



### Description

The FDS6670A uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 30V$   $I_D = 18A$

$R_{DS(ON)} < 6.5m\Omega$  @  $V_{GS}=10V$

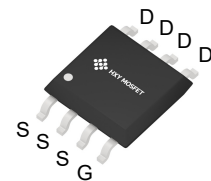
$R_{DS(ON)} < 12m\Omega$  @  $V_{GS}=4.5V$

### Application

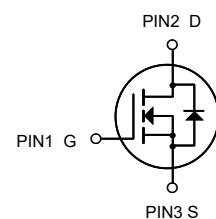
Battery protection

Load switch

Uninterruptible power supply



SOP-8  
(SOIC-8)



N-Channel MOSFET

### Package Marking and Ordering Information

| Product ID | Pack          | Brand      | Qty(PCS) |
|------------|---------------|------------|----------|
| FDS6670A   | SOP-8(SOIC-8) | HXY MOSFET | 3000     |

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

| Symbol             | Parameter                                                | Limit      | Unit          |
|--------------------|----------------------------------------------------------|------------|---------------|
| $V_{DS}$           | Drain-Source Voltage                                     | 30         | V             |
| $V_{GS}$           | Gate-Source Voltage                                      | $\pm 20$   | V             |
| $I_D$              | Drain Current-Continuous                                 | 18         | A             |
| $I_D(70^{\circ}C)$ | Drain Current-Continuous( $T_c=70^{\circ}C$ )            | 8.2        | A             |
| $I_{DM}$           | Pulsed Drain Current                                     | 42         | A             |
| $P_D$              | Maximum Power Dissipation                                | 1.5        | W             |
| $T_J, T_{STG}$     | Operating Junction and Storage Temperature Range         | -55 To 150 | $^{\circ}C$   |
| $R_{\theta JC}$    | Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | 36         | $^{\circ}C/W$ |



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

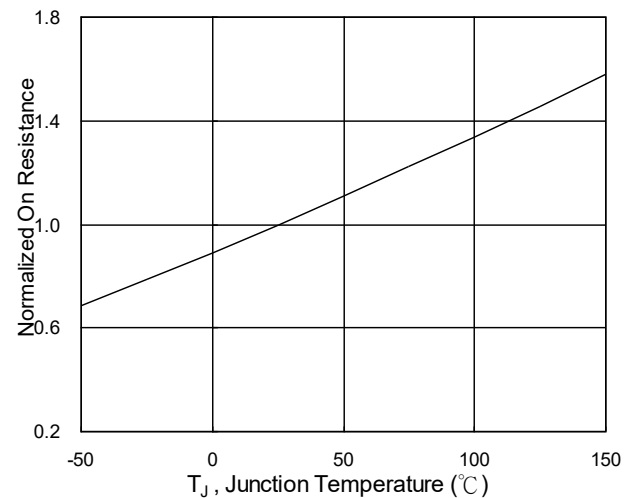
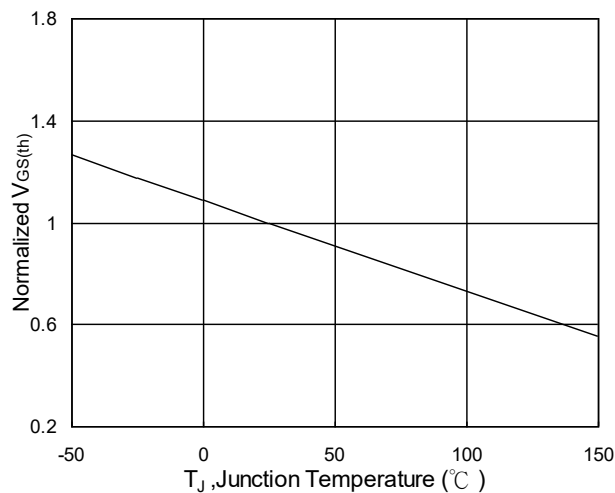
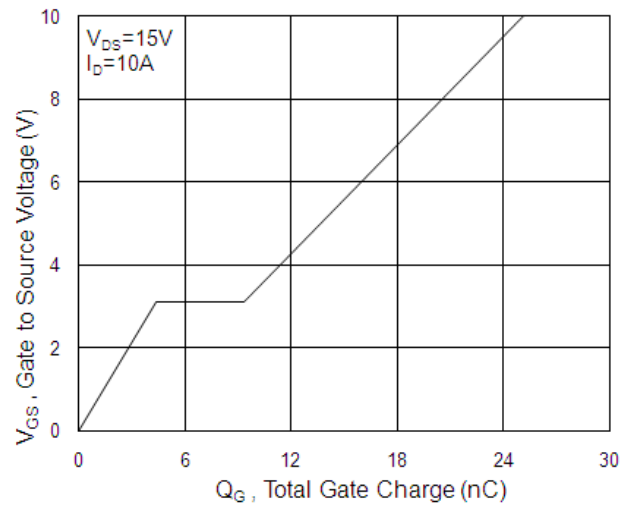
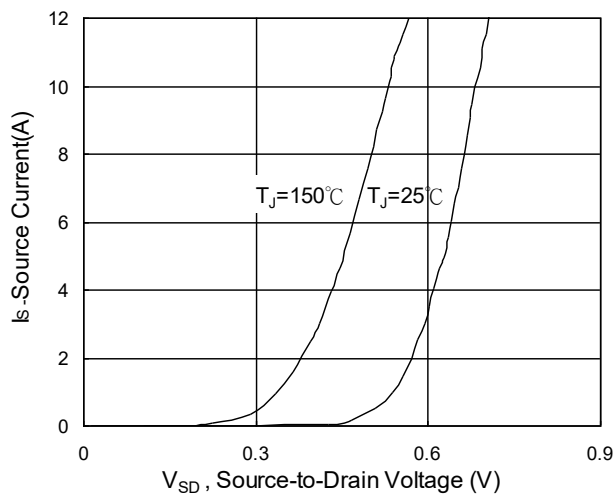
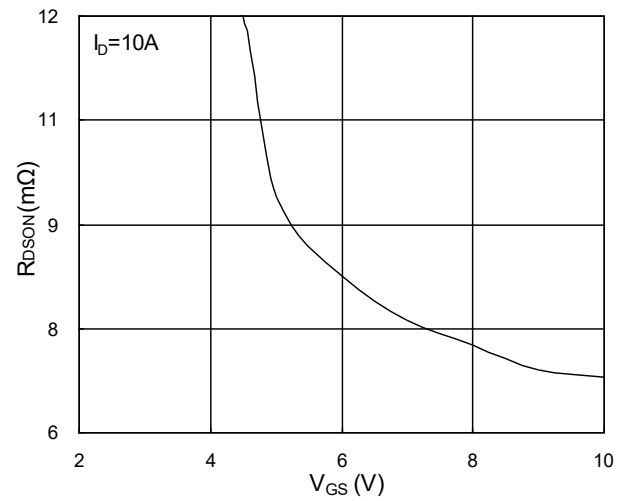
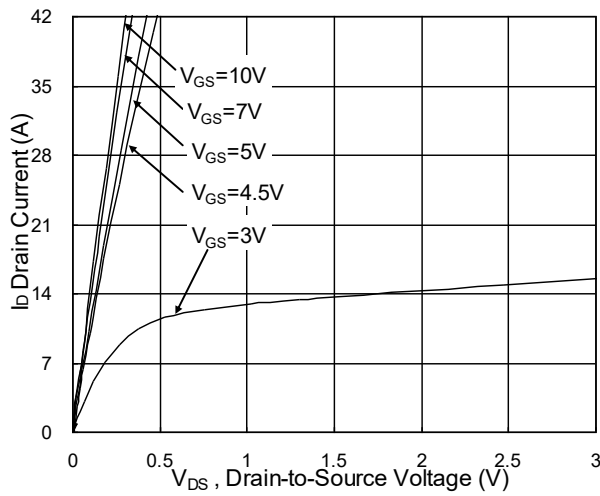
| Symbol                       | Parameter                                      | Conditions                                                 | Min. | Typ.  | Max.      | Unit                 |
|------------------------------|------------------------------------------------|------------------------------------------------------------|------|-------|-----------|----------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=250\mu A$                               | 30   | ---   | ---       | V                    |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient             | Reference to $25^\circ\text{C}$ , $I_D=1mA$                | ---  | 0.027 | ---       | V/ $^\circ\text{C}$  |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V$ , $I_D=10A$                                   | ---  | 5.5   | 6.5       | $m\Omega$            |
|                              |                                                | $V_{GS}=4.5V$ , $I_D=8A$                                   | ---  | 9     | 12        |                      |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 1.2  | 1.5   | 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         | $\mu A$              |
|                              |                                                | $V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=55^\circ\text{C}$        | ---  | ---   | 5         |                      |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                             | ---  | ---   | $\pm 100$ | nA                   |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=5V$ , $I_D=10A$                                    | ---  | 5.8   | ---       | S                    |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$                       | ---  | 2.2   | 3.8       | $\Omega$             |
| $Q_g$                        | Total Gate Charge (4.5V)                       | $V_{DS}=15V$ , $V_{GS}=4.5V$ , $I_D=10A$                   | ---  | 12.6  | 17.6      | nC                   |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                            | ---  | 4.2   | 5.9       |                      |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                            | ---  | 5.1   | 7.1       |                      |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=15V$ , $V_{GS}=10V$ , $R_G=3.3\Omega$<br>$I_D=10A$ | ---  | 6.2   | 12.4      | ns                   |
| $T_r$                        | Rise Time                                      |                                                            | ---  | 59    | 106       |                      |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                            | ---  | 27.6  | 55        |                      |
| $T_f$                        | Fall Time                                      |                                                            | ---  | 8.4   | 16.8      |                      |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=15V$ , $V_{GS}=0V$ , $f=1MHz$                      | ---  | 1317  | 1845      | pF                   |
| $C_{oss}$                    | Output Capacitance                             |                                                            | ---  | 163   | 228.2     |                      |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                            | ---  | 131   | 183.4     |                      |
| $I_S$                        | Continuous Source Current <sup>1,5</sup>       | $V_G=V_D=0V$ , Force Current                               | ---  | ---   | 10.3      | A                    |
| $I_{SM}$                     | Pulsed Source Current <sup>2,5</sup>           |                                                            | ---  | ---   | 42        | A                    |
| $V_{SD}$                     | Diode Forward Voltage <sup>2</sup>             | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^\circ\text{C}$            | ---  | ---   | 1.2       | V                    |
| $t_{rr}$                     | Reverse Recovery Time                          | $I_F=10A$ , $dI/dt=100A/\mu s$ , $T_J=25^\circ\text{C}$    | ---  | 12.5  | ---       | nS                   |
| $Q_{rr}$                     | Reverse Recovery Charge                        |                                                            | ---  | 5     | ---       | nC                   |

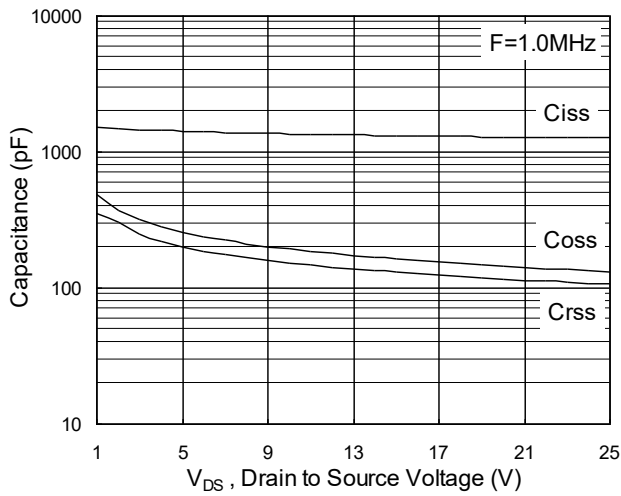
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> 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  $V_{DD}=25V$ ,  $V_{GS}=10V$ ,  $L=0.1mH$ ,  $I_{AS}=35A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  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.

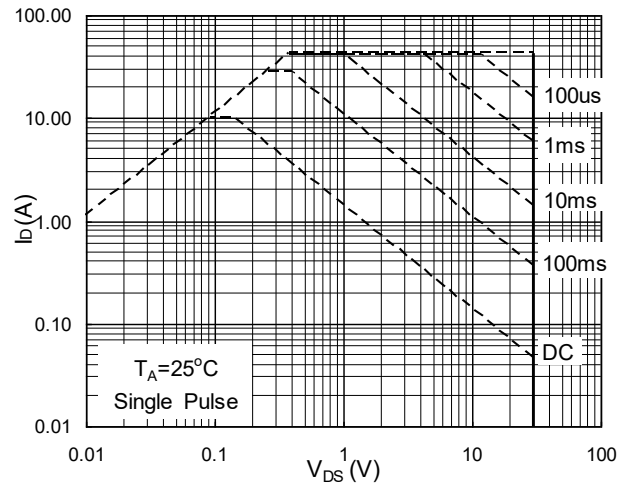


## Typical Characteristics

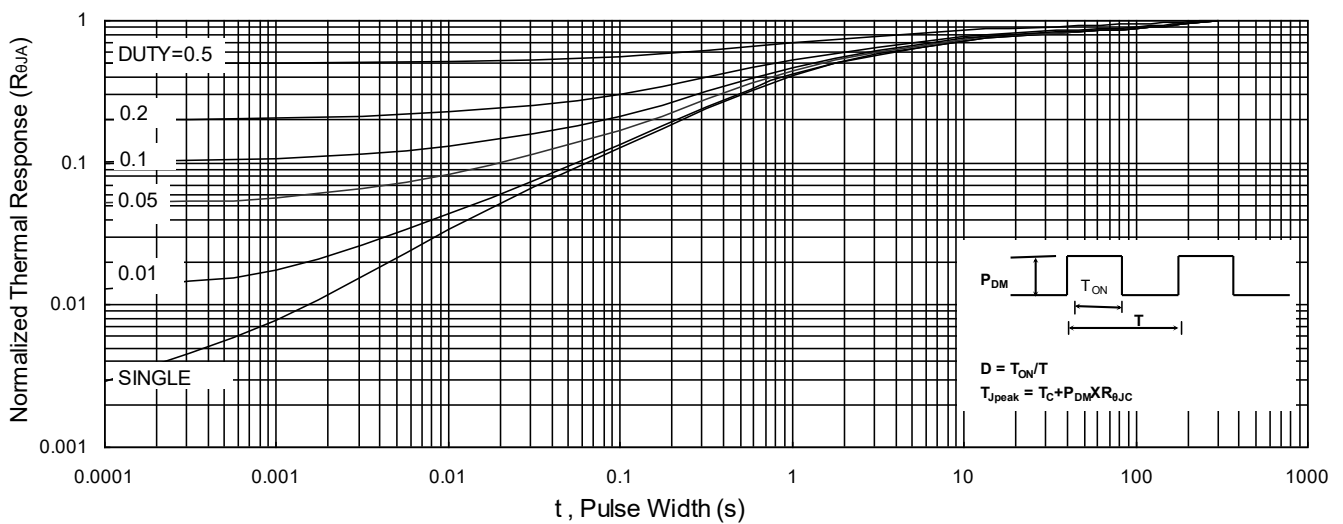




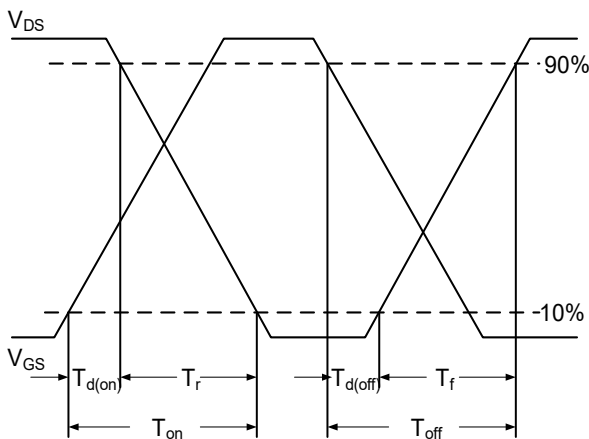
**Fig.7 Capacitance**



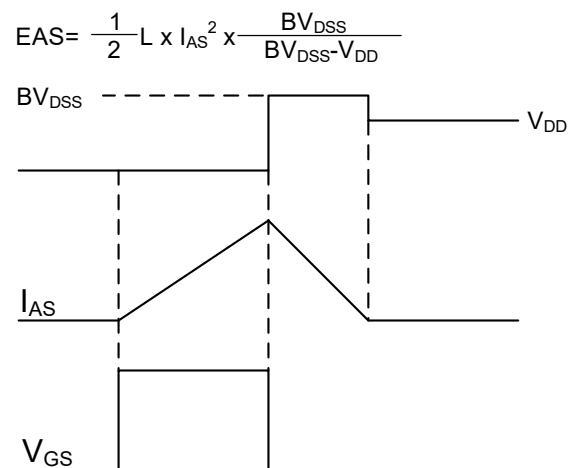
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



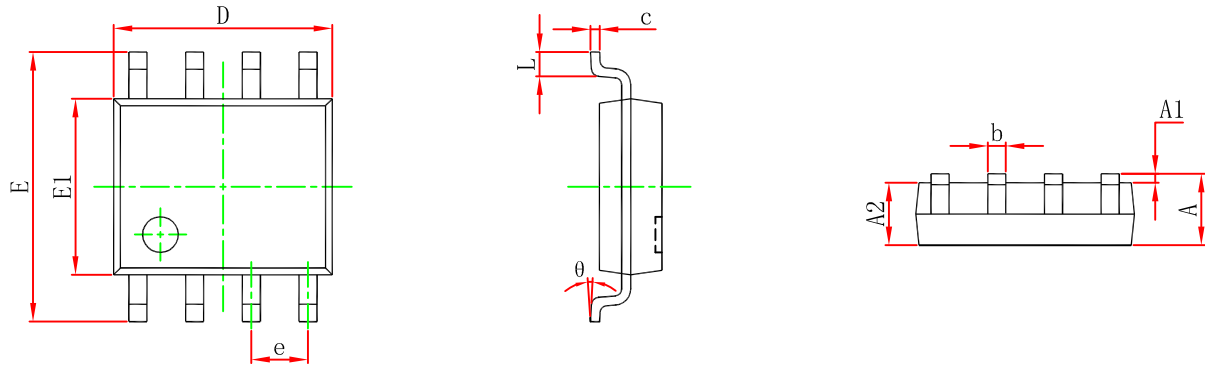
**Fig.10 Switching Time Waveform**



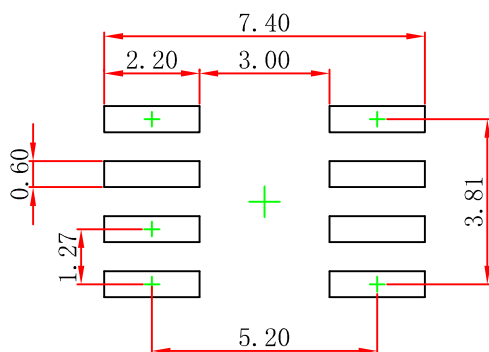
**Fig.11 Unclamped Inductive Switching Waveform**



## SOP-8(SOIC-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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