74AUP1G175-Q100

Low-power D-type flip-flop with reset; positive-edge trigger

Rev. 2 — 10 March 2017 **Product data sheet**

1 General description

The 74AUP1G175-Q100 provides a low-power, low-voltage positive-edge triggered D-type flip-flop with individual data (D) input, clock (CP) input, master reset ($\overline{MR}$) input, and Q output. The master reset ($\overline{MR}$) is an asynchronous active LOW input and operates independently of the clock input. Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The D input must be stable one set-up time prior to the LOW-to-HIGH clock transition, for predictable operation.

Schmitt trigger action at all inputs makes the circuit tolerant to slower input rise and fall times across the entire V_{CC} range from 0.8 V to 3.6 V. This device ensures a very low static and dynamic power consumption across the entire V_{CC} range from 0.8 V to 3.6 V.

This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

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 0.8 V to 3.6 V
- High noise immunity
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - MIL-STD-883, method 3015 Class 3A. Exceeds 5000 V
  - HBM JESD22-A114F Class 3A. Exceeds 5000 V
  - MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)
- Low static power consumption; I_{CC} = 0.9 μA (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of V_{CC}
- I_{OFF} circuitry provides partial Power-down mode operation

3 Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AUP1G175GW-Q100	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363

4 Marking

Table 2. Marking

Type number	Marking code [1]
74AUP1G175GW-Q100	aT

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5 Functional diagram

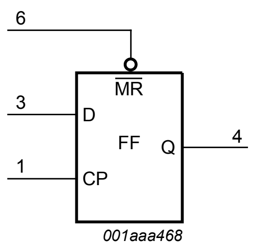


Figure 1. Logic symbol

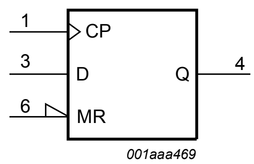


Figure 2. IEC logic symbol

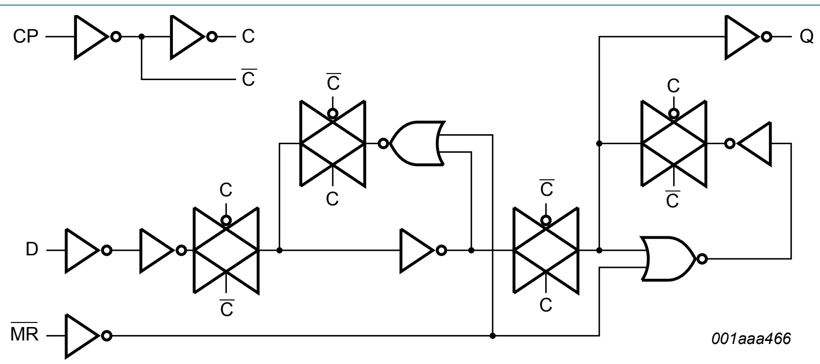


Figure 3. Logic diagram

6 Pinning information

6.1 Pinning

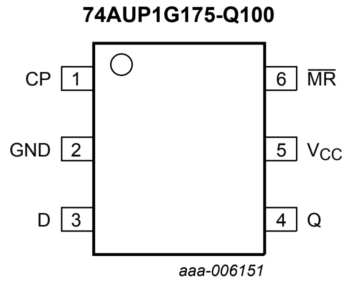


Figure 4. Pin configuration SOT363 (SC-88)

6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
CP	1	clock input (LOW-to-HIGH, edge-triggered)
GND	2	ground (0 V)
D	3	data input
Q	4	flip-flop output
V_{CC}	5	supply voltage
$\overline{MR}$	6	master reset input (active LOW)

7 Functional description

Table 4. Function table [1]

Operating mode	Input			Output
	$\overline{MR}$	CP	D	Q
Reset (clear)	L	X	X	L
Load '1'	H	↑	h	H
Load '0'	H	↑	l	L

[1] H = HIGH voltage level;
h = HIGH voltage level one set-up time prior to the LOW-to-HIGH CP transition;
L = LOW voltage level;
l = LOW voltage level one set-up time prior to the LOW-to-HIGH CP transition;
↑ = LOW-to-HIGH CP transition;
X = don't care.

8 Limiting values

Table 5. 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	+4.6	V
I_{IK}	input clamping current	$V_I < 0$ V	-50	-	mA
V_I	input voltage	[1]	-0.5	+4.6	V
I_{OK}	output clamping current	$V_O < 0$ V	-50	-	mA
V_O	output voltage	Active mode and Power-down mode [1]	-0.5	+4.6	V
I_O	output current	$V_O = 0$ V to V_{CC}	-	±20	mA
I_{CC}	supply current		-	50	mA
I_{GND}	ground current		-50	-	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	total power dissipation	T_{amb} = -40 °C to +125 °C [2]	-	250	mW

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

[2] For SC-88 packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.

9 Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		0.8	3.6	V
V_I	input voltage		0	3.6	V
V_O	output voltage	Active mode	0	V_{CC}	V
		Power-down mode; $V_{CC} = 0$ V	0	3.6	V
T_{amb}	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	V_{CC} = 0.8 V to 3.6 V	-	200	ns/V

10 Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 0.8 V	0.70 × V_{CC}	-	-	V
		V_{CC} = 0.9 V to 1.95 V	0.65 × V_{CC}	-	-	V
		V_{CC} = 2.3 V to 2.7 V	1.6	-	-	V
		V_{CC} = 3.0 V to 3.6 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 0.8 V	-	-	0.30 × V_{CC}	V
		V_{CC} = 0.9 V to 1.95 V	-	-	0.35 × V_{CC}	V
		V_{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V_{CC} = 3.0 V to 3.6 V	-	-	0.9	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}				
		I_O = -20 μA; V_{CC} = 0.8 V to 3.6 V	V_{CC} - 0.1	-	-	V
		I_O = -1.1 mA; V_{CC} = 1.1 V	0.75 × V_{CC}	-	-	V
		I_O = -1.7 mA; V_{CC} = 1.4 V	1.11	-	-	V
		I_O = -1.9 mA; V_{CC} = 1.65 V	1.32	-	-	V
		I_O = -2.3 mA; V_{CC} = 2.3 V	2.05	-	-	V
		I_O = -3.1 mA; V_{CC} = 2.3 V	1.9	-	-	V
		I_O = -2.7 mA; V_{CC} = 3.0 V	2.72	-	-	V
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.6	-	-	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}				
		I_O = 20 μA; V_{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I_O = 1.1 mA; V_{CC} = 1.1 V	-	-	0.3 × V_{CC}	V
		I_O = 1.7 mA; V_{CC} = 1.4 V	-	-	0.31	V
		I_O = 1.9 mA; V_{CC} = 1.65 V	-	-	0.31	V
		I_O = 2.3 mA; V_{CC} = 2.3 V	-	-	0.31	V
		I_O = 3.1 mA; V_{CC} = 2.3 V	-	-	0.44	V
		I_O = 2.7 mA; V_{CC} = 3.0 V	-	-	0.31	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	-	-	0.44	V
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	-	-	±0.1	μA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	-	-	±0.2	μA
ΔI_{OFF}	additional power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V to 0.2 V	-	-	±0.2	μA
I_{CC}	supply current	V_I = GND or V_{CC}; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	-	0.5	μA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V [1]	-	-	40	µA
C_I	input capacitance	$V_{CC} = 0$ V to 3.6 V; V_I = GND or V_{CC}	-	0.8	-	pF
C_O	output capacitance	V_O = GND; $V_{CC} = 0$ V	-	1.7	-	pF
$T_{amb} = -40$ °C to +85 °C						
V_{IH}	HIGH-level input voltage	$V_{CC} = 0.8$ V	0.70 × V_{CC}	-	-	V
		$V_{CC} = 0.9$ V to 1.95 V	0.65 × V_{CC}	-	-	V
		$V_{CC} = 2.3$ V to 2.7 V	1.6	-	-	V
		$V_{CC} = 3.0$ V to 3.6 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 0.8$ V	-	-	0.30 × V_{CC}	V
		$V_{CC} = 0.9$ V to 1.95 V	-	-	0.35 × V_{CC}	V
		$V_{CC} = 2.3$ V to 2.7 V	-	-	0.7	V
		$V_{CC} = 3.0$ V to 3.6 V	-	-	0.9	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -20$ µA; $V_{CC} = 0.8$ V to 3.6 V	$V_{CC} - 0.1$	-	-	V
		$I_O = -1.1$ mA; $V_{CC} = 1.1$ V	0.7 × V_{CC}	-	-	V
		$I_O = -1.7$ mA; $V_{CC} = 1.4$ V	1.03	-	-	V
		$I_O = -1.9$ mA; $V_{CC} = 1.65$ V	1.30	-	-	V
		$I_O = -2.3$ mA; $V_{CC} = 2.3$ V	1.97	-	-	V
		$I_O = -3.1$ mA; $V_{CC} = 2.3$ V	1.85	-	-	V
		$I_O = -2.7$ mA; $V_{CC} = 3.0$ V	2.67	-	-	V
		$I_O = -4.0$ mA; $V_{CC} = 3.0$ V	2.55	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 20$ µA; $V_{CC} = 0.8$ V to 3.6 V	-	-	0.1	V
		$I_O = 1.1$ mA; $V_{CC} = 1.1$ V	-	-	0.3 × V_{CC}	V
		$I_O = 1.7$ mA; $V_{CC} = 1.4$ V	-	-	0.37	V
		$I_O = 1.9$ mA; $V_{CC} = 1.65$ V	-	-	0.35	V
		$I_O = 2.3$ mA; $V_{CC} = 2.3$ V	-	-	0.33	V
		$I_O = 3.1$ mA; $V_{CC} = 2.3$ V	-	-	0.45	V
		$I_O = 2.7$ mA; $V_{CC} = 3.0$ V	-	-	0.33	V
		$I_O = 4.0$ mA; $V_{CC} = 3.0$ V	-	-	0.45	V
I_I	input leakage current	V_I = GND to 3.6 V; $V_{CC} = 0$ V to 3.6 V	-	-	±0.5	µA
I_{OFF}	power-off leakage current	V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.5	µA
ΔI_{OFF}	additional power-off leakage current	V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.6	µA
I_{CC}	supply current	V_I = GND or V_{CC}; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	0.9	µA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V [1]	-	-	50	µA
$T_{amb} = -40$ °C to +125 °C						
V_{IH}	HIGH-level input voltage	$V_{CC} = 0.8$ V	0.75 × V_{CC}	-	-	V
		$V_{CC} = 0.9$ V to 1.95 V	0.70 × V_{CC}	-	-	V
		$V_{CC} = 2.3$ V to 2.7 V	1.6	-	-	V
		$V_{CC} = 3.0$ V to 3.6 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 0.8$ V	-	-	0.25 × V_{CC}	V
		$V_{CC} = 0.9$ V to 1.95 V	-	-	0.30 × V_{CC}	V
		$V_{CC} = 2.3$ V to 2.7 V	-	-	0.7	V
		$V_{CC} = 3.0$ V to 3.6 V	-	-	0.9	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -20$ µA; $V_{CC} = 0.8$ V to 3.6 V	$V_{CC} - 0.11$	-	-	V
		$I_O = -1.1$ mA; $V_{CC} = 1.1$ V	0.6 × V_{CC}	-	-	V
		$I_O = -1.7$ mA; $V_{CC} = 1.4$ V	0.93	-	-	V
		$I_O = -1.9$ mA; $V_{CC} = 1.65$ V	1.17	-	-	V
		$I_O = -2.3$ mA; $V_{CC} = 2.3$ V	1.77	-	-	V
		$I_O = -3.1$ mA; $V_{CC} = 2.3$ V	1.67	-	-	V
		$I_O = -2.7$ mA; $V_{CC} = 3.0$ V	2.40	-	-	V
		$I_O = -4.0$ mA; $V_{CC} = 3.0$ V	2.30	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 20$ µA; $V_{CC} = 0.8$ V to 3.6 V	-	-	0.11	V
		$I_O = 1.1$ mA; $V_{CC} = 1.1$ V	-	-	0.33 × V_{CC}	V
		$I_O = 1.7$ mA; $V_{CC} = 1.4$ V	-	-	0.41	V
		$I_O = 1.9$ mA; $V_{CC} = 1.65$ V	-	-	0.39	V
		$I_O = 2.3$ mA; $V_{CC} = 2.3$ V	-	-	0.36	V
		$I_O = 3.1$ mA; $V_{CC} = 2.3$ V	-	-	0.50	V
		$I_O = 2.7$ mA; $V_{CC} = 3.0$ V	-	-	0.36	V
		$I_O = 4.0$ mA; $V_{CC} = 3.0$ V	-	-	0.50	V
I_I	input leakage current	V_I = GND to 3.6 V; $V_{CC} = 0$ V to 3.6 V	-	-	±0.75	µA
I_{OFF}	power-off leakage current	V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.75	µA
ΔI_{OFF}	additional power-off leakage current	V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.75	µA
I_{CC}	supply current	V_I = GND or V_{CC}; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	1.4	µA
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V [1]	-	-	75	µA

[1] One input at $V_{CC} - 0.6$ V, other input at V_{CC} or GND.

11 Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 7.

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C_L = 5 pF									
t_{pd}	propagation delay	CP to Q; see Figure 5 [2]							
		V_{CC} = 0.8 V	-	21.1	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.4	5.9	11.7	2.2	11.9	12.0	ns
		V_{CC} = 1.4 V to 1.6 V	2.0	4.1	6.8	1.8	7.3	7.6	ns
		V_{CC} = 1.65 V to 1.95 V	1.6	3.3	5.4	1.3	5.9	6.2	ns
		V_{CC} = 2.3 V to 2.7 V	1.3	2.5	3.6	1.1	4.0	4.2	ns
		V_{CC} = 3.0 V to 3.6 V	1.2	2.1	2.9	1.0	3.3	3.5	ns
		$\overline{MR}$ to Q; see Figure 6 [2]							
		V_{CC} = 0.8 V	-	17.4	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.4	5.2	9.7	2.2	10.0	12.0	ns
		V_{CC} = 1.4 V to 1.6 V	2.3	3.8	5.2	2.1	6.4	6.6	ns
		V_{CC} = 1.65 V to 1.95 V	1.8	3.1	4.9	1.7	5.4	5.6	ns
		V_{CC} = 2.3 V to 2.7 V	1.8	2.6	3.6	1.5	4.0	4.0	ns
		V_{CC} = 3.0 V to 3.6 V	1.6	2.4	3.1	1.3	3.3	3.6	ns
f_{max}	maximum frequency	CP; see Figure 5							
		V_{CC} = 0.8 V	-	50	-	-	-	-	MHz
		V_{CC} = 1.1 V to 1.3 V	-	200	-	170	-	-	MHz
		V_{CC} = 1.4 V to 1.6 V	-	345	-	310	-	-	MHz
		V_{CC} = 1.65 V to 1.95 V	-	435	-	400	-	-	MHz
		V_{CC} = 2.3 V to 2.7 V	-	550	-	490	-	-	MHz
		V_{CC} = 3.0 V to 3.6 V	-	615	-	550	-	-	MHz
C_L = 10 pF									
t_{pd}	propagation delay	CP to Q; see Figure 5 [2]							
		V_{CC} = 0.8 V	-	24.7	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.6	6.8	13.3	2.4	13.6	13.6	ns
		V_{CC} = 1.4 V to 1.6 V	2.3	4.8	7.9	2.0	8.4	8.7	ns
		V_{CC} = 1.65 V to 1.95 V	2.1	3.9	6.1	1.8	6.6	6.9	ns
		V_{CC} = 2.3 V to 2.7 V	1.7	3.0	4.3	1.5	4.7	5.0	ns
		V_{CC} = 3.0 V to 3.6 V	1.6	2.7	3.6	1.3	4.0	4.2	ns
		$\overline{MR}$ to Q; see Figure 6 [2]							
		V_{CC} = 0.8 V	-	21.0	-	-	-	-	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
		V_{CC} = 1.1 V to 1.3 V	2.6	6.2	11.5	2.6	11.7	13.6	ns
		V_{CC} = 1.4 V to 1.6 V	2.5	4.4	6.1	2.4	7.6	7.8	ns
		V_{CC} = 1.65 V to 1.95 V	2.5	3.7	5.7	2.2	6.3	6.3	ns
		V_{CC} = 2.3 V to 2.7 V	2.1	3.2	4.3	1.9	4.7	4.9	ns
		V_{CC} = 3.0 V to 3.6 V	2.0	3.0	3.9	1.8	4.1	4.3	ns
f_{max}	maximum frequency	CP; see Figure 5							
		V_{CC} = 0.8 V	-	50	-	-	-	-	MHz
		V_{CC} = 1.1 V to 1.3 V	-	190	-	150	-	-	MHz
		V_{CC} = 1.4 V to 1.6 V	-	320	-	280	-	-	MHz
		V_{CC} = 1.65 V to 1.95 V	-	420	-	310	-	-	MHz
		V_{CC} = 2.3 V to 2.7 V	-	485	-	370	-	-	MHz
		V_{CC} = 3.0 V to 3.6 V	-	550	-	410	-	-	MHz
C_L = 15 pF									
t_{pd}	propagation delay	CP to Q; see Figure 5 [2]							
		V_{CC} = 0.8 V	-	28.1	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.0	7.6	14.8	2.8	15.2	15.4	ns
		V_{CC} = 1.4 V to 1.6 V	2.7	5.3	8.7	2.3	9.4	9.9	ns
		V_{CC} = 1.65 V to 1.95 V	2.3	4.4	6.8	2.1	7.4	7.9	ns
		V_{CC} = 2.3 V to 2.7 V	2.1	3.5	5.0	1.9	5.3	5.6	ns
		V_{CC} = 3.0 V to 3.6 V	2.0	3.1	4.3	1.7	4.7	4.9	ns
		$\overline{MR}$ to Q; see Figure 6 [2]							
		V_{CC} = 0.8 V	-	24.6	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.2	7.0	13.2	2.9	13.5	15.2	ns
		V_{CC} = 1.4 V to 1.6 V	3.1	5.0	6.8	2.6	8.6	9.1	ns
		V_{CC} = 1.65 V to 1.95 V	2.5	4.3	6.5	2.5	7.2	7.4	ns
		V_{CC} = 2.3 V to 2.7 V	2.6	3.7	5.0	2.2	5.4	5.5	ns
		V_{CC} = 3.0 V to 3.6 V	2.4	3.5	4.4	2.1	4.8	5.0	ns
f_{max}	maximum frequency	CP; see Figure 5							
		V_{CC} = 0.8 V	-	50	-	-	-	-	MHz
		V_{CC} = 1.1 V to 1.3 V	-	180	-	120	-	-	MHz
		V_{CC} = 1.4 V to 1.6 V	-	300	-	190	-	-	MHz
		V_{CC} = 1.65 V to 1.95 V	-	405	-	240	-	-	MHz
		V_{CC} = 2.3 V to 2.7 V	-	420	-	300	-	-	MHz
		V_{CC} = 3.0 V to 3.6 V	-	480	-	320	-	-	MHz
C_L = 30 pF									

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
t_{pd}	propagation delay	CP to Q; see Figure 5 [2]							
		V_{CC} = 0.8 V	-	38.4	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.6	9.8	19.5	3.4	20.6	21.0	ns
		V_{CC} = 1.4 V to 1.6 V	3.3	6.9	11.2	3.2	12.4	13.0	ns
		V_{CC} = 1.65 V to 1.95 V	3.1	5.7	8.8	2.9	9.6	10.2	ns
		V_{CC} = 2.3 V to 2.7 V	3.0	4.6	6.4	2.6	6.9	7.3	ns
		V_{CC} = 3.0 V to 3.6 V	2.8	4.2	5.7	2.5	6.5	6.9	ns
		$\overline{MR}$ to Q; see Figure 6 [2]							
		V_{CC} = 0.8 V	-	35.1	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.9	9.3	18.0	3.7	18.6	19.8	ns
		V_{CC} = 1.4 V to 1.6 V	3.9	6.6	8.9	3.6	11.6	12.2	ns
		V_{CC} = 1.65 V to 1.95 V	3.6	5.6	8.6	3.4	9.6	9.7	ns
		V_{CC} = 2.3 V to 2.7 V	3.5	4.8	6.4	2.9	7.2	7.2	ns
		V_{CC} = 3.0 V to 3.6 V	3.3	4.6	5.7	3.1	6.4	6.9	ns
f_{max}	maximum frequency	CP; see Figure 5							
		V_{CC} = 0.8 V	-	35	-	-	-	-	MHz
		V_{CC} = 1.1 V to 1.3 V	-	130	-	70	-	-	MHz
		V_{CC} = 1.4 V to 1.6 V	-	200	-	120	-	-	MHz
		V_{CC} = 1.65 V to 1.95 V	-	240	-	150	-	-	MHz
		V_{CC} = 2.3 V to 2.7 V	-	275	-	190	-	-	MHz
		V_{CC} = 3.0 V to 3.6 V	-	300	-	200	-	-	MHz
C_L = 5 pF, 10 pF, 15 pF and 30 pF									
t_W	pulse width	CP; HIGH or LOW; see Figure 5							
		V_{CC} = 0.8 V	-	5.25	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	-	1.6	-	1.5	-	-	ns
		V_{CC} = 1.4 V to 1.6 V	-	1.0	-	0.9	-	-	ns
		V_{CC} = 1.65 V to 1.95 V	-	0.75	-	0.7	-	-	ns
		V_{CC} = 2.3 V to 2.7 V	-	0.6	-	0.4	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	-	0.55	-	0.4	-	-	ns
		$\overline{MR}$; LOW; see Figure 6							
		V_{CC} = 0.8 V	-	9.0	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	-	3.0	-	4.9	-	-	ns
		V_{CC} = 1.4 V to 1.6 V	-	1.75	-	2.5	-	-	ns
		V_{CC} = 1.65 V to 1.95 V	-	1.35	-	1.8	-	-	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
		V_{CC} = 2.3 V to 2.7 V	-	0.9	-	1.1	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	-	0.8	-	0.8	-	-	ns
t_{rec}	recovery time	$\overline{MR}$; see Figure 6							
		V_{CC} = 0.8 V	-	-	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	-	-1.1	-	-1.2	-	-	ns
		V_{CC} = 1.4 V to 1.6 V	-	-2.0	-	-0.8	-	-	ns
		V_{CC} = 1.65 V to 1.95 V	-	-0.5	-	-0.7	-	-	ns
		V_{CC} = 2.3 V to 2.7 V	-	-0.9	-	-0.4	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	-	-1.0	-	-0.2	-	-	ns
$t_{su(H)}$	set-up time HIGH	D to CP; see Figure 5							
		V_{CC} = 0.8 V	-	-	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	-	0.5	-	1.2	-	-	ns
		V_{CC} = 1.4 V to 1.6 V	-	0.4	-	0.8	-	-	ns
		V_{CC} = 1.65 V to 1.95 V	-	0.3	-	0.6	-	-	ns
		V_{CC} = 2.3 V to 2.7 V	-	0.3	-	0.5	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	-	0.2	-	0.5	-	-	ns
$t_{su(L)}$	set-up time LOW	D to CP; see Figure 5							
		V_{CC} = 0.8 V	-	-	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	-	0.8	-	1.7	-	-	ns
		V_{CC} = 1.4 V to 1.6 V	-	0.6	-	1.1	-	-	ns
		V_{CC} = 1.65 V to 1.95 V	-	0.4	-	0.9	-	-	ns
		V_{CC} = 2.3 V to 2.7 V	-	0.4	-	0.9	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	-	0.5	-	0.9	-	-	ns
t_h	hold time	D to CP; see Figure 5							
		V_{CC} = 0.8 V	-	-	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V	-	-0.7	-	0.2	-	-	ns
		V_{CC} = 1.4 V to 1.6 V	-	-0.5	-	0	-	-	ns
		V_{CC} = 1.65 V to 1.95 V	-	-0.5	-	0	-	-	ns
		V_{CC} = 2.3 V to 2.7 V	-	-0.3	-	0	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	-	-0.4	-	0	-	-	ns
C_{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC} [3]							
		V_{CC} = 0.8 V	-	1.6	-	-	-	-	pF
		V_{CC} = 1.1 V to 1.3 V	-	1.7	-	-	-	-	pF
		V_{CC} = 1.4 V to 1.6 V	-	1.8	-	-	-	-	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
		V_{CC} = 1.65 V to 1.95 V	-	1.9	-	-	-	-	pF
		V_{CC} = 2.3 V to 2.7 V	-	2.2	-	-	-	-	pF
		V_{CC} = 3.0 V to 3.6 V	-	2.7	-	-	-	-	pF

[1] All typical values are measured at nominal V_{CC}.

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

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

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

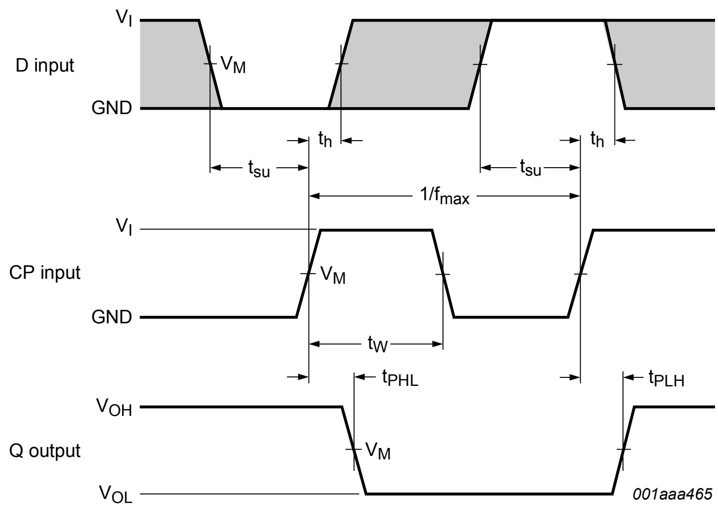
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

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

11.1 Waveforms and test circuit

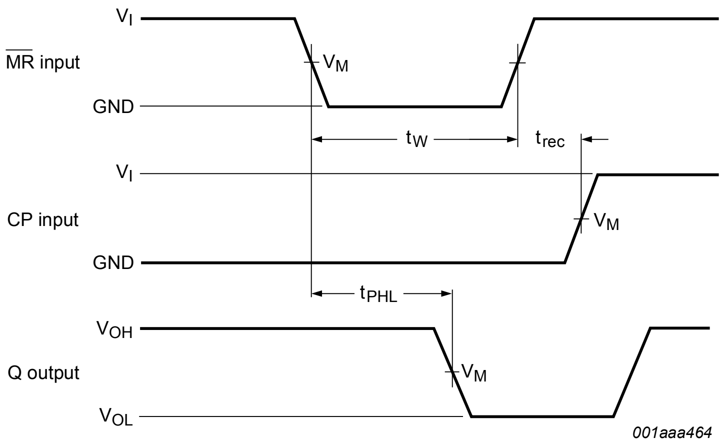


Measurement points are given in Table 9.

The shaded areas indicate when the input is permitted to change for predictable output performance.

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

Figure 5. The clock input (CP) to output (Q) propagation delays, the clock pulse width, the D to CP set-up, the CP to D hold times and the maximum input clock frequency



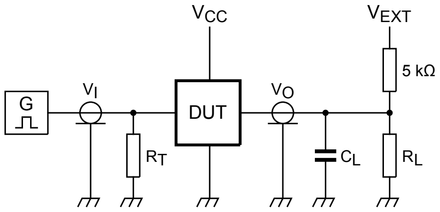
Measurement points are given in Table 9.

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

Figure 6. The master reset ($\overline{MR}$) input to output (Q) propagation delays, the master reset pulse width and the $\overline{MR}$ to CP recovery time

Table 9. Measurement points

Supply voltage	Output	Input		
V_{CC}	V_M	V_M	V_I	$t_r = t_f$
0.8 V to 3.6 V	0.5 × V_{CC}	0.5 × V_{CC}	V_{CC}	≤ 3.0 ns



Test data is given in Table 10.

Definitions for test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

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

V_{EXT} = External voltage for measuring switching times.

Figure 7. Test circuit for measuring switching times

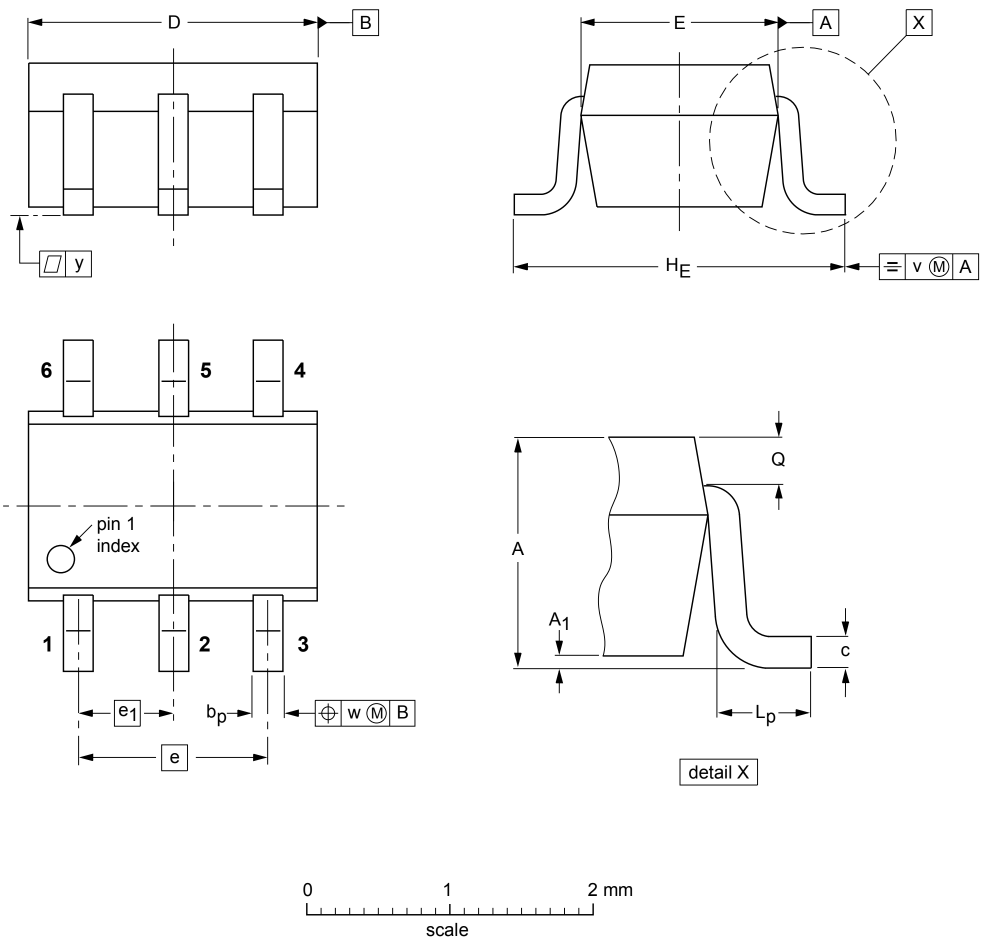
Table 10. Test data

Supply voltage	Load		V_{EXT}		
V_{CC}	C_L	R_L [1]	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ	open	GND	2 × V_{CC}

[1] For measuring enable and disable times R_L = 5 kΩ, for measuring propagation delays, setup and hold times and pulse width R_L = 1 MΩ.

12 Package outline

Plastic surface-mounted package; 6 leads **SOT363**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.30 0.20	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT363			SC-88			~~04-11-08~~ 06-03-16

Figure 8. Package outline SOT363 (SC-88)

13 Abbreviations

Table 11. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MIL	Military
MM	Machine Model

14 Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP1G175_Q100 v.2	20170310	Product data sheet	-	74AUP1G175_Q100 v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
74AUP1G175_Q100 v.1	20130131	Product data sheet	-	-

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