



8

Specifications

This chapter contains the specifications and gives the dimensions of the TOS5200.

- Unless specified otherwise, the specifications are for the following settings and conditions.
- The product is warmed up for at least 30 minutes.
 - Values indicated by “TYP” are typical values. They are not guaranteed performance values.
 - Values indicated by “rdng” are readout values.
 - Values indicated by “set” are settings.

Withstanding voltage tester

			TOS5200								
AC output section	Output range		0.05 kV to 5.00 kV								
		Setting accuracy	± (2 % of set + 20 V) [at no load]								
		Setting range	0.00 kV to 5.50 kV								
		Resolution	10 V STEP								
		Max. rated output ¹	500 VA (5 kV/100 mA)								
		Max. rated voltage	5 kV								
		Max. rated current	100 mA [output voltage 0.5 kV or higher]								
		Transformer rating	500 VA								
		Output voltage wave-form 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).								
		Crest factor	Within $\sqrt{2} \pm 3$ % (output voltage 800 V or higher, at no load)								
		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 line regulation	±0.3 % (5 kV at no load; power supply voltage: 90 V to 250 V)								
	Short-circuit current	200 mA or more (output voltage 1.0 kV or higher)									
	Output method	PWM switching									
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. 0.00 kV to 5.50 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	Digital	Measurement range	0.000 kV to 6.500 kV								
		Display	□.□□□ kV								
		Accuracy	V < 500 V: ± (1.5 % of reading + 20 V), V ≥ 500 V: ±1.5 % of reading								
		Response ³	True rms/ Mean-value response rms display Can be switched								
		Hold feature	After a test is finished, the measured voltage is held until the PASS or FAIL judgment is cleared.								
Ammeter	Digital	Measurement range	0.00 mA to 110 mA								
		Display	i = measured current <table border="1" style="width: 100%; text-align: center;"> <tr> <td>i < 1 mA</td> <td>1 mA ≤ i < 10 mA</td> <td>10 mA ≤ i < 100 mA</td> <td>100 mA ≤ i</td> </tr> <tr> <td>□.□□□ mA</td> <td>□.□□□ mA</td> <td>□□.□□ mA</td> <td>□□□.□ mA</td> </tr> </table>	i < 1 mA	1 mA ≤ i < 10 mA	10 mA ≤ i < 100 mA	100 mA ≤ i	□.□□□ mA	□.□□□ mA	□□.□□ mA	□□□.□ mA
		i < 1 mA	1 mA ≤ i < 10 mA	10 mA ≤ i < 100 mA	100 mA ≤ i						
		□.□□□ mA	□.□□□ mA	□□.□□ mA	□□□.□ mA						
		Accuracy ⁴	1.00 mA ≤ i: ± (1.5 % of reading), i < 1.00 mA: ± (1.5 % of reading + 30 μA)								
		Response ³	True rms/ Mean-value response rms display Can be switched								
Hold feature	After a test is finished, the measured current is held until the PASS judgment is cleared.										

		TOS5200				
Judgment feature	Judgment method and judgment operation	Judgment	Judgment method	Display	Buzzer	SIGNAL I/O
		UPPER FAIL	If a current that is greater than or equal to the upper limit is detected, the output is turned off, and an UPPER FAIL judgment occurs.	FAIL LED and "UPPER" lights.	ON	Generates a U-FAIL signal
		LOWER FAIL	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 withstanding voltage tests.	FAIL LED and "LOWER" lights.	ON	Generates an 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
		<ul style="list-style-type: none"> If PASS HOLD is enabled, the PASS signal is generated continuously until the TOS5200 receives a STOP signal. The UPPER FAIL and LOWER FAIL signals are generated continuously until the TOS5200 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		0.01 mA to 110 mA				
Lower limit setting		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 or mean-value 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)				

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 withstanding voltage tests has been designed to be one half that of the rated output. Use the TOS5200 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 TOS5200 returns to its normal temperature.

Ambient temperature	Upper limit	Pause time	Output time
t ≤ 40 °C	50 mA < i ≤ 110 mA	Greater than or equal to the output time	30 min. max.
	i ≤ 50 mA	Not necessary	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 In either case, true rms or mean-value, a response time of at least 50 ms is required to meet the measurement accuracy.

4 Regarding ammeter and judgment accuracy:

During withstanding voltage 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	5 kV
When using 350 mm long test leads that are suspended in air (TYP)	2 μA	4 μA	10 μA
When using the accessory, high-voltage test lead TL31-TOS (TYP)	16 μA	32 μA	80 μA

When the humidity is 70 % or higher, add 50 μA.

Other features

TOS5200	
Test mode	
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 hold a PASS judgment result	You can set the length of time to hold 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	The test ends when the specified time elapses.
Output voltage monitor feature (Volt Error)	If output voltage exceeds "setting + 350 V" or is lower than "setting - 350 V," the TOS5200 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).
Protection functions	Under any of the following conditions, the TOS5200 switches to the PROTECTION state, immediately turns output off, and stops testing. PROTECTION on the screen lights.
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. Withstanding voltage test: ± 350 V
Over Load Protection	While monitoring the output power, power exceeding the output power limit was detected. Withstanding voltage test: 550 VA
Over Heat Protection	The internal temperature of the TOS5200 became too high.
Over Rating Protection	The output current was generated for a length of time that exceeds the regulated time.
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, or a defect was detected during remote control operation.

Interfaces

		TOS5200															
USB		USB Specification 2.0 Standard type B socket															
RS232C ¹	Hardware	D-SUB 9-pin connector (EIA-232-D compliant) All functions except the POWER switch and key lock															
		Baudrate: 9600, 19200, 38400, 57600, 115200 bps															
		Transmission system: Start-stop synchronization															
	Program message terminator	CR+LF during transmission, CR, LF, or CR+LF during reception															
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															
Output specifications	Output method	Open drain output (4.5 Vdc to 30 Vdc)															
	Output withstanding voltage	30 Vdc															
	Output saturation voltage	Approx. 1.1 V (25 °C)															
	Maximum output current	400 mA (TOTAL)															
Input specifications ²	High-level input voltage	11 V to 12 V															
	Low-level input voltage	0 V to 4 V															
	Low-level input current	5 mA max.															
	Input time width	5 ms minimum															
1 INTERLOCK+		If you open the positive and negative terminals, the output is turned off, and the TOS5200 is switched to Protection mode. Open: If the resistance between the terminals is 1.2 kΩ or greater. Short: If the resistance between the terminals is 1 kΩ or less.															
2 PM0		Panel memory selection signal. The selection signal is latched on the rising edge of the input strobe signal to recall panel memory. * The selection of memory is prioritized over TEST SEL and AUTO SEL.															
3 PM1																	
		<table border="1"> <thead> <tr> <th>PM0</th> <th>PM1</th> <th>Recalled panel memory number</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>H</td> <td>Memory 1</td> </tr> <tr> <td>L</td> <td>H</td> <td>Memory 2</td> </tr> <tr> <td>H</td> <td>L</td> <td>Memory 3</td> </tr> <tr> <td>L</td> <td>L</td> <td>—</td> </tr> </tbody> </table>	PM0	PM1	Recalled panel memory number	H	H	Memory 1	L	H	Memory 2	H	L	Memory 3	L	L	—
PM0	PM1	Recalled panel memory number															
H	H	Memory 1															
L	H	Memory 2															
H	L	Memory 3															
L	L	—															
4 NC	—																
5 NC	—																
6 NC	—																
7 NC	—																
8 NC	—																
9 STB		Panel memory strobe signal input terminal.															
10 TEST SEL		NA															
11 AUTO SEL		NA															
12 COM	—	Circuit common terminal.															
13 INTERLOCK-		If you open the positive and negative terminals, the output is turned off, and the TOS5200 is switched to Protection mode. Open: If the resistance between the terminals is 1.2 kΩ or greater. Short: If the resistance between the terminals is 1 kΩ or less.															
14 HV.ON	○	On during testing and when a voltage remains across the output terminals.															
15 TEST	○	On during testing (excluding when voltage is rising or falling).															
16 PASS	○	On for approximately 0.2 seconds when a PASS judgment occurs. On continuously when the PASS HOLD time is set to HOLD.															
17 U-FAIL	○	On continuously when UPPER FAIL results from judgment because a value greater than or equal to the upper limit is detected.															

		TOS5200
SIGNAL I/O (continued)		
18 L-FAIL	O	On continuously when FAIL results from judgment because a value less than or equal to the lower limit is detected.
19 READY	O	On when the TOS5200 is waiting (when it is in the READY state).
20 PROTECTION	O	On when protective features have activated (the TOS5200 is in the Protection state).
21 START	I	Start signal input terminal.
22 STOP	I	Stop signal input terminal.
23 ENABLE	I	Start signal enable signal input terminal.
24 +24V	—	+24 V internal power supply output terminal; maximum output current 100 mA.
25 COM	—	Circuit common terminal.
STATUS SIGNAL OUTPUT		Output terminal for a warning light.
	+ Terminal	A +24 V signal is generated from this terminal when output has been turned on.
	COM	+24 V circuit common terminal

1 Talk mode can be set when RS232C is in use.

Talk mode	Description
0	Responds only to commands from a PC (factory default setting).
	Automatically responds at the start and end of a test. The TOS5200 status, settings, and measured values are returned.
1	Response at the start of a test
	Response at the end of a test
	Status
	Settings, measured values
	test time

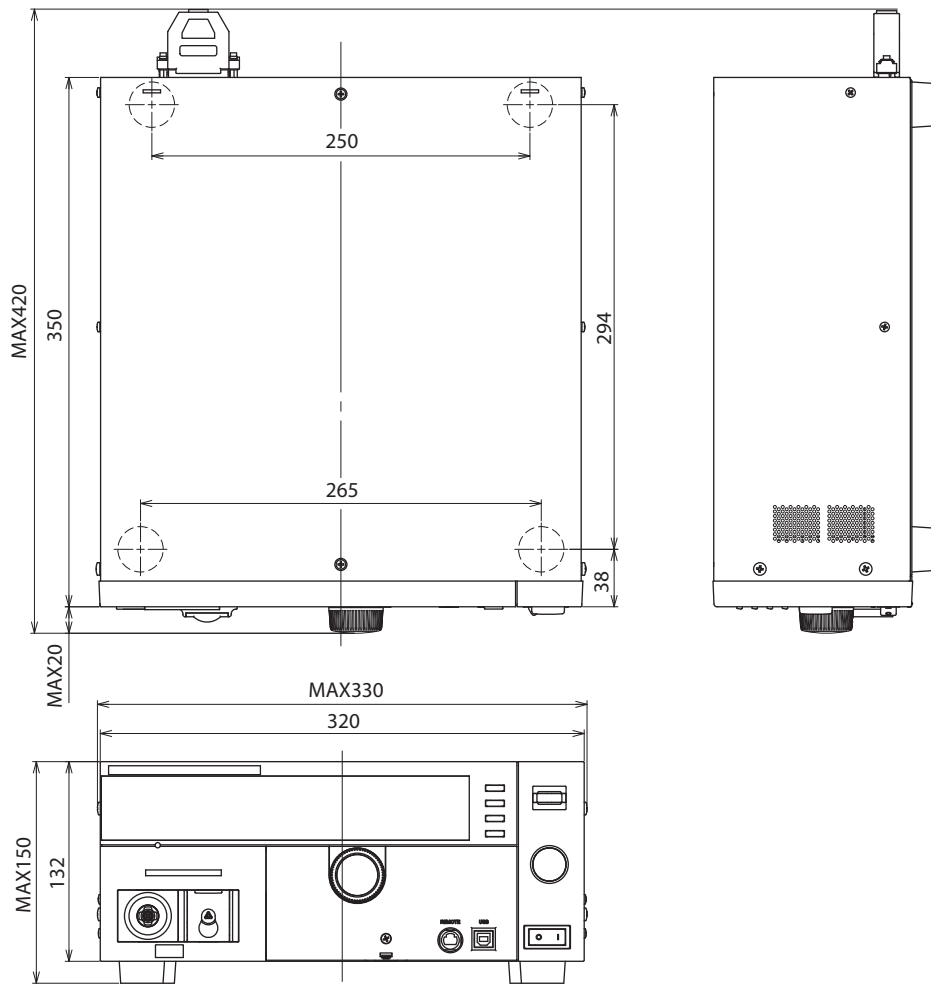
2 The input signals are all low-active control. The input terminal is pulled up to +12 V by a resistor. Leaving the input terminal open is equivalent to applying a high level signal.

General

		TOS5200	
Display		LCD: LED backlight custom design	
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 consumption	When no load is connected (READY)	100 VA or less
		Rated load	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)		1500 Vac, 1 minute	
Earth continuity		25 Aac, 0.1 Ω or less	
Electromagnetic compatibility ^{1 2}		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 (Class A ³) EN 55011 (Class A ³ , Group 1 ⁴) EN 61000-3-2 EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the TOS5200 is less than 2.5 m. Shielded cables are being used when using the SIGNAL I/O. The high-voltage test lead TL31-TOS is being used. Electrical discharges are not occurring outside the DUT.	
Safety ¹		Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU ² EN 61010-1 (Class I ⁵ , Pollution degree 2 ⁶)	
Dimensions		See "Outline drawing".	
Weight		Approx. 14 kg (30.9 lb.)	
Accessories	Power cord		1 pc.
	High-voltage test lead (TL31-TOS)		1 set (1 red wire and 1 black wire, each with alligator clips); 1.5 m
	SIGNAL I/O plug		1 set; assembly type
	High-voltage warning sticker		1 pc.
	Setup Guide		1 pc.
	Quick Reference		English: 1 pc. , Japanese: 1 pc.
	Safety Information		1 pc.
	CD-ROM		1 pc.

- 1 Does not apply to specially ordered or modified TOS5200s.
- 2 Limited to products that have the CE mark on their panels. Not be in compliance with EMC limits unless the ferrite core is attached on the cable for connection of J1 connector.
- 3 This is a Class A equipment. The TOS5200 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.
- 4 This is a Group 1 equipment. The TOS5200 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.
- 5 This is a Class I equipment. Be sure to ground the TOS5200's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.
- 6 Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

Outline drawing



Unit: mm (inch)