

## General Description

The MY60N10S uses advanced Trench technology and designs to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in PWM load switching and general purpose applications.

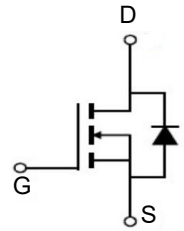
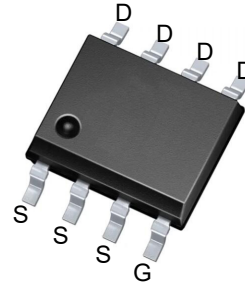


## Features

|                                  |     |            |
|----------------------------------|-----|------------|
| $V_{DSS}$                        | 60  | V          |
| $I_D$                            | 9   | A          |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | <12 | m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | <14 | m $\Omega$ |

## Application

- Motor / Body Load Control
- Load Switch
- DC-DC converters and Off-line UPS



## Package Marking and Ordering Information

| Product ID | Pack  | Marking | Qty(PCS) |
|------------|-------|---------|----------|
| MY60N10S   | SOP-8 | N/A     | 3000     |

## Absolute Maximum Ratings ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                              | Symbol    | Value       | Unit               |
|----------------------------------------|-----------|-------------|--------------------|
| Drain-Source Voltage                   | $V$       | 60          | V                  |
| Gate-Source Voltage                    | $V_{GS}$  | $\pm 20$    | V                  |
| Drain Current-Continuous               | $I_D$     | 9           | A                  |
|                                        |           | 7           | A                  |
| Drain Current-Pulsed <sup>Note 1</sup> | $I_{DM}$  | 32          | A                  |
| Avalanche Current                      | $I_{AS}$  | 36          | A                  |
| Avalanche Energy, $L=0.1\text{mH}$     | $E_{AS}$  | 64          | mJ                 |
| Maximum Power Dissipation              | $P_D$     | 1.5         | W                  |
|                                        |           | 0.9         | W                  |
| Storage Temperature Range              | $T_{STG}$ | -55 to +150 | $^{\circ}\text{C}$ |
| Operating Junction Temperature Range   | $T_J$     | -55 to +150 | $^{\circ}\text{C}$ |

### Thermal Resistance Ratings

| Parameter                   | Symbol          | Conditions   | Min. | Typ. | Max. | Unit                 |
|-----------------------------|-----------------|--------------|------|------|------|----------------------|
| Maximum Junction-to-Ambient | $R_{\theta JA}$ | Steady State | -    | -    | 85   | $^{\circ}\text{C/W}$ |
| Maximum Junction-to-Case    | $R_{\theta JC}$ | Steady State | -    | -    | 24   | $^{\circ}\text{C/W}$ |

**Electrical Characteristics ( $T_J=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

| OFF CHARACTERISTICS             |            |                                 |      |      |           |         |
|---------------------------------|------------|---------------------------------|------|------|-----------|---------|
| Parameter                       | Symbol     | Conditions                      | Min. | Typ. | Max.      | Unit    |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$ | $V_{GS}=0V$ , $I_{DS}=250\mu A$ | 60   | -    | -         | V       |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS}=48V$ , $V_{GS}=0V$      | -    | -    | 1         | $\mu A$ |
| Gate-Body Leakage               | $I_{GSS}$  | $V_{GS}=\pm 20V$ , $V_{DS}=0V$  | -    | -    | $\pm 100$ | nA      |

| ON CHARACTERISTICS               |              |                                     |      |      |      |            |
|----------------------------------|--------------|-------------------------------------|------|------|------|------------|
| Parameter                        | Symbol       | Conditions                          | Min. | Typ. | Max. | Unit       |
| Gate Threshold Voltage           | $V_{GS(TH)}$ | $V_{DS}=V_{GS}$ , $I_{DS}=250\mu A$ | 1.2  | -    | 2.5  | V          |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=10V$ , $I_{DS}=9A$          | -    | 10   | 12   | m $\Omega$ |
| Drain-Source On-State Resistance |              | $V_{GS}=4.5V$ , $I_{DS}=6A$         | -    | 12   | 14   |            |

| DYNAMIC CHARACTERISTICS      |           |                                       |      |      |      |          |
|------------------------------|-----------|---------------------------------------|------|------|------|----------|
| Parameter                    | Symbol    | Conditions                            | Min. | Typ. | Max. | Unit     |
| Input Capacitance            | $C_{iss}$ | $V_{DS}=30V$ , $V_{GS}=0V$ , $f=1MHz$ | -    | 2037 | -    | pF       |
| Output Capacitance           | $C_{oss}$ |                                       | -    | 160  | -    |          |
| Reverse Transfer Capacitance | $C_{rss}$ |                                       | -    | 78   | -    |          |
| Gate Resistance              | $R_g$     | $V_{GS}=0V$ , $V_{DS}=0V$ , $f=1MHz$  | -    | 0.6  | -    | $\Omega$ |

| SWITCHING CHARACTERISTICS     |            |                                                           |      |      |      |      |
|-------------------------------|------------|-----------------------------------------------------------|------|------|------|------|
| Parameter                     | Symbol     | Conditions                                                | Min. | Typ. | Max. | Unit |
| Turn-On Delay Time            | $T_d(on)$  | $V_{DD}=15V$ , $I_D=9A$ ,<br>$V_{GS}=10V$ , $R_g=6\Omega$ | -    | 9.3  | -    | ns   |
| Rise Time                     | $t_r$      |                                                           | -    | 27.4 | -    |      |
| Turn-Off Delay Time           | $T_d(off)$ |                                                           | -    | 43.9 | -    |      |
| Fall Time                     | $t_f$      | $V_{DS}=30V$ , $I_{DS}=9A$ , $V_{GS}=10V$                 | -    | 10.6 | -    | nC   |
| Total Gate Charge             | $Q_g$      |                                                           | -    | 38   | -    |      |
| Gate to Source Gate Charge    | $Q_{gs}$   |                                                           | -    | 5.7  | -    |      |
| Gate to Drain "Miller" Charge | $Q_{gd}$   |                                                           | -    | 8.5  | -    |      |

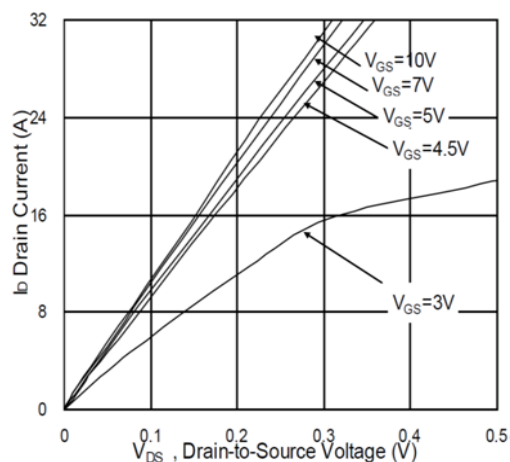
| DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS |          |                              |      |      |      |      |
|--------------------------------------------------------|----------|------------------------------|------|------|------|------|
| Parameter                                              | Symbol   | Conditions                   | Min. | Typ. | Max. | Unit |
| Maximum Body-Diode Continuous Current                  | $I_S$    | $V_G=V_D=0V$ , Force Current | -    | -    | 9    | A    |
| Pulsed Source Current                                  | $I_{SM}$ | $V_G=V_D=0V$ , Force Current | -    | -    | 32   | A    |
| Drain-Source Diode Forward Voltage                     | $V_{SD}$ | $V_{GS}=0V$ , $I_S=1A$       | -    | 0.8  | 1.2  | V    |

Notes:

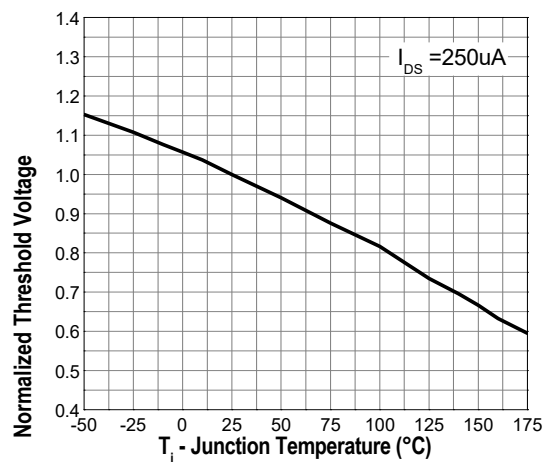
1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
2.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  shown below for single device operation on FR-4 in still air.

## Typical Characteristics

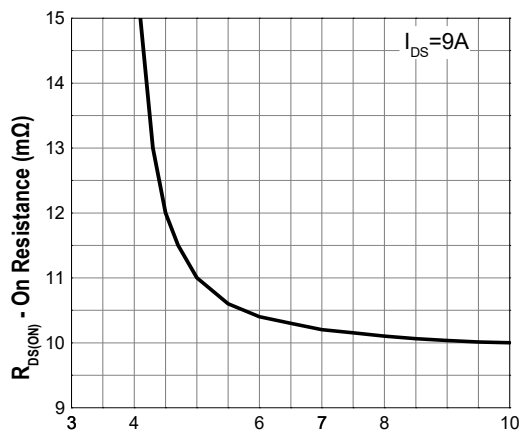
Output Characteristics



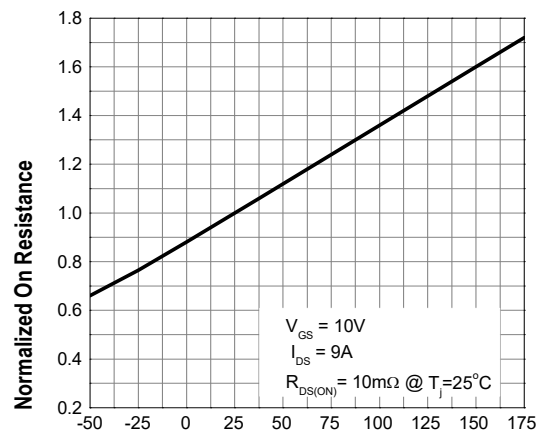
Gate Threshold Voltage



Gate-Source On Resistance

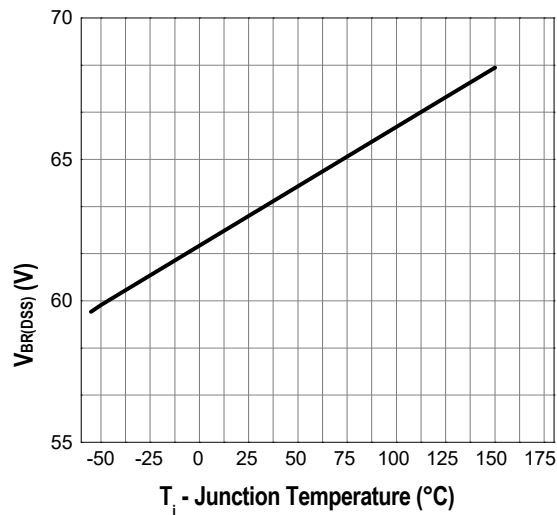
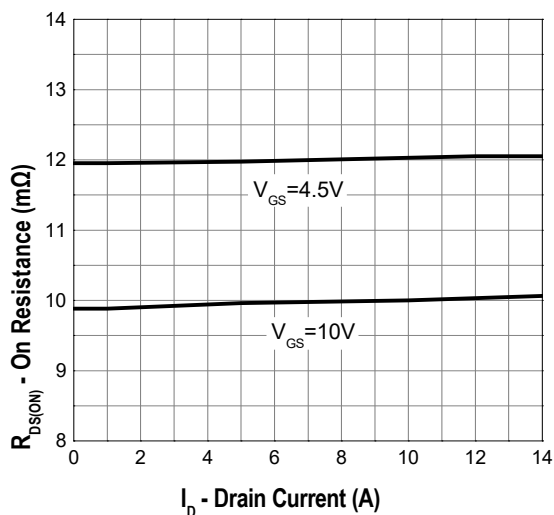


Drain-Source On Resistance

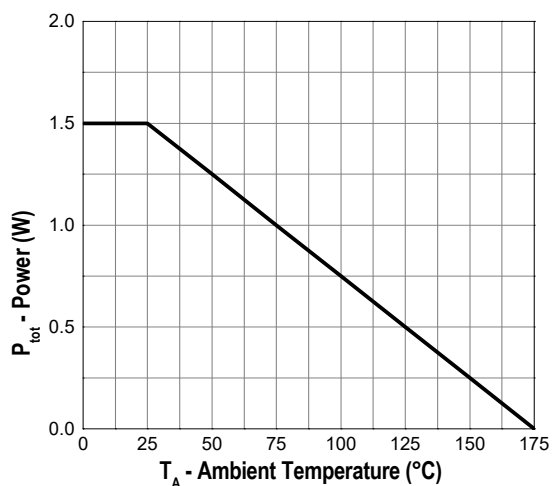


$V_{GS}$  - Gate-Source Voltage (V) Drain-Source On Resistance

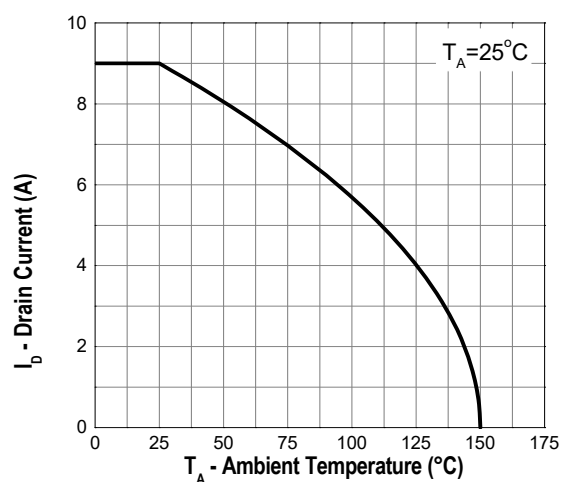
$T_J$  - Junction Temperature (°C) Drain-source Breakdown Voltage



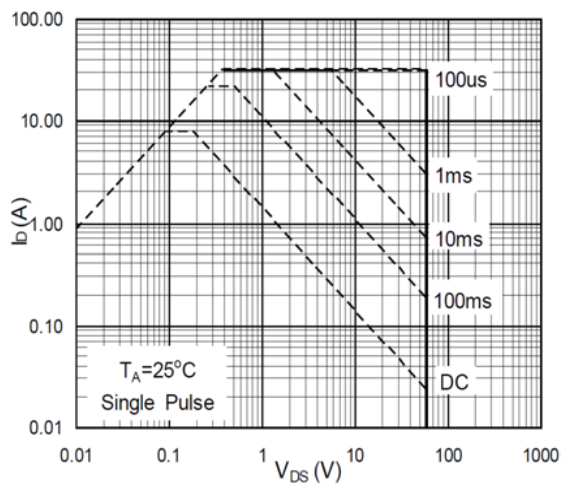
**Power Dissipation**



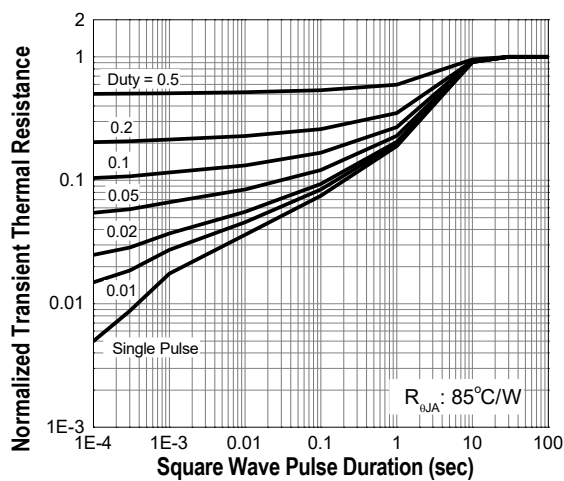
**Drain Current**



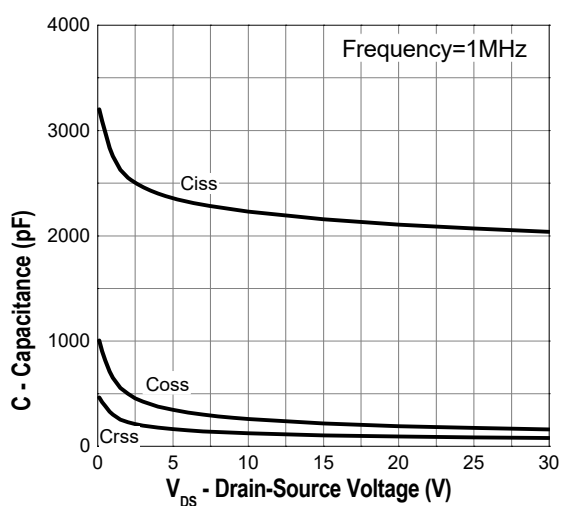
**Safe Operation Area**



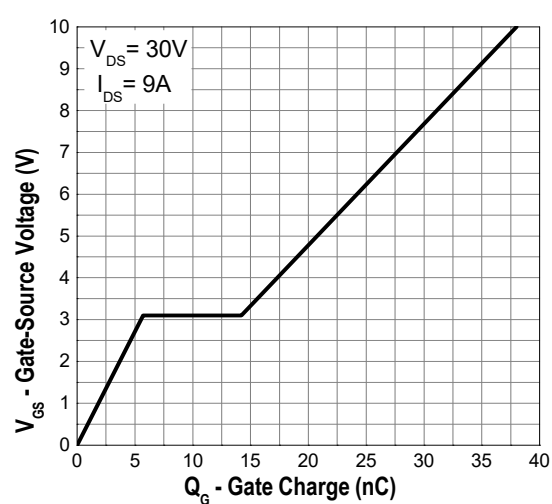
**Transient Thermal Impedance**



**Capacitance**



**Gate Charge**



Package Mechanical Data-SOP-8

