Agilent Technologies

Product Specifications
Multiplexer (Option 010/HP 44470A)

Option 010 is a 10-channel multiplexer for scanning or multiple signal connections. Channels switch 2 wires (Hi and Lo) with 2PST relays for DVM inputs and other signals up to 250V and 2A. This module can also be used to multiplex signals to other switching functions, such as the matrix module.

Input Characteristics
Maximum Voltage: (terminal-terminal or terminal-chassis): 250 V dc, 250 Vac rms, 350 Vac peak
Maximum Current: 2A dc, 2 A ac rms
Maximum Power: 60 W dc, 500 VA ac
Thermal Offset: < 3,µV
DC Isolation (40ºC, 60% RH)
Channel-channel, open channel: >10^11 ohm

AC Isolation/Performance
(50 ohm termination) 100 kHz 1 MHz 10 MHz
Insertion Loss (dB) <0.30 <0.35 <0.90
Crosstalk (dB) <-73 <-53 <-33

Channel Relay Multiplexer (HP 44470D)
The Agilent 44470D Relay Multiplexer module provides 20 two-wire channels to switch analog signals to a common bus. The Relays exhibit low thermal offset characteristics, making them ideal for precision low-level measurements.

The individual relays on this module are rated for a maximum, open circuit voltage of 250 volts dc or ac rms. Maximum current per relay is 2 amps dc or ac rms and maximum power per relay is 60 watts dc or 125 VA ac. Maximum closed channel resistance is lower than 20HM. The Agilent 44470D can be operated in either a break-before-make (BBM) mode or a mode where multiple channels may be closed together. The Agilent 44470D offers many possible uses, including multiplexer signals directly to a measuring instrument. It can also be used as an input/output multiplexer with the Agilent 44473 Amatrix-option card or other switching configurations.

The Agilent 44470D doubles the number of channels of the Agilent 44470A and is compatible with its command set. A new removable terminal block (HP 44480B) is provided for convenience in wiring.

Notice: the Agilent 44470D must be used with an upgraded Agilent 3488A Switch/ Control Unit (Agilent 3488A opt. #023). To upgrade an existing Agilent 3488A, order Agilent P/N 44488A.

Input Characteristics
Total Channels: 20
Maximum Voltage: 250V dc or ac rms (terminal-terminal or terminal-chassis)
Maximum Current: 2A dc or ac rms (per channel or module)
Maximum Power: 60 W dc, 125 VA ac (per channel or module)
Overvoltage Transients (max) 1400Vpk
Thermal Offset: < 3,µV differential or single-ended
Closed Channel Resistance < 2ohm (end of relay life)
Maximum Scan Rate: 43 Channels/sec (Using Agilent 3488A external increment & channel closed, with Agilent 44474A display off)
DC Isolation (with one channel closed)
Open Channel: < (40ºC, 60% RH): > 10^{11}ohm

Channel – Channel: < (40ºC, 95% RH): > $5x10^9$ohm
Hi-Lo: < (40ºC, 60% RH): > $5x10^{10}$ohm < (40ºC, 95% RH) > 10^9ohm
Channel - Chassis < (40ºC, 60% RH) > $5x10^{10}$ohm < (40ºC, 95% RH) > 10^9ohm

AC Isolation/Performance

Capacitance Open Channel, (with 1 channel closed) Channel - Channel < 7pF
Hi - Lo < 27pF
Channel - Chassis < 80pF
Insertion Loss (dB) 100 KHz < 0.2 (with 50 ohm termination) 1 MHz < 0.25, 10 MHz < 1.2
Crosstalk (dB) 100 KHz < -73, 1MHz < -53, 10 MHz < -31

General Purpose Relay (Option 01l/HP 44471A)

This module consists of 10 SPST independent relays for general signal switching and control of external devices. Quality connections make this module ideal for switching signals when multiplexing is not required, or for supplying switchable power to the device under test.

Input Characteristics

Maximum Voltage (terminal-terminal or terminal-chassis): 250 V dc, 250 Vac rms, 350 Vac peak
Maximum Current: 2A dc, 2 A ac rms
Maximum Power: 60 W dc, 500 VA ac
Thermal Offset: < 3,µV
DC Isolation (40ºC, 60% RH)
Channel-channel, open channel: >10^11 ohm

AC Isolation/Performance

(50 ohm termination) 100 kHz 1 MHz 10 MHz
Insertion Loss (dB) <0.30 <0.35 <0.90
Crosstalk (dB) <-73 <-53 <-33

General Purpose Relay (HP 44471D)

The Agilent 44471D General Purpose (GP) Relay module provides 20 independent single pole-single throw (SPST, Form A) switches. The module can find many uses as an actuator assembly. Its low thermal characteristics make it ideal for independent (non-multiplexed) signal switching.

The individual relays on this module are rated for a maximum, open circuit voltage of 250 volts dc or ac rms. Maximum current per relay is 1 amp dc or ac rms and maximum power per relay is 60 watts dc or 125 VA ac. Maximum closed channel resistance is lower than 2 Ohm.

The Agilent 44471D doubles the number of channels of the Agilent 44471A and the compatible terminal block (HP 44481B) is provided for convenience in wiring.

Notice: the Agilent 44471D must be used with an upgraded Agilent 3488A Switch/Control Unit (Agilent 3488A opt. #023). To upgrade an existing Agilent 3488A, order Agilent P/N 44488A.

Input Characteristics
Total Channels: 20
Maximum Voltage: 250V dc or ac rms (terminal-terminal or terminal-chassis)
Maximum Current: 1A dc or ac rms (per channel or module) 20A dc or ac rms
Maximum Power: 60 W dc; 125 VA ac (per channel or module)
Overvoltage Transients (max) 1400Vpk
Thermal Offset: < 3,µV differential or single-ended
Closed Channel Resrstance < 2ohm (end of relay life)
Maximum Scan Rate 43 Channels/sec (Using Agilent 3488A external increment & channel closed, with Agilent 44474A display off)

DC Isolation (with one channel closed)
Open Channel, < (40ºC, 60% RH): > 10^{11}ohm
Channel - Channel < (40ºC, 95% RH): > 10^{9}ohm
Channel - Chassis < (40ºC, 60% RH) > $5x10^{11}$ohm < (40ºC, 95% RH) > 10^{10}ohm

AC Isolation/Performance

Capacitance Open Channel, (with 1 channel closed) Channel - Channel < 7pF
Hi - Lo < 10pF
Channel - Chassis < 25pF

Insertion Loss (dB) 100 KHz < 0.2
(with 50 ohm termination) 1 MHz < 0.25
10 MHz < 1

Crosstalk (dB) 100 KHz < -71
(with 50 ohm termination) 1MHz < -51
10 MHz < -31

VHF Switch (Option 012/HP 44472A)

The VHF module provides broadband switching for high-frequency and pulse signals. The two independent groups of bidirectional 1 x4 switches can be used for signals from dc to 300 MHz. All channels have 50-ohm characteristic impedance and are break-before-make within a group of four channels. Each group is isolated from the other and from ground to prevent ground loops. Excellent isolation makes this module ideal for high-frequency signal analyzer measurements requiring a large dynamic range.

Input Characteristics
Maximum Voltage
Center-center, center-low: 250 Vdc, 30 Vac rms, 42 Vac peak
Low-chassis, low-low: 42 V dc
Maximum Current (per channel): 30 mA dc, 300 mA ac rms
Thermal Offset: <15 µ V per channel
Characteristic Impedance: 50 ohm

AC Isolation/Performance
30 MHz 100 MHz 300 MHz
Crosstalk (dB)
Channel-Channel <-100 <-85 <-65
Group-Group <-85 <-85 <-50
Insertion Loss (dB) <0.5 <0.75 <1.25
VSWR <1.06 <1.12 <1.43

All channels break-before-make within a group of 4 channels.

Matrix Switch (Option 013/HP 44473A)

Option 013 offers highly flexible switching with a 4x4, 2-wire matrix. Any combination of four input channels maybe connected to any combination of 4 output channels. Each cross point or node in the matrix uses a 2PST relay to switch two lines (Hi and Lo) at a time. Multiple 4 x 4 modules can be connected to form larger matrices. Multiplexer can be used in conjunction with this module to effectively expand the number of inputs and outputs of the matrix.

Input Characteristics
Maximum Voltage (terminal-terminal or terminal-chassis):
250 V dc, 250 Vac rms, 350 Vac peak
Maximum Current: 2A dc, 2 A ac rms
Maximum Power: 60 W dc, 500 VA ac
Thermal Offset: < 3,µV
DC Isolation (40ºC, 60% RH)
Channel-channel, open channel: >10^11 ohm

AC Isolation/Performance
(50 ohm termination) 100 kHz 1 MHz 10 MHz
Insertion Loss (dB) <0.30 <0.35 <0.90
Crosstalk (dB) <-73 <-53 <-33

Digital I/O (Option 014/HP 44474A)

This module offers 16 very flexible bidirectional I/O lines and 4TTL-compatible handshake lines for sensing and control of external devices. The digital inputs can be used to sense contact closures to ground. Each channel provides current sinks for remote switching of external relays, such as the Agilent 33311 series coaxial switches.

I/O Lines
Maximum Voltage: +30 Vdc (line-chassis)
Output Characteristics: V (high) >=2.4 V; V (low) <=0.4 V
I (low) Maximum: 125 mA @ V (low) <=1.25 V; fused at 250 mA
Input Characteristics: V (high) >=2 V; V (low) <=0.8 V
External Increment: Advances Agilent 3488A to next programmed configuration on falling edge of TTL pulse
Channel Closed: Indicates completion of new configuration; TTL pulse

Microwave Switch (Option 016/Hp 44476A)
This microwave switch furnishes three independent SPST 50-ohm coaxial switches with excellent performance from dc to 18 GHz. The 3.5 mm SMA connector allows you to easily connect cables for multiple system configurations.

Frequency Range: DC to 18 GHz
Isolation: >90 dB
Impedance: 50 ohm
Insertion Loss: < 0.05 dB
SWR: 1.40

Form-C Relay (Option 017/HP 44477A)
This module provides seven separate SPDT channels for general purpose switching and control of external devices. Using a power supply, the module can drive programmable attenuators and non-HP coaxial switches.

Input Characteristics
Maximum Voltage (terminal-terminal or terminal-chassis):
250 V dc, 250 Vac rms, 350 Vac peak

Maximum Current: 2A dc, 2 A ac rms
Maximum Power: 60 W dc, 500 VA ac
Thermal Offset: < 3,µV
DC Isolation (40ºC, 60% RH)
Channel-channel, open channel: >10^11 ohm

AC Isolation/Performance
(50 ohm termination) 100 kHz 1 MHz 10 MHz
Insertion Loss (dB) <0.30 <0.35 <0.90
Crosstalk (dB) <-73 <-53 <-33

Microwave Switch (Option 018/HP 44476B)
The module brings multi-port 50 ohm coaxial switching to your test system. The module can mount any two Agilent 3331XX coaxial switches. The Agilent coaxial relays come in 3-, 4-, and 5-port configurations--different switches for a variety of applications. Agilent coaxial switches that can be used are:

Agilent Coaxial Switch Port Frequency

Agilent 33311B/Opt 011 3 dc to 18 GHz

Agilent 33311C/Opt 011 3 dc to 26.5 GHz

Agilent 33312B/Opt 011 4 dc to 18 Ghz

Agilent 33312 C/Opt 011 4 dc to 26.5 Ghz

Agilent 33313B/Opt 011 5 dc to 18 GHz

Agilent 33313C/Opt 011 5 dc to 26.5 GHz

Microwave Switch Module

Refer to Agilent 3331XX product specifications.

1.3 GHz 50 Ohm Multiplexer (Option 019/HP 44478A)
1.3 GHz 75 Ohm Multiplexer (Option 020/HP 44478B)

These modules bring bi-directional switching of signals from dc to 1.3 GHz, with high-channel isolation (> 55 dB @ 1 GHz). Each module consists of two groups of 1x4 multiplexer. All test connections are made to BNCs on the module?s edge. Off-channels can be resistively terminated.

Input Characteristics
Maximum Voltage: 42 Vdc + ac peak
Maximum Current per Channel: 1 A DC or AC rms
Maximum Power per Channel: 24 W, 24 VA, or 44 dBm
Impedance: 50 ohm (Opt 019/HP 44478A) 75 ohm (Opt 020/HP 44478B)

AC Performance
<= 10 MHz <= 100 MHz <= 500 MHz <= 1.3 GHz

Insertion Loss (dB)
<= (40º C, 95% RH) <0.3 <0.7 <1.5 <30
<= (25º C, 40% RH), (Typ.) <0.2 <0.5 <1.1 <1.9

Crosstalk (dB)
Channel-Channel
Channel-Common <-90 <-80 <-65 <-55
Group-Group, Module-Module <-90 <-80 <-70 <-60
VSWR <1.2 <1.25 <1.35 <1.55

Breadboard (Option 015/HP 44475A)
The breadboard module provides a convenient way to implement custom circuits and special functions that interface directly to the Agilent 3488A backplane control signals.