KIKUSUI
TELONIC
TEST INSTRUMENTS & POWER SUPPLIES
ESTABLISHED OVER 50 YEARS SINCE 1966
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TOS9311 MODEL

AC/DC 10.0 kV
All-In-One Model Allowing for 3 Types of Tests [ACW/DCW/IR]

NEW

Withstanding Voltage/Insulation Resistance Tester

Multifunctional Safety Analyzer (10 kV model)

TOS9311

A new model of our latest multifunctional high voltage safety analyzer.
A single unit allows for three types of tests: ACW/DCW/IR.
Maximum voltage for AC withstand voltage testing: 10 kV/50 mA
Maximum voltage for DC withstand voltage testing: 5 kV/20 mA, 10 kV/10 mA (100 W)
Measurement range of insulation resistance testing: 0.001 MΩ to 100.0 GΩ (DC-25 V to -1,000 V/DC+50 V to +10,000 V)
A Withstanding voltage test can also be used for quick NG judgment. The detection sensitivity can be selected from 5 levels.
LAN/USB/RS232C come as standard
A color LCD shows measured values and a standard overview for each test.

Complies the growing demand for high voltages. 10.0 kV output for both AC and DC.

Suitable for high-withstand-voltage power devices and withstand voltage testing of high-voltage PV panels!

To meet the requirement higher than 5 kV

Introducing Kikusui Electronics latest model of safety analyzer the TOS9311. The solution for high-voltage electrical safety testing. This state-of-the-art multi-analyzer is designed to handle 10 kV AC/DC safety tests with ease, ensuring comprehensive testing of electronic equipment and components exposed to high voltages.
The TOS9311 is able to perform a wide range of critical safety tests, including AC withstand voltage tests, DC withstand voltage tests, and insulation resistance tests—all with a single, user-friendly unit.

It is design to comply to meet SiC power devices requiring 6.5 kV withstand voltage, high-voltage inverters and converters, or advanced PV panels rated for up to 1,500 V. The TOS9311 provides reliable and precise testing to ensure your equipment meets the highest safety standards. Enhance your testing capabilities and safeguard your designs with the TOS9311—where innovation meets reliability.

Multifunctional Safety Analyzer (10 kV model)

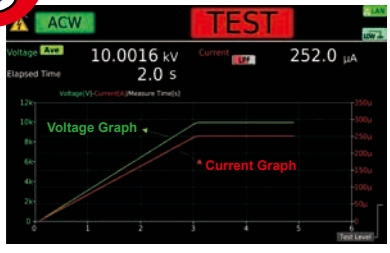
TOS9311

Three Features That Make TOS9311 Stand Out!

POINT! 1

Enhanced Measurement and Display Functions

- Graphs, numerical values and lists can be displayed.



▲Trend graphs can be displayed.

▲Easy-to-read numerical values

▲Lists can also be displayed.

POINT! 2

Front and Rear Output Terminals

- Convenient for system integration

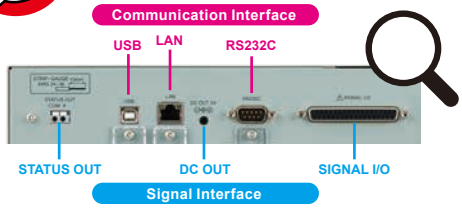
▲Front output terminal

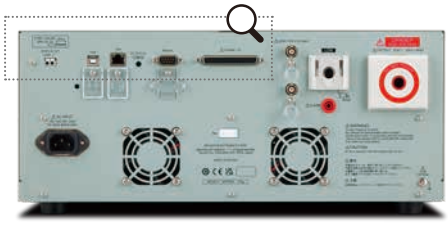
▲Rear output terminal

POINT! 3

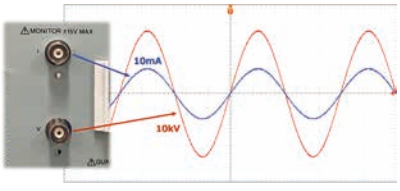
Various I/Fs Come as Standard

- Both PC control and PLC control are supported.





▲Rear panel



▲Analog monitor
(can be directly connected to an oscilloscope)

Improvements Over the Previous Model [TOS5101]!

- **Stability:** Stable high voltage output, unaffected by AC line fluctuations. Built-in PWM amplifier.
- **Functions:** The rise and fall voltage can be set. A rise time function is supported.
- **User-friendliness:** Memory function. Test conditions and test results can be stored in the main unit.
- **Standard performance:** Measurement accuracy is significantly improved (four times higher for voltage and five times higher for current)

LEVEL UP

TOS9311-Practical Applications

■ For Sic 6500 V Withstand Voltage Power Device Evaluation!

This product is a top-tier solution for evaluating critical components like isolators near power devices.
Equipped with our advanced withstand voltage testing functionality to ensure reliability for high-voltage V-I measurements.

Key Factors!

Semiconductors

- **Output voltage can be adjusted.**
- **Rise time can be Set freely.**
- **Equipped with a graph display function.**

■ For High-Voltage PV Panel Evaluation!

TOS9311 equips with rise time function and trend graph display, which instantly visualize current changes caused by test voltages. The graph data not only provides clear, real-time insights but also serves as a valuable tool for in-depth analysis of testing results!

Key Factors!

Regenerative Energy

- **Precise current measurements**
- **Rise time can be Set freely.**
- **Equipped with a graph display function.**

■ Can Easily Be Adapted for the Automation of Production Lines!

The TOS9311 offers easy access to settings, measured values, and test results through versatile interfaces.
Front and rear output terminals ensure seamless system integration. Test conditions can be configured with the TOS9311, and test sequences are easily managed via PLC calls, optimizing workflow and performance.

Key Factors!

Automation

- **Various interfaces come as standard.**
- **The output voltage can be set and read out via communication.**
- **Two output terminals to choose from**

■ Withstanding Voltage Test Section

AC output section (ACW only)	Output range		0.050 kV to 10.000 kV
		Resolution	1 V
		Setting accuracy	±(1.2 % of setting + 0.02 kV) (at no load)
	Max. rated load *1		500 VA (10 kV/50 mA)
	Max. rated current		50 mA (When the output voltage is 0.5 kV or higher)
	Transformer rating		500 VA
	Output voltage waveform *2		Sine
		Distortion Rate	2 % or less (When the output voltage is 1.0 kV or more and the pure resistive load is 200 kΩ)
	Crest factor		√2 ± 3 %(1500 V or more)
	Frequency		50 Hz/60 Hz
		Accuracy	±0.1 %
	Voltage regulation		±3 % or less (When changing from maximum rated load to no load.)
	Short-circuit current		100 mA or more (Output voltage 1.0 kV or higher)
	Output method		PWM switching
DC output section (DCW only)	Output range		0.100 kV to 10.000 kV
		Resolution	1 V
		Setting accuracy	±(1.2 % of setting + 0.02 kV)
	Max. rated load *1		100 W (5 kV/20 mA, 10 kV/10 mA)
	Max. rated current		20 mA
	Ripple	10 kV no load	30 Vp-p Typ.
		Max. rated load	100 Vp-p Typ.
	Voltage regulation		1 % or less (When changing from maximum rated load to no load.)
	Short-circuit current		50 mA (100 mA peak)
	Discharge function		Forced discharge after test completion (Discharge resistance: 125 kΩ)
Start voltage			The voltage at the start of the test can be set.
		setting range	1 % to 99 % of the test voltage (1% resolution)
Output voltage monitor function			If the output voltage exceeds ±(10 % of setting + 0.05 kV), the output is turned off, and the protection function is activated.

*1 When tests are performed consecutively, output time limit and rest time may become necessary depending on the upper limit setting.
*2 If an AC voltage is applied to a capacitive load, the output voltage may rise higher than at no load depending on the load capacitance. Further, waveform distortions may occur if an EUT whose capacitance is dependent on voltage (for example, an EUT that consists of ceramic capacitors) is connected as the load. However, if the test voltage is 1.5 kV, the effect of a capacitance of 1 000 pF or less can be ignored. Because the product's high-voltage power supply uses the PWM switching method, if the test voltage is 500 V or less, the switching and spike noise proportions are large. The lower the test voltage, the greater the waveform is distorted.

Voltmeter	Measurement range	0.000 kV to 10.500 kV AC/DC
	Resolution	0.1 V
	Accuracy	±(1.2 % of reading + 5 V)
	Response	Can be switched between true rms and mean-value response rms conversion. Peak-value response in a separate system (the peak-value response is for measuring the dielectric breakdown voltage while rising)
	Hold function	The voltage measurement after a test is finished is held while the pass/fail judgment is displayed.
Ammeter *1	Measurement range	AC: 0.00 mA to 55 mA (Current including the active component and reactive component), DC: 0.00 mA to 22 mA
	Accuracy	±(1 % of reading + 2 μA) (active component)
	Response	Can be switched between true rms and mean-value response rms conversion.
	Hold function	The current measurement after a test is finished is held while the pass judgment is displayed.
	Offset cancel function	Cancels up to 10 mA of the current flowing through the insulation resistance and stray capacitance components across output cables and the like (resistance component only for DC tests). OFF function available.
	Calibration	Active component: Calibrated with the rms of a sine wave using a pure resistive load.

*1 During AC voltage tests, current also flows in the stray capacitance of items such as the test leads and tools.

Judgment function	Upper limit setting range	AC: 0.01 mA to 55.00 mA, DC: 0.01 mA to 21.00 mA
	Lower limit setting range	AC: 0.00 mA to 54.99 mA, DC: 0.00 mA to 20.99 mA, OFF. Setting 0.00 is equivalent to OFF.
	Judgment accuracy *1	±(1 % of setting + 5 μA)
	Current detection method	Comparison with reference values using the following methods: Calculating true RMS value / Converting the average response to RMS value / Measuring the wave height.
	Response speed (filter) switching	Switches the current detection response speed (sensitivity) used in UPPER FAIL judgment between five levels in ACW and DCW tests.

*1 During AC voltage tests, current also flows in the stray capacitance of items such as the test leads and tools.

Timer function	Voltage rise time settings range	0.1 s to 200.0 s
	Voltage fall time setting time	0.1 s to 200.0 s, OFF (valid only for determining PASS) During DC withstand voltage testing, the voltage may not fall entirely during the set time due to the internal capacitance and the capacitance of the test object.
	Test time setting range	0.1 s to 1000.0 s (with TIMER OFF function)
	Judgment delay (Judge Delay) setting range *1	0.1 s to 100.0 s, AUTO (DCW only)
	Accuracy	±(100 ppm of setting + 20 ms) (excluding the fall time)

*1 Less than the sum of the rise time and fall time.

■ Insulation Resistance Test Section

Output section	Output voltage range		-25 V to -1000 V/+0.05 kV to +10.000 kV
		Resolution	1 V
		Setting accuracy	±(1.2 % of setting + 2 V)/ ±(1.2 % of setting + 0.02 kV)
	Max. rated load		1 W (-1000 V/1 mA)/10 W (10 kV/1 mA)
	Max. rated current		1 mA
	Ripple	1 kV no load	2 Vp-p or less/30 Vp-p or less
		Max. rated load	10 Vp-p or less/70 Vp-p or less
	Voltage regulation		1 % or less (when changing from maximum rated load to no load)
	Short-circuit current		12 mA or less/As per DCW specifications
	Discharge function		Forced discharge after test completion (discharge resistance: 20 kΩ)/As per DCW specifications
	Output voltage monitor function		If the output voltage exceeds ±(10 % of setting + 50 V), the output is turned off, and the protection function is activated.
Voltmeter	Digital *1	Measurement range	Negative polarity: 0 Vdc to -1200 Vdc Positive polarity: 0 kVdc to 10.500 kVdc
		Resolution	0.1 V
		Accuracy	Negative polarity: ±(1 % of reading + 1 V) Positive polarity: ±(1.2 % of reading + 5 V)
Resistance meter	Measurement range		0.001 MΩ to 100.0 GΩ (in the range of maximum rated current of 1 mA to 5 nA)
	Hold function		The resistance measurement after a test is finished is held while the pass judgment is displayed.
	Offset cancel function		Cancels up to 2000 GΩ of the unnecessary insulation resistance across output cables and the like. OFF function available.

*1 When positive polarity is outputted, it conforms to the voltage tester's voltmeter specifications.

Judgment function	Upper limit setting range	0.001 MΩ to 100.000 GΩ (in the range up to the maximum rated current), OFF
	Lower limit setting range	0.000 MΩ to 99.999 GΩ (in the range up to the maximum rated current), OFF. Setting 0.000 is equivalent to OFF.
	Judgment Accuracy For Both UPPER and LOWER	Add ten digits to the resistance measurement accuracy. (An evaluation waiting test time and test time of 3.0 s or longer are required for evaluations of 200 μA or less and 10.0 s or longer when LPF is set to ON.)

Timer function	Voltage rise time settings range	0.1 s to 200.0 s
	Test time setting range	0.1 s to 1000.0 s, OFF
	Judgment delay (Judge Delay) setting range *1	0.1 s to 100.0 s, AUTO
	Accuracy	±(100 ppm of setting + 20 ms) (excluding Fall Time)

*1 Only a time shorter than the sum of Rise Time and Test Time can be set.

■ General Specifications

Environment	Installation location		Indoors, 2000 m or less, Pollution Degree 2
	Spec guaranteed range	Temperature	5 °C to 35 °C (41 °F to 95 °F)
		Humidity	20 %rh to 80 %rh (no condensation)
	Operating range	Temperature	0 °C to 40 °C (32 °F to 104 °F)
		Humidity	20 %rh to 80 %rh (no condensation)
	Storage range	Temperature	-20 °C to 70 °C (-4 °F to 158 °F)
		Humidity	90 %rh or less (no condensation)
Power supply	Nominal voltage range (allowable voltage range)		100 Vac to 120 V, 200 V to 240 V (90 Vac to 132 V, 170 V to 250 V), no switching required
	Power consumption	No load (READY state)	100 VA or less
		Rated load	800 VA max.
	Allowable frequency range		47 Hz to 63 Hz
Insulation resistance (between AC LINE and chassis)			30 MΩ or more (500 Vdc)
Withstanding voltage (between AC LINE and chassis)			1500 Vac, 1 minute, 20 mA or less
Earth continuity			25 Aac, 0.1 Ω or less
Electromagnetic compatibility *1			Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 (Class A), EN 55011 (Class A, Group 1), EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions: The maximum length of all cabling and wiring connected to the product must be less than 2.5 m. Shielded cables are being used when using the SIGNAL I/O. Use the included high voltage test leads. Electrical discharges are applied only to the EUT.
Safety			Complies with the requirements of the following directive and standards. Low Voltage Directive 2014/35/EU *1 EN 61010-1 (Class I, Pollution Degree 2), EN61010-2-030
Dimensions(MAX) /Weight			430(16.93) (440(17.32)) W × 174.2(6.86) (195(7.68)) H × 500(19.69) (540(21.26)) D mm(inches) / Approx. 27 kg (59.5 lb.)
Accessories			Power cord (1 pc.), High-voltage test lead (1 pair), SIGNAL I/O plug (1 set) Assembly type D-sub plug unit, High-voltage warning sticker (1 pc.), Heavy object warning label (1 pc.), Cable tie (1 pc.), Getting Started Guide (1 copy), Safety Information (1 copy), China RoHS sheet (1 sheet)

*1 Only on models that have CE/UKCA marking on the panel.

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