

# DATA SHEET

**IIC10-14/4**

**IIC10P-14/4      IIC10G-14/4**

**Integrated inductive components**

Supersedes data of February 2002

2004 Sep 01

Integrated inductive components

IIC10-14/4  
IIC10P-14/4 IIC10G-14/4

IIC10P-14/4

Effective core parameters

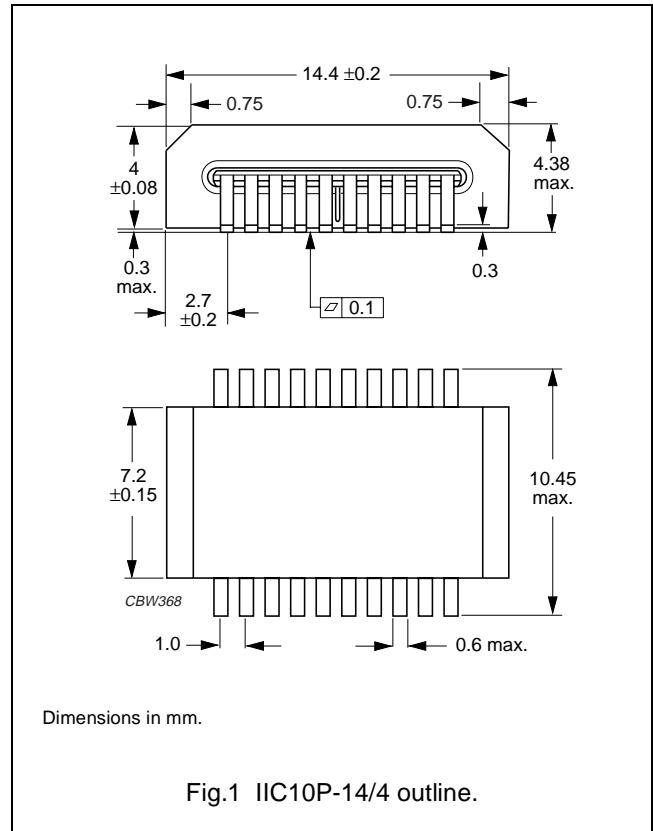
SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(I/A)$	core factor (C1)	2.47	mm <sup>-1</sup>
$V_e$	effective volume	338	mm <sup>3</sup>
$l_e$	effective length	28.9	mm
$A_e$	effective area	11.7	mm <sup>2</sup>
m	mass of core half	≈1.85	g

FEATURES

- Inductive SMD component that looks like a standard IC.
- Windings are completed by PCB tracks.
- Suitable for reflow soldering.
- Partial air gap to resist saturation.
- Number of turns can be adapted by track layout.

APPLICATIONS

- Power inductor
- Output choke
- EMI choke with bias current.



IICs with partial air gap for use as power inductors

GRADE	L (μH) FOR 10 TURNS NO BIAS CURRENT			L (μH) FOR 10 TURNS WITH A BIAS CURRENT OF 1 A			TYPE NUMBER
	f = 100 kHz; T = 25 °C	f = 500 kHz; T = 25 °C	f = 1 MHz; T = 25 °C	f = 100 kHz; T = 25 °C	f = 500 kHz; T = 25 °C	f = 1 MHz; T = 25 °C	
3C30 <small>des</small>	92 ±25%	–	–	≥5	–	–	IIC10P-14/4-3C30
3F4 <small>des</small>	–	–	45 ±25%	–	–	≥5	IIC10P-14/4-3F4
3F35 <small>des</small>	–	70 ±25%	–	–	≥5	–	IIC10P-14/4-3F35

IICs with partial air gap under power conditions

GRADE	CORE LOSS (mW) at			TYPE NUMBER
	f = 100 kHz; B = 100 mT; T = 100 °C	f = 500 kHz; B = 50 mT; T = 100 °C	f = 1 MHz; B = 30 mT; T = 100 °C	
3C30	≤30	–	–	IIC10P-14/4-3C30
3F4	–	–	≤70	IIC10P-14/4-3F4
3F35	–	≤40	–	IIC10P-14/4-3F35

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Effective core parameters

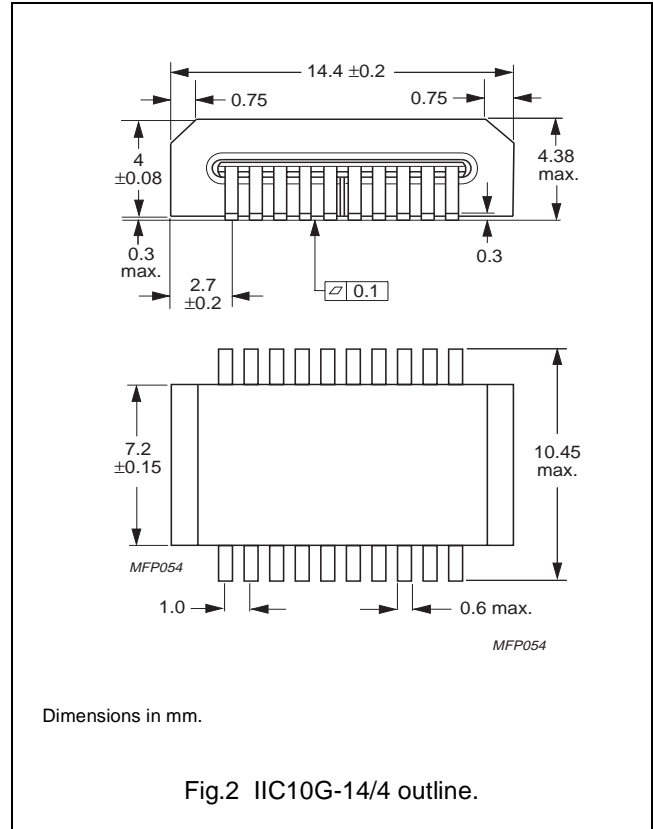
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m	mass of core half	≈1.85	g

FEATURES

- Inductive SMD component that looks like a standard IC.
- Windings are completed by PCB tracks.
- Suitable for reflow soldering.
- Full air gap to resist saturation.
- Number of turns can be adapted by track layout.

APPLICATIONS

- Power inductor
- Output choke
- EMI choke with bias current.



IICs with full air gap for use as power inductors

GRADE	L (μH) FOR 10 TURNS NO BIAS CURRENT		L (μH) FOR 10 TURNS WITH A BIAS CURRENT OF 4 A		TYPE NUMBER
	f = 500 kHz; T = 25 °C	f = 1 MHz; T = 25 °C	f = 500 kHz; T = 25 °C	f = 1 MHz; T = 25 °C	
3F35 <small>des</small>	8 ± 15 %	–	≥ 6	–	IIC10G-14/4-3F35
3F4 <small>des</small>	–	7.5 ± 15 %	–	≥ 5.5	IIC10G-14/4-3F4

IICs with full air gap under power conditions

GRADE	CORE LOSS (mW) at		TYPE NUMBER
	f = 500 kHz; B = 50 mT; T = 100 °C	f = 1 MHz; B = 30 mT; T = 100 °C	
3F35	≤ 40	–	IIC10G-14/4-3F35
3F4	–	≤ 70	IIC10G-14/4-3F4

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Effective core parameters

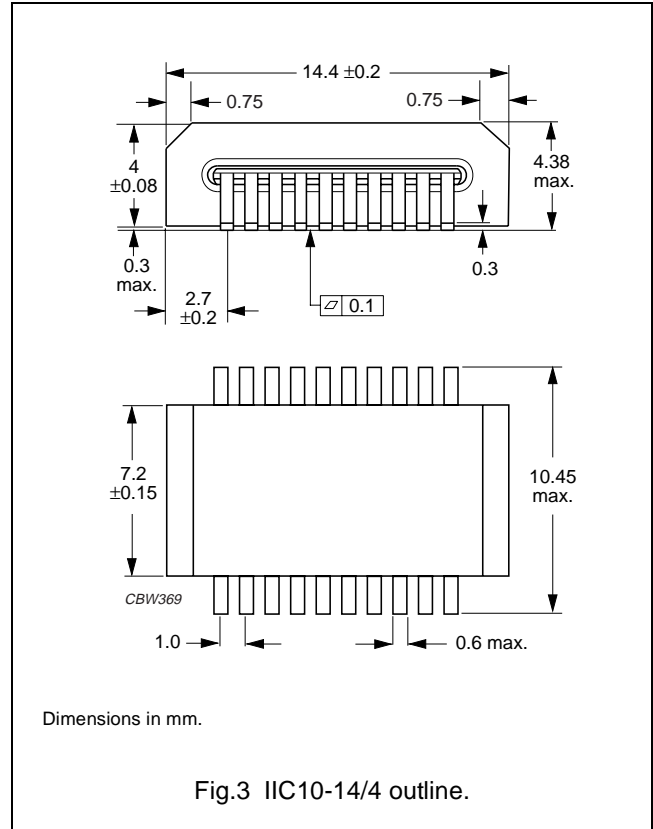
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$A_e$	effective area	11.7	mm <sup>2</sup>
$m$	mass of core half	≈1.85	g

FEATURES

- Inductive SMD component that looks like a standard IC.
- Windings are completed by PCB tracks.
- Suitable for reflow soldering.
- Several magnetic functions, depending on track layout.

APPLICATIONS

- Common-mode choke
- Mutli-line choke
- Power transformers
- Signal transformers
- Saturable inductor.



IICs for use as transformer or common-mode chokes

GRADE	$A_L$ (nH) at			CORE LOSS (mW) at		TYPE NUMBER
	f = 10 kHz; T = 25 °C	f = 500 kHz; T = 25 °C	f = 1 MHz; T = 25 °C	f = 500 kHz; B = 50 mT; T = 100 °C	f = 1 MHz; B = 30 mT; T = 100 °C	
3F4 <small>des</small>	–	–	450 ±25%	–	≤70	IIC10-14/4-3F4
3E6 <small>des</small>	6000 ±30%	–	–	–	–	IIC10-14/4-3E6
3F35 <small>des</small>	–	700 ±25%	–	≤40	–	IIC10-14/4-3F35

IIC for use as a common-mode choke or multi-line choke

GRADE	$ Z_{typ} $ Ω for 1 turn at f = 100 MHz; T = 25 °C <sup>(1)</sup>	TYPE NUMBER
3S4 <small>des</small>	≈35	IIC10-14/4-3S4

Note

1. Minimum value,  $|Z|_{min}$  is –20%.

IIC with rectangular hysteresis loop for use in magnetic regulators

GRADE	E·t product (V·μs) at		TYPE NUMBER
	f = 100 kHz; H = 800 A/m; T = 100 °C; I <sub>reset</sub> = 70 mA; 10 turns	f = 100 kHz; H = 800 A/m; T = 100 °C; I <sub>reset</sub> = 0 mA; 10 turns	
3R1 <small>des</small>	≥33	≤12	IIC10-14/4-3R1

**GENERAL DATA**

ITEM	SPECIFICATION
Leadframe material	copper (Cu), tin-lead (SnPb) plated, lead-free (Sn) available on request.
Moulding material	liquid crystal polymer (LCP), flame retardant in accordance with "ULV94-0"
Solderability	"IEC 60068-2-58", Part 2, Test Ta, method 1
Taping method	"IEC 60286-3" and "EIA 481-1"

**R<sub>dc</sub>**

≈65 mΩ (25 °C) and ≈85 mΩ (100 °C) for 10 turns including 20 solder joints (assuming 70 μm Cu PCB tracks).

**Isolation voltage**

>500 V (DC) between leads and between leads and ferrite core.

**Isolation resistance**

>100 MΩ between leads.

**Inter winding capacitance**

2 windings of 5 turns:

unifilar ≈5 pF

bifilar ≈10 pF.

(depending on track layout; see Figs 2 and 3)

**Leakage inductance**

2 windings of 5 turns:

unifilar ≈1.8 μH

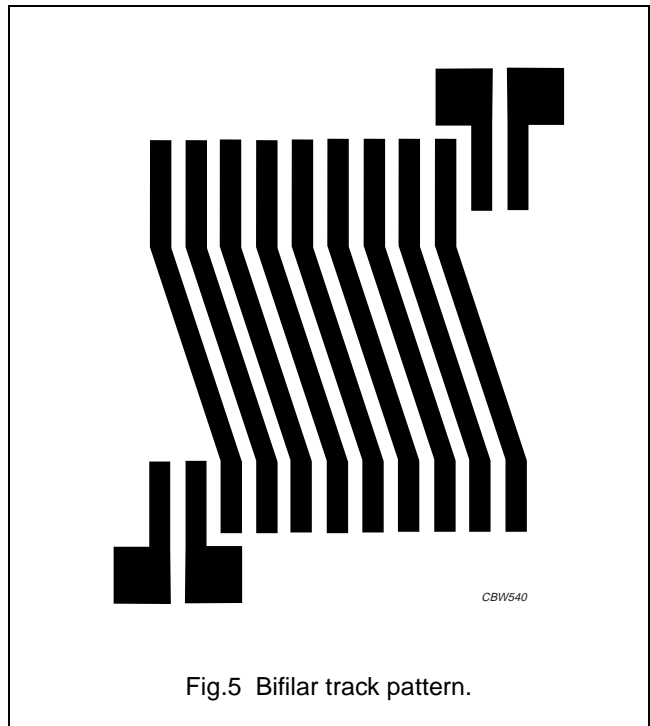
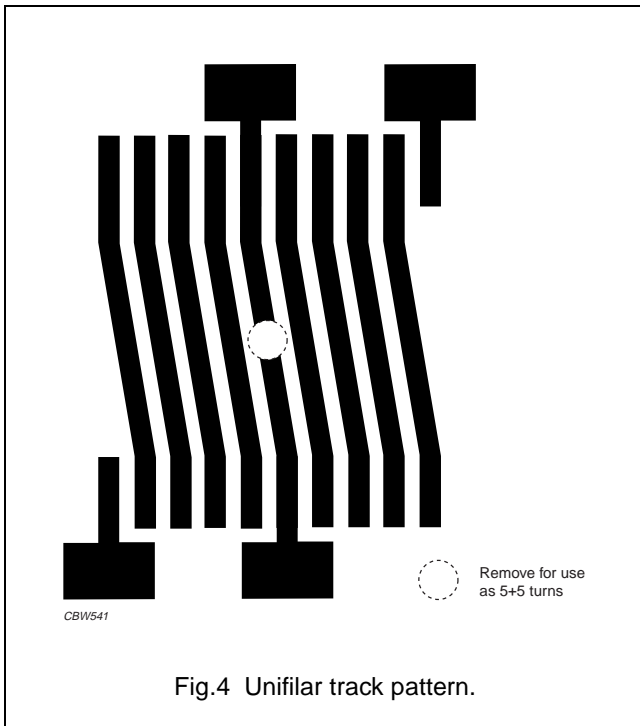
bifilar ≈0.2 μH.

**Maximum continuous current (DC)**

4 A (depending on copper track thickness on PCB).

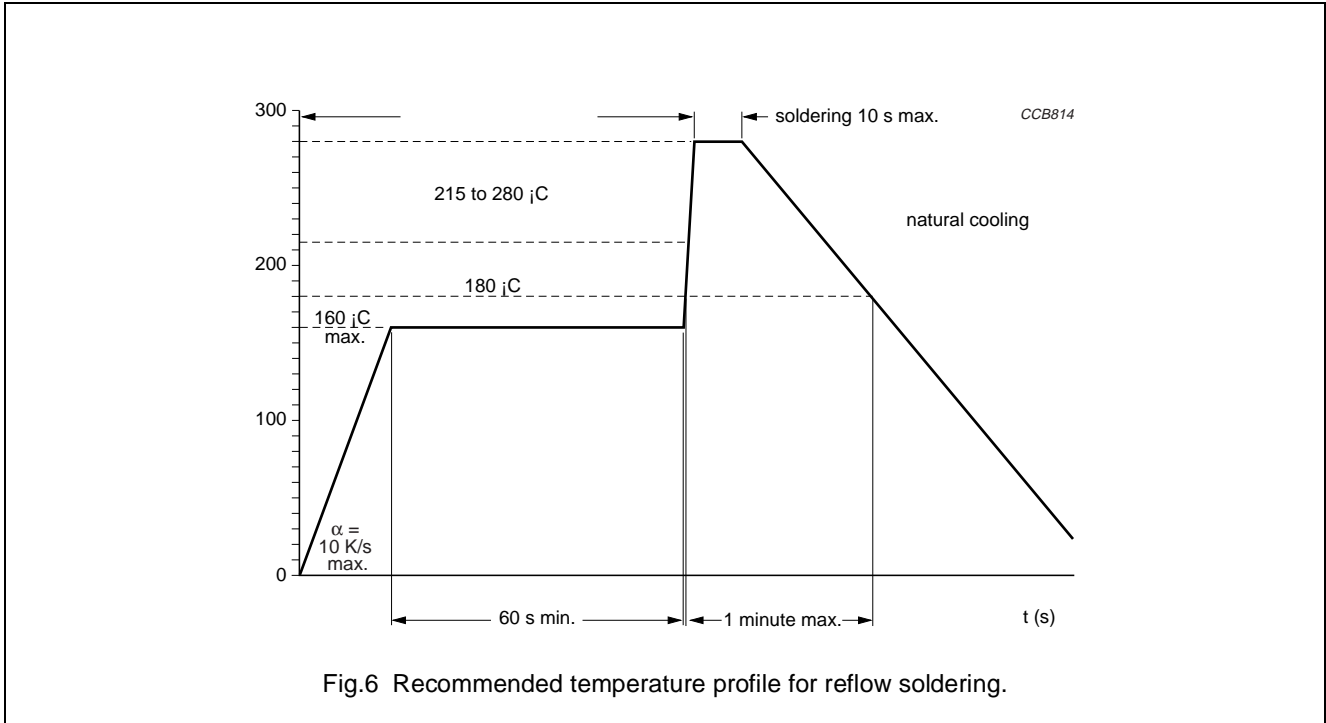
**Maximum peak current**

10 A.

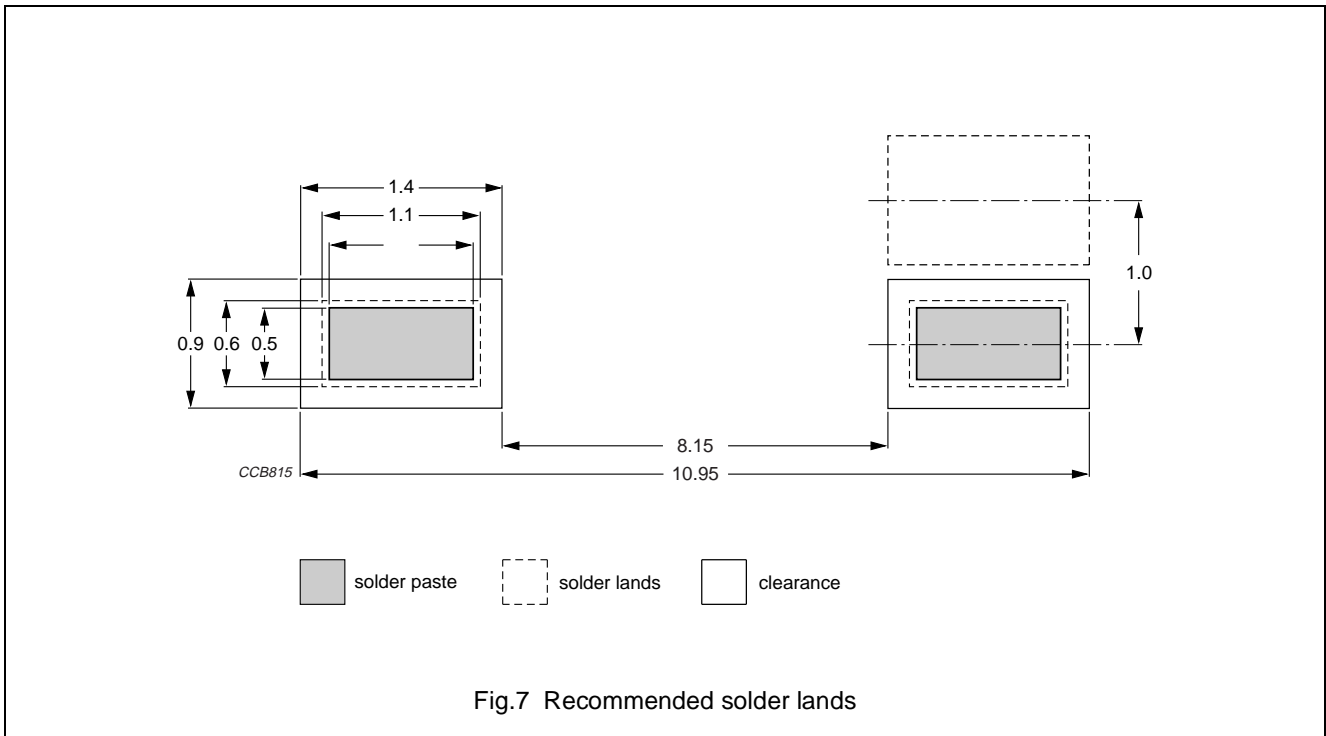


**MOUNTING**

**Soldering information**



**RECOMMENDED SOLDER LANDS**

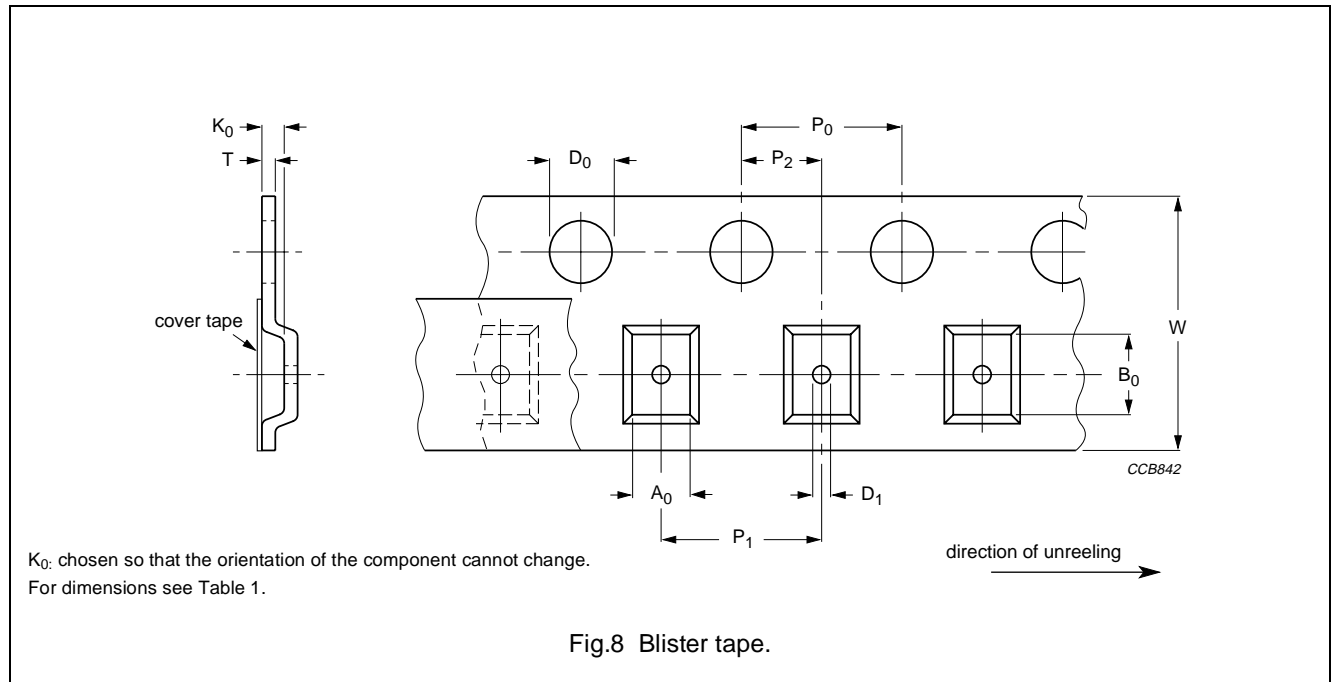


**PACKAGING**

**Tape and reel specifications**

All tape and reel specifications are in accordance with the second edition of "IEC 60286-3". Basic dimensions are given in Figs 8 and 9, and Table 1.

**Blister tape**



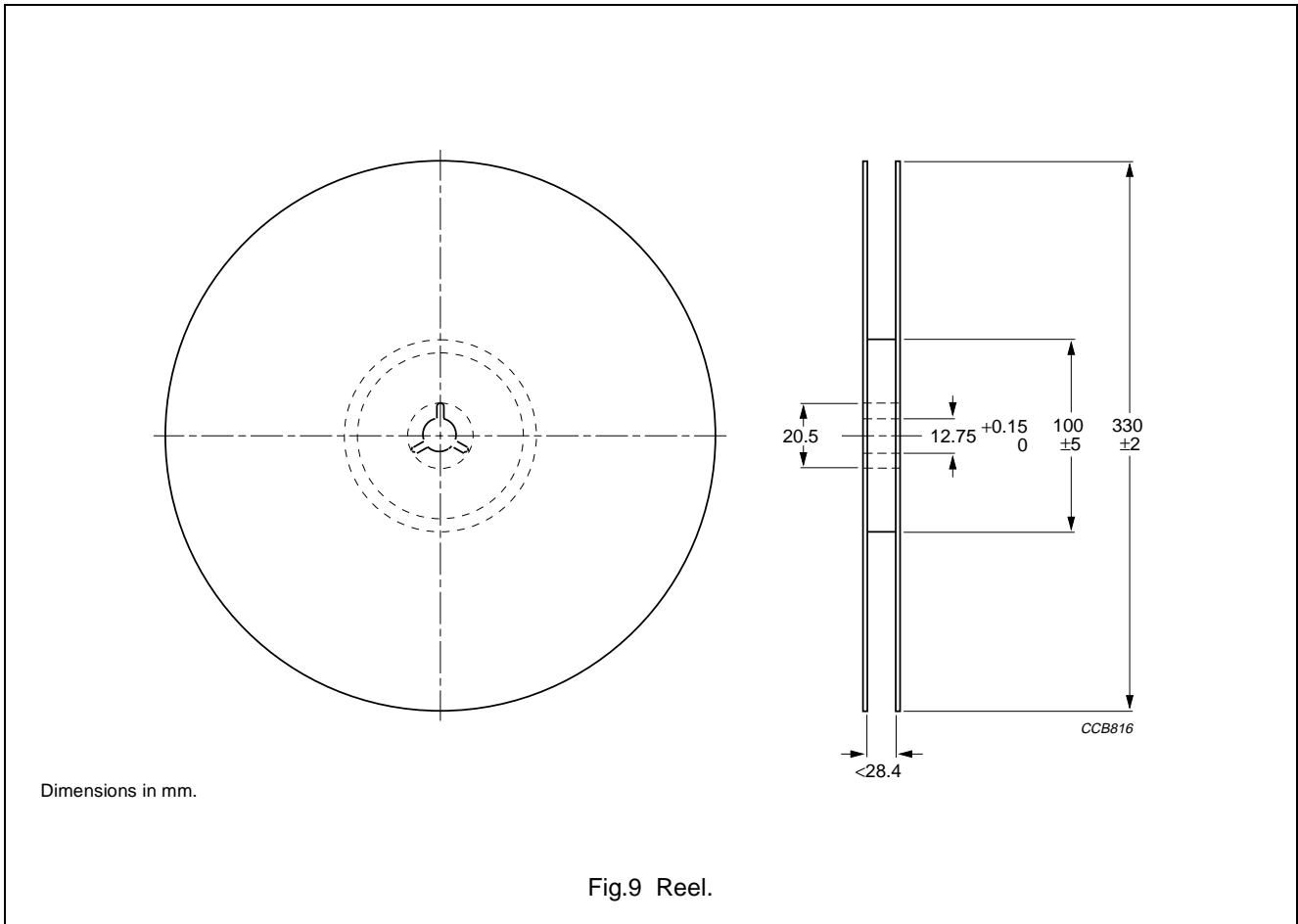
**Table 1** Dimensions of blister tape; see Fig.8

SYMBOL	DIMENSIONS	TOL.	UNIT
$A_0$	10.6	$\pm 0.1$	mm
$B_0$	14.75	$\pm 0.1$	mm
$K_0$	4.75	$\pm 0.1$	mm
$W$	24	$\pm 0.3$	mm
$D_0$	1.5	$\pm 0.1$	mm
$D_1$	1.5	$\pm 0.25$	mm
$P_0$ ; note 1	4	$\pm 0.1$	mm
$P_1$	12	$\pm 0.1$	mm
$P_2$	6	$\pm 0.1$	mm
$T$	0.3	$\pm 0.1$	mm

**Note**

- $P_0$  pitch tolerance over any 10 pitches is  $\pm 0.2$  mm.

**Reel specifications**



**Storage requirements**

These storage requirements should be observed in order to ensure the soldering of the exposed electrode:

- Maximum ambient temperature shall not exceed 40 °C. Storage temperature higher than 40 °C could result in the deformation of packaging materials.
- Maximum relative humidity recommended for storage is 70% RH. High humidity with high temperature can accelerate the oxidation of the tin-lead plating on the termination and reduce the solderability of the components.
- Products shall not be stored in environments with the presence of harmful gases containing sulfur or chlorine.



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**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**

**Life support applications** — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Ferroxcube customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Ferroxcube for any damages resulting from such application.

**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.