



## Description

The STD10P6F6 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

$V_{DS} = -60V$   $I_D = -10A$

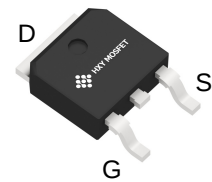
$R_{DS(ON)} < 140m\Omega$  @  $V_{GS}=10V$

## Application

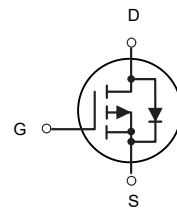
Brushless motor

Load switch

Uninterruptible power supply



TO252-2L  
(DPAK)



P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack            | Brand      | Qty(PCS) |
|------------|-----------------|------------|----------|
| STD10P6F6  | TO-252-2L(DPAK) | HXY MOSFET | 2500     |

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

| Symbol                 | Parameter                                              | Rating     | Units         |
|------------------------|--------------------------------------------------------|------------|---------------|
| $V_{DS}$               | Drain-Source Voltage                                   | -60        | V             |
| $V_{GS}$               | Gate-Source Voltage                                    | $\pm 20$   | V             |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -10        | A             |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -8.3       | A             |
| $I_D@T_A=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -3.3       | A             |
| $I_D@T_A=70^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -2.7       | A             |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                      | -26        | A             |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>             | 29.8       | mJ            |
| $I_{AS}$               | Avalanche Current                                      | -24.4      | A             |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                   | 31.3       | W             |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                   | 2          | W             |
| $T_{STG}$              | Storage Temperature Range                              | -55 to 150 | $^{\circ}C$   |
| $T_J$                  | Operating Junction Temperature Range                   | -55 to 150 | $^{\circ}C$   |
| $R_{\theta JA}$        | Thermal Resistance Junction-Ambient <sup>1</sup>       | 62         | $^{\circ}C/W$ |
| $R_{\theta JC}$        | Thermal Resistance Junction-Case <sup>1</sup>          | 4.0        | $^{\circ}C/W$ |



**P-Channel Electrical Characteristics (T<sub>J</sub> =25 °C, unless otherwise noted)**

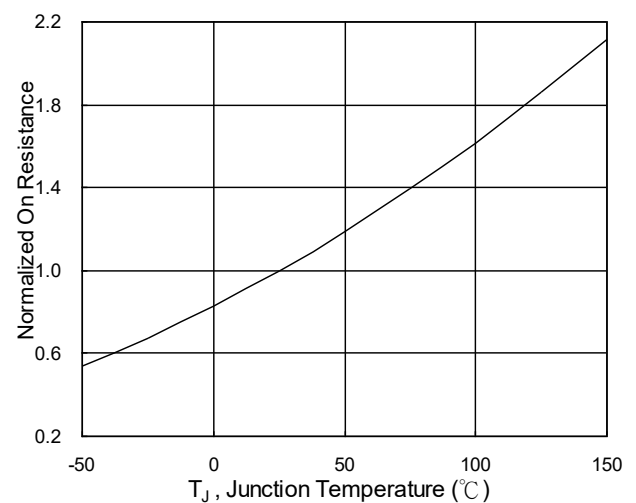
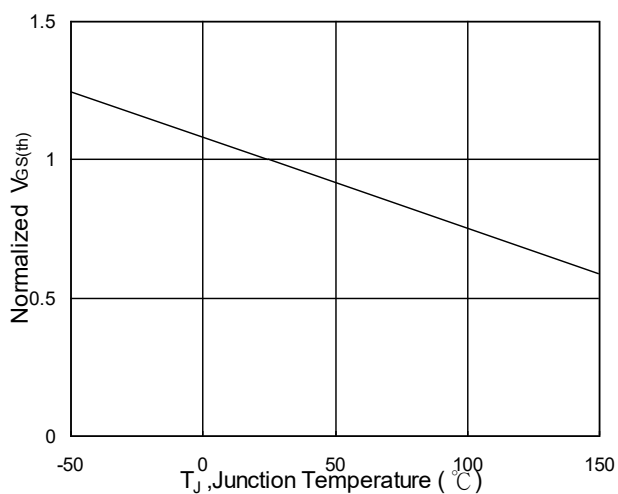
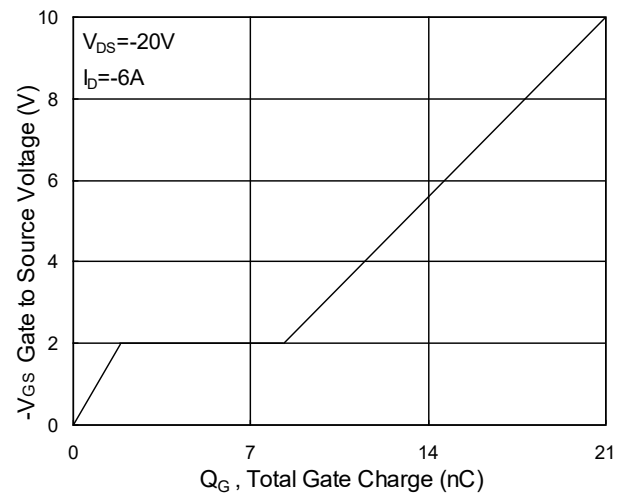
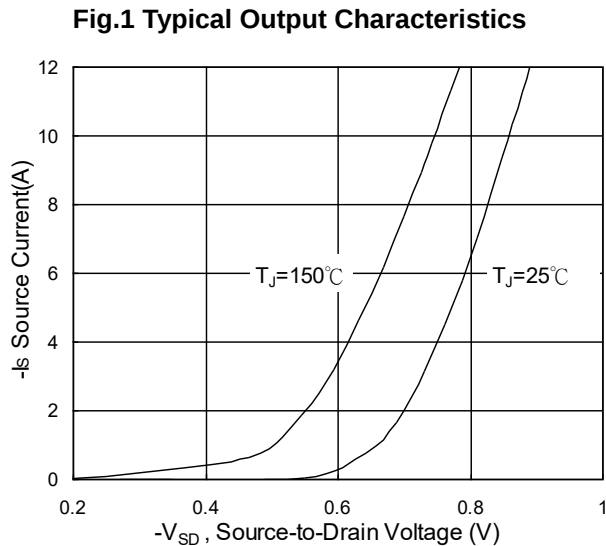
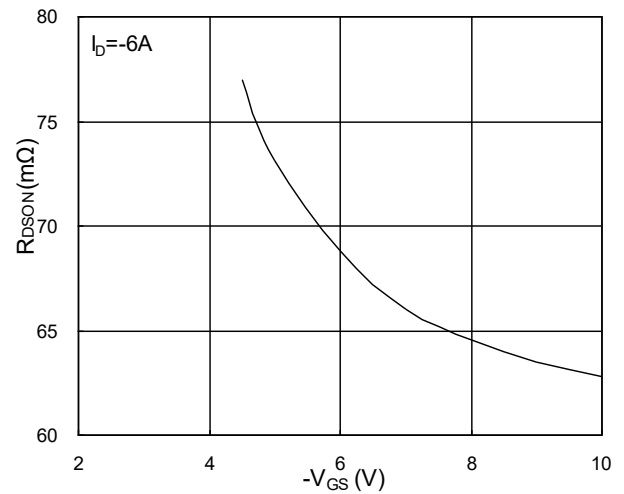
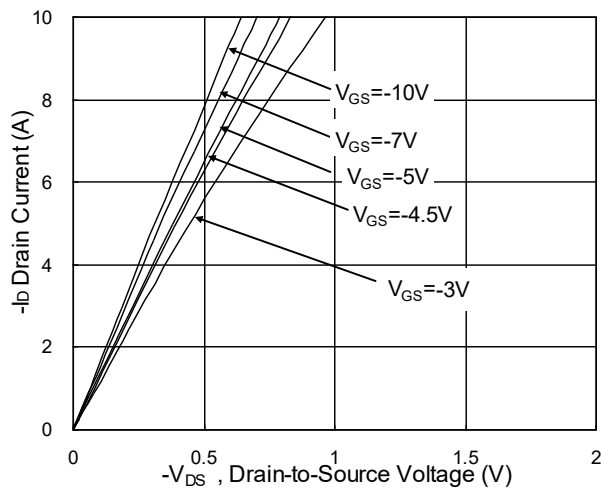
| Symbol                 | Parameter                                      | Conditions                                                                                       | Min. | Typ.  | Max. | Unit |
|------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------|------|-------|------|------|
| BVDSS                  | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V , I <sub>D</sub> =-250uA                                                     | -60  | ---   | ---  | V    |
| ΔBVDSS/ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient      | Reference to 25°C , I <sub>D</sub> =-1mA                                                         | ---  | -0.03 | ---  | V/°C |
| RDS(ON)                | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V , I <sub>D</sub> =-3A                                                      | ---  | 125   | 140  | mΩ   |
|                        |                                                | V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-2A                                                     | ---  | 185   | 200  |      |
| VGS(th)                | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA                                        | -1.2 | 1.6   | -2.5 | V    |
| IDSS                   | Drain-Source Leakage Current                   | V <sub>DS</sub> =-48V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C                               | ---  | ---   | 1    | uA   |
|                        |                                                | V <sub>DS</sub> =-48V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C                               | ---  | ---   | 5    |      |
| IGSS                   | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V                                                      | ---  | ---   | ±100 | nA   |
| gfs                    | Forward Transconductance                       | V <sub>DS</sub> =-5V , I <sub>D</sub> =-3A                                                       | ---  | 8.5   | ---  | S    |
| Q <sub>g</sub>         | Total Gate Charge (-4.5V)                      | V <sub>DS</sub> =-48V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-3A                             | ---  | 12.1  | ---  | nC   |
| Q <sub>gs</sub>        | Gate-Source Charge                             |                                                                                                  | ---  | 2.2   | ---  |      |
| Q <sub>gd</sub>        | Gate-Drain Charge                              |                                                                                                  | ---  | 6.3   | ---  |      |
| Td(on)                 | Turn-On Delay Time                             | V <sub>DD</sub> =-15V , V <sub>GS</sub> =-10V ,<br>R <sub>G</sub> =3.3Ω ,<br>I <sub>D</sub> =-1A | ---  | 9.2   | ---  | ns   |
| T <sub>r</sub>         | Rise Time                                      |                                                                                                  | ---  | 20.1  | ---  |      |
| Td(off)                | Turn-Off Delay Time                            |                                                                                                  | ---  | 46.7  | ---  |      |
| T <sub>f</sub>         | Fall Time                                      |                                                                                                  | ---  | 9.4   | ---  |      |
| Ciss                   | Input Capacitance                              | V <sub>DS</sub> =-15V , V <sub>GS</sub> =0V , f=1MHz                                             | ---  | 1137  | ---  | pF   |
| Coss                   | Output Capacitance                             |                                                                                                  | ---  | 76    | ---  |      |
| Crss                   | Reverse Transfer Capacitance                   |                                                                                                  | ---  | 50    | ---  |      |
| IS                     | Continuous Source Current <sup>1,5</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                                               | ---  | ---   | -13  | A    |
| VSD                    | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V , I <sub>S</sub> =-1A , T <sub>J</sub> =25°C                                 | ---  | ---   | -1.2 | V    |

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 20Z copper.
- 2、 The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、 The EAS data shows Max. rating . The test condition is V DD =-25V,V GS =-10V,L=0.1mH,IAS =-24A
- 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.



### P-Channel Typical Characteristics



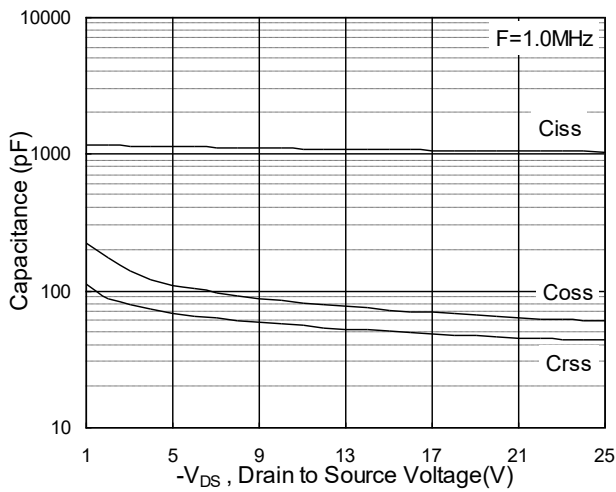


Fig.7 Capacitance

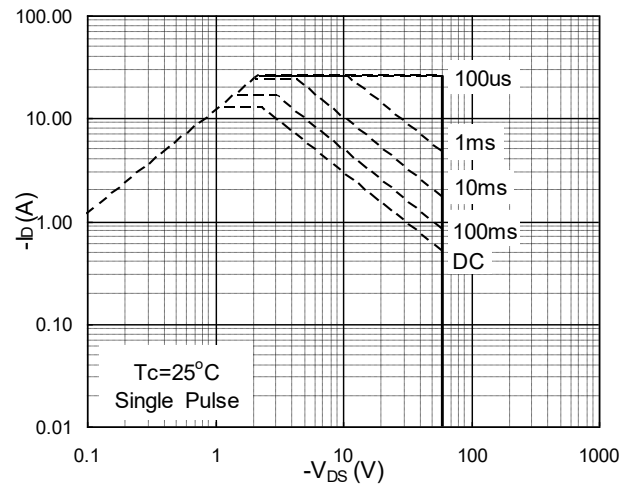


Fig.8 Safe Operating Area

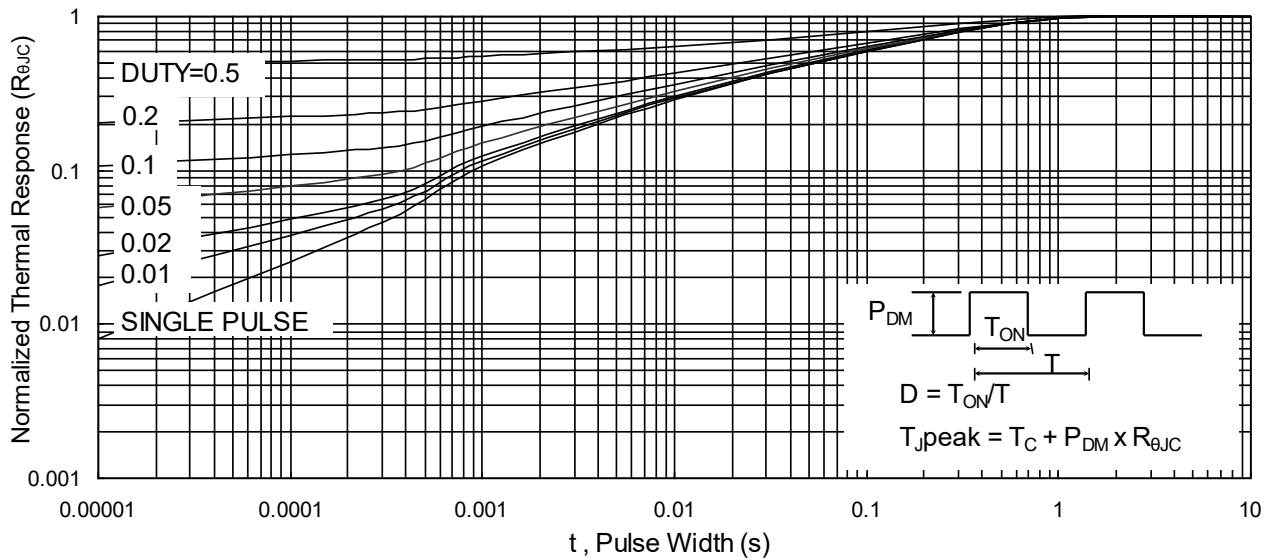


Fig.9 Normalized Maximum Transient Thermal Impedance

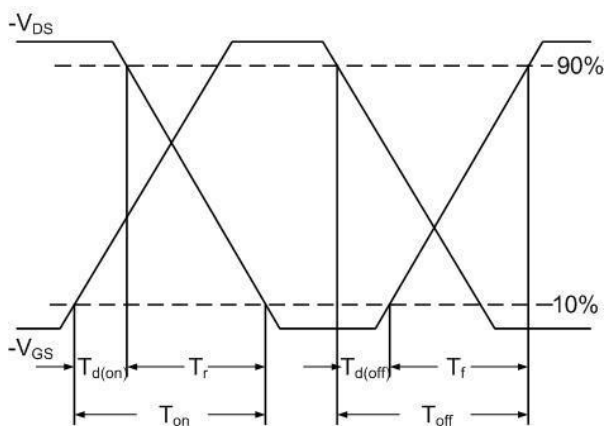


Fig.10 Switching Time Waveform

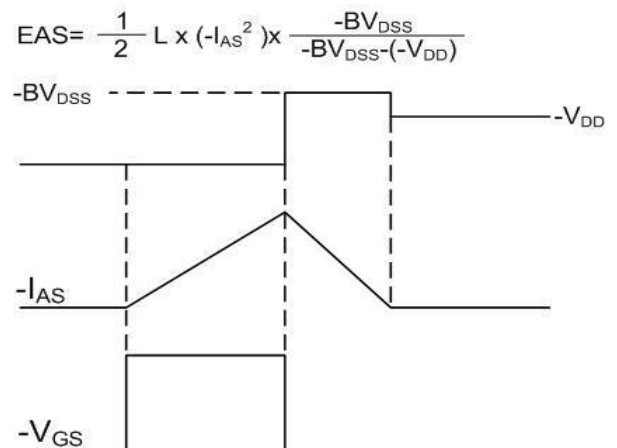
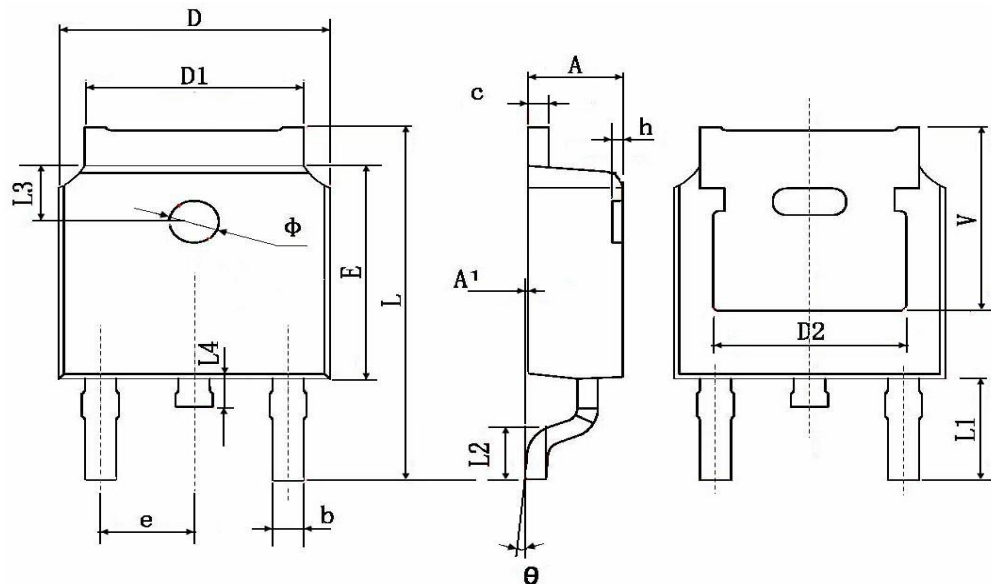


Fig.11 Unclamped Inductive Switching Waveform



## TO-252-2L(DPAK) Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 4.830 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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