



Filters for Communication Lines

Analog Systems and Control Lines

Series/Type: **B84312**

Date: January 2004

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Passband up to 300 kHz

Stopband attenuation up to 40 GHz



Features

- Use of coaxial feed-through capacitors on input and output
- Single or current-balanced chokes depending on requirement
- Insertion loss to CISPR 17
- Also available with integrated EMP protection

Installation

Single filters are attached directly to the shielding wall. Larger numbers can be housed in filter cabinets or boxes. Various models and the matching flexible connector fittings are available.

Mechanical design

The electrical components are incorporated in an RF-tight case of tin-plated sheet steel. Filters are available for 2 or 20 lines and for upright or flat installation on shielding wall.

| Model | Installation | | Filter selection |
|---------|--------------|--|---|
| B84312C | Upright | Space-saving solution for installing a number of different filters. | B84312C*B (2-line) B84312C*H (20-line) |
| B84312F | Flat | Low profile and thus advantage especially for just one or a few filters. | B84312F*B (2-line) |

Filter applications

The following standard filters are designed for the most common applications; customized models can be produced for differing requirements.

| Passband | Z_L | I_R | Application | Circuit diagram | No. of lines | Series |
|------------|----------|-------|---|-----------------|--------------|------------------------|
| kHz | Ω | A | | | | B84312 |
| DC ... 3.4 | 600 | 0.1 | Standard filters for telephone systems | 1 | 2 20 | +0020B*** C0020H*** |
| DC ... 3.4 | 600 | 0.1 | Telephone systems for enhanced requirements (stopband attenuation of 100 dB above 10 kHz) | 3 | 2 20 | +0090B*** C0090H*** |
| DC ... 50 | 600 | 0.1 | Filters for telephone systems and modem cables, conditionally for control lines with critical signal rise times | 1 | 2 20 | +0040B*** C0040H*** |
| DC ...120 | 150 | 0.1 | Data signals with balanced signal transmission mode as used | 2 | 2 20 | +0050B*** C0050H*** |
| DC ... 300 | 150 | 0.1 | by modems or interfaces RS 485 up to 9600 Baud and/or RS 422 up to 19200 Baud | 2 | 2 20 | +0060B*** C0060H*** |
| DC ... 120 | 100 | 2 | Smoke detectors with serial data transmission in bus systems and remote power feeding, temperature switches, 24 V emergency lighting, DC motors | 2 | 2 20 | +0050B*** C0050H*** |
| — | — | 3 | 24-V emergency lighting, DC motors, signal and control lines | 2 | 2 20 | +0050B*** C0050H*** |
| — | — | 1 | Universal filters for signal and control lines with up to 1 A | 1 | 2 20 | +0030B*** C0030H*** |
| — | — | 1 | Control lines with up to 1 A and enhanced attenuation requirements | 3 | 2 20 | +0100B*** C0100H*** |

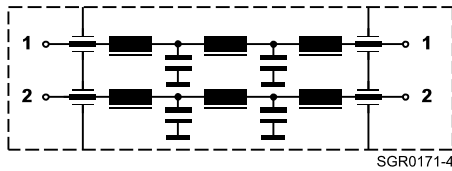
+: C = upright installation, F = flat installation

Circuit diagrams

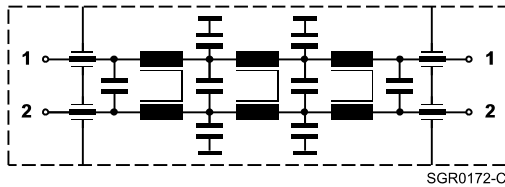
The diagrams each show a circuit of a 2-line filter.

In the series of 20-line filters there are 10 of them in each case.

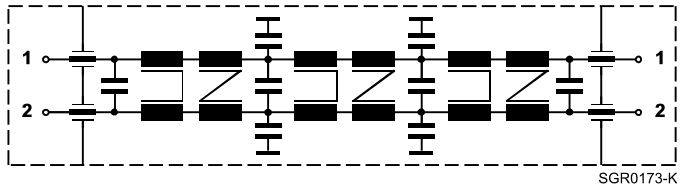
Circuit diagram 1



Circuit diagram 2



Circuit diagram 3



Note on circuit diagrams 2 and 3:

These filters are mounted with current-compensated chokes. Make sure that the forward and return line are routed paired through one filter.

General technical data

| | | | | |
|-----------------------------------|------------|------------------------------|---------|---|
| Rated voltage | $V_{R,AC}$ | 100 | V | |
| Rated voltage | $V_{R,DC}$ | 100 | V | |
| Rated frequency | f_R | | | Pass bandwidth at Z_L |
| Rated current | I_R | See characteristics | | $T_A = 40\text{ °C}$ |
| Line impedance | Z_L | See characteristics | | |
| Test voltage | V_{test} | 250 VDC, 2 s 250 VDC, 2 s | | Line/line Line/case |
| Maximum DC resistance | R_{max} | See characteristics | | Per line |
| Permissible ambient temperature | T_A | -25/+40 | °C | |
| Climatic category (EN 60068-1) | | 25/085/56 | | -25 °C/+85 °C/56 days damp heat test |
| Weight | | 560 4.5 | g kg | 2-line filters 20-line filters |
| Mechanical version | | C F | | Upright for 2- and 20-line filters Flat for 2-line filters |

Filters with EMP protection:

| | | | | |
|---------------------------------|------------|--------------|--------|--------------------------|
| Nominal DC spark-over voltage | V_{sdcN} | <500 | V | Per line |
| Surge response voltage | | <800 <800 | V V | At 1 kV/μs At 1 kV/ns |
| Nominal surge current (8/20 μs) | | 5/10 | kA | |
| Suppression condition | | $I \leq I_R$ | | |

Maximum voltage on filter output for filters with EMP protection

| | | | | | | |
|--------------------------------------|---------------------|----------------------------|----------------------------|-------------|-------------|-------------|
| Series | B84312 | ...0020+1** ...0090+1** | ...0030+1** ...0100+1** | ...0040+1** | ...0050+1** | ...0060+1** |
| Pulse shape in symmetrical circuit | | | | | | |
| dv/dt = 0.1 | kV/μs | 2 V | 360 V | 8 V | 3 V | 12 V |
| dv/dt = 1 | kV/μs | 1 V | 60 V | 3 V | 2 V | 9 V |
| dv/dt = 1 | kV/ns ¹⁾ | 0.5 V | 2 V | 0.5 V | 0.5 V | 1.2 V |
| Nominal surge current (8/20 μs) | | 5 V | 290 V | 12 V | 10 V | 12 V |
| Pulse shape in unsymmetrical circuit | | | | | | |
| dv/dt = 0.1 | kV/μs | 50 V | 700 V | 250 V | 120 V | 280 V |
| dv/dt = 1 | kV/μs | 35 V | 130 V | 60 V | 25 V | 30 V |
| dv/dt = 1 | kV/ns ¹⁾ | 1 V | 5 V | 3 V | 1 V | 1 V |
| Nominal surge current (8/20 μs) | | 20 V | 200 V | 110 V | 25 V | 50 V |

1) Typical test pulse: rise time 10 ns, time to half value 1500 ns, charge voltage min. 50 kV, source impedance 90 Ω

Characteristics and ordering codes

| I_R | Pass bandwidth kHz | Z_L Ω | R_{max} Per line Ω | Circuit diagram | Number of lines | Ordering code |
|-------|-----------------------|-------------------|-----------------------------------|--------------------|--------------------|-----------------|
| A | | | | | | |
| 0.1 | DC ... 3.4 | 600 | 11 | 1 | 2 | B84312C0020B*03 |
| 0.1 | DC ... 3.4 | 600 | 11 | 1 | 2 | B84312F0020B*03 |
| 0.1 | DC ... 3.4 | 600 | 11 | 1 | 20 | B84312C0020H*03 |
| 1 | — ²⁾ | ³⁾ | 0.4 | 1 | 2 | B84312C0030B*03 |
| 1 | — ²⁾ | ³⁾ | 0.4 | 1 | 2 | B84312F0030B*03 |
| 1 | — ²⁾ | ³⁾ | 0.4 | 1 | 20 | B84312C0030H*03 |
| 0.1 | DC ... 50 | 600 | 1.1 | 1 | 2 | B84312C0040B*01 |
| 0.1 | DC ... 50 | 600 | 1.1 | 1 | 2 | B84312F0040B*01 |
| 0.1 | DC ... 50 | 600 | 1.1 | 1 | 20 | B84312C0040H*01 |
| 0.1 | DC ... 120 | 150 | 4.4 | 2 | 2 | B84312C0050B*01 |
| 0.1 | DC ... 120 | 150 | 4.4 | 2 | 2 | B84312F0050B*01 |
| 0.1 | DC ... 120 | 150 | 4.4 | 2 | 20 | B84312C0050H*01 |
| 2 | DC ... 120 | 100 | 0.4 | 2 | 2 | B84312C0050B*21 |
| 2 | DC ... 120 | 100 | 0.4 | 2 | 2 | B84312F0050B*21 |
| 2 | DC ... 120 | 100 | 0.4 | 2 | 20 | B84312C0050H*21 |
| 3 | — ²⁾ | ³⁾ | 0.2 | 2 | 2 | B84312C0050B*31 |
| 3 | — ²⁾ | ³⁾ | 0.2 | 2 | 2 | B84312F0050B*31 |
| 3 | — ²⁾ | ³⁾ | 0.2 | 2 | 20 | B84312C0050H*31 |
| 0.1 | DC ... 300 | 150 | 1.0 | 2 | 2 | B84312C0060B*01 |
| 0.1 | DC ... 300 | 150 | 1.0 | 2 | 2 | B84312F0060B*01 |
| 0.1 | DC ... 3.4 | 600 | 17 | 3 | 2 | B84312C0090B*04 |
| 0.1 | DC ... 3.4 | 600 | 17 | 3 | 2 | B84312F0090B*04 |
| 0.1 | DC ... 3.4 | 600 | 17 | 3 | 20 | B84312C0090H*04 |
| 1 | — ²⁾ | ³⁾ | 0.6 | 3 | 2 | B84312C0100B*03 |
| 1 | — ²⁾ | ³⁾ | 0.6 | 3 | 2 | B84312F0100B*03 |
| 1 | — ²⁾ | ³⁾ | 0.6 | 3 | 20 | B84312C0100H*03 |

*: 0 = Standard filters

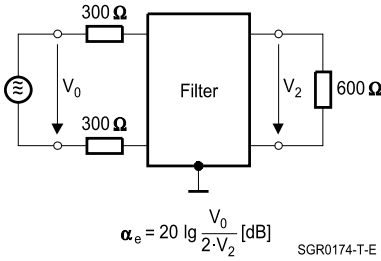
1 = Filters with EMP protection

2) Control line filters, not matched

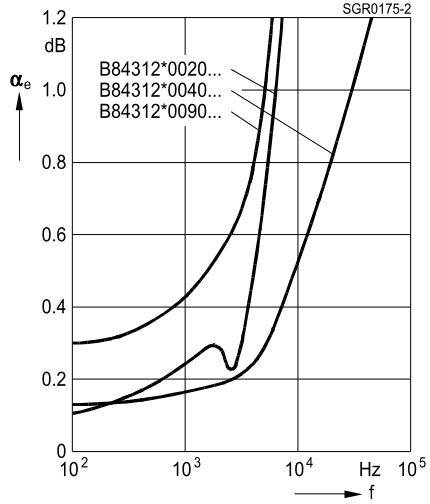
3) Not specified

Insertion loss α_e in passband (typical)

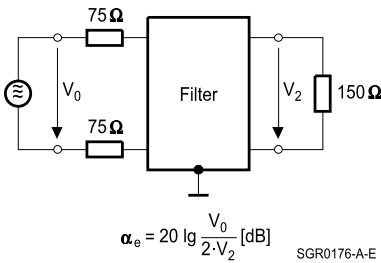
Measurement circuit



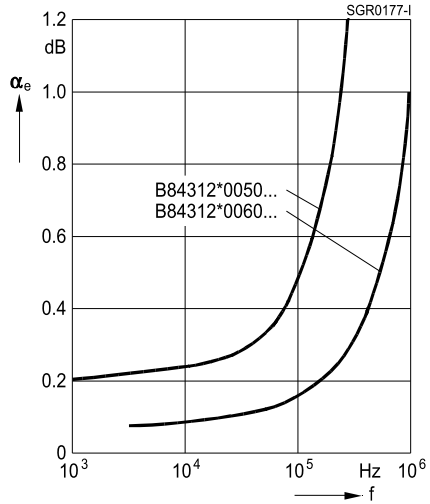
Symmetrical measurement circuit
with $Z_L = 600 \Omega$



Measurement circuit

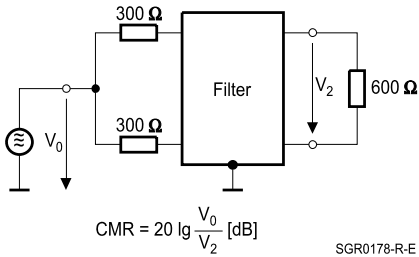


Symmetrical measurement circuit
with $Z_L = 150 \Omega$



Unsymmetrical measurement (common-mode-rejection) in passband

Measurement circuit

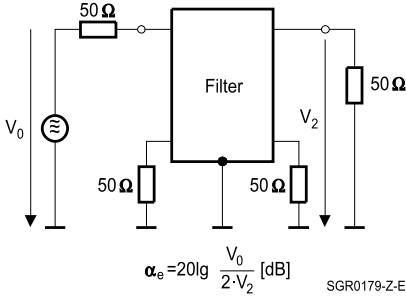


Filter with $Z_L = 600 \Omega$

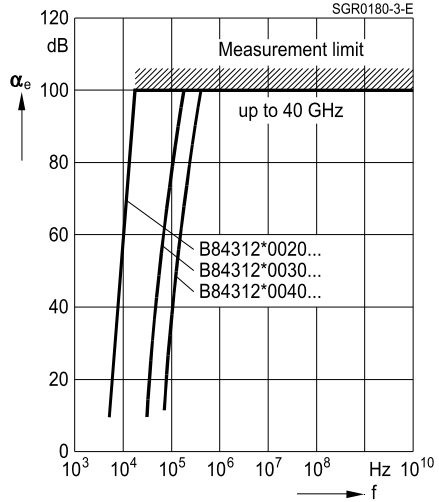
CMR >40 dB in passband

Insertion loss α_e in stopband (typical)

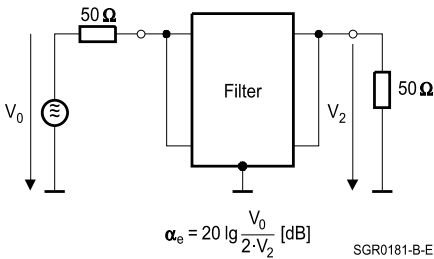
Measurement circuit



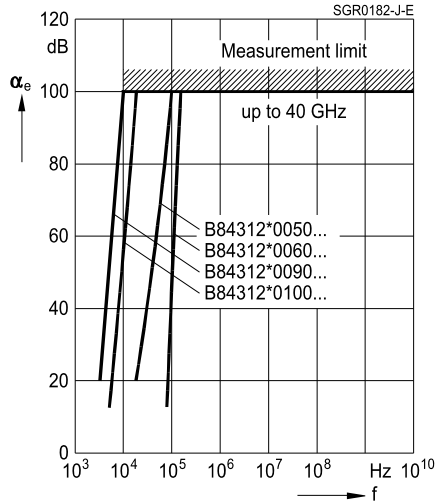
Unsymmetrical measurement circuit



Measurement circuit

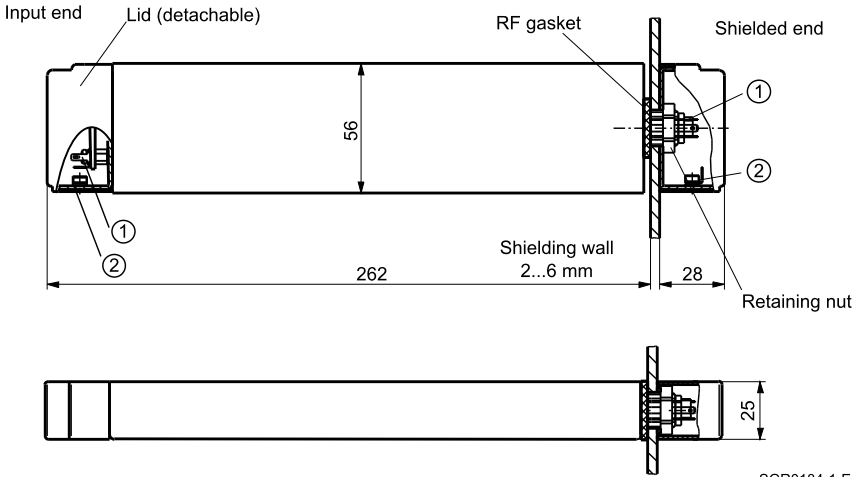


Asymmetrical measurement
to MIL-STD-220A



Dimensional drawings

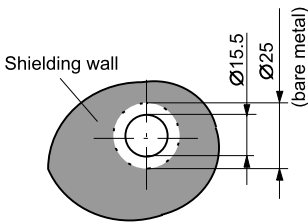
2-line filters, upright installation



SGR0184-1-E

- ① Line connections at both ends:
2 x tab connectors for receptacle 2.8 x 0.5 (in accessory bag)
- ② Strain relief with ground connection for cable diameter 4.5 ... 6 mm

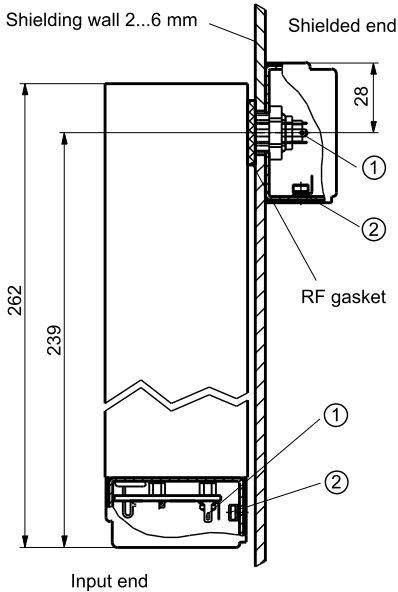
Hole for installation in shielding wall



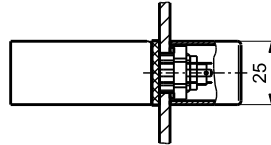
SGR0185-9-E

2-line filters, flat installation

Side view



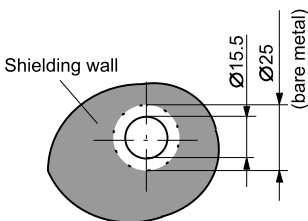
Plan view



SGR0186-H-E

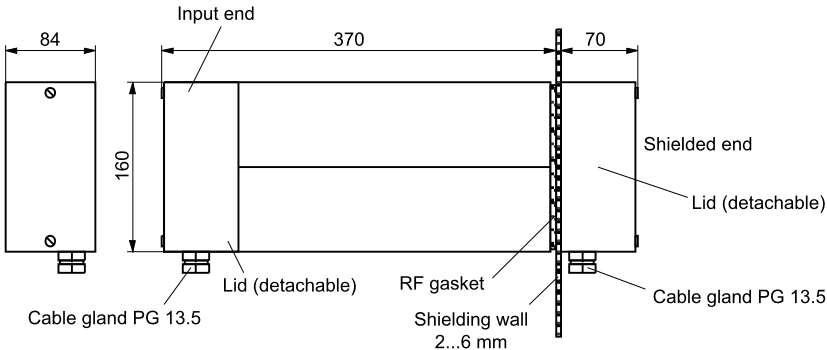
- ① Line connections at both ends:
2 x tab connectors for receptacle 2.8 x 0.5 (in accessory bag)
- ② Strain relief with ground connection for cable diameter 4.5 ... 6 mm

Hole for installation in shielding wall



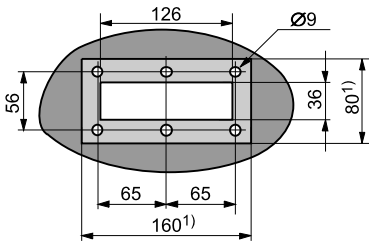
SGR0185-9-E

20-line filters, upright installation

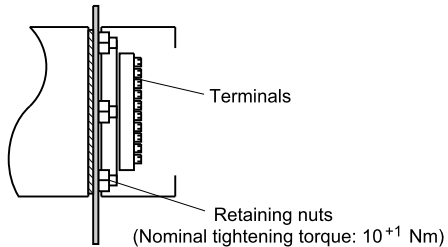


SGR0187-Q-E

Hole for installation in shielding wall



1) Bare metal



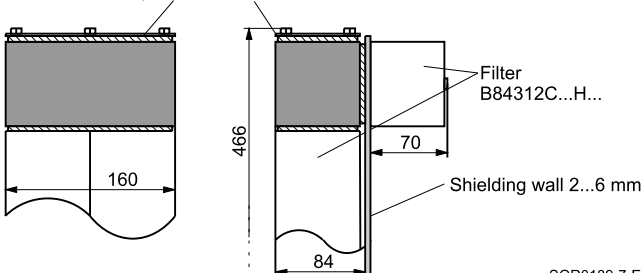
SGR0188-Y-E

Adapter

A bracket adapter is available for flat installation on the shielding wall.

Ordering code: B84298M0012C004

Bracket adapter B84298M0012C004



SGR0189-7-E