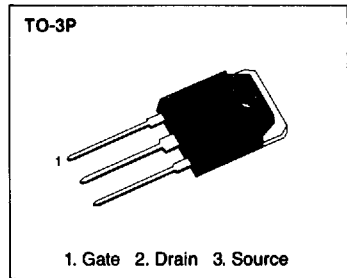


## FEATURES

- Lower  $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability



## PRODUCT SUMMARY

| Part Number | V <sub>DS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|-------------|-----------------|---------------------|----------------|
| SSH5N90     | 900V            | 2.5 $\Omega$        | 5A             |

## ABSOLUTE MAXIMUM RATINGS

| Characteristic   | Symbol                            | SSH5N90     | Unit            |
|--|-----------------------------------|-------------|-----------------|
| Drain-Source Voltage (1)   | V <sub>DSS</sub>                  | 900         | V <sub>dc</sub> |
| Drain-Gate Voltage (R <sub>GS</sub> =1.0M $\Omega$ ) (1)                   | V <sub>DGR</sub>                  | 900         | V <sub>dc</sub> |
| Gate-Source Voltage  | V <sub>GS</sub>                   | $\pm 30$    | V <sub>dc</sub> |
| Continuous Drain Current T <sub>C</sub> =25 °C                             | I <sub>D</sub>                    | 5.0         | A <sub>dc</sub> |
| Continuous Drain Current T <sub>C</sub> =100 °C                            | I <sub>D</sub>                    | 3.5         | A <sub>dc</sub> |
| Drain Current - Pulsed (3)   | I <sub>DM</sub>                   | 20.0        | A <sub>dc</sub> |
| Single Pulsed Avalanche Energy (4)   | E <sub>AS</sub>                   | 430         | mJ              |
| Avalanche Current  | I <sub>AS</sub>                   | 5.0         | A               |
| Total Power Dissipation at T <sub>C</sub> =25 °C                           | P <sub>D</sub>                    | 150         | Watts           |
| Derate Above 25 °C   |                                   | 1.20        | W/ °C           |
| Operating and Storage<br>Junction Temperature Range                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C              |
| Maximum Lead Temp. for Soldering<br>Purposes, 1/8" from case for 5 seconds | T <sub>L</sub>                    | 300         | °C              |

Notes : (1) T<sub>J</sub>=25°C to 150°C

(2) Pulse test : Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

(3) Repetitive rating : Pulse width limited by junction temperature

(4) L=51mH, V<sub>dd</sub>=50V, R<sub>G</sub>=25 $\Omega$ , Starting T<sub>J</sub>=25°C

**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

| Symbol       | Characteristic                                     | Min | Typ  | Max  | Units      | Test Conditions  |
|--------------|--|-----|------|------|------------|--|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                     | 900 | -    | -    | V          | $V_{GS}=0V, I_D=250\mu A$  |
| $V_{GS(th)}$ | Gate Threshold Voltage                             | 2.0 | -    | 4.5  | V          | $V_{DS}=V_{GS}, I_D=250\mu A$  |
| $I_{GSS}$    | Gate-Source Leakage Forward                        | -   | -    | 100  | nA         | $V_{GS}=20V$   |
| $I_{GSS}$    | Gate-Source Leakage Reverse                        | -   | -    | -100 | nA         | $V_{GS}=-20V$  |
| $I_{DSS}$    | Zero Gate Voltage Drain Current                    | -   | -    | 250  | $\mu A$    | $V_{DS}=\text{Max. Rating}, V_{GS}=0V$   |
|              |  | -   | -    | 1000 | $\mu A$    | $V_{DS}=0.8 \text{ Max. Rating}, V_{GS}=0V, T_C=150^\circ\text{C}$   |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance(2)               | -   | 1.7  | 2.5  | $\Omega$   | $V_{GS}=10V, I_D=2.5A$   |
| $g_{fs}$     | Forward Transconductance (2)                       | 3.5 | -    | -    | $\text{U}$ | $V_{DS}=15V, I_D=2.5A$   |
| $C_{iss}$    | Input Capacitance                                  | -   | 1700 | -    | pF         | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$   |
| $C_{oss}$    | Output Capacitance                                 | -   | 140  | -    | pF         |  |
| $C_{rss}$    | Reverse Transfer Capacitance                       | -   | 60   | -    | pF         |  |
| $t_{d(on)}$  | Turn-On Delay Time                                 | -   | 40   | -    | ns         | $V_{DD}=0.5 BV_{DSS}, I_D=5.0A, Z_\theta=9.1\Omega$<br>(MOSFET switching times are essentially independent of operating temperature) |
| $t_r$        | Rise Time  | -   | 90   | -    | ns         |  |
| $t_{d(off)}$ | Turn-Off Delay Time                                | -   | 250  | -    | ns         |  |
| $t_f$        | Fall Time  | -   | 100  | -    | ns         |  |
| $Q_g$        | Total Gate Charge<br>(Gate-Source Plus Gate-Drain) | -   | -    | 110  | nC         | $V_{GS}=10V, I_D=5A, V_{DS}=0.8 \text{ Max. Rating}$<br>(Gate charge is essentially independent of operating temperature)            |
| $Q_{gs}$     | Gate-Source Charge                                 | -   | 13   | -    | nC         |  |
| $Q_{gd}$     | Gate-Drain ("Miller") Charge                       | -   | 40   | -    | nC         |  |

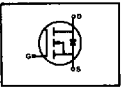
**THERMAL RESISTANCE**

| Symbol     | Characteristics     |     | SSH5N90 | Units | Remark                |
|------------|---------------------|-----|---------|-------|-----------------------|
| $R_{thJC}$ | Junction-to-Case    | MAX | 0.73    | K/W   |                       |
| $R_{thCS}$ | Case-to-Sink        | TYP | 0.24    | K/W   | Mounting surface flat |
| $R_{thJA}$ | Junction-to-Ambient | MAX | 40      | K/W   | Free Air Operation    |

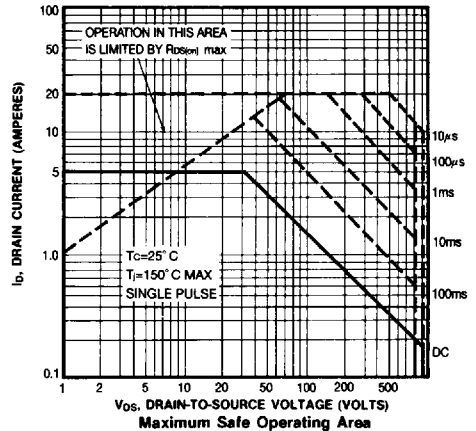
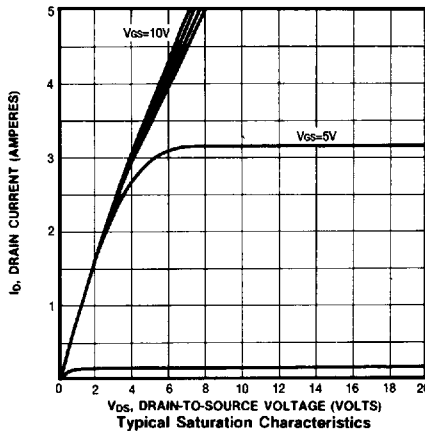
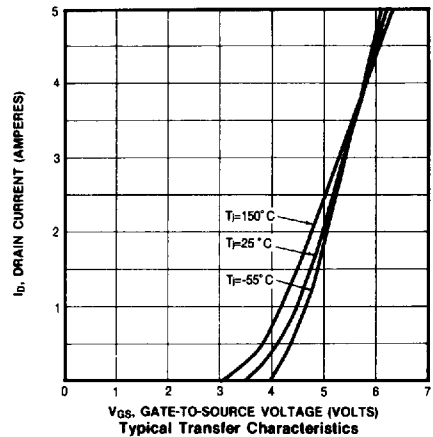
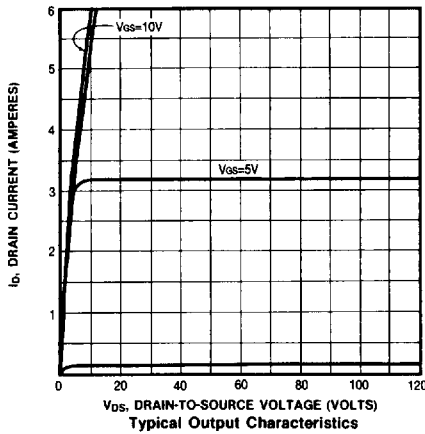
Notes : (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$ (2) Pulse test : Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ 

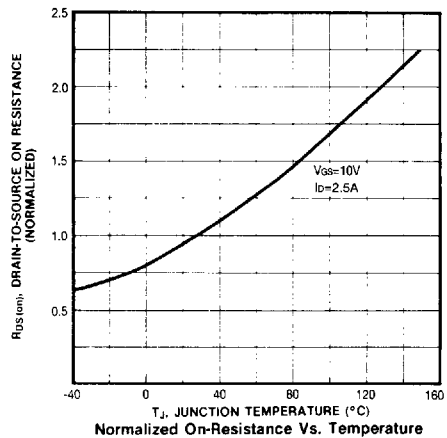
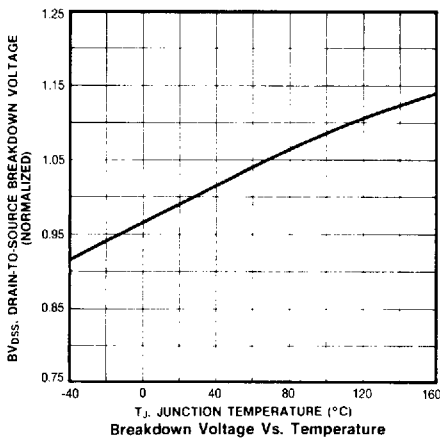
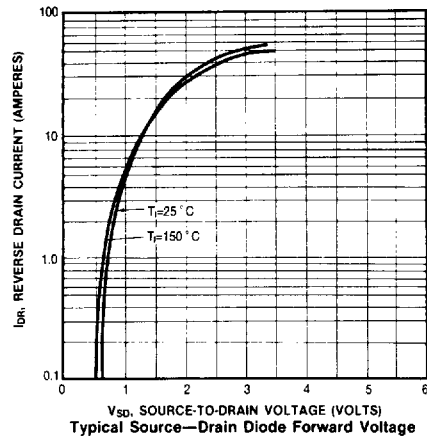
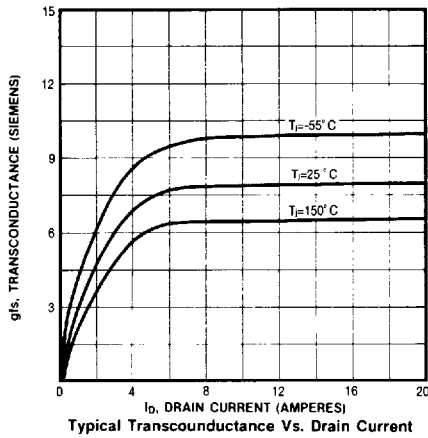
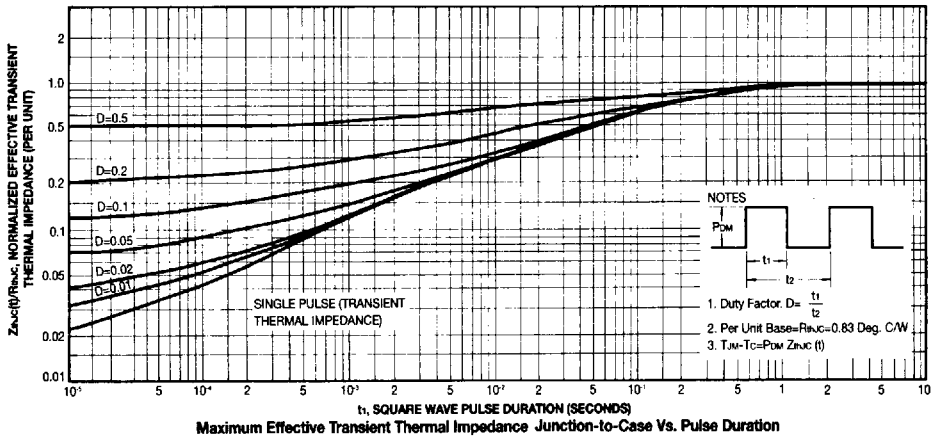
(3) Repetitive rating : Pulse width limited by max. junction temperature

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol   | Characteristic                            | Min | Typ | Max | Units | Test Conditions   |
|----------|---|-----|-----|-----|-------|---|
| $I_S$    | Continuous Source Current<br>(Body Diode) | -   | -   | 5   | A     | Modified MOSFET symbol showing the integral reverse P-N junction rectifier<br> |
| $I_{SM}$ | Pulse Source Current<br>(Body Diode) (3)  | -   | -   | 20  | A     |   |
| $V_{SD}$ | Diode Forward Voltage (2)                 | -   | -   | 1.5 | V     | $T_J=25^\circ\text{C}$ , $I_S=5\text{A}$ , $V_{GS}=0\text{V}$   |
| $t_r$    | Reverse Recovery Time                     | -   | 500 | -   | ns    | $T_J=25^\circ\text{C}$ , $I_F=5\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{S}$  |

- Notes : (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$   
 (2) Pulse test : Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating : Pulse width limited by max. junction temperature





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