



PDTC143XU

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

30 October 2025

Product data sheet

1. General description

NPN Resistor-Equipped Transistor (RET) in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

PNP complement: PDTA143XU

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

- Digital application in automotive and industrial segments
- Cost-saving alternative for BC847 series in digital applications
- Controlling IC inputs
- Switching loads

4. Quick reference data

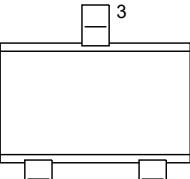
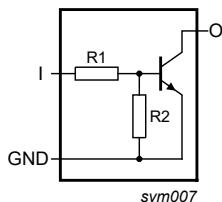
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base		-	-	50	V
I _O	output current			-	-	100	mA
R1	bias resistor 1 (input)		[1]	3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		[1]	1.7	2.1	2.6	

[1] See "Section 11: Test information" for resistor calculation and test conditions.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I	input (base)	 SC-70 (SOT323)	
2	GND	ground (emitter)		
3	O	output (collector)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PDTC143XU	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PDTC143XU	%53

[1] % = placeholder for manufacturing site code

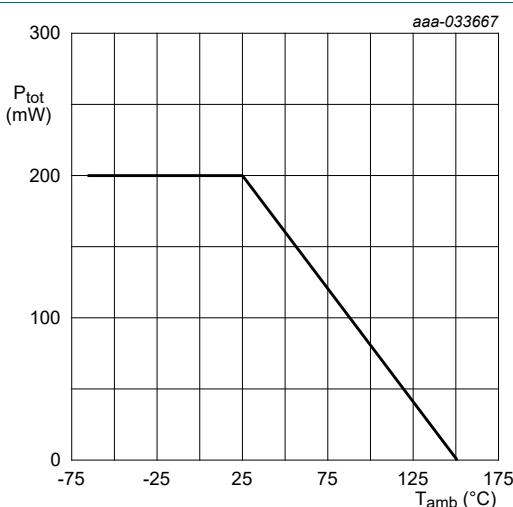
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
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		-	7	V
V_I	input voltage			-7	20	V
I_O	output current			-	100	mA
I_{CM}	peak collector current	$t_p \leq 1 \text{ ms}$; single pulse		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25 \text{ }^{\circ}\text{C}$	[1]	-	250	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 PCB, single-sided, 35 μm copper, tin-plated and standard footprint.



FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint

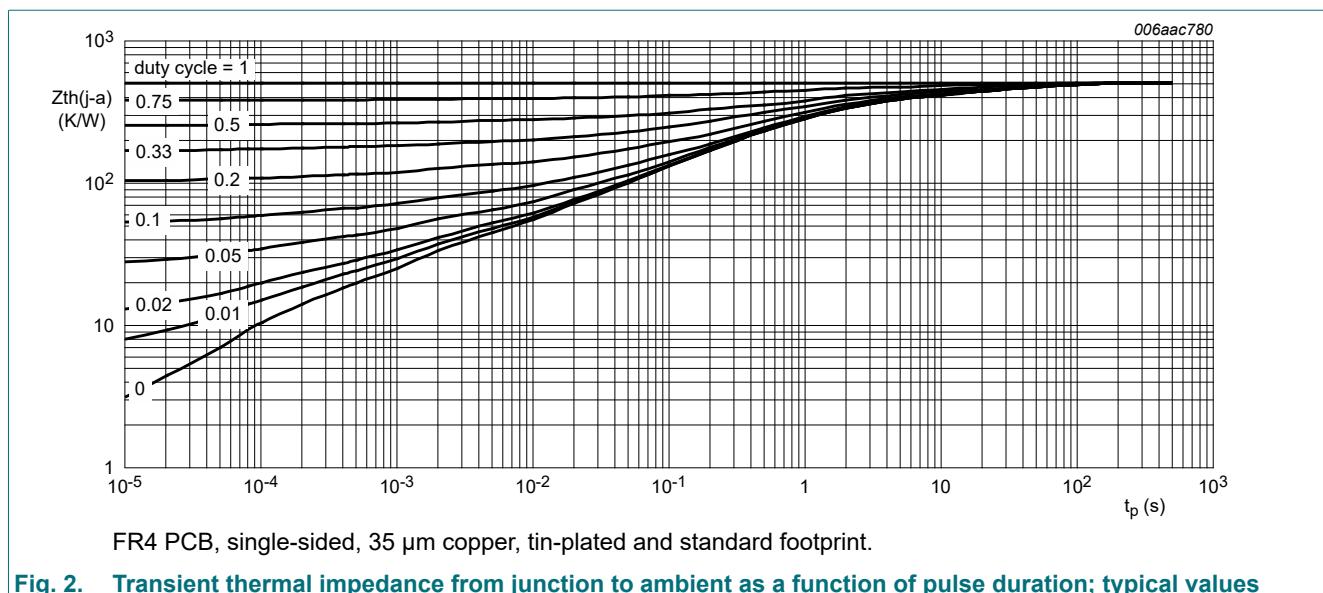
Fig. 1. Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W

[1] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.



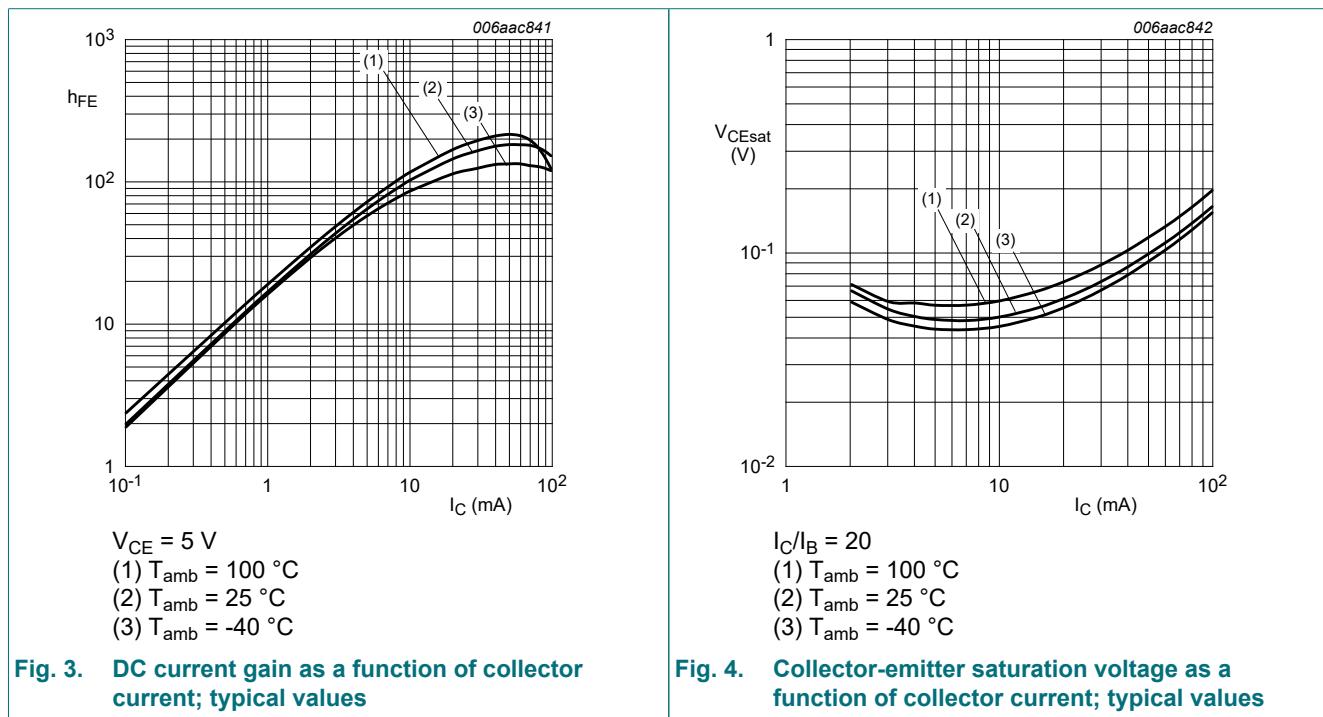
10. Characteristics

Table 7. Characteristics

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

[1] See "Section 11: Test information" for resistor calculation and test conditions.

[2] Characteristics of built-in transistor.



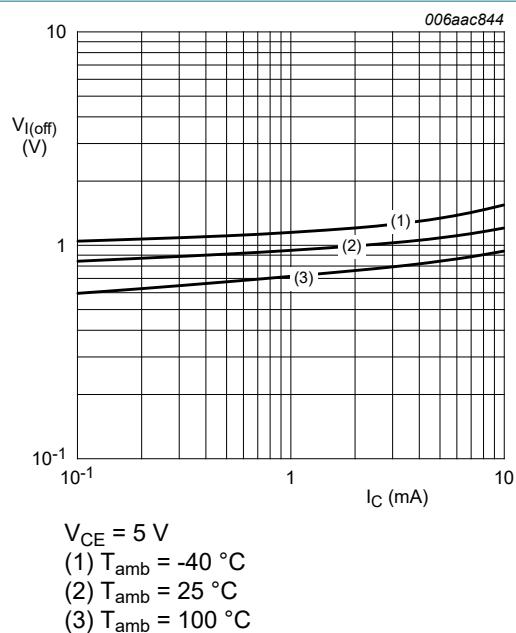
50 V, 100 mA NPN resistor-equipped transistor; $R1 = 4.7 \text{ k}\Omega$, $R2 = 10 \text{ k}\Omega$ 

Fig. 5. Off-state input voltage as a function of collector current; typical values

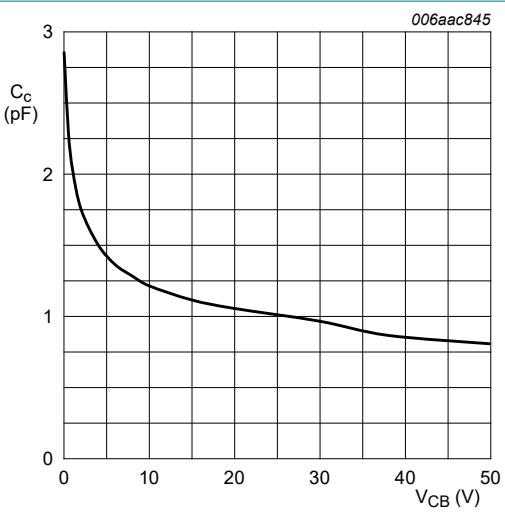


Fig. 6. Collector capacitance as a function of collector-base voltage; typical values

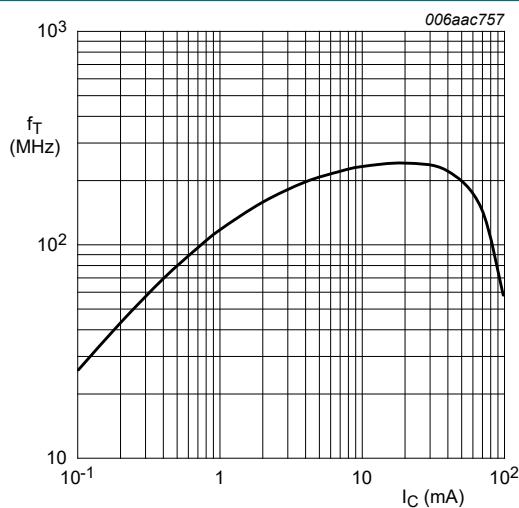
 $V_{CE} = 5 \text{ V}; T_{\text{amb}} = 25^\circ\text{C}$

Fig. 7. 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.

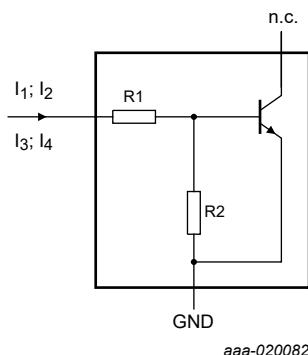
Resistor calculation

- 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)

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



aaa-020082

Fig. 8. Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I ₁	I ₂	I ₃	I ₄
PDTC143XU	4.7	10	350 µA	450 µA	-350 µA	-450 µA

12. Package outline

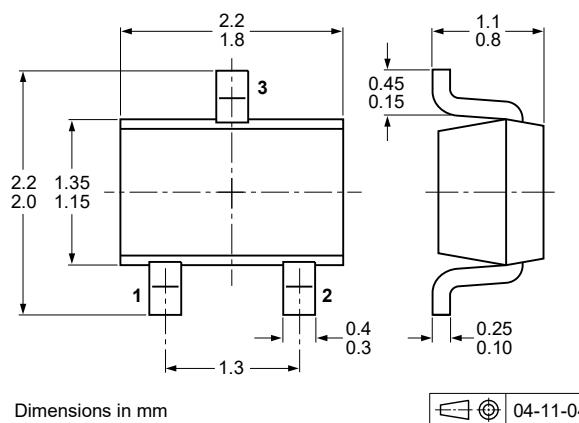


Fig. 9. Package outline SC-70 (SOT323)

13. Soldering

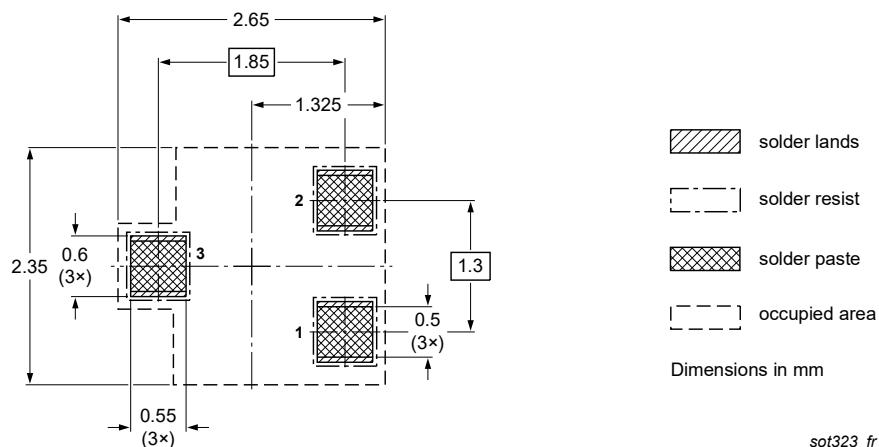


Fig. 10. Reflow soldering footprint for SC-70 (SOT323)

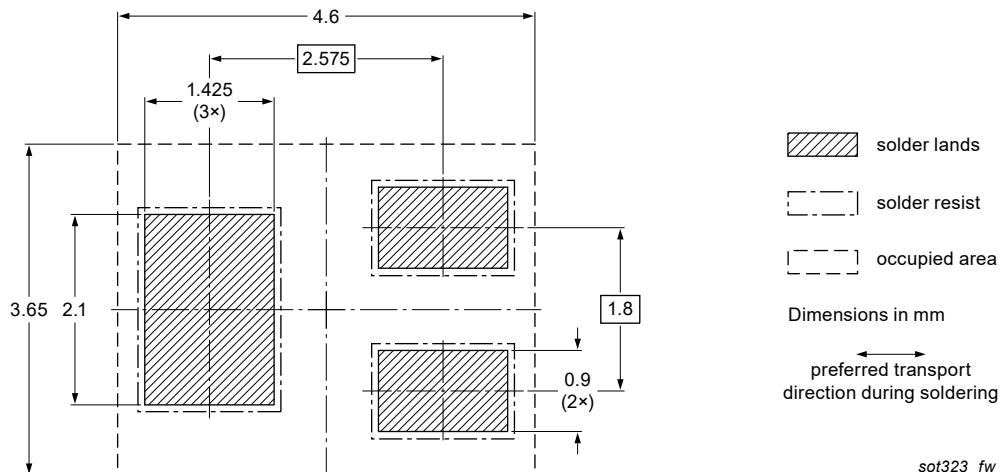


Fig. 11. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTC143XU v.12	20251030	Product data sheet	-	PDTC143X_SER v.11
Modification:	<ul style="list-style-type: none">Family data sheet splitted to single type data sheets.The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.Legal texts have been adapted to the new company name where appropriate.Packing information removed.			
PDTC143X_SER v.11	20111209	Product data sheet	-	PDTC143X_SERIES v.10
PDTC143X_SERIES v.10	20091116	Product data sheet	-	PDTC143X_SERIES v.6
PDTC143X_SERIES v.9	20050726	Product data sheet	-	PDTC143X_SERIES v.8
PDTC143X_SERIES v.8	20040806	Product specification	-	PDTC143X_SERIES v.7
PDTC143X_SERIES v.7	20040323	Product specification	-	PDTC143X_SERIES v.6
PDTC143X_SERIES v.6	20040112	Product specification	-	PDTC143X_SERIES v.5
PDTC143X_SERIES v.5	20031112	Product specification	-	PDTC143X_SERIES v.4
PDTC143X_SERIES v.4	20030910	Product specification	-	PDTC143X_SERIES v.3
PDTC143X_SERIES v.3	20030410	Product specification	-	-

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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