



Series 91 and 92 Miniature Broadband SP3T Switches

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Application Notes for [RF Switches](#)

MODELS 9130-500 AND 9230-500

These switches provide high-performance characteristics over a multi-octave frequency range. The model 9130-500 covers the 1 to 18 GHz frequency range while the Model 9230-500 covers the 0.2 to 4 GHz range. This description and operation are the same as that for the Models 9120-500 and 9220-500 SP2T switches.

MODELS 9130T-500, 9130W-500 AND 9230T-500

These switches are non-reflective version of the switches described above.

MODELS 9130AH-500 AND 9130AHT-500

These switches are the same as the 9120AH-500 and 9120AHT-500 except for the number of ports.

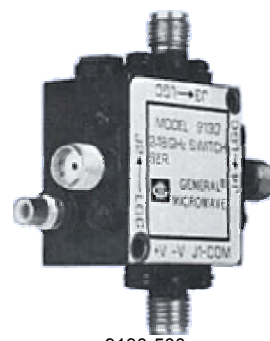
SERIES F91 AND F92

The Series F91 and F92 switches are the same as the corresponding Series 91 and 92 models, except the units are equipped with integrated drivers.

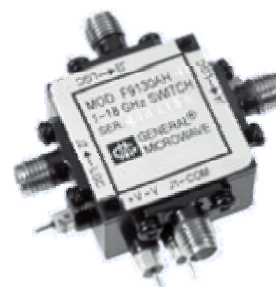
SERIES G91 AND G92

These switches are the same as the Series G91 and G92 SP2T switches except for the number of ports.

- Frequency range (Series 91): 1 to 18 GHz
- Frequency ranged (Series 92): 0.2 to 4 GHz
- Rise and fall times as fast as 10 nsec
- Reflective and Non-reflective models
- Low VSWR and insertion loss
- Isolation: up to 60 dB
- Miniature size, light weight



9130-500
(DRIVERLESS)



F9130AH
(WITH INTEGRATED DRIVER)

MODEL NO. ⁽¹⁾	CHARACTERISTIC	FREQUENCY (GHz)					
		0.2-1	1-2	2-4	4-8	8-12.4	12.4-18
9130-500* F9130	Min. Isolation (dB)	-	60	60	60	60	50
	Max. Insertion Loss (dB)	-	1.5	1.5	1.5	2.0	2.5
	Max. VSWR (ON)	-	1.75	1.75	1.75	1.75	2.0
G9130*	Min. Isolation (dB)	-	60	60	60	60	50
	Max. Insertion Loss (dB)	-	1.8	1.8	2.0	2.5	2.8
	Max. VSWR (ON)	-	1.5	1.5	1.7	1.7	2.0
9230-500* F9230	Min. Isolation (dB)	60	60	60	-	-	-
	Max. Insertion Loss (dB)	1.5	1.5	1.5	-	-	-
	Max. VSWR (ON)	1.5	1.5	1.5	-	-	-
G9230*	Min. Isolation (dB)	60	60	60	-	-	-
	Max. Insertion Loss (dB)	1.8	1.8	1.8	-	-	-
	Max. VSWR (ON)	1.5	1.5	1.5	-	-	-
9130T-500* F9130T* G9130T*	Min. Isolation (dB)	-	50	50	45	40	40
	Max. Insertion Loss (dB)	-	1.4	1.5	1.6	1.8	2.5
	Max. VSWR (ON or OFF)	-	1.5	1.5	1.7	1.7	2.0
9230T-500* F9230T* G9230T*	Min. Isolation (dB)	60	60	50	-	-	-
	Max. Insertion Loss (dB)	1.2	1.2	1.4	-	-	-
	Max. VSWR (ON or OFF)	1.5	1.5	1.5	-	-	-
9130W-500* F9130W G9130W*	Min. Isolation (dB)	-	60	60	60	60	55
	Max. Insertion Loss (dB)	-	1.8	1.8	2.0	2.5	2.8
	Max. VSWR (ON or OFF)	-	1.5	1.7	1.7	2.0	2.0
9130AH-500* F913AH	Min. Isolation (dB)	-	60	60	60	60	50
	Max. Insertion Loss (dB)	-	1.2	1.2	1.5	2.0	2.6
	Max. VSWR (ON)	-	1.75	1.75	1.75	1.75	2.0

9130AHT-500* F9130AHT	Min. Isolation (dB)	-	60	60	60	60	50
	Max. Insertion Loss (dB)	-	1.6	1.6	1.8	2.5	3.3
	Max. VSWR (ON)	-	1.75	1.75	1.9	2.0	2.0
	Max. VSWR (OFF)	-	1.75	1.75	2.0	2.2	2.3

*Special-order product. Consult factory before ordering.

PERFORMANCE CHARACTERISTICS

Power Handling Capability

Without Performance Degradation

- Units without "T" or "W" suffix: 1W cw or peak
- Units with "T" or "W" suffix
 - Input to any "OFF" port: 100 mW cw or peak
 - Input to any "ON" port: 1W cw or peak
 - Input to common port: 1W cw or peak

Survival Power

- Units without "T" or "W" suffix: 1W average, 75W peak (1 µsec max. pulse width)
- Units with "T" or "W" suffix
 - Input to any "OFF" port: 1W average, 10W peak (1 µsec max. pulse width)
 - Input to any "ON" port: 1W average, 75W peak (1 µsec max. pulse width)
 - Input to common port: 1W average, 75W peak (1 µsec max. pulse width)

(1) Models prefixed with "F" or "G" are equipped with integrated TTL-compatible drivers; models without the "F" or "G" prefix are current-controlled units and are furnished without drivers; models suffixed with "T" or "W" are non-reflective except a high VSWR will be present at the common port if all other ports are OFF; models suffixed with "H" are high-speed units.

Switching Characteristics⁽¹⁾

SERIES 91/F91/G91

Units without "H" suffix

- ON time 250 nsec max.
- OFF time 250 nsec max.

Units with "H" suffix

- Rise time 10 nsec max.
- Fall time 10 nsec max.
- ON time 25 nsec max.
- OFF time 20 nsec max.
- Repetition rate ... 20 MHz max.

SERIES 92/F92/G92

- ON time 500 nsec max.
- OFF time 500 nsec max.

Power Supply Requirements

SERIES 92/F92/G92

Driverless Units

Bias current required at each port for rated isolation and insertion loss

Control Characteristics

**SERIES 91/92/F91/F92
Units With Integrated Drivers
Control Input Impedance**

Units without "H" suffix

TTL, low power Schottky, one unit load. (A unit load is 0.8 mA sink current and 40 µA source current.)

Units with "H" suffix

TTL, advanced Schottky, one unit load. (A unit load is .06 mA sink current and 20 µA source current.)

Control Logic

Logic "0" (-0.3 to +0.8V) for port ON and logic "1" (+2.0 to +5.0V) for port OFF

SERIES G91/G92

Control Input

Impedance Schottky TTL, one unit load. (A unit load is 2.0 mA sink current and 50 µ source current.)

Control Logic

Logic "0" (-0.3 to +0.8V) for port ON and logic "1" (+2.0 to +5.0V) for port OFF.

PORT OFF

Units without "H" suffix..... +50 mA

Units with "H" suffix +30 mA

PORT ON

Units without "H" suffix -50 mA

Units with "H" suffix -35 mA

Units With Integrated Drivers

(For one port ON)

	+5V ±5%	-12 to -15V
Units Without "H" Suffix	130 m	60 mA
Units With "H" Suffix	75 mA	55 mA
Units With "HT" Suffix	105 m	55 mA

SERIES G91/G92

(For one port ON)

+5V ±5%, 100 mA
+15V ±5%, 40 mA

(1) For driverless units, shaped current pulses must be provided by user.

ENVIRONMENTAL RATINGS

Temperature Range

Units With Integrated Drivers

Operating -54°C to +110°C

Non-Operating -65°C to +125°C

Driverless Units

Operating and Non-Operating -65°C to +125°C

Humidity MIL-STD-202F, Method 103B, Cond. B (96 hrs. at 95%)

Shock MIL-STD-202F, Method 213B, Cond. B (75G, 6 msec)

Vibration MIL-STD-202F, Method 204D, Cond. B (.06" double amplitude or 15G, whichever is less)

Altitude MIL-STD-202F, Method 105C, Cond. B (50,000 ft)

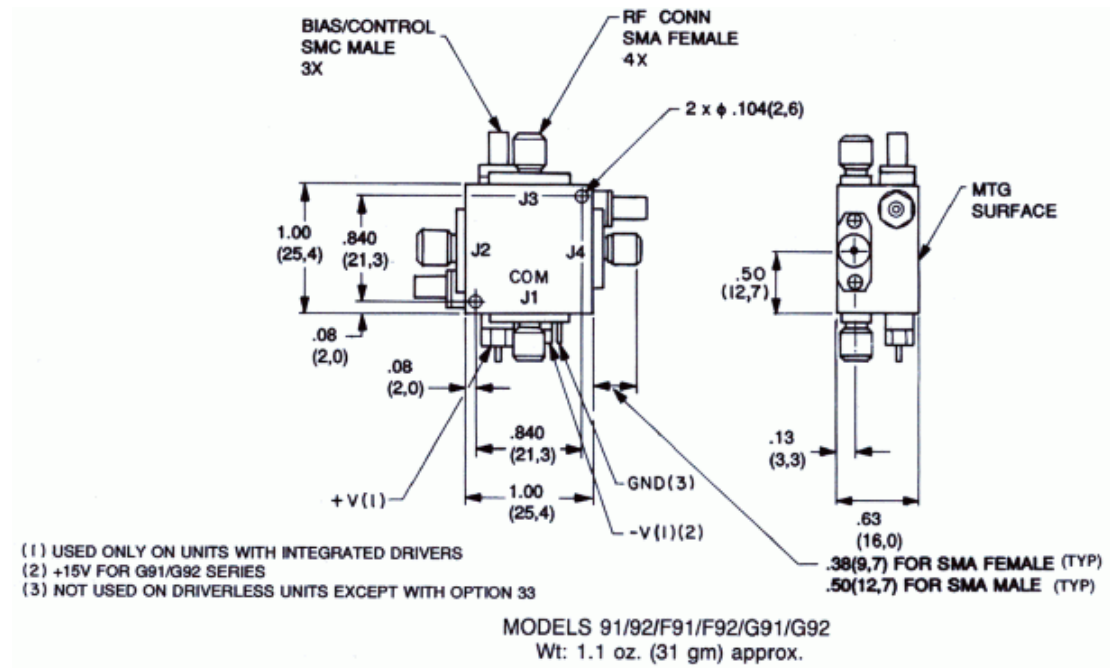
Temp. Cycling MIL-STD-202F, Method 107D, Cond. A, 5 cycles

AVAILABLE OPTIONS

Option No.	Description
3	SMA female bias/control connectors
7	SMA male RF connectors
9	Inverse control logic; logic "0" for port OFF and logic "1" for port ON (Not applicable to Series 91/92)
33	EMI filter solder-type bias/control terminals
41⁽¹⁾	Internal video filter, common port only
42⁽¹⁾	Internal video filter, output ports only
43⁽¹⁾	Internal video filter, all ports
55⁽²⁾	Frequency range 0.5 to 18 GHz.
64A	SMB male bias/control connectors

(1) Not applicable to Series 92/F92/G92. [See Video Filter Options on Switches](#)
(2) Applicable only to 1 to 18 GHz switches. [See impact of Option 55 on specifications](#)

DIMENSIONS AND WEIGHTS



Dimensional Tolerances, unless otherwise indicated: .XX \pm .02; .XXX \pm .005

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