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Find the *Pickering 20-525-902-LS1* at our website: *Click HERE*

20-520/522/525
High Isolation RF Switching Matrix



- 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
- Modules Cascadable to Any Size Using Internal Analogue Bus
- Automatic Isolation Switching for Maximised 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

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.

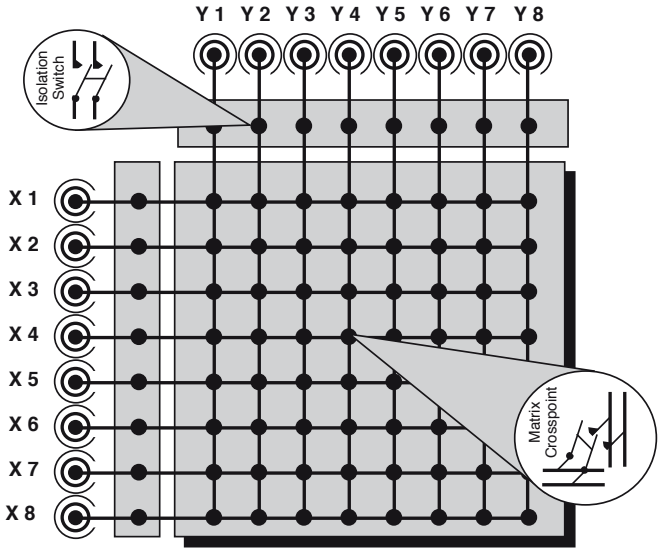
Connections are made via industry standard BNC connectors. Larger matrices are easily constructed using the internal 24 pole shielded analogue bus. **Isolation Switches** on each module remove all unselected columns and rows from the system, maximising both isolation and RF performance.

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

Full Self-Test is performed at power up and at any other time either manually or 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 (either high on-state or low off-state resistance) the front panel will indicate a fault. The diagnosis - including the position of the suspect relay - will be indicated using the DIAGNOSTIC? command.

Creating Larger Matrices - Easily!

Very large matrices can be constructed by interconnecting two or more matrix modules. All such matrix modules must have the same primary address. Their position within the matrix is determined by their bank address, this is set on an additional 5-way dip-switch. A shielded 24-pole low frequency analogue bus is provided on the System 20 Analogue backplane so constructing large matrices is very straight forward, no time consuming daisy-chained wiring harnesses etc.



8 x 8 High Isolation Matrix (2 Pole) Schematic (Available in 50Ω, 75Ω or 120Ω Versions)

Access to the Analogue Bus is facilitated via user configurable links (these links can be preconfigured at the factory prior to shipping).

Please note that the standard analogue backplane is unsuitable for carrying high frequency signals, i.e. with a frequency above a few MHz. An alternative RF analogue backplane is available, type 20-943-501, this bus can be tailored to your exact requirements, please contact factory for further details.

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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.

Programming

The Matrix module is very easy to program using the Intelligent IEEE-488.2/RS-232 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 (*TST?) or via a recessed push button. 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**
3. **Full Contact Test**

Please refer to the Matrix Index Page for a fuller description of self-test.

Connectors

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



20-525-802 High Isolation RF Switching Module

Width and Dimensions

All 20-520/22/25 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.

General Specification (All Versions)

Maximum Voltage: Maximum Power: Maximum Switch Current:	100V DC 10W †† 1.0A
On Path Resistance: Off Path Resistance:	<500mΩ $>10^8$Ω
Diff Thermal Offset (1 pole version): Diff Thermal Offset (2 pole version):	<20µV <10µV
Expected Life (Low Power): Expected Life (Max Power):	$>1x10^8$ operations $>5x10^6$ 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: Rise Time:	200MHz <1.5ns †
Insertion Loss (<100MHz): V.S.W.R. (<70MHz):	<3dB † <1:1.8 †
Isolation (<100MHz): Crosstalk (<100MHz):	>75dB >60dB
Capacitance - open channel to gnd: Capacitance - selected channel to gnd: Capacitance - open input to output:	<40pF <70pF <4pF

Specification – 2 Pole 50Ω & 75Ω Versions

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

Specification – 120Ω Telecoms Versions

Characteristic Impedance:	120Ω
Maximum Frequency: Rise Time:	200MHz <1.5ns †
Insertion Loss (<200MHz): Return Loss (<150MHz):	<3dB <12dB
Isolation (<130MHz): Crosstalk (<130MHz):	>50dB >50dB
Note: 120Ω matrix modules only permit one cross-point to be set on any row or column at any one time, e.g. a maximum of 8 cross-points may be set on an 8x8 module	

Operating/Storage Conditions

Operating Conditions

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

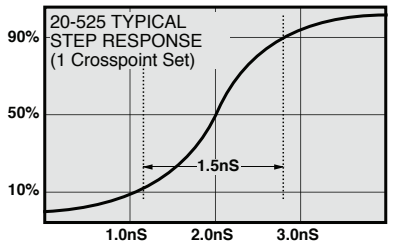
Storage and Transport Conditions

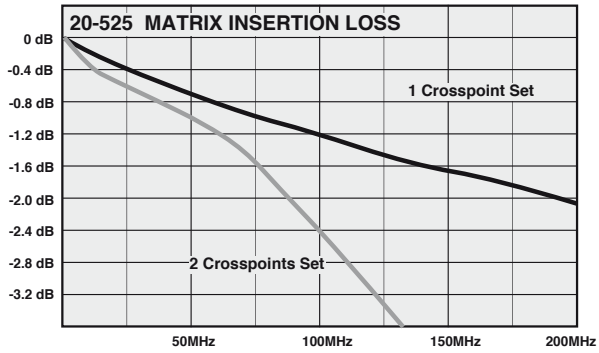
Storage Temperature:	-20°C to +75°C
Humidity:	Up to 95% non-condensing
Altitude:	15000m

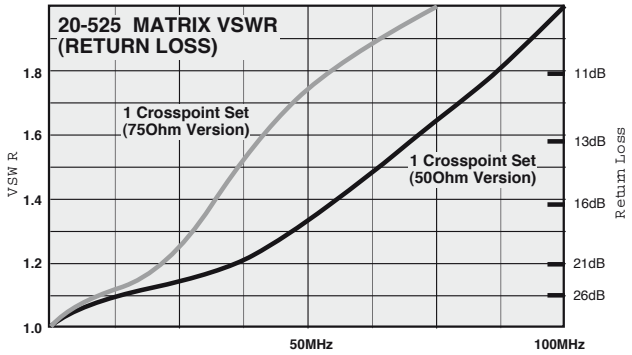
Typical RF Performance Plots for 50Ω and 75Ω Single Pole RF Matrix Modules

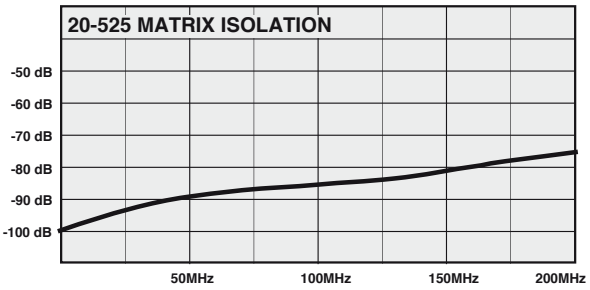
Curves are shown for matrix rows/columns with: 1 or 2 interconnected cross-points set. For optimum insertion loss and VSWR (reflection) performance ensure only one cross-point is set in any one row/column.

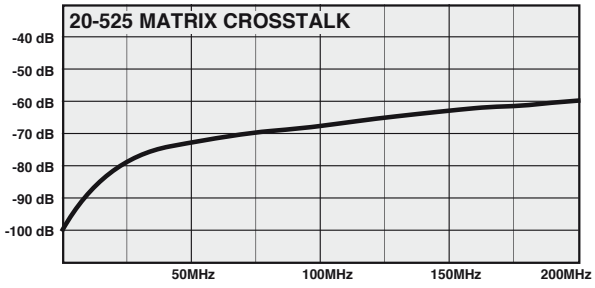
Performance curves for all versions of the single pole matrix modules have similar characteristics, any differences are shown.







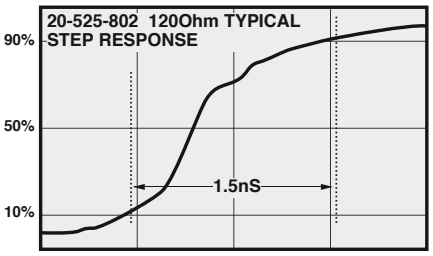


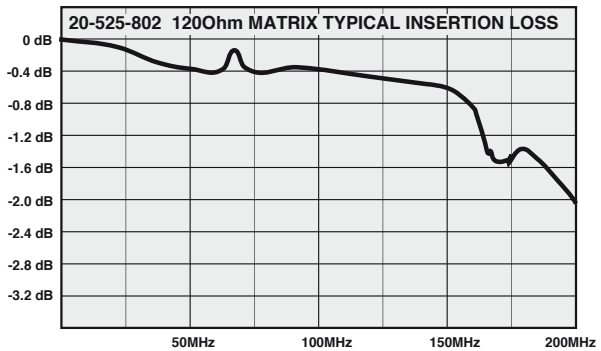


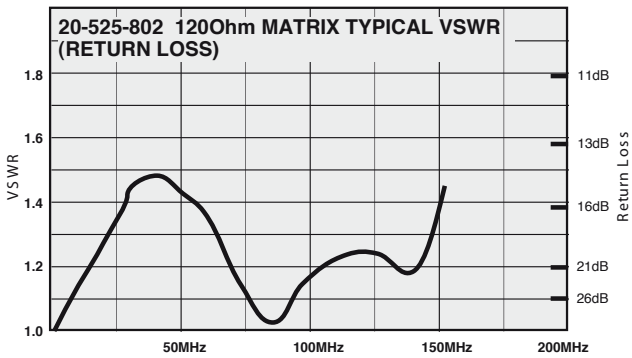
Typical RF Performance Plots for 50Ω, 75Ω and 120Ω Double Pole RF Matrix Modules

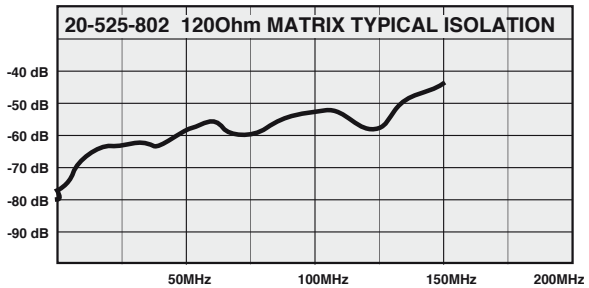
For optimum insertion loss and VSWR (reflection) performance ensure only one cross-point is set in any one row/column. For the 120Ω versions: Only one cross-point may be set in any one row/column (e.g. a maximum of 8 cross-points for a 20-525-802 module).

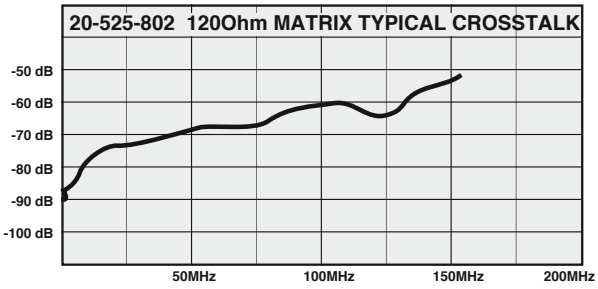
Performance curves for all versions of the double pole matrix modules have similar characteristics.







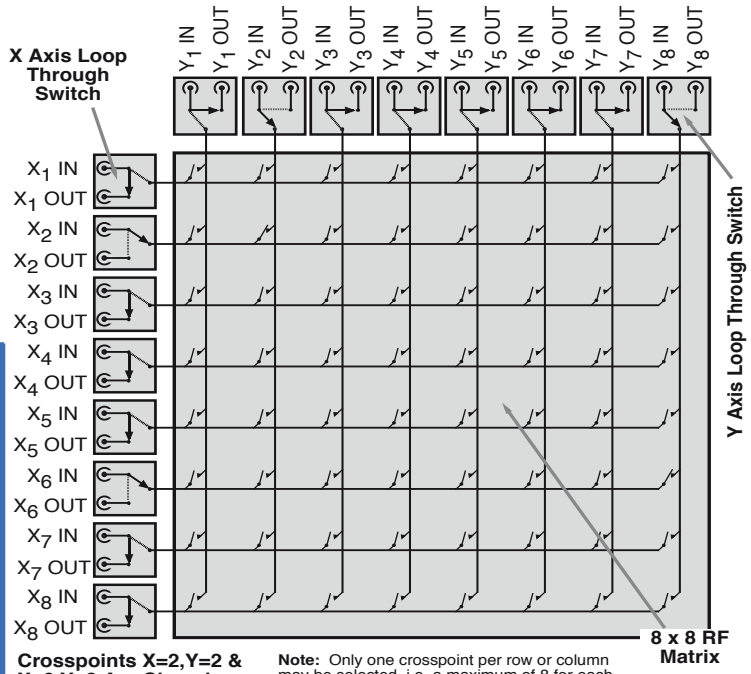




Loop Through Expansion

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.

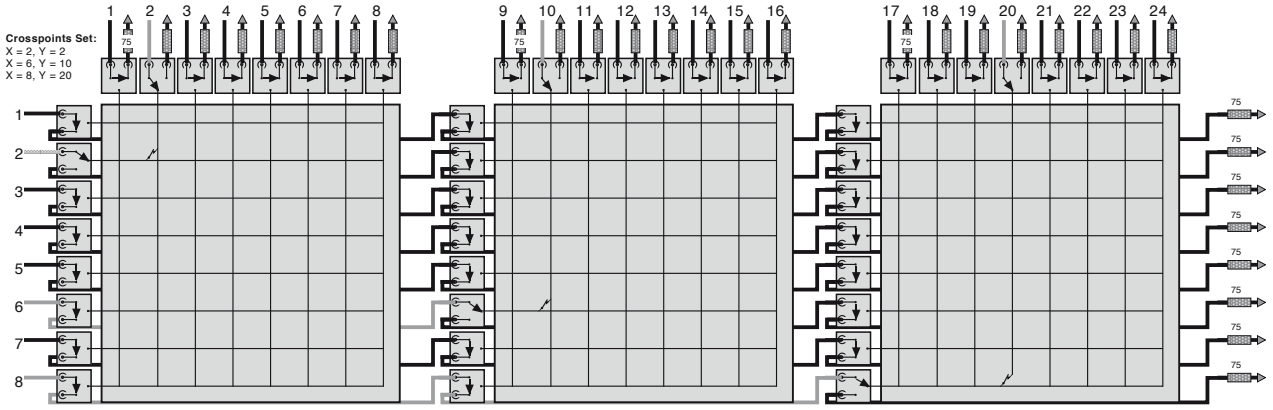
This option is similar to that provided for the 20-750 matrix module (8x4, 1000MHz), please refer to the 20-750 RF Matrix Application Datasheet or contact factory for further information.



Typical RF Matrix: 24x8

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.



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	50way Dtype	**20-520-802**
8x4 Matrix	1	50Ω	Co-Ax	**20-522-521**
	2	50Ω	Co-Ax	**20-522-522**
	2	50Ω	Tri-Ax	**20-522-622**
	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**
	2	50Ω	Tri-Ax	**20-525-622**
	1	75Ω	Co-Ax	**20-525-721**
	2	75Ω	Co-Ax	**20-525-722**
	2	120Ω	50way Dtype	**20-525-802**

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

Other reed switch types are available (e.g. Mercury Wetted), please contact factory to discuss your application.
Other connector styles may be available, please contact factory for further information.

Mating Connectors

50Ω Co-ax BNC to BNC Lead, 1m length	**10-980-510**
75Ω Co-ax BNC to BNC Lead, 1m length	**10-980-710**
50Ω Tri-ax BNC to BNC Lead, 1m length	**10-984-510**
50-way D-type socket with pins and shell	**10-960-050**

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

The 20-520 range of RF matrix modules is very extensive with many options, if you would like assistance with this data sheet please contact the sales office.

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