

## PACKING AND PACKING QUANTITIES

Page

### SCOPE

#### SURFACE-MOUNT DEVICES

Tape specification

Reel specification

Tube specification

Packing quantities

#### LEADED DEVICES

Tape and reel packing of TO-92 devices

Bulk packing of TO-92 devices

www.datasheetcloud

# PowerMOS transistors

# Packing and packing quantities

## SCOPE

This chapter covers packing and packing quantity details for surface-mount and leaded devices in the following packages:

**Table 1** Survey of packages

PACKAGE	
SURFACE-MOUNT	THROUGH-HOLE
SOT23	TO-92 (SOT54)
SOT89	TO-92 var. (SOT54 var.)
SO8 (SOT96-1)	SOT78
SOT223	SOT186
SC-70 (SOT323)	SOT186A
SSOP16 (SOT338-1)	SOT226
SSOP24 (SOT340-1)	SOT263
SC-88 (SOT363)	SOT263-1
SOT404	SOT429
SOT426	
SOT428	
SO24 (SOT137-1)	
TSOP6 (SOT457)	

## SURFACE-MOUNT DEVICES

Tape and reel packing for surface-mount devices meets the feed requirements for automatic pick and place equipment (packing conforms to IEC publication 286-3). Tape is an ideal shipping container making handling easy and providing secure blister cavities in which the devices are sealed with peel-off cover tape.

### Tape specification

Tape dimensions are specified in Tables 2, 3 and 4 and in Figures 1 through 5 for 8, 12, 16 and 24 mm tape.

**Table 2** Carrier tape widths

8 mm	12 mm	16 mm	24 mm
SC-70 (SOT323)	SOT89	SSOP16 (SOT338-1)	SOT404
SC-88 (SOT363)	SOT223	SSOP24 (SOT340-1)	SOT426
SOT23	SO8 (SOT96-1)		SO24 (SOT137-1)
TSOP6 (SOT457)			

**Table 3** Variable tape dimensions

PACKAGE	SYMBOL						
	W (mm)	F (mm)	P (mm)	D <sub>1</sub> (mm)	A <sub>0</sub> (mm)	B <sub>0</sub> (mm)	K <sub>0</sub> (mm)
SC-70 (SOT323)	8.0	3.5	4.0	1.0	2.4	2.4	1.2
SC-88 (SOT363)	8.0	3.5	4.0	1.0	2.4	2.4	1.2
SOT23	8.0	3.5	4.0	1.0	3.1	2.6	1.3
TSOP6 (SOT457)	8.0	3.5	4.0	1.0	3.2	3.1	1.3
SOT89	12.0	5.5	8.0	1.5	4.3	4.6	1.6
SO8 (SOT96-1)	12.0	5.5	8.0	1.5	6.7	5.4	1.8
SOT223	12.0	5.5	8.0	1.5	7.0	7.4	1.9
Tolerance	±0.2	±0.05	±0.1	min.	±0.1	±0.1	±0.1
SSOP16 (SOT338-1)	16.0	7.5	12.0	1.5	8.2	6.6	2.5
SSOP24 (SOT340-1)	16.0	7.5	12.0	1.5	8.2	8.8	2.5
SOT428	16.0	7.5	8.0	1.5	6.9	10.5	2.65
Tolerance	±0.3	±0.1	±0.1	min.	±0.1	±0.1	±0.1
SO24 (SOT137-1)	24.0	12.0	12.0	1.5	11.1	16.1	2.7

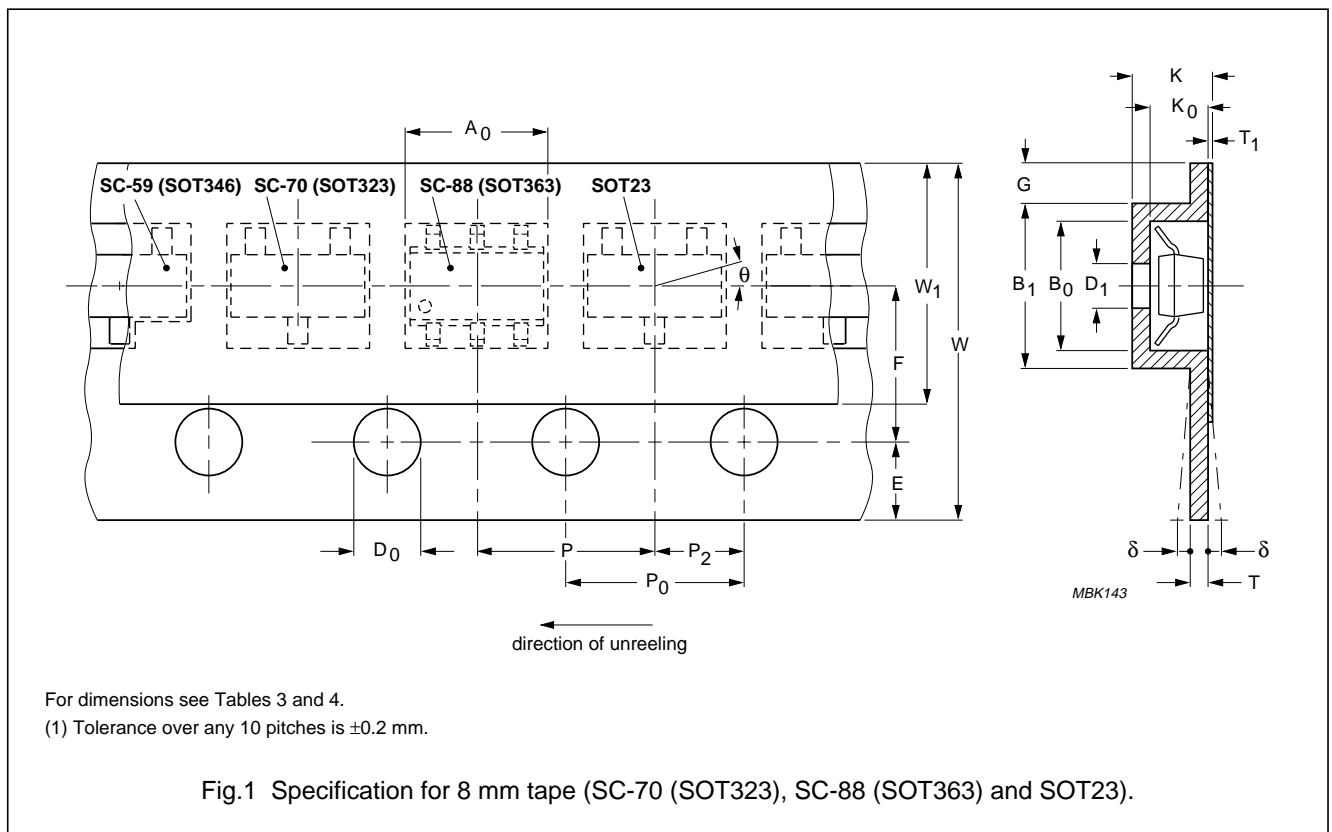
PowerMOS transistors

Packing and packing quantities

PACKAGE	SYMBOL						
	W (mm)	F (mm)	P (mm)	D <sub>1</sub> (mm)	A <sub>0</sub> (mm)	B <sub>0</sub> (mm)	K <sub>0</sub> (mm)
SOT404	24.0	12.0	16.0	1.5	10.6	16.7	4.9
SOT426	24.0	12.0	16.0	1.5	10.6	16.7	4.9
Tolerance	±0.5	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

Table 4 Fixed tape dimensions

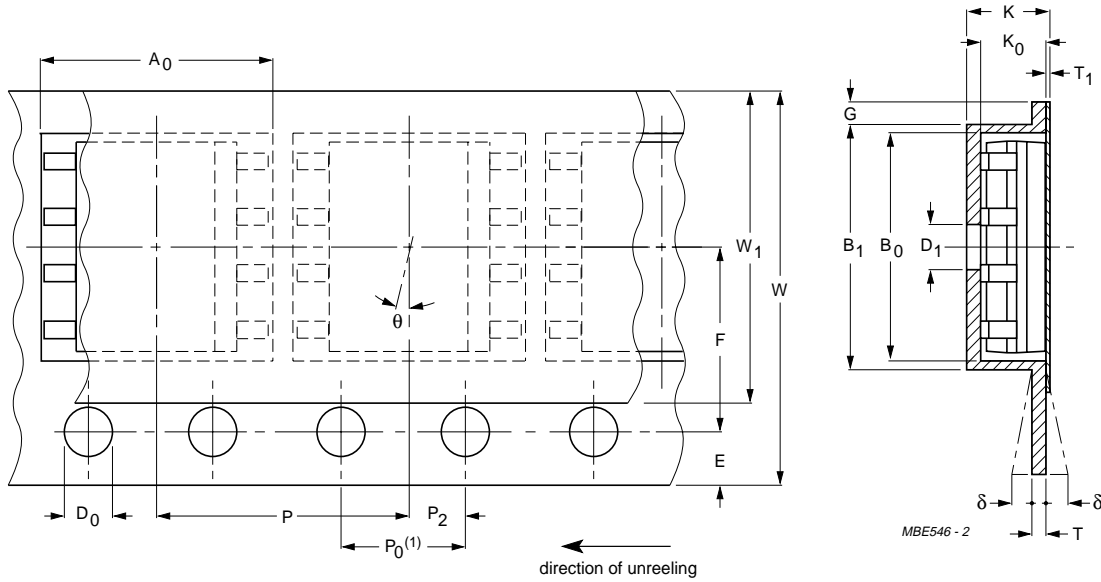
TAPE WIDTH	SYMBOL							
	E (mm)	D <sub>0</sub> (mm)	P <sub>0</sub> (mm)	P <sub>2</sub> (mm)	G (mm)	T (mm)	δ (mm)	θ (deg)
8 and 12 mm	1.75	1.5	4.0	2.0	0.75	0.4	0.3	15
Tolerance	±0.1	-0/+0.1	±0.1	±0.05	min.	max.	max.	max.
16 mm	1.75	1.5	4.0	2.0	0.75	0.4	0.3	10
Tolerance	±0.1	-0/+0.1	±0.1	±0.1	min.	max.	max.	max.
24 mm	1.75	1.5	4.0	2.0	0.75	0.4	0.3	10
Tolerance	±0.1	-0/+0.1	±0.1	±0.1	min.	max.	max.	max.





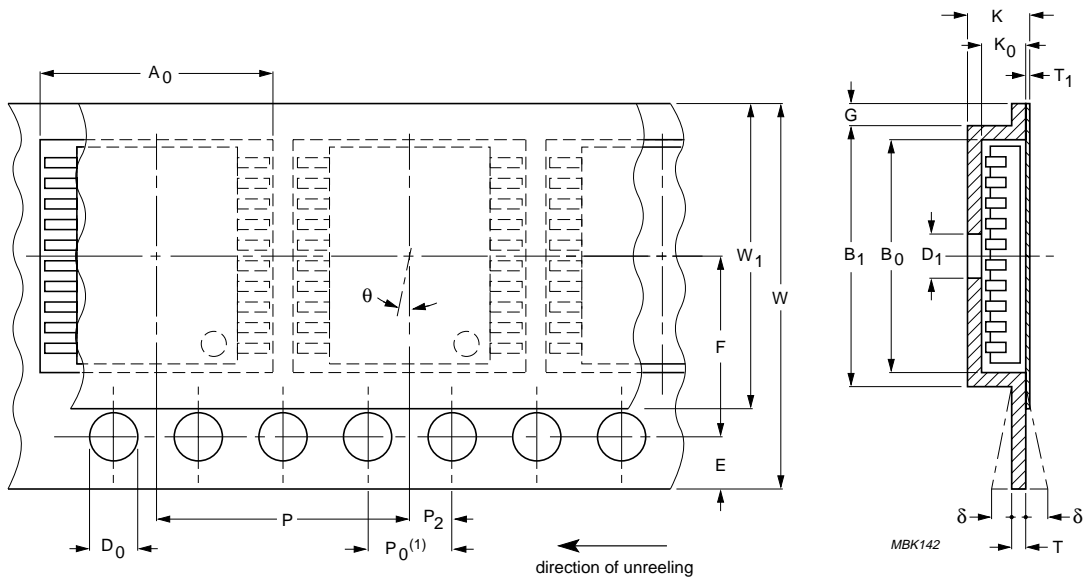
PowerMOS transistors

Packing and packing quantities



For dimensions see Tables 3 and 4.  
 (1) Tolerance over any 10 pitches is 0.2 mm.

Fig.4 Specification for 12 mm tape (SO8 (SOT96-1)).

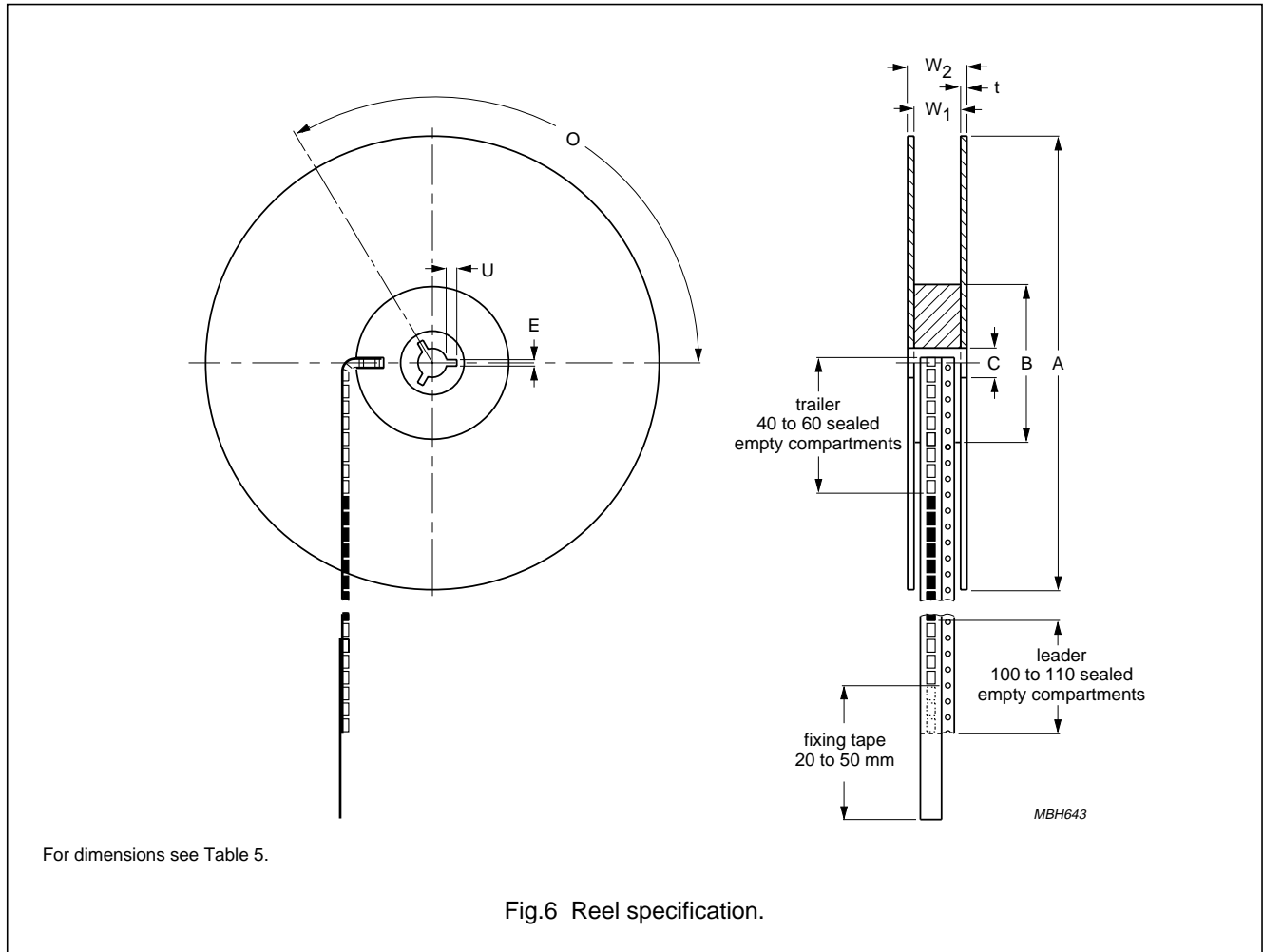


For dimensions see Tables 3 and 4.  
 (1) Tolerance over any 10 pitches is 0.2 mm.

Fig.5 Specification for 16 mm tape SSOP16 (SOT338-1) and SSOP24 (SOT340-1)).

**Reel specification**

Reel dimensions are specified in Fig.6 and Table 5 for 8, 12, 16 and 24 mm tape.



**Table 5** Reel dimensions

TAPE WIDTH	SYMBOL							
	A (mm)	B (mm)	C (mm)	W <sub>1</sub> (mm)	W <sub>2</sub> (mm)	E (mm)	U (mm)	O (deg)
8 mm	180/286 or 180/330	62	12.75	8.4	14.4	1.5	3.6	120
12 mm	180/330	62	12.75	12.4	18.4	1.5	3.6	120
16 mm	330	62	12.75	16.4	22.4	1.5	3.6	120
24 mm	180/330	62	12.75	24.4	30.4	1.5	3.6	120
Tolerance	±0.5	±1.5	-0/+0.15	-0/+1.5	max.	min.	min.	-

# PowerMOS transistors

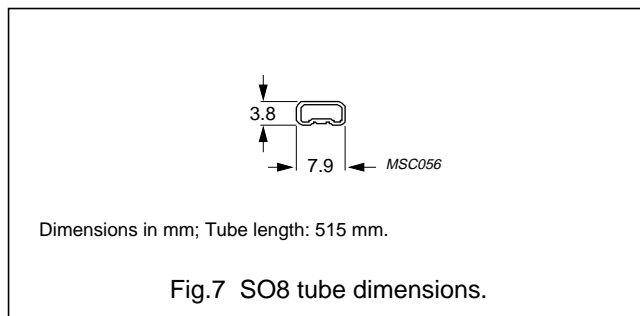
# Packing and packing quantities

### Tube specification

Devices in SO8 packages are also available in tubes. The tube dimensions are specified in Fig.7.

### Packing quantities

Table 6 shows the packing quantities for a single box for each package style, and Table 7 shows the smallest packing quantity (SPQ) for a single tube and the packing quantity (PQ) for a single box for SO and SSOP packages.



**Table 6** Packing quantities by package with relevant ordering code ending

PACKAGE	PACKING QUANTITY	ORDERING CODE ENDING	KIND OF PACKING	REEL DIAMETER (mm/inch)
SC-70 (SOT323)	3000	115	8 mm tape and reel	180/7
	10000	135	8 mm tape and reel	286/11¼
SC-88 (SOT363)	3000	115	8 mm tape and reel	180/7
	10000	135	8 mm tape and reel	286/11¼
SOT23	3000	215	8 mm tape and reel	180/7
	10000	235	8 mm tape and reel	286/11¼
SOT89	1000	115	12 mm tape and reel	180/7
	4000	135	12 mm tape and reel	330/13
SOT223	1000	115	12 mm tape and reel	180/7
	4000	135	12 mm tape and reel	330/13
SO24 (SOT137-1)	500	115	24 mm tape and reel	180/7
	1000	118	24 mm tape and reel	330/13
SO8 (SOT96-1)	2500	118	8 mm tape and reel	330/13
SSOP16 (SOT338-1)	2000	118	16 mm tape and reel	330/13
SSOP24 (SOT340-1)	1000	118	16 mm tape and reel	330/13
SOT404	800	118	24 mm tape and reel	330/13
SOT426	800	118	24 mm tape and reel	330/13
SOT428	2500	118	16 mm tape and reel	330/13
TSOP6 (SOT457)	3000	115	8 mm tape and reel	180/7

**Table 7** Packing quantities by package in tubes

PACKAGE	PACKING QUANTITY	ORDERING CODE ENDING	KIND OF PACKING
TO-220AB (SOT78)	50	–	520 mm tube (turn-lock)
	1000	127	20 tubes in a box
SO8 (SOT96-1)	100	–	515 mm tube (turn-lock)
	2000	112	20 tubes in a box
SOT186	50	–	520 mm tube (turn-lock)
	1000	127	20 tubes in a box

PowerMOS transistors

Packing and  
packing quantities

PACKAGE	PACKING QUANTITY	ORDERING CODE ENDING	KIND OF PACKING
SOT186A	50	–	520 mm tube (turn-lock)
	1000	127	20 tubes in a box
SOT226	50	–	520 mm tube (turn-lock)
	1000	127	20 tubes in a box
SOT263	50	–	413 mm tube (turn-lock)
	1000	127	20 tubes in a box
SOT263-01	50	–	413 mm tube (turn-lock)
	600	127	12 tubes in a box
SOT429	25	–	413 mm tube (turn-lock)
	500	127	20 tubes in a box

**LEADED DEVICES**

**Tape and reel packing of TO-92 devices**

Tape and reel packing meets the feed requirements of automatic pick and place equipment (packing conforms to IEC publication 286-2 and 286-3). Additionally, the tape is an ideal shipping container.

The transistors are supplied on tape in boxes (ammopack) or on reels. The number per reel and per ammopack is

2000. The ammopack has 80 layers of 25 transistors each. Each layer contains 25 transistors, plus one empty position in order to fold the layer correctly. The ammopack is accessible from both sides, enabling the user to choose between 'normal' (see Fig.8) and 'reverse' tape. 'Normal' is indicated by a plus sign (+) on the ammopack and 'reverse' by a minus sign (-). In the European version, the leading pin is the source.

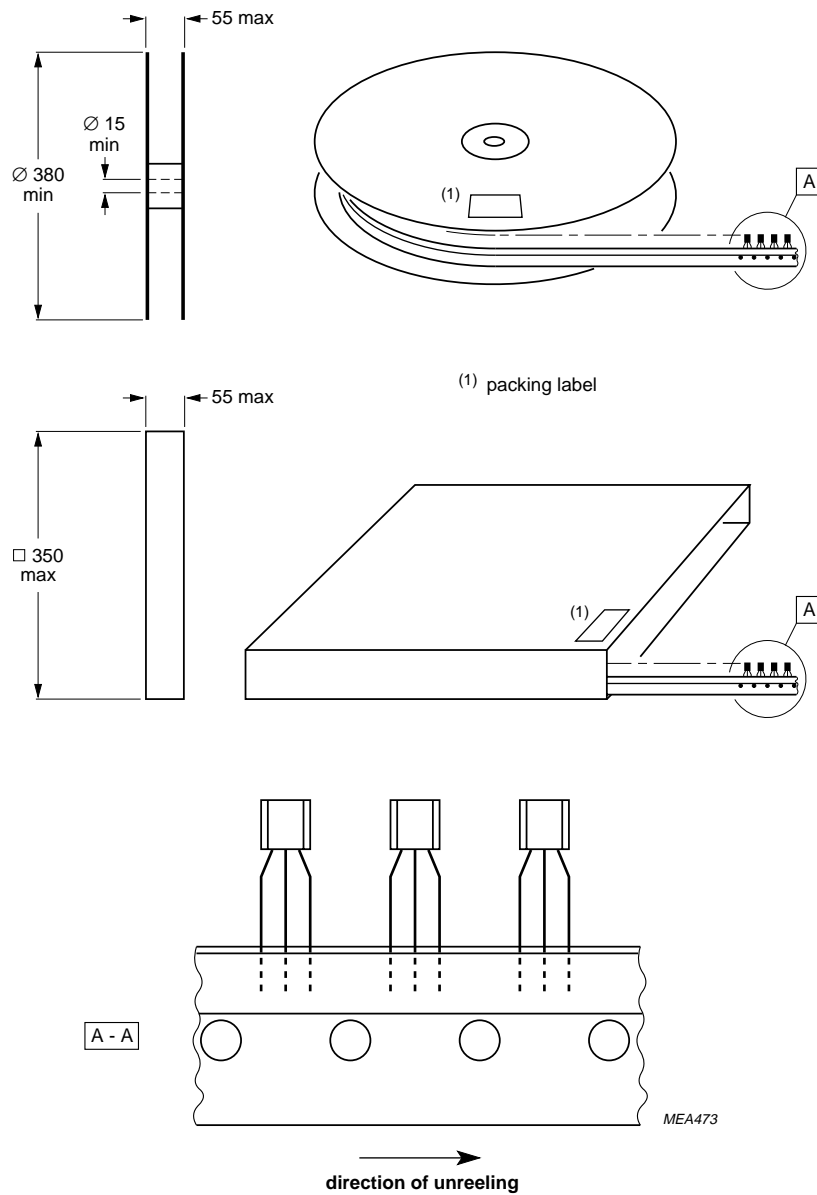
**DROPOUTS**

A maximum of 0.5% of the specified number of transistors in each packing may be missing. Up to 3 consecutive components may be missing provided the gap is followed by 6 consecutive components.

**TAPE SPLICING**

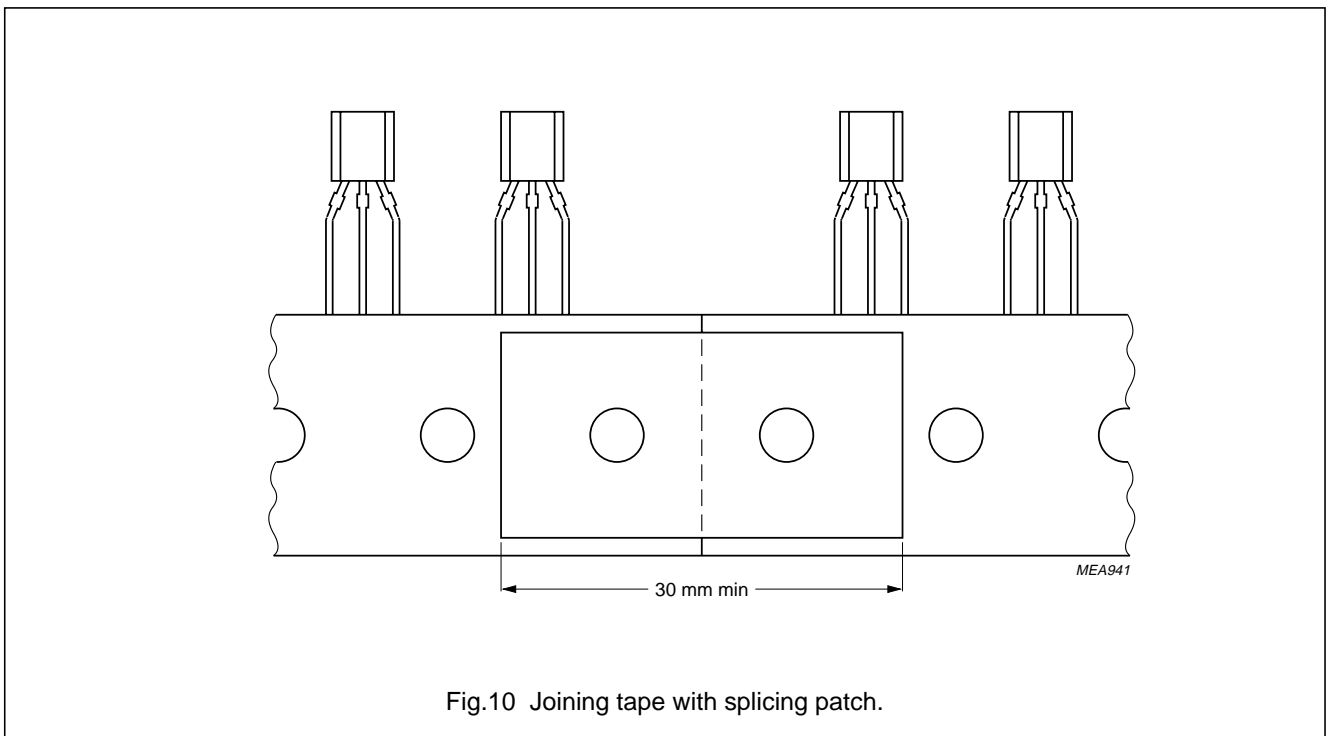
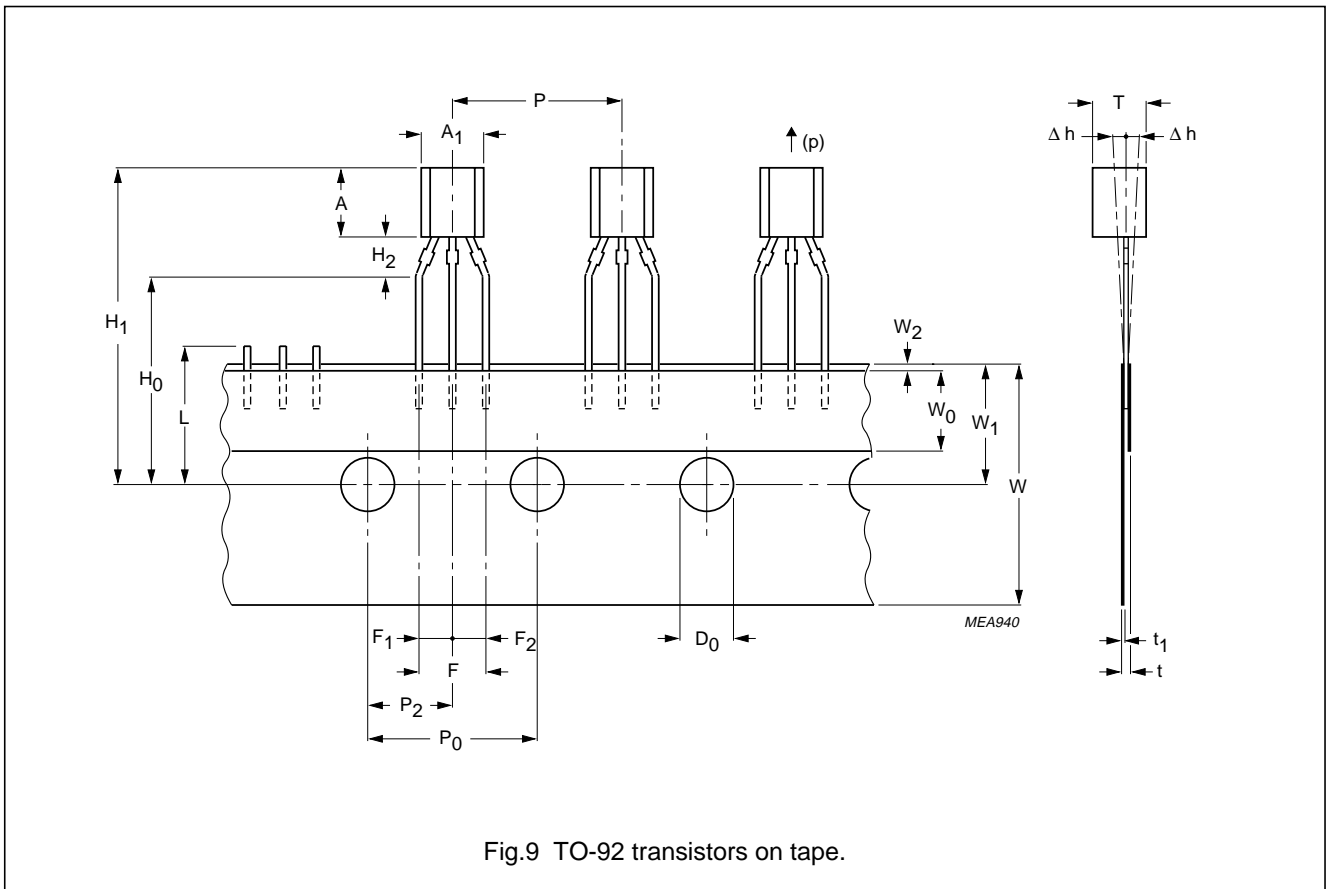
Splice the carrier tape on the back and/or front so that the feed hole pitch ( $P_0$ ) is maintained (see Figs 9 and 10).





Dimensions in mm.

Fig.8 Dimensions of reel and box.



## PowerMOS transistors

Packing and  
packing quantities**Table 8** Tape specification (TO-92 leaded types)

SYMBOL	DIMENSION	SPECIFICATIONS					REMARKS
		MIN.	NOM.	MAX.	TOL.	UNIT	
A <sub>1</sub>	body width	4	–	4.8	–	mm	
A	body height	4.8	–	5.2	–	mm	
T	body thickness	3.5	–	3.9	–	mm	
P	pitch of component	–	12.7	–	±1	mm	
P <sub>0</sub>	feed hole pitch	–	12.7	–	±0.3	mm	
	cumulative pitch error	–	–	–	±0.1		note 1
P <sub>2</sub>	feed hole centre to component centre	–	6.35	–	±0.4	mm	to be measured at bottom of clinch
F	distance between outer leads	–	5.08	–	+0.6/–0.2	mm	
Δh	component alignment	–	0	1	–	mm	at top of body
W	tape width	–	18	–	±0.5	mm	
W <sub>0</sub>	hold-down tape width	–	6	–	±0.2	mm	
W <sub>1</sub>	hole position	–	9	–	+0.7/–0.5	mm	
W <sub>2</sub>	hold-down tape position	–	0.5	–	±0.2	mm	
H <sub>0</sub>	lead wire clinch height	–	16.5	–	±0.5	mm	
H <sub>1</sub>	component height	–	–	23.25	–	mm	
L	length of snapped leads	–	–	11	–	mm	
D <sub>0</sub>	feed hole diameter	–	4	–	±0.2	mm	
t	total tape thickness	–	–	1.2	–	mm	t <sub>1</sub> = 0.3 to 0.6
F <sub>1</sub> , F <sub>2</sub>	lead-to-lead distance	–	–	–	+0.4/–0.2	mm	
H <sub>2</sub>	clinch height	–	–	–	–	mm	
(p)	pull-out force	6	–	–	–	N	

**Note**

1. Measured over 20 devices.

**Bulk packing of TO-92 devices**

In addition to TO-92 on tape, TO-92 can also be delivered in bulk. Products are packed in boxes and plastic bags with 1 000 pieces to a bag and 5 bags to a box.

As well as the standard TO-92 with straight leads, leads with delta pinning are available in bulk on request (see package outline chapter).