

# NPI Promotion Material

**G9KC, 4-pole 40A 480 VAC PCB Power Relay  
with Form B Auxiliary Contact**



**OMRON**

# Overview of G9KC

- G9KC is a **4-pole (4PST) 40 A PCB power relay** with **Form B auxiliary contact** as an option.
- **Lower contact resistance** than equivalent in the market, which could solve thermal design issues.
- Most suitable for **3-phase EV charging station (Mode 3)**, also for 3-phase AC supply applications.

**G9KC**, 4-pole 40 A 480 VAC PCB Power Relay



G9KC-4A : 4a (main)

G9KC-4A1B : 4a (main) + 1b (auxiliary)

Target Application:

## **3-phase EVSE Mode 3 (EV Charging Station)**

Applicable to the existing highest models of 22 kW (32 A, 3-phase 400 VAC) especially for EU market



- ✓ **Lower Contact Resistance** than PCB relay equivalent
- ✓ Compliant with IEC Standards related with EV Charging (IEC 61851-1, IEC 62955)
- ✓ Auxiliary Contact compliant with Mirror Contact Structure specified by IEC 60947-4-1, F.7.2

**Stable Fast EV Charging**

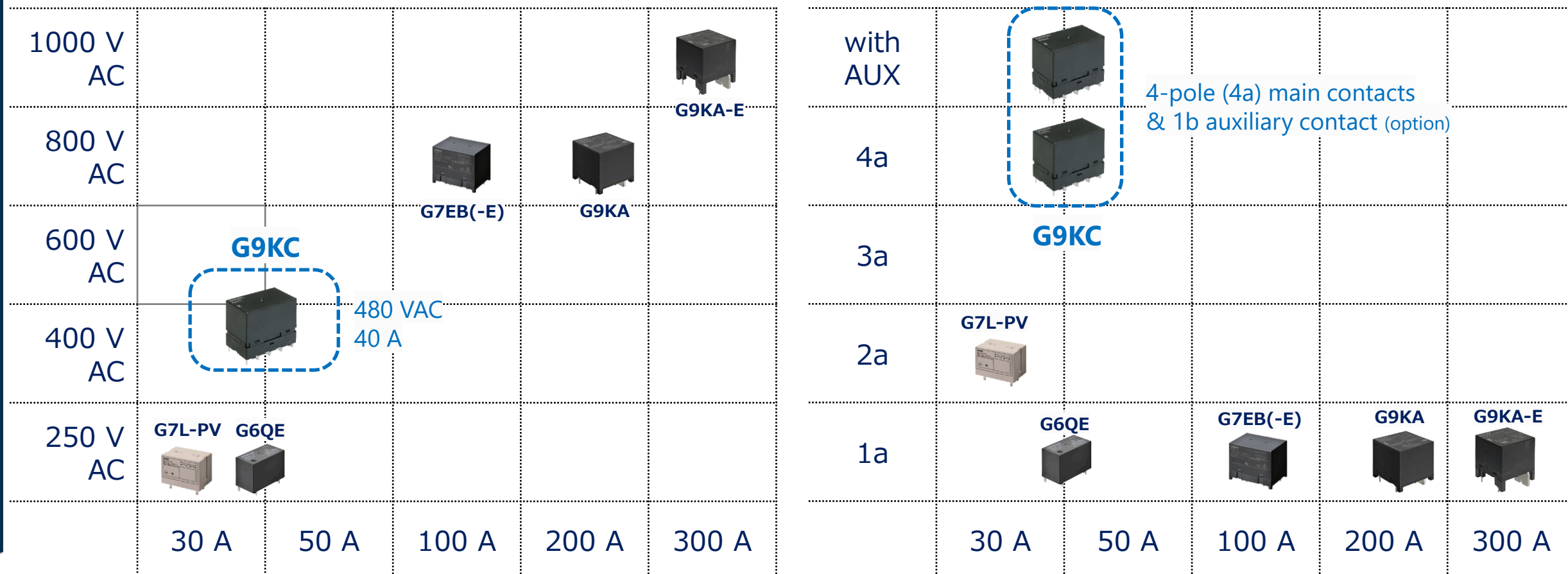
**Compact and Lower Cost**

**Reliable and Longer Life**

# G9KC positioning in Product Map

- G9KC is positioned as a functional relay with mechanically coupled 4-pole (4a) structure and with 1b auxiliary contact option in Omron PCB high power relay products.

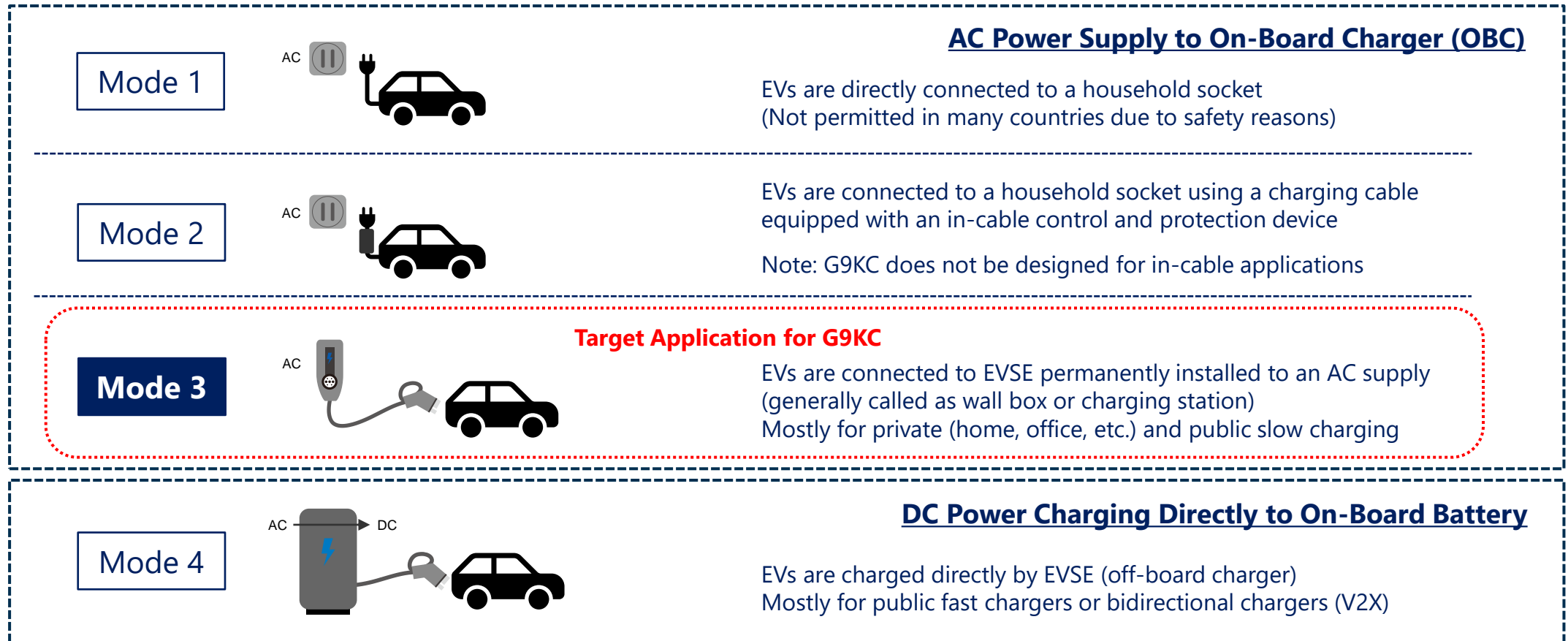
## Omron PCB High Power AC Relays



# EV Charging Mode for EV Supply Equipment (EVSE)

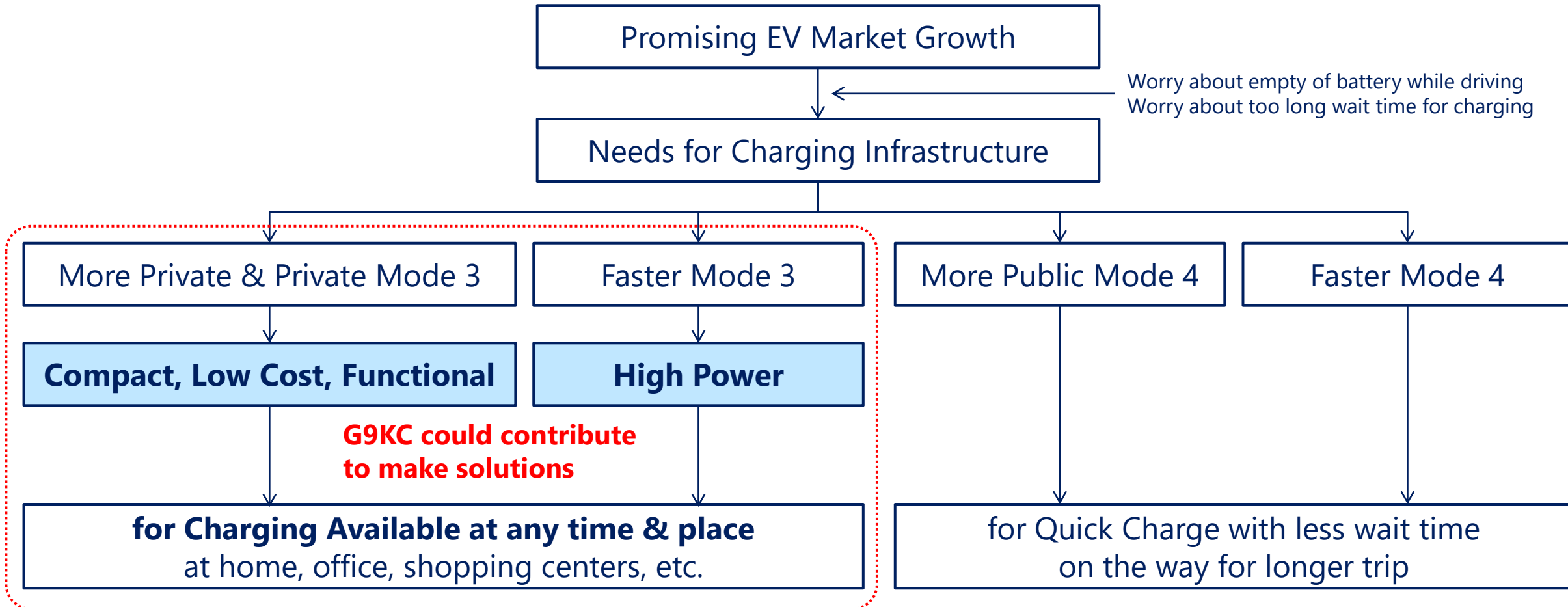
- EVSEs are categorized into 4 charging modes and **G9KC is suitable for Mode 3.**
- Mode 3 is mostly used for private (home, office, etc.) and public slow charging.

EV Charging Mode specified by IEC 61851-1 (Electric vehicle conductive charging system – Part 1: General requirements)



# Market Needs for EV Charging

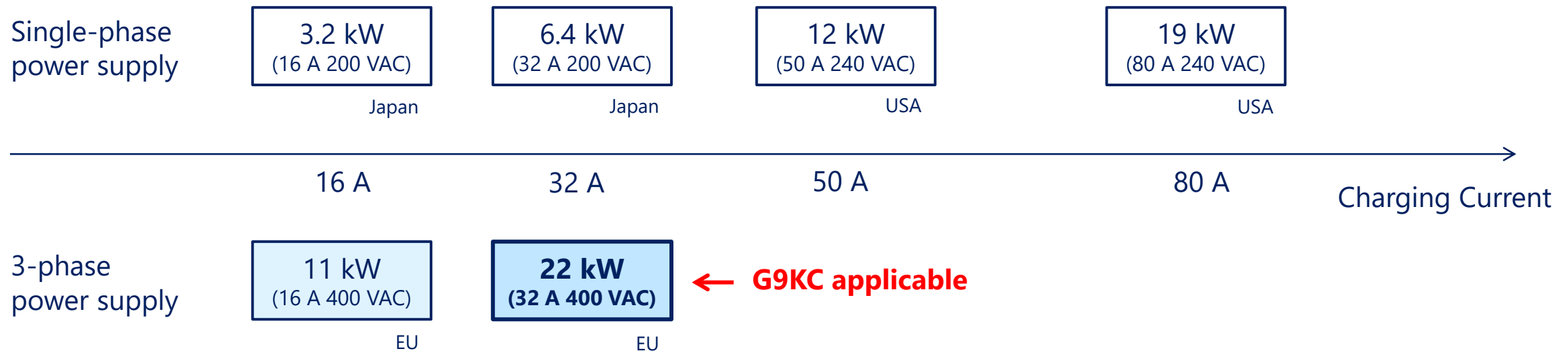
- **More charging spots** and **faster charging** are needed to support EV market growth.
- G9KC could contribute to provide **compact, lower cost and higher power EVSE Mode 3** for charging available at any time & place.



# Variations & Trend in EVSE Mode 3

- For faster charging, market trends to **increase charging current** and **utilize 3-phase power supply**.
- **3-phase Mode 3** is getting popular, **especially in EU**, where 3-phase supply available at home.
- **22 kW (32 A 3-phase 400 VAC)** is the highest Mode 3, and G9KC is applicable to it.
- Other than EU, 3-phase Mode 3 could be popular for public charging in near future.

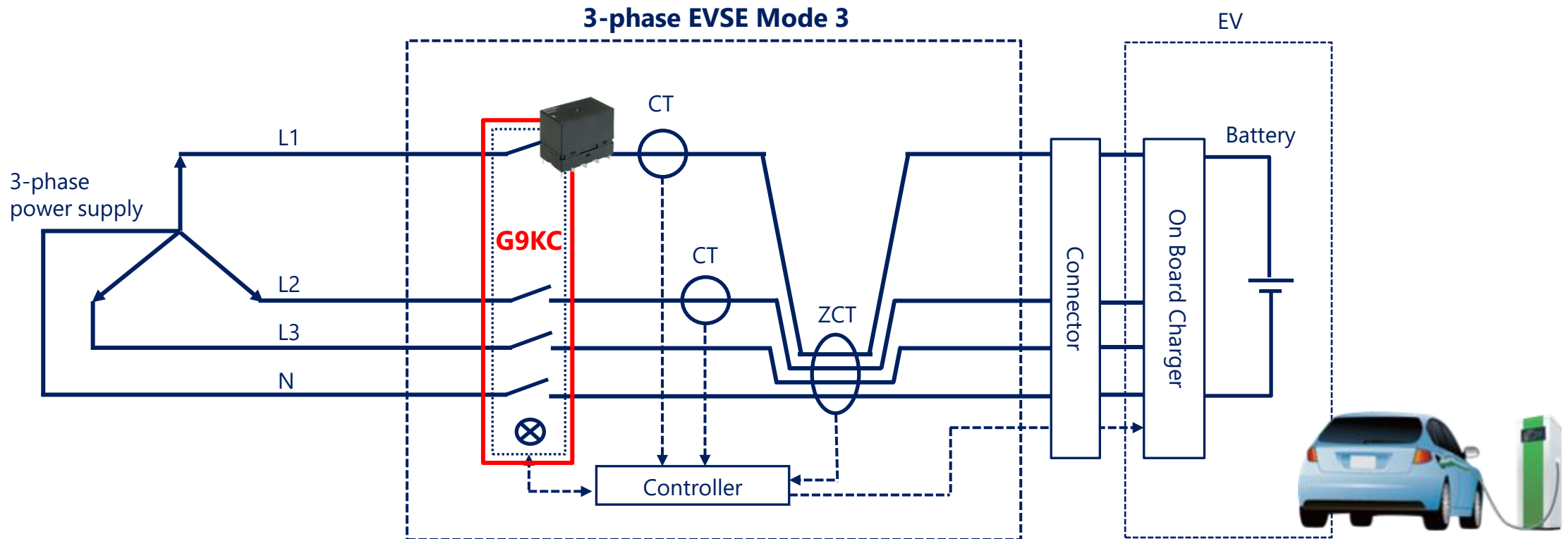
## Examples of EVSE Mode 3 Ratings in the market



3-phase power supply is better to make higher power with less current (thinner & lighter cable) although 3-phase supply should be available at the site.

# Application Case of G9KC in EVSE Mode 3

- G9KC is applicable to **high power 3-phase EVSE Mode 3** to open/close a main circuit for safety and to break charging current in emergency situations.
- Heat generated from relay would be **a main cause for temperature rise** inside EVSE.



EVSE Mode 3 mainly consists of sensors and control circuits.

Relay is a key component to open/close a main circuit for safety and to break charging current in emergency situations.

Heat generated from relay would be a main cause for temperature rise on PCB and in an enclosure of EVSE.

# Features of G9KC

- G9KC is the **4-pole PCB relay** with **lower contact resistance**, compliant with **IEC standards related with EV charging**, and has an option of **auxiliary contact for reliable failure detection**.

## Lower Contact Resistance

- ✓ G9KC provides lower contact resistance than equivalent in the market, not only at initial but also after usage, which contributes lower heat generation and lower temperature rise on PCB and inside enclosure.

## Compliant with IEC Standards related with EV Charging

- ✓ G9KC is compliant with some IEC standards related with EV charging such as IEC 61851-1, 12.2.5 (50,000 cycles, contact category CC 2) and IEC 62955, 9.11.2 (short-circuit tests), IEC 62955, 8.1.2 (all poles shall be mechanically coupled), etc.

## Auxiliary Contact compliant with Mirror Contact Structure specified by IEC

- ✓ G9KC has an option of auxiliary contact compliant with mirror contact structure specified by IEC 60947-4-1, F.7.2, which provides reliable detection of relay contact failure for safety user operation.

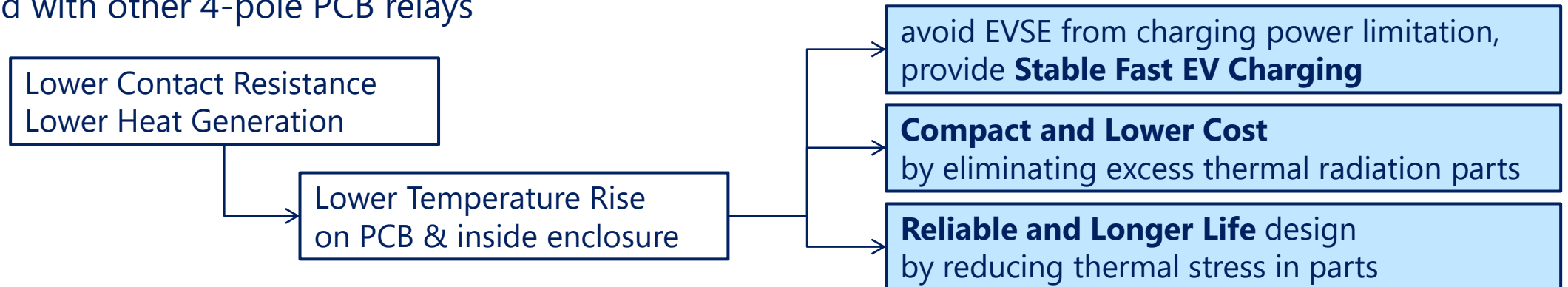
## Safety Standard Certifications

- ✓ G9KC is certificated by UL/C-UL, TUV and CQC with relay safety standards.

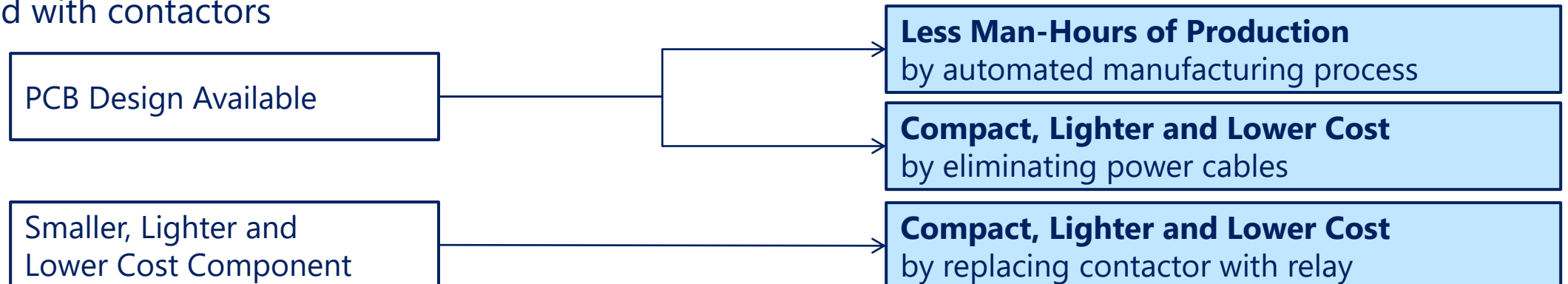
# Customer Benefits with G9KC

- Compared with other PCB relays, lower heat generation from G9KC would provide **stable fast EV charging capability, compact and lower cost design, reliable and longer life products**.
- Compared with contactors, **compact, lighter and lower cost products** could be **automatically manufactured** with PCB mounting assembly.

Compared with other 4-pole PCB relays

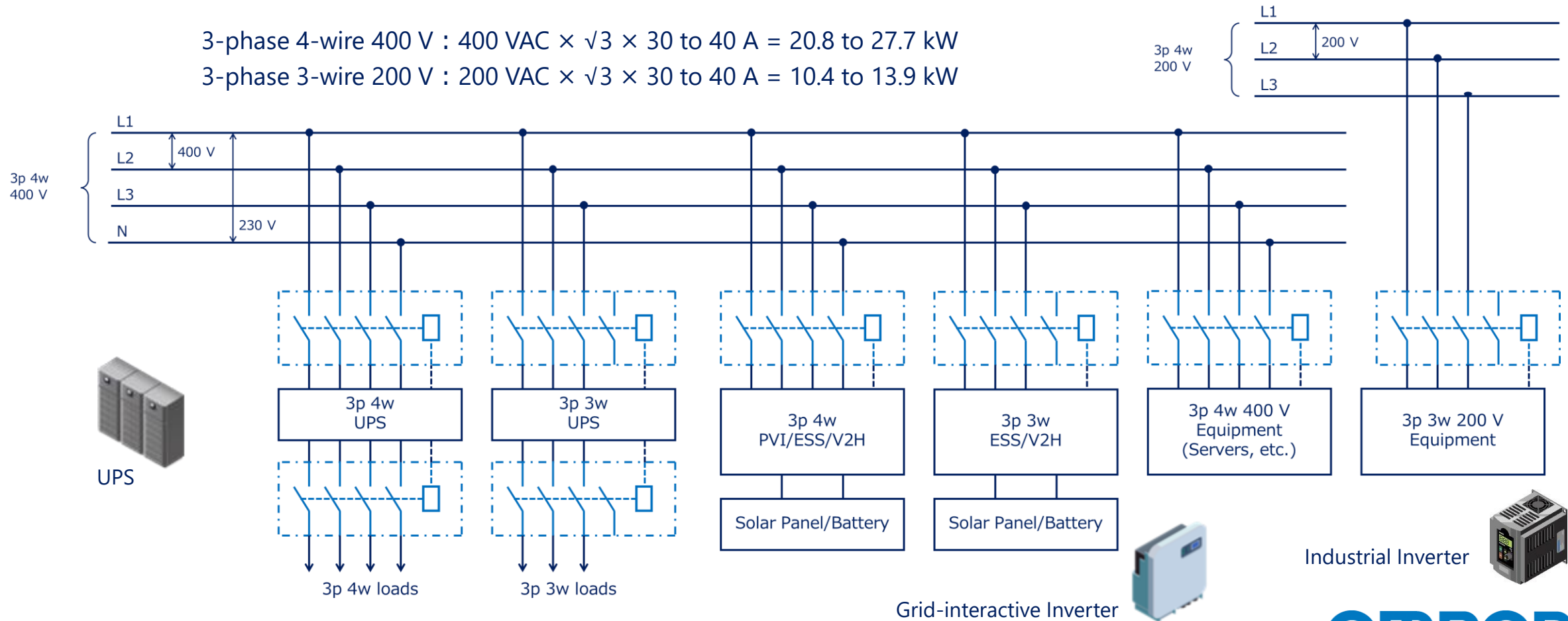


Compared with contactors



# Other Potential Applications

- G9KC could be also applicable to **3-phase power supply applications** such as PV inverters, industrial inverters, UPS and ESS for AC input and output disconnection.
- Aiming for downsizing and cost reduction by replacing contactors or single-pole relays.



# Models of G9KC

- **G9KC-4A** is 4PST-NO (4a) relay without auxiliary contact.
- **G9KC-4A1B** is 4PST-NO (4a) relay with SPST-NC (1b) auxiliary contact.
- Both models have 2 coil options, 12 VDC and 24 VDC.

Type	Contact form	Enclosure rating	Terminal shape	Model	Rated coil voltage (V)	Minimum packing unit
Standard	4PST-NO (4a)	Flux protection	PCB terminals	<b>G9KC-4A</b>	12 VDC 24 VDC	45 pcs/box
	4PST-NO (4a) + SPST-NC (1b)			<b>G9KC-4A1B</b>		

**Note:** When ordering, add the rated coil voltage to the model number.

Example: G9KC-4A DC12

└─ Rated coil voltage

Both the coil voltage on the product case and the packing will be marked as □□ VDC.

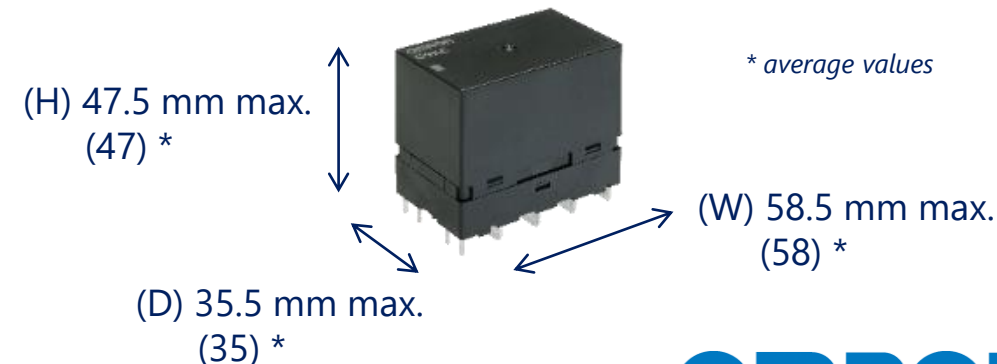


# Specifications

- **4a** main contacts, rated loads of **277 VAC 32 A (50K ops.)** and **480 VAC 40 A (30K ops.)**.
- **1b** auxiliary contact, rated loads of **30 VDC / 277 VAC 1A (100K ops.)**.

Main Contact	
Contact Form	4PST-NO (4a)
Rated Load (Resistive) & Electrical Durability	277 VAC 32 A 50,000 ops. 480 VAC 40 A 30,000 ops.
Mechanical Durability	1,000,000 ops. (G9KC-4A) 100,000 ops. (G9KC-4A1B)
Contact Resistance	6 m Ohm max.
Contact Gap	3.6 mm min.
Compliant with	IEC 62955, 9.11.2 ( $I_n=32A$ , $I_{nc}=3kA$ ) Short-circuit tests
Common	
Terminal Type	PCB terminal
Ambient Temperature	-40 to +85 deg.C
Weight	Approx. 220 g
Standard Certification	UL/C-UL, TUV, CQC

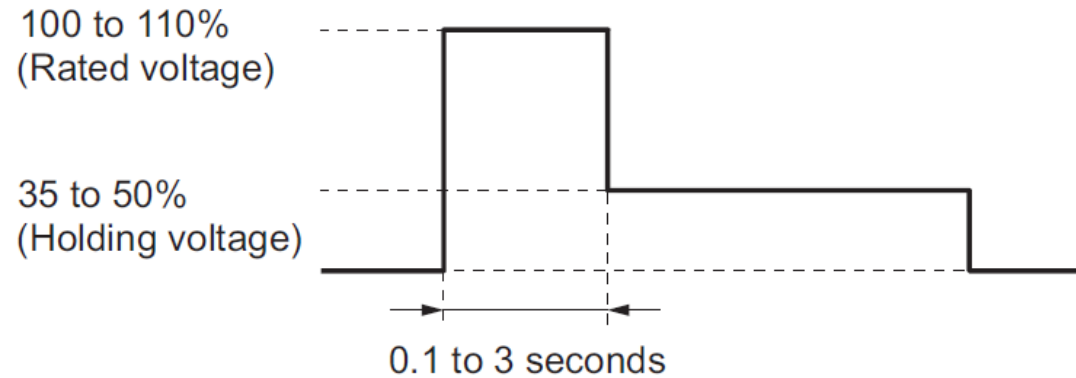
Auxiliary Contact (G9KC-4A1B only)	
Contact Form	SPST-NC (1b)
Rated Load (Resistive) & Electrical Durability	30 VDC 1 A 100,000 ops. 277 VAC 1 A 100,000 ops.
Compliant with	IEC 60947-4-1, F.7.2 Mirror contact structure
Coil	
Rated Voltage	12 VDC / 24 VDC
Power Consumption (Approx.)	2,800 mW at rated voltage, 575 mW at 35% holding voltage



Values are initial values at 23 deg.C.  
This is a rough description, please refer to the datasheet for details.

# Precaution for Holding Voltage

- G9KC **MUST BE USED at Holding Voltage** after making the contacts.
- For the holding voltage details, please refer to the Datasheet, White Paper, or ask your Omron representative.



	Applied coil voltage	Coil resistance *	Coil power consumption
Rated voltage	100 to 110%	28.8 $\Omega$ (DC12)	Approx. 5 to 6 W
Holding voltage	35 to 50%	115 $\Omega$ (DC24)	Approx. 0.6 to 1.3 W

\* The coil resistances were measured at a coil temperature of 23°C with tolerances of  $\pm 10\%$ .



Thank You