- **World's Highest Density Single-Slot 3U PXI Reed Relay Matrix Module With 528 Crosspoints**
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Minimize Cost Using Partially Populated Configurations - Available for All Models
- Switch up to 150 Volts, 0.5A with 10W Max Power
- Fast Operating Speed <300μs
- VISA, IVI & Kernel Drivers Supplied for Windows
- Ease of Maintenance & Repair Through the Use of Leaded Relays
- Supported by PXI or LXI Chassis
- Supported by *eBIRST ™*
- 3 Year Warranty

The world's highest density single slot PXI reed relay matrix module, the 40-540/541/542, is available as a 132x4, 66x8 or 33x16 reed relay matrix with 1-pole switching.

Typical applications include signal routing in Functional ATE and data acquisition systems. These matrices are constructed using high reliability sputtered ruthenium reed relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by daisy chaining the common signals from multiple PXI modules. However, for applications that require a very large matrix, Pickering's BRIC™ modules are best suited.

Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Supported by *eBIRST*

eBIRST switching system test tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

40-540-021   132 x 4 Matrix

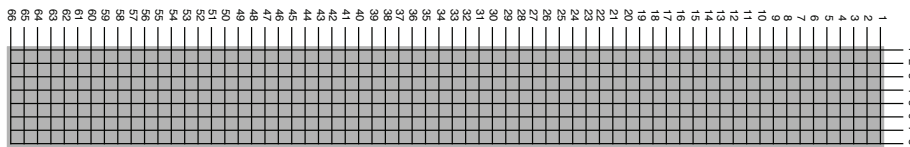40-541-021   66 x 8 Matrix

40-542-021   33 x 16 Matrix
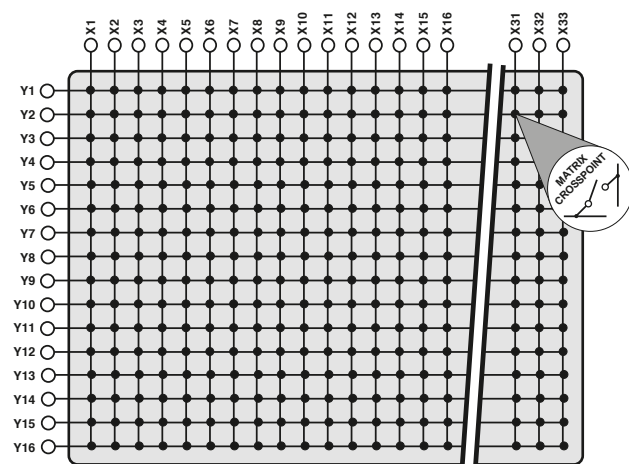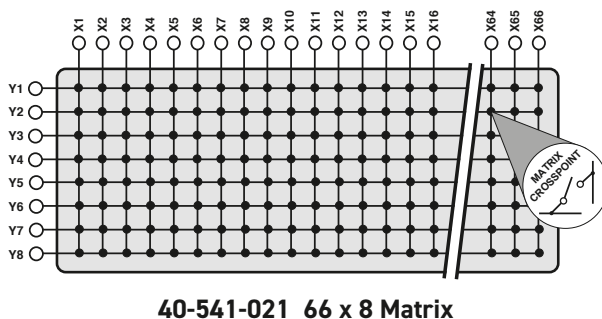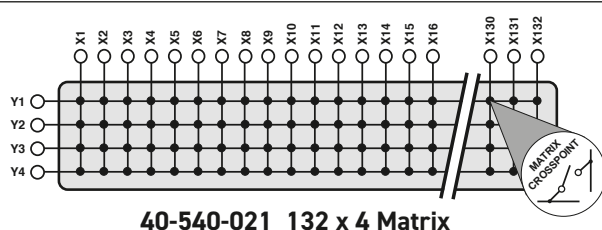
The 40-540, 40-541 and 40-542 may be ordered partially populated to a specific matrix configuration (if volumes dictate), the diagrams show some example configurations.

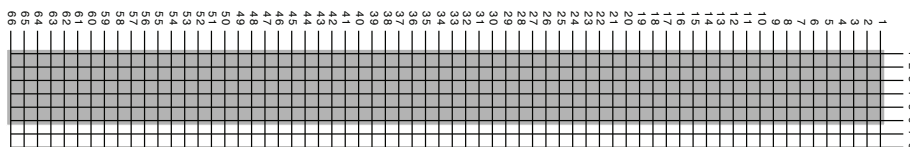**The illustrations right show:**
- A 40-540 fully populated 132x4 matrix.
- A 40-540 partially populated 132x2 matrix.
- A 40-540 partially populated 100x4 matrix.
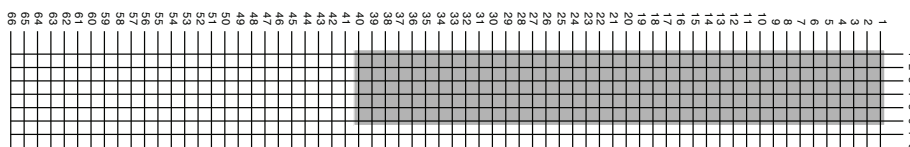
The illustrations below show:
- A 40-541 fully populated 66x8 matrix.
- A 40-541 partially populated 66x6 matrix.
- A 40-541 partially populated 40x6 matrix.
- A 40-542 fully populated 33x16 matrix.
- A 40-542 partially populated 25x16 matrix.
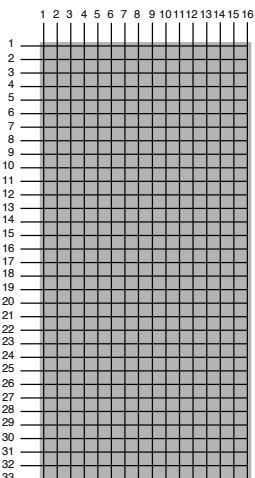- A 40-542 partially populated 33x12 matrix.
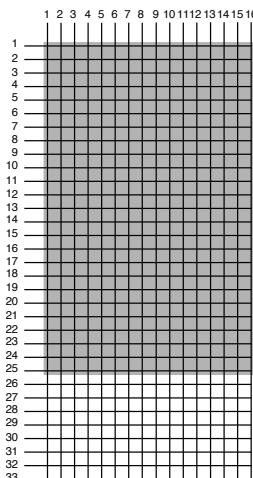

40-541 Fully Populated 66 x 8 Matrix
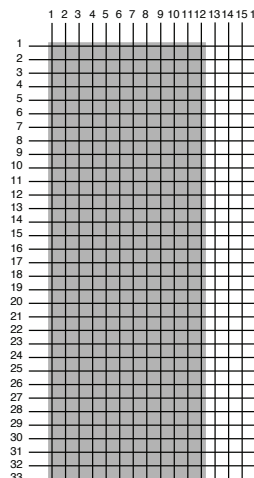
40-541 Partially Populated 66 x 6 Matrix

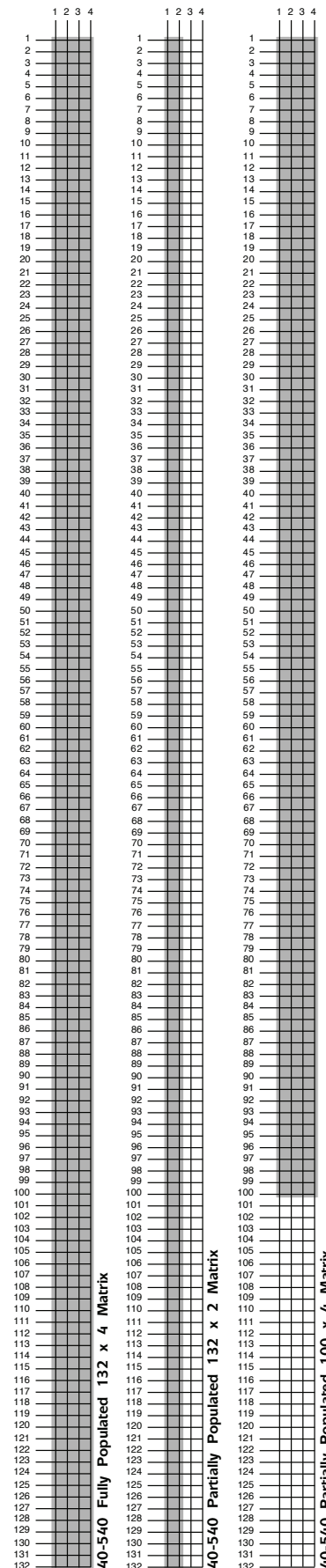**40-541 Partially Populated 40 x 6 Matrix**

40-542 Fully Populated 33 x 16 Matrix

40-542 Partially Populated 25 x 16 Matrix

40-542 Partially Populated 33 x 12 Matrix

40-540 Fully Populated 132 x 4 Matrix

40-540 Partially Populated 132 x 2 Matrix

40-540 Partially Populated 100 x 4 Matrix

Advantages Over Competing PXI High Density Matrix Solutions		
	40-540/541/542 Matrix	**Competing PXI High Density Matrix**
World's Highest Density 3U 1-Slot PXI Matrix	Yes	No
Reed relay type	Instrumentation Quality Sputtered Ruthenium Reed Relays.	Lower Cost Rhodium Reed Relays.
Simple relay replacement	Easy to replace Pickering leaded reed relays.	"Challenging" to replace surface mount reed relays.
Matrix orderable in lower capacity versions	Yes - Just specify X and Y limits. You pay for just what you need.	No - You pay full price every time whatever your needs.
Upgrade matrix at any time	Yes - Fast turnaround factory upgrade.	No
Terminal block required	No - Just use standard commercial connectors.	Required to configure matrix and offer strain relief.
Robust direct connection to PXI matrix front panel	Yes	Terminal block usually required.
Maximum number of simultaneously operated relays	100	40
Spare relays conveniently located within PXI module	Yes	No
Relay count tracking	No - Because Pickering provide a Full Matrix Diagnostic Tool - eBIRST.	Yes - But this method is unreliable†
Diagnostic Tool available	Yes	No
Switch 150 Volts DC	Yes	No
Predictable Bandwidth	Yes	No - Significantly reduced where an external terminal block is required for configuration
Wide selection of screened cable assemblies	Yes	No
Fully LXI Compliant	Yes (using 60-102B/103B Chassis)	No

† Counting relay operations as a way of anticipating failure may prove very misleading, since it takes no account of the relay load (over 95% of reed relay failures are due to excessive loads). Expected life for a reed relay will vary by a factor of up to 1000, dependant upon load type (ranging from $>10^9$ operations for low power loads to $>1 \times 10^6$ operations for high power loads).

Relay Type

The 40-540/541/542 modules are fitted with ruthenium sputtered reed relays, these offer very long life with good low level switching performance and excellent contact resistance stability. Spare reed relays are built onto the circuit board to allow easy maintenance with minimum downtime.

Switching Specification

| Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC*
Max Power:	10W
Max Switch Current:	0.5A
Max Carry Current:	0.5A
Initial Path Resistance On (Single Module): Off (Single Module):	$<1\Omega$ $>10^9\Omega$
Operate Time:	$<300\mu s$
Release Time:	$<300\mu s$
Maximum number of simultaneously operated relays:	135 (40-540) 100 (40-541/542)
Expected Life, low power load:	$>10^9$ operations
Expected Life, full power load:	$>1\times10^6$ operations

* For full voltage rating, signal sources to be switched must be fully isolated from mains supply and safety earth.

RF Specification - In a 50Ω System

Bandwidth (-3dB):	15MHz	(40-540-021)
	20MHz	(40-541-021)
	25MHz	(40-542-021)
Crosstalk (typical):	10kHz:	-90dB
	100kHz:	-75dB
	1MHz	-55dB
	10MHz	-35dB
Isolation (typical):	10kHz:	90dB
	100kHz:	85dB
	1MHz	70dB
	10MHz	60dB

Power Requirements

+3.3V	+5V	+12V	-12V
0	800mA (typ 280mA)	0	0
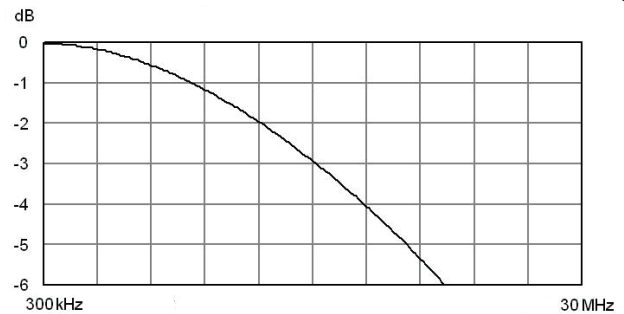
40-540-021 Insertion Loss Plot (typical worst case)

40-541-021 Insertion Loss Plot (typical worst case)

40-542-021 Insertion Loss Plot (typical worst case)

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 400g (40-542-021).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel connectors:
- 132x4 Matrix (40-540-021): 200-pin female LFH
- 66x8 Matrix (40-541-021): 96-pin male micro-D
- 33x16 Matrix (40-542-021): 68-pin male micro-D

For pin outs please refer to the operating manual.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses a 33MHz 32-bit backplane interface.

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.

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics.

Sputtered Ruthenium Reed Relays offer maximum performance, they are hermetically sealed and offer a very stable, long life relay contact (typically 10^9 operations with very fast operate time. Alternative types such as electro-mechanical armature relays or non-instrumentation grade reed relays are lower cost but do not offer the consistent contact resistance, long life, fast switching speed and low level switching capability of a reed relay.

All of the reed relays used in our matrix switching modules are manufactured by Pickering Electronics, these offer maximum switching performance.
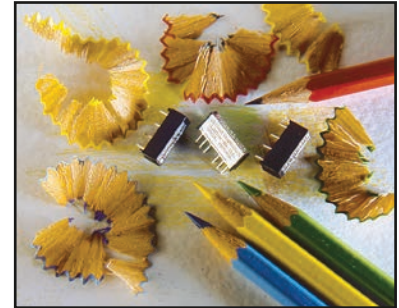
PICKERING INTERFACES BRIC™ MATRIX MODULES

For applications that require a very large number of matrix crosspoints, Pickering's range of versatile BRIC modules should be considered.

The BRIC4 is a 4-slot PXI module available with over 2200 crosspoints, the BRIC8 is an 8-slot PXI module available with over 4400 crosspoints. Single pole, double pole or screened relay options are available and matrix Y dimensions of 4, 8, 16 or 32 can be specified. For more information, please refer to the 40-560A BRIC data sheet available

Servicing the competitor's high density matrix requires the use of expensive SMT rework equipment. Pickering's Matrix requires simple hand tools.
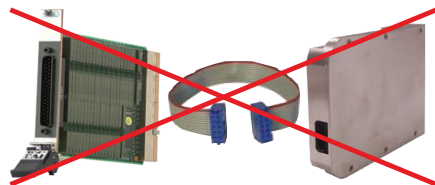
To upgrade the competitor's solution, extra PXI cards are needed as well as terminal blocks and cables. With Pickering's BRIC, extra daughter cards are simply added.

Product Order Codes

Ultra High Density PXI Matrix Modules:

Single 132x4 Matrix, 1 Pole	40-540-021
Single 66x8 Matrix, 1 Pole	40-541-021
Single 33x16 Matrix, 1 Pole	40-542-021

Partially Populated Versions:

These are available by specifying the X and Y size in the product code, for example:

40-540-021-100x4 (100x4 1-pole matrix).

Product Customization

Pickering PXI 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 reed relay types
- Mixture of reed 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.

Support Products

eBIRST Switching System Test Tool

This product is supported by the *eBIRST* test tools which simplify the identification of failed relays, the required *eBIRST* tools are below.

Product	Test Tool	Adaptor	Termination
40-540	93-002-001	Not Reqd	Not Reqd
40-541	93-002-001	93-002-226	93-016-103
40-542	93-002-001	93-006-401	Not Reqd

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-540/541/542	**91-100-009 & 91-100-010**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-540/541/542 modules please refer to the 90-002D 200-pin LFH, 90-016D 96-pin micro-D and 90-015D 68-pin micro-D Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Chassis Compatibility

This PXI module must be used in a suitable chassis. It is compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis

Chassis Selection Guide

Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
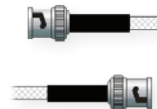- Independence from Windows operating system

Connectivity Solutions

We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules.
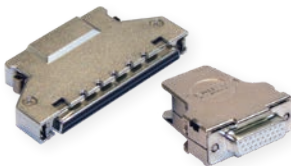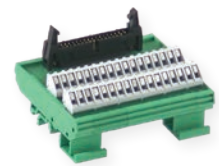
Connectors & Backshells   **Multiway Cable Assemblies**   **RF Cable Assemblies**   **Connector Blocks**

We also offer customized cabling and have a free online Cable Design Tool that can be used to create custom cable solutions for many applications.
Visit: pickeringtest.com/cdt to start your design.

Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both Virginia Panel and MacPanel.

Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our sister company, Pickering Electronics. These instrument grade reed relays feature *SoftCenter*® technology, ensuring long service life and repeatable contact performance

To learn more, please go to: pickeringrelay.com

pickering   Pickering Interfaces

Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: pickeringtest.com/os

The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Keysight** VEE
- **Mathworks** Matlab
- **Marvin** ATEasy
- **MTQ Testsolutions** Tecap Test & Measurement Suite

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.

We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.

To learn more about software drivers and development environments, please go to: pickeringtest.com/software

Signal Routing Software

Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development.

To learn more, please go to: pickeringtest.com/spm

Diagnostic Relay Test Tools

eBIRST Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

To learn more, please go to: pickeringtest.com/ebirst

Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years. To learn more, please go to: pickeringtest.com/support

Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles, as well as complete product catalogs and product reference maps to assist when looking for the switching, simulation and cable and connector solutions you need. We have also published handy reference books for the PXI and LXI standards.
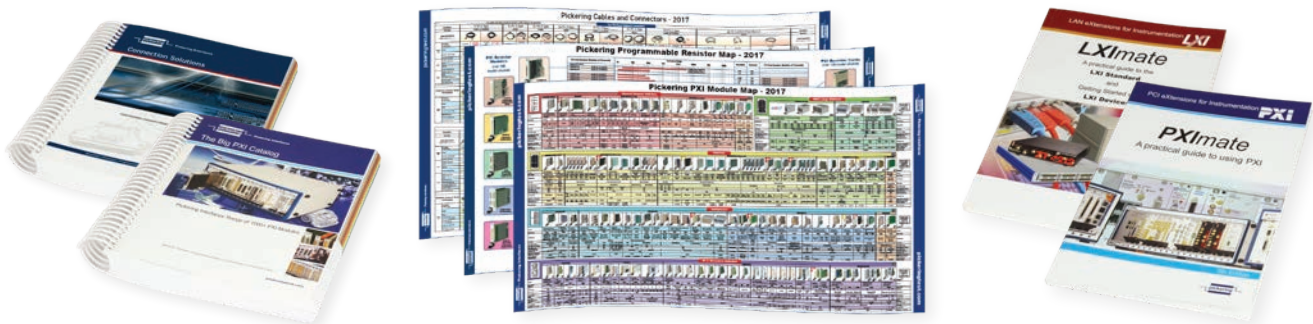
To view, download or request any of our product resources, please visit: pickeringtest.com/resources

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