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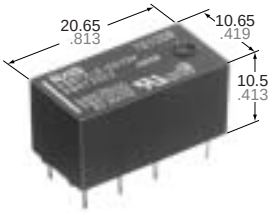
NAiS

**4,000 V BREAKDOWN VOLTAGE DS RELAYS**

# DS-BT RELAYS




mm inch

## FEATURES

- **4,000 V breakdown voltage**
- **Reinforced insulation between coil and contacts**
- **Surge voltage withstand: 1500 V FCC Parts 68**

## SPECIFICATIONS

### Contact

| | | | |
|---|---|---|---|
| Arrangement | | 2 Form C | 2 Form D |
| Initial contact resistance, max. (By voltage drop 6 V DC 1 A) | | 50 mΩ | |
| Contact material | | Gold-clad silver | |
| Rating (resistive load) | Nominal switching capacity | 2 A 30 V DC | 1 A 30 V DC |
| | Max. switching power | 60 W, 125 VA | 30 W, 62.5 VA |
| | Max. switching voltage | 220 V DC, 250 V AC | |
| | Max. switching current | 2 A | 1 A |
| | Min. switching capacity**[1] | 10 μA 10 mV DC | |
| Electrical life (min. ope.) | Mechanical (at 180 cpm) | $2\times10^7$ | $10^6$ |
| | Electrical (at 20 cpm) | $2\times10^5$ | |

**[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.

### Coil

| Arrangement | 2 Form C | 2 Form D |
|---|---|---|
| Nominal operating power | 360 mW | 540 mW |

**Remarks**

* Specifications will vary with foreign standards certification ratings.
*[1] Measurement at same location as "Initial breakdown voltage" section
*[2] Detection current: 10mA
*[3] Excluding contact bounce time
*[4] Half-wave pulse of sine wave: 11ms, detection time: 10μs
*[5] Half-wave pulse of sine wave: 6ms
*[6] Detection time: 10μs
*[7] Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT in catalog

### Characteristics

| | | | |
|---|---|---|---|
| Arrangement | | 2 Form C | 2 Form D |
| Max. operating speed | | 60 cpm at rated load | |
| Initial insulation resistance*[1] | | Min. 100 MΩ (at 500 V DC) | |
| Initial break-down voltage*[2] | Between open contacts | 750 Vrms for 1 min. | 500 Vrms for 1 min. |
| | Between contacts and coil | 4,000 Vrms for 1 min. | |
| | Between contacts sets | 750 V | 500 V |
| FCC surge voltage between open contacts | | 1,500 V | |
| Operate time*[3] (at nominal voltage) | | Approx. 3 ms | |
| Release time (without diode)*[3] (at nominal voltage) | | Approx. 2 ms | |
| Temperature rise | | Max. 65°C | |
| Vibration resistance | Functional*[4] | 10 to 55 Hz at double amplitude of 3.3 mm | |
| | Destruction*[5] | 10 to 55 Hz at double amplitude of 5 mm | |
| Shock resistance | Functional*[6] | Min. 294 m/s² (30 G) | |
| | Destruction | Min. 980 m/s² (100 G) | |
| Conditions for operation, transport and storage*[7] (Not freezing and condensing at low temperature) | Ambient temp. | –40°C to +70°C –40°F to +158°F | –40°C to +60°C –40°F to +140°F |
| | Humidity | 5 to 85%R.H. | |
| Unit weight | | Approx. 4.0 g 0.14 oz | |

## TYPICAL APPLICATIONS

Modem
Facsimile
Telecommunication equipment

## ORDERING INFORMATION

DSBT | 2 | M | 2D | DC3V

| Contact arrangement | Sensitivity | MBB function | Coil voltage |
|---|---|---|---|
| 2: 2 Form C or 2 Form D | S: 360 mW (2 Form C only)<br>M: 540 mW (2 Form D only) | Nil: BBM (Form C)<br>2D: 2MBB (2 Form D) | DC 1.5, 3, 5, 6, 9, 12, 24 V |

Note: Standard packing; Carton: 25 pcs. Case 1,000 pcs.

## TYPES AND COIL DATA (at 20°C 68°F)

**1) 2 Form C type**

| Operating function | Part No. | Coil voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Nominal operating current, mA (±10%) | Coil resistance, Ω (±10%) | Nominal operating power, mW | Max. allowable voltage, V DC (at 50°C 122°F) |
|---|---|---|---|---|---|---|---|---|
| Single side stable | DSBT2-S-DC1.5V | 1.5 | 1.125 | 0.15 | 240 | 6.25 | 360 | 1.95 |
| | DSBT2-S-DC3V | 3 | 2.25 | 0.3 | 120 | 25 | | 3.9 |
| | DSBT2-S-DC5V | 5 | 3.75 | 0.5 | 72 | 69.4 | | 6.5 |
| | DSBT2-S-DC6V | 6 | 4.5 | 0.6 | 60 | 100 | | 7.8 |
| | DSBT2-S-DC9V | 9 | 6.75 | 0.9 | 40 | 225 | | 11.7 |
| | DSBT2-S-DC12V | 12 | 9 | 1.2 | 30 | 400 | | 15.6 |
| | DSBT2-S-DC24V | 24 | 18 | 2.4 | 15 | 1,600 | | 31.2 |

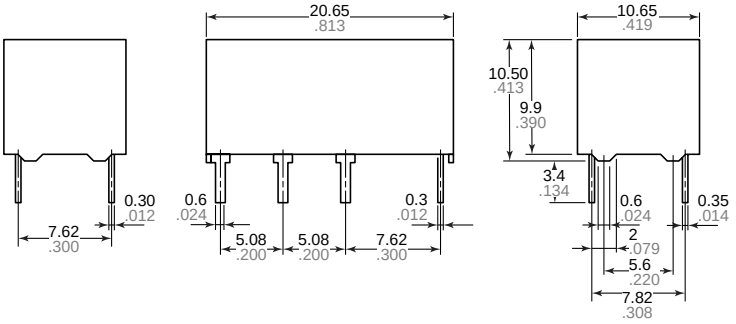
**2) 2 Form D type**

| Operating function | Part No. | Coil voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Nominal operating current, mA (±10%) | Coil resistance, Ω (±10%) | Nominal operating power, mW | Max. allowable voltage, V DC (at 50°C 122°F) |
|---|---|---|---|---|---|---|---|---|
| Single side stable | DSBT2-M-2D-DC1.5V | 1.5 | 1.125 | 0.15 | 360 | 4.2 | 540 | 1.8 |
| | DSBT2-M-2D-DC3V | 3 | 2.25 | 0.3 | 180 | 16.7 | | 3.6 |
| | DSBT2-M-2D-DC5V | 5 | 3.75 | 0.5 | 108 | 46.3 | | 6 |
| | DSBT2-M-2D-DC6V | 6 | 4.5 | 0.6 | 90 | 66.7 | | 7.2 |
| | DSBT2-M-2D-DC9V | 9 | 6.75 | 0.9 | 60 | 150 | | 10.8 |
| | DSBT2-M-2D-DC12V | 12 | 9 | 1.2 | 45 | 266.7 | | 14.4 |
| | DSBT2-M-2D-DC24V | 24 | 18 | 2.4 | 22.5 | 1,066.7 | | 28.8 |

Note: Standard packing Tube: 25 pcs. Case: 1,000 pcs.

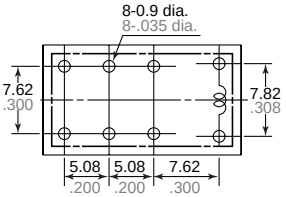
## DIMENSIONS

mm inch



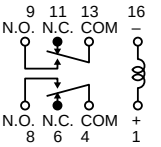

General tolerance: ±0.3 ± .012

PC board pattern (Bottom view)




Tolerance: ±0.1 ± .004

Schematic (Bottom view)

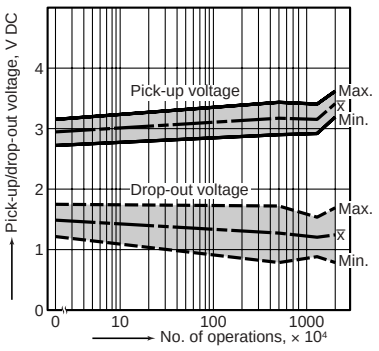



## REFERENCE DATA

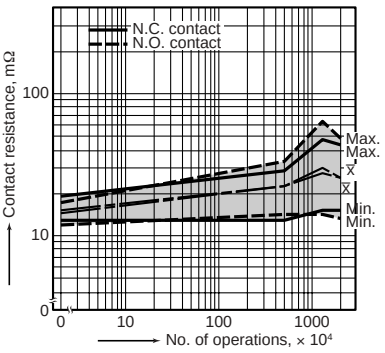
1. Mechanical life test

Tested sample: DSBT2-S-DC5V, 10 pcs.
Coil applied voltage: 5 V DC
Operating frequency: 30 cpm

Change of pick-up and drop-out voltage

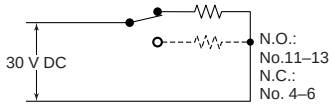


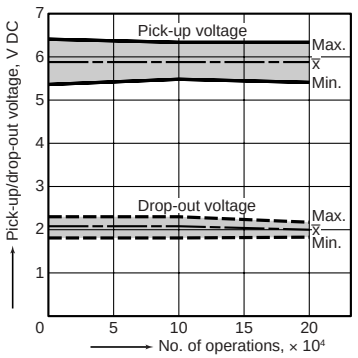

Change of contact resistance

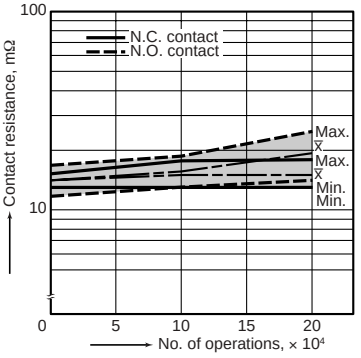


## 2. Electrical life test (resistive)

Tested sample: DSBT2-S-DC12V, 6 pcs.
Condition: 2 A 30 V DC resistive load, 30 cpm
Circuit

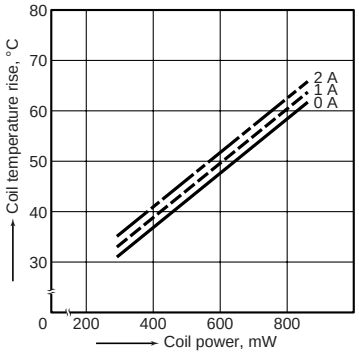


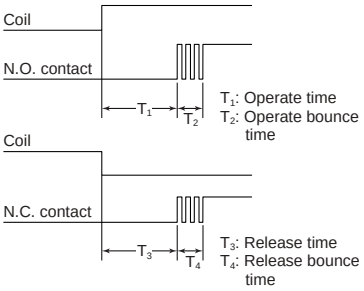

## 3. Coil temperature rise

Tested sample: DSBT2-S-DC12V, 5 pcs.
Measured portion: Inside the coil

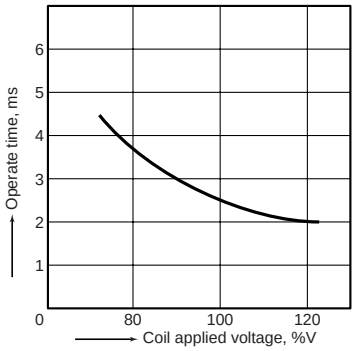



## 4. Operate and release time characteristics

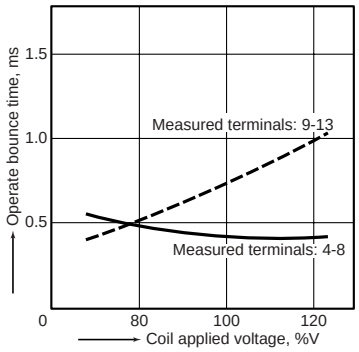
Tested sample: DSBT2-S-DC5V, 10 pcs.
Ambient temperature: 23°C 73°F



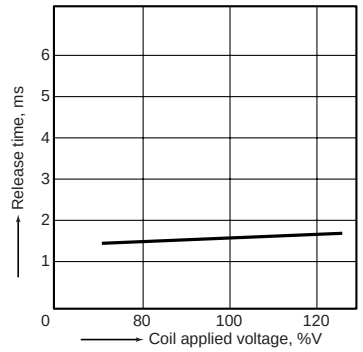

Without diode ($T_1$)



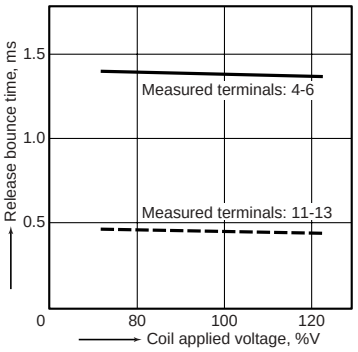

Without diode ($T_2$)




Without diode ($T_3$)

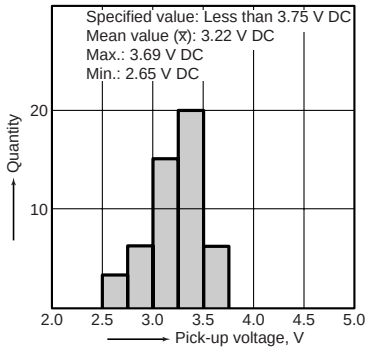



Without diode ($T_4$)

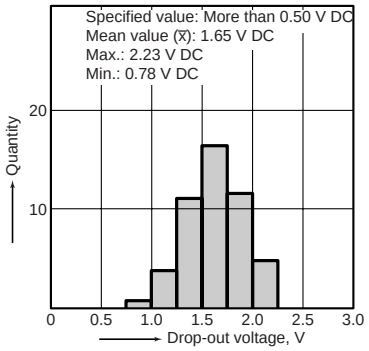



## 5. Distribution of pick-up and drop-out voltage

Tested sample: DSBT2-S-DC5V, 50 pcs.
Pick-up voltage

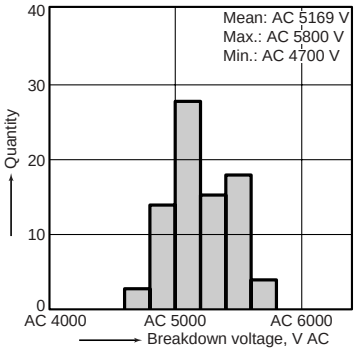



Drop-out voltage




## 6. Distribution of breakdown voltage

(between contacts and coil)
Tested sample: DSBT2-S-DC5V, 100 pcs.




**For Cautions for Use, see Relay Technical Information in catalog.**