



HP 87204/206 Family

Multiport - High Performance

HP 87104A,B,C and 87106A,B,C multiport switches operate up to 26.5 GHz. These switches offer warranted repeatability of 0.03 dB maximum over 5 million switching cycles.

For rigorous requirements such as matrix switching, you can rely on port-to-port isolation of better than 100 dB at 4 GHz, 70 dB at 20 GHz, and 65 dB at 26.5 GHz. When used in switching trees or in full access matrixes, isolation and insertion loss repeatability is crucial to measurement confidence.

HP 87104 is a single-pole-4-throw (SP4T) and the HP 87106 is a SP6T function. Both switches have internal solid-state logic that automatically programs the non-used ports to a matched load when any one port is programmed to "on". This relieves the user from having to provide external logic drive pulses. For user-designed circuit drivers, Option T24 is available. It provides internal circuits that are compatible with external TTL/5V CMOS digital ICs.

Internal current interrupts and position indicators are optoelectronically coupled to the electromechanical switch action. This provides highly-reliable solenoid control along with accurate position indication to monitor circuits. Unselected RF ports are terminated in a well-matched 50-ohm load for eliminating unwanted reflections in unused signal lines.

The HP 87104/106 models have the capability to perform switching with a make-before-break action, by energizing the coils in the proper logic sequence. When this function is engaged, the impedance momentarily goes to 25 ohms, and then returns to the nominal 50-ohm match. HP 87204A,B,C and 87206A,B,C switches are fully equivalent to models HP 87104/106 in their RF switching performance. However, their drive circuits are primarily designed to work with the HP 87130A and 70611A switch drivers. In particular, the switches are best suited for interfacing with the switch driver's monitor circuits. In automated systems, the importance of switch position monitoring and reporting is often critical to system operation. See pages 110 and 111 for more information on switch driver instruments. The standard HP 87204/206 provides a 16-pin drive connector while Option 100 provides solder terminals. The HP 87204/206 can perform make-before-break or break-before-make switching.

HP-IB Compatibility

All of the HP switch families can be remotely and automatically controlled from switch driver instruments such as the HP 11713A, 3235A, 3488A, or E1700A. These drivers are all HP-IB (IEEE 488) compatible as is the HP 87130A switch driver, a standalone system for automated control of up to 248 switches. For systems configured in the HP Modular Measurement System, use the HP 70611A to operate up to 248 switches. Drivers are also available for HP VXI and HP VEE systems. For more information on switch drivers available, see page 110.

Switch Driver Cables

See page 109 for a brief listing of driver cables. For complete cable configuration information, request publication number 5963-2038E, *HP 70611A, HP 87130A and HP 11713A Switch and Attenuator Driver Configuration Guide.*

Selection Guide

			Product Category										
HP Model	Frequency	Features	Configurable	High	High	High		Multiport			High		
WOUEI	Ralige		Connectors	Feriorinance	Reliability	4-nort	5-nort	SP3T	SP4T	SP5T	SP6T	SP4T	SP6T
8761A	dc to 18 GHz	1 million cycles	x			pon		0101					
8761B	dc to 18 GHz	Selectable connector	X										
		configuration											
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	dc to 4 GHz	 Current interrupts and 		Х									
(75 \2)		position indication											
		• TTL /51/ CMOS option											
87634	dc to 4 GHz	• 1 million cycles				X							
8763R	dc to 18 GHz	High repeatability				X							
8763C	dc to 26.5 GHz	 1-port terminated 				X							
	2010 2010 0112	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					×						
		 Current interrupts and position indication 											
		capability											
		TTL/5V CMOS option											
8765A	dc to 4 GHz	Highest frequency range			Х								
8765B	dc to 20 GHz	 5 million cycles 			Х								
8765C	dc to 26.5 GHz	 High repeatability 			Х								
8765D	dc to 40 GHz	 Unterminated 			Х								
8765F (75 Ω)	dc to 4 GHz				Х								
8766K	dc to 26.5 GHz	5 million cvcles						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									Х		
		position indication											
074044		capability										V	
87104A	do to 20 CH-	S million cycles High repostability										X	
87104B	de to 26.5 GHz	All-ports terminated										X	
871040	dc to 20.5 GHz	Ontoelectronic interrupts										^	X
87106R	dc to 20 GHz	and position indicators											X
871060	dc to 26.5 GHz	TTL/5V CMOS option											X
87204A	dc to 4 GHz	5 million cycles										X	
87204R	dc to 20 GHz	High repeatability										X	
87204C	dc to 26.5 GHz	All-ports terminated										X	
87206A	dc to 4 GHz	Optoelectronic interrupts											X
87206B	dc to 20 GHz	and position indication											X
87206C	dc to 26.5 GHz	capability											X

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Specifications

HP Model	87104A 87104B 87104C	87106A 87106B 87106C	87204A 87204B 87204C	87206A 87206B 87206C				
Configuration	SP4T	SP6T	SP4T	SP6T				
Features		Terminated	Terminated					
		Break-before-make or	Break-before-make or					
		make-before-break	make-before-break					
	Op	toelectronic current interrupts	Optoelectronic current interrupts					
	Op	toelectronic position indicator ¹	Optoelectronic position indication capability ²					
		Internal control logic	Direct path control					
Impedance		50 Ω						
Frequency Range		A: dc to 4 GHz						
		► B: dc to 20 GHz						
		C: dc to 26	.5 GHz					
Insertion Loss (dB)		0.3 + 0.015	5 x freq (GHz)					
SWR		<1.2: dc to 4 GHz						
		<1.35: 4 to 12.4 GHz						
		<1.45: 12.4 to 18 GHz						
lealetien (JD)		<1./. 18 to 20.5 UHZ						
Isolation (dB)		>100 dB. 40 to 45 GU						
		>80 0B: 12 to 15 GHZ						
		>/U 05: 10 10 20 GHZ						
Input Power		>03 UB. 20 10	20.3 GHZ					
		1	N					
Peak ³		50 W (10						
Switching Time (ms)	4		5					
Repeatability (max) ⁴		0.03	dB					
Life (min)	✓ 5.000.000 cycles							
Supply Voltage and Curren	nt		,					
Supply Voltage Range	20 to 32 Vdc							
Supply Voltage (nom)	age (nom) 🛛 🖌 🚽 🖂 24 Vdc —							
Current (nom) ⁵		200 mA						
RF Connectors	-	SM/	A (f)					
DC Connectors		Ribbon cable	e receptacle					

Indicates QuickShip availability. Standard models and Option 100 only. Contact HP Direct or your local HP sales representative to confirm QuickShip.

Options

	87104A,B,C	87106A,B,C	87204A,B,C		87206A,B,C
Control Logic	Opt. T24: TTL/5V CM	NOS compatible logic with 24 Vdc supply	-	— N/A —	
DC Connectors	-	Opt. 100: Solder termina	ls ———		
Calibration Documentation	-	See ordering information	ı ———		

¹ Position sensing when used with customer supplied external circuitry only.
² Position sensing when used with HP 87130A/70611A switch driver or customer supplied external circuitry.
³ Not to exceed average power (non-switching).
⁴ Measured at 25 °C.

⁵ Closing one RF path requires 200 mA. Add 200 mA for each additional RF path closed or opened.



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Simplified Schematics



Signal Path Control Data

The table shown here can be used to better understand how to select a signal path for HP 87104/106 multiport switches. For example, there are two drive control alternatives, i.e. a standard drive scheme and a TTL/5V CMOS drive scheme. For standard drive, it is required that the supply voltage be applied to pin 1 and that pin 15 is grounded. The path from port C to port 2 can be closed by grounding pin 5. Note that all other RF paths are simultaneously opened by internal logic. Further, the HP 87104/106 permits closing 1 or more RF paths simultaneously, allowing make-before-break RF switching transitions. See product data sheet for more information.

HP 87104/106 Series Signal Path Control Data¹

DE Doth		Drive Control Voltages ²					
KF Fdui	Pin No. ²	Standard	TTL/5V CMOS				
1 to C ³	3	Ground	"High"				
2 to C	5	Ground	"High"				
3 to C	7	Ground	"High"				
4 to C ³	9	Ground	"High"				
5 to C	11	Ground	"High"				
6 to C	13	Ground	"High"				
Open all paths	164	Ground	"High"				

¹ HP recommends the HP 87130A/70611A switch driver for HP 87204/206 series products. See data sheet for additional information related to driving these switches.
 ² Pin 1 is supply voltage. Pin 15 is common ground.

³ Paths 1 and 4 are not available for HP 87104A,B,C.

⁴Not available on Option 100.

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Drive Connection Diagrams

HP 87104/106 Series

Standard/Option T24



HP 87204/206 Series Standard



Option 100 (Solder Terminals)

Option 100 (Solder Terminals)



¹ Paths 1 and 4 are not connected for HP 87104/204 series.

² This function is not available on Option 100.

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Outline Drawings

HP 87104/106, 87204/206 Series



Ordering Information





¹ Option T24 not available with HP 87204/206 series products.