

74HC4067-Q100; 74HCT4067-Q100

16-channel analog multiplexer/demultiplexer

Rev. 1 — 22 May 2015

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 $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
- Input levels S0, S1, S2, S3 and \bar{E} inputs:
 - ◆ For 74HC4067-Q100: CMOS level
 - ◆ For 74HCT4067-Q100: TTL level
- Low ON resistance:
 - ◆ $80\ \Omega$ (typical) at $V_{CC} = 4.5\text{ V}$
 - ◆ $70\ \Omega$ (typical) at $V_{CC} = 6.0\text{ V}$
 - ◆ $60\ \Omega$ (typical) at $V_{CC} = 9.0\text{ V}$
- Specified in compliance with JEDEC standard no. 7A
- ESD protection:
 - ◆ MIL-STD-883, method 3015 exceeds 2000 V
 - ◆ HBM JESD22-A114F exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
 - ◆ CDM JESD22-C101E exceeds 1000 V
- Multiple package options
- Typical 'break before make' built-in

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 × 5.5 × 0.85 mm	SOT815-1
74HCT4067BQ-Q100				

5. Functional diagram

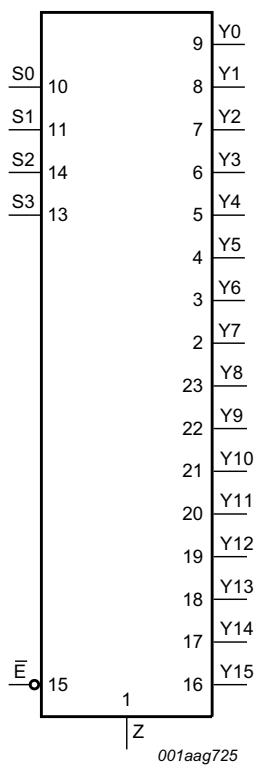


Fig 1. Logic symbol

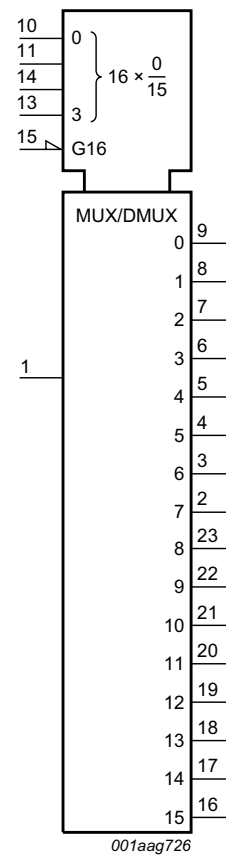


Fig 2. IEC logic symbol

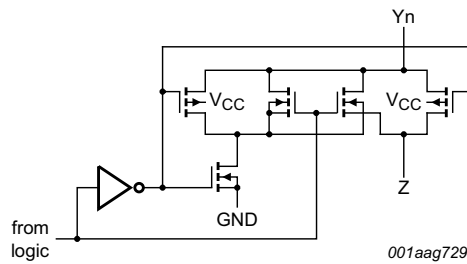


Fig 3. Schematic diagram (one switch)

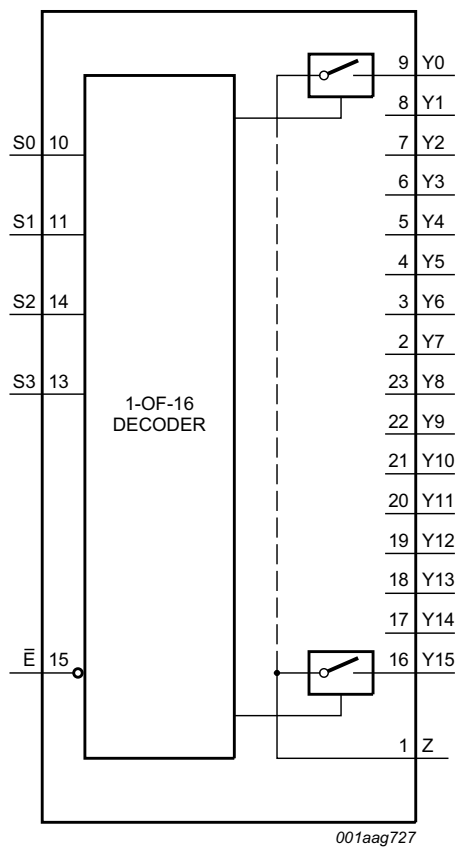


Fig 4. Functional diagram

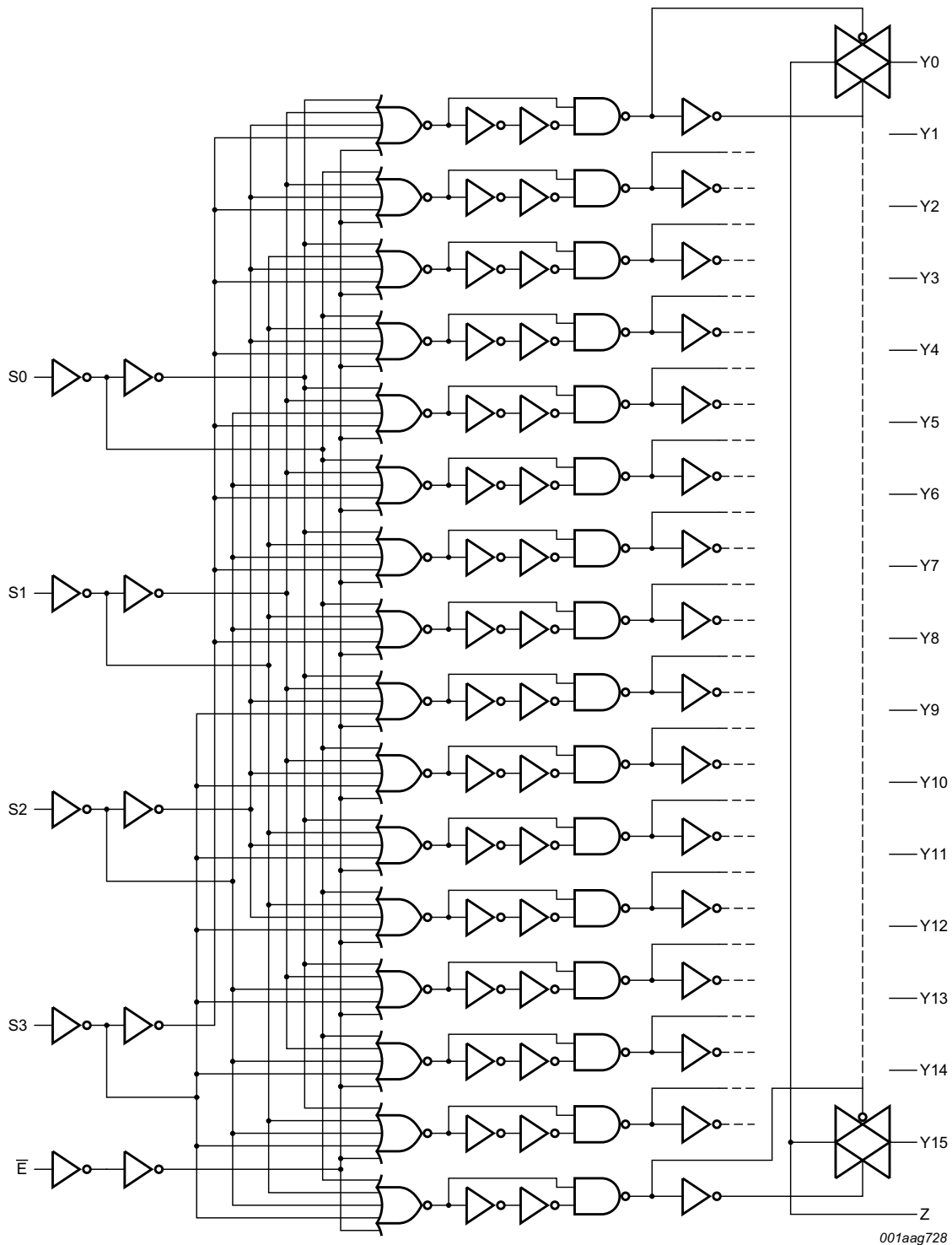
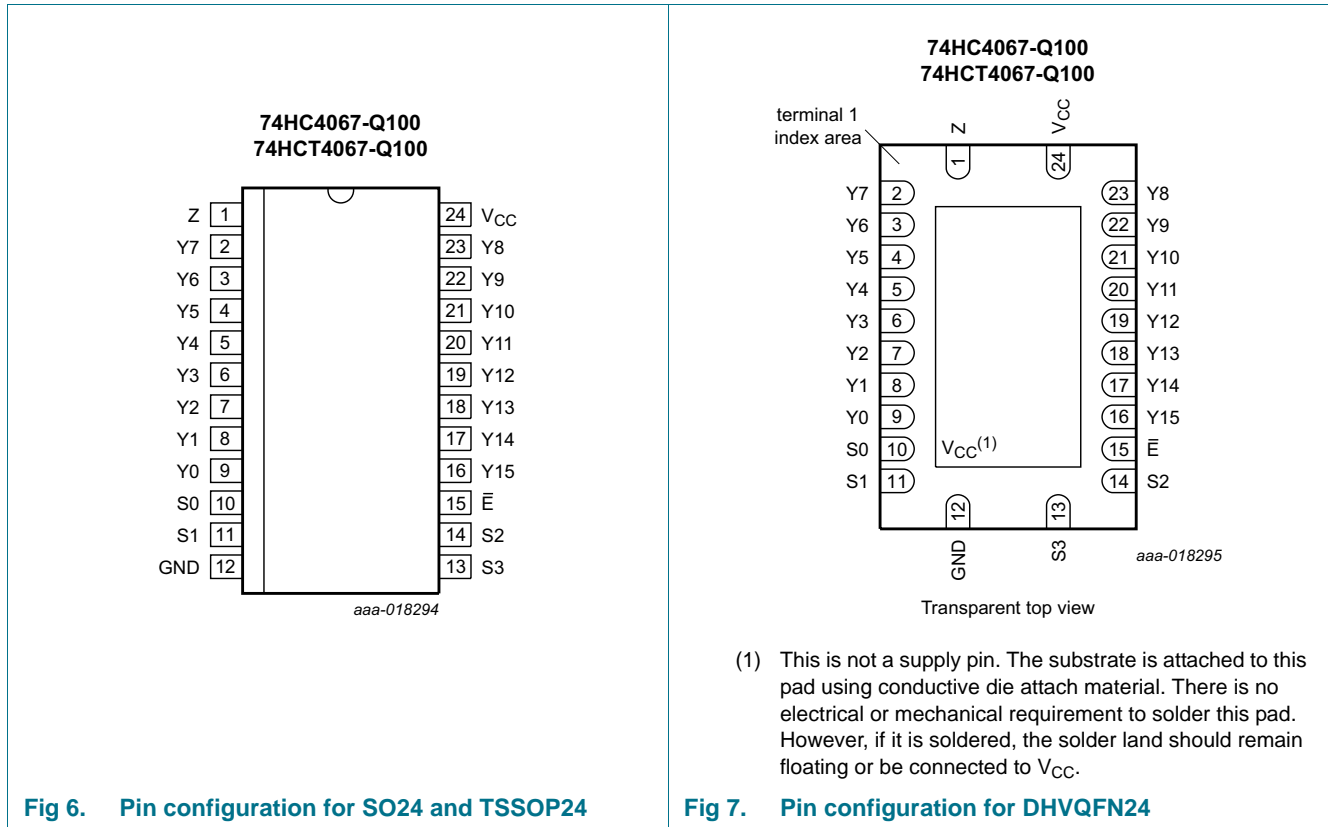


Fig 5. Logic diagram

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, S3, S2	10, 11, 13, 14	address input 0
GND	12	ground (0 V)
\bar{E}	15	enable input (active LOW)
V _{CC}	24	supply voltage

7. Functional description

Table 3. Function table^[1]

Inputs					Channel ON
\bar{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	-

- [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 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 $V_I > V_{CC} + 0.5\text{ V}$	-	± 20	mA
I_{SK}	switch clamping current	$V_{SW} < -0.5\text{ V}$ or $V_{SW} > V_{CC} + 0.5\text{ V}$	-	± 20	mA
I_{SW}	switch current	$V_{SW} = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$	-	± 25	mA
I_{CC}	supply current		-	+50	mA
I_{GND}	ground current		-50	-	mA
T_{stg}	storage temperature		-65	+150	°C

Table 4. Limiting values ...continued

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

Symbol	Parameter	Conditions	Min	Max	Unit
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C			
		SO24 package [2]	-	500	mW
		SSOP24 package [3]	-	500	mW
		TSSOP24 package [3]	-	500	mW
		DHVQFN24 package [4]	-	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 SO24 package: P_{tot} derates linearly with 8 mW/K above 70 °C.
- [3] For TSSOP24 package: P_{tot} derates linearly with 5.5 mW/K above 60 °C.
- [4] For DHVQFN24 package: P_{tot} derates linearly with 4.5 mW/K above 60 °C.

9. Recommended operating conditions

Table 5. Recommended operating conditions

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

10. Static characteristics

Table 6. R_{ON} resistance per switch for types 74HC4067-Q100 and 74HCT4067-Q100

$V_I = V_{IH}$ or V_{IL} ; for test circuit see [Figure 8](#).

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.

For 74HC4067-Q100: $V_{CC} - GND = 2.0\text{ V}, 4.5\text{ V}, 6.0\text{ V}$ and 9.0 V .

For 74HCT4067-Q100: $V_{CC} - GND = 4.5\text{ V}$.

Symbol	Parameter	Conditions	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
$R_{ON(\text{peak})}$	ON resistance (peak)	$V_{is} = V_{CC}$ to GND					
		$V_{CC} = 2.0\text{ V}; I_{SW} = 100\ \mu\text{A}$ [1]	-	-	-	-	Ω
		$V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$	110	180	225	270	Ω
		$V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	95	160	200	240	Ω
		$V_{CC} = 9.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	75	130	165	195	Ω
$R_{ON(\text{rail})}$	ON resistance (rail)	$V_{is} = GND$ or V_{CC}					
		$V_{CC} = 2.0\text{ V}; I_{SW} = 100\ \mu\text{A}$ [1]	150	-	-	-	
		$V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$	90	160	200	240	Ω
		$V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	80	140	175	210	Ω
		$V_{CC} = 9.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$	70	120	150	180	Ω
ΔR_{ON}	ON resistance mismatch between channels	$V_{is} = V_{CC}$ to GND					
		$V_{CC} = 2.0\text{ V}$ [1]	-	-	-	-	Ω
		$V_{CC} = 4.5\text{ V}$	9	-	-	-	Ω
		$V_{CC} = 6.0\text{ V}$	8	-	-	-	Ω
		$V_{CC} = 9.0\text{ V}$	6	-	-	-	Ω

[1] At supply voltages ($V_{CC} - GND$) 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.

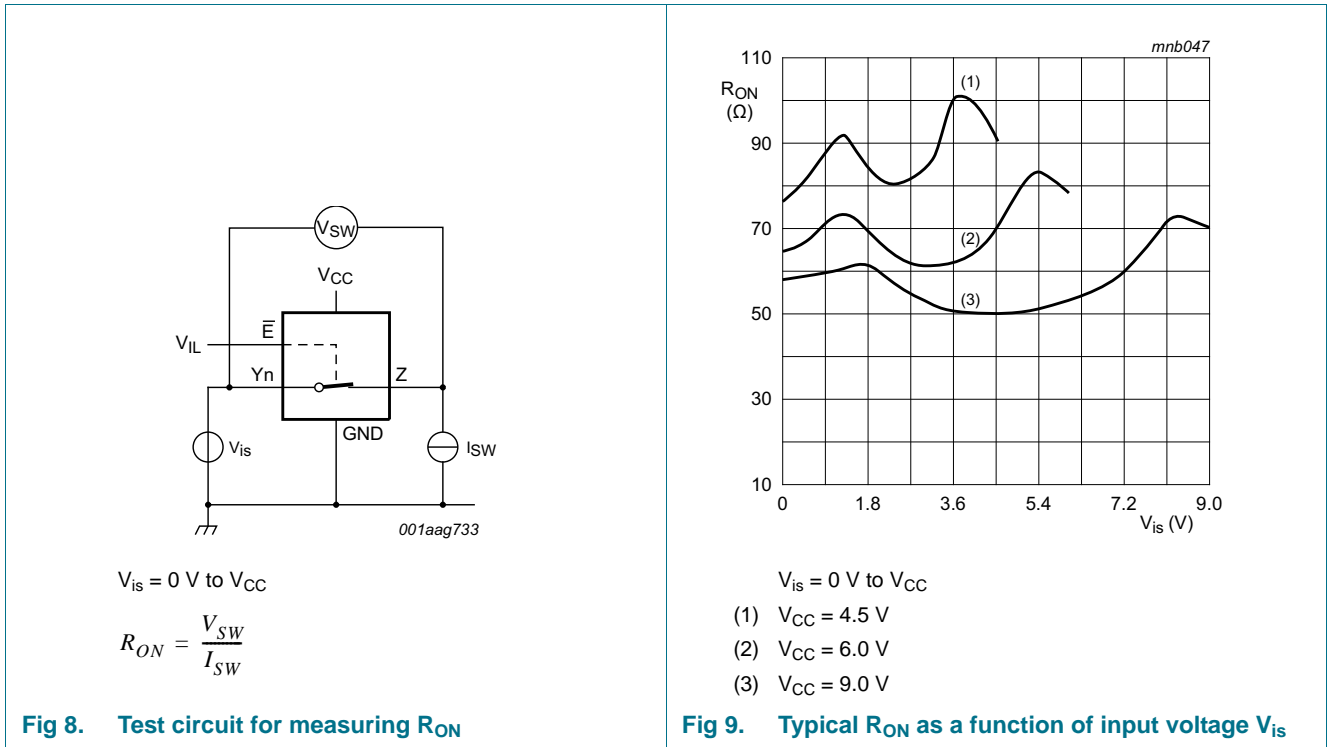


Table 7. Static characteristics 74HC4067-Q100

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	$V_I = V_{CC}$ or GND				
		$V_{CC} = 6.0 \text{ V}$	-	-	± 0.1	μA
		$V_{CC} = 10.0 \text{ V}$	-	-	± 0.2	μA
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0 \text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 10				
		per channel	-	-	± 0.1	μA
		all channels	-	-	± 0.8	μA
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0 \text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 11	-	-	± 0.8	μA

Table 7. Static characteristics 74HC4067-Q100 ...continued

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
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{is} =$ GND or V_{CC} ; $V_{os} = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	8.0	μ A
		$V_{CC} = 10.0$ V	-	-	16.0	μ A
C_I	input capacitance		-	3.5	-	pF
$T_{amb} = -40$ °C to $+85$ °C						
V_{IH}	HIGH-level input voltage	$V_{CC} = 2.0$ V	1.5	-	-	V
		$V_{CC} = 4.5$ V	3.15	-	-	V
		$V_{CC} = 6.0$ V	4.2	-	-	V
		$V_{CC} = 9.0$ V	6.3	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 2.0$ V	-	-	0.50	V
		$V_{CC} = 4.5$ V	-	-	1.35	V
		$V_{CC} = 6.0$ V	-	-	1.80	V
		$V_{CC} = 9.0$ V	-	-	2.70	V
I_I	input leakage current	$V_I = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	± 1.0	μ A
		$V_{CC} = 10.0$ V	-	-	± 2.0	μ A
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0$ V; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 10				
		per channel	-	-	± 1.0	μ A
		all channels	-	-	± 8.0	μ A
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0$ V; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 11	-	-	± 8.0	μ A
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{is} =$ GND or V_{CC} ; $V_{os} = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	80.0	μ A
		$V_{CC} = 10.0$ V	-	-	160	μ A
$T_{amb} = -40$ °C to $+125$ °C						
V_{IH}	HIGH-level input voltage	$V_{CC} = 2.0$ V	1.5	-	-	V
		$V_{CC} = 4.5$ V	3.15	-	-	V
		$V_{CC} = 6.0$ V	4.2	-	-	V
		$V_{CC} = 9.0$ V	6.3	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 2.0$ V	-	-	0.50	V
		$V_{CC} = 4.5$ V	-	-	1.35	V
		$V_{CC} = 6.0$ V	-	-	1.80	V
		$V_{CC} = 9.0$ V	-	-	2.70	V
I_I	input leakage current	$V_I = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	± 1.0	μ A
		$V_{CC} = 10.0$ V	-	-	± 2.0	μ A

Table 7. Static characteristics 74HC4067-Q100 ...continued

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
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 10				
		per channel	-	-	± 1.0	μA
		all channels	-	-	± 8.0	μA
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 11	-	-	± 8.0	μA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or V_{CC} ; $V_{os} = V_{CC}$ or GND				
		$V_{CC} = 6.0\text{ V}$	-	-	160	μA
		$V_{CC} = 10.0\text{ V}$	-	-	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
$T_{amb} = 25\text{ }^\circ\text{C}$						
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; $V_{CC} = 5.5\text{ V}$	-	-	± 0.1	μA
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 10				
		per channel	-	-	± 0.1	μA
		all channels	-	-	± 0.8	μA
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 11	-	-	± 0.8	μA
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	μA
ΔI_{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	μA
		pin Sn	-	50	180	μA
C_I	input capacitance		-	3.5	-	pF
$T_{amb} = -40\text{ }^\circ\text{C to }+85\text{ }^\circ\text{C}$						
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; $V_{CC} = 5.5\text{ V}$	-	-	± 1.0	μA
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 10				
		per channel	-	-	± 1.0	μA
		all channels	-	-	± 8.0	μA

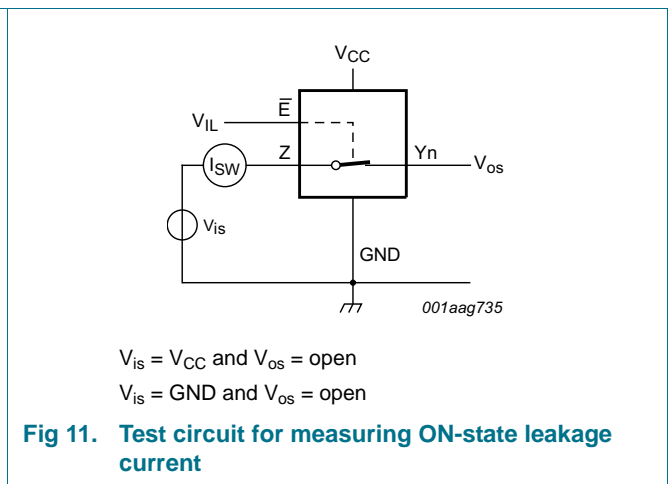
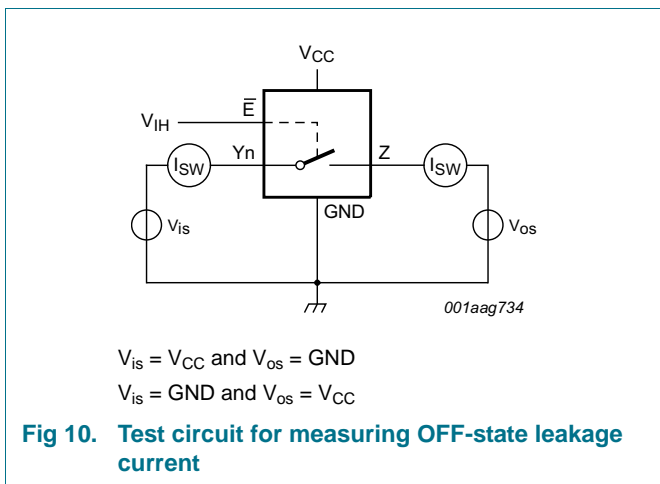
Table 8. Static characteristics 74HCT4067-Q100 ...continued

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
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 11	-	-	± 8.0	μA
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 V	-	-	80.0	μA
ΔI_{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 V				
		pin \bar{E}	-	-	270	μA
		pin S_n	-	-	225	μA
$T_{amb} = -40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$						
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5\text{ V}$ to 5.5 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5\text{ V}$ to 5.5 V	-	-	0.8	V
I_I	input leakage current	$V_I = V_{CC}$ or GND ; $V_{CC} = 5.5\text{ V}$	-	-	± 1.0	μA
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 10				
		per channel	-	-	± 1.0	μA
		all channels	-	-	± 8.0	μA
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Figure 11	-	-	± 8.0	μA
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 V	-	-	160	μA
ΔI_{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 V				
		pin \bar{E}	-	-	294	μA
		pin S_n	-	-	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 [Figure 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 Figure 12 [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 Y_n					
		$V_{CC} = 2.0\text{ V}$	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 Y_n ; see Figure 13 [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
		S_n to Y_n					
		$V_{CC} = 2.0\text{ V}$	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
		S_n 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		

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

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

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		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
t_{on}	turn-on time	\bar{E} to Yn; see Figure 13 [4]					
		$V_{CC} = 2.0\text{ V}$	80	275	345	415	ns
		$V_{CC} = 4.5\text{ V}$	29	55	69	83	ns
		$V_{CC} = 5.0\text{ V}$; $C_L = 15\text{ pF}$	26	-	-	-	ns
		$V_{CC} = 6.0\text{ V}$	23	47	59	71	ns
		$V_{CC} = 9.0\text{ V}$	17	42	53	63	ns
		Sn to Yn					
		$V_{CC} = 2.0\text{ V}$	88	300	375	450	ns
		$V_{CC} = 4.5\text{ V}$	32	60	75	90	ns
		$V_{CC} = 5.0\text{ V}$; $C_L = 15\text{ pF}$	29	-	-	-	ns
		$V_{CC} = 6.0\text{ V}$	26	51	64	77	ns
		$V_{CC} = 9.0\text{ V}$	18	45	56	68	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
		$V_{CC} = 9.0\text{ V}$	18	42	53	63	ns
		Sn to Z					
		$V_{CC} = 2.0\text{ V}$	94	300	375	450	ns
		$V_{CC} = 4.5\text{ V}$	34	60	75	90	ns
$V_{CC} = 6.0\text{ V}$	27	51	64	77	ns		
$V_{CC} = 9.0\text{ V}$	19	45	56	68	ns		
C_{PD}	power dissipation capacitance	per switch; $V_I = GND$ to V_{CC} [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 μW).

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

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.

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 [Figure 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 Figure 12 [1][2]					
		$V_{CC} = 4.5\text{ V}$	9	15	19	22	ns
		Z to Y_n					
		$V_{CC} = 4.5\text{ V}$	6	12	15	18	ns
t_{off}	turn-off time	\bar{E} to Y_n ; see Figure 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					
		$V_{CC} = 4.5\text{ V}$	35	60	75	90	ns
t_{on}	turn-on time	\bar{E} to Y_n ; see Figure 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					
		$V_{CC} = 4.5\text{ V}$	38	65	81	98	ns
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 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_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.

12. Waveforms

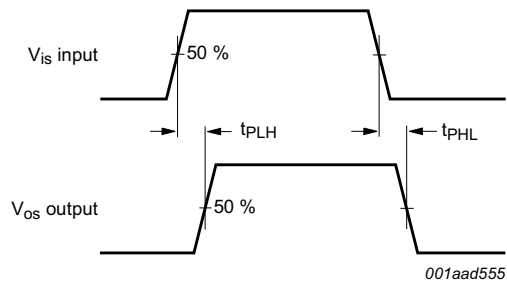
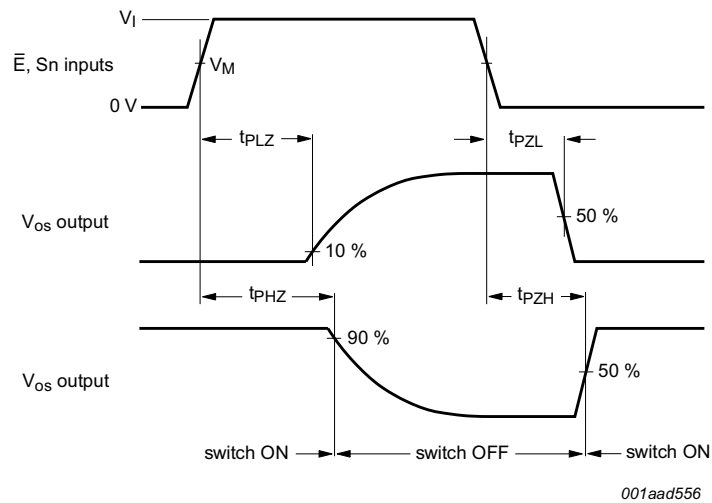


Fig 12. Input (V_{is}) to output (V_{os}) propagation delays



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

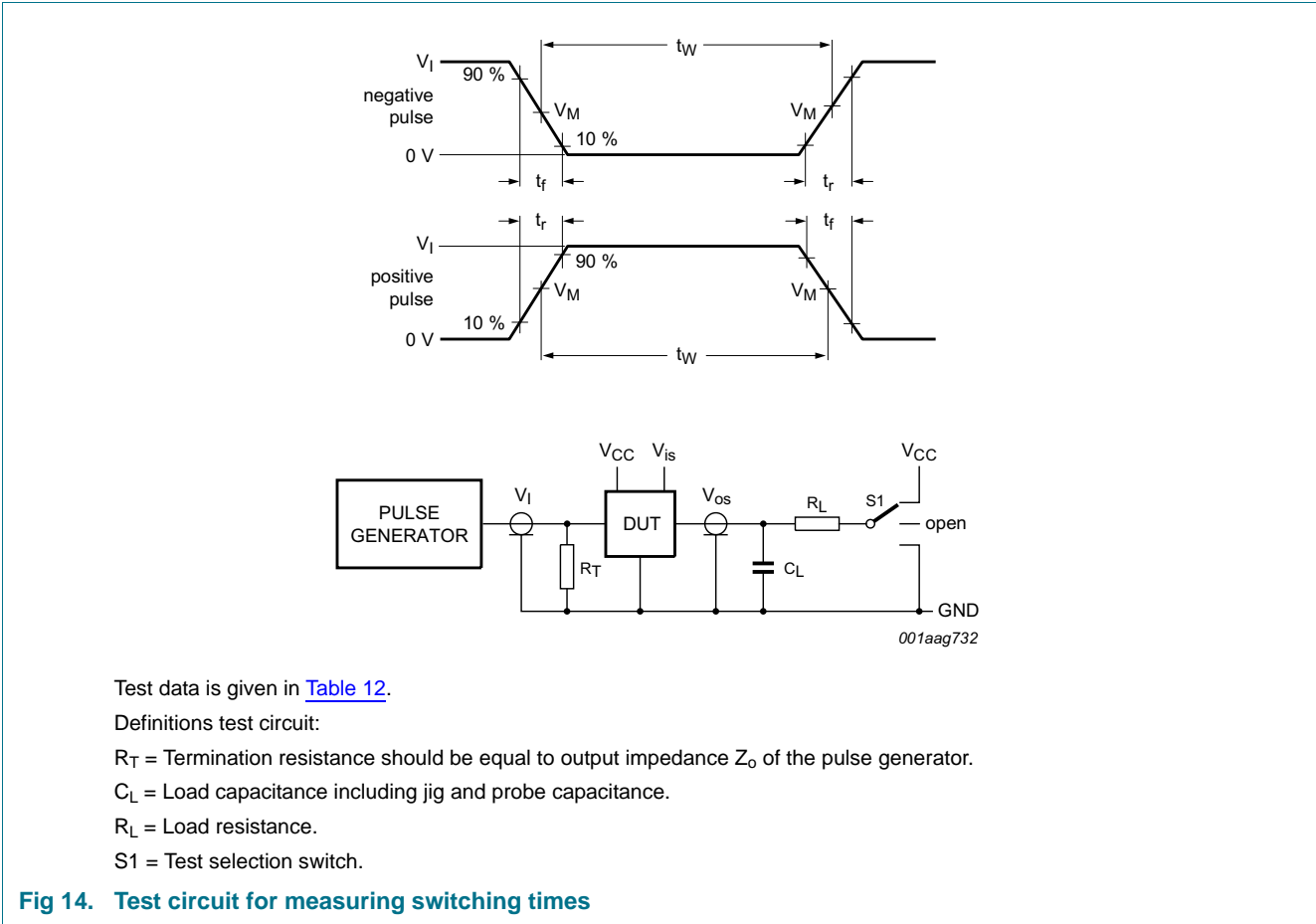


Table 12. Test data

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 Ω	GND
t_{PLZ}, t_{PZL}	GND to V_{CC}	GND to V_{CC}	GND	6 ns	50 pF, 15 pF	1 k Ω	V_{CC}

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

13. Additional dynamic characteristics

Table 13. Additional dynamic characteristics

Recommended conditions and typical values; $GND = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

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
THD	total harmonic distortion	$R_L = 10\text{ k}\Omega$; $C_L = 50\text{ pF}$; see Figure 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	-	%
α_{iso}	isolation (OFF-state)	$R_L = 600\text{ }\Omega$; $C_L = 50\text{ pF}$; see Figure 16 ^[1]				
		$V_{CC} = 4.5\text{ V}$	-	-50	-	dB
		$V_{CC} = 9.0\text{ V}$	-	-50	-	dB
$f_{(-3dB)}$	-3 dB frequency response	$R_L = 50\text{ }\Omega$; $C_L = 10\text{ pF}$; see Figure 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 Ω).

[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 Ω). After set-up, f_i is increased to obtain a reading of -3 dB at V_{os} .

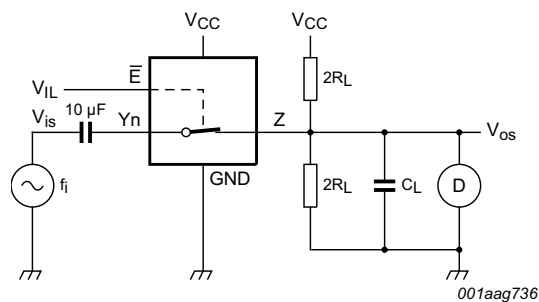
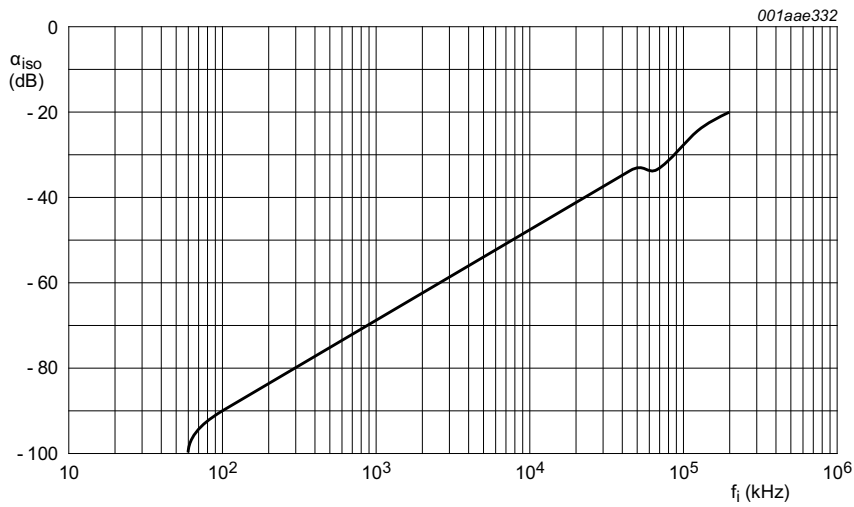
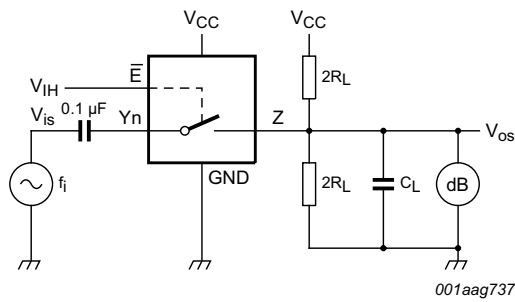


Fig 15. Test circuit for measuring total harmonic distortion



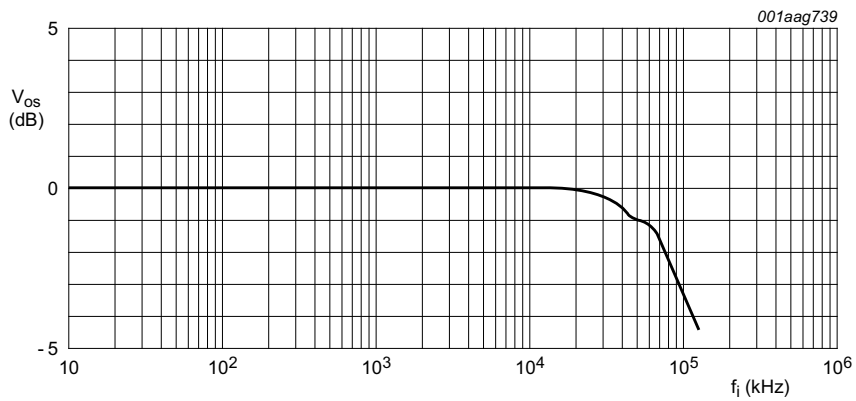
a. Isolation (OFF-state)



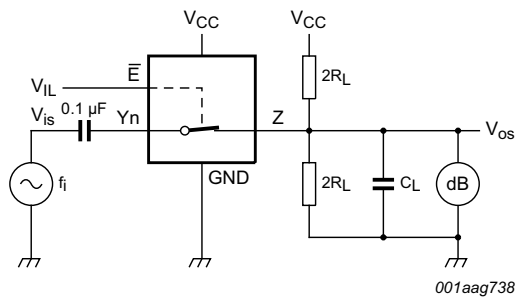
b. Test circuit

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

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

14. Package outline

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

SOT137-1

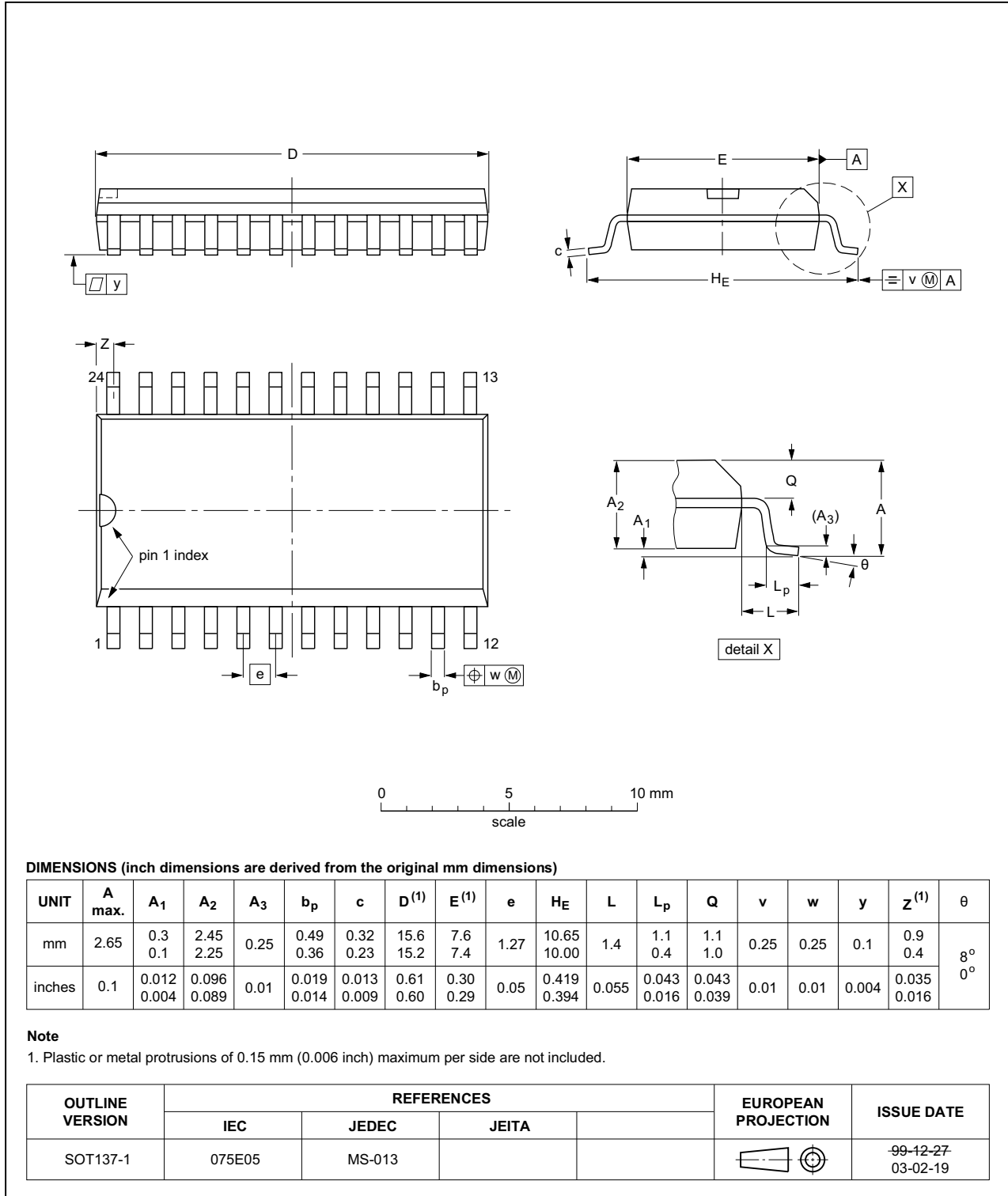


Fig 18. Package outline SOT137-1 (SO24)

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

SOT355-1

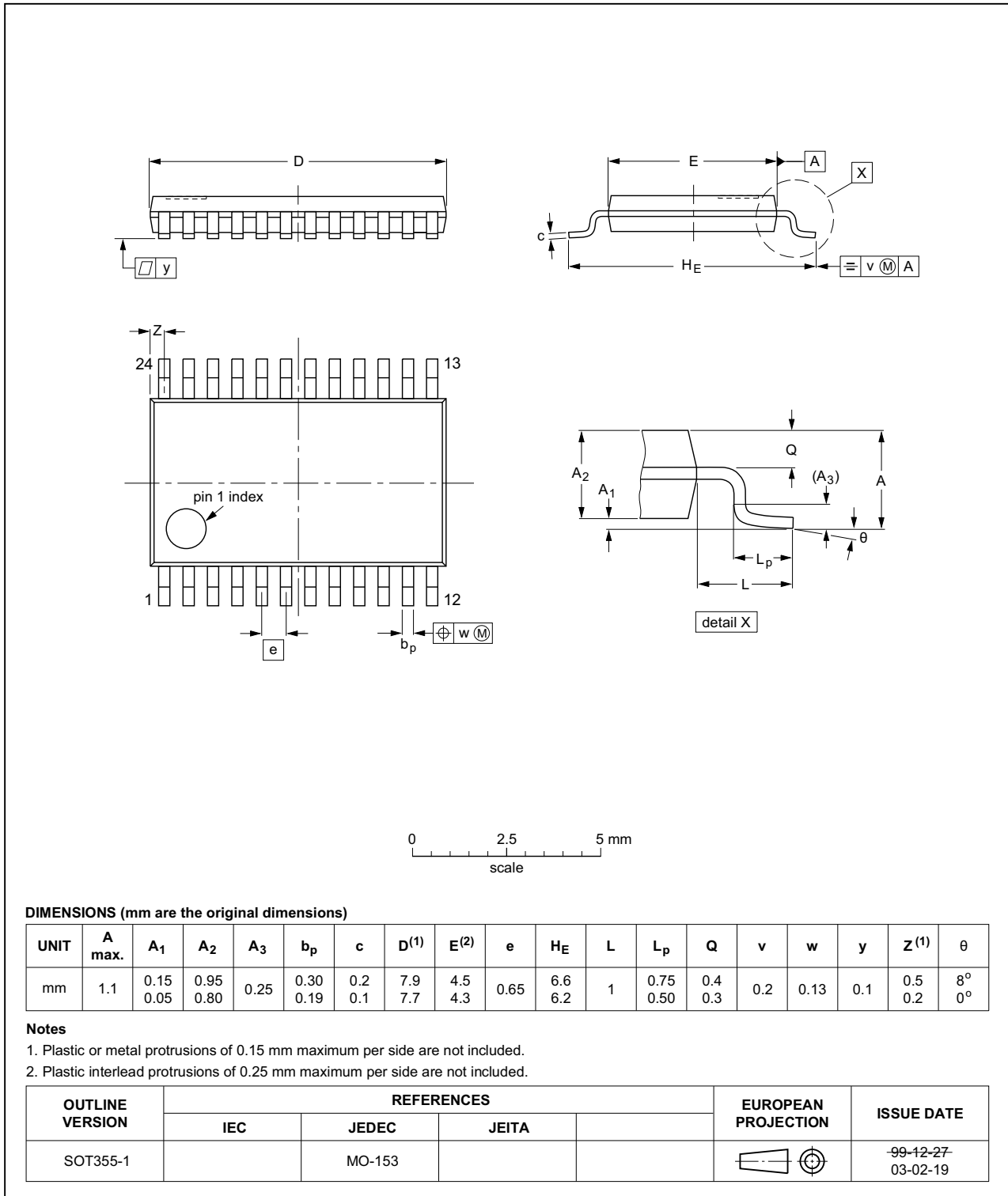


Fig 19. Package outline SOT355-1 (TSSOP24)

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

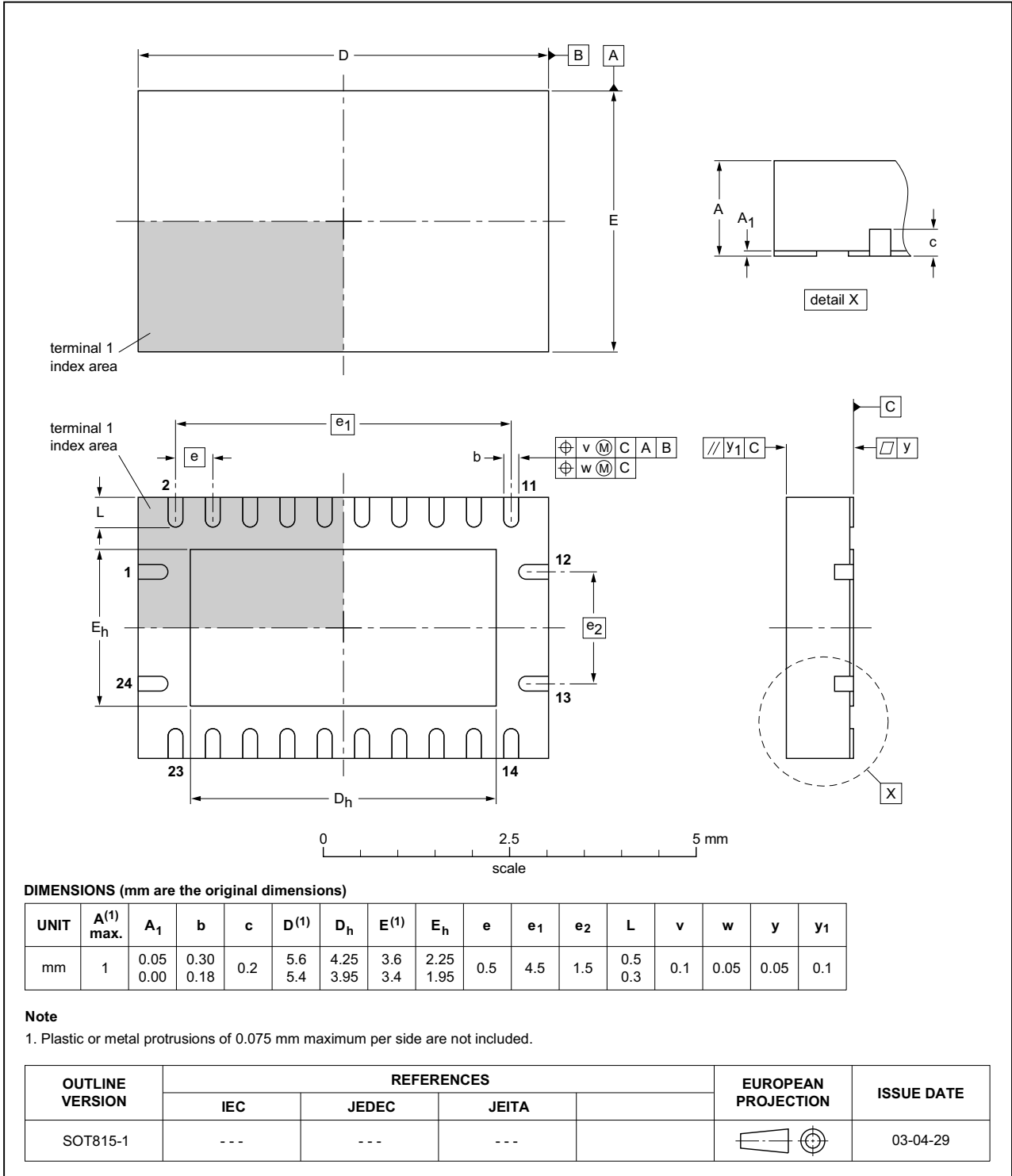


Fig 20. Package outline SOT815-1 (DHVQFN24)

15. Abbreviations

Table 14. Abbreviations

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

16. Revision history

Table 15. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4067_Q100 v.1	20150522	Product data sheet	-	-

17. Legal information

17.1 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 URL <http://www.nexperia.com>.

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19. Contents

1	General description	1
2	Features and benefits	1
3	Applications	1
4	Ordering information	2
5	Functional diagram	2
6	Pinning information	5
6.1	Pinning	5
6.2	Pin description	5
7	Functional description	6
8	Limiting values	6
9	Recommended operating conditions	7
10	Static characteristics	8
11	Dynamic characteristics	13
12	Waveforms	16
13	Additional dynamic characteristics	18
14	Package outline	21
15	Abbreviations	24
16	Revision history	24
17	Legal information	25
17.1	Data sheet status	25
17.2	Definitions	25
17.3	Disclaimers	25
17.4	Trademarks	26
18	Contact information	26
19	Contents	27