

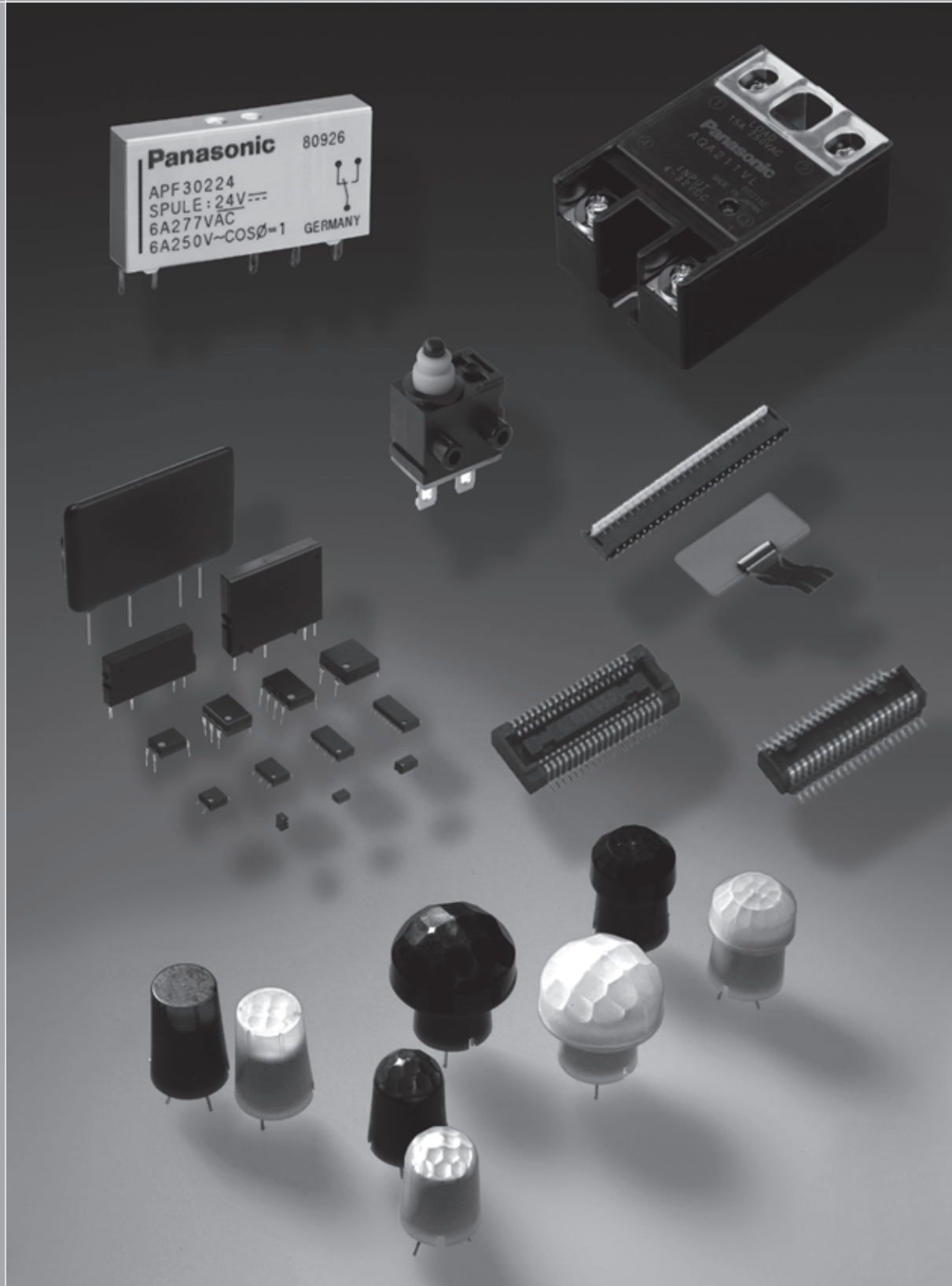


**Panasonic**

**TTI & Panasonic**  
Electromechanical  
Products



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**TTI, Inc. – Never Short on Solutions**

## PhotoMOS Relays

Modern semiconductor technology enables fast, quiet, bounce-free switching, even in miniature sizes. PhotoMOS relays, nevertheless, enjoy an almost unlimited lifetime if used according to the specifications. Moreover, they are extremely reliable, unaffected by vibrations, and their ON-resistance remains stable throughout their entire lifetime.



### Features & Benefits

- Linear output characteristics
- No threshold voltage
- Low operate current (sensitive type  $\leq 0.31\text{mA}$ )
- Low output capacitance (RF type  $\leq 0.5\text{pF}$ )
- Absolute minimum leakage current (pA)
- Extremely long lifetime
- Stable ON-resistance over the lifetime
- Extremely compact design (TSON, VSSOP, SON, SSOP, SOP)
- No contact bounce
- Highly resistant to shock and vibration
- Flexible mounting orientation

### Applications

- Measuring devices and technology
- IC and PC board testers
- Multiplexers
- Medical technology
- Industrial control systems
- Battery management
- Signal/alarm contacts
- Outputs for programmable control
- Pulse and counter outputs

## AQ-A Relays

Complementing its extensive product portfolio of electromechanical relays, Panasonic is continually expanding its offer of semiconductor relays. With its zero-cross or random type triac output, the AQ-A SSR can switch load voltages of 110V or 230VAC at load currents of 15A, 25A and 40A. This allows for optimal control of loads such as heaters, motors, fans and lamps. Its wide input voltage range of 4-32VDC provides the design engineer with plenty of flexibility. A low driving power consumption, high breakdown voltage of 4000V between input and output and a nearly limitless number of switching cycles make the AQ-A stand out even more. The hockey puck type AQ-A SSR boasts a height of a mere 25mm. This new series includes an integrated varistor for surge protection and an operation indicator LED as standard. Additional functions are available upon request.

### Features & Benefits

- Compact size with high power: 40mm x 58mm x 25.5mm (WxLxH)
- Screw terminal SSR: 15A – 40A
- Terminal cover on the output side
- Mounting pitch: 47.5mm
- Built-in varistor
- Integrated snubber circuit
- Operation status LED
- Broad input range: 4VDC – 32VDC
- Reinforced insulation: breakdown voltage:  $4,000V_{\text{RMS}}$  between input and output
- Zero-cross and random types available

### Applications

- Heater control
- Business use:
  - Cooking machine
  - Vending machine
  - Freezer
  - Refrigerator
- Industrial use:
  - Moulding machine
  - Temperature-controlled bath
  - Printing machine
  - Packing machine

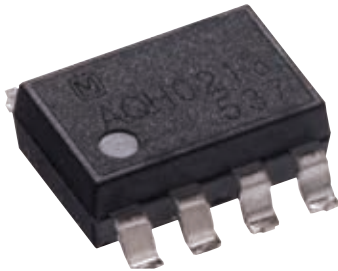


### How to read Part Numbers

1	2	3	4	5	6	7	8
A	Q	A	▲	■	1	V	L
Product Code			Output type	Terminal/Type	Input Voltage	Functions	
			2 15A, 75VAC – 250VAC	1 Screw terminal, zero-cross	1 4VDC – 32VDC	VL Built-in varistor and LED indication	
			4 25A, 75VAC – 250VAC	2 Screw terminal, random*			
			6 40A, 75VAC – 250VAC	* Random type is available by custom order			

## AQH Solid State Relays

With its AQH Series, Panasonic delivers an extremely compact and affordable solid state relay in an 8-pin DIP/SMD package (L/W/H = 9.78mm x 6.4mm x 3.4mm) for switching 110V to 230VAC loads. A variety of types with a typical LED trigger current of just 5mA can effectively handle ON-state RMS (load) currents of 0.3A, 0.6A, 0.9A or 1.2A (without heat sink). Moreover, the maximum load currents stated apply for ambient temperatures of up to -40°C without derating. Depending on the switching behavior desired, you can also choose between a zero-cross and random version. All AQH solid state relays feature an I/O isolation voltage of 5,000VAC. These compact yet powerful relays can be found in applications ranging from small household appliances to large industrial equipment. Typical loads include fans and heating elements such as those found in printers, air conditioners and washing machines. Furthermore, solid state technology offers the advantage of realising phase control for power regulation, e.g. velocity control of fans.



### Features & Benefits

- Compact DIP type: 0.3A – 1.2A
- Compact SSR, ideal for AC load control
- Supports 0.3A, 0.6A, 0.9A, and 1.2A<sub>RMS</sub> on-state current
- Handles both 100 and 200VAC loads
- High I/O isolation voltage: 5,000VAC (between input and output)
- Zero-cross type and random type available
- No derating: up to +40°C
- No heat sink required

### Applications

- Home appliances:
  - Air conditioners
  - Microwave ovens
  - Washing machines
  - Personal hygiene systems
  - Refrigerators
  - Fan heaters
  - Cookers
  - Humidifiers
- Industrial equipment

Type	Part No.				Packing quantity	
	Through hole terminal	Surface-mount terminal			Tube	Tape and reel
	Tube packing style		Tape and reel packing style			
		Picked from the 1/2/3/4-pin side	Picked from the 5/6/8-pin side			
Zero-cross	AQH0213	AQH0213A	AQH0213AX	AQH0213AZ	1 tube contains 50 pieces 1 batch contains 500 pieces	1,000 pieces
	AQH1213	AQH1213A	AQH1213AX	AQH1213AZ		
	AQH2213	AQH2213A	AQH2213AX	AQH2213AZ		
	AQH3213	AQH3213A	AQH3213AX	AQH3213AZ		
Random	AQH0223	AQH0223A	AQH0223AX	AQH0223AZ		
	AQH1223	AQH1223A	AQH1223AX	AQH1223AZ		
	AQH2223	AQH2223A	AQH2223AX	AQH2223AZ		
	AQH3223	AQH3223A	AQH3223AX	AQH3223AZ		

## APF Power Relays

The PF relay is available with either a normally open or a change over contact. Cadmium-free silver-nickel is used as the contact material, which is highly resistant to arc erosion. The contacts are also available with gold-clad plating. Despite being so compact, the PF relay boasts minimum clearance and creepage distances of 5.5mm and 8mm respectively. With such values, the PF relay can be recommended for safe isolation when equipping high-voltage systems (EN 50178) and control devices for household use (EN 60730), or in applications for white goods (EN 60335-1).



### Features & Benefits

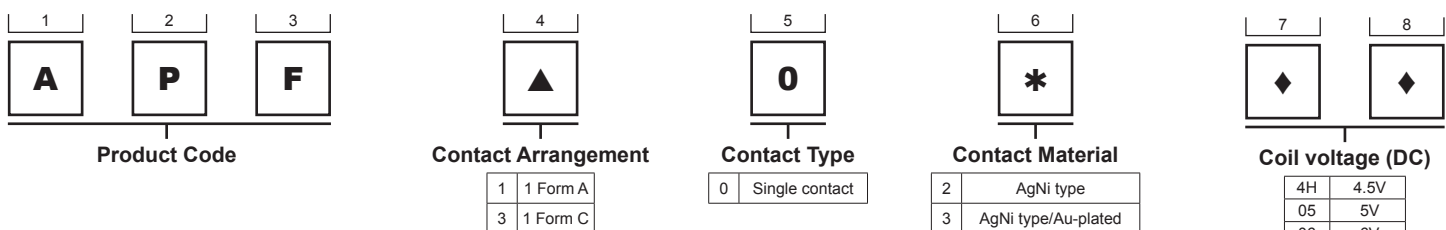
- Slim power relay with sensitive coil: 170mW for 4.5VDC – 24VDC and 217mW for 48VDC and 175mW for 60VDC
- Compact design: 28mm x 5mm x 15mm (LxWxH)
- Up to 6A/250VAC
- Conform to EN60335-1 clause 30 (GWT)
- Reinforced insulation standard: EN/IEC 61810-1
- 4kV breakdown voltage between contact and coil

- 6kV surge withstand voltage between contact and coil
- UL/CUL, VDE approvals

### Applications

- Interface relay for programmable controllers
- Output relay for measuring equipment, timers, counters and temperature controllers
- Industrial equipment, office equipment
- Household appliances for Europe

### How to read Part Numbers



Note: UL/C-UL/VDE approved type is standard.

## DE Power Relays

Miniature polarised 8A/10A power Relay. It's the smallest 16A relay in the market! Nominal switching capacity 16A 250V AC. Its small size makes it suitable for application use in smart sockets and smart plugs for wall outlets.

### Features & Benefits

- Conforms to European safety standards (VDE0700 and VDE0631) EN60730 and EN60335
- Insulating distance between coil and contacts:
  - Clearance minimum 8mm .315 inch
  - Creepage distance minimum 8mm .315 inch
- Size in mm: 25 x 12.5 x 12.5 (LxWxH)
- Extensive product line-up
- Surge voltage between contact and coil 12kV - Low operating power
- High switching capacity: 16A = 25,000 ; 10A = 10,000 switching cycles
- Compact body saves space
- Low coil power
- Creepage and clearance distance: min. 8mm
- Mounting method: PCB
- PIP/ THR type (pin in paste) --> reflowable



### How to read Part Numbers

1	2	3	4	5	6																														
<b>D</b>	<b>E</b>	▲	■	*	<b>V</b>																														
<b>Product Code</b>		<b>Contact Arrangement</b>	<b>Operating Function</b>	<b>Coil Voltage (VDC)</b>	<b>Functions</b>																														
		<table border="1"> <tr><td>1A</td><td>1 Form A</td></tr> <tr><td>2A</td><td>2 Form A</td></tr> <tr><td>1A2A</td><td>1 Form A 1 Form B</td></tr> </table>	1A	1 Form A	2A	2 Form A	1A2A	1 Form A 1 Form B	<table border="1"> <tr><td>Nil</td><td>Single Sided Stable</td></tr> <tr><td>L</td><td>1 Coil Latching</td></tr> <tr><td>L2</td><td>2 Coil Latching</td></tr> </table>	Nil	Single Sided Stable	L	1 Coil Latching	L2	2 Coil Latching	<table border="1"> <tr><td>1.5</td><td>1.5VDC</td></tr> <tr><td>3</td><td>3VDC</td></tr> <tr><td>4.5</td><td>4.5VDC</td></tr> <tr><td>5</td><td>5VDC</td></tr> <tr><td>6</td><td>6VDC</td></tr> <tr><td>9</td><td>9VDC</td></tr> <tr><td>12</td><td>12VDC</td></tr> <tr><td>24</td><td>24VDC</td></tr> <tr><td>48*</td><td>48VDC</td></tr> </table>	1.5	1.5VDC	3	3VDC	4.5	4.5VDC	5	5VDC	6	6VDC	9	9VDC	12	12VDC	24	24VDC	48*	48VDC	<p>Note: UL/CSA, VDE approved type is standard</p> <p>(*Single sided stable only)</p>
1A	1 Form A																																		
2A	2 Form A																																		
1A2A	1 Form A 1 Form B																																		
Nil	Single Sided Stable																																		
L	1 Coil Latching																																		
L2	2 Coil Latching																																		
1.5	1.5VDC																																		
3	3VDC																																		
4.5	4.5VDC																																		
5	5VDC																																		
6	6VDC																																		
9	9VDC																																		
12	12VDC																																		
24	24VDC																																		
48*	48VDC																																		

## ALDP Relays

The ALDP universal relay has a breakdown voltage of 4000V between contact and coil and a clearance and creepage distance of at least 6mm between contact and coil. The surge withstand voltage is even 10,000V between contact and coil. Another advantage as far as saving energy is concerned is the low coil power of only 200mW. The ALDP relay is available in all commonly used coil voltages between 5V DC and 24V DC, which provides a lot of flexibility for developers. Of course, the relay complies to the necessary standards (UL, C-UL, and VDE approval) in order to be used in national and international applications. The relay is produced in a fully automatic assembly line with a 100% end test. By testing every relay Panasonic can ensure constant and optimal quality.

### Features & Benefits

- Nominal switching capacity: 5A 277V AC
- Ambient temperature: -40°C – +85°C
- Excellent heat resistance and tracking performance: EN60695 (GWT2-11, GWF12-12, GWIT2-13) data available
- Slim type: 20.3 (L) x 7.0 (W) x 15 (H) mm
- High insulation resistance:
  - Creepage distance and clearances between contact and coil: Min. 6mm (In compliance with IEC65)
  - Surge withstand voltage between contact and coil: 10,000V or more

### Applications

- Boilers
- Air conditioner
- Refrigerator
- Hot water units
- Microwave ovens
- Fan heaters



### How to read Part Numbers

1	2	3	4	5	6	7																		
<b>A</b>	<b>L</b>	<b>D</b>	<b>P</b>	<b>1</b>	*	◆																		
<b>Product Code</b>				<b>Contact Arrangement</b>	<b>Nominal Coil Voltage (DC)</b>	<b>Packing Style</b>																		
				<table border="1"> <tr><td>1</td><td>1 Form A</td></tr> </table>	1	1 Form A	<table border="1"> <tr><td>05</td><td>5V</td></tr> <tr><td>06</td><td>6V</td></tr> <tr><td>09</td><td>9V</td></tr> <tr><td>12</td><td>12V</td></tr> <tr><td>18</td><td>18V</td></tr> <tr><td>24</td><td>24V</td></tr> </table>	05	5V	06	6V	09	9V	12	12V	18	18V	24	24V	<table border="1"> <tr><td>Nil</td><td>Tube Packing</td></tr> <tr><td>W</td><td>Carton Packing</td></tr> </table>	Nil	Tube Packing	W	Carton Packing
1	1 Form A																							
05	5V																							
06	6V																							
09	9V																							
12	12V																							
18	18V																							
24	24V																							
Nil	Tube Packing																							
W	Carton Packing																							

Note: Certified UL, C-UL, VDE and VDE

## GQ/GN Signal Relays of the 4th Generation

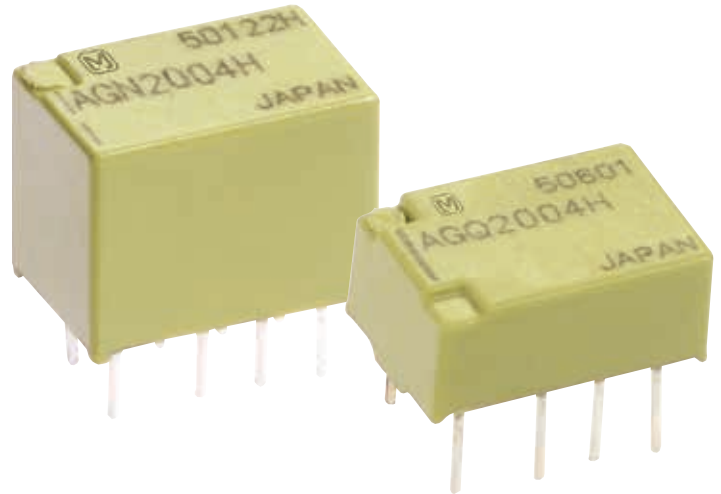
The ultra small signal relays are equipped with two changeover contacts and available as single side stable and one coil latching type. The relays are particularly suitable for low level load up to 2A and ensure with the AgPd contacts a constant contact resistant over the lifetime.

### Features & Benefits

- Compact flat/slim body saves space:
  - Small surface area of 5.7mm x 10.6mm of the AGN relay
  - Packaging density can be increased to support much smaller designs
  - Low profile and 5.2mm flatter design
- High sensitivity single side stable type (Nominal operating power: 100mW) is available
- THT and two SMD versions available
- Outstanding surge resistance:
  - Surge breakdown voltage between contacts and coil: 2,500V 2x10 $\mu$ s (Telcordia)
  - Surge breakdown voltage between open contacts: 1,500V 10x160 $\mu$ s (FCC part 68)
- Use of twin crossbar contacts ensures high contact reliability:
  - AgPd contact is used for resistance against sulphides
- Low gas moulding material
  - Coil assembly molding technology avoids generating volatile gas from coil
- Outstanding vibration and shock resistance:
  - Functional shock resistance: 750m/s<sup>2</sup>
  - Destructive shock resistance: 1,000m/s<sup>2</sup>
  - Functional vibration resistance: 10 – 55Hz (at double amplitude of 3.3mm)
  - Destructive vibration resistance: 10 – 55Hz (at double amplitude of 5mm)
- Sealed construction allows automatic washing

### Applications

- Telephone switchboard
- Telecommunications equipment
- Security
- Measurement equipment
- Consumer electronic and audio visual equipment



### How to read Part Numbers

1	2	3	4	5	6	7	8	9	10
A	G	N	2	▲	0	■	*	*	◆
<b>Product Code</b>			<b>Contact Arrangement</b>	<b>Operating Function</b>	<b>Type of Operation</b>	<b>Terminal Shape</b>	<b>Nominal Coil Voltage</b>		<b>Packing Style</b>
			2 2 Form C	0 Single Side Stable 1 1 Coil Latching 6 High Sensitivity Single Side Stable Type	0 Standard Type (BBM)	Nil Standard PCB Terminal A Surface-Mount Terminal A Type S Surface-Mount Terminal SType	1H 1.5V 03 3V 4H 4.5V 06 6V 09 9V 12 12V 24 24V		Nil Tube Packing X Tape and Reel Packing (Picked from 1/2/3/4 Pin Side) Z Tape and Reel Packing (Picked from 5/6/7/8 Pin Side)

1	2	3	4	5	6	7	8	9	10
A	G	Q	2	▲	0	■	*	*	◆
<b>Product Code</b>			<b>Contact Arrangement</b>	<b>Operating Function</b>	<b>Type of Operation</b>	<b>Terminal Shape</b>	<b>Nominal Coil Voltage</b>		<b>Packing Style</b>
			2 2 Form C	0 Single Side Stable 1 1 Coil Latching 6 High Sensitivity Single Side Stable Type	0 Standard Type (BBM)	Nil Standard PCB Terminal A Surface-Mount Terminal A Type S Surface-Mount Terminal SType	1H 1.5V 03 3V 4H 4.5V 06 6V 09 9V 12 12V 24 24V		Nil Tube Packing X Tape and Reel Packing (Picked from 1/2/3/4 Pin Side) Z Tape and Reel Packing (Picked from 5/6/7/8 Pin Side)

## Built-In Motion Sensors

The PIR sensors from Panasonic have been in the industry for many years and are highly appreciated because of high sensitivity and accuracy. Thanks to its comprehensive R&D and modern production facilities in Japan, Panasonic offers a wide variety of PIR sensors with state-of-the-art technology.

### PIR Sensors

#### Features & Benefits

- Compact design:
  - Circuits are enclosed in a metallic case (TO-5) which helps minimise the adverse effects of external electro magnetic fields (i.e. radiated noise caused by cellular phones)
- Low current consumption:
  - Specialised circuit reduces current consumption to 1µA during sleep mode. This maximises battery lifetime, which is optimal for battery-driven devices
- Lead-free pyroelectric elements:
  - Lead-free sensor elements are used in comparison to the conventional PIR sensing elements made of PZT ceramic
- Available in two categories based on differences in scale of lenses
- With built-in amplifier and comparator
- Special ASIC design for best S/N ratio
- Quad type pyroelectric element

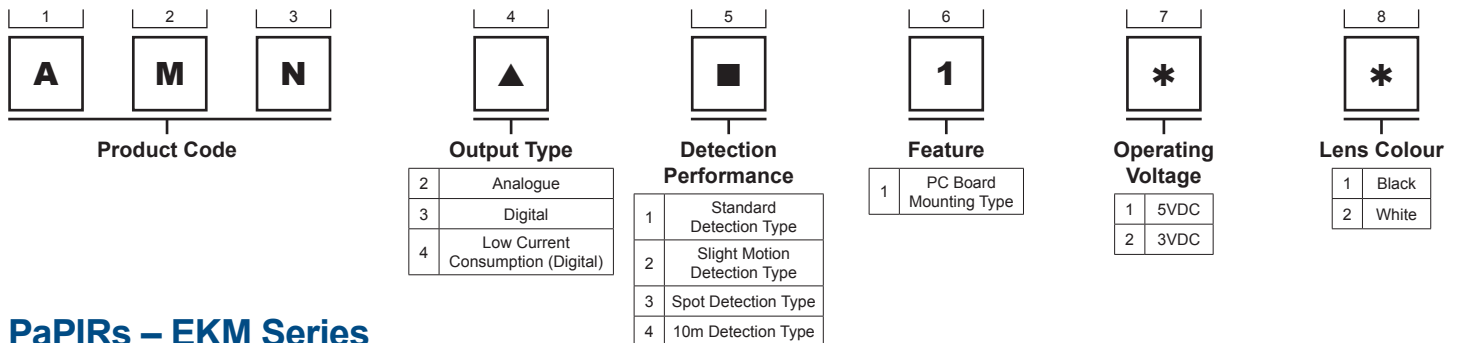


### NaPiOn – AMN Series

#### Features & Benefits

- Available in digital and analogue signal output
- Four different detection types available: standard, slight motion, spot and long distance
- Detection distance: 5m – 10m (depends on type)
- Lens is prolong and in semi-circle shape, which enables bigger area detection

#### How to read Part Numbers

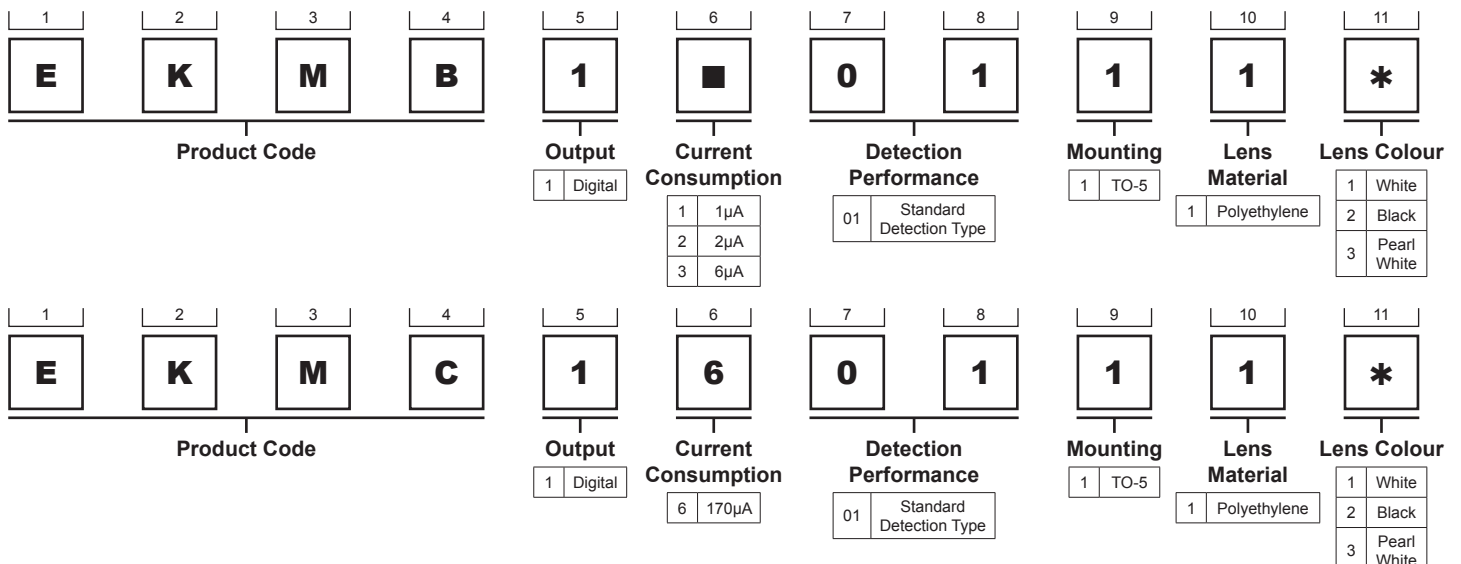


### PaPIRs – EKM Series

#### Features & Benefits

- Available in digital signal output
- Two different detection types available: standard and long distance
- Flat lens allows freedom of design and can easily be integrated into finished products for customers
- Detection distance: 5m – 12m (depends on type)

#### How to read Part Numbers



## ASQ Mini Switches

Turquoise stroke mini switches, smallest size in IP67. The design of the ASQ mini is based on the very popular ASQ switch, which has been sold more than 100 million times. With its sliding contact and the compact structure, the ASQ Mini is the optimal solution for tactile detection tasks in environments where space is limited and conditions are rough. Despite its relatively small size of 8x8mm and a depth of only 5mm, the switch has an over travel of up to 2.2mm. This way, the ASQ Mini offers a high tolerance for construction and during the design-in phase.

### Features & Benefits

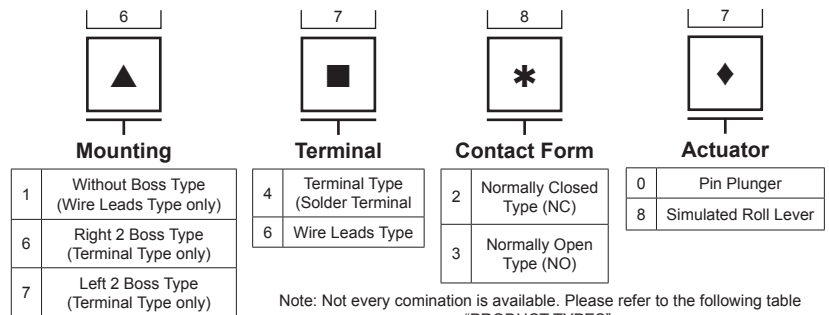
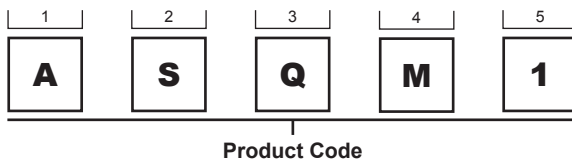
- Miniaturisation achieved with changing from 1 Form C to 1 Form A or 1 Form B contacts (For the terminal type, volume has been cut 45% compared to our previous product)
- Size in mm: 8.3 x 5.3 x 7.85 (LxWxH)
- Lever installation possible while being miniature. Operation possible in various moving parts such as metal cams
- Contact pressure does not depend on the operation stroke
- High contact reliability to support low level switching loads
- Highly effective sealing for resistance against adverse environments (IP67)
- Silent operation with sliding contact
- Available in different contact forms

### Applications

- Automobiles (detection of door opening and closing, shift lever position, etc.)
- Household appliances (vacuum cleaners, air conditioners, washing machines, etc.)



### How to read Part Numbers



Note: Not every combination is available. Please refer to the following table "PRODUCT TYPES".

## FPC/FFC Connector

FPC is a connection type for high speed transmission where smaller pitch space, lower profile or lighter interconnections are required. FPC connectors offer excellent high speed differential transmission characteristics and support all high speed transmission standards.

### Features & Benefits

- Mechanical design freedom is achieved with double top and bottom contacts
- Wiring patterns can be placed underneath the connector
- Easy-to-handle back lock design
- Man-hours of assembly time can be reduced by delivering the connectors with their levers opened
- Nickel barrier helps resist solder creepage
- FPC holding contacts available
- Connectors for flexible printed circuits (FPC) and flat flex cables (FFC) Height 0.6 – 1.0mm. Pitch between terminals 0.2/0.3/0.4/0.5mm

### Applications

- Embedded solutions
- Mobile products
- Display connection



## Board to Board/Board to FPC

Board-to-board is a connection type comprising two connector halves (socket /header). This type is used when space limitations require stacking printed circuit boards, or when small module circuit boards are mounted on a motherboard. Board-to-board enables parallel connections between printed circuit boards, with one-to-one signal transmission. Board-to-FPC is used to connect flexible and rigid circuit boards. This connection type is often used for small modules (such as camera modules and display panels) requiring a connection to the motherboard, or if other routing options are not feasible due to space limitations.

### Features & Benefits

- High resistance to various environments
- Simple lock structure provides tactile feedback to ensure excellent mating/unmating operation feel
- Gull-wing-shaped terminals to facilitate visual inspections
- 2-piece type narrow pitch connector for board-to-board and board-to-FPC connection with 0.6 – 14.0mm mating height. Pitch between terminals is 0.35/0.4/0.5/0.8mm

### Applications

- Embedded solutions
- Mobile products
- Wireless modules





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