

# 74HC4052-Q100; 74HCT4052-Q100

## Dual 4-channel analog multiplexer/demultiplexer

Rev. 2 — 22 November 2012

Product data sheet

## 1. General description

The 74HC4052-Q100; 74HCT4052-Q100 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). The device is specified in compliance with JEDEC standard no. 7A.

The 74HC4052-Q100; 74HCT4052-Q100 is a dual 4-channel analog multiplexer/demultiplexer with common select logic. Each multiplexer has four independent inputs/outputs (pins nY0 to nY3) and a common input/output (pin nZ). The common channel select logics include two digital select inputs (pins S0 and S1) and an active LOW enable input (pin  $\bar{E}$ ). When pin  $\bar{E}$  = LOW, one of the four switches is selected (low-impedance ON-state) with pins S0 and S1. When pin  $\bar{E}$  = HIGH, all switches are in the high-impedance OFF-state, independent of pins S0 and S1.

$V_{CC}$  and GND are the supply voltage pins for the digital control inputs (pins S0, S1 and  $\bar{E}$ ). The  $V_{CC}$  to GND ranges are 2.0 V to 10.0 V for the 74HC4052-Q100, and 4.5 V to 5.5 V for the 74HCT4052-Q100. The analog inputs/outputs (pins nY0 to nY3 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 10.0 V. For operation as a digital multiplexer/demultiplexer,  $V_{EE}$  is connected to GND (typically ground).

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  $+125\text{ }^{\circ}\text{C}$
- Wide analog input voltage range from  $-5\text{ V}$  to  $+5\text{ V}$
- Low ON resistance:
  - ◆  $80\ \Omega$  (typical) at  $V_{CC} - V_{EE} = 4.5\text{ V}$
  - ◆  $70\ \Omega$  (typical) at  $V_{CC} - V_{EE} = 6.0\text{ V}$
  - ◆  $60\ \Omega$  (typical) at  $V_{CC} - V_{EE} = 9.0\text{ V}$
- Logic level translation: to enable 5 V logic to communicate with  $\pm 5\text{ V}$  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 ( $C = 200\text{ pF}$ ,  $R = 0\ \Omega$ )
  - ◆ CDM AEC-Q100-011 revision B exceeds 1000 V
- Multiple package options

## 3. Applications

- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

## 4. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74HC4052D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT4052D-Q100				
74HC4052PW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74HCT4052PW-Q100				
74HC4052BQ-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
74HCT4052BQ-Q100				

## 5. Functional diagram

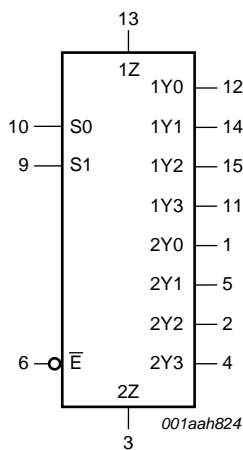


Fig 1. Logic symbol

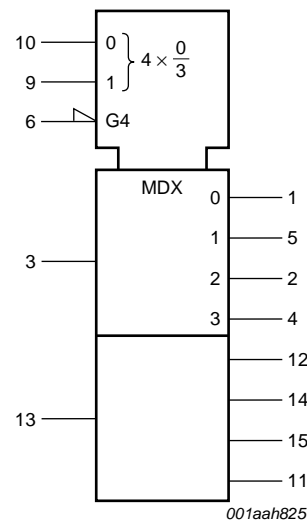


Fig 2. IEC logic symbol

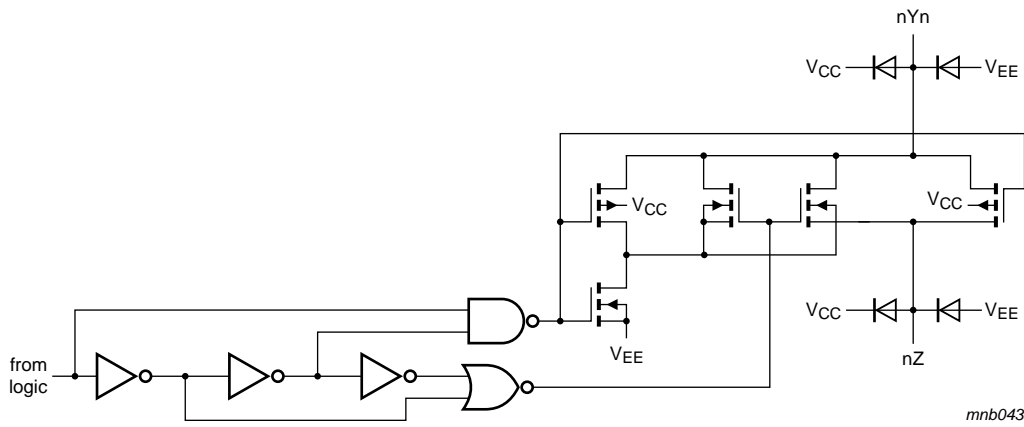


Fig 3. Schematic diagram (one switch)

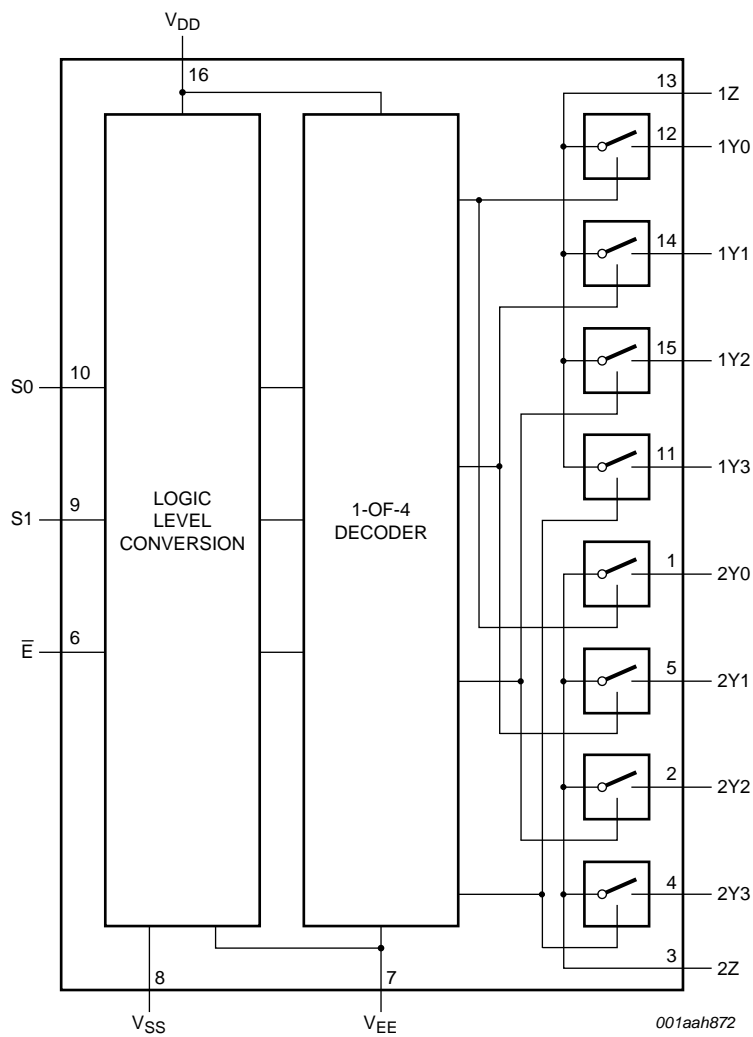
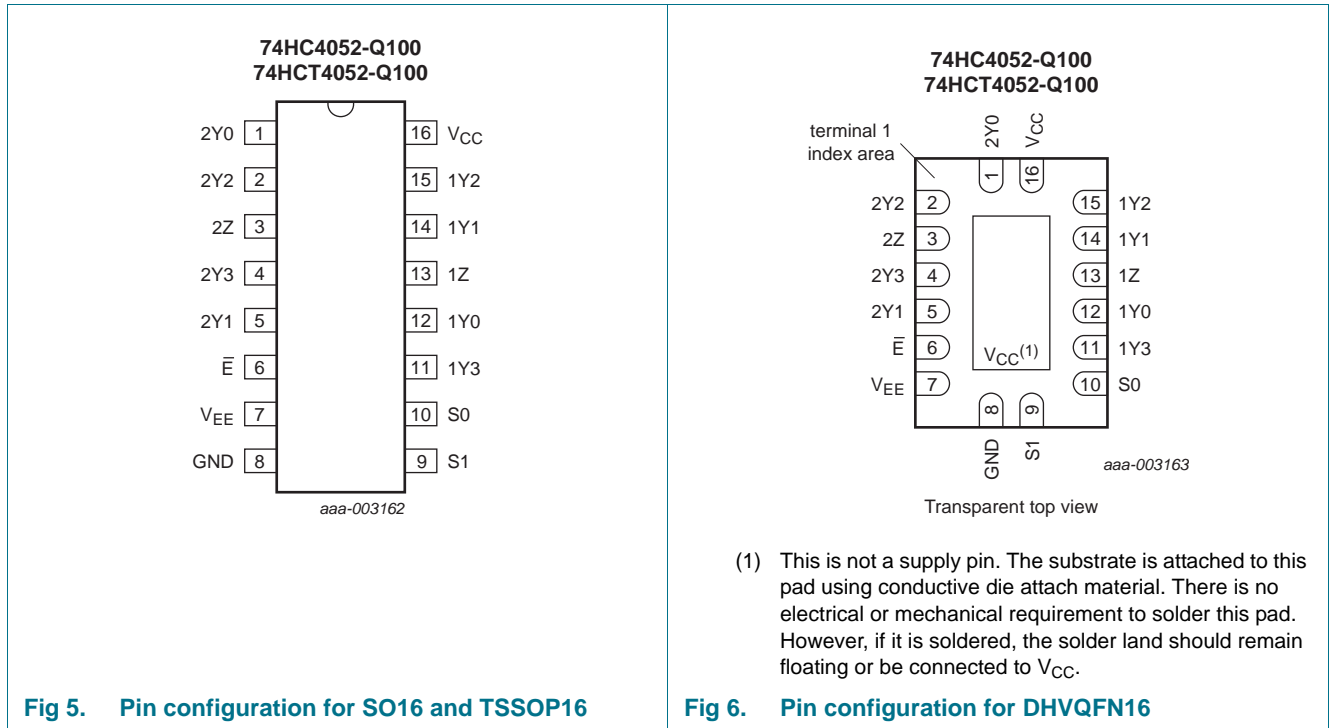


Fig 4. Functional diagram

## 6. Pinning information

### 6.1 Pinning



### 6.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
2Y0, 2Y1, 2Y2, 2Y3	1, 5, 2, 4	independent input or output
1Z, 2Z	13, 3	common input or output
$\bar{E}$	6	enable input (active LOW)
V <sub>EE</sub>	7	negative supply voltage
GND	8	ground (0 V)
S0, S1	10, 9	select logic input
1Y0, 1Y1, 1Y2, 1Y3	12, 14, 15, 11	independent input or output
V <sub>CC</sub>	16	positive supply voltage

## 7. Functional description

### 7.1 Function table

Table 3. Function table<sup>[1]</sup>

Input			Channel on
$\bar{E}$	S1	S0	
L	L	L	nY0 and nZ
L	L	H	nY1 and nZ
L	H	L	nY2 and nZ
L	H	H	nY3 and nZ
H	X	X	none

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

## 8. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		<sup>[1]</sup> -0.5	+11.0	V
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA
$I_{SK}$	switch clamping current	$V_{SW} < -0.5\text{ V}$ or $V_{SW} > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA
$I_{SW}$	switch current	$-0.5\text{ V} < V_{SW} < V_{CC} + 0.5\text{ V}$	-	$\pm 25$	mA
$I_{EE}$	supply current		-	$\pm 20$	mA
$I_{CC}$	supply current		-	50	mA
$I_{GND}$	ground current		-	-50	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation		<sup>[2]</sup> -	500	mW
P	power dissipation	per switch	-	100	mW

[1] To avoid drawing  $V_{CC}$  current out of pins nZ, when switch current flows in pins nYn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into pins nZ, no  $V_{CC}$  current flows out of pins nYn. In this case there is no limit for the voltage drop across the switch, but the voltages at pins nYn and nZ may not exceed  $V_{CC}$  or  $V_{EE}$ .

[2] For SO16 packages: above 70 °C the value of  $P_{tot}$  derates linearly with 8 mW/K.  
For TSSOP16 package: above 60 °C the value of  $P_{tot}$  derates linearly with 5.5 mW/K.  
For DHVQFN16 package: above 60 °C the value of  $P_{tot}$  derates linearly with 4.5 mW/K.

## 9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	74HC4052-Q100			74HCT4052-Q100			Unit
			Min	Typ	Max	Min	Typ	Max	
$V_{CC}$	supply voltage	see <a href="#">Figure 7</a> and <a href="#">Figure 8</a>							
		$V_{CC} - GND$	2.0	5.0	10.0	4.5	5.0	5.5	V
		$V_{CC} - V_{EE}$	2.0	5.0	10.0	2.0	5.0	10.0	V
$V_I$	input voltage		GND	-	$V_{CC}$	GND	-	$V_{CC}$	V
$V_{SW}$	switch voltage		$V_{EE}$	-	$V_{CC}$	$V_{EE}$	-	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 2.0\text{ V}$	-	-	625	-	-	-	ns/V
		$V_{CC} = 4.5\text{ V}$	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0\text{ V}$	-	-	83	-	-	-	ns/V
		$V_{CC} = 10.0\text{ V}$	-	-	31	-	-	-	ns/V

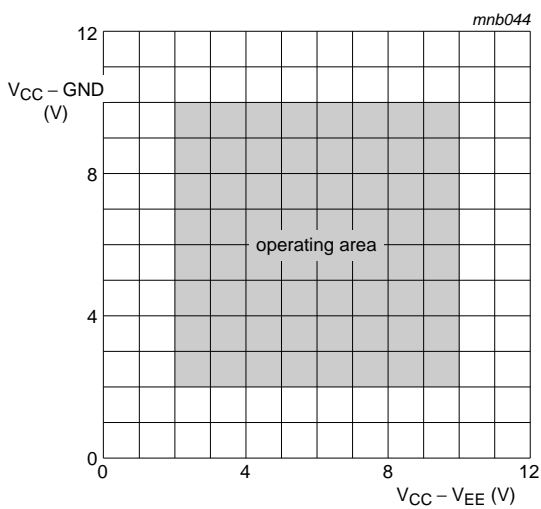


Fig 7. Guaranteed operating area as a function of the supply voltages for 74HC4052-Q100

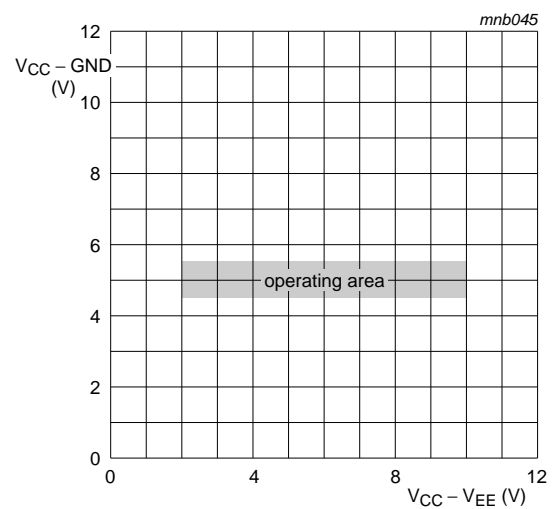


Fig 8. Guaranteed operating area as a function of the supply voltages for 74HCT4052-Q100

## 10. Static characteristics

**Table 6.**  $R_{ON}$  resistance per switch for 74HC405-Q100 and 74HCT4052-Q100

$V_I = V_{IH}$  or  $V_{IL}$ ; for test circuit see [Figure 9](#).

$V_{is}$  is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

For 74HC4052-Q100:  $V_{CC} - GND$  or  $V_{CC} - V_{EE} = 2.0\text{ V}$ , 4.5 V, 6.0 V and 9.0 V.

For 74HCT4052-Q100:  $V_{CC} - GND = 4.5\text{ V}$  and 5.5 V,  $V_{CC} - V_{EE} = 2.0\text{ V}$ , 4.5 V, 6.0 V and 9.0 V.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = -40\text{ °C}</math> to <math>+85\text{ °C}</math><sup>[1]</sup></b>						
$R_{ON(peak)}$	ON resistance (peak)	$V_{is} = V_{CC}$ to $V_{EE}$				
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$	[2] -	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	100	225	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	90	200	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	70	165	$\Omega$
$R_{ON(rail)}$	ON resistance (rail)	$V_{is} = V_{EE}$				
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$	[2] -	150	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	80	175	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	70	150	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	60	130	$\Omega$
		$V_{is} = V_{CC}$				
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$	[2] -	150	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	90	200	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	80	175	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	65	150	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_{is} = V_{CC}$ to $V_{EE}$				
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	[2] -	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	9	-	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	8	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	6	-	$\Omega$
<b><math>T_{amb} = -40\text{ °C}</math> to <math>+125\text{ °C}</math></b>						
$R_{ON(peak)}$	ON resistance (peak)	$V_{is} = V_{CC}$ to $V_{EE}$				
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$	[2] -	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	270	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	240	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	195	$\Omega$

**Table 6.**  $R_{ON}$  resistance per switch for 74HC405-Q100 and 74HCT4052-Q100 ...continued

$V_I = V_{IH}$  or  $V_{IL}$ ; for test circuit see [Figure 9](#).

$V_{is}$  is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

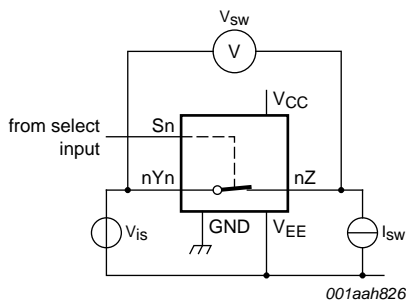
For 74HC4052-Q100:  $V_{CC} - GND$  or  $V_{CC} - V_{EE} = 2.0\text{ V}$ ,  $4.5\text{ V}$ ,  $6.0\text{ V}$  and  $9.0\text{ V}$ .

For 74HCT4052-Q100:  $V_{CC} - GND = 4.5\text{ V}$  and  $5.5\text{ V}$ ,  $V_{CC} - V_{EE} = 2.0\text{ V}$ ,  $4.5\text{ V}$ ,  $6.0\text{ V}$  and  $9.0\text{ V}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{ON(rail)}$	ON resistance (rail)	$V_{is} = V_{EE}$					
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$	[2]	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	210	$\Omega$	
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	180	$\Omega$	
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	160	$\Omega$	
		$V_{is} = V_{CC}$					
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$	[2]	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	240	$\Omega$	
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	210	$\Omega$	
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	-	180	$\Omega$	

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

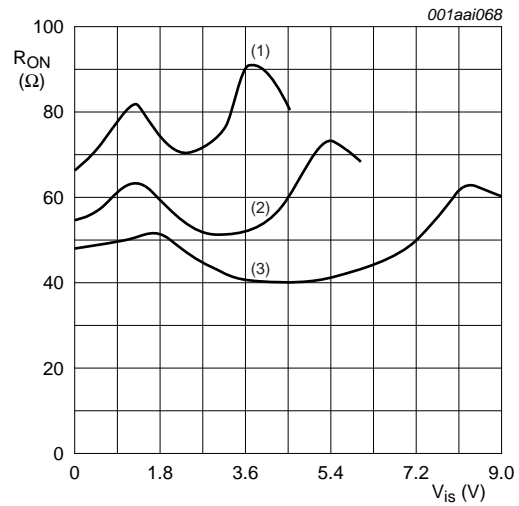
[2] When supply voltages ( $V_{CC} - V_{EE}$ ) near  $2.0\text{ V}$  the analog switch ON resistance becomes extremely non-linear. When using a supply of  $2\text{ V}$ , only use these devices for transmitting digital signals.



$V_{is} = 0\text{ V}$  to  $(V_{CC} - V_{EE})$ .

$$R_{ON} = \frac{V_{sw}}{I_{sw}}$$

**Fig 9.** Test circuit for measuring  $R_{ON}$



$V_{is} = 0\text{ V}$  to  $(V_{CC} - V_{EE})$ .

- (1)  $V_{CC} = 4.5\text{ V}$
- (2)  $V_{CC} = 6\text{ V}$
- (3)  $V_{CC} = 9\text{ V}$

**Fig 10.** Typical  $R_{ON}$  as a function of input voltage  $V_{is}$



**Table 7. Static characteristics for 74HC4052-Q100**

Voltages are referenced to GND (ground = 0 V).

$V_{is}$  is the input voltage at pins nYn or nZ, whichever is assigned as an input.

$V_{os}$  is the output voltage at pins nZ or nYn, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math>[1]</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	1.2	-	V
		$V_{CC} = 4.5\text{ V}$	3.15	2.4	-	V
		$V_{CC} = 6.0\text{ V}$	4.2	3.2	-	V
		$V_{CC} = 9.0\text{ V}$	6.3	4.7	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	0.8	0.5	V
		$V_{CC} = 4.5\text{ V}$	-	2.1	1.35	V
		$V_{CC} = 6.0\text{ V}$	-	2.8	1.8	V
		$V_{CC} = 9.0\text{ V}$	-	4.3	2.7	V
$I_I$	input leakage current	$V_{EE} = 0\text{ V}; V_I = V_{CC}\text{ or GND}$				
		$V_{CC} = 6.0\text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
		$V_{CC} = 10.0\text{ V}$	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0\text{ V}; V_{EE} = 0\text{ V}; V_I = V_{IH}\text{ or }V_{IL};$ $ V_{SW}  = V_{CC} - V_{EE};$ see <a href="#">Figure 11</a>				
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
		all channels	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_I = V_{IH}\text{ or }V_{IL};  V_{SW}  = V_{CC} - V_{EE};$ $V_{CC} = 10.0\text{ V}; V_{EE} = 0\text{ V};$ see <a href="#">Figure 12</a>	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_{EE} = 0\text{ V}; V_I = V_{CC}\text{ or GND}; V_{is} = V_{EE}\text{ or }V_{CC};$ $V_{os} = V_{CC}\text{ or }V_{EE}$				
		$V_{CC} = 6.0\text{ V}$	-	-	80.0	$\mu\text{A}$
		$V_{CC} = 10.0\text{ V}$	-	-	160.0	$\mu\text{A}$
$C_I$	input capacitance		-	3.5	-	pF
$C_{SW}$	switch capacitance	independent pins nYn	-	5	-	pF
		common pins nZ	-	12	-	pF
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	-	-	V
		$V_{CC} = 4.5\text{ V}$	3.15	-	-	V
		$V_{CC} = 6.0\text{ V}$	4.2	-	-	V
		$V_{CC} = 9.0\text{ V}$	6.3	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	-	0.5	V
		$V_{CC} = 4.5\text{ V}$	-	-	1.35	V
		$V_{CC} = 6.0\text{ V}$	-	-	1.8	V
		$V_{CC} = 9.0\text{ V}$	-	-	2.7	V
$I_I$	input leakage current	$V_{EE} = 0\text{ V}; V_I = V_{CC}\text{ or GND}$				
		$V_{CC} = 6.0\text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
		$V_{CC} = 10.0\text{ V}$	-	-	$\pm 2.0$	$\mu\text{A}$

**Table 7.** Static characteristics for 74HC4052-Q100 ...continued

Voltages are referenced to GND (ground = 0 V).

$V_{is}$  is the input voltage at pins  $nY_n$  or  $nZ$ , whichever is assigned as an input.

$V_{os}$  is the output voltage at pins  $nZ$  or  $nY_n$ , whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - V_{EE}$ ; see <a href="#">Figure 11</a>				
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
		all channels	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - V_{EE}$ ; $V_{CC} = 10.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; see <a href="#">Figure 12</a>	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_{EE} = 0\text{ V}$ ; $V_I = V_{CC}$ or GND; $V_{is} = V_{EE}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or $V_{EE}$				
		$V_{CC} = 6.0\text{ V}$	-	-	160.0	$\mu\text{A}$
		$V_{CC} = 10.0\text{ V}$	-	-	320.0	$\mu\text{A}$

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

**Table 8.** Static characteristics for 74HCT4052-Q100

Voltages are referenced to GND (ground = 0 V).

$V_{is}$  is the input voltage at pins  $nY_n$  or  $nZ$ , whichever is assigned as an input.

$V_{os}$  is the output voltage at pins  $nZ$  or  $nY_n$ , whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = -40\text{ }^\circ\text{C}</math> to <math>+85\text{ }^\circ\text{C}</math>[1]</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$	2.0	1.6	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$	-	1.2	0.8	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - V_{EE}$ ; see <a href="#">Figure 11</a>				
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
		all channels	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - V_{EE}$ ; see <a href="#">Figure 12</a>	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = V_{EE}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or $V_{EE}$				
		$V_{CC} = 5.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	80.0	$\mu\text{A}$
		$V_{CC} = 5.0\text{ V}$ ; $V_{EE} = -5.0\text{ V}$	-	-	160.0	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input; $V_I = V_{CC} - 2.1\text{ V}$ ; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	45	202.5	$\mu\text{A}$
$C_I$	input capacitance		-	3.5	-	pF
$C_{SW}$	switch capacitance	independent pins $nY_n$	-	5	-	pF
		common pins $nZ$	-	12	-	pF
<b><math>T_{amb} = -40\text{ }^\circ\text{C}</math> to <math>+125\text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$	2.0	-	-	V

**Table 8. Static characteristics for 74HCT4052-Q100 ...continued**

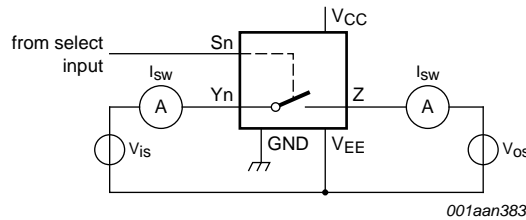
Voltages are referenced to GND (ground = 0 V).

$V_{is}$  is the input voltage at pins  $nY_n$  or  $nZ$ , whichever is assigned as an input.

$V_{os}$  is the output voltage at pins  $nZ$  or  $nY_n$ , whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	0.8	V
$I_I$	input leakage current	$V_I = V_{CC} \text{ or } \text{GND}; V_{CC} = 5.5 \text{ V}; V_{EE} = 0 \text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(\text{OFF})}$	OFF-state leakage current	$V_{CC} = 10.0 \text{ V}; V_{EE} = 0 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};  V_{SW}  = V_{CC} - V_{EE};$ see <a href="#">Figure 11</a>	-	-	$\pm 1.0$	$\mu\text{A}$
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
		all channels	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{S(\text{ON})}$	ON-state leakage current	$V_{CC} = 10.0 \text{ V}; V_{EE} = 0 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};  V_{SW}  = V_{CC} - V_{EE};$ see <a href="#">Figure 12</a>	-	-	$\pm 2.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC} \text{ or } \text{GND}; V_{is} = V_{EE} \text{ or } V_{CC}; V_{os} = V_{CC} \text{ or } V_{EE}$	-	-	-	-
		$V_{CC} = 5.5 \text{ V}; V_{EE} = 0 \text{ V}$	-	-	160.0	$\mu\text{A}$
		$V_{CC} = 5.0 \text{ V}; V_{EE} = -5.0 \text{ V}$	-	-	320.0	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input; $V_I = V_{CC} - 2.1 \text{ V};$ other inputs at $V_{CC}$ or $\text{GND}; V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; V_{EE} = 0 \text{ V}$	-	-	220.5	$\mu\text{A}$

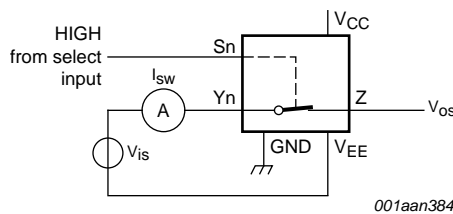
[1] All typical values are measured at  $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ .



$V_{is} = V_{CC}$  and  $V_{os} = V_{EE}$ .

$V_{is} = V_{EE}$  and  $V_{os} = V_{CC}$ .

**Fig 11. Test circuit for measuring OFF-state current**



$V_{is} = V_{CC}$  and  $V_{os} = \text{open-circuit}$ .

$V_{is} = V_{EE}$  and  $V_{os} = \text{open-circuit}$ .

**Fig 12. Test circuit for measuring ON-state current**

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics for 74HC4052-Q100**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see [Figure 15](#).

$V_{is}$  is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math>[1]</b>						
$t_{pd}$	propagation delay	$V_{is}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see <a href="#">Figure 13</a>	[2]			
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	14	75	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	5	15	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	4	13	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	4	10	ns
$t_{on}$	turn-on time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see <a href="#">Figure 14</a>	[3]			
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	105	405	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	38	81	ns
		$V_{CC} = 5.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $C_L = 15\text{ pF}$	-	28	-	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	30	69	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	26	58	ns
$t_{off}$	turn-off time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see <a href="#">Figure 14</a>	[4]			
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	74	315	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	27	63	ns
		$V_{CC} = 5.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $C_L = 15\text{ pF}$	-	21	-	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	22	54	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	22	48	ns
$C_{PD}$	power dissipation capacitance	per switch; $V_I = GND$ to $V_{CC}$	[5]	57	-	pF
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>						
$t_{pd}$	propagation delay	$V_{is}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see <a href="#">Figure 13</a>	[2]			
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	90	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	18	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	15	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	12	ns
$t_{on}$	turn-on time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see <a href="#">Figure 14</a>	[3]			
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	490	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	98	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	83	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	69	ns

**Table 9. Dynamic characteristics for 74HC4052-Q100 ...continued**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see [Figure 15](#).

$V_{is}$  is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{off}$	turn-off time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see <a href="#">Figure 14</a>	[4]			
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	375	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	75	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	64	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	57	ns

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

[2]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[3]  $t_{on}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[4]  $t_{off}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$N$  = number of inputs switching;

$\Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;

$C_L$  = output load capacitance in pF;

$C_{sw}$  = switch capacitance in pF;

$V_{CC}$  = supply voltage in V.

**Table 10. Dynamic characteristics for 74HCT4052-Q100**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see [Figure 15](#).

$V_{is}$  is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b><math>T_{amb} = -40\text{ }^\circ\text{C to } +85\text{ }^\circ\text{C}</math>[1]</b>							
$t_{pd}$	propagation delay	$V_{is}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see <a href="#">Figure 13</a>	[2]				
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	5	15	ns	
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	4	10	ns	
$t_{on}$	turn-on time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see <a href="#">Figure 14</a>	[3]				
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	41	88	ns	
		$V_{CC} = 5.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $C_L = 15\text{ pF}$	-	18	-	ns	
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	28	60	ns	
$t_{off}$	turn-off time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see <a href="#">Figure 14</a>	[4]				
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	26	63	ns	
		$V_{CC} = 5.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $C_L = 15\text{ pF}$	-	13	-	ns	
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	21	48	ns	
$C_{PD}$	power dissipation capacitance	per switch; $V_I = GND$ to $V_{CC} - 1.5\text{ V}$	[5]	-	57	-	pF

**Table 10. Dynamic characteristics for 74HCT4052-Q100 ...continued**

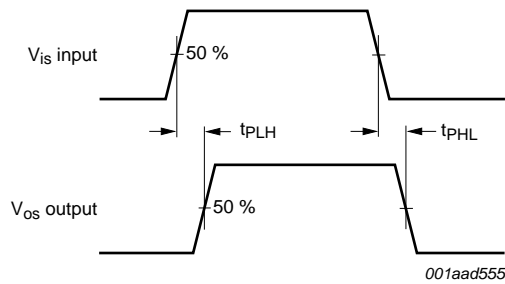
$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see [Figure 15](#).

$V_{is}$  is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

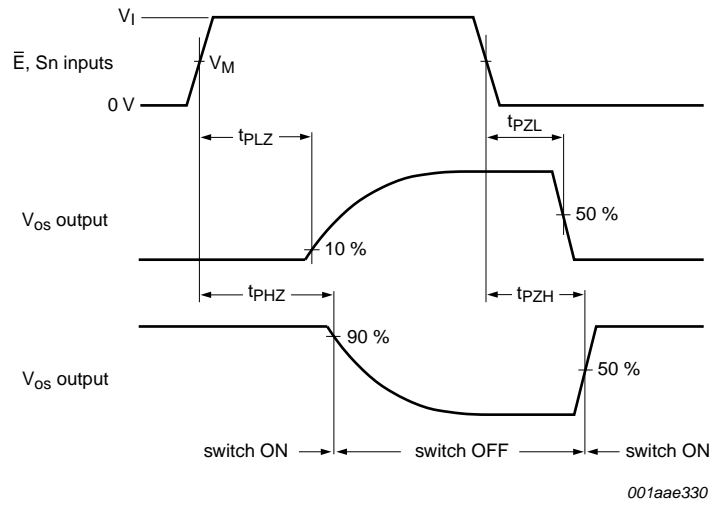
$V_{os}$  is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>						
$t_{pd}$	propagation delay	$V_{is}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see <a href="#">Figure 13</a>	[2]			
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	18	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	12	ns
$t_{on}$	turn-on time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see <a href="#">Figure 14</a>	[3]			
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	105	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	72	ns
$t_{off}$	turn-off time	$\bar{E}$ , Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see <a href="#">Figure 14</a>	[4]			
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	75	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	57	ns

- [1] All typical values are measured at  $T_{amb} = 25\text{ °C}$ .
- [2]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .
- [3]  $t_{on}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .
- [4]  $t_{off}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .
- [5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $N$  = number of inputs switching;  
 $\Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;  
 $C_L$  = output load capacitance in pF;  
 $C_{sw}$  = switch capacitance in pF;  
 $V_{CC}$  = supply voltage in V.



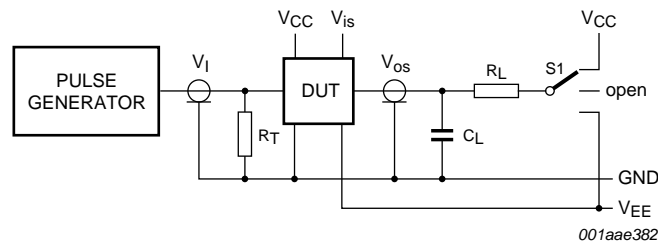
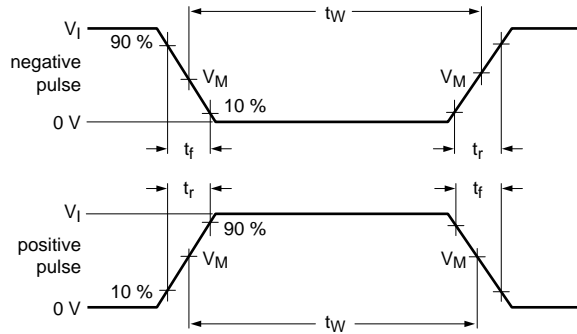
**Fig 13. Input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays**



For 74HC4052-Q100:  $V_M = 0.5 \times V_{CC}$ .

For 74HCT4052-Q100:  $V_M = 1.3 \text{ V}$ .

**Fig 14. Turn-on and turn-off times**



Definitions for test circuit; see [Table 11](#):

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

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

$R_L$  = load resistance.

S1 = Test selection switch.

**Fig 15. Test circuit for measuring AC performance**

Table 11. Test data

Test	Input				Load		S1 position
	V <sub>I</sub>	V <sub>is</sub>	t <sub>r</sub> , t <sub>f</sub>		C <sub>L</sub>	R <sub>L</sub>	
			at f <sub>max</sub>	other <sup>[1]</sup>			
t <sub>PHL</sub> , t <sub>PLH</sub>	[2]	pulse	< 2 ns	6 ns	50 pF	1 kΩ	open
t <sub>PZH</sub> , t <sub>PHZ</sub>	[2]	V <sub>CC</sub>	< 2 ns	6 ns	50 pF	1 kΩ	V <sub>EE</sub>
t <sub>PZL</sub> , t <sub>PLZ</sub>	[2]	V <sub>EE</sub>	< 2 ns	6 ns	50 pF	1 kΩ	V <sub>CC</sub>

[1] t<sub>r</sub> = t<sub>f</sub> = 6 ns; when measuring f<sub>max</sub>, there is no constraint to t<sub>r</sub> and t<sub>f</sub> with 50 % duty factor.

[2] V<sub>I</sub> values:

- For 74HC4052-Q100: V<sub>I</sub> = V<sub>CC</sub>
- For 74HCT4052-Q100: V<sub>I</sub> = 3 V

## 12. Additional dynamic characteristics

Table 12. Additional dynamic characteristics

Recommended conditions and typical values; GND = 0 V; T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 50 pF.

V<sub>is</sub> is the input voltage at pins nYn or nZ, whichever is assigned as an input.

V<sub>os</sub> is the output voltage at pins nYn or nZ, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
d <sub>sin</sub>	sine-wave distortion	f <sub>i</sub> = 1 kHz; R <sub>L</sub> = 10 kΩ; see <a href="#">Figure 16</a>					
		V <sub>is</sub> = 4.0 V (p-p); V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	-	0.04	-	%	
		V <sub>is</sub> = 8.0 V (p-p); V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	0.02	-	%	
		f <sub>i</sub> = 10 kHz; R <sub>L</sub> = 10 kΩ; see <a href="#">Figure 16</a>					
		V <sub>is</sub> = 4.0 V (p-p); V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	-	0.12	-	%	
		V <sub>is</sub> = 8.0 V (p-p); V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	0.06	-	%	
α <sub>iso</sub>	isolation (OFF-state)	R <sub>L</sub> = 600 Ω; f <sub>i</sub> = 1 MHz; see <a href="#">Figure 17</a>					
		V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	[1]	-	-50	-	dB
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	[1]	-	-50	-	dB
Xtalk	crosstalk	between two switches/multiplexers; R <sub>L</sub> = 600 Ω; f <sub>i</sub> = 1 MHz; see <a href="#">Figure 18</a>					
		V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	[1]	-	-60	-	dB
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	[1]	-	-60	-	dB
V <sub>ct</sub>	crosstalk voltage	peak-to-peak value between control and any switch. R <sub>L</sub> = 600 Ω; f <sub>i</sub> = 1 MHz; E or Sn square wave between V <sub>CC</sub> and GND; t <sub>r</sub> = t <sub>f</sub> = 6 ns; see <a href="#">Figure 19</a>					
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	110	-	mV	
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	220	-	mV	
f <sub>(-3dB)</sub>	-3 dB frequency response	R <sub>L</sub> = 50 Ω; see <a href="#">Figure 20</a>					
		V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	[2]	-	170	-	MHz
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	[2]	-	180	-	MHz

[1] Adjust input voltage V<sub>is</sub> to 0 dBm level (0 dBm = 1 mW into 600 Ω).

[2] Adjust input voltage V<sub>is</sub> to 0 dBm level at V<sub>os</sub> for 1 MHz (0 dBm = 1 mW into 50 Ω).



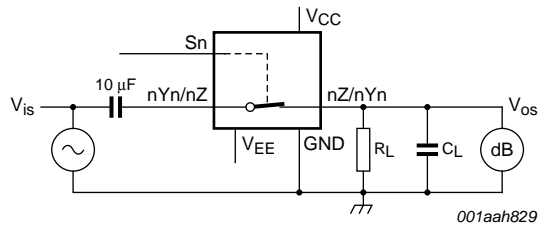
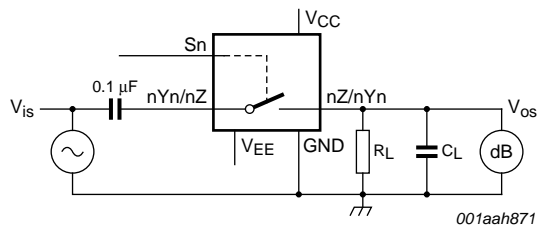
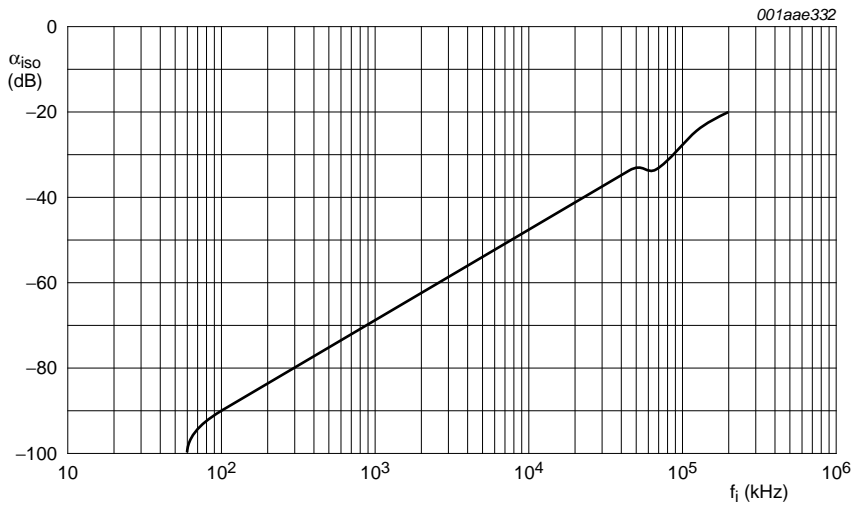


Fig 16. Test circuit for measuring sine-wave distortion



$V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $V_{EE} = -4.5\text{ V}$ ;  $R_L = 600\ \Omega$ ;  $R_S = 1\text{ k}\Omega$ .

a. Test circuit



b. Isolation (OFF-state) as a function of frequency

Fig 17. Test circuit for measuring isolation (OFF-state)

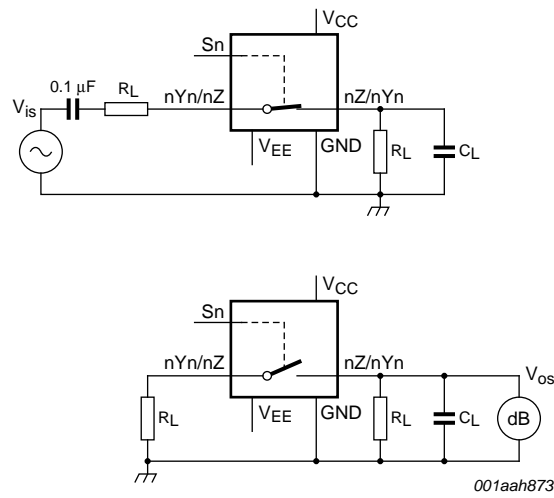


Fig 18. Test circuits for measuring crosstalk between any two switches/multiplexers

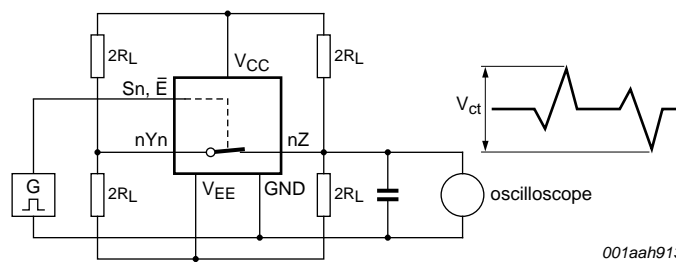
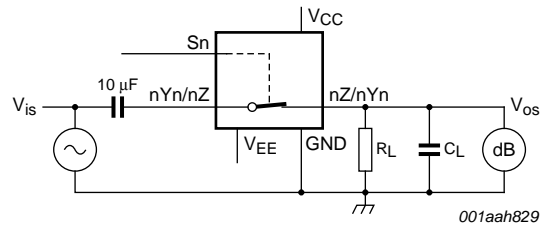
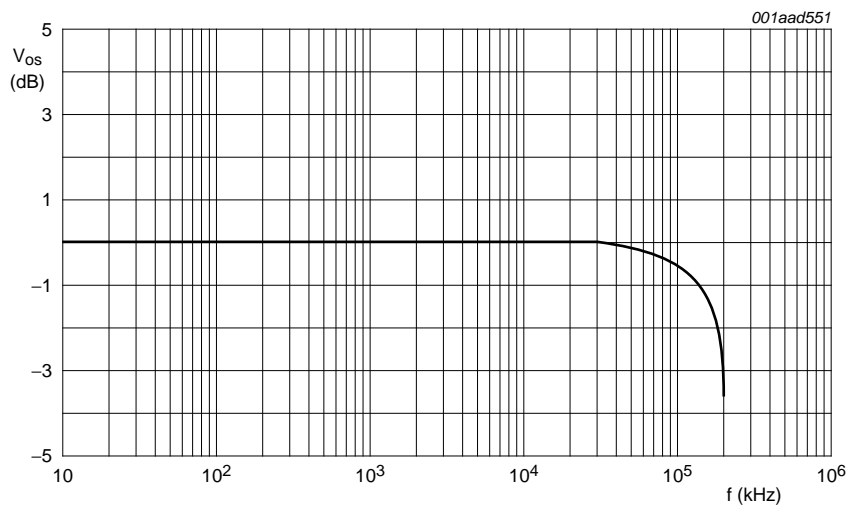


Fig 19. Test circuit for measuring crosstalk between control input and any switch



$V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $V_{EE} = -4.5\text{ V}$ ;  $R_L = 50\ \Omega$ ;  $R_S = 1\text{ k}\Omega$ .

a. Test circuit



b. Typical frequency response

**Fig 20. Test circuit for frequency response**

## 13. Package outline

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

SOT109-1

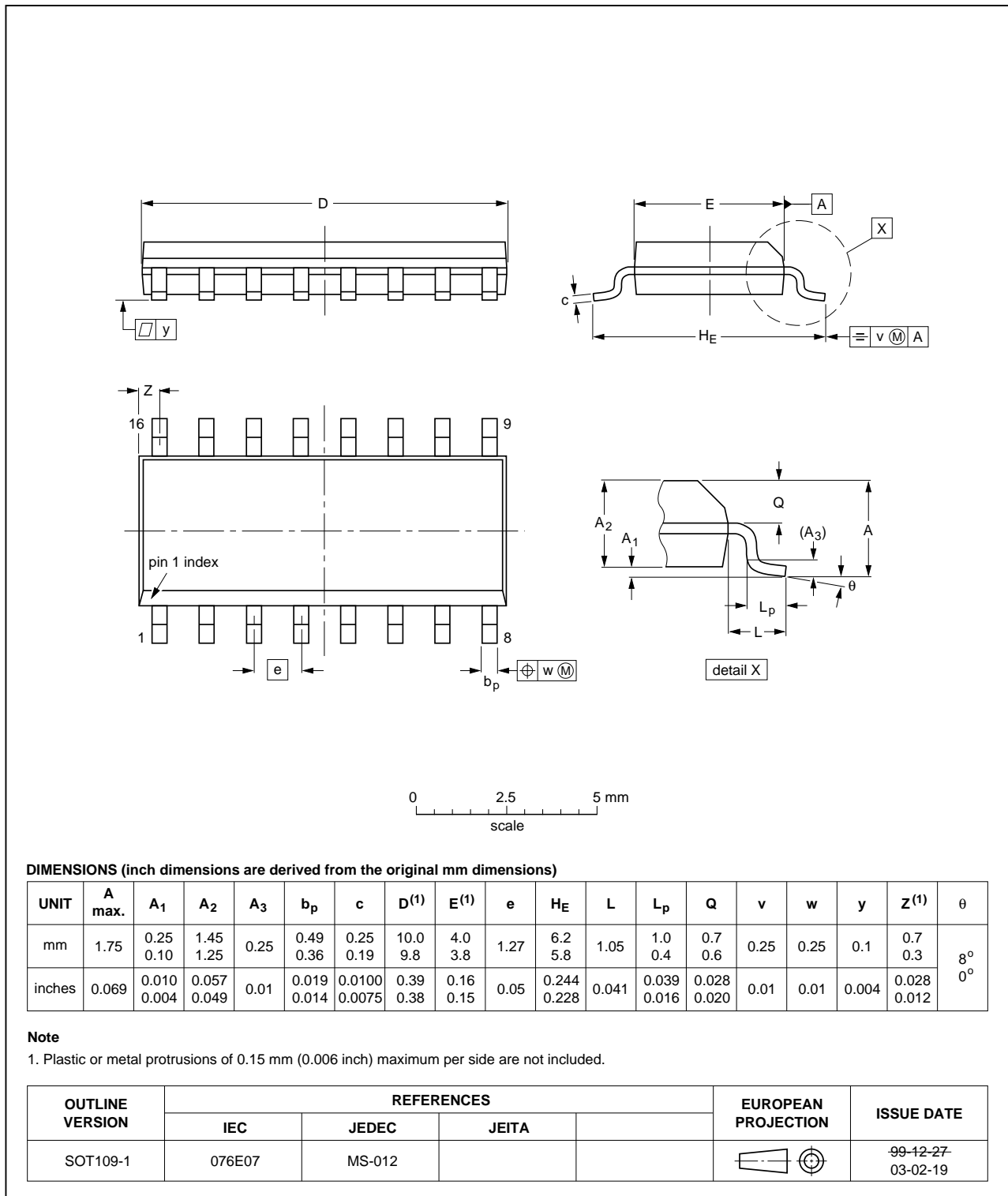


Fig 21. Package outline SOT109-1 (SO16)

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

SOT403-1

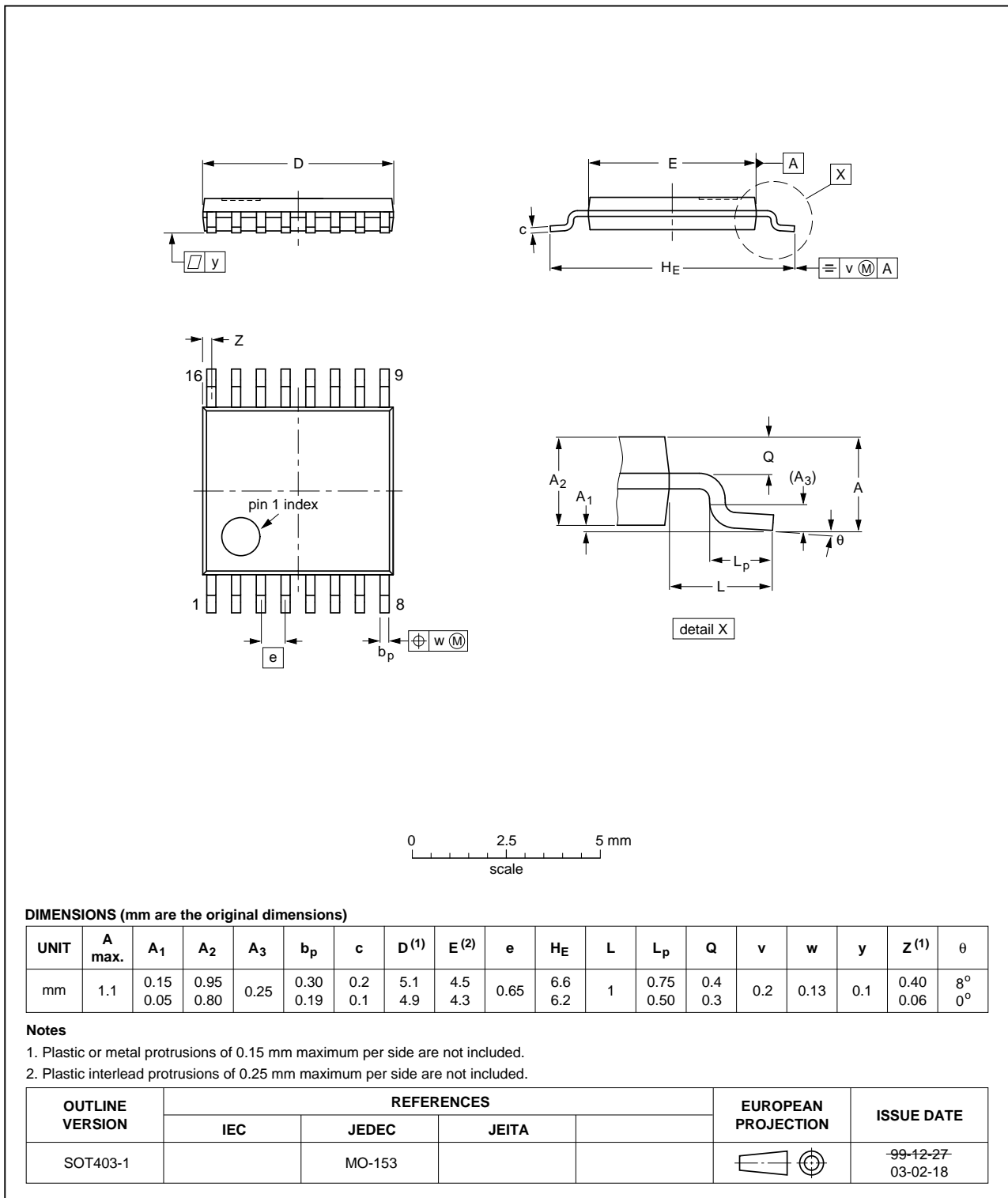


Fig 22. Package outline SOT403-1 (TSSOP16)

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

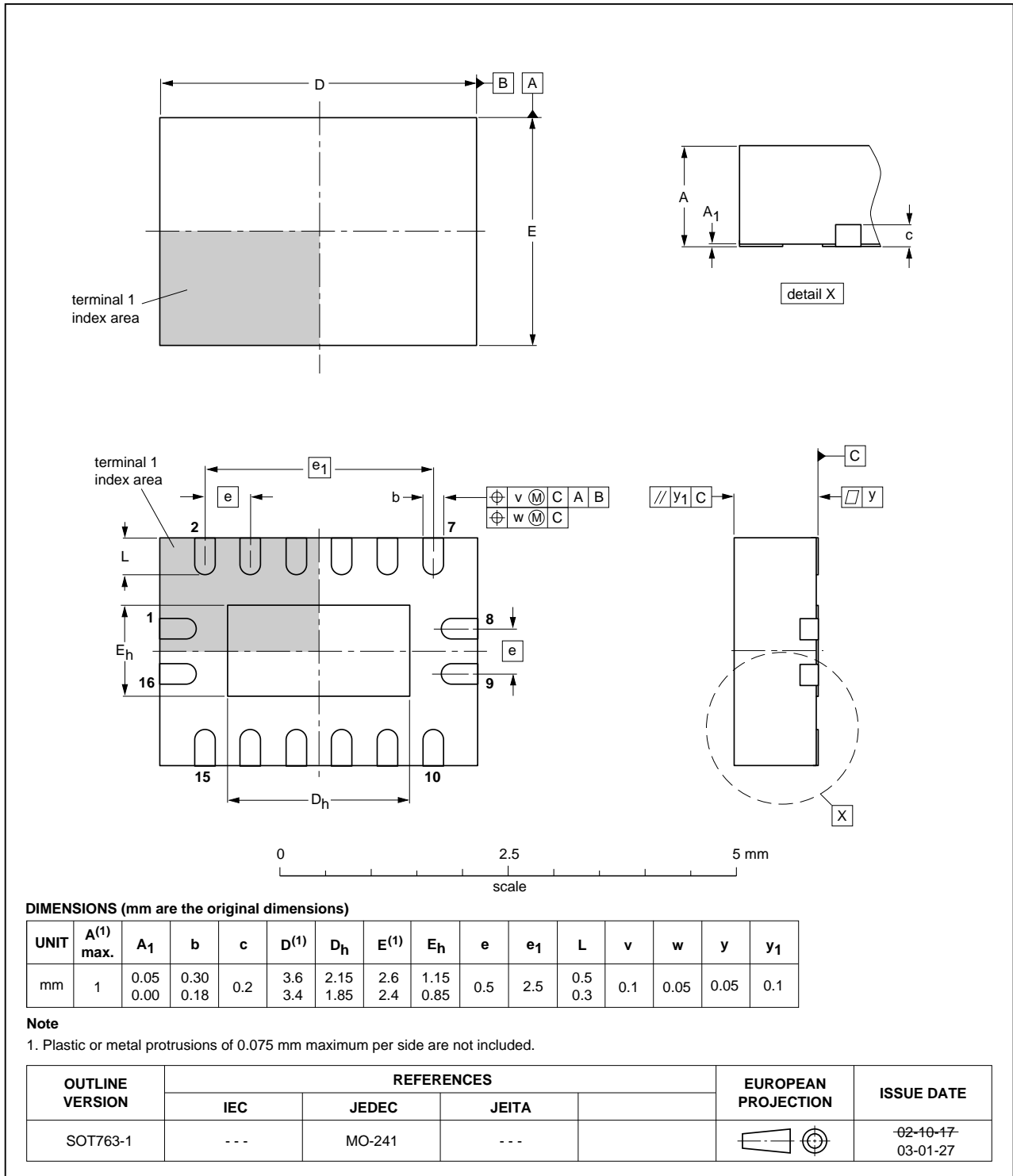


Fig 23. Package outline SOT763-1 (DHVQFN16)

## 14. 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

## 15. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4052_Q100 v.2	20121122	Product data sheet	-	74HC_HCT4052_Q100 v.1
Modifications:	• CDM added to features.			
74HC_HCT4052_Q100 v.1	20120720	Product data sheet	-	-

## 16. Legal information

### 16.1 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>.

### 16.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification** — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 16.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Nexperia.

**Right to make changes** — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use in automotive applications** — This Nexperia product has been qualified for use in automotive applications. Unless otherwise agreed in writing, the product is not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale** — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nexperia.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.



**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Translations** — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

## 16.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 17. Contact information

---

For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

## 18. Contents

---

<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>Applications</b> .....	<b>2</b>
<b>4</b>	<b>Ordering information</b> .....	<b>2</b>
<b>5</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>6</b>	<b>Pinning information</b> .....	<b>4</b>
6.1	Pinning .....	4
6.2	Pin description .....	4
<b>7</b>	<b>Functional description</b> .....	<b>5</b>
7.1	Function table .....	5
<b>8</b>	<b>Limiting values</b> .....	<b>5</b>
<b>9</b>	<b>Recommended operating conditions</b> .....	<b>6</b>
<b>10</b>	<b>Static characteristics</b> .....	<b>7</b>
<b>11</b>	<b>Dynamic characteristics</b> .....	<b>12</b>
<b>12</b>	<b>Additional dynamic characteristics</b> .....	<b>16</b>
<b>13</b>	<b>Package outline</b> .....	<b>20</b>
<b>14</b>	<b>Abbreviations</b> .....	<b>23</b>
<b>15</b>	<b>Revision history</b> .....	<b>23</b>
<b>16</b>	<b>Legal information</b> .....	<b>24</b>
16.1	Data sheet status .....	24
16.2	Definitions .....	24
16.3	Disclaimers .....	24
16.4	Trademarks .....	25
<b>17</b>	<b>Contact information</b> .....	<b>25</b>
<b>18</b>	<b>Contents</b> .....	<b>26</b>