Toggles
Rockers
Pushbuttons
Illuminated PB
Programmable
Keylocks
Rotaries
Slides   H
Tactiles
Tilt
Touch
Indicators
Accessories
Supplement

# Series FS

## Miniature Slides for High Frequency

# General Specifications

For high frequency (DC through 1GHz):  Isolation 40dB minimum at 1GHz.
Insertion loss 0.5dB maximum at 1GHz.

Impedance 75 ohms

Innovative alternative to relay products

Highly reliable, self-cleaning twin contact mechanism with gold plating

Long total travel of .138" (3.5mm) for highly visible actuator position

Distinct audible and tactile feedback during actuation

Suited to high frequency applications (90MHz to 1GHz) such as CATV and
communication equipment

Actual Size
with Tall Actuator
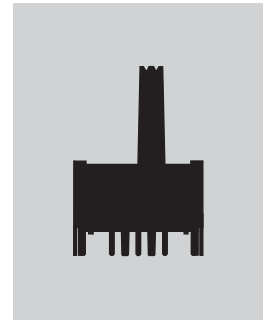


# Distinctive Characteristics

### Electrical Capacity (Resistive Load)

| | |
|---|---|
| **Logic Level:** | 0.4VA maximum @ 28V AC/DC maximum |
| | (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V) |
| | Note:  Find additional explanation of operating range in Supplement section. |

### RF Ratings

| | |
|---|---|
| **Impedance:** | 75 ohms |
| **Insertion Loss:** | 0.5dB maximum @ 1GHz |
| **Isolation:** | 40dB minimum @ 1GHz |

### Other Ratings

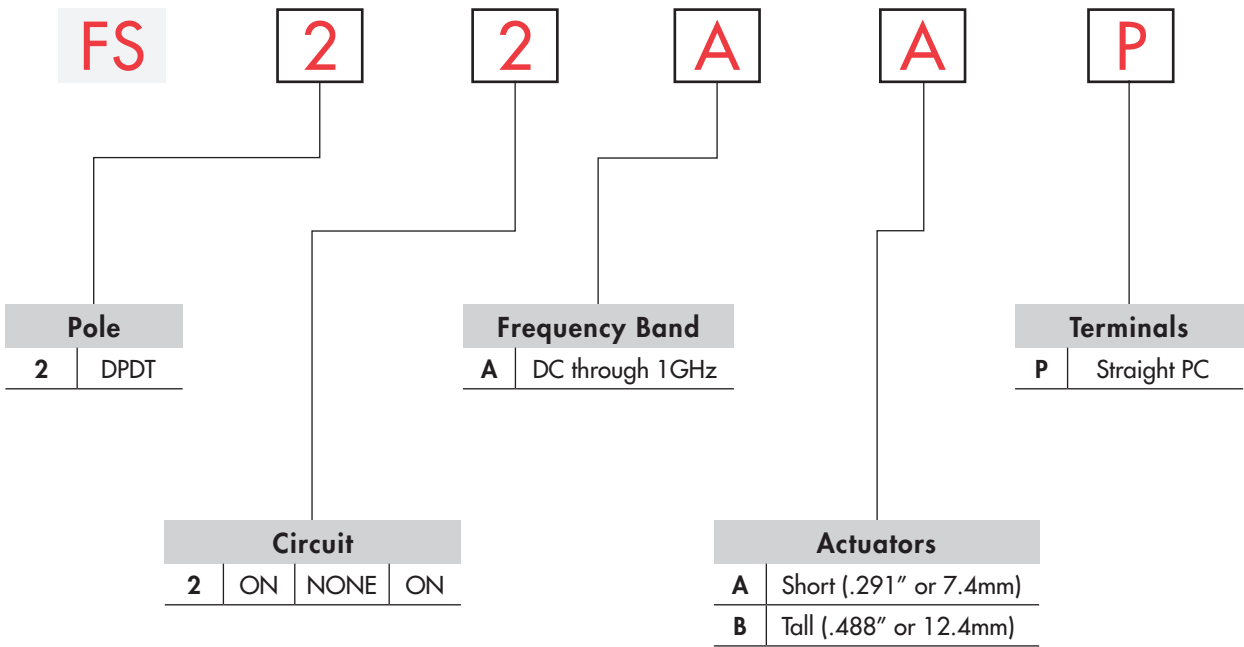| | |
|---|---|
| **Contact Resistance:** | 200 milliohms maximum |
| **Insulation Resistance:** | 250 megohms minimum @ 500V DC |
| **Dielectric Strength:** | 500V AC minimum for 1 minute minimum |
| **Mechanical Life:** | 1,000 operations minimum |
| **Electrical Life:** | 1,000 operations minimum |
| **Contact Timing:** | Nonshorting (break-before-make) |
| **Total Travel:** | .138" (3.5mm) |

### Environmental Data

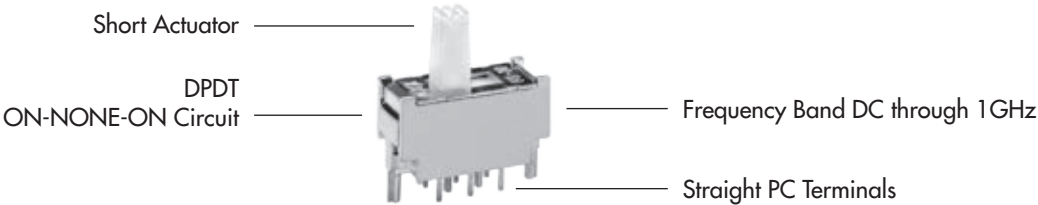| | |
|---|---|
| **Operating Temp Range:** | −30°C through +85°C (−22°F through +185°F) |
| **Humidity:** | 90 ~ 95% humidity for 240 hours @ 40°C (104°F) |
| **Vibration:** | 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 5 minutes; 3 right angled directions for 2 hours |
| **Shock:** | 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction) |

### Installation

| | |
|---|---|
| **Soldering Time & Temp:** | Wave Soldering:  See Profile A in Supplement section. |
| | Manual Soldering:  See Profile A in Supplement section. |
| **Cleaning:** | These devices are not process sealed.  Hand clean locally using alcohol based solution. |

NKK
SWITCHES

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## TYPICAL SWITCH ORDERING EXAMPLE

| FS | 2 | 2 | A | A | P |

**Pole**
| 2 | DPDT |

**Frequency Band**
| A | DC through 1GHz |

**Terminals**
| P | Straight PC |

**Circuit**
| 2 | ON | NONE | ON |

**Actuators**
| A | Short (.291" or 7.4mm) |
| B | Tall (.488" or 12.4mm) |

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**FS22AAP**

Short Actuator

DPDT
ON-NONE-ON Circuit

Frequency Band DC through 1GHz

Straight PC Terminals

## POLE & CIRCUIT

| | | Slide Position | | | Connected Terminals | | | Throw & Schematics |
|---|---|---|---|---|---|---|---|---|
| Pole | Model | Left | Center | Right | Left | Center | Right | Note: Terminal numbers are not actually on the switch. |
| DP | **FS22** | ON | NONE | ON | 2-1 5-4 | NA | 2-3 5-6 | DPDT |

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## HIGH FREQUENCY PERFORMANCE

### RF Connection Options

Option 1



In — Out

Direction of Actuation

— = Circuit Trace

Option 2



In — Out

Direction of Actuation

T = Terminator

Option 3



In — Out

Direction of Actuation

Out 2

A = Amplifier or other device
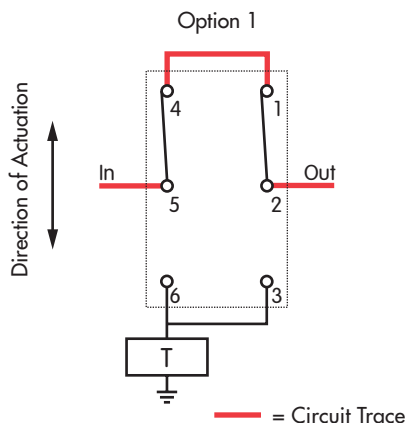
**Isolation**

>40dB @ 1GHz
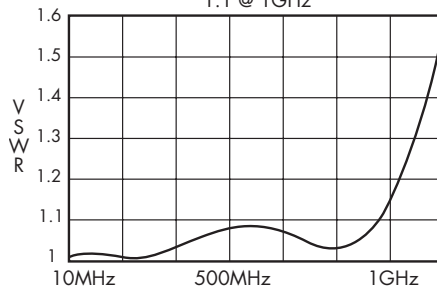(higher value is better)
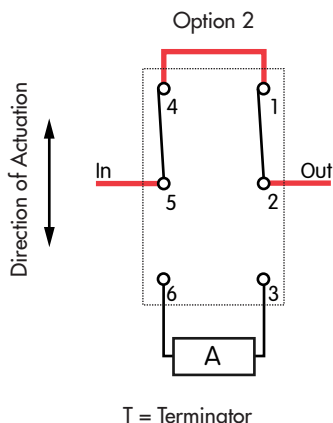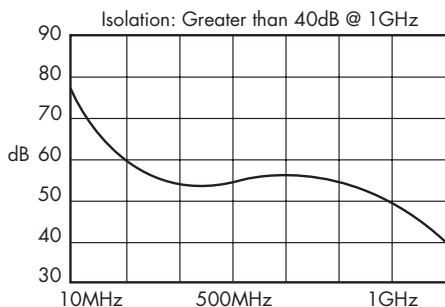
**Insertion Loss**

<0.5dB @ 1GHz
(lower value is better)
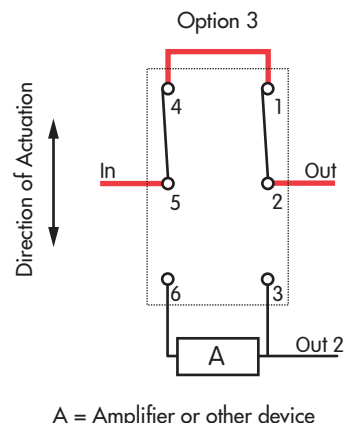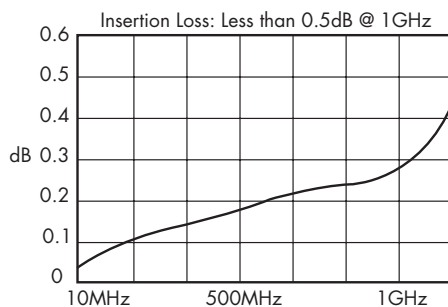
**Standing Wave Ration
or Impedance Matching**

Standing Wave = ratio between highest
voltage & lowest voltage
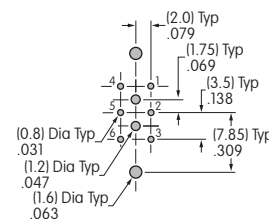(must always be more than 1)



Isolation: Greater than 40dB @ 1GHz



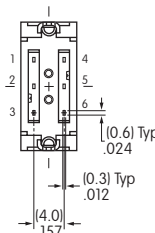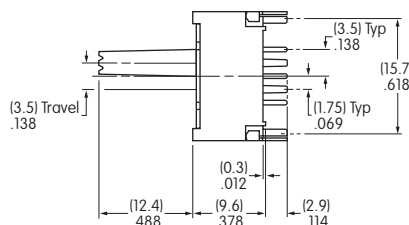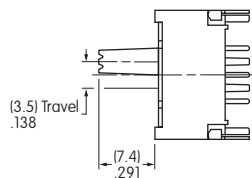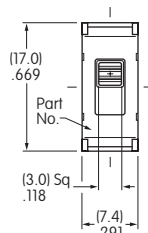Insertion Loss: Less than 0.5dB @ 1GHz



VSWR (Voltage Standing Wave Ratio):
1:1 @ 1GHz

Note: The data above reflects the conditions using the FS switch on a test PCB with two coaxial connectors.
High frequency applications require external connection on the PCB. Contact factory for details.

## TYPICAL SWITCH DIMENSIONS

### Short & Tall Actuators



(3.5) Travel .138

(7.4) .291

(17.0) .669

Part No.

(3.0) Sq .118

(7.4) .291

(3.5) Typ .138

(15.7) .618

(1.75) Typ .069

(3.5) Travel .138

(12.4) .488

(9.6) .378

(2.9) .114

(0.3) .012

(0.6) Typ .024

(4.0) .157

(0.3) Typ .012

(2.0) Typ .079

(1.75) Typ .069

(3.5) Typ .138

(0.8) Dia Typ .031

(1.2) Dia Typ .047

(1.6) Dia Typ .063

(7.85) Typ .309

**FS22ABP**

Actuator in LEFT position.