# E-T-A Smart Power Relay E-1048-8S...

## Description

The Smart Power Relay E-1048-8S is a remotely controllable electronic load disconnecting relay with two functions in a single unit:

- electronic relay
- electronic overcurrent protection

A choice of current ratings is available from 1 A through 30 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

It has been designed for installation in IP-protected enclosures. The optimised design allows reduction of space requirements up to 50 % compared to standard electro-mechanical cubic relays. Power consumption is cut by factor 5 compared to standard electro-mechanical relays and allows gas saving and reduction of $CO_2$ emissions.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection

**Now type E-1048-8S combines these two functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.**

## Applications

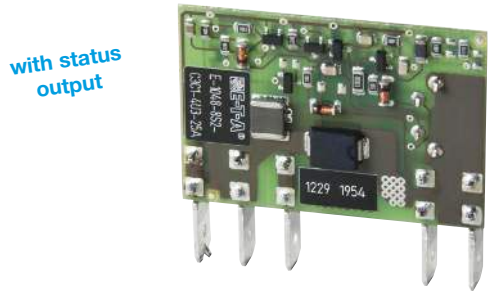
Type E-1048-8S is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched and protected:

- agricultural and construction machinery,
- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load.

## Features

- The E-1048-8Slimline features integral power electronics and provides wear-free switching function, insensitive against shock, vibration and dust.
- Compared to electro-mechanical relays, only a fraction of the closed-circuit current or switching current is needed. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 50 µA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of a short circuit.
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Load conditions are visually indicated by a bicolour LED (load activated: yellow LED lighted; load disconnected due to overload or short circuit: red LED lighted).
- An optional status output for group fault signalling »SF« provides status indication of the load circuit (overload/short circuit)




**E-1048-8S SLIMLINE-version**

## Technical Data ($T_{amb.}$ = 25 °C, $U_N$ = DC 24 V)

**Power supply LINE +**

| | |
|---|---|
| Type | DC power supply with small $R_i$ battery and generator etc. |
| Voltage ratings $U_N$ | DC 12 V/DC 24 V |
| Operating voltage $U_S$ | DC 9...32 V |
| Closed-circuit current $I_0$ in the OFF condition [1] | < 50 µA |

**Load circuit LOAD**

| | |
|---|---|
| Load output | Power MOSFET, high side switching |
| Current rating range $I_N$ | 1 A...25 A (fixed ratings), without load reduction up to 85° C (25 A ... 70 °C)<br>$I_N$ = 1 A...10 A: see trip curve 1<br>$I_N$ = 15 A...25 A: see trip curve 2 |
| Types of loads | resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current) |

Typical voltage drop $U_{ON}$ at rated current $I_N$ (at 25 °C) [1]

| $I_N$ | $U_{ON}$ | $I_N$ | $U_{ON}$ |
|---|---|---|---|
| 1 A | 50 mV | 10 A | 110 mV |
| 2 A | 55 mV | 15 A | 70 mV |
| 3 A | 60 mV | 20 A | 90 mV |
| 5 A | 80 mV | 25 A | 120 mV |
| 7.5 A | 90 mV | | |

| | |
|---|---|
| Switching point [1] | typically 1.3 x $I_N$<br>(-40 °C...+85 °C: 1.1...1.5 x $I_N$) |
| Trip time [1] | typically 200 ms with switch-on onto overload and/or load increase on duty; can be modified in relation to specific projects. |
| Max. overload | $I_N$ = 1 A...10 A: 60 A (at L/R = 3 ms)<br>$I_N$ = 15 A...25 A: 200 A (at L/R = 3 ms)<br>short-circuit-proof switching output with overload disconnection after typically 200 ms at $I_{load}$ > typically 1.3 x rated current |
| Temperature disconnection | power transistor > 150 °C |
| Parallel connection of channels | for loads of 25 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section). |
| Free-wheeling diode for connected load | integral<br>$I_N$ = 1 A...10 A: max. 40 A<br>$I_N$ = 15 A...25 A: max. 100 A |

1) typical

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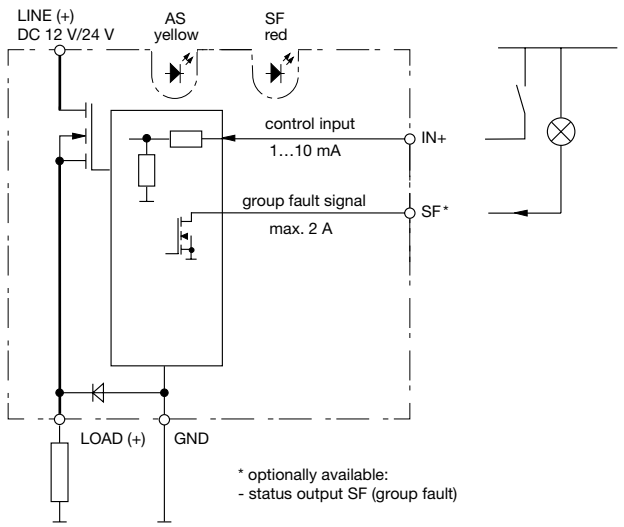
| | |
|---|---|
| Delay time [1] | $t_{on}$ 0.5 ms / $t_{off}$ 1.5 ms |
| Short circuit, overload in load circuit | - disconnection of load<br>- no automatic re-start<br>- after remedy of the fault unit has to be reset via control input IN+ |
| **Control input IN+** | |
| Control voltage IN+ | 0...5 V = “OFF”, 8.5...32 V = “ON” |
| Control current $I_E$ [1] | 1 mA at 12 V / 5 mA at 24 V |
| Reset in the event of a failure | - via external control signal (low - high) at control input IN+<br>- via reset of supply voltage |
| Rising edge of IN+ | < 5 ms |
| **Status functions** | |
| Group fault signal SF | transistor output minus-switching (LSS), open collector, short circuit and overload-proof; max. load DC 32 V / 2 A 0 V level; in the event of overload and short circuit disconnection |
| **Visual status indication** | |
| control current on (AS)<br>disconnection<br>overcurrent (SF) | yellow LED lighted<br><br>red LED lighted |
| **General data** | |
| **Reverse polarity protection** | |
| Control circuit | yes |
| Load circuit | no (due to integral free-wheeling diode) |
| **Temperature range**<br>ambient temperature<br>< Temperature shutdown | 1...20 A: -40...+85 °C<br>25 A: -40...70 °C without load reduction<br>power transistor > 150 °C |
| **Tests** | |
| Humid heat | combined test, 9 cycles with functional test<br>test to DIN EN 60068-2-30, Z/AD |
| Temperature change | min. temperature -40 °C,<br>max. temperature +90 °C<br>test to DIN IEC 60068-2-14, Nb |
| Vibration (random) | in operation, with temperature change<br>6 g eff. (10 Hz...2,000 Hz)<br>test to DIN EN 60068-2-64<br>Vibration was tested with standard sockets for PCB mounting.<br>Behaviour at vibrations depends on design, quality and age (number of push-in cycles) of the socket particularly regarding duration of the vibration and the mounting position |
| Shock | 25 g/11 ms, 10 shocks<br>test to DIN EN 60068-2-27 |
| Corrosion | test to DIN EN 60068-2-52, severity 3 |
| EMC requirements | EMC directive:<br>emitted interference EN 61000-6-3<br>noise immunity EN 61000-6-2 |
| **Terminals** | 4 blade terminals 6.3 mm x 0.8 mm to DIN 46244-A6.3-0.8<br>contact material CuZn37F37<br>copper-plated and tin-plated |
| **Dimensions** | approx. 30 x 45 x 9 mm when plugged in<br>41 x 45 x 9 mm including terminals |
| Mass | approx. 13 g |

## Ordering Information

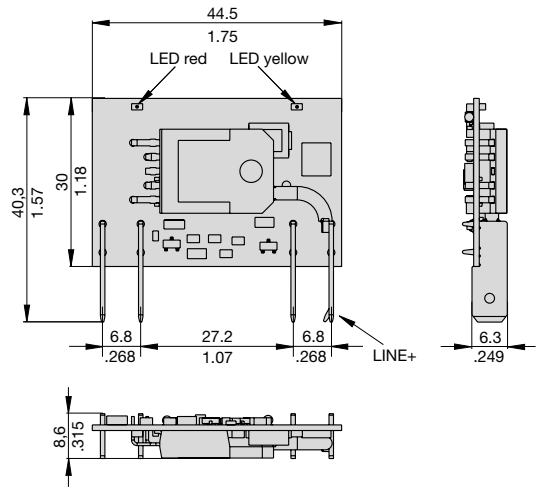
| Type No. | | |
|---|---|---|
| E-1048-8S | | Smart Power Relay DC 12/24 V, ratings 1 through 25 A, SLIMLINE design |
| | 2 - C3 | without enclosure, temperature range 40 … 85 °C (70 °C at 25 A); LED indication: yellow AS (control signal), red SF (group fault signal) |
| | **Status output minus switching** | |
| | A | without |
| | C | with group fault output (SF) |
| | 1 - 4U3 - | short circuit and overload indication, 200 ms switch-off delay at overload; DC 12/24 V |
| | **Current ratings** | |
| | 1 A | |
| | 2 A | |
| | 3 A | |
| | 5 A | |
| | 7.5 A | |
| | 10 A | |
| | 15 A | |
| | 20 A | |
| | 25 A | |
| E-1048-8S | 2 - C3 C 1-4U3 - 10A | ordering example |

## Connection diagram SLIMLINE



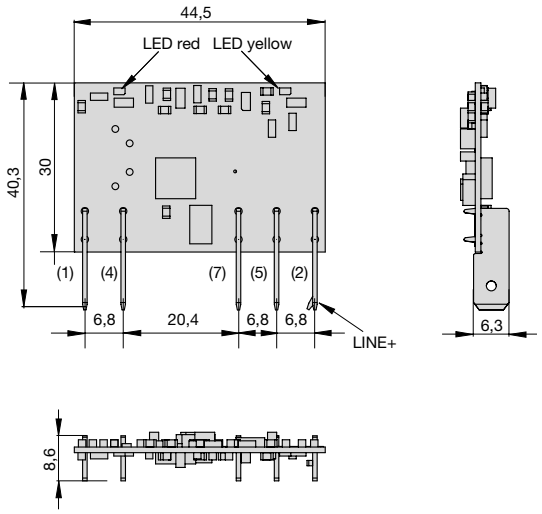

This is a metric design and millimeter dimensions take precedence ( mm / inch )

## Dimensions SLIMLINE




Design: power semiconductor varies depending on the current rating

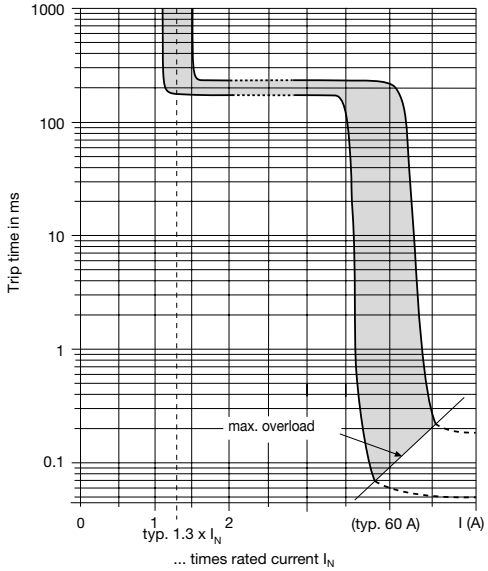
E-1048-8S2-C3C1-4U3



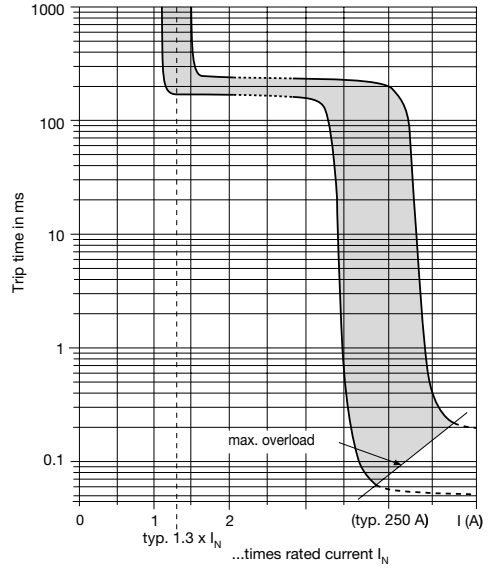

Design: power semiconductor varies depending on the current rating

## Typical time/current characteristics ($T_A$ = 25 °C)

**Trip curve 1**
1 A, 2 A, 3 A, 5 A, 7,5 A and 10 A (standard 200 ms)

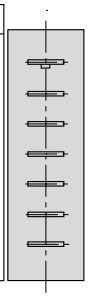



**Trip curve 2**
15 A, 20 A, 25 and 30 A (standard 200 ms)




## Pin selection SLIMLINE

| E-1048-8S. | | 17-P10-Si | |
|---|---|---|---|
| LINE + | (2) | (2) | [2(k)] |
| GND | (5) | (5) | [12] |
| SF | (7) | (7) | [24] |
| IN+ | (4) | (4) | [11] |
| LOAD | (1) | (1) | [1] |



pin 7 only available for versions with SF

## Accessories

| **Single mounting sockets (up to 16 A max. load)** |
|---|
| 17-P10-Si |
| 17-P70-Si |
| **2-way mounting socket (up to 16 A max. load)** |
| 23-P10-Si |
| 63-P10-Si |

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All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.