- Single or Dual 6 Channel Panel Mounted Multiplexer
- Up To 3 Remote Multiplexers From Single Slot Version
- 50 Ω Versions With 3-50 GHz Bandwidth
- 50 Ω Terminated and Unterminated Versions
- 75 Ω Version With 2.5 GHz Bandwidth
- LED Indication
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-785B range of PXI microwave multiplexer modules are suitable for switching  $50\,\Omega$  signals up to  $50\,\text{GHz}$ . They are available in single or dual 6 channel configurations with relays mounted on the front panel. Remote versions are also available which can support up to three multiplexers in a single slot.

The remote multiplexer versions, as well as occupying less PXI panel space, allow the microwave relays to be placed closer to the UUT and RF test equipment. This can shorten the length of cables and improve system performance. Remote multiplexers are supplied with a 1.5m interface cable.

The panel mounted  $50\,\Omega$  terminated version occupies 4 slots for the single version or 6 slots for the dual version.

A 75  $\Omega$  version is available with a bandwidth of 2.5 GHz and uses Siemens 1.6/5.6 style connectors.

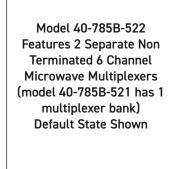
The 40-785B range is suitable for constructing complex microwave switching networks and includes switching configurations to suit most applications. Connection is by high performance SMA, SMA-2.9, SMA-2.4 or N-type connectors for  $50 \Omega$  versions.

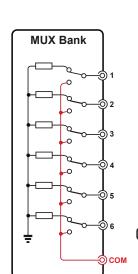
These modules give you the highest RF and microwave switching performance available within a Pickering switching system. Although designed for microwave applications, they have many uses in the RF spectrum where extremely low insertion loss and ultra high isolation are critical.

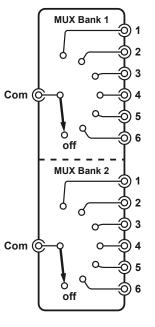


Single slot version controls 1, 2 or 3 remotely mounted microwave multiplexers via interface cables









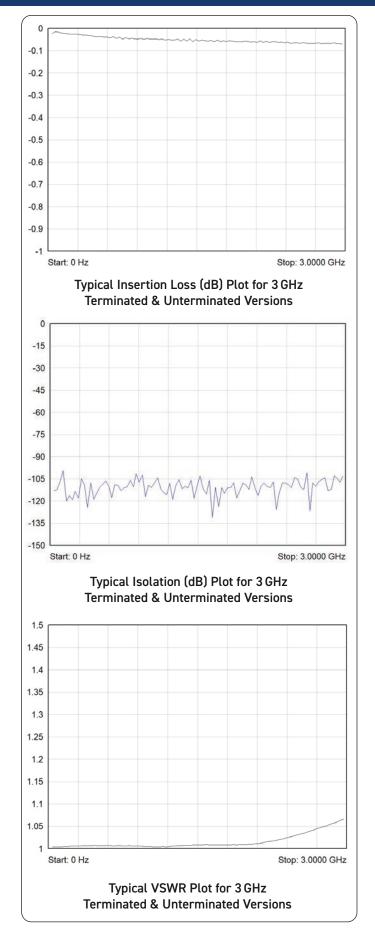
Model 40-785B-521-T Features a single Terminated 6 Channel Microwave Multiplexer (model 40-785B-522-T has 2 multiplexer banks) Default State Shown

# General Multiplexer Information

Relay Manufacturer:	Radiall
Configuration:	SP6T Microwave MUX with 1, 2 or 3 independent banks.
LED Indicators:	Multiplexers have blue LEDs to indicate a closed RF path.
Operate Time:	Typically 15ms
Maximum Cold Switch Voltage:	100 V
Maximum Carry Current:	1 A

# Specification - 3 GHz Versions

Characteristic Impedance:	50 Ω
Connectors:	N-type
Bandwidth	DC to 3 GHz
Isolation:	80 dB (0-3 GHz)
Insertion Loss:	0.2 dB (0-3 GHz)
VSWR:	1.2:1 (0-3 GHz)
Maximum RF Carry Power:	400 W (0-3 GHz)
Termination Power Rating:	1 W per termination, 3 W total per 6 channel multiplexer.
Expected Life (Low Power):	3 GHz option, >2 million operations
	3 GHz terminated option, >2 million operations



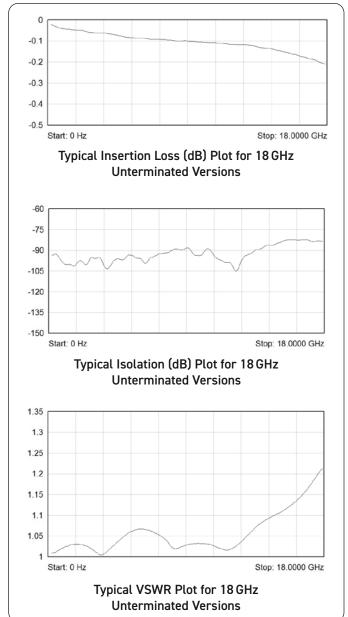
# Specification - 18 GHz Versions

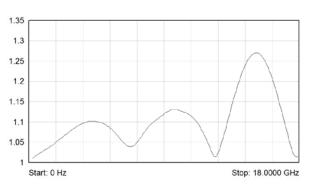
Characteristic Impedance:	50 Ω
Connectors:	SMA
Bandwidth	DC to 18 GHz
Isolation:	80 dB (0-3 GHz)
	70 dB (3-8 GHz)
	60 dB (8-12.4 GHz)
	60 dB (12.4-18 GHz)
Insertion Loss:	0.2 dB (0-3 GHz)
	0.3 dB (3-8 GHz)
	0.4 dB (8-12.4 GHz)
	0.5 dB (12.4-18 GHz)
VSWR:	1.2:1 (0-3 GHz)
	1.3:1 (3-8 GHz)
	1.4:1 (8-12.4 GHz)
	1.5:1 (12.4-18 GHz)
Maximum RF Carry Power:	240 W (0-3 GHz)
	150 W (3-8 GHz)
	120 W (8-12.4 GHz)
	100 W (12.4-18 GHz)
Termination Power Rating:	1 W per termination,
	3W total per 6 channel
	multiplexer.
Expected Life (Low Power):	18 GHz option
	>5 million operations
	18 GHz terminated option
	>2 million operations



0 -0.1 -0.2 -0.3 -0.4 -0.5 Start: 0 Hz Stop: 18.0000 GHz

Typical Insertion Loss (dB) Plot for 18 GHz
Terminated Versions



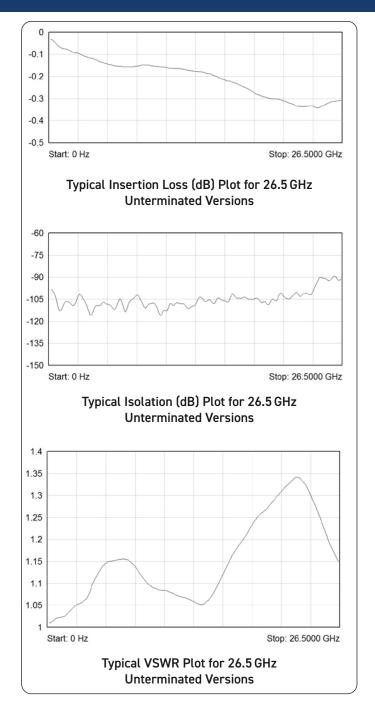


Typical VSWR Plot for 18 GHz Terminated Versions



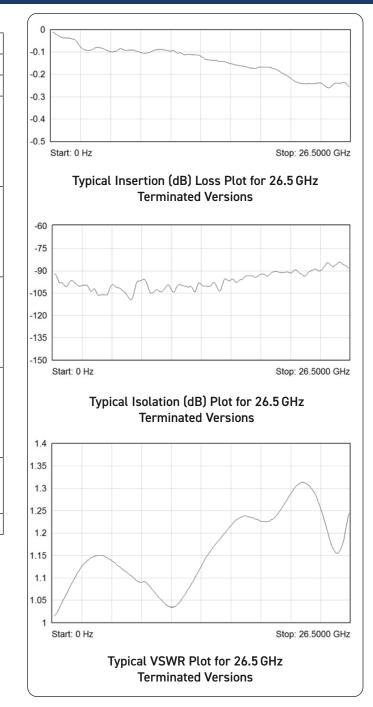
# Specification - 26.5 GHz Unterminated Versions

_ •	
Characteristic Impedance:	50 Ω
Connectors:	SMA
Bandwidth	DC to 26.5 GHz
Isolation:	80 dB (0-3 GHz)
	70 dB (3-8 GHz)
	60 dB (8-12.4 GHz)
	60 dB (12.4-18 GHz)
	50 dB (18-26.5 GHz)
Insertion Loss:	0.2 dB (0-3 GHz)
	0.3 dB (3-8 GHz)
	0.4 dB (8-12.4 GHz)
	0.5 dB (12.4-18 GHz)
	0.7 dB (18-26.5 GHz
VSWR:	1.2:1 (0-3 GHz)
	1.3:1 (3-8 GHz)
	1.4:1 (8-12.4 GHz)
	1.5:1 (12.4-18 GHz)
	1.7:1(18-26.5 GHz)
Maximum RF Carry Power:	240 W (0-3 GHz)
	150 W (3-8 GHz)
	120 W (8-12.4 GHz)
	100 W (12.4-18 GHz)
	40 W (18-26.5 GHz)
Expected Life (low power):	5 million ops per position



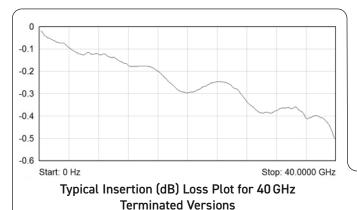
# Specification - 26.5 GHz Terminated Versions

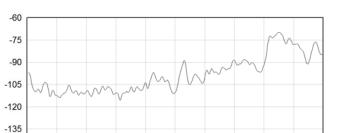
Characteristic Impedance:	50 Ω
Connectors:	SMA
Bandwidth	DC to 26.5 GHz
Isolation:	80 dB (0-3 GHz)
	70 dB (3-8 GHz)
	60 dB (8-12.4 GHz)
	60 dB (12.4-18 GHz)
	55 dB (18-26.5 GHz)
Insertion Loss:	0.2 dB (0-3 GHz)
	0.3 dB (3-8 GHz)
	0.4 dB (8-12.4 GHz)
	0.5 dB (12.4-18 GHz)
	0.7 dB (18-26.5 GHz
VSWR:	1.2:1 (0-3 GHz)
	1.3:1 (3-8 GHz)
	1.4:1 (8-12.4 GHz)
	1.5:1 (12.4-18 GHz)
	1.7:1(18-26.5 GHz)
Maximum RF Carry Power:	240 W (0-3 GHz)
	150 W (3-8 GHz)
	120 W (8-12.4 GHz)
	100 W (12.4-18 GHz)
	40 W (18-26.5 GHz)
Termination power rating:	1 W per termination,
	3W total per 6 channel
	multiplexer
Expected Life (low power):	>2 million ops per position



#### Specification - 40 GHz Versions

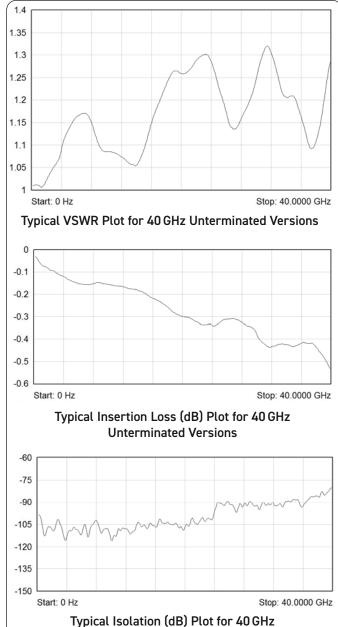
Characteristic Impedance:	50 Ω
Connectors:	SMA-2.9
Bandwidth	DC to 40 GHz
Isolation:	70 dB (0-6 GHz)
	60 dB (6-12.4 GHz)
	60 dB (12.4-18 GHz)
	55 dB (18-26.5 GHz)
	50 dB (26.5-40 GHz)
Insertion Loss:	0.2 dB (0-6 GHz)
	0.4 dB (6-12.4 GHz)
	0.5 dB (12.4-18 GHz)
	0.7 dB (18-26.5 GHz)
	1.1 dB (26.5-40 GHz)
VSWR:	1.3:1 (0-6 GHz)
	1.4:1 (6-12.4 GHz)
	1.5:1 (12.4-18 GHz)
	1.7:1(18-26.5 GHz)
	2.2:1 (26.5-40 GHz
Maximum RF Carry Power:	40 W (0-6 GHz)
	30 W (6-12.4 GHz)
	25 W (12.4-18 GHz)
	15 W (18-26.5 GHz)
	5 W (26.5-40 GHz)
Termination power rating:	1 W per termination,
	3W total per 6 channel mux
Expected Life (Low Power):	>2 million ops per position

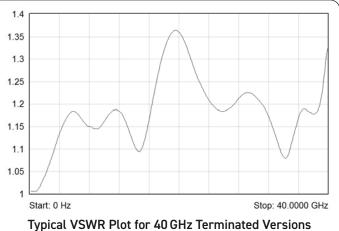




Typical Isolation (dB) Plot for 40 GHz Terminated Versions

Stop: 40.0000 GHz





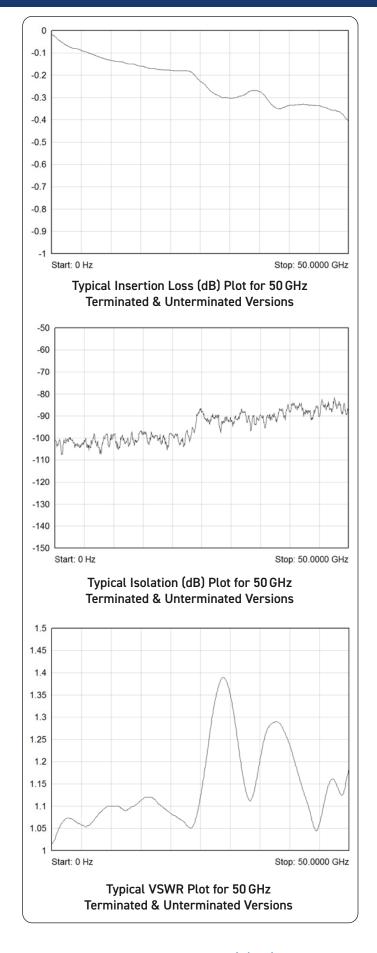
**Unterminated Versions** 



-150

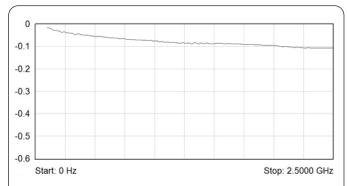
# Specification - 50 GHz Versions

Characteristic Impedance:	50 Ω
Connectors:	SMA-2.4
Bandwidth	DC to 50 GHz
Isolation:	70 dB (0-6 GHz) 60 dB (6-12.4 GHz) 60 dB (12.4-18 GHz) 55 dB (18-26.5 GHz) 50 dB (26.5-40 GHz) 50 dB (40-50 GHz)
Insertion Loss:	0.2 dB (0-6 GHz) 0.4 dB (6-12.4 GHz) 0.5 dB (12.4-18 GHz) 0.7 dB (18-26.5 GHz) 0.9 dB (26.5-40 GHz) 1.2 dB (40-50 GHz)
VSWR:	1.3:1 (0-6 GHz) 1.4:1 (6-12.4 GHz) 1.5:1 (12.4-18 GHz) 1.7:1(18-26.5 GHz) 1.9:1 (26.5-40 GHz) 2.2:1 (40-50 GHz)
Maximum RF Carry Power:	40 W (0-6 GHz) 30 W (6-12.4 GHz) 25 W (12.4-18 GHz) 15 W (18-26.5 GHz) 5 W (26.5-40 GHz) 3 W (40-50 GHz)
Termination power rating:	1 W per termination, 3 W total per 6 channel multiplexer
Expected Life (Low Power):	>2 million operations per position

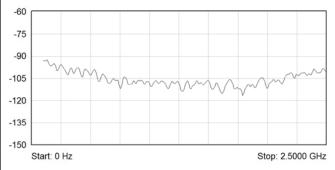


#### Specification - 2.5 GHz Unterminated Version

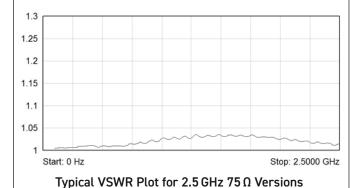
Characteristic Impedance:	75 Ω
Connectors:	1.6/5.6
Bandwidth	DC to 2.5 GHz
Isolation:	80 dB (0-1 GHz) 70 dB (1-2.5 GHz)
Insertion Loss:	0.2 dB (0-1 GHz) 0.3 dB (1-2.5 GHz)
VSWR:	1.2:1 (0-1 GHz) 1.3:1 (1-2.5 GHz)
Maximum RF Carry Power:	400 W (0-1 GHz) 240 W (1-2.5 GHz)
Expected Life (Low Power):	>2 million operations per position



# Typical Insertion Loss (dB) Plot for 2.5 GHz 75 $\Omega$ Versions



#### Typical Isolation (dB) Plot for 2.5 GHz 75 $\Omega$ Versions



#### **Power Requirements**

+3.3 V	+5 V	+12 V	-12 V
0	0.2 A	0.75 A	0

#### Mechanical Characteristics

Front panel mounted multiplexers:

- Single unterminated versions (except 3 GHz) 3 PXI slots
- · 3 GHz versions 4 PXI slots
- · Single terminated versions 4 PXI slots
- Dual unterminated versions 3 PXI slots
- Dual terminated versions 6 PXI slots

Remote mounted multiplexer versions occupy one slot and are supplied with a 1.5 m interface cable for each of the supplied microwave relays.

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 coaxial connectors on microwave switches:

- 3 GHz, 50 Ω versions N-type
- 18 GHz, 50 Ω versions SMA
- 26.5 GHz, 50 Ω versions SMA
- 40 GHz, 50 Ω versions SMA-2.9
- 50 GHz,  $50 \Omega$  versions SMA-2.4
- 2.5 GHz,  $75 \Omega$  versions Siemens  $1.6/5.675 \Omega$  connectors

# Operating/Storage Conditions

# **Operating Conditions**

Operating Temperature: 0 °C to +55 °C

Humidity: Up to 90% non-condensing

Altitude: 5000 m

#### Storage and Transport Conditions

Storage Temperature: -20 °C to +75 °C

Humidity: Up to 90% non-condensing

Altitude: 15000 m

#### PXI & CompactPCI Compliance

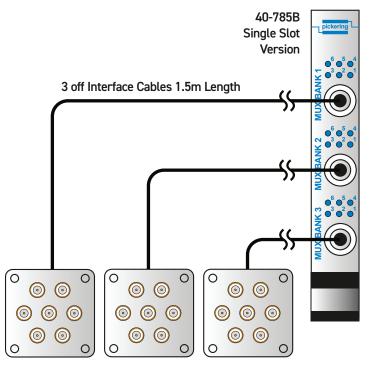
The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus & Star Trigger are not implemented. Uses a 33 MHz 32-bit backplane interface.

# 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.



# Remotely Mounted Microwave Multiplexer Versions



Remotely Mounted Microwave Multiplexers

Interconnection Between 40-785B Single Slot Version and Remotely Mounted Microwave Multiplexers



# Remote Mount Microwave Multiplexer (18-50 GHz) Range:

- · Upper left, terminated 18 GHz relay.
- Upper middle, unterminated (all frequencies) relay.
- Upper right, terminated 26.5 GHz, 40 GHz or 50 GHz relay.
- Lower left, terminated 18 GHz relay mounted to optional bracket.
- Lower middle, unterminated (all frequencies) relay mounted to optional bracket.
- Lower right, terminated 26.5 GHz, 40 GHz or 50 GHz relay mounted to optional bracket.

#### **Product Order Codes**

Product Order Codes	
18G Hz Multiplexer Versions - 50 Ω	
† Single 6 Chan, Panel mount, 50 Ω SMA	40-785B-521
† Dual 6 Chan, Panel mount, 50 Ω SMA	40-785B-522
Single 6 Chan, Panel mt, 50 Ω SMA, Term.	40-785B-521-T
Dual 6 Chan, Panel mt, $50 \Omega$ SMA, Term.	40-785B-522-T
Single 6 Chan, Remote mount, 50 Ω SMA	40-785B-521-E
Dual 6 Chan, Remote mount, $50 \Omega$ SMA	40-785B-522-E
Triple 6 Chan, Remote mount, 50 Ω SMA	40-785B-523-E
Single 6 Chan, Remote, 50 Ω SMA, Term.	40-785B-521-TE
Dual 6 Chan, Remote, 50 Ω SMA, Term.	40-785B-522-TE
Triple 6 Chan, Remote, 50 Ω SMA, Term.	40-785B-523-TE
26.5 GHz Multiplexer Versions - 50 Ω	40 703D 323 TE
‡ Single 6 Chan, Panel mount, 50 Ω SMA	40-785B-531
‡ Dual 6 Chan, Panel mount, 50 Ω SMA	40-785B-532
Single 6 Chan, Panel mt, 50 Ω SMA, Term.	40-785B-531-T
•	40-785B-531-T
Dual 6 Chan, Panel mt, 50 Ω SMA, Term.	
Single 6 Chan, Remote mount, 50 Ω SMA	40-785B-531-E
Dual 6 Chan, Remote mount, 50 Ω SMA	40-785B-532-E
Triple 6 Chan, Remote mount, 50 Ω SMA	40-785B-533-E
Single 6 Chan, Remote, 50 Ω SMA, Term.	40-785B-531-TE
Dual 6 Chan, Remote, 50 Ω SMA, Term.	40-785B-532-TE
Triple 6 Chan, Remote, 50 Ω SMA, Term.	40-785B-533-TE
40 GHz Multiplexer Versions - 50 Ω	
‡ Single 6 Chan, Panel mount, 50 Ω SMA-2.9	40-785B-541
‡ Dual 6 Chan, Panel mount, 50 Ω SMA-2.9	40-785B-542
Single 6 Chan, Panel mt, $50\Omega$ SMA-2.9, Term.	40-785B-541-T
Dual 6 Chan, Panel mt, 50 Ω SMA-2.9, Term.	40-785B-542-T
Single 6 Chan, Remote mount, 50 Ω SMA-2.9	40-785B-541-E
Dual 6 Chan, Remote mount, 50 Ω SMA-2.9	40-785B-542-E
Triple 6 Chan, Remote mount, 50 Ω SMA-2.9	40-785B-543-E
Single 6 Chan, Remote, 50Ω SMA-2.9, Term.	40-785B-541-TE
Dual 6 Chan, Remote, 50 Ω SMA-2.9, Term.	40-785B-542-TE
Triple 6 Chan, Remote, 50 Ω SMA-2.9, Term.	40-785B-543-TE
50 GHz Multiplexer Versions - 50 Ω	
Single 6 Chan, Panel mount, 50 Ω SMA-2.4	40-785B-551
Dual 6 Chan, Panel mount, 50 Ω SMA-2.4	40-785B-552
Single 6 Chan, Panel mt, 50 Ω SMA-2.4, Term.	
Dual 6 Chan, Panel mt, $50 \Omega$ SMA-2.4, Term.	40-785B-552-T
Single 6 Chan, Remote mount, 50 Ω SMA-2.4	40-785B-551-E
Dual 6 Chan, Remote mount, 50 Ω SMA-2.4	40-785B-552-E
Triple 6 Chan, Remote mount, 50 Ω SMA-2.4	40-785B-553-E
Single 6 Chan, Remote, 50 Ω SMA-2.4, Term.	40-785B-551-TE
Dual 6 Chan, Remote, 50 Ω SMA-2.4, Term.	40-785B-552-TE
Triple 6 Chan, Remote, 50 Ω SMA-2.4, Term.	40-785B-553-TE
	40-703D-333-1L
2.5 GHz Multiplexer Versions - 75 Ω	/O 70ED 7E1
Single 6 Chan, Panel mount, 75 Ω 1.6/5.6	40-785B-751
Dual 6 Chan, Panel mount, 75 Ω 1.6/5.6	40-785B-752
Single 6 Chan, Remote mount, $75 \Omega$ 1.6/5.6	40-785B-751-E
Dual 6 Chan, Remote mount, 75 Ω 1.6/5.6	40-785B-752-E
Triple 6 Chan, Remote mount, 75 Ω 1.6/5.6	40-785B-753-E
3 GHz Multiplexer Versions - 50 Ω	/A = A = A = A = A = A = A = A = A = A =
Single 6 Chan, Panel mount, 50 Ω N-type	40-785B-561
Single 6 Chan, Panel mt, 50 Ω N-type, Term.	40-785B-561-T
Single 6 Chan, Remote mount, 50 Ω N-type	40-785B-561-E
Dual 6 Chan, Remote mount, $50\Omega$ N-type	40-785B-562-E
Triple 6 Chan, Remote mount, 50 Ω N-type	40-785B-563-E
Single 6 Chan, Remote, 50 Ω N-type, Term.	40-785B-561-TE
Dual 6 Chan, Remote, 50 Ω N-type, Term.	40-785B-562-TE
Triple 6 Chan, Remote, 50 Ω N-type, Term.	40-785B-563-TE
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Accessories		
Microwave relay bracket for remote mounting:		
Bracket for 40-785B-52x-E, 40-785B-53x-E,		
40-785B-54x-E or 40-785B-55x-E	40-785A-521-E-MB	
Bracket for 40-785B-52x-TE,		
40-785B-53x-TE, 40-785B-54x-TE or		
40-785B-55x-TE	40-785A-531-TE-MB	
Bracket for 40-785B-56x-E or		
40-785B-56x-TE	40-785A-561-TE-MB	
·		

**Note:** A single relay is mounted to each bracket, see user manual for details. To mount more than one relay, order multiples of the required part number.

- † These models have equivalents in the 40-784A range that occupy only two PXI slots.
- **‡** These models have been superceded with more competitive options from model 40-784A, however remain available for legacy requirements.

# Legacy Relay Support

In January 2022 the SP6T terminated 18GHz relay was replaced by the manufacturer due to obsolescence. The alternate part has identical performance but utilises a square mounting flange compared to the circular mount of the previous relay.

Users of the remote mount SP6T terminated 18GHz products should be aware that the mounting method has changed and if purchasing the optional remote mount bracket, an alternate part number should be used.

For relays supplied prior to January 2022 the round flange based mounting bracket is available as part number 40-785A-521-TE-MB.

#### Mating Connectors & Cabling

For connection accessories for the 40-785B range please refer to the 90-011D RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

#### **Product Customization**

Pickering 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.



# 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 Relay Division. These instrument grade reed relays feature **SoftCenter**<sup>TM</sup> technology, ensuring long service life and repeatable contact performance. To learn more, please go to: pickeringrelay.com







# **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 and OpenTAP
- 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: <a href="mailto:pickeringtest.com/ebirst">pickeringtest.com/ebirst</a>



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: <a href="pickeringtest.com/support">pickeringtest.com/support</a>

### **Available Product Resources**

We have a large library of product resources including success stories, product and support videos, articles and white papers as well as application specific product brochures to assist when looking for the switching, simulation and connection solutions you need. We have also published handy reference books on Switching Technology and for the PXI and LXI standards.



To view, download or request any of our product resources, please visit: pickeringtest.com/resources

