

# 74LVC2G53

## 2-channel analog multiplexer/demultiplexer

Rev. 05 — 18 June 2008

Product data sheet

### 1. General description

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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

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- 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-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101C 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
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

### 4. Marking

Table 2. Marking codes

Type number	Marking code
74LVC2G53DC	V53
74LVC2G53DP	V53
74LVC2G53GT	V53
74LVC2G53GD	V53
74LVC2G53GM	V53

### 5. Functional diagram

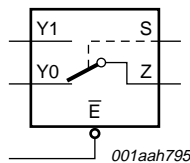


Fig 1. Logic symbol

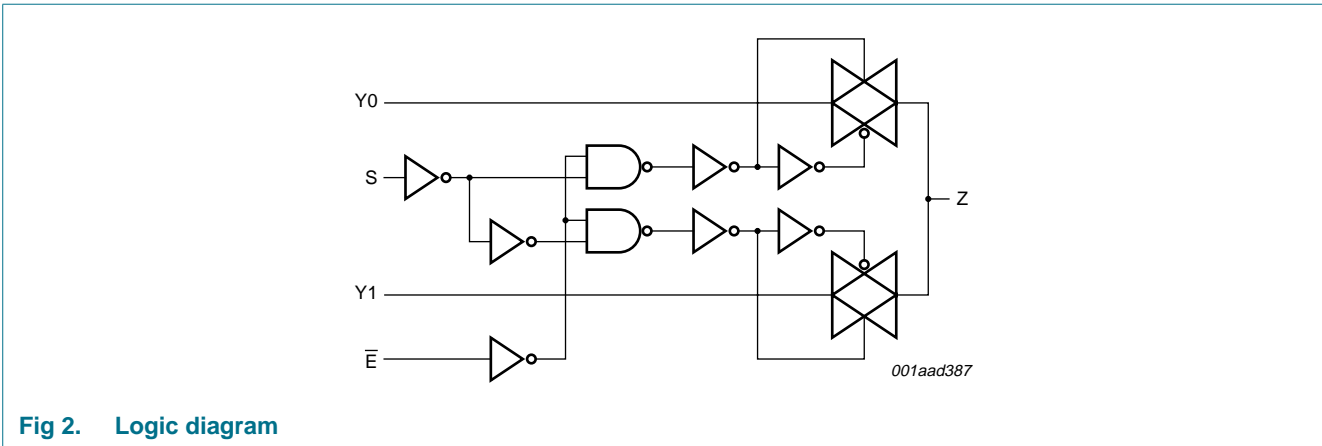


Fig 2. Logic diagram

## 6. Pinning information

### 6.1 Pinning

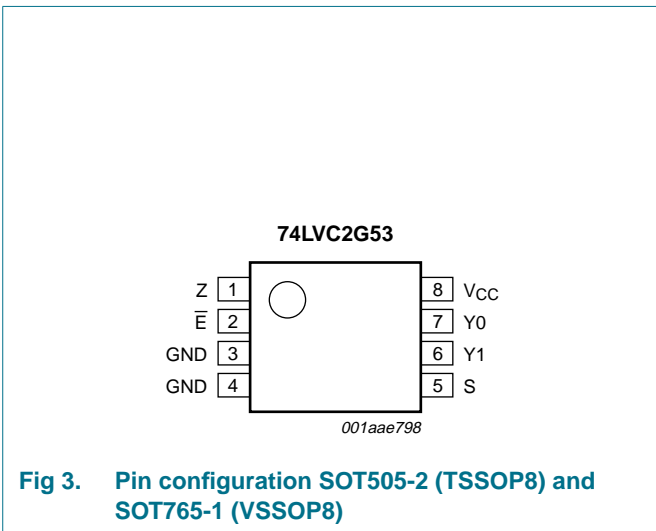


Fig 3. Pin configuration SOT505-2 (TSSOP8) and SOT765-1 (VSSOP8)

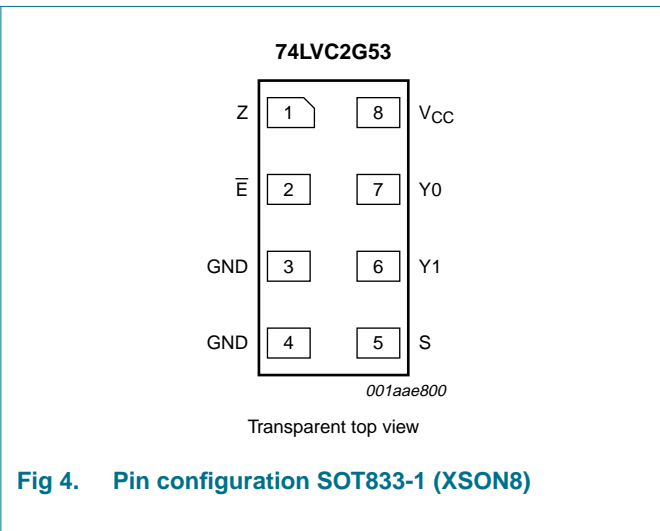


Fig 4. Pin configuration SOT833-1 (XSON8)

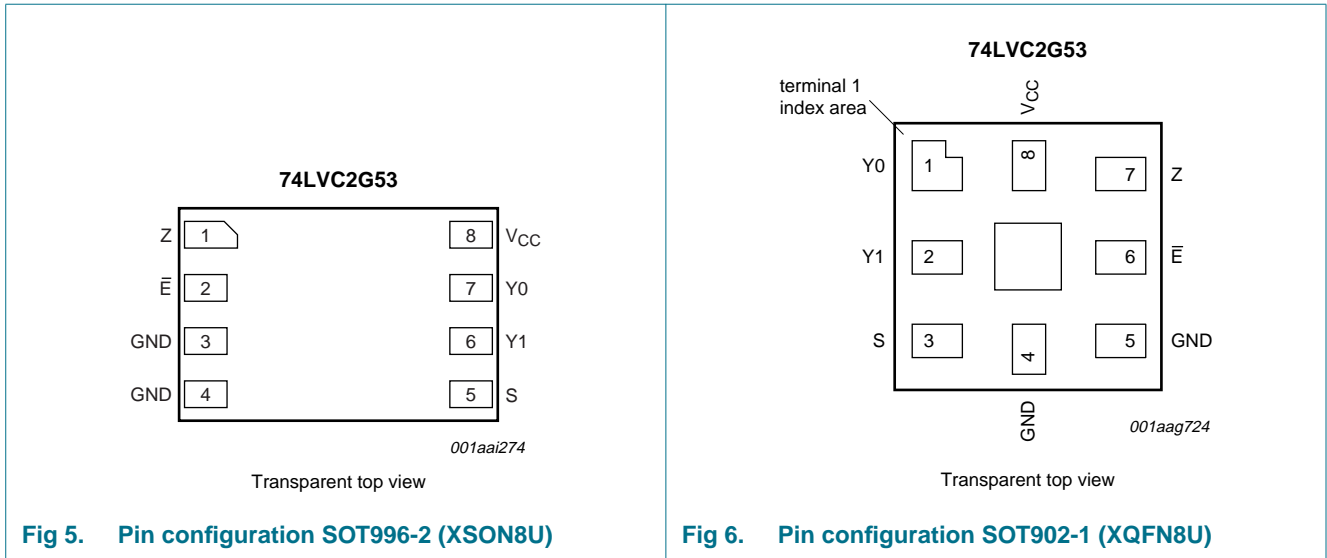


Fig 5. Pin configuration SOT996-2 (XSON8U)

Fig 6. Pin configuration SOT902-1 (XQFN8U)

### 6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT505-2, SOT765-1, SOT996-2 and SOT833-1	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 45 °C the value of  $P_{tot}$  derates linearly with 2.4 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**

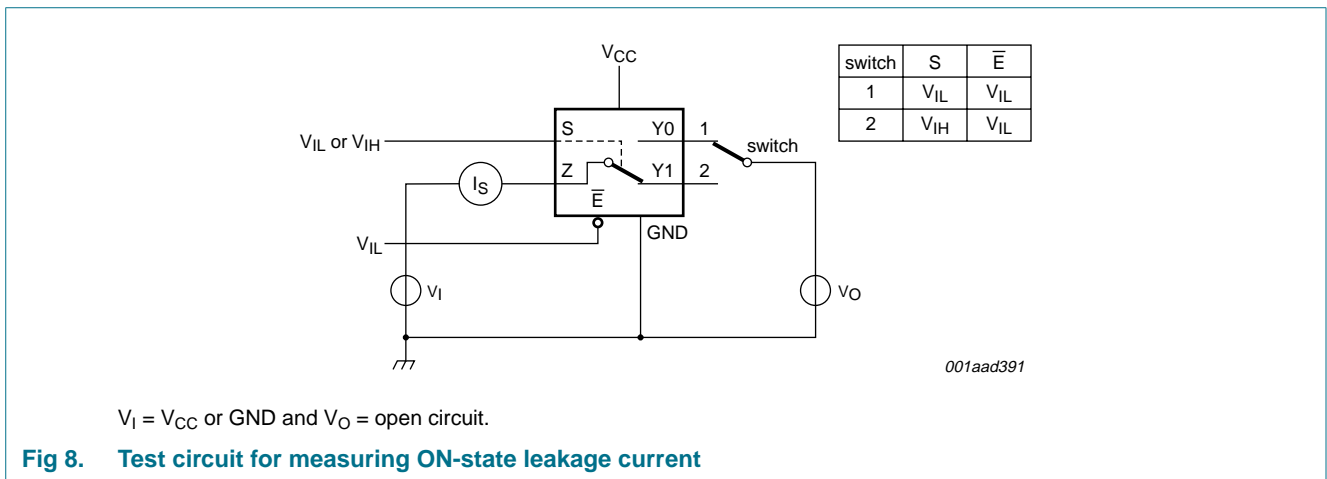
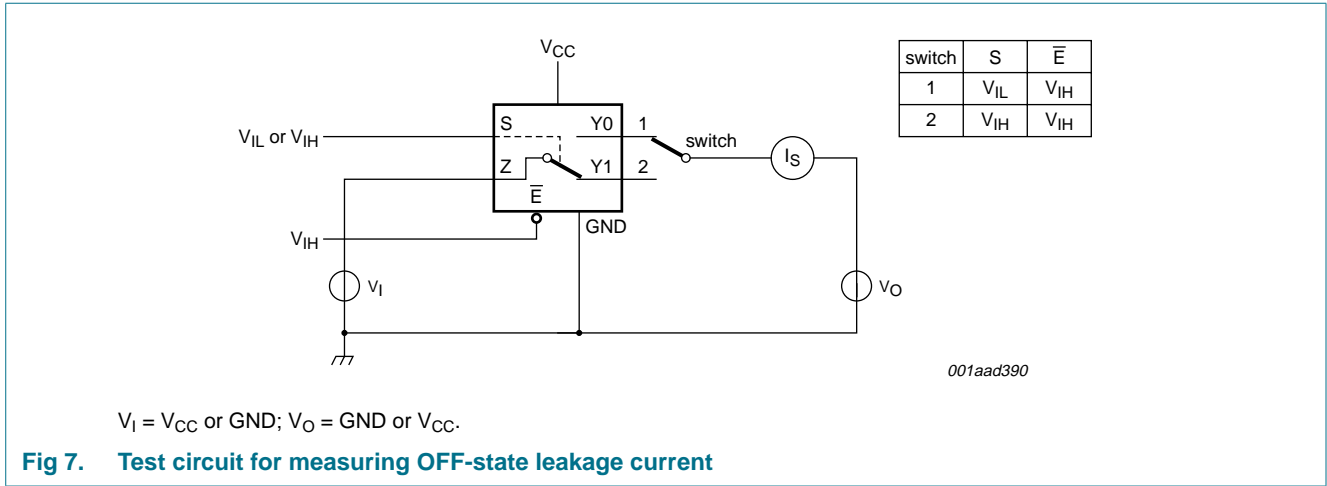
At recommended operating conditions; voltages are referenced to GND (ground 0 V).

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>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; 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>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; 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> ; I <sub>O</sub> = 0 A; 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; I <sub>O</sub> = 0 A; 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 <sub>ON(peak)</sub>	ON resistance (peak)	V <sub>I</sub> = GND to V <sub>CC</sub> ; see Figure 9	-	34.0	130	-	195	Ω		
			I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V							
			I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V		-	12.0	30	-	45	Ω
			I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V		-	10.4	25	-	38	Ω
			I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V		-	7.8	20	-	30	Ω
			I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V		-	6.2	15	-	23	Ω

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

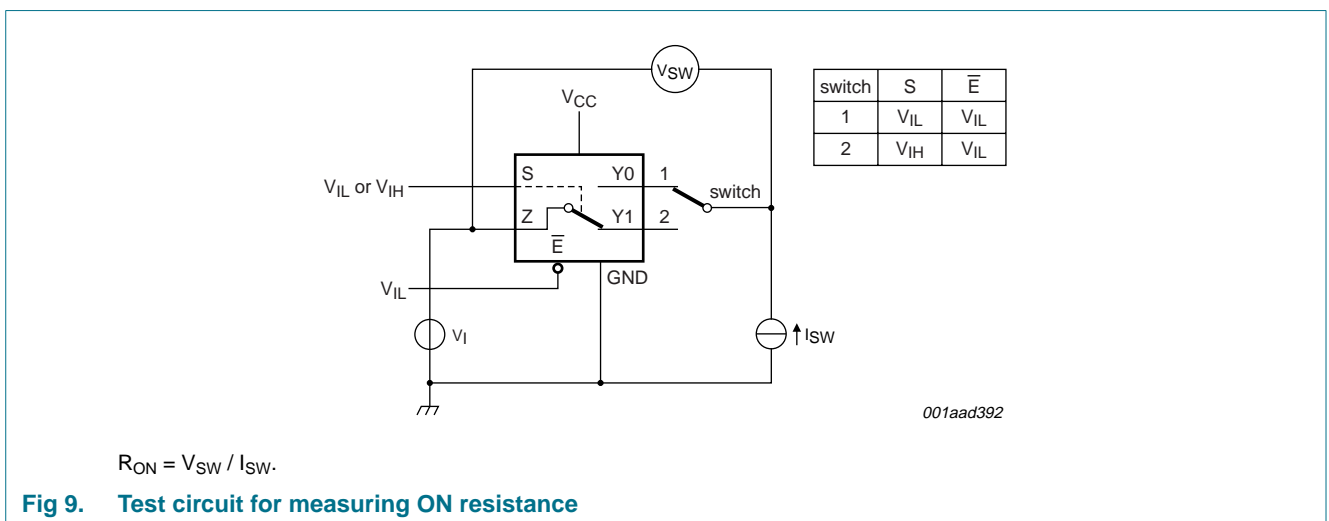
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 10](#) to [Figure 15](#).

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> <sup>[2]</sup>						
		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

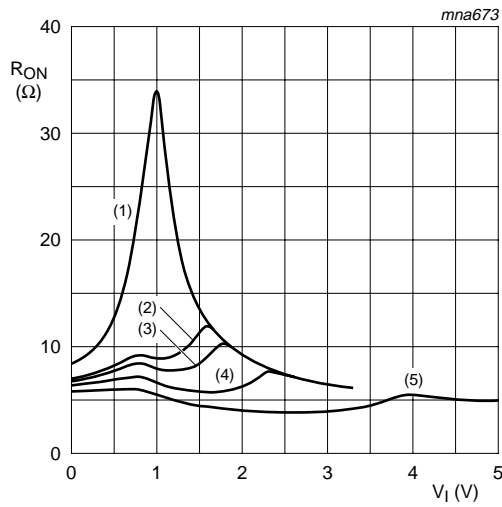
[1] Typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.

[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

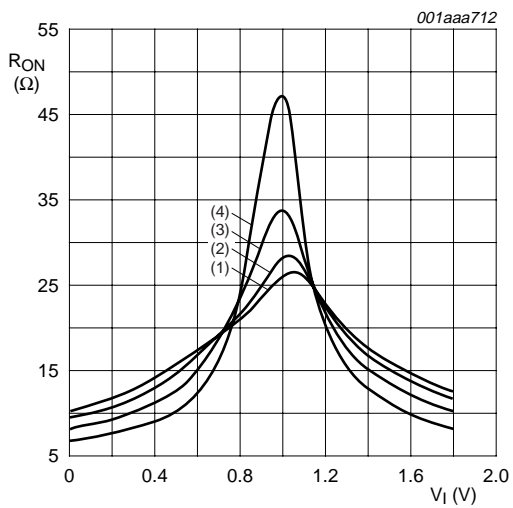






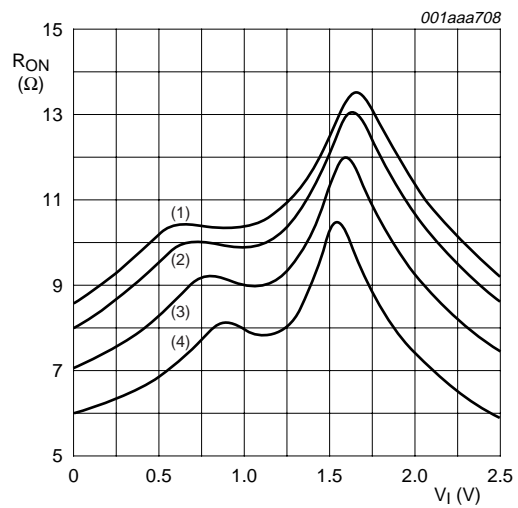
- (1)  $V_{CC} = 1.8\text{ V}$ .
- (2)  $V_{CC} = 2.5\text{ V}$ .
- (3)  $V_{CC} = 2.7\text{ V}$ .
- (4)  $V_{CC} = 3.3\text{ V}$ .
- (5)  $V_{CC} = 5.0\text{ V}$ .

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



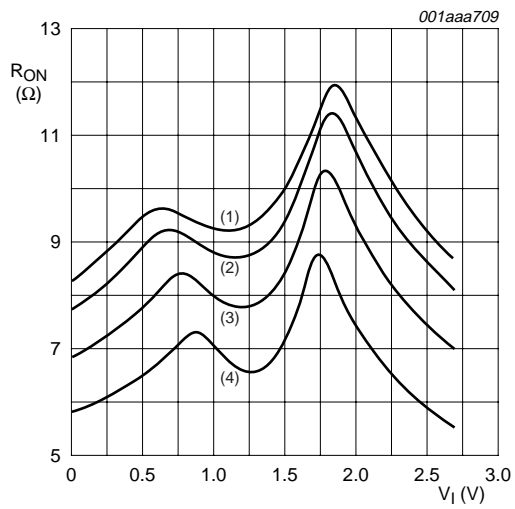
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

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



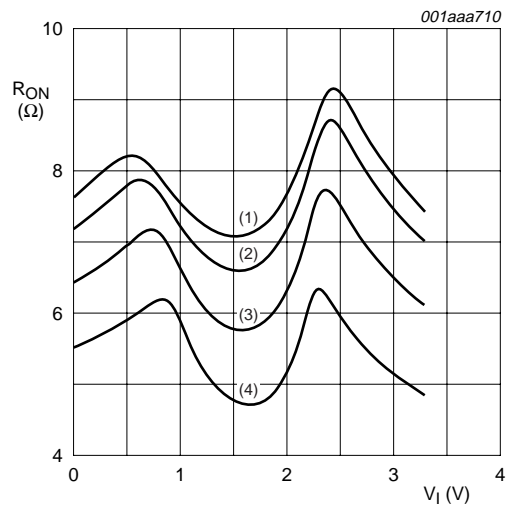
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

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



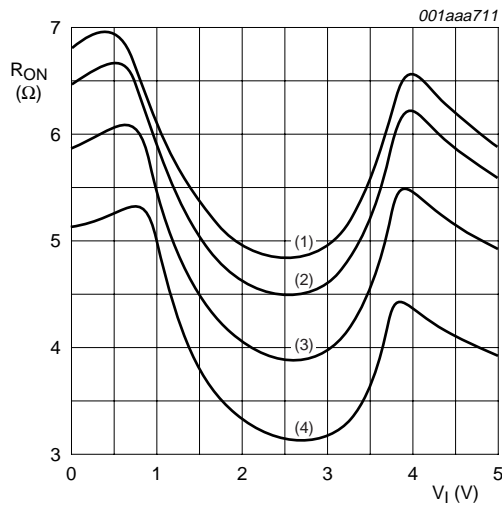
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**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 load 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>.

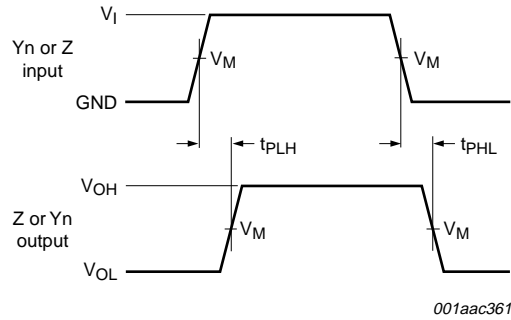
[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[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>.

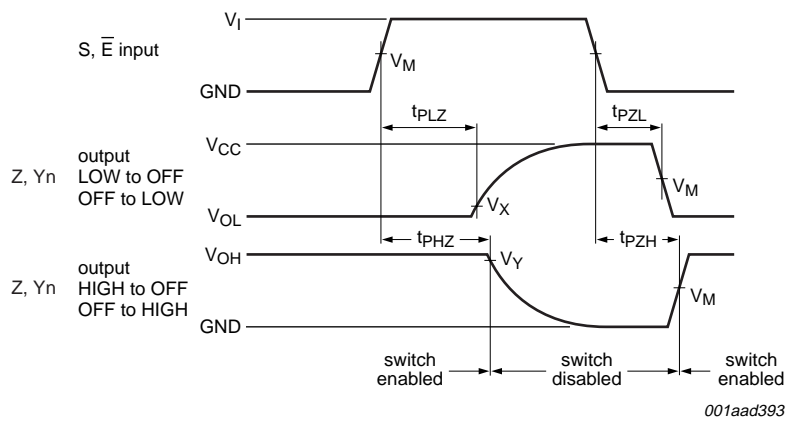
[5] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

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**

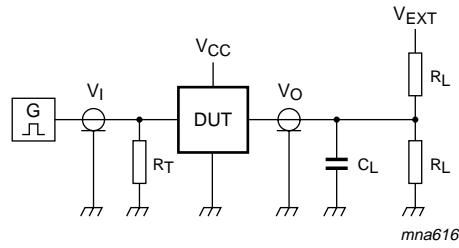


Measurement points are given in [Table 10](#).  
 Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

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

**Fig 18. Load circuit for 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);  $T_{amb} = 25^\circ C$ .

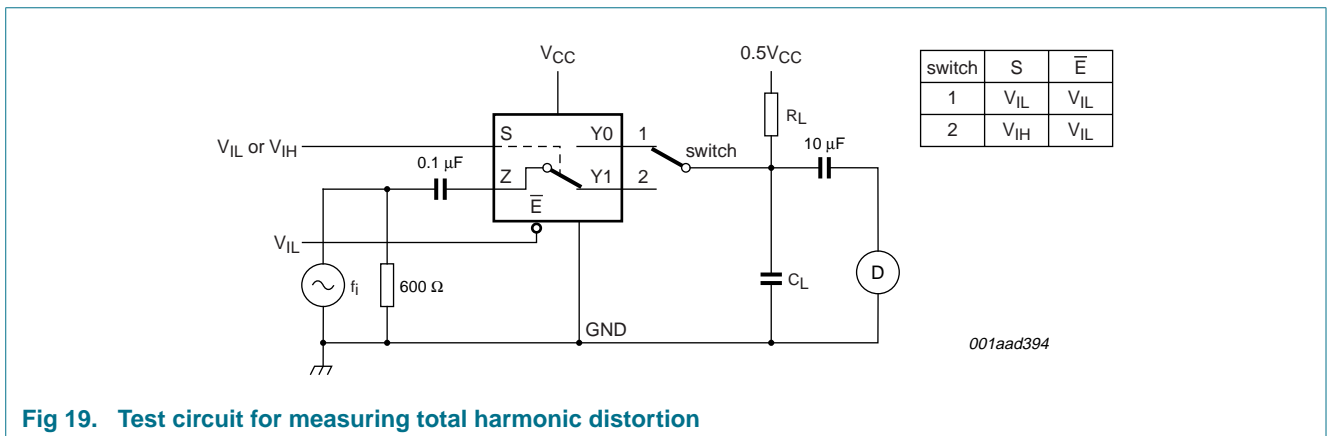
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	$f_i = 600$ Hz to 20 kHz; $R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $V_I = 0.5$ V (p-p); see <a href="#">Figure 19</a>				
		$V_{CC} = 1.65$ V	-	0.260	-	%
		$V_{CC} = 2.3$ V	-	0.078	-	%
		$V_{CC} = 3.0$ V	-	0.078	-	%
		$V_{CC} = 4.5$ V	-	0.078	-	%
$f_{(-3dB)}$	-3 dB frequency response	$R_L = 50$ $\Omega$ ; $C_L = 5$ pF; see <a href="#">Figure 20</a>				
		$V_{CC} = 1.65$ V	-	200	-	MHz
		$V_{CC} = 2.3$ V	-	300	-	MHz
		$V_{CC} = 3.0$ V	-	300	-	MHz
		$V_{CC} = 4.5$ V	-	300	-	MHz

**Table 12. Additional dynamic characteristics ...continued**

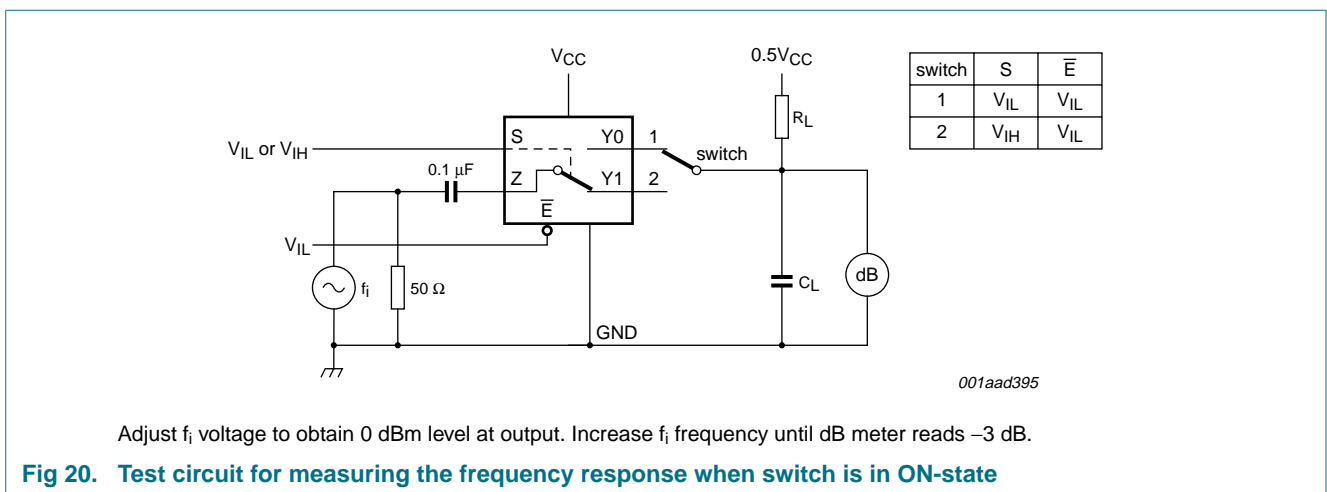
At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25^\circ\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\alpha_{iso}$	isolation (OFF-state)	$R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; $f_i = 10\ \text{MHz}$ ; see <a href="#">Figure 21</a>				
		$V_{CC} = 1.65\ \text{V}$	-	-42	-	dB
		$V_{CC} = 2.3\ \text{V}$	-	-42	-	dB
		$V_{CC} = 3.0\ \text{V}$	-	-40	-	dB
		$V_{CC} = 4.5\ \text{V}$	-	-40	-	dB
$Q_{inj}$	charge injection	$C_L = 0.1\ \text{nF}$ ; $V_{gen} = 0\ \text{V}$ ; $R_{gen} = 0\ \Omega$ ; $f_i = 1\ \text{MHz}$ ; $R_L = 1\ \text{M}\Omega$ ; see <a href="#">Figure 22</a>				
		$V_{CC} = 1.8\ \text{V}$	-	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

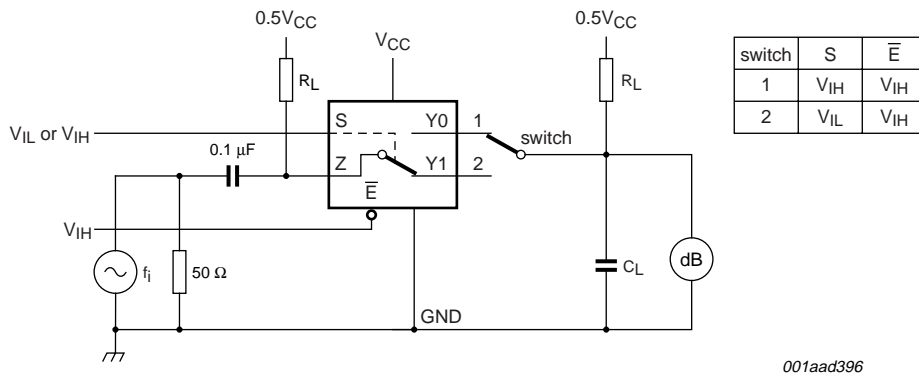
11.3 Test circuits



**Fig 19. Test circuit for measuring total harmonic distortion**

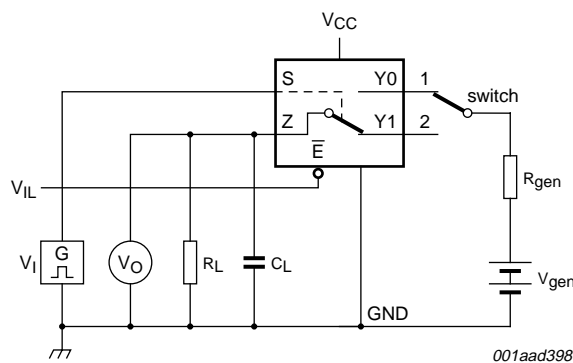


**Fig 20. Test circuit for measuring the frequency response when switch is in ON-state**

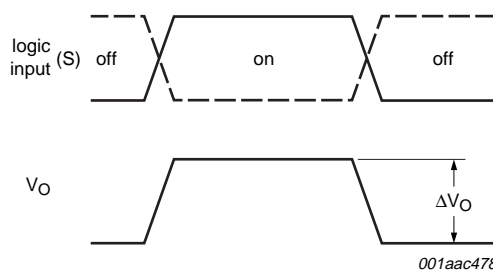


Adjust  $f_i$  voltage to obtain 0 dBm level at input.

**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

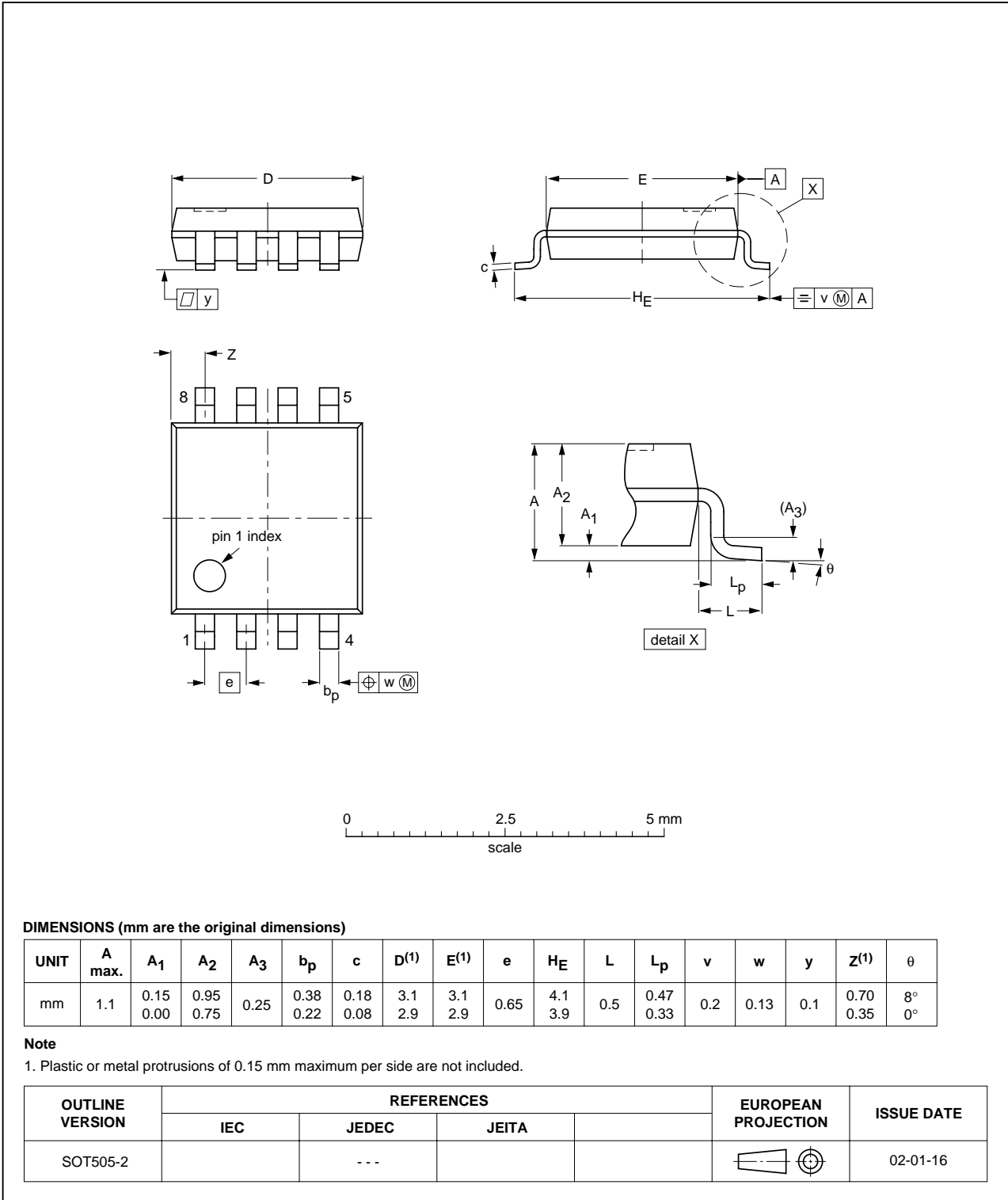


Fig 23. Package outline SOT505-2 (TSSOP8)



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

SOT765-1

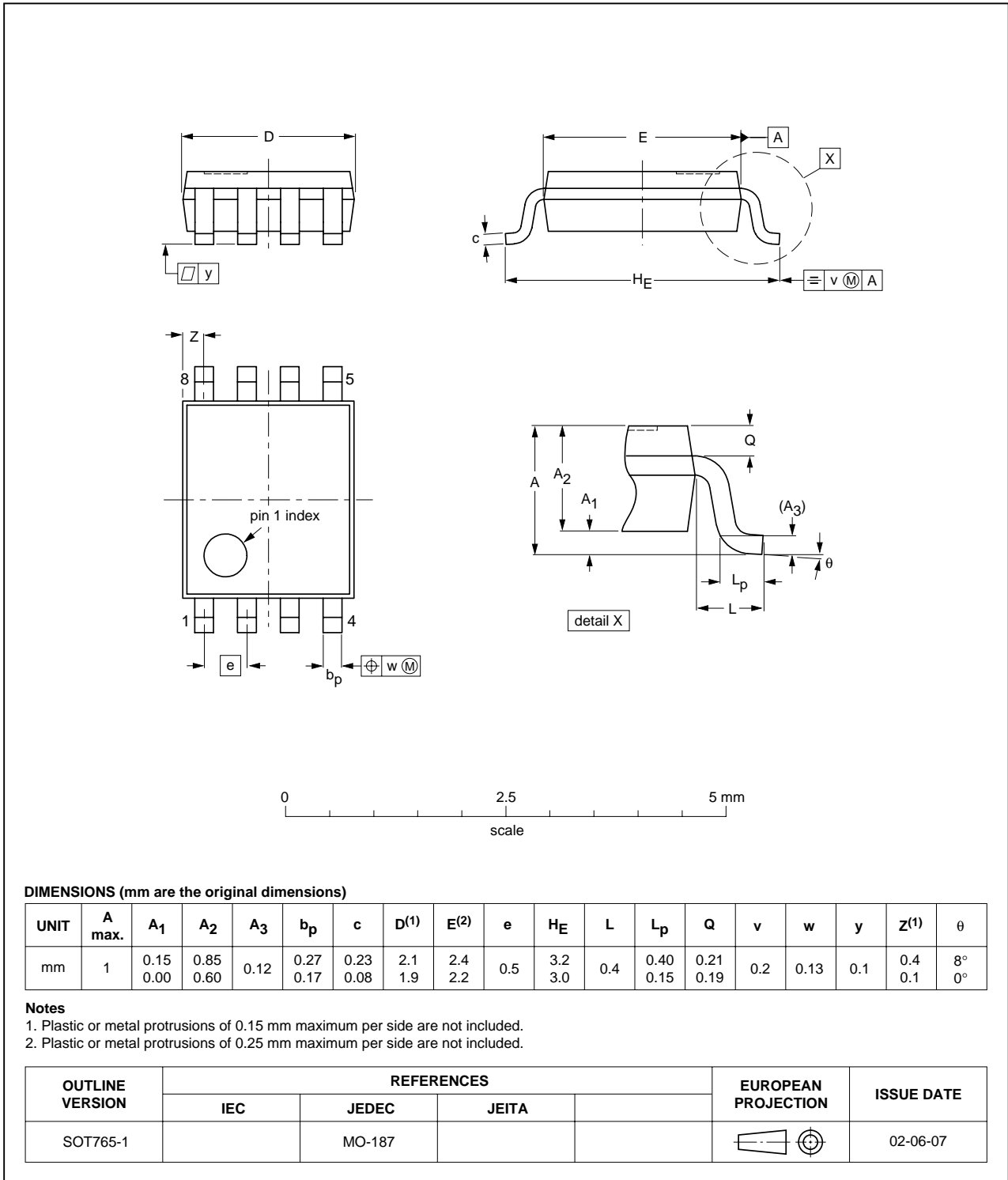


Fig 24. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

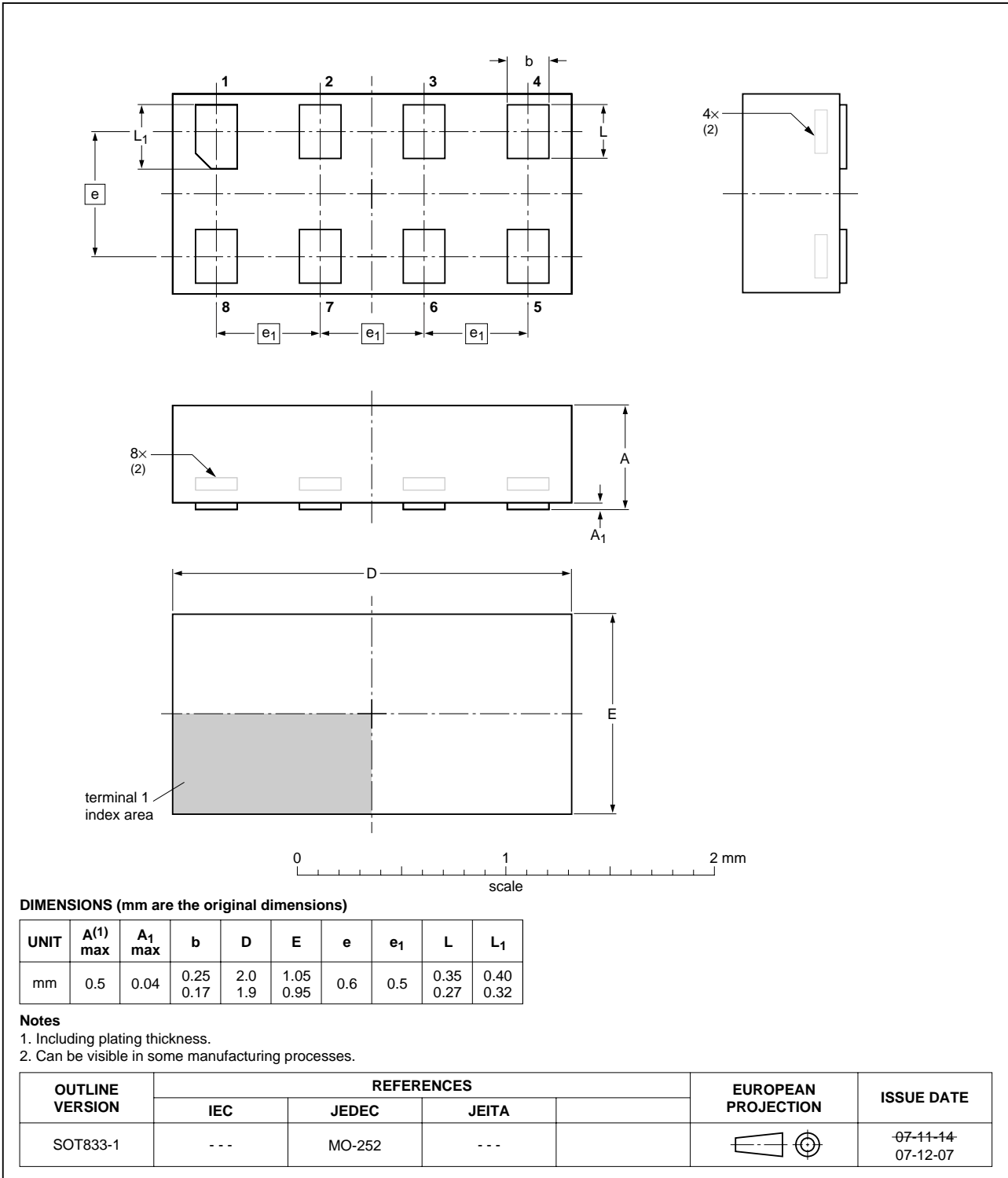


Fig 25. Package outline SOT833-1 (XSON8)

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

SOT996-2

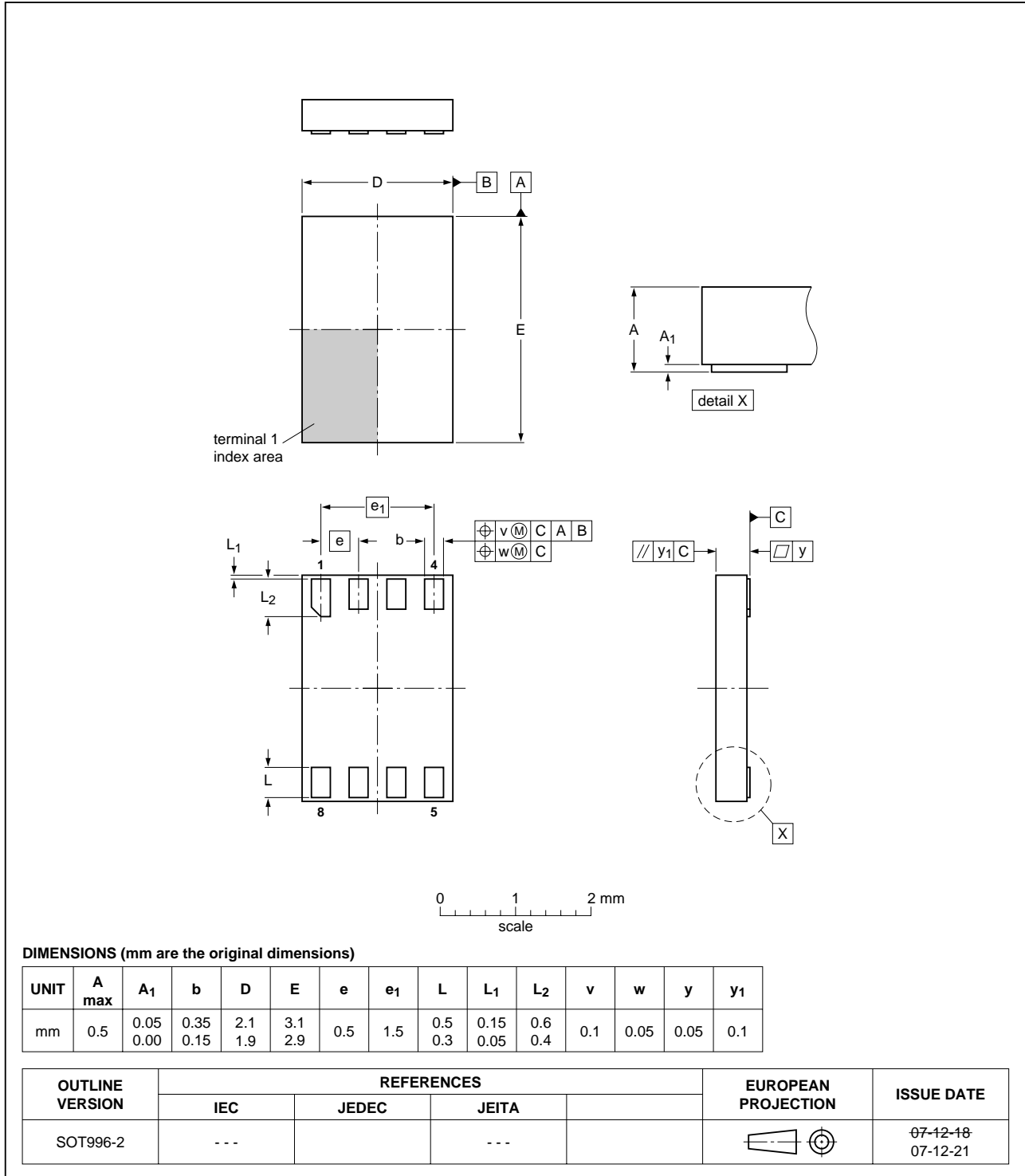


Fig 26. Package outline SOT996-2 (XSON8U)

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

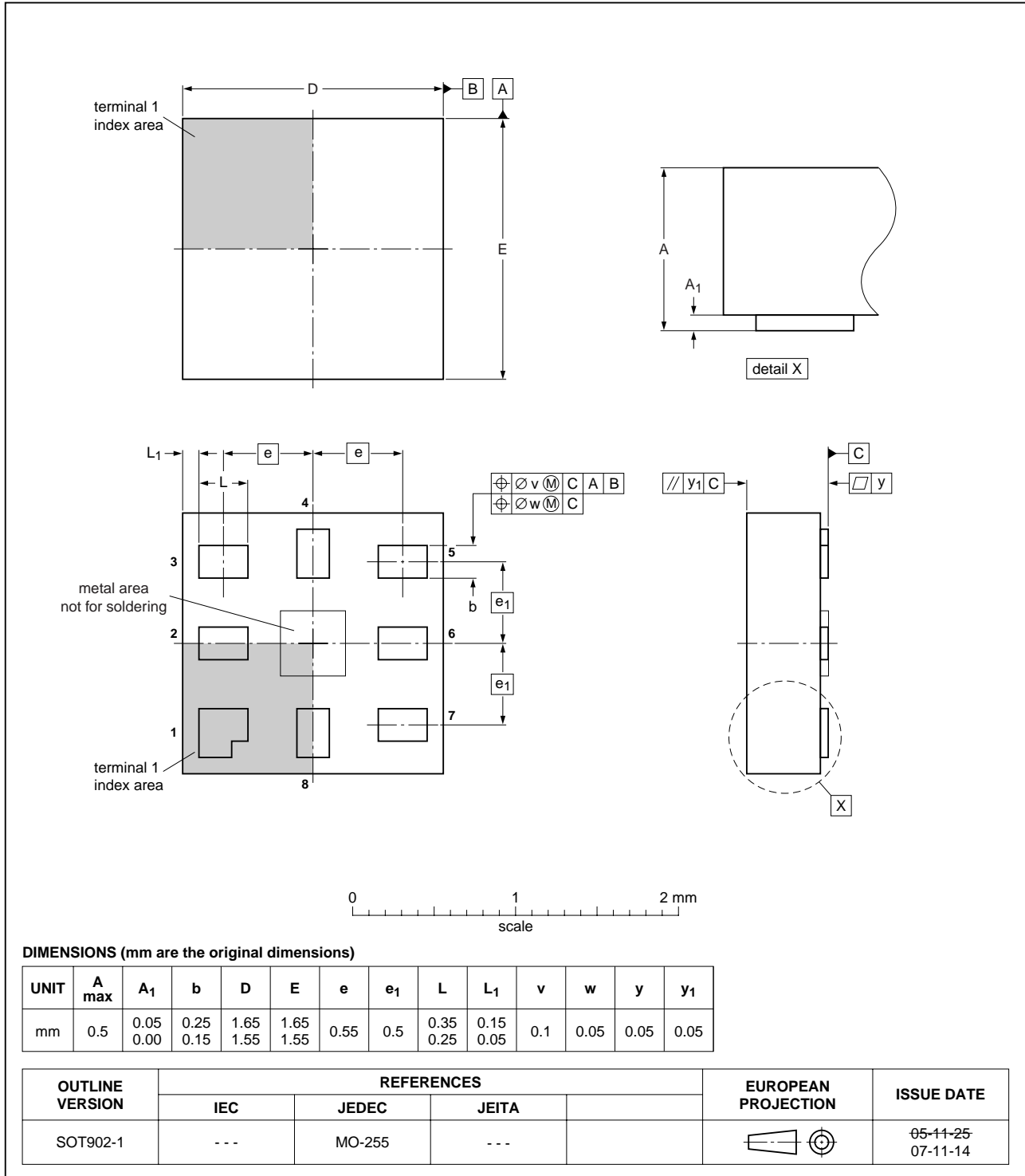


Fig 27. Package outline SOT902-1 (XQFN8U)

## 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_5	20080618	Product data sheet	-	74LVC2G53_4
Modifications:	<ul style="list-style-type: none"> <li>Added type number 74LVC2G53GD (XSON8U / SOT996-2 package)</li> </ul>			
74LVC2G53_4	20080228	Product data sheet	-	74LVC2G53_3
74LVC2G53_3	20070828	Product data sheet	-	74LVC2G53_2
74LVC2G53_2	20060331	Product data sheet	-	74LVC2G53_1
74LVC2G53_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>.

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