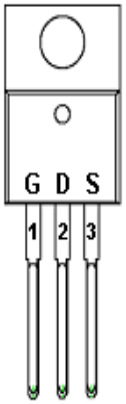
# SPN60T15
## N-Channel Enhancement Mode MOSFET

### DESCRIPTION
The SPN60T15 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.

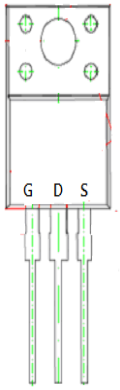
### APPLICATIONS
- AC/DC Synchronous Rectifier
- Load Switch
- UPS
- Power Tool
- Motor Control

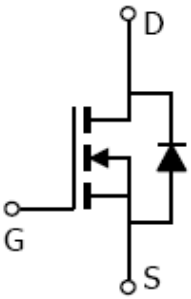
### FEATURES
- 150V/60A, $R_{DS(ON)}$=19mΩ@$V_{GS}$=10V
- High density cell design for extremely low $R_{DS}$ (ON)
- Exceptional on-resistance and maximum DC current capability
- TO-220-3L/TO-220F-3L package design

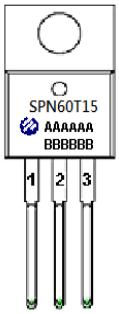
### PIN CONFIGURATION
**TO-220**



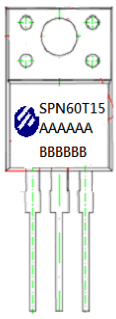

**TO-220F**




### PART MARKING



A : Lot Code
B : Date Code
( YY / MM / DD )




A: Lot Code
B: Date Code
(YYMMDD)

# SPN60T15
## N-Channel Enhancement Mode MOSFET

**TO-220/TO-220F PIN DESCRIPTION**

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

**ORDERING INFORMATION**

| Part Number | Package | Part Marking |
|---|---|---|
| SPN60T15T220TGB | TO-220-3L | SPN60T15 |
| SPN60T15T220FTGB | TO-220F-3L | SPN60T15 |

※ SPN60T15T220TGB : Tube ; Pb – Free ; Halogen – Free
※ SPN60T15T220FTGB : Tube ; Pb – Free ; Halogen - Free

**ABSOULTE MAXIMUM RATINGS**

($T_j$=25℃ Unless otherwise noted)

| Parameter | | Symbol | Typical | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 150 | V |
| Gate –Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current(Silicon Limited) | $T_C$=25℃ | $I_D$ | 60 | A |
| | $T_C$=100℃ | | 38 | |
| Pulsed Drain Current(TO-220/TO-220F) | | $I_{DM}$ | 150 | A |
| Avalanche Energy, Single Pulse @ L=0.3mH, $T_C$=25℃ | | $E_{AS}$ | 184 | mJ |
| Power Dissipation @ $T_C$=25℃(TO-220/TO-220F) | | $P_D$ | 214 | W |
| Operating Junction Temperature(TO-220/TO-220F) | | $T_J$ | -55/150 | ℃ |
| Storage Temperature Range(TO-220/TO-220F) | | $T_{STG}$ | -55/150 | ℃ |
| Thermal Resistance-Junction to Ambient (TO-220/TO-220F) | | $R_{\theta JA}$ | 60 | ℃/W |
| Thermal Resistance-Junction to Case (TO-220/TO-220F) | | $R_{\theta JC}$ | 0.7 | ℃/W |

**Note :**
The maximum current rating is package limited at 120A for TO-220-3L
The maximum current rating is package limited at 78A for TO-220F-3L

# SPN60T15
## N-Channel Enhancement Mode MOSFET

**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 | 150 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 2.0 | 3.0 | 4.0 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$=±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=150V,$V_{GS}$=0V $T_J$=25℃ | | | 1 | uA |
| | | $V_{DS}$=150V,$V_{GS}$=0V $T_J$=100℃ | | | 100 | |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V,$I_D$=20A | | 15 | 19 | mΩ |
| Forward Transconductance | gfs | $V_{DS}$=5V,$I_D$=20A | | 50 | | S |
| Gate Resistance | $R_G$ | $V_{GS}$=0V,$V_{DS}$=Open, f=1MHz | | 3.5 | | Ω |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=20A,$V_{GS}$ =0V | | 0.9 | 1.2 | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=75V, $V_{GS}$=10V $I_D$= 20A | | 27 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 9 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 2 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=75V,$V_{GS}$=0V f=1MHz | | 2275 | | pF |
| Output Capacitance | $C_{oss}$ | | | 165 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 5.5 | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD}$=75V, $V_{GS}$=10V $I_D$=20A, $R_G$=10Ω | | 12 | | nS |
| | $t_r$ | | | 4 | | |
| Turn-Off Time | $t_{d(off)}$ | | | 24 | | |
| | $t_f$ | | | 5 | | |

### TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

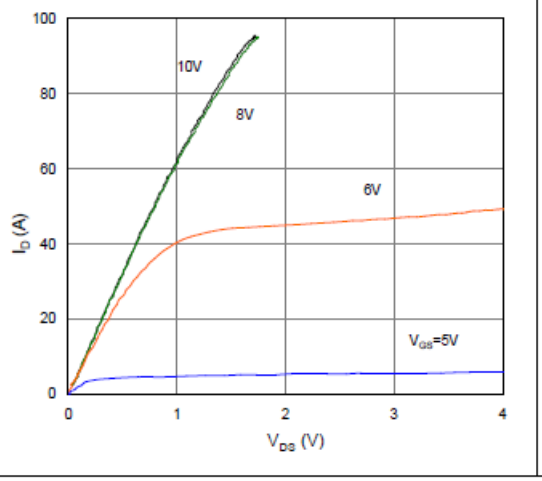



Figure 2. On-Resistance vs. Gate-Source Voltage

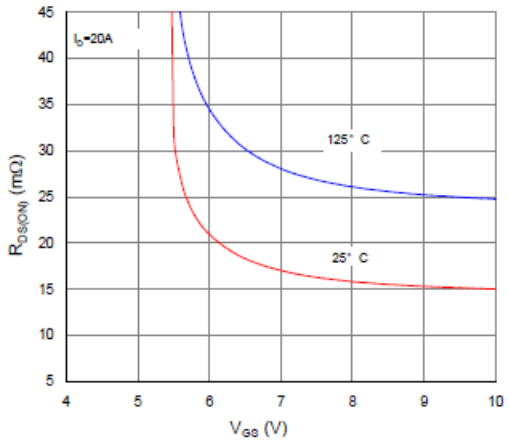



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

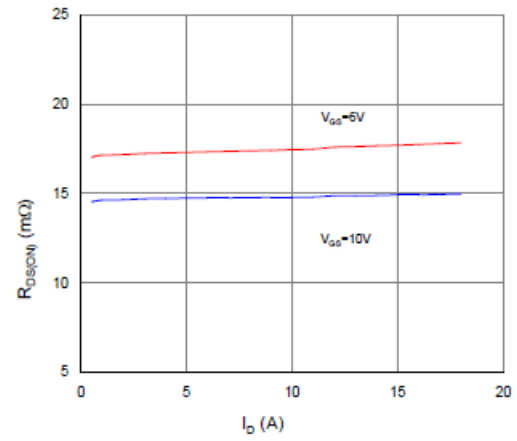



Figure 4. Normalized On-Resistance vs. Junction Temperature

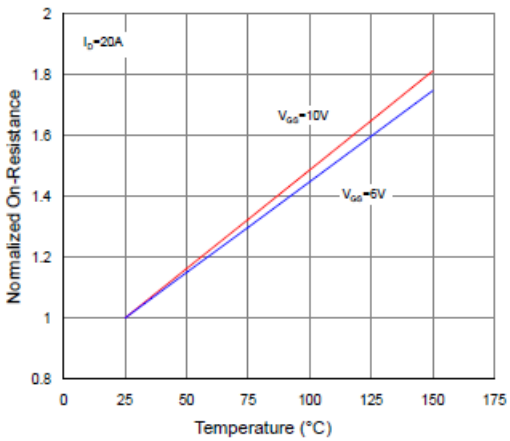



Figure 5. Typical Transfer Characteristics

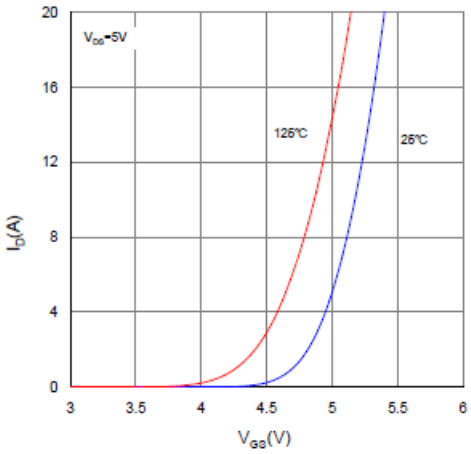
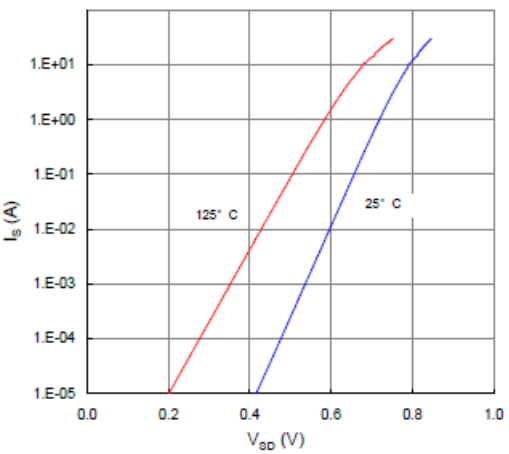



Figure 6. Typical Source-Drain Diode Forward Voltage



### TYPICAL CHARACTERISTICS

Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

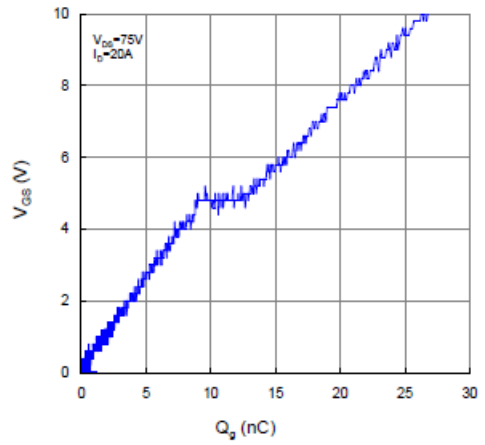



Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

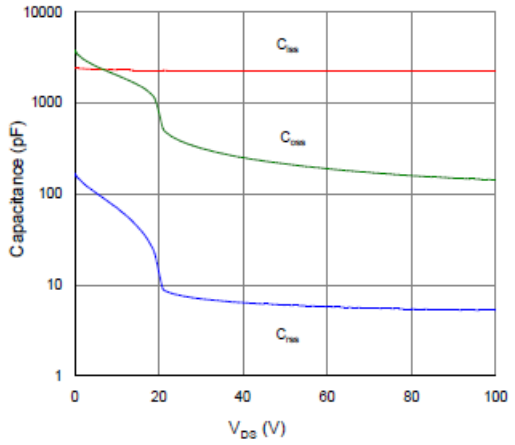



Figure 9. Maximum Safe Operating Area

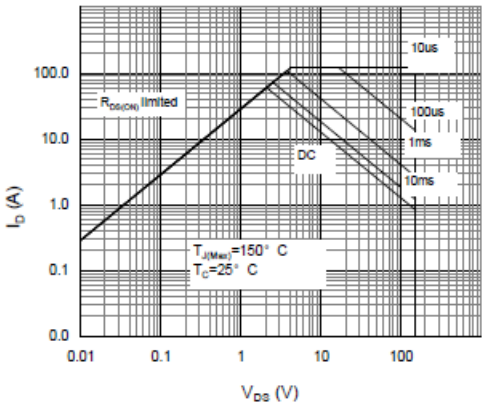



Figure 10. Maximun Drain Current vs. Case Temperature

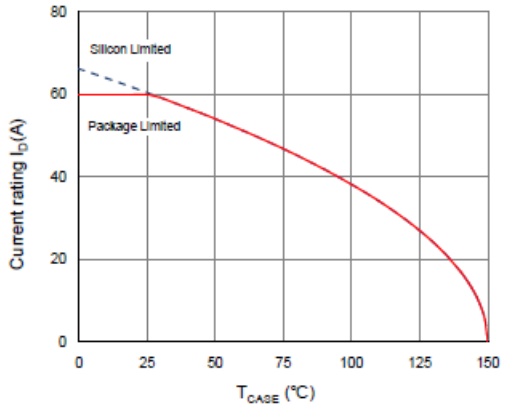
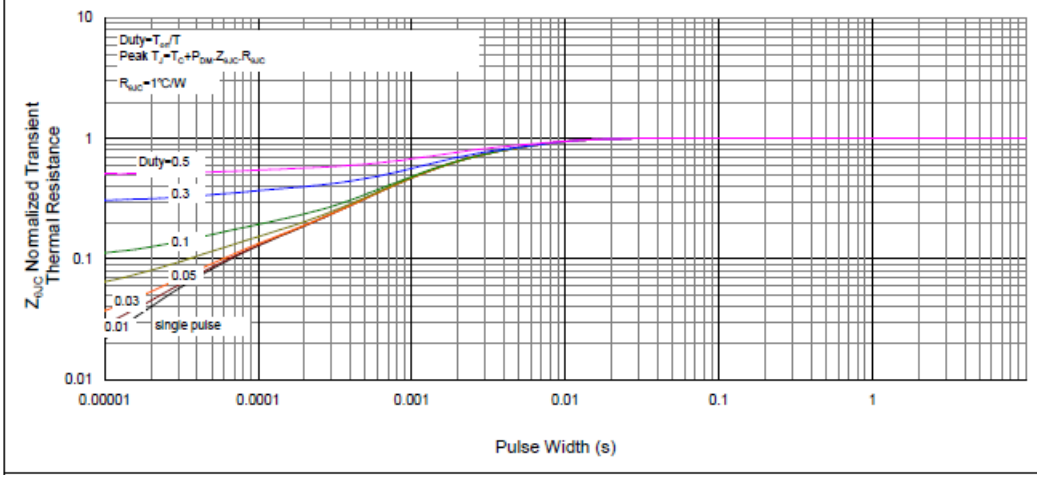
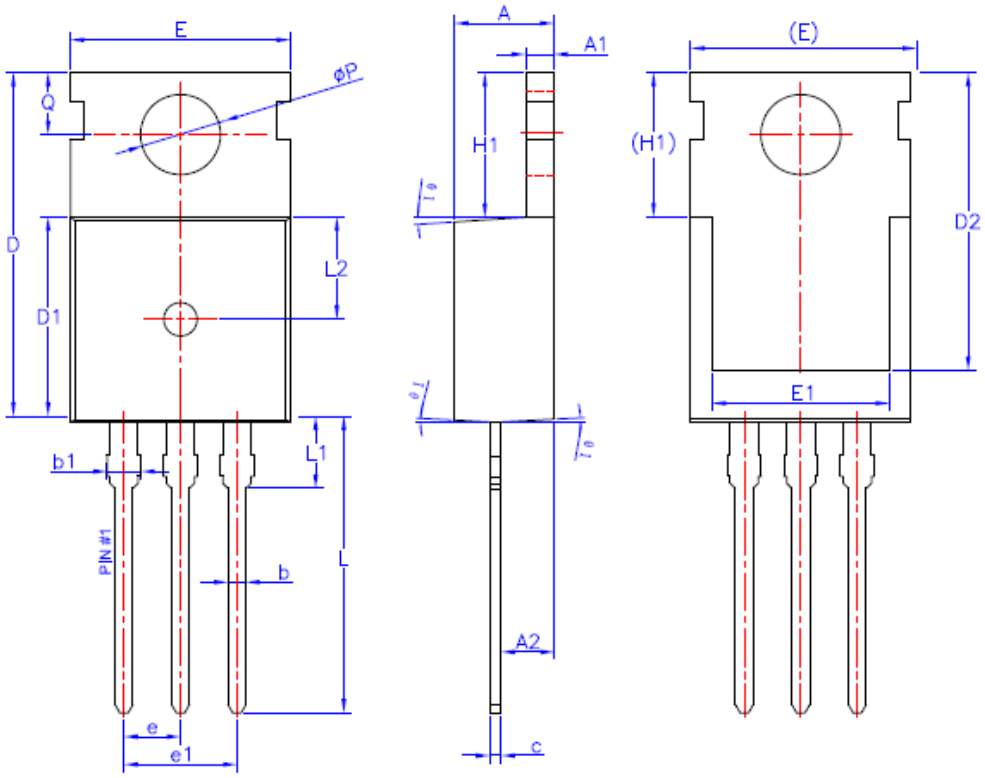



Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

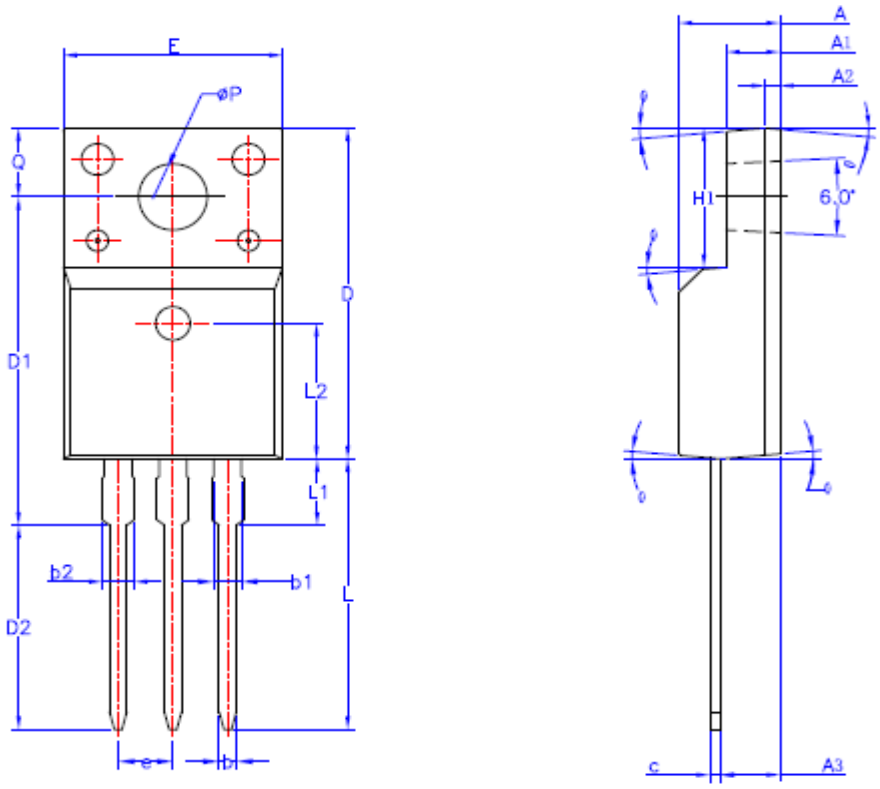


**TO-220-3L PACKAGE OUTLINE**




| 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 | 1.27 | – | 1.40 |
| 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° |

**TO-220F-3L PACKAGE OUTLINE**




| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 4.50 | 4.70 | 4.83 |
| A1 | 2.34 | 2.54 | 2.74 |
| A2 | | 0.70 REF | |
| A3 | 2.56 | 2.76 | 2.93 |
| b | 0.70 | — | 0.90 |
| b1 | 1.18 | — | 1.38 |
| b2 | — | — | 1.47 |
| c | 0.45 | 0.50 | 0.60 |
| D | 15.67 | 15.87 | 16.07 |
| D1 | 15.55 | 15.75 | 15.95 |
| D2 | 9.60 | 9.80 | 10.0 |
| E | 9.96 | 10.16 | 10.36 |
| e | | 2.54BSC | |
| H1 | 6.48 | 6.68 | 6.88 |
| L | 12.68 | 12.98 | 13.28 |
| L1 | — | — | 3.50 |
| L2 | | 6.50REF | |
| øP | 3.08 | 3.18 | 3.28 |
| Q | 3.20 | — | 3.40 |
| θ1 | 1° | 3° | 5° |

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
© http://www.syncpower.com