



### Description

The HXY30G30NF 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

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

$R_{DS(ON)} < 13m\Omega$  @  $V_{GS}=10V$

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

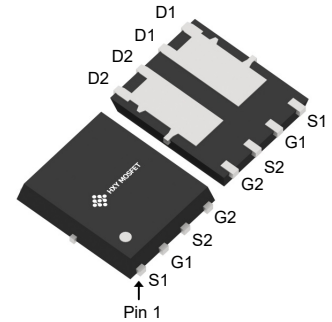
$R_{DS(ON)} < 25m\Omega$  @  $V_{GS}=-10V$

### Application

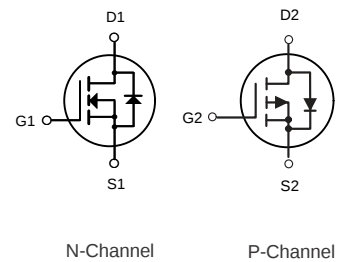
Battery protection

Load switch

Uninterruptible power supply



DFN5X6B-8L



### Package Marking and Ordering Information

| Product ID | Pack       | Marking    | Qty(PCS) |
|------------|------------|------------|----------|
| HXY30G30NF | DFN5X6B-8L | 30G30 YYYY | 5000     |

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

| Symbol                 | Parameter                                | Rating     |            | Units         |
|------------------------|------------------------------------------|------------|------------|---------------|
|                        |                                          | N-Channel  | P-Channel  |               |
| $V_{DS}$               | Drain-Source Voltage                     | 30         | -30        | V             |
| $V_{GS}$               | Gate-Source Voltage                      | $\pm 20$   | $\pm 20$   | V             |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V | 30         | -30        | A             |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ 10V | 15         | -16        | A             |
| $I_{DM}$               | Pulsed Drain Current                     | 46         | -40        | A             |
| EAS                    | Single Pulse Avalanche Energy            | 28         | 66         | mJ            |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation                  | 15         | 21.3       | W             |
| $T_{STG}$              | Storage Temperature Range                | -55 to 150 | -55 to 150 | $^{\circ}C$   |
| $T_J$                  | Operating Junction Temperature Range     | -55 to 150 | -55 to 150 | $^{\circ}C$   |
| $R_{\theta JA}$        | Thermal Resistance Junction-Ambient      | ---        | 48         | $^{\circ}C/W$ |
| $R_{\theta JC}$        | Thermal Resistance Junction-Case         | ---        | 5          | $^{\circ}C/W$ |



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

| Symbol                                                 | Parameter                                                 | Test Condition                                                                           | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristics                                    |                                                           |                                                                                          |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                               | 30   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,                                               | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                               | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                          |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                 | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =10A                                                | -    | 9.5  | 13   | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                                                | -    | 16   | 22.5 |       |
| Dynamic Characteristics                                |                                                           |                                                                                          |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                   | -    | 633  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                          | -    | 120  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                          | -    | 99   | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =15V, I <sub>D</sub> =10A,<br>V <sub>GS</sub> =10V                       | -    | 15   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                          | -    | 4.7  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                          | -    | 3.6  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                          |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DS</sub> =30V, I <sub>D</sub> =18A,<br>R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V | -    | 5    | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                          | -    | 8    | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                          | -    | 21   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                          | -    | 7    | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                          |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                          | -    | -    | 30   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                          | -    | -    | 72   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =18A                                                 | -    | -    | 1.2  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =18A, dI/dt=100A/μs                                                       | -    | 7    | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                        |                                                                                          | -    | 5.9  | -    | nC    |

Note :

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ 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  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=20A$
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.



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

| Symbol                                                 | Parameter                                                 | Test Condition                                                                                 | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristics                                    |                                                           |                                                                                                |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA                                                   | -30  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V                                                    | -    | -    | -1   | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                     | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                                |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA                                     | -1.0 | -1.6 | -2.5 | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A                                                  | -    | 21   | 25   | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A                                                  | -    | 31   | 40   |       |
| Dynamic Characteristics                                |                                                           |                                                                                                |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                       | -    | 1240 | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                                | -    | 151  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                                | -    | 138  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A,<br>V <sub>GS</sub> = -10V                        | -    | 24   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                                | -    | 3.7  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                                | -    | 4.8  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                                |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DD</sub> = -15V, I <sub>D</sub> = -10A,<br>V <sub>GS</sub> = -10V, R <sub>GEN</sub> =3Ω | -    | 11   | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                                | -    | 5.5  | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                                | -    | 3.5  | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                                | -    | 4.6  | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                                |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                                | -    | -    | -30  | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                                | -    | -    | -40  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> = -10A                                                     | -    | -    | -1.2 | V     |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

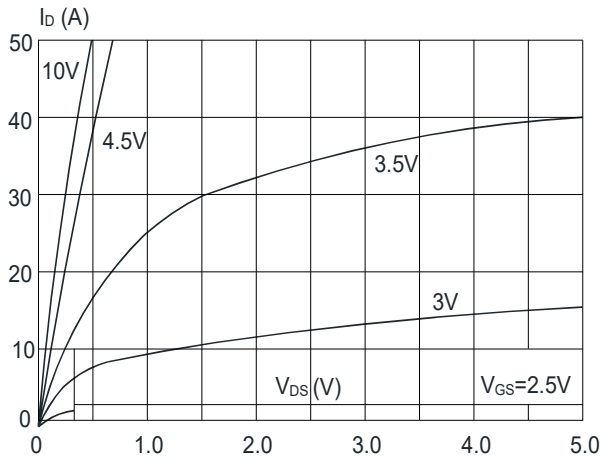
2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=-15V$ ,  $V_G=-10V$ ,  $R_G=25\Omega$ ,  $L=0.1mH$ ,  $I_{AS} = -27A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$

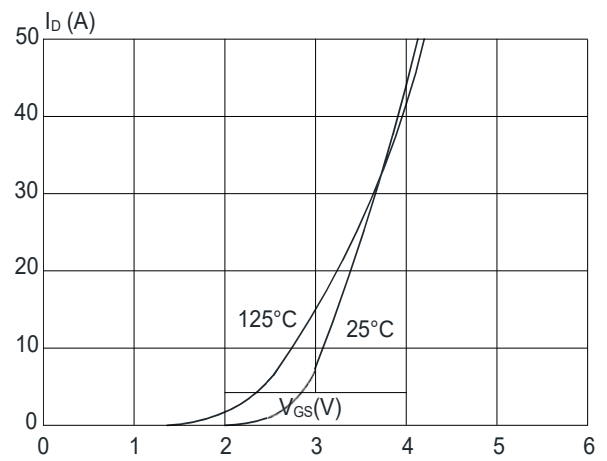


## Typical Performance Characteristics-N

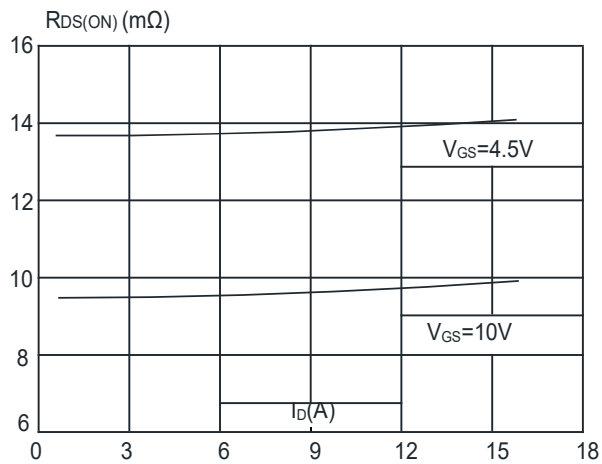
**Figure1:** Output Characteristics



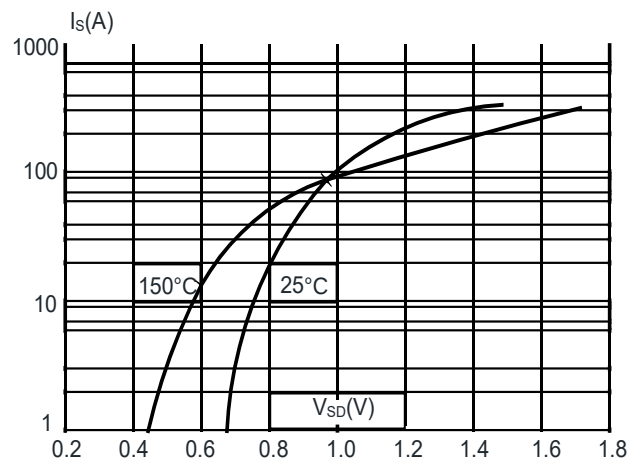
**Figure 2:** Typical Transfer Characteristics



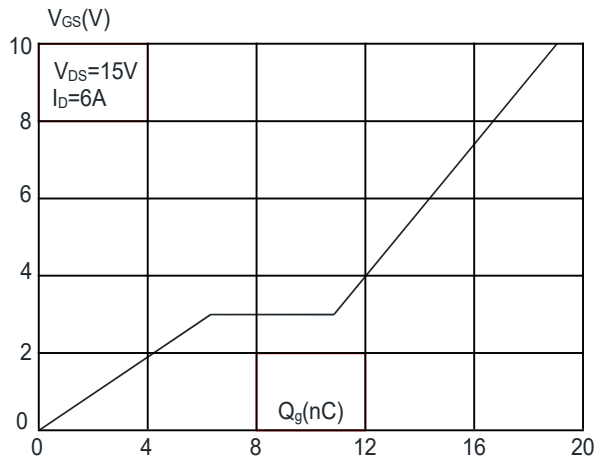
**Figure 3:** On-resistance vs. Drain Current



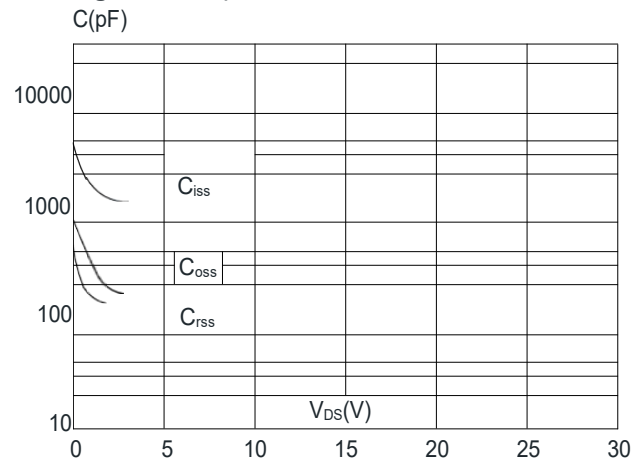
**Figure 4:** Body Diode Characteristics



**Figure 5:** Gate Charge Characteristics

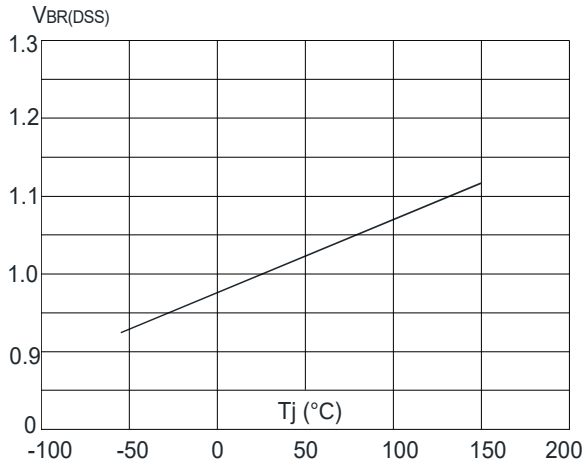


**Figure 6:** Capacitance Characteristics

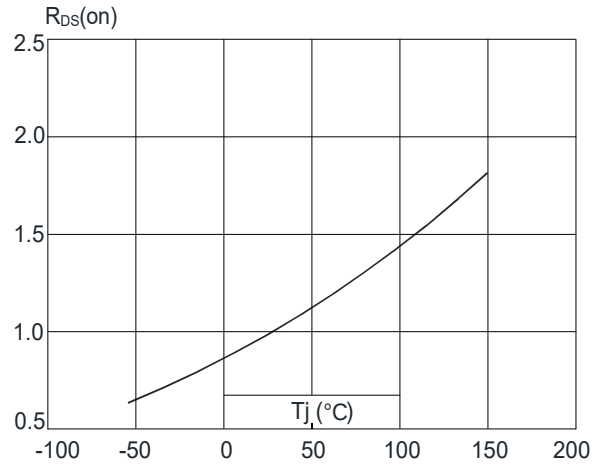




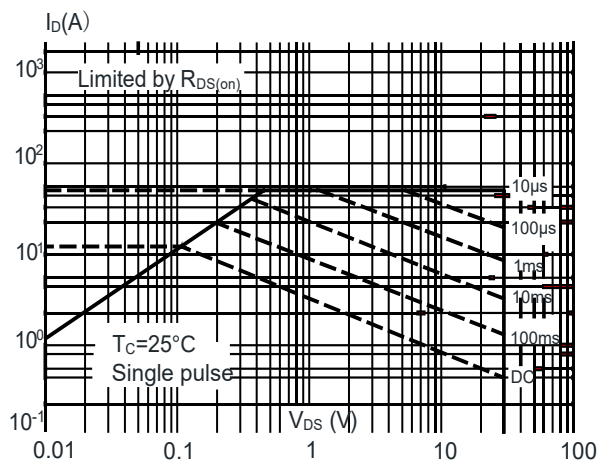
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



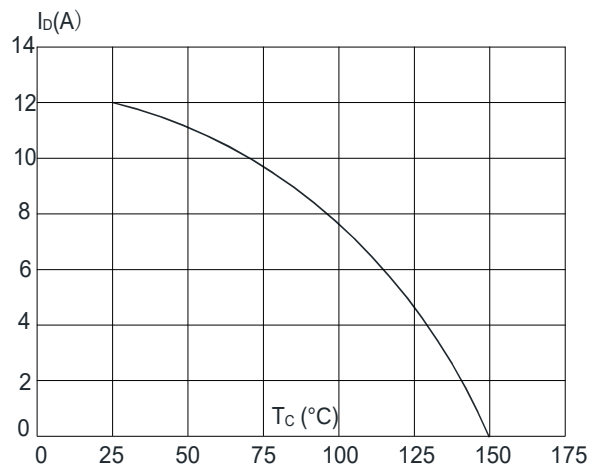
**Figure 8:** Normalized on Resistance vs. Junction Temperature



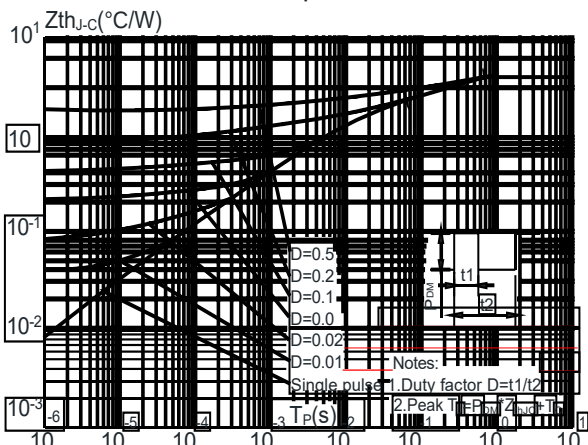
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case





### Test Circuit-N

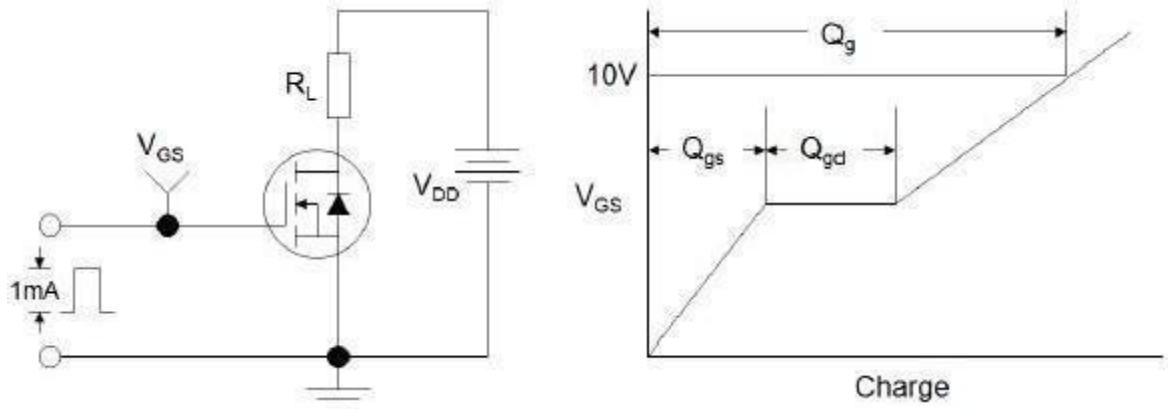


Figure1:Gate Charge Test Circuit & Waveform

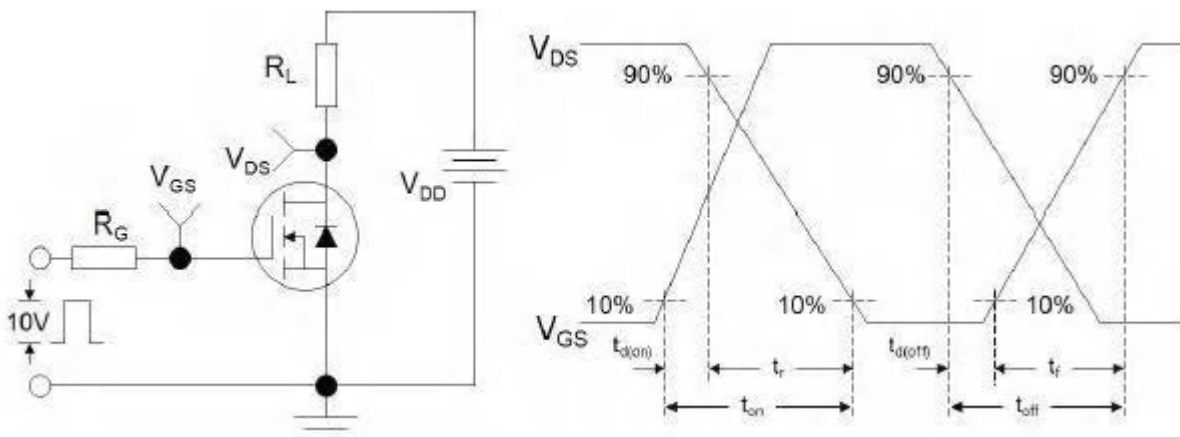


Figure 2: Resistive Switching Test Circuit & Waveforms

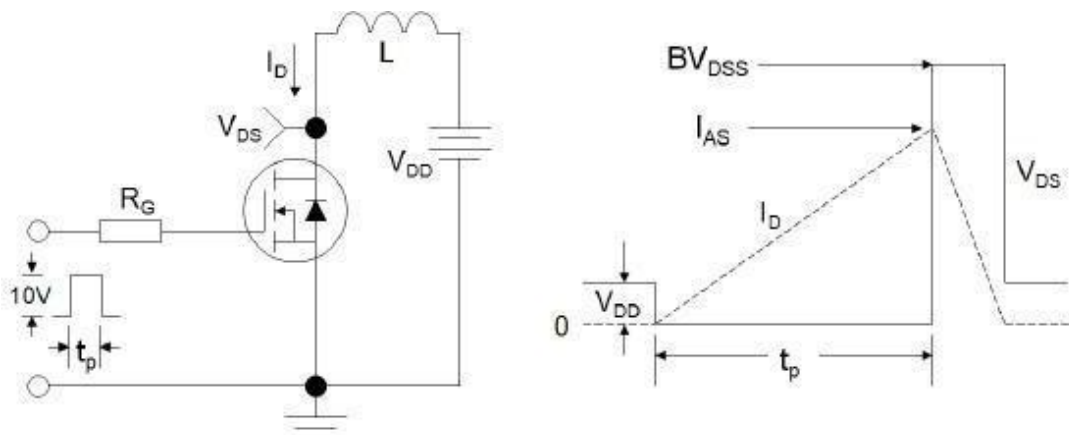
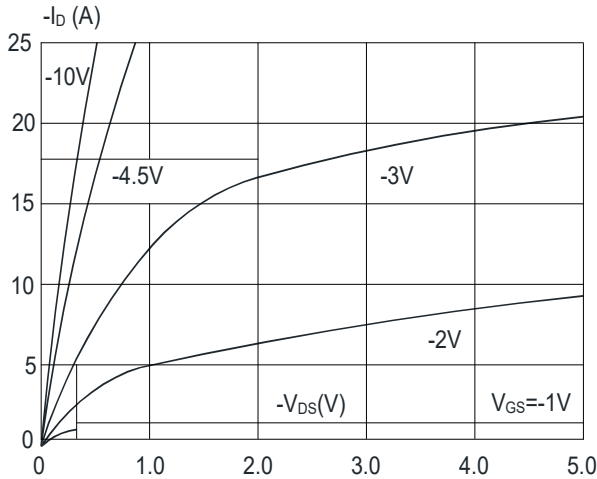


Figure 3:Unclamped Inductive Switching Test Circuit & Wavefor

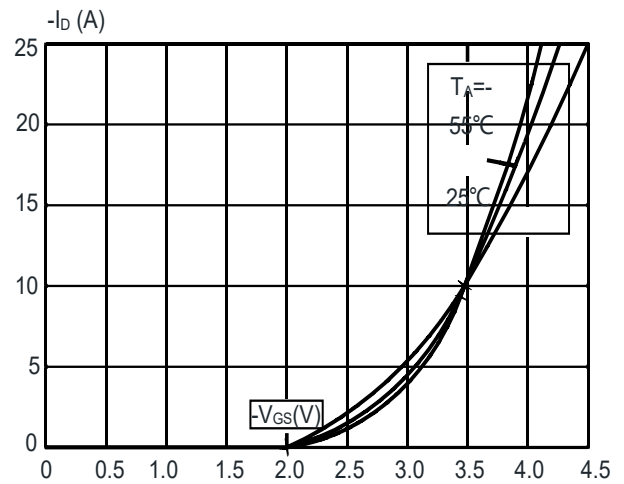


## Typical Performance Characteristics-P

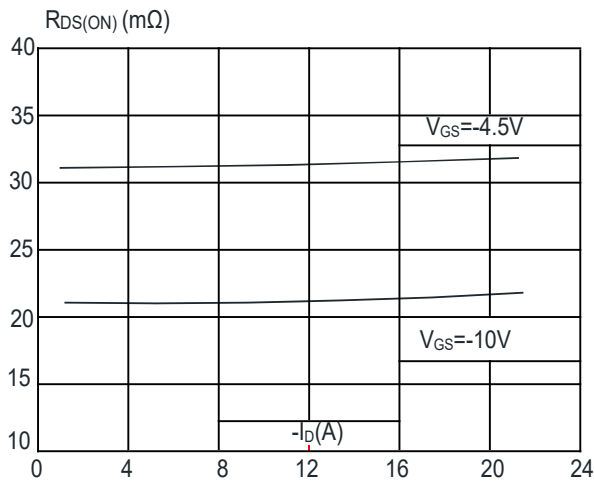
**Figure1: Output Characteristics**



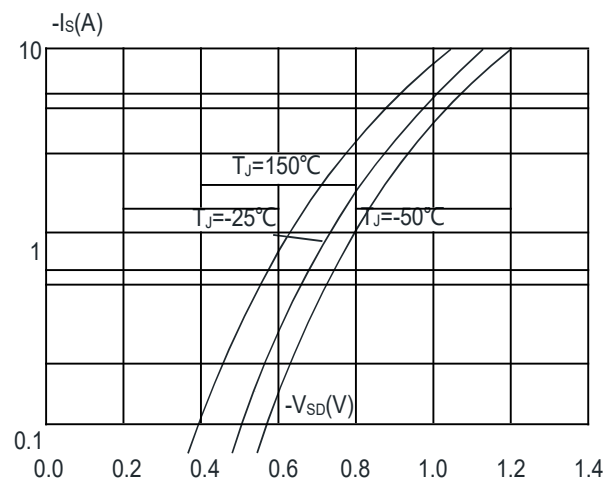
**Figure 2: Typical Transfer Characteristics**



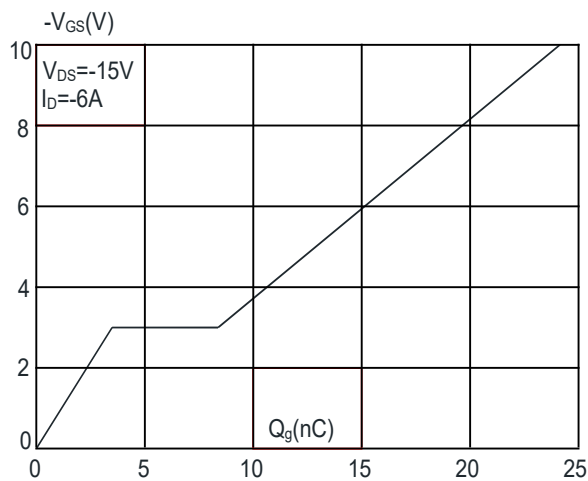
**Figure 3: On-resistance vs. Drain Current**



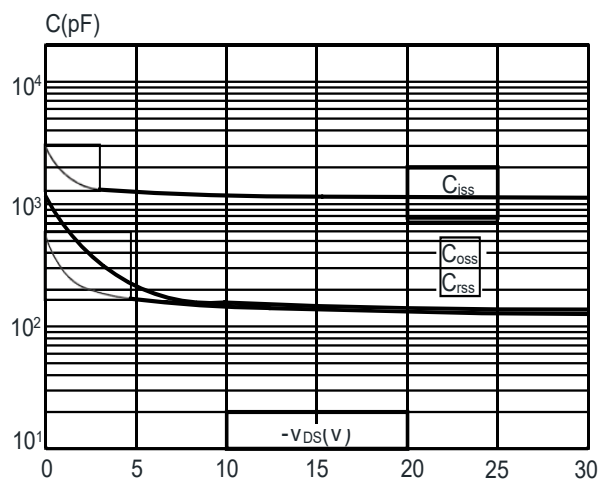
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

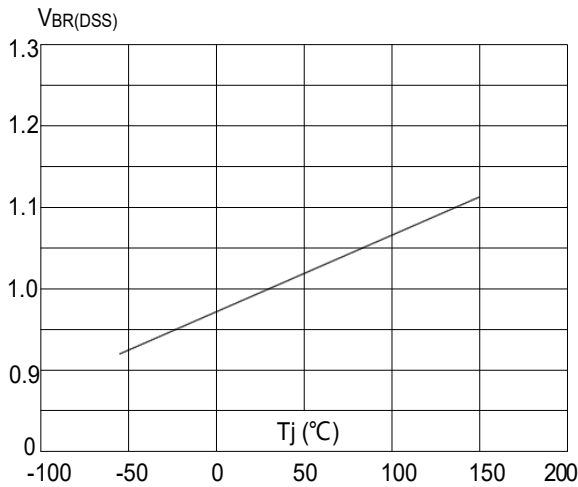


**Figure 6: Capacitance Characteristics**

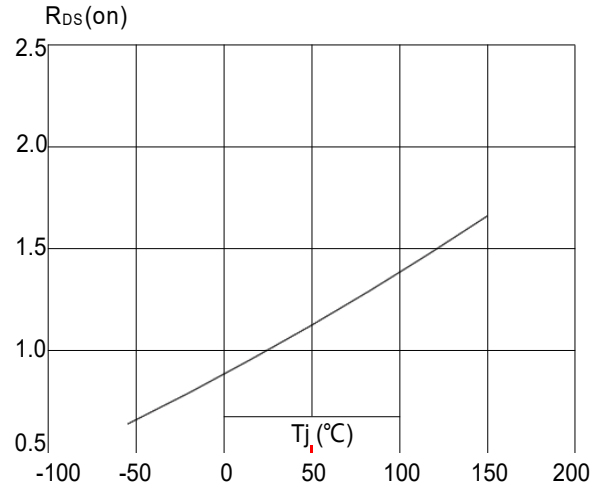




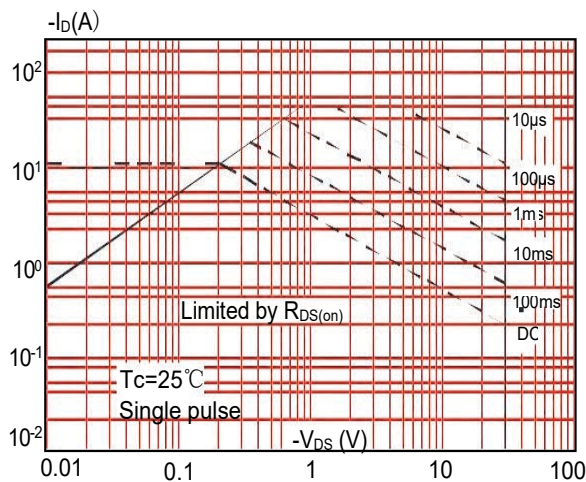
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



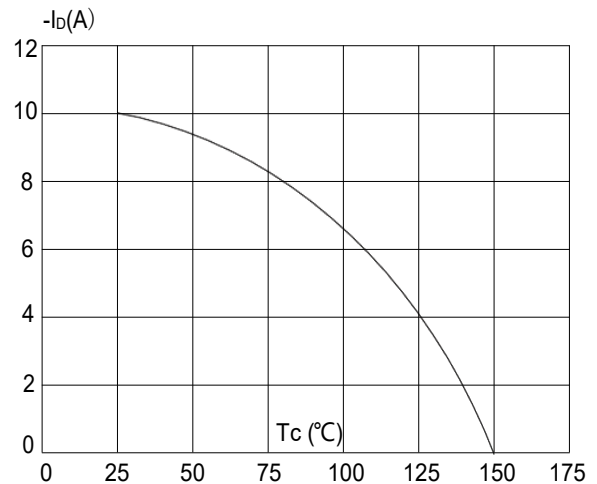
**Figure 8:** Normalized on Resistance vs. Junction Temperature



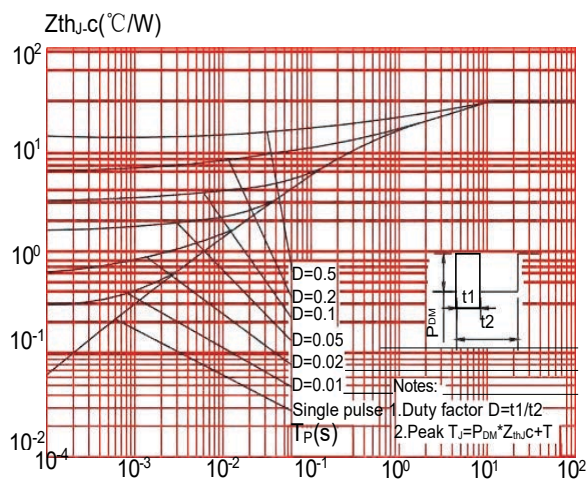
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



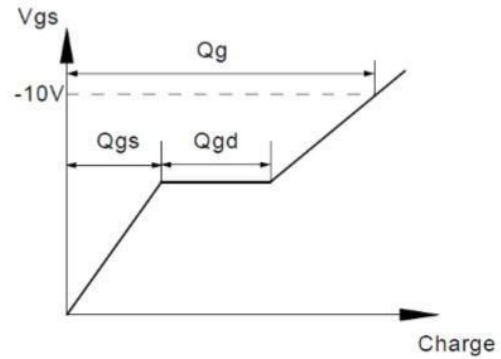
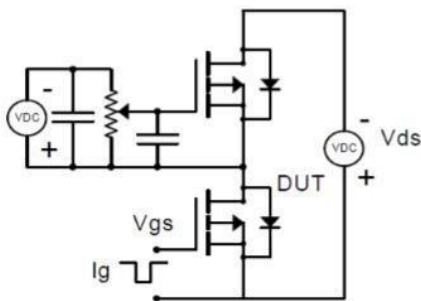
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



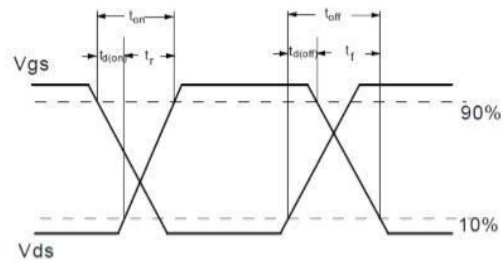
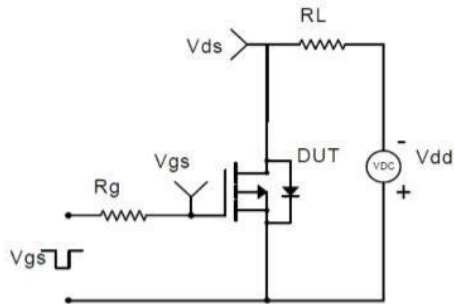


## Test Circuit-P

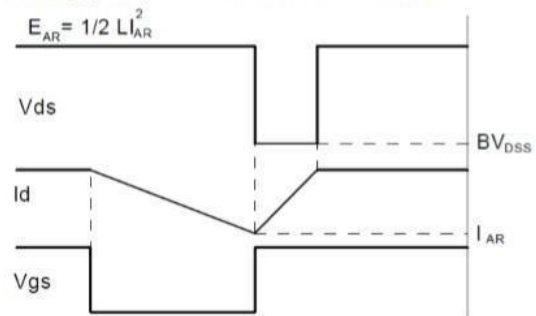
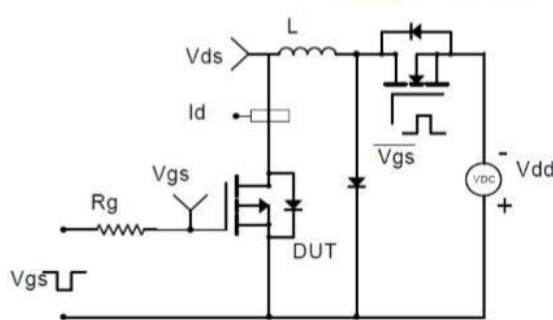
Gate Charge Test Circuit & Waveform



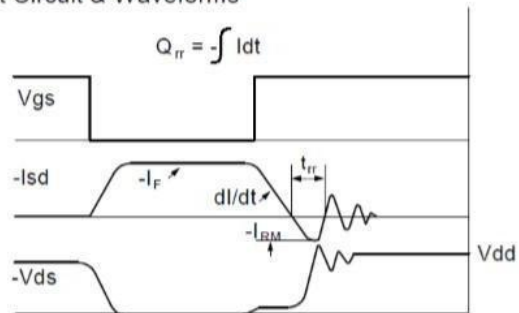
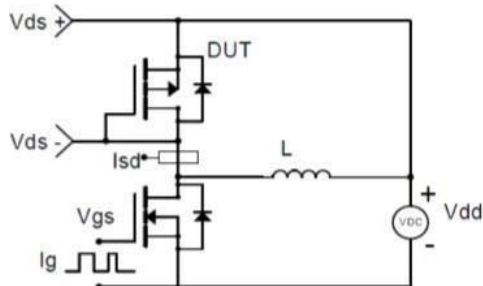
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

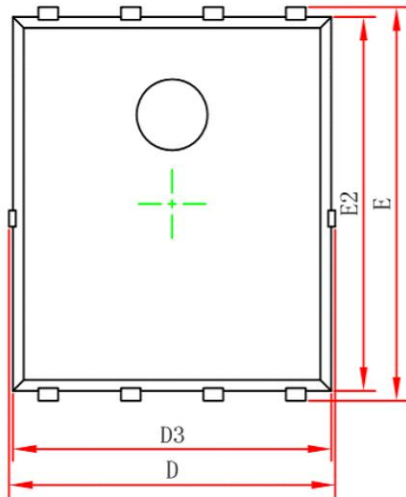


Diode Recovery Test Circuit & Waveforms

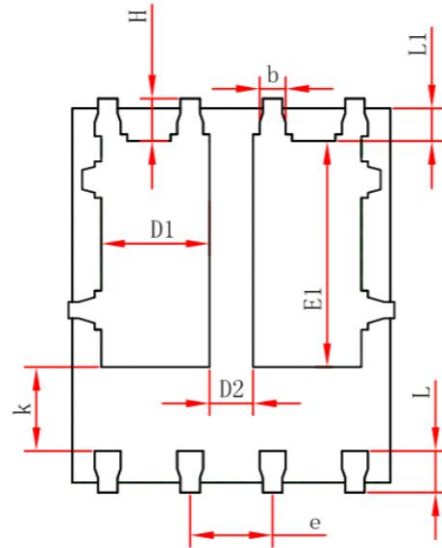




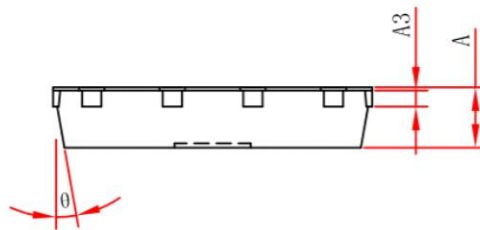
## DFN5X6B-8L Package Information



**Top View**



**Bottom View**



**Side View**

| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.000 | 0.035                | 0.039 |
| A3     | 0.154REF.                 |       | 0.006REF.            |       |
| D      | 4.944                     | 5.096 | 0.195                | 0.201 |
| E      | 5.974                     | 6.126 | 0.235                | 0.241 |
| D1     | 1.470                     | 1.870 | 0.058                | 0.074 |
| D2     | 0.470                     | 0.870 | 0.019                | 0.034 |
| E1     | 3.375                     | 3.575 | 0.133                | 0.141 |
| D3     | 4.824                     | 4.976 | 0.190                | 0.196 |
| E2     | 5.674                     | 5.826 | 0.223                | 0.229 |
| k      | 1.190                     | 1.390 | 0.047                | 0.055 |
| b      | 0.350                     | 0.450 | 0.014                | 0.018 |
| e      | 1.270TYP.                 |       | 0.050TYP.            |       |
| L      | 0.559                     | 0.711 | 0.022                | 0.028 |
| L1     | 0.424                     | 0.576 | 0.017                | 0.023 |
| H      | 0.574                     | 0.726 | 0.023                | 0.029 |
| θ      | 10°                       | 12°   | 10°                  | 12°   |



### **Attention**

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
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