

74AHC2G08-Q100; 74AHCT2G08-Q100

Dual 2-input AND gate

Rev. 4 — 21 March 2018

Product data sheet

1 General description

The 74AHC2G08-Q100 and 74AHCT2G08-Q100 are high-speed Si-gate CMOS devices.

They provide two 2-input AND gates.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

The AHCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

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
- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- Multiple package options
- 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)

3 Ordering information

Table 1. Ordering information

| Type number | Package | | | |
|-------------------|-------------------|--------|---|----------|
| | Temperature range | Name | Description | Version |
| 74AHC2G08DP-Q100 | -40 °C to +125 °C | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm | SOT505-2 |
| 74AHCT2G08DP-Q100 | | | | |
| 74AHC2G08DC-Q100 | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm | SOT765-1 |
| 74AHCT2G08DC-Q100 | | | | |

4 Marking

Table 2. Marking

| Type number | Marking code ^[1] |
|-------------------|-----------------------------|
| 74AHC2G08DP-Q100 | A08 |
| 74AHCT2G08DP-Q100 | C08 |
| 74AHC2G08DC-Q100 | A08 |
| 74AHCT2G08DC-Q100 | C08 |

[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

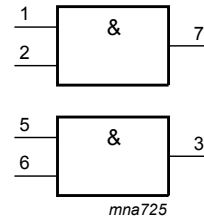


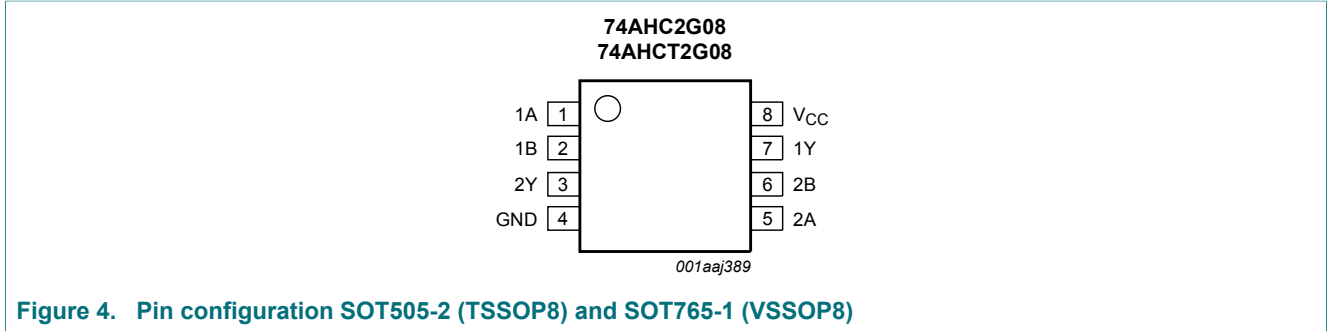
Figure 2. IEC logic symbol



Figure 3. Logic diagram (one gate)

6 Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|-----------------|------|----------------|
| 1A, 2A | 1, 5 | data input |
| 1B, 2B | 2, 6 | data input |
| GND | 4 | ground (0 V) |
| 1Y, 2Y | 7, 3 | data output |
| V _{CC} | 8 | supply voltage |

7 Functional description

Table 4. Function table

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

| Input | | Output |
|-------|----|--------|
| nA | nB | nY |
| L | L | L |
| L | H | L |
| H | L | L |
| H | H | H |

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 | +7.0 | V |
| V_I | input voltage | | -0.5 | +7.0 | V |
| I_{IK} | input clamping current | $V_I < -0.5$ 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 | | - | 75 | mA |
| I_{GND} | ground current | | -75 | - | 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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT505-2 package: above 96 °C the value of P_{tot} derates linearly with 4.6 mW/K.
For SOT765-1 package: above 99 °C the value of P_{tot} derates linearly with 4.9 mW/K.

9 Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | 74AHC2G08-Q100 | | | 74AHCT2G08-Q100 | | | Unit |
|---------------------|-------------------------------------|------------------------------|----------------|-----|----------|-----------------|-----|----------|------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| V_{CC} | supply voltage | | 2.0 | 5.0 | 5.5 | 4.5 | 5.0 | 5.5 | V |
| V_I | input voltage | | 0 | - | 5.5 | 0 | - | 5.5 | V |
| V_O | output voltage | | 0 | - | V_{CC} | 0 | - | V_{CC} | V |
| T_{amb} | ambient temperature | | -40 | +25 | +125 | -40 | +25 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 3.3$ V ± 0.3 V | - | - | 100 | - | - | - | ns/V |
| | | $V_{CC} = 5.0$ V ± 0.5 V | - | - | 20 | - | - | 20 | ns/V |

10 Static characteristics

Table 7. Static characteristics

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 | |
| 74AHC2G08-Q100 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 2.0 V | 1.5 | - | - | 1.5 | - | 1.5 | - | V |
| | | V _{CC} = 3.0 V | 2.1 | - | - | 2.1 | - | 2.1 | - | V |
| | | V _{CC} = 5.5 V | 3.85 | - | - | 3.85 | - | 3.85 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
| | | V _{CC} = 3.0 V | - | - | 0.9 | - | 0.9 | - | 0.9 | V |
| | | V _{CC} = 5.5 V | - | - | 1.65 | - | 1.65 | - | 1.65 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | | | |
| | | I _O = -50 µA; V _{CC} = 2.0 V | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | I _O = -50 µA; V _{CC} = 3.0 V | 2.9 | 3.0 | - | 2.9 | - | 2.9 | - | V |
| | | I _O = -50 µA; V _{CC} = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -4.0 mA; V _{CC} = 3.0 V | 2.58 | - | - | 2.48 | - | 2.40 | - | V |
| | | I _O = -8.0 mA; V _{CC} = 4.5 V | 3.94 | - | - | 3.8 | - | 3.70 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | | | |
| | | I _O = 50 µA; V _{CC} = 2.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 3.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 4.0 mA; V _{CC} = 3.0 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| | | I _O = 8.0 mA; V _{CC} = 4.5 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | 0.1 | - | 1.0 | - | 2.0 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.0 | - | 10 | - | 40 | µA |
| C _I | input capacitance | | - | 1.5 | 10 | - | 10 | - | 10 | pF |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|------------------------|---------------------------|--|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHCT2G08-Q100 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 4.5 V to 5.5 V | 2.0 | - | - | 2.0 | - | 2.0 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 4.5 V to 5.5 V | - | - | 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 = -50 µA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -8.0 mA | 3.94 | - | - | 3.8 | - | 3.70 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = 50 µA | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 8.0 mA | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | 0.1 | - | 1.0 | - | 2.0 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.0 | - | 10 | - | 40 | µA |
| ΔI _{CC} | additional supply current | per input pin; V _I = 3.4 V; other inputs at V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.35 | - | 1.5 | - | 1.5 | mA |
| C _I | input capacitance | | - | 1.5 | 10 | - | 10 | - | 10 | pF |

11 Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; for test circuit see [Figure 6](#).

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-----------------------|-------------------------------|--|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHC2G08-Q100 | | | | | | | | | | |
| t _{pd} | propagation delay | nA, nB to nY; see Figure 5 ^[1] | | | | | | | | |
| | | V _{CC} = 3.0 V to 3.6 V ^[2] | | | | | | | | |
| | | C _L = 15 pF | - | 4.6 | 8.8 | 1.0 | 10.5 | 1.0 | 12.0 | ns |
| | | C _L = 50 pF | - | 6.5 | 12.3 | 1.0 | 14.0 | 1.0 | 16.0 | ns |
| | | V _{CC} = 4.5 V to 5.5 V ^[3] | | | | | | | | |
| | | C _L = 15 pF | - | 3.2 | 5.9 | 1.0 | 7.0 | 1.0 | 8.0 | ns |
| | | C _L = 50 pF | - | 4.6 | 7.9 | 1.0 | 9.0 | 1.0 | 10.5 | ns |
| C _{PD} | power dissipation capacitance | per buffer; C _L = 50 pF; f _i = 1 MHz; V _I = GND to V _{CC} ^[4] | - | 17 | - | - | - | - | - | pF |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|------------------------|-------------------------------|---|-------|-----|-----|------------------|-----|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHCT2G08-Q100 | | | | | | | | | | |
| t_{pd} | propagation delay | nA, nB to nY; see Figure 5 [1] | | | | | | | | |
| | | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ [3] | | | | | | | | |
| | | $C_L = 15 \text{ pF}$ | - | 3.6 | 6.2 | 1.0 | 7.1 | 1.0 | 8.0 | ns |
| | | $C_L = 50 \text{ pF}$ | - | 5.1 | 7.9 | 1.0 | 9.0 | 1.0 | 10.5 | ns |
| C_{PD} | power dissipation capacitance | per buffer; $C_L = 50 \text{ pF}$; $f_i = 1 \text{ MHz}$; $V_i = \text{GND to } V_{CC}$ [4] | - | 19 | - | - | - | - | - | pF |

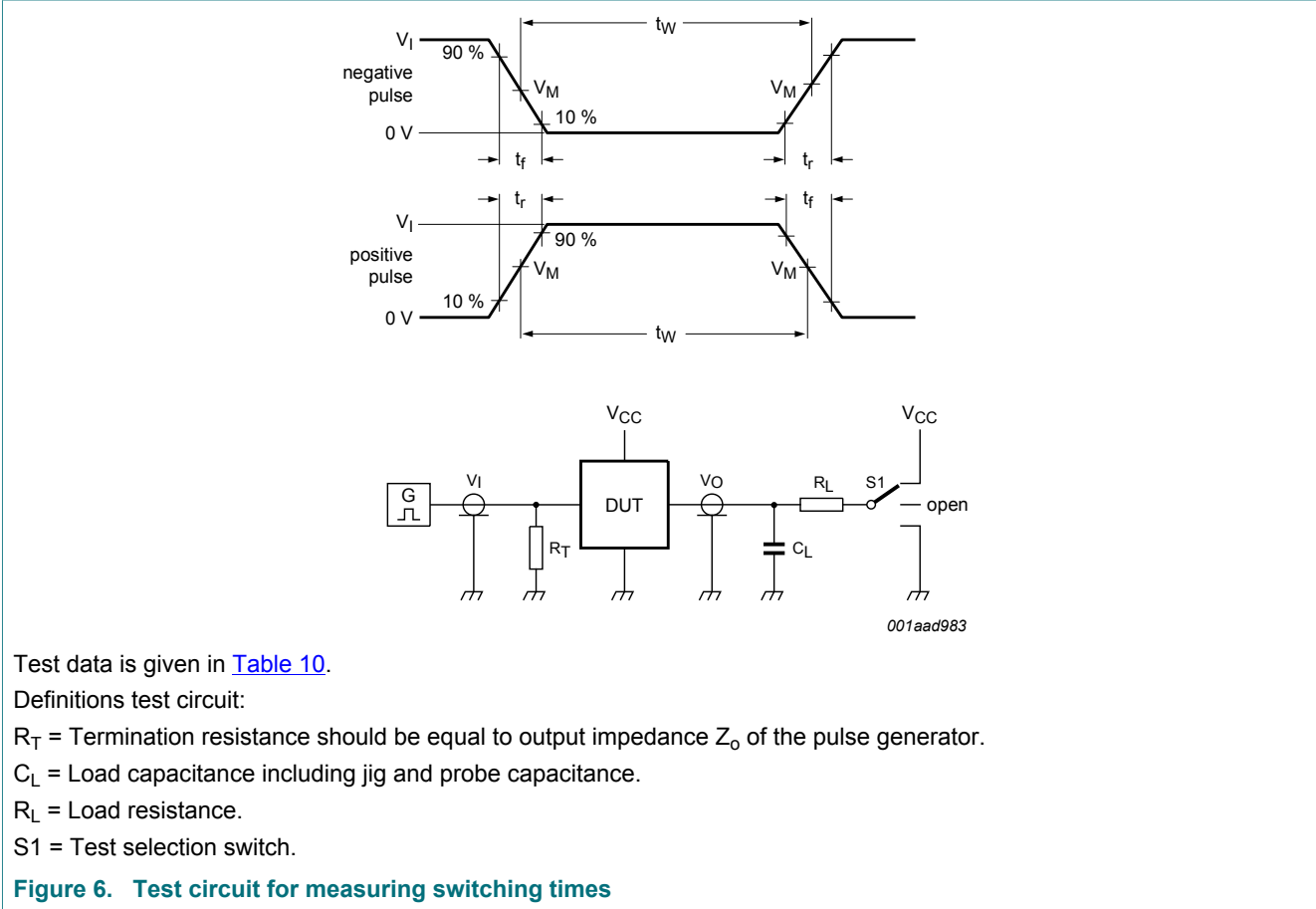
- [1] t_{pd} is the same as t_{PLH} and t_{PHL} .
- [2] Typical values are measured at $V_{CC} = 3.3 \text{ V}$.
- [3] Typical values are measured at $V_{CC} = 5.0 \text{ V}$.
- [4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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 Waveform and test circuit



Table 9. Measurement points

| Type | Input | Output |
|-----------------|-------------|-------------|
| | V_M | V_M |
| 74AHC2G08-Q100 | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 74AHCT2G08-Q100 | 1.5 V | $0.5V_{CC}$ |



Test data is given in [Table 10](#).

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.

Figure 6. Test circuit for measuring switching times

Table 10. 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} |
| 74AHC2G08-Q100 | V_{CC} | ≤ 3 ns | 15 pF, 50 pF | 1 k Ω | open | GND | V_{CC} |
| 74AHCT2G08-Q100 | 3 V | ≤ 3 ns | 15 pF, 50 pF | 1 k Ω | open | GND | V_{CC} |

12 Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2



DIMENSIONS (mm are the original dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | H _E | L | L _p | v | w | y | Z ⁽¹⁾ | θ |
|------|-----------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|-----|----------------|-----|------|-----|------------------|----------|
| mm | 1.1 | 0.15 0.00 | 0.95 0.75 | 0.25 | 0.38 0.22 | 0.18 0.08 | 3.1 2.9 | 3.1 2.9 | 0.65 | 4.1 3.9 | 0.5 | 0.47 0.33 | 0.2 | 0.13 | 0.1 | 0.70 0.35 | 8° 0° |

Note

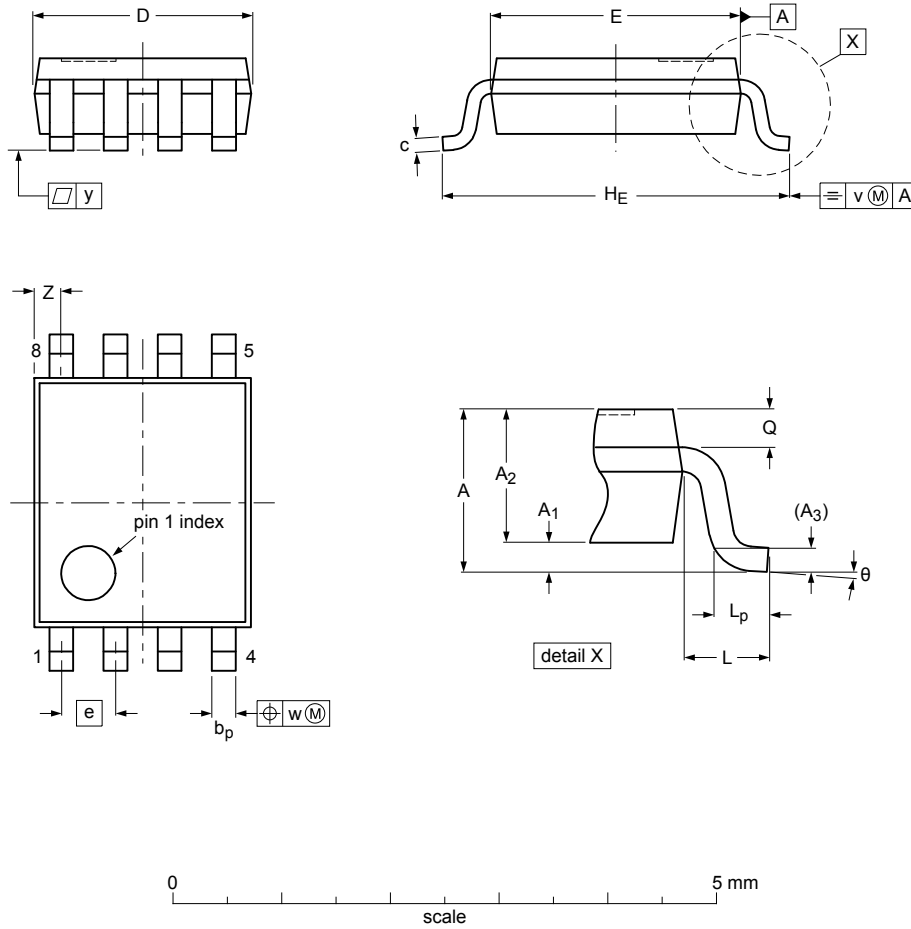
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|------------------------|------------|
| | IEC | JEDEC | JEITA | | |
| SOT505-2 | | --- | | | 02-01-16 |

Figure 7. Package outline SOT505-2 (TSSOP8)

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1



Dimensions (mm are the original dimensions)

| Unit | A | 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 |
|------|------|----------------|----------------|----------------|----------------|------|------------------|------------------|-----|----------------|-----|----------------|------|-----|------|-----|------------------|----|
| | max. | | | | | | | | | | | | | | | | | |
| mm | max | 0.15 | 0.85 | | 0.27 | 0.23 | 2.1 | 2.4 | | 3.2 | | 0.40 | 0.21 | | | | 0.4 | 8° |
| | nom | 1 | | 0.12 | | | | | 0.5 | | 0.4 | | | 0.2 | 0.08 | 0.1 | | |
| | min | | 0.00 | 0.60 | 0.17 | 0.08 | 1.9 | 2.2 | | 3.0 | | 0.15 | 0.19 | | | | 0.1 | 0° |

Note

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

sot765-1_po

| Outline version | References | | | | European projection | Issue date |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT765-1 | | MO-187 | | | | 07-06-02 16-05-31 |

Figure 8. Package outline SOT765-1 (VSSOP8)

13 Abbreviations

Table 11. Abbreviations

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

14 Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------------|---|--------------------|---------------|-------------------------|
| 74AHC_AHCT2G08_Q100 v.4 | 20180321 | Product data sheet | - | 74AHC_AHCT2G08_Q100 v.3 |
| Modifications: | <ul style="list-style-type: none"> 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. Table 5: total power dissipation derating factors have changed. Type number 74AHC2G08GD-Q100 and 74AHCT2G08GD-Q100 (SOT996-2/XSON8) removed . | | | |
| 74AHC_AHCT2G08_Q100 v.3 | 20151120 | Product data sheet | - | 74AHC_AHCT2G08_Q100 v.2 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74AHC2G08GD-Q100 and 74AHCT2G08GD-Q100 (SOT996-2/XSON8). | | | |
| 74AHC_AHCT2G08_Q100 v.2 | 20140121 | Product data sheet | - | 74AHC_AHCT2G08_Q100 v.1 |
| 74AHC_AHCT2G08_Q100 v.1 | 20131113 | Product data sheet | - | - |

15 Legal information

15.1 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".
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Date of release: 21 March 2018

Document identifier: 74AHC_AHCT2G08_Q100

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Экспресс доставка в любую точку России;
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- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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