TOS5300 SERIES

Hipot Tester/Hipot Tester with Insulation Resistance Test

A new standard for Hipot & Insulation resistance testing Applied to World-Wide input voltage

TOS5301

TOS5302

TOS5300

TOS5300(ACW)
TOS5301(ACW/DCW)
TOS5302(ACW/IR)

DRIVERS USB CE

New low-cost standard model that provides thorough operability, reliability and safety.

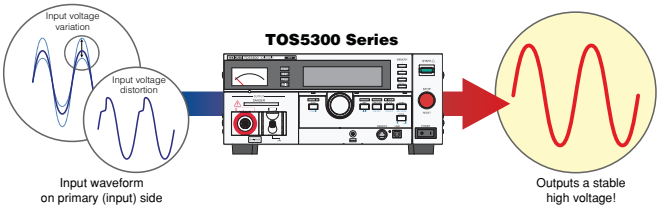
The "TOS5300 Series" is a series of test instruments used in Hipot tests and insulation resistance tests, two of the four tests regarded as necessary for ensuring the safety of electrical products. With an output of 5 kV/100 mA (AC) and 6 kV/10 mA (DC), the series can be used in Hipot & insulation resistance testing of electronic equipment and electronic parts, based on the requirements of IEC, EN, UL, VDE, JIS, and other international safety standards and the Electrical Appliance and Material Safety Law. Also, the test voltage stability is improved with the adoption of a newly developed switching amplifier. Since the output voltage can be kept constant even when the AC line voltage or frequency changes, consistent testing can be performed, even when the power supply environment is in an unstable region. The TOS5300 is also equipped with a number of features that are capable of meeting a variety of test needs. It is a new low-cost standard model that provides thorough operability, reliability and safety.

- The PWM amp system provides highly-stable output
- 5 kV/100 mA (500 VA) AC Hipot test
- 6 kV/maximum output 50 W DC Hipot tester (TOS5301)
- 25 V-1000 V (7 steps), 500 V or greater, up to 5.00 GΩ Insulation Resistance test
- High-precision measurement ±1.5% of reading (with voltmeter 500 V or higher, Ammeter 1 mA or higher)
- Rise time(AC/DC) / Fall time(AC) control
- Key lock function and Protection cover for key operation
- Equipped with USB interface

Basic performance

The achievement of AC Hipot testing with a constant stable output! [Input voltage variation : ± 0.3%]

A conventional Hipot tester boosts and outputs the AC line's input voltage through the use of a slide transformer. With this slide transformer system, input voltage fluctuations will affect the output, preventing tests from being performed properly. At times, the application of distortion voltage applied to the EUT may cause a failure of new product (accelerating a deterioration of components). Since the TOS5300 Series equips with a high-efficient PWM amplifier that can output a stable high-voltage without being affected by the variation of AC power line, users can perform "safe", "stable", and highly "reliable" tests with confidence, even in regions with large voltage variations.



Realizing high-precision measurement with high-resolution and high-speed judgement

Equipped with a high-accuracy, high-resolution of True RMS measurement circuit, including a Voltmeter with ±1.5 % of reading (500 V or greater) / minimum resolution of 1 V, and an Ammeter with ±1.5 % of reading (1 mA or more) / minimum resolution of 1μA. In addition, it is also equipped with an Auto range function, with achieving a judgment accuracy of ±1.5 % of reading. The Lower limit judgment accuracy achieves a level of performance equivalent to the Upper limit judgment accuracy that enables to detect for such a poor contact or disconnections of test leads. Moreover, it realizes the fast judgment by the test time of 0.1 second, while reliable testing can be performed, thanks to high-precision, high-resolution, high-speed measurement and the judgment functions.

Supporting the World-wide input voltage

Usable in any country, without changing the input power supply.The instrument not rely on the input power environment. Supplying the stable test voltage with 50/60 Hz frequencies.

Reducing the tact time

Reduction of the tact time leads to improve the productivity. However, it has been an issue that reducing the tact time may cause to worsen the measurement accuracy when the test time is faster than the measuring response speed. The TOS5300 series has been achieved to set the test time from 0.1s.

6kV/50WDC Hipot test (Model TOS5301)

Capable to perform DC Hipot test up to 6 kV. (Model TOS5301) Equipped with a stable DC/DC converter with a low-ripple and the load variation of 3 % or less.

nsulation resistance test for 25 V to 1000 V*

The TOS5302 is equipped with an insulation resistance tester. The test voltages can be set from 25V, 50V, 100V, 125V, 250V, 500V and 1000V. And for setting at 500V and above, it can perform the insulation resistance test up to 5.00 GΩ.

*At 500 V and above, measurements up to 5.00 GΩ are possible.

Protection cover prevents physical operation error in the production site

In many cases, workers on electronic equipment production lines and inspection lines are not technical experts. Therefore, it is possible that the operators may change setting conditions and make operation errors. In order to prevent from such cases, the TOS5300 is equipped with a key lock function and a protection cover to disable a physical key operation from the front panel.

New design of output terminal improves safety and functionality

In consideration of safety for the operator and the environment, the output terminal of HIGH-side has been placed in the most distant location from the control area. The free rotation machanisim protects from twisting (or breaking) of the cable. Also, with having the lock function for the LOW terminal on the main unit, the metal plate is no longer attached to the test lead of LOW-side, and it makes to resist damage to the test lead. Because of elimination of these projected components, the TOS5300 can avoid from unexpected accidents such as when the unit travels to other location. And also when the test lead is snagged on something, or unexpected stress is applied on the test lead, the High (High-voltage) test lead is designed to disconnect easily, but the Low (ground) test lead is designed to resist disconnection.
In order to prevent the insertion error, the color coding of the cable are classified to HIGH (red) and LOW (black) , and the plug shape of terminal are also different design.

▲ View with the protection cover removed

TOS5300 SERIES

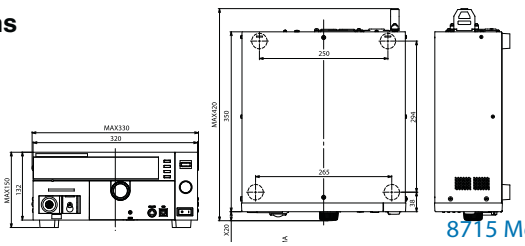
Hipot Tester/Hipot Tester with Insulation Resistance Test

Unless specified otherwise, the specifications are for the following settings and conditions.
- The warm-up time is 30 minutes.
- TYP:These are typical values. These values do not guarantee the performance of the product.
- rdng: Indicates the readout value.
- set: Indicates a setting.
- f.s: Indicates full scale.

Hipot Tester

			TOS5300	TOS5301	TOS5302
AC output section	Output range		0.05 kV to 5.00 kV		
		Accuracy	±(2 % of set + 20 V) when no load is connected		
		Setting range	0.00 kV to 5.50 kV		
		Resolution	10 V steps		
	Max. rated output *1		500 VA (5 kV/100 mA)		
	Max. rated voltage		5 kV		
	Max. rated current		100 mA (when the output voltage is 0.5 kV or greater)		
	Transformer rating		500 VA		
	Output voltage waveform *2		Sine		
		Distortion	If the output voltage is 0.5 kV or more: 3 % or less (when no load or a pure resistive load is connected).		
	Frequency		50 Hz or 60 Hz		
		Accuracy	±0.5 % (excluding during voltage rise time)		
	Voltage regulation		10 % or less (when changing from maximum rated load to no load)		
	Input voltage variation		±0.3 % (5 kV when no load is connected; power supply voltage: 90 V to 250 V)		
	Short-circuit current		200 mA or more (when the output voltage is 1.0 kV or greater)		
	Output method		PWM switching		
DC output section	Output range		—	0.05 kV to 6.00 kV	—
		Accuracy		± (2 % of set + 20 V) When no load is connected	
		Setting range		0.00 kV to 6.20 kV	
		Resolution		10 V STEP	
	Max. rated output *1			50 W (5 kV / 10 mA)	
	Max. rated voltage			6 kV	
	Max. rated current			10 mA	
	Ripple(TYP)	5 kV when no load is connected		50 Vp-p	
		Max. rated load		100 Vp-p	
	Voltage regulation			3% or less (When changing from maximum rated load to no load)	
	Short-circuit current (TYP)			40 mA (when generation 6 kV output)	
	Discharge feature			Forced discharge after test completion (discharge resistance: 125 kΩ)	
Start Voltage			The voltage at the start of withstanding voltage tests can be set to 50% of the test voltage.		
Limit Voltage			The test voltage upper limit can be set . AC: 0.00 kV to 5.50 kV, DC: 0.00 kV to 6.20 kV		
Output voltage monitor feature			If output voltage exceeds the specified value + 350 V or is lower than the specified value - 350 V, output is turned off, and protective features are activated.		
Voltmeter	Analog	Scale	6 kV AC / DC f.s		
		Accuracy	± 5 % f.s		
		Indication	Average value response/rms scale		
	Digital	Measurement range	0.000 kV to 6.500 kV AC / DC		
		Display	□ . □□□ kV		
		Accuracy	V < 500 V: ±(1.5 % of reading + 20 V); V ≥ 500 V: ±1.5 % of reading		
		Response *3	True rms, Average value response / rms display switchable		
		Hold feature	After a test is finished, the measured voltage is retained until the PASS or FAIL judgment is cleared.		
Ammeter	Digital	Measurement range	AC: 0.00 mA to 110 mA	AC: 0.00 mA to 110 mA DC: 0.00 mA to 11 mA	AC: 0.00 mA to 110 mA
		Display	i = measured current i < 1 mA: □ . □□□ mA; 1 mA ≤ i < 10 mA: □ . □□□ mA; 10 mA ≤ i < 100 mA: □□ . □□ mA; 100 mA ≤ i: □□□ . □ mA		
		Accuracy *4	1.00 mA ≤ i: ±(1.5 % of rdng); i < 1.00 mA: ±(1.5 % of reading + 30 μA)		
		Response *3	True rms, Average value response / rms display switchable		
		Hold feature	After a test is finished, the measured voltage is retained until the PASS judgment is cleared.		

External dimensional diagrams



Unit: mm

Hipot Tester

			TOS5300	TOS5301	TOS5302
Judgment feature	Judgment method and judgment operation		<table><tr><th>Judgment</th><th>Judgment method</th><th>Display</th><th>Buzzer</th><th>SIGNAL I/O</th></tr><tr><td>UPPER FAIL</td><td>If a current that is greater than or equal to the upper limit is detected, the output is turned off, and an UPPER the output is turned off, and an UPPER FAIL judgment occurs. During the voltage rise time (Rise Time) of DC hipot tests, an UPPER FAIL judgment also occurs if there is a problem with the voltage rise ratio.</td><td>FAIL LED lights OVER is displayed on the screen</td><td>ON</td><td>Generates a U-FAIL signal</td></tr><tr><td>LOWER FAIL</td><td>If a current that is less than or equal to the lower limit is detected, the output is turned off, and a LOWER FAIL judgment occurs. This judgment is not performed during voltage rise time (Rise Time) of all tests and during the voltage fall time (Fall Time) of AC hipot tests.</td><td>FAIL LED lights UNDER is displayed on the screen</td><td>ON</td><td>Generates a L-FAIL signal</td></tr><tr><td>PASS</td><td>If the specified time elapses without any problems, the output is turned off, and a PASS judgment occurs.</td><td>PASS LED lights</td><td>ON</td><td>Generates a PASS signal</td></tr></table>		
			• If PASS HOLD is enabled, the PASS signal is generated continuously until the TOS5300 Series receives a STOP signal. • The UPPER FAIL and LOWER FAIL signals are generated continuously until the TOS5300 Series receives a STOP signal. • The FAIL and PASS buzzer volume levels can be changed. • For PASS judgments, the length of time that the buzzer sounds for is fixed to 0.2 seconds. Even if PASS HOLD is enabled, the buzzer turns off after 0.2 seconds.		
	Upper limit setting		AC: 0.01 mA to 110 mA	AC: 0.01 mA to 110 mA DC: 0.01 mA to 11 mA	AC: 0.01 mA to 110 mA
	Lower limit setting		AC: 0.01 mA to 110 mA / OFF	AC: 0.01 mA to 110 mA / OFF DC: 0.01 mA to 11 mA / OFF	AC: 0.01 mA to 110 mA / OFF
	Judgment accuracy *4		1.00 mA ≤ i: ±(1.5 % of set), i < 1.00 mA: ±(1.5 % of set + 30 µA)		
	Current detection method		Calculates the current's true rms value and compares this value with the reference value		
	Calibration		Calibrated with the rms of a sine wave using a pure resistive load		
Time	Voltage rise time		0.1 s to 10.0 s		
		Resolution	0.1 s		
	Voltage fall time		0.1 s / OFF (only enabled when a PASS judgment occurs)		
	Test time		0.1 s to 999 s, can be turned off (TIMER OFF)		
		Resolution	0.1 s to 99.9 s: 0.1 s. 100 s to 999 s: 1 s.		
	Accuracy		±(100 ppm + 20 ms) excluding Fall Time Excluding AC: Fall Time Add DC: Rise Time Add ±50 ms at 1 kV or more, Add ±100 ms at less than 1kV.		

*1: Regarding the output time limits:
Taking size, weight, and cost into consideration, the heat dissipation capability of the voltage generator that is used for hipot tests has been designed to be one half that of the rated output. Use the TOS5300 Series within the following limits. If you use the product in a manner that exceeds these limits, the output section may overheat, and the internal protection circuits may be activated. If this happens, stop testing, and wait until the TOS5300 Series returns to its normal temperature.

Ambient temperature	Upper limit		Pause time	Output time
t ≤ 40 °C	AC	50 mA < i ≤ 110 mA	Greater than or equal to the output time	30 min. max.
		i ≤ 50 mA	Not necessary	Continuous output possible
	DC	5 mA < i ≤ 11 mA	Greater than or equal to the output time	1 min. max.
		i ≤ 5 mA	Greater than or equal to the wait time (WAIT TIME)	Continuous output possible

(Output time = voltage rise time + test time + voltage fall time)

*2: Regarding the test voltage waveform:
Waveform distortions may occur if an DUT whose capacitance is dependent on voltage (for example, an DUT 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 1000 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.

*3: For both True rms and Mean-value response, 50 ms or above response time is required to satisfy the measurement accuracy.

*4: Regarding ammeter and judgment accuracy:
During AC hipot tests, current also flows in the stray capacitance of items such as the measurement leads and jigs. This current that flows in the stray capacitances is added to the current that flows in the DUT, and the sum of these currents is measured.Especially if you want to perform judgments with high sensitivity and accuracy, it is necessary to consider methods to limit the current that flows in these stray capacitances, such as by adding upper and lower limits.

Output voltage	1 kV	2 kV	3 kV	4 kV	5 kV
When using 350 mm long test leads that are suspended in air (TYP)	2 µA	4 µA	6 µA	8 µA	10 µA
When using the accessory, high test lead TL31-TOS (TYP)	16 µA	32 µA	48 µA	64 µA	80 µA

Insulation Resistance Tester

			TOS5302
Output section	Output voltage		25 V, 50 V, 100 V, 125 V, 250 V, 500 V, 1000 VDC (negative)
		Accuracy	-0 %, +5 %
	Max. rated load		1 W (-1000 V DC / 1 mA)
	Max. rated current		1 mA
	Ripple	1000 V when no load is connected	2 Vp-p or less
		Max. rated load	10 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
	Discharge feature		Forced discharge after test completion (discharge resistance: approx. 25 kΩ)
	Limit voltage		The test voltage upper limit can be set : 25 V, 50 V, 100 V, 125 V, 250 V, 500 V, 1000 V
	Output voltage monitor feature		If output voltage exceeds "10 % of set + 10 V" or is lower than "-(10 % of set + 10 V)," output is turned off, and protective features are activated.
Volt-meter	Analog	Scale	6 kV AC/DC f.s
		Accuracy	± 5 % f.s
		Indication	Average value response/rms scale
	Digital	Measurement range	0 V to -1200 V
		Display	Measured voltage: V < 100 V / 100 V ≤ V < 1000 V / 1000 V ≤ V Display: □□ V / □□□ V / □□□□ V
		Accuracy	± (1 % of reading + 1 V)
Resistance meter	Measurement range / measurement accuracy *4 *5	25 V	0.03 MΩ ≤ R ≤ 25 MΩ / ±(2 % of reading + 2 digits) 25 MΩ < R ≤ 125 MΩ / ±5 % of reading 125 MΩ < R ≤ 250 MΩ / ±10 % of reading
		50 V	0.05 MΩ ≤ R ≤ 50 MΩ / ±(2 % of reading + 2 digits) 50 MΩ < R ≤ 250 MΩ / ±5 % of reading 250 MΩ < R ≤ 500 MΩ / ±10 % of reading
		100 V	0.100 MΩ ≤ R ≤ 100 MΩ / ±2 % of reading 100 MΩ < R ≤ 500 MΩ / ±5 % of reading 500 MΩ < R ≤ 1 GΩ / ±10 % of reading
		125 V	0.125 MΩ ≤ R ≤ 125 MΩ / ±2 % of reading 125 MΩ < R ≤ 625 MΩ / ±5 % of reading 625 MΩ < R ≤ 1.25 GΩ / ±10 % of reading
		250 V	0.250 MΩ ≤ R ≤ 250 MΩ / ±2 % of reading 250 MΩ < R ≤ 1.25 GΩ / ±5 % of reading 1.25 GΩ < R ≤ 2.5 GΩ / ±10 % of reading
		500 V	0.50 MΩ ≤ R ≤ 500 MΩ / ±2 % of reading 500 MΩ < R ≤ 2.5 GΩ / ±5 % of reading 2.5 GΩ < R ≤ 5 GΩ / ±10 % of reading
		1000 V	1 MΩ ≤ R < 1 GΩ / ±2 % of reading 1 GΩ ≤ R ≤ 5 GΩ / ±5 % of reading
	Display *5		25 kΩ ≤ R < 1.00 MΩ: □□□ kΩ / 1.00 MΩ ≤ R < 10.0 MΩ: □ . □□ MΩ / 10.0 MΩ ≤ R < 100 MΩ: □□ . □ MΩ / 100.0 MΩ ≤ R < 1.00 GΩ: □□□ MΩ / 1.00 GΩ ≤ R ≤ 9.99 GΩ: □ . □□ GΩ
Hold feature			After a test is finished, the measured resistance is retained until the PASS judgment is cleared.
Current detection response speed			Can be switched between three levels: Fast, Mid, Slow
Judgment feature	Judgment method and judgment operation		See table below
	Upper limit setting range		0.03 MΩ to 5.00 GΩ
	Lower limit setting range		0.03 MΩ to 5.00 GΩ
	Judgment accuracy (the same for UPPER and LOWER)		Measurement accuracy + 2 digits Humidity: 20 %rh to 70 %rh (no condensation). No interference caused by wobbly test leads or other problems. For judgments of 200 nA or less, a test time of at least 1.0 seconds is necessary. If the current detection response speed is set to Mid, a test time of at least 0.3 seconds is necessary. If the current detection response speed is set to Slow, a test time of at least 0.5 seconds is necessary.
Time	Voltage rise time		10 ms (TYP)
	Test Time		0.1 s to 999 s, can be turned off (TIMER OFF)
		Resolution	0.1 s to 99.9 s: 0.1 s. 100 s to 999 s : 1 s.
	Accuracy		± (100 ppm + 20 ms)

Judgment	Judgment method	Display	Buzzer	SIGNAL I/O
UPPER FAIL	If a resistance that is greater than or equal to the upper limit is detected, the output is turned off, and an UPPER FAIL judgment occurs. This judgment is not performed during voltage rise time (Rise Time).	FAIL LED lights; OVER is displayed on the screen	ON	Generates a U-FAIL signal
LOWER FAIL	If a resistance that is less than or equal to the lower limit is detected or if a problem occurs during the voltage rise time (Rise Time), the output is turned off, and a LOWER FAIL judgment occurs.	FAIL LED lights; UNDER is displayed on the screen	ON	Generates a L-FAIL signal
PASS	If the specified time elapses without any problems, the output is turned off, and a PASS judgment occurs.	PASS LED lights	ON	Generates a PASS signal

- If PASS HOLD is enabled, the PASS signal is generated continuously until the TOS5300 Series receives a STOP signal.
- The UPPER FAIL and LOWER FAIL signals are generated continuously until the TOS5300 Series receives a STOP signal.
- The FAIL and PASS buzzer volume levels can be changed.
- For PASS judgments, the length of time that the buzzer sounds for is fixed to 0.2 seconds. Even if PASS HOLD is enabled, the buzzer turns off after 0.2 seconds.

*4: Humidity: 20 %rh to 70 %rh (no condensation). No bends in the test leads. *5: R = measured insulation resistance

TOS5300 SERIES

Hipot Tester/Hipot Tester with Insulation Resistance Test

Other Features / Interfaces

			TOS5300	TOS5301	TOS5302
Double action feature			Tests can only be started by pressing and releasing STOP and then pressing START within 0.5 seconds of releasing the STOP switch.		
Length of time to maintain a PASS judgment result			You can set the length of time to maintain a PASS judgment: 50 ms, 100 ms, 200 ms, 1 s, 2 s,5 s, or HOLD.		
Momentary feature			Tests are only executed while the START switch is held down.		
Fail mode feature			This feature enables you to prevent remotely transmitted stop signals from clearing FAIL judgments and PROTECTION modes.		
Timer feature			This feature finishes tests when the specified time elapses.		
Output voltage monitor feature			If output voltage exceeds “setting + 350 V” or is lower than “setting - 350 V,” the TOS5300 Series switches to PROTECTION mode, output is turned off, and testing finishes.		
Memory			Up to three sets of test conditions can be saved to memory.		
Key lock			Locks panel key operations (settings and changes).		
Protective features			Under any of the following conditions, the TOS5300 Series switches to the PROTECTION state, immediately turns output off, and stops testing. A message is displayed on the screen.		
	Interlock Protection		An interlock signal has been detected.		
	Power Supply Protection		An error was detected in the power supply.		
	Volt Error Protection		While monitoring the output voltage, a voltage outside of the rated limits was detected. AC or DC hipot tests: ±350 V Insulation resistance test: ±(10 % of set + 10 V)		
	Over Load Protection		During a withstanding voltage test, a value that is greater than or equal to the output limit power was specified. AC hipot test: 550 VA. DC hipot test: 55 VA.		
	Over Heat Protection		The internal temperature of the TOS5300 Series became too high.		
	Over Rating Protection		During a withstanding voltage test, the output current was generated for a length of time that exceeds the regulated time.		
	Calibration Protection		The specified calibration period has elapsed.		
	Remote Protection		A connection to or disconnection from the front-panel REMOTE connector was detected.		
	SIGNAL I/O Protection		The rear-panel SIGNAL I/O connector’s ENABLE signal has changed.		
	USB Protection		The USB connector has been disconnected while the TOS5300 Series was being controlled through the USB interface.		
System clock			Set in the following format: year/month/day hour/minutes/seconds.		
	Calibration date		Set when the TOS5300 Series is calibrated.		
	Calibration period setting		Sets the period before the next calibration is necessary.		
	Notification of when the calibration period elapses		Sets the operation that is performed when the specified calibration period elapses. When the TOS5300 Series turns on, it can display a notification or switch to the protection mode and disable testing.		
Interfaces		USB	USB Specification 2.0		
		REMOTE	Front-panel 9-pin MINI DIN connector. By connecting an optional device to this connector, you can control the starting and stopping of tests remotely.		
		SIGNAL I/O	Rear-panel D-sub 25-pin connector		

General Specifications

				TOS5300	TOS5301	TOS5302
Display				VFD: 256 × 64 dots + 4 status indicators		
Backup battery life				3 years (at 25 °C or 77 °F)		
Environment	Installation location			Indoors, at a height of up to 2000 m		
	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 240 VAC (90 VAC to 250 VAC)		
	Power consumptio		When no load is connected (READY)	100 VA or less		
			When rated load isconnected	800 VA max.		
	Allowable frequency range			47 Hz to 63 Hz		
Insulation resistance (between AC LINE and the chassis)				30 MΩ or more (500 VDC)		
Withstanding voltage (between AC LINE and the chassis)				1400 Vac, 2 seconds (Routine test) / 1500 Vac, 1 minutes (Type test)		
Earth continuity *1				25 AAC, 0.1 Ω or less		
Safety (Does not apply to specially ordered or modified TOS5300 Series testers.)				Complies with the requirements of the following directive and standard. Low Voltage Directive 2006/95/EC, EN 61010-1 Class I *4 , Pollution degree 2		
Electromagnetic compatibility (EMC) *1 (Does not apply to specially ordered or modified TOS5300 Series testers.) (Limited to products that have the CE mark on their panels.)				Complies with the requirements of the following directive and standard. EMC Directive 2004/108/EC, EN 61326-1(Class A*2), EN 55011(Class A*2, Group1*3) EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the TOS5300 must be less than 2.5 m. The shielded cable is being used when using the SIGNAL I/O. The high test lead TL31-TOS		
Dimensions				320[12.60 inch] (330[12.99 inch]) W × 132[5.20 inch] (150[5.19 inch]) H × 350[13.78 inch] (420[16.54 inch]) D mm		
Weight				Approx. 14 kg (Approx. 30.9 lbs.)	Approx. 15 kg (Approx. 33.1 lbs.)	Approx. 14 kg (Approx. 30.9 lbs.)
Accessories				Power cord : 1pc. / High test lead (TL31-TOS) : 1set (1 red wire and 1 black wire, each with alligator clips); 1.5 m / D-sub 25-pin plug : 1set ; assembly type / High-voltage warning sticker : 1pc. / User’s manual : 1pc. / CD-R : 1pc.*5		

*1: Only on models that have the CE marking on the panel. Although signals are insulated with output terminals, each signal is common. Logic setting is also possible.
*2: This is a Class A equipment. This product is intended for use in an industrial environment.
This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*3: This is a Group 1 equipment. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.
*4: This is a Class I equipment. Be sure to ground this product’s protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.
*5: Contains the User's Manual, the Cimmunication Interface Manual, VISA library (KI-VISA), IVI-COM driver, and Safety evaluation test.