

# DC-18 GHz SP6T Terminated RF Switch (24 V, TTL, Indicators)

Compact electromechanical SP6T coaxial switch for signal routing up to 18 GHz. Terminated output ports (absorptive throws) with reflective common port. 24 V control with TTL-compatible channel selection and indicator outputs via DIP-DC interface.

FREQUENCY

**DC-18 GHz**

INSERTION LOSS

**0.30-0.50 dB**

ISOLATION

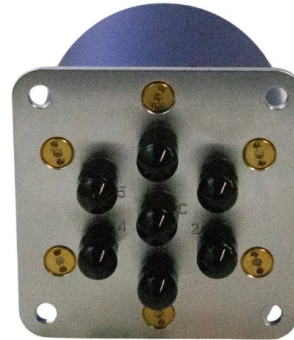
**60-70 dB**

SWITCHING

**≤15 ms**

HIGHLIGHTS

- Electromechanical SP6T, DC-18 GHz
- Terminated output ports (absorptive throws); reflective common port
- 24 V control with TTL-compatible channel inputs
- Indicator outputs via "Indicator COM" + per-channel indicator pins
- 2.92 mm RF connectors (6 throws + common)



Images are for reference only. Final appearance depends on configuration.

APPLICATIONS

- ATE / automated RF routing
- Lab switching matrices and RF test benches
- Broadband measurement setups (terminated idle paths)
- Receiver path selection and signal distribution

Electrical specifications are typical at 25 °C, sea level. Performance may deteriorate at high/low temperature. 50 Ω system impedance assumed.

## Electrical Summary

Typical values @ 25 °C, Z<sub>S</sub>=Z<sub>L</sub>=50 Ω

| Parameter         | Value    | Unit | Notes                                       |
|-------------------|----------|------|---|
| VSWR              | ≤1.3-1.5 | :1   | Band dependent                              |
| Power supply      | 24       | VDC  | Control supply                              |
| Control interface | TTL      | —    | One-hot channel lines (CH1-CH6)             |
| Indicators        | Yes      | —    | Closure to Indicator COM for active channel |

## Electrical Specifications

Max/Min values as specified. 50 Ω system, typical @ 25 °C unless noted.

| Frequency band | Insertion loss | VSWR   | Isolation | Avg power | Units            |
|----------------|----------------|--------|-----------|-----------|------------------|
| DC–6 GHz       | ≤ 0.30         | ≤ 1.30 | ≥ 70      | ≤ 45      | dB / :1 / dB / W |
| 6–12 GHz       | ≤ 0.40         | ≤ 1.40 | ≥ 60      | ≤ 40      | dB / :1 / dB / W |
| 12–18 GHz      | ≤ 0.50         | ≤ 1.50 | ≥ 60      | ≤ 27      | dB / :1 / dB / W |

Terminated output ports (absorptive throws) are designed to reduce reflections on unselected paths. The common port is reflective.

## Control Characteristics

24 V supply, TTL channel selection, DIP-DC interface

| Item               | Value          | Unit   | Notes              |
|--------------------|----------------|--------|--------------------|
| Control method     | TTL / Failsafe | —      | TTL channel inputs |
| Rated voltage (DC) | 24             | V      | Control supply     |
| Drive current      | ≤ 200          | mA     | DC @ 20 °C         |
| Reset current      | ≤ 1200         | mA     | DC @ 20 °C         |
| Control interface  | DIP-DC         | —      | 2×8 control header |
| Switching time     | ≤ 15           | ms     | Max                |
| Life               | ≥ 5,000,000    | cycles | Minimum            |

### INDICATOR OUTPUTS (SUMMARY)

- Indicator pins provide a closure to **Indicator COM** for the active channel.
- Common usage: connect Indicator COM to GND and read indicator pins as active-low closures.
- Detailed pinout and recommended wiring are provided on Page 4.

## Environmental Characteristics

As specified

| Parameter             | Value       | Unit | Notes          |
|-----------------------|-------------|------|----------------|
| Operating temperature | –45 to +65  | °C   | Standard       |
| Storage temperature   | –55 to +85  | °C   | —              |
| Humidity              | 5 to 85     | %    | Non-condensing |
| Protection level      | IP63        | —    | —              |
| Shock (power off)     | 50 G, 11 ms | —    | 1/2 sine       |
| Vibration (power on)  | 10 G RMS    | Hz   | 20–2000        |

For repeatable RF measurements, terminate unused RF ports with 50 Ω loads and use short, high-quality coaxial leads.

## Mechanical Specifications

Outline, interfaces, and mounting

| Item               | Value        | Unit | Notes                             |
|--------------------|--------------|------|-----------------------------------|
| Mounting footprint | 58.4 × 58.4  | mm   | Front plate outline (see drawing) |
| Body diameter      | Ø58          | mm   | Main body                         |
| Overall height     | 62           | mm   | From plate face (see drawing)     |
| Mounting holes     | 4 × Ø4.3     | mm   | Through                           |
| RF connectors      | 2.92 mm (×7) | —    | 6 throws + common                 |
| Control connector  | DIP-DC (2×8) | —    | Channel + indicators              |

### INTEGRATION NOTES

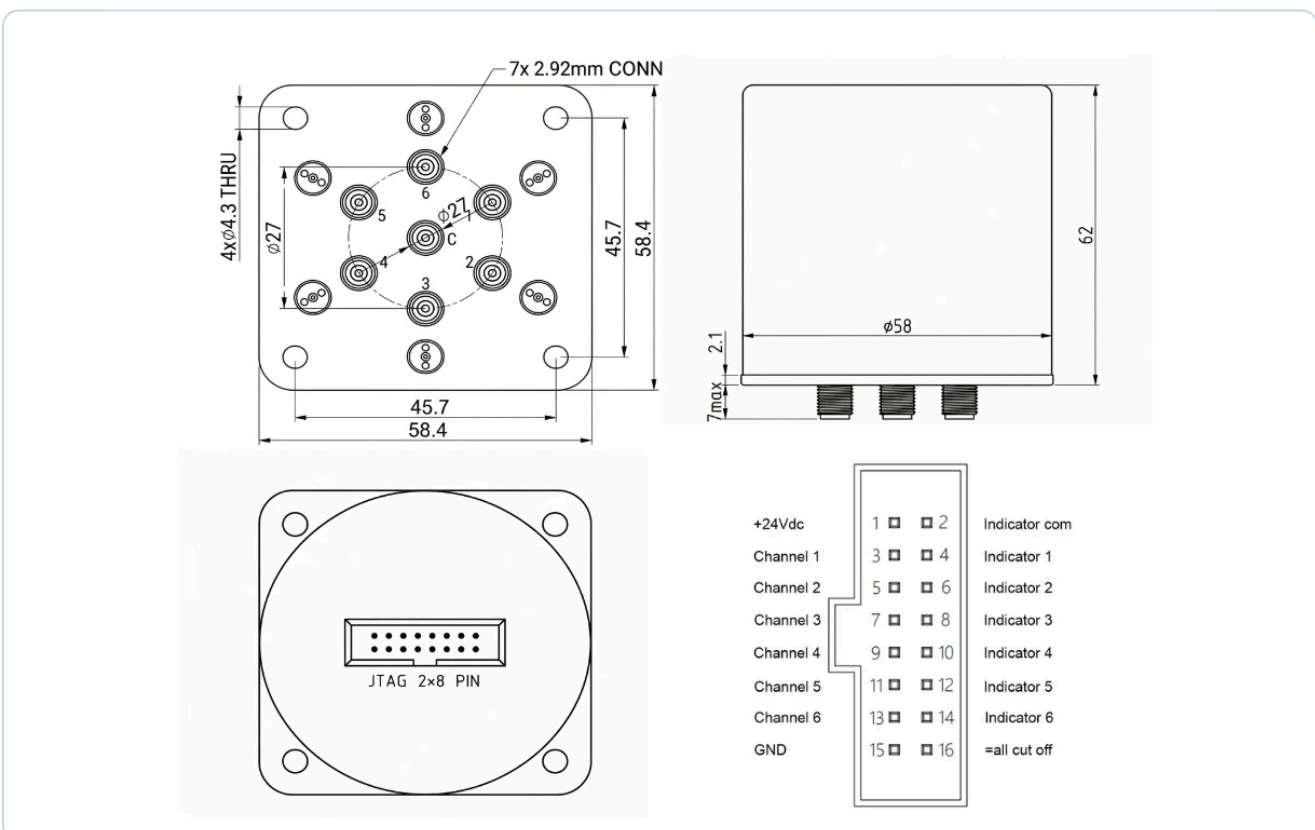
- Mount on a flat, rigid surface to avoid mechanical stress and connector misalignment.
- Use high-quality 2.92 mm torque wrenches and controlled torque for repeatable RF performance.
- Provide strain relief on coaxial cables to avoid side-load on connectors.

### HANDLING

- ESD precautions recommended during handling and integration.
- Avoid impact/shock while mounted; mechanical switches can be sensitive to misalignment forces.
- Do not use RF connectors as mechanical supports.

## Outline Drawing

Reference mechanical drawing (interfaces and pin legend)



## DIP-DC Control Interface (2×8)

24 V supply, TTL channel selection, indicator outputs

| Pin | Signal        | Type   | Description                         |
|-----|---------------|--------|-------------------------------------|
| 1   | +24V          | Power  | 24 VDC control supply               |
| 2   | CH1           | TTL    | Channel 1 select                    |
| 3   | CH2           | TTL    | Channel 2 select                    |
| 4   | CH3           | TTL    | Channel 3 select                    |
| 5   | CH4           | TTL    | Channel 4 select                    |
| 6   | CH5           | TTL    | Channel 5 select                    |
| 7   | CH6           | TTL    | Channel 6 select                    |
| 8   | GND           | Power  | Control return                      |
| 9   | Indicator COM | Common | Common return for indicator outputs |
| 10  | IND1          | Output | Closure to COM when CH1 active      |
| 11  | IND2          | Output | Closure to COM when CH2 active      |
| 12  | IND3          | Output | Closure to COM when CH3 active      |
| 13  | IND4          | Output | Closure to COM when CH4 active      |
| 14  | IND5          | Output | Closure to COM when CH5 active      |
| 15  | IND6          | Output | Closure to COM when CH6 active      |
| 16  | NC            | —      | Reserved / Not connected            |

### CHANNEL SELECTION LOGIC

- TTL compatible channel inputs (CH1–CH6).
- One-hot operation recommended (only one channel HIGH).
- Selected channel routes Common port to the corresponding throw.
- Unselected throws remain internally terminated (absorptive).

### INDICATOR BEHAVIOR

- Active channel provides a closure between INDx and Indicator COM.
- Outputs are passive contact closures (not voltage-driven).
- Use external pull-up resistor for logic monitoring.

## Channel Selection Summary

One-hot TTL control (recommended)

| Active Input | RF Path         | Indicator Closure |
|--------------|-----------------|-------------------|
| CH1          | Common → Port 1 | IND1 → COM        |
| CH2          | Common → Port 2 | IND2 → COM        |
| CH3          | Common → Port 3 | IND3 → COM        |
| CH4          | Common → Port 4 | IND4 → COM        |
| CH5          | Common → Port 5 | IND5 → COM        |
| CH6          | Common → Port 6 | IND6 → COM        |

Multiple simultaneous channel assertions are not recommended. Undefined behavior may occur if more than one channel input is driven HIGH.

### RECOMMENDED WIRING PRACTICE

- Connect Indicator COM to system ground.
- Use pull-up resistors on INDx lines when interfacing to logic inputs.
- Ensure only one CHx input is active at any time.
- Apply 24 V supply before asserting channel inputs.

## Recommended Operation & Power Sequencing

Best practice for repeatable RF performance and long service life

### **ON** Power-up & Channel Selection

1. Ensure all RF ports are properly terminated (50 Ω where required).
2. Apply +24 V control supply.
3. Assert one channel input (CH1–CH6).
4. Verify selected path via indicator output if required.
5. Apply RF signal after mechanical switching is complete.

### **OFF** Shutdown Sequence

1. Remove RF signal.
2. De-assert channel input.
3. Remove +24 V supply.

## Fail-Safe Behavior

Mechanical return when supply is removed

- Failsafe operation when 24 V supply is removed.
- All throw ports remain internally terminated.
- The common port is reflective when no channel is asserted.
- Switch returns to its defined mechanical rest state upon power removal.

## Safety & Usage Notes

Mechanical RF switching considerations

### RF OPERATION

- Hot switching is not recommended unless specifically qualified.
- Operate within specified average power limits per frequency band.
- Unterminated or mismatched loads may affect long-term reliability.

### CONTROL & WIRING

- Use clean, regulated 24 V supply.
- Avoid floating TTL inputs.
- Use external pull-ups for indicator monitoring.
- Do not exceed rated control current limits.

## Available Configurations (Switch Family)

Select frequency, control voltage, actuation mode, and control connector

### FAMILY OVERVIEW

E-REON offers a modular family of terminated electromechanical coaxial switches (SP3T to SP6T) for automated test equipment (ATE), instrumentation, defense, and laboratory switching. Variants are available to match system frequency, control voltage, and I/O harnessing.

### CORE OPTIONS

- **Switch type:** SP3T / SP4T / SP5T / SP6T (terminated throws)
- **RF connectors:** 2.92 mm (default); alternatives on request
- **Control voltage:** 12 V or 24 V versions
- **Actuation mode:** Latching or Normally-Open behavior (per model option)
- **Control connectors:** multiple I/O connectorizations for ATE harnessing

### ENVIRONMENTAL OPTIONS

- **Standard temperature:** –25 °C to +65 °C
- **Extended temperature:** –55 °C to +85 °C (option)
- **Vibration (operating):** 10 G RMS, 20–2000 Hz
- **Shock (non-operating):** 30 G, 11 ms, 1/2 sine

## Frequency / Performance Classes

Typical band groupings used for family configuration

| Frequency class | Typical VSWR | Typical insertion loss | Typical isolation | Notes                 |
|-----------------|--------------|------------------------|-------------------|-----------------------|
| DC–6 GHz        | ≤ 1.3        | ≈ 0.3 dB               | ≈ 70 dB           | Low-loss baseline     |
| 6–12 GHz        | ≤ 1.4        | ≈ 0.4 dB               | ≈ 60 dB           | General microwave     |
| 12–18 GHz       | ≤ 1.5        | ≈ 0.5 dB               | ≈ 60 dB           | Standard 18 GHz class |
| 18–32 GHz       | ≤ 1.9        | ≈ 0.8 dB               | ≈ 55 dB           | Extended band option  |
| 32–40 GHz       | ≤ 2.1        | ≈ 1.3 dB               | ≈ 50 dB           | 40 GHz class option   |

## Control & Connectorization Options

Common control I/O formats for integration and ATE harnessing

| Option group      | Available variants                             | Notes                            |
|-------------------|--|----------------------------------|
| Control voltage   | 12 V (11–14 V), 24 V (20–28 V)                 | Choose to match system supply    |
| TTL drive         | 3.5–7 V drive, 25–50 mA per input (typ. range) | Used for channel selection logic |
| Actuation mode    | Latching, Normally-Open behavior               | Selection depends on application |
| Control connector | 2×8 header, 2×10 header, D-SUB 9, D-SUB 15     | For different harness standards  |

## Important Notice & Disclaimer

Read before use and integration

### General

The information contained in this document is provided for reference purposes only and is believed to be accurate and reliable at the time of publication. E-REON B.V. reserves the right to make changes to specifications, design, or manufacturing processes without prior notice.

### Use & Application

- Products are intended for professional and industrial use.
- Performance may vary depending on installation, cabling, impedance matching, and environmental conditions.
- Operation beyond specified electrical or environmental limits may result in reduced performance or permanent damage.

### RF & Power Handling

- Ensure proper 50  $\Omega$  terminations where required.
- Hot switching is not recommended unless explicitly qualified.
- Exceeding rated RF power limits may reduce switching life.

### Liability

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