

# 74LVC2G53

## 2-channel analog multiplexer/demultiplexer

Rev. 02 — 31 March 2006

Product data sheet

### 1. General description

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The 74LVC2G53 is a high-performance, low-power, low-voltage, Si-gate CMOS device that provides superior performance to most advanced CMOS compatible TTL families.

The 74LVC2G53 provides one analog multiplexer/demultiplexer with a digital select input (S), two independent inputs/outputs (B0 and B1), a common input/output (A) and an active LOW enable input ( $\bar{E}$ ). When pin  $\bar{E}$  is HIGH, the switch is turned off.

The 74LVC2G53 can handle both analog and digital signals.

### 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
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114-C exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101-C exceeds 1000 V
- CMOS low-power consumption
- Latch-up performance meets requirements of JESD 78 Class I
- Direct interface with TTL levels
- 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

**PHILIPS**

### 3. Quick reference data

**Table 1. Quick reference data**

$GND = 0\text{ V}$ ;  $t_r = t_f \leq 2.5\text{ ns}$ ; minimum and maximum values at  $T_{amb} = -40\text{ °C}$  to  $+85\text{ °C}$ ; typical values at  $T_{amb} = 25\text{ °C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit		
$t_{on}$	turn-on time	S to A or Bn $C_L = 50\text{ pF}$ ; $R_L = 500\ \Omega$	$V_{CC} = 3.3\text{ V}$	1.8	3.4	5.0	ns	
			$V_{CC} = 5.0\text{ V}$	1.3	2.6	3.8	ns	
			$\bar{E}$ to A or Bn $C_L = 50\text{ pF}$ ; $R_L = 500\ \Omega$	$V_{CC} = 3.3\text{ V}$	1.2	2.2	3.8	ns
	$t_{off}$	turn-off time	S to A or Bn $C_L = 50\text{ pF}$ ; $R_L = 500\ \Omega$	$V_{CC} = 3.3\text{ V}$	1.1	4.0	5.4	ns
				$V_{CC} = 5.0\text{ V}$	1.0	2.9	3.8	ns
				$\bar{E}$ to A or Bn $C_L = 50\text{ pF}$ ; $R_L = 500\ \Omega$	$V_{CC} = 3.3\text{ V}$	2.0	3.7	5.0
$C_i$	input capacitance		$V_{CC} = 5.0\text{ V}$	1.3	2.9	3.8	ns	
				-	2.5	-	pF	
				-	6.0	-	pF	
$C_{S(OFF)}$	OFF-state capacitance		-	18	-	pF		
$C_{S(ON)}$	ON-state capacitance		-	18	-	pF		

### 4. Ordering information

**Table 2. 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 $1 \times 1.95 \times 0.5\text{ mm}$	SOT833-1

### 5. Marking

**Table 3. Marking**

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

## 6. Functional diagram

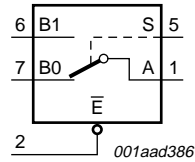


Fig 1. Logic symbol

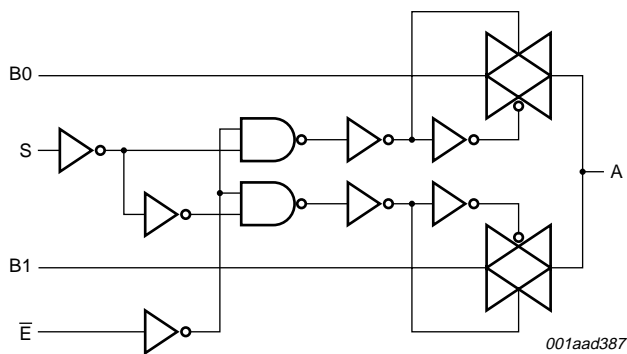


Fig 2. Logic diagram

## 7. Pinning information

### 7.1 Pinning

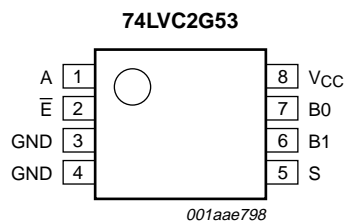


Fig 3. Pin configuration TSSOP8 and VSSOP8

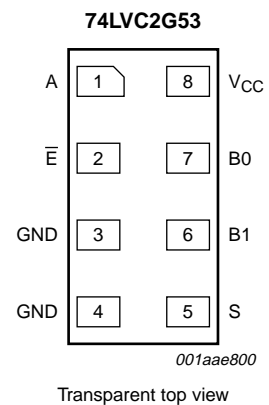


Fig 4. Pin configuration XSON8

## 7.2 Pin description

Table 4. Pin description

Symbol	Pin	Description
A	1	common A output or input
$\bar{E}$	2	enable input (active LOW)
GND	3	ground (0 V)
GND	4	ground (0 V)
S	5	select input
B1	6	independent B1 input or output
B0	7	independent B0 input or output
V <sub>CC</sub>	8	supply voltage

## 8. Functional description

### 8.1 Function table

Table 5. Function table<sup>[1]</sup>

Input		Channel on
S	$\bar{E}$	
L	L	B0 to A or A to B0
H	L	B1 to A or A to B1
X	H	Z (switch off)

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

## 9. Limiting values

**Table 6. 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 $V_I > V_{CC} + 0.5$	-	-50	mA
$I_{SK}$	switch clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5$	-	$\pm 50$	mA
$V_{SW}$	switch voltage	enable and disable mode	-0.5	$V_{CC} + 0.5$	V
$I_{SW}$	switch current	$V_{SW} = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$	-	$\pm 50$	mA
$I_{CC}$	quiescent 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 $+125\text{ °C}$	[2] -	300	mW

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

[2] For TSSOP8 package: above 55 °C the value of  $P_{tot}$  derates linearly with 2.5 mW/K.  
For VSSOP8 package: above 110 °C the value of  $P_{tot}$  derates linearly with 8 mW/K.  
For XSON8 package: above 45 °C the value of  $P_{tot}$  derates linearly with 2.4 mW/K.

## 10. Recommended operating conditions

**Table 7. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Typ	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] 0	-	20	ns/V
		$V_{CC} = 2.7\text{ V}$ to $5.5\text{ V}$	[2] 0	-	10	ns/V

[1] To avoid drawing  $V_{CC}$  current out of terminal A when switch current flows in terminal Bn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal A, no  $V_{CC}$  current will flow out of terminal Bn. In this case, there is no limit for the voltage drop across the switch.

[2] Applies to control signal levels.

## 11. Static characteristics

**Table 8. Static characteristics**

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

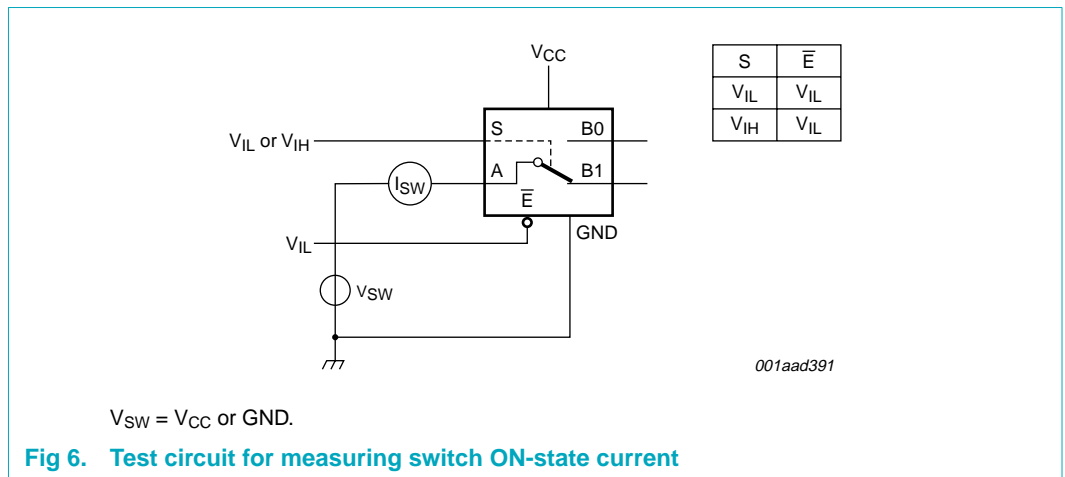
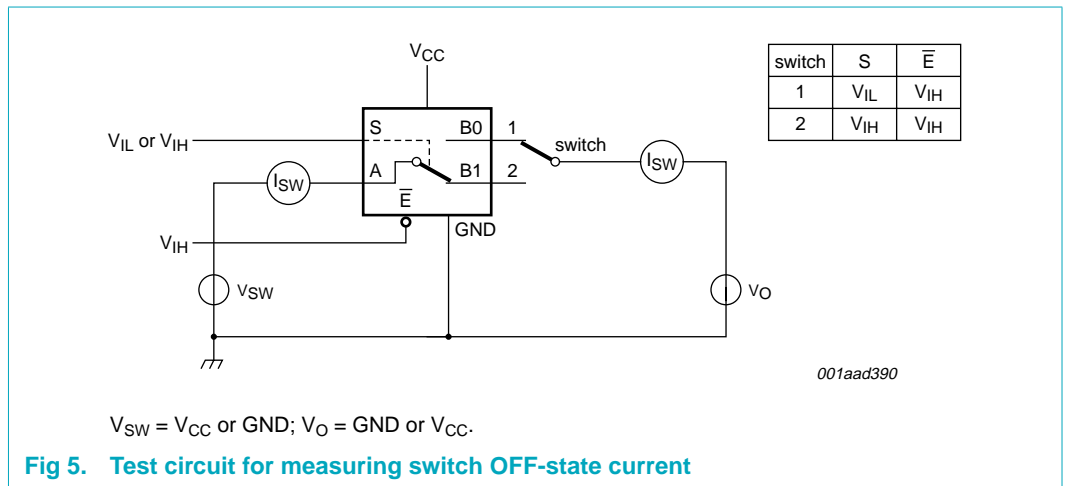
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math>[1]</b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	$0.65V_{CC}$	-	-	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.7	-	-	V
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	2.0	-	-	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$0.7V_{CC}$	-	-	V
$V_{IL}$	LOW-state input voltage	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	$0.35V_{CC}$	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	0.7	V
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	0.8	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	$0.3V_{CC}$	V
$I_{LI}$	input leakage current	on pin S and pin $\bar{E}$ ; $V_I = 5.5\text{ V or GND}; V_{CC} = 5.5\text{ V}$	-	$\pm 0.1$	$\pm 2$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	per channel; $V_{SW} = \text{GND and } V_O = V_{CC}$ or $V_{SW} = V_{CC} \text{ and } V_O = \text{GND};$ $V_{CC} = 5.5\text{ V};$ see <a href="#">Figure 5</a>	-	$\pm 0.1$	$\pm 5$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	per channel; $V_{SW} = \text{GND or } V_{CC}; V_{CC} = 5.5\text{ V};$ see <a href="#">Figure 6</a>	-	$\pm 0.1$	$\pm 5$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = V_{CC} \text{ or GND};$ $V_{SW} = \text{GND or } V_{CC}; I_O = 0\text{ A};$ $V_{CC} = 5.5\text{ V}$	-	0.1	10	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current	per input pin; $V_I = V_{CC} - 0.6\text{ V}; V_{SW} = \text{GND or } V_{CC};$ $I_O = 0\text{ A}; V_{CC} = 5.5\text{ V}$	-	5	500	$\mu\text{A}$
$C_i$	input capacitance		-	2.5	-	pF
$C_{S(OFF)}$	OFF-state capacitance		-	6.0	-	pF
$C_{S(ON)}$	ON-state capacitance		-	18	-	pF
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	$0.65V_{CC}$	-	-	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.7	-	-	V
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	2.0	-	-	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$0.7V_{CC}$	-	-	V
$V_{IL}$	LOW-state input voltage	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	$0.35V_{CC}$	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	0.7	V
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	0.8	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	$0.3V_{CC}$	V
$I_{LI}$	input leakage current	on pin S and pin $\bar{E}$ ; $V_I = 5.5\text{ V or GND}; V_{CC} = 5.5\text{ V}$	-	-	$\pm 10$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	per channel; $V_{SW} = \text{GND and } V_O = V_{CC}$ or $V_{SW} = V_{CC} \text{ and } V_O = \text{GND};$ $V_{CC} = 5.5\text{ V};$ see <a href="#">Figure 5</a>	-	-	$\pm 20$	$\mu\text{A}$

**Table 8. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{S(ON)}$	ON-state leakage current	per channel; $V_{SW} = GND$ or $V_{CC}$ ; $V_{CC} = 5.5 V$ ; see <a href="#">Figure 6</a>	-	-	$\pm 20$	$\mu A$
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or $GND$ ; $V_{SW} = GND$ or $V_{CC}$ ; $I_O = 0 A$ ; $V_{CC} = 5.5 V$	-	-	40	$\mu A$
$\Delta I_{CC}$	additional quiescent supply current	per input pin; $V_I = V_{CC} - 0.6 V$ ; $V_{SW} = GND$ or $V_{CC}$ ; $I_O = 0 A$ ; $V_{CC} = 5.5 V$	-	-	5000	$\mu A$

[1] Typical values are measured at  $T_{amb} = 25\text{ }^\circ C$ .



**Table 9. Resistance  $R_{on}$** At recommended operating conditions; voltages are referenced to GND (ground = 0 V); see test circuit [Figure 7](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b>							
$R_{ON(rail)}$	ON resistance (rail)	$V_{SW} = GND$					
		$I_{SW} = 4\text{ mA}; V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	8.7	18	$\Omega$	
		$I_{SW} = 8\text{ mA}; V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	7.2	16	$\Omega$	
		$I_{SW} = 12\text{ mA}; V_{CC} = 2.7\text{ V}$	-	7.0	14	$\Omega$	
		$I_{SW} = 24\text{ mA}; V_{CC} = 3\text{ V to }3.6\text{ V}$	-	6.5	12	$\Omega$	
		$I_{SW} = 32\text{ mA}; V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	5.9	10	$\Omega$	
		$V_{SW} = V_{CC}$					
		$I_{SW} = 4\text{ mA}; V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	12	30	$\Omega$	
		$I_{SW} = 8\text{ mA}; V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	8.3	20	$\Omega$	
		$I_{SW} = 12\text{ mA}; V_{CC} = 2.7\text{ V}$	-	7.8	18	$\Omega$	
$R_{ON(peak)}$	ON resistance (peak)	$V_{SW} = GND\text{ to }V_{CC}$					
		$I_{SW} = 4\text{ mA}; V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	57	130	$\Omega$	
		$I_{SW} = 8\text{ mA}; V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	15	30	$\Omega$	
		$I_{SW} = 12\text{ mA}; V_{CC} = 2.7\text{ V}$	-	13	25	$\Omega$	
		$I_{SW} = 24\text{ mA}; V_{CC} = 3\text{ V to }3.6\text{ V}$	-	9.0	20	$\Omega$	
$R_{ON(flat)}$	ON resistance (flatness)	$V_{SW} = GND\text{ to }V_{CC}$ ; see <a href="#">Figure 9</a>					
		$I_{SW} = 4\text{ mA}; V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	100	-	$\Omega$	
		$I_{SW} = 8\text{ mA}; V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	17	-	$\Omega$	
		$I_{SW} = 12\text{ mA}; V_{CC} = 2.7\text{ V}$	-	10	-	$\Omega$	
		$I_{SW} = 24\text{ mA}; V_{CC} = 3\text{ V to }3.6\text{ V}$	-	5	-	$\Omega$	
$R_{ON(rail)}$	ON resistance (rail)	$V_{SW} = GND$					
		$I_{SW} = 4\text{ mA}; V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	27	$\Omega$	
		$I_{SW} = 8\text{ mA}; V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	24	$\Omega$	
		$I_{SW} = 12\text{ mA}; V_{CC} = 2.7\text{ V}$	-	-	21	$\Omega$	
		$I_{SW} = 24\text{ mA}; V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	18	$\Omega$	
		$I_{SW} = 32\text{ mA}; V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	15	$\Omega$	
		$V_{SW} = V_{CC}$					
		$I_{SW} = 4\text{ mA}; V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	45	$\Omega$	
		$I_{SW} = 8\text{ mA}; V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	30	$\Omega$	
		$I_{SW} = 12\text{ mA}; V_{CC} = 2.7\text{ V}$	-	-	27	$\Omega$	
$I_{SW} = 24\text{ mA}; V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	23	$\Omega$			
$I_{SW} = 32\text{ mA}; V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	15	$\Omega$			

 **$T_{amb} = -40\text{ °C to }+125\text{ °C}$**

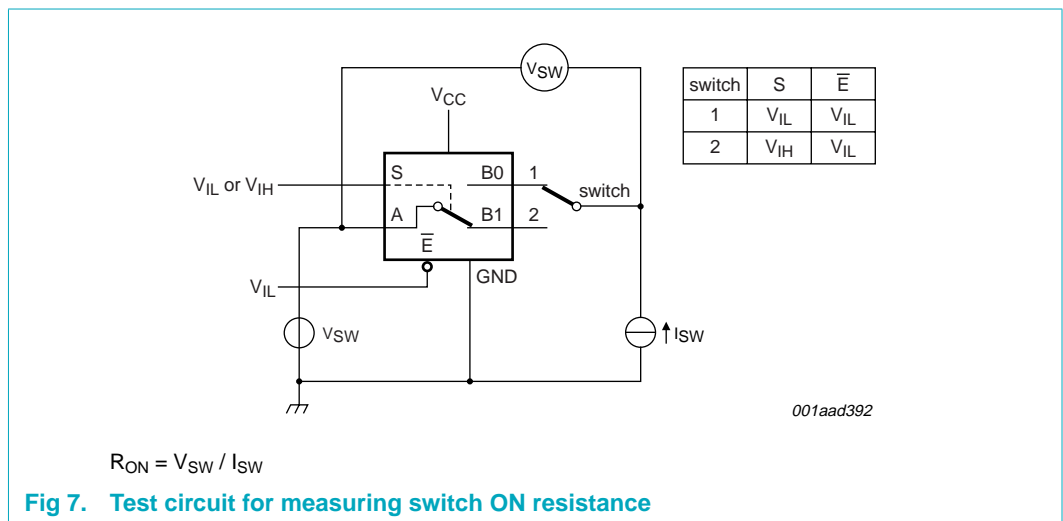


**Table 9. Resistance  $R_{ON}$  ...continued**

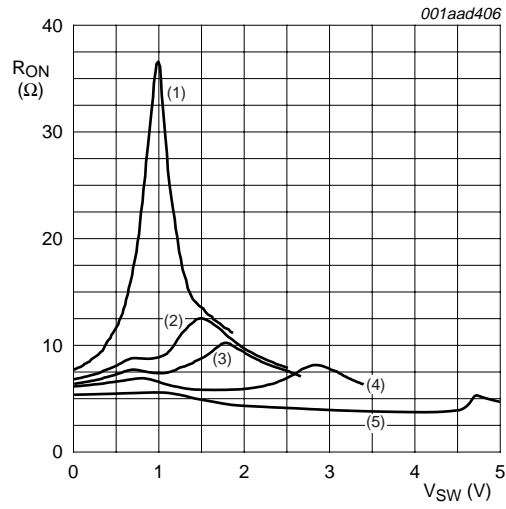
At recommended operating conditions; voltages are referenced to GND (ground = 0 V); see test circuit [Figure 7](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{ON(peak)}$	ON resistance (peak)	$V_{SW} = GND \text{ to } V_{CC}$				
		$I_{SW} = 4 \text{ mA}; V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	-	-	130	$\Omega$
		$I_{SW} = 8 \text{ mA}; V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	55	$\Omega$
		$I_{SW} = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	35	$\Omega$
		$I_{SW} = 24 \text{ mA}; V_{CC} = 3 \text{ V to } 3.6 \text{ V}$	-	-	25	$\Omega$
		$I_{SW} = 32 \text{ mA}; V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	20	$\Omega$

[1] Typical values are measured at  $T_{amb} = 25 \text{ }^\circ\text{C}$  and nominal  $V_{CC}$ .

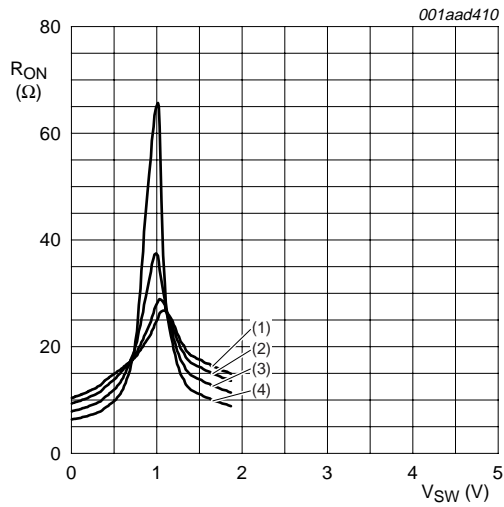


**Fig 7. Test circuit for measuring switch ON resistance**

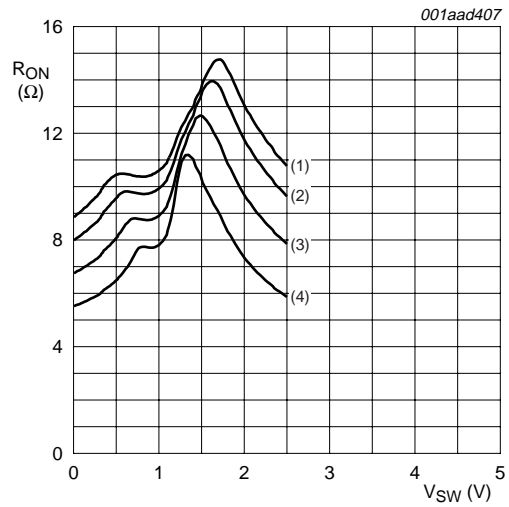


- (1)  $V_{CC} = 1.8\text{ V}$
  - (2)  $V_{CC} = 2.5\text{ V}$
  - (3)  $V_{CC} = 2.7\text{ V}$
  - (4)  $V_{CC} = 3.3\text{ V}$
  - (5)  $V_{CC} = 5.0\text{ V}$
- $T_{amb} = 25\text{ }^{\circ}\text{C}$

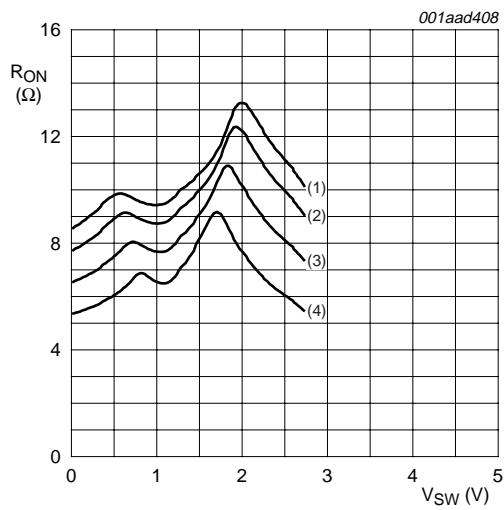
**Fig 8. Typical switch ON resistance as a function of input voltage**



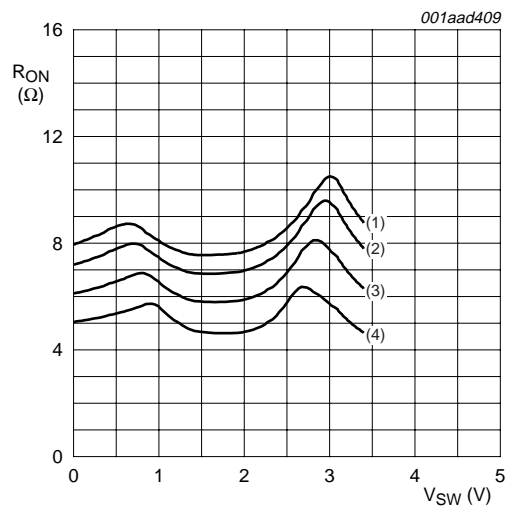
- (1)  $T_{amb} = 125\text{ °C}$
  - (2)  $T_{amb} = 85\text{ °C}$
  - (3)  $T_{amb} = 25\text{ °C}$
  - (4)  $T_{amb} = -40\text{ °C}$
- a.  $V_{CC} = 1.8\text{ V}$



- (1)  $T_{amb} = 125\text{ °C}$
  - (2)  $T_{amb} = 85\text{ °C}$
  - (3)  $T_{amb} = 25\text{ °C}$
  - (4)  $T_{amb} = -40\text{ °C}$
- b.  $V_{CC} = 2.5\text{ V}$



- (1)  $T_{amb} = 125\text{ °C}$
  - (2)  $T_{amb} = 85\text{ °C}$
  - (3)  $T_{amb} = 25\text{ °C}$
  - (4)  $T_{amb} = -40\text{ °C}$
- c.  $V_{CC} = 2.7\text{ V}$



- (1)  $T_{amb} = 125\text{ °C}$
  - (2)  $T_{amb} = 85\text{ °C}$
  - (3)  $T_{amb} = 25\text{ °C}$
  - (4)  $T_{amb} = -40\text{ °C}$
- d.  $V_{CC} = 3.3\text{ V}$

Fig 9. Switch ON resistance as a function of switch voltage

## 12. Dynamic characteristics

**Table 10. Dynamic characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); test circuit [Figure 12](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit			
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math>[1]</b>									
$t_{PHL}$	HIGH-to-LOW propagation delay	see <a href="#">Figure 10</a>							
		A to Bn or Bn to A	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	2	ns		
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	1.2	ns		
			$V_{CC} = 2.7\text{ V}$	-	-	1.0	ns		
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	0.8	ns		
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	0.6	ns		
$t_{PLH}$	LOW-to-HIGH propagation delay	see <a href="#">Figure 10</a>							
		A to Bn or Bn to A	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	2	ns		
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	1.2	ns		
			$V_{CC} = 2.7\text{ V}$	-	-	1.0	ns		
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	0.8	ns		
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	0.6	ns		
$t_{on}$	turn-on time	see <a href="#">Figure 11</a>							
		S to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.6	6.7	10.3	ns		
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.9	4.1	6.4	ns		
			$V_{CC} = 2.7\text{ V}$	1.9	4.0	5.5	ns		
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	1.8	3.4	5.0	ns		
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.3	2.6	3.8	ns		
		$\bar{E}$ to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.9	4.0	7.3	ns		
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.4	2.5	4.4	ns		
			$V_{CC} = 2.7\text{ V}$	1.1	2.6	3.9	ns		
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	1.2	2.2	3.8	ns		
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.0	1.7	2.6	ns		
		$t_{off}$	turn-off time	see <a href="#">Figure 11</a>					
				S to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.1	6.8	10.0	ns
					$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.4	3.7	6.1	ns
$V_{CC} = 2.7\text{ V}$	1.4				4.9	6.2	ns		
$V_{CC} = 3\text{ V to }3.6\text{ V}$	1.1				4.0	5.4	ns		
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.0				2.9	3.8	ns		
$\bar{E}$ to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$			2.3	5.6	8.6	ns		
	$V_{CC} = 2.3\text{ V to }2.7\text{ V}$			1.2	3.2	4.8	ns		
	$V_{CC} = 2.7\text{ V}$			1.4	4.0	5.2	ns		
	$V_{CC} = 3\text{ V to }3.6\text{ V}$			2.0	3.7	5.0	ns		
	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$			1.3	2.9	3.8	ns		

**Table 10. Dynamic characteristics ...continued**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); test circuit [Figure 12](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>							
$t_{PHL}$	HIGH-to-LOW propagation delay	see <a href="#">Figure 10</a>					
		A to Bn or Bn to A	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	2.5	ns
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	1.5	ns
			$V_{CC} = 2.7\text{ V}$	-	-	1.25	ns
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	1.0	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	0.8	ns
$t_{PLH}$	LOW-to-HIGH propagation delay	see <a href="#">Figure 10</a>					
		A to Bn or Bn to A	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	-	2.5	ns
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	1.5	ns
			$V_{CC} = 2.7\text{ V}$	-	-	1.25	ns
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	-	-	1.0	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	0.8	ns
$t_{on}$	turn-on time	see <a href="#">Figure 11</a>					
		S to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.6	-	12.9	ns
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.9	-	8.0	ns
			$V_{CC} = 2.7\text{ V}$	1.8	-	7.0	ns
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	1.8	-	6.3	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.3	-	4.8	ns
		$\bar{E}$ to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.9	-	9.2	ns
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.4	-	5.5	ns
			$V_{CC} = 2.7\text{ V}$	1.1	-	4.9	ns
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	1.2	-	4.8	ns
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.0		-	3.3	ns		
$t_{off}$	turn-off time	see <a href="#">Figure 11</a>					
		S to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.1	-	12.5	ns
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.4	-	7.7	ns
			$V_{CC} = 2.7\text{ V}$	1.4	-	7.8	ns
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	1.1	-	6.8	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.0	-	4.8	ns
		$\bar{E}$ to A or Bn	$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.3	-	11.0	ns
			$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.2	-	6.0	ns
			$V_{CC} = 2.7\text{ V}$	1.4	-	6.5	ns
			$V_{CC} = 3\text{ V to }3.6\text{ V}$	2.0	-	6.3	ns
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.3		-	4.8	ns		

[1] Typical values are measured at  $T_{amb} = 25\text{ °C}$  and nominal  $V_{CC}$ .

13. Waveforms

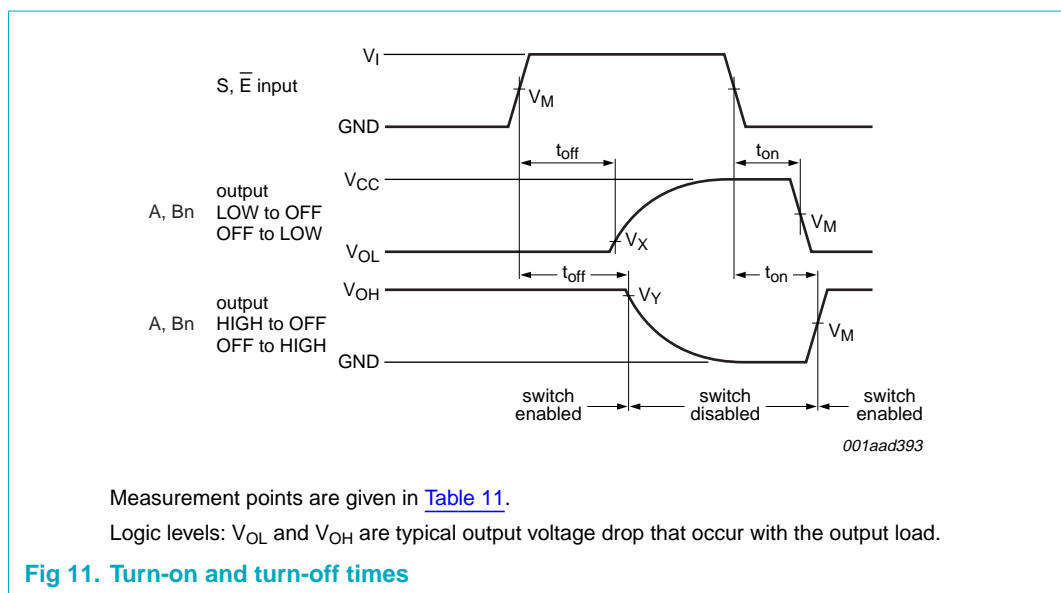
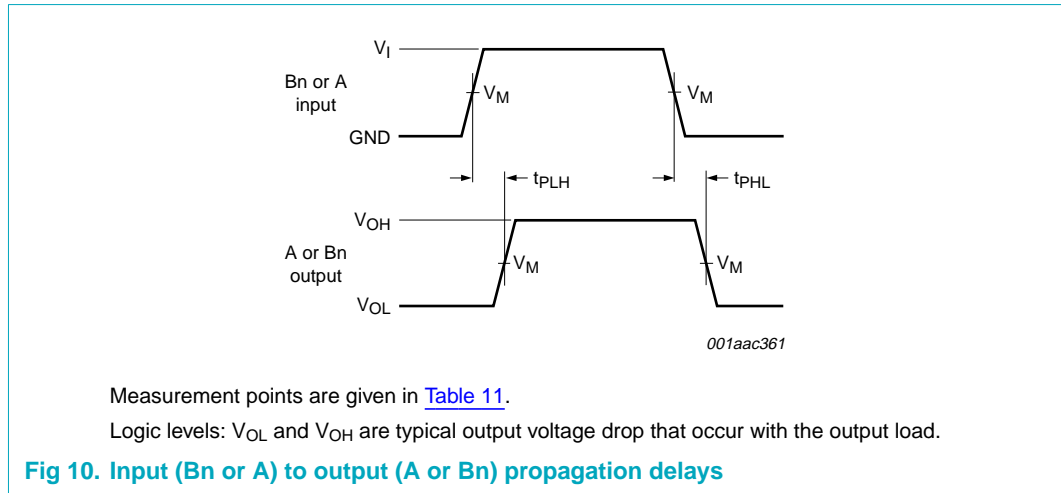
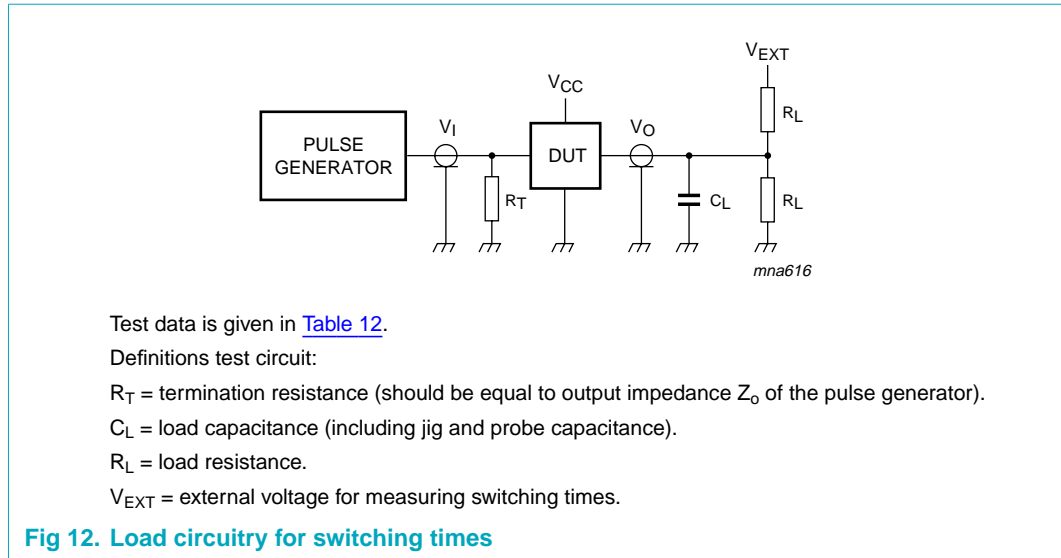


Table 11. Measurement points

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	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$



**Table 12. Test data**

Supply voltage $V_{CC}$	Input		Load		$V_{EXT}$ $t_{PLH}, t_{PHL}$	$t_{on}, t_{off}$	
	$V_I$	$t_r, t_f$	$C_L$	$R_L$		HIGH to OFF OFF to HIGH	LOW to OFF OFF to LOW
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	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2 \times V_{CC}$
3 V to 3.6 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2 \times V_{CC}$
4.5 V to 5.5 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2 \times V_{CC}$

## 14. Additional dynamic characteristics

**Table 13. Additional dynamic characteristics**

At recommended operating conditions; typical values measured at  $T_{amb} = 25^\circ C$ .

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 13</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 14</a>		[1]		
		$V_{CC} = 1.65$ 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 13. Additional dynamic characteristics ...continued**

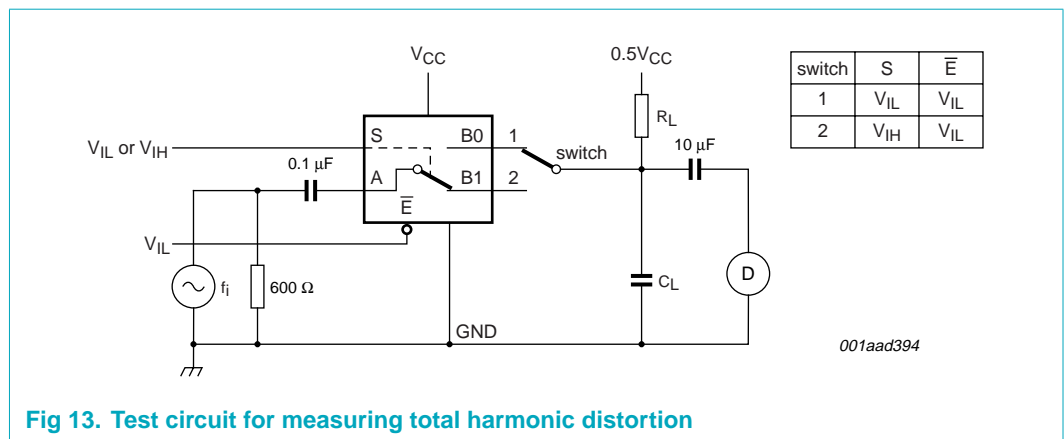
At recommended operating conditions; typical values measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\alpha_{\text{OFF(ft)}}$	OFF-state feed-through attenuation	$R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; $f_i = 10\ \text{MHz}$ ; see <a href="#">Figure 15</a>	[2]			
		$V_{CC} = 1.65\ \text{V}$	-	-42	-	dB
		$V_{CC} = 2.3\ \text{V}$	-	-42	-	dB
		$V_{CC} = 3.0\ \text{V}$	-	-40	-	dB
$V_{\text{ct(sw-sw)}}$	crosstalk between switches	$R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; $f_i = 10\ \text{MHz}$ ; see <a href="#">Figure 16</a>				
		$V_{CC} = 1.65\ \text{V}$	-	-68	-	dBV
		$V_{CC} = 2.3\ \text{V}$	-	-70	-	dBV
		$V_{CC} = 3.0\ \text{V}$	-	-70	-	dBV
$Q_{\text{inj}}$	charge injection	$C_L = 0.1\ \text{nF}$ ; $V_{\text{gen}} = 0\ \text{V}$ ; $R_{\text{gen}} = 0\ \Omega$ ; $f_i = 1\ \text{MHz}$ ; $R_L = 1\ \text{M}\Omega$ ; see <a href="#">Figure 17</a>	[3]			
		$V_{CC} = 1.8\ \text{V}$	-	< 0.003	-	pC
		$V_{CC} = 2.5\ \text{V}$	-	0.004	-	pC
		$V_{CC} = 3.3\ \text{V}$	-	0.0045	-	pC
		$V_{CC} = 4.5\ \text{V}$	-	0.0045	-	pC
		$V_{CC} = 5.5\ \text{V}$	-	0.0045	-	pC

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

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

[3] Definition:  $Q_{\text{inj}} = \Delta V_O \times C_L$ . Guaranteed by design.



**Fig 13. Test circuit for measuring total harmonic distortion**



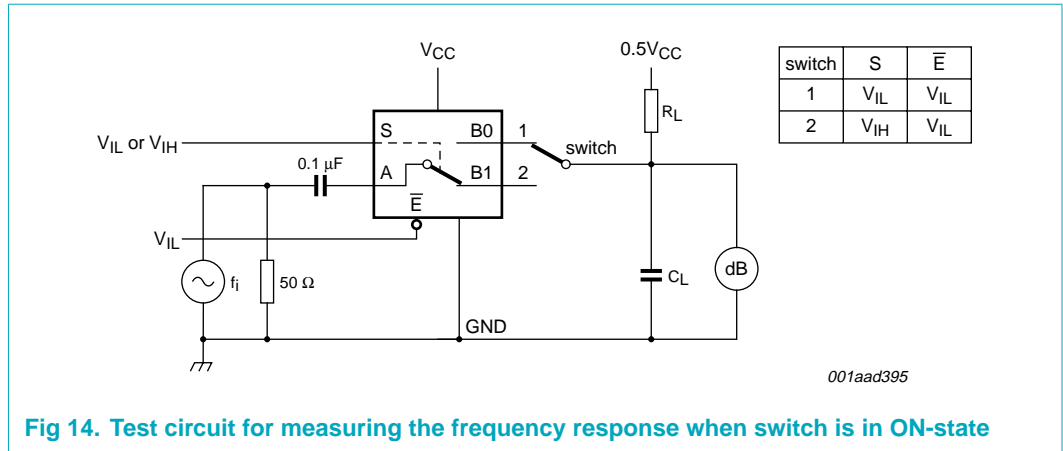


Fig 14. Test circuit for measuring the frequency response when switch is in ON-state

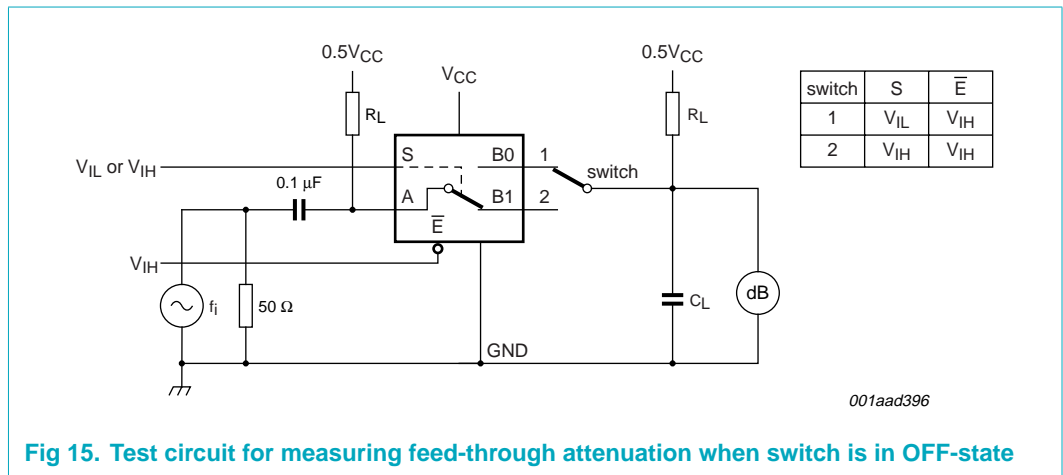


Fig 15. Test circuit for measuring feed-through attenuation when switch is in OFF-state

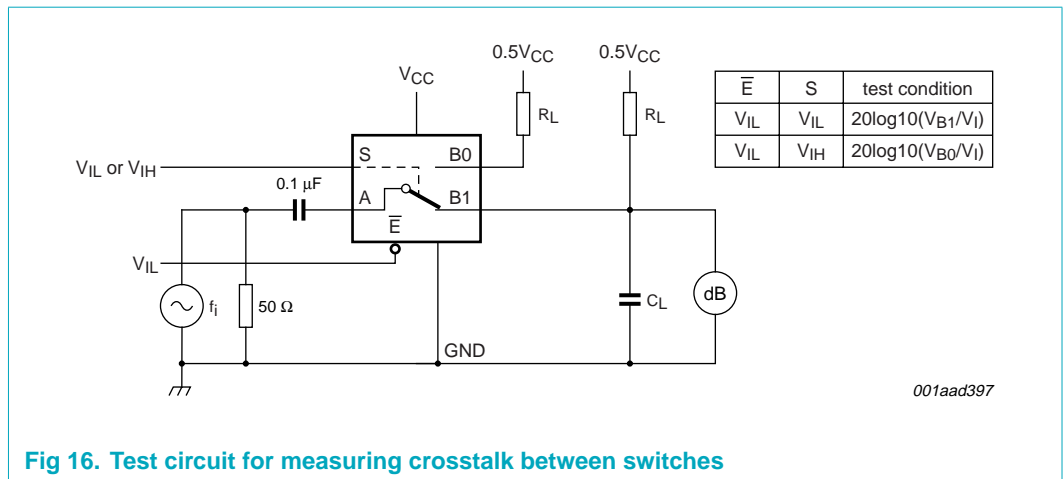
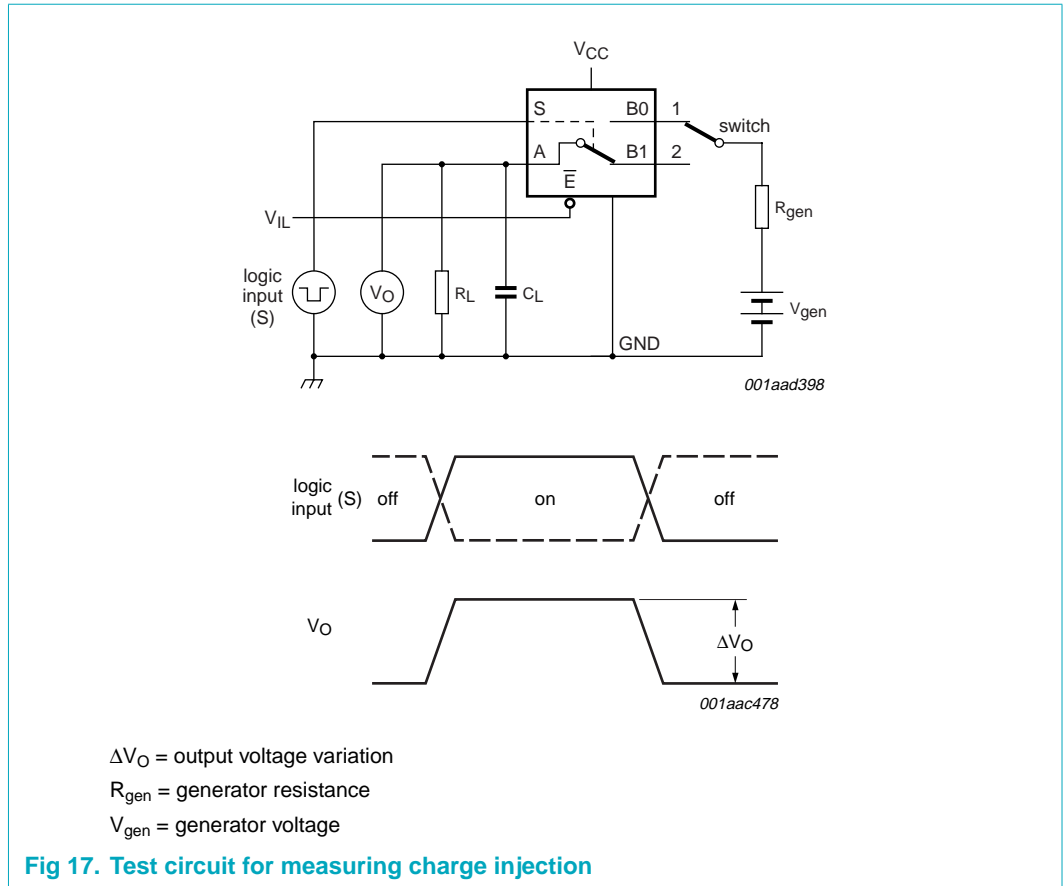


Fig 16. Test circuit for measuring crosstalk between switches



15. Package outline

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

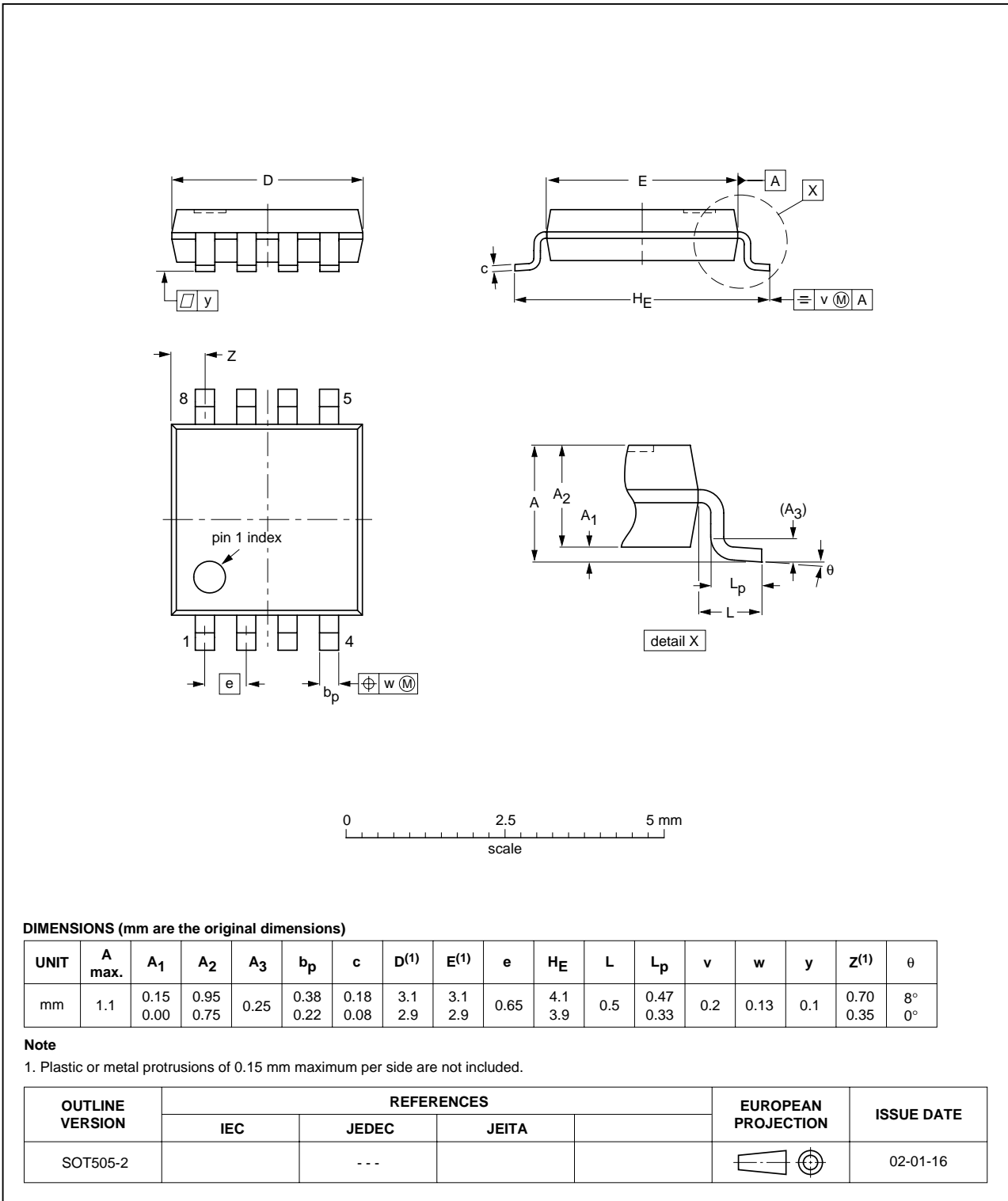


Fig 18. Package outline SOT505-2 (TSSOP8)

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

SOT765-1

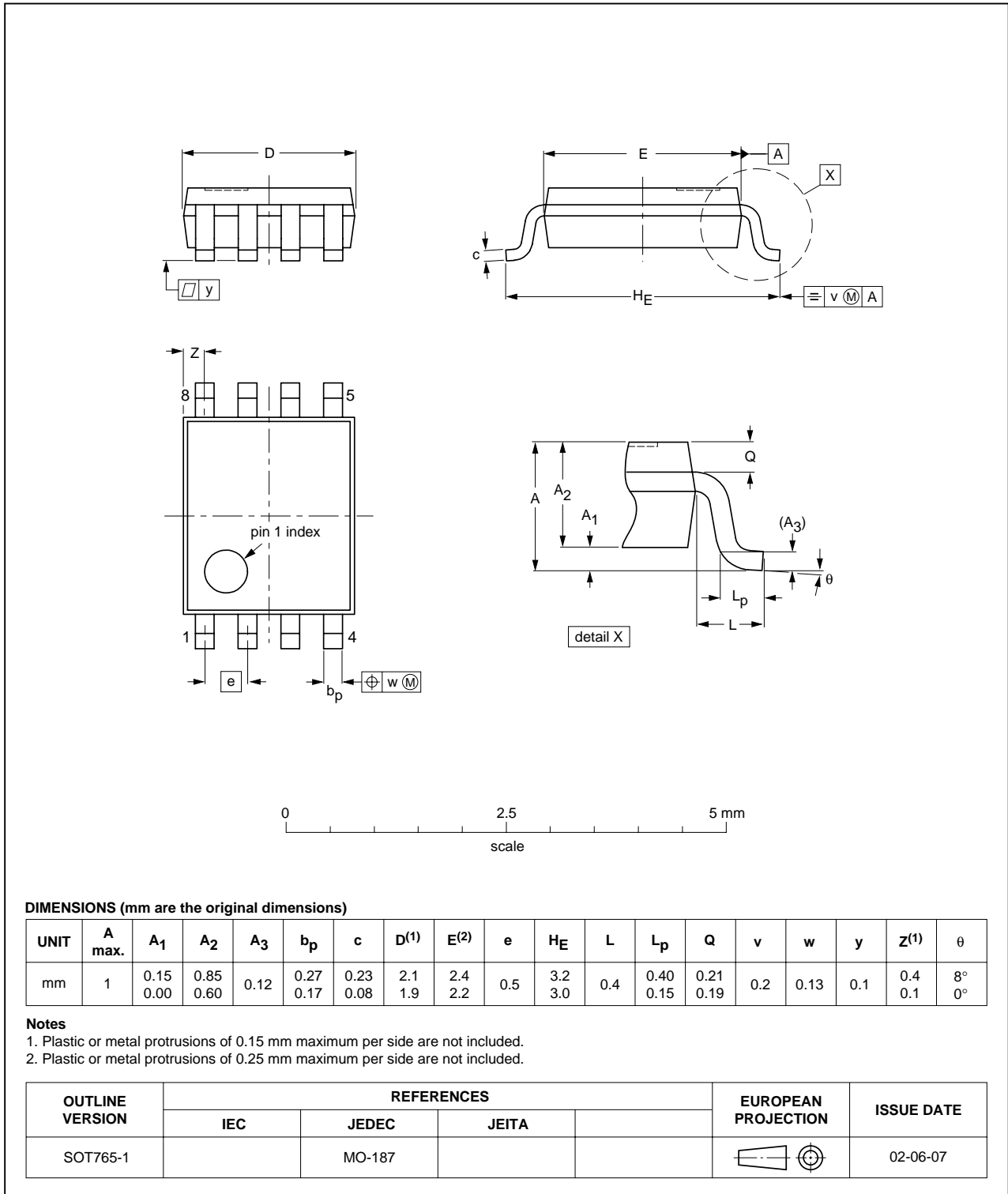


Fig 19. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

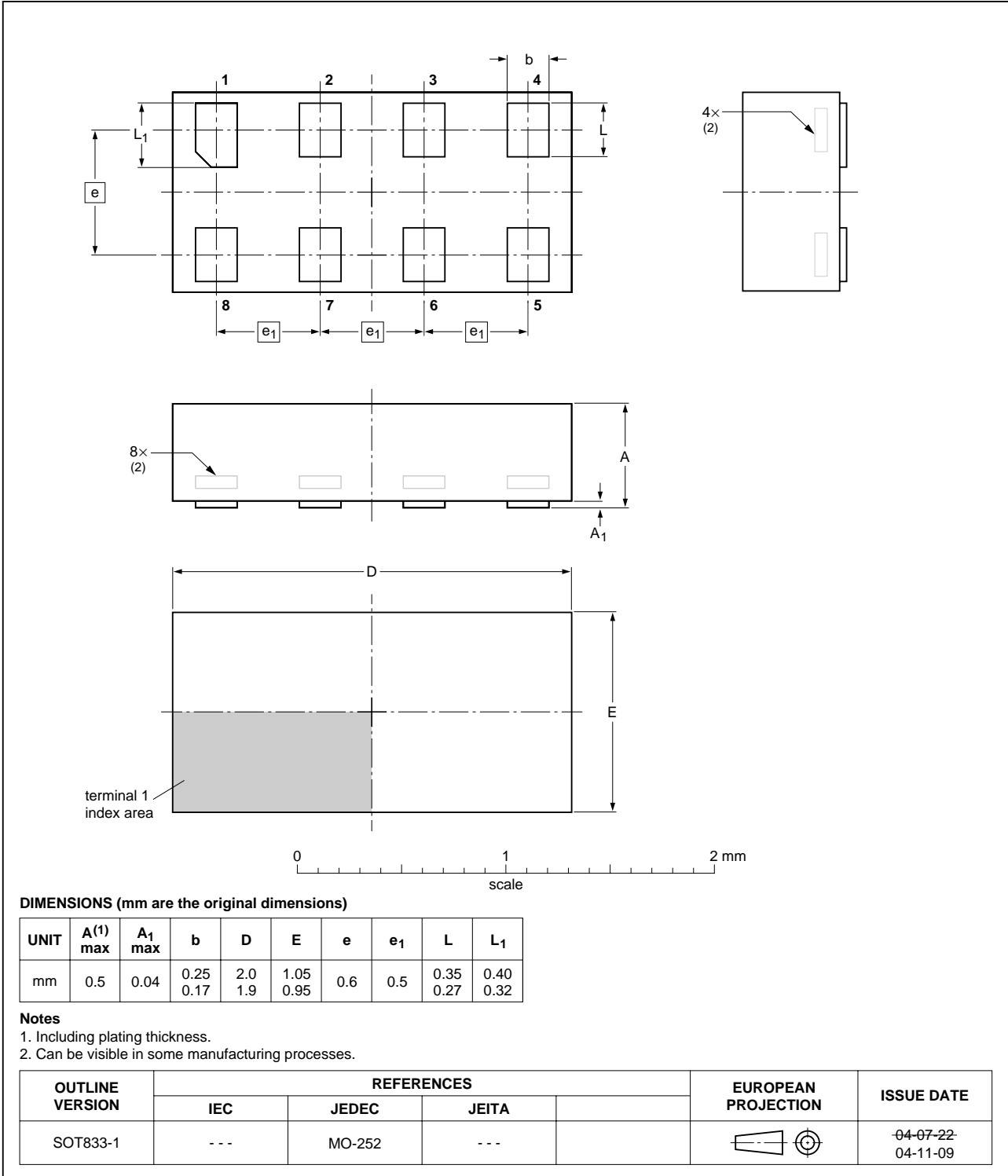


Fig 20. Package outline SOT833-1 (XSON8)

## 16. Abbreviations

Table 14. 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

## 17. Revision history

Table 15. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC2G53_2	20060331	Product data sheet	-	74LVC2G53_1
Modifications:	• Added: type number 74LVC2G53DP (TSSOP8 package)			
74LVC2G53_1	20060110	Product data sheet	-	-

## 18. Legal information

### 18.1 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".

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