

CBT3245A-Q100

Octal bus switch

Rev. 3 — 9 April 2020

Product data sheet

1. General description

The CBT3245A-Q100 provides eight bits of high-speed TTL-compatible bus switching. The low ON resistance of the switch allows connections to be made with minimal propagation delay.

The CBT3245A-Q100 is organized as one 8-bit bus switches with one output enable (\overline{OE}) input. When \overline{OE} is LOW, the switch is on and port A is connected to the B port. When \overline{OE} is HIGH, each switch is disabled.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 3) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 3)
 - Specified from -40 °C to +85 °C
- 5 Ω switch connection between two ports
- TTL-compatible control input levels
- Multiple package options
- Latch-up protection exceeds 500 mA per JESD78
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115B exceeds 150 V (C = 200 pF, R = 0 Ω)
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

3. Ordering information

Table 1. Ordering information

Type number	Package				Version
	Temperature range	Name	Description		
CBT3245AD-Q100	-40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm		SOT163-1
CBT3245APW-Q100	-40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm		SOT360-1
CBT3245ABQ-Q100	-40 °C to +85 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm		SOT764-1

4. Functional diagram

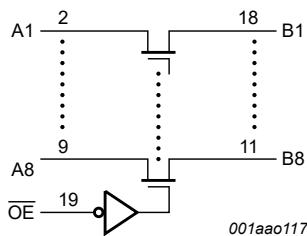


Fig. 1. Logic diagram

5. Pinning information

5.1. Pinning

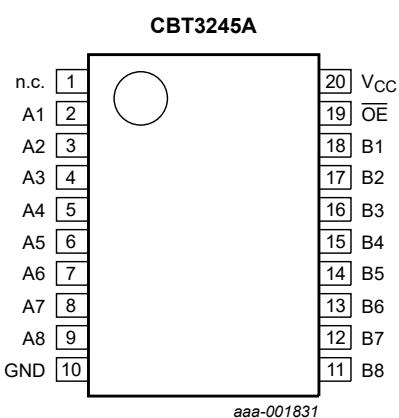
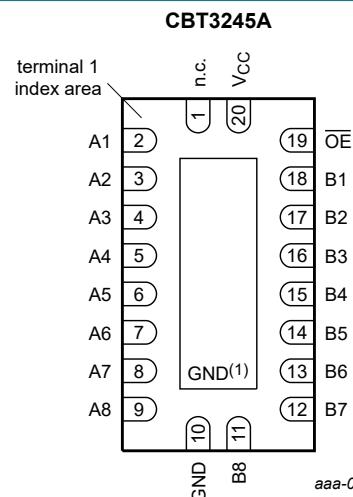


Fig. 2. Pin configuration for SOT163-1 (SO20) and SOT360-1 (TSSOP20)



(1) This is not a ground pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to GND.

Fig. 3. Pin configuration for SOT764-1 (DHVQFN20)

5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
n.c.	1	not connected
A1 to A8	2, 3, 4, 5, 6, 7, 8, 9	data input/output (A port)
GND	10	ground (0 V)
B1 to B8	18, 17, 16, 15, 14, 13, 12, 11	data input/output (B port)
OE	19	output enable input (active LOW)
V _{CC}	20	positive supply voltage

6. Functional description

Table 3. Functional description

H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF-state.

Input	Input/output
OE	An, Bn
L	An = Bn
H	Z

7. Limiting values

Table 4. Limiting values

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

T_{amb} = -40 °C to +85 °C, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit	
V_{CC}	supply voltage		-0.5	+7.0	V	
V_I	input voltage		[1]	-0.5	+7.0	V
I_{OK}	output clamping current	$V_O < 0$ V	-50	-	mA	
V_O	output voltage		[1]	-0.5	+7.0	V
I_O	output current	$V_O < 0$ V	-	± 128	mA	
I_{IK}	input clamping current	$V_I < 0$ V	-50	-	mA	
T_{stg}	storage temperature		-65	+150	°C	

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

8. Recommended operating conditions

Table 5. Recommended operating conditions

All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		4.0	-	5.5	V
V_{IH}	HIGH-level input voltage		2.0	-	-	V
V_{IL}	LOW-level input voltage		-	-	0.8	V
T_{amb}	ambient temperature	operating in free air	-40	-	+85	°C

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions	$T_{amb} = -40^{\circ}C$ to $+85^{\circ}C$			Unit
			Min	Typ [1]	Max	
V_{IK}	input clamping voltage	$V_{CC} = 4.5\text{ V}$; $I_I = -18\text{ mA}$	-	-	-1.2	V
I_I	input leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or 5.5 V	-	-	± 5	μA
I_{CC}	supply current	$V_{CC} = 5.5\text{ V}$; $I_O = 0\text{ mA}$; $V_I = V_{CC}$ or GND	-	1	3	μA
ΔI_{CC}	additional supply current	per input pin; $V_{CC} = 5.5\text{ V}$; one input at 3.4 V , other inputs at V_{CC} or GND	[2]	-	-	mA
C_I	input capacitance	control pins; $V_I = 3\text{ V}$ or 0 V	-	3.2	-	pF
$C_{IO(off)}$	off-state input/output capacitance	port off; $V_I = 3\text{ V}$ or 0 V ; $\bar{OE} = V_{CC}$	-	6.6	-	pF
R_{ON}	ON resistance	$V_{CC} = 4.5\text{ V}$; $V_I = 0\text{ V}$; $I_I = 64\text{ mA}$	[3]	-	5	Ω
		$V_{CC} = 4.5\text{ V}$; $V_I = 0\text{ V}$; $I_I = 30\text{ mA}$	[3]	-	5	Ω
		$V_{CC} = 4.5\text{ V}$; $V_I = 2.4\text{ V}$; $I_I = -15\text{ mA}$	[3]	-	10	Ω

[1] All typical values are measured at $V_{CC} = 5\text{ V}$ and $T_{amb} = 25^{\circ}\text{C}$.

[2] This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND .

[3] Measured by the voltage drop between the An and the Bn terminals at the indicated current through the switch. ON resistance is determined by the lowest voltage of the two (An or Bn) terminals.

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see [Fig. 6](#).

Symbol	Parameter	Conditions	$T_{amb} = -40^{\circ}C$ to $+85^{\circ}C$		Unit
			Min	Max	
t_{pd}	propagation delay	An, Bn to Bn, An; $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$; see Fig. 4 [1][2]	-	0.25	ns
t_{en}	enable time	\bar{OE} to An or Bn; $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$; see Fig. 5 [3]	1.0	5.9	ns
t_{dis}	disable time	\bar{OE} to An or Bn; $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$; see Fig. 5 [4]	1.0	6.0	ns

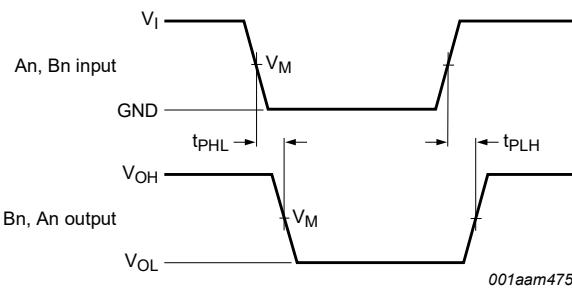
[1] The propagation delay is the calculated RC time constant of the typical ON resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

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

[3] t_{en} is the same as t_{PZL} and t_{PZH} .

[4] t_{dis} is the same as t_{PLZ} and t_{PHZ} .

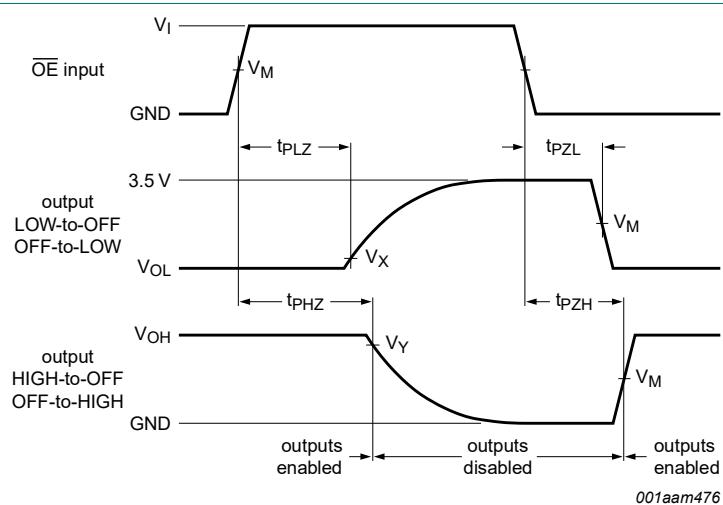
10.1. Waveforms and test circuit



Measurement points are given in [Table 8](#).

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 4. The data input (An, Bn) to output (Bn, An) propagation delay times



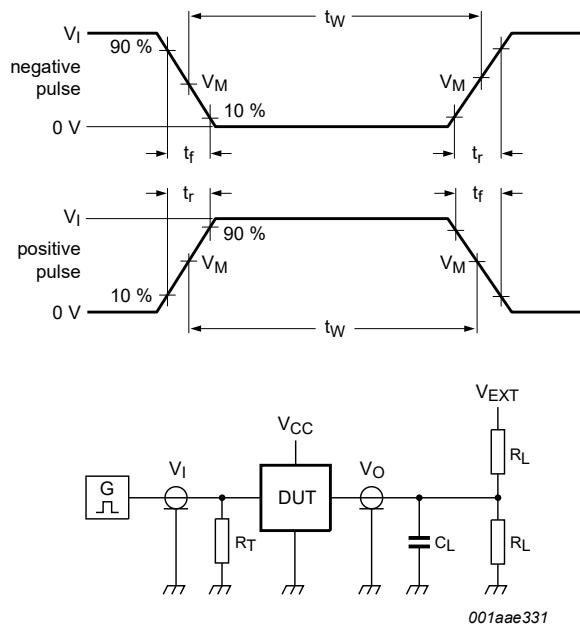
Measurement points are given in [Table 8](#).

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 5. Enable and disable times

Table 8. Measurement points

Supply voltage	Input	Output			
V_{CC}	V_I	V_M	V_M	V_X	V_Y
$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	GND to 3.0 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$



Test data is given in [Table 9](#).

All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz; $Z_o = 50 \Omega$.

The outputs are measured one at a time with one transition per measurement.

Definitions for test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

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

V_{EXT} = External voltage for measuring switching times.

Fig. 6. Test circuit for measuring switching times

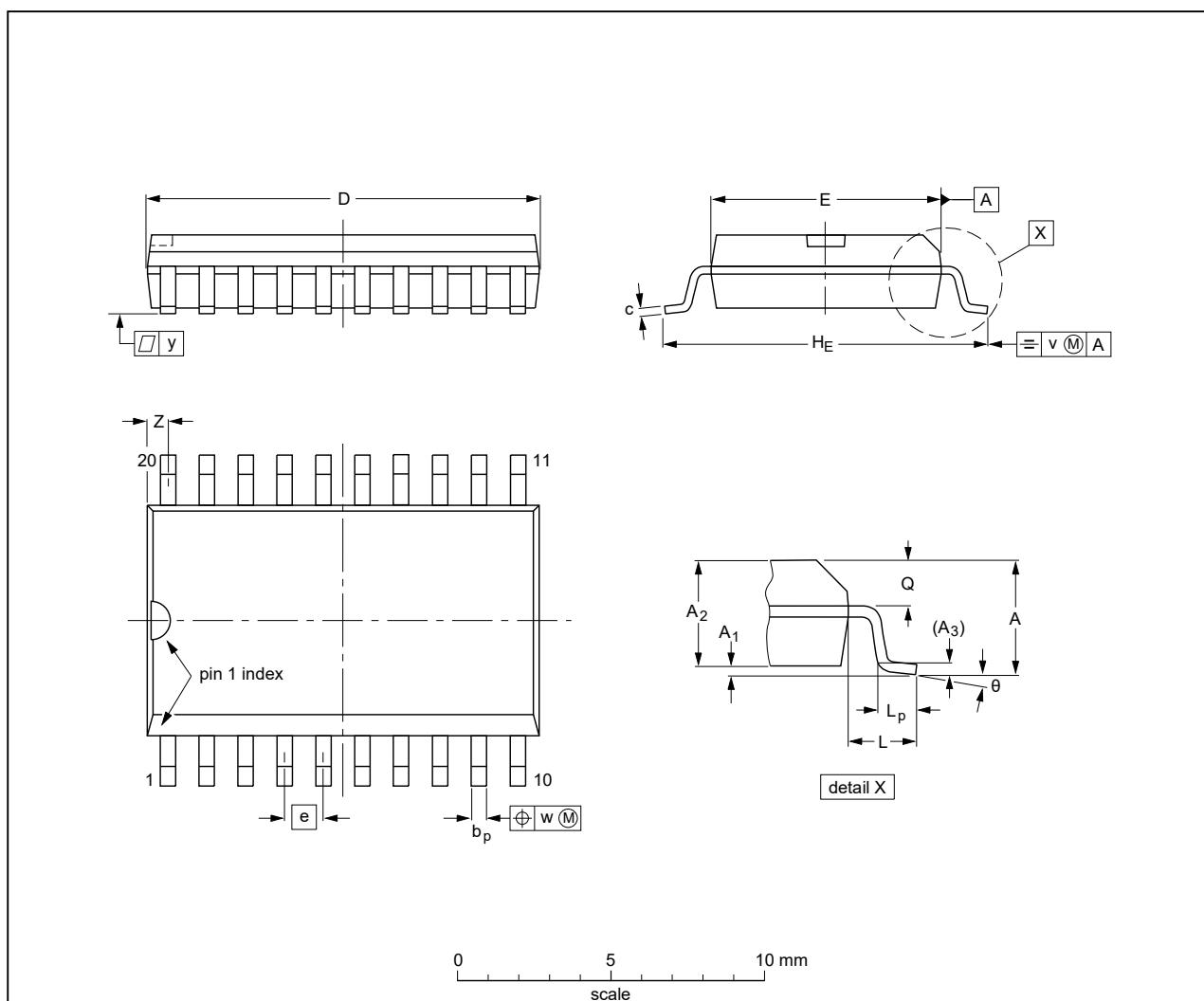
Table 9. Test data

Supply voltage	Input		Load		V_{EXT}		
	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	GND to 3.0 V	$\leq 2.5 \text{ ns}$	50 pF	500 Ω	open	7.0 V	open

11. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _E	L	L _p	Q	v	w	y	z ⁽¹⁾	θ	
mm	2.65	0.3	2.45	0.25	0.49	0.32	13.0	7.6	1.27	10.65	1.4	1.1	1.1	0.25	0.25	0.1	0.9	8°	
inches	0.1	0.012	0.096	0.01	0.019	0.013	0.51	0.30	0.05	10.00	0.055	0.043	1.0	0.016	0.039	0.004	0.035	0.016	0°

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT163-1	075E04	MS-013				99-12-27 03-02-19

Fig. 7. Package outline SOT163-1 (SO20)

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

SOT360-1

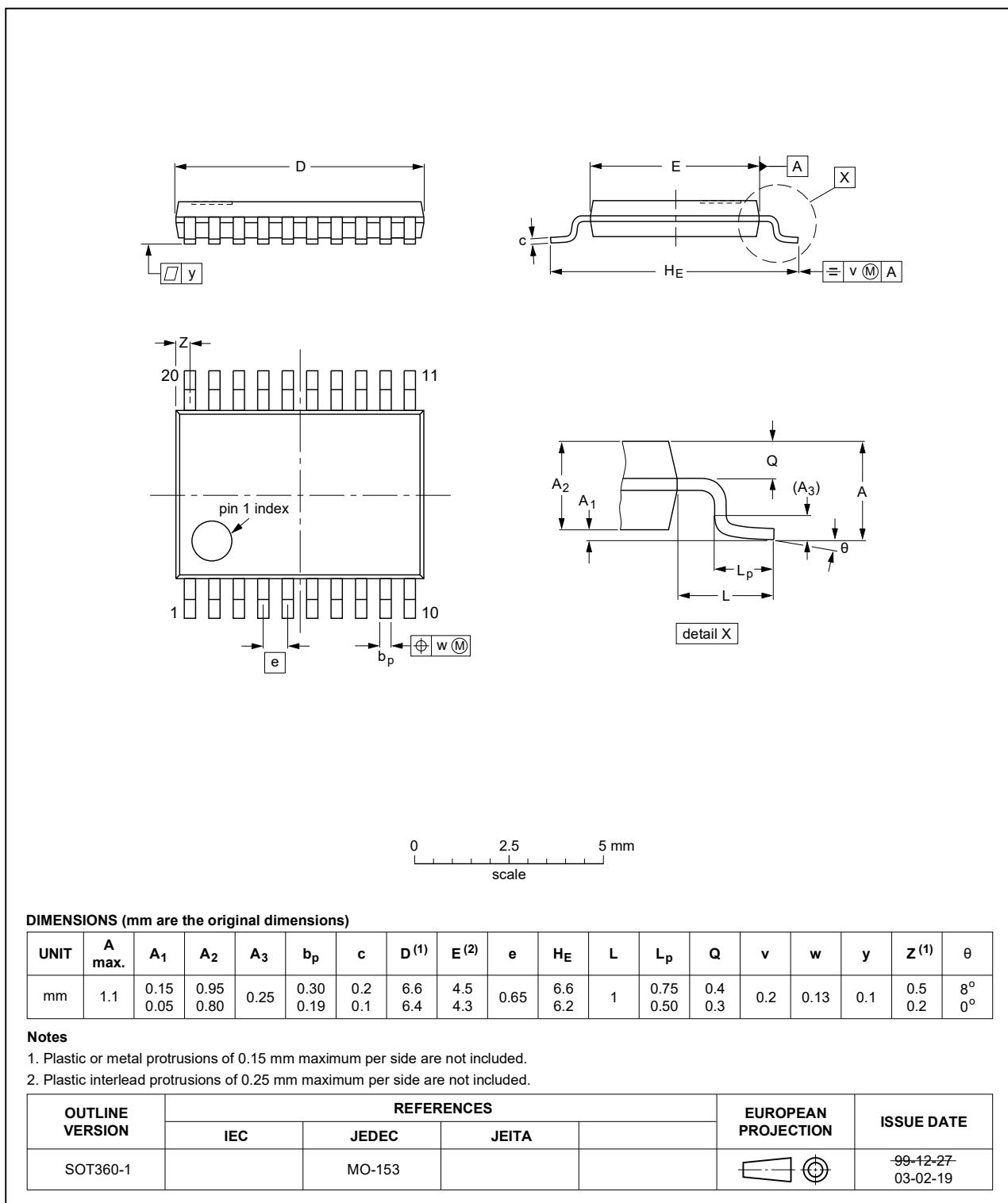


Fig. 8. Package outline SOT360-1 (TSSOP20)

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm

SOT764-1

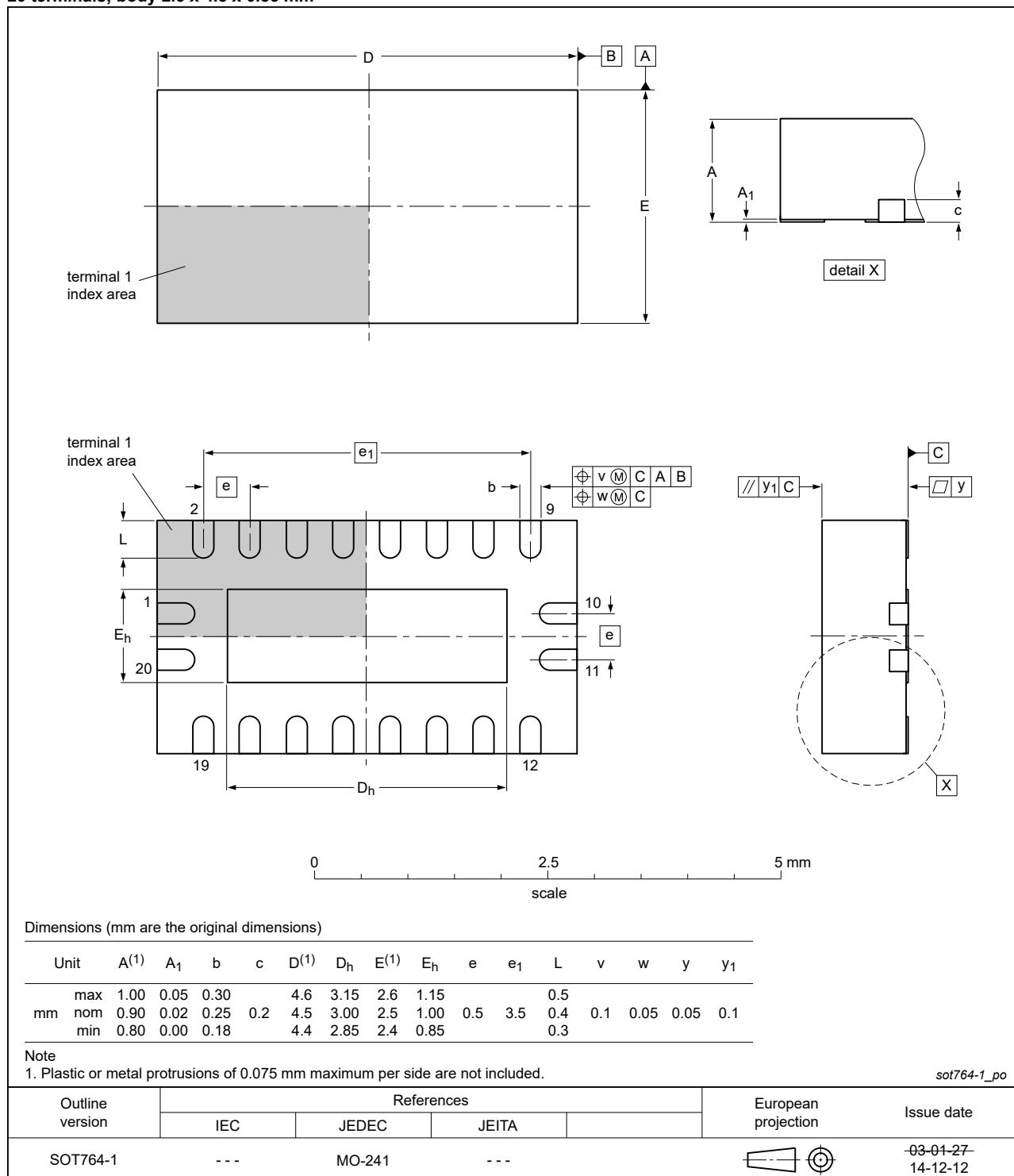


Fig. 9. Package outline SOT764-1 (DHVQFN20)

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
ESD	ElectroStatic Discharge
DUT	Device Under Test
HBM	Human Body Model
MIL	Military
MM	Machine Model
PRR	Pulse Rate Repetition
TTL	Transistor-Transistor Logic

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CBT3245A_Q100 v.3	20200409	Product data sheet	-	CBT3245A_Q100 v.2
Modifications:	<ul style="list-style-type: none">• Section 2 updated.			
CBT3245A_Q100 v.2	20190430	Product data sheet	-	CBT3245A_Q100 v.1
Modifications:	<ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.• Legal texts have been adapted to the new company name where appropriate.• Fig. 9: Package outline drawing SOT764-1 updated.			
CBT3245A_Q100 v.1	20130320	Product data sheet	-	-

14. 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 9 April 2020

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