

# PBYR2545CT/CTB/CTE

Schottky barrier rectifier diodes

Rev. 05 — 20 January 2003

Product data

## 1. Product profile

### 1.1 Description

Dual, common cathode schottky rectifier diodes in two conventional leaded plastic packages and one surface mount plastic package.

Product availability:

PBYR2545CT in SOT78 (TO-220AB)

PBYR2545CTB in SOT404 (D<sup>2</sup>-PAK)

PBYR2545CTE in SOT226 (I<sup>2</sup>-PAK).

### 1.2 Features

- Low forward volt drop
- Reverse surge capability
- Fast switching
- High thermal cycling performance

### 1.3 Applications

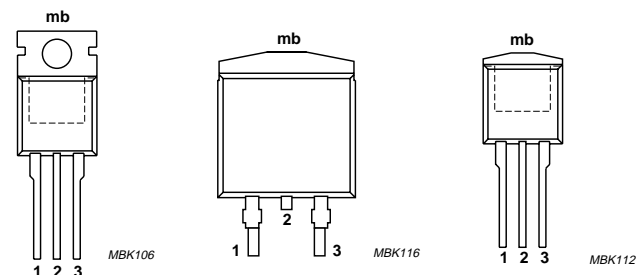
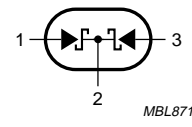
- Switched mode power supplies
- Low loss rectification

### 1.4 Quick reference data

- $V_{RRM} \leq 45 \text{ V}$
- $I_{F(AV)} \leq 30 \text{ A}$
- $V_F \leq 0.62 \text{ V}$
- $T_{j(max)} \leq 150 \text{ °C}$

## 2. Pinning information

Table 1: Pinning - SOT78, SOT404, SOT226 simplified outline and symbol

Pin	Description	Simplified outline	Symbol	
1	anode 1			
2	cathode [1]			
3	anode 2			
mb	cathode			
		SOT78 (TO-220AB)	SOT404 (D <sup>2</sup> -PAK)	SOT226 (I <sup>2</sup> -PAK)

[1] It is not possible to make connection to pin 2 of the SOT404 package.

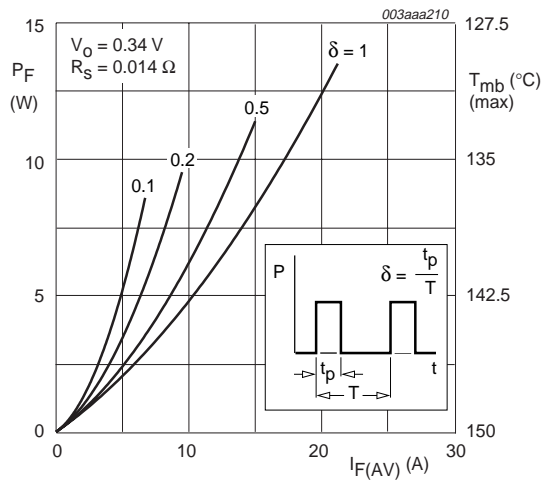
### 3. Limiting values

**Table 2: Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	45	V
$V_{RWM}$	working peak reverse voltage		-	45	V
$V_R$	continuous reverse voltage	$T_{mb} \leq 113\text{ °C}$	-	45	V
$I_{F(AV)}$	average rectified forward current	both diodes conducting; square wave; $\delta = 0.5$ ; $T_{mb} \leq 126\text{ °C}$	[1] -	30	A
$T_{stg}$	storage temperature		- 65	+175	°C
$T_j$	junction temperature		-	150	°C
<b>Per diode</b>					
$I_{FRM}$	repetitive peak forward current	square wave; $\delta = 0.5$ ; $T_{mb} \leq 126\text{ °C}$	-	30	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$	-	180	A
		$t_p = 8.3\text{ ms}$ ; sinusoidal; $T_j = 125\text{ °C}$ prior to surge; with reapplied $V_{RRM(max)}$	-	200	A
$I_{RRM}$	repetitive peak reverse surge current	pulse width and repetition rate limited by $T_{j(max)}$	-	1	A

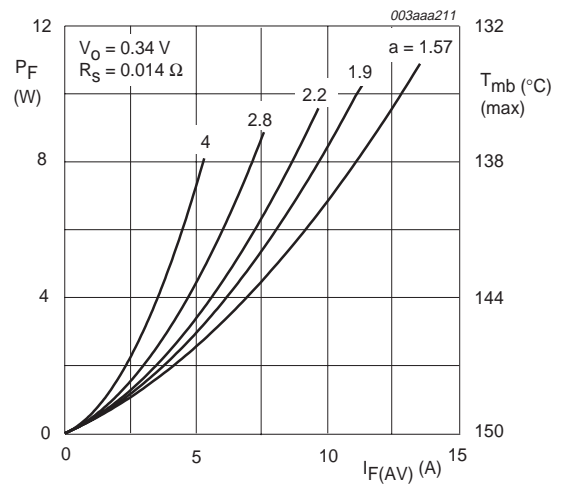
[1] For output currents greater than 20A, the cathode connection should be made to the metal mounting tab.



Square current waveform

$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

**Fig 1. Maximum forward power dissipation (square current waveform) as a function of average forward current (per diode).**



Sinusoidal current waveform

$$a = \frac{I_{F(RMS)}}{I_{F(AV)}}$$

**Fig 2. Maximum forward power dissipation (sinusoidal current waveform) as a function of average forward current (per diode).**

## 4. Thermal characteristics

Table 3: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	per diode; <b>Figure 3</b>	-	-	1.5	K/W
		both diodes	-	-	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	SOT78 and SOT226	-	60	-	K/W
		SOT404	-	50	-	K/W
		minimum footprint; mounted on an FR4 printed-circuit board	-	50	-	K/W

### 4.1 Transient thermal impedance

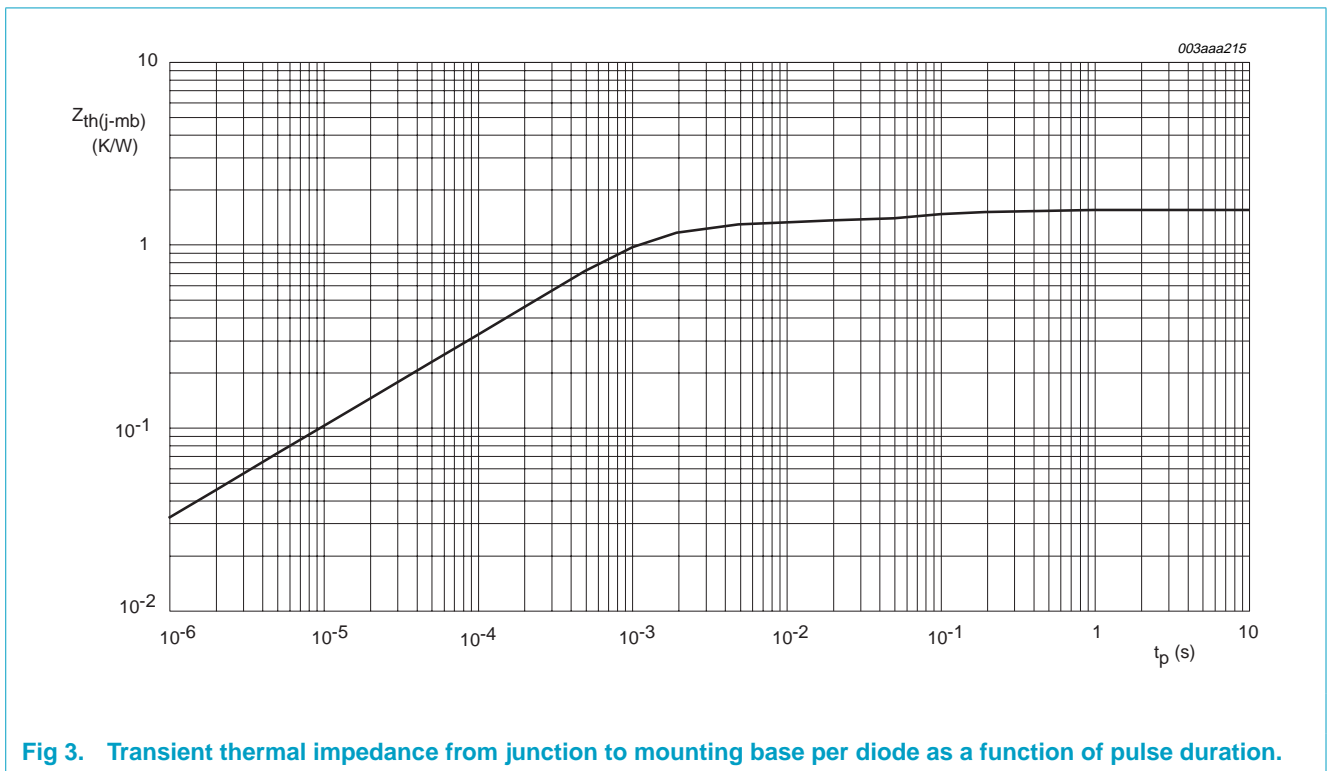


Fig 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse duration.

## 5. Characteristics

**Table 4: Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics per diode</b>						
$V_F$	forward voltage	$I_F = 30\text{ A}; T_j = 125\text{ °C}$ ; <b>Figure 4</b>	-	0.72	0.76	V
		$I_F = 20\text{ A}; T_j = 125\text{ °C}$	-	0.58	0.62	V
		$I_F = 30\text{ A}$	-	0.72	0.82	V
$I_R$	reverse current	$V_R = V_{RRM}$ ; <b>Figure 5</b>	-	0.3	2	mA
		$V_R = V_{RRM}; T_j = 100\text{ °C}$	-	30	40	mA
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 5\text{ V}$ ; <b>Figure 6</b> $T_j = 25\text{ °C}$ to $125\text{ °C}$	-	530	-	pF

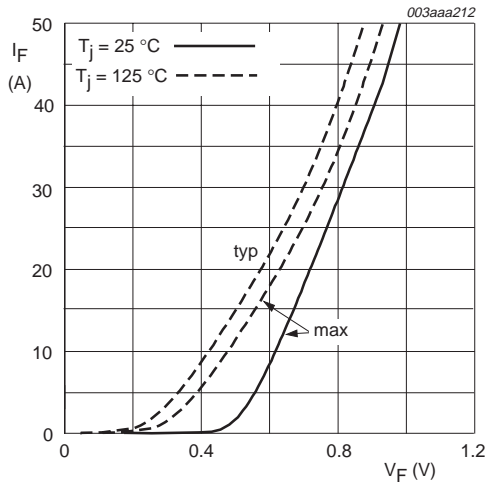


Fig 4. Forward current as a function of forward voltage; typical values.

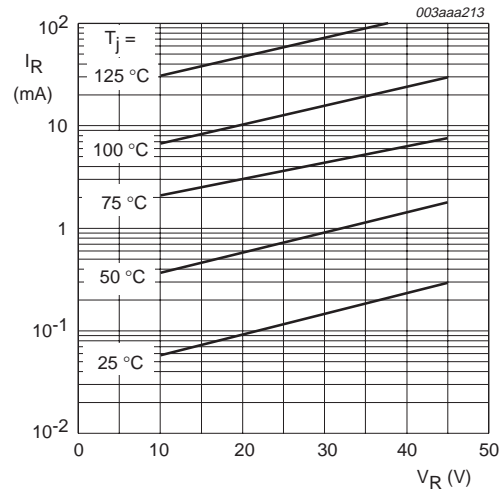
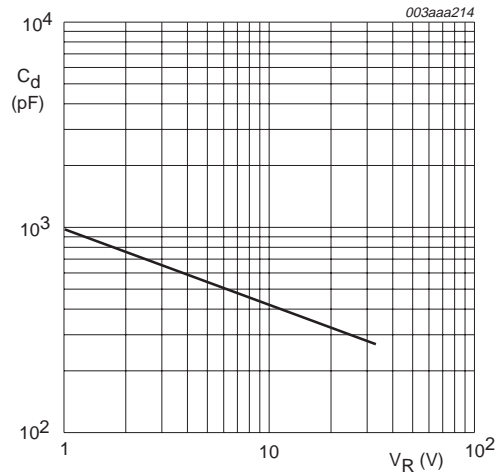


Fig 5. Reverse current as a function of reverse voltage per diode; typical values.



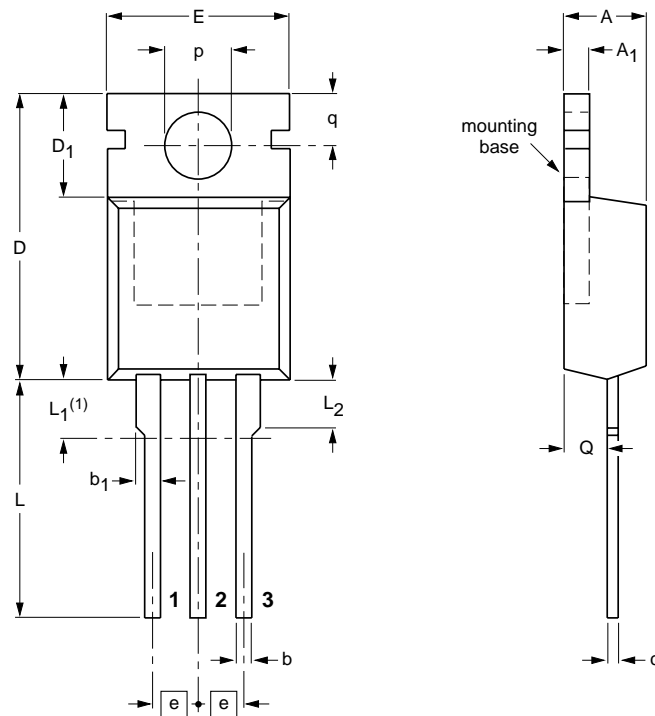
f = 1MHz

Fig 6. Diode capacitance as a function of reverse voltage per diode; typical values.

## 6. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub>	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> ( <sup>1</sup> )	L <sub>2</sub> max.	p	q	Q
mm	4.5 4.1	1.39 1.27	0.9 0.7	1.3 1.0	0.7 0.4	15.8 15.2	6.4 5.9	10.3 9.7	2.54	15.0 13.5	3.30 2.79	3.0	3.8 3.6	3.0 2.7	2.6 2.2

**Note**

1. Terminals in this zone are not tinned.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT78		3-lead TO-220AB	SC-46		00-09-07 01-02-16

Fig 7. SOT78 (TO-220AB).

Plastic single-ended surface mounted package (Philips version of D<sup>2</sup>-PAK); 3 leads  
(one lead cropped)

SOT404

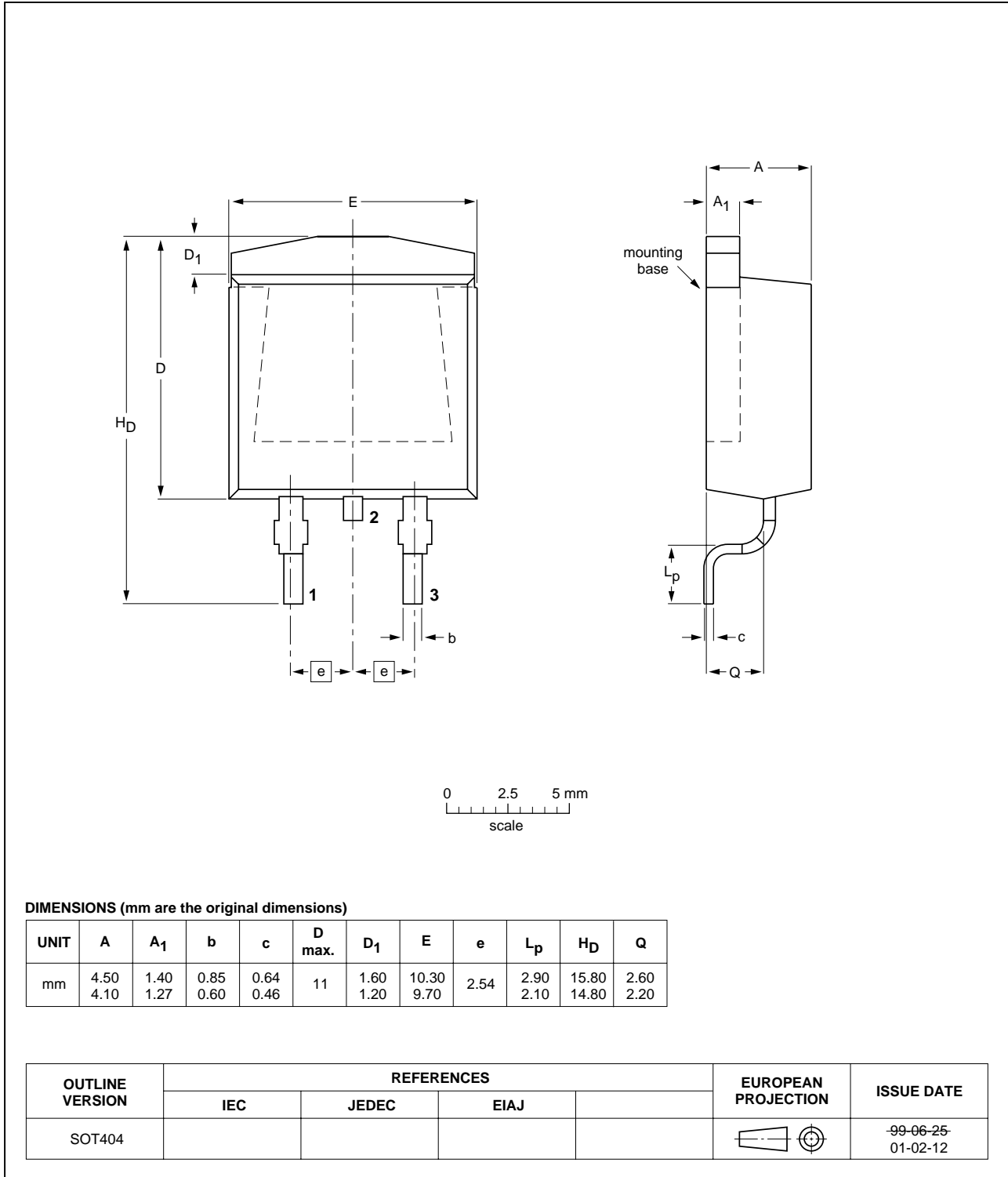


Fig 8. SOT404 (D<sup>2</sup>-PAK).



Plastic single-ended package; low-profile 3 lead TO-220AB

SOT226

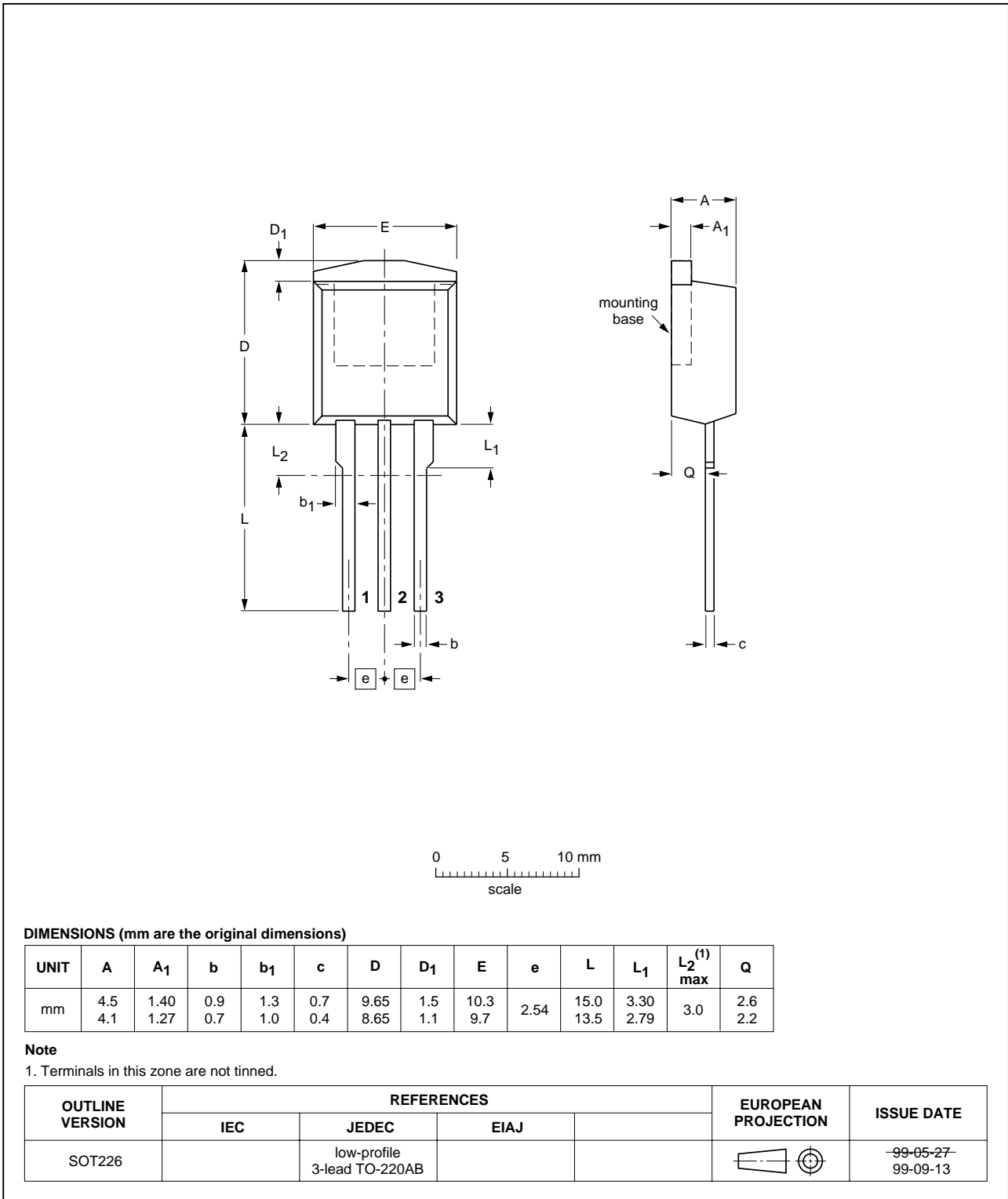
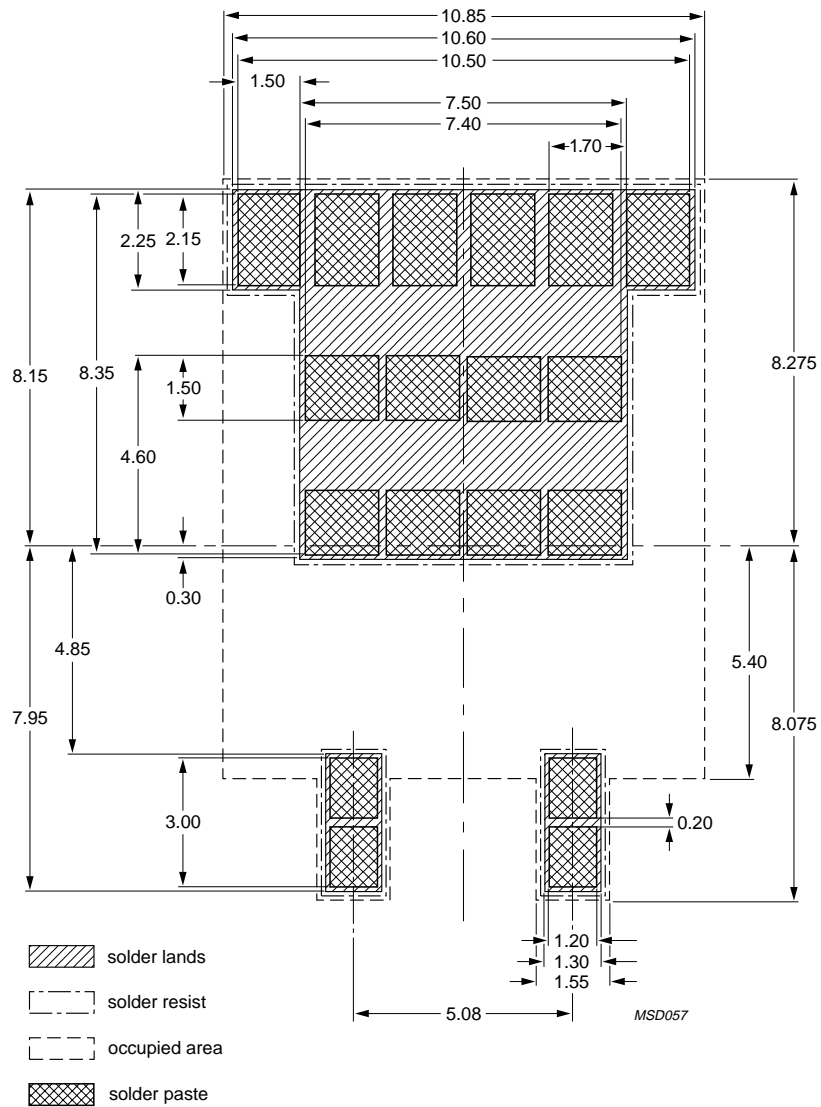


Fig 9. SOT226 (I<sup>2</sup>-PAK).

## 7. Soldering



Dimensions in mm.

Fig 10. Reflow soldering footprint for SOT404.

## 8. Revision history

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**Table 5: Revision history**

Rev	Date	CPCN	Description
05	20030120	-	Product data (9397 750 10926) supersedes Product specification PBYR2545CT_CTB_SERIES revision 04 of 1998 Oct 01

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## 9. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2][3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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