14F3S-1/4x4

PXI RF Switching Module

Features

DC - 18 GHz
Reconfigurable Bidirectional Non-Blocking Matrix:
 4 inputs and 4 outputs
 By removing external cables, the switch can be reconfigured
Software Control:
 ›› *Custom GUI in LabVIEW, LabWindows/CVI and Visual Basic*
 ›› *VISA/IVI drivers (for advanced programming)*

Part Number

14F3S-1/4x4

Photo: 14F3S-1/4x4

Description

Overview:

The 14F3S-1/4x4 Model is a bidirectional PXI (PCI eXtensions for Instrumentation) RF switching module. It is configured as a non-blocking crossbar with 4 inputs and 4 outputs. The coaxial switch operates between DC to 18 GHz and the module occupies 4 slots of a 3U PXI chassis. NI PXI-1036 chassis, provided by National Instrument, is recommended; however the module is compatible with any desired PXI chassis. It is design for complex test setups and for sophisticated switching requirements.

Software Control:

Graphical User Interfaces (GUIs) are provided in LabVIEW, LabWindows/CVI, and Visual Basics to allow the user to control the switch easily. For advanced programming, VISA and IVI drivers are included such that one can program and control the switch in any way desired using e.g. LabWindows/CVI (NI developed ANSI C-based programming), LabVIEW, Visual Basics, C or any other desired programming language or platform.

Other Switch Configurations:

The switch is equipped with (5) external semi-rigid cables that are arranged such that a 4x4 matrix configuration is created. By removing some or all cables, it allows the user to reconfigure the module to sets of standard coaxial switches e.g. SPDT, DPDT (Transfer), SP4T etc. Further by adding external 50 Ω loads one can configure the matrix to a terminated switch. Note that the provided software package supports any reconfiguration that is possible within the 4x4 matrix.

RF Characteristics

Impedance:	50 Ohms
Operating Frequency:	DC – 18 GHz
Switching Speed*:	25 ms (max)
Operating Life:	1,000,000 cycles (Cold Switching)

* software delays are not taken into account

Power Consumption Backplane Supply

Voltage	+12 VDC	+5 VDC	+3.3 VDC	-12 VDC
Current	1 A	0.15 A	0.1 A	0 A

Physical

Relay Type:	Electromechanical
Contact Material:	Beryllium copper, gold-plated
I/O Connector Type:	SMA Female
Dimensions:	4-slots wide
	3U maximum height (5.25")
	7" maximum depth (NI chassis compatible)
Front Panel Color:	Gray
Weight (max):	1.32 lbs

Shock and Vibration

Operational Shock:	30 g peak, half-sine, 11 ms pulse
Random Vibration:	
›› Operating	5 to 500 Hz, 0.3 g_{rms}
›› Non-operating	5 to 500 Hz, 2.4 g_{rms}

Environment

Operating Temperature:	0 °C to +55 °C
Storage Temperature:	-20 °C to +70 °C
Relative Humidity:	5% to 85% Non-Condensing
Operating Altitude:	5,000 m
Storage Altitude:	15,000 m

	Frequency (GHz)				
	DC-4	4-8	8-12	12-16	16-18
VSWR (Voltage Standing Wave Ratio)	1.30:1	1.35:1	1.40:1	1.50:1	1.80:1
Insertion Loss (dB)	0.3	0.4	0.6	0.8	0.9
Open Channel Isolation (dB)	80	80	70	60	50
RF CW Power (W)	100 W	70 W	60 W	50 W	50 W

DowKey Microwave
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14F3S-1/4x4

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Platforms

PXI Compliance:

All Dow-Key PXI modules support full PXI/cPCI bus interface and complies with both PXI 2.1 specifications and CompactPCI specification (from the PCI Industrial Computer Group - PICMG).

Drivers:

>> VISA driver
>> IVI driver

Supported Platforms:

>> Windows 98/2000/XP
>> NI platforms: LabVIEW, LabWindows, CVI (ANSI C-based)
>> Any programming language using VISA drivers

Developed GUIs (Graphical User Interfaces):

>> LabVIEW GUI
>> Visual Basic GUI
>> LabWindows GUI

Reconfiguration

By removing the external semi-rigid cables and actuating the correct coils, one can reconfigure the 4x4 matrix as shown below.
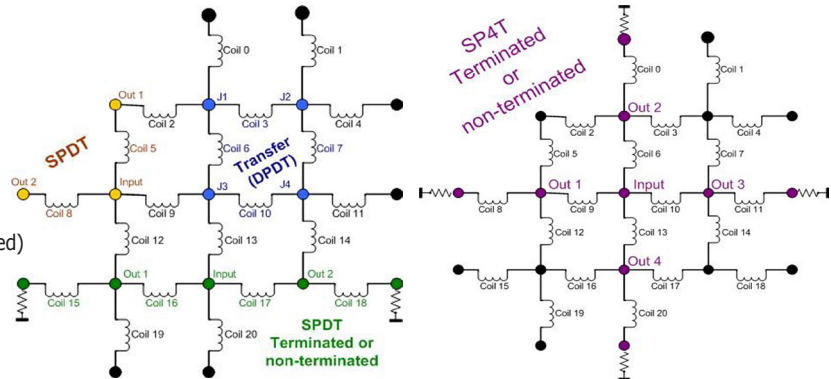
Note: Other possible configurations exist but are not shown.

Software Control: 4x4 PXI module

Together with 14F3S-1/4x4 module, a software package is provided. The package includes Graphical User Interfaces for LabVIEW, LabWindows/CVI, and Visual Basics users.

The GUI is developed using VISA respective IVI drivers, and it gives the user access to use the underlying code to develop other applications for controlling the coaxial switch.

Figure 1 shows the internal interconnections of the 4x4 matrix and the table below it, shows the sequence of coils that need to be energized in order to create a closed RF path. Any test setup can be created by controlling the individual coils. Thus, a similar table can be created for the above reconfigured 4x4 module.

Figure 2 shows the LabVIEW GUI and how each coil can be set/reset by controlling each individual coil.
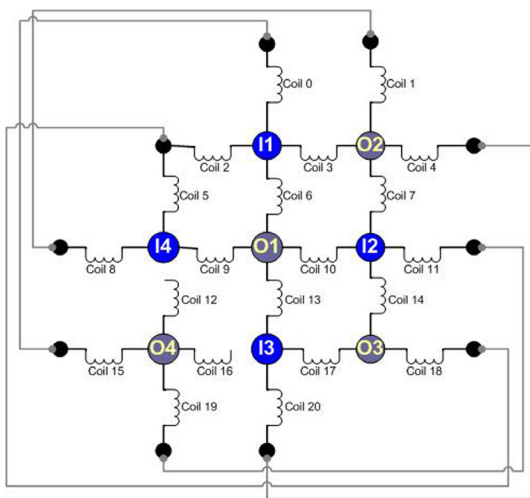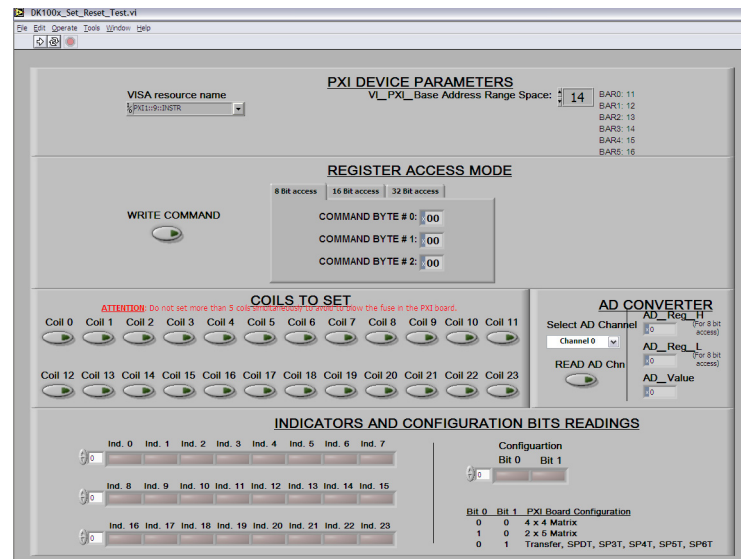

Figure 1: Internal view of 12K3S-1/4x4

Figure 2: Dow-Key LabVIEW GUI

	Output 1	Output 2	Output 3	Output 4
Input 1	Coil#6	Coil#3	Coil#2 & Coil#18	Coil#0 & Coil#15
Input 2	Coil#10	Coil#7	Coil#14	Coil#11 & Coil#19
Input 3	Coil#13	Coil#4 & Coil#20	Coil#17	Coil#16
Input 4	Coil#9	Coil#1 & Coil#8	Coil#5 & Coil#18	Coil#12