

# MFS

## Sub-miniature Switches



RoHS Compliant



### Common Specifications

#### Initial contact resistance

Measured at 1.5mA 200  $\mu$  VAC 1kHz

#### Dielectric strength

Measurement at 500 V AC.

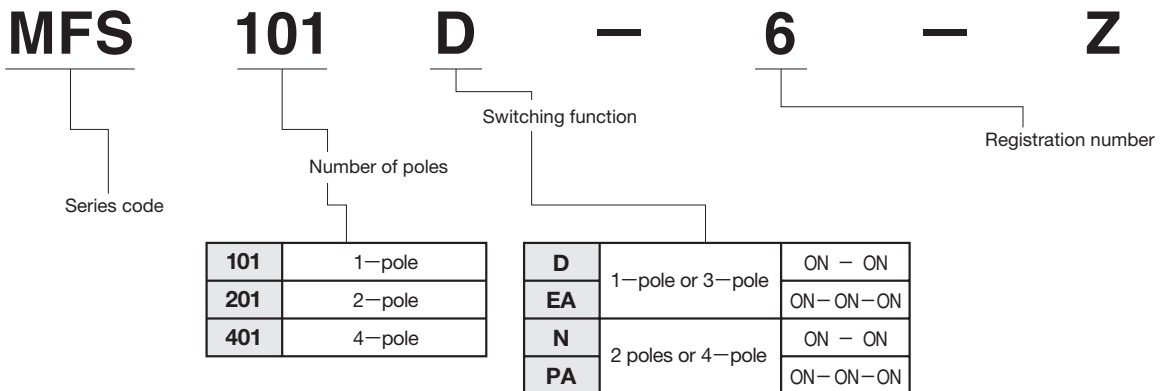
#### Insulation Resistance

Measured at 500VDC

#### Operating temperature range

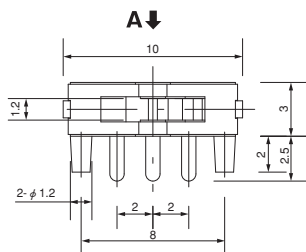
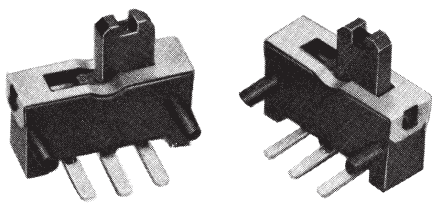
-10°C~+70°C

### Part Numbering



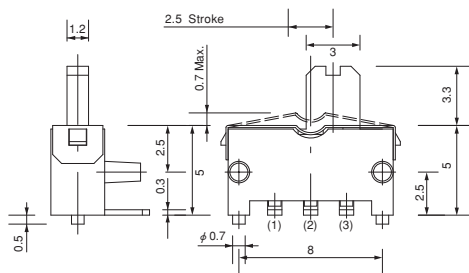
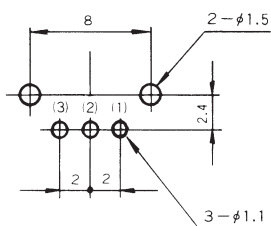
MFS101D-6-Z

Non-shorting



### PC Hole Layouts

(Top view)



### Specifications

Rating	Max.	DC10V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20m $\Omega$ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100M $\Omega$ Min.	
Electrical life	5,000 cycles	
Operating force	0.98~2.94N	
Switch timing	Non-shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
ON		3
2-3		

Terminal numbers are not shown on the switch.

# MFS

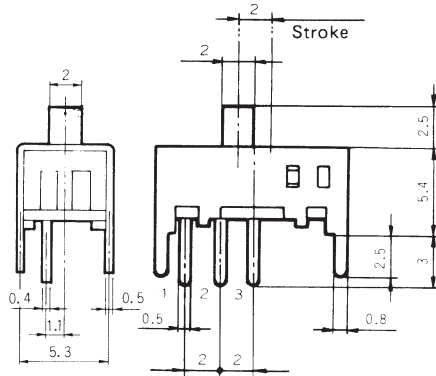
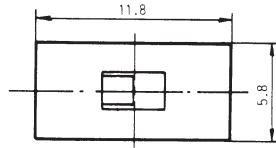
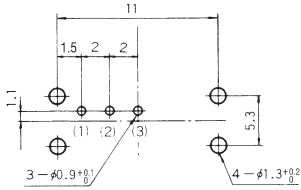
## MFS101D-8-Z

shorting



### PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

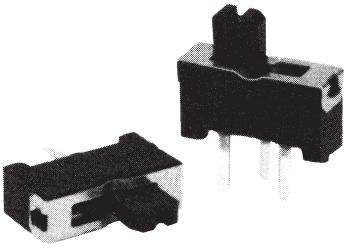
### Specifications

Rating	Max.	DC30V 0.3A AC30V 2A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20m $\Omega$ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100M $\Omega$ Min.	
Electrical life	5,000 cycles at DC30V 0.3A 100cycles at AC30V 2A	
Operating force	2.45 $\pm$ 0.98 N	
Switch timing	Shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
		3
ON	ON	
2-1	2-3	

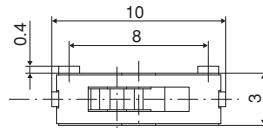
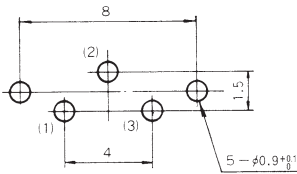
## MFS101D-9-Z

Non-shorting

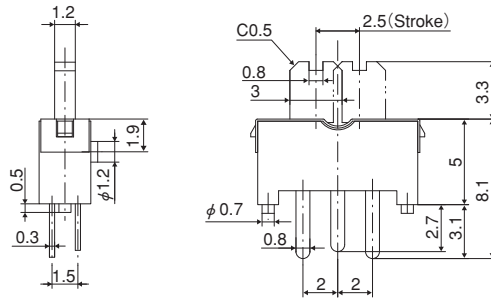


### PC Hole Layouts

(Top view)



A ↑



Terminal numbers are not shown on the switch.

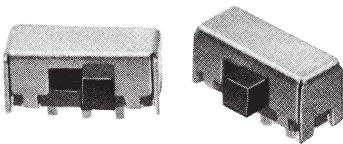
### Specifications

Rating	Max.	DC12V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20m $\Omega$ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100M $\Omega$ Min.	
Electrical life	5,000 cycles	
Operating force	0.98 $\pm$ 2.94N	
Switch timing	Non-shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
		3
ON	ON	
2-1	2-3	

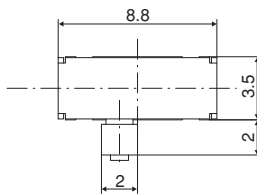
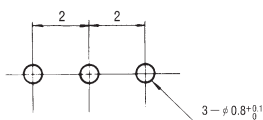
## ☆ MFS101D-10-Z

Non-shorting

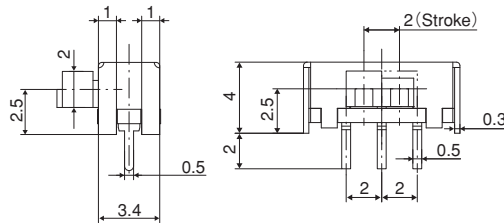


### PC Hole Layouts

(Top view)



A ↓



Terminal numbers are not shown on the switch.

### Specifications

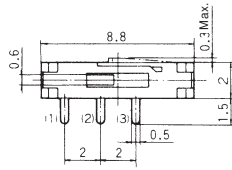
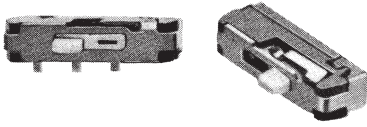
Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20m $\Omega$ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100M $\Omega$ Min.	
Electrical life	5,000 cycles	
Operating force	2.94 $\pm$ 1.96N	
Switch timing	Non-shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
		3
2-3	2-1	

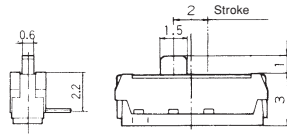
MFS

☆MFS101D-11-Z

Non-shorting

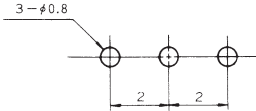


↑ A



■ PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

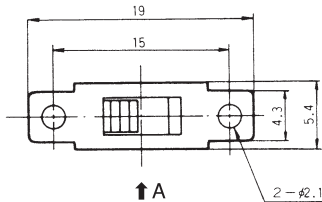
■ Specifications

Rating	Max.	DC12V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	50mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	1.47±0.98N	
Switch timing	Non-shorting	

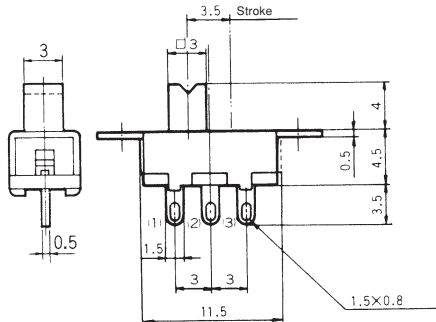
Switching function (Viewed from A)	Circuit diagram	No. of terminals
		 3
ON	ON	
3-1	3-2	

MFS101D-14-Z

Non-shorting



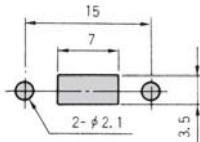
↑ A



Terminal numbers are not shown on the switch.

■ Panel Cut-Out Dimensions

(Top view)



■ Specifications

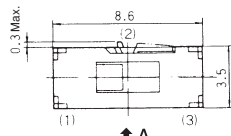
Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	1.96±0.98N	
Switch timing	Non-shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
		 3
2-1	2-3	

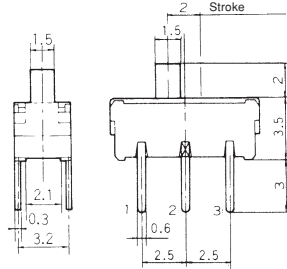
MFS101D-15-Z

Non-shorting

Gold plated contact



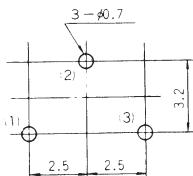
↑ A



Terminal numbers are not shown on the switch.

■ PC Hole Layouts

(Top view)



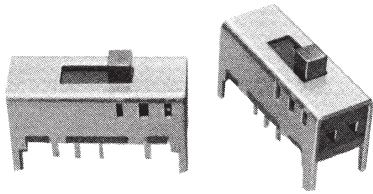
■ Specifications

Rating	Max.	DC12V 0.2A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	50mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	1.47±0.98N	
Switch timing	Non-shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
		 3
2-1	2-3	

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☆MFS101EA-Z  
※[Note] See below.

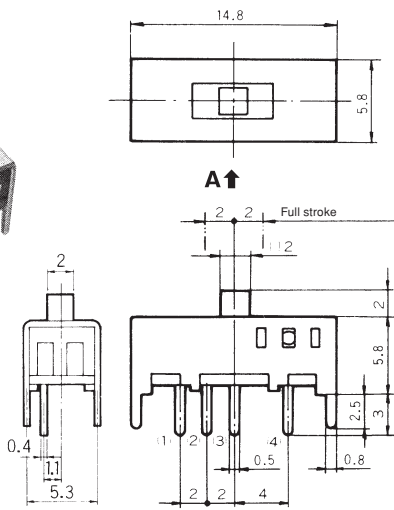
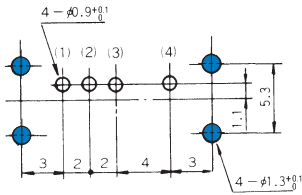


■ Specifications

Rating	Max.	DC30V 0.3A AC30V 2A (Resistive load)
	Min.	DC5V 10mA(Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles at DC30V 0.3A 100cycles at AC30V 2A	
Operating force	$2.45 \pm 0.98N$ $1.47 \pm 0.98N$	
Switch timing	Undefined	

■ PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

Switching function (Viewed from A)			Circuit diagram	No. of terminals
				4
ON	ON	ON		
3-1	3-2	3-4		

: Operating force from the center to the outer side (right or left).  
 : Operating force from the outer side (right or left) to the center.

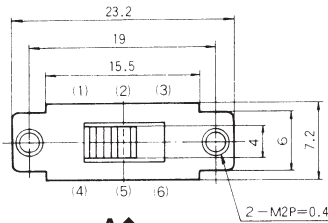
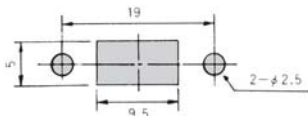
MFS201N-Z

Non-shorting



■ Panel Cut-Out Dimensions

(Top view)



Terminal numbers are not shown on the switch.

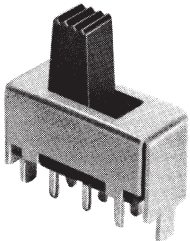
■ Specifications

Rating	Max.	AC125V 1A · DC30V 1A
	Min.	DC5V 10mA(Resistive load)
Initial contact resistance	30mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	300MΩ Min.	
Electrical life	5,000 cycles	
Operating force	0.98~4.9N	
Switch timing	Non-shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
			6
ON	ON		
2-1 5-4	2-3 5-6		

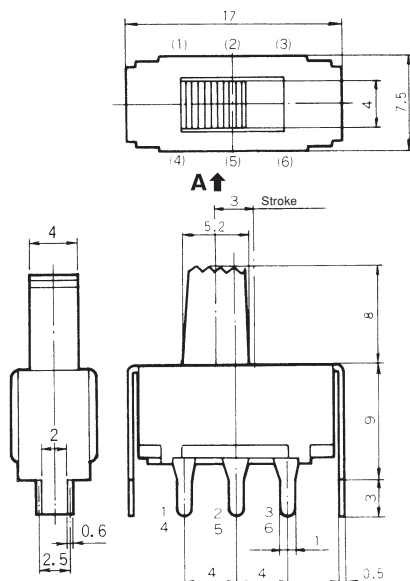
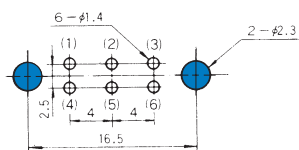
MFS201N-4-Z

Non-shorting



■ PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

■ Specifications

Rating	Max.	AC125V 1A · DC30V 1A
	Min.	DC5V 10mA(Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	300MΩ Min.	
Electrical life	5,000 cycles	
Operating force	1.47~4.41N	
Switch timing	Non-shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
			6
ON	ON		
2-1 5-4	2-3 5-6		

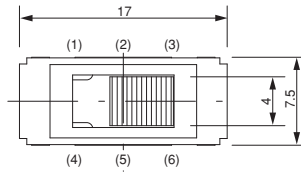
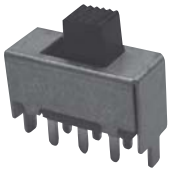
※ : Please note that MFS101EA-Z can be either Shorting or Non-shorting.

☆ : Semi-standard products.

# MFS

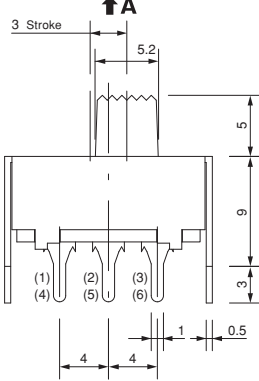
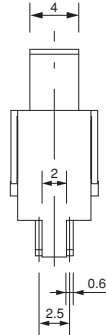
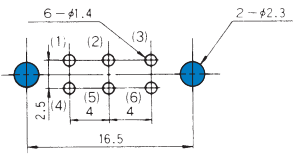
## MFS201N-9-Z

Non-shorting



### PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

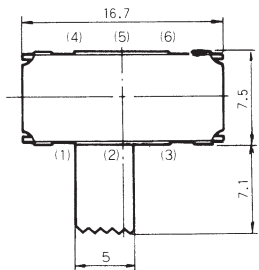
### Specifications

Rating	Max.	AC125V 1A · DC30V 1A
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	300MΩ Min.	
Electrical life	5,000 cycles	
Operating force	1.47~4.41N	
Switch timing	Non-shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
2-1	2-3		
5-4	5-6		

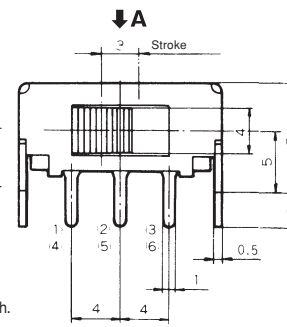
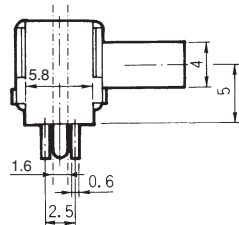
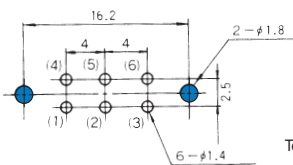
## MFS201N-16-Z

Non-shorting



### PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

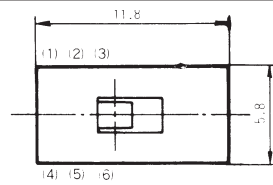
### Specifications

Rating	Max.	AC125V 1A · DC30V 1A
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	2.94±1.47N	
Switch timing	Non-shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
2-3	2-1		
5-6	5-4		

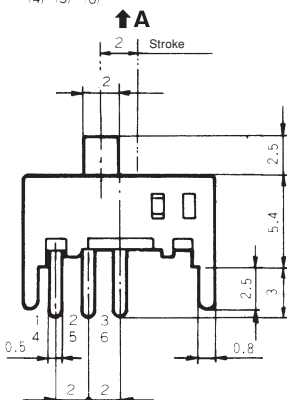
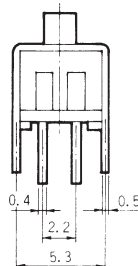
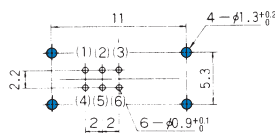
## MFS201N-19-Z

Shorting



### PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

### Specifications

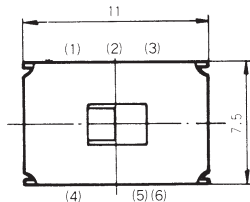
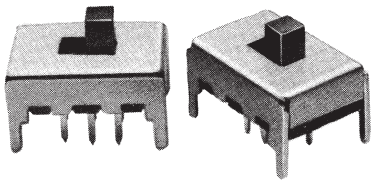
Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	2.45±0.98N	
Switch timing	ショートティング Shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
2-1	2-3		
5-4	5-6		

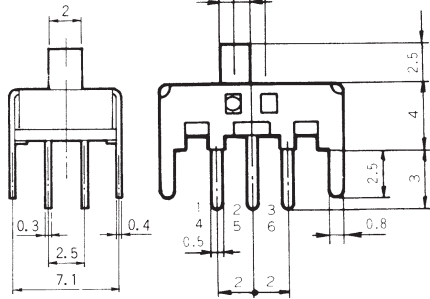
# MFS

## ★ MFS201N-20-Z

Shorting



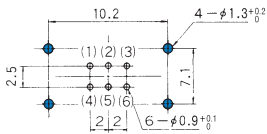
A ↑  
Stroke



Terminal numbers are not shown on the switch.

### PC Hole Layouts

(Top view)



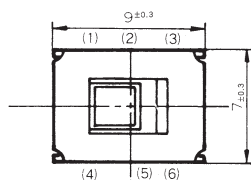
### Specifications

Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	4.41±1.47N	
Switch timing	Shorting	

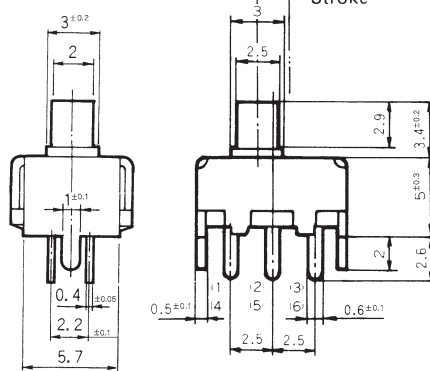
Switching function (Viewed from A)		Circuit diagram	No. of terminals
			6
2-1	2-3		
5-4	5-6		

## MFS201N-21-Z

Non-shorting



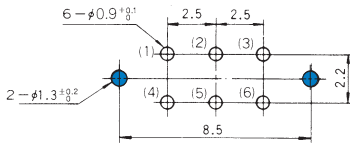
A ↑  
Stroke



Terminal numbers are not shown on the switch.

### PC Hole Layouts

(Top view)



### Specifications

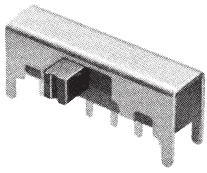
Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	2.45±0.98N	
Switch timing	Non-shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
			6
2-1	2-3		
5-4	5-6		

MFS

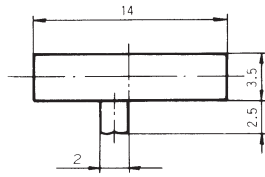
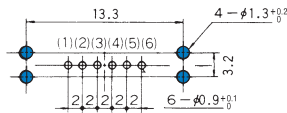
MFS201N-23-Z

Non-shorting

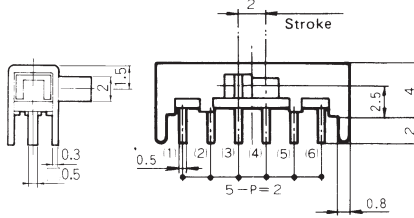


PC Hole Layouts

(Top view)



↓ A



Terminal numbers are not shown on the switch.

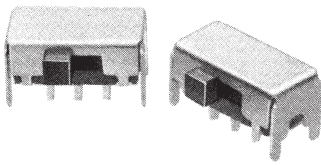
Specifications

Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	3.92±2.45N	
Switch timing	Non-shorting	

Switching function (Viewed from A)		Circuit diagram	No. of terminals
			6
2-3 5-6	2-1 5-4		

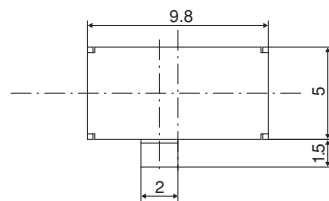
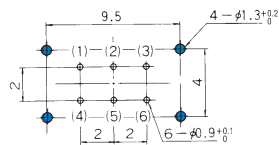
MFS201N-24-Z

Non-shorting

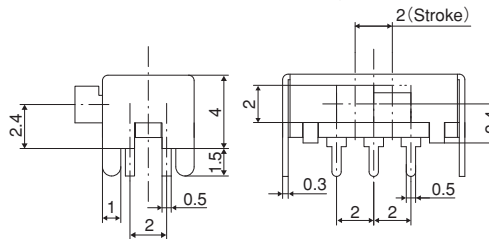


PC Hole Layouts

(Top view)



↓ A



Terminal numbers are not shown on the switch.

Specifications

Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	1.96±0.98N	
Switch timing	Non-shorting	

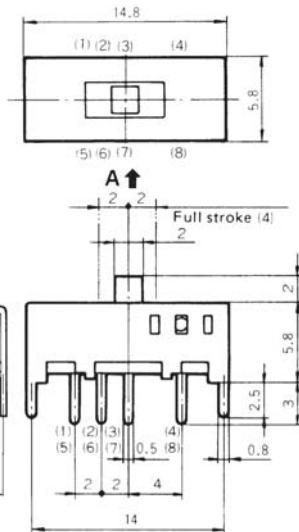
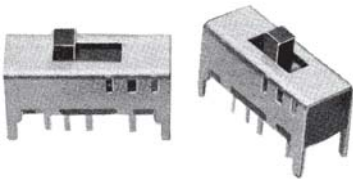
Switching function (Viewed from A)		Circuit diagram	No. of terminals
			6
2-3 5-6	2-1 5-4		



# MFS

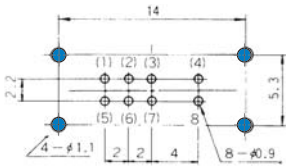
## ★MFS201PA-4-Z

※[Note] See below.



### ■PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

### ■ Specifications

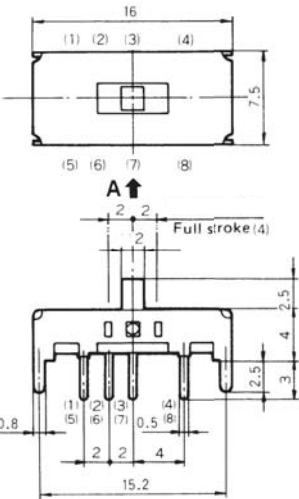
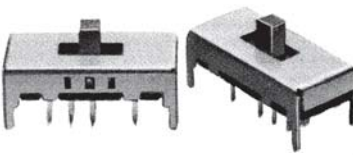
Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	$2.45 \pm 0.98\text{N}$ $1.47 \pm 0.98\text{N}$	
Switch timing	Undefined	

Switching function (Viewed from A)			Circuit diagram	No. of terminals
				8
ON	ON	ON		
3-1 7-5	3-2 7-6	3-4 7-8		

: Operating force from the center to the outer side (right or left).  
 : Operating force from the outer side (right or left) to the center.

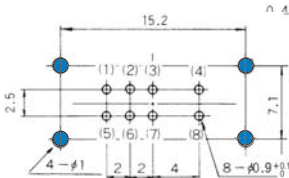
## ★MFS201PA-5-Z

※[Note] See below.



### ■PC Hole Layouts

(Top view)



Terminal numbers are not shown on the switch.

### ■ Specifications

Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	$4.41^{+1.67}_{-2.16}\text{N}$	
Switch timing	Undefined	

Switching function (Viewed from A)			Circuit diagram	No. of terminals
				8
ON	ON	ON		
3-1 7-5	3-2 7-6	3-4 7-8		

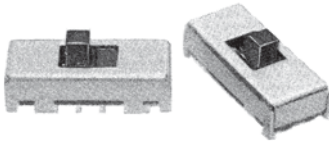
※ : Please note that MFS201PA-4-Z and MFS201PA-5-Z can be either Shorting or Non-shorting (See page 525).

★ : Made to order products.

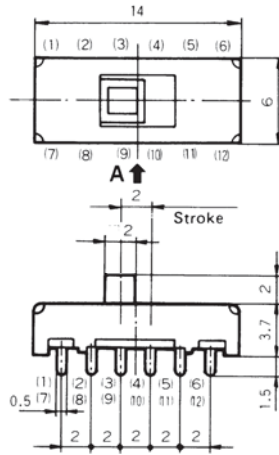
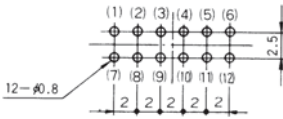


# MFS

## ★ MFS401N-2-Z Shorting



### ■ PC Hole Layouts (Top view)



Terminal numbers are not shown on the switch.

### ■ Specifications

Rating	Max.	DC30V 0.3A (Resistive load)
	Min.	DC5V 10mA (Resistive load)
Initial contact resistance	20mΩ Max.	
Dielectric strength	AC500V 1 minute	
Insulation resistance	100MΩ Min.	
Electrical life	5,000 cycles	
Operating force	0.98 N Max. (No detent)	
Switch timing	Shorting	

Switching function (Viewed from A)	Circuit diagram	No. of terminals
ON 2-1    2-3 5-4    5-6 8-7    8-9 11-10   11-12		12

### ■ Soldering

#### (1) Manual Soldering

Device : Soldering iron

Please refer to “MFS Series Heat-resistant Table” shown below.

#### (2) Auto Soldering

**MFS** series are not compatible with auto soldering. Soldering should be done manually.

#### (3) When soldering two or more terminals to the common land, use solder resist to solder them independently.

### ■ Flux Cleaning

#### (1) Solvent : Fluorine or Alcohol type.

#### (2) MSF Series are not process sealed. If the PC board is to be cleaned, clean the soldering surface of substrate with a brush so that the switch is not exposed to the cleaning solution.

### ■ Frequency of switch use

If the switch is not likely to be operated frequently (e.g. two or three operations a year) in the dry circuit area, a sulfide film is likely to be formed on the contacts, resulting in contact failure. If this is the case, gold-plated products are recommended. Please contact your local Nidec Copal Electronics sales representative.

### ■ MFS series heat-resistant table

Resin board	Model	Temperature
Resin board	MFS101D-6-Z	270°C MAX. 3sec MAX.
	MFS101D-9-Z	
	MFS101D-11-Z	
	MFS101D-15-Z	
Phenol board	MFS101D-8-Z	360°C MAX. 3sec MAX.
	MFS201N-19-Z	
	MFS201N-20-Z	
	MFS101D-10-Z	
	MFS101D-14-Z	
	MFS201N-Z	
	MFS201N-4-Z	
	MFS201N-9-Z	
	MFS201N-16-Z	
	MFS201N-21-Z	
	MFS201N-23-Z	
	MFS201N-24-Z	
	MFS201PA-4-Z	
	MFS101EA-Z	
	MFS201PA-5-Z	
	MFS401N-2-Z	

### ■ Packaging Specifications

