# Dual N-Channel Enhancement Mode Field Effect Transistor with ESD Protection

## Features

$V_{DS}$ (V) = 20V

$I_D$ = 7A ($V_{GS}$ = 4.5V)

$R_{DS(ON)}$ <24mΩ ($V_{GS}$ = 4.5V)

$R_{DS(ON)}$ <40mΩ ($V_{GS}$ = 2.5V)

$R_{DS(ON)}$ <60mΩ ($V_{GS}$ = 2V)

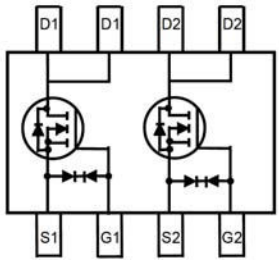
ESD Protected : 2000V

Standard Product HX9926ESQ is Pb-free.

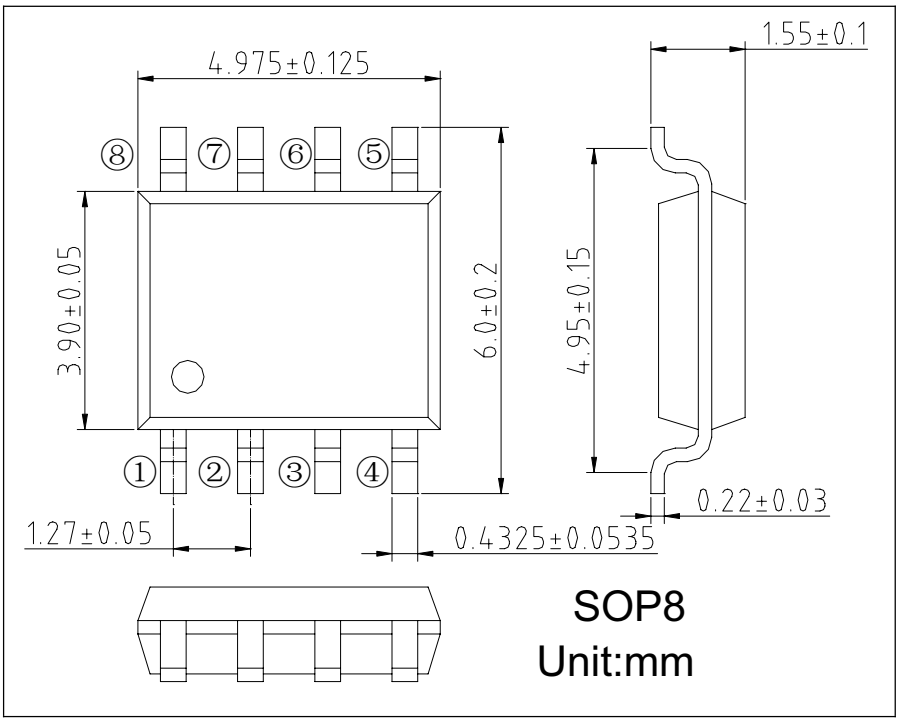
## General Description

The HX9926ESQ uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. They offer operation over a wide gate drive range from 1.8V to 12V. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration.

## Pin Configurations




## Package Information




## Absolute Maximum Ratings @$T_A$=25℃ unless otherwise noted

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 20 | V |

| | | | | |
|---|---|---|---|---|
| Gate-Source Voltage | | $V_{GSS}$ | ±12 | V |
| Drain Current (Continuous) *AC | $T_A$=25°C | $I_D$ | 7 | A |
| | $T_A$=70°C | | 5.6 | |
| Drain Current (Pulse) *B | | $I_{DM}$ | 24 | A |
| Power Dissipation | $T_A$=25°C | $P_D$ | 2 | W |
| | $T_A$=70°C | | 1.3 | |
| Operating Temperature/ Storage Temperature | | $T_{JI}/T_{STG}$ | -55~150 | ℃ |

- **Electrical Characteristics** @$T_A$=25℃ unless otherwise noted

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 20 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 20 V, $V_{GS}$ = 0V | -- | -- | 1 | μA |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_{DS}$ = 250μA | 0.6 | 0.77 | 1 | V |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ =±12V, $V_{DS}$ = 0V | -- | -- | 10 | μA |
| Drain-Source On-state Resistance | $R_{DS(on)}$ | $V_{GS}$ = 4.5V, $I_D$ = 6.5A | -- | 17.5 | 24 | mΩ |
| | | $V_{GS}$ = 2.5V, $I_D$ = 4.2A | -- | 24 | 40 | mΩ |
| | | $V_{GS}$ = 2V, $I_D$ = 2A | -- | 31 | 60 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =10V, $I_D$ = 6A | -- | 16 | -- | S |
| Diode Forward Voltage | $V_{SD}$ | $I_{SD}$ = 1.7A , $V_{GS}$ = 0V | -- | 0.8 | 1.6 | V |
| Maximum Body-Diode Continuous Current | $I_S$ | | -- | -- | 1.7 | A |
| **Switching** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=4.5V, $V_{DS}$=10V, $I_D$=6A | -- | 15 | 19.5 | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 3.4 | 4.42 | nC |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 1.2 | 1.56 | nC |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{GS}$=4.5V, $V_{DS}$=10V, $R_L$=10Ω,$R_{GEN}$=6Ω | -- | 140 | 280 | ns |
| Turn-on Rise Time | $t_r$ | | -- | 210 | 420 | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 390 | 780 | ns |
| Turn-off Fall Time | $t_f$ | | -- | 220 | 440 | ns |
| **Dynamic** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=8V, f=1MHz | -- | 950 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 450 | -- | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 135 | -- | pF |

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

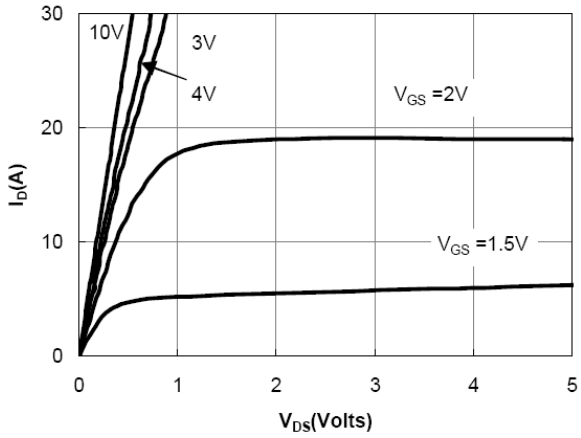



Figure 1: On-Regions CharacteristiCS

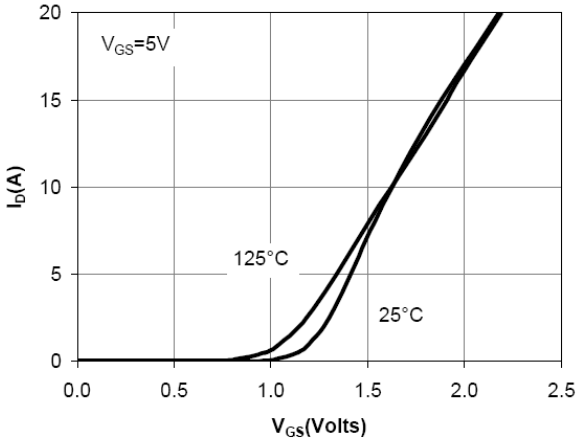



Figure 2: Transfer Characteristics

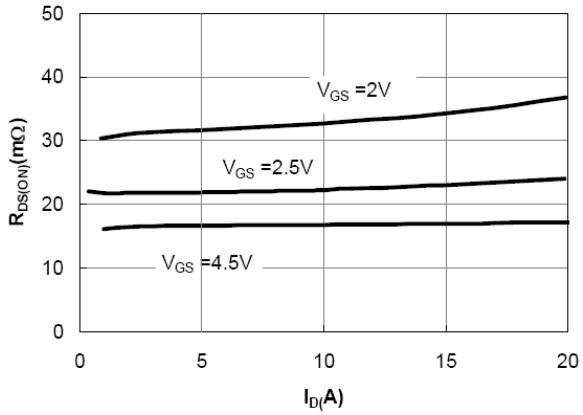



Figure 3: On-Resistance vs. Drain Current and Gate Voltage

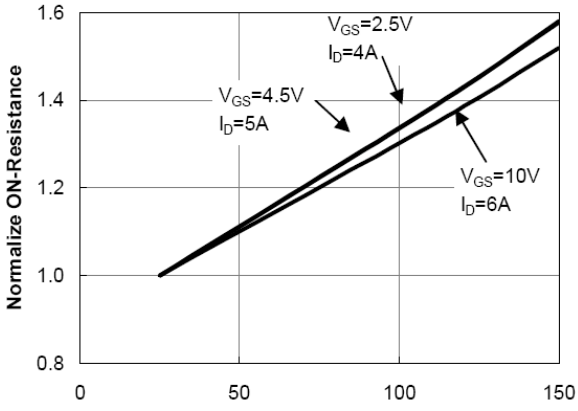



Figure 4: On-Resistance vs. Junction Temperature

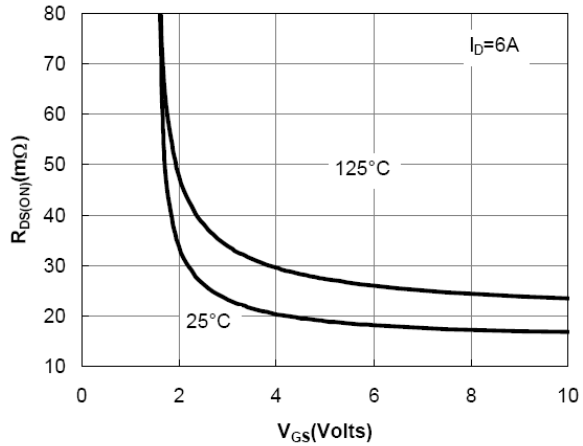



Figure 5: On-Resistance vs. Gate-Source Voltage

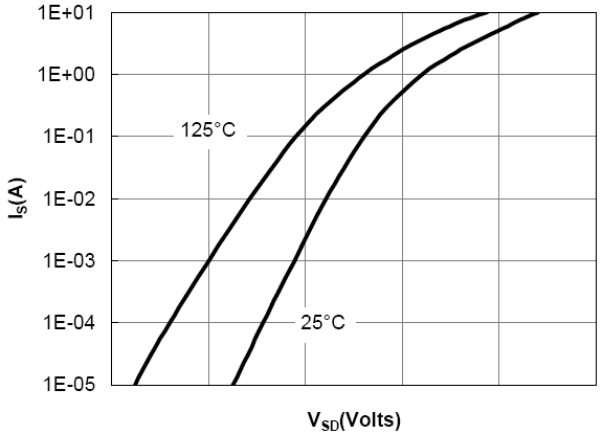



Figure 6: Body-Diode Characteristics

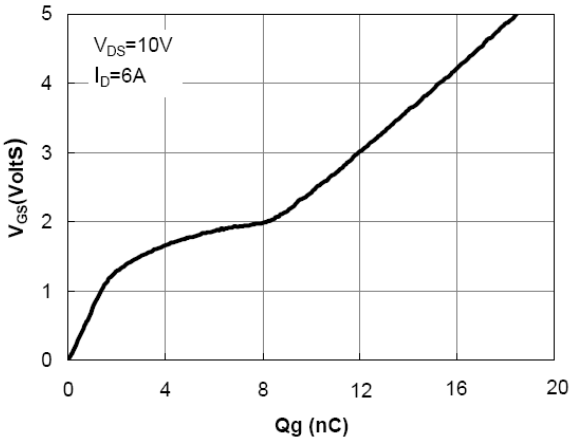



Figure 7: Gate-Charge Characteristics

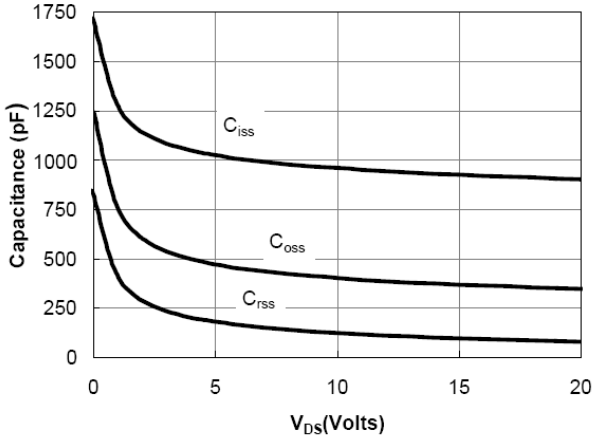



Figure 8: Capacitance Characteristics

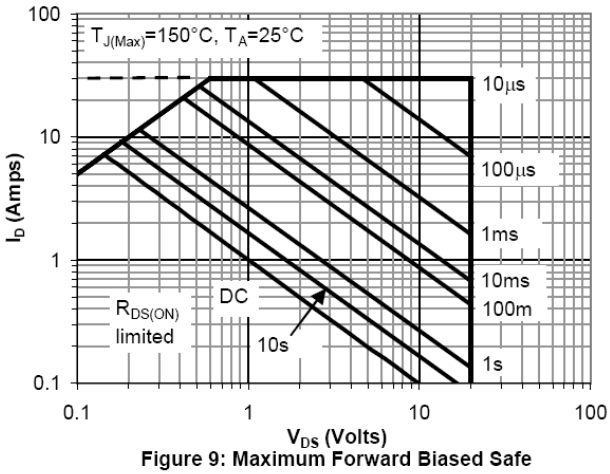



Figure 9: Maximum Forward Biased Safe Operating Area

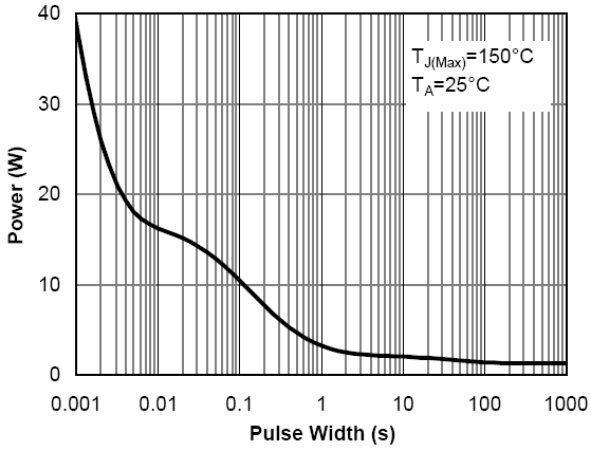



Figure 10: Single Pulse Power Rating Junction-to-Ambient

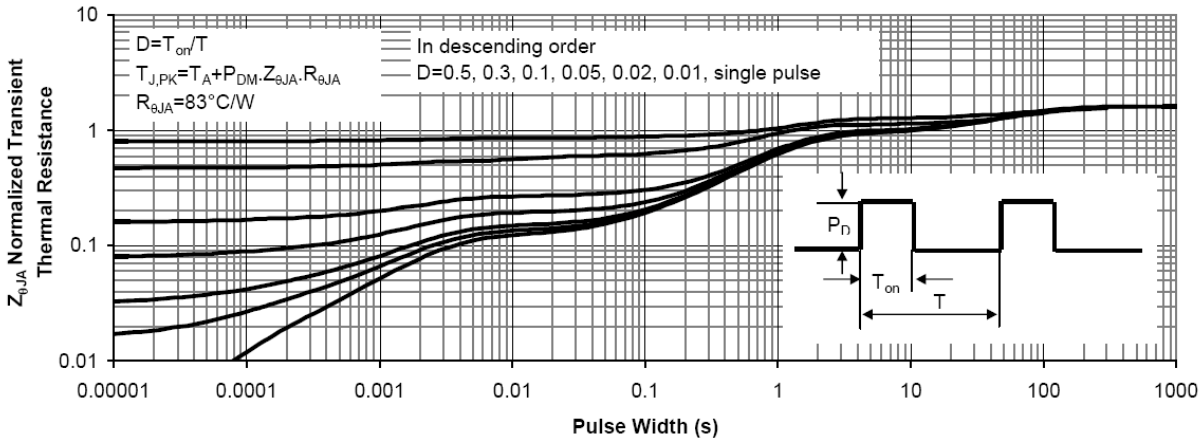



Figure 11: Normalized Maximum Transient Thermal Impedance

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