# DATA SHEET



# AUTOMOTIVE AC RELAYS **AX1 SERIES**

# DESCRIPTION

The NEXEM AX1 series is AC relay for On Board Charger (OBC) applications of Electric Vehicle for automobiles which require high quality and high performance.

The AX1 series have higher carrying current performance for AC load.

#### FEATURE

- Large current capacity for AC load (16A and 32A rated current)
- Small size
- High heat resistance
- Flux tight
- Pb free

# **APPLICATION**

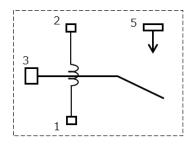
• On Board Charger (OBC) of Electric Vehicles (PHEV and BEV)



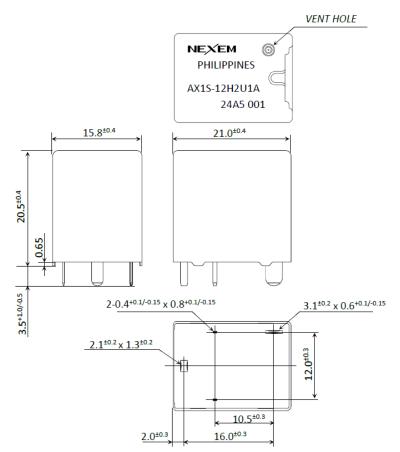
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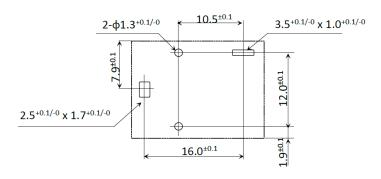
# [1a Type] SCHEMATICS (BOTTOM VIEW)



# **DIMENSIONS** (in mm)



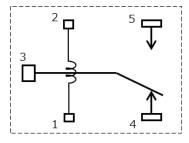
# **RECOMMENDED PCB PAD LAYOUT (BOTTOM VIEW) (in mm)**



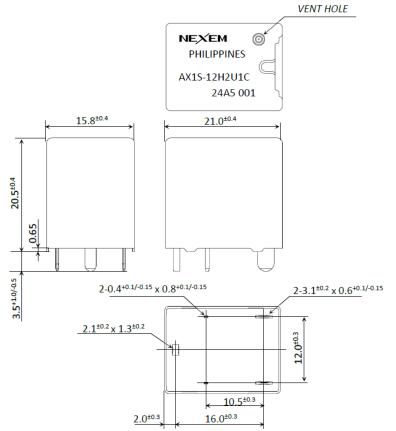
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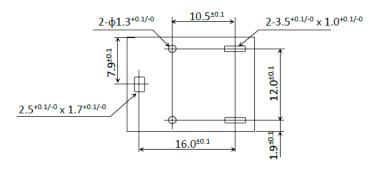
# [1c Type] SCHEMATICS (BOTTOM VIEW)



# **DIMENSIONS** (in mm)



RECOMMENDED PCB PAD LAYOUT (BOTTOM VIEW) (in mm)



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#### <Rated current: 32A, Dielectric Strength (Between open contacts): 1000Vac>

(Ambient temperature: 20°C)

Items			Specifi	Specifications		
Contact form			1 form A	1 form C		
	Max. switching voltage		277	277Vac		
• • •	Max. switching current		3	32A		
Contact	Max. conti	nuous current <sup>(1)</sup>	40A (at 105°C)			
rating	Contact res	sistance	10mΩ (20A 6Vdc)			
	Rated load		277Vac 32A,	277Vac 32A, Resistive load		
Contact mate	erial		Ag	alloy		
Operate time	(2)		15ms	s max.		
Release time	(2)		10ms	s max.		
	Insulation	resistance	1000MΩ mi	1000MΩ min. at 500Vdc		
Insulation	Dielectric strength	Between open contacts	1000Vac, 50/60Hz 1minute			
		Between coil and contact	4000Vac, 50/	4000Vac, 50/60Hz 1minute		
Shock	Misoperation		98r	98m/s <sup>2</sup>		
resistance	Destructive	e failure	980m/s <sup>2</sup>			
Vibration	Misoperati	ion				
resistance	Destructive	e failure	- 10 to 55Hz, 1.5mm DA			
Ambient tem	perature		-40 to +105°C (no freezing and condensation)			
	Mechanica	l	300,000 cycles			
	Electrical (	N(O)(3)	Making 25A, Carrying 32A, Breaking 25A, 277Vac at 105°C			
Life	Electrical (	N/O) <sup>(3)</sup>	10,000cycles			
				Making 5A,		
expectancy	Electrical (	N/C) (3)		Carrying 32A, Breaking 5A,		
	Electrical (N/C) <sup>(3)</sup>		-	277Vac at 105°C		
				10,000cycles		
Weight			Approx. 16g			

(1) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

(2) Excluding contact bounce without flywheel coil diode.

(3) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.

(4) EM Devices recommends that the usage of the coating agent close to the relay is to be avoided.

(5) Please take care of the relay orientation installed in a car to avoid the malfunction by the vibration, impact and so on. If you have any questions, please contact EM Devices Corporation.

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#### <Rated current: 16A, Dielectric Strength (Between open contacts): 1000Vac>

(Ambient temperature: 20°C)

Items			Specifications		
Contact form			1 form A	1 form C	
	Max. switching voltage		277Vac		
Contact	Max. switc	hing current	16A		
	Max. conti	nuous current <sup>(6)</sup>	20A (at 105°C)		
rating	Contact res	sistance	10mΩ (20A 6Vdc)		
	Rated load		277Vac 16A,	Resistive load	
Contact mate	erial		Aga	alloy	
Operate time	(7)		15ms	s max.	
Release time	(7)		10ms	s max.	
	Insulation	resistance	1000MΩ min. at 500Vdc		
Insulation	Dielectric strength	Between open contacts	1000Vac, 50/60Hz 1minute		
		Between coil and contact	4000Vac, 50/	4000Vac, 50/60Hz 1minute	
Shock	Misoperati	on	98r	n/s²	
resistance	Destructive	e failure	980m/s²		
Vibration	Misoperation				
resistance	Destructive	e failure	10 to 55Hz, 1.5mm DA		
Ambient tem	perature		-40 to +105°C (no free	zing and condensation)	
	Mechanical		300,000 cycles		
	Electrical (N/O) <sup>(8)</sup>		16A- 277Vac at 10	16A- 277Vac at 105°C, 10,000cycles	
Life				Making 5A,	
expectancy	Electrical //	N(C) (8)		Carrying 16A, Breaking 5A,	
	Electrical (I	N/C) <sup>(0)</sup>	-	277Vac at 105°C	
				10,000cycles	
Weight			Approx. 16g		

(6) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

(7) Excluding contact bounce without flywheel coil diode.

(8) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.

(9) EM Devices recommends that the usage of the coating agent close to the relay is to be avoided.

(10) Please take care of the relay orientation installed in a car to avoid the malfunction by the vibration, impact and so on. If you have any questions, please contact EM Devices Corporation.

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### **COIL RATING**

#### <Rated current: 32A/16A, Dielectric Strength (Between open contacts): 1000Vac>

(Ambient temperature: 20°C)

Nominal Voltage (VDC)	Coil Resistance (Ω)±10%	Must Operate Voltage <sup>(11)</sup> (VDC)	Must Release Voltage <sup>(11)</sup> (VDC)	Holding voltage (VDC)	Nominal Operating Power (W)
12	120	9.6	0.6	30~80% of rated voltage (at 23°C) 40~45% of rated voltage (at 105°C)	1.2W

(11) Test by pulse voltage

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#### <Rated current: 32A, Dielectric Strength (Between open contacts): 1500Vac>

(Ambient temperature: 20°C)

Items			Specifications		
Contact form	Contact form		1 form A		
	Max. switching voltage		600Vac		
<b>a</b>	Max. switc	hing current	32A		
Contact	Max. conti	nuous current <sup>(12)</sup>	40A (at 105°C)		
rating	Contact res	sistance	10mΩ (20A 6Vdc)		
	Rated load		277Vac 32A, Resistive load		
Contact mate	erial		Ag alloy		
Operate time	(13) و		15ms max.		
Release time	(13)		10ms max.		
	Insulation resistance		1000MΩ min. at 500Vdc		
Insulation	Dielectric strength	Between open contacts	1500Vac, 50/60Hz 1minute		
		Between coil and contact	4000Vac, 50/60Hz 1minute		
Shock	Misoperati	on	98m/s <sup>2</sup>		
resistance	Destructive	e failure	980m/s <sup>2</sup>		
Vibration	Misoperati	on			
resistance	Destructive	e failure	10 to 55Hz, 1.5mm DA		
Ambient temperature			-40 to +105°C (no freezing and condensation)		
1:6-	Mechanica	l	100,000 cycles		
Life	Flootrical (1	4)	Making 25A, Carrying 32A, Breaking 25A, 277Vac at 105°C		
expectancy	Electrical (14)		10,000cycles		
Weight			Approx. 16g		

(12) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

(13) Excluding contact bounce without flywheel coil diode.

(14) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.

(15) EM Devices recommends that the usage of the coating agent close to the relay is to be avoided.

(16) Please take care of the relay orientation installed in a car to avoid the malfunction by the vibration, impact and so on. If you have any questions, please contact EM Devices Corporation.

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#### <Rated current: 16A, Dielectric Strength (Between open contacts): 1500Vac>

(Ambient temperature: 20°C)

Items			Specifications	
Contact form	1		1 form A	
	Max. switching voltage		600Vac	
<b>.</b>	Max. switc	hing current	16A	
Contact	Max. conti	nuous current <sup>(17)</sup>	20A (at 105°C)	
rating	Contact re	sistance	10mΩ (20A 6Vdc)	
	Rated load		277Vac 16A, Resistive load	
Contact mate	erial		Ag alloy	
Operate time (18)			15ms max.	
Release time (18)			10ms max.	
	Insulation resistance		1000MΩ min. at 500Vdc	
Insulation	Dielectric	Between open contacts	1500Vac, 50/60Hz 1minute	
	strength	Between coil and contact	4000Vac, 50/60Hz 1minute	
Shock	Misoperati	ion	98m/s <sup>2</sup>	
resistance	Destructive	e failure	980m/s <sup>2</sup>	
Vibration	Misoperati	on		
resistance	Destructive failure		10 to 55Hz, 1.5mm DA	
Ambient temperature			-40 to +105°C (no freezing and condensation)	
Life	Mechanical		100,000 cycles	
expectancy	Electrical <sup>(19)</sup>		16A- 277Vac at 105°C, 10,000cycles	
Weight			Approx. 16g	

(17) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

(18) Excluding contact bounce without flywheel coil diode.

(19) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.

(20) EM Devices recommends that the usage of the coating agent close to the relay is to be avoided.

(21) Please take care of the relay orientation installed in a car to avoid the malfunction by the vibration, impact and so on. If you have any questions, please contact EM Devices Corporation.



## **COIL RATING**

#### <Rated current: 32A/16A, Dielectric Strength (Between open contacts): 1500Vac>

(Ambient temperature: 20°C)

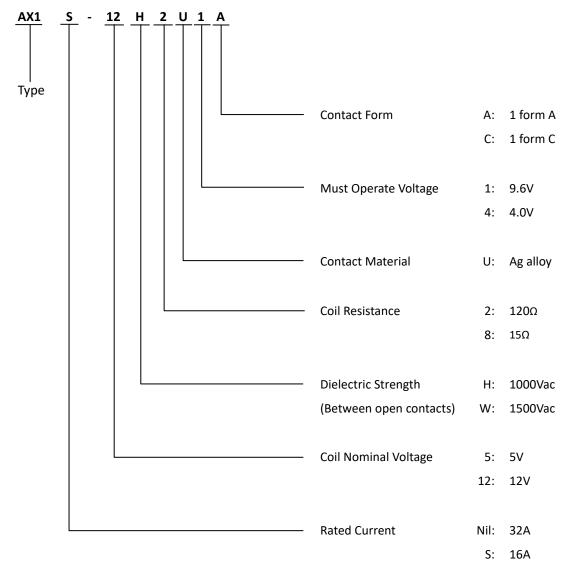
Nominal Voltage (VDC)	Coil Resistance (Ω)±10%	Must Operate Voltage <sup>(22)</sup> (VDC)	Must Release Voltage <sup>(22)</sup> (VDC)	Holding voltage (VDC)	Nominal Operating Power (W)
5	15	4.0	0.25	32~36% of rated voltage (at 105°C)	1.67W

(22) Test by pulse voltage

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#### PART NUMBER SYSTEM



Rated	Contact	Coil Nominal	Coil	Dielectric Strength	Unsealed type	
Current	Form	Voltage	Resistance	(Between open contacts)		
	1a	12VDC	120Ω	1000Vac	AX1S-12H2U1A	
16A	1c	12VDC	120Ω	1000Vac	AX1S-12H2U1C	
	1a	5VDC	15Ω	1500Vac	AX1S-5W8U4A	
32A	1a	12VDC	120Ω	1000Vac	AX1-12H2U1A	
	1c	12VDC	120Ω	1000Vac	AX1-12H2U1C	
	1a	5VDC	15Ω	1500Vac	AX1-5W8U4A	

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