



PBSS2515YPN-Q

15 V low V_{CEsat} NPN/PNP transistor

17 February 2022

Product data sheet

1. General description

NPN/PNP low V_{CEsat} transistor pair in a SOT363 (SC-88) very small Surface-Mounted Device (SMD) plastic package. .

2. Features and benefits

- Low collector-emitter saturation voltage
- High current capability
- Replaces two SC-70 packaged low V_{CEsat} transistors on same PCB area
- Reduces required PCB area
- Reduced pick and place costs.
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General purpose switching and muting
- Low frequency driver circuits
- LCD backlighting
- Supply line switching circuits
- Battery driven equipment (mobile phones, video cameras and hand-held devices).

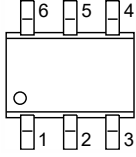
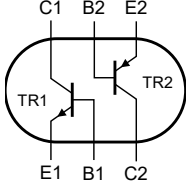
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor unless otherwise specified; for the PNP transistor with negative polarity						
V_{CEO}	collector-emitter voltage	open base	-	-	15	V
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	1	A
TR1 (NPN)						
R_{CEsat}	collector-emitter saturation resistance	$I_C = 500$ mA; $I_B = 50$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_{amb} = 25$ °C	-	300	500	m Ω
TR2 (PNP)						
R_{CEsat}	collector-emitter saturation resistance	$I_C = -500$ mA; $I_B = -50$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_{amb} = 25$ °C	-	300	500	m Ω

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 TSSOP6 (SOT363)	 sym139
2	B1	base TR1		
3	C2	collector TR2		
4	E2	emitter TR2		
5	B2	base TR2		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS2515YPN-Q	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]
PBSS2515YPN-Q	N8 %

[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
Per transistor unless otherwise specified; for the PNP transistor with negative polarity						
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	single pulse; $t_p \leq 1$ ms		-	1	A
I_{BM}	peak base current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C		-	200	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	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 PCB, single-sided copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	416	K/W

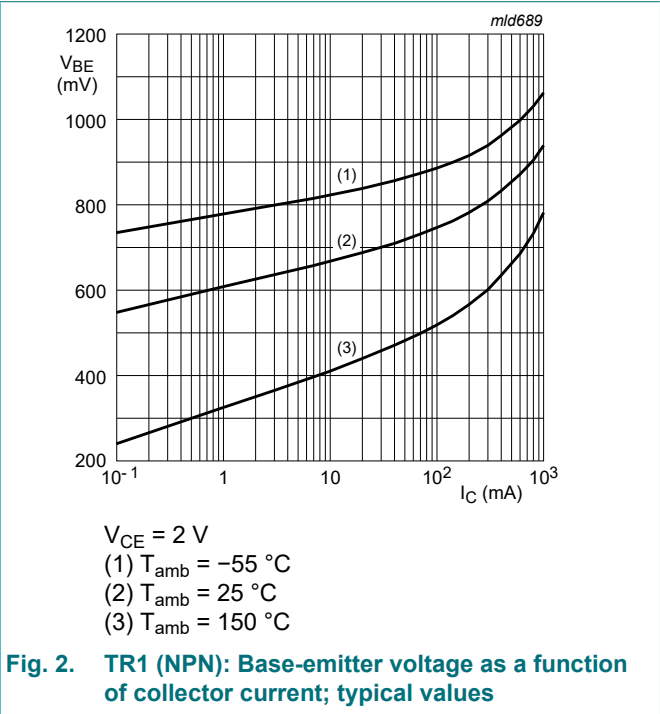
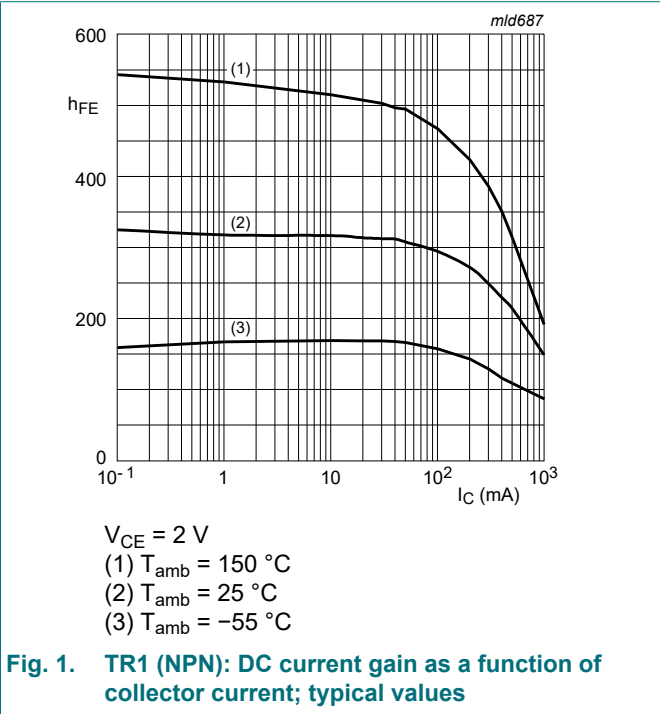
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

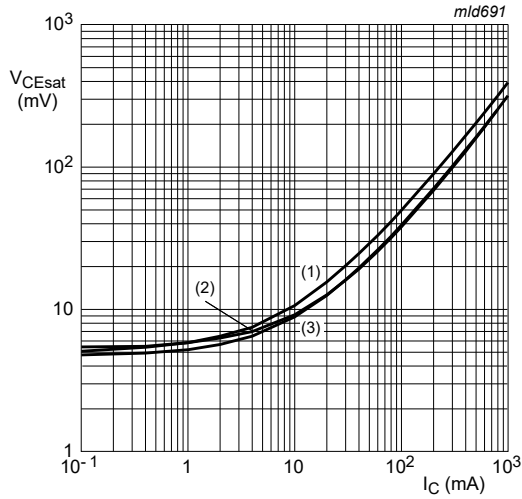
10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor unless otherwise specified; for the PNP transistor with negative polarity							
I_{CBO}	collector-base cut-off current	$V_{CB} = 15\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ °C}$		-	-	100	nA
		$V_{CB} = 15\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$		-	-	50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ °C}$		-	-	100	nA
TR1 (NPN)							
h_{FE}	DC current gain	$V_{CE} = 2\text{ V}; I_C = 10\text{ mA}; T_{amb} = 25\text{ °C}$		200	-	-	
		$V_{CE} = 2\text{ V}; I_C = 100\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		150	-	-	
		$V_{CE} = 2\text{ V}; I_C = 500\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		90	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}; T_{amb} = 25\text{ °C}$		-	-	25	mV
		$I_C = 200\text{ mA}; I_B = 10\text{ mA}; T_{amb} = 25\text{ °C}$		-	-	150	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		-	-	250	mV
				-	300	500	mΩ
V_{BEsat}	base-emitter saturation voltage			-	-	1.1	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 2\text{ V}; I_C = 100\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		-	-	0.9	V
f_T	transition frequency	$V_{CE} = 5\text{ V}; I_C = 100\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ °C}$		250	420	-	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$		-	4.4	6	pF
TR2 (PNP)							
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}; I_C = -10\text{ mA}; T_{amb} = 25\text{ °C}$		200	-	-	
		$V_{CE} = -2\text{ V}; I_C = -100\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		150	-	-	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		90	-	-	

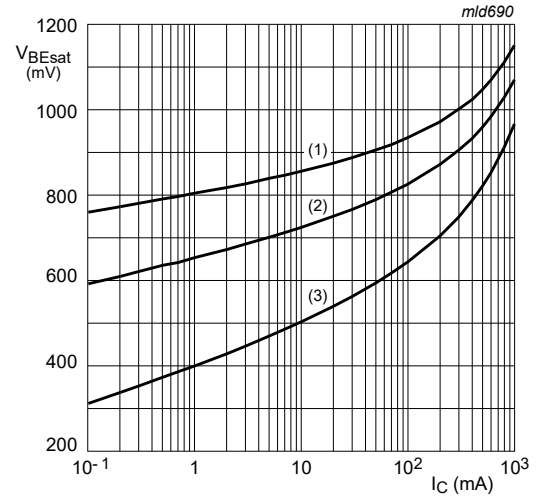
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEsat}	collector-emitter saturation voltage	I _C = -10 mA; I _B = -0.5 mA; T _{amb} = 25 °C	-	-	-25	mV
		I _C = -200 mA; I _B = -10 mA; T _{amb} = 25 °C	-	-	-150	mV
		I _C = -500 mA; I _B = -50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	-	-250	mV
R _{CEsat}	collector-emitter saturation resistance	I _C = -500 mA; I _B = -50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	300	500	mΩ
V _{BEsat}	base-emitter saturation voltage		-	-	-1.1	V
V _{BEon}	base-emitter turn-on voltage	V _{CE} = -2 V; I _C = -100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	-	-0.9	V
f _T	transition frequency	V _{CE} = -5 V; I _C = -100 mA; f = 100 MHz; T _{amb} = 25 °C	100	280	-	MHz
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





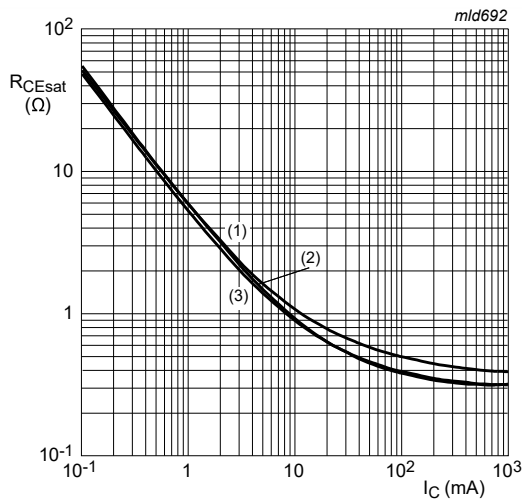
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 3. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



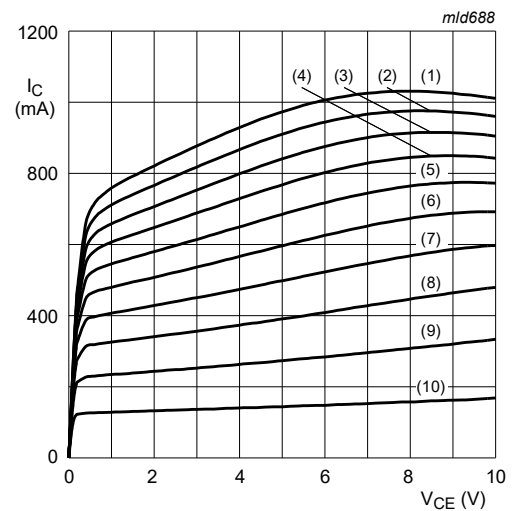
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



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

Fig. 5. TR1 (NPN): Equivalent on-resistance as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$
 (1) $I_B = 4.6\text{ mA}$
 (2) $I_B = 4.14\text{ mA}$
 (3) $I_B = 3.68\text{ mA}$
 (4) $I_B = 3.22\text{ mA}$
 (5) $I_B = 2.76\text{ mA}$
 (6) $I_B = 2.3\text{ mA}$
 (7) $I_B = 1.84\text{ mA}$
 (8) $I_B = 1.38\text{ mA}$
 (9) $I_B = 0.92\text{ mA}$
 (10) $I_B = 0.46\text{ mA}$

Fig. 6. TR1 (NPN): Collector current as a function of collector-emitter voltage; typical values

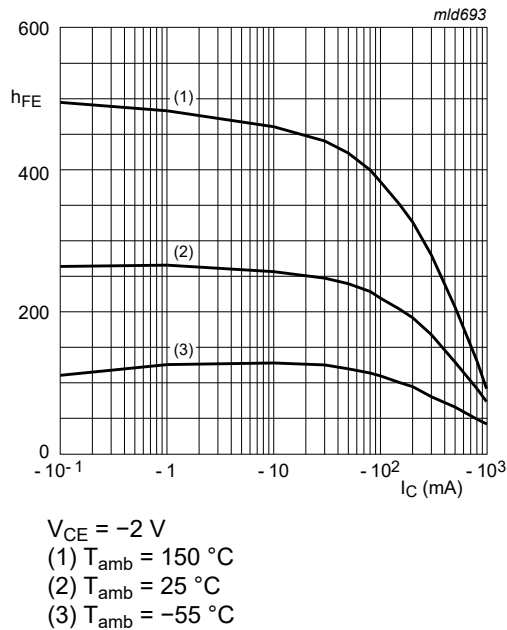


Fig. 7. TR2 (PNP): DC current gain as a function of collector current; typical values

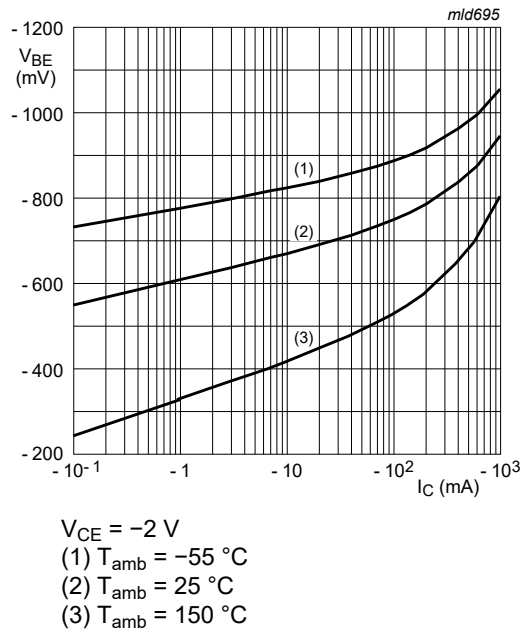


Fig. 8. TR2 (PNP): Base-emitter voltage as a function of collector current; typical values

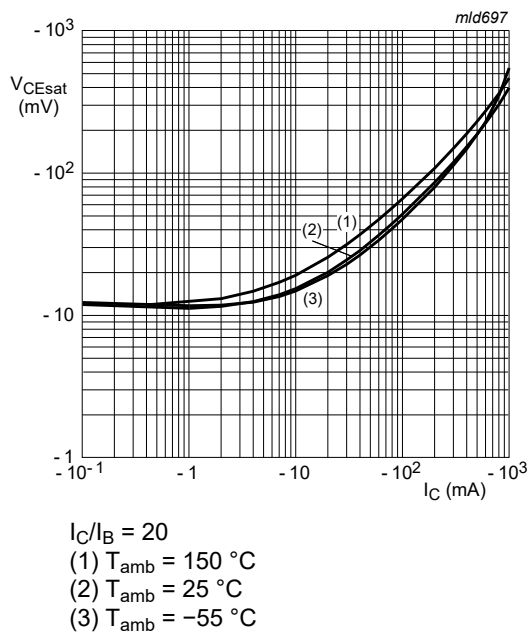


Fig. 9. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

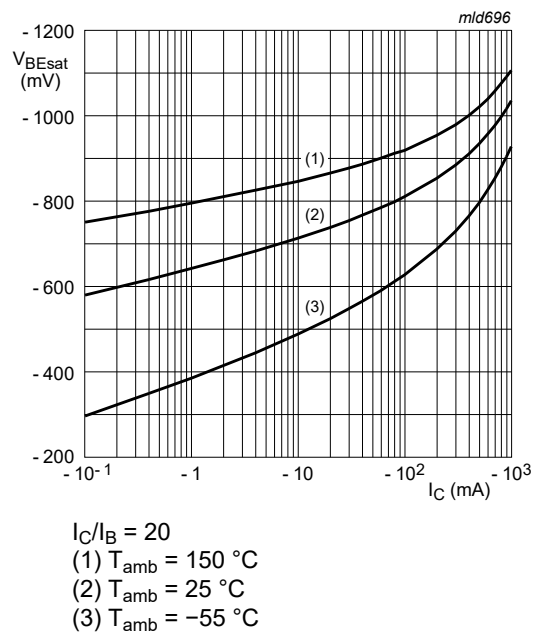
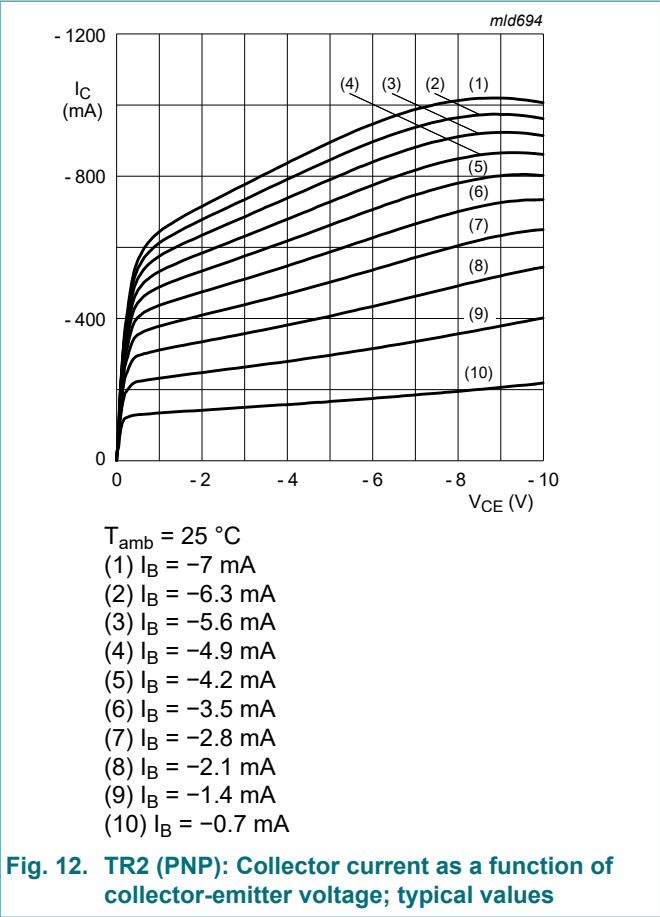
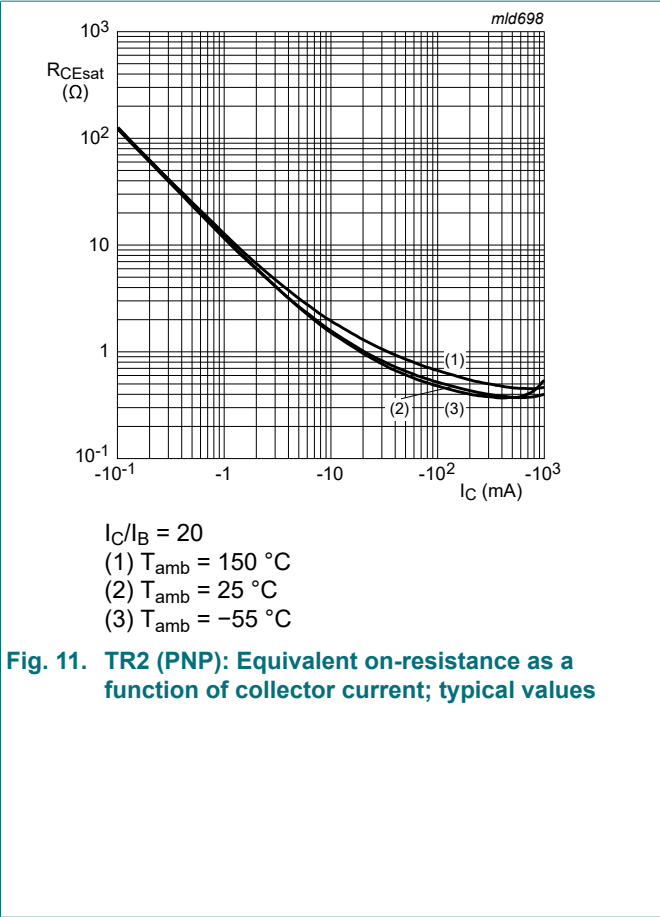


Fig. 10. TR2 (PNP): Base-emitter saturation voltage as a function of collector current; typical values

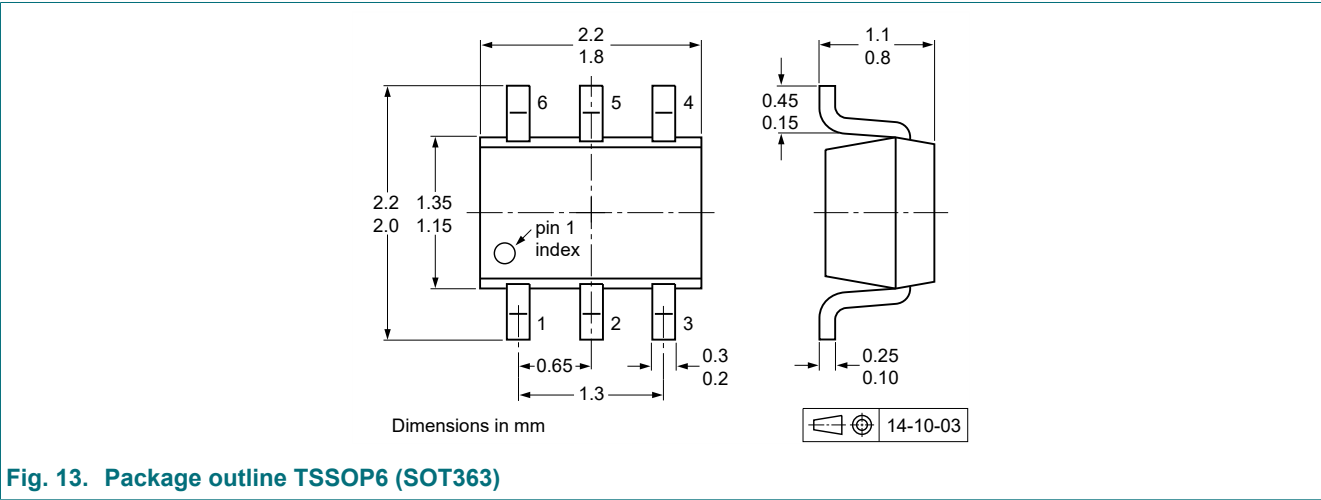


11. Test information

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.

12. Package outline



13. Soldering

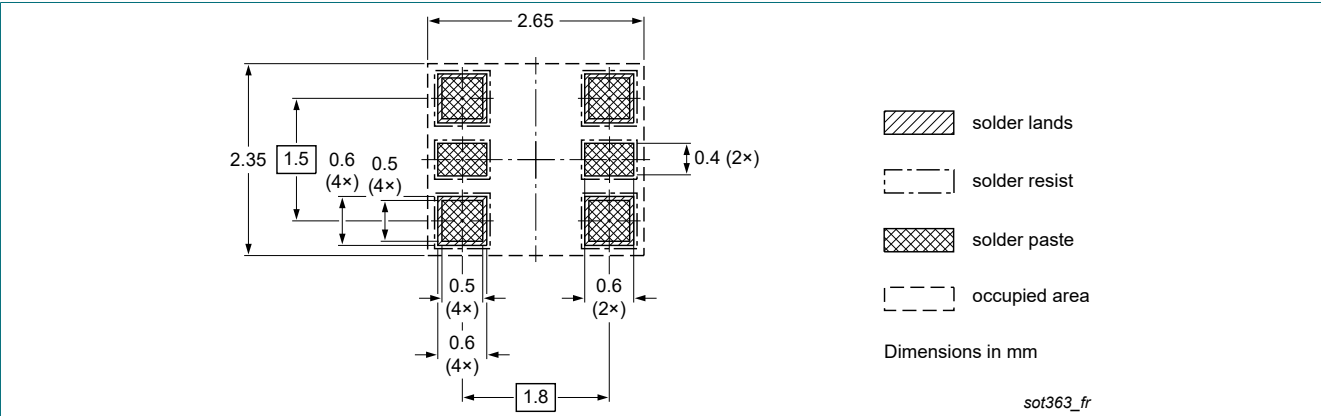


Fig. 14. Reflow soldering footprint for TSSOP6 (SOT363)

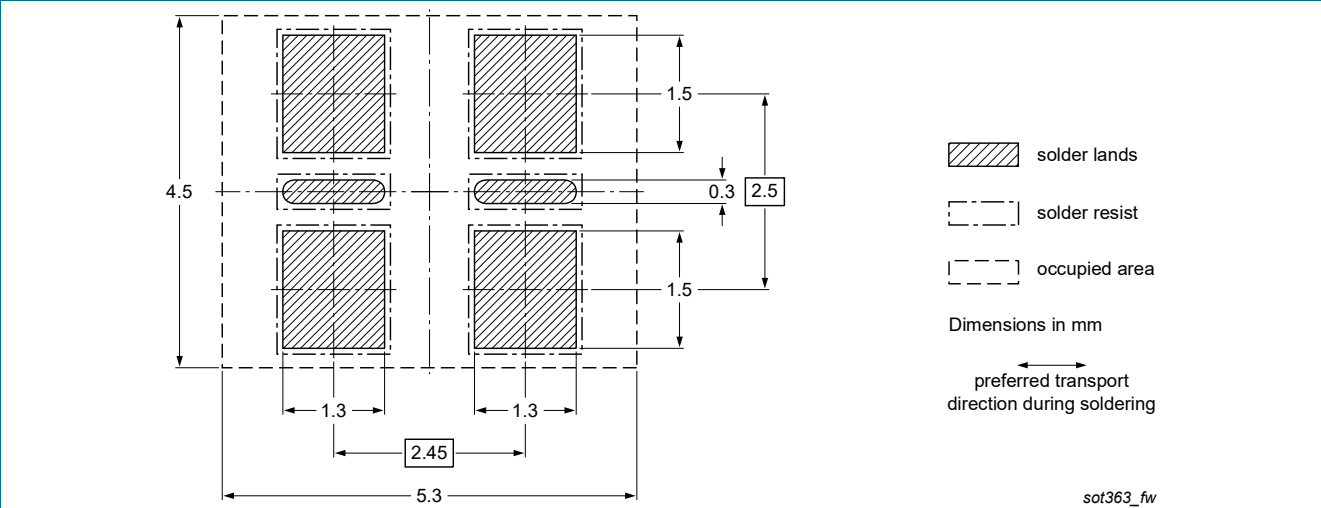


Fig. 15. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2515YPN-Q v.1	20220217	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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