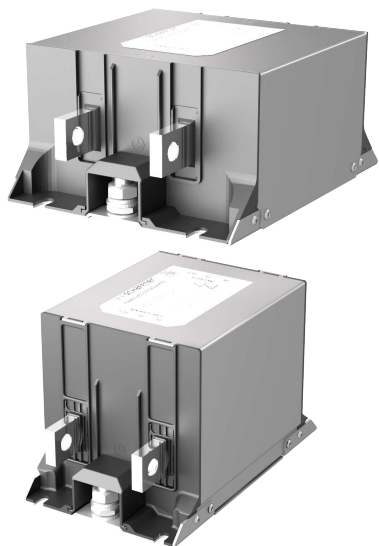
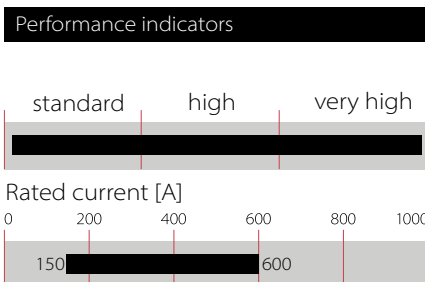


DC-Busbar EMC/RFI Filter for EV charging applications



- 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

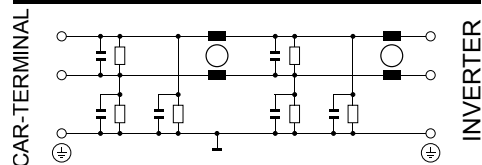
Technical specifications

| | |
|--|--|
| 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 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

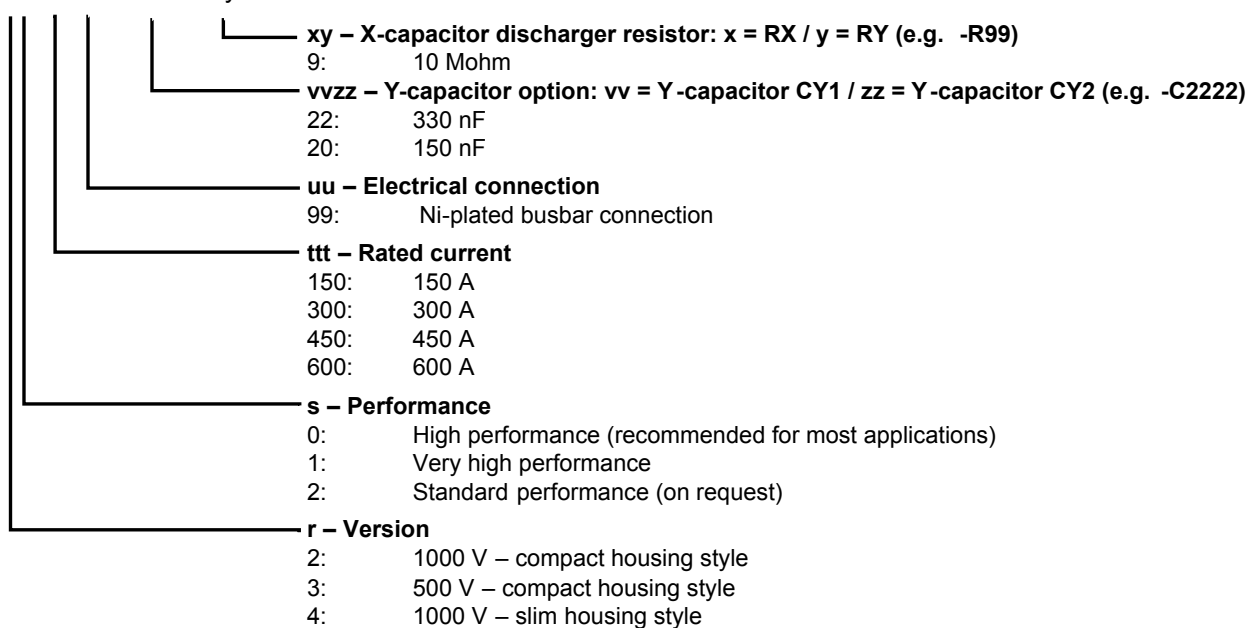
Filter selection table

| 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 | | |
| 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 |

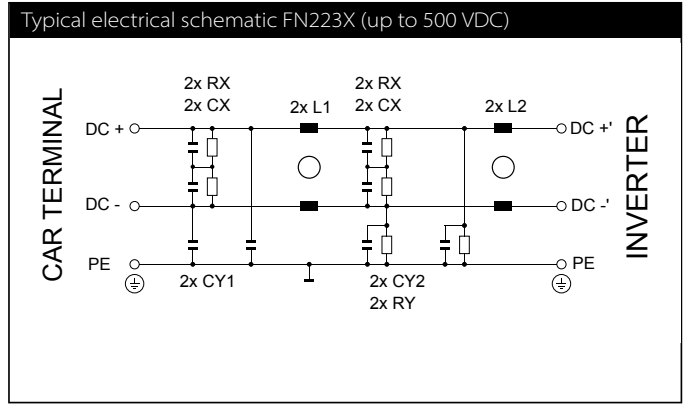
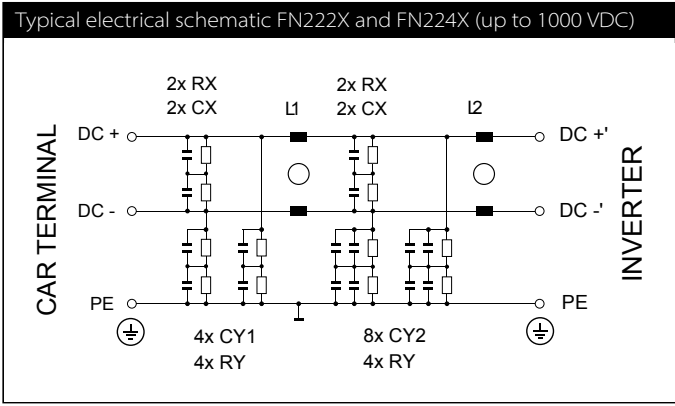
* Tolerances apply: Capacitance: ±20%, Resistance: ±10%

Product selector*

FN22rs-ttt-uu-Cvvzz-Rxy



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

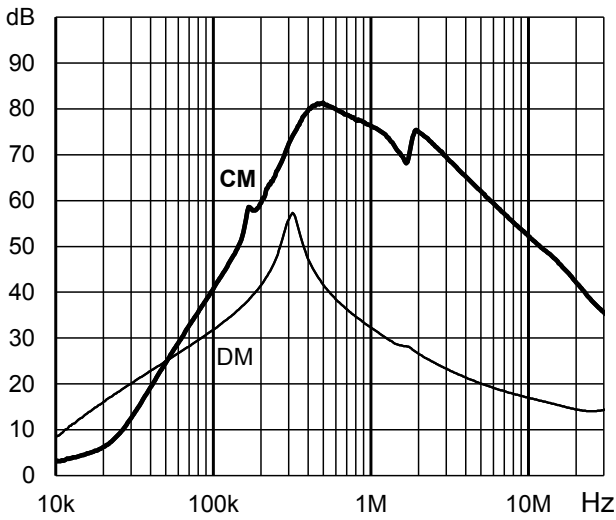


Typical filter attenuation

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

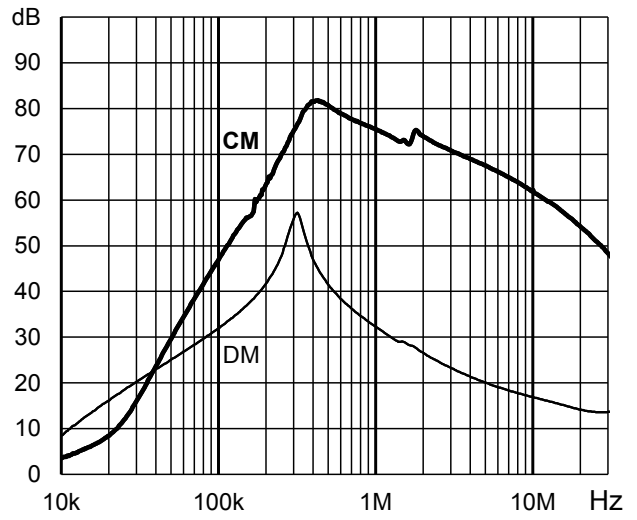
FN2220-ttt-uu-C2222-Rxy and FN2240-ttt-uu-C2222-Rxy

High Performance



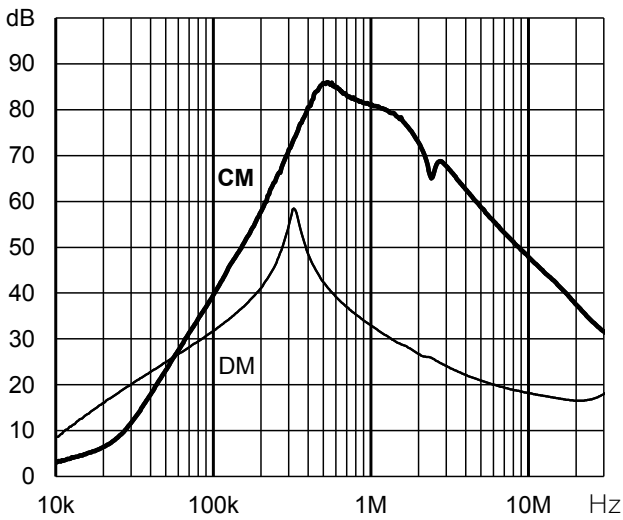
FN2221-ttt-uu-C2222-Rxy and FN2241-ttt-uu-C2222-Rxy

Very High Performance



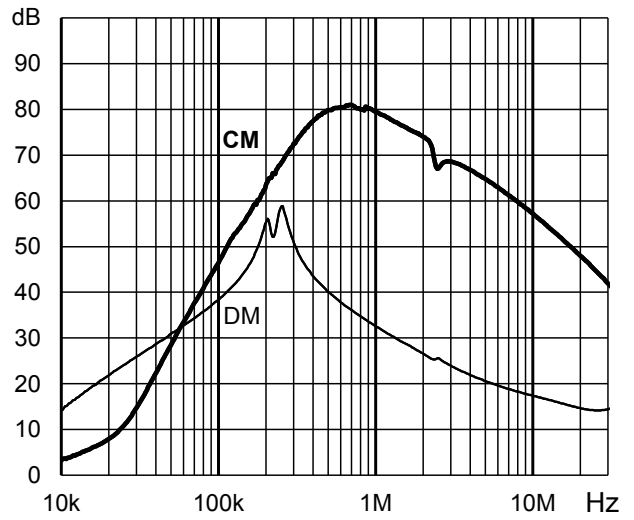
FN2230-ttt-uu-C2022-Rxy

High Performance

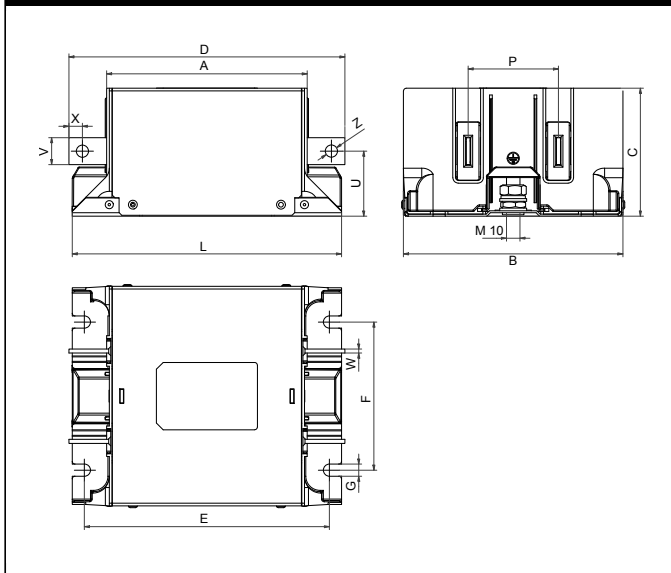


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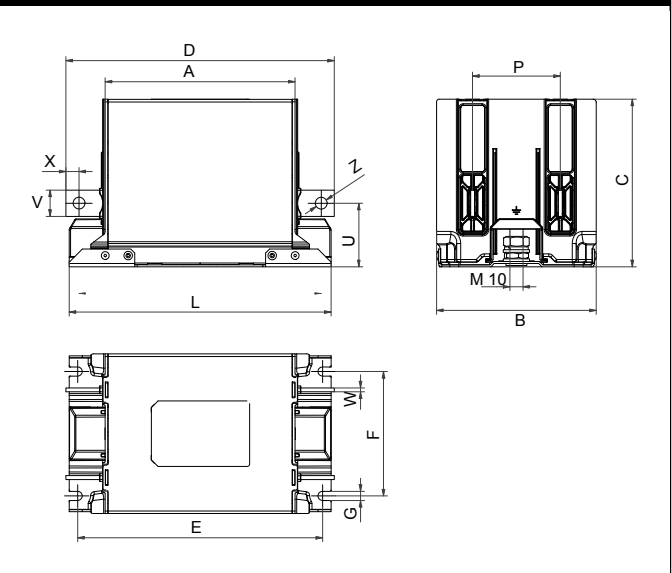
Very High Performance



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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