

# NVC6S5A444NLZ

## Power MOSFET

60 V, 78 mΩ, 4.5 A, N-Channel

Automotive Power MOSFET designed to minimize gate charge and low on resistance. AEC-Q101 qualified MOSFET and PPAP capable suitable for automotive applications.

### Features

- 4.5 V Drive
- High ESD Protection
- Low On-Resistance
- CPH6 Package is Pin-Compatible with SOT-26
- Pb-Free, Halogen Free and RoHS Compliance

### Typical Applications

- Load Switch
- Motor Drive

### Specifications

#### ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25°C)

| Parameter  | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Drain to Source Voltage                              | V <sub>DSS</sub>                  | 60          | V    |
| Gate to Source Voltage                               | V <sub>GSS</sub>                  | ±20         | V    |
| Drain Current (DC) (Note 1)                          | I <sub>D</sub>                    | 4.5         | A    |
| Drain Current (DC) (Note 2)                          |                                   | 3.5         | A    |
| Drain Current (Pulse)<br>PW ≤ 10 μs, duty cycle ≤ 1% | I <sub>DP</sub>                   | 18          | A    |
| Power Dissipation<br>T <sub>a</sub> = 25°C (Note 1)  | P <sub>D</sub>                    | 1.9         | W    |
| Power Dissipation<br>T <sub>a</sub> = 25°C (Note 2)  |                                   | 0.97        | W    |
| Junction Temperature and Storage Temperature         | T <sub>J</sub> , T <sub>stg</sub> | -55 to +175 | °C   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL RESISTANCE MAXIMUM RATINGS

| Parameter           | Symbol   | Value            | Unit      |
|---------------------|----------|------------------|-----------|
| Junction to Ambient | (Note 1) | R <sub>θJA</sub> | 78.1 °C/W |
|                     | (Note 2) |                  | 153 °C/W  |

1. Surface mounted on ceramic substrate (900 mm<sup>2</sup> × 0.8 mm).
2. Surface mounted on FR4 board using a 92 mm<sup>2</sup>, 1 oz. Cu pad.

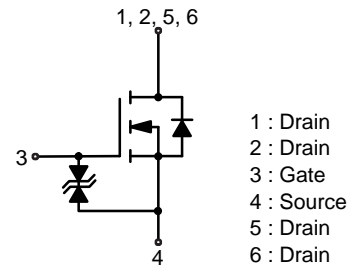


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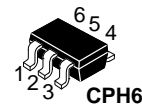
[www.onsemi.com](http://www.onsemi.com)

| V <sub>DSS</sub> | R <sub>DS(on)</sub> MAX | I <sub>D</sub> MAX |
|------------------|-------------------------|--------------------|
| 60 V             | 78 mΩ @ 10 V            | 4.5 A              |
|                  | 120 mΩ @ 4.5 V          |                    |

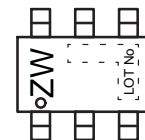
### ELECTRICAL CONNECTION N-Channel



### MARKING DIAGRAM



CASE 318BD



### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

# NVC6S5A444NLZ

## ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

| Parameter                                  | Symbol        | Conditions  | Min | Typ  | Max      | Unit             |
|--|---------------|---|-----|------|----------|------------------|
| Drain to Source Breakdown Voltage          | $V_{(BR)DSS}$ | $I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}$                          | 60  | –    | –        | V                |
| Zero-Gate Voltage Drain Current            | $I_{DSS}$     | $V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$                       | –   | –    | 1.0      | $\mu\text{A}$    |
| Gate to Source Leakage Current             | $I_{GSS}$     | $V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$                   | –   | –    | $\pm 10$ | $\mu\text{A}$    |
| Gate Threshold Voltage                     | $V_{GS(th)}$  | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$                         | 1.2 | –    | 2.6      | V                |
| Forward Transconductance                   | $g_{FS}$      | $V_{DS} = 10 \text{ V}, I_D = 2 \text{ A}$                          | –   | 3.0  | –        | S                |
| Static Drain to Source On-State Resistance | $R_{DS(on)}$  | $I_D = 2 \text{ A}, V_{GS} = 10 \text{ V}$                          | –   | 60   | 78       | $\text{m}\Omega$ |
|  |               | $I_D = 1 \text{ A}, V_{GS} = 4.5 \text{ V}$                         | –   | 84   | 120      | $\text{m}\Omega$ |
| Input Capacitance                          | $C_{iss}$     | $V_{DS} = 20 \text{ V}, f = 1 \text{ MHz}$                          | –   | 505  | –        | $\text{pF}$      |
| Output Capacitance                         | $C_{oss}$     |   | –   | 57   | –        | $\text{pF}$      |
| Reverse Transfer Capacitance               | $C_{rss}$     |   | –   | 37   | –        | $\text{pF}$      |
| Turn-ON Delay Time                         | $t_d(on)$     | See Figure 1  | –   | 7.3  | –        | ns               |
| Rise Time                                  | $t_r$         |   | –   | 9.8  | –        | ns               |
| Turn-OFF Delay Time                        | $t_d(off)$    |   | –   | 40   | –        | ns               |
| Fall Time                                  | $t_f$         |   | –   | 24   | –        | ns               |
| Total Gate Charge                          | $Q_g$         | $V_{DS} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 4.5 \text{ A}$ | –   | 10   | –        | nC               |
| Gate to Source Charge                      | $Q_{gs}$      |   | –   | 1.6  | –        | nC               |
| Gate to Drain "Miller" Charge              | $Q_{gd}$      |   | –   | 2.1  | –        | nC               |
| Forward Diode Voltage                      | $V_{SD}$      | $I_S = 4.5 \text{ A}, V_{GS} = 0 \text{ V}$                         | –   | 0.86 | 1.2      | V                |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

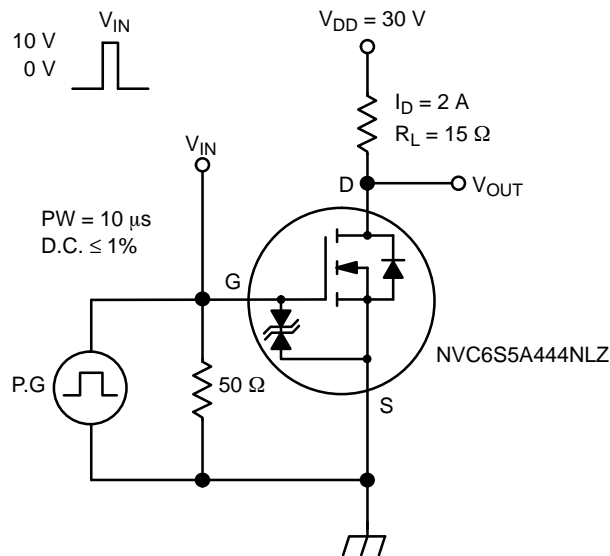


Figure 1. Switching Time Test Circuit

# NVC6S5A444NLZ

## TYPICAL CHARACTERISTICS

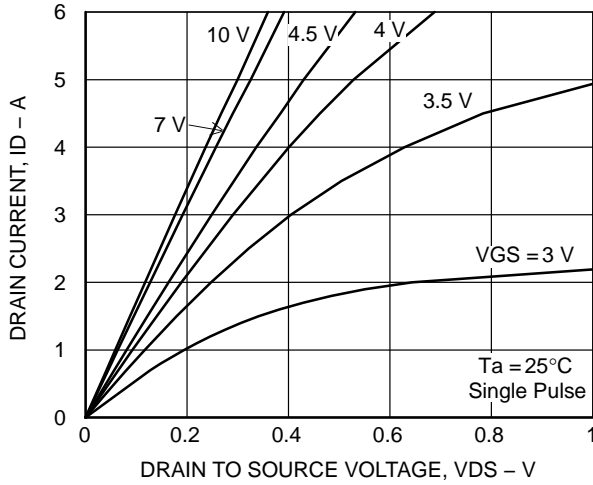


Figure 2.  $I_D - V_{DS}$

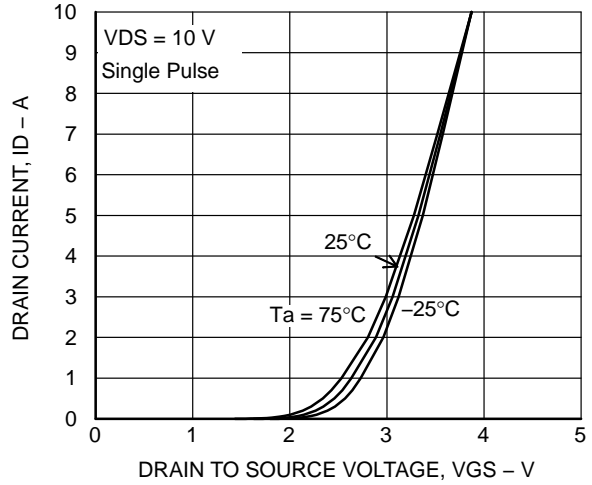


Figure 3.  $I_D - V_{GS}$

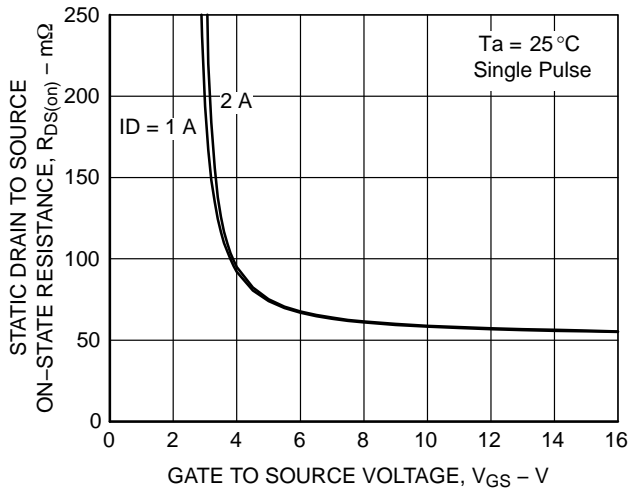


Figure 4.  $R_{DS(on)} - V_{GS}$

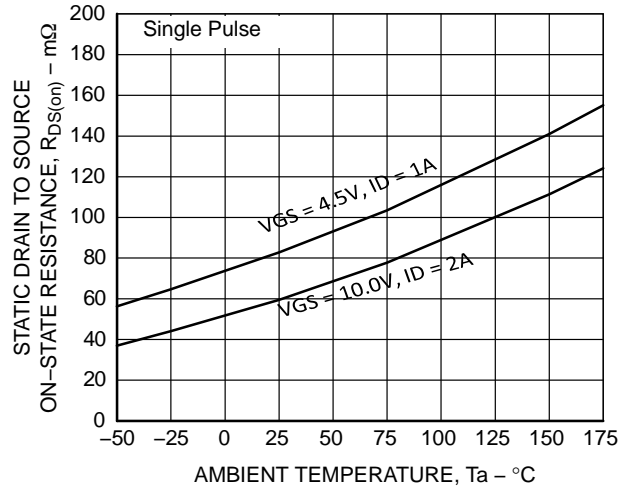


Figure 5.  $R_{DS(on)} - T_a$

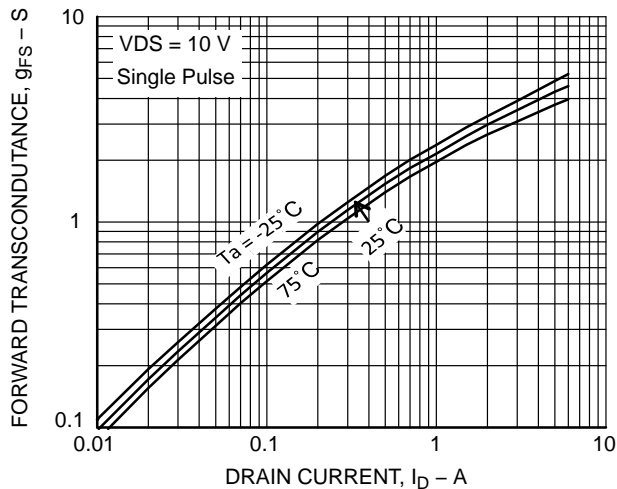


Figure 6.  $g_{FS} - I_D$

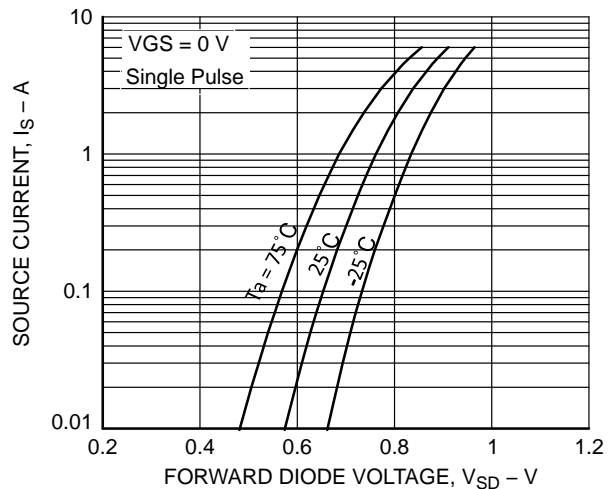


Figure 7.  $I_S - V_{SD}$

# NVC6S5A444NLZ

## TYPICAL CHARACTERISTICS

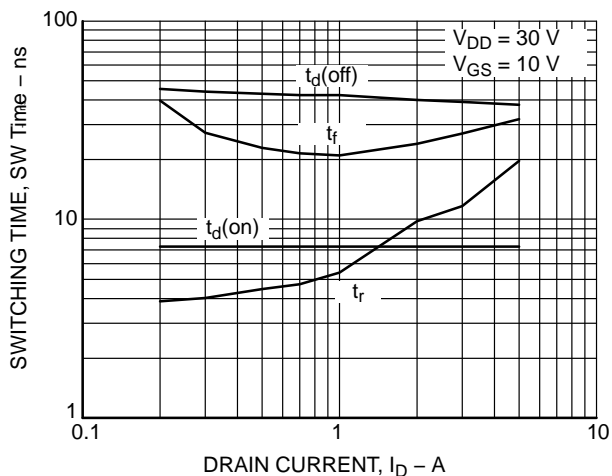


Figure 8. SW TIME -  $I_D$

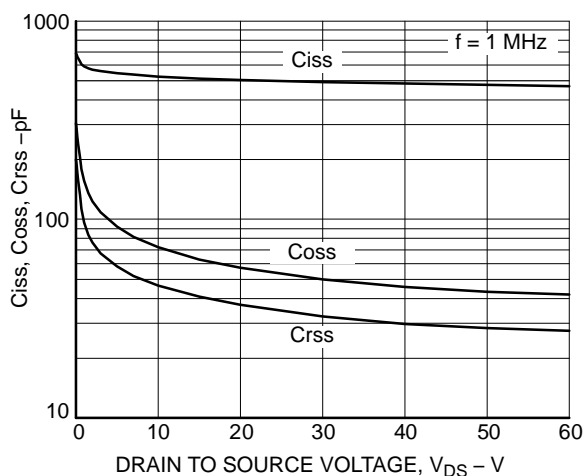


Figure 9. Ciss, Coss, Crss -  $V_{DS}$

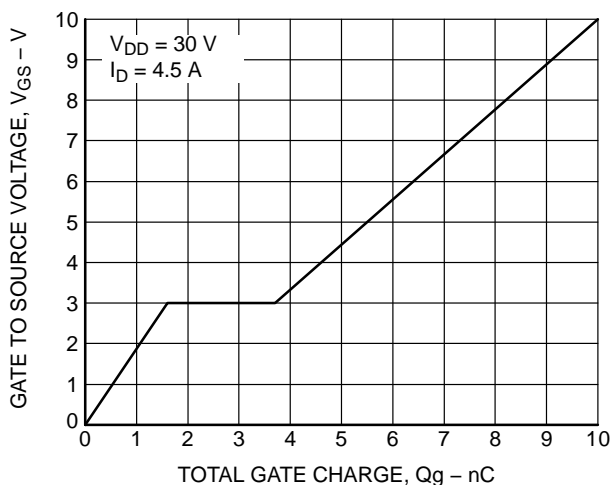


Figure 10.  $V_{GS}$  -  $Q_g$

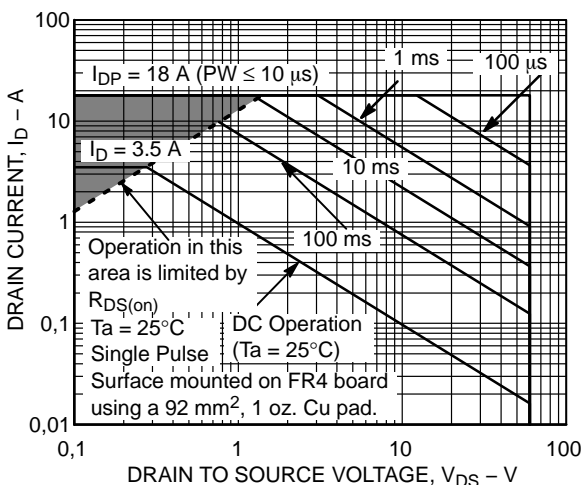


Figure 11. SOA

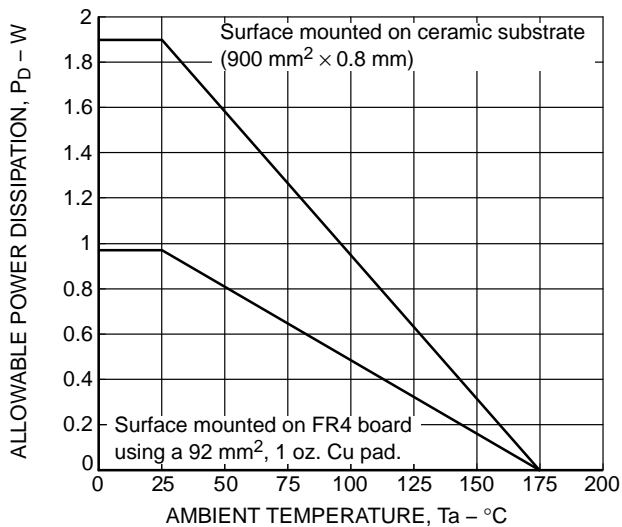


Figure 12.  $P_D$  -  $T_a$

# NVC6S5A444NLZ

## TYPICAL CHARACTERISTICS

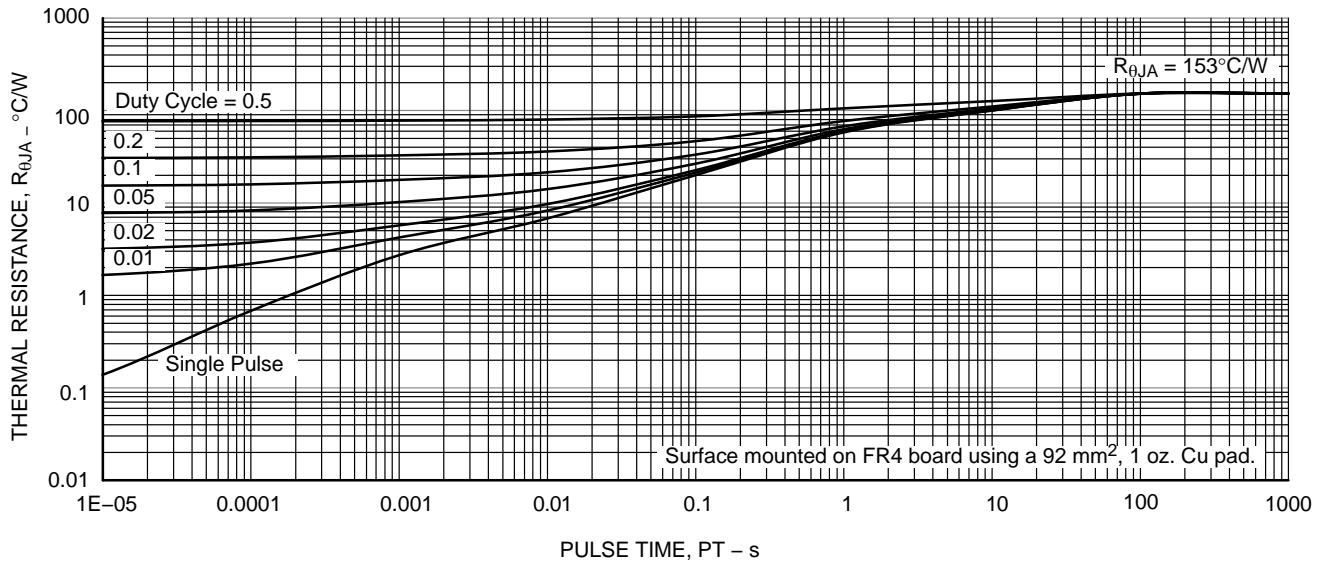


Figure 13.  $R_{\theta JA}$  – PULSE TIME

### DEVICE ORDERING INFORMATION

| Device           | Marking | Package                          | Shipping†           |
|------------------|---------|----------------------------------|---------------------|
| NVC6S5A444NLZT1G | ZW      | CPH6<br>(Pb-Free / Halogen Free) | 3,000 / Tape & Reel |
| NVC6S5A444NLZT2G |         |                                  |                     |

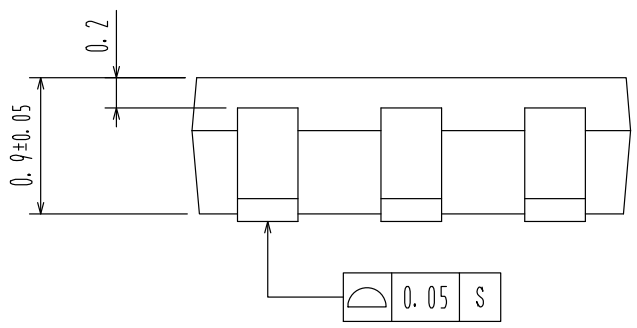
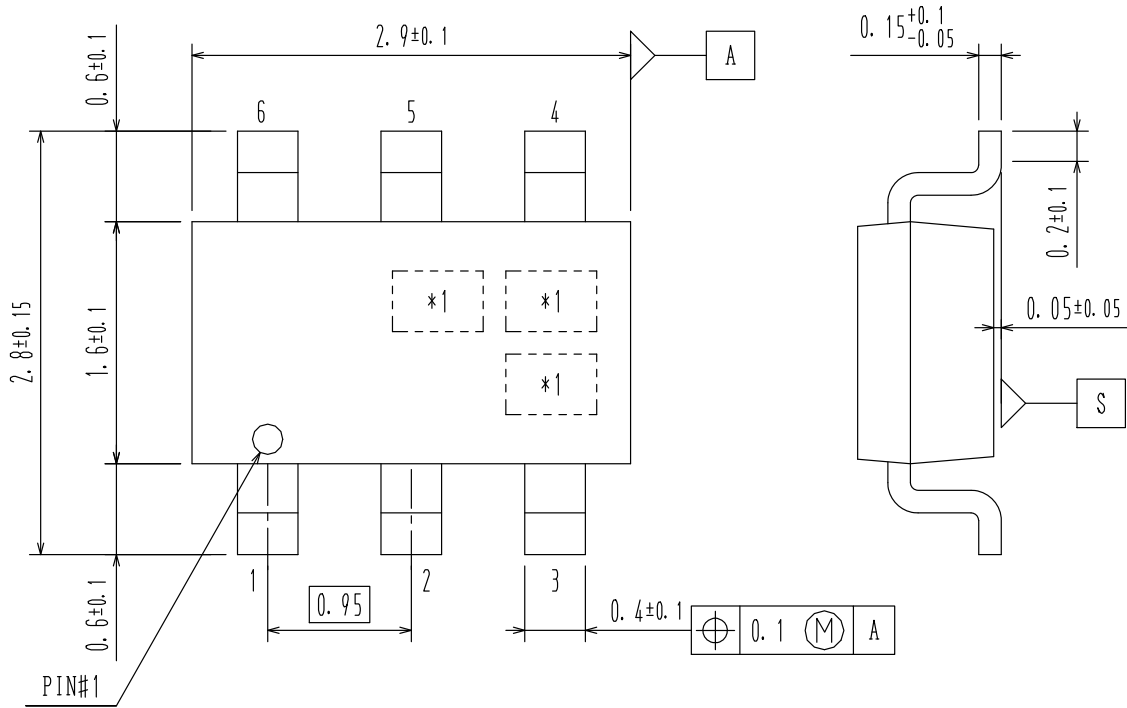
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

Since the NVC6S5A444NLZ is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

**CPH6**  
**CASE 318BD**  
**ISSUE O**

DATE 30 NOV 2011



|                         |                    |  |
|-------------------------|--------------------|--|
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| <b>DESCRIPTION:</b>     | <b>CPH6</b>        | <b>PAGE 1 OF 1</b>   |

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