

# 74HC4067-Q100; 74HCT4067-Q100

16-channel analog multiplexer/demultiplexer

Rev. 2 — 2 June 2020

Product data sheet

## 1. General description

The 74HC4067-Q100; 74HCT4067-Q100 is a single-pole 16-throw analog switch (SP16T) suitable for use in analog or digital 16:1 multiplexer/demultiplexer applications. The switch features four digital select inputs (S0, S1, S2 and S3), sixteen independent inputs/outputs (Yn), a common input/output (Z) and a digital enable input ( $\bar{E}$ ). When  $\bar{E}$  is HIGH, the switches are turned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

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 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 2.0 V to 10.0 V
- Input levels S0, S1, S2, S3 and  $\bar{E}$  inputs:
  - For 74HC4067-Q100: CMOS level
  - For 74HCT4067-Q100: TTL level
- CMOS low power dissipation
- High noise immunity
- Typical 'break before make' built-in
- Low ON resistance:
  - 80  $\Omega$  (typical) at  $V_{CC} = 4.5$  V
  - 70  $\Omega$  (typical) at  $V_{CC} = 6.0$  V
  - 60  $\Omega$  (typical) at  $V_{CC} = 9.0$  V
- Complies with JEDEC standards:
  - JESD8C (2.7 V to 3.6 V)
  - JESD7A (2.0 V to 6.0 V)
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- 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 pF, R = 0  $\Omega$ )
  - CDM JESD22-C101E exceeds 1000 V
- Multiple package options
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

## 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	
74HC4067D-Q100	-40 °C to +125 °C	SO24	plastic small outline package; 24 leads; body width 7.5 mm	SOT137-1
74HCT4067D-Q100				
74HC4067PW-Q100	-40 °C to +125 °C	TSSOP24	plastic thin shrink small outline package; 24 leads; body width 4.4 mm	SOT355-1
74HCT4067PW-Q100				
74HC4067BQ-Q100	-40 °C to +125 °C	DHVQFN24	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 24 terminals; body 3.5 x 5.5 x 0.85 mm	SOT815-1
74HCT4067BQ-Q100				

### 5. Functional diagram

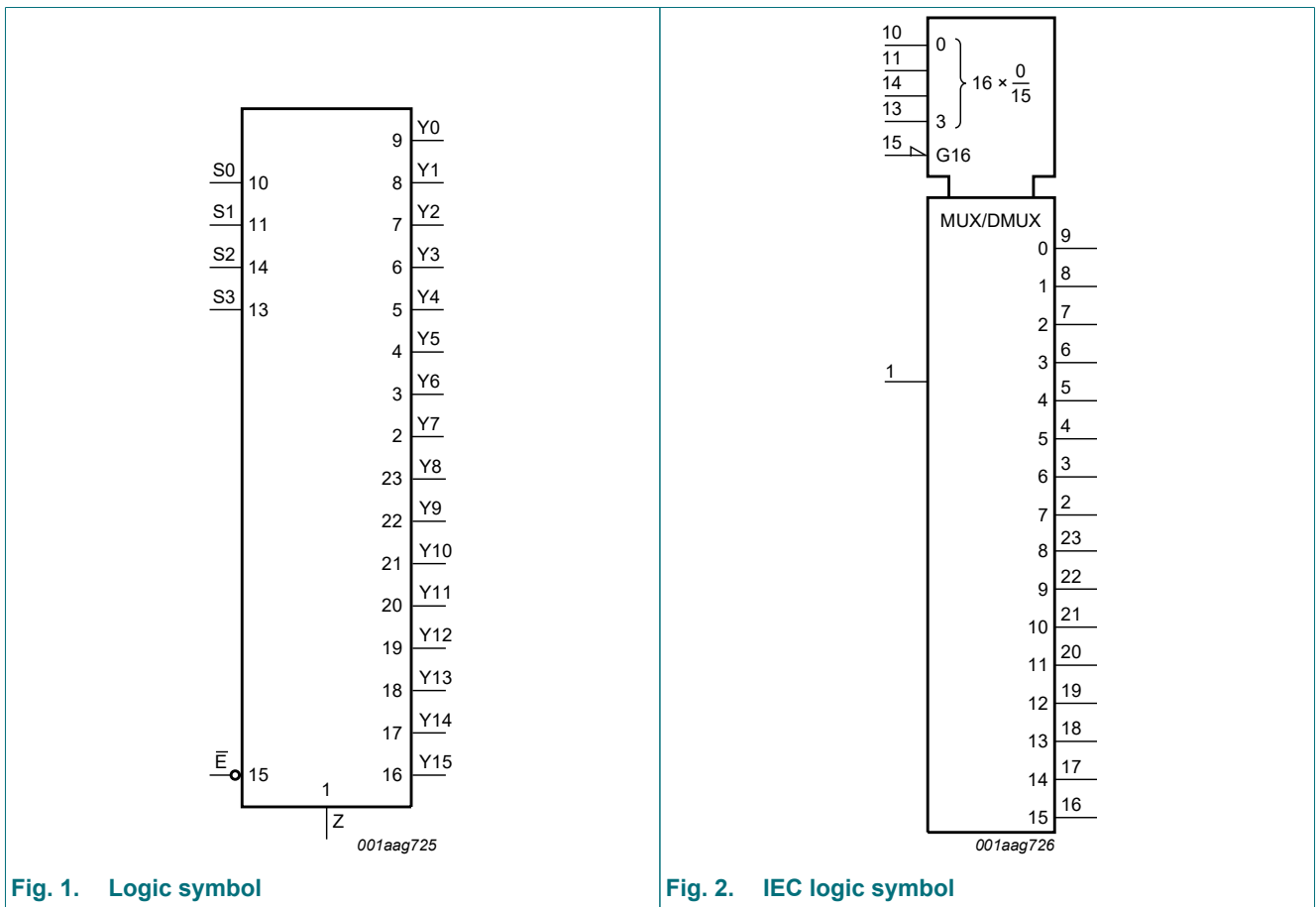


Fig. 1. Logic symbol

Fig. 2. IEC logic symbol

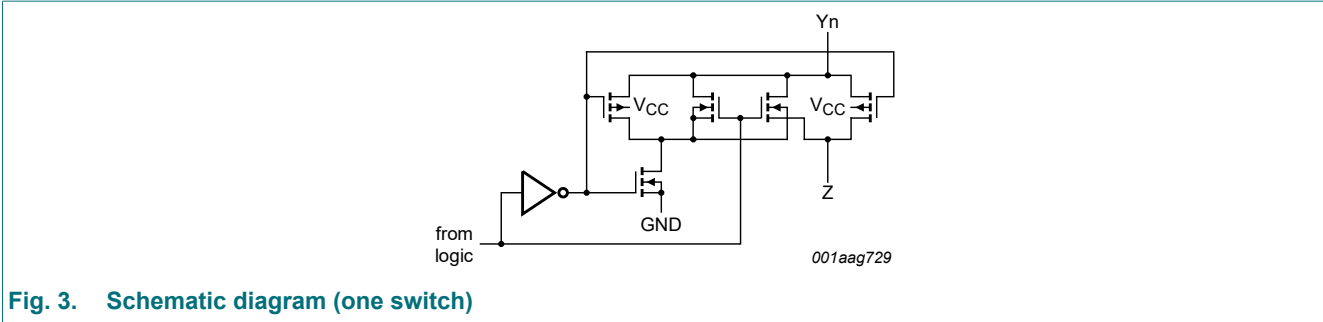


Fig. 3. Schematic diagram (one switch)

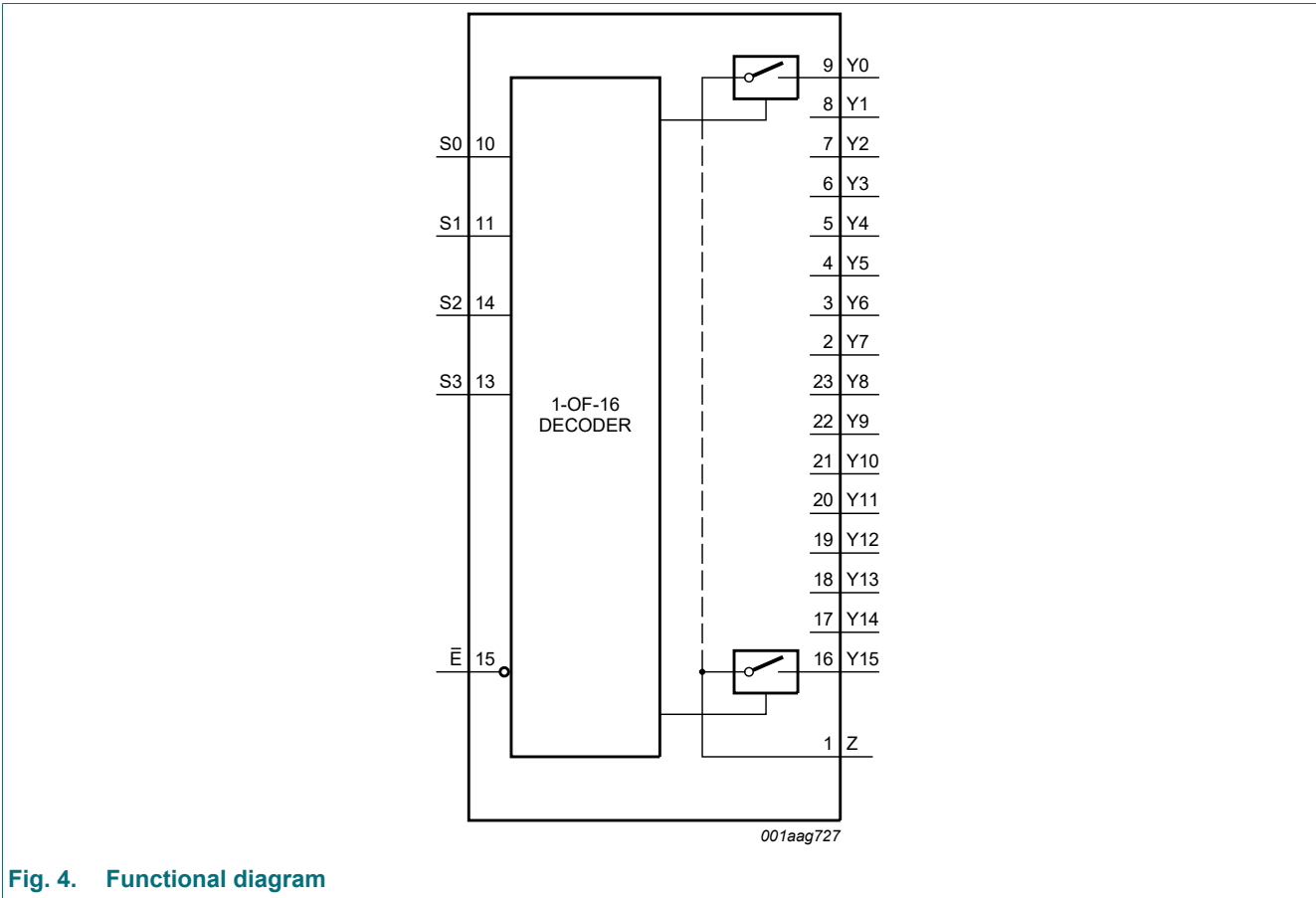
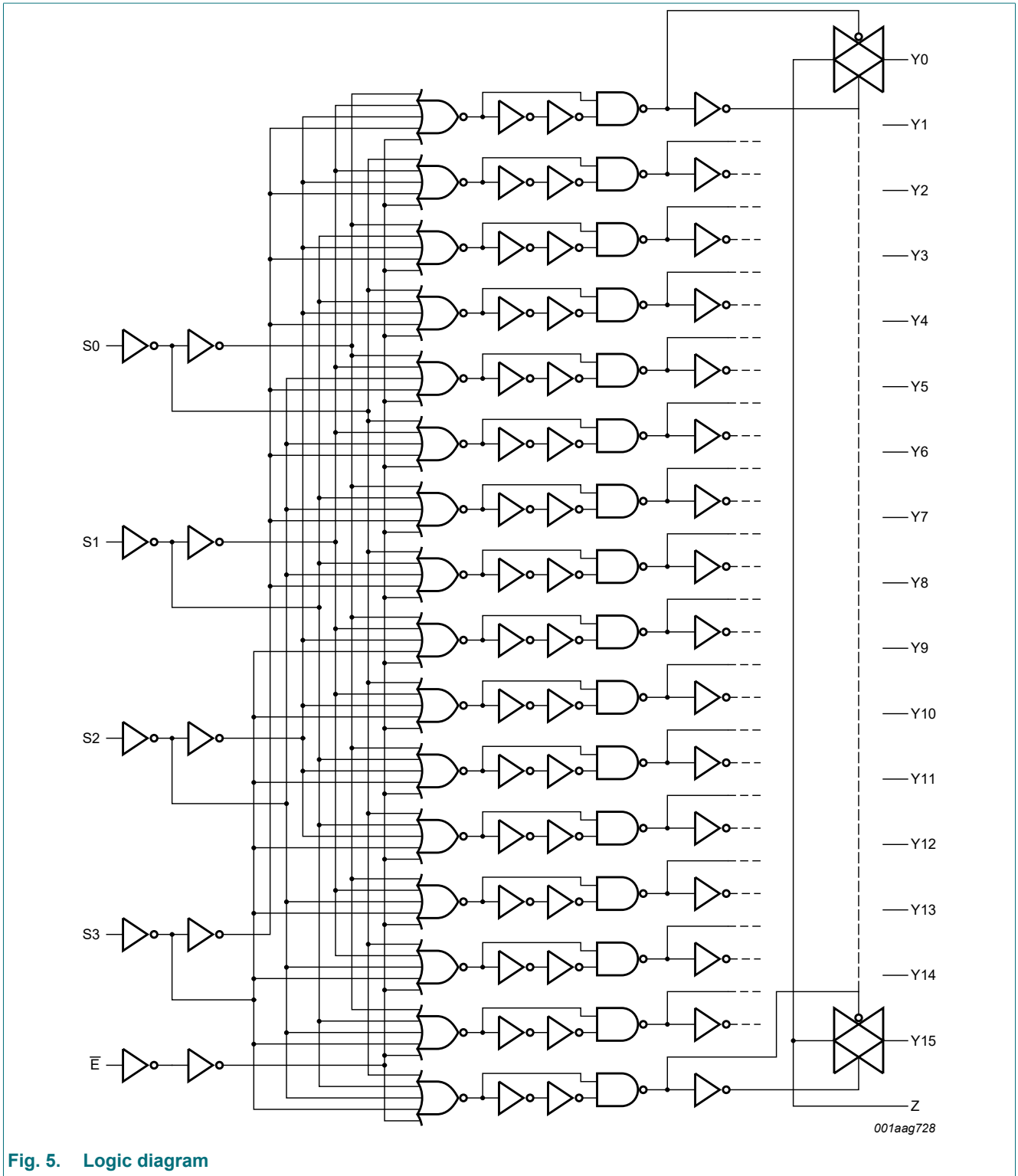
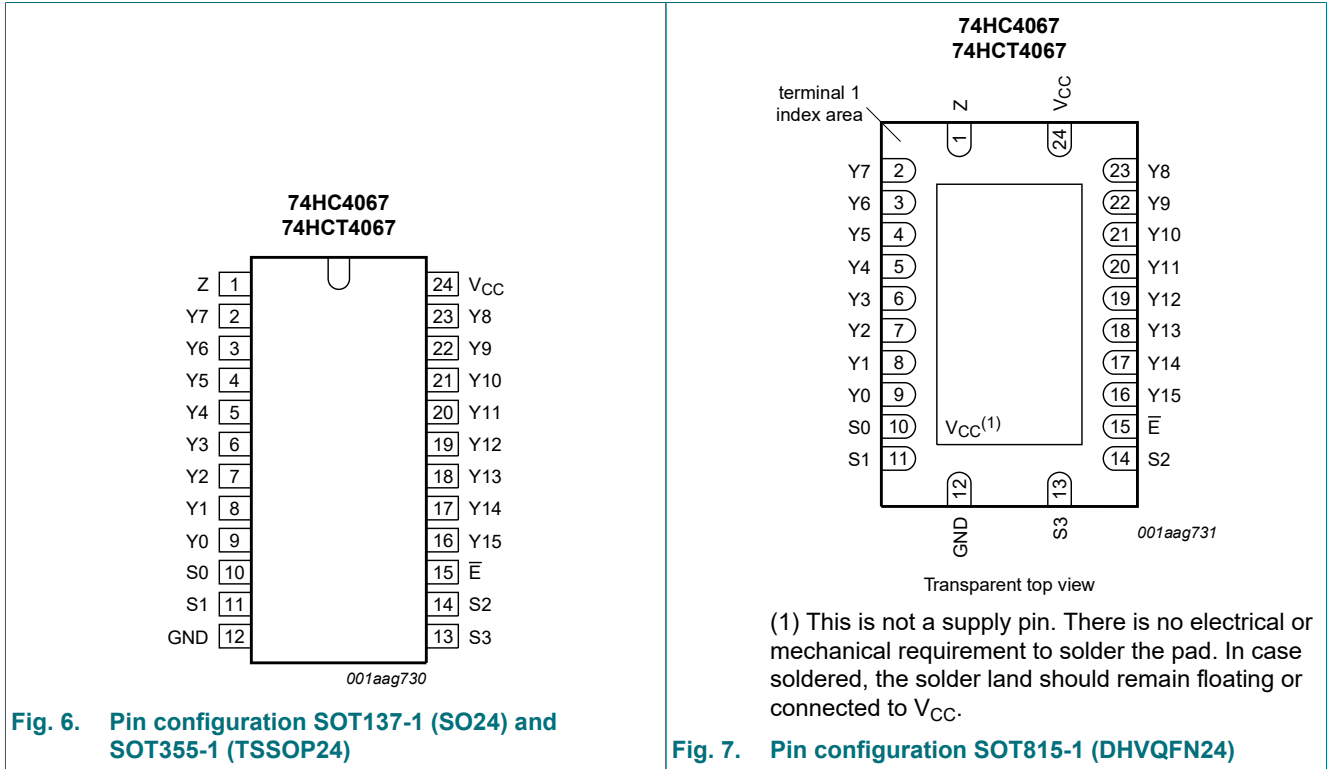


Fig. 4. Functional diagram



## 6. Pinning information

### 6.1. Pinning



### 6.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
Z	1	common input or output
Y7, Y6, Y5, Y4, Y3, Y2, Y1, Y0, Y15, Y14, Y13, Y12, Y11, Y10, Y9, Y8	2, 3, 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 23	independent input or output
S0, S1, S2, S3	10, 11, 14, 13	address input
GND	12	ground (0 V)
$\bar{E}$	15	enable input (active LOW)
$V_{CC}$	24	supply voltage

## 7. Functional description

**Table 3. Function table**

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

Inputs					Channel ON
E	S3	S2	S1	S0	
L	L	L	L	L	Y0 to Z
L	L	L	L	H	Y1 to Z
L	L	L	H	L	Y2 to Z
L	L	L	H	H	Y3 to Z
L	L	H	L	L	Y4 to Z
L	L	H	L	H	Y5 to Z
L	L	H	H	L	Y6 to Z
L	L	H	H	H	Y7 to Z
L	H	L	L	L	Y8 to Z
L	H	L	L	H	Y9 to Z
L	H	L	H	L	Y10 to Z
L	H	L	H	H	Y11 to Z
L	H	H	L	L	Y12 to Z
L	H	H	L	H	Y13 to Z
L	H	H	H	L	Y14 to Z
L	H	H	H	H	Y15 to Z
H	X	X	X	X	-

## 8. Limiting values

**Table 4. 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	[1]	-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	$V_{SW} = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$	-	$\pm 25$	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	$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [2]	-	500	mW
P	power dissipation	per switch	-	100	mW

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

[2] For SOT137-1 (SO24) package:  $P_{tot}$  derates linearly with 16.2 mW/K above 119 °C.  
 For SOT355-1 (TSSOP24) package:  $P_{tot}$  derates linearly with 12.4 mW/K above 110 °C.  
 For SOT815-1 (DHVQFN24) package:  $P_{tot}$  derates linearly with 15.0 mW/K above 117 °C.

## 9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	74HC4067-Q100			74HCT4067-Q100			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	10.0	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		GND	-	V <sub>CC</sub>	GND	-	V <sub>CC</sub>	V
V <sub>SW</sub>	switch voltage		GND	-	V <sub>CC</sub>	GND	-	V <sub>CC</sub>	V
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 2.0 V	-	-	625	-	-	-	ns
		V <sub>CC</sub> = 4.5 V	-	1.67	139	-	1.67	139	ns
		V <sub>CC</sub> = 6.0 V	-	-	83	-	-	-	ns
		V <sub>CC</sub> = 10.0 V	-	-	31	-	-	-	ns
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C

## 10. Static characteristics

Table 6. R<sub>ON</sub> resistance per switch for types 74HC4067-Q100 and 74HCT4067-Q100

V<sub>I</sub> = V<sub>IH</sub> or V<sub>IL</sub>; for test circuit see Fig. 8.

V<sub>is</sub> is the input voltage at a Y<sub>n</sub> or Z terminal, whichever is assigned as an input.

V<sub>os</sub> is the output voltage at a Y<sub>n</sub> or Z terminal, whichever is assigned as an output.

For 74HC4067-Q100: V<sub>CC</sub> - GND = 2.0 V, 4.5 V, 6.0 V and 9.0 V.

For 74HCT4067-Q100: V<sub>CC</sub> - GND = 4.5 V.

Symbol	Parameter	Conditions	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
R <sub>ON(peak)</sub>	ON resistance (peak)	V <sub>is</sub> = V <sub>CC</sub> to GND					
		V <sub>CC</sub> = 2.0 V; I <sub>SW</sub> = 100 μA [1]	-	-	-	-	Ω
		V <sub>CC</sub> = 4.5 V; I <sub>SW</sub> = 1000 μA	110	180	225	270	Ω
		V <sub>CC</sub> = 6.0 V; I <sub>SW</sub> = 1000 μA	95	160	200	240	Ω
		V <sub>CC</sub> = 9.0 V; I <sub>SW</sub> = 1000 μA	75	130	165	195	Ω
R <sub>ON(rail)</sub>	ON resistance (rail)	V <sub>is</sub> = GND or V <sub>CC</sub>					
		V <sub>CC</sub> = 2.0 V; I <sub>SW</sub> = 100 μA [1]	150	-	-	-	
		V <sub>CC</sub> = 4.5 V; I <sub>SW</sub> = 1000 μA	90	160	200	240	Ω
		V <sub>CC</sub> = 6.0 V; I <sub>SW</sub> = 1000 μA	80	140	175	210	Ω
		V <sub>CC</sub> = 9.0 V; I <sub>SW</sub> = 1000 μA	70	120	150	180	Ω
ΔR <sub>ON</sub>	ON resistance mismatch between channels	V <sub>is</sub> = V <sub>CC</sub> to GND					
		V <sub>CC</sub> = 2.0 V [1]	-	-	-	-	Ω
		V <sub>CC</sub> = 4.5 V	9	-	-	-	Ω
		V <sub>CC</sub> = 6.0 V	8	-	-	-	Ω
		V <sub>CC</sub> = 9.0 V	6	-	-	-	Ω

[1] At supply voltages (V<sub>CC</sub> - GND) approaching 2 V, the analog switch ON resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.

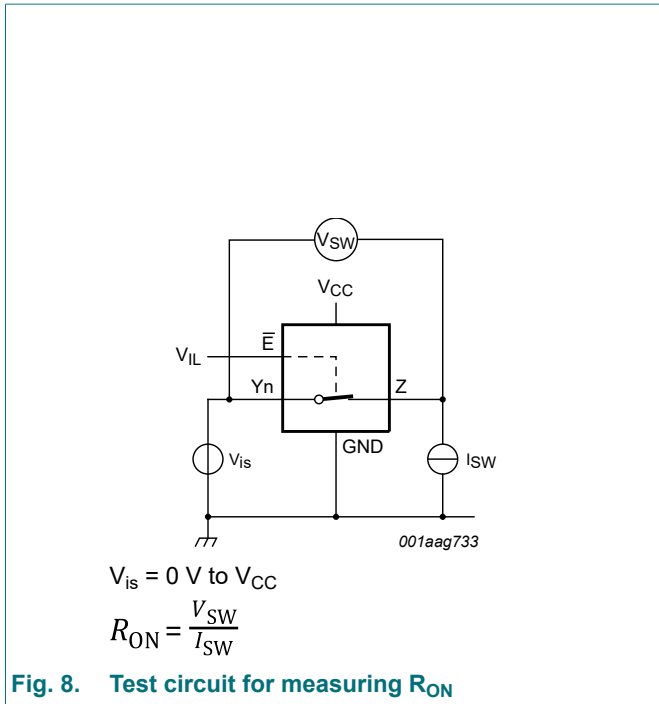


Fig. 8. Test circuit for measuring  $R_{ON}$

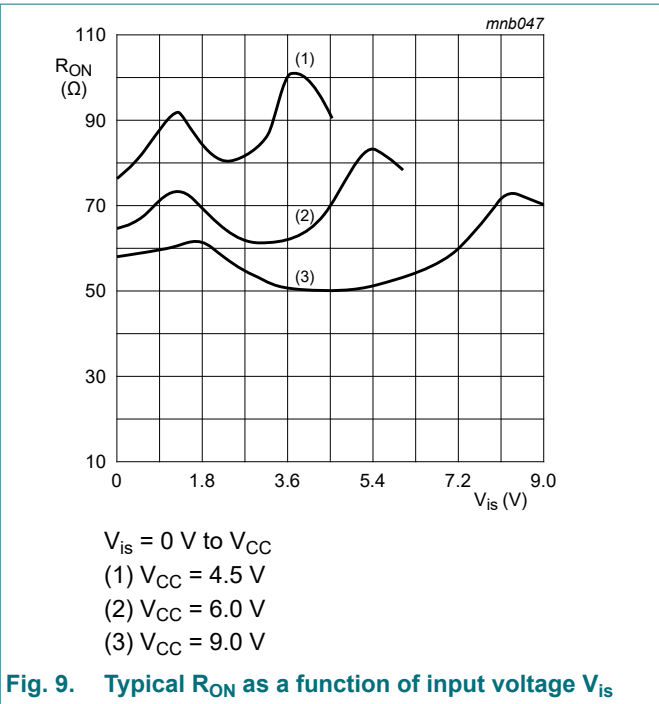


Fig. 9. Typical  $R_{ON}$  as a function of input voltage  $V_{is}$

Table 7. Static characteristics 74HC4067-Q100

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

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{amb} = 25 \text{ }^\circ\text{C}$						
$V_{IH}$	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	1.80	V
		$V_{CC} = 9.0 \text{ V}$	-	4.3	2.70	V
$I_I$	input leakage current	$V_I = V_{CC} \text{ or } GND$				
		$V_{CC} = 6.0 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
		$V_{CC} = 10.0 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};  V_{SW}  = V_{CC} - GND$ ; see Fig. 10				
		per channel	-	-	$\pm 0.1$	$\mu\text{A}$
		all channels	-	-	$\pm 0.8$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};  V_{SW}  = V_{CC} - GND$ ; see Fig. 11	-	-	$\pm 0.8$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC} \text{ or } GND; V_{is} = GND \text{ or } V_{CC}; V_{os} = V_{CC} \text{ or } GND$				
		$V_{CC} = 6.0 \text{ V}$	-	-	8.0	$\mu\text{A}$
		$V_{CC} = 10.0 \text{ V}$	-	-	16.0	$\mu\text{A}$
$C_I$	input capacitance		-	3.5	-	pF



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	V
		V <sub>CC</sub> = 9.0 V	6.3	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.50	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	1.80	V
		V <sub>CC</sub> = 9.0 V	-	-	2.70	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND				
		V <sub>CC</sub> = 6.0 V	-	-	±1.0	µA
		V <sub>CC</sub> = 10.0 V	-	-	±2.0	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - GND; see <a href="#">Fig. 10</a>				
		per channel	-	-	±1.0	µA
		all channels	-	-	±8.0	µA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - GND; see <a href="#">Fig. 11</a>	-	-	±8.0	µA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = GND or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or GND				
		V <sub>CC</sub> = 6.0 V	-	-	80.0	µA
		V <sub>CC</sub> = 10.0 V	-	-	160	µA
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	V
		V <sub>CC</sub> = 9.0 V	6.3	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.50	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	1.80	V
		V <sub>CC</sub> = 9.0 V	-	-	2.70	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND				
		V <sub>CC</sub> = 6.0 V	-	-	±1.0	µA
		V <sub>CC</sub> = 10.0 V	-	-	±2.0	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - GND; see <a href="#">Fig. 10</a>				
		per channel	-	-	±1.0	µA
		all channels	-	-	±8.0	µA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - GND; see <a href="#">Fig. 11</a>	-	-	±8.0	µA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = GND or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or GND				
		V <sub>CC</sub> = 6.0 V	-	-	160	µA
		V <sub>CC</sub> = 10.0 V	-	-	320	µA

**Table 8. Static characteristics 74HCT4067-Q100**

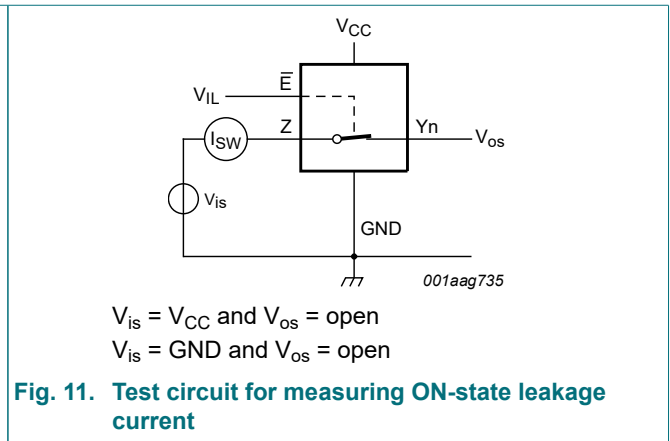
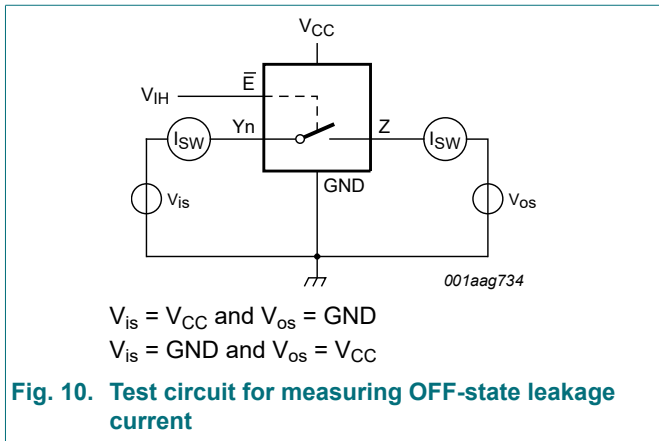
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25\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	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; $V_{CC} = 5.5\text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Fig. 10</a>				
		per channel	-	-	$\pm 0.1$	$\mu\text{A}$
		all channels	-	-	$\pm 0.8$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Fig. 11</a>	-	-	$\pm 0.8$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	8.0	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1\text{ V}$ ; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$				
		pin $\bar{E}$	-	60	216	$\mu\text{A}$
		pin Sn	-	50	180	$\mu\text{A}$
$C_I$	input capacitance		-	3.5	-	pF
<b><math>T_{amb} = -40\text{ }^{\circ}\text{C to }+85\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
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	0.8	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Fig. 10</a>				
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
		all channels	-	-	$\pm 8.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Fig. 11</a>	-	-	$\pm 8.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	80.0	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1\text{ V}$ ; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$				
		pin $\bar{E}$	-	-	270	$\mu\text{A}$
		pin Sn	-	-	225	$\mu\text{A}$

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.8	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±1.0	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - GND; see Fig. 10				
		per channel	-	-	±1.0	µA
		all channels	-	-	±8.0	µA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - GND; see Fig. 11	-	-	±8.0	µA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = GND or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	160	µA
ΔI <sub>CC</sub>	additional supply current	per input pin; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V				
		pin $\bar{E}$	-	-	294	µA
		pin Sn	-	-	245	µA



## 11. Dynamic characteristics

**Table 9. Dynamic characteristics 74HC4067-Q100**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$  unless specified otherwise; for test circuit see [Fig. 14](#).

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

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

Symbol	Parameter	Conditions	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
$t_{pd}$	propagation delay	Yn to Z; see <a href="#">Fig. 12</a> [1][2]					
		$V_{CC} = 2.0\text{ V}$	25	75	95	110	ns
		$V_{CC} = 4.5\text{ V}$	9	15	19	22	ns
		$V_{CC} = 6.0\text{ V}$	7	13	16	19	ns
		$V_{CC} = 9.0\text{ V}$	5	9	11	14	ns
		Z to Yn					
		$V_{CC} = 2.0\text{ V}$	18	60	75	90	ns
		$V_{CC} = 4.5\text{ V}$	6	12	15	18	ns
		$V_{CC} = 6.0\text{ V}$	5	10	13	15	ns
		$V_{CC} = 9.0\text{ V}$	4	8	10	12	ns
$t_{off}$	turn-off time	$\bar{E}$ to Yn; see <a href="#">Fig. 13</a> [3]					
		$V_{CC} = 2.0\text{ V}$	74	250	315	375	ns
		$V_{CC} = 4.5\text{ V}$	27	50	63	75	ns
		$V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$	27	-	-	-	ns
		$V_{CC} = 6.0\text{ V}$	22	43	54	64	ns
		$V_{CC} = 9.0\text{ V}$	20	38	48	57	ns
		Sn to Yn					
		$V_{CC} = 2.0\text{ V}$	83	250	315	375	ns
		$V_{CC} = 4.5\text{ V}$	30	50	63	75	ns
		$V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$	29	-	-	-	ns
		$V_{CC} = 6.0\text{ V}$	24	43	54	64	ns
		$V_{CC} = 9.0\text{ V}$	21	38	48	57	ns
		$\bar{E}$ to Z					
		$V_{CC} = 2.0\text{ V}$	85	275	345	415	ns
		$V_{CC} = 4.5\text{ V}$	31	55	69	83	ns
		$V_{CC} = 6.0\text{ V}$	25	47	59	71	ns
		$V_{CC} = 9.0\text{ V}$	24	42	53	63	ns
		Sn to Z					
		$V_{CC} = 2.0\text{ V}$	94	290	365	435	ns
		$V_{CC} = 4.5\text{ V}$	34	58	73	87	ns
		$V_{CC} = 6.0\text{ V}$	27	47	62	74	ns
		$V_{CC} = 9.0\text{ V}$	25	45	56	68	ns

Symbol	Parameter	Conditions	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
t <sub>on</sub>	turn-on time	$\bar{E}$ to Yn; see Fig. 13 [4]					
		V <sub>CC</sub> = 2.0 V	80	275	345	415	ns
		V <sub>CC</sub> = 4.5 V	29	55	69	83	ns
		V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF	26	-	-	-	ns
		V <sub>CC</sub> = 6.0 V	23	47	59	71	ns
		V <sub>CC</sub> = 9.0 V	17	42	53	63	ns
		Sn to Yn					
		V <sub>CC</sub> = 2.0 V	88	300	375	450	ns
		V <sub>CC</sub> = 4.5 V	32	60	75	90	ns
		V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF	29	-	-	-	ns
		V <sub>CC</sub> = 6.0 V	26	51	64	77	ns
		V <sub>CC</sub> = 9.0 V	18	45	56	68	ns
		$\bar{E}$ to Z					
		V <sub>CC</sub> = 2.0 V	85	275	345	415	ns
		V <sub>CC</sub> = 4.5 V	31	55	69	83	ns
		V <sub>CC</sub> = 6.0 V	25	47	59	71	ns
		V <sub>CC</sub> = 9.0 V	18	42	53	63	ns
		Sn to Z					
		V <sub>CC</sub> = 2.0 V	94	300	375	450	ns
		V <sub>CC</sub> = 4.5 V	34	60	75	90	ns
V <sub>CC</sub> = 6.0 V	27	51	64	77	ns		
V <sub>CC</sub> = 9.0 V	19	45	56	68	ns		
C <sub>PD</sub>	power dissipation capacitance	per switch; V <sub>I</sub> = GND to V <sub>CC</sub> [5]	29	-	-	-	pF

[1] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.  
 [2] Due to higher Z terminal capacitance (16 switches versus 1) the delay figures to the Z terminal are higher than those to the Y terminal.  
 [3] t<sub>on</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.  
 [4] t<sub>off</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.  
 [5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  where:  
 f<sub>i</sub> = input frequency in MHz;  
 f<sub>o</sub> = output frequency in MHz;  
 $\sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;  
 C<sub>L</sub> = output load capacitance in pF;  
 C<sub>sw</sub> = switch capacitance in pF;  
 V<sub>CC</sub> = supply voltage in V.

**Table 10. Dynamic characteristics 74HCT4067-Q100**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$  unless specified otherwise; for test circuit see Fig. 14.

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

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

Symbol	Parameter	Conditions	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
$t_{pd}$	propagation delay	$Y_n$ to $Z$ ; see Fig. 12 [1][2]					
		$V_{CC} = 4.5\text{ V}$	9	15	19	22	ns
		$Z$ to $Y_n$					
$t_{off}$	turn-off time	$\bar{E}$ to $Y_n$ ; see Fig. 13 [3]					
		$V_{CC} = 4.5\text{ V}$	26	55	69	83	ns
		$V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$	26	-	-	-	ns
		$S_n$ to $Y_n$					
		$V_{CC} = 4.5\text{ V}$	31	55	69	83	ns
		$V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$	30	-	-	-	ns
		$\bar{E}$ to $Z$					
		$V_{CC} = 4.5\text{ V}$	30	60	75	90	ns
		$S_n$ to $Z$					
$t_{on}$	turn-on time	$\bar{E}$ to $Y_n$ ; see Fig. 13 [4]					
		$V_{CC} = 4.5\text{ V}$	32	60	75	90	ns
		$V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$	32	-	-	-	ns
		$S_n$ to $Y_n$					
		$V_{CC} = 4.5\text{ V}$	35	60	75	90	ns
		$V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$	33	-	-	-	ns
		$\bar{E}$ to $Z$					
		$V_{CC} = 4.5\text{ V}$	38	65	81	98	ns
		$S_n$ to $Z$					
$C_{PD}$	power dissipation capacitance	per switch; $V_I = GND$ to $(V_{CC} - 1.5\text{ V})$ [5]	29	-	-	-	pF

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

[2] Due to higher  $Z$  terminal capacitance (16 switches versus 1) the delay figures to the  $Z$  terminal are higher than those to the  $Y$  terminal.

[3]  $t_{on}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_{off}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

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

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

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

$C_L$  = output load capacitance in pF;

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

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

### 11.1. Waveforms and test circuit

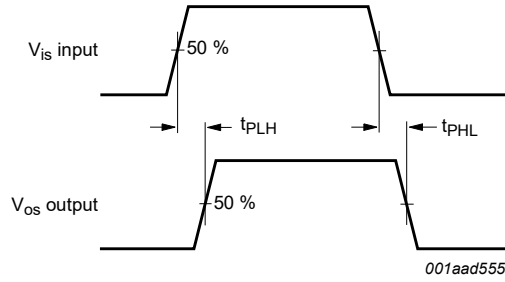
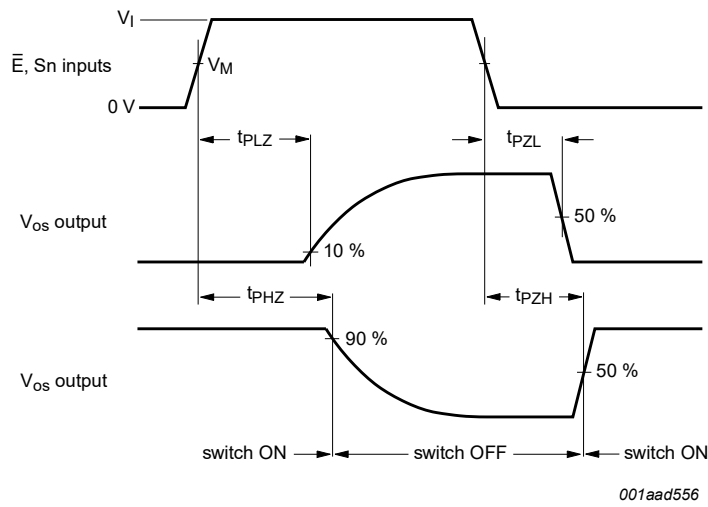


Fig. 12. Input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays



Measurement points are shown in [Table 11](#).

Fig. 13. Turn-on and turn-off times

Table 11. Measurement points

Type	$V_I$	$V_M$
74HC4067-Q100	$V_{CC}$	$0.5V_{CC}$
74HCT4067-Q100	3.0 V	1.3 V

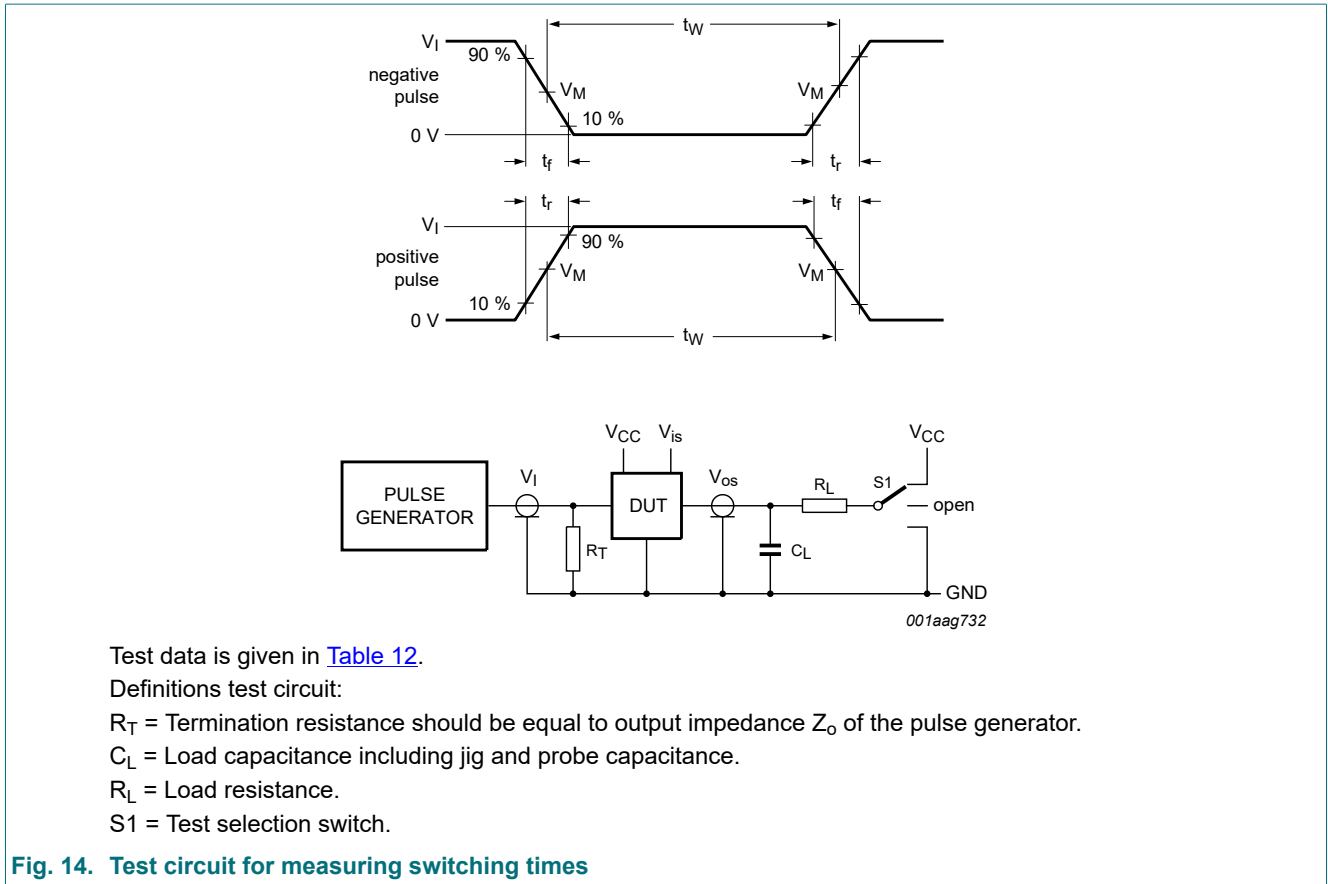


Table 12. Test data

Test	Input				Output		S1 position
	Control $\bar{E}$	Address Sn	Switch Yn (Z)	$t_r, t_f$	Switch Z (Yn)		
	$V_I[1]$	$V_I[1]$	$V_{is}$		$C_L$	$R_L$	
$t_{PHL}, t_{PLH}$	GND	GND or $V_{CC}$	GND to $V_{CC}$	6 ns	50 pF	-	open
$t_{PHZ}, t_{PZH}$	GND to $V_{CC}$	GND to $V_{CC}$	$V_{CC}$	6 ns	50 pF, 15 pF	1 k $\Omega$	GND
$t_{PLZ}, t_{PZL}$	GND to $V_{CC}$	GND to $V_{CC}$	GND	6 ns	50 pF, 15 pF	1 k $\Omega$	$V_{CC}$

[1] For 74HCT4067-Q100: maximum input voltage  $V_I = 3.0$  V.



## 12. Additional dynamic characteristics

**Table 13. Additional dynamic characteristics**

Recommended conditions and typical values; GND = 0 V.

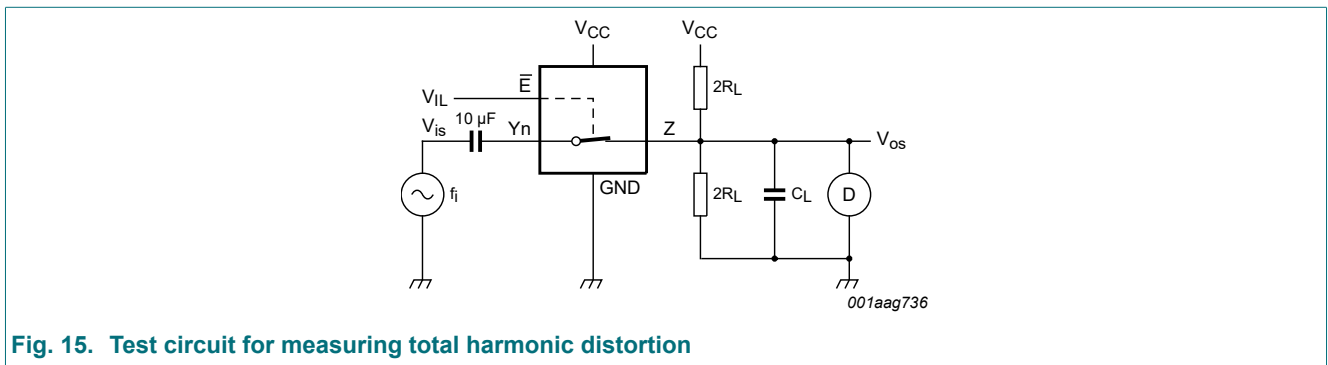
$V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

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

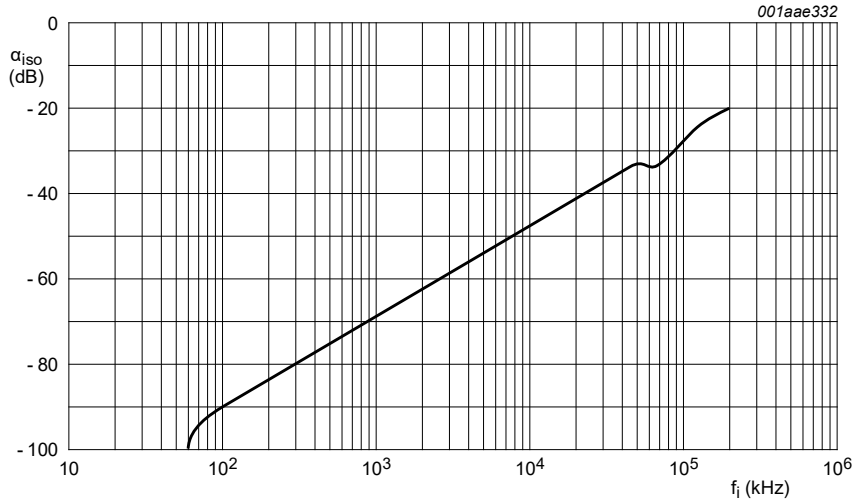
Symbol	Parameter	Conditions	25 °C			Unit
			Min	Typ	Max	
THD	total harmonic distortion	$R_L = 10\text{ k}\Omega$ ; $C_L = 50\text{ pF}$ ; see Fig. 15				
		$f_i = 1\text{ kHz}$				
		$V_{CC} = 4.5\text{ V}$ ; $V_{is(p-p)} = 4.0\text{ V}$	-	0.04	-	%
		$V_{CC} = 9.0\text{ V}$ ; $V_{is(p-p)} = 8.0\text{ V}$	-	0.02	-	%
		$f_i = 10\text{ kHz}$				
		$V_{CC} = 4.5\text{ V}$ ; $V_{is(p-p)} = 4.0\text{ V}$	-	0.12	-	%
$\alpha_{iso}$	isolation (OFF-state)	$R_L = 600\ \Omega$ ; $C_L = 50\text{ pF}$ ; see Fig. 16 [1]				
		$V_{CC} = 4.5\text{ V}$	-	-50	-	dB
		$V_{CC} = 9.0\text{ V}$	-	-50	-	dB
$f_{(-3dB)}$	-3 dB frequency response	$R_L = 50\ \Omega$ ; $C_L = 10\text{ pF}$ ; see Fig. 17 [2]				
		$V_{CC} = 4.5\text{ V}$	-	90	-	MHz
		$V_{CC} = 9.0\text{ V}$	-	100	-	MHz
$C_{sw}$	switch capacitance	independent pins Y	-	5	-	pF
		common pin Z	-	45	-	pF

[1] Adjust input voltage  $V_{is}$  to 0 dBm level (0 dBm = 1 mW into 600  $\Omega$ ).

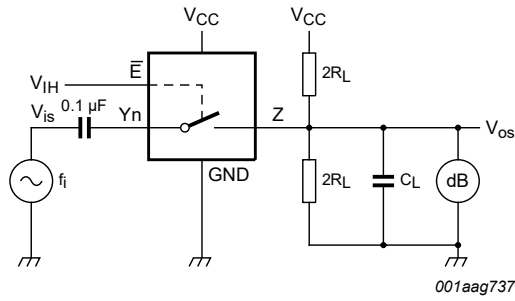
[2] Adjust input voltage  $V_{is}$  to 0 dBm level at  $V_{os}$  for  $f_i = 1\text{ MHz}$  (0 dBm = 1 mW into 50  $\Omega$ ). After set-up,  $f_i$  is increased to obtain a reading of -3 dB at  $V_{os}$ .



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



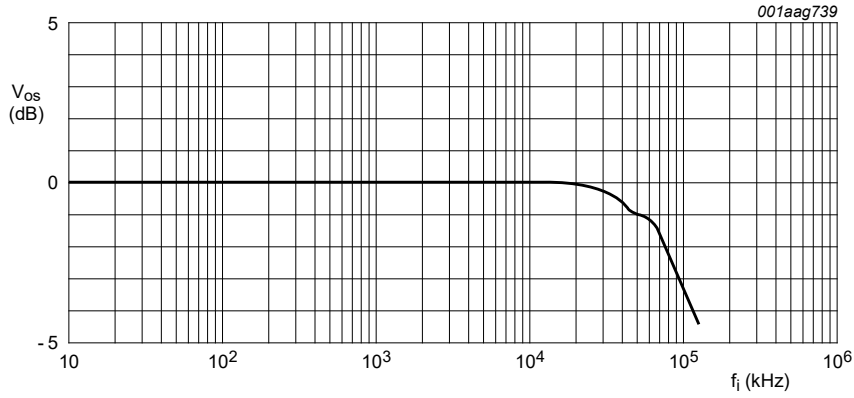
a. Isolation (OFF-state)



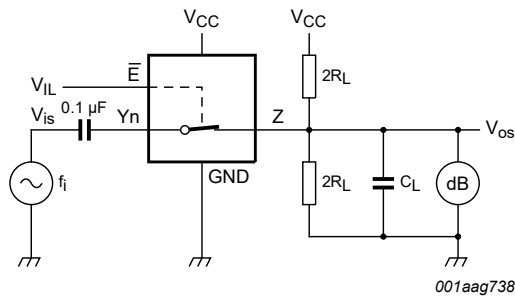
b. Test circuit

$V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $R_L = 600\ \Omega$ ;  $R_{source} = 1\text{ k}\Omega$ .

**Fig. 16. Isolation (OFF-state) as a function of frequency**



a. Typical -3 dB frequency response



b. Test circuit

$V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $R_L = 50\ \Omega$ ;  $R_{source} = 1\text{ k}\Omega$ .

Fig. 17. -3 dB frequency response

### 13. Package outline

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1

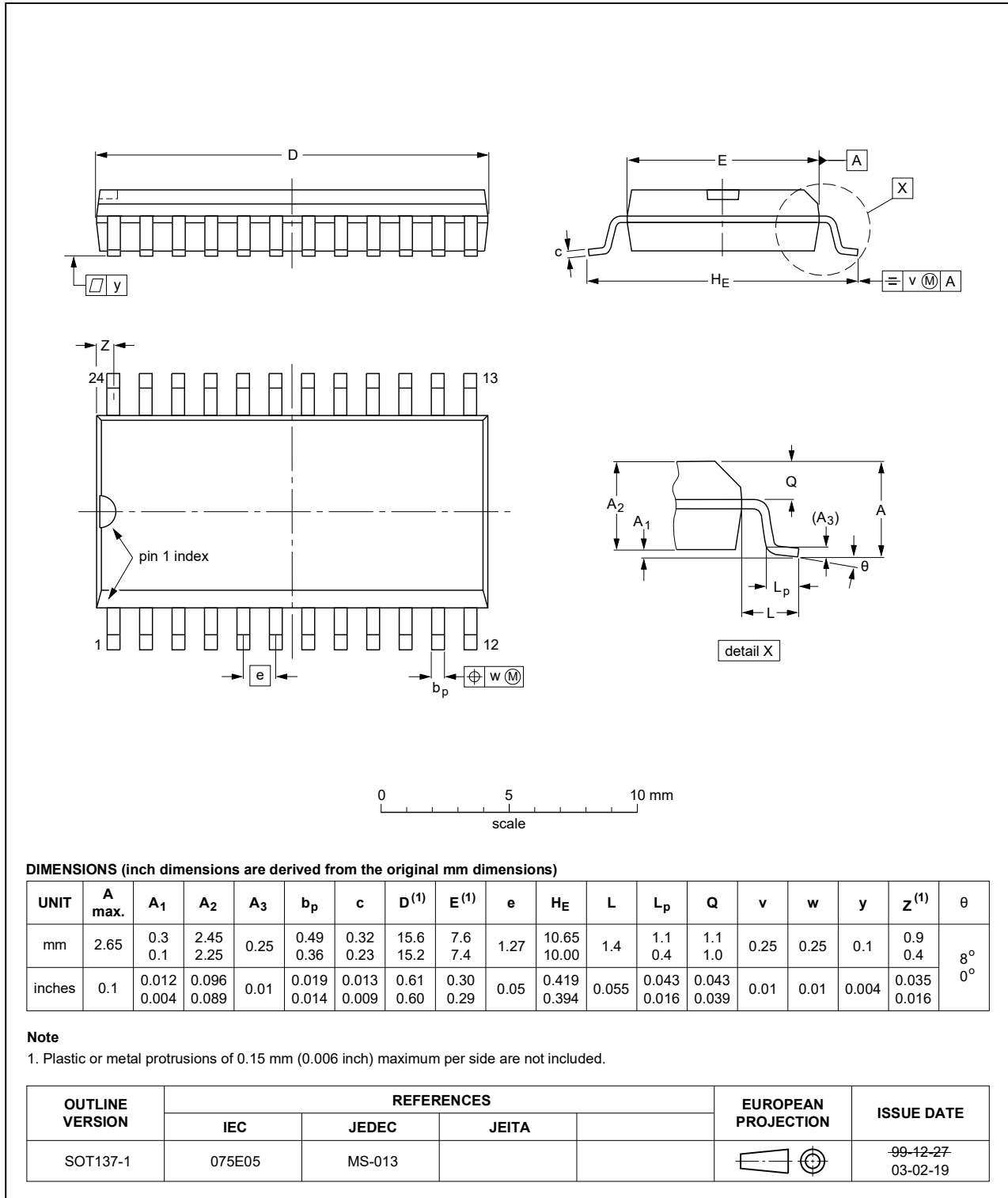


Fig. 18. Package outline SOT137-1 (SO24)

TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1

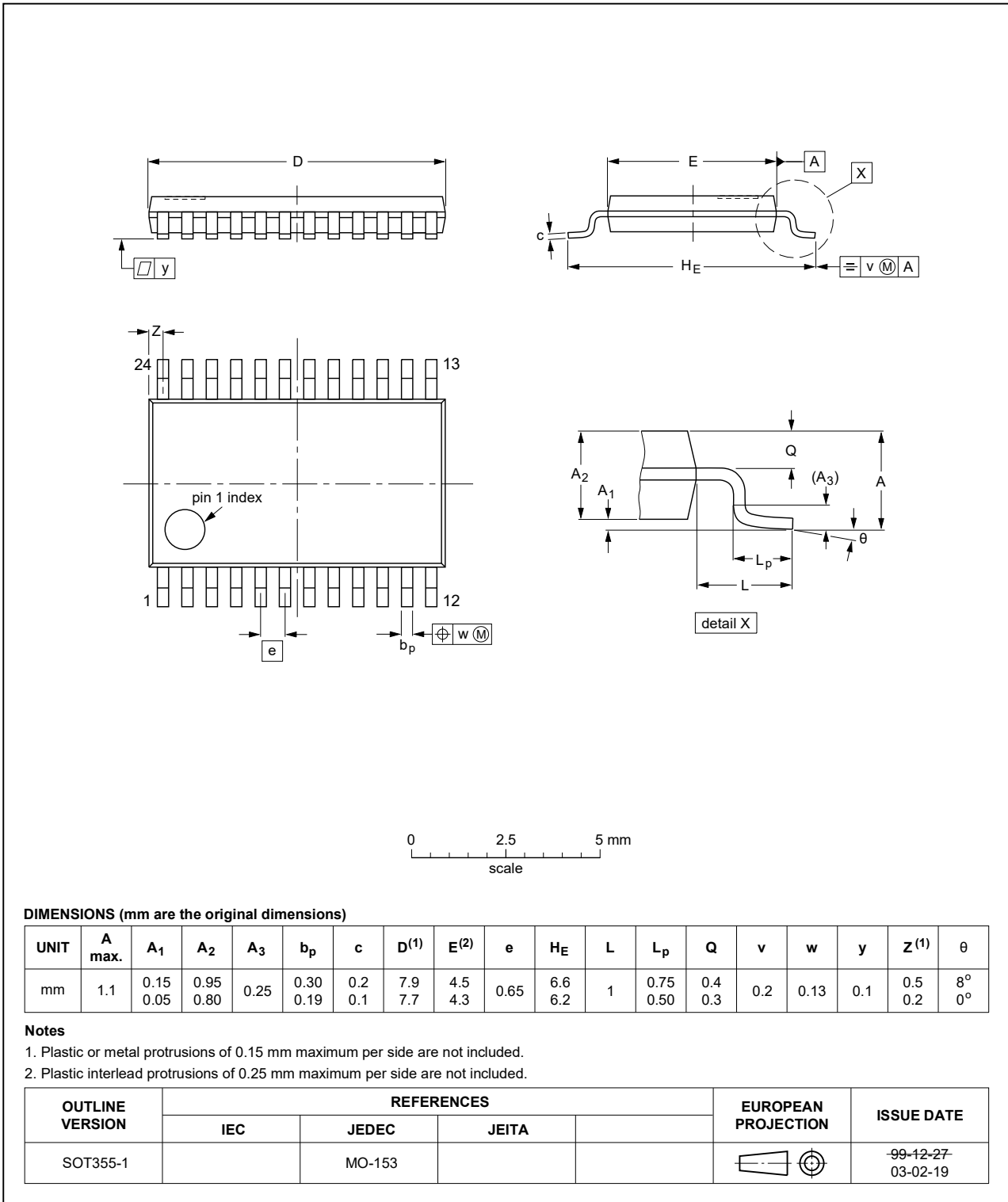


Fig. 19. Package outline SOT355-1 (TSSOP24)

DHVQFN24: plastic dual in-line compatible thermal enhanced very thin quad flat package;  
no leads; 24 terminals; body 3.5 x 5.5 x 0.85 mm

SOT815-1

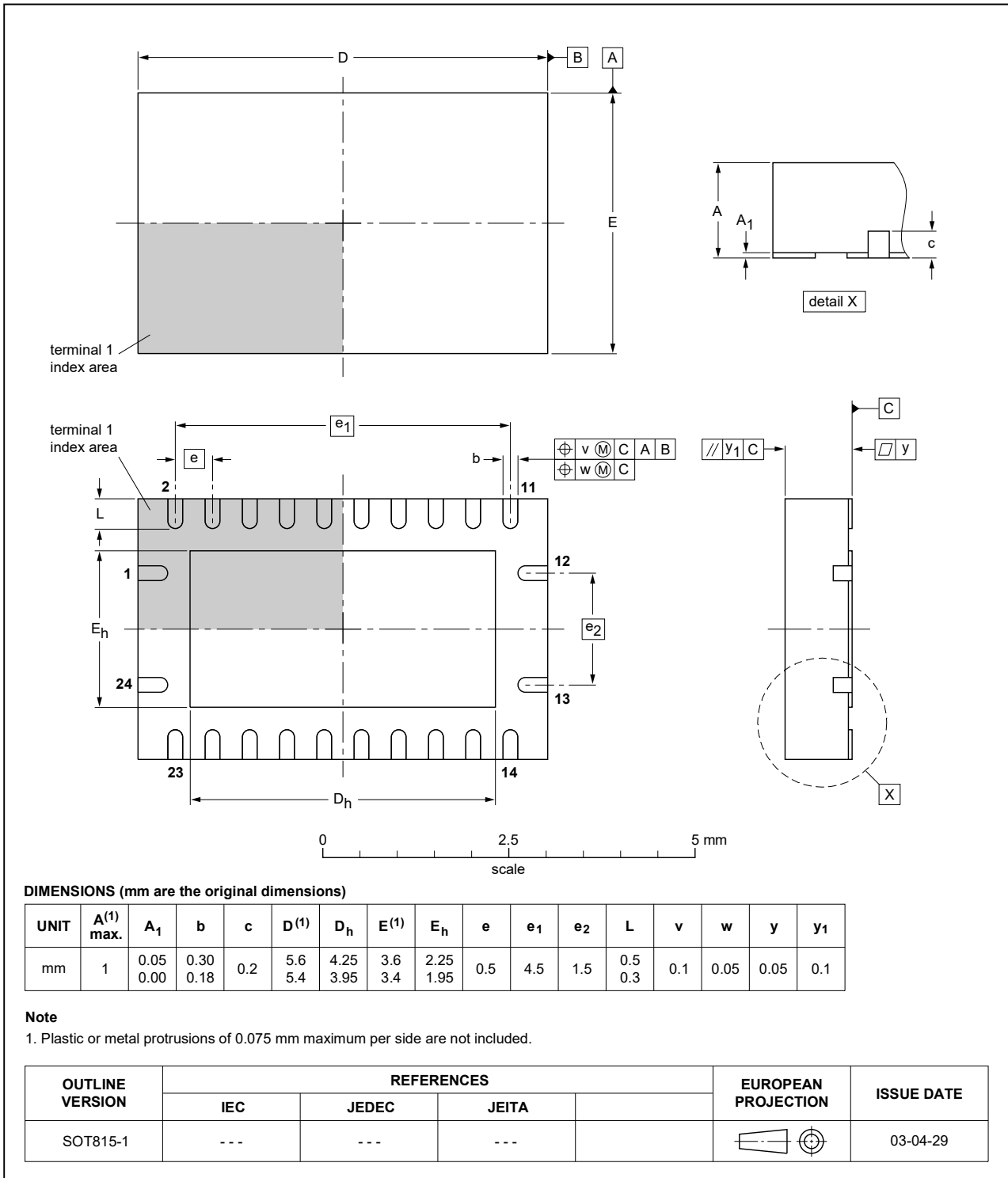


Fig. 20. Package outline SOT815-1 (DHVQFN24)

## 14. Abbreviations

Table 14. Abbreviations

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

## 15. Revision history

Table 15. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4067_Q100 v.2	20200602	Product data sheet	-	74HC_HCT4067_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 have been updated.</li> </ul>			
74HC_HCT4067_Q100 v.1	20150522	Product data sheet	-	-

## 16. 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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