# AZ7707

## SPDT SUBMINIATURE POWER RELAY


### FEATURES

- Ordering options from 3A to 10A
- 4 kV dielectric strength available
- 200mW and 450mW coil options
- Epoxy sealed version available
- UL Class F insulation (155°C) available
- TÜV, UL / CUR and CQC approvals (pending)

### CONTACTS

| | |
|---|---|
| **Arrangement** | SPST (1 Form A), SPDT (1 Form C) |
| **Ratings** (max.) | (resistive load) |
| 3A versions<br>switched power<br>switched current<br>switched voltage | <br>90 W or 750 VA<br>3 A<br>30 VDC* or 400 VAC |
| 5A version<br>switched power<br>switched current<br>switched voltage | <br>150 W or 1250 VA<br>5 A<br>30 VDC* or 400 VAC |
| High capacity<br>switched power<br>switched current<br>switched voltage | <br>150 W or 2500 VA<br>10 A<br>30 VDC* or 400 VAC |
| | * Note: If switching voltage is greater than 30 VDC, special precautions must be taken. Please contact the factory. |
| **Rated Loads** | |
| AZ7707, form C, 0.45W | 3 A at 250 VAC, Gen.Pur., 100k cycles, 85°C [1]<br>3 A at 30 VDC, Res., 100k cycles, 85°C [1] |
| AZ7707, form A, 0.2 W | 3 A at 277 VAC, Res., 50k cycles, 85°C [2]<br>3 A at 30 VDC, Res., 50k cycles, 85°C [2] |
| AZ7707, form A, 0.45 W | 5 A at 277 VAC, Res., 50k cycles, 85°C<br>5 A at 30 VDC, Res., 50k cycles, 85°C<br>5 A at 250 VAC, Gen.Pur., 100k cycles, 85°C [1]<br>1/3 HP at 277 VAC, 100k cycles [1] [2] [3] [4] |
| AZ7707T, form A, 0.2 W | 10 A at 277 VAC, Res., 10k cycles, 85°C [2]<br>10 A at 30 VDC, Res., 10k cycles, 85°C [2]<br>8 A at 277 VAC, Res., 50k cycles, 85°C [2]<br>8 A at 30 VDC, Res., 50k cycles, 85°C [2] |
| AZ7707T, form A, 0.45 W | 10 A at 277 VAC, Res., 50k cycles, 85°C [2]<br>10 A at 30 VDC, Res., 50k cycles, 85°C [2]<br>1/6 HP at 125/250 VAC, 50k cycles [2] [3]<br>TV-5, 120VAC, 25k cycles [2] [3] |
| | Notes:<br>1) Only available with 2.5kV dielectric strength<br>2) Only available with $AgSnO_2$ contacts<br>3) Approvals at UL only<br>4) Class F only<br>* All elevated temp ratings using open vent hole |
| **Contact materials** | AgNi (silver nickel)<br>$AgSnO_2$ (silver tin oxide) |
| **Initial resistance** | < 100 mΩ (using 6V/1A, voltage drop method) |

### GENERAL DATA

| | |
|---|---|
| **Life Expectancy**<br>mechanical<br>electrical | (minimum operations)<br>1 x $10^6$<br>see approved ratings |
| **Operate Time** | ≤ 8 ms (at nominal coil voltage) |
| **Release Time** | ≤ 5 ms (nom. coil voltage, w/o suppression) |
| **Dielectric Strength** | (at sea level for 1 min.)<br>2500 $V_{RMS}$ coil to contact<br>4000 $V_{RMS}$ coil to contact (option)<br>1000 $V_{RMS}$ between open contacts |
| **Insulation Distances**<br>2.5kV option<br><br>4.0kV option | (clearance / creepage)<br>≥ 1.5 mm / ≥ 3.2 mm coil to contact<br>≥ 0.3 mm / ≥ 2.0 mm open contacts<br><br>≥ 5.5 mm / ≥ 6.5 mm coil to contact<br>≥ 0.3 mm / ≥ 4.3 mm open contacts |
| **Insulation Resistance** | 1000 MΩ (min.) at 20°C, 500 VDC, 50% RH |
| **Temperature Range**<br>operating | (at nominal coil voltage)<br>-40°C (-40°F) to 85°C (185°F) |
| **Vibration resistance** | 1.5 mm (0.062") DA at 10–55 Hz |
| **Shock** | 10 g operating |
| **Enclosure**<br>material<br>protection category<br>material group<br>flammability | <br>PBT<br>RTII, RTIII<br>IIIa<br>UL94 V-0 |
| **Terminals** | Tinned copper alloy, THT PCB mounting |
| **Soldering**<br>preheating<br>soldering | (referring IEC 61760-1 wave soldering)<br>120°C (248°F) / ≤ 120 s<br>260 ±5°C (500 ±9°F) / ≤ 2 x 5 s |
| **Dimensions**<br>length<br>width<br>height | <br>18.4 mm (0.724")<br>10.2 mm (0.402")<br>15.5 mm (0.610") |
| **Weight** | 6 grams (approx.) |
| **Packing unit in pcs** | 100 per tray / 1000 per carton box |
| **Compliance** | UL 508, IEC 61810-1, GB/T 21711.1<br>RoHS, REACH |
| **Agency Approvals**<br>TÜV<br>UL/CUR<br>CQC | |

## COIL

| | |
|---|---|
| **Nominal coil DC voltages** | see coil voltage specifications tables |
| **Dropout** | > 5% of nominal coil voltage |
| **Nominal power**<br>standard coil<br>sensitive coil | (approx.)<br>450 mW<br>200 mW |
| **Power at pickup voltage**<br>standard coil<br>sensitive coil | (typ.)<br>253 mW<br>113 mW |
| **Max. continuous dissipation** | 760 mW at 20°C (68°F) ambient |
| **Temperature Rise**<br>standard coil<br>sensitive coil - 10A version<br>sensitive coil - 3A version | (at nominal coil voltage, full load)<br>65 K<br>55 K<br>50 K |
| **Max. temperature** | 155°C (311°F) |

## COIL VOLTAGE SPECIFICATIONS

**Standard 450mW Coil**

| Nominal Coil VDC | Must Operate VDC | Max. Continuous VDC | Resistance Ohm ± 10% |
|---|---|---|---|
| 3 | 2.25 | 3.9 | 20 |
| 5 | 3.75 | 6.6 | 55 |
| 6 | 4.5 | 7.8 | 80 |
| 9 | 6.75 | 11.7 | 180 |
| 12 | 9.0 | 15.6 | 320 |
| 18 | 13.5 | 23.4 | 720 |
| 24 | 18.0 | 31.2 | 1280 |
| 48 | 36.0 | 62.4 | 5120 |

**Sensitive 200mW Coil (4 kV Version Only)**

| Nominal Coil VDC | Must Operate VDC | Max. Continuous VDC | Resistance Ohm ± 10% |
|---|---|---|---|
| 3 | 2.25 | 4.5 | 45 |
| 5 | 3.75 | 7.5 | 125 |
| 6 | 4.5 | 9.0 | 180 |
| 9 | 6.75 | 13.5 | 400 |
| 12 | 9.0 | 18.0 | 720 |
| 18 | 13.5 | 27.0 | 1600 |
| 24 | 18.0 | 36.0 | 2800 |
| 48 | 36.0 | 72.0 | 11520 |

Note: All values at 23°C (73°F), upright position, terminals downward.

## NOTES

1. All values at reference temperature of 23°C (73°F) unless stated otherwise.
2. Relay may pull in with less than “Must Operate” value.
3. Coil suppression circuits such as diodes, etc. in parallel to the coil will lengthen the release time.
4. Relay adjustment may be affected if excessive shock is applied to the relay.
5. Relay adjustment may be affected if undue pressure is exerted on the relay case.
6. Specifications subject to change without notice.

## ORDERING DATA

**2.5 kV Dielectric Versions**

**AZ7707-□□□-□□D□□**

**Coil Insulation**
nil: Class B insulation
F: Class F insulation

**Sealing option**
nil: non sealed
E: sealed version

**Nominal coil voltage**
see coil voltage specifications tables

**Contact Material**
E: $AgSnO_2$ (silver tin oxide)
B: AgNi (silver nickel)

**Contact arrangement**
1A: 1 Form A (SPST)
1C: 1 Form C (SPDT)

**4 kV Dielectric Versions**

**AZ7707□-1AE-□□D□□□R**

**Coil Insulation**
nil: Class B insulation
F: Class F insulation

**Sealing option**
nil: non sealed
E: sealed version

**Coil option**
nil: standard 450 mW coil
S: sensitive 200 mW coil

**Nominal coil voltage**
see coil voltage specifications tables

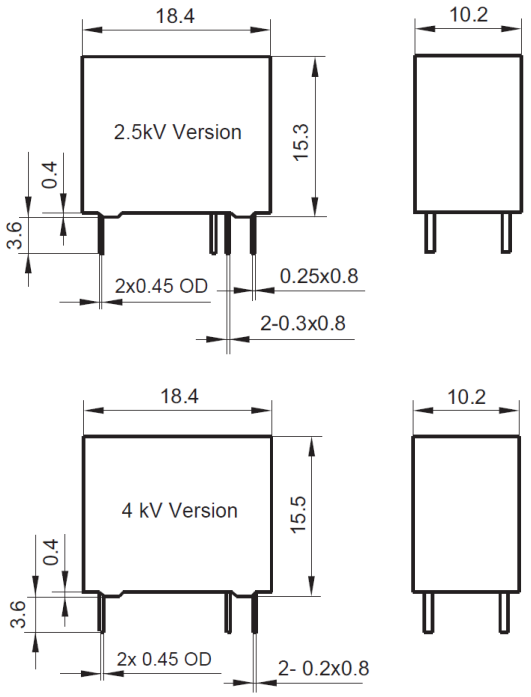
**Contact Option**
nil: Standard version
T: High capacity ersion

**Example ordering data**

| | |
|---|---|
| AZ7707-1CB-5D | Standard version, 1 Form C, silver nickel contacts, 5 VDC standard coil, non sealed, class B insulation, 2.5 kV dielectric |
| AZ7707-1AE-18DSEF | Standard version, 1 Form A, silver tin contacts, 18 VDC standard coil, sealed, class F insulation, 2.5 kV dielectric |
| AZ7707T-1AE-12DSFR | High capacity version, 12 VDC sensitive coil, non sealed, class F insulation, 4 kV dielectric |

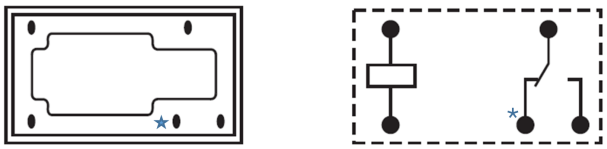
## MECHANICAL DATA

Dimensions in mm . Tolerance: ±0.2mm (≤1mm) , ±0.3mm (1-5mm), ±0.4mm (>5mm)




## WIRING DIAGRAMS

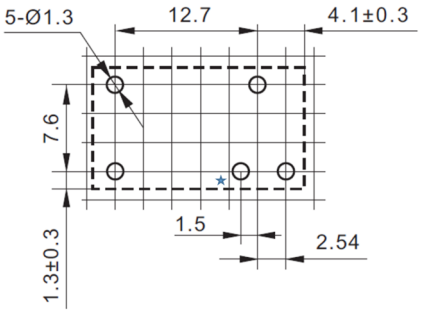
Viewed towards terminals.
Shown in deenergized condition.



* Not used on 1 Form A version

## PC BOARD LAYOUT

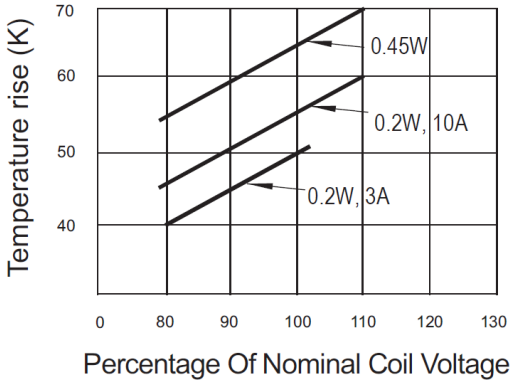
Dimensions in mm. Tolerance: ±0.1mm




★ For 1 form C type only.

## COIL TEMPERATURE RISE

Tested at ambient of 85°C



## NOTES

**General**

1. All values in this datasheet are at reference temperature of 23°C (73°F) unless stated otherwise.
2. Evaluate the component's performance and operating conditions under the worst-case conditions of the actual application.
3. The datasheet and the component's specifications are subject to change without notice.
4. Customer special requirements to be reviewed by our company and identified in the form of a suffix number

**Storage, handling, and environmental guidelines**

1. Relays are electromechanical components that are sensitive to shock. The relay's adjustment can be affected if the relay is subjected to excessive shock or excessive pressure is applied to the relay case. Relays which have been dropped must no longer be used.
2. Do not allow the relay to be used in an environment containing silicone, otherwise silicone inside the relay may cause the relay contact acceleration failure.
3. Prevent relays from atmospheres containing corrosive gases or liquid or solid, such as water vapor, H2S, SO2, NO2, Cl, P, dust and other harmful substances and elements. Corrosion of structures and contacts leads to malfunction and shortens the component's service life.
4. Prevent non-sealed relays from atmospheres subject to dust. Dust particles may enter the case and get stuck between the contacts, causing the contact circuits to fail.
5. Do not use these relays in environments with explosive or flammable gases. Electrical arcing at the contacts could ignite these gases and cause fire.
6. For automated dual wave soldering process we recommend preheating with 120°C (248°F) for max. 120 seconds and a soldering temperature of 260 ±5°C (500 ±9°F) for max. 10 seconds soldering time (max. 5 seconds per wave). For manual soldering we recommend 350°C (662°F) max. temperature for max. 5 seconds. During the soldering process, no force may be exerted on the relay terminals.
7. Non-sealed relays (RTII) must not be washed, immersion cleaned or conformal coated as substances may enter the case and cause corrosion or seizure of mechanical parts.
8. Avoid high frequency or ultrasonic vibrations on the relays as these can cause contact welding and misalignment or destruction of internal structures.
9. During operation, storage and transport, ambient temperature should be within the specified operating temperature range. Humidity should be in the range of 5% to 85% RH. Icing and condensation must be avoided. Relays stored for an extended period of time may show initially increased contact resistance values due to chemical effects such as oxidation.

**Design guidelines**

1. The relay may pull in and operate with less than the specified *must operate* voltage value.
2. The coil's *must operate* and *min. holding* voltages, the coil's *ohmic resistance* and the relay's *operate time* depend on the temperature of the coil. The specified values are given for a coil temperature of 23°C and increase by approx. 0.39% per Kelvin of temperature rise. This circumstance must be considered, especially during operation with high load currents and elevated ambient temperature.
3. At elevated ambient temperatures, after applying the rated nominal coil voltage for ≥ 200 milliseconds, the coil energization must be reduced to a suitable holding level in order to reduce thermal stress and to prevent the coil from overheating.
4. Coil suppression circuits such as diodes, etc. in parallel to the coil will lengthen the release time. We recommend using suppression circuits with a breakdown voltage of approx. 2 times the nominal coil voltage in order to achieve a quick release time.
5. When using PWM coil control, use a fast-switching recirculation diode in parallel with the coil to keep the coil current during pulse pauses. To achieve a quick release time when de-energizing the coil, the recirculation diode must be eliminated from the circuit to get a fast decay of coil current. As PWM frequency we recommend ≥ 15 kHz in order to avoid audible noise from magnetostriction. To reduce negative EMI effects, we recommend to apply the PWM to the coil's inner/center layer terminal and have the outer layer terminal connected to ground or the supply rail.
6. Contact resistance is a function of load current, dwell time and wear level of the contacts. Immediately after closing the contacts, or if tested with low current only, the contact resistance will show a relatively high value. A low level steady state contact resistance is reached at higher current after a certain time in thermal equilibrium.
7. The relay dissipates heat form power losses through its load terminals. Provide sufficient cross section and area of the PCB traces so that they can act as heat spreader.
8. For PCBs with multiple relays, do not place the components directly next to each other. We suggest providing a mounting distance of minimum 10 mm to allow for better cooling.
9. As with any contact mechanism, the relay's NC signal contact bounces when switching. For evaluation of its signal, suitable debouncing measures must be taken to get a reliable signal.

## DISCLAIMER

This product specification is to be used in conjunction with the application notes which can be downloaded from the regional ZETTLER relay websites. The specification provides an overview of the most significant part features. Any individual applications and operating conditions are not taken into consideration. It is recommended to test the product under application conditions. Responsibility for the application remains with the customer. Proper operation and service life cannot be guaranteed if the part is operated outside the specified limits.

## ZETTLER GROUP

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