

# 74LV4053-Q100

## Triple single-pole double-throw analog switch

Rev. 2 — 23 September 2020

Product data sheet

## 1. General description

The 74LV4053-Q100 is a triple single-pole double-throw (SPDT) analog switch, suitable for use as an analog or digital multiplexer/demultiplexer. It is a low-voltage Si-gate CMOS device and is pin and function compatible with the 74HC4053-Q100 and 74HCT4053-Q100. Each switch has a digital select input ( $S_n$ ), two independent inputs/outputs ( $nY_0$  and  $nY_1$ ) and a common input/output ( $nZ$ ). All three switches share an enable input ( $\bar{E}$ ). A HIGH on  $\bar{E}$  causes all switches into the high-impedance OFF-state, independent of  $S_n$ .

$V_{CC}$  and GND are the supply voltage connections for the digital control inputs ( $S_n$  and  $\bar{E}$ ). The  $V_{CC}$  to GND range is 1 V to 6 V. The analog inputs/outputs ( $nY_0$ ,  $nY_1$  and  $nZ$ ) can swing between  $V_{CC}$  as a positive limit and  $V_{EE}$  as a negative limit.  $V_{CC} - V_{EE}$  may not exceed 6 V. For operation as a digital multiplexer/demultiplexer,  $V_{EE}$  is connected to GND (typically ground).  $V_{EE}$  and  $V_{SS}$  are the supply voltage connections for the switches.

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

- 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  $+125\text{ }^{\circ}\text{C}$
- Optimized for low-voltage applications: 1.0 V to 3.6 V
- Accepts TTL input levels between  $V_{CC} = 2.7\text{ V}$  and  $V_{CC} = 3.6\text{ V}$
- Low ON resistance:
  - 180  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 2.0\text{ V}$
  - 100  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 3.0\text{ V}$
  - 75  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 4.5\text{ V}$
- Logic level translation:
  - To enable 3 V logic to communicate with  $\pm 3\text{ V}$  analog signals
- Typical 'break before make' built in
- ESD protection:
  - MIL-STD-883, method 3015 exceeds 2000 V
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\text{ }\Omega$ )
- Multiple package options
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74LV4053D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74LV4053PW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74LV4053BQ-Q100	-40 °C to +125 °C	DHVQFN16	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm	SOT763-1

### 4. Functional diagram

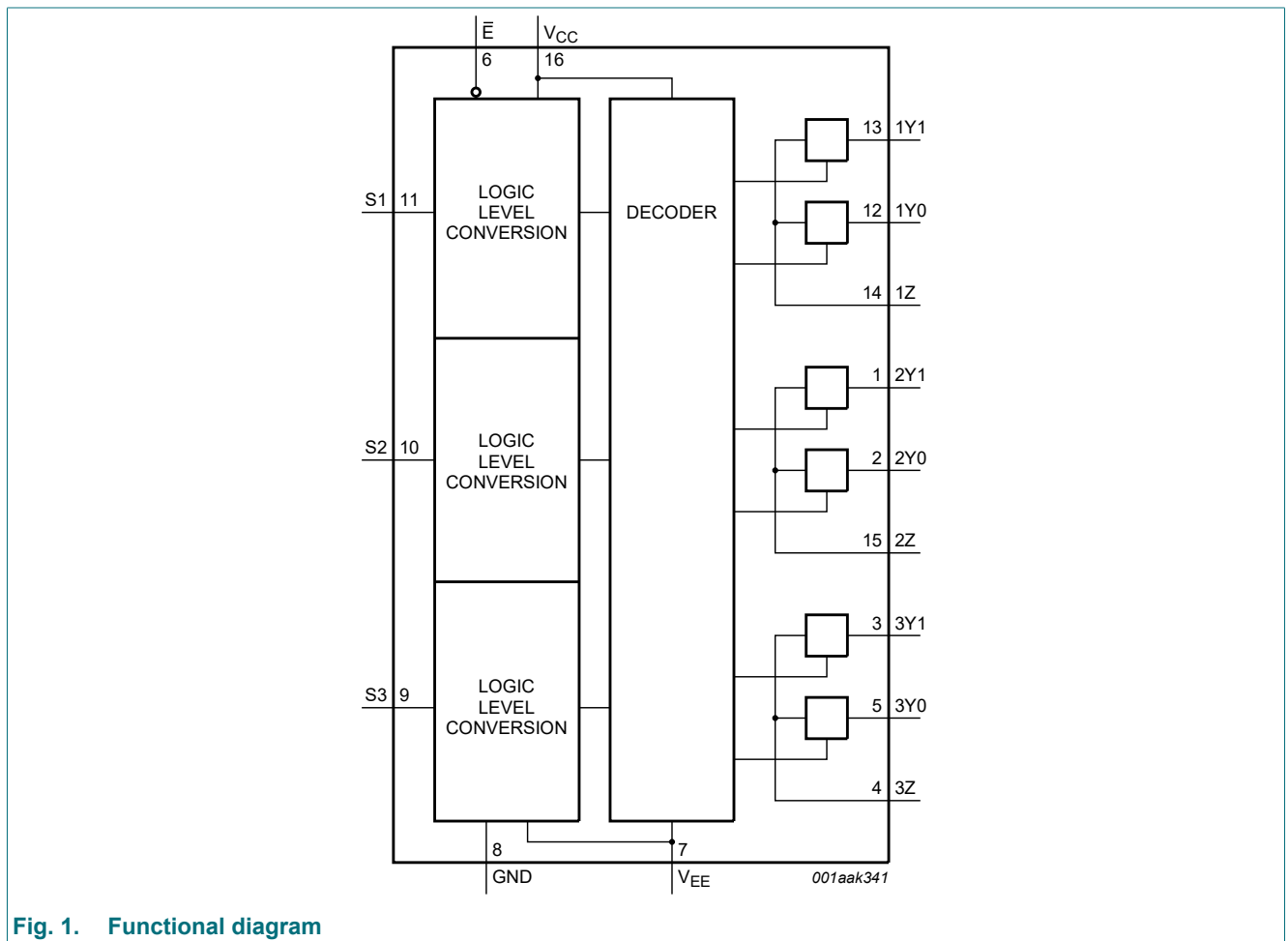


Fig. 1. Functional diagram

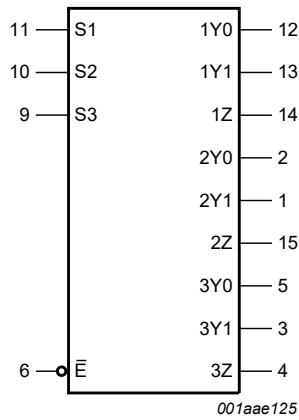


Fig. 2. Logic symbol

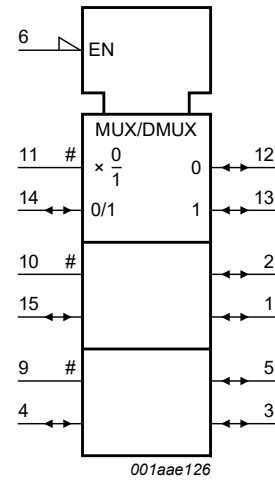


Fig. 3. IEC logic symbol

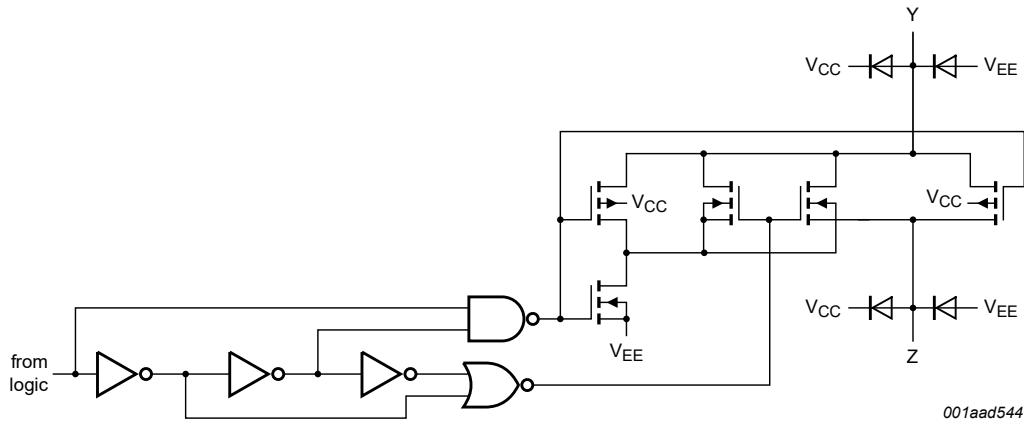


Fig. 4. Schematic diagram (one switch)

## 5. Pinning information

### 5.1. Pinning

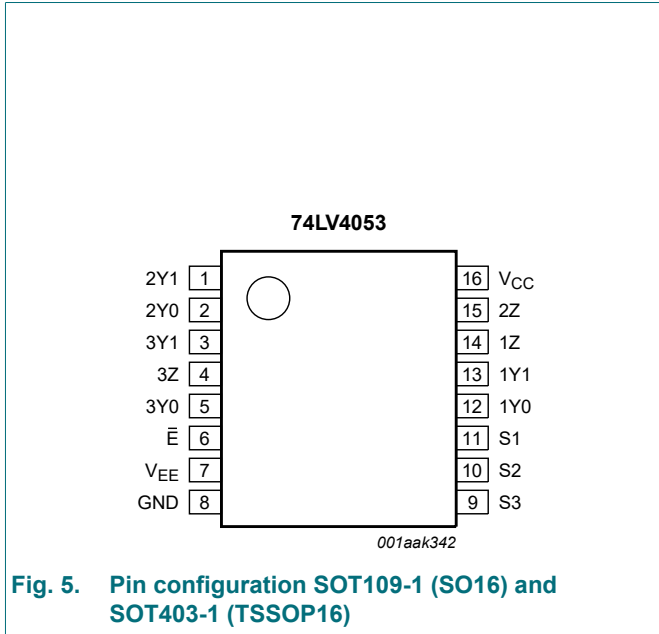


Fig. 5. Pin configuration SOT109-1 (SO16) and SOT403-1 (TSSOP16)

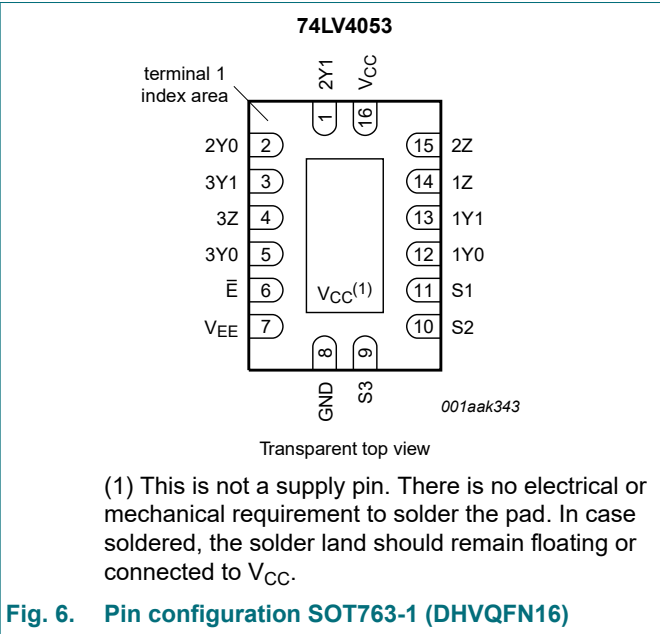


Fig. 6. Pin configuration SOT763-1 (DHVQFN16)

### 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
$\bar{E}$	6	enable input (active LOW)
V <sub>EE</sub>	7	supply voltage
GND	8	ground supply voltage
S1, S2, S3	11, 10, 9	select input
1Y0, 2Y0, 3Y0	12, 2, 5	independent input or output
1Y1, 2Y1, 3Y1	13, 1, 3	independent input or output
1Z, 2Z, 3Z	14, 15, 4	common output or input
V <sub>CC</sub>	16	supply voltage

## 6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care.

Inputs		Channel on
$\bar{E}$	S <sub>n</sub>	
L	L	nY0 to nZ
L	H	nY1 to nZ
H	X	switches off

## 7. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to  $V_{SS} = 0\text{ V}$  (ground).

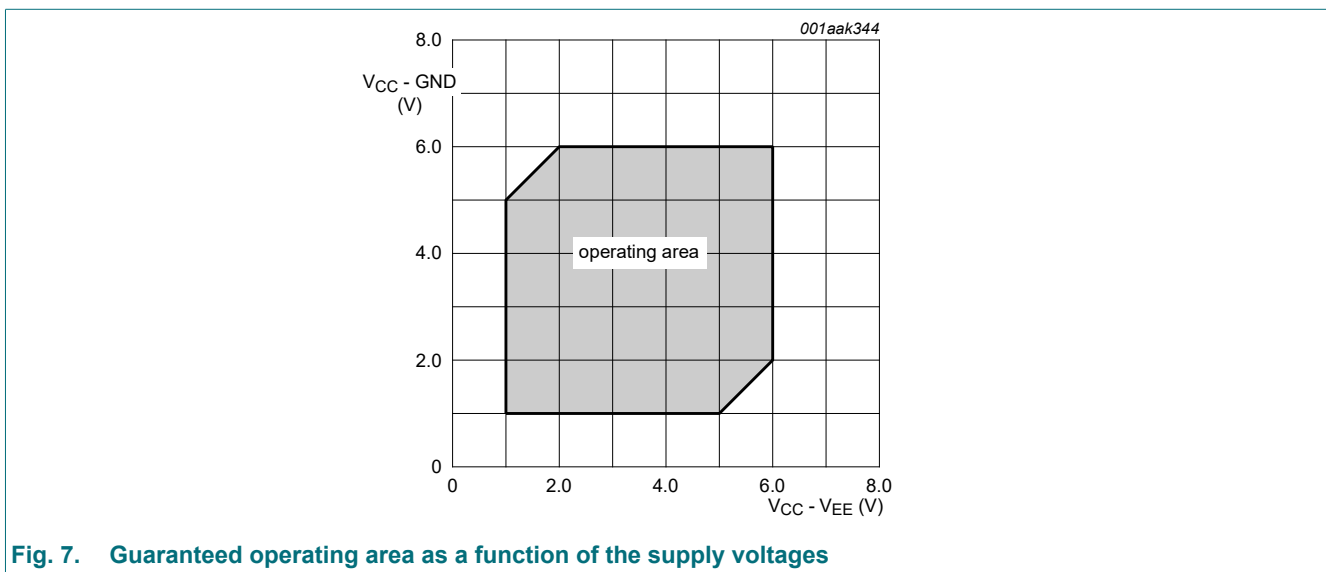
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage	[1]	-0.5	+7.0	V
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ [2]	-	$\pm 20$	mA
$I_{SK}$	switch clamping current	$V_{SW} < -0.5\text{ V}$ or $V_{SW} > V_{CC} + 0.5\text{ V}$ [2]	-	$\pm 20$	mA
$I_{SW}$	switch current	$V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$ ; source or sink current [2]	-	$\pm 25$	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [3]	-	500	mW

- [1] To avoid drawing  $V_{CC}$  current out of terminal nZ, when switch current flows into terminals nYn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal nZ, no  $V_{CC}$  current will flow out of terminals nYn, and in this case there is no limit for the voltage drop across the switch, but the voltages at nYn and nZ may not exceed  $V_{CC}$  or  $V_{EE}$ .
- [2] The minimum input voltage rating may be exceeded if the input current rating is observed.
- [3] For SOT109-1 (SO16) package:  $P_{tot}$  derates linearly with 12.4 mW/K above 110 °C.  
 For SOT403-1 (TSSOP16) package:  $P_{tot}$  derates linearly with 8.5 mW/K above 91 °C.  
 For SOT763-1 (DHVQFN16) package:  $P_{tot}$  derates linearly with 11.2 mW/K above 106 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CC}$	supply voltage	see Fig. 7	1	3.3	6	V
$V_I$	input voltage		0	-	$V_{CC}$	V
$V_{SW}$	switch voltage		0	-	$V_{CC}$	V
$T_{amb}$	ambient temperature	in free air	-40	-	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 1.0\text{ V}$ to $2.0\text{ V}$	-	-	500	ns/V
		$V_{CC} = 2.0\text{ V}$ to $2.7\text{ V}$	-	-	200	ns/V
		$V_{CC} = 2.7\text{ V}$ to $3.6\text{ V}$	-	-	100	ns/V



**Fig. 7. Guaranteed operating area as a function of the supply voltages**

## 9. Static characteristics

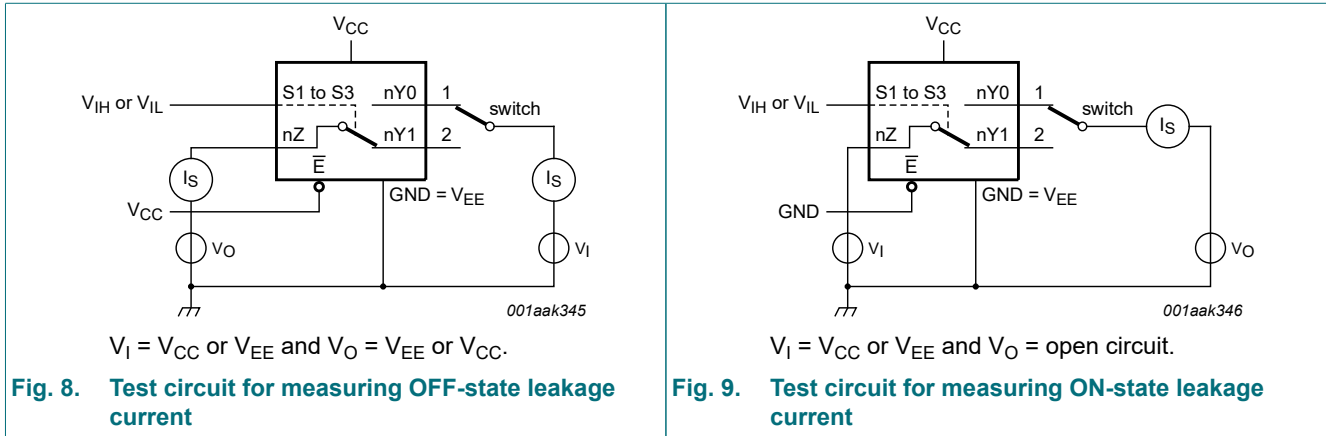
**Table 6. Static characteristics**

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 <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.2 V	0.9	-	-	0.9	-	V
		V <sub>CC</sub> = 2.0 V	1.4	-	-	1.4	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	3.15	-	V
		V <sub>CC</sub> = 6.0 V	4.20	-	-	4.20	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.2 V	-	-	0.3	-	0.3	V
		V <sub>CC</sub> = 2.0 V	-	-	0.6	-	0.6	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	1.80	-	1.80	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND						
		V <sub>CC</sub> = 3.6 V	-	-	1.0	-	1.0	μA
		V <sub>CC</sub> = 6.0 V	-	-	2.0	-	2.0	μA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; see Fig. 8						
		V <sub>CC</sub> = 3.6 V	-	-	1.0	-	1.0	μA
		V <sub>CC</sub> = 6.0 V	-	-	2.0	-	2.0	μA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; see Fig. 9						
		V <sub>CC</sub> = 3.6 V	-	-	1.0	-	1.0	μA
		V <sub>CC</sub> = 6.0 V	-	-	2.0	-	2.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A						
		V <sub>CC</sub> = 3.6 V	-	-	20	-	40	μA
		V <sub>CC</sub> = 6.0 V	-	-	40	-	80	μA
ΔI <sub>CC</sub>	additional supply current	per input; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	500	-	850	μA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	pF
C <sub>sw</sub>	switch capacitance	independent pins nYn	-	5	-	-	-	pF
		common pins nZ	-	8	-	-	-	pF

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

9.1. Test circuits



9.2. ON resistance

Table 7. ON resistance

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for graphs see Fig. 10 and Fig. 11.

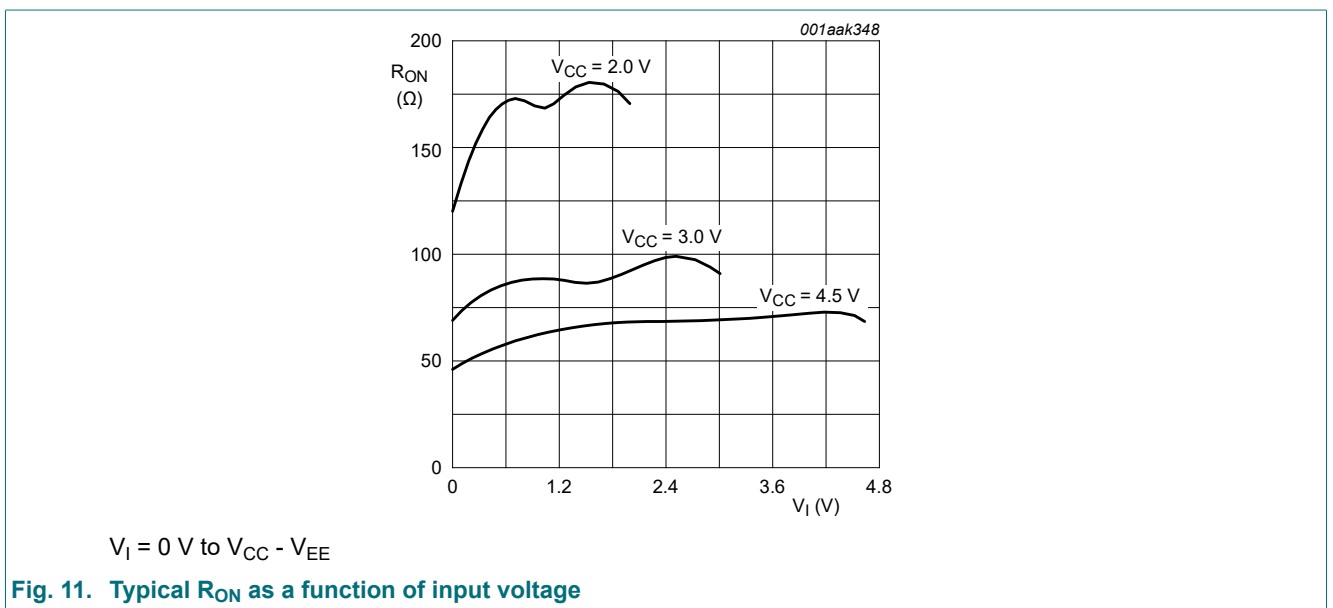
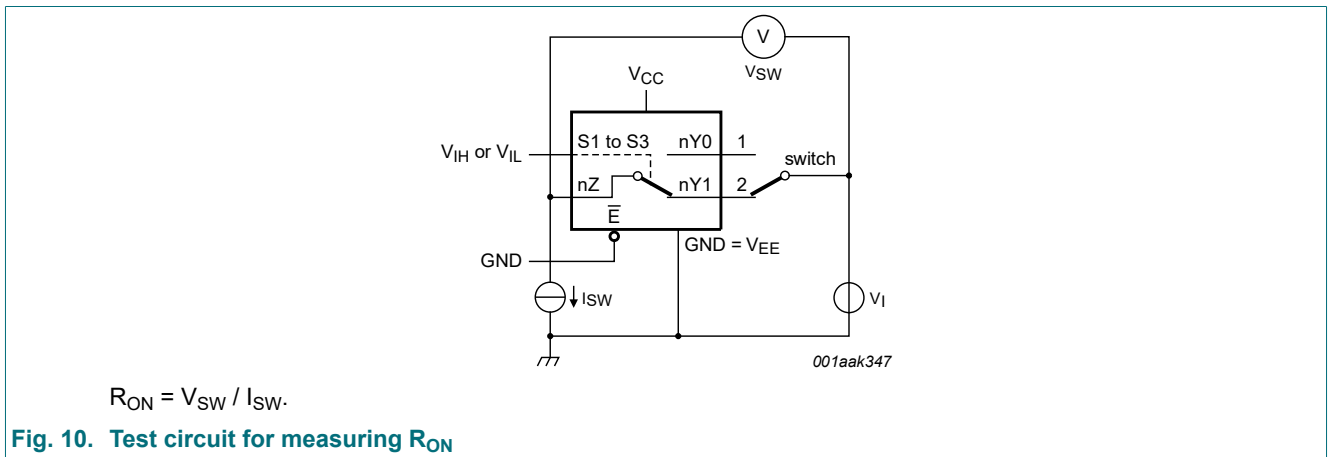
Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
R <sub>ON(peak)</sub>	ON resistance (peak)	$V_I = 0\text{ V to }V_{CC} - V_{EE}$						
		$V_{CC} = 1.2\text{ V}; I_{SW} = 100\ \mu\text{A}$ [2]	-	-	-	-	-	Ω
		$V_{CC} = 2.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	180	365	-	435	Ω
		$V_{CC} = 2.7\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	115	225	-	270	Ω
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	100	200	-	245	Ω
		$V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	75	150	-	180	Ω
		$V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	70	140	-	165	Ω
ΔR <sub>ON</sub>	ON resistance mismatch between channels	$V_I = 0\text{ V to }V_{CC} - V_{EE}$						
		$V_{CC} = 1.2\text{ V}; I_{SW} = 100\ \mu\text{A}$ [2]	-	-	-	-	-	Ω
		$V_{CC} = 2.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	5	-	-	-	Ω
		$V_{CC} = 2.7\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	4	-	-	-	Ω
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	4	-	-	-	Ω
		$V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	3	-	-	-	Ω
		$V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	2	-	-	-	Ω
R <sub>ON(rail)</sub>	ON resistance (rail)	$V_I = \text{GND}$						
		$V_{CC} = 1.2\text{ V}; I_{SW} = 100\ \mu\text{A}$ [2]	-	250	-	-	-	Ω
		$V_{CC} = 2.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	120	280	-	325	Ω
		$V_{CC} = 2.7\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	75	170	-	195	Ω
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	70	155	-	180	Ω
		$V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	50	120	-	135	Ω
		$V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	-	45	105	-	120	Ω

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
R <sub>ON(rail)</sub>	ON resistance (rail)	V <sub>I</sub> = V <sub>CC</sub> - V <sub>EE</sub>						
		V <sub>CC</sub> = 1.2 V; I <sub>SW</sub> = 100 μA [2]	-	350	-	-	-	Ω
		V <sub>CC</sub> = 2.0 V; I <sub>SW</sub> = 1000 μA	-	170	340	-	400	Ω
		V <sub>CC</sub> = 2.7 V; I <sub>SW</sub> = 1000 μA	-	105	210	-	250	Ω
		V <sub>CC</sub> = 3.0 V to 3.6 V; I <sub>SW</sub> = 1000 μA	-	95	190	-	225	Ω
		V <sub>CC</sub> = 4.5 V; I <sub>SW</sub> = 1000 μA	-	70	140	-	165	Ω
		V <sub>CC</sub> = 6.0 V; I <sub>SW</sub> = 1000 μA	-	65	125	-	150	Ω

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

[2] When supply voltages (V<sub>CC</sub> - V<sub>EE</sub>) near 1.2 V the analog switch ON resistance becomes extremely non-linear. When using a supply of 1.2 V, it is recommended to use these devices only for transmitting digital signals.

### 9.3. On resistance waveform and test circuit





## 10. Dynamic characteristics

**Table 8. Dynamic characteristics**

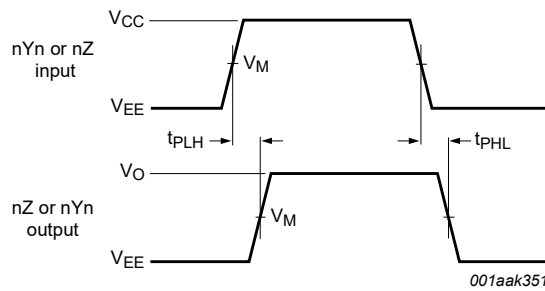
Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 14.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
$t_{pd}$	propagation delay	nYn, nZ to nZ, nYn; see Fig. 12 [2]						
		$V_{CC} = 1.2\text{ V}$	-	25	-	-	-	ns
		$V_{CC} = 2.0\text{ V}$	-	9	17	-	20	ns
		$V_{CC} = 2.7\text{ V}$	-	6	13	-	15	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3]	-	5	10	-	12	ns
		$V_{CC} = 4.5\text{ V}$	-	4	9	-	10	ns
		$V_{CC} = 6.0\text{ V}$	-	3	7	-	8	ns
$t_{en}$	enable time	$\bar{E}$ to nYn, nZ; see Fig. 13 [2]						
		$V_{CC} = 1.2\text{ V}$	-	100	-	-	-	ns
		$V_{CC} = 2.0\text{ V}$	-	34	65	-	77	ns
		$V_{CC} = 2.7\text{ V}$	-	25	48	-	56	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; C_L = 15\text{ pF}$ [3]	-	16	-	-	-	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3]	-	19	38	-	45	ns
		$V_{CC} = 4.5\text{ V}$	-	17	32	-	38	ns
		$V_{CC} = 6.0\text{ V}$	-	13	25	-	29	ns
		Sn to nYn, nZ; see Fig. 13 [2]						
		$V_{CC} = 1.2\text{ V}$	-	125	-	-	-	ns
		$V_{CC} = 2.0\text{ V}$	-	43	82	-	97	ns
		$V_{CC} = 2.7\text{ V}$	-	31	60	-	71	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; C_L = 15\text{ pF}$ [3]	-	20	-	-	-	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3]	-	24	48	-	57	ns
		$V_{CC} = 4.5\text{ V}$	-	21	41	-	48	ns
		$V_{CC} = 6.0\text{ V}$	-	16	31	-	37	ns
$t_{dis}$	disable time	$\bar{E}$ to nYn, nZ; see Fig. 13 [2]						
		$V_{CC} = 1.2\text{ V}$	-	95	-	-	-	ns
		$V_{CC} = 2.0\text{ V}$	-	34	61	-	73	ns
		$V_{CC} = 2.7\text{ V}$	-	26	46	-	54	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; C_L = 15\text{ pF}$ [3]	-	17	-	-	-	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3]	-	20	37	-	44	ns
		$V_{CC} = 4.5\text{ V}$	-	18	32	-	38	ns
		$V_{CC} = 6.0\text{ V}$	-	15	25	-	30	ns
		Sn to nYn, nZ; see Fig. 13 [2]						
		$V_{CC} = 1.2\text{ V}$	-	90	-	-	-	ns
		$V_{CC} = 2.0\text{ V}$	-	32	59	-	70	ns
		$V_{CC} = 2.7\text{ V}$	-	24	44	-	52	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; C_L = 15\text{ pF}$ [3]	-	16	-	-	-	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3]	-	19	36	-	42	ns
		$V_{CC} = 4.5\text{ V}$	-	17	31	-	36	ns
		$V_{CC} = 6.0\text{ V}$	-	14	24	-	28	ns

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
C <sub>PD</sub>	power dissipation capacitance	C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> [4]	-	36	-	-	-	pF

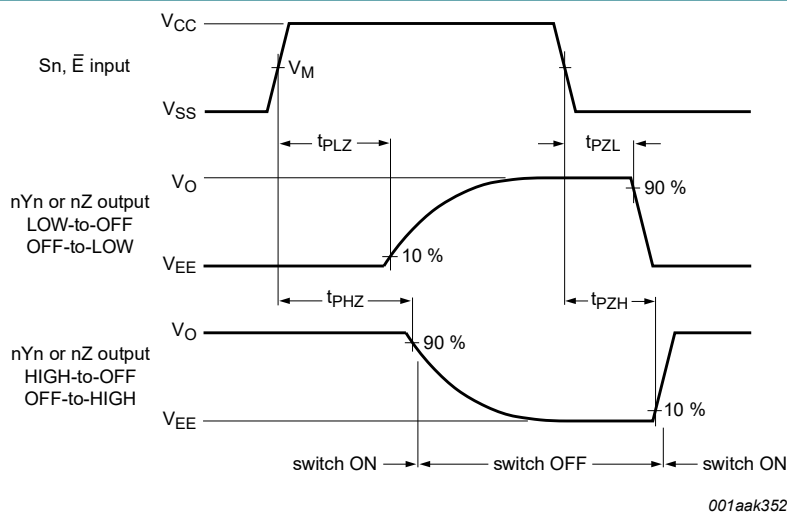
- [1] All typical values are measured at T<sub>amb</sub> = 25 °C.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.  
t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.  
t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.
- [3] Typical values are measured at nominal supply voltage (V<sub>CC</sub> = 3.3 V).
- [4] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + Σ((C<sub>L</sub> + C<sub>SW</sub>) × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) where:  
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>SW</sub> = maximum switch capacitance in pF;  
V<sub>CC</sub> = supply voltage in Volts  
N = number of inputs switching  
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

### 10.1. Waveforms and test circuit



Measurement points are given in Table 9.  
V<sub>OL</sub> and V<sub>OH</sub> are typical voltage output levels that occur with the output load.

**Fig. 12. Propagation delay input (nYn, nZ) to output (nZ, nYn)**

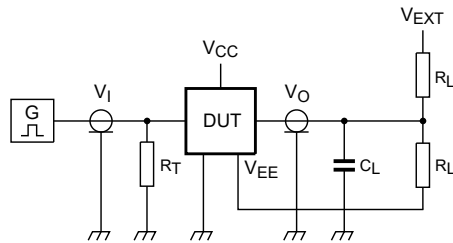
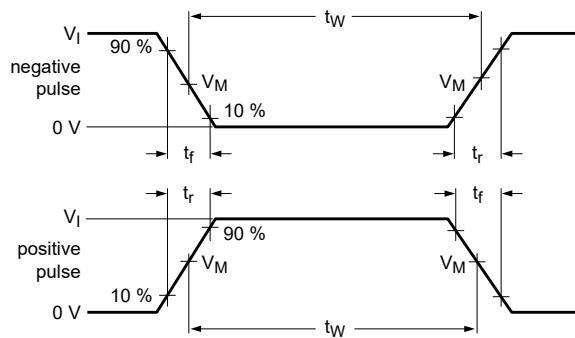


Measurement points are given in Table 9.  
V<sub>OL</sub> and V<sub>OH</sub> are typical voltage output levels that occur with the output load.

**Fig. 13. Enable and disable times**

Table 9. Measurement points

Supply voltage	Input	Output		
$V_{CC}$	$V_M$	$V_M$	$V_X$	$V_Y$
< 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.1V_{CC}$	$V_{OH} - 0.1V_{CC}$
2.7 V to 3.6 V	1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$
> 3.6 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.1V_{CC}$	$V_{OH} - 0.1V_{CC}$



001aak353

Test data is given in [Table 10](#).

Definitions for test circuit:

$R_L$  = Load resistance.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

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

Fig. 14. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		$V_{EXT}$		
$V_{CC}$	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
< 2.7 V	$V_{CC}$	$\leq 6 \text{ ns}$	50 pF	1 k $\Omega$	open	$V_{EE}$	$2V_{CC}$
2.7 V to 3.6 V	2.7 V	$\leq 6 \text{ ns}$	15 pF, 50 pF	1 k $\Omega$	open	$V_{EE}$	$2V_{CC}$
> 3.6 V	$V_{CC}$	$\leq 6 \text{ ns}$	50 pF	1 k $\Omega$	open	$V_{EE}$	$2V_{CC}$

### 10.2. Additional dynamic parameters

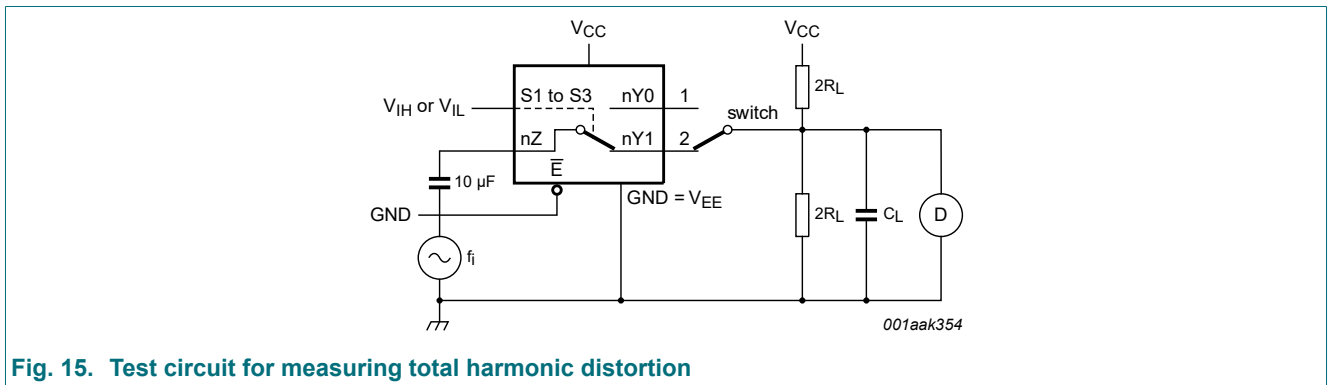
**Table 11. Additional dynamic characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $V_I = \text{GND}$  or  $V_{CC}$  (unless otherwise specified);  $t_r = t_f \leq 6.0 \text{ ns}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	$f_i = 1 \text{ kHz}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 10 \text{ k}\Omega$ ; see Fig. 15				
		$V_{CC} = 3.0 \text{ V}$ ; $V_I = 2.75 \text{ V (p-p)}$	-	0.8	-	%
		$V_{CC} = 6.0 \text{ V}$ ; $V_I = 5.5 \text{ V (p-p)}$	-	0.4	-	%
		$f_i = 10 \text{ kHz}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 10 \text{ k}\Omega$ ; see Fig. 15				
		$V_{CC} = 3.0 \text{ V}$ ; $V_I = 2.75 \text{ V (p-p)}$	-	2.4	-	%
		$V_{CC} = 6.0 \text{ V}$ ; $V_I = 5.5 \text{ V (p-p)}$	-	1.2	-	%
$f_{(-3\text{dB})}$	-3 dB frequency response	$C_L = 50 \text{ pF}$ ; $R_L = 50 \text{ }\Omega$ ; see Fig. 16 [1]				
		$V_{CC} = 3.0 \text{ V}$	-	180	-	MHz
		$V_{CC} = 6.0 \text{ V}$	-	200	-	MHz
$\alpha_{\text{iso}}$	isolation (OFF-state)	$f_i = 1 \text{ MHz}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 600 \text{ }\Omega$ ; see Fig. 18 [2]				
		$V_{CC} = 3.0 \text{ V}$	-	-50	-	dB
		$V_{CC} = 6.0 \text{ V}$	-	-50	-	dB
$V_{\text{ct}}$	crosstalk voltage	between digital inputs and switch; $f_i = 1 \text{ MHz}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 600 \text{ }\Omega$ ; see Fig. 20 [2]				
		$V_{CC} = 3.0 \text{ V}$	-	0.11	-	V
		$V_{CC} = 6.0 \text{ V}$	-	0.12	-	V
Xtalk	crosstalk	between switches; $f_i = 1 \text{ MHz}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 600 \text{ }\Omega$ ; see Fig. 21				
		$V_{CC} = 3.0 \text{ V}$	-	-60	-	dB
		$V_{CC} = 6.0 \text{ V}$	-	-60	-	dB

- [1] Adjust  $f_i$  voltage to obtain 0 dBm level at output for 1 MHz (0 dBm = 1 mW into 50  $\Omega$ ).
- [2] Adjust  $f_i$  voltage to obtain 0 dBm level at output for 1 MHz (0 dBm = 1 mW into 600  $\Omega$ ).

#### 10.2.1. Test circuits



**Fig. 15. Test circuit for measuring total harmonic distortion**

Triple single-pole double-throw analog switch

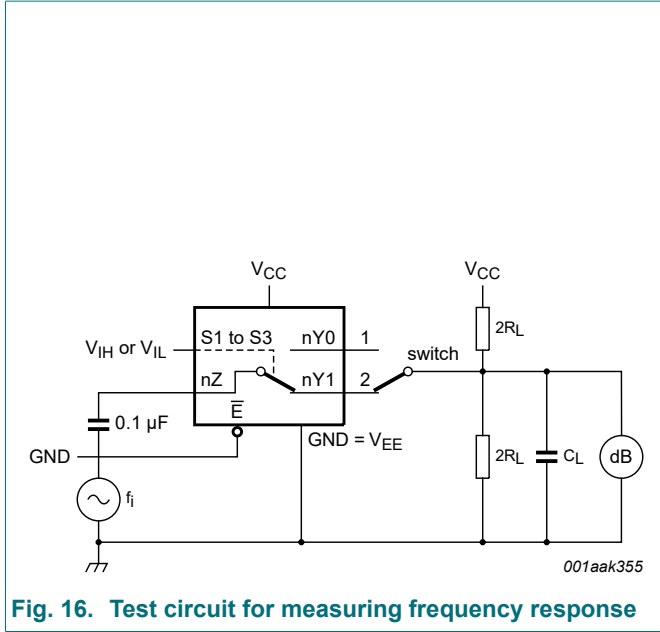


Fig. 16. Test circuit for measuring frequency response

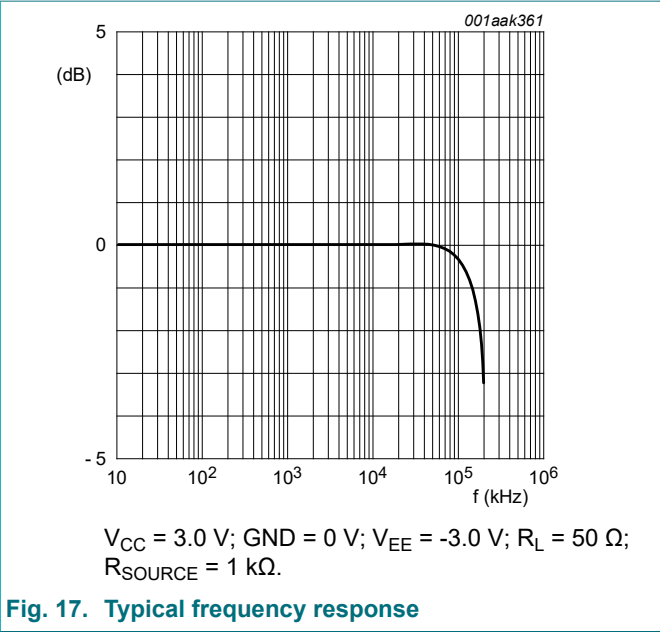


Fig. 17. Typical frequency response

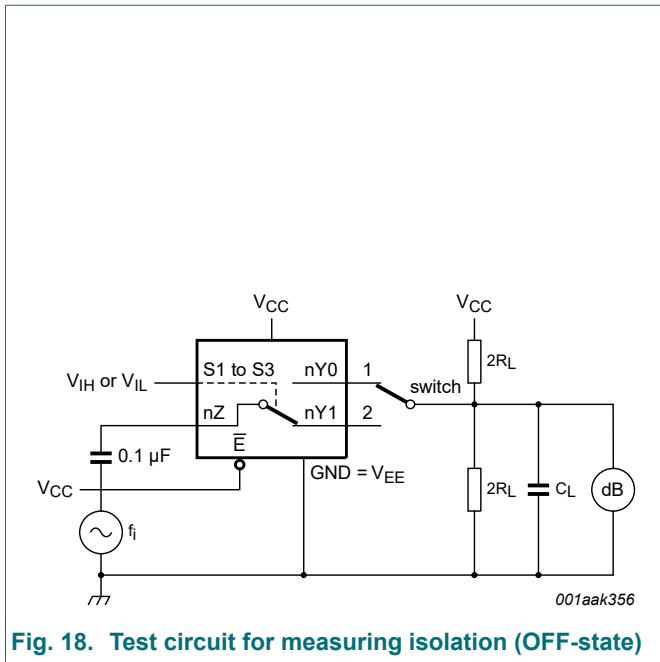


Fig. 18. Test circuit for measuring isolation (OFF-state)

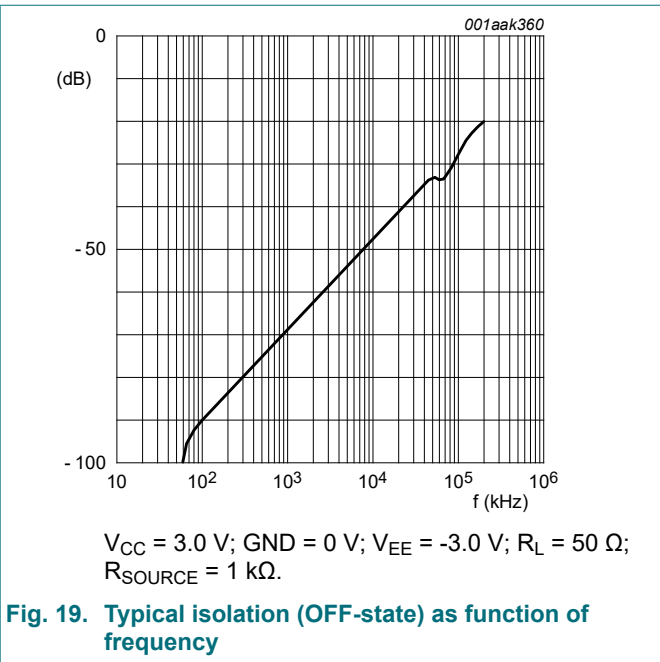
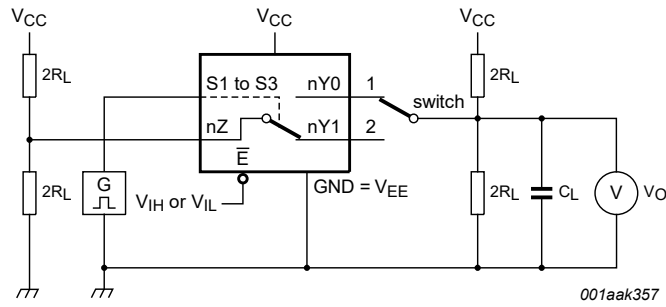
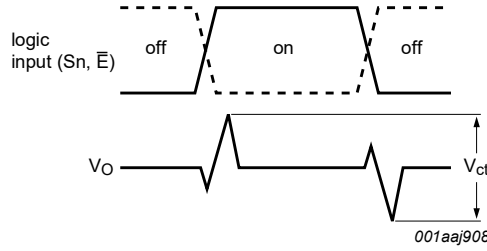


Fig. 19. Typical isolation (OFF-state) as function of frequency

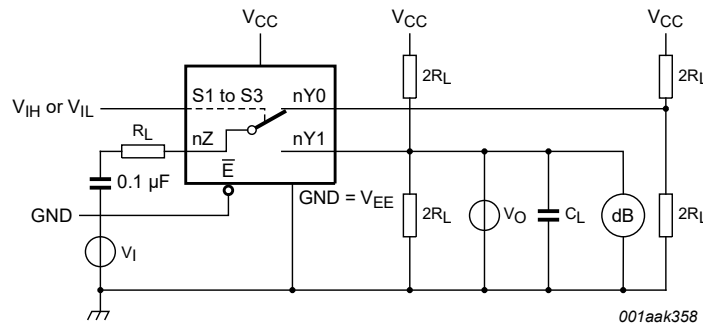


a. Test circuit

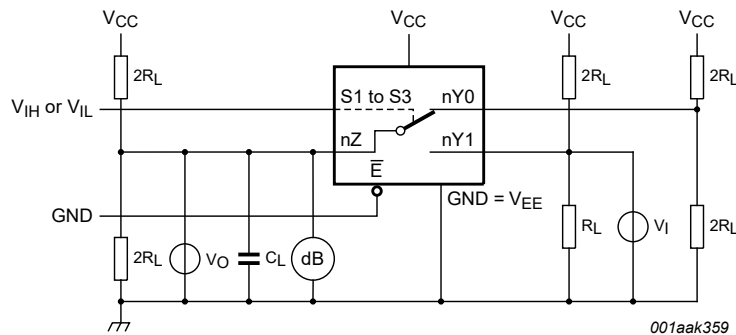


b. Input and output pulse definitions  
 $V_i$  may be connected to  $S_n$  or  $\bar{E}$ .

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



a. Switch closed condition



b. Switch open condition

**Fig. 21. Test circuit for measuring crosstalk between switches**

### 11. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

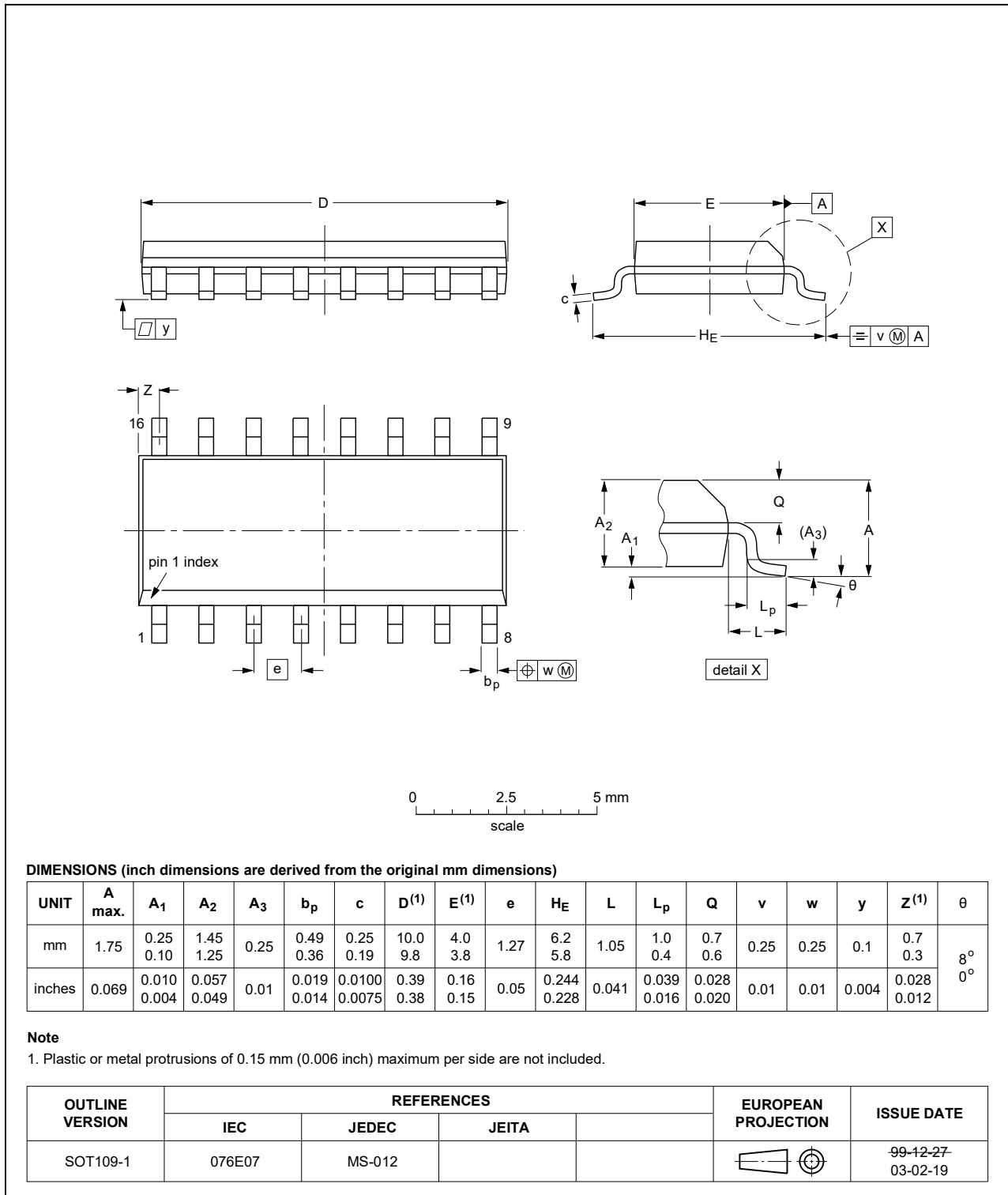


Fig. 22. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

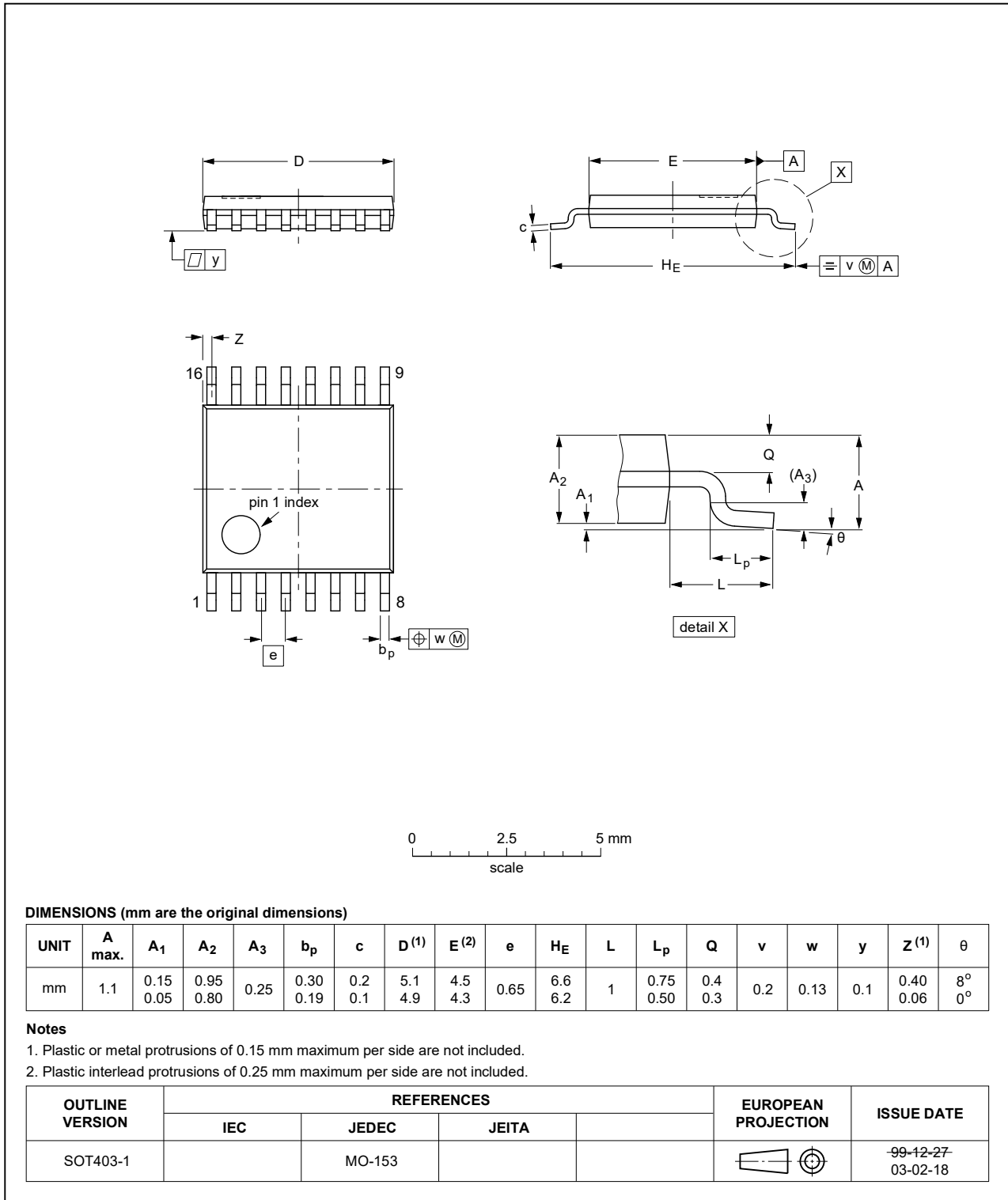


Fig. 23. Package outline SOT403-1 (TSSOP16)



DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 x 3.5 x 0.85 mm

SOT763-1

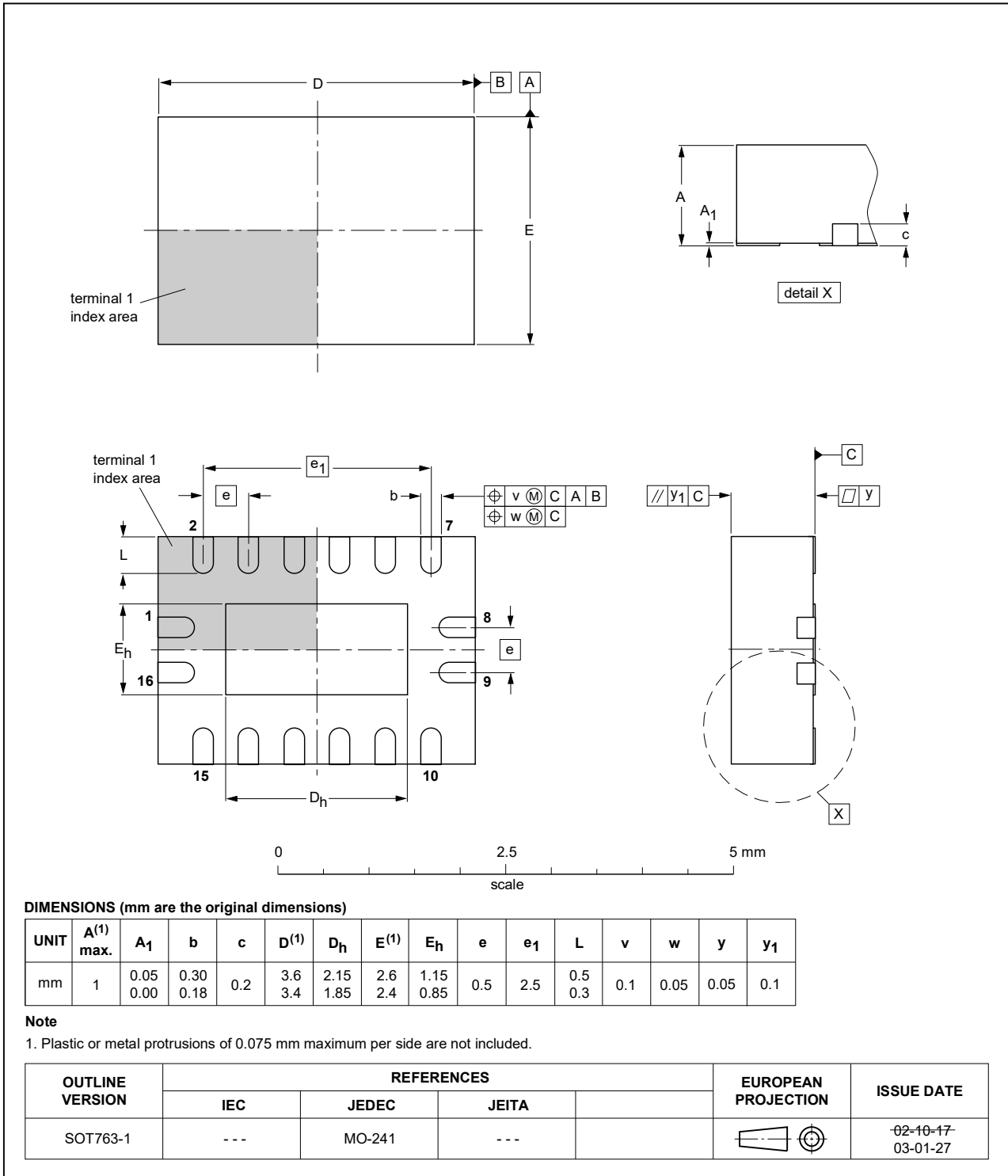


Fig. 24. Package outline SOT763-1 (DHVQFN16)

## 12. Abbreviations

Table 12. Abbreviations

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

## 13. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LV4053_Q100 v.2	20200923	Product data sheet	-	74LV4053_Q100 v.1
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Section 2</a> updated.</li> <li><a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74LV4053_Q100 v.1	20140325	Product data sheet	-	-

## 14. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	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 <https://www.nexperia.com>.

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