PDTC143X series

NPN resistor-equipped transistors; R1 = 4.7 kΩ, R2 = 10 kΩ

Rev. 11 — 9 December 2011 Product data sheet

1. Product profile

1.1 General description

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

Table 1. Product overview

Type number	Package			PNP complement	Package configuration
	NXP	JEITA	JEDEC		
PDTC143XE	SOT416	SC-75	-	PDTA143XE	ultra small
PDTC143XM	SOT883	SC-101	-	PDTA143XM	leadless ultra small
PDTC143XT	SOT23	-	TO-236AB	PDTA143XT	small
PDTC143XU	SOT323	SC-70	-	PDTA143XU	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 applications in automotive and industrial segments
- Control of IC inputs
- Cost-saving alternative for BC847/857 series in digital applications
- Switching loads

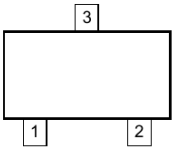
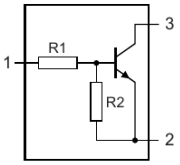
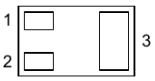
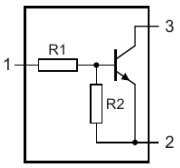
1.4 Quick reference data

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)		3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		1.7	2.1	2.6	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
SOT23; SOT323; SOT416			
1	input (base)	 006aaa144	 sym007
2	GND (emitter)		
3	output (collector)		
SOT883			
1	input (base)	 Transparent top view	 sym007
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTC143XE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTC143XM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTC143XT	-	plastic surface-mounted package; 3 leads	SOT23
PDTC143XU	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 5. Marking codes

Type number	Marking code[1]
PDTC143XE	34
PDTC143XM	E2
PDTC143XT	*32
PDTC143XU	*53

[1] * = placeholder for manufacturing site code

5. Limiting values

Table 6. Limiting values

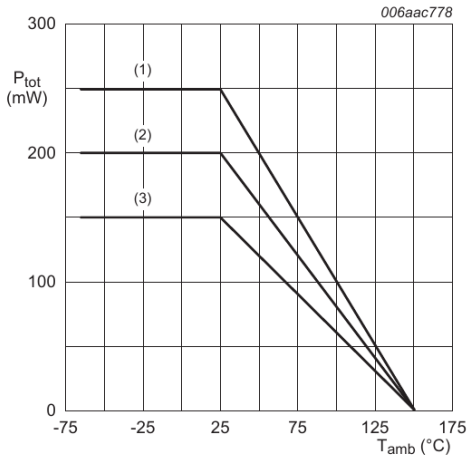
In accordance with the Absolute Maximum Rating System (IEC 60134).

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		-	7	V
V_I	input voltage					
	positive			-	+20	V
	negative			-	−7	V
I_O	output current			-	100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
	PDTC143XE (SOT416)		[1][2]	-	150	mW
	PDTC143XM (SOT883)		[2][3]	-	250	mW
	PDTC143XT (SOT23)		[1]	-	250	mW
	PDTC143XU (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 μm copper strip line, standard footprint.



(1) SOT23; FR4 PCB, standard footprint
SOT883; FR4 PCB with 70 μm copper strip line, standard footprint

(2) SOT323; FR4 PCB, standard footprint

(3) SOT416; FR4 PCB, standard footprint

Fig 1. Power derating curves

6. Thermal characteristics

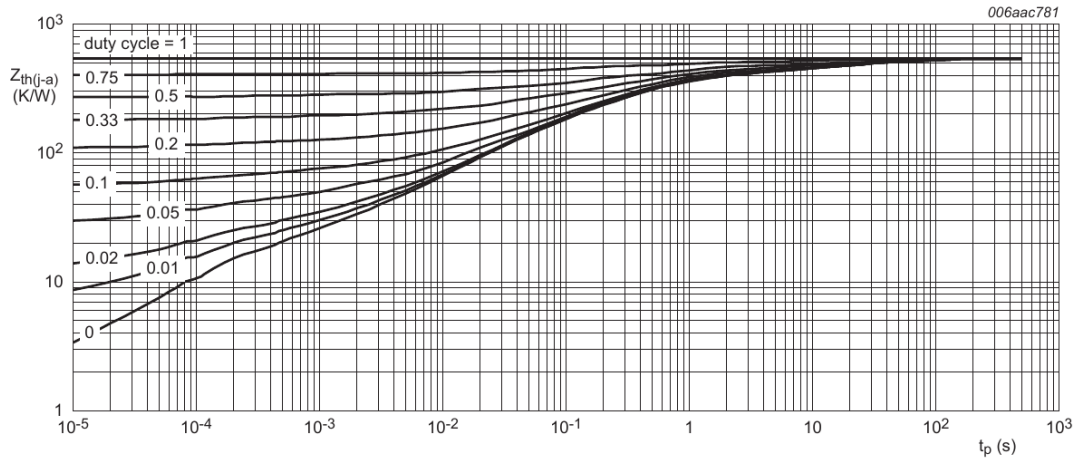
Table 7. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	PDTC143XE (SOT416)		[1][2]	-	-	830	K/W
	PDTC143XM (SOT883)		[2][3]	-	-	500	K/W
	PDTC143XT (SOT23)		[1]	-	-	500	K/W
	PDTC143XU (SOT323)		[1]	-	-	625	K/W

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

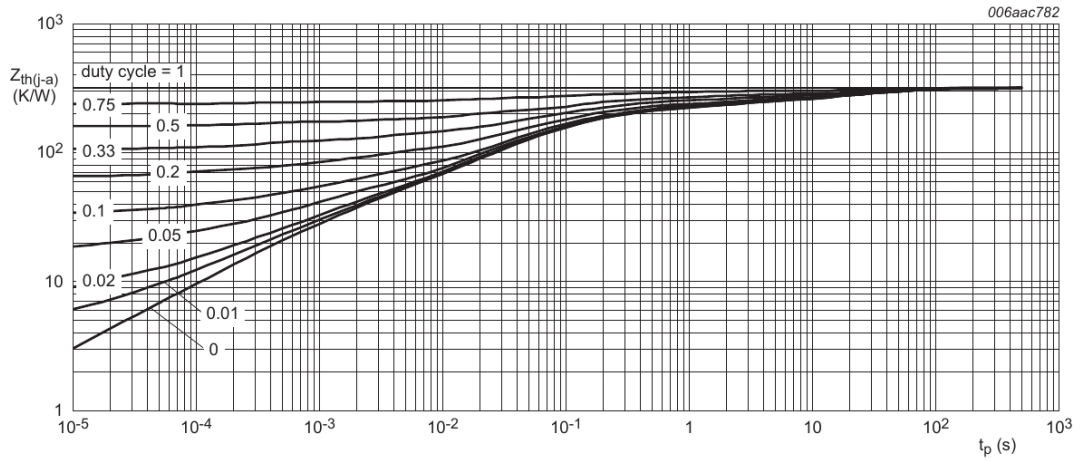
[2] Reflow soldering is the only recommended soldering method.

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



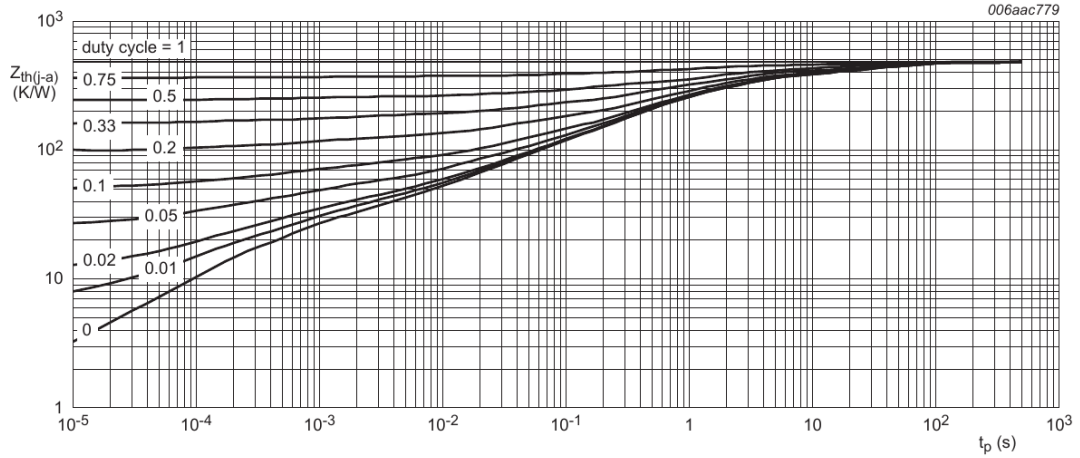
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTC143XE (SOT416); typical values



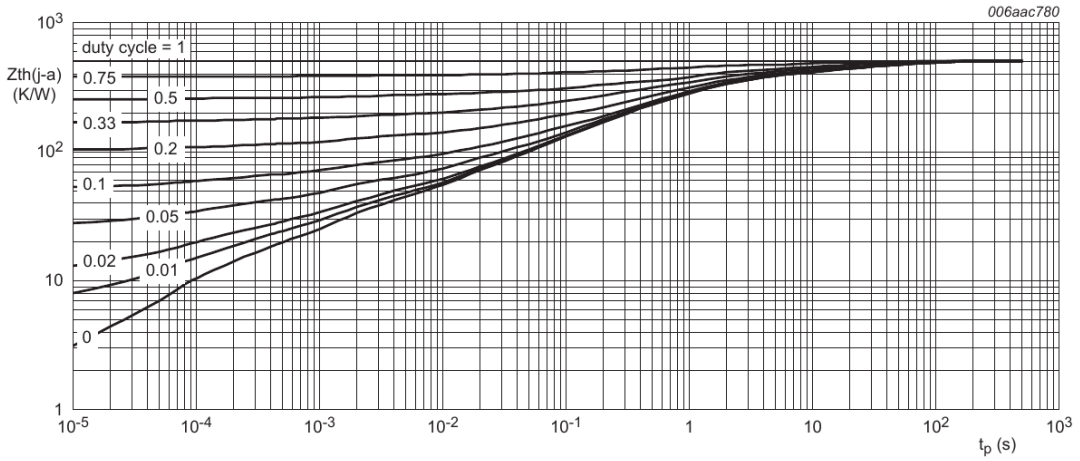
FR4 PCB, 70 μm copper strip line

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTC143XM (SOT883); typical values



FR4 PCB, standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTC143XT (SOT23); typical values



FR4 PCB, standard footprint

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTC143XU (SOT323); typical values

7. Characteristics

Table 8. Characteristics

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

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

[1] Characteristics of built-in transistor