BC806W series

80 V, 500 mA PNP general-purpose transistors

Rev. 2 — 27 November 2019 Product data sheet

1. General description

PNP general-purpose transistors in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN complement:
	Nexperia	JEITA	
BC806-16W	SOT323	SC-70	BC816-16W
BC806-25W	SOT323	SC-70	BC816-25W

2. Features and benefits

- High current
- High voltage
- Two current gain selections
- AEC-Q101 qualified

3. Applications

- General-purpose switching and amplification
- 48 V automotive board net

4. Quick reference data

Table 2. Quick reference data

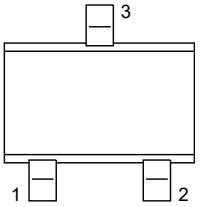
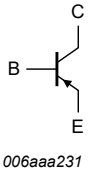
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-80	V
I_C	collector current			-	-	-500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	-1	A
h_{FE}	DC current gain						
	BC806-16W	V_{CE} = -1 V; I_C = -100 mA	[1]	100	-	250	
	BC806-25W		[1]	160	-	400	

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC806-16W	SC-70	plastic, surface-mounted package; 3 leads	SOT323
BC806-25W			

7. Marking

Table 5. Marking

Type number	Marking code [1]
BC806-16W	2J%
BC806-25W	2K%

[1] % = placeholder for manufacturing site code

8. Limiting values

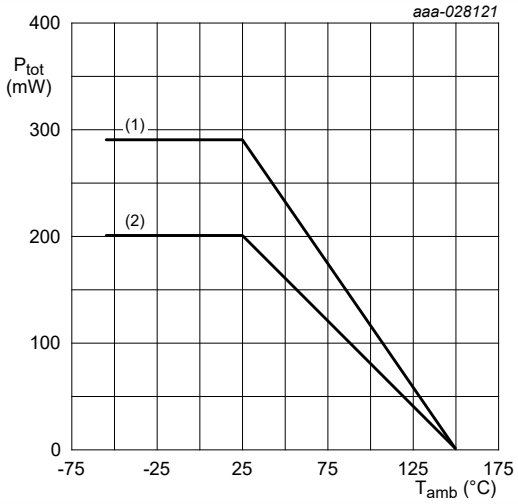
Table 6. Limiting values

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

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	-80	V
V_{CEO}	collector-emitter voltage	open base		-	-80	V
V_{EBO}	emitter-base voltage	open collector		-	-8	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		-	-200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	200	mW
			[2]	-	290	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 Printed-Circuit-Board (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 1 cm^2.



(1) FR4 PCB; 1 cm^2 mounting pad for collector
(2) FR4 PCB; standard footprint

Fig. 1. Power derating curves for SOT323

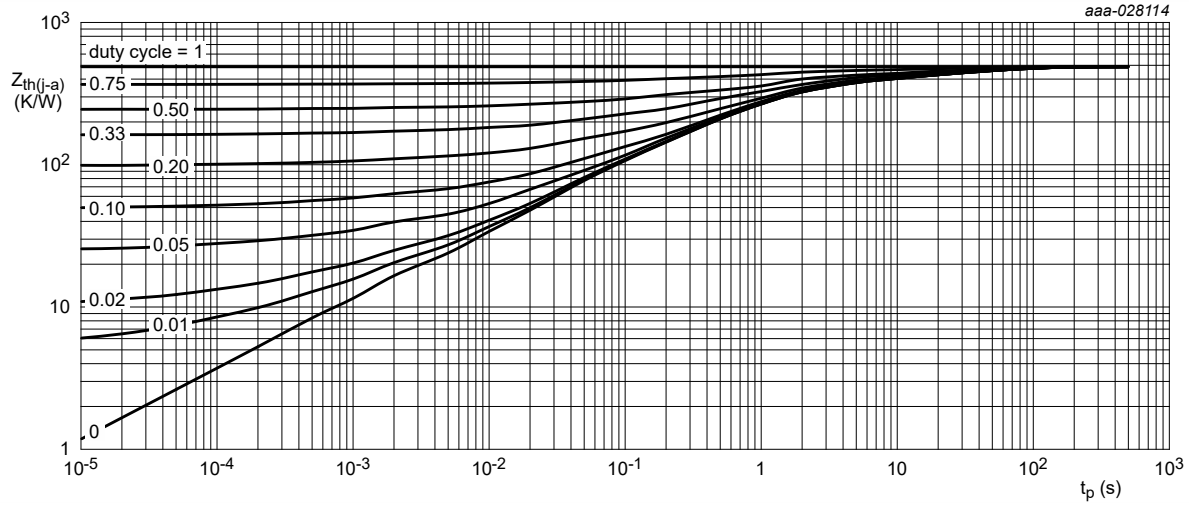
9. Thermal characteristics

Table 7. Thermal characteristics

T_{amb} = 25 °C unless otherwise specified.

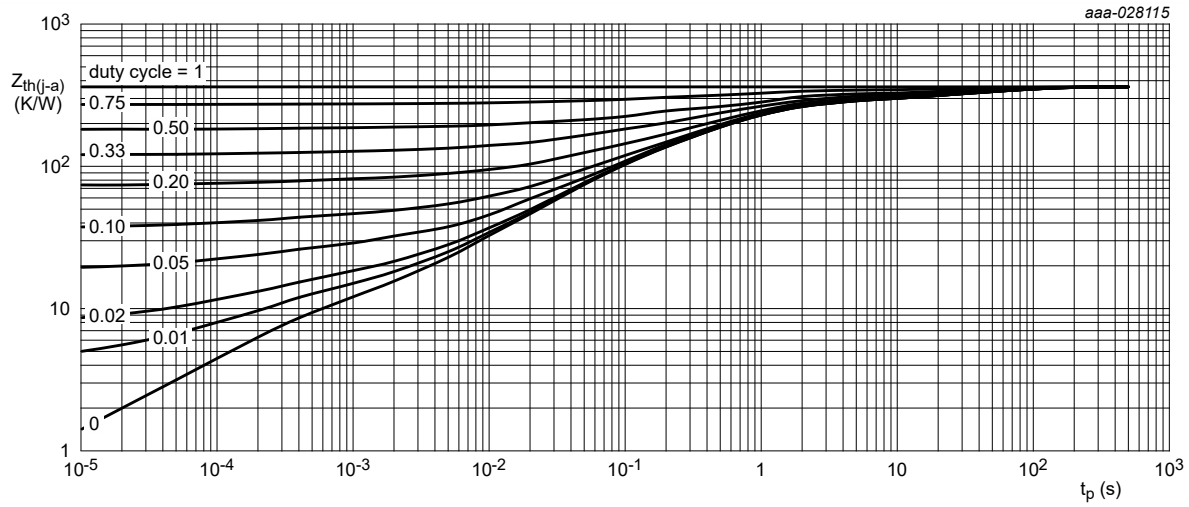
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
			[2]	-	-	431	K/W

[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 1 cm^2.



FR4 PCB; single-sided copper; tin-plated and standard footprint

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



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm^2

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

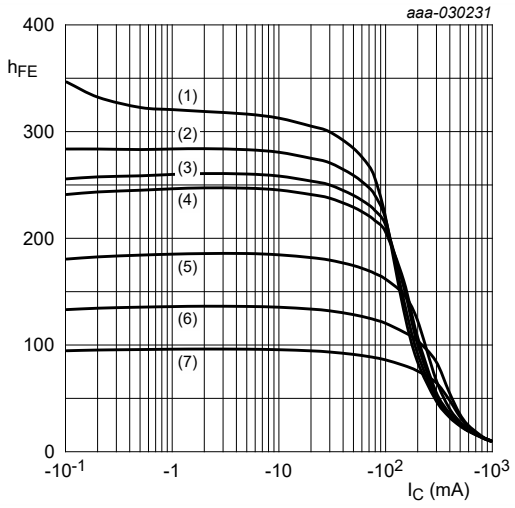
10. Characteristics

Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A		-80	-		V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = -2 mA; I_E = 0 A		-80	-		V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = -100 µA; I_C = 0 A		-8	-		V
I_{CBO}	collector-base cut-off current	V_{CB} = -64 V; I_E = 0 A		-	-	-100	nA
		V_{CB} = -64 V; I_E = 0 A; T_j = 150 °C		-	-	-5	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = -6.4 V; I_C = 0 A		-	-	-100	nA
h_{FE}	DC current gain						
	BC806-16W	V_{CE} = -1 V; I_C = -100 mA	[1]	100	-	250	
	BC806-25W	V_{CE} = -1 V; I_C = -100 mA	[1]	160	-	400	
		V_{CE} = -2 V; I_C = -500 mA	[1]	30	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -100 mA; I_B = -10 mA	[1]	-	-	-150	mV
		I_C = -500 mA; I_B = -50 mA	[1]	-	-	-400	mV
V_{BE}	base-emitter voltage	V_{CE} = -1 V ; I_C = -500 mA	[1]	-	-	-1.2	V
f_T	transition frequency	V_{CE} = -5 V; I_C = -50 mA; f = 100 MHz		80	-	-	MHz
C_c	collector capacitance	V_{CB} = -10 V; I_E = i_e = 0 A; f = 1 MHz		-	5	-	pF

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$



V_{CE} = -1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 125 °C

(3) T_{amb} = 100 °C

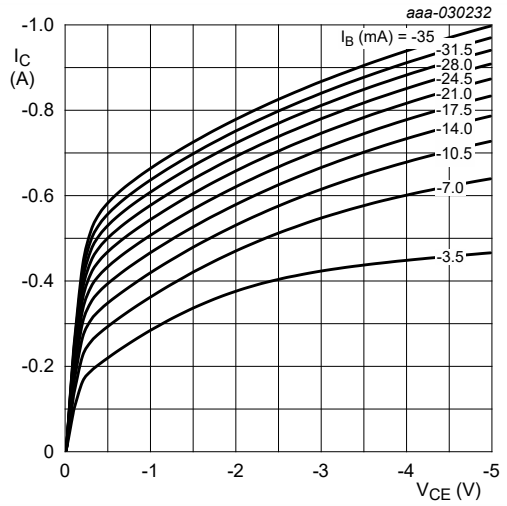
(4) T_{amb} = 85 °C

(5) T_{amb} = 25 °C

(6) T_{amb} = -40 °C

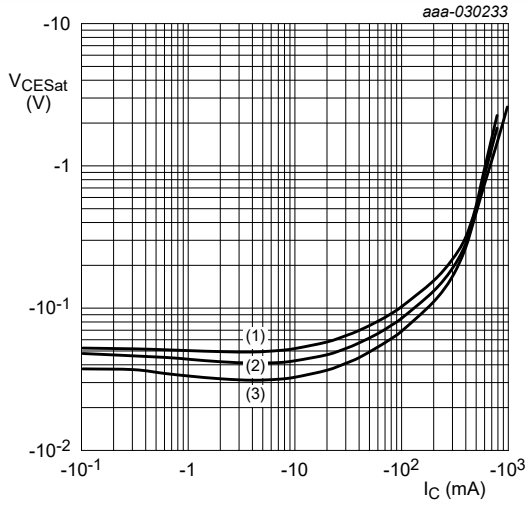
(7) T_{amb} = -55 °C

Fig. 4. BC806-16W: DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

Fig. 5. BC806-16W: Collector current as a function of collector-emitter voltage; typical values



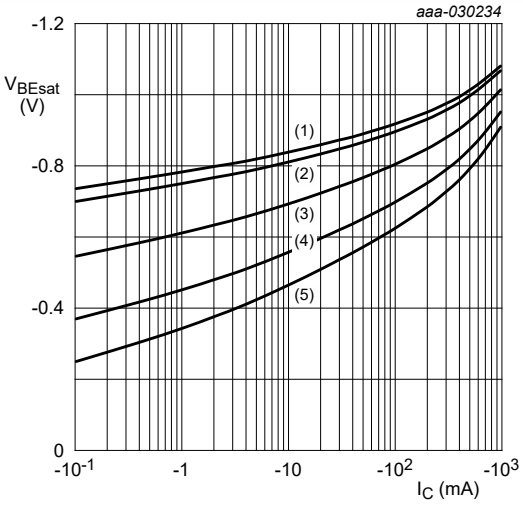
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -40 °C

Fig. 6. BC806-16W: Collector-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 10

(1) T_{amb} = -55 °C

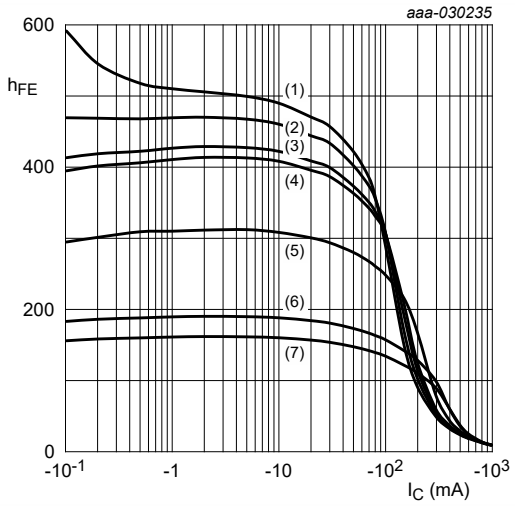
(2) T_{amb} = -40 °C

(3) T_{amb} = 25 °C

(4) T_{amb} = 100 °C

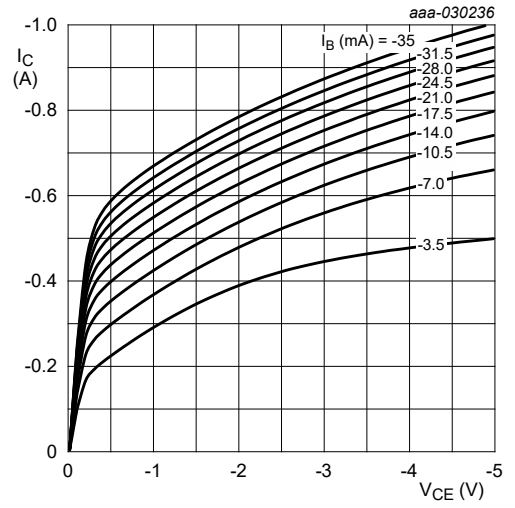
(5) T_{amb} = 150 °C

Fig. 7. BC806-16W: Base-emitter saturation voltage as a function of collector current; typical values



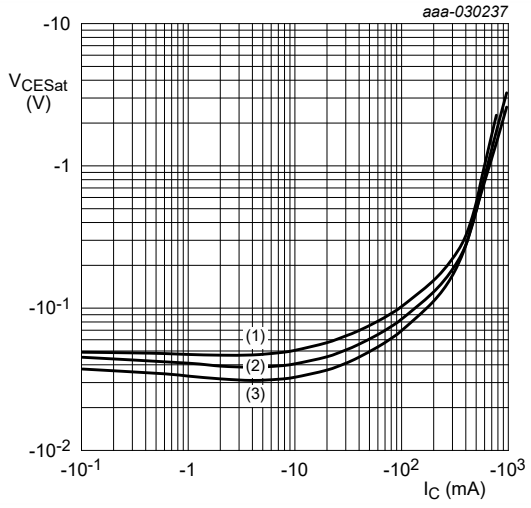
V_{CE} = -1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 125 °C
(3) T_{amb} = 100 °C
(4) T_{amb} = 85 °C
(5) T_{amb} = 25 °C
(6) T_{amb} = -40 °C
(7) T_{amb} = -55 °C

Fig. 8. BC806-25W: DC current gain as a function of collector current; typical values



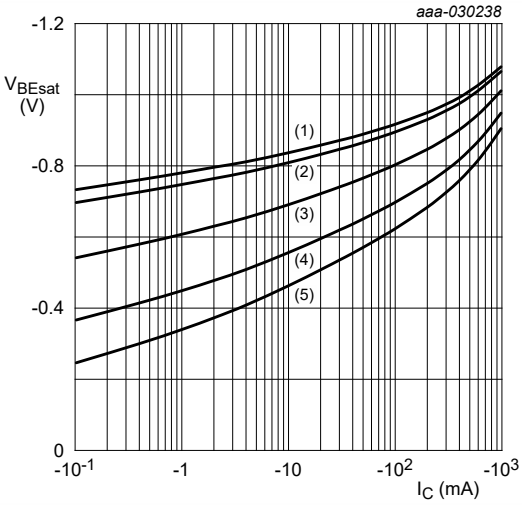
T_{amb} = 25 °C

Fig. 9. BC806-25W: Collector current as a function of collector-emitter voltage; typical values



I_C/I_B = 20
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 10. BC806-25W: Collector-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = -40 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = 100 °C
(5) T_{amb} = 150 °C

Fig. 11. BC806-25W: Base-emitter saturation voltage as a function of collector current; typical values

11. Test information

11.1. 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.

12. Package outline

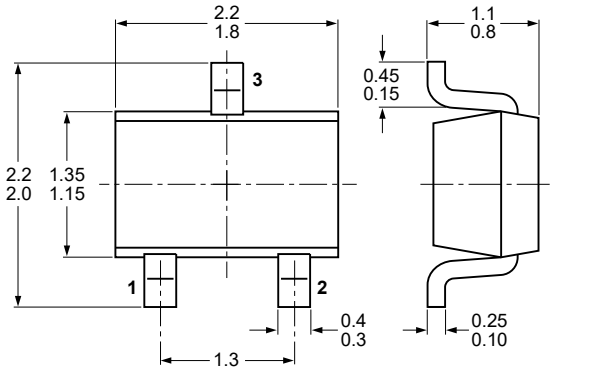


Fig. 12. Package outline SOT323 (SC-70)

13. Soldering

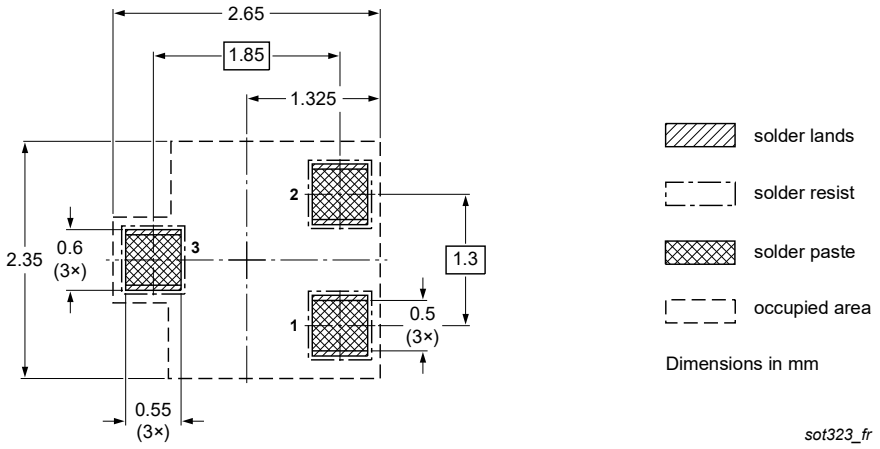


Fig. 13. Reflow soldering footprint for SOT323 (SC-70)

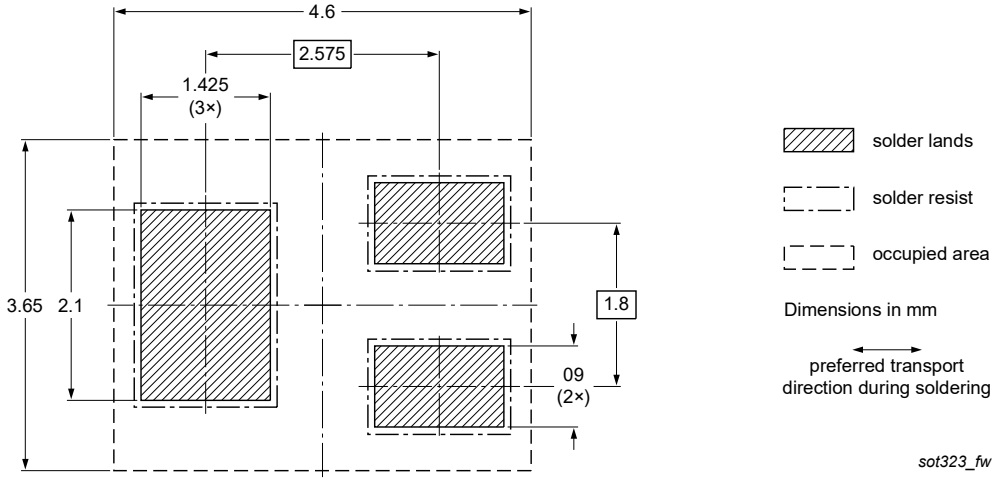


Fig. 14. Wave soldering footprint for SOT323 (SC-70)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC806W_SER v.2	20191127	Product data sheet	-	BC806W_SER v.1
Modifications:	• Product status changed			
BC806W_SER v.1	20190909	Preliminary 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.

[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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