

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 (D²-PAK)

PBYR2545CTE in SOT226 (I²-PAK).

1.2 Features

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

1.3 Applications

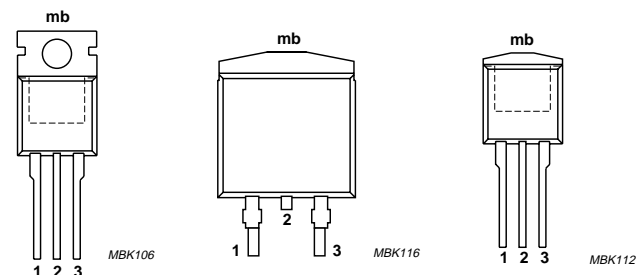
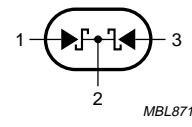
- Switched mode power supplies
- Low loss rectification

1.4 Quick reference data

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

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 ² -PAK)	SOT226 (I ² -PAK)

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

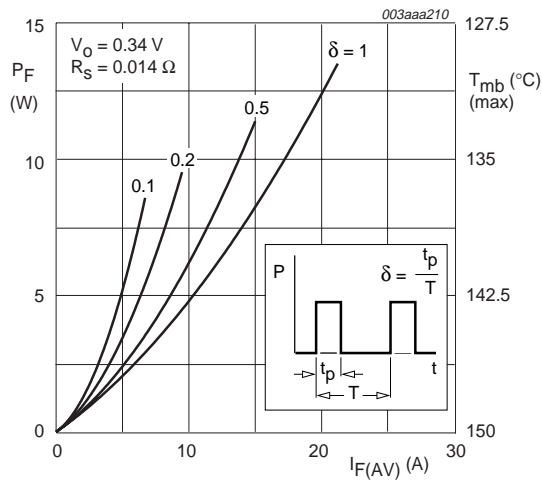
3. Limiting values

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
Per diode					
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

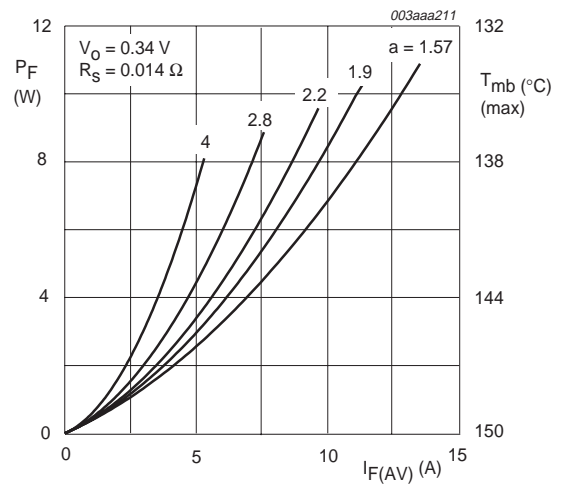
[1] For output currents greater than 20A, the cathode connection should be made to the metal mounting tab.



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; Figure 3	-	-	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

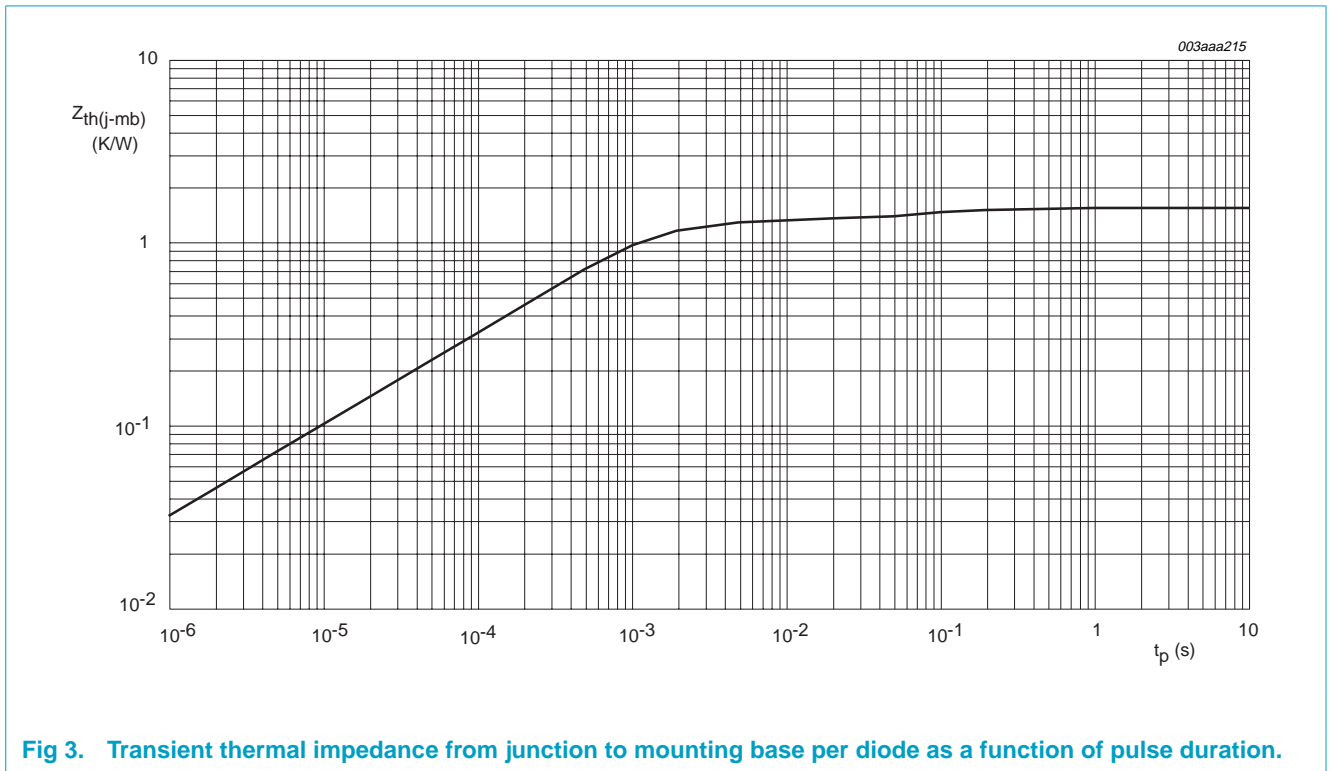


Fig 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse duration.

5. Characteristics

Table 4: Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics per diode						
V_F	forward voltage	$I_F = 30\text{ A}; T_j = 125\text{ °C}$; Figure 4	-	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	$V_R = V_{RRM}$; Figure 5	-	0.3	2	mA
		$V_R = V_{RRM}; T_j = 100\text{ °C}$	-	30	40	mA
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 5\text{ V}$; Figure 6 $T_j = 25\text{ °C}$ to 125 °C	-	530	-	pF

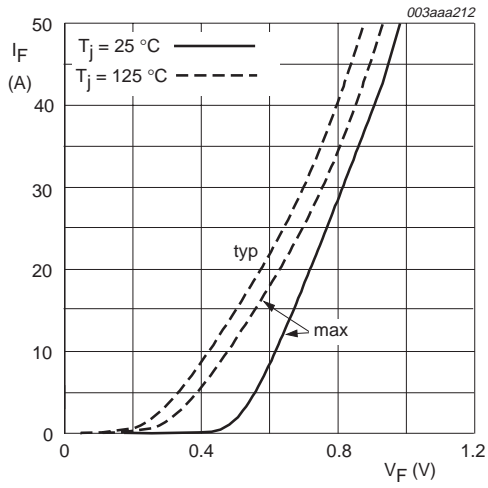


Fig 4. Forward current as a function of forward voltage; typical values.

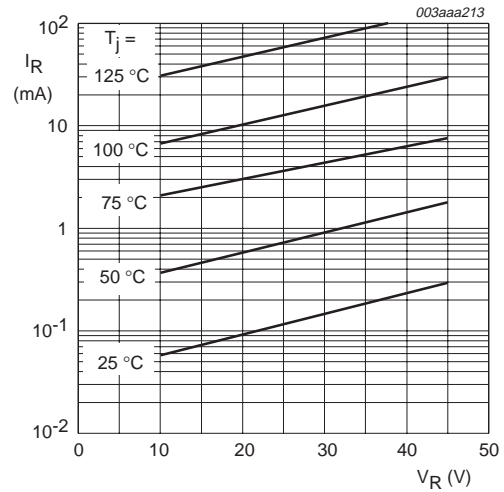
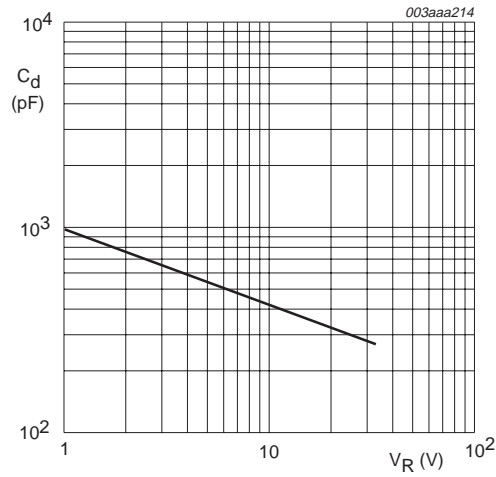


Fig 5. Reverse current as a function of reverse voltage per diode; typical values.



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

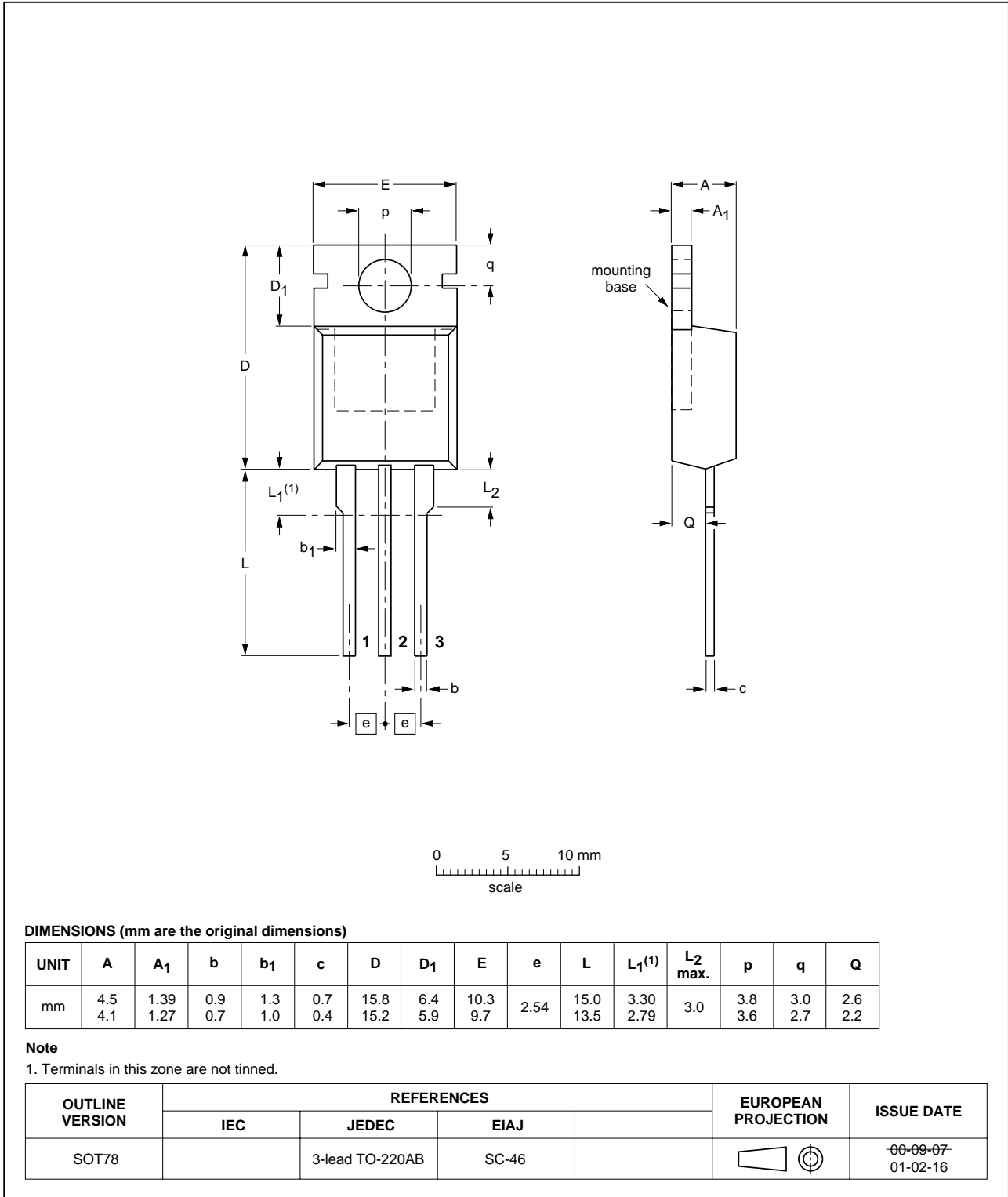


Fig 7. SOT78 (TO-220AB).

Plastic single-ended surface mounted package (Philips version of D²-PAK); 3 leads
(one lead cropped)

SOT404

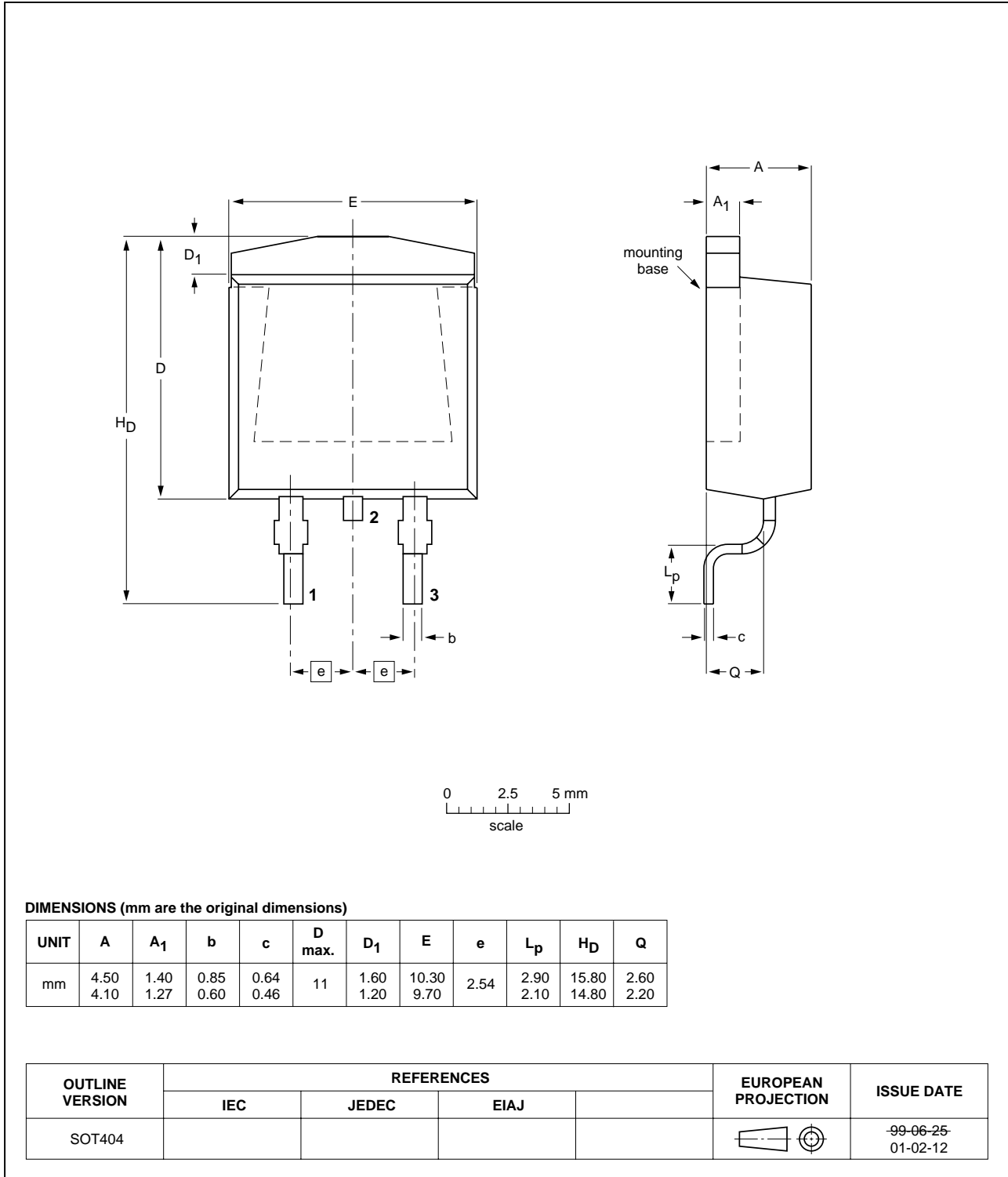


Fig 8. SOT404 (D²-PAK).

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

SOT226

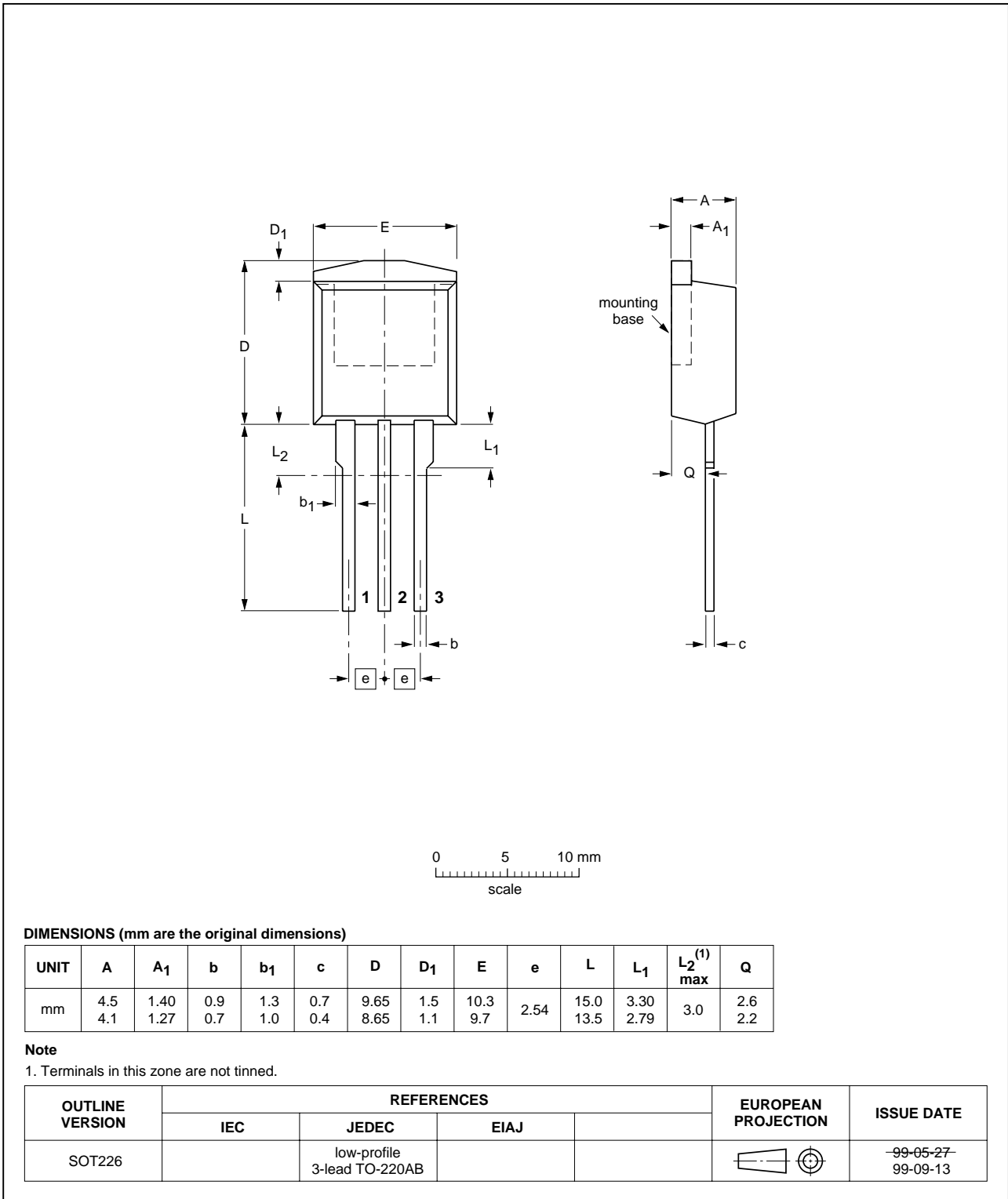
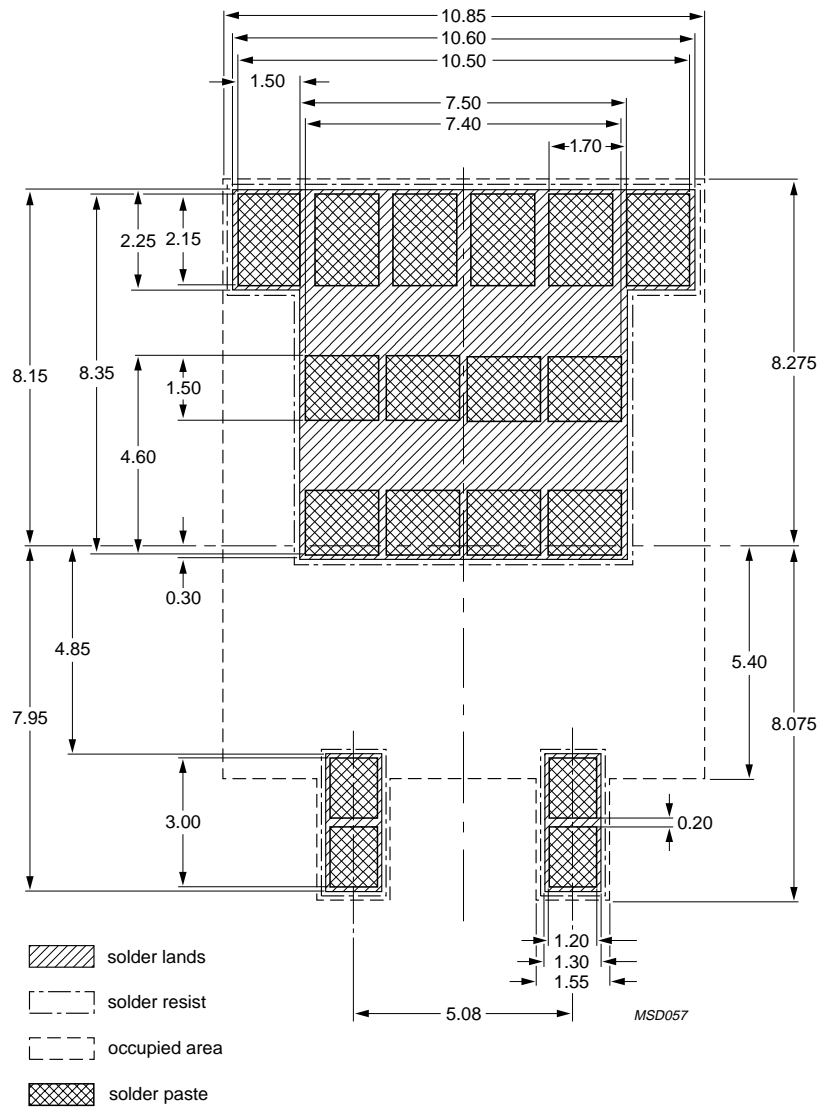


Fig 9. SOT226 (I²-PAK).

7. Soldering



Dimensions in mm.

Fig 10. Reflow soldering footprint for SOT404.

8. Revision history

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

9. Data sheet status

Level	Data sheet status ^[1]	Product status ^{[2][3]}	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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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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