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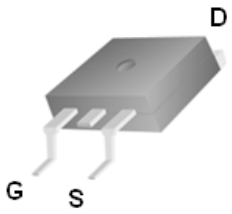
# P9006ESG

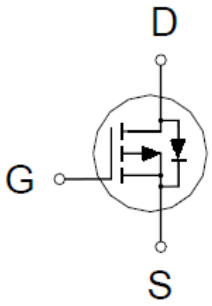
## P-Channel Enhancement Mode MOSFET

### PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| -60V | 90mΩ @$V_{GS}$ = 10V | -18A |




TO-263




### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current | $T_C$ = 25 °C | $I_D$ | -18 | A |
| | $T_C$ = 100 °C | | -12 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | -48 | |
| Avalanche Current | | $I_{AS}$ | -22 | |
| Avalanche Energy | L = 0.1mH | $E_{AS}$ | 24 | mJ |
| Power Dissipation | $T_C$ = 25 °C | $P_D$ | 54 | W |
| | $T_C$ = 100 °C | | 22 | |
| Junction & Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | SYMBOL | TYPICAL | MAXIMUM | UNITS |
|---|---|---|---|---|
| Junction-to-Case | $R_{\theta JC}$ | | 2.3 | °C / W |

[1]limited by maximum junction temperature.

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### ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C, Unless Otherwise Noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = -250μA | -60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = -250μA | -1 | -1.7 | -3 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = -48V, $V_{GS}$ = 0V | | | -1 | μA |
| | | $V_{DS}$ = -40V, $V_{GS}$ = 0V , $T_J$ = 125 °C | | | -10 | |
| On-State Drain Current[1] | $I_{D(ON)}$ | $V_{DS}$ = -5V, $V_{GS}$ = -10V | -48 | | | A |
| Drain-Source On-State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$ = -4.5V, $I_D$ = -3.5A | | 70 | 135 | mΩ |
| | | $V_{GS}$ = -10V, $I_D$ = -4.5A | | 54 | 90 | |
| Forward Transconductance[1] | $g_{fs}$ | $V_{DS}$ = -5V, $I_D$ = -4.5A | | 12 | | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = -25V, f = 1MHz | | 1070 | | pF |
| Output Capacitance | $C_{oss}$ | | | 99 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 64 | | |
| Total Gate Charge[2] | $Q_g$ | $V_{DS}$ = 0.5$V_{(BR)DSS}$, $V_{GS}$ = -10V, $I_D$ = -4.5A | | 22 | | nC |
| Gate-Source Charge[2] | $Q_{gs}$ | | | 3 | | |
| Gate-Drain Charge[2] | $Q_{gd}$ | | | 6 | | |
| Turn-On Delay Time[2] | $t_{d(on)}$ | $V_{DS}$ = -20V, $I_D$ ≅ -5A, $V_{GS}$ = -10V, $R_{GEN}$ = 6Ω | | 9 | | nS |
| Rise Time[2] | $t_r$ | | | 15 | | |
| Turn-Off Delay Time[2] | $t_{d(off)}$ | | | 36 | | |
| Fall Time[2] | $t_f$ | | | 11 | | |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_J$ = 25 °C)** | | | | | | |
| Continuous Current | $I_S$ | | | | -18 | A |
| Forward Voltage[1] | $V_{SD}$ | $I_F$ = -4.5A, $V_{GS}$ = 0V | | | -1 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = -4.5A, $dI_F/dt$ = 100A / μS | | 19 | | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | | 14 | | nC |

[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

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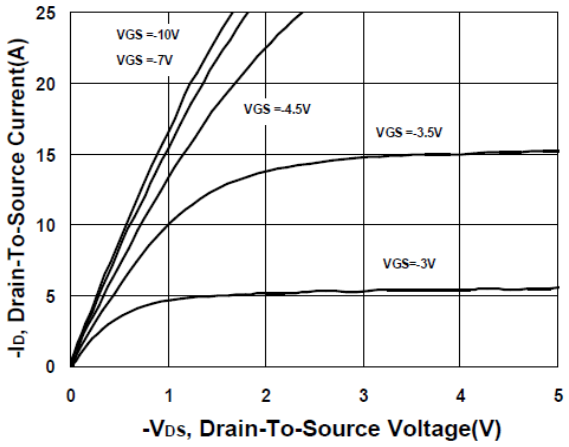
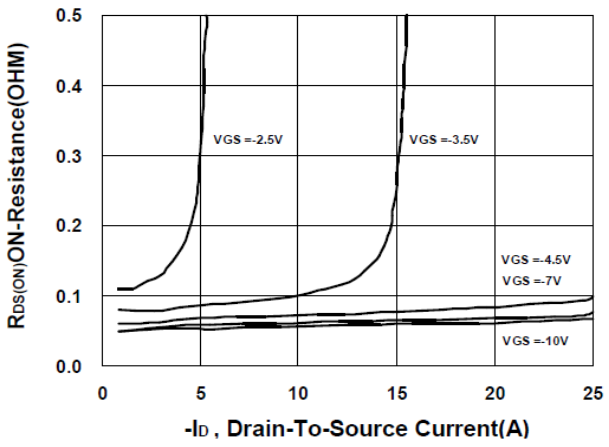
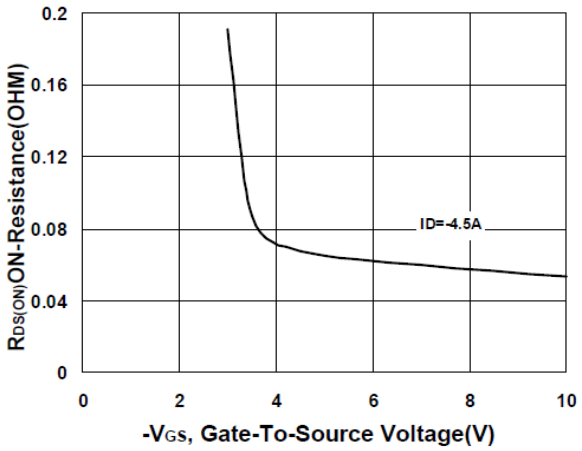
### Output Characteristics



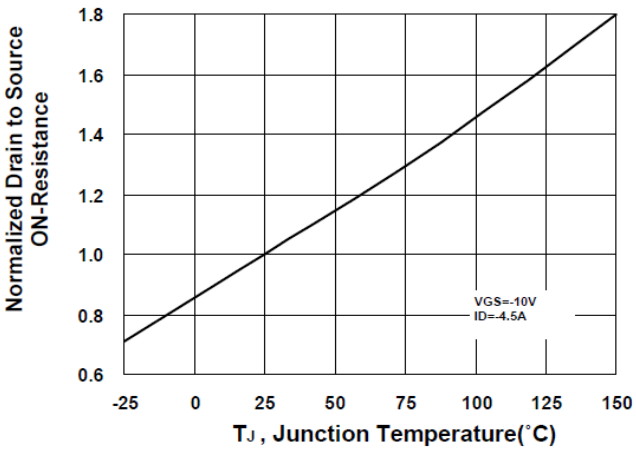

### On-Resistance VS Drain Current



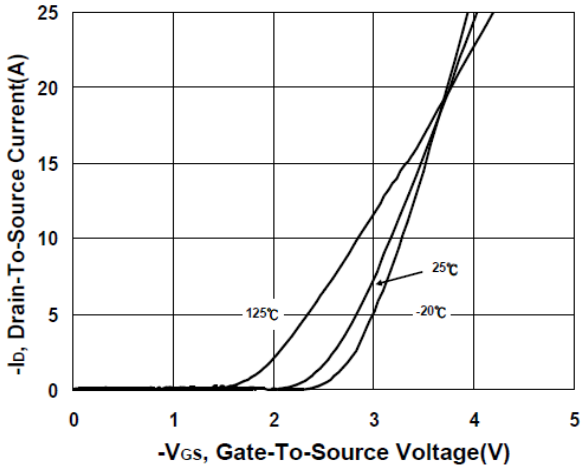

### On-Resistance VS Gate-To-Source



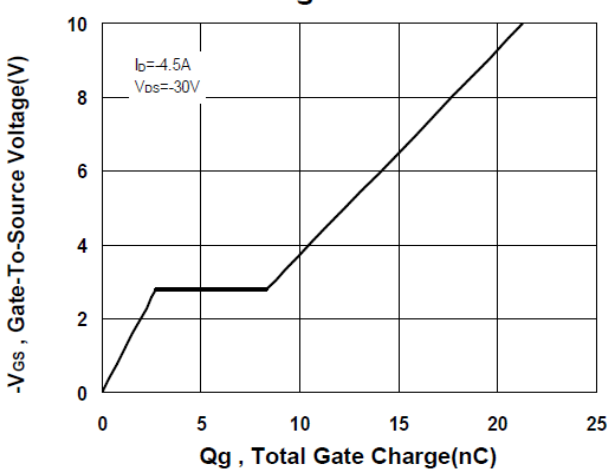

### On-Resistance VS Temperature




### Transfer Characteristics




### Gate charge Characteristics



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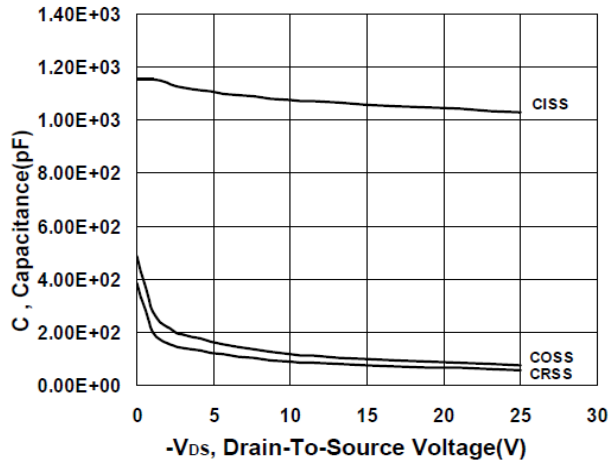
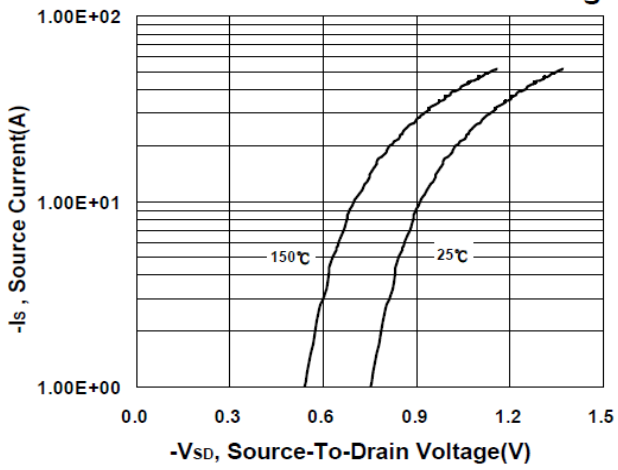
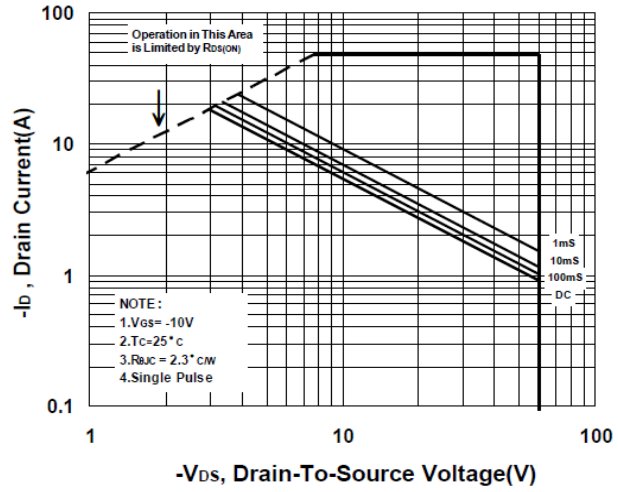
### Capacitance Characteristic



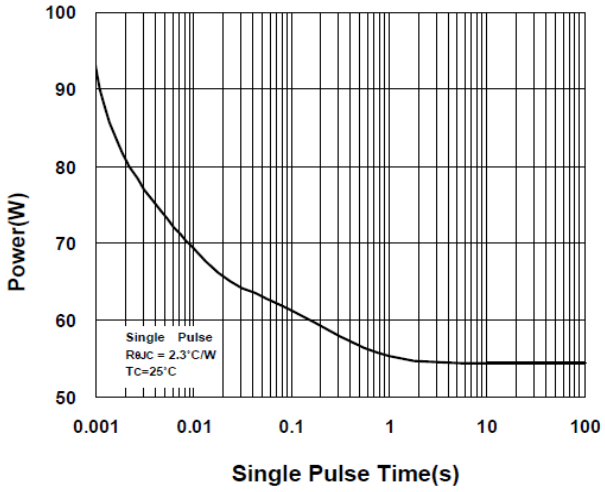

### Source-Drain Diode Forward Voltage



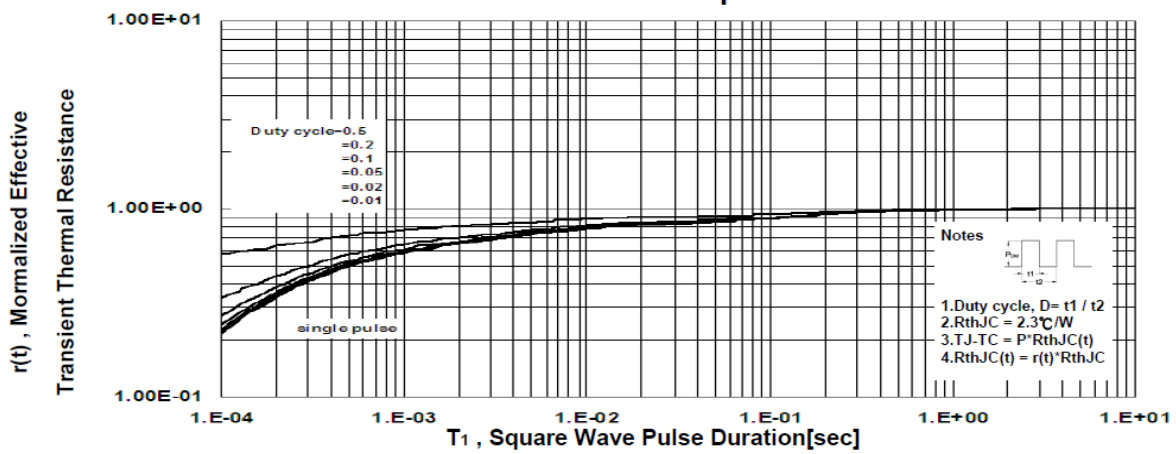

### Safe Operating Area




### Single Pulse Maximum Power Dissipation




### Transient Thermal Response Curve



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### Package Dimension

## TO-263 ($D^2$PAK) MECHANICAL DATA

| Dimension | mm | | | Dimension | mm | | |
|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | Min. | Typ. | Max. |
| A | 4.2 | | 4.8 | e | 4.08 | 5.08 | 6.08 |
| A1 | 0 | | 0.3 | E | 9.8 | | 10.55 |
| b | 0.71 | | 1.06 | E1 | 6.9 | | 8.7 |
| b2 | 1.07 | | 1.47 | H | 14.2 | | 15.8 |
| C | 0.3 | | 0.69 | L | 1.2 | | 2.79 |
| C2 | 1.15 | | 1.45 | L1 | 1 | | 1.65 |
| D | 8.3 | | 9.4 | L2 | 1.2 | | 1.78 |
| D1 | 6.37 | | 8.23 | | | | |