edge Rising

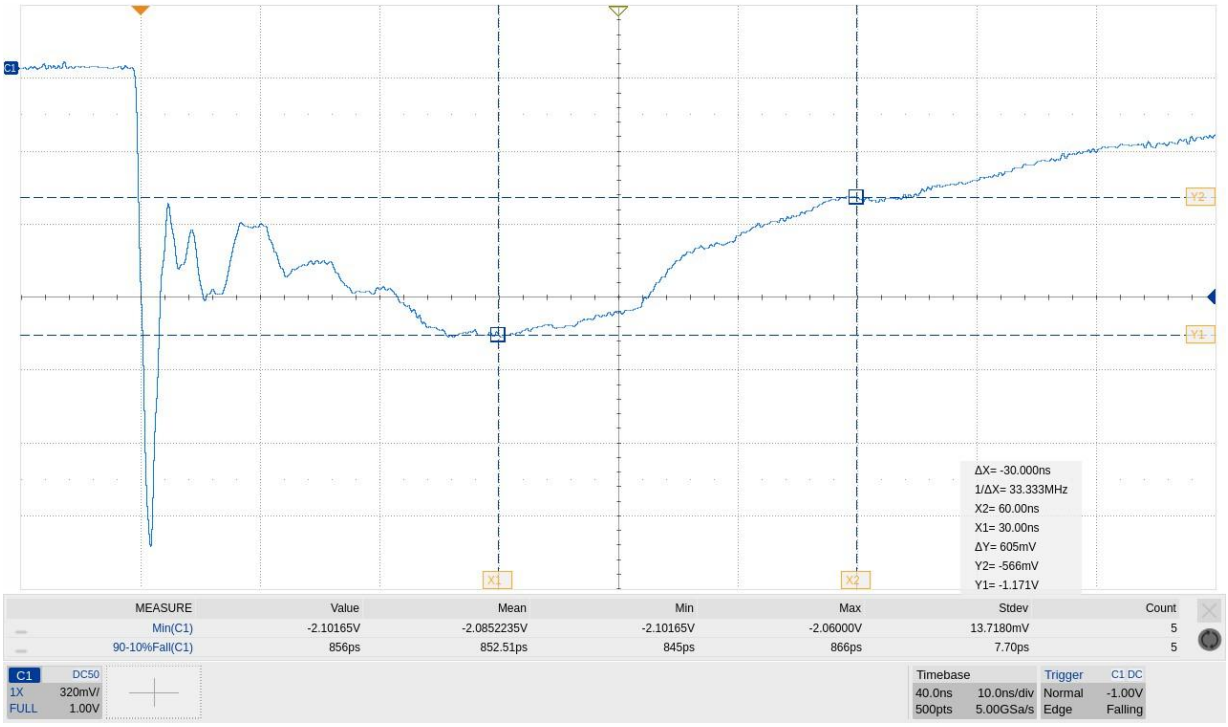
-6kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= 439mV
Y2= -430mV
Y1= -869mV
MEASURE Value Mean Min Max Stdev Count
Min(C1) -1.578000V -1.55318824V -1.578000V -1.538912V 15.71504mV 5
90-10%Fall(C1) 843ps 842.72ps 840ps 846ps 2.22ps 5
C1 DC50
1X 240mV/
FULL 751mV
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal -751mV
Edge Falling

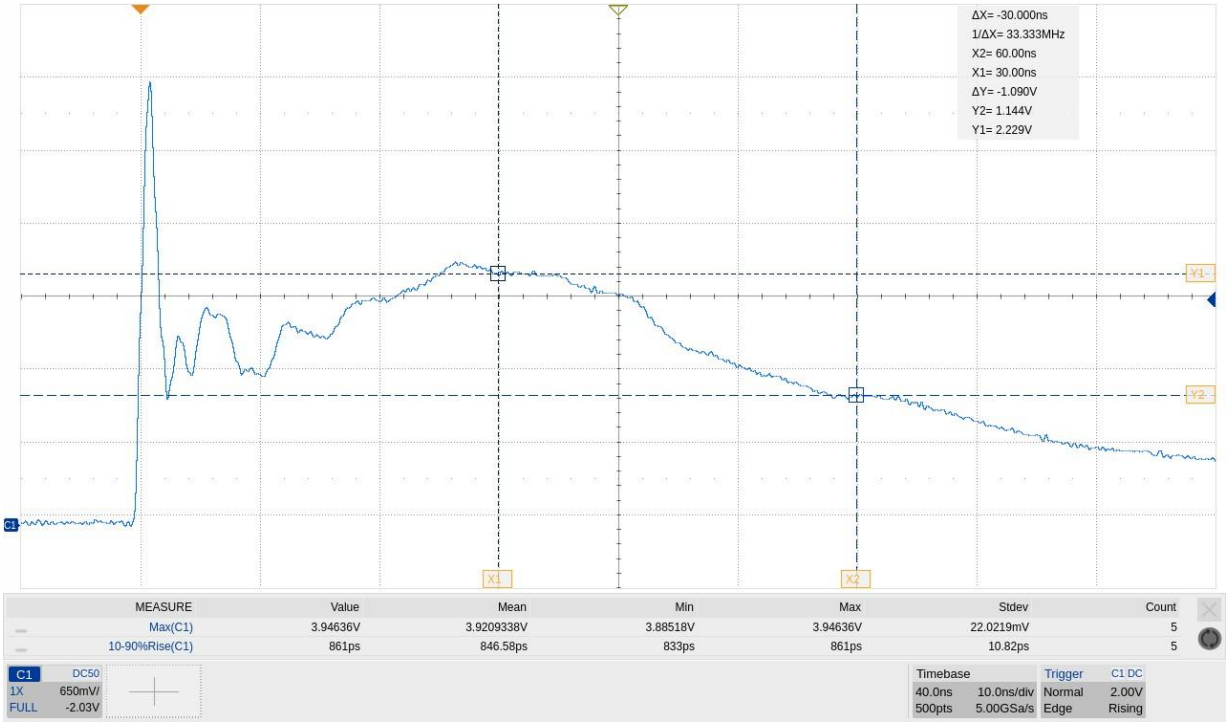
8kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= -560.000mV
Y2= 566mV
Y1= 1.126V
MEASURE Value Mean Min Max Stdev Count
Max(C1) 2.04494V 2.0529647V 2.03318V 2.06894V 12.6544mV 5
10-90%Rise(C1) 833ps 825.04ps 814ps 833ps 6.55ps 5
C1 DC50
1X 320mV/
FULL -1.00V
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal 1.00V
Edge Rising

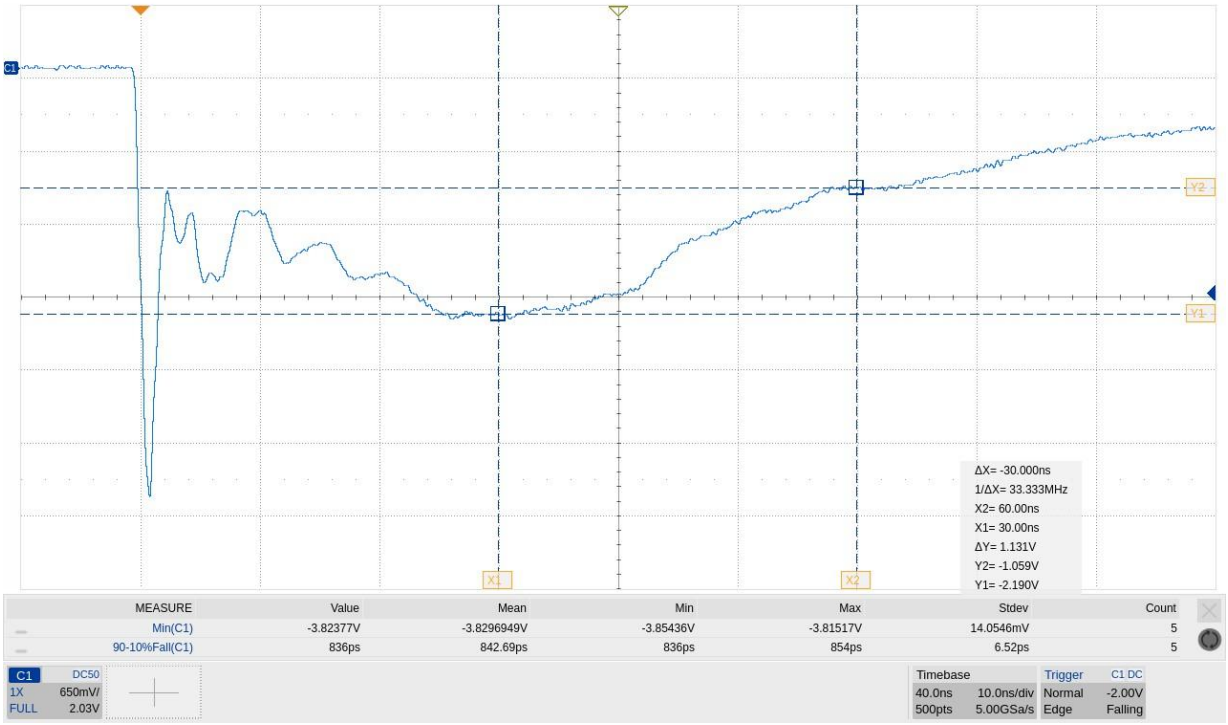
-8kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= 605mV
Y2= -566mV
Y1= -1.171V
MEASURE Value Mean Min Max Stdev Count
Min(C1) -2.10165V -2.0852235V -2.10165V -2.06000V 13.7180mV 5
90-10%Fall(C1) 856ps 852.51ps 845ps 866ps 7.70ps 5
C1 DC50
1X 320mV/
FULL 1.00V
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal -1.00V
Edge Falling

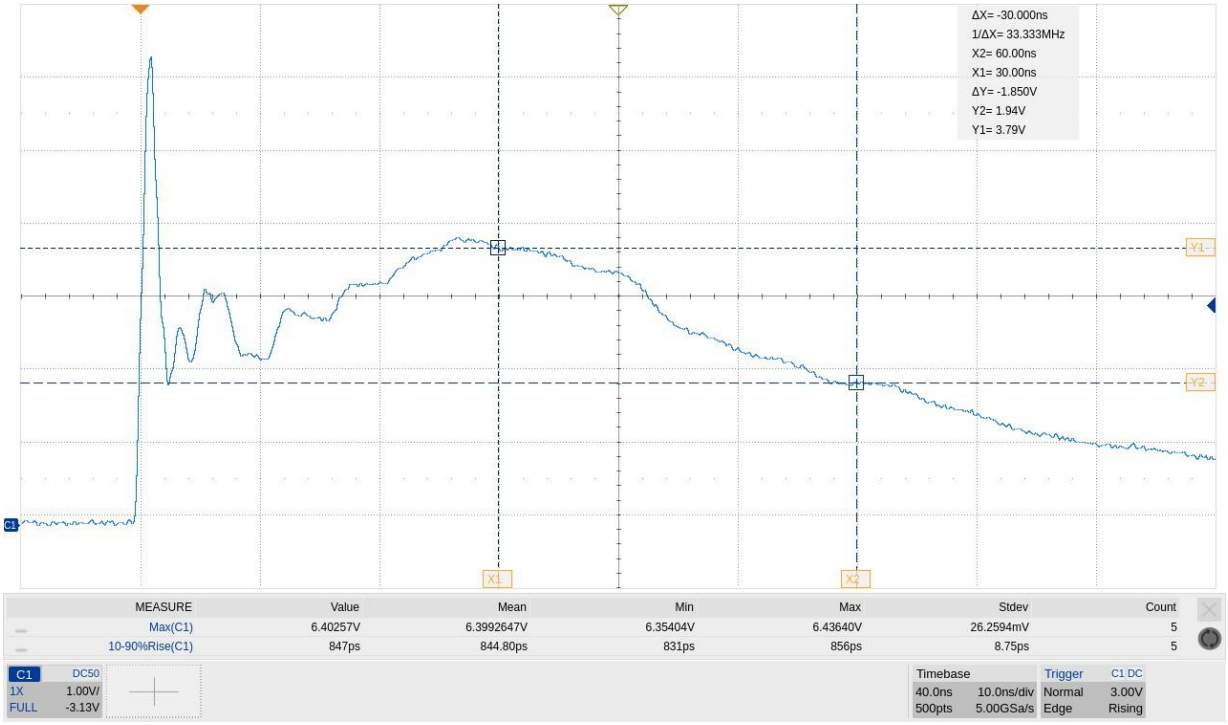
15kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= -1.090V
Y2= 1.144V
Y1= 2.229V
MEASURE Value Mean Min Max Stdev Count
Max(C1) 3.94636V 3.9209338V 3.88518V 3.94636V 22.0219mV 5
10-90%Rise(C1) 861ps 846.58ps 833ps 861ps 10.82ps 5
C1 DC50
1X 650mV/
FULL -2.03V
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal 2.00V
Edge Rising

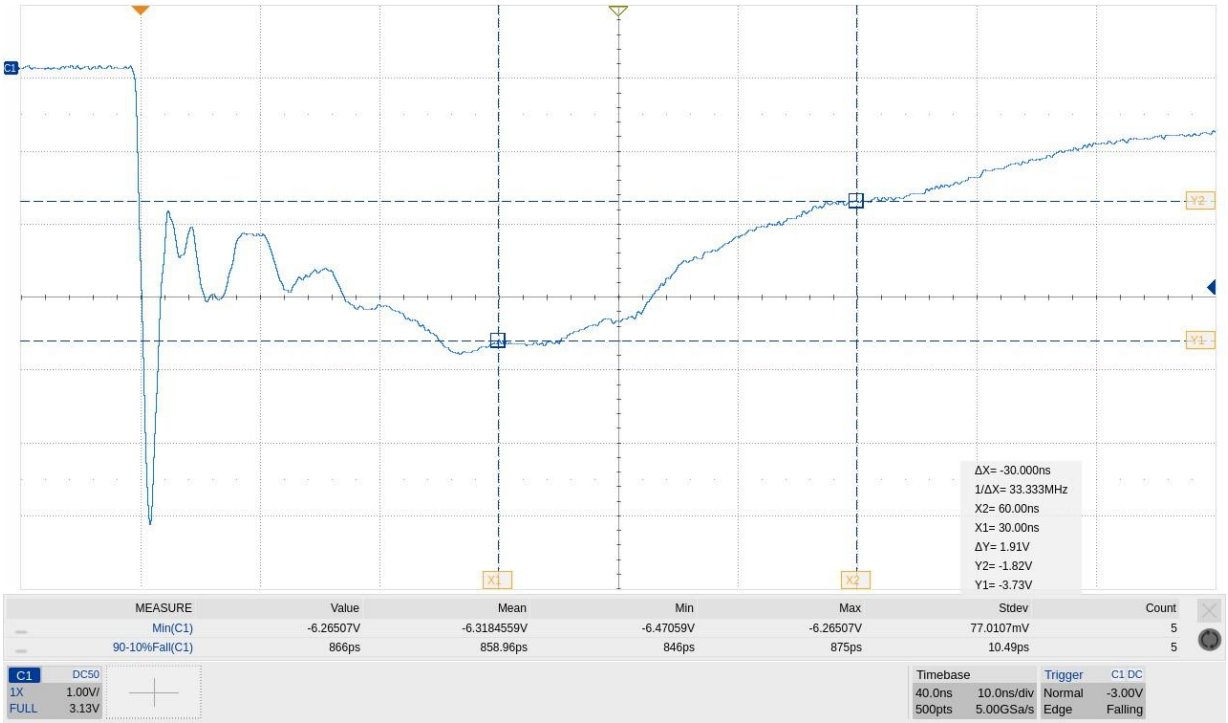
-15kV


ΔX= -30.000ns
1/ΔX= 33.333MHz
X2= 60.00ns
X1= 30.00ns
ΔY= 1.131V
Y2= -1.059V
Y1= -2.190V
MEASURE Value Mean Min Max Stdev Count
Min(C1) -3.82377V -3.8296949V -3.85436V -3.81517V 14.0546mV 5
90-10%Fall(C1) 836ps 842.69ps 836ps 854ps 6.52ps 5
C1 DC50
1X 650mV/
FULL 2.03V
Timebase
40.0ns 10.0ns/div
500pts 5.00GSa/s
Trigger C1 DC
Normal -2.00V
Edge Falling

25kV



-25kV



End of Calibration Report: ESD Simulator 30kV 150pF/330Ω cert. rev. 2