

## SERIES: VFM-XX | DESCRIPTION: DC EMI FILTER

### FEATURES

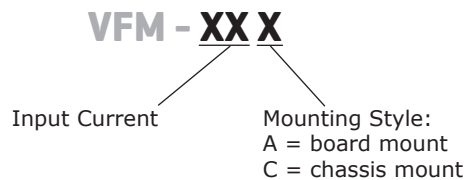
- compact size
- suitable for use with wide range of dc-dc converters
- reduces common and differential mode noise



| MODEL   | input voltage  | input surge voltage <sup>1</sup> | input current | isolation voltage <sup>2</sup> |
|---------|----------------|----------------------------------|---------------|--------------------------------|
|         | range<br>(Vdc) | nominal<br>(Vdc)                 | max<br>(A)    | min<br>(Vdc)                   |
| VFM-10A | 0 ~ 75         | 100                              | 10            | 1,500                          |
| VFM-15C | 0 ~ 75         | 100                              | 15            | 1,500                          |
| VFM-20A | 0 ~ 75         | 100                              | 20            | 1,500                          |
| VFM-25C | 0 ~ 36         | 50                               | 25            | 1,500                          |

Note: 1. For 100 ms.  
2. Input to ground, output to ground.

### PART NUMBER KEY



SPECIFICATIONS

| parameter            | conditions/description            | min             | nom | max | units |
|----------------------|-----------------------------------|-----------------|-----|-----|-------|
| isolation voltage    | input to ground, output to ground | 1,500           |     |     | Vdc   |
| isolation resistance | input to ground, output to ground | 10 <sup>7</sup> |     |     | Ω     |
| dc resistance        | total for two legs                |                 | 16  |     | mΩ    |

ENVIRONMENTAL

| parameter             | conditions/description | min | nom | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature |                        | -40 |     | 100 | °C    |
| case temperature      |                        |     |     | 100 | °C    |
| storage temperature   |                        | -40 |     | 100 | °C    |
| cooling               | natural convection     |     |     |     |       |

MECHANICAL

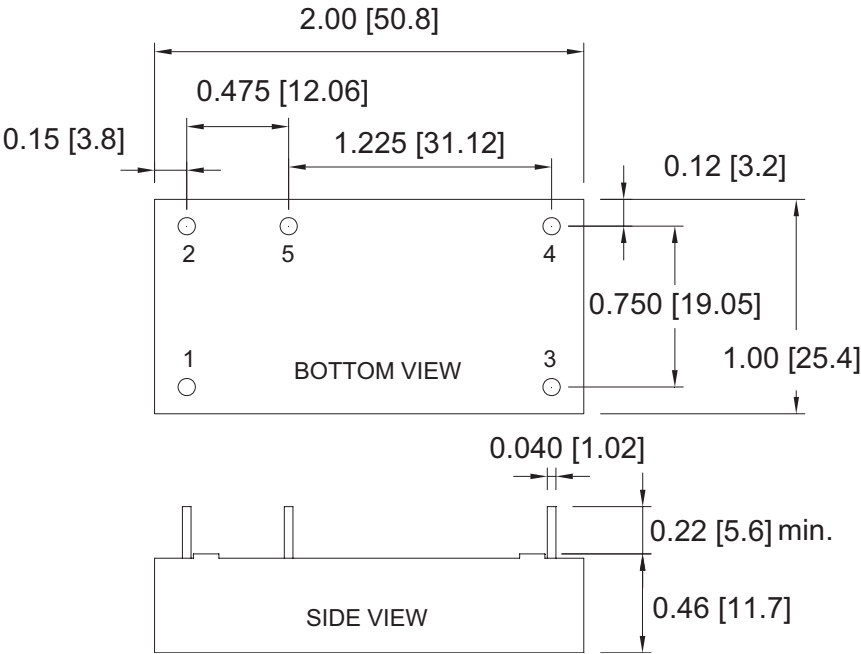
| parameter     | conditions/description                                                    | min | typ | max | units |
|---------------|---------------------------------------------------------------------------|-----|-----|-----|-------|
| dimensions    | VFM-10A: 2.00 x 1.00 x 0.46 [50.8 x 25.4 x 11.7 mm]                       |     |     |     | inch  |
|               | VFM-15C: 4.06 x 3.11 x 0.89 [103.2 x 79 x 22.7 mm]                        |     |     |     | inch  |
|               | VFM-20A: 2.00 x 1.60 x 0.50 [50.8 x 40.6 x 12.7 mm]                       |     |     |     | inch  |
|               | VFM-25C: 4.06 x 3.11 x 0.89 [103.2 x 79 x 22.7 mm]                        |     |     |     | inch  |
| case material | VFM-10A & VFM-20A: black plastic<br>VFM-15C & VFM-25C: black coated steel |     |     |     |       |

MECHANICAL DRAWING

VFM-10A

units: inch [mm]  
tolerance: inches: x.xx = ±0.02, x.xxx = ±0.010  
mm: x.x = ±0.5, x.xx = ±0.25  
pin size: 0.04 [1.02]

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | +Vin     |
| 2               | -Vin     |
| 3               | +Vout    |
| 4               | -Vout    |
| 5               | GND      |



## MECHANICAL DRAWING (CONTINUED)

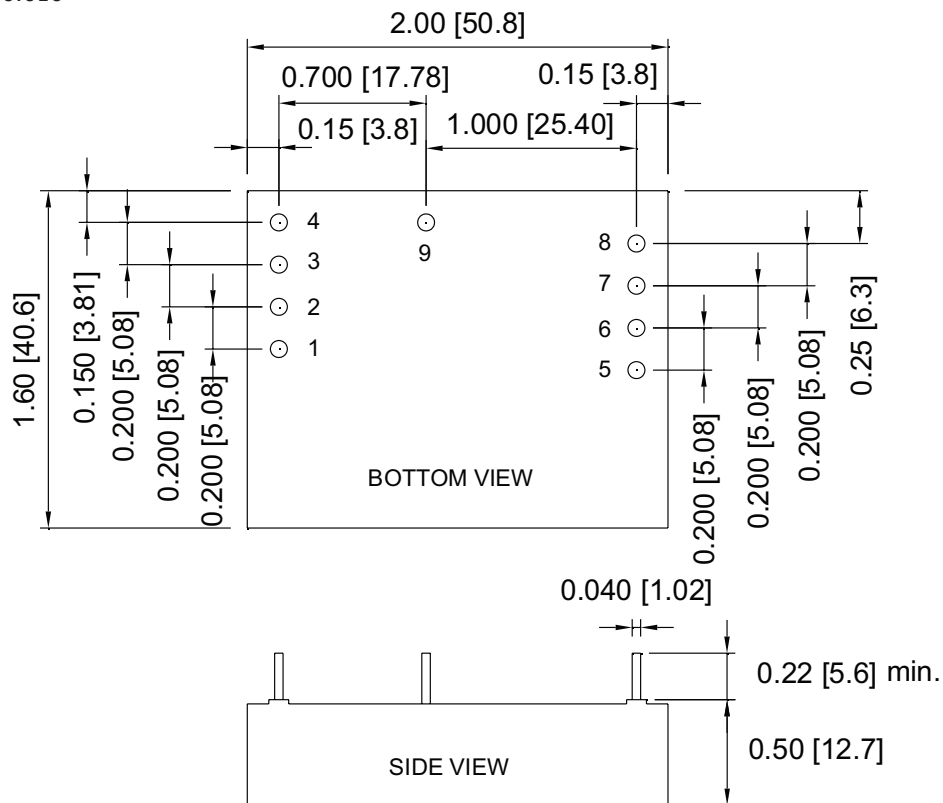
### VFM-20A

units: inch [mm]

tolerance: inches: x.xx =  $\pm 0.02$ , x.xxx =  $\pm 0.010$ mm: x.x =  $\pm 0.5$ , x.xx =  $\pm 0.25$ 

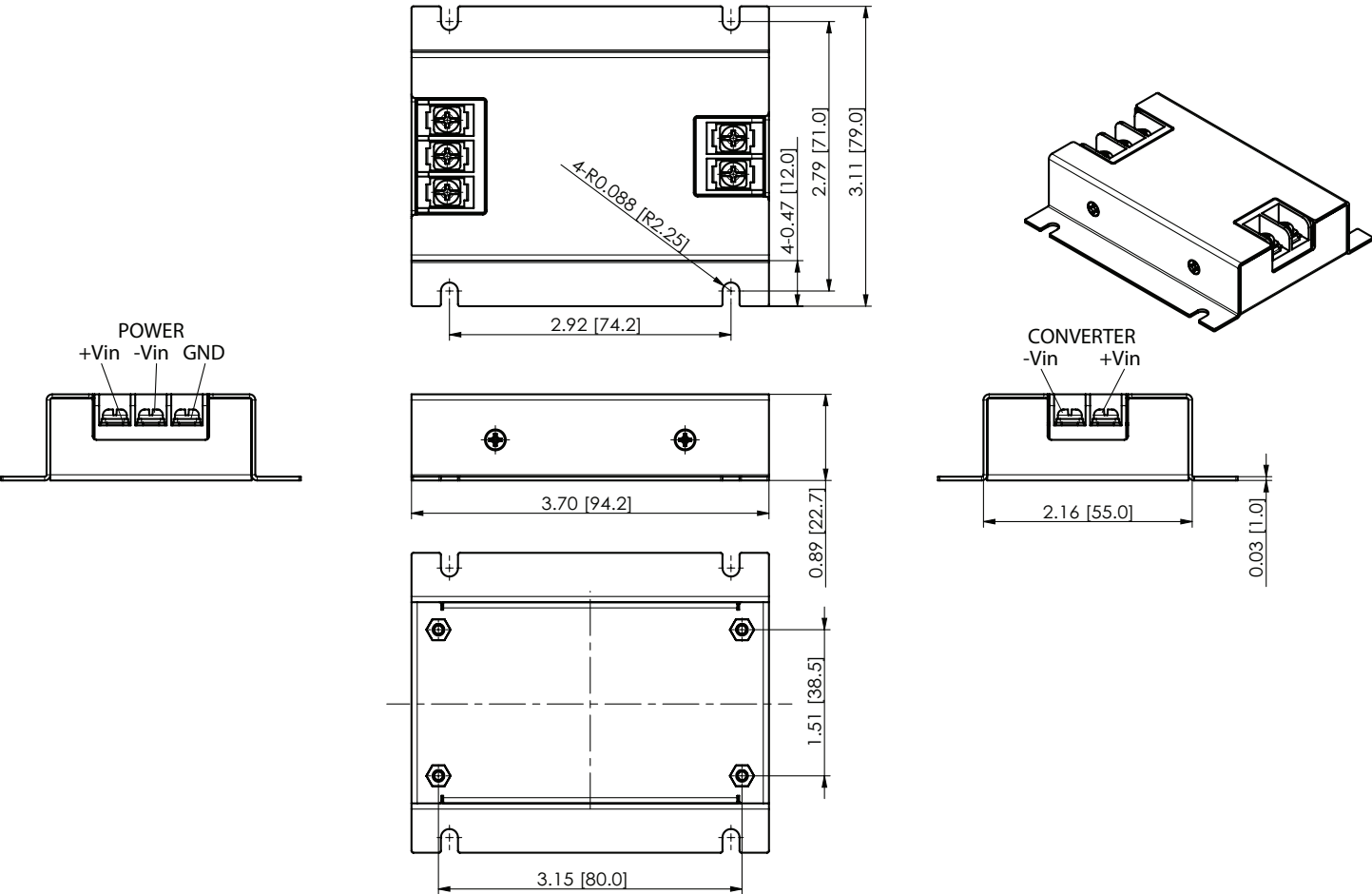
pin size: 0.04 [1.02]

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | +Vin     |
| 2               | +Vin     |
| 3               | -Vin     |
| 4               | -Vin     |
| 5               | +Vout    |
| 6               | +Vout    |
| 7               | -Vout    |
| 8               | -Vout    |
| 9               | GND      |



MECHANICAL DRAWING (CONTINUED)

VFM-15C & VFM-25C



## INTERNAL SCHEMATICS

Figure 1  
VFM-10A

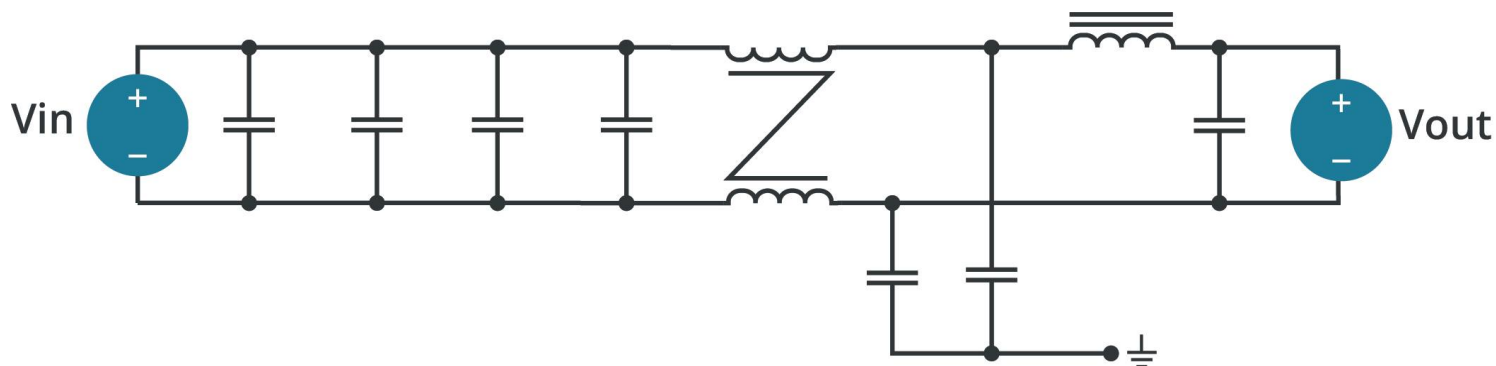


Figure 2  
VFM-20A

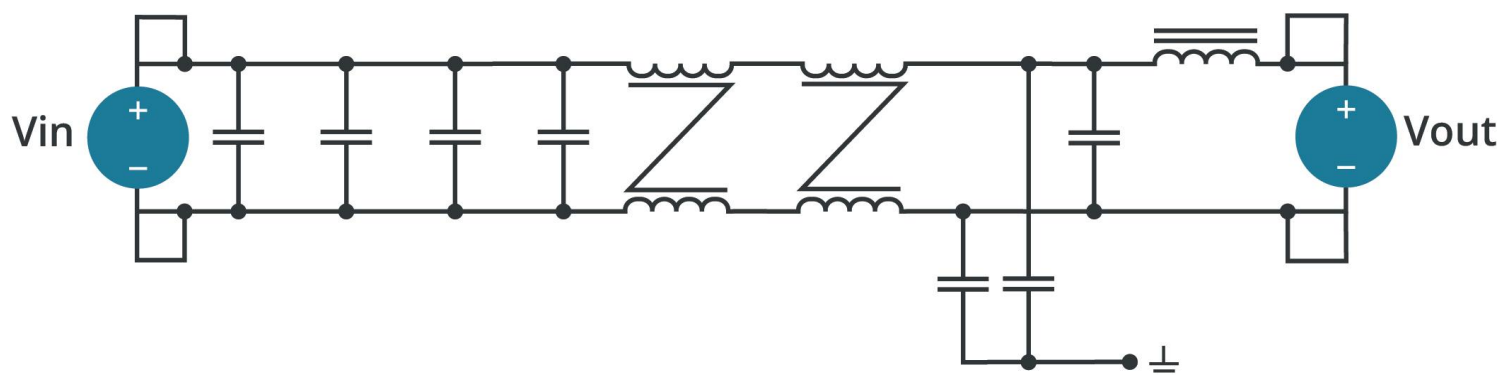
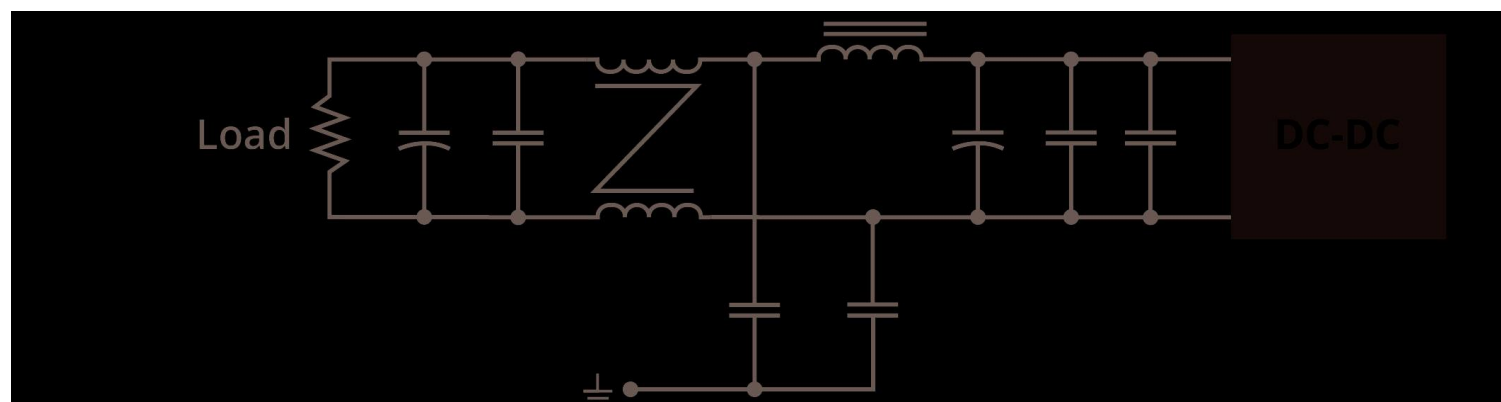
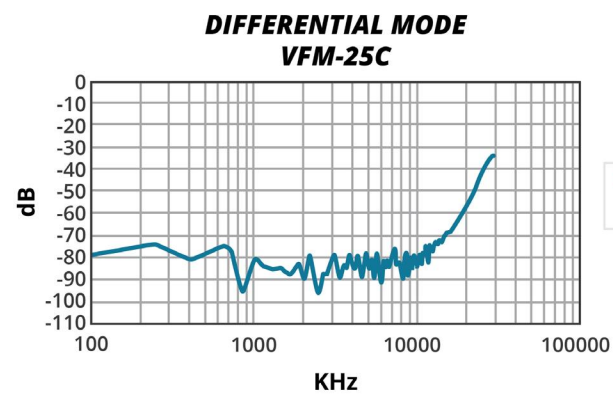
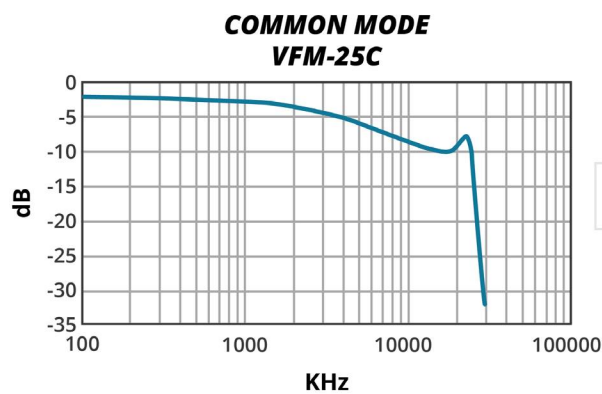
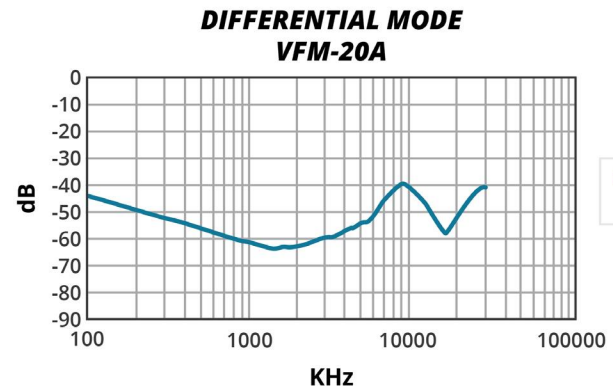
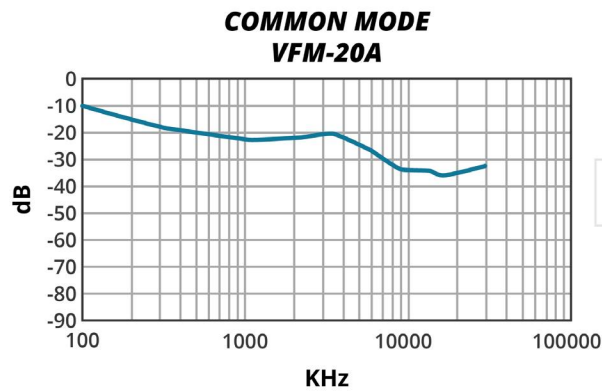
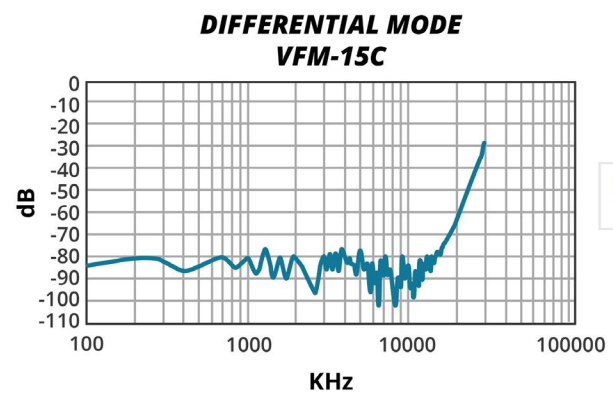
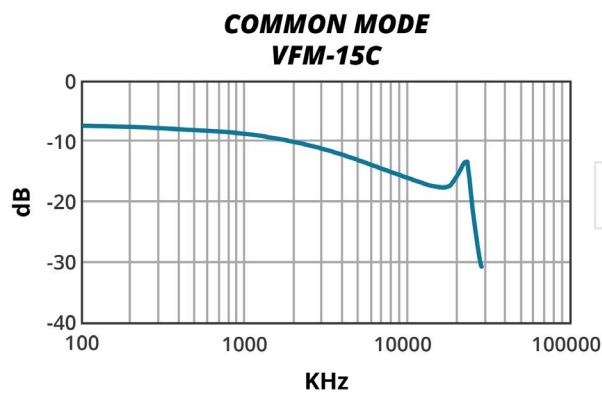
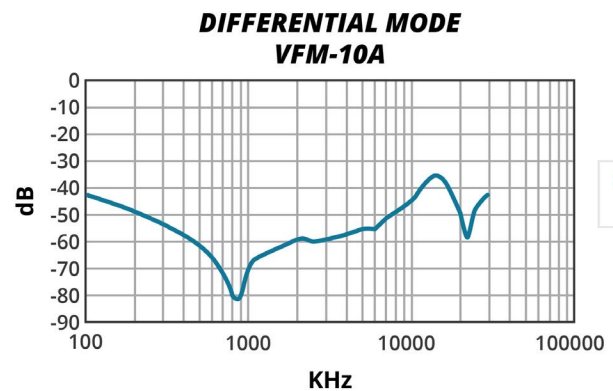
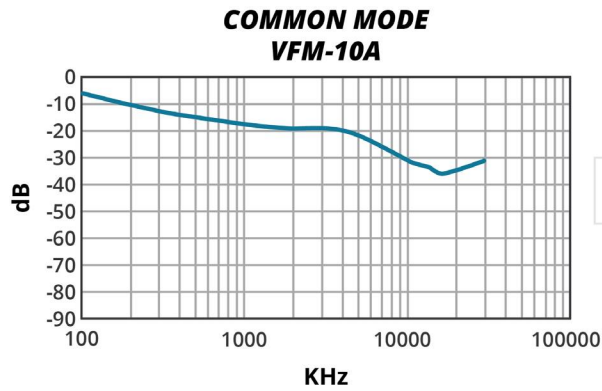


Figure 3  
VFM-15C & VFM-25C



## INSERTION LOSS GRAPHS



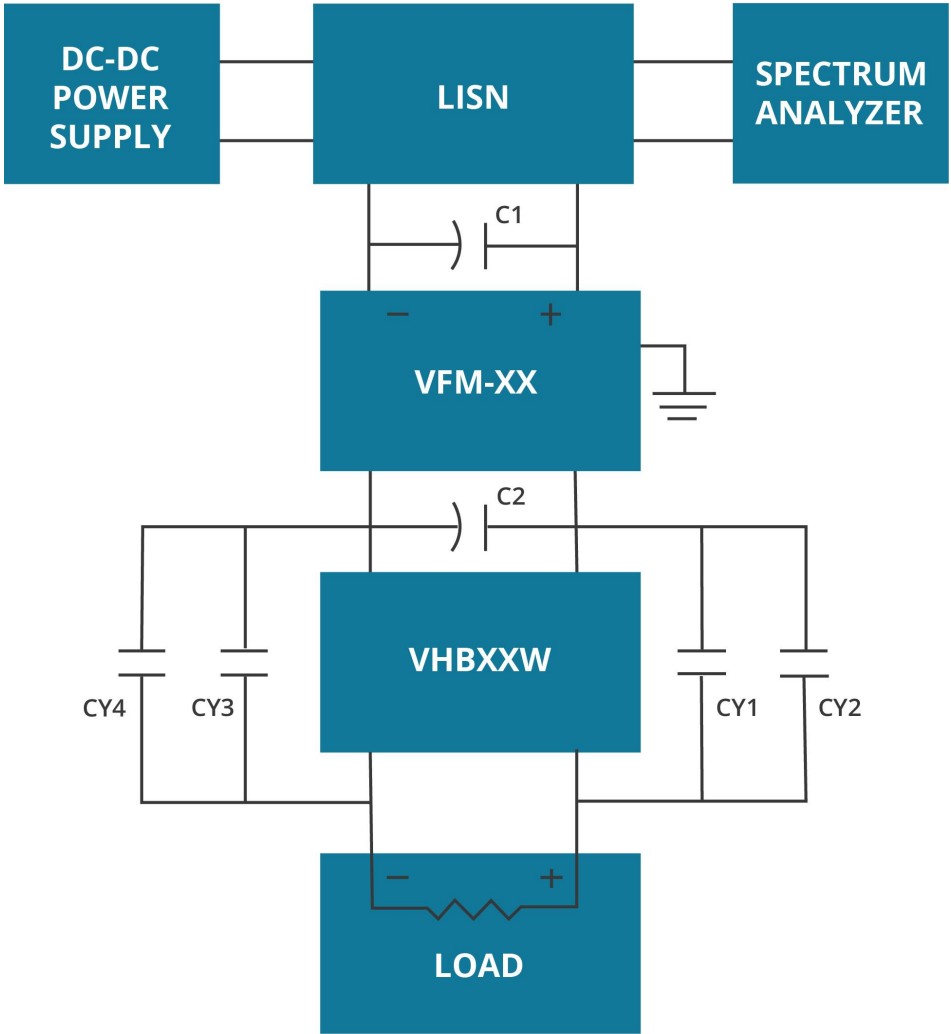
APPLICATION CIRCUIT

The following application note shows EN 55022 class B conducted emissions tests for the VFM-XX series EMI filters in series with a VHK or VHB series DC/DC converter and a purely resistive load. This information is for example only. Actual results may vary.

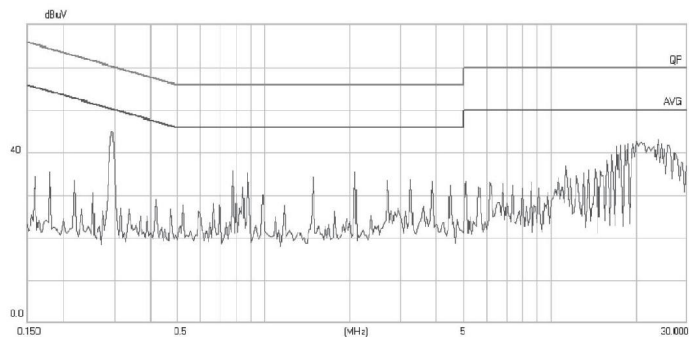
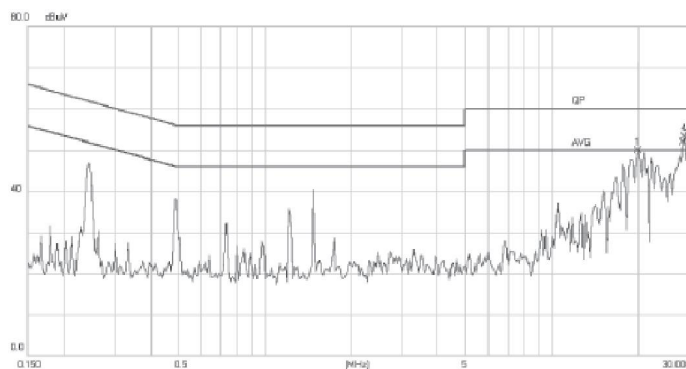
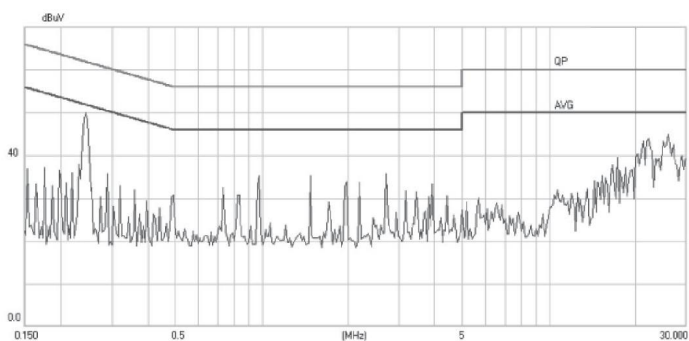
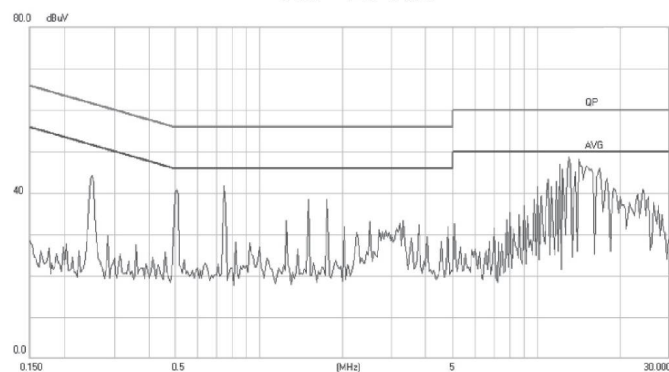
1) EMI Filtering - Connection Diagram

| Filter Model (VFM-XX) | DC-DC Converter Model (VHXXXW) | C1                  | C2                   | CY1            | CY2 | CY3            | CY4         |
|-----------------------|--------------------------------|---------------------|----------------------|----------------|-----|----------------|-------------|
| VFM-10A               | VHB50W-Q24-S5                  | 47 $\mu$ F/100 V KY | ...                  | ...            | ... | ...            | ...         |
|                       | VHB50W-Q48-S5                  | 47 $\mu$ F/100 V KY | ...                  | ...            | ... | ...            | ...         |
| VFM-15C               | VHK200W                        | ...                 | ...                  | ...            | ... | ...            | ...         |
| VFM-20A               | VHB150W-Q24-S5                 | 47 $\mu$ F/100 V KY | 220 $\mu$ F/100 V KY | 1000 pF / 2 KV | ... | 1000 pF / 2 KV | 560 pF/2 KV |
|                       | VHB150W-Q48-S5                 | ...                 | 220 $\mu$ F/100 V KY | 1000 pF / 2 KV | ... | 1000 pF / 2 KV | 560 pF/2 KV |
| VFM-25C               | VHK200W                        | ...                 | ...                  | ...            | ... | ...            | ...         |

Figure 4



## 2) Conducted Emission Measurement

***FILTER MODEL (VFM-10A)******DC-DC CONVERTER MODEL: VHB50W-Q24-S5******Vin = 12 Vdc******FILTER MODEL (VFM-15C)******DC-DC CONVERTER MODEL: VHK200W-Q48-S12******Vin = 48 Vdc******FILTER MODEL (VFM-20A)******DC-DC CONVERTER MODEL: VHB150W-Q24-S5******Vin = 12 Vdc******FILTER MODEL (VFM-25C)******DC-DC CONVERTER MODEL: VHK200W-Q24-S12******Vin = 24 Vdc***

## REVISION HISTORY

| rev. | description                                  | date       |
|------|----------------------------------------------|------------|
| 1.0  | initial release                              | 01/01/2017 |
| 1.01 | specification updated to a new CUI template  | 01/17/2022 |
| 1.02 | pin connection table updated                 | 05/11/2022 |
| 1.03 | pin size updated in the pin connection table | 06/14/2022 |
| 1.04 | header updated on page 6                     | 04/26/2023 |

The revision history provided is for informational purposes only and is believed to be accurate.



**CUI INC**  
a bel group

**Headquarters**  
20050 SW 112th Ave.  
Tualatin, OR 97062  
**800.275.4899**

Fax 503.612.2383  
**cui.com**  
techsupport@cui.com

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