



PBL1504Y

15 V 500 mA PNP/NPN loadswitch double transistor

08 October 2024

Product data sheet

1. General description

Low V_{CEsat} PNP transistor and NPN Resistor- Equipped Transistor (RET) in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low V_{CEsat} and resistor-equipped transistor in one package
- Low threshold voltage (<1 V) compared to MOSFET
- Low drive power required
- Space-saving solution
- Reduction of component count

3. Applications

- Supply line switches
- Battery charger switches
- High-side switches for LEDs, drivers and backlights
- Portable equipment

4. Quick reference data

Table 1. Quick reference data

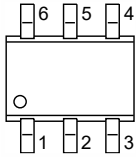
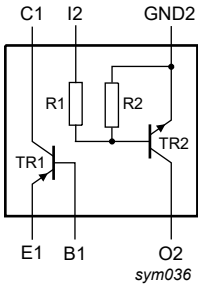
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Transistor TR1: PNP						
V_{CEO}	collector-emitter voltage	open base	-	-	-15	V
I_C	collector current		-	-	-500	mA
R_{CEsat}	collector-emitter saturation resistance	$I_C = -500$ mA; $I_B = -50$ mA; $T_{amb} = 25$ °C [1]	-	300	500	mΩ
Transistor TR2: NPN						
V_{CEO}	collector-emitter voltage	open base	-	-	50	V
I_O	output current		-	-	100	mA
R1	bias resistor 1 (input)	[2]	15.4	22	28.6	kΩ
R2/R1	bias resistor ratio	[2]	0.8	1	1.2	

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$

[2] 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	E1	emitter TR1	 TSSOP6 (SOT363)	 sym036
2	B1	base TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBLS1504Y	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBLS1504Y	%C4

[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
Transistor TR1: PNP						
V _{CBO}	collector-base voltage	open emitter		-	-15	V
V _{CEO}	collector-emitter voltage	open base		-	-15	V
V _{EBO}	emitter-base voltage	open collector		-	-6	V
I _C	collector current			-	-500	mA
I _{CM}	peak collector current	t _p ≤ 1 ms; δ ≤ 0.02		-	-1	A
I _B	base current			-	-50	mA
I _{BM}	peak base current	t _p ≤ 1 ms; δ ≤ 0.02		-	-100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	200	mW
Transistor TR2: NPN						
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			-	100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	200	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C		-	300	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, 35 µm copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per device							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	416	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
Transistor TR1: PNP							
I _{CBO}	collector-base cut-off current	V _{CB} = -15 V; I _E = 0 A; T _{amb} = 25 °C		-	-	-100	nA
		V _{CB} = -15 V; I _E = 0 A; T _j = 150 °C		-	-	-50	µA
I _{CES}	collector-emitter cut-off current	V _{CE} = -15 V; V _{BE} = 0 V; T _{amb} = 25 °C		-	-	-100	nA
I _{EBO}	emitter-base cut-off current	V _{EB} = -5 V; I _C = 0 A; T _{amb} = 25 °C		-	-	-100	nA
h _{FE}	DC current gain	V _{CE} = -2 V; I _C = -10 mA; T _{amb} = 25 °C		200	-	-	
		V _{CE} = -2 V; I _C = -100 mA; T _{amb} = 25 °C	[1]	150	-	-	
		V _{CE} = -2 V; I _C = -500 mA; T _{amb} = 25 °C	[1]	90	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = -10 mA; I _B = -0.5 mA; T _{amb} = 25 °C		-	-	-25	mV
		I _C = -200 mA; I _B = -10 mA; T _{amb} = 25 °C		-	-	-150	mV
		I _C = -500 mA; I _B = -50 mA; T _{amb} = 25 °C	[1]	-	-	-250	mV
R _{CEsat}	collector-emitter saturation resistance		[1]	-	300	500	mΩ
V _{BEsat}	base-emitter saturation voltage		[1]	-	-	-1.1	V
V _{BEon}	base-emitter turn-on voltage	V _{CE} = -2 V; I _C = -100 mA; T _{amb} = 25 °C	[1]	-	-	-0.9	V
C _c	collector capacitance	V _{CB} = -10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	-	10	pF
f _T	transition frequency	V _{CE} = -5 V; I _C = -100 mA; f = 100 MHz; T _{amb} = 25 °C		100	280	-	MHz
Transistor TR2: NPN							
I _{CBO}	collector-base cut-off current	V _{CB} = 50 V; I _E = 0 A; T _{amb} = 25 °C		-	-	100	nA
I _{CEO}	collector-emitter cut-off current	V _{CE} = 30 V; I _B = 0 A; T _{amb} = 25 °C		-	-	1	µA
		V _{CE} = 30 V; I _B = 0 A; T _j = 150 °C		-	-	50	µA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C		-	-	180	µA
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 5 mA; T _{amb} = 25 °C		60	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA; T _{amb} = 25 °C		-	-	150	mV
V _{I(off)}	off-state input voltage	V _{CE} = 5 V; I _C = 100 µA; T _{amb} = 25 °C		-	1.1	0.8	V
V _{I(on)}	on-state input voltage	V _{CE} = 0.3 V; I _C = 5 mA; T _{amb} = 25 °C		2.5	1.7	-	V
R1	bias resistor 1 (input)		[2]	15.4	22	28.6	kΩ
R2/R1	bias resistor ratio		[2]	0.8	1	1.2	
C _c	collector capacitance	V _{CB} = 10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	-	2.5	pF

[1] Pulse test: t_p ≤ 300 µs; δ ≤ 0.02
[2] See "Section 11: Test information" for resistor calculation and test conditions.

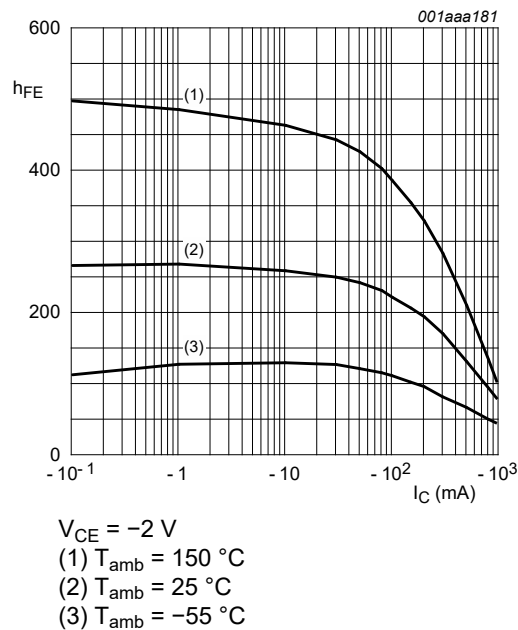


Fig. 1. TR1 (PNP): DC current gain as a function of collector current; typical values

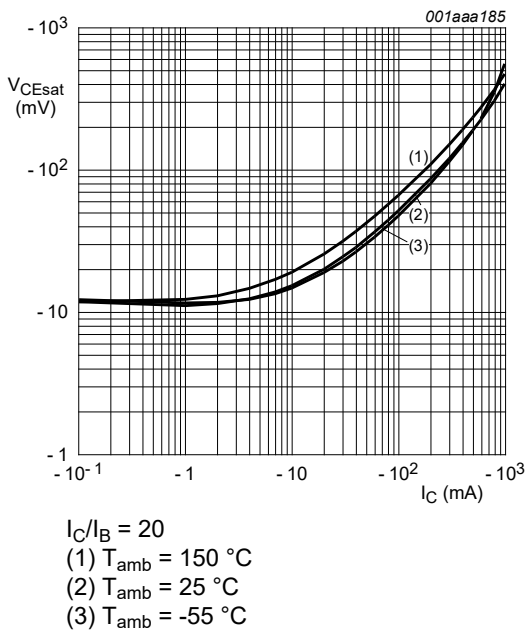


Fig. 2. TR1 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

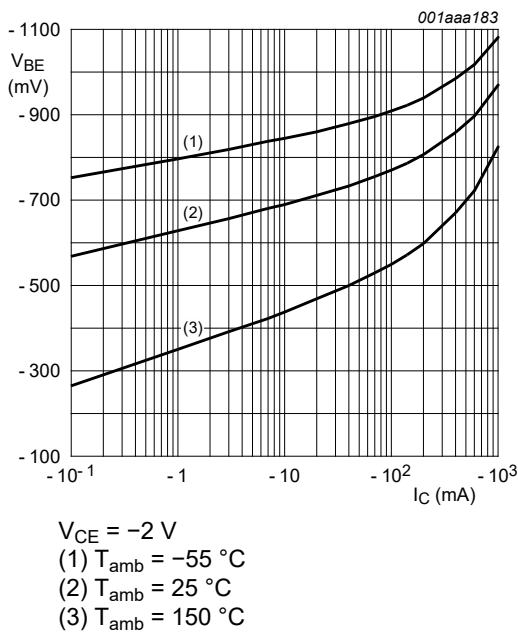


Fig. 3. TR1 (PNP): Base-emitter voltage as a function of collector current; typical values

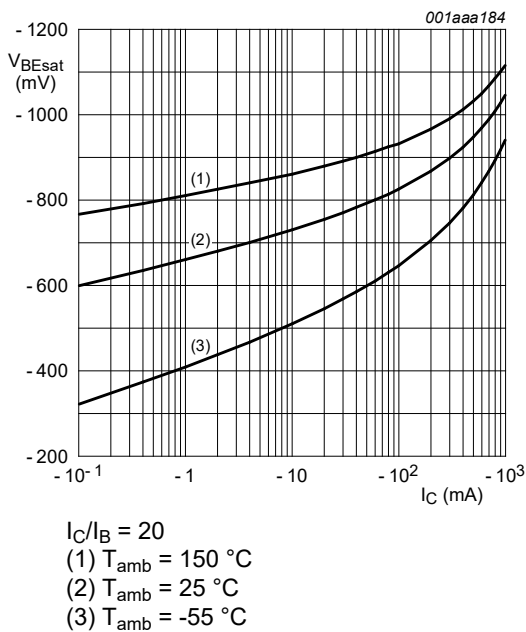
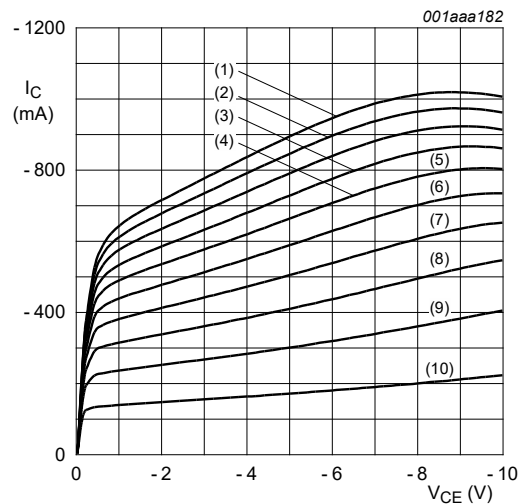
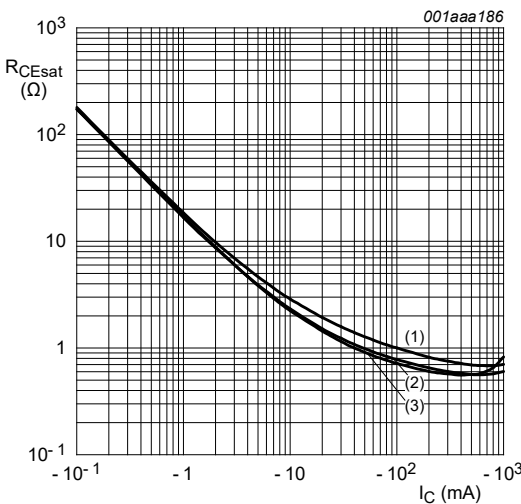


Fig. 4. TR1 (PNP): Base-emitter saturation voltage as a function of collector current; typical values



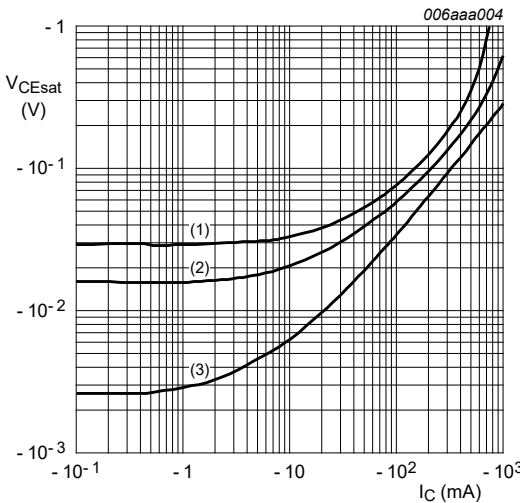
$T_{amb} = 25\text{ }^{\circ}\text{C}$
(1) $I_B = -7.0\text{ mA}$
(2) $I_B = -6.3\text{ mA}$
(3) $I_B = -5.6\text{ mA}$
(4) $I_B = -4.9\text{ mA}$
(5) $I_B = -4.2\text{ mA}$
(6) $I_B = -3.5\text{ mA}$
(7) $I_B = -2.8\text{ mA}$
(8) $I_B = -2.1\text{ mA}$
(9) $I_B = -1.4\text{ mA}$
(10) $I_B = -0.7\text{ mA}$

Fig. 5. TR1 (PNP): Collector current as a function of collector-emitter voltage; typical values



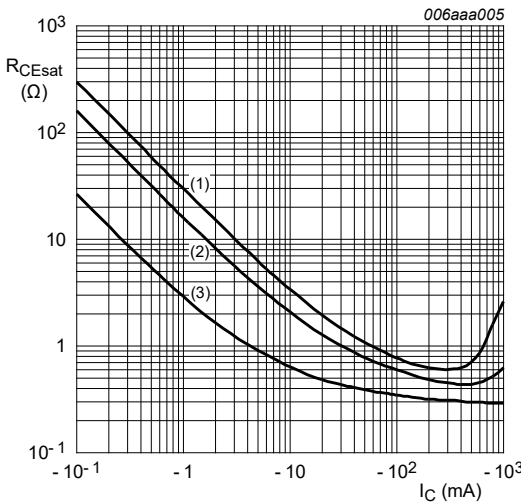
$I_C/I_B = 20$
(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = 150\text{ }^{\circ}\text{C}$

Fig. 6. TR1 (PNP): Equivalent on-resistance as a function of collector current; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}$
(1) $I_C/I_B = 100$
(2) $I_C/I_B = 50$
(3) $I_C/I_B = 10$

Fig. 7. TR1 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}$
(1) $I_C/I_B = 100$
(2) $I_C/I_B = 50$
(3) $I_C/I_B = 10$

Fig. 8. TR1 (PNP): Equivalent on-resistance as a function of collector current; typical values

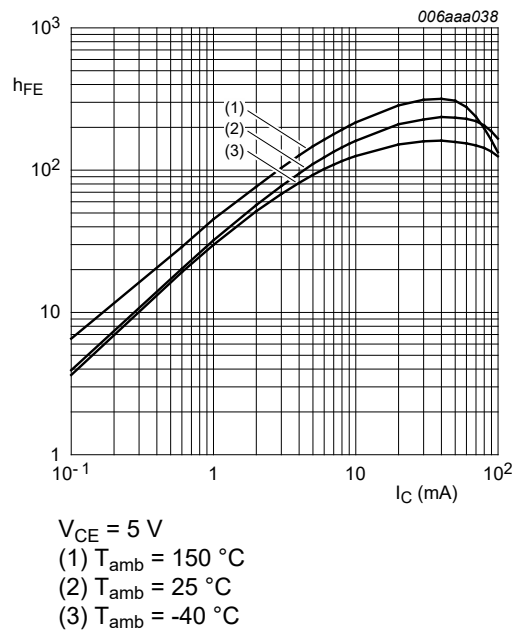


Fig. 9. TR2 (NPN): DC current gain as a function of collector current; typical values

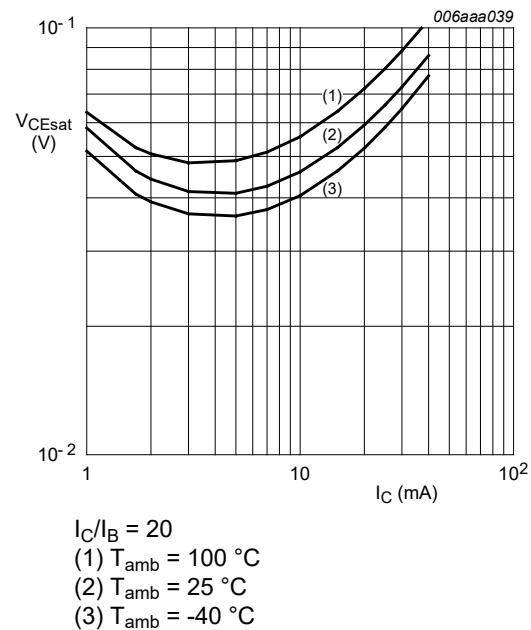


Fig. 10. TR2 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

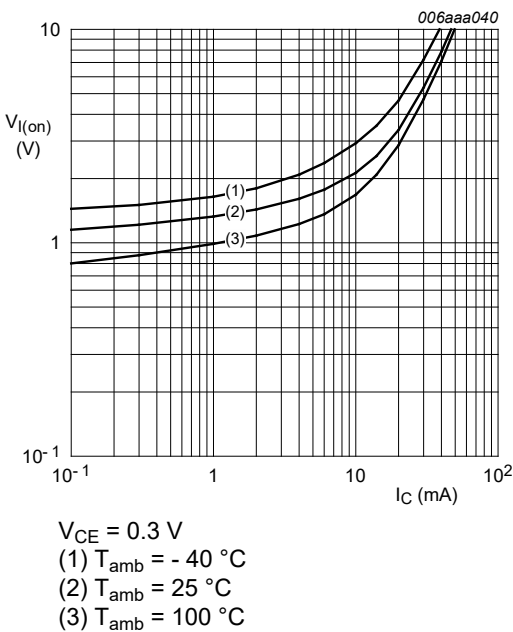


Fig. 11. TR2 (NPN): On-state input voltage as a function of collector current; typical values

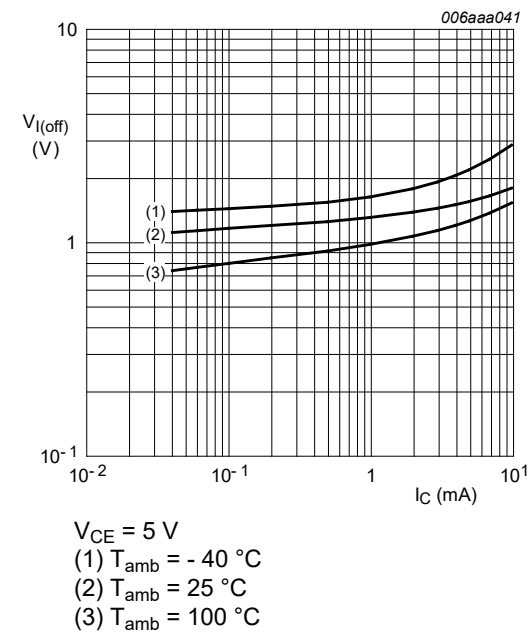
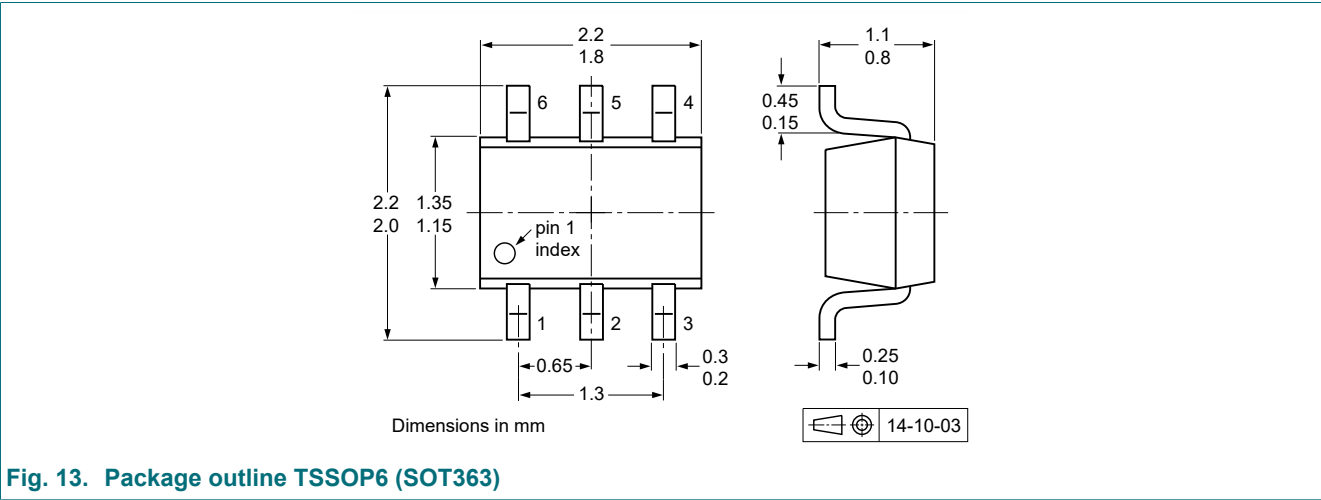
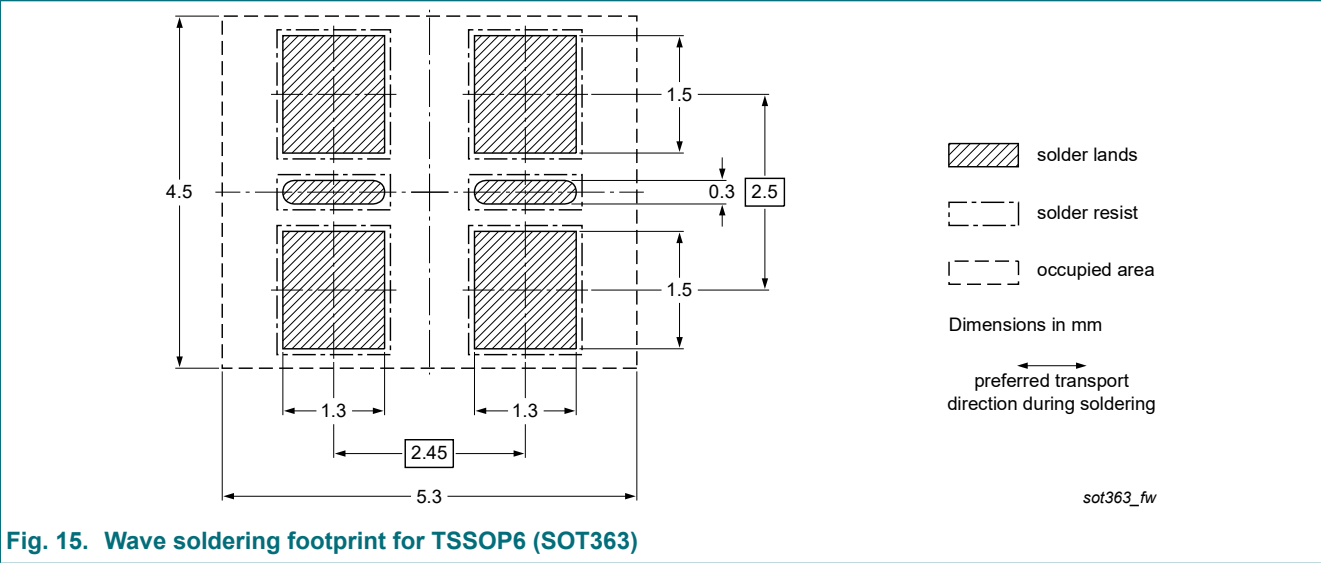
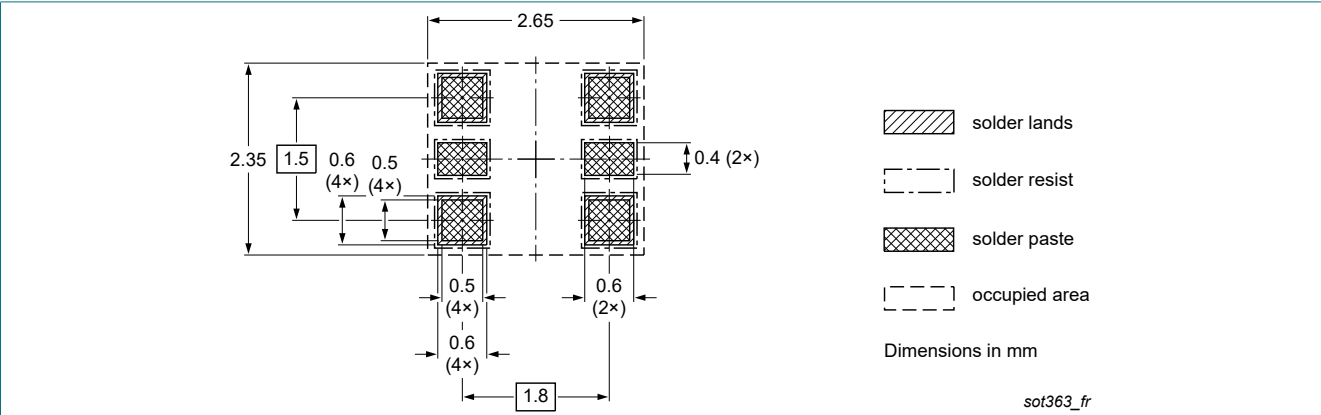


Fig. 12. TR2 (NPN): Off-state input voltage as a function of collector current; typical values

11. Package outline



12. Soldering



13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBLS1504Y v.4	20241008	Product data sheet	-	PBLS1504Y_PBLS1504V_3
Modifications:	- Family data sheet reduced to single type data sheet. - Product changed to non automotive. Please refer to the automotive product(s) with -Q.			
PBLS1504Y_PBLS1504V_3	20090825	Product data sheet	-	PBLS1504Y_PBLS1504V_2
PBLS1504Y_PBLS1504V_2	20041125	Product data sheet	-	PBLS1504V_1
PBLS1504V_1	20031107	Product specification	-	

14. 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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