



# SPN4868 N-Channel Enhancement Mode MOSFET

## DESCRIPTION

The SPN4868 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology.

This high density process is especially tailored to minimize on-state resistance.

These devices are particularly suited for low voltage application, notebook computer power management and other battery powered circuits where high efficiency and fast switching is required.

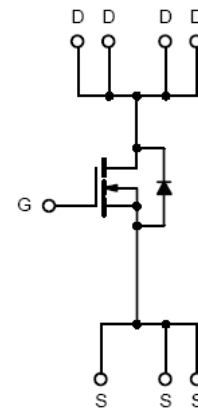
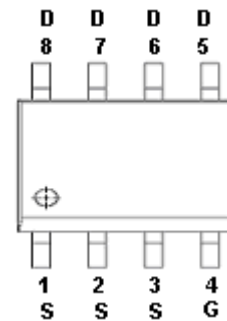
## FEATURES

- ◆ 60V/6A,  $R_{DS(ON)}=21m\Omega@V_{GS}=10V$
- ◆ 60V/4A,  $R_{DS(ON)}=24m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ SOP-8P package design

## APPLICATIONS

- Motor Drive
- Power Tools
- LED Lighting

## PIN CONFIGURATION (SOP-8P)



## PART MARKING





# SPN4868

## N-Channel Enhancement Mode MOSFET

### PIN DESCRIPTION

| Pin | Symbol | Description |
|-----|--------|-------------|
| 1   | S      | Source      |
| 2   | S      | Source      |
| 3   | S      | Source      |
| 4   | G      | Gate        |
| 5   | D      | Drain       |
| 6   | D      | Drain       |
| 7   | D      | Drain       |
| 8   | D      | Drain       |

### ORDERING INFORMATION

| Part Number  | Package | Part Marking |
|--------------|---------|--------------|
| SPN4868S8RGB | SOP-8P  | SPN4868      |

※ SPN4868S8RGB : 13" Tape Reel ; Pb – Free; Halogen - Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

| Parameter                                       | Symbol           | Typical               | Unit |   |
|---|------------------|-----------------------|------|---|
| Drain-Source Voltage                            | V <sub>DSS</sub> | 60                    | V    |   |
| Gate –Source Voltage                            | V <sub>GSS</sub> | ±20                   | V    |   |
| Continuous Drain Current(T <sub>J</sub> =150°C) | I <sub>D</sub>   | T <sub>C</sub> =25°C  | 6    | A |
|   |                  | T <sub>C</sub> =100°C | 3.6  |   |
| Pulsed Drain Current                            | I <sub>DM</sub>  | 24                    | A    |   |
| Continuous Source Current(Diode Conduction)     | I <sub>S</sub>   | 6                     | A    |   |
| Power Dissipation                               | P <sub>D</sub>   | 1.47                  | W    |   |
| Operating Junction Temperature                  | T <sub>J</sub>   | -55/150               | °C   |   |
| Storage Temperature Range                       | T <sub>STG</sub> | -55/150               | °C   |   |
| Thermal Resistance-Junction to Ambient          | R <sub>θJA</sub> | 62                    | °C/W |   |
| Thermal Resistance-Junction to Case             | R <sub>θJC</sub> | 2.8                   | °C/W |   |



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### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

| Parameter                       | Symbol               | Conditions  | Min. | Typ  | Max. | Unit |
|---------------------------------|----------------------|---|------|------|------|------|
| <b>Static</b>                   |                      |   |      |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA  | 60   |      |      | V    |
| Gate Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =25uA                                  | 1.2  | 1.8  | 2.5  |      |
| Gate Leakage Current            | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V  |      |      | ±100 | nA   |
| Zero Gate Voltage Drain Current | I <sub>DSS</sub>     | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V,<br>T <sub>J</sub> =25°C                        |      |      | 1    | uA   |
|                                 |                      | V <sub>DS</sub> =48V, V <sub>GS</sub> =0V,<br>T <sub>J</sub> =125°C                       |      |      | 10   |      |
| Drain-Source On-Resistance      | R <sub>DSS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =6A  |      | 17   | 21   | mΩ   |
|                                 |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A   |      | 20   | 24   |      |
| Forward Transconductance        | g <sub>fs</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =10A   |      | 9    |      | S    |
| Diode Forward Voltage           | V <sub>SD</sub>      | I <sub>F</sub> =1A, V <sub>GS</sub> =0V   |      |      | 1    | V    |
| <b>Dynamic</b>                  |                      |   |      |      |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V,<br>I <sub>D</sub> =15A                        |      | 28   | 42   | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |   |      | 3.5  | 7    |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |   |      | 6.5  | 10   |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>GS</sub> =0V, V <sub>DS</sub> =20V,<br>F=1MHz                                      |      | 1680 | 2440 | pF   |
| Output Capacitance              | C <sub>oss</sub>     |   |      | 115  | 170  |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |   |      | 85   | 125  |      |
| Turn-On Time                    | t <sub>d(on)</sub>   | (V <sub>DD</sub> =30V, I <sub>D</sub> =-1A,<br>V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω) |      | 7.2  | 14   | ns   |
|                                 | t <sub>r</sub>       |   |      | 38   | 72   |      |
| Turn-Off Time                   | t <sub>d(off)</sub>  |   |      | 34   | 65   |      |
|                                 | t <sub>f</sub>       |   |      | 8.2  | 16   |      |



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## TYPICAL CHARACTERISTICS

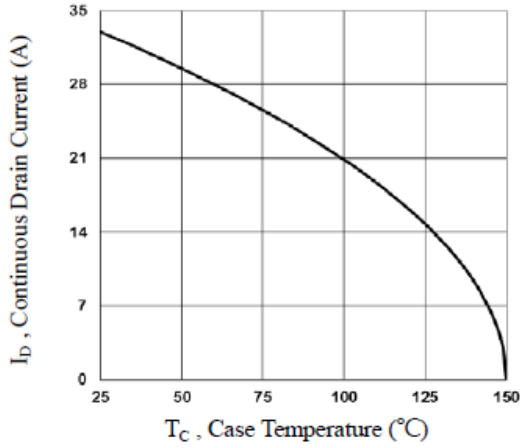


Fig.1 Continuous Drain Current vs.  $T_C$

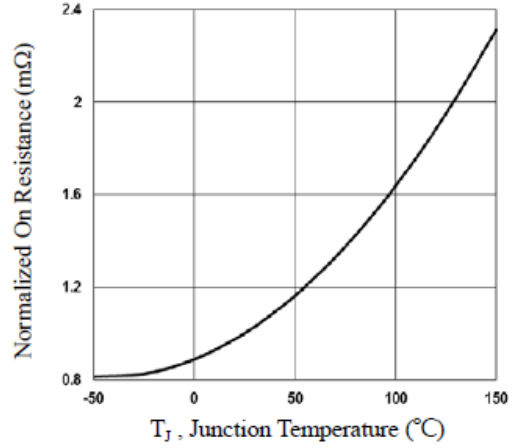


Fig.2 Normalized  $R_{DSON}$  vs.  $T_J$

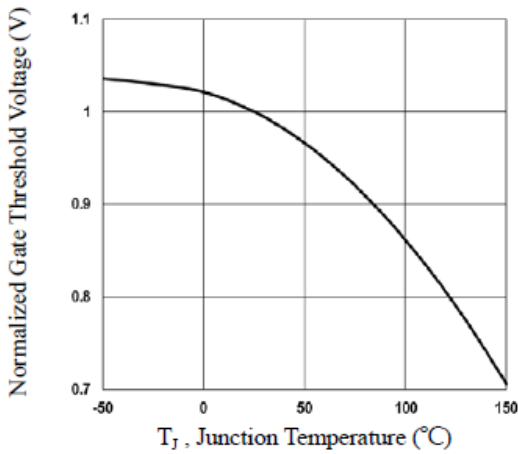


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

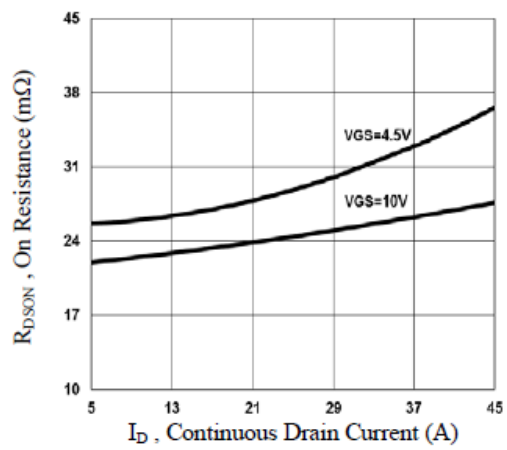


Fig.4  $R_{DSON}$  vs. Continuous Drain Current

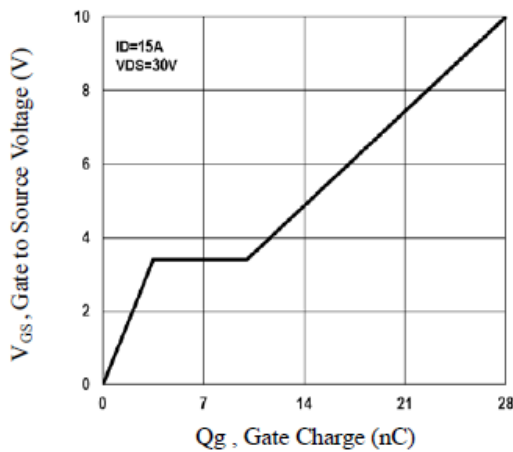


Fig.5 Gate Charge Waveform

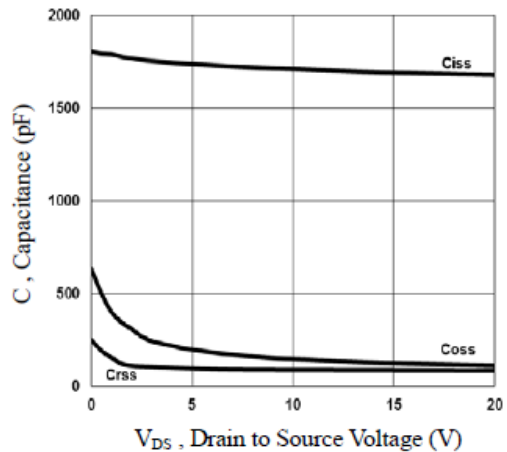
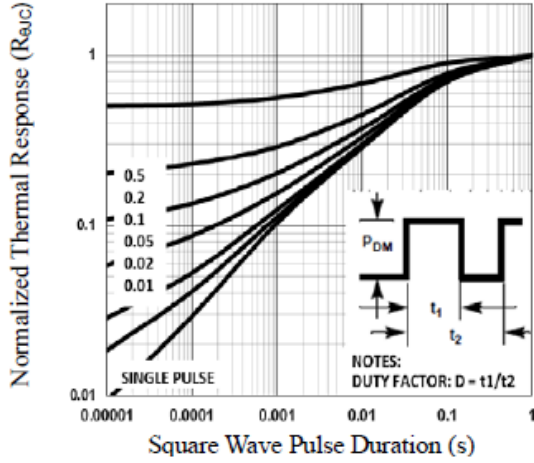


Fig.6 Capacitance Characteristics

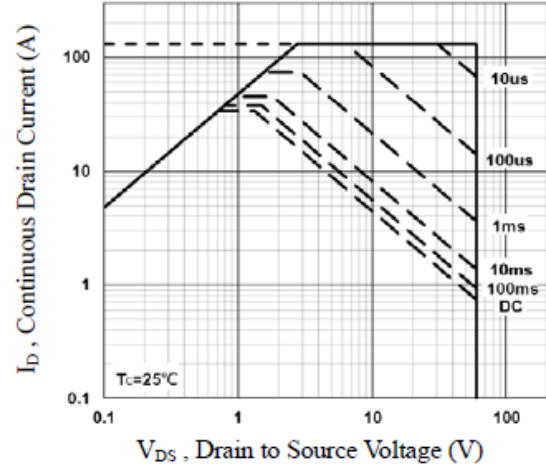


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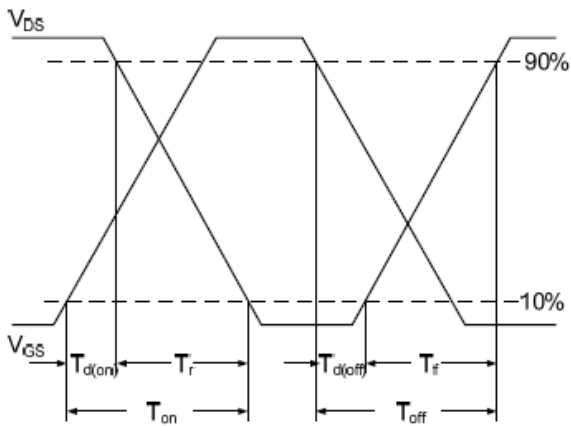
## TYPICAL CHARACTERISTICS



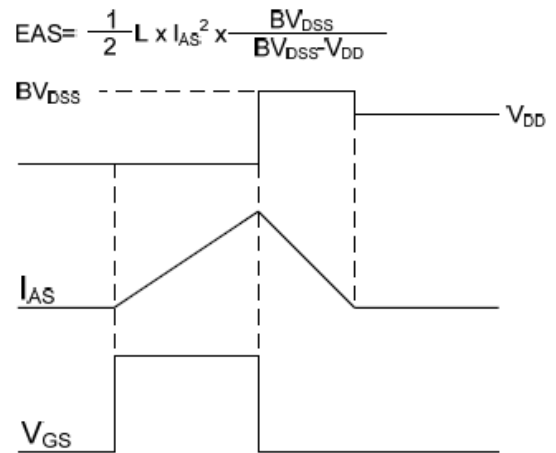
**Fig.7 Normalized Transient Impedance**



**Fig.8 Maximum Safe Operation Area**



**Fig.9 Switching Time Waveform**



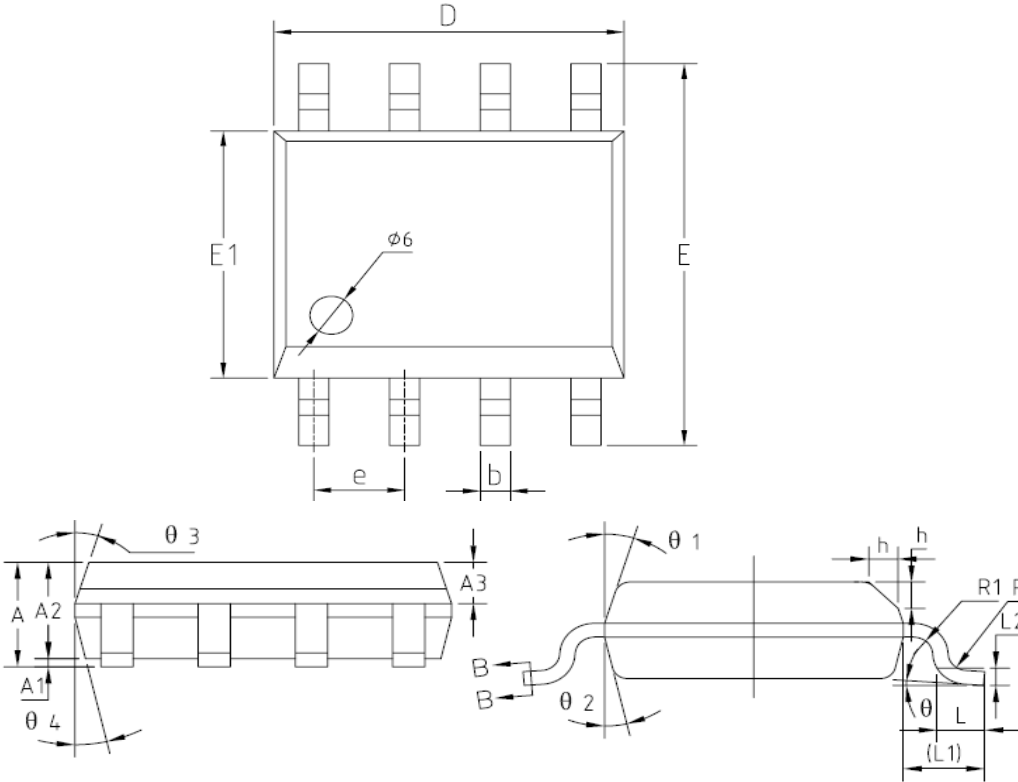
**Fig.10 EAS Waveform**



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### SOP-8 PACKAGE OUTLINE



| SYMBOL     | MIN      | NOM  | MAX  |
|------------|----------|------|------|
| A          | 1.35     | --   | 1.75 |
| A1         | 0.10     | --   | 0.25 |
| A2         | 1.25     | 1.40 | 1.65 |
| A3         | 0.50     | 0.60 | 0.70 |
| b          | 0.33     | -    | 0.51 |
| c          | 0.17     | --   | 0.25 |
| D          | 4.80     | 4.93 | 5.05 |
| E          | 5.80     | 6.00 | 6.20 |
| E1         | 3.80     | 3.90 | 4.00 |
| e          | 1.17     | 1.27 | 1.37 |
| L          | 0.45     | 0.60 | 0.80 |
| L1         | 1.04 REF |      |      |
| L2         | 0.25BSC  |      |      |
| R          | 0.07     | --   | --   |
| R1         | 0.07     | --   | 0.20 |
| h          | 0.25     | --   | 0.50 |
| $\theta$   | 0°       | --   | 8°   |
| $\theta 1$ | 15°      | 17°  | 19°  |
| $\theta 2$ | 11°      | 13°  | 15°  |
| $\theta 3$ | 15°      | 17°  | 19°  |
| $\theta 4$ | 11°      | 13°  | 15°  |



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