

OVERVIEW

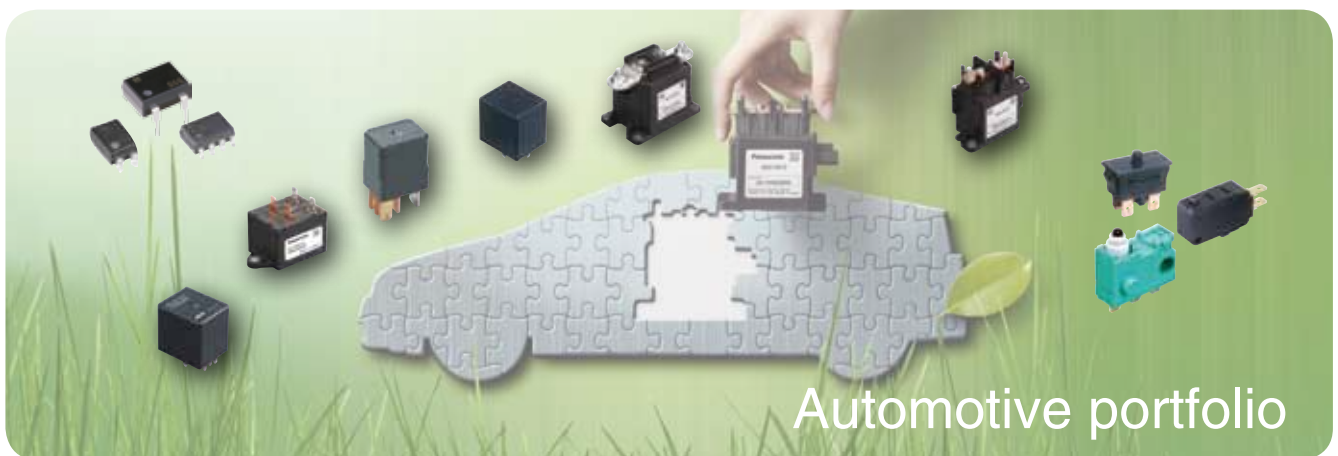
EV RELAYS



A history of quality products and a long partnership with the automotive industry

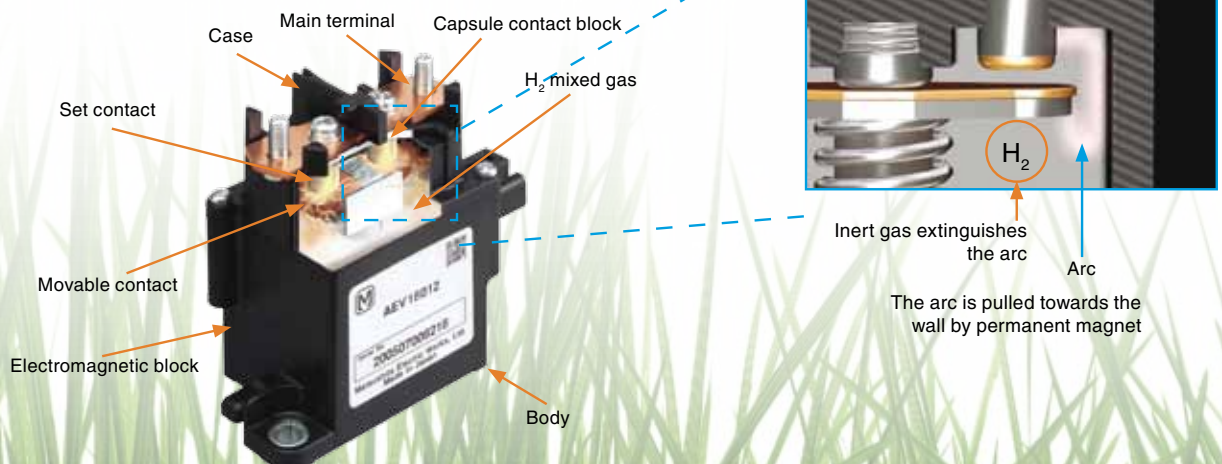
Panasonic has been contributing to the ever increasing need for innovation in transportation electronics for decades, with highly reliable, long lasting devices for transportation safety, comfort, entertainment and powertrain applications.

There is continued effort within the transportation industry to balance societal and economic pressures with the environment. Panasonic continually supports these efforts with proven quality, a solid manufacturing organization and experienced engineering talent.



EV relay operation

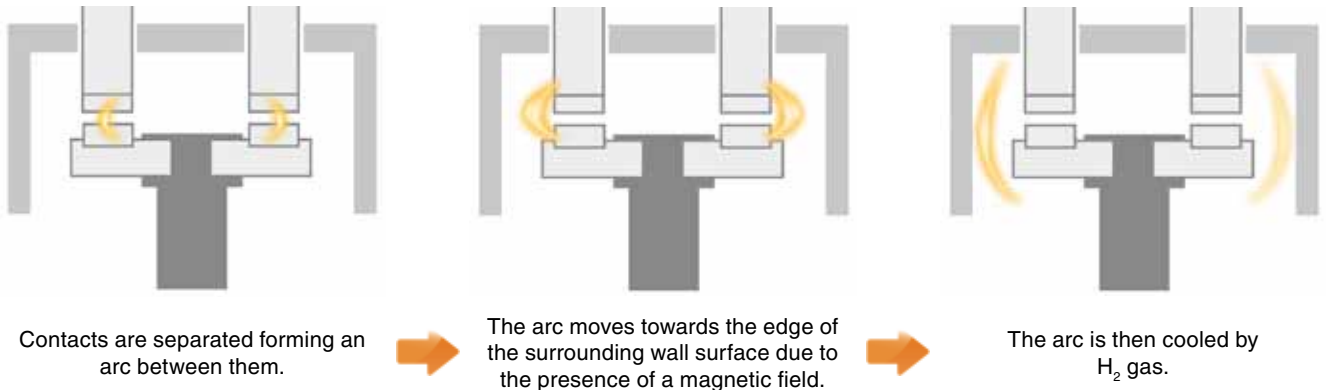
When a high voltage circuit is opened, a strong arc will be formed between the contacts. This arc expands due to the presence of a magnetic field, which is used to weaken the arc. To weaken it even further, Panasonic uses inert gas (H_2) which rapidly extinguishes the arc. Typical voltage drop is approximately 400V DC.



Hydrogen encapsulation mechanism

Panasonic's EV relays have an explosion-proof structure with the contacts housed in a ceramic capsule that seals in hydrogen gas. This structure provides greater safety when shutting off high DC voltages.

Thanks to this capsule structure that seals in hydrogen, the contacts remain free of oxidization. The structure also ensures a dust-free and waterproof environment for the contacts. Highly reliable contact performance for an extended period of time is also ensured.



Switching solutions for electromobility

As a market leader in high voltage DC contactors (EV relays), we are drawing upon our vast expertise to optimize existing products and stimulate new development. The EV relay is constantly being enhanced to cope with more stringent short circuit conditions and higher system voltages while simultaneously contributing to cost reduction for these essential safety systems. We have also designed a complete battery disconnect unit (BDU) to guarantee optimal performance between the battery pack and HV electronics and to speed up customers' projects with a proven, off-the-shelf product.

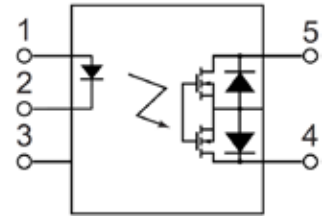
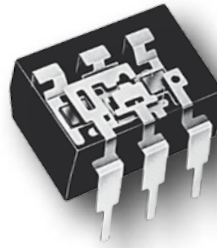
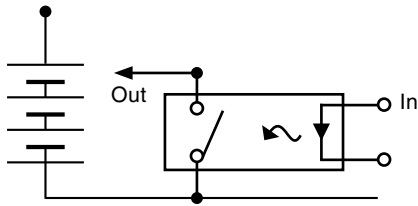
Of course, a sufficiently widespread charging infrastructure is the key to success concerning electromobility. For DC charging, Panasonic offers a broad spectrum of EV relays. For onboard charging inverters, we are working with automotive manufactures to enhance existing power relays to better cope with the demands of the emerging electric car industry until requirements become standardized and an ideal, universal relay can be developed.



PhotoMOS relays

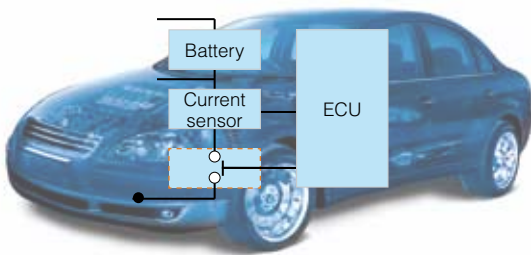
Semiconductor MOSFETs are used in certain automotive designs, such as battery cell monitoring and capacitor charging/discharging. Panasonic PhotoMOS relays are an excellent alternative for such designs. The internal construction of an automotive grade PhotoMOS has added features such as double molding that make it more durable for harsh, everyday environments. Selecting the proper

PhotoMOS relay depends on its derated voltage. Derating is essential in any reliable design and is an important factor when considering product life. The chart below depicts the absolute maximum ratings for selecting PhotoMOS part numbers.



Part number	Package	Contact configuration	Absolute maximum rating			
			Load voltage (V _L)*1	Load current (I _L)*1	Temperature limits	
					Operating (T _{opr})	Storage (T _{stg})
AQW212HAX***	DIP8pin (SMD)	2 Form A	60V	500mA (600mA)*2	-40°C to +85°C -40°F to +185°F	-40°C to +100°C -40°F to +212°F
AQY215HAX***	DIP4pin (SMD)	1 Form A	100V	250mA	-40°C to +85°C -40°F to +185°F	-40°C to +100°C -40°F to +212°F
AQV216HAX***	DIP5pin (SMD)	1 Form A	600V	40mA	-40°C to +85°C -40°F to +185°F	-40°C to +100°C -40°F to +212°F
AQW216HAX***	DIP8pin (SMD)	2 Form A	600V	40mA (50mA)*2	-40°C to +85°C -40°F to +185°F	-40°C to +100°C -40°F to +212°F
AQV258HAX***	DIP5pin (SMD)	1 Form A	1500V	20mA	-40°C to +85°C -40°F to +185°F	-40°C to +100°C -40°F to +212°F

*1 Indicate the peak AC and DC values.
*2 When using 1 channel only.



Isolation monitoring

A PhotoMOS relay can be used as a switch to detect HV battery leaks, which not only makes the electric car safe but is required by law in many countries.

PhotoMOS relay: battery management





A BMS monitors the conditions of each battery cell and tries to maintain the cells within their operating limits. It provides a fail-safe mechanism in case of uncontrolled conditions and sets the battery to allow regenerative braking charges without






overcharging the battery. Panasonic automotive grade relays, PhotoMOS AQV, AQW and AQY series, are ideal for scanning each and every battery cell where high switching speeds are required, while also providing excellent electrical isolation.



Note:
Please contact your local Panasonic technical sales representative to help select the complete P/N based on your specific design requirements.

At a glance

Type	5A* (AEC51012)	10A (AEV110122)	10A (AEV31012)	20A (AEV52012)
Appearance				
Size (LxWxH) mm	61.8 x 30.0 x 31.6	66.8 x 37.9 x 49.7	62.4 x 37.9 x 31.3	78.0 x 40.0 x 37
Contact arrangement	1a	1a	1a	1a
Nominal switching capacity	400VDC	400VDC	10A 400VDC	20A 400VDC
Max. carrying current	5A (continuous)	10A (continuous)	10A (continuous)	20A (continuous)
Short term current	10A (5min.) 20A (1min.)	15A (2min.) 30A (30sec.)	15A (2min.) 30A (30sec.)	40A (10min.) 60A (1min.)
Max. cut-off current	–	–	–	–
Electrical life	70,000 ops @ 10A 400VDC 5 ops @ 30A (L/R≤1ms)	50 ops @ 30A (L/R≤1ms) 30,000 ops @ 15A 400VDC 75,000 ops @ 10A 400VDC	50 ops @ 30A (L/R≤1ms) 30,000 ops @ 15A 400VDC 75,000 ops @ 10A 400VDC	50 ops @ 60A (L/R≤1ms) 30,000 ops @ 20A 400VDC
Economizer	–	–	–	–
Nominal operating power	Max. 1.6W, nom. 1.4W	Max. 1.4W, nom. 1.24W	Max. 1.4W, nom. 1.24W	Nom. 3.9W
Connection terminal	Faston terminal #250 tab x 0.8	Faston terminal #187 tab x 0.5	PCB mount	Faston terminal #250 tab x 0.8
Recommended wire size	2mm ²	2mm ²	–	3mm ²
Unit weight	55g	80g	80g	180g

Type	60A horizontal (silent) (AEVS960122)	80A (AEV18012)	120A (AEV14012)	200A (AEV17012)	300A (AEV19012)
Appearance	 45dB vs. 60dB (w/o coil suppressions)				
Size (LxWxH) mm	77 x 67.8 x 37.7	75 x 40 x 79.0	75 x 40 x 79.0	95 x 45 x 75	111.0 x 60.0 x 74.7
Contact arrangement	1a	1a	1a	1a	1a
Nominal switching capacity	60A 400VDC	80A 400VDC	120A 400VDC	200A 400VDC	300A 400VDC
Max. carrying current	60A (continuous)	80A (continuous)	120A (continuous)	200A (continuous)	300A (continuous)
Short term current	120A (5min.) @ 65°C 180A (2min.) @ 65°C	120A (15min.) 180A (2min.)	225A (3min.) 400A (30s)	300A (15min.)	600A (1min.)
Max. cut-off current	600A 300VDC	800A 300VDC	1,200A @ 300VDC	2,000A @ 350VDC	2,500A @ 300VDC
Electrical life	5 ops @ 600A (L/R≤1ms) 1,000 ops @ 60A	50 ops @ 120A (L/R≤1ms) 1,000 ops @ 80A 400VDC	50 ops @ 120A 400VDC	13,000 ops @ 60A 400VDC 3,000 ops @ 200A 400VDC	1,000 ops @ 300A 400VDC
Economizer	–	–	–	–	yes, holding coil
Nominal operating power	5.5W	Max. 4.5W	4.2W	6W	40W (inrush, approx. 0.1s) 4W (stable)
Connection terminal	M4 screws	M5 nuts	M6 nuts	M6 screws	M8 nuts
Recommended wire size	15mm ²	22mm ²	38mm ²	60mm ²	100mm ²
Unit weight	240g	400g	Approx. 400g	Approx. 600g	750g

* Note: non encapsulated contacts

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Europe

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