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CBT3245A

Octal bus switch

Rev. 3 — 5 January 2012

Product data sheet

1. General description

The CBT3245A 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 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. The CBT3245A is characterized for operation from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

2. Features and benefits

- $5\ \Omega$ switch connection between two ports
- TTL-compatible control input levels
- Multiple package options
- Latch-up protection exceeds 500 mA per JESD78
- ESD protection:
 - ◆ HBM JESD22-A114F exceeds 2000 V
 - ◆ MM JESD22-A115B exceeds 150 V
 - ◆ CDM JESD22-C101C exceeds 1000 V

3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
CBT3245AD	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
CBT3245ADB	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
CBT3245ADS	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	SSOP20 ^[1]	plastic shrink small outline package; 20 leads; body width 3.9 mm; lead pitch 0.635 mm	SOT724-1
CBT3245APW	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
CBT3245ABQ	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	DHVQFN20	plastic dual-in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body $2.5 \times 4.5 \times 0.85\text{ mm}$	SOT764-1

[1] Also known as QSOP20 package



4. Functional diagram

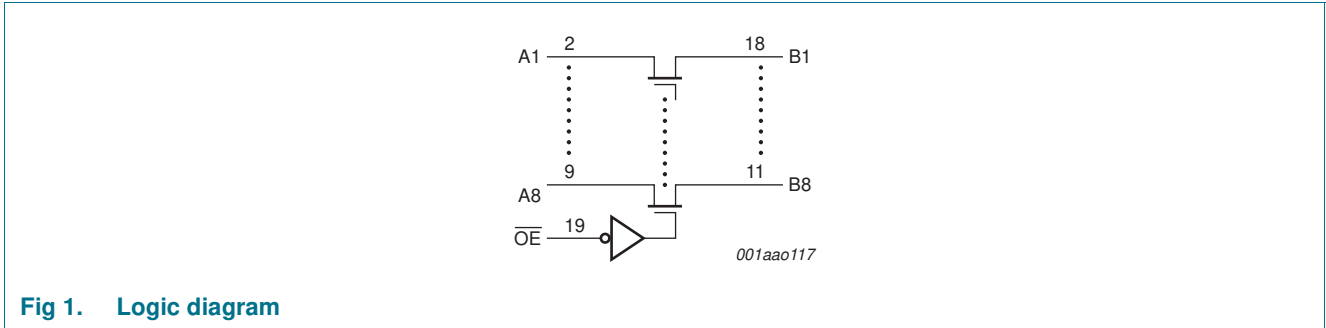
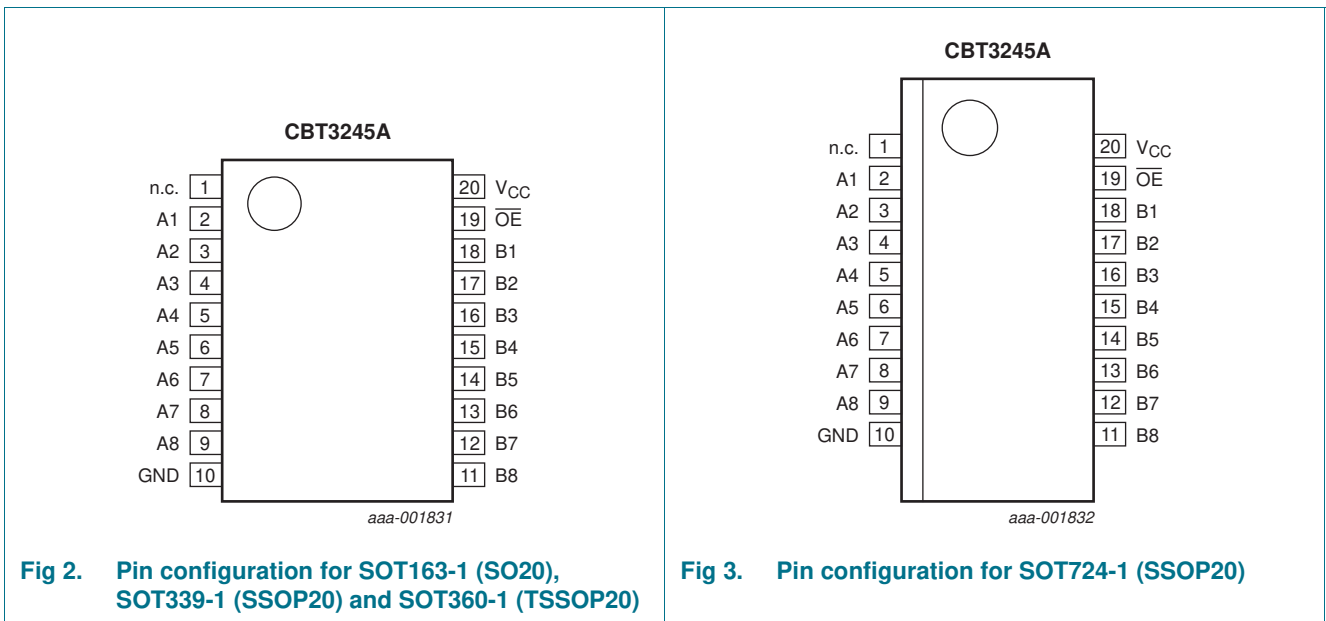
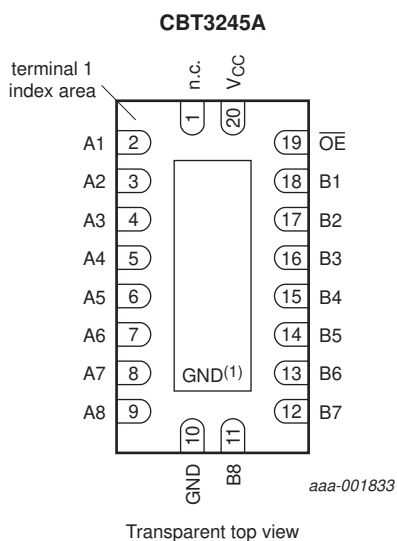


Fig 1. Logic diagram

5. Pinning information

5.1 Pinning





(1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.

Fig 4. 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)
\overline{OE}	19	output enable input (active LOW)
V _{CC}	20	positive supply voltage

6. Functional description

Table 3. Function selection^[1]

Input	Input/output
\overline{OE}	An, Bn
L	An = Bn
H	Z

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

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).^[1]

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.5	+7.0	V
V_I	input voltage		^[2] -0.5	+7.0	V
I_{OK}	output clamping current	$V_O < 0\text{ V}$	-50	-	mA
V_O	output voltage		^[2] -0.5	+7.0	V
I_O	output current	$V_O < 0\text{ V}$	-	±128	mA
I_{IK}	input clamping current	$V_I = 0\text{ V}$	-50	-	mA
T_{stg}	storage temperature		-65	+150	°C

[1] Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under [Section 8](#), is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

[2] 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. 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	$T_{amb} = -40\text{ °C to }+85\text{ °C}$			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	$V_{CC} = 5.5\text{ V}; V_I = \text{GND or } 5.5\text{ V}$	-	-	±5	μA
I_{CC}	supply current	$V_{CC} = 5.5\text{ V}; I_O = 0\text{ mA};$ $V_I = V_{CC}\text{ or GND}$	-	1	3	μA
ΔI_{CC}	additional supply current	per input pin; $V_{CC} = 5.5\text{ V};$ one input at ^[2] 3.4 V, other inputs at V_{CC} or GND	-	-	3.5	mA
C_I	input capacitance	control pins; $V_I = 3\text{ V or } 0\text{ V}$	-	3.2	-	pF
$C_{io(off)}$	off-state input/output capacitance	port off; $V_I = 3\text{ V or } 0\text{ V}; \overline{OE} = V_{CC}$	-	6.6	-	pF

Table 6. Static characteristics ...continued
 Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	T _{amb} = -40 °C to +85 °C			Unit
			Min	Typ ^[1]	Max	
R _{ON}	ON resistance	V _{CC} = 4.5 V; V _I = 0 V; I _I = 64 mA [3]	-	5	7	Ω
		V _{CC} = 4.5 V; V _I = 0 V; I _I = 30 mA [3]	-	5	7	Ω
		V _{CC} = 4.5 V; V _I = 2.4 V; I _I = -15 mA [3]	-	10	15	Ω

[1] All typical values are at V_{CC} = 5 V, T_{amb} = 25 °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 [Figure 7](#).

Symbol	Parameter	Conditions	T _{amb} = -40 °C to +85 °C		Unit
			Min	Max	
t _{pd}	propagation delay	An, Bn to Bn, An; see Figure 5 [1][2]			
		V _{CC} = 5.0 V ± 0.5 V	-	0.25	ns
t _{en}	enable time	$\overline{\text{OE}}$ to An or Bn; see Figure 6 [2]			
		V _{CC} = 5.0 V ± 0.5 V	1.0	5.9	ns
t _{dis}	disable time	$\overline{\text{OE}}$ to An or Bn; see Figure 6 [2]			
		V _{CC} = 5.0 V ± 0.5 V	1.0	6.0	ns

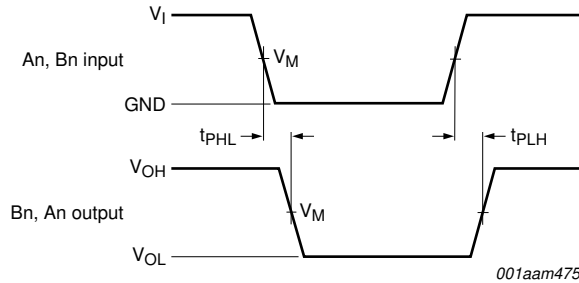
[1] The propagation delay is the calculated RC time constant of the typical ON resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

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

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

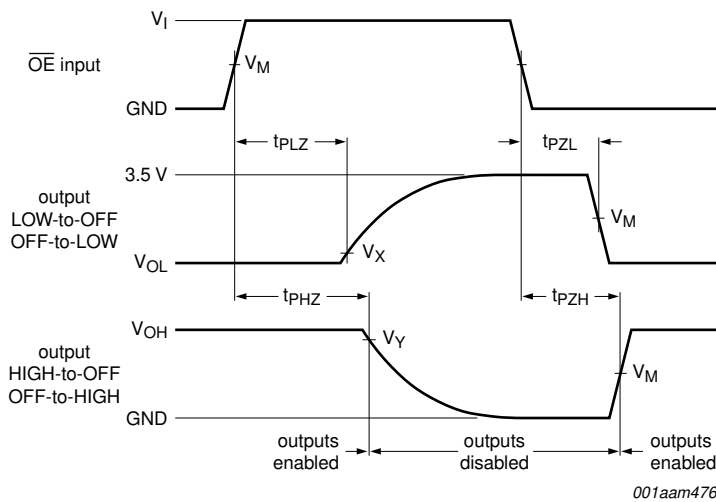
t_{dis} is the same as t_{PLZ} and t_{PHZ}.

11. Waveforms



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



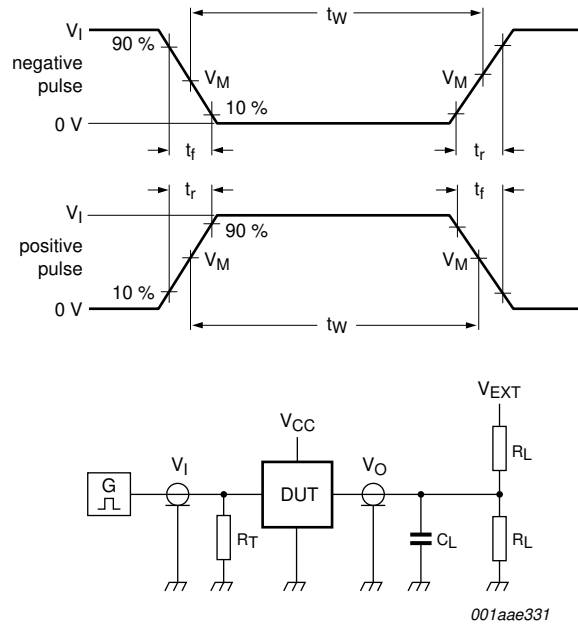
Measurement points are given in [Table 8](#).
 Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 6. 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	$V_{OL} + 0.3\text{ V}$	$V_{OH} - 0.3\text{ V}$

12. Test information



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

All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz; Z_o = 50 Ω.

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 7. 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 V ± 0.5 V	GND to 3.0 V	≤ 2.5 ns	50 pF	500 Ω	open	7.0 V	open

13. Package outline

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

SOT163-1

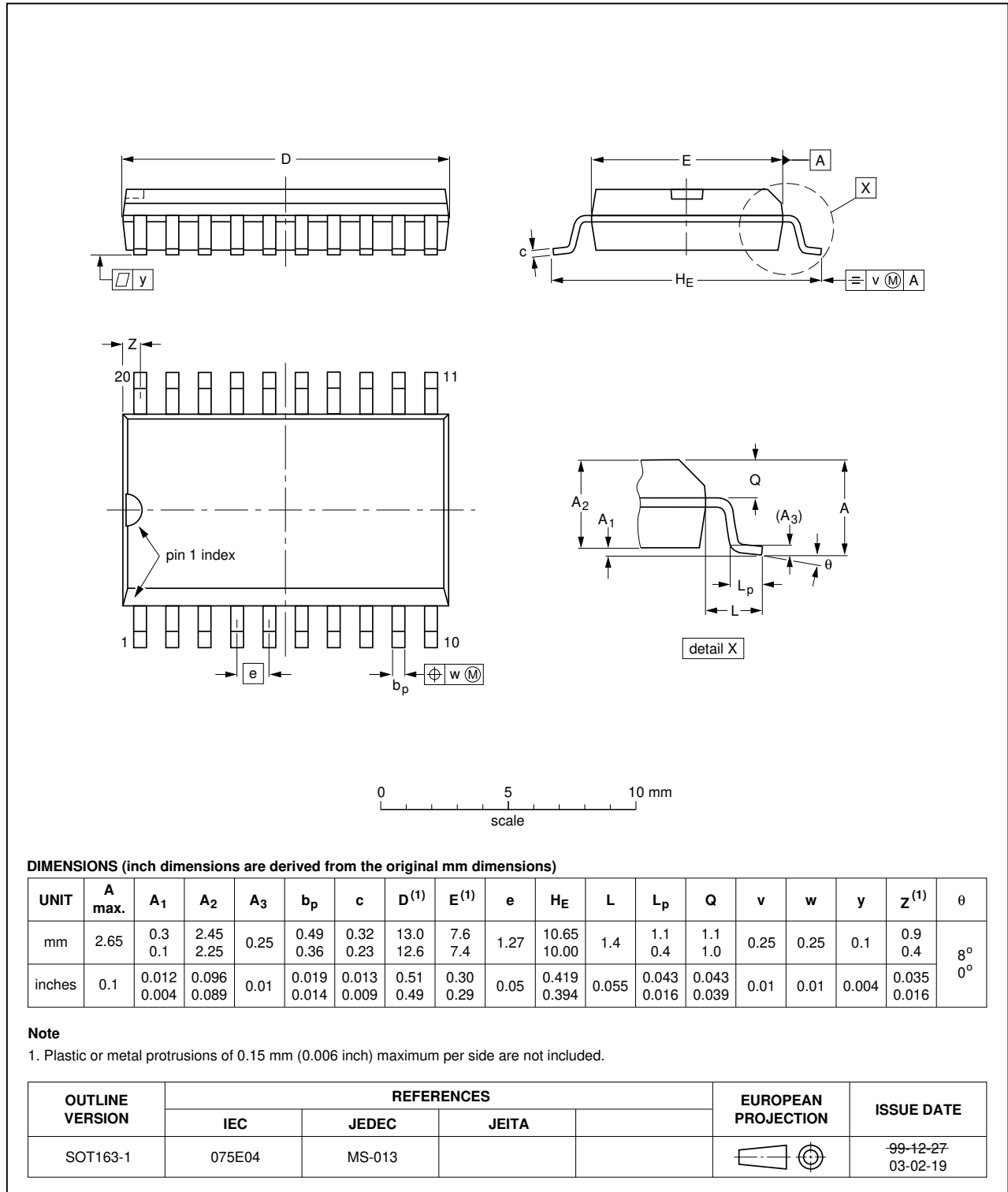


Fig 8. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1

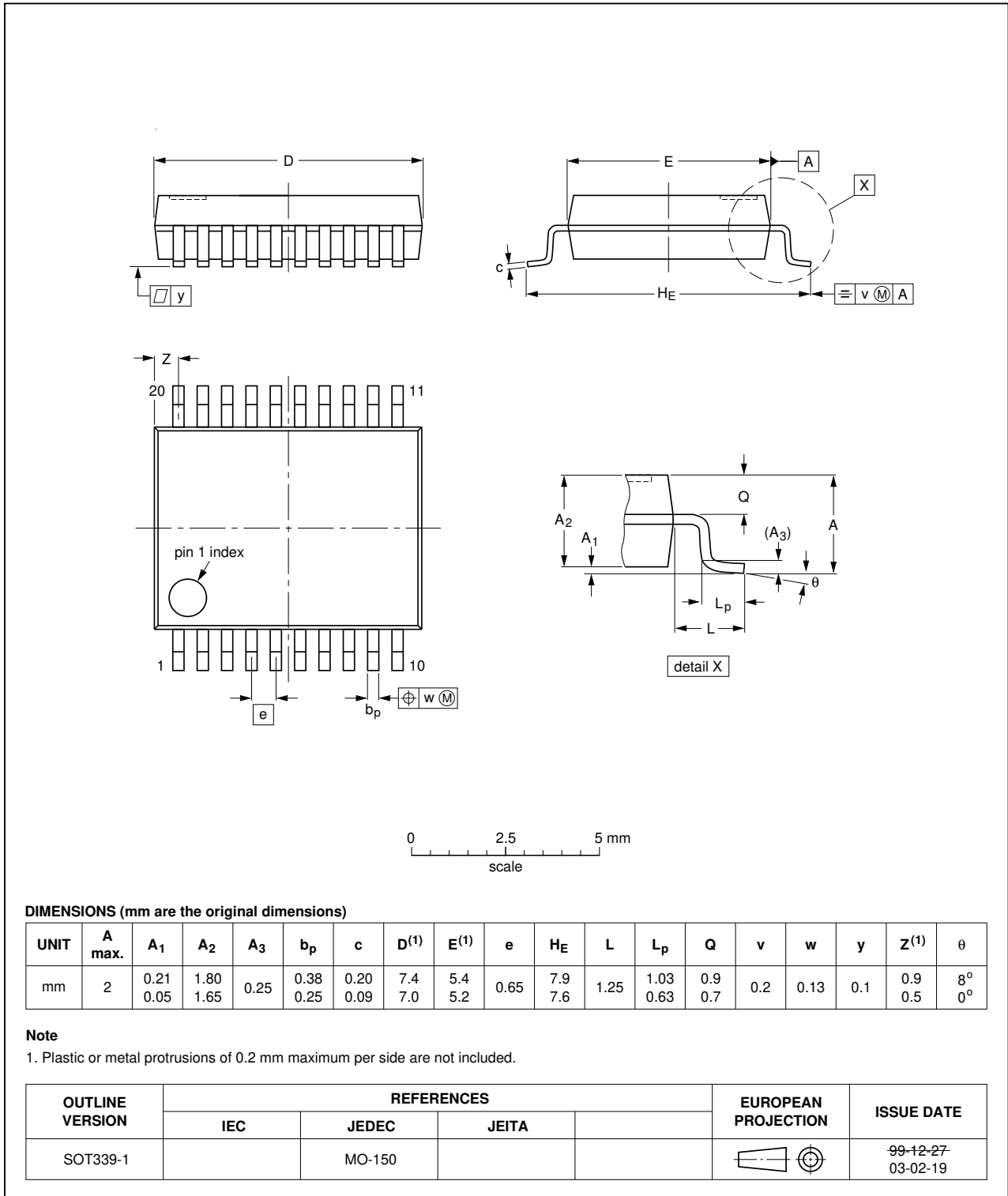


Fig 9. Package outline SOT339-1 (SSOP20)

SSOP20: plastic shrink small outline package; 20 leads; body width 3.9 mm; lead pitch 0.635 mm SOT724-1

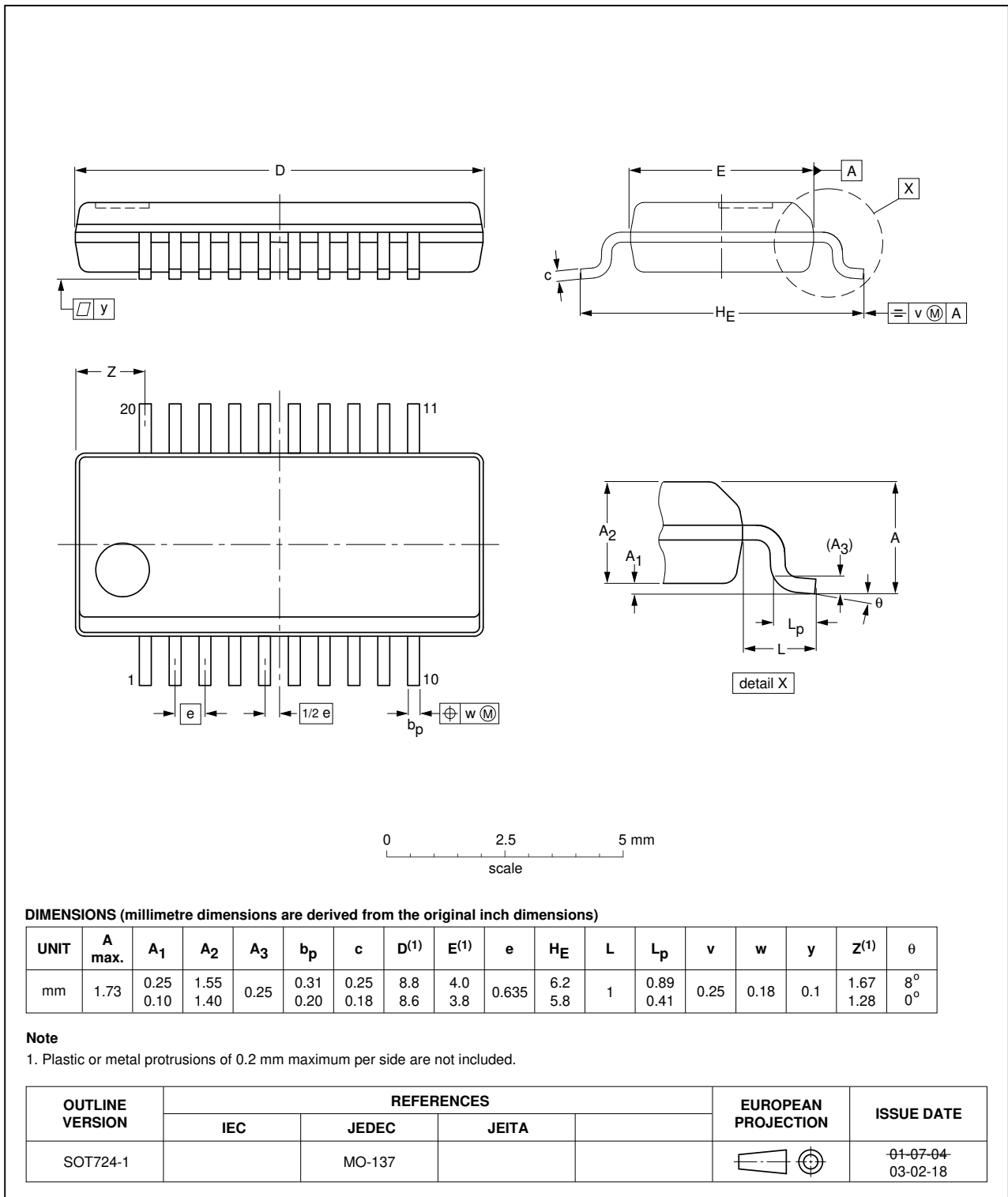


Fig 10. Package outline SOT724-1 (SSOP20)

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

SOT360-1

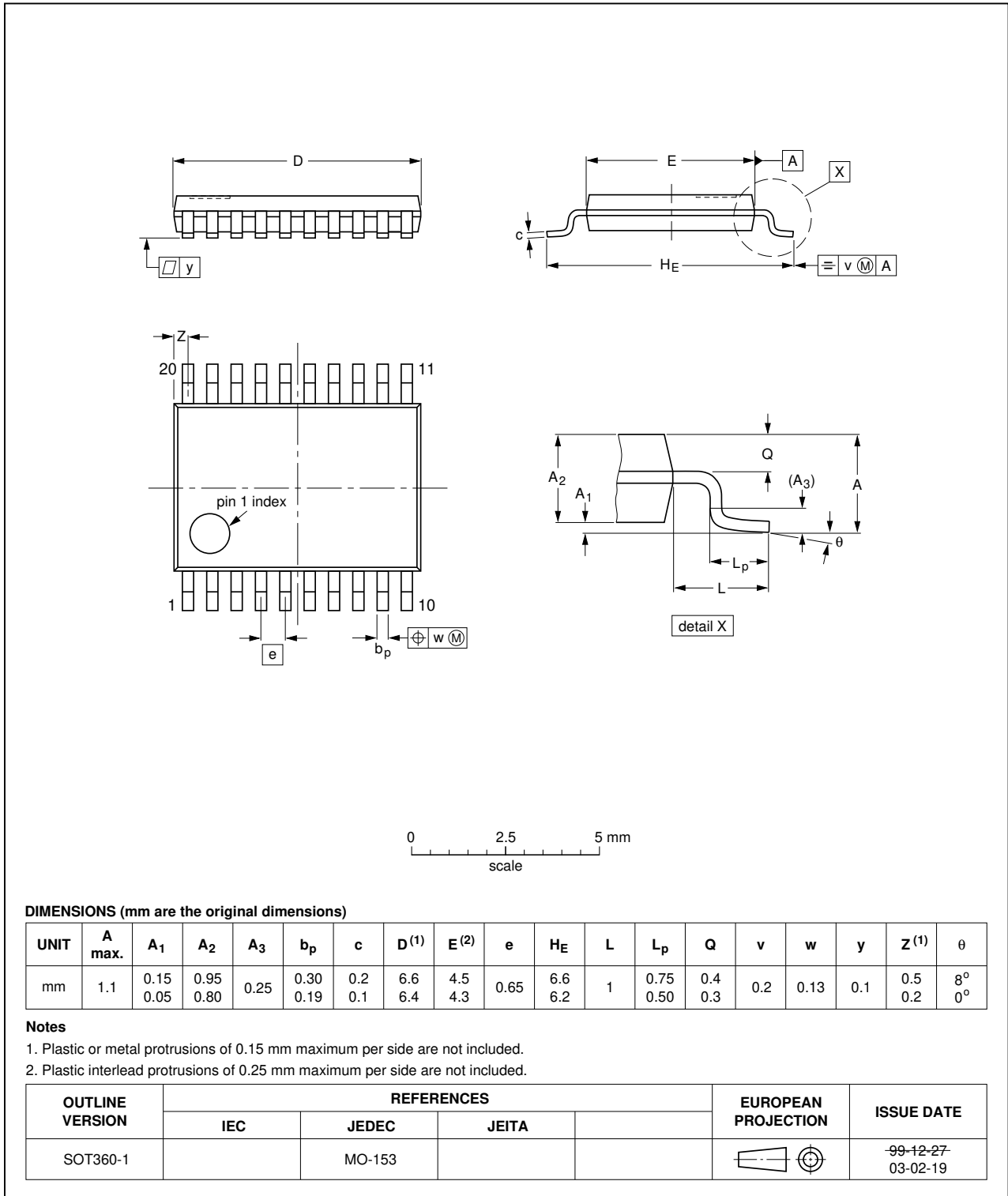


Fig 11. Package outline SOT360-1 (TSSOP20)

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

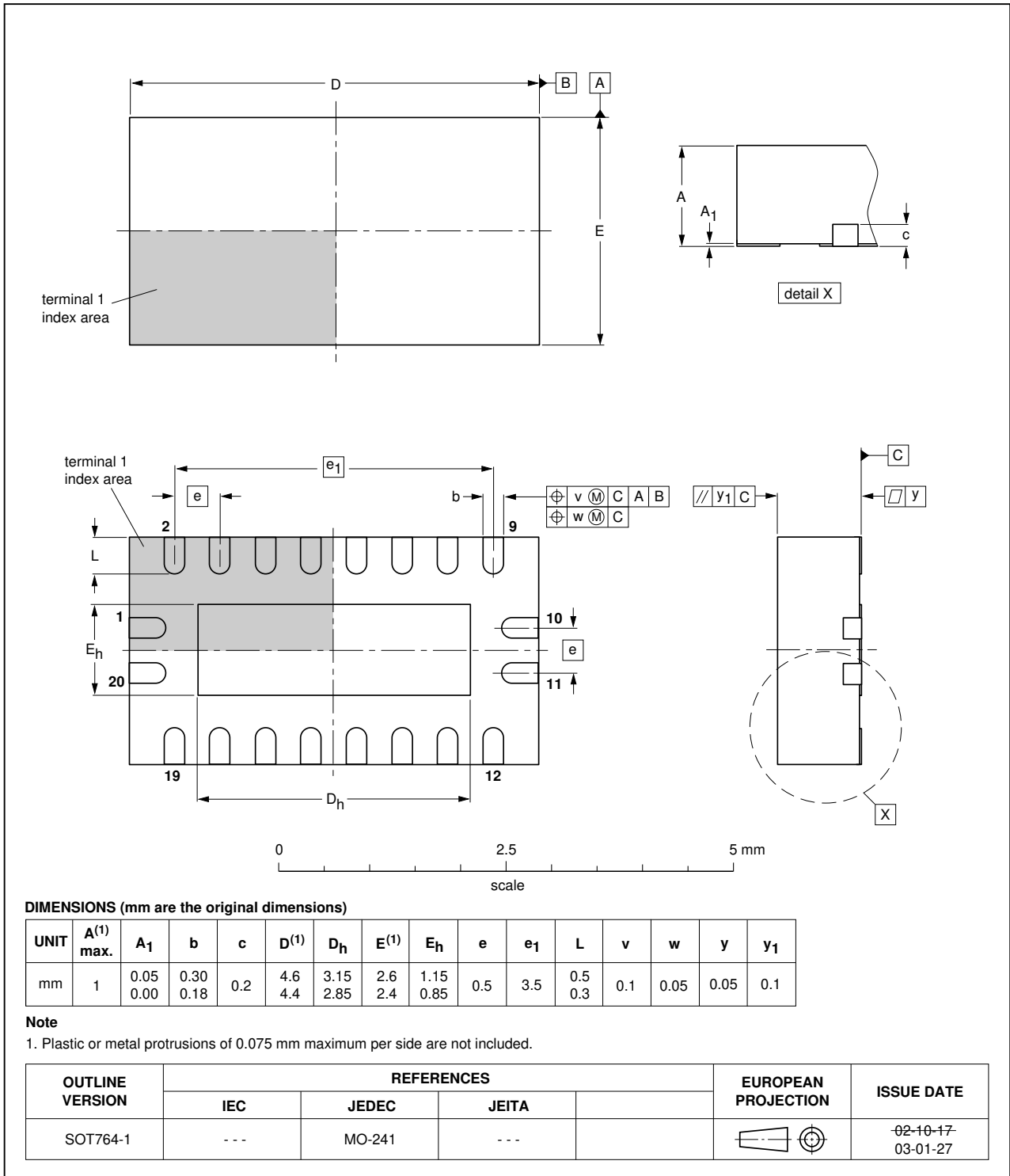


Fig 12. Package outline SOT764-1 (DHVQFN20)

14. Abbreviations

Table 10. Abbreviations

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

15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CBT3245A v.3	20120105	Product data sheet	-	CBT3245A v.2
Modifications:	<ul style="list-style-type: none"> The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. Marking code removed from order information section. Description of C_I and C_{I/O} corrected (errata). 			
CBT3245A v.2	20020627	Product data sheet	-	CBT3245A v.1
CBT3245A v.1	20020218	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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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18. Contents

1	General description	1
2	Features and benefits	1
3	Ordering information	1
4	Functional diagram	2
5	Pinning information	2
5.1	Pinning	2
5.2	Pin description	3
6	Functional description	3
7	Limiting values	4
8	Recommended operating conditions	4
9	Static characteristics	4
10	Dynamic characteristics	5
11	Waveforms	6
12	Test information	7
13	Package outline	8
14	Abbreviations	13
15	Revision history	13
16	Legal information	14
16.1	Data sheet status	14
16.2	Definitions	14
16.3	Disclaimers	14
16.4	Trademarks	15
17	Contact information	15
18	Contents	16

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Date of release: 5 January 2012

Document identifier: CBT3245A