

PBSS2540E

40 V, 500 mA NPN low V_{CEsat} (BISS) transistor

Rev. 02 — 15 November 2009

Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough in Small Signal (BISS) transistor in a SOT416 (SC-75) SMD plastic package.

PNP complement: PBS3540E.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- High efficiency due to less heat generation
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors

1.3 Applications

- DC-to-DC conversion
- MOSFET gate driving
- Motor control
- Charging circuits
- Low power switches (e.g. motors, fans)

1.4 Quick reference data

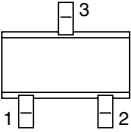
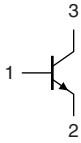
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	40	V
I_C	collector current (DC)		-	-	500	mA
I_{CM}	peak collector current		-	-	1	A
R_{CEsat}	collector-emitter saturation resistance	$I_C = 500 \text{ mA};$ $I_B = 50 \text{ mA}$	[1] -	380	500	$m\Omega$

[1] Pulse test: $t_p \leq 300 \mu\text{s}; \delta \leq 0.02$

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	base		
2	emitter		
3	collector		

sym021

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS2540E	SC-75	plastic surface mounted package; 3 leads	SOT416

4. Marking

Table 4. Marking codes

Type number	Marking code
PBSS2540E	1S

5. Limiting values

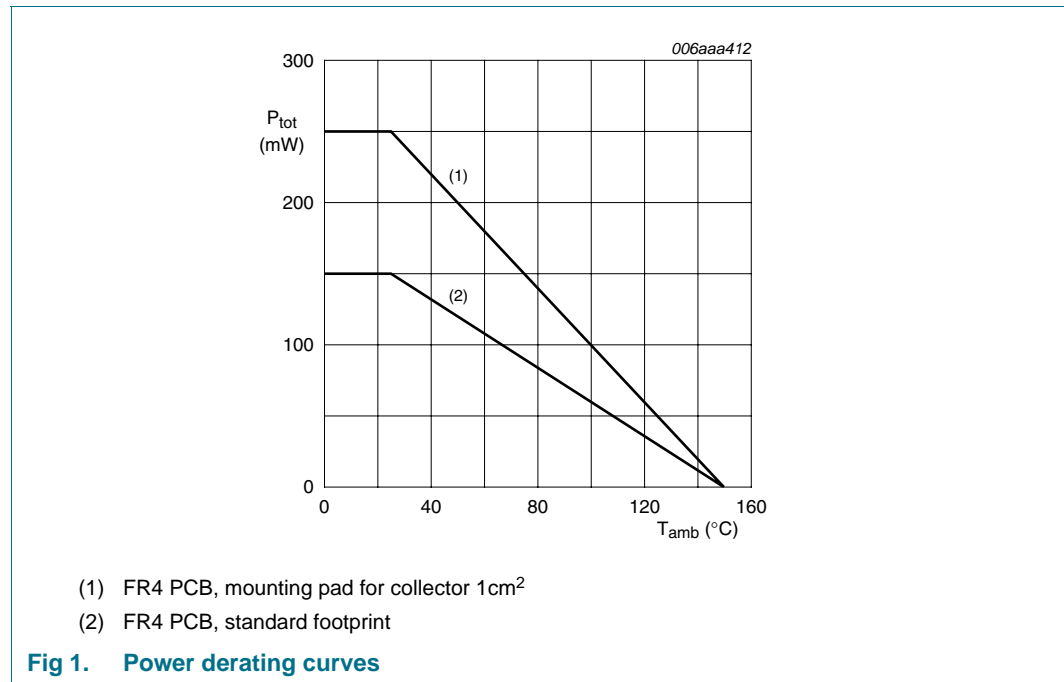
Table 5. Limiting values

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 (DC)		-	500	mA	
I_{CM}	peak collector current		-	1	A	
I_{BM}	peak base current		-	100	mA	
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	[1]	-	150	mW
			[2]	-	250	mW
T_j	junction temperature		-	150	$^\circ\text{C}$	
T_{amb}	ambient temperature		-65	+150	$^\circ\text{C}$	
T_{stg}	storage temperature		-65	+150	$^\circ\text{C}$	

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1cm².



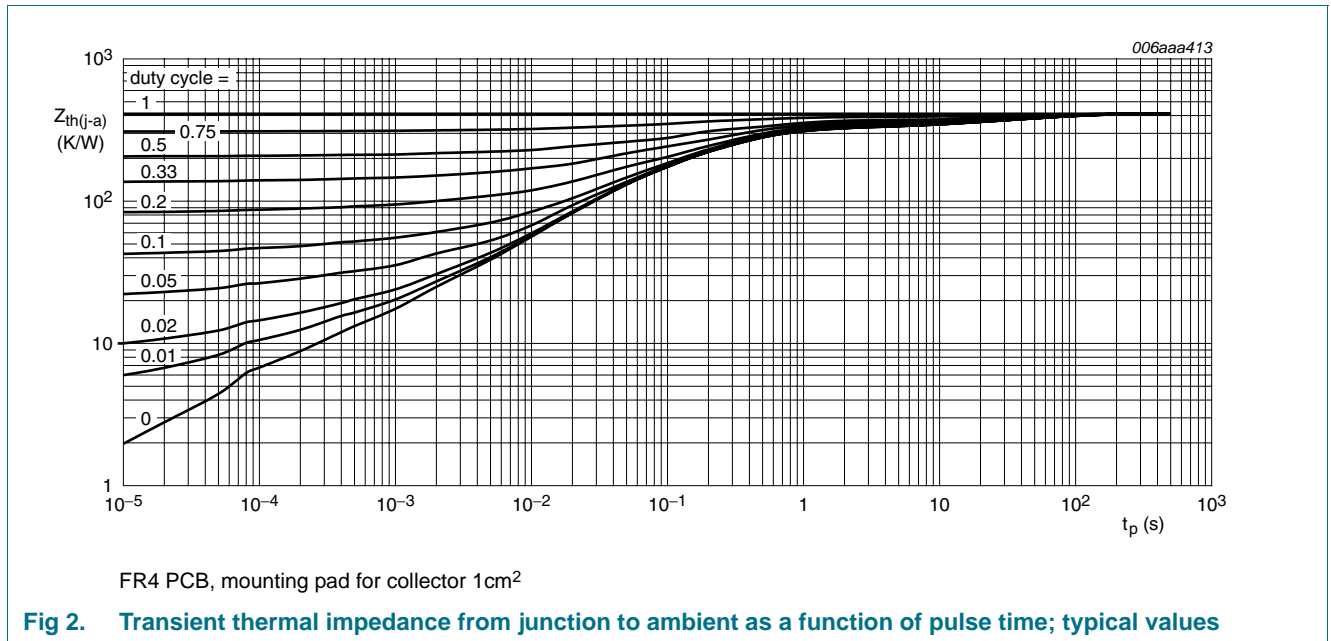
6. Thermal characteristics

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]	-	-	833	K/W
			[2]	-	-	500	K/W

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1cm².

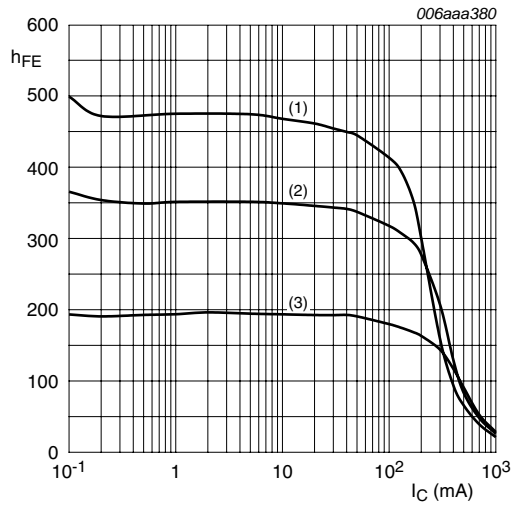


7. Characteristics

Table 7. Characteristics
 $T_{amb} = 25\text{ °C}$ unless otherwise specified

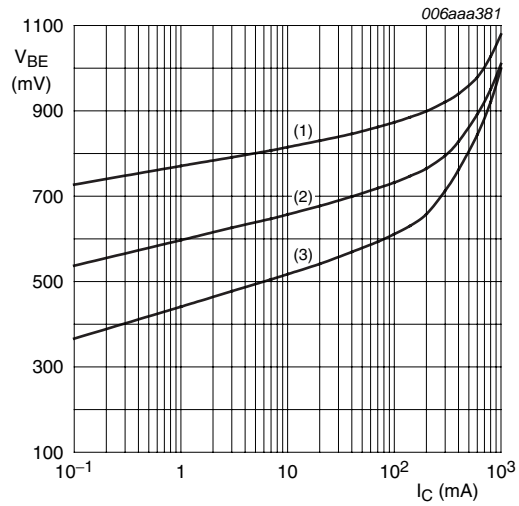
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 2\text{ V}; I_C = 10\text{ mA}$	200	-	-	
		$V_{CE} = 2\text{ V}; I_C = 100\text{ mA}$	[1] 100	-	-	
		$V_{CE} = 2\text{ V}; I_C = 500\text{ mA}$	[1] 50	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$	-	-	50	mV
		$I_C = 100\text{ mA}; I_B = 5\text{ mA}$	-	-	100	mV
		$I_C = 200\text{ mA}; I_B = 10\text{ mA}$	-	-	200	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	[1] -	-	250	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	[1] -	380	500	$\text{m}\Omega$
V_{BEsat}	base-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	[1] -	-	1.2	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 2\text{ V}; I_C = 100\text{ mA}$	-	-	1.1	V
f_T	transition frequency	$V_{CE} = 5\text{ V}; I_C = 100\text{ mA}; f = 100\text{ MHz}$	250	450	-	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_E = 0\text{ A}; f = 1\text{ MHz}$	-	-	6	pF

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$



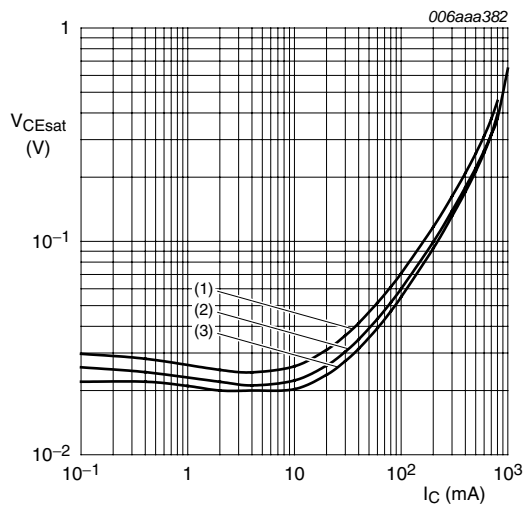
$V_{CE} = 2\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig. 3. DC current gain as a function of collector current; typical values



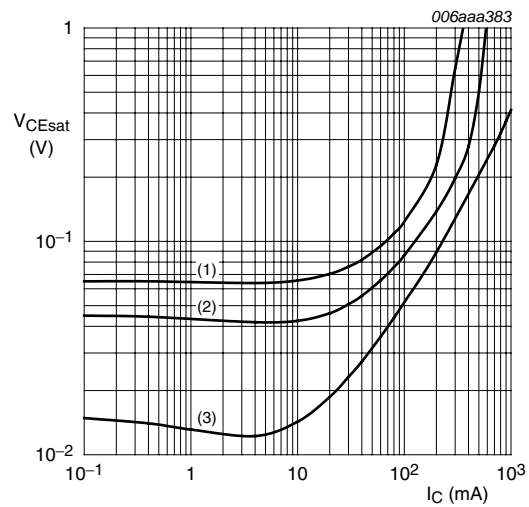
$V_{CE} = 2\text{ V}$
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



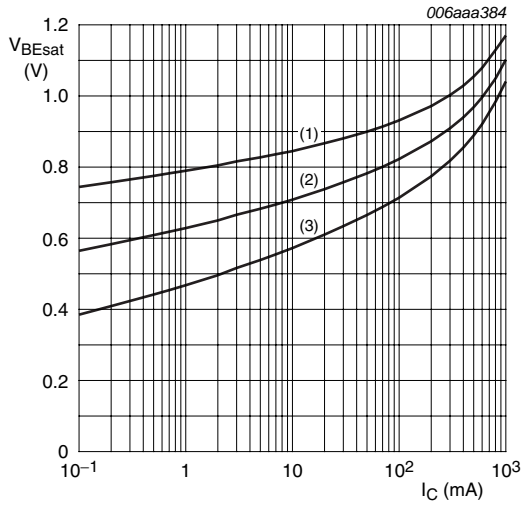
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



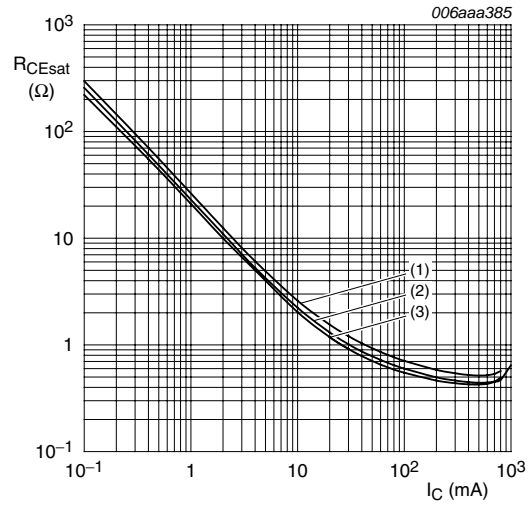
$T_{amb} = 25\text{ }^{\circ}\text{C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 10$

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



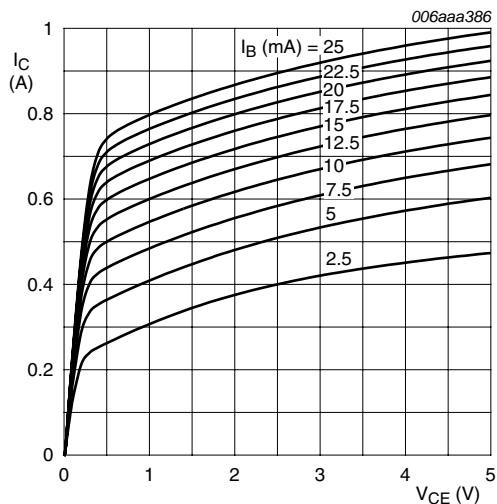
$I_C/I_B = 20$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

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



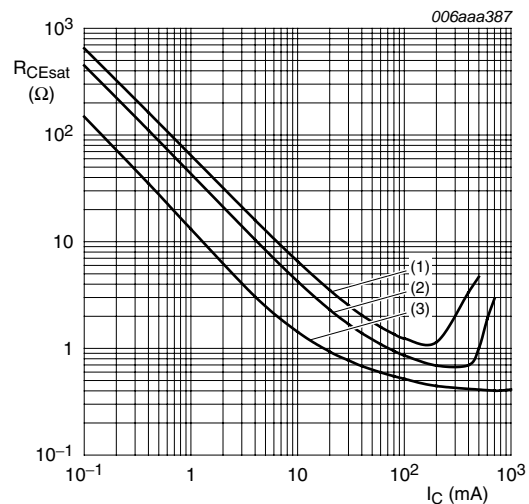
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



$T_{amb} = 25\text{ °C}$

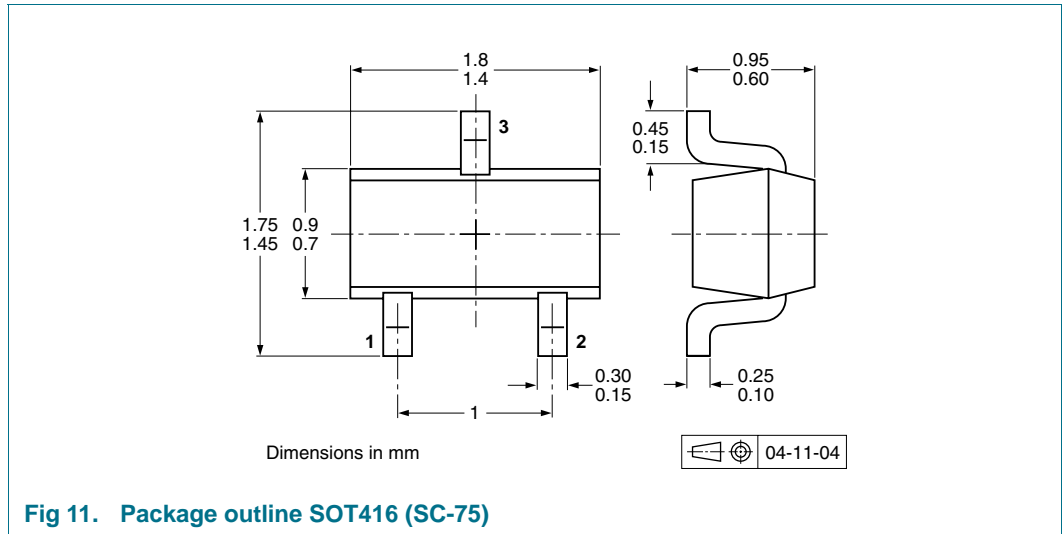
Fig 9. Collector current as a function of collector-emitter voltage; typical values



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

Fig 10. Collector-emitter saturation resistance as a function of collector current; typical values

8. Package outline



9. Packing information

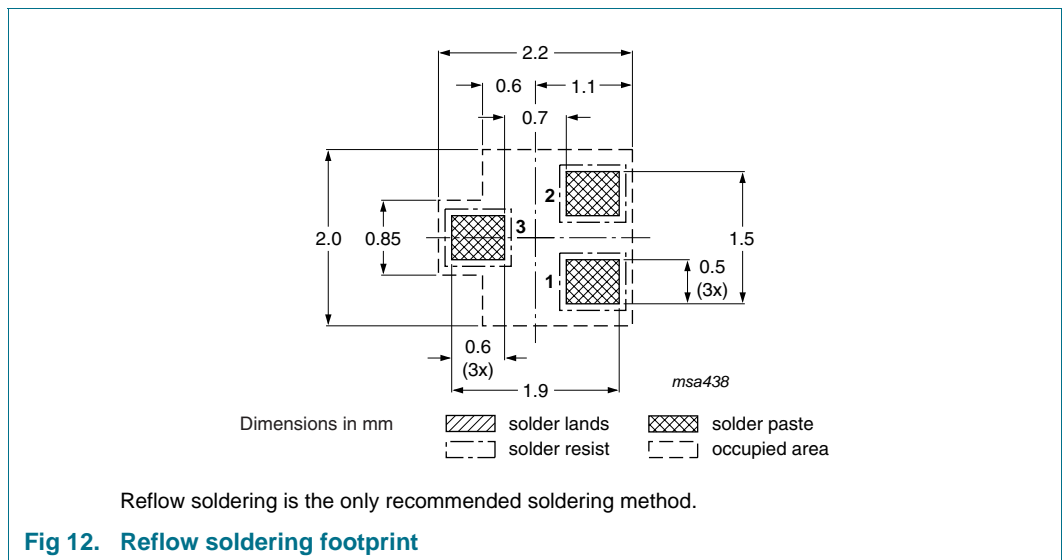
Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
PBSS2540E	SOT416	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see [Section 13](#).

10. Soldering



11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2540E_2	20091115	Product data sheet	-	PBSS2540E_1
Modifications:	<ul style="list-style-type: none"> • This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Figure 5 “Collector-emitter saturation voltage as a function of collector current; typical values”: V_{CEsat} unit amended from mV to V • Figure 6 “Collector-emitter saturation voltage as a function of collector current; typical values”: V_{CEsat} unit amended from mV to V • Figure 12 “Reflow soldering footprint”: updated 			
PBSS2540E_1	20050504	Product data sheet	-	-

12. Legal information

12.1 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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