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Agilent 3499A/B/C Switch/Control System

Quick Reference Guide

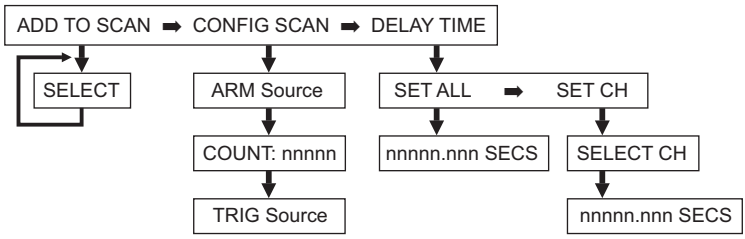
Front-Panel Menu Reference (SCPI Mode)

- Turn the knob to select an item at the current menu level.
- Press **Enter** to move to the next level in the menu.
- Press the *same* menu key again to return to the previous menu level.

View MENU [View]

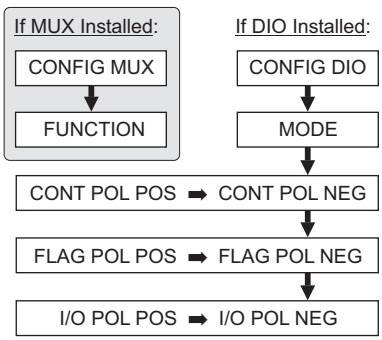
ERROR ➡ SCAN LIST ➡ RELAY CYCLES

S.List MENU [S.List]

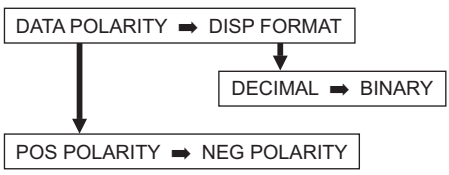


Mode MENU [Mode]

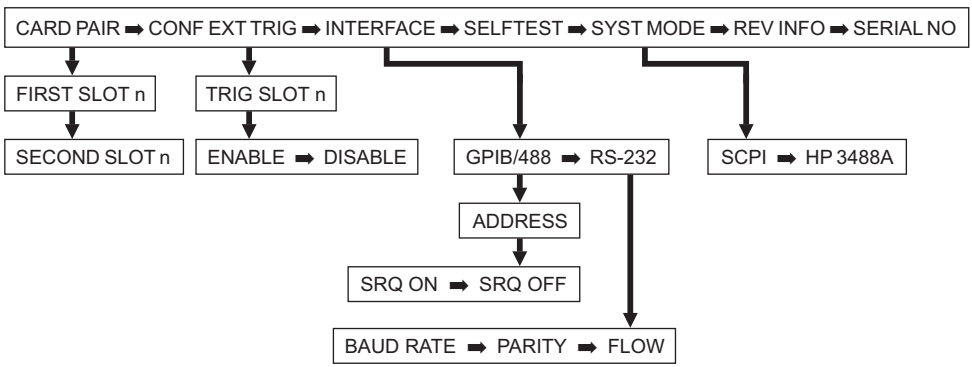
A. Select a Slot



B. Select a DIO Port



Menu MENU [Menu]



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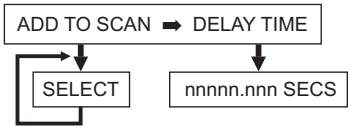
Front-Panel Menu Reference (3488 Mode)

- Turn the knob to select an item at the current menu level.
- Press **Enter** to move to the next level in the menu.
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View MENU [View]

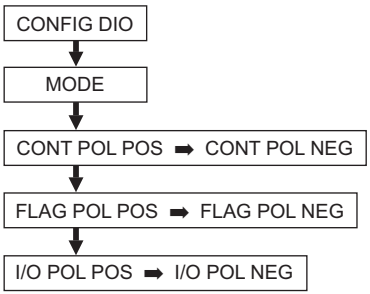
ERROR ➡ SCAN LIST ➡ RELAY CYCLES

S.List MENU [S.List]

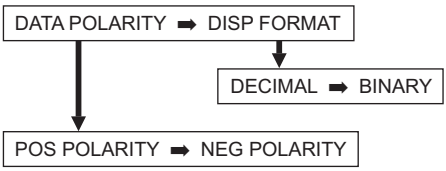


Mode MENU [Mode]

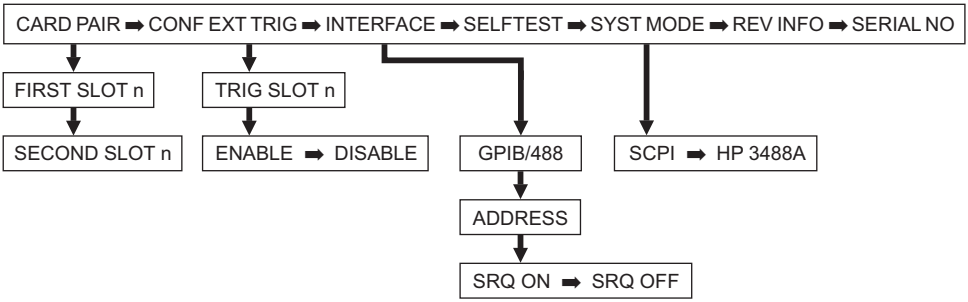
A. Select a Slot



B. Select a DIO Port



Menu MENU [Menu]



Note: You can operate the 3499A/B/C in either the SCPI mode or the 3488A mode.
- In the **SCPI** mode, you can operate the instrument from the front panel or over the remote interface (GPIB or RS-232) using SCPI commands.
- In the **3488A** mode, you can operate the instrument from the front panel or over the remote interface (GPIB only) using 3488A commands.

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SCPI Commands Quick Reference

- Square brackets ([ ]) indicate optional keywords or parameters.
- Angle brackets (< >) enclose parameters for which you must specify a value. Default parameters are shown in **bold**.
- A vertical bar (|) separates multiple parameters.

Channel numbers have the form (@***snn***), where ***s*** is the slot number and ***nn*** is the channel number. Examples are shown below.

```
ROUT:CLOS (@111)
ROUT:CLOS (@111,112,203,204)
ROUT:CLOS (@101:111)
```

Switch Commands

```
[ROUTe:]
   CLOSe <channel_list>
   CLOSe? <channel_list>
   CLOSe:STATe?
   OPEN <channel_list>|ALL
   OPEN? <channel_list>
```

Specific Plug-in Commands

```
[ROUTe:]
   CPAir <slot1>,<slot2>|-1
   CPAir?
   FUNCtion <slot>,<1|2|3|4|WIRE1|WIRE2|BIWIRE2|WIRE4>
   FUNCtion? <slot>

INPut
   :ATTenuation[:LEVel] <port>,<dB>
   :ATTenuation[:LEVel]?
```

Scan List Commands

```
[ROUTe:]
   SCAN[:LIST] <scan_list>
   SCAN[:LIST]?
   SCAN CLEar
   SCAN:SIZE?
```

Scanning Commands

```
INITiate
ABORt
TRIGger[:IMMediate]
*TRG
```


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Scan Configuration Commands

```
ARM
   :SOURce <BUS|EXTernal|IMMediate|TIMer|MIX|HOLD>
   :SOURce?
   :COUNt <number>|MIN|MAX|INFinity
   :COUNt? [MIN|MAX|INFinity]
   :TIMer <seconds>|MIN|MAX
   :TIMer? [MINimum|MAXimum]

TRIGger
   :SOURce <BUS|EXTernal|IMMediate|TIMer|MIX|HOLD>
   :SOURce?
   :TIMer <seconds>|MIN|MAX
   :TIMer? [MIN|MAX]

[ROUTe:]
   [CHANnel:]DELay <seconds>,<channel_list>|ALL
   [CHANnel:]DELay? <channel_list>

CONFigure
   :EXTernal[:TRIGger]:SOURce <slot>
   :EXTernal[:TRIGger]:SOURce?
   :EXTernal[:TRIGger][:OUTPut] <0|1|OFF|ON>
   :EXTernal[:TRIGger][:OUTPut]?
```

State Storage Commands

```
*SAV <mem>

*RCL <mem>

SYSTem:STATe:DELete <mem>|ALL
```

Valid Memory Locations

01 - 10 (Rev 1.0, 2.0, 3.0)
01 - 50 (Rev 4.0)

Digital Input Commands

```
SENSe:DIGital:DATA
   :BIT? <bit_port>
   [:<BYTE|WORD|LWORD>][:VALue]? <port>
   [:<BYTE|WORD|LWORD>]:BLOCK? <port>,<size>
```

Digital Output Commands

```
SOURce:DIGital:DATA
   :BIT <bit_port>,<0|1|POS|NEG>
   [:<BYTE|WORD|LWORD>][:VALue] <port>,<data>
   [:<BYTE|WORD|LWORD>]:BLOCK <port>,<block_data>
```


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Digital Configuration Commands

```
SOURce:DIGital
   :MODE <slot>,<mode>
   :MODE? <slot>
   :CONTrol:POLarity <slot>,<0|1|POS|NEG>
   :CONTrol:POLarity? <slot>
   :FLAG:POLarity <slot>,<0|1|POS|NEG>
   :FLAG:POLarity? <slot>
   :IO:POLarity <slot>,<0|1|POS|NEG>
   :IO:POLarity? <slot>

SOURce:DIGital:DATA
   [:<BYTE|WORD|LWORD>]:POLarity <port>,<0|1|POS|NEG>
   [:<BYTE|WORD|LWORD>]:POLarity? <port>
```

Digital I/O Memory Commands

```
SOURce:DIGital:DATA
   [:<BYTE|WORD|LWORD>]:TRACe <port>,<sys_mem_name>

SOURce:DIGital:TRACe
   :DEFine <sys_mem_name>,<size>[,<fill>]
   :DEFine? <sys_mem_name>
   :DEFine:CATalog?
   [:DATA] <sys_mem_name>,<block_data>
   :DELete[:NAME] <sys_mem_name>
   :DELete:ALL

SENSe:DIGital:DATA
   [:<BYTE|WORD|LWORD>]:TRACe <port>,<sys_mem_name>

SENSe:DIGital:TRACe
   [:DATA]? <sys_mem_name>
```

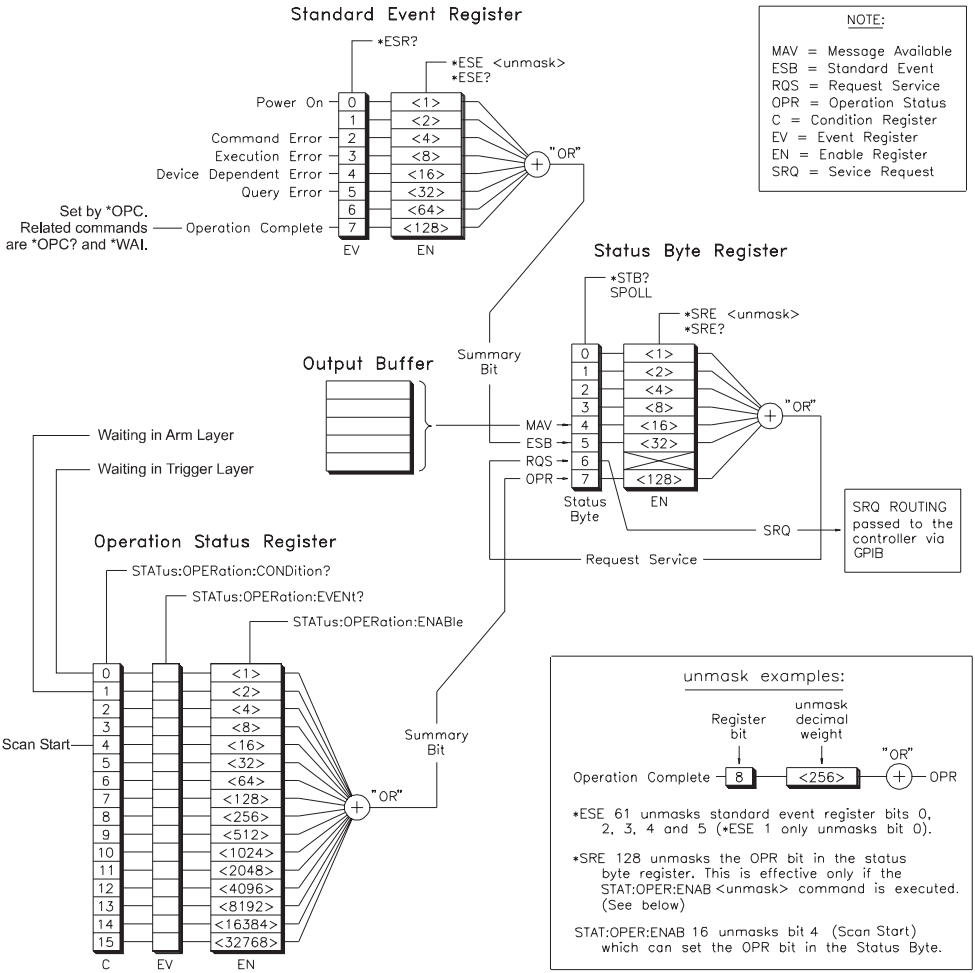

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Status System Commands

```
STATus                                  *CLS
    :OPERation:CONDition?
    :OPERation:ENABle <unmask>          *ESE <value>
    :OPERation:ENABle?                  *ESE?
    :OPERation[:EVENt]?
    :PRESet                             *SRE <value>
                                        *SRE?

                                        *STB?
```

SCPI Status System



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System Information Commands

```
*IDN?

SYSTem
   :CTYPE? <slot>
   :ERRor?
   :VERSion?

DIAGnostic
   [:RELay]:CYCLes? <channel_list>
   [:RELay]:CYCLes:MAX? <slot>
   [:RELay]:CYCLes:CLEar <channel_list>
```

System-Level Control Commands

```
*OPC
*OPC?

*RST

*TST?

*WAI

SYSTem:CPON <slot>|ALL

DIAGnostic
   :DISPlay[:INFOrmation] <message>
   :DISPlay:STATe <0|1|OFF|ON>
   :DISPlay:STATe?
   :MONitor <slot>|<channel>|<port>|-1
   :MONitor?

SYSMODE <0|1|SCPI|HP3488>
SYSMODE?
```

RS-232 Commands

```
SYSTem
   :LOCal
   :REMote
   :RWLock
```


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3488 Commands Quick Reference

Channel numbers have the form ***snn***, where ***s*** is the slot number and ***nn*** is the channel number. Examples are shown below.

```
CLOSE 111
CLOSE 111,112,203,204
CLOSE 101-111
```

3488A Standard Commands

```
CLOSE <channel_address>[,<channel_address>...]
OPEN <channel_address>[,<channel_address>...]
VIEW <channel_address>
CTYPE <slot>
CRESET <slot>[,<slot>,...]
SLIST <channel_address>[(, or -)<channel_address>...]
STEP
CHAN [<channel_address>]
CMON <slot>
DELAY [<time in milliseconds>]
```

3488A Digital Commands

```
DMODE <slot>[,<mode>][,<polarity>][,<EI>]
DWRITE <slot><port>,<data>[,<data>...]
DREAD <slot><port>[,<number of times to read>]
DELAY [<time in milliseconds>]
DBW <slot><port>,#I<block data>
DBR <slot><port>[,<number of times to read>]
```

3488A System Commands

```
SYSMODE <0|1|SCPI|HP3488A>
SYSMODE?
RESET
TEST
ID?
STATUS
STORE <1-40>
RECALL <1-40>
ERROR
MASK [<decimal value>]
OLAP <1|0>
EHALT <1|0>
DISP <ASCII character string>
DON/DOFF
LOCK <1|0>
```


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Error Messages

See Chapter 6 in the 3499A/B/C User's Manual for more information.

Execution Errors (SCPI Mode)

-101 Invalid character
-102 Syntax error
-103 Invalid separator
-105 GET not allowed
-108 Parameter not allowed
-109 Missing parameter
-112 Program mnemonic too long
-113 Undefined header
-121 Invalid character in number
-123 Exponent too large
-124 Too many digits
-128 Numeric data not allowed
-131 Invalid suffix
-134 Suffix too long
-138 Suffix not allowed
-148 Character data not allowed
-151 Invalid string data
-158 String data not allowed
-161 Invalid block data
-168 Block data not allowed
-178 Expression data not allowed
-222 Data out of range
-223 Too much data
-224 Illegal parameter value
-310 System error
-350 Queue overflow
-410 Query INTERRUPTED
-420 Query UNTERMINATED
-430 Query DEADLOCKED
-440 Query UNTERMINATED after indefinite response

Self Test (SCPI / 3488A Modes)

+0 PASSED
+1 ROM test failed
+2 GPIB test failed
+3 RS-232 test failed
+4 Front panel test failed

Instrument Errors (3488A Mode)

100 Number of SAV/RCL out of range
101 Unable to recall - scan is running
102 Unable to recall - memory is empty
103 Unable to recall - modules were changed
104 Unable to store - scan is running
110 Slot number out of range
111 Data out of range
112 Not able to perform requested operation
113 Block name not exist
114 Block name already exist
115 Two Blocks already exist
116 Channel number out of range
201 Scan list is empty
202 Scan initiated
203 Scan init ignored
204 Trig ignored
206 Too many channels
207 Card in use
208 N2282A execution error
300 Unable to execute this command in local mode
501 RS232 data receiving error
502 Internal command error
503 RS232 only - unable to execute on GPIB

Error Conditions (3488A Mode)

In 3488A mode, you can query the error queue when the ERROR annuciator is on. The value returned is equal to the sum of the values of the possible error conditions:

1 Syntax Error
2 Execution Error which include:
  a Parameter out of range
  b Module type mismatch
  c Attempt to access a non-existent stored state or scan list
4 Hardware Trigger too fast
8 Logical Failure
16 Power Supply Failure

Note: If the string “+00000” is returned by the ERROR command, the error queue is empty. If this is the case, “0000” is displayed on the front panel.

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Factory Default and Reset States (SCPI Mode)

Input/Output Configuration	Factory Default State	Reset State
Interface	GPIB	Keep current setting
GPIB Address	09	Keep current setting
System Mode	SCPI	Keep current setting
Baud Rate (RS-232)	9600	Keep current setting
Parity (RS-232)	Odd (7 Data Bits)	Keep current setting
Flow Control (RS-232)	XON/XOFF	Keep current setting
Module-Related Operation	**Factory Default State**	**Reset State**
Switching Channels	Open	Open
Digital I/O Ports	Input	Input
Card Pair	None	None
System-Related Operation	**Factory Default State**	**Reset State**
Display State	On	On
Stored State	Empty	Keep current setting
Error Queue	Empty	Empty
Scan-Related Operation	**Factory Default State**	**Reset State**
Scanning	None	Stop scan in progress
Scan List	Empty	Empty
ARM SOURce	IMMediate	IMMediate
ARM TIMer (seconds)	0	0
ARM COUNt	1	1
TRIGger SOURce	IMMediate	IMMediate
TRIGger TIMer (seconds)	0	0
Channel Delay (seconds)	0	0
Trigger Out Pulse	Disabled	Disabled

Factory Default and Reset States (3488A Mode)

Input/Output Configuration	Factory Default State	Reset State
Interface	GPIB	Keep current setting
GPIB Address	09	Keep current setting
System Mode	SCPI	Keep current setting
Module-Related Operation	**Factory Default State**	**Reset State**
Switching Channels	Open	Open
Digital I/O Ports	Input	Input
Card Pair	None	None
System-Related Operation	**Factory Default State**	**Reset State**
Display State	On	On
Stored State	Empty	Keep current setting
Error Queue	Empty	Empty
Scan-Related Operation	**Factory Default State**	**Reset State**
Scanning	None	Stop scan in progress
Scan List	Empty	Empty

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Plug-In Module Selection Guide

Multiplexer Modules

Module	Description	Max Voltage	Max Current Per Channel	# Slots	Terminal Blocks/Cables
N2260A	40-Channel	200 V	1 A	1 Slot	N2290A Screw Terminal N2297A DIN96-to-Twin D50 Cable N2299A DIN96-to-Quad D25 Cable
N2266A	40-Channel	200 V	0.5 A	1 Slot	N2290A Screw Terminal N2297A DIN96-to-Twin D50 Cable N2299A DIN96-to-Quad D25 Cable
N2270A	10-Channel	1000 V	1 A	2 Slots	N2320A Crimp-and-Insert Kit
44470A	10-Channel	250 V	2 A	1 Slot	44480A Screw Terminal
44470D	20-Channel	250 V	2 A	1 Slot	44480B Screw Terminal

General-Purpose Relay Modules

Module	Description	Max Voltage	Max Current Per Channel	# Slots	Terminal Blocks/Cables
N2261A	40-Channel	200 V	1 A	1 Slot	N2291A Screw Terminal N2297A DIN96-to-Twin D50 Cable N2299A DIN96-to-Quad D25 Cable
N2267A	8-Channel	250 V	8 A	1 Slot	N2327A Crimp-and-Insert Kit
44471A	10-Channel	250 V	2 A	1 Slot	44481A Screw Terminal
44471D	20-Channel	250 V	1 A	1 Slot	44481D Screw Terminal
44477A	7-Channel	250 V	2 A	1 Slot	44487A Screw Terminal

Matrix Modules

Module	Description	Max Voltage	Max Current Per Channel	# Slots	Terminal Blocks/Cables
N2262A	4x8 Matrix	200 V	1 A	1 Slot	N2292A Screw Terminal N2298A DIN96-to-D25 Cable
44473A	4x4 Matrix	250 V	2 A	1 Slot	44483A Screw Terminal

Digital I/O Modules

Module	Description	Max Voltage	Max Current Per Channel	# Slots	Terminal Blocks/Cables
N2263A	32-Bit TTL	42 V	0.6 A	1 Slot	N2293A Screw Terminal N2297A DIN96-to-Twin D50 Cable N2299A DIN96-to-Quad D25 Cable
44474A	16-Bit TTL	30 V	0.125 A	1 Slot	44484A Screw Terminal

Breadboard Module

Module	Description	# Slots	Terminal Block
44475A	Provides space for customized circuitry	1 Slot	44485A Screw Terminal

Continued on next page ➡

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Module Selection Guide (cont'd)

Multifunction Modules

Module	Description	Max Voltage	Max Current Per Channel	# Slots	Terminal Blocks/Cables
N2264A	12-Chan GP 3-Chan GP 16-Bit DIO	200 V 125 V 42 V	1 A 5 A 0.6 A	1 Slot	N2294A Screw Terminal N2297A DIN96-to-Twin D50 Cable N2299A DIN96-to-Quad D25 Cable
N2265A	4x4 Matrix 16-Bit DIO	200 V 42 V	1 A 0.6 A	1 Slot	N2295A Screw Terminal N2297A DIN96-to-Twin D50 Cable N2299A DIN96-to-Quad D25 Cable

Optical Multiplexer Modules (typical specs)

Module	Description	Insertion Loss	Stability	# Slots	Connectors
N2280A	Quad 1x2	0.5 dB	± 0.03 dB	2 Slots	SC/APC Connectors on Module
N2281A	Dual 1x4	0.5 dB	± 0.03 dB	2 Slots	SC/APC Connectors on Module
N2282A	Single 1x8	0.5 dB	± 0.02 dB	2 Slots	SC/APC Connectors on Module

RF and Microwave Modules

Module	Description	Insertion Loss	Cross Talk	# Slots	Connectors
N2268A	Dual 1x4	<0.35 dB	<-64 dB	1 Slot	SMA Connectors on Module
N2272A	Single 1x9	<0.5 dB	<-75 dB	1 Slot	BNC Connectors on Module
N2276A	Dual 1x6	<0.36 dB	<-100dB	3 Slots	SMA Connectors on Module
N2276A/ Opt 204	Dual 1x4	<0.36 dB	<-100dB	3 Slots	SMA Connectors on Module
N2276B	Supports 2 external microwave switches or attenuators (sold separately). Technical specifications vary depending on external switch selection.			3 Slots	Typically SMA Connectors on external switches
44472A	Dual 1x4	<0.75 dB	<-85 dB	1 Slot	BNC Connectors on Module
44478A	Dual 1x4	<1.1 dB	<-70 dB	1 Slot	BNC Connectors on Module (50Ω)
44478B	Dual 1x4	<1.1 dB	<-70 dB	1 Slot	BNC Connectors on Module (75Ω)
44476A	Triple 1x2	<0.25 dB	<-90 dB	1 Slot	SMA Connectors on Module
44476B	Supports 2 external microwave switches (sold separately). Technical specifications vary depending on external switch selection.			1 Slot	Typically SMA Connectors on external switches



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