



**1 Form C / 2 Form C, 2 A,  
200 mW Nominal operating  
power relays**

## DS RELAYS



**RoHS compliant**

### FEATURES

1. 1 Form C / 2 Form C contact
2. Available 2 coil latching type
3. DIL terminal array enables use of IC sockets

### TYPICAL APPLICATIONS

1. Telecommunications and measuring devices
2. Office equipment
3. Computers and related equipment
4. Industrial equipment

## ORDERING INFORMATION

DS  E -  -

Contact arrangement

- 1: 1 Form C
- 2: 2 Form C

M: Standard type

S: High sensitivity type

Operating function

- Nil: Single side stable
- L2: 2 coil latching

Nominal coil voltage

DC 1.5, 3, 5, 6, 9, 12, 24, 48 V

Note: \* Nominal coil voltage 1.5V type are 1 Form C only.

## TYPES

| Contact arrangement | Nominal coil voltage | High sensitivity type   |                      | Standard type           |                      |
|---------------------|----------------------|-------------------------|----------------------|-------------------------|----------------------|
|                     |                      | Single side stable type | 2 coil latching type | Single side stable type | 2 coil latching type |
|                     |                      | Part No.                | Part No.             | Part No.                | Part No.             |
| 1 Form C            | 1.5 V DC             | DS1E-S-DC1.5V           | DS1E-SL2-DC1.5V      | DS1E-M-DC1.5V           | DS1E-ML2-DC1.5V      |
|                     | 3 V DC               | DS1E-S-DC3V             | DS1E-SL2-DC3V        | DS1E-M-DC3V             | DS1E-ML2-DC3V        |
|                     | 5 V DC               | DS1E-S-DC5V             | DS1E-SL2-DC5V        | DS1E-M-DC5V             | DS1E-ML2-DC5V        |
|                     | 6 V DC               | DS1E-S-DC6V             | DS1E-SL2-DC6V        | DS1E-M-DC6V             | DS1E-ML2-DC6V        |
|                     | 9 V DC               | DS1E-S-DC9V             | DS1E-SL2-DC9V        | DS1E-M-DC9V             | DS1E-ML2-DC9V        |
|                     | 12 V DC              | DS1E-S-DC12V            | DS1E-SL2-DC12V       | DS1E-M-DC12V            | DS1E-ML2-DC12V       |
|                     | 24 V DC              | DS1E-S-DC24V            | DS1E-SL2-DC24V       | DS1E-M-DC24V            | DS1E-ML2-DC24V       |
|                     | 48 V DC              | DS1E-S-DC48V            | DS1E-SL2-DC48V       | DS1E-M-DC48V            | DS1E-ML2-DC48V       |
| 2 Form C            | 3 V DC               | DS2E-S-DC3V             | DS2E-SL2-DC3V        | —                       | —                    |
|                     | 5 V DC               | DS2E-S-DC5V             | DS2E-SL2-DC5V        | —                       | —                    |
|                     | 6 V DC               | DS2E-S-DC6V             | DS2E-SL2-DC6V        | —                       | —                    |
|                     | 9 V DC               | DS2E-S-DC9V             | DS2E-SL2-DC9V        | —                       | —                    |
|                     | 12 V DC              | DS2E-S-DC12V            | DS2E-SL2-DC12V       | —                       | —                    |
|                     | 24 V DC              | DS2E-S-DC24V            | DS2E-SL2-DC24V       | —                       | —                    |
|                     | 48 V DC              | DS2E-S-DC48V            | DS2E-SL2-DC48V       | —                       | —                    |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

## RATING

## 1. Coil data

## 1) Single side stable type

| Type                      | Nominal coil voltage | Pick-up voltage (at 20°C 68°F)                         | Drop-out voltage (at 20°C 68°F)           | Nominal operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Nominal operating power | Max. applied voltage (at 50°C 122°F)   |
|---------------------------|----------------------|--|---|---|---------------------------------------|-------------------------|--|
| Standard (M) type         | 1.5 V DC             | 70%V or less of nominal voltage (Initial)              | 10%V or more of nominal voltage (Initial) | 266.7 mA  | 5.63 Ω                                | 400 mW                  | 1 Form C:<br>120%V of nominal voltage  |
|                           | 3 V DC               |  |   | 133.3 mA  | 22.5 Ω                                |                         |  |
|                           | 5 V DC               |  |   | 80.0 mA   | 62.5 Ω                                |                         |  |
|                           | 6 V DC               |  |   | 66.7 mA   | 90 Ω                                  |                         |  |
|                           | 9 V DC               |  |   | 44.4 mA   | 203 Ω                                 |                         |  |
|                           | 12 V DC              |  |   | 33.3 mA   | 360 Ω                                 |                         |  |
|                           | 24 V DC              |  |   | 16.7 mA   | 1,440 Ω                               |                         |  |
| High sensitivity (S) type | 1.5 V DC             | 1 Form C:<br>80%V or less of nominal voltage           | 10%V or more of nominal voltage (Initial) | 133.3 mA  | 11.3 Ω                                | 200 mW                  | 1 Form C:<br>160%V of nominal voltage<br><br>2 Form C:<br>220%V of nominal voltage |
|                           | 3 V DC               |  |   | 66.7 mA   | 45 Ω                                  |                         |  |
|                           | 5 V DC               |  |   | 40.0 mA   | 125 Ω                                 |                         |  |
|                           | 6 V DC               | 2 Form C:<br>70%V or less of nominal voltage (Initial) |   | 33.3 mA   | 180 Ω                                 |                         |  |
|                           | 9 V DC               |  |   | 22.2 mA   | 405 Ω                                 |                         |  |
|                           | 12 V DC              |  |   | 16.7 mA   | 720 Ω                                 |                         |  |
|                           | 24 V DC              | 8.3 mA   |   | 2,880 Ω   |                                       |                         |  |
| 48 V DC                   | 4.2 mA               | 11,520 Ω   |   |   |                                       |                         |  |

## 2) 2 coil latching type

| Type                      | Nominal coil voltage | Set voltage (at 20°C 68°F)                             | Reset voltage (at 20°C 68°F)   | Nominal operating current [±10%] (at 20°C 68°F) |            | Coil resistance [±10%] (at 20°C 68°F) |            | Nominal operating power |            | Max. applied voltage (at 50°C 122°F)   |
|---------------------------|----------------------|--|--|---|------------|---------------------------------------|------------|-------------------------|------------|--|
|                           |                      |  |  | Set coil  | Reset coil | Set coil                              | Reset coil | Set coil                | Reset coil |  |
| Standard (M) type         | 1.5 V DC             | 70%V or less of nominal voltage (Initial)              | 70%V or less of nominal voltage (Initial)  | 240 mA  | 240 mA     | 6.25 Ω                                | 6.25 Ω     | 360 mW                  | 360 mW     | 1 Form C:<br>120%V of nominal voltage  |
|                           | 3 V DC               |  |  | 120 mA  | 120 mA     | 25 Ω                                  | 25 Ω       |                         |            |  |
|                           | 5 V DC               |  |  | 72 mA   | 72 mA      | 69.4 Ω                                | 69.4 Ω     |                         |            |  |
|                           | 6 V DC               |  |  | 60 mA   | 60 mA      | 100 Ω                                 | 100 Ω      |                         |            |  |
|                           | 9 V DC               |  |  | 40 mA   | 40 mA      | 225 Ω                                 | 225 Ω      |                         |            |  |
|                           | 12 V DC              |  |  | 30 mA   | 30 mA      | 400 Ω                                 | 400 Ω      |                         |            |  |
|                           | 24 V DC              |  |  | 15 mA   | 15 mA      | 1,600 Ω                               | 1,600 Ω    |                         |            |  |
| High sensitivity (S) type | 1.5 V DC             | 1 Form C:<br>80%V or less of nominal voltage           | 1 Form C:<br>80%V or less of nominal voltage<br><br>2 Form C:<br>70%V or less of nominal voltage (Initial) | 120 mA  | 120 mA     | 12.5 Ω                                | 12.5 Ω     | 180 mW                  | 180 mW     | 1 Form C:<br>160%V of nominal voltage<br><br>2 Form C:<br>220%V of nominal voltage |
|                           | 3 V DC               |  |  | 60 mA   | 60 mA      | 50 Ω                                  | 50 Ω       |                         |            |  |
|                           | 5 V DC               |  |  | 36 mA   | 36 mA      | 139 Ω                                 | 139 Ω      |                         |            |  |
|                           | 6 V DC               | 2 Form C:<br>70%V or less of nominal voltage (Initial) |  | 30 mA   | 30 mA      | 200 Ω                                 | 200 Ω      |                         |            |  |
|                           | 9 V DC               |  |  | 20 mA   | 20 mA      | 450 Ω                                 | 450 Ω      |                         |            |  |
|                           | 12 V DC              |  |  | 15 mA   | 15 mA      | 800 Ω                                 | 800 Ω      |                         |            |  |
|                           | 24 V DC              | 7.5 mA   |  | 7.5 mA  | 3,200 Ω    | 3,200 Ω                               |            |                         |            |  |
| 48 V DC                   | 3.75 mA              | 3.75 mA  | 12,800 Ω   | 12,800 Ω  |            |                                       |            |                         |            |  |

## 2. Specifications

| Characteristics            | Item  |                          | Specifications  |                           |
|----------------------------|---|--------------------------|---|---------------------------|
| Contact                    | Arrangement                                       |                          | 1 Form C  | 2 Form C                  |
|                            | Initial contact resistance, max.                  |                          | Max. 50 mΩ (By voltage drop 6 V DC 1A)  |                           |
|                            | Contact material                                  |                          | Ag+Au clad  |                           |
| Rating                     | Nominal switching capacity                        |                          | 2 A 30 V DC (resistive load)  |                           |
|                            | Max. switching power                              |                          | 60 W, 125 VA (resistive load)   |                           |
|                            | Max. switching voltage                            |                          | 220 V DC, 250 V AC  |                           |
|                            | Max. carrying current                             |                          | 3 A   |                           |
|                            | Min. switching capacity (Reference value)*1       |                          | 10μA 10m V DC   |                           |
|                            | Nominal operating power                           |                          | Single side stable (M type: 400 mW, S type: 200 mW);<br>latching (M type: 360 mW, S type: 180 mW)                               |                           |
| Electrical characteristics | Insulation resistance (Initial)                   |                          | Min. 100MΩ (at 500V DC)<br>Measurement at same location as "Initial breakdown voltage" section.                                 |                           |
|                            | Breakdown voltage (Initial)                       | Between open contacts    | 1,000 Vrms for 1min.<br>(500 Vrms for 1min: 1 Form C type) (Detection current: 10mA.)   |                           |
|                            |   | Between contact and coil | 1,500 Vrms for 1min.<br>(1,000 Vrms for 1min: 1 Form C type) (Detection current: 10mA.)   |                           |
|                            | Temperature rise                                  |                          | Max. 65°C<br>(By resistive method, nominal coil voltage applied to the coil, contact carrying current: 2A.)                     |                           |
|                            | Operate time [Set time] (at 20°C 68°F)            |                          | Max. 10 ms [10 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.)                                   |                           |
|                            | Release time [Reset time] (at 20°C 68°F)          |                          | Max. 5 ms [10 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.)<br>(without diode)                 |                           |
| Mechanical characteristics | Shock resistance                                  | Functional*2             | Min. 490 m/s <sup>2</sup>   | Min. 490 m/s <sup>2</sup> |
|                            |   | Destructive              | Min. 980 m/s <sup>2</sup> (Half-wave pulse of sine wave: 6 ms.)   |                           |
|                            | Vibration resistance                              | Functional               | 10 to 55 Hz at double amplitude of 3.3 mm (Detection time: 10μs.)   |                           |
|                            |   | Destructive              | 10 to 55 Hz at double amplitude of 5 mm   |                           |
| Expected life              | Mechanical  |                          | Min. 10 <sup>8</sup> (10 <sup>7</sup> : 1 Form C latching type) (at 600 cpm)  |                           |
|                            | Electrical  |                          | Min. 5×10 <sup>5</sup> rated load (at 60 cpm)   |                           |
| Conditions                 | Conditions for operation, transport and storage*3 |                          | Ambient temperature: -40°C to +70°C -40°F to +158°F<br>Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) |                           |
|                            | Max. operating speed (at rated load)              |                          | 60 cpm  |                           |
| Unit weight                |   |                          | Approx. 3 g .11 oz  | Approx. 4g .14oz          |

Notes: \*1 This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load. TX/TX-S/TX-D relay AgPd contact type are available for low level load switching (10V DC, 10mA max. level).

\*2 Half-wave pulse of sine wave: 1 ms; detection time: 10μs

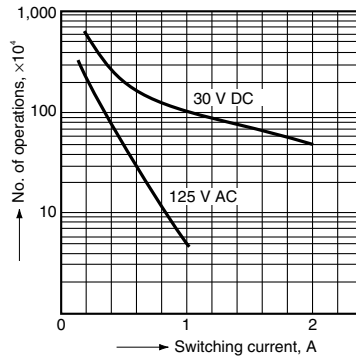
\*3 Refer to "AMBIENT ENVIRONMENT" in GENERAL APPLICATION GUIDELINES.

# REFERENCE DATA

## 1. Maximum switching capacity



## 2. Life curve (Resistive load)



## 3. Contact reliability for AC loads

Tested sample: DS2E-S-DC24V 10 pcs.  
 Operating speed: 20 cpm.  
 Detection level: 200 mΩ

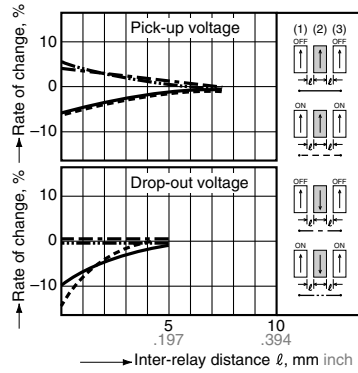


## 4. Operate and release time characteristics (2 Form C single side stable type)

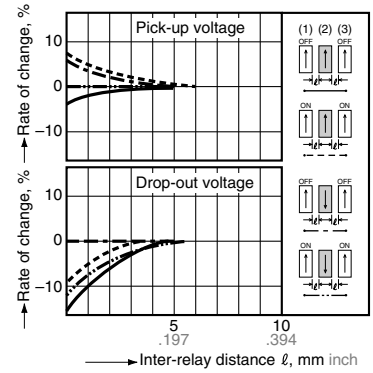
Test condition: Without diode connected to coil in parallel



## 5-(1). Influence of adjacent mounting (1 Form C)



## 5-(2). Influence of adjacent mounting (2 Form C)



# DIMENSIONS (mm inch)

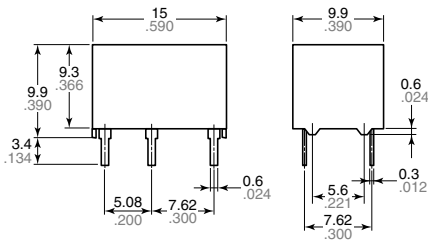
The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

## DS (1 Form C)

Single side stable, 2 coil latching

**CAD Data**

External dimensions

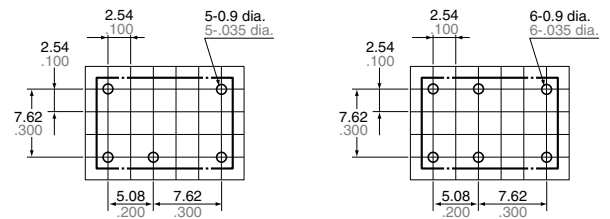


General tolerance:  $\pm 0.3 \pm 0.012$

PC board pattern (Bottom view)

Single side stable

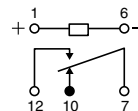
2 coil latching



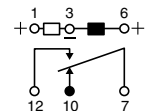
Schematic (Bottom view)

Single side stable

2 coil latching



(Deenergized condition)



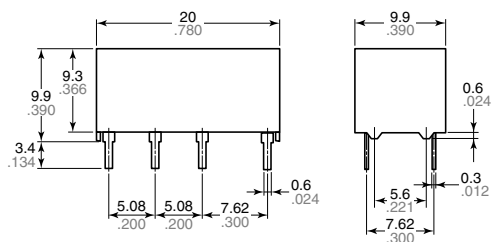
(Reset condition)

Tolerance:  $\pm 0.1 \pm 0.004$

**DS (2 Form C)**  
Single side stable

**CAD Data**

External dimensions



General tolerance:  $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)



Schematic (Bottom view)



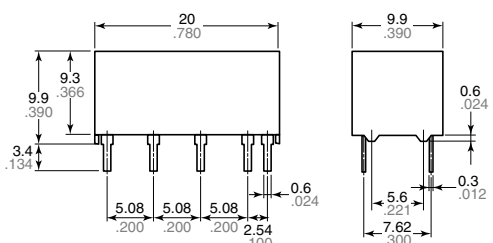
(Deenergized condition)

Tolerance:  $\pm 0.1 \pm 0.04$

**DS (2 Form C)**  
2 coil latching

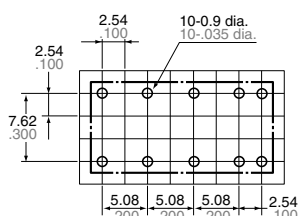
**CAD Data**

External dimensions



General tolerance:  $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)



Schematic (Bottom view)



(Reset condition)

Tolerance:  $\pm 0.1 \pm 0.04$

**NOTES**

**1. Coil connection**

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

**For general cautions for use, please refer to the "Cautions for use of Signal Relays" or "General Application Guidelines".**

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