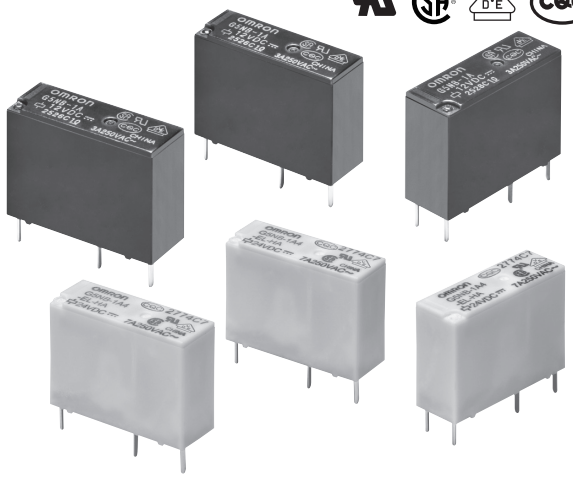
OMRON

G5NB

PCB Power Relay

A Miniature Power Relay with 1-pole 3 A to 7 A High Capacity Switching Suitable for a Wide Range of Applications



- Highly efficient magnetic circuit for low power consumption (200 mW).
- Safety-oriented design with dielectric strength of 4,000 V between coil and contacts, and surge resistance of 10,000 V.
- Minimum 100,000 operations (-E type) or 200,000 operations (-EL type) durability at 5 A (250 VAC) switching performance.
- Support for high ambient temperature up to a maximum of 85°C. (-EL and -CF types support up to 105°C)
- Standard model conforms to UL/CSA/VDE/CQC standards.
- Conforms to IEC/EN 60335-1. (-HA type)
- Satisfies EN61010 reinforced insulation requirements.
- Conforms to IEC/EN60079-1, IEC/EN60079-15.
  (IEC/EN) 60079-1 clause 15.5 Enclosed-break devices (Group IIA) testing passed.
  (IEC/EN) 60079-15 clause 11.2 Sealed devices testing passed.
- Reduced power consumption with voltage holding and pulse width modulation (PWM) control (Only for G5NB-□-PW model)

G5NB

■Model Number Legend

G5NB-□□□-□-□-□-□-□-□

1 2 3 4 5 6 7 8 9

1. Number of Poles
1 : 1-pole

2. Contact Form
A : SPST-NO (1a)

3. Enclosure rating
None : Flux protection
4 : Sealed

4. Classification
None : Standard
E : High-capacity (rating 5 A)
EL : High-capacity and electrical durability (rating 7 A)

5. Market Code
None : General purpose
HA : Home Appliance according to IEC/EN60335-1

6. Coil Insulation Class(UL1446)
None : Class B
CF : Class F

7. Coil Holding Voltage
None : Standard
SW : Supported

8. High temperature rating
None : Standard
A85 : High temperature rating at 85°C

9. Packing
None : Tray Packing
SP : Tube Packing

■Application Examples

Home appliances, Water heaters, Industrial equipment, Building automation

■Ordering Information

●Standard/-E type

Classification	Relay Function	Contact form	Enclosure rating	Tray Packing			Tube Packing		
				Model	Rated coil voltage	Minimum packing unit	Model	Rated coil voltage	Minimum packing unit
Standard	Single stable relay	SPST-NO (1a)	Flux protection	G5NB-1A	5,12,18,24 VDC	Inner packaging: 100 pcs./tray Outer packaging: 2,000 pcs./box	G5NB-1A-SP	5,12,24 VDC	Inner packaging: 50 pcs/Tube Outer packaging: 2,000 pcs./box
				G5NB-1A-PW	5,12,24 VDC		G5NB-1A-PW-SP	5,12,24 VDC	
				G5NB-1A-CF	5,12,24 VDC		G5NB-1A-CF-SP	5,12,24 VDC	
				G5NB-1A-CF-PW	5,12,24 VDC		G5NB-1A-CF-PW-SP	5,12,24 VDC	
				G5NB-1A-HA	5,12,24 VDC		G5NB-1A-HA-SP	5,12,24 VDC	
				G5NB-1A-HA-CF	5,12,24 VDC		G5NB-1A-HA-CF-SP	5,12,24 VDC	
				G5NB-1A-HA-CF-PW	5,12,24 VDC		G5NB-1A-HA-CF-PW-SP	5,12,24 VDC	
				G5NB-1A-HA-PW	5,12,24 VDC		—	—	
			Sealed	G5NB-1A4	5,12,18,24 VDC		G5NB-1A4-SP	5,12,18,24 VDC	
-E type			Flux protection	G5NB-1A-E	5,12,18,24 VDC		G5NB-1A-E-SP	5,12,24 VDC	
				G5NB-1A-E-HA	5,12,24 VDC		G5NB-1A-E-HA-SP	5,12,24 VDC	
			Sealed	G5NB-1A4-E	5,12,18,24 VDC		G5NB-1A4-E-SP	5,12,18,24 VDC	

Note 1. When ordering, add the rated coil voltage to the model number.
Example: G5NB-1A DC5
Rated coil voltage
However, the notation of the coil voltage on the product case as well as on the packing will be marked as □□VDC.
Note 2. When ordering tape packing, add "-SP" to the model number.
Be sure since "-SP" is not part of the relay model number, it is not marked on the relay case.
Note 3. If you need a relay that complies with the international safety standard for fire resistance (IEC/EN60335-1), use the "-HA" type.

●-EL type

Classification	Relay Function	Contact form	Enclosure rating	Tray Packing			Tube Packing		
				Model	Rated coil voltage	Minimum packing unit	Model	Rated coil voltage	Minimum packing unit
High-capacity and electrical durability G5NB-EL	Single stable relay	SPST-NO (1a)	Flux protection	G5NB-1A-EL-HA-A85	5,12,24 VDC	Inner packaging: 100 pcs./tray Outer packaging: 2,000 pcs./box	G5NB-1A-EL-HA-A85-SP	5,12,24 VDC	Inner packaging: 50 pcs/Tube Outer packaging: 2,000 pcs./box
			Sealed	G5NB-1A4-EL-HA	5,12,24 VDC		G5NB-1A4-EL-HA-SP	5,12,24 VDC	
				G5NB-1A4-EL-HA-PW	5,12,24 VDC		G5NB-1A4-EL-HA-PW-SP	5,12,24 VDC	
				G5NB-1A4-EL-HA-CF	5,12,24 VDC		G5NB-1A4-EL-HA-CF-SP	5,12,24 VDC	

Note 1. When ordering, add the rated coil voltage to the model number.
Example: G5NB-1A4-EL-HA DC12
Rated coil voltage
However, the notation of the coil voltage on the product case as well as on the packing will be marked as □□VDC.
Note 2. When ordering tape packing, add "-SP" to the model number.
Be sure since "-SP" is not part of the relay model number, it is not marked on the relay case.

■Ratings

●Coil/Standard, -E type

Item / Rated voltage		Rated current (mA)	Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V)	Max. voltage (V)	Power consumption (mW)
DC	5 VDC	40	125	75% max.	10% min. 10 to 31%*	180% (at 23°C)	Approx. 200 Approx. 32*
	12 VDC	16.7	720				
	18 VDC	11.1	1,620				
	24 VDC	8.3	2,880				

●Coil/-EL type

Item / Rated voltage		Rated current (mA)	Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V)	Max. voltage (V)	Power consumption (mW)
DC	5 VDC	40	125	75% max.	10% min. 10 to 39%*	160% (at 23°C)	Approx. 200 Approx. 50*
	12 VDC	16.7	720				
	24 VDC	8.3	2,880				

Note 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
Note 2. The operating characteristics are measured at a coil temperature of 23°C.
Note 3. The “Max. voltage” is the maximum voltage that can be applied to the relay coil.
* These numbers are only for -PW type. Power consumption with Holding Voltage is 32mW (Standard), 50mW (-EL type). Please confirm the detail in page 6 Coil Voltage Reduction (Holding Voltage).

●Contacts

Item	G5NB Standard	G5NB-E	G5NB-EL
Contact Type	Single		
Contact material	Ag-alloy (Cd free)		
Rated load	3 A at 125 VAC 3 A at 250 VAC	5 A at 250 VAC	7 A at 250 VAC
	3 A at 30 VDC	3 A at 30 VDC	5 A at 30 VDC
Rated carry current	3 A	5 A	7 A
Max. switching voltage	250 VAC, 30 VDC		
Max. switching current	3 A	5 A	7 A

■Characteristics

Item		G5NB Standard	G5NB-E	G5NB-EL	G5NB-EL-A85
Contact resistance *1		100 mΩ max.			
Operate time		10 ms max.			
Release time		10 ms max.			
Insulation resistance *2		1,000 MΩ min.			
Dielectric strength	Between coil and contacts	4,000 VAC, 50/60 Hz for 1 min			
	Between contacts of the same polarity	750 VAC, 50/60 Hz for 1 min			
Insulation distance	Between coil and contacts	Clearance: 6 mm, Creepage: 6 mm			
Impulse withstand voltage	Between coil and contacts	10 kV (1.2 x 50 μs)			
Vibration resistance	Destruction	10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)			
	Malfunction	10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)			
Shock resistance	Destruction	1,000 m/s²			
	Malfunction	100 m/s²			
Durability	Mechanical	5,000,000 operations min.			
	Electrical *3 (rated load)	200,000 operations at 125 VAC, 3A 100,000 operations at 250 VAC, 3A 200,000 operations at 30 VDC, 3A	100,000 operations at 250 VAC, 5A 200,000 operations at 30 VDC, 3A	200,000 operations at 250 VAC, 5A 50,000 operations at 250 VAC, 7A 100,000 operations at 30 VDC, 5A	(At ambient temperature of 85°C) 100,000 operations at 250 VAC, 5A 50,000 operations at 250 VAC, 7A
Failure rate (P level) (reference value) *4		DC5V 10mA			
Ambient operating temperature		-40°C to 85°C -40°C to 105°C (Only -EL -CF type *5)			
Ambient operating humidity		5% to 85% (with no icing or condensation)			
Weight		Approx. 4 g			

Note. Values in the above table are the initial values at 23°C.
*1. Measurement conditions: 5 VDC, 1 A, voltage drop method
*2. Measurement conditions: Measured at the same points as the dielectric strength using a 500 VDC ohmmeter.
*3. Electrical durability values were measured with a resistive load and switching frequencies of Standard & -E type: 1,800 operations/hour and -EL type: 900 operations/hour.
*4. This value was measured at a switching frequency of 120 operations/min.
*5. If 85°C is exceeded, the relay does not comply with the Electrical Appliance and Material Safety Act.

■Engineering Data

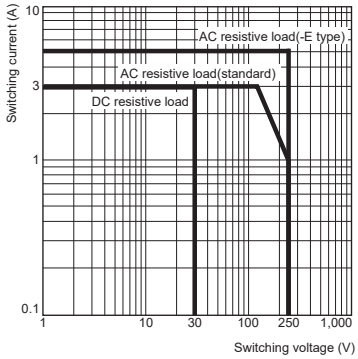
●Actual electrical durability performance (* The following data is from tests conducted using our in-house simulated load circuits. They are reference values, not guaranteed values.)

Item	Application	Load voltage		Inrush current	Steady current	Break current	Ambient temperature	Switching frequency		Switching operations (Approx.)
		(VAC)		(A)	(A)	(A)	(°C)	On(s)	Off(s)	(Operation)
G5NB Standard	Motor and lamp load	AC	120	2.5	0.5	0.5	23	1	1	250,000
G5NB Standard	Valve load (with varistor)	DC	160	0.24	0.24	0.24	23	1	1	250,000
G5NB Standard	Pump load	AC	140	5.4 (0-P)	1.6	1.6	23	1	1	200,000
G5NB Standard	Motor load	AC	100	10.7 (0-P)	1.1	1.1	23	1	1	200,000
G5NB-E	Fan motor load	AC	250	21.4 (0-P)	0.1	0.1	23	1	1	50,000
G5NB-EL	Simulated inductive load	AC	250	4A cos 0.4 dia.			85	2	2	40,000

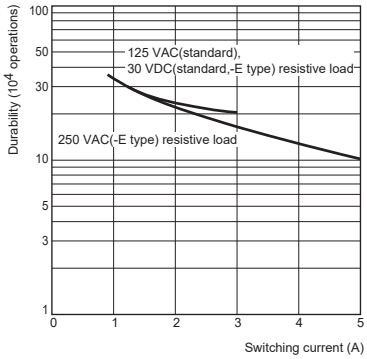
■Engineering Data

G5NB

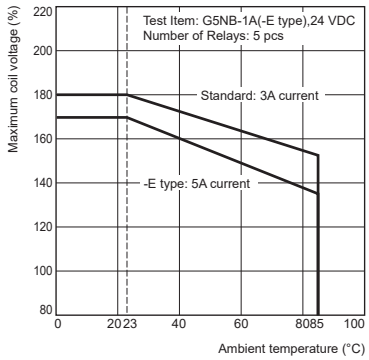
●Maximum Switching Capacity (Standard, -E type)



●Durability (Standard, -E type)

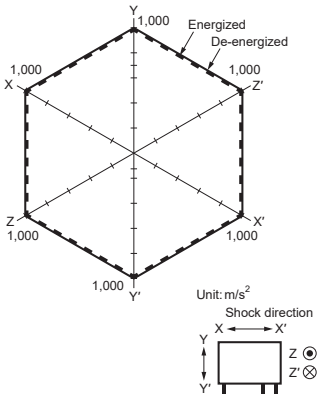


●Ambient Temperature vs. Maximum Coil Voltage (Standard, -E type)



Note. The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

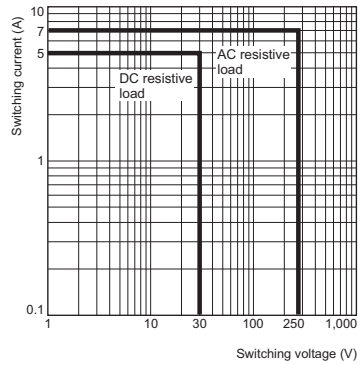
●Shock malfunction (Standard, -E type)



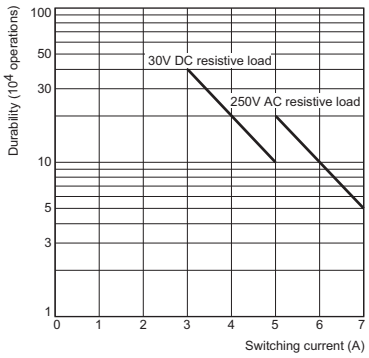
Test Item: G5NB-1A 24 VDC
Number of Relays: 5 pcs
Test Method: Shock is applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction is measured. The energized voltage is 100% of the rated voltage.
Rating: 100 m/s²

G5NB-EL

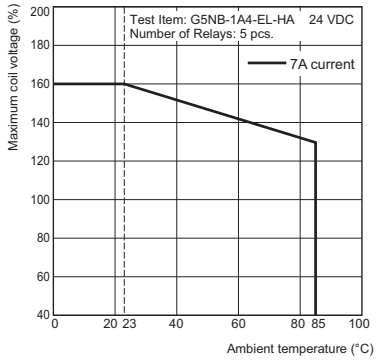
●Maximum Switching Capacity



●Durability

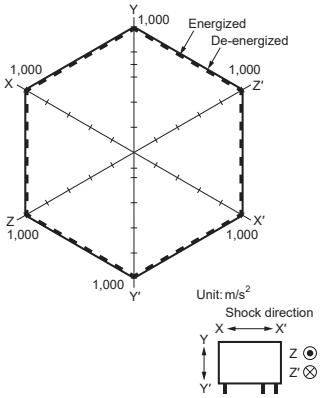


●Ambient Temperature vs. Maximum Coil Voltage



Note. The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

●Shock malfunction



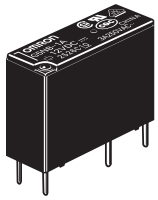
Test Item: G5NB-1A4-EL-HA 24 VDC
Number of Relays: 5 pcs
Test Method: Shock is applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction is measured. The energized voltage is 100% of the rated voltage.
Rating: 100 m/s²

■Dimensions

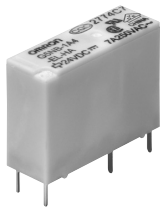
CAD Data marked products, 2D drawings and 3D CAD models are available.
For CAD information, please visit our website, which is noted on the last page.

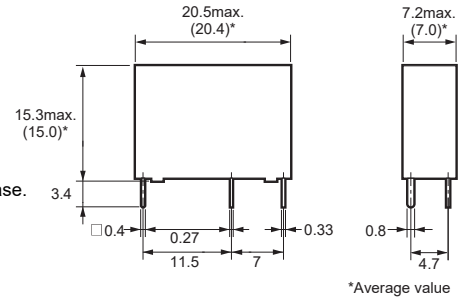
(Unit: mm)

G5NB-1A(4)(-E)(-HA)(-CF)(-PW)
G5NB-1A(4)-EL-HA(-A85)(-CF)(-PW)



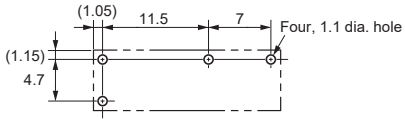
Note. -HA type has a white case.



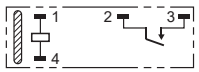


*Average value

PCB Mounting Holes
(Bottom View)
Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections
(Bottom View)



(No coil polarity)

CAD Data

■Approved Standards

The approval rating values for overseas standards are different from the performance values determined individually. Confirm the values before use.

●**UL Recognized:** (File No. E41515)
CSA Certified: (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G5NB-1A(4)(-HA)(-CF)(-PW)	SPST-NO (1a)	5 to 24 VDC	3 A 250 VAC (Resistive) 85°C	100,000
			3 A 30 VDC (Resistive) 70°C	6,000
G5NB-1A(4)-E(-HA)	SPST-NO (1a)	5 to 24 VDC	5 A 250 VAC (Resistive) 85°C 5 A 30 VDC (Resistive) 70°C	6,000
			C300 Pilot duty, 85°C	50,000
G5NB-1A4-EL-HA(-PW) G5NB-1A-EL-HA-A85	SPST-NO (1a)	5 to 24 VDC	7 A 250 VAC (General Purpose) 85°C	30,000
			5 A 250 VAC (General Purpose) 85°C	50,000
			5 A 30 VDC (Resistive) 85°C	6,000
G5NB-1A4-EL-HA-CF	SPST-NO (1a)	5 to 24 VDC	7 A 250 VAC (General Purpose) 85°C	30,000
			5 A 250 VAC (Resistive) 105°C	50,000
			2FLA/12 LRA 250 VAC 105°C	30,000
			5 A 30 VDC (Resistive) 85°C	6,000
			5 A 250 VAC (Resistive) 85°C	100,000
			B300 Pilot duty, 85°C	30,000
			C300 Pilot duty, 105°C	30,000

●**EN/IEC, VDE Certified** **(Certificate No. 137575)**

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G5NB-1A(4)(-HA)(-CF)(-PW)	SPST-NO (1a)	5, 12, 18, 24 VDC	3 A 250 VAC (Resistive) 85°C 3 A 30 VDC (Resistive) 85°C	100,000
G5NB-1A(4)-E(-HA)	SPST-NO (1a)	5, 12, 18, 24 VDC	5 A 250 VAC (Resistive) 85°C 5 A 30 VDC (Resistive) 85°C	10,000
			3 A 250 VAC (Resistive) 85°C	100,000
G5NB-1A4-EL-HA(-PW) G5NB-1A-EL-HA-A85	SPST-NO (1a)	5, 12, 24 VDC	7 A 250 VAC (Resistive) 85°C	10,000
			5 A 30 VDC (Resistive) 85°C	
G5NB-1A4-EL-HA-CF	SPST-NO (1a)	5, 12, 24 VDC	7 A 250 VAC (Resistive) 85°C	10,000
			5 A 30 VDC (Resistive) 85°C	
			5 A 250 VAC (Resistive) 105°C	50,000
			5 A 250 VAC (Resistive) 85°C	100,000
			5 (2) A 250 VAC -40/85°C (EN/IEC60730-1)	100,000
			3 (1) A 250 VAC -40/105°C (EN/IEC60730-1)	100,000

●**GB, CQC Certified** GB/T21711.1

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G5NB-1A(4)	SPST-NO (1a)	5, 12, 18, 24 VDC	3 A 250 VAC (Resistive) 85°C	100,000
G5NB-1A(4)-E	SPST-NO (1a)	5, 12, 18, 24 VDC	5 A 250 VAC (Resistive) 70°C	100,000
G5NB-1A(4)-EL-HA(-PW) G5NB-1A-EL-HA-A85	SPST-NO (1a)	5, 12, 24 VDC	7 A 250 VAC (Resistive) 85°C	10,000

Creepage distance	6.0 mm min.
Clearance distance	6.0 mm min.
Insulation material group	IIIa
Type of insulation coil-contact circuit	Pollution degree 2 / Reinforced (Sealed) Pollution degree 3 / Basic (Flux protection) / Reinforced (Sealed)
Type of interruption	Micro disconnection
Rated Insulation voltage	250 V
Pollution degree	3
Rated voltage system	250 V
Over voltage category	III
Category of protection according to IEC 61810-1	RT II (Flux protection) / RT III (Sealed)
Glow wire according to IEC 60335-1	<HA Models only> GWT 750°C min. (IEC 60695-2-11) / GWFI 850°C min. (IEC 60695-2-12)
Flammability class according to UL94	V-0

●Regarding IEC/EN60079-1, -15

Type of protection: Enclosed-break devices (Group IIA*)
(IEC/EN) 60079-1 clause 15.5 testing passed.

Type of protection: Sealed devices
(IEC/EN) 60079-15 clause 11.2 testing passed.

*Gas protection group definition:
– Group IIA: (55 ± 0.5) % hydrogen/air at atmospheric pressure;
– Group IIB: (37 ± 0.5) % hydrogen/air at atmospheric pressure;
– Group IIC: (40 ± 1) % hydrogen, (20 ± 1) % oxygen and the remainder nitrogen at atmospheric pressure or alternatively (27.5 ± 1.5) % hydrogen/air at an overpressure at a pressure equal to 1.5 times atmospheric pressure.

Please contact your local OMRON representative for more details on the standards.

■Precautions

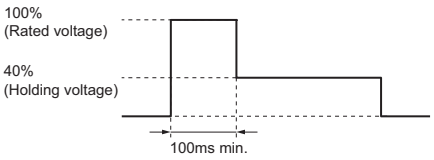
●Please refer to "PCB Relays Common Precautions" for correct use.

Correct Use

●Coil Voltage Reduction (Holding Voltage) after Relay Operation

- If the coil voltage is reduced to the holding voltage after Relay operation, first apply the rated voltage to the coil for at least 100 ms, as shown below.
- A voltage of at least 40% (Standard/-E type) or 50% (-EL type) of the rated voltage is required for the coil holding voltage. Do not allow voltage fluctuations to cause the coil holding voltage to fall below this level.

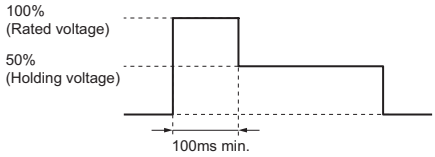
G5NB Standard/-E type



	Applied coil voltage	Coil resistance*	Power consumption
Rated voltage	100%	125Ω (5 VDC) 720Ω (12 VDC) 2,880Ω (24 VDC)	Approx. 200 mW
Holding voltage	40%		Approx. 32 mW

* The coil resistance were measured at a coil temperature of 23°C with tolerances of ± 10%.

G5NB -EL type



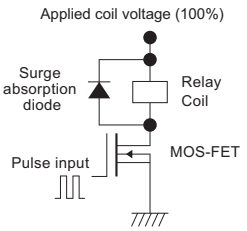
	Applied coil voltage	Coil resistance*	Power consumption
Rated voltage	100%	125Ω (5 VDC) 720Ω (12 VDC) 2,880Ω (24 VDC)	Approx.200 mW
Holding voltage	50%		Approx.50 mW

* The coil resistance were measured at a coil temperature of 23°C with tolerances of ± 10%.

●Power consumption reduction of coil with pulse width modulation (PWM)

- Models with PWM drive capability (-PW of Standard/-E type) can reduce coil holding current with PWM control. This function reduces power consumption by reducing the current held by coil.
- Apply the rated voltage for at least 100 ms at the time of relay operation.
- The following are our verification conditions. When using, it be sure to check the actual machine under the actual usage conditions.

■Example of drive circuit



■Conditions of validation carried out by OMRON

- Applied voltage: rated voltage
- Duty: 50% or more
- Frequency: 10 kHz or more
- Diode Vf: 0.4 V or less

Please check each region's Terms & Conditions by region website.

OMRON Corporation
Device & Module Solutions Company

Regional Contact

Americas
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