System 46

RF/Microwave Switch System 32-channel, Unterminated



Flexible Solutions in a Compact Package

The S46 Microwave Switch System is designed to simplify the automated switching needed to test a wide range of telecommunications products and devices. The S46 can control 32 relay contacts in a package as small as a 2U high (3.5 in) full-rack enclosure. Standard configurations make it simple to select a system that meets the specifications of the testing application without the expense of unnecessary switches or other features. This "just what you need and no more" design philosophy allows S46 systems to provide outstanding price/performance value.

- Compact RF/microwave switching system only 2U high
- Built-in contact closure counter to monitor switch cycles
- Standard configuration allows up to 32 channels of switching
- Simple control with built-in GPIB/IEEE-488 interface bus
- Channel characterization data storage
- Frequency ranges up to 40GHz

APPLICATIONS

- Cellular and cordless phones
- Specialized mobile radios
- Base stations
- Specialized antenna systems
- RF components, including RFICs
- Wireless peripherals, including Bluetooth devices
- Broadband wireless transceivers
- High speed digital communications, including SONET speeds 3Gbps and 10Gbps

The enclosures used in standard S46 configurations can accommodate eight SPDT unterminated coaxial microwave relays and four multi-pole, unterminated, coaxial microwave relays. Any of these multi-pole unterminated relays can be one of the following relay types: SP4T or SP6T. S46 switching systems can be used as multiplexers, matrices, independent relays, or a combination of configurations. To order a standard system, simply select the number of relays and their location on the front panel. As test requirements change, relays can be easily added to the system to create a new switch configuration.

Frequency Range

To accommodate the rapidly evolving test requirements in RF/microwave applications, the S46 has ordering provisions for frequency ranges up to 40GHz. Configuration options include DC to 18GHz, DC to 26.5GHz, and DC to 40GHz.

Simple Operation

The S46 switch system's 32 control channels can be operated via the IEEE-488 interface bus with a minimal set of instructions. This small instruction set ensures the system can be set up and running quickly. Front panel LEDs indicate the status of all relay contacts continuously to allow the user to monitor system operation easily.

Excellent Microwave Switching Performance

Keithley's experience and partnerships with leading manufacturers in the microwave relay industry allow Keithley to offer the lowest insertion loss, VSWR, and crosstalk performance specifications available. Low-loss, semi-flexible RF cables are available as accessories to maximize signal integrity.

Maximum System Up-Time and Enhanced System Performance

The S46 controller automatically counts relay contact closures to allow equipment maintenance personnel to assess when the relays are nearing the end of their mechanical life. In this way, preventive maintenance can be performed in a timely way during scheduled shutdowns, avoiding unplanned shutdowns and the resulting loss of production time.

In addition to counting contact closures, the S46 has a portion of its memory available to store S-parameters or calibration constants for each relay contact or each pathway. If a specific performance parameter is critical, such as Voltage Standing Wave Ratio (VSWR) or insertion loss, the parameter can be stored in memory for use in trend analysis between scheduled maintenance shutdowns. Stored parameters can also be used for compensation to enhance accuracy during RF measurements.

SWITCHING AND CONTROL



System 46

RF/Microwave Switch System 32-channel, Unterminated

CABLING

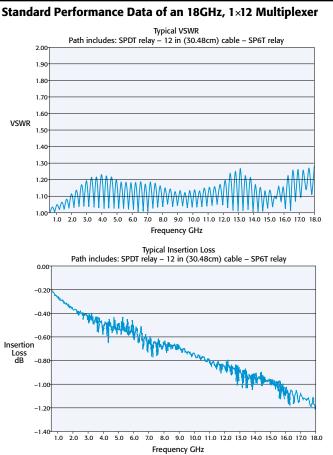
\$46-SMA-0.5

S46-SMA-1

S46-SMA-1.7

\$46-\$MA26-0.5

S46-SMA26-1



Examples of Standard System Switch Configurations

	S46-SMA26-1.7	DC-26.5GHz, Low Loss, Semi-Flex SMA-SMA Cable Assembly, 0.518m (20.4 in.)
	TL-24	SMA Cable Torque Wrench
	SWITCH KITS	
	S46-SPDT-KIT	Standard Performance 18GHz Unterminated SPDT Relay and Control Cable Assembly
₩W	S46-SP4T-KIT	Standard Performance 18GHz Unterminated SP4T Relay and Control Cable Assembly
	S46-SP6T-KIT	Standard Performance 18GHz Unterminated SP6T Relay and Control Cable Assembly
5.0 16.0 17.0 18.0	S46-SPDT-KIT-R	High Performance 18GHz Unterminated SPDT Relay and Control Cable Assembly
relay	S46-SP4T-KIT-R	High Performance 18GHz Unterminated SP4T Relay and Control Cable Assembly
	S46-SP6T-KIT-R	High Performance 18GHz Unterminated SP6T Relay and Control Cable Assembly
	S46-SPDT-KIT-26	High Performance 26.5GHz Unterminated SPDT Relay and Control Cable Assembly
	S46-SP4T-KIT-26	High Performance 26.5GHz Unterminated SP4T Relay and Control Cable Assembly
	S46-SP6T-KIT-26	High Performance 26.5GHz Unterminated SP6T Relay and Control Cable Assembly
	S46-SPDT-KIT-40	High Performance 40GHz Unterminated SPDT Relay and Control Cable Assembly
MMM	S46-SP4T-KIT-40	High Performance 40GHz Unterminated SP4T Relay and Control Cable Assembly

S46-SP6T-KIT-40 High Performance 40GHz Unterminated SP6T Relay and Control Cable Assembly

ACCESSORIES AVAILABLE

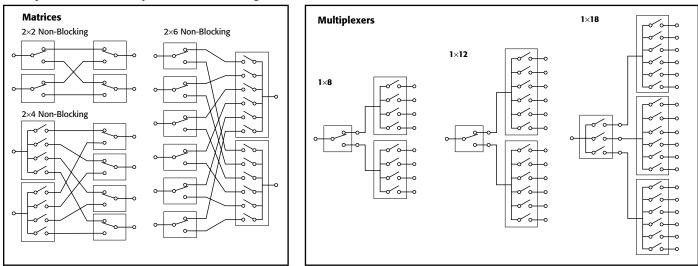
DC-18GHz, Low Loss, Semi-Flex SMA-SMA Cable Assembly, 0.152m (6 in.)

DC-18GHz, Low Loss, Semi-Flex SMA-SMA Cable Assembly, 0.305m (12 in.)

DC-18GHz, Low Loss, Semi-Flex SMA-SMA Cable Assembly, 0.518m (20.4 in.)

DC-26.5GHz, Low Loss, Semi-Flex SMA-SMA Cable Assembly, 0.152m (6 in.)

DC-26.5GHz, Low Loss, Semi-Flex SMA-SMA Cable Assembly, 0.305m (12 in.)



MAXIMUM CONFIGURATION: (8) - Unterminated SPDT relays. (4) - Unterminated multi-pole relays (SP4T, SP6T).



www.valuetronics.com

SWITCHING AND CONTROI

System 46 specifications

System 46 **Ordering Information**

Specifying Standard S46 Model Numbers

Accessories Supplied Power cord, instruction manual, and rack mount kit

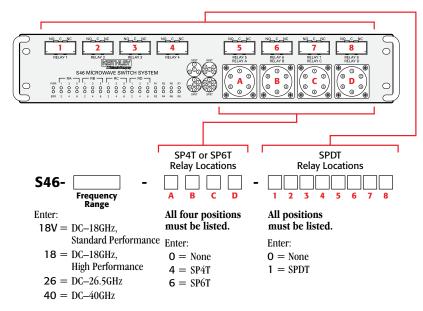
GENERAL

- CONTACT CLOSURE COUNTERS: 1 counter per channel, up to 10 million counts each, maintained in non-volatile memory.
- NON-VOLATILE STORAGE: 32 separate locations; each location up to 68 bytes long, for user-definable channel and system parameters.
- NUMBER OF RELAY CONTROL LINES: 32, each open collector driver capable of 300mA sink current (max.).

INTERFACE: GPIB (IEEE-488.2) and SCPI.

- INDICATORS: Power, relay position status, and error LED. POWER: 100-240VAC. 50/60Hz.
- MAXIMUM COMMON MODE: 42V peak, any terminal to earth.
- ENVIRONMENT: Operating: 0° to 40°C, up to 35°C < 80% RH. Storage: -25° to 65°C.
- EMC: Conforms to European Union Directive 89/336/EEC. SAFETY: Conforms with European Union Directive 73/23/
- EEC
- DIMENSIONS: 89mm high × 485mm wide × 370mm. deep (3.5" × 19" × 14.563").
- SHIPPING WEIGHT: 13kg (28 lbs).

RF/Microwave Switch System 32-channel, Unterminated



Multipole Relay Locations A-D: Enter a "4" for an SP4T relay or a "6" for a SP6T relay in the required location. Enter a "0" in unused multi-pole locations. There must be digits in all four positions.

SPDT Relay Locations 1-8: Enter a "1" for an SPDT relay in the required location. Enter a "0" in unused multi-pole locations. There must be digits in all eight positions.

Example 1: Model Number S46-18V-0604-00101100

Includes: SP6T in position B, SP4T in position D, SPDTs in positions 3, 5, and 6. Frequency range "18V," standard performance DC-18GHz.

Example 2: Model Number S46-26-0440-11100000

Includes: SP4T in positions B and C, SPDTs in positions 1, 2, and 3. Frequency range "26," high performance DC-26.5GHz.

Unterminated Relay Specifications

0	18V	18	26	40
Option	Std. Performance	High Performance		
FREQUENCY RANGE	DC-18 GHz	DC-18 GHz	DC-26.5 GHz	DC-40 GHz
CONNECTOR TYPE SPI	OT SMA	SMA	SMA	SMA 2.9
SP4T, SP	ST SMA	SMA	SMA 2.9	SMA 2.9
IMPEDANCE	50Ω	50Ω	50Ω	50Ω
CONTACT LIFE SPI	0T 2 × 10 ⁶	1×10^{7}	1×10^{7}	1×10^{7}
SP4T, SP	5T 2 × 10 ⁶	5×10^{6}	2×10^{6}	2×10^{6}
VSWR (max.)	DC-6 GHz: 1.25	DC-3 GHz: 1.20	DC-6 GHz: 1.30	DC-6 GHz: 1.30
	6-12 GHz: 1.40	3-8 GHz: 1.30	6-12.4 GHz: 1.40	6-12.4 GHz: 1.40
	12-18 GHz: 1.50	8-12.4 GHz: 1.40	12.4-18 GHz: 1.50	12.4-18 GHz: 1.50
		12.4-18 GHz: 1.50	18-26.5 GHz: 1.70	18-26.5 GHz: 1.70
				26.5-40 GHz: 2.20
INSERTION LOSS (max.) dB	DC-6 GHz: 0.2	DC-3 GHz: 0.2	DC-6 GHz: 0.2	DC-6 GHz: 0.2
	6-12 GHz: 0.4	3-8 GHz: 0.3	6-12.4 GHz: 0.4	6-12.4 GHz: 0.4
	12-18 GHz: 0.5	8-12.4 GHz: 0.4	12.4-18 GHz: 0.5	12.4-18 GHz: 0.5
		12.4-18 GHz: 0.5	18-26.5 GHz: 0.7	18-26.5 GHz: 0.7
				26.5-40 GHz: 1.1
ISOLATION (min.) dB	DC-6 GHz: 70	DC-3 GHz: 80	DC-6 GHz: 70	DC-6 GHz: 70
	6-12 GHz: 60	3-8 GHz: 70	6-12.4 GHz: 60	6-12.4 GHz: 60
	12-18 GHz: 60	8-12.4 GHz: 60	12.4-18 GHz: 60	12.4-18 GHz: 60
		12.4-18 GHz: 60	18-26.5 GHz: 55	18-26.5 GHz: 55
				26.5-40 GHz: 50
ACTUATION TIME (max.) ms				
SPI	OT 20	10	10	10
SP4T, SP	6T 15	15	15	15



www.valuetronics.com

Contact Information:

ASEAN / Australia (65) 6356 3900 Austria 00800 2255 4835 Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777 Belgium 00800 2255 4835 Brazil +55 (11) 3759 7627 Canada 1 800 833 9200 Central East Europe and the Baltics +41 52 675 3777 Central Europe & Greece +41 52 675 3777 Denmark +45 80 88 1401 Finland +41 52 675 3777 France 00800 2255 4835 Germany 00800 2255 4835 Hong Kong 400 820 5835 India 000 800 650 1835 Italy 00800 2255 4835 Japan 81 (3) 6714 3010 Luxembourg +41 52 675 3777 Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90 Middle East, Asia, and North Africa +41 52 675 3777 The Netherlands 00800 2255 4835 Norway 800 16098 People's Republic of China 400 820 5835 Poland +41 52 675 3777 Portugal 80 08 12370 Republic of Korea 001 800 8255 2835 Russia & CIS +7 (495) 6647564 South Africa +41 52 675 3777 Spain 00800 2255 4835 Sweden 00800 2255 4835 Switzerland 00800 2255 4835 Taiwan 886 (2) 2656 6688 United Kingdom & Ireland 00800 2255 4835 USA 1 800 833 9200 Rev 0415

For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology.Visit www.tektronix.com or www.keithley.com.

Copyright © 2016, Tektronix. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. TEKTRONIX and TEK are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks or registered trademarks of their respective companies.

03/16 KI

1KW-60222-0



www.valuetronics.com