EMC filters

3-line filters
for converters and power electronics

Series/Type: **B84143D*R127**

Date: June 2024

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Power line filters for 3-phase systems
Rated voltage V_R: 300/520 V AC
Rated current I_R: 16 A to 200 A

Schematic picture

Construction

- 3-line filters
- Metal case
- Book size

Features

- Very high insertion loss
- Easy to install
- Low weight
- Compact design
- Degree of protection: IP 20[1)]
- Optimized for long motor cables
- EN 55011, Class A & B and
- IEC 61300-3, Class C2 & C1 respectively
- Design complies with IEC 60939
- UL and CSA approval
- Short Circuit Current Rating SCCR 50 kA, for 90 A ... 150 A types

Typical applications

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

Terminals

- Finger-safe terminals

Marking

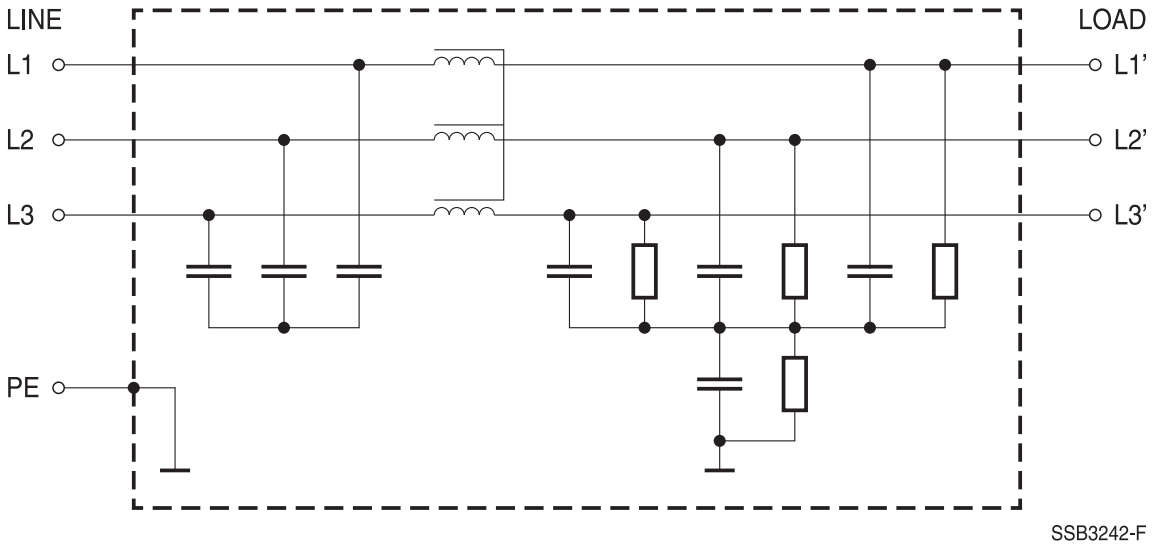
Marking on component:
Manufacturer's logo, ordering code, rated voltage, rated current, rated temperature, climatic category, date code, approvals

Minimum data on packaging:
Manufacturer's logo, ordering code, quantity, date code

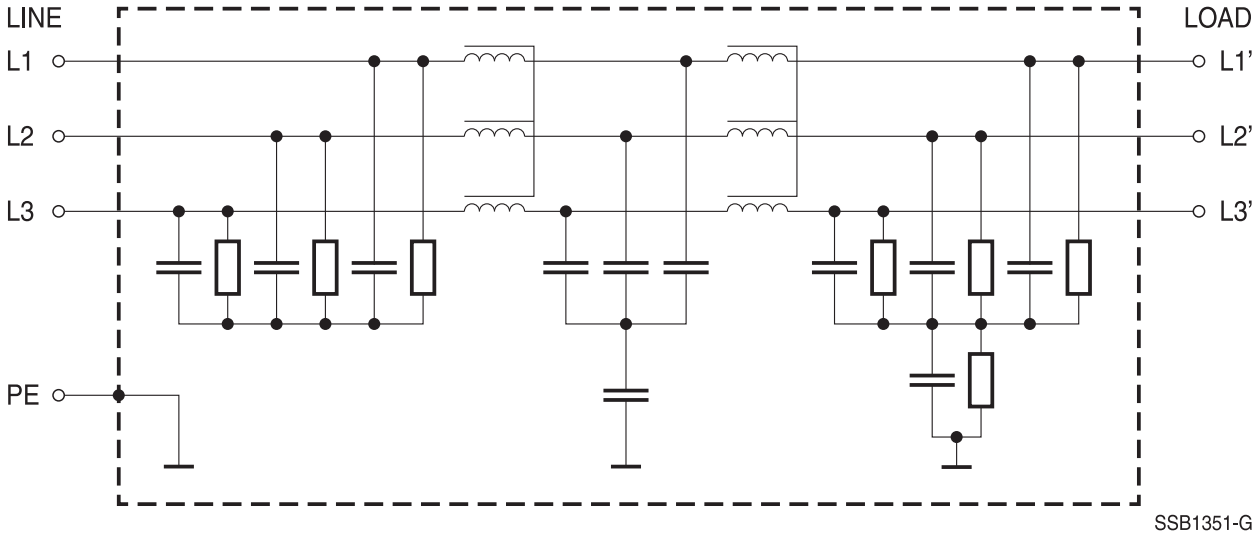
1) According to IEC 60529: 2015

Typical circuit diagrams

B84143D0016R127 ... B84143D0036R127 (16 A ... 36 A)



B84143D0050R127 ... B84143D0200R127 (50 A ... 200 A)



Technical data and measuring conditions

Rated voltage $V_{R\ [L–PE\ /\ L–L]}$	305/530 V AC (50/60 Hz)
Rated current I_R	Referred to 50 °C rated temperature
Test voltage V_{test}	2200 V DC, 2 s (line/line) 2720 V DC, 2 s (lines/case)
Rated temperature T_R	50 °C
Overload capability (thermal)	1.5 · I_R for 3 min per hour or 2.5 · I_R for 30 s per hour
Leakage current I_{LK} (IEC 60939−1: 2010, Annex A)	At V_R and 50 Hz
Climatic category (IEC 60068-1: 2013)	25/100/21 (–25 °C/+100 °C/21 days damp heat test)
Approvals	UL 1283, CSA C22.2 No.8

Motor cable length in relation to EN 55011

Ordering code	I_R A	Motor cable length at EMC limit class EN 55011[1)]	
		Class A	Class B
B84143D0016R127	16	300 m	100 m
B84143D0025R127	25	300 m	100 m
B84143D0036R127	36	300 m	100 m
B84143D0050R127	50	300 m	200 m
B84143D0075R127	75	300 m	200 m
B84143D0090R127	90	300 m	200 m
B84143D0120R127	120	300 m	200 m
B84143D0150R127	150	300 m	200 m
B84143D0200R127	200	300 m	200 m

1) Typical values. The motor cable length depends on the clock frequency and the disturbance level of the frequency converter and might differ from above mentioned indicated cable lengths.

Characteristics and ordering codes

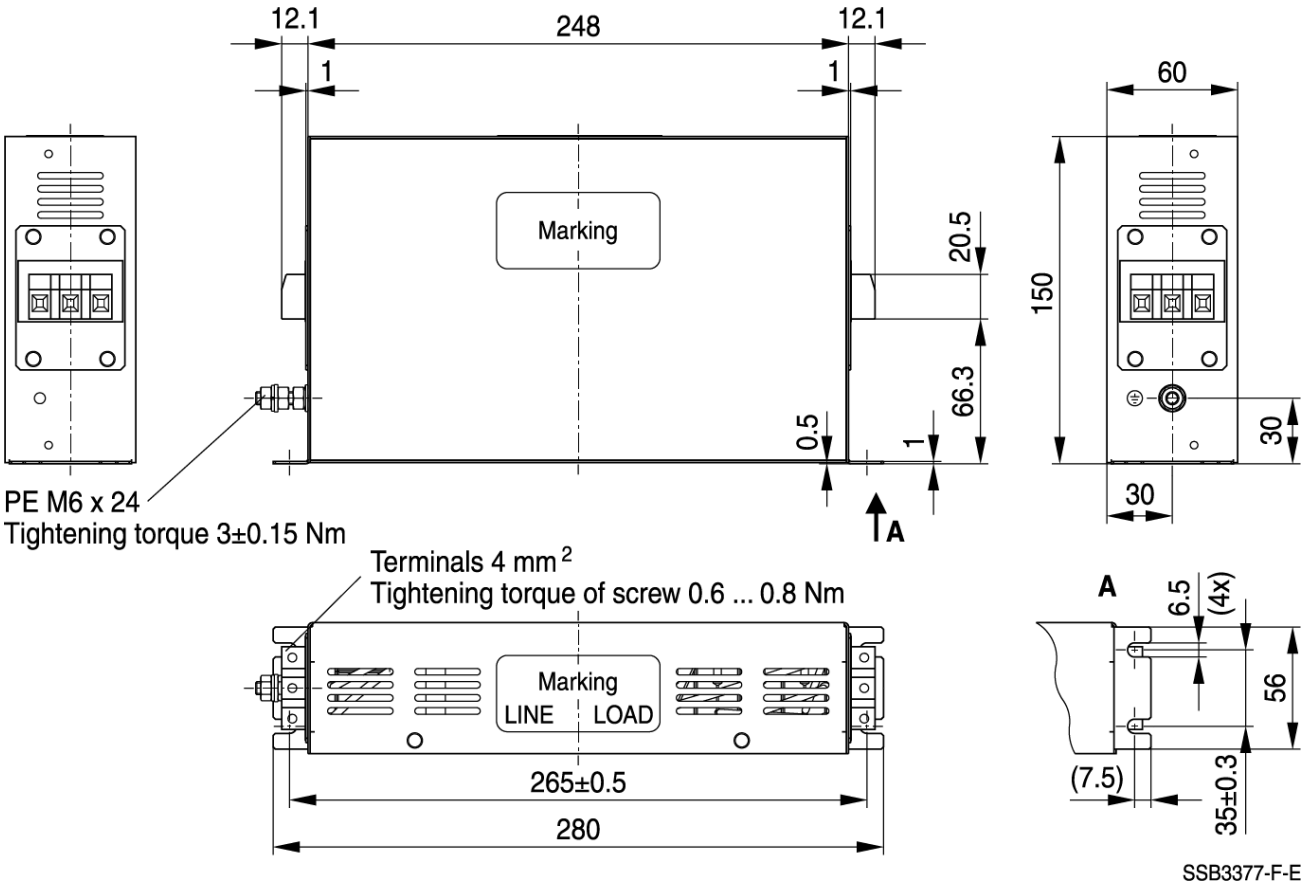
I_R	Terminal cross section	I_{LK}	R_{typ}	Approx. weight	Ordering code	Approvals	
A	mm^2	mA	mΩ	kg			
V_R = 305/530 V AC							
16	4	7.9	14.5	2.5	B84143D0016R127	x	x
25	6	9.2	7.0	2.5	B84143D0025R127	x	x
36	10	8.7	4.5	3.5	B84143D0036R127	x	x
50	25	12	2.5	5.5	B84143D0050R127	x	x
75	50	16	1.0	8.0	B84143D0075R127	x	x
90	50	16	1.0	8.0	B84143D0090R127	x	x
120	95	27	1.0	14.5	B84143D0120R127	x	x
150	95	24	0.5	17.0	B84143D0150R127	x	x
200	95	24	0.5	18.5	B84143D0200R127	x	x

x = Approval granted

Short Circuit Current Rating SCCR 50 kA for the types 90 A ... 150 A

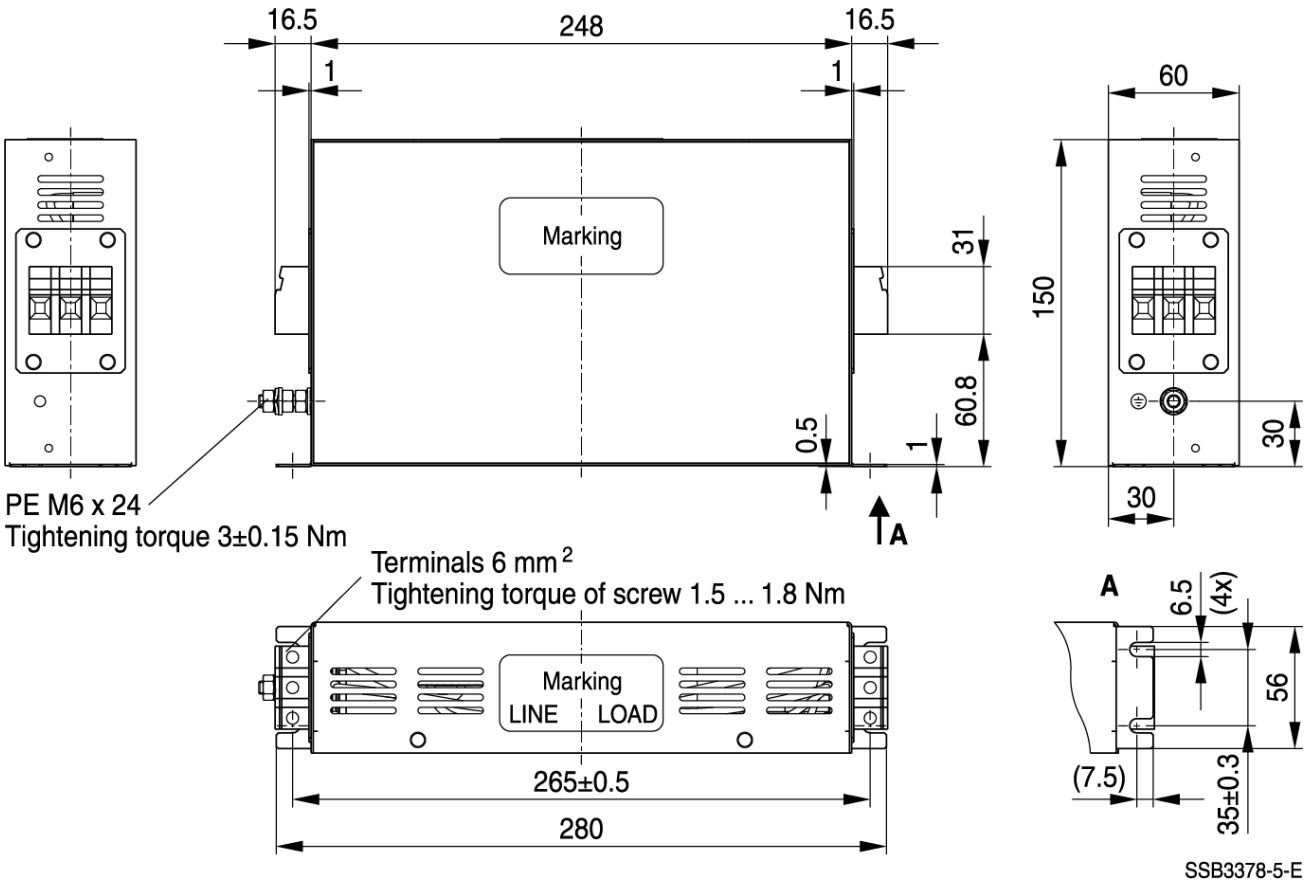
Dimensional drawings

B84143D0016R127 (16 A)



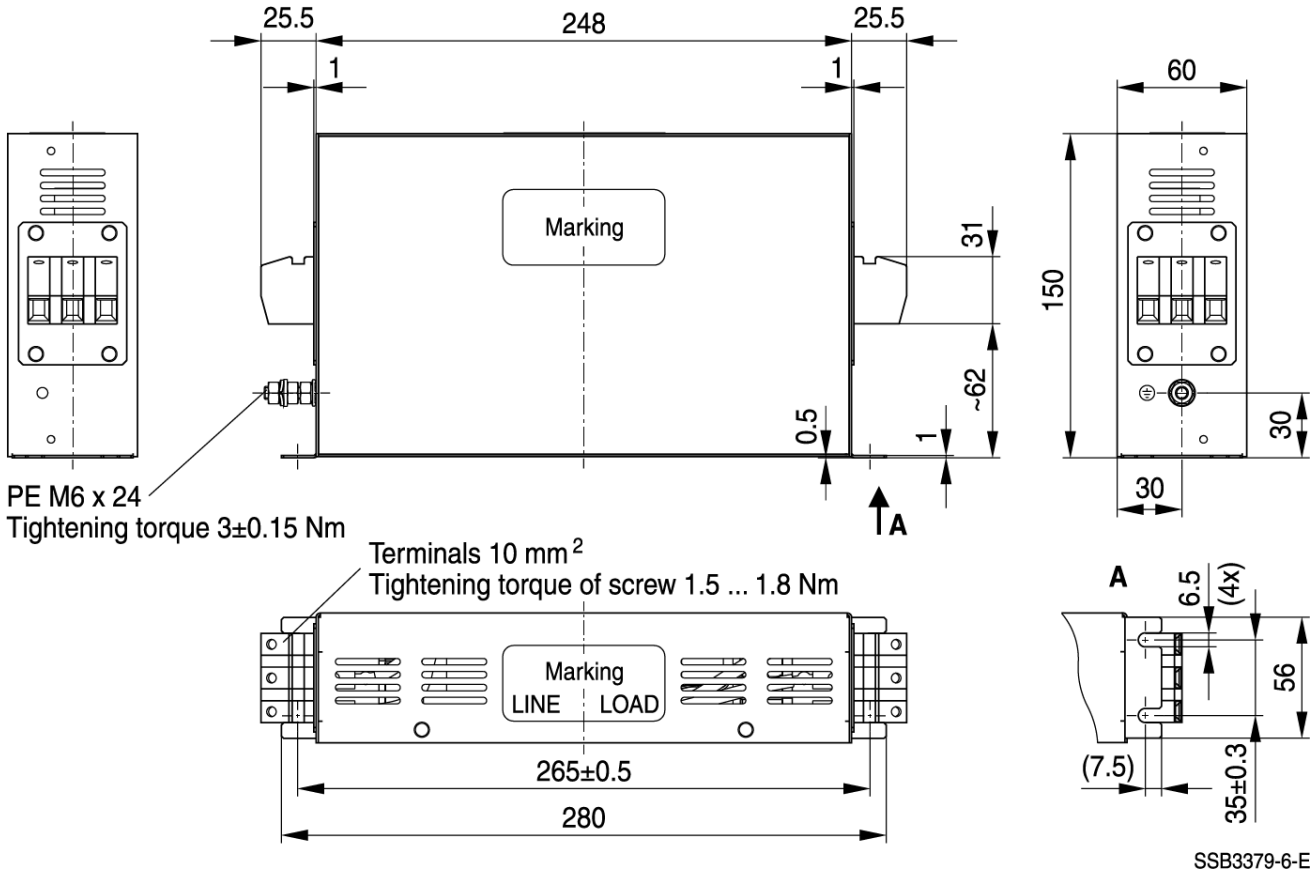
General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0025R127 (25 A)



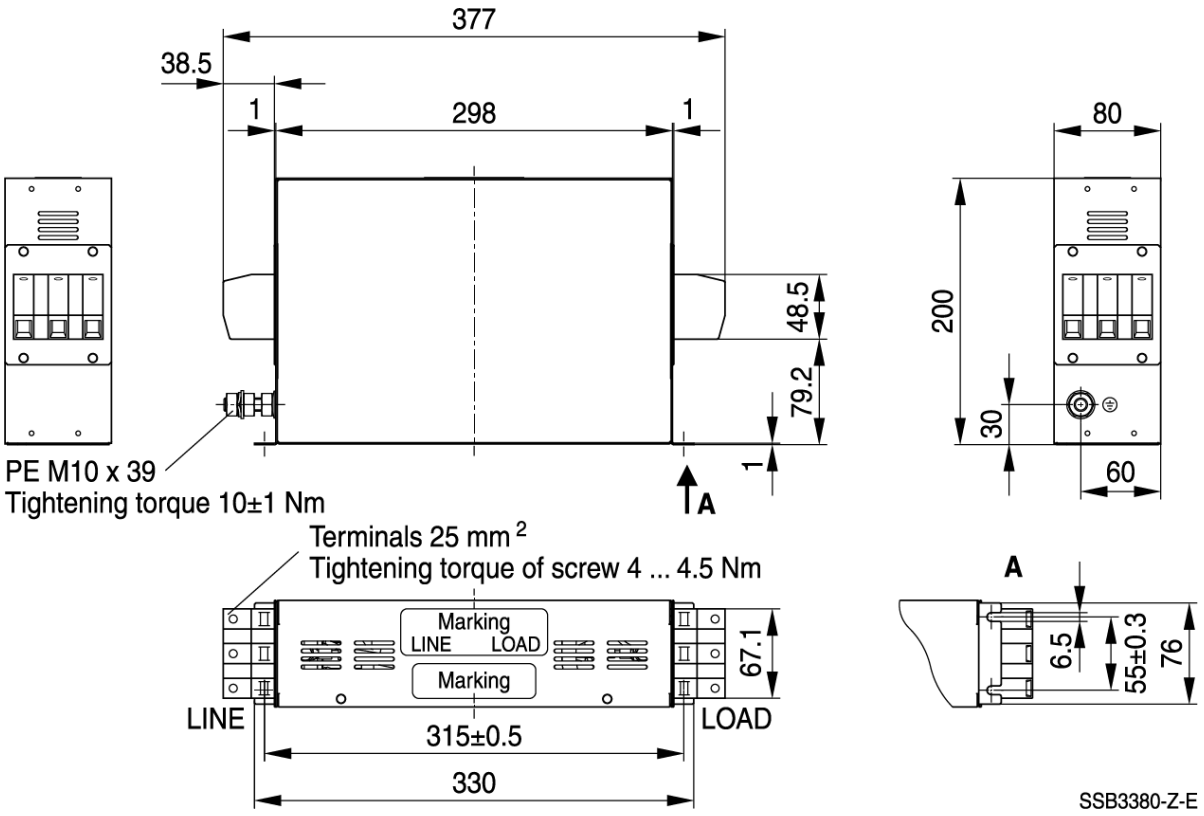
General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0036R127 (36 A)



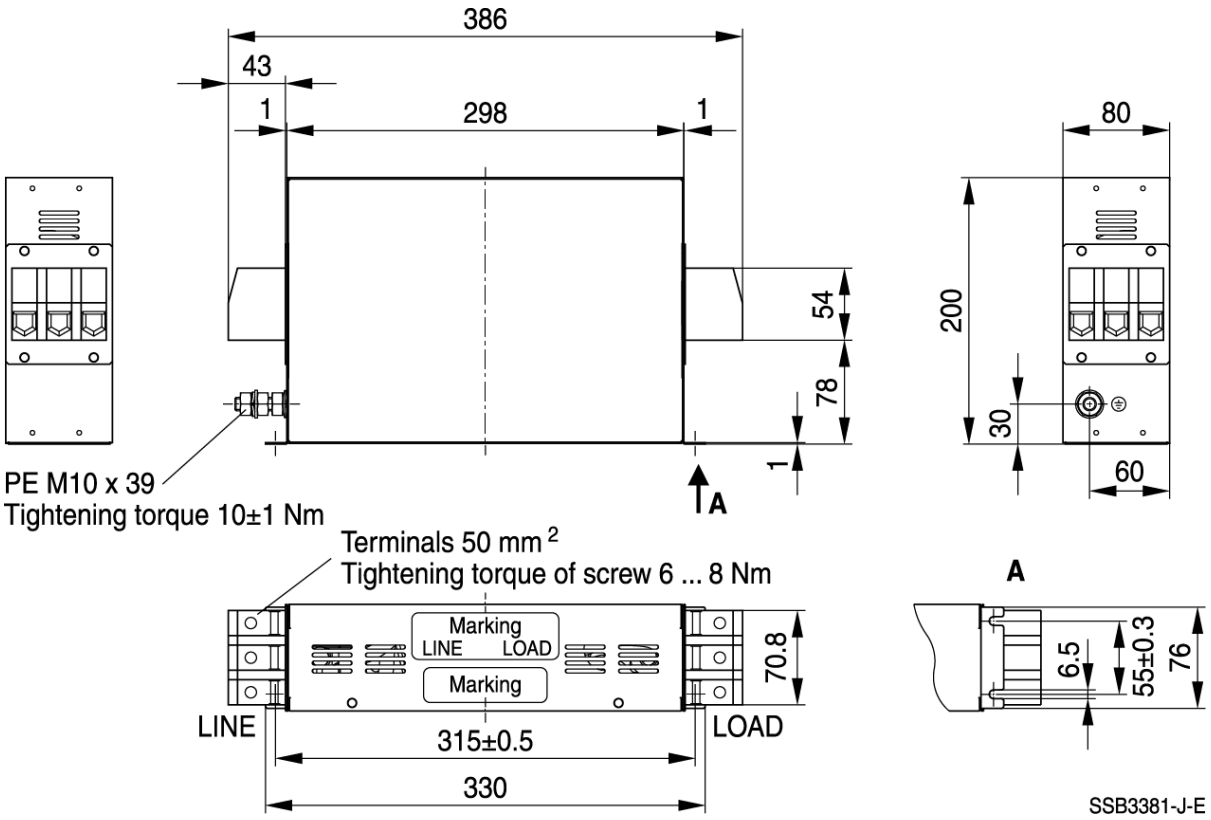
General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0050R127 (50 A)



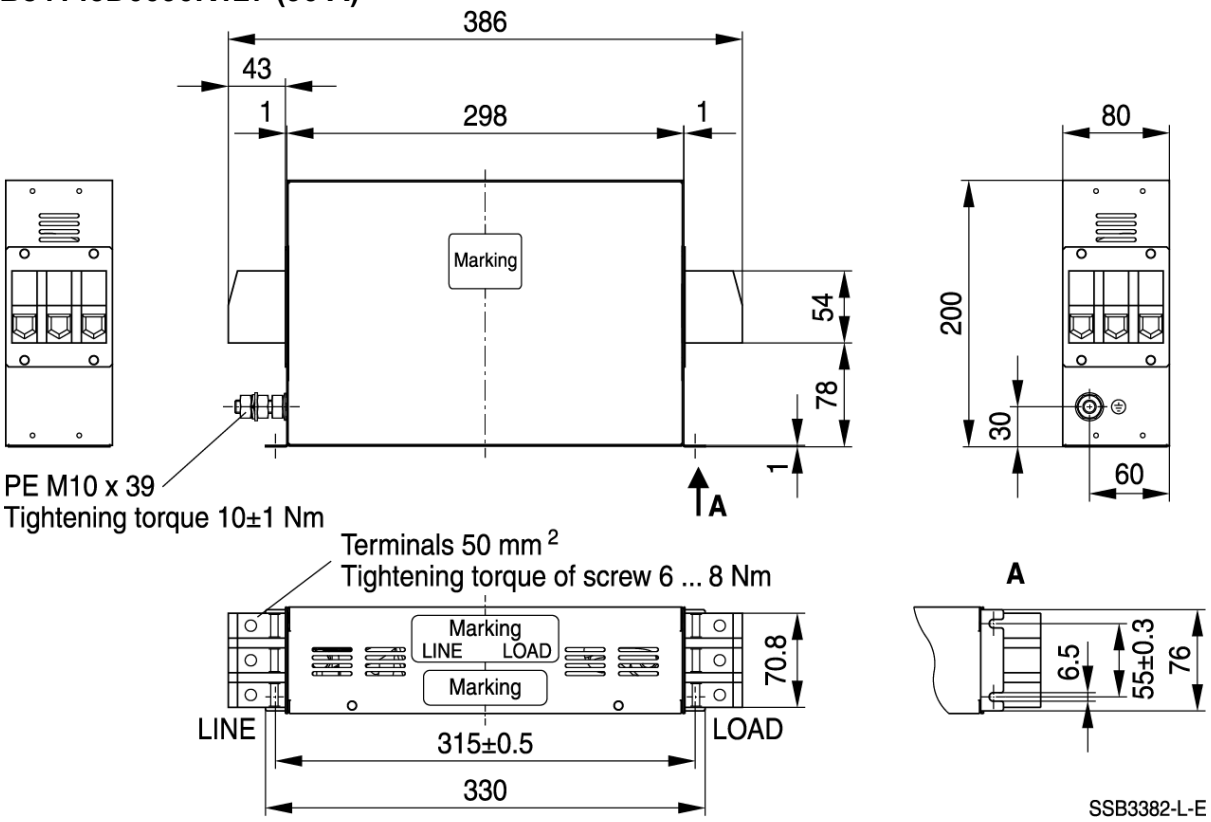
General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0075R127 (75 A)



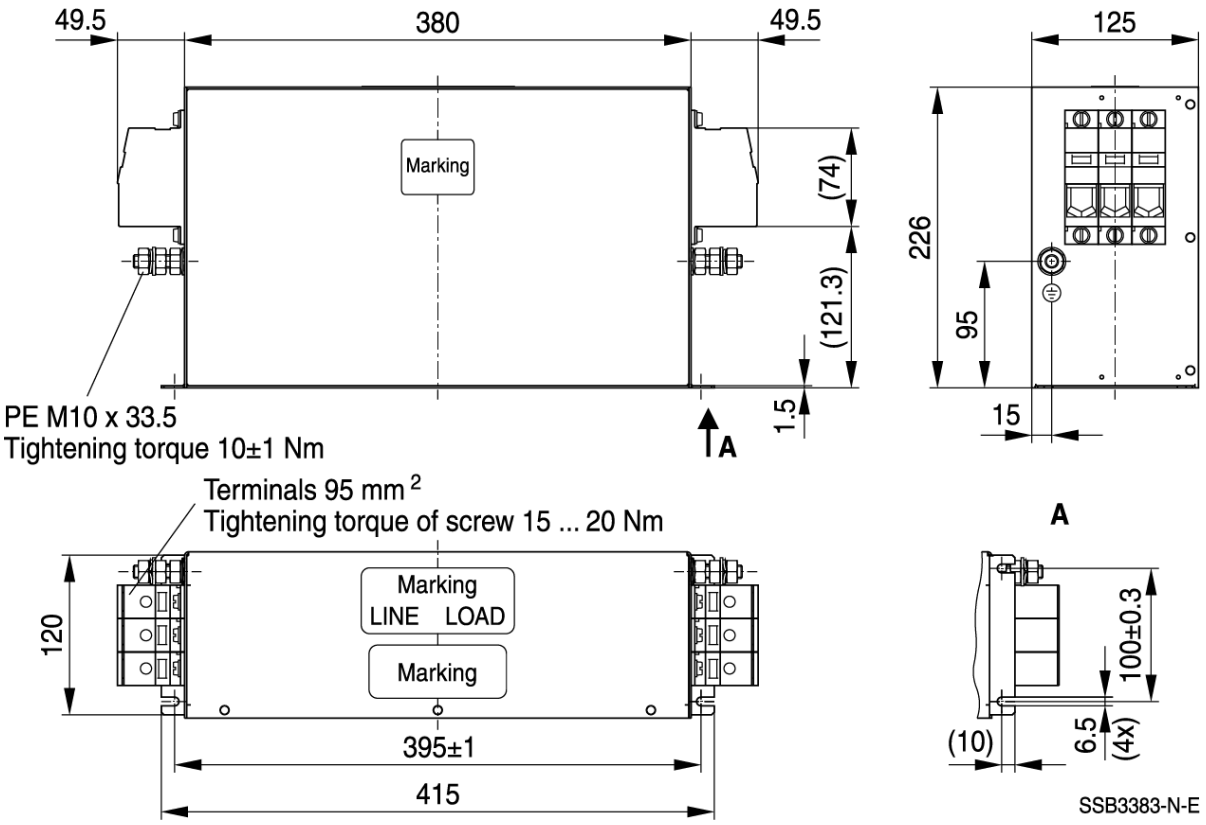
General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0090R127 (90 A)



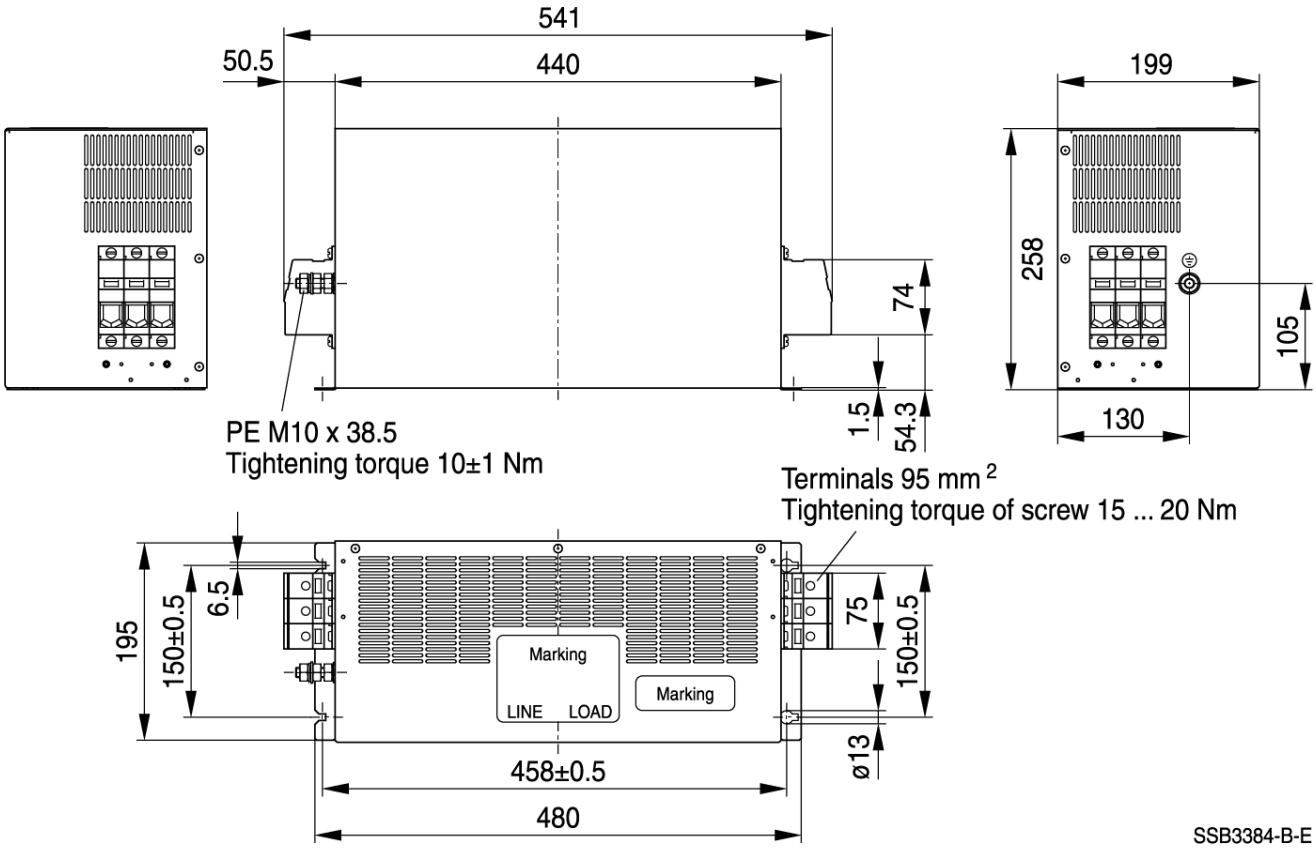
General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0120R127, B84143D0150R127 (120 A, 150 A)



General tolerances according to ISO 2768-cL
Dimensions in mm

B84143D0200R127 (200 A)

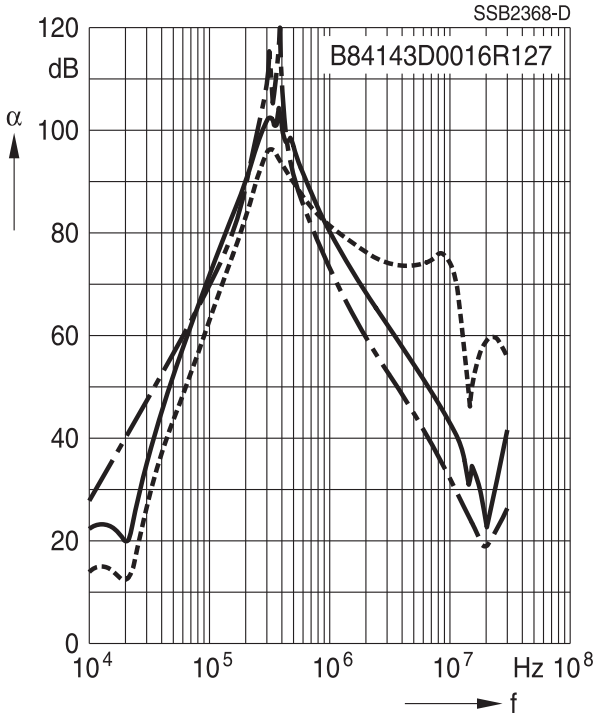


General tolerances according to ISO 2768-cL
Dimensions in mm

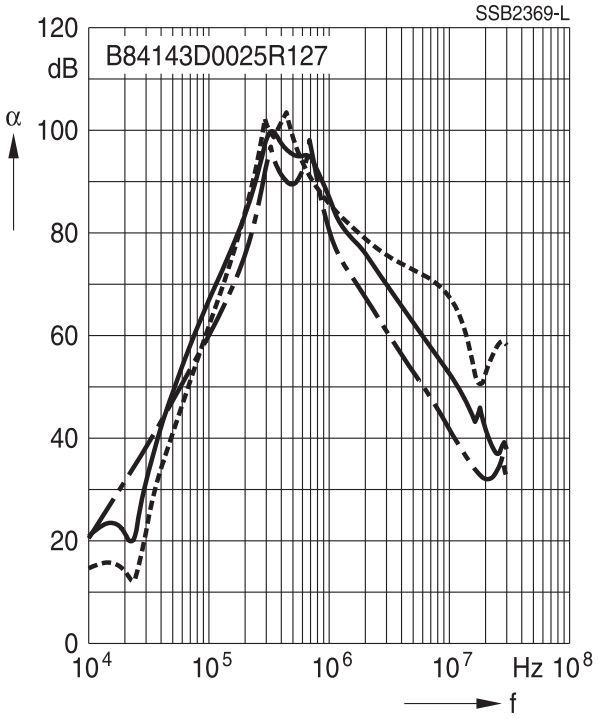
Insertion loss (typical values at Z = 50 Ω)

——————— unsymmetrical, adjacent branches terminated
—·—·—·—·—·— common mod, all branches in parallel (asymmetrical)
– – – – – – – – – differential mode (symmetrical)

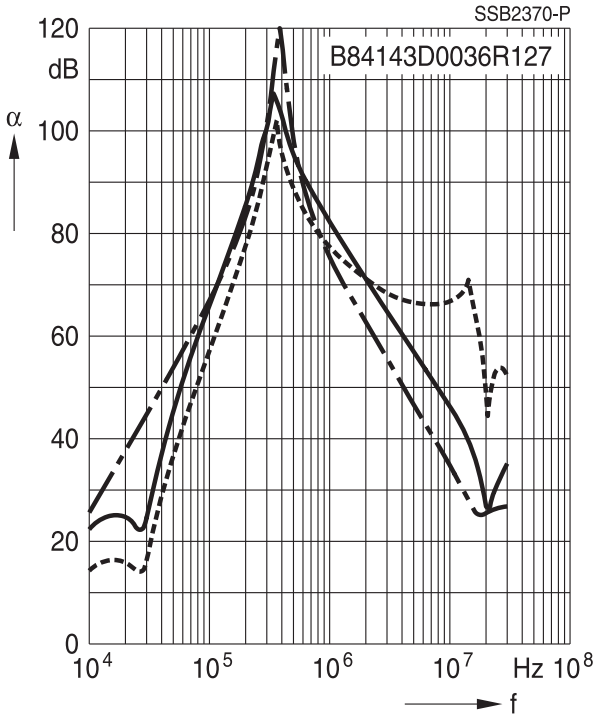
Filters for 16 A



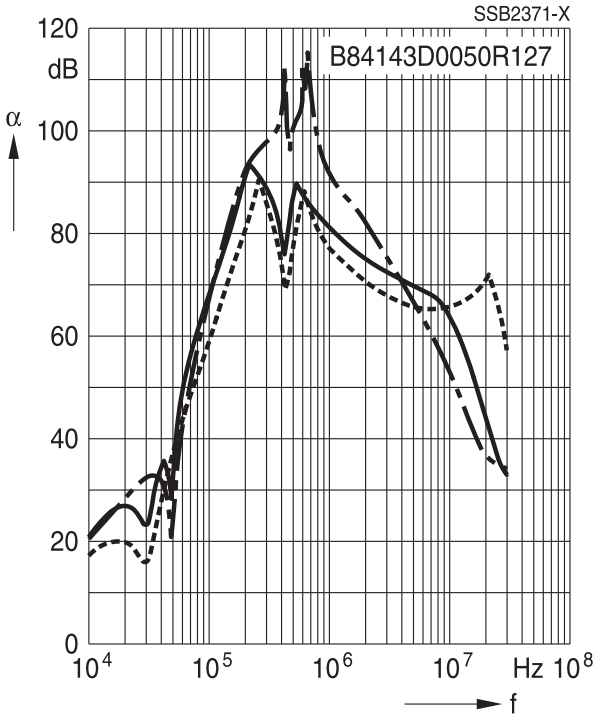
Filters for 25 A



Filters for 36 A



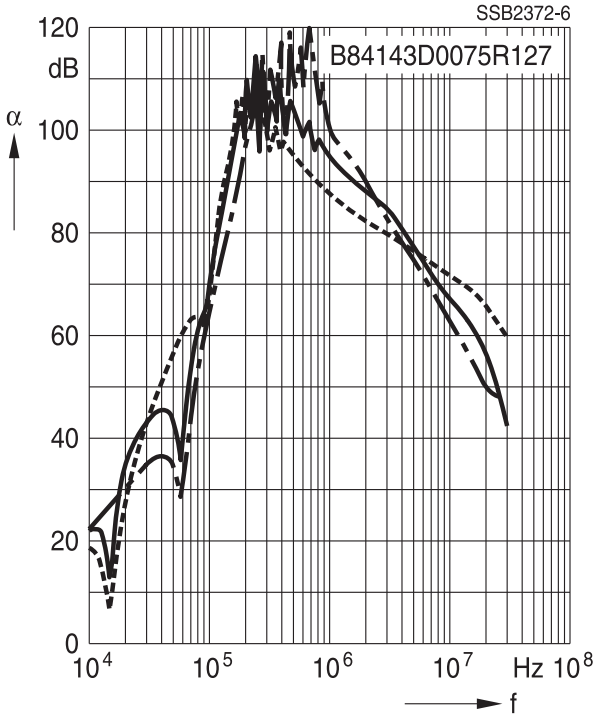
Filters for 50 A



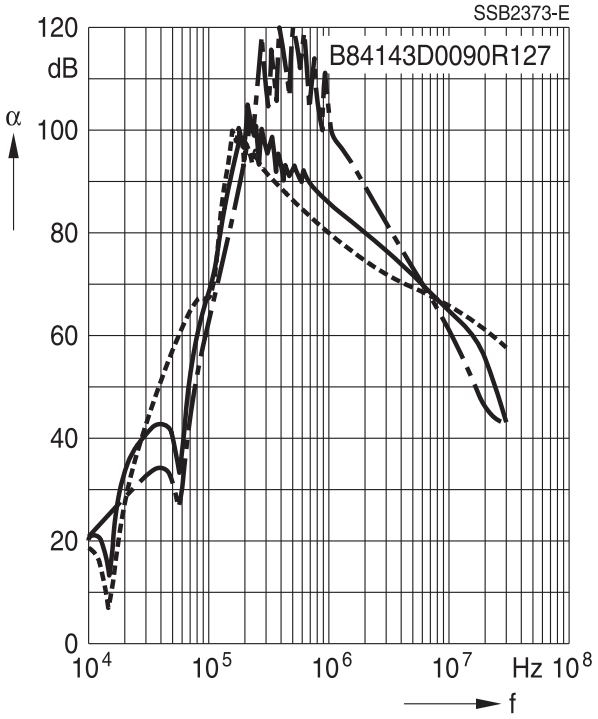
Insertion loss (typical values at Z = 50 Ω)

——————— unsymmetrical, adjacent branches terminated
—·—·—·—·—·— common mod, all branches in parallel (asymmetrical)
– – – – – – – – – differential mode (symmetrical)

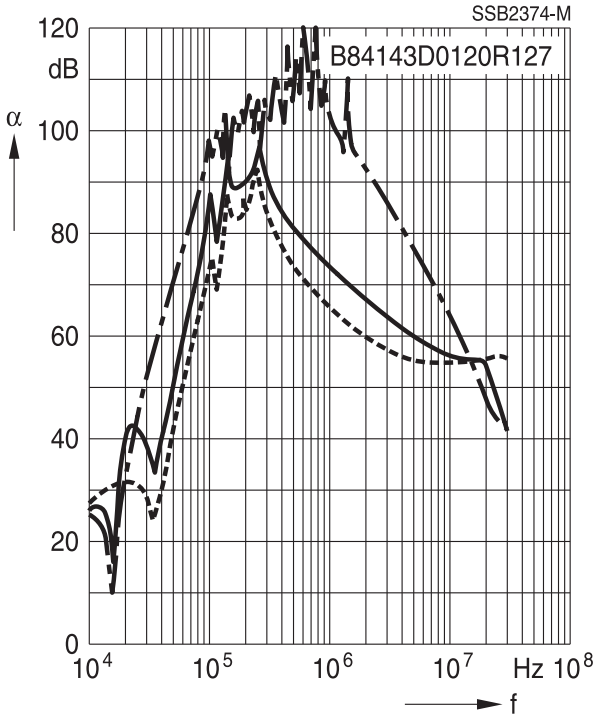
Filters for 75 A



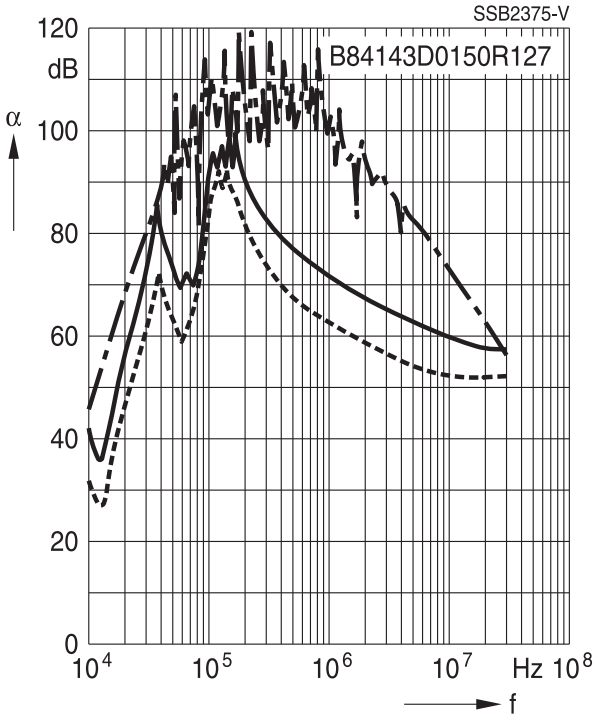
Filters for 90 A



Filters for 120 A



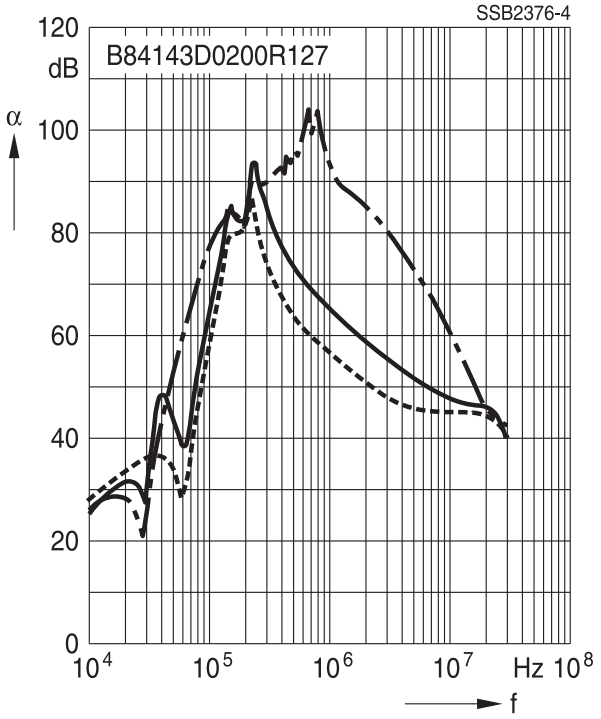
Filters for 150 A



Insertion loss (typical values at Z = 50 Ω)

——————— unsymmetrical, adjacent branches terminated
—·—·—·—·—·— common mod, all branches in parallel (asymmetrical)
– – – – – – – – – differential mode (symmetrical)

Filters for 200 A



Cautions and warnings

- Please note further advice in our website www.tdk-electronics.tdk.com/pemc_filters_gti
- 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: The products contain components that store an electric charge. Dangerous voltages can continue to exist at the product 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 product is installed and secured against loosening by defined tightening torque. Remove them at last, when uninstalling. Depending on the magnitude of the leakage currents, the particular specifications for making the protective-earth connection must be observed.
- Impermissible overloading of the product, 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 product housing).
- The products must be protected in the application against impermissible exceeding of the rated currents by overcurrent protective devices.
- For leakage currents >10 mA, a fixed connection of the protective earth conductor to the public power grid is required. This means that connection via plug connectors is not permitted. The protective conductor must have a mini-mum cross-section of 10 mm^2 Cu or 16 mm^2 Al over its entire length. Alternatively, two separate protective conductors with the minimum cross-section specified in each case can also be connected.
- For leakage currents 3.5 mA < I_{LK} a) ≤ 10 mA, the following solutions are possible:
  - Stationary device with fixed connection
  - Stationary device with type B plug-in connection (industrial plug-in connection according to IEC 60309) and cross-section ≥ 2.5 mm^2
  - Stationary device with type A plug-in connection (non-industrial plug-in device) and additional second protective earth connection
  - Movable equipment with type A plug-in connection and additional second protective earth connection in premises with restricted access
- The products must be protected in the application against impermissible exceeding of the specification parameter.
- The converter output frequency must be within the specified range to avoid resonances and uncontrolled warming of the output chokes and output filters.
- The components can become very hot during operation, there is the risk of burns if touched. The product can remain hot for some time after the power is switched off!
- The products are only to be attached to the fixings or mounting holes provided for this purpose in accordance with the data sheet. It is not permitted for the product specified in the data sheet to assume a mechanical function in the final application, in particular any type of tension or pressure on the product must be prevented.

a) I_{LK} = Leakage current

Display of ordering codes for TDK Electronics products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications, on the company website, or in order-related documents such as shipping notes, order confirmations and product labels. The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.
Detailed information can be found on the Internet under www.tdk-electronics.tdk.com/orderingcodes.

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 (Eingang zu Ausgang)
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_C	Current through capacitor	Strom durch Kondensator
I_{LK}	Filter leakage current	Filter-Ableitstrom
I_{max}	Maximum current	Maximalstrom
I_N	Nominal current	Nennstrom
I_{op}	Operating current (design current)	Betriebsstrom
I_{pk}	Rated peak withstand current	Bemessungsstoßstromfestigkeit
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_L	Power loss	Verlustleistung
R	Resistance	Widerstand
R_{is}	Insulation resistance	Isolationswiderstand
R_{typ}	DC resistance, typical value	Gleichstromwiderstand typisch
T_A	Ambient temperature	Umgebungstemperatur
T_{max}	Upper category temperature	Obere Kategorietemperatur
T_{min}	Lower category temperature	Untere Kategorietemperatur
T_R	Rated temperature	Bemessungstemperatur
u_k	Referred voltage drop in %	Bezogener Spannungsabfall in %
V_{eff}	RMS voltage	Effektivspannung
V_K	Voltage drop	Spannungsabfall
V_{LE}	Voltage line to earth; voltage line to ground	Spannung Phase zu Erdpotential
V_N	Nominal voltage	Nennspannung
V_R	Rated voltage	Bemessungsspannung
V_{peak}	Peak voltage	Spitzenspannung
V_{test}	Test voltage	Prüfspannung

Symbol	English	German
V_X	Voltage over X capacitor	Spannung über X-Kondensator
V_Y	Voltage over Y capacitor	Spannung über Y-Kondensator
X_L	Inductive reactance	Induktiver Blindwiderstand
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 we are 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 a 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 life-saving 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.tdk-electronics.tdk.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 our General Terms and Conditions of Supply**.

Important notes

7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard**. The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements (“CSR”) TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System**. For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.
8. The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, FilterCap, FormFit, InsuGate, LeaXield, MediPlas, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PiezoBrush, PlasmaBrush, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SurfIND, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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