

## Agilent N6700 MPS Low-Profile Modular Power System

Models: N6700A, N6710A, N6721A-29A, N6731A-35A,  
N6742A-45A, N6751A, N6752A, N6761A, N6762A

### Product Overview



- Ideal for ATE systems in R&D, Design Validation, and Manufacturing
- Small size: up to 4 outputs in 1U of rack space
- Flexible, modular system: Can mix and match power levels and performance levels to optimize investment
- Performance modules for critical test requirements
- Value modules for basic DC power requirements
- Fast command processing times to improve throughput
- Connect via GPIB, LAN, or USB



**Agilent Technologies**

## Small Size and Flexibility for ATE

Power supplies are a fundamental component of every test system in industries including aerospace and defense, consumer electronics, computers and peripherals, communications, semiconductor and automotive electronics. Today's complex automatic test equipment (ATE) systems often require multiple power sources. Test system designers are challenged to keep costs down by reducing rack space occupied by these multiple power supplies and to continually increase test system throughput.

The Agilent N6700 Low-Profile Modular Power System (MPS) is a 1U (rack unit) high, multiple-output programmable DC power supply system that enables test system integrators to optimize performance, power and price to match test needs.

The Agilent N6700 MPS gives test system designers the flexibility to mix and match from 13 different DC power modules to create a 1- to 4-channel DC power system optimized to meet specific test requirements. Test system engineers can invest in high-performance outputs where speed and accuracy are needed, or purchase basic performance outputs for simple DC power requirements.

## N6700 System Features



Figure 1. Connectivity: GPIB, 10/100 Base-T Ethernet, and USB 2.0 all standard

### Small Size

The Agilent N6700 MPS uses an advanced switching power supply design that fits within 1U of rack space. It has side air vents (no top or bottom air vents) so other instruments can be mounted directly above or below it. (Requires rack mount kit; see Ordering Information.)

### Built-in Measurement of Voltage and Current

The N6700 modules come standard with built-in measurement of voltage and current to simplify wiring and design of an ATE system.

### Protection Features

Each N6700 module is protected against over-voltage, over-current, and over-temperature. A fault condition in one module can be detected within 10 microseconds by other modules so that they can be quickly shut down to avoid hazardous conditions on your DUT.

### Connectivity

The N6700 MPS comes standard with GPIB, USB 2.0, and 10/100 Base-T Ethernet LAN interfaces. While GPIB is best suited for use with existing systems, Agilent offers USB and LAN to allow you to take advantage of the availability, speed, and ease-of-use of common computer industry standard interfaces.

### Security

When used in systems running GPIB, the LAN and/or USB interfaces can be disabled for extra security. Also, all non-volatile RAM data and settings can be cleared from the front panel.

### Control from any Browser

The N6700 can be controlled via a standard web browser. The N6700 contains a web server that provides web pages for monitor, control, and setup of the MPS.

### Output Sequencing

Each DC power module can be individually set to turn on or to turn off with a delay. By adjusting the delay times and then commanding the N6700 to turn on, you can set the N6700 modules to sequence on in a particular order. The same sequencing capability is available to shut down the modules in a particular order.

### Series and Parallel Operation

To increase available voltage and power, similarly rated outputs can be operated directly in series. To increase available current and power, similarly rated outputs can be operated directly in parallel.

### Triggering

The N6700A Low-Profile MPS mainframe has hardware trigger in/trigger out signals which permit the N6700 to be synchronized with external events. For example, a switch closure in the fixture can trigger the N6700 to turn on power to the DUT, or change voltage, or take a measurement.

### Drivers

The N6700 comes with both *VXIplug&play* drivers and IVI-COM drivers.

### Programming Language

The N6700 supports SCPI (Standard Commands for Programmable Instruments).

### Output Disconnect Relays

Each module in the N6700 can be individually ordered with optional Output Disconnect Relays. These relays disconnect both the plus and minus side of the power supply, including the sense leads.

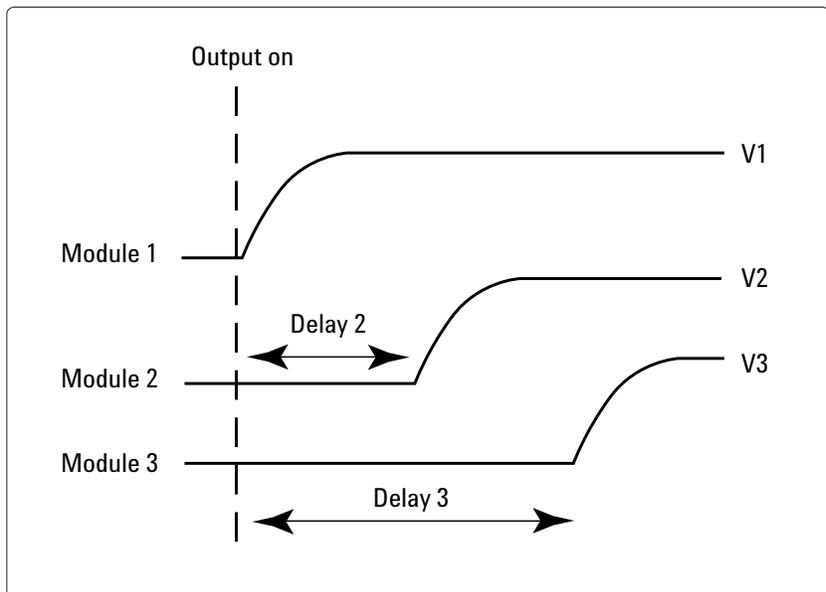


Figure 2. Output Sequencing



Figure 3. Front panel with up to 4 channels displayed simultaneously (Picture shows 3 channels installed.)

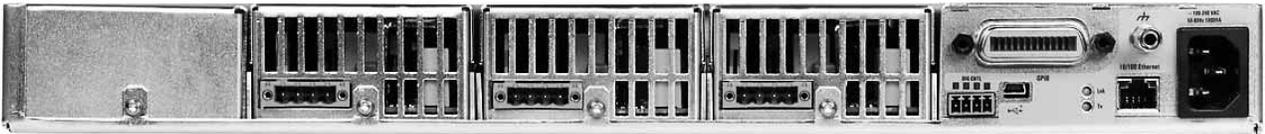


Figure 4. Rear panel (Picture shows 3 channels installed.)

### Front Panel

In addition to full control over its three standard interfaces, the N6700 has a full featured front panel to permit easy manual operation for test prototyping, debugging, and troubleshooting when used in an ATE system. You can have confidence that the N6700 is working properly because you can view the settings and actual output values on all four outputs at the same time.

### Universal AC Input

The N6700 has a universal input that operates from 100-240 Vac, 50/60 Hz. There are no switches to set or fuses to change when switching from one voltage standard to another. The AC input employs power factor correction.

### Quick Disconnects

Each power module has quick disconnects for easy system setup and maintenance.

### Rack Mount Kit

The N6700 is easily rack-mounted using available option #908. This kit provides all the necessary hardware to rack mount one N6700A mainframe in only 1U of rack space. This rack mount kit includes front rack ears and rear supports which take the place of standard rack rails and/or slides. Note that standard rack rails or slides

are not needed and are not compatible with the N6700A because of its 1U size and airflow requirements.

### 3-Year Warranty

The N6700 is backed by a standard 3 year return to Agilent warranty. Other warranty options are available—contact Agilent for details.



Figure 5. Quick disconnects for power and sense leads

## Choosing the right DC Power Modules to meet your ATE needs



### **N6750 Family**

*For applications where the power supply plays a critical role*

The Agilent N6750 family of high-performance, autoranging DC power modules provides low noise, high accuracy and programming speeds that are up to 10 to 50 times faster than other programmable power supplies. In addition, Agilent has, for the first time, included high-speed test extensions in general-purpose power supplies. The high-speed test extensions offer an oscilloscope-like digitizer that simplifies system configuration and increases

measurement accuracy when viewing high-speed transient or pulse events within the device-under-test (DUT). In addition, autoranging output capabilities enable one power supply to do the job of several traditional power supplies.



### **N6760 Family**

*For applications where precision is required*

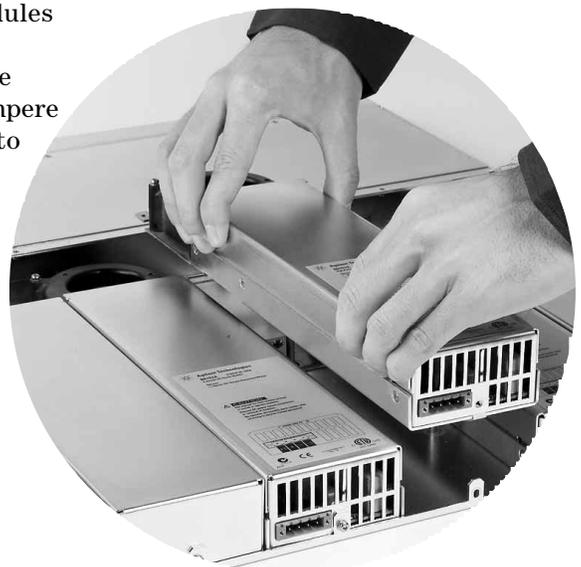
The Agilent N6760 family of precision DC power modules provides precise control and measurements in the milliamperere and microampere region with the ability to simultaneously digitize voltage and current, and capture those measurements in an oscilloscope-like data buffer.



### **N6730/40 Family**

*For basic DC applications*

The Agilent N6730 and N6740 families of DC power modules provide programmable voltage and current, measurement and protection features at a very economical price, making these modules suitable to power the DUT or to provide power for ATE system resources, such as fixture control.



**Figure 6.** User re-configurable modular system

## The N6750 and N6760 Families: Performance Modules for when the power supply is a critical part of your testing

When your testing requires a power supply to do more than just provide a constant DC level, the N6750 family of High-Performance, Autoranging DC Power Modules and the N6760 family of Precision DC Power Modules are the perfect fit. These modules combine a fast output with flexible controls and sophisticated measurements. The N6750/60 is more than a power supply; it is a stimulus/response instrument.

To fit in 1U, the N6750/60 use an advanced switch-mode design that offers the low output noise and fast output speed typically found on linear power supplies.

### Low Noise Outputs

Careful attention has been paid to this design to ensure low normal mode noise (ripple and peak-peak) as well as low common mode noise. This switching power supply outperforms most linear power supplies on the market.

### Output Programming Speed

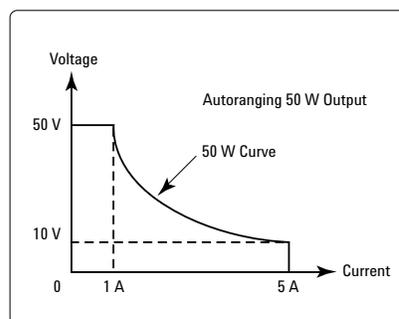
When it comes to speed, the N6750/60 achieves performance unlike a typical DC power supply. Thanks to an active down-programming circuit to rapidly pull down the output when lowering the module's output voltage, the N6750/60 can rapidly program both up and down in voltage. Changing voltage from 0 V to 50 V, or 50 V to 0 V, can be accomplished in less than 5 milliseconds. And for smaller voltage changes, for example from 0 V to 5 V or 5 V to 0 V, the programming speed is less than 500 microseconds. These output speeds allow the N6750/60 to give maximum system throughput when your test calls for frequent changes in power supply voltage settings.

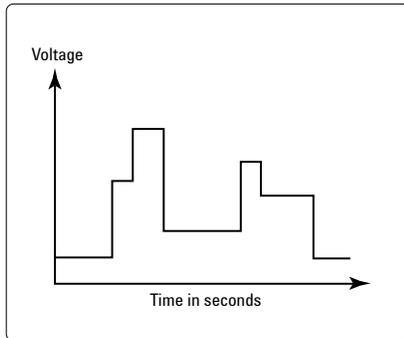
### Autoranging for Flexibility

The N6750/60 gives test system designers even more flexibility by providing autoranging outputs. This autoranging capability provides maximum output power at any output voltage up to 50 V. This allows one power supply to do the job of several power supplies because its operating range covers low voltage, high current as well as high voltage, low current operating points.

For example, the N6751A High-Performance, Autoranging DC Module, rated at 50 V, 5 A, and 50 W can provide full power at 10 V @ 5 A (=50 W), 20 V @ 2.5 A (= 50 W), 33.3 V @ 1.5 A (= 50 W), 50 V @ 1 A (= 50 W) or anywhere in between. Therefore, this 50 W autoranging power supply, due to its extended voltage and current range, can produce voltage and current combinations in the range of a 250 W non-autoranging power supply.

The flexibility of autoranging is useful when the DUT operates over a wide range of voltages, when the ATE system needs to test a wide range of DUTs, or when margin is needed because the ATE power supply must be selected before final DUT power requirements are determined.





**Figure 7.** High Speed Test Extensions LIST mode provides “power ARB” capability

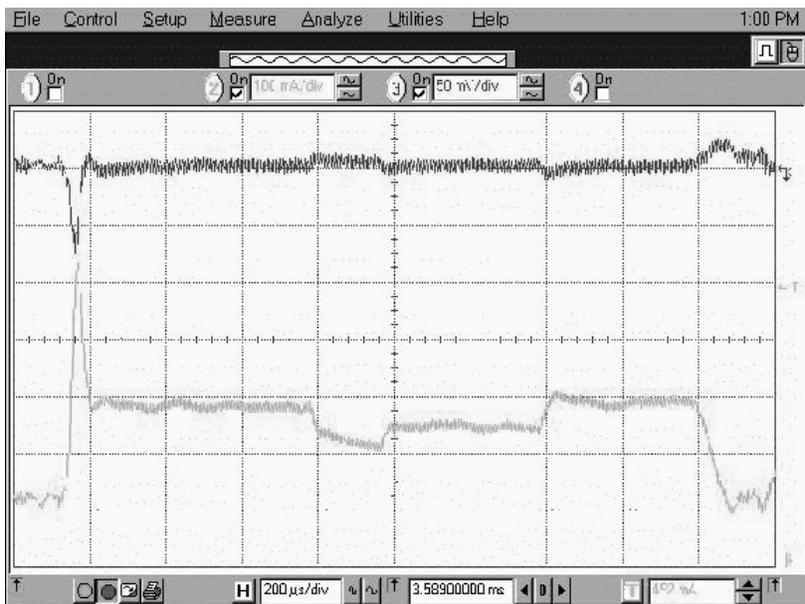
### High-Speed Test Extensions

To make your testing go even faster, the N6750/60 offer High-Speed Test Extensions (HSTE). This enhancement to the N6750/60 DC Power Modules extends the capabilities to include features similar to a built-in arbitrary waveform generator and a built-in oscilloscope.

Through the LIST mode of HSTE, you can download up to 512 setpoints of voltage and current. In LIST mode, you can program the output to execute a LIST of voltage and current setpoints. For each setpoint, a dwell time can be specified and the power supply will stay (i.e., dwell) at that setpoint for the programmed dwell time value. For each setpoint in the LIST, you can have a different dwell time from 0 to 262 seconds with 1 microsecond resolution.\* Then, you can trigger the module to begin executing the list. The module will step thru the list, staying at each setpoint for the programmed dwell time,

and then it will move on to the next point. This speeds up execution by removing the computer I/O from the process. The result is an output that automatically changes according to the programmed list, just like an arbitrary waveform generator.

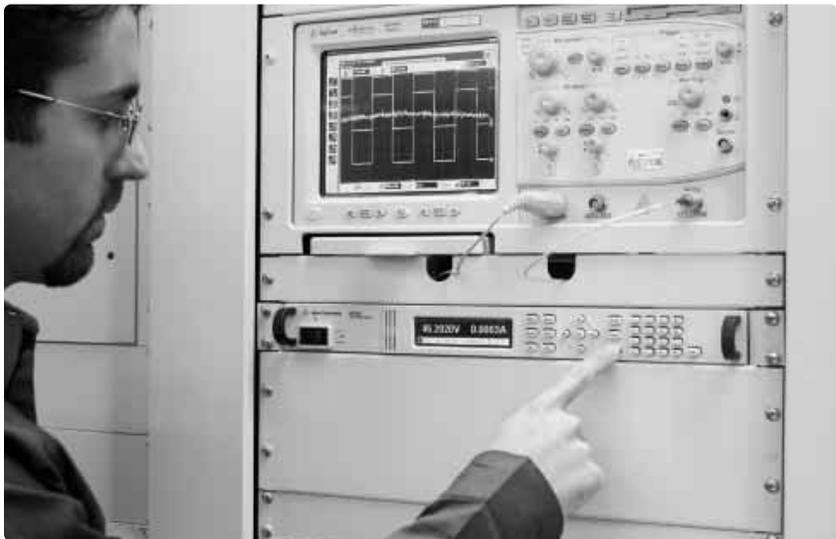
*\* Note that the output response time is less than 5 milliseconds per voltage change, so steps of less than 5 milliseconds will not achieve their final output voltage value before moving on to the next step. This is useful when trying to create a smooth waveform.*



**Figure 8.** High Speed Test Extensions Digitizer adds “oscilloscope-like” data capture

While some applications require fast risetime and/or falltimes, some devices can actually be harmed by a power supply that is too fast. For these cases, the LIST mode of the N6700 can be used to “slow down” the output. For this application, you create a slow ramp of output voltage by dividing the total voltage excursion into a smaller number of steps and dwell at each step for some amount of time. For example, let’s say you need to go from 0 V to 50 V in 500 milliseconds. For this case, the output programming response time specification of 5 milliseconds is too fast. To slow down the output, you could use LIST mode and program 50 steps of 1 volt per step, and dwell at each step for 10 milliseconds. The result will be a ramp from 0 V to 50 V in 500 milliseconds.

HSTE also provides an oscilloscope-like digitizer built into the power module to capture voltage and current measurements of up to 4096 points at up to 50,000 measurements per second. For applications such as



design validation of battery powered digital devices, the ability to capture dynamic information about the current flowing into the DUT allows designers to better understand the current drain on DUT batteries and optimize DUT power management during normal DUT operation and in DUT standby mode.

The digitizer can also be synchronized with changes in the output. For example, the digitizer can make measurements in response to a trigger generated by a change in output voltage caused by LIST mode.

In this configuration, you can ensure that measurements are made at the right moment during each step of an executing LIST. This is particularly useful if you are trying to measure current consumption during a rapidly changing voltage stimulus, such as current drawn during a pulsed output voltage.

#### **Precision Low-level Performance**

The N6760 family of Precision DC Power Modules additionally provide dual ranges on both programming and measurement. In the low range, these power supplies provide precision in the milliampere and microampere regions. They are ideally suited for semiconductor and passive device testing, or where a precisely controlled output and highly accurate, precise measurements are needed during test.

## If you are using Agilent Multiple-Output System DC Power Supplies Now

### Models

6621A, 6622A, 6623A,

6624A, 6625A, 6626A,

6627A, 6628A, 6629A

If you would like to take advantage of the size and speed of the N6700, Agilent offers preconfigured N6700 Modular Power Systems to replace Agilent 662xA Power Supplies. Rather than ordering an N6700 system with multiple options for modules, to simplify ordering, the N672xA model numbers are available as single model number preconfigured replacements. See ordering information at the end of this data sheet.

To assist in converting from Agilent 662x to the N6700, please refer to “Application Note 1467—How to use the Agilent N67xxA Modular Power System to replace an Agilent 662xA”. Look for literature part number 5989-0466EN at [www.agilent.com/find/N6700](http://www.agilent.com/find/N6700)

## The N6730 and N6740 Families: Basic Modules when you just need a simple power supply

Not all applications require high performance power supplies. When your budget is tight, and when speed and accuracy are a low consideration, the Agilent N6700 Low-Profile MPS supports basic DC power modules that provide an economical solution. The N6730 and N6740 families give you clean, reliable DC power without advanced features.

The Agilent N6730 family of 50 W DC Power Modules and the N6740 family of 100 W DC Power Modules provide the following:

- Fully programmable Constant Voltage/Constant Current DC Source
- Remote sensing for accurate control of output voltage when voltage drops in the leads are present
- Built-in measurements of voltage and current
- Protection (over-voltage over-current, and over-temperature) against damage to your DUT or to the power module

- Performance (programming accuracy, measurement accuracy, noise) suitable for most common DC power applications
- Built-in optional output disconnect relays, which break both the power and the sense leads, to simplify system wiring

### Use the N6730/40 in Place of Fixed-output DC Power Supplies

Many ATE systems have complex fixtures that contain indicator lights, relays or active circuits (like sensors, triggers, amplifiers) to facilitate testing of the DUT. These circuits need DC power, too. One solution for powering these ATE system resources would be to purchase a fixed-output DC source. However, there are considerations when integrating a fixed output DC source into an ATE system.

The table below illustrates these points and how it may be easier, faster, and more economical to purchase an N6730/40 programmable DC Power Module in place of a fixed-output DC Power Supply.

**All the benefits of the N6700 MPS at a low price**

While the N6730/40 are economical solutions to basic DC power requirements, they are also part of the N6700 MPS. Therefore, while saving, you still have the benefits of:

- Small size (true 1U)
- Mix-and-match with other N6700 DC Power Modules when you need performance along with basic DC outputs
- Connectivity via LAN, USB, and GPIB
- Fast command processing time of less than 1 ms
- Remote control over internet via standard web browser
- Friendly front panel
- Optional output disconnect relays

<b>Factor</b>	<b>Consideration When Using a Fixed-Output DC Power Supply</b>	<b>Solution Using N6730/40 DC Power Modules in N6700 MPS</b>
<b>Control the output</b>	You may want some limited control over this DC source (on/off).	The N6730/40 is fully controllable over LAN, USB, GPIB
<b>Monitor the output</b>	You may want to be able to monitor the voltage or current to ensure proper operation, which would require wiring to a system DMM.	The N6730/40 has built-in measurements of voltage and current, eliminating the need for wiring to a system DMM.
<b>Mounting the power supply</b>	You will need to mount the power supply in the ATE system. Finding a safe location can be a challenge. Some system designers will build a “drawer” or “tray” for holding power supplies. However, this adds extra design time, fabrication costs, installation costs, and occupies rack space.	The N6730/40 are compact modules integrated into a 1U rack mountable mainframe. There is no need to design or build any custom mounting hardware.
<b>Safety</b>	You may want to provide a safety interlock to this DC source. This would require control (on/off) and a means to detect the interlock condition.	The N6730/40 have hardware inputs for remote on/off that can be directly connected to a safety interlock system.

## Performance Specifications

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55°C, and derated above 40°C.

		N6751A / N6752A	N6761A / N6762A
<b>DC Output Ratings</b>			
	Voltage	50 V	50 V
	Current	5 A / 10 A	1.5 A / 3 A
	Power	50 W / 100 W	50 W / 100 W
<b>Output Ripple and Noise (PARD)</b> (from 20 Hz – 20 MHz)			
	CV peak-to-peak <sup>1</sup>	6 mV	6 mV
	CV rms	1 mV	1 mV
<b>Load Effect (Regulation)<sup>2</sup></b>			
	Voltage	2 mV	0.5 mV
	Current	2 mA	30 µA
<b>Source Effect (Regulation)</b>			
	Voltage	1 mV	1 mV
	Current	1 mA	30 µA
<b>Programming Accuracy<sup>3</sup></b> (at 23 °C ±5 °C after a 30 minute warm-up)			
	Voltage high range	0.06% + 19 mV	0.016% + 6 mV
	Voltage low range (≤ 5.5 V)	N/A	0.016% + 1.5 mV
	Current high range	0.1% + 20 mA	0.04% + 200 µA
	Current low range (≤ 100 mA)	N/A	0.04% + 15 µA
<b>Measurement Accuracy</b> (at 23 °C ±5 °C)			
	Voltage high range	0.05% + 20 mV	0.016% + 6 mV
	Voltage low range (≤ 5.5 V)	N/A	0.016% + 1.5 mV
	Current high range	0.1% + 4 mA	0.03% + 200 µA
	Current low range (≤ 100 mA)	N/A	0.03% + 15 µA
<b>Load Transient Recovery Time</b> (time to recover to within the settling band following a load change)			
• from 60% to 100% and from 100% to 60% of full load for models N6751A & N6761A			
• from 50% to 100% and from 100% to 50% of full load for models N6752A & N6762A.			
	Voltage settling band	± 75 mV	± 75 mV
	Time	< 100 µs	< 150 µs

<sup>1</sup> For typical values, see Supplemental Characteristics.

<sup>2</sup> With an output change from no load to full load, up to a maximum load-lead drop of 1 V per lead.

<sup>3</sup> Applies from minimum to maximum programming range. (see Supplemental Characteristics)

## Performance Specifications (Continued)

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55°C, and derated above 40°C.

		<b>N6731A</b>	<b>N6732A/ N6742A</b>	<b>N6733A/ N6743A</b>	<b>N6734A/ N6744A</b>	<b>N6735A/ N6745A</b>
<b>DC Output Ratings</b>						
	Voltage	5 V	8 V	20 V	35 V	50 V
	Current	10 A	6.25 A / 10 A	2.5 A / 5 A	1.5 A / 3 A	0.8 A / 1.6 A
	Power	50 W	50 W / 80 W	50 W / 100 W	52.5 W / 105 W	40 W / 80 W
<b>Output Ripple and Noise (PARD)</b> (from 20 Hz – 20 MHz)						
	CV peak-to-peak	10 mV	12 mV	14 mV	15 mV	20 mV
	CV rms	2 mV	2 mV	3 mV	5 mV	9 mV
<b>Load Effect (Regulation)<sup>1</sup></b>						
	Voltage	2 mV	2 mV	2 mV	4 mV	6 mV
	Current	2 mA	2 mA	2 mA	2 mA	2 mA
<b>Source Effect (Regulation)</b>						
	Voltage	1 mV	2 mV	2 mV	4 mV	6 mV
	Current	1 mA	1 mA	1 mA	1 mA	1 mA
<b>Programming Accuracy<sup>2</sup></b> (at 23 °C ±5 °C after a 30 minute warm-up)						
	Voltage	0.1% + 19 mV	0.1% + 19 mV	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV
	Current	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA
<b>Measurement Accuracy</b> (at 23 °C ±5 °C)						
	Voltage	0.1% + 20 mV	0.1% + 20 mV	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV
	Current	0.15% + 20 mA	0.15% + 10 mA	0.15% + 5 mA	0.15% + 4 mA	0.15% + 4 mA
<b>Load Transient Recovery Time</b> (time to recover to within the settling band following a load change from 50% to 100% and from 100% to 50% of full load.)						
	Voltage settling band	± 80 mV	± 80 mV	± 200 mV	± 200 mV	± 200 mV
	Time	200 μs	200 μs	200 μs	200 μs	200 μs

<sup>1</sup> With an output change from no load to full load, up to a maximum load-lead drop of 1 V per lead.

<sup>2</sup> Applies from minimum to maximum programming range. (see Supplemental Characteristics)

## Supplemental Characteristics

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or type testing. All characteristics are typical unless otherwise noted.

	N6751A / N6752A	N6761A / N6762A
<b>Programming Ranges</b>		
Voltage high range	20 mV – 51 V	15 mV – 51 V
Voltage low range ( $\leq 5.5$ V)	N/A	12 mV – 5.5 V
Current high range	10 mA – 5.1 A/10 mA – 10.2 A	1 mA – 1.53 A/1 mA – 3.06 A
Current low range ( $\leq 0.1$ A)	N/A	0.1 mA – 0.1 A
<b>Programming Resolution</b>		
Voltage high range	3.5 mV	880 $\mu$ V
Voltage low range ( $\leq 5.5$ V)	N/A	90 $\mu$ V
Current high range	3.25 mA	60 $\mu$ A
Current low range ( $\leq 0.1$ A)	N/A	2 $\mu$ A
<b>Measurement Resolution</b>		
Voltage high range	1.8 mV	440 $\mu$ V
Voltage low range ( $\leq 5.5$ V)	N/A	44 $\mu$ V
Current high range	410 $\mu$ A	30 $\mu$ A
Current low range ( $\leq 0.1$ A)	N/A	1 $\mu$ A
<b>Programming Temperature Coefficient per <math>^{\circ}</math>C</b>		
Voltage high range	18 ppm + 160 $\mu$ V	18 ppm + 140 $\mu$ V
Voltage low range ( $\leq 5.5$ V)	N/A	40 ppm + 70 $\mu$ V
Current high range	100 ppm + 45 $\mu$ A	33 ppm + 10 $\mu$ A
Current low range ( $\leq 0.1$ A)	N/A	60 ppm + 1.5 $\mu$ A
<b>Measurement Temperature Coefficient per <math>^{\circ}</math>C</b>		
Voltage high range	25 ppm + 35 $\mu$ V	23 ppm + 40 $\mu$ V
Voltage low range ( $\leq 5.5$ V)	N/A	30 ppm + 40 $\mu$ V
Current high range	60 ppm + 3 $\mu$ A	40 ppm + 0.3 $\mu$ A
Current low range ( $\leq 0.1$ A)	N/A	50 ppm + 0.3 $\mu$ A
<b>Load Cross Regulation</b>		
Voltage, from no load to full load	1 mV	0.5 mV
Current, from no load to full load	1 mA	5 $\mu$ A
<b>Output Ripple and Noise (PARD)</b>		
Typical CV peak-to-peak	4 mV	4 mV
CC rms	2 mA	2 mA
<b>Common Mode Noise</b> (from either output to chassis)		
rms (20 Hz - 20 MHz)	500 $\mu$ A	500 $\mu$ A
peak-to-peak (20 Hz - 20 MHz)	< 2 mA	< 2 mA
<b>Over-voltage Protection</b>		
Accuracy	0.25% + 250 mV	0.25% + 250 mV
Response Time	50 $\mu$ s from occurrence of 0V condition to start of output shutdown	
<b>Down-programming Capability<sup>1</sup></b>		
Continuous power	7 W	7 W
Peak current	7 A	3 A

<sup>1</sup> Modules can discharge a 1000  $\mu$ F capacitor from 50 V to 0 V at a rate of 4 times/second.

## Supplemental Characteristics (Continued)

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or type testing. All characteristics are typical unless otherwise noted.

	N6751A / N6752A	N6761A / N6762A
<b>Up-programming Time with full resistive load:</b> (time from 10% to 90% of total voltage excursion)		
Voltage setting from 0 V to 10 V	0.2 ms	0.6 ms
Voltage setting from 0 V to 50 V	1.5 ms	2.2 ms
<b>Up-programming Settling Time with full resistive load:</b> (time from start of voltage change to within 50 mV of final value)		
Voltage setting from 0 V to 10 V	0.5 ms	0.9 ms
Voltage setting from 0 V to 50 V	4 ms	4 ms
<b>Down-programming Time with no load:</b> (time from start of voltage change to output voltage < 0.5 V)		
Voltage setting from 10 V to 0 V	0.3 ms	0.3 ms
Voltage setting from 50 V to 0 V	1.3 ms	1.3 ms
<b>Down-programming Settling Time with no load:</b> (time from start of voltage change to output voltage within 50 mV of final value)		
Voltage setting from 10 V to 0 V	0.45 ms	0.45 ms
Voltage setting from 50 V to 0 V	1.4 ms	1.4 ms
<b>Down-programming Time with 1000 <math>\mu</math>F load:</b> (time from start of voltage change to output voltage < 0.5 V)		
Voltage setting from 10 V to 0 V	2.1 ms	4.5 ms
Voltage setting from 50 V to 0 V	11 ms	23 ms

## Supplemental Characteristics (Continued)

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or type testing. All characteristics are typical unless otherwise noted.

		<b>N6731A</b>	<b>N6732A/ N6742A</b>	<b>N6733A/ N6743A</b>	<b>N6734A/ N6744A</b>	<b>N6735A/ N6745A</b>
<b>Programming Ranges</b>						
	Voltage	20 mV – 5.1 V	20 mV – 8.16 V	20 mV – 20.4 V	20 mV – 35.7 V	20 mV – 51 V
	Current	10 mA – 10.2 A	10 mA – 6.375 A/ 10 mA – 10.2 A	10 mA – 2.55 A/ 10 mA – 5.1 A	10 mA – 1.53 A/ 10 mA – 3.06 A	10 mA – 0.816 A/ 10 mA – 1.63 A
<b>Programming Resolution</b>						
	Voltage	3.5 mV	4 mV	5 mV	9 mV	13 mV
	Current	5 mA	3.25 mA	3.25 mA	3.25 mA	3.25 mA
<b>Measurement Resolution</b>						
	Voltage	3 mV	4 mV	10 mV	18 mV	30 mV
	Current	10 mA	7 mA	3 mA	2 mA	1 mA
<b>Output Ripple and Noise (PARD)</b>						
	CC rms	8 mA	4 mA	2 mA	2 mA	2 mA
<b>Common Mode Noise</b> (from either output to chassis)						
	rms (20 Hz – 20 MHz)	1 mA	1 mA	1 mA	1 mA	1 mA
	peak-to-peak (20Hz - 20MHz)	< 10 mA	< 10 mA	< 10 mA	< 10 mA	< 10 mA
<b>Over-voltage Protection</b>						
	Accuracy	0.25% + 250 mV	0.25% + 250 mV	0.25% + 250 mV	0.25% + 250 mV	0.25% + 300 mV
	Response Time	50 $\mu$ s from occurrence of 0V condition to start of output shutdown				
<b>Maximum Up-programming and Down-programming</b> <b>Time with full resistive load:</b> (time from 10% to 90% of total voltage excursion)						
	Voltage setting from 0 V to full scale and full scale to 0 V	10 ms	10 ms	10 ms	10 ms	10 ms
<b>Maximum Up-programming and Down-programming</b> <b>Settling Time with full resistive load:</b> (time from start of voltage change until voltage settles within 0.1% of the full-scale voltage of its final value)						
	Voltage setting from 0 V to full scale and full scale to 0 V	100 ms	100 ms	100 ms	100 ms	100 ms
<b>Remote Sense Capability:</b>						
	Outputs can maintain specifications with up to a 1-volt drop per load lead.					
<b>Series and Parallel Operation:</b>						
	Similarly rated outputs can be operated directly in parallel or can be connected for straight series operation. Auto-series and auto-parallel operation is not available.					

## Supplemental Characteristics (Continued)

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or type testing. All characteristics are typical unless otherwise noted.

### N6700A MPS Mainframe

<b>Output Response Characteristics</b>		
Command processing time		≤ 1 ms from receipt of command to start of the output change
<b>Protection Response Characteristics</b>		
Inhibit Input		5 μs (from receipt of inhibit to start of shutdown)
Fault on coupled outputs		< 10 μs (from receipt of fault to start of shutdown)
<b>Digital Control Characteristics</b>		
Maximum voltage ratings		+16.5 VDC/-5 VDC between pins (pin 4 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 = 0.14 mA @ 16.5 VDC
Pins 1, 2, 3 as digital/trigger outputs (pin 4 = 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 = 0.12 mA @ 16.5 VDC
Pins 1, 2, 3 as digital/trigger inputs and pin 3 as INH input (pin 4 = 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
<b>Interface Capabilities</b>		
GPIB		SCPI - 1993, IEEE 488.2 compliant interface
USB 2.0		Requires Agilent I/O Library version M.01.01.04
10/100 LAN		Requires Agilent I/O Library version L.01.01
Web server		Built-in Web server - requires Internet Explorer 5+ or Netscape 4.x
<b>Environmental Conditions</b>		
Operating environment		Indoor use, installation category II <sup>1</sup> , pollution degree 2
Temperature range		0°C to 55°C (output derated above 40°C)
Relative humidity		Up to 95%
Altitude		Up to 2000 meters
Storage temperature		-30°C to 70°C

<sup>1</sup>Category II for AC input.

## Supplemental Characteristics (Continued)

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or type testing. All characteristics are typical unless otherwise noted.

### N6700A MPS Mainframe

<b>Regulatory Compliance</b>		
EMC		Complies with the European EMC directive 89/336/EEC for Class A test and measurement products. Complies with the Australian standard and carries the C-Tick mark. This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada. <b>Electrostatic discharges greater than 1 kV near the I/O connectors may cause the unit to reset and require operator intervention.</b>
Safety		Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking. This product also complies with the US and Canadian safety standards for test and measurement products.
<b>Acoustic Noise Declaration</b>		
	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).
<b>Isolation</b>		
	No output terminal may be more than 240 VDC from any other terminal or chassis ground.	
<b>AC Input</b>		
	Nominal Input Ratings	100 VAC – 240 VAC; 50/60 Hz
	Input Range	86 VAC – 264 VAC
	Power Consumption	1000 VA typical; 1100 VA maximum (with power factor correction)
	Fuse	Internal fuse (not customer accessible)
<b>Mainframe Dimensions</b>		
	Height:	44.45 mm; 1.75 in.
	Width:	432.5 mm; 17.03 in.
	Depth:	596.9 mm; 23.5 in.
<b>Mainframe Weight</b>		
	With 4 installed modules	Net: 12.78 kg; 28 lbs.

## Agilent N67xxA Option Characteristics

### Output Relay Option

Mechanical relays that break conduction path on + output, - output, + sense, - sense. Relays sequenced to ensure no loss of control when sense lines are opened.

### High Speed Test Extensions

#### List mode

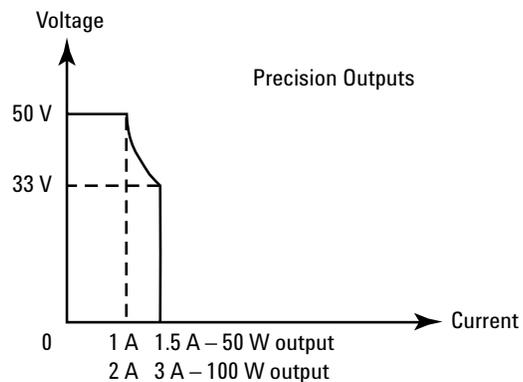
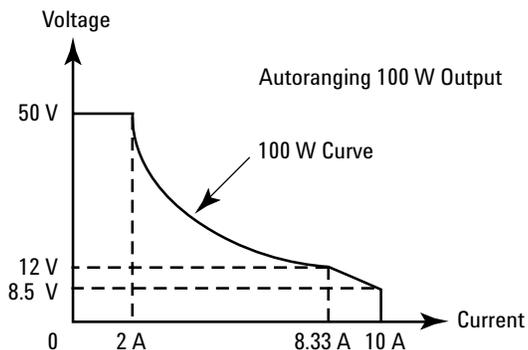
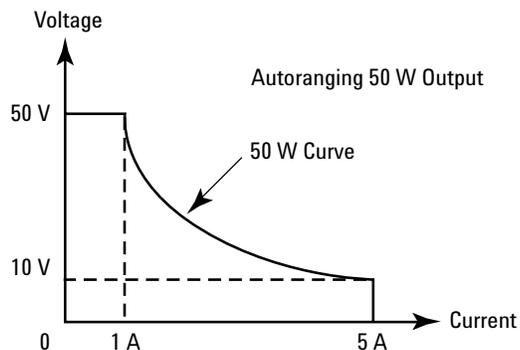
- Number of steps = 1 to 512
- Dwell time = 1  $\mu$ s to 262 seconds
- Maximum list repetitions = 256, or infinite

### High Speed Test Extensions

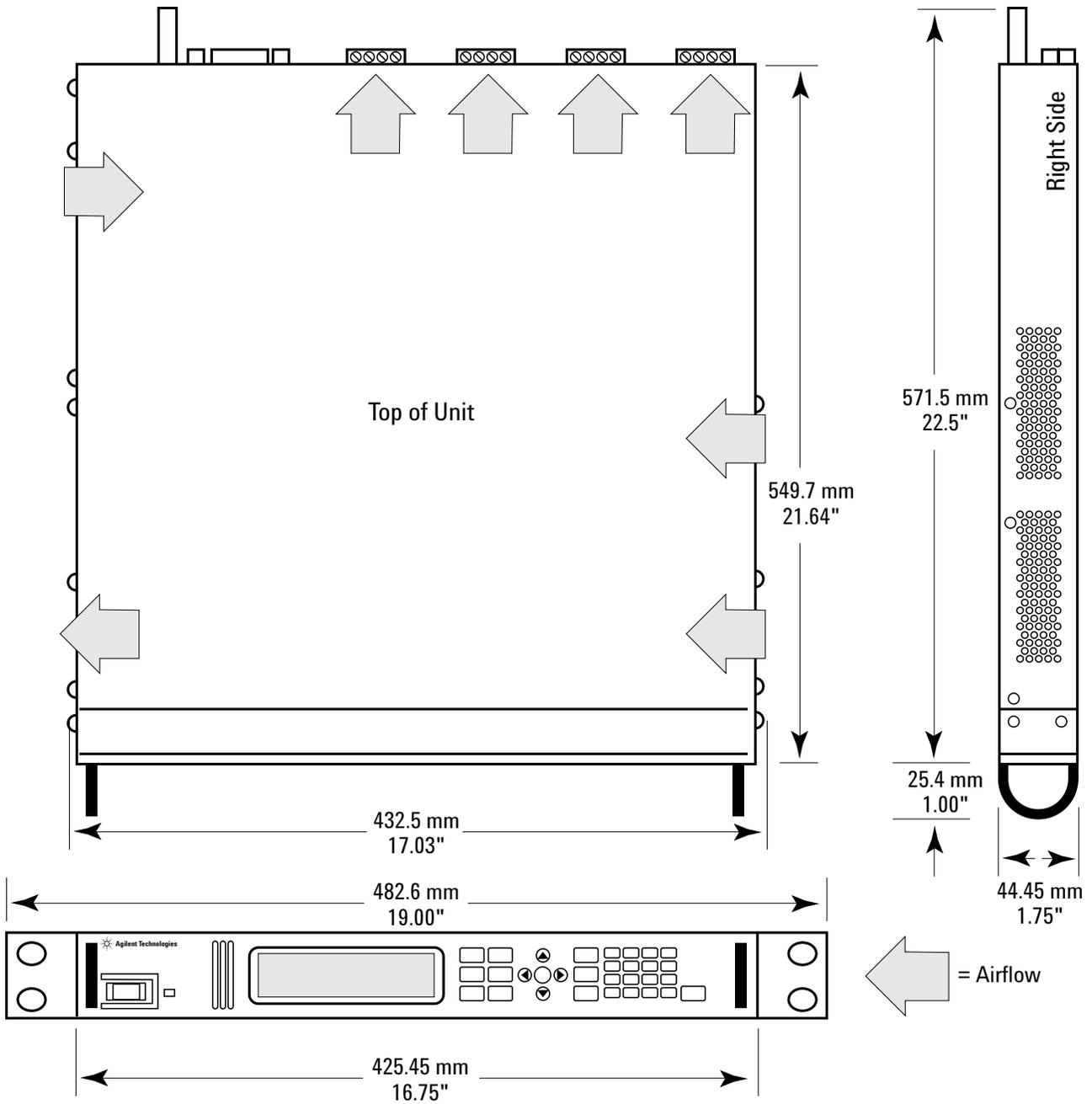
#### Digitizer

- Measurement points = 1 to 4096
- Sample rate = 0.000025 Hz to 50 kHz

## Autoranging Characteristic



# Outline Diagram



## Ordering Information

### N6710A Systems

To purchase an N6700 Modular Power System, order an N6710A. The N6710A is a build-to-order system that is shipped as a fully tested and assembled multiple-output power supply. Each N6710A consists of 1 N6700A mainframe plus optionally 1 to 4 modules. To specify which modules you want installed in the N6700A, modules are ordered as options to the N6710A. If you order less than 4 modules, the empty slots will be automatically filled with blank filler panels. You must order at least 1 module.

*Note: Mainframes and Modules are not available as standalone products. You cannot order N6700A mainframes and N67xxA modules as separate products at this time.*

**N6710A System** Build-to-Order Modular Power System (Consists of 1 N6700A mainframe)

#### Available options to N6710A

<b>N6710A-908</b>	Rack Mount Kit (Required for rack mounting; Standard rack mount hardware will not work.)
<b>N6710A-0L1</b>	Standard Documentation Kit
<b>N6710A-0L2</b>	Additional copy of Standard Documentation Kit
<b>N6710A-0B0</b>	Delete Standard Documentation Kit
<b>N6710A-900</b>	Power Cord, United Kingdom, P/N 8120-1351
<b>N6710A-901</b>	Power Cord, Australia, P/N 8120-1369
<b>N6710A-902</b>	Power Cord, Europe, P/N 8120-1689
<b>N6710A-903</b>	Power Cord, USA, Canada, P/N 8120-4383
<b>N6710A-904</b>	Power Cord, USA, Canada, P/N 8120-0698
<b>N6710A-906</b>	Power Cord, Switzerland, P/N 8120-2104
<b>N6710A-912</b>	Power Cord, Denmark, P/N 8120-2956
<b>N6710A-917</b>	Power Cord, South Africa, India, P/N 8120-4211
<b>N6710A-918</b>	Power Cord, Japan, P/N 8120-4753
<b>N6710A-919</b>	Power Cord, Israel, P/N 8120-6800
<b>N6710A-920</b>	Power Cord, Argentina, P/N 8120-6869
<b>N6710A-921</b>	Power Cord, Chile, P/N 8120-6980
<b>N6710A-922</b>	Power Cord, China, P/N 8120-8376
<b>N6710A-927</b>	Power Cord, Thailand, P/N 8120-8871
<b>N6710A-UK6</b>	Commercial calibration with test results data
<b>N6710A-1A7</b>	ISO 17025 Cal Certificate

## Ordering Information

### Modules

Modules are ordered as options to the N6710A. Modules are not orderable individually. To order a module as an option to an N6710A, specify its model number, followed by “-ATO”. For example, to order an N6731A as an option to the N6710A, you would specify “N6731A-ATO” as the option.

When ordering options to the modules, you can individually specify each option for each module. For example, you can order the first module with Option 761 Output Disconnect Relays, while the remaining modules have no relay option.

### Module options for N6710A System

#### N6730 50 W

##### DC Power Modules

<b>N6731A-ATO</b>	5 V, 10 A, 50 W DC Power Module
<b>N6732A-ATO</b>	8 V, 6.25 A, 50 W DC Power Module
<b>N6733A-ATO</b>	20 V, 2.5 A, 50 W DC Power Module
<b>N6734A-ATO</b>	35 V, 1.5 A, 50 W DC Power Module
<b>N6735A-ATO</b>	50 V, 0.8 A, 40 W DC Power Module

##### Available options to N673xA modules

<b>N673xA-ATO-761</b>	Output Disconnect Relays
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#### N6740 100 W

##### DC Power Modules

<b>N6742A-ATO</b>	8 V, 10 A, 80 W DC Power Module
<b>N6743A-ATO</b>	20 V, 5 A, 100 W DC Power Module
<b>N6744A-ATO</b>	35 V, 3 A, 100 W DC Power Module
<b>N6745A-ATO</b>	50 V, 1.6 A, 80 W DC Power Module

##### Available options to N674xA modules

<b>N674xA-ATO-761</b>	Output Disconnect Relays
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#### N6750 High-Performance, Autoranging DC Power Modules

<b>N6751A-ATO</b>	50 V, 5 A, 50 W High-Performance Autoranging DC Power Module
<b>N6752A-ATO</b>	50 V, 10 A, 100 W High-Performance Autoranging DC Power Module

##### Available options to N675xA modules

<b>N675xA-ATO-761</b>	Output Disconnect Relays
<b>N675xA-ATO-054</b>	High-Speed Test Extensions

#### N6760 Precision

##### DC Power Modules

<b>N6761A-ATO</b>	50 V, 5 A, 50 W Precision DC Power Module
<b>N6762A-ATO</b>	50 V, 10 A, 100 W Precision DC Power Module

##### Available options to N676xA modules

<b>N676xA-ATO-761</b>	Output Disconnect Relays
<standard>	High-Speed Test Extensions are included on all N676xA modules

## Ordering Information

### Preconfigured N672x Systems

If you would like to take advantage of the size and speed of the N6700, Agilent offers preconfigured N6700 Modular Power Systems to replace Agilent 662xA Power Supplies. Rather than ordering an N6710A system with multiple options for modules, to simplify ordering, the N672xA model numbers are available as single model number preconfigured replacements. However, if you need to add capabilities not offered in these preconfigured models (for example, adding Output Disconnect Relays), use the N6710A Build-to-Order System number to create other configurations of modules and options.

### Preconfigured Systems to replace 662x Power Supplies

<b>N6721A</b>	6621A Replacement
<b>N6722A</b>	6622A Replacement
<b>N6723A</b>	6623A Replacement
<b>N6724A</b>	6624A Replacement
<b>N6725A</b>	6625A Replacement
<b>N6726A</b>	6626A Replacement
<b>N6727A</b>	6627A Replacement
<b>N6728A</b>	6628A Replacement
<b>N6729A</b>	6629A Replacement

### Preconfigured Systems to replace 662x Power Supplies

Available options to N672xA	
<b>N672xA-908</b>	Rack Mount Kit (Required for rack mounting; Standard rack mount hardware will not work.)
<b>N672xA-0L1</b>	Standard Documentation Kit
<b>N672xA-0L2</b>	Additional copy of Standard Documentation Kit
<b>N672xA-0B0</b>	Delete Standard Documentation Kit
<b>N672xA-900</b>	Power Cord, United Kingdom, P/N 8120-1351
<b>N672xA-901</b>	Power Cord, Australia, P/N 8120-1369
<b>N672xA-902</b>	Power Cord, Europe, P/N 8120-1689
<b>N672xA-903</b>	Power Cord, USA, Canada, P/N 8120-4383
<b>N672xA-904</b>	Power Cord, USA, Canada, P/N 8120-0698
<b>N672xA-906</b>	Power Cord, Switzerland, P/N 8120-2104
<b>N672xA-912</b>	Power Cord, Denmark, P/N 8120-2956
<b>N672xA-917</b>	Power Cord, South Africa, India, P/N 8120-4211
<b>N672xA-918</b>	Power Cord, Japan, P/N 8120-4753
<b>N672xA-919</b>	Power Cord, Israel, P/N 8120-6800
<b>N672xA-920</b>	Power Cord, Argentina, P/N 8120-6869
<b>N672xA-921</b>	Power Cord, Chile, P/N 8120-6980
<b>N672xA-922</b>	Power Cord, China, P/N 8120-8376
<b>N672xA-927</b>	Power Cord, Thailand, P/N 8120-8871
<b>N672xA-UK6</b>	Commercial calibration with test results data
<b>N672xA-1A7</b>	ISO 17025 Cal Certificate

## Ordering Information (Continued)

Original Model Number	New Replacement Model Number	Consists of	N6751A 50 V, 5 A, 50 W High-Performance Autoranging DC Power Module	N6752A 50 V, 10 A, 100 W High-Performance Autoranging DC Power Module	N6761A 50 V, 1.5 A, 50 W Precision DC Power Module	N6762A 50 V, 3 A, 100 W Precision DC Power Module
6621A	N6721A	= N6700A +		2		
6622A	N6722A	= N6700A +		2		
6623A	N6723A	= N6700A +	2	1		
6624A	N6724A	= N6700A +	4			
6625A	N6725A	= N6700A +			1	1
6626A	N6726A	= N6700A +			2	2
6627A	N6727A	= N6700A +	4			
6628A	N6728A	= N6700A +				2
6629A	N6729A	= N6700A +				4

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(fax) (81) 426 56 7840

**Korea:**  
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(fax) (82 2) 2004 5115

**Latin America:**  
(tel) 305 269 7500  
(fax) 305 269 7599

**Taiwan:**  
(tel) 080 004 7866  
(fax) (886 2) 2545 6723

**Other Asia Pacific Countries:**  
(tel) (65) 375 8100  
(fax) (65) 836 0252  
Email: [tm\\_asia@agilent.com](mailto:tm_asia@agilent.com)

Product specifications and descriptions in this document subject to change without notice. For latest and complete specifications, refer to the N6700 User's Guide, Agilent part number 5969-2908. The web contains the most up-to-date version of the User's Guide. Go to <http://www.agilent.com/find/N6700>.

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