



## General Description

The SIR846DP-T1-GE3 use advanced SGT MOSFET technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness.

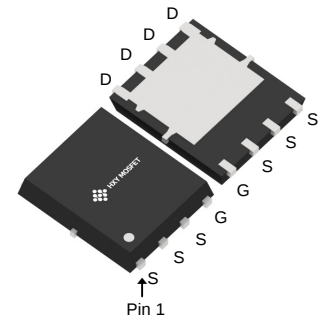
## General Features

$V_{DS} = 100V$   $I_D = 75A$

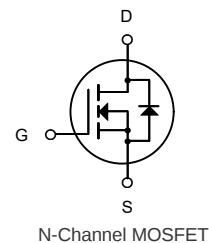
$R_{DS(ON)} < 7.5m\Omega$  @  $V_{GS}=10V$

## Applications

Consumer electronic power supply Motor control  
Synchronous-rectification Isolated DC  
Synchronous-rectification applications



DFN5X6-8L  
(Power(5x6))



## Package Marking and Ordering Information

| Product ID      | Pack                  | Brand      | Qty(PCS) |
|-----------------|-----------------------|------------|----------|
| SIR846DP-T1-GE3 | DFN5X6-8L(Power(5x6)) | HXY MOSFET | 5000     |

## Absolute Maximum Ratings at $T_j=25^{\circ}C$ unless otherwise noted

| Parameter                                    | Symbol          | Value      | Unit          |
|----------------------------------------------|-----------------|------------|---------------|
| Drain source voltage                         | $V_{DS}$        | 100        | V             |
| Gate source voltage                          | $V_{GS}$        | $\pm 20$   | V             |
| Continuous drain current <sup>1)</sup>       | $I_D$           | 75         | A             |
| Pulsed drain current <sup>2)</sup>           | $I_D$ , pulse   | 300        | A             |
| Power dissipation <sup>3)</sup>              | $P_D$           | 97         | W             |
| Single pulsed avalanche energy <sup>5)</sup> | EAS             | 90         | mJ            |
| Operation and storage temperature            | $T_{stg}, T_j$  | -55 to 150 | $^{\circ}C$   |
| Thermal resistance, junction-case            | $R_{\theta JC}$ | 1.3        | $^{\circ}C/W$ |



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

| Symbol                                                 | Parameter                                                 | Test Condition                                                                         | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                           |                                                                                        |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                             | 100  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =100V, 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  | 1.6  | 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> =20A                                              | -    | 6.4  | 7.5  | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A                                              | -    | 9.2  | 11.4 | mΩ    |
| Dynamic Characteristics                                |                                                           |                                                                                        |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                 | -    | 2944 | -    | pF    |
| C <sub>Oss</sub>                                       | Output Capacitance                                        |                                                                                        | -    | 736  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                        | -    | 2.04 | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =50V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V                     | -    | 39.4 | -    | nc    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                        | -    | 5.6  | -    | nc    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                        | -    | 7.6  | -    | nc    |
| Switching Characteristics                              |                                                           |                                                                                        |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DD</sub> =50V, I <sub>D</sub> =25A,<br>R <sub>G</sub> =6Ω, V <sub>GS</sub> =10V | -    | 13   | -    | nc    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                        | -    | 27.5 | -    | nc    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                        | -    | 45.5 | -    | nc    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                        | -    | 41.5 | -    | nc    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                        |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                        | -    | -    | 75   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                        | -    | -    | 300  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =30A                                               | -    | -    | 1    | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                          | T <sub>J</sub> =25°C,<br>I <sub>F</sub> =12A,dI/dt=100A/μs                             | -    | 177  | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                        |                                                                                        | -    | 1291 | -    | nc    |

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

2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=50V$ ,  $V_G=10V$ ,  $R_G=25\Omega$ ,  $L=0.5mH$ ,  $I_{AS}=19A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$



## Typical Performance Characteristics

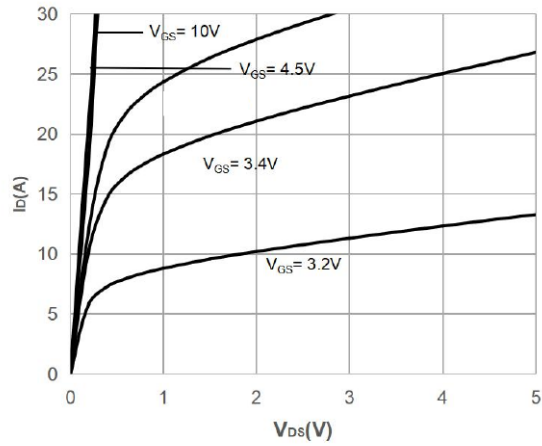


Figure 1: Output Characteristics

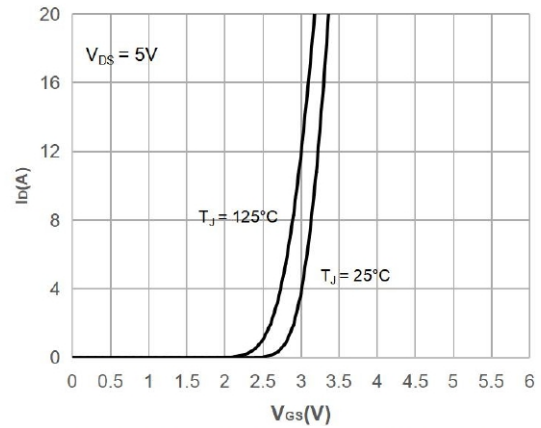


Figure 2: Typical Transfer Characteristics

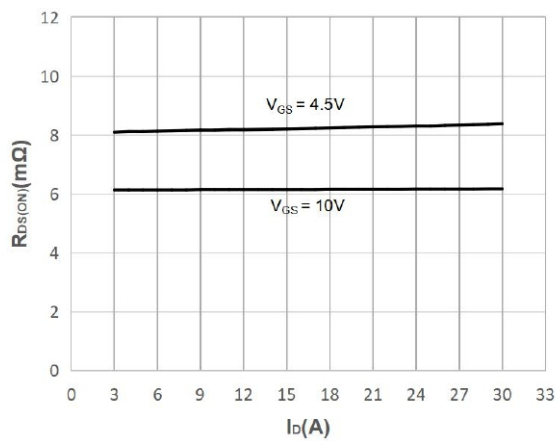


Figure 3: On-resistance vs. Drain Current

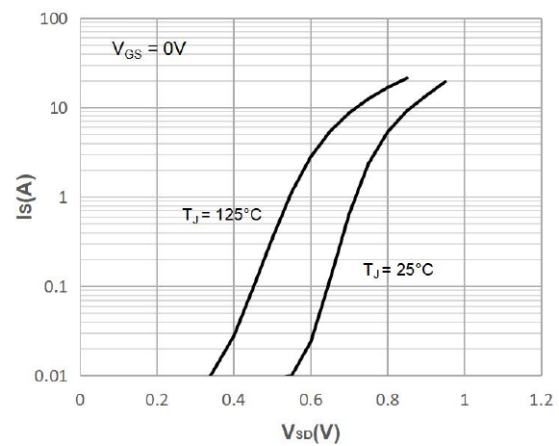


Figure 4: Body Diode Characteristics

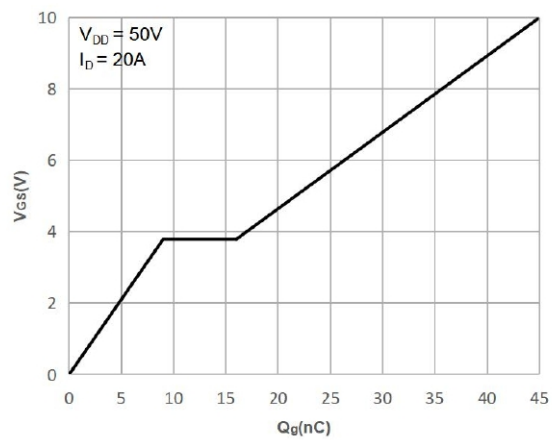


Figure 5: Gate Charge Characteristics

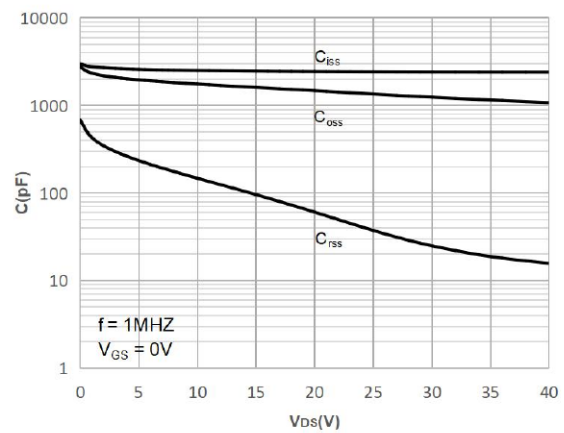


Figure 6: Capacitance Characteristics



Figure 7: Normalized Breakdown voltage vs. Junction Temperature

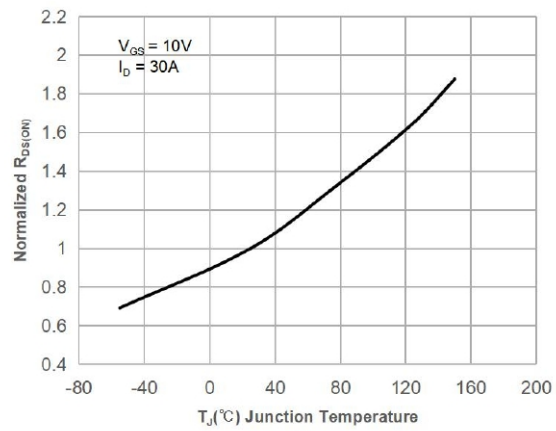


Figure 8: Normalized on Resistance vs. Junction Temperature



Figure 9: Maximum Safe Operating Area

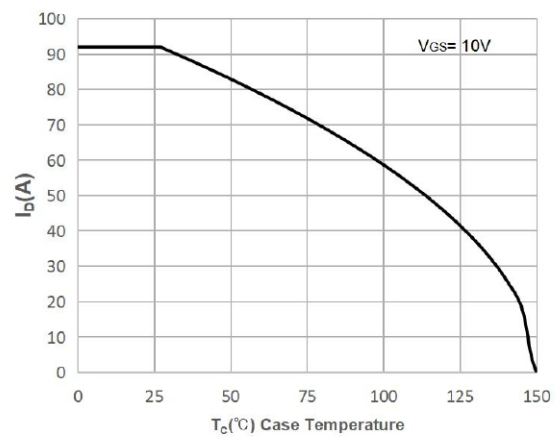


Figure 10: Maximum Continuous Drain Current vs. Case Temperature



Figure 11: Normalized Maximum Transient Thermal Impedance



Figure 12: Peak Current Capacity



## DFN5X6-8L(Power(5x6)) Package Information



| SYMBOL | MM       |      |       | INCH     |       |       |
|--------|----------|------|-------|----------|-------|-------|
|        | MIN      | NOM  | MAX   | MIN      | NOM   | MAX   |
| A      | 4.95     | 5    | 5.05  | 0.195    | 0.197 | 0.199 |
| A1     | 4.82     | 4.9  | 4.98  | 0.190    | 0.193 | 0.196 |
| D      | 5.98     | 6    | 6.02  | 0.235    | 0.236 | 0.237 |
| D1     | 5.67     | 5.75 | 5.83  | 0.223    | 0.226 | 0.230 |
| B      | 0.9      | 0.95 | 1     | 0.035    | 0.037 | 0.039 |
| B1     | 0.254REF |      |       | 0.010REF |       |       |
| C      | 3.95     | 4    | 4.05  | 0.156    | 0.157 | 0.159 |
| C1     | 0.35     | 0.4  | 0.45  | 0.014    | 0.016 | 0.018 |
| C2     | 1.27TYP  |      |       | 0.5TYP   |       |       |
| θ1     | 8°       | 10°  | 12°   | 8°       | 10°   | 12°   |
| L1     | 0.63     | 0.64 | 0.65  | 0.025    | 0.025 | 0.026 |
| L2     | 1.2      | 1.3  | 1.4   | 0.047    | 0.051 | 0.055 |
| L3     | 3.415    | 3.42 | 3.425 | 0.134    | 0.135 | 0.135 |
| H      | 0.24     | 0.25 | 0.26  | 0.009    | 0.010 | 0.010 |



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