

COMPONENT GUIDE

HIGHLIGHTS FOR ECO INNOVATIONS



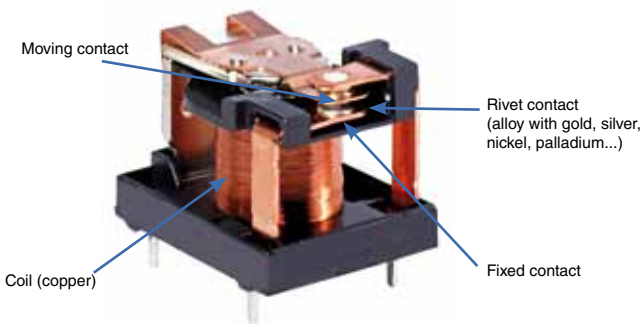
Introduction to electromechanical relays

Telecommunications, machine construction, measurement and control systems, automotive electronics, building security and installation – today there is virtually no branch of human activity that can exist without using modern relays.

Panasonic is able to meet both simple or complex demands from its vast range of sophisticated, economic switching technologies by offering the most appropriate relay to solve specific applications.

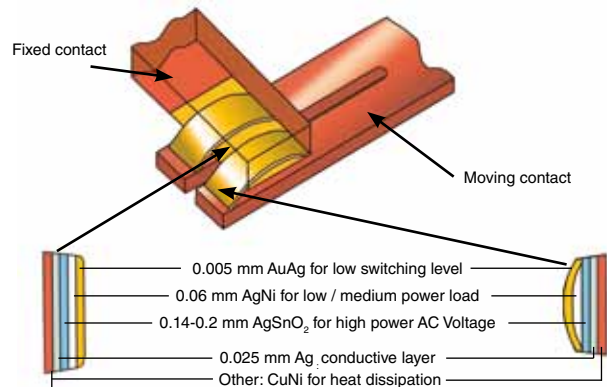
With over 30 years experience at the forefront of relay innovation and development, Panasonic today offers one of the world's most comprehensive ranges of electromechanical and semiconductor types.

Internal structure of a relay



Load switching capability ranges from low-level signals to double-digit ampere values. Panasonic relays are available for all common mounting configurations with screw, PCB, solder or surface mount terminals to meet most demands of operating environments and conditions.

Contacts details



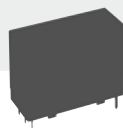
The design of Panasonic relays is optimized, and contacts are the most important elements of relay construction. Contact performance is influenced by contact material, voltage and current values applied to the contacts, type of load, frequency of switching, ambient atmosphere, form of contact, contact switching speed, bounce...

DW series: Small polarized latching relays

1 Form A / 8A with 12,000V surge breakdown voltage



- Pin-in-Paste version available
- Surge withstand voltage between coil and contact: 12,000V
- Breakdown voltage between coil and contact: 5,000Vrms
- Creepage and clearance distance: min. 6mm
- Conforms to EN 60335, PTI 325



Size in mm: 24 x 10 x 18.8 (LxWxH)

Switching current	Max: 8A
Max. switching voltage	250VAC
Contact arrangement	1a
Breakdown voltage between open contacts	1000Vrms
Breakdown voltage between contacts and coil	5000Vrms
Surge withstand voltage	12,000V (initial)
Coil voltage	(DC) 3, 5, 6, 9, 12, 24V
Coil power (1 coil latching/2 coil latching)	200mW / 400mW
Mounting method	Wave solder / PiP
Ambient temperature	- 40°C to +85°C (- 40°F to +185°F)

Typical applications



Whiteware



Metering



Home automation

DE series: Compact relays

Miniature 8A/10A power relay



- Low coil power
- High switching capacity: 16A = 25.000 ; 10A = 100,000 switching cycles
- Creepage and clearance distance: min. 8mm
- Mounting method: PCB
- Conforms to European safety standards: EN60730 and EN60335



Size in mm: 25 x 12.5 x 12.5 (LxWxH)

Switching current	Max: 8A (1a1b, 2a) ; 10/16A (1a)
Max. switching voltage	230V DC ; 440V AC
Contact arrangement	1a, 1a1b, 2a
Breakdown voltage between open contacts	1000Vrms
Breakdown voltage between contact sets	4000Vrms (1a1b, 2a)
Breakdown voltage between contacts and coil	5000Vrms
Surge withstand voltage	12000V
Coil voltage	(DC) 1.5, 3, 4.5, 5, 6, 9, 12, 24, 48V
Coil power	Single side stable: 200mW 1 coil latching: 100mW 2 coil latching: 200mW
Ambient temperature	- 40°C to +70°C (- 40°F to +158°F)

Typical applications



Temperature controller



Metering



Home automation

DJ series: High switching current relays

Compact with high capacity power relay 16A up to 20A*



- Latching type available
- Low coil power
- Optional available with manual test button
- Creepage and clearance distance: min. 8mm
- Mounting method: PCB

* 20A acceptable under certain conditions (please consult us)



Size in mm: 29 x 13 x 16 (LxWxH)

Switching current	Max: 16A, up to 20A
Max. switching voltage	125V DC ; 400V AC
Contact arrangement	1a, 1b, 1c, 1a1b, 2a, 2b, 2c
Breakdown voltage between open contacts	1000Vrms
Breakdown voltage between contacts and coil	4000Vrms
Surge withstand voltage	10,000V
Coil voltage	(DC) 5, 6, 12, 24, 48V
Coil power	Single side stable: 250mW 1 coil latching: 150mW 2 coil latching: 250mW
Ambient temperature	- 40°C to +70°C (- 40°F to +158°F)

Typical applications



Electric power



Brake circuits of industrial machine



Time switches

PF series: Slim 6A type relay

Very slim type relays with high power capacity



- Optimized lifetime
- Slim size with wide switching capacity
- High surge voltage (6,000V) and high breakdown voltage (4,000V)
- Insulation construction conforms to VDE0700
- Contacts with silver nickel or silver nickel gold-clad
- Clearance distance min. 5.5mm
- Creepage distance min. 8mm



Size in mm: 28 x 5 x 15 (LxWxH)



Print socket available with LED indicator

Switching current	6A (up to 8A*)
Max. switching voltage	300V DC ; 400V AC
Contact arrangement	1a, 1c
Breakdown voltage between open contacts	1000Vrms
Breakdown voltage between contacts and coil	4000Vrms
Surge withstand voltage	6000V
Coil voltage	(DC) 4.5, 5, 6, 12, 18, 24, 48, 60V
Coil power	170mW (5 to 24V) 217mW (48V) 175mW (60V)
Mounting method	PCB
Ambient temperature	- 40°C to +85°C (-40°F to +185°F)

* 8A 277V AC General use (UL, C-UL, File No. E120782)
8A 250V AC (VDE File No. 40027672)

Typical applications



Industrial equipment



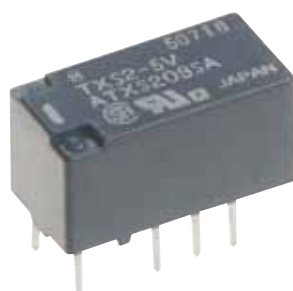
Interface modules



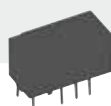
Timers

TX-S series: Signal relays with sensitive coil

2 Form C relays with 1 amp switching



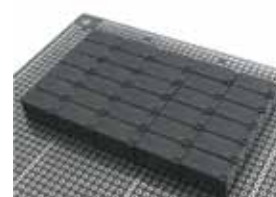
- High contact sensitivity: twin crossbar contacts
- Nominal operating power, 50mW
- 1500V FCC
- 2 types of surface-mount terminals available
- Added new pin layout (LT type) in 2 coil latching type
- Mounting method: PCB, SMT



Size in mm: 15 x 7.4 x 8.2 / 8.4 (LxWxH)

Switching current	Max: 1A; min: 10μA
Max. switching voltage	110V DC; 125V AC
Contact arrangement	2c
Breakdown voltage between open contacts	750Vrms
Breakdown voltage between contact sets	1000Vrms
Breakdown voltage between contacts and coil	1800Vrms
Surge withstand voltage	1500V FCC; 2500V Bellcore (Telcordia)
Coil voltage	(DC) 1.5, 3, 4.5, 5, 6, 9, 12, 24V
Coil power	Single side stable: 50mW (1.5 to 12V DC) ; 70mW (24V DC) 1 coil latching: 35mW (1.5 to 12V DC) ; 50mW (24V DC) 2 coil latching: 70mW (1.5 to 12V DC) ; 150mW (24V DC)
Ambient temperature	- 40°C to +70°C (-40°F to +158°F)

Typical application



High packing density suitable for battery power applications

SF-Y series: Compact, flat relays with forcibly guided contacts

Approvals: EN61810-1, EN50205, EN50178



- Reinforced insulation
- Available as 4-pole and 6-pole types with various contact arrangements
- Gold-clad contacts available upon request
- Polarized rotating armature for low nominal operating power and high shock and vibration resistance



Size in mm: 31 / 39 x 28.6 x 14.5 (LxWxH)

Switching current	Max.: 6A; min.: 1mA
Max. switching voltage	30V DC ; 250V AC
Contact arrangement	2a2b, 3a1b, 4a2b, 5a1b
Breakdown voltage between open contacts	1500Vrms
Breakdown voltage between contact sets	4000Vrms
Breakdown voltage between contacts and coil	4000Vrms, 2500Vrms
Coil voltage	(DC) 5, 12, 18, 21, 24
Coil power	670mW
Mounting method	PCB
Ambient temperature	- 40°C to +70°C, +85°C on request (- 40°F to +158°F)

Typical applications



Elevators, safety control modules, machine safety



Railway and signal technology



Medical technology

EP series: High capacity DC cut-off relays

High capacity of max. 1000V DC cut-off possible



- High capacity to cut off DC voltage in a compact relay: max. cut-off current 2500A/300V DC (300A)
- Nominal switching capacity (300A 400V DC)
- Low operating noise
- High contact reliability
- DC type with sealed capsule and arc-space-free construction



Size in mm (80A type): 79 x 75.5 x 40 (LxWxH)

Max. switching voltage	400V DC
Switching capability (1a)	Max: from 10A to 300A; min: 1A
Breakdown voltage between open contacts	2500Vrms
Breakdown voltage between contacts and coil	2500Vrms
Coil voltage	(DC) 12, 24, 48, 100V
Coil power	From 1.4W to 4.5W (10A...80A) 300A: 45W then 4W (after 100ms)
Mounting method	Screw terminal
Ambient temperature	- 40°C to +80°C (- 40°F to +176°F)

Typical applications



Solar inverter



Battery charge and discharge control

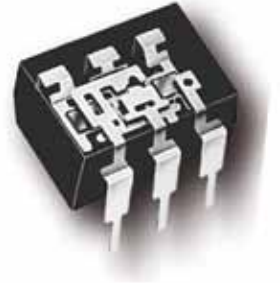
Introduction to PhotoMOS and Solid State Relays

What makes PhotoMOS relays so successful?

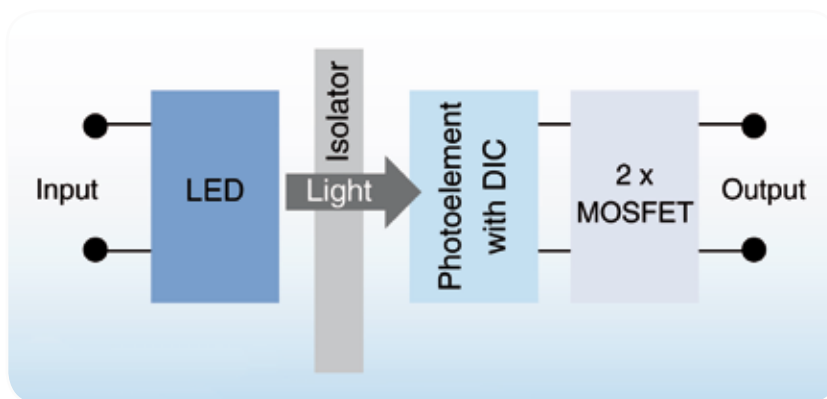
Modern semiconductor technology enables fast, quiet, bounce-free switching, even in miniature sizes.

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.



PhotoMOS technology



The basic construction of the PhotoMOS relay can be seen in the illustration. Light emitted from an LED on the input side passes through an isolator permeable to light and is detected by a solar cell. Via a trigger circuit, the solar cell's output voltage controls the gates of two source-coupled MOSFETs at the output. This arrangement allows PhotoMOS relays to switch both AC and DC loads.

The integration of MOSFET technology in PhotoMOS relays differentiates them significantly from other semiconductor relays with triacs or transistors at the output.

Various packages available



The most important advantages at a glance

- Galvanic I/O isolation
- Linear output characteristics
- No threshold voltage
- Low operate current (sensitive type $\leq 0.31\text{mA}$)
- Low output capacitance (RF type $\leq 1\text{pF}$)
- Absolute minimum leakage current (pA)
- Extremely long lifetime
- Stable ON-resistance over the entire lifetime
- Extremely compact design (VSSOP, SON, SSOP, SOP)
- No contact bounce
- Highly resistant to shock and vibration
- Flexible mounting orientation

AQ-A series: Hockey puck type Solid State Relays

Small screw terminal relay with load current from 15 to 40A



- Photo-Triac
- Zero-cross and random type available
- Wide range input, built-in varistor and LED indication
- Various types of heat sinks to achieve max. load current
- Pre-mounted terminal cover to protect touching output side with load voltage



Size in mm: 58 x 40 x 25.5 (LxWxH)

Load voltage	75V to 250VAC
Max. load current	From 15 to 40A
Input current	Max. 20mA
Operate time	Max. 1/2 cycle of voltage sine wave + 1ms
Release time	Max. 1/2 cycle of voltage sine wave + 1ms
Insulation resistance	Min. 100MΩ between input and output
Breakdown voltage (initial)	4,000 Vrms between input and output 2,500 Vrms between input, output and case
Vibration resistance (functional)	10 to 55Hz double amplitude of 1.5mm
Shock resistance (functional)	Min. 980m/s ²
Operational method	Zero-cross (turn ON and turn OFF)
Ambient temperature	- 20°C to +80°C (- 4°F to +176°F)

Typical applications



Freezer Refrigerator



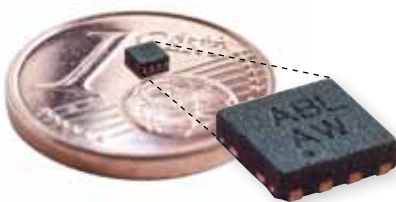
Molding machine



Printing machine

IC3 series: Relay driver

Solenoid/valve driver with current limitation



- Developed to reduce non-latching type relays' consumption down to 25% of nominal power
- Adjustable hold current: 30% - 70% of energizing current with current limitation



Size in mm: 2 x 2 x 0.55 (LxWxH)

Only available in Europe:

IC3DC	Solenoid/valve driver with current limitation and with DC current source operation
IC3PWM	Solenoid/valve driver with current limitation and with PWM switching operation

Typical applications



Industrial control



Electrical heaters



Motor speed control

Features:

Supply range	+5V to +50V
Internal VDDA	3.3V
Supply current	1 mA
Internal osc frequency	30kHz
Fix delay	136ms
Adjustable duty cycle	20% – 90% (IC3PWM only)
Adjustable energizing current	10mA – 100mA
Thermal shutdown	150°C
Package type	8-pin MLPD

AEQ series: Low level load switches 100μA at 3V DC

Carries low level load and contributes to energy savings



- High contact reliability by double-sided sliding & gold-plated contact
- Ultra long stroke of 2.5mm for NC contact
- Stable contact pressure without bouncing
- No operational click sound by sliding contact
- 10 times lower switching current compared with other switches



Size in mm: 13.3 x 8.4 x 13.4 (LxWxH)

Rating	100μA at 3VDC to 100mA at 30VDC
Min. switching capacity	10μA at 1VDC
Contact form	SPDT
Electrical switching life	3VDC 0,1mA (resistive load): min. 2×10^5 30VDC 100mA (resistive load): min. 10^5
Switching frequency	20 times/min
Pushbutton operation speed	100mm/s
Terminal	Solder or PC board terminal
Ambient temperature	-25°C to +85°C (no freezing and condensing)
Degree of protection	IP40
Heat and cold resistance	-45°C to -40°C 48 hours / 85°C to 90°C 48 hours
Humidity resistance	40°C 95% R.H. 96 hours

Actuator type: Operating force, max.:

Pin plunger 1.2N

Leaf lever 1.7N

Simulated leaf lever 1.5N

Typical applications



Home appliances



Energy savings

ASQ series: IP67 snap action switches

Highly resistant to harsh environments, suitable for all markets



- Tightness class conforming to IP67
- High contact reliability by double-sided sliding & gold-plated contact
- Ultra long stroke of 2.5mm for NC contact
- Stable contact pressure without bouncing
- No operational click sound by sliding contact
- Direct lateral actuation of the pin plunger



Size in mm: 13.3 x 5.4 x 10.1 (LxWxH)

Electrical switching life	5V DC 1mA (resistive load): min. 5×10^5 16V DC 50mA (resistive load): min. 5×10^5 30VDC 100mA (resistive load): min. 2×10^5
Switching frequency	20 times/min.
Pushbutton operation speed	100mm/s
Degree of protection	IP67

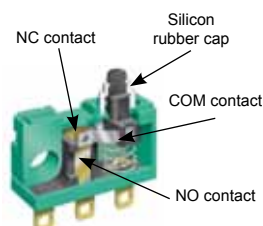
Customized solutions



Please consult us for customized solutions :

Wire cutting, wire welding, hot melt potting, contact crimping, over molding, 100% end test, marking & packing.

Working principle



Typical applications



Automotive
(door locking units, steering column lock, comfort applications)



Industrial
(stop switch for solar tracker, machinery equipment...)

Grid-EYE: 2D matrix thermopile sensor

Panasonic's proprietary passive infrared technology



- Temperature detection a two-dimensional area of 8x8 pixels (64)
- Digital output of temperature values
- Miniature SMD package; reflow mounting supported
- Detects motionless objects



Size in mm: 11.6 x 8 x 4.3 (LxWxH)

Detection distance	Max. 5m
Viewing angle	60°
Current consumption	Normal mode: 4.5mA (typical) Sleep mode: 0.2mA (typical) Stand-by mode: 0.8mA (typical)
Number of pixels	64 (vertical 8 × horizontal 8 matrix)
Frame rate	10 frames/s or 1 frame/s
Output mode	Temperature output
Temperature output resolution	0.25°C
External interface	I ² C (fast mode)

Typical applications



Security and people counting



Home automation:
lighting control etc.



Medical control:
patient detection and
positioning

Dual use article!

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PaPIRs: PIR motion sensors

Very low consumption type 1µA/3V



Standard type



Long distance type

- Low profile with fitted lens and embedded sensing circuit
- Very low consumption type: 1, 2 and 6µA with integrated amplifier and electronic circuits that increase battery life to approximately 6 years
- Quad sensor technology by Panasonic: much more sensitive and reactive sensors thanks to 4 photo elements
- Robust design against false detection



Size in mm: - Standard type - 19mm height and Ø11mm on PCB
- Long distance type - 24.8mm height and Ø11mm on PCB

Detection performances:

Items		Standard detection type	Long distance detection type
Detection range		Max. 5m	Max. 12m
Detection area	Horizontal	94° (± 47°)	102° (±51°)
	Vertical	82° (±41°)	92° (±46°)
	Detection zones	64 zones	92 zones

- The temperature difference between the target and the surroundings should be above 4°C (7.2°F)
- Movement speed: 1.0m/s
- Target concept is human body (size around 700x250mm)

Typical applications



Wireless security sensor



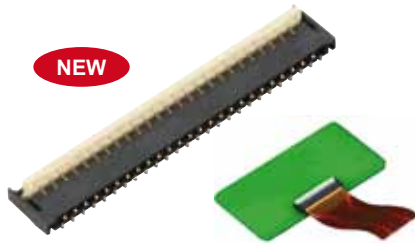
Home appliances
(energy savings)



Air conditioners /
air purifiers

FPC connectors: Back lock type


Designed for space saving applications



- 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



Size depends on the number of contacts

Usage	Board to FPC
Pitch	0.2mm to 0.5mm
Mated height	0.6mm to 1.0mm
Lock structure	Back lock 
Applicable FPC thickness	0.2mm / 0.3mm
Specification	Top and bottom double contact (except Y3BL)
Terminal capability	0.2A / terminal (max. 5A at total pin contacts)
Number of pin contacts	2 to 51
Ambient temperature	-55°C to +85°C
Insertion and removal life	20 times

Typical applications



Embedded solutions



Mobile products

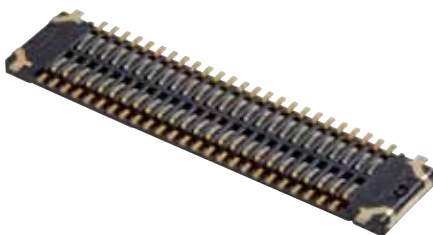


Wireless modules

Narrow pitch connectors: For Board to FPC/Board to Board

Panasonic's proprietary Tough Contact (Advanced) pattern

"TOUGH CONTACT ADVANCED"



- 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.



Size depends on the mated height and number of contacts

Usage	Board to FPC / Board to Board
Pitch	0.35mm to 0.5mm
Mated height	0.6 to 90mm
Specification	Ultra-slim body
Terminal capability	0.3A / terminal (max. 5A at total pin contacts)
Number of pin contacts	10 to 160
Ambient temperature	-55°C to +85°C
Insertion and removal life	30 times

Typical applications



Embedded solutions



Mobile products



Display connection

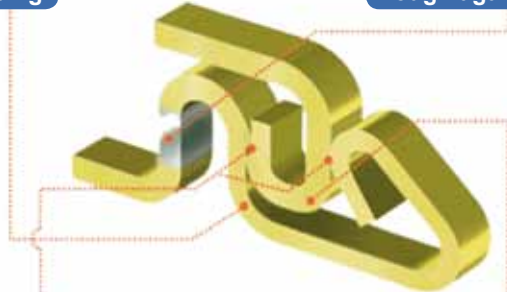
Tough Contact Advanced technology

Tough against dropping

Bellows contact construction improves the ability to withstand twisting and increased resistance to shock of dropping.

Tough against solder rise

Solder remains in the terminal area and a stable fillet of the soldering joints is possible. Prevents contact area from solder rise.



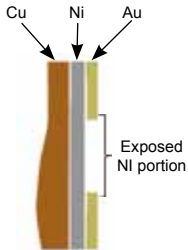
"TOUGH CONTACT ADVANCED"

Tough against foreign particles and flux

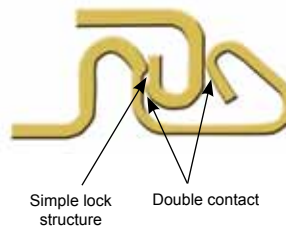
Prevents foreign substances from contact area, doubles the contact points and increases contact pressure

Tough against corrosive gases

Porosity treatment ensures high contact reliability by sealing pinholes in the gold plating.



An area where the nickel-plated layer is exposed has been secured in the middle of the socket contact. This area prevents solder rise, to which conventional ultra-low-profile connectors are prone. Influence of solder controlled in contact and contact spring parts. Solder remains in the terminals and a stable fillet mold is possible.



The two-point contact structure provides high contact reliability even though the profile is ultra-low at 0.6mm. The structure blocks flux and foreign substances, with an effect equivalent to that of our unique V-notch structure.

The simple lock structure gives tactile feedback that ensures a superior mating/unmating operation feel.

MIPTEC technology

3D fine pattern

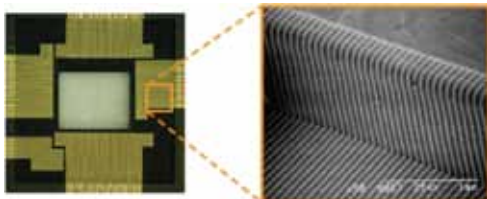
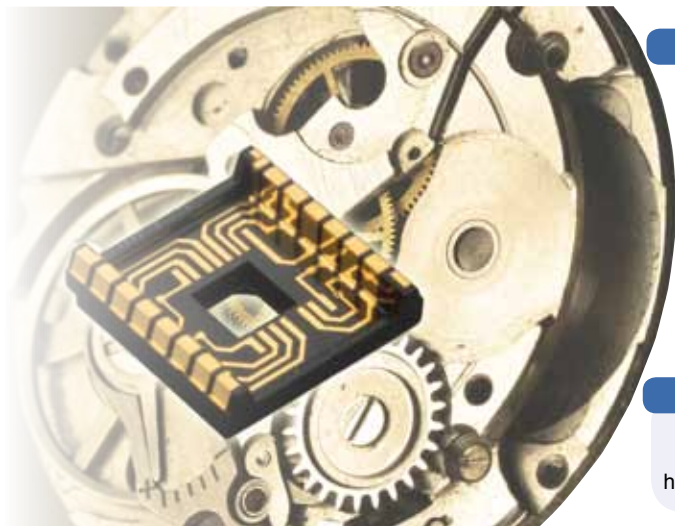
3D fine patterning is achieved by the high accuracy laser processing technology (circuit width/distance between circuit = 50μm/50μm, molded component pattern accuracy ± 30μm).

Direct bare chip mounting

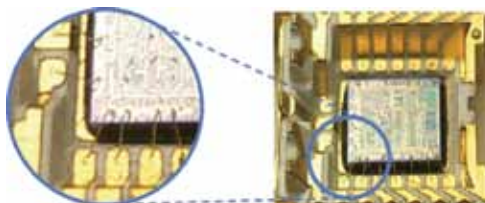
Direct mounting of chips is achieved with a resin material featuring a low linear expansion coefficient. Combined with a surface activation technology, this ensures smoothness of circuit surfaces.

Ceramic MID

Capable of forming 3D fine patterns on surfaces made of ceramic as well as resin. High mounting reliability (low coefficient of linear expansion), high thermal resistance/high heat dissipation, good high frequency characteristics.



3D fine pattern



Direct bare chip mounting



Ceramic MID

North America

Europe

Asia Pacific

China

Japan

Panasonic Electric Works

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▶ Switzerland	Panasonic Electric Works Schweiz AG	Grundstrasse 8, 6343 Rotkreuz, Tel. +41 (0) 41 7997050, Fax +41 (0) 41 7997055, www.panasonic-electric-works.ch
▶ United Kingdom	Panasonic Electric Works UK Ltd.	Sunrise Parkway, Linford Wood, Milton Keynes, MK14 6LF, Tel. +44 (0) 1908 231555, Fax +44 (0) 1908 231599, www.panasonic-electric-works.co.uk

North & South America

▶ USA	Panasonic Industrial Devices Sales Company of America	629 Central Avenue, New Providence, N.J. 07974, Tel. 1-908-464-3550, Fax 1-908-464-8513, www.pewa.panasonic.com
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Asia Pacific/China/Japan

▶ China	Panasonic Electric Works Sales (China) Co. Ltd.	Level 2, Tower W3, The Towers Oriental Plaza, No. 2, East Chang An Ave., Dong Cheng District, Beijing 100738, Tel. +86-10-5925-5988, Fax +86-10-5925-5973
▶ Hong Kong	Panasonic Industrial Devices Automation Controls Sales (Hong Kong) Co., Ltd.	RM1205-9, 12/F, Tower 2, The Gateway, 25 Canton Road, Tsimshatsui, Kowloon, Hong Kong, Tel. +852-2956-3118, Fax +852-2956-0398
▶ Japan	Panasonic Corporation	1048 Kadoma, Kadoma-shi, Osaka 571-8686, Japan, Tel. +81-6-6908-1050, Fax +81-6-6908-5781, www.panasonic.net
▶ Singapore	Panasonic Industrial Devices Automation Controls Sales Asia Pacific	300 Beach Road, #16-01 The Concourse, Singapore 199555, Tel. +65-6390-3811, Fax +65-6390-3810