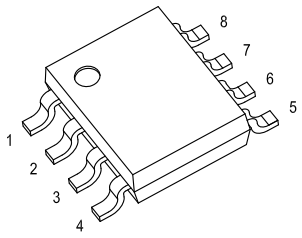
# SOP-8 Plastic-Encapsulate MOSFET

## 60V N-Channel MOSFET

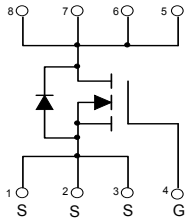
### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---|---|---|
| 60V | 8.7mΩ@10V | 9A |
| | 11.5mΩ@4.5V | |

**SOP8**




**Schematic diagram**



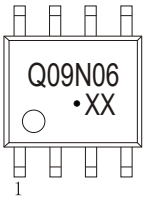

### Feature

- High density cell design for ultra low $R_{DS(ON)}$
- Excellent package for good heat dissipation

### Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

### MARKING:




Front side

Q09N06 = Device Code

YY = Date Code

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25℃ unless otherwise noted)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current[1,2] | | $I_D$ | 9 | A |
| Pulsed Drain Current | | $I_{DM}$ | 36 | A |
| Single Pulsed Avalanche Energy | | $E_{AS}$* | 16 | mJ |
| Power Dissipation | | $P_D$ | 3.1 | W |
| Thermal Resistance from Junction to Ambient[1] | t ≤ 10sec. | $R_{\theta JA}$ | 40 | ℃/W |
| | Steady-State | | 65 | ℃/W |
| Junction Temperature | | $T_J$ | 150 | ℃ |
| Storage Temperature | | $T_{STG}$ | -55~ +150 | ℃ |

*$E_{AS}$ Test Condition $V_{DD}$ = 15V, $V_{GS}$ = 10V, L = 0.1mH, $I_{AS}$ = 18A

## Electrical Characteristics ($T_A$=25℃ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 60 | | | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ = 60V, $V_{GS}$ = 0V | | | 1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | | | ±100 | nA |
| **On Characteristics** | | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1 | 1.5 | 2.5 | V |
| Drainsource onresistance | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 9A | | 8.7 | 16 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 9A | | 11.5 | 18 | |
| Forward transconductance | $g_{FS}$ | $V_{DS}$ = 5V, $I_D$ = 9A | 10 | 20 | | S |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 30V, $V_{GS}$ = 0V, f = 1MHz | | 2595 | | pF |
| Output Capacitance | $C_{oss}$ | | | 177 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 163 | | |
| Gate resistance | $R_g$ | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz | | 2 | | Ω |
| **Switching Characteristics** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 30V, $V_{GS}$ = 10V, $I_D$ = 8A | | 62 | | nC |
| GateSource Charge | $Q_{gs}$ | | | 10 | | |
| GateDrain Charge | $Q_{gd}$ | | | 21 | | |
| Turnon delay time | $t_{d(on)}$ | $V_{DD}$ = 30V, $R_G$ = 3Ω,$V_{GS}$ = 10V, $R_L$ = 3Ω | | 9.5 | | ns |
| Turnon rise time | $t_r$ | | | 7 | | |
| Turnoff delay time | $t_{d(off)}$ | | | 35 | | |
| Turnoff fall time | $t_f$ | | | 6 | | |
| **Diode Characteristics** | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V , $I_S$ = 9A | | | 1.2 | V |

Notes :

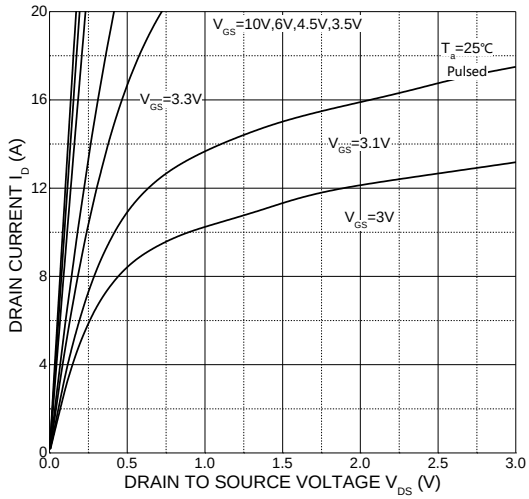
1.$R_{\theta JA}$ is measured with the device mounted on 1 $in^2$ FR4 board with 1oz. single side copper, in a still air environment with $T_A$ = 25°C.

2.$R_{\theta JA}$ is measured in the steady state

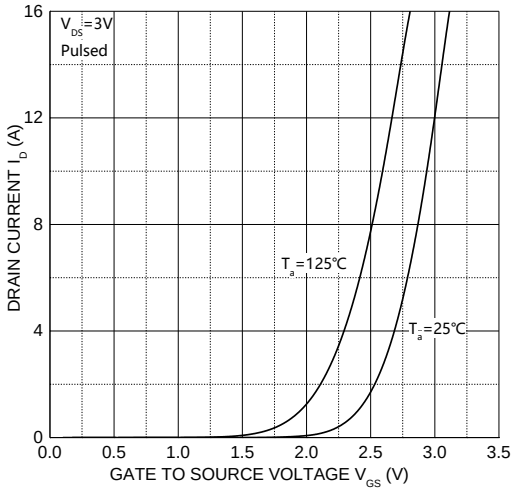
3.Pulse test : Pulse width ≤ 380μs, duty cycle ≤ 2%.

## Typical Characteristics

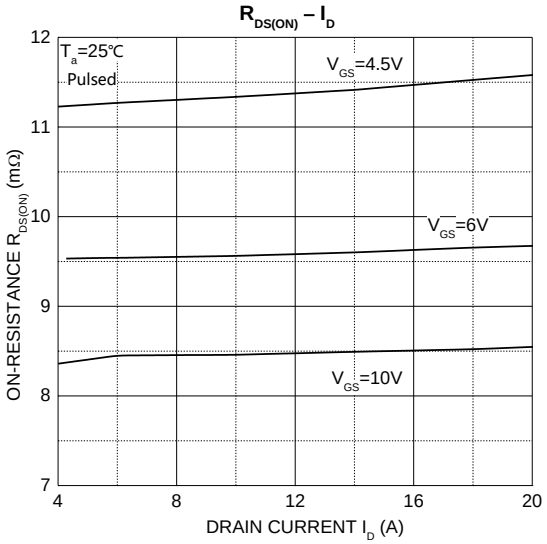
**Output Characteristics**



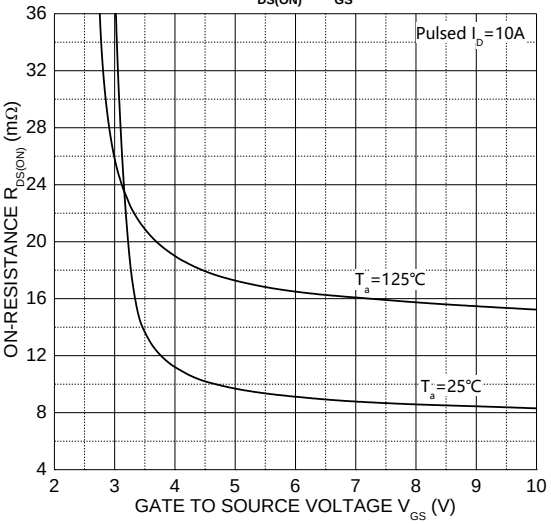

**Transfer Characteristics**



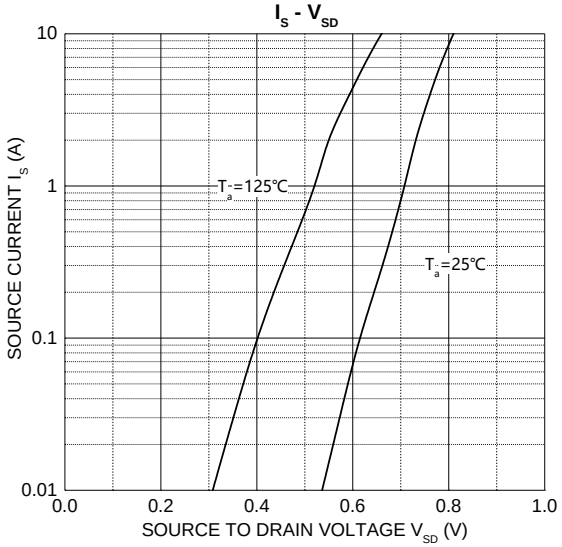

**$R_{DS(ON)}$ – $I_D$**



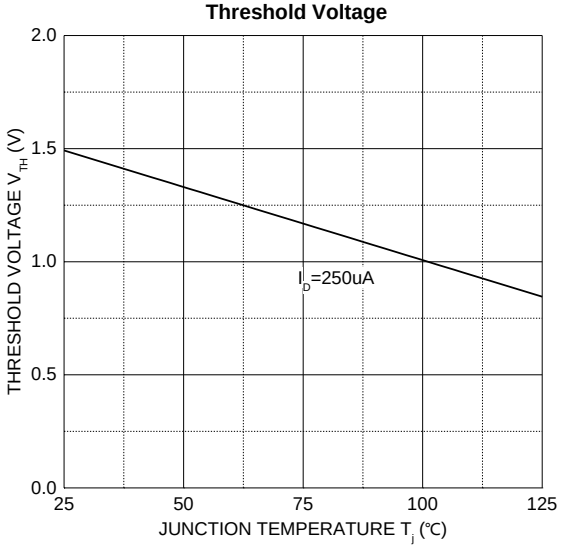

**$R_{DS(ON)}$ - $V_{GS}$**



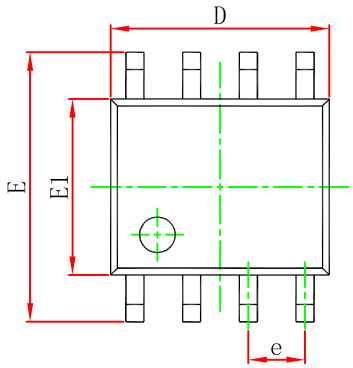

**$I_S$ - $V_{SD}$**

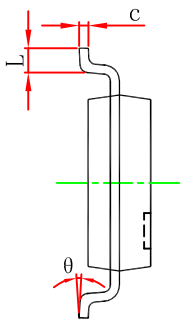


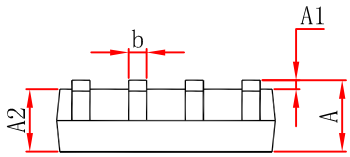

**Threshold Voltage**



## SOP-8 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | **Min** | **Max** | **Min** | **Max** |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |