



Description

The FDS6984S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 30V$ $I_D = 8A$

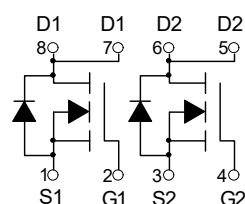
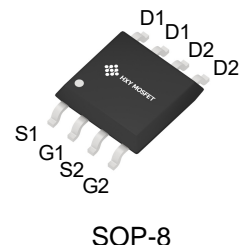
$R_{DS(ON)} < 19m\Omega$ @ $V_{GS}=4.5V$

Application

Battery protection

Load switch

Uninterruptible power supply



Dual N-Channel MOSFET

Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|------------|-------|---------------|----------|
| FDS6984S | SOP-8 | 4842 XXX YYYY | 3000 |

Absolute Maximum Ratings@ $T_J=25^{\circ}C$ (unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|-----------------------|---|------------|---------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_A=25^{\circ}C$ | Drain Current, V_{GS} @ 4.5V ³ | 8 | A |
| $I_D@T_A=70^{\circ}C$ | Drain Current, V_{GS} @ 4.5V ³ | 5.8 | A |
| I_{DM} | Pulsed Drain Current ¹ | 37 | A |
| $P_D@T_A=25^{\circ}C$ | Total Power Dissipation | 1.5 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^{\circ}C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^{\circ}C$ |
| R_{thj-a} | Maximum Thermal Resistance, Junction-ambient ³ | 85 | $^{\circ}C/W$ |



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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------|--|---|------|-------|-----------|-----------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V$, $I_D=250\mu A$ | 30 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T$ | BVDSS Temperature Coefficient | Reference to 25°C , $I_D=1mA$ | --- | 0.034 | --- | $V/^{\circ}\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V$, $I_D=7A$ | --- | 17 | 19 | $m\Omega$ |
| | | $V_{GS}=4.5V$, $I_D=4A$ | --- | 22 | 28 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}$, $I_D=250\mu A$ | 1.2 | --- | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -5.8 | --- | $mV/^{\circ}\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=24V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=24V$, $V_{GS}=0V$, $T_J=55^{\circ}\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V$, $V_{DS}=0V$ | --- | --- | ± 100 | nA |
| g_{fs} | Forward Transconductance | $V_{DS}=5V$, $I_D=7A$ | --- | 6 | --- | S |
| R_g | Gate Resistance | $V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$ | --- | 2.5 | --- | Ω |
| Q_g | Total Gate Charge (4.5V) | $V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=7A$ | --- | 6 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 2.5 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 2.1 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=15V$, $V_{GS}=10V$, $R_G=3.3\Omega$ $I_D=7A$ | --- | 2.4 | --- | ns |
| T_r | Rise Time | | --- | 7.8 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 22 | --- | |
| T_f | Fall Time | | --- | 4 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=15V$, $V_{GS}=0V$, $f=1MHz$ | --- | 572 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 80 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 65 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|--|--|------|------|------|------|
| I_S | Continuous Source Current ^{1,5} | $V_G=V_D=0V$, Force Current | --- | --- | 7.3 | A |
| I_{SM} | Pulsed Source Current ^{2,5} | | --- | --- | 37 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}\text{C}$ | --- | --- | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F=7A$, $dI/dt=100A/\mu s$, $T_J=25^{\circ}\text{C}$ | --- | 20 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | | --- | 1.1 | --- | nC |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V$, $V_{GS}=10V$, $L=0.1mH$, $I_{AS}=21A$
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



Typical Characteristics

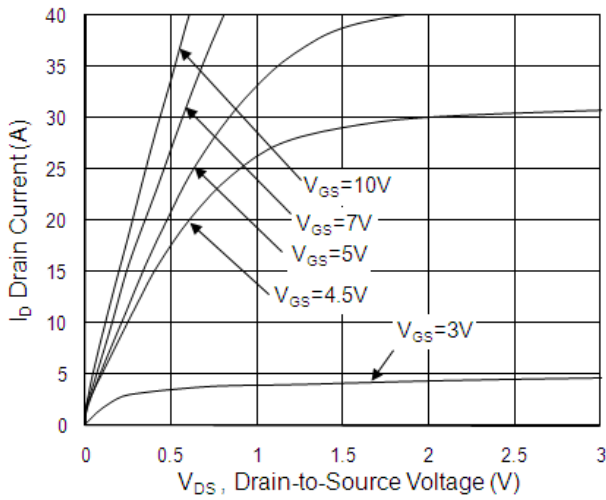


Fig.1 Typical Output Characteristics

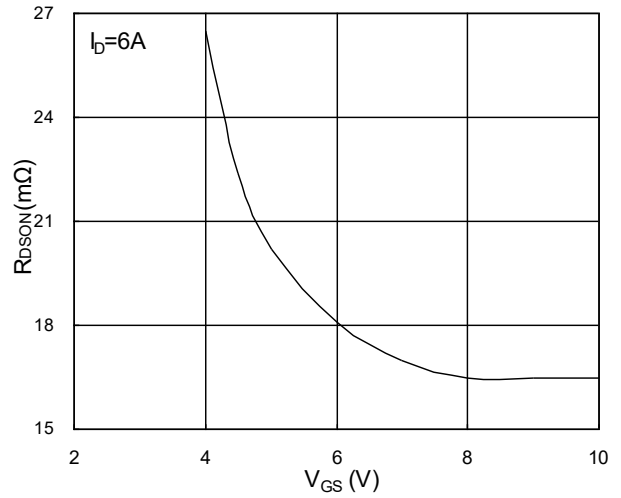


Fig.2 On-Resistance vs. G-S Voltage

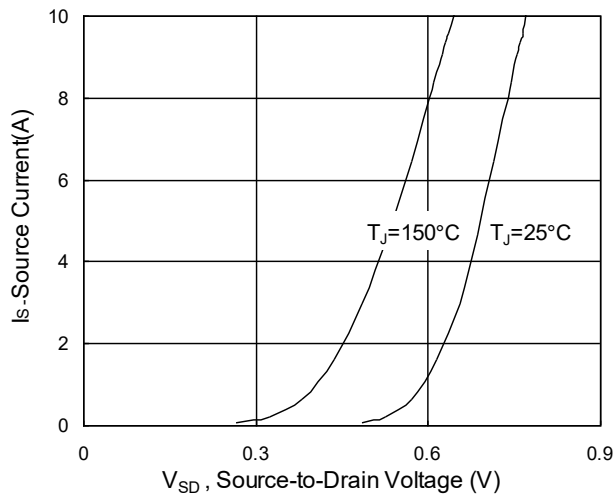


Fig.3 Forward Characteristics Of Reverse

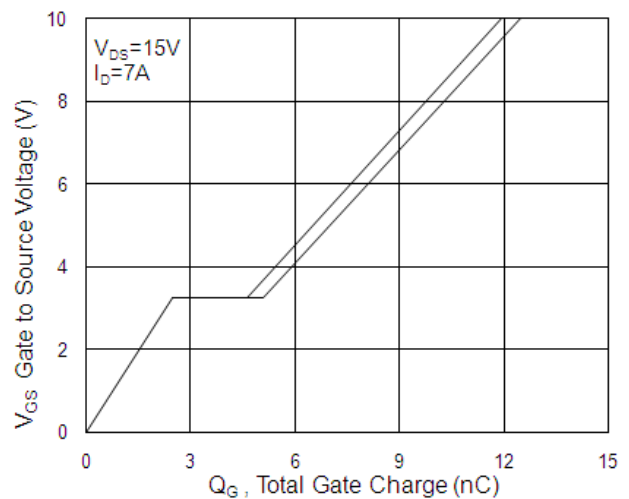


Fig.4 Gate-Charge Characteristics

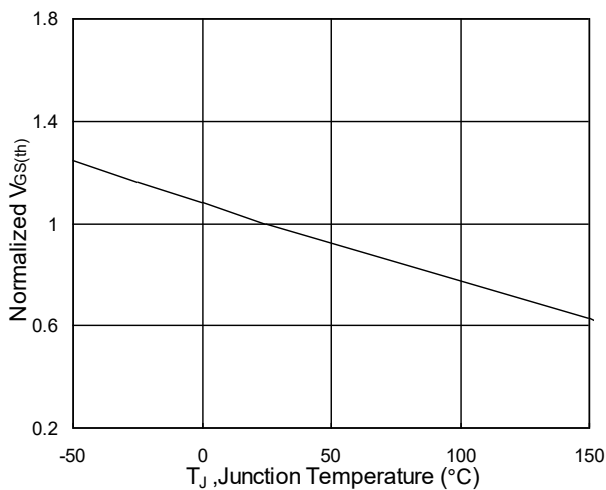


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

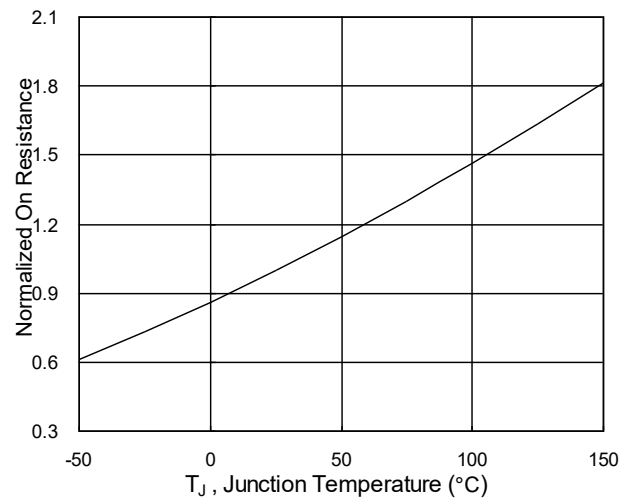


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

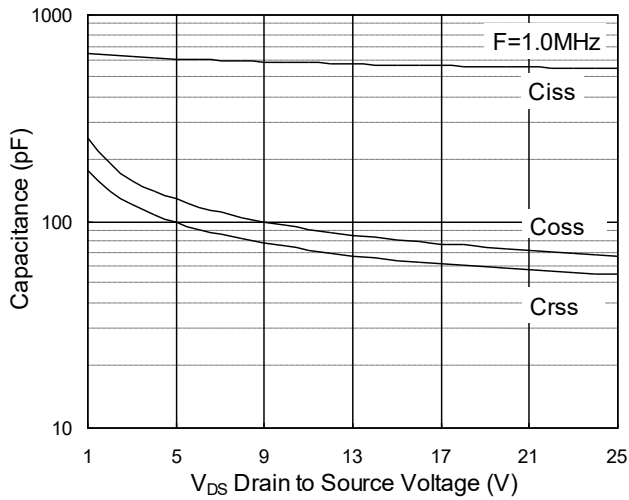


Fig.7 Capacitance

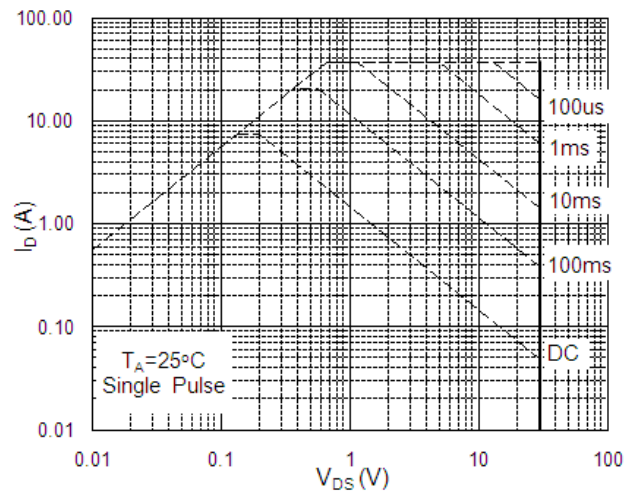


Fig.8 Safe Operating Area

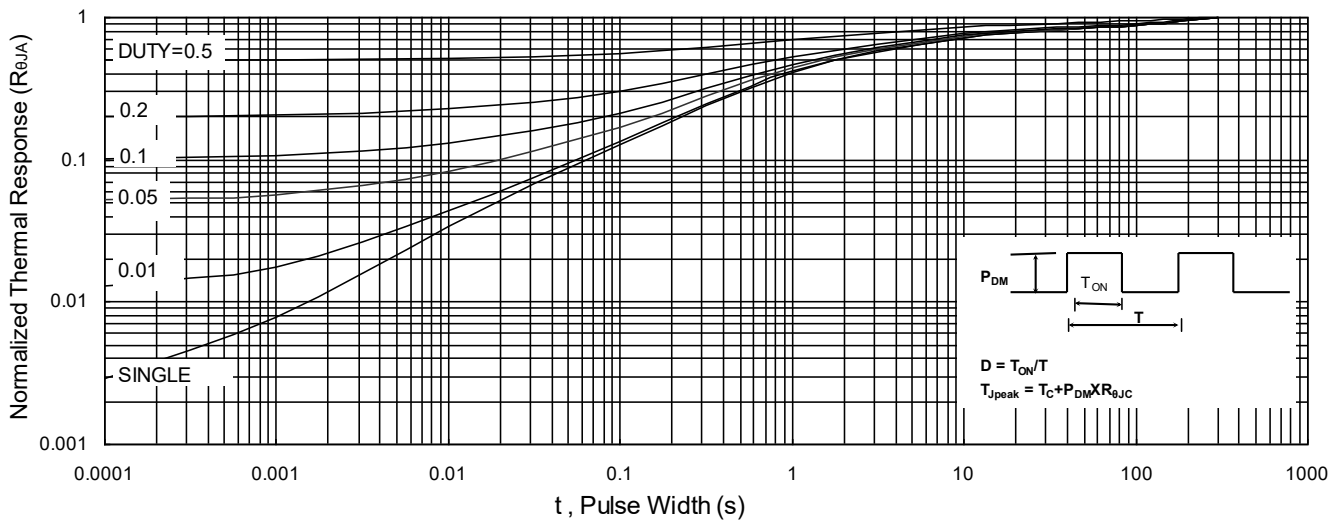


Fig.9 Normalized Maximum Transient Thermal Impedance

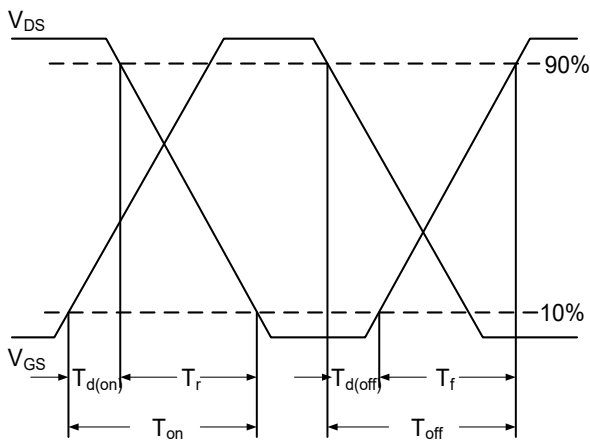


Fig.10 Switching Time Waveform

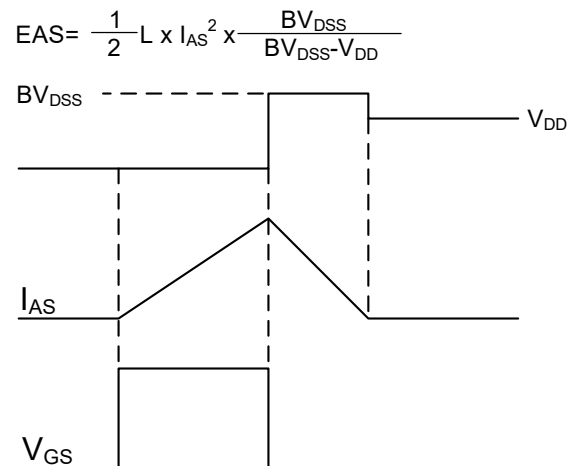
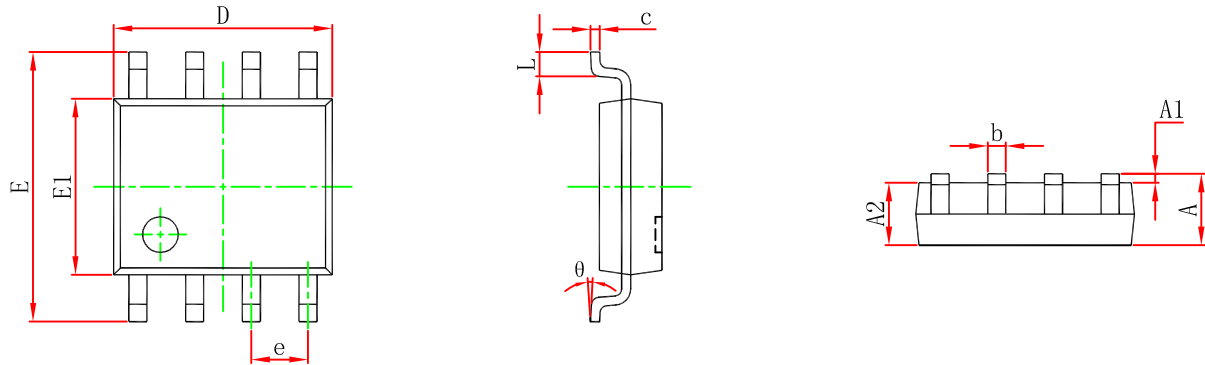


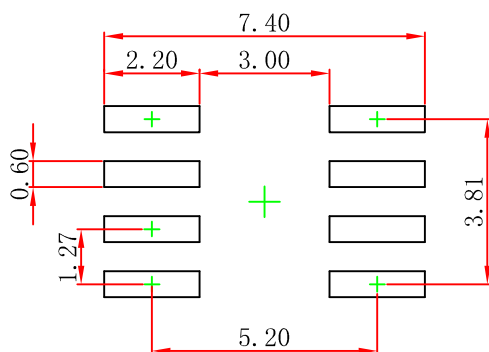
Fig.11 Unclamped Inductive Switching Waveform



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° |



Note:
1. Controlling dimension; in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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