

# 74LVC1G384-Q100

## Bilateral switch

Rev. 2 — 9 December 2016

Product data sheet

## 1. General description

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The 74LVC1G384-Q100 provides one single pole, single throw analog switch function. It has two input/output terminals (Y and Z) and an active LOW enable input pin ( $\bar{E}$ ). When pin  $\bar{E}$  is HIGH, the analog switch is turned off.

Schmitt trigger action at the enable input 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.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

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- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - ◆ Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON resistance:
  - ◆  $7.5\text{ }\Omega$  (typical) at  $V_{CC} = 2.7\text{ V}$
  - ◆  $6.5\text{ }\Omega$  (typical) at  $V_{CC} = 3.3\text{ V}$
  - ◆  $6\text{ }\Omega$  (typical) at  $V_{CC} = 5\text{ V}$
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\text{ }\Omega$ )
- 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
- Enable input accepts voltages up to 5.5 V
- Inputs accept voltages up to 5 V

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G384GW-Q100	−40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74LVC1G384GV-Q100	−40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753

4. Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74LVC1G384GW-Q100	YL
74LVC1G384GV-Q100	YL

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

5. Functional diagram

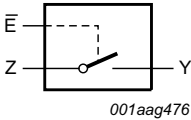


Fig 1. Logic symbol

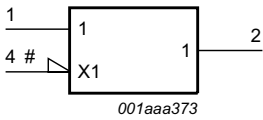


Fig 2. IEC logic symbol

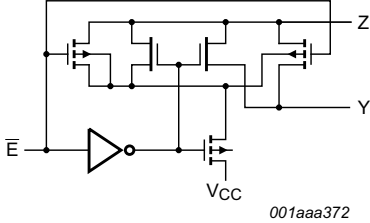
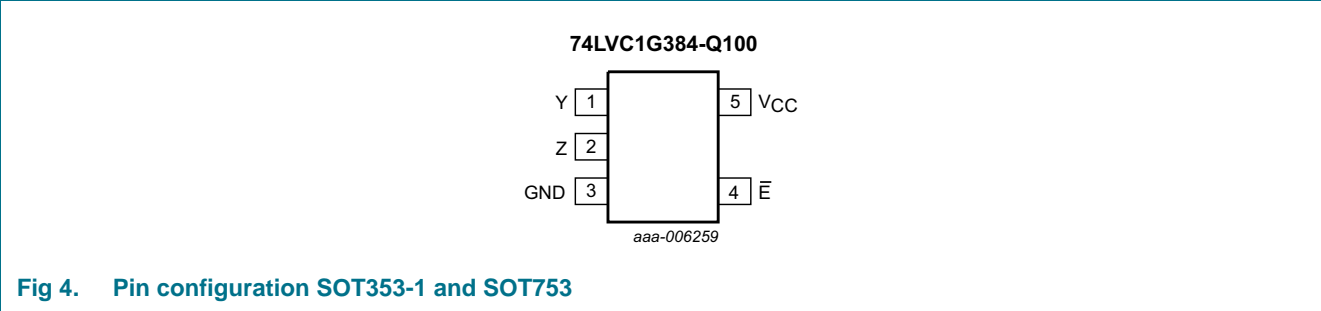


Fig 3. Logic diagram

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
Y	1	independent input or output
Z	2	independent output or input
GND	3	ground (0 V)
$\bar{E}$	4	enable input (active LOW)
V <sub>CC</sub>	5	supply voltage

7. Functional description

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

Input $\bar{E}$	Switch
L	ON-state
H	OFF-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
$V_{CC}$	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 TSSOP5 and SC-74A packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.

## 9. Recommended operating conditions

**Table 6. 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	[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 $2.7 \text{ V}$	-	-	20	ns/V
		$V_{CC} = 2.7 \text{ V}$ to $5.5 \text{ V}$	-	-	10	ns/V

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

## 10. Static characteristics

**Table 7. Static characteristics**

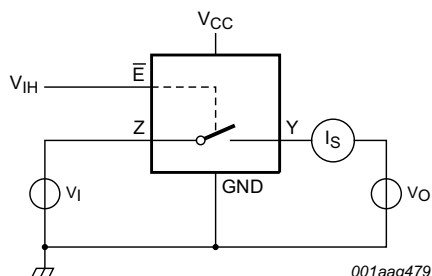
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ <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	0.65V <sub>CC</sub>	-	-	0.65V <sub>CC</sub>	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7V <sub>CC</sub>	-	-	0.7V <sub>CC</sub>	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35V <sub>CC</sub>	-	0.35V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3V <sub>CC</sub>	-	0.3V <sub>CC</sub>	V
I <sub>I</sub>	input leakage current	pin $\bar{E}$ ; V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V <sup>[2]</sup>	-	±0.1	±1	-	±1	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 5</a> <sup>[2]</sup>	-	±0.1	±0.2	-	±0.5	µA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 6</a> <sup>[2]</sup>	-	±0.1	±1	-	±2	µA
I <sub>CC</sub>	supply current	V <sub>I</sub> = 5.5 V or GND; V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 1.65 V to 5.5 V <sup>[2]</sup>	-	0.1	4	-	4	µA
ΔI <sub>CC</sub>	additional supply current	pin $\bar{E}$ ; V <sub>I</sub> = V <sub>CC</sub> – 0.6 V; V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 5.5 V <sup>[2]</sup>	-	5	500	-	500	µA
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.

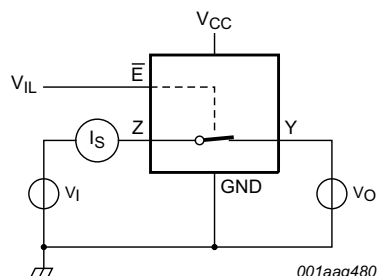
[2] These typical values are measured at V<sub>CC</sub> = 3.3 V.

## 10.1 Test circuits



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

**Fig 5. Test circuit for measuring OFF-state leakage current**



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

**Fig 6. 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 8](#) to [Figure 13](#).

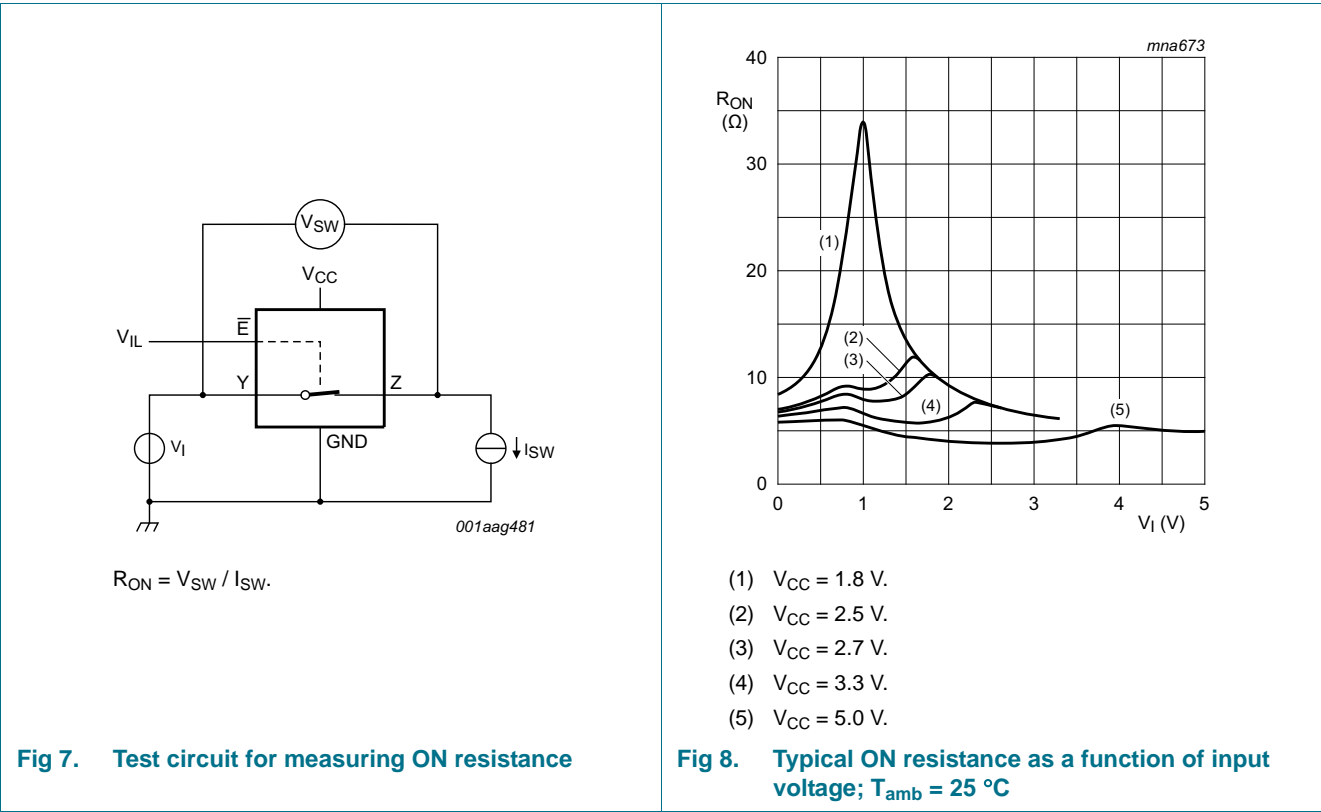
Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$R_{ON(\text{peak})}$	ON resistance (peak)	$V_I = \text{GND}$ to $V_{CC}$ ; see <a href="#">Figure 7</a>						
		$I_{SW} = 4 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$ to $1.95 \text{ V}$	-	34.0	130	-	195	$\Omega$
		$I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$	-	12.0	30	-	45	$\Omega$
		$I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$	-	10.4	25	-	38	$\Omega$
		$I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3 \text{ V}$ to $3.6 \text{ V}$	-	7.8	20	-	30	$\Omega$
		$I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	6.2	15	-	23	$\Omega$
$R_{ON(\text{rail})}$	ON resistance (rail)	$V_I = \text{GND}$ ; see <a href="#">Figure 7</a>						
		$I_{SW} = 4 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$ to $1.95 \text{ V}$	-	8.2	18	-	27	$\Omega$
		$I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$	-	7.1	16	-	24	$\Omega$
		$I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$	-	6.9	14	-	21	$\Omega$
		$I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3 \text{ V}$ to $3.6 \text{ V}$	-	6.5	12	-	18	$\Omega$
		$I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	5.8	10	-	15	$\Omega$
		$V_I = V_{CC}$ ; see <a href="#">Figure 7</a>				-		
		$I_{SW} = 4 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$ to $1.95 \text{ V}$	-	10.4	30	-	45	$\Omega$
		$I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$	-	7.6	20	-	30	$\Omega$
		$I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$	-	7.0	18	-	27	$\Omega$
		$I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3 \text{ V}$ to $3.6 \text{ V}$	-	6.1	15	-	23	$\Omega$
		$I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	4.9	10	-	15	$\Omega$

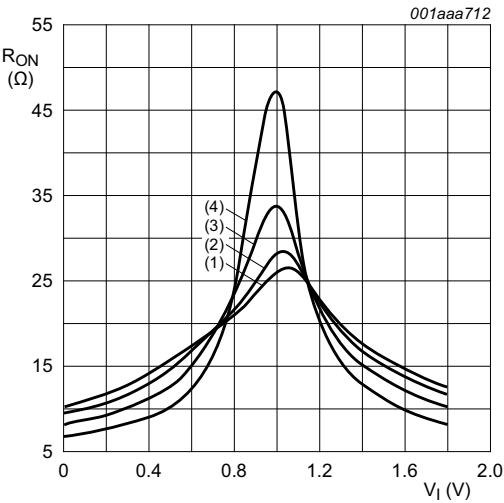
**Table 8. ON resistance ...continued**  
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 8](#) to [Figure 13](#).

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(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.

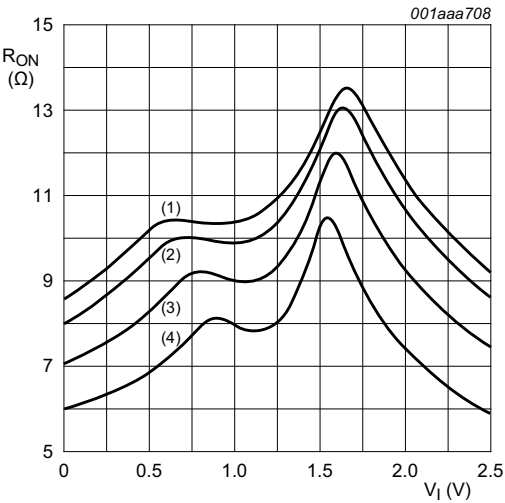
10.3 ON resistance test circuit and graphs





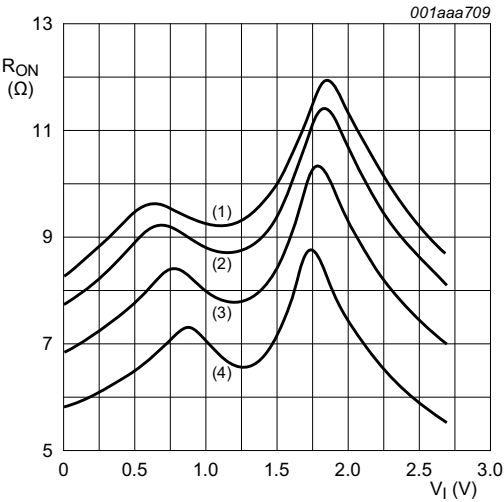
- (1)  $T_{amb} = 125$  °C.
- (2)  $T_{amb} = 85$  °C.
- (3)  $T_{amb} = 25$  °C.
- (4)  $T_{amb} = -40$  °C.

Fig 9. ON resistance as a function of input voltage;  $V_{CC} = 1.8$  V



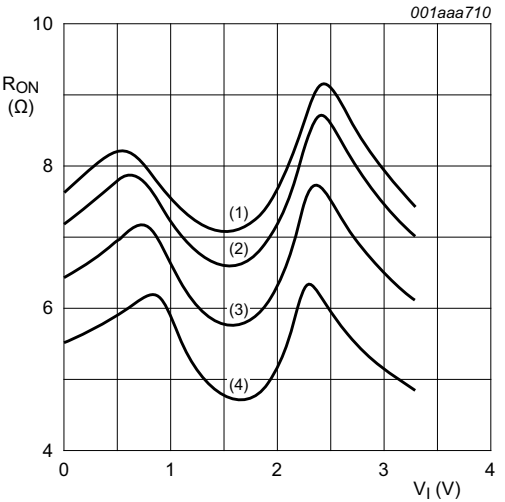
- (1)  $T_{amb} = 125$  °C.
- (2)  $T_{amb} = 85$  °C.
- (3)  $T_{amb} = 25$  °C.
- (4)  $T_{amb} = -40$  °C.

Fig 10. ON resistance as a function of input voltage;  $V_{CC} = 2.5$  V



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

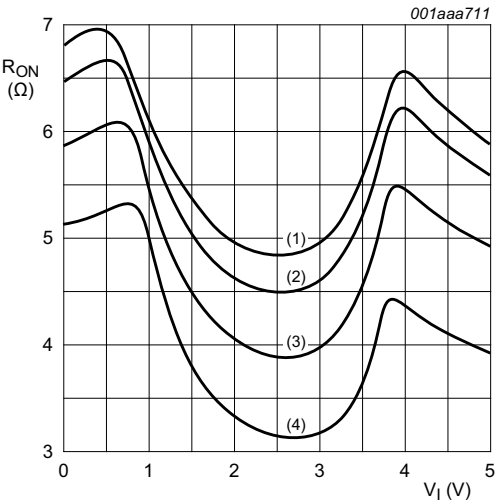
Fig 11. ON resistance as a function of input voltage;  $V_{CC} = 2.7$  V



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

Fig 12. ON resistance as a function of input voltage;  $V_{CC} = 3.3$  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;  $V_{CC} = 5.0\text{ V}$

11. Dynamic characteristics

Table 9. Dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

Symbol	Parameter	Conditions	−40 °C to +85 °C			−40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$t_{pd}$	propagation delay	Y to Z or Z to Y; see <a href="#">Figure 14</a> <sup>[2][3]</sup>						
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	0.8	2.0	-	3.0	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	0.4	1.2	-	2.0	ns
		$V_{CC} = 2.7\text{ V}$	-	0.4	1.0	-	1.5	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	0.3	0.8	-	1.5	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	0.2	0.6	-	1.0	ns
$t_{en}$	enable time	$\bar{E}$ to Y or Z; see <a href="#">Figure 15</a> <sup>[4]</sup>						
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.0	10.0	12.0	1.0	15.5	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.0	5.7	6.5	1.0	8.5	ns
		$V_{CC} = 2.7\text{ V}$	1.0	5.4	6.0	1.0	8.0	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.0	4.8	5.0	1.0	6.5	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.0	3.3	4.2	1.0	5.5	ns

**Table 9. Dynamic characteristics ...continued**At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

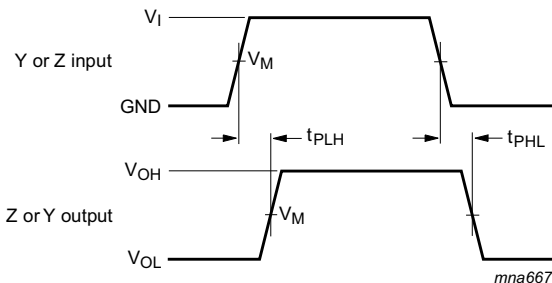
Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$t_{dis}$	disable time	$\overline{E}$ to Y or Z; see <a href="#">Figure 15</a> <sup>[5]</sup>						
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	1.0	7.4	10.0	1.0	13.0	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.0	4.1	6.9	1.0	9.0	ns
		$V_{CC} = 2.7 \text{ V}$	1.0	4.9	7.5	1.0	9.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	1.0	5.4	6.5	1.0	8.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	1.0	3.6	5.0	1.0	6.5	ns
$C_{PD}$	power dissipation capacitance	$C_L = 50 \text{ pF}$ ; $f_i = 10 \text{ MHz}$ ; $V_I = \text{GND to } V_{CC}$ <sup>[6]</sup>						
		$V_{CC} = 2.5 \text{ V}$	-	13.7	-	-	-	pF
		$V_{CC} = 3.3 \text{ V}$	-	15.2	-	-	-	pF
		$V_{CC} = 5.0 \text{ V}$	-	18.3	-	-	-	pF

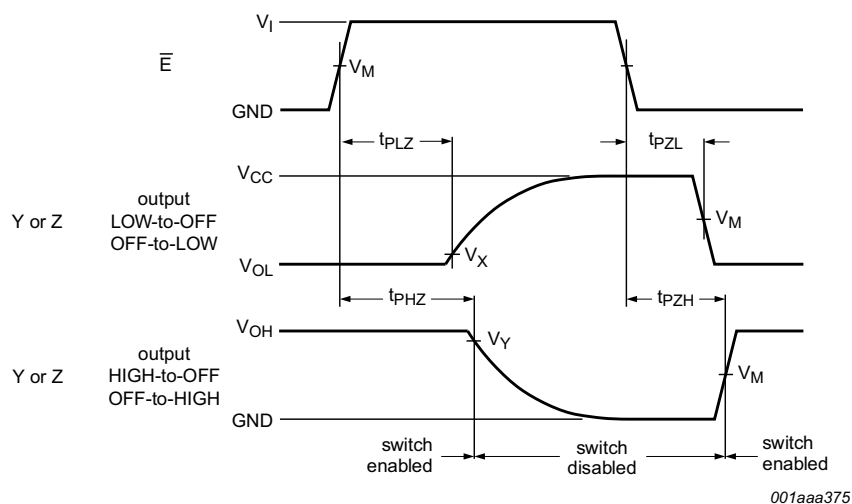
[1] Typical values are measured at  $T_{amb} = 25 \text{ °C}$  and nominal  $V_{CC}$ .[2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

[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]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .[5]  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .[6]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\{(C_L + C_{S(ON)}) \times V_{CC}^2 \times f_o\}$  where: $f_i$  = input frequency in MHz; $f_o$  = output frequency in MHz; $C_L$  = output load capacitance in pF; $C_{S(ON)}$  = maximum ON-state switch capacitance in pF; $V_{CC}$  = supply voltage in V; $N$  = number of inputs switching; $\Sigma\{(C_L + C_{S(ON)}) \times V_{CC}^2 \times f_o\}$  = 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 14. Input (Y or Z) to output (Z or Y) propagation delays**



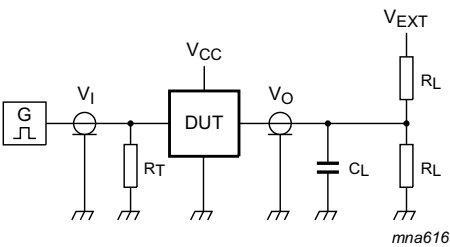
Measurement points are given in [Table 10](#).

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

**Fig 15. Enable and disable times**

### Table 10. Measurement points

Supply voltage	Input	Output		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>X</sub>	V <sub>Y</sub>
1.65 V to 1.95 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> – 0.15 V
2.3 V to 2.7 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> – 0.15 V
2.7 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> – 0.3 V
3.0 V to 3.6 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> – 0.3 V
4.5 V to 5.5 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> – 0.3 V



Test data is given in [Table 11](#).  
Definitions for 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 16. Test circuit for measuring switching times

Table 11. Test data

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

11.2 Additional dynamic characteristics

Table 12. 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	$R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ kHz; see <a href="#">Figure 17</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	-	0.001	-	%
		$R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 10$ kHz; see <a href="#">Figure 17</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	-	%

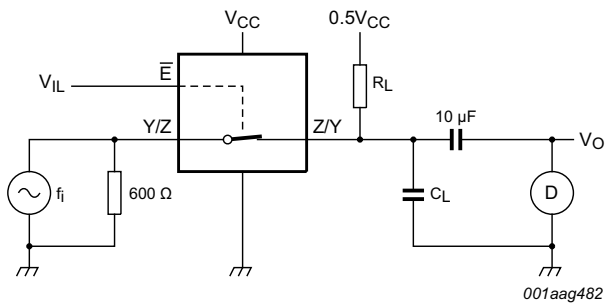
**Table 12. Additional dynamic characteristics ...continued**At recommended operating conditions; typical values measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$f_{(-3\text{dB})}$	-3 dB frequency response	$R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 18</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
		$R_L = 50\text{ }\Omega$ ; $C_L = 5\text{ pF}$ ; see <a href="#">Figure 18</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
		$R_L = 50\text{ }\Omega$ ; $C_L = 10\text{ pF}$ ; see <a href="#">Figure 18</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
$\alpha_{iso}$	isolation (OFF-state)	$R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; see <a href="#">Figure 19</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
		$R_L = 50\text{ }\Omega$ ; $C_L = 5\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; see <a href="#">Figure 19</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
$V_{ct}$	crosstalk voltage	between digital input and switch; $R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; $t_r = t_f = 2\text{ ns}$ ; see <a href="#">Figure 20</a>				
		$V_{CC} = 1.65\text{ V}$	-	69	-	mV
		$V_{CC} = 2.3\text{ V}$	-	87	-	mV
		$V_{CC} = 3.0\text{ V}$	-	156	-	mV
		$V_{CC} = 4.5\text{ V}$	-	302	-	mV

Table 12. Additional dynamic characteristics ...continued  
At recommended operating conditions; typical values measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

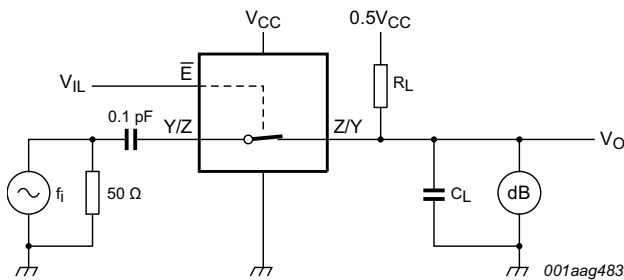
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$Q_{inj}$	charge injection	$C_L = 0.1\text{ nF}$ ; $V_{gen} = 0\text{ V}$ ; $R_{gen} = 0\text{ }\Omega$ ; $f_i = 1\text{ MHz}$ ; $R_L = 1\text{ M}\Omega$ ; see <a href="#">Section 11</a>				
		$V_{CC} = 1.8\text{ V}$	-	3.3	-	pC
		$V_{CC} = 2.5\text{ V}$	-	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



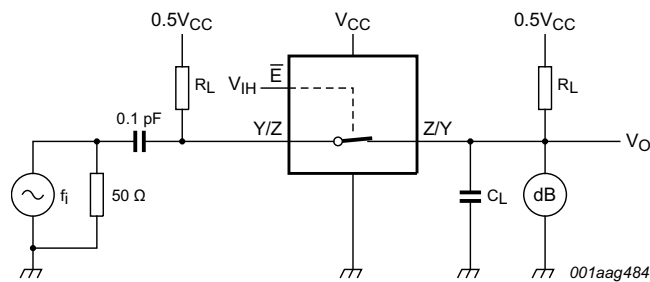
**Test conditions:**  
 $V_{CC} = 1.65\text{ V}$ :  $V_I = 1.4\text{ V}$  (p-p).  
 $V_{CC} = 2.3\text{ V}$ :  $V_I = 2\text{ V}$  (p-p).  
 $V_{CC} = 3\text{ V}$ :  $V_I = 2.5\text{ V}$  (p-p).  
 $V_{CC} = 4.5\text{ V}$ :  $V_I = 4\text{ V}$  (p-p).

Fig 17. Test circuit for measuring total harmonic distortion



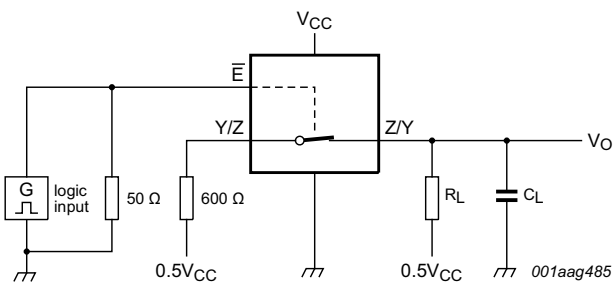
To obtain 0 dBm level at input, adjust  $f_i$  voltage. Increase  $f_i$  frequency until dB meter reads  $-3\text{ dB}$ .

Fig 18. Test circuit for measuring the frequency response when switch is in ON-state

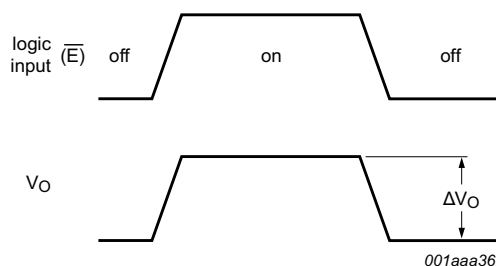
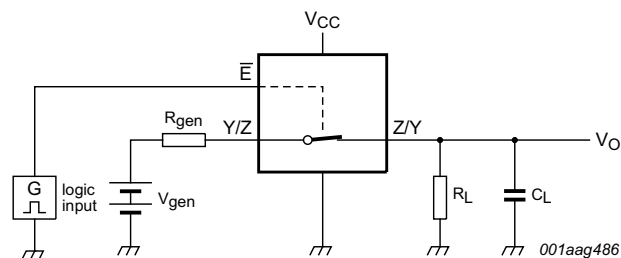


To obtain 0 dBm level at input, adjust  $f_i$  voltage.

**Fig 19. Test circuit for measuring isolation (OFF-state)**



**Fig 20. Test circuit for measuring crosstalk between digital inputs and switch**



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

$\Delta V_O$  = output voltage variation.

$R_{gen}$  = generator resistance.

$V_{gen}$  = generator voltage.

**Fig 21. Test circuit for measuring charge injection**

12. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

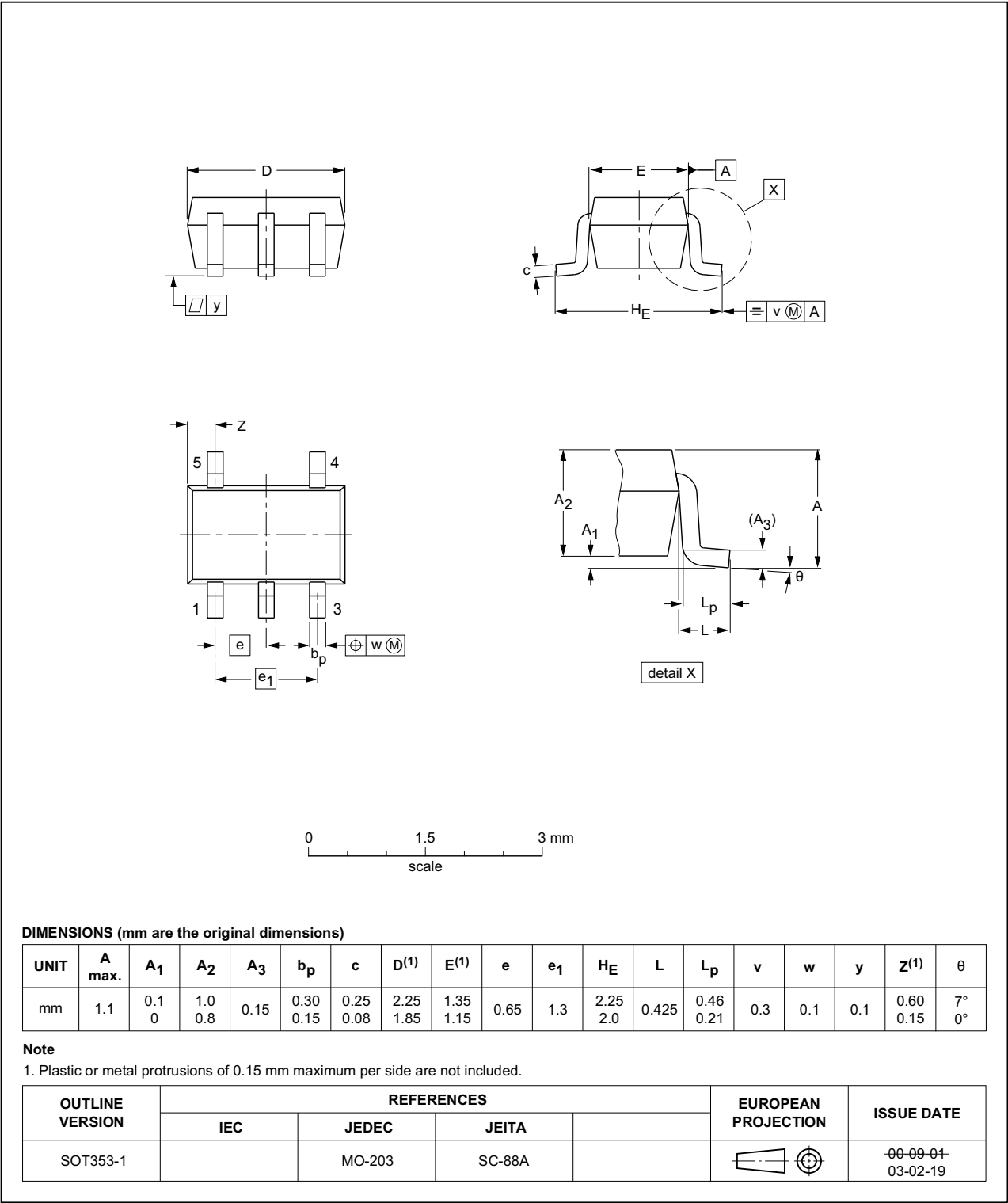


Fig 22. Package outline SOT353-1 (TSSOP5)



Plastic surface-mounted package; 5 leads

SOT753

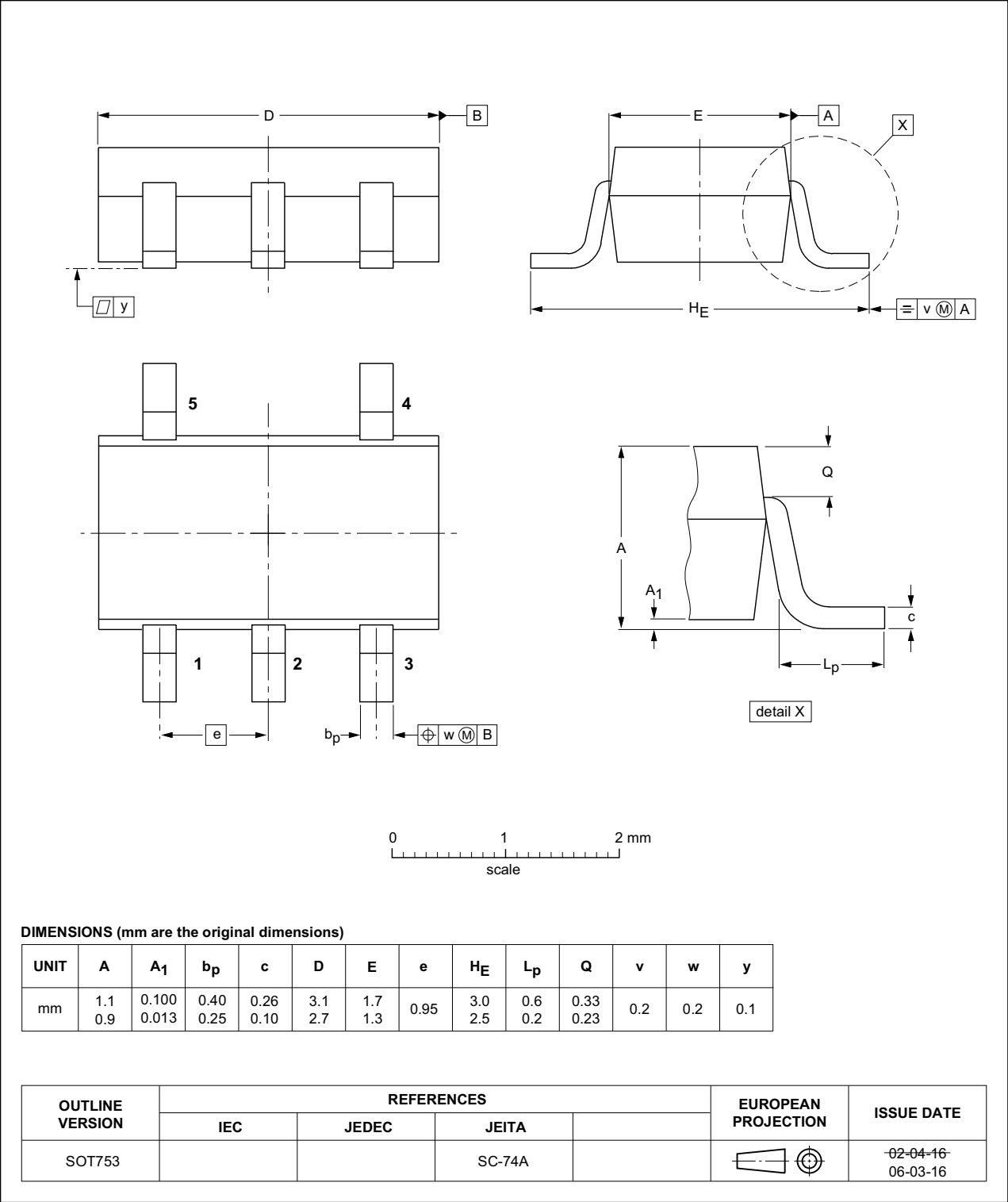


Fig 23. Package outline SOT753 (SC-74A)

## 13. Abbreviations

Table 13. Abbreviations

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

## 14. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G384_Q100 v.2	20161209	Product data sheet	-	74LVC1G384_Q100 v.1
Modifications:	<ul style="list-style-type: none"><li><a href="#">Table 7</a>: The maximum limits for leakage current and supply current have changed.</li></ul>			
74LVC1G384_Q100 v.1	20130219	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.nexperia.com>.

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## 17. Contents

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<b>1</b>	<b>General description</b> .....	<b>1</b>
<b>2</b>	<b>Features and benefits</b> .....	<b>1</b>
<b>3</b>	<b>Ordering information</b> .....	<b>2</b>
<b>4</b>	<b>Marking</b> .....	<b>2</b>
<b>5</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>6</b>	<b>Pinning information</b> .....	<b>3</b>
6.1	Pinning .....	3
6.2	Pin description .....	3
<b>7</b>	<b>Functional description</b> .....	<b>3</b>
<b>8</b>	<b>Limiting values</b> .....	<b>4</b>
<b>9</b>	<b>Recommended operating conditions</b> .....	<b>4</b>
<b>10</b>	<b>Static characteristics</b> .....	<b>5</b>
10.1	Test circuits .....	6
10.2	ON resistance .....	6
10.3	ON resistance test circuit and graphs .....	7
<b>11</b>	<b>Dynamic characteristics</b> .....	<b>9</b>
11.1	Waveforms and test circuit .....	10
11.2	Additional dynamic characteristics .....	12
11.3	Test circuits .....	14
<b>12</b>	<b>Package outline</b> .....	<b>16</b>
<b>13</b>	<b>Abbreviations</b> .....	<b>18</b>
<b>14</b>	<b>Revision history</b> .....	<b>18</b>
<b>15</b>	<b>Legal information</b> .....	<b>19</b>
15.1	Data sheet status .....	19
15.2	Definitions .....	19
15.3	Disclaimers .....	19
15.4	Trademarks .....	20
<b>16</b>	<b>Contact information</b> .....	<b>20</b>
<b>17</b>	<b>Contents</b> .....	<b>21</b>

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