



# PDTA143X/123J/143Z/114Y/124XQC 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 $\Omega$	k $\Omega$	Nexperia	JEDEC	
PDTA143XQC	4.7	10	SOT8009	MO-340CA	PDTC143XQC
PDTA123JQC	2.2	47			PDTC123JQC
PDTA143ZQC	4.7	47			PDTC143ZQC
PDTA114YQC	10	47			PDTC114YQC
PDTA124XQC	22	47			PDTC124XQC

## 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

## 3. Applications

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

## 4. Quick reference data

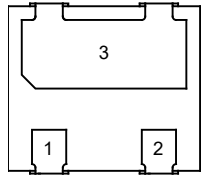
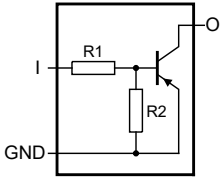
Table 2. Quick reference data

$T_{amb} = 25\text{ }^{\circ}\text{C}$  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	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			
PDTA143ZQC			
PDTA114YQC			
PDTA124XQC			

## 7. Marking

Table 5. Marking

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

## 8. Limiting values

**Table 6. Limiting values**

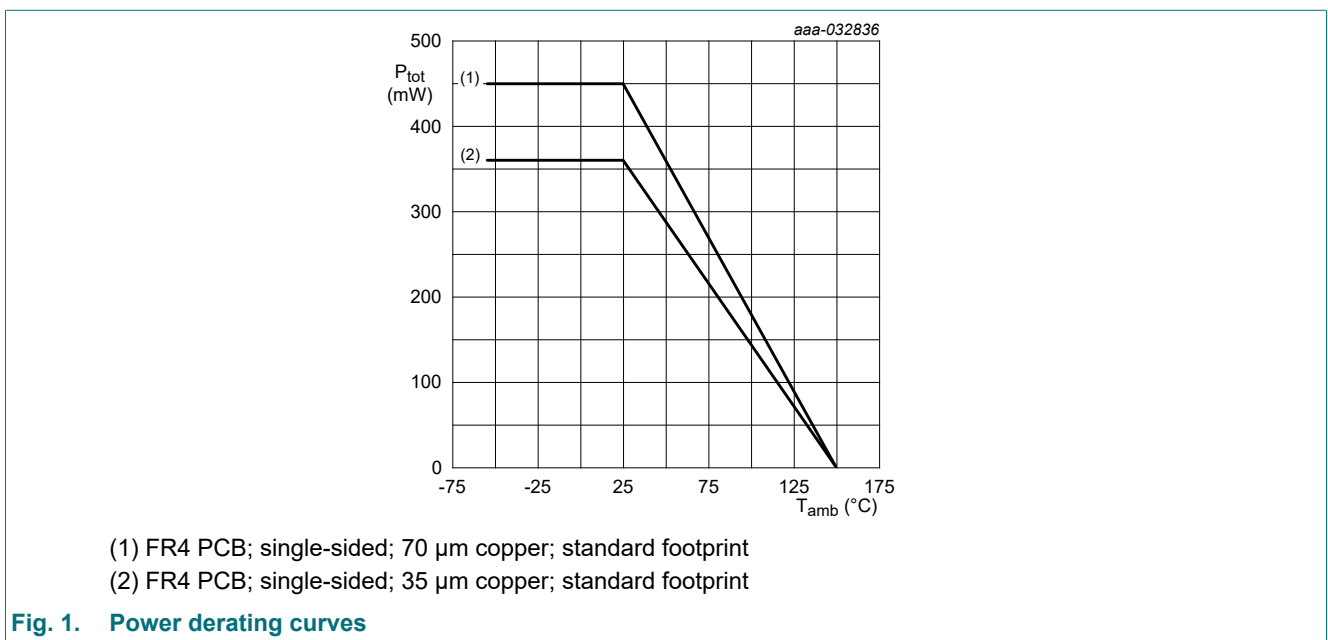
In accordance with the Absolute Maximum Rating System (IEC 60134).

$T_{amb} = 25\text{ °C}$  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	open collector	-	-7	V	
	PDTA143XQC					
	PDTA123JQC					
	PDTA143ZQC					
	PDTA114YQC					
	PDTA124XQC					
$V_i$	input voltage					
	PDTA143XQC					
	PDTA123JQC					
	PDTA143ZQC					
	PDTA114YQC					
	PDTA124XQC					
$I_O$	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  $\mu\text{m}$  copper; tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB; single-sided; 70  $\mu\text{m}$  copper; tin-plated and standard footprint.



(1) FR4 PCB; single-sided; 70  $\mu\text{m}$  copper; standard footprint  
 (2) FR4 PCB; single-sided; 35  $\mu\text{m}$  copper; standard footprint

**Fig. 1. Power derating curves**

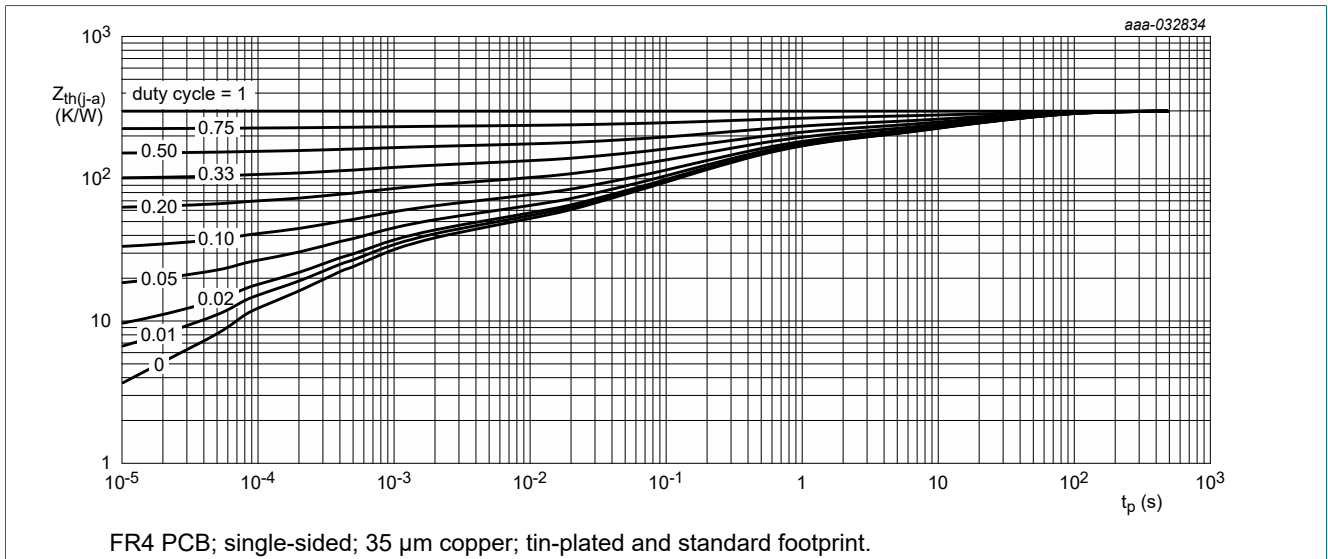
### 9. Thermal characteristics

**Table 7. Thermal characteristics**

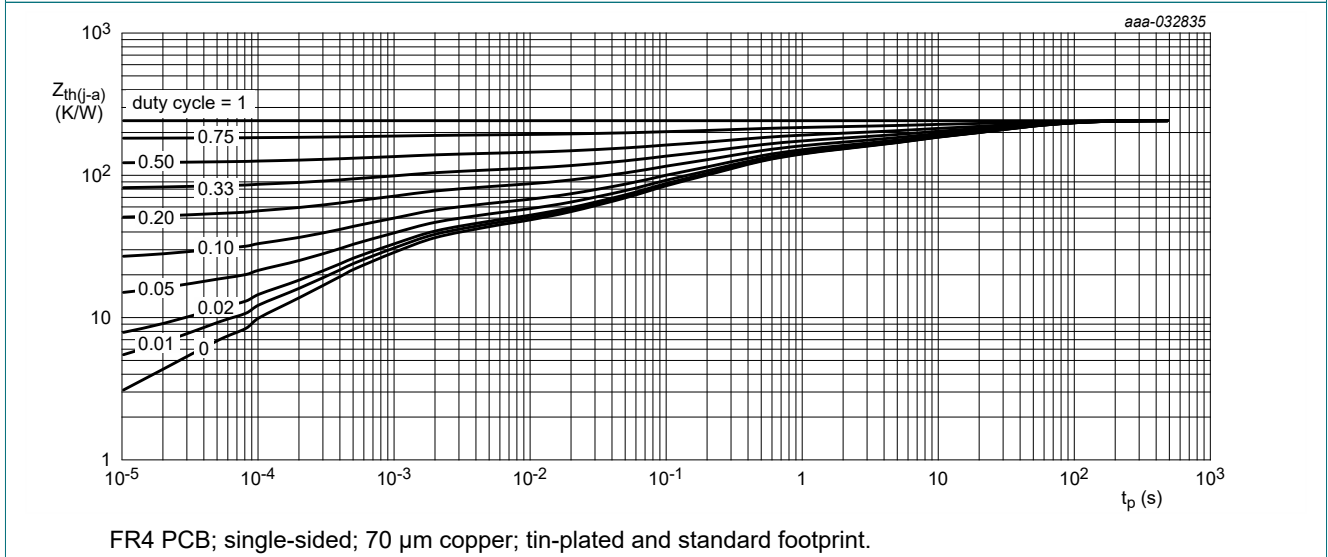
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

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  $\mu\text{m}$  copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided; 70  $\mu\text{m}$  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

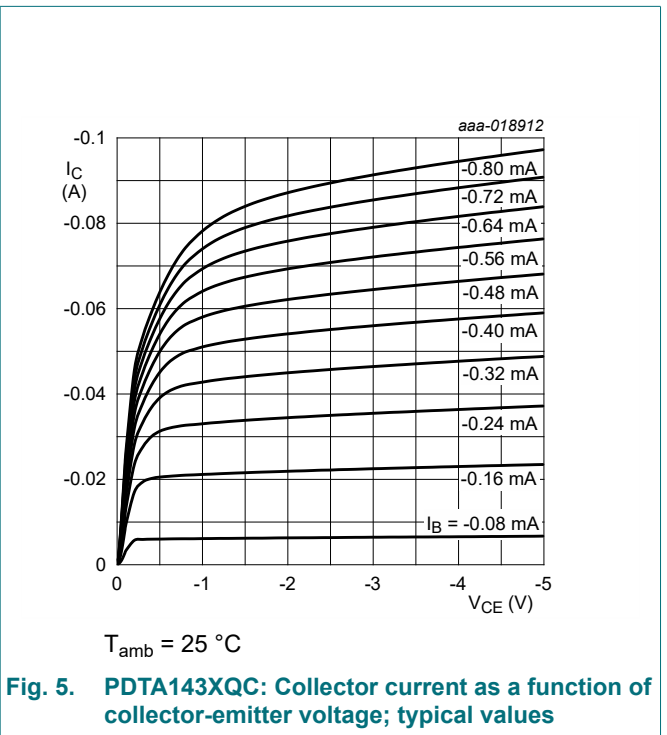
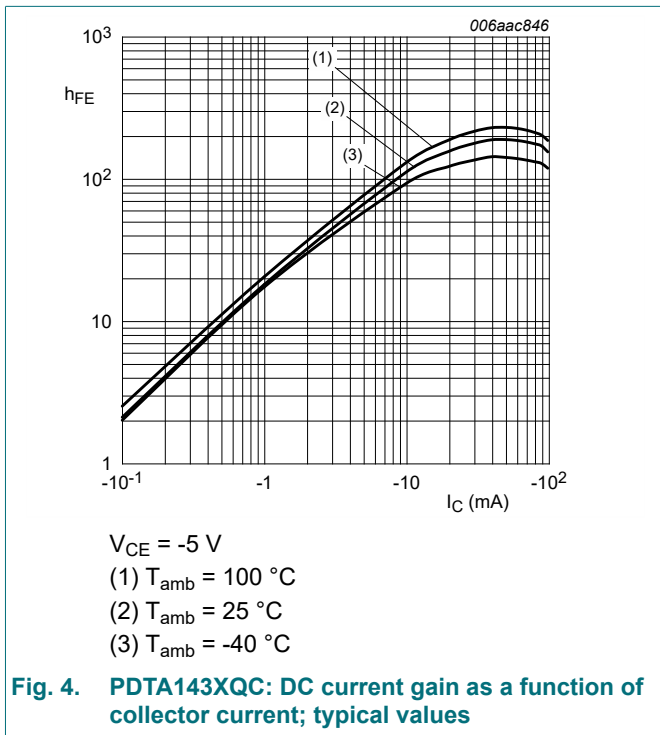
**Table 8. Characteristics**
 $T_{amb} = 25\text{ °C}$  unless otherwise specified.

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

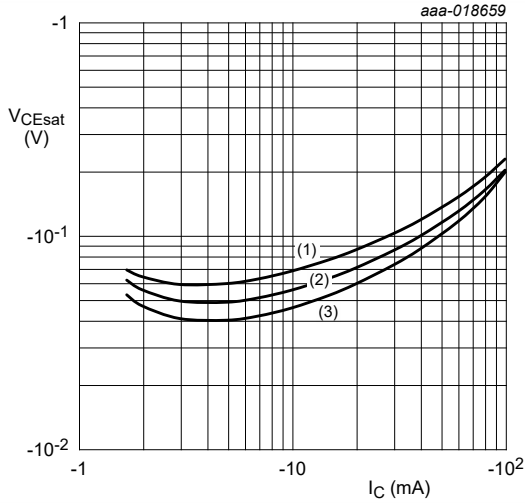
50 V, 100 mA PNP resistor-equipped transistors

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R1	bias resistor 1 (input)					
	PDTA143XQC		[1] 3.3	4.7	6.1	kΩ
	PDTA123JQC		1.54	2.2	2.86	kΩ
	PDTA143ZQC		3.3	4.7	6.1	kΩ
	PDTA114YQC		7	10	13	kΩ
	PDTA124XQC		15.4	22	28.6	kΩ
R2/R1	bias resistor ratio					
	PDTA143XQC		[1] 1.7	2.13	2.6	
	PDTA123JQC		17	21	26	
	PDTA143ZQC		8	10	12	
	PDTA114YQC		3.7	4.7	5.7	
	PDTA124XQC		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



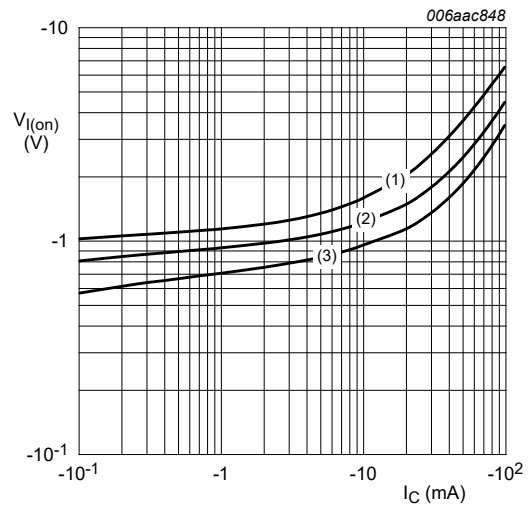
50 V, 100 mA PNP resistor-equipped transistors



$I_C/I_B = 20$

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

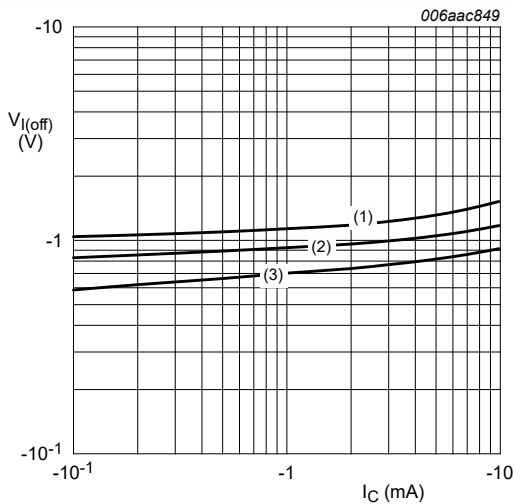
**Fig. 6. PDTA143XQC: Collector-emitter saturation voltage as a function of collector current; typical values**



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

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

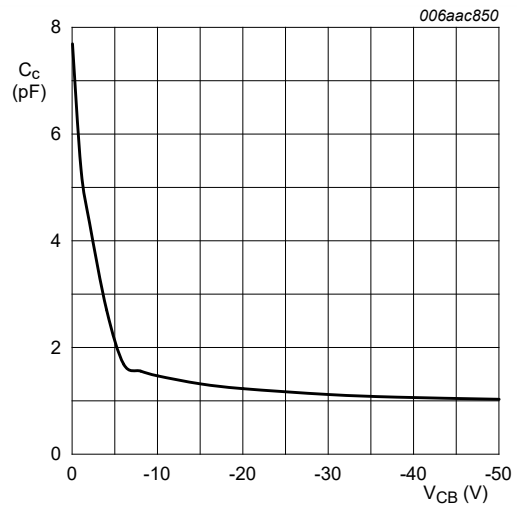
**Fig. 7. PDTA143XQC: On-state input voltage as a function of collector current; typical values**



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

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

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



$f = 1\text{ MHz}$

$T_{amb} = 25\text{ °C}$

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

50 V, 100 mA PNP resistor-equipped transistors

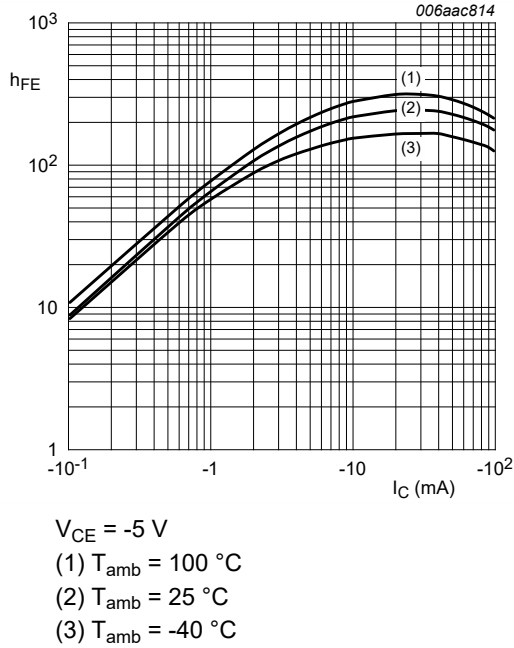


Fig. 10. PDTA123JQC: DC current gain as a function of collector current; typical values

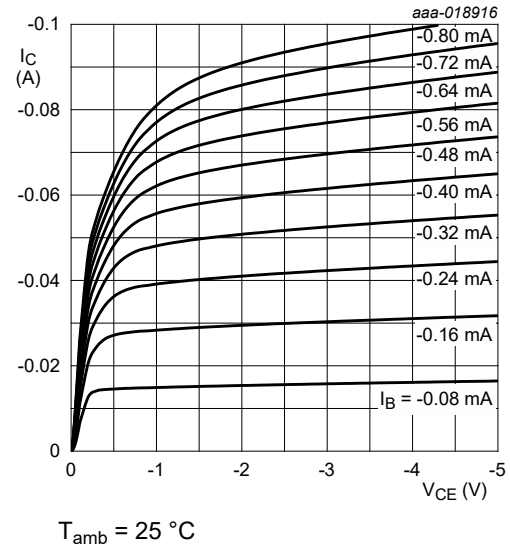


Fig. 11. PDTA123JQC: Collector current as a function of collector-emitter voltage; typical values

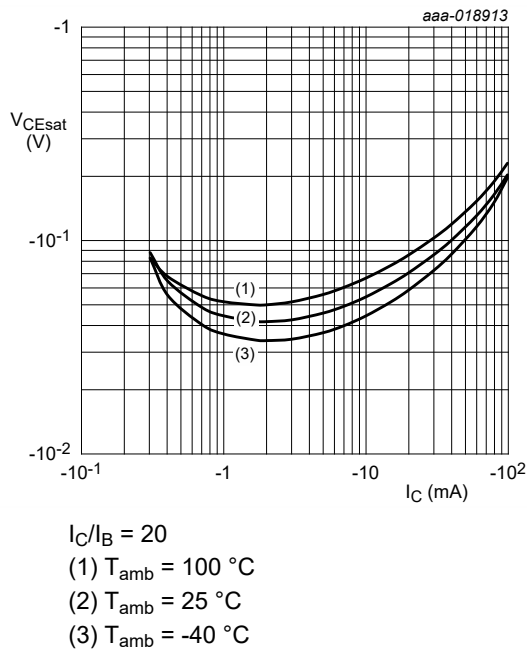


Fig. 12. PDTA123JQC: Collector-emitter saturation voltage as a function of collector current; typical values

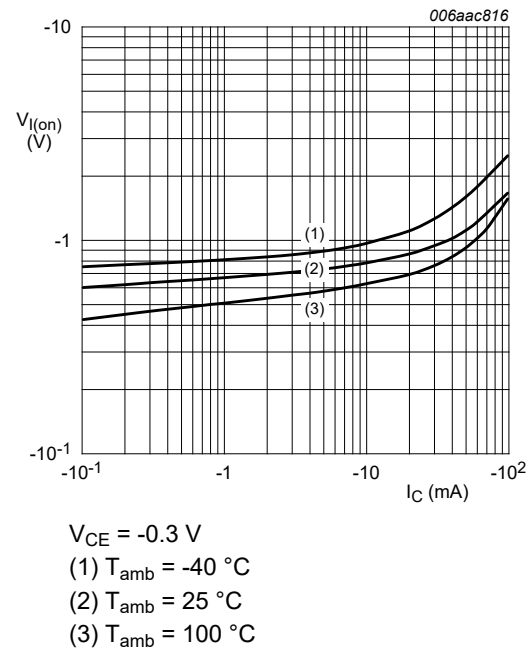


Fig. 13. PDTA123JQC: On-state input voltage as a function of collector current; typical values



50 V, 100 mA PNP resistor-equipped transistors

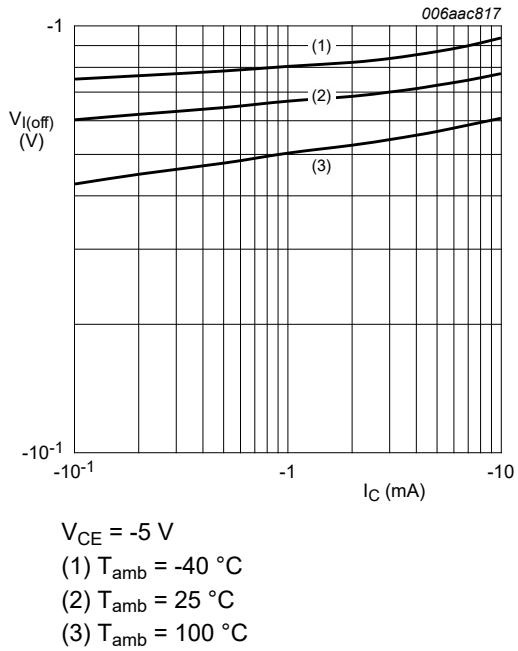


Fig. 14. PDTA123JQC: Off-state input voltage as a function of collector current; typical values

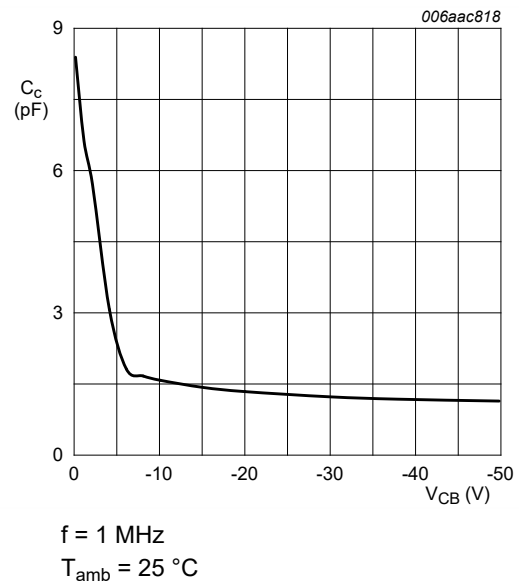


Fig. 15. PDTA123JQC: Collector capacitance as a function of collector-base voltage; typical values

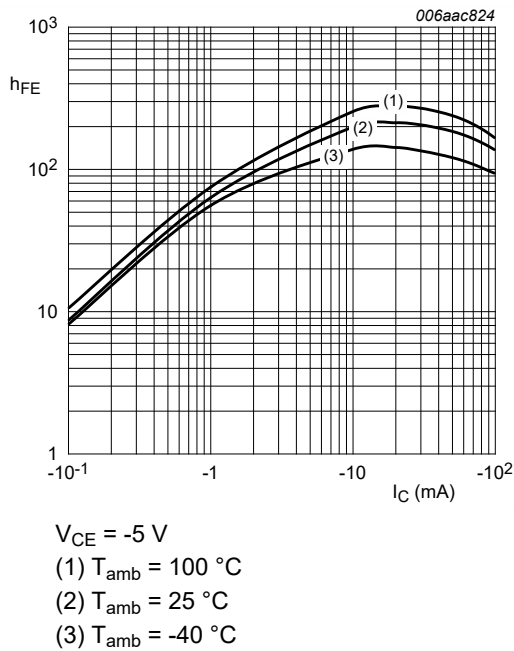


Fig. 16. PDTA143ZQC: DC current gain as a function of collector current; typical values

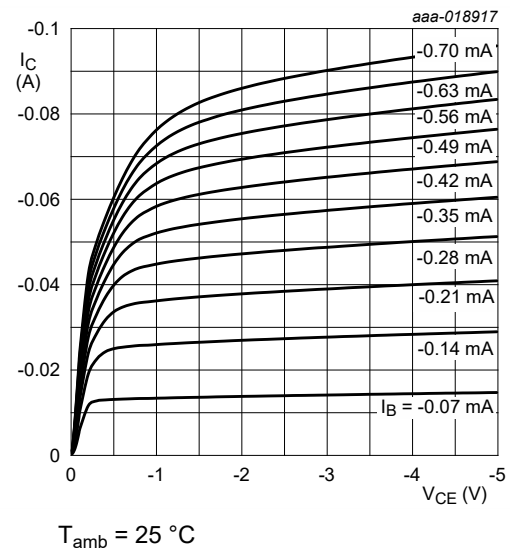
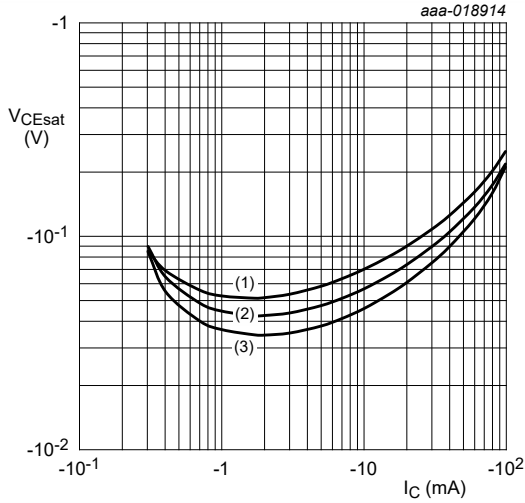


Fig. 17. PDTA143ZQC: Collector current as a function of collector-emitter voltage; typical values

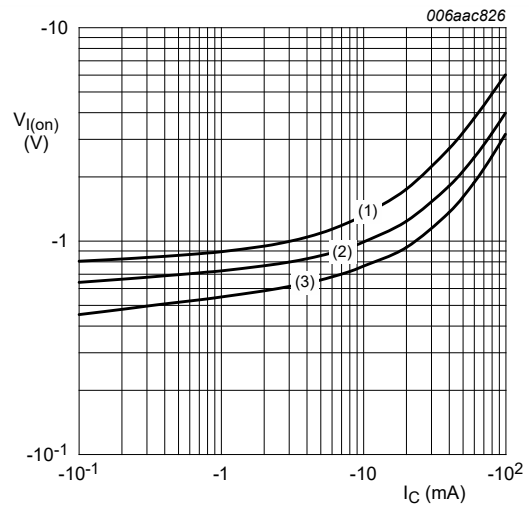
50 V, 100 mA PNP resistor-equipped transistors



$I_C/I_B = 20$

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

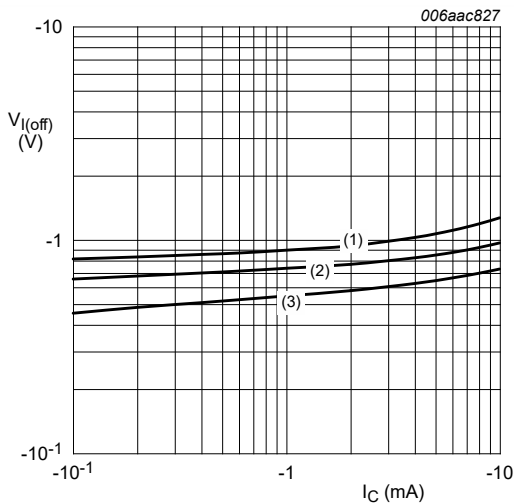
**Fig. 18. PDTA143ZQC: Collector-emitter saturation voltage as a function of collector current; typical values**



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

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

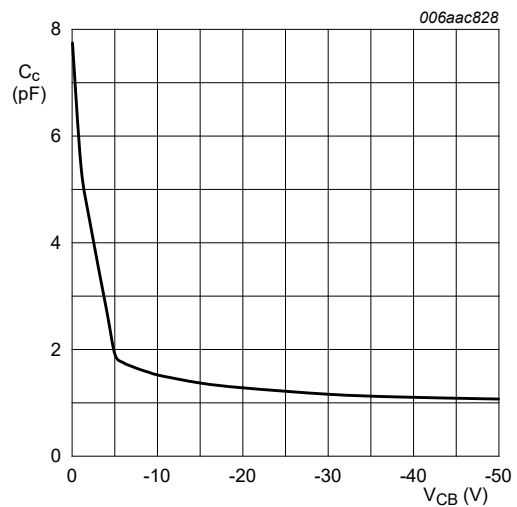
**Fig. 19. PDTA143ZQC: On-state input voltage as a function of collector current; typical values**



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

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

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



$f = 1\text{ MHz}$

$T_{amb} = 25\text{ °C}$

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

50 V, 100 mA PNP resistor-equipped transistors

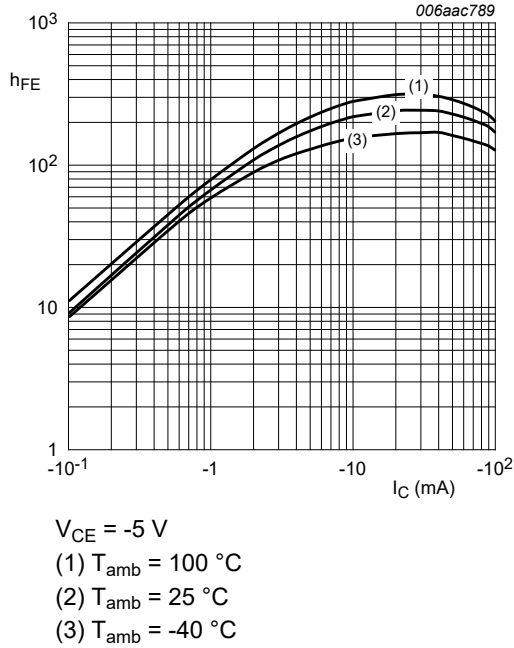


Fig. 22. PDTA114YQC: DC current gain as a function of collector current; typical values

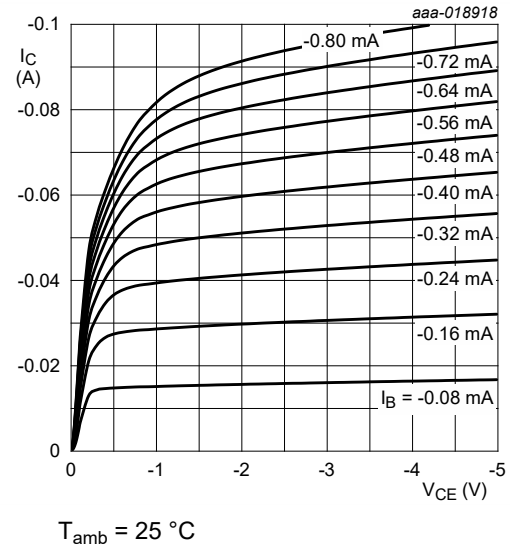


Fig. 23. PDTA114YQC: Collector current as a function of collector-emitter voltage; typical values

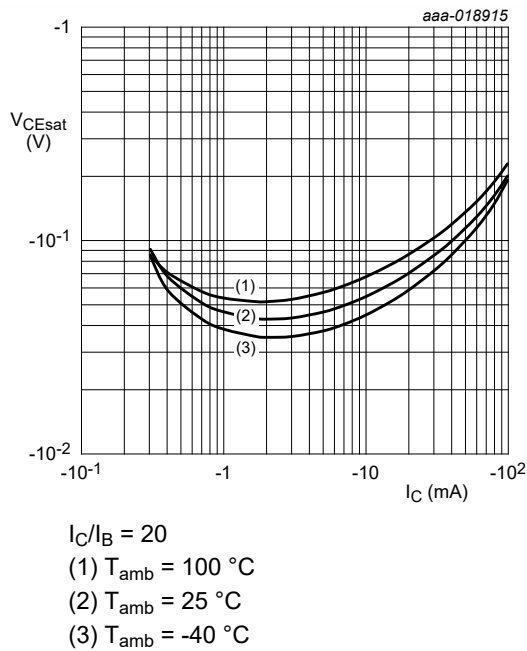


Fig. 24. PDTA114YQC: Collector-emitter saturation voltage as a function of collector current; typical values

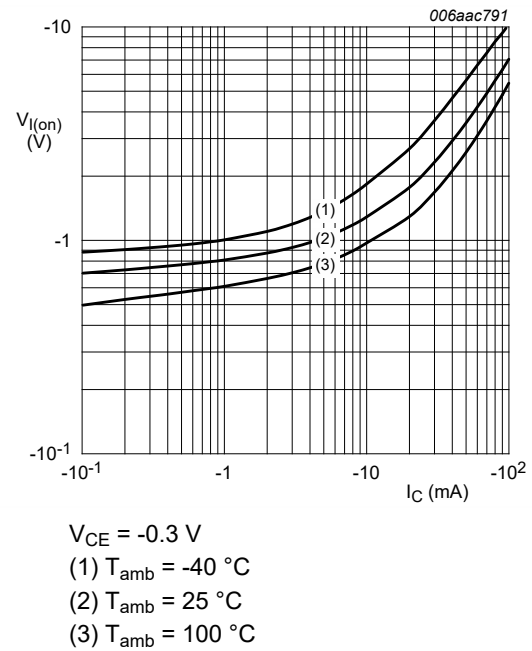
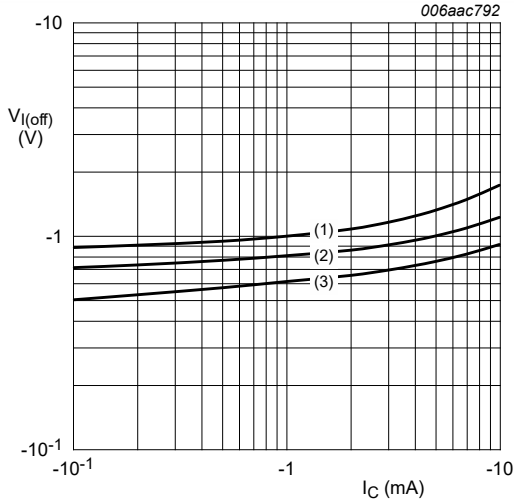


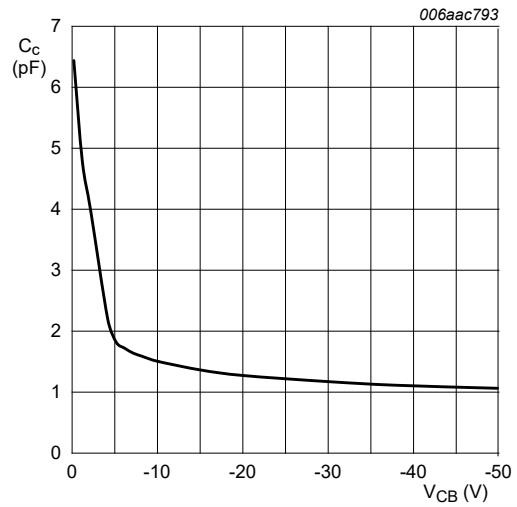
Fig. 25. PDTA114YQC: On-state input voltage as a function of collector current; typical values

50 V, 100 mA PNP resistor-equipped transistors



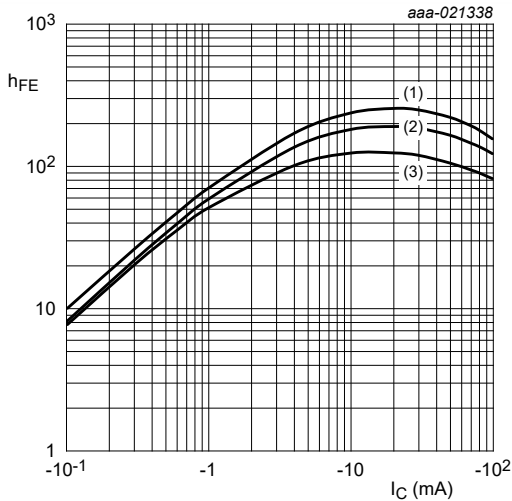
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

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



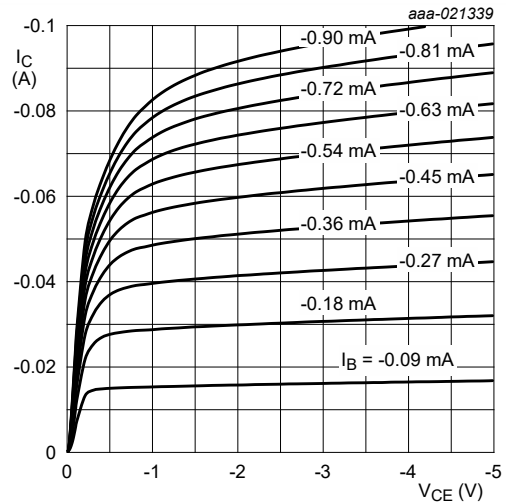
$f = 1 \text{ MHz}$   
 $T_{amb} = 25 \text{ }^\circ\text{C}$

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



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

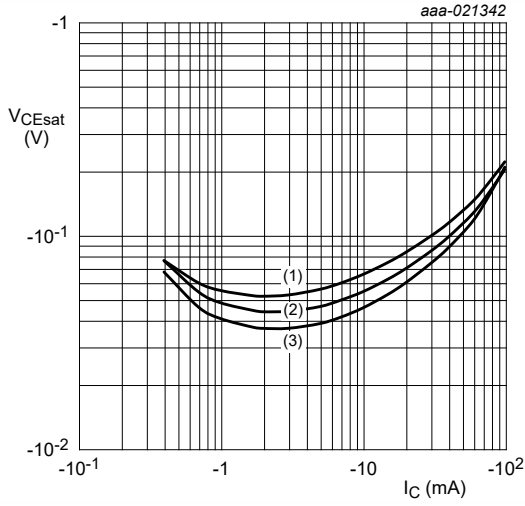
Fig. 28. PDTA124XQC: DC current gain as a function of collector current; typical values



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

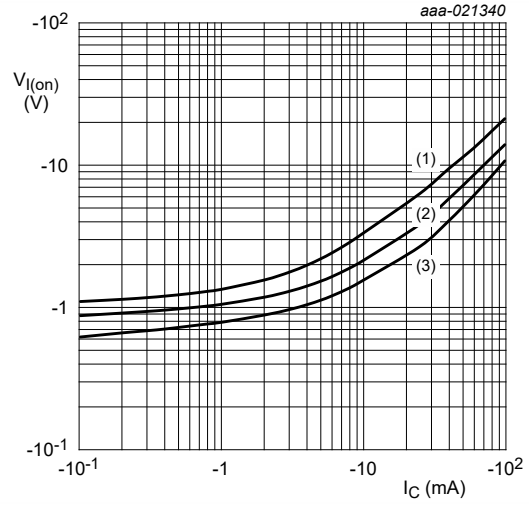
Fig. 29. PDTA124XQC: Collector current as a function of collector-emitter voltage; typical values

50 V, 100 mA PNP resistor-equipped transistors



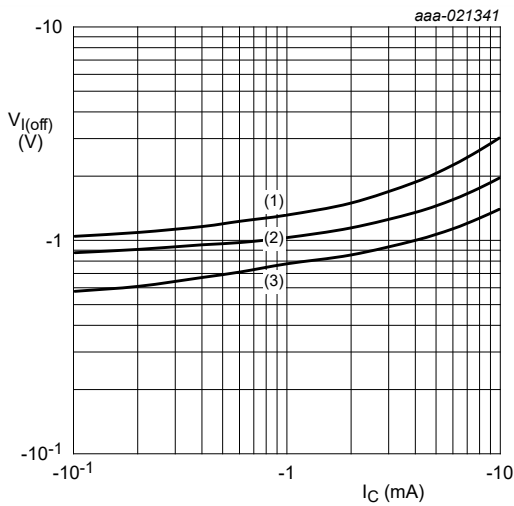
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -40\text{ °C}$

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



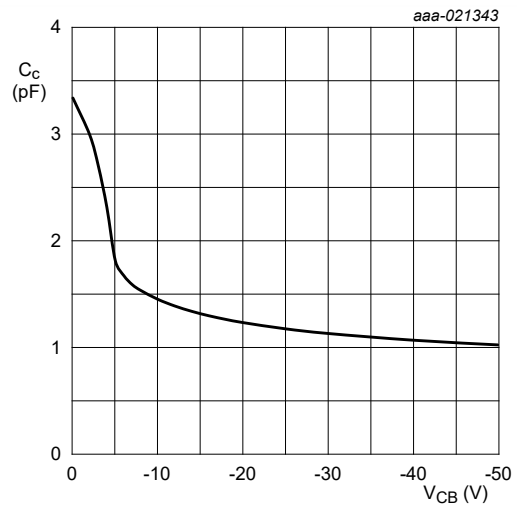
$V_{CE} = -0.3\text{ V}$   
 (1)  $T_{amb} = -40\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

**Fig. 31. PDTA124XQC: 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)  $T_{amb} = 100\text{ °C}$

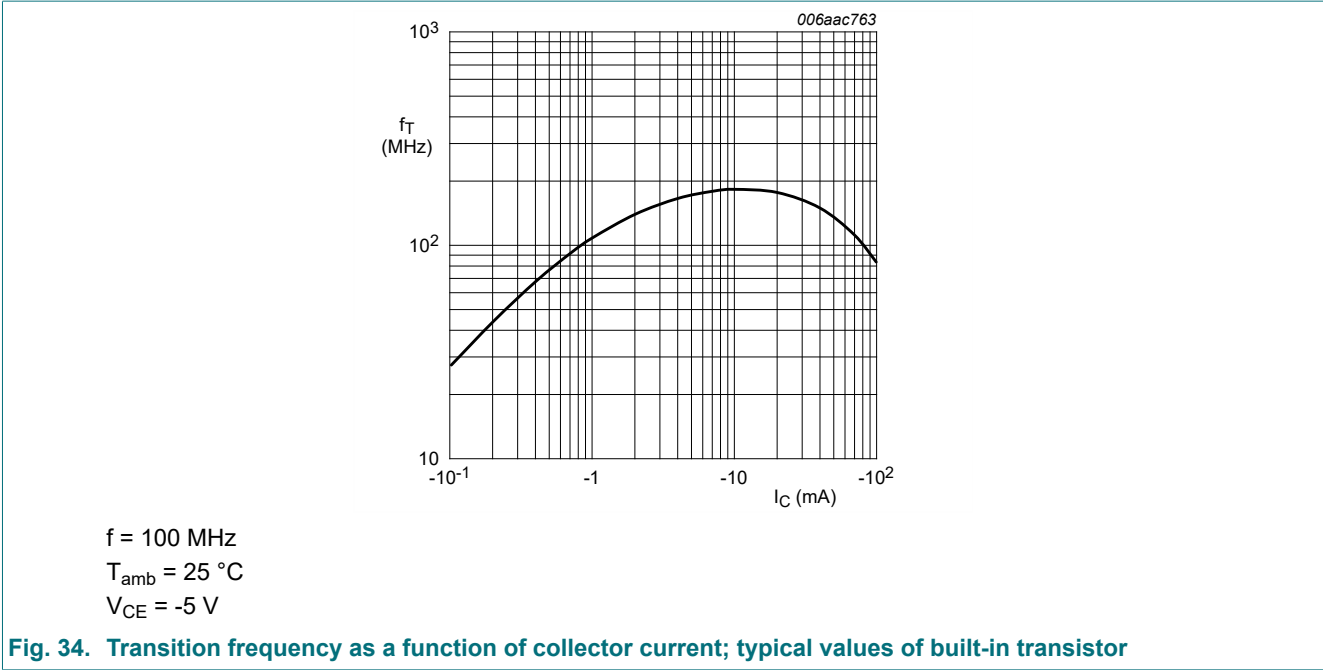
**Fig. 32. PDTA124XQC: Off-state input voltage as a function of collector current; typical values**



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

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

50 V, 100 mA PNP resistor-equipped transistors





## 12. Package outline

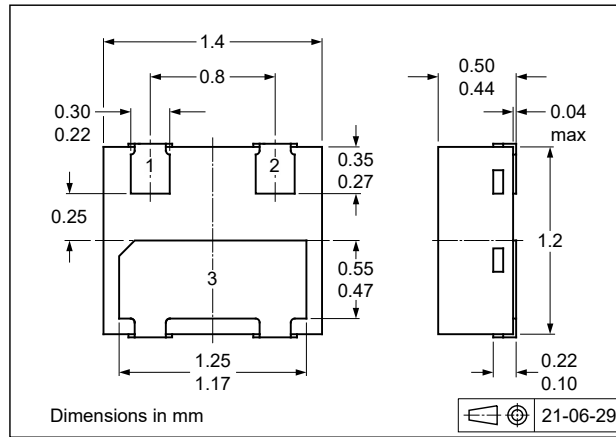
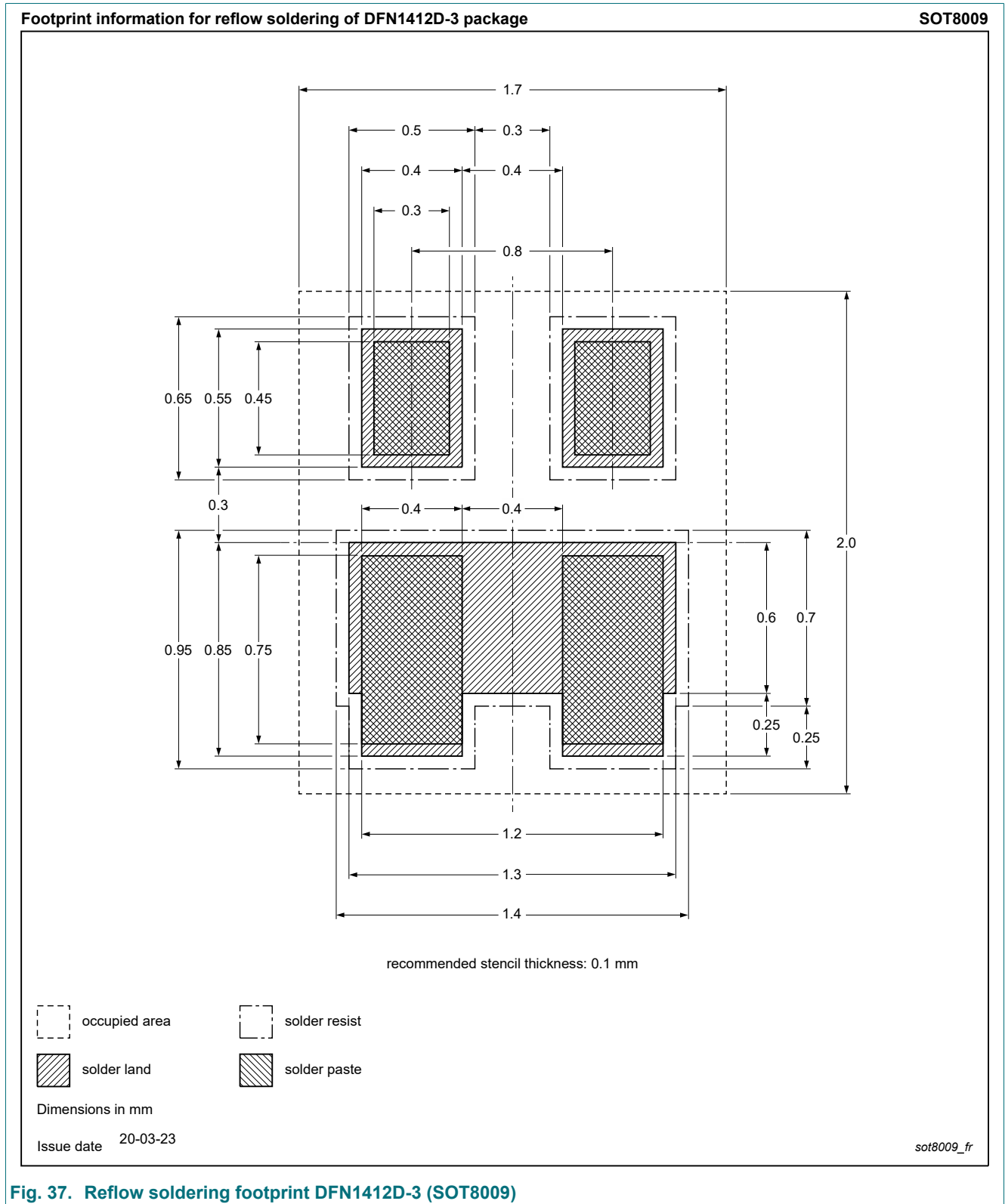


Fig. 36. Package outline DFN1412D-3 (SOT8009)



### 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_SER v.1	20210930	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.

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