

74HC4017; 74HCT4017

Johnson decade counter with 10 decoded outputs

Rev. 4 — 10 December 2013

Product data sheet

1. General description

The 74HC4017; 74HCT4017 is a 5-stage Johnson decade counter with 10 decoded outputs (Q_0 to Q_9), an output from the most significant flip-flop ($\overline{Q_5-9}$), two clock inputs (CP_0 and $\overline{CP_1}$) and an overriding asynchronous master reset input ($\overline{MR}$). The counter is advanced by either a LOW-to-HIGH transition at CP_0 while $\overline{CP_1}$ is LOW or a HIGH-to-LOW transition at $\overline{CP_1}$ while CP_0 is HIGH. When cascading counters, the $\overline{Q_5-9}$ output, which is LOW while the counter is in states 5, 6, 7, 8 and 9, can be used to drive the CP_0 input of the next counter. A HIGH on $\overline{MR}$ resets the counter to zero ($Q_0 = \overline{Q_5-9} = \text{HIGH}$; Q_1 to $Q_9 = \text{LOW}$) independent of the clock inputs (CP_0 and $\overline{CP_1}$). Automatic code correction of the counter is provided by an internal circuit: following any illegal code the counter returns to a proper counting mode within 11 clock pulses. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- Input levels:
 - ◆ For 74HC4017: CMOS level
 - ◆ For 74HCT4017: TTL level
- Complies with JEDEC standard no. 7 A
- ESD protection:
 - ◆ HBM JESD22-A114E exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$

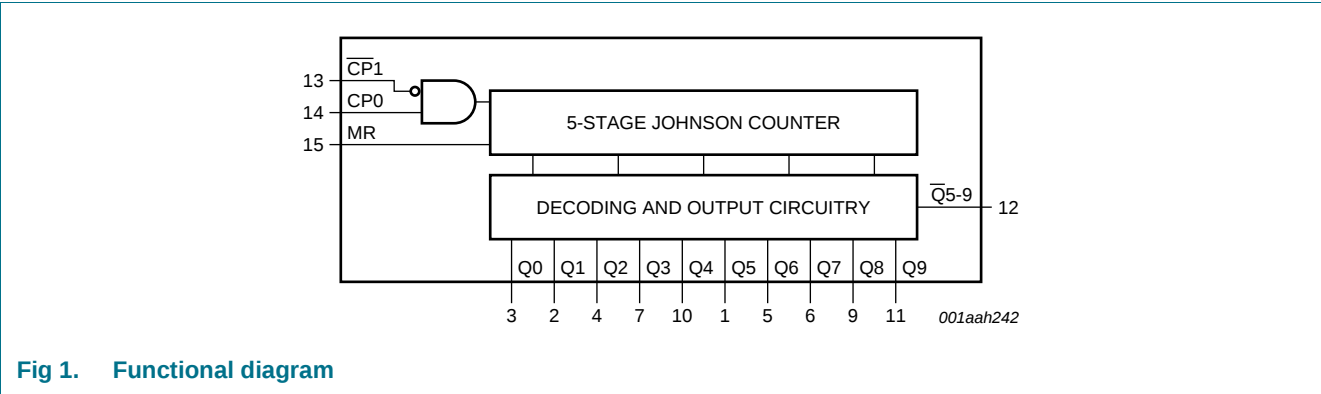


3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC4017				
74HC4017N	−40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil)	SOT38-4
74HC4017D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HC4017DB	−40 °C to +125 °C	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1
74HC4017PW	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74HC4017BQ	−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				
74HCT4017N	−40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil)	SOT38-4
74HCT4017D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT4017BQ	−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



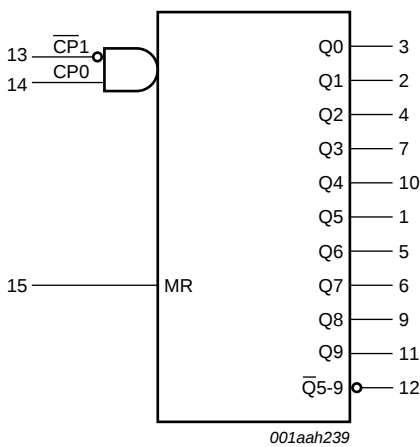


Fig 2. Logic symbol

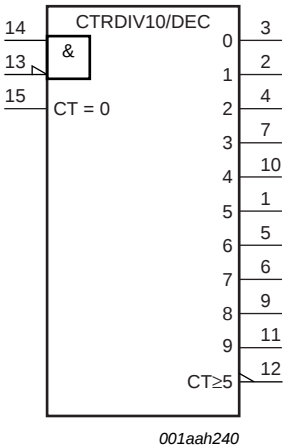


Fig 3. IEC logic symbol

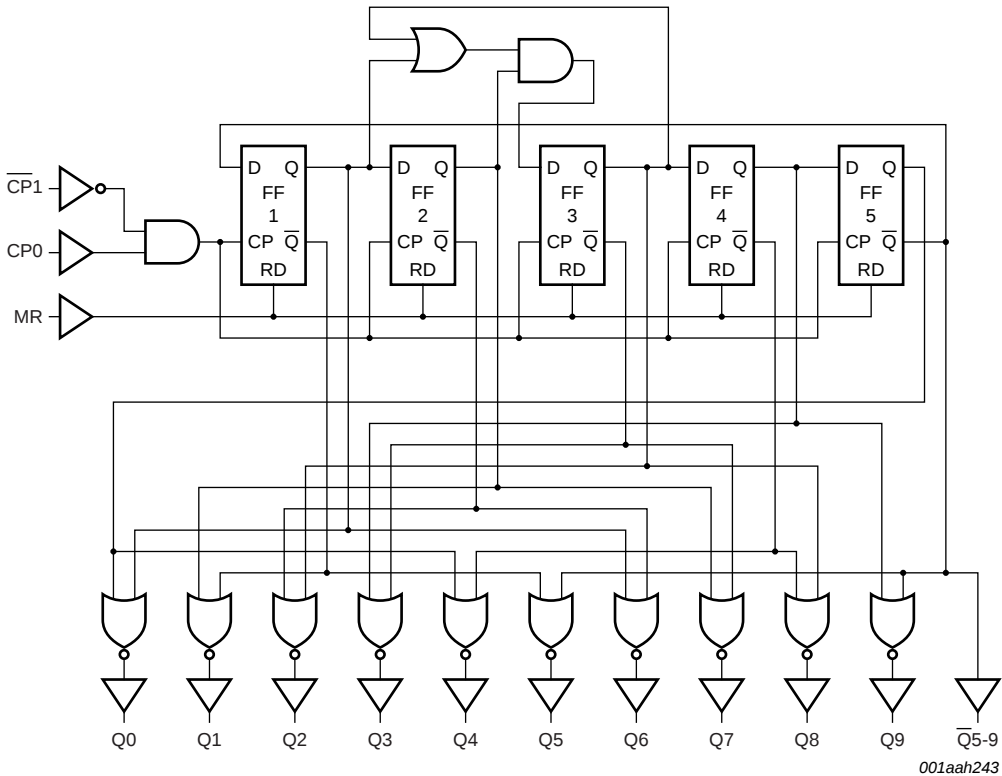


Fig 4. Logic diagram

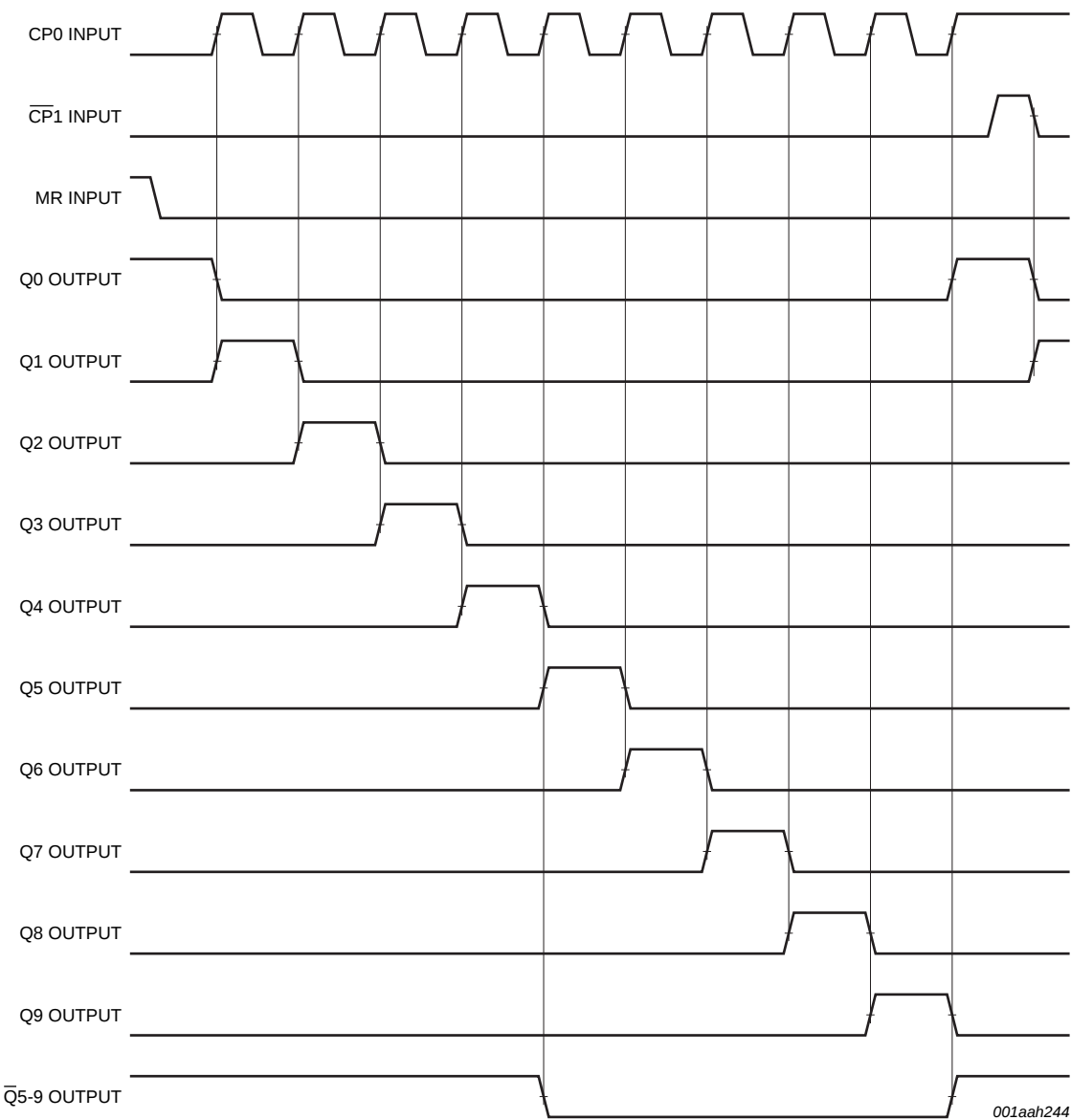


Fig 5. Timing diagram

5. Pinning information

5.1 Pinning

74HC4017
74HCT4017

Q5 1
Q1 2
Q0 3
Q2 4
Q6 5
Q7 6
Q3 7
GND 8
16 V_{CC}
15 MR
14 CP0
13 CP1
12 Q5-9
11 Q9
10 Q4
9 Q8

001aah238

74HC4017
74HCT4017

terminal 1 index area

Q5 1
Q1 2
Q0 3
Q2 4
Q6 5
Q7 6
Q3 7
GND 8
9 Q8
16 V_{CC}
15 MR
14 CP0
13 CP1
12 Q5-9
11 Q9
10 Q4

001aah241

Transparent top view

(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 6. Pin configuration DIP16, SO16 and (T)SSOP16

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	CP1	Operation
H	X	X	Q0 = $\overline{Q5-9}$ = 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			
	DIP16 package		^[2] -	750	mW
	SO16 package		^[3] -	500	mW
	(T)SSOP16 package		^[4] -	500	mW
	DHVQFN16 package		^[5] -	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 12 mW/K above 70 °C.
 [3] P_{tot} derates linearly with 8 mW/K above 70 °C.
 [4] P_{tot} derates linearly with 5.5 mW/K above 60 °C.
 [5] 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						
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	$V_{CC} = 2.0\text{ V}$	-	-	625	ns/V
		$V_{CC} = 4.5\text{ V}$	-	1.67	139	ns/V
		$V_{CC} = 6.0\text{ V}$	-	-	83	ns/V
T_{amb}	ambient temperature		-40	-	+125	°C
74HCT4017						
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	$V_{CC} = 4.5\text{ V}$	-	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										
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 µA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 µA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 µA; 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										
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 µA	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 µA	-	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
		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

$GND = 0\text{ V}$; $t_r = t_f = 6\text{ ns}$; $C_L = 50\text{ pF}$; 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										
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
		$\overline{CP}1$ to Qn; $\overline{CP}1$ 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 $\overline{CP}1$ (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 ...continuedGND = 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	$V_I = \text{GND}$ to V_{CC} ; $V_{CC} = 5$ V; $f_i = 1$ MHz	[3]	–	35	–	–	–	–	pF
74HCT4017										
t_{pd}	propagation delay	CP0 to Qn; CP0 to $\overline{Q5-9}$; [1] see Figure 10								
		$V_{CC} = 4.5$ V	–	25	46	–	58	–	69	ns
		$V_{CC} = 5.0$ V; $C_L = 15$ pF	–	21	–	–	–	–	–	ns
		$\overline{CP1}$ to Qn; $\overline{CP1}$ to $\overline{Q5-9}$; 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 $\overline{Q5-9}$, Q0; see Figure 10								
		$V_{CC} = 4.5$ V	–	20	46	–	58	–	69	ns

Table 7. Dynamic characteristics ...continuedGND = 0 V; $t_r = t_f = 6$ ns; $C_L = 50$ pF; see [Figure 11](#).

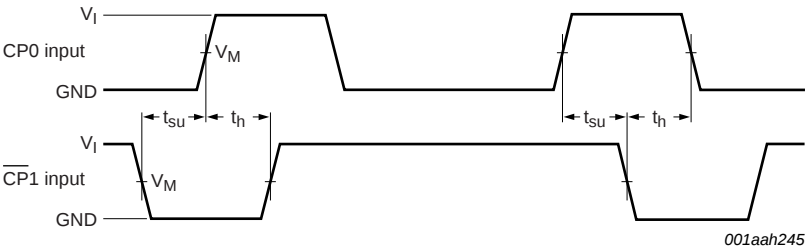
Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_t	transition time	see Figure 10 [2] $V_{CC} = 4.5$ V	-	7	15	-	19	-	22	ns
t_W	pulse width	CP0 and $\overline{CP1}$ (HIGH or LOW); see Figure 9 $V_{CC} = 4.5$ V	16	7	-	20	-	24	-	ns
		MR (HIGH);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

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

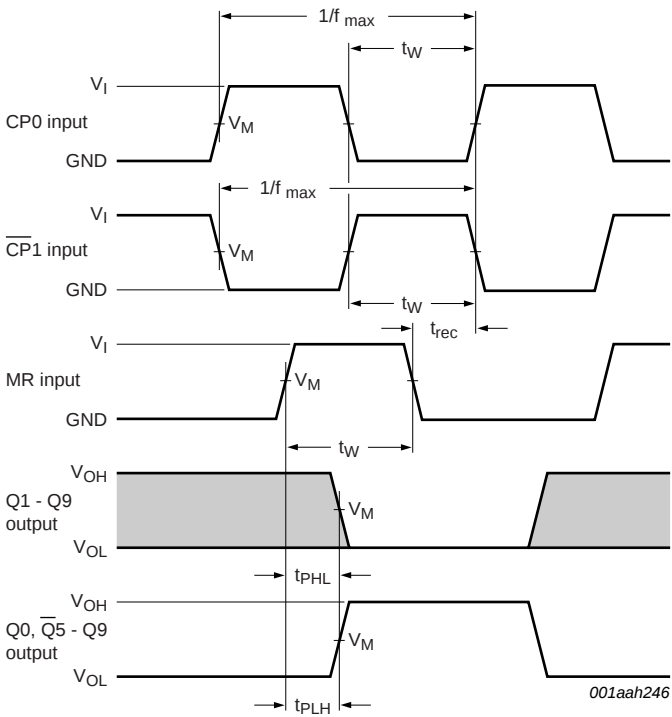
 f_i = input frequency in MHz; f_o = output frequency in MHz; C_L = output load capacitance in pF; V_{CC} = supply voltage in V; N = number of inputs switching; $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

11. Waveforms



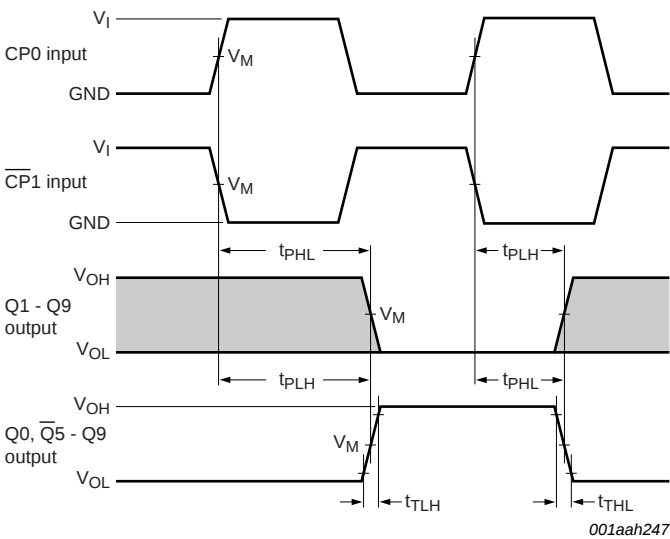
Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 8. Waveforms showing the set-up and hold times for CP0 to CP1 and 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 the minimum pulse width for CP0, CP1 and MR input; the maximum frequency for CP0 and CP1 input; the recovery time for MR and the MR input to Qn and Q5-9 output propagation delays

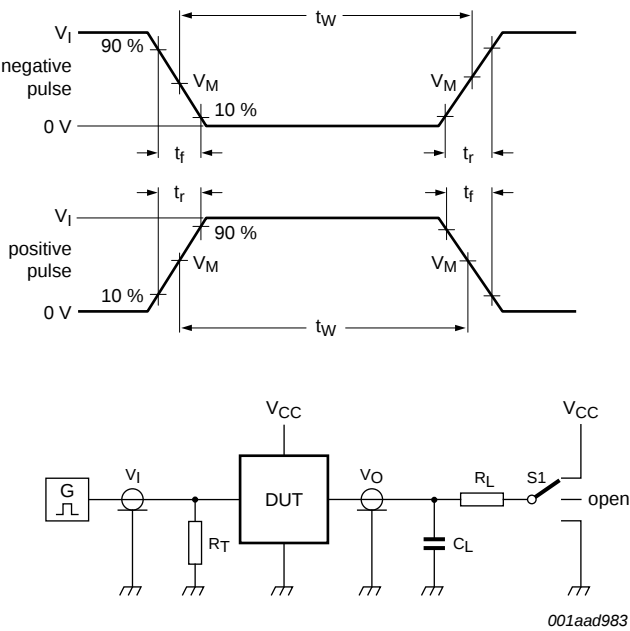


Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.
Conditions: $\overline{CP1}$ = LOW while CP0 is triggered on a LOW-to-HIGH transition and CP0 = HIGH, while $\overline{CP1}$ is triggered on a HIGH-to-LOW transition.

Fig 10. Waveforms showing the propagation delays for CP0, $\overline{CP1}$ to Qn, $\overline{Q5-9}$ outputs and the output transition times

Table 8. Measurement points

Type	Input	Output
	V_M	V_M
74HC4017	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
74HCT4017	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

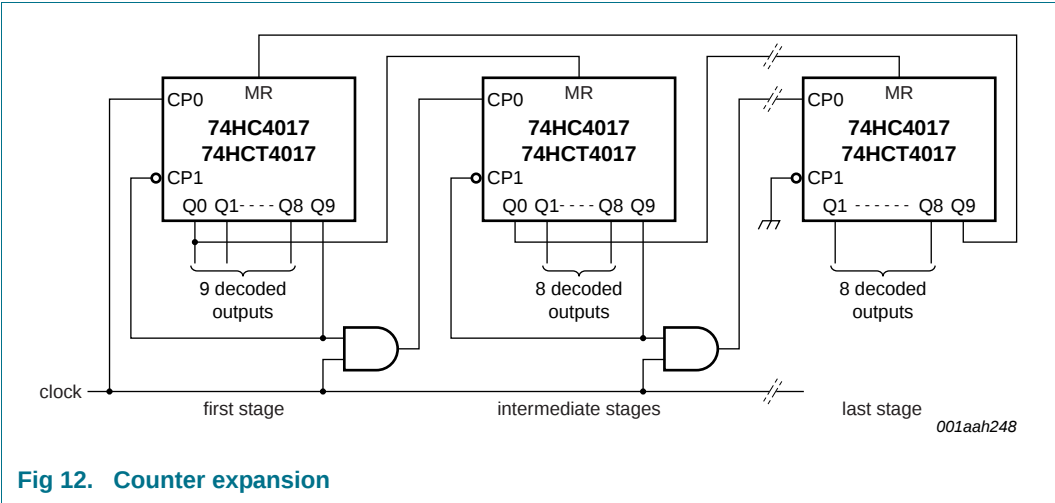
Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
74HC4017	V_{CC}	6 ns	15 pF, 50 pF	1 k Ω	open	GND	V_{CC}
74HCT4017	3 V	6 ns	15 pF, 50 pF	1 k Ω	open	GND	V_{CC}

12. Application information

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

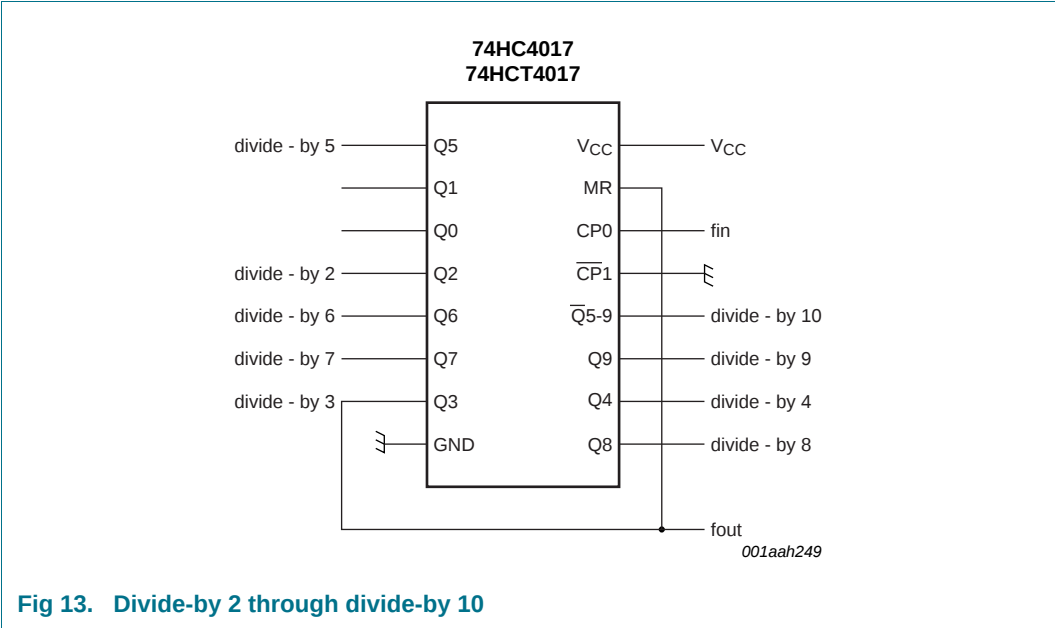
- Decade counter with decimal decoding
- 1 out of n decoding counter (when cascaded)
- Sequential controller
- Timer

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



Remark: It is essential not to enable the counter on $\overline{CP1}$ when CP0 is HIGH, or on CP0 when CP1 is LOW, as this would cause an extra count.

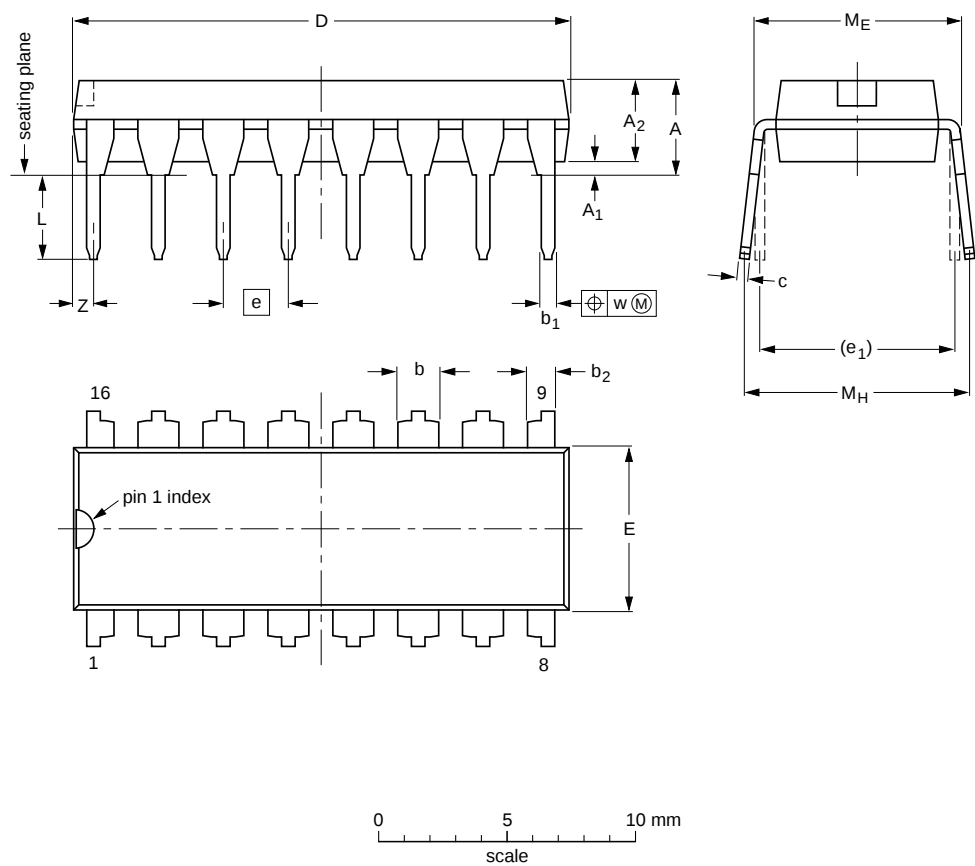
Figure 13 shows an example of a divide-by 2 through divide-by 10 circuit using one 74HC4017; 74HCT4017. Since the 74HC4017; 74HCT4017 has an asynchronous reset, the output pulse widths are narrow (minimum expected pulse width is 6 ns). The output pulse widths can be enlarged by inserting an RC network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



13. Package outline

DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4



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

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	b ₂	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	L	M _E	M _H	w	Z ⁽¹⁾ max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	1.25 0.85	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	0.76
inches	0.17	0.02	0.13	0.068 0.051	0.021 0.015	0.049 0.033	0.014 0.009	0.77 0.73	0.26 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.03

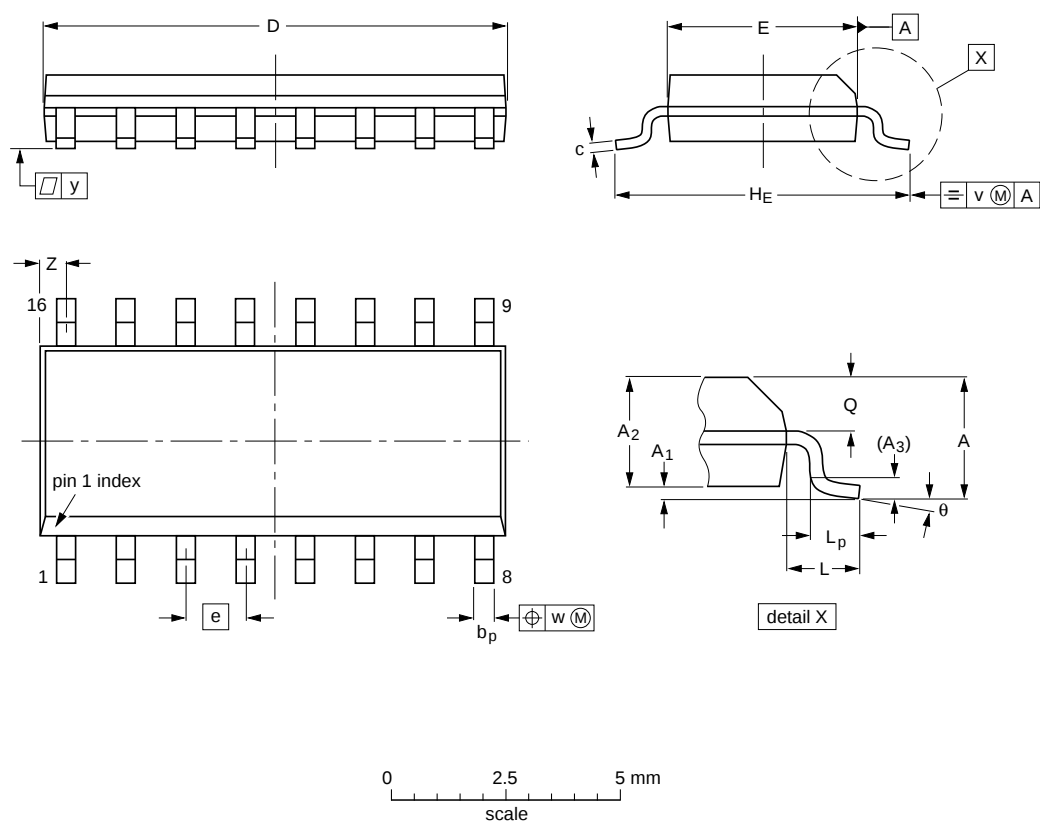
Note
1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT38-4						95-01-14 03-02-13

Fig 14. Package outline SOT38-4 (DIP16)

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 15. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

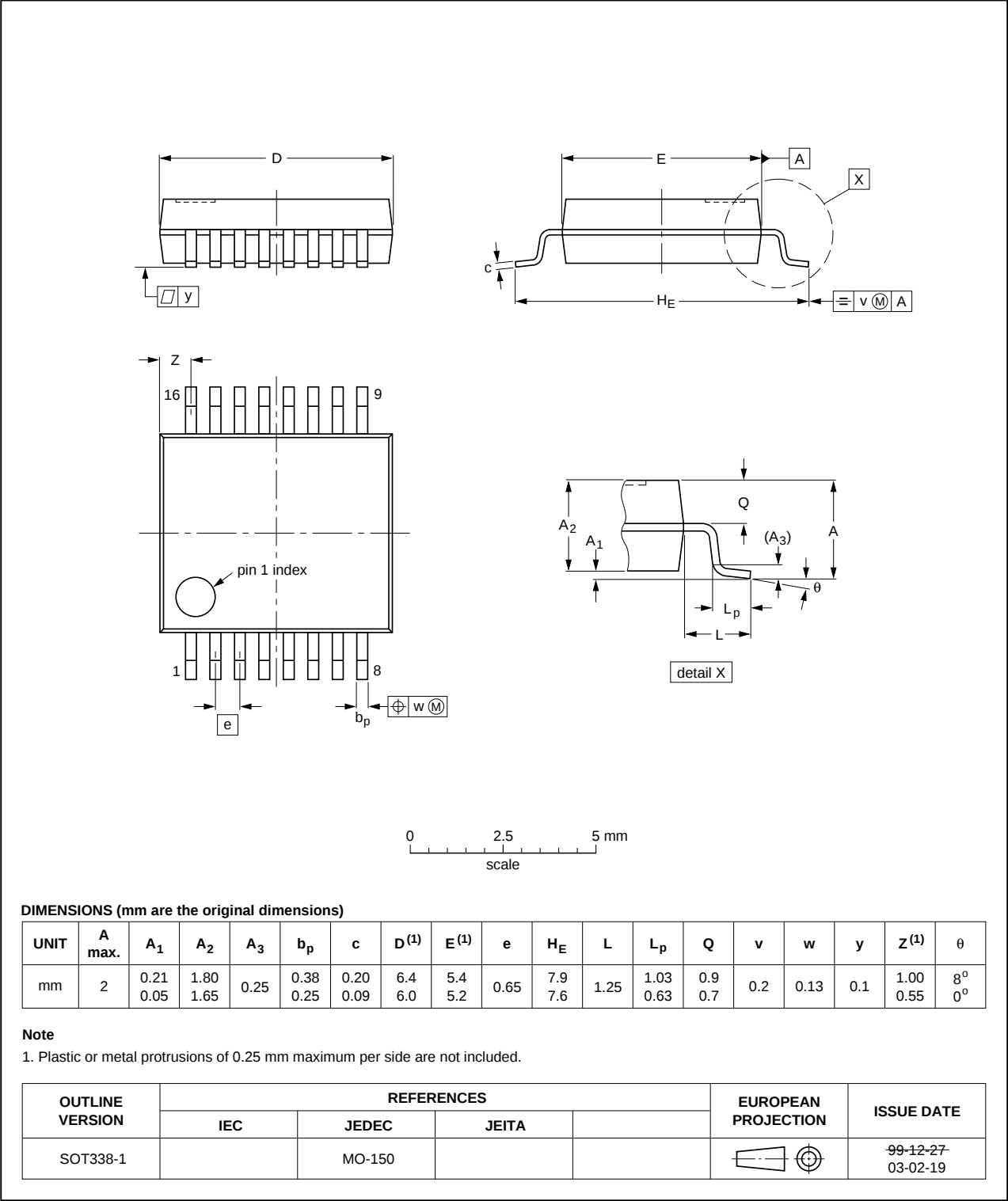


Fig 16. Package outline SOT338-1 (SSOP16)

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

SOT403-1

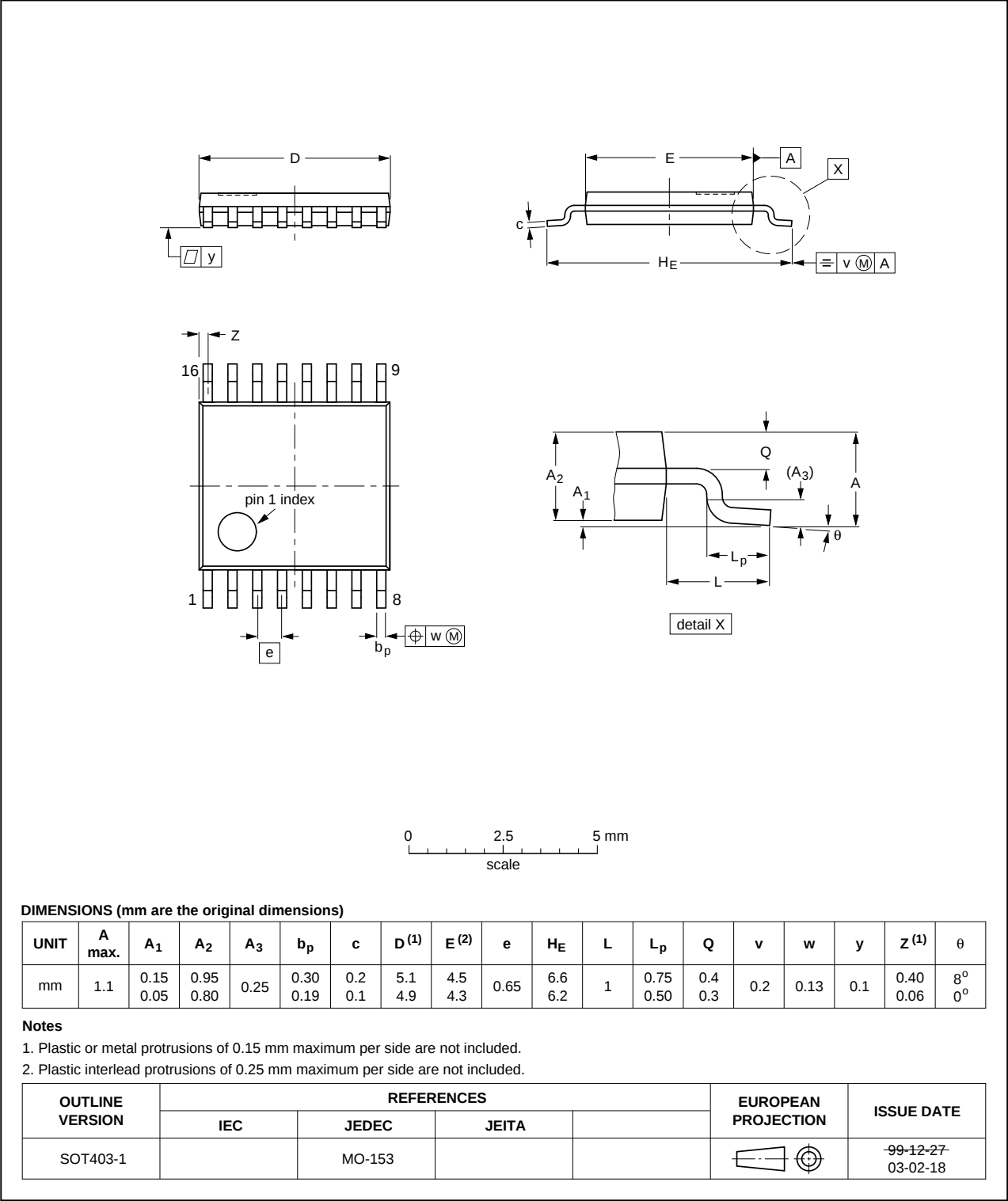


Fig 17. Package outline SOT403-1 (TSSOP16)

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

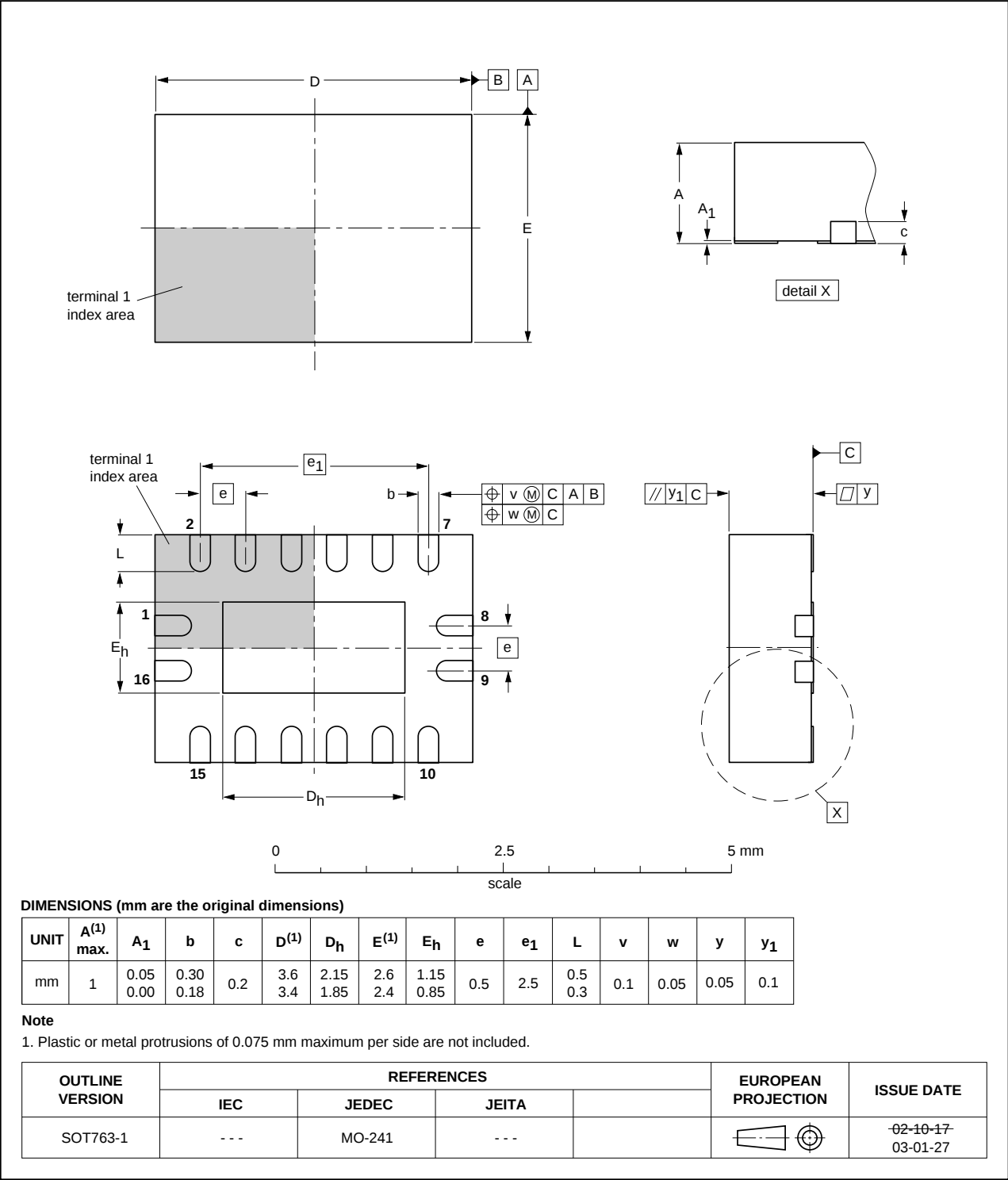


Fig 18. Package outline SOT763-1 (DHVQFN16)

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
TTL	Transistor-Transistor Logic

15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4017 v.4	20131210	Product data sheet	-	74HC_HCT4017 v.3
Modifications:	General description updated.			
74HC_HCT4017 v.3	20080108	Product data sheet	-	74HC_HCT4017_CNV v.2
Modifications:	- The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. - Legal texts have been adapted to the new company name where appropriate. Section 3: DHVQFN16 package added. Section 7: derating values added for DHVQFN16 package. Section 13: outline drawing added for DHVQFN16 package.			
74HC_HCT4017_CNV v.2	19970829	Product specification	-	-

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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