

# 74LVC2G53

## 2-channel analog multiplexer/demultiplexer

Rev. 6 — 27 September 2010

Product data sheet

### 1. General description

---

The 74LVC2G53 is a low-power, low-voltage, high-speed, Si-gate CMOS device.

The 74LVC2G53 provides one analog multiplexer/demultiplexer with a digital select input (S), two independent inputs/outputs (Y0 and Y1), a common input/output (Z) and an active LOW enable input ( $\bar{E}$ ). When pin  $\bar{E}$  is HIGH, the switch is turned off.

Schmitt-trigger action at the select and enable inputs makes the circuit tolerant of slower input rise and fall times across the entire  $V_{CC}$  range from 1.65 V to 5.5 V.

### 2. Features and benefits

---

- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON resistance:
  - ◆ 7.5  $\Omega$  (typical) at  $V_{CC} = 2.7$  V
  - ◆ 6.5  $\Omega$  (typical) at  $V_{CC} = 3.3$  V
  - ◆ 6  $\Omega$  (typical) at  $V_{CC} = 5$  V
- Switch current capability of 32 mA
- High noise immunity
- CMOS low-power consumption
- TTL interface compatibility at 3.3 V
- Latch-up performance meets requirements of JESD 78 Class I
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 V
- Control inputs accepts voltages up to 5 V
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and from  $-40$  °C to  $+125$  °C



### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74LVC2G53DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74LVC2G53DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74LVC2G53GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1
74LVC2G53GF	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm	SOT1089
74LVC2G53GD	-40 °C to +125 °C	XSON8U	plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 × 2 × 0.5 mm	SOT996-2
74LVC2G53GM	-40 °C to +125 °C	XQFN8U	plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 × 1.6 × 0.5 mm	SOT902-1
74LVC2G53GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74LVC2G53GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203

### 4. Marking

Table 2. Marking codes

Type number	Marking code <sup>[1]</sup>
74LVC2G53DC	V53
74LVC2G53DP	V53
74LVC2G53GT	V53
74LVC2G53GF	V3
74LVC2G53GD	V53
74LVC2G53GM	V53
74LVC2G53GN	V3
74LVC2G53GS	V3

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

### 5. Functional diagram

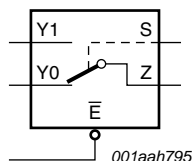


Fig 1. Logic symbol

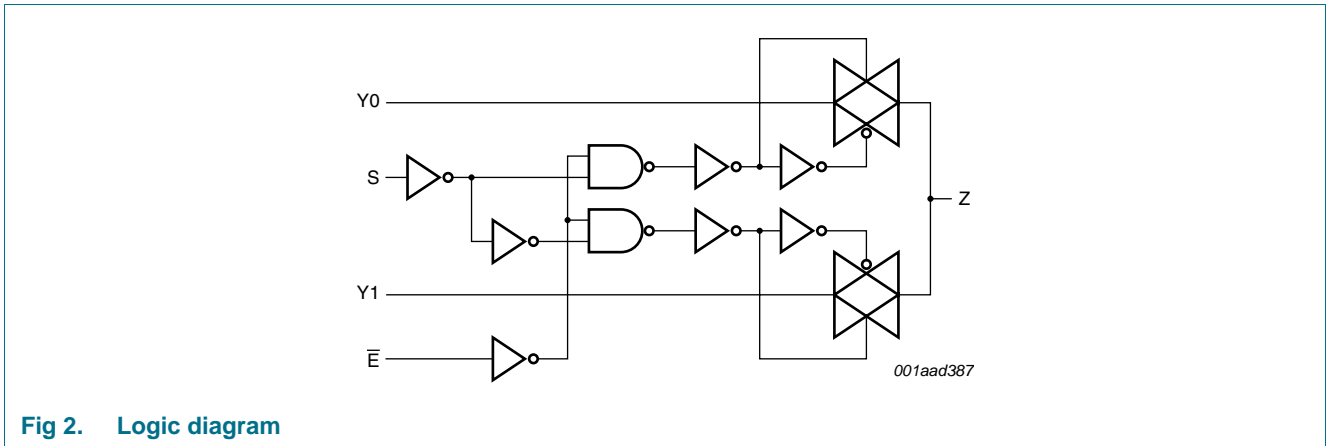


Fig 2. Logic diagram

## 6. Pinning information

### 6.1 Pinning

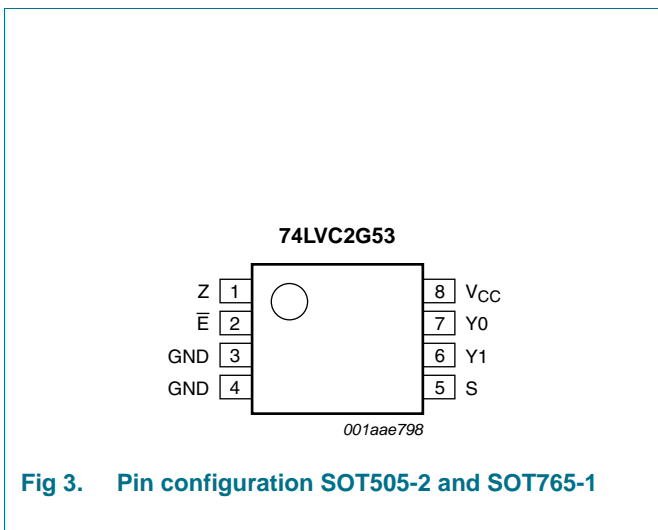


Fig 3. Pin configuration SOT505-2 and SOT765-1

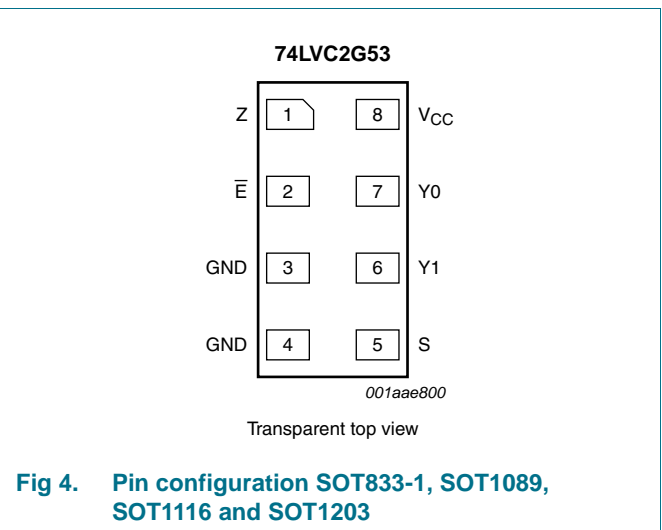


Fig 4. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203

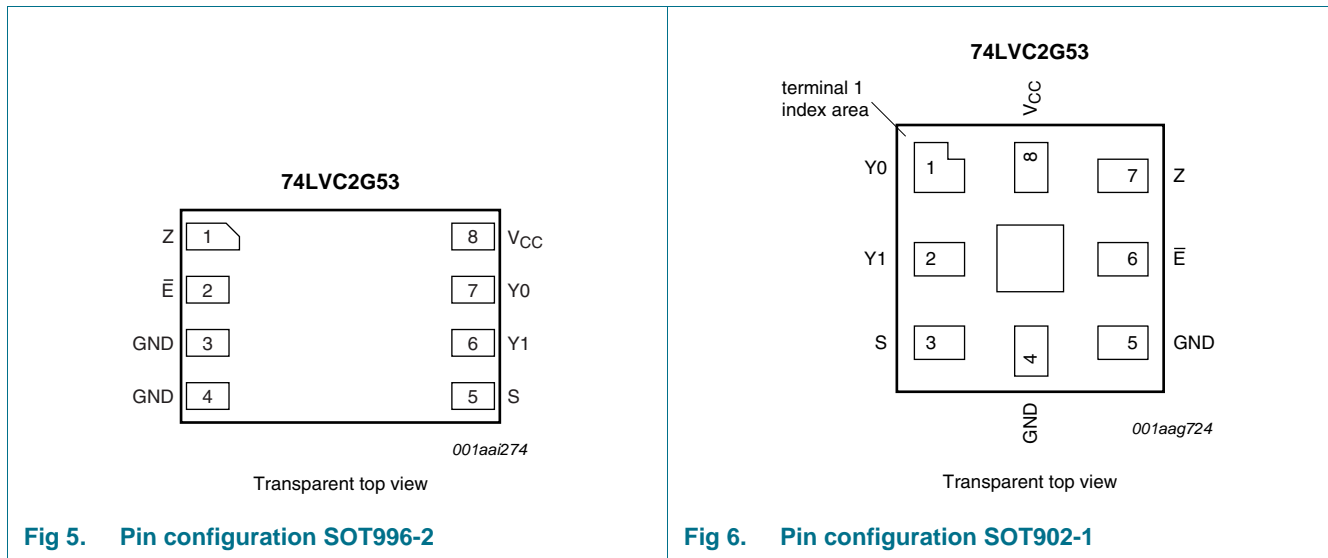


Fig 5. Pin configuration SOT996-2

Fig 6. Pin configuration SOT902-1

### 6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT505-2, SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203	SOT902-1	
Z	1	7	common output or input
$\bar{E}$	2	6	enable input (active LOW)
GND	3	5	ground (0 V)
GND	4	4	ground (0 V)
S	5	3	select input
Y1	6	2	independent input or output
Y0	7	1	independent input or output
V <sub>CC</sub>	8	8	supply voltage

## 7. Functional description

Table 4. Function table<sup>[1]</sup>

Input		Channel on
S	$\bar{E}$	
L	L	Y0 to Z or Z to Y0
H	L	Y1 to Z or Z to Y1
X	H	Z (switch off)

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

## 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	+6.5	V
$V_I$	input voltage		[1] -0.5	+6.5	V
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-50	-	mA
$I_{SK}$	switch clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-	$\pm 50$	mA
$V_{SW}$	switch voltage	enable and disable mode	[2] -0.5	$V_{CC} + 0.5$	V
$I_{SW}$	switch current	$V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$	-	$\pm 50$	mA
$I_{CC}$	supply current		-	100	mA
$I_{GND}$	ground current		-100	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$	[3] -	250	mW

[1] The minimum input voltage rating may be exceeded if the input current rating is observed.

[2] The minimum and maximum switch voltage ratings may be exceeded if the switch clamping current rating is observed.

[3] For TSSOP8 packages: above 55 °C the value of  $P_{tot}$  derates linearly with 2.5 mW/K.

For VSSOP8 packages: above 110 °C the value of  $P_{tot}$  derates linearly with 8.0 mW/K.

For XSON8, XSON8U and XQFN8U packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6. Operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		1.65	5.5	V
$V_I$	input voltage		0	5.5	V
$V_{SW}$	switch voltage	enable and disable mode	[1] 0	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 1.65\text{ V}$ to $2.7\text{ V}$	[2] -	20	ns/V
		$V_{CC} = 2.7\text{ V}$ to $5.5\text{ V}$	[2] -	10	ns/V

[1] To avoid sinking GND current from terminal Z when switch current flows in terminal Yn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no GND current will flow from terminal Yn. In this case, there is no limit for the voltage drop across the switch.

[2] Applies to control signal levels.

## 10. Static characteristics

**Table 7. Static characteristics**

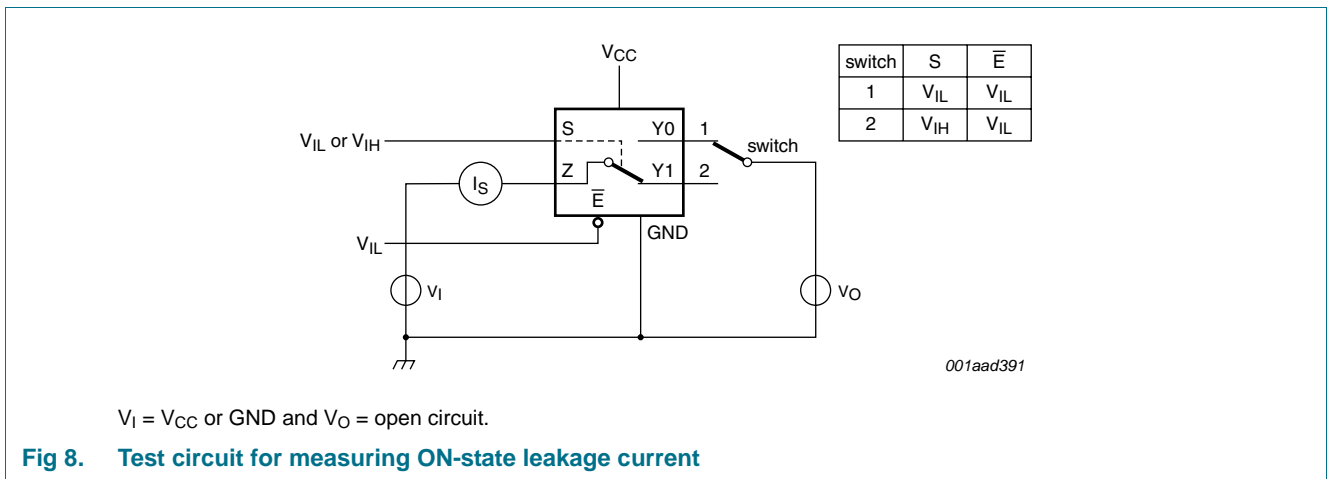
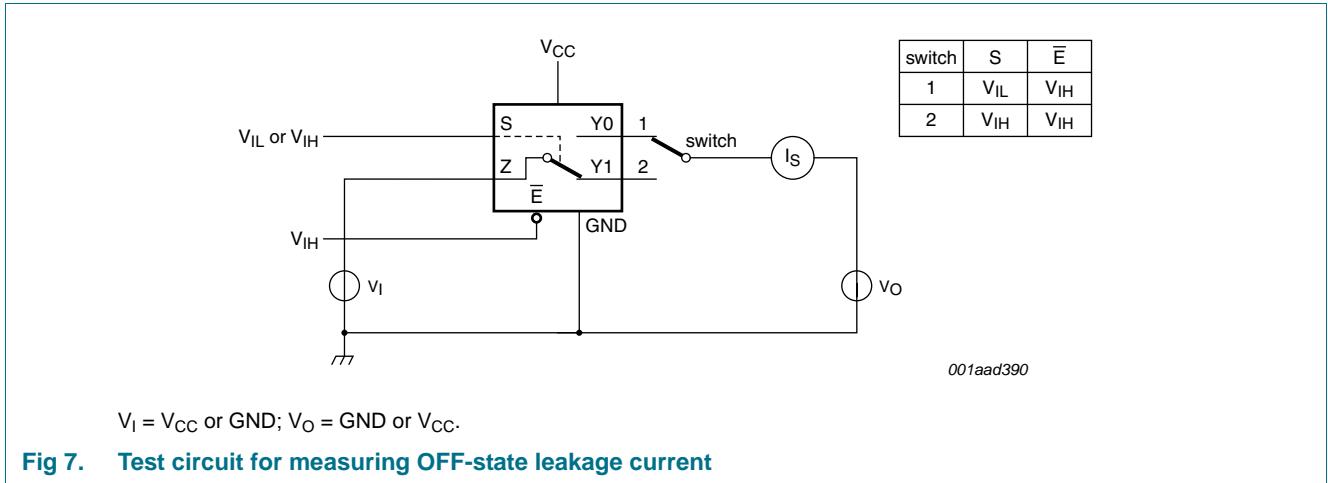
At recommended operating conditions; voltages are referenced to GND (ground 0 V).

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			T <sub>amb</sub> = -40 °C to +125 °C		Unit	
			Min	Typ <sup>[1]</sup>	Max	Min	Max		
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>	-	-	0.65 × V <sub>CC</sub>	-	V	
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V	
		V <sub>CC</sub> = 3 V to 3.6 V	2.0	-	-	2.0	-	V	
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>	-	-	0.7 × V <sub>CC</sub>	-	V	
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	-	0.35 × V <sub>CC</sub>	V	
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V	
		V <sub>CC</sub> = 3 V to 3.6 V	-	-	0.8	-	0.8	V	
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3 × V <sub>CC</sub>	-	0.3 × V <sub>CC</sub>	V	
I <sub>I</sub>	input leakage current	pin S and pin $\bar{E}$ ; V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	<a href="#">[2]</a>	-	±0.1	±2	-	±10	μA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 7</a>	<a href="#">[2]</a>	-	±0.1	±5	-	±20	μA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 8</a>	<a href="#">[2]</a>	-	±0.1	±5	-	±20	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = 5.5 V or GND; V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 1.65 V to 5.5 V	<a href="#">[2]</a>	-	0.1	10	-	40	μA
ΔI <sub>CC</sub>	additional supply current	pin S and pin $\bar{E}$ ; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 5.5 V	<a href="#">[2]</a>	-	5	500	-	5000	μA
C <sub>I</sub>	input capacitance		-	2.5	-	-	-	-	pF
C <sub>S(OFF)</sub>	OFF-state capacitance		-	6.0	-	-	-	-	pF
C <sub>S(ON)</sub>	ON-state capacitance		-	18	-	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C.

[2] These typical values are measured at V<sub>CC</sub> = 3.3 V.

10.1 Test circuits



10.2 ON resistance

**Table 8. ON resistance**

At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 10](#) to [Figure 15](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	$V_I = GND$ to $V_{CC}$ ; see <a href="#">Figure 9</a> $I_{SW} = 4$ mA; $V_{CC} = 1.65$ V to 1.95 V	-	34.0	130	-	195	$\Omega$
			-	12.0	30	-	45	$\Omega$
			-	10.4	25	-	38	$\Omega$
			-	7.8	20	-	30	$\Omega$
			-	6.2	15	-	23	$\Omega$

**Table 8. ON resistance ...continued**

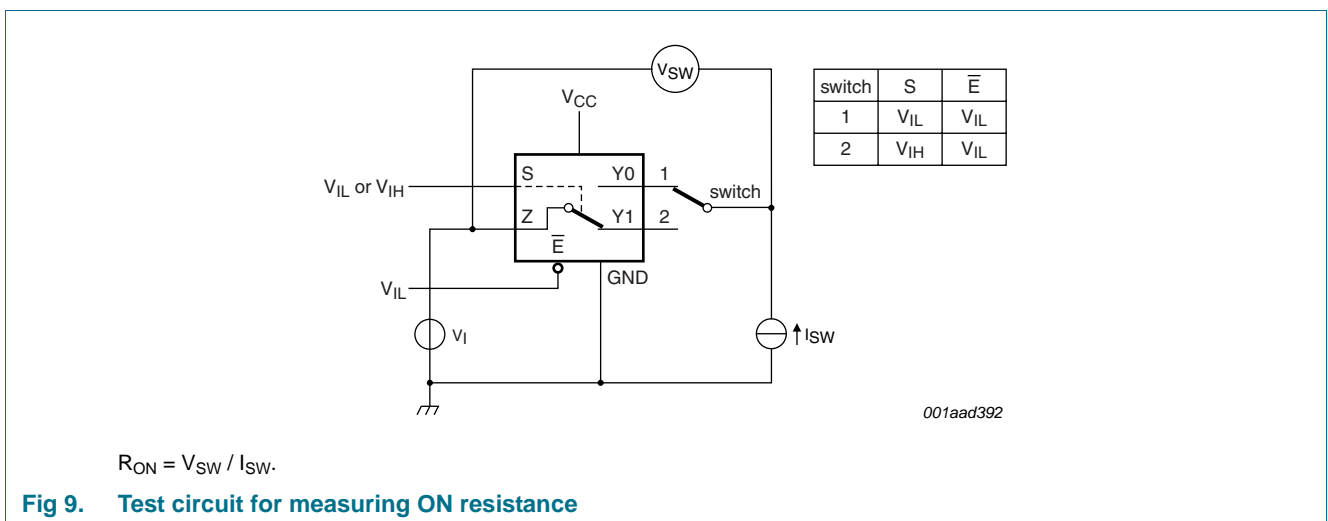
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 10](#) to [Figure 15](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
R <sub>ON(rail)</sub>	ON resistance (rail)	V <sub>I</sub> = GND; see <a href="#">Figure 9</a>						
		I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V	-	8.2	18	-	27	Ω
		I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V	-	7.1	16	-	24	Ω
		I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	6.9	14	-	21	Ω
		I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V	-	6.5	12	-	18	Ω
		I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V	-	5.8	10	-	15	Ω
		V <sub>I</sub> = V <sub>CC</sub> ; see <a href="#">Figure 9</a>						
		I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V	-	10.4	30	-	45	Ω
		I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V	-	7.6	20	-	30	Ω
		I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	7.0	18	-	27	Ω
I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V	-	6.1	15	-	23	Ω		
I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V	-	4.9	10	-	15	Ω		
R <sub>ON(flat)</sub>	ON resistance (flatness)	V <sub>I</sub> = GND to V <sub>CC</sub> <a href="#">[2]</a>						
		I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V	-	26.0	-	-	-	Ω
		I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V	-	5.0	-	-	-	Ω
		I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	3.5	-	-	-	Ω
		I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V	-	2.0	-	-	-	Ω
		I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.5	-	-	-	Ω

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.

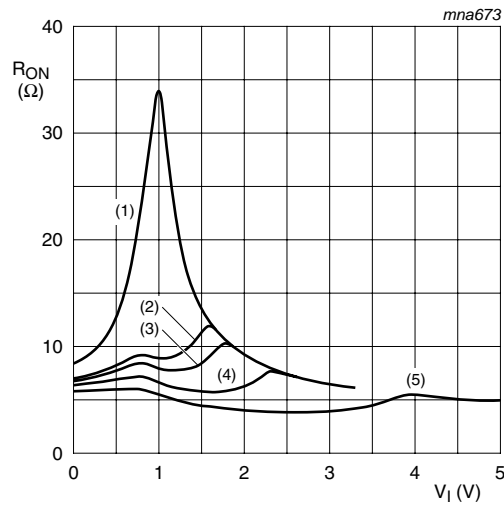
[2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V<sub>CC</sub> and temperature.

### 10.3 ON resistance test circuit and graphs



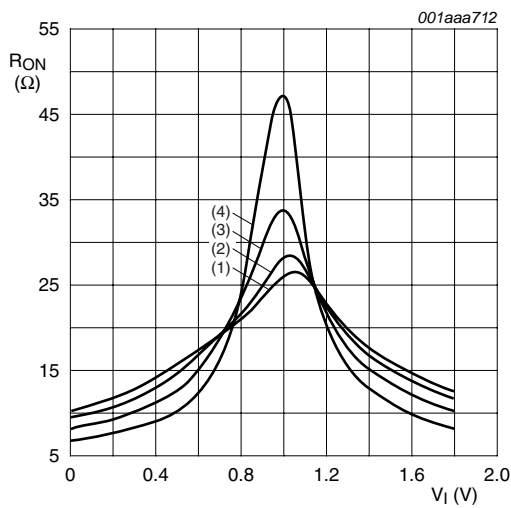
**Fig 9. Test circuit for measuring ON resistance**





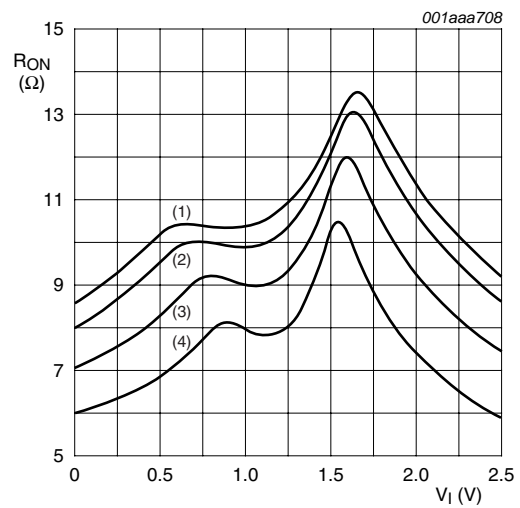
- (1)  $V_{CC} = 1.8\text{ V}$ .
- (2)  $V_{CC} = 2.5\text{ V}$ .
- (3)  $V_{CC} = 2.7\text{ V}$ .
- (4)  $V_{CC} = 3.3\text{ V}$ .
- (5)  $V_{CC} = 5.0\text{ V}$ .

Fig 10. Typical ON resistance as a function of input voltage;  $T_{amb} = 25\text{ }^{\circ}\text{C}$



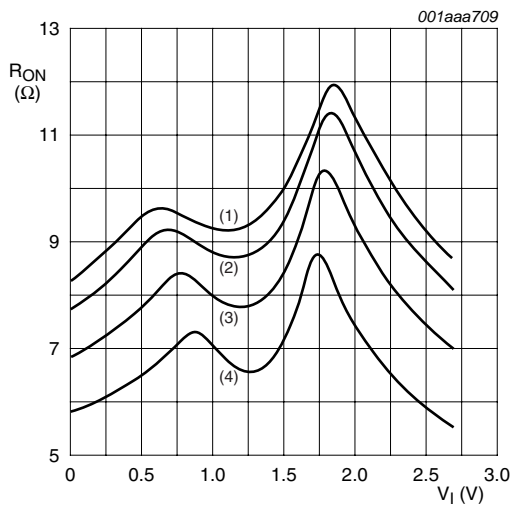
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

Fig 11. ON resistance as a function of input voltage;  $V_{CC} = 1.8\text{ V}$



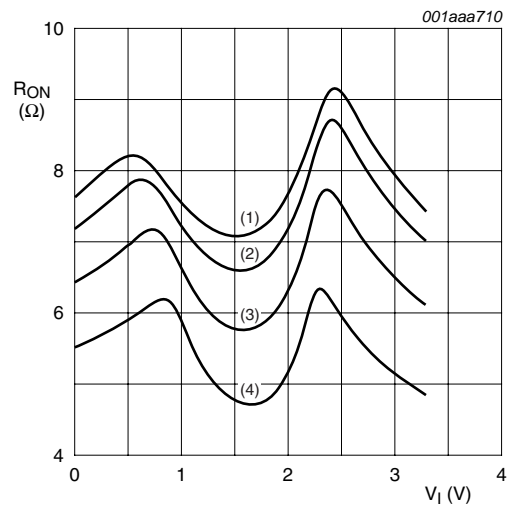
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

Fig 12. ON resistance as a function of input voltage;  $V_{CC} = 2.5\text{ V}$



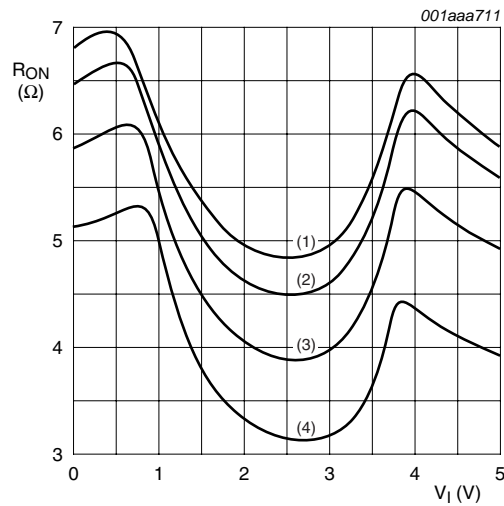
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**Fig 13. ON resistance as a function of input voltage;  $V_{CC} = 2.7\text{ V}$**



- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**Fig 14. ON resistance as a function of input voltage;  $V_{CC} = 3.3\text{ V}$**



- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**Fig 15. ON resistance as a function of input voltage;  $V_{CC} = 5.0\text{ V}$**

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 18](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
t <sub>pd</sub>	propagation delay	Z to Y <sub>n</sub> or Y <sub>n</sub> to Z; see <a href="#">Figure 16</a> <sup>[2][3]</sup>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	2	-	2.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	1.2	-	1.5	ns
		V <sub>CC</sub> = 2.7 V	-	-	1.0	-	1.25	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.8	-	1.0	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.6	-	0.8	ns
t <sub>en</sub>	enable time	S to Z or Y <sub>n</sub> ; see <a href="#">Figure 17</a> <sup>[4]</sup>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.6	6.7	10.3	2.6	12.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.9	4.1	6.4	1.9	8.0	ns
		V <sub>CC</sub> = 2.7 V	1.9	4.0	5.5	1.8	7.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.8	3.4	5.0	1.8	6.3	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.3	2.6	3.8	1.3	4.8	ns
		$\bar{E}$ to Z or Y <sub>n</sub> ; see <a href="#">Figure 17</a> <sup>[4]</sup>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.9	4.0	7.3	1.9	9.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	2.5	4.4	1.4	5.5	ns
		V <sub>CC</sub> = 2.7 V	1.1	2.6	3.9	1.1	4.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.2	2.2	3.8	1.2	4.8	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	1.7	2.6	1.0	3.3	ns
t <sub>dis</sub>	disable time	S to Z or Y <sub>n</sub> ; see <a href="#">Figure 17</a> <sup>[5]</sup>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	6.8	10.0	2.1	12.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	3.7	6.1	1.4	7.7	ns
		V <sub>CC</sub> = 2.7 V	1.4	4.9	6.2	1.4	7.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	4.0	5.4	1.1	6.8	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	2.9	3.8	1.0	4.8	ns
		$\bar{E}$ to Z or Y <sub>n</sub> ; see <a href="#">Figure 17</a> <sup>[5]</sup>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	5.6	8.6	2.3	11.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	3.2	4.8	1.2	6.0	ns
		V <sub>CC</sub> = 2.7 V	1.4	4.0	5.2	1.4	6.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.7	5.0	2.0	6.3	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.3	2.9	3.8	1.3	4.8	ns

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.

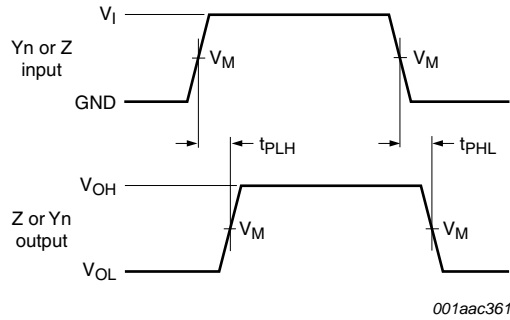
[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

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

[4] t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.

[5] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

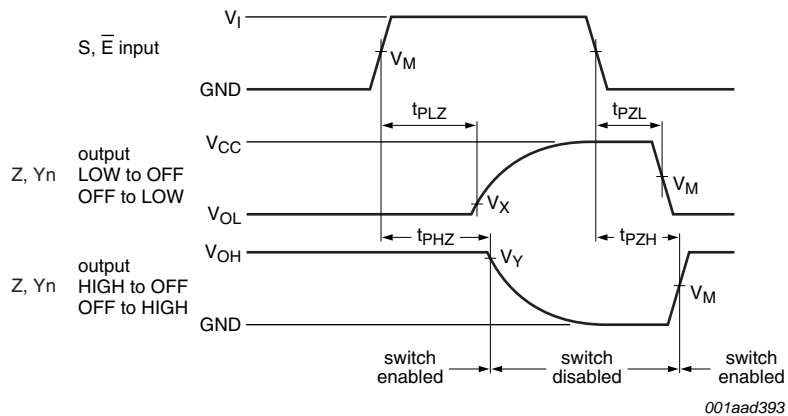
11.1 Waveforms and test circuits



Measurement points are given in [Table 10](#).

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

**Fig 16. Input (Yn or Z) to output (Z or Yn) propagation delays**



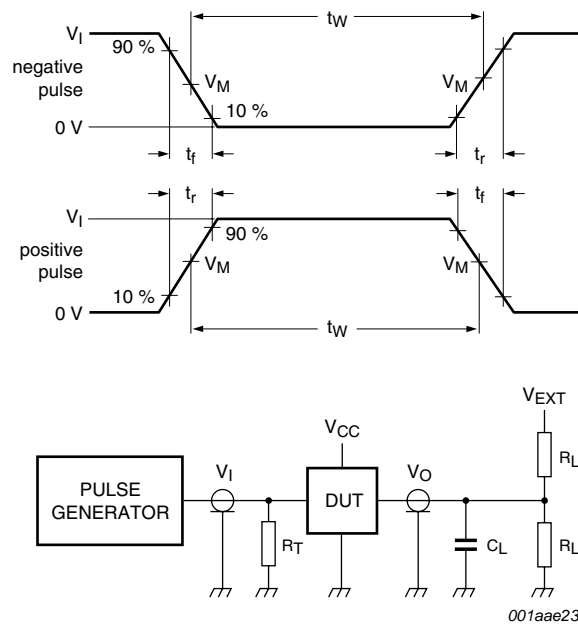
Measurement points are given in [Table 10](#).

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

**Fig 17. Enable and disable times**

**Table 10. Measurement points**

Supply voltage	Input	Output		
$V_{CC}$	$V_M$	$V_M$	$V_X$	$V_Y$
1.65 V to 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.15 V$	$V_{OH} - 0.15 V$
2.7 V to 5.5 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$



Test data is given in [Table 11](#).

Definitions for test circuit:

$R_L$  = Load resistor.

$C_L$  = Load capacitance including jig and probe capacitance.

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

$V_{EXT}$  = Test voltage for switching times.

**Fig 18. Test circuit for measuring switching times**

**Table 11. Test data**

Supply voltage	Input		Load		$V_{EXT}$		
$V_{CC}$	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
1.65 V to 1.95 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	1 k $\Omega$	open	GND	$2V_{CC}$
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open	GND	$2V_{CC}$
2.7 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2V_{CC}$
3 V to 3.6 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2V_{CC}$
4.5 V to 5.5 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2V_{CC}$

11.2 Additional dynamic characteristics

Table 12. Additional dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	$f_i = 600\text{ Hz to }20\text{ kHz}; R_L = 600\text{ }\Omega;$ $C_L = 50\text{ pF}; V_I = 0.5\text{ V (p-p); see Figure 19}$				
		$V_{CC} = 1.65\text{ V}$	-	0.260	-	%
		$V_{CC} = 2.3\text{ V}$	-	0.078	-	%
		$V_{CC} = 3.0\text{ V}$	-	0.078	-	%
$f_{(-3\text{dB})}$	-3 dB frequency response	$R_L = 50\text{ }\Omega; C_L = 5\text{ pF; see Figure 20}$				
		$V_{CC} = 1.65\text{ V}$	-	200	-	MHz
		$V_{CC} = 2.3\text{ V}$	-	300	-	MHz
		$V_{CC} = 3.0\text{ V}$	-	300	-	MHz
$\alpha_{iso}$	isolation (OFF-state)	$R_L = 50\text{ }\Omega; C_L = 5\text{ pF}; f_i = 10\text{ MHz;}$ <u>see Figure 21</u>				
		$V_{CC} = 1.65\text{ V}$	-	-42	-	dB
		$V_{CC} = 2.3\text{ V}$	-	-42	-	dB
		$V_{CC} = 3.0\text{ V}$	-	-40	-	dB
$Q_{inj}$	charge injection	$C_L = 0.1\text{ nF}; V_{gen} = 0\text{ V}; R_{gen} = 0\text{ }\Omega;$ $f_i = 1\text{ MHz}; R_L = 1\text{ M}\Omega; \text{ see Figure 22}$				
		$V_{CC} = 1.8\text{ V}$	-	3.3	-	pC
		$V_{CC} = 2.5\text{ V}$	-	4.1	-	pC
		$V_{CC} = 3.3\text{ V}$	-	5.0	-	pC
		$V_{CC} = 4.5\text{ V}$	-	6.4	-	pC
		$V_{CC} = 5.5\text{ V}$	-	7.5	-	pC

11.3 Test circuits

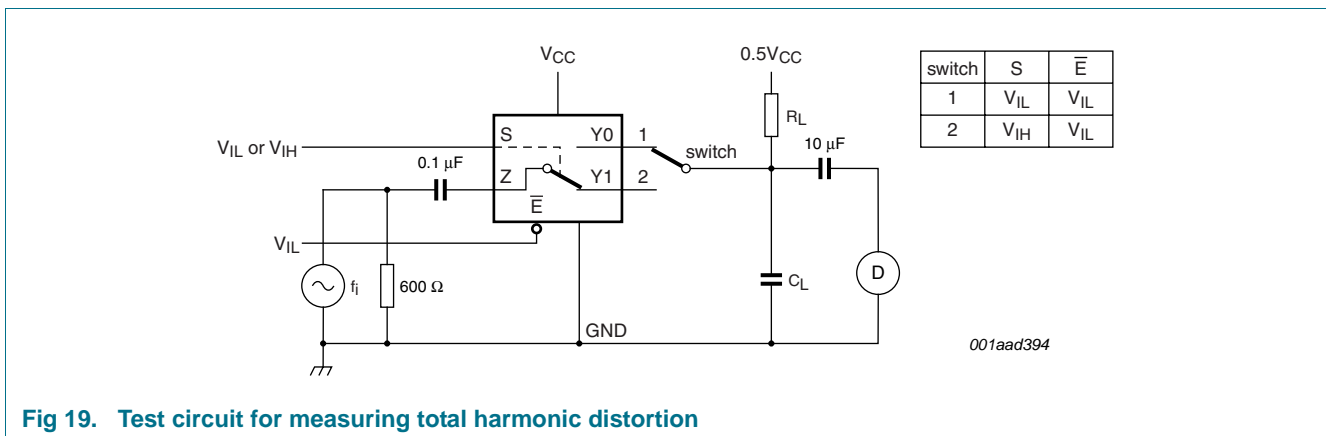
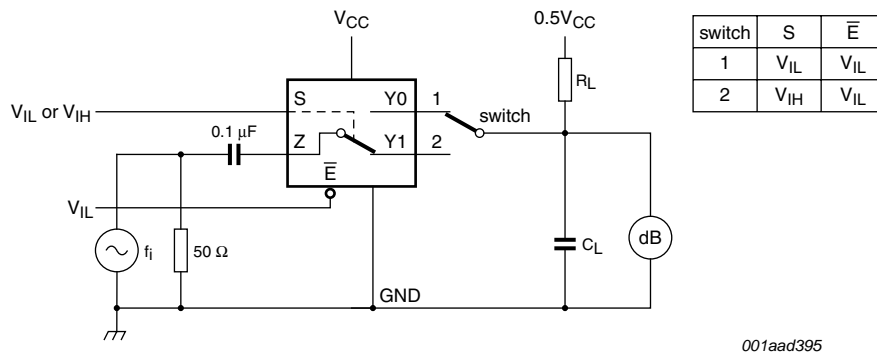
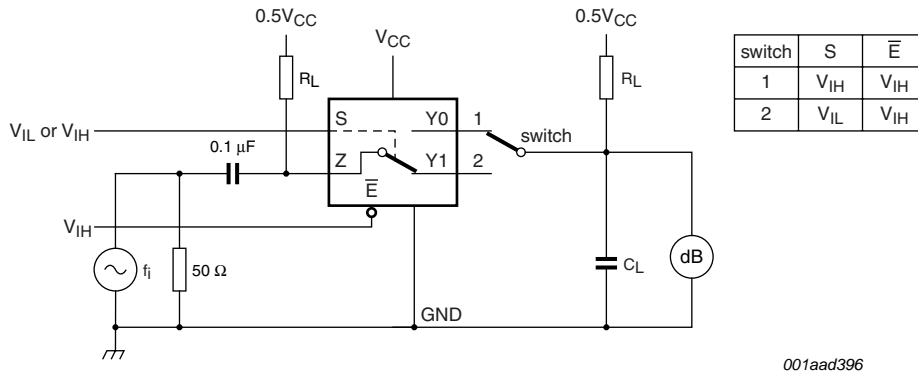


Fig 19. Test circuit for measuring total harmonic distortion



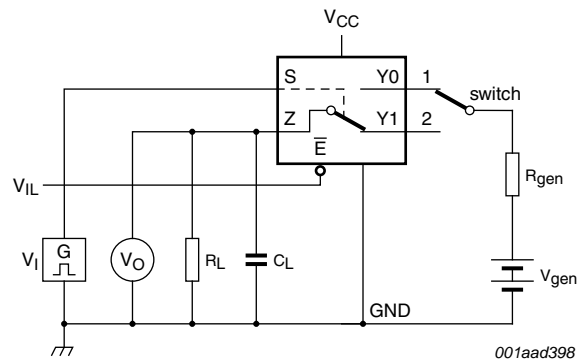
Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads  $-3\ \text{dB}$ .

**Fig 20. Test circuit for measuring the frequency response when switch is in ON-state**

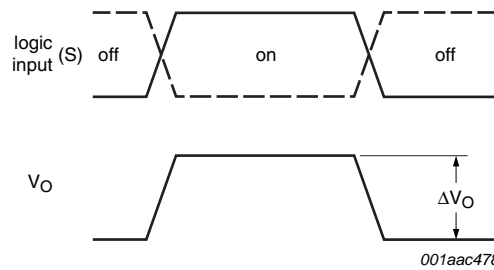


Adjust  $f_i$  voltage to obtain 0 dBm level at input.

**Fig 21. Test circuit for measuring isolation (OFF-state)**



a. Test circuit



b. Input and output pulse definitions

$$Q_{inj} = \Delta V_O \times C_L$$

$\Delta V_O$  = output voltage variation.

$R_{gen}$  = generator resistance.

$V_{gen}$  = generator voltage.

**Fig 22. Test circuit for measuring charge injection**



12. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

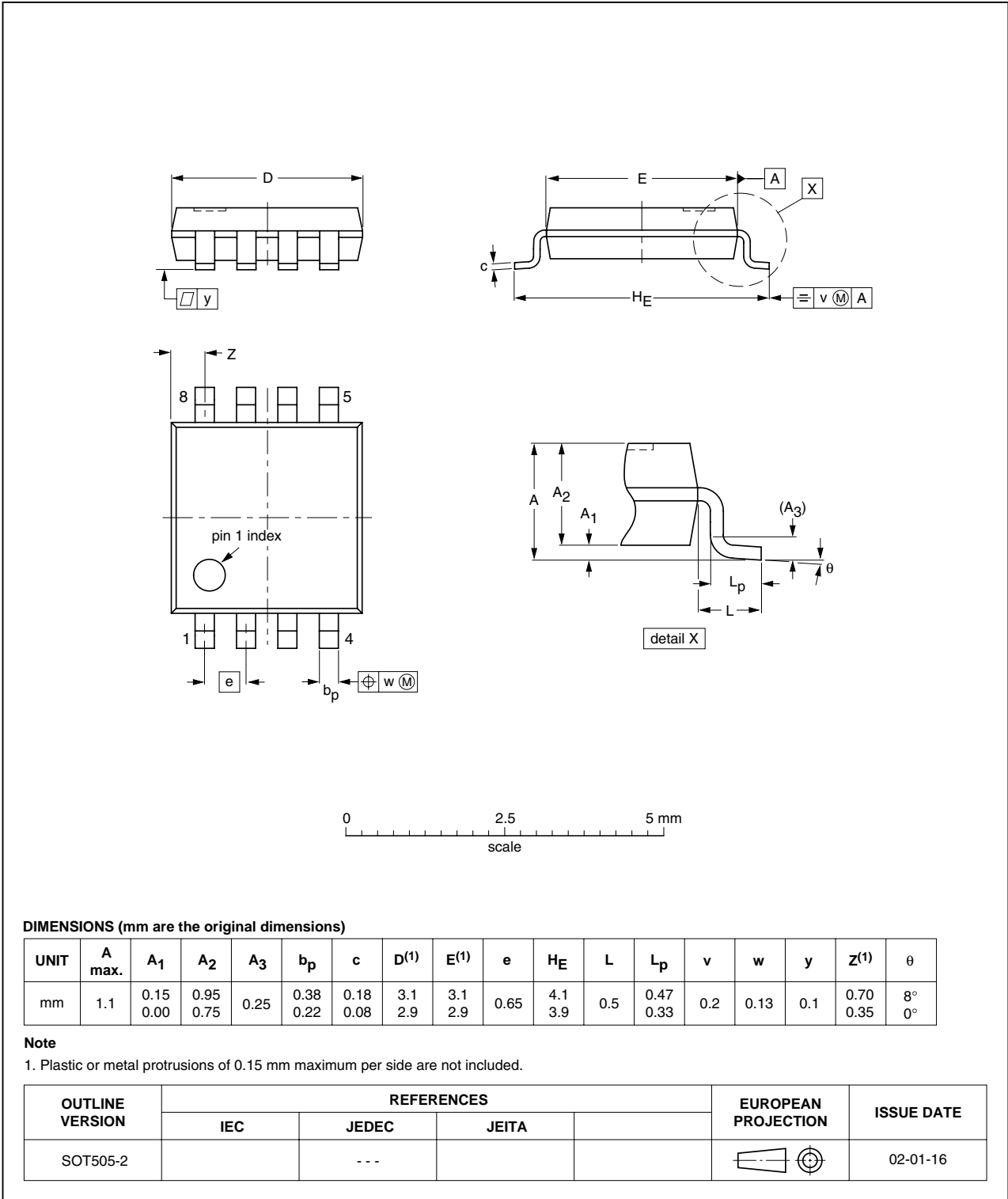


Fig 23. Package outline SOT505-2 (TSSOP8)

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1

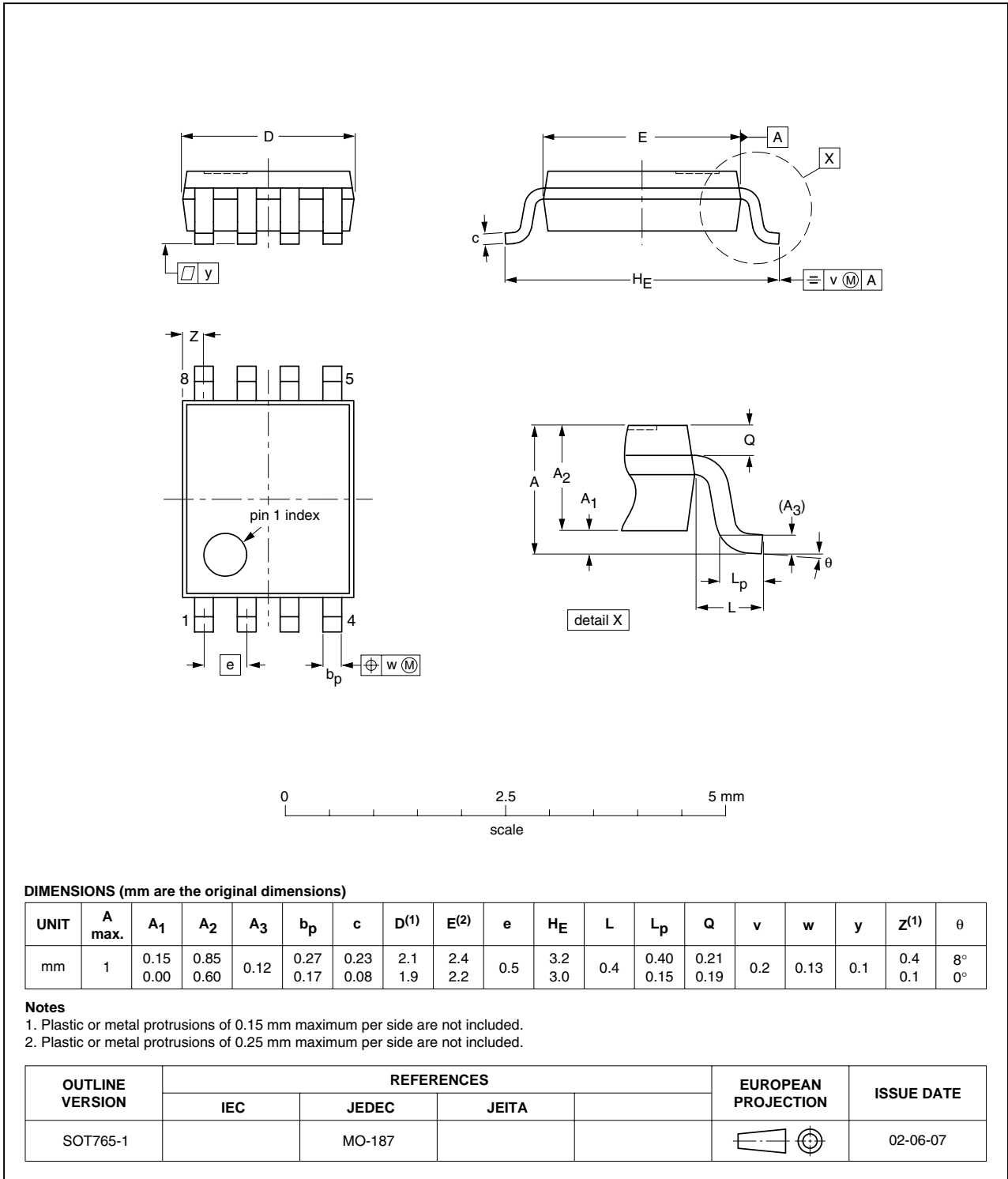


Fig 24. Package outline SOT765-1 (VSSOP8)

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm

SOT833-1

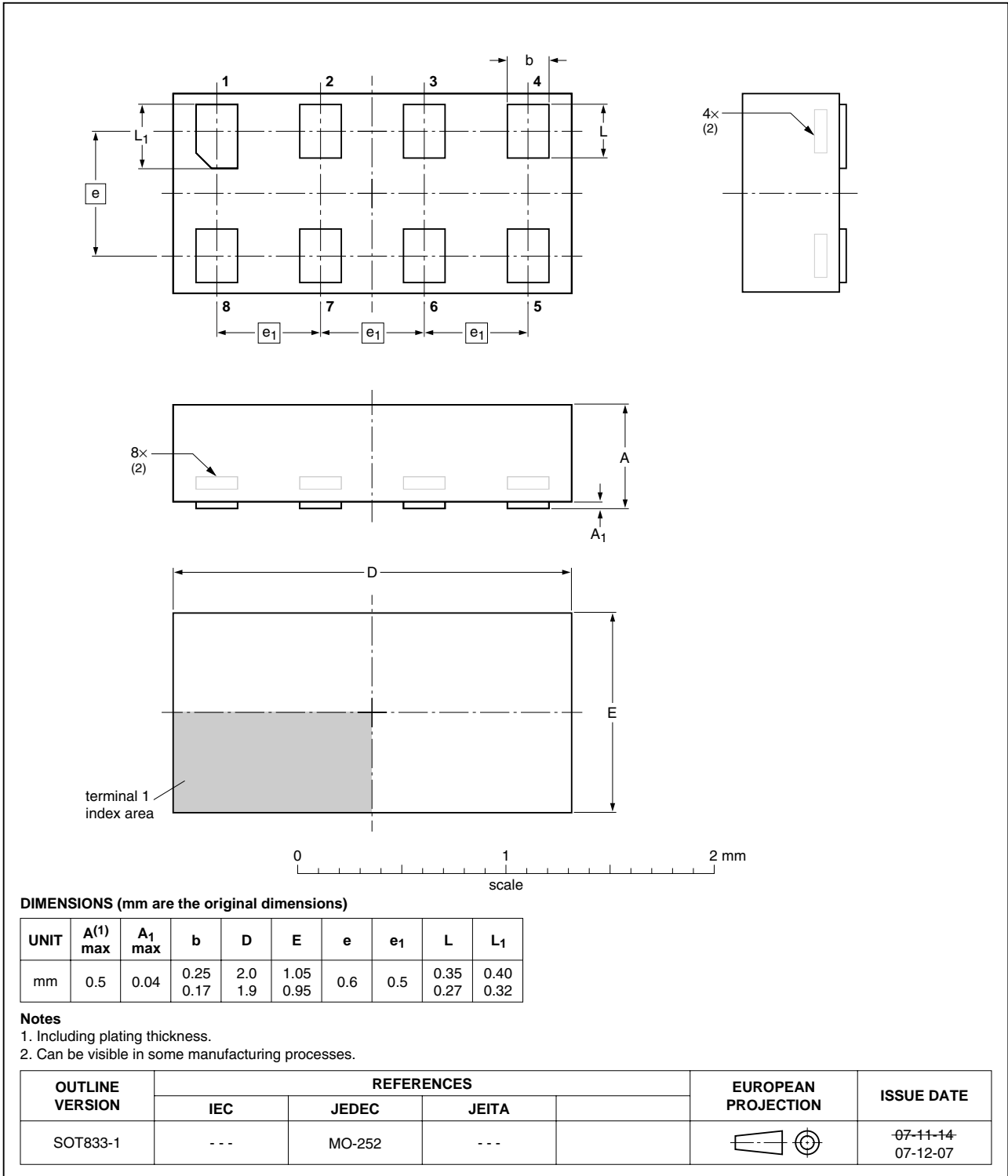


Fig 25. Package outline SOT833-1 (XSON8)

**XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.35 x 1 x 0.5 mm**

SOT1089

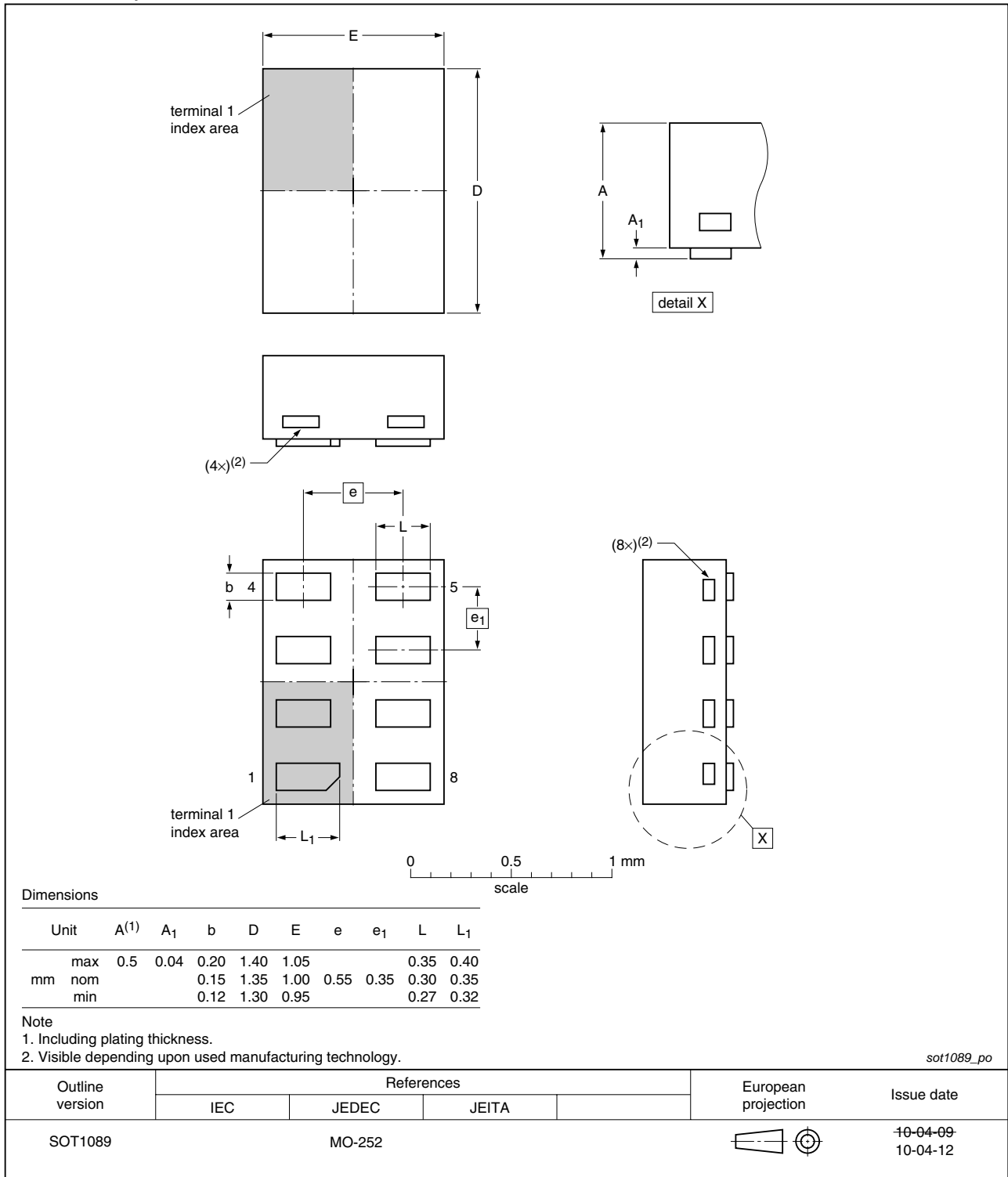


Fig 26. Package outline SOT1089 (XSON8)

XSON8U: plastic extremely thin small outline package; no leads;  
8 terminals; UTLP based; body 3 x 2 x 0.5 mm

SOT996-2

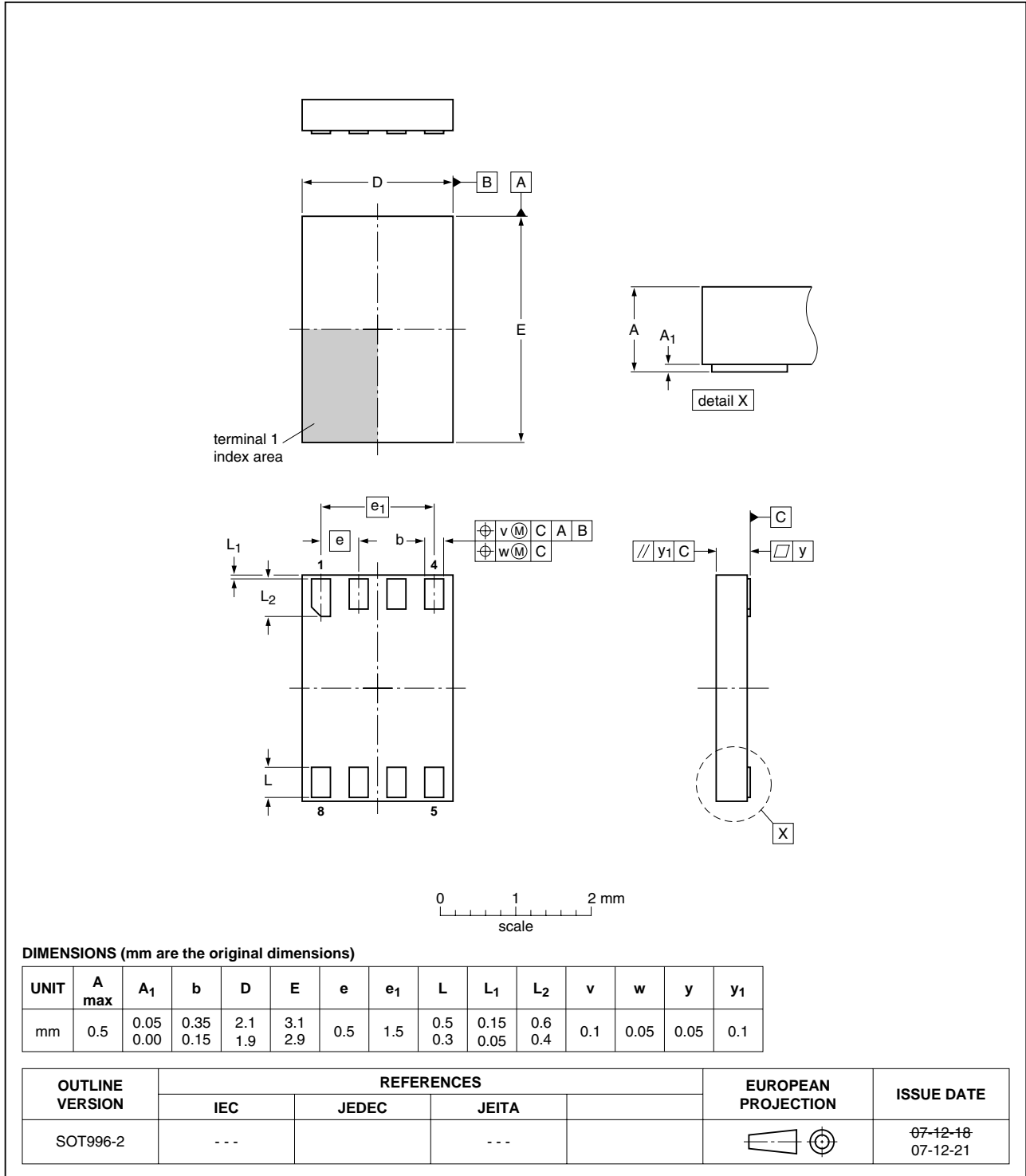


Fig 27. Package outline SOT996-2 (XSON8U)

XQFN8U: plastic extremely thin quad flat package; no leads;  
8 terminals; UTLP based; body 1.6 x 1.6 x 0.5 mm

SOT902-1

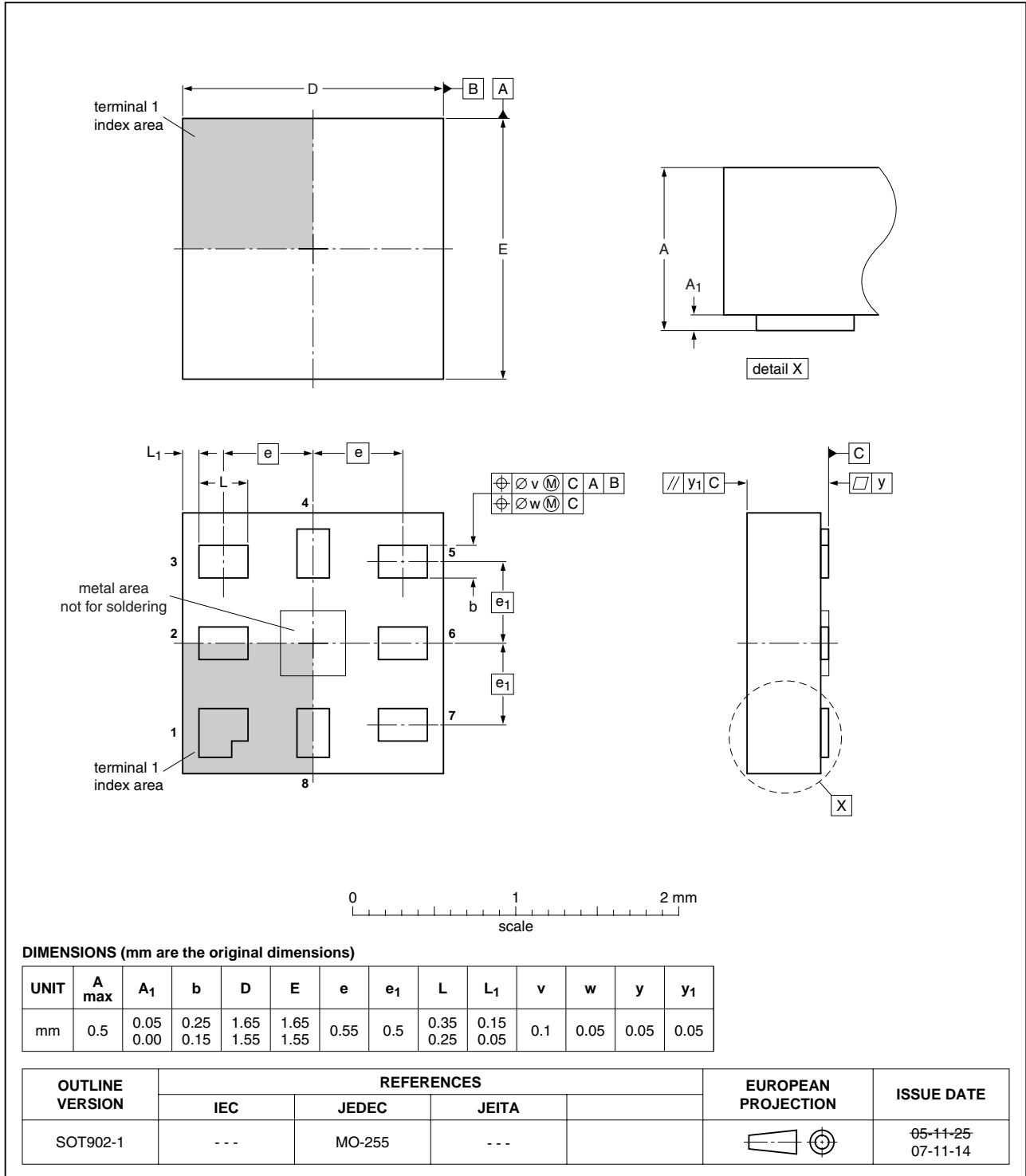


Fig 28. Package outline SOT902-1 (XQFN8U)

**XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.2 x 1.0 x 0.35 mm**

SOT1116

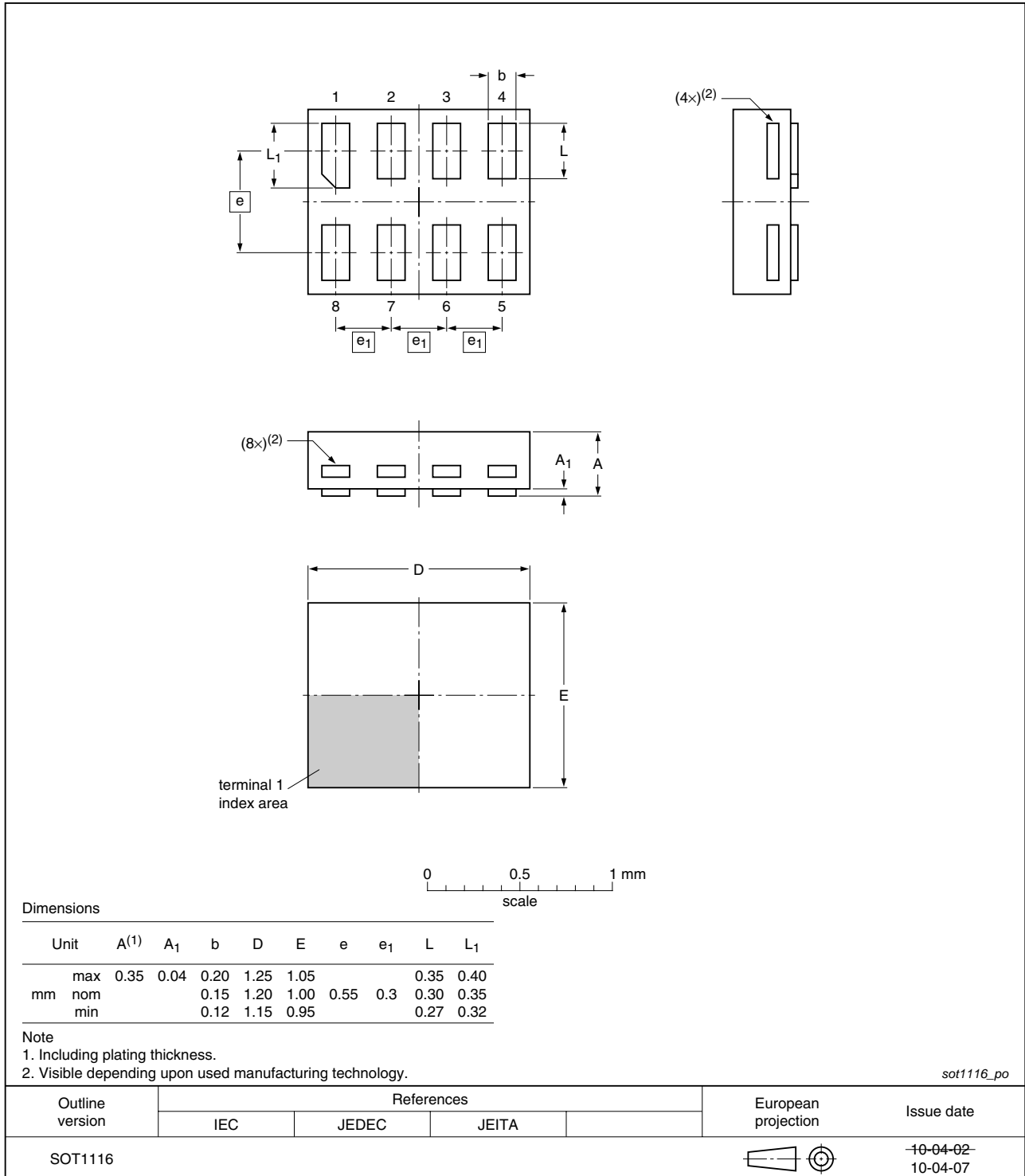


Fig 29. Package outline SOT1116 (XSON8)

**XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.35 x 1.0 x 0.35 mm**

SOT1203

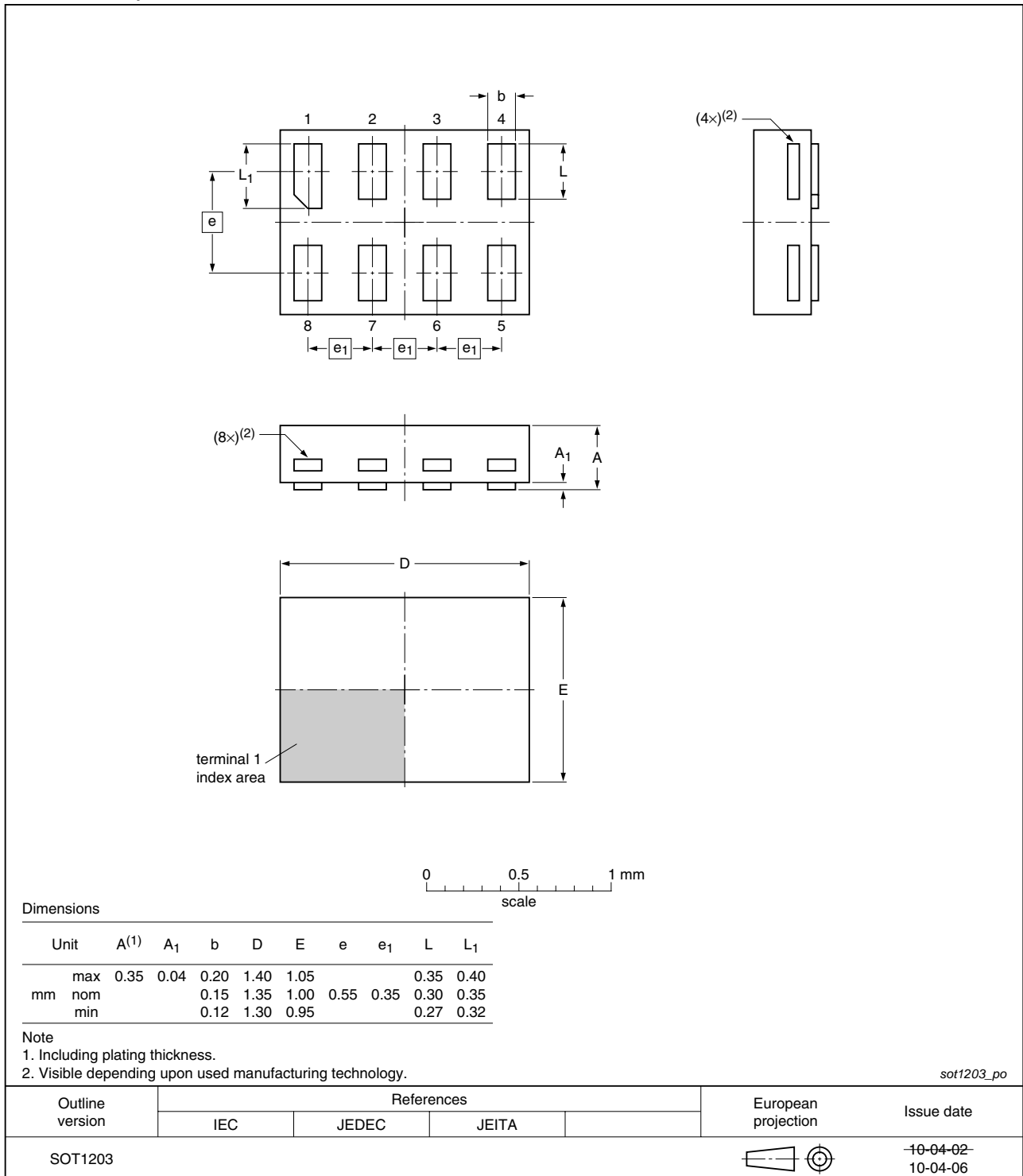


Fig 30. Package outline SOT1203 (XSON8)



## 13. Abbreviations

Table 13. Abbreviations

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

## 14. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC2G53 v.6	20100927	Product data sheet	-	74LVC2G53 v.5
Modifications:	<ul style="list-style-type: none"> <li>• Added type number 74LVC2G53GF (SOT1089/XSON8 package).</li> <li>• Added type number 74LVC2G53GN (SOT1116/XSON8 package).</li> <li>• Added type number 74LVC2G53GS (SOT1203/XSON8 package).</li> </ul>			
74LVC2G53 v.5	20080618	Product data sheet	-	74LVC2G53 v.4
74LVC2G53 v.4	20080228	Product data sheet	-	74LVC2G53 v.3
74LVC2G53 v.3	20070828	Product data sheet	-	74LVC2G53 v.2
74LVC2G53 v.2	20060331	Product data sheet	-	74LVC2G53 v.1
74LVC2G53 v.1	20060110	Product data sheet	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

### 15.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification** — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 15.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use in automotive applications** — This NXP Semiconductors product has been qualified for use in automotive applications. The product is not designed, authorized or warranted to be

suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

## 15.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 16. Contact information

---

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

## 17. Contents

<b>1</b>	<b>General description</b> .....	<b>1</b>
<b>2</b>	<b>Features and benefits</b> .....	<b>1</b>
<b>3</b>	<b>Ordering information</b> .....	<b>2</b>
<b>4</b>	<b>Marking</b> .....	<b>2</b>
<b>5</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>6</b>	<b>Pinning information</b> .....	<b>3</b>
6.1	Pinning .....	3
6.2	Pin description .....	4
<b>7</b>	<b>Functional description</b> .....	<b>4</b>
<b>8</b>	<b>Limiting values</b> .....	<b>5</b>
<b>9</b>	<b>Recommended operating conditions</b> .....	<b>5</b>
<b>10</b>	<b>Static characteristics</b> .....	<b>6</b>
10.1	Test circuits .....	7
10.2	ON resistance .....	7
10.3	ON resistance test circuit and graphs .....	8
<b>11</b>	<b>Dynamic characteristics</b> .....	<b>11</b>
11.1	Waveforms and test circuits .....	12
11.2	Additional dynamic characteristics .....	14
11.3	Test circuits .....	14
<b>12</b>	<b>Package outline</b> .....	<b>17</b>
<b>13</b>	<b>Abbreviations</b> .....	<b>25</b>
<b>14</b>	<b>Revision history</b> .....	<b>25</b>
<b>15</b>	<b>Legal information</b> .....	<b>26</b>
15.1	Data sheet status .....	26
15.2	Definitions .....	26
15.3	Disclaimers .....	26
15.4	Trademarks .....	27
<b>16</b>	<b>Contact information</b> .....	<b>27</b>
<b>17</b>	<b>Contents</b> .....	<b>28</b>

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP B.V. 2010.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

Date of release: 27 September 2010

Document identifier: 74LVC2G53