



SCS Directory

Accreditation number: SCS 0146

International standard: ISO/IEC 17025:2017
Swiss standard: SN EN ISO/IEC 17025:2018

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Initial accreditation: 30.11.2016
Current accreditation: 30.11.2016 to 29.11.2021
Scope of accreditation see: www.sas.admin.ch
(Accredited bodies)

Scope of accreditation as of 18.01.2019

Calibration laboratory for electrical quantities

Calibration and Measurement Capability (CMC)

On site calibration available on request excepting S-Parameters

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions $T_{amb}: 18\text{ °C} \dots 28\text{ °C}$	Best Measurement Capability \pm ¹⁾	Remarks
DC Voltage V_{DC}	1 mV ... 10 mV 10 mV ... 1000 V		0,5 % 0,1 %	Output Voltage of Voltage sources or Test-Generators
DC High V_{DC} (by resistive divider)	0,1 kV ... 30 kV		0,8 %	Output Voltage of EMC-Test-Generators and charging voltages of Pulse Circuits, IEC 61000-4-x
AC Voltage V_{AC}	1 mV ... 10 mV	f = 10 Hz ... 1000 Hz	4,0 %	Output Voltage of Voltage sources or Test-Generators
	10 mV ... 750 V	f = 10 Hz ... 1000 Hz	0,5 %	



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DC Current I_{DC}	1 mA ... 30 A		0,5 %	
AC-Current I_{AC}	1 mA ... 3 A	$f = 10\text{ Hz} \dots 1000\text{ Hz}$	1,0 %	
	1 A ... 1200 A	$f = 50\text{ Hz} \dots 1000\text{ Hz}$	1,5 %	By current clamp
	100 A ... 2000 A	$f = 10\text{ Hz} \dots 1000\text{ Hz}$	2,0 %	By Rogowski coil
				Output current of EMC-Test-Generators f. e. acc. to IEC 61000-4-8
Resistance (DC)	0,1 Ohm ... 1 Ohm		5,0 %	
	1 Ohm ... 10 Ohm		0,5 %	
	10 Ohm ... 1 MOhm		0,1 %	
	1 MOhm...10 MOhm		0,5 %	
	10 MOhm... 100 MOhm		1,0 %	
Capacitance C	100 pF ... 10 μ F	$f = 1\text{ kHz}$	0,5 %	
	10 μ F ... 100 μ F	$f = 1\text{ kHz}$	1,0 %	
Inductance L	10 μ H ... 100 μ H	$f = 1\text{ kHz}$	0,7 %	
	100 μ H ... 1 H	$f = 1\text{ kHz}$	0,5 %	
Frequency f, Sine	10 Hz ... 300 kHz	$V = 0,1\text{ V} \dots 750\text{ V}$	0,05 %	
S Parameter				
S21 No on site Calibration available	0 dB ... -40 dB	$f = 300\text{ kHz} \dots 3\text{ GHz}$	0,27 dB	@ S11 and S22 < 0,0316 (-30 dB)
	-40 dB ... -60 dB		0,39 dB	
	-60 dB ... -80 dB		0,44 dB	
ESD Contact discharge on ESD-Target + Attenuator		Relative humidity: 30 % ... 60 %, Air pressure: 86 kPa ... 106 kPa		Acc. to IEC 61000-4-2
Peak current I_P	2 A ... 120 A		4,5 % (8 %) *	
Current $I@30\text{ ns}$	2 A ... 120 A		6,2 % (16 %) *	* Incl. reproducibility
Current $I@60\text{ ns}$	2 A ... 120 A		6,2 % (8 %) *	



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Current I@60 ns ... 800 ns	2 A ... 120 A		6,2 % (8 %) *	Acc. to IEC 61000-4-4
Rise Time t_r	500 ps ... 1000 ps		55 ps	
EFT				
Peak Voltage	20 V ... 3500 V	Into 50 Ohm	3,8 %	
CDN Peak Voltage	20 V ... 3500 V	Into 50 Ohm	4,0 %	
Peak Voltage	20 V ... 7000 V	Into 1 kOhm	4,1 %	
Rise Time	1 ns ... 1 μ s		200 ps	
Pulse Width	10 ns ... 1 μ s		1000 ps	
CDN Pulse Width	10 ns ... 1 μ s		900 ps	
Impulse Repetition Time	1 μ s ... 10 ms		10 ns	
Burst Duration	0,1 ms ... 100 ms		1,0 μ s	
Burst Period	1 ms ... 1 s		10 μ s	
EFT-Load 50 Ohm				
Input Impedance	10 Ohm ... 100 Ohm	DC	0,1 %	
Insertion Loss (60 dB)	50 dB ... 70 dB	f = 300 kHz ... 100 MHz	0,30 dB	
		f = 100 MHz ... 400 MHz	0,32 dB	
EFT-Load 1 kOhm				
Input Impedance	10 Ohm ... 10 000 Ohm	DC	0,1 %	
Insertion Loss (60 dB)	50 dB ... 70 dB	f = 300 kHz ... 100 MHz	0,34 dB	
		f = 100 MHz ... 400 MHz	0,41 dB	



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Surge CWG 1,2/ 50 μs				Acc. to IEC 61000-4-5, extended ranges
Peak Voltage	100 V ... 6000 V 6 kV ... 25 kV		2,3 % 3,1 %	
Peak Current	20 A ... 6000 A 6 kA ... 100 kA		2,3 % 2,6 %	
Front Time (Voltage)	0,8 μ s ... 2,5 μ s	Peak voltage \leq 6 kV Peak voltage > 6 kV	50 ns 60 ns	
Front Time (Current)	0,9 μ s ... 9,6 μ s	20 A ... 6000 A 6 kA ... 100 kA	130 ns 150 ns	
Pulse Duration (Voltage)	5 μ s ... 60 μ s	Peak voltage \leq 6 kV Peak voltage > 6 kV	330 ns 3400 ns	
Pulse Duration (Current)	9,1 μ s ... 62,4 μ s 16 μ s ... 24 μ s	20 A ... 6 kA 6 kA ... 100 kA	200 ns 220 ns	
Phase angle 50/60 Hz	0° ... 360°		1,0 °	
Surge Telecom 10/700 μs				Annex A
Peak Voltage	100 V ... 6000 V 6 kV ... 12 kV		2,3 % 2,8 %	
Peak Current	5 A ... 600 A		2,3 %	
Front Time (Voltage)	5,6 μ s ... 13 μ s	Peak voltage \leq 6 kV Peak voltage > 6 kV	230 ns 270 ns	
Front Time (Current)	2 μ s ... 6 μ s		110 ns	
Pulse Duration (Voltage)	175 μ s ... 840 μ s	Peak voltage \leq 6 kV Peak voltage > 6 kV	5 μ s 20 μ s	
Pulse Duration (Current)	254 μ s ... 384 μ s	5 A ... 600 A	2,1 μ s	



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Insulation 0,5 Joule				
Peak Voltage	500 V ... 6000 V 6 kV ... 25 kV	Surge Pulse 1,2/ 50	2,3 % 3,1 %	Acc. to IEC 60060-1 and IEC 60255-26
Front Time (Voltage)	0,8 μ s ... 2,5 μ s	Peak Voltage \leq 6 kV Peak Voltage $>$ 6 kV	50 ns 60 ns	
Duration (Voltage)	5 μ s ... 60 μ s	Peak Voltage \leq 6 kV Peak Voltage $>$ 6 kV	330 ns 3400 ns	
Peak Current	0,5 A ... 160 A		3,0 %	
Surge Magnetic Field				Acc. to IEC 61000-4-9
Pulse Duration (Current)	18 μ s ... 28 μ s	100 A ... 1600 A	150 ns	
Front Time (Current)	7,2 μ s ... 11,2 μ s	100 A ... 1600 A	110 ns	
Peak Current	100 A ... 1600 A		2,3 %	
DOW (slow) Magnetic field				Acc. to IEC 61000-4-10
Peak Current	1 A ... 300 A	0,1/ 1 MHz	3,0 %	
5 th Current Peak	0,5 A ... 300 A		3,2 %	
10 th Current Peak	0,1 A ... 300 A		4,0 %	
Decay Rate	$ I_{pk5}/ I_{pk1} > 50\%$ $ I_{pk10}/ I_{pk1} < 50\%$		4,5% 5,0 %	
Oscillation Period	0,8 μ s ... 12 μ s	0,8 A ... 300 A	0,5 %	
Repetition Time of the Impulses	2 ms ... 30 ms		4,0 μ s	
Ring wave				Acc. to IEC 61000-4-12
Peak Voltage	100 V ... 6000 V 6 kV ... 12 kV		2,4 % 2,8 %	
Voltage Decay	0,4 < Ratio Pk2 to Pk1 < 1,1 0,4 < Ratio Pk3 to Pk2 < 0,8 0,4 < Ratio Pk4 to Pk3 < 0,8	100 V ... 6000 V	4,0 % 4,6 % 7,4 %	



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Peak Current	0,4 < Ratio Pk2 to Pk1 < 1,1	6 kV ... 12 kV	4,4 %	Acc. to IEC 61000-4-11 or IEC 61000-4-34 (High current 16A < I < 75 A)
	0,4 < Ratio Pk3 to Pk2 < 0,8		5,0 %	
	0,4 < Ratio Pk4 to Pk3 < 0,8		7,7 %	
Rise Time (Voltage)	7,5 A ... 1000 A	2,8 %		
Voltage Period 100 kHz	0,35 μ s ... 0,65 μ s	100 V ... 6000 V	15 ns	
		6 kV ... 12 kV	20 ns	
Rise Time (Current)	8,2 μ s ... 12,5 μ s	100 V ... 6000 V	0,15 %	
		6 kV ... 12 kV	0,45 %	
Phase Angle 50/ 60 Hz	0,35 μ s ... 1 μ s		20 ns	
Voltage dips and interruption	0° up to 360°		1,0 °	
Voltage	10 V ... 1000 V	f = 50/ 60 Hz	2,5 %	
Rise Time/ Fall Time	1 μ s ... 5 μ s		50 ns	
Peak Voltage	-50 V ... +50 V		2,7 %	
Inrush Current	200 A ... 1000 A		3,5 %	
Phase Angle	0 ° up to 360 °		1,0 °	
SLOW DOW		100 kHz/ 1 MHz		Acc. to IEC 61000-4-18
Peak Voltage	200 V ... 5000 V	Open Circuit	3,6 %	
5 th Peak Voltage	100 V ... 5000 V	$Z_{oc} \geq 10\text{ k}\Omega$	3,9 %	
10 th Peak Voltage	20 V ... 5000 V		4,6 %	
Decaying (Voltage)	$V_{Pk5} > 50\%$ of V_{Pk1} $V_{Pk10} < 50\%$ of V_{Pk1}		5,2 %	
			5,8 %	
Rise Time	75 ns	60 ... 90 ns	3,5 ns	
T_{Period} Voltage	0,8 μ s ... 12 μ s		0,36 %	
Burst Duration	$\geq 2\text{ s}$		200,0 ns	
Repetition Rate of the Pulses	30/ s ... 500/ s		4,0 μ s	
Peak Current	0,5 A ... 100 A	$Z_{sc} \leq 0,1\text{ Ohm}$	3,0 %	



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FAST DOW		3/ 10/ 30 MHz		Acc. to IEC 61000-4-18
Peak Voltage	200 V ... 5000 V	$Z_{oc} = 1\text{ k}\Omega$	3,5 %	
5 th Peak Voltage	100 V ... 5000 V		5,3%	
10 th Peak Voltage	20 V ... 5000 V		5,8 %	
Decaying	$V_{PK5} > 50\%$ of V_{PK1}		6,2 %	
	$V_{PK10} < 50\%$ of V_{PK1}		6,6 %	
Rise Time	3,5 ns ... 6,5 ns	$Z_{oc} = 1\text{ k}\Omega$	0,22 ns	
Period	25 ns ... 450 ns		0,5%	
Burst Duration	4 ms ... 100 ms		5,0 μ s	
Repetition Rate	0,18 ms ... 0,22 ms		50,0 ns	
Peak Current	1,0 A ... 100 A	$Z_{SC} = 0,1\text{ }\Omega \pm 2\%$	3,0 % ... 4,9%	Depending on frequency
5 th Peak Current	0,25 A ... 100 A		4,4 % ... 6,1%	
10 th Peak Current	0,1 A ... 100 A		6,2 % ... 7,9%	
Decaying	$I_{PK5} > 25\%$ of I_{PK1}		5,2 % ... 7,6 %	Depending on frequency
	$I_{PK10} < 25\%$ of I_{PK1}		6,9 % ... 9,2 %	
Rise Time	3,5 ns ... 450 ns		1,0 ns	

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