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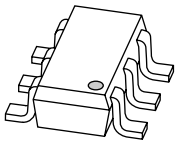


PIMN31

500 mA, 50 V NPN/NPN double resistor-equipped transistor; R1 = 1 kΩ, R2 = 10 kΩ

Rev. 01 — 19 June 2007 Product data sheet

1. Product profile

1.1 General description

500 mA, 50 V NPN/NPN double Resistor-Equipped Transistor (RET) in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

1.2 Features

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

1.3 Applications

- Digital application in automotive and industrial segments
- Switching loads

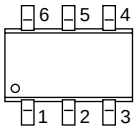
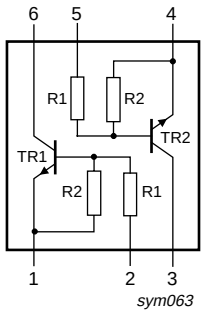
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V_{CEO}	collector-emitter voltage	open base	-	-	50	V
I_O	output current		-	-	500	mA
R1	bias resistor 1 (input)		0.7	1	1.3	kΩ
R2/R1	bias resistor ratio		9	10	11	

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	GND (emitter) TR1		
2	input (base) TR1		
3	output (collector) TR2		
4	GND (emitter) TR2		
5	input (base) TR2		
6	output (collector) TR1		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PIMN31	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 4. Marking codes

Type number	Marking code
PIMN31	4E

5. Limiting values

Table 5. Limiting values

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

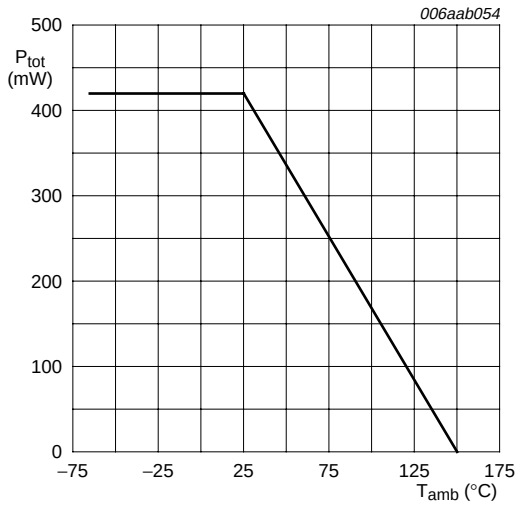
Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V_{CBO}	collector-base voltage	open emitter		-	50	V
V_{CEO}	collector-emitter voltage	open base		-	50	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
V_I	input voltage					
	positive			-	+12	V
	negative			-	–5	V
I_O	output current			-	500	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	290	mW

Table 5. Limiting values *…continued*

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	420	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–65	+150	°C
T_{stg}	storage temperature			–65	+150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

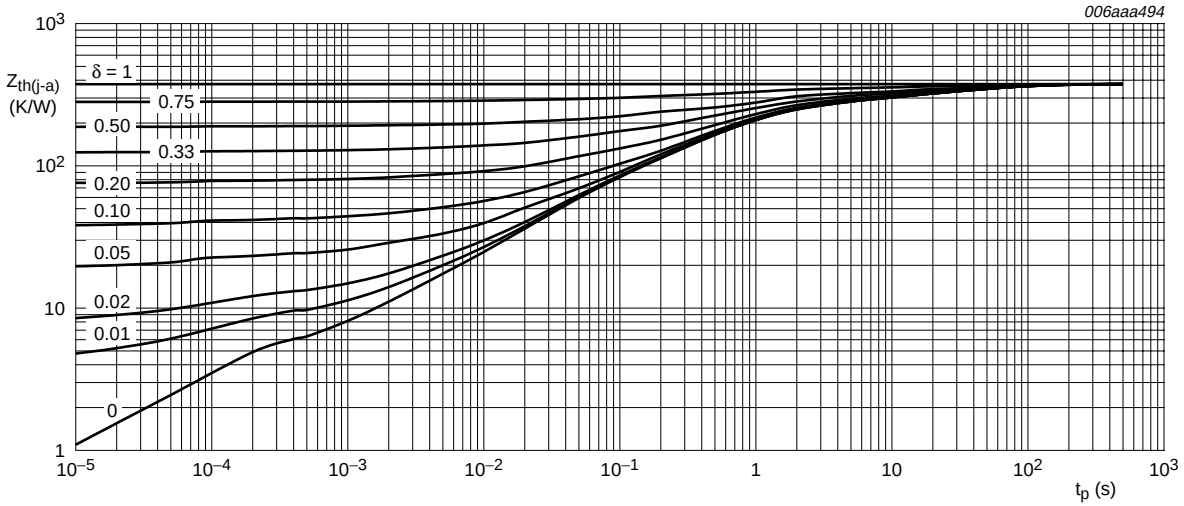
Fig 1. Power derating curve

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	431	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	105	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	298	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

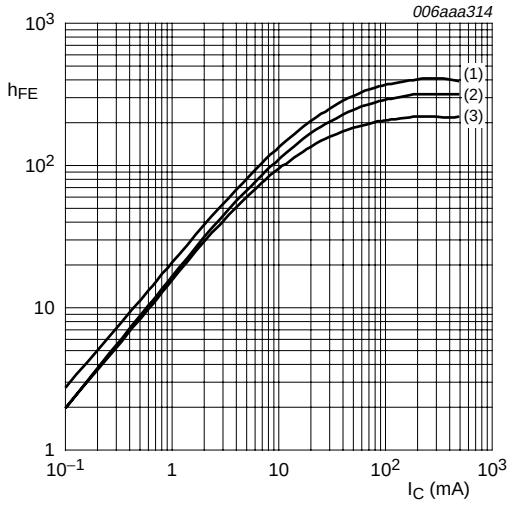
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT457 (SC-74); typical values

7. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	V_{CB} = 50 V; I_E = 0 A	-	-	100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 50 V; I_B = 0 A	-	-	0.5	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A	-	-	0.72	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 50 mA	70	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 50 mA; I_B = 2.5 mA	-	-	0.3	V
$V_{I(off)}$	off-state input voltage	V_{CE} = 5 V; I_C = 100 µA	0.3	0.6	1	V
$V_{I(on)}$	on-state input voltage	V_{CE} = 0.3 V; I_C = 20 mA	0.4	0.8	1.4	V
R1	bias resistor 1 (input)		0.7	1	1.3	kΩ
R2/R1	bias resistor ratio		9	10	11	
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz	-	7	-	pF



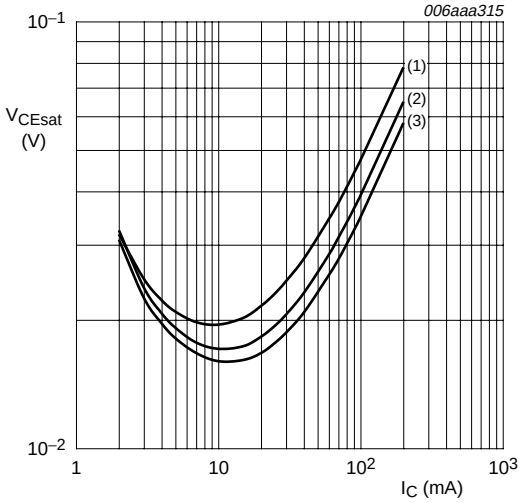
V_{CE} = 5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 3. DC current gain as a function of collector current; typical values



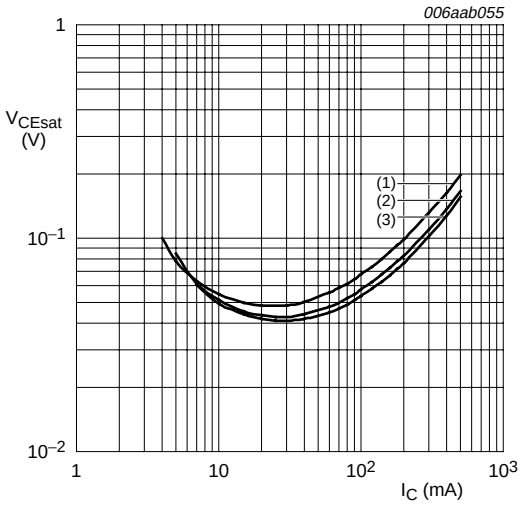
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values



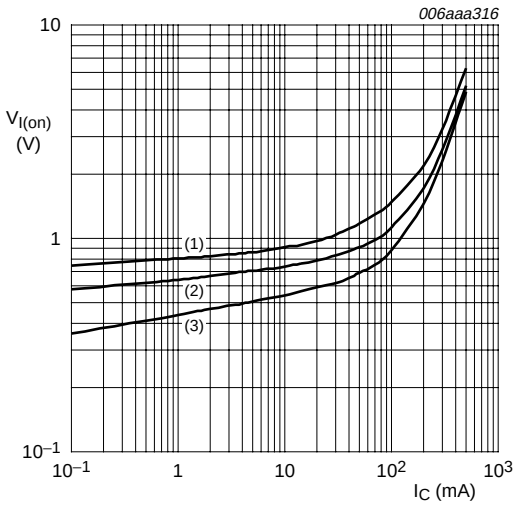
I_C/I_B = 50

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 5. Collector-emitter saturation voltage as a function of collector current; typical values



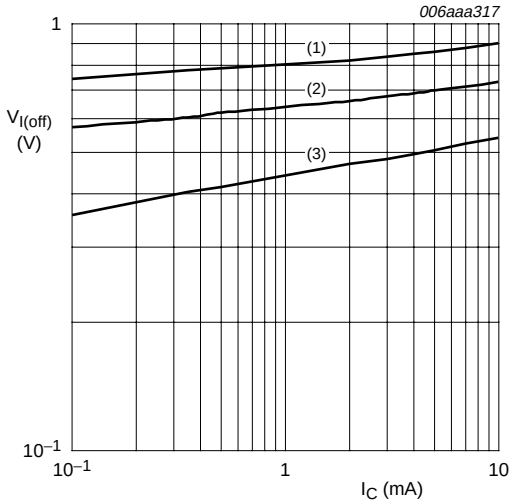
V_{CE} = 0.3 V

(1) T_{amb} = –40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 6. On-state input voltage as a function of collector current; typical values



V_{CE} = 5 V

(1) T_{amb} = –40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 7. Off-state input voltage as a function of collector current; typical values

8. Test information

8.1 Quality information

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

9. Package outline

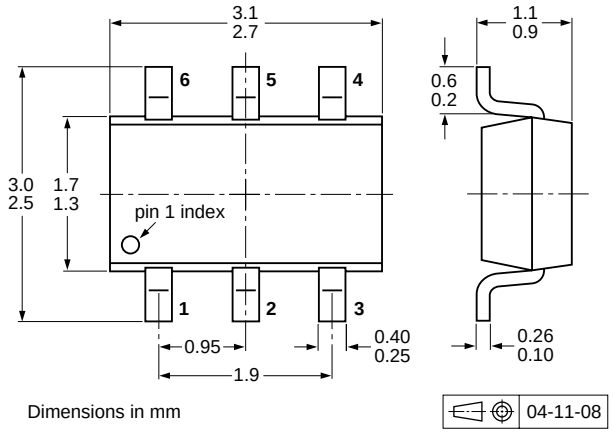


Fig 8. Package outline SOT457 (SC-74)

10. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

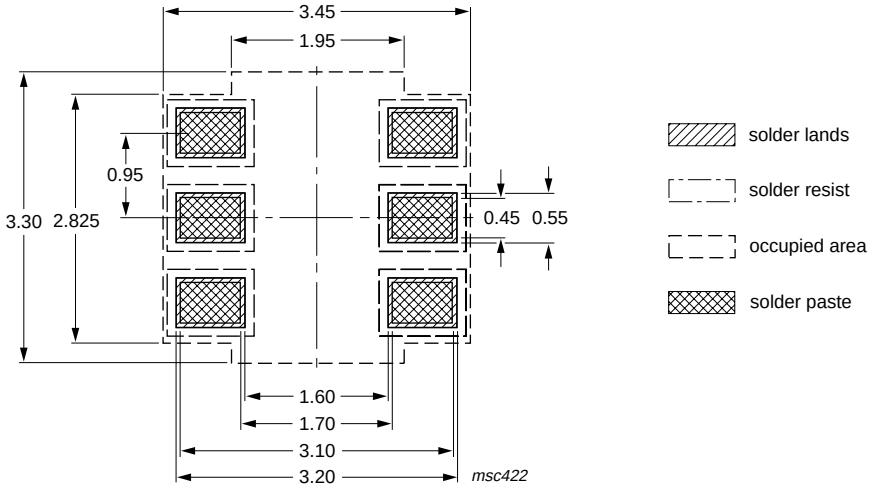
Type number	Package	Description		Packing quantity	
				3000	10000
PIMN31	SOT457	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-165

[1] For further information and the availability of packing methods, see Section 14.

[2] T1: normal taping

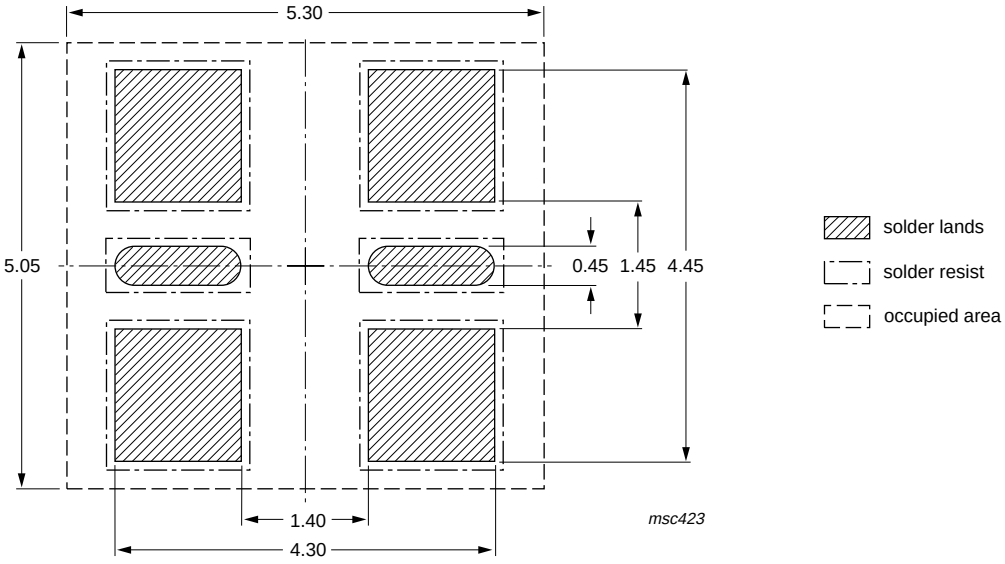
[3] T2: reverse taping

11. Soldering



Dimensions in mm

Fig 9. Reflow soldering footprint SOT457 (SC-74)



Dimensions in mm

Fig 10. Wave soldering footprint SOT457 (SC-74)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PIMN31_1	20070619	Product data sheet	-	-

13. Legal information

13.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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