



# SPN11T10

## N-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SPN11T10 is the N-Channel logic enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. The SPN11T10 has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

### FEATURES

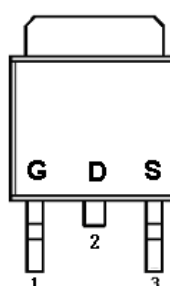
- ◆ 100V/12A,  $R_{DS(ON)}=120m\Omega@V_{GS}=10V$
- ◆ High density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-252-2L, TO-251S-3L package design

### APPLICATIONS

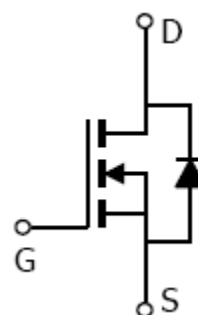
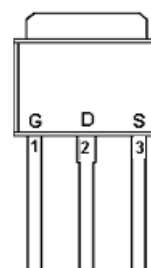
- Powered System
- DC/DC Converter
- Load Switch

### PIN CONFIGURATION

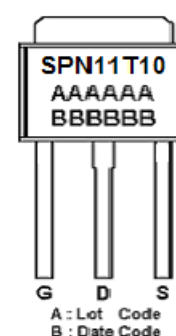
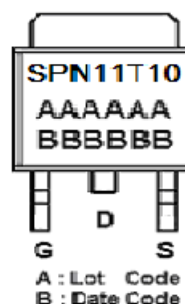
TO-252-2L



TO-251S-3L



### PART MARKING





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### PIN DESCRIPTION

| Pin | Symbol | Description |
|-----|--------|-------------|
| 1   | G      | Gate        |
| 2   | D      | Drain       |
| 3   | S      | Source      |

### ORDERING INFORMATION

| Part Number     | Package    | Part Marking |
|-----------------|------------|--------------|
| SPN11T10T252RGB | TO-252-2L  | SPN11T10     |
| SPN11T10T251TGB | TO-251S-3L | SPN11T10     |

※ SPN11T10T252RGB : Tape Reel ; Pb – Free ; Halogen - Free

※ SPN11T10T251TGB : Tube ; Pb – Free ; Halogen - Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

| Parameter                                       |                      | Symbol           | Typical | Unit |
|-------------------------------------------------|----------------------|------------------|---------|------|
| Drain-Source Voltage                            |                      | V <sub>DSS</sub> | 100     | V    |
| Gate –Source Voltage                            |                      | V <sub>GSS</sub> | ±20     | V    |
| Continuous Drain Current(T <sub>J</sub> =150°C) | T <sub>C</sub> =25°C | I <sub>D</sub>   | 12      | A    |
|                                                 | T <sub>C</sub> =70°C |                  | 8.0     |      |
| Pulsed Drain Current                            |                      | I <sub>DM</sub>  | 24      | A    |
| Avalanche Current                               |                      | I <sub>AS</sub>  | 14      | A    |
| Power Dissipation @ TA=25°C                     |                      | P <sub>D</sub>   | 40      | W    |
| Avalanche Energy, Single Pulse @ L=1mH, TA=25°C |                      | E <sub>AS</sub>  | 41      | mJ   |
| Operating Junction Temperature                  |                      | T <sub>J</sub>   | 150     | °C   |
| Storage Temperature Range                       |                      | T <sub>STG</sub> | -55/150 | °C   |
| Thermal Resistance-Junction to Ambient          |                      | R <sub>θJA</sub> | 110     | °C/W |



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### ELECTRICAL CHARACTERISTICS

(T<sub>A</sub>=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> =250μA                                                | 100  |      |      | V    |
| Gate Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 1    |      | 3    |      |
| 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> =80V, V <sub>GS</sub> =0V                                                 |      |      | 25   | μA   |
|                                 |                      | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =125°C                        |      |      | 250  |      |
| On-State Drain Current          | I <sub>D(on)</sub>   | V <sub>DS</sub> ≥5V, V <sub>GS</sub> =10V                                                 | 12   |      |      | A    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =12A                                                 |      |      | 120  | mΩ   |
|                                 |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A                                                 |      |      | 150  | mΩ   |
| Forward Transconductance        | g <sub>fs</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =8A                                                  |      | 7.3  |      | S    |
| Diode Forward Voltage           | V <sub>SD</sub>      | I <sub>S</sub> =8A, V <sub>GS</sub> =0V                                                   |      |      | 1.1  | V    |
| <b>Dynamic</b>                  |                      |                                                                                           |      |      |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =80V, V <sub>GS</sub> =10V<br>I <sub>D</sub> =10A                         |      | 26   |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                           |      | 4.6  |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                           |      | 5.1  |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V<br>f=1MHz                                       |      | 1535 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                           |      | 65   |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                           |      | 36   |      |      |
| Turn-On Time                    | t <sub>d(on)</sub>   | V <sub>DD</sub> =50V, I <sub>D</sub> =10A,<br>V <sub>GEN</sub> =10V, R <sub>G</sub> =3.3Ω |      | 4.2  |      | nS   |
|                                 | t <sub>r</sub>       |                                                                                           |      | 8.2  |      |      |
| Turn-Off Time                   | t <sub>d(off)</sub>  |                                                                                           |      | 35.6 |      |      |
|                                 | t <sub>f</sub>       |                                                                                           |      | 9.6  |      |      |



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### TYPICAL CHARACTERISTICS

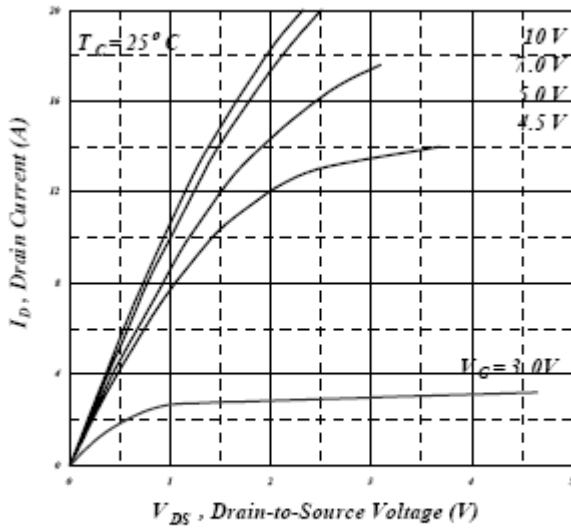


Fig 1. Typical Output Characteristics

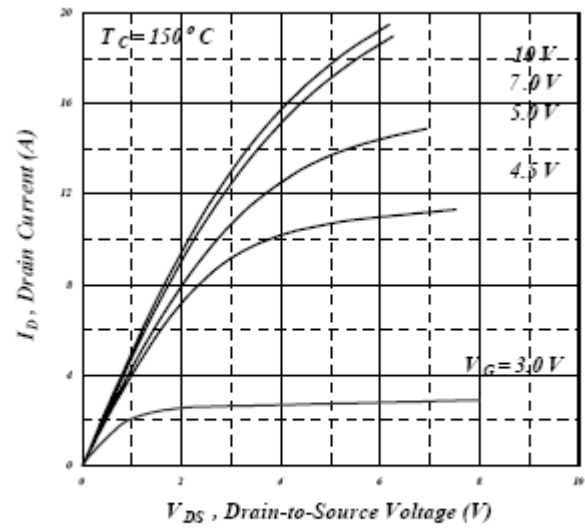


Fig 2. Typical Output Characteristics

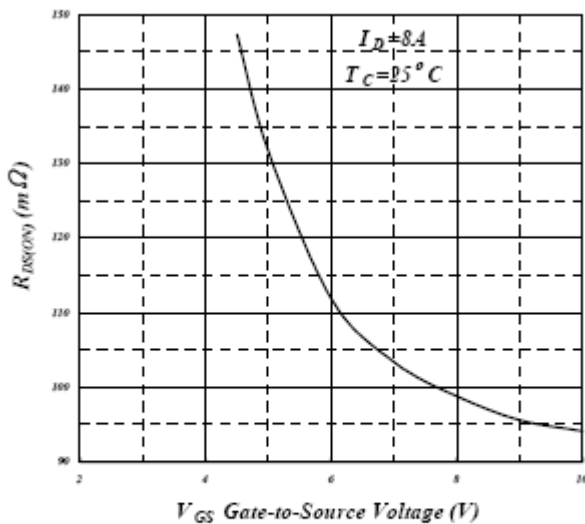


Fig 3. On-Resistance v.s. Gate Voltage

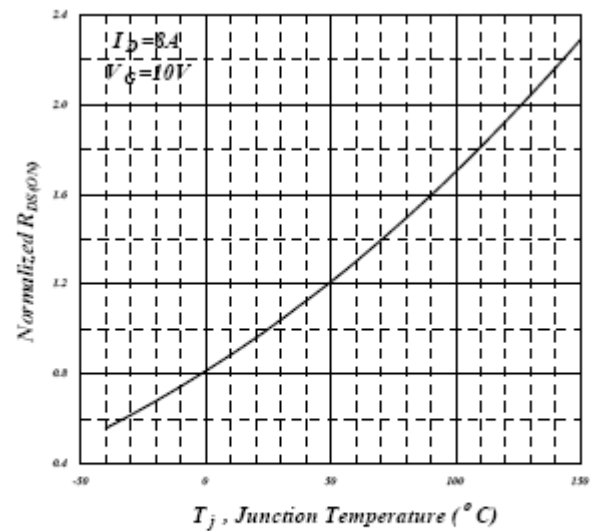


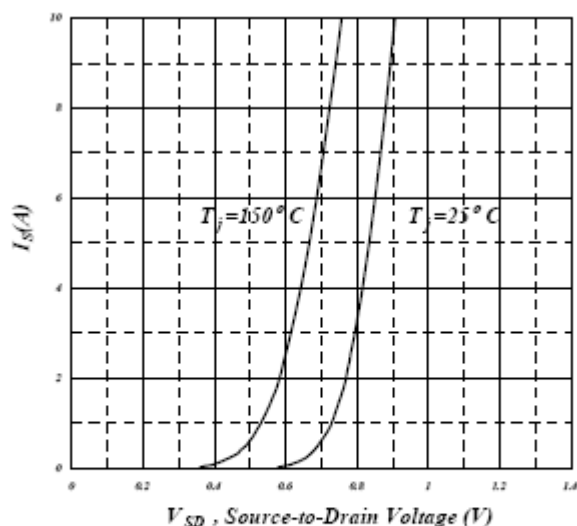
Fig 4. Normalized On-Resistance  
v.s. Junction Temperature



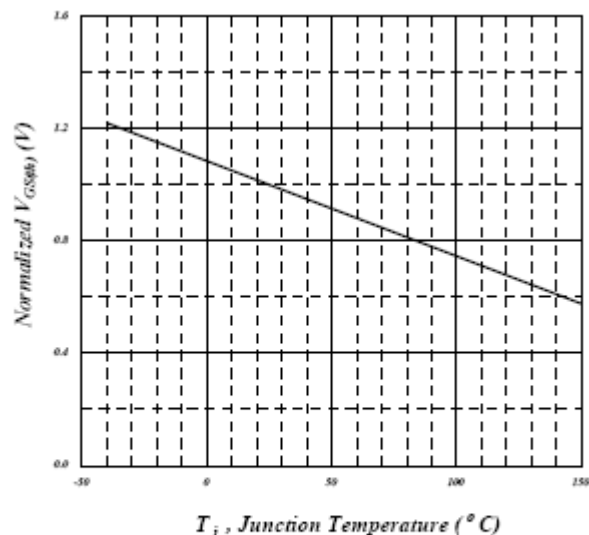
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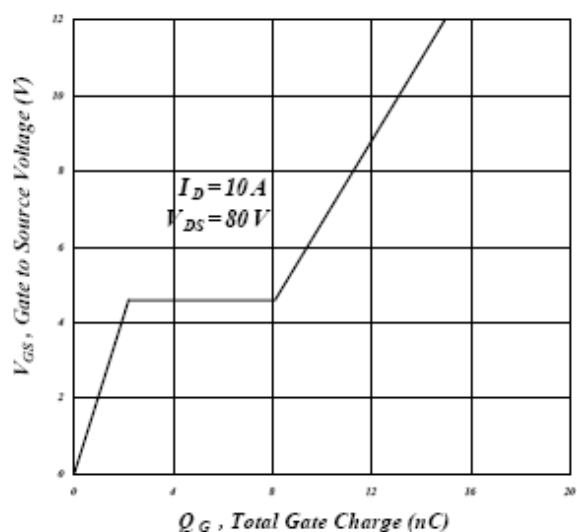
### TYPICAL CHARACTERISTICS



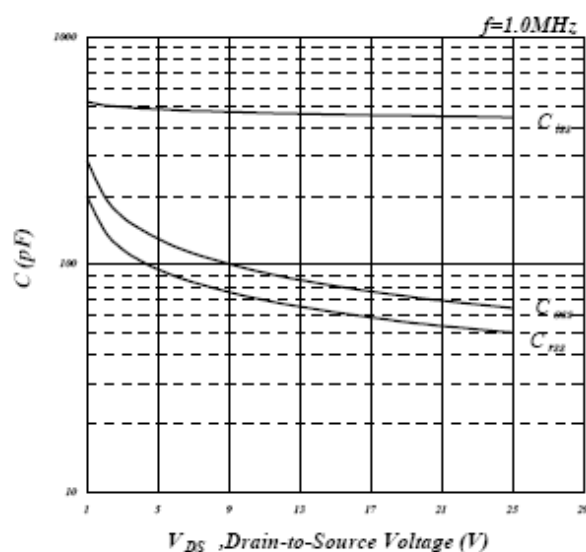
**Fig 5. Forward Characteristic of Reverse Diode**



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



**Fig 7. Gate Charge Characteristics**



**Fig 8. Typical Capacitance Characteristics**



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### TYPICAL CHARACTERISTICS

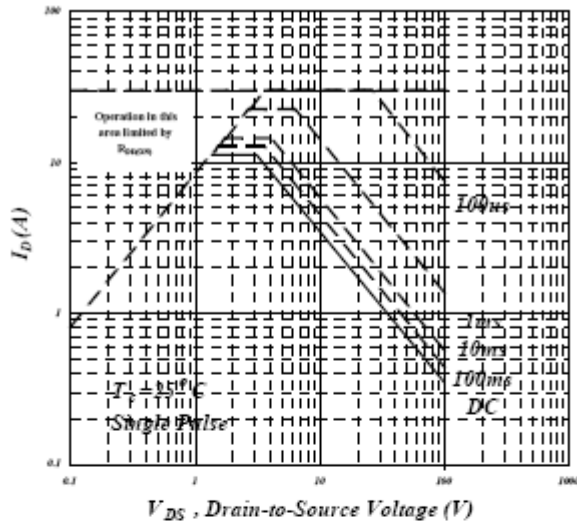


Fig 9. Maximum Safe Operating Area

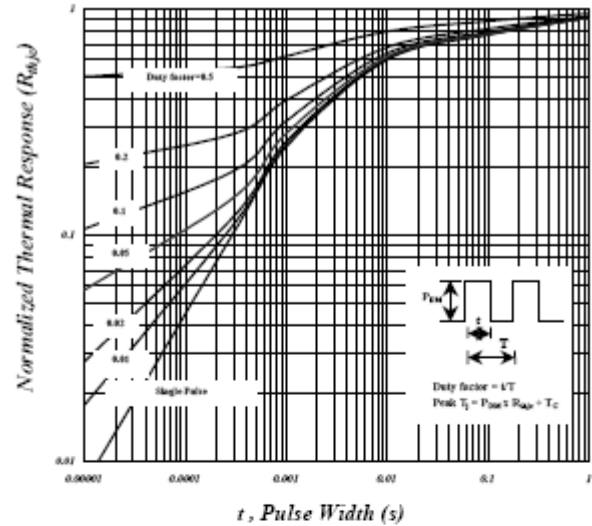


Fig 10. Effective Transient Thermal Impedance

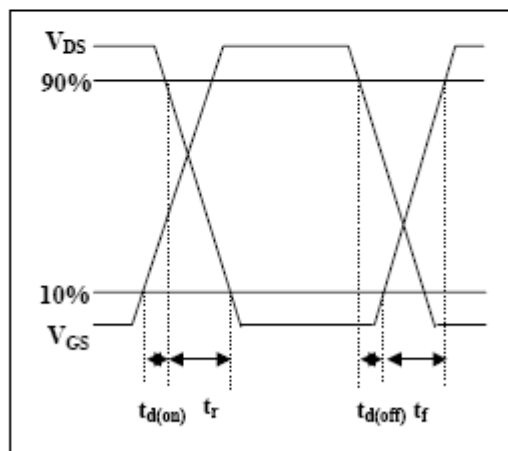


Fig 11. Switching Time Waveform

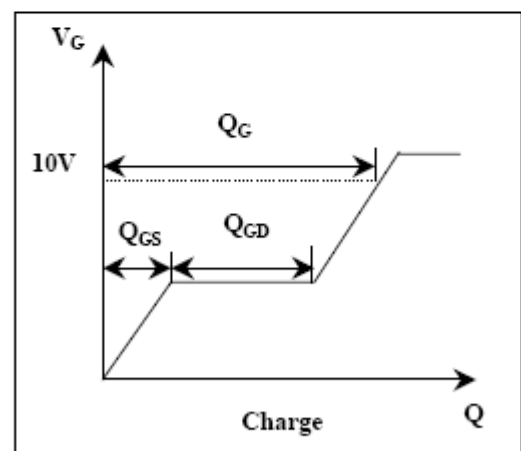


Fig 12. Gate Charge Waveform



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SYNC Power Corporation

7F-2, No.3-1, Park Street

NanKang District (NKSP), Taipei, Taiwan 115

Phone: 886-2-2655-8178

Fax: 886-2-2655-8468

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