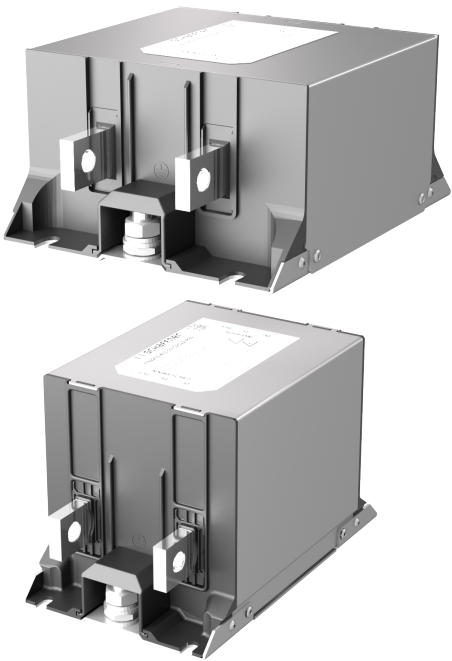
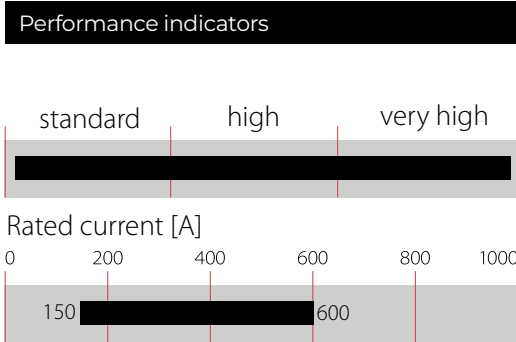
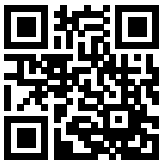


DC-Busbar EMC/RFI Filter for EV charging applications



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



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

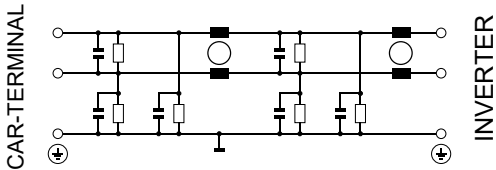
Typical Applications

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

Technical Specifications

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

Typical electrical schematic



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]
		CY1	[nF] CY2		RX	[MOhm] RY		
1000 VDC - compact housing style								
High performance:								
FN2220-150-99-C2222-R99	150	330	330	990	10	10	6	3
FN2220-300-99-C2222-R99	300	330	330	990	10	10	14	3
FN2220-450-99-C2222-R99	450	330	330	990	10	10	14	3
FN2220-600-99-C2222-R99	600	330	330	990	10	10	25	3
Very high performance:								
FN2221-600-99-C2222-R99	600	330	330	990	10	10	25	3
500 VDC - compact housing style								
High performance:								
FN2230-150-99-C2022-R99	150	150	330	960	10	10	6	3
FN2230-300-99-C2022-R99	300	150	330	960	10	10	14	3
FN2230-450-99-C2022-R99	450	150	330	960	10	10	14	3
FN2230-600-99-C2022-R99	600	150	330	960	10	10	25	3
Very high performance:								
FN2231-600-99-C2022-R99	600	150	330	960	10	10	25	3
1000 VDC - slim housing style								
High performance:								
FN2240-150-99-C2222-R99	150	330	330	990	10	10	6	3
FN2240-300-99-C2222-R99	300	330	330	990	10	10	14	3
FN2240-450-99-C2222-R99	450	330	330	990	10	10	14	3
FN2240-600-99-C2222-R99	600	330	330	990	10	10	25	3
Very high performance:								
FN2241-600-99-C2222-R99	600	330	330	990	10	10	25	3

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

Product Selector*

FN22rs-ttt-uu-Cvvzz-Rxy

xy – X-capacitor discharger resistor: x = RX / y = RY (e.g. -R99)
9: 10 Mohm

vvzz – Y-capacitor option: vv = Y-capacitor CY1 / zz = Y-capacitor CY2 (e.g. -C2222)
22: 330 nF
20: 150 nF

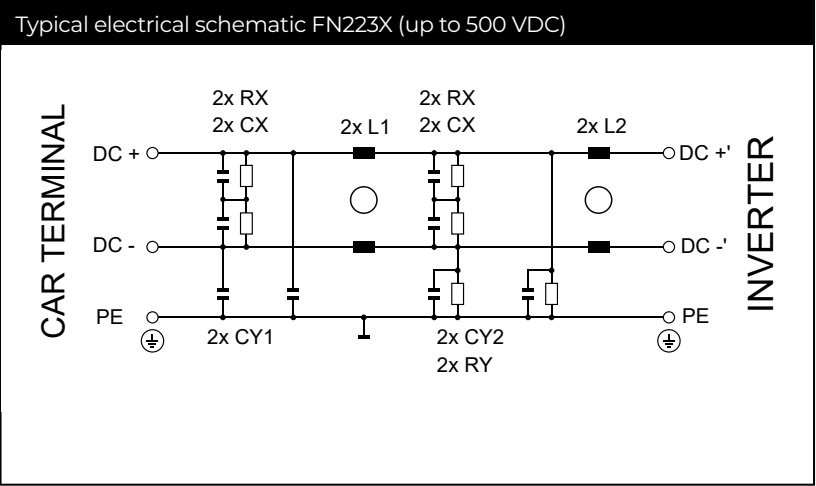
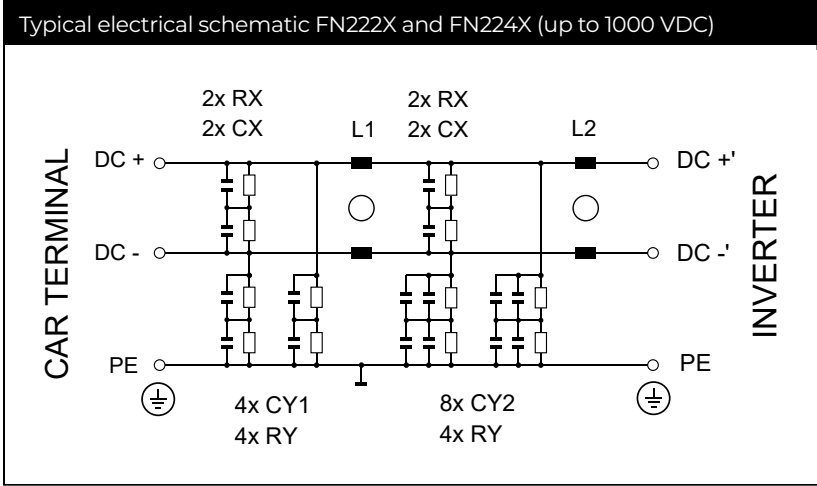
uu – Electrical connection
99: Ni-plated busbar connection

ttt – Rated current
150: 150 A
300: 300 A
450: 450 A
600: 600 A

s – Performance
0: High performance (recommended for most applications)
1: Very high performance
2: Standard performance (on request)

r – Version
2: 1000 V – compact housing style
3: 500 V – compact housing style
4: 1000 V – slim housing style

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

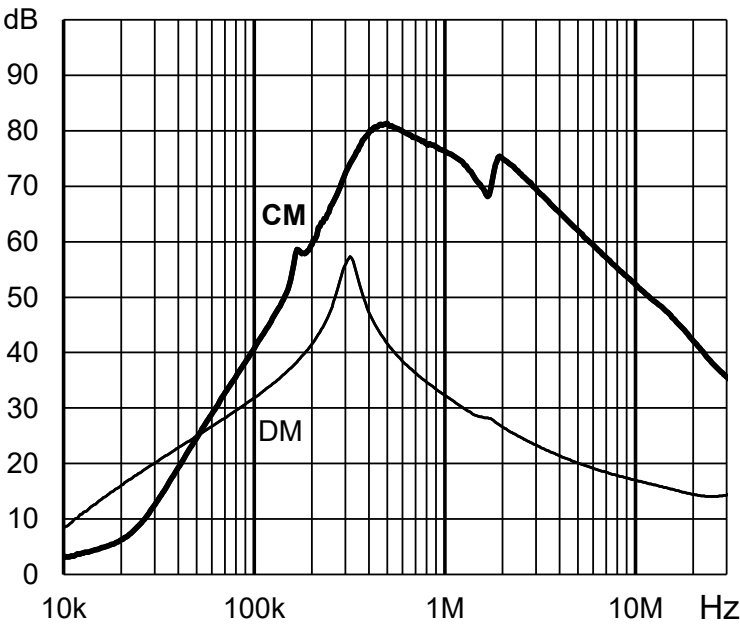


Typical Filter Attenuation

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

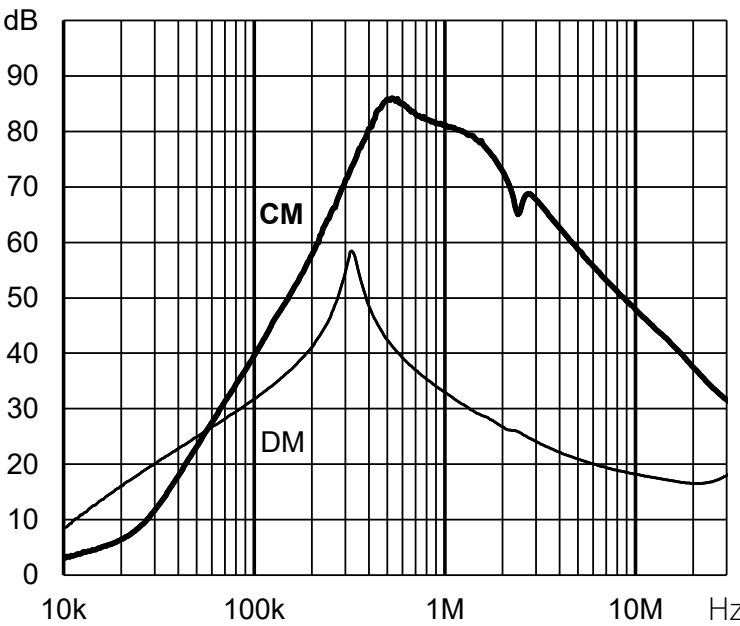
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High Performance



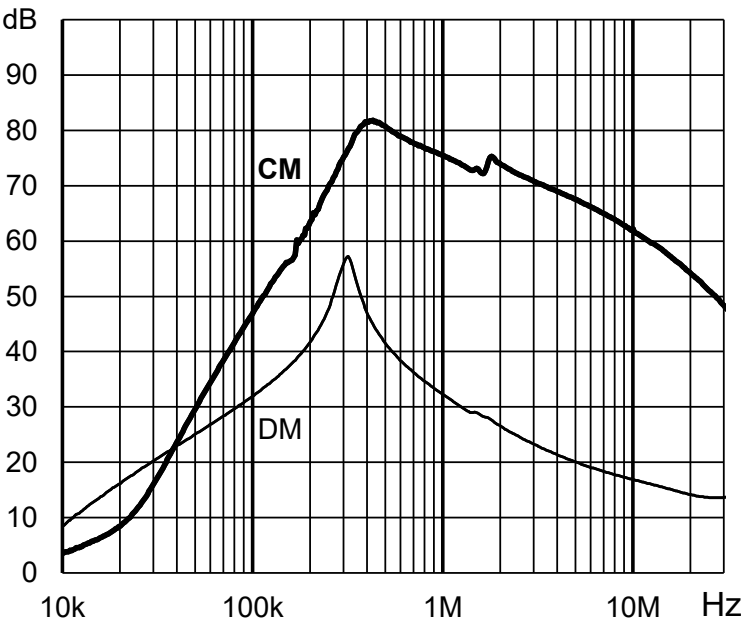
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High Performance



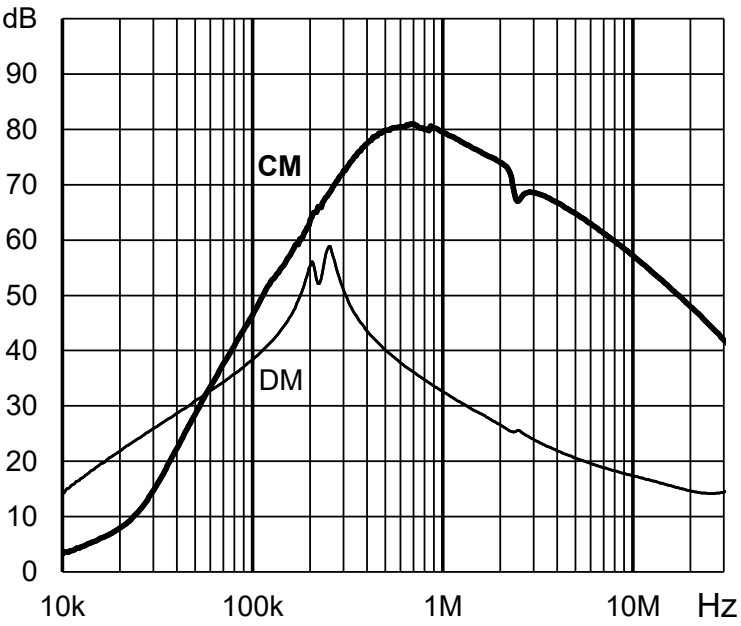
FN2221-ttt-uu-C2222-Rxy and FN2241-ttt-uu-C2222-Rxy

Very High Performance

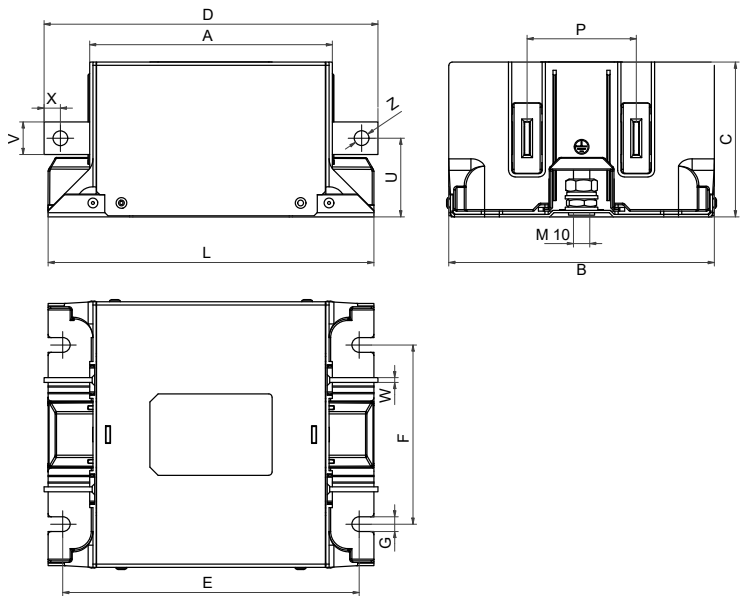


FN2231-ttt-uu-C2022-Rxy

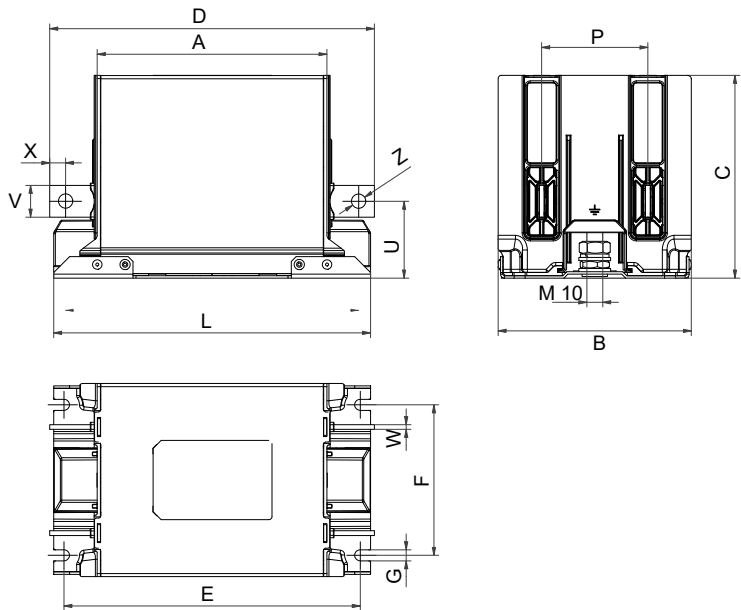
Very High Performance



FN222X and FN223X



FN224X



Dimensions*

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

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

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