

# 74LVC2G66

## Bilateral switch

Rev. 04 — 1 July 2008

Product data sheet

## 1. General description

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The 74LVC2G66 is a low-power, low-voltage, high-speed Si-gate CMOS device.

The 74LVC2G66 provides two single pole, single-throw analog switch functions. Each switch has two input/output terminals (nY and nZ) and an active HIGH enable input (nE). When nE is LOW, the analog switch is turned off.

Schmitt-trigger action at the 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 JESD78 Class I
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Enable input accepts voltages up to 5.5 V
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C

### 3. Ordering information

Table 1. Ordering information

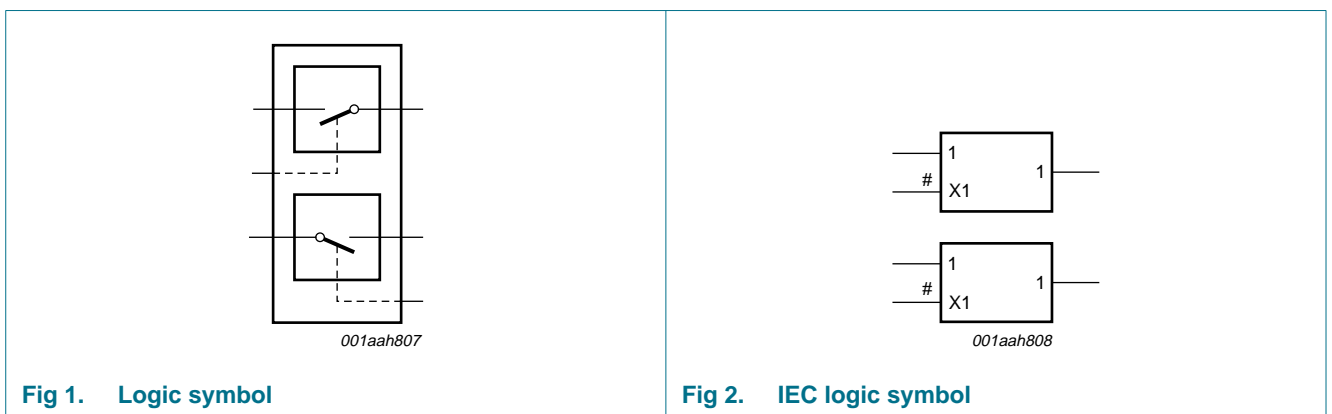
Type number	Package			Version
	Temperature range	Name	Description	
74LVC2G66DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74LVC2G66DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74LVC2G66GT	-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
74LVC2G66GD	-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
74LVC2G66GM	-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
74LVC2G66DP	V66
74LVC2G66DC	V66
74LVC2G66GT	V66
74LVC2G66GD	V66
74LVC2G66GM	V66

### 5. Functional diagram



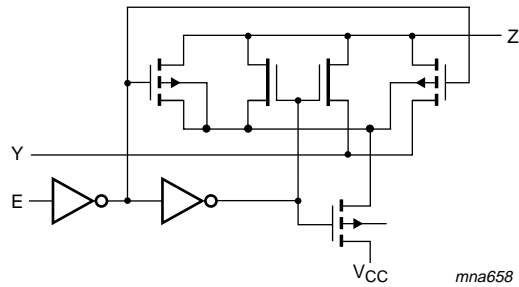


Fig 3. Logic diagram (one switch)

## 6. Pinning information

### 6.1 Pinning

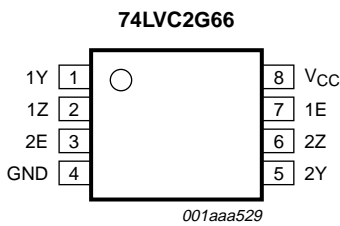


Fig 4. Pin configuration SOT505-2 (TSSOP8) and SOT765-1 (VSSOP8)

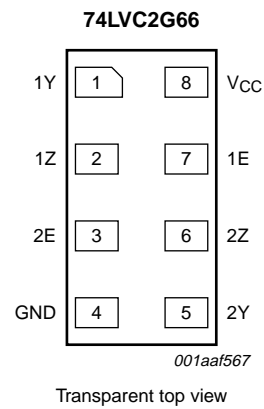


Fig 5. Pin configuration SOT833-1 (XSON8)

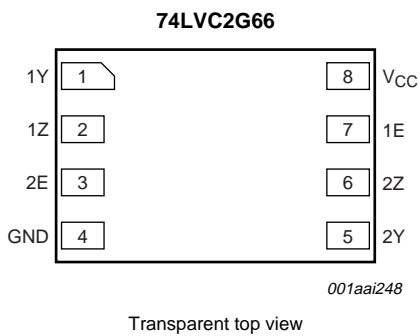


Fig 6. Pin configuration SOT996-2 (XSON8U)

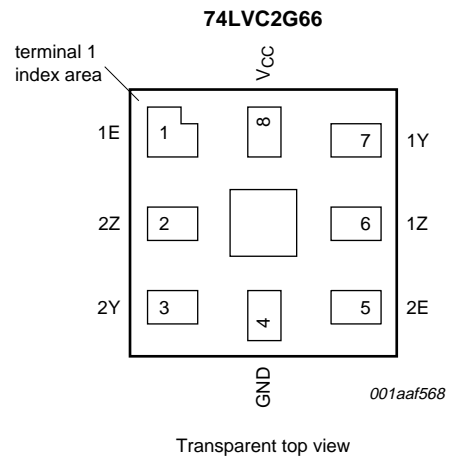


Fig 7. Pin configuration SOT902-1 (XQFN8U)

## 6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT505-2, SOT765-1, SOT833-1 and SOT996-2	SOT902-1	
1Y	1	7	independent input or output
1Z	2	6	independent input or output
2E	3	5	enable input (active HIGH)
GND	4	4	ground (0 V)
2Y	5	3	independent input or output
2Z	6	2	independent input or output
1E	7	1	enable input (active HIGH)
V <sub>CC</sub>	8	8	supply voltage

## 7. Functional description

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

Input nE	Switch
L	OFF-state
H	ON-state

[1] H = HIGH voltage level; L = LOW voltage level.

## 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 <sub>CC</sub>	supply voltage		-0.5	+6.5	V
V <sub>I</sub>	input voltage		<sup>[1]</sup> -0.5	+6.5	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V	-50	-	mA
I <sub>SK</sub>	switch clamping current	V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V	-	±50	mA
V <sub>SW</sub>	switch voltage	enable and disable mode	<sup>[2]</sup> -0.5	V <sub>CC</sub> + 0.5	V
I <sub>SW</sub>	switch current	V <sub>SW</sub> > -0.5 V or V <sub>SW</sub> < V <sub>CC</sub> + 0.5 V	-	±50	mA
I <sub>CC</sub>	supply current		-	100	mA
I <sub>GND</sub>	ground current		-100	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C	<sup>[3]</sup> -	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 package: above 55 °C the value of P<sub>tot</sub> derates linearly with 2.5 mW/K.

For VSSOP8 package: above 110 °C the value of P<sub>tot</sub> derates linearly with 8 mW/K.

For XSON8, XSON8U and XQFN8U packages: above 45 °C the value of P<sub>tot</sub> 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		[1][2] 0	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 1.65\text{ V to }2.7\text{ V}$	[3] -	20	ns/V
		$V_{CC} = 2.7\text{ V to }5.5\text{ V}$	[3] -	10	ns/V

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

[2] For overvoltage tolerant switch voltage capability, refer to 74LVCV2G66.

[3] 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	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	$0.65 \times V_{CC}$	-	-	$0.65 \times V_{CC}$	-	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.7	-	-	1.7	-	V
		$V_{CC} = 2.7\text{ V to }3.6\text{ V}$	2.0	-	-	2.0	-	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$0.7 \times V_{CC}$	-	-	$0.7 \times V_{CC}$	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	$0.35 \times V_{CC}$	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	0.7	-	0.7	V
		$V_{CC} = 2.7\text{ V to }3.6\text{ V}$	-	-	0.8	-	0.8	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	$0.3 \times V_{CC}$	-	$0.3 \times V_{CC}$	V
$I_I$	input leakage current	pin nE; $V_I = 5.5\text{ V or GND}$ ; $V_{CC} = 0\text{ V to }5.5\text{ V}$	[2] -	$\pm 0.1$	$\pm 5$	-	$\pm 100$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_I = V_{IH}\text{ or }V_{IL}$ ; $V_{CC} = 5.5\text{ V}$ ; see <a href="#">Figure 8</a>	[2] -	$\pm 0.1$	$\pm 5$	-	$\pm 200$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_I = V_{IH}\text{ or }V_{IL}$ ; $V_{CC} = 5.5\text{ V}$ ; see <a href="#">Figure 9</a>	[2] -	$\pm 0.1$	$\pm 5$	-	$\pm 200$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = 5.5\text{ V or GND}$ ; $V_{SW} = \text{GND or }V_{CC}$ ; $I_O = 0\text{ A}$ ; $V_{CC} = 1.65\text{ V to }5.5\text{ V}$	[2] -	0.1	10	-	200	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	pin nE; $V_I = V_{CC} - 0.6\text{ V}$ ; $V_{SW} = \text{GND or }V_{CC}$ ; $I_O = 0\text{ A}$ ; $V_{CC} = 5.5\text{ V}$	[2] -	5	500	-	5000	$\mu\text{A}$

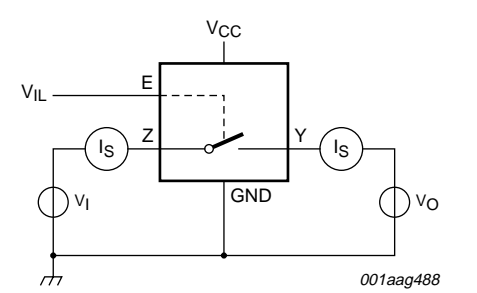
**Table 7. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
C <sub>I</sub>	input capacitance		-	2.0	-	-	-	pF
C <sub>S(OFF)</sub>	OFF-state capacitance		-	5.0	-	-	-	pF
C <sub>S(ON)</sub>	ON-state capacitance		-	9.5	-	-	-	pF

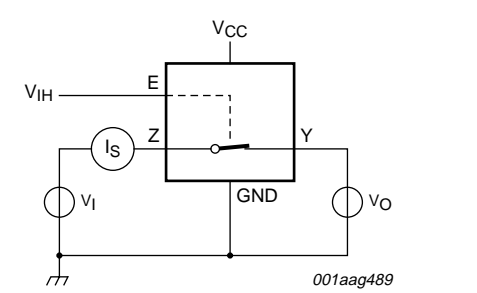
- [1] All typical values are measured at T<sub>amb</sub> = 25 °C.
- [2] These typical values are measured at V<sub>CC</sub> = 3.3 V.

### 10.1 Test circuits



$V_I = V_{CC}$  or GND and  $V_O =$  GND or  $V_{CC}$ .

**Fig 8. Test circuit for measuring OFF-state leakage current**



$V_I = V_{CC}$  or GND and  $V_O =$  open circuit.

**Fig 9. Test circuit for measuring ON-state leakage current**

10.2 ON resistance

Table 8. ON resistance

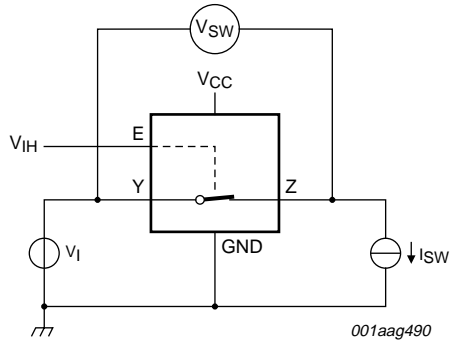
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see Figure 11 to Figure 16.

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 10						
		I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V	-	34.0	130	-	195	Ω
		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> = 3.0 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
R <sub>ON(rail)</sub>	ON resistance (rail)	V <sub>I</sub> = GND; see Figure 10						
		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> = 3.0 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 Figure 10						
		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> = 3.0 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> = 3.0 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>.

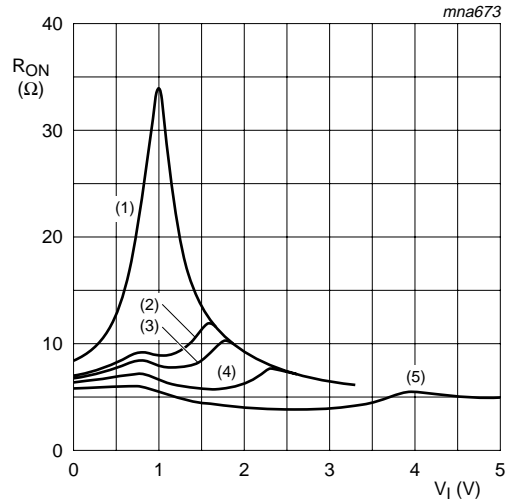
[2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V<sub>CC</sub> and temperature.

10.3 ON resistance test circuit and graphs



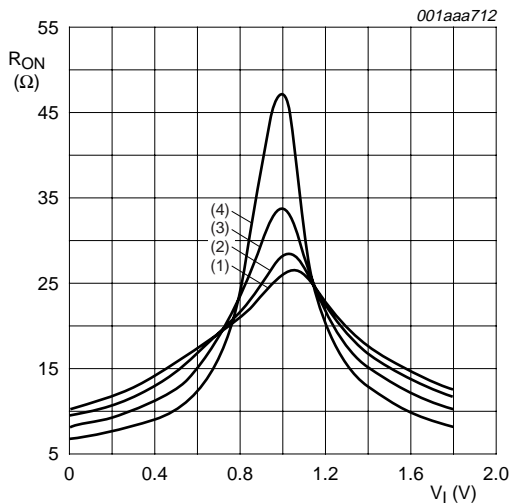
$R_{ON} = V_{SW} / I_{SW}$

Fig 10. Test circuit for measuring ON resistance



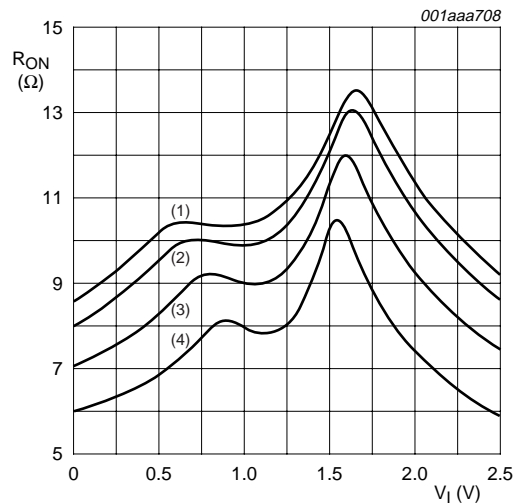
- (1)  $V_{CC} = 1.8 \text{ V.}$
- (2)  $V_{CC} = 2.5 \text{ V.}$
- (3)  $V_{CC} = 2.7 \text{ V.}$
- (4)  $V_{CC} = 3.3 \text{ V.}$
- (5)  $V_{CC} = 5.0 \text{ V.}$

Fig 11. 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)  $T_{amb} = -40 \text{ }^\circ\text{C.}$

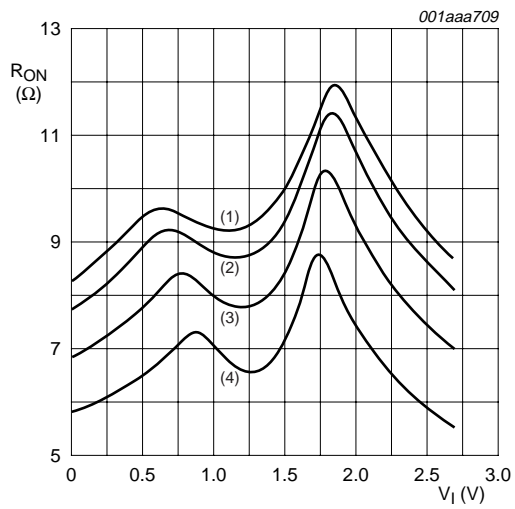
Fig 12. ON resistance as a function of input voltage;  $V_{CC} = 1.8 \text{ V}$



- (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)  $T_{amb} = -40 \text{ }^\circ\text{C.}$

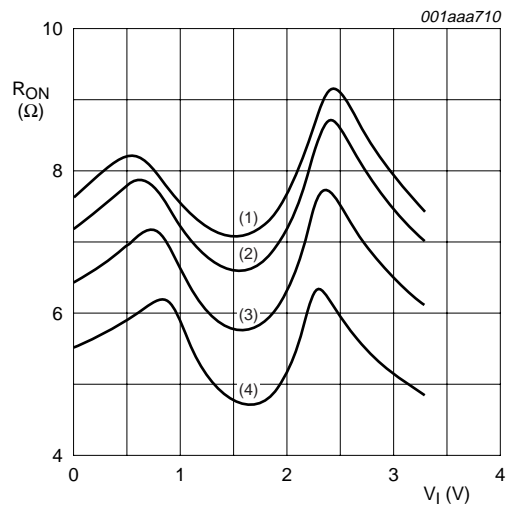
Fig 13. ON resistance as a function of input voltage;  $V_{CC} = 2.5 \text{ V}$





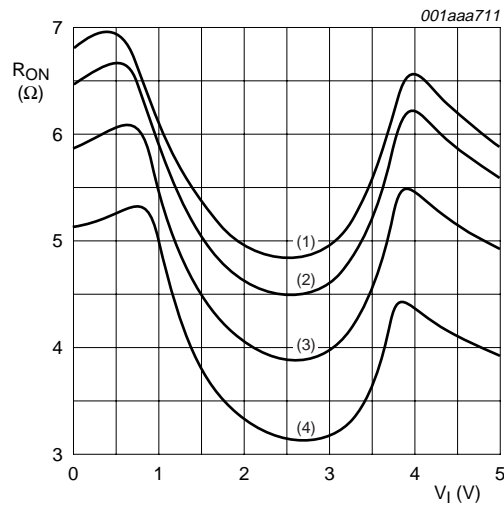
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**Fig 14. 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 15. 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 16. 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 19](#).

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	nY to nZ or nZ to nY; see <a href="#">Figure 17</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.8	2.0	-	3.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.4	1.2	-	2.0	ns
		V <sub>CC</sub> = 2.7 V	-	0.4	1.0	-	1.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.3	0.8	-	1.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	0.2	0.6	-	1.0	ns
t <sub>en</sub>	enable time	nE to nY or nZ; see <a href="#">Figure 18</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	4.6	10	1.0	13.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.7	5.6	1.0	7.5	ns
		V <sub>CC</sub> = 2.7 V	1.0	2.7	5.0	1.0	6.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	2.4	4.4	1.0	6.0	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	1.8	3.9	1.0	5.0	ns
t <sub>dis</sub>	disable time	E to Y or Z; see <a href="#">Figure 18</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	3.8	9.0	1.0	11.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.1	5.5	1.0	7.0	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.5	6.5	1.0	8.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	3.0	6.0	1.0	8.0	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	2.2	5.0	1.0	6.5	ns
C <sub>PD</sub>	power dissipation capacitance	C <sub>L</sub> = 50 pF; f <sub>i</sub> = 10 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>						
		V <sub>CC</sub> = 2.5 V	-	9.0	-	-	-	pF
		V <sub>CC</sub> = 3.3 V	-	11.0	-	-	-	pF
		V <sub>CC</sub> = 5.0 V	-	15.7	-	-	-	pF

[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>.

[6] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\{(C_L + C_{S(ON)}) \times V_{CC}^2 \times f_o\}$$

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

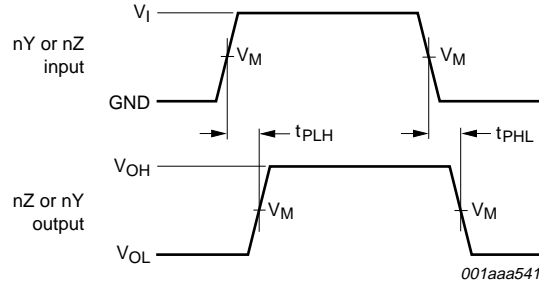
C<sub>S(ON)</sub> = maximum ON-state switch capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

Σ{(C<sub>L</sub> + C<sub>S(ON)</sub>) × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>} = sum of the outputs.

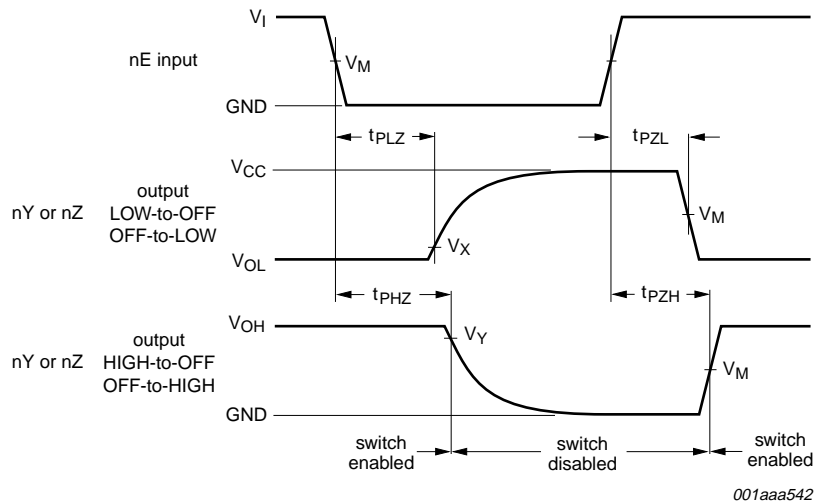
11.1 Waveforms and test circuit



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. Input (nY or nZ) to output (nZ or nY) propagation delays



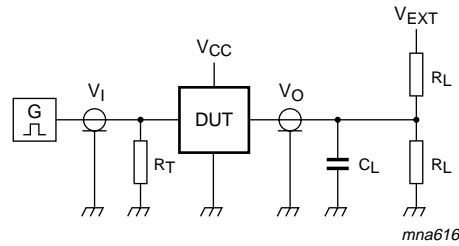
Measurement points are given in [Table 10](#).

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

Fig 18. 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 1.95 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$
2.3 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$
2.7 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
3.0 V to 3.6 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
4.5 V to 5.5 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$



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 19. 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	$2 \times V_{CC}$
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open	GND	$2 \times V_{CC}$
2.7 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	6 V
3.0 V to 3.6 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	6 V
4.5 V to 5.5 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2 \times V_{CC}$

## 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	$R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ kHz; see <a href="#">Figure 20</a>					
		$V_{CC} = 1.65$ V	-	0.032	-	%	
		$V_{CC} = 2.3$ V	-	0.008	-	%	
		$V_{CC} = 3.0$ V	-	0.006	-	%	
		$V_{CC} = 4.5$ V	-	0.005	-	%	
		$R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 10$ kHz; see <a href="#">Figure 20</a>					
		$V_{CC} = 1.65$ V	-	0.068	-	%	
		$V_{CC} = 2.3$ V	-	0.009	-	%	
		$V_{CC} = 3.0$ V	-	0.008	-	%	
		$V_{CC} = 4.5$ V	-	0.006	-	%	

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

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

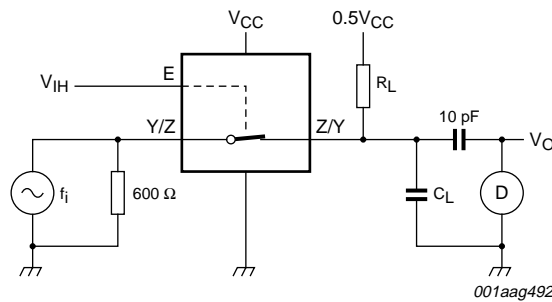
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$f_{(-3\text{dB})}$	-3 dB frequency response	$R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ; see <a href="#">Figure 21</a>					
		$V_{CC} = 1.65\ \text{V}$	-	135	-	MHz	
		$V_{CC} = 2.3\ \text{V}$	-	145	-	MHz	
		$V_{CC} = 3.0\ \text{V}$	-	150	-	MHz	
		$V_{CC} = 4.5\ \text{V}$	-	155	-	MHz	
		$R_L = 50\ \Omega$ ; $C_L = 10\ \text{pF}$ ; see <a href="#">Figure 21</a>					
		$V_{CC} = 1.65\ \text{V}$	-	200	-	MHz	
		$V_{CC} = 2.3\ \text{V}$	-	350	-	MHz	
		$V_{CC} = 3.0\ \text{V}$	-	410	-	MHz	
		$V_{CC} = 4.5\ \text{V}$	-	440	-	MHz	
		$R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; see <a href="#">Figure 21</a>					
		$V_{CC} = 1.65\ \text{V}$	-	> 500	-	MHz	
		$V_{CC} = 2.3\ \text{V}$	-	> 500	-	MHz	
		$V_{CC} = 3.0\ \text{V}$	-	> 500	-	MHz	
		$V_{CC} = 4.5\ \text{V}$	-	> 500	-	MHz	
		$\alpha_{\text{iso}}$	isolation (OFF-state)	$R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 22</a>			
$V_{CC} = 1.65\ \text{V}$	-			-46	-	dB	
$V_{CC} = 2.3\ \text{V}$	-			-46	-	dB	
$V_{CC} = 3.0\ \text{V}$	-			-46	-	dB	
$V_{CC} = 4.5\ \text{V}$	-			-46	-	dB	
$R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 22</a>							
$V_{CC} = 1.65\ \text{V}$	-			-37	-	dB	
$V_{CC} = 2.3\ \text{V}$	-			-37	-	dB	
$V_{CC} = 3.0\ \text{V}$	-			-37	-	dB	
$V_{CC} = 4.5\ \text{V}$	-			-37	-	dB	
$V_{\text{ct}}$	crosstalk voltage	between digital inputs and switch; $R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; $t_r = t_f = 2\ \text{ns}$ ; see <a href="#">Figure 23</a>					
		$V_{CC} = 1.65\ \text{V}$	-	-	-	mV	
		$V_{CC} = 2.3\ \text{V}$	-	91	-	mV	
		$V_{CC} = 3.0\ \text{V}$	-	119	-	mV	
		$V_{CC} = 4.5\ \text{V}$	-	205	-	mV	

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

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	
Xtalk	crosstalk	between switches; $R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 24</a>					
		$V_{CC} = 1.65\ \text{V}$	-	-	-	dB	
		$V_{CC} = 2.3\ \text{V}$	-	-56	-	dB	
		$V_{CC} = 3\ \text{V}$	-	-56	-	dB	
		$V_{CC} = 4.5\ \text{V}$	-	-56	-	dB	
		between switches; $R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 24</a>					
		$V_{CC} = 1.65\ \text{V}$	-	-	-	dB	
		$V_{CC} = 2.3\ \text{V}$	-	-29	-	dB	
		$V_{CC} = 3\ \text{V}$	-	-28	-	dB	
		$V_{CC} = 4.5\ \text{V}$	-	-28	-	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 25</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



**Test conditions:**

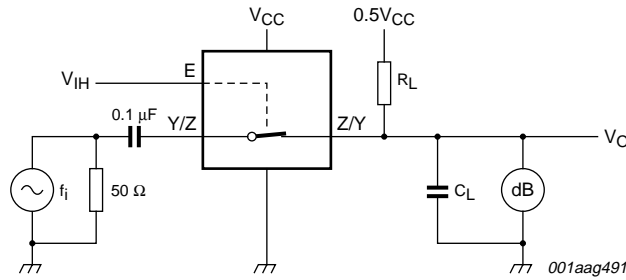
$V_{CC} = 1.65\ \text{V}$ :  $V_i = 1.4\ \text{V}$  (p-p).

$V_{CC} = 2.3\ \text{V}$ :  $V_i = 2\ \text{V}$  (p-p).

$V_{CC} = 3\ \text{V}$ :  $V_i = 2.5\ \text{V}$  (p-p).

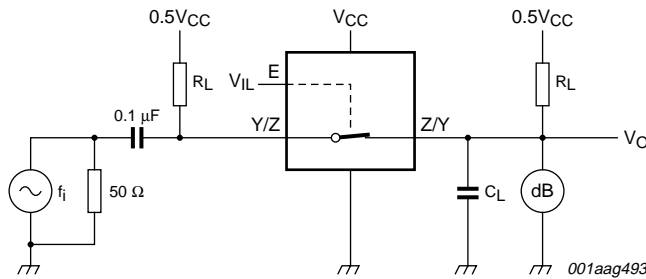
$V_{CC} = 4.5\ \text{V}$ :  $V_i = 4\ \text{V}$  (p-p).

**Fig 20. Test circuit for measuring total harmonic distortion**



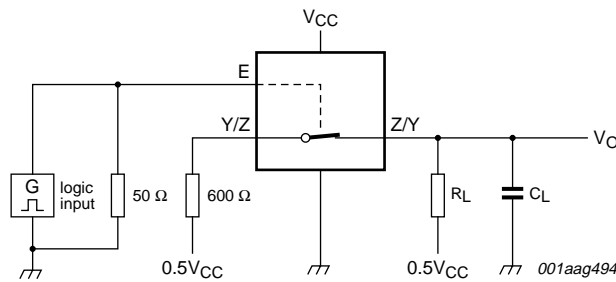
Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads -3 dB.

**Fig 21. Test circuit for measuring the frequency response when switch is in ON-state**

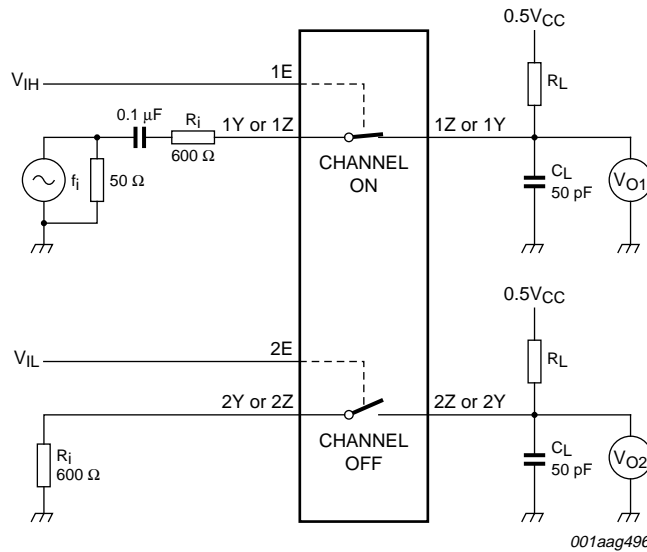


Adjust  $f_i$  voltage to obtain 0 dBm level at input.

**Fig 22. Test circuit for measuring isolation (OFF-state)**

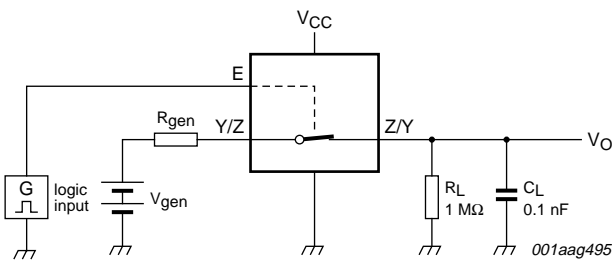


**Fig 23. Test circuit for measuring crosstalk voltage (between digital inputs and switch)**

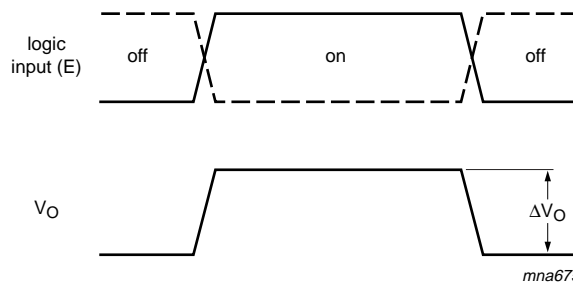


$20 \log_{10} (V_{O2} / V_{O1})$  or  $20 \log_{10} (V_{O1} / V_{O2})$ .

**Fig 24. Test circuit for measuring crosstalk between switches**



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 25. 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

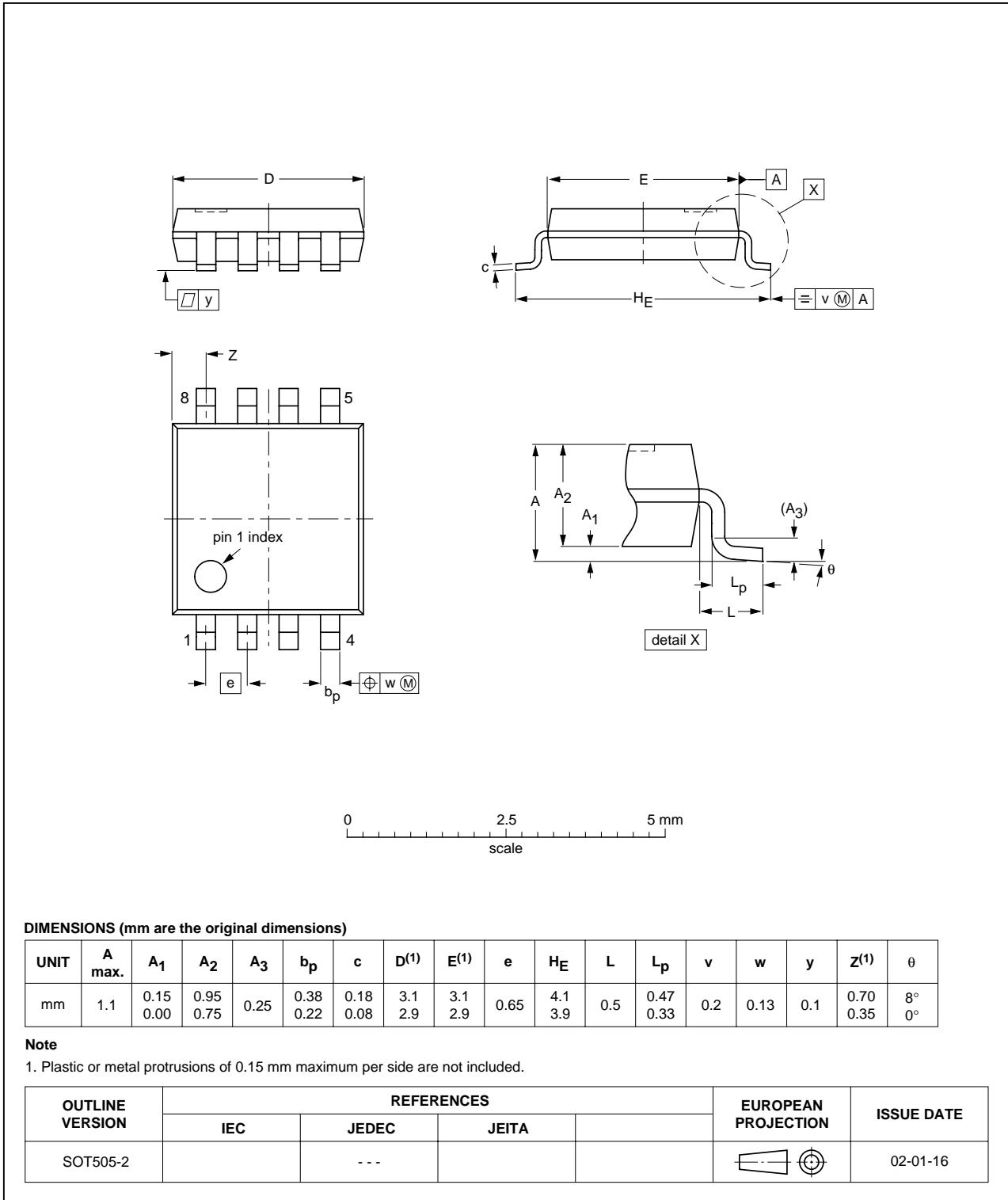


Fig 26. Package outline SOT505-2 (TSSOP8)

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

SOT765-1

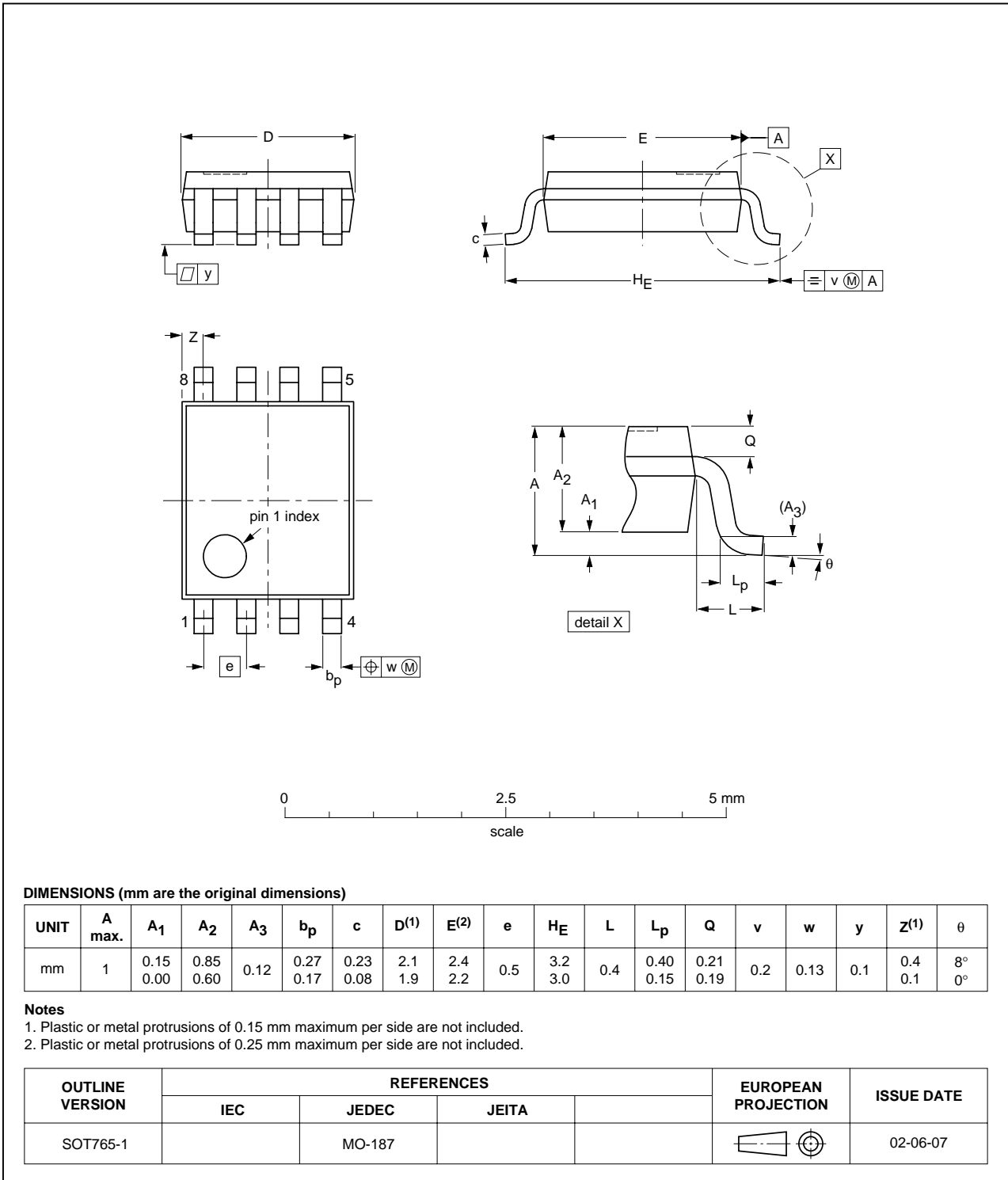


Fig 27. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

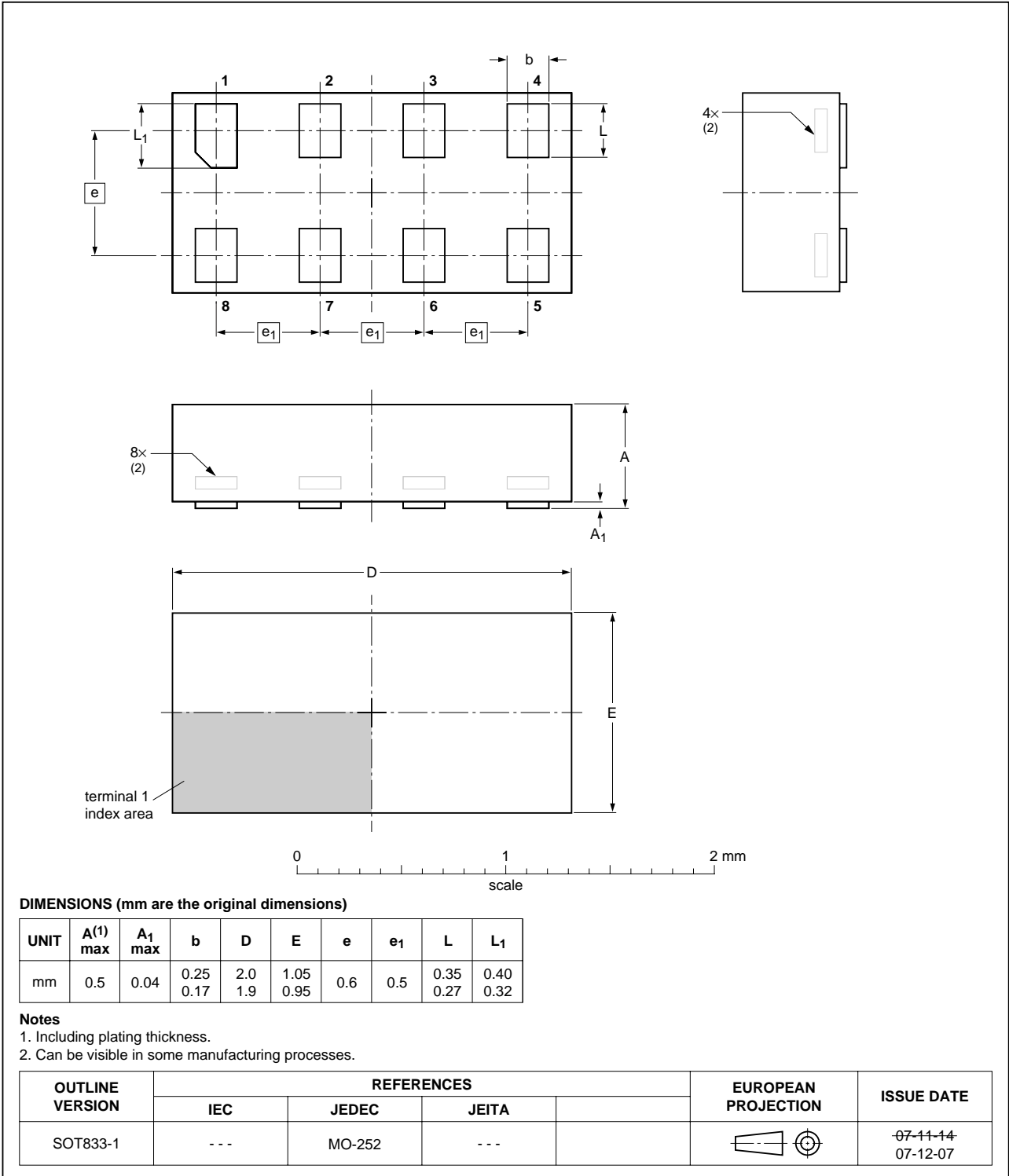


Fig 28. Package outline SOT833-1 (XSON8)

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

SOT996-2

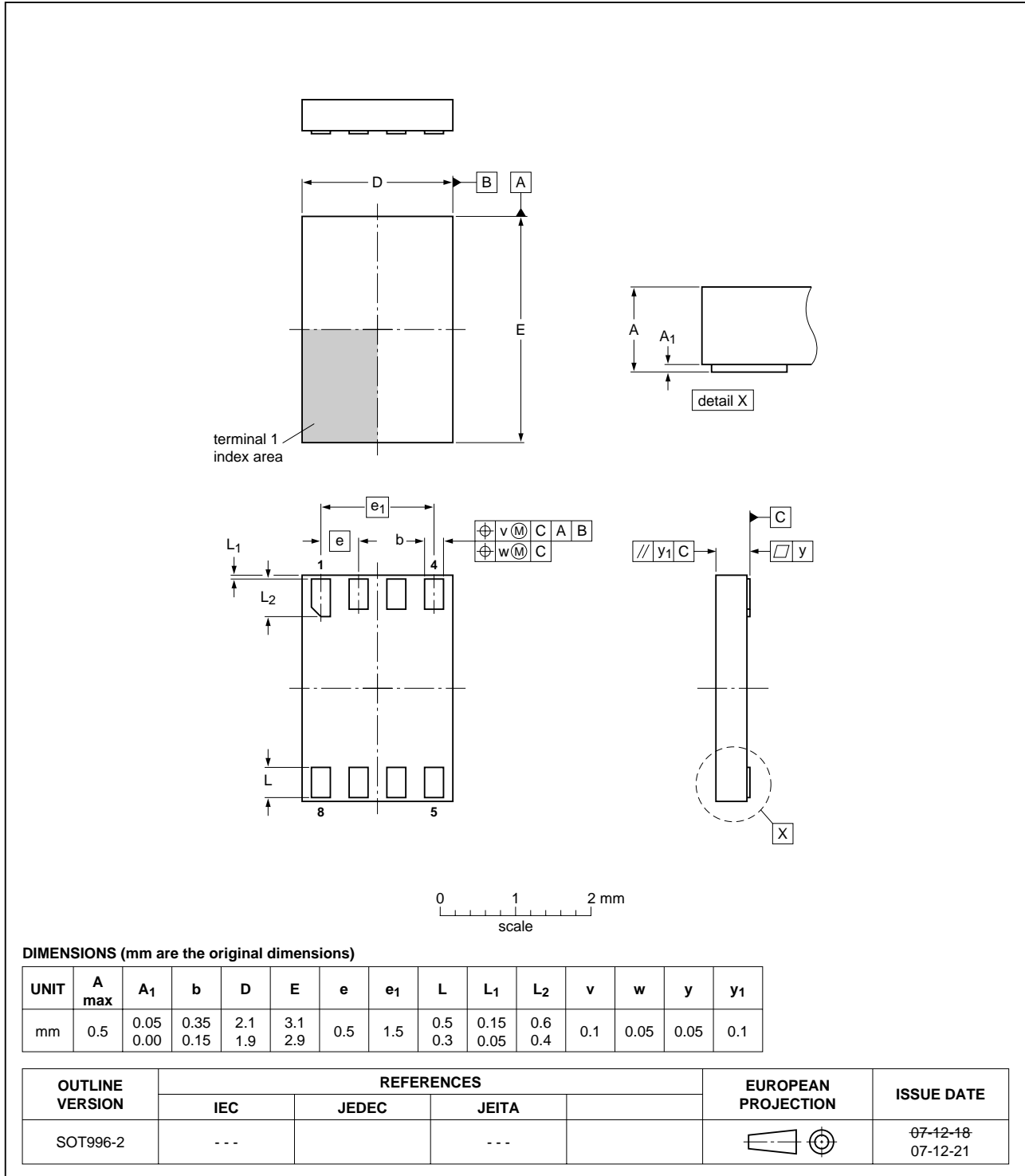
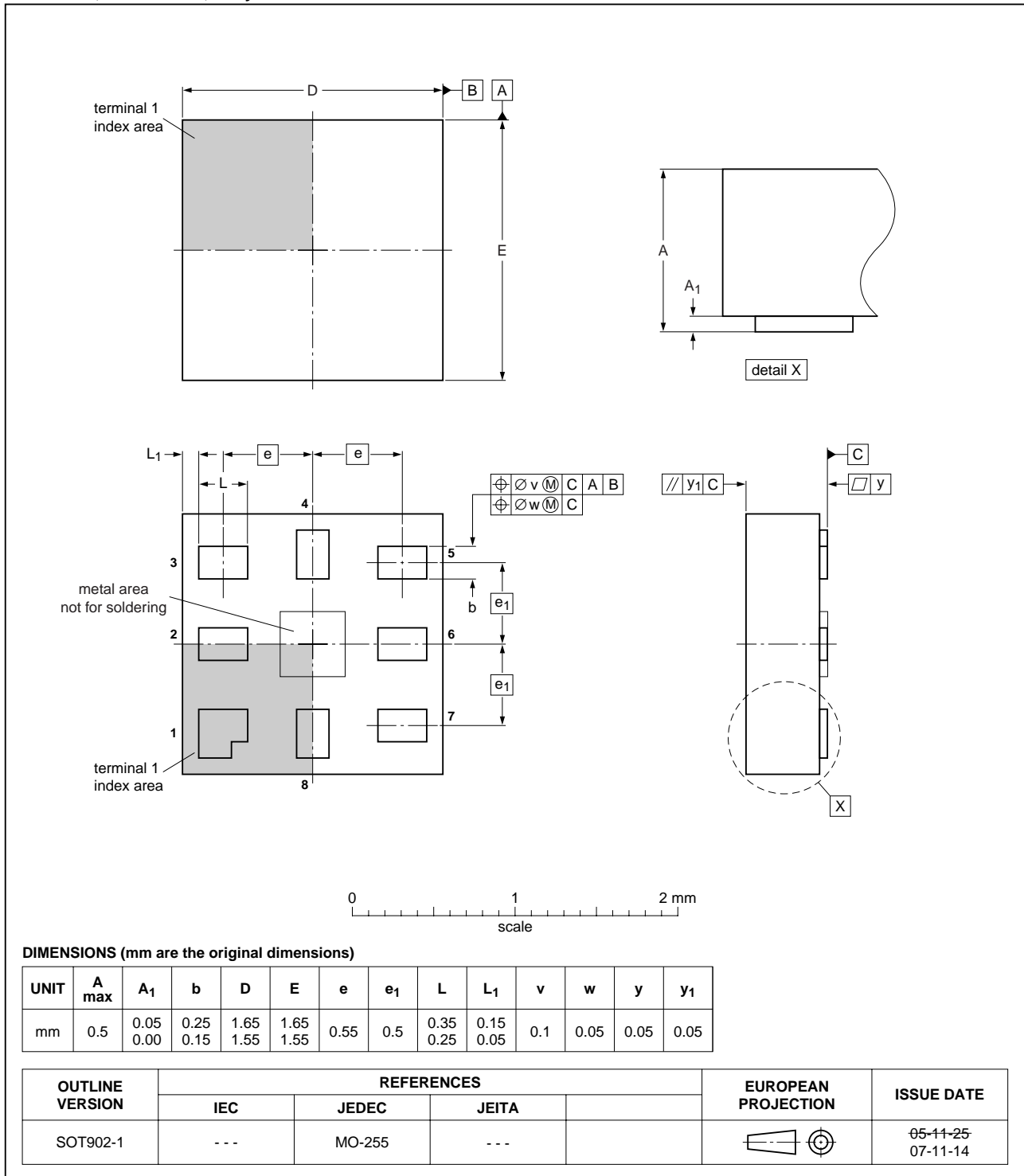


Fig 29. Package outline SOT996-2 (XSON8U)

**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 30. 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
DUT	Device Under Test

## 14. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC2G66_4	20080701	Product data sheet	-	74LVC2G66_3
Modifications:				
			<ul style="list-style-type: none"><li>• <a href="#">Section 8</a>: derating factor for TSSOP8 package corrected.</li><li>• Added type number 74LVC2G66GD (XSON8U package).</li></ul>	
74LVC2G66_3	20080310	Product data sheet	-	74LVC2G66_2
74LVC2G66_2	20070828	Product data sheet	-	74LVC2G66_1
74LVC2G66_1	20040629	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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