

HP offers a broad line of coaxial switches, covering up to 40 GHz, for use in test and measurement applications. All switches use magnetically-latched solenoids and are primarily designed with breakbefore-make RF contacts for test simplicity. The Selection Guide on page 89 describes the product families and their features.

SPDT - Configurable Connectors

HP 8761A,B SPDT switches operate up to 18 GHz. Each port features six connector options plus 50-ohm termination for design flexibility.

SPDT - High Performance

HP 8762A,B,C switches operate up to 26.5 GHz. They provide exceptional isolation of 90 dB to 18 GHz and switched terminations, so that all ports maintain a 50-ohm match. Internal loads are rated at 1 watt average (100 W peak, 10 µsec pulse width). Control voltage Options T15 and T24 are compatible with TTL/5V CMOS drive circuitry. Another model, HP 8762F, is designed for 75-ohm transmission lines, making it valuable for communication applications up to 4 GHz.

SPDT - High Reliability

HP 8765A,B,C,D,F are SPDT switches that offer outstanding performance and a life of 5 million cycles. This switch family is available in four models up to 40 GHz, as well as a 75-ohm model to 4 GHz. Unlike the HP 8762 switches, they do not have internal, switched RF loads or dc current interrupts. Coil voltage options cover the complete range from 5 Vdc to 24 Vdc. Since the switches are magnetically latched, the coil voltage may be switched off after 15 ms.

The standard HP 8765 switch comes with ribbon cables and standard printed circuit board with a 0.025-inch connector for convenient assembly. Optional solder terminals are available.

Transfer - High Performance

HP 8763A,B,C switches operate up to 26.5 GHz. They are preferred for transfer applications because of their compact design. Transfer switches are used to automatically insert or remove a test component from a signal path. Because of their excellent isolation, they can also be used as the intersection (crosspoint) switch in full-access matrix switching applications. One port is internally terminated. Options T15 and T24 are available for TTL/5V CMOS compatibility.

HP 8764A,B,C switches operate up to 26.5 GHz, similar to the HP 8763, but with the internal termination replaced by a fifth port. The fifth port can be utilized for signal path reversal or as a calibration port. Options T15 and T24 offer TTL/5V CMOS compatibility.

Multiport - Low Profile

HP 8766/67/68/69K series switches are modified versions of the HP 8494/95/96/97 series step attenuators (dc to 26.5 GHz) for applications requiring a single-pole, 3-throw, 4-throw, 5-throw or 6-throw coaxial switch. The switch ports are unterminated. These switches offer warranted repeatability of 0.03 dB maximum over 5 million switching cycles.

The switches are available with several optional cables and connectors to make them compatible with standard 14-pin DIP sockets. Isolation and insertion loss vary with frequency, and depend upon the port selected.

Selection Guide

					Produc	t Cat	egor	у					
HP Model	Frequency Range	Features	SPDT Configurable Connectors	SPDT High Performance	SPDT High Reliability	Transfer High Performance		Multiport Low-profile				Multiport High Performance	
						4-port	5-port	SP3T	SP4T	SP5T	SP6T	SP4T	SP6T
8761A	dc to 18 GHz	 1 million cycles 	Х										
8761B	dc to 18 GHz	 Selectable connector configuration 	X										
8762A	dc to 4 GHz	 1 million cycles 		Х									
8762B	dc to 18 GHz	 High repeatability 		Х									
8762C	dc to 26.5 GHz	 All-ports terminated 		Х									
8762F (75 Ω)	dc to 4 GHz	Current interrupts and position indication capability TTI /5V/ CMOS option		Х									
87634	dc to 4 GHz	• 1 million cycles				X							+
8763B	dc to 18 GHz	High repeatability				X							
87630	dc to 26.5 GHz	1-port terminated				X							
01000		Current interrupts and position indication capability TTL/5V CMOS option				~							
8764A	dc to 4 GHz	1 million cycles					X						
8764B	dc to 18 GHz	High repeatability					X						
8764C	dc to 26.5 Ghz	Unterminated					X						-
		Current interrupts and position indication capability TTL/5V CMOS option											
8765A	dc to 4 GHz	Highest frequency range			X								
8765B	dc to 20 GHz	• 5 million cycles			X								
8765C	dc to 26.5 GHz	High repeatability			X								
8765D	dc to 40 GHz	Unterminated			X								
8765F (75 Ω)	dc to 4 GHz				X								
8766K	dc to 26.5 GHz	 5 million cycles 						Х					
8767K	dc to 26.5 GHz	 High repeatability 							X				
8768K	dc to 26.5 GHz	Unterminated								Х			
8769K	dc to 26.5 GHz	 Current interrupts and position indication capability 									X		
87104A	dc to 4 GHz	 5 million cycles 										Х	
87104B	dc to 20 GHz	 High repeatability 										Х	
87104C	dc to 26.5 GHz	 All-ports terminated 										Х	
87106A	dc to 4 GHz	Optoelectronic interrupts											Х
87106B	dc to 20 GHz	and position indicators											X
87106C	dc to 26.5 GHz	ITL/5V CMOS option											Х
87204A	dc to 4 GHz	 5 million cycles 										Х	
87204B	dc to 20 GHz	 High repeatability 										Х	
87204C	dc to 26.5 GHz	All-ports terminated										Х	
87206A	dc to 4 GHz	Optoelectronic interrupts											X
87206B	dc to 20 GHz	capability											X
87206C	dc to 26.5 GHz												

89

4

SPDT

Specifications

HP Model	8761A, 8761B	8762A, 8762B	8762C	8762F	8765A, 8765B, 8765C	8765D	8765F
Features	Unterminated Break-before-make	Terr Break-b	minated efore-make	-	Unt	erminated before-make	-
	Selectable connector configuration	Curren Position ind	t interrupts lication capability ¹				
Impedance	50 Ω	50 Ω	50 Ω	75 Ω	50 Ω	50 Ω	75 Ω
Frequency Range	dc to 18 GHz	A: dc to 4 GHz B: dc to 18 GHz	dc to 26.5 GHz	dc to 4 GHz	A: dc to 4 GHz B: dc to 20 GHz	dc to 40 GHz	dc to 4 GHz
					C: dc to 26.5 GHz		
Insertion Loss (dB) SWR (Through Line)	<0.5 to 12.4 GHz <0.8 to 18 GHz See Connector Code Option data on page 93	A: <0.20 to 2 GHz <0.25 to 4 GHz B: <0.20 to 26 GHz <0.50 to 18 GHz A: <1.2 to 4 GHz B: <1.1 to 2 GHz	<0.25 to 2 GHz <0.50 to 18 GHz <1.25 to 26.5 GHz <1.15 to 2 GHz <1.25 to 12.4 GHz	<0.4	A & B: 0.2 + 0.025 f ² max C: 0.25 + 0.027 f ² max 0.2 @ 4 GHz typ. 0.5 @ 20 GHz typ. 0.7 @ 26.5 GHz typ. A & B: <1.2 to 4 GHz	$\begin{array}{c} \textbf{0.2 + 0.023f}^{2} \text{ max} \\ 0.2 \text{ typ. } @ 4 \text{ GHz} \\ 0.5 \text{ typ. } @ 20 \text{ GHz} \\ 0.7 \text{ typ. } @ 26.5 \text{ GHz} \\ \textbf{0.75 + 0.023} \Delta f^{3} \text{ max} \\ (26.5 \leq f \leq 40) \\ 1.0 \text{ typ. } @ 40 \text{ GHz} \\ <1.25 \text{ to } 4 \text{ GHz} \\ <1.45 \text{ to } 18 \text{ GHz} \end{array}$	<0.18 to 1 GHz <0.24 to 2 GHz <0.4 to 4 GHz <1.15 to 1 GHz <1.20 to 4 GHz
		<1.2 to 12.4 GHz <1.3 to 18 GHz	<1.40 to 18 GHz <1.8 to 26.5 GHz		<1.35 to 12.4 GHz <1.45 to 18 GHz <1.7 to 20 GHz C: <1.25 to 4 GHz <1.45 to 18 GHz <1.7 to 26.5 GHz	<1.7 to 40 GHz	
SWR (Into Termination) Option 7:	Add 0.05 to SWR (Through Line) of connector selected	A: <1.1 to 2 GHz <1.2 to 4 GHz B: <1.15 to 2 GHz <1.20 to 12.4 GHz <1.30 to 18 GHz	<1.15 to 2 GHz <1.25 to 12.4 GHz <1.40 to 18 GHz <1.8 to 26.5 GHz	<1.30	◄	N/A	
Isolation (dB)	>50 to 12.4 GHz >45 to 18 GHz	>100 to 4 GHz >90 to 18 GHz	>90 to 18 GHz >50 to 26.5 GHz	>100	110 – 2.25f ² min 120 typ. @ 4 GHz 90 typ. @ 20 GHz 60 typ. @ 26.5 GHz	110 - 2.25f ² min 120 typ. @ 4 GHz 90 typ. @ 20 GHz 60 typ. @ 26.5 GHz 55 typ. @ 40 GHz >50 (26.5 to 40 GHz)	>100 to 1 GHz >90 to 4 GHz

Indicates QuickShip availability. HP 8762A,B,C standard models only. HP 8765A,B,C with Option 024 only. Contact HP Direct or your local HP sales representative to confirm QuickShip.

 1 Provides position sensing when used with HP 87130A/70611A or customer supplied external circuitry. 2 f is frequency in GHz. 3 Δf = f (GHz) – 26.5.

SPDT

Specifications (continued)

HP Model	8761A,B	8762A,B	8762C	8762F	8765A,B,C	8765D	8765F
Input Power Average Peak ¹	10 W 5 kW 2		1 W 100 W (10 µs max)	-	-	2 W 100 W (10 µs max)	
Switching Time (max)	50 ms		30 ms		•	— 15 ms —	
Repeatability (max) ³	0.03 dB	0.03 dB	0.03 dB to 18 GHz 0.5 dB to 26.5 GHz	0.03 dB	•	—— 0.03 dB ———	
Life (min)	1,000,000 cycles		1,000,000 cycles		-	5,000,000 cycles	
RF Connectors	See connector options in ordering example	SMA (f)	3.5 mm (f)	Mini SMB (m) ⁴ (75 Ω)	A & B: SMA (f) C: 3.5 mm (f)	2.4 mm (f) See options	Mini SMB (m) ⁴ (75 Ω)
DC Connectors	Solder terminals		Solder terminals	-	•	Ribbon cable	

¹ Not to exceed average power (non-switching).

² Option 7: 2 W average, 100 W peak (10 µs max).

³ Measured at 25 °C.

 4 75 Ω Mini SMB does not mate with 75 Ω SMB. See data sheet for more information.

Options

HP Model	8761A	8761B	8762A,B,C,F			8765A,B,C,D	,F			
Supply Voltage, Current and Impedance ⁵			Std. / Opt. T24 Opt. 011 Opt. 015/Opt. T15		Opt. 005	Opt. 010	Opt. 015	Opt. 024		
Supply Voltage	12 to 15 Vdc 24 to 30 Vdc		20 to 32 Vdc 4.5 to 7 Vdc 12 to 20 Vdc		4.5 to 7 Vdc	7 to 12 Vdc	12 to 20 Vdc	20 to 32 Vdc		
Range										
Supply Voltage	12 Vdc	24 Vdc	24 Vdc	5 Vdc	15 Vdc	5 Vdc	10 Vdc	15 Vdc	24 Vdc	
(nom)										
Current (nom)	80 mA	65 mA	120 mA	400 mA	182 mA	385 mA	300 mA	200 mA	120 mA	
Impedance (nom)	150 Ω, 90 mH	400 Ω, 300 mH	200 Ω, 127 mH	13 Ω, 8 mH	82 Ω, 57 mH	13 Ω, 8 mH	33 Ω, 25 mH	75 Ω, 55 mH	200 Ω, 135 mH	
Control Logic	►N/A -		Opt. T15: TTL/5V CMOS compatible logic with 15 Vdc supply ⁶			► N/A				
			Opt. T24: TTL/5V CMOS compatible logic with 24 Vdc supply ⁶							
RF Connector	See orderin	ig information	-	—— N/A —		D (Opt. 292): 2.92 mm (f)				
DC Connectors			—— N/A — 🕨			Opt. 100: Solder terminals				
							Opt. 108: 8-inch ribbon cable extension			
						Opt. 116: 16	-inch ribbon ca	ble extension		
Calibration Documentation	-			—— See or	dering information —	1				

⁵ Must specify option for HP 8765 series products.

⁶ Not available with HP 8762F.

SPDT

Schematics

HP 8761 Series



HP 8762 Series



HP 8765 Series¹



¹ Opt. 100 Solder Terminal numbers in parenthesis

Signal Path Control Data

The tables shown here can be used to better understand how to select a signal path for each switch. For example, the HP 8762 switch has two drive control alternatives i.e. a standard drive scheme and a TTL/5V CMOS drive scheme. For TTL/5V CMOS drive, it is required that the supply voltage be applied to pin C and that pin 1 is grounded. To close the path from port 1 to port C, apply a TTL "low" to pin 2. Additional information related to signal path control can be found in the product data sheet.

HP 8765 Series

HP 8761 Series

	DC Drive Control Voltage						
RF Path	Pin "+"	Pin "–"					
1 to C	Negative	Positive					
2 to C	Positive	Negative					

HP 8762 Series

	Drive Control Alternatives								
	Standard D	rive Voltage ²	TTL/5V CMOS Drive Voltage ^{2,3}						
RF Path	Pin 1	Pin 2	Pin 1	Pin 2					
1 to C	Ground	Open	Ground	"Low"					
2 to C	Open	Ground	Ground	"High"					

² Drive pin C is supply voltage.
 ³ Not available on HP 8762F.

		Drive Control Alternatives ⁴									
Common Positive I				tive Drive Voltage		Common Negative Drive Voltage			Polarity Reversal Drive Voltage		
KF Falli	Std. (Opt. 100)	Pin 1 (1)	Pin 3/4 (2/3)	Pin 5 (4)	Pin 3 (2)	Pin 1/5 (1/4)	Pin 4 (3)	Pin 1 (1)	Pin 3/4 (2/3)	Pin 5 (4)	
1 to C		Open	Supply voltage	Ground	Open	Ground	Supply voltage	Ground	Connected	Supply voltage	
2 to C		Ground	Supply voltage	Open	Supply voltage	Ground	Open	Supply voltage	Connected	Ground	

⁴ See data sheet for additional information on these drive control alternatives.

SPDT

HP 8761 Series





HP 8761 Series Connector Dimensions									
Connector Code Option	Connector Type	Dimensi mm	ion "A" (inch)	SWR (Through Line)					
0	Type-N (f)	13.72	(0.540)	<1.25 to 18 GHz					
1	Type-N (m)	19.79	(0.775)	<1.25 to 18 GHz					
2	APC-7 threaded sleeve	9.27	(0.365)	<1.2 to 18 GHz					
3	APC-7 coupling nut	11.94	(0.470)	<1.2 to 18 GHz					
4	UT-250 coax	9.27	(0.365)	<1.25 to 18 GHz					
5	SMA (f)	16.13	(0.635)	<1.35 to 18 GHz					
6	SMA (m)	17.15	(0.675)	<1.35 to 18 GHz					
7	50 Ω termination	30.5	(1.20)						

HP 8762 Series

26.4 (1.04)

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Dimensions are in millimeters (inches) nominal, unless otherwise specified.

SPDT

HP 8765A,B,C,D



HP 8765F

¹ 8.46 (0.333) for D versions.

 2 75 Ω Mini-SMB (m) does not mate with 75 Ω SMB connectors. See data sheet for details.

Dimensions are in millimeters (inches) nominal, unless otherwise specified.

SPDT

Ordering Information

HP 8761 Series Ordering Example



HP 8762 Series Ordering Example



HP 8765 Series Ordering Example



¹ This option must be specified when ordering this product.

² Port 1 or port 2 only.

³ Not available with HP 8762F.

⁴ Not available for HP 8762F, 8765D Opt. 292, or 8765F.

⁵ Available with HP 8765 only.