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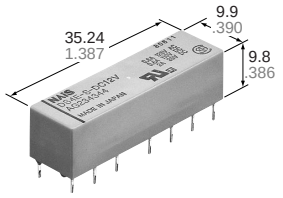
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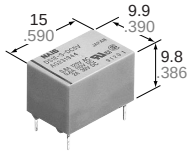
NAiS

HIGHLY SENSITIVE 1500 V FCC SURGE WITHSTANDING MINIATURE RELAY

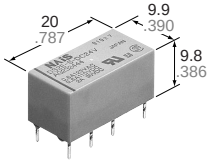
DS-RELAYS



DS4E



DS1E



DS2E

mm inch

FEATURES

- **High sensitivity: 200 mW pick-up power**
  100 mW pick-up power types available
- **Latching types available**
- **High switching capacity: 60 W, 125 V A**
- **High breakdown voltage: 1,500 V FCC surge between open contacts**
  1,000 V AC between open contacts
- **DIP-1C type can be used with 14 pin IC socket**
  2C type can be used with 16 pin IC socket,
  4C type can be used with 2 sets of 14 pin IC sockets
- **Gold-cap silver palladium types available for 2 Form C type**
- **Bifurcated contacts are standard**

SPECIFICATIONS

Contact

Arrangement		1 Form C, 2 Form C, 4 Form C
Initial contact resistance, max. (By voltage drop 6 V DC 1 A)		50 mΩ
Contact material		Gold-clad sliver
Rating (resistive)	Max. switching power	60 W, 125 VA
	Max. switching voltage	220 V DC, 250 V AC
	Max. switching current	2 A DC, AC
	Max. carrying current	3 A DC, AC
Expected life (min. operations)	Mechanical (at 600 cpm)	10^8 (10^7 1 Form C 2 coil latching type)
	Electrical 2 A 30 VDC resistive	5×10^5

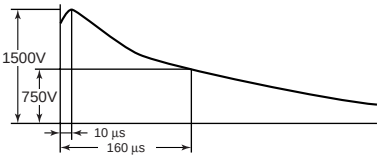
* Gold capped silver-palladium contact also available for 2 Form C 10^7 operations at 0.1 A 50 V DC resistive

Coil (polarized) (at 20°C 68°F)

M type	Single side stable	Minimum operating power	Approx. 200 mW
		Nominal operating power	Approx. 400 mW
	1 coil latching	Minimum set and reset power	Approx. 90 mW
		Nominal set and reset power	Approx. 180 mW
	2 coil latching	Minimum set and reset power	Approx. 180 mW
		Nominal set and reset power	Approx. 360 mW
S type	Single side stable	Minimum operating power	Approx. 100 mW (128 mW)*
		Nominal operating power	Approx. 200 mW
	1 coil latching	Minimum set and reset power	Approx. 45 mW (58 mW)*
		Nominal set and reset power	Approx. 90 mW
	2 coil latching	Minimum set and reset power	Approx. 90 mW (115 mW)*
		Nominal set and reset power	Approx. 180 mW

* For 1 Form C high sensitive types.

FCC (Federal Communication Commission) requests following standard as Breakdown Voltage specification.



Characteristics (at 20°C 68°F)

Max. operating speed		20 cpm at rated load 50 cps at low level load	
Initial insuration resistance*1		Min. 100 MΩ (at 500 V DC)	
Initial breakdown voltage*2	Type of relay	(DS1-S type)	(Other types)
	Between open contacts	500 Vrms	1,000 Vrms
	Between contacts sets	—	1,000 Vrms
	Between contacts and coil	1,000 Vrms	1,500 Vrms
FCC surge voltage between contacts and coil		1,500 V (Expect DS1-S type)	
Operate time*3 (at nominal voltage)		Approx. 3 ms	
Release time (without diode)*3 (at nominal voltage)		Approx. 2 ms	
Set time*3 (at nominal voltage)		Approx. 3 ms	
Reset time*3 (at nominal voltage)		Approx. 3 ms	
Temperature rise (at nominal voltage, Contact current: 2A)		Max. 65°C	
Shock resistance	Functional*4	1C, 2C:Min. 490 m/s² {50 G} 4C:Min. 294 m/s² {30 G}	
	Destructive*5	Min. 980 m/s² {100 G}	
Vibration resistance	Functional*6	10 to 55 Hz at double amplitude of 3.3 mm	
	Destructive	10 to 55 Hz at double amplitude of 5 mm	
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	
	Humidity	5 to 85% R.H.	
Unit weight	1 Form C	Approx. 3.2g .11oz	
	2 Form C	Approx. 4g .14oz	
	4 Form C	Approx. 7g .25oz	

Remarks

* Specifications will vary with foreign standards certification ratings.
*1 Measurement at same location as "Initial breakdown voltage" section
*2 Detection current: 10 mA
*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 (Page 61)

TYPICAL APPLICATIONS

- Telecommunication equipment
- Office equipment
- Computer peripherals
- Security equipment
- Measuring instrumentation

ORDERING INFORMATION

Ex DS [2] [E] — [M] [L2] – [DC 48 V] — [R] *

Contact arrangement	Classification of type	Sensitivity	Operating function	Coil voltage
1: 1 Form C 2: 2 Form C 4: 4 Form C	E: Amber sealed type	M: 400 mW nominal operating power S: 200 mW nominal operating power	Nil: Single side stable L: 1 coil latching L2: 2 coil latching	DC 1.5, 3, 5, 6, 9, 12, 24, 48 V

*Reverse polarity types available (add suffix-R). Standard packing: Carton: 50 pcs.; Case: 500 pcs.

TYPES

Single side stable

	Nominal Voltage, V DC	Part No.		
		1 Form C	2 Form C	4 Form C
M (400 mW) type	1.5	DS1E-M-DC1.5V	DS2E-M-DC1.5V	DS4E-M-DC1.5V
	3	DS1E-M-DC3V	DS2E-M-DC3V	DS4E-M-DC3V
	5	DS1E-M-DC5V	DS2E-M-DC5V	DS4E-M-DC5V
	6	DS1E-M-DC6V	DS2E-M-DC6V	DS4E-M-DC6V
	9	DS1E-M-DC9V	DS2E-M-DC9V	DS4E-M-DC9V
	12	DS1E-M-DC12V	DS2E-M-DC12V	DS4E-M-DC12V
	24	DS1E-M-DC24V	DS2E-M-DC24V	DS4E-M-DC24V
	48	DS1E-M-DC48V	DS2E-M-DC48V	DS4E-M-DC48V
S (200 mW) type	1.5	DS1E-S-DC1.5V	DS2E-S-DC1.5V	DS4E-S-DC1.5V
	3	DS1E-S-DC3V	DS2E-S-DC3V	DS4E-S-DC3V
	5	DS1E-S-DC5V	DS2E-S-DC5V	DS4E-S-DC5V
	6	DS1E-S-DC6V	DS2E-S-DC6V	DS4E-S-DC6V
	9	DS1E-S-DC9V	DS2E-S-DC9V	DS4E-S-DC9V
	12	DS1E-S-DC12V	DS2E-S-DC12V	DS4E-S-DC12V
	24	DS1E-S-DC24V	DS2E-S-DC24V	DS4E-S-DC24V
	48	DS1E-S-DC48V	DS2E-S-DC48V	DS4E-S-DC48V

1 coil latching

	Nominal Voltage, V DC	Part No.		
		1 Form C	2 Form C	4 Form C
M (180 mW) type	1.5	DS1E-ML-DC1.5V	DS2E-ML-DC1.5V	DS4E-ML-DC1.5V
	3	DS1E-ML-DC3V	DS2E-ML-DC3V	DS4E-ML-DC3V
	5	DS1E-ML-DC5V	DS2E-ML-DC5V	DS4E-ML-DC5V
	6	DS1E-ML-DC6V	DS2E-ML-DC6V	DS4E-ML-DC6V
	9	DS1E-ML-DC9V	DS2E-ML-DC9V	DS4E-ML-DC9V
	12	DS1E-ML-DC12V	DS2E-ML-DC12V	DS4E-ML-DC12V
	24	DS1E-ML-DC24V	DS2E-ML-DC24V	DS4E-ML-DC24V
	48	DS1E-ML-DC48V	DS2E-ML-DC48V	DS4E-ML-DC48V
S (90 mW) type	1.5	DS1E-SL-DC1.5V	DS2E-SL-DC1.5V	DS4E-SL-DC1.5V
	3	DS1E-SL-DC3V	DS2E-SL-DC3V	DS4E-SL-DC3V
	5	DS1E-SL-DC5V	DS2E-SL-DC5V	DS4E-SL-DC5V
	6	DS1E-SL-DC6V	DS2E-SL-DC6V	DS4E-SL-DC6V
	9	DS1E-SL-DC9V	DS2E-SL-DC9V	DS4E-SL-DC9V
	12	DS1E-SL-DC12V	DS2E-SL-DC12V	DS4E-SL-DC12V
	24	DS1E-SL-DC24V	DS2E-SL-DC24V	DS4E-SL-DC24V
	48	DS1E-SL-DC48V	DS2E-SL-DC48V	DS4E-SL-DC48V

2 coil latching

	Nominal Voltage, V DC	Part No.		
		1 Form C	2 Form C	4 Form C
M (360 mW) type	1.5	DS1E-ML2-DC1.5V	DS2E-ML2-DC1.5V	DS4E-ML2-DC1.5V
	3	DS1E-ML2-DC3V	DS2E-ML2-DC3V	DS4E-ML2-DC3V
	5	DS1E-ML2-DC5V	DS2E-ML2-DC5V	DS4E-ML2-DC5V
	6	DS1E-ML2-DC6V	DS2E-ML2-DC6V	DS4E-ML2-DC6V
	9	DS1E-ML2-DC9V	DS2E-ML2-DC9V	DS4E-ML2-DC9V
	12	DS1E-ML2-DC12V	DS2E-ML2-DC12V	DS4E-ML2-DC12V
	24	DS1E-ML2-DC24V	DS2E-ML2-DC24V	DS4E-ML2-DC24V
	48	DS1E-ML2-DC48V	DS2E-ML2-DC48V	DS4E-ML2-DC48V
S (180 mW) type	1.5	DS1E-SL2-DC1.5V	DS2E-SL2-DC1.5V	DS4E-SL2-DC1.5V
	3	DS1E-SL2-DC3V	DS2E-SL2-DC3V	DS4E-SL2-DC3V
	5	DS1E-SL2-DC5V	DS2E-SL2-DC5V	DS4E-SL2-DC5V
	6	DS1E-SL2-DC6V	DS2E-SL2-DC6V	DS4E-SL2-DC6V
	9	DS1E-SL2-DC9V	DS2E-SL2-DC9V	DS4E-SL2-DC9V
	12	DS1E-SL2-DC12V	DS2E-SL2-DC12V	DS4E-SL2-DC12V
	24	DS1E-SL2-DC24V	DS2E-SL2-DC24V	DS4E-SL2-DC24V
	48	DS1E-SL2-DC48V	DS2E-SL2-DC48V	DS4E-SL2-DC48V

Notes:
1. Reverse polarity types available (add suffix-R).
2. Standard packing: carton: 50 pcs.; case: 500 pcs.

COIL DATA (at 20°C 68°F)

Single side stable

	Nominal voltage, V DC	Pick-up voltage, V DC (max.)		Drop-out voltage, V DC (min.)	Coil resistance, Ω (±10%)	Maximum allowable, V DC (at 50°C 122°F)	
		1 Form C	2, 4 Form C			1 Form C	2, 4 Form C
M type	1.5	1.05	1.05	0.15	5.63	1.8	2.25
	3	2.1	2.1	0.3	22.5	3.6	4.5
	5	3.5	3.5	0.5	62.5	6	7.5
	6	4.2	4.2	0.6	90	7.2	9
	9	6.3	6.3	0.9	203	10.8	13.5
	12	8.4	8.4	1.2	360	14.4	18
	24	16.8	16.8	2.4	1440	28.8	36
	48	33.6	33.6	4.8	5760	57.6	72
S type	1.5	1.2	1.05	0.15	11.3	2.4	3
	3	2.4	2.1	0.3	45	4.8	6
	5	4.0	3.5	0.5	125	8.0	10
	6	4.8	4.2	0.6	180	9.6	12
	9	7.2	6.3	0.9	405	14.4	18
	12	9.6	8.4	1.2	720	19.2	24
	24	19.2	16.8	2.4	2880	28.4	48
	48	38.6	33.6	4.8	11520	76.8	96

1 coil latching

	Nominal voltage, V DC	Reset Set, V DC (max.)		Coil resistance, Ω (±10%)	Maximum allowable, V DC (at 50°C 122°F)	
		1 Form C	2, 4 Form C		1 Form C	2, 4 Form C
M type	1.5	1.05	1.05	12.5	1.8	2.25
	3	2.1	2.1	50	3.6	4.5
	5	3.5	3.5	139	6	7.5
	6	4.2	4.2	200	7.2	9
	9	6.3	6.3	450	10.8	13.5
	12	8.4	8.4	800	14.4	18
	24	16.8	16.8	3200	28.8	36
	48	33.6	33.6	12800	57.6	72
S type	1.5	1.2	1.05	25	2.4	3
	3	2.4	2.1	100	4.8	6
	5	4.0	3.5	278	8.0	10
	6	4.8	4.2	400	9.6	12
	9	7.2	6.3	900	14.4	18
	12	9.6	8.4	1600	19.2	24
	24	19.2	16.8	6400	38.4	48
	48	38.4	33.6	25600	76.8	96

2 coil latching

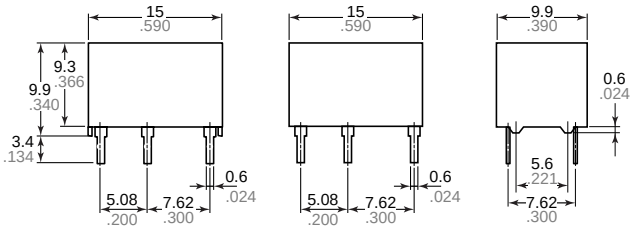
	Nominal voltage, V DC	Reset Set, V DC (max.)		Coil resistance, Ω (±10%)		Maximum allowable, V DC (at 50°C 122°F)	
		1 Form C	2,4 Form C	Coil I	Coil II	1 Form C	2,4 Form C
M type	1.5	1.05	1.05	6.25		1.8	2.25
	3	2.1	2.1	25		3.6	4.5
	5	3.5	3.5	69.4		6	7.5
	6	4.2	4.2	100		7.2	9
	9	6.3	6.3	225		10.8	13.5
	12	8.4	8.4	400		14.4	18
	24	16.8	16.8	1600		28.8	36
	48	33.6	33.6	6400		57.6	72
S type	1.5	1.2	1.05	12.5		2.4	3
	3	2.4	2.1	50		4.8	6
	5	4.0	3.5	139		8.0	10
	6	4.8	4.2	200		9.6	12
	9	7.2	6.3	450		14.4	18
	12	9.6	8.4	800		19.2	24
	24	19.2	16.8	3200		38.4	48
	48	38.4	33.6	12800		76.8	96

DIMENSIONS

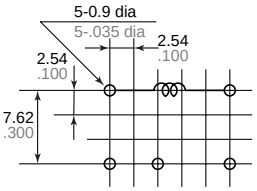
mm inch

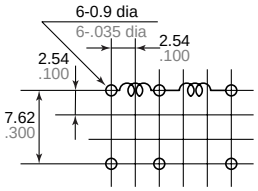
1 Form C

Single side stable, 1 coil latching, 2 coil latching



PC board pattern (Copper-side view)
Single side stable, 1 coil latching 2 coil latching

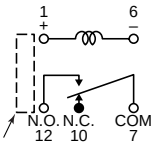




Tolerance: ±0.1 ± .004

General tolerance: ±0.3 ±.012

Schematic (Bottom view)
Single side stable
Deenergized condition



• A polarity bar showing the relay direction can replace the schematic.

1 coil latching

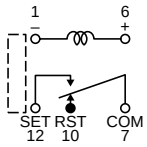


Diagram shows the "reset" position when terminals 1 and 6 are energized.
Energize with reverse polarity to transfer contacts.

2 coil latching

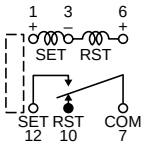
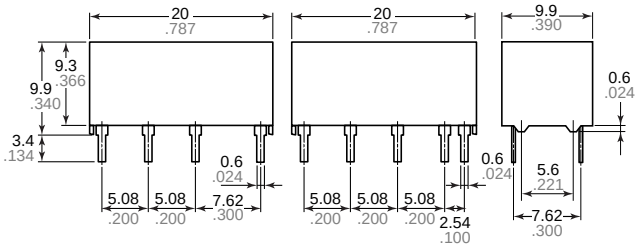


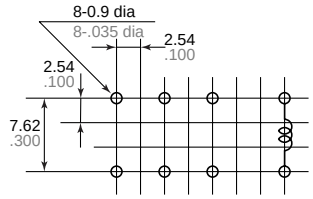
Diagram shows the "reset" position when terminals 3 and 6 are energized.
Energize terminals 1 and 3 to transfer contacts.

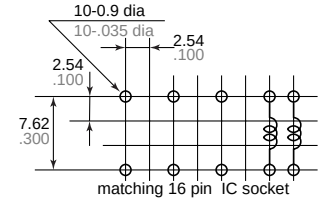
2 Form C

Single side stable, 1 coil latching, 2 coil latching



PC board pattern (Copper-side view)
Single side stable, 1 coil latching 2 coil latching

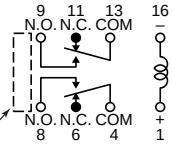




Tolerance: ±0.1 ± .004

General tolerance: ±0.3 ±.012

Schematic (Bottom view)
Single side stable
Deenergized condition



• A polarity bar showing the relay direction can replace the schematic.

1 coil latching

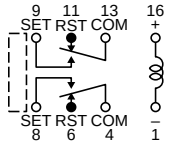


Diagram shows the "reset" position when terminals 1 and 16 are energized.
Energize with reverse polarity to transfer contacts.

2 coil latching

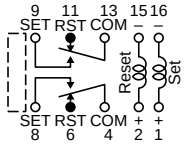
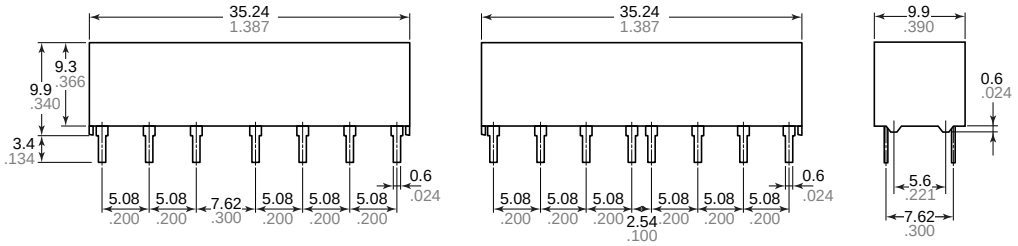


Diagram shows the "reset" position when terminals 2 and 15 are energized.
Energize terminals 1 and 16 to transfer contacts.

4 Form C

mm inch

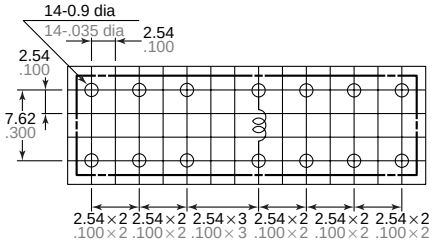
Single side stable, 1 coil latching, 2 coil latching



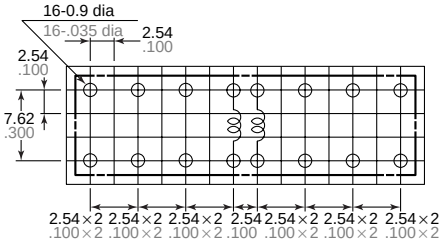
General tolerance: ±0.3 ±.012

PC board pattern (Copper-side view)

Single side stable, 1 coil latching



2 coil latching

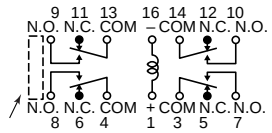


Tolerance: ±0.1 ± .004

Schematic (Bottom view)

Single side stable

Deenergized condition



• A polarity bar showing the relay direction can replace the schematic.

1 coil latching

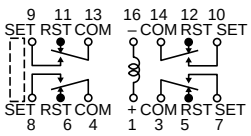


Diagram shows the "reset" position when terminals 1 and 16 are energized.
Energize with reverse polarity to transfer contacts.

2 coil latching

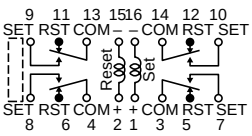
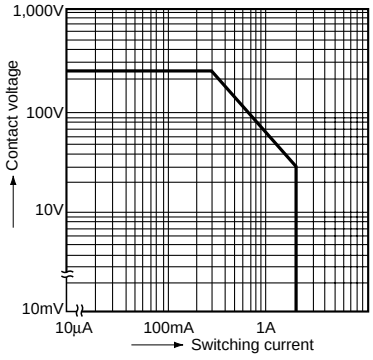


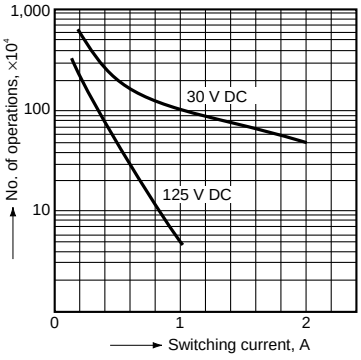
Diagram shows the "reset" position when terminals 2 and 15 are energized.
Energize terminals 1 and 16 to transfer contacts.

REFERENCE DATA

1. Maximum switching capacity

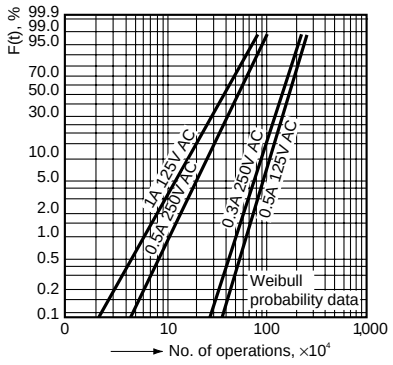


2. Life curve (Resistive load)

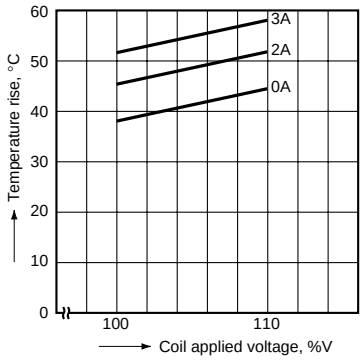


3. Contact reliability for AC loads

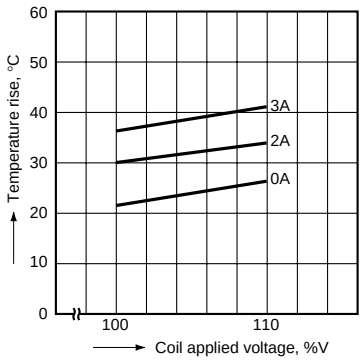
Sample: DS2E-M-DC24V 10 pcs.
Cycle rate: 20 cpm.
Detection level: 200 mΩ



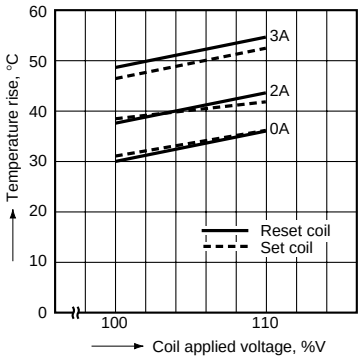
4-(1). Coil termperature rise
(2 Form C single side stable type)
Point measured: Inside the coil
Ambient temperature: 18° to 19°C 64° to 66°F



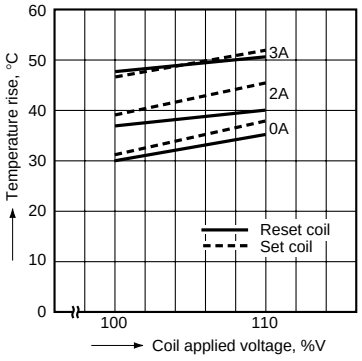
4-(2). Coil tempeature rise
(4 Form C single side stable type)
Point measured: Inside the coil
Ambient temperature: 17° to 18°C 63° to 64°F



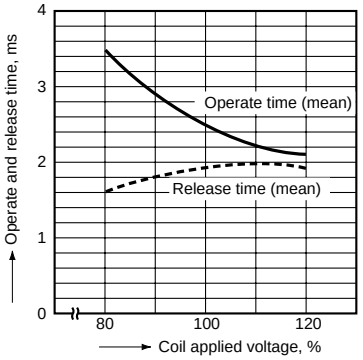
4-(3). Coil temperature rise
(2 Form C 2 coil latching type)
Point measured: Inside the coil
Ambient temperature: 20° to 21°C 68° to 70°F



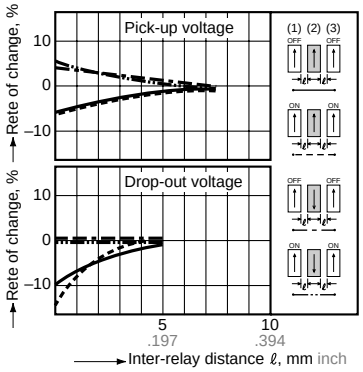
4-(4). Coil temperature rise
(4 Form C 2 coil latching type)
Point measured: Inside the coil
Ambient temperature: 20°C 68°F



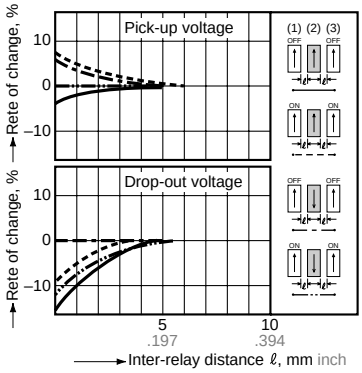
5. Operate and release time characteristics
(2 Form C single side stable type)
Test condition: Without diode connected to coil in parallel



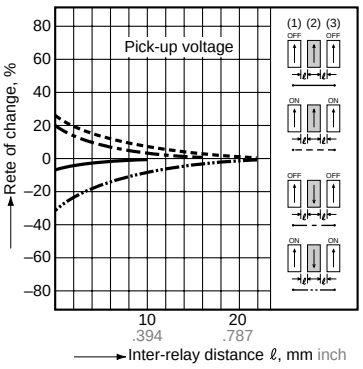
6-(1). Influence of adjuacent mounting
(1 Form C)

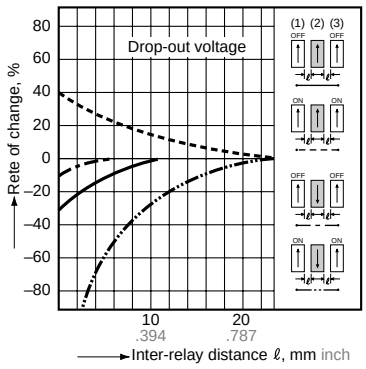


6-(2). Influence of adjacent mounting
(2 Form C)



6-(3). Influence of adjacent mounting
(4 Form C)





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