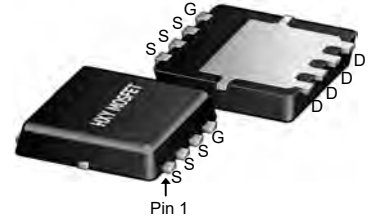




Description

The SIRA12DP-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

General Features

$V_{DS} = 30\text{ V}$ $I_D = 120\text{ A}$

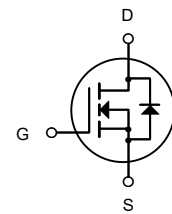
$R_{DS(ON)} < 4.4\text{ m}\Omega$ $V_{GS} = 10\text{ V}$

Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|-----------------|-----------|------------|----------|
| SIRA12DP-T1-GE3 | DFN5X6-8L | HXY MOSFET | 5000 |

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

| Symbol | Parameter | Rating | Units |
|---------------------------------|---|------------|--------------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D @ T_C = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10\text{V}^{1,6}$ | 120 | A |
| $I_D @ T_C = 100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10\text{V}^{1,6}$ | 66 | A |
| I_{DM} | Pulsed Drain Current ² | 320 | A |
| EAS | Single Pulse Avalanche Energy ³ | 180 | mJ |
| I_{AS} | Avalanche Current | 60 | A |
| $P_D @ T_C = 25^\circ\text{C}$ | Total Power Dissipation ⁴ | 187 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | 62 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | 1.1 | $^\circ\text{C/W}$ |



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|-------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V , I _D =250uA | 30 | --- | --- | V |
| ∂BV _{DSS} /∂T _J | BV _{DSS} Temperature Coefficient | Reference to 25°C , I _D =1mA | --- | 0.014 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V , I _D =30A | --- | 3.5 | 4.4 | mΩ |
| | | V _{GS} =4.5V , I _D =15A | --- | 4.6 | 5.8 | |
| V _{GS(th)} | Gate Threshold Voltage | | 1.2 | --- | 2.5 | V |
| ∂V _{GS(th)} | V _{GS(th)} Temperature Coefficient | V _{GS} =V _{DS} , I _D =250uA | --- | -4 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =24V , V _{GS} =0V , T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V , V _{GS} =0V , T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} = ±20V , V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V , I _D =30A | --- | 50 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V , V _{GS} =0V , f=1MHz | --- | 1.7 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V , V _{GS} =10V , I _D =15A | --- | 56.9 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 13.8 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 23.5 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V , V _{GS} =10V , R _G =3.3 Ω , I _D =1A | --- | 20.1 | --- | ns |
| T _r | Rise Time | | --- | 6.3 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 124.6 | --- | |
| T _f | Fall Time | | --- | 15.8 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =15V , V _{GS} =0V , f=1MHz | --- | 4345 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 340 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 225 | --- | |
| I _s | Continuous Source Current ^{1,6} | V _G =V _D =0V , Force Current | --- | --- | 85 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V , I _s =1A , T _J =25°C | --- | --- | 1.2 | V |



Typical Characteristics

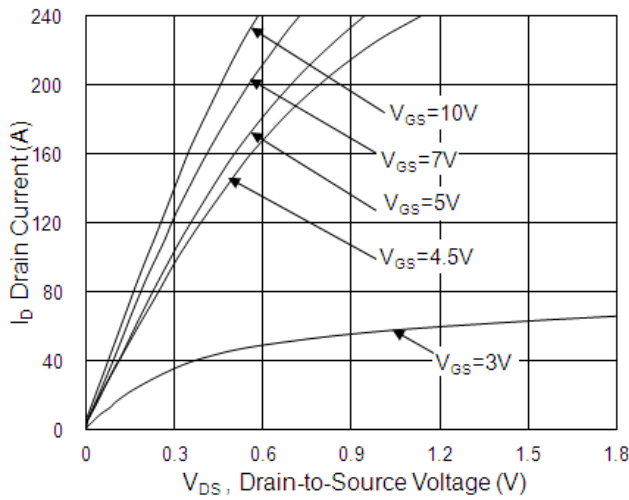


Fig.1 Typical Output Characteristics

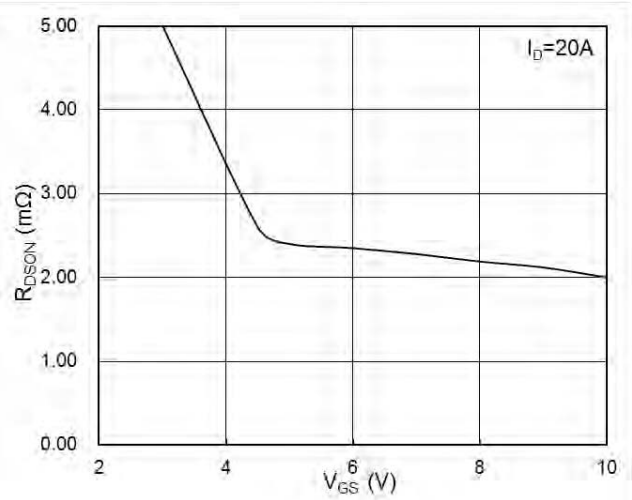


Fig.2 On-Resistance v.s Gate-Source

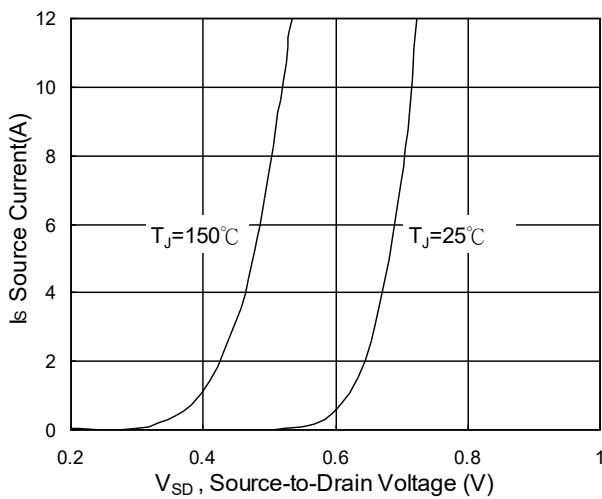


Fig.3 Forward Characteristics of Reverse

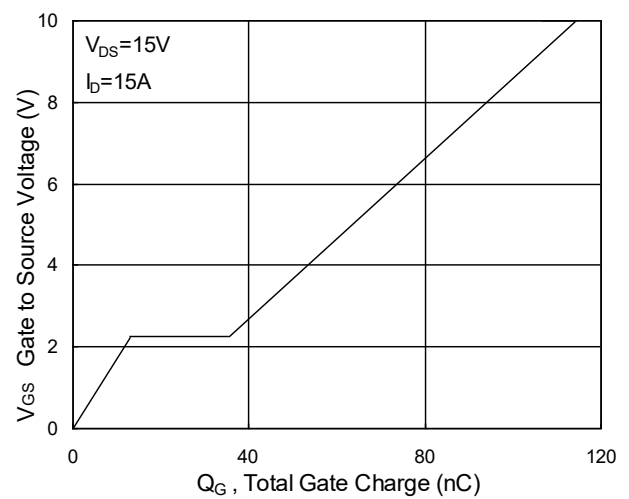


Fig.4 Gate-Charge Characteristics

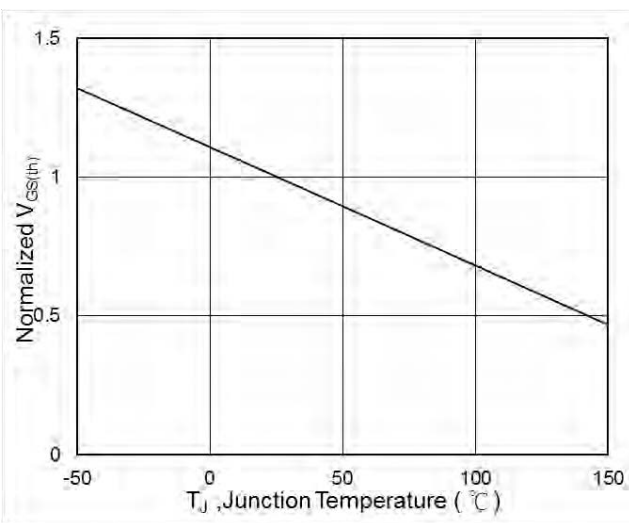


Fig.5 Normalized V_{GS(th)} v.s T_J

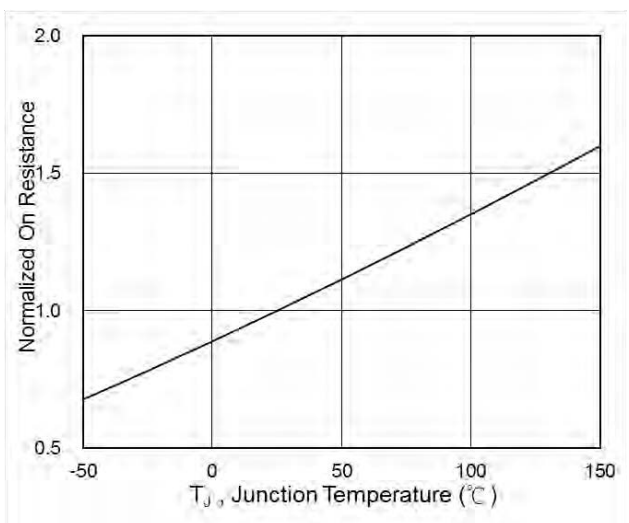


Fig.6 Normalized R_{DS(on)} v.s T_J

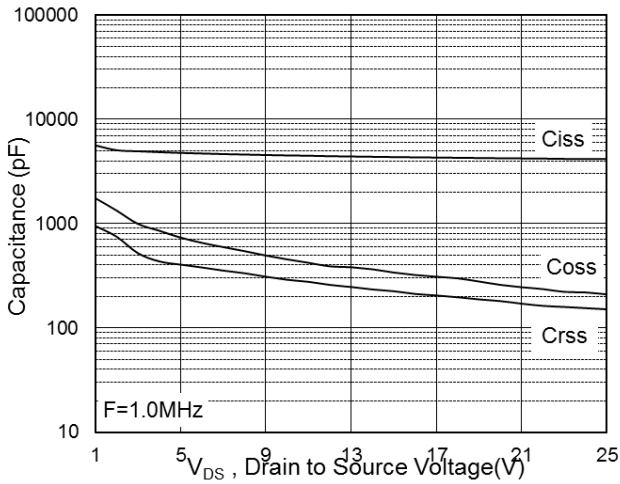


Fig.7 Capacitance

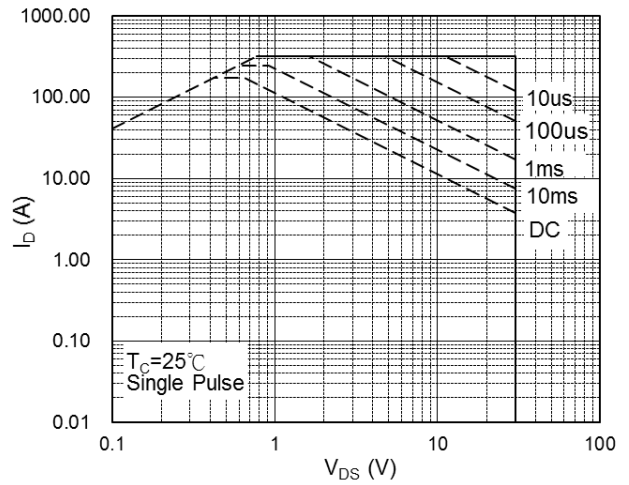


Fig.8 Safe Operating Area

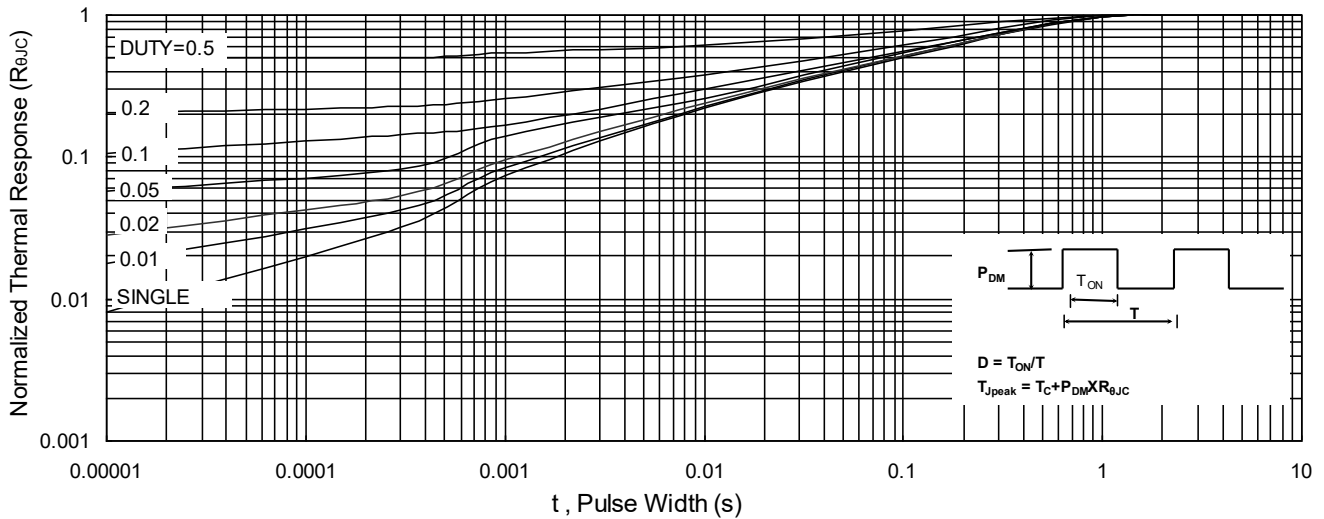


Fig.9 Normalized Maximum Transient Thermal Impedance

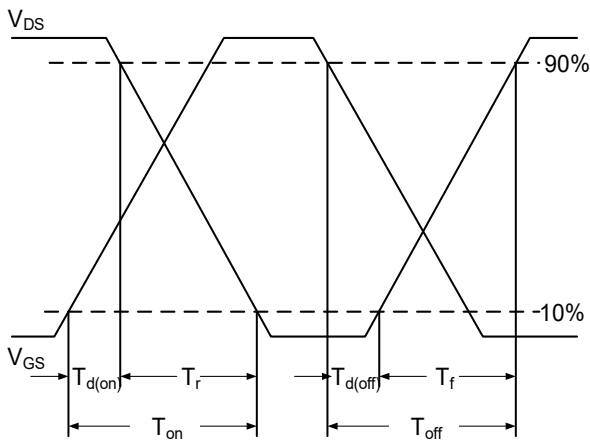


Fig.10 Switching Time Waveform

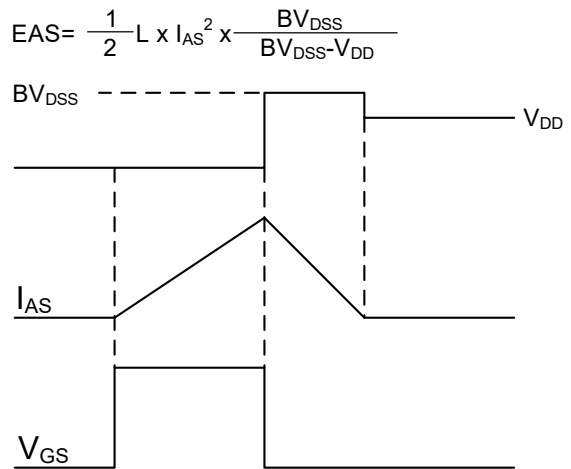
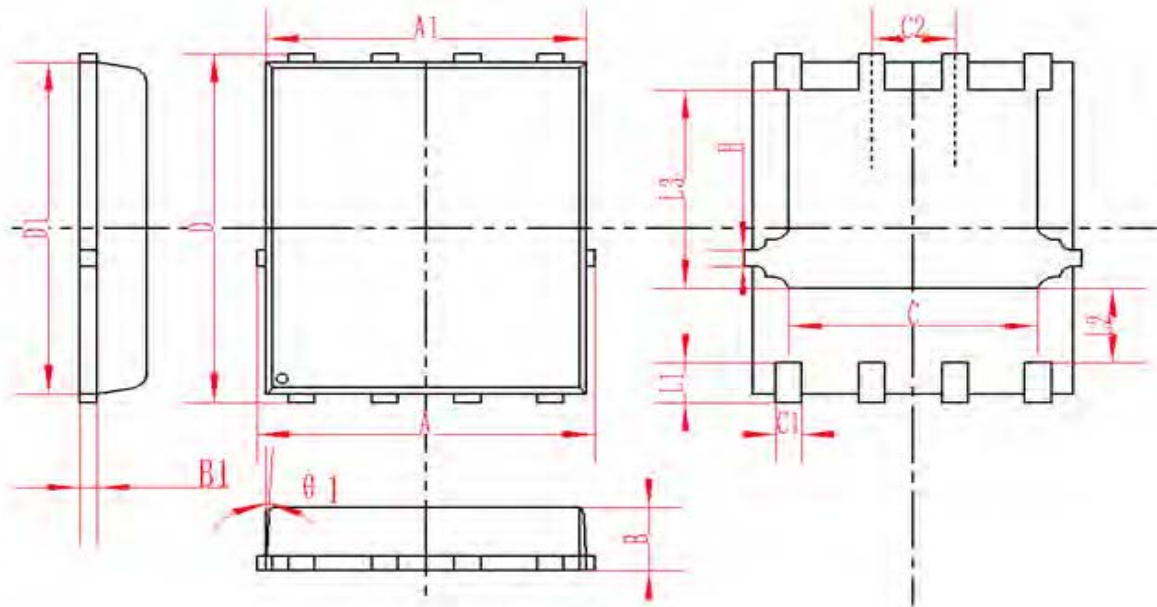


Fig.11 Unclamped Inductive Switching Waveform



DFN5X6-8L Package Information



| SYMBOL | MM | | | INCH | | |
|------------|----------|------|-------|----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 5.3 | 5.5 | 5.7 | 0.208 | 0.216 | 0.224 |
| A1 | 5.1 | 5.2 | 5.3 | 0.2 | 0.204 | 0.209 |
| D | 5.98 | 6 | 6.02 | 0.235 | 0.236 | 0.237 |
| D1 | 5.85 | 6.05 | 6.25 | 0.23 | 0.238 | 0.246 |
| B | 0.85 | 0.95 | 1.05 | 0.033 | 0.037 | 0.041 |
| 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 | | |
| $\theta 1$ | 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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