# 74AUP1G04-Q100

# Low-power inverter

Rev. 4.1 — 11 July 2023

**Product data sheet** 

### 1. General description

The 74AUP1G04-Q100 is a single inverter.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times across the entire VCC 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
- · CMOS low power dissipation
- 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 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
- Low static power consumption; I<sub>CC</sub> = 0.9 μA (maximum)
- Latch-up performance exceeds 100 mA per JESD 78B Class II
- Overvoltage tolerant inputs to 3.6 V
- Low noise overshoot and undershoot < 10 % of V<sub>CC</sub>
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 3A exceeds 5000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

# 3. Ordering information

#### Table 1. Ordering information

Type number	Package						
	Temperature range	Name	Description	Version			
74AUP1G04GV-Q100	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753			
74AUP1G04GW-Q100	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1			



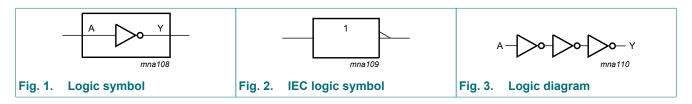
# 4. Marking

### Table 2. Marking

Type number	Marking code[1]
74AUP1G04GV-Q100	p04
74AUP1G04GW-Q100	pC

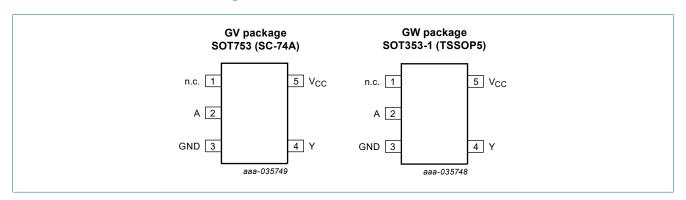
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

# 5. Functional diagram



## 6. Pinning information

### 6.1. Pinning



### 6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
n.c.	1	not connected
A	2	data input
GND	3	ground (0 V)
Υ	4	data output
V <sub>CC</sub>	5	supply voltage

# 7. Functional description

#### **Table 4. Function table**

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level.$ 

Input	Output
A	Υ
L	Н
Н	L

# 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 <sub>CC</sub>	supply voltage		-0.5	+4.6	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-50	-	mA
VI	input voltage	[1]	-0.5	+4.6	V
I <sub>OK</sub>	output clamping current	$V_{O} < 0 V$	-50	-	mA
Vo	output voltage	active mode [1]	-0.5	V <sub>CC</sub> + 0.5	V
		power-down mode; $V_{CC} = 0 \text{ V}$ [1]	-0.5	+4.6	V
Io	output current	$V_O = 0 V \text{ to } V_{CC}$	-	± 20	mA
I <sub>CC</sub>	supply current		-	+50	mA
I <sub>GND</sub>	ground current		-50	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40  ^{\circ}\text{C} \text{ to } +125  ^{\circ}\text{C}$ [2]	-	250	mW

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

# 9. Recommended operating conditions

### Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		0.8	3.6	V
VI	input voltage		0	3.6	V
Vo	output voltage	active mode	0	V <sub>CC</sub>	V
		power-down mode; V <sub>CC</sub> = 0 V	0	3.6	V
T <sub>amb</sub>	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 0.8 V to 3.6 V	0	200	ns/V

<sup>[2]</sup> For SOT353-1 (TSSOP5) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C. For SOT753 (SC-74A) package: P<sub>tot</sub> derates linearly with 3.8 mW/K above 85 °C.

# 10. Static characteristics

#### **Table 7. Static characteristics**

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = 2	5 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.70×V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.65×V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.30×V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35×V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	$I_{O}$ = -20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.75×V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.11	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.32	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	2.05	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.72	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.6	-	-	V
V <sub>OL</sub>	LOW-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	$I_{O}$ = 20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3×V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.31	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.31	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.31	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.44	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.31	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.44	V
l <sub>l</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	± 0.1	μΑ
l <sub>OFF</sub>	power-off leakage current	$V_{I}$ or $V_{O} = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	± 0.2	μΑ
ΔI <sub>OFF</sub>	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	μΑ
I <sub>CC</sub>	supply current	$V_I$ = GND or $V_{CC}$ ; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.5	μA
ΔI <sub>CC</sub>	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	40	μA
Cı	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V; } V_I = \text{GND or } V_{CC}$	-	0.8	-	pF
Co	output capacitance	$V_O = GND; V_{CC} = 0 V$	-	1.7	-	pF

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -	40 °C to +85 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.70×V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.65×V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.30×V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35×V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	$I_{O}$ = -20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.7×V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.03	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.30	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.97	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.85	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.67	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.55	-	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_{O}$ = 20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3×V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.37	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.35	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.33	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.33	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.45	V
l <sub>l</sub>	input leakage current	$V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	± 0.5	μΑ
I <sub>OFF</sub>	power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	± 0.5	μΑ
ΔI <sub>OFF</sub>	additional power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	± 0.6	μΑ
I <sub>CC</sub>	supply current	$V_{I}$ = GND or $V_{CC}$ ; $I_{O}$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.9	μΑ
ΔI <sub>CC</sub>	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	50	μΑ
T <sub>amb</sub> = -	40 °C to +125 °C		<b>'</b>		l	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.75×V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.70×V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.25×V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.30×V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V <sub>OH</sub>	HIGH-level output	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
	voltage	I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.11	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.6×V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	0.93	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.17	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.77	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.67	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.40	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.30	-	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.11	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.33×V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.41	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.39	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.36	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.50	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.50	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	± 0.75	μA
I <sub>OFF</sub>	power-off leakage current	$V_{I}$ or $V_{O} = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	± 0.75	μΑ
ΔI <sub>OFF</sub>	additional power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	± 0.75	μΑ
I <sub>CC</sub>	supply current	$V_{I}$ = GND or $V_{CC}$ ; $I_{O}$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	1.4	μA
$\Delta I_{CC}$	additional supply current	$V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	75	μΑ

# 11. Dynamic characteristics

### **Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit			
T <sub>amb</sub> = 2	T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 5 pF								
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4 [2]							
		V <sub>CC</sub> = 0.8 V	-	16.0	-	ns			
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	5.0	10.3	ns			
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.8	3.6	6.4	ns			
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	2.9	5.0	ns			
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	2.4	3.9	ns			
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	2.1	3.2	ns			

Symbol	Parameter	Conditions		Min	Typ[1]	Max	Unit
T <sub>amb</sub> = 2	25 °C; C <sub>L</sub> = 10 pF	,	-		•	-	'
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	[2]				
		V <sub>CC</sub> = 0.8 V		-	19.8	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V		2.8	5.9	12.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V		2.3	4.2	7.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V		2.0	3.5	5.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V		1.7	2.9	4.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V		1.6	2.7	3.8	ns
T <sub>amb</sub> = 2	25 °C; C <sub>L</sub> = 15 pF						'
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	[2]				
		V <sub>CC</sub> = 0.8 V		-	23.3	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V		3.2	6.7	13.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V		2.6	4.7	8.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V		2.3	4.0	6.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V		2.1	3.3	5.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V		2.0	3.1	4.2	ns
T <sub>amb</sub> = 2	25 °C; C <sub>L</sub> = 30 pF	,			•		'
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	[2]				
		V <sub>CC</sub> = 0.8 V		-	33.6	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V		4.4	8.9	16.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V		3.6	6.3	10.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V		3.2	5.3	9.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V		2.9	4.5	6.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V		2.9	4.2	5.4	ns
T <sub>amb</sub> = 2	25 °C						
C <sub>PD</sub>	power dissipation	$f = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$	[3]				
	capacitance	V <sub>CC</sub> = 0.8 V		-	2.5	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V		-	2.7	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V		-	2.8	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V		-	3.0	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V		-	3.5	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V		-	4.0	-	pF
	1	4			1	I .	

<sup>[1]</sup> All typical values are measured at nominal  $V_{CC}$ .

f<sub>i</sub> = input frequency in MHz;

 $f_o$  = output frequency in MHz;

 $C_L$  = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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

 <sup>[2]</sup> t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
 [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).
 P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + ∑(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> x f<sub>o</sub>) where:

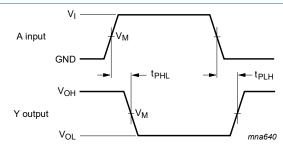
**Table 9. Dynamic characteristics** 

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5

Symbol	mbol Parameter Conditions	Conditions	-40 °C 1	-40 °C to +85 °C		-40 °C to +125 °C	
			Min	Max	Min	Max	
C <sub>L</sub> = 5 p	F				-		
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	1]				
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.1	11.4	2.1	12.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.6	7.4	1.6	8.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	5.9	1.4	6.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.1	4.5	1.1	5.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	3.9	1.0	4.3	ns
C <sub>L</sub> = 10	pF			<u>'</u>	1		
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	1]				
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.6	13.7	2.6	15.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.1	8.7	2.1	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.8	7.0	1.8	7.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.5	5.4	1.5	6.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.4	4.5	1.4	5.0	ns
C <sub>L</sub> = 15	pF						
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	1]				
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.0	15.8	3.0	17.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.4	10.0	2.4	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	8.0	2.1	8.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	6.1	1.8	6.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.8	5.0	1.8	5.5	ns
C <sub>L</sub> = 30	pF						
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4	1]				
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.0	19.0	4.0	20.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.2	12.9	3.2	14.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.9	10.5	2.9	11.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.6	7.6	2.6	8.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.6	6.2	2.6	6.9	ns

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

### 11.1. Waveform and test circuit



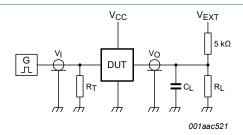
Measurement points are given in Table 10.

Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

Fig. 4. The data input (A) to output (Y) propagation delays

**Table 10. Measurement points** 

Supply voltage	Output	Input		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>I</sub>	$t_r = t_f$
0.8 V to 3.6 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 3.0 ns



Test data is given in Table 11.

Definitions for test circuit:

R<sub>L</sub> = Load resistance;

C<sub>L</sub> = Load capacitance including jig and probe capacitance;

 $R_T$  = Termination resistance should be equal to the output impedance  $Z_0$  of the pulse generator;

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

Fig. 5. Test circuit for measuring switching times

Table 11. Test data

Supply voltage	Load		Load V <sub>EXT</sub>		
V <sub>CC</sub>	CL	R <sub>L</sub> [1]	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
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 <sub>CC</sub>

[1] For measuring enable and disable times  $R_L$  = 5  $k\Omega.$ 

For measuring propagation delays, setup and hold times and pulse width  $R_L$  = 1  $M\Omega$ .

# 12. Package outline

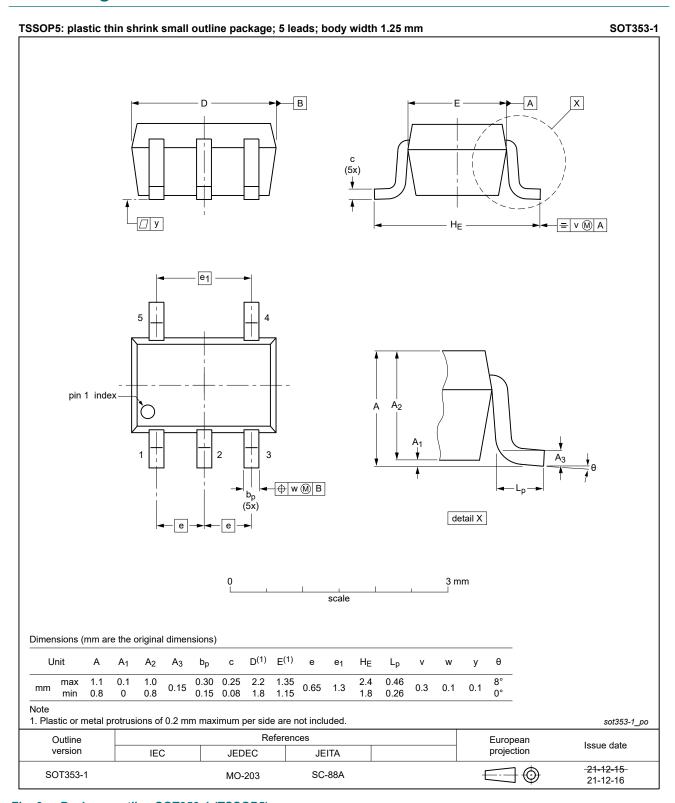


Fig. 6. Package outline SOT353-1 (TSSOP5)

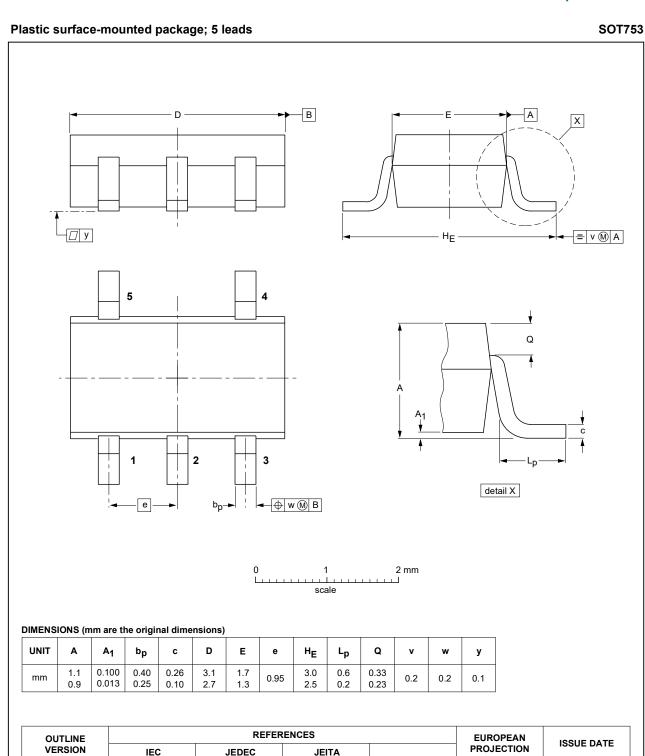


Fig. 7. Package outline SOT753 (SC-74A)

SOT753

SC-74A

02-04-16

06-03-16

 $\bigoplus \bigoplus$ 

## 13. Abbreviations

#### **Table 12. Abbreviations**

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model

# 14. Revision history

### **Table 13. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP1G04_Q100 v.4.1	20230711	Product data sheet	-	74AUP1G04_Q100 v.3
Modifications:	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.			
74AUP1G04_Q100 v.3	20220113	Product data sheet	-	74AUP1G04_Q100 v.2
Modifications:	<ul> <li>Section 1 and Section 2 updated.</li> <li>Fig. 6: Package outline drawing for SOT353-1(TSSOP5) has changed.</li> </ul>			
74AUP1G04_Q100 v.2	20210430	Product data sheet	-	74AUP1G04_Q100 v.1
Modifications:	<ul> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Table 5: Derating values for P<sub>tot</sub> total power dissipation have been updated.</li> </ul>			
74AUP1G04_Q100 v.1	20131118	Product data sheet	-	-

## 15. Legal information

#### **Data sheet status**

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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