

# DATA SHEET

**E14/3.5/5**

**Planar E cores and accessories**

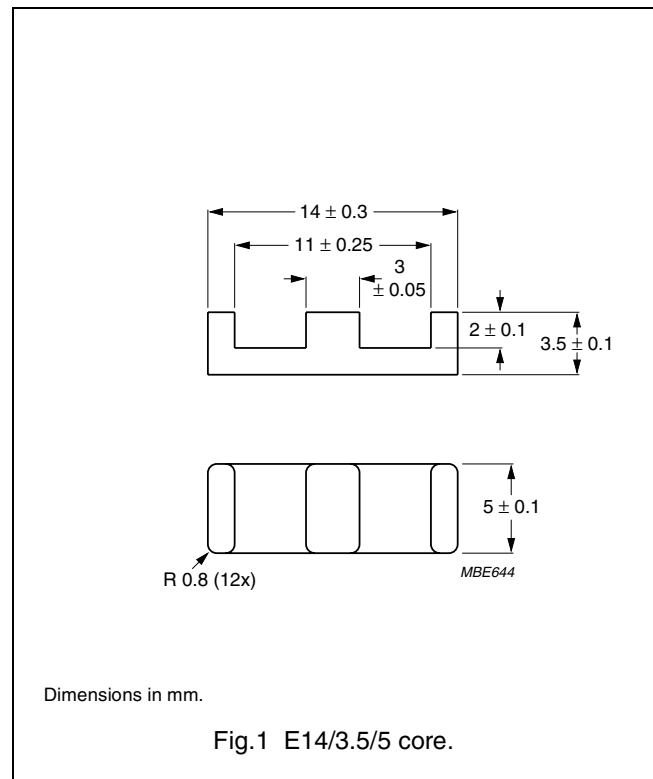
Supersedes data of September 2004

2008 Sep 01

**CORES**

**Effective core parameters of a set of E cores**

| SYMBOL        | PARAMETER         | VALUE | UNIT             |
|---------------|-------------------|-------|------------------|
| $\Sigma(l/A)$ | core factor (C1)  | 1.43  | mm <sup>-1</sup> |
| $V_e$         | effective volume  | 300   | mm <sup>3</sup>  |
| $l_e$         | effective length  | 20.7  | mm               |
| $A_e$         | effective area    | 14.3  | mm <sup>2</sup>  |
| $A_{min}$     | minimum area      | 14.3  | mm <sup>2</sup>  |
| m             | mass of core half | ≈ 0.6 | g                |

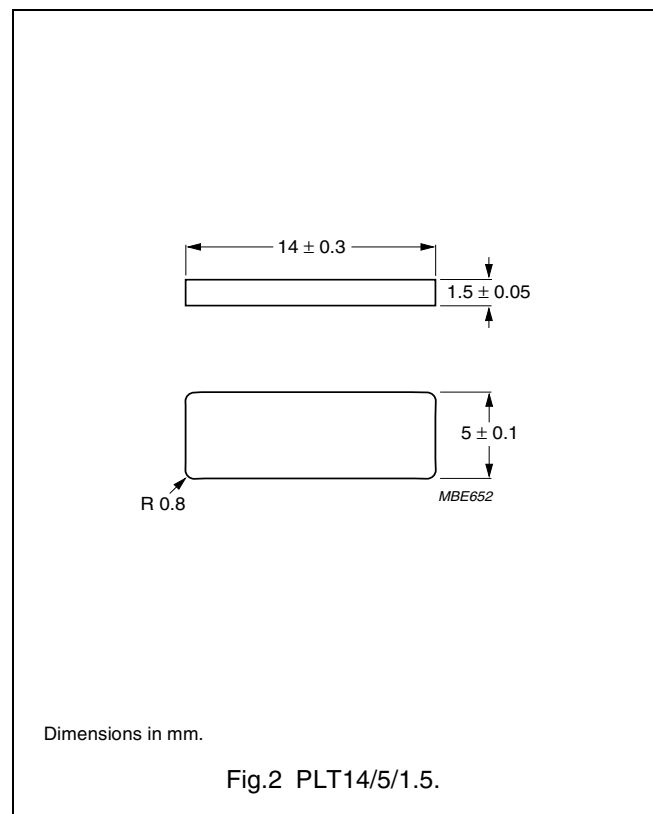


**Effective core parameters of an E/PLT combination**

| SYMBOL        | PARAMETER        | VALUE | UNIT             |
|---------------|------------------|-------|------------------|
| $\Sigma(l/A)$ | core factor (C1) | 1.16  | mm <sup>-1</sup> |
| $V_e$         | effective volume | 240   | mm <sup>3</sup>  |
| $l_e$         | effective length | 16.7  | mm               |
| $A_e$         | effective area   | 14.5  | mm <sup>2</sup>  |
| $A_{min}$     | minimum area     | 14.5  | mm <sup>2</sup>  |
| m             | mass of plate    | ≈ 0.5 | g                |

**Ordering information for plates**

| GRADE                    | TYPE NUMBER      |
|--------------------------|------------------|
| 3C90                     | PLT14/5/1.5-3C90 |
| 3C92 <small>des</small>  | PLT14/5/1.5-3C92 |
| 3C93 <small>des</small>  | PLT14/5/1.5-3C93 |
| 3C94                     | PLT14/5/1.5-3C94 |
| 3C95 <small>des</small>  | PLT14/5/1.5-3C95 |
| 3C96 <small>des</small>  | PLT14/5/1.5-3C96 |
| 3F3                      | PLT14/5/1.5-3F3  |
| 3F35 <small>des</small>  | PLT14/5/1.5-3F35 |
| 3F4 <small>des</small>   | PLT14/5/1.5-3F4  |
| 3F45 <small>prot</small> | PLT14/5/1.5-3F45 |
| 3E6                      | PLT14/5/1.5-3E6  |



## Planar E cores and accessories

E14/3.5/5

**Core halves for use in combination with an ungapped E core**

$A_L$  measured in combination with a non-gapped core half, clamping force for  $A_L$  measurements,  $10 \pm 5$  N, using a PCB coil containing 4 layers of 8 tracks each, total height 1.6 mm.

| GRADE            | $A_L$<br>(nH)    | $\mu_e$        | AIR GAP<br>( $\mu\text{m}$ ) | TYPE NUMBER           |
|------------------|------------------|----------------|------------------------------|-----------------------|
| 3C90             | 63 $\pm 3\%$     | $\approx 72$   | $\approx 530$                | E14/3.5/5-3C90-A63-E  |
|                  | 100 $\pm 5\%$    | $\approx 114$  | $\approx 270$                | E14/3.5/5-3C90-A100-E |
|                  | 160 $\pm 8\%$    | $\approx 182$  | $\approx 130$                | E14/3.5/5-3C90-A160-E |
|                  | 1280 $\pm 25\%$  | $\approx 1450$ | $\approx 0$                  | E14/3.5/5-3C90        |
| 3C92 <b>des</b>  | 960 $\pm 25\%$   | $\approx 1090$ | $\approx 0$                  | E14/3.5/5-3C92        |
| 3C93 <b>des</b>  | 1100 $\pm 25\%$  | $\approx 1250$ | $\approx 0$                  | E14/3.5/5-3C93        |
| 3C94             | 63 $\pm 3\%$     | $\approx 72$   | $\approx 530$                | E14/3.5/5-3C94-A63-E  |
|                  | 100 $\pm 5\%$    | $\approx 114$  | $\approx 270$                | E14/3.5/5-3C94-A100-E |
|                  | 160 $\pm 8\%$    | $\approx 182$  | $\approx 130$                | E14/3.5/5-3C94-A160-E |
|                  | 1280 $\pm 25\%$  | $\approx 1450$ | $\approx 0$                  | E14/3.5/5-3C94        |
| 3C95 <b>des</b>  | 1500 $\pm 25\%$  | $\approx 1730$ | $\approx 0$                  | E14/3.5/5-3C95        |
| 3C96 <b>des</b>  | 1200 $\pm 25\%$  | $\approx 1360$ | $\approx 0$                  | E14/3.5/5-3C96        |
| 3F3              | 63 $\pm 3\%$     | $\approx 72$   | $\approx 530$                | E14/3.5/5-3F3-A63-E   |
|                  | 100 $\pm 5\%$    | $\approx 114$  | $\approx 270$                | E14/3.5/5-3F3-A100-E  |
|                  | 160 $\pm 8\%$    | $\approx 182$  | $\approx 130$                | E14/3.5/5-3F3-A160-E  |
|                  | 1100 $\pm 25\%$  | $\approx 1250$ | $\approx 0$                  | E14/3.5/5-3F3         |
| 3F35 <b>des</b>  | 900 $\pm 25\%$   | $\approx 1020$ | $\approx 0$                  | E14/3.5/5-3F35        |
| 3F4 <b>des</b>   | 63 $\pm 3\%$     | $\approx 72$   | $\approx 530$                | E14/3.5/5-3F4-A63-E   |
|                  | 100 $\pm 5\%$    | $\approx 114$  | $\approx 270$                | E14/3.5/5-3F4-A100-E  |
|                  | 160 $\pm 8\%$    | $\approx 182$  | $\approx 130$                | E14/3.5/5-3F4-A160-E  |
|                  | 650 $\pm 25\%$   | $\approx 740$  | $\approx 0$                  | E14/3.5/5-3F4         |
| 3F45 <b>prot</b> | 650 $\pm 25\%$   | $\approx 740$  | $\approx 0$                  | E14/3.5/5-3F45        |
| 3E6              | 5600 $+40/-30\%$ | $\approx 6360$ | $\approx 0$                  | E14/3.5/5-3E6         |

## Planar E cores and accessories

E14/3.5/5

**Core halves for use in combination with a plate (PLT)**

$A_L$  measured in combination with a plate (PLT) clamping force for  $A_L$  measurements,  $10 \pm 5$  N, using a PCB coil containing 4 layers of 8 tracks each, total height 1.6 mm.

| GRADE            | $A_L$<br>(nH)    | $\mu_e$        | AIR GAP<br>( $\mu\text{m}$ ) | TYPE NUMBER           |
|------------------|------------------|----------------|------------------------------|-----------------------|
| 3C90             | 63 $\pm 3\%$     | $\approx 58$   | $\approx 600$                | E14/3.5/5-3C90-A63-P  |
|                  | 100 $\pm 5\%$    | $\approx 92$   | $\approx 300$                | E14/3.5/5-3C90-A100-P |
|                  | 160 $\pm 8\%$    | $\approx 148$  | $\approx 150$                | E14/3.5/5-3C90-A160-P |
|                  | 1500 $\pm 25\%$  | $\approx 1400$ | $\approx 0$                  | E14/3.5/5-3C90        |
| 3C92 <b>des</b>  | 1130 $\pm 25\%$  | $\approx 1040$ | $\approx 0$                  | E14/3.5/5-3C92        |
| 3C93 <b>des</b>  | 1300 $\pm 25\%$  | $\approx 1200$ | $\approx 0$                  | E14/3.5/5-3C93        |
| 3C94             | 63 $\pm 3\%$     | $\approx 58$   | $\approx 600$                | E14/3.5/5-3C94-A63-P  |
|                  | 100 $\pm 5\%$    | $\approx 92$   | $\approx 300$                | E14/3.5/5-3C94-A100-P |
|                  | 160 $\pm 8\%$    | $\approx 148$  | $\approx 150$                | E14/3.5/5-3C94-A160-P |
|                  | 1500 $\pm 25\%$  | $\approx 1400$ | $\approx 0$                  | E14/3.5/5-3C94        |
| 3C95 <b>des</b>  | 1740 $\pm 25\%$  | $\approx 1600$ | $\approx 0$                  | E14/3.5/5-3C95        |
| 3C96 <b>des</b>  | 1350 $\pm 25\%$  | $\approx 1260$ | $\approx 0$                  | E14/3.5/5-3C96        |
| 3F3              | 63 $\pm 3\%$     | $\approx 58$   | $\approx 600$                | E14/3.5/5-3F3-A63-P   |
|                  | 100 $\pm 5\%$    | $\approx 92$   | $\approx 300$                | E14/3.5/5-3F3-A100-P  |
|                  | 160 $\pm 8\%$    | $\approx 148$  | $\approx 150$                | E14/3.5/5-3F3-A160-P  |
|                  | 1300 $\pm 25\%$  | $\approx 1200$ | $\approx 0$                  | E14/3.5/5-3F3         |
| 3F35 <b>des</b>  | 1050 $\pm 25\%$  | $\approx 980$  | $\approx 0$                  | E14/3.5/5-3F35        |
| 3F4 <b>des</b>   | 63 $\pm 3\%$     | $\approx 58$   | $\approx 600$                | E14/3.5/5-3F4-A63-P   |
|                  | 100 $\pm 5\%$    | $\approx 92$   | $\approx 300$                | E14/3.5/5-3F4-A100-P  |
|                  | 160 $\pm 8\%$    | $\approx 148$  | $\approx 150$                | E14/3.5/5-3F4-A160-P  |
|                  | 780 $\pm 25\%$   | $\approx 720$  | $\approx 0$                  | E14/3.5/5-3F4         |
| 3F45 <b>prot</b> | 780 $\pm 25\%$   | $\approx 720$  | $\approx 0$                  | E14/3.5/5-3F45        |
| 3E6              | 6400 $+40/-30\%$ | $\approx 5900$ | $\approx 0$                  | E14/3.5/5-3E6         |

## Planar E cores and accessories

E14/3.5/5

## Properties of core sets under power conditions

| GRADE        | B (mT) at                                 | CORE LOSS (W) at                                  |  |   |  |  |
|--------------|---|---|--|---|--|--|
|              | H = 250 A/m;<br>f = 10 kHz;<br>T = 100 °C | f = 100 kHz;<br>$\hat{B}$ = 100 mT;<br>T = 100 °C | f = 100 kHz;<br>$\hat{B}$ = 200 mT;<br>T = 25 °C | f = 100 kHz;<br>$\hat{B}$ = 200 mT;<br>T = 100 °C | f = 400 kHz;<br>$\hat{B}$ = 50 mT;<br>T = 100 °C | f = 500 kHz;<br>$\hat{B}$ = 50 mT;<br>T = 100 °C |
| E+E14-3C90   | ≥320                                      | ≤ 0.030   | –  | –   | –  | –  |
| E+PLT14-3C90 | ≥320                                      | ≤ 0.026   | –  | –   | –  | –  |
| E+E14-3C92   | ≥370                                      | ≤ 0.024   | –  | ≤ 0.16  | –  | –  |
| E+PLT14-3C92 | ≥370                                      | ≤ 0.021   | –  | ≤ 0.15  | –  | –  |
| E+E14-3C93   | ≥320                                      | ≤ 0.024 <sup>(1)</sup>                            | –  | ≤ 0.16 <sup>(1)</sup>                             | –  | –  |
| E+PLT14-3C93 | ≥320                                      | ≤ 0.021 <sup>(1)</sup>                            | –  | ≤ 0.15 <sup>(1)</sup>                             | –  | –  |
| E+E14-3C94   | ≥320                                      | ≤ 0.024   | –  | ≤ 0.16  | –  | –  |
| E+PLT14-3C94 | ≥320                                      | ≤ 0.021   | –  | ≤ 0.15  | –  | –  |
| E+E14-3C95   | ≥320                                      | –   | ≤ 0.17   | ≤ 0.16  | –  | –  |
| E+PLT14-3C95 | ≥320                                      | –   | ≤ 0.13   | ≤ 0.12  | –  | –  |
| E+E14-3C96   | ≥340                                      | ≤ 0.019   | –  | ≤ 0.13  | ≤ 0.05   | ≤ 0.11   |
| E+PLT14-3C96 | ≥340                                      | ≤ 0.016   | –  | ≤ 0.12  | ≤ 0.045  | ≤ 0.09   |
| E+E14-3F3    | ≥300                                      | ≤ 0.033   | –  | –   | ≤ 0.06   | –  |
| E+PLT14-3F3  | ≥300                                      | ≤ 0.027   | –  | –   | ≤ 0.047  | –  |
| E+E14-3F35   | ≥300                                      | –   | –  | –   | ≤ 0.03   | ≤ 0.05   |
| E+PLT14-3F35 | ≥300                                      | –   | –  | –   | ≤ 0.024  | ≤ 0.035  |

1. Measured at 140 °C.

## Properties of core sets under power conditions (continued)

| GRADE        | B (mT) at                                 | CORE LOSS (W) at                                  |  |  |  |
|--------------|---|---|--|--|--|
|              | H = 250 A/m;<br>f = 10 kHz;<br>T = 100 °C | f = 500 kHz;<br>$\hat{B}$ = 100 mT;<br>T = 100 °C | f = 1 MHz;<br>$\hat{B}$ = 30 mT;<br>T = 100 °C | f = 1 MHz;<br>$\hat{B}$ = 50 mT;<br>T = 100 °C | f = 3 MHz;<br>$\hat{B}$ = 10 mT;<br>T = 100 °C |
| E+E14-3F35   | ≥300                                      | ≤ 0.35  | –  | –  | –  |
| E+PLT14-3F35 | ≥300                                      | ≤ 0.27  | –  | –  | –  |
| E+E14-3F4    | ≥250                                      | –   | ≤ 0.09   | –  | ≤ 0.15   |
| E+PLT14-3F4  | ≥250                                      | –   | ≤ 0.07   | –  | ≤ 0.12   |
| E+E14-3F45   | ≥250                                      | –   | ≤ 0.07   | ≤ 0.26   | ≤ 0.12   |
| E+PLT14-3F45 | ≥250                                      | –   | ≤ 0.055  | ≤ 0.2  | ≤ 0.095  |

**MOUNTING INFORMATION**

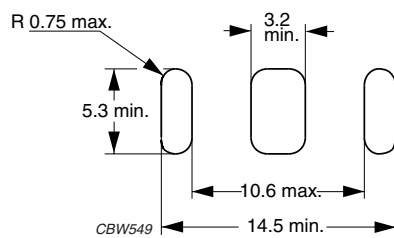
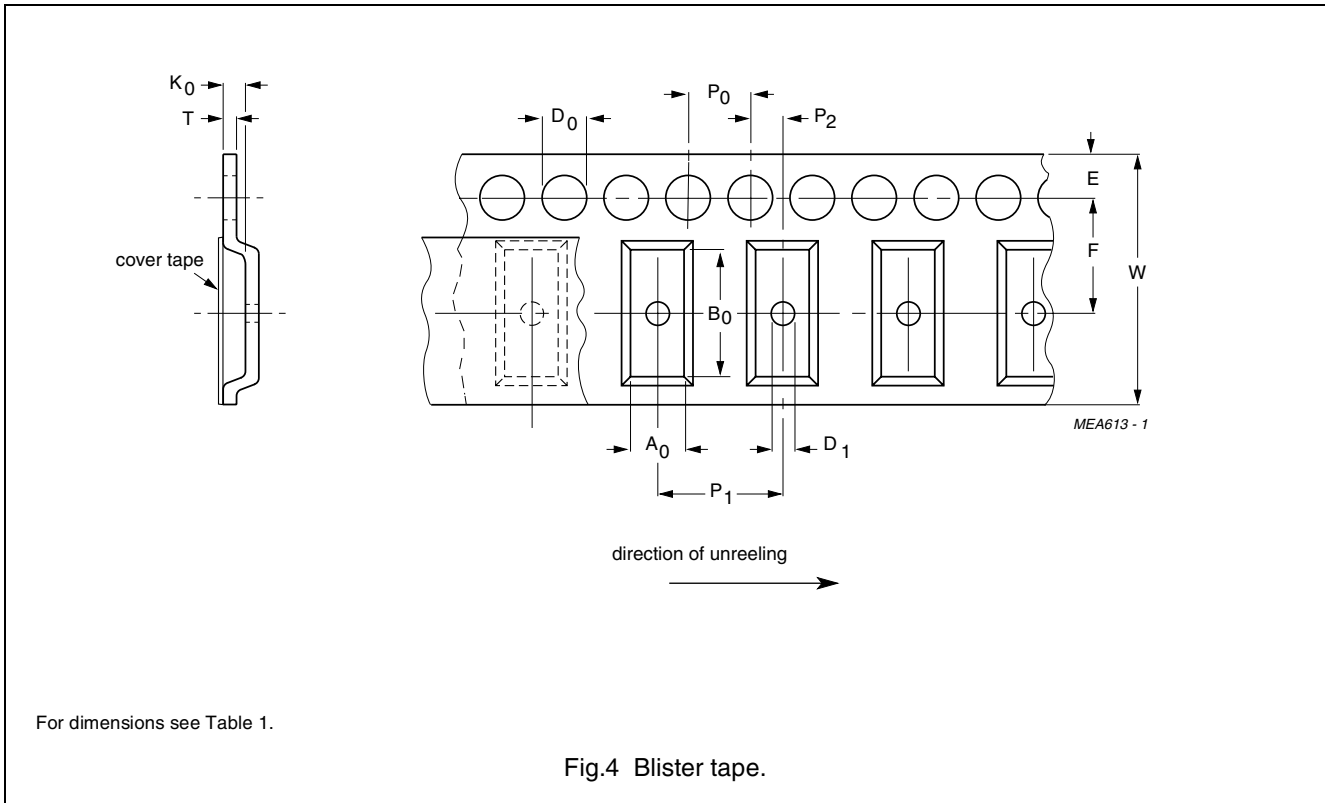


Fig.3 Recommended PCB cut-out for glued planar E14/3.5/5 cores.

**BLISTER TAPE AND REEL DIMENSIONS** prot



**Table 1** Physical dimensions of blister tape; see Fig.4

| SIZE  | DIMENSIONS (mm) |
|-------|-----------------|
| $A_0$ | $5.4 \pm 0.2$   |
| $B_0$ | $14.6 \pm 0.2$  |
| $K_0$ | $4.0 \pm 0.2$   |
| $T$   | $0.3 \pm 0.05$  |
| $W$   | $24.0 \pm 0.3$  |
| $E$   | $1.75 \pm 0.1$  |
| $F$   | $11.5 \pm 0.1$  |
| $D_0$ | $1.5 \pm 0.1$   |
| $D_1$ | $\geq 1.5$      |
| $P_0$ | $4.0 \pm 0.1$   |
| $P_1$ | $8.0 \pm 0.1$   |
| $P_2$ | $2.0 \pm 0.1$   |

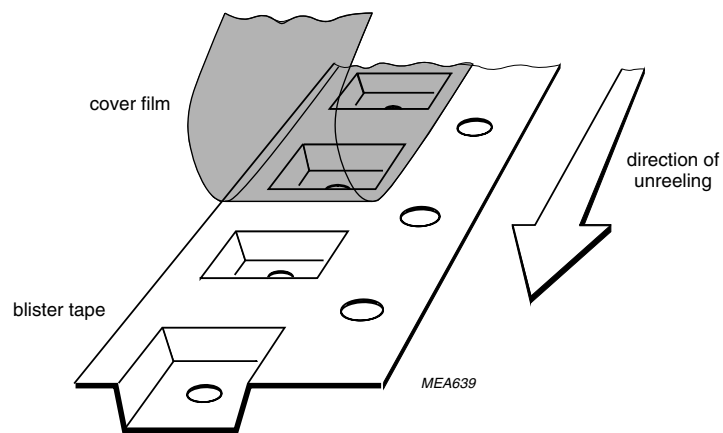
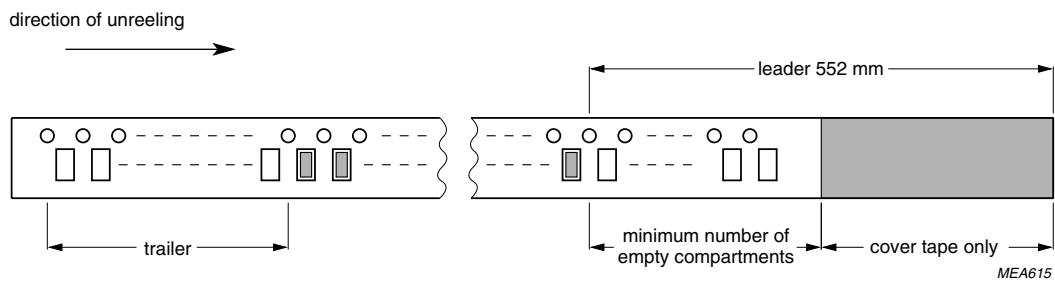


Fig.5 Construction of blister tape.



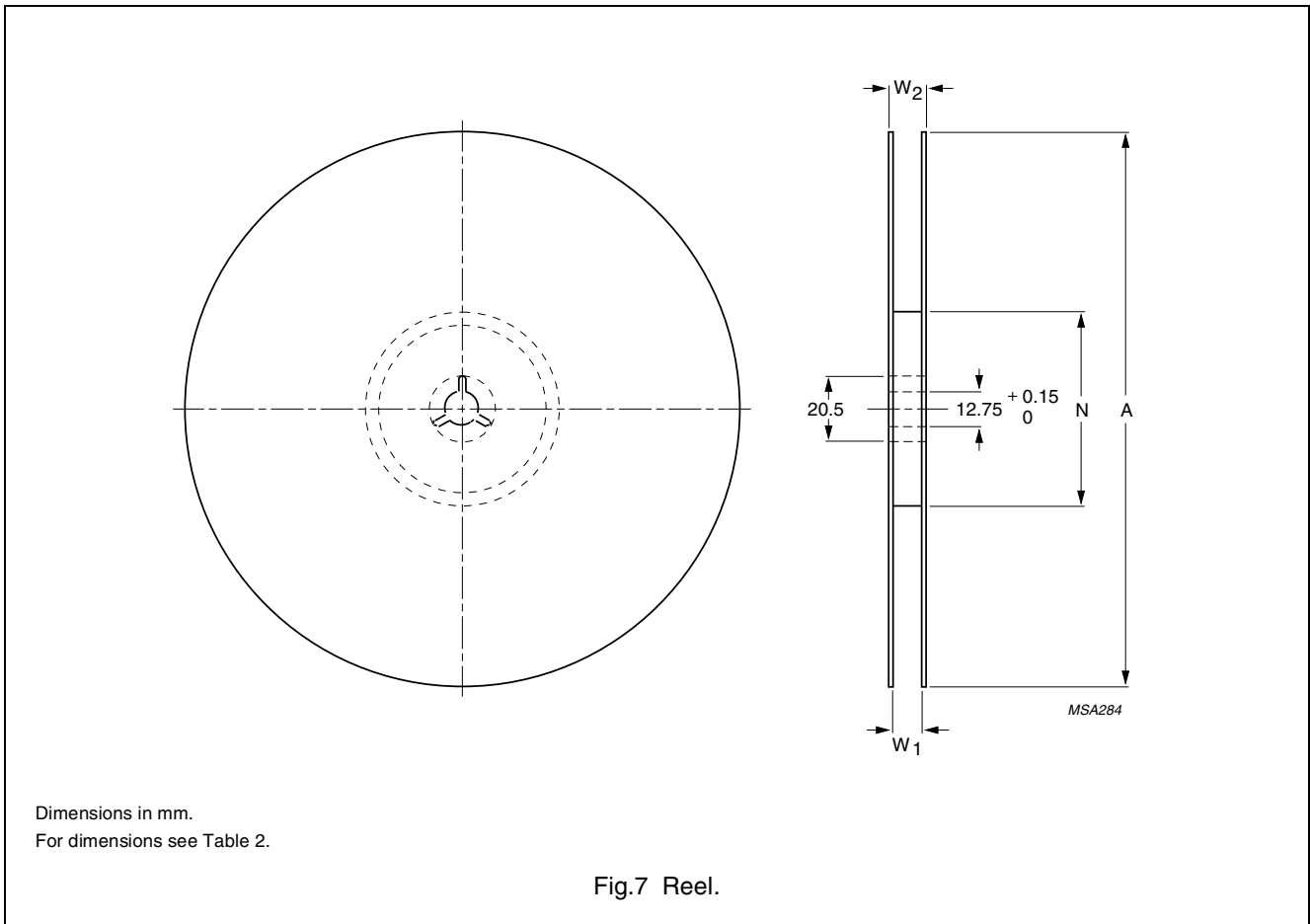
Leader: length of leader tape is 552 mm minimum covered with cover tape.

Trailer: 160 mm minimum (secured with tape).

Storage temperature range for tape: -25 to +45 °C.

Fig.6 Leader/trailer tape.





**Table 2** Reel dimensions; see Fig.7

| SIZE | DIMENSIONS (mm) |        |                |                |
|------|-----------------|--------|----------------|----------------|
|      | A               | N      | W <sub>1</sub> | W <sub>2</sub> |
| 24   | 330             | 100 ±5 | 24.4           | ≤28.4          |

## Planar E cores and accessories

E14/3.5/5




**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. |

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**PRODUCT STATUS DEFINITIONS**

| STATUS           | INDICATION  | DEFINITION   |
|------------------|---|--|
| <b>Prototype</b> |  | 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. |
| <b>Design-in</b> |  | These products are recommended for new designs.  |
| <b>Preferred</b> |   | These products are recommended for use in current designs and are available via our sales channels.  |
| <b>Support</b>   |  | These products are <b>not</b> recommended for new designs and may not be available through all of our sales channels. Customers are advised to check for availability.         |