



EMC filters

3-line filters
for converters and power electronics

Series/Type: **B84143A*166**
Date: May 2012

for converters and power electronics

Power line filters for 3-phase systems

Rated voltage V_R : 520/300 V AC

Rated current I_R : 10 A to 35 A

Construction

- 3-line filters
- Metal case

Features

- Excellent price/performance ratio
- Ultra-compact design
- Low weight
- Easy to install
- Optimized for short motor cables and operation under full load
- ENEC10, UL and cUL approval



Typical applications

- Frequency converters for motor drives, e.g.
 - elevators
 - pumps
 - HVAC systems (heating, ventilation and air conditioning)
- Power supplies

Terminals

- Tab connectors (10 A ... 20 A)
- Finger-safe terminal blocks (35 A)

Marking

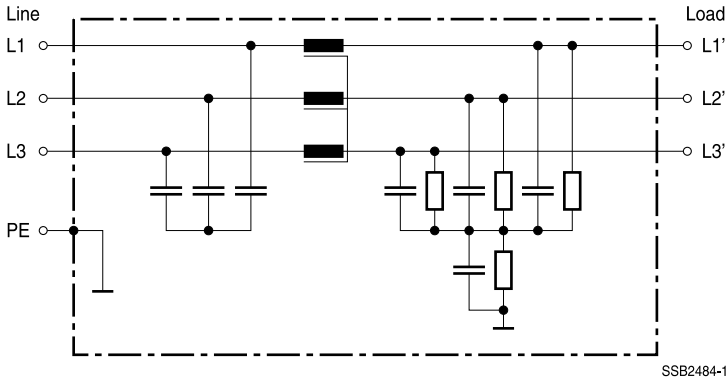
Marking on component:

Manufacturer's logo, ordering code, rated voltage, rated current, rated temperature, climatic category, date code, approvals

Minimum data on packaging:

Manufacturer's logo, ordering code, quantity, date code






Typical circuit diagram

Technical data and measuring conditions

Rated voltage V_R	520/300 V AC (50/60 Hz)
Rated current I_R	Referred to 50 °C rated temperature ¹⁾
Test voltage V_{test}	2236 V DC, 2 s (line/line) 2720 V DC, 2 s (lines/case)
Overload capability (thermal)	1.5 · I_R for 3 min per hour or 2.5 · I_R for 30 s per hour
Climatic category (IEC 60068-1)	25/100/21 (–25 °C/+100 °C/21 days damp heat test)
Approvals	IEC 60939, UL 1283, CSA C22.2 No.8

1) For use at higher ambient temperature as the rated temperature, see current derating in our data book.

Characteristics and ordering codes

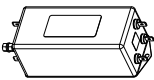
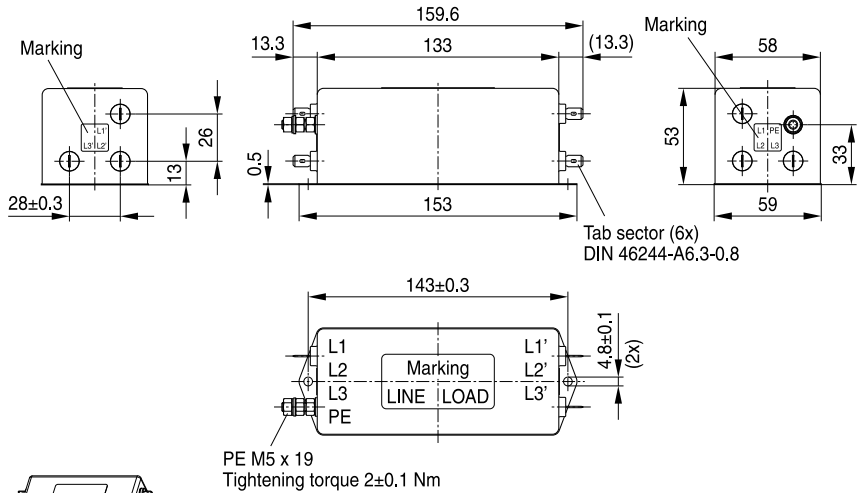
I_R	Terminal cross section	$I_{LK}^{1)}$	R_{typ}	Approx. weight	Ordering code	Approvals		
A	mm ²	mA	mΩ	kg				
$V_R = 520/300$ V AC								
10	5	3.1	12.9	0.6	B84143A0010A166	×	×	×
20	5	3.1	4.9	0.75	B84143A0020A166	×	×	×
35	6	5.0	2.7	1.1	B84143A0035R166	×	×	×

× = Approval granted

1) Calculation according IEC 60939-1 (04.2011), annex A, "Calculation of leakage current" at V_R , 50 Hz.

Dimensional drawings

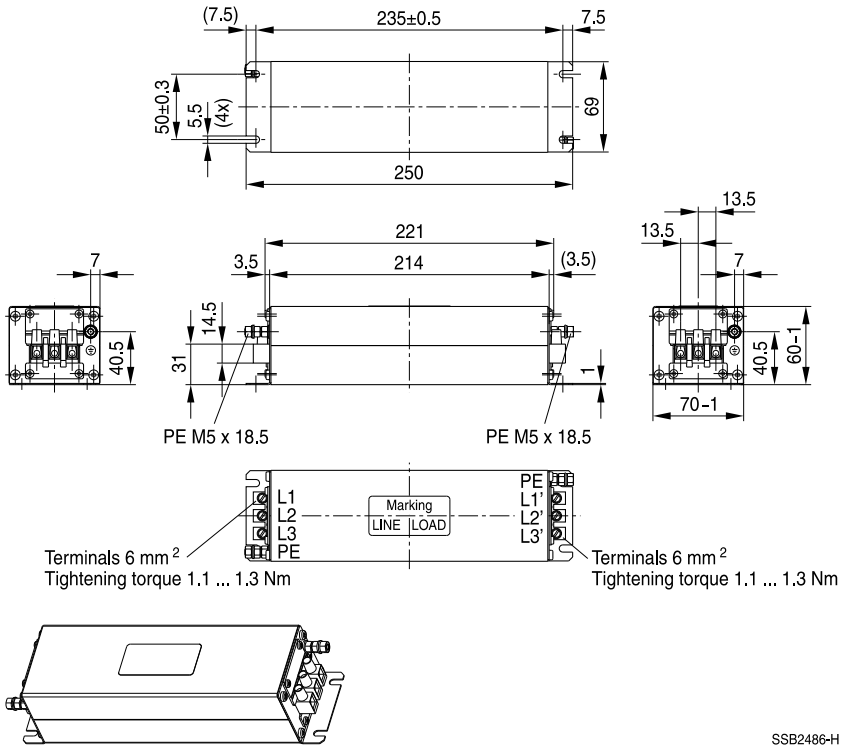
B84143A0010A166, B84143A0020A166 (10 A, 20 A)



SSB2485-9

General tolerances according to ISO 2768—C
Dimensions in mm

B84143A0035R166 (35 A)



SSB2486-H

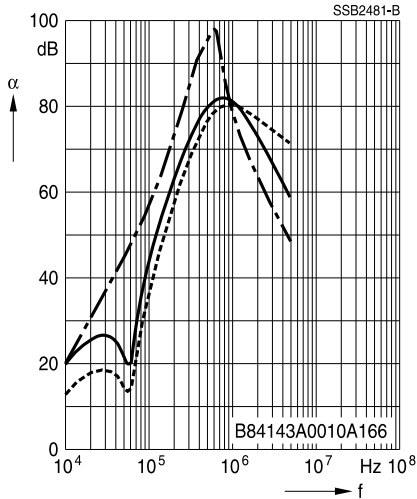
General tolerances according to ISO 2768-C
Dimensions in mm

for converters and power electronics

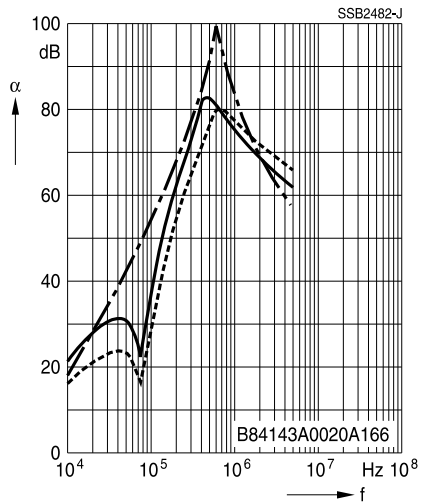
Insertion loss (typical values at $Z = 50 \Omega$)

- unsymmetrical, adjacent branches terminated
- - - - - common mode, all branches in parallel (asymmetrical)
- - - - - differential mode (symmetrical)

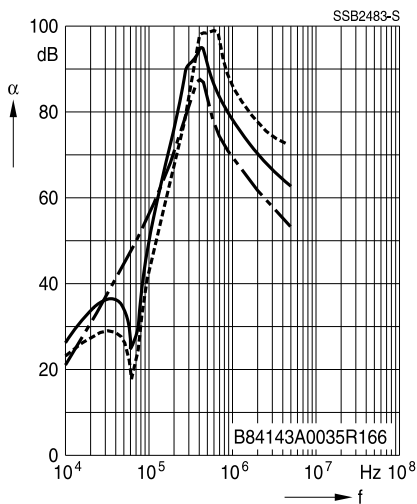
Filter for 10 A



Filter for 20 A



Filter for 35 A



Cautions and warnings

- Please note the advices in our data book “EMC Filters” (latest edition); attention should be paid to the chapter “General safety notes”.
- It shall be ensured that only qualified persons (electricity specialists) are engaged on work such as planning, assembly, installation, operation, repair and maintenance. They must be provided with the corresponding documentation.
- Danger of electric shock. EMC filters contain components that store an electric charge. Dangerous voltages can continue to exist at the filter terminals for longer than five minutes even after the power has been switched off.
- The protective earth connections shall be the first to be made when the EMC filter is installed and the last to be disconnected. Depending on the magnitude of the leakage currents, the particular specifications for making the protective-earth connection must be observed.
- Impermissible overloading of the EMC filter, such as with circuits able to cause resonances, impermissible voltages at higher frequencies etc. can lead to bodily injury and death as well as cause substantial material damages (e.g. destruction of the filter housing).
- EMC filters must be protected in the application against impermissible exceeding of the rated currents by overcurrent protective.
- In case of leakage currents >3.5 mA you shall mount the PE conductor stationary with the required cross section before beginning of operation and save it against disconnecting. For leakage currents $I_{LK}^{(1)} < 10$ mA the PE conductor must have a KU value²⁾ of 4.5; for leakage currents $I_{LK} \geq 10$ mA the PE conductor must have a KU value of 6.

1) I_{LK} = leakage current let-go

2) The KU value (symbol KU) is a classification parameter of safety-referred failure types designed to ensure protection against hazardous body currents and excessive heating. A value of KU = 4.5 with respect to interruptions is attained: a) with a permanently connected protective earth circuit ≥ 1.5 mm² and b) with a protective earth circuit ≥ 2.5 mm² connected via shroud connectors (IEC 60309-2). KU = 6 with respect to interruptions is achieved for fixed-connection lines ≥ 10 mm² where the type of connection and line layout correspond to the requirements for PEN conductors as specified in relevant standards.

Symbols and terms

Symbol	English	German
α	Insertion loss	Einfügungsdämpfung
C_R	Rated capacitance	Bemessungskapazität
C_X	Capacitance X capacitor	Kapazität X-Kondensator
C_Y	Capacitance Y capacitor	Kapazität Y-Kondensator
ΔV	Voltage drop (input to output)	Spannungsabfall im Filter
dv/dt	Rate of voltage rise	Spannungsanstiegsgeschwindigkeit
f	Frequency	Frequenz
f_M	Converter output frequency	Motorfrequenz
f_P	Pulse frequency	Pulsfrequenz
f_R	Rated frequency	Bemessungsfrequenz
f_{res}	Resonant frequency	Resonanzfrequenz
I_{LK}	Filter leakage current	Filter-Ableitstrom
I_C	Current through capacitor	Strom durch Kondensator
I_{max}	Maximum current	Maximalstrom
I_N	Nominal current	Nennstrom
I_{op}	Operating current (design current)	Betriebsstrom
I_q	Capacitive reactive current	Kapazitiver Blindstrom
I_R	Rated current	Bemessungsstrom
I_S	Interference current	Störstrom
L	Inductance	Induktivität
L_R	Rated inductance	Bemessungsinduktivität
L_{stray}	Stray inductance	Streuinduktivität
P_{loss}	Power loss	Verlustleistung
R	Resistance	Widerstand
R_{is}	Insulation resistance	Isolationswiderstand
R_{typ}	DC resistance, typical value	Gleichstromwiderstand, Richtwert
T_A	Ambient temperature	Umgebungstemperatur
T_{max}	Upper category temperature	Obere Kategorietemperatur
T_{min}	Lower category temperature	Untere Kategorietemperatur
T_R	Rated temperature	Bemessungstemperatur
V_{eff}	RMS voltage	Effektivspannung
V_{LE}	Voltage line to earth; voltage line to ground	Spannung Phase zu Erdpotential
V_N	Nominal voltage	Netzspannung
V_R	Rated voltage	Bemessungsspannung
V_{peak}	Peak voltage	Spitzenspannung
V_{test}	Test voltage	Prüfspannung
V_X	Voltage over X capacitor	Spannung über X-Kondensator
V_Y	Voltage over Y capacitor	Spannung über Y-Kondensator
Z	Impedance	Scheinwiderstand
$ Z $	Impedance, absolute value	Scheinwiderstand (Betragswert)

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or lifesaving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, BAOKE, Alu-X, CeraDiode, CeraLink, CSMP, CSSP, CTVS, DeltaCap, DigiSiMic, DSSP, FilterCap, FormFit, MiniBlue, MiniCell, MKD, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.