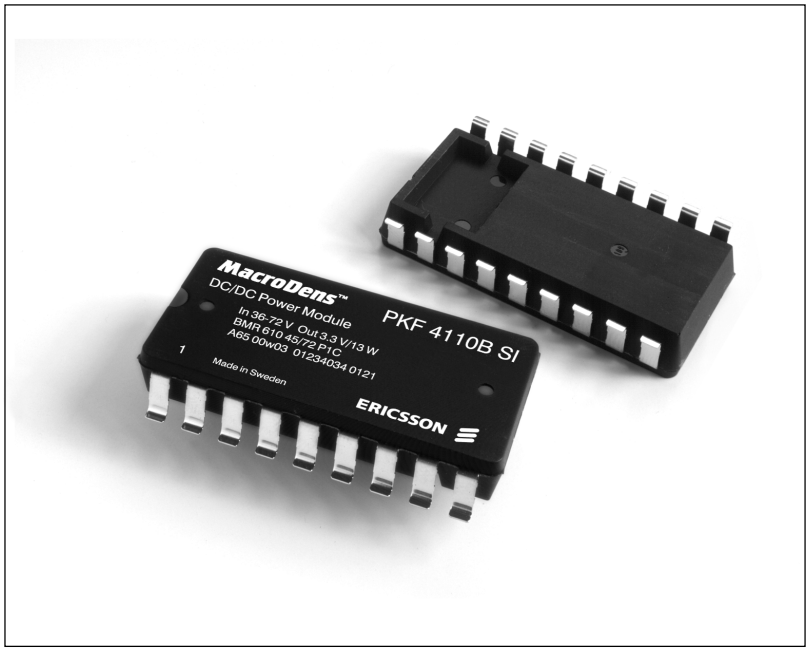
*Advanced Specification*

# 13 W DC/DC Power Modules
# 48 V Input Series

- *SMD and through-hole versions with ultra low component height 8.0 mm (0.315 in.)*
- *84% efficiency (typ at 3.3 V/4 A)*
- *1,500 V dc isolation voltage*
- *Synchronous rectification*
- *MTBF >4.9 million hours at +55°C case temperature (+40°C ambient)*
- *Low EMI measured according to CISPR 22 and FCC part 15J*




The MacroDens™ 13W PKF 4000B I series true component level on-board DC/DC power modules are intended as distributed power sources in decentralized –48 and –60V DC power systems. Utilization of thick film technology and a high degree of silicon integration has made it possible to achieve a MTBF of more than 4.9 million hours.
The high reliability and the very low height of these DC/DC power modules makes them particularly suited for Information Technology and Telecom (IT&T) applications, with board spacing down to 15 mm or 0.6 in.
The over-moulded rugged design also makes them suitable for other demanding industrial applications.
They are optimized for free convection cooling and have an operational ambient temperature range in compliance with present and future application needs, including non temperature controlled environments.
The mechanical design offers a surface mount version, delivered in ready-to-use tubes, trays or tape & reel package, and compatibility with semi and fully aqueous cleaning processes.
The PKF series is manufactured in highly automated production lines using SMT, laser trimming, 100% burn-in and ATE final inspection.
Ericsson Components AB has been an ISO 9001 certified supplier since 1991.

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# General

## Absolute Maximum Ratings

| Characteristics | | min | max | Unit |
|---|---|---|---|---|
| $T_C$ | Case temperature at full output power | –45 | +100 | °C |
| $T_S$ | Storage temperature | –55 | +125 | °C |
| $V_I$ | Continuous input voltage[1)] | –0.5 | +75 | Vdc |
| $V_{ISO}$ | Isolation voltage (input to output test voltage) | 1,500 | | Vdc |

Stress in excess of Absolute Maximum Ratings may cause permanent damage. Absolute Maximum Ratings, sometimes referred to as no destruction limits, are normally tested with one parameter at a time exceeding the limits of Output data or Electrical Characteristics. If exposed to stress above these limits, function and performance may degrade in an unspecified manner.

## Input $T_C < T_{Cmax}$ unless otherwise specified

| Characteristics | | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| $V_I$ | Input voltage range | | 36 | | 75 | V |
| $V_{Ioff}$ | Turn-off input voltage | See typical characteristics | 30.0 | 33.5 | 35.0 | V |
| $V_{Ion}$ | Turn-on input voltage | See typical characteristics | 30.0 | 34.5 | 36.0 | V |

# PKF 4110B

$T_C$ = –30…+95°C, $V_I$ = 36...75 V.

## Output

| Characteristics | | Conditions | | Output 1 | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | min | typ | max | |
| $V_{Oi}$ | Output voltage initial setting and accuracy | $T_C$ = +25°C, $I_O$ = 3.5 A, $V_I$ = 53V | | 3.27 | 3.30 | 3.33 | V |
| | Output adjust range[1)] | | | 2.80 | | 3.80 | V |
| $V_O$ | Output voltage tolerance band | $I_O$ = 0…4.0 A Long term drift included | | 3.17 | | 3.43 | V |
| $I_O$ | Output current | | | 0 | | 4 | A |
| $P_{Omax}$ | Max output power[2)] | Calculated value | | 13 | | | W |
| $V_{Oac}$ | Output ripple & noise | $I_O$ = 4 A | 20 Hz…5 MHz | | | 70 | $mV_{p-p}$ |

[1)] See also Operating Information.
[2)] See Typical Characteristics.

## Miscellaneous

| Characteristics | | Conditions | | min | typ | max | Unit |
|---|---|---|---|---|---|---|---|
| η | Efficiency | $I_O$ = 4 A | $V_I$ = 53V | | 84 | | % |
| | | | $V_I$ = 66V | | 83 | | |


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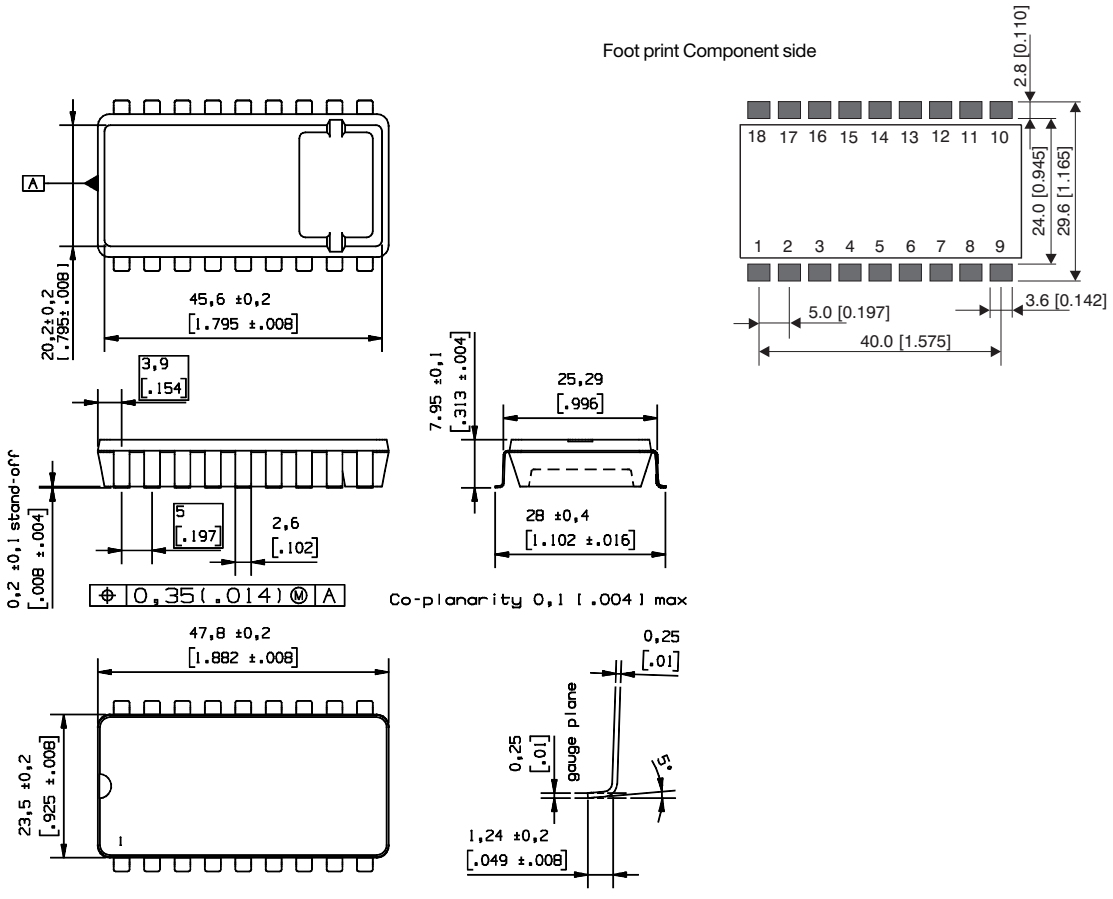
## Mechanical Data




Dimensions in mm (in)

## Connections

| Pin | Designation | Function |
|---|---|---|
| 1 | Aux | Auxiliary |
| 2 | Rtn | Output return. |
| 3 | Out 1 | Output 1. Positive voltage ref. to Rtn. |
| 4-7 | NC | Not connected. Isolated from each other. |
| 8 | $V_{adj}$ | Output voltage adjust. |
| 9 | NC | Not connected. |
| 10 | NC | Not connected. |
| 11 | RC | Remote control and turn-on/off input voltage adjust. Used to turn-on and turn-off output and to set the turn-on/off input voltage threshold. |
| 12–16 | NC | Not connected. Isolated from each other. |
| 17 | −In | Negative input. |
| 18 | + In | Positive input. |

## Weight

Maximum 20 g (0.71 oz).

## Case

The case consists of semiconductor grade epoxy with embedded pins.

Coefficient of thermal expansion (CTE) is typ. 15 ppm/°C.

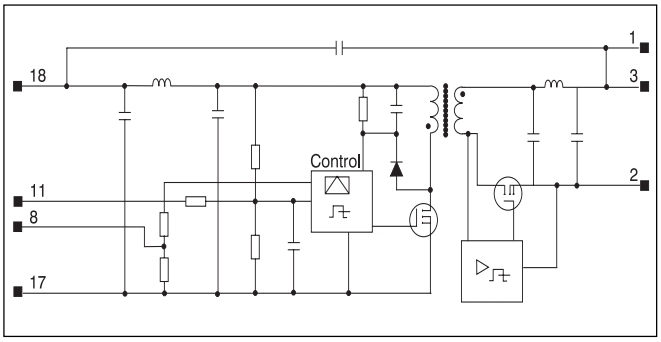
## Connection Pins

Base material is copper (Cu), first plating is nickel (Ni) and second (outer) plating is palladium (Pd).

# Electrical Data

### Fundamental circuit diagram

### Single output




# Operating Information

### Remote Control (RC)

Turn-on or turn-off can be realized by using the RC-pin. If pin 11 is connected to pin 17 the power modules turns off. Normal operation is achieved if pin 11 is open (NC). To ensure safe turn-off the voltage difference between pin 11 and 17 shall be less than 1.0 V. RC is an TTL open collector compatible output with a sink capacity >300 µA (see fig. 1).

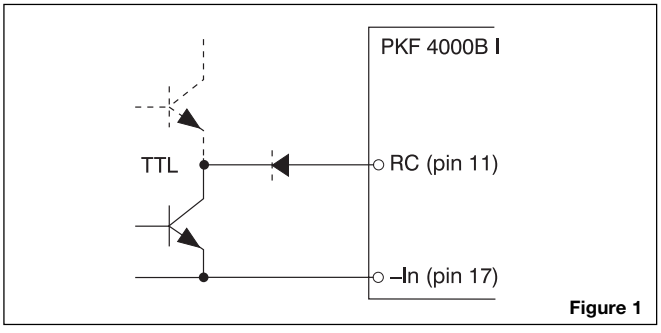



**Figure 1**

### Turn-on/off Input Voltage

The power module monitors the input voltage and will turn on and turn off at predetermined levels set by means of external resistors.

### Output Voltage Adjust ($V_{adj}$)

Output voltage, $V_O$, can be adjusted by using an external resistor or other external circuitry. If other circuitry is used, the slow rate has to be limited to maximum 5 V/ms. I To increase $V_O$ a resistor should be connected between pin 8 and 17.

### Parallel Operation

Paralleling is not possible due to synchronous rectification.

# Quality

### Reliability

Meantime between failure (MTBF) is calculated to >4.9 million hours at full output power and a case temperature of +55°C ($T_A$ = +40 °C), using the Ericsson failure rate data system. The Ericsson failure rate data system is based on field failure rates and is continuously updated. The data corresponds to actual failure rates of components used in Information Technology and Telecom equipment in temperature controlled environments ($T_A$ = −5… +65 °C). The data is considered to have a confidence level of 90%. For more information see Design Note 002.

### Quality Statement

The products are designed and manufactured in an industrial environment where quality systems and methods like ISO 9000, 6σ and SPC, are intensively in use to boost the continuous improvements strategy. Infant mortality or early failures in the products are screened out by a burn-in procedure and an ATE-based final test. Conservative design rules, design reviews and product qualifications, plus the high competence of an engaged work force, contribute to the high quality of our products.

### Warranty

Ericsson Components warrants to the original purchaser or end user that the products conform to this Data Sheet and are free from material and workmanship defects for a period of five (5) years from the date of manufacture, if the product is used within specified conditions and not opened. In case the product is discontinued, claims will be accepted up to three (3) years from the date of the discontinuation. For additional details on this limited warranty please refer to Ericsson Components AB's "General Terms and Conditions of Sales", EKA 950701, or individual contract documents.

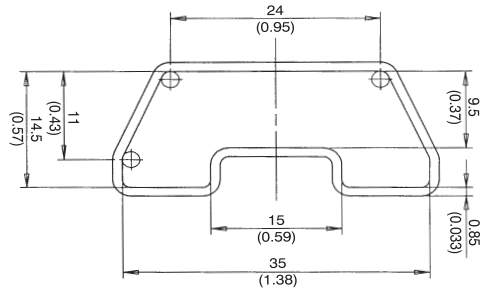
### Limitation of liability

Ericsson Components does not make any other warranties, expressed or implied including any warranty of merchantability or fitness for a particular purpose (including, but not limited to, use in life support applications, where malfunctions of product can cause injury to a person's health or life).

# Delivery Package Information

## Tubes

The PKF-series is delivered in tubes (designated by /A) with a length of 500 mm (19.69 in), see fig. 2.




All dimensions in mm (in)

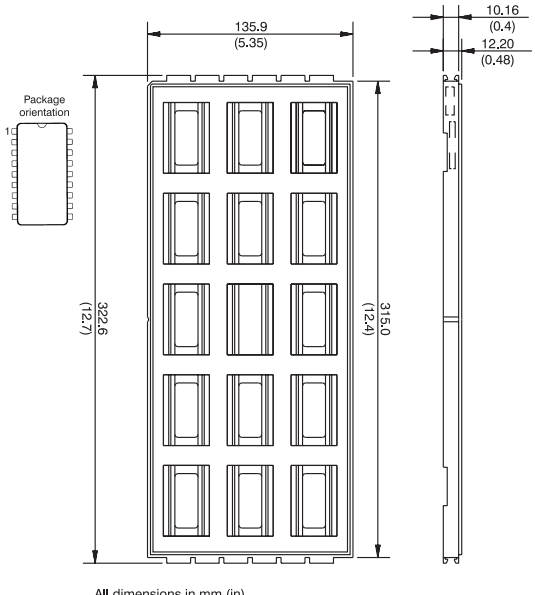
**Figure 2**

### Specification

| | |
|---|---|
| Material: | Antistatic coated PVC |
| Max surface resistance: | $10^{11}\Omega/\square$ |
| Color: | Transparent |
| Capacity: | 10 power modules/tube |
| Weight: | Typ. 60 g |
| End stops: | Pins |

## Trays

SMD versions, SI, can be delivered in standard JEDEC trays (designated by /B) on request, see fig. 3. For more information, please contact your local Ericsson sales office.




All dimensions in mm (in)

**Figure 3**

### Specification

| | |
|---|---|
| Material: | Polypropylene (PP) |
| Max temperature: | 125 °C |
| Max surface resistance: | $10^{5}\Omega/\square$ |
| Color: | Black |
| Capacity: | 15 power modules/tray |
| Stacking pitch: | 10.16 mm |
| Weight: | Typ. 130 g |
| Min. order quantity: | 150 pcs (one box contains 10 full trays) |

## Tape & Reel

SMD versions, SI, can be delivered in standard tape & reel package (designated by /C) on request, see fig. 4. For more information, please contact your local Ericsson sales office.

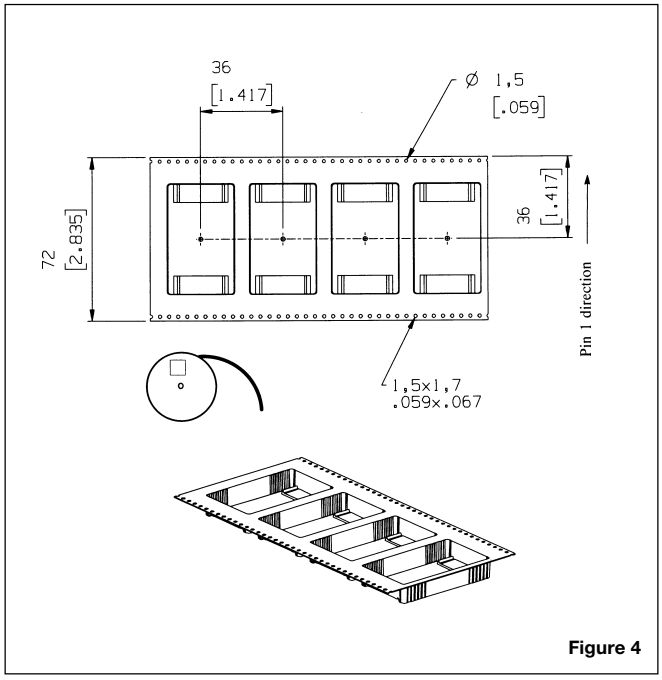



**Figure 4**

### Specification

| | |
|---|---|
| Tape material: | Conductive polystyrene (PS) |
| Tape width: | 72 mm |
| Tape pitch: | 36 mm |
| Max surface resistance: | $10^{5}\Omega/\square$ |
| Tape color: | Black |
| Cover tape color: | Transparent |
| Reel diameter: | 13" |
| Reel hub diameter: | 7" |
| Reel capacity: | 150 power modules/reel |
| Full reel weight: | Typ. 3.7 kg |
| Min. order quantity: | 300 pcs (one box contains two reels) |

**Ericsson Microelectronics** AB
SE-164 81 KISTA, Sweden
Phone: +46 8 721 6258 Fax: +46 8 721 7001
www.ericsson.com/microelectronics

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