Keysight Technologies
TS-8900 PXI-Based Standard Platform for Automated Test Equipment Integration

Technical Overview

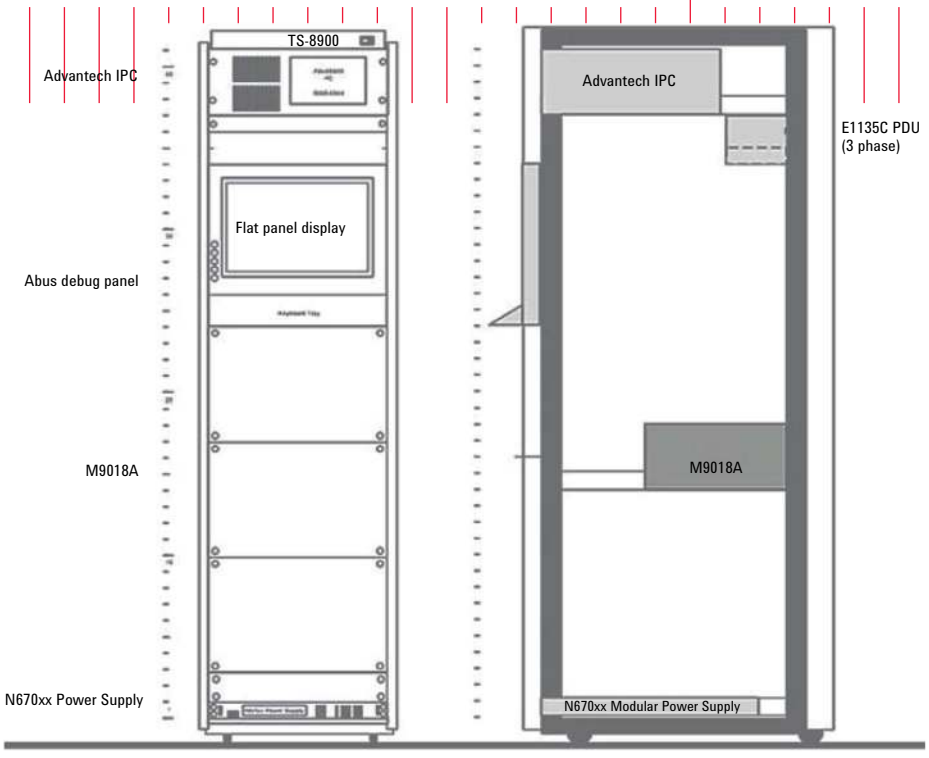

Illustration of a full-configuration TS-8900. Actual TS-8900 shell platform will differ. Refer to Figure 1 for schematic of the TS-8900 shell platform.

KEYSIGHT TECHNOLOGIES

Introduction

The Keysight Technologies, Inc. TS-8900 standard PXI-based high performance shell platform that offers self-integrators who need an off-the-shelf PXI-based platform the following values:

- Quick delivery times* for further rack and stack of equipment, fixtures and interfaces
- Uses industry standard PXI, GPIB and LXI source and measurement instrumentations
- Worldwide support
- Long shelf life (> 5 years)

TS-8900 is the latest off-the-shelf, PXI-based shell platform designed for self-integrators who would like to build their own automated test equipment (ATE). Designed to reduce cost of test, the TS-8900 achieves this by providing an affordable platform with short lead time delivery* and worldwide support with long shelf life to reduce equipment capital cost. It is ideal for self-integrators who require a standard off-the-shelf shell platform to design and integrate their own ATE.

TS-8900 Base Platform Characteristics

Speed

The TS-8900 shell platform is designed to provide self-integrators an off-the-shelf solution that is quick to order and integrate in order to quickly deploy their ATE systems into their respective test validation or manufacturing lines. With delivery lead times of 4-6 weeks*, self-integrators are then able to reduce the deployment times for their ATE systems.

Cost

Due to quick delivery lead times, self-integrators can reduce their inventory costs by implementing just-in-time deliveries of their ATE systems. With worldwide support infrastructure for the TS-8900, self-integrators can reduce their maintenance and support costs, resulting in lower total cost of ownership.

Worldwide support

The TS-8900 provides a standard integration platform with Keysight global support to customers. This is achieved via Keysight's global support infrastructure, thus lowering the total cost of test for self-integrators where they can develop their test once, and deploy it everywhere.

(*Typical estimated delivery lead time is 4 weeks. Please call your nearest sales office or rep to obtain more accurate dates. Contact list available at www.keysight.com/find/contactus.)

TS-8900 Platform Architecture

The TS-8900 shell platform consists of the following:

- System controller (operating system: Windows® 7 Professional) and industrial grade 17-inch LCD screen
- 1135C power distribution unit (default: 3-phase configuration)
- M9018A PXI mainframe with M9021A PCIe interface card
- 2.0 m Rack
- N6702A modular power supply mainframe

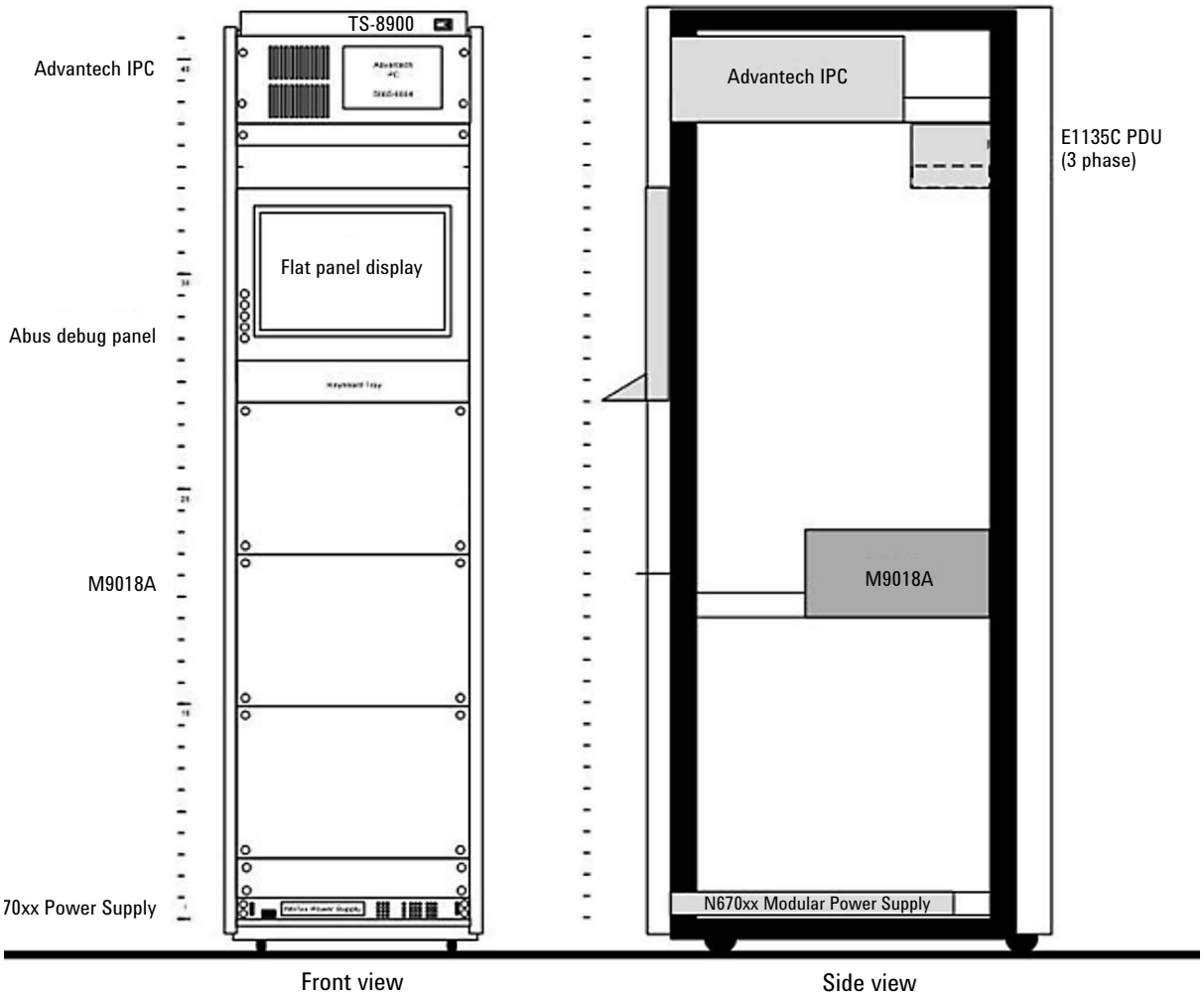

Figure 1: Schematic illustration of the TS-8900 shell platform

System Controller

The TS-8900 system controller comprises an industrial PC with Intel Core 2 Duo 3.0 GHz, 1333 MHz FSB, 6MB L2 Cache and 2 GB RAM with pre-installed Windows 7 Professional. As the PC controller ships with 6 COM ports, 6 USB ports (2 front, 4 rear), 1 GPIB port and 7 PCI slots available, the TS-8900 provides customers with a scalable system controller that is able to able to support up to 7 PCI expansion cards.

The PC display is a 17-inch industrial grade LCD screen – this is especially helpful since some industries require long shelf life for their test equipment (> 5 years), with an industrial controller with display, Keysight is able to assist self-integrators to meet these industrial requirements.

Keysight 1135C Power Distribution Unit (PDU)

The Keysight 1135C PDU is shipped with WYE 3-Phase W/ NEU 5-Wire FOR 220/380-240/415VAC. It provides users the flexibility to support input voltages of 3 phase or single phase power supply for their ATE equipment. The 1135C PDU is configured by default with 12 power outlets (4 used, 8 outlets available), with 15 A max per outlet. Benefits provided to customers and system integrators are:

Flexibility

The 1135C PDU is configurable to support 3-phase and single phase voltages that would be required in different environments and different regions. Customers have the flexibility to re-configure the PDU as they see fit when moving the ATE system from region to region or from one environment to another. Below is a list of supported input voltages:

1. 120/208–240/415 V 3-Phase Wye with Neutral
2. 208 or 220 V 3-Phase Wye
3. 100/200–120/240 V Three-Phase Delta
4. 120/208–240/415 V Single Phase Wye with Neutral
5. 100/200–120/240 V Single Phase with Center-Tap Neutral
6. 200–240 V Single Phase Non-Earthed
7. 100–240 V Single Phase Earthed

Safety

The 1135C PDU has a built-in emergency shutdown (EMO) switch. This enables customers or system integrators to design and implement a emergency safety cutoff switch for operator safety and convenience within anywhere in their ATE system. The 1135C PDU also has a line monitoring function designed to protect users and ATE equipment against injuries and damages resulting from voltage spikes. Below are the line monitoring limits upon PDU turn-on:

	S1 = 115 V	S1 = 230 V	Frequency
Low limit	90.5 Vac ± 3%	181 Vac ± 3%	47 – 63 Hz
High limit	133.5 Vac ± 3%	267 Vac ± 3%	47 – 63 Hz

For more information on configuring and operating the Keysight 1135C PDU, please refer to the link:
http://www.keysight.com/upload/cmc_upload/All/E1135-90001.pdf

PXI 18-slot Mainframe

The TS-8900 base platform comes with an 18 slot PXI mainframe.
The key benefits of the PXI mainframe are:

Speed

This mainframe comes with a PCIe 2.0 backplane, providing the highest industry data rate at 8 GB/s to system slot. The backplane can also be optimized for a given embedded controller or for highest slot-to-slot communication.

Compatibility

The M9018A PXI mainframe supports PXIe and PXIe Hybrid modules. It also supports PXI-1 and cPCI modules that have a J1 connector. It has 16 hybrid slots with up to 42 W cooling per slot.

Ease of use

With multiple inlets for cool air circulation from the sides, front and bottom of the chassis, the M9018A mainframe provides customers with the flexibility of maximizing the rack space in the base platform.

For more information on the M9018A PXI mainframe, please refer to the link:
www.keysight.com/find/M9018A/

Power Sources

The TS-8900 base platform comes with a N6702A modular power supply mainframe. The benefits of this power supply mainframe to self-integrators are:

Size

The N6702A modular power supply mainframe is only 1U tall and supports up to 4 outputs at up to 300 W per module

Flexibility

Customers have various power supply modules to suit their needs from basic modules to precision modules. Customers can select any combo of 22 output power and performance levels. Open connectivity options like LAN, USB, and GPIB are all available.

Speed

The N6700 series modular power supply supports command processing time of less than 1 millisecond. With features like built-in output sequencing and scope-like digitizer (optional), The N6700 series modular power supply is truly a market leader in speed to maximize system throughput.

For more information on the available power module options available for the N6702A mainframe, please visit www.keysight.com/find/N6700Power

Product Specifications

E2235C industrial PC controller and 17-inch industrial LCD display

	Built-up components
Backplane	13-slot backplane, 8x PCI, 3x PCIex1, 1x PCIex16 slots
Motherboard	LGA775 Core 2 Quad CPU card with VGA and dual GB port LAN
Processor	Intel Core 2 Quad 3.0 Ghz CPU
Memory	Transcend 2 GB DDR2-667 RAM
Optical drive	LITEON 20X SATA DVD ± RW
Front USB access ports	2 front access USB ports
Audio	Creative Labs Sound Blaster Audigy SE
Storage	Seagate 250 GB 3.5" SATA 24x7 7 KRPM 32 M
Power supply	400W ATX power supply
Display	1280 x 1024 17-inch LCD screen
Others	– 6 COM ports – 1 parallel port – 4 USB ports (rear)

1135C Power Distribution Unit (PDU)

Input voltage	100–240 volts single phase, 200–415 volts 3-phase, 50/60 hertz
Input current	32 amps max
Input wire size:	On the Mains Disconnect Switch: #8 AWG 1 10 square millimeters (0.147-inch, 3.57 mm dia.) max wires 2
Mains disconnect:	600 volts, 60 amps, 4-pole, lockable
Output voltage:	Maximum 240 volts
Output current:	From the output terminal block: 15 amps maximum per branch circuit (10 circuits) From the outlets (receptacles): 15 amps maximum per circuit if switched (circuit breakers) or 10 amps maximum per circuit if un-switched (fuses)
Main/Branch PDU drive:	Can control up to 20 other E1135 PDUs
Operational altitude:	Maximum 2,000 meters (6,560 feet)
Operational temperature:	40 degrees C max
Operational humidity:	80 percent R.H. max
Transients:	4,000 volts peak max (IEC installation category III)
Pollution degree:	2

Chassis characteristics	
Standards compliance	
PXI-5 PXI Express hardware specification PXI-1 hardware specification Rev 2.2 PICMG EXP.0 R1.0 specification	
Backplane	
Module size	3U
Total slots Hybrid compatible slots PXIe system slot PXIe timing slot	18 16 1 (with three system expansion slots) 1 (also accepts PXIe module)
Module compatibility	PXIe, PXI-hybrid, PXI-1 (J1-only), and cPCI (J1-only)
Mechanical	
Size	444.4mm W x 191.8mm H x 466mm D (with feet installed) 444.4mm W x 177.8mm H x 466mm D (with feet removed) 4U x 1 rack width
Weight (without modules)	15.5 kg (34 lbs)

Power supply characteristics	
AC input	
Operating voltage/power (low-line)	100-120V, 900W (nom)
Operating voltage/power (high-line)	220-240V, 1200W (nom)
Input frequency range	50/60 Hz
Overcurrent protection	Internal fuse in line
DC output power	
Total DC power [1] 220-240 Vac input 100-120 Vac input	 867.5 W 667.5 W
PXI Power Compliance	
The M9018A exceeds the PXI power specifications at high line (220-240 V). Depending on the modules used, the chassis may not meet the specification and would be considered a low-power chassis in such cases. It is recommended that power budgeting be employed, especially at low line	

1. Includes 5VAUX supply (7.5W)

Power supply characteristics, continued					
DC supplies (220-240 Vac input)					
Voltage	Maximum current[1]	Load regulation	Maximum ripple and noise (20 MHz BW)		
+3.3 V	60 A[2]	1%	1.5% (pk-pk)		
+5 V	58.8 A	1%	1% (pk-pk)		
+12 V	47.2 A[2]	1%	1% (pk-pk)		
–12 V	4 A[2]	1%	1% (pk-pk)		
5 VAUX	1.5 A	1%	50 mV (pk-pk)		
DC supplies (100-120 Vac input)					
The maximum current from each supply rail is the same for both low-line and high-line inputs, however, the total power supplied for all rails (except 5 VAUX) must not exceed 660 W on lowline (100-120 Vac input).					
Backplane pin current capacity					
Slot	+3.3 V	+5 V	+12 V	– 12 V	5 VAUX
System controller slot	9 A	9 A	11 A	0 A	1 A
System timing/ PXIe slot	6 A	0 A	4 A	0 A	1 A
PXIe hybrid slot	6 A	6 A	4 A	1 A	1 A
Chassis cooling and power dissipation characteristics					
Slot airflow direction	Bottom of module to top of module				
Chassis cooling intake	Bottom of front bezal, side panels, and bottom panel of chassis				
Chassis cooling exhaust	Rear of chassis				
Chassis cooling fans	Three 186 cfm fans on rear panel with HIGH/AUTO speed selector				
Power dissipation, system slot	140 W max				
Power dissipation, user slot	42 W max[3]				
Power dissipation, timing slot	42 W max[3]				

1. *The total power supplied for all rails (except 5VAUX) must not exceed 860 W.*
2. *The total power supplied for 3.3V, 12 V, and -12 V rails must not exceed 566 W.*
3. *Maximum per slot power dissipation at 55 °C with 15 °C temperature rise; requires: a) that the chassis bottom not be blocked (1U rack space below the chassis or feet extended), or b) two air inlet modules in slots 9, 10, or 11, and a slot blocker in empty controller slots. Module cooling can be impacted by each module's resistance to air flow.*

Clocks and triggers	
10 MHz system clock (PXI_CLK10)	
Maximum slot-to-slot skew	155 ps
Accuracy	25 ppm
Output amplitude (10 MHz REF Out BNC)	1 Vpk-pk ±20% square-wave into 50 Ω 2 Vpk-pk unloaded
Output impedance (10 MHz REF Out BNC)	50 Ω ±5 Ω
100 MHz system clock (PXIe_CLK100)	
Maximum slot-to-slot skew	120 ps
Accuracy	25 ppm
External 10 MHz clock source input requirements	
Frequency input	10 MHz ±100 PPM
Input signal (10 MHz REF In BNC)	100 mVPP to 5 VPP (square-wave or sine-wave)
Input impedance (10 MHz REF In BNC)	50 Ω ±5 Ω
Input signal (PXI timing slot PXI_CLK10_IN)	5 V or 3.3 V TTL signal
PXI Star Trigger	
Maximum slot-to-slot skew	250 ps
PXI Differential Star Triggers	
Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps

Environmental characteristics[1,2]		
Operating and storage conditions		
Humidity	Type tested at 95%, +40 ˚C (non-condensing)	
	Operating	Storage
Temperature	0 ˚C to 55 ˚C	–40 ˚C to 70 ˚C
Altitude	up to 2 km (6,562 ft)	up to 3 km (9,842 ft)
Vibration		
Operating random vibration	Type-tested at 5 to 500 Hz, 0.21 g rms	
Survival random vibration	Type-tested at 5 to 500 Hz, 2.09 g rms	
Acoustical emissions (referenced to 1pW)		
	Auto fan (25 ˚C ambient)	High fan
Sound pressure level[3]	57 dBA	68 dBA
Sound power	61 dBA	76 dBA

1. *Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to, temperature, humidity, shock, vibration, altitude, and power line conditions.*
2. *Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F class 3.*
3. *At operator position.*

Regulatory characteristics	
Safety	
Complies with European Low Voltage Directive 2006/95/EC	
– IEC/EN 61010-1, 2nd Edition	
– Canada: CSA C22.2 No. 61010-1	
– USA: UL std no. 61010-1, 2nd Edition	
German acoustic statement	
Acoustic noise emission LpA <70 dB Operator position Normal position Per ISO 7779	Geraeuschemission LpA <70 dB Am Arbeitsplatz Normaler Betrieb Nach DIN 45635 t.19
EMC	
Complies with European EMC Directive 2004/108/EC	
– IEC/EN 61326-1	
– CISPR Pub 11 Group 1, Class A	
– AS/NZS CISPR 11	
– ICES/NMB-001 This ISM device complies with Canadian ICES-001 Cet appareil ISM est conforme à la norme NMB-001 du Canada	

Keysight N6702A MPS Mainframe

Supplemental characteristics	
Maximum Power Available for Modules: (sum of total module output power)	1200 W (for N6702A mainframes)
Internal Flash Memory:	8 Mbyte
Protection Response Characteristics: INH input Fault on coupled outputs	 5 µs from receipt of inhibit to start of shutdown < 10 µs from receipt of fault to start of shutdown
Command Processing Time:	≤ 1 ms from receipt of command to start of output change
Digital Control Characteristics:	
Maximum voltage ratings	+16.5 VDC/–5 VDC between pins (pin 8 is internally connected to chassis ground).
Pins 1 and 2 as FLT output	Maximum low-level output voltage = 0.5 V @ 4 mA Maximum low-level sink current = 4 mA Typical high-level leakage current = 1 mA @ 16.5 VDC
Pins 1 - 7 as digital/trigger outputs (pin 8 = common)	Maximum low-level output voltage = 0.5 V @ 4 mA; 1 V @ 50 mA; 1.75 V @ 100 mA Maximum low-level sink current = 100 mA Typical high-level leakage current = 0.8 mA @ 16.5 VDC
Pins 1 - 7 as digital/trigger inputs and pin 3 as INH input (pin 8 = common)	Maximum low-level input voltage = 0.8 V Minimum high-level input voltage = 2 V Typical low-level current = 2 mA @ 0 V (internal 2.2k pull-up) Typical high-level leakage current = 0.12 mA @ 16.5 VDC
Interface Capabilities:	
GPIB	SCPI - 1993, IEEE 488.2 compliant interface
LXI Compliance	Class C (only applies to units with LXI label on front panel)
USB 2.0	Requires Keysight IO Library version M.01.01 or 14.0 and up
10/100 LAN	Requires Keysight IO Library version L.01.01 or 14.0 and up
Built-in Web server	Requires Internet Explorer 7+ or Firefox 2+
Regulatory Compliance:	
EMC	Complies with European EMC Directive for test and measurement products. – IEC/EN 61326-1 – CISPR 11, Group 1, class A – AS/NZS CISPR 11 – ICES/NMB-001 Complies with Australian standard and carries C-Tick mark. This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.
Safety	Complies with European Low Voltage Directive and carries the CE-marking. Conforms to UL 61010-1 and CSA C22.2 61010-1.

Supplemental Characteristics (continued)	
Environmental Conditions	
Operating environment	Indoor use, installation category II (for AC input), pollution degree 2
Temperature range	0 °C to 55 °C (output current is derated 1% per °C above 40 °C ambient temperature)
Relative humidity	Up to 95%
Altitude	Up to 2000 meters
Storage temperature	–30 °C to 70 °C
Acoustic Noise Declaration:	
This statement is provided to comply with the requirements of the German Sound Emission Directive, from 18 January 1991.	Sound Pressure Lp <70 dB(A), At Operator Position, Normal Operation, According to EN 27779 (Type Test). Schalldruckpegel Lp <70 dB(A), Am Arbeitsplatz, Normaler Betrieb, Nach EN 27779 (Typprüfung).
Output Terminal Isolation:	
Maximum Rating	No output terminal may be more than 240 VDC from any other terminal or chassis ground. **N6781A Note:** When using the AUX measurement input terminals on Model N6781A, no output or input terminal may be more than ±60 VDC from any other terminal or chassis ground.
AC Input:	
Input Ratings	~ 100 VAC – 240 VAC; 50/60/400Hz
Power Consumption	1000 VA (N6700B) 1440 VA (N6701A) 1440 VA (N6702A @ < 180 VAC input) 2200 VA (N6702A @ > 180 VAC input)
Power Factor NOTE 1	0.99 @ nominal input and rated power
Fuse	Internal fuse - not customer accessible. **N6702A Note:** AC mains circuits rated at 100-180 VAC cannot supply enough current to power the N6702A mainframe when operated at its full rated power. When connected to a100-180 VAC mains, internal circuits will limit the power available to modules to 600 W maximum.
Net Weight:	
N6702A with 4 power modules Single power module (typical)	14.09 kg / 31 lbs. 1.23 kg / 2.71 lbs
Dimensions:	**Refer to the outline diagrams on the following page.**

1. *Under full load at 400 Hz, power factor drops from 0.99 @ 120 VAC to as low as 0.76 @ 265 VAC. Power factor degrades further under no load conditions.*

More information

Introduction to Test-System Design (AN 1465-1) pub. no. 5988-9747EN
http://literature.cdn.keysight.com//litweb/pdf/5988-9747EN.pdf

Computer I/O Considerations (AN 1465-2) pub. no. 5988-9818EN
http://literature.cdn.keysight.com/litweb/pdf/5988-9818EN.pdf

Understanding Drivers and Direct I/O (AN 1465-3) pub. no. 5989-0110EN
http://literature.cdn.keysight.com/litweb/pdf/5989-0110EN.pdf

Choosing Your Test-System Software Architecture (AN 1465-4) pub. no. 5988-9819EN
http://literature.cdn.keysight.com/litweb/pdf/5988-9819EN.pdf

Choosing Your Test-System Hardware Architecture and Instrumentation (AN 1465-5) pub. no. 5988-9820EN
http://literature.cdn.keysight.com/litweb/pdf/5988-9820EN.pdf

Understanding the Effects of Racking and system interconnections (AN 1465-6) pub. no. 5988-9821EN
http://literature.cdn.keysight.com/litweb/pdf/5988-9821EN.pdf

Maximizing System Throughput and Optimizing Deployment (AN 1465-7) pub. no. 5988-9822EN
http://literature.cdn.keysight.com/litweb/pdf/5988-9822EN.pdf

Operational Maintenance (AN 1465-8) pub. no. 5988-9823EN
http://literature.cdn.keysight.com/litweb/pdf/5988-9823EN.pdf

Using LAN in Test Systems: The Basics (AN 1465-9) pub no. 5989-1412EN
http://literature.cdn.keysight.com/litweb/pdf/5989-1412EN.pdf

Using LAN in Test Systems: Network Configuration (AN 1465-10) pub no. 5989-1413EN
http://literature.cdn.keysight.com/litweb/pdf/5989-1413EN.pdf

Using LAN in Test Systems: PC Configuration (AN 1465-11) pub no. 5989-1415EN
http://literature.cdn.keysight.com/litweb/pdf/5989-1415EN.pdf

Using USB in the Test and Measurement Environment (AN 1465-12) pub no. 5989-1417EN
http://literature.cdn.keysight.com/litweb/pdf/5989-1417EN.pdf

Instrument Racks and Accessories: Calculated System Center of Gravity
http://www.keysight.com/find/rackcenterofgravity

TS-8900 (U8975A) Ordering Information

Item	Description
U8975A	U8975A TS-8900 Base System without Interface and Instrumentation (Customer Integration and Test required)
E2235C-740	LCD DISPLAY - 17 inch with Rackmount Kit
U8970A-KM1	Fixed keyboard and mouse

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www.pxisa.org
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Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

www.keysight.com/find/ts8900

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

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For other unlisted countries:
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Published in USA, August 2, 2014
5991-0682EN
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