

PDTA114E series

PNP resistor-equipped transistors;
R1 = 10 k Ω , R2 = 10 k Ω

Rev. 10 — 21 December 2011

Product data sheet

1. Product profile

1.1 General description

PNP Resistor-Equipped Transistor (RET) family in small Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

Type number	Package			NPN complement	Package configuration
	NXP	JEITA	JEDEC		
PDTA114EE	SOT416	SC-75	-	PDTC114EE	ultra small
PDTA114EM	SOT883	SC-101	-	PDTC114EM	leadless ultra small
PDTA114ET	SOT23	-	TO-236AB	PDTC114ET	small
PDTA114EU	SOT323	SC-70	-	PDTC114EU	very small

1.2 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

1.3 Applications

- Digital application in automotive and industrial segments
- Control of IC inputs
- Cost-saving alternative for BC847/857 series in digital applications
- Switching loads

1.4 Quick reference data

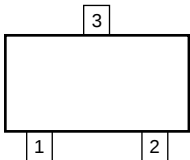
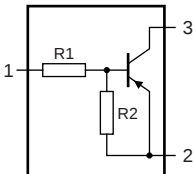
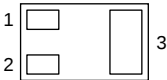
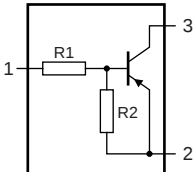
Table 2. Quick reference data

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)		7	10	13	k Ω
R2/R1	bias resistor ratio		0.8	1.0	1.2	



2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
SOT23; SOT323; SOT416			
1	input (base)	 006aaa144	 sym003
2	GND (emitter)		
3	output (collector)		
SOT883			
1	input (base)	 Transparent top view	 sym003
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTA114EE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTA114EM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA114ET	-	plastic surface-mounted package; 3 leads	SOT23
PDTA114EU	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PDTA114EE	03
PDTA114EM	E5
PDTA114ET	*03
PDTA114EU	*03

[1] * = placeholder for manufacturing site code.

5. Limiting values

Table 6. Limiting values

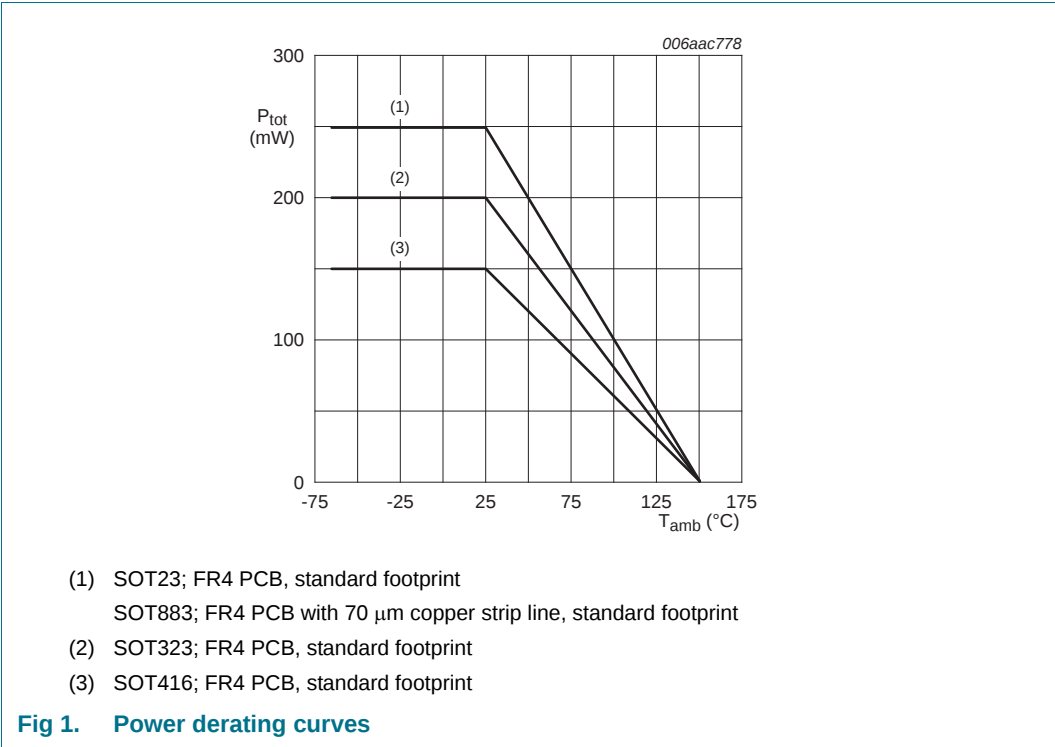
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	-	-10	V
V _I	input voltage				
	positive		-	+40	V
	negative		-	-10	V
I _O	output current		-	-100	mA
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	-100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C			
	PDTA114EE (SOT416)		[1][2]	150	mW
	PDTA114EM (SOT883)		[2][3]	250	mW
	PDTA114ET (SOT23)		[1]	250	mW
	PDTA114EU (SOT323)		[1]	200	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.

[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB with 70 μ m copper strip line, standard footprint.

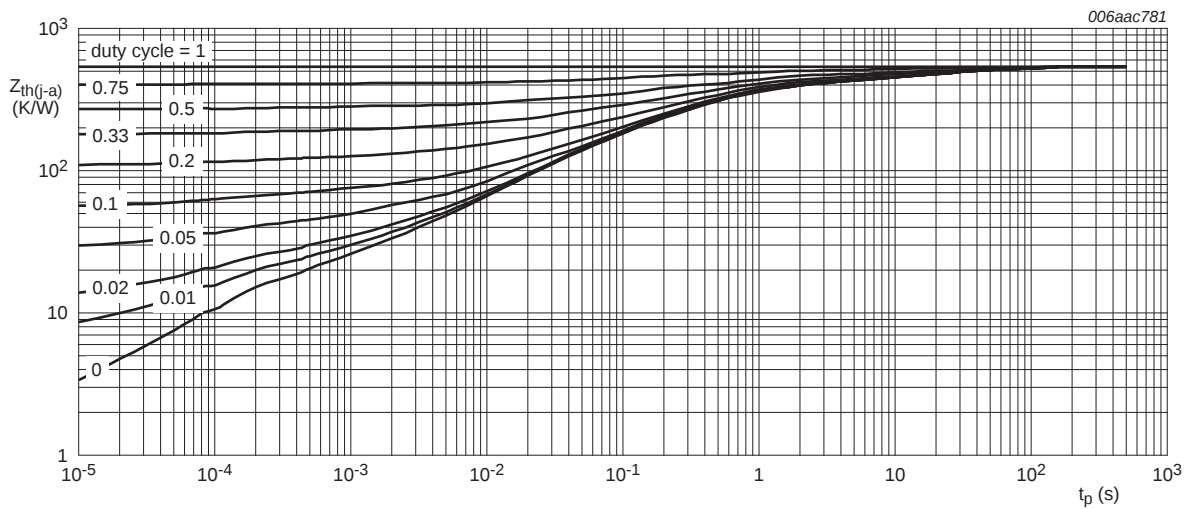


6. Thermal characteristics

Table 7. Thermal characteristics

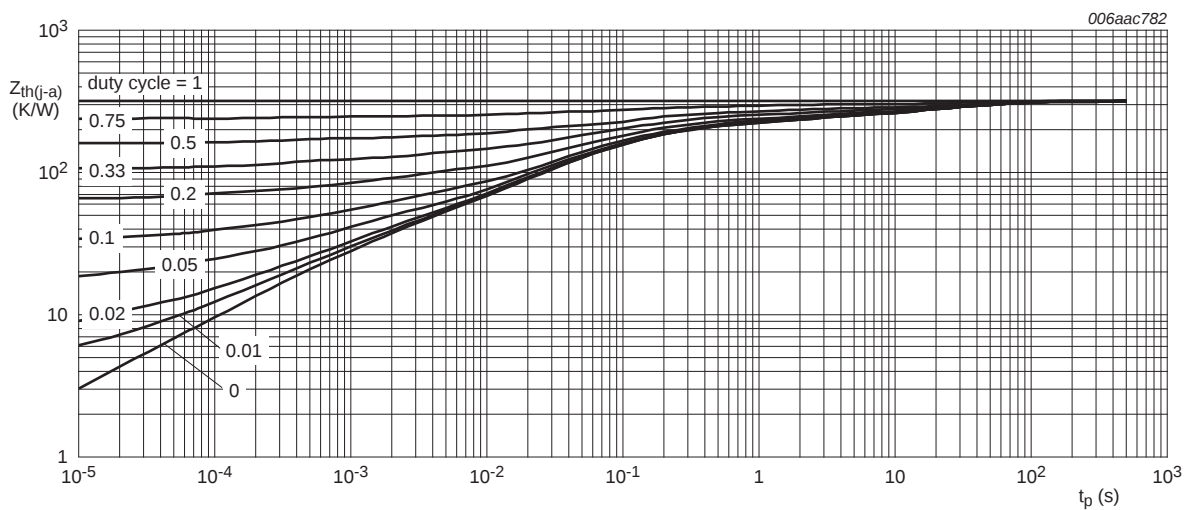
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air				
	PDTA114EE (SOT416)	[1][2]	-	-	830	K/W
	PDTA114EM (SOT883)	[2][3]	-	-	500	K/W
	PDTA114ET (SOT23)	[1]	-	-	500	K/W
	PDTA114EU (SOT323)	[1]	-	-	625	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Reflow soldering is the only recommended soldering method.
- [3] Device mounted on an FR4 PCB with 70 μm copper strip line, standard footprint.



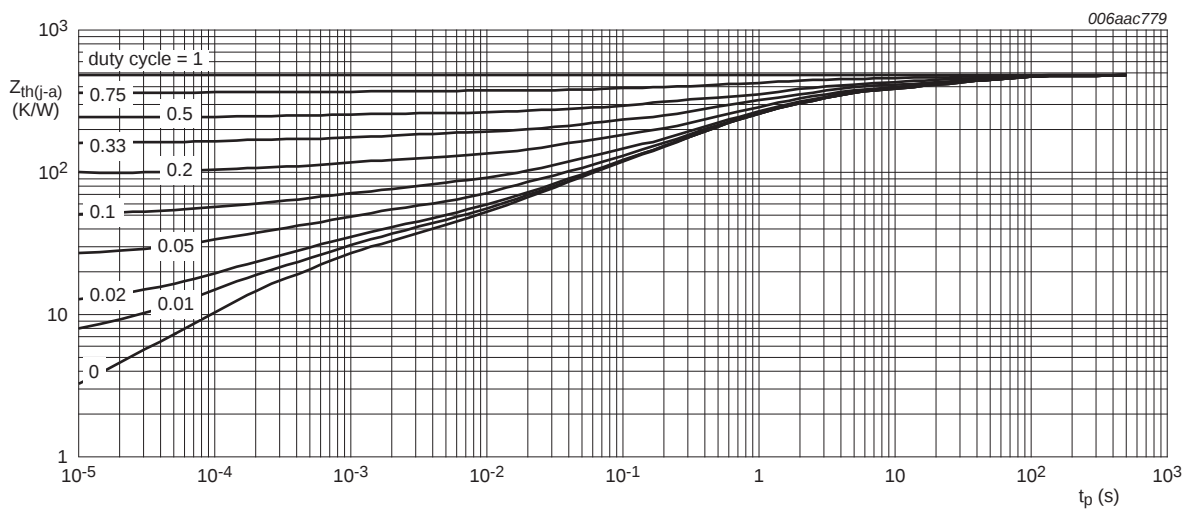
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114EE (SOT416); typical values



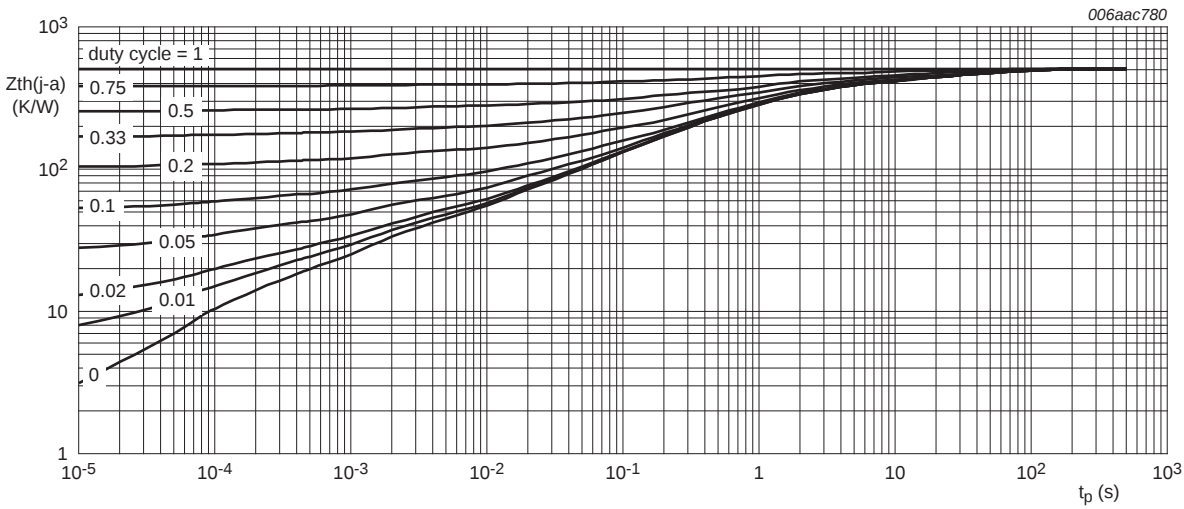
FR4 PCB, 70 μm copper strip line

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114EM (SOT883); typical values



FR4 PCB, standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114ET (SOT23); typical values



FR4 PCB, standard footprint

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114EU (SOT323); typical values

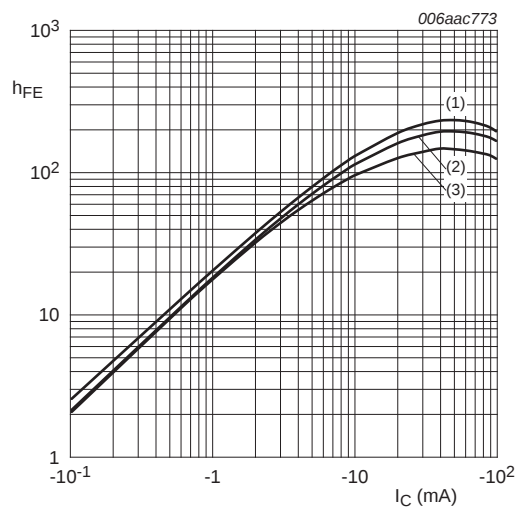
7. Characteristics

Table 8. Characteristics

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

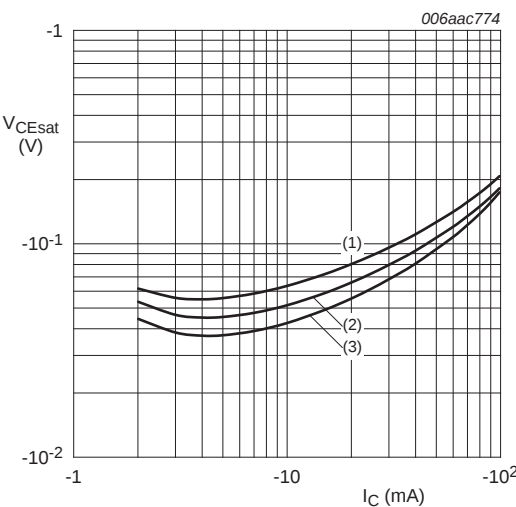
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -50\text{ V}$; $I_E = 0\text{ A}$	-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -30\text{ V}$; $I_B = 0\text{ A}$	-	-	-1	μA
		$V_{CE} = -30\text{ V}$; $I_B = 0\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$	-	-	-5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}$; $I_C = 0\text{ A}$	-	-	-400	μA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}$; $I_C = -5\text{ mA}$	30	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10\text{ mA}$; $I_B = -0.5\text{ mA}$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}$; $I_C = -100\text{ }\mu\text{A}$	-	-1.1	-0.8	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}$; $I_C = -10\text{ mA}$	-2.5	-1.8	-	V
R1	bias resistor 1 (input)		7	10	13	kΩ
R2/R1	bias resistor ratio		0.8	1.0	1.2	
C_c	collector capacitance	$V_{CB} = -10\text{ V}$; $I_E = I_C = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	3	pF
f_T	transition frequency	$V_{CE} = -5\text{ V}$; $I_C = -10\text{ mA}$; $f = 100\text{ MHz}$	[1] -	180	-	MHz

[1] Characteristics of built-in transistor.



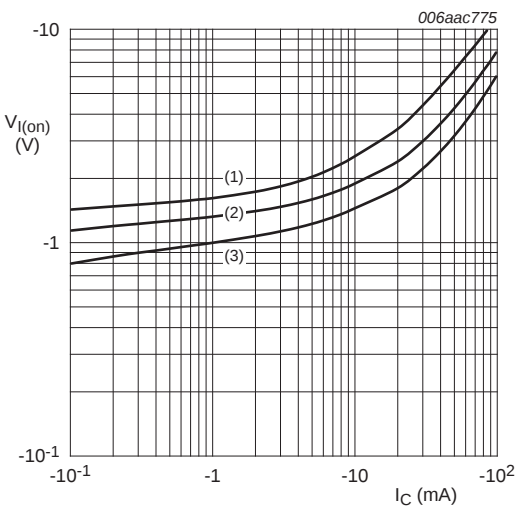
$V_{CE} = -5\text{ V}$
(1) $T_{amb} = 100^\circ\text{C}$
(2) $T_{amb} = 25^\circ\text{C}$
(3) $T_{amb} = -40^\circ\text{C}$

Fig 6. DC current gain as a function of collector current; typical values



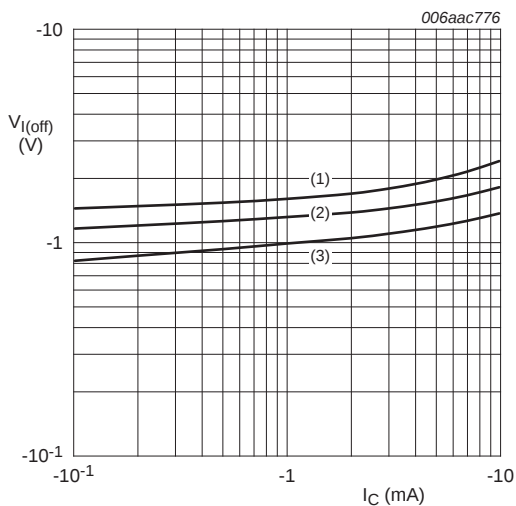
$I_C/I_B = 20$
(1) $T_{amb} = 100^\circ\text{C}$
(2) $T_{amb} = 25^\circ\text{C}$
(3) $T_{amb} = -40^\circ\text{C}$

Fig 7. Collector-emitter saturation voltage as a function of collector current; typical values



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

Fig 8. On-state input voltage as a function of collector current; typical values



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

Fig 9. Off-state input voltage as a function of collector current; typical values

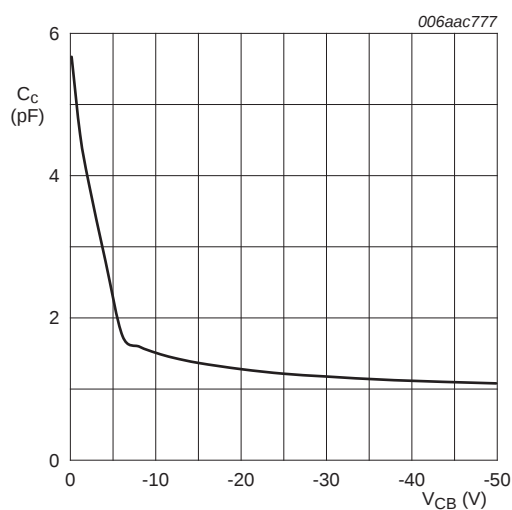


Fig 10. Collector capacitance as a function of collector-base voltage; typical values

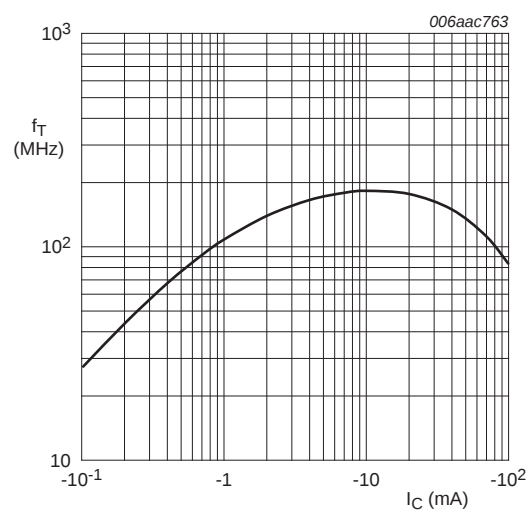


Fig 11. Transition frequency as a function of collector current; typical values of built-in transistor

8. Test information

8.1 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.

9. Package outline

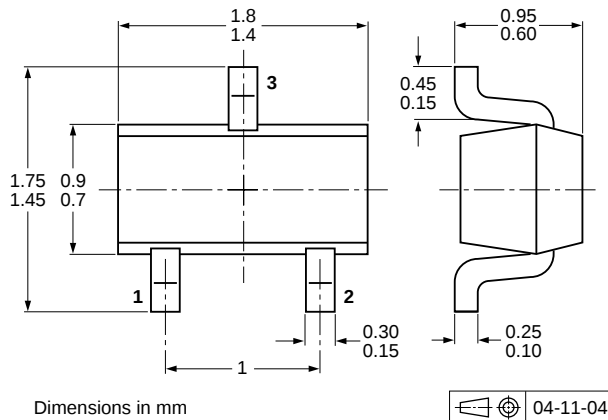


Fig 12. Package outline PDTA114EE (SOT416/SC-75)

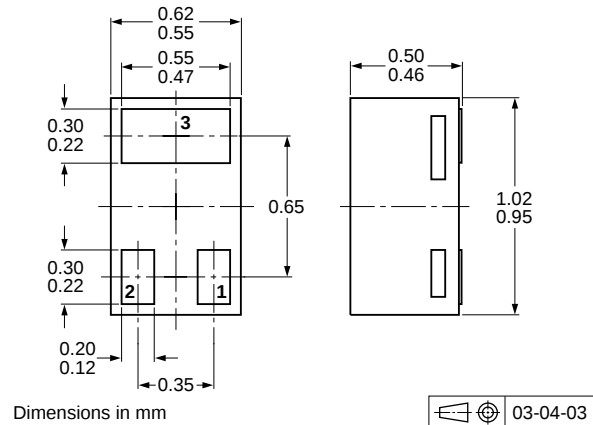


Fig 13. Package outline PDTA114EM (SOT883/SC-101)

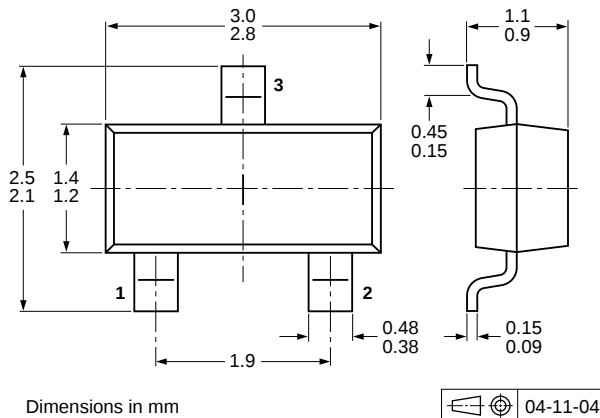


Fig 14. Package outline PDTA114ET (SOT23)

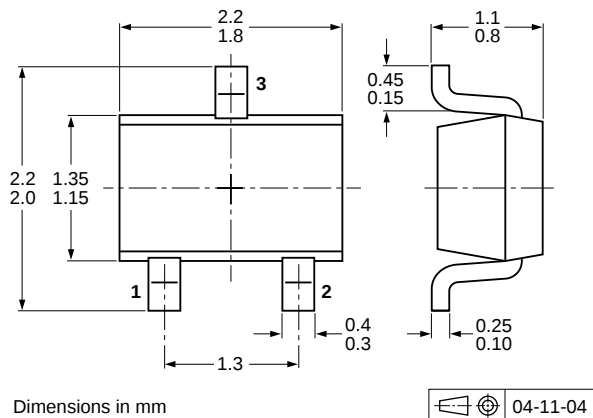


Fig 15. Package outline PDTA114EU (SOT323/SC-70)

10. Packing information

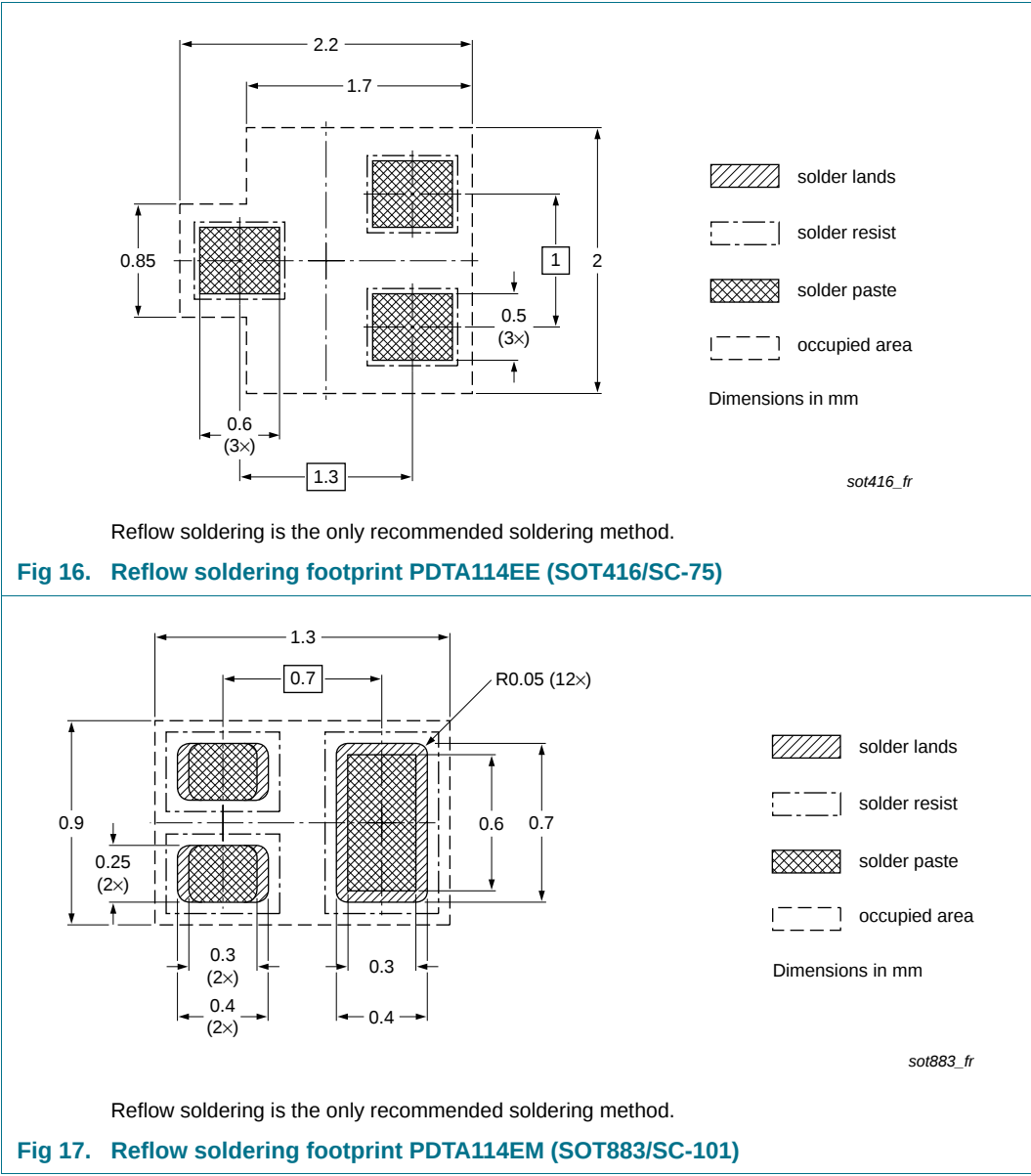
Table 9. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
PDTA114EE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-135
PDTA114EM	SOT883	2 mm pitch, 8 mm tape and reel	-	-315
PDTA114ET	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
PDTA114EU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

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

11. Soldering



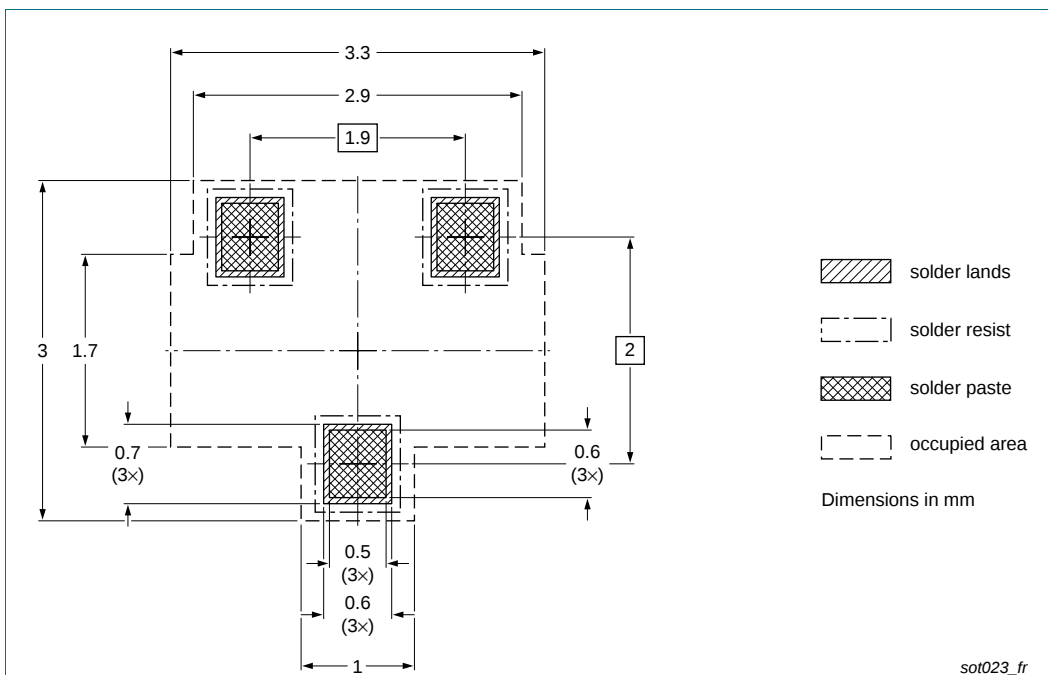


Fig 18. Reflow soldering footprint PDTA114ET (SOT23)

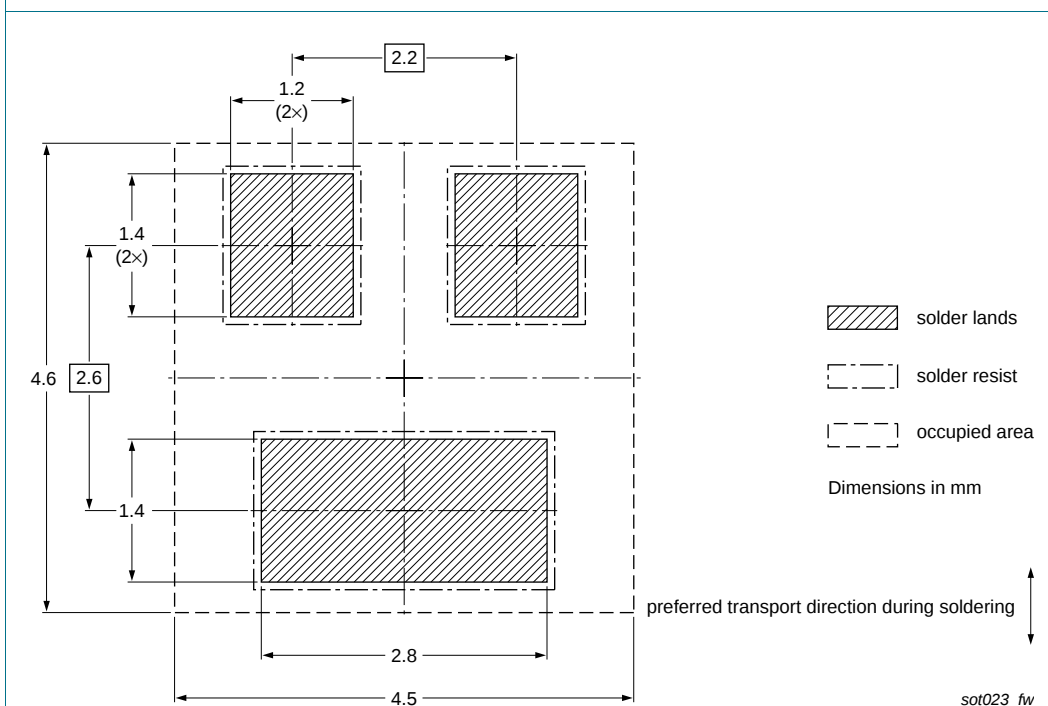


Fig 19. Wave soldering footprint PDTA114ET (SOT23)

