IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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If you have any questions related to this document, please contact our nearest sales office via e-mail or phone (details via salesaddresses@ween-semi.com).

Thank you for your cooperation and understanding,

WeEn Semiconductors

TB100

NPN power transistor

30 September 2016 **Product data sheet**

1. General description

High voltage, high speed, planar passivated NPN power switching transistor in a SOT54 (TO92) plastic package intended for use in low power SMPS emitter switching circuits.

2. Features and benefits

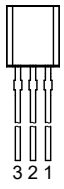
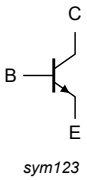
- Fast switching
- High base current drive capability
- High voltage capability
- Very low switching and conduction losses

3. Applications

- Emitter-switched low power SMPS circuits
- Self Oscillating Power Supplies
- AC-DC converters
- DC-AC inverters

4. Pinning information

Table 1. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter	 **TO-92 (SOT54)**	 *sym123*
2	C	collector		
3	B	base		

5. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
TB100	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

6. Marking

Table 3. Marking codes

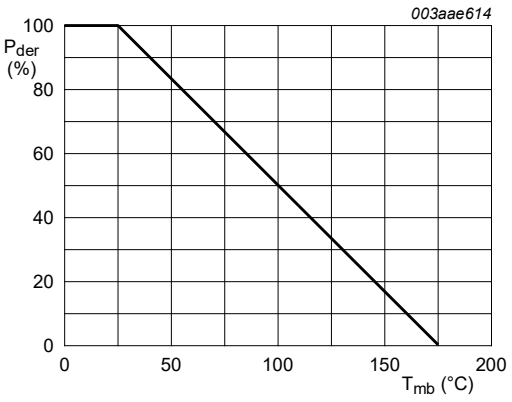
Type number	Marking code
TB100	TB100

7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V		-	700	V
V_{CBO}	collector-base voltage	I_E = 0 A		-	700	V
I_C	collector current	DC		-	1	A
I_{CM}	peak collector current			-	2	A
I_B	base current			-	0.5	A
I_{BM}	peak base current			-	3	A
P_{tot}	total power dissipation	$T_{lead} \leq$ 25 °C; Fig. 1		-	2	W
T_{stg}	storage temperature			-65	150	°C
T_j	junction temperature			-	150	°C



$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\,\%$$

Fig. 1. Normalized total power dissipation as a function of mounting base temperature

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j\text{-}lead)}$	thermal resistance from junction to lead			-	-	60	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient free air	printed circuit board mounted; lead length = 4 mm; Fig. 2		-	150	-	K/W

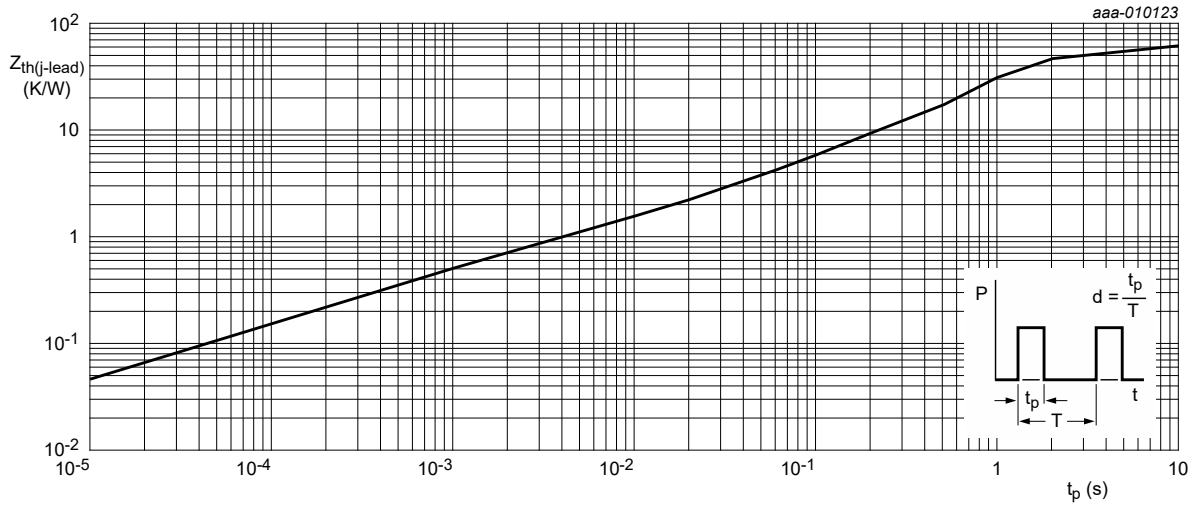


Fig. 2. Transient thermal impedance from junction to lead as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{CES}	collector-emitter cut-off current (base shorted)	V_{BE} = 0 V; V_{CE} = 700 V		-	0.8	100	µA
		V_{BE} = 0 V; V_{CE} = 700 V; T_j = 125 °C		-	2	500	µA
I_{EBO}	emitter-base cut-off current (collector open)	V_{EB} = 9 V; I_C = 0 A; T_{lead} = 25 °C		-	0.05	100	µA
V_{CEsat}	collector-emitter saturation voltage	I_C = 0.75 A; I_B = 0.15 A; T_{lead} = 25 °C; Fig. 3		-	0.24	1	V
V_{BEsat}	base-emitter saturation voltage	I_C = 0.75 A; I_B = 0.15 A; T_{lead} = 25 °C; Fig. 4		-	0.93	1.3	V
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 5 V; T_{lead} = 25 °C; Fig. 5; Fig. 6		12	22	32	
		I_C = 100 mA; V_{CE} = 5 V; T_{lead} = 25 °C; Fig. 5; Fig. 6		14	24	34	
		I_C = 0.75 A; V_{CE} = 5 V; T_{lead} = 25 °C; Fig. 5; Fig. 6		12	15.5	20	
Dynamic characteristics (resistive load)							
t_s	storage time	I_C = 1 A; I_{Bon} = 0.2 A; I_{Boff} = -0.2 A; R_L = 75 Ω; V_{BB} = -4 V; T_{lead} = 25 °C; Fig. 7; Fig. 8		-	2	-	µs
t_f	fall time			-	320	-	ns

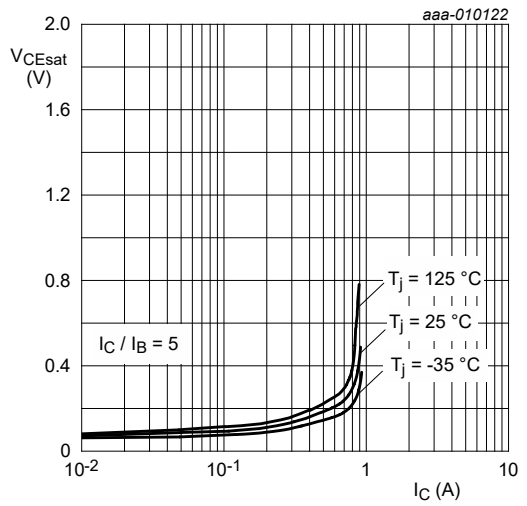


Fig. 3. Collector-emitter saturation voltage as a function of collector current; typical values

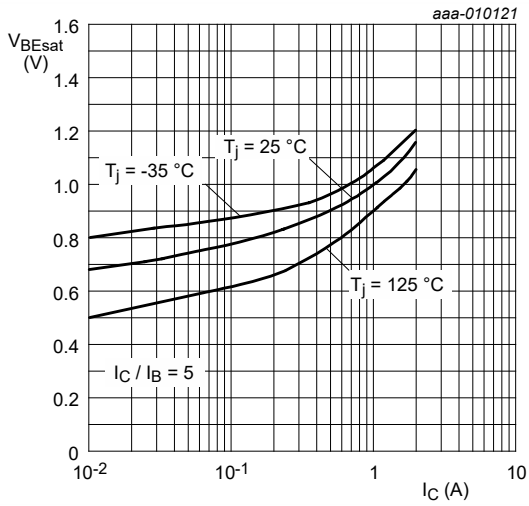


Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values

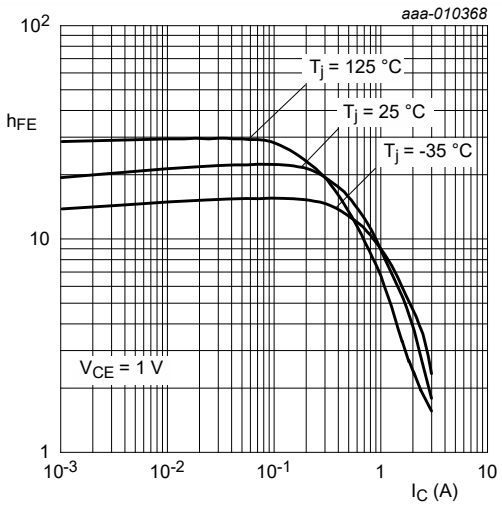


Fig. 5. DC current gain as a function of collector current; typical values

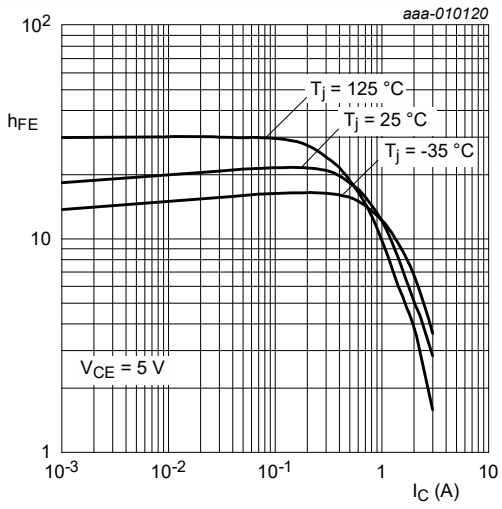


Fig. 6. DC current gain as a function of collector current; typical values

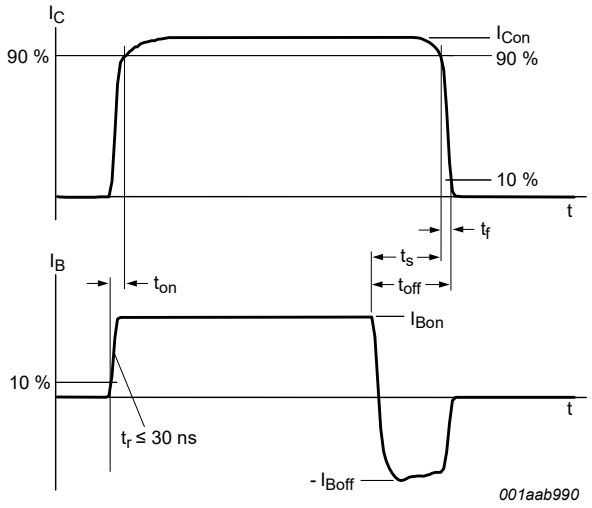
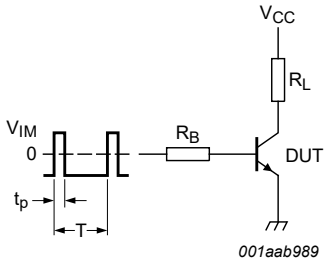


Fig. 7. Switching times waveforms for resistive load



$V_{IM} = -6$ to $+8$ V; $V_{CC} = 250$ V; $t_p = 20$ μs; $\delta = \frac{t_p}{T} = 0.01$

R_B and R_L calculated from I_{Con} and I_{Bon} requirements.

Fig. 8. Test circuit for resistive load switching

10. Package outline

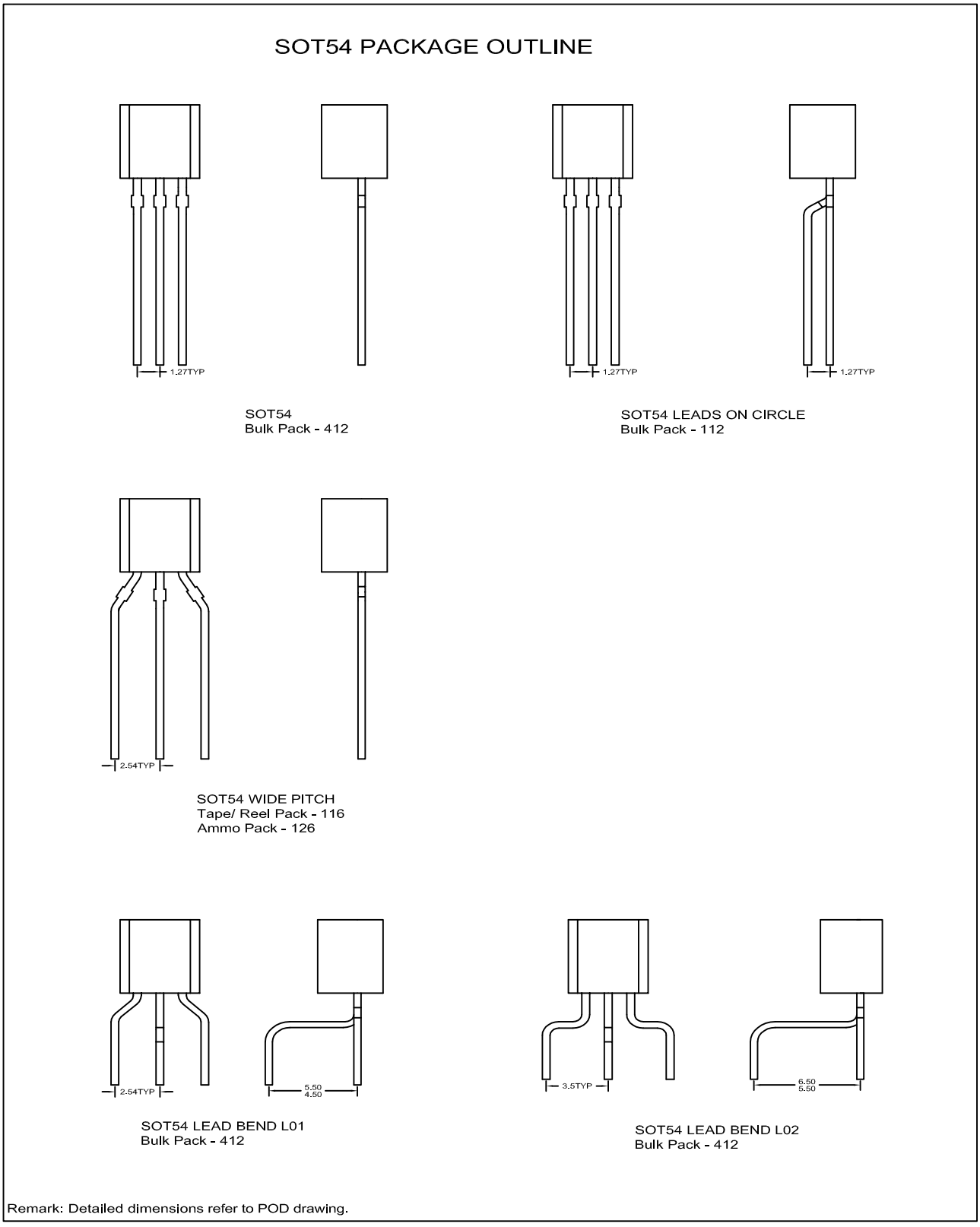


Fig. 9. Package outline TO-92 (SOT54)

11. 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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Date of release: 30 September 2016