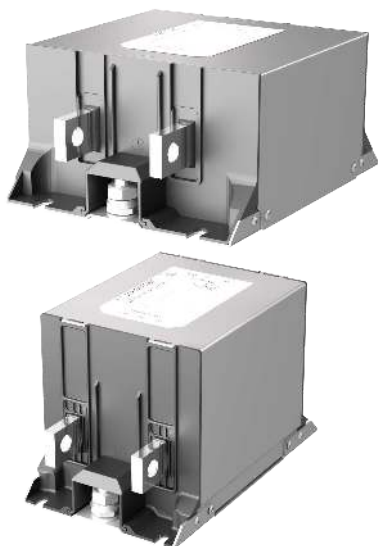


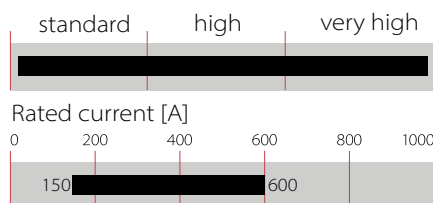
# DC-Busbar EMC/RFI Filter for EV charging applications



- Designed for usage in EV charging applications
- Ultra-compact filter
- Multiple performance options
- Design acc. to EV charging safety standards



### Performance indicators



### Approvals & Compliances



### Features and benefits

- FN222X, FN223X and FN224X series of filters provides state-of-the-art EMI attenuation with a choice of three performance levels
- The filters are built to fit perfectly to high power EV charging applications
- The shape allows a convenient and space-saving installation
- Fulfills the requirements in IEC/EN 61851-23 Electric vehicle conductive charging system
- Fulfills the requirements in UL 2202 Electric Vehicle (EV) Charging System Equipment
- FN224X offers voltage and performance ratings of FN222X on a smaller footprint

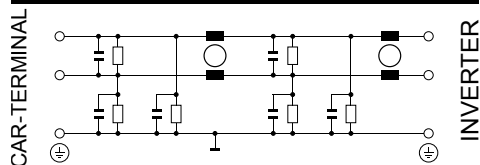
### Technical specifications

<b>Maximum continuous operating voltage</b>	1000 VDC (FN222X, FN224X) 500 VDC (FN223X)
<b>Operating frequency</b>	DC
<b>Rated currents</b>	150 to 600 A @ 55 °C
<b>Overload capability</b>	6x rated current for 1 sec, once per hour 1.5x rated current for 1 minute, once per hour
<b>Climatic class</b>	40/100/21 acc. to IEC 60068-1
<b>Temperature range (operation and storage)</b>	-40 °C to +100 °C (with current derating >55 °C)
<b>High potential test voltage</b>	DC+ -> DC- 3600 VDC for 2 s (FN222X, FN224X)* DC+ -> DC- 2000 VDC for 2 s (FN223X)* DC+/DC- -> PE 5000 VDC for 2 s (FN222X, FN224X)* DC+/DC- -> PE 2500 VDC for 2 s (FN223X)*
<b>Pollution degree</b>	PD 3 acc. IEC 60664-1
<b>Overvoltage category</b>	II acc. IEC 60664-1
<b>Surge withstand</b>	DC+/DC- to PE: 4000 V (FN223X) / 6000 V (FN222X, FN224X); DC+ to DC-: 2000 V; acc. to IEC 61000-4-5
<b>Altitude</b>	up to 2000 m no derating applies. Above 2000 m derating acc. to IEC 60664-1 applies
<b>Protection category</b>	IP00 acc. to IEC 60529
<b>Vibration and shock</b>	3M12 (operation) acc. to IEC 60721-3-3
<b>Flammability corresponding to</b>	Plastics: UL 94 V-0
<b>MTBF</b>	> 300,000 hours
<b>Cooling</b>	Natural convection AN
<b>Certified to</b>	UL 60939-3, IEC 60939-3, CSA 22.2 No. 8-13
<b>Output connections</b>	Ni-plated busbars

### Typical applications

- High Power EV DC charging beyond HPC350 (500 A @ 920 V)
- Two voltage levels (500 VDC and 1000 VDC) for CHAdeMO and CCS

Typical electrical schematic (please refer to page 3 for further details)



\*High potential test voltage: Repetition with max. 80% of specified values

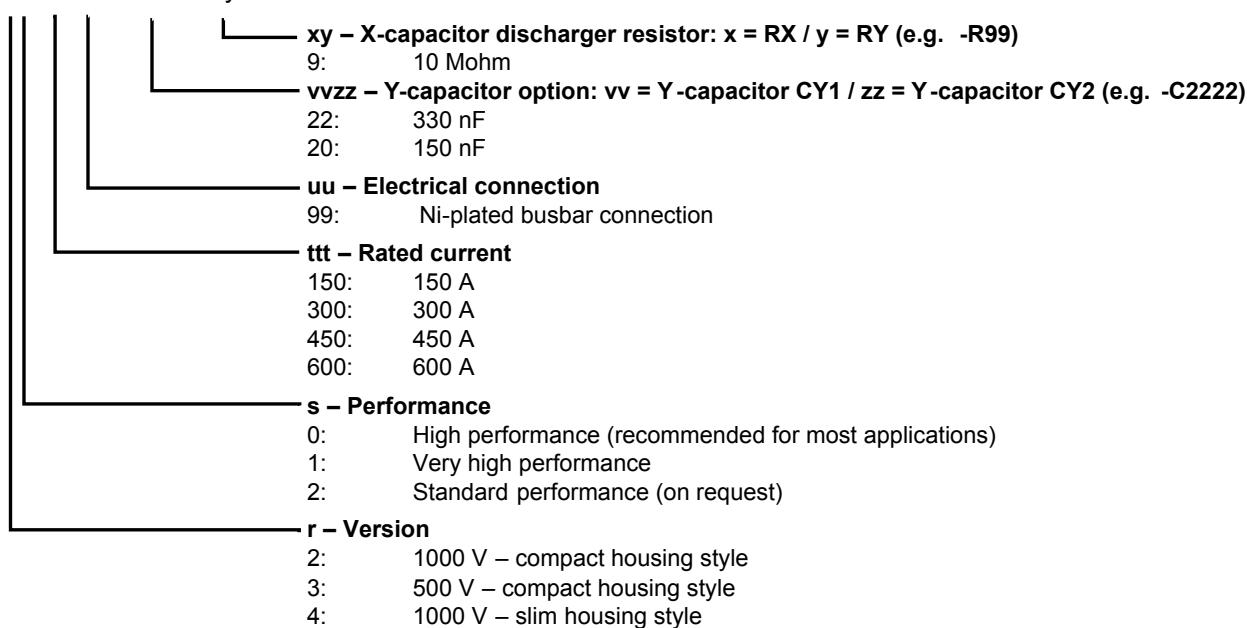
## Filter selection table

Filter	Rated current @55°C [A]	Capacitance*		total equiv. capacitance to PE [nF]	Resistance*		Typical power dissipation @25°C/DC [W]	Weight approx. [kg]
		[nF]			[MOhm]			
		CY1	CY2		RX	RY		
<b>1000 VDC - compact housing style</b>								
<b>High performance:</b>								
<b>FN2220-150-99-C2222-R99</b>	150	330	330	990	10	10	6	3
<b>FN2220-300-99-C2222-R99</b>	300	330	330	990	10	10	14	3
<b>FN2220-450-99-C2222-R99</b>	450	330	330	990	10	10	14	3
<b>FN2220-600-99-C2222-R99</b>	600	330	330	990	10	10	25	3
<b>Very high performance:</b>								
<b>FN2221-600-99-C2222-R99</b>	600	330	330	990	10	10	25	3
<b>500 VDC - compact housing style</b>								
<b>High performance:</b>								
<b>FN2230-150-99-C2022-R99</b>	150	150	330	960	10	10	6	3
<b>FN2230-300-99-C2022-R99</b>	300	150	330	960	10	10	14	3
<b>FN2230-450-99-C2022-R99</b>	450	150	330	960	10	10	14	3
<b>FN2230-600-99-C2022-R99</b>	600	150	330	960	10	10	25	3
<b>Very high performance:</b>								
<b>FN2231-600-99-C2022-R99</b>	600	150	330	960	10	10	25	3
<b>1000 VDC - slim housing style</b>								
<b>High performance:</b>								
<b>FN2240-150-99-C2222-R99</b>	150	330	330	990	10	10	6	3
<b>FN2240-300-99-C2222-R99</b>	300	330	330	990	10	10	14	3
<b>FN2240-450-99-C2222-R99</b>	450	330	330	990	10	10	14	3
<b>FN2240-600-99-C2222-R99</b>	600	330	330	990	10	10	25	3
<b>Very high performance:</b>								
<b>FN2241-600-99-C2222-R99</b>	600	330	330	990	10	10	25	3

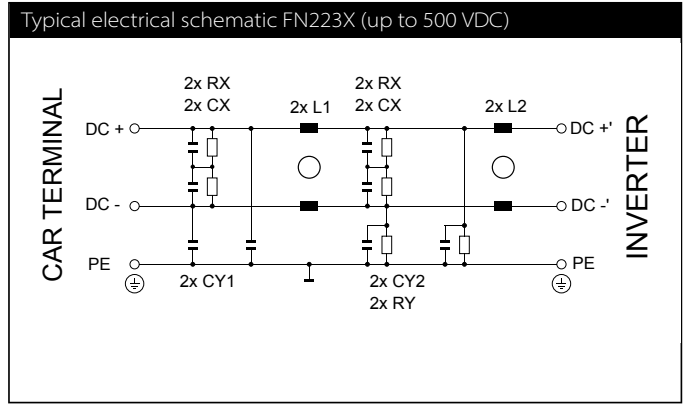
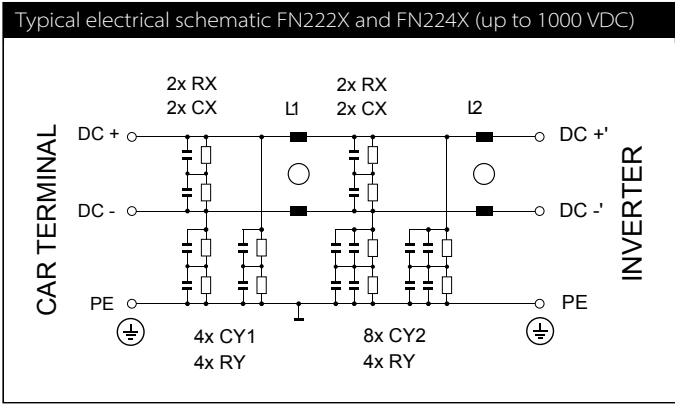
\* Tolerances apply: Capacitance: ±20%, Resistance: ±10%

## Product selector\*

FN22rs-ttt-uu-Cvvzz-Rxy



\*Filter can be adapted to specific requirements. Variations of resistor and capacitor values available on request.

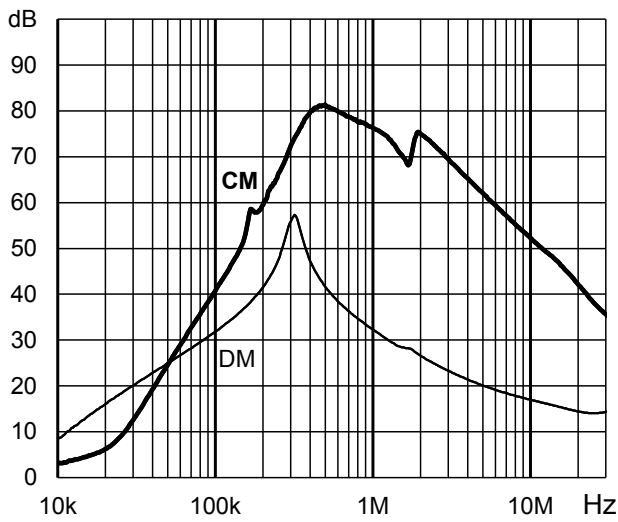


**Typical filter attenuation**

Per CISPR 17: symmetrical 50 Ω/50 Ω -> Differential Mode (DM); asymmetrical 50 Ω/50 Ω -> Common Mode (CM)

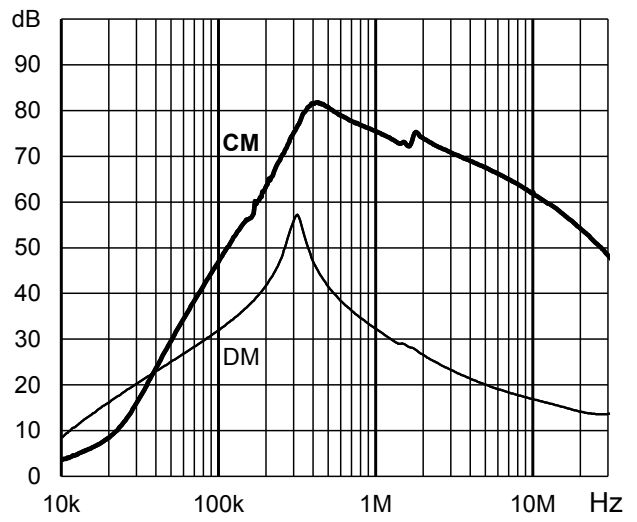
FN2220-ttt-uu-C2222-Rxy and FN2240-ttt-uu-C2222-Rxy

High Performance



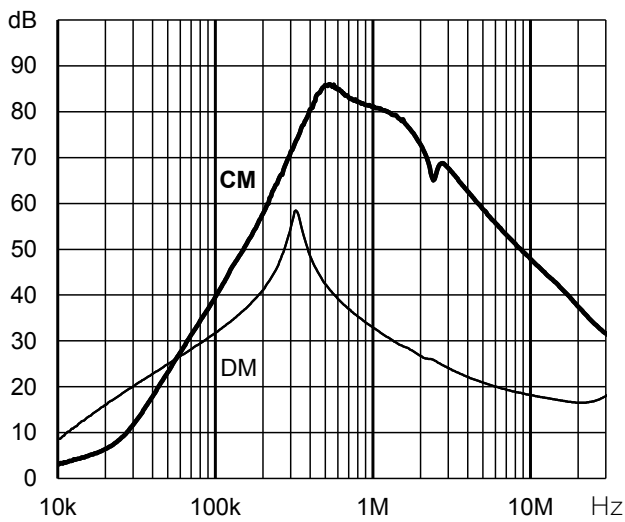
FN2221-ttt-uu-C2222-Rxy and FN2241-ttt-uu-C2222-Rxy

Very High Performance



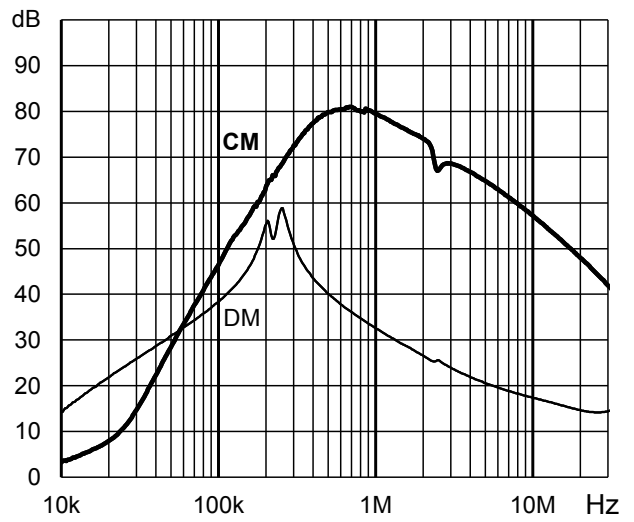
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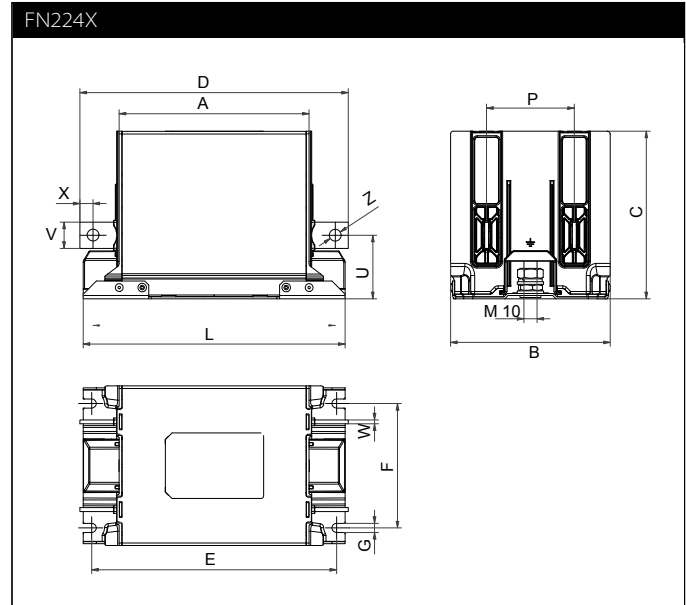
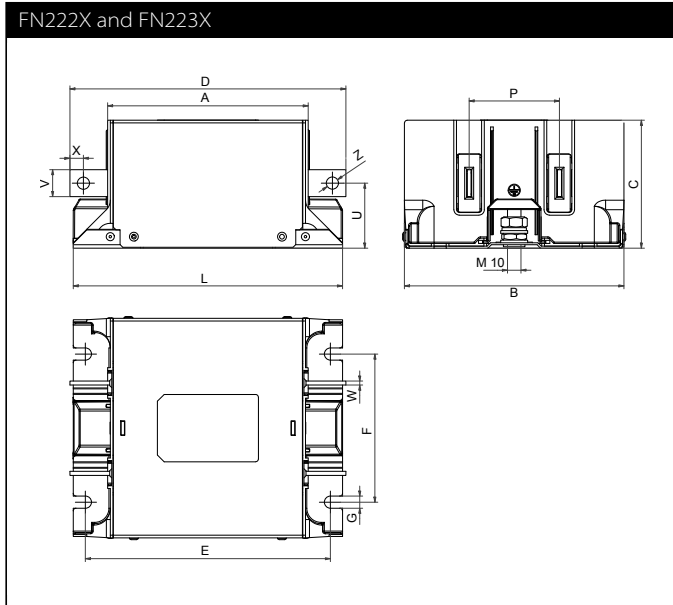
High Performance



FN2231-ttt-uu-C2022-Rxy

Very High Performance





### Dimensions\*

	FN222X and FN223X				FN224X				Tolerances
	150 A	300 A	450 A	600 A	150 A	300 A	450 A	600 A	
<b>A</b>	145	145	145	145	145	145	145	145	±1
<b>B</b>	163	163	163	163	122	122	122	122	
<b>C</b>	95	95	95	95	128	128	128	128	±1
<b>D</b>	205	210	210	210	205	210	210	210	±2
<b>E</b>	182	182	182	182	187	187	187	187	
<b>F</b>	110	110	110	110	95	95	95	95	
<b>G</b>	9	9	9	9	7	7	7	7	
<b>L</b>	200	200	200	200	200	200	200	200	
<b>P</b>	67	67	67	67	67	67	67	67	±1
<b>U</b>	48	48	48	48	48	48	48	48	±1
<b>V</b>	20	25	25	25	20	25	25	25	
<b>W</b>	3	4	8	8	3	4	8	8	
<b>X</b>	10	12.5	12.5	12.5	10	12.5	12.5	12.5	
<b>Z</b>	9	11	11	11	9	11	11	11	

\* All dimensions in mm. For dimensions without stated tolerances: ISO 2768-m/EN 22768-m applies.



## Headquarters, global innovation and development

### Switzerland

#### Schaffner Group

Industrie Nord  
Nordstrasse 11e  
4542 Luterbach  
T +41 32 681 66 26  
[info@schaffner.com](mailto:info@schaffner.com)



## Sales and application centers

### China

#### Schaffner EMC Ltd. Shanghai

T20-3 C, No 565 Chuangye Road,  
Pudong district  
201201 Shanghai  
T +86 21 3813 9500  
[cschina@schaffner.com](mailto:cschina@schaffner.com)  
[www.schaffner.com.cn](http://www.schaffner.com.cn)

### Finland

#### Schaffner Oy

Sauvonrinne 19 H  
08500 Lohja  
T +358 50 468 7284  
[finlandsales@schaffner.com](mailto:finlandsales@schaffner.com)

### France

#### Schaffner EMC S.A.S.

16-20 Rue Louis Rameau  
95875 Bezons  
T +33 1 34 34 30 60  
F +33 1 39 47 02 28  
[francesales@schaffner.com](mailto:francesales@schaffner.com)

### Germany

#### Schaffner Deutschland GmbH

Schoemperlenstrasse 12B  
76185 Karlsruhe  
T +49 721 56910  
[germanysales@schaffner.com](mailto:germanysales@schaffner.com)

### India

#### Schaffner India Pvt. Ltd

REGUS WORLD TRADE CENTRE  
WTC, 22nd Floor Unit No 2238, Brigade  
Gateway Campus, 26/1, Dr. Rajkumar Road  
Malleshwaram (W)  
560055 Bangalore  
T +91 80 67935355  
[indiasales@schaffner.com](mailto:indiasales@schaffner.com)

### Italy

#### Schaffner EMC S.r.l.

Via Ticino, 30  
20900 Monza (MB)  
T +39 039 21 41 070  
[italysales@schaffner.com](mailto:italysales@schaffner.com)

### Japan

#### Schaffner EMC K.K.

Taiju-Seimei Sangenjaya Bldg.  
1-32-12, Kamiyuma, Setagaya-ku  
154-0011 Tokyo  
T +81 3 5712 3650  
F +81 3 5712 3651  
[japansales@schaffner.com](mailto:japansales@schaffner.com)  
[www.schaffner.jp](http://www.schaffner.jp)

### Singapore

#### Schaffner EMC Pte Ltd.

#05-09, Kg Ubi Ind. Estate  
408705 Singapore  
T +65 6377 3283  
F +65 6377 3281  
[singaporesales@schaffner.com](mailto:singaporesales@schaffner.com)

### Spain

#### Schaffner EMC España

Calle Caléndula 93, Miniparc III, Edificio E  
El Soto de Moraleja, Alcobendas  
28109 Madrid  
T +34 917 912 900  
F +34 917 912 901  
[spainsales@schaffner.com](mailto:spainsales@schaffner.com)

### Sweden

#### Schaffner EMC AB

Östermalmstorg 1  
114 42 Stockholm  
T +46 8 5050 2425  
[swedensales@schaffner.com](mailto:swedensales@schaffner.com)  
[www.schaffner.com](http://www.schaffner.com)

### Switzerland

#### Schaffner EMV AG

Industrie Nord  
Nordstrasse 11e  
4542 Luterbach  
T +41 32 681 66 88  
T +41 32 681 66 26  
[switzerlandsales@schaffner.com](mailto:switzerlandsales@schaffner.com)

### Taiwan

#### Schaffner EMV Ltd.

20 Floor-2, No 97, Section 1, XinTai 5th Road  
22175 XiZhi District New Taipei City 22175  
T +886 2 2697 5500  
F +886 2 2697 5533  
[taiwansales@schaffner.com](mailto:taiwansales@schaffner.com)  
[www.schaffner.com.tw](http://www.schaffner.com.tw)

### Thailand

#### Schaffner EMC Co. Ltd.

Northern Region Industrial Estate  
67 Moo 4 Tambon Ban Klang  
Amphur Muangng P.O. Box 14  
51000 Lamphun  
T +66 53 58 11 04  
F +66 53 58 10 19  
[thailandsales@schaffner.com](mailto:thailandsales@schaffner.com)

### United Kingdom

#### Schaffner Ltd.

1, Oakmede Place  
Binfield  
RG42 4JF Berkshire  
T +44 118 9770070  
F +44 118 9792969  
[uksales@schaffner.com](mailto:uksales@schaffner.com)

### USA

#### Schaffner EMC Inc.

52 Mayfield Avenue  
Edison, New Jersey  
T +1 732 225 9533  
F +1 732 225 4789  
[usasales@schaffner.com](mailto:usasales@schaffner.com)  
[www.schaffnerusa.com](http://www.schaffnerusa.com)

To find your local partner within Schaffner's global network: [www.schaffner.com](http://www.schaffner.com)

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