

Smallest book-style EMC/RFI Filter for Inverter and Power Drive Systems

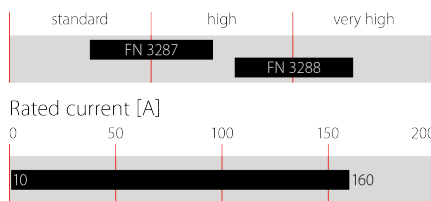


- Standard and high performance EMC solution
- Footprint space-saving book-style housing
- Solid safety connector blocks
- Standard attenuation performance FN 3287
- High attenuation performance FN 3288
- HV versions for 690 VAC applications
- HVIT- and IT versions for IT distribution networks
- Versions with low leakage current



Performance indicators

Attenuation performance



Approvals



600 VAC

Features and benefits

- FN 3287 and FN 3288 series of filters provides state-of-the-art EMI attenuation based on an innovative filter topology. They help to ensure compliance with Class C2 or even C1 limits.
- The slim book-style shape allows a convenient and space-saving installation next to inverters, converters or motor drives.
- The compact FN3287 and FN3288 filter from 10 to 160A are designed for the most diverse applications worldwide, including machinery and machine tools.
- FN 3288 HV filters up to 160 A are applicable for 690 VAC distribution networks.
- FN 3288IT and FN 3288HVIT filters up to 160 A meet the special requirements for IT distribution networks.
- Low leakage current filter versions help to fulfill tough requirements (e.g. 0.1 mA) in respect of leakage current limitation.

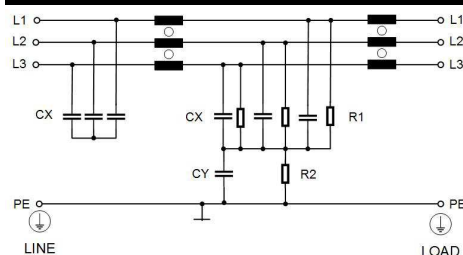
Technical specifications

| | |
|--|--|
| Maximum continuous operating voltage | 3x 530/305 VAC (FN 3287, FN 3288) 3x 530 VAC (FN 3288 IT) 3x 760/440 VAC (FN 3288 HV) 3x 760 VAC (FN 3288 HVIT) |
| Rated currents | 10 to 160 A @50°C |
| Operating frequency | DC to 60 Hz |
| High potential test voltage | P -> E 2260 VDC for 2 s (FN 3287, FN 3288) P -> E 2900 VDC for 2 s (FN 3288 IT) P -> P 2280 VDC for 2 s (FN 3287, FN 3288, FN 3288 IT) P -> E 2650 VDC for 2 s (FN 3288 HV) P -> E 3530 VDC for 2 s (FN 3288 HVIT) P -> P 3270 VDC for 2 s (FN 3288 HV) |
| Pollution degree | 2 acc. IEC 60664-1 |
| Protection category | IP 20 acc. to IEC 60529 |
| Overload capability | 6x rated current for 1 sec, once per hour 1.5x rated current for 1 minute, once per hour |
| Temperature range (operation and storage) | -40°C to +100°C (with current derating >50°C) |
| Climatic class | -40/100/21 acc. to IEC 60068-1 |
| Vibration and shock | 3M4 (operation); 2M2 (transport) acc. to IEC 60721-3-3; IEC 60721-3-2 |
| Flammability according to | UL 94 V-0 |
| Compliance with insulation requirement | > 1 MOhm acc. to IEC 60204-1 |
| Design corresponding to | UL 60939-3, IEC 60939-3 |
| MTBF | > 200,000 hours |
| Overtoltage category | II acc. IEC 60664-1 |

Typical applications

- Three-phase variable speed drives and power drive systems (PDS)
- Machine tool and machinery equipment
- IT power distribution networks (FN 3288IT and FN 3288 HVIT)
- General energy conversion devices (inverters, converters)
- Process automation equipment
- Three-phase power supplies
- Low-leakage current requirements

Typical electrical schematic



Note: IT and HVIT versions without discharge resistor to ground.

Filter selection table

| Filter | Rated current @ 50°C (40°C) [A] | Typical drive power rating** [kW] | Leakage current*** @ 530 VAC/50 Hz [mA] | | | | | | | | Power loss @ 25°C [W] | Terminal Type | Weight [kg] | Frame |
|--------------------------------------|---------------------------------------|---|---|-----|-----|-----|-----|-----|-----|-----|-----------------------------|------------------|----------------|-------|
| | | | C35 | C34 | C33 | C28 | C27 | C26 | C21 | C17 | | | | |
| *C.. | | | | | | | | | | | | | | |
| Standard performance: | | | | | | | | | | | | | | |
| FN 3287-10-44-C...R65 | 10 (11) | 5.5 | | | | 3.7 | | 2.2 | 0.4 | | 6.9 | -44 | 0.7 | Q |
| FN 3287-16-44-C...R65 | 16 (17) | 7.5 | | | 4.3 | | | 2.4 | 0.4 | | 8.5 | -44 | 0.8 | R |
| FN 3287-20-33-C...R65 | 20 (22) | 11 | | | 4.9 | | | 2.5 | 0.4 | | 9.4 | -33 | 0.9 | S |
| FN 3287-25-33-C...R65 | 25 (27) | 15 | | | 4.9 | | | 2.5 | 0.4 | | 11.0 | -33 | 1.0 | S |
| FN 3287-40-33-C...R65 | 40 (44) | 22 | | | 4.9 | | | 2.5 | 0.4 | | 19.2 | -33 | 1.5 | T |
| FN 3287-50-53-C...R65 | 50 (55) | 30 | | | 4.9 | | | 2.5 | 0.4 | | 21.7 | -53 | 2.1 | U |
| FN 3287-63-53-C...R65 | 63 (69) | 37 | | | 4.9 | | | 2.5 | 0.4 | | 27.4 | -53 | 2.2 | U |
| FN 3287-80-34-C...R65 | 80 (88) | 45 | | | 5.6 | | | 2.7 | 0.4 | | 32.6 | -34 | 3.4 | F |
| FN 3287-100-35-C...R65 | 100 (110) | 55 | | | 5.6 | | | 2.7 | 0.4 | | 33.0 | -35 | 4.2 | G |
| FN 3287-125-35-C...R65 | 125 (137) | 75 | | | 5.6 | | | 2.7 | 0.4 | | 37.5 | -35 | 4.6 | G |
| FN 3287-160-40-C...R65 | 160 (175) | 90 | | | 5.6 | | | 2.7 | 0.4 | | 38.4 | -40 | 6.0 | H |
| High performance: | | | | | | | | | | | | | | |
| FN 3288-10-44-C...R65 | 10 (11) | 5.5 | | 5.9 | | | | 2.5 | 0.4 | 0.1 | 6.8 | -44 | 0.8 | A |
| FN 3288-16-44-C...R65 | 16 (17) | 7.5 | 6.0 | | | | | 2.5 | 0.4 | 0.1 | 9.2 | -44 | 1.0 | B |
| FN 3288-20-33-C...R65 | 20 (22) | 11 | 6.0 | | | | | 2.5 | 0.4 | 0.1 | 10.0 | -33 | 1.2 | C |
| FN 3288-25-33-C...R65 | 25 (27) | 15 | 6.0 | | | | | 2.5 | 0.4 | 0.1 | 16.9 | -33 | 1.2 | C |
| FN 3288-40-33-C...R65 | 40 (44) | 22 | 6.0 | | | | 3.5 | | 0.4 | 0.1 | 20.2 | -33 | 1.8 | D |
| FN 3288-50-53-C...R65 | 50 (55) | 30 | 6.6 | | | | | 2.6 | 0.4 | 0.1 | 24.0 | -53 | 2.5 | E |
| FN 3288-63-53-C...R65 | 63 (69) | 37 | 6.6 | | | | | 2.6 | 0.4 | 0.1 | 34.5 | -53 | 2.7 | E |
| FN 3288-80-34-C...R65 | 80 (88) | 45 | 7.1 | | | | | 2.7 | 0.4 | 0.1 | 28.8 | -34 | 4.3 | F |
| FN 3288-100-35-C...R65 | 100 (110) | 55 | 7.1 | | | | | 2.7 | 0.4 | 0.1 | 36.0 | -35 | 5.1 | G |
| FN 3288-125-35-C...R65 | 125 (137) | 75 | 7.1 | | | | | 2.7 | 0.4 | 0.1 | 42.2 | -35 | 5.0 | G |
| FN 3288-160-40-C...R65 | 160 (175) | 90 | 7.1 | | | | | 2.7 | 0.4 | 0.1 | 46.1 | -40 | 6.6 | H |
| HP for IT power networks****: | | | | | | | | | | | | | | |
| FN 3288IT-10-44-C...R60 | 10 (11) | 5.5 | | 5.9 | | | | | | | 6.2 | -44 | 1.1 | I |
| FN 3288IT-16-44-C...R60 | 16 (17) | 7.5 | | 5.9 | | | | | | | 9.6 | -44 | 1.3 | J |
| FN 3288IT-20-33-C...R60 | 20 (22) | 11 | | 5.9 | | | | | | | 13.2 | -33 | 1.6 | K |
| FN 3288IT-25-33-C...R60 | 25 (27) | 15 | | 5.9 | | | | | | | 15.6 | -33 | 1.6 | K |
| FN 3288IT-40-33-C...R60 | 40 (44) | 22 | | 5.9 | | | | | | | 18.7 | -33 | 2.8 | L |
| FN 3288IT-50-53-C...R60 | 50 (55) | 30 | | 6.5 | | | | | | | 22.2 | -53 | 2.8 | M |
| FN 3288IT-63-53-C...R60 | 63 (69) | 37 | | 6.5 | | | | | | | 29.8 | -53 | 2.9 | M |
| FN 3288IT-80-34-C...R60 | 80 (88) | 45 | | 7.0 | | | | | | | 28.8 | -34 | 4.6 | N |
| FN 3288IT-100-35-C...R60 | 100 (110) | 55 | | 7.0 | | | | | | | 33.0 | -35 | 5.4 | O |
| FN 3288IT-125-35-C...R60 | 125 (137) | 75 | | 7.0 | | | | | | | 42.2 | -35 | 5.3 | O |
| FN 3288IT-160-40-C...R60 | 160 (175) | 90 | | 7.0 | | | | | | | 46.1 | -40 | 6.9 | P |

* Replace C.. with corresponding listed C35, C34, C33, C28, C27, C26, C21 or C17.

** Typical power rating at 400 VAC for FN 3287 and FN 3288 with $\cos \phi = 0.85$. The exact value depends upon the efficiency of the drive, the motor and the entire application.

*** Standardized calculated leakage current acc. IEC 60939 under normal operating conditions (FN 3287, FN 3288 and FN 3288 IT at 530 VAC).

**** These filters may be operated in IT system as long as the operation conditions and possible short circuit/fault (earth connection of one conductor) occurs between the supply (line side) and the filter. The filters are not designed for short circuit/faults occurring between converter and motor.

Filter selection table

| Filter | Rated current @ 50°C (40°C) [A] | Typical drive power rating** [kW] | Leakage current*** @ 760 VAC/50 Hz [mA] | | | | | | | Power loss @ 25°C [W] | Input/output Connections | Weight [kg] | Frame |
|--------------------------------------|---------------------------------------|---|---|-----|-----|------|-----|-----|-----|-----------------------------|-----------------------------|----------------|-------|
| | | | C44 | C43 | C42 | C36 | C34 | C26 | C25 | | | | |
| * C.. | | | | | | | | | | | | | |
| High voltage versions: | | | | | | | | | | | | | |
| FN 3288HV-10-44-C..-R65 | 10 (11) | 10 | | | | | 8.4 | | 1.8 | 6.9 | -44 | 1.2 | I |
| FN 3288HV-16-44-C..-R65 | 16 (17) | 16 | | | | | 8.4 | | 2.5 | 10.8 | -44 | 1.5 | J |
| FN 3288HV-20-33-C..-R65 | 20 (22) | 20 | | | | 10.9 | | | 2.5 | 12.0 | -33 | 1.8 | K |
| FN 3288HV-25-33-C..-R65 | 25 (27) | 25 | | | | 10.9 | | | 2.5 | 14.6 | -33 | 1.9 | K |
| FN 3288HV-40-33-C..-R65 | 40 (44) | 40 | | | | 12.4 | | | 2.6 | 19.2 | -33 | 2.9 | L |
| FN 3288HV-50-53-C..-R65 | 50 (55) | 50 | | | | 12.4 | | | 2.6 | 26.3 | -53 | 3.3 | M |
| FN 3288HV-63-53-C..-R65 | 63 (69) | 64 | | | | 12.4 | | | 2.6 | 32.1 | -53 | 3.5 | M |
| FN 3288HV-80-34-C..-R65 | 80 (88) | 80 | | | | 12.4 | | | 2.6 | 28.8 | -34 | 4.9 | N |
| FN 3288HV-100-35-C..-R65 | 100 (110) | 100 | | | | 12.4 | | | 2.6 | 33.0 | -35 | 5.8 | O |
| FN 3288HV-125-35-C..-R65 | 125 (137) | 125 | | | | 12.4 | | | 2.6 | 42.0 | -35 | 5.9 | O |
| FN 3288HV-160-40-C..-R65 | 160 (175) | 160 | | | | 12.4 | | | 2.6 | 46.1 | -40 | 7.2 | P |
| HV for IT power networks****: | | | | | | | | | | | | | |
| FN 3288HVIT-10-44-C..-R60 | 10 (11) | 10 | | | 4.6 | | | | 3.6 | 6.9 | -44 | 1.2 | I |
| FN 3288HVIT-16-44-C..-R60 | 16 (17) | 16 | | 6.8 | | | | | 3.7 | 10.8 | -44 | 1.5 | J |
| FN 3288HVIT-20-33-C..-R60 | 20 (22) | 20 | | 6.8 | | | | | 3.7 | 12.0 | -33 | 1.8 | K |
| FN 3288HVIT-25-33-C..-R60 | 25 (27) | 25 | | 6.8 | | | | | 3.7 | 14.6 | -33 | 1.9 | K |
| FN 3288HVIT-40-33-C..-R60 | 40 (44) | 40 | | 6.8 | | | | | 3.7 | 19.2 | -33 | 2.9 | L |
| FN 3288HVIT-50-53-C..-R60 | 50 (55) | 50 | | 6.8 | | | | | 3.7 | 26.3 | -53 | 3.3 | M |
| FN 3288HVIT-63-53-C..-R60 | 63 (69) | 64 | | 6.8 | | | | | 3.7 | 32.1 | -53 | 3.5 | M |
| FN 3288HVIT-80-34-C..-R60 | 80 (88) | 80 | | 6.8 | | | | | 3.7 | 28.8 | -34 | 4.9 | N |
| FN 3288HVIT-100-35-C..-R60 | 100 (110) | 100 | | 6.8 | | | | | 3.7 | 33.0 | -35 | 5.8 | O |
| FN 3288HVIT-125-35-C..-R60 | 125 (137) | 125 | 5.9 | | | | | | 3.7 | 42.2 | -35 | 5.9 | O |
| FN 3288HVIT-160-40-C..-R60 | 160 (175) | 160 | | 6.8 | | | | | 3.7 | 46.1 | -40 | 7.2 | P |

* Replace C.. with corresponding listed C44, C43, C42, C36, C34, C26, C25 or C24.

** Typical power rating (400 VAC for FN 3287 and FN 3288 / 690 VAC for FN 3288 HV and FN 3288 HVIT) with $\cos \phi=0.85$. The exact value depends upon the efficiency of the drive, the motor and the entire application.

*** Standardized calculated leakage current acc. IEC 60939 under normal operating conditions (FN 3288 HV and FN 3288 HVIT at 760 VAC).

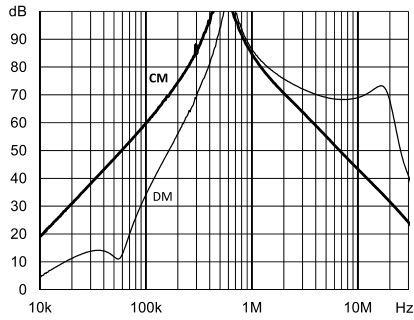
****These filters may be operated in IT system as long as the operation conditions and possible short circuit/fault (earth connection of one conductor) occurs between the supply (line side) and the filter. The filters are not designed for short circuit/faults occurring between converter and motor.

Typical filter attenuation – FN 3287 standard performance

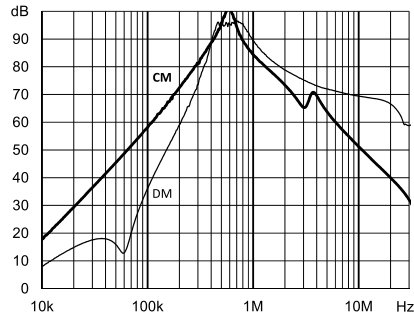
(FN 3287 standard performance version with standard leakage current)

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

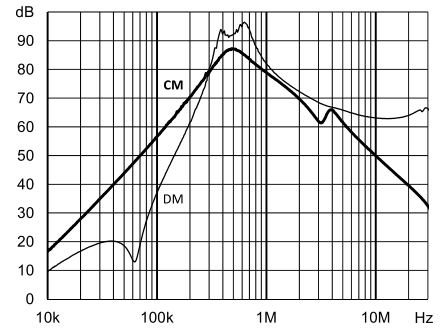
FN 3287-10-44-C28-R65



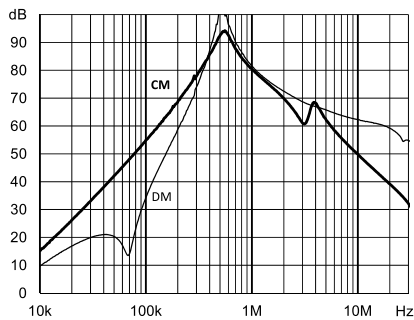
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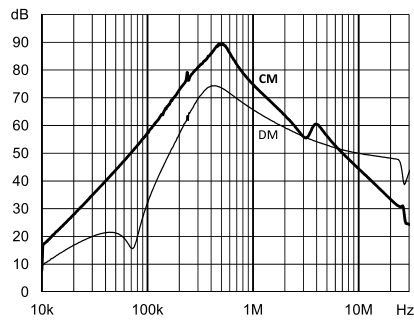
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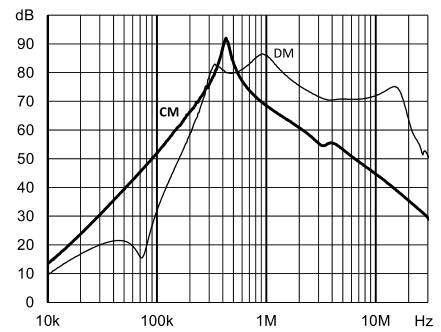
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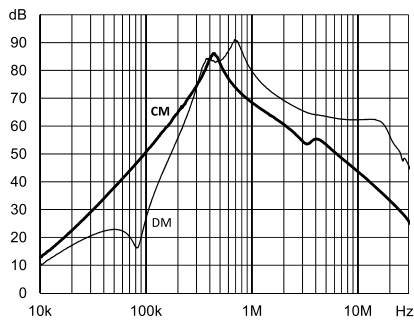
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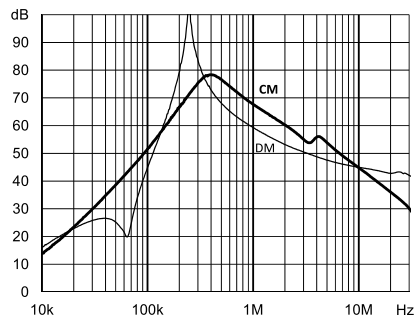
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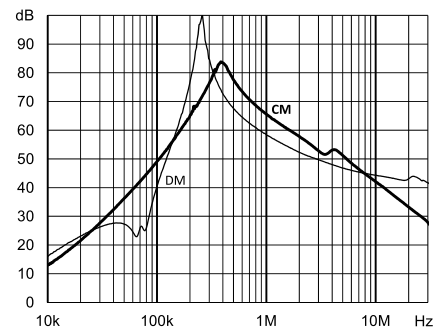
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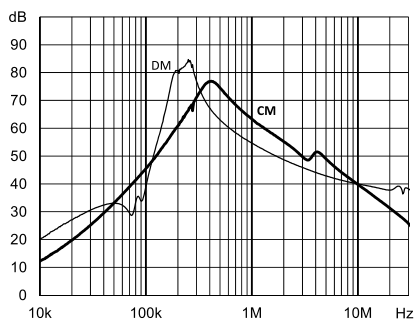
FN 3287-80-34-C33-R65



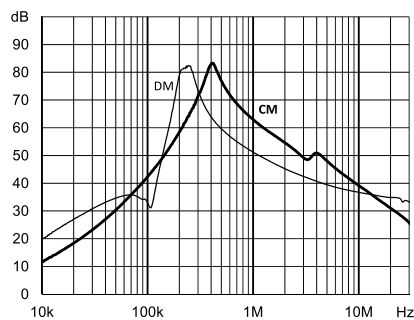
FN 3287-100-35-C33-R65



FN 3287-125-35-C33-R65



FN 3287-160-40-C33-R65

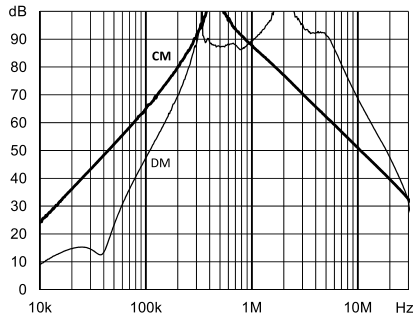


Typical filter attenuation – FN 3288 high performance

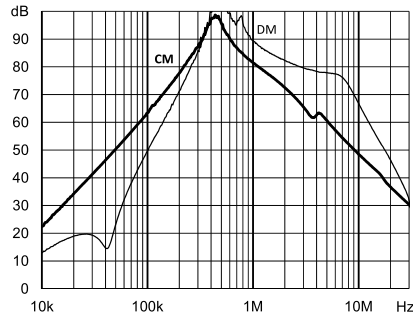
(FN 3288 high performance version with standard leakage current)

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

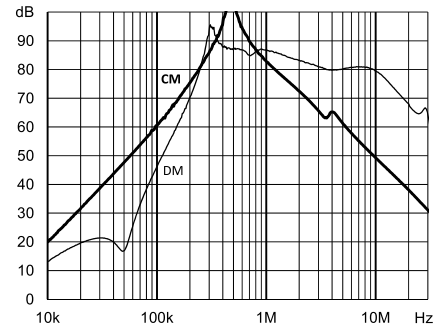
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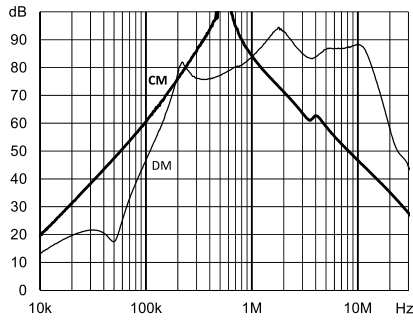
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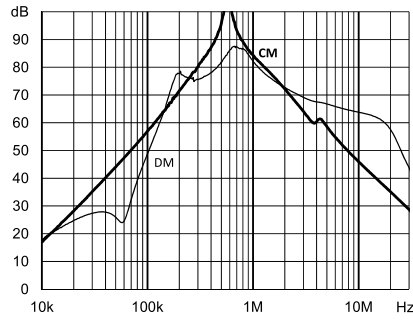
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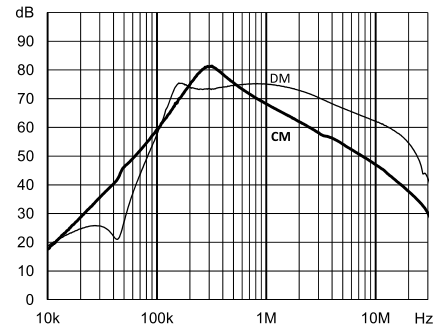
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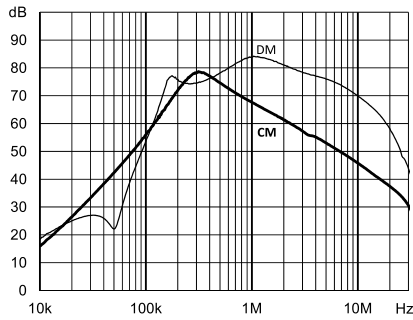
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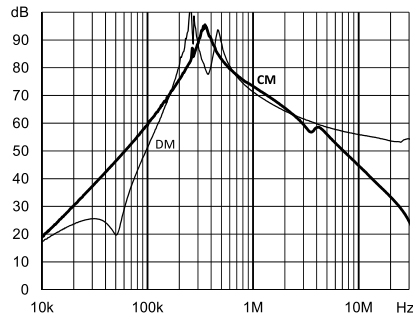
FN 3288-50-53-C35-R65



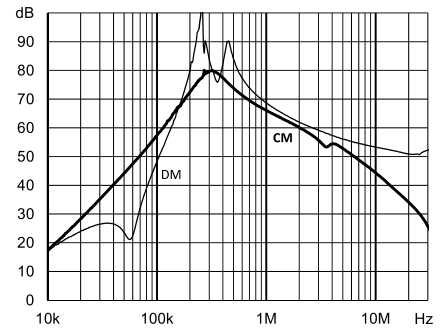
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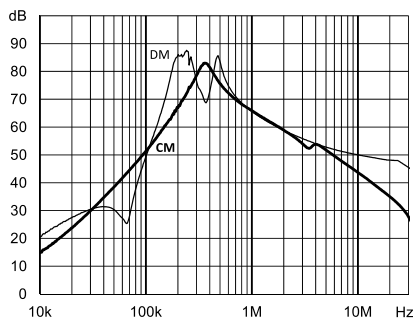
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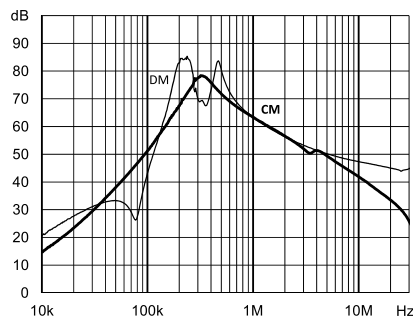
FN 3288-100-35-C35-R65



FN 3288-125-35-C35-R65



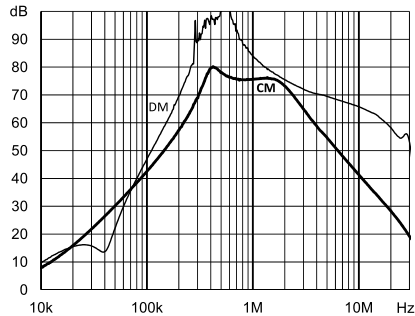
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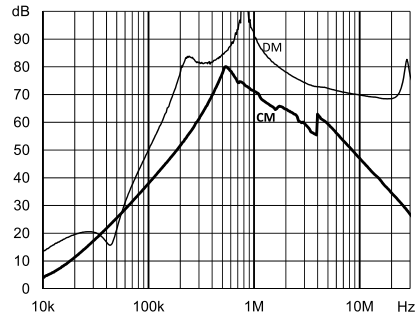
Typical filter attenuation – FN 3288 low leakage current version

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

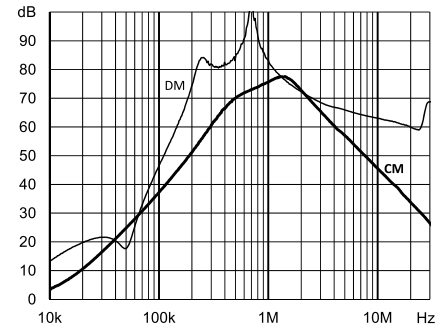
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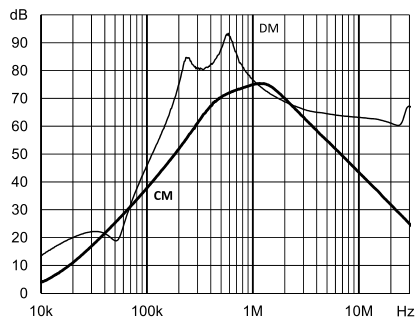
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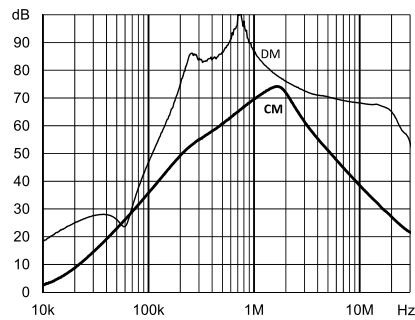
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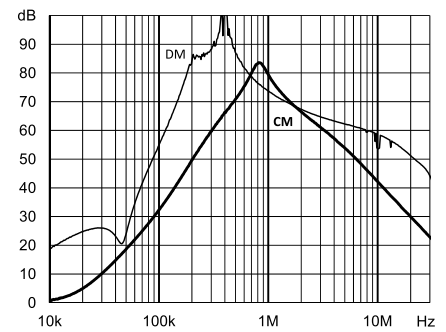
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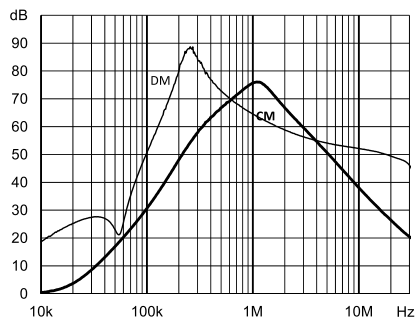
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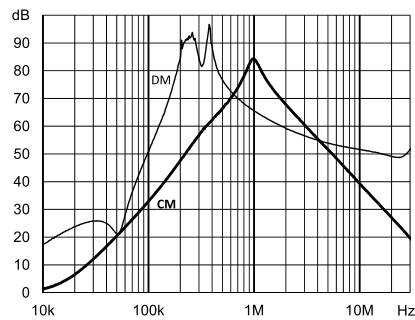
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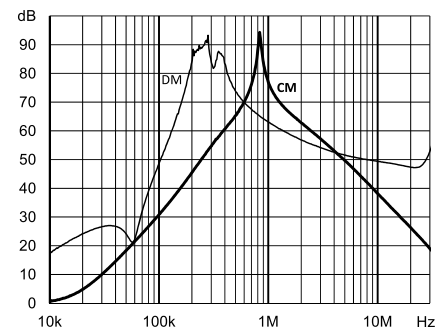
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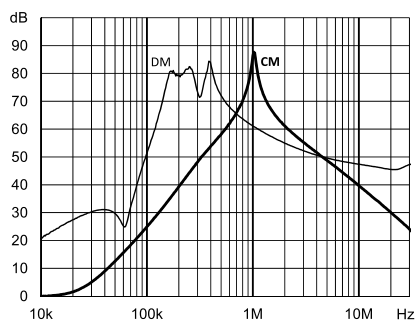
FN 3288-80-34-C21-R65



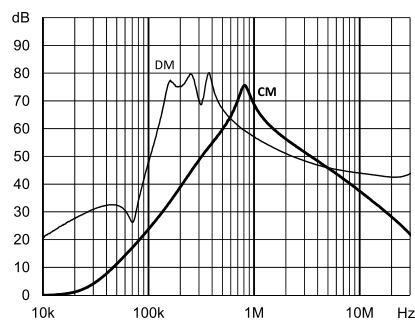
FN 3288-100-35-C21-R65



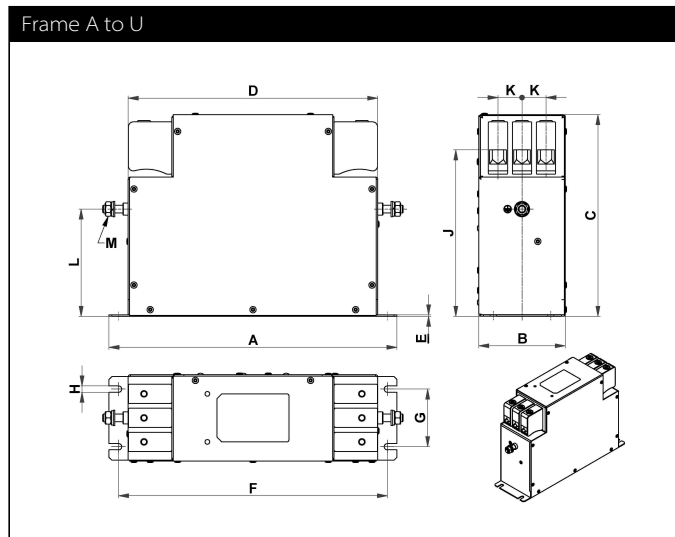
FN 3288-125-35-C21-R65



FN 3288-160-40-C21-R65



Mechanical data



Dimensions*

| Frame | A | B | C | D | E | F | G | H | J+/-2 | K | L+/-1 | M** |
|-------|-----|-----|-----|-----|-----|-----|----|-----|-------|------|-------|-----|
| A | 185 | 40 | 120 | 157 | 0.8 | 175 | 20 | 4.5 | 102 | 11 | 76 | M5 |
| B | 195 | 45 | 140 | 164 | 0.8 | 180 | 25 | 5.4 | 122 | 11 | 93 | M5 |
| C | 210 | 45 | 145 | 174 | 0.8 | 195 | 25 | 5.4 | 126 | 13 | 96 | M5 |
| D | 235 | 50 | 168 | 207 | 1.0 | 220 | 30 | 5.4 | 149 | 13 | 115 | M6 |
| E | 255 | 65 | 180 | 226 | 1.0 | 240 | 45 | 5.4 | 156 | 16 | 120 | M6 |
| F | 290 | 80 | 205 | 250 | 1.2 | 270 | 50 | 6.5 | 172 | 22 | 110 | M6 |
| G | 300 | 90 | 210 | 260 | 1.5 | 280 | 60 | 6.5 | 173 | 25 | 112 | M8 |
| H | 310 | 100 | 225 | 270 | 1.5 | 290 | 70 | 6.5 | 183 | 28 | 110 | M10 |
| I | 230 | 50 | 132 | 203 | 0.8 | 220 | 30 | 4.5 | 114 | 12.5 | 88 | M5 |
| J | 230 | 55 | 159 | 198 | 0.8 | 215 | 35 | 5.4 | 141 | 13 | 112 | M5 |
| K | 245 | 55 | 167 | 212 | 0.8 | 230 | 35 | 5.4 | 148 | 13 | 118 | M5 |
| L | 265 | 60 | 191 | 237 | 1.0 | 250 | 40 | 5.4 | 172 | 13 | 135 | M6 |
| M | 265 | 70 | 194 | 237 | 1.0 | 250 | 50 | 5.4 | 170 | 16 | 133 | M6 |
| N | 310 | 95 | 220 | 270 | 1.2 | 290 | 65 | 6.5 | 187 | 22 | 125 | M6 |
| O | 320 | 95 | 230 | 280 | 1.5 | 300 | 65 | 6.5 | 192 | 25 | 127 | M8 |
| P | 330 | 100 | 240 | 290 | 1.5 | 310 | 70 | 6.5 | 198 | 30 | 127 | M10 |
| Q | 180 | 40 | 112 | 153 | 0.8 | 170 | 20 | 4.5 | 94 | 11 | 68 | M5 |
| R | 200 | 45 | 120 | 170 | 0.8 | 185 | 25 | 5.4 | 102 | 11 | 76 | M5 |
| S | 205 | 45 | 132 | 173 | 0.8 | 190 | 25 | 5.4 | 113 | 13 | 83 | M5 |
| T | 215 | 50 | 147 | 185 | 1.0 | 200 | 30 | 5.4 | 128 | 13 | 95 | M6 |
| U | 220 | 65 | 180 | 186 | 1.0 | 205 | 45 | 5.4 | 156 | 16 | 120 | M6 |

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

** Earth screw torque: M5 2.0-2.2 Nm; M6 3.5-4.0 Nm; M8 8.0-9.0 Nm; M10 15-17 Nm

Filter input/output connector cross sections

| | -44 | -33 | -53 | -34 | -35 | -40 |
|---------------------------|------------------------|------------------------|------------------------|----------------------|-----------------------|-----------------------|
| | | | | | | |
| Solid wire | 0.5-10 mm ² | 0.5-16 mm ² | 0.5-16 mm ² | 6-35 mm ² | 10-50 mm ² | 25-95 mm ² |
| Flex wire | 0.5-6 mm ² | 0.5-10 mm ² | 0.5-16 mm ² | 6-25 mm ² | 10-16 mm ² | 25-95 mm ² |
| Flex wire AWG | AWG 20-8 | AWG 22-6 | AWG 20-4 | AWG 10-2 | AWG 6-1/0 | AWG 0-4/0 |
| Recommended torque | 1.0-1.2 Nm | 1.5-1.8 Nm | 2.0-2.3 Nm | 4.0-4.5 Nm | 7.0-8.0 Nm | 17-20 Nm |

Please visit www.schaffner.com to find more details on filter connectors.



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