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Electronics

The Best Relaytion


## D2n Relay

2 pole telecom relay, non-polarized,
Through Hole Type (THT)
Relay types: non-latching with 1 coil

## Features

- Standard DIL relay
- Dimensions $20.3 \times 10.1 \times 10.43 \mathrm{~mm}, 0.800 \times 0.400 \times 0.450$ inch
- Switching and continous current 3 A
- 2 changeover contacts ( 2 form C / DPDT)
- Single contacts
- Immersion cleanable
- Four different coil sensitivities (150, 200, 400, > 500 mW )
- Surge voltage resistance meets FCC Part 68 requirement: $1.5 \mathrm{kV}(10 / 160 \mu \mathrm{sec})$ between coil and contacts


## Typical applications

- Communications equipment
- Office equipment
- Measurement and control equipment
- Entertainment electronics
- Medical Equipment
- Consumer electronics



THT Version


## Dimensions

|  | THT <br> V23105-A5xxx-A201 mm inch |  |
| :---: | :---: | :---: |
| L | $20.2 \pm 0.1$ | $0.795 \pm 0.004$ |
| W | $10.0 \pm 0.1$ | $0.394 \pm 0.004$ |
| H | $11.43 \pm 0.2$ | 0.450-0.008 |
| T | $3.5 \pm 0.3$ | $0.138 \pm 0.012$ |
| Tw | 0.72-0.2 | 0.028-0.008 |
| S | $0.3 \pm 0.1$ | $0.012 \pm 0.004$ |

Mounting hole layout
View onto the component side of the PCB (top view)


Basic grid 2.54 mm

## Terminal assignment

Relay - top view


Coil Data (values at $23^{\circ} \mathrm{C}$ )

| Nominal <br> voltage <br> Unom | Minimum <br> voltage $U_{1}$ | Maximum <br> voltage $U_{\text {II }}$ | Release/ <br> reset voltage <br> Minimum | Nominal power <br> consumption | Resistance |
| :---: | :---: | :---: | :---: | :---: | :---: | Coil number

150 mW nominal power consumption

| 5 | 4.0 | 13.0 | 0.25 | 150 | 167 | 001 |
| ---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | 4.8 | 15.6 | 0.30 | 150 | 240 | 002 |
| 9 | 7.2 | 23.4 | 0.45 | 150 | 540 | 006 |
| 12 | 9.6 | 31.2 | 0.60 | 150 | 960 | 003 |
| 24 | 19.2 | 59.5 | 1.20 | 165 | 3480 | 005 |

200 mW nominal power consumption

| 3 | 2.1 | 6.7 | 0.15 | 200 | 45 | 308 |
| ---: | ---: | ---: | :---: | :---: | :---: | :---: |
| 5 | 3.5 | 11.2 | 0.25 | 200 | 125 | 301 |
| 6 | 4.2 | 13.5 | 0.30 | 200 | 180 | 302 |
| 9 | 6.3 | 20.3 | 0.45 | 200 | 405 | 306 |
| 12 | 8.4 | 27.0 | 0.60 | 200 | 720 | 303 |
| 24 | 16.8 | 54.1 | 108.3 | 2.20 | 200 | 2880 |
| 48 | 33.6 | 200 | 11520 | 305 |  |  |

400 mW nominal power consumption

| 5 | 3.5 | 7.9 | 0.25 | 400 | 62 | 401 |
| ---: | ---: | :---: | :---: | :---: | :---: | :---: |
| 6 | 4.2 | 9.5 | 0.30 | 400 | 90 | 402 |
| 9 | 6.3 | 14.3 | 0.45 | 400 | 203 | 406 |
| 12 | 8.4 | 19.1 | 0.60 | 400 | 360 | 403 |
| 24 | 16.8 | 38.3 | 1.20 | 400 | 1440 | 405 |
| 48 | 33.6 | 76.6 | 2.40 | 400 | 5760 | 407 |

$>500 \mathrm{~mW}$ nominal power consumption

| 5 | 3.5 | 6.3 | 0.25 | 695 | 36 | 501 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | 4.2 | 8.9 | 0.30 | 515 | 502 |  |
| 9 | 6.3 | 12.5 | 0.45 | 580 | 506 |  |
| 12 | 8.4 | 17.8 | 0.60 | 515 | 503 |  |
| 24 | 16.8 | 34.4 | 1.20 | 550 | 280 | 1050 |
| 48 | 33.6 | 67.3 | 2.40 | 575 | 4000 | 505 |

$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing
$U_{\|}=\quad$ Maximum continous voltage at $23^{\circ}$
The operating voltage limits $U_{1}$ and $U_{\text {II }}$ depend on
the temperature according to the formula:

| $U_{\text {Itamb }}=$ | $\mathrm{K}_{1} \cdot U_{123^{\circ} \mathrm{C}}$ <br> and |
| :--- | :--- |
| $U_{\text {II tamb }}=$ | $\mathrm{K}_{\\| I} \cdot U_{\\| 23^{\circ} \mathrm{C}}$ |
| $t_{\text {amb }}$ | $=$ Ambient temperature |
| $U_{\text {Itamb }}$ | $=$ Minimum voltage at ambient temperature, t |
| $U_{\text {amb }}$ |  |
| $U_{1 I}, k_{\text {II }}$ | $=$ Maximum voltage at ambient temperature, t |
|  | $=$ Factors (dependent on temperature), see diagram |

Coil versions, BT 47 type / specification T4563 C (current tested)

| Nominal <br> voltage | Operating <br> current | Nominal power <br> consumption | Resistance | British <br> Telecom Code | Coil number |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Vdc | mA | mW | $\Omega / \pm 10 \%$ |  |  |

## Contact Data

| Number of contacts and type | 2 changeover contacts |
| :---: | :---: |
| Contact assembly | single contacts |
| Contact material | Silver-nickel, gold-covered |
| Limiting continuous current at max. ambient temperature | 3 A |
| Maximum switching current | 3 A |
| Maximum swichting voltage | 220 Vdc |
|  | 250 Vac |
| Maximum switching capacity | $60 \mathrm{~W}, 125 \mathrm{VA}$ |
| Thermoelectric potential | > $10 \mu \mathrm{~V}$ |
| Initial contact resistance / measuring condition: $10 \mathrm{~mA} / 20 \mathrm{mV}$ | $<100 \mathrm{~m} \Omega$ |
| Electrical endurance at $230 \mathrm{Vac} / 0.5 \mathrm{~A}$ | typ. $3.0 \times 10^{5}$ operations |
| at $6 \mathrm{Vdc} / 0.1 \mathrm{~A}$ | typ. $2.0 \times 10^{6}$ operations |
| at $30 \mathrm{Vdc} / 1 \mathrm{~A}$ | typ. $5.0 \times 10^{5}$ operations |
| at $30 \mathrm{Vdc} / 2 \mathrm{~A}$ | typ. $1.0 \times 10^{5}$ operations |
| Mechanical endurance | typ. $15.0 \times 10^{6}$ operations |
| UL/CSA ratings | $30 \mathrm{Vdc} / 1.0 \mathrm{~A}$ |
|  | $100 \mathrm{Vdc} / 0.3 \mathrm{~A}$ |
|  | $125 \mathrm{Vac} / 0.5 \mathrm{~A}$ for 150 mW and 200 mW coil |
|  | $125 \mathrm{Vac} / 1.0 \mathrm{~A}$ for 400 mW and 500 mW coil |


| Insulation |  |
| :---: | :---: |
| Insulation resistance at 500 Vdc | $>10^{9} \Omega$ |
| Dielectric test voltage ( 1 min ) between coil and contacts between adjacent contact sets between open contacts | 1000 Vrms <br> 750 Vrms <br> 750 Vrms |
| Surge voltage resistance <br> according to FCC $68(10 / 160 \mu \mathrm{~s})$ <br> between coil and contacts <br> between adjacent contact sets between open contacts | $\begin{aligned} & 1500 \mathrm{~V} \\ & 1500 \mathrm{~V} \\ & 1500 \mathrm{~V} \end{aligned}$ |

## High Frequency Data

| Capacitance <br> between coil and contacts <br> between adjacent contact sets <br> between open contacts | $\max .2 \mathrm{pF}$ <br> max. 1.5 pF <br> max. 1 pF |
| :--- | :---: |
| RF Characteristics |  |
| Isolation at $100 / 900 \mathrm{MHz}$ | $-39.0 \mathrm{~dB} /-20.7 \mathrm{~dB}$ |
| Insertion loss at $100 / 900 \mathrm{MHz}$ | $-0.02 \mathrm{~dB} /-0.27 \mathrm{~dB}$ |
| V.S.W.R. at $100 / 900 \mathrm{MHz}$ | $1.04 / 1.40$ |

## General data

| Operate time at $U_{\text {nom }}$ typ. / max. | $5 \mathrm{~ms} / 7 \mathrm{~ms}$ |
| :--- | :---: |
| Release time without diode in parallel, typ. / max. | $4 \mathrm{~ms} / 6 \mathrm{~ms}$ |
| Release time with diode in parallel, typ. / max. | $7 \mathrm{~ms} / 10 \mathrm{~ms}$ |
| Bounce time at closing contact, typ. / max. | $3 \mathrm{~ms} / 5 \mathrm{~ms}$ |
| Maximum switching rate without load | 20 operations s |
| Ambient temperature | $-25^{\circ} \mathrm{C} \ldots+85^{\circ} \mathrm{C}$ |
| 150 and 200 mW coil | $-25^{\circ} \mathrm{C} . .775^{\circ} \mathrm{C}$ |
| 400 mW coil | $-25^{\circ} \mathrm{C} \ldots+60^{\circ} \mathrm{C}$ |
| 500 mW coil | $<100 \mathrm{~K} / \mathrm{W}$ |
| Thermal resistance | $105^{\circ} \mathrm{C}$ |
| Maximum permissible coil temperature | 10 g |
| Vibration resistance (function) | 10 to 55 Hz |
| Shock resistance, half sinus, 11 ms | 10 g (function) |
| Degree of protection | $40 \mathrm{~g} \mathrm{(damage)}$ |
| Needle flame test | immersion cleanable, IP 67 |
| Mounting position | application time 20 s, burning time $<15 \mathrm{~s}$ |
| Processing information | any |
| Weight (mass) | Ultrasonic cleaning is not recommended |
| Resistance to soldering heat | max. 2.5 g |

All data refers to $23^{\circ} \mathrm{C}$ unless otherwise specified.

Tube for THT version - 25 relays per tube, 1000 relays per box


## Ordering Information

Relay Code

| V23105A5001A201 | $8-1393792-5$ | V23105A5406A201 | $1-1393793-0$ |
| :--- | :--- | :--- | :--- |
| V23105A5002A201 | $8-1393792-7$ | V23105A5407A201 | $1-1393793-1$ |
| V23105A5003A201 | $8-1393792-8$ | V23105A5475A201 | $1-1393793-2$ |
| V23105A5005A201 | $9-1393792-0$ | V23105A5476A201 | $1-1393793-3$ |
| V23105A5006A201 | $9-1393792-1$ | V23105A5477A201 | $1-1393793-4$ |
| V23105A5301A201 | $9-1393792-3$ | V23105A5478A201 | $1-1393793-5$ |
| V23105A5302A201 | $9-1393792-5$ | V23105A5479A201 | $3-1393794-0$ |
| V23105A5303A201 | $9-1393792-7$ | V23105A5501A201 | $1-1393793-6$ |
| V23105A5305A201 | $9-1393792-9$ | V23105A5502A201 | $1-1393793-8$ |
| V23105A5306A201 | $0-1393793-2$ | V23105A5503A201 | $1-1393793-9$ |
| V23105A5307A201 | $0-1393793-3$ | V23105A5505A201 | $2-1393793-1$ |
| V23105A5308A201 | $0-1393793-5$ | V23105A5506A201 | $2-1393793-3$ |
| V23105A5401A201 | $0-1393793-6$ | V23105A5507A201 | $2-1393793-4$ |
| V23105A5402A201 | $0-1393793-7$ |  |  |
| V23105A5403A201 | $0-1393793-8$ |  |  |
| V23105A5405A201 | $0-1393793-9$ |  |  |

Ordering system:
V23105A5xxxA201
$x x x=$ see coil table on page 4

Tyco
Part Number

Relay Code
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Part Number

## IM Relays

$4^{\text {th }}$ generation slim line - low profile polarized $2 \mathrm{c} / \mathrm{o}$ telecom relay with bifurcated contacts, available as non latching or latching relay with 1 coil. Nominal voltage range from $1.5 \ldots 24 \mathrm{~V}$, coil power consumption of $140 \ldots 200 \mathrm{~mW}$, latching relays with 1 coil 100 mW . The IM relay is available as through hole and surface mount type (J-Legs and Gull Wings) and capable to switch loads up to 60 W/62,5 VA. Dielectric strength fulfills the Bellcore requirements according GR 1089 ( $2,5 \mathrm{kV}$ $2 / 10 \mu \mathrm{~s})$ and FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$. The IM relay is CECC/IECO approved and certified in accordance with IEC/EN 60950 and UL1950. Dimensions approx. $10 \times 6 \mathrm{~mm}$ board space and 5.65 mm height.

## P2 Relays

$3^{\text {rd }}$ generation polarized $2 \mathrm{c} / \mathrm{o}$ telecom relay with bifurcated contacts, available as non latching or latching relay with 1 or 2 coils. Nominal voltage range from 3 ... 24 V , coil power consumption 140 mW , latching relays with 1 coil 70 mW . The P2 relay is available as through hole or surface mount type and capable to switch currents up to 5 A . Dielectric strength fulfills the Bellcore requirements according GR $1089(2,5 \mathrm{kV}-2 / 10 \mu \mathrm{~s})$ and FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$. Dimensions approx. $15 \times 7,5 \mathrm{~mm}$ board space and 10 mm height.

## FX Relays

$3^{\text {rd }}$ generation polarized $2 \mathrm{c} / \mathrm{o}$ telecom relay with bifurcated contacts, available as non latching or latching relay with 1 coil. Nominal voltage range from 3 ... 48 V , coil power consumption of 80 ... 260 mW for the high sensitive version, $140 \ldots 300 \mathrm{~mW}$ for the standard version, latching relays with 1 coil 100 mW . The FX2 relay is available as through hole type and capable to switch loads up to $60 \mathrm{~W} / 62,5 \mathrm{VA}$. Dielectric strength fulfills the Bellcore requirements according GR $1089(2,5 \mathrm{kV}-2 / 10 \mu \mathrm{~s})$ and FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$. The FX2 is CECC/IECQ approved and certified in accordance with IEC/EN 60950 and UL1950. Dimensions approx. $15 \times 7,5 \mathrm{~mm}$ board space and $10,7 \mathrm{~mm}$ height.

## FT2 / FU2 Relays

$3^{\text {rd }}$ generation non polarized, non latching $2 \mathrm{c} / \mathrm{o}$ telecom relay with bifurcated contacts. Nominal voltage range from 3 ... 48 V , coil power consumption 200 ... 300 mW . Most sensitive 48 V relay. Available as through hole and surface mount type. Dielectric strength fulfills the Bellcore requirements according GR $1089(2,5 \mathrm{kV}-2 / 10 \mu \mathrm{~s})$ and FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$. The FT2/FU2 is CECC/IECO approved and certified in accordance with IEC/EN 60950 and UL1950. Dimensions approx. $15 \times 7,5 \mathrm{~mm}$ board space and 10 mm height.

## FP2 Relays

$3^{\text {rd }}$ generation polarized $2 \mathrm{c} / \mathrm{o}$ telecom relay with bifurcated contacts, available as non latching or latching relay with 1 or 2 coils. Nominal voltage range from 3 ... 48 V , coil power consumption of 80 ... 260 mW for the high sensitive version, $140 \ldots 300 \mathrm{~mW}$ for the standard version, latching relays with 1 coil 100 mW .. The FP2 relay is available as through hole type and capable to switch loads up to 30 W/62,5 VA. Dielectric strength fulfills FCC part 68 ( $1,5 \mathrm{kV}-10$ / $160 \mu \mathrm{~s}$ ). The FP2 is CECC/IECQ approved. Dimensions approx. $14 \times 9 \mathrm{~mm}$ board space and 5 mm height.

## MT2 / MT4

$2^{\text {nd }}$ generation non polarized, non latching $2 \mathrm{c} / \mathrm{o}$ and $4 \mathrm{c} / \mathrm{o}$ telecom and signal relay with bifurcated contacts. Nominal voltage range from 4.5 ... 48 V , coil power consumption 150/200/300/400 and 550 mW , and 300 mW (MT4). Dielectric strength fulfills the
requirements according FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$ for both and the Bellcore requirements according GR $1089(2,5 \mathrm{kV}-2 / 10 \mu \mathrm{~s})$ the MT4 only.
Dimensions MT2 approx. $20 \times 10 \mathrm{~mm}$ board space and 11 mm height, MT4 approx. $20 \times 15 \mathrm{~mm}$ board space and 11 mm height.

## D2n Relays

$2^{\text {nd }}$ generation non polarized $2 \mathrm{c} / \mathrm{o}$ relay for telecom and various other applications. Nominal voltage range from $3 \ldots 48 \mathrm{~V}$, coil power consumption from $150 \ldots 500 \mathrm{~mW}$. The D2n relay is capable to switch currents up to 3 A . Dielectric strength fulfills the requirements according FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$. Dimensions approx. $20 \times 10 \mathrm{~mm}$ board space and $11,5 \mathrm{~mm}$ height.

## P1 Relays

Extremely sensitive, polarized $1 \mathrm{c} / \mathrm{o}$ relay with bifurcated contacts for a wide range of applications, available as non latching or latching relay with 1 or 2 coils. Nominal voltage range from 3 ... 24 V , coil power consumption 65 mW , latching relays with 1 coil 30 mW . The P 1 relay is available as through hole or surface mount type and capable to switch currents up to 1 A . Dielectric strength fulfills the requirements according FCC part $68(1,5 \mathrm{kV}-10 / 160 \mu \mathrm{~s})$. Dimensions approx. $13 \times 7,6 \mathrm{~mm}$ board space and 7 mm height for THT or 8 mm height for SMT version.

## W11 Relays

Low cost, non polarized $1 \mathrm{c} / \mathrm{o}$ relay for various applications. Nominal voltage range from 3 ... 24 V , coil power consumption 450 mW , sensitive versions 200 mW . The W11 relay is capable to switch currents up to 3 A. Dielectric strength 1000 Vrms. Dimensions approx. $15,6 \times 10,6 \mathrm{~mm}$ board space and $11,5 \mathrm{~mm}$ height.

## Reed Relays

High sensitive, non polarized relay for telecom and various other applications, available with $1 \mathrm{n} / \mathrm{o}, 2 \mathrm{n} / \mathrm{o}$ or 1c/o contacts. Nominal voltage range from $5 \ldots 24 \mathrm{~V}$, coil power consumption $50 \ldots 280 \mathrm{~mW}$ for $1 \mathrm{n} / \mathrm{o}$ and $125 \ldots 280 \mathrm{~mW}$ for $2 \mathrm{n} / \mathrm{o}$ or $1 \mathrm{c} / \mathrm{o}$ versions. Reedrelays are available in DIP or SIL housing and capable to switch currents up to 0,5 A. Integrated diode and/or electrostatic shield optional. Dielectric strength 1500 Vdc . Dimensions approx. $19,3 \times 7 \mathrm{~mm}$ board space and 5 ... $7,5 \mathrm{~mm}$ height for DIP or $19,8 \times 5 \mathrm{~mm}$ board space and $7,8 \mathrm{~mm}$ height for SIL version.

## Cradle Relays

Extremely reliable and mature relay family of $1^{\text {st }}$ generation for various signal switching applications. Available as non polarized, polarized / latching and relay with AC coil. The benefit is the possibility of combining various contact sets from 1 up to 6 poles, single and bifurcated contacts, different contact materials with a coil voltage range from $1,5 \mathrm{Vdc}$ to 220 Vac . Cradle relays are available as dust protected and hermetically sealed versions, with plug in or solder terminals and are capable to switch currents up to 5 A . Forcibly guided (linked) contact sets optional. Dielectric strength 500 Vrms. Dimensions from approx. $19 \times 24$ to $19 \times 35 \mathrm{~mm}$ board space and 30 mm height.

## Other Relays

We offer a variety of different relay families for maintenance and replacement purposes. These relays are up to 60 years old now, such as Card Relay SN (V23030 / V23031 series), Small General Purpose Relay (V23006 series), Small Polarized Relay (V23063 ... V23067 and V23163 ... V23167 series). Accessories like sockets, hold down springs, etc. optional.

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