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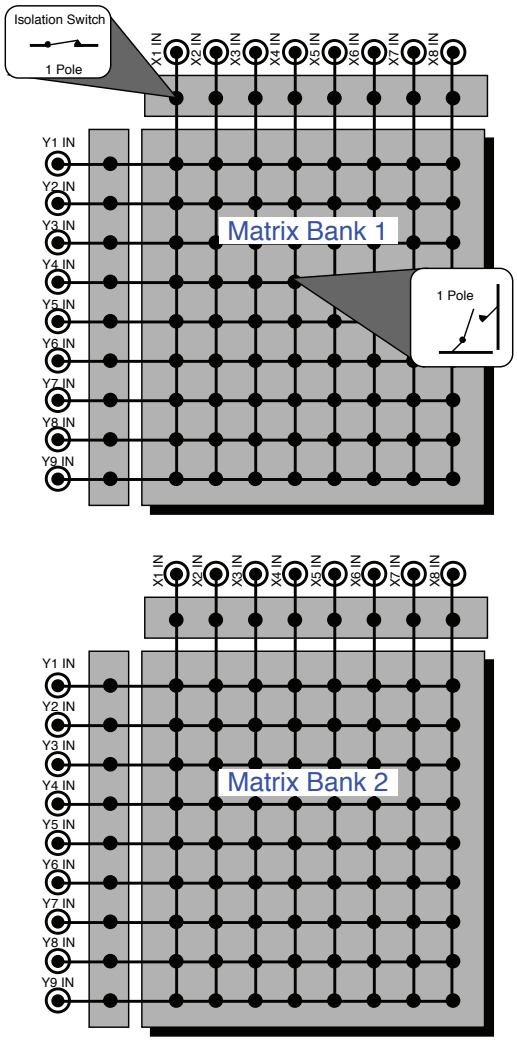
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Find the *Pickering 30-728-721* at our website: ***Click HERE***

30-728
Dual 8 x 9 RF Coaxial Matrix

- Dual 8 x 9 RF Coaxial Matrix
- 400MHz Bandwidth
- 50Ω or 75Ω Impedance
- C Sized VXI Message Based Module
- High Quality Ruthenium Reed Relays
- High Density Coaxial Connectors: SMB, BT Type 43, 1.0/2.3 and mini-SMB
- Built-In Fixtureless Relay Self Test with Fault Diagnosis to Component Level with Service Indicator
- SCPI Software Commands
- SCPI Control Via The Built-In RS-232 Interface Allows Easy Manual Control and Monitoring
- IVI & VXI Plug and Play Drivers





Dual 8 x 9 Coaxial Matrix Schematic Diagram

The 30-728 is a dual 8 x 9 RF Matrix Module suitable for switching frequencies to beyond 400MHz. The 30-728 is available in either 50Ω or 75Ω versions with a choice of coaxial connectors. It is intended for the easy construction of high performance bidirectional matrix switching systems.

Automatic Isolation Switches are located on all coaxial connectors (refer to drawing), these disconnect the matrix from the external test fixture. This maximises isolation and RF performance.

Built-in relay self-test gives maximum switching confidence with early failure warning.

A special version, 30-728-721, retains a loop thru function on Y9 (see next page).

Software Support

The SCPI command set is fully implemented and the 30-728 is supplied with IVI & VXI plug and play drivers (available direct from our web site, www.pickeringswitch.com).

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Self Test

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. To assist in the early detection of failed relays, all switch contacts are automatically checked against an internal calibrated standard (one for each of the 144 switch paths), as soon as the switch contact starts to deteriorate (but before failure) a service LED indicator will be activated.

Matrix Operation

The 30-728 is a true Dual 8 x 9 high density matrix, any combination of crosspoints may be selected. Only the signal is switched, all grounds are common.

Special Version With Loop Thru on Y9

A version is available which is backwards compatible with the 30-728-721 and MAX 20 (Mobus card). This is a 75Ω matrix, but uses 50Ω SMB coaxial connectors. Also a loop thru is retained on Y9 (used for external self test).

Reed Relay Type

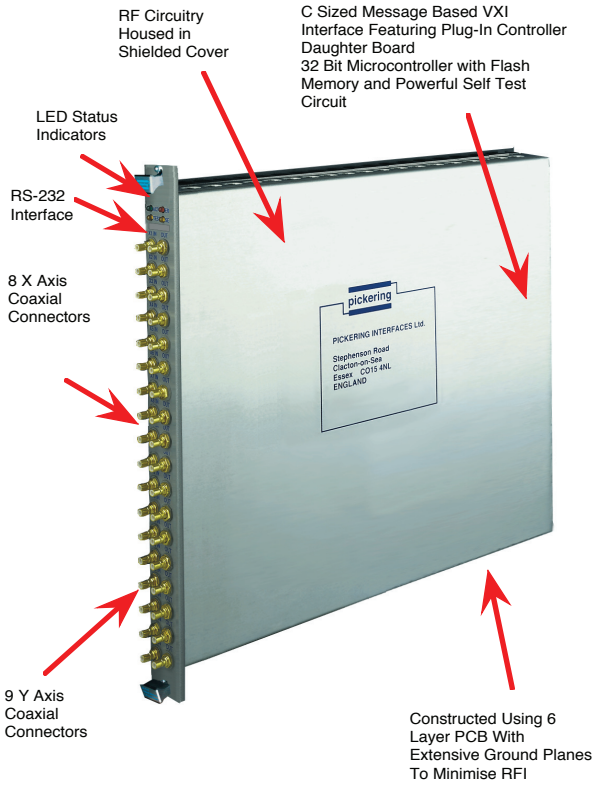
The 30-728 matrix uses Ruthenium Electro-Plated Reed Relays, these offer very stable switch contact resistance with expected life of $>10^8$ operations when switching typical RF signals.

Width, Dimensions and Weight

The 30-728 is housed in a C Sized VXI module and occupies 1 slot (30mm). Weight is < 1500g.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.



General Switching Specification

Maximum Voltage:	100V DC
Maximum Power:	10W
Maximum Switch Current:	0.5A
Maximum Carry Current:	1.2A
Characteristic Impedance:	50Ω or 75Ω
On Path Resistance:	<500mΩ
Off Path Resistance:	$>10^8$Ω
Differential Thermal Offset:	<30µV
Expected Life (low power):	$>1x10^8$ ops.
Expected Life (max power):	$>5x10^6$ ops.
Switching Time (1 crosspoint)	<3.5ms
Switching Time (data block)	<5.0ms
Switching Time (*RCL)	<3.0ms
(Measured on controller with 66MHz 486/DX2)	

RF Specification

Maximum Frequency:	400MHz
Typical Rise Time:	800ps †
Insertion Loss (<400MHz):	<3dB †
VSWR (<400MHz):	<1:1.8 †
Isolation (<400MHz):	>70dB
Crosstalk (<400MHz):	>60dB

Loop Thru RF Specification (1 Pole)

Insertion Loss (<100MHz):	<1dB
VSWR (<100MHz):	<1:1.05

† Matrix RF Performance is entirely dependant upon the combination of crosspoints currently selected, these figures are for **one** selected crosspoint on any X or Y channel only, refer to graphs opposite.

Power Supply Specification

5V DC	<0.5A
12V DC	<0.7A (<12 crosspoints selected)
Total Power:	<11W (<12 crosspoints selected)
Power Up Delay:	<15s (required for self-test)

Environmental Specification

Operating Temperature:	0° to 45°C
Storage Temperature:	-20° to +75°C
Humidity:	95% Non Condensing
Cooling Requirements:	Forced ventilation advised

VXI Module Construction

The module is constructed in accordance with the VXI specification, revision 1.4.

The 30-728 has a standard IEEE-488.2 message based VXI interface and is constructed using a 6 layer PCB with very extensive RFI shielding. The microcontroller and VXI interface are contained on a small “piggyback” daughter PCB. Most components are surface mount types, however to simplify maintenance all relays are leaded.

Microcontroller Based Design

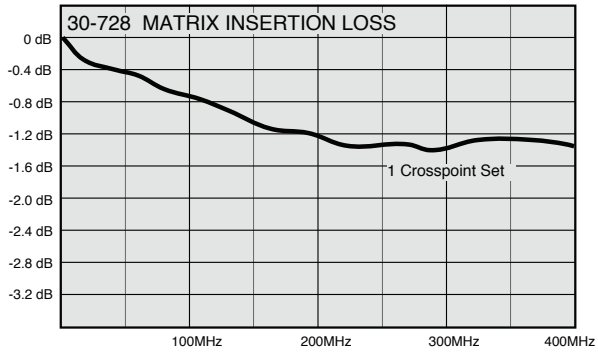
The 30-728 matrix has a built in 32-bit microcontroller, Motorola 68332. The operation of this module is controlled entirely by this microcontroller.

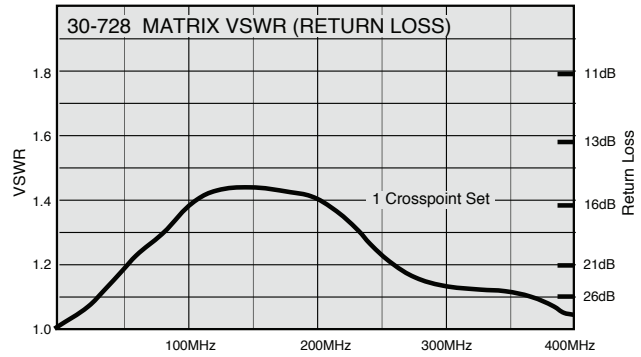
The flash memory based microcontroller allows modifications to the matrix instruction set or self test operation to be implemented by simply downloading new firmware from disc or from the Pickering Internet Web site. Parametric data is also stored in nonvolatile flash memory.

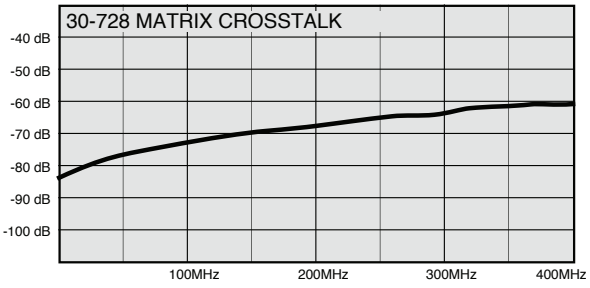
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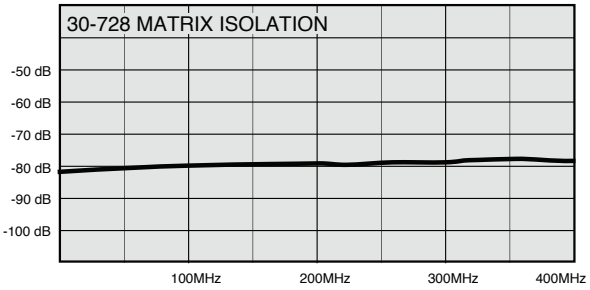
RF Performance Plots for 30-728 75Ω 400MHz RF Matrix Module

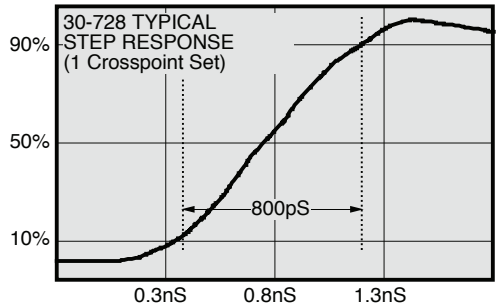
Typical curves are shown for matrix rows/columns with 1 crosspoint set. For optimum insertion loss and VSWR (reflection) performance ensure only one crosspoint is set in any one row/column. Multiple crosspoints can be set on any one row or column but this will seriously degrade RF performance.











Automatic Self Test

Self-Test is invoked at power on (taking around 4 seconds) and may also be operated under software command (from the VXI or RS-232 ports). Self-Test pass is indicated on a front panel LED with a full pass/fail description available using the DIAGnostic? command. Self-Test comprises 4 levels (shown in the flow chart below):-

1. **Power Supply, Logic and Temperature Test**
2. **Relay Coil Test**
3. **Full Contact Test**
4. **Contact Test For Relays Entering End Of Life**

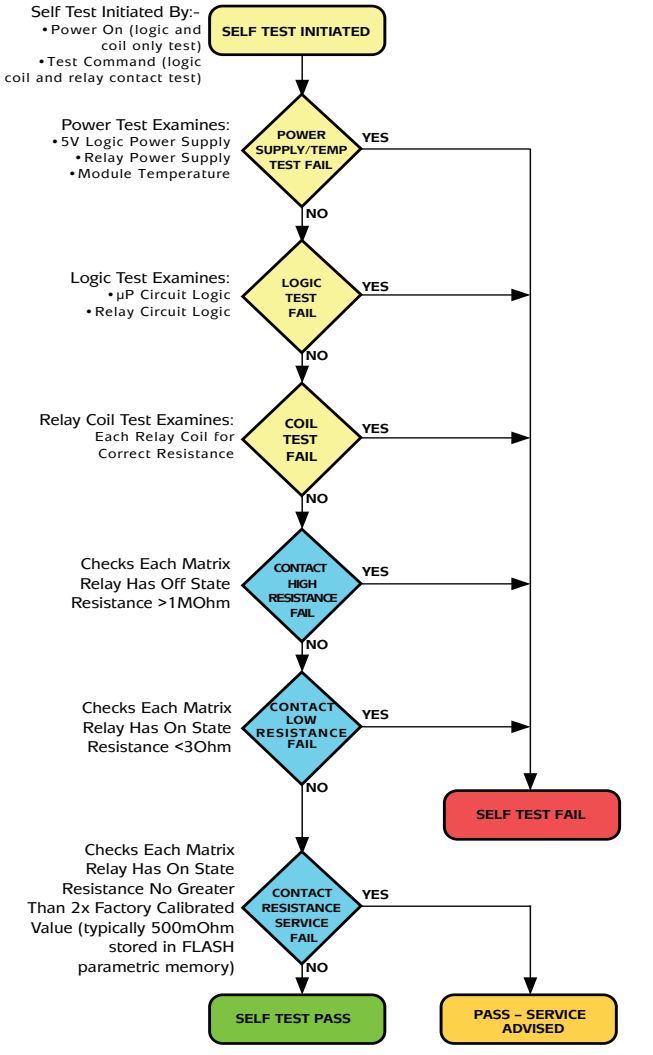
Power up self test includes just items 1 and 2. Full self test (run from software command) includes items 1,2 ,3 and 4.

Self test is undertaken *without* removing test fixtures, built in isolation switches first disconnect the core matrix from the external fixture before the test commences (to maximise reliability these isolation switches always “cold switch”).

All relay service and fail test thresholds are re-programmable also complete relay self test data together with detailed diagnostics may be dumped via the RS-232 port.

Built-In Spare Relays

Spare relays are mounted within the module, so should self test indicate a suspect relay then repair will only take a few minutes, thus keeping downtime to an absolute minimum.



All test levels for coil resistance, contact resistance, power supplies, etc., are programmable.

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LED Indicators

There are six indicators:-

POW Power indicator. Colour Green.

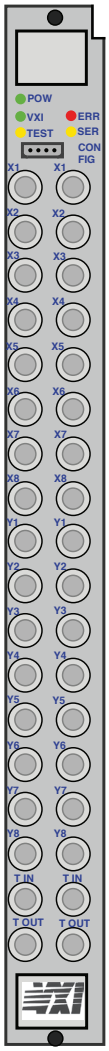
VXI Indicates if module has VXI interface. Colour Green.

ACT Matrix active indicator, set if any crosspoint is selected. Colour Green.

ERR Error found during self test. Colour Red.

TEST Self Test running indicator. Colour Yellow.

WARN Module requires maintenance. A relay has been diagnosed as entering failure conditions. Colour Yellow.



DIP Switches

The 30-728 has a DIP switch, SW1 for VXI addressing.

The built in RS-232 port is used for additional configurations and self test options.

Using The 30-728-721 (75Ω Matrix) in 50Ω Systems

The 30-728-721 matrix may also be used in 50Ω systems (it is fitted with 50Ω SMB connectors) but the RF performance is lower. However for many applications, especially below 1MHz, this will not reduce measurement accuracy.

IVI & VXI Plug and Play

All Pickering Interfaces VXI modules are IVI & VXI Plug and Play compliant. Latest drivers are at:
www.pickeringswitch.com

Programming

The 30-728 Matrix module is very easy to program. All commands are in IEEE-488.2 format, the main examples are shown below (a separate Programming Manual will be available):-

Device Specific Commands

:SERVice? :TYPE?

488.2 Common Commands

*CLS	*ESE <INT_P>	*ESE?
*ESR?	*IDN?	*OPC
*OPC?	*RCL r	*RST
*SRE <INT_P>	*SRE?	*SAV r
*STB?	*TST?	*WAI

SCPI Commands

```
:STATus
   :OPERation
      [:EVENt]?
         :CONDition?
         :ENABle  <INT_P>
         :ENABle?
   :QUEStionable
      [:EVENt]?
         :CONDition?
         :ENABle  <INT_P>
         :ENABle?
   :PRESet
:SYSTem
   :ERRor[:NEXT]?
   :VERSion?
   :CAPability?
:[ROUTe]
   :CLOSe <channel_list>
      :STATe?
   :OPEN <channel_list>
      :ALL
:DIAGnostic?
```

Notes

SCPI version conformance is 1996.0. Nodes in [] are optional.

Parameter types

<INT_P>:: <Rounded NRf>

<INT_VAL>:: <Rounded NRf> | MIN | MAX | DEF

<NRf>:: IEEE 488.2 'flexible' syntax for NR1,NR2, & NR3

<Rounded NRf>:: Number will be rounded to an integer if parameter requires integer

<channel_list>:: IEEE488.2 channel list

VXI Programming Examples

`TYPE?`	Description of matrix.
`CLOS (@1(2!3))`	Close bank 1 crosspoint y=2,x=3.
`CLOS (@1(1!2,3!4))`	Close bank 1 crosspoints y=1,x=2 & y=3,x=4.
`CLOS (@2(5!7:6!8))`	Close range of crosspoints, bank 2: y=5,x=7, y=5,x=8, y=6,x=7, y=6,x=8.
`OPEN (@1(2!3))`	Open bank 1 crosspoint y=2,x=3.
`OPEN:ALL`	Open all crosspoints.

RS-232 Programming Commands

The 30-728 also has a built in RS-232 port (9600/19200 /57600 baud, XON/XOFF, 8 bit, no parity). This is provided on a 4 pin Molex type connector. A separate adapter lead to allow use with a standard 9 pin D-type is available.

The RS-232 port allows the matrix to be controlled and monitored from any RS-232 terminal. This can be used as a very versatile debugging aid.

The RS-232 port supports full SCPI operation. Therefore the RS-232 port can be used for familiarization and debugging of your VXI program code.

Product Order Codes

VXI Dual 8 x 9 400MHz Coaxial Matrix with Built In Relay Self Test	
50Ω SMB	**30-728-511**
75Ω BT Type 43/SMZ	**30-728-711**
75Ω 1.0/2.3	**30-728-741**
75Ω Mini SMB	**30-728-751**
Special version of the 75Ω Coaxial Matrix, 400MHz Bandwidth with Loop Thru on Y9 position. 75Ω Impedance (but using 50Ω SMB connectors)	**30-728-721**
Further options are available including alternative RF connectors.	
PC Adapter for RS-232 port (2m, 9 way D)	**30-952-020**

Further options are available including alternative RF connectors.

30-728 cards are supplied with a detailed datasheet and CD ROM containing datasheets for all Pickering Switching products, company information and software drivers.

Mating Connectors & Cabling

50Ω SMB to SMB Lead, 1m length	**10-987-510**
75Ω SMB to SMB Lead, 1m length	**10-987-710**
75Ω 1.0/2.3 to 1.0/2.3 Lead, 1m length	**40-977-731**
75Ω Type 43 to Type 43 Lead, 0.5m length	**10-988-705**
Other lead lengths are available, please contact sales office	

Latest Details

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

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

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