Bus buffer/line driver; 3-state

Rev. 1 — 26 March 2013

Product data sheet

1. General description

74AHC1G126-Q100 and 74AHCT1G126-Q100 are high-speed Si-gate CMOS devices. They provide one non-inverting buffer/line driver with 3-state output. The output enable input pin (OE) controls the 3-state output. A LOW at pin OE causes the output to assume a high-impedance OFF-state.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

The AHCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- Multiple package options
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)

3. Ordering information

Table 1. Ordering information

Type number	Package									
	Temperature range	Name	Description	Version						
74AHC1G126GW-Q100	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package;	SOT353-1						
74AHCT1G126GW-Q100			5 leads; body width 1.25 mm							
74AHC1G126GV-Q100	–40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753						
74AHCT1G126GV-Q100										



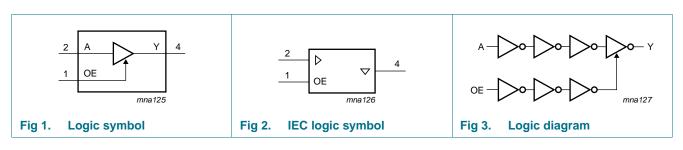
Bus buffer/line driver; 3-state

4. Marking

Table 2. Marking codes	
Type number	Marking ^[1]
74AHC1G126GW-Q100	AN
74AHCT1G126GW-Q100	CN
74AHC1G126GV-Q100	A26
74AHCT1G126GV-Q100	C26

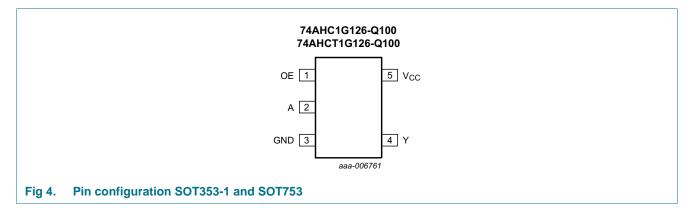
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1 Pinning



NXP Semiconductors 74AHC1G126-Q100; 74AHCT1G126-Q100

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6.2 Pin description

Table 3.	Pin description	
Symbol	Pin	Description
OE	1	output enable input
А	2	data input A
GND	3	ground (0 V)
Y	4	data output Y
n.c.	-	not connected
V _{CC}	5	supply voltage

7. Functional description

Table 4.Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state

Input	Output	
OE	A	Y
н	L	L
Н	Н	Н
L	Х	Z

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+7.0	V
VI	input voltage		-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -0.5 V	<u>[1]</u> –20	-	mA
I _{OK}	output clamping current	$V_{\rm O}$ < –0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V	<u>[1]</u> _	±20	mA
lo	output current	$-0.5 \text{ V} < \text{V}_{\text{O}} < \text{V}_{\text{CC}} + 0.5 \text{ V}$	-	±25	mA
I _{CC}	supply current		-	75	mA
I _{GND}	ground current		-75	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	$T_{amb} = -40 \ ^{\circ}C \ to +125 \ ^{\circ}C$	[2] _	250	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For TSSOP5 and SC-74A packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.

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9. Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter Conditions			C1G126-0	Q100	74AH0	Unit		
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
VI	input voltage		0	-	5.5	0	-	5.5	V
Vo	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t / \Delta V$	input transition rise	V_{CC} = 3.3 V \pm 0.3 V	-	-	100	-	-	-	ns/V
	and fall rate	V_{CC} = 5.0 V \pm 0.5 V	-	-	20	-	-	20	ns/V

10. Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		25 °C	;	–40 °C	to +85 °C	–40 °C to +125 °C		Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G126-Q100									
V _{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V _{IL}	LOW-level	$V_{CC} = 2.0 V$	-	-	0.5	-	0.5	-	0.5	V
	input voltage	$V_{CC} = 3.0 V$	-	-	0.9	-	0.9	-	0.9	V
		$V_{CC} = 5.5 V$	-	-	1.65	-	1.65	-	1.65	V
V _{OH}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	I_{O} = –50 $\mu A; \ V_{CC}$ = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I_{O} = –50 $\mu\text{A};$ V_{CC} = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I_{O} = –50 $\mu\text{A};$ V_{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I_{O} = –4.0 mA; V_{CC} = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I_{O} = –8.0 mA; V_{CC} = 4.5 V	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	I_{O} = 50 $\mu A; V_{CC}$ = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I_{O} = 50 $\mu A; V_{CC}$ = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 50 $\mu A; V_{CC}$ = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I_{O} = 4.0 mA; V_{CC} = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I_{O} = 8.0 mA; V_{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
I _{OZ}	OFF-state output current	$ V_{I} = V_{IH} \text{ or } V_{IL}; V_{O} = V_{CC} \text{ or } \\ GND; V_{CC} = 5.5 \text{ V} $	-	-	±0.25	-	±2.5	-	±10	μA
l _l	input leakage current	$V_{I} = 5.5 V \text{ or GND};$ $V_{CC} = 0 V \text{ to } 5.5 V$	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current	$\label{eq:VI} \begin{array}{l} V_{I} = V_{CC} \text{ or } GND; \ I_{O} = 0 \ A; \\ V_{CC} = 5.5 \ V \end{array}$	-	-	2.0	-	20	-	40	μΑ

Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions		25 °C	;	_40 °C	to +85 °C	_40 °C	to +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
Cı	input capacitance		-	3	10	-	10	-	10	pF
74AHCT	1G126-Q100									
V _{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
VIL	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -8.0 mA	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	V _{OL} LOW-level output voltage	V_{I} = V_{IH} or $V_{IL};V_{CC}$ = 4.5 V								
		I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		l _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
I _{OZ}	OFF-state output current	$V_{\text{I}} = V_{\text{IH}} \text{ or } V_{\text{IL}}; V_{\text{O}} = V_{\text{CC}} \text{ or} \\ \text{GND}; V_{\text{CC}} = 5.5 \text{ V}$	-	-	±0.25	-	±2.5	-	±10	μA
l _l	input leakage current	$V_I = 5.5 V \text{ or GND};$ $V_{CC} = 0 V \text{ to } 5.5 V$	-	-	0.1	-	1.0	-	2.0	μA
I _{CC}	supply current		-	-	2.0	-	20	-	40	μΑ
ΔI _{CC}	additional supply current	per input pin; $V_I = V_{CC} - 2.1 V$; other inputs at V_{CC} or GND; $I_O = 0 A$; $V_{CC} = 4.5 V$ to 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
CI	input capacitance		-	3	10	-	10	-	10	pF

Table 7. Static characteristics ...continued Voltages are referenced to GND (ground = 0.V)

11. Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; For test circuit see <u>Figure 7</u>.

Symbol	Parameter	Conditions		25 °C		_40 °C	to +85 °C	–40 °C t	to +125 ℃	Unit	
				Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G126-Q100										
pa 1 1 0	propagation	A to Y; see Figure 5	<u>[1]</u>								
	delay	V_{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	4.4	8.0	1.0	9.5	1.0	10.0	ns
		C _L = 50 pF		-	6.3	11.5	1.0	13.0	1.0	14.5	ns
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns

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Symbol	Parameter	Conditions			25 °C		_40 °C	to +85 °C	−40 °C	to +125 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
t _{en}	enable time	OE to Y; see Figure 6	<u>[1]</u>								
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$	[2]								
		C _L = 15 pF		-	4.9	8.0	1.0	9.5	1.0	10.0	ns
		C _L = 50 pF		-	7.0	11.5	1.0	13.0	1.0	14.5	ns
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.6	5.6	1.0	6.3	1.0	7.0	ns
		C _L = 50 pF		-	5.4	8.0	1.0	9.0	1.0	9.5	ns
dis	disable time	OE to Y; see Figure 6	[1]								
		V_{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	6.3	9.7	1.0	11.5	1.0	12.5	ns
		C _L = 50 pF		-	9.0	13.2	1.0	15.0	1.0	16.5	ns
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	4.3	6.8	1.0	8.0	1.0	8.5	ns
		C _L = 50 pF		-	6.1	8.8	1.0	10.0	1.0	11.0	ns
C _{PD}	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}; \text{ f} = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	9	-	-	-	-	-	pF
74AHCT	1G126-Q100										
pd	propagation	A to Y; see Figure 5	[1]								
	delay	V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
en	enable time	OE to Y; see Figure 6	[1]								
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.4	5.6	1.0	6.3	1.0	6.5	ns
		C _L = 50 pF		-	4.8	8.0	1.0	9.0	1.0	9.0	ns
dis	disable time	OE to Y; see Figure 6	<u>[1]</u>								
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF			4.0	6.8	1.0	8.0	1.0	8.5	ns
		C _L = 50 pF			5.7	8.8	1.0	10.0	1.0	11.5	ns

Table 8.Dynamic characteristics ... continuedGND = 0 V; For test circuit see Figure 7.

Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions		25 °C		–40 °C to +85 °C		–40 °C to +125 °C		Uni	
				Min	Тур	Max	Min	Max	Min	Max	
C _{PD}	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}; \text{ f} = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	11	-	-	-	-	-	pF

Table 8. Dynamic characteristics ...continued

[1] t_{pd} is the same as t_{PLH} and t_{PHL} .

- t_{en} is the same as t_{PZL} and t_{PZH} .
- t_{dis} is the same as t_{PLZ} and $t_{\text{PHZ}}.$

[2] Typical values are measured at V_{CC} = 3.3 V.

- [3] Typical values are measured at V_{CC} = 5.0 V.
- [4] C_{PD} is used to determine the dynamic power dissipation P_D (μW).

 P_{D} = $C_{PD} \times V_{CC}{}^{2} \times f_{i}$ + $\Sigma (C_{L} \times V_{CC}{}^{2} \times f_{o})$ where:

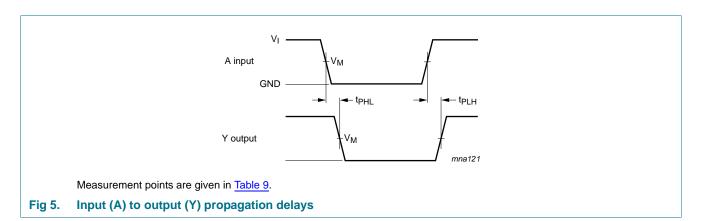
 f_i = input frequency in MHz;

 f_o = output frequency in MHz;

 C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

12. Waveforms



Bus buffer/line driver; 3-state

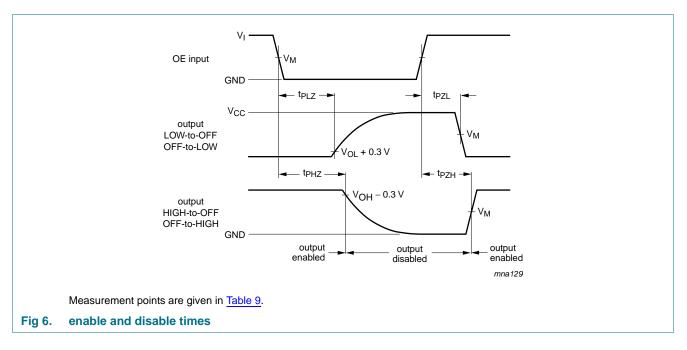


Table 9.Measurement points

Туре	Input	Output	
	V _M	VI	V _M
74AHC1G126-Q100	$0.5 imes V_{CC}$	GND to V _{CC}	$0.5 imes V_{CC}$
74AHCT1G126-Q100	1.5 V	GND to 3.0 V	$0.5 imes V_{CC}$

Bus buffer/line driver; 3-state

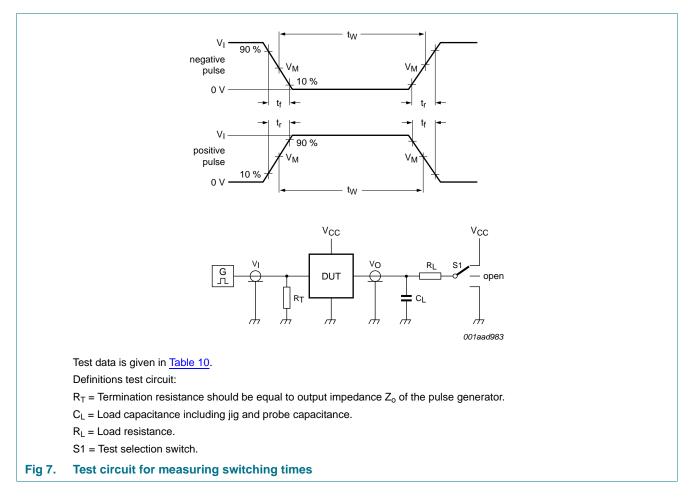


Table 10. Test data

Туре	Input		Load		S1 position		
	VI	t _r , t _f	CL	RL	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
74AHC1G126-Q100	V _{CC}	\leq 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}
74AHCT1G126-Q100	3 V	\leq 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}

Bus buffer/line driver; 3-state

13. Package outline

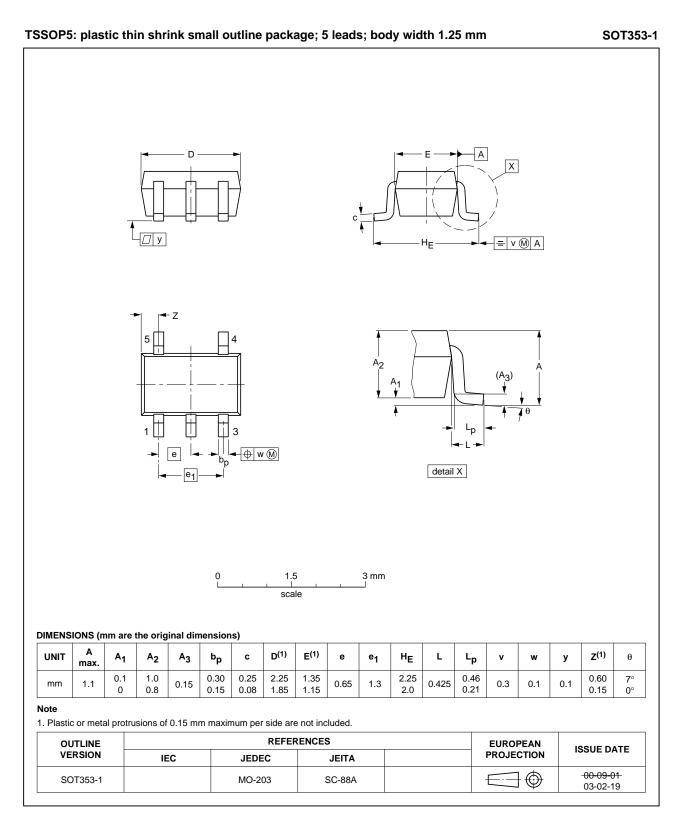


Fig 8. Package outline SOT353-1 (TSSOP5)

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Bus buffer/line driver; 3-state

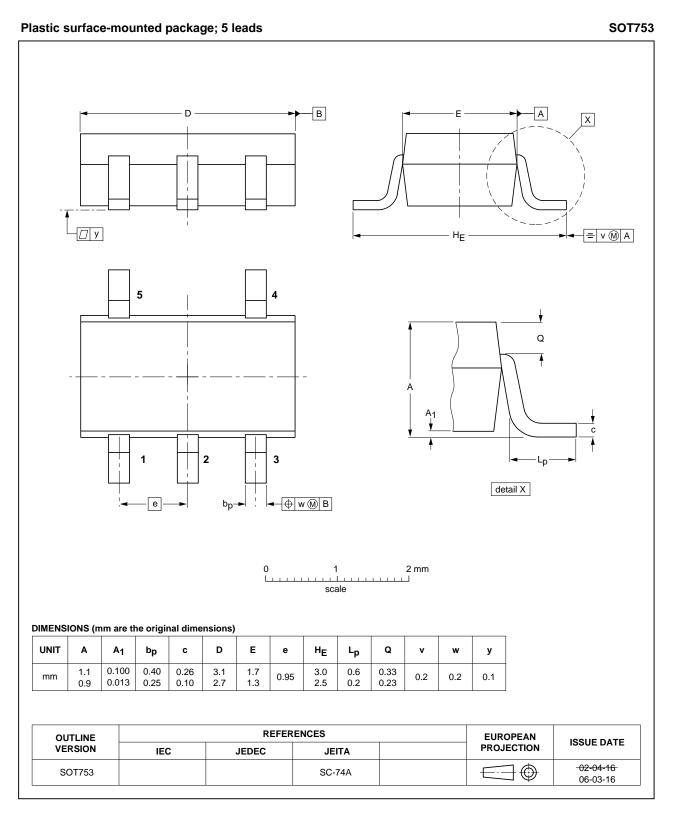


Fig 9. Package outline SOT753 (SC-74A)

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Bus buffer/line driver; 3-state

14. Abbreviations

Table 11. Abbreviations		
Acronym	Description	
CMOS	Complementary Metal Oxide Semiconductor	
CDM	Charged Device Model	
DUT	Device Under Test	
ESD	ElectroStatic Discharge	
HBM	Human Body Model	
MM	Machine Model	
MIL	Military	
TTL	Transistor-Transistor Logic	

15. Revision history

Table 12. Revision history	Revision history				
Document ID	Release date	Data sheet status	Change notice	Supersedes	
74AHC1G_AHCT1G126_Q100 v.1	20130326	Product data sheet	-	-	

16. Legal information

16.1 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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