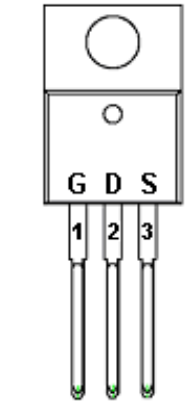
# SPN180T10
## N-Channel Enhancement Mode MOSFET

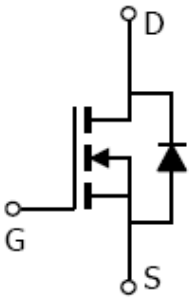
### DESCRIPTION
The SPN180T10 is the N-Channel enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier application, Motor control power management and other Power Tool circuits. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

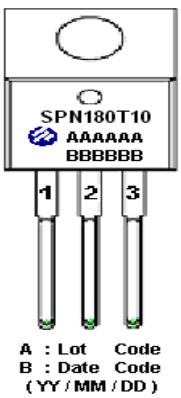
### FEATURES
- 100V/180A, $R_{DS(ON)}$=3.7mΩ@$V_{GS}$= 10V
- High density cell design for extremely low RDS (ON)
- Exceptional on-resistance and maximum DC current capability
- TO-220 package design

### APPLICATIONS
- AC/DC Synchronous Rectifier
- Load Switch
- UPS
- Power Tool
- Motor Control

### PIN CONFIGURATION
**TO-220**




### 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 |
|---|---|---|
| SPN180T10T220TGB | TO-220-3L | SPN180T10 |

※ SPN180T10T220TGB : Tube ; Pb – Free ; Halogen - Free

**ABSOULTE MAXIMUM RATINGS**

($T_A$=25℃ Unless otherwise noted)

| Parameter | | Symbol | Typical | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 100 | V |
| Gate –Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current($T_J$=150℃) | $T_A$=25℃ | $I_D$ | 180 | A |
| | $T_A$=70℃ | | 135 | |
| Pulsed Drain Current | | $I_{DM}$ | 400 | A |
| Avalanche Energy, Single Pulse @ L=0.1mH, $T_A$=25℃ | | $E_{AS}$ | 180 | mJ |
| Power Dissipation @ $T_A$=25℃ | | $P_D$ | 166 | W |
| Operating Junction Temperature | | $T_J$ | -55/150 | ℃ |
| Storage Temperature Range | | $T_{STG}$ | -55/150 | ℃ |
| Thermal Resistance-Junction to Ambient | | $R_{\theta JA}$ | 62 | ℃/W |

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**ELECTRICAL CHARACTERISTICS**

($T_A$=25℃ Unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V,$I_D$=250uA | 100 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 2.0 | | 4.0 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$=±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=100V,$V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=100V,$V_{GS}$=0V $T_J$=100℃ | | | 100 | |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$= 10V,$I_D$=20A | | 3.4 | 3.7 | mΩ |
| Forward Transconductance | gfs | $V_{DS}$=5V,$I_D$=20A | | 90 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=20A,$V_{GS}$ =0V | | | 1.2 | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V, $V_{GS}$=10V $I_D$= 20A | | 118 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 27 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 21 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V,$V_{GS}$=0V f=1MHz | | 7300 | | pF |
| Output Capacitance | $C_{oss}$ | | | 580 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 18 | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD}$=50V, $V_{GS}$=10V $I_D$=20A, $R_G$=10Ω | | 35 | | nS |
| | $t_r$ | | | 56 | | |
| Turn-Off Time | $t_{d(off)}$ | | | 92 | | |
| | $t_f$ | | | 26 | | |

## TYPICAL CHARACTERISTICS

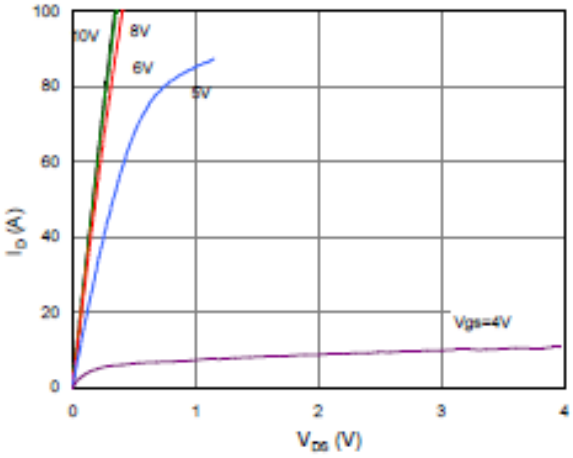



Fig. 1 Output Characteristics

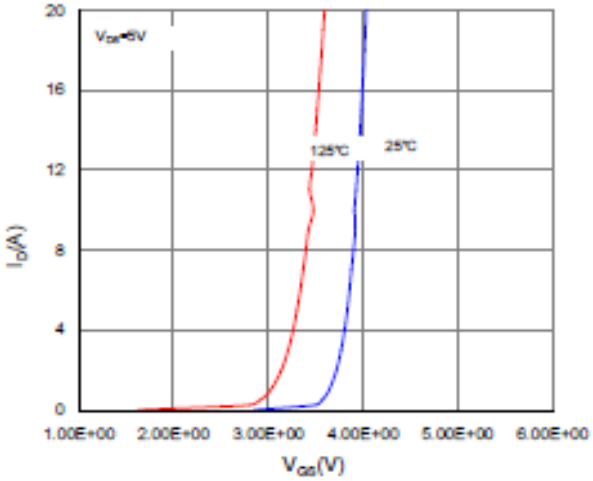



Fig. 2 Transfer Characteristics

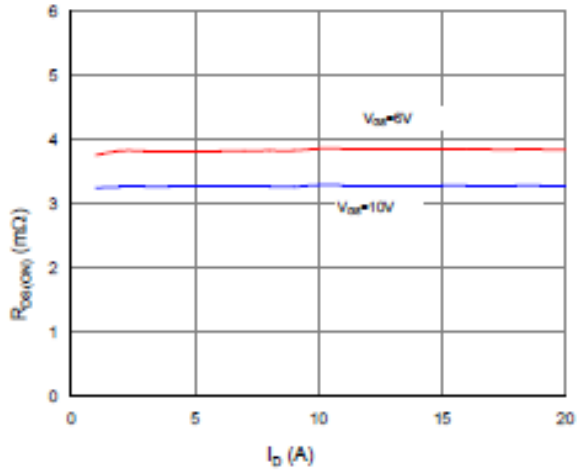



Fig. 3 On Resistances vs Drain Current

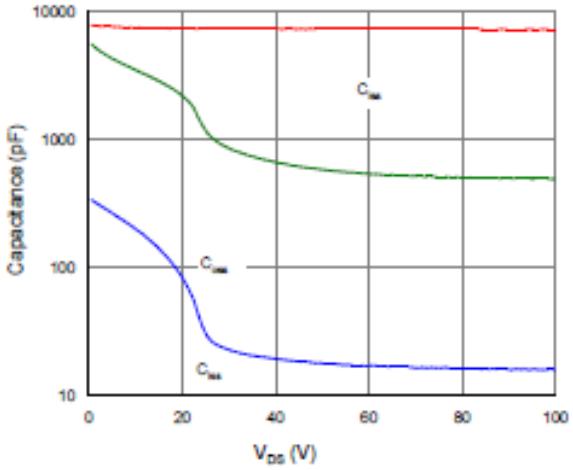



Fig. 4 Capacitance

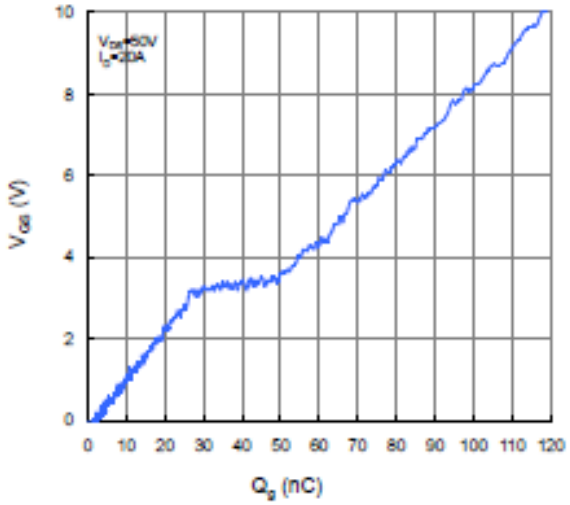



Fig. 5 Gate Charge

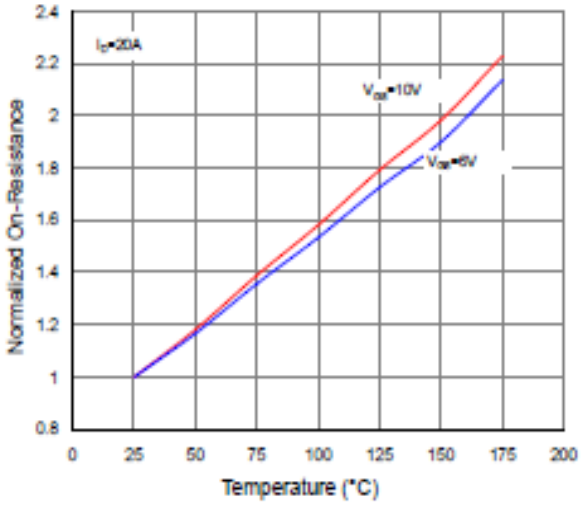



Fig. 6 On- Resistance vs Junction Temperature

## TYPICAL CHARACTERISTICS

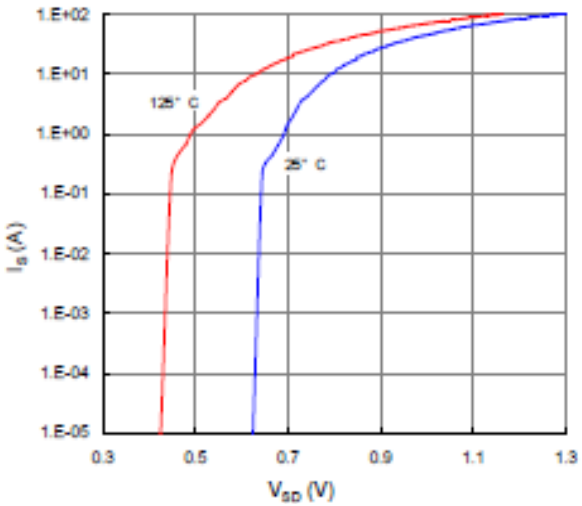



Fig. 7 Source Drain Diode Forward Voltage

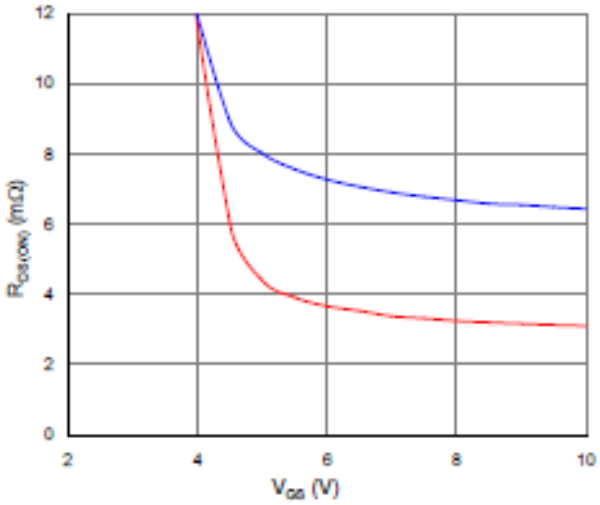



Fig. 8 On Resistance vs Gate Source Voltage

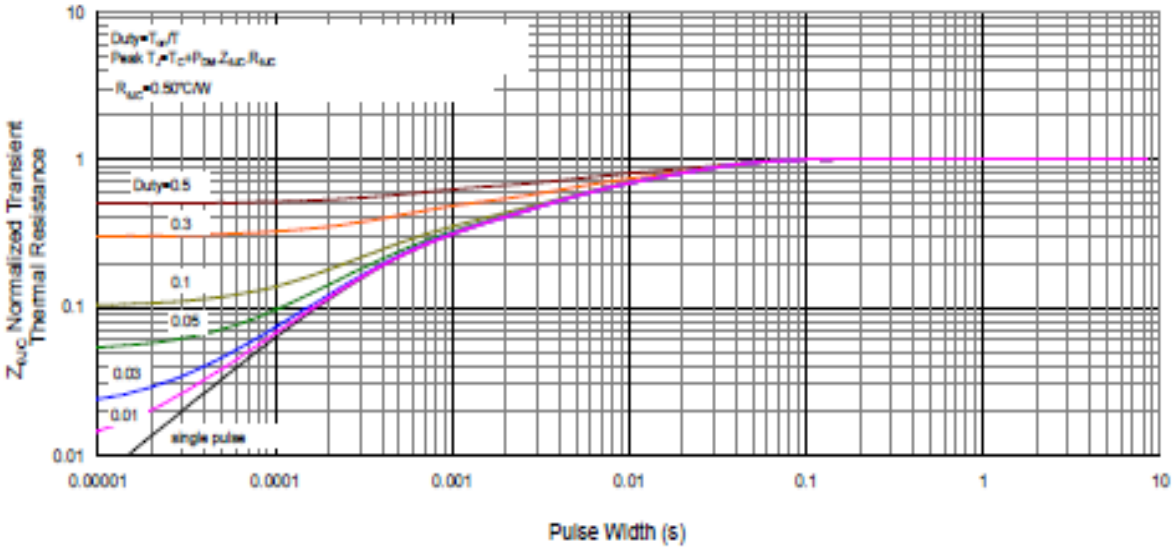
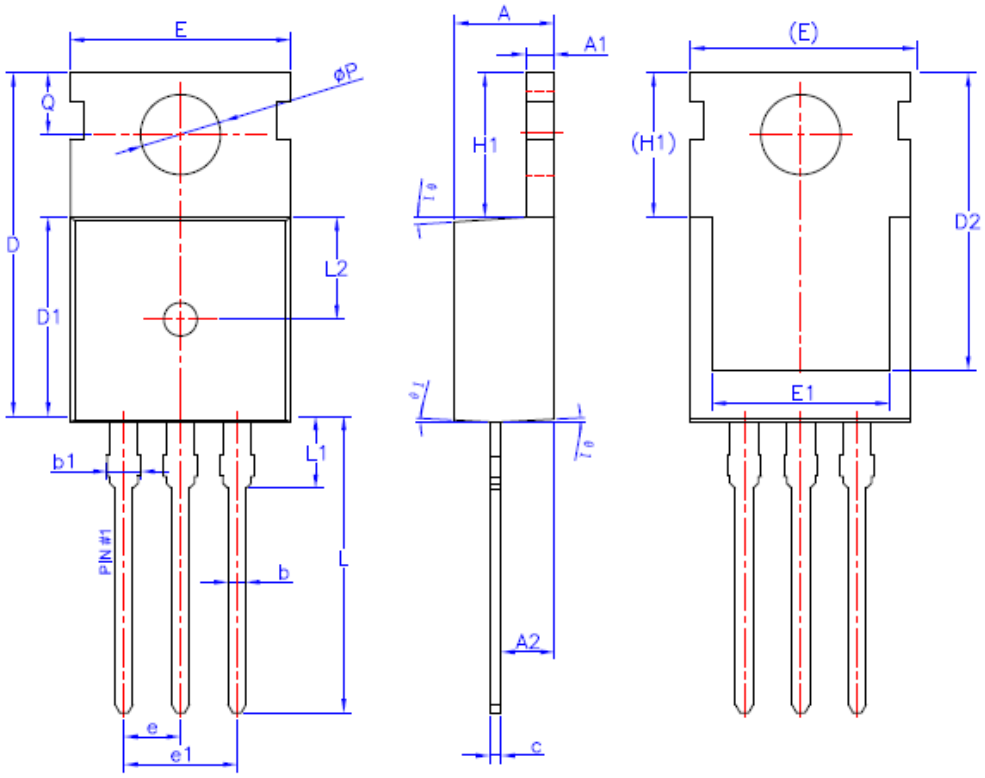



Fig. 9 Normalized Thermal Transient Impedance, Junction to Foot

**TO-220 PACKAGE OUTLINE**




| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 4.40 | 4.50 | 4.60 |
| A1 | 1.27 | 1.30 | 1.33 |
| A2 | 2.30 | 2.40 | 2.50 |
| b | 0.70 | – | 0.90 |
| b1 | 1.42 | – | 1.57 |
| c | 0.45 | 0.50 | 0.60 |
| D | 15.30 | 15.70 | 16.10 |
| D1 | 9.10 | 9.20 | 9.30 |
| D2 | 13.10 | – | 13.70 |
| E | 9.70 | 9.90 | 10.20 |
| E1 | 7.80 | 8.00 | 8.20 |
| e | 2.54BSC | | |
| e1 | 5.08BSC | | |
| H1 | 6.30 | 6.50 | 6.70 |
| L | 12.78 | 13.08 | 13.38 |
| L1 | – | – | 3.50 |
| L2 | 4.60REF | | |
| øP | 3.55 | 3.60 | 3.65 |
| Q | 2.73 | – | 2.87 |
| θ1 | 1° | 3° | 5° |

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