



PUMD18-Q

50 V, 100 mA NPN/PNP resistor-equipped double transistor;
R1 = 4.7 kΩ, R2 = 10 kΩ

5 March 2025

Product data sheet

1. General description

NPN/PNP double Resistor-Equipped Transistor (RET) in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PUMH18-Q

PNP/PNP complement: PUMB18-Q

2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplified circuit design
- Reduces component count
- Reduces pick and place costs
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Low current peripheral driver
- Controlling 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
Per transistor							
V _{CEO}	collector-emitter voltage	open base	[1]	-	-	50	V
I _O	output current		[1]	-	-	100	mA
R1	bias resistor 1 (input)		[2]	3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		[2]	1.7	2.1	2.6	

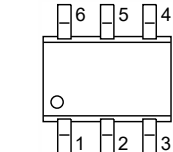
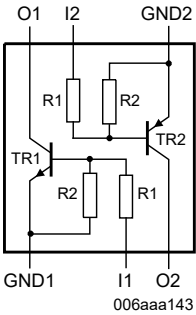
[1] For the PNP transistor with negative polarity.

[2] See section "Test information" for resistor calculation and test conditions.

50 V, 100 mA NPN/PNP resistor-equipped double transistor; R1 = 4.7 kΩ, R2 = 10 kΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1	 TSSOP6 (SOT363)	
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		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PUMD18-Q	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PUMD18-Q	T5%

[1] % = placeholder for manufacturing site code

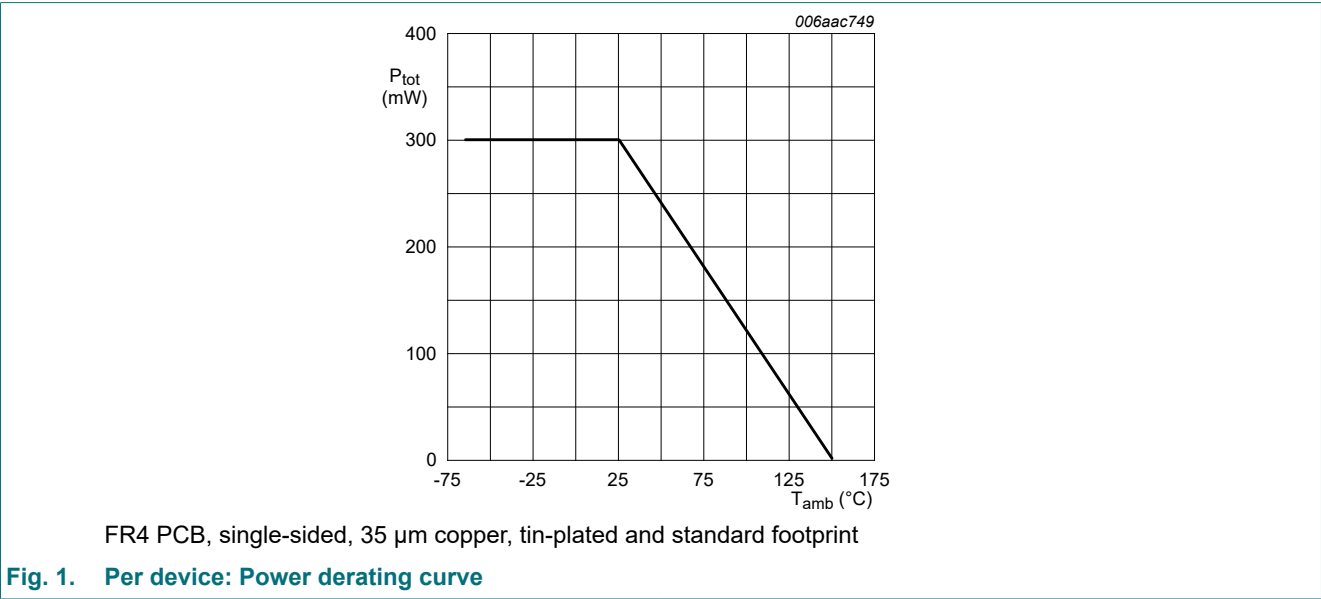
50 V, 100 mA NPN/PNP resistor-equipped double transistor; R1 = 4.7 kΩ, R2 = 10 kΩ

8. 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	[1]	-	50	V
V _{CEO}	collector-emitter voltage	open base	[1]	-	50	V
V _{EBO}	emitter-base voltage	open collector	[1]	-	7	V
V _I	input voltage	TR1		-7	20	V
		TR2		-20	7	V
I _O	output current		[1]	-	100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2]	-	200	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2]	-	300	mW
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-65	150	°C
T _{stg}	storage temperature			-65	150	°C

- [1] For the PNP transistor with negative polarity.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

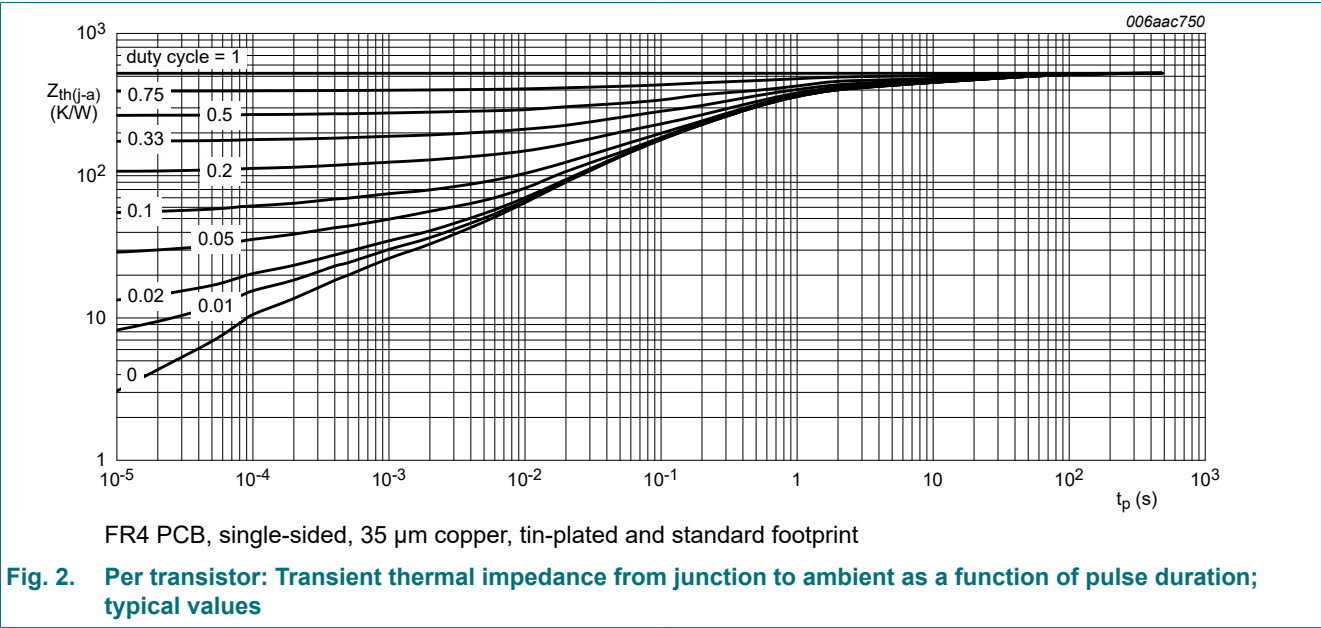


9. Thermal characteristics

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]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W

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



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$; $I_E = 0\text{ A}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2\text{ mA}$; $I_B = 0\text{ A}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	50	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 50\text{ V}$; $I_E = 0\text{ A}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-	100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30\text{ V}$; $I_B = 0\text{ A}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-	100	nA
		$V_{CE} = 30\text{ V}$; $I_B = 0\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$	[1]	-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}$; $I_C = 0\text{ A}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-	600	μA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	50	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-	100	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = 5\text{ V}$; $I_C = 100\text{ }\mu\text{A}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	0.9	0.3	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = 0.3\text{ V}$; $I_C = 20\text{ mA}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	2.5	1.5	-	V
R1	bias resistor 1 (input)		[2]	3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		[2]	1.7	2.1	2.6	
TR1 (NPN)							
C_c	collector capacitance	$V_{CB} = 10\text{ V}$; $I_E = 0\text{ A}$; $i_e = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	2.5	pF
f_T	transition frequency	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$; $f = 100\text{ MHz}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[3]	-	230	-	MHz
TR2 (PNP)							
C_c	collector capacitance	$V_{CB} = -10\text{ V}$; $I_E = 0\text{ A}$; $i_e = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	3	pF
f_T	transition frequency	$V_{CE} = -5\text{ V}$; $I_C = -10\text{ mA}$; $f = 100\text{ MHz}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[3]	-	180	-	MHz

[1] For the PNP transistor with negative polarity.
[2] See section "Test information" for resistor calculation and test conditions.
[3] Characteristics of built-in transistor

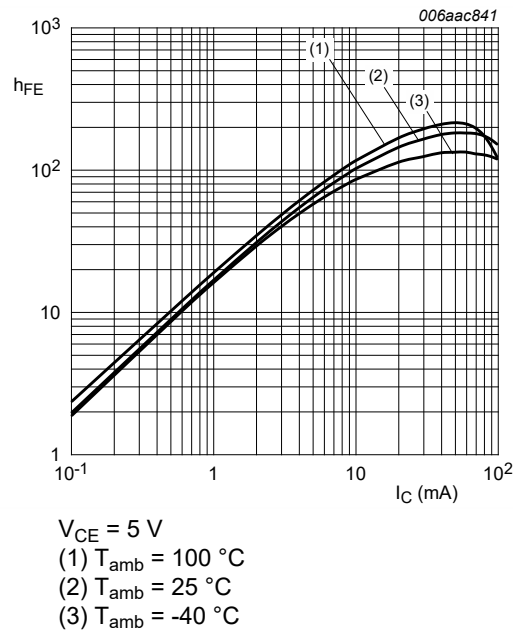


Fig. 3. TR1 (NPN): DC current gain as a function of collector current; typical values

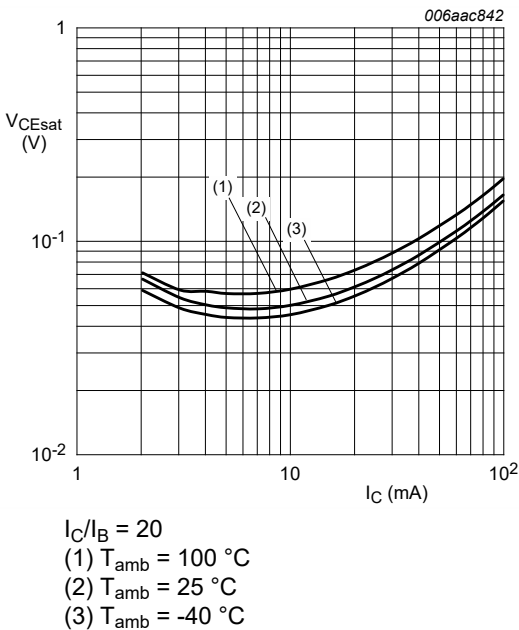


Fig. 4. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

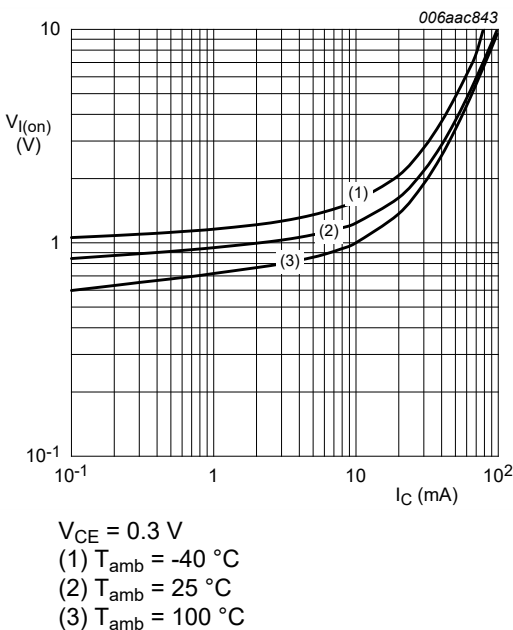


Fig. 5. TR1 (NPN): On-state input voltage as a function of collector current; typical values

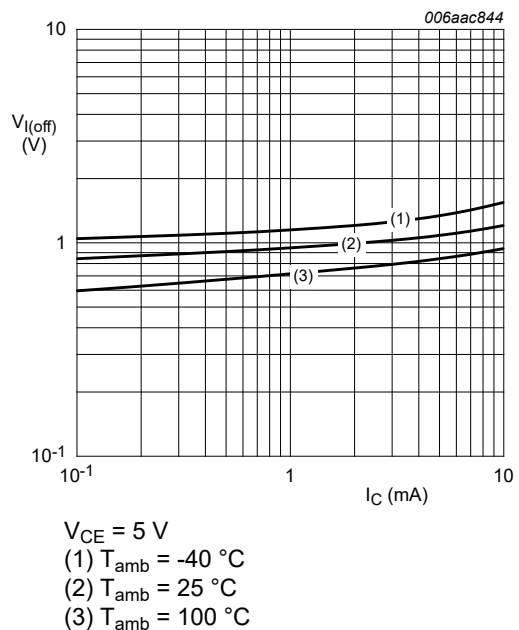


Fig. 6. TR1 (NPN): Off-state input voltage as a function of collector current; typical values

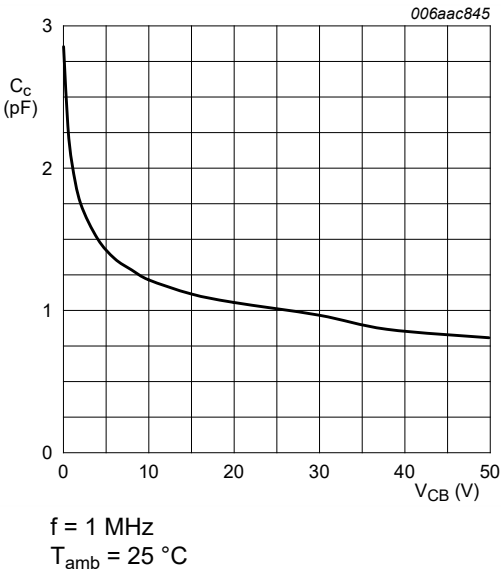


Fig. 7. TR1 (NPN): Collector capacitance as a function of collector-base voltage; typical values

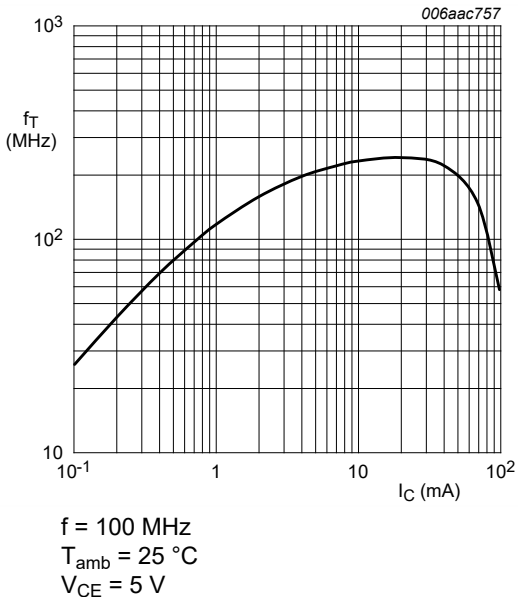


Fig. 8. TR1 (NPN): Transition frequency as a function of collector current; typical values of built-in transistor

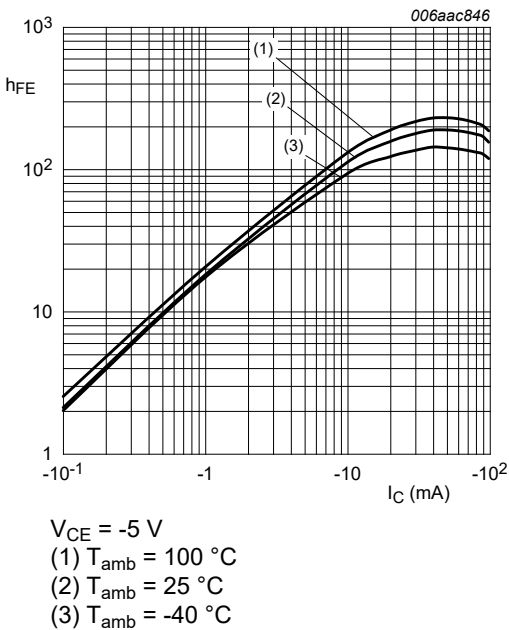


Fig. 9. TR2 (PNP): DC current gain as a function of collector current; typical values

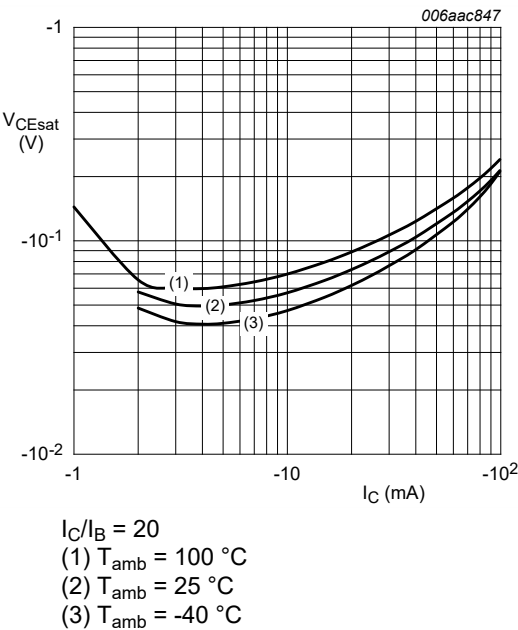


Fig. 10. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

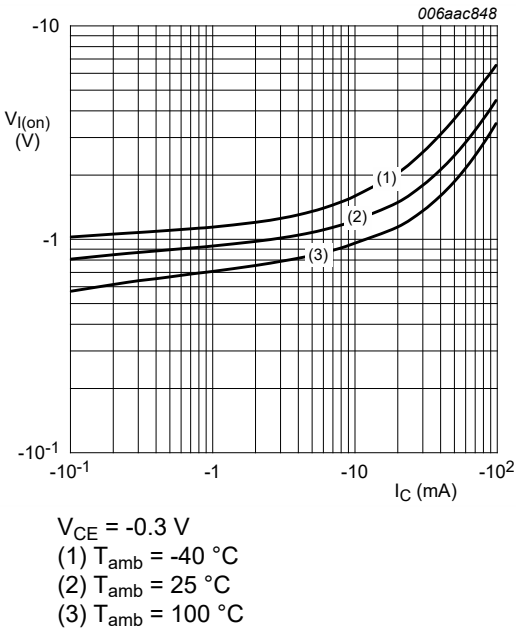


Fig. 11. TR2 (PNP): On-state input voltage as a function of collector current; typical values

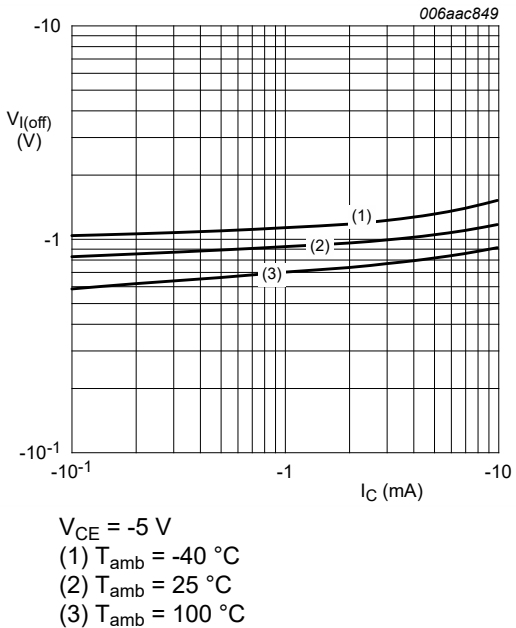


Fig. 12. TR2 (PNP): Off-state input voltage as a function of collector current; typical values

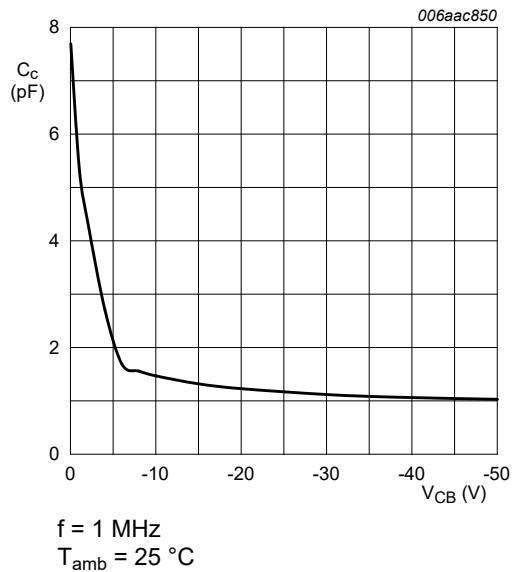


Fig. 13. TR2 (PNP): Collector capacitance as a function of collector-base voltage; typical values

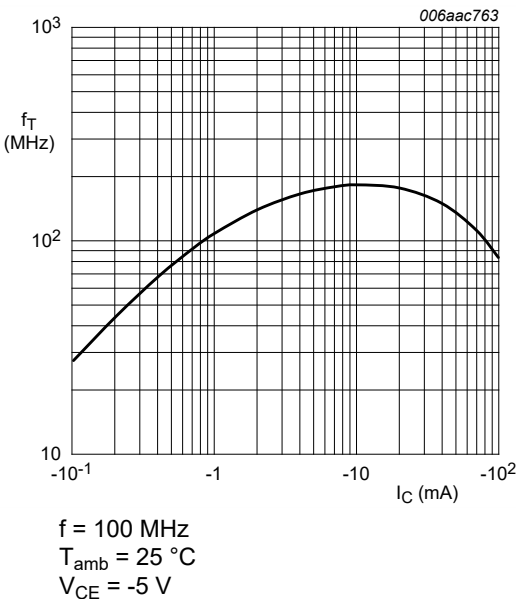


Fig. 14. TR2 (PNP): Transition frequency as a function of collector current; typical values of built-in transistor

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.

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_1 = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R_2}{R_1} = \frac{V(I_4) - V(I_3)}{R_1 \cdot (I_4 - I_3)} - 1$$

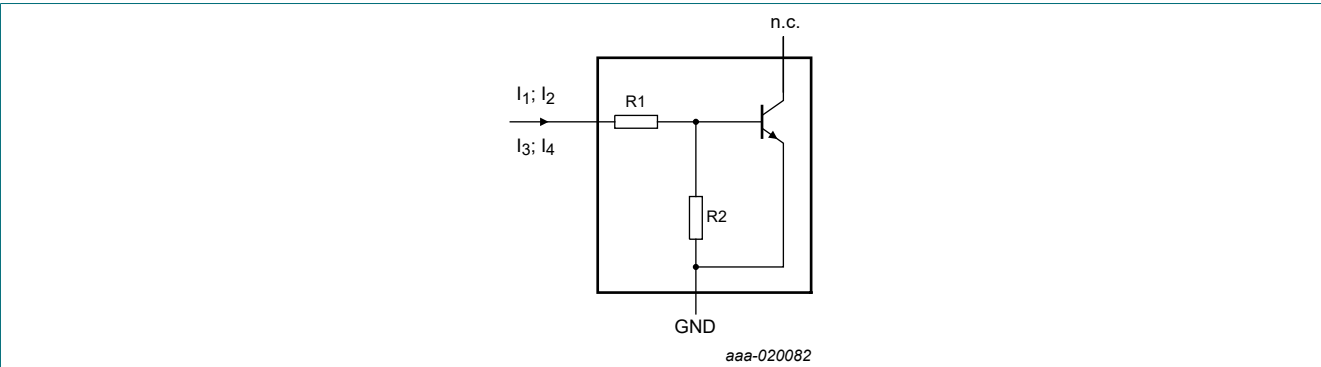


Fig. 15. NPN transistor: Resistor test circuit

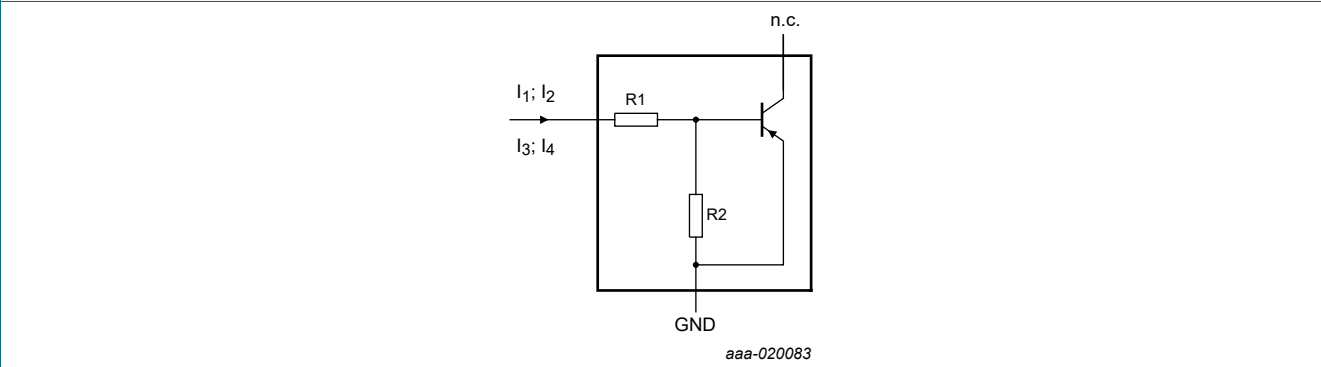


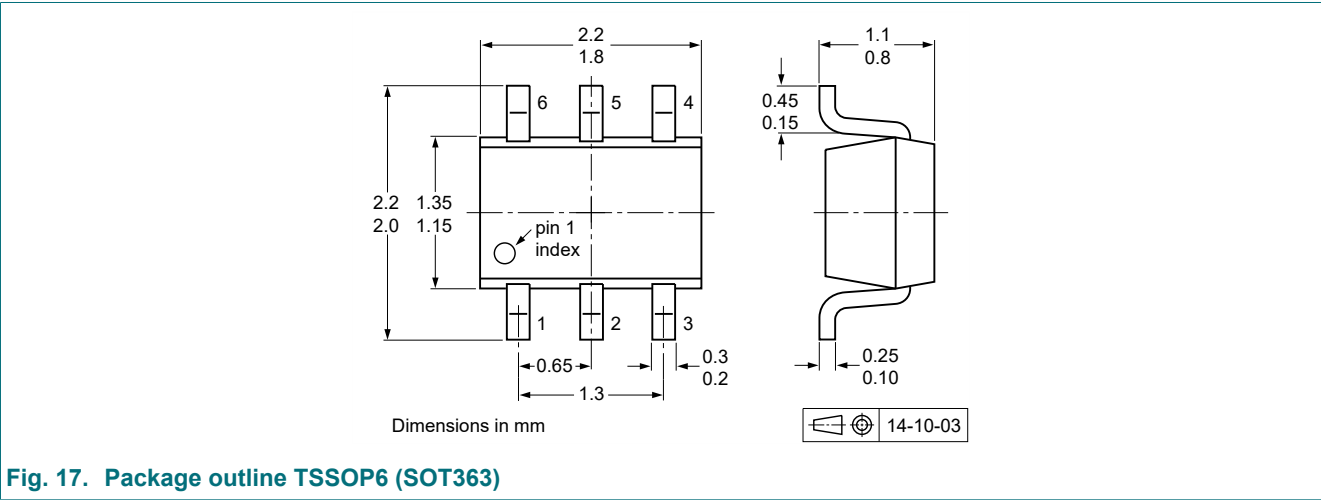
Fig. 16. PNP transistor: Resistor test circuit

Resistor test conditions

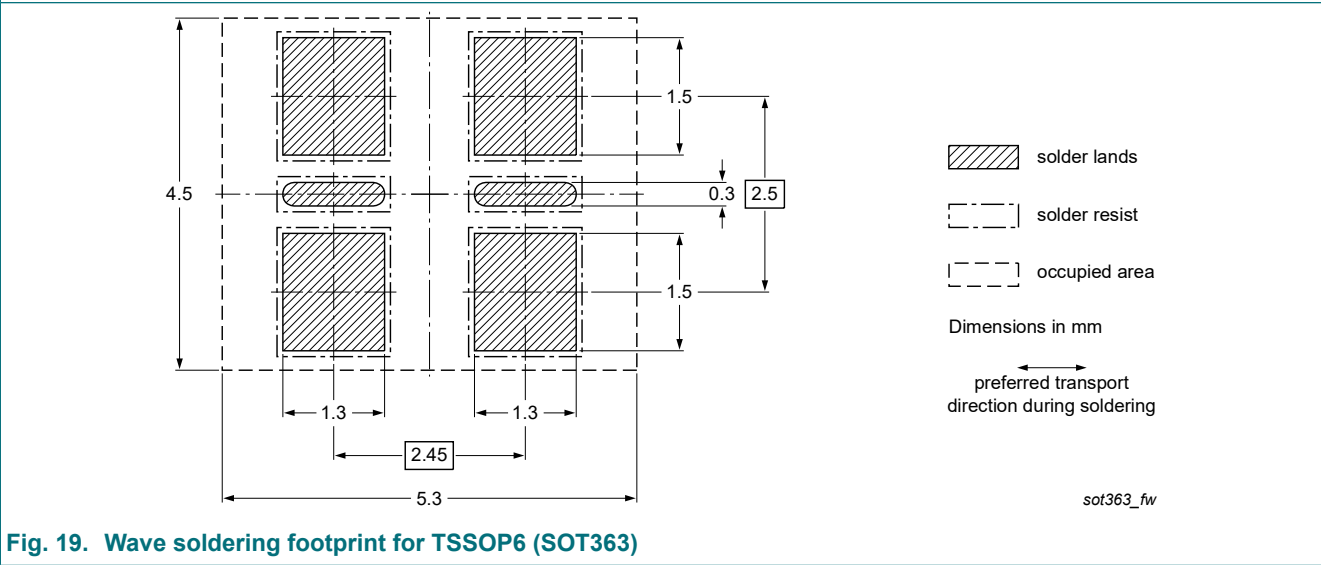
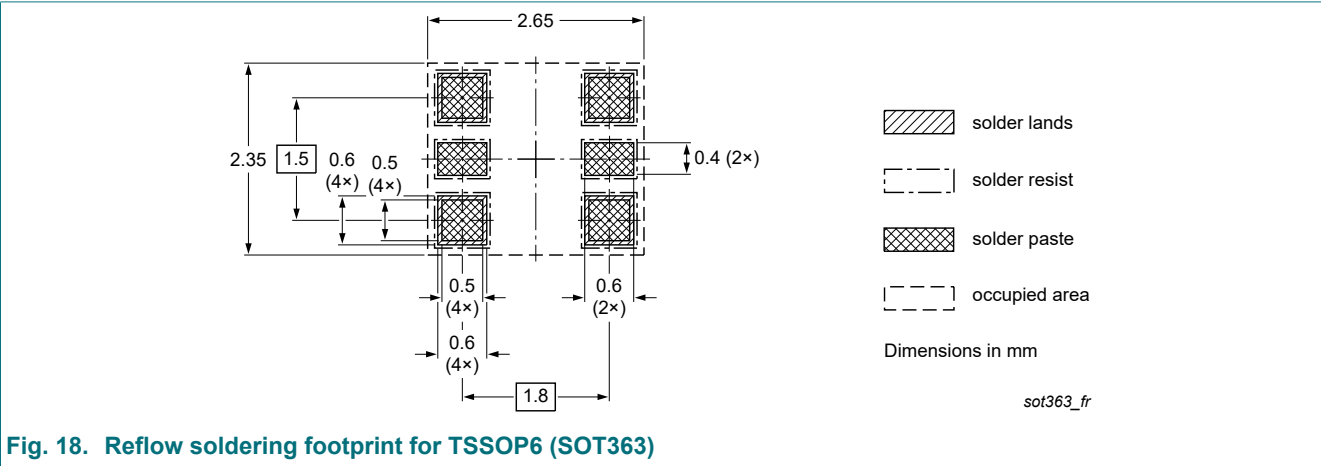
Table 8. Resistor test conditions

PUMD18-Q	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I ₁	I ₂	I ₃	I ₄
TR1 (NPN)	4.7	10	350 μA	450 μA	-350 μA	-450 μA
TR2 (PNP)	4.7	10	-350 μA	-450 μA	350 μA	450 μA

12. Package outline



13. Soldering



50 V, 100 mA NPN/PNP resistor-equipped double transistor; R1 = 4.7 kΩ, R2 = 10 kΩ

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PUMD18-Q v.1	20250305	Product data sheet	-	-

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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Date of release: 5 March 2025