

Cryogenic Microwave Switch Control Module

Product Features

- Designed for use with with Radiall Cryogenic Microwave Switch: [R583423141](#)
- Dedicated hardware timing control logic on each channel delivers pre-defined current limited actuation pulses to cryostat
- Outputs protected against inductive loads
- Optimized pulse control and signal conditioning to minimize power dissipation in cryogenic environment
- Typical transient heating $<10\text{mK}$ /actuation pulse for switch installed on coldplate (LD250 DR)



Cryogenic Microwave Switch Controller

General Description

The CryoSwitch Control Module is designed specifically for use with Radiall's SP6T Cryogenic Latching Bipolar Actuator (Model R583423141). The controller features a simple to use interface, which allows control of the switch using standard CMOS-TTL logic.

In standard operation, each of the 6 RF outputs of the switch can be connected (disconnected) to the common RF input by applying a high (low) logic level signal on the corresponding controller input pin. The input logic level triggers a current-limited 20 ms long control pulse with positive (input high) or negative (input low) polarity between the corresponding pair of output signals as shown in Table 2. A low-pass input filter provides rejection of fast switching or spurious input signals to ensure excessive power is not delivered to the cryostat. By default the filter is set to reject input pulses shorter than 500ms.

The control pulse and filter characteristics are adjustable upon request.

Electrical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage (BNC)	V_s	24	28	30	V
Supply Current (BNC)	I_s		500		mA
Input Logic Level High	V_{IH}	3	5	5.3	V
Input Logic Level Low	V_{IL}	0	0	2.2	V
Input Impedance	Z_{In}		10		$k\Omega$
Output High Voltage	V_{OH}	24	28	30	V
Output Low Voltage	V_{OL}		0		V
Operating Temperature	T_{op}		25		$^{\circ}C$

Table 1: Electrical Characteristics

Timing Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
Minimum Hold Time	t_d	480	500	520	ms
Output Pulse Width	t_s		20		ms

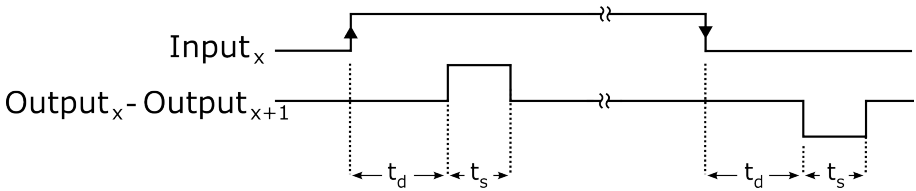
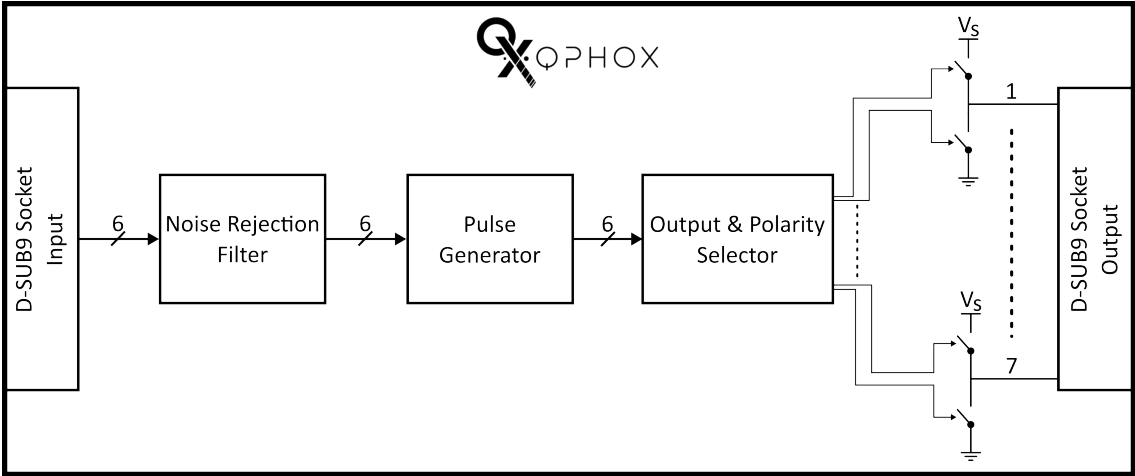


Figure 1: Timing Diagram

Operating Modes

Input Pin (DB9)	Input Logic State	DB9 Output Voltage		Cryogenic Switch State
		V_s	0V	
1	High (Rising Edge)	1	2	IN-1 Closed
	Low (Falling Edge)	2	1	IN-1 Open
2	High (Rising Edge)	2	3	IN-2 Closed
	Low (Falling Edge)	3	2	IN-2 Open
3	High (Rising Edge)	3	4	IN-3 Closed
	Low (Falling Edge)	4	3	IN-3 Open
4	High (Rising Edge)	4	5	IN-4 Closed
	Low (Falling Edge)	5	4	IN-4 Open
5	High (Rising Edge)	5	6	IN-5 Closed
	Low (Falling Edge)	6	5	IN-5 Open
6	High (Rising Edge)	6	7	IN-6 Closed
	Low (Falling Edge)	7	6	IN-6 Open

Block Diagram



Dimensions

220mm (L) × 103mm (W) × 30.5mm (H)

Application Information

- Connect output pins 1-7 of the controller D-SUB-9 socket to matching input pins 1-7 of the Cryogenic Switch D-SUB-15 plug as shown in Figure 2.
- The input pins 1-6 of the controller D-SUB-9 socket may be connected to any suitable CMOS-TTL logic controller. Note Table 1 for logic threshold information.
- Connect suitable power supply to the BNC power input, refer to Table 1.
- On power up all outputs are set as high impedance.

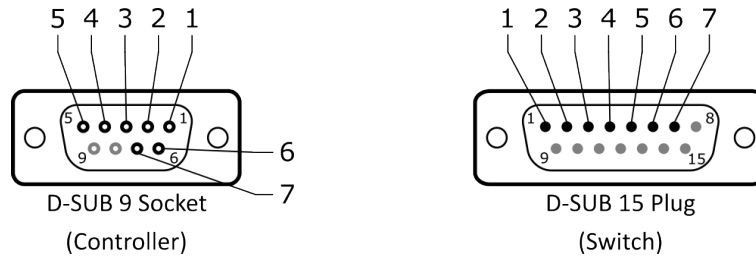


Figure 2: Output connections