74LVC1G53

2-channel analog multiplexer/demultiplexer

Rev. 01 — 10 January 2006 Product data sheet

1. General description

The 74LVC1G53 is a high-performance, low-power, low-voltage, Si-gate CMOS device that provides superior performance to most advanced CMOS compatible TTL families.

The 74LVC1G53 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 ($\overline{E}$). When pin $\overline{E}$ is HIGH, the switch is turned off.

The 74LVC1G53 can handle both analog and digital signals.

2. Features

- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON resistance:
  - 7.5 Ω (typical) at V_{CC} = 2.7 V
  - 6.5 Ω (typical) at V_{CC} = 3.3 V
  - 6 Ω (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

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3. Quick reference data

Table 1: Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{on}	turn-on time					
	S to A or Bn	C_L = 50 pF; R_L = 500 Ω				
		V_{CC} = 3.3 V	1.8	3.4	5.0	ns
		V_{CC} = 5.0 V	1.3	2.6	3.8	ns
	$\overline{E}$ to A or Bn	C_L = 50 pF; R_L = 500 Ω				
		V_{CC} = 3.3 V	1.2	2.2	3.8	ns
		V_{CC} = 5.0 V	1.0	1.7	2.6	ns
t_{off}	turn-off time					
	S to A or Bn	C_L = 50 pF; R_L = 500 Ω				
		V_{CC} = 3.3 V	1.1	4.0	5.4	ns
		V_{CC} = 5.0 V	1.0	2.9	3.8	ns
	$\overline{E}$ to A or Bn	C_L = 50 pF; R_L = 500 Ω				
		V_{CC} = 3.3 V	2.0	3.7	5.0	ns
		V_{CC} = 5.0 V	1.3	2.9	3.8	ns
C_i	input capacitance		-	2.5	-	pF
$C_{S(OFF)}$	OFF-state capacitance		-	6.0	-	pF
$C_{S(ON)}$	ON-state capacitance		-	18	-	pF

4. Ordering information

Table 2: Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G53DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74LVC1G53GT	–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

5. Marking

Table 3: Marking

Type number	Marking code
74LVC1G53DC	V53
74LVC1G53GT	V53

6. Functional diagram

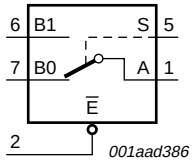


Fig 1. Logic symbol

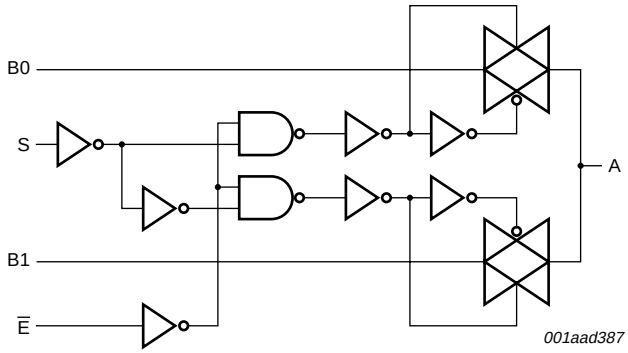


Fig 2. Logic diagram

7. Pinning information

7.1 Pinning

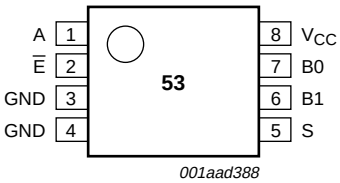
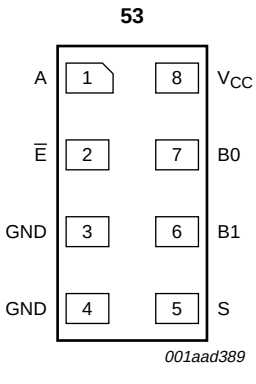


Fig 3. Pin configuration VSSOP8



Transparent top view

Fig 4. Pin configuration XSON8

7.2 Pin description

Table 4: Pin description

Symbol	Pin	Description
A	1	common A output or input
$\overline{E}$	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_{CC}	8	supply voltage

8. Functional description

8.1 Function table

Table 5: Function table [1]

Input		Channel on
S	**$\overline{E}$**	
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	$V_I < –0.5$ V or $V_I > V_{CC} + 0.5$		-	–50	mA
I_{SK}	switch clamping current	$V_I < –0.5$ V or $V_I > V_{CC} + 0.5$		-	±50	mA
V_{SW}	switch voltage	enable and disable mode		–0.5	$V_{CC} + 0.5$	V
I_{SW}	switch current	$V_{SW} = –0.5$ V to $(V_{CC} + 0.5$ V)		-	±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	$T_{amb} = –40$ °C to +125 °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 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	$V_{CC} = 1.65$ V to 2.7 V	[2]	0	-	20	ns/V
		$V_{CC} = 2.7$ V to 5.5 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).

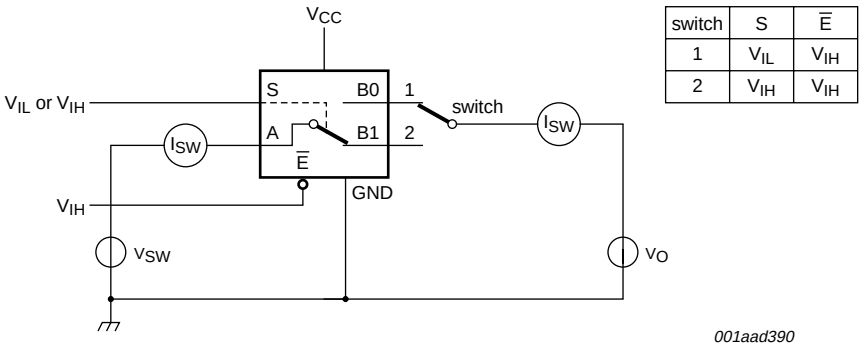
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = −40 °C to +85 °C [1]						
V_{IH}	HIGH-state input voltage	V_{CC} = 1.65 V to 1.95 V	$0.65V_{CC}$	-	-	V
		V_{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V_{CC} = 3 V to 3.6 V	2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V	$0.7V_{CC}$	-	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 1.65 V to 1.95 V	-	-	$0.35V_{CC}$	V
		V_{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V_{CC} = 3 V to 3.6 V	-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V	-	-	$0.3V_{CC}$	V
I_{LI}	input leakage current	on pin S and pin $\overline{E}$; V_I = 5.5 V or GND; V_{CC} = 5.5 V	-	±0.1	±2	µA
$I_{S(OFF)}$	OFF-state leakage current	per channel; V_{SW} = GND and V_O = V_{CC} or V_{SW} = V_{CC} and V_O = GND; V_{CC} = 5.5 V; see Figure 5	-	±0.1	±5	µA
$I_{S(ON)}$	ON-state leakage current	per channel; V_{SW} = GND or V_{CC}; V_{CC} = 5.5 V; see Figure 6	-	±0.1	±5	µA
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	-	0.1	10	µA
ΔI_{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	-	5	500	µA
C_i	input capacitance		-	2.5	-	pF
$C_{S(OFF)}$	OFF-state capacitance		-	6.0	-	pF
$C_{S(ON)}$	ON-state capacitance		-	18	-	pF
T_{amb} = −40 °C to +125 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 1.65 V to 1.95 V	$0.65V_{CC}$	-	-	V
		V_{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V_{CC} = 3 V to 3.6 V	2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V	$0.7V_{CC}$	-	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 1.65 V to 1.95 V	-	-	$0.35V_{CC}$	V
		V_{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V_{CC} = 3 V to 3.6 V	-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V		-	$0.3V_{CC}$	V
I_{LI}	input leakage current	on pin S and pin $\overline{E}$; V_I = 5.5 V or GND; V_{CC} = 5.5 V	-	-	±10	µA
$I_{S(OFF)}$	OFF-state leakage current	per channel; V_{SW} = GND and V_O = V_{CC} or V_{SW} = V_{CC} and V_O = GND; V_{CC} = 5.5 V; see Figure 5	-	-	±20	µA

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 Figure 6	-	-	±20	µA
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	µA
ΔI_{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	µA

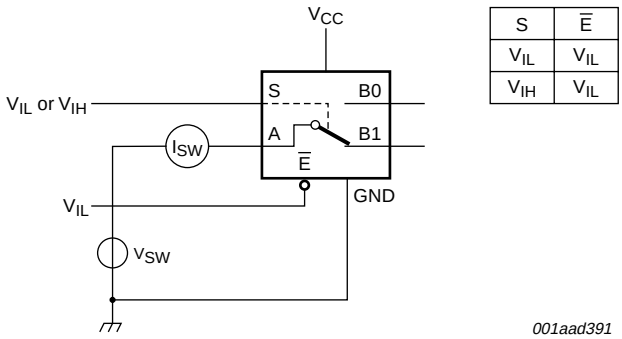
[1] Typical values are measured at T_{amb} = 25 °C.



switch	S	$\overline{E}$
1	V_{IL}	V_{IH}
2	V_{IH}	V_{IH}

V_{SW} = V_{CC} or GND; V_O = GND or V_{CC}.

Fig 5. Test circuit for measuring switch OFF-state current



S	$\overline{E}$
V_{IL}	V_{IL}
V_{IH}	V_{IL}

V_{SW} = V_{CC} or GND.

Fig 6. Test circuit for measuring switch ON-state current

Table 9: Resistance R_{on}

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

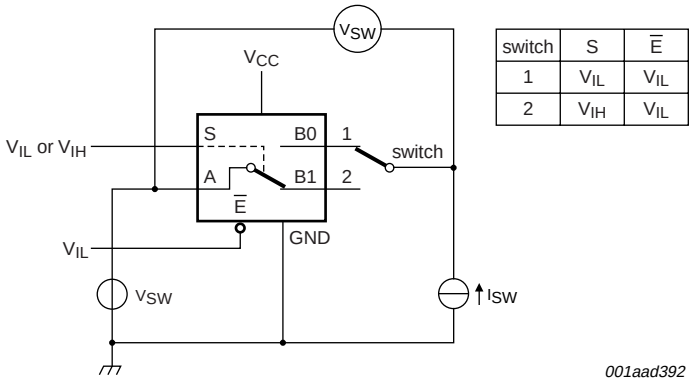
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = −40 °C to +85 °C [1]						
$R_{ON(rail)}$	ON resistance (rail)	V_{SW} = GND				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	8.7	18	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	7.2	16	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	7.0	14	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	6.5	12	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	5.9	10	Ω
		V_{SW} = V_{CC}				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	12	30	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	8.3	20	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	7.8	18	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	6.7	15	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	5.2	10	Ω
$R_{ON(peak)}$	ON resistance (peak)	V_{SW} = GND to V_{CC}				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	57	130	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	15	30	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	13	25	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	9.0	20	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	6.0	15	Ω
$R_{ON(flat)}$	ON resistance (flatness)	V_{SW} = GND to V_{CC}; see Figure 9				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	100	-	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	17	-	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	10	-	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	5	-	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	3	-	Ω
T_{amb} = −40 °C to +125 °C						
$R_{ON(rail)}$	ON resistance (rail)	V_{SW} = GND				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	-	27	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	-	24	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	-	21	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	-	18	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	-	15	Ω
		V_{SW} = V_{CC}				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	-	45	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	-	30	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	-	27	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	-	23	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	-	15	Ω

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 to V_{CC}				
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	-	130	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	-	55	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	-	35	Ω
		I_{SW} = 24 mA; V_{CC} = 3 V to 3.6 V	-	-	25	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	-	20	Ω

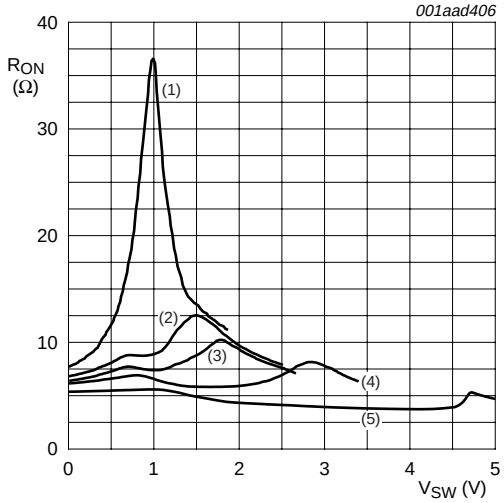
[1] Typical values are measured at T_{amb} = 25 °C and nominal V_{CC}.



switch	S	$\overline{E}$
1	V_{IL}	V_{IL}
2	V_{IH}	V_{IL}

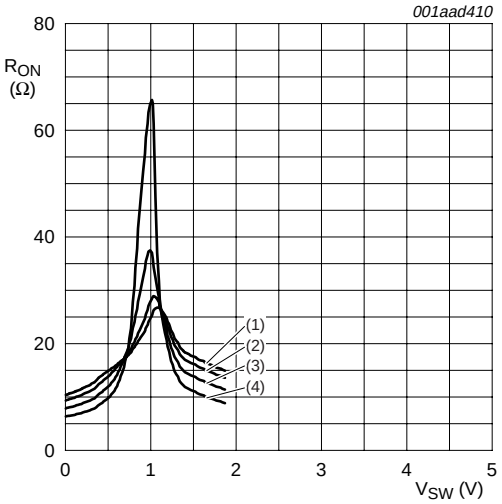
$R_{ON} = V_{SW} / I_{SW}$

Fig 7. Test circuit for measuring switch ON resistance



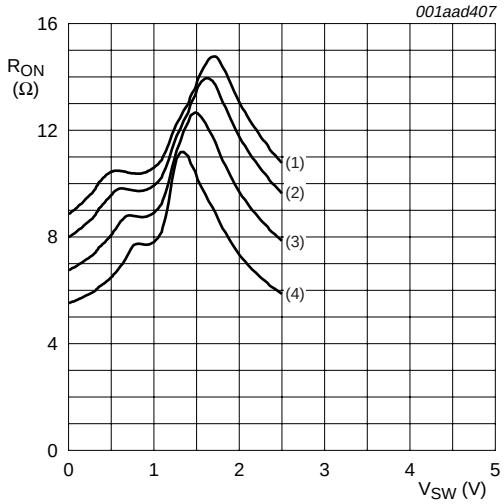
(1) V_{CC} = 1.8 V
(2) V_{CC} = 2.5 V
(3) V_{CC} = 2.7 V
(4) V_{CC} = 3.3 V
(5) V_{CC} = 5.0 V
(6) T_{amb} = 25 °C

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



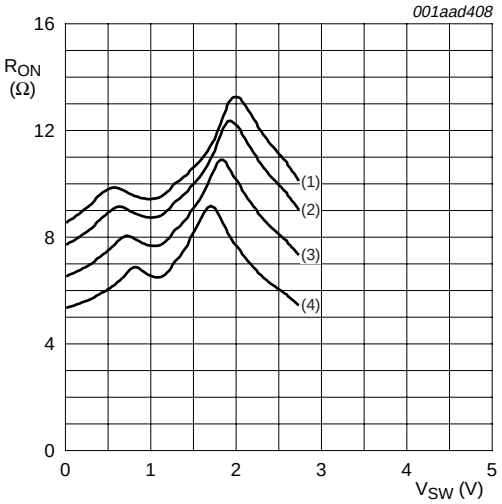
(1) T_{amb} = 125 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = –40 °C

a. V_{CC} = 1.8 V



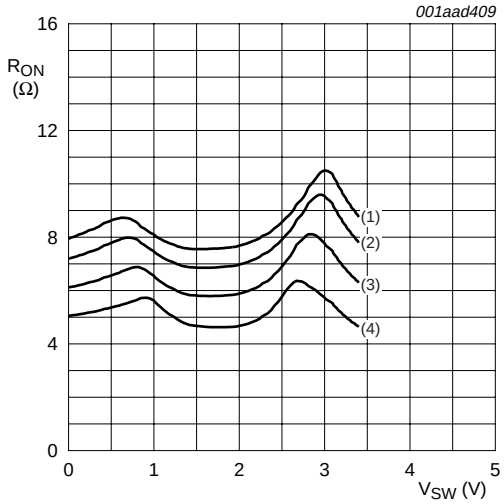
(1) T_{amb} = 125 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = –40 °C

b. V_{CC} = 2.5 V



(1) T_{amb} = 125 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = –40 °C

c. V_{CC} = 2.7 V



(1) T_{amb} = 125 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = –40 °C

d. V_{CC} = 3.3 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
T_{amb} = −40 °C to +85 °C [1]						
t_{PHL}	HIGH-to-LOW propagation delay	see Figure 10				
	A to Bn or Bn to A	V_{CC} = 1.65 V to 1.95 V	-	-	2	ns
		V_{CC} = 2.3 V to 2.7 V	-	-	1.2	ns
		V_{CC} = 2.7 V	-	-	1.0	ns
		V_{CC} = 3 V to 3.6 V	-	-	0.8	ns
		V_{CC} = 4.5 V to 5.5 V	-	-	0.6	ns
t_{PLH}	LOW-to-HIGH propagation delay	see Figure 10				
	A to Bn or Bn to A	V_{CC} = 1.65 V to 1.95 V	-	-	2	ns
		V_{CC} = 2.3 V to 2.7 V	-	-	1.2	ns
		V_{CC} = 2.7 V	-	-	1.0	ns
		V_{CC} = 3 V to 3.6 V	-	-	0.8	ns
		V_{CC} = 4.5 V to 5.5 V	-	-	0.6	ns
t_{on}	turn-on time	see Figure 11				
	S to A or Bn	V_{CC} = 1.65 V to 1.95 V	2.6	6.7	10.3	ns
		V_{CC} = 2.3 V to 2.7 V	1.9	4.1	6.4	ns
		V_{CC} = 2.7 V	1.9	4.0	5.5	ns
		V_{CC} = 3 V to 3.6 V	1.8	3.4	5.0	ns
		V_{CC} = 4.5 V to 5.5 V	1.3	2.6	3.8	ns
	$\overline{E}$ to A or Bn	V_{CC} = 1.65 V to 1.95 V	1.9	4.0	7.3	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	2.5	4.4	ns
		V_{CC} = 2.7 V	1.1	2.6	3.9	ns
		V_{CC} = 3 V to 3.6 V	1.2	2.2	3.8	ns
		V_{CC} = 4.5 V to 5.5 V	1.0	1.7	2.6	ns
t_{off}	turn-off time	see Figure 11				
	S to A or Bn	V_{CC} = 1.65 V to 1.95 V	2.1	6.8	10.0	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	3.7	6.1	ns
		V_{CC} = 2.7 V	1.4	4.9	6.2	ns
		V_{CC} = 3 V to 3.6 V	1.1	4.0	5.4	ns
		V_{CC} = 4.5 V to 5.5 V	1.0	2.9	3.8	ns
	$\overline{E}$ to A or Bn	V_{CC} = 1.65 V to 1.95 V	2.3	5.6	8.6	ns
		V_{CC} = 2.3 V to 2.7 V	1.2	3.2	4.8	ns
		V_{CC} = 2.7 V	1.4	4.0	5.2	ns
		V_{CC} = 3 V to 3.6 V	2.0	3.7	5.0	ns
		V_{CC} = 4.5 V to 5.5 V	1.3	2.9	3.8	ns

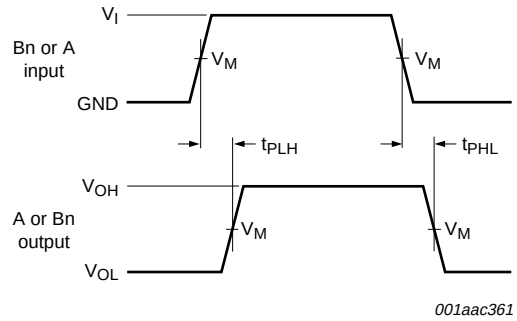
Table 10: Dynamic characteristics *...continued*

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

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

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

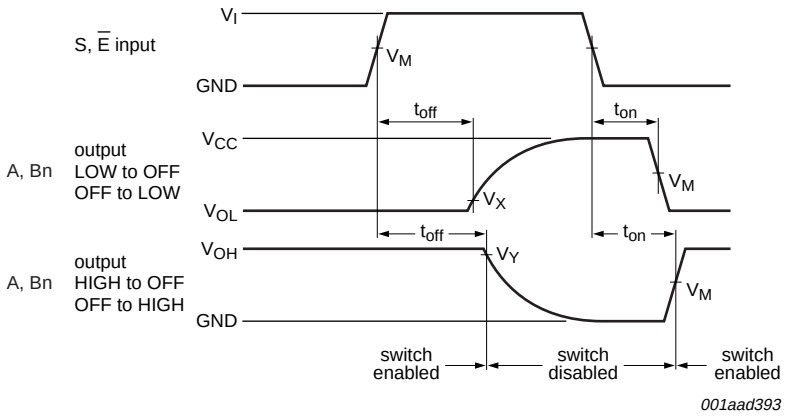
13. Waveforms



Measurement points are given in Table 11.

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

Fig 10. Input (Bn or A) to output (A or Bn) propagation delays



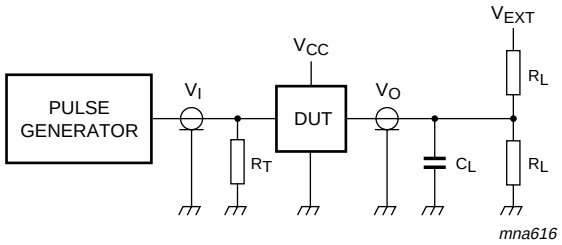
Measurement points are given in Table 11.

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

Fig 11. Turn-on and turn-off times

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



Test data is given in Table 12.

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 12. Load circuitry for switching times

Table 12: 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_{on}, t_{off}	
						HIGH to OFF OFF to HIGH	LOW to OFF OFF to LOW
1.65 V to 1.95 V	V_{CC}	≤ 2.0 ns	30 pF	1 kΩ	open	GND	$2 \times V_{CC}$
2.3 V to 2.7 V	V_{CC}	≤ 2.0 ns	30 pF	500 Ω	open	GND	$2 \times V_{CC}$
2.7 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	$2 \times V_{CC}$
3 V to 3.6 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	$2 \times V_{CC}$
4.5 V to 5.5 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	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 °C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	f_i = 600 Hz to 20 kHz; R_L = 600 Ω; C_L = 50 pF; V_i = 0.5 V (p-p); see Figure 13				
		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 Ω; C_L = 5 pF; see Figure 14 [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*

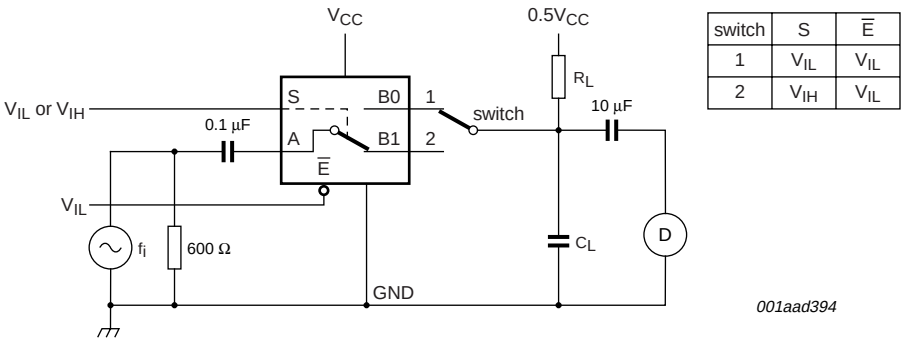
At recommended operating conditions; typical values measured at T_{amb} = 25 °C.

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

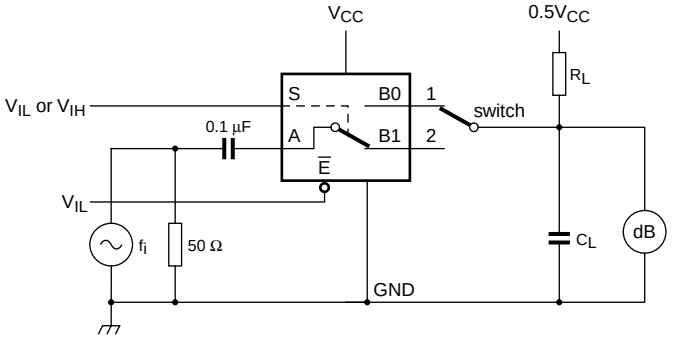
[2] Adjust f_i voltage to obtain 0 dBm level at input.

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



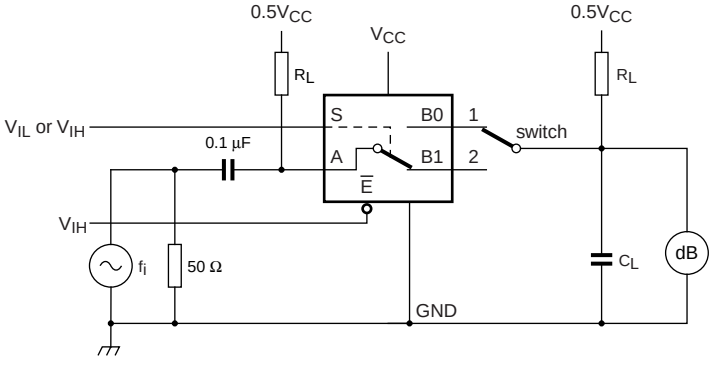
switch	S	$\overline{E}$
1	V_{IL}	V_{IL}
2	V_{IH}	V_{IL}

Fig 13. Test circuit for measuring total harmonic distortion



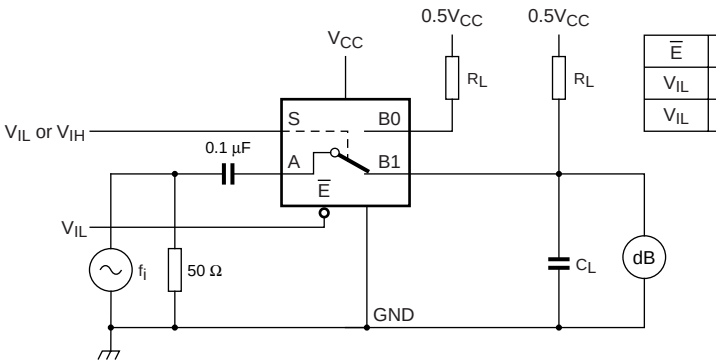
switch	S	$\overline{E}$
1	V_{IL}	V_{IL}
2	V_{IH}	V_{IL}

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



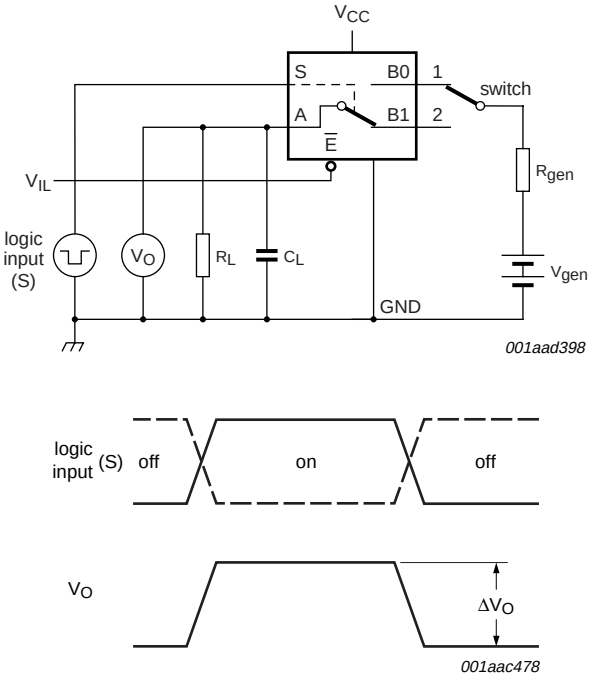
switch	S	$\overline{E}$
1	V_{IL}	V_{IH}
2	V_{IH}	V_{IH}

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



$\overline{E}$	S	test condition
V_{IL}	V_{IL}	$20\log_{10}(V_{B1}/V_I)$
V_{IL}	V_{IH}	$20\log_{10}(V_{B0}/V_I)$

Fig 16. Test circuit for measuring crosstalk between switches



ΔV_O = output voltage variation

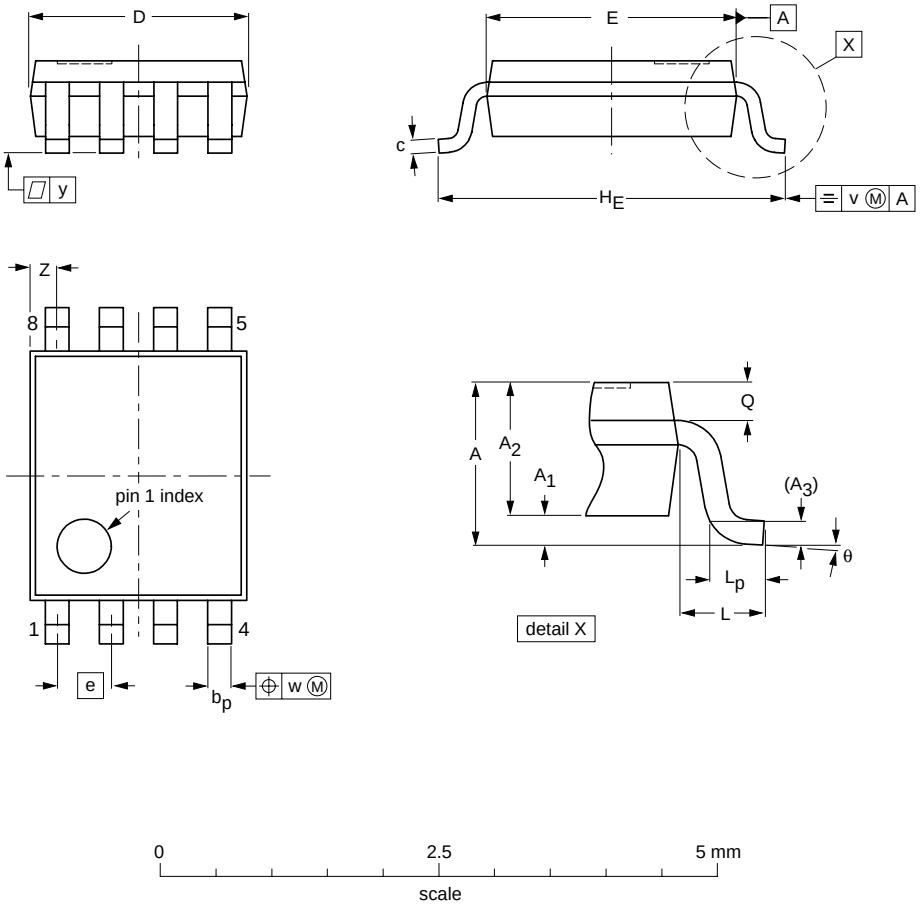
R_{gen} = generator resistance

V_{gen} = generator voltage

Fig 17. Test circuit for measuring charge injection

15. Package outline

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm **SOT765-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1	0.15 0.00	0.85 0.60	0.12	0.27 0.17	0.23 0.08	2.1 1.9	2.4 2.2	0.5	3.2 3.0	0.4	0.40 0.15	0.21 0.19	0.2	0.13	0.1	0.4 0.1	8° 0°

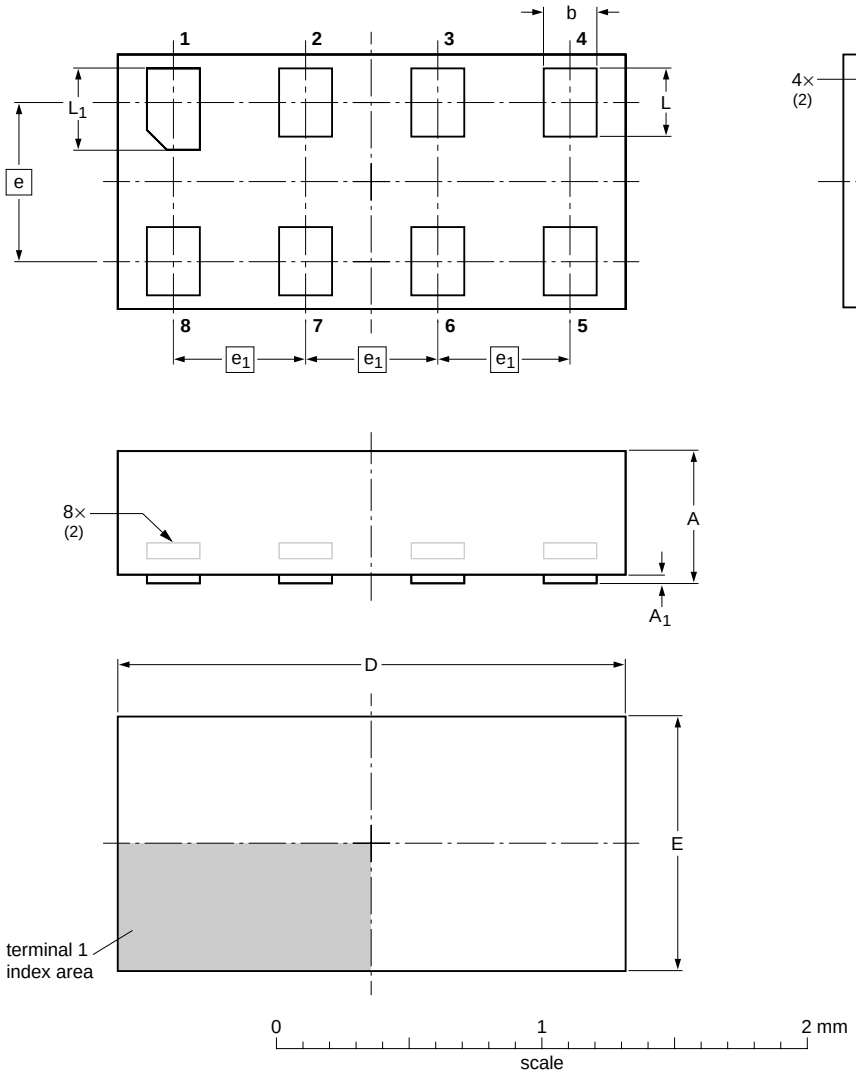
Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT765-1		MO-187				02-06-07

Fig 18. 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**



DIMENSIONS (mm are the original dimensions)

UNIT	A(1) max	A1 max	b	D	E	e	e1	L	L1
mm	0.5	0.04	0.25 0.17	2.0 1.9	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

Notes

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT833-1	- - -	MO-252	- - -			~~04-07-22~~ 04-11-09

Fig 19. 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	Doc. number	Supersedes
74LVC1G53_1	20060110	Product data sheet	-	-	-

18. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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23. Contents

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