

Agilent N6700 MPS Low-Profile Modular Power System

Models: N6700B, N6710B, N6731B-36B, N6741B-46B,
N6751A, N6752A, N6761A, N6762A

Product Overview

New!

Higher voltage and
higher current models



- 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 16 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

N6700 System Features



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

where speed and accuracy are needed, or purchase basic performance outputs for simple DC power requirements.

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.

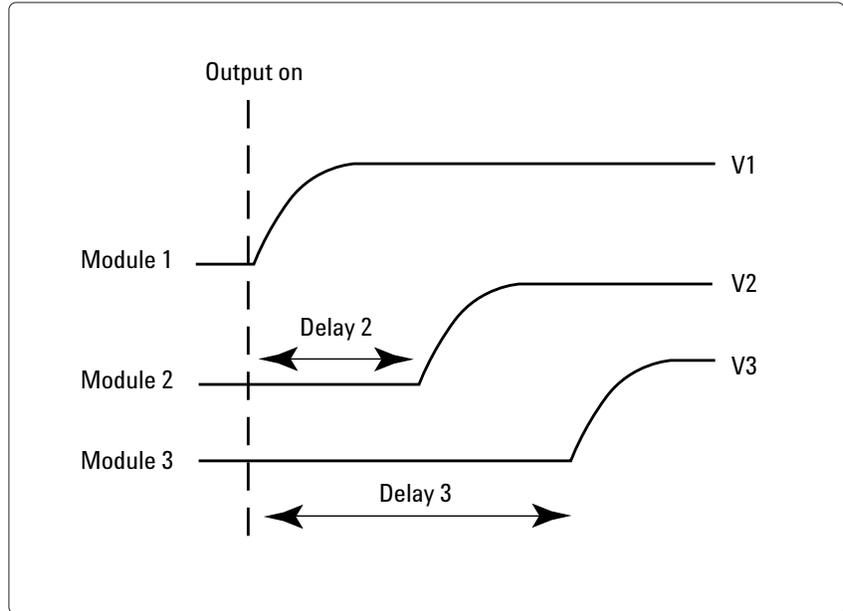


Figure 2. Output Sequencing

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.

Programmable Voltage Slew

For some applications, like inrush limiting or powering rate-sensitive devices, it is necessary to slow down and control the speed of the power supply to maintain a specific voltage slew rate. The N6700 provides programmable voltage slew rate, so that with a single command, you can generate a 0 V to full-scale voltage change controllable from 1 millisecond to 10 seconds. Programmable voltage slew is available from the front panel when operating the N6700 manually or via computer control.

Series Operation

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

Easy Parallel Operation with Virtual Channels

To increase available output power and current, identical outputs can be operated in parallel. To simplify parallel operation for applications requiring currents greater than any single output can provide, the N6700 offers virtual channels, a firmware-based feature that allows the N6700 system to treat up to 4 channels as a single, synchronized channel. Once configured, all functions (sourcing, measurements, triggering, protection, and status monitoring) behave as if there is 1 channel of up to 4 times the capacity of a single channel, without writing a single line of code to manage the interaction and synchronization of the paralleled power supplies.

Virtual channel capability is available from the front panel when operating the N6700 manually or via computer control.

Triggering

The N6700B 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 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, 50/60/400 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 N6700B 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 N6700B because of its 1U size and airflow requirements.



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.

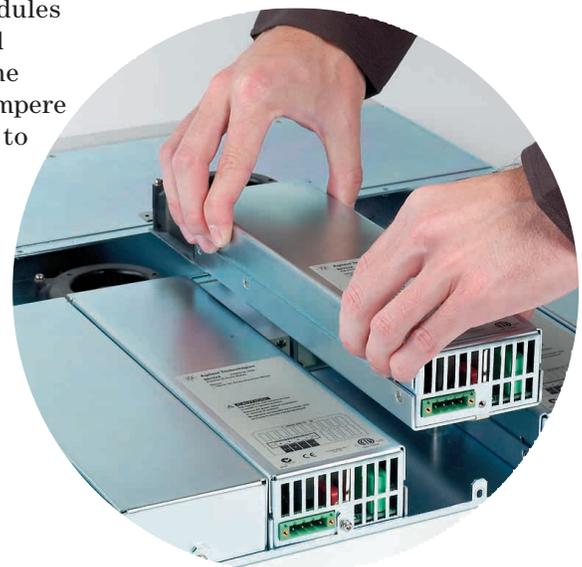


Figure 6. User re-configurable modular system

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.

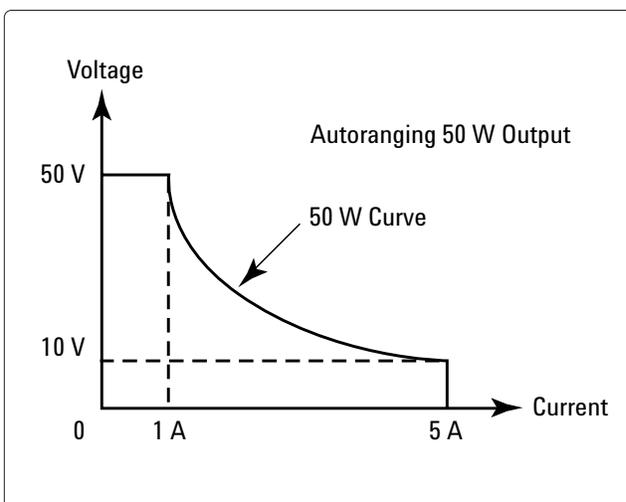
Output Programming Speed

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.

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

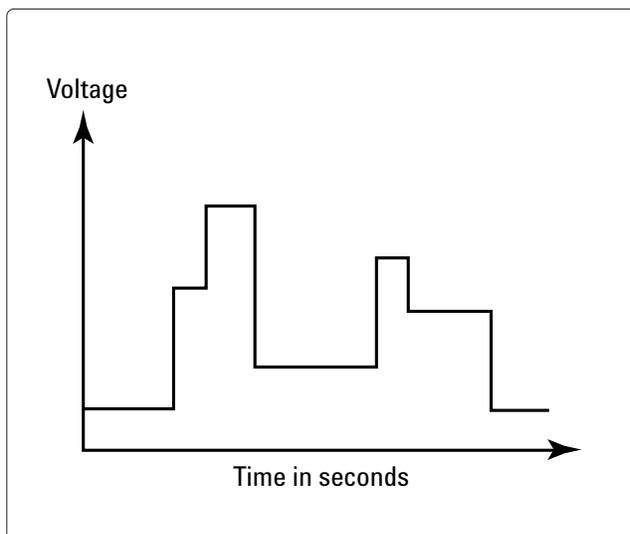


Figure 7. High Speed Test Extensions LIST mode provides “power ARB” capability

dwel 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.*

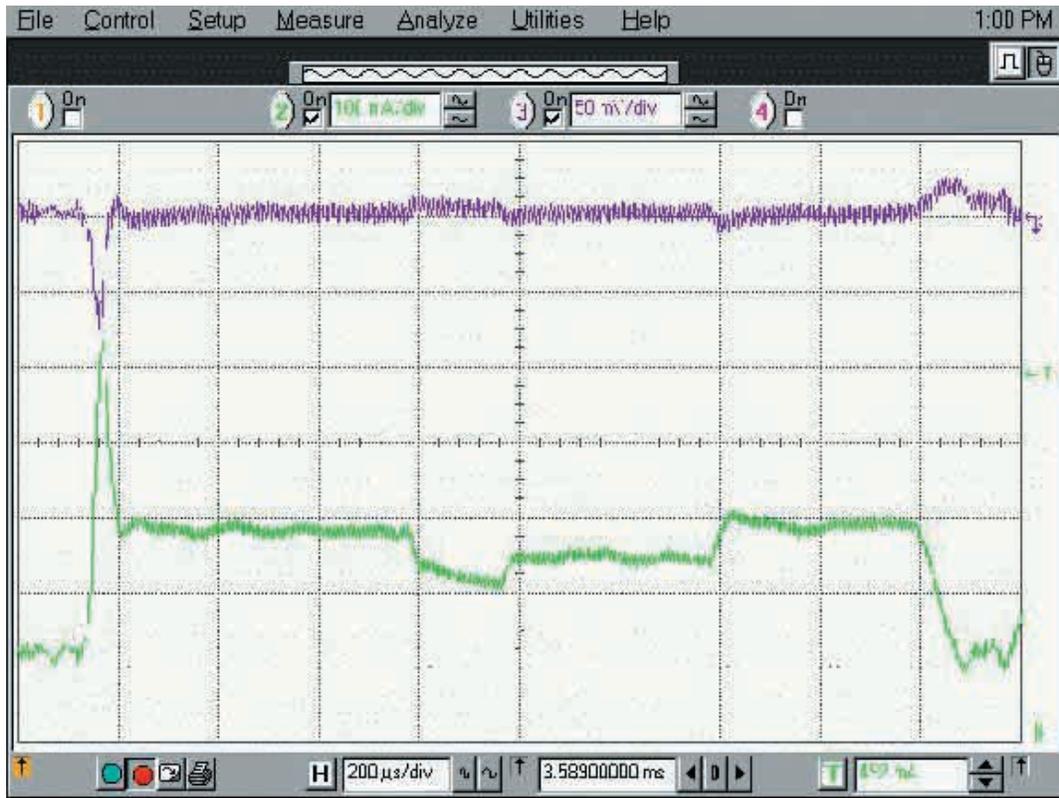


Figure 8. High Speed Test Extensions Digitizer adds “oscilloscope-like” data capture

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, and need assistance 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

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

Factor	Consideration When Using a Fixed-Output DC Power Supply	Solution Using N6730/40 DC Power Modules in N6700 MPS
Control the output	You may want some limited control over this DC source (on/off).	The N6730/40 is fully controllable over LAN, USB, GPIB
Monitor the output	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.
Mounting the power supply	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.
Safety	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
DC Output Ratings			
	Voltage	50 V	50 V
	Current	5 A / 10 A	1.5 A / 3 A
	Power	50 W / 100 W	50 W / 100 W
Output Ripple and Noise (PARD) (from 20 Hz – 20 MHz)			
	CV peak-to-peak ¹	6 mV	6 mV
	CV rms	1 mV	1 mV
Load Effect (Regulation) (for any output load change, with a maximum load-lead drop of 1 V per lead)			
	Voltage	2 mV	0.5 mV
	Current	2 mA	30 µA
Source Effect (Regulation)			
	Voltage	1 mV	1 mV
	Current	1 mA	30 µA
Programming Accuracy (at 23°C ±5°C after 30 minute warm-up. Applies from min. to max. programming range)			
	Voltage high range	0.06% + 19 mV	0.016% + 6 mV
	Voltage low range (≤ 5.5 V)	N/A	0.015% + 1.5 mV
	Current high range	0.1% + 20 mA	0.04% + 200 µA
	Current low range (≤ 100 mA, @ 0 - 7 V) ^{NOTE 2}	N/A	0.04% + 15 µA
	(≤ 100 mA, @ 0 - 50 V)	N/A	0.04% + 55 µA
Measurement Accuracy (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, @ 0 - 7 V) ^{NOTE 2}	N/A	0.03% + 15 µA ^{NOTE 3}
	(≤ 100 mA, @ 0 - 50 V)	N/A	0.03% + 55 µA
Load Transient Recovery Time (time to recover to within the settling band following a load change)			
<ul style="list-style-type: none"> • 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 Time	± 75 mV < 100 µs	± 75 mV < 150 µs

¹ For typical values, refer to Supplemental Characteristics.

² Requires a 3 minute wait if you have entered the 0- 7 V range from a voltage greater than 7 V..

³ Applies when measuring 4006 data points (SENSe:SWEep:POINTS = 4096).

Performance Specifications (Continued)

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

		N6731B/ N6741B	N6732B/ N6742B	N6733B/ N6743B	N6734B/ N6744B	N6735B/ N6745B	N6736B/ N6746B
DC Output Ratings							
	Voltage	5 V	8 V	20 V	35 V	60 V	100 V
	Current	10 A / 20 A	6.25 A / 12.5 A	2.5 A / 5 A	1.5 A / 3 A	0.8 A / 1.6 A	0.5 A / 1A
	Power	50 W / 100 W					
Output Ripple and Noise (PARD) (from 20 Hz – 20 MHz)							
	CV peak-to-peak	10 mV / 11 mV	12 mV	14 mV	15 mV	25 mV	30 mV
	CV rms	2 mV	2 mV	3 mV	5 mV	9 mV	18 mV
Load Effect (Regulation)¹							
	Voltage	4 mV	4 mV	4 mV	5 mV	5 mV	5 mV
	Current	2 mA					
Source Effect (Regulation)							
	Voltage	1 mV	2 mV	2 mV	4 mV	6 mV	10 mV
	Current	1 mA					
Programming Accuracy² (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	0.1% + 100 mV
	Current	0.15% + 20 mA	0.15% + 10 mA				
Measurement Accuracy (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	0.1% + 100 mV
	Current	0.15% + 20 mA	0.15% + 10 mA	0.15% + 5 mA	0.15% + 4 mA	0.15% + 4 mA	0.15% + 2 mA
Load Transient Recovery Time (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 / 100 mV	± 80 mV / 100 mV	± 200 mV / 300 mV	± 200 mV / 300 mV	± 400 mV / 500 mV	± 500 mV / 1000 mV
	Time	200 μs					

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

² 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
Programming Ranges		
Voltage high range	20 mV – 51 V	15 mV – 51 V
Voltage low range (≤ 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 (≤ 0.1 A)	N/A	0.1 mA – 0.1 A
Programming Resolution		
Voltage high range	3.5 mV	880 μ V
Voltage low range (≤ 5.5 V)	N/A	90 μ V
Current high range	3.25 mA	60 μ A
Current low range (≤ 0.1 A)	N/A	2 μ A
Measurement Resolution		
Voltage high range	1.8 mV	440 μ V
Voltage low range (≤ 5.5 V)	N/A	44 μ V
Current high range	410 μ A	30 μ A
Current low range (≤ 0.1 A)	N/A	1 μ A
Programming Temperature Coefficient per $^{\circ}$C		
Voltage high range	18 ppm + 160 μ V	18 ppm + 140 μ V
Voltage low range (≤ 5.5 V)	N/A	40 ppm + 70 μ V
Current high range	100 ppm + 45 μ A	33 ppm + 10 μ A
Current low range (≤ 0.1 A)	N/A	60 ppm + 1.5 μ A
Measurement Temperature Coefficient per $^{\circ}$C		
Voltage high range	25 ppm + 35 μ V	23 ppm + 40 μ V
Voltage low range (≤ 5.5 V)	N/A	30 ppm + 40 μ V
Current high range	60 ppm + 3 μ A	40 ppm + 0.3 μ A
Current low range (≤ 0.1 A)	N/A	50 ppm + 0.3 μ A
Load Cross Regulation		
Voltage, from no load to full load	1 mV	0.5 mV
Current, from no load to full load	1 mA	5 μ A
Output Ripple and Noise (PARD)		
Typical CV peak-to-peak	4 mV	4 mV
CC rms	2 mA	2 mA
Common Mode Noise (from either output to chassis)		
rms (20 Hz - 20 MHz)	500 μ A	500 μ A
peak-to-peak (20 Hz - 20 MHz)	< 2 mA	< 2 mA
Over-voltage Protection		
Accuracy	0.25% + 250 mV	0.25% + 250 mV
Response Time	50 μ s from occurrence of 0V condition to start of output shutdown	
Down-programming Capability¹		
Continuous power	7 W	7 W
Peak current	7 A	3 A

¹ Modules can discharge a 1000 μ 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
Up-programming Time with full resistive load: (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
Up-programming Settling Time with full resistive load: (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
Down-programming Time with no load: (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
Down-programming Settling Time with no load: (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
Down-programming Time with 1000 μF load: (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.

		N6731B/ N6741B	N6732B/ N6742B	N6733B/ N6743B	N6734B/ N6744B	N6735B/ N6745B	N6736B/ N6746B
Programming Ranges							
Voltage		15 mV – 5.1 V	15 mV – 8.16 V	30 mV – 20.4 V	40 mV – 35.7 V	70 mV – 61 V	100 mV – 102 V
Current		60 mA – 10.2 A/ 60 mA – 20.4 A	40 mA – 6.375 A/ 40 mA – 12.75 A	10 mA – 2.55 A/ 10 mA – 5.1 A	5 mA – 1.53 A/ 5 mA – 3.06 A	2.5 mA – 0.85 A/ 2.5 mA – 1.7 A	1.5 mA – 0.51 A/ 1.5 mA – 1.02 A
Programming Resolution							
Voltage		3.5 mV	4 mV	7 mV	10 mV	18 mV	28 mV
Current		7 mA	4 mA	3 mA	2 mA	1 mA	0.5 mA
Measurement Resolution							
Voltage		3 mV	4 mV	10 mV	18 mV	30 mV	33 mV
Current		10 mA	7 mA	3 mA	2 mA	1 mA	0.5 mA
Output Ripple and Noise (PARD)							
CC rms		8 mA	4 mA	2 mA	2 mA	2 mA	2 mA
Common Mode Noise (from either output to chassis)							
rms (20 Hz – 20 MHz)		1 mA	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	< 10 mA
Over-voltage Protection							
Accuracy (without relay option)		0.25% + 250 mV	0.25% + 250 mV	0.25% + 250 mV	0.25% + 250 mV	0.25% + 300 mV	0.25% + 300 mV
Response Time		50 μ s from occurrence of 0V condition to start of output shutdown					
Maximum Up-programming and Down-programming Time with full resistive load: (time from 10% to 90% of total voltage excursion)							
Voltage setting from 0 V to full scale and full scale to 0 V		20 ms	20 ms	20 ms	20 ms	20 ms	20 ms
Maximum Up-programming and Down-programming Settling Time with full resistive load: (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	100 ms
Remote Sense Capability:							
		Outputs can maintain specifications with up to a 1-volt drop per load lead.					
Series and Parallel Operation:							
		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.

N6700B MPS Mainframe

Output Response Characteristics		
Command processing time		≤ 1 ms from receipt of command to start of the output change
Protection Response Characteristics		
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)
Digital Control Characteristics		
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 thru 8 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 thru 8 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
Interface Capabilities		
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
Environmental Conditions		
Operating environment		Indoor use, installation category II ¹ , 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

¹Category 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.

N6700B MPS Mainframe

Regulatory Compliance		
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. Electrostatic discharges greater than 1 kV near the I/O connectors may cause the unit to reset and require operator intervention.
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.
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).
Isolation		
	No output terminal may be more than 240 VDC from any other terminal or chassis ground.	
AC Input		
	Nominal Input Ratings	100 VAC – 240 VAC; 50/60/400 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)
Mainframe Dimensions		
	Height:	44.45 mm; 1.75 in.
	Width:	432.5 mm; 17.03 in.
	Depth:	596.9 mm; 23.5 in.
Mainframe Weight		
	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

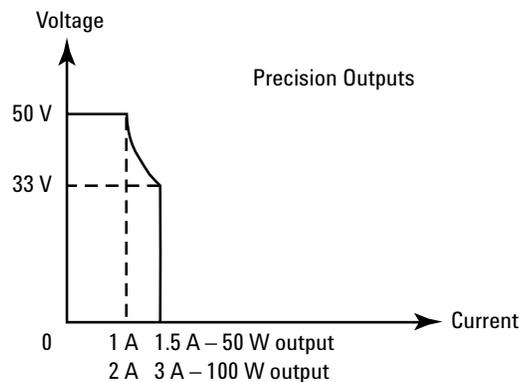
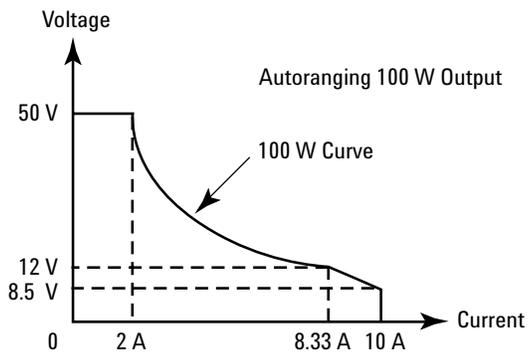
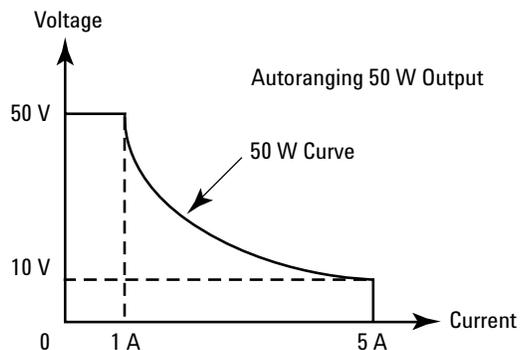
- Number of steps = 1 to 512
- Dwell time = 1 μ s to 262 seconds
- Maximum list repetitions = 256, or infinite

High Speed Test Extensions

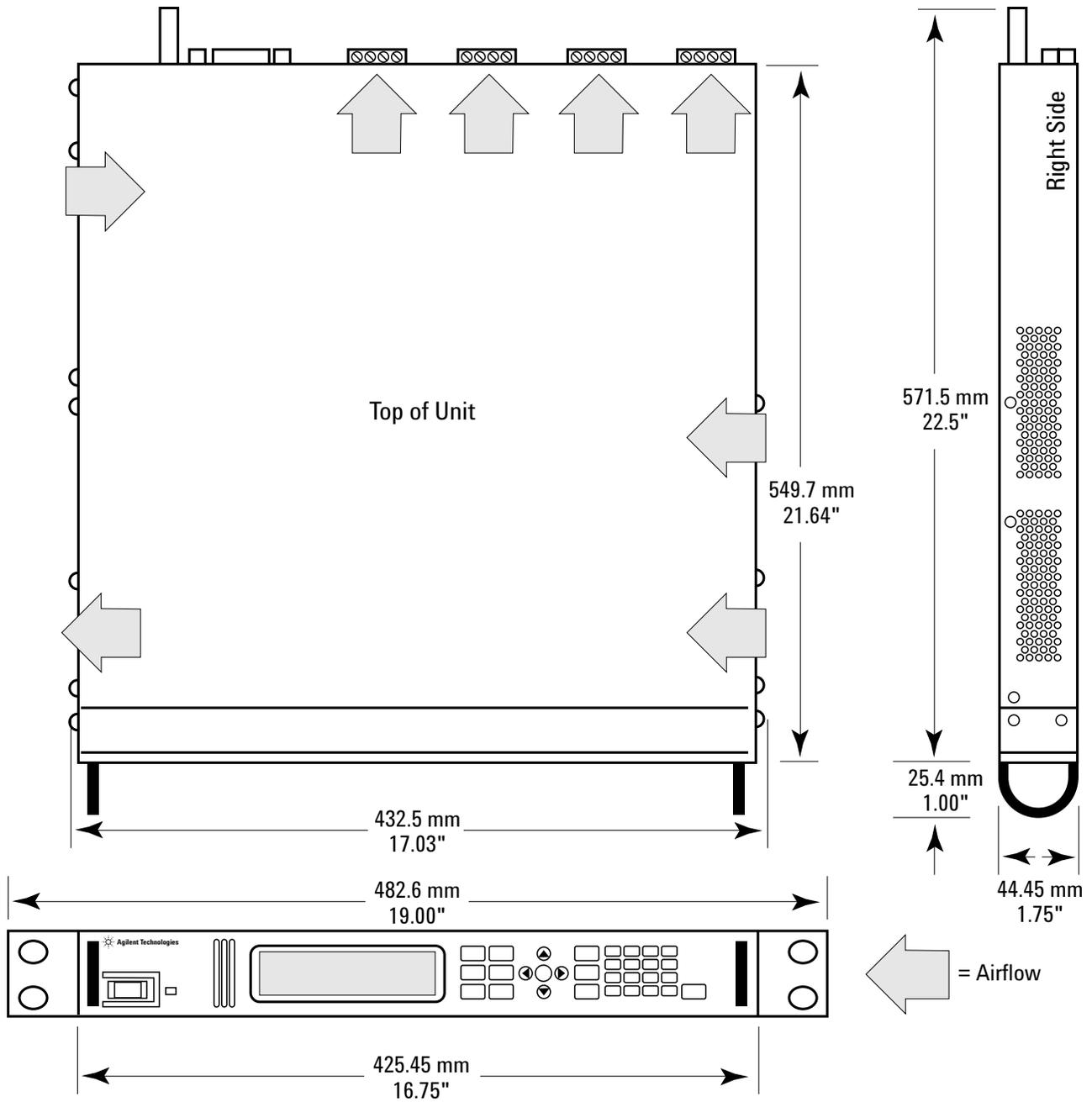
Digitizer

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

Autoranging Characteristic



Outline Diagram



Ordering Information

The N6700 Modular Power System is available 2 ways:

- (1) You can order an N6700B mainframe and various modules as separate products. (See steps below.) Each item will arrive in a separate box such that you can assemble the system yourself when you need to.
- (2) You can order an N6710B, which is a build-to-order system that is shipped as a fully tested and assembled multiple-output power supply. (See pages 24 and 25 for N6710B ordering information.)

When ordering the N6700 MPS as a mainframe and modules, follow these steps:

Step 1:

Order the N6700B mainframe and appropriate documentation and line cord options.

Step 2:

Order 1 to 4 modules (see next page).

Step 3.

For proper N6700B operation, you must fill any empty module slots with filler panels. When ordering less than 4 modules per mainframe, you MUST order an N6700B-FLR Filler Panel Kit. Each kit contains 3 filler panels.

Step 4:

If you will be rack mounting the N6700B, you MUST order N6700B-908 Rack Mount Kit.

Mainframe

N6700B	Low-Profile Modular Power System Mainframe Holds 1 to 4 modules.
---------------	---

Available options to N6700B

N6700B-908	Rack Mount Kit Required for rack mounting. Standard rack mount hardware will not work. This N6700 Rack Mount Kit is also orderable separately as product N6709A
N6700B-FLR	Filler Panel Kit Required when you have < 4 modules in an N6700B. Each filler panel kit contains 3 filler panels. This N6700 Filler Panel Kit is also orderable separately as product N6708A
N6700B-0L1	Standard Documentation Kit
N6700B-0L2	Additional copy of Standard Documentation Kit
N6700B-0B0	Delete Standard Documentation Kit
N6700B-900	Power Cord, United Kingdom, P/N 8120-1351
N6700B-901	Power Cord, Australia, P/N 8120-1369
N6700B-902	Power Cord, Europe, P/N 8120-1689
N6700B-903	Power Cord, USA, Canada, P/N 8120-4383
N6700B-904	Power Cord, USA, Canada, P/N 8120-0698
N6700B-906	Power Cord, Switzerland, P/N 8120-2104
N6700B-912	Power Cord, Denmark, P/N 8120-2956
N6700B-917	Power Cord, South Africa, India, P/N 8120-4211
N6700B-918	Power Cord, Japan, P/N 8120-4753
N6700B-919	Power Cord, Israel, P/N 8120-6800
N6700B-920	Power Cord, Argentina, P/N 8120-6869
N6700B-921	Power Cord, Chile, P/N 8120-6980
N6700B-922	Power Cord, China, P/N 8120-8376
N6700B-927	Power Cord, Thailand, P/N 8120-8871

Ordering Information

Modules

Order 1 to 4 modules to be installed into each N6700B mainframe. (To order modules as part of N6710B, see page 25.)

You can individually specify each option for each module. For example, you can order the one module with Option 761 Output Disconnect Relays, while the remaining modules have no relay option.

As your needs change and you want to change configuration or add more modules to existing N6700A or N6700B mainframes, use this ordering information to order the required modules.

Modules

N6730 50 W DC Power Modules		
N6731B		5 V, 10 A, 50 W DC Power Module
N6732B		8 V, 6.25 A, 50 W DC Power Module
N6733B		20 V, 2.5 A, 50 W DC Power Module
N6734B		35 V, 1.5 A, 50 W DC Power Module
N6735B		60 V, 0.8 A, 50 W DC Power Module
N6736B		100 V, 0.5 A, 50 W DC Power Module
Available options to N673xB modules		
N673xB-761		Output Disconnect Relays
N673xB-UK6		Commercial calibration with test results data
N673xB-1A7		ISO 17025 Cal certificate
N6740 100 W DC Power Modules		
N6741B		5 V, 20 A, 100 W DC Power Module
N6742B		8 V, 12.5 A, 100 W DC Power Module
N6743B		20 V, 5 A, 100 W DC Power Module
N6744B		35 V, 3 A, 100 W DC Power Module
N6745B		60 V, 1.6 A, 100 W DC Power Module
N6746B		100 V, 1 A, 100 W DC Power Module
Available options to N674xB modules		
N674xB-761		Output Disconnect Relays
N674xB-UK6		Commercial calibration with test results data
N674xB-1A7		ISO 17025 Cal certificate
N6750 High-Performance, Autoranging DC Power Modules		
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
Available options to N675xA modules		
N675xA-761		Output Disconnect Relays
N675xA-054		High-Speed Test Extensions
N675xA-UK6		Commercial calibration with test results data
N675xA-1A7		ISO 17025 Cal certificate
N6760 Precision DC Power Modules		
N6761A		50 V, 5 A, 50 W Precision DC Power Module
N6762A		50 V, 10 A, 100 W Precision DC Power Module
Available options to N676xA modules		
N676xA-761		Output Disconnect Relays
<standard>		High-Speed Test Extensions are included on all N676xA modules
N676xA-UK6		Commercial calibration with test results data
N676xA-1A7		ISO 17025 Cal certificate

Ordering Information

N6710B Systems

To purchase an N6710 Modular Power System, order an N6710B. The N6710B is a build-to-order system that is shipped as a fully tested and assembled multiple-output power supply. Each N6710B consists of 1 N6700B mainframe plus optionally 1 to 4 modules. To specify which modules you want installed in the N6710B, modules are ordered as options to the N6710B. 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.

N6710B System Build-to-Order Modular Power System (Consists of 1 N6700B mainframe)

Available options to N6710B

N6710B-908	Rack Mount Kit Required for rack mounting. Standard rack mount hardware will not work. This N6700 Rack Mount Kit is also orderable separately as product N6709A
N6710B-0L1	Standard Documentation Kit
N6710B-0L2	Additional copy of Standard Documentation Kit
N6710B-0B0	Delete Standard Documentation Kit
N6710B-900	Power Cord, United Kingdom, P/N 8120-1351
N6710B-901	Power Cord, Australia, P/N 8120-1369
N6710B-902	Power Cord, Europe, P/N 8120-1689
N6710B-903	Power Cord, USA, Canada, P/N 8120-4383
N6710B-904	Power Cord, USA, Canada, P/N 8120-0698
N6710B-906	Power Cord, Switzerland, P/N 8120-2104
N6710B-912	Power Cord, Denmark, P/N 8120-2956
N6710B-917	Power Cord, South Africa, India, P/N 8120-4211
N6710B-918	Power Cord, Japan, P/N 8120-4753
N6710B-919	Power Cord, Israel, P/N 8120-6800
N6710B-920	Power Cord, Argentina, P/N 8120-6869
N6710B-921	Power Cord, Chile, P/N 8120-6980
N6710B-922	Power Cord, China, P/N 8120-8376
N6710B-927	Power Cord, Thailand, P/N 8120-8871

Ordering Information

Modules as options to N6710B

To order a module as an option to an N6710B, specify its model number, followed by “-ATO”.

For example, to order an N6731B as an option to the N6710B, you would specify “N6731B -ATO” as the option. (To order modules as separate products, see page 23.)

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 N6710B System

N6730 50 W		
DC Power Modules	N6731B-ATO	5 V, 10 A, 50 W DC Power Module
	N6732B-ATO	8 V, 6.25 A, 50 W DC Power Module
	N6733B-ATO	20 V, 2.5 A, 50 W DC Power Module
	N6734B-ATO	35 V, 1.5 A, 50 W DC Power Module
	N6735B-ATO	60 V, 0.8 A, 50 W DC Power Module
	N6736B-ATO	100 V, 0.5 A, 50 W DC Power Module
Available options to N673xB modules	N673xB-ATO-761	Output Disconnect Relays
	N673xB-ATO-UK6	Commercial calibration with test results data
	N673xB-ATO-1A7	ISO 17025 Cal certificate
N6740 100 W		
DC Power Modules	N6741B-ATO	5 V, 20 A, 100 W DC Power Module
	N6742B-ATO	8 V, 12.5 A, 100 W DC Power Module
	N6743B-ATO	20 V, 5 A, 100 W DC Power Module
	N6744B-ATO	35 V, 3 A, 100 W DC Power Module
	N6745B-ATO	60 V, 1.6 A, 100 W DC Power Module
	N6746B-ATO	100 V, 1 A, 100 W DC Power Module
Available options to N674xB modules	N674xB-ATO-761	Output Disconnect Relays
	N674xB-ATO-UK6	Commercial calibration with test results data
	N674xB-ATO-1A7	ISO 17025 Cal certificate
N6750 High-Performance, Autoranging DC		
Power Modules	N6751A-ATO	50 V, 5 A, 50 W High-Performance Autoranging DC Power Module
	N6752A-ATO	50 V, 10 A, 100 W High-Performance Autoranging DC Power Module
Available options to N675xA modules	N675xA-ATO-761	Output Disconnect Relays
	N675xA-ATO-054	High-Speed Test Extensions
	N675xA-ATO-UK6	Commercial calibration with test results data
	N675xA-ATO-1A7	ISO 17025 Cal certificate
N6760 Precision		
DC Power Modules	N6761A-ATO	50 V, 5 A, 50 W Precision DC Power Module
	N6762A-ATO	50 V, 10 A, 100 W Precision DC Power Module
Available options to N676xA modules	N676xA-ATO-761	Output Disconnect Relays
	<standard>	High-Speed Test Extensions are included on all N676xA modules
	N676xA-ATO-UK6	Commercial calibration with test results data
	N676xA-ATO-1A7	ISO 17025 Cal certificate

Compatibility and Upgrade Information

You have	with firmware	and with modules	If you want to here is what you need to do
N6710A or N6700A	Any version starting with A (example: A.00.00)	Any combination of modules with model number N673xA, N674xA, N675xA or N676xA	Add more modules with model numbers N673xA, N674xA, N675xA, or N676xA	Capability available with your current version of hardware and firmware; No upgrade required.
			Add more modules with model numbers N673xB or N674xB	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
			Add or change modules to mix-and-match any combination of modules with model numbers N673xA, N673xB, N674xA, N674xB, N675xA, and N676xA	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
			Add virtual channel capability for paralleling	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
			Add programmable voltage slew capability	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
N6700A or N6710A	B.00.00 or greater	Any combination of modules with model number N673xA, N673xB, N674xA, N674xB, N675xA, or N676xA	Add or change modules to mix-and-match any combination of modules with model numbers N673xA, N673xB, N674xA, N674xB, N675xA, and N676xA	Capability available with your current version of hardware and firmware; No upgrade required.
			Add virtual channel capability for paralleling	Capability available with your current version of hardware and firmware; No upgrade required.
			Add programmable voltage slew capability	Capability available with your current version of hardware and firmware; No upgrade required.
N6700B or N6710B	B.00.00 or greater	Any combination of modules with model number N673xA, N673xB, N674xA, N674xB, N675xA, or N676xA	Add or change modules to mix-and-match any combination of modules with model numbers N673xA, N673xB, N674xA, N674xB, N675xA, and N676xA	Capability available with your current version of hardware and firmware; No upgrade required.
			Add virtual channel capability for paralleling	Capability available with your current version of hardware and firmware; No upgrade required.
			Add programmable voltage slew capability	Capability available with your current version of hardware and firmware; No upgrade required.

Compatibility and Upgrade Information (Continued)

You have	with firmware	and with modules	If you want to here is what you need to do
N6721A thru N6729A	Any version starting with A (example: A.00.00)	Any combination of modules with model number N675xA or N676xA	Add more modules with model numbers N675xA or N676xA	Capability available with your current version of hardware and firmware; No upgrade required.
			Add more modules with model numbers N673xA or N674xA (see note 1 below)	Capability available with your current version of hardware and firmware; No upgrade required.
			Add more modules with model numbers N673xB or N674xB (see note 1 below)	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
			Add or change modules to mix-and-match any combination of modules with model numbers N673xA, N673xB, N674xA, N674xB, N675xA, and N676xA (see note 1 below)	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
			Add virtual channel capability for paralleling (see note 2 below)	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700
			Add programmable voltage slew capability (see note 2 below)	Install firmware version B.00.00 or greater available at www.agilent.com/find/n6700

Notes:

¹ If you add modules with model #'s N673xA, N673xB, N674xA, or N674xB, you will not be able to access the Agilent 662x command set compatibility of your N672xA for any installed modules. Only SCPI commands will be accepted.

² These features are not available in the Agilent 662x command set. You must use SCPI commands to access these new programmable features.

Compatibility with older models
If you previously purchased an Agilent 662xA or N672xA, and you want to make another purchase, use the table at right to find the equivalent configuration of N6700B Low-Profile Modular Power System Mainframe and DC Power Modules.

Older Agilent Model	A version model number	Equivalent configuration with latest N6700 series models
6621A	N6721A	N6700B + 2 x N6752A
6622A	N6722A	N6700B + 2 x N6752A
6623A	N6723A	N6700B + 2 x N6751A 1 x N6752A
6624A	N6724A	N6700B + 4 x N6751A
6625A	N6725A	N6700B + 1 x N6761A 1 x N6762A
6626A	N6726A	N6700B + 2 x N6761A 2 x N6762A
6627A	N6727A	N6700B + 4 x N6751A
6628A	N6728A	N6700B + 2 x N6762A
6629A	N6729A	N6700B + 4 x N6762A

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Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

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www.agilent.com/find/assist

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(fax) 800 820 2816

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(fax) (81) 426 56 7840

Korea:

(tel) (82 2) 2004 5004

(fax) (82 2) 2004 5115

Latin America:

(tel) (305) 269 7500

(fax) (305) 269 7599

Taiwan:

(tel) 0800 047 866

(fax) 0800 286 331

Other Asia Pacific Countries:

(tel) (65) 6375 8100

(fax) (65) 6836 0252

Email: 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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