



PBSS2540MB

40 V, 0.5 A NPN low V_{CEsat} (BISS) transistor

Rev. 1 — 4 April 2012

Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS3540MB.

1.2 Features and benefits

- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency due to less heat generation
- AEC-Q101 qualified
- Reduced Printed-Circuit Board (PCB) requirements

1.3 Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Drivers in low supply voltage applications (e.g. lamps and LEDs)

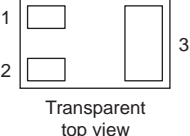
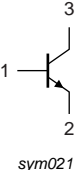
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	40	V
I_C	collector current		-	-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	1	A
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	-	380	500	m Ω

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SOT883B (DFN1006B-3)	 sym021
2	E	emitter		
3	C	collector		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS2540MB	DFN1006B-3	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

4. Marking

Table 4. Marking codes

Type number	Marking code
PBSS2540MB	0001 0010

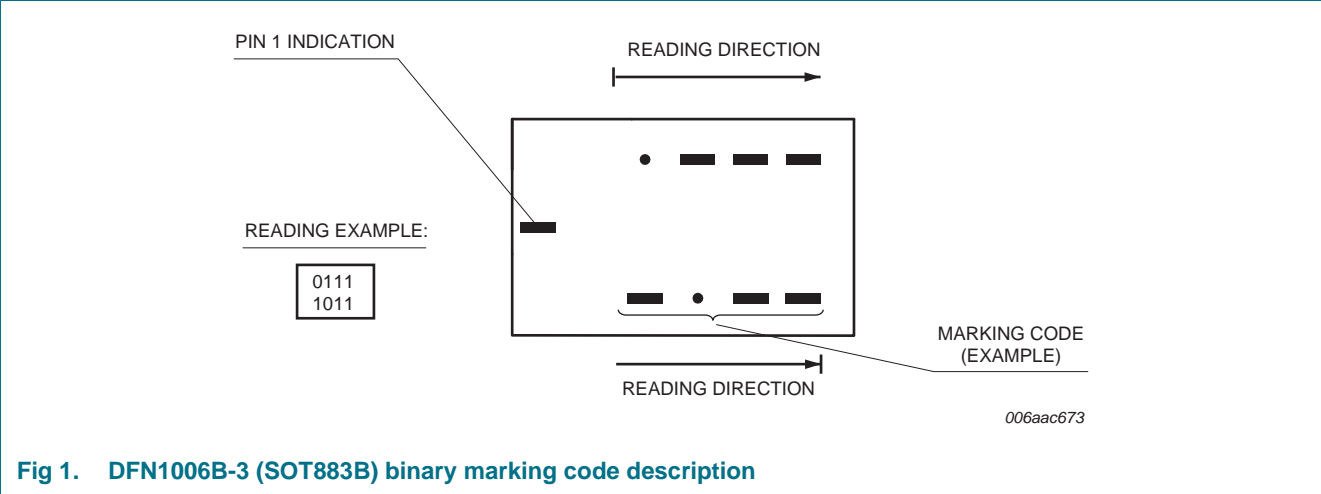


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

5. Limiting values

Table 5. 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	-	40	V
V _{CEO}	collector-emitter voltage	open base	-	40	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	single pulse; $t_p \leq 1$ ms	-	100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] [2]	250	mW
			[3] [2]	590	mW
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-55	150	°C
T _{stg}	storage temperature		-65	150	°C

[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, single-sided copper, tin-plated, mounting pad for collector 1 cm².

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	500	K/W
			[3][2]	-	212	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, single-sided copper, tin-plated, mounting pad for collector 1 cm².

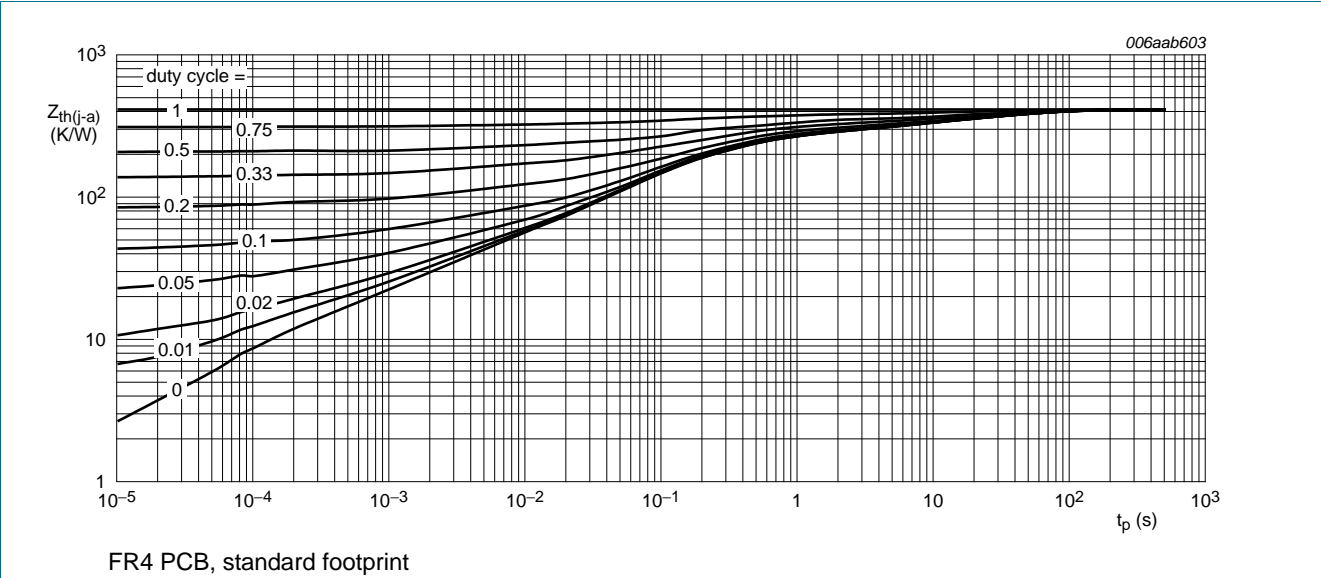


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

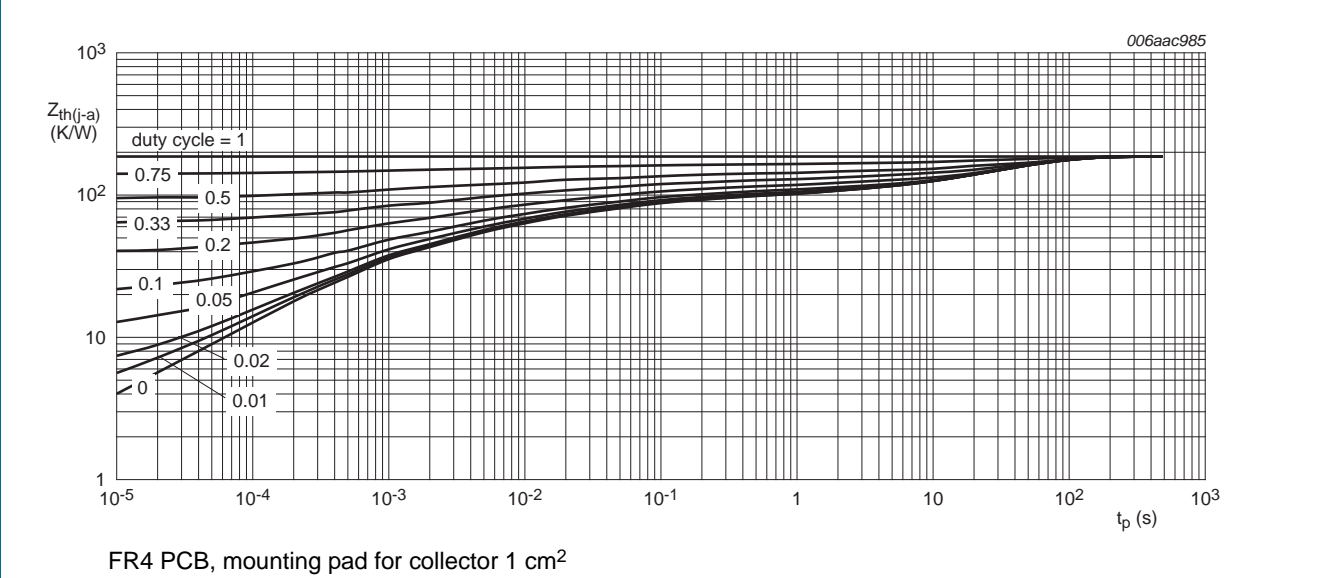


Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ °C}$	-	-	100	nA
		$V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	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
h_{FE}	DC current gain	$V_{CE} = 2\text{ V}; I_C = 10\text{ mA}; T_{amb} = 25\text{ °C}$	200	-	-	
		$V_{CE} = 2\text{ V}; I_C = 100\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	150	-	-	
		$V_{CE} = 2\text{ V}; I_C = 500\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	50	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}; T_{amb} = 25\text{ °C}$	-	-	50	mV
		$I_C = 100\text{ mA}; I_B = 5\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	-	-	100	mV
		$I_C = 200\text{ mA}; I_B = 10\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	-	-	200	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	-	-	250	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = 500\text{ mA}; I_B = 50\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	-	380	500	mΩ
V_{BEsat}	base-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 50\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	-	-	1.2	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 2\text{ V}; I_C = 100\text{ mA};$ pulsed; $t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$	-	-	1.1	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	450	-	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A};$ $f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$	-	-	6	pF

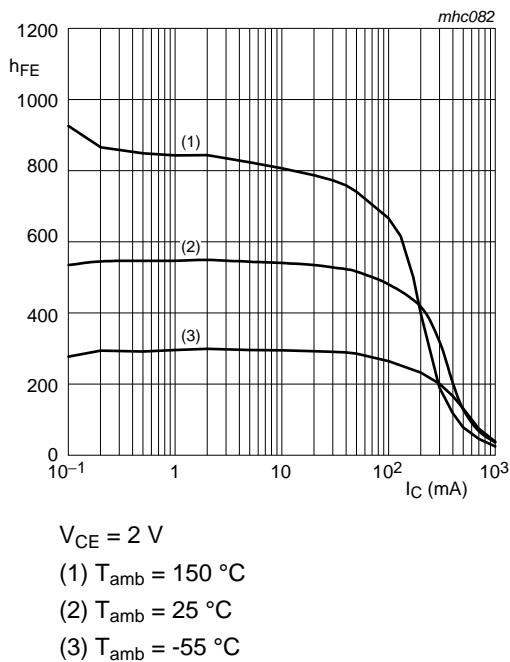


Fig 4. DC current gain as a function of collector current; typical values

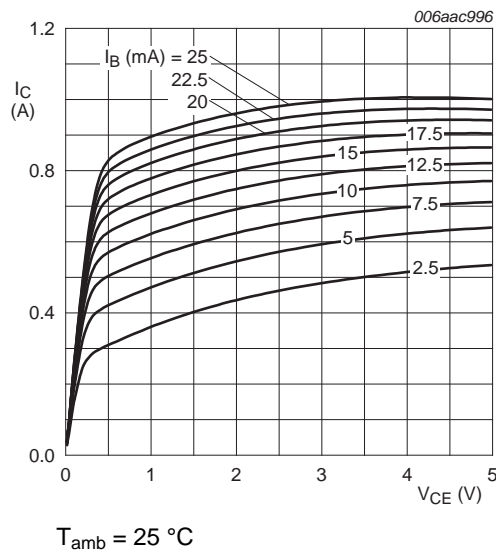


Fig 5. Collector current as a function of collector-emitter voltage; typical values

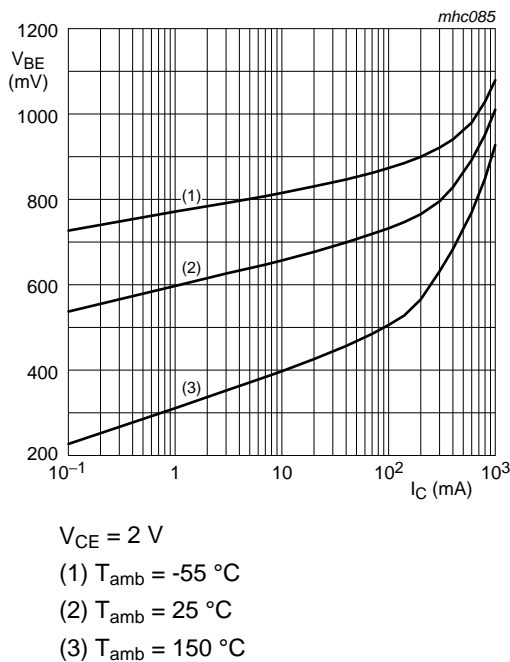


Fig 6. Base-emitter voltage as a function of collector current; typical values

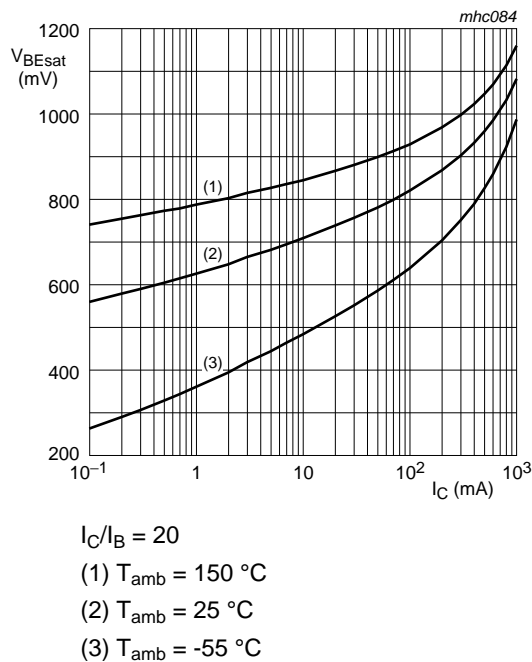
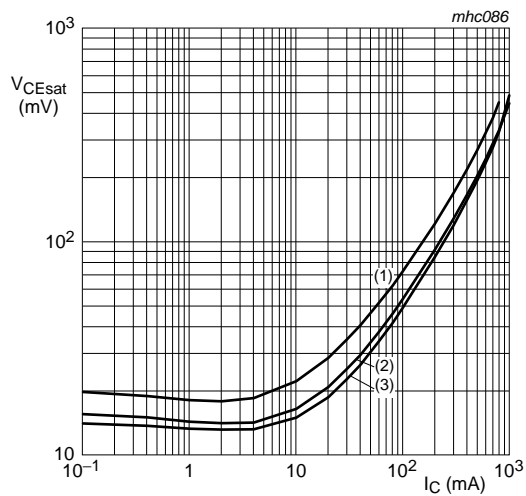


Fig 7. Base-emitter saturation voltage as a function of collector current; typical values



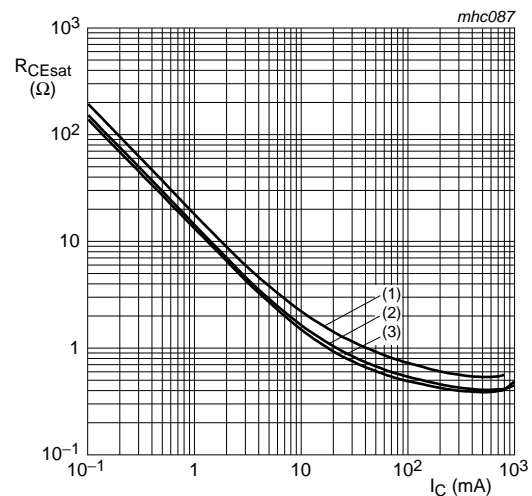
$$I_C/I_B = 20$$

(1) $T_{amb} = 150^\circ\text{C}$

(2) $T_{amb} = 25^\circ\text{C}$

(3) $T_{amb} = -55^\circ\text{C}$

Fig 8. Collector-emitter saturation voltage as a function of collector current; typical values



$$I_C/I_B = 20$$

(1) $T_{amb} = 150^\circ\text{C}$

(2) $T_{amb} = 25^\circ\text{C}$

(3) $T_{amb} = -55^\circ\text{C}$

Fig 9. Collector-emitter saturation resistance as a function of collector current; typical values

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 10. Package outline SOT883B (DFN1006B-3)

10. Soldering

Footprint information for reflow soldering

SOT883B

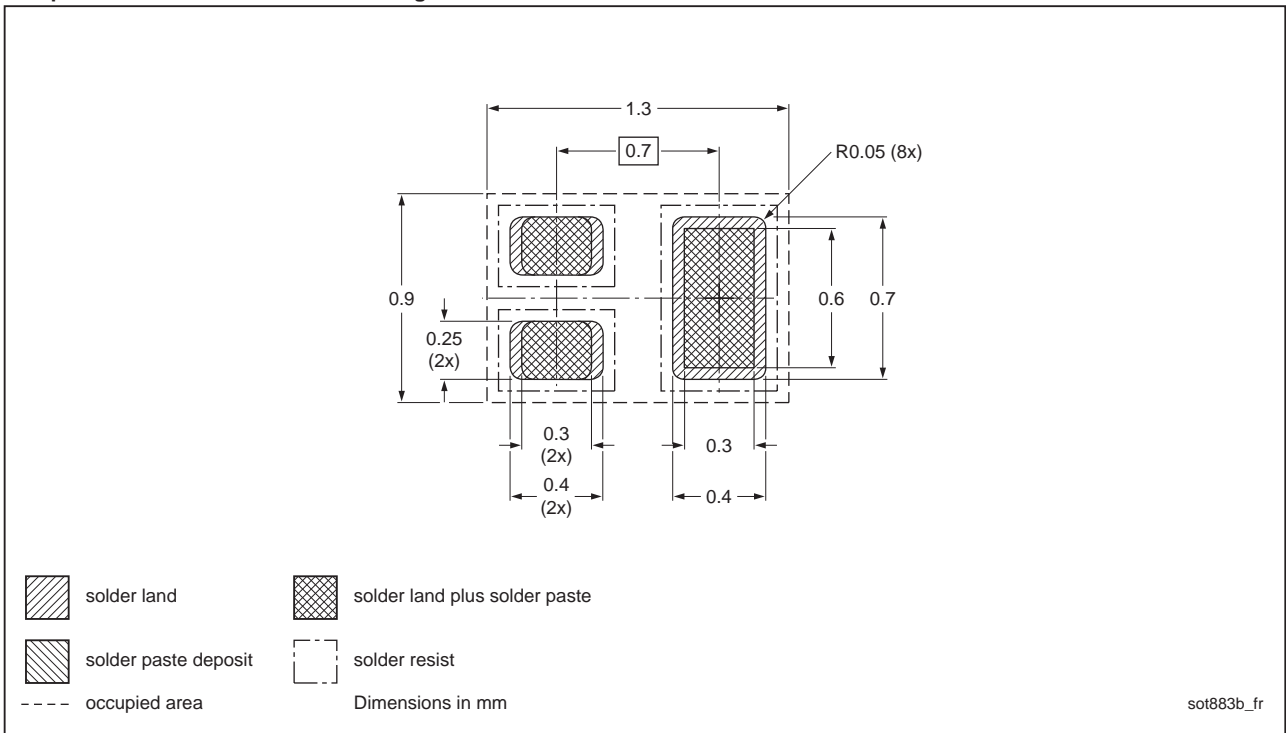


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2540MB v.1	20120404	Product data sheet	-	-

12. Legal information

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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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