

DATA SHEET

EFD20/10/7

EFD cores and accessories

Supersedes data of September 2004

2008 Sep 01

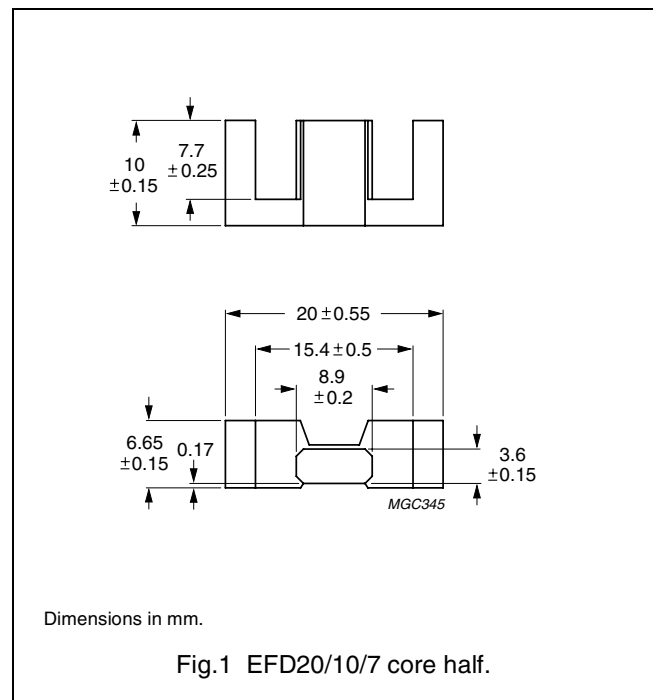


FERROXCUBE
A YAGEO COMPANY

CORES

Effective core parameters

| SYMBOL | PARAMETER | VALUE | UNIT |
|---------------|-------------------|-------|------------------|
| $\Sigma(l/A)$ | core factor (C1) | 1.52 | mm ⁻¹ |
| V_e | effective volume | 1460 | mm ³ |
| l_e | effective length | 47.0 | mm |
| A_e | effective area | 31.0 | mm ² |
| A_{min} | minimum area | 29 | mm ² |
| m | mass of core half | ≈ 3.5 | g |



Core halves

A_L measured in combination with a non-gapped core half, clamping force for A_L measurements 20 ± 10 N, unless stated otherwise.

| GRADE | A_L (nH) | μ_e | TOTAL AIR GAP (μm) | TYPE NUMBER |
|-------------------------|------------------------|---------|---------------------------------|----------------------|
| 3C90 | 63 ± 3% ⁽¹⁾ | ≈ 76 | ≈ 960 | EFD20/10/7-3C90-E63 |
| | 100 ± 3% | ≈ 121 | ≈ 510 | EFD20/10/7-3C90-A100 |
| | 160 ± 5% | ≈ 193 | ≈ 280 | EFD20/10/7-3C90-A160 |
| | 250 ± 8% | ≈ 302 | ≈ 160 | EFD20/10/7-3C90-A250 |
| | 315 ± 10% | ≈ 380 | ≈ 120 | EFD20/10/7-3C90-A315 |
| | 1300 ± 25% | ≈ 1570 | ≈ 0 | EFD20/10/7-3C90 |
| 3C94 | 63 ± 3% ⁽¹⁾ | ≈ 76 | ≈ 960 | EFD20/10/7-3C94-E63 |
| | 100 ± 3% | ≈ 121 | ≈ 510 | EFD20/10/7-3C94-A100 |
| | 160 ± 5% | ≈ 193 | ≈ 280 | EFD20/10/7-3C94-A160 |
| | 250 ± 8% | ≈ 302 | ≈ 160 | EFD20/10/7-3C94-A250 |
| | 315 ± 10% | ≈ 380 | ≈ 120 | EFD20/10/7-3C94-A315 |
| | 1300 ± 25% | ≈ 1570 | ≈ 0 | EFD20/10/7-3C94 |
| 3C95 <small>des</small> | 1540 ± 25% | ≈ 1865 | ≈ 0 | EFD20/10/7-3C95 |
| 3C96 <small>des</small> | 1200 ± 25% | ≈ 1450 | ≈ 0 | EFD20/10/7-3C96 |
| 3F3 | 63 ± 3% ⁽¹⁾ | ≈ 76 | ≈ 960 | EFD20/10/7-3F3-E63 |
| | 100 ± 3% | ≈ 121 | ≈ 510 | EFD20/10/7-3F3-A100 |
| | 160 ± 5% | ≈ 193 | ≈ 280 | EFD20/10/7-3F3-A160 |
| | 250 ± 8% | ≈ 302 | ≈ 160 | EFD20/10/7-3F3-A250 |
| | 315 ± 10% | ≈ 380 | ≈ 120 | EFD20/10/7-3F3-A315 |
| | 1200 ± 25% | ≈ 1450 | ≈ 0 | EFD20/10/7-3F3 |

EFD cores and accessories

EFD20/10/7

| GRADE | A_L (nH) | μ_e | TOTAL AIR GAP (μm) | TYPE NUMBER |
|--------------------------|-----------------------------|----------------|------------------------------------|---------------------|
| 3F35 <small>des</small> | 920 $\pm 25\%$ | ≈ 1110 | ≈ 0 | EFD20/10/7-3F35 |
| 3F4 <small>des</small> | 63 $\pm 3\%$ ⁽¹⁾ | ≈ 76 | ≈ 900 | EFD20/10/7-3F4-E63 |
| | 100 $\pm 3\%$ | ≈ 121 | ≈ 450 | EFD20/10/7-3F4-A100 |
| | 160 $\pm 5\%$ | ≈ 193 | ≈ 230 | EFD20/10/7-3F4-A160 |
| | 250 $\pm 8\%$ | ≈ 302 | ≈ 120 | EFD20/10/7-3F4-A250 |
| | 315 $\pm 10\%$ | ≈ 380 | ≈ 80 | EFD20/10/7-3F4-A315 |
| | 650 $\pm 25\%$ | ≈ 780 | ≈ 0 | EFD20/10/7-3F4 |
| 3F45 <small>prot</small> | 650 $\pm 25\%$ | ≈ 780 | ≈ 0 | EFD20/10/7-3F45 |

Note

1. Measured in combination with an equal gapped core half, clamping force for A_L measurements, 20 ± 10 N.

Properties of core sets under power conditions

| GRADE | B (mT) at | CORE LOSS (W) at | | | | |
|-------|-------------------------------------|--|---|--|---|--|
| | H = 250 A/m; f = 25 kHz; T = 100 °C | f = 25 kHz; $\hat{B} = 200$ mT; T = 100 °C | f = 100 kHz; $\hat{B} = 100$ mT; T = 100 °C | f = 100 kHz; $\hat{B} = 200$ mT; T = 25 °C | f = 100 kHz; $\hat{B} = 200$ mT; T = 100 °C | f = 400 kHz; $\hat{B} = 50$ mT; T = 100 °C |
| 3C90 | ≥ 330 | ≤ 0.16 | ≤ 0.17 | – | – | – |
| 3C94 | ≥ 330 | – | ≤ 0.13 | – | ≤ 0.8 | – |
| 3C95 | ≥ 330 | – | – | ≤ 0.86 | ≤ 0.82 | – |
| 3C96 | ≥ 330 | – | ≤ 0.1 | – | ≤ 0.6 | ≤ 0.26 |
| 3F35 | ≥ 300 | – | – | – | – | ≤ 0.13 |
| 3F3 | ≥ 315 | – | ≤ 0.17 | – | – | ≤ 0.28 |
| 3F4 | ≥ 300 | – | – | – | – | – |

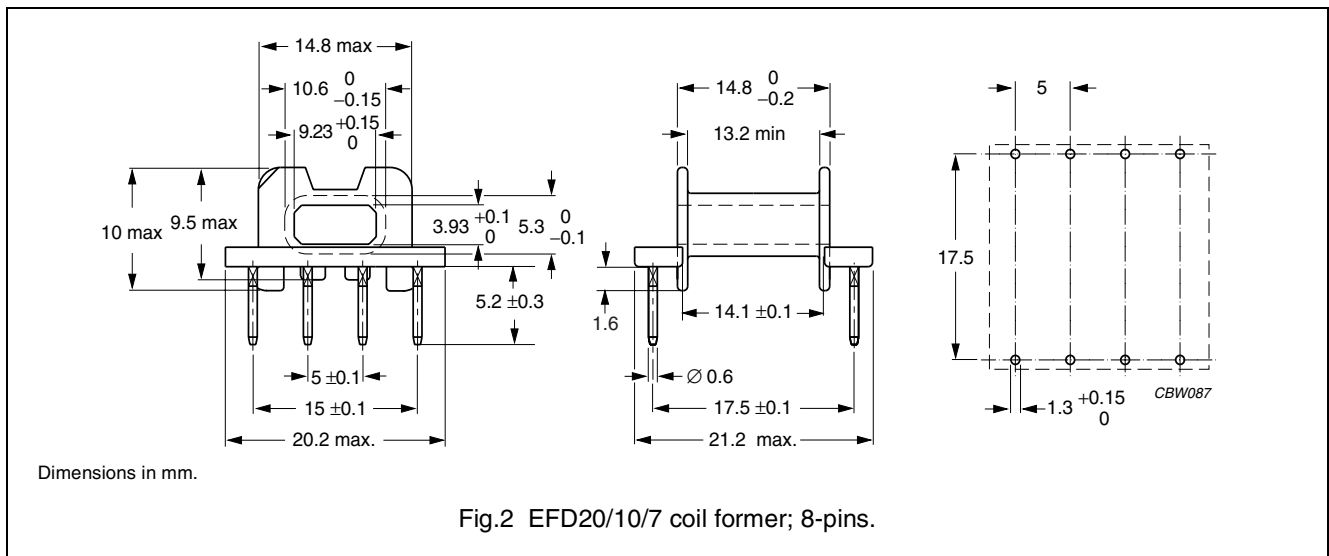
Properties of core sets under power conditions (continued)

| GRADE | B (mT) at | CORE LOSS (W) at | | | | |
|-------|-------------------------------------|--|---|--|--|--|
| | H = 250 A/m; f = 25 kHz; T = 100 °C | f = 500 kHz; $\hat{B} = 50$ mT; T = 100 °C | f = 500 kHz; $\hat{B} = 100$ mT; T = 100 °C | f = 1 MHz; $\hat{B} = 30$ mT; T = 100 °C | f = 1 MHz; $\hat{B} = 50$ mT; T = 100 °C | f = 3 MHz; $\hat{B} = 10$ mT; T = 100 °C |
| 3C90 | ≥ 330 | – | – | – | – | – |
| 3C94 | ≥ 330 | – | – | – | – | – |
| 3C95 | ≥ 330 | – | – | – | – | – |
| 3C96 | ≥ 330 | ≤ 0.5 | – | – | – | – |
| 3F35 | ≥ 300 | ≤ 0.2 | ≤ 1.5 | – | – | – |
| 3F3 | ≥ 315 | – | – | – | – | – |
| 3F4 | ≥ 300 | – | – | ≤ 0.43 | – | ≤ 0.7 |
| 3F45 | ≥ 300 | – | – | ≤ 0.34 | ≤ 1.25 | ≤ 0.55 |

COIL FORMERS

General data

| PARAMETER | SPECIFICATION |
|-------------------------------|---|
| Coil former material | phenolformaldehyde (PF), glass-reinforced, flame retardant in accordance with "UL94 V-0"; UL file number E167521(M) |
| Pin material | copper-tin alloy (CuSn), Ni flash, tin (Sn) plated, see note 1 |
| Maximum operating temperature | 180 °C, "IEC 60085", class H |
| Resistance to soldering heat | "IEC 60068-2-20", Part 2, Test Tb, method 1B, 350 °C, 3.5 s |
| Solderability | "IEC 60068-2-20", Part 2, Test Ta, method 1: 235 °C, 2 s |



Winding data and area product for EFD20 coil former with 8-pins

| NUMBER OF SECTIONS | WINDING AREA (mm ²) | MINIMUM WINDING WIDTH (mm) | AVERAGE LENGTH OF TURN (mm) | AREA PRODUCT Ae x Aw (mm ⁴) | TYPE NUMBER |
|--------------------|---------------------------------|----------------------------|-----------------------------|---|--------------------------------|
| 1 | 26.4 | 13.2 | 36.5 | 818 | CSH-EFD20-1S-8P ⁽¹⁾ |

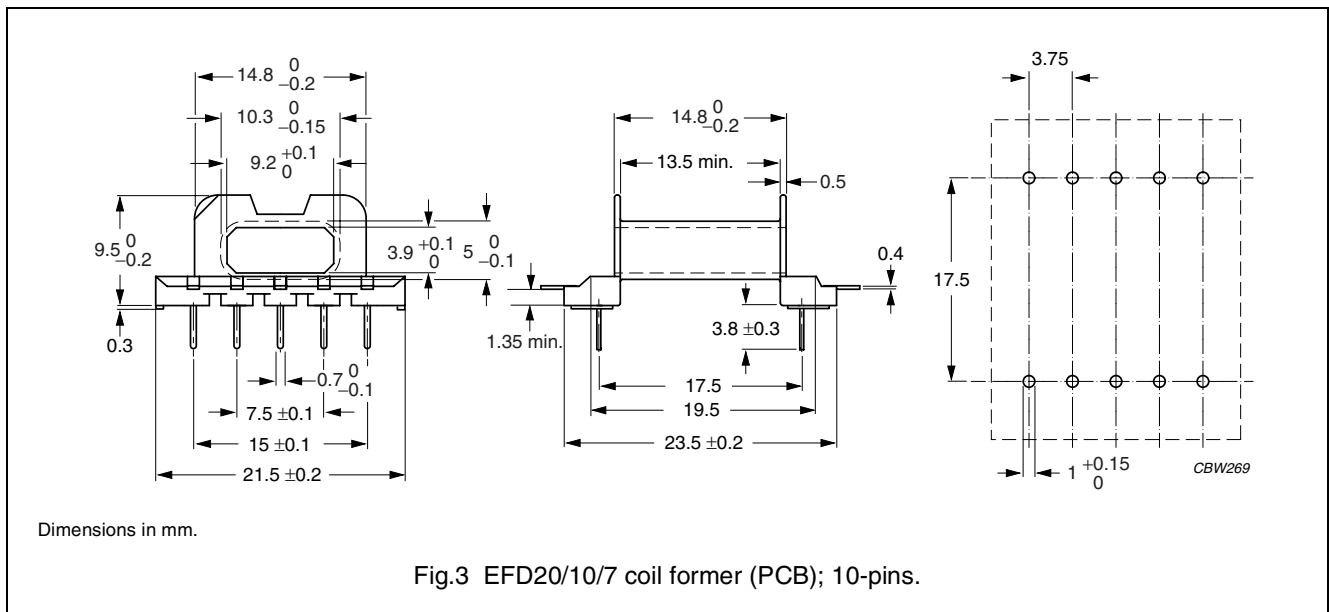
Note

- Also available with post-inserted pins.

COIL FORMERS

General data

| PARAMETER | SPECIFICATION |
|-------------------------------|--|
| Coil former material | liquid crystal polymer (LCP), glass reinforced, flame retardant in accordance with "UL94 V-0"; UL file number E54705 (M) |
| Pin material | copper-tin alloy (CuSn), Ni flash, tin (Sn) plated |
| Maximum operating temperature | 155 °C, "IEC 60085", class F |
| Resistance to soldering heat | "IEC 60068-2-20", Part 2, Test Tb, method 1B, 350 °C, 3.5 s |
| Solderability | "IEC 60068-2-20", Part 2, Test Ta, method 1: 235 °C, 2 s |



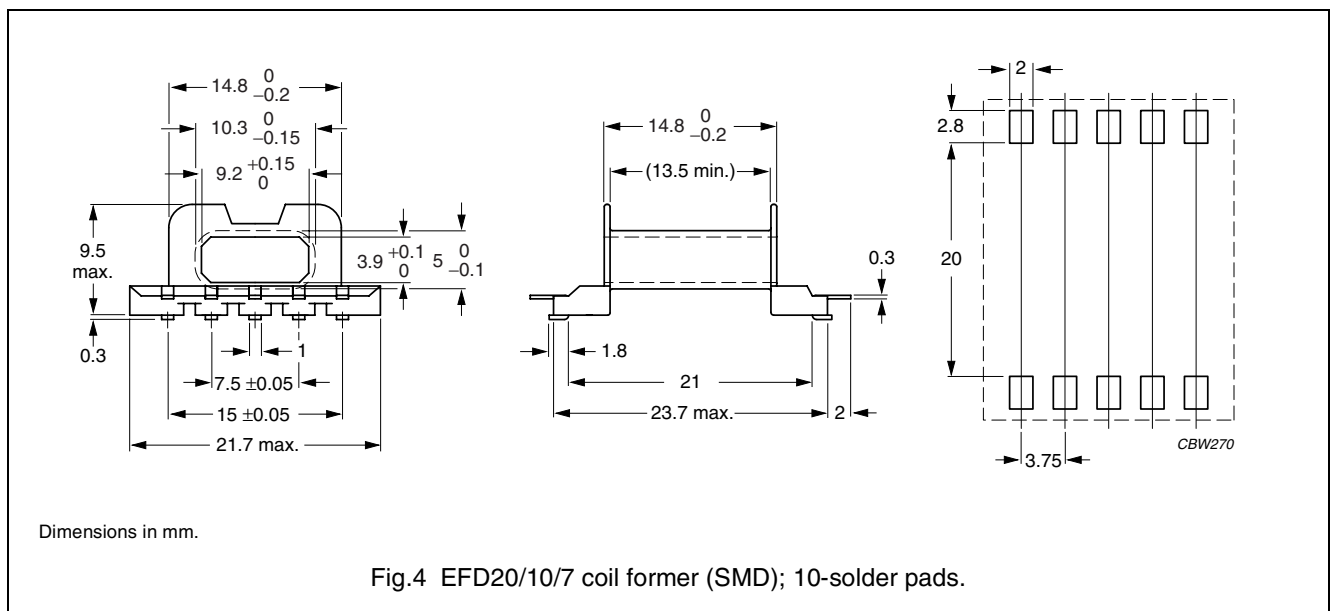
Winding data and area product for EFD20/10/7 coil former (PCB) with 10-pins

| NUMBER OF SECTIONS | WINDING AREA (mm ²) | MINIMUM WINDING WIDTH (mm) | AVERAGE LENGTH OF TURN (mm) | AREA PRODUCT Ae x Aw (mm ⁴) | TYPE NUMBER |
|--------------------|---------------------------------|----------------------------|-----------------------------|---|---------------------|
| 1 | 27.7 | 13.5 | 34.1 | 859 | CPH-EFD20-1S-10PD-Z |

COIL FORMERS

General data

| PARAMETER | SPECIFICATION |
|-------------------------------|--|
| Coil former material | liquid crystal polymer (LCP), glass reinforced, flame retardant in accordance with "UL94 V-0"; UL file number E83005 (M) |
| Pin material | copper-tin alloy (CuSn), tin (Sn) plated |
| Maximum operating temperature | 155 °C, "IEC 60085", class F |
| Resistance to soldering heat | "IEC 60068-2-20", Part 2, Test Tb, method 1B, 350 °C, 3.5 s |
| Solderability | "IEC 60068-2-20", Part 2, Test Ta, method 1: 235 °C, 2 s |



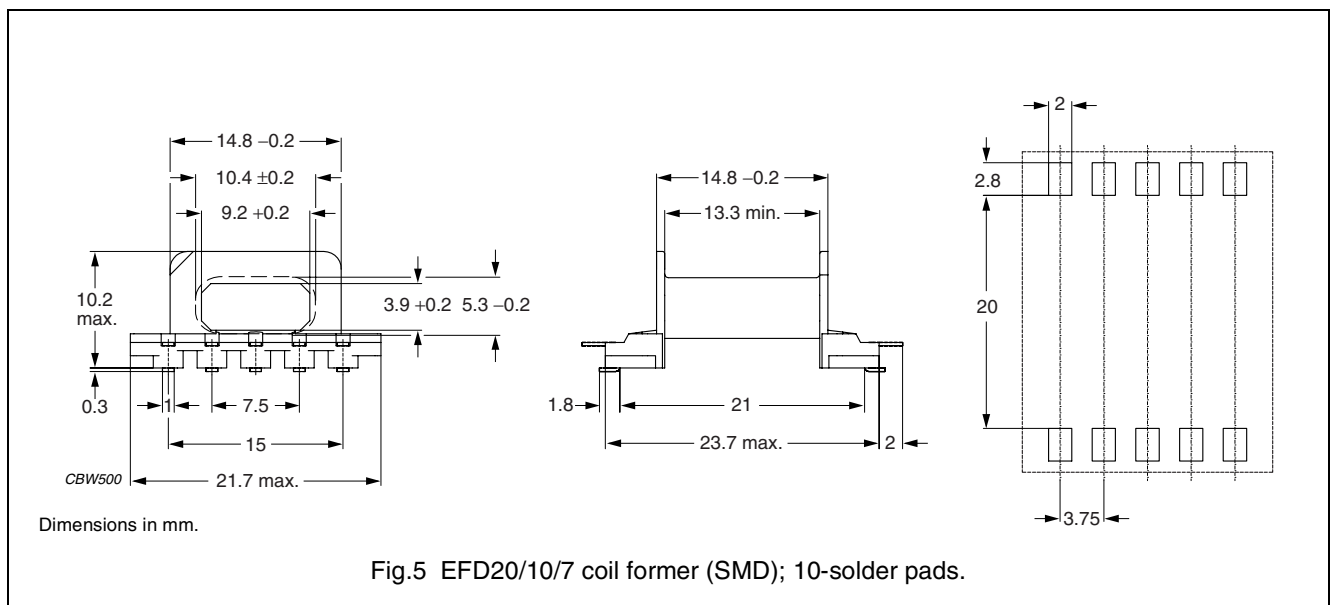
Winding data and area product for EFD20/10/7 coil former (SMD) with 10-solder pads

| NUMBER OF SECTIONS | WINDING AREA (mm ²) | MINIMUM WINDING WIDTH (mm) | AVERAGE LENGTH OF TURN (mm) | AREA PRODUCT Ae x Aw (mm ⁴) | TYPE NUMBER |
|--------------------|---------------------------------|----------------------------|-----------------------------|---|-------------------|
| 1 | 27.7 | 13.5 | 34.1 | 859 | CPHS-EFD20-1S-10P |

COIL FORMERS

General data

| PARAMETER | SPECIFICATION |
|-------------------------------|---|
| Coil former material | phenolformaldehyde (PF), glass reinforced, flame retardant in accordance with "UL94 V-0"; UL file number E41429 (M) |
| Solder pad material | copper-tin alloy (CuSn), tin (Sn) plated |
| Maximum operating temperature | 180 °C, "IEC 60085", class H |
| Resistance to soldering heat | "IEC 60068-2-20", Part 2, Test Tb, method 1B, 350 °C, 3.5 s |
| Solderability | "IEC 60068-2-20", Part 2, Test Ta, method 1: 235 °C, 2 s |



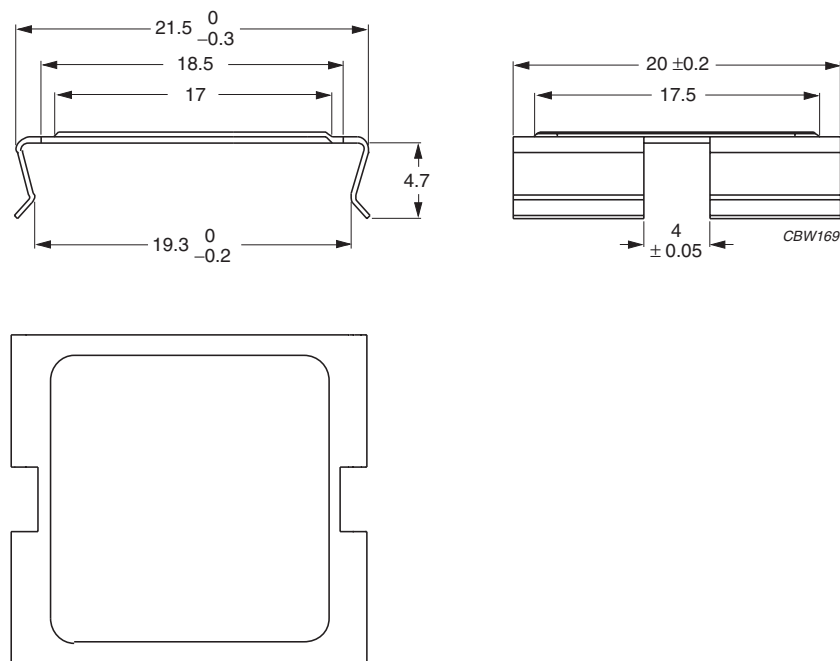
Winding data and area product for EFD20/10/7 coil former (SMD) with 10-solder pads

| NUMBER OF SECTIONS | NUMBER OF SOLDER PADS | WINDING AREA (mm ²) | MINIMUM WINDING WIDTH (mm) | AVERAGE LENGTH OF TURN (mm) | AREA PRODUCT Ae x Aw (mm ⁴) | TYPE NUMBER |
|--------------------|-----------------------|---------------------------------|----------------------------|-----------------------------|---|---------------------|
| 1 | 10 | 27.2 | 13.3 | 34.9 | 843 | CSHS-EFD20-1S-10P-Z |

MOUNTING PARTS

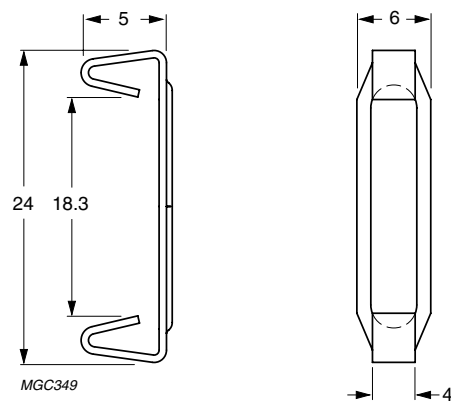
General data

| ITEM | REMARKS | FIGURE | TYPE NUMBER |
|-------|---|--------|-------------|
| Clamp | stainless steel (CrNi); clamping force ≈ 30 N | 6 | CLM-EFD20 |
| Clip | stainless steel (CrNi); clamping force ≈ 20 N | 7 | CLI-EFD20 |



Dimensions in mm.

Fig.6 Clamp CLM-EFD20



Dimensions in mm.

Fig.7 Clip CLI-EFD20.




DATA SHEET STATUS DEFINITIONS

| DATA SHEET STATUS | PRODUCT STATUS | DEFINITIONS |
|---------------------------|----------------|--|
| Preliminary specification | Development | This data sheet contains preliminary data. Ferroxcube reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
| Product specification | Production | This data sheet contains final specifications. Ferroxcube reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |

DISCLAIMER

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PRODUCT STATUS DEFINITIONS

| STATUS | INDICATION | DEFINITION |
|------------------|---|--|
| Prototype |  | These are products that have been made as development samples for the purposes of technical evaluation only. The data for these types is provisional and is subject to change. |
| Design-in |  | These products are recommended for new designs. |
| Preferred | | These products are recommended for use in current designs and are available via our sales channels. |
| Support |  | These products are not recommended for new designs and may not be available through all of our sales channels. Customers are advised to check for availability. |