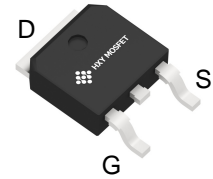




Description

The STD60NF3LLT4 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.



TO-252-2L

General Features

$V_{DS} = 30V$ $I_D = 60A$

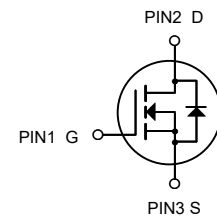
$R_{DS(ON)} < 9m\Omega$ @ $V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|--------------|-----------|------------|----------|
| STD60NF3LLT4 | TO-252-2L | HXY MOSFET | 2500 |

Absolute Maximum Ratings (Tc=25°C unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|-----------------------|---|------------|-------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ¹ | 60 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ¹ | 40 | A |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ¹ | 13.6 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ¹ | 11.4 | A |
| I_{DM} | Pulsed Drain Current ² | 110 | A |
| EAS | Single Pulse Avalanche Energy ³ | 57.8 | mJ |
| I_{AS} | Avalanche Current | 34 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 41 | W |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ⁴ | 2.42 | W |
| T_{STG} | Storage Temperature Range | -55 to 175 | °C |
| T_J | Operating Junction Temperature Range | -55 to 175 | °C |
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient (Steady State) ¹ | 62 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | 3.6 | °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 |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.027 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =30A | --- | 7 | 9 | mΩ |
| | | V _{GS} =4.5V, I _D =15A | --- | 11 | 14 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.5 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -5.8 | --- | 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 | --- | 38 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.2 | 3.5 | |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =4.5V, I _D =15A | --- | 12.6 | 17.6 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 4.2 | 5.9 | |
| Q _{gd} | Gate-Drain Charge | | --- | 5.1 | 7.1 | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GS} =10V, R _G =3.3 I _D =15A | --- | 4.6 | 9.2 | ns |
| T _r | Rise Time | | --- | 12.2 | 22 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 26.6 | 53 | |
| T _f | Fall Time | | --- | 8 | 16 | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 1317 | 1843 | pF |
| C _{oss} | Output Capacitance | | --- | 163 | 228 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 131 | 183 | |
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | 55 | A |
| I _{SM} | Pulsed Source Current ^{2,5} | | --- | --- | 110 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | I _F =30A, dI/dt=100A/μs, T _J =25°C | --- | 9.2 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 2 | --- | nC |

Note :

- 1 .The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ 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,I_{AS}=34A
- 4.The power dissipation is limited by 175°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.



Typical Characteristics

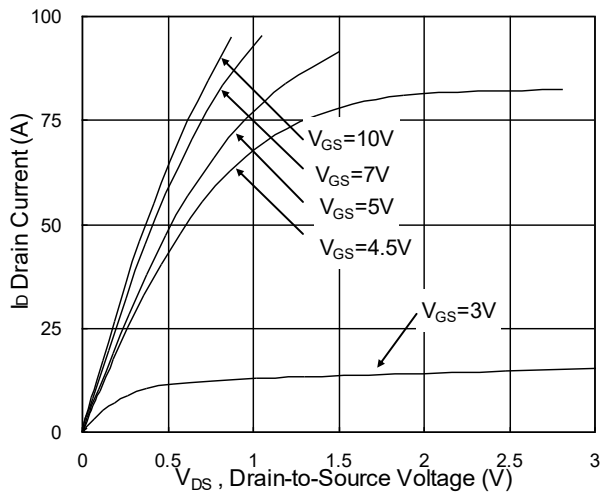


Fig.1 Typical Output Characteristics

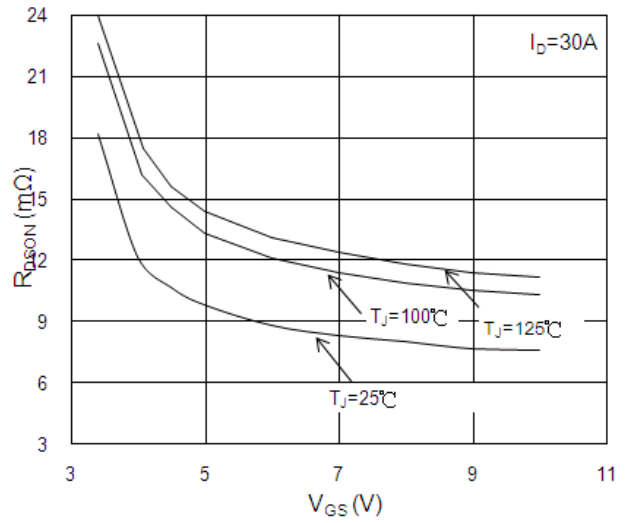


Fig.2 On-Resistance vs. G-S Voltage

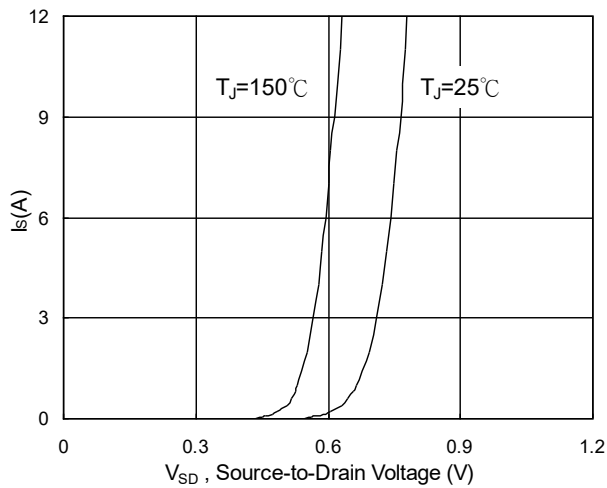


Fig.3 Forward Characteristics of Reverse

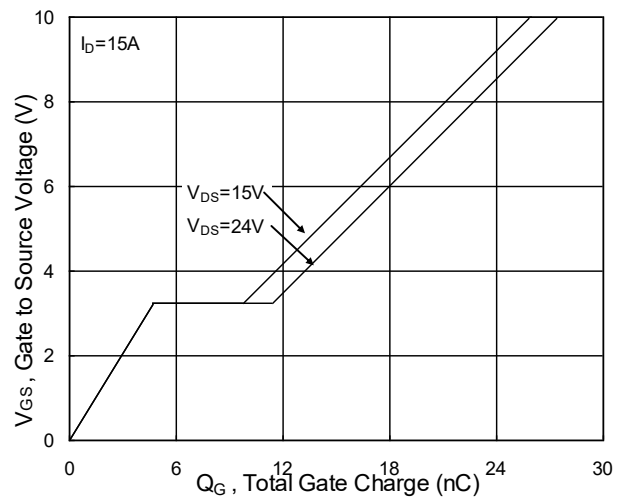


Fig.4 Gate-Charge Characteristics

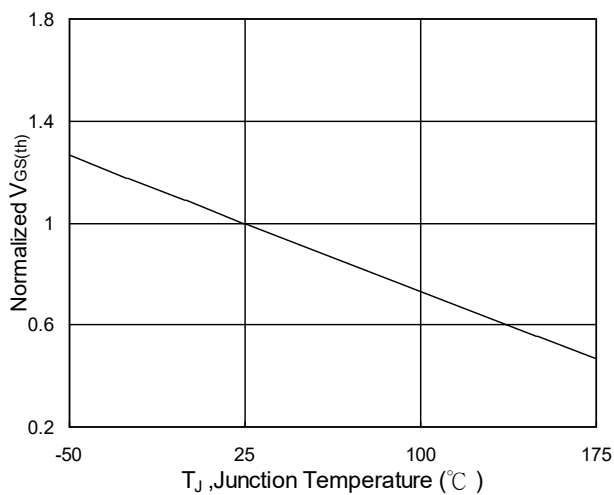


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

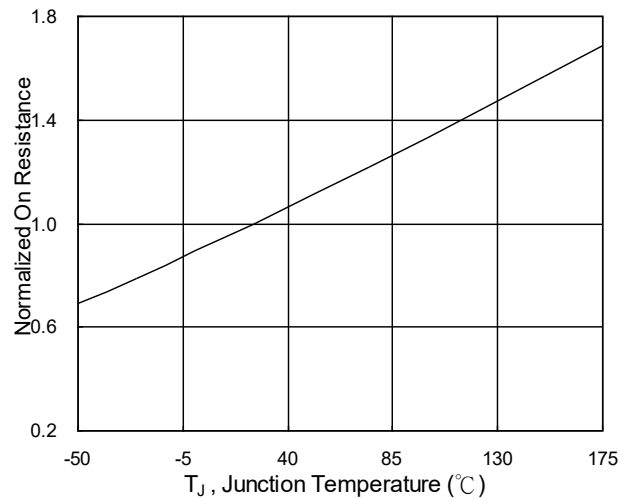


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

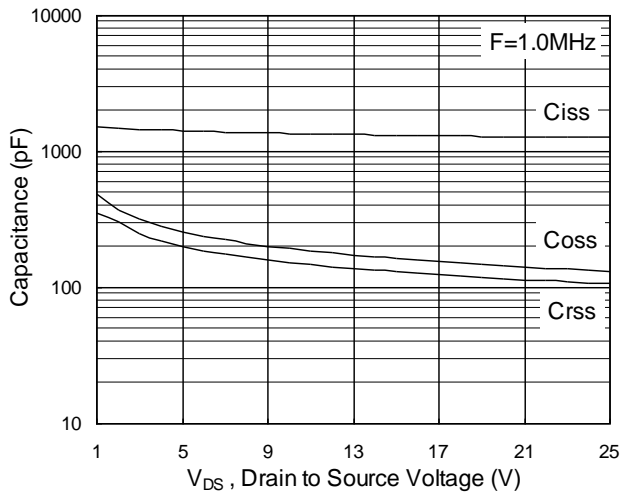


Fig.7 Capacitance

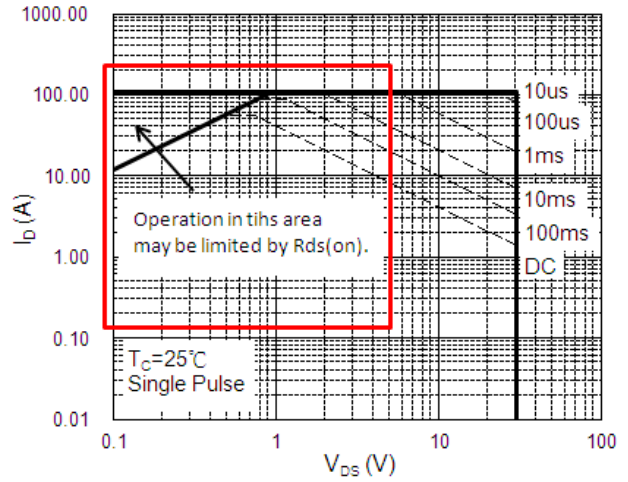


Fig.8 Safe Operating Area

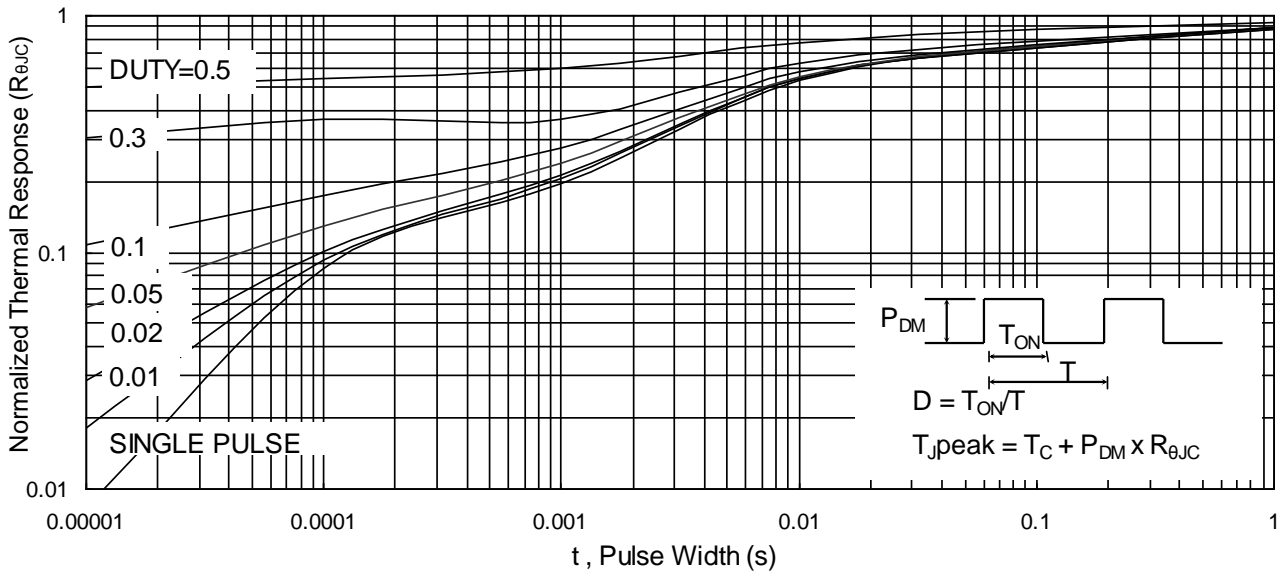


Fig.9 Normalized Maximum Transient Thermal Impedance

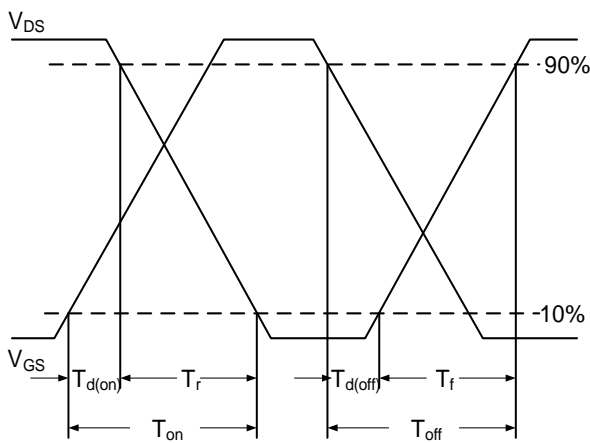


Fig.10 Switching Time Waveform

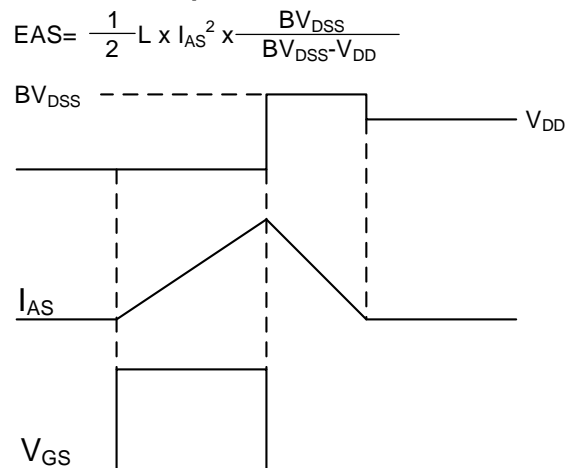


Fig.11 Unclamped Inductive Switching Waveform



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