



PDTA143X/123J/143Z/114Y/124XQC-Q series

50 V, 100 mA PNP resistor-equipped transistors

Rev. 1 — 30 September 2021

Product data sheet

1. General description

100 mA PNP Resistor-Equipped Transistor (RET) family in an ultra small DFN1412D-3 (SOT8009) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

Table 1. Product overview

Type number	R1	R2	Package		NPN complement:
	k Ω	k Ω	Nexperia	JEDEC	
PDTA143XQC-Q	4.7	10	SOT8009	MO-340CA	PDTC143XQC-Q
PDTA123JQC-Q	2.2	47			PDTC123JQC-Q
PDTA143ZQC-Q	4.7	47			PDTC143ZQC-Q
PDTA114YQC-Q	10	47			PDTC114YQC-Q
PDTA124XQC-Q	22	47			PDTC124XQC-Q

2. Features and benefits

- 100 mA output current capability
- Built-in resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- Low package height of 0.5 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Digital applications
- Cost saving alternative for BC857-Q series in digital applications
- Controlling IC inputs
- Switching loads

4. Quick reference data

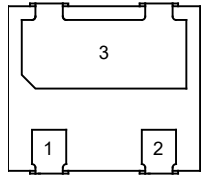
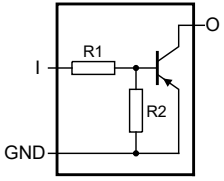
Table 2. Quick reference data

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-50	V
I_O	output current		-	-	-100	mA

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I	input (base)	 <p>Transparent top view</p>	 <p>aaa-019606</p>
2	GND	GND (emitter)		
3	O	output (collector)		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTA143XQC-Q	DFN1412D-3	plastic leadless ultra small outline package with side-wettable flanks (SWF); 3 terminals; 0.8 mm pitch; body: 1.4 x 1.2 x 0.48 mm	SOT8009
PDTA123JQC-Q			
PDTA143ZQC-Q			
PDTA114YQC-Q			
PDTA124XQC-Q			

7. Marking

Table 5. Marking

Type number	Marking code
PDTA143XQC-Q	8F
PDTA123JQC-Q	8C
PDTA143ZQC-Q	8G
PDTA114YQC-Q	8B
PDTA124XQC-Q	6F

8. Limiting values

Table 6. Limiting values

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

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

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					
	PDTA143XQC-Q	open collector	-	-7	V	
	PDTA123JQC-Q		-	-5	V	
	PDTA143ZQC-Q		-	-5	V	
	PDTA114YQC-Q		-	-6	V	
	PDTA124XQC-Q		-	-7	V	
V_i	input voltage					
	PDTA143XQC-Q		-30	+7	V	
	PDTA123JQC-Q		-12	+5	V	
	PDTA143ZQC-Q		-30	+5	V	
	PDTA114YQC-Q		-40	+6	V	
	PDTA124XQC-Q		-40	+7	V	
I_O	output current		-	-100	mA	
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	360	mW
			[2]	-	450	mW
T_j	junction temperature		-	150	°C	
T_{amb}	ambient temperature		-55	150	°C	
T_{stg}	storage temperature		-65	150	°C	

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided; 35 μm copper; tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB; single-sided; 70 μm copper; tin-plated and standard footprint.

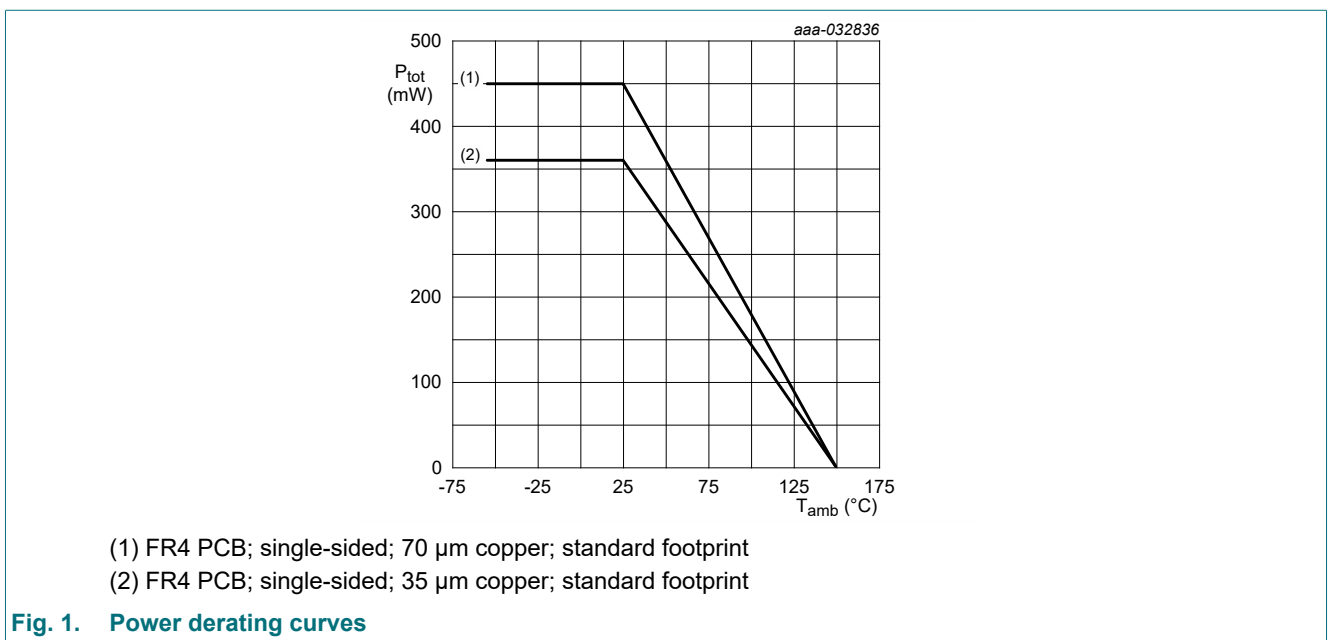


Fig. 1. Power derating curves

9. Thermal characteristics

Table 7. Thermal characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	348	K/W
			[2]	-	278	K/W

- [1] Device mounted on an FR4 PCB; single-sided; 35 μm copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided; 70 μm copper; tin-plated and standard footprint.

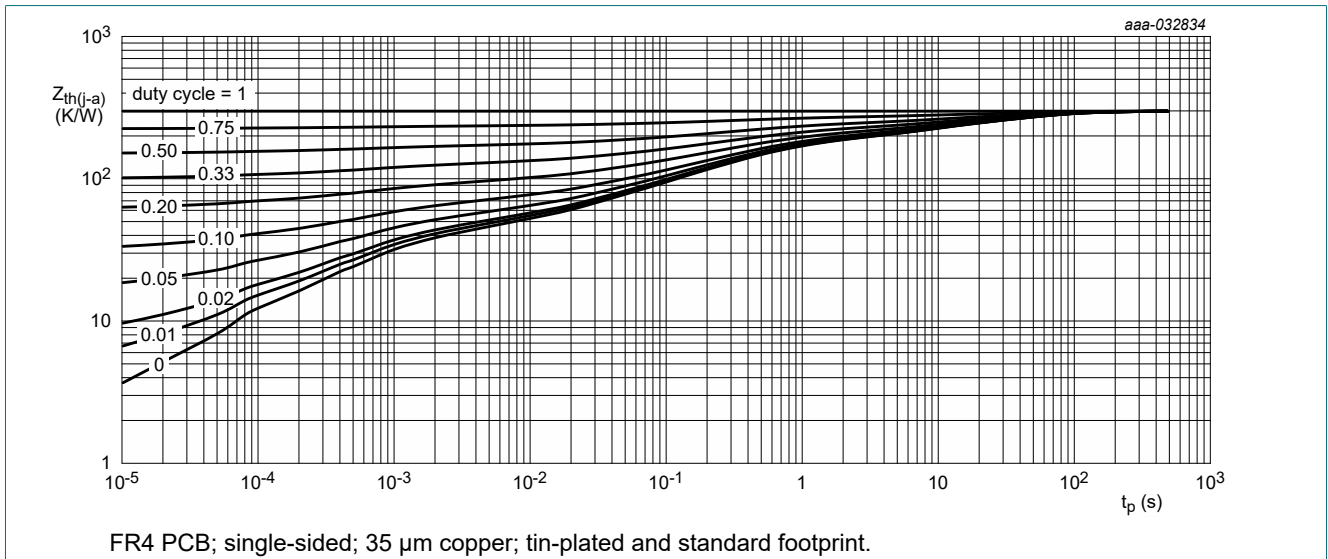


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

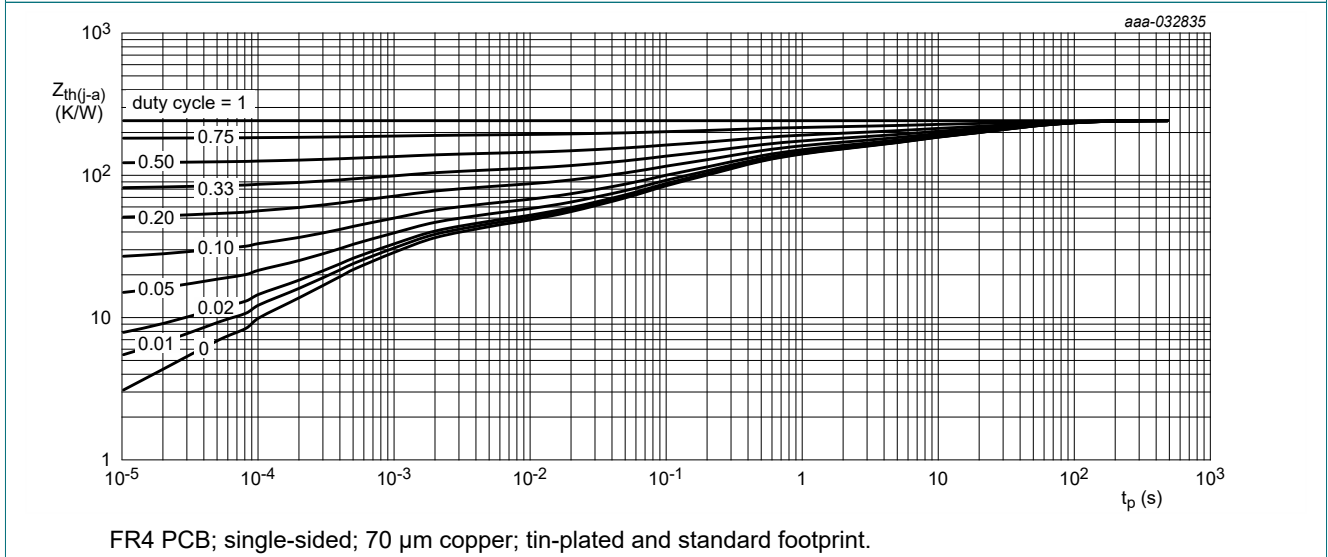


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

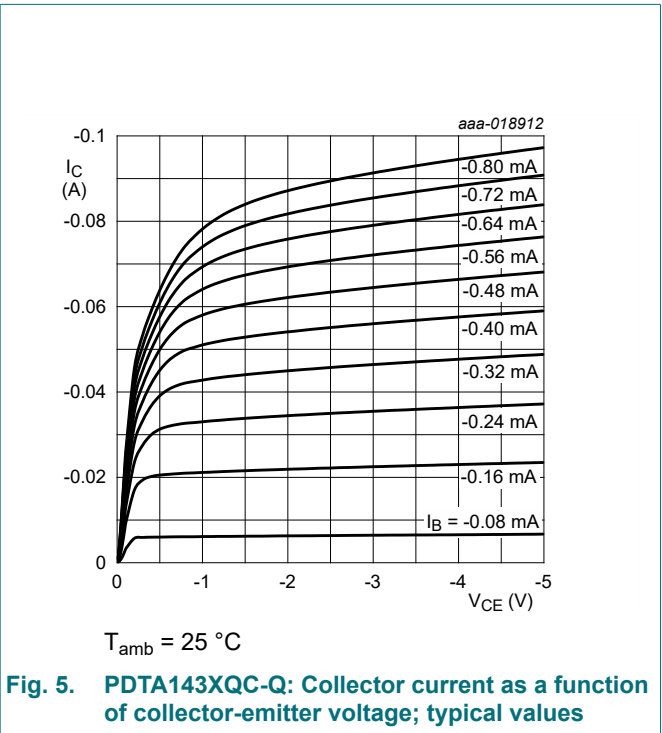
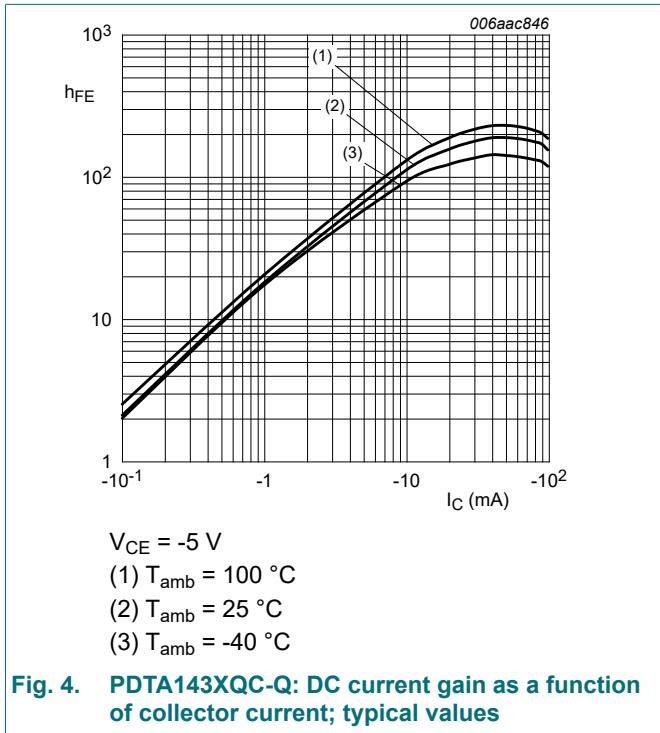
Table 8. Characteristics
 $T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100\ \mu\text{A}$; $I_E = 0\ \text{A}$	-50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -2\ \text{mA}$; $I_B = 0\ \text{A}$	-50	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = -50\ \text{V}$; $I_E = 0\ \text{A}$	-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -30\ \text{V}$; $I_B = 0\ \text{A}$	-	-	-100	nA
		$V_{CE} = -30\ \text{V}$; $I_B = 0\ \text{A}$; $T_j = 150\text{ °C}$	-	-	-5	μA
I_{EBO}	emitter-base cut-off current					
	PDTA143XQC-Q	$V_{EB} = -5\ \text{V}$; $I_C = 0\ \text{A}$	-	-	-600	μA
	PDTA123JQC-Q		-	-	-180	μA
	PDTA143ZQC-Q		-	-	-170	μA
	PDTA114YQC-Q				-150	μA
	PDTA124XQC-Q				-120	μA
h_{FE}	DC current gain					
	PDTA143XQC-Q	$V_{CE} = -5\ \text{V}$; $I_C = -10\ \text{mA}$	50	-	-	
	PDTA123JQC-Q		100	-	-	
	PDTA143ZQC-Q		100	-	-	
	PDTA114YQC-Q	$V_{CE} = -5\ \text{V}$; $I_C = -5\ \text{mA}$	100	-	-	
	PDTA124XQC-Q		80	-	-	
V_{CEsat}	collector-emitter saturation voltage					
	PDTA143XQC-Q	$I_C = -10\ \text{mA}$; $I_B = -0.5\ \text{mA}$	-	-	-100	mV
	PDTA123JQC-Q		-	-	-100	mV
	PDTA143ZQC-Q	$I_C = -5\ \text{mA}$; $I_B = -0.25\ \text{mA}$	-	-	-100	mV
	PDTA114YQC-Q		-	-	-100	mV
	PDTA124XQC-Q	$I_C = -10\ \text{mA}$; $I_B = -0.5\ \text{mA}$	-	-	-100	mV
$V_{I(off)}$	off-state input voltage					
	PDTA143XQC-Q	$V_{CE} = -5\ \text{V}$; $I_C = -100\ \mu\text{A}$	-	-0.9	-0.3	V
	PDTA123JQC-Q		-	-0.6	-0.5	V
	PDTA143ZQC-Q		-	-0.6	-0.5	V
	PDTA114YQC-Q		-	-0.7	-0.5	V
	PDTA124XQC-Q		-	-0.8	-0.5	V
$V_{I(on)}$	on-state input voltage					
	PDTA143XQC-Q	$V_{CE} = -0.3\ \text{V}$; $I_C = -20\ \text{mA}$	-2.5	-1.5	-	V
	PDTA123JQC-Q	$V_{CE} = -0.3\ \text{V}$; $I_C = -5\ \text{mA}$	-1.1	-0.75	-	V
	PDTA143ZQC-Q	$V_{CE} = -0.3\ \text{V}$; $I_C = -5\ \text{mA}$	-1.3	-0.9	-	V
	PDTA114YQC-Q	$V_{CE} = -0.3\ \text{V}$; $I_C = -1\ \text{mA}$	-1.4	-0.8	-	V
	PDTA124XQC-Q	$V_{CE} = -0.3\ \text{V}$; $I_C = -2\ \text{mA}$	-2	-1.1	-	V

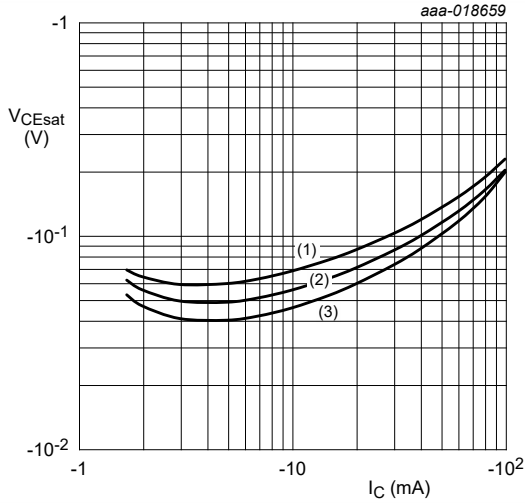
50 V, 100 mA PNP resistor-equipped transistors

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R1	bias resistor 1 (input)					
	PDTA143XQC-Q		[1] 3.3	4.7	6.1	kΩ
	PDTA123JQC-Q		1.54	2.2	2.86	kΩ
	PDTA143ZQC-Q		3.3	4.7	6.1	kΩ
	PDTA114YQC-Q		7	10	13	kΩ
PDTA124XQC-Q		15.4	22	28.6	kΩ	
R2/R1	bias resistor ratio					
	PDTA143XQC-Q		[1] 1.7	2.13	2.6	
	PDTA123JQC-Q		17	21	26	
	PDTA143ZQC-Q		8	10	12	
	PDTA114YQC-Q		3.7	4.7	5.7	
PDTA124XQC-Q		1.7	2.13	2.6		
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; f = 100\text{ MHz}$	[2] -	180	-	MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	3	pF

- [1] See "Section 11: Test information" for resistor calculation and test conditions
- [2] Characteristics of built-in transistor



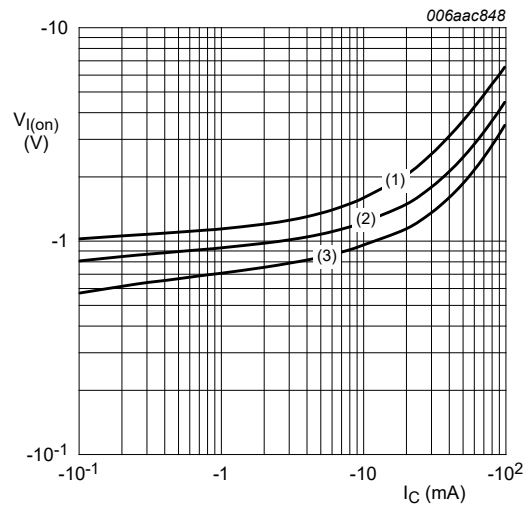
50 V, 100 mA PNP resistor-equipped transistors



$I_C/I_B = 20$

- (1) $T_{amb} = 100\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = -40\text{ °C}$

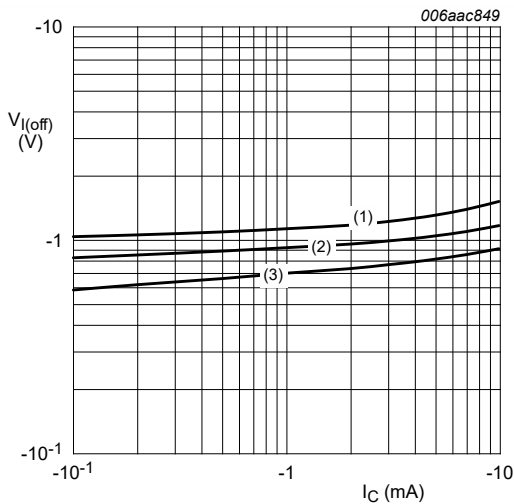
Fig. 6. PDTA143XQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = -0.3\text{ V}$

- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = 100\text{ °C}$

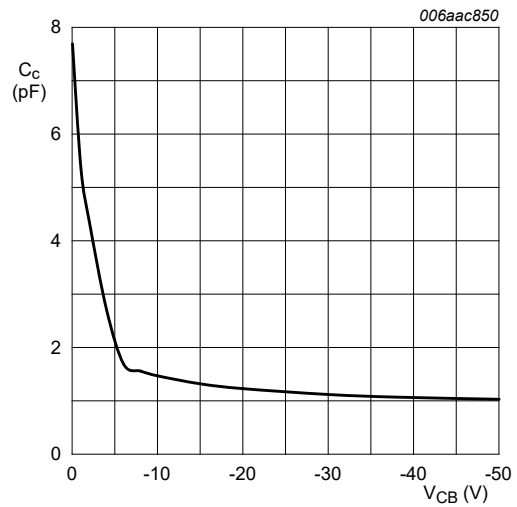
Fig. 7. PDTA143XQC-Q: On-state input voltage as a function of collector current; typical values



$V_{CE} = -5\text{ V}$

- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = 100\text{ °C}$

Fig. 8. PDTA143XQC-Q: Off-state input voltage as a function of collector current; typical values



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

Fig. 9. PDTA143XQC-Q: Collector capacitance as a function of collector-base voltage; typical values

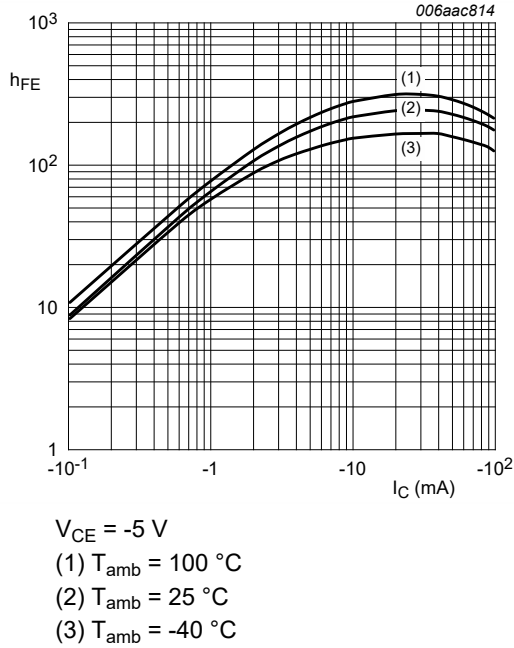


Fig. 10. PDTA123JQC-Q: DC current gain as a function of collector current; typical values

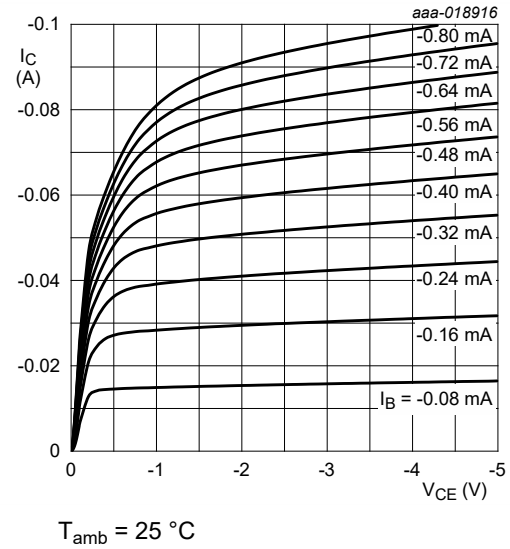


Fig. 11. PDTA123JQC-Q: Collector current as a function of collector-emitter voltage; typical values

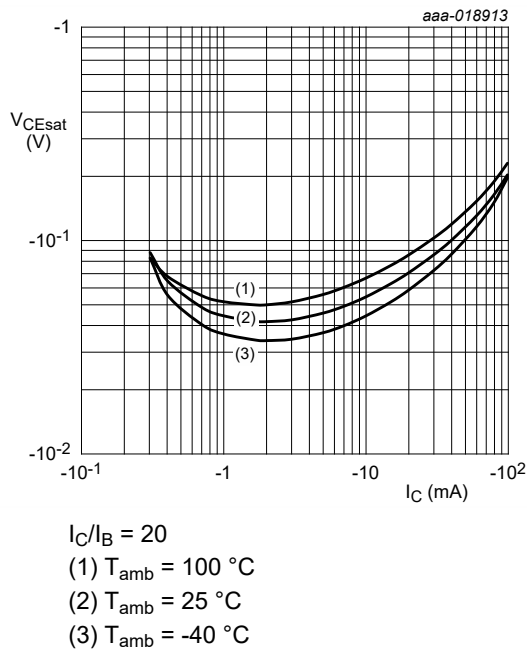


Fig. 12. PDTA123JQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values

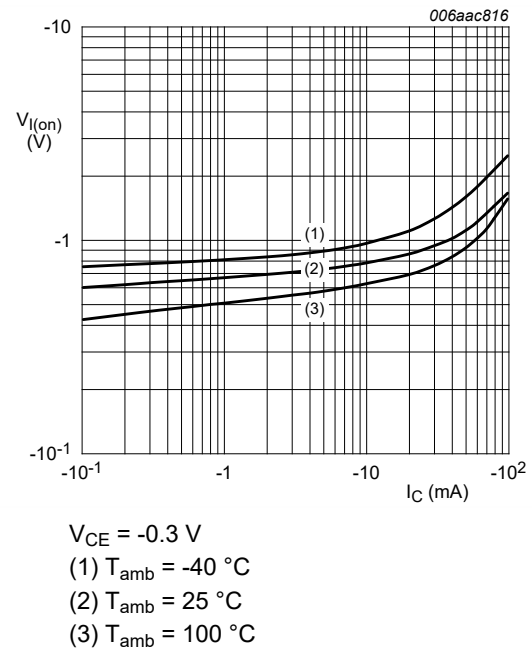
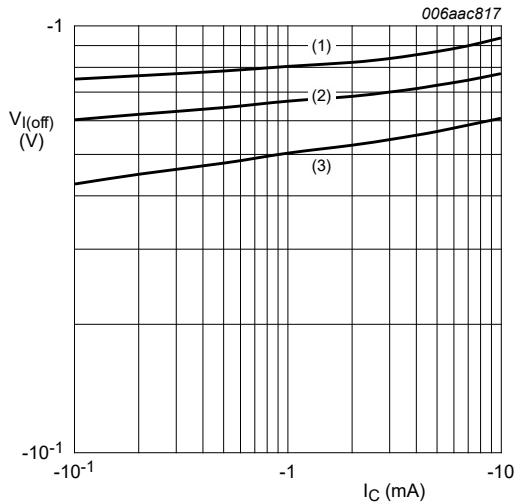


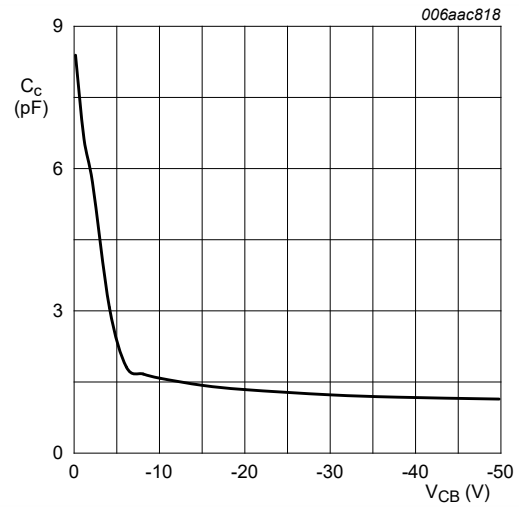
Fig. 13. PDTA123JQC-Q: On-state input voltage as a function of collector current; typical values



$V_{CE} = -5\text{ V}$

- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = 100\text{ °C}$

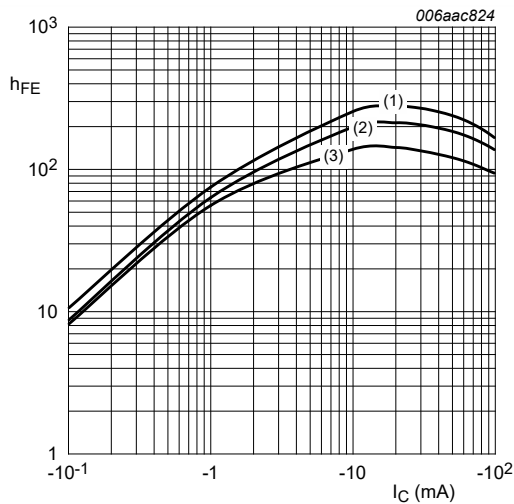
Fig. 14. PDTA123JQC-Q: Off-state input voltage as a function of collector current; typical values



$f = 1\text{ MHz}$

$T_{amb} = 25\text{ °C}$

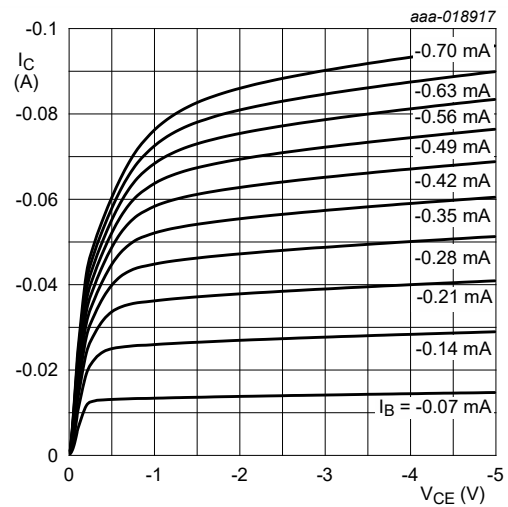
Fig. 15. PDTA123JQC-Q: Collector capacitance as a function of collector-base voltage; typical values



$V_{CE} = -5\text{ V}$

- (1) $T_{amb} = 100\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = -40\text{ °C}$

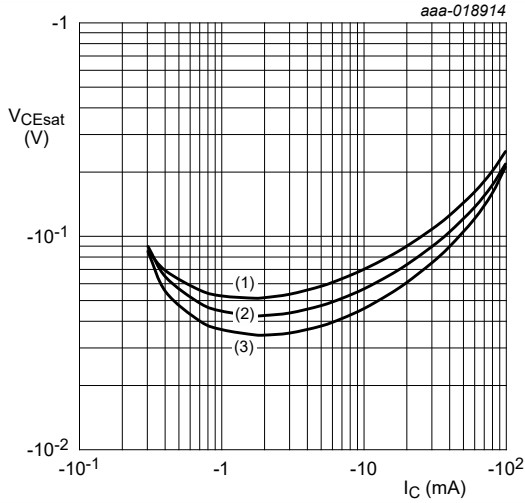
Fig. 16. PDTA143ZQC-Q: DC current gain as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$

Fig. 17. PDTA143ZQC-Q: Collector current as a function of collector-emitter voltage; typical values

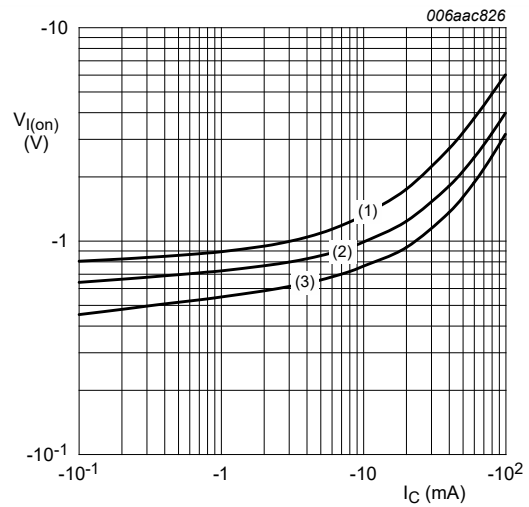
50 V, 100 mA PNP resistor-equipped transistors



$I_C/I_B = 20$

- (1) $T_{amb} = 100\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = -40\text{ °C}$

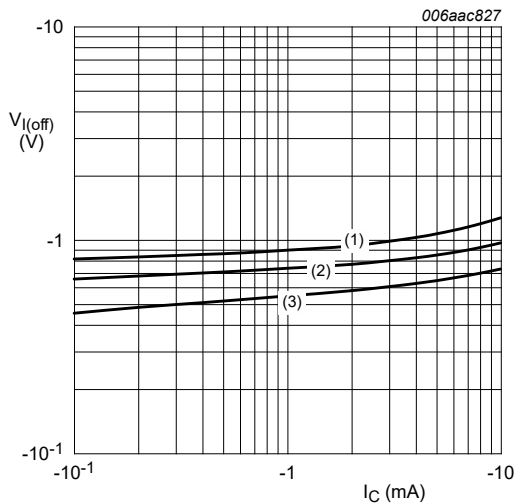
Fig. 18. PDTA143ZQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = -0.3\text{ V}$

- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = 100\text{ °C}$

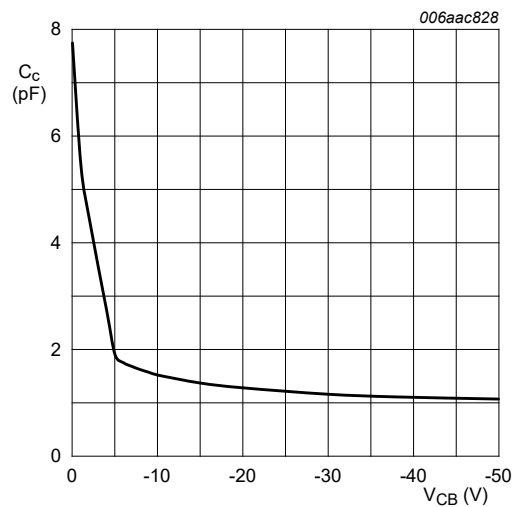
Fig. 19. PDTA143ZQC-Q: On-state input voltage as a function of collector current; typical values



$V_{CE} = -5\text{ V}$

- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = 100\text{ °C}$

Fig. 20. PDTA143ZQC-Q: Off-state input voltage as a function of collector current; typical values



$f = 1\text{ MHz}$

$T_{amb} = 25\text{ °C}$

Fig. 21. PDTA143ZQC-Q: Collector capacitance as a function of collector-base voltage; typical values

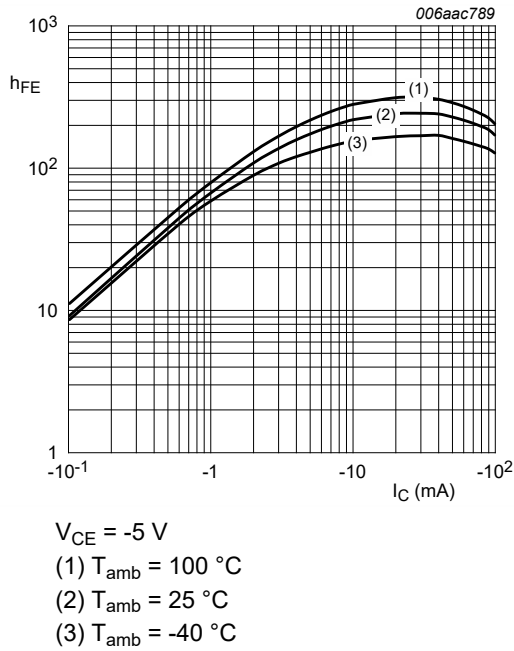


Fig. 22. PDTA114YQC-Q: DC current gain as a function of collector current; typical values

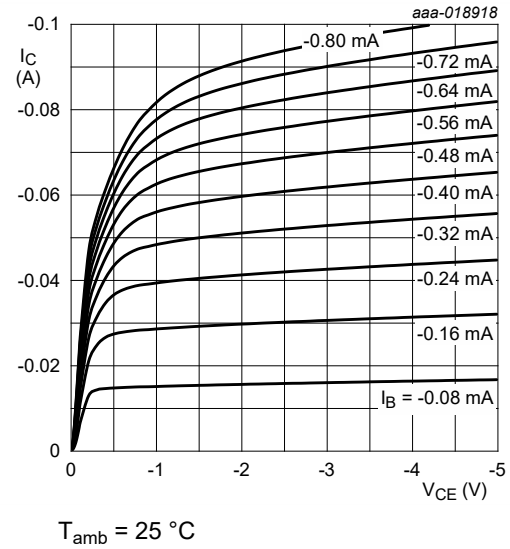


Fig. 23. PDTA114YQC-Q: Collector current as a function of collector-emitter voltage; typical values

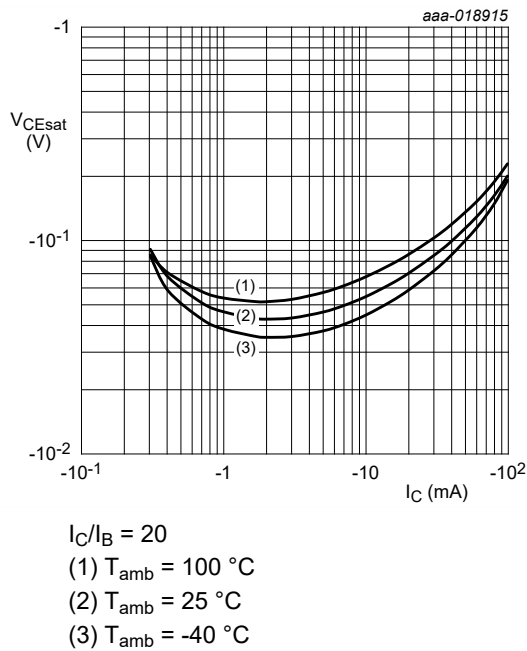


Fig. 24. PDTA114YQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values

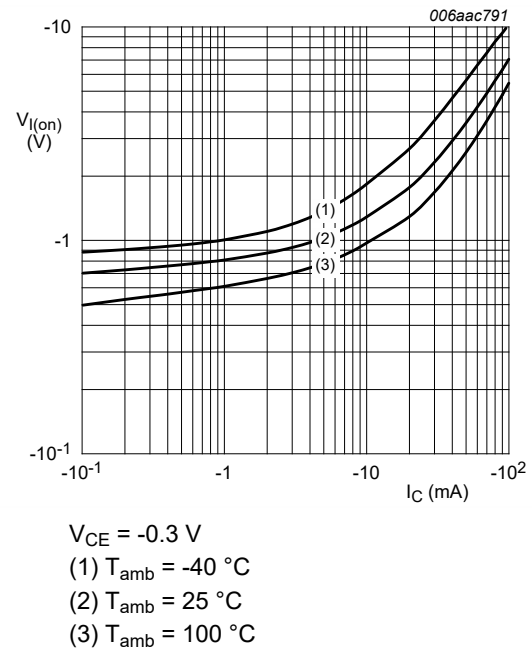


Fig. 25. PDTA114YQC-Q: On-state input voltage as a function of collector current; typical values

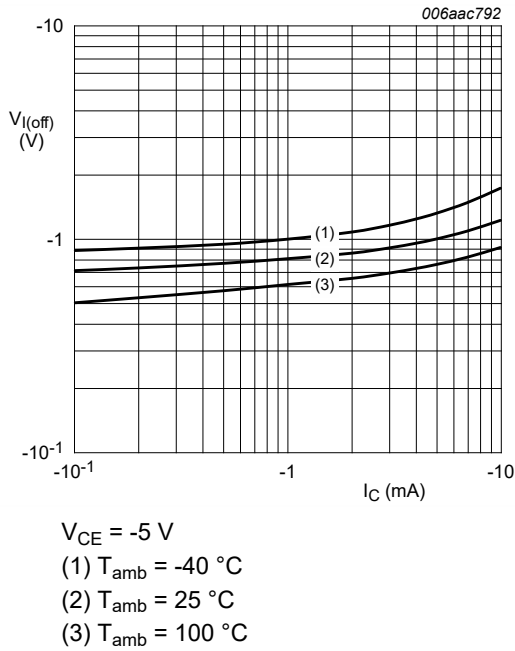


Fig. 26. PDTA114YQC-Q: Off-state input voltage as a function of collector current; typical values

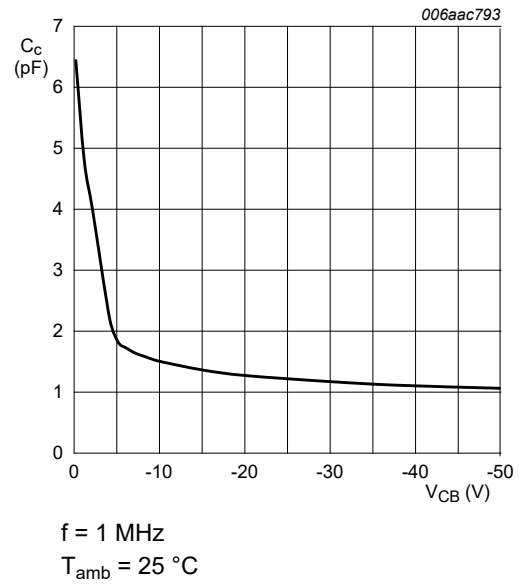


Fig. 27. PDTA114YQC-Q: Collector capacitance as a function of collector-base voltage; typical values

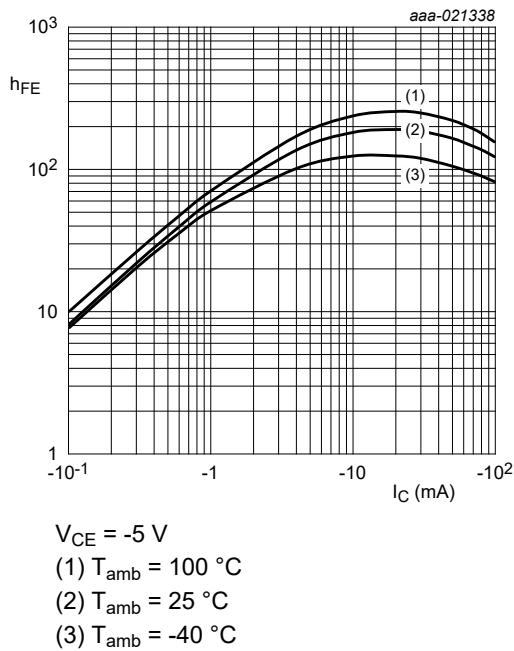


Fig. 28. PDTA124XQC-Q: DC current gain as a function of collector current; typical values

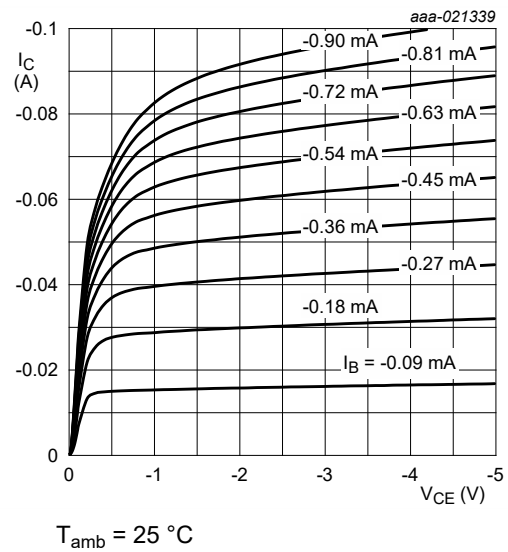
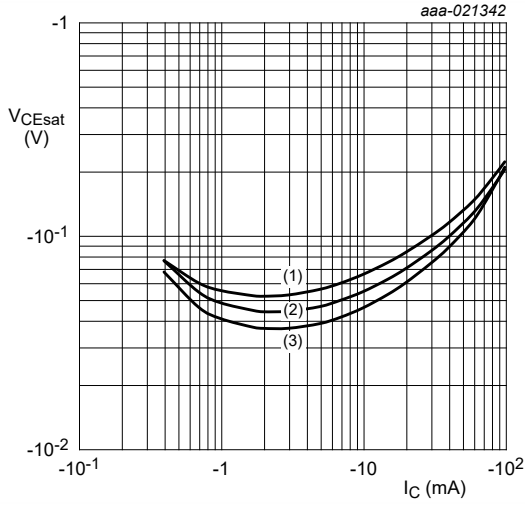


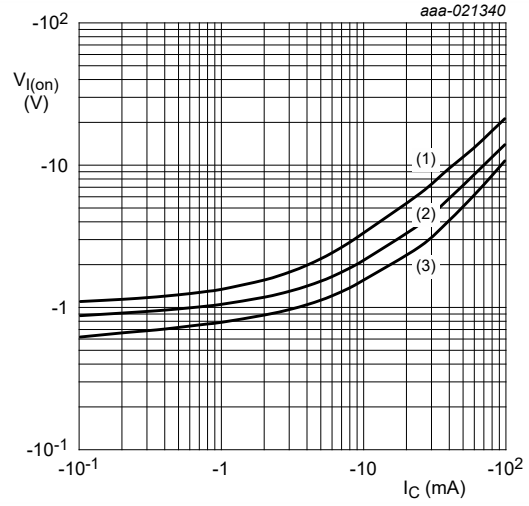
Fig. 29. PDTA124XQC-Q: Collector current as a function of collector-emitter voltage; typical values

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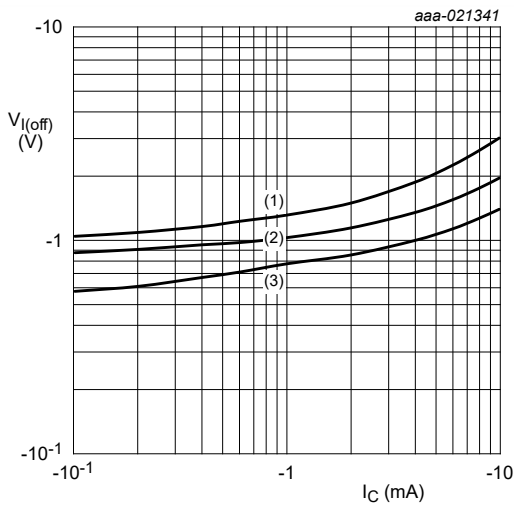
$I_C/I_B = 10$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -40\text{ °C}$

Fig. 30. PDTA124XQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values



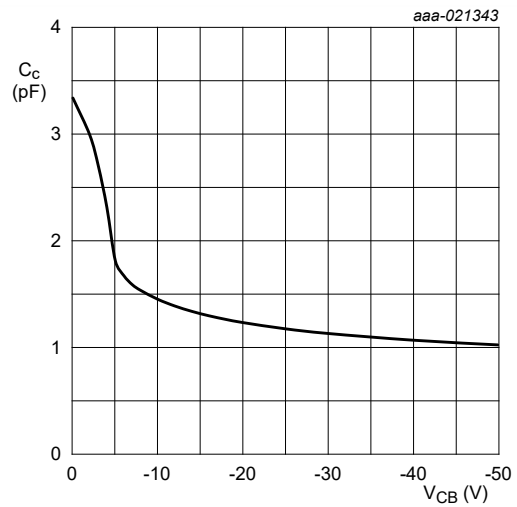
$V_{CE} = -0.3\text{ V}$
 (1) $T_{amb} = -40\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

Fig. 31. PDTA124XQC-Q: On-state input voltage as a function of collector current; typical values



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

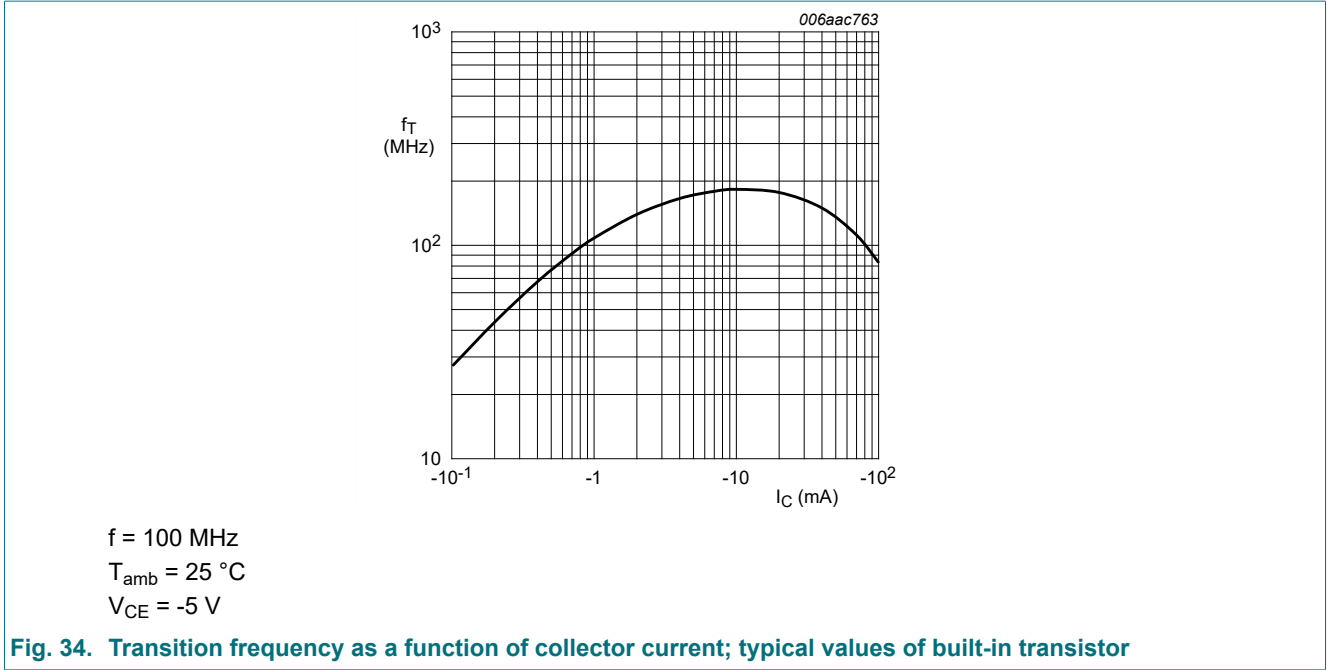
Fig. 32. PDTA124XQC-Q: Off-state input voltage as a function of collector current; typical values



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

Fig. 33. PDTA124XQC-Q: Collector capacitance as a function of collector-base voltage; typical values

50 V, 100 mA PNP resistor-equipped transistors



11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R1 = \frac{V(I12) - V(I11)}{I12 - I11}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I14) - V(I13)}{R1 \cdot (I14 - I13)} - 1$$

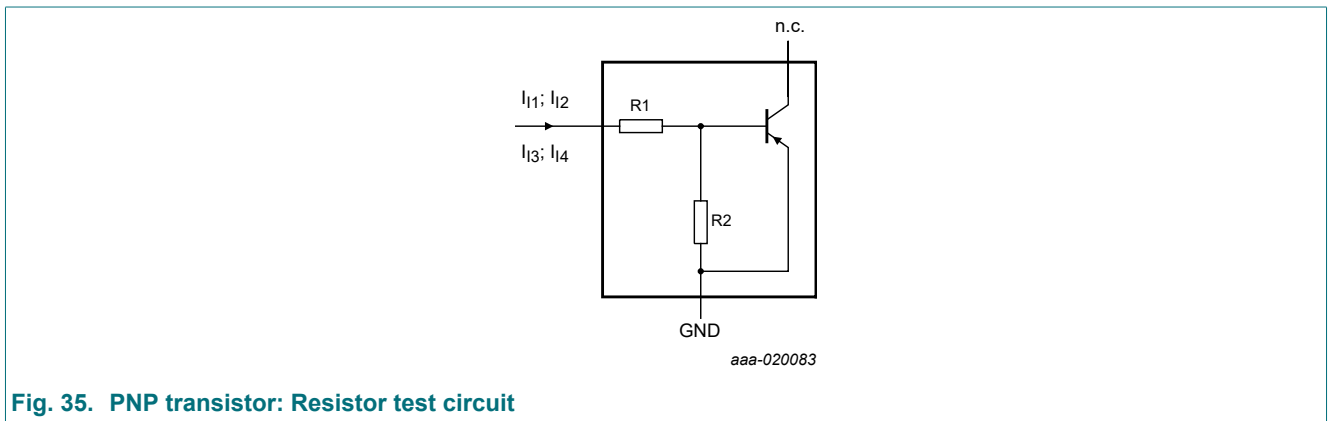


Fig. 35. PNP transistor: Resistor test circuit

Resistor test conditions

Table 9. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I ₁₁	I ₁₂	I ₁₃	I ₁₄
PDTA143XQC-Q	4.7	10	-350 μA	-450 μA	350 μA	450 μA
PDTA123JQC-Q	2.2	47	-90 μA	-140 μA	55 μA	105 μA
PDTA143ZQC-Q	4.7	47	-90 μA	-140 μA	55 μA	105 μA
PDTA114YQC-Q	10	47	-90 μA	-140 μA	55 μA	105 μA
PDTA124XQC-Q	22	47	-55 μA	-105 μA	55 μA	105 μA

12. Package outline

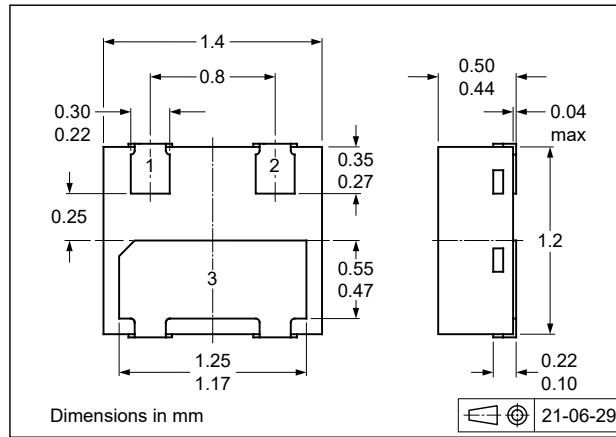


Fig. 36. Package outline DFN1412D-3 (SOT8009)

13. Soldering

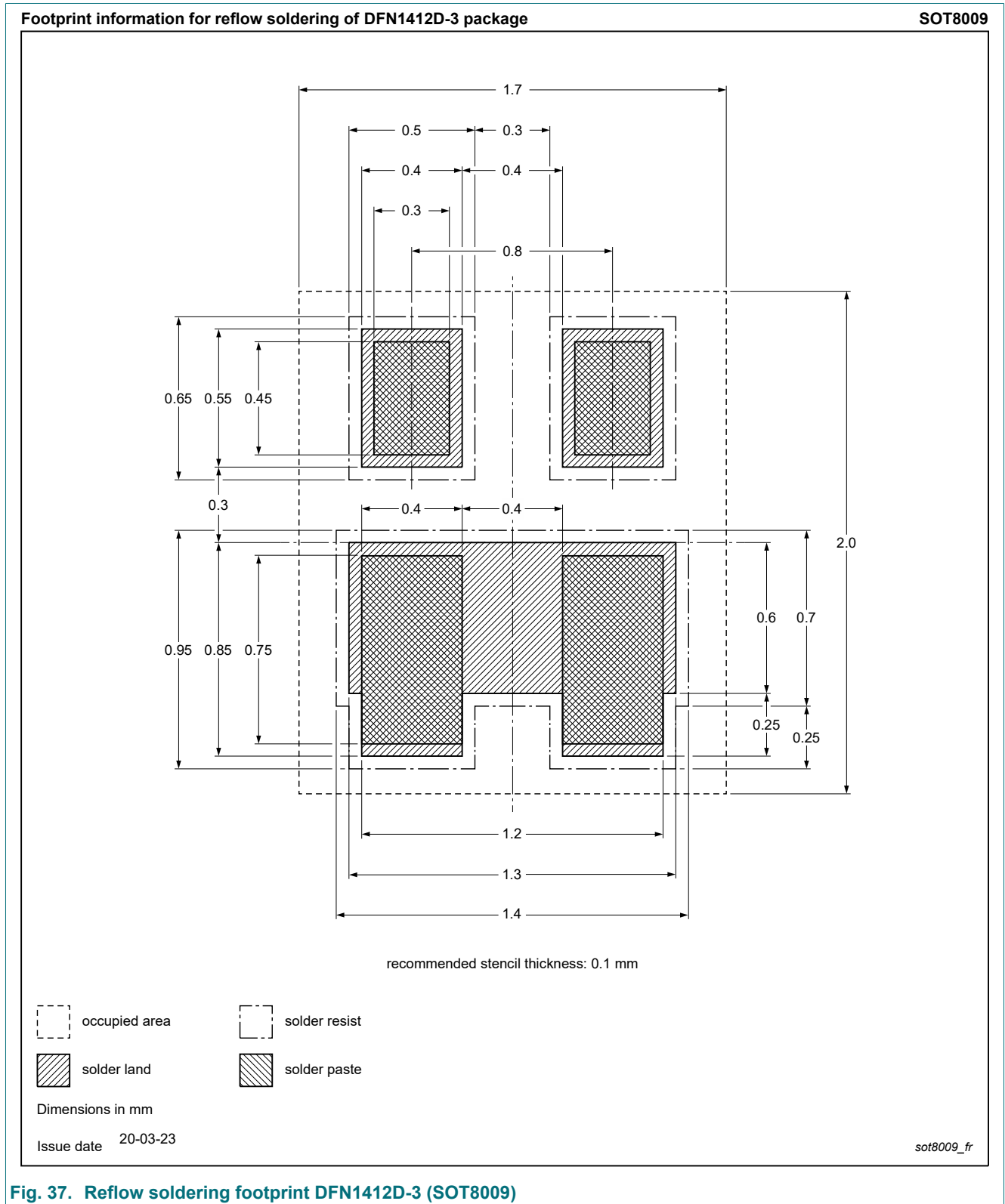


Fig. 37. Reflow soldering footprint DFN1412D-3 (SOT8009)

14. Revision history

Table 10. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTA143X_TO_124XQC-Q_SER v.1	20210930	Product data sheet	-	-

50 V, 100 mA PNP resistor-equipped transistors

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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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