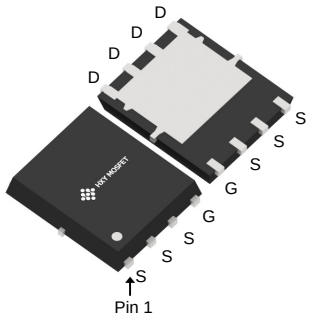
# SIR4604LDP-T1-GE3

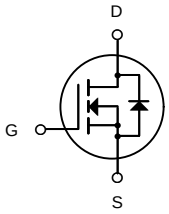
N-Channel Enhancement Mode MOSFET

## Description

The SIR4604LDP-T1-GE3 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.




DFN5X6-8L




N-Channel MOSFET

## General Features

$V_{DS}$ = 60V $I_D$ =65A

$R_{DS(ON)}$ < 11mΩ $V_{GS}$=10V

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| SIR4604LDP-T1-GE3 | DFN5X6-8L | HXY MOSFET | 5000 |

## Absolute Maximum Ratings ($T_C$=25°C unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 65 | A |
| $I_D$@$T_C$=70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 49 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 180 | A |
| EAS | Single Pulse Avalanche Energy[3] | 56 | mJ |
| $P_D$@$T_C$=25°C | Total Power Dissipation[4] | 89 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | 62 | °C/W |

## Electrical Characteristics ($T_J$=25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristic** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 60 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=60V, $V_{GS}$=0V, | - | - | 1.0 | μA |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{DS}$=0V, $V_{GS}$= ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.0 | 1.6 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note3 | $V_{GS}$=10V, $I_D$=20A | - | 8 | 11 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=10A | - | 14 | 20 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V, $V_{GS}$=0V, f=1.0MHz | - | 930 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 370 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 20 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=30V, $I_D$=20A, $V_{GS}$=10V | - | 19 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 4.8 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 4.5 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$=30V, $I_D$=20A, $R_G$=1.6Ω, $V_{GS}$=10V | - | 4.9 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 31 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 23 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 8.7 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 65 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 240 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=30A | - | - | 1.4 | V |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $T_J$=25°C, $I_F$=20A,dI/dt=100A/μs | - | 34 | - | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | | - | 14 | - | nC |

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

2. EAS condition: $T_J$=25°C, $V_{DD}$=30V, $V_G$=10V, $R_G$=25Ω, L=0.5mH, $I_{AS}$=12A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Performance Characteristics

**Figure1:** Output Characteristics

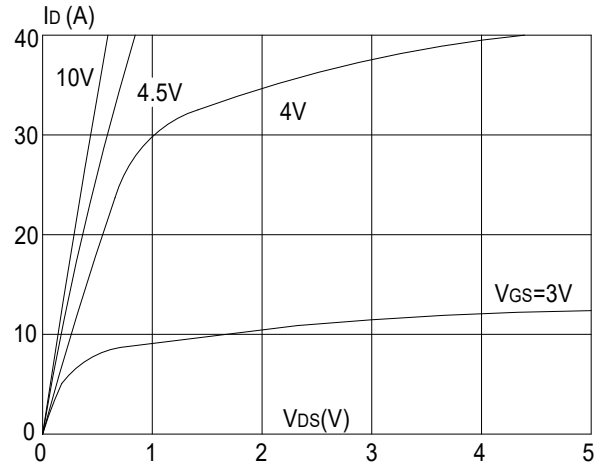



**Figure 2:** Typical Transfer Characteristics

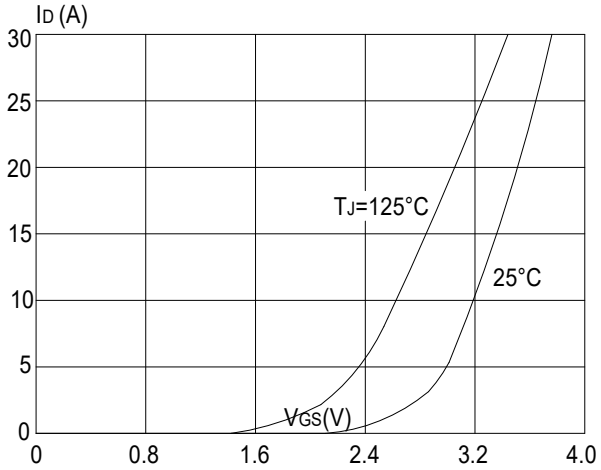



**Figure 3:**On-resistance vs. Drain Current

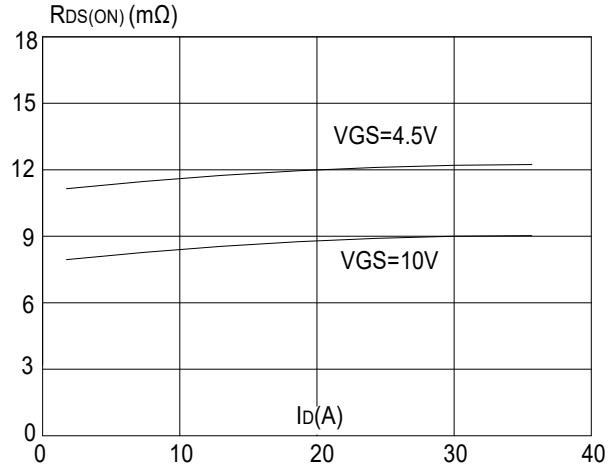



**Figure 4**: Body Diode Characteristics

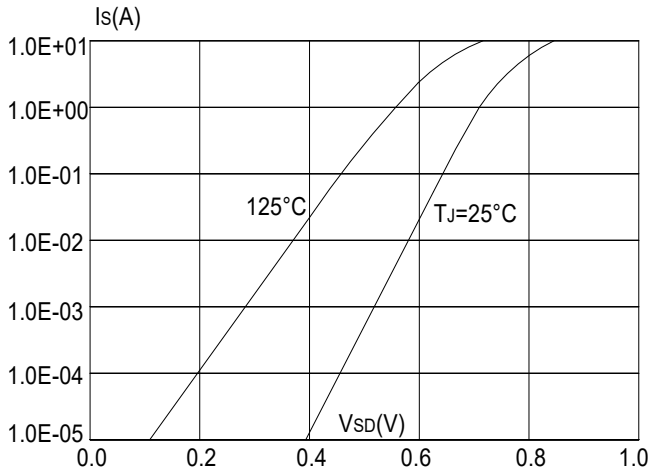



**Figure 5:** Gate Charge Characteristics

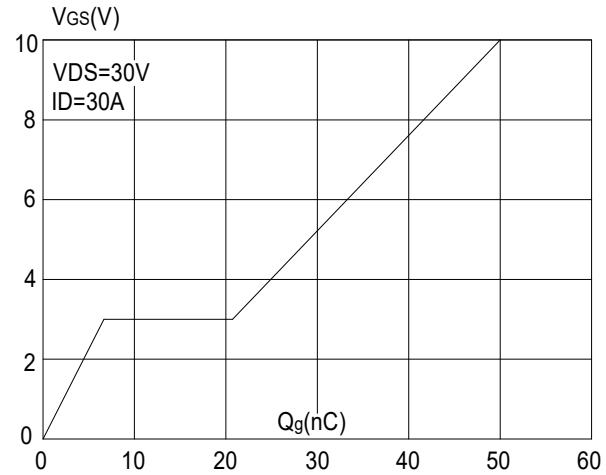



**Figure 6:** Capacitance Characteristics

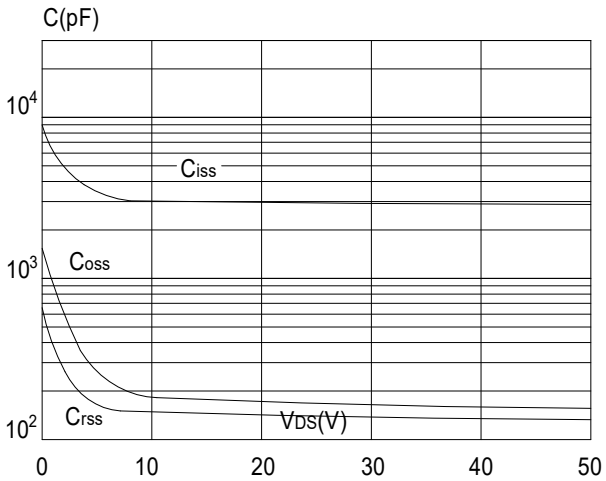


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

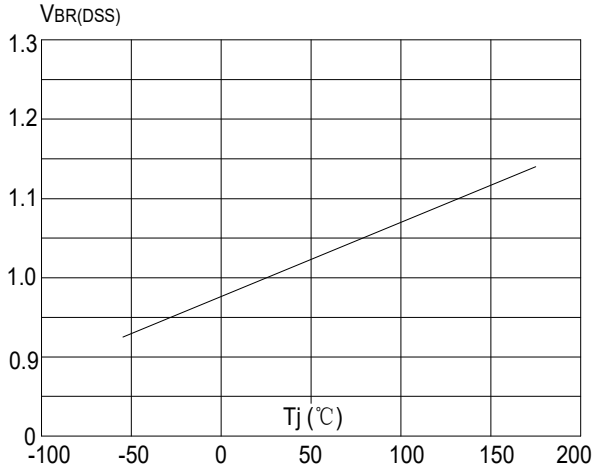



**Figure 8:** Normalized on Resistance vs. Junction Temperature

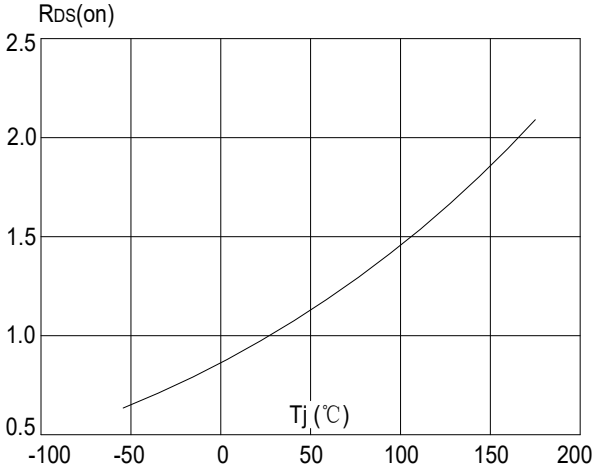



**Figure 9:** Maximum Safe Operating Area

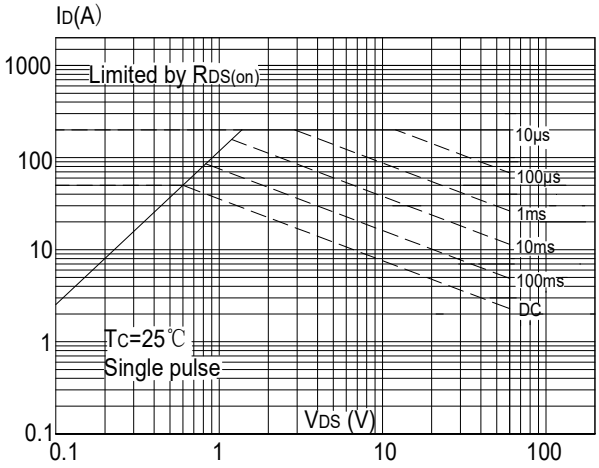



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

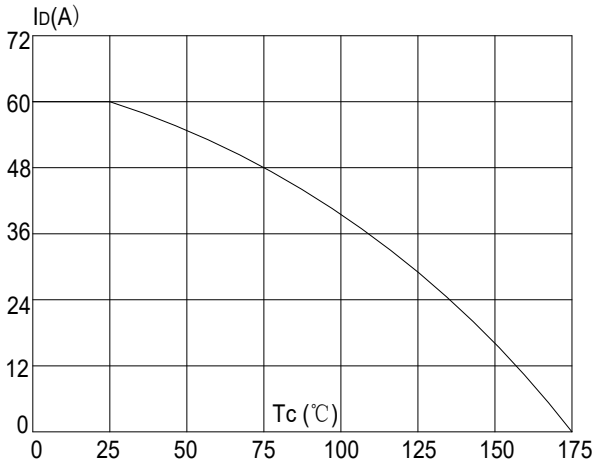
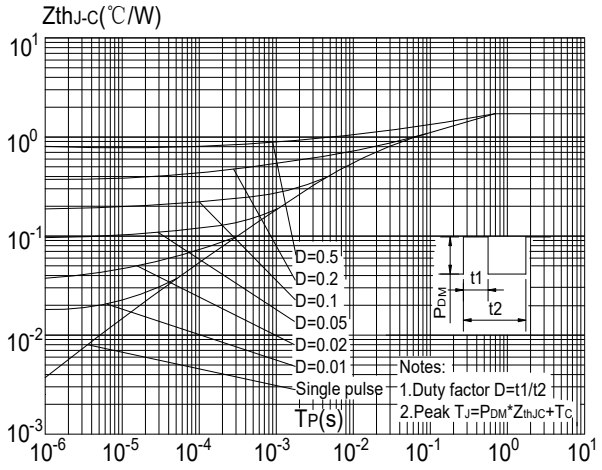
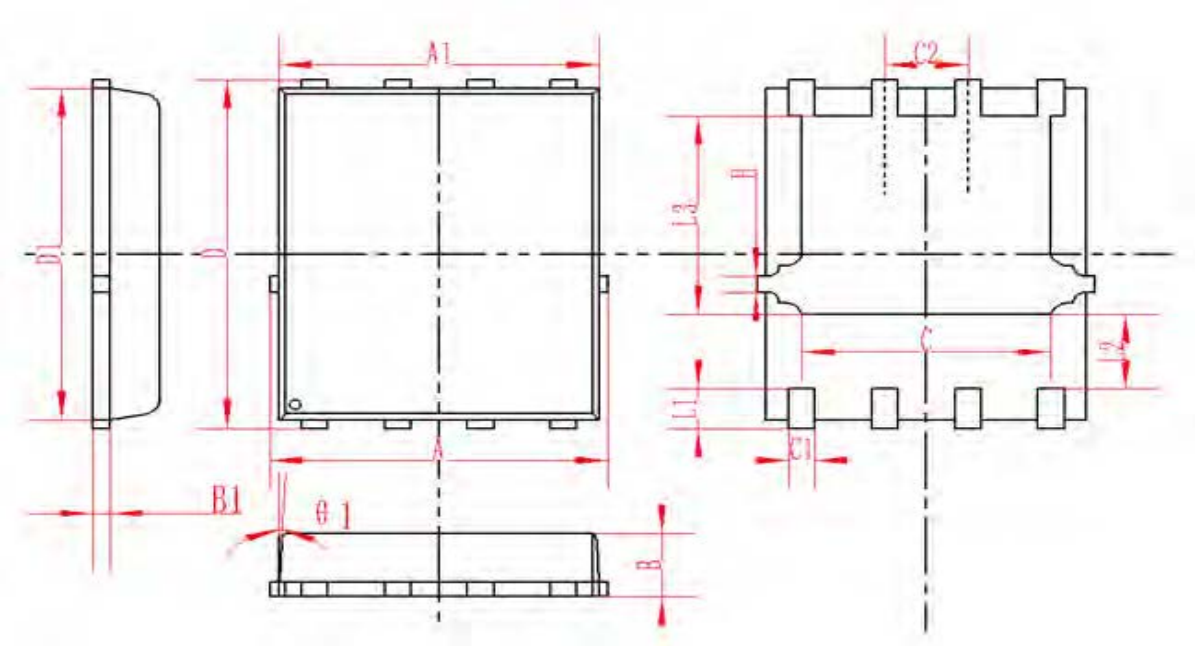



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



## DFN5X6-8L 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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