



# PIMD3

NPN/PNP resistor-equipped transistors;  
 $R1 = 10 \text{ k}\Omega$ ,  $R2 = 10 \text{ k}\Omega$

12 August 2022

Product data sheet

## 1. General description

NPN/PNP Resistor-Equipped Transistors (RET) in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

## 3. Applications

- Low current peripheral driver
- Control of IC inputs
- Replaces general-purpose transistors in digital applications

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor, for the PNP transistor with negative polarity</b>							
$V_{CEO}$	collector-emitter voltage	open base		-	-	50	V
$I_o$	output current			-	-	100	mA
$R1$	bias resistor 1 (input)			7	10	13	$\text{k}\Omega$
$R2/R1$	bias resistor ratio			0.8	1	1.2	

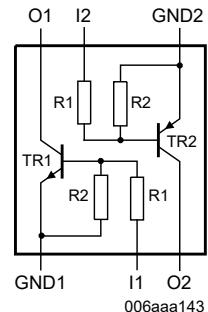
**nexperia**

## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1		
2	I1	input (base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	O1	output (collector) TR1		

SC-74; TSOP6 (SOT457)



## 6. Ordering information

**Table 3. Ordering information**

Type number	Package			Version
	Name	Description	Version	
PIMD3	SC-74; TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads		<a href="#">SOT457</a>

## 7. Marking

**Table 4. Marking codes**

Type number	Marking code
PIMD3	M7

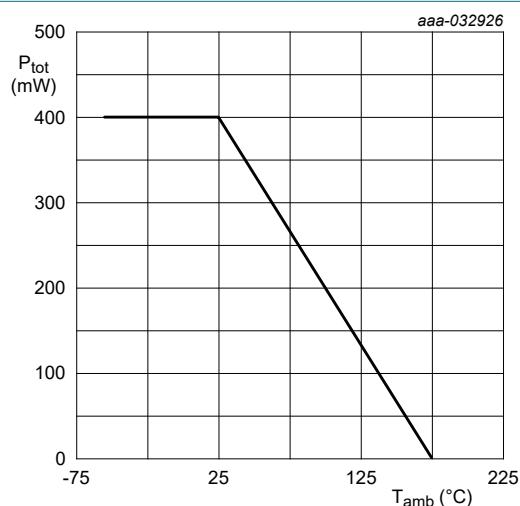
## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per transistor, for the PNP transistor with negative polarity</b>						
$V_{CBO}$	collector-base voltage	open emitter		-	50	V
$V_{CEO}$	collector-emitter voltage	open base		-	50	V
$V_{EBO}$	emitter-base voltage	open collector		-	10	V
$V_I$	input voltage	input voltage TR1		-	40	V
				-	-10	V
		input voltage TR2		-	10	V
				-	-40	V
$I_O$	output current			-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^{\circ}\text{C}$	[1]	-	250	mW
<b>Per device</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^{\circ}\text{C}$	[1]	-	400	mW
$T_j$	junction temperature			-	150	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature			-65	150	$^{\circ}\text{C}$
$T_{stg}$	storage temperature			-65	150	$^{\circ}\text{C}$

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35  $\mu\text{m}$  copper, tin-plated and standard footprint.



FR4 PCB, single-sided, 35  $\mu\text{m}$  copper, tin-plated and standard footprint

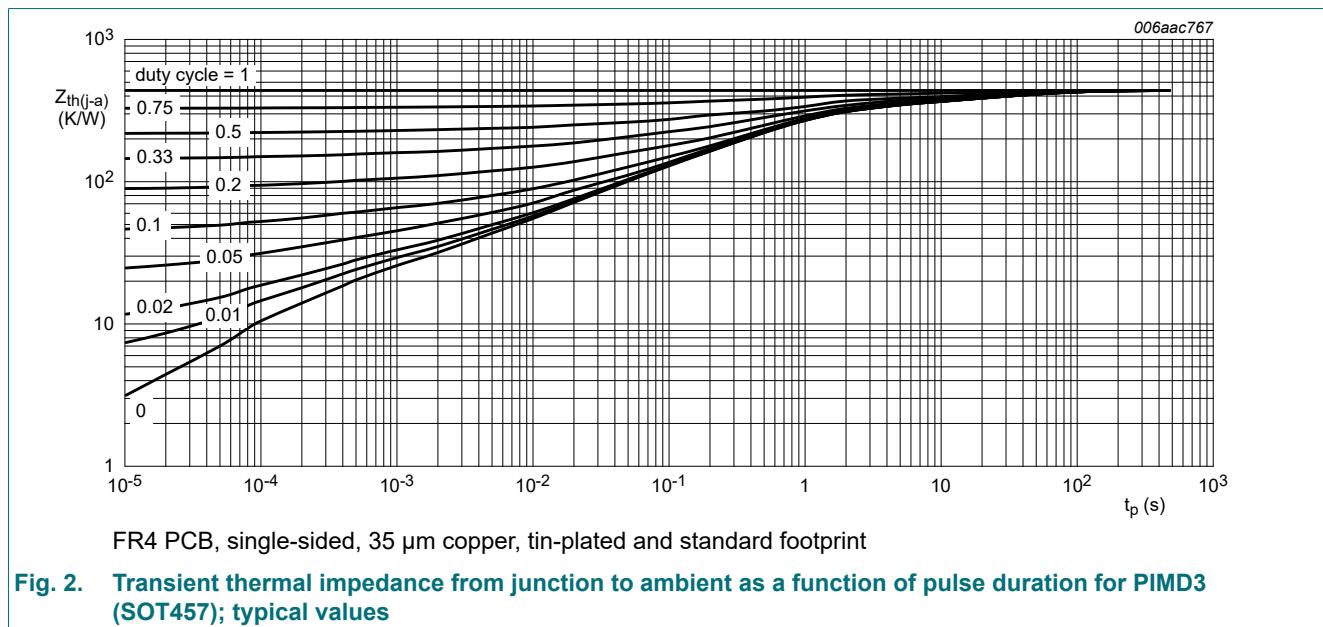
**Fig. 1. Per device: Power derating curve**

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
<b>Per device</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	313	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35  $\mu\text{m}$  copper, tin-plated and standard footprint.

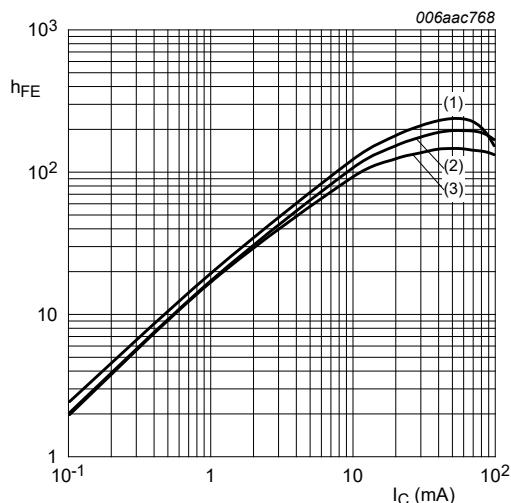


## 10. Characteristics

Table 7. Characteristics

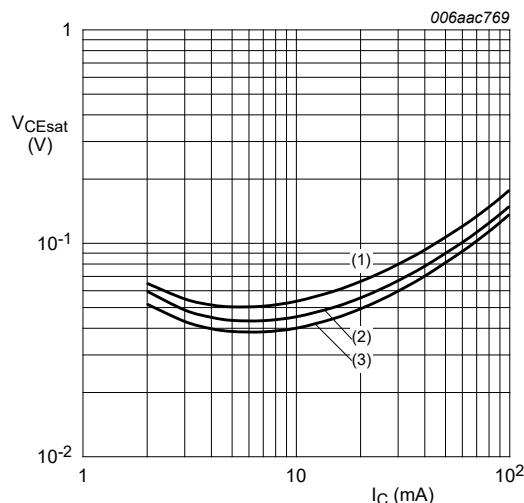
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor, for the PNP transistor with negative polarity</b>							
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2 \text{ mA}$ ; $I_B = 0 \text{ A}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		50	-	-	V
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 50 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	-	100	nA
$I_{CEO}$	collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$ ; $I_B = 0 \text{ A}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	-	1	$\mu\text{A}$
		$V_{CE} = 30 \text{ V}$ ; $I_B = 0 \text{ A}$ ; $T_j = 150^\circ\text{C}$		-	-	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5 \text{ V}$ ; $I_C = 0 \text{ mA}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	-	400	$\mu\text{A}$
$h_{FE}$	DC current gain	$V_{CE} = 5 \text{ V}$ ; $I_C = 5 \text{ mA}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		30	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10 \text{ mA}$ ; $I_B = 0.5 \text{ mA}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	-	150	mV
$V_{I(\text{off})}$	off-state input voltage	$V_{CE} = 5 \text{ V}$ ; $I_C = 100 \mu\text{A}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	1.1	0.8	V
$V_{I(\text{on})}$	on-state input voltage	$V_{CE} = 0.3 \text{ V}$ ; $I_C = 10 \text{ mA}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		2.5	1.8	-	V
$R1$	bias resistor 1 (input)			7	10	13	$\text{k}\Omega$
$R2/R1$	bias resistor ratio			0.8	1	1.2	
<b>TR1 (NPN)</b>							
$C_c$	collector capacitance	$V_{CB} = 10 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $i_e = 0 \text{ A}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	-	2.5	pF
$f_T$	transition frequency	$V_{CE} = 5 \text{ V}$ ; $I_C = 10 \text{ mA}$ ; $f = 100 \text{ MHz}$ ; $T_{\text{amb}} = 25^\circ\text{C}$	[1]	-	230	-	MHz
<b>TR2 (PNP)</b>							
$C_c$	collector capacitance	$V_{CB} = 10 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $i_e = 0 \text{ A}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25^\circ\text{C}$		-	-	3	pF
$f_T$	transition frequency	$V_{CE} = -5 \text{ V}$ ; $I_C = -10 \text{ mA}$ ; $f = 100 \text{ MHz}$ ; $T_{\text{amb}} = 25^\circ\text{C}$	[1]	-	180	-	MHz

[1] Characteristics of built-in transistor

NPN/PNP resistor-equipped transistors;  $R1 = 10 \text{ k}\Omega$ ,  $R2 = 10 \text{ k}\Omega$ 

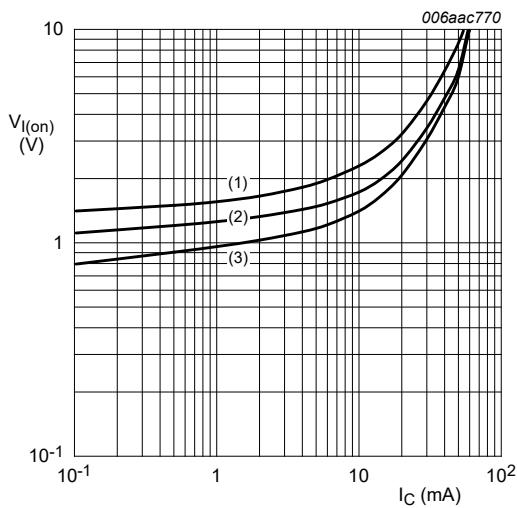
$V_{CE} = 5 \text{ V}$   
 (1)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

Fig. 3. TR1 (NPN): DC current gain as a function of collector current; typical values



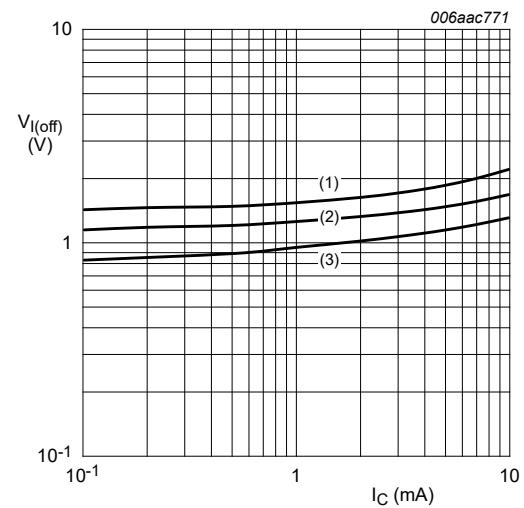
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

Fig. 4. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



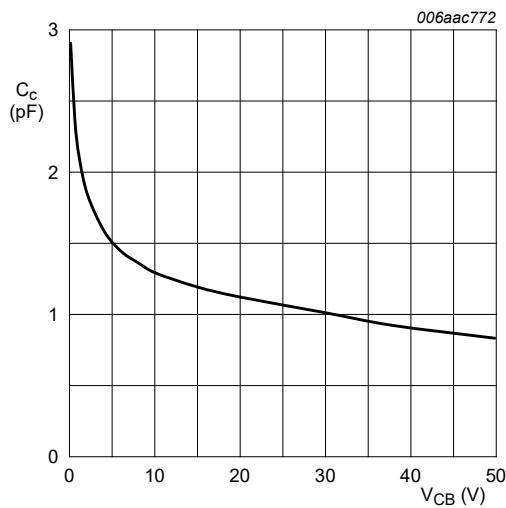
$V_{CE} = 0.3 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig. 5. TR1 (NPN): On-state input voltage as a function of collector current; typical values



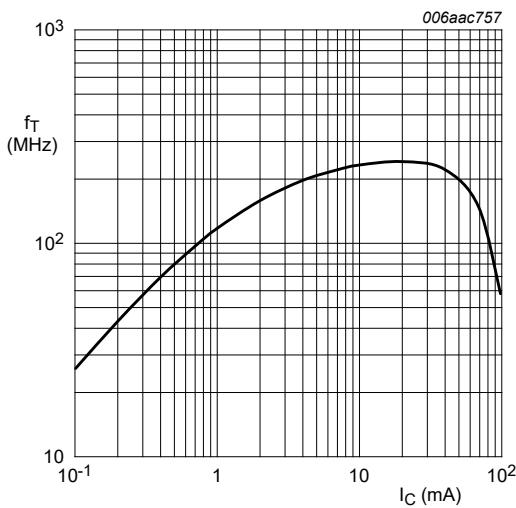
$V_{CE} = 5 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig. 6. TR1 (NPN): Off-state input voltage as a function of collector current; typical values



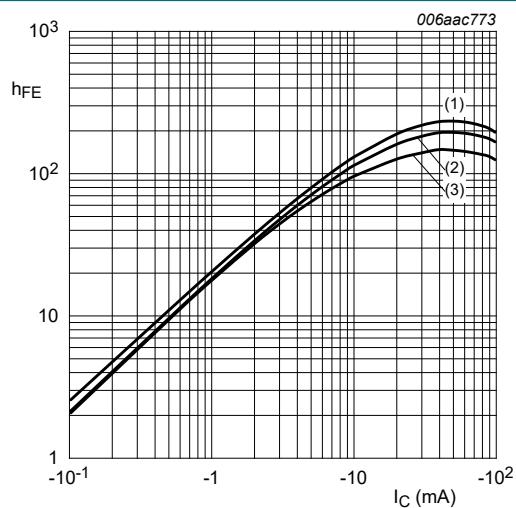
$f = 1 \text{ MHz}$   
 $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$

Fig. 7. TR1 (NPN): Collector capacitance as a function of collector-base voltage; typical values



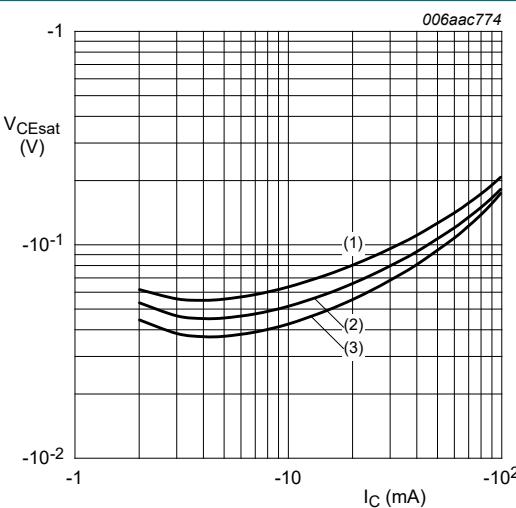
$f = 100 \text{ MHz}$   
 $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$   
 $V_{CE} = 5 \text{ V}$

Fig. 8. TR1 (NPN): Transition frequency as a function of collector current; typical values of built-in transistor



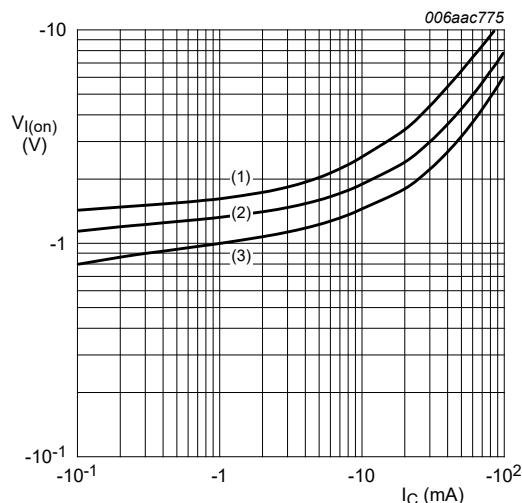
$V_{CE} = -5 \text{ V}$   
(1)  $T_{\text{amb}} = 100 \text{ }^{\circ}\text{C}$   
(2)  $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$   
(3)  $T_{\text{amb}} = -40 \text{ }^{\circ}\text{C}$

Fig. 9. TR2 (PNP): DC current gain as a function of collector current; typical values



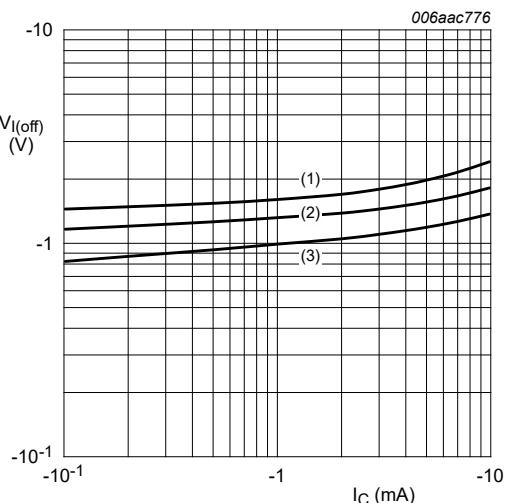
$I_C/I_B = 20$   
(1)  $T_{\text{amb}} = 100 \text{ }^{\circ}\text{C}$   
(2)  $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$   
(3)  $T_{\text{amb}} = -40 \text{ }^{\circ}\text{C}$

Fig. 10. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values



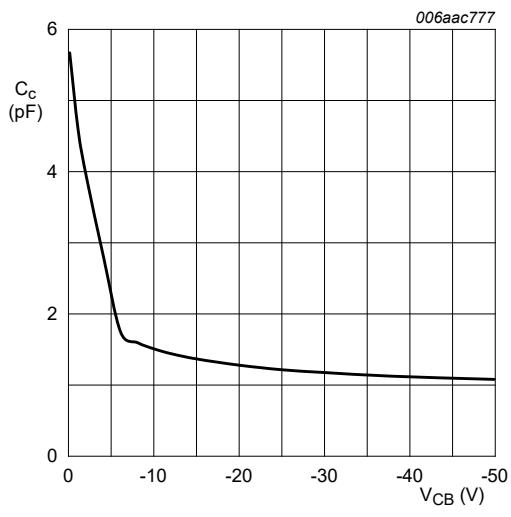
$V_{CE} = -0.3 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig. 11. TR2 (PNP): On-state input voltage as a function of collector current; typical values



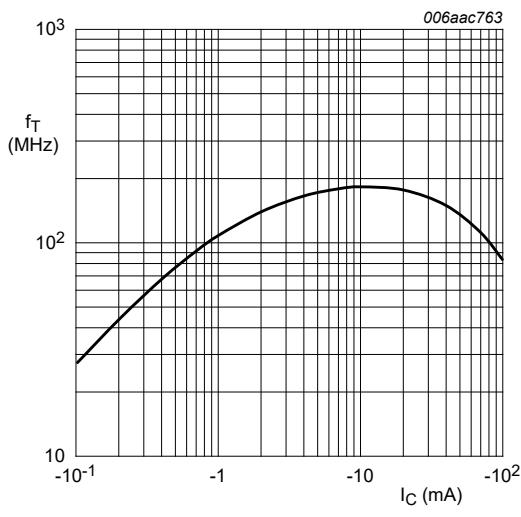
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig. 12. TR2 (PNP): Off-state input voltage as a function of collector current; typical values



$f = 1 \text{ MHz}$   
 $T_{amb} = 25 \text{ }^{\circ}\text{C}$

Fig. 13. TR2 (PNP): Collector capacitance as a function of collector-base voltage; typical values



$f = 100 \text{ MHz}$   
 $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 $V_{CE} = -5 \text{ V}$

Fig. 14. TR2 (PNP): Transition frequency as a function of collector current; typical values of built-in transistor

## 11. Test information

### Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 12. Package outline

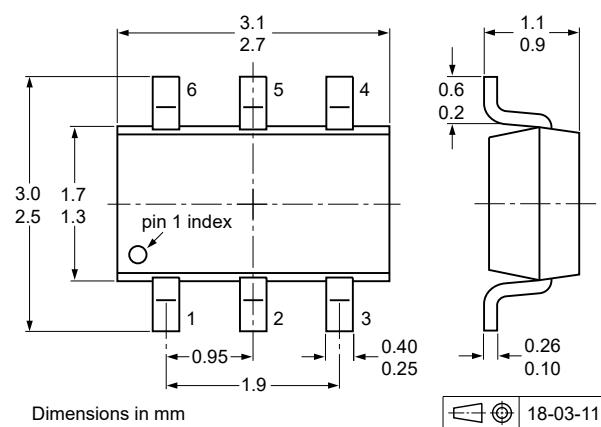


Fig. 15. Package outline SC-74; TSOP6 (SOT457)

## 13. Soldering

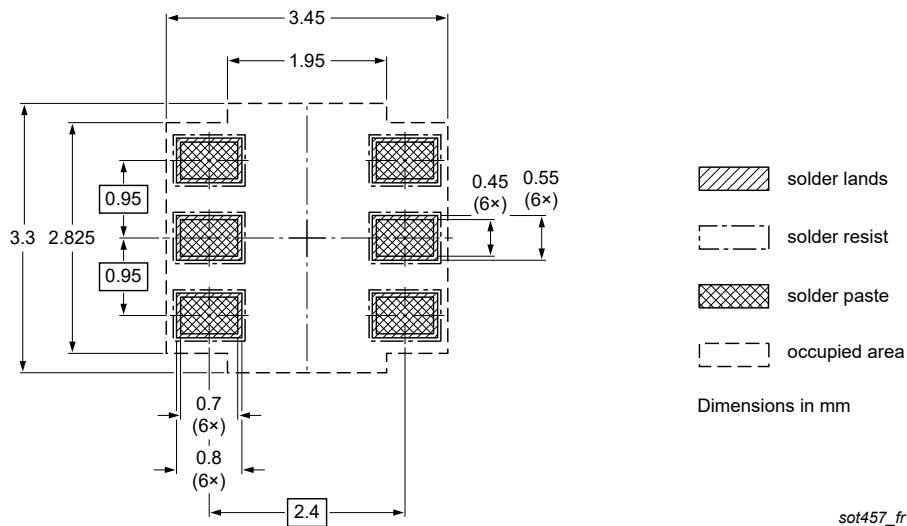


Fig. 16. Reflow soldering footprint for SC-74; TSOP6 (SOT457)

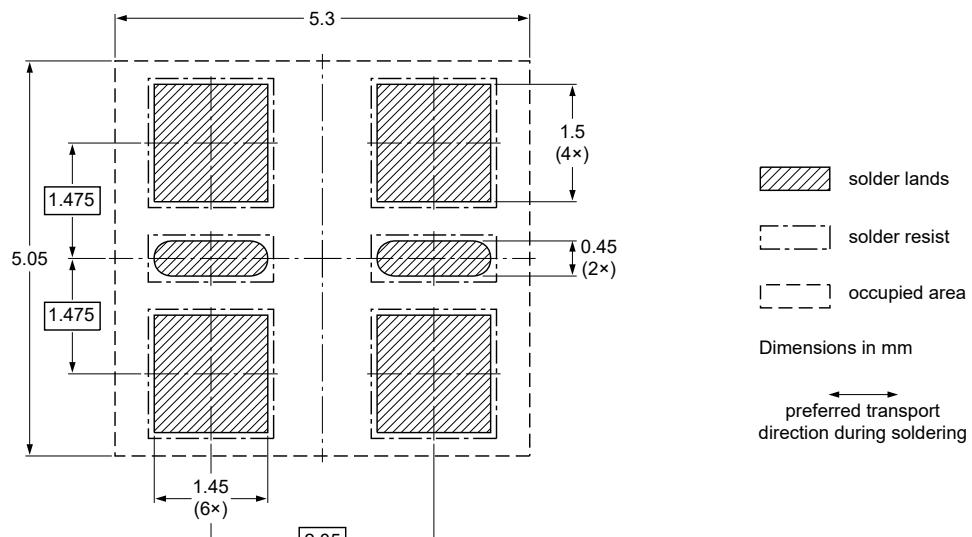


Fig. 17. Wave soldering footprint for SC-74; TSOP6 (SOT457)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PIMD3 v.12	20220812	Product data sheet	-	PEMD3_PIMD3_PUMD3 v.11
Modification:	• Family data sheet reduced to single type data sheet.			
PEMD3_PIMD3_PUMD3 v.11	20130925	Product data sheet	-	PEMD3_PIMD3_PUMD3 v.10
PEMD3_PIMD3_PUMD3 v.10	20091115	Product data sheet	-	PEMD3_PIMD3_PUMD3 v.9
PEMD3_PIMD3_PUMD3 v.9	20050518	Product data sheet	-	PEMD3_PIMD3_PUMD3 v.8
PEMD3_PIMD3_PUMD3 v.8	20041206	Product data sheet	-	PEMD3_PUMD3 v.7

## 15. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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