

74AHCT244A

Octal buffer/line driver; 3-state

Rev. 1 — 23 November 2016

Product data sheet

1. General description

The 74AHCT244A is an 8-bit buffer/line driver with 3-state outputs and TTL inputs. The device features two output enables ($\overline{1OE}$ and $\overline{2OE}$). A HIGH on \overline{nOE} causes the associated outputs to assume a high-impedance OFF-state.

Designed to operate over a V_{CC} range from 4.5 V to 5.5 V, the inputs are TTL compatible, which allows the device to be used to translate from 3.3 V to 5 V.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

This device is fully specified for partial Power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

2. Features and benefits

- Direct interface with TTL levels
- Supply voltage range from 4.5 V to 5.5 V
- Typical t_{pd} of 2.8 ns at 5 V
- Typical $V_{OL(p)} < 0.8$ V at $V_{CC} = 5$ V, $T_{amb} = 25$ °C
- Typical $V_{OH(v)} > 2.3$ V at $V_{CC} = 5$ V, $T_{amb} = 25$ °C
- Supports mixed-mode voltage operation on all ports
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 250 mA per JESD 78 Class II
- ESD protection:
 - ◆ HBM ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 3 kV
 - ◆ MM JESD22-A115-A exceeds 150 V
 - ◆ CDM JESD22-C101E exceeds 2 kV
- Specified from -40 °C to $+85$ °C and from -40 °C to $+125$ °C

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AHCT244APW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1

4. Functional diagram

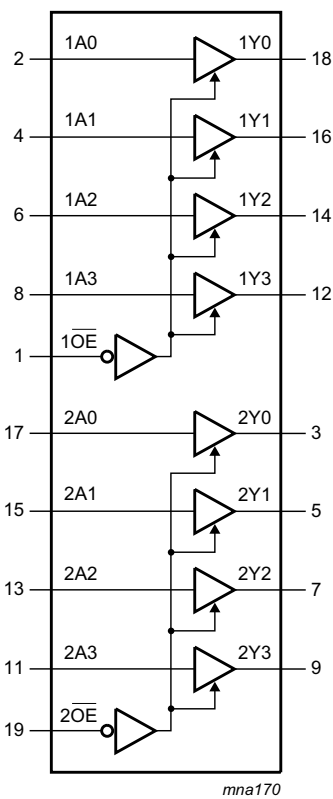


Fig 1. Logic symbol

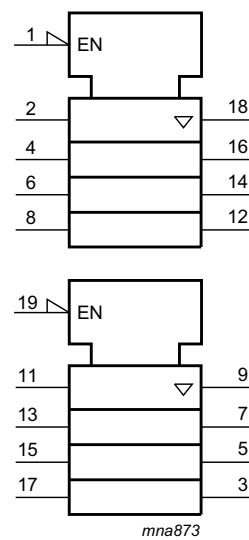


Fig 2. IEC logic symbol

5. Pinning information

5.1 Pinning

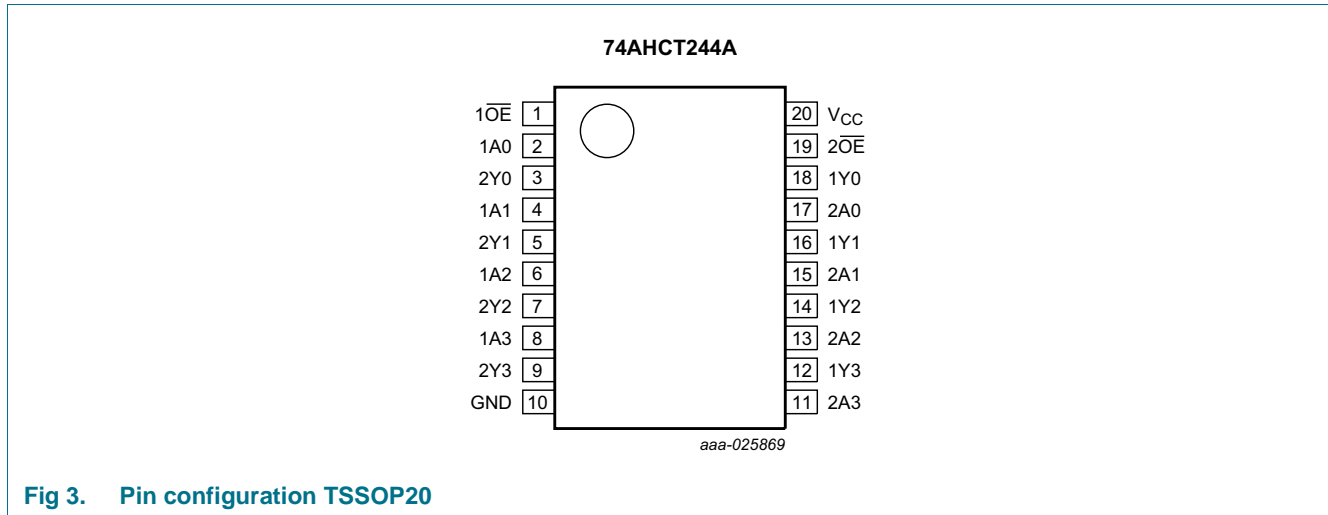


Fig 3. Pin configuration TSSOP20

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
$\overline{1OE}$, $\overline{2OE}$	1, 19	output enable input (active LOW)
1A0, 1A1, 1A2, 1A3	2, 4, 6, 8	data input
2Y0, 2Y1, 2Y2, 2Y3	3, 5, 7, 9	data output
GND	10	ground (0 V)
2A0, 2A1, 2A2, 2A3	17, 15, 13, 11	data input
1Y0, 1Y1, 1Y2, 1Y3,	18, 16, 14, 12	data output

6. Functional description

Table 3. Function table [1]

Control	Input	Output
$\overline{\text{nOE}}$	nAn	nYn
L	L	L
L	H	H
H	X	Z

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

7. Limiting values

Table 4. 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
V_I	input voltage		-0.5	+7.0	V
V_O	output voltage	active mode	-0.5	$V_{CC} + 0.5$	V
		power-down or 3-state mode	-0.5	+7.0	V
I_{IK}	input clamping current	$V_I < 0$ V	-20	-	mA
I_{OK}	output clamping current	$V_O < 0$ V	-20	-	mA
I_O	output current	$V_O = 0$ V to V_{CC}	-	± 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	$T_{amb} = -40$ °C to +125 °C	-	500	mW

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

[2] The output voltage ratings may be exceeded if the output current ratings are observed.

[3] This value is limited to 7.0 V maximum.

[4] For TSSOP20 package: above 100 °C the value of P_{tot} derates linearly with 10 mW/K.

8. Recommended operating conditions

Table 5. Recommended operating conditions

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		4.5	5.5	V
V_I	input voltage		0	5.5	V
V_O	output voltage	active mode	0	V_{CC}	V
		power-down or 3-state mode	0	5.5	V
T_{amb}	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	-	20	ns/V

9. Static characteristics

Table 6. 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	Typ	Max	Min	Max	Min	Max	
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	2	-	-	2	-	2	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	0.8	-	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5\text{ V}$								
		$I_O = -50\ \mu\text{A}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -8\text{ mA}$	3.94	-	-	3.8	-	3.7	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5\text{ V}$								
		$I_O = 50\ \mu\text{A}$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 8\text{ mA}$	-	-	0.36	-	0.44	-	0.55	V
I_{OZ}	OFF-state output current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $V_O = \text{GND to }5.5\text{ V}$	-	-	± 0.25	-	± 2.5	-	± 2.5	μA
I_{OFF}	power-off leakage current	V_I or $V_O = \text{GND to }5.5\text{ V}$; $V_{CC} = 0\text{ V}$	-	-	0.5	-	5	-	5	μA
I_I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 0\text{ V to }5.5\text{ V}$	-	-	± 0.1	-	± 1	-	± 1	μA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{ A}$; $V_{CC} = 5.5\text{ V}$	-	-	2	-	20	-	20	μA
ΔI_{CC}	additional supply current	per input pin; $V_I = 3.4\text{ V}$; $I_O = 0\text{ A}$; other pins at V_{CC} or GND; $V_{CC} = 5.5\text{ V}$	-	-	1.35	-	1.5	-	1.5	mA

10. Dynamic characteristics

Table 7. Dynamic characteristics
GND = 0 V. For test circuit see Figure 6.

Symbol	Parameter	Conditions	25 °C			−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	Min	Max	
t _{pd}	propagation delay	nAn to nYn; see Figure 4 [2]								
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	2.8	7.4	1	8.5	1	9.5	ns
		C _L = 50 pF	-	4.4	8.4	1	9.5	1	10.5	ns
t _{en}	enable time	nOE to nYn; see Figure 5								
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	3.8	10.4	1	12	1	13	ns
		C _L = 50 pF	-	5.4	11.4	1	13	1	14.5	ns
t _{dis}	disable time	nOE to nYn; see Figure 5 [2]								
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	2.9	8	1	11	1	11	ns
		C _L = 50 pF	-	5.1	11.4	1	13	1	14.5	ns
t _{sk(o)}	skew	V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF	-	-	1	-	1	-	1	ns
C _I	input capacitance	V _I = V _{CC} or GND; V _{CC} = 5 V	-	2	6	-	6	-	6	pF
C _O	output capacitance	V _O = V _{CC} or GND; V _{CC} = 5 V	-	5	-	-	-	-	-	pF
C _{PD}	power dissipation capacitance	per buffer; [3] C _L = 0 pF; f = 10 MHz; V _I = GND to V _{CC}	-	8	-	-	-	-	-	pF

[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 5 V.

[2] 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_{PHZ}.

[3] C_{PD} is used to determine the dynamic power dissipation P_D (μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

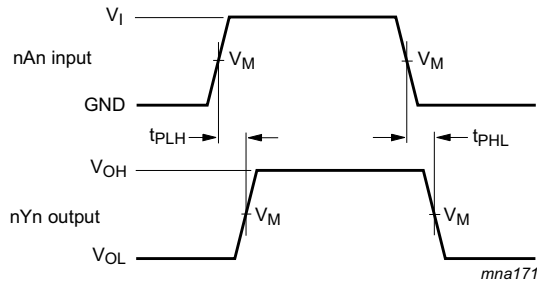
C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

Table 8. Noise characteristics
 GND = 0 V. For test circuit see [Figure 6](#).

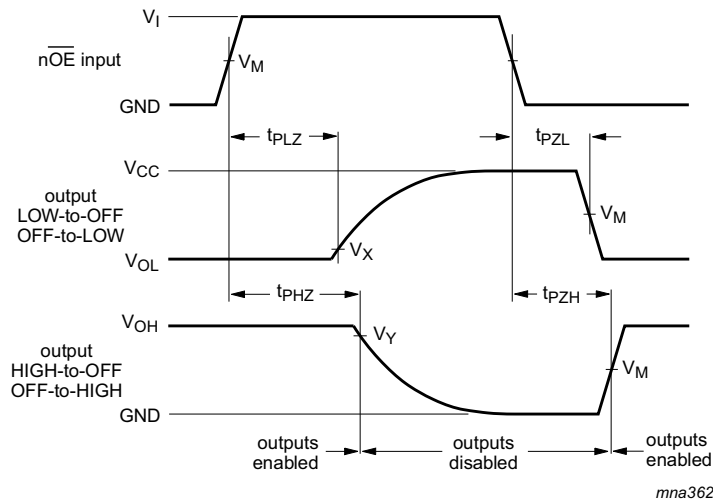
Symbol	Parameter	Conditions	T _{amb} = 25 °C			Unit
			Min	Typ	Max	
V_{CC} = 5 V; C_L = 50 pF						
V _{OL(p)}	LOW-level output voltage (peak)		-	0.5	1.5	V
V _{OL(v)}	LOW-level output voltage (valley)		-1.5	-0.3	-	V
V _{OH(v)}	HIGH-level output voltage (valley)		-	4.5	-	V
V _{IH(AC)}	AC HIGH-level input voltage (dynamic)		2	-	-	V
V _{IL(AC)}	AC LOW-level input voltage (dynamic)		-	-	0.8	V

11. Waveforms



Measurement points are given in [Table 9](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 4. Propagation delay input (nAn) to output (nYn)

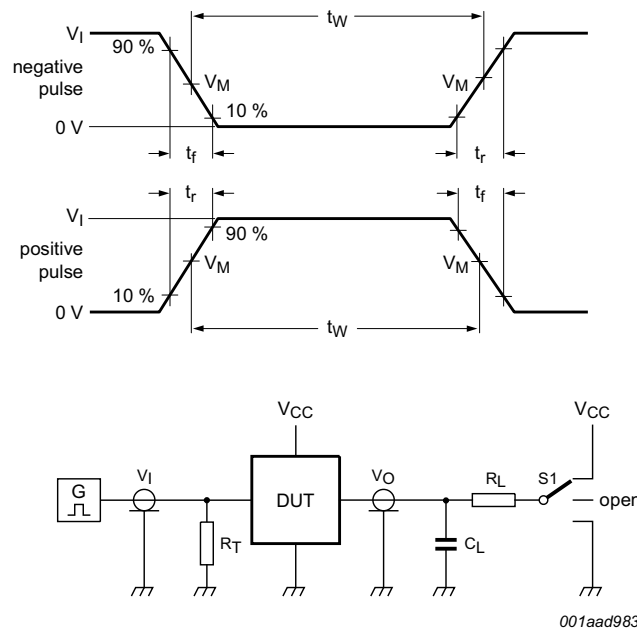


Measurement points are given in [Table 9](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 5. enable and disable times

Table 9. Measurement points

Input	Output		
V_M	V_M	V_X	V_Y
1.5 V	$0.5V_{CC}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$



Test data is given in [Table 10](#).

Definitions test circuit:

R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator

C_L = Load capacitance including jig and probe capacitance

R_L = Load resistor

S1 = Test selection switch

Fig 6. Test circuit for measuring switching times

Table 10. Test data

Input		Load		S1 position		
V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
GND to 3.0 V	3.0 ns	15 pF, 50 pF	1 k Ω	open	GND	V_{CC}

12. Package outline

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

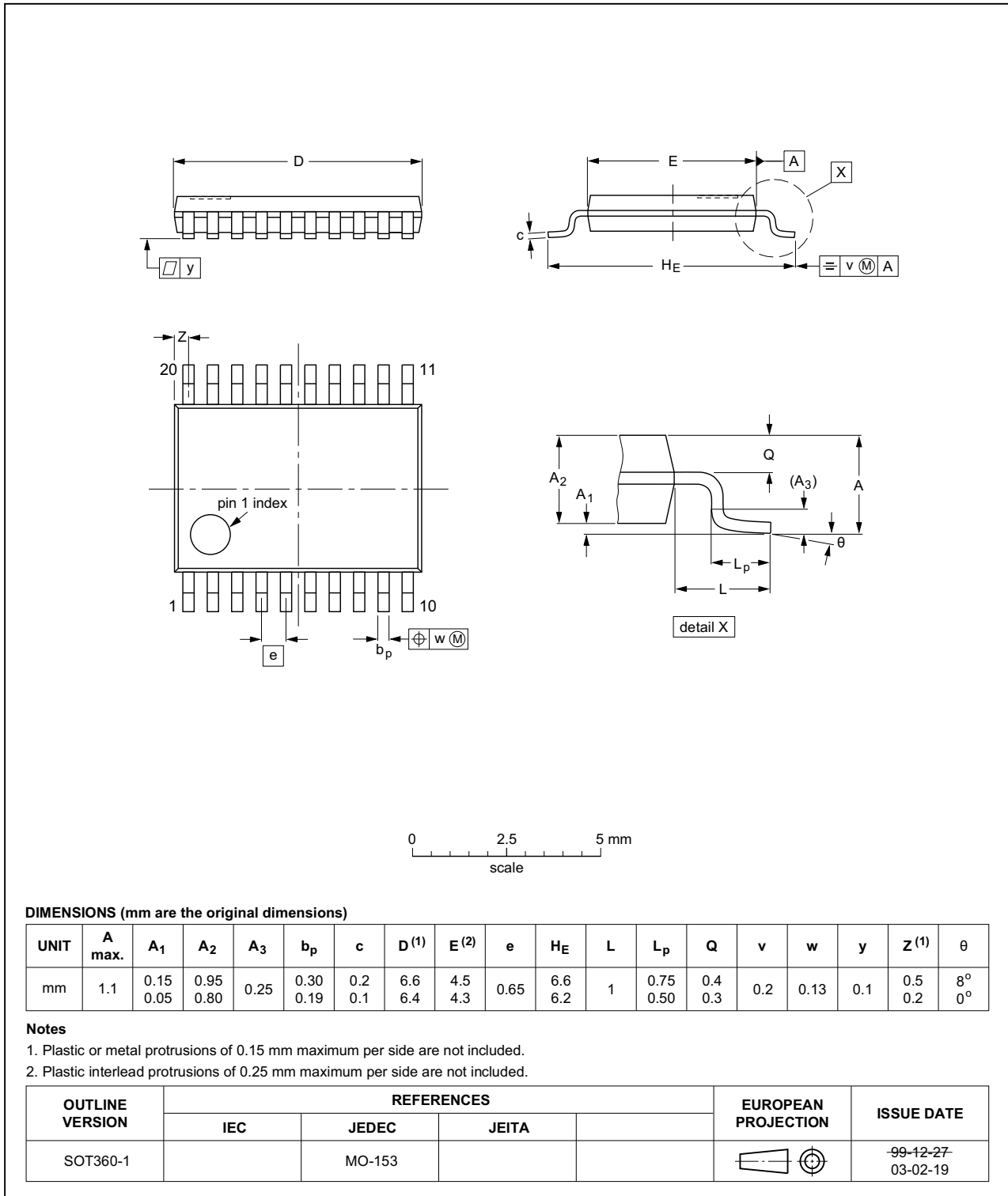


Fig 7. Package outline SOT360-1 (TSSOP20)

13. Abbreviations

Table 11. Abbreviations

Acronym	Description
CDM	Charge Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHCT244A v.1	20161123	Product data sheet	-	-

15. Legal information

15.1 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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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