

- High Isolation Low Noise 100MHz Switching Matrix
- 75Ω Version Suitable for Telecoms and High Quality Video Switching
- 120Ω Differential Version Suitable for Digital Telecoms/Data Switching
- Choice of 16x4, 8x4 & 8x8 Formats with 1 or 2 Pole Switching
- Automatic Isolation Switching for Maximized Performance
- Optional Loop Through Versions for Construction of Large RF Matrices with Automatic Termination
- Built-In Switch Self Test with Fault Diagnosis to Component Level



***Please contact Pickering for alternative PXI/LXI/USB solutions**

The 8x8, 8x4 and 16x4 RF Matrix Modules switch frequencies beyond 100MHz with a choice of 50Ω, 75Ω & 120Ω versions. Suitable for high accuracy test instrumentation requiring good isolation/noise performance. Built-in switch self-test gives complete switch confidence.

System 20 High Isolation RF Matrix Modules are intended for easy construction of high performance Bidirectional matrix switching systems; modules may be easily cascaded to form matrices of almost any size.

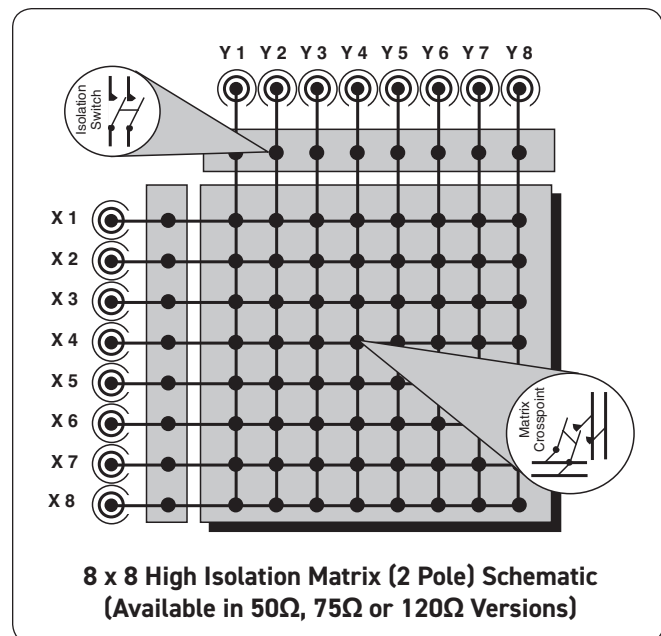
Connections are made via industry standard BNC connectors. Isolation Switches on each module remove all unselected columns and rows from the system, maximizing both isolation and RF performance.

Full Self-Test is performed at power up and at any other time under program control. Self-Test is of particular importance in large systems where relay contact integrity is a very major consideration. In the unlikely event of relay failure the front panel will indicate a fault. The diagnosis - including the position of the suspect relay - will be indicated using the **DIAGNOSTIC?** command.

Applications

Main applications will be for very high quality switching where standard matrix units have inadequate RF and isolation performance, these include: high quality data acquisition (usually 2-pole with frequencies <1MHz), RF matrices (1-pole to beyond 100MHz), video applications (75Ω impedance), telecommunications (75Ω and 120Ω impedance) and high quality signal routing in functional ATE systems.

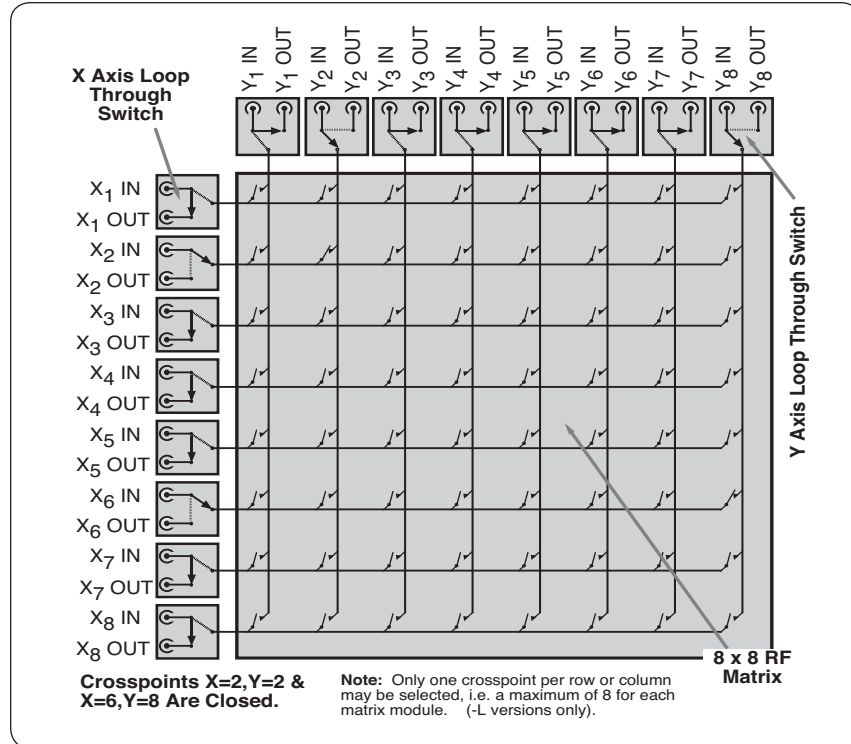
Models 20-520-802 (16x4) and 20-525-802 (8x8) are designed specifically for digital telecommunications switching using 120Ω twisted pair cabling, and use a high density 50-pin connector.



Loop Through Expansion

A further version offering loop-through connectors for easy construction of large RF matrices is available, specify option –L, see schematic diagram. This can also be used for automatic termination of unselected Input/Output signals.

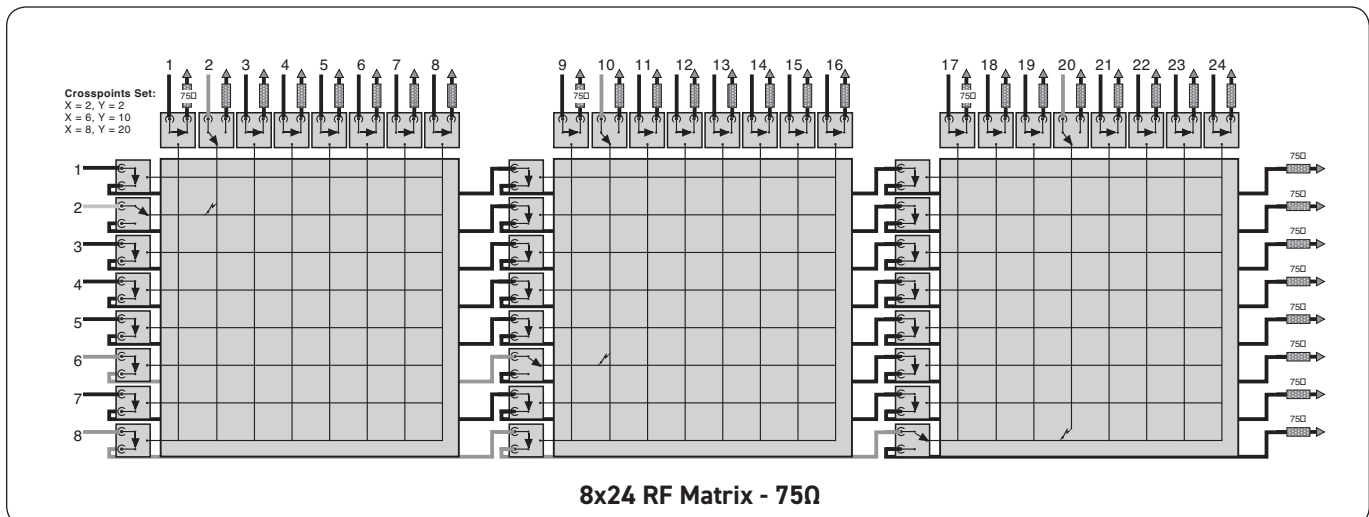
This option is similar to that provided for the 20-750 matrix module (8x4, 1000MHz), please refer to the 20-750 RF Matrix Application Datasheet or contact factory for further information.



Typical RF Matrix: 8x24

The schematic below illustrates a 75Ω 8x24 RF matrix, all non-selected lines are automatically terminated into 75Ω loads (added externally). Up to 30 matrix modules may be interconnected in this way, allowing very large RF matrices to be easily constructed without substantial performance loss.

Conventional RF matrix modules cannot be expanded without a very substantial loss in RF performance (especially poor insertion loss and return loss), nor can they offer automatic termination of non-selected signals.



General Specification (All Versions)

Maximum Voltage:	100V DC
Maximum Power:	10W ††
Maximum Switch Current:	1.0A
On Path Resistance:	<500mΩ
Off Path Resistance:	>10 ⁸ Ω
Diff Thermal Offset (1 pole version):	<20μV
Diff Thermal Offset (2 pole version):	<10μV
Expected Life (Low Power):	>1x10 ⁸ operations
Expected Life (Max Power):	>5x10 ⁶ operations
Switching Time:	15ms

†† For all matrix modules with Loop Through option (-L) Max Power is reduced to 3W and Max Switch Current to 0.25A.

RF Specification - 1 Pole 50Ω and 75Ω Versions

Characteristic Impedance:	50Ω or 75Ω
Maximum Frequency:	200MHz
Rise Time:	<1.5ns †
Insertion Loss (<200MHz):	<3dB †
V.S.W.R. (<100MHz):	<1:1.8 †
Isolation (<100MHz):	>75dB
Crosstalk (<100MHz):	>60dB
Capacitance - open channel to gnd:	<40pF
Capacitance - selected channel to gnd:	<70pF
Capacitance - open input to output:	<4pF

RF Specification - 2 Pole 50Ω and 75Ω Versions

Characteristic Impedance:	50Ω or 75Ω
Maximum Frequency:	100MHz
Rise Time:	<2.0ns †
Insertion Loss (<100MHz):	<3dB †
Return Loss:	<11dB †
Isolation (<100MHz):	>65dB
Crosstalk (<100MHz):	>55dB

† RF Performance is entirely dependant upon the combination of cross-points currently selected, these figures are for one selected cross-point only, refer to the graphs.

RF Specification - 120Ω Telecoms Versions

Characteristic Impedance:	120Ω
Maximum Frequency:	50MHz
Rise Time:	<1.5ns †
Insertion Loss (<50MHz):	<3dB
Return Loss (<50MHz):	<12dB
Isolation (<50MHz):	>50dB
Crosstalk (<50MHz):	>50dB

Programming

The matrix module is very easy to program using the Intelligent IEEE-488.2/RS-232-C Interface:

ARESET a	Open all switches on device a
DIAGNOSTIC?	Report any Self Test errors
DELAY t	Force a minimum delay of t milliseconds between two instructions
MCLOSE a, x, y	Close switch at coordinates x, y on matrix a
MOPEN a, x, y	Open switch at coordinates x, y on matrix a
RESET	Open all switches on all modules
VIEW? a	View status of device a

Self Test

Self-Test is invoked at power on (taking around 30 seconds) and may also be operated under software control (***TST?**). Self-Test pass is indicated on a front panel LED with a full pass/fail description available using the **DIAGNOSTIC?** command. Self-Test comprises 3 levels:-

1. Logic Test
2. Relay Coil Test

Connectors

- Single pole versions use BNC coaxial connectors.
- Double pole versions have a BNC connector with the outer shield isolated from chassis ground.
- 120Ω versions use a 50-pin high density connector, additional contacts are provided for shielded twisted pair cabling.

Mechanical Characteristics

All 20-520/522/525 model versions are housed in shielded 6U height (262mm) Eurocard modules and are 160mm deep. Panel width is as follows:-

- All 50Ω and 75Ω versions are 2.4 Inches, except -L types.
- 50Ω and 75Ω versions with Loop Through option (-L) are 3.6 Inches.
- All 120Ω versions are 1.8 Inches.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 95% non-condensing
Altitude:	5000m

Storage and Transport Conditions

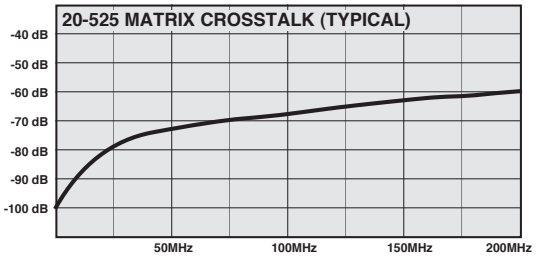
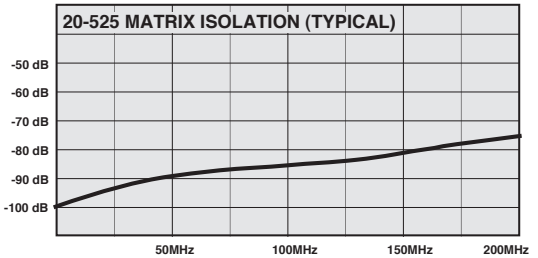
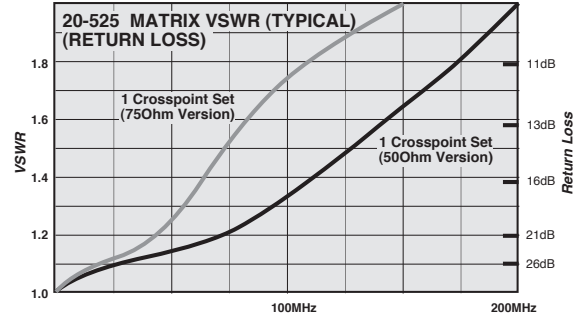
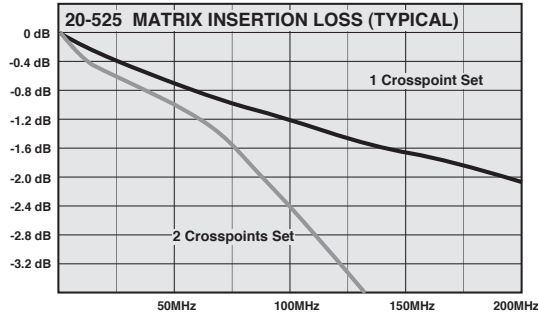
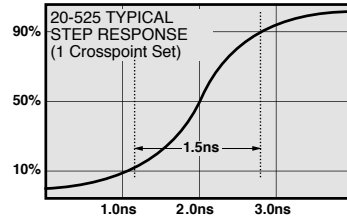
Storage Temperature:	-20°C to +75°C
Humidity:	Up to 95% non-condensing
Altitude:	15000m

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2010, EMC Immunity EN61326-1:2013, Emissions EN55011:2009+A1:2010.

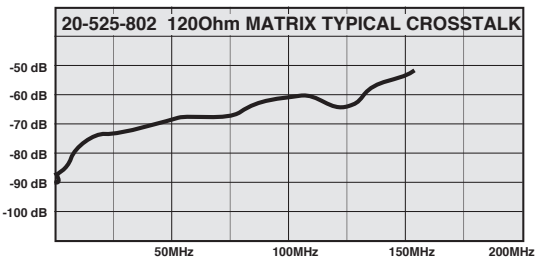
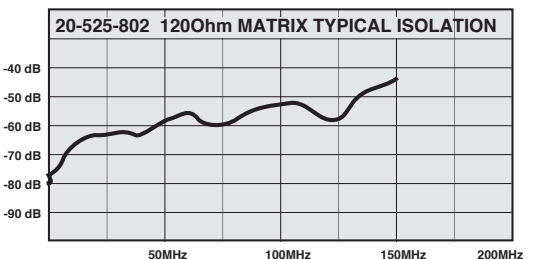
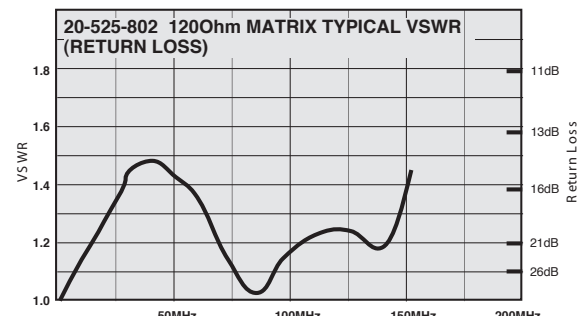
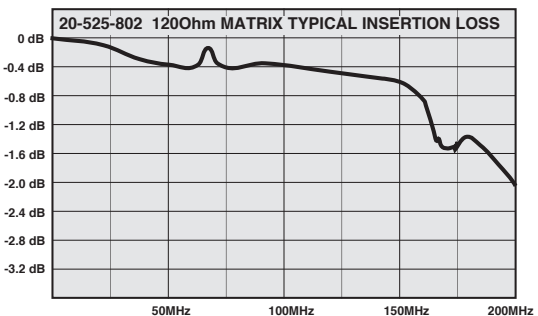
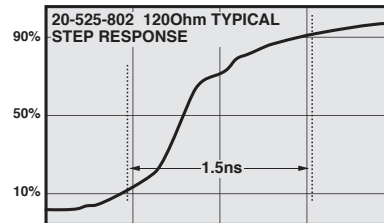
Typical RF Performance Plots for 50Ω and 75Ω Single Pole RF Matrix Modules

Curves are shown for matrix rows/columns with: 1 or 2 interconnected cross-points set. For optimum insertion loss and VSWR (reflection) performance ensure only one cross-point is set in any one row/column. Performance curves for all versions of the single pole matrix modules have similar characteristics, any differences are shown.



Typical RF Performance Plots for 50Ω, 75Ω and 120Ω Double Pole RF Matrix Modules

For optimum insertion loss and VSWR (reflection) performance ensure only one cross-point is set in any one row/column. Performance curves for all versions of the double pole matrix modules have similar characteristics.



Product Order Codes

Configuration	No. of Poles	Impedance	Connector	Part Number
16x4 Matrix	1	50Ω	Co-Ax	20-520-521
	2	50Ω	Co-Ax	20-520-522
	1	75Ω	Co-Ax	20-520-721
	2	120Ω	50-Pin Dtype	20-520-802
8x4 Matrix	1	50Ω	Co-Ax	20-522-521
	2	50Ω	Co-Ax	20-522-522
	1	75Ω	Co-Ax	20-522-721
	2	75Ω	Co-Ax	20-522-722
8x8 Matrix	1	50Ω	Co-Ax	20-525-521
	2	50Ω	Co-Ax	20-525-522
	1	75Ω	Co-Ax	20-525-721
	2	75Ω	Co-Ax	20-525-722
	2	120Ω	50-Pin D-type	20-525-802

Loop Through Option: All of the above matrix modules are available with a loop through option, this is frequently used in the construction of large self terminating RF matrices. Please order option -L (e.g. 20-525-521-L)

Other connector styles may be available, please contact factory for further information.

Mating Connectors & Cabling

For connection accessories for this series of modules please refer to the [90-011D](#) RF Cable Assemblies and [90-005D](#) 50-pin D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Product Customization

Pickering System 20 modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements.

Customization can include:

- Alternative relay types
- Mixture of relay types
- Alternative number of relays
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.



20-525-802 High Isolation RF Switching Module