



Description

The IRFHM9331TRPBF uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is well suited for high current load applications.

Features

$V_{DS} = -30V, I_D = -35A$

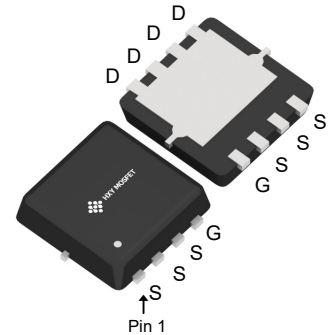
$R_{DS(ON)} < 15m\Omega @ V_{GS} = -10V$

$R_{DS(ON)} < 26m\Omega @ V_{GS} = -4.5V$

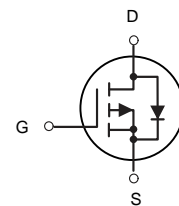
Application

High side switch for full bridge converter

DC/DC converter for LCD display



DFN3X3-8L



P-Channel MOSFET

Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|----------------|-----------|------------|----------|
| IRFHM9331TRPBF | DFN3X3-8L | HXY MOSFET | 5000 |

Absolute Maximum Ratings@ $T_J = 25^\circ C$ (unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|--------------------------------------|---|------------|-------|
| V _{DS} | Drain-Source Voltage | -30 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| I _D @T _A =25°C | Drain Current ³ , V _{GS} @ 10V | -35 | A |
| I _D @T _A =70°C | Drain Current ³ , V _{GS} @ 10V | -25 | A |
| IDM | Pulsed Drain Current ¹ | -120 | A |
| P _D @T _A =25°C | Total Power Dissipation | 15 | W |
| TSTG | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |
| R _{thj-c} | Maximum Thermal Resistance, Junction-case | 6 | °C/W |
| R _{thj-a} | Maximum Thermal Resistance, Junction-ambient ³ | 66 | °C/W |



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

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---------------|--|--|------|------|-----------|------------|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -30 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=-30V, V_{GS}=0V,$ | - | - | -1 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | - | - | ± 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1.0 | -1.6 | -2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance Note3 | $V_{GS}=-10V, I_D=-10A$ | - | 12 | 15 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-5A$ | - | 18 | 26 | |
| C_{iss} | Input Capacitance | $V_{DS}=-15V, V_{GS}=0V,$ $f=1.0MHz$ | - | 1330 | - | pF |
| C_{oss} | Output Capacitance | | - | 183 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 156 | - | pF |
| Q_g | Total Gate Charge | $V_{DS}=-15V, I_D=-5A,$ $V_{GS}=-10V$ | - | 22 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 1.0 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 1.8 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}=-15V, I_D=-10A,$ $V_{GS}=-10V, R_{GEN}=2.5\Omega$ | - | 9 | - | ns |
| t_r | Turn-on Rise Time | | - | 13 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 48 | - | ns |
| t_f | Turn-off Fall Time | | - | 20 | - | ns |
| I_S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | -35 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | -90 | A |
| V_{SD} | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=-15A$ | - | -0.8 | -1.2 | V |
| t_{rr} | Reverse Recovery Time | $T_J=25^\circ\text{C},$ | - | 64 | - | ns |
| Q_{rr} | Reverse Recovery Charge | $V_{DD}=-24V, I_F=-2.8A,$ $di/dt=-100A/\mu s$ | - | 25 | - | nC |

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

2. EAS condition: $T_J=25^\circ\text{C}, V_{GS}=10V, R_G=25\Omega, L=0.5mH, I_{AS}=-12.7A$

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



Typical Performance Characteristics

Figure 1: Output Characteristics

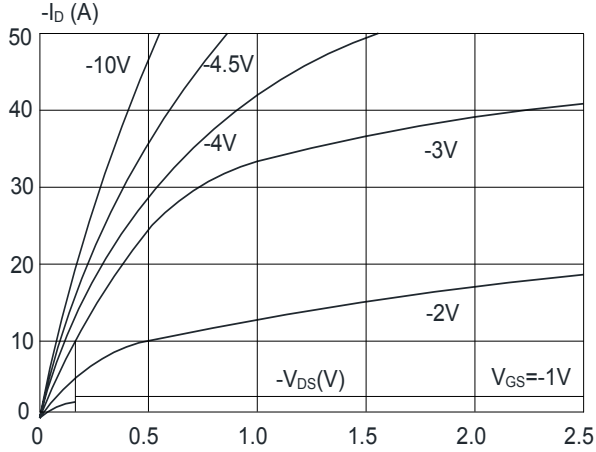


Figure 2: Typical Transfer Characteristics

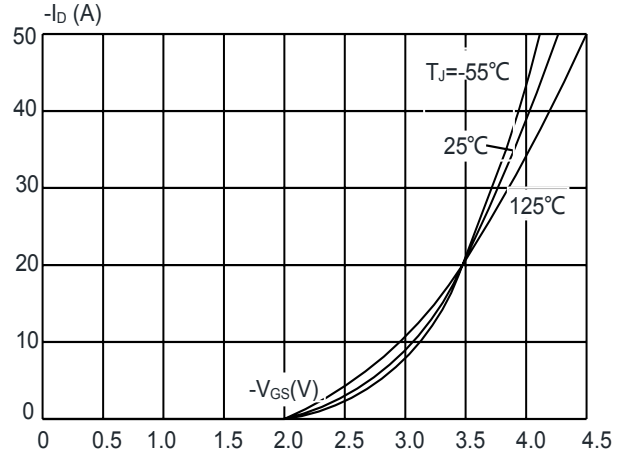


Figure 3: On-resistance vs. Drain Current

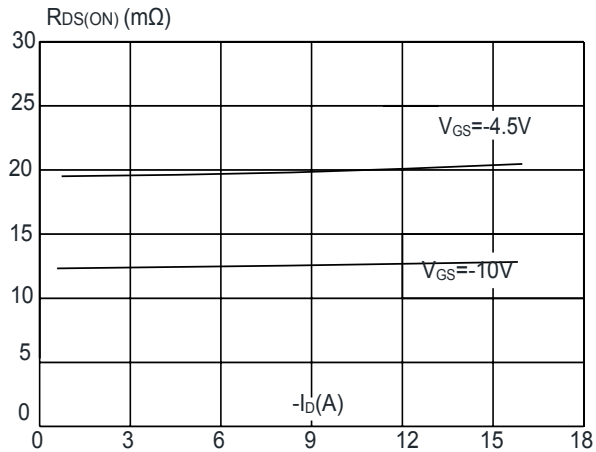


Figure 4: Body Diode Characteristics

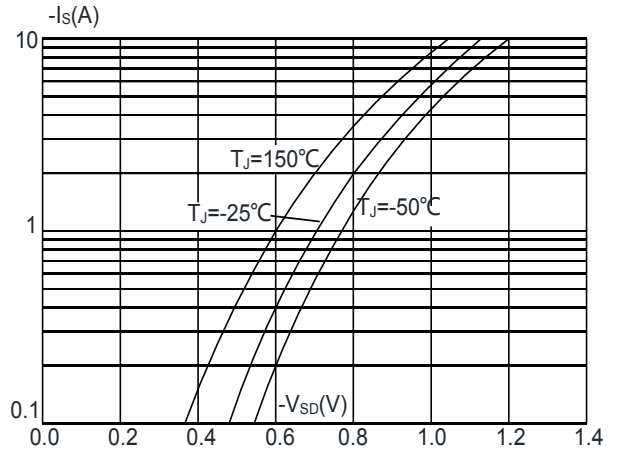


Figure 5: Gate Charge Characteristics

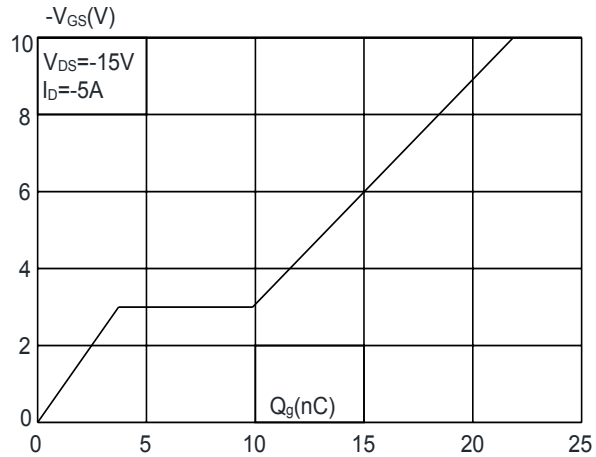


Figure 6: Capacitance Characteristics

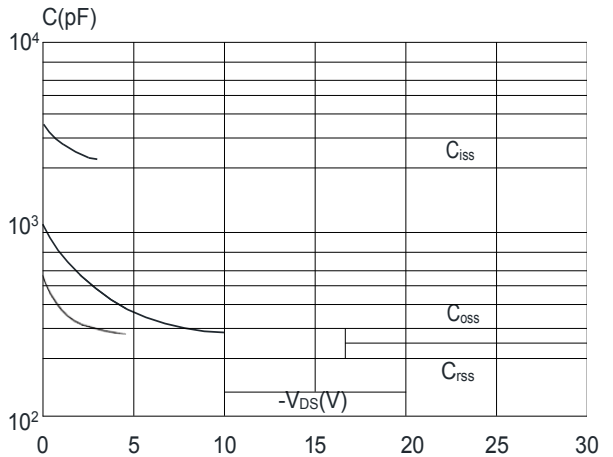




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

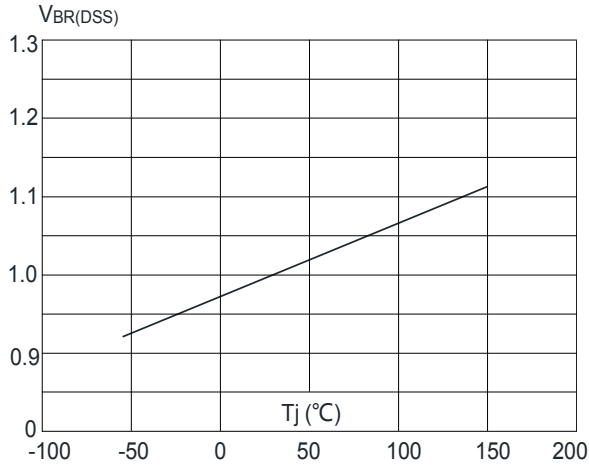


Figure 8: Normalized on Resistance vs. Junction Temperature

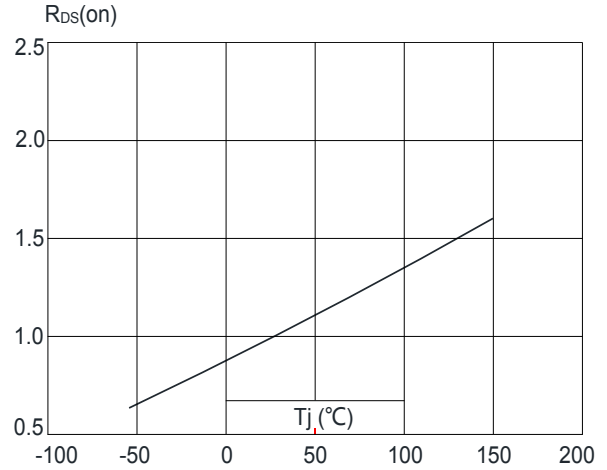


Figure 9: Maximum Safe Operating Area

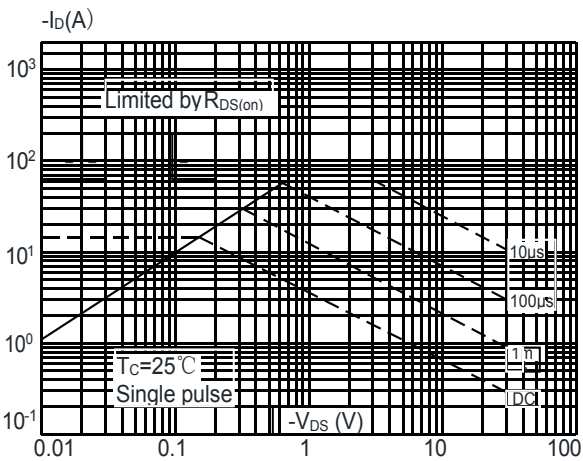


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

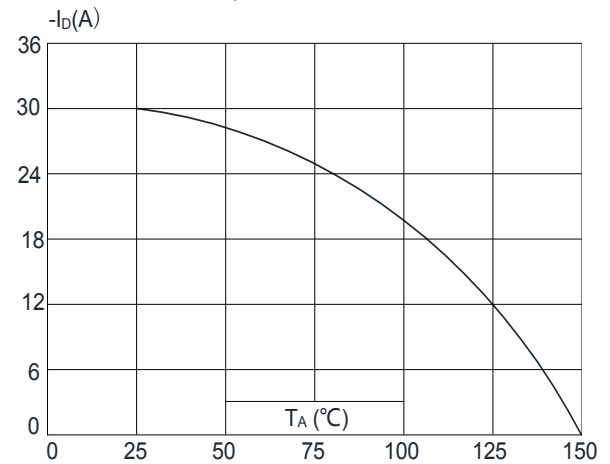
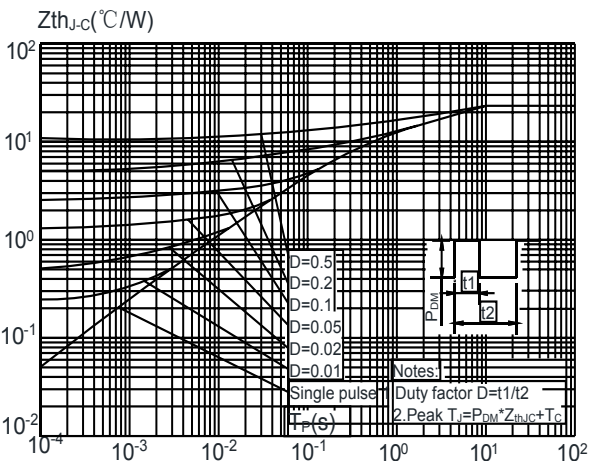


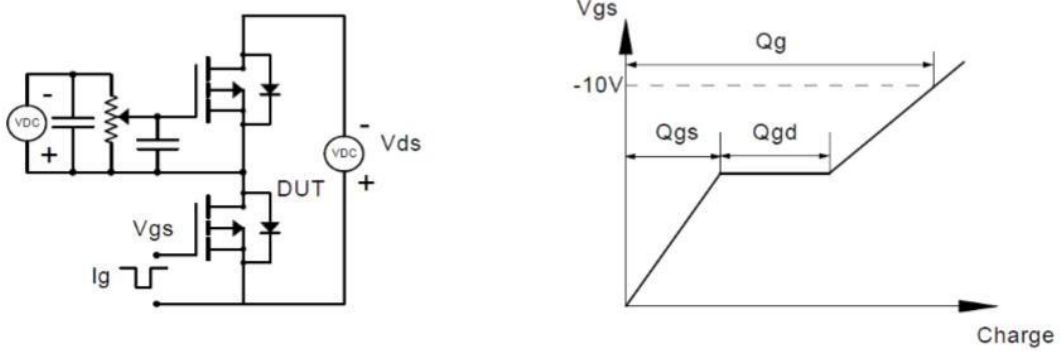
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



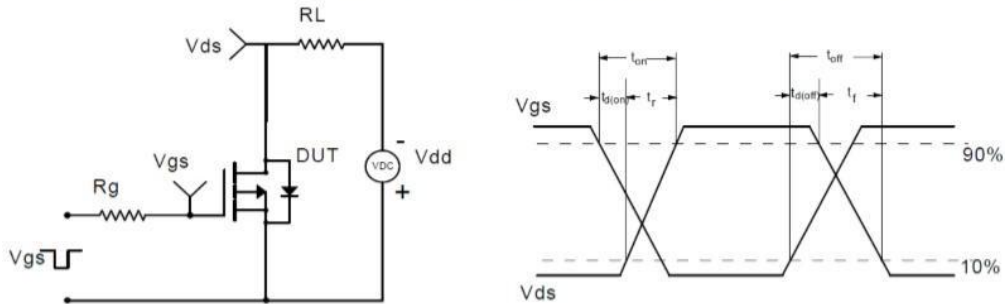


Test Circuit

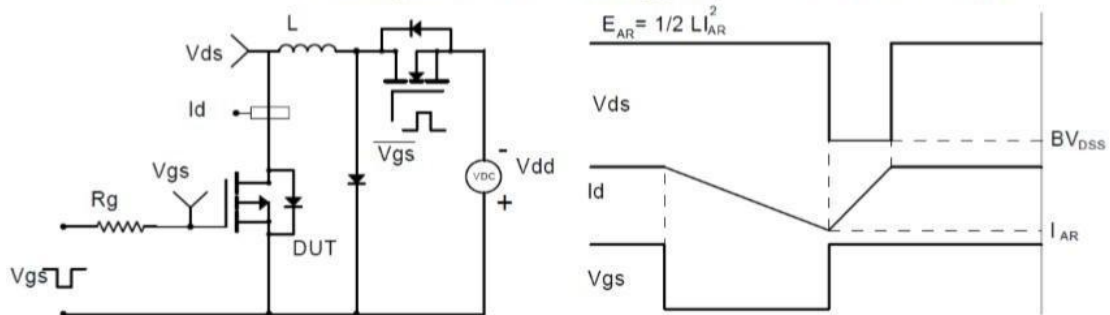
Gate Charge Test Circuit & Waveform



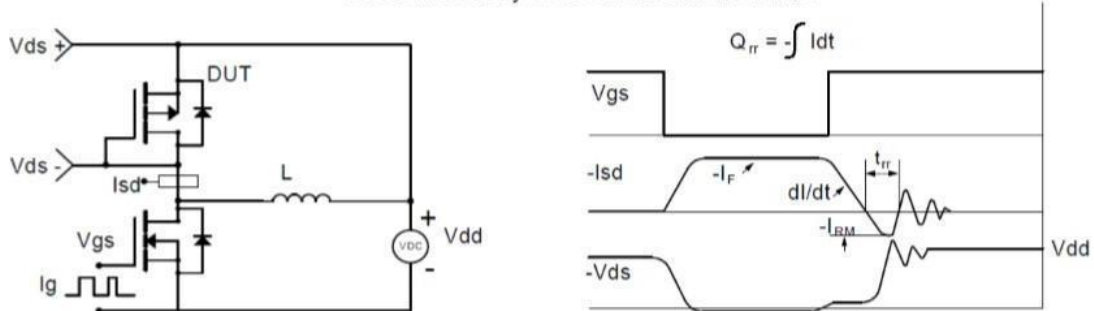
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

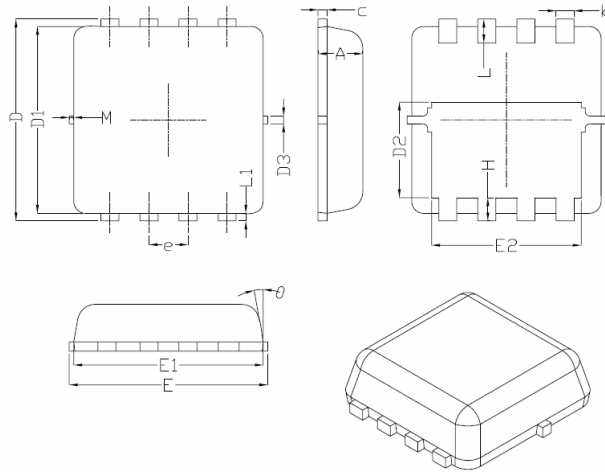


Diode Recovery Test Circuit & Waveforms





DFN3X3-8L Package Information



| Symbol | Dimensions In Millimeters | | |
|----------|---------------------------|------|------|
| | Min. | Nom. | Max. |
| A | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.25 |
| D | 3.25 | 3.35 | 3.45 |
| D1 | 3.00 | 3.10 | 3.20 |
| D2 | 1.48 | 1.58 | 1.68 |
| D3 | - | 0.13 | - |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 3.00 | 3.15 | 3.20 |
| E2 | 2.39 | 2.49 | 2.59 |
| e | 0.65BSC | | |
| H | 0.30 | 0.39 | 0.50 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | - | 0.13 | - |
| M | * | * | 0.15 |
| θ | | 10° | 12° |



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