74HC4017-Q100; 74HCT4017-Q100

Johnson decade counter with 10 decoded outputs

Rev. 1 — 24 March 2014 | Product data sheet

1. General description

The 74HC4017-Q100; 74HCT4017-Q100 is a 5-stage Johnson decade counter with 10 decoded outputs (Q0 to Q9). It has an output from the most significant flip-flop ($\overline{\text{Q5-9}}$), two clock inputs (CP0 and $\overline{\text{CP1}}$) and an overriding asynchronous master reset input (MR). Either a LOW-to-HIGH transition at CP0 while $\overline{\text{CP1}}$ is LOW, or a HIGH-to-LOW transition at $\overline{\text{CP1}}$ while CP0 is HIGH, advances the counter. The $\overline{\text{Q5-9}}$ output is LOW while the counter is in states 5, 6, 7, 8 and 9. When cascading counters, it can be used to drive the CP0 input of the next counter. A HIGH on MR resets the counter to zero (Q0 = $\overline{\text{Q5-9}}$ = HIGH; Q1 to Q9 = LOW) independent of the clock inputs (CP0 and $\overline{\text{CP1}}$). An internal circuit: following any illegal code the counter returns to a proper counting mode within 11 clock pulses provides automatic code correction of the counter. Inputs include clamp diodes that enable 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 6.0 V
- Input levels:
  - For 74HC4017-Q100: CMOS level
  - For 74HCT4017-Q100: TTL level
- Complies with JEDEC standard no. 7 A
- 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 Ω)
- Multiple package options

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC4017-Q100				
74HC4017D-Q100	–40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HC4017PW-Q100	–40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74HC4017BQ-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
74HCT4017-Q100				
74HCT4017D-Q100	–40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT4017BQ-Q100	–40 °C to +125 °C	DHVQFN16	plastic dual in-line compatible thermal-enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm	SOT763-1

4. Functional diagram

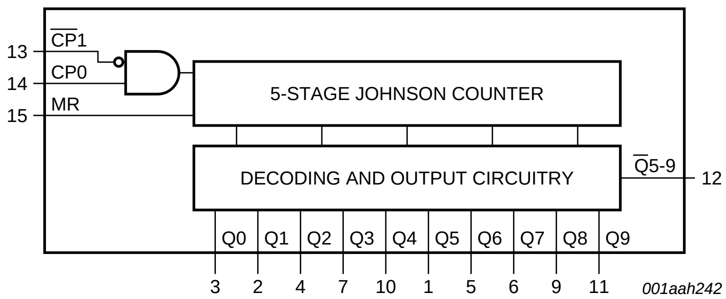


Fig 1. Functional diagram

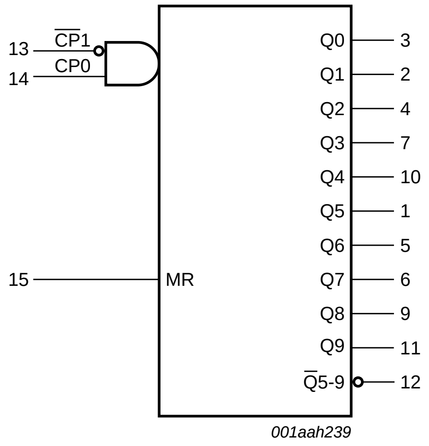


Fig 2. Logic symbol

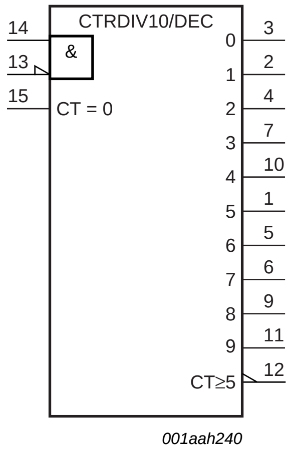


Fig 3. IEC logic symbol

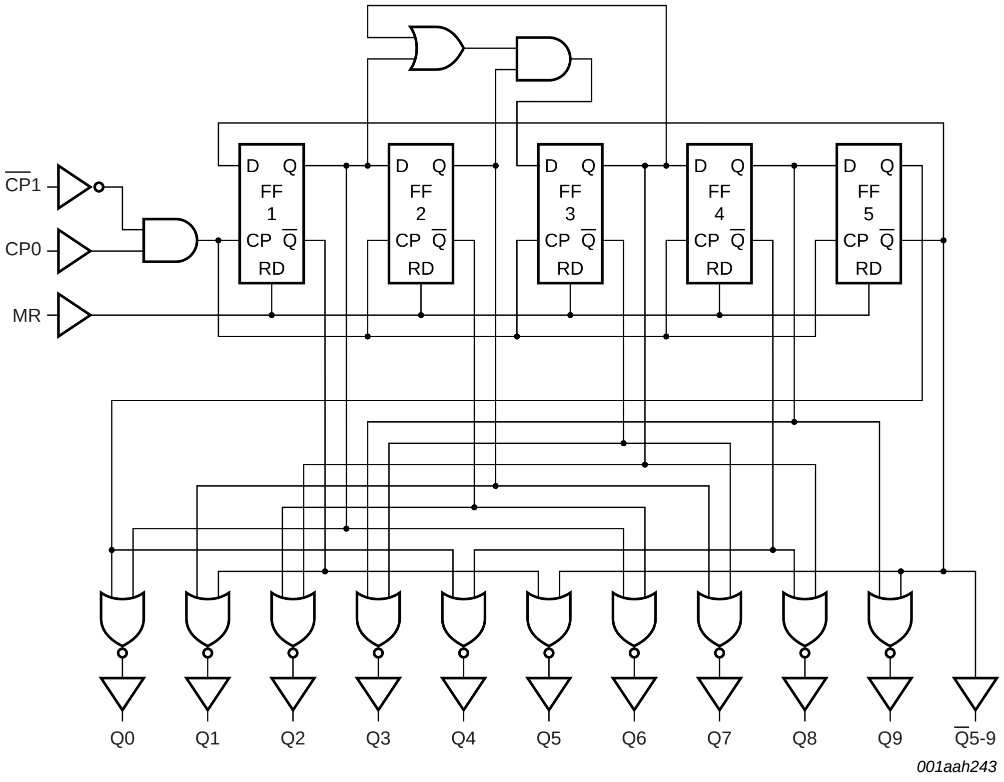


Fig 4. Logic diagram

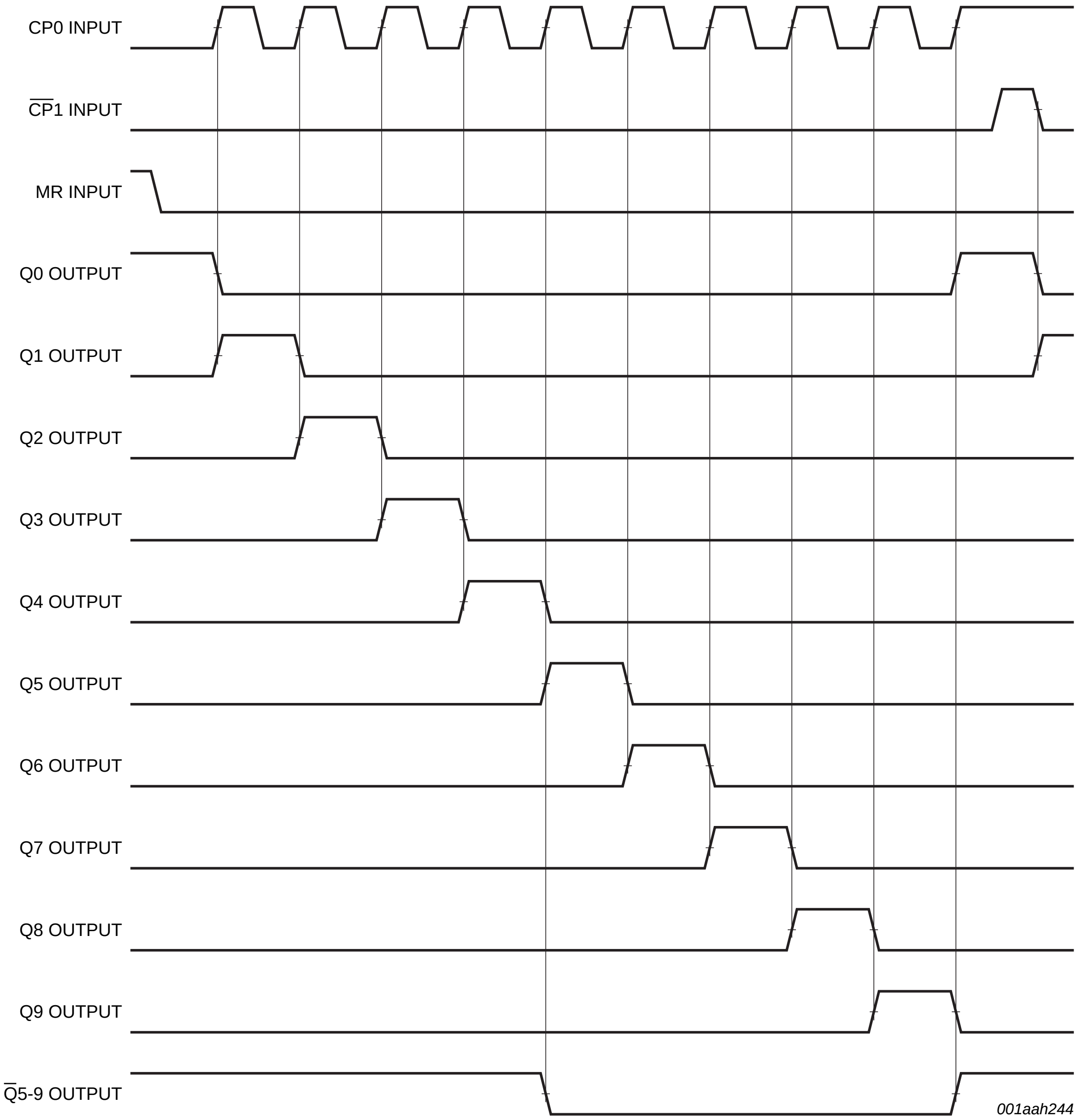


Fig 5. Timing diagram

5. Pinning information

5.1 Pinning

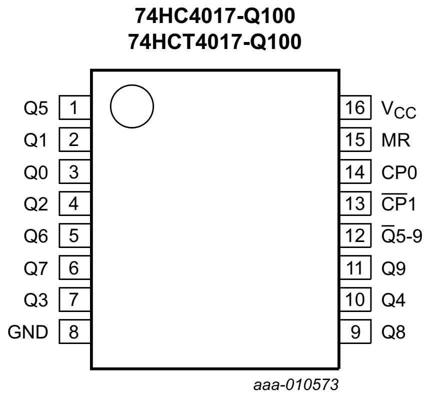
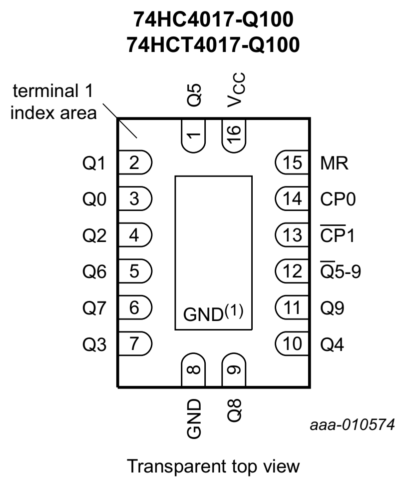


Fig 6. Pin configuration SO16 and TSSOP16



(1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.

Fig 7. Pin configuration DHVQFN16

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
Q[0:9]	3, 2, 4, 7, 10, 1, 5, 6, 9, 11	decoded output
GND	8	ground (0 V)
$\overline{Q}$5-9	12	carry output (active LOW)
$\overline{CP}$1	13	clock input (HIGH-to-LOW edge-triggered)
CP0	14	clock input (LOW-to-HIGH edge-triggered)
MR	15	master reset input (active HIGH)
V_{CC}	16	supply voltage

6. Functional description

Table 3. Function table[1]

MR	CP0	$\overline{CP1}$	Operation
H	X	X	Q0 = $\overline{Q5\text{-}9}$ = HIGH; Q1 to Q9 = LOW
L	H	↓	counter advances
L	↑	L	counter advances
L	L	X	no change
L	X	H	no change
L	H	↑	no change
L	↓	L	no change

[1] H = HIGH voltage level;
L = LOW voltage level;
X = don't care;
↑ = LOW-to-HIGH transition;
↓ = HIGH-to-LOW transition;

7. 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			–0.5	+7	V
I_{IK}	input clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_O	output current	-0.5 V $< V_O < V_{CC} + 0.5$ V		-	±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 °C to +125 °C				
	SO16 package		[2]	-	500	mW
	TSSOP16 package		[3]	-	500	mW
	DHVQFN16 package		[4]	-	500	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] P_{tot} derates linearly with 8 mW/K above 70 °C.

[3] P_{tot} derates linearly with 5.5 mW/K above 60 °C.

[4] P_{tot} derates linearly with 4.5 mW/K above 60 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
74HC4017-Q100						
V_{CC}	supply voltage		2.0	5.0	6.0	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
$\Delta t/\Delta V$	input transition rise and fall rate	V_{CC} = 2.0 V	-	-	625	ns/V
		V_{CC} = 4.5 V	-	1.67	139	ns/V
		V_{CC} = 6.0 V	-	-	83	ns/V
T_{amb}	ambient temperature		–40	-	+125	°C
74HCT4017-Q100						
V_{CC}	supply voltage		4.5	5.0	5.5	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
$\Delta t/\Delta V$	input transition rise and fall rate	V_{CC} = 4.5 V	-	1.67	139	ns/V
T_{amb}	ambient temperature		–40	-	+125	°C

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC4017-Q100										
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V_{CC} = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V_{CC} = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V_{CC} = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V_{CC} = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}								
		I_O = –20 μA; V_{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I_O = –20 μA; V_{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I_O = –20 μA; V_{CC} = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		I_O = –4.0 mA; V_{CC} = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I_O = –5.2 mA; V_{CC} = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	V

Table 6. Static characteristics *...continued*

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

Symbol	Parameter	Conditions	25 °C			−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}								
		$I_O = 20\ \mu A$; $V_{CC} = 2.0\ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 20\ \mu A$; $V_{CC} = 4.5\ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 20\ \mu A$; $V_{CC} = 6.0\ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 4.0\ mA$; $V_{CC} = 4.5\ V$	-	0.15	0.26	-	0.33	-	0.4	V
		$I_O = 5.2\ mA$; $V_{CC} = 6.0\ V$	-	0.16	0.26	-	0.33	-	0.4	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0\ V$	-	-	±0.1	-	±1.0	-	±1.0	μA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0\ A$; $V_{CC} = 6.0\ V$	-	-	8.0	-	80	-	160	μA
C_I	input capacitance		-	3.5	-	-	-	-	-	pF
74HCT4017-Q100										
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5\ V$ to $5.5\ V$	2.0	1.6	-	2.0	-	2.0	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5\ V$ to $5.5\ V$	-	1.2	0.8	-	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}; $V_{CC} = 4.5\ V$								
		$I_O = -20\ \mu A$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -4\ mA$	3.98	4.32	-	3.84	-	3.7	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}; $V_{CC} = 4.5\ V$								
		$I_O = 20\ \mu A$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 4.0\ mA$	-	0.15	0.26	-	0.33	-	0.4	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\ V$	-	-	±0.1	-	±1.0	-	±1.0	μA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\ V$; $I_O = 0\ A$	-	-	8.0	-	80	-	160	μA
ΔI_{CC}	additional supply current	per input pin; $V_I = V_{CC} - 2.1\ V$; other inputs at V_{CC} or GND; $V_{CC} = 4.5\ V$ to $5.5\ V$; $I_O = 0\ A$								
		CP0 input	-	25	90	-	113	-	123	μA
		$\overline{CP1}$ input	-	40	144	-	180	-	196	μA
		MR input	-	50	180	-	225	-	245	μA
C_I	input capacitance		-	3.5	-	-	-	-	-	pF

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF; see Figure 11.

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC4017-Q100										
t_{pd}	propagation delay	CP0 to Qn; CP0 to $\overline{Q}$5-9; see Figure 10 [1]								
		V_{CC} = 2.0 V	-	63	230	-	290	-	345	ns
		V_{CC} = 4.5 V	-	23	46	-	58	-	69	ns
		V_{CC} = 5.0 V; C_L = 15 pF	-	20	-	-	-	-	-	ns
		V_{CC} = 6.0 V	-	18	39	-	49	-	59	ns
		$\overline{CP1}$ to Qn; $\overline{CP1}$ to $\overline{Q}$5-9; see Figure 10								
		V_{CC} = 2.0 V	-	61	250	-	315	-	375	ns
		V_{CC} = 4.5 V	-	22	50	-	63	-	75	ns
		V_{CC} = 5.0 V; C_L = 15 pF	-	20	-	-	-	-	-	ns
		V_{CC} = 6.0 V	-	18	43	-	54	-	64	ns
t_{PHL}	HIGH to LOW propagation delay	MR to Q[1:9]; see Figure 10								
		V_{CC} = 2.0 V	-	52	230	-	290	-	345	ns
		V_{CC} = 4.5 V	-	19	46	-	58	-	69	ns
		V_{CC} = 6.0 V	-	15	39	-	49	-	59	ns
t_{PLH}	LOW to HIGH propagation delay	MR to $\overline{Q}$5-9, Q0; see Figure 10								
		V_{CC} = 2.0 V	-	55	230	-	290	-	345	ns
		V_{CC} = 4.5 V	-	20	46	-	58	-	69	ns
		V_{CC} = 6.0 V	-	16	39	-	49	-	59	ns
t_t	transition time	see Figure 10 [2]								
		V_{CC} = 2.0 V	-	19	75	-	95	-	110	ns
		V_{CC} = 4.5 V	-	7	15	-	19	-	22	ns
		V_{CC} = 6.0 V	-	6	13	-	16	-	19	ns
t_W	pulse width	CP0 and $\overline{CP1}$ (HIGH or LOW); see Figure 9								
		V_{CC} = 2.0 V	80	17	-	100	-	120	-	ns
		V_{CC} = 4.5 V	16	6	-	20	-	24	-	ns
		V_{CC} = 6.0 V	14	5	-	17	-	20	-	ns
		MR (HIGH); see Figure 9								
		V_{CC} = 2.0 V	80	19	-	100	-	120	-	ns
		V_{CC} = 4.5 V	16	7	-	20	-	24	-	ns
		V_{CC} = 6.0 V	14	6	-	17	-	20	-	ns

Table 7. Dynamic characteristics *...continued*
GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF; see Figure 11.

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{su}	set-up time	$\overline{CP1}$ to CP0; CP0 to $\overline{CP1}$; see Figure 8								
		V_{CC} = 2.0 V	50	–8	-	65	-	75	-	ns
		V_{CC} = 4.5 V	10	–3	-	13	-	15	-	ns
		V_{CC} = 6.0 V	9	–2	-	11	-	13	-	ns
t_h	hold time	$\overline{CP1}$ to CP0; CP0 to $\overline{CP1}$; see Figure 8								
		V_{CC} = 2.0 V	50	17	-	65	-	75	-	ns
		V_{CC} = 4.5 V	10	6	-	13	-	15	-	ns
		V_{CC} = 6.0 V	9	5	-	11	-	13	-	ns
t_{rec}	recovery time	MR to CP0 and MR to $\overline{CP1}$; see Figure 9								
		V_{CC} = 2.0 V	5	–17	-	5	-	5	-	ns
		V_{CC} = 4.5 V	5	–6	-	5	-	5	-	ns
		V_{CC} = 6.0 V	5	–5	-	5	-	5	-	ns
f_{max}	maximum frequency	CP0 or $\overline{CP1}$; see Figure 9								
		V_{CC} = 2.0 V	6.0	23	-	4.8	-	4.0	-	MHz
		V_{CC} = 4.5 V	30	70	-	24	-	20	-	MHz
		V_{CC} = 5.0 V; C_L = 15 pF	-	77	-	-	-	-	-	MHz
		V_{CC} = 6.0 V	25	83	-	28	-	24	-	MHz
C_{PD}	power dissipation capacitance	V_I = GND to V_{CC}; V_{CC} = 5 V; f_i = 1 MHz [3]	-	35	-	-	-	-	-	pF
74HCT4017-Q100										
t_{pd}	propagation delay	CP0 to Qn; CP0 to $\overline{Q5\text{-}9}$; see Figure 10 [1]								
		V_{CC} = 4.5 V	-	25	46	-	58	-	69	ns
		V_{CC} = 5.0 V; C_L = 15 pF	-	21	-	-	-	-	-	ns
		$\overline{CP1}$ to Qn; $\overline{CP1}$ to $\overline{Q5\text{-}9}$; see Figure 10								
		V_{CC} = 4.5 V	-	25	50	-	63	-	75	ns
		V_{CC} = 5.0 V; C_L = 15 pF	-	21	-	-	-	-	-	ns
t_{PHL}	HIGH to LOW propagation delay	MR to Q[1:9]; see Figure 10								
		V_{CC} = 4.5 V	-	22	46	-	58	-	69	ns
t_{PLH}	LOW to HIGH propagation delay	MR to $\overline{Q5\text{-}9}$, Q0; see Figure 10								
		V_{CC} = 4.5 V	-	20	46	-	58	-	69	ns

Table 7. Dynamic characteristics *...continued*

GND = 0 V; $t_r = t_f$ = 6 ns; C_L = 50 pF; see Figure 11.

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_t	transition time	see Figure 10 [2]								
		V_{CC} = 4.5 V	-	7	15	-	19	-	22	ns
t_W	pulse width	CP0 and $\overline{CP1}$ (HIGH or LOW); see Figure 9								
		V_{CC} = 4.5 V	16	7	-	20	-	24	-	ns
		MR (HIGH); see Figure 9								
		V_{CC} = 4.5 V	16	4	-	20	-	24	-	ns
t_{su}	set-up time	$\overline{CP1}$ to CP0; CP0 to $\overline{CP1}$; see Figure 8								
		V_{CC} = 4.5 V	10	–3	-	13	-	15	-	ns
t_h	hold time	$\overline{CP1}$ to CP0; CP0 to $\overline{CP1}$; see Figure 8								
		V_{CC} = 4.5 V	10	6	-	13	-	15	-	ns
t_{rec}	recovery time	MR to CP0 and MR to $\overline{CP1}$; see Figure 9								
		V_{CC} = 4.5 V	5	–5	-	5	-	5	-	ns
f_{max}	maximum frequency	CP0 or $\overline{CP1}$; see Figure 9								
		V_{CC} = 4.5 V	30	61	-	24	-	20	-	MHz
		V_{CC} = 5.0 V; C_L = 15 pF	-	67	-	-	-	-	-	MHz
C_{PD}	power dissipation capacitance	V_I = GND to V_{CC} – 1.5 V; V_{CC} = 5 V; f_i = 1 MHz [3]	-	36	-	-	-	-	-	pF

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

[2] t_t is the same as t_{THL} and t_{TLH}.

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

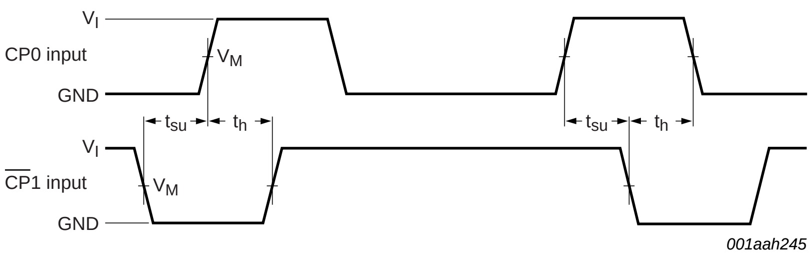
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\sum(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

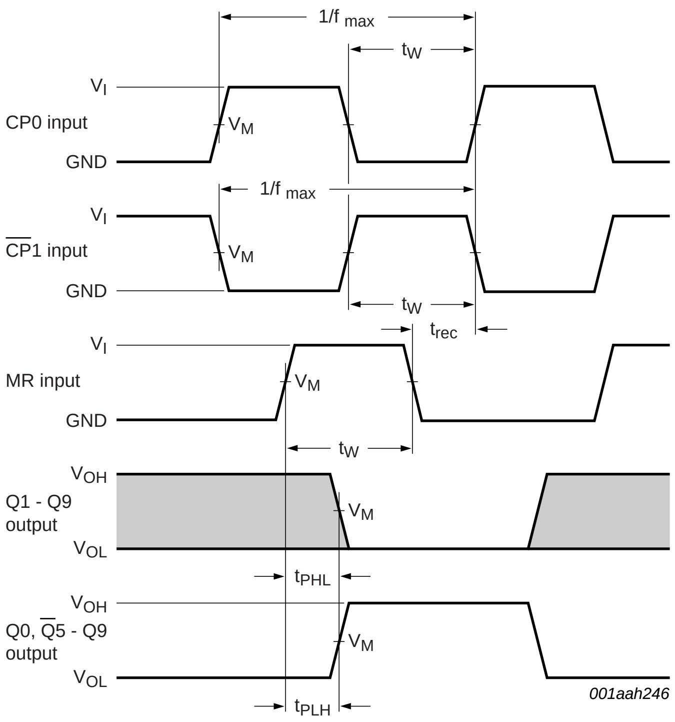
11. Waveforms



Measurement points are given in Table 8.

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

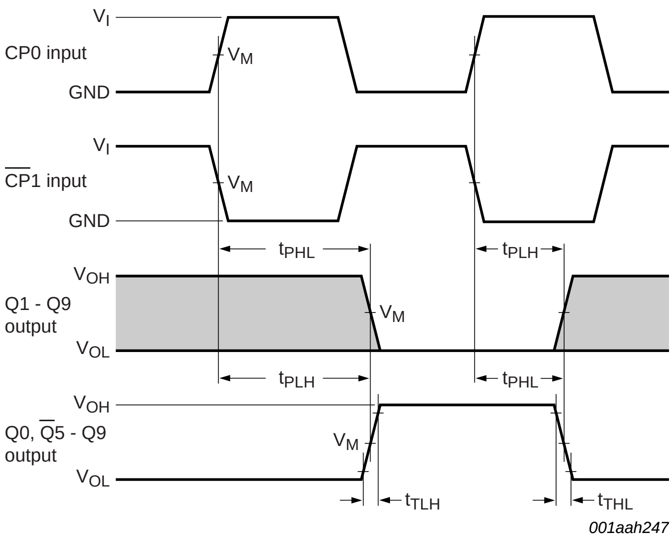
Fig 8. Waveforms showing the set-up and hold times for CP0 to $\overline{CP1}$ and $\overline{CP1}$ to CP0



Measurement points are given in Table 8.

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

Fig 9. Waveforms showing minimum pulse widths, maximum CP input frequencies, recovery times and output propagation delays



Measurement points are given in Table 8.

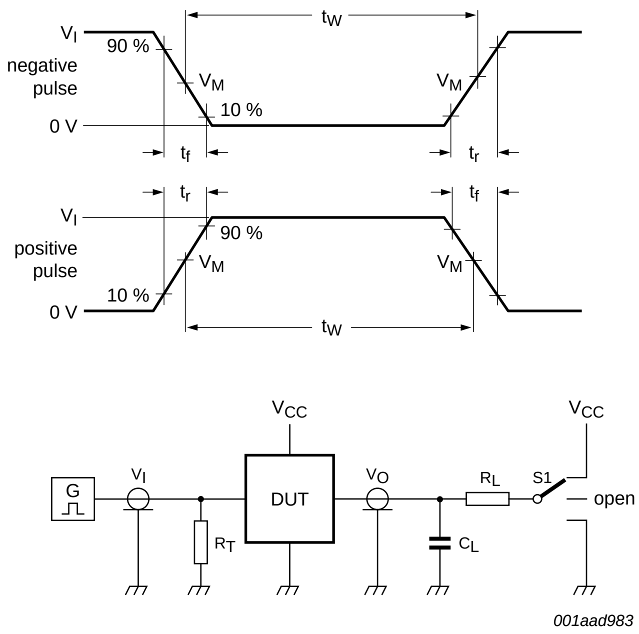
V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Conditions: $\overline{CP1}$ = LOW while CP0 is triggered on a LOW-to-HIGH transition and CP0 = HIGH, while $\overline{CP1}$ is triggered on a HIGH-to-LOW transition.

Fig 10. Waveforms showing propagation delays for CP to Qn outputs and output transition times

Table 8. Measurement points

Type	Input	Output
	V_M	V_M
74HC4017-Q100	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
74HCT4017-Q100	1.3 V	1.3 V



Test data is given in Table 9.

Definitions test circuit:

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

C_L = Load capacitance including jig and probe capacitance.

R_L = Load resistance.

S1 = Test selection switch.

Fig 11. Load circuitry for measuring switching times

Table 9. Test data

Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
74HC4017-Q100	V_{CC}	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V_{CC}
74HCT4017-Q100	3 V	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V_{CC}

12. Application information

Some examples of applications for the 74HC4017-Q100; 74HCT4017-Q100 are:

- Decade counter with decimal decoding
- 1 out of n decoding counter (when cascaded)
- Sequential controller
- Timer

Figure 12 shows a technique for extending the number of decoded output states for the 74HC4017-Q100; 74HCT4017-Q100. Decoded outputs are sequential within each stage and from stage to stage, with no dead time (except propagation delay).

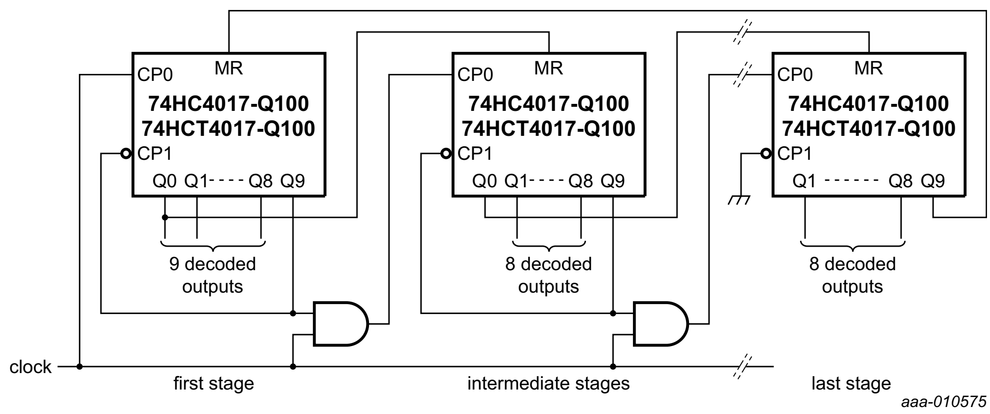


Fig 12. Counter expansion

Remark: Do not enable the counter on $\overline{CP1}$ when CP0 is HIGH, or on CP0 when $\overline{CP1}$ is LOW. It causes an extra count.

Figure 13 shows an example of a divide-by 2 through divide-by 10 circuit using one 74HC4017-Q100; 74HCT4017-Q100. Since the 74HC4017-Q100; 74HCT4017-Q100 has an asynchronous reset, the output pulse widths are narrow (minimum expected pulse width is 6 ns). The output pulse widths can be enlarged by inserting an RC network at the MR input.

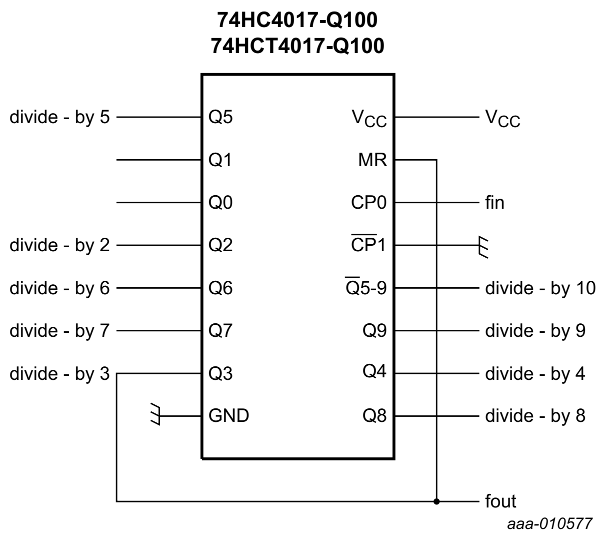
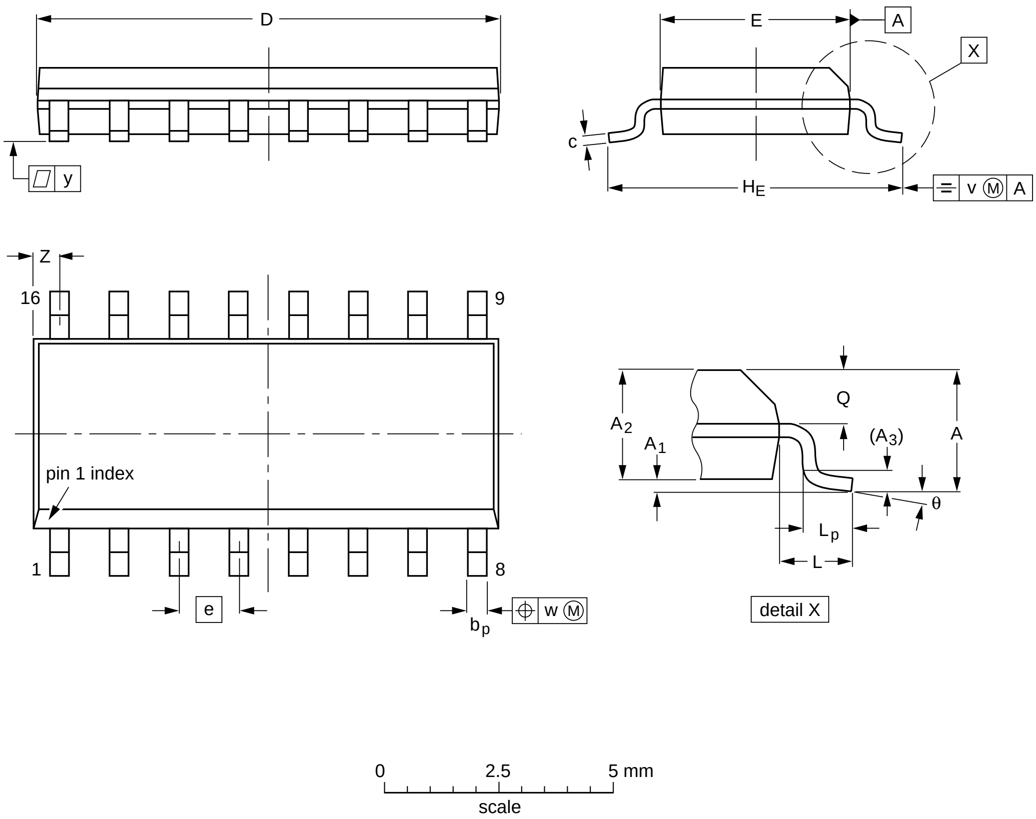


Fig 13. Divide-by 2 through divide-by 10

13. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

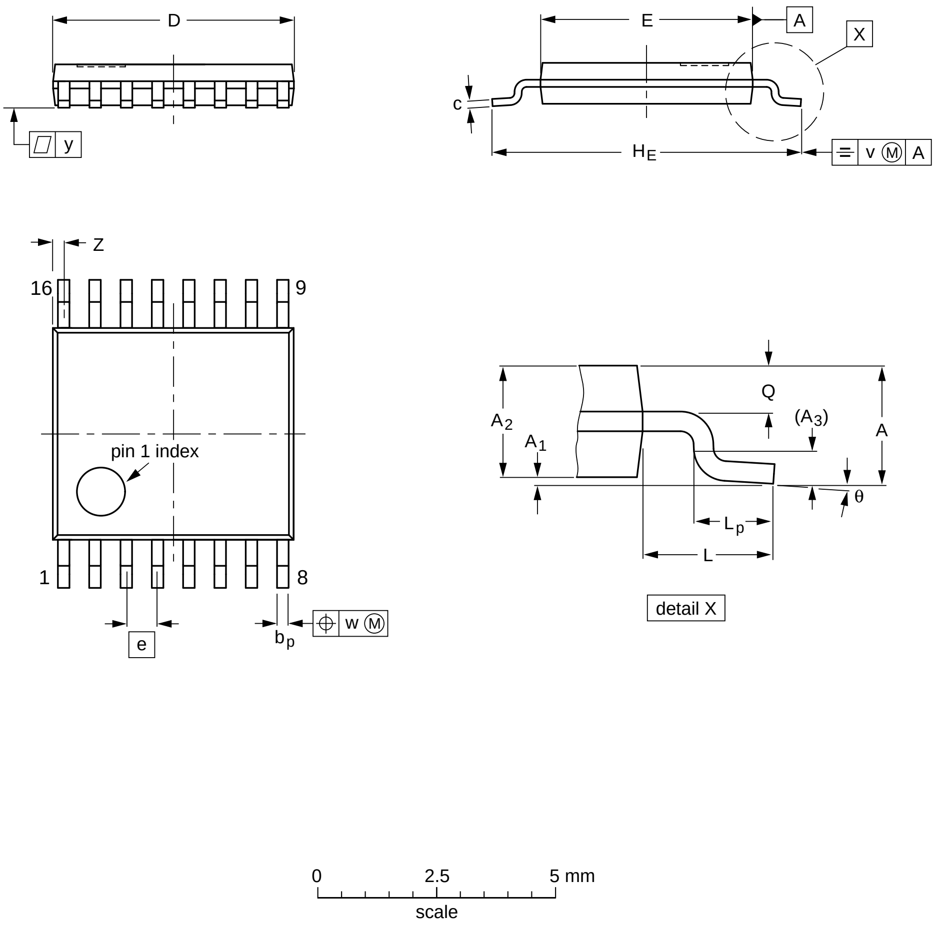
Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				~~99-12-27~~ 03-02-19

Fig 14. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm **SOT403-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (2)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.40 0.06	8^o 0^o

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

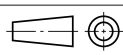
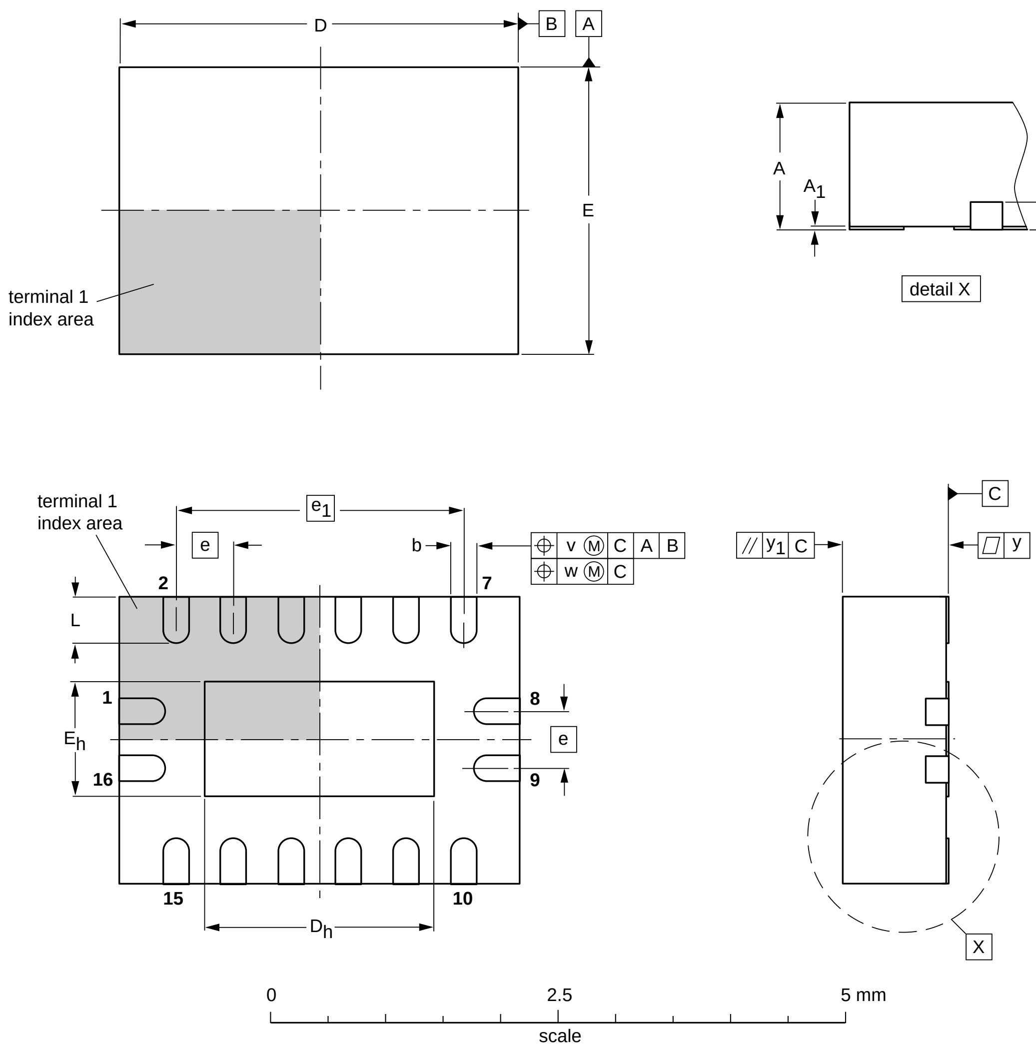
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT403-1		MO-153				~~99-12-27~~ 03-02-18

Fig 15. 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**



DIMENSIONS (mm are the original dimensions)

UNIT	$A^{(1)}$ max.	A_1	b	c	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	e_1	L	v	w	y	y_1
mm	1	0.05 0.00	0.30 0.18	0.2	3.6 3.4	2.15 1.85	2.6 2.4	1.15 0.85	0.5	2.5	0.5 0.3	0.1	0.05	0.05	0.1

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT763-1	- - -	MO-241	- - -			~~02-10-17~~ 03-01-27

Fig 16. Package outline SOT763-1 (DHVQFN16)

14. Abbreviations

Table 10. Abbreviations

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

15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4017_Q100 v.1	20140324	Product data sheet	-	-

16. Legal information

16.1 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.nxp.com.

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